
Operation & Maintenance Manual

RUBBER CRAWLER CARRIER

MST-2200VD

Serial No. 223101 and up

WARNING

Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read this manual before operating or maintaining this machine. This manual should be kept near the machine for reference and periodically reviewed by all personnel will come into contact with it.

MOROOKA

MOROOKA CO., LTD.

CONTENTS

ITEM	Page
FOREWORD	0- 1
1. FOREWORD	0- 2
2. INTRODUCTION	0- 3
3. SAFETY INFORMATION	0- 4
4. LOCATION OF SERIAL NUMBER	0- 5
SAFETY	1- 1
1. General precautions	1- 2
2. Precautions during inspection and maintenance	1- 4
3. Precautions before starting engine	1- 9
4. Precautions when starting engine	1-11
5. Precautions when traveling	1-12
6. Precautions for operation	1-15
7. Precautions for transportation	1-17
8. Position for attaching safety labels	1-18
OPERATION	2- 1
1. General view	2- 2
1.1 General view of machine	2- 2
1.2 General view of operator's compartment	2- 3
1.3 General view of meter box	2- 4
1.4 General view of switch box	2- 4
2. Explanation of components	2- 5
2.1 Meters and lamps	2- 5
2.2 Switches	2- 9
2.3 Warning devices	2-13
2.4 Travel lever	2-14
2.5 Dump control lever	2-16
2.6 Dump body safety bar	2-16
2.7 Air conditioner	2-17
2.7.1 Location of vents	2-17
2.7.2 Names and functions Of parts on control panel	2-17
2.7.3 Precautions when using air conditioner	2-20
2.7.4 Precautions for handling in off-season	2-20
2.8 AM/FM Radio	2-21
2.9 Fuse box in rear box	2-24
2.10 Operator' seat	2-26
2.11 Seat belt	2-28

ITEM	Page
2.12 Window shield	2-29
2.12.1 Front window (upper)	2-29
2.12.2 Front window (lower)	2-30
2.12.3 Skylight	2-30
2.12.4 Sliding window (door)	2-30
2.12.5 Cab door	2-30
2.12.6 Cab door open lever	2-31
2.12.7 Rear escape window	2-31
2.13 Accessories inside cab	2-32
2.14 Engine inspection cover	2-33
2.15 Battery inspection cover	2-33
2.16 Front grill	2-33
2.17 Undercover	2-33
3. Operation	2-34
3.1 Check before starting engine	2-34
3.2 Operations and checks before starting engine	2-37
3.3 Starting engine	2-38
3.4 Moving machine off	2-41
3.5 Shifting speed range, changing between FORWARD and REVERSE	2-42
3.6 Steering machine	2-44
3.7 Stopping machine	2-46
3.8 Emergency stopping machine	2-46
3.9 Parking machine	2-47
3.10 Stopping engine	2-47
3.11 Checks after stopping engine	2-48
3.12 Locking	2-48
3.13 Precautions when traveling	2-49
4. Handling dump body	2-50
4.1 Dumping operation of dump body	2-50
4.2 Locking dump control lever	2-51
4.3 Operating safety bar	2-52
4.4 Precautions during operation	2-53
5. Manual release parking brake	2-54
5.1 Outline of parking brake	2-54
5.2 Method for manual release of parking brake	2-54
6. Handling rubber crawler	2-56
6.1 Features of rubber crawler	2-56
6.2 Prohibited operations for rubber crawler	2-56
6.3 Precautions when using rubber crawler	2-57
7. Transportation	2-58
7.1 Loading, unloading work	2-58
7.2 Precautions for loading	2-58
7.3 Precautions for transportation	2-58

ITEM	Page
8. Cold weather operation	2-59
8.1 Precautions for low temperature	2-59
8.2 After completion of work	2-60
8.3 After cold weather	2-60
9. Long-term storage	2-61
9.1 Before storage	2-61
9.2 Precautions during storage	2-61
9.3 Precautions after storage	2-61
10. Handling battery	2-62
10.1 Precautions when handling battery	2-62
10.2 Removal and installation of battery	2-63
10.3 Precautions when charging battery	2-63
10.4 Starting engine with booster cable	2-64
11. Troubleshooting	2-65
11.1 Problems with engine related parts	2-65
11.2 Problems with chassis related parts	2-66
11.3 Problems with electric related parts	2-67
MAINTENANCE	3- 1
1. Basic outline of maintenance	3- 2
2. Precautions for maintenance	3- 4
3. Use of fuel and lubricants according to ambient temperature	3- 6
3.1 Fuel, coolant, and lubricant table	3- 6
4. Tools and tightening torques	3-8
4.1 Introduction of necessary tools	3-8
4.2 Torque list for bolts and nuts	3-9
5. Periodic replacement of critical parts	3-10
5.1 Periodic replacement interval (every 2 years)	3-10
5.2 Periodic inspection	3-10
5.3 Specified periodic replacement parts	3-11
6. Maintenance schedule chart	3-12
7. Service procedure	3-14
7.1 Outline of inspection and maintenance procedures	3-14
7.2 Initial 100 hours service	3-14
7.3 Initial 500 hours service	3-14
7.4 When required	3-15
7.5 Check before starting	3-25
7.6 Every 50 hours service	3-30
7.7 Every 100 hours service	3-30
7.8 Every 250 hours service	3-31
7.9 Every 500 hours service	3-35
7.10 Every 1500 hours service	3-37
SPECIFICATIONS	4- 1
1. Dimension drawing	4- 2
2. Specifications table	4- 3

FOREWORD

1. FOREWORD	0- 2
2. INTRODUCTION	0- 3
3. SAFETY INFORMATION	0- 4
4. LOCATION OF SERIAL NUMBER	0- 5

1. FOREWORD

Thank you for purchasing this Morooka Rubber Crawler Carrier.

This manual describes procedures for operation, handling, testing, and maintenance.

It will help the operator realize many years of faithful service from the machine.

Please read this manual carefully BEFORE operating the machine. This will enable you to realize the peak performance of the machine.

For details of handling the engine, please see the separate engine operation manual for any item not given in this manual.

WARNING

- **Improper operation and maintenance of this machine can be hazardous and could result in serious injury or death.**
- **Operators and maintenance personnel should read this manual thoroughly before beginning operation or maintenance.**
Always keep this manual on the machine and be sure to read and understand it thoroughly before performing operation and maintenance.
- **Some actions involved in operation and maintenance of the machine can cause a serious accident if they are not done in the manner described in this manual.**
- **Keep this manual handy and have all personnel read it periodically.**
- **If this manual has been lost or has become dirty and cannot be read, request a replacement manual from Morooka or your Morooka distributor.**
- **If you lend this machine to another person, always have that person read the operation manual and make sure that they understand the content of the manual before starting operation. Be particularly careful to ensure that they follow the safety regulations when operating.**
- **Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult Morooka or your Morooka distributor for the latest available information of your machine or for questions regarding information in this manual.**
- **The description of safety is given in SAFETY INFORMATION on page 0-3 and in SAFETY from page 1-1.**

2. INTRODUCTION

1. FEATURES OF THE MACHINE

- Low-ground-pressure rubber crawler type that can travel easily on uneven ground, soft ground, or snow.
- Long, wide rubber crawler to provide powerful and stable drawbar pull.
- Hydraulic drive (HST) to allow travel operations to be carried out with a single lever to give forward and reverse with step less gear shifting, as well as turning and stopping.

2. BREAKING IN THE MACHINE

Your Morooka machine has been thoroughly adjusted and tested before shipment.

However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.

Be sure to break in the machine for the initial 100 hours (as indicated by the hourmeter). Proper breaking in will allow the machine to give you many years of service.

During breaking in, pay particular attention to the following points.

- After starting the engine, idle it for 5 minutes to carry out the warming-up operation.
- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starts, sudden acceleration, sudden steering and sudden stops except in cases of emergency.

3. WARRANTY

If any failure that is considered to be the responsibility of Morooka should occur within 6 months of delivery of the new machine or within 600 hours on the hourmeter, whichever comes sooner, repairs will be carried out free of charge in accordance with the warranty.

3. SAFETY INFORMATION

Most accidents are caused by the failure to follow fundamental safety rules for the operation and maintenance of machines.

To avoid accidents, read, understand and follow all precautions and warnings in this manual and on the machine before performing operation and maintenance.

Do not operate or carry out maintenance of this machine unless you are sure that you understand the explanations and procedures completely.

To identify safety messages in this manual and on machine labels, the following signal words are used.

DANGER

This word is used on safety messages and safety labels where there is a high probability of serious injury or death if the hazard is not avoided. These safety messages or labels usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may also result in serious damage to the machine.

WARNING

This word is used on safety messages and safety labels where there is a potentially dangerous situation which could result in serious injury or death if the hazard is not avoided. These safety messages or labels usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may also result in serious damage to the machine.

CAUTION

This word is used on safety messages and safety labels for hazards which could result in minor or moderate injury if the hazard is not avoided. This word might also be word for hazards where the only result could be damage to the machine.

NOTICE

This word is used for precautions that must be taken to avoid actions which could shorten the life of the machine.

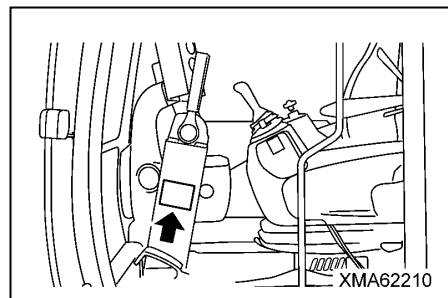
Safety precautions are described in SAFETY from page 1-1.

Morooka cannot predict every circumstance that might involve a potential hazard in operation and maintenance.

Therefore the safety messages in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, it is your responsibility to be sure that you and others can do such procedures and actions safely and without damaging the machine. If you are unsure about the safety of some procedures, contact your Morooka distributor.

4. LOCATION OF SERIAL NUMBER

On this machine, there is plate with the machine serial number stamped on it stuck to the left side surface of the travel lever stand inside the operator's compartment in the position in the diagram on the right.



For the position of the engine serial number, please see the separate engine operation manual. When inquiring about service or ordering parts, please quote the machine serial number, engine serial number, and hour-meter reading.

SAFETY

1. General precautions	1- 2
2. Precautions during inspection and maintenance	1- 4
3. Precautions before starting engine	1- 9
4. Precautions when starting engine	1-11
5. Precautions when traveling	1-12
6. Precautions during operation	1-15
7. Precautions for transportation	1-17
8. Position for attaching safety labels	1-18

WARNING

Read and follow all safety precautions. Failure to do so may result in serious injury or death.

This safety section also contains precautions for optional equipment and attachments.

1. GENERAL PRECAUTIONS

SAFETY RULES

- Only trained and qualified personnel, or personnel authorized by the company (or superior) can operate and maintain the machine.
- Follow all safety rules, prohibitions, precautions, procedures, and instructions when operating or performing maintenance on the machine, and pay careful attention to safety.
- Operating the machine when you are not in good physical condition reduces the power of judgment needed to avoid danger and leads to accidents.

People in the following conditions should not operate the machine.

- People who cannot operate normally because they are tired, ill, or suffering from the effects of medication.
- People who have been drinking.
- Pregnant women



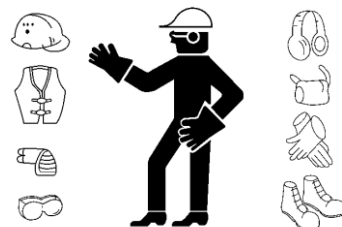
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SAFETY FEATURES

- Be sure that all guards and covers are in their proper position. Have guards and covers repaired if damaged.
- Use safety features such as safety lock levers and seat belts properly.
- Improper use of safety features could result in serious bodily injury or death.
 - ★ Parking brake switch : See "OPERATION 3.7 PARKING MACHINE".
 - ★ Dump control lever lock : See "OPERATION 4.2 LOCKING DUMP CONTROL LEVER".
 - ★ Seat belt : See "OPERATION 2.11 SEAT BELT".

WEAR SUITABLE CLOTHING

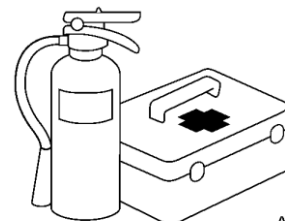
- Always wear properly fitting clothes which allow ease of movement. If there are buttons, always button the cuffs.
- Avoid loose clothing, towels, jewelry, and loose long hair. They can catch on controls or in moving parts and cause serious injury or death.
- Also, do not wear oily clothes, they can easily catch fire.
- Wear a hard hat, safety glasses, non-slip safety shoes, and gloves when operating or maintaining the machine.



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FIRE EXTINGUISHER AND FIRST AID KIT

- Be sure that fire extinguishers have been provided and read the labels to ensure that you know how to use them.
- Provide a first aid kit at the storage point.
- Know what to do in the event of a fire.
- Be sure that you know the phone numbers of persons you should contact in case of an emergency.



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UNAUTHORIZED MODIFICATION

- Any modification made without authorization from Morooka can adversely affect the performance of the machine, and may also create hazards.
- Before making a modification, consult your Morooka distributor. Morooka will not be responsible for any injury or damage caused by any unauthorized modification.

FIRE PREVENTION FOR FUEL, OIL, AND ANTIFREEZE

Fuel, oil, and antifreeze can be ignited by a flame. Fuel is particularly flammable and can be hazardous.

- Use well-ventilated areas for adding or storing oil and fuel.
- Keep oil and fuel in the determined place and do not allow unauthorized persons to enter.
- Tighten all fuel and oil caps securely.
- Keep any flame away from flammable fluids.
- Do not leave any cloths or rags soaked in oil or fuel lying in the fuel or oil storage area. Clean such materials up immediately.
- Stop the engine and do not bring lighted cigarettes or cigarette lighters close when refueling.



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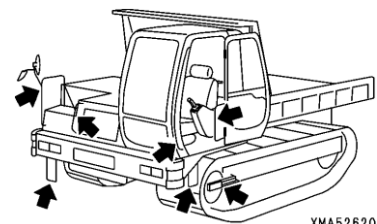


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USE HANDRAILS AND STEPS FOR GET ON OR OFF

Get on or off the machine as follows.

- Never jump on or off the machine. Never get on or off a moving machine.
- When getting on or off the machine, always face the machine and use the handrails and steps.
- To ensure safety, always maintain three-point contact with the handrails and steps to ensure that you support yourself.
- If there is any oil, grease, or mud on the handrails or steps, wipe it off immediately. Always keep these parts clean.



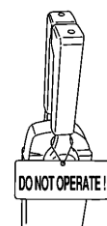
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2. PRECAUTIONS DURING INSPECTION AND MAINTENANCE

NO UNAUTHORIZED PERSONS

Never allow unauthorized persons into the area when carrying out inspection and maintenance.

When leaving the operator's seat to carry out operations, hang a "DO NOT OPERATE !" sign (Part No.: 1-41010-1210) on the control lever to prevent any other person from operating the machine.



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USE SUITABLE TOOLS

Always use tools that are designed for the purpose. Do not use broken or deteriorated tools, or tools that are designed for other purposes.

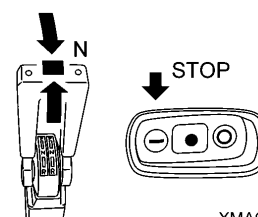


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STOP ENGINE WHEN INSPECTION AND MAINTENANCE

When carrying out inspection and maintenance, always follow the precautions below.

- Select firm, level ground to park the machine.
- Lower the dump body, apply the parking brake, then stop the engine.
- Check that the travel lever is at the N position.
- If the engine must be started to carry out inspection or maintenance, take steps to ensure that the engine can be stopped at any moment.
- When carrying out the operation with two or more workers, determine the order of operation and fix signals, and follow the instructions of the person in charge.

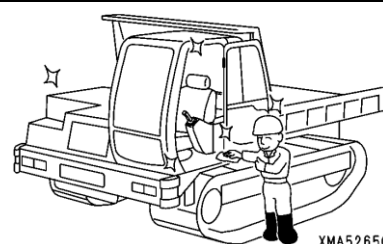


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ALWAYS KEEP MACHINE CLEAN

Always do the following to keep the machine clean.

- Always keep the floor, steps, and handrails free of oil, grease, mud, or water. There is danger that you may slip and be injured. Always wipe off any oil, grease, mud or water.
- Do not leave tools or parts lying around on the floor or steps. There is danger that you may trip over them. Always clear up tools and parts immediately.
- Dry wood chips, leaves, grass, paper, oil, and other flammable materials around the engine, muffler, battery, or hydraulic tank may cause fire. Always remove any flammable objects and wipe off any oil.
- Always remove any mud accumulated around the undercarriage. There is danger that you may slip and fall when stepping on to the rubber crawler.



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VENTILATION FOR ENCLOSED AREAS

Exhaust fumes from the engine can kill.

- If it is necessary to start the engine within an enclosed area, open the doors and windows to provide adequate ventilation.



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KEEP AWAY FROM ROTATING AND MOVING PARTS

- Do not go close to the fan when it is rotating. Do not bring anything that can be caught up in the fan close to the fan.
- Do not come close to the dump body when it is moving. There is danger of getting caught or crushed.



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KEEP AWAY FROM FLAME WHEN ADDING FUEL

When filling the fuel tank with fuel, or when draining the water, always follow the precautions below.

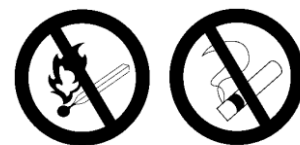
- Stop the engine.
- Do not bring any lighted cigarette or cigarette lighter close to the fuel tank.
- After adding fuel, tighten the cap securely and wipe up any spilled fuel.
- Do not bend the fuel hose or hit it with any sharp object.
- If any hose is loose or damaged, always repair or replace it.



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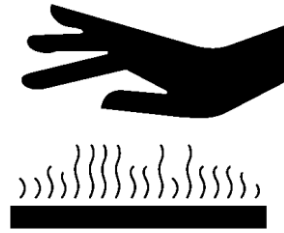
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DO NOT TOUCH HIGH-TEMPERATURE, HIGH-PRESSURE PARTS IMMEDIATELY AFTER STOPPING ENGINE

Immediately after stopping the engine, many parts are at high temperature or under high pressure. If parts are removed or touched carelessly, there is danger of burns or other injury.

For the following parts particularly, always wait for the machine to cool down before inspecting.

- Radiator and radiator cap
- Hydraulic tank and hydraulic hoses
- Muffler and all parts of engine.

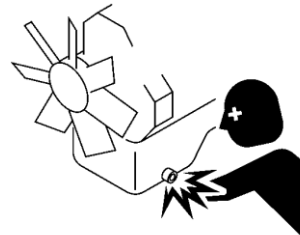


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WAIT FOR ENGINE TO COOL BEFORE CHANGING ENGINE OIL

When changing the engine oil, always follow the precautions below.

- Stop the engine and wait for the engine and oil temperature to go down before changing the oil.
- After adding oil, tighten the cap and drain valve securely and wipe up any oil that was spilled.



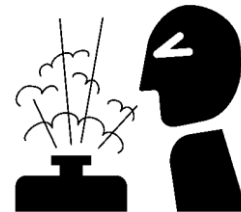
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WAIT FOR WATER TEMPERATURE TO GO DOWN BEFORE ADDING COOLANT

Do not add water to the radiator.

Always follow the precautions below.

- Stop the engine and wait for the water temperature to go down.
- Turn the radiator cap slowly to release the internal pressure completely, then remove the cap.
- After adding water, tighten the cap securely and wipe up any water that was spilled.

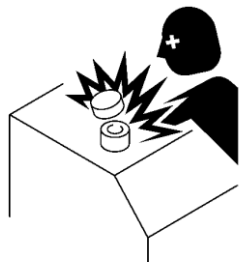


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WAIT FOR PRESSURE TO GO DOWN BEFORE ADDING HYDRAULIC OIL

When adding oil to the hydraulic tank or when changing the oil, always follow the precautions below.

- Lower the dump body and stop the engine.
- Loosen the hydraulic tank cap slowly to release the internal pressure completely, then remove the cap.
- After adding oil, tighten the cap and drain plug securely and wipe up any oil that was spilled.



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TAKE CARE WHEN HANDLING HIGH PRESSURE HOSES

Remember that oil is always flowing under high pressure in the hydraulic hoses. Do not remove the hoses before the internal pressure has been released.

When handling the high-pressure hoses, always follow the precautions below.

- Do not bend the high-pressure hoses or hit them with any sharp object.
- If any hose is loose or damaged, repair or replace it.
- It is extremely dangerous if oil is leaking from even small holes in the hoses or hydraulic equipment. If such a problem occurs, please contact your Morooka distributor.



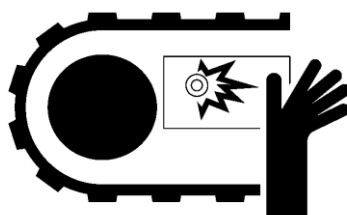
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BE CAREFUL OF HIGH-PRESSURE GREASE WHEN ADJUSTING RUBBER CRAWLER ATTENTION

The rubber crawler tension adjuster is filled with grease. The grease is kept under high pressure by the recoil spring inside the tension adjuster.

Always follow the precautions below when adjusting the tension. If these precautions are not followed, the valve may fly out and cause serious injury.

- Do not loosen the tension adjustment valve more than one turn. There is danger that the valve may fly out.
- When adjusting the tension, do not stand directly in front of the valve; stand to the side to avoid danger.

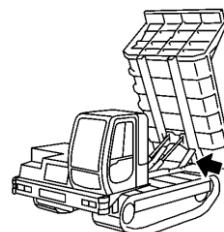


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USE SAFETY BAR UNDER DUMP BODY

When going under the dump body to carry out operations, always follow the precautions below.

- Hang a "DO NOT OPERATE !" sign (Part No.: 1-41010-1210) in the operator's compartment to prevent any one else from operating the machine.
- Always use the safety bar when going under the dump body.
- ★ Safety bar: See "OPERATION 4.3 OPERATING SAFETY BAR".



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BE CAREFUL WHEN HANDLING BATTERY

- When checking or repairing the electrical system, always remove the negative (-) terminal from the battery to stop the flow of electricity.

Failure to do this may cause fire or short circuit.

- Be careful not to get battery electrolyte on your skin or clothes. If the battery electrolyte gets on you, wash it off immediately with water.



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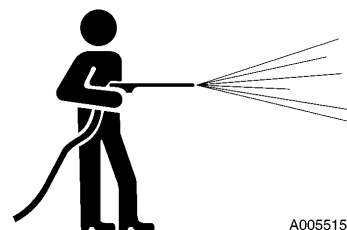
DO NOT SPRAY WATER ON ELECTRICAL COMPONENTS

When washing the machine, do not spray water on the electrical components.

If water gets into the electrical system, it will cause defective operations which may lead to malfunctions.

Cover the following parts with a sheet to prevent water from getting on them.

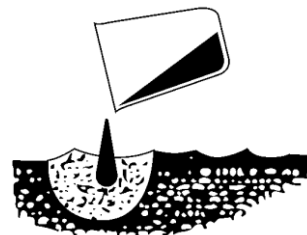
- Instrument panel and control panel, switches, sensors, connectors
- Starting motor, alternator, sensors, connectors around the engine
- Battery, relay, connectors at front right of machine



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DISPOSE OF WASTE MATERIAL CORRECTLY

- When draining and changing the oil, always put a container under the engine and tank to catch the oil.
- Do not drain the oil directly into the ground or throw it into rivers or the sewage system.
- When disposing of oil, fuel, coolant, solvent, filters, batteries, and other harmful objects, always use a suitable method or procedure.



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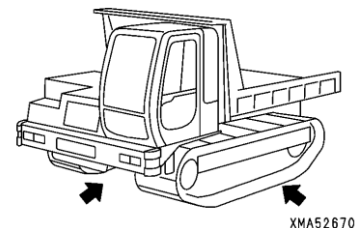
3. PRECAUTIONS BEFORE STARTING ENGINE

ALWAYS CARRY OUT CHECKS BEFORE STARTING

Before starting the engine, always carry out the walk-around checks and inspections given in this manual.

- Check the ground under the machine to see if there is any trace of oil or water leakage.
- Be particularly careful to check the undercarriage for loose or missing nuts and bolts.
- If any abnormalities are found during the check, carry out simple repairs.

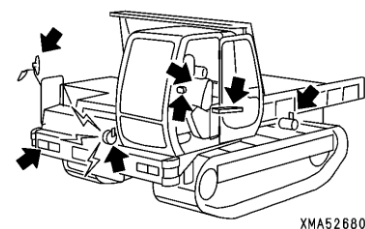
If the repairs are difficult, please contact your Morooka distributor. The machine must not be used before repairs are carried out.



CHECK SAFETY PARTS AND LIGHTING

Check the operation of the following parts and devices needed for operation.

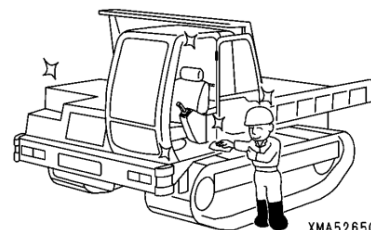
- Check that the horn, buzzer, and turn signal lamps work normally.
- Check that the front lamps light up normally.
- Check that the side mirrors are adjusted so that they give a clear view from the operator's seat.
- Clean the lights to ensure that they give good visibility.
- Adjust the operator's seat to a suitable position for operation. Always adjust the seat if it has been used by another operator.
- Check that the seat belt can be locked properly. Always adjust if it has been used by another operator.



ALWAYS KEEP OPERATOR'S COMPARTMENT CLEAN

Always do the following to keep the operator's compartment clean and tidy.

- Always keep the floor, steps, and handrails free of oil, grease, mud, or water. There is danger that you may slip and be injured. Always wipe off any oil, grease, mud or water.
- Do not leave tools or parts lying around on the floor or steps. Keep these parts in the proper place to prevent them from obstructing operation.



FIRE PREVENTION

- Completely remove all wood chips, leaves, grass, paper and other flammable materials accumulated in the engine compartment. They could cause a fire.
- Check fuel, lubrication, and hydraulic systems for leaks. Have any leaks repaired. Wipe up any excess oil, fuel or other flammable fluids.



VENTILATION FOR ENCLOSED AREAS

Exhaust fumes from the engine can kill.

- If it is necessary to start the engine within an enclosed area, open the doors and windows to provide adequate ventilation.

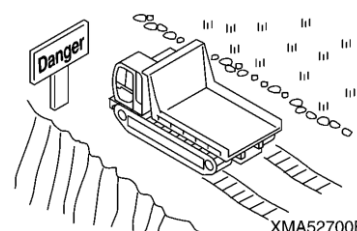


A0055060

SAFETY AT WORKSITE

Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.

- Check the terrain and condition of the ground at the worksite, and determine the best and safest method of operation.
- If there are any dangerous places, erect signs and take other steps to ensure safety.
- Check the depth and flow of water and the ground condition before operating in water or crossing a river. NEVER be in water which is in excess of the permissible water depth.
- If there are bridges or any other structure, check that they are of sufficient strength to support the weight of the machine.
- Inside the jobsite, do not allow any person other than the signalman to come close. Restrict the entry even of related workers.



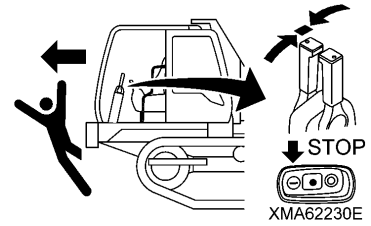
XMA52700E

4. PRECAUTIONS WHEN STARTING ENGINE

PLACE LEVERS AT NEUTRAL

Always place the levers at the following positions.

- Place the travel lever at the N position.
- Place the dump control lever at the HOLD position.
- Set the parking brake switch to the STOP position.
- Sit properly in the operator's seat and fit the seat belt.



CHECK FOR SAFETY IN SURROUNDING AREA

Always check that there are no people in the surrounding area. Be particularly careful to check under the machine.

- Never start the engine if a warning tag has been attached to the controls.
- When starting the engine, sound the horn to warn people in the area.
- Do not allow anyone other than the operator to ride on the machine.

5. PRECAUTIONS WHEN TRAVELING

CHECK FOR SAFETY IN SURROUNDING AREA

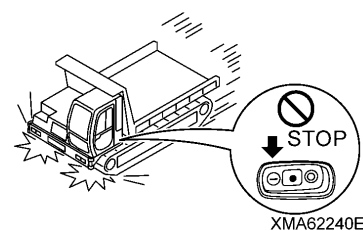
Always check that there are no people in the surrounding area. Be particularly careful to check behind the machine.

- If the dump body is raised, always lower it.
- Sound the horn to warn people in the area that you are about to start the machine.

AVOID SUDDEN OPERATIONS EXCEPT IN EMERGENCIES

Do not suddenly start, suddenly stop, or suddenly turn the machine or carry out any other operation suddenly. Such operations may cause the crawler to come off and the machine to tip over.

- When starting or turning the machine, operate the travel lever slowly. Run the engine at low speed.
- Return the travel lever slowly to the N position. Apply the brake to stop the machine.
- If the travel lever is moved too far beyond the N position to the REVERSE (or FORWARD) position, the engine will run in reverse, or other problems will occur.
- Do not use the parking brake to stop the machine.
- If a dangerous state occurs by any possibility, and when it becomes necessary to stop the machine urgently, press the parking brake switch to set it to the STOP position or turn the engine starting switch to the OFF position to stop the engine.



TRAVEL CAREFULLY ON UNEVEN GROUND OR ON CURVES

When traveling on uneven ground or in places where there are many curves, reduce the travel speed and travel carefully. If the machine is traveling at high speed it may turn over or crawler may come off.

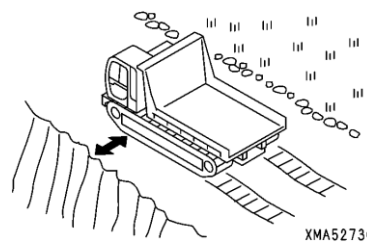
NO TRAVELING ON PUBLIC ROADS

This machine is not permitted to travel on public roads.
When moving the machine, always transport it by truck or trailer.

BE CAREFUL OF ROAD SHOULDERS

When traveling on narrow agricultural roads, always follow the precautions below.

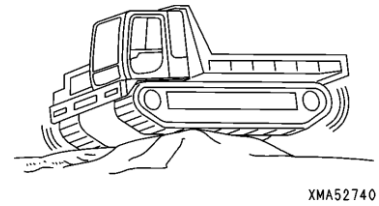
- Do not travel too close to the road shoulder, and travel at reduced speed.
- Do not travel on any soft road shoulder or place covered with grass.
- During or after rain, the danger of landslides and falling rocks increases. Always travel at low speed and check that the area is safe.



AVOID OBSTACLES

Avoid traveling over obstacles or earth embankments as far as possible. If the machine has to travel over an obstacle, do as follows. Never travel over large boulders, breakable objects, pieces of concrete, or other sharp objects.

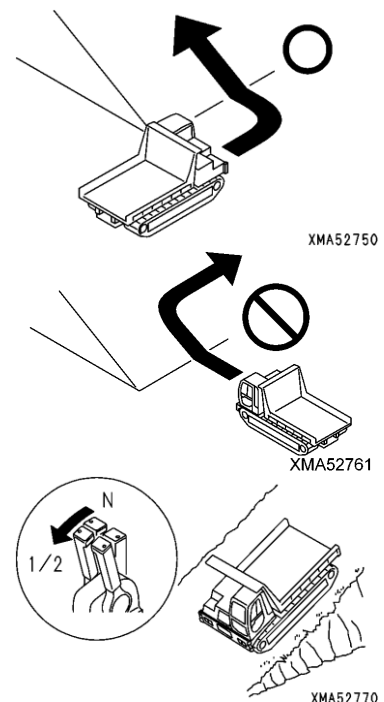
- Reduce the travel speed and travel carefully.
- Steer the machine so that the center of the rubber crawler passes directly over the obstacle. Mount the obstacle slowly, and when the machine goes over the top and starts to tip forward, stop the machine. Then slowly start the machine again. Never change direction when doing this.
- Earth embankments may collapse under the weight or vibration of the machine and cause the machine to slip, so drive the machine slowly and do not change speed or direction. Be particularly careful when traveling over freshly dug ditches. They may collapse.



TRAVELING ON SLOPES

When traveling on hills or slopes, always follow the precautions below.

- Do not travel at an angle on a hill or slope, or parallel to the slope. Such action could result in the machine tipping over or slipping.
- When traveling up hills or slopes, always travel directly up the slope. Set the travel speed to a low range and keep the travel lever close to the N position (low speed).
- Do not suddenly change speed on the slope. There is danger that the direction of the machine may suddenly change and the machine may slip.
- When traveling down slopes, set the travel speed to a low range, run the engine at low idling, and operate the travel lever to a position less than 1/2 of the full stroke from the N position. If the machine travels too fast, there is danger that the engine will overrun and the machine may slip.
- Do not travel on grass, fallen leaves, wet steel plates, or other slippery objects.
- If a dangerous state occurs by any possibility, and when it becomes necessary to stop the machine urgently, press the parking brake switch to set it to the STOP position or turn the engine starting switch to the OFF position to stop the engine.



ENSURE GOOD VISIBILITY

When working in dark places or at night, turn on the head lamps. Turn on the lights in mist, snow, or rain.

OPERATE CAREFULLY ON SNOW

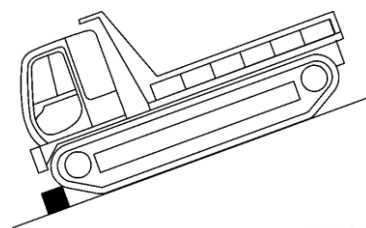
- When working on snow or icy roads, even a slight slope may cause the machine to slip to the side, so always travel at low speed and avoid sudden starting, stopping, or turning.
- When there has been heavy snow, the road shoulder and objects placed beside the road are buried in the snow and cannot be seen, so always carry out operations carefully.



XMA52780

PARKING MACHINE

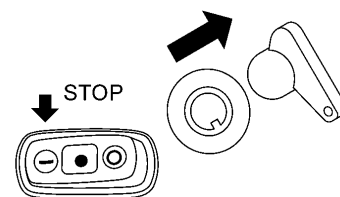
- Park the machine on firm, level ground.
Select a place where there is no problem of falling rocks, landslides, or floods.
- If the machine has to be parked on a slope, do as follows.
- Stop the machine facing directly up or down the slope.
 - Always put blocks under the tracks to prevent the machine from moving.
 - Lower the dump body fully.



XMA52780

REMOVE KEY WHEN LEAVING MACHINE

- When leaving the machine, always do as follows.
- Lower the dump body fully.
 - Apply the parking brake, then stop the engine.
 - Lock the dump control lever.
 - Remove the starting key and always take it with you.



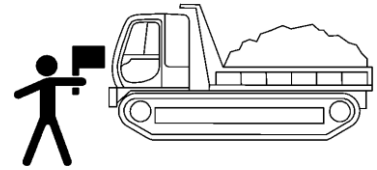
XMA62250E

6. PRECAUTIONS FOR OPERATION

USE SIGNALS

When carrying out work with one or more workers, or when using a signalman, determine the signals and the person in charge before starting work, and always follow the agreed procedure. Even when using a signalman, always pay careful attention to the following.

- When working in confined spaces or indoors, be careful not to hit the surroundings or the ceiling.
- When operating in urban areas or on roads, put up fences around the jobsite and take steps to ensure the safety of passing traffic and pedestrians.



XMA52810

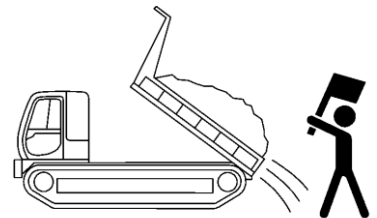
MAKE JOBSITE FLAT

Make the jobsite flat. This will not only increase the efficiency but will also ensure safety. If the jobsite is dusty, spray water to ensure the visibility.

OPERATE DUMP BODY CAREFULLY

When carrying out dumping operations, be careful of the following.

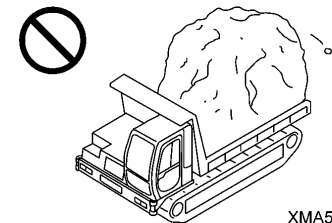
- Check that there is no person or obstacle near the dump body.
- Stop the machine at the determined point and operate the dump in accordance with signals from the signalman.
- Block the tracks to prevent the machine from moving in reverse.
- When dumping on slopes, there is danger of the machine tipping over. If it is felt that there is danger to the machine, stop the operation immediately.



XMA52820

NO OVERLOADING

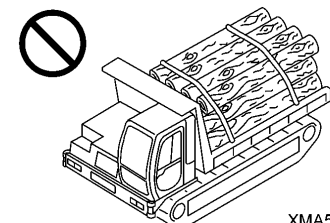
Never load the machine above its capacity. Overloading will not only cause failures, but will also cause overrunning and tipping over on slopes.



XMA52831

LOAD DUMP BODY EVENLY

- Do not load the dump body on one side. Always spread the load to maintain the balance in the dump body.
- When carrying long objects, such as timber or steel beams, give careful consideration to the position of the center of gravity of the load, and secure with ropes.
- When stacking U-shaped ditch liners or concrete blocks, lay a plate down first and secure with ropes to prevent the load from slipping.



XMA52841

DO NOT GO CLOSE TO HIGH-VOLTAGE CABLE

When carrying out operations on jobsites where there are power cables, use a signalman and take steps to protect the electric cables. Check with the electricity company before starting operations.

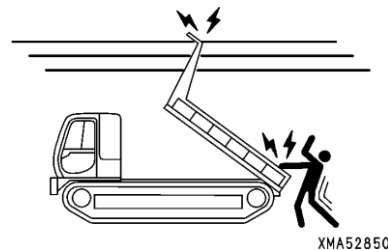
- Going close to high-voltage cables can cause electric shock, even if the machine does not touch the cables. Always maintain the safe distance given below between the machine and the electric cable.

	Voltage of Electrical Cable	Minimum Safe Distance
Low voltage (Distribution line)	100-200V	2m
	6,600V	2m
Special (Transmission line)	22,000V	3m
	66,000V	4m
	154,000V	5m
	187,000V	6m
	275,000V	7m
	500,000V	11m

- If the dump body should touch the electric cable, the operator should not leave the operator's compartment. He should call another worker to report the situation.

The following actions are effective in preventing accidents.

- (1) Wear shoes with rubber soles.
 - (2) Use a signalman to give warning if the machine approaches too close to the electric cables.
- When carrying out operations near high-voltage cables, do not let anyone come close to the machine.



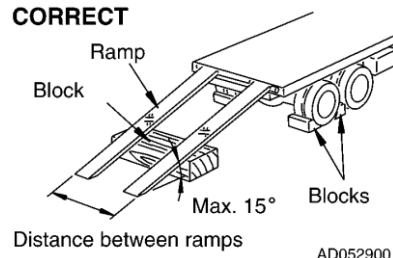
7. PRECAUTIONS FOR TRANSPORTATION

USE SAFE RAMPS

Always use ramps which fulfill the following conditions.

- Strong ramps which can fully support the weight of the machine.
- Ramps with a width greater than the width of the crawlers.
- Ramps of a length which will not form a steep angle when placed against the platform of the truck or trailer to be used for transportation. If the ramps are too long and they bend excessively, use blocks to support the ramps as necessary.
- Ramps with hooks and non-slip surface.
- Be sure that the ramp surface is clean and free of grease, oil, ice and loose materials. Remove dirt from the machine tracks.

CORRECT

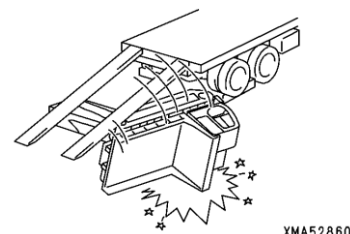


LOADING AND UNLOADING

Loading and unloading the machine always involves potential hazards. **EXTREME CAUTION SHOULD BE USED.**

Always do as follows

- Perform loading and unloading on firm level ground only.
- Stop the engine of the haulage truck, apply the parking brake securely, then block the tires.
- Set the ramps parallel and in line with the width of the crawlers.
- Fix the hooks of the ramps securely to the truck platform.
- Set the machine to be loaded in line with the ramps, then approach the ramps at low speed.
- Do not correct the direction of travel when on the ramps. If it is necessary to change the direction, drive the machine off the ramps, and set the machine to the correct direction.
- After loading, put blocks under the front and rear of the crawlers to prevent the machine from moving, then tie the machine down with chains or wire rope.



SHIPPING

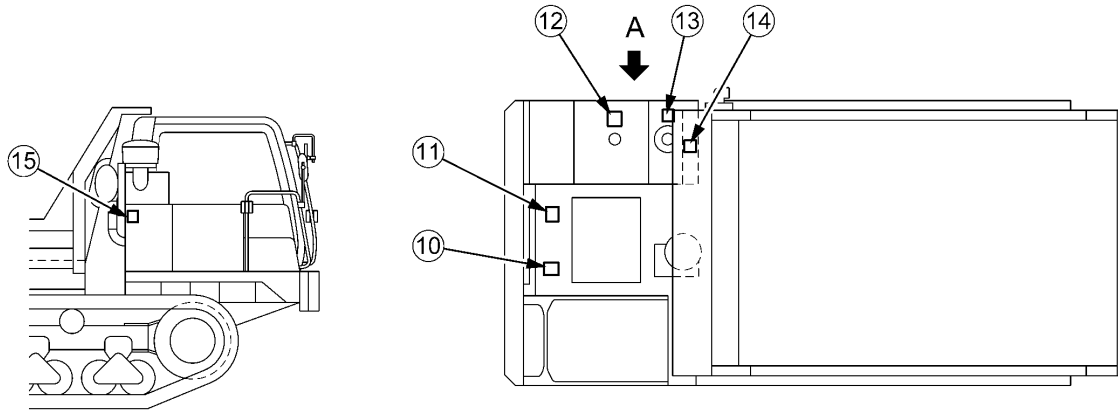
- When shipping the machine on a hauling vehicle, obey all state and local laws governing the weight, width, and length of a load. Also obey all applicable traffic regulations.
- Take into account the width, height and weight of the load when determining the shipping route.

8. POSITION FOR ATTACHING SAFETY LABELS

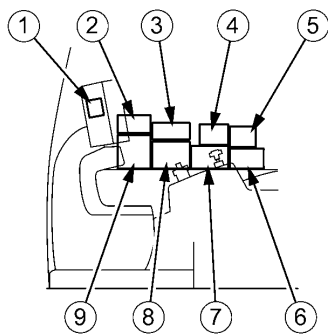
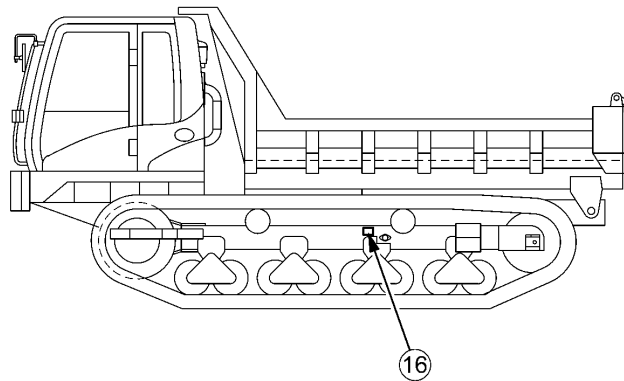
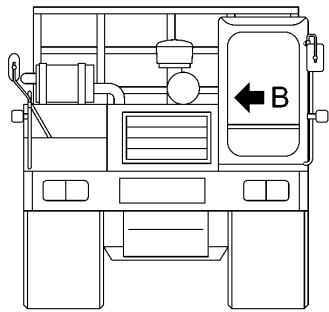
Always keep these labels clean.

If they are lost or damaged, always attach them again or replace them with a new label.

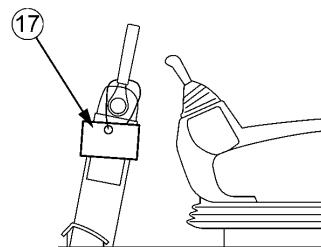
There are other labels in addition to the safety labels listed as follows, so handle them in the same way.



View A



View B



Travel, Work Equipment Lever

XMA62261E

- (1) Precautions when engine starting
(1-46010-2520)

**"START ENGINE
6 SECOND AFTER
POWER ON
(ELECTRICITY)"**

- (2) Precautions for engine starting operation (1)
(1-46010-3030)

⚠ CAUTION

STARTING ENGINE (1)

- When starting the engine, be sure to set the engine speed control dial to the IDLING position.
- To start the engine, turn the starting switch key to the ON position, turn off the engine diagnostic lamp (orange) and the engine warning lamp (red) (takes about 6 seconds to go off), and turn the key to the START position.

1-46010-3030

- (3) Precautions for engine starting operation (2)
(1-46010-3040)

⚠ CAUTION

STARTING ENGINE (2)

- When starting the engine, do not keep turning the key for more than 15 seconds at a time.
- If the engine does not start on your first try, return the engine starting key to the OFF position, wait for about 2 minutes, then turn the key to the ON position again.

1-46010-3040

- (4) Precautions when fitting seat belt
(1-41010-1310)



⚠ WARNING

SEAT BELT

- Always fasten the seat belt during operation.

1-41010-1310

- (5) Precautions for warming-up operation
(1-41010-1230)

⚠ CAUTION

WARMING-UP

- This machine must be properly warmed up, or the equipment will operate abnormally or unexpectedly, and may be damaged.

1-41010-1230

- (6) Caution for periodic replacement parts
(1-12020-1210)

⚠ CAUTION

Replace the following parts periodically.

Periodic replacement parts	Replacement interval
Fuel hose (from fuel tank to fuel injection pump)	Every 2 years
Fuel hose (from fuel injection pump to fuel tank)	
Hydraulic hose (from main pump to travel motor)	
Hydraulic hose (from gear pump to main control valve)	
Hydraulic hose (from dump control valve to dump cylinder)	
Hydraulic hose (between left and right dump cylinder)	Every 3 years
Seat belt	

1-12020-1210

- (7) Precautions when travelling downhill
(1-41010-1290)

⚠ WARNING

WHEN TRAVELLING DOWN SLOPES

- When traveling down slopes, reduce the engine speed before traveling on slopes, adjust the travel level throttle, and travel down the slope at low speed.
- DO NOT travel across or parallel slopes. The machine may overturn sideslips.
- NEVER travel down slopes at engine speed more than the rated engine speed. This may overturn and dangerous slipping.

1-41010-1290

- (8) Precaution for starting engine and leaving machine
(1-41010-1320)

⚠ WARNING

STARTING ENGINE AND MACHINE

- When starting engine, put the travel lever in the N position, and put parking brake lever or the switch in the STOP position.
- When traveling the machine, always put the parking brake lever or the switch in the RUN position.
- Ensure safety around the machine, sound the horn and start.
- DO NOT operate abruptly: this means no starting abruptly, stopping abruptly or turning abruptly. Operating abruptly may cause the track to disengage or cause the machine to fall over.

1-41010-1320

(9) Precautions when operation (1-41010-1330)

⚠ WARNING

- Before operating the machine read the Operation & Maintenance Manual carefully.
- Take extra care when traveling on uneven ground or oval-shaped ground. Depending on the track tension, this may cause the track to disengage or the machine to damage.
- Always check if there are stones clogged around the links before starting.
- When entering under the dump body for checking, always use the safety bar to prevent the dump body lowering.
- Always dump the load on the level, hard ground.
- When leaving the operators seat, put the travel lever in the N position, and put the parking brake or the switch in the STOP position.
- DO NOT use the parking brake as the service brake except in an emergency.
- When leaving the machine, always take the key.

1-41010-1330

(10) Beware of rotating fan and pulley (1-41010-1260)



⚠ WARNING
FAN, PULLEY

- When engine is rotating, keep hands, feel clothes, etc. away from fan and pulley.

1-41010-1260

(11) Beware of high-temperature coolant (1-41010-1300)

⚠ WARNING



RADIATOR

- DO NOT open the cap when the engine is hot. Opening may burn you.

1-41010-1300

(12) Precautions when adding fuel (1-41010-1280)



⚠ DANGER
DIESEL FUEL

- Stop the engine when adding fuel.
- Keep away from fire.

1-41010-1280

(13) Precautions for oil inside hydraulic tank (1-41010-1250)

⚠ CAUTION

HYDRAULIC OIL

- Use the specified hydraulic oil shown the Operation & Maintenance Manual.

1-41010-1250

(14) Muffler is at high temperature (1-41020-1220)

⚠ WARNING



- DO NOT touch hot portion, touching may cause you.

1-41010-1220

(15) Beware of rotating crawler (1-41010-1240)

⚠ DANGER



TRACK

- DO NOT get on the rubber track as this may cause you to fall or be caught.

1-41010-1240

(16) Precautions for crawler adjustment valve (1-41010-1270)



⚠ WARNING
VALVE

- High pressure. DO NOT loosen the valve more than one turn.
- Careless loosening will cause the valve to jump out.

1-41010-1270

- (17) Warning tag to prevent operation during maintenance
(1-41010-1210)

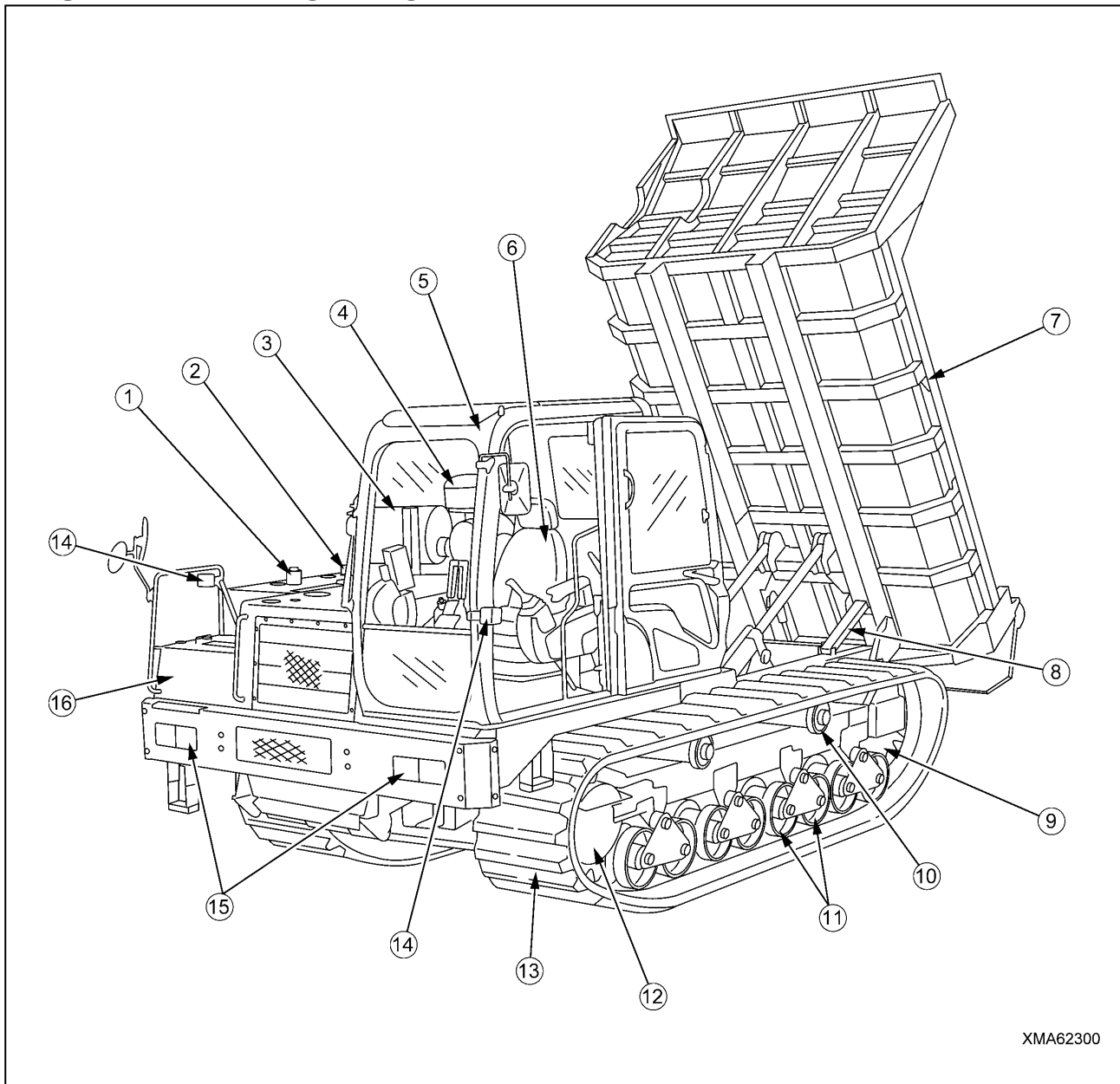


OPERATION

1. General view	2- 2
2. Explanation of components	2- 5
3. Operation	2-34
4. Handling dump body	2-50
5. Manual release of parking brake	2-54
6. Handling rubber crawler	2-56
7. Transportation	2-58
8. Cold weather operation	2-59
9. Long-term storage	2-61
10. Handling battery	2-62
11. Troubleshooting	2-65

1. GENERAL VIEW

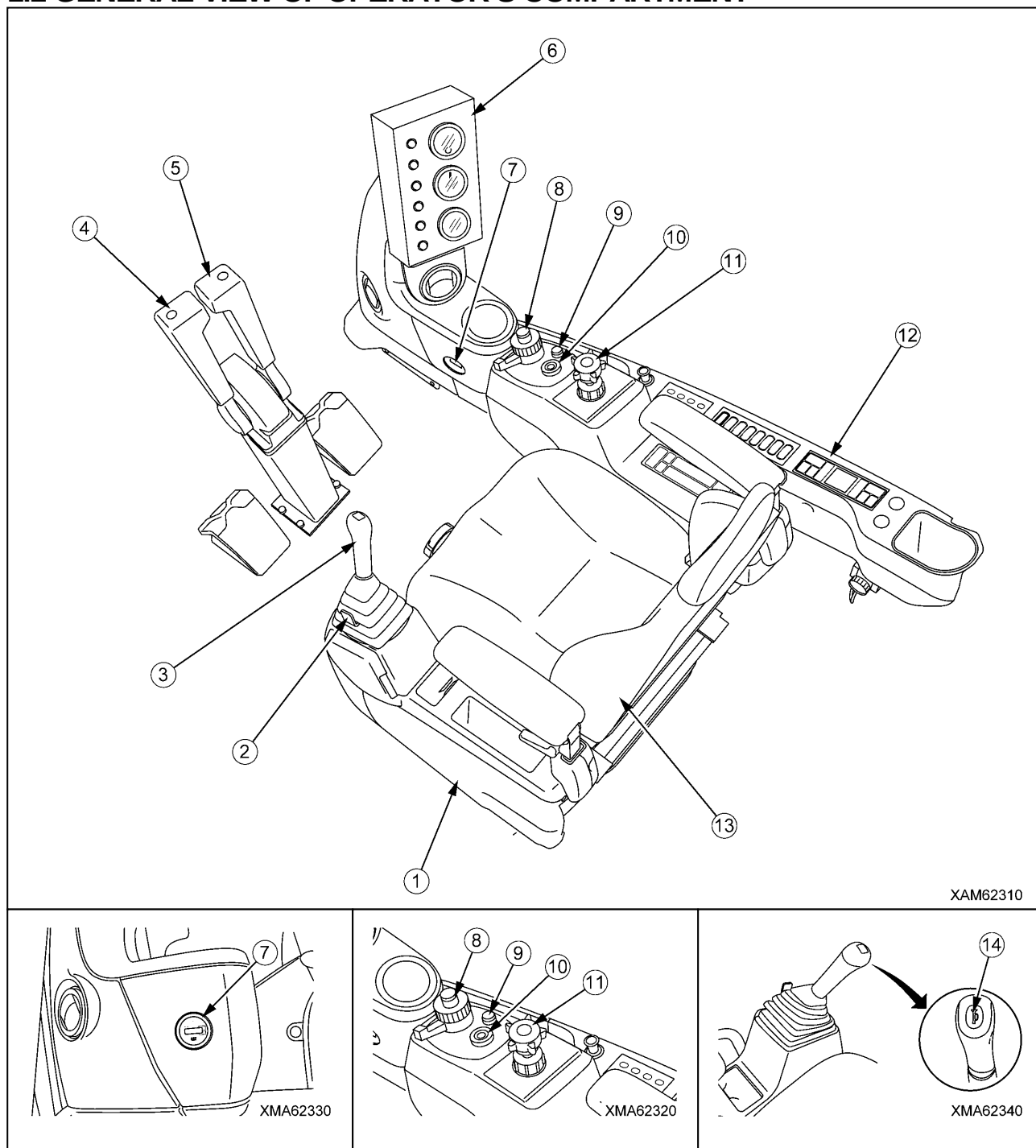
1.1 GENERAL VIEW OF MACHINE



- (1) Fuel tank
- (2) Hydraulic tank
- (3) Muffler
- (4) Air cleaner
- (5) Cab
- (6) Operator's seat
- (7) Dump body
- (8) Safety bar

- (9) Rear idler
- (10) Carrier roller
- (11) Track roller
- (12) Travel motor, sprocket
- (13) Rubber crawler
- (14) Turn signal lamp
- (15) Head lamp
- (16) Battery box

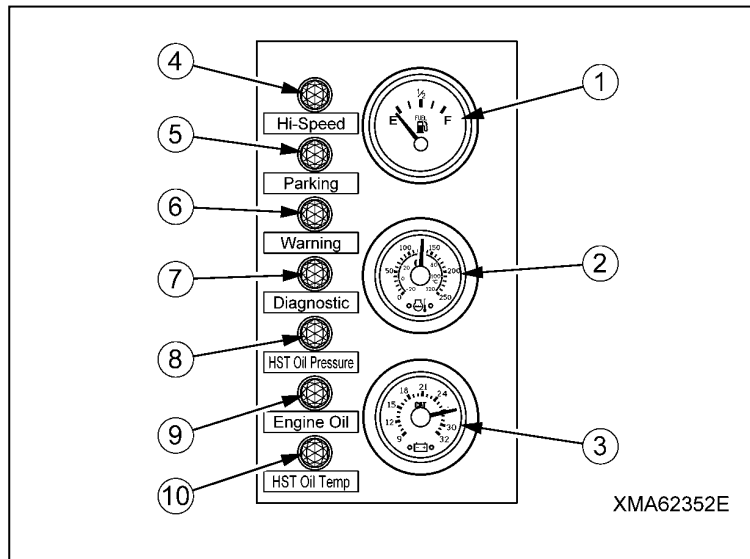
1.2 GENERAL VIEW OF OPERATOR'S COMPARTMENT



- (1) Left side console box
- (2) Dump control lever lock
- (3) Dump control lever
- (4) Left travel lever
- (5) Right travel lever
- (6) Meter box
- (7) Hourmeter

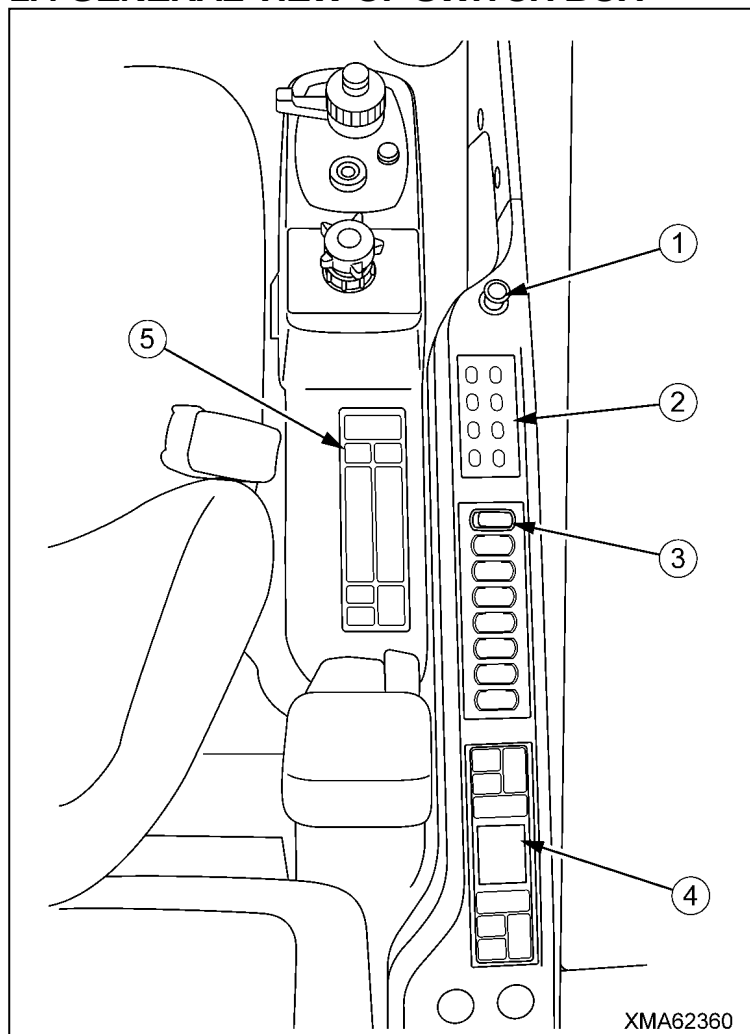
- (8) Combination switch
- (9) Hi-Lo speed range selector switch
- (10) Starter switch
- (11) Engine speed control dial
- (12) Seat switch box
- (13) Operator's seat
- (14) Horn switch

1.3 GENERAL VIEW OF METER BOX



- (1) Fuel gauge I
- (2) Engine water temperature gauge
- (3) Voltmeter
- (4) High speed travel lamp (Green)
- (5) Parking brake switch (red)
- (6) Engine warning lamp (Red)
- (7) Engine diagnostic lamp (Orange)
- (8) HST oil pressure lamp (Red)
- (9) Engine oil pressure lamp (Red)
- (10) HST oil temperature lamp (Red)

1.4 GENERAL VIEW OF SWITCH BOX



- (1) Cigarette lighter
- (2) Switch panel
- (3) Parking brake switch
- (4) Air conditioner controller
- (5) Car radio

2. EXPLANATION OF COMPONENTS

The following is an explanation of devices needed for operating the machine.

To carry out suitable operations correctly and safely, it is important to understand fully the methods of operating the equipment and the meanings of the displays.

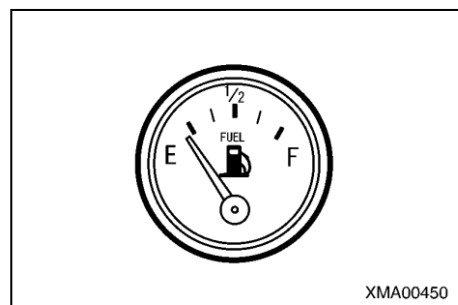
2.1 METERS AND LAMPS

[1] FUEL GAUGE

This indicates the amount of fuel remaining in the fuel tank.

When the starting switch is at the ON position, if the indicator points to the E, there is little fuel remaining, so fill the tank.

- ★ Make it a rule to fill the tank (to the point where the indicator points to F when completing the work at the end of each day.



[2] ENGINE WATER TEMPERATURE GAUGE

NOTICE

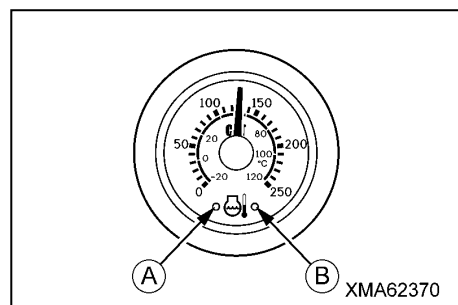
The scales on the engine water temperature gauge are as follows.
The white numbers on the outside show the temperature in Fahrenheit (°F).
The yellow numbers on the inside show the temperature in Celsius (°C).

This indicates the temperature of the engine cooling water.

During operation, the indicator should be in the range below 100°C (210°F). If the center of the indicator points to 108°C (226°F) during operation, right lamp (B) inside the gauge flashes to warn the operator that the engine cooling water temperature has risen abnormally. If right lamp (B) inside the gauge flashes, run the engine at low speed and wait for the indicator to go down to the range below 100°C (210°F).

If the center of the indicator points to 111°C (232°F) during operation, lamps (A) and (B) inside the gauge light up to warn the operator that the engine is about to overheat. If lamps (A) and (B) inside the gauge lights up, stop the engine and check the following.

- ★ After stopping the engine when lamps (A) and (B) inside the gauge light up, check for leakage of water from the radiator, for clogging of the radiator core, and for damage or incorrect tension of the fan belt.
- ★ When the starting switch is turned ON, both lamps (A) and (B) light up for approx. 1 second and then go out.



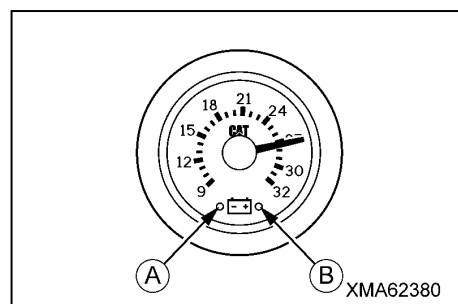
[3] VOLTMETER

When the engine is running, this displays the condition of the battery power source and charging system.

During normal operations, the center of the indicator should point to around 27V. If the center of the indicator points to below 18V during operations, left lamp (A) inside the instrument panel flashes to warn the operator that there is an abnormal drop in the battery voltage.

If there is an abnormal rise (overcharging) in the battery voltage during operations, right lamp (B) inside the instrument panel flashes to warn the operator. If either lamp (A) or (B) inside the instrument panel flashes, stop the engine immediately and carry out the following inspection.

- ★ If either lamp (A) or (B) flashes, stop the engine, then check the wiring of the battery and alternator, check the alternator belt tension, and check for damage to the alternator belt.
- ★ When the starting switch is turned ON, both lamps (A) and (B) light up for approx. 1 second and then go out.



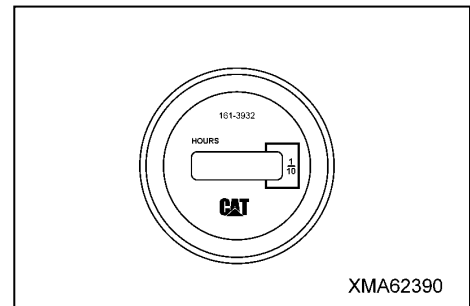
[4] HOURMETER

This shows the total number of hours of the operation of the machine. When the starting switch is at the ON position, the meter will advance even if the machine is not moving.

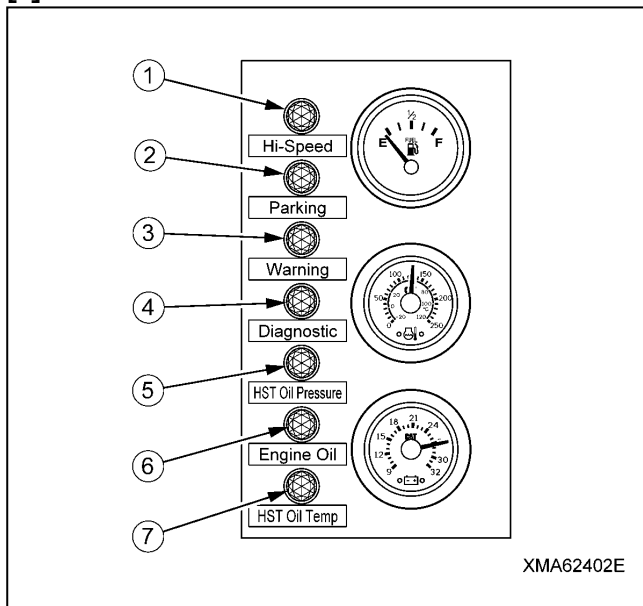
Use the hourmeter reading as the standard for periodic inspection and maintenance.

★The last digit on the right indicates the time in units of 0.1 hours (6 minutes).

★When you stop the engine, always turn the starting switch to the OFF position.



[5] MONITOR LAMPS AT METER BOX



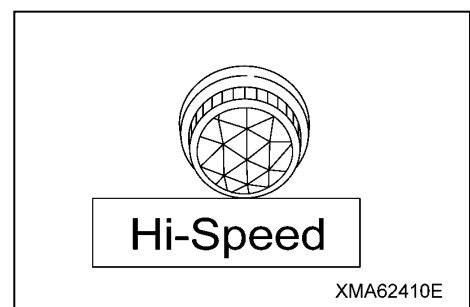
- (1) High-Speed travel pilot lamp (Green)
- (2) Parking brake lamp (Red)
- (3) Engine warning lamp (Red)
- (4) Engine diagnostic lamp (Orange)
- (5) HST oil pressure lamp (Red)
- (6) Engine oil pressure lamp (Red)
- (7) HST oil temperature lamp (Red)

(1) HIGH-SPEED TRAVEL PILOT LAMP (Green)

This lights up to inform the operator that the machine is in the high-speed travel range.

When the Hi-Lo speed range selector switch is pressed to set it to the HI RANGE, the lamp lights up.

When the Hi-Lo speed range selector switch is pressed again to set it to the LO RANGE, the lamp goes out.

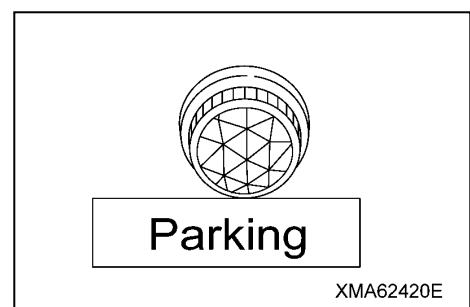


(2) PARKING BRAKE LAMP (Red)

This shows the operation of the parking brake.

If the parking brake switch is set to the ON (STOP) position, the lamp will lights up and the parking brake will be applied.

If the parking brake switch is set to the OFF (RUN) position, the lamp will goes out and the parking brake will be released.



(3) ENGINE WARNING LAMP (Red)

This warns the operator of engine abnormalities of the engine during its operation.

It should be out during operations.

If it lights up during operation, this indicates an abnormality has occurred in the engine.

★If this lamp lights up, stop the engine immediately and contact your distributor. The reduced hydraulic pressure of the engine, increased coolant temperature, reduced coolant level, or increased intake air temperature may be suspected.

★When the starting switch is turned to the ON position, this warning lamp will light up to enable the function of the lamp to be checked and will go out after approximately six seconds. If the lamp goes out, the engine can be considered to be operating normally. Start the engine only after the lamp has gone out.

★If the lamp does not go out, do not under any circumstances start the engine. In this case, contact your distributor immediately.



(4) ENGINE DIAGNOSTIC LAMP (Orange)

This lights up to inform the operator of the location of the engine failure during operation.

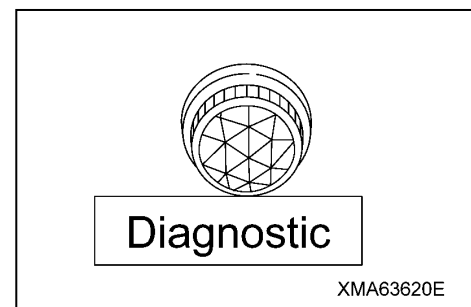
During operation, this lamp should be out.

If any abnormality occurs in the engine during operation, this lamp flashes. The location of the failure is identified by the number of times the lamp flashes.

★If the lamp flashes, stop the engine immediately and contact your distributor.

★When the starting switch is turned to the ON position, this warning lamp will light up to enable the function of the lamp to be checked and will go out after approximately six seconds. If the lamp goes out, the engine can be considered to be operating normally. Start the engine only after the lamp has gone out.

★If the lamp does not go out, do not under any circumstances start the engine. In this case, contact your distributor immediately.



(5) HST OIL PRESSURE LAMP (Red)

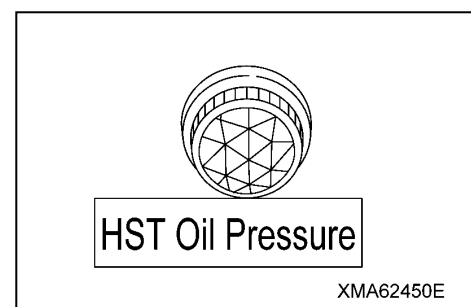
This warns the operator that the HST oil pressure has dropped.

It should be out during operations.

If it lights up during operations, the HST oil pressure has dropped.

Stop operations immediately and check for the cause.

★Check the line filter and strainer for clogging, check for oil leakage from the hydraulic piping, and check the oil level in the hydraulic tank.



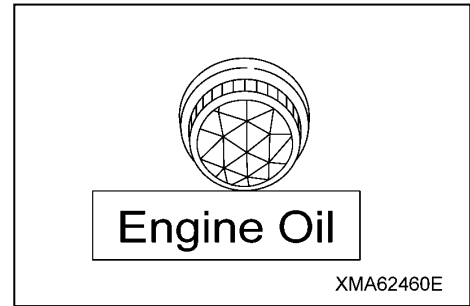
(6) ENGINE OIL PRESSURE LAMP (Red)

This warns the operator that the engine oil pressure has dropped. It should be out during operations.

If it lights up during operations, the engine oil pressure has dropped. Stop operations immediately and check for the cause.

★ Check the engine oil level. Check also for clogging of the engine oil filter.

★ If the inspection shows that there is no abnormality, please contact your distributor.



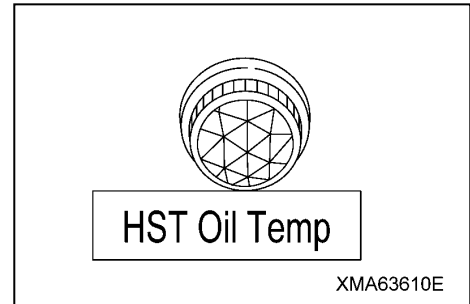
(7) HST OIL TEMPERATURE LAMP (Red)

This warns of an abnormality in the HST hydraulic oil temperature. This lamp should be out during operations.

If it lights up during operations, the HST hydraulic oil temperature has dropped below 20°C or has risen to approx. 95°C.

★ If the HST hydraulic oil temperature is below 20°C, carry out the warming-up operation until the monitor goes out.

★ If the HST hydraulic oil temperature has gone above 95°C, take steps to reduce the load on the machine, such as reducing the payload, reducing the engine speed, and avoiding continuous operation under load.



2.2 SWITCHES

[1] STARTING SWITCH

NOTICE

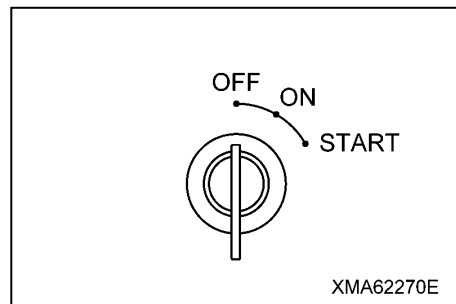
Do not try to start the engine immediately when inserting the starting switch. Turn the switch to the ON position and wait for approx. 6 seconds. During this time, the engine diagnostic lamp (orange) and engine warning lamp (red) light up and then go out.

This switch is used to start and stop the engine.

- OFF: The starting key can be inserted and removed at this position. When the key is turned to this position, all the switches for the electric circuits are turned off, and the engine stops.
- ON: Electricity flows to the charging circuit and lamp circuit.
- START: This is the position for starting the engine (the starting motor turns). When the engine starts, release the key.

The key will return automatically to the ON position.

- ★After the engine is started, do not turn the key to the OFF position except when stopping the engine.



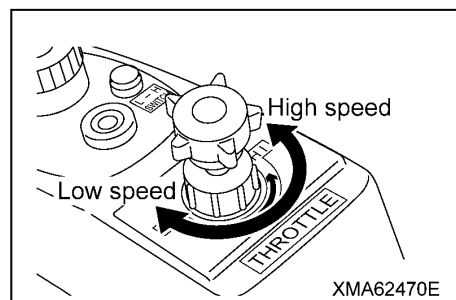
[2] ENGINE SPEED CONTROL DIAL

NOTICE

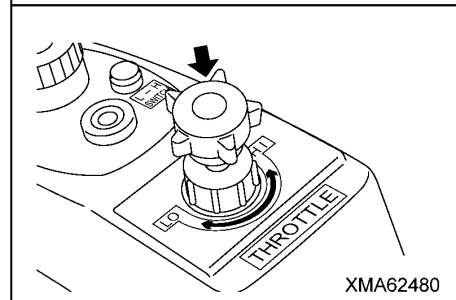
- If the engine is stopped before it has cooled down properly, there is danger that the service life of the engine parts will be reduced. Never stop the engine suddenly except in cases of emergency.
 - If the engine has overheated, do not suddenly stop it. Run the engine at a midrange speed and gradually cool it down before stopping it.
 - If you press the knob of the engine speed control dial, the engine speed will drop suddenly to low idling.
- Use this method to reduce the engine speed only when an abnormality has occurred in the engine or when there is an emergency. Do not use it for normal operations.

This dial is used to control the engine speed and output.

- Turn dial knob to left (Counterclockwise): Engine runs at high speed
- Turn dial knob to right (Clockwise): Engine runs at low speed



- Press dial knob: Engine speed goes down to low idling speed.



[3] HI-LO SPEED RANGE SELECTOR SWITCH

⚠ WARNING

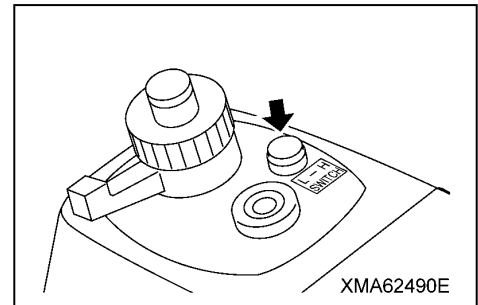
- When traveling on slopes, always set the travel speed range to low speed.
If the machine is driven in the high speed range, it will cause the engine to overrun.
- When traveling with a load, always set the travel speed range to low speed.
If the machine is driven in the high speed range, it will cause the engine to overheat.

This switch is used to select the travel speed range.

When the switch is operated, the speed selection mechanism inside the travel motor is actuated and the machine enters the high speed range or low speed range.

In the high speed range and low speed range, if the engine speed and the amount the travel lever is operated are the same, the travel speed changes.

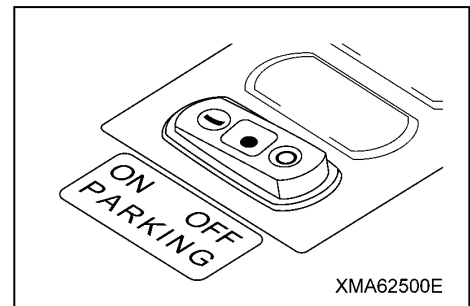
- Push: The travel motor changes to the high speed range and the high speed lamp on the meter box lights up.
- Push again: The travel motor changes to the low speed range and the high speed lamp on the meter box goes out.



[4] PARKING BRAKE SWITCH

This switch is used to operate the parking brake inside the travel motor.

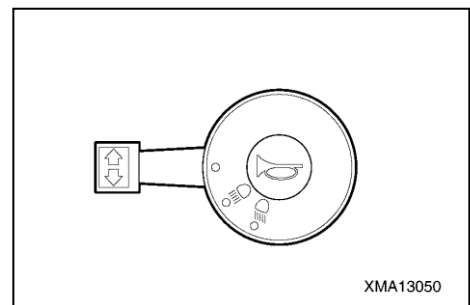
- ON (STOP): The parking brake is applied, the parking brake lamp lights up, and the alarm buzzer sounds.
- OFF (RUN): The parking brake is released and the parking brake lamp goes out.



[5] COMBINATION SWITCH

This switch is used to operate the horn, head lamps, lighting, and turn signal lamps.

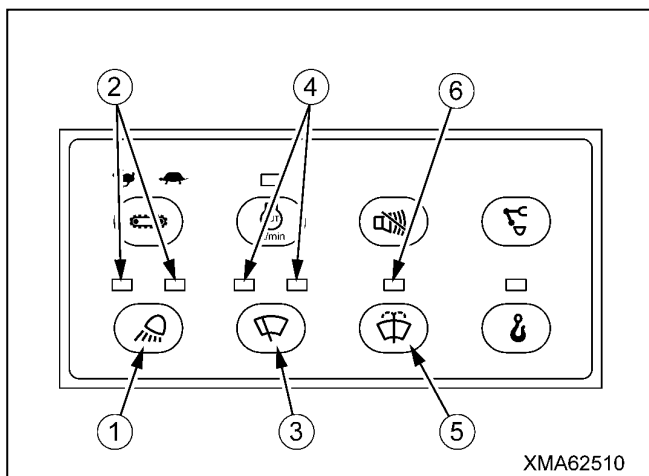
- Press center of switch: Horn sounds.
- Turn switch knob one stage clockwise: Head lamp (Lo) and instrument lighting light up.
- Turn switch knob two stages clockwise: Head lamp (Hi) and instrument lighting light up.
- Move lever back: Left turn signal lamp flashes.
- Move lever forward: Right turn signal lamp flashes.



[6] SHEET SWITCH AT SWITCH PANEL

NOTICE

Some of the switches inside the seat switch are not used on this machine. The switches not marked by arrows in the diagram below do not have any function.

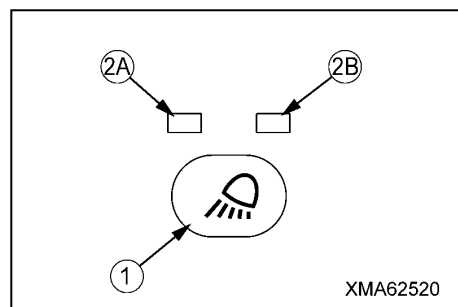


- (1) Head lamp switch
- (2) Head lamp indicator lamps (2 pieces)
- (3) Wiper switch
- (4) Wiper indicator lamps (2 pieces)
- (5) Window washer switch
- (6) Window washer switch indicator lamp (1 piece)

(1) HEAD LIGHT SWITCH & (2) INDICATOR LAMPS

This switch is used to operate the head lamps.

- Press 1 time: Head lamps light up (low beam) and left indicator lamp (2A) lights up.
- Press 2 times: Head lamp lights up (low beam) and both left and right indicator lamps (2A), (2B) light up.
- Press 3 times: Head lamp goes out and left and right indicator lamps (2A), (2B) go out.



(3) WIPER SWITCH & (4) INDICATOR LAMPS

CAUTION

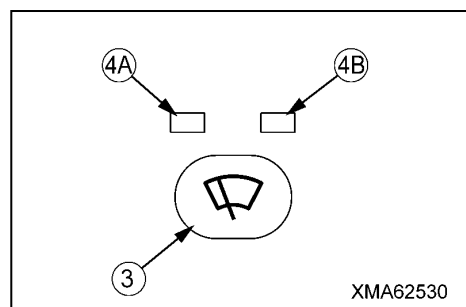
If the wiper does not work even when the switch is turned ON, turn the switch OFF immediately and check for the cause. If the switch is left ON, it will cause damage to the motor.

This switch is used to operate the wiper.

- Press 1 time: Wiper moves intermittently once every 6 seconds and left indicator lamp (4A) lights up.
- Press 2 times: Wiper moves intermittently once every 3 seconds and right indicator lamp (4B) lights up.
- Press 3 times: Wiper moves continuously and both left and right indicator lamp (4A), (4B) light up.
- Press 4 times: Wiper stops and both left and right indicator lamp (4A), (4B) go out.

★The wiper does not work when the front window (top) is open.

Always close the front window (top) before using the wiper.



(5) WINDOW WASHER SWITCH & (6) INDICATOR LAMP

⚠ CAUTION

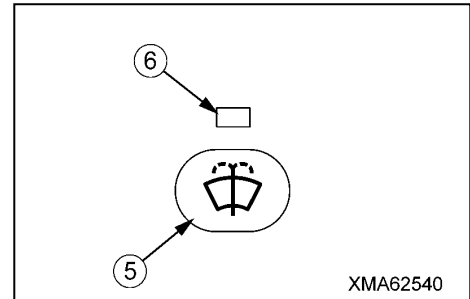
Do not keep the switch pressed continuously for more than 20 seconds. Do not keep the switch pressed when no washer fluid comes out. This will cause damage to the motor inside the washer tank.

This switch is used to operate the window washer.

When switch (5) is pressed, indicator lamp (6) lights up while the switch is being pressed and washer fluid is sprayed from the nozzle.

When the washer fluid is sprayed out, the wiper automatically starts.

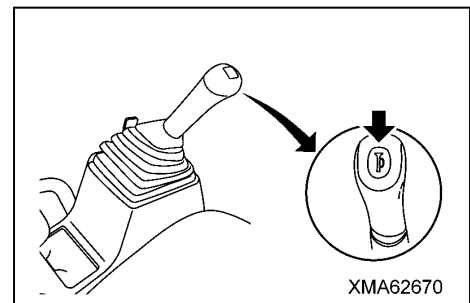
When switch (5) is released, washer fluid stops spraying out and the wiper moves 2 or 3 times and then stops.



[7] HORN SWITCH

This switch is used to sound the horn.

Press the switch at the tip of the grip of the dump control lever to sound the horn.



[8] CIGARETTE LIGHTER

NOTICE

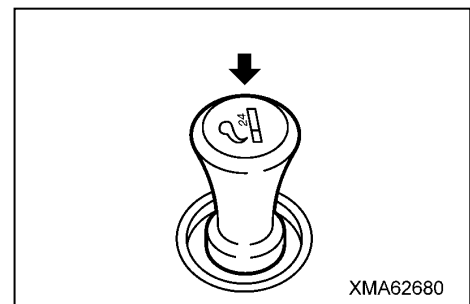
When the cigarette lighter is pushed in, if it does not return to its original position after more than 30 seconds have passed, pull it out immediately. If it is left pushed in, it may cause a fire.

Use the lighter to light cigarettes.

Turn the starting switch to the ON position, push in the cigarette lighter with your finger, then release it. When the cigarette lighter is ready for use, a click can be heard and the knob returns to its original position.

Pull the cigarette lighter out and use it.

After use, push the lighter in so that the outside is level with the socket.



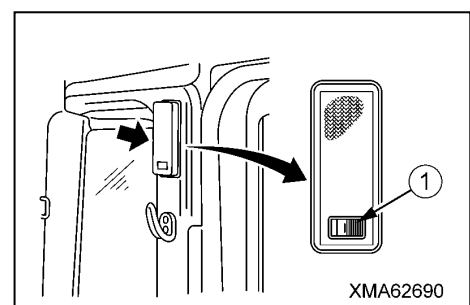
[9] ROOM LAMP (WITH SWITCH)

The room lamp is installed at the top left inside the cab.

There is a switch (1) front the room lamp.

Operate the room lamp switch as follows.

- ON (Push to left): Room lamp lights up.
- OFF (Push to right): Room lamp goes out.



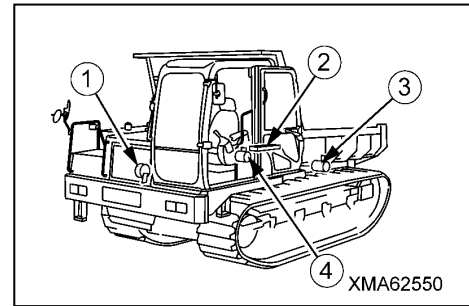
2.3 WARNING DEVICES

[1] HORN

Horn (1) is installed inside the front grill to the frame on the left side of the radiator.

When the starting switch is turned ON and the horn switch is pressed, horn (1) will sound continuously.

Always sound the horn to warn the people in the surrounding area before starting the engine or before moving the machine off.



[2] SLOPE ALARM BUZZER

Slope alarm buzzer (2) is installed inside the rear box in the operator's compartment.

If the angle of the slope goes above the set angle when the machine is traveling, slope alarm buzzer (2) will automatically sound intermittently to warn the operator that the angle is too large.

It is dangerous to continue traveling with the dump body loaded when slope alarm buzzer (2) sounds.

When traveling downhill, do as follows to prevent any danger from overrunning.

1. Operate the throttle lever to set the **engine speed to low speed**.
2. Set the travel lever **as close as possible to the N position**, then drive the machine carefully.
3. If the load in the dump body exceeds the maximum payload or is near the maximum payload, **reduce the load**.

[3] BACKUP BUZZER

Backup buzzer (3) is installed on the left side inside the frame at the rear of the chassis.

When the engine is started and the travel lever is operated to REVERSE, backup buzzer e will sound intermittently to warn the operator that the travel lever is at the REVERSE position.

[4] PARKING BRAKE BUZZER

Parking brake buzzer (4) is installed inside the rear box in the operator's compartment.

When the starting switch is turned to ON position and the parking brake switch is operated to the ON (STOP) position, parking brake buzzer (4) will sound intermittently to inform the operator that the parking brake is applied.

2.4 TRAVEL LEVER

WARNING

- Always stop the machine before switching the travel levers between FORWARD and REVERSE. If the direction of travel is suddenly changed, it may cause damage to the machine.
- Do not operate the travel levers by a large amount suddenly. Always operate them slowly. If they are suddenly operated, the machine and the operator will suffer a large shock.
- When stopping the machine, do not return the travel lever past the N (neutral) position. If the lever is moved past the N (neutral) position, it will cause failure such as reverse rotation of the engine.
- Do not make unnecessary counter rotation turns or sudden turns at high speed. There is danger that the crawlers and hydraulic equipment may be damaged, or that the machine may hit some other object.

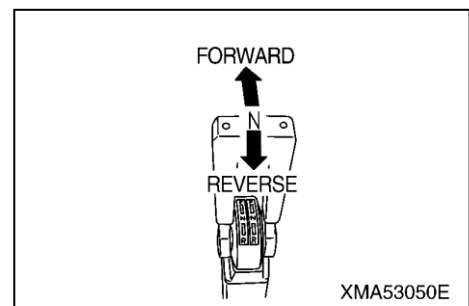
The travel levers are used to drive the machine in forward or reverse, to stop or steer the machine, and to control the travel speed.

★The travel levers become heavier as they are operated in the direction of FORWARD or REVERSE, and become lighter as they are operated back towards N (neutral).

[1] TRAVELING STRAIGHT OR STOPPING

Operate the left and right travel levers at the same time.

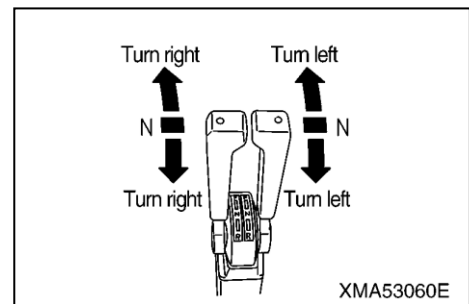
- FORWARD: Push the levers forward.
- REVERSE: Pull the levers back.
- STOP: Return the levers to the N position.



[2] TURNING (STEERING)

Operate the left and right travel levers at the same time, but operate one lever more than the other.

- Traveling forward and turning left: Push the right travel lever forward and return the left travel lever in the direction of N.
- Traveling forward and turning right: Push the left travel lever forward and return the right travel lever in the direction of N.
- Traveling in reverse and turning left: Pull the right travel lever back and return the left travel lever in the direction of N.
- Traveling in reverse and turning right: Pull the left travel lever back and return the right travel lever in the direction of N.



[3] TURNING GRADUALLY

Operate the left and right travel levers by a different amount.

If there is a big difference between the two levers, the machine will turn rapidly.

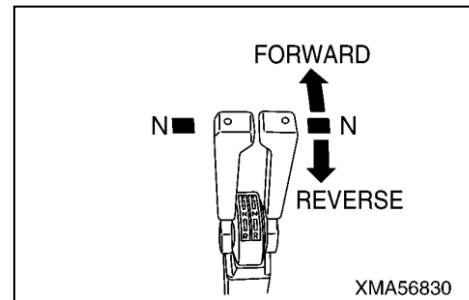
If there is a small difference between the two levers, the machine will turn gradually.

[4] PIVOT TURN

There are the following two types of pivot turn.

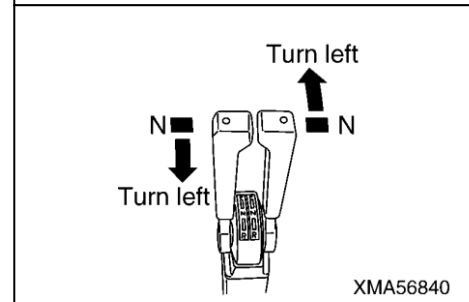
- **Pivot turn:**

Return one travel lever fully to the N position and operate the other travel lever in the direction of FORWARD or REVERSE.



- **Spin turn (counter rotation turn):**

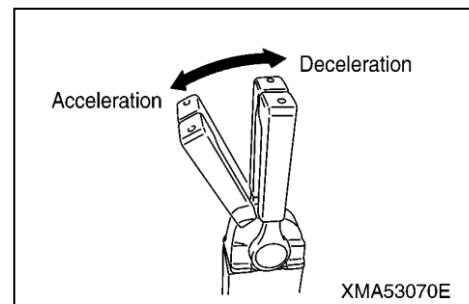
Operate the left and right travel levers in opposite directions.



[5] CHANGING TRAVEL SPEED

Change the angle of the travel lever to change the speed.

Operate the travel lever a small amount to travel at low speed, and operate it a large amount to travel at high speed.



2.5 DUMP CONTROL LEVER

⚠ WARNING

- Always stop the machine before operating the dump body to the dump position.
 - Position a signalman to ensure safety in the surrounding area, and follow his signals when carrying out the dumping operation.
 - Always operate the dump control lever slowly. If the dump body is suddenly stopped or it is allowed to hit the frame when it is lowered, it will cause failures and will also cause problems of safety in the surrounding area.
 - When leaving the operator's compartment with the dump body raised, always lock the dump control lever.
- In addition, use the safety bar to prevent the dump body from coming down.
Even when the engine is stopped, it is possible to lower the dump body.

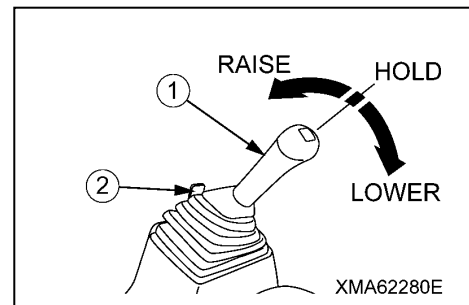
[1] DUMP CONTROL LEVER

Dump control lever (1) is used to raise and lower the dump body.

There are three operating positions: RAISE, HOLD, and LOWER.

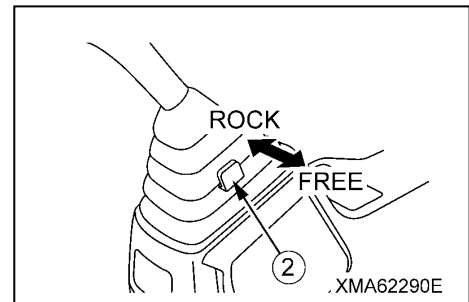
- RAISE: The dump body is raised.
- HOLD: The dump body is stopped and held in position.
- LOWER: The dump body is lowered.

★When the control lever is released, it automatically returns to the HOLD position.



[2] DUMP CONTROL LEVER LOCK

Lever lock (2) is used to hold the dump control lever at the HOLD position.

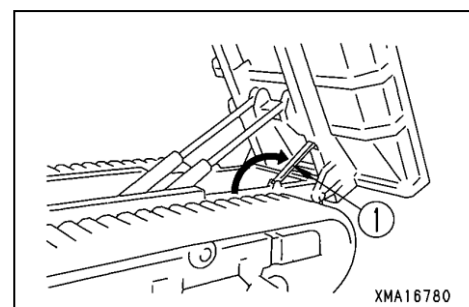


2.6 DUMP BODY SAFETY BAR

⚠ WARNING

- If it is necessary to go under the dump body to carry out inspection and maintenance, always use the safety bar to prevent the dump body from coming down.
- When using the safety bar, check that the bar is fitted securely to the dump body holder.
- The safety bar is a safety device used during inspection and maintenance. Do not use the safety bar to support the dump body when replacing the dump cylinder, valve, hydraulic hoses, or other equipment. In such cases always support the dump body with a crane.

Safety bar (1) is a device to ensure safety during operations, and is used when going under the dump body to carry out inspection and maintenance.



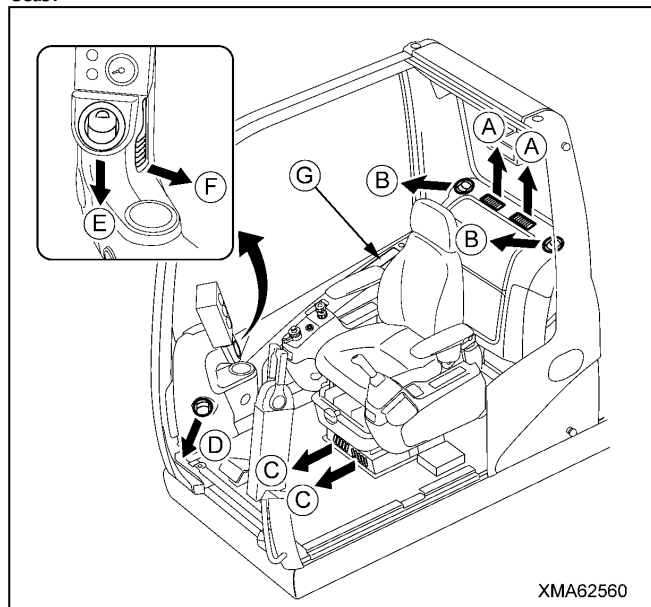
2.7 AIR CONDITIONER

⚠ CAUTION

The air conditioner and control panel are particularly weak against water, so be careful not to let water get directly on them. This will cause failure.

2.7.1 LOCATION OF VENTS

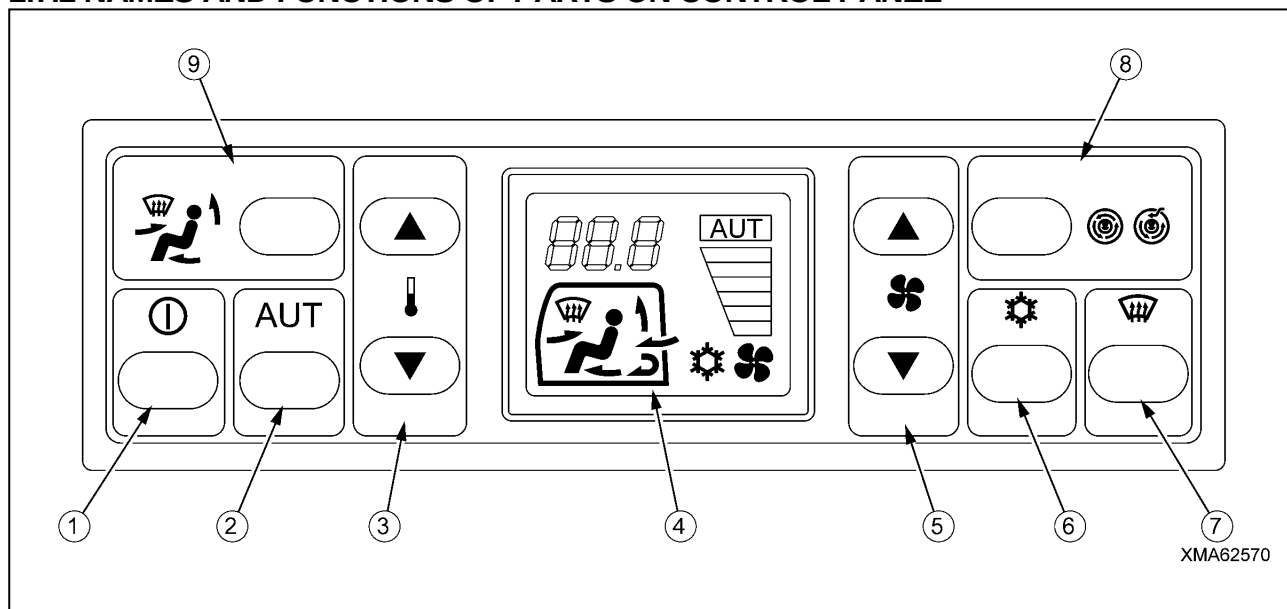
The air conditioner is installed at the rear of the operator's compartment and provides warm air or cold air for the cab.



- (A) Head vent
- (B) Head vent
- (C) Foot vent
- (D) Defroster vent (Front window)
- (E) Face vent
- (F) Defroster vent (Right side window)
- (G) Control panel

★The direction of the flow of air from all the vents except for the foot vent can be controlled with the louvers.

2.7.2 NAMES AND FUNCTIONS OF PARTS ON CONTROL PANEL



- (1) Power switch
- (2) AUT (Automatic operation) switch
- (3) Temperature control switch
- (4) LCD display
- (5) Fan speed selector switch
- (6) Compressor switch
- (7) Defroster vent switch
- (8) FRESH/RECIRC selector switch
- (9) Vent selector switch

⚠ WARNING

Do not operate the switches when your hands are wet. This will cause electric shock.

NOTICE

- When using the air conditioner, do not suddenly raise the engine speed to high speed. This will cause failure.
- Do not bring any flame close the controls.
- When cleaning the air conditioner filters, carry out the operation carefully. If the filter is clogged, the efficiency of the air conditioner will be reduced, and it will also lead to failure.

[1] POWER SWITCH (1)

This is the main switch for the air conditioner power supply.

When the switch is pressed, LCD display (4) lights up and the air conditioner starts.

If the switch is pressed again, LCD display (4) goes out and the air conditioner stops.

★If the main switch is turned OFF, when the air conditioner is started again, it will start under the same settings as when it was turned off.

[2] AUT SWITCH (2)

This switch is used for automatic operation of the air conditioner.

When the switch is pressed, the AUT LCD display (4) lights up and the air conditioner starts automatically operation at a set temperature within a range of 18 - 32°C (64 - 90°F).

★If any switch is used to make a manual setting, the automatic operation is cancelled. However, the function before the automatic setting was carried out is maintained.

★The air conditioner can be operated with this switch, but it cannot be stopped.

[3] TEMPERATURE CONTROL SWITCH (3)

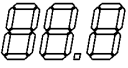
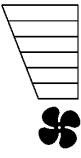
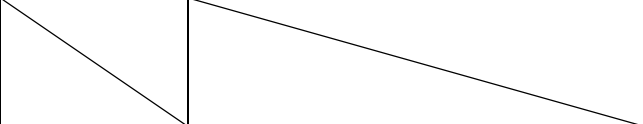
This switch is used to control the temperature of the air blowing out from the vents.

The temperature set inside the cab is displayed on LCD display (4).

- To lower the set temperature, press the "▽" switch.
- To raise the set temperature, press the "△" switch.

[4] LCD DISPLAY (4)

This displays the present settings of the air conditioner.

	This displays the set temperature. "25.0" means approximately 25°C (77°F).		This displays the speed of the air flow.
	This displays the vent and air intake port.		This displays the ON/OFF condition of the compressor.
	This shows that automatic operation is being used.		

[5] FAN SPEED SELECTOR SWITCH (5)

This switch is used to control the speed of the air flow from the vents. The air speed can be set to 6 levels. The speed of the air flow is displayed on LCD display (4).

- To lower the air speed, press the "▽" switch.
- To raise the air speed, press the "△" switch.

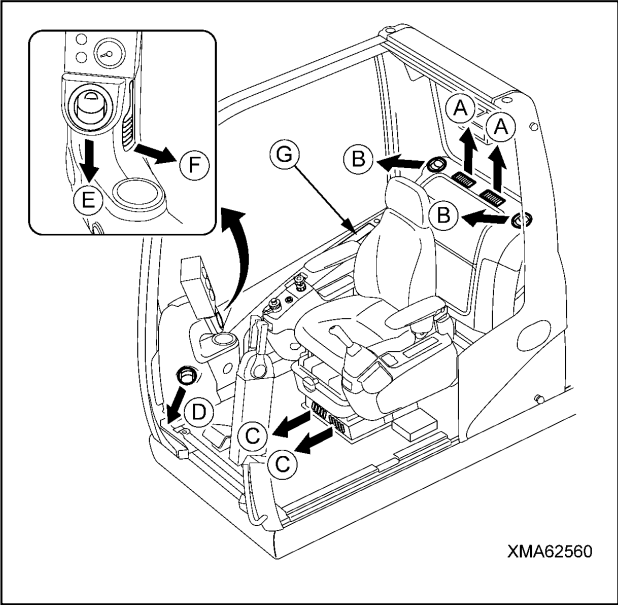
[6] COMPRESSOR SWITCH (6)

This switch is used to turn the air conditioner ON. When the switch is pressed, [⚙️] is displayed on LCD display (4), and the system switches to the air conditioner condition.

[7] DEFROSTER VENT SWITCH (7)

This switch is used to blow air out for defrosting. When the switch is pressed, [❄️] is displayed on LCD display (4), and air for defrosting is blown out from all vents.

- Open the grille for defroster vents (D) and (F) manually.
 - Close face vent (E) manually.
- ★It is possible to blow out air for defrosting by operating the defroster vent switch.
- [Foot/defroster mode] is available for the defrosting function, so please select one of these as desired.
- For details of the [Foot/defroster mode], see [9] VENT SELECTOR SWITCH.



[8] FRESH/RECIRC SELECTOR SWITCH (8)

Use this switch to select the air intake port. Each time the switch is pressed, the air intake switches between recirculation of the internal air and intake of fresh air from outside, and the air intake system is displayed on LCD display (4).

	Air inside cab is circulated		Air is taken in from outside and inside of cab is pressurized.
---	------------------------------	---	--

[9] VENT SELECTOR SWITCH (9)

This switch is used to select the vent.

The setting for the vents is displayed on LCD display (4) in the order shown in the chart below.

LCD display mode/name	Louver (vent)					
	A	B	C	D	E	F
 Vent	●	●		(Closed)	● (Closed)	(Closed)
 Bi-level	●	●	●	(Closed)	● (Closed)	(Closed)
 Foot			●			
 Foot / Defroster			●	● (Closed)	● (Closed)	● (Closed)

★When selecting the independent defroster mode, operate defroster switch (7).

★Open and close grilles (D), (E), and (F) manually.

★The ● mark shows the vent.

2.7.3 PRECAUTIONS WHEN USING AIR CONDITIONER

The air conditioner is used not only to lower the temperature when cooling but also to reduce the humidity to make the environment in the cab comfortable.

Use the air conditioner to match the ambient temperature and weather conditions, and also obey the following conditions to maintain pleasant conditions.

- It is not good for your health to cool the cab too much. Set the temperature so that it feels slightly cooler. The difference from the ambient temperature should be 5 - 6°C (41 - 43°F).
- If you smoke when the air conditioner is running, it may cause your eyes to sting. If this happens, switch to ventilation for a short time.
- When using the air conditioner with the door or window open, condensation may form inside the cab because of the humidity. Be careful when handling documents.

2.7.4 PRECAUTIONS FOR HANDLING IN OFF-SEASON

- To ensure that the air conditioner can be used for a long time to provide pleasant conditions, please ask your air-conditioner salesman to carry out inspection and maintenance before the start of the cooling season.
- In the off-season, run the air conditioner for several minutes once a week. Running the air conditioner ensures that the film of oil is maintained at all parts of the compressor, and this makes it possible to maintain the air conditioner in the optimum condition.

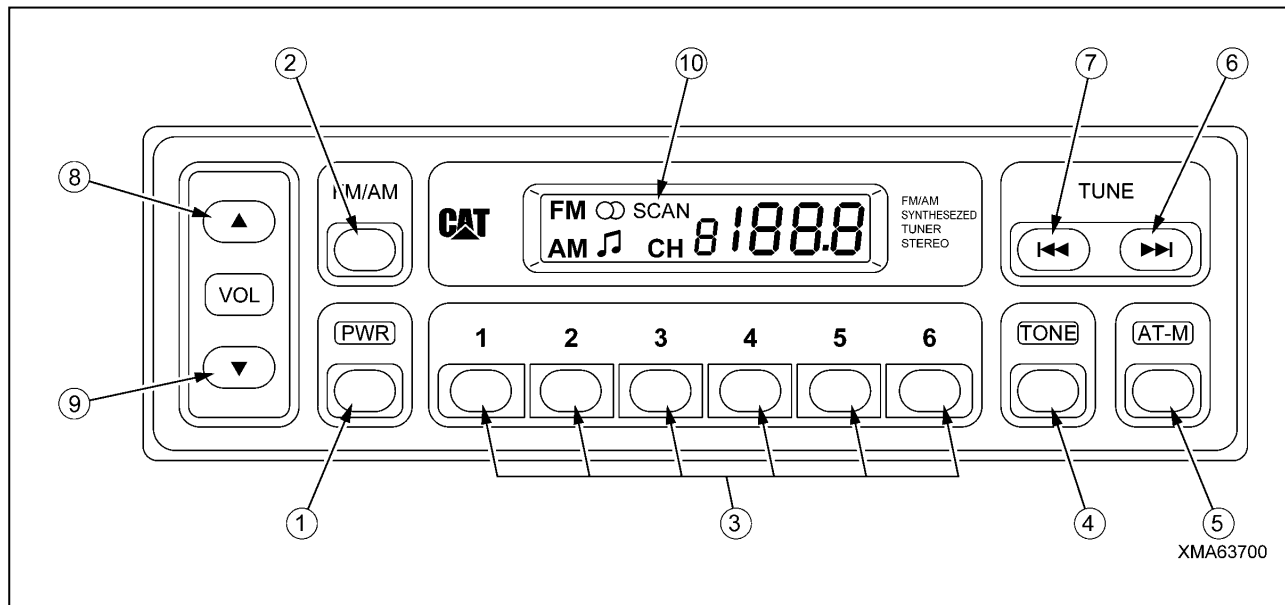
2.8 AM/FM RADIO

NOTICE

The radio can be used when the starting switch is at the ON position.

If the radio is operated with the engine stopped, the battery will be discharged and it may be impossible to start the engine.

Always run the engine when using the radio.



(1) Power button [PWR]

(2) AM/FM selector button [FM/AM]

(3) Preset selector button [1, 2, 3, 4, 5, 6]

(4) Tone selector button [TONE]

(5) Scan/auto memory button [AT-M]

(6) Station selector button [TUNE]

(7) Station selector button [TUNE]

(8) Volume button (up) [▲]

(9) Volume button (down) [▼]

(10) Display

★ For some buttons it is necessary to keep the button pressed for a longer time.

Keep the button pressed until a [peep] sound is heard.

(1) POWER BUTTON (1) [PWR]

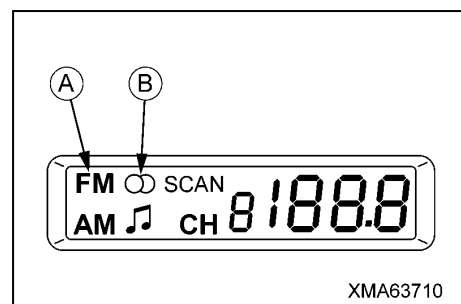
Press this button to turn the power for the radio ON.

Press this button again to turn the power of the radio OFF.

(2) AM/FM SELECTOR BUTTON (2) [FM/AM]

When this button is pressed, the band switches between AM and FM.

The selected band is displayed on portion A of the display. When an FM stereo broadcast is being received, a mark appears on portion B of the display.



(3) PRESET SELECTOR BUTTON (3) [1, 2, 3, 4, 5, 6]

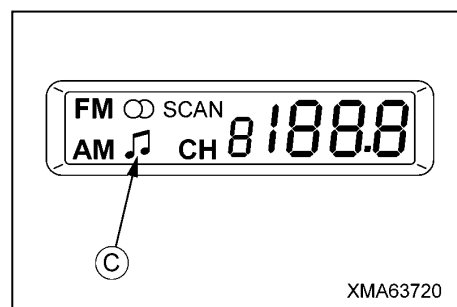
These buttons are used to call up the stations (frequencies) for the preset channels [1 - 6] or to set the channels to the desired frequencies.

(4) TONE SELECTOR BUTTON (4) [TONE]

Each time this button is pressed, the tone is changed. Use it to select the desired tone.

The selected tone is displayed on portion "C" of display (10) by a musical note icon when the tone is high.

When there is noise and it is difficult to hear, select low tone (the musical note icon goes out). This cuts the high tone range.



(5) SCAN/AUTO MEMORY BUTTON (5) [AT-M]

Depending how this switch is pressed, it can be used for scanning selected stations and for auto memory.

When this button is pressed, the selected stations can be scanned.

If this button is kept pressed for a long time, auto memory can be carried out.

(6) STATION SELECTOR BUTTON (6) [TUNE]

When this button is pressed, the selected station moves up to a higher frequency.

(7) STATION SELECTOR BUTTON [TUNE]

When this button is pressed, the selected station moves down to a lower frequency.

(8) VOLUME BUTTON (UP) (7) [▲]

When this button is pressed, the volume becomes higher.

(9) VOLUME BUTTON (DOWN) [▼]

When this button is pressed, the volume becomes lower.

[1] METHOD FOR SELECTING STATION

Press station selector button (6) or (7), or keep them pressed for a long time to select the station manually or automatically.

The frequency being received is displayed on portion "D" of display (10).

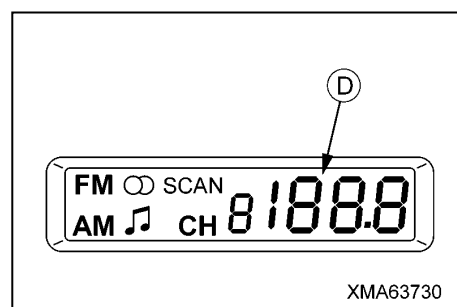
(1) METHOD FOR SELECTING STATION MANUALLY

Press station selector button (6) or (7) to select the desired frequency.

- When moving up to select a higher frequency, press station selector button (6).
- When moving down to select a lower frequency, press station selector button (7).

★When an AM broadcast is being received, if the button is pressed, the frequency will go up or down 9kHz.

★When an FM broadcast is being received, if the button is pressed, the frequency will go up or down 0.1MHz.



(2) METHOD FOR SELECTING STATION AUTOMATICALLY

Keep station selector button (6) or (7) pressed until a [peep] sound is heard. When a broadcast is received, it will automatically stop.

When searching for the next station, press the station selector button and keep it pressed.

- When moving up to select a higher frequency, keep station selector button (6) pressed.
- When moving down to select a lower frequency, keep station selector button (7) pressed.

To cancel the automatic station selection, press station selector button (6) or (7) again.

★If the signal reception is weak or a station is not selected, use manual selection to set to the desired frequency.

[2] METHOD OF PRESETTING

1. Select the station to be memorized with station selector button (6) or (7).

★ For details, see the previous section [2.8.1 METHOD FOR SELECTING STATION].

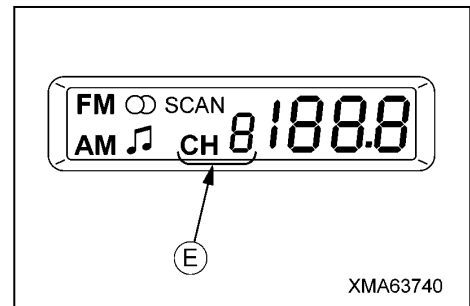
2. Keep any one of preset station selector buttons (3) (1 - 6) pressed until a [peep] sound is heard.

The broadcasting frequency is saved to that button. When this is done, any frequency previously saved to that button is deleted.

When the saving operation is completed, the number of the station selector button is displayed on portion "E" of the display.

★ After saving the frequency, it is possible to press preset station selector button (3) to listen to the broadcasting station saved to that button.

★ If it is desired to change the presetting, use the same procedure as when presetting a new frequency.



[3] METHOD OF SCANNING STATION SELECTION AND AUTO MEMORY

(1) SCANNING STATION SELECTION

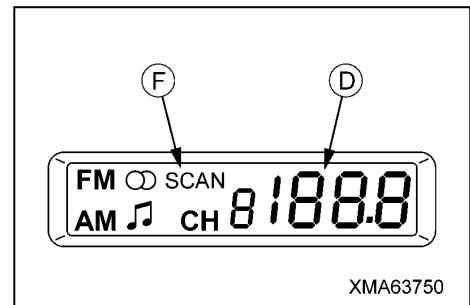
When scan/auto memory button (5) is pressed, the radio receives the frequencies saved to each preset station selection button (3) for 5 seconds each. If button (5) for the desired frequency is pressed again, the radio will continue to receive that frequency. When scanning the station selection, [SCAN] lights up in portion "F" of display (10). In addition, the frequency being received is displayed in portion "D".

(2) AUTO MEMORY

If scan/auto memory button (5) is kept pressed until a [peep] sound is heard, the broadcasting stations with the best reception inside the reception ranges are automatically saved in order of frequency to each preset station selector button (3). Note that the previously saved frequencies are deleted.

[Erasure of memory]

If the connection with the battery is broken, such as during maintenance or when the radio is removed, any frequencies saved to the preset station selection buttons are lost after a few days. If this happens, please set the preset station selections again.



2.9 FUSE BOX IN REAR BOX

⚠ CAUTION

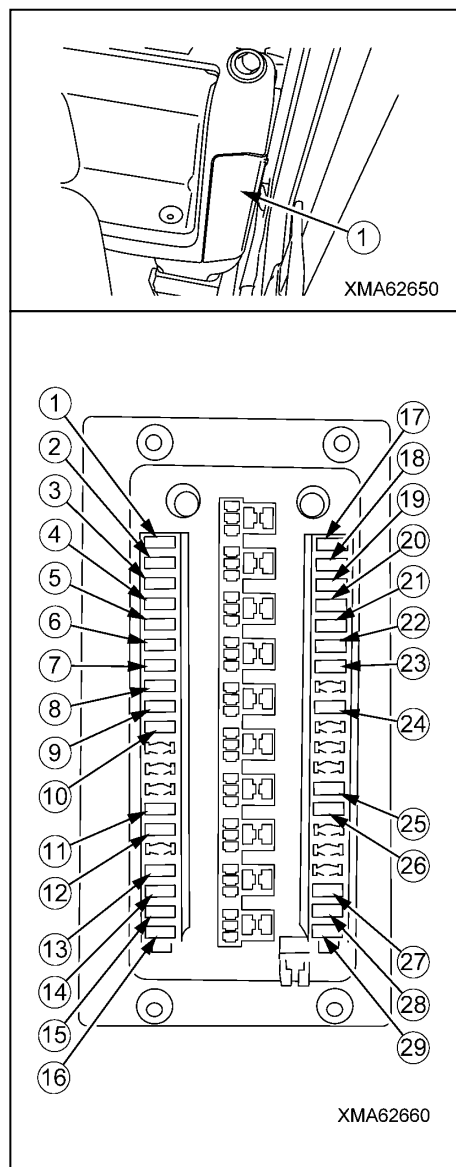
- Always turn the starting switch to the OFF position before replacing the fuse.
- If the fuse is blown, always check for the cause in that circuit and carry out repairs before replacing the fuse.
- When replacing the fuse, always replace it with a fuse of the same capacity.

NOTICE

Fuses are devices to prevent electrical equipment and wiring from burning out.
If a fuse is corroded or covered in white powder, always replace it.

1. Remove the fuse inspection cover (1) at the bottom of the rear box (left side) at the rear of the operator's seat.
2. After removing inspection cover (1), check or replace the fuses inside it.
3. The fuses inside the fuse box are for the circuits shown in the table below.

No.	Capacity	Name of circuit
1	15A	Air conditioner
2	10A	High-low speed range selector switch
3	10A	Cigarette lighter
4	10A	HST oil pressure switch
5	5A	Radio
6	15A	Warning lamp
7	15A	Troubleshooting lamp
8	10A	Wiper, wiper controller
9	10A	Parking brake
10	10A	Engine oil pressure switch
11	10A	Spare
12	10A	Spare
13	5A	Spare
14	5A	Spare
15	10A	Spare
16	10A	Spare
17	15A	Air conditioner
18	10A	Fuel gauge
19	15A	Light and horn
20	10A	Turn signal indicator lamp
21	10A	Hour-meter
22	10A	Clinometer warning device
23	10A	Backup buzzer
24	25A	Engine control module (ECM)
25	10A	Spare
26	10A	Spare
27	15A	Spare
28	15A	Spare
29	25A	Spare



2.10 OPERATOR'S SEAT

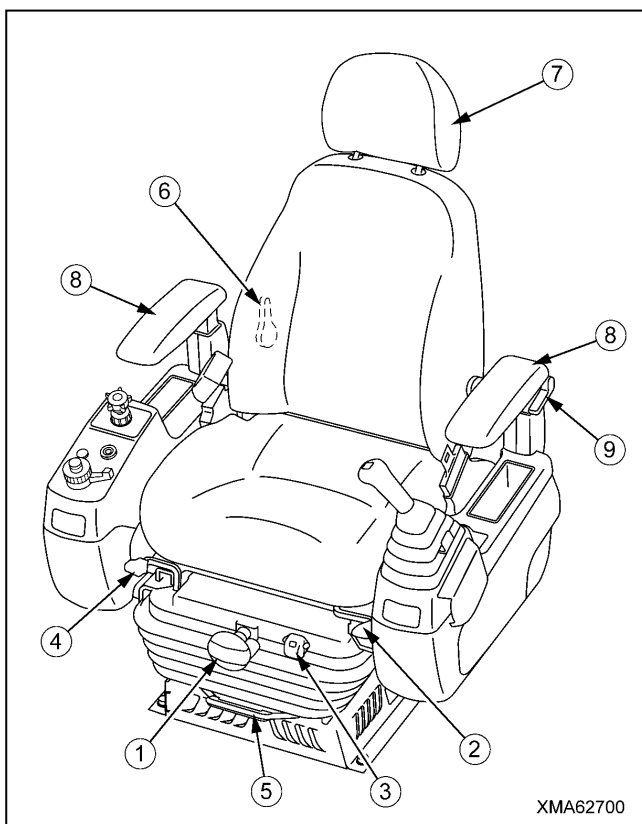
⚠ WARNING

- Adjust the operator's seat before operations. Always adjust the operator's seat after it has been used by another operator.
- Adjust the operator's seat so that you can operate the travel lever easily with your back against the seat backrest.
- Never adjust the seat when traveling.
- Always lower the armrest before starting operation.

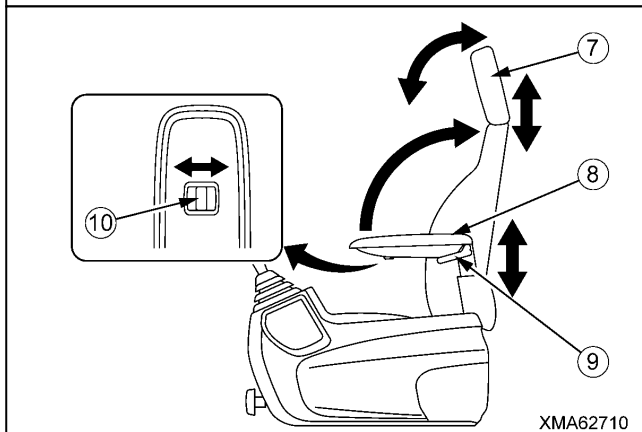
The armrest is installed to prevent the danger of the operator falling from the operator's seat if the machine tips at an angle when traveling.

NOTICE

Do not operate seat/console slide lever (6). The console and seat is designed so that it cannot slide to the front or rear.



- (1) Seat height adjustment handle
- (2) Height adjustment/tilt lever
- (3) Indicator
- (4) Seat fore-and-aft adjustment lever
- (5) Seat/console fore-and-aft adjustment lever
- (6) Reclining adjustment lever
- (7) Headrest
- (8) Armrest
- (9) Armrest tilt lever
- (10) Armrest control dial



[1] SEAT HEIGHT ADJUSTMENT

Use seat height adjustment handle (1) to adjust the height.

To make the seat higher, turn handle (1) clockwise.

To make the seat lower, turn handle (1) counterclockwise.

After adjusting the height of the seat, sit in the seat and check indicator (3).

If indicator (3) is green, the seat is set to the correct weight.

If indicator (3) is red, the seat setting is outside the correct weight range. Adjust the seat height again

[2] HEIGHT ADJUSTMENT OF FRONT OF SEAT

Use height adjustment/tilt lever (2) to adjust the height of the front of the seat.

When lever (2) is pulled up, the front portion of the seat only is tilted up or down.

[3] SEAT FORE-AND-AFT ADJUSTMENT

Use seat fore-and-aft adjustment lever (4) to adjust the seat to the front or rear.

Keep lever (4) pulled up and slide the seat to the front or rear.

After adjusting to the desired position, release lever (4) and check that it is securely locked.

[4] RECLINING ADJUSTMENT

Use reclining adjustment lever (6) to adjust the reclining angle.

Keep lever (6) pulled up and adjust the seat back to the desired angle.

After adjusting, release lever (6) and secure it in position.

[5] HEADREST ADJUSTMENT

Headrest (7) can be adjusted up, down, and to the front or rear.

To adjust headrest (7) up or down, hold the headrest and move it up or down to adjust to the desired position.

To adjust headrest (7) to the front or rear, hold the headrest and move it to the front or rear to adjust to the desired position.

[6] ARMREST ADJUSTMENT

Armrest (8) can be rotated up to the rear. It is also possible to adjust the height and angle.

Use armrest tilt lever (9) and armrest control dial (10) to adjust.

To adjust the height, keep tilt lever (9) pulled up and tilt the armrest.

To adjust the angle, turn control dial (10) at the bottom of armrest (8) by hand.

It is possible to make fine adjustments of the angle of armrest (8).

2.11 SEAT BELT

⚠ WARNING

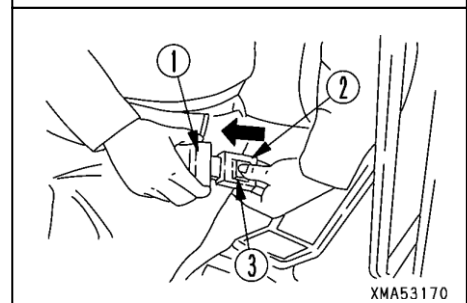
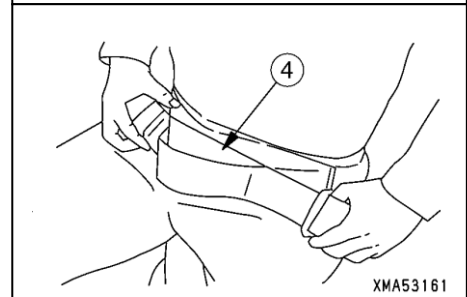
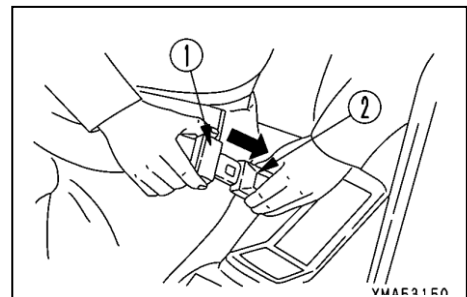
- Before fastening seat belt, always check that there is no abnormality in the belt mount or seat belt clamps.
If there is any wear or damage, always replace the seat belt.
- Always adjust the seat belt and fasten it before starting operations.
The seat belt is installed to prevent the danger of the operator falling from the operator's seat if the machine tips at an angle when traveling.
- Do not use the left or right seat belts when they are twisted.

NOTICE

When the seat belt has been used for a long period, and the belt is damaged or starting to become fluffy, or if the clamps are broken or distorted, replace with a new seat belt.
Always replace the seat belt once every three years even if there is no visible sign of abnormality.

[1] FITTING SEAT BELT

1. Sit in the operator's seat with your back against the seat backrest, then adjust the position of the operator's seat so that it is possible to operate the travel levers comfortably. For details, see 2.10 OPERATOR'S SEAT.
2. Insert tongue (1) securely into buckle (2) of the seat belt.
3. Pull the seat belt lightly to check that the tongue and buckle are securely locked.
4. Adjust seat belt (4) to fit your body.
5. When removing the seat belt, press button (3) in the center of buckle (2) and pull out tongue (1).



2.12 WINDOW SHIELD

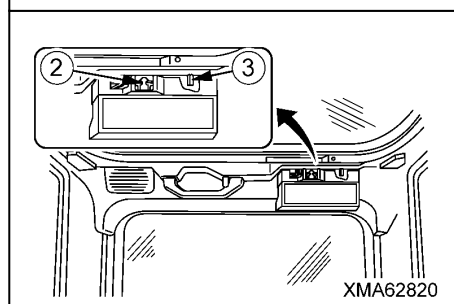
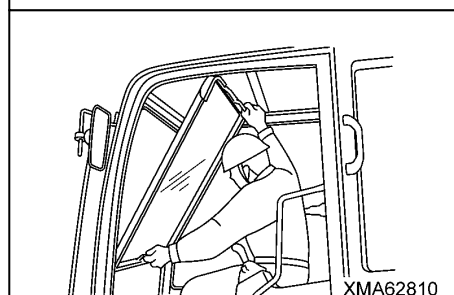
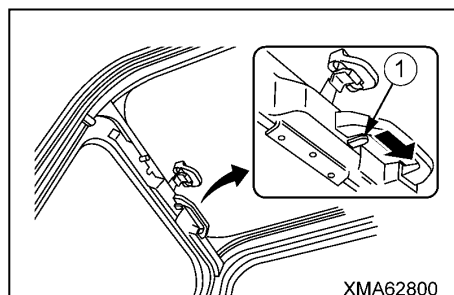
⚠ WARNING

- Always lock the dump control lever before opening or closing the front window. If the dump control lever is touched by mistake, there is danger that the dump body may suddenly move down and cause serious injury or even death.
- When closing the front window, lower the front window slowly and be careful not to get your hands caught.
- When the front window is open, check that it is securely locked. If the window slides down, there is danger that it may cause serious personal injury.

2.12.1 FRONT WINDOW (UPPER)

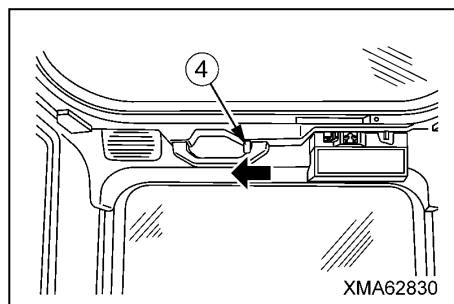
[1] METHOD OF OPENING

1. Stop the machine on level ground, lower the dump body, then stop the engine.
2. Move lock release lever (1) at the top of the front window in the direction of the arrow to release the lock.
3. Firmly hold the grip at the bottom of the front window with your left hand and the grip at the top with your right hand, then lift up the front window.
4. Move the front window to the rear of the roof, and push it against the auto lock (2) at the rear left of the roof to secure it in position.
★In some cases, only auxiliary lock (3) may lock properly, so hold the grips again and check that the front window is securely locked.



[2] WHEN CLOSING

1. Stop the machine on level ground, lower the dump body, then stop the engine.
2. Move lock release lever (4) in the direction of the arrow.
3. Grip lock release lever (4) and move the front window slightly to the front. The lock is released.
4. Firmly hold each grip of the front window and move the front window to the front of the roof.
5. Push the front window strongly against the window frame to secure it in position.
6. Check that the front window is securely locked.



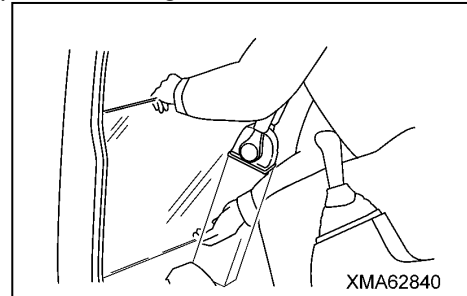
2.12.2 FRONT WINDOW (LOWER)

⚠ CAUTION

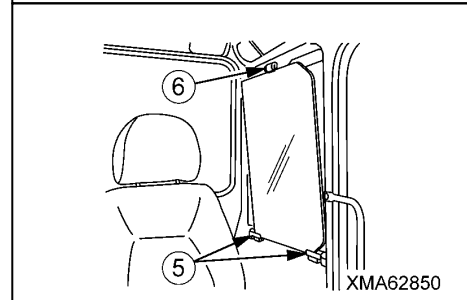
Be careful not to catch your fingers when handling the front window.

★When removing the front window (lower), open the front window (upper) before starting.

1. Lift up the front window glass and remove it from the window frame.



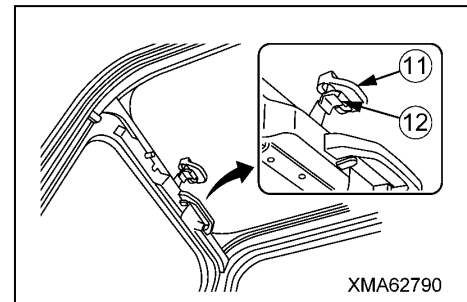
2. After removing the glass, stow it in the holder at the rear of the cab.
When stowing the window glass, insert the window glass with 2 brackets (5) at the bottom of the window frame, then fix it in position securely with top catch (6).



2.12.3 HATCH

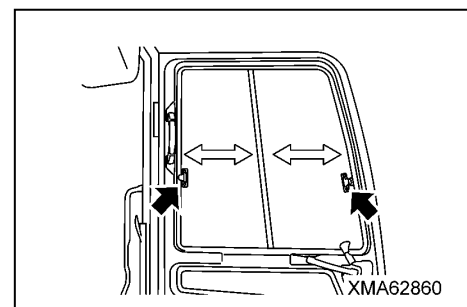
Grip handle (11) and push lock (12) up and release the lock. Then push the hatch to open it.

When closing the hatch, grip handle (11) and pull down slowly to apply the lock.



2.12.4 SLIDING WINDOW (DOOR)

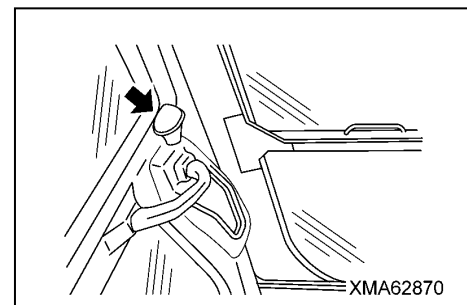
Pinch the latch of the cab door glass to release the lock, then slide the glass to open or close it.



2.12.5 CAB DOOR

Push the door latch knob to the front. The door will open.

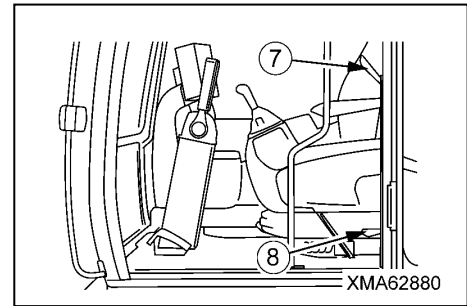
Open the door fully and secure it in position with the door catch on the side of the cab. This will improve the ventilation.



2.12.6 CAB DOOR OPEN LEVER

Push down lever (7) or lever (8).

The door is released from the door catch.

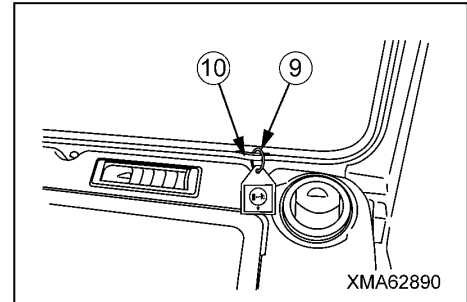


2.12.7 REAR ESCAPE WINDOW

If the cab door will not open for some reason, use the rear window as an escape exit in emergencies.

Pull ring (9), remove the seal (10) completely from the window frame rubber, then push the rear window strongly. The rear window will be removed to the outside.

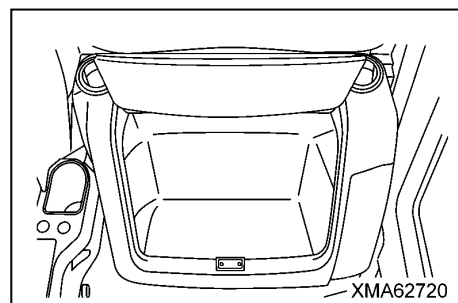
- ★ Do not remove the rear window except when using it as an emergency exit.
- ★ Do not fix the rear window in position. In addition, do not place any parts or equipment on the operator's seat or around the rear window that will prevent you from escaping.
- ★ When escaping from the rear window, remove the headrest from the operator's seat to prevent it from obstructing you.



2.13 ACCESSORIES INSIDE CAB

[1] LARGE BOX

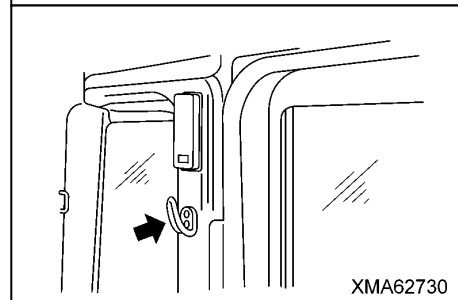
This is at the rear of the operator's compartment.
Normally, use it as a place to keep your first-aid box.



[2] COAT HOOK

This is installed at the top left inside the cab.

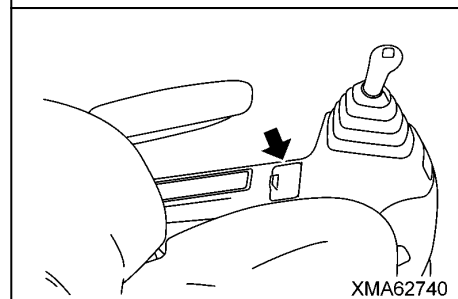
★Do not hang objects on the hook that will obstruct your view or hinder you when you operate the machine, or that will obstruct you when you get on or off the machine.



[3] ASHTRAY

This is at the rear of the dump control lever on the left console.

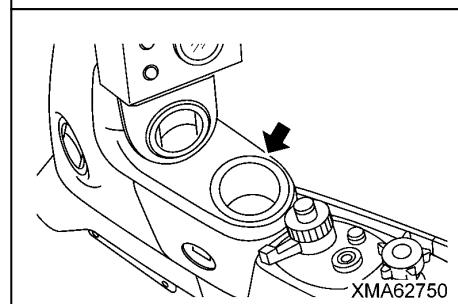
When using the ashtray, open the lid. When removing it, pull it up with the lid open.



[4] DRINK HOLDER

This is under the meter box at the front right of the operator's compartment.

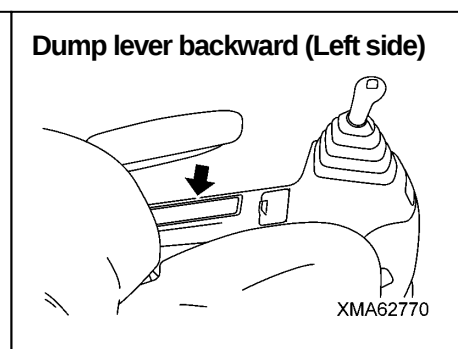
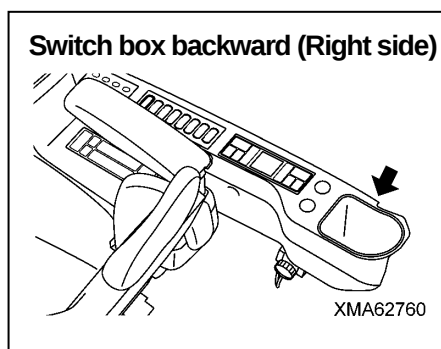
Use this to keep drink cans or PET bottles.



[5] GLOVE COMPARTMENT

Under armrest on left side of operator's seat

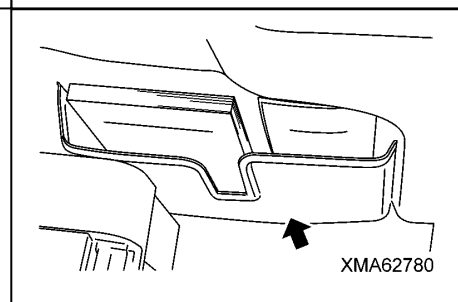
Use this to keep small objects such as cigarette packs, cell phones, or sunglasses.



[6] MAGAZINE RACK

This is at the rear left of the operator's compartment. Use it to keep maps, magazines, etc.

★Do not use it for storing tools. This will cause it to break.



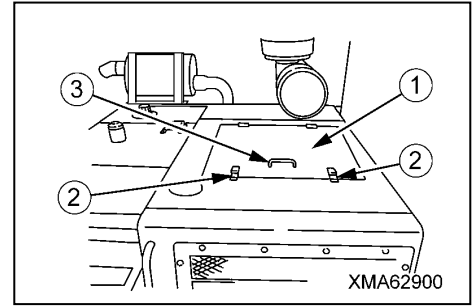
2.14 ENGINE INSPECTION COVER

When carrying out inspection and maintenance of the engine, do as follows to open the inspection cover.

1. Release 2 catches (2) at the left and right of inspection cover (1), then pull handle (3) up.

The cover is held in the open position by the damper.

2. After completion of inspection and maintenance, grip handle (3) of the inspection cover (1) and return it to the frame, then fit left and right catches (2).



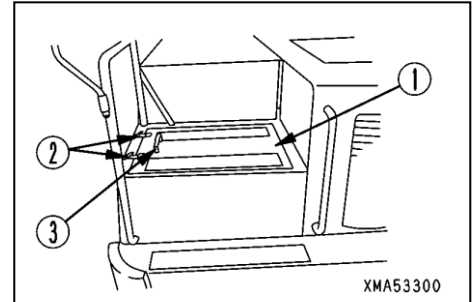
2.15 BATTERY INSPECTION COVER

When carrying out inspection and maintenance of the battery, do as follows to open the inspection cover.

1. Release 2 catches (2) at the front and rear of inspection cover (1), then pull handle (3) up.

The cover is held in the open position by the damper.

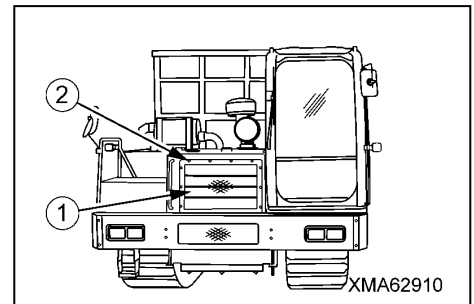
2. After completion of inspection and maintenance, grip handle (3) of the inspection cover (1) and return it to the frame, then fit front and rear catches (2).



2.16 FRONT GRILL

When cleaning the radiator fins or oil cooler fins, do as follows to remove the front grill.

1. Remove 9 mounting bolts (2), then remove front grill (1).
2. After completion of inspection and maintenance, follow the reverse procedure to removal and install the front grill (1).



2.17 UNDERCOVER

When changing the coolant, do as follows to remove the undercover.

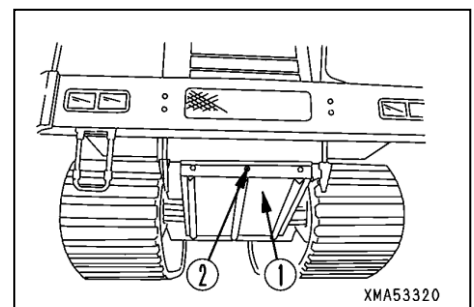
1. Set a garage jack under the center of undercover (1).

★Set a wooden block between the jack and the undercover to prevent damage to the undercover.

2. Remove 3 mounting bolts (2), then lower the jack and open undercover (1).

★If it is necessary to remove undercover (1), use a wooden hammer and knock the rear portion of undercover (1) out to the right side to disconnect the portion connecting it to the frame.

3. After completion of inspection and maintenance, put undercover (1) on the jack, set it at the mounting position under the machine, then tighten mounting bolts (2).



3. OPERATION

3.1 CHECK BEFORE STARTING ENGINE

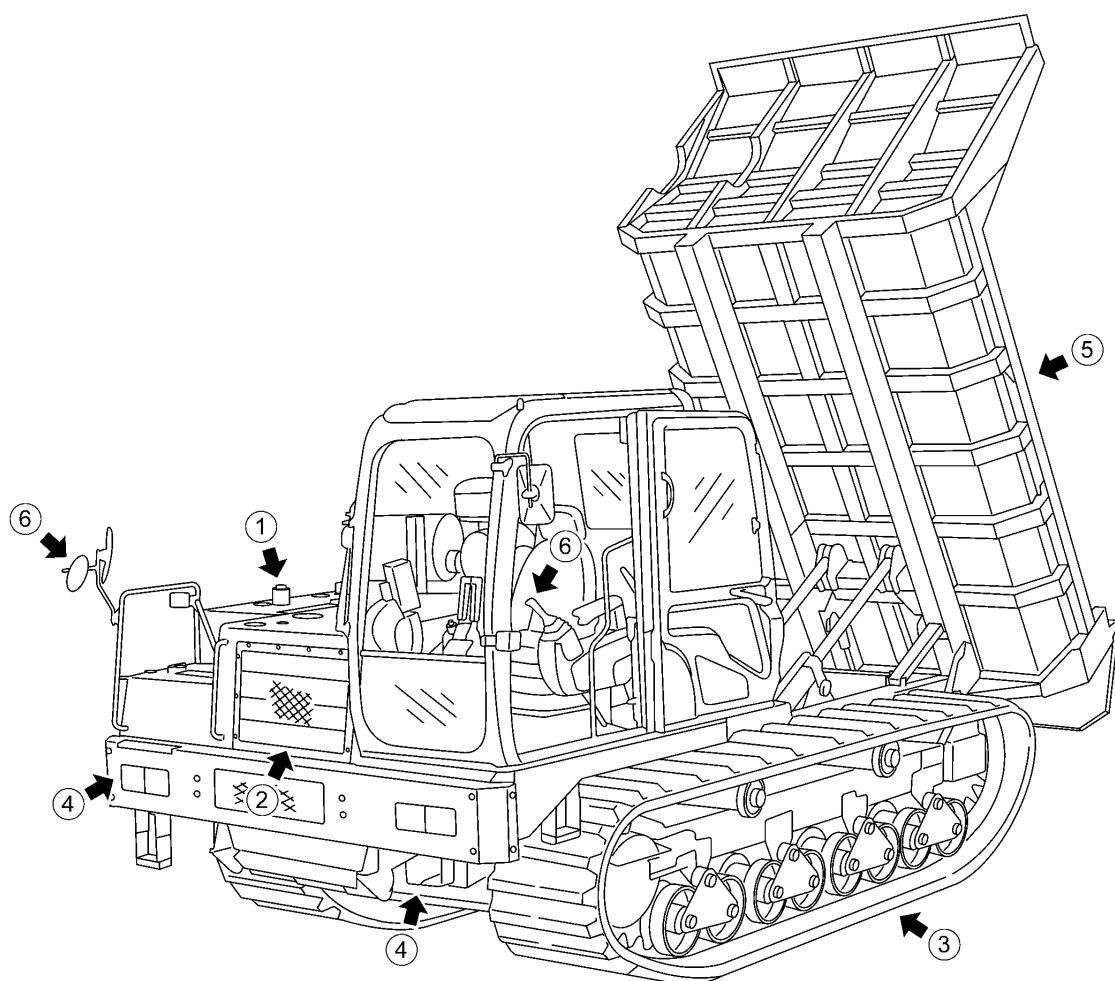
[1] WALK-AROUND CHECK

⚠ WARNING

- Check carefully that there are no dead leaves, waste paper, oil, grease, or other flammable materials around the battery or the muffler, or other parts of the engine which reach high temperatures. These flammable materials can cause fire.
- Check carefully that there is no leakage of oil or fuel from the hydraulic hoses or fuel hoses. If any cracks, deformation, or other abnormalities are found, repair them immediately. These problems will cause fire, abnormalities in travel, or problems with raising or lowering the dump body.
- Always use the handrails and steps when getting on or off the machine.

Before starting the engine at the beginning of the day's work, look under and around the machine and check the following points.

- Check for dead leaves, waste paper, dust, oil, or grease at places which reach high temperatures.
- Check for loose or missing bolts, nuts, or connecting pins.
- Check for leakage of oil, fuel, or coolant.
- Check for hanging electrical wires or loose connections.



XMA62920

(1) Check around engine

Check for dead leaves, waste paper, dust, oil, grease, or other flammable materials, and check for leakage of fuel, oil, or coolant from the engine. Remove any flammable materials, and repair any abnormalities.

Check for hanging electrical wires, loose connections, or signs of burns around the starting motor, alternator, battery, or battery relay. Repair any abnormality.

(2) Check inside front grill

Check the front surface of the radiator and oil cooler for dead leaves, waste paper, dust, or other flammable materials or materials which cause clogging. Remove any such materials.

(3) Check undercarriage (rubber crawler, track roller, carrier roller, sprocket, idler)

Check for any wear, breaks, or cracks. Check for any loose or missing nuts or bolts. Tighten if necessary and repair any abnormalities.

(4) Check under machine

Check the hydraulic tank and fuel tank for leakage, and check the ground under the machine for traces of oil, fuel, or coolant. If any signs of leakage are found, check for the source of the leakage and repair any abnormality.

Check for loose or missing nuts and bolts from the undercover and other parts, and tighten if necessary.

(5) Check dump body, safety bar

Check for any wear, breaks, or cracks. Check for any loose or missing nuts, bolts, or connecting pins. Tighten if necessary and repair any abnormalities.

Check for any leakage of oil from the hydraulic hoses or hydraulic cylinders, and repair any abnormality.

(6) Check mirrors, lamps, meter box

Check for any damage to the mirrors, lamps, or meters, and repair or replace if there is any abnormality.

[2] CHECKS BEFORE STARTING

Before starting the engine at the beginning of the day's work, carry out the following checks before starting and checks when required.

For details of the checks before starting, checks when required, and other maintenance, see "MAINTENANCE".

1. Checks when required

- [1] Check, adjust rubber crawler tension
- [2] Check rubber crawler for damage, wear
- [3] Clean, replace air cleaner
- [4] Clean inside of cooling system and change coolant
- [5] Check, clean radiator fins, oil cooler fins, inter cooler fins, Air conditioner condenser fins
- [6] Check window washer fluid level, add fluid
- [7] Check refrigerant (gas) volume
- [8] Clean, replace air filter of air conditioner
- [9] Clean, replace fresh filter of air conditioner

2. Checks before starting

- [1] Check coolant level, add water
- [2] Check fuel level, add fuel
- [3] Check engine lubricating oil level, add oil
- [4] Check oil level in hydraulic tank, add oil
- [5] Check, adjust fan belt tension
- [6] Check, adjust air compressor belt tension
- [7] Check electric wiring
- [8] Check operation of switches, lamps, gauges
- [9] Check operation of horn, alarm buzzer

[3] ADJUST OPERATOR'S SEAT

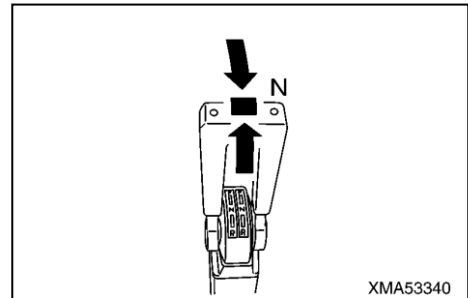
WARNING

- **Adjust the operator's seat before operations. Always adjust the operator's seat after it has been used by another operator.**
- **Adjust the operator's seat so that you can operate the travel lever easily with your back against the seat backrest.**
- **Never adjust the seat when traveling.**
- **Always lower the armrest and fasten the seat belt before starting operation.**
The armrest and seat belt are installed to prevent the danger of the operator falling from the operator's seat if the machine tips at an angle when traveling.

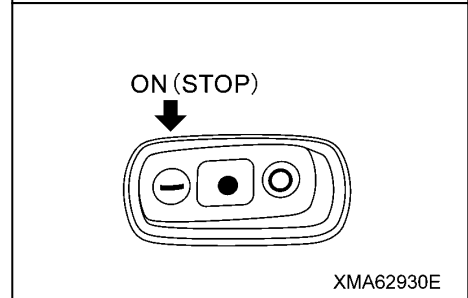
For details of adjusting the operator's seat, see "2.10 OPERATOR'S SEAT".

3.2 OPERATIONS AND CHECKS BEFORE STARTING ENGINE

1. Check that the left and right travel levers are at the N position.

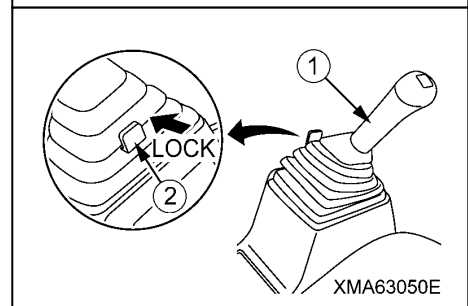


2. Check that the parking brake switch is at the ON (STOP) position.



3. Check that the dump body is completely lowered and that dump control lever (1) is at the HOLD position.

4. Check that lock lever (2) of the dump control lever is at the LOCK position.



3.3 STARTING ENGINE

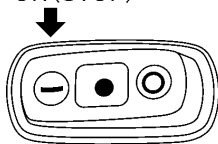
⚠ WARNING

Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.

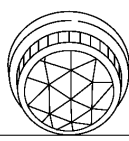
NOTICE

- When starting the engine, be sure to press the parking brake switch to set it to the ON (STOP) position. The engine cannot be started without setting the parking brake switch to this ON (STOP) position.
- Do not try to start the engine immediately when inserting the starting switch. Turn the switch to the ON position and wait for approx. 6 seconds. During this time, the engine diagnostic lamp (orange) and engine warning lamp (red) on the meter box surface light up and then go out.
- Do not crank the starting motor continuously for more than 15 seconds. If the engine does not start, wait for at least 2 minutes before trying to start again.

ON (STOP)

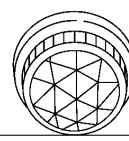


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Warning

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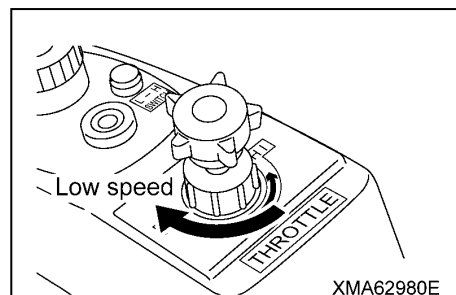


Diagnostic

XMA63620E

[1] STARTING ENGINE

1. Turn the engine speed control dial to the low speed position.



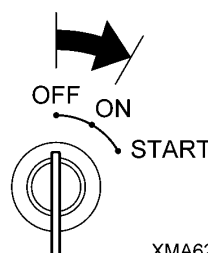
XMA62980E

2. Insert the key in the starting switch, turn it to the ON position, and check that the engine diagnostic lamp (orange) and engine warning lamp (red) light up.

Wait for approx. 6 seconds and check that the lamps go out.

⚠ CAUTION

If the starting motor is turned on by turning the key of the starting switch to the ON position before the engine diagnostic lamp (orange) and the engine warning lamp (red) go out, the starting motor may be damaged and fail.



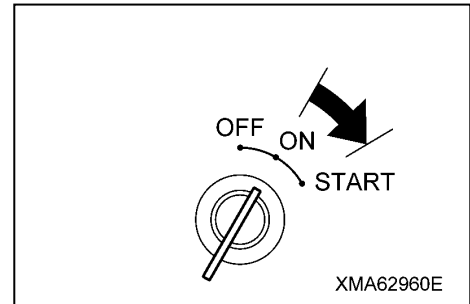
XMA62950E

3. Start the engine by turning the key of the starting switch to the START position and activating the starting motor.

★ In cold weather conditions, the intake air heater starts automatically to preheat the intake air according to the condition of the intake air temperature and coolant temperature. For this reason, the starting motor may turn over a little longer before the engine starts up.

! CAUTION

When starting the engine, do not keep turning over the starting motor for more than 15 seconds at a time. If you do so, the starting motor may fail or you may drain the battery.



4. If the engine does not start on the first try, return the key of the starting switch to the OFF position, wait for approximately two minutes for the battery to recover and the starting motor to cool down, then turn the key to the ON position again (as explained in Steps 2 and 3).

! CAUTION

If you try to start the engine more times without stopping the starting motor completely, the starting motor pinion and the engine ring gears may be damaged and fail.

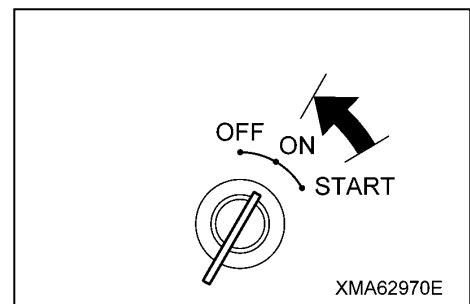
5. If the engine does not start even when you have tried to start it twice, there may be some problems with the battery or the engine starting circuit. Check the battery voltage, the electrical wiring of the starting motor, and other factors.

6. After the engine starts, release the key.

★ The key will return automatically to the ON position.

! CAUTION

Never turn the key of the starting switch to the START position while the engine is running. Doing so may damage the starting motor pinion, inside parts, or engine ring gears.



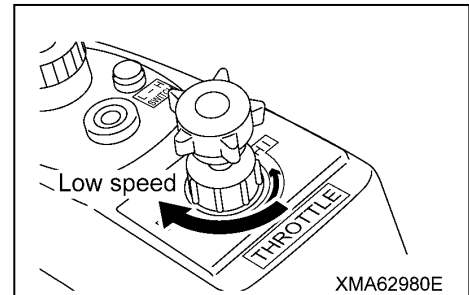
[2] AFTER STARTING (warming-up operation)

NOTICE

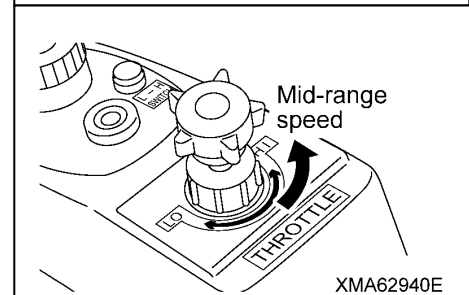
Run the engine under light load until the engine coolant temperature is within a range of 50°C - 80°C (122°F - 176°F). Do not suddenly accelerate the engine.

After the engine starts, carry out the warming-up operation as follows.

1. Turn the engine speed control dial to the low speed position, and run for approx. 5 minutes under no load.



2. Turn the engine speed control dial to the mid-range speed position, and run for approx. 5 minutes under no load.



3. Operate dump control lever (1) to the RAISE position, raise the dump body to the maximum height, and run the engine in this condition for approx. 5 minutes.

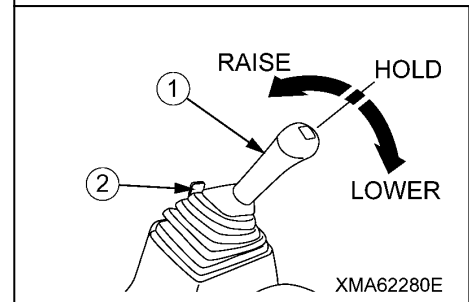
★Keep dump control lever (1) at the RAISE position.

4. Keep dump control lever (1) at the RAISE position, turn the engine speed control dial to the right (clockwise) further to run the engine at high speed, and run the engine in this condition for 2 - 5 minutes.

This operation warms up the hydraulic oil and makes the operation of the travel and dump body smooth.

5. Check that the meter box gauges, monitor, charge lamps, parking brake buzzer, and backup buzzer work normally.

6. Check that there is no abnormality in the exhaust gas color, engine noise, or vibration.

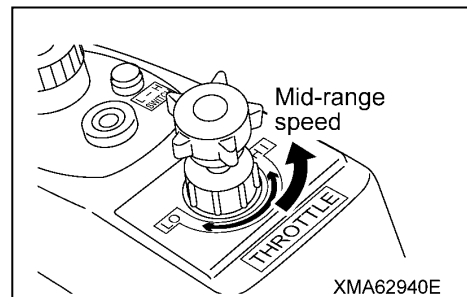


3.4 MOVING MACHINE OFF

⚠ WARNING

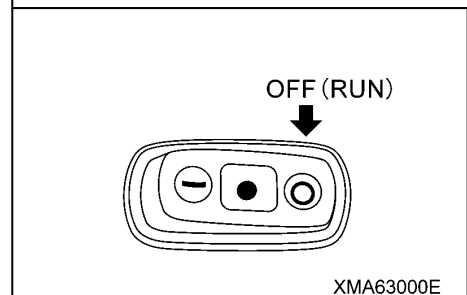
- Check that there is no one in the area around the machine before starting. Check particularly carefully around the dump body at the rear of the machine.
- When starting the machine off, check that the surrounding area is safe, and sound the horn to inform people that you are starting.
- When starting the machine off, operate the travel lever gradually. The more the travel lever is operated, the faster the machine will travel. Do not start the machine off suddenly.
- When starting uphill on slopes, always start in the low speed range and run the engine at high speed. Keep the travel lever as close as possible to the N position.
- When traveling forward downhill, if the angle of the slope goes above a certain range, the slope alarm buzzer at the rear of the operator's compartment sounds to warn the operator. It is dangerous to start the machine off with the dump body loaded if the slope alarm buzzer sounds. Reduce the engine to low speed, set the travel lever close to the N position, and start the machine off carefully.

1. Turn the engine speed control dial to the mid-range speed position.



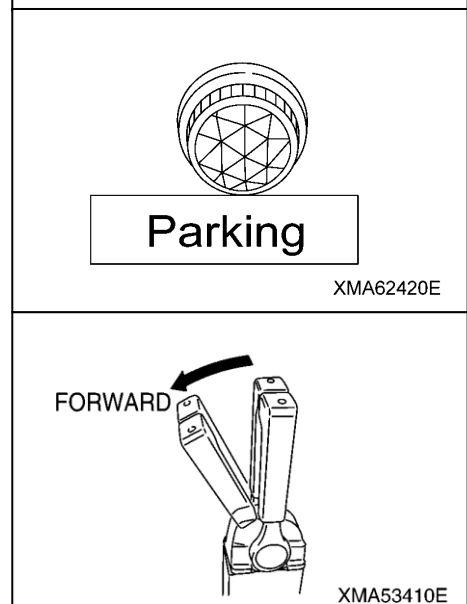
2. Set the parking brake switch to the OFF (RUN) position to release the parking brake.

- ★ Check that the parking brake pilot lamp on the meter box goes out and that the parking brake buzzer stops sounding.



3. Operate the left and right travel levers gradually and start the machine off slowly.

- ★ When starting off in reverse, check that the backup buzzer sounds when the travel lever is operated to the REVERSE position.



3.5 SHIFTING SPEED RANGE AND

CHANGING BETWEEN FORWARD AND REVERSE

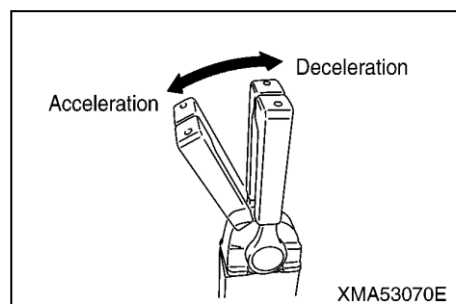
WARNING

- When traveling, select a travel speed to match the travel surface and ground condition.
- When traveling on a slope, be sure to set the travel speed range to the low speed range. Also, when traveling on a slope, travel straight forward.
- When going down a slope, always travel in the low speed range. Run the engine at low speed and operate the travel lever a maximum of half way from the N position. Traveling at excessive speed is dangerous and will cause overrunning.
- When traveling up a slope, always travel in the low speed range. Run the engine at the rated speed and keep the travel lever close to the N position. Always travel directly up the slope.
- When traveling forward downhill, if the angle of the slope goes above a certain range, the slope alarm buzzer at the rear of the operator's compartment sounds to warn the operator.
It is dangerous to start the machine off with the dump body loaded if the slope alarm buzzer sounds. Reduce the engine to low speed, set the travel lever close to the N position, and start the machine off carefully.
- If a dangerous state occurs by any possibility, and when it becomes necessary to stop the machine urgently, press the parking brake switch to set it to the ON (STOP) position or turn the engine starting switch to the OFF position to stop the engine.
- When switching between FORWARD and REVERSE, always stop the machine before shifting direction.
If the direction of travel is shifted suddenly between FORWARD and REVERSE, it will cause failures such as reverse rotation of the engine.
- When switching the travel speed range, always stop the machine first before operating the switch.

[1] CHANGING SPEED

The travel speed can be changed by changing the amount that the travel lever is operated.

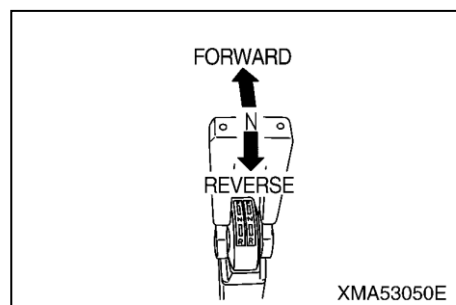
1. The closer the travel lever is to the N position, the lower the travel speed.
2. The further the travel lever is from the N position, the higher the travel speed.



[2] SHIFTING BETWEEN FORWARD AND REVERSE

The direction of travel can be changed by changing the direction of operation of the travel lever.

- When the travel lever is pushed forward, the machine will travel forward.
- When the travel lever is pulled back, the machine will travel in reverse.
★ Check that the backup buzzer sounds when the travel lever is operated to the REVERSE position.



[3] SWITCHING BETWEEN HIGH AND LOW SPEED RANGES

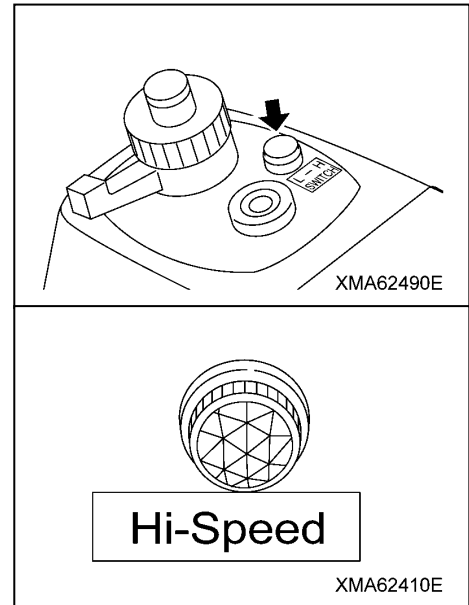
The travel speed range is changed by operating the Hi-Lo speed range selector switch.

- When the switch is pressed, the mechanism inside the travel motor is switched and the machine changes to the high speed range.

At the same time, the high-speed lamp on the meter box lights up to show that the machine is traveling in the high speed range.

- If the switch is pressed again, the mechanism inside the travel motor returns to its original position, and the machine travels in the low speed range.

At the same time, the high-speed lamp on the meter box goes out to show that the machine is traveling in the low speed range.



3.6 STEERING MACHINE

WARNING

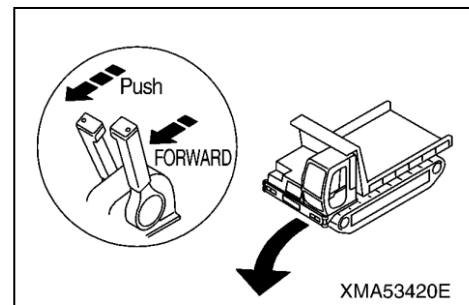
- Do not turn the machine sharply at high speed; do not carry spin turns unless necessary. This will damage the crawler and hydraulic equipment, and there is also danger that the machine may hit other objects.
- The machine may slip to the side if it is turned on a slope, so avoid turning on slopes as far as possible. Be particularly careful about turning on soft ground or clay ground.
- When traveling forward downhill, if the angle of the slope goes above a certain range, the slope alarm buzzer at the rear of the operator's compartment sounds to warn the operator. It is dangerous to turn with the dump body loaded if the slope alarm buzzer sounds. Dump the load immediately to empty the dump body, then turn slowly.
- If a dangerous state occurs by any possibility, and when it becomes necessary to stop the machine urgently, press the parking brake switch to set it to the ON (STOP) position or turn the engine starting switch to the OFF position to stop the engine.

[1] GRADUAL TURN

The radius of the turn is determined by the difference in the amount that the left and right travel levers are operated. The larger the difference between the left and right travel levers, the smaller the radius of the turn will be.

[Turning while increasing speed]

- To make a gradual turn when traveling forward, push the travel lever forward a small amount on the opposite side to the direction of the turn. To make a rapid turn when traveling forward, push the travel lever forward a large amount on the opposite side to the direction of the turn.
 - ★ When turning to the left, push the right travel lever forward.
 - When turning to the right, push the left travel lever forward.
- To make a gradual turn when traveling in reverse, pull the travel lever back a small amount on the opposite side to the direction of the turn. To make a rapid turn when traveling in reverse, pull the travel lever back a large amount on the opposite side to the direction of the turn.
 - ★ When turning to the left, pull the right travel lever back.
 - When turning to the right, pull the left travel lever back.



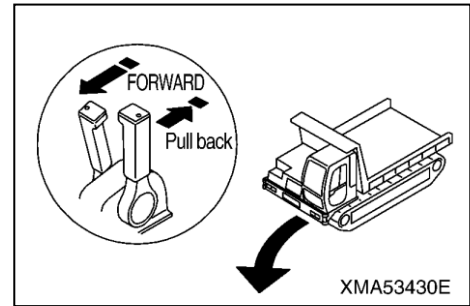
[Turning while decreasing speed]

- To make a gradual turn when traveling forward, pull the travel lever back a small amount in the direction of STOP on the same side as the direction of the turn.

To make a rapid turn when traveling forward, pull the travel lever back a large amount on the same side as the direction of the turn.

- ★When turning to the left, pull the left travel lever back towards STOP.

When turning to the right, pull the right travel lever back towards STOP.



- To make a gradual turn when traveling in reverse, push the travel lever back a small amount in the direction of STOP on the same side as the direction of the turn.

To make a rapid turn when traveling forward, push the travel lever back a large amount on the same side as the direction of the turn.

- ★When turning to the left, push the left travel lever back towards STOP.

When turning to the right, push the right travel lever back toward

[2] PIVOT TURN

Operate the travel lever on one side and set the other lever at the N position.

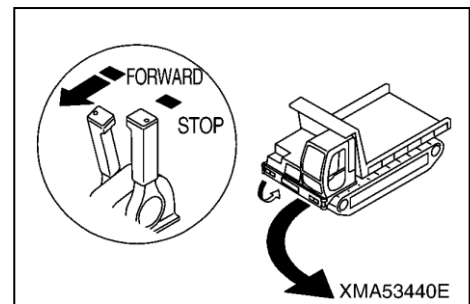
Only the crawler on the side that is operated will rotate, so the machine will make a pivot turn.

- ★To turn to the left when traveling forward, push the right travel lever forward.

To turn to the right when traveling forward, push the left travel lever forward.

- ★To turn to the left when traveling in reverse, pull the right travel lever back.

To turn to the right when traveling in reverse, pull the left travel lever back.

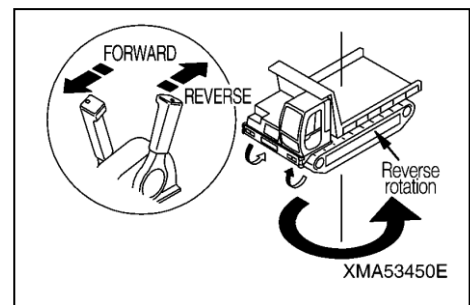


[3] SPIN TURN (Counter rotation turn)

Operate the left and right travel levers in opposite directions. The left and right crawlers will rotate in opposite directions and the machine will make a spin turn.

- ★To turn to the left, push the right travel lever forward and pull the left travel lever back.

- ★To turn to the right, push the left travel lever forward and pull the left travel lever back.



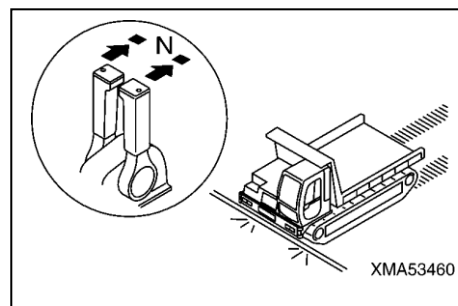
3.7 STOPPING MACHINE

⚠ WARNING

- Avoid stopping suddenly. Always leave room to spare when stopping.
- Never use the parking brake to stop the machine. Using the parking brake will cause the machine to stop suddenly and will also damage the machine.
- When stopping the machine, return the left and right travel levers at the same time to the N position. If the left and right levers are not operated at the same time, there is danger that the brakes will pull to one side.
- When stopping, do not return the travel lever past the N position. If the travel lever is moved past the N position, it will cause failures such as reverse rotation of the engine.

Return the left and right travel levers to the N position.

The hydraulic brake is automatically applied and the machine will stop.



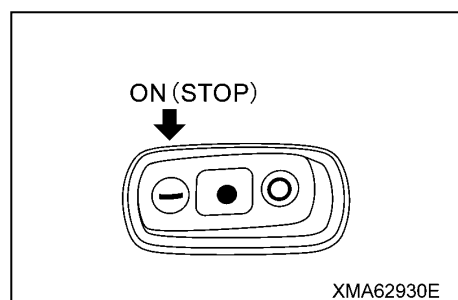
3.8 EMERGENCY STOPPING MACHINE

⚠ WARNING

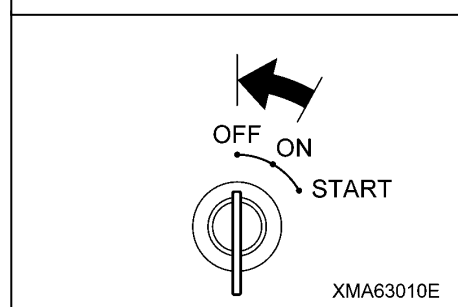
If a dangerous state occurs by any possibility, and when it becomes necessary to stop the machine urgently, press the parking brake switch to set it to the ON (STOP) position or turn the engine starting switch to the OFF position to stop the engine.

There are following 2 methods when making an emergency stop of the machine.

- Push in the parking brake switch to apply the parking brake.



- Turn back the starting switch key to the OFF position to stop the engine.



3.9 PARKING MACHINE

⚠ WARNING

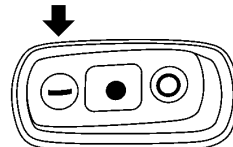
Choose firm, level ground to park the machine.

If the machine must be parked on the slope, apply the parking brake and block the tracks to prevent the machine from moving.

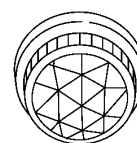
Set the parking brake switch to the ON (STOP) position to apply the parking brake.

★ Check that the parking brake lamp on the meter box lights up and that the parking brake buzzer sounds. Press the parking brake switch in to apply the parking brake.

ON (STOP)



XMA62930E



Parking

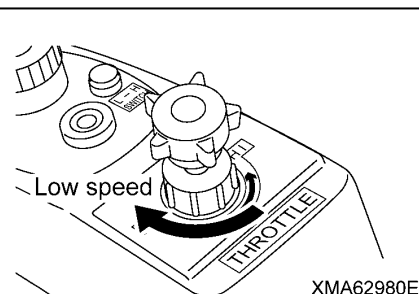
XMA62420E

3.10 STOPPING ENGINE

NOTICE

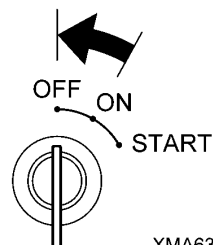
- Do not stop the engine before it has properly cooled down. Stopping the machine before it cools down will shorten the service life of the engine. Never stop the engine suddenly except in emergency.
- If the engine has overheated, do not stop it suddenly. Run the engine at a mid-range speed and gradually cool it down before stopping the engine.

1. Turn the engine speed control dial to the low speed position to reduce the engine speed and run the engine at idling for 5 minutes to cool the engine down.



XMA62980E

2. Return the key in the starting switch to the OFF position.



XMA63010E

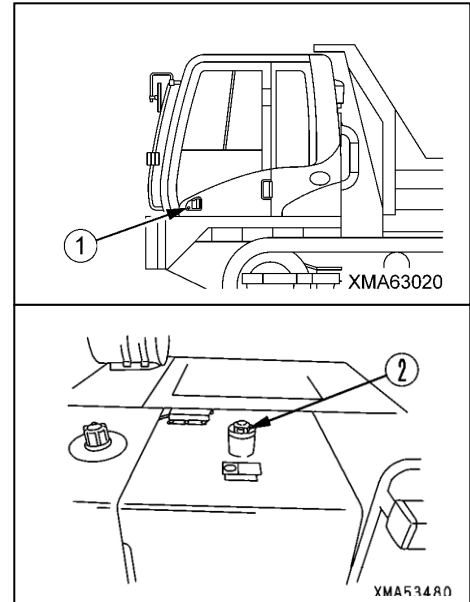
3.11 CHECKS AFTER STOPPING ENGINE

- Carry out a walk-around check and check the undercarriage, dump body, and bodywork; check also for leakage of oil and water. If any abnormality is found, repair it.
- Fill the fuel tank with fuel.
- Remove any dead leaves, waste paper, or other flammable materials from around the engine that may cause fire.
- Remove any mud or snow stuck to the undercarriage or dump body.

3.12 LOCKING

To prevent vandalism, the following locations can be locked.

(1) Cab door



(2) Fuel tank filler cap

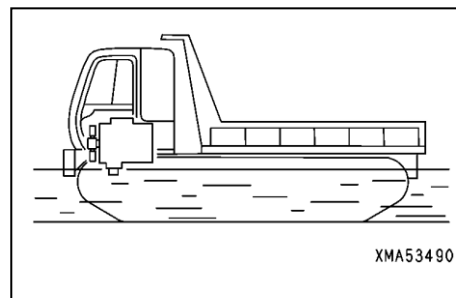
3.13 PRECAUTIONS WHEN TRAVELING

WARNING

Always follow these precautions when traveling. Failure to follow these precautions may lead to a serious injury or accident.

[1] PERMISSIBLE WATER DEPTH

When operating in water, do not let the bottom surface of the engine oil pan go below the water surface.

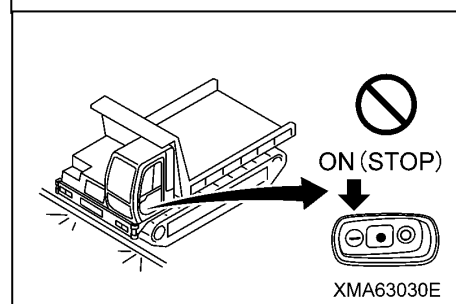


[2] USE OF PARKING BRAKE

When stopping the machine, return the travel lever to the N position. The hydraulic brake inside the HST is automatically applied to stop the machine. Never use the parking brake to stop the machine.

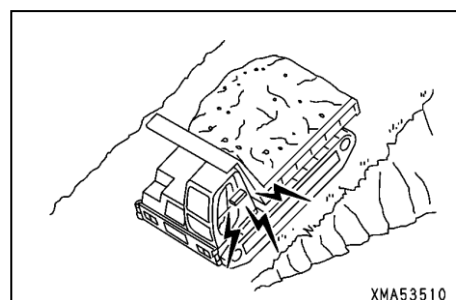
Using the parking brake will not only stop the machine suddenly, but will also cause failure of the travel motor.

Do not use the parking brake to stop the machine except when it is necessary to stop the machine suddenly in emergencies.



[3] PAY ATTENTION TO ANGLE ALARM BUZZER

If the angle exceeds a certain angle on slopes, the slope alarm buzzer on the roof sounds to warn the operator. It is dangerous to travel with the dump body loaded if the angle alarm buzzer sounds. Reduce the engine to low speed, set the travel lever close to the N position, and drive the machine carefully.



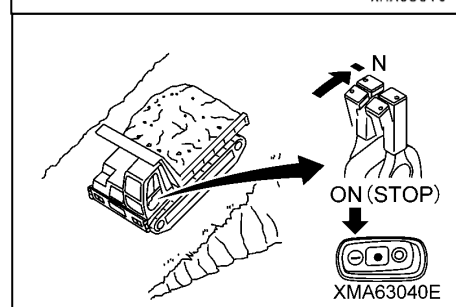
[4] PRECAUTIONS WHEN ENGINE STOPS ON SLOPES

If the engine stops on a slope, do as follows.

1. Return the travel lever to the N position.
2. Press the parking brake switch to the ON (STOP) position.

★Check that the parking brake lamp lights up.

3. Start the engine again.



[5] PRECAUTIONS WITH FUEL LEVEL ON SLOPES

If the fuel level in the fuel tank is low and the machine is on a slope or there is swaying, the engine may suck in air, which may cause the engine to stop.

Always maintain a sufficient level of fuel in the fuel tank.

[6] PRECAUTIONS FOR OIL LEVELS ON SLOPES

When traveling or carrying out operations on steep slopes, check the oil level in the hydraulic tank and engine, and add oil to the high level.

This will prevent failure caused by lack of oil.

4. HANDLING DUMP BODY

4.1 OPERATING DUMP BODY

WARNING

- Always stop the machine before operating the dump body to the dump position.
 - Position a signalman to ensure safety in the surrounding area, and follow his signals when carrying out the dumping operation.
 - Always operate the dump control lever slowly. If the dump body is suddenly stopped or it is allowed to hit the frame when it is lowered, it will cause failures and will also cause problems of safety in the surrounding area.
 - When leaving the operator's compartment with the dump body raised, always lock the dump control lever.
- In addition, use the safety bar to prevent the dump body from coming down.
Even when the engine is stopped, it is possible to lower the dump body.

Operate the dump body as follows.

★The further the dump control lever is operated, the faster the dump body will move.

★When the dump control lever is released, it automatically returns to the HOLD position.

1. Stop the machine completely. For details, see "3.7 STOPPING MACHINE".

2. Turn the engine speed control dial to the high speed position and raise the engine speed sufficiently.

3. Pull the dump control lever (1) up.

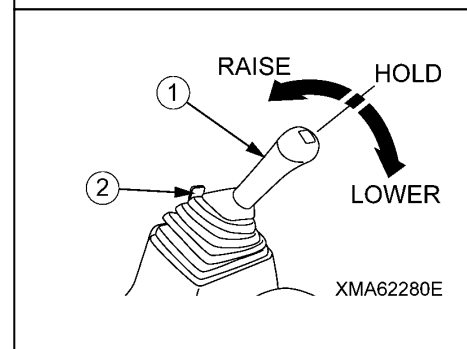
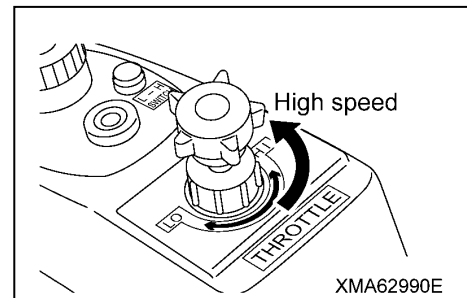
The dump body will rise.

★When the dump body comes near to the max. height, push the dump control lever down to reduce the speed of the dump body.

4. Push the dump control lever (1) down.

The dump body will go down.

★When the dump body comes near to the frame, pull the dump control lever up to reduce the speed of the dump body.



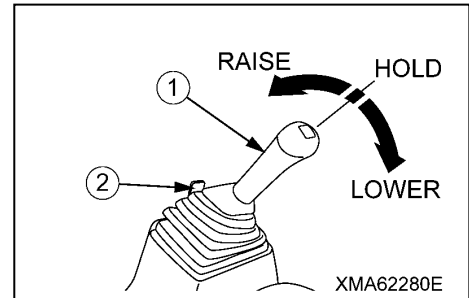
4.2 LOCKING DUMP CONTROL LEVER

WARNING

If you leave the operator's seat with the dump track raised, always lock the dump control lever. The dump body can be lowered even when the engine is stopped.

Lock the dump control lever as follows.

1. Release dump control lever (1) and set it to the HOLD position.

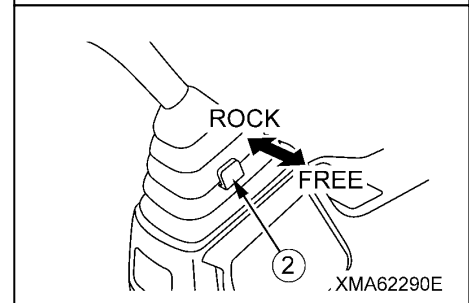


2. Push lock lever (2) to inside.

This will lock dump control lever (1).

3. To release the lock from the dump control lever, pull lock lever (2) to the outside.

This will release the lock from dump control lever (1).



4.3 OPERATING SAFETY BAR

WARNING

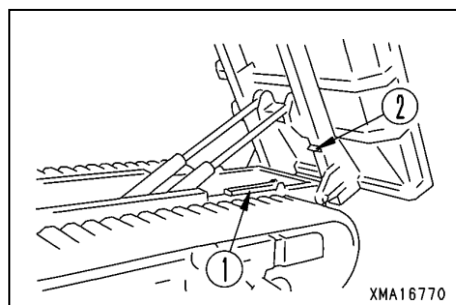
- If it is necessary to go under the dump body to carry out inspection and maintenance, always use the safety bar to prevent the dump body from coming down.
- When using the safety bar, check that the bar is fitted securely to the dump body holder.
- The safety bar is a safety device used during inspection and maintenance. Do not use the safety bar to support the dump body when replacing the dump cylinder, valve, hydraulic hoses, or other equipment. In such cases always support the dump body with a crane.

NOTICE

When setting the safety bar in position, never start the engine and operate the dump control lever to the LOWER position.
If this is done, the safety bar will hit the dump body and may break.

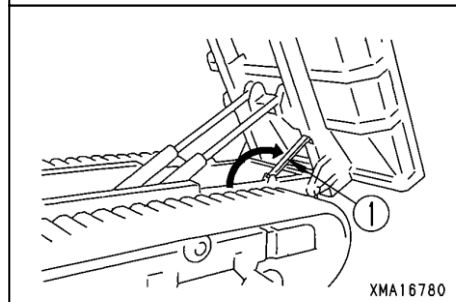
[1] INSTALLING SAFETY BAR

1. Raise the dump body to at least 45° . For details, see “4.1 OPERATING DUMP BODY”.
2. Raise safety bar (1) and set it in holder (2) in the bottom surface of the dump body.
3. Stop the engine and push the dump control lever down. The dump body will go down under its own weight.
★If the dump body does not go down under its own weight, start the engine and operate the dump control lever to lower it to a point where the dump body and safety bar still do not come into contact.



[2] REMOVING SAFETY BAR

1. Raise the dump body fully. For details, see “4.1 OPERATING DUMP BODY”.
2. Return safety bar (1) to the fixed position on top of the frame.



4.4 PRECAUTIONS DURING OPERATION

WARNING

Always follow these precautions when carrying out operations.
Failure to follow these precautions may lead to a serious injury or accident.

[1] PRECAUTIONS FOR JOBSITES

- As far as possible, select firm, level ground.

When working on slopes or extremely uneven ground, the change in the center of gravity when the dump is operated may cause the machine tip over.

- As far as possible, avoid the edge of cliffs or ground which may collapse.

If work must be carried out in such places, set up blocks to prevent the machine from going near the edge or near retaining walls, or position a signalman and take other necessary steps for ensuring safety.

- When dumping a load from a high point, always position a signalman and follow the signals.

The signalman must always check the safety of the dumping point carefully.

[2] PRECAUTIONS FOR LOAD

- Do not overload the machine.

Do not fit side racks or plates, or make other modifications to extend the size of the dump body to increase the load.

- When loading the dump body, always spread the load uniformly.

Loading the dump body unevenly will cause instability and may cause the machine to tip over.

- Be careful not to let the loading bucket or crane hook hit the dump body or flaps.

- When loading large rocks, first load the dump body with fine soil, then load the rocks on top of that.

- When handling long objects, such as logs or steel beams, load carefully and pay careful consideration to the center of gravity so that the load does not collapse or sway excessively during hauling operations.

Tie down such loads securely with rope.

If necessary, use blocks and take steps to prevent the rope from slipping.

- When loading stacks of U-shaped ditch liners or concrete blocks, lay a steel sheet and secure with rope, and take other steps to prevent the load from slipping.

5. MANUAL RELEASE OF PARKING BRAKE

5.1 OUTLINE OF PARKING BRAKE

The parking brake is built into the left and right travel motors.

When the parking brake is released under normal conditions, the parking brake switch is operated and uses the hydraulic power generated when the engine is running.

If the engine is stopped and there is no hydraulic power, even if the parking brake switch is set to the RUN position, the parking brake will remain applied.

If any failure should occur in the HST (pump, motor) or engine, and the engine cannot be started again, release the parking brake manually.

5.2 METHOD FOR MANUAL RELEASE OF PARKING BRAKE

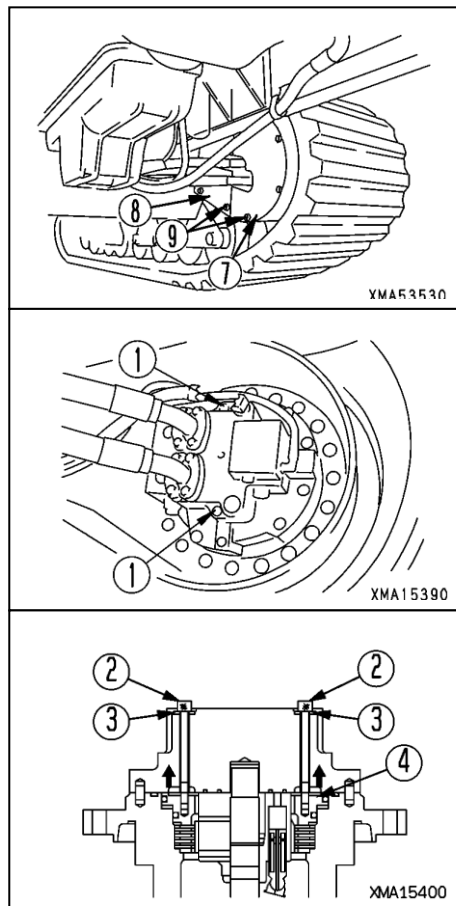
⚠ WARNING

- When releasing the parking brake manually, loosen the hydraulic tank cap slowly, then remove it and wait for the oil temperature to go down fully.
- The circuit inside the HST is still under internal pressure, so when removing plugs and hoses, do not stand directly in front of them; loosen them gradually before removing.
- When the hoses are removed, a large quantity of oil will come out, so always catch the oil in an oil container.
- When releasing the parking brake manually, the operation involves dangerous work, such as removing high-pressure hoses, so always pay careful attention to safety during the operation and contact your distributor before starting the operation.

[1] PROCEDURE FOR RELEASING PARKING BRAKE MANUALLY.

When releasing the parking brake manually, do as follows.

1. Remove the undercover. For details, see "2.21 UNDERCOVER".
2. Remove mounting bolts (9) (8 on each side), then remove front and rear travel motor covers (7) and (8) (2 on each side).
3. Remove plugs (1) (2 on each side) from the left and right travel motors.
4. Set washer (3) to the supplied bolt (2) (M10 x 100), then pass the bolt through the plug hole.
5. Turn bolt (2) clockwise to screw it into the thread of brake piston (4) inside the travel motor.
 - ★Screw in bolt (2) until the seat surface of washer (3) contacts the cover.
6. Turn bolt (2) two more turns clockwise.
 - ★When this is done, the brake piston is pulled towards the cover and the parking brake is released.

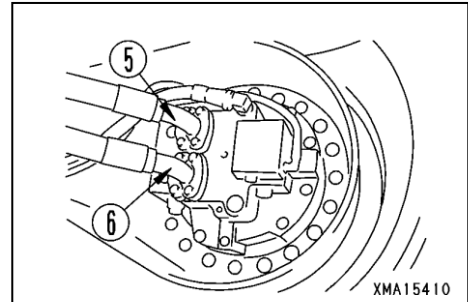


[2] PREPARATIONS FOR MOVING FAILED MACHINE

NOTICE

When moving a machine which has had its parking brake released manually, the distance of movement should be only the few meters needed to move it to a safe place.
Moving the machine a long distance will cause failure of the HST.
When moving a failed machine, carry out the following preparatory work.

1. Remove either high-pressure hose (5) (or (6)) connected to the travel motor.
★After removing the hose, cover the hose mount with cloth or vinyl to stop the oil flow.
2. Remove the other high-pressure hose ((6) or (5), whichever was not removed in Step 1) at the pump end.
3. Connect the mouthpiece at the pump end of high-pressure hose (6) (or (5)) removed in Step 2 to the mounting hole at the travel motor end of the high-pressure hose (5) (or (6)) removed in Step 1.



6. HANDLING RUBBER CRAWLER

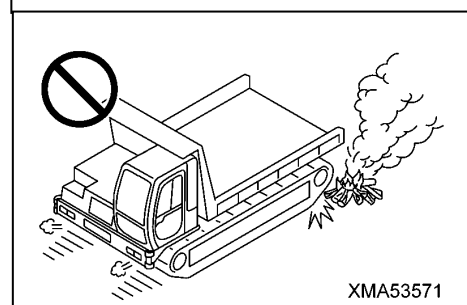
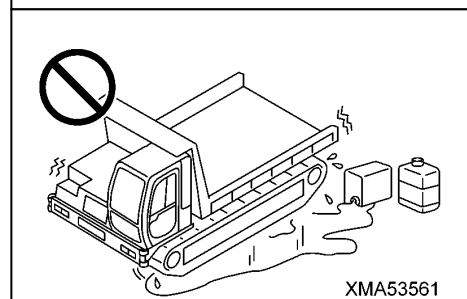
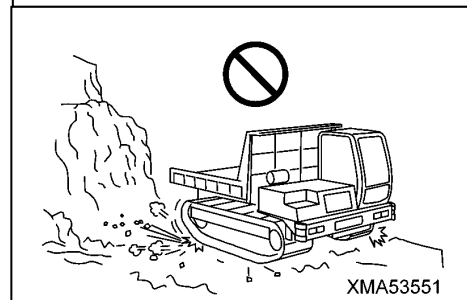
6.1 FEATURES OF RUBBER CRAWLER

The properties of the material used for the rubber crawlers gives it many advantages, such as low vibration, high drawbar pull, and ease of handling.

Make sure that you fully understand the advantages of rubber crawlers, and follow the content of “6.2 PROHIBITED OPERATIONS FOR RUBBER CRAWLER” and “6.3 PRECAUTIONS WHEN USING RUBBER CRAWLER” to extend the service life of the rubber crawlers and to realize the maximum advantages of the rubber crawler.

6.2 PROHIBITED OPERATIONS FOR RUBBER CRAWLER

- Turning operations or other operations on hard rocky ground, extremely rough rocky, in places with many tree stumps, on steel rods or steel scrap, or places with many sharp objects, or on concrete surfaces will cause damage to the rubber shoe.
- On riverbeds or other jobsites where there are large numbers of rocks of different sizes, the rocks will get caught in the rubber shoe and damage the shoe or cause it to come off the roller.
- Do not let oil, fuel, or chemical solvent get on the rubber shoe.
Do not travel in places where there is oil on the road surface.
- Do not let the machine enter any place where the ground is at high temperature, such as on asphalt or steel plates that have been left in the sun or in places where there have been fires.
- When putting the machine in long-term storage (3 months or more), store the machine indoors where it is out of direct sunlight and rain.

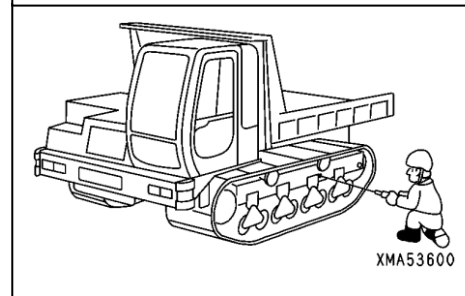
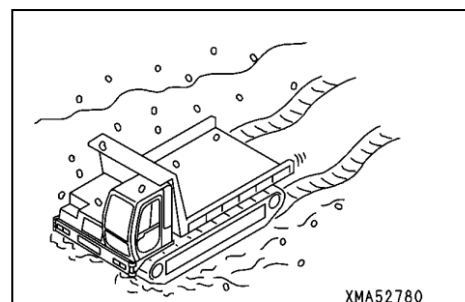
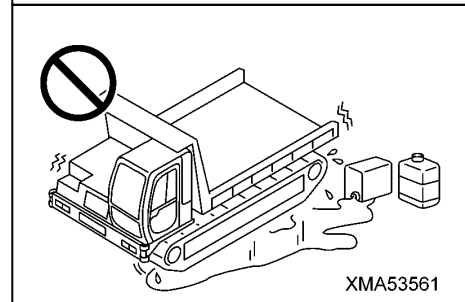
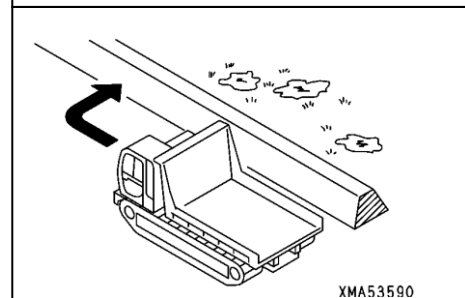
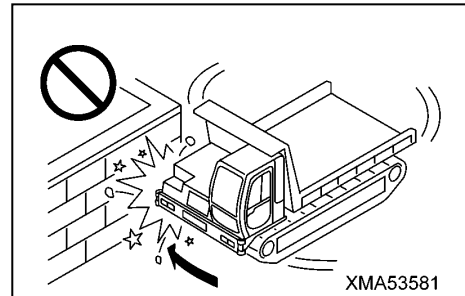


6.3 PRECAUTIONS WHEN USING RUBBER CRAWLER

⚠ WARNING

Always follow these precautions when using rubber crawlers. Failure to follow these precautions may lead to a serious injury or accident.

- Do not make sharp turns on concrete surfaces.
- Do not operate the machine in such a way that the rubber track scrapes against concrete walls.
- Sudden changes of direction will cause damage and premature wear to the rubber shoes, so avoid sudden turns as far as possible.
- Avoid traveling and turning in places where there is a large ridge. When traveling over a ridge, approach the ridge at a right angle.
- As far as possible, avoid handling loads that produce oil when crushed (soy beans, corn, vegetables, etc.). If the machine is used for handling such products, be sure to wash the track thoroughly after use.
- When handling loads such as salt, ammonium sulphate, potassium chloride, potassium sulphate, or phosphates, be sure to wash the track thoroughly after use.
- On snow or frozen road surfaces, the rubber shoe will slip very easily. Be careful also of slipping when traveling or operating on slopes.
- To prevent the rubber shoe from coming off, always check that the tension is correct.
If the tension is too loose, the rubber shoe will come off and there will be abnormal wear of the steel core and sprocket.
If the tension is too tight, the travel speed will be reduced and there will be premature wear or damage to the undercarriage.



7. TRANSPORTATION

7.1 LOADING, UNLOADING WORK

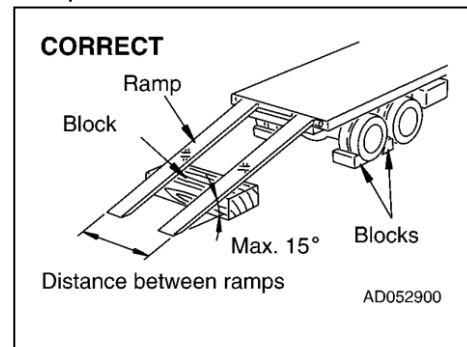
WARNING

- Make sure the ramp has sufficient width, length and thickness to enable the machine to be safely loaded and unloaded. If the ramp sags appreciably, reinforce it with blocks, etc.
- When loading and unloading the machine, park the trailer on a flat firm roadbed. Keep a fairly long distance between the road shoulder and the machine.
- Remove the mud from the undercarriage to prevent the machine from slipping to the side on slopes. Be sure the ramp surface is clean and free of grease, oil, ice and loosen materials.
- Never change the direction of travel when on the ramps. If it is necessary to change direction, drive off the ramps and correct the direction, then drive on to the ramps again.

When loading or unloading, always use ramps or a platform and carry out the operations as follows.

1. Apply the brake securely to the truck or trailer and put blocks under the tires to prevent the machine from moving.
2. Set the ramps so that the center of the machine is aligned with the truck or trailer, and fix securely in position.
★Check that the left and right ramps are at the same height.
3. Align the machine with the ramps, and drive up or down the ramps slowly to the load or unload the machine.
4. To prevent the machine from moving during transportation, put wooden blocks under the front and rear of the rubber crawler and secure the machine with chains or wire rope.

Be particularly careful to secure it so that it cannot slip to the side.



7.2 PRECAUTIONS FOR LOADING

WARNING

When loading and unloading the machine, park the trailer on a flat firm roadbed. Keep a fairly long distance between the road shoulder and the machine.

After loading the specified position, secure the machine as follows.

1. Lower the dump body slowly.
2. Push the parking brake switch in to apply the parking brake.
3. Return the engine throttle lever to the low-speed position, turn the starting switch to the OFF position and stop the engine. Remove the starting key.
4. When transporting the machine, place rectangular timber underneath the front and rear track shoes to prevent the machine from moving about. Also, hold it down with chains or rope. Be particularly careful to ensure that the machine does not slip sideways.

7.3 PRECAUTIONS FOR TRANSPORTATION

WARNING

Determine the route for transporting the machine by taking into account the width, height and weight of the machine.

Obey all state and local laws governing the weight, width and length of a load. Observe all regulations governing wide loads.

8. COLD WEATHER OPERATION

8.1 PRECAUTIONS FOR LOW TEMPERATURE

If the temperature becomes low, it becomes difficult to start the engine, and the coolant may freeze, so do as follows.

[1] FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components.

For details of the specified viscosity, see "MAINTENANCE 3. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

[2] COOLANT MIXTURE RATIO IN COOLING WATER

WARNING

Antifreeze is flammable, so keep it away from flames. Never smoke when handling antifreeze. Antifreeze is added to the coolant to prevent the water from freezing when the machine is not being used.

NOTICE

Never use methanol, ethanol, or propanol-based antifreeze.

To prevent engine overheating, rust, corrosion or freezing in the cooling system, use a mixture of long life coolant with tap water for engine cooling water.

The coolant serves anti-rust, anti-corrosion, and antifreeze. It should be used year around.

The coolant mixture ratio must be 30% or higher to ensure anti-rust and anti-corrosion properties.

[Coolant mixture ratio]

Use the following table as a guide. The table shows examples when the amount of cooling water is "54 liters (14.27 US gal) [11.88 UK gal]".

Item	Unit				
Min. temperature	Deg C	-10	-15	-20	-25
	Deg F	14	5	-4	-13
Amount of coolant	Litter	16.2	16.2	18.9	21.6
	US gal	4.28	4.28	4.99	5.71
	UK gal	3.56	3.56	4.16	4.75
Amount of cooling water	Litter	37.8	37.8	35.1	32.4
	US gal	9.99	9.99	9.28	8.56
	UK gal	8.32	8.32	7.72	7.13
Coolant mixture ratio	%	30	30	35	40

When the vehicle is delivered, the cooling water is mixed with 30% long life coolant of the brand as shown below.

★COOLANT GREEN (ENEOS): Non-amine type

[3] BATTERY

DANGER

- To avoid gas explosions, do not bring fire or sparks near the battery.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amounts of water, and consult a doctor.

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%, and insulate it against cold temperature so that the machine can be started easily the next morning.

Measure the specific gravity and calculate the rate of charge from the following conversion table.

Rated of charge (%)	Temp. of battery electrolyte				
	°C	20	0	-10	-20
	°F	68	32	14	-4
100		1.28	1.29	1.30	1.31
90		1.26	1.27	1.28	1.29
80		1.24	1.25	1.26	1.27
75		1.23	1.24	1.25	1.26

8.2 AFTER COMPLETION OF WORK

To prevent mud, water, or the undercarriage from freezing and making it impossible for the machine to move on the following morning, always observe the following precautions.

- Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by mud or dirt getting inside the seal with frozen drops of water.
- Park the machine on concrete or hard ground. If this is impossible, park the machine on wooden boards.
- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- As the battery capacity drops markedly in low temperatures, cover the battery or remove it from the machine, keep it in a warm place, and install it again the next morning.
- If electrolyte level is found low, add distilled water in the morning before beginning work. Do not add the water after day's work so as to prevent fluid in the battery from freezing in the night.

8.3 AFTER COLD WEATHER

When season changes and the weather becomes warmer, do as follows.

- Replace the fuel and oil for all parts with oil of the viscosity specified.

For details, see "MAINTENACE 3. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh water.

9. LONG-TERM STORAGE

9.1 BEFORE STORAGE

When putting the machine in storage for more than one month, do as follows.

- After every part is washed and dried, the machine shall be housed in a dry building. Never leave it outdoors.
In case it is indispensable to leave it outdoors, park the machine on the flat ground and cover it with canvas etc.
- Completely fill the fuel tank, lubricate and change the oil before storage.
- Apply a thin coat of grease to metal surface of the hydraulic piston rods and the idler adjusting rods.
- Disconnect the negative terminals of the battery and cover it, or remove it from the machine and store it separately.
- If the temperature will go below 0°C (32°F), add anti-freeze to the cooling water.
When not using anti-freeze, drain all the cooling water, and put a "No coolant" sign in the operator's compartment.

9.2 PRECAUTIONS DURING STORAGE

WARNING

If warming-up operation must be carried out inside a building, open the windows and doors to ensure good ventilation and prevent gas poisoning.

- When the machine is in long-term storage, start the engine once a month and carry out the warming-up operation thoroughly.
In addition, move the machine for a short distance, and carry out the raise and lower operation thoroughly for the dump body.
- ★ If the cooling water has been drained from the machine, always fill with cooling water before starting the engine.
- ★ Before operating the dump body, wipe off the coat of grease from the piston rods of the hydraulic cylinders.

9.3 PRECAUTIONS AFTER STORAGE

Carry out the following procedure when using the machine after long-term storage.

- Wipe off the coat of grease from the piston rods of the hydraulic cylinders.
- Remove the drain plugs from the hydraulic tank, fuel tank, engine oil pan, and travel motors, and drain the water.
- Drain the water from the engine oil filter, fuel filter, and hydraulic line filter.
- Carry out the checks before starting and warm up the machine thoroughly, then check all parts of the machine carefully.

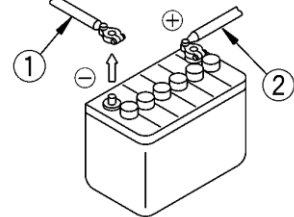
10. HANDLING BATTERY

When handling batteries, always do as follows.

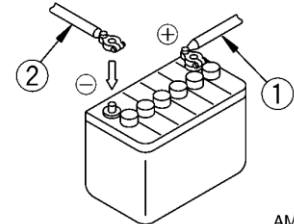
⚠ DANGER

- Before working with the battery, stop the engine and turn the key in the starting switch to the OFF position.
 - When working with the battery, always wear safety glasses.
 - Batteries generate hydrogen gas, so there is danger of explosion. Do not smoke, use a lighter, or create any spark near the battery.
 - Battery electrolyte contains sulphuric acid. If you get acid on yourself, immediately flush the area with large amounts of water. If acid gets into your eyes, flush them immediately with large amounts of fresh water, then go to a doctor for treatment.
 - When removing the battery, first disconnect the negative (-) terminal of the cable from the ground.
 - When installing, install the positive (+) terminal first.
 - If a tool touches the cable connecting the positive terminal and the chassis, there is danger that it will cause sparks. Do not carry tools in your breast pocket.
 - Defective contact caused by loose battery terminals can generate sparks and lead to an explosion.
- Tighten the battery terminals securely.**

When removing, disconnect the cable from the ground terminal first.



When installing, install the positive (+) terminal first.



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10.1 PRECAUTIONS WHEN HANDLING BATTERY

- Always be careful not to let the battery become discharged.

Do not wait for the battery to become discharged before recharging it; measure the specific gravity of the battery electrolyte beforehand and charge the battery if necessary.

Always keeping the battery in good condition will extend the life of the battery.

- When operating the machine in high temperatures, check the level of the battery electrolyte at shorter intervals than specified for periodic inspection and maintenance.
- When working in low temperatures, the capacity of the battery will drop considerably, so maintain the battery charge as close as possible to 100%, and insulate it against cold temperatures so that the machine can be started easily the next morning.

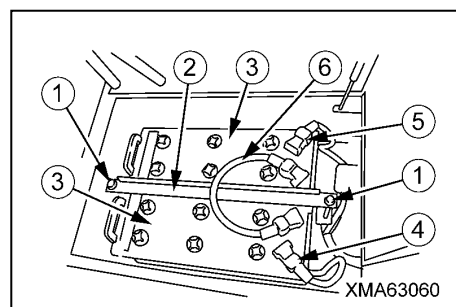
When adding distilled water, to prevent the electrolyte from freezing, always add the distilled water immediately before starting operations on the following morning.

10.2 REMOVAL AND INSTALLATION OF BATTERY

The battery is installed in front of the fuel tank on the front right side of the machine.

[1] REMOVAL

1. Open the inspection cover. For details, see "2.19 BATTERY INSPECTION COVER".
2. Remove locknuts (1) (left and right: x2), then remove plate (2) and cover (3).
3. Disconnect the battery cable from negative (-) terminal (4) for the ground, then disconnect at positive (+) terminal end (5) and cable (6) connecting the batteries.
4. Remove 2 batteries (3).



[2] INSTALLATION

Install the batteries in the reverse order to removal.

★When connecting the battery cables, always install the negative (-) terminal at the ground end last.

10.3 PRECAUTIONS WHEN CHARGING BATTERY

If the battery becomes discharged or the battery charge is low, charge the battery.

To charge the battery when it is still mounted on the machine, do as follows.

⚠ WARNING

It is dangerous if the temperature of the battery electrolyte exceeds 45°C (113°F) during charging, so stop charging and wait for the temperature to go down.

- Disconnect the wiring from the battery terminals before charging.

There is danger of abnormal voltage being applied to the alternator and damaging it.

When disconnecting the wiring, always disconnect the negative (-) terminal wiring first; and when connecting the wiring, always connect the negative (-) terminal wiring last.

- During charging, remove all the plugs from the battery cells to allow any gas to escape.

- When the charging is completed, stop the charging immediately.

If the battery is overcharged, overheating of the battery will cause damage to the battery.

★Reference: Measure the specific gravity and calculate the rate of charge from the following conversion table.

Rated of charge (%)	Temp. of battery electrolyte				
	°C	20	0	-10	-20
	°F	68	32	14	-4
100		1.28	1.29	1.30	1.31
90		1.26	1.27	1.28	1.29
80		1.24	1.25	1.26	1.27
75		1.23	1.24	1.25	1.26

10.4 STARTING ENGINE WITH BOOSTER CABLE

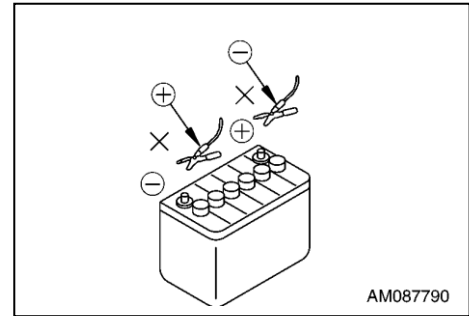
If the battery is discharged and booster cables are used to start the engine, do as follows

⚠ DANGER

- Be careful not to let the normal machine and problem machine contact each other.
- When connecting the cables, never let the positive (+) and negative (-) terminals contact each other.
- Make sure that there is no mistake in the booster cable connection.

When the final connection is made to the negative (-) terminal, sparks will be generated, so do not connect to the negative (-) terminal of the battery on the problem machine. Connect to the engine block.

- When starting the engine with a booster cable, always wear safety glasses.



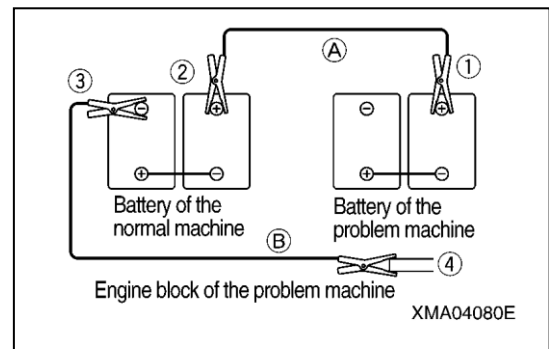
NOTICE

- The size of the booster cable and clip should be suitable for the battery capacity. Check that they are not corroded or damaged.
- The battery on the normal machine must be the same capacity as that on the problem machine.

[1] CONNECTING THE BOOSTER CABLES

★The numbers in the diagram on the right show the order for connecting the cables.

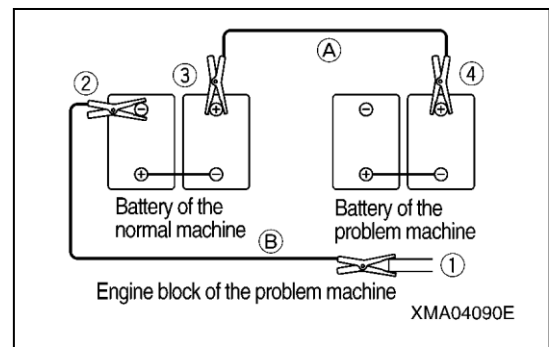
1. Make sure that the starting switches of the normal machine and problem machine are both at the OFF position.
2. Connect the clips at the ends of booster cable **A** to the positive (+) terminal of the problem machine and the normal machine.
3. Connect one clip of booster cable **B** to the negative (-) terminal of the normal machine.
4. Connect the other clip of booster cable **B** to the engine block of the problem machine.
5. Start the problem machine.



[2] DISCONNECTING THE BOOSTER CABLE

★The numbers in the diagram on the right show the order for connecting the cables.

When the engine on the problem machine starts, remove the cables in the reverse order to connecting.



11. TROUBLESHOOTING

If it is felt that there is any abnormality, investigate the cause immediately and take the necessary action to prevent any serious failure.

If the cause is unknown, please contact your distributor for repairs.

When contacting your distributor, please give the machine serial number and engine number.

11.1 PROBLEMS WITH ENGINE RELATED PARTS

Problem	Main causes	Remedy
Starting motor does not turn when starting switch is turned to START	• Insufficient battery charge • Defective wiring • Failure in starting motor, relay	• Charge • Check, repair • Contact your distributor
Starting motor turns, but cranks engine slowly	• Insufficient battery charge • Defective ground connection wiring • Viscosity of engine oil is too high	• Charge • Check, repair • Change to proper viscosity
Starting motor turns, but engine does not start	• Lack of fuel • Air in fuel line • Failure in fuel injection pump • Failure in engine	• Check, add fuel • Bleed air • Contact your distributor • Contact your distributor
After warming-up operation, [Engine oil pressure lamp] on meter box stays lighted up even when engine speed is raised (Engine oil pressure does not rise)	• Lack of engine oil • Clogged engine oil filter • Failure in engine parts	• Check, add oil • Replace new parts • Contact your distributor
Engine water temperature gauge points to around 120°C (250°F), or steam spurts out from near radiator system	• Lack of coolant • Leakage of oil from coolant system • Loose fan belt • Clogged radiator fin • Defective thermostat • Overloading, operation under excessive load	• Check, add water • Check, repair or ccontact your distributor • Check, adjust, or replace new belt • Check, clean • Replace new parts • Reduce to below max. payload
Engine water temperature gauge indicator does not reach around 80°C (180°F)	• Defective thermostat • Defective engine water temperature gauge	• Replace new parts • Replace new parts
Engine exhaust color is white	• Engine oil level is too high • Improper fuel	• Adjust to correct amount • Change to specified fuel
Engine exhaust color is too black	• Clogged air cleaner • Improper fuel • Failure in engine	• Check, clean • Change to specified fuel • Contact your distributor

Problem	Main causes	Remedy
Engine does not run smoothly	• Air in fuel line • Fuel filter clogged with dirt, water in fuel filter • Leakage of fuel from fuel system • Failure in engine	• Bleed air • Check, replace new parts, or repair • Check, repair • Contact your distributor
Engine stops when set to low speed	• Failure in engine	• Contact your distributor
Engine suddenly stops during operation	• Lack of fuel • Lack of engine oil • Failure in engine	• Check, add fuel • Check, add oil • Contact your distributor

11.2 PROBLEMS WITH CHASSIS RELATED PARTS

Problem	Main causes	Remedy
Machine does not move	• Parking brake still applied • Leakage of oil from hydraulic system • Travel lever cable disconnected • Failure in hydraulic equipment	• Release parking brake, or check brake piping • Check, repair • Check, repair • Contact your distributor
HST oil pressure lamp on meter box lights up during operation (HST oil pressure is lowered)	• Clogged hydraulic line filter • Clogged strainer inside hydraulic tank • Defective wiring • Failure in hydraulic equipment	• Check, clean • Check, clean • Check, repair • Contact your distributor
Abnormal noise generated from around pump	• Clogged strainer inside hydraulic tank • Leakage of oil from hydraulic system • Failure in hydraulic equipment	• Check, clean, or replace new parts • Check, repair • Contact your distributor
Rubber crawler comes off	• Rubber crawler tension too loose	• Check, adjust
Abnormal wear of sprocket	• Rubber crawler tension too tight	• Check, adjust

11.3 PROBLEMS WITH ELECTRIC RELATED PARTS

Problem	Main causes	Remedy
Indicator of voltmeter inside the box does not go above 21V when the engine is running (Battery is not charging)	• Defective wiring • Loose fan belt • Defective alternator • Defective battery function	• Check, repair • Check, adjust or replace • Contact your distributor • Check, repair or replace
Head lamp is not bright	• Battery charge is too low • Defective alternator	• Charge • Contact your distributor
No lamps light up	• Blown fuse • Defective wiring • Defective lamp switch	• Check, replace • Check, repair • Check, replace
Individual head lamps, gauge lamps do not light up	• Blown bulb • Defective wiring	• Replace • Check, repair
Horn does not sound	• Blown fuse • Defective wiring • Defective horn	• Check, replace • Check, repair • Check, replace
Left, right turn signal lamps do not flash	• Blown fuse • Defective wiring • Defective flasher relay • Defective flasher switch	• Check, replace • Check, repair • Check, replace • Check, replace
Backup buzzer does not sound	• Blown fuse • Defective wiring • Defective buzzer • Defective backup switch	• Check, replace • Check, repair • Check, replace • Check, adjust or replace
Parking brake buzzer does not sound	• Blown fuse • Defective wiring • Defective buzzer • Defective parking brake switch	• Check, replace • Check, repair • Check, replace • Check, replace
Slope alarm buzzer does not sound	• Blown fuse • Defective wiring • Defective buzzer • Defective slope alarm unit	• Check, replace • Check, replace • Contact your distributor • Contact your distributor

MAINTENANCE

1. Basic outline of maintenance	3- 2
2. Precautions for maintenance	3- 4
3. Use of fuel and lubricants according to ambient temperature	3- 6
4. Tools and tightening torques	3-8
5. Periodic replacement of critical parts	3-10
6. Maintenance schedule chart	3-12
7. Service procedure	3-14

1. BASIC OUTLINE OF MAINTENANCE

[1] OIL

- Oil is used under extremely heavy-duty conditions (high temperature, high pressure) in the engine, hydraulic pump, motor, and work equipment. Therefore, it deteriorates as time passes.

Always use the grade of oil and the oil which matches the ambient temperature listed in this operation manual.

Even if the oil is not dirty, always change it at the specified interval.

- When adding oil, do not mix oils of different grades or brands.
- Always add oil to the specified oil level. Too much oil and too little oil are both the cause of problems.
- When changing the oil, always replace the related oil filter at the same time.
- Always be careful when handling oil to prevent water, dirt, or other impurities from getting into the oil.

A large proportion of problems with the machine are caused by impurities getting into the oil, so be extremely careful not to let impurities get into the oil: always store the oil indoors and carry out oil-filling operations in a dust-free environment.

- If the oil is a milky white, there is probably water or air in the circuit. In such cases, please contact your distributor.

[2] FUEL

- Do not use any fuel except diesel oil.
- Always use the fuel specified for the ambient temperature listed in this operation manual.
- The fuel pump is a precision instrument, so if fuel containing water or dirt is used, the fuel pump will stop working. Be extremely careful not to let impurities get into the fuel: always store the fuel indoors and carry out refueling operations in a dust-free environment.
- If fuel is stored in drum cans, store the drum cans on their sides so that the ports in the drum cans are in a straight line to the side. This action will prevent damp air from being sucked in.
- To prevent moisture in the air from getting into the fuel tank, always fill the tank after the completion of each day's work.
- If the machine runs out of fuel, or when the fuel filter has been replaced, it is necessary to bleed the air the circuit.

Always read the separate operation manual for the engine when carrying out this operation.

[3] COOLANT

- Do not use river water, well water, or water from simple water lines as the coolant.
Such kinds of water contain many impurities, such as calcium and dirt, so scale will collect inside the engine and radiator. This will cause improper heat exchange, and will lead to overheating.
- If the engine overheats, allow the engine to cool down, then add coolant.
- When using antifreeze, always follow the precautions given in the operation manual.

[4] GREASE

- Grease is used at the connecting points of the dump body or travel lever linkage to prevent gouging or noise.
- The grease nipples not listed in this manual are nipples used for overhaul, so there is no need to add grease to them.
However, if any gouging or noise occurs during use, add grease.
- When adding grease, pump in grease until the old grease is completely forced out, then wipe off all the old grease. Be particularly careful to wipe off the grease at points where mud and dirt may stick and cause wear of the rotating parts.

[5] FILTERS

- Filters are used to prevent trouble caused when impurities in the oil, fuel, or air enter important equipment. When the replacement interval listed in this manual is reached, always replace or clean the filters.
However, when using this machine under heavy-duty conditions, replace the filters before the specified replacement interval has passed.
- Do not wash and reuse oil filters or fuel filters. Always replace them with new parts.
- When replacing the oil filter, check the old filter for any metal particles or pieces of rubber from the hoses.
If any rubber or metal is found, please contact your distributor. This action is important to prevent any failure before it occurs.
- When using new filters, do not remove the wrapping until immediately before using them.

[6] ELECTRICAL COMPONENTS

- It is extremely dangerous if electrical components become wet or the film covering them is broken. This may lead to electrical leakage and may cause misoperation of the machine. When washing the machine, take care not to get water onto electrical components.
- Never remove any electrical components from the machine or disassemble them.
- Always contact your distributor before installing additional electrical equipment to your machine.
- After the machine has been used near the sea or after it has been used for spreading fertilizer, wipe the electrical components carefully with a dry cloth to prevent corrosion.

[7] HYDRAULIC SYSTEM

- The hydraulic equipment is at high temperature and high pressure during operations and immediately after operations have been completed.
When carrying out inspection and maintenance of the hydraulic equipment, always do as follows.
 - (1) Stop the machine on level ground, and lower the work equipment to the ground so that there is no pressure in the hydraulic cylinder circuit.
 - (2) Always stop the engine.
 - (3) Loosen the hydraulic tank cap slowly, then remove it.
 - (4) Always wait for the temperature to go down before starting maintenance. Even when the temperature goes down, the circuits are still under internal pressure, so when removing plugs or hoses, do not stand directly in front of them, and loosen the connections slowly before removing.
- If high-pressure hoses, connections, or hydraulic equipment have been removed, always replace the O-ring.
- When replacing or cleaning the hydraulic line filter or strainer, or when replacing or repairing the hydraulic equipment or hoses, always bleed the air from the circuit after completion of the operation.

2. PRECAUTIONS FOR MAINTENANCE

WARNING

- Before carrying out inspection and maintenance, always read “2. PRECAUTIONS FOR INSPECTION AND MAINTENANCE in the SAFETY” volume and make sure that you understand the safety procedures for operations.
- Do not carry out any operation not listed in this manual for inspection and maintenance. When carrying out inspection and maintenance of the engine, always read the separate engine operation manual and make sure that you understand it.

[1] CHECK HOURMETER

- Read the hourmeter every day to check if the required interval has been reached for any maintenance item.

[2] USE GENUINE PARTS

- When replacing parts, always use the genuine parts specified in the parts list.

[3] PRECAUTIONS WHEN ADDING OR CHANGING OIL OR GREASE

- When adding or changing fuel, oil, or grease, always use the type specified by Morooka. Be sure to use the viscosity specified for the ambient temperature.
- Never mix types of oil or brands of oil from different makers.
- The oil used when the machine is shipped from the factory is as shown in the table below.

Item	Type	Brand
Engine oil pan	CF class DH-1 10W-30	-
Hydraulic tank	Hydraulic oil ISO VG46	Idemitsu Kosan Super Hydro X 46
Travel motor reduction gear case	SAE90 GL-5	Shin Nihon Sekiyu Gear Lube SP 90

[4] PRECAUTIONS WHEN WASHING OR CLEANING MACHINE

1. Wash or clean the machine to make it easier to locate problem points. In particular, wash the oil filler, level gauge, and greasing plugs to prevent dirt or mud from entering when adding oil or grease.
2. Cover electrical parts, such as the starting motor or alternator, with a sheet to prevent water from getting on them.
3. Do not carry out high-pressure washing for the radiator or oil cooler parts.

[5] BE CAREFUL OF OIL AND COOLANT TEMPERATURE

1. It is dangerous to drain the oil or coolant or replace the filters immediately after stopping the engine. Wait for the machine to cool down before carrying out such operations.
2. When draining the oil, warm up the oil to a suitable temperature [approx. 20 to 40°C (68 to 104°F)] before carrying out the operation.

[6] PRECAUTIONS WHEN CHECKING OIL LEVEL, ADDING OIL

1. When checking the oil level or adding oil, choose a place where there is no dust to prevent dirt from entering the oil line.
2. Use clean oil and grease. Use a clean container to prevent dirt from getting in.
3. If there is a strainer fitted to the oil filler port, do not remove the strainer when adding oil.
4. Check that the lubricating oil is at the correct level. The oil level should not be too high or too low.

[7] CHECKING DRAINED OIL, FILTER

- When the oil has been changed or the filter replaced, always check the drained oil and removed filter to check for metal particles or other foreign materials.

[8] SETTING UP WARNING SIGNS

- When the oil or coolant has been drained, put warning signs (Part No.: 1-41010-1210) in the operator's compartment to prevent anyone from starting the engine by mistake.

[9] PRECAUTIONS WHEN WASHING PARTS

- When washing parts, use a non-flammable washing agent or diesel oil.
When using diesel oil, do not bring lighted cigarettes or cigarette lighters close.

[10] PRECAUTIONS WHEN INSTALLING PARTS

- When O-rings, gaskets, or other seals are used for the mounting surface, clean the mounting surface and always replace the seal with a new part.

[11] PRECAUTIONS WHEN CARRYING OUT INSPECTION AND MAINTENANCE OF A MACHINE AFTER OPERATIONS IN DUSTY AREAS

- Check carefully for clogging of the air cleaner, and clean the air cleaner element more frequently.
- Clean the radiator core, oil cooler core and inter cooler core more frequently to prevent clogging.
- Replace the fuel filter more frequently.
- Clean electrical parts carefully (in particular, the starting motor or alternator) to prevent dust from collecting.

[12] PRECAUTIONS WHEN CARRYING OUT INSPECTION AND MAINTENANCE ON MACHINES BEFORE STARTING OPERATIONS IN SWAMPY AREAS, RAIN, RIVERBEDS, OR SNOW

- Before starting operations, check that the drain plug under the engine and the greasing plugs for the track rollers are securely tightened.
- After completion of operations, wash the machine carefully and check for cracks and damage, and for loose or missing nuts and bolts.

3. USE OF FUEL AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

3.1 FUEL, COOLANT, AND LUBRICANT TABLE

NOTICE

- The quality of engine oil influences significantly on the engine performance and start ability. Always use the engine oil of CG-4 class or CAT diesel engine oil Cat DEO and of specified viscosity (refer to the table below) according to the ambient temperatures.
- Always use diesel fuel. Never use additives such as anti-freeze and water-removing agents. Otherwise, the fuel injection system may be damaged. Never use kerosene, as it may cause a trouble.

- Select the fuel and oil from the table below according to the ambient temperature.
- The specified capacity is the total amount of oil, including the oil in the piping of the various components.
- The refill capacity is the amount of oil added when changing the oil during inspection and maintenance.
- When starting the engine in an ambient temperature of lower than 0 deg C, always use a grade specified for temperatures below 0 deg C, even if the temperature goes up to 10 deg C during the daytime.
- For the coolant mixture ratio of cooling water, see "Operation 8. Cold Weather Operation" in "[2] Coolant Mixture Ratio in Cooling Water".

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE									CAPACITY	
		-22 -30	-4 -20	14 -10	32 0	50 10	68 20	86 30	104°F 40 °C		Specified	Refill
Engine oil pan	Engine oil				SAE15W-40						21ℓ 5.55 US gal 4.62 UK gal	21ℓ 5.55 US gal 4.62 UK gal
					SAE10W-30							
Hydraulic oil tank	Hydraulic oil										165ℓ 43.59 US gal 36.30 UK gal	155ℓ 43.59 US gal 36.30 UK gal
					ISO VG46							
					ISO VG32							
Travel motor reduction gear case(each)	Gear oil				SAE90						7.0ℓ 1.85 US gal 1.54 UK gal	-
Fuel tank	Diesel fuel				ASTM D975 No.2						258ℓ 68.16 US gal 56.75 UK gal	-
					ASTM D975 No.1							
Cooling system	Water				Long Life Coolant						54ℓ 14.27 US gal 11.88 UK gal	-

REMARK

- When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in this manual.

Change oil according to the following table if fuel sulphur content is above 0.5%.

Fuel sulphur content	Change interval of oil in engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

- When starting the engine in an atmospheric temperature of lower than 0°C (32°F), be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40, even though an atmospheric temperature goes up to 10°C (50°F) more or less in the day time.
- Use API classification CD as engine oil and if API classification CC, reduce the engine oil change interval to half.
- There is no problem if single grade oil is mixed with multigrade oil (SAE10W-30, 15W-40), but be sure to add single grade oil that matches the temperature in the table.
- We recommend genuine oil which has been specifically formulated and approved for use in engine and hydraulic work equipment applications.

Specified capacity: Total amount of oil including oil for components and oil in piping.

Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

ASTM: American Society of Testing and Material

SAE: Society of Automotive Engineers

API: American Petroleum Institute

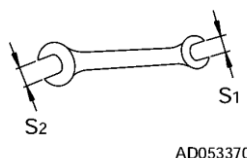
- Hydraulic oil: Nihon Sekiyu Highland Wide KV46.
★When changing the hydraulic oil, please contact your distributor.

4. TOOLS AND TIGHTENING TORQUES

4.1 INTRODUCTION OF NECESSARY TOOLS

The following tools are needed when carrying out maintenance.

If the tools are broken or worn, please order new tools from your distributor.

No.	Name of tool	Part No.	Remarks
1	Wrench set	0-9100-00000 0-9100-00709 0-9100-00810 0-9100-01113 0-9100-01214 0-9100-01719 0-9100-02224	Width across flats (S1 x S2) 7mm x 9mm 8mm x 10mm 11mm x 13mm 12mm x 14mm 17mm x 19mm 22mm x 24mm  AD053370
2	Wrench	0-9105-04600	Width across flats 46mm
3	Screw driver (+)	0-9210-00150	
4	Screw driver (-)	0-9200-00200	

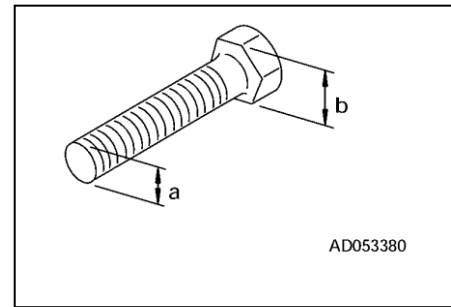
4.2 TORQUE LIST FOR BOLTS AND NUTS

Unless otherwise specified, tighten the metric bolts and nuts to the torque shown in the table below.

The tightening torque is determined by the width across flats (b) of the nut and bolt.

NOTICE

**When tightening panels or other parts with tightening fixtures made of plastic, be careful not to use excessive tightening torque. Tightening excessively will damage the plastic parts.
Be extremely careful when tightening.**



Thread diameter x Width across thread pitch flats (a) (mm x mm)	Width across flats (b) (mm)	Tightening torque (kgf-m) {N-m}	
		Tensile strength 4T	Tensile strength 11T
3x0.5	5.5	0.05 {0.5}	0.2 {1.8}
4x0.7	7	0.1 {1.0}	0.4 {4.1}
5x0.8	8	0.2 {2.2}	0.8 {8.2}
6x1.0	10	0.4 {3.6}	1.4 {14.0}
8x1.25	13	0.9 {8.9}	3.5 {34.0}
10x1.5	17	1.8 {17.7}	6.9 {67.4}
12x1.75	19	3.2 {30.9}	12.0 {117}
14x2.0	22	5.0 {49.1}	19.1 {187}
16x2.0	24	7.8 {76.7}	29.7 {291}
18x2.5	27	10.7 {105}	40.9 {401}
20x2.5	30	15.3 {149}	58.1 {570}
22x2.5	32	20.8 {203}	79.0 {775}
24x3.0	36	26.4 {258}	100 {983}
27x3.0	41	38.6 {378}	147 {1440}
30x3.5	46	52.4 {513}	199 {1955}
33x3.5	50	71.3 {699}	271 {2660}
36x4.0	55	91.6 {898}	348 {3416}
39x4.0	60	119 {1162}	451 {4421}

5. PERIODIC REPLACEMENT OF CRITICAL PARTS

5.1 PERIODIC REPLACEMENT INTERVAL (EVERY 2 YEARS)

In order to further increase the safety of the machine Morooka recommends periodic inspection and replacement of critical parts (hydraulic hoses, fuel hoses, etc.) which are related to causes of fire and to efficiency in the raising and lowering of the dump body and traveling and stopping functions of the machine.

With these parts, the material changes as time passes, and they easily wear or deteriorate. However, it is difficult to judge the condition of the parts simply by periodic maintenance, so they should always be replaced after a fixed time has passed, regardless of their condition. Always replace them with new genuine parts to ensure that the machine always maintains its function completely.

5.2 PERIODIC INSPECTION

WARNING

- Check the hydraulic hoses and fuel hoses carefully to check for cracks, deterioration, or other damage, and to check that there is no leakage from the connections.
When carrying out checks before starting, always check the ground under the machine to check for traces of oil leakage.
- When replacing the hydraulic hoses or fuel hoses, always order genuine parts. Never use any imitation or substitute parts.
- When any hydraulic hose is replaced, always replace the O-rings at the same time. Failure to do this will cause oil leakage.

If the monthly inspection or checks before starting show any abnormality, such as leakage of oil or deformation and cracking, tighten the parts immediately or replace them with new genuine parts.

When doing this, check the hose clamps at the same time, and replace them if they are deformed or cracked.

Check and repair any hydraulic hoses, even if they are not listed as critical parts.

The table below shows the checks to be carried out during periodic maintenance.

Periodic maintenance interval	Inspection items
Checks before starting	• Leakage of oil from caulked portions, connections of fuel hoses, hydraulic hoses
Monthly inspection	• Leakage of oil from caulked portions, connections of fuel hoses, hydraulic hoses • Damage to fuel hoses, hydraulic hoses (cracks, wear, gouging, swelling, crushing) • Interference with other parts
Every 2 years inspection	• Replacement of critical parts • Leakage of oil from caulked portions, connections of fuel hoses, hydraulic hoses • Damage to fuel hoses, hydraulic hoses (cracks, wear, gouging, swelling, crushing) • Interference with other parts

5.3 SPECIFIED PERIODIC REPLACEMENT PARTS

CAUTION

- The list of periodic replacement parts specified by Morooka does not include the fuel hoses on the engine. Refer to the separate engine parts list (parts book) and carry out replacement in the same way as for the periodic replacement parts specified by Morooka.
- For details of the part numbers for periodic replacement parts specified by Morooka, see the parts list (parts book), and contact your distributor to place orders.

As the periodic replacement parts, the parts shown in the table below should be used.

For details of the parts, see the parts list (parts book).

No.	No. Periodic replacement parts	Q'ty	Replacement interval
1	Fuel hose (fuel pump to fuel injection pump)	1	Replace every 2 years
2	Fuel hose (fuel injection pump to fuel tank)	1	
3	Hydraulic hose (main pump to/from travel motor)	4	
4	Hydraulic hose (gear pump to main control valve)	1	
5	Hydraulic hose (main control valve to dump cylinder)	2	
6	Hydraulic hose (Between left and right dump cylinders)	2	Replace every 3 years
7	Seat belt	1	

6. MAINTENANCE SCHEDULE CHART

Service item	Page
7.2 INITIAL 100 HOURS SERVICE ★This is only after the first 100 hours for new machines	3-14
[1] Change engine lubricating oil, replace engine oil filter	3-31
[2] Replace hydraulic line filter	3-35
[3] Change oil in hydraulic tank	3-36
7.3 INITIAL 500 HOURS SERVICE ★This is only after the first 500 hours for new machines	3-14
[1] Change oil inside travel motor reduction gear case	3-37
7.4 WHEN REQUIRED ★If necessary, carry out these checks every day.	3-15
[1] Check, adjust rubber crawler tension	3-15
[2] Check rubber crawler for damage, wear	3-16
[3] Clean, replace air cleaner	3-17
[4] Clean inside of cooling system (change coolant)	3-19
[5] Check, clean radiator fins, oil cooler fins, inter cooler fins, Air conditioner condenser fins	3-21
[6] Check window washer fluid level, add fluid	3-21
[7] Check refrigerant (gas) volume	3-22
[8] Clean, replace air filter of air conditioner	3-23
[9] Clean, replace fresh filter of air conditioner	3-24
7.5 CHECK BEFORE STARTING ★Always carry out the following checks before starting the engine.	3-25
[1] Check coolant level, add water	3-25
[2] Check fuel level, add fuel	3-25
[3] Check engine lubricating oil level, add oil	3-26
[4] Check oil level in hydraulic tank, add oil	3-26
[5] Check dust indicator	3-27
[6] Check, adjust fan belt tension	3-27
[7] Check, adjust air compressor belt tension	3-28
[8] Check electric wiring	3-29
[9] Check operation of switches, lamps, gauges	3-29
[10] Check operation of horn, alarm buzzer	3-29
7.6 EVERY 50 HOURS SERVICE	3-30
[1] Drain water, sediment from fuel tank	3-30
[2] Drain water, sediment from water separator	3-30
7.7 EVERY 100 HOURS SERVICE	3-30
[1] Check battery electrolyte level, add distilled water	3-30
7.8 EVERY 250 HOURS SERVICE	3-31
[1] Change engine lubricating oil, replace engine oil filter	3-31
[2] Replace water separator element	3-32
[3] Replace fuel filter	3-33
[4] Grease all parts of dump cylinder	3-33
[5] Grease dump body rear side flap opening rod	3-34
[6] Grease dump body hinge pin	3-34
[7] Grease dump body rear side flap opening lever	3-34
[8] Grease track roller pivot shaft	3-34
[9] Grease rear idler shaft	3-34

Service item	Page
7.9 EVERY 500 HOURS SERVICE	3-35
[1] Replace hydraulic line filter	3-35
[2] Change oil in hydraulic tank	3-36
7.10 EVERY 1500 HOURS SERVICE	3-37
[1] Change oil inside travel motor reduction gear case	3-37

7. SERVICE PROCEDURE

7.1 OUTLINE OF INSPECTION AND MAINTENANCE PROCEDURES

This section explains the methods for inspection and maintenance operations listed in “6. MAINTENANCE SCHEDULE CHART”.

Always observe the precautions related to safety for each item, and carry out the operation safely.

If the operation is difficult, do not try to carry it out; please contact your distributor.

- The operations in this section require the following parts to be removed or opened, and then installed or closed.

For details of the procedure, see the following sections.

(1) Engine inspection cover: See “OPERATION, 2.14 ENGINE INSPECTION COVER”.

(2) Battery inspection cover: See “OPERATION, 2.15 BATTERY INSPECTION COVER”.

(3) Front grill: See “OPERATION, 2.16 FRONT GRILL”.

(4) Undercover: See “OPERATION, 2.17 UNDERCOVER”.

7.2 INITIAL 100 HOURS SERVICE

Carry out the following maintenance after the initial 100 hours breaking-in operation for new machines.

[1] CHANGE ENGINE LUBRICATING OIL, REPLACE ENGINE OIL FILTER

For details of the method of maintenance, see EVERY 250 HOURS SERVICE.

[2] REPLACE HYDRAULIC LINE FILTER

For details of the method of maintenance, see EVERY 500 HOURS SERVICE.

[3] CHANGE OIL IN HYDRAULIC TANK

For details of the method of maintenance, see EVERY 500 HOURS SERVICE.

7.3 INITIAL 500 HOURS SERVICE

Carry out the following maintenance after the initial 500 hours breaking-in operation for new machines.

[1] CHANGE OIL INSIDE TRAVEL MOTOR REDUCTION GEAR CASE

For details of the method of maintenance, see EVERY 1500 HOURS SERVICE.

7.4 WHEN REQUIRED

[1] CHECK, ADJUST RUBBER CRAWLER TENSION

WARNING

The tension adjuster for the rubber crawler is charged with grease. The grease is kept under high pressure by the recoil spring inside the tension adjuster.

Always follow the precautions given below. Failure to follow these precautions may cause the valve to fly out, resulting in serious injury or accident.

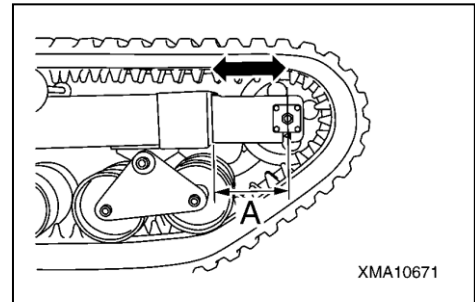
- Never loosen the tension adjustment valve more than one turn. There is danger that the valve may fly out.
- When adjusting the tension, never stand directly in front of the valve. It is dangerous.

• CHECKING TENSION

1. Drive the machine a short distance forward and backward, and then stop the engine.
2. Measure distance **A** from the rear end of the track frame to the center of the idler, and check that it is within the following range.

★ Dimension **A**: 430 ± 20 mm

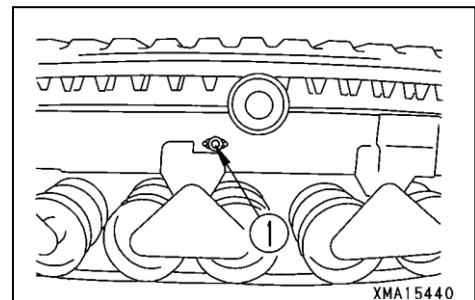
- ★ If the result of the measurement shows that dimension **A** is greater than the specified range, adjust the rubber crawler tension. For details, see “ADJUSTING TENSION”.



• ADJUSTING WHEN TENSION IS LOOSE (When measurement is below range for dimension A)

- ★ Before adjusting, prepare a grease pump.

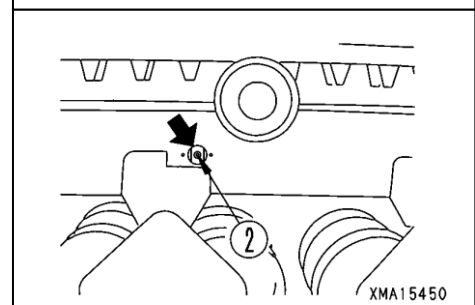
1. Remove 2 bolts, and then remove grease valve cover (1).



2. Using the grease pump, pump in grease through valve (2) until dimension **A** is within the range given for “CHECKING TENSION”.

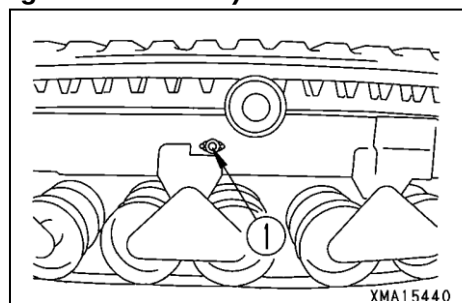
★ If dimension **A** does not enter the range above even when grease is pumped in, the rubber crawler must be replaced, or there is probably some abnormality in the tension adjuster, so please contact your distributor.

3. Drive the machine a short distance forward and backward to make the tension uniform, and then repeat the steps for “CHECKING TENSION” to measure dimension **A**.
4. Install grease valve cover (1), and then tighten the bolts.



• **ADJUSTING WHEN TENSION IS TIGHT (when measurement is above range for dimension A)**

1. Remove 2 bolts, and then remove grease valve cover (1).

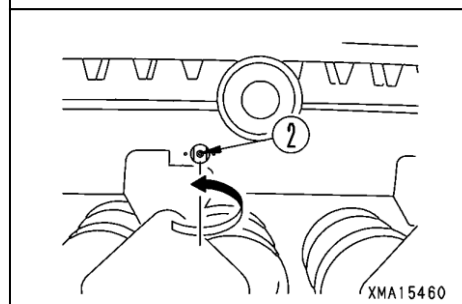


2. Loosen valve (2) until dimension A is within the range given for "CHECKING TENSION".

★ If the grease comes out slowly, push the idler end of the rubber crawler strongly.

Never loosen valve (2) more than 1 turn.

★ If the grease still comes out slowly, start the engine and drive the machine a short distance forward and backward.



3. Tighten valve (2) securely.

4. Drive the machine a short distance forward and backward to make the tension uniform, and then repeat the steps for "CHECKING TENSION" to measure dimension A.

5. Install grease valve cover (1), and then tighten the bolts.

[2] CHECK RUBBER CRAWLER FOR DAMAGE, WEAR

⚠ WARNING

If there are any large cracks or damage to the rubber crawler, replace the rubber crawler immediately. There is danger that the rubber crawler may break suddenly without warning during operations.

NOTICE

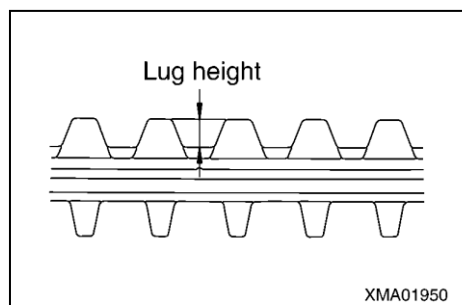
- When checking the rubber crawler, remove all mud and snow from the crawler before checking.
- Using the rubber crawler when it has exceeded the wear limit will cause slipping and will reduce the drawbar pull. If the rubber crawler is in the following condition, replace it with a new rubber crawler.

• If the height of the lug is less than 1/3 of the standard dimension, replace the rubber crawler.

★ Standard height: 45 mm

★ Wear limit: 15 mm

• If there are cracks or deep cuts and the wire in the core of the rubber crawler can be seen, replace the rubber crawler.



[3] CLEAN, REPLACE AIR CLEANER

⚠ WARNING

- Never clean, or replace the air cleaner when the engine is running.
- When using compressed air to clean the element, there is danger that dirt and dust may fly and get into eyes. Always wear safety glasses.

NOTICE

- When cleaning the outer element, do not hit it or knock it against other objects.
- Do not use the outer element if the folds or seal are damaged.
- Replace the outer element with a new part if it has been cleaned three or four times, or if it has been used for one year. When replacing the outer element, replace the inner element at the same time.
- After cleaning the outer element, if the engine exhaust gas color is black or there is lack of power, replace the outer element. When replacing the outer element, replace the inner element at the same time.
- Never clean the inner element and use it again. Always replace it with a new element.

• CHECK AIR CLEANER

If dust indicator (1) inside the air cleaner is red, clean the air cleaner element.

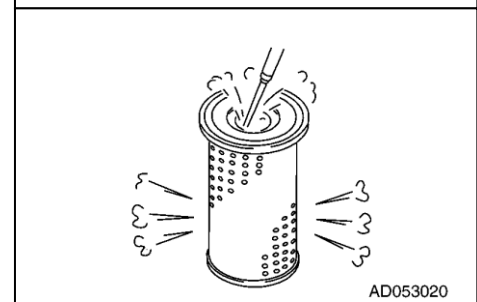
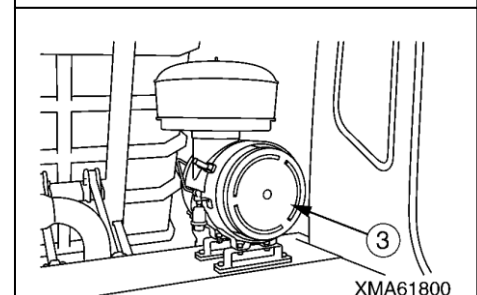
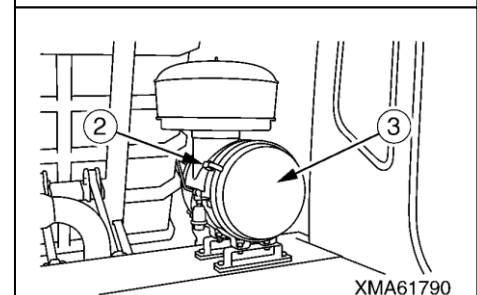
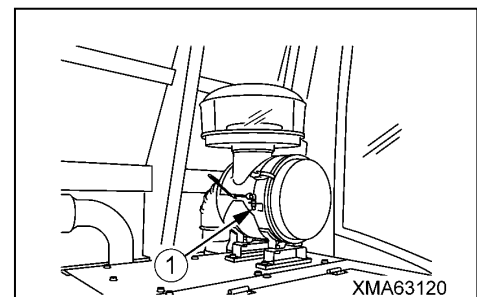
• METHOD OF CLEANING OUTER ELEMENT

1. Remove 2 catchers (2) at the air cleaner cover, and then remove air cleaner cover (3).

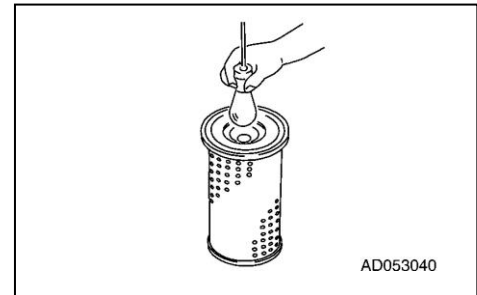
2. Take out the outer element (4).

3. Blow with dry compressed air (max. 0.68 MPa [7 kgf/cm²]) along the folds from the inside of element r.

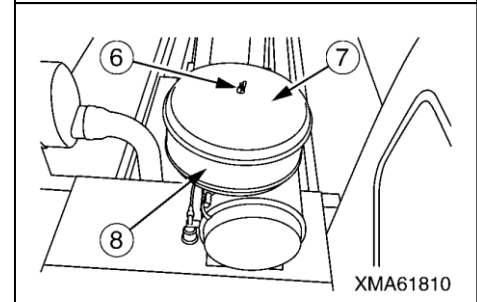
Next, blow along the folds from the outside of the element, and then blow from the inside of the element again.



4. After cleaning, use a light bulb from inside the element to check if there are any small holes or thin places in the element. Replace the element if such places are found.



5. After cleaning the outer element (4), insert the outer element (4) to the body.
6. Fit the air cleaner cover (2) to the body, then secure with catcher (3).
7. Remove the wing nut (6), and then remove the air cleaner cap (7).
8. Remove the dust case (8), then clean the inside of the dust case (8).
9. After cleaning the dust case (8), set the dust case (8) to its original position, and install the air cleaner cover (2), and then tighten the wing nut (6).



• METHOD OF REPLACING OUTER ELEMENT

Remove the outer element and replace it with a new element.

For details of the procedure, see METHOD OF CLEANING OUTER ELEMENT. When replacing the outer element, replace the inner element at the same time. For details, see METHOD OF REPLACING INNER ELEMENT.

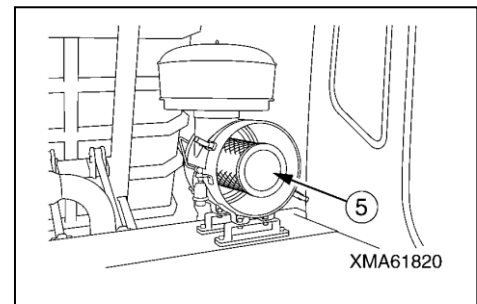
• METHOD OF REPLACING INNER ELEMENT

1. Remove the outer element.

For details of the procedure, see METHOD OF CLEANING OUTER ELEMENT.

2. Take out the inner element (5).
3. Cover the air connector end (air outlet) with a clean cloth or cloth tape.
4. Clean the inside of the body, and then remove the cover fitted in Step 3.
5. Insert the new inner element (5) in the body.
6. Install the outer element (4).

For details of the procedure, see METHOD OF CLEANING OUTER ELEMENT.



[4] CLEAN INSIDE OF COOLING SYSTEM AND CHANGE COOLANT

⚠ WARNING

- Immediately after the engine is stopped, the coolant is at high temperature, so there is danger of burns if you drain the coolant immediately.
Wait for the engine to cool down before draining the coolant.
- Do not suddenly remove the cap when the radiator water temperature is high. Boiling water will spurt out and cause burns.
Wait for the water temperature to go down before removing the cap. When removing the cap, turn it slowly to fully release the internal pressure, then remove the cap.

NOTICE

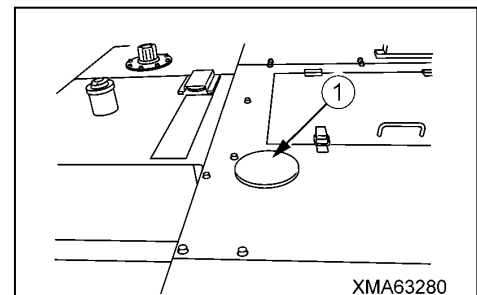
- Replace the cooling water (coolant) every year or 2000 running hours whichever comes first.
- For the coolant mixture ratio of cooling water, see "Operation 8. Cold Weather Operation" in "[2] Coolant Mixture Ratio in Cooling Water".

Clean the cooling water circuit as follows.

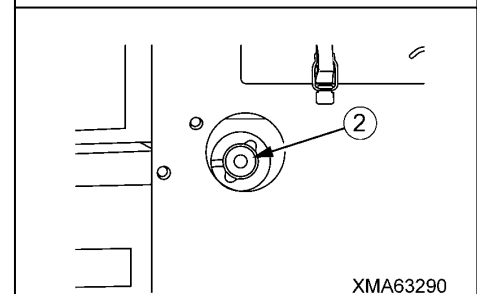
★ Use tap water for the coolant.

Do not use river water, well water, or untreated water supplies.

1. Stop the machine on level ground and stop the engine.
2. Remove the radiator inspection cover (1).



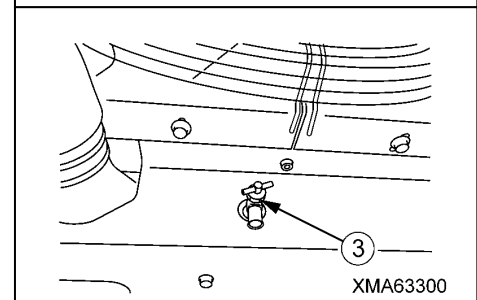
3. Turn radiator cap (2) slowly to fully release the internal pressure, and remove it.



4. Remove the undercover.
5. Open radiator drain valve (3) to drain the water.

★ If there is antifreeze in the coolant, put containers to catch the water under of the drain valve.

6. After draining the water, close the radiator drain valve (3), then add tap water through the water filler to fill the radiator.
7. Open the radiator drain valve (3), then start the engine, run at low idling, and run water through the system to flush it for 10 minutes.



★ While running water through the cooling system to flush it, be careful to adjust the water flow so that the radiator is always full.

★ While running water through the cooling system to flush it, be careful that the water supply hose does not slip out of the water filler.

8. After flushing the system, stop the engine, stop the water supply, and then drain the water.

9. After draining the water, close the radiator drain valve (3), then add cleaning agent through the water filler.

★For details of the method of cleaning, see the instructions on the cleaning agent.

10. After flushing with cleaning agent, open the radiator drain valve (3), drain the water, then start the engine, run at low idling, and flush with water until clean water comes out.

★While running water through the cooling system to flush it, be careful to adjust the water flow so that the radiator is always full.

★While running water through the cooling system to flush it, be careful that the water supply hose does not slip out of the water filler.

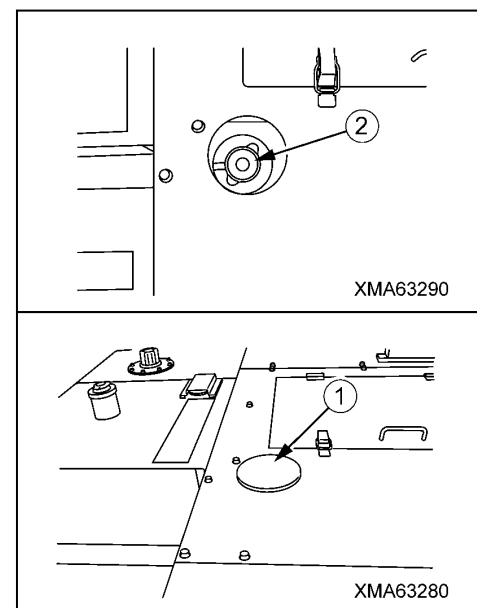
11. When clean water comes out, stop the engine, and close the radiator drain valve (3).

12. Add tap water through the water filler to fill the radiator.

13. Start the engine, run for 5 minutes at low idling, then run for a further 5 minutes at high idling to remove the air from the coolant.

★Leave the radiator cap removed when doing this.

14. Stop the engine, leave for approx. 3 minutes, then add tap water to near the top of the water filler, and tighten the radiator cap (2).



15. Install the radiator inspection cover (1).

16. Install the undercover.

[5] CHECK, CLEAN RADIATOR, INTER COOLER, OIL COOLER, A/C CONDENSOR FINS

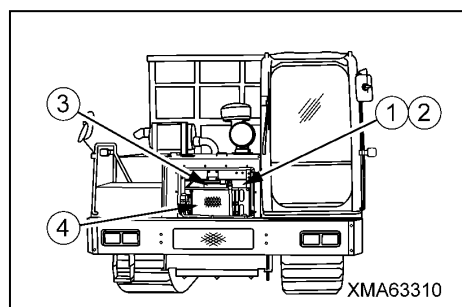
⚠ WARNING

- Never inspect or clean the fins when the engine is running. Always stop the engine before starting the operation.
- When using compressed air to clean the fins, there is danger that dirt and dust may fly and get into eyes. Always wear safety glasses.

NOTICE

- When cleaning the fins, use compressed air at a pressure of less than 0.29Mpa {3 kgf/cm²}, and stand away from the fins when directing the compressed air.
If the compressed air is blown directly against the radiator or is blown at high pressure, the fins will be damaged and this will cause leakage of water or oil.
- When cleaning the fins, do not use steam or water instead of compressed air. This causes clogging.

1. Remove the front grill.
2. Check for mud, dirt, dead leaves, or waste paper clogging radiator fins (1), inter cooler core (2) or oil cooler fins (3) or air conditioner condenser fins (4).
3. If the result of the inspection shows that the fins are clogged, blow with dry compressed air (0.29 MPa [3 kgf/cm²]) to clean.
4. After cleaning the fins, install the front grill.



[6] CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID

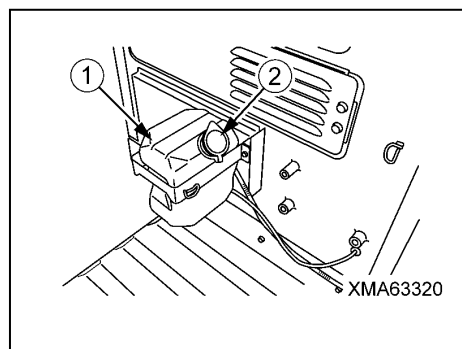
• CHECKING, FILLING

If the window washer fluid does not come out, check the level of the fluid in washer tank (1).

If the level is low, remove cap (2) from the washer tank and fill with automobile window washer fluid.

★ When filling with fluid, be careful not to let dirt get in.

★ The washer tank is installed to the outside at the rear of the cab.



• Mixing RATIO FOR WINDOW WASHER FLUID

Change the mixture ratio of the window washer fluid according to the ambient temperature.

Mix the concentrated window washer fluid with tap water according to the proportions given in the table below, and then fill the washer tank.

★ There are two types of concentrated window washer fluid: the general type for use at freezing temperatures of -10°C (14°F), and a cold weather type for use in temperatures down to -30°C (-22°F). Select the type according to the territory and season.

Territory, season	Mixing proportion		Freezing temperature
	Concentrated fluid	Tap water	
Normal	1/3	2/3	-10°C (14°F)
Winter in cold area	1/2	1/2	-20°C (-4°F)
Winter in extremely cold area	Use undiluted washer fluid	None	-30°C (-22°F)

[7] CHECK REFRIGERANT (GAS) VOLUME

⚠ WARNING

- If the refrigerant used in the cooler gets into your eyes or on to your hands, it may cause loss of sight or frost bite. Never loosen or remove any part of the refrigerant circuit.
- Always ask your refrigerant dealer to charge the cooler with refrigerant.

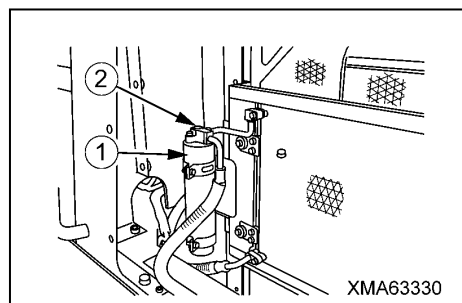
NOTICE

- If the cooler is operated when it has run out of refrigerant or the refrigerant level is low, the compressor will be damaged. Always check the refrigerant level before using the cooler.
- Even in the off-season when the cooler is not being used, run the cooler for 3 to 5 minutes once a month.

- Check the volume of refrigerant in the cooler through the top of the receiver which is charged with gas or through sight gauge (2).

Receiver (1) is mounted on the right side of the condenser inside the front grill.

Remove the front grill to carry out inspection.

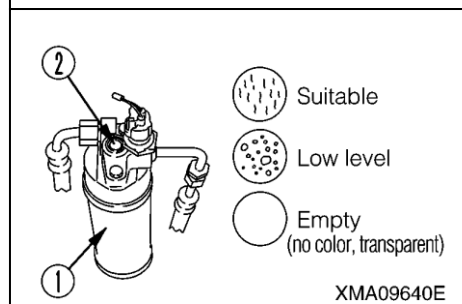


- Check the volume of refrigerant in the cooler as follows.

1. Remove the front grill.
2. Start the engine and run at high idling.
3. Set the control panel inside the operator's compartment to cooling and run at high speed.
4. Look through receiver (1) or sight gauges (2) (inspection window) to check the condition of the gas flowing in the refrigerant circuit.

Compare it with the table below to judge the condition.

Judgment of refrigerant level	Condition in sight gauge
Suitable	No bubbles in refrigerant flow
Low level	Continuous bubbles in refrigerant flow
Empty	Sight gauge is colorless, transparent



5. Check for oil oozing out from the connection of the piping of the receiver (1).

If there is oil oozing out, gas is leaking.

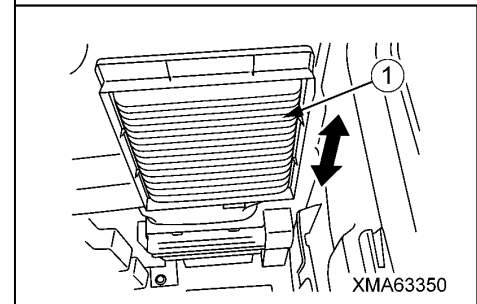
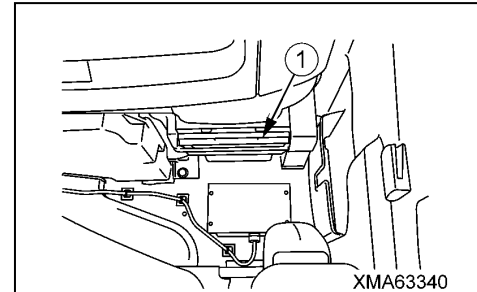
[8] CLEAN, REPLACE AIR FILTER OF AIR CONDITIONER

NOTICE

- If the air filter is not cleaned for long periods, the cooling and heating effect of the air conditioner will drop. It will also cause breakage of the equipment.
- When cleaning the air filter, do not use compressed air or wash with water.
- If the air filter is markedly damaged or deteriorated, replace it with a new part. We recommend that you replace the filter once a year even if it is not damaged or deteriorated.

Air conditioner is at the bottom left of the front face of the large box at the rear of the operator's compartment.

1. Slide air filter (1) up and remove it.
2. Remove the filter from the filter holder.
3. Tap the filter likely to remove the dust and dirt.
4. After cleaning, insert air filter (1) in its original position.



[9] CLEAN, REPLACE FRESH FILTER OF AIR CONDITIONER

WARNING

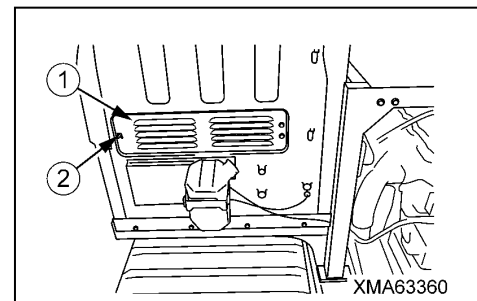
If you use compressed air when cleaning the filter, there is danger that dirt or dust will fly and get into your eyes. Always wear safety glasses.

NOTICE

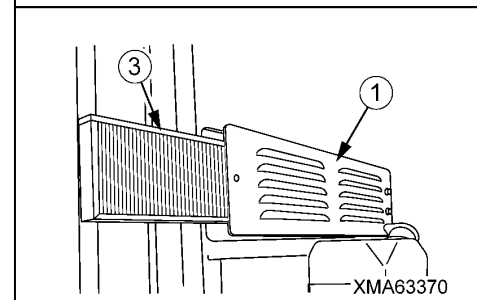
- When using compressed air to clean the filter, keep the pressure of the compressed air to a maximum of 0.20 MPa [2 kgf/cm²] and do not bring the air jet close to the filter. The filter will be damaged if the air jet is aimed directly at it or if the air is blown at high pressure.
- If the fresh air filter is markedly damaged or deteriorated, replace it with a new part. If the fresh air filter is cleaned repeatedly, it will gradually become impossible to return to its original condition. We recommend that you replace the filter once a year even if it is not damaged or deteriorated.

The fresh air filter for the air conditioner is inside the cover at the rear left outside the cab.

1. Raise the dump body. For details, see "OPERATION 4. OPERATING DUMP BODY".
2. Remove wing bolt (2), then open cover (1).



3. Remove fresh air filter (3) from inside cover (1).
 4. Blow the filter with compressed air (Max. 0.2 MPa {2 kgf/cm²}) to clean it.
 5. After cleaning, check filter (3) and replace it with a new part if it is damaged or extremely dirty.
 6. Install fresh air filter (3) in the opposite order to removal.
- ★When installing the fresh air filter, install with the arrow on the filter frame facing the inside of the cab.



7.5 CHECK BEFORE STARTING

[1] CHECK COOLANT LEVEL, ADD WATER

WARNING

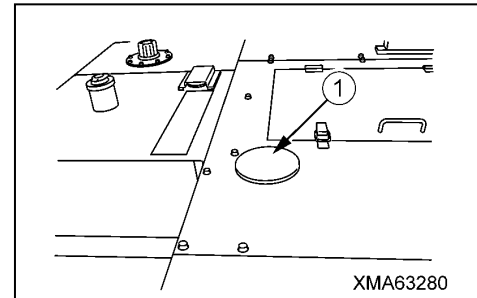
Do not suddenly remove the cap when the radiator water temperature is high. Boiling water will spurt out and cause burns.

Wait for the water temperature to go down before removing the cap. When removing the cap, turn it slowly to fully release the internal pressure, then remove the cap.

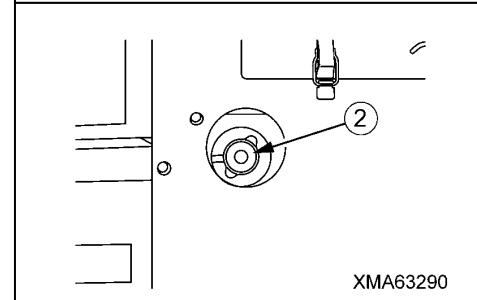
NOTICE

If the result of the coolant level check shows that more water must be added than usual, there is probably a water leak, so search for the cause and repair the problem immediately.

1. Remove the radiator inspection cover (1).



2. Turn the radiator cap (2) slowly to fully release the internal pressure, and remove it.
3. Check the coolant level is close to the bottom of the filler port.
If the coolant level is low, add tap water.
4. After adding water, tighten the cap securely.
5. Install the radiator inspection cover (1).

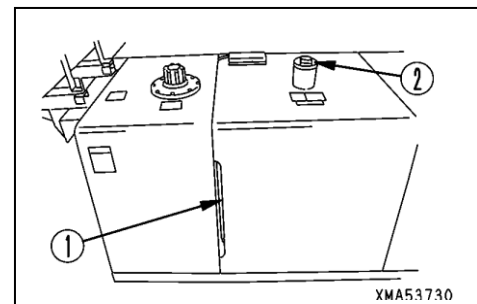


[2] CHECK FUEL LEVEL, ADD FUEL

DANGER

When adding fuel, never let the fuel overflow from the tank. This will cause fire.

1. Check the fuel level with level gauge (1) at the side face of the fuel tank.
 2. Release the lock on the cap (2) with a key and remove the cap (2) from the fuel tank and add fuel through the fuel filler.
 3. Check the breather hole on the inside of the cap, and if it is clogged, wash it.
 4. After adding fuel, tighten the cap (2) securely and lock up it with a key.
- ★ Always fill the fuel tank after completing the day's operation.



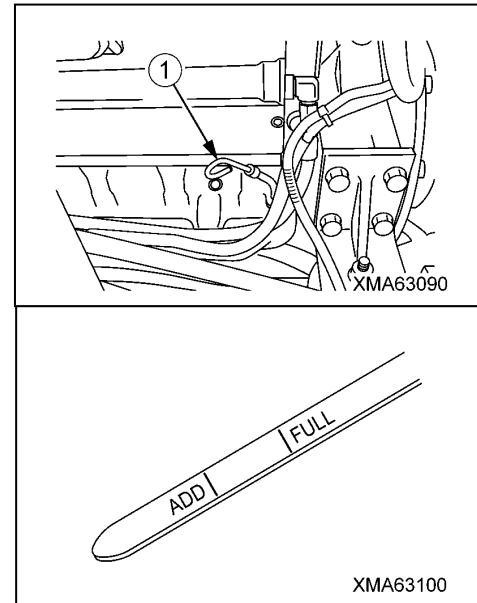
[3] CHECK ENGINE LUBRICATING OIL LEVEL, ADD OIL

• CHECKING OIL LEVEL

1. Raise the dump body. For details, see "OPERATION 4. OPERATING DUMP BODY".
2. Pull out dipstick (1) at the engine rear left side and wipe the oil off with a cloth.
3. Insert dipstick (1) fully into the gauge guide, then pull it out again.
4. The oil level should be between FULL and ADD lines on dipstick (1).

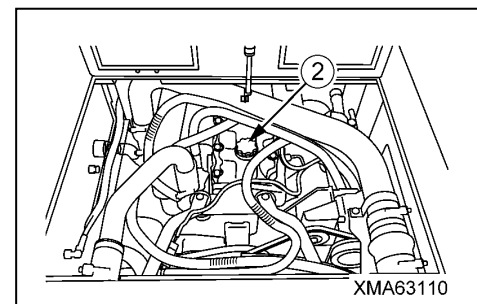
If the oil level is below ADD line, add engine oil.

5. Lower the dump body. For details, see "OPERATION 4. OPERATING DUMP BODY".



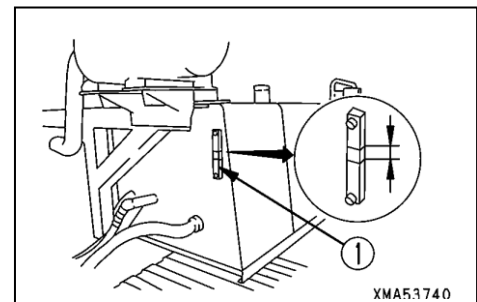
• FILLING WITH OIL

1. Open the engine inspection cover.
2. Remove cap (2) and add engine oil.
 - ★ For details of the engine oil, see "3. USE OF FUEL AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
 - ★ Use a container with an attached hose when filling with oil.
3. Check the oil level again, and if it is within the specified range, tighten cap (2) securely.
4. Close the engine inspection cover.



[4] CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

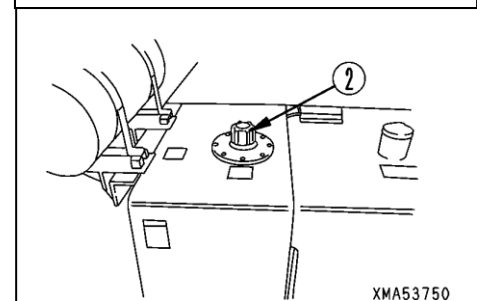
1. Use level gauge (1) at the side face of the hydraulic tank to check the oil level and the condition of dirt in the oil. The oil level should be between the top and bottom red lines on the gauge.



2. If the oil level is low, remove cap (2) of the hydraulic tank and add hydraulic oil through the oil filler.

★ For details of the hydraulic oil, see "3. USE OF FUEL AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

3. Check the breather hole inside the cap and clean it if it is clogged.
4. After adding oil, tighten cap (2) securely.



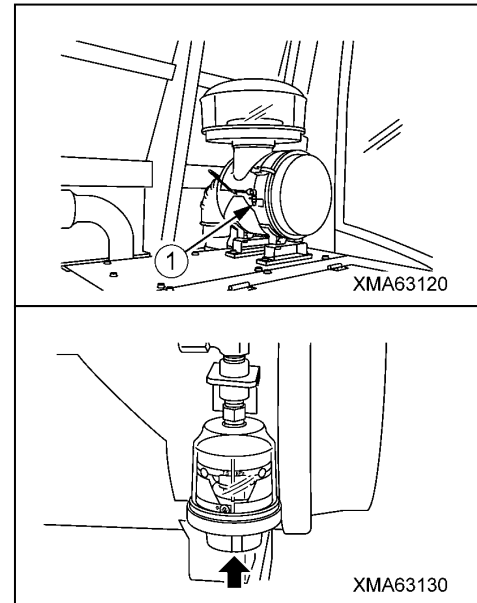
[5] CHECK DUST INDICATOR

Check if the red piston has appeared in the transparent portion of dust indicator (1).

If the red piston has appeared, clean or replace the element immediately.

★ For details of the method of cleaning the element, see “7.4 WHEN REQUIRED”.

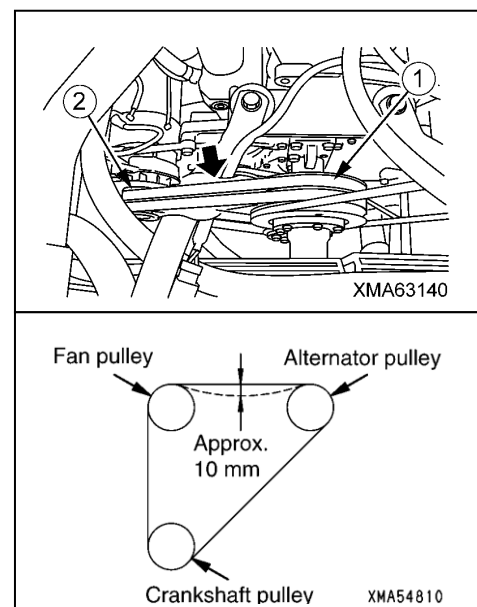
★ After checking, cleaning, or replacing, push the knob of dust indicator to return the red piston to its original position.



[6] CHECK, ADJUST FAN BELT TENSION

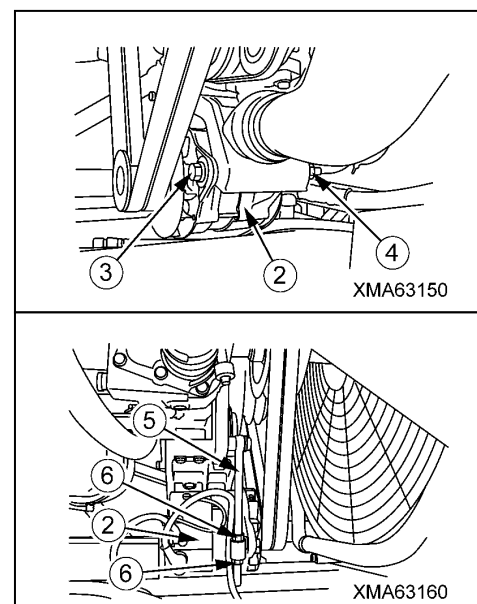
• CHECKING TENSION

1. Open the engine inspection cover.
2. Push with your finger (approx. 58.8 N {6 kg}) at a point midway between the fan pulley (1) and alternator pulley (2). The deflection should be approx. 10 mm.
3. If the deflection is too large, adjust the belt tension. For details, see “ADJUSTING TENSION”.



• ADJUSTING TENSION

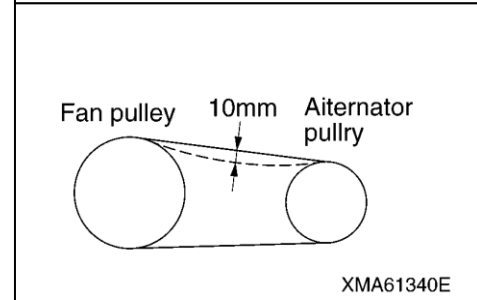
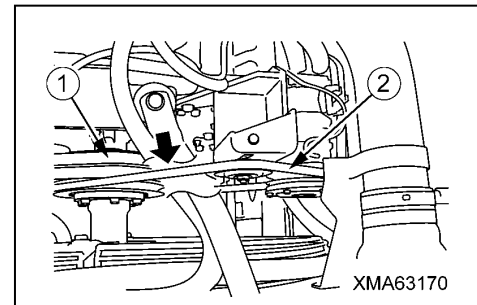
1. Loosen bolt (3) and locknut (4) at the bottom of the alternator (2).
2. Loosen 2 locknuts (6) of the adjustment bolt (5) at the top of the alternator (2).
3. Turn lock nut (6) to right (clockwise), then move alternator towards the main frame to adjust so that the belt deflection is approx. 10 mm.
4. When the belt tension is correct, tighten locknut (4) at the bottom of the alternator (2) first, and then tighten 2 locknuts (6) of the adjustment bolt (5) at the top of the alternator (2).
5. Repeat the procedure for checking the tension to check the belt tension again.
6. Close the engine inspection cover.



[7] CHECK, ADJUST COMPRESSOR BELT TENSION

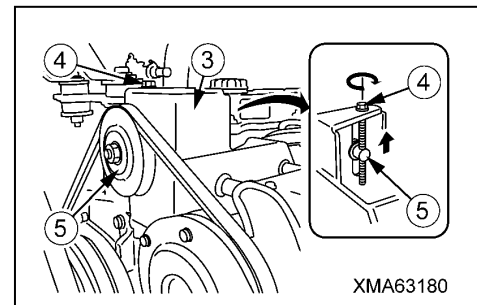
• CHECKING TENSION

1. Open the engine inspection cover.
2. Push with your finger (approx. 58.8 N {6 kg}) at a point midway between the fan pulley (1) and compressor pulley (2). The deflection should be approx. 10 mm.
3. If the deflection is too large, adjust the belt tension. For details, see "ADJUSTING TENSION".



• ADJUSTING TENSION

1. Turn adjustment bolt (4) at the top of tension pulley bracket (3) clockwise to adjust the belt deflection to approx. 10 mm. When this is done, tension pulley (5) comes up.
2. Repeat the procedure for checking the tension and check the belt tension again.
3. Close the engine inspection cover.



[8] CHECK ELECTRIC WIRING

DANGER

If any tool touches between the battery positive (+) terminal and the chassis, there is danger that sparks will be caused. Do not put tools and other metal objects in your breast pocket. They may fall out.

- Open the battery inspection cover, and check for looseness of the battery terminal, looseness of the ground connection and battery relay wiring, and for signs of short circuits.
- Open the engine inspection cover, and check for loose starting motor wiring and signs of short circuits.
- Open the engine inspection cover, and check loose alternator wiring and signs of short circuit.

[9] CHECK OPERATION OF SWITCHES, LAMPS, GAUGES

- Turn the starting switch to the ON position and check that the monitor lamps light up.
- Turn the starting switch to the ON position, operate the lamp switch and flasher switch inside the combination switch, and check that each lamp lights up.
 - ★ If any lamp does not light up, the bulb is probably blown or there is a disconnection, so contact your distributor.
- Turn the starting switch to the ON position, push the Hi-Lo speed range selector switch, and check that the high speed travel lamp on the meter box lights up.
 - ★ If high speed travel lamp does not light up, the bulb is probably blown or there is a disconnection, so contact your distributor.
- Turn the starting switch to the ON position, operate the parking brake switch to the ON (STOP) position, and check that the parking lamp on the meter box lights up.
 - ★ If parking lamp does not light up, the bulb is probably blown or there is a disconnection, so contact your distributor.
- Turn the starting switch to the ON position, operate the wiper switch, and check that the wiper motor action.
 - ★ If wiper motor does not act, there is probably a failure or disconnection in the wiper motor, so contact your distributor.
- Turn the starting switch to the ON position, operate the air conditioner controller, and check that the air conditioner function.
 - ★ If air conditioner does not function, there is probably a failure or disconnection in the air conditioner unit, so contact your distributor.

[10] CHECK OPERATION OF HORN, ALARM BUZZER

- Turn the starting switch to the ON position, push the horn switch inside the combination switch or dump control lever top end position, and check that the horn sounds.
 - ★ If the horn does not sound, there is probably a failure or disconnection in the horn, so contact your distributor.
- Turn the starting switch to the ON position, operate the parking brake switch to the ON (STOP) position (pilot lamp lights up) and check that the buzzer sounds.
 - ★ If the parking brake buzzer does not sound, there is probably a failure or disconnection in the buzzer, so contact your distributor.
- Turn the starting switch to the ON position, operate the travel lever to the REVERSE position and check that the backup buzzer sounds.
 - ★ If the backup buzzer does not sound, there is probably a failure or disconnection in the buzzer or backup buzzer switch, so contact your distributor.

7.6 EVERY 50 HOURS SERVICE

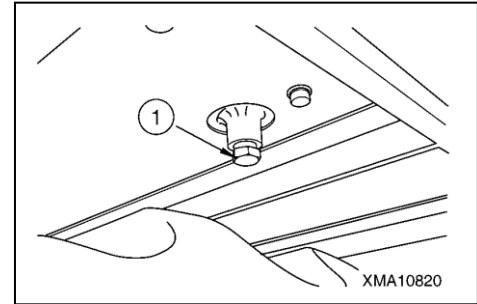
[1] DRAIN WATER, SEDIMENT FROM FUEL TANK

★Set a container under the fuel tank to catch the fuel.

1. Turn the plug (1) under the fuel tank to the left slightly.

The water and sediment accumulated at the bottom of the tank will be drained together with the fuel.

2. After completely draining the sediment and water, tighten the plug (1) under the fuel tank.



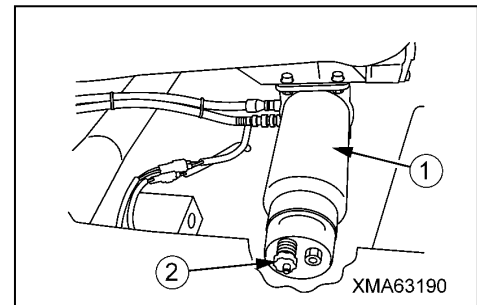
[2] DRAIN WATER, SEDIMENT FROM WATER SEPARATOR

★Set a container under the water separator to catch the fuel.

1. Turn the valve (2) of the water separator (1) bottom to the left.

The water and sediment accumulated at the bottom of the water separator (1) will be drained together with the fuel.

2. After completely draining the sediment and water, turn the valve (2) of the water separator (1) bottom to the right, and close it.



7.7 EVERY 100 HOURS SERVICE

★Carry out "every-50 hours service" at the same time.

[1] CHECK BATTERY ELECTROLYTE LEVEL, ADD DISTILLED WATER

⚠ DANGER

- If any tool touches between the battery positive (+) terminal and the chassis, there is danger that sparks will be caused. Do not put tools and other metal objects in your breast pocket. They may fall out.
- Be careful not to get battery electrolyte on yourself or on your clothes.
- Do not bring any lighted cigarette or cigarette lighter close.

1. Open the battery inspection cover.

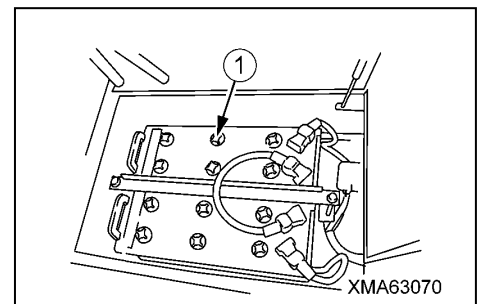
2. Remove all battery caps (1) and check the battery electrolyte level.

The battery electrolyte level should be approx. 10 - 12 mm above the plate.

3. If the battery electrolyte level is low, add distilled water.

★From time to time, measure the specific gravity of the battery, and charge if necessary.

4. Close the battery inspection cover.



7.8 EVERY 250 HOURS SERVICE

Carry out “every-50 hours service and every-100 hours service” at the same time.

[1] CHANGE ENGINE LUBRICATING OIL, REPLACE ENGINE OIL FILTER

WARNING

- Stop the engine and wait for the temperature to go down.
- After adding oil, tighten the cap and drain plug securely, then wipe up any spilled oil.

★ Set a container under the engine to catch the oil.

★ Prepare a filter wrench.

1. Turn the handle (4) of the drain valve (3) from the engine oil pan and drain the oil.

★ Set the container under the engine oil pan to catch the oil.

★ Be careful not to get oil on yourself.

2. Check the drained oil.

★ If there are large amounts of metal particles or dirt in the drained oil, please contact your distributor.

3. After completely draining the oil, close the drain valve (3).

4. Using the filter wrench, turn the oil filter cartridge (5) to the left and remove it.

5. Clean the oil filter mount, coat the packing surface of the new oil filter cartridge with engine oil, and then install it to the mount.

★ Fill the Engine oil into the new filter cartridge.

★ When installing a new filter cartridge, always tighten it by hand, and be careful not to tighten it too much.

For details, see the separate Operation and Maintenance Manual for the engine.

6. Open the engine inspection cover.

7. Remove the filler cap (2) and add the specified amount of engine oil.

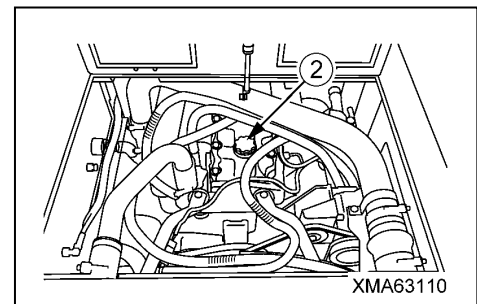
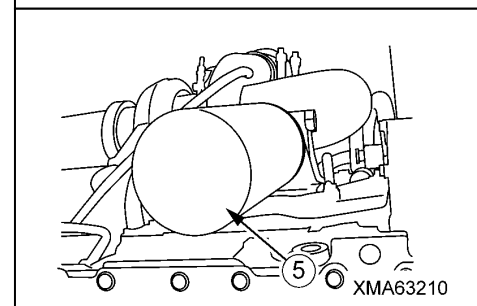
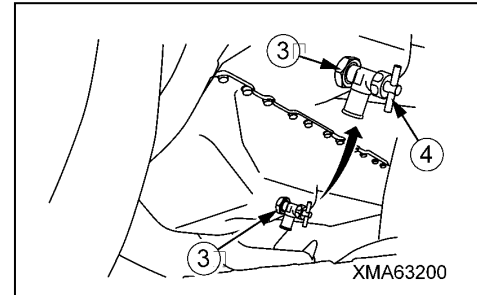
★ For details of the oil to use, see “3. USE OF FUEL AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE”.

★ Engine oil refill amount: 21 liters (5.55 US gal, 4.62 UK gal)

★ Use a container with an attached hose when filling with oil.

8. Start the engine, run at idling for several minutes, then check that the oil is within the range between the top and bottom marks on the engine oil level gauge. For details, see “7.5 CHECK BEFORE STARTING”.

9. Close the engine inspection cover.



[2] REPLACE WATER SEPARATOR

WARNING

- Stop the engine and wait for the engine to cool down.
- Do not smoke or bring any flame close.
- If any fuel leaks or overflows, always wipe it up immediately. If fuel gets on any high-temperature part, it will cause fire.

NOTICE

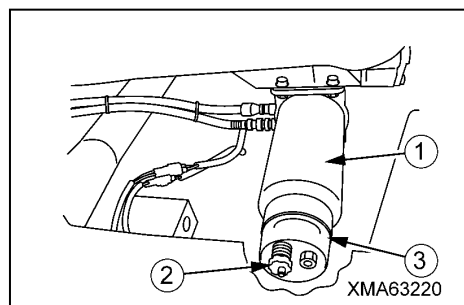
- After replacing the water separator, bleed the air from the fuel circuit. For details, see the separate Operation and Maintenance Manual for the engine.
- The water separator is a cartridge type, so it cannot be used again.

★ Set a container under the water separator to catch the fuel.

★ Prepare a filter wrench.

★ The water separator is installed at the bottom left of the engine.

1. Go under the machine and turn water drain valve (2) at the bottom face of water separator (1) to the left (counterclockwise) to drain the fuel from water separator (1).
2. Turn water drain valve (2) at the bottom face of water separator (1) to the right (clockwise) and close the valve.
3. Hold the bottom of water separator (1), loosen bowl (3) by hand, and remove it.
4. Using the filter wrench, turn water separator (1) to the left (counterclockwise) and remove it.
5. Clean the inside of the water separator mount and bowl (3).
 - ★ Check the seal of the water separator mount and the seal of bowl (3). If they are damaged or deteriorated, replace them with new parts.
6. Install new water separator (1) to the water separator mount.
 - ★ Coat the seal face of water separator (1) with clean diesel fuel.
 - ★ When installing water separator (1), bring the seal surface into contact, then tighten a further 1/3 - 1/2 turns.
7. Install bowl (3) to water separator (1), then tighten securely by hand.



[3] REPLACE FUEL FILTER

WARNING

- Stop the engine and wait for the engine to cool down.
- Do not smoke or bring any flame close.
- If any fuel leaks or overflows, always wipe it up immediately. If fuel gets on any high-temperature part, it will cause fire.

NOTICE

- After replacing the fuel filter, bleed the air from the fuel circuit. For details, see the separate Operation and Maintenance Manual for the engine.
- The water separator is a cartridge type, so it cannot be used again.
- When replacing the fuel filter, do not put any fuel inside the new fuel filter. This fuel will not be filtered, so it will cause premature wear of the structural parts of the fuel system.

★ Set a container under the fuel filter to catch the fuel.

★ Prepare a filter wrench.

★ Fuel filter (1) is installed at the top left of the engine.

1. Raise the dump body. For details, see "OPERATION 4. OPERATING DUMP BODY".

2. Using the filter wrench, turn the fuel filter (1) to the left (Counter clockwise) and remove it.

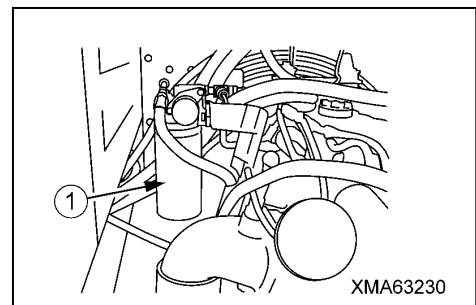
3. Clean the fuel filter mount.

★ Coat the O-ring at the mount of fuel filter (1) with clean diesel fuel.

4. Install new fuel filter (1) to the fuel filter mount.

★ When installing fuel filter (1), tighten by hand until the filter gasket contacts the mount, then tighten a further 3/4 turns with the filter wrench.

5. Lower the dump body. For details, see "OPERATION 4. OPERATING DUMP BODY".

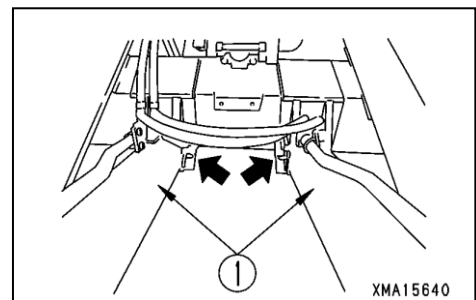


[4] GREASE ALL PARTS OF DUMP CYLINDER

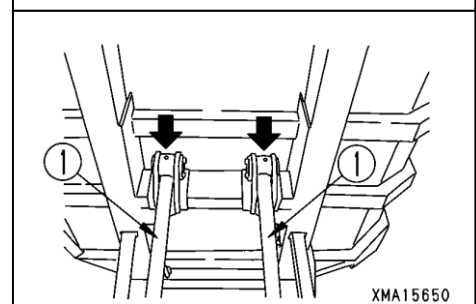
★ Prepare a grease pump.

1. Raise the dump body. For details, see "OPERATION 4. OPERATING DUMP BODY".

2. Grease the bottom (left and right: 2 places) of the dump cylinder (1).



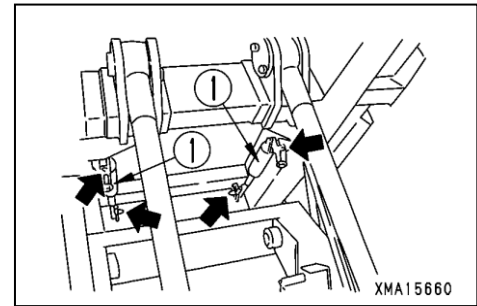
3. Grease the piston rod (left and right: 2 places) of the dump cylinder (1).



[5] GREASE DUMP BODY REAR SIDE FLAP OPERATING ROD

★Prepare a grease pump.

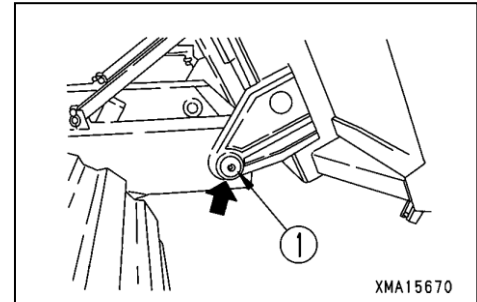
1. Raise the dump body. For details, see "OPERATION 4. OPERATING DUMP BODY".
2. Grease the pin position (left and right: 4 places) of the flap operating rod (1).



[6] GREASE DUMP BODY HINGE PIN

★Prepare a grease pump.

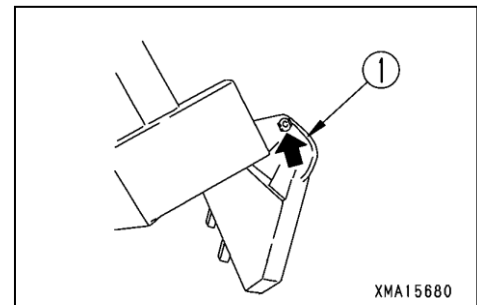
1. Raise the dump body. For details, see "OPERATION 4. OPERATING DUMP BODY".
2. Grease the dump body hinge pin position (1) (left and right: 2 places).



[7] GREASE DUMP BODY REAR SIDE FLAP OPERATING LEVER

★Prepare a grease pump.

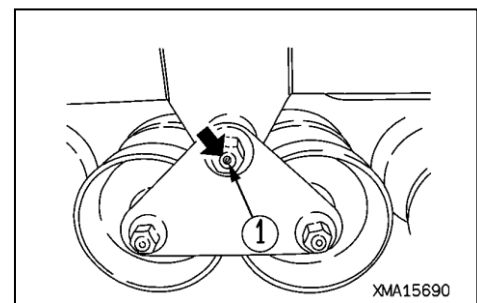
1. Raise the dump body. For details, see "OPERATION 4. OPERATING DUMP BODY".
2. Grease the pin position (left and right: 2 places) of the flap operating lever (1).



[8] GREASE TRACK ROLLER PIVOT SHAFT

★Prepare a grease pump.

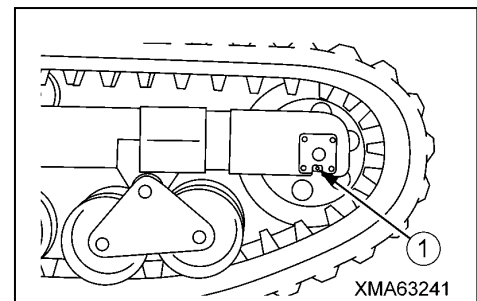
- Grease the shaft position (left and right: 8 places) of the track roller pivot shaft (1).



[9] GREASE REAR IDLER SHAFT

★Prepare a grease pump.

- Grease the shaft position (left and right: 2 places) of the rear idler shaft (1).



7.9 EVERY 500 HOURS SERVICE

Carry out “every-50 hours, every-100 hours and every-250 hours service” at the same time.

[1] REPLACE HYDRAULIC LINE FILTER

WARNING

- Raise the dump body, stop the engine, then wait for the oil temperature to go down.
- Loosen the cap of the hydraulic tank slowly to release the internal pressure completely, then remove the cap.
- Operate the travel lever and dump control lever 2 or 3 times to the end of their stroke to completely release the remaining pressure in the hydraulic circuit.

NOTICE

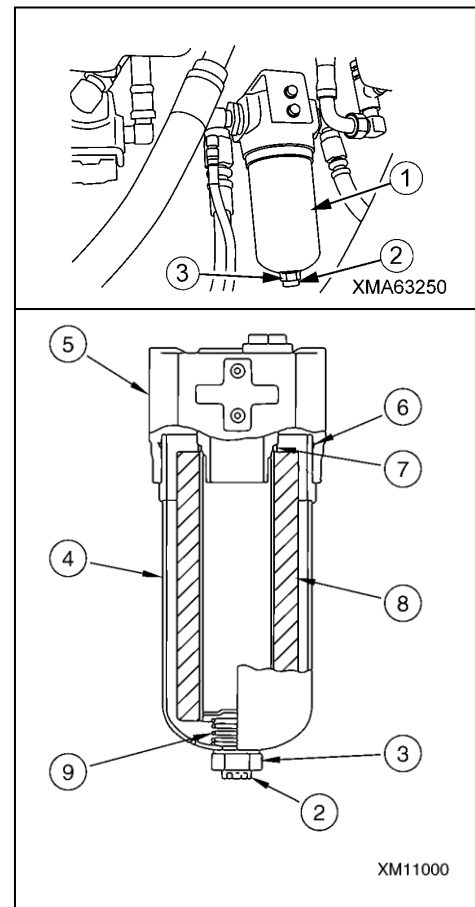
When replacing the hydraulic line filter, always change the oil in the hydraulic tank at the same time.

★ Set a container under the hydraulic line filter to catch the oil.

1. Remove the drain plug (2) of the line filter (1) and drain the oil.
2. Setting a spanner to the nut portion (3) being positioned at the lower section of the case of the line filter, turn it toward left side to remove the filter case (4).
3. Remove the o-rings (6), (7) inside the filter head (5).
4. Clean the filter head (5).
5. Take out the element (8) in the filter case (4), and wash the filter case (4).
6. Fit the new o-rings (6), (7) in to the filter head (5).
7. Inserting a new element (8) into the filter case (4), screw it in into the filter body section (5).

★ When inserting the element (8) into the filter case (4), be careful not to let the spring (9) inside the filter case (4) collapse.

★ Fill the hydraulic oil to the filter case.



[2] CHANGE OIL IN HYDRAULIC TANK

⚠ WARNING

- Lower the dump body, then stop the engine and wait for the temperature to go down.
- Loosen the oil filler cap slowly to release the pressure inside the hydraulic tank, then remove the cap.
- Make full stroke operations of the travel lever and the damp control lever to release the remaining pressure inside the hydraulic circuits totally.
- After adding oil, tighten the cap and drain plug securely, then wipe up any spilled oil.

NOTICE

- When changing the oil in the hydraulic tank, always replace the hydraulic line filter at the same time.
- Always replace the O-ring used inspection cover inside the hydraulic tank with a new O-ring.

★ Set a container under the hydraulic tank to catch the oil.

1. Remove the filler cap (2) on the hydraulic tank.

2. Turn drain plug (3) at the bottom of the hydraulic tank to the left and drain the oil from the hydraulic tank.

★ Set the container under the hydraulic tank to catch the oil.

★ Be careful not to get oil on yourself.

3. Inspect the drained oil.

★ If there are large amounts of metal particles or dirt in the drained oil, please contact your distributor.

4. After completely draining the oil, tighten drain plug (3).

5. Remove the 8 bolts, then remove the inspection cover (4).

6. Take out the oil strainer (5) from the hydraulic tank, then wash it in diesel oil.

7. Install the oil strainer (5) inside the hydraulic tank, set new O-ring (6) to the hydraulic tank, then install inspection cover (4) and tighten the bolts.

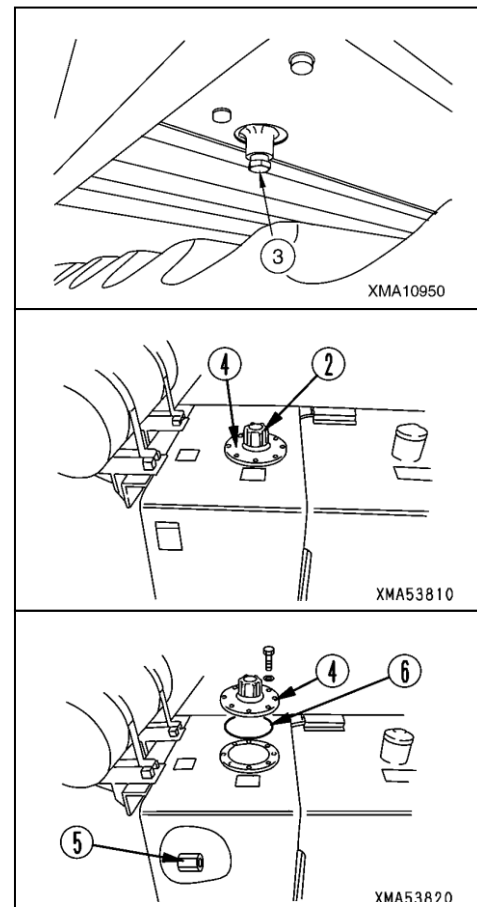
8. Fill with hydraulic oil through the oil filler.

★ For details of the hydraulic oil to use, see "3. USE OF FUEL, COOLANT, AND LUBRICANT ACCORDING TO AMBIENT TEMPERATURE".

★ Hydraulic oil refill amount: 155ℓ (40.95 US gal, 34.10 UK gal)

★ Use a container with an attached hose when filling with oil.

9. Check that the oil level is between the top and bottom red lines on the level gauge at the rear of the hydraulic tank. For details, see "7.5 CHECK BEFORE STARTING (4)".



7.10 EVERY 1500 HOURS SERVICE

Carry out “every-50 hours, every-100 hours, every-250 hours and every-500 hours service” at the same time.

[1] CHANGE OIL INSIDE TRAVEL MOTOR REDUCTION GEAR CASE

WARNING

- Stop the engine and wait for the oil temperature to go down.
- After adding oil, tighten the plugs securely and wipe up any spilled oil.

★ Set a container under the travel motor reduction gear case to catch the oil.

1. Drive the machine forward or backward to position drain plug (1) of the reduction gear case at the bottom, then stop the engine.

2. Remove the oil filler plug (3), oil level inspection plug (2), and drain plug (1), and drain the oil from the case.

★ Set the container under the travel motor to catch the oil.

3. Inspect the drained oil.

★ If there are large amounts of metal particles or dirt in the drained oil, please contact your distributor.

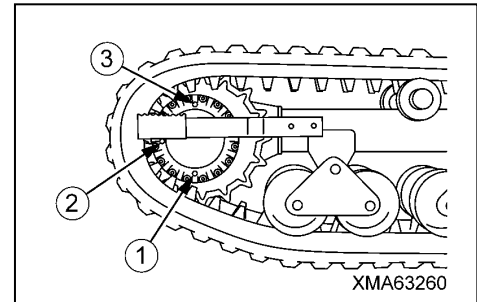
4. After the oil has been completely drained, tighten drain plug (1).

5. Add the specified amount of gear oil through the oil filler plug (3), and check that oil comes out from the oil level inspection plug (2) hole.

★ For details of the gear oil, see “3. USE OF FUEL AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE”.

★ Specified amount of gear oil: 7 liters (1.85 US gal, 1.54 UK gal)

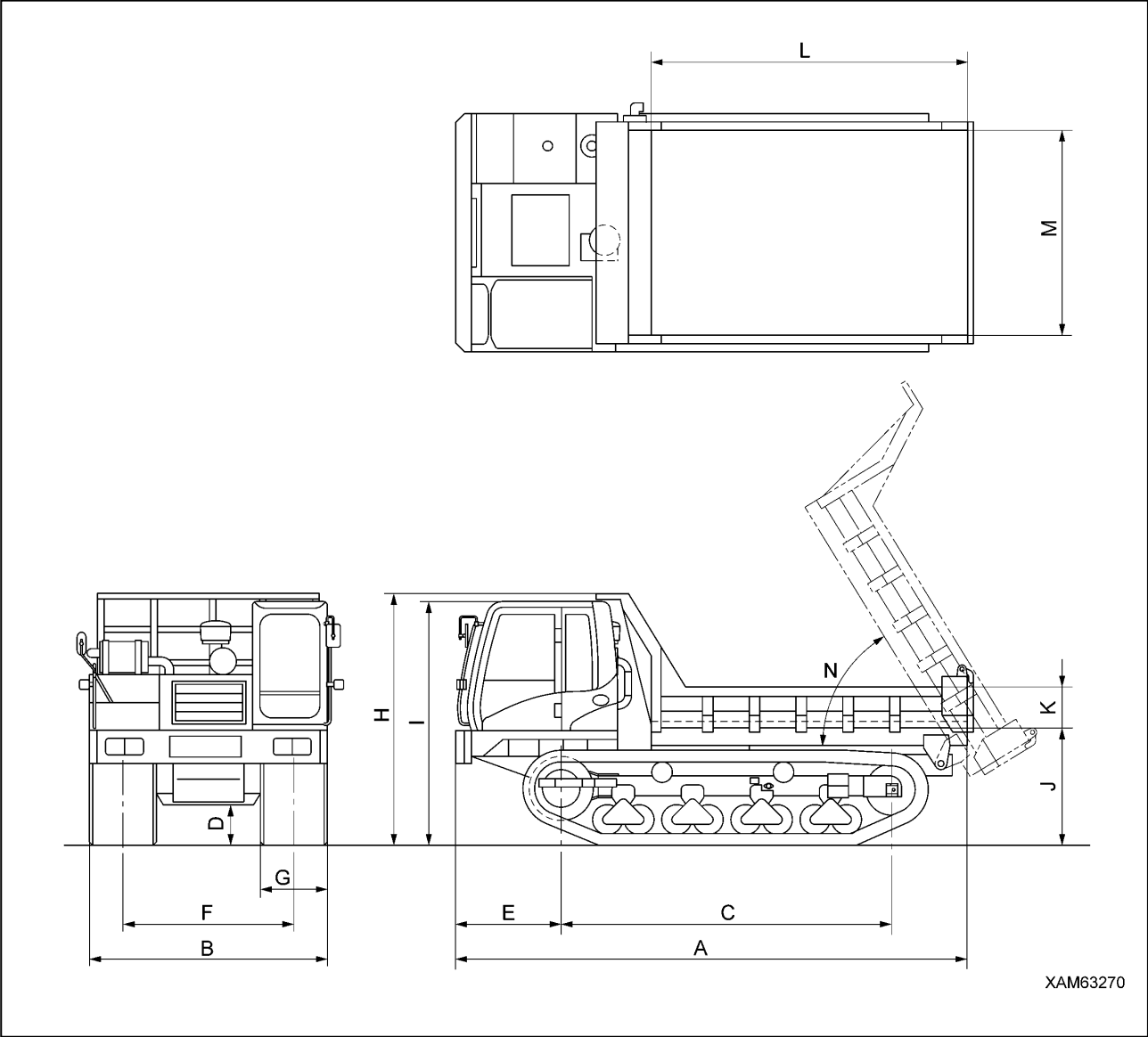
6. Tighten the oil filler plug (3) and the oil level inspection plug (2).



SPECIFICATIONS

1. Dimension drawing	4-2
2. Specifications table	4-3

1. DIMENSION DRAWING



2. SPECIFICATIONS TABLE

Model name			MST-2200VD
A	Overall length	(mm)	6,200
B	Overall width	(mm)	2,905
C	Distance between center of idler and center of sprocket	(mm)	3,840
D	Min. ground clearance	(mm)	430
E	Distance between front of machine and center of sprocket	(mm)	1,270
F	Track gauge	(mm)	2,050
G	Track width	(mm)	750
H	Overall height (cab roof top)	(mm)	3,140
I	Overall height (dump body top)	(mm)	2,980
J	Clearance between ground and bottom of dump body	(mm)	1,450
K	Dump body height	(mm)	400
L	Dump body length	(mm)	3,600
M	Dump body width	(mm)	2,450
N	Max. dumping angle	(deg)	60
Mass (weight) of machine		(kg)	13,400
Max. payload		(kg)	10,000
Drive system		Fully hydraulic system (HST)	
Speed change system		Step-less speed change	
Travel speed (at high speed range)		(km/h)	0 – 12km/h
Travel speed (at low speed range)		(km/h)	0 – 8km/h
Ground contact pressure (unloaded)		(kPa {kg·f/cm ² })	22.6 {0.23}
Ground contact pressure (loaded)		(kPa {kg·f/cm ² })	40.2 {0.41}
Engine model		Caterpillar C7	
Engine type		Water-cooled, 4-cycle, in-line upright hydraulic type electric unit injector with turbocharger, air cooled inter cooler	
No. of cylinders – bore x stroke		(mm)	6 – 110 x 127
Piston displacement		(ℓ)	7,242
Rated output/engine speed		(kW/min ⁻¹)	186/2,200
Fuel		Diesel oil	
Fuel consumption ratio		(ℓ)	258
Battery		12V, 120Ah	

RUBBER CRAWLER CARRIER MST-2200VD OPERATION AND MAINTENANCE MANUAL

Document No.AE12200VD2-06

Sixth edition: February 15, 2011

Issued by Morooka Co., Ltd.
358 Shoubeisindencho, Ryugasaki,
Ibaraki 301-0034,
Japan

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