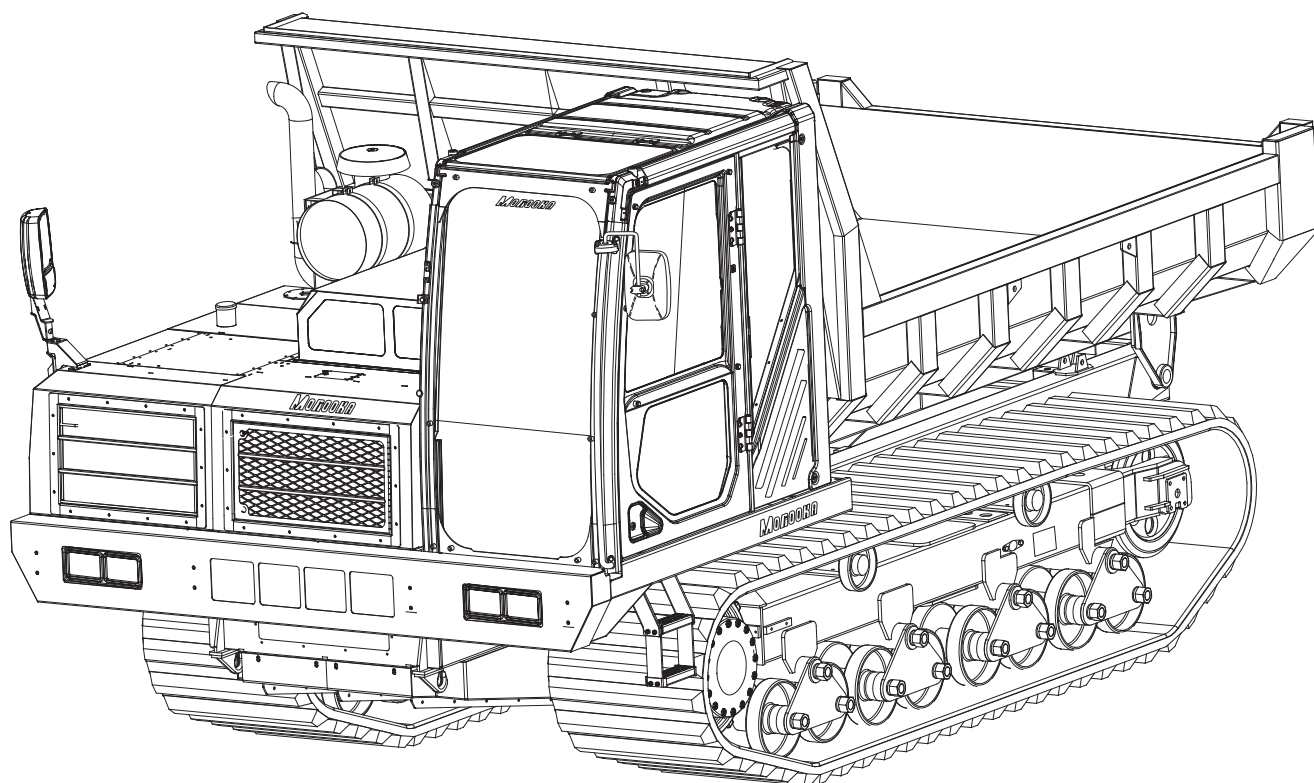




Operator Manual

MST-3000VD

Tier 4 Final



⚠ WARNING

FAILURE TO READ AND UNDERSTAND THE CONTENTS OF THIS MANUAL CAN RESULT IN DEATH, SERIOUS INJURY, OR DAMAGE TO PROPERTY AND EQUIPMENT. ALWAYS READ AND UNDERSTAND THE CONTENTS OF THIS MANUAL BEFORE OPERATING MACHINE. KEEP MANUAL WITH MACHINE AT ALL TIMES.

Revision History

Rev.	Date	Page	Change
0	6-08-2016		Initial Release

SECTION A. INTRODUCTION

A.1 GENERAL INFORMATION

This manual is for Morooka Rubber Track Carrier MST-3000VD Tier 4 Final (T4F).

Information used in these instructions was current at time of printing. However, due to Morooka America's ongoing product improvement, production changes may cause your equipment to appear slightly different in detail.

Morooka America reserves the right to change specifications or design without notice and without incurring obligation to install the same on equipment previously manufactured.

Your Morooka America equipment has been carefully designed to provide dependable operation in return for your investment.

This manual has been prepared to aid you in the operation and maintenance of the MST-3000VD T4F. It should be considered a permanent part of the machine and remain with the machine when you sell it.

A.2 MACHINE FEATURES

- Low-ground-pressure rubber track type carrier that can travel easily on uneven ground, soft ground, or snow.
- Long, wide rubber tracks provide powerful and stable drawbar pull.
- Automatic hydraulic drive (HST) allows travel operations to be controlled with a joystick to give forward and reverse with stepless gear shifting, as well as turning and stopping.

A.3 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 performance and shorten machine life.

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:

- After starting the engine, idle for 5 minutes to perform warm-up operations.
- Avoid operating with heavy loads or at high speeds.
- Avoid sudden starts, sudden acceleration, sudden steering, and sudden stops except in an emergency.

A.4 SERIAL NUMBER

The machine serial number is stamped on a data plate attached to the left side of the seat pedestal mount (Figure A-1 on next page) and on the left front side of the carrier frame (Figure A-2 on next page). Refer to the engine manual for location of the engine serial number.

The serial number provides important information about your equipment and is required to obtain correct replacement parts.

NOTE: *Data plate and serial number shown is for example only. Your data plate and serial number will be different.*

Always provide model and serial number to your Morooka America Dealer when ordering parts or anytime correspondence is made with Morooka America Corporation.



Figure A-1. Cab Serial Number Location

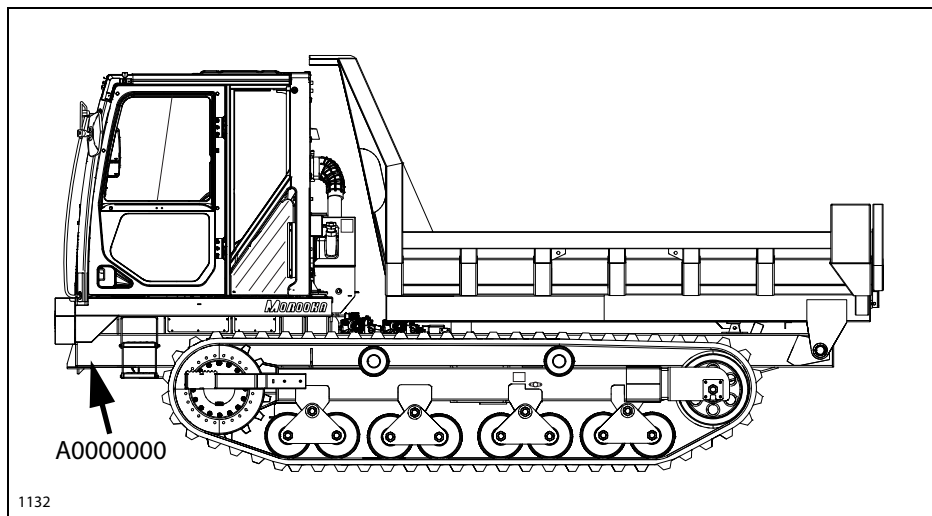


Figure A-2. Frame Serial Number Location

SECTION NO.	TITLE	PAGE NO.
SECTION	SECTION A. - INTRODUCTION	
A1	General Information	A-1
A2	Machine Features	A-1
A3	Breaking in The Machine.....	A-1
A4	Serial Number	A-1
SECTION	1 - SAFETY	
1.1	Safety Information.....	1-1
1.2	General	1-2
1.3	Before Operation	1-2
	Operator Training and Knowledge.....	1-2
	Safety Rules.....	1-2
	Unauthorized Modification.....	1-2
	Safety Features	1-3
	Clothing and Protective Equipment	1-3
	Fire Extinguishers and First Aid Kit.....	1-3
	Fire Prevention	1-3
	Getting On or Off Machine	1-3
1.4	Precautions During Inspection and Maintenance	1-4
	Use Proper Tools.....	1-4
	Inspection and Maintenance	1-4
	Keep Machine Clean	1-4
	Ventilate Enclosed Areas.....	1-4
	Keep Away From Rotating And Moving Parts.....	1-5
	Keep Away From Flame When Fueling or Servicing Fuel Filters	1-5
	Do Not Touch High-Temperature or High-Pressure Parts	1-5
	Wait For Engine to Cool Before Changing Engine Oil.....	1-5
	Wait for Coolant to Cool Before Adding Coolant.....	1-5
	Wait For Pressure To Go Down Before Adding Hydraulic Oil	1-6
	After adding oil, tighten cap and drain plug securely. Wipe up spilled oil.	1-6
	Be Aware of Grease Under Pressure When Adjusting Track Tension	1-6
	Avoid Contact With Diesel Exhaust Fluid.....	1-6
	Avoid Fluid Under Pressure.....	1-6
	Dump Bed Safety Bars.....	1-7
	Battery Hazards	1-7
	Do Not Spray Water On Electrical Components	1-7
	Properly Dispose of Waste Material	1-7
1.5	Precautions Before Starting Engine	1-8
	Check Safety Parts and Lighting	1-8
	Keep Operator's Compartment Clean.....	1-8
	Fire Prevention	1-8
	Ventilation For Enclosed Areas	1-8
1.6	Precautions When Starting Engine	1-9
	Check Surrounding Area	1-9
	Worksite Safety	1-9
1.7	Precautions When Driving	1-9
	Avoid Sudden Movements	1-10
	Drive Carefully On Uneven Ground Or Curves.....	1-10
	Do Not Drive On Public Roads	1-10
	Be Careful Of Road Shoulders	1-10
	Avoid Obstacles	1-10
	Visibility.....	1-10

TABLE OF CONTENTS

SECTION NO.	TITLE	PAGE NO.
1.8	Driving.....	1-11
	Grades and Sideslopes	1-11
	Snow and Ice	1-11
1.9	Parking	1-11
	Leaving Machine.....	1-11
1.10	Precautions For Operation.....	1-12
	Operate Dump Bed Carefully	1-12
	Do Not Overload	1-12
	Load Dump Bed Evenly	1-12
1.11	Electrocution Hazards	1-13
1.12	Safety and Instruction Labels	1-14
 SECTION 2 - USER RESPONSIBILITIES, MACHINE PREPARATION, AND INSPECTION		
2.1	Machine Preparation, Inspection, and Maintenance	2-1
	General.....	2-1
	Preparation, Inspection, and Maintenance	2-1
	Before Start Inspection	2-1
	Delivery Inspection and Frequent Inspection	2-1
	Annual Machine Inspection	2-1
	Preventive Maintenance	2-1
2.2	General Carrier Components.....	2-2
2.3	Before Operation Inspection.....	2-3
	General.....	2-4
 SECTION 3 - CONTROLS AND INDICATORS		
3.1	General	3-1
3.2	Cab Door	3-1
3.3	Side Window.....	3-1
3.4	Front Window.....	3-2
	Open Upper Window	3-2
	Close Upper Window	3-2
	Open Lower Window	3-2
	Close Lower Window.....	3-2
3.5	Roof Hatch	3-3
3.6	Alternate Exits.....	3-3
	Front Window	3-3
	Roof Hatch	3-4
	Remove Roof Hatch from Inside	3-4
	Seat	3-5
	Seat Belt.....	3-6
3.7	Cab Controls	3-6
	Throttle	3-7
	Switch Panel.....	3-7
	Engine Start Switch	3-8
	Battery Disconnect Switch	3-9
3.8	Climate Control	3-10
	Vents.....	3-10
3.9	Radio	3-12
	Radio Reception	3-14
3.10	Power Receptacles	3-14
3.11	Mirrors.....	3-14
3.12	Joystick	3-15
3.13	Display.....	3-16

SECTION NO.	TITLE	PAGE NO.
	Startup (Menu) Screen	3-16
	Display Navigation	3-17
	EDC/Mach Setup (Electronic Directional Control)/Machine Setup Screen.....	3-18
	Setup Screen	3-18
	Camera Screen.....	3-19
	Diagnostic Screens.....	3-20
	Diagnostic Message (DM1, DM2) Screen	3-21
	Fault Icon Screen.....	3-22
	Operation Screens	3-23
SECTION 4 - MACHINE OPERATION		
4.1	Before Start	4-1
4.2	Starting Engine.....	4-1
4.3	After Start	4-2
4.4	Diesel Exhaust System	4-3
	DEF System Warnings	4-3
4.5	Driving.....	4-3
	Changing Speed	4-3
	Changing Direction	4-4
	Cruise Control	4-4
	Driving On Slopes.....	4-4
	Water Operation	4-5
	Operating Techniques	4-6
	Stopping	4-6
4.6	Emergency Stop.....	4-6
4.7	Parking	4-6
4.8	Shut Down Engine	4-6
4.9	After Operation	4-7
	Locking.....	4-7
4.10	Dump Body	4-7
	Raise Dump Body	4-7
	Lower Dump Body	4-7
	Dump Body Safety Bar	4-8
	Precautions During Operation.....	4-8
4.11	Rubber Tracks	4-9
	Prohibited Operations	4-9
	Precautions.....	4-10
4.12	Cold Weather Operation.....	4-10
	Fuel And Lubricants.....	4-10
	Coolant.....	4-10
	Batteries	4-11
	After Operation	4-11
	After Cold Weather.....	4-11
SECTION 5 - EMERGENCY PROCEDURES		
5.1	Jump Starting	5-1
5.2	Towing.....	5-2
	Remove Torque Hub Sun Gear.....	5-3
	Tow Carrier	5-3
	Reinstall Sun Gear.....	5-4

SECTION NO.	TITLE	PAGE NO.
SECTION 6	- SPECIFICATIONS AND OPERATOR MAINTENANCE	
6.1	Introduction	6-1
6.2	Operating specifications.....	6-1
	Capacities	6-1
	Engine Data	6-1
6.3	Dimensional Data	6-2
6.4	Maintenance Schedule	6-3
6.5	Basic Maintenance	6-4
	Oil.....	6-4
	Fuel	6-4
	Coolant.....	6-4
	Grease.....	6-4
	Filters	6-5
	Electrical Components	6-5
	Hydraulic System	6-5
6.6	Maintenance and Lubrication.....	6-6
	Air Filter	6-7
	Coolant.....	6-9
	Engine Oil and Oil Filter	6-10
	DEF Tank	6-11
	Fuel Tank	6-12
	Hydraulic Oil and Filters	6-14
	Sprocket Drive Torque Hub	6-15
	Washer Fluid.....	6-15
	Grease Points	6-16
6.7	Rollover Protective Structure (ROPS)	6-17
6.8	Tracks.....	6-18
	Cleaning.....	6-18
	Inspecting	6-18
	Track Tension.....	6-19
	Cab Fresh Air Filter.....	6-21
	Air Conditioner/Cab Heater Recirculation Filter	6-21
6.9	Cab Fuse and Relay Panel.....	6-22
6.10	Main Power Circuit Breaker Panel	6-23
6.11	Troubleshooting	6-24
	Engine.....	6-24
	Chassis	6-25
	Electrical System.....	6-25
6.12	Periodic Replacement Of Critical Parts.....	6-26
	Periodic Replacement Interval (Every 2 Years).....	6-26
	Periodic Inspection	6-26
6.13	Periodic Replacement Parts.....	6-27
SECTION 7	- TRANSPORTATION AND STORAGE	
7.1	Transporting Carrier	7-1
	Ramps	7-1
	Loading And Unloading.....	7-1
	Transporting.....	7-1
7.2	Long-Term Storage.....	7-2
	Preparation.....	7-2
	During Storage	7-2
	After Storage	7-2

FIGURE NO.	TITLE	PAGE NO.
A-1.	Cab Serial Number Location	A-2
A-2.	Frame Serial Number Location	A-2
1-1.	Decal Locations 1 of 3	1-14
1-2.	Decal Locations 2 of 3	1-15
1-3.	Decal Locations 3 of 3	1-16
1-4.	Decal Locations 2 of 2	1-17
2-1.	Basic Nomenclature	2-2
2-2.	Walk Around Inspection - 1 of 2	2-3
2-3.	Walk-Around Inspection - 2 of 2	2-4
3-1.	Cab Door Controls	3-1
3-2.	Side Window Controls	3-1
3-3.	Upper Window Controls and Storage	3-2
3-4.	Lower Window Controls and Storage	3-2
3-5.	Roof Hatch Controls	3-3
3-6.	Front Window Alternate Exit	3-3
3-7.	Window Emergency Hammer Location	3-3
3-8.	Roof Hatch Inside Release	3-4
3-9.	Roof Hatch Outside Release	3-4
3-10.	Alternate Roof Hatch	3-4
3-11.	Seat Controls	3-5
3-12.	Armrest Adjustment	3-5
3-13.	Seat Belt	3-6
3-14.	Cab Control Locations	3-6
3-15.	Switch Panel Functions	3-7
3-16.	Engine Start Switch	3-8
3-17.	Climate Control System	3-10
3-18.	Climate Control System Display	3-11
3-19.	Radio Controls	3-12
3-20.	Radio Display	3-13
3-21.	Power Receptacles and Mirror Remote Control	3-14
3-22.	Mirror Adjustment	3-14
3-23.	Joystick Controls	3-15
3-24.	Joystick/Carrier Motion	3-15
3-25.	Startup (Menu) Screen	3-16
3-26.	Display Screen Navigation Chart	3-17
3-27.	Setup Screen	3-18
3-28.	Camera Screen	3-19
3-29.	Fault Screen	3-20
3-30.	DM1, DM2 - Engine Diagnostic Message Screen	3-21
3-31.	Fault Icon Screen	3-22
3-32.	Engine Info 1 Screen	3-23
3-33.	Engine Info 2 Screen	3-24
3-34.	Hydraulic Information Screen	3-25
3-35.	Slope Screen	3-26
3-36.	Option Screen	3-27
4-1.	Slope and Side Slope	4-4
4-2.	Maximum Water Depth	4-5
4-3.	Maximum Angle Entering Water	4-5
4-4.	Safety Bar Installation	4-8
5-1.	Battery Jumper Cable Connections	5-2
5-2.	Torque Hub Sun Gear Removal	5-3
5-3.	Torque Hub Sun Gear Installation	5-4
6-1.	Lubrication Specification Table	6-6
6-2.	Air Filter Restriction Indicator	6-7
6-3.	Air Cleaner Assembly	6-7
6-4.	Radiator Fill	6-9
6-5.	Oil Dipstick and Fill Location	6-10

FIGURE NO.	TITLE	PAGE NO.
6-6.	DEF Tank Fill	6-11
6-7.	Fuel Tank	6-12
6-8.	Fuel Filters	6-13
6-9.	Hydraulic Tank And Level Indicator	6-14
6-10.	Hydraulic Filters	6-14
6-11.	Sprocket Drive Hub Lubrication	6-15
6-12.	Washer Fluid Tank	6-15
6-13.	Lug Wear Measurement	6-18
6-14.	Track Tension Measurement	6-19
6-15.	Adjust Track Tension	6-20
6-16.	Cab Fresh Air Filter	6-21
6-17.	AC/Heater Recirculation Filter	6-21
6-18.	Cab Fuse and Relay Panel	6-22
6-19.	Main Power Circuit Breaker Panel	6-23
7-1.	Loading Ramps	7-1

SECTION 1. SAFETY

1.1 SAFETY INFORMATION

It is the responsibility of the user to read and understand the Operator Manual in regards to safety, operation, lubrication and maintenance before operation of this equipment. It is the user's responsibility to inspect and service the machine routinely as directed in the Operator Manual.

We have attempted to cover all areas of safety, operation, lubrication and maintenance; however, there may be times when special care must be taken to fit your conditions.



Throughout this manual the symbol  and the words **DANGER**, **WARNING**, and **CAUTION** are used to call attention to safety information that if not followed, will or could result in death or injury. **NOTICE** and **NOTE** are used to call your attention to important information.

The definition of each of these terms follows:

DANGER

DANGER INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.

WARNING

WARNING INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.

CAUTION

CAUTION, USED WITH THE SAFETY ALERT SYMBOL, INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN MINOR OR MODERATE INJURY.

NOTICE

NOTICE IS USED TO ADDRESS PRACTICES NOT RELATED TO PERSONAL INJURY.

NOTE: *Special point of information or machine adjustment instructions.*

WARNING

FAILURE TO READ AND UNDERSTAND THE CONTENTS OF THIS MANUAL CAN RESULT IN DEATH, SERIOUS INJURY, OR DAMAGE TO PROPERTY AND EQUIPMENT. ALWAYS READ AND UNDERSTAND THE CONTENTS OF THIS MANUAL BEFORE OPERATING MACHINE. KEEP MANUAL WITH MACHINE AT ALL TIMES.

1.2 GENERAL

Safety messages in this SAFETY chapter are intended to illustrate basic safety procedures of this machine. However, it is impossible for these safety messages to cover every possible hazardous situation you may encounter. If you have any questions concerning safety, you should first consult your supervisor and/or your authorized dealer before operating or performing maintenance work on the machine.

This section outlines precautions needed for proper and safe machine operation and maintenance. For proper machine use, it is mandatory that a daily routine is established based on content of this manual. A maintenance program, using information provided in this manual, must also be established by a qualified person and followed to ensure machine is safe to operate.

The owner/user/operator of the machine must not operate the machine until this manual has been read, training is accomplished, and operation of the machine has been completed under supervision of an experienced and qualified operator.

If there are any questions with regard to safety, training, inspection, maintenance, application, and operation contact Morooka America Corporation.

1.3 BEFORE OPERATION

Operator Training and Knowledge

- Read and understand this manual before operating machine.
- Do not operate this machine until training is performed by authorized persons.
- Only authorized and qualified personnel can operate the machine.
- Read, understand, and obey all DANGERS, WARNINGS, CAUTIONS, and operating instructions on the machine and in the manual.
- Use machine in a manner within the scope of its intended application set by Morooka.
- All operating personnel must be familiar with emergency operation of the machine as specified in this manual.
- Read, understand, and follow all employer, local, and government regulations related to machine operation.

WARNING

READ AND FOLLOW ALL SAFETY PRECAUTIONS. FAILURE TO DO SO MAY RESULT IN DEATH, SERIOUS INJURY, OR DAMAGE TO PROPERTY AND EQUIPMENT.

Safety Rules

- Only trained and qualified personnel, or personnel can operate and maintain the machine.
- Follow all safety rules, prohibitions, precautions, procedures, and instructions when operating or performing maintenance on the machine. Pay careful attention to safety.

Unauthorized Modification

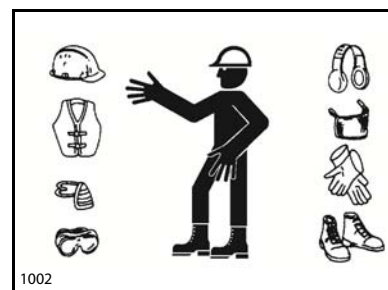
- Any modification made without authorization from Morooka can adversely affect machine performance and may create hazards.
- Morooka is not responsible for any injury or damage caused by any unauthorized modification.

Safety Features

- Seat belt must be properly worn AT ALL TIMES when operating machine.
- Make sure all guards and covers are in their proper position. Repair guards and covers if damaged or not working properly.
- Properly use safety features such as joystick, dump bed prop bars, and backup camera.
- Improper use of safety features could result in death or serious injury.

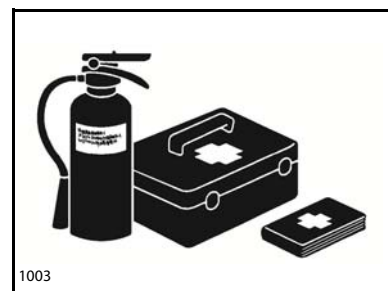
Clothing and Protective Equipment

- 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.
- 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 machine.



Fire Extinguishers and First Aid Kit

- Make sure fire extinguishers are provided and 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.
- Know the phone numbers of persons to contact in case of an emergency.



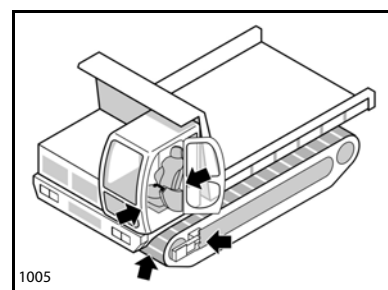
Fire Prevention

- Fuel, oil, and antifreeze are flammable. Keep flames and ignition sources away from flammable fluids.
- Keep oil and fuel in an appropriate location and do not allow unauthorized persons to enter. Use well-ventilated areas for adding or storing oil and fuel.
- Tighten all fuel and oil caps securely.
- 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 engine when refueling. Do not smoke or have any open flame within 50 ft (15 m).



Getting On or Off Machine

- 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.
- Always maintain three-point contact with handrails and steps to ensure 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.

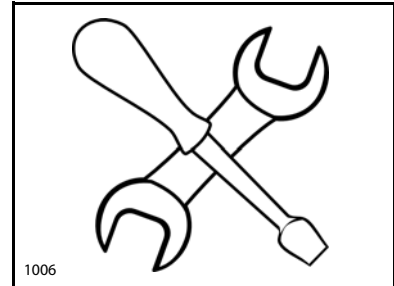


1.4 PRECAUTIONS DURING INSPECTION AND MAINTENANCE

- Never allow unauthorized persons in the area when performing inspection and maintenance.
- Lockout/tagout machine to prevent any other person from operating machine.

Use Proper Tools

- Always use correct tools for the task.
- Do not use damaged or worn tools, or tools designed for other purposes.



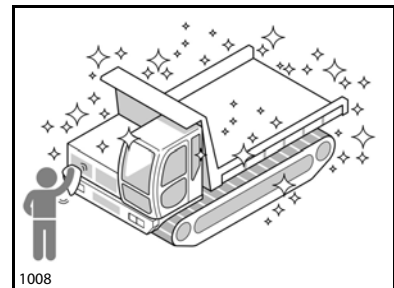
Inspection and Maintenance

- Select firm, level ground to park the machine.
- Lower dump bed, apply parking brake, then stop engine.
- If engine must be started to carry out inspection or maintenance, take steps to ensure engine can be stopped at any time.
- When performing maintenance with two or more workers; determine procedures, pre-arrange signals, and follow instructions of person in charge.



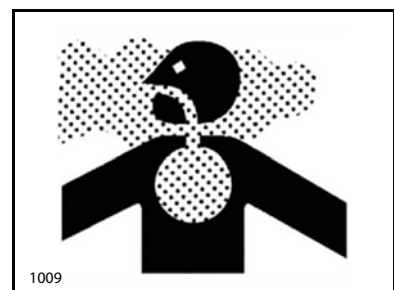
Keep Machine Clean

- Keep floor, steps, and handrails free of oil, grease, mud, or water. You may slip and be injured. Always wipe off any oil, grease, mud or water.
- Do not leave tools or parts lying on floor or steps. You may trip over them. Remove tools and parts immediately.
- Dry wood chips, leaves, grass, paper, oil, and other flammable materials around engine, muffler, battery, or hydraulic tank may cause a fire. Remove flammable objects and clean up all fluids.
- Remove any mud accumulated around the undercarriage. You may slip and fall when stepping on the rubber tracks.



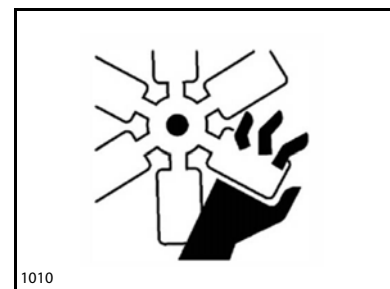
Ventilate Enclosed Areas

- Exhaust fumes from engine can kill.
- If it is necessary to start engine in an enclosed area, open doors and windows to provide adequate ventilation.



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 bed when it is moving. There is danger of getting caught or crushed.



Keep Away From Flame When Fueling or Servicing Fuel Filters

When filling fuel tank or draining water from fuel filters:

- Stop engine. Turn off power and accessories.
- Do not bring any lit cigarette or other ignition source close to fuel tank or filters.
- After adding fuel, tighten cap securely and wipe up any spilled fuel.
- Do not bend fuel hose or hit it with any sharp object.
- Replace loose or damaged hose.

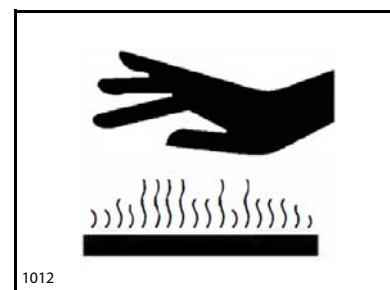


Do Not Touch High-Temperature or High-Pressure Parts Immediately After Stopping Engine

Many parts are at high temperature or under high pressure immediately after stopping engine. There is danger of burns or other injuries.

Always wait for machine to cool down before inspecting the following parts:

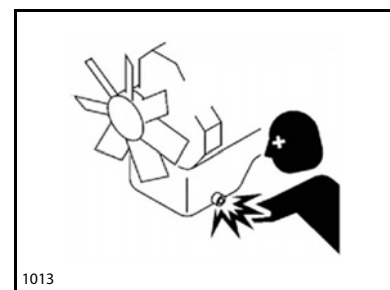
- Radiator and radiator cap
- Hydraulic tank and hydraulic hoses
- Muffler and all parts of engine



Wait For Engine to Cool Before Changing Engine Oil.

When changing engine oil:

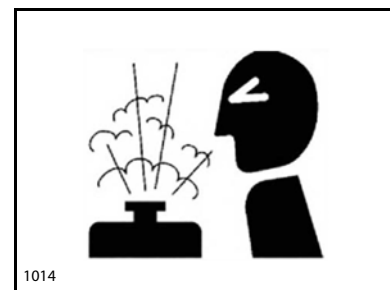
- Stop engine and wait for engine and oil temperature to go down before changing the oil.
- After adding oil, tighten drain valve and cap securely and wipe up any oil that was spilled.



Wait for Coolant to Cool Before Adding Coolant.

Do not add water to the radiator. Always follow precautions below.

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

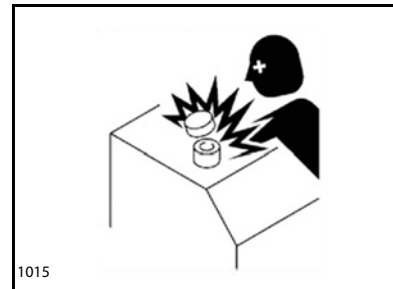


Wait For Pressure To Go Down Before Adding Hydraulic Oil

When adding or changing hydraulic tank oil, always follow precautions below:

- Lower dump bed and stop engine.
- Loosen hydraulic tank cap slowly to release internal pressure completely, then remove cap.

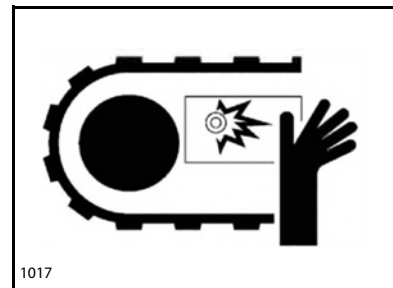
After adding oil, tighten cap and drain plug securely. Wipe up spilled oil.



Be Aware of Grease Under Pressure When Adjusting Track Tension

The track tension adjuster is filled with grease kept under high pressure by a recoil spring inside the adjuster. Always follow precautions below when adjusting tension:

- Do not loosen tension adjustment valve more than one turn. Valve may fly out and can cause serious injury.
- When adjusting tension, do not stand directly in front of the valve. Stand to the side to avoid danger.



Avoid Contact With Diesel Exhaust Fluid

Diesel Exhaust Fluid (DEF) is corrosive and can cause personnel injury or damage to equipment.

- Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.
- Effects of overexposure may include irritation of the nose, throat and digestive tract, headaches, coughing, nausea, vomiting and disorientation.
- Always wear eye protection and chemical resistant gloves when handling DEF. If splashed in eyes, flush eyes immediately and seek medical attention.



Avoid Fluid Under Pressure

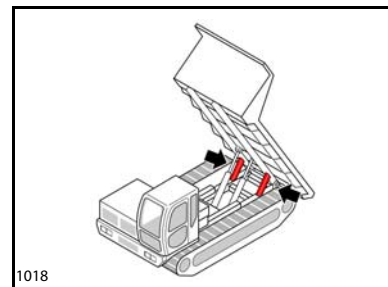
- Fluids such as diesel fuel or hydraulic oil under pressure can penetrate skin or eyes causing serious injury, blindness or death.
- Relieve pressure before disconnecting hydraulic or other lines. Make sure all connectors are securely connected before applying pressure.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. Wear a face shield or goggles for eye protection.
- If an accident occurs, see a doctor familiar with this type of injury immediately. Any fluid injected into the skin must be surgically removed within a few hours, or gangrene may result.
- Do not bend high-pressure hoses or hit them with any sharp object.
- Repair or replace loose or damaged hoses.



Dump Bed Safety Bars

When going under a raised dump bed for any reason:

- Lockout/tagout controls to prevent anyone from operating machine.
- Always use safety bars when going under a raised dump bed.



1018

Battery Hazards

- 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 short circuit and fire.
- Do not get battery electrolyte on your skin or clothes. If battery electrolyte gets on you, wash it off immediately with water.

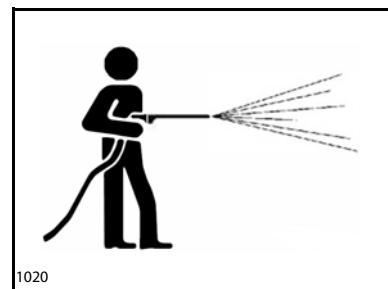


1019

Do Not Spray Water On Electrical Components

Do not spray water on electrical components when washing machine. If water gets into the electrical system, it can damage components and cause malfunctions. Protect the following components to prevent water from getting on them:

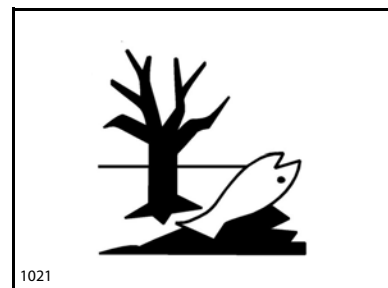
- Instrument panel and control panel, switches, sensors, and connectors.
- Starting motor, alternator, sensors, and connectors around the engine.
- Battery, relay, and connectors at front right of machine.



1020

Properly Dispose of Waste Material

- When draining and changing 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.



1021

1.5 PRECAUTIONS BEFORE STARTING ENGINE

- Perform walk-around checks and inspections in this manual.
- Check ground under machine for oil, coolant, or other fluid leaks.
- Be particularly careful to check undercarriage for loose or missing nuts and bolts.
- Repair any problems found during inspection. **DO NOT USE MACHINE UNTIL REPAIRED.** If repairs cannot be made, contact your Morooka dealer for assistance.

Check Safety Parts and Lighting

- Check operation of the following parts and devices needed for safe operation.
- Check horn, buzzer, and turn signal lamps work normally.
- Check front lamps light up normally.
- Check side mirrors are adjusted to give a clear view from the operator's seat.
- Clean lights to ensure good visibility.
- Adjust operator's seat to a suitable position for operation.
- Check seat belt locks properly.

Keep Operator's Compartment Clean

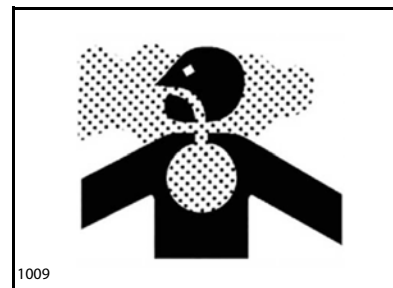
- Keep floor, steps, and handrails free of oil, grease, mud, or water. You may slip and be injured. Always wipe off any oil, grease, mud or water.
- Do not leave tools or parts lying around on the floor or steps. Keep these parts in the proper place to prevent them from obstructing operation.

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

- Engine exhaust fumes can kill.
- If it is necessary to start engine in an enclosed area, open doors and windows to provide adequate ventilation.



1.6 PRECAUTIONS WHEN STARTING ENGINE

- Set parking brake switch to the STOP position.
- Sit properly in the operators seat and fasten seat belt.

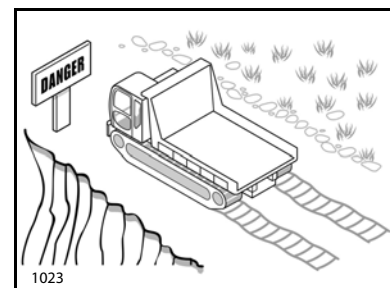


Check Surrounding Area

- Always check there are no people in the surrounding area. Be particularly careful to check under the machine.
- Never start engine if a warning tag has been attached to the controls.
- When starting engine, sound horn to warn people in the area.
- Do not allow anyone other than the operator to ride on the machine.

Worksite Safety

- Check worksite terrain and ground condition. Determine safest method of operation.
- Place signs and take other steps to ensure safety at any dangerous location.
- Check depth and flow of water and ground conditions before operating in water or crossing a river. NEVER enter water in excess of permissible water depth.
- If there are bridges or other structures, check they can support machine weight.
- Inside the jobsite, do not allow any person other than signalman to come close. Restrict entry of all other workers.



1.7 PRECAUTIONS WHEN DRIVING

⚠ WARNING

BEING THROWN FROM CARRIER CAN RESULT IN DEATH OR SERIOUS INJURY. SEAT BELTS MUST BE WORN AT ALL TIMES WHEN OPERATING MACHINE. IF CARRIER BECOMES UNSTABLE KEEP YOUR SEAT BELT FASTENED, BRACE YOURSELF, HOLD ON FIRMLY, AND LEAN AWAY FROM THE POINT OF IMPACT. STAY WITH THE MACHINE. DO NOT JUMP.

⚠ WARNING

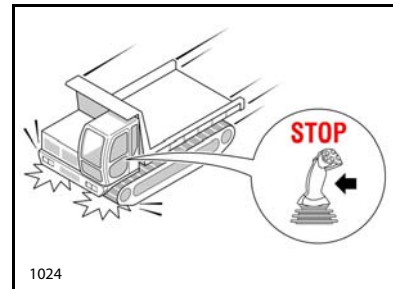
DO NOT OPERATE MACHINE WITHOUT READING AND UNDERSTANDING PROPER HANDLING AND OPERATION. DO NOT OPERATE MACHINE BEFORE BEING TRAINED BY AUTHORIZED PERSONNEL.

⚠ WARNING

IMPROPER DRIVING, ESPECIALLY ON GRADES OR SIDESLOPES, CAN CAUSE LOSS OF CONTROL AND VEHICLE ROLLOVER CAUSING DEATH OR SERIOUS INJURY.

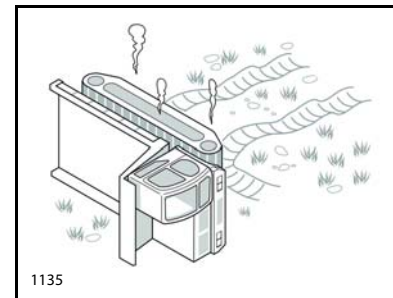
Avoid Sudden Movements

- Do not suddenly start, stop, turn, or make any other sudden moves. Sudden moves may cause the track to come off and machine to rollover.
- When starting or turning machine, operate joystick slowly. Run engine at low speed.
- Release joystick trigger to stop machine.
- If there is an emergency and the machine must be stopped quickly, release joystick trigger or turn engine start switch to OFF.



Drive Carefully On Uneven Ground Or Curves

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

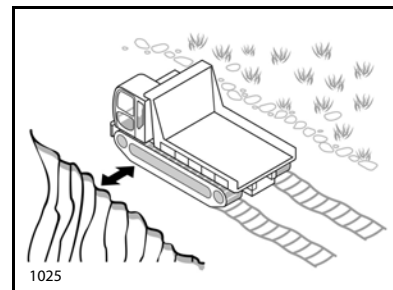


Do Not Drive On Public Roads

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

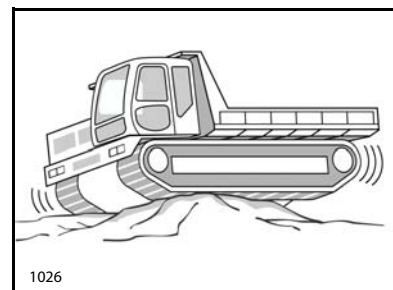
Be Careful Of Road Shoulders

- When traveling on narrow agricultural roads:
- 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, danger of landslides and falling rocks increases. Always travel at low speed and check area is safe.



Avoid Obstacles

- Avoid driving over obstacles or earth embankments. If machine must travel over an obstacle, do as following:
- Never drive over large boulders, breakable objects, pieces of concrete, or other sharp objects.
- Reduce speed and drive carefully.
- Steer machine so center of rubber track passes directly over the obstacle. Never change direction. Climb obstacle slowly. When machine goes over the top and starts to tip forward, stop machine - then slowly move forward.
- Earth embankments may collapse under weight or vibration of machine and cause the machine to slip. Drive machine slowly and do not change speed or direction.
- Be particularly careful when driving over freshly dug ditches. They may collapse.



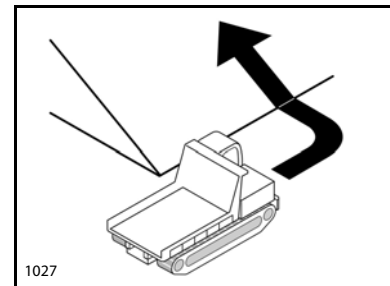
Visibility

- When working in dark places or at night, turn on headlights. Turn on lights in mist, snow, or rain.

1.8 DRIVING

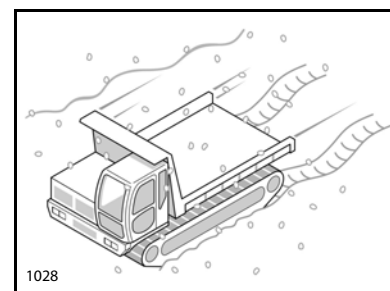
Grades and Sideslopes

- Do not drive at an angle on a hill or slope, or parallel to the slope. Such action could result in machine tipping over or slipping.
- When traveling up grades or slopes, always travel directly up the grade. Set travel speed to a low range and keep throttle close to the N position (low speed).
- Do not suddenly change speed on a grade or slope. Machine direction may suddenly change and machine may slip.
- When traveling down slopes, set travel speed to a low range and run engine at low idle.



Snow and Ice

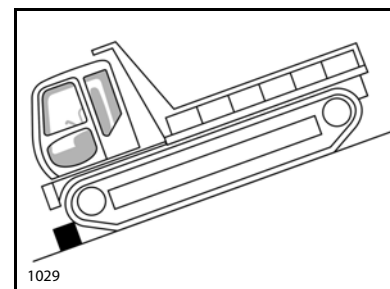
- When working on snow or icy roads, even a slight slope may cause the machine to slip to the side. Always drive at low speed and avoid sudden starting, stopping, or turning.
- When there has been heavy snow, the road shoulder and objects beside the road are buried in snow and cannot be seen. Drive carefully.



1.9 PARKING

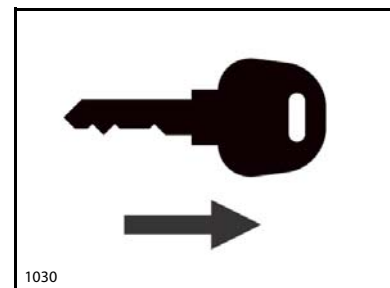
Park machine on firm, level ground. Select a place where there is no problem of falling rocks, landslides, or floods. If machine must be parked on a slope, do the following:

- Stop machine facing directly up or down slope.
- Place blocks under tracks to prevent machine from moving.
- Lower dump bed.



Leaving Machine

- Lower dump bed completely.
- Stop engine.
- Remove starting key and take it with you.
- Turn battery disconnect switch off.

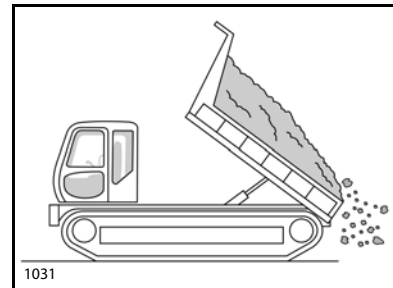


1.10 PRECAUTIONS FOR OPERATION

- When operating with one or more workers, or when using a signalman, determine the signals and person in charge before starting work. Always follow agreed procedure.
- When working in confined spaces or indoors, be careful not to hit surroundings or ceiling.
- When operating in urban areas or on roads, place fences or barriers around jobsite and take steps to ensure safety of passing traffic and pedestrians.
- Make jobsite as level as possible. This will not only increase efficiency, but help ensure safety.
- If jobsite is dusty, spray with water to improve visibility.

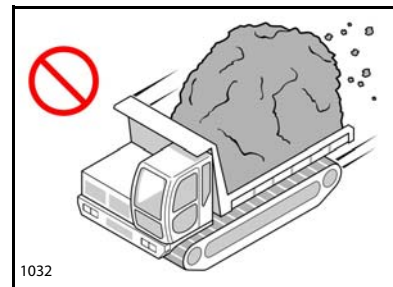
Operate Dump Bed Carefully

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



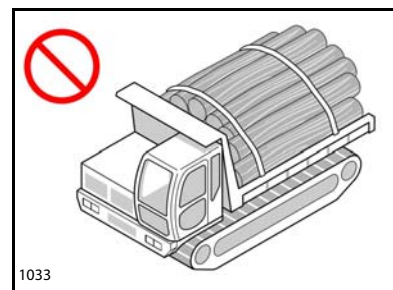
Do Not Overload

- Never load machine above capacity.
- Overloading will not only cause failures, but can cause loss of control and roll over on slopes.



Load Dump Bed Evenly

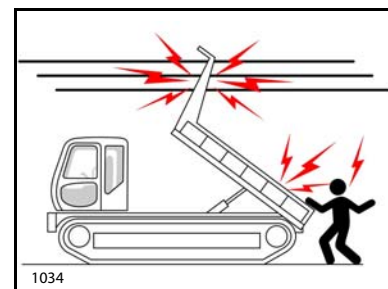
- Do not load dump bed on one side. Evenly distribute the load to maintain balance.
- When carrying long objects, such as timber or steel beams, give careful consideration to load center of gravity. Secure load with ropes.
- When stacking U-shaped ditch liners or concrete blocks, lay a plate down first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



1.11 ELECTROCUTION HAZARDS

When working in areas where there are power cables, use a signal person and take steps to protect electric cables. Check with the electricity company before starting operations.

- This machine is not insulated and does not provide protection from contact or proximity to electrical current.
- If dump bed should touch an electric cable, do not leave the operator's compartment. Call another worker to report the situation.



⚠ DANGER

ELECTRIC SHOCK WILL CAUSE DEATH OR SERIOUS INJURY. DO NOT MANEUVER MACHINE INSIDE PROHIBITED ZONE (MAD). ASSUME ALL ELECTRICAL PARTS AND WIRING ARE ENERGIZED UNLESS KNOWN OTHERWISE.

- Maintain distance from electrical lines, apparatus, or any energized (exposed or insulated) parts according to the Minimum Approach Distance (MAD) as shown in Table 1-1.
- Allow for machine movement and electrical line swaying.

Table 1-1. Minimum Approach Distances (M.A.D.)

Voltage Range (Phase to Phase)	MINIMUM APPROACH DISTANCE in Feet (Meters)
0 to 50 KV	10 (3)
Over 50 KV to 200 KV	15 (5)
Over 200 KV to 350 KV	20 (6)
Over 350 KV to 500 KV	25 (8)
Over 500 KV to 750 KV	35 (11)
Over 750 KV to 1000 KV	45 (14)
NOTE: This requirement shall apply except where employer, local or governmental regulations are more stringent.	

- Maintain a clearance of at least 10 ft (3m) between any part of the machine and its occupant from any electrical line or apparatus carrying up to 50,000 volts. One foot additional clearance is required for every additional 30,000 volts or less.
- The minimum approach distance may be reduced if insulating barriers are installed to prevent contact, and the barriers are rated for the voltage of the line being guarded. These barriers shall not be part of (or attached to) the machine. The minimum approach distance shall be reduced to a distance within the designed working dimensions of the insulating barrier. This determination shall be made by a qualified person in accordance with the employer, local, or governmental requirements for work practices near energized equipment.

The following actions can help prevent accidents:

- Wear shoes with rubber soles.
- Use a signal person 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.

1.12 SAFETY AND INSTRUCTION LABELS

Keep labels clean. Replace if missing or damaged.

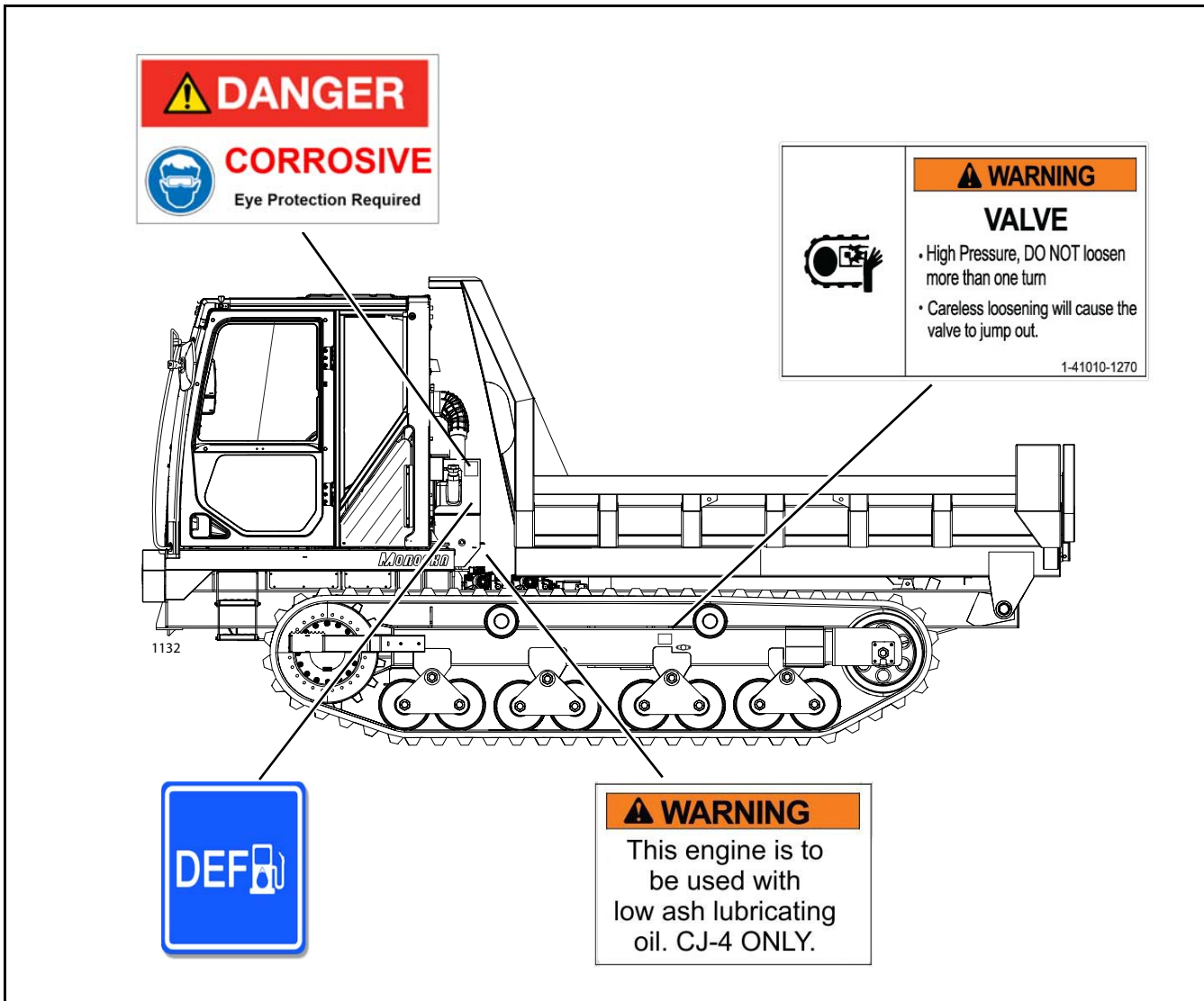


Figure 1-1. Decal Locations 1 of 3

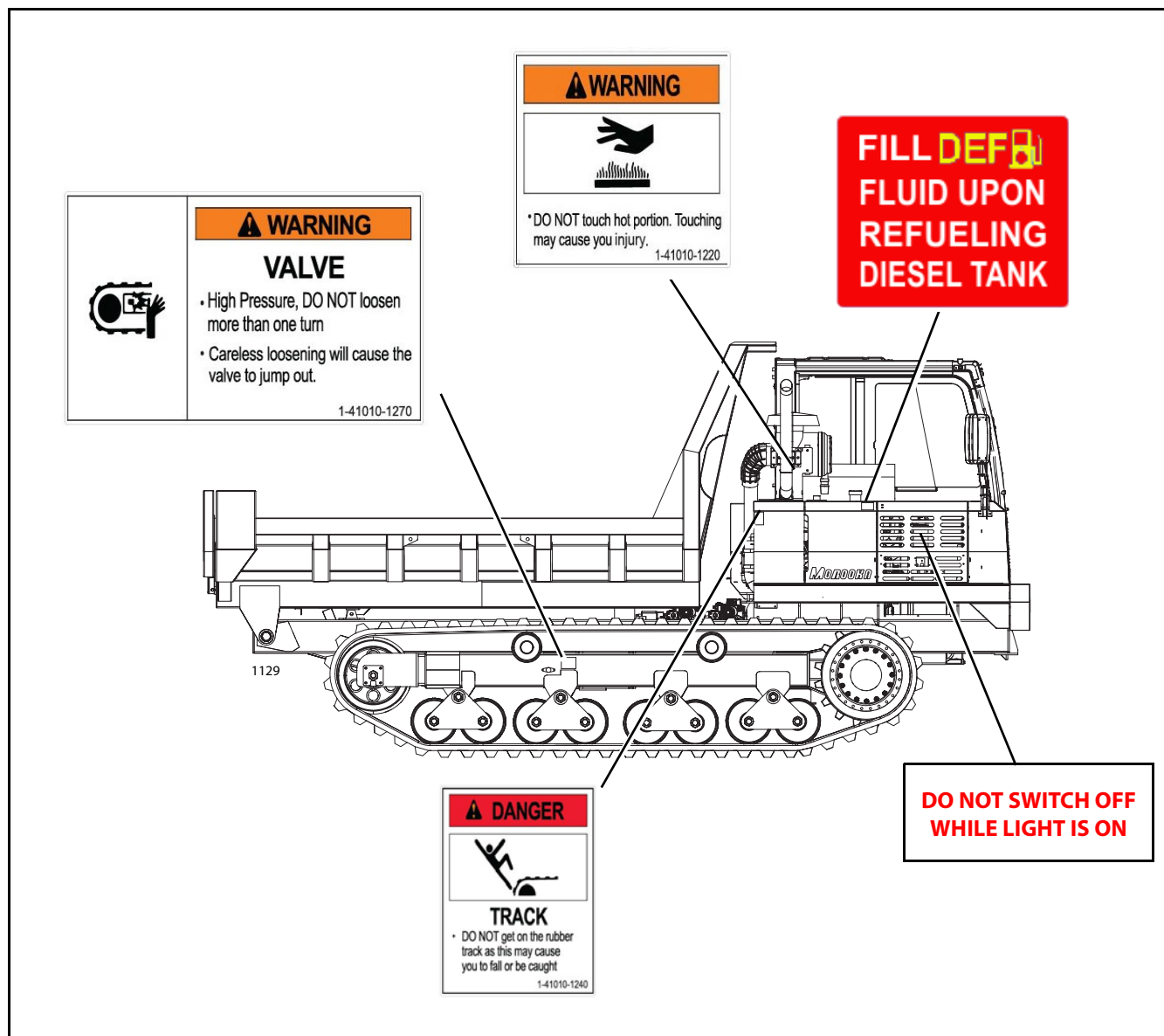


Figure 1-2. Decal Locations 2 of 3

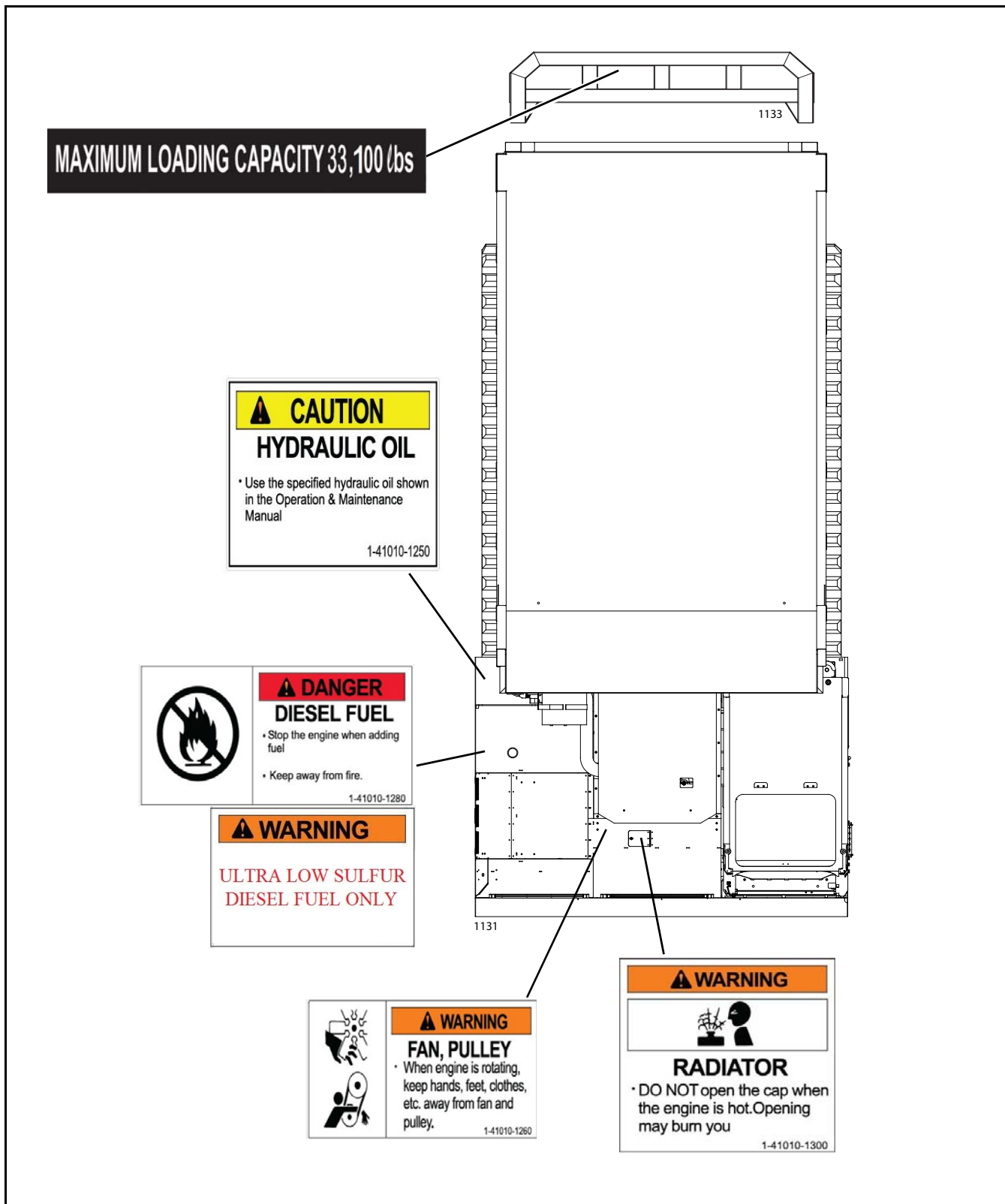


Figure 1-3. Decal Locations 3 of 3

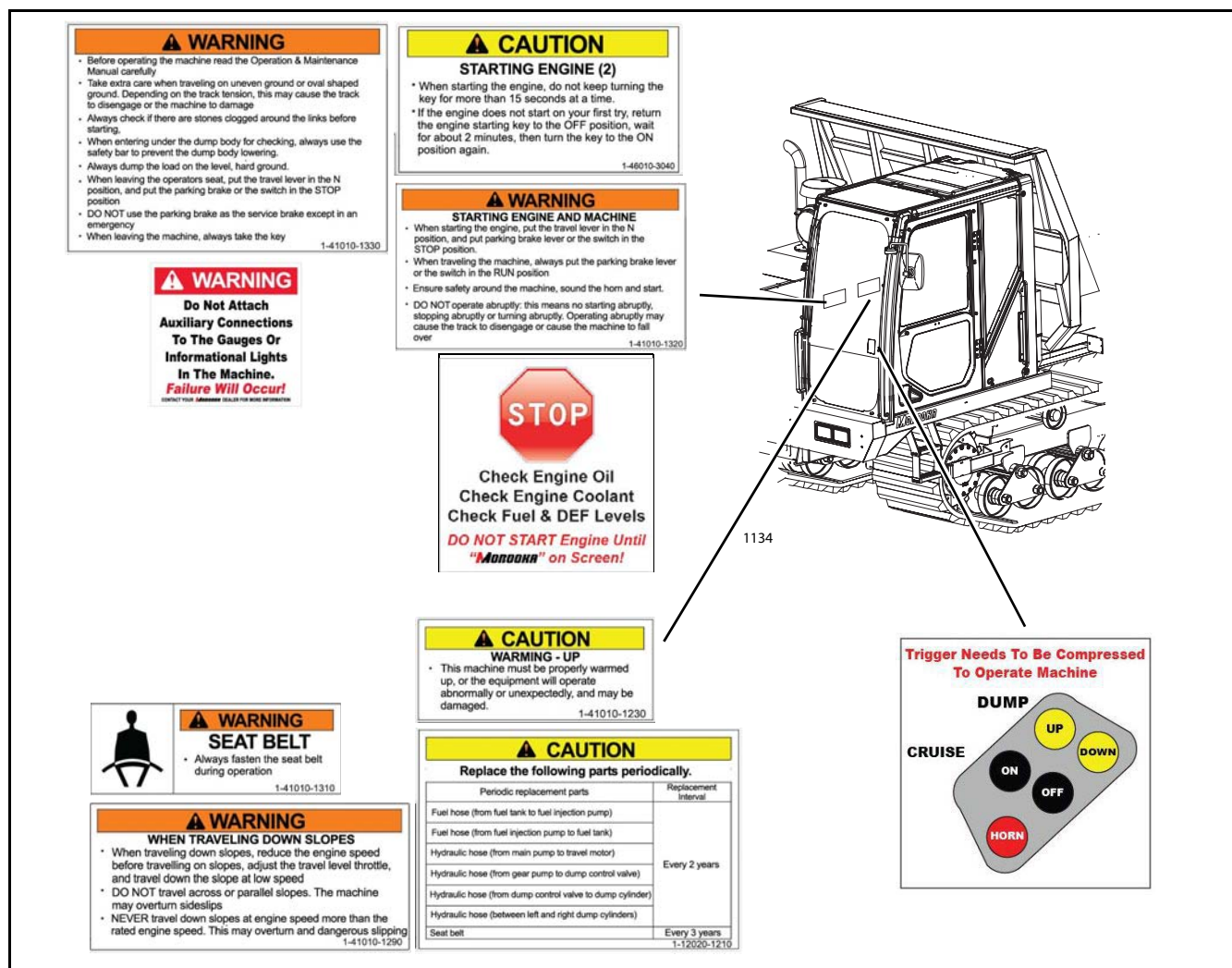


Figure 1-4. Decal Locations 2 of 2

THIS PAGE BLANK

SECTION 2. USER RESPONSIBILITIES, MACHINE PREPARATION, AND INSPECTION

2.1 MACHINE PREPARATION, INSPECTION, AND MAINTENANCE

General

This section provides information needed to place the machine in operation and maintain its safe operating condition. For maximum service life and safe operation, ensure all inspections and maintenance have been completed before operating machine.

Preparation, Inspection, and Maintenance

It is important to establish and maintain a comprehensive inspection and preventive maintenance program. The following table outlines periodic machine inspections and maintenance recommended by Morooka America, LLC. Frequency of inspections and maintenance must be increased as environment, severity, and amount of use requires.

Before Start Inspection

It is the Operator's responsibility to perform a machine Before Start Inspection daily or when changing operators. This Operator Manual must be read in its entirety and understood before performing the Before Start Inspection.

Delivery Inspection and Frequent Inspection

The Delivery Inspection and Frequent Inspection shall be performed by a qualified mechanic. A qualified mechanic is a person who, by possession of a recognized degree, certificate, extensive knowledge, training, or experience, has successfully demonstrated the ability and proficiency to service, repair, and maintain this machine.

The Delivery Inspection should be performed before each sale, lease, or rental delivery. The Frequent Inspection is for each machine in service for 3 months or 150 hours (whichever comes first), out of service for a period of more than 3 months, or when purchased used. The frequency of this inspection must be increased as environment, severity and frequency of usage requires.

Reference the appropriate areas of the Operator and Engine Manuals for servicing and maintenance procedures.

Annual Machine Inspection

An Annual Machine Inspection should be performed each year, no later than thirteen (13) months from the date of the previous Annual Machine Inspection. Morooka America recommends this inspection be performed by a Qualified Mechanic.

Reference the Preventive Maintenance Schedule for items requiring inspection during performance of this inspection. Reference the appropriate areas of the Operator and Engine Manuals for servicing and maintenance procedures.

For the purpose of receiving safety-related bulletins, it is important that Morooka America, LLC has updated ownership information for each machine. When performing the Annual Machine Inspection, notify Morooka America, LLC of current machine ownership.

Preventive Maintenance

Maintenance shall be performed by a qualified mechanic with specified inspections. A qualified mechanic is a person who, by possession of a recognized degree, certificate, extensive knowledge, training, or experience, has successfully demonstrated the ability and proficiency to service, repair, and maintain this machine.

Reference the Preventive Maintenance Schedule and the appropriate areas of this manual for servicing and maintenance procedures. The frequency of service and maintenance must be increased as environment, severity and frequency of usage requires.

Table 2-1. Inspection and Maintenance

Type	Frequency	Primary Responsibility	Service Qualification	Reference
Before Start Inspection	Before use each day or at each Operator change.	Operator	Operator	Operator Manual
Delivery Inspection	Before each sale, lease, or rental delivery.	Owner, Dealer, or User	Qualified Mechanic	Operator Manual
Frequent Inspection	In service for 3 months or 150 hours, whichever comes first; or Out of service for a period of more than 3 months; or purchased used.	Owner, Dealer, or User	Qualified Mechanic	Operator Manual Engine Manuals
Annual Inspection	No later than 13 months from date of prior year inspection.	User	Qualified Mechanic	Operator Manual Engine Manuals
Preventive Maintenance	Intervals listed in Operator Manual.	User	Qualified Mechanic	Operator Manual

2.2 GENERAL CARRIER COMPONENTS

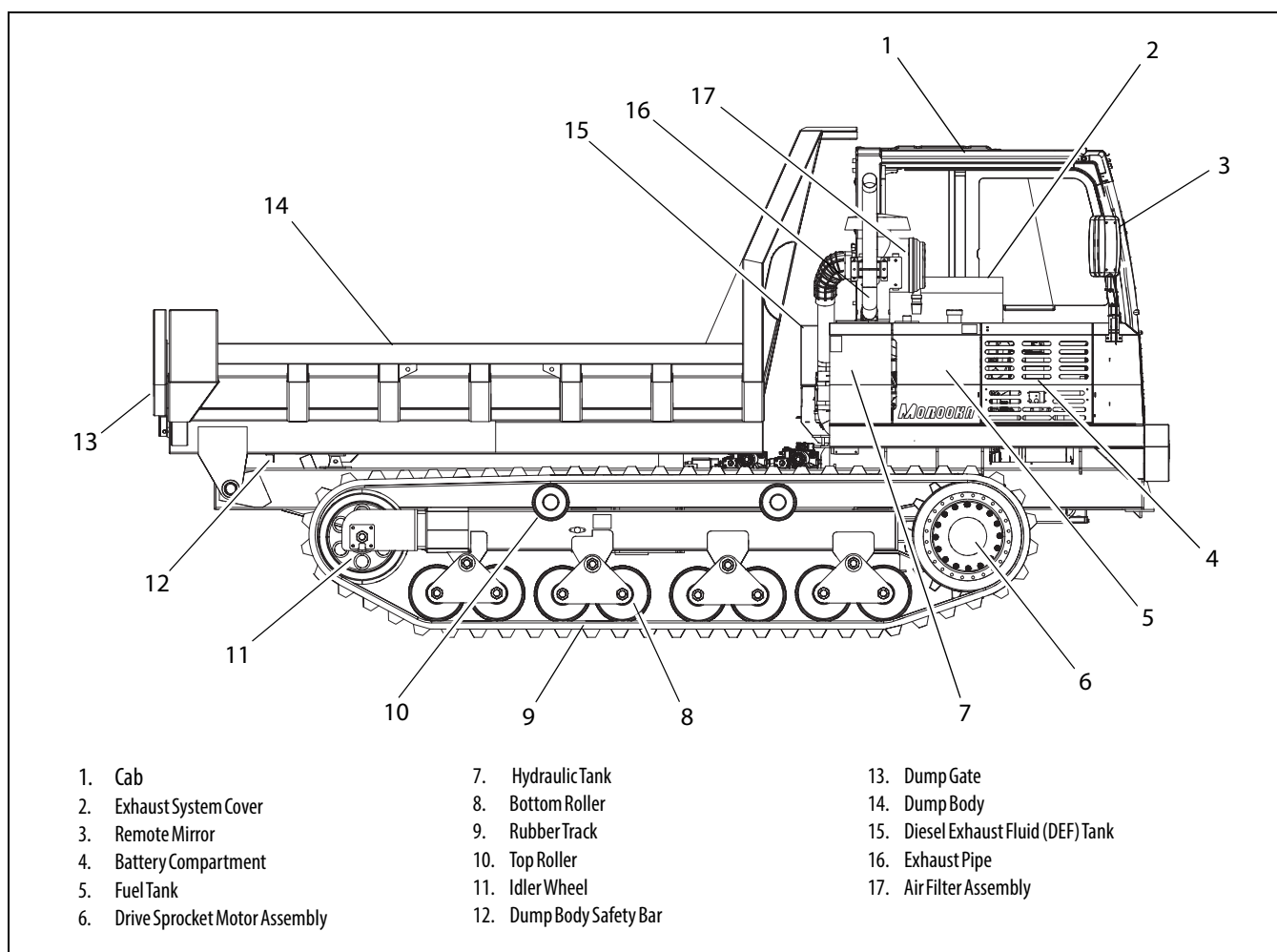


Figure 2-1. Basic Nomenclature

2.3 BEFORE OPERATION INSPECTION

The Before Start Inspection should include each of the following:

1. Cleanliness – Check surfaces for leaks, fluids, heavy contamination, or foreign objects. Clean as needed. Report leaks to maintenance personnel.
2. Damage - Inspect machine for dents, damage, weld or other metal cracks, severe rust, and other issues.
3. Decals and labels – Check for cleanliness and legibility. Make sure no decals or labels are missing. Clean or replace all illegible decals and labels.
4. Operator Manual – Make sure a copy of the Operator Manual is in the cab.
5. “Walk-Around” Inspection – Refer to Figure 2-3. and Figure 2-3.
6. Diesel Exhaust Fluid (DEF)– Check and fill daily as required.
7. Windshield Washer Fluid – Check and fill as required.
8. Hydraulic Oil – Check hydraulic oil level with dump body lowered. Add as required.

NOTE: Machine must be started and dump body raised and locked in position to check engine fluid levels and filters. Refer to Sections 3 and 4 for machine operating instructions.

9. Fuel – Check and drain filters. Add Ultra-Low Sulfur Diesel Fuel as necessary.
10. Engine Oil - Level at Full mark on dipstick. Filler cap secure.

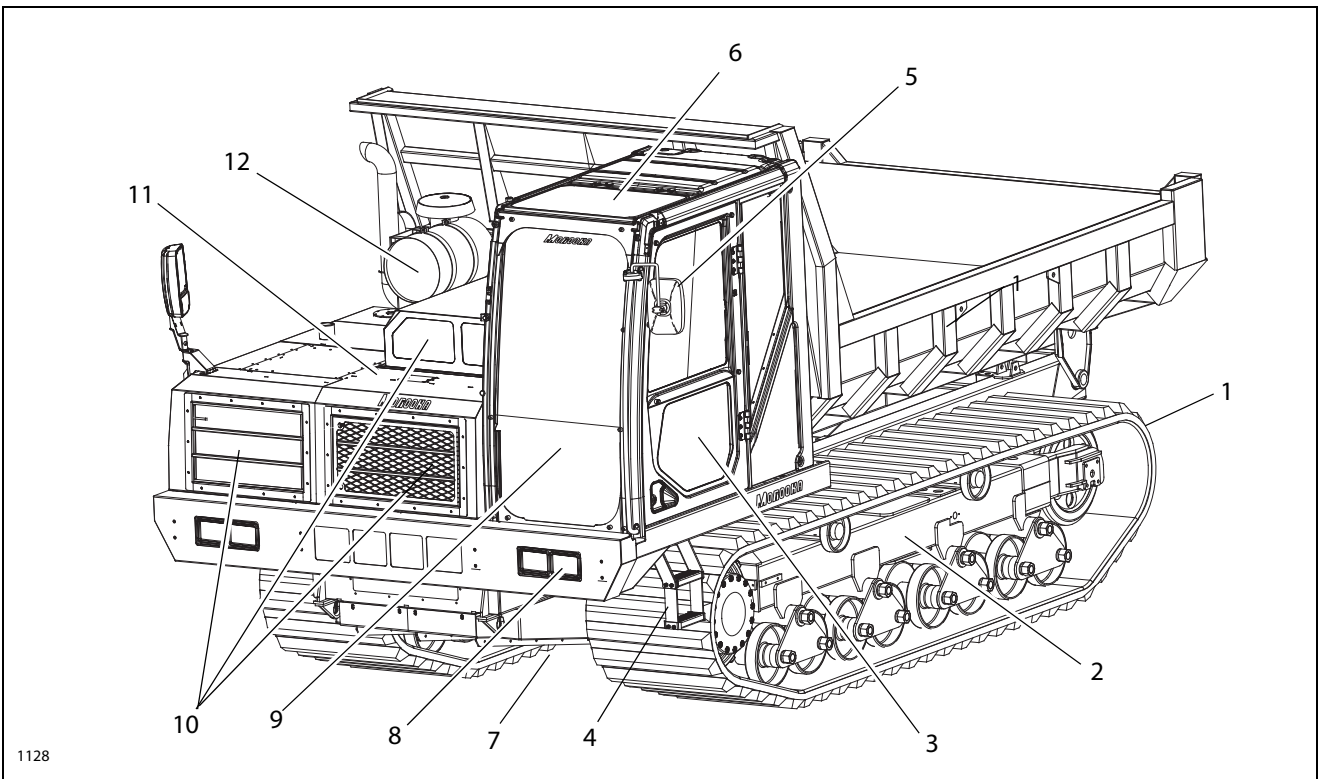


Figure 2-2. Walk Around Inspection - 1 of 2

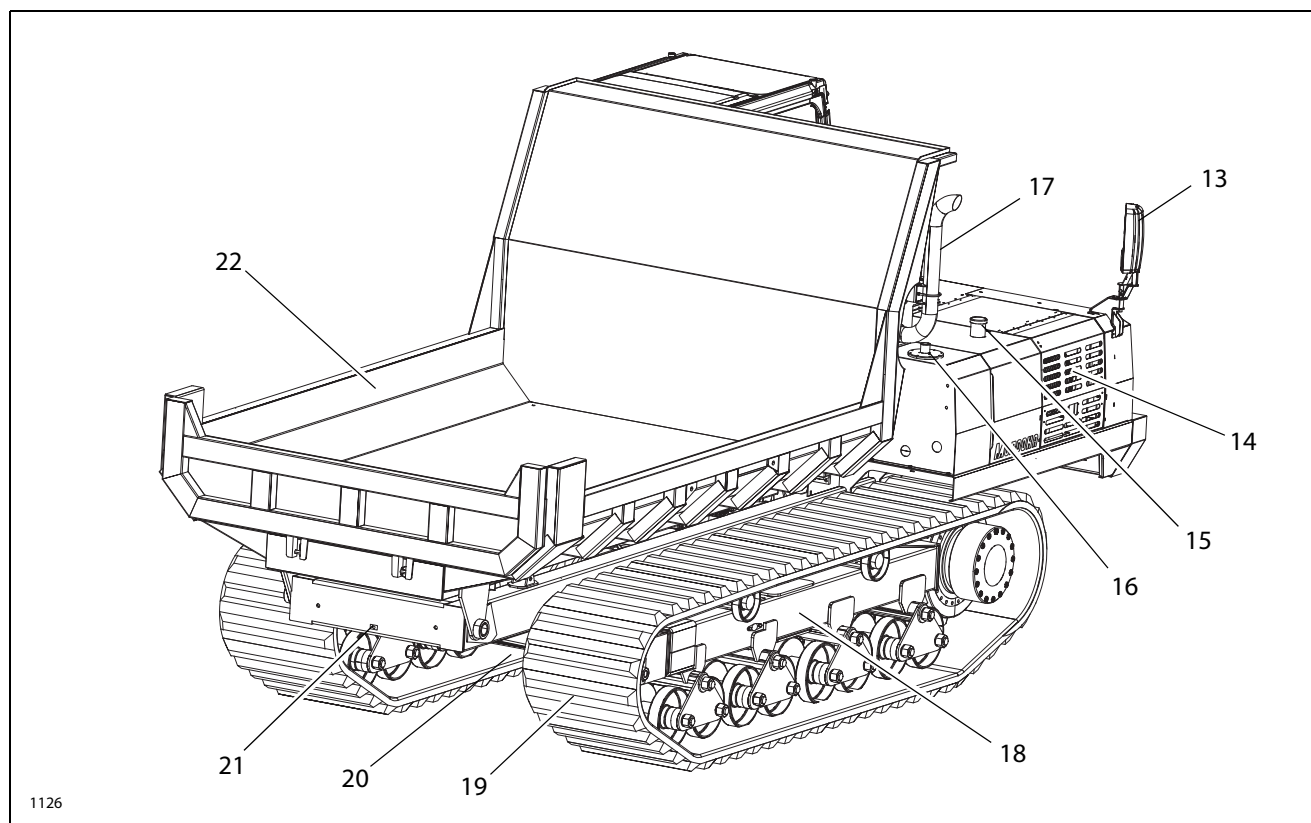


Figure 2-3. Walk-Around Inspection - 2 of 2

General

Begin "Walk-Around Inspection" at Item 1, as noted on the diagram. Check each item in sequence for conditions listed in the following checklist.

⚠ WARNING

PERSONNEL INJURY. UNEXPECTED MACHINE MOVEMENT CAN CAUSE DEATH OR SERIOUS INJURY. MAKE SURE MACHINE POWER IS OFF WHEN WORKING ON OR AROUND MACHINE.

NOTE: Make sure there are no loose or missing parts on all components, they are securely fastened, and no visible damage, leaks or excessive wear exists in addition to any other criteria mentioned.

1. **Left Side Rubber Track.** Check for cracks, cuts, missing pieces, or excessive wear. Check track tension. Clean tracks if clogged with mud, ice, or other debris.
2. **Left Side Undercarriage.** Ensure bolts are tight and none are missing. Check for damage to metal components. Look for cracks, abnormal wear, or bent components. Visually inspect rollers, bogey wheels, and idler for signs of damage or excessive amounts of wear. Inspect sprocket for missing teeth, cracks, or excessive wear.
3. **Door and Side Windows.** Make sure all compartment latches and locks operate correctly. Side window not damaged or excessively dirty. Clean and repair as required.
4. **Steps.** Make sure steps are secure and not bent. Remove mud, ice, and other debris.
5. **Manual Left Side Mirror.** No damage or missing hardware. Clean mirror with soft damp cloth as required.

6. **Overhead Hatch.** Make sure all latches and locks operate correctly. Hatch not damaged or excessively dirty. Clean and repair as required.
7. **Front Underside.** Check ground under machine for traces of oil, fuel, or coolant. If any signs of leakage are found, locate source and repair. Check for damage to any visible hoses and cables. Make sure all panels and covers are in place and correctly fastened. Check for loose or missing nuts and bolts from the undercover and other parts, and tighten if necessary.
8. **Headlights.** All headlights installed. No cracks or damage. Clean with soft, damp cloth as required.
9. **Front Window and Windshield Wiper.** Window not damaged or excessively dirty. Windshield wiper intact and wiper arm not damaged or missing hardware. Clean and repair as required.
10. **Louvers and Grilles.** 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.
11. **Engine Compartment and Access Panels.** Inspect engine compartment for debris and remove. Inspect cooling system for leaks, and damaged hoses. Correct any leaks. Remove debris from radiator. Inspect engine drive belts. Replace belts that are worn, frayed, or broken. Check for hanging electrical wires, loose connections, or signs of burns around the starting motor and alternator. Make sure all engine access panels are closed and secure.
12. **Air Cleaner Assembly.** Check dust ejector for clogging. Cover closed and secure. Do not open air cleaner assembly to check filter element.
13. **Right Side Remote Mirror.** Inspect mirror for cracks or other damage. Clean as required. Check remote cable for damage.
14. **Battery Compartment. Batteries should be secured with no corrosion on terminals.** Check for debris, dust, oil, grease, or other flammable materials. Check for leakage of fuel, oil, or coolant from the engine. Remove any flammable materials, and repair any abnormalities. battery, or battery relay. Repair any abnormality.
15. **Fuel Tank.** No fuel leaks or damage. Fuel cap installed and secure.
16. **Hydraulic Oil Tank.** No hydraulic oil leaks or damage. Hydraulic fluid level full in sight glass. Hydraulic fill cap installed and secure.
17. **Exhaust System.** Check for damaged, separated, or obstructed exhaust pipe. No missing or loose hardware.
18. **Right Side Undercarriage.** Ensure bolts are tight and none are missing. Check for damage to metal components. Look for cracks, abnormal wear, or bent components. Visually inspect rollers, bogey wheels, and idler for signs of damage or excessive amounts of wear. Inspect sprocket for missing teeth, cracks, or excessive wear.
19. **Right Side Rubber Track.** Check for cracks, cuts, missing pieces, or excessive wear. Check track tension. Clean tracks if clogged with mud, ice, or other debris.
20. **Rear Underside.** Check ground under machine for traces of oil, fuel, or coolant. If any signs of leakage are found, locate source and repair. Check for damage to any visible hoses and cables. Make sure all panels and covers are in place and correctly fastened.
21. **Rear View Camera.** Clean lens using clean, damp soft cloth only. Check for scratches and other damage.
22. **Dump Body and Safety Bars (Raised position with safety bars installed).** Check for wear, breaks, or cracks. Check for loose or missing nuts, bolts, or connecting pins. Tighten fasteners and repair as required. Check for oil leaks from hydraulic hoses or hydraulic cylinders and repair as required.

THIS PAGE BLANK

SECTION 3. CONTROLS AND INDICATORS

3.1 GENERAL

This section provides information needed to understand control functions.

Note: Manufacturer has no direct control over machine application and operation. User and operator are responsible for proper training and following good safety practices.

3.2 CAB DOOR

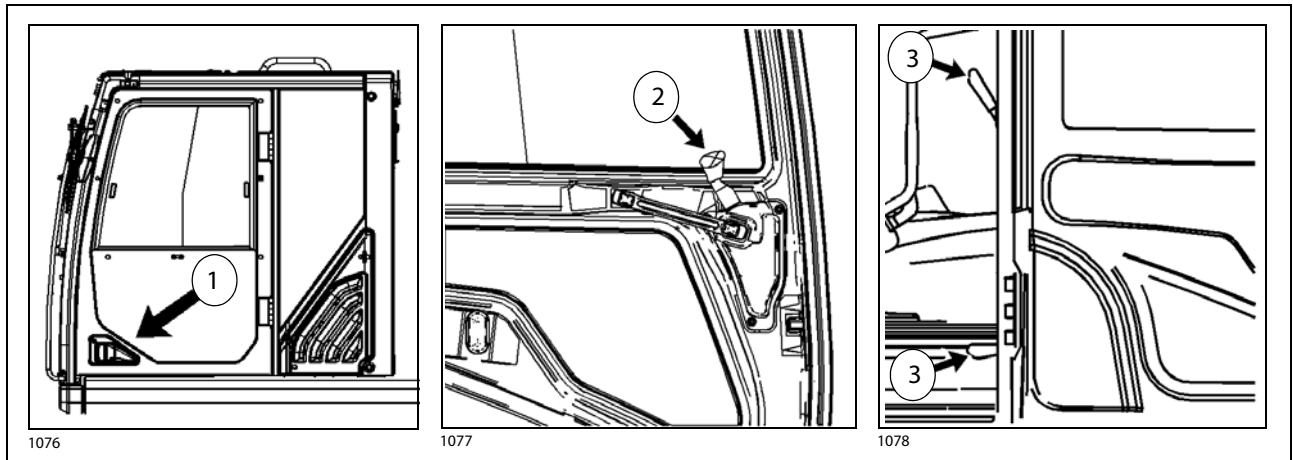


Figure 3-1. Cab Door Controls

1. To open cab door from outside of cab, pull outward on door handle (1).
2. To open cab door from inside of cab, push forward on cab door latch lever (2).
3. For additional ventilation, open cab door all the way and engage catch on exterior cab wall.
4. To release cab door from catch, pull downward on one of the two cab door release levers (3).

3.3 SIDE WINDOW

5. To open window, release window latch (4) and slide window to desired position.
6. To close window, slide window until latch (4) engages.

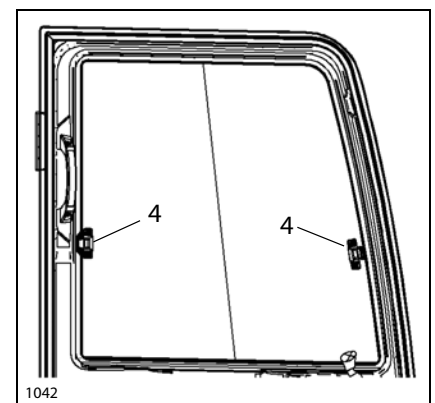


Figure 3-2. Side Window Controls

3.4 FRONT WINDOW

To provide full ventilation inside the cab, the upper and lower window can be fully opened.

NOTE: The cab visor (if equipped) must be down before the front window is raised. The front window will not lock in the overhead storage position with the cab visor in the raised position.

WARNING

INJURY FROM UNEXPECTED MOTION. PARK MACHINE ON A LEVEL SURFACE AND STOP ENGINE BEFORE REMOVING OR INSTALLING A WINDOW.

Open Upper Window

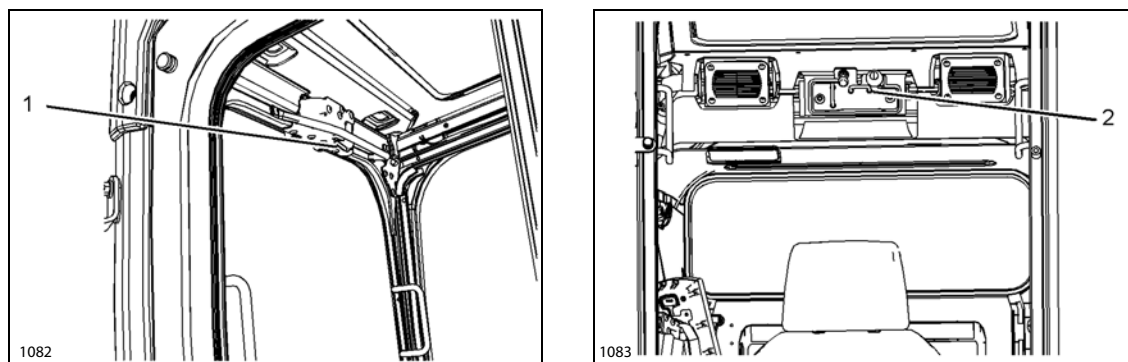


Figure 3-3. Upper Window Controls and Storage

1. Release auto-lock latch by moving lever (1) to the right.
2. Hold both grips located on the window frame. Pull window upward.
3. Hold both grips on the window frame and move window into the STORAGE position until auto-lock latch (2) is engaged.

Close Upper Window

1. Move auto-lock latch lever (1) in direction of arrow to release auto-lock latch (2).
2. Reverse Steps 1 through 3 to close upper window.

Open Lower Window

1. Raise lower window out of window frame.
2. Store lower window in holder located in rear of left side cab frame.
3. Place one end of lower window into brackets (3).
4. Secure opposite end of lower window with catch (4).

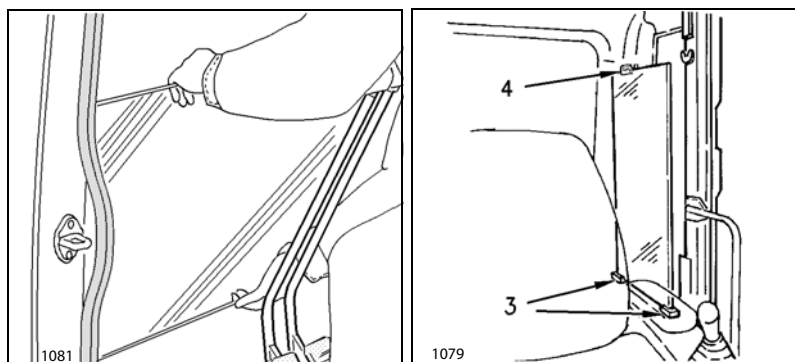


Figure 3-4. Lower Window Controls and Storage

NOTE: Lower window is curved and can be positioned only one way in brackets.

Close Lower Window

To close lower window, reverse procedure for opening the lower window.

3.5 ROOF HATCH

OPEN

1. To open roof hatch, release lock (2).
2. Hold grip (1) and push roof hatch backward.

CLOSE

3. To close roof hatch, hold grip (1) and pull roof hatch forward.
4. Engage lock (2) securely.

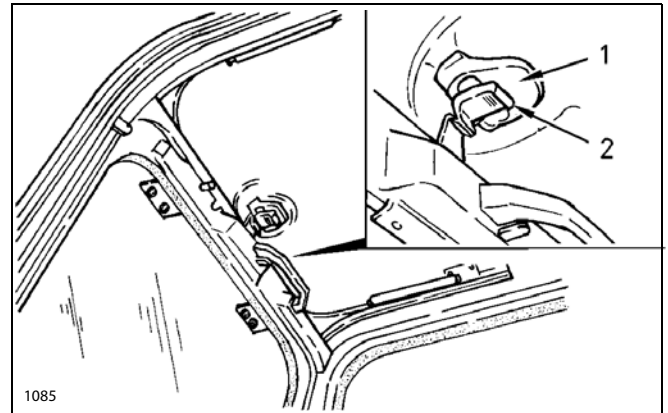


Figure 3-5. Roof Hatch Controls

3.6 ALTERNATE EXITS

Front Window

1. To remove the front window, move lever (1) to the right.
2. Grab handles (2) and lift the window into the overhead storage position.
3. Exit through the front window.

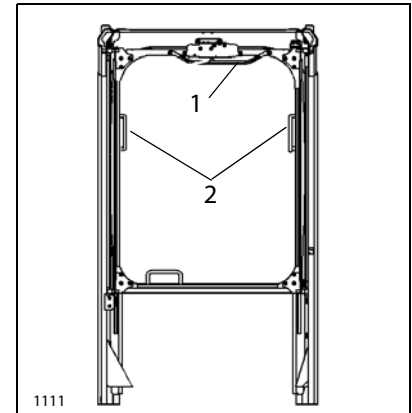


Figure 3-6. Front Window Alternate Exit

Right Side Window

Break Glass – Perform the following procedure to exit through right side window. Hammer (3) is mounted near rear window of the cab.

1. Strike right side window with hammer to break glass.
2. Climb through right side window opening to exit cab.

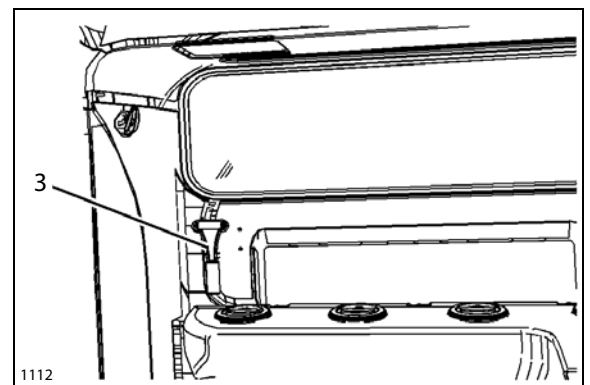


Figure 3-7. Window Emergency Hammer Location

Roof Hatch

NOTE: Before operating machine, make sure lock mechanism (7) (if equipped) is unlocked.

REMOVE ROOF HATCH FROM INSIDE

1. Slide visor cover back. If equipped, make sure lock mechanism (7) is unlocked.
2. Release latch (4). Hold grip (5) and push roof hatch outward.
3. If equipped with gas springs (6), press gas spring release (8) and remove gas spring to open hatch wider.
4. Exit through roof hatch.

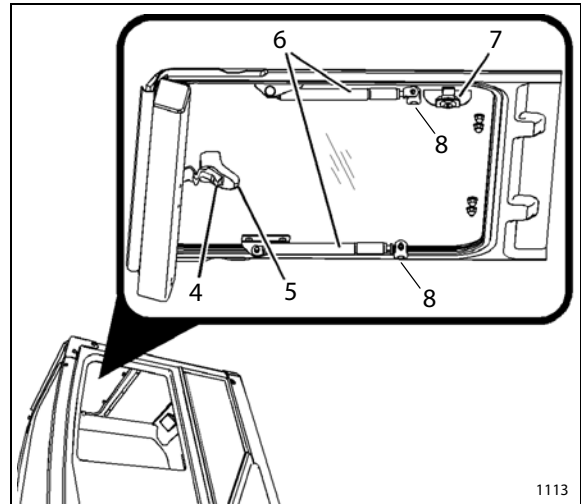


Figure 3-8. Roof Hatch Inside Release

REMOVE ROOF HATCH FROM OUTSIDE

If equipped with knob release (9), roof hatch can be removed from outside of cab.

1. Remove knobs (9) and slide backward to allow hatch to be lifted.
2. Exit through roof hatch.

NOTE: Lock mechanism (Item 7, Fig. 3-8 if equipped) must be unlocked to allow hatch to be lifted.

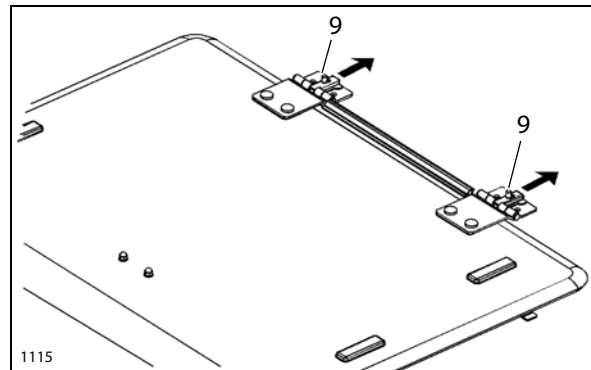


Figure 3-9. Roof Hatch Outside Release

REMOVE ROOF HATCH FROM INSIDE

1. Slide visor cover back.
2. Remove knobs (10) and push roof hatch outward.
3. Exit through roof hatch.

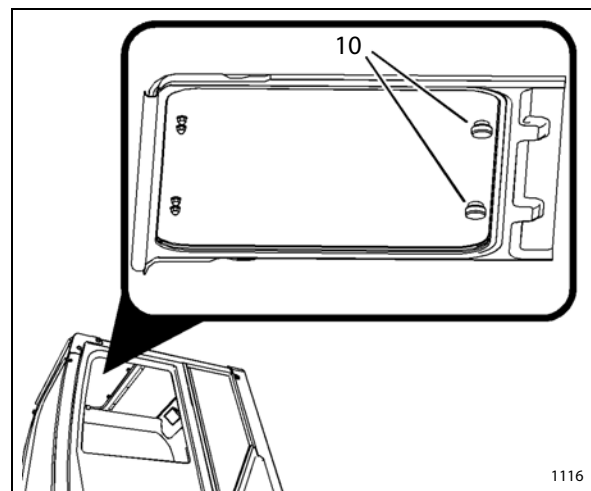


Figure 3-10. Alternate Roof Hatch

Seat

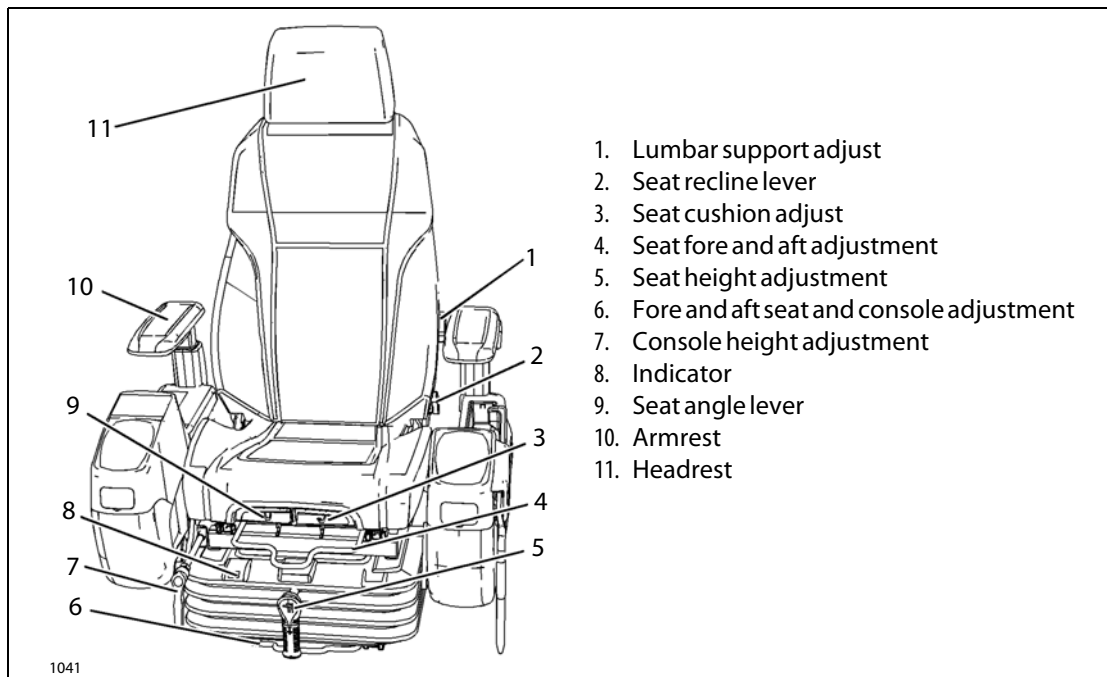


Figure 3-11. Seat Controls

1. Lumbar Support. The lumbar support is located in the back of the seat. Turn knob (1) counter-clockwise in to increase lumbar support. To decrease lumbar support, continue to turn the knob counter-clockwise.
2. Recline. Pull up lever (2) to change seat back recline angle. Hold seat back to desired position. Release lever.
3. Seat Cushion. Push in lever (3) in to adjust cushion length.
4. Fore and aft seat and console adjustment. To adjust seat forward or backward, pull up and hold lever (4). Move seat to desired position. Release lever to lock seat in selected position.

NOTE: Before adjusting seat forward or backward, make sure seat height adjustment lever (5) is in the downward position.

5. Turn lever (5) to adjust seat and console to desired height. To raise seat, pull grip down and rotate grip with the plus sign outward. To lower seat, pull grip down and rotate grip with the minus sign outward. Release grip to return to original position.
6. Pull lever (6) to adjust seat and console forward and backward.
7. Console Height. Use handle (7) to adjust console height. When lever is pulled forward, a gear is released and the lever rotates freely. Release lever to return to original position.
8. Indicator. Displays red if seat is not properly locked.
9. Tilt angle. Push lever (8) in to adjust seat tilt angle.
10. Armrest height. Unlatch lever (12) and move armrest up or down. Latch lever when armrest is in desired position.
11. Headrest. Hold headrest (11) with both hands. Move headrest up and down. Release headrest at desired position to lock in place.

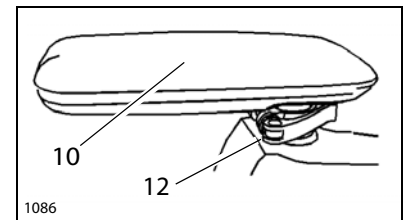


Figure 3-12. Armrest Adjustment

Seat Belt

NOTE: This machine was equipped with a seat belt when the machine was shipped from Morooka. At time of installation, the seat belt and instructions for installation of the seat belt met SAE J386 and ISO 6683 standards. Consult your Morooka dealer for all replacement parts.

Always check condition of the seat belt and mounting hardware before you operate machine.

⚠ WARNING

DO NOT USE SEAT BELT EXTENSIONS. USE OF SEAT BELT EXTENSIONS WITH RETRACTABLE SEAT BELTS CAN CAUSE DEATH OR SERIOUS INJURY. THE RETRACTOR SYSTEM MAY NOT LOCK UP AND THE OPERATOR WILL NOT BE RESTRAINED.

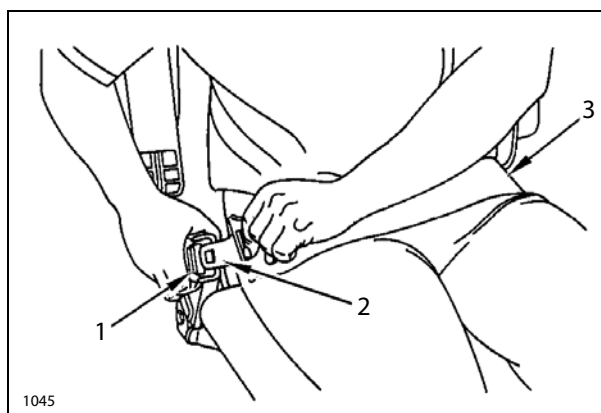


Figure 3-13. Seat Belt

FASTENING SEAT BELT

Pull seat belt (3) out of retractor in a continuous motion.

Insert seat belt catch (2) into buckle (1). Make sure seat belt is placed low across operator's lap.

The retractor adjusts belt length and locks in place. A comfort ride sleeve allows the operator limited movement.

RELEASING SEAT BELT

Push release button on buckle (1) to release seat belt. Seat belt automatically retracts.

3.7 CAB CONTROLS

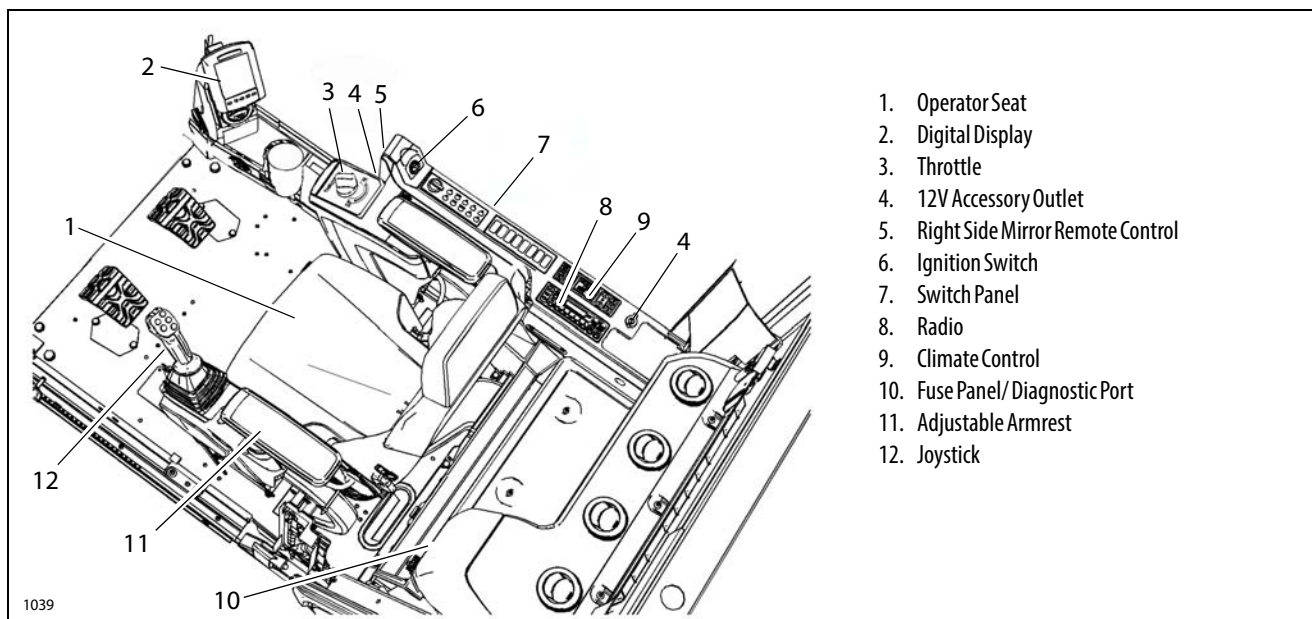


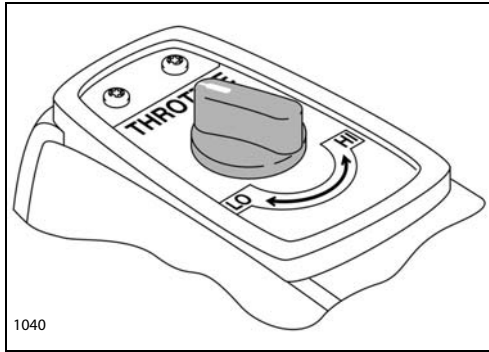
Figure 3-14. Cab Control Locations

1. Operator Seat
2. Digital Display
3. Throttle
4. 12V Accessory Outlet
5. Right Side Mirror Remote Control
6. Ignition Switch
7. Switch Panel
8. Radio
9. Climate Control
10. Fuse Panel/ Diagnostic Port
11. Adjustable Armrest
12. Joystick

Throttle

NOTICE

IF ENGINE IS STOPPED BEFORE IT HAS COOLED DOWN PROPERLY, ENGINE LIFE MAY BE REDUCED. NEVER STOP ENGINE SUDDENLY EXCEPT IN CASES OF EMERGENCY.



NOTE: If engine has overheated, do not suddenly stop it. Run engine at a midrange speed and gradually cool it down before stopping it.

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

Switch Panel

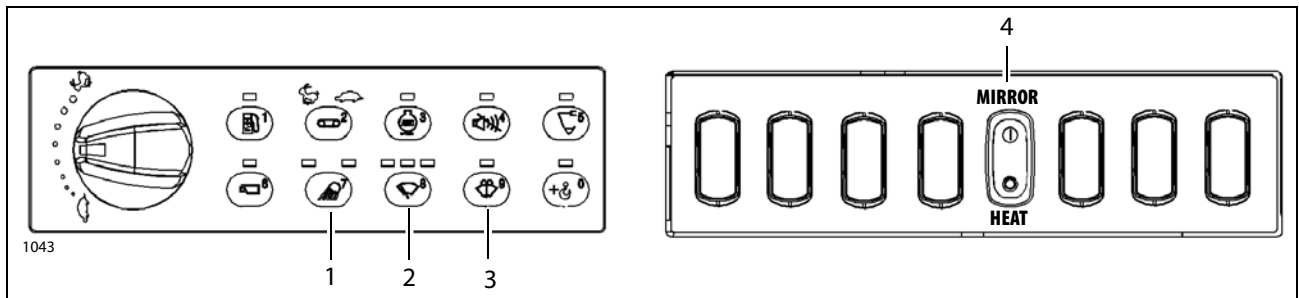


Figure 3-15. Switch Panel Functions

NOTE: Dial and switches not identified below have no function.

1. Head lamp switch and indicators.



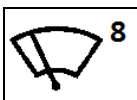
- Press 1 time: Low beam head lamps and left indicator light up.
- Press 2 times: High beam head lamps, and left and right indicators light up.
- Press 3 times: Head lamp and left and right indicators go out.

2. Wiper switch and indicator lights.

NOTICE

DAMAGE TO EQUIPMENT. IF WIPER DOES NOT WORK WHEN SWITCH IS TURNED ON, TURN SWITCH OFF IMMEDIATELY AND CHECK FOR THE CAUSE. IF SWITCH IS LEFT ON, IT WILL DAMAGE THE MOTOR.

NOTE: Wiper does not work when top front window is open. Always close top front window before using wiper.



- 6 Second Delay. Press 1 time: Wiper moves intermittently once every 6 seconds and left indicator lights up.
- 3 Second Delay. Press 2 times: Wiper moves intermittently once every 3 seconds and right indicator lights up.

SECTION 3 - CONTROLS AND INDICATORS

- Continuous. Press 3 times: Wiper moves continuously and both left and right indicators light up.
- Off. Press 4 times: Wiper stops and both left and right indicators go out.

3. Window washer switch and indicators.

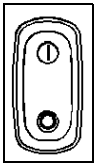
NOTICE

EQUIPMENT FAILURE. IF WASHER IS USED CONTINUOUSLY FOR MORE THAN 20 SECONDS OR USED WHEN NO WASHER SOLUTION COMES OUT, MOTOR FAILURE CAN OCCUR.

- Press and hold switch. Indicator lights, washer fluid is sprayed from nozzle, and wiper automatically starts.
- Release switch. Washer fluid stops spraying, wiper moves 2 or 3 times and stops.



4. Mirror Heat Switch



- Press and hold switch to deice or defrost right side remote mirror.
- Release switch to turn off mirror heat.

Engine Start Switch

NOTICE

THE ENGINE START SWITCH MUST BE IN THE ON POSITION AND ENGINE MUST BE RUNNING TO MAINTAIN ELECTRICAL AND HYDRAULIC FUNCTIONS. THIS PROCEDURE MUST BE FOLLOWED IN TO PREVENT SERIOUS MACHINE DAMAGE.

OFF – Insert engine start switch key only when start switch (1) is in the OFF position. Remove engine start switch key only when engine start switch is in the OFF position. Turn engine start switch to the OFF position before you attempt to restart the engine. Turn engine start switch to the OFF position to stop engine.

ON – To activate cab electrical circuits, turn key clockwise to the ON position.

START – To start engine, turn key clockwise to the START position. After engine starts, release the key. The key will return to the ON position.

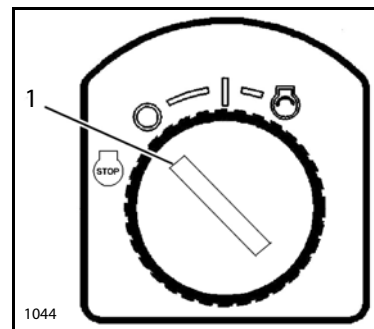


Figure 3-16. Engine Start Switch

NOTICE

ENGINE DAMAGE. VERIFY ENGINE IS FULLY OPERATIONAL BEFORE CRANKING THE ENGINE. DO NOT CRANK AN ENGINE THAT IS NOT FULLY OPERATIONAL OR DAMAGE TO ENGINE MAY OCCUR.

NOTICE

ENGINE DAMAGE. IF ENGINE FAILS TO START, RETURN ENGINE START SWITCH KEY TO THE OFF POSITION. RETURN KEY TO THE START POSITION BEFORE ATTEMPTING TO START ENGINE AGAIN.

Battery Disconnect Switch

The battery disconnect switch (1) is located on the right side of the machine behind the battery access door.

ON – To activate the electrical system, insert disconnect switch key and turn battery disconnect switch clockwise. The battery disconnect switch must be turned to the ON position before you can start the engine.

OFF – To deactivate the electrical system, turn battery disconnect switch counter-clockwise to the OFF position.

NOTE: *The battery disconnect switch and the engine start switch perform different functions. The entire electrical system is disabled when you turn the battery disconnect switch to the OFF position. The battery remains connected to the electrical system when you turn the engine start switch to the OFF position.*



Turn battery disconnect switch to the **OFF** position and remove key when you service the electrical system or any other machine components.

NOTICE

EQUIPMENT DAMAGE. NEVER MOVE BATTERY DISCONNECT SWITCH TO THE OFF POSITION WHILE ENGINE IS OPERATING. SERIOUS DAMAGE TO THE ELECTRICAL SYSTEM COULD RESULT.

Perform the following procedure to check the battery disconnect switch for proper operation:

1. With battery disconnect switch in the ON position, verify electrical components in the operator compartment are functioning. Verify hour meter is displaying information. Verify engine will crank.
2. Turn battery disconnect switch to the OFF position.
3. If any items continue to operate with battery disconnect switch in the OFF position, contact your Morooka America dealer.

3.8 CLIMATE CONTROL

The climate control system (1) is installed at the rear of the operator's compartment and provides warm or cold air for the cab. The climate control panel (2) is located under the right window inside the cab. The system can be run manually or set to run automatically within a temperature range of 64 - 90°F (18 - 32°C).

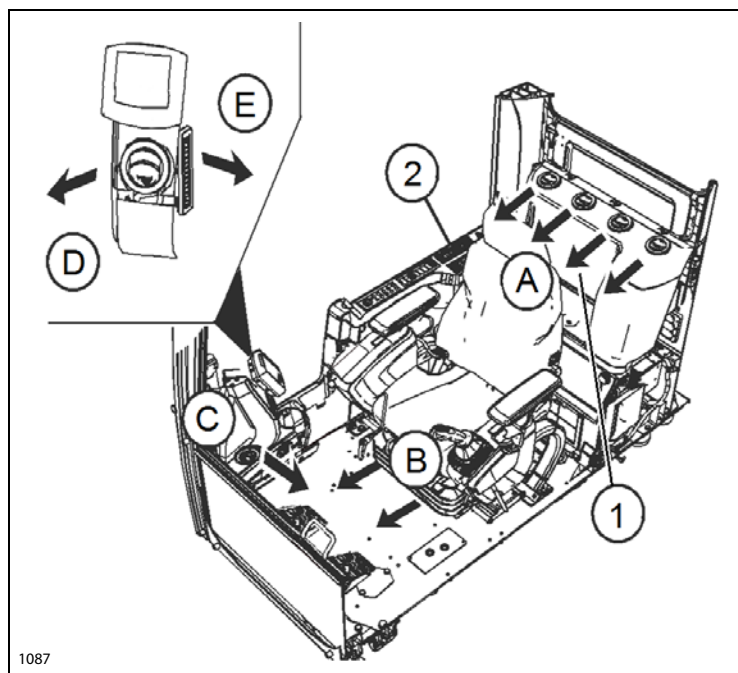
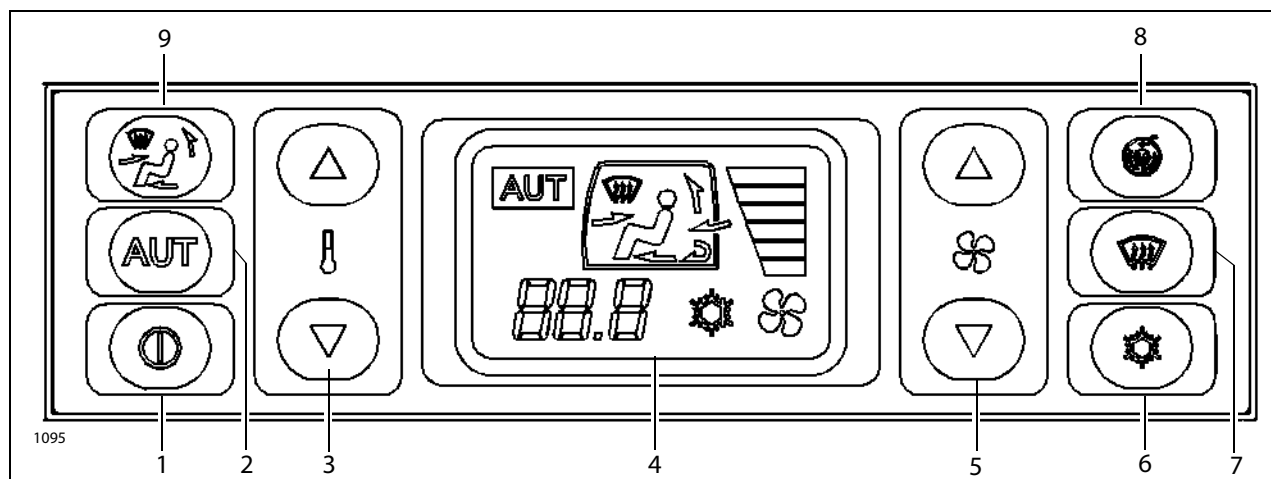


Figure 3-17. Climate Control System

Vents

Adjust louvers for air outlets (A - D) by hand to desired direction. Louvers for air outlet (E) cannot be adjusted.

Controls



- | | | |
|-------------------------------|---------------------------|-----------------------------|
| 1. Power Switch | 4. LCD Display Panel | 7. Defrost Switch |
| 2. Automatic Control Switch | 5. Fan Switch | 8. Air Inlet Select Switch |
| 3. Temperature Control Switch | 6. Air Conditioner Switch | 9. Air Outlet Select Switch |



1. Power Switch. Push switch in to power on the system. Push switch again in to power off the system.

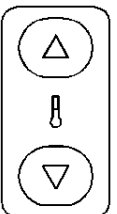


2. Automatic Control Switch (AUT). Press to automatically control temperature and fan speed.

NOTE: Pressing the AUT switch does not turn off air conditioning. Pressing any other switch cancels Automatic Mode, but all functions remain as set before entering AUT mode.

If the climate control system is in the full AUT setting at engine start-up and the temperature inside the cab is too warm or too cool, the damper for fresh air ventilation may automatically close for a few minutes. This helps bring the air temperature to the preset temperature more quickly.

NOTE: Always keep the sunlight sensor clean. Do not obstruct sunlight sensor.



3. Temperature Switch. These switches control air temperature coming from the air outlets to achieve the preset temperature. This preset temperature appears on LCD panel (4). If the heating and air conditioning system is in the automatic mode, pushing these switches changes the preset temperature.

a. Increase – Push up arrow to increase air temperature from air outlets or increase the preset temperature.

b. Decrease – Push down arrow to decrease air temperature from air outlets or decrease preset temperature.

4. LCD Display. Shows active control and temperature settings.

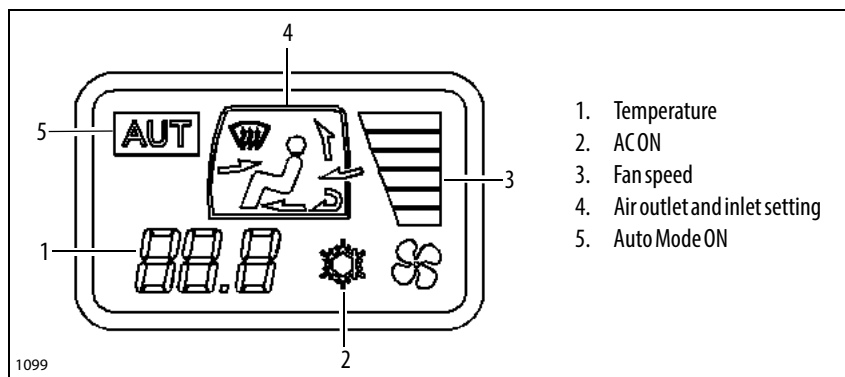
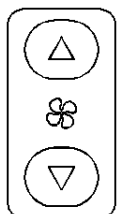


Figure 3-18. Climate Control System Display



5. Fan Switch – The fan switch directly controls fan speed. If the climate control system is operating in automatic mode, pushing this switch overrides automatically selected fan speed.

a. Increase – Push up arrow to increase fan speed.

b. Decrease – Push down arrow to decrease fan speed.



6. Air Conditioner (AC) Switch – Push switch to turn on or turn off AC compressor. Use the AC in humid conditions to remove moisture from air in the cab. In cool weather, operate the AC system weekly to prevent refrigerant leakage and help maintain it in optimum working order.



7. Defrost. Press this switch to defog the windows. Air will also be dehumidified while the compressor is running. This selection directs air flow out of air outlet (C) and air outlet (D).

SECTION 3 - CONTROLS AND INDICATORS



8. Air Inlet Select Switch. Press to select Recirculate or Fresh Air. The display shows which option is selected as shown below:



Recirculate. Air inlet is closed. Air recirculates inside the cab.



Fresh Air. Air inlet is open. Fresh air flows into the cab through the cab air filter.



9. Air Outlet Select Switch. Press until desired vent option is selected. The display shows which option is in use as shown below:



Upper Body. Opens air outlet (A) and (D).



Upper Body and Floor. Opens air outlet (A), (B), and (D).



Floor. Opens air outlet (B).



Floor and Defroster. Opens air outlet (B), (C), and (D).

ENGLISH - METRIC TEMPERATURE DISPLAY SELECTION

To display temperature reading in °F or °C, press both keys of the fan switch at the same time for five seconds.

3.9 RADIO

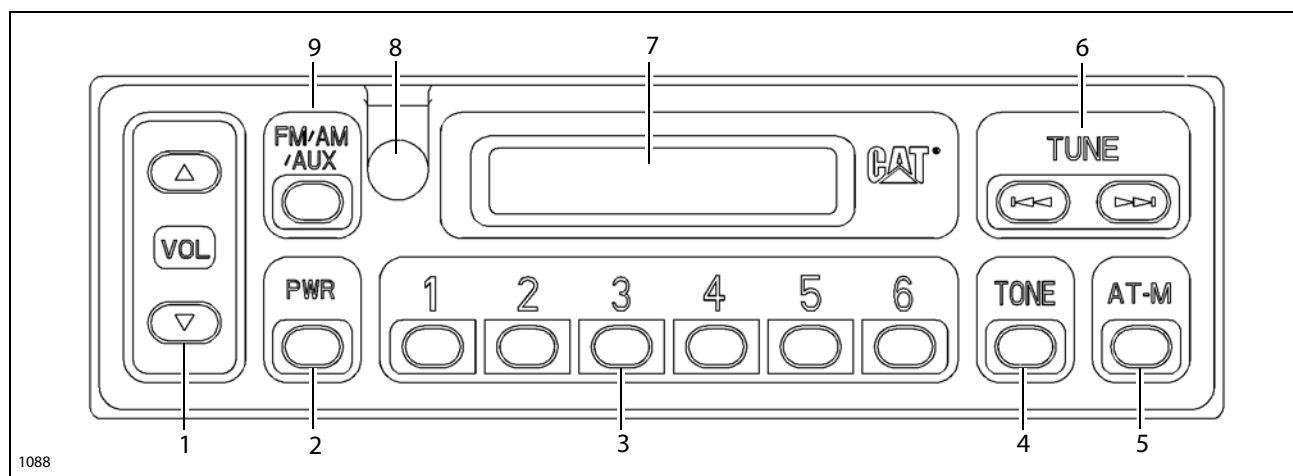


Figure 3-19. Radio Controls

- | | | |
|---------------------------|---------------------------|-------------------------|
| 1. Volume Control | 4. Tone Control | 7. Display |
| 2. Power Switch | 5. Auto Memory | 8. Auxiliary Input Jack |
| 3. Station Select Buttons | 6. Radio Frequency Select | 9. Radio Mode Select |

CAUTION

PERSONNEL INJURY OR EQUIPMENT DAMAGE. LISTENING TO RADIO AT HIGH VOLUME CAN PREVENT HEARING EMERGENCY SIGNALS OR ALARMS. TURN DOWN RADIO VOLUME WHEN MACHINE IS IN OPERATION.

NOTE: Radio can be used only when battery disconnect switch and engine start switch are in the ON position.

NOTE: When a button is pushed, a beep sounds.

1. Volume Control – Push volume control to control the volume. Push upper volume control to increase sound level and push lower volume control to decrease sound level.
2. Power Switch – Push to turn on the radio. Push again to turn off the radio.
3. Station Select Buttons – The circuitry in the memory system allows you to preset six radio stations. To preset any of the Station Select Buttons, follow the procedure below:

PRESETTING RADIO STATIONS

- a. Turn on radio. Select AM or FM band (9).
- b. Select the first radio station by using tuning buttons (6).
- c. Press one of preset buttons (3) for more than 1.5 seconds. The radio station will be stored in the memory for selected preset.
- d. Push preset button (3) to tune in the radio station.
- e. Repeat procedure for remaining preset buttons.

NOTE: When the preset station is weak, use TUNE buttons to find a stronger signal.

4. Tone Control – Music is optimized by pressing the tone control so that display will show MUSIC.
5. Scan and Auto Memory – Press button for less than 0.5 seconds to listen to 5 seconds of each preset radio station. Press button again to stop scanning through preset stations and keep listening to the current station. When this function is used, SCAN is shown on display. Frequency of the radio station is also shown on the display. Press and hold button at least 1.5 seconds to store radio stations with the six strongest signals. Stations already stored in memory will be erased.

NOTE: The memory system is erased after a few days if battery is disconnected.

6. Tune Buttons – Push “tune” buttons to select a radio station. Press the left arrow button to decrease the frequency. Press the right arrow button to increase the frequency. Pressing an arrow button for less than 0.5 seconds changes the radio station one at a time. Pressing the arrow buttons for more than 0.5 seconds will change the frequency automatically until a radio station is found.
7. Display. The display shows active control selections:

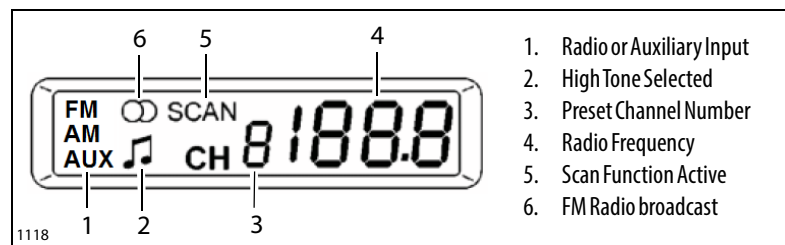


Figure 3-20. Radio Display

8. Auxiliary Input. The auxiliary input allows for connection of a portable audio device.
9. AM/FM/AUX Selector. Push button to select FM, AM, or AUX functions. Selected function appears on display panel.

Radio Reception

NOTE: Radio must be connected to a power source to set area of reception.

Use the following procedure to set the desired area as shown in table at right:

1. Turn off radio.
2. Press Station Select button 1, Station Select button 4, and AT-M button (5) at the same time. Hold until **EU** or **US** is displayed on the display panel.

Area	Display	
	EU	US
North America		X
Central and South America		X
European Union	X	
Asia/Oceania	X	

NOTE: Remove any protective film from the radio. Remove protective vinyl from operator seat. Film and vinyl may cause noise interference in the radio.

3.10 POWER RECEPTACLES

Two 12 volt power receptacles (1) are located on the right side console. These power receptacles can be used for powering automotive electrical equipment or accessories. Remove cap before use.

3.11 MIRRORS

Mirrors provide additional visibility around your machine. Make sure mirrors are in proper working condition and are clean. Adjust all mirrors at the beginning of each work period and when you change operators.

The right side mirror is adjusted using a remote control knob (1) located on the back side of the engine start switch console. The left side mirror is adjusted manually.

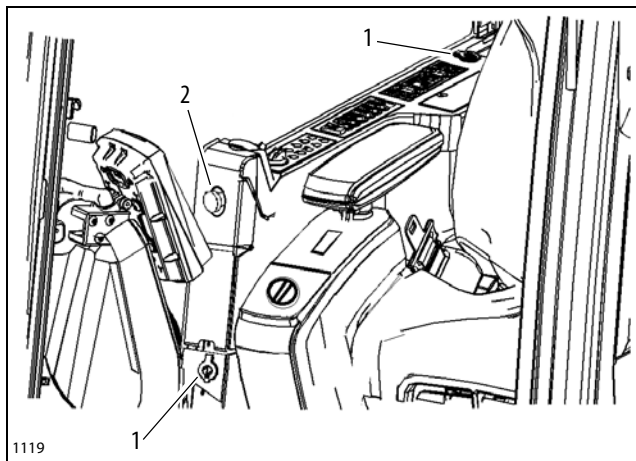


Figure 3-21. Power Receptacles and Mirror Remote Control

⚠ WARNING

OBSTRUCTED VISIBILITY. MODIFIED MACHINES OR MACHINES THAT HAVE ADDITIONAL EQUIPMENT OR ATTACHMENTS MAY AFFECT VISIBILITY. ALWAYS MAINTAIN AWARENESS OF PERSONNEL AND OBSTACLES AROUND THE VEHICLE. USE GROUND GUIDES WHEN REQUIRED.

MIRROR ADJUSTMENT

1. Park machine on a level surface.
2. Stop engine.
3. Adjust rear view mirrors to provide visibility behind machine at a distance of approximately 100 ft (30 m) from rear corners.

RIGHT SIDE REAR VIEW MIRROR

Adjust mirror using remote control so side of dump bed (3) and track (4) can be seen from the operator seat. Provide as much visibility to rear of machine as possible.

LEFT SIDE REAR VIEW MIRROR

Adjust left mirror outside cab so side of dump bed (3) and track (4) can be seen from the operator seat. Provide as much visibility to rear of machine as possible.

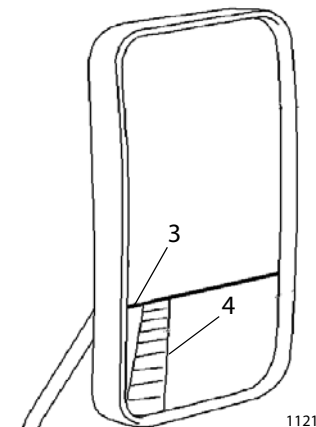


Figure 3-22. Mirror Adjustment

3.12 JOYSTICK

NOTE: Refer to Section 4 Operation for detailed instructions on safely operating carrier.

The joystick controls all carrier motion and dump bed functions.

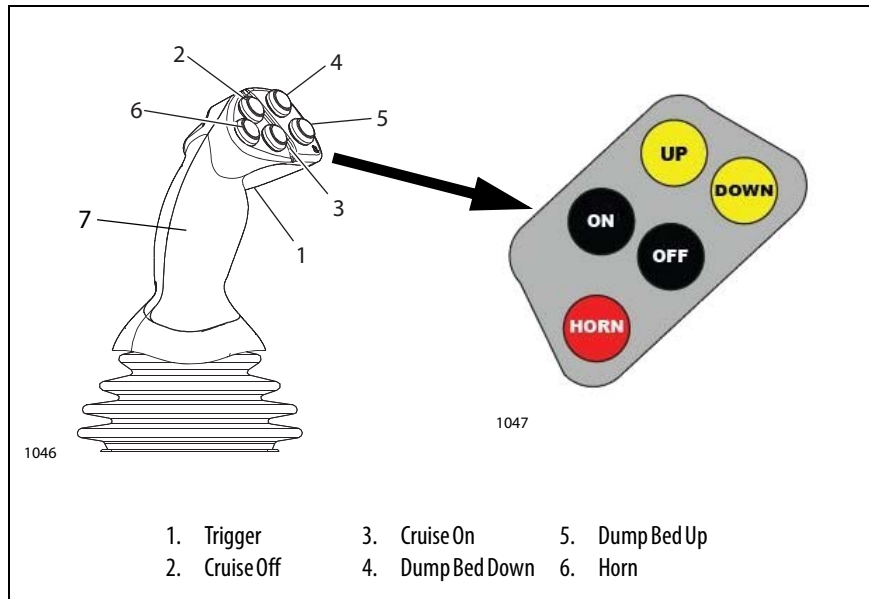


Figure 3-23. Joystick Controls

1. Trigger. Pressing the trigger enables joystick functions and releases the parking brake. Releasing the trigger automatically applies parking brake and disables drive functions unless Cruise On is selected.
2. Cruise ON – Press to allow carrier to continue moving after releasing trigger.
3. Cruise OFF – Disconnects cruise function and enables joystick trigger.
4. Dump UP – Press and hold button down to raise dump body.
5. Dump DOWN – Press and hold button to lower dump body.
6. Horn – Press to sound horn.
7. Joystick – Move in direction of desired travel as shown below:

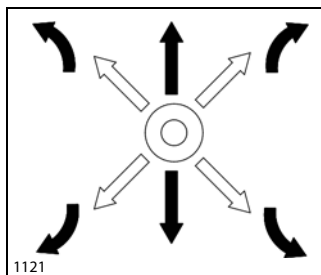


Figure 3-24. Joystick/Carrier Motion

3.13 DISPLAY

The display provides digital gages, fault monitoring and alerts, a rear-view camera, and setup options. If a problem is detected such as a low DEF level or high oil temperature, a fault screen displays and the related symbol will flash. In some situations an audible alarm will sound. Fault screens can be temporarily overridden, but will continue to redisplay until the fault is corrected.

Table 3-1. Display Symbols

Symbol	Description	Symbol	Description
	Battery Voltage		Exhaust System Fail
	Diesel Exhaust Fluid (DEF) Level		Fuel Level
	Engine Oil Pressure		Fuel Flow Rate
	Engine Oil Temperature		Hydraulic Oil Temperature
	Engine Preheat		Intake Manifold Pressure
	Engine Warning		Intake Manifold Temperature
	Engine Stop		

Startup (Menu) Screen

The Startup screen shows the current software version (1) for the Display and the Controller. It also displays the Wait to Start engine preheat lamp (2) if engine is not ready to start.

Select other screens using the keypad (3) below navigation buttons displayed on the screen (4).

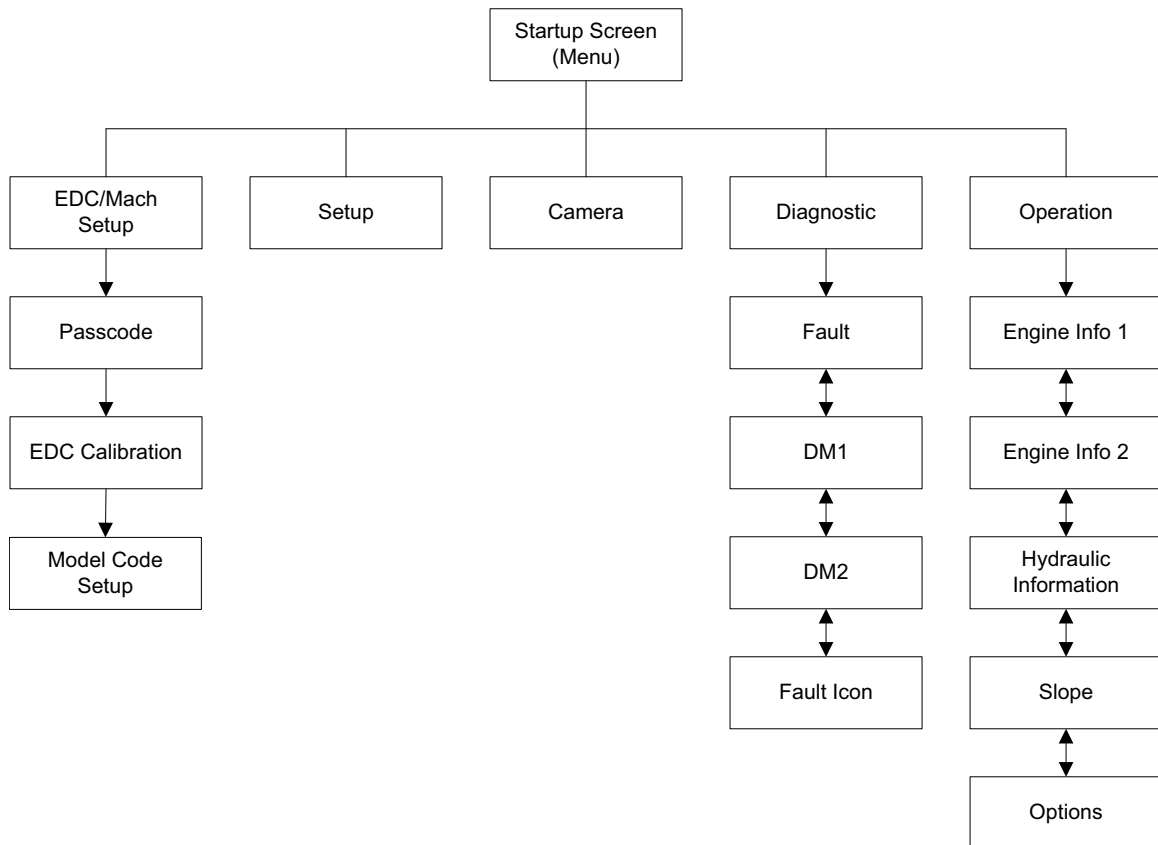


Figure 3-25. Startup (Menu) Screen

Display Navigation

From the Startup (Menu) Screen, there are five main screens:

1. EDC/Machine Setup – For special service and machine setup use only. Screen access requires a passcode.
2. Setup – Configures language (if available) and Imperial/Metric display functions.
3. Camera – Displays view behind carrier.
4. Diagnostic – Provides fault and troubleshooting information.
5. Operation – Shows carrier and engine information required for safe and efficient operation.



1049

Figure 3-26. Display Screen Navigation Chart

NOTE: Navigation buttons display on a screen only if that navigation option is available.

PREV - Displays previously viewed screen.

MENU - Returns to Startup screen.

NEXT - Displays next screen.

EDC/Mach Setup (Electronic Directional Control)/Machine Setup Screen

Pressing the EDC/Mach Setup button displays the Passcode screen. Access is for special service and machine configuration settings. It is not available to the operator.

Setup Screen

The Setup screen allows the operator to set language and units of measure. Press setup buttons (5) to cycle through available options for each item.

1. Language (If available)
2. Units - English or Metric

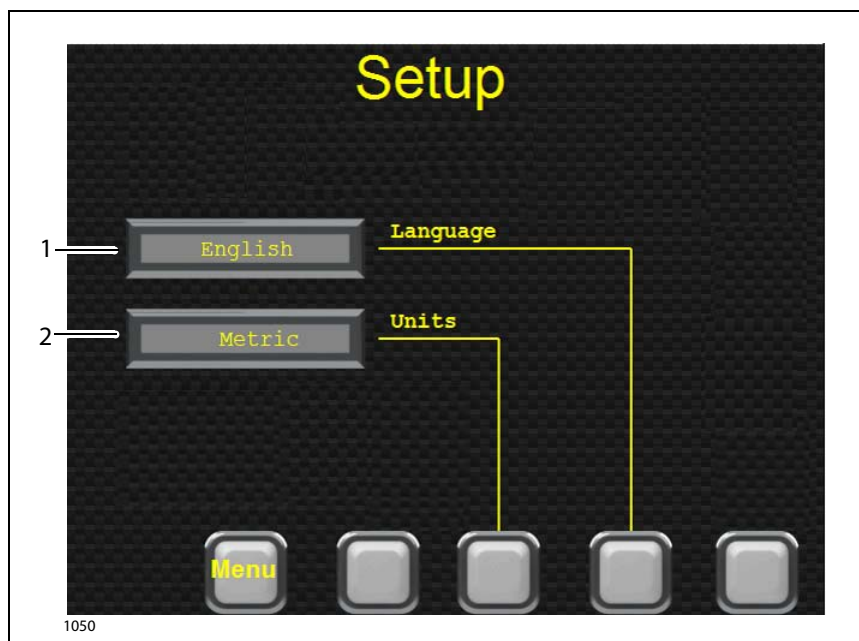


Figure 3-27. Setup Screen

Press **MENU** button to return to the startup screen.

Camera Screen

WARNING

CRUSH HAZARD. RUNNING INTO PERSONS OR OBJECTS CAN CAUSE DEATH, SERIOUS INJURY, OR DAMAGE TO PROPERTY AND EQUIPMENT. ALWAYS CHECK MIRRORS AND AREA BEHIND VEHICLE BEFORE AND WHEN BACKING UP. REVERSE SYSTEMS ARE FOR SUPPLEMENTARY USE ONLY.

The rear view camera provides a view of the area directly behind the carrier. Distances are marked in green, yellow, and red caution zones to help prevent running into an object.

NOTE: *Lines are for reference only and do not indicate actual distances.*

The Camera screen becomes active if an operator presses the CAMERA button from the Startup Screen or when machine is moving in reverse.

NOTICE

EQUIPMENT MALFUNCTION. ALWAYS KEEP CAMERA LENS CLEAN OR CAMERA MAY NOT OPERATE NORMALLY. CAMERA MAY NOT OPERATE NORMALLY AT EXTREMELY HIGH OR LOW TEMPERATURES.



Figure 3-28. Camera Screen

Press **MENU** button to return to the startup screen.

Diagnostic Screens

FAULT SCREEN

1. When a fault occurs the fault number is shown in red.
2. Messages display in the fault message area.
3. **CLEAR** - clears all faults on the screen. If a fault is still active it displays again.
4. **UP** - scrolls to the previous faults.
5. **DOWN** - scrolls to the next faults.

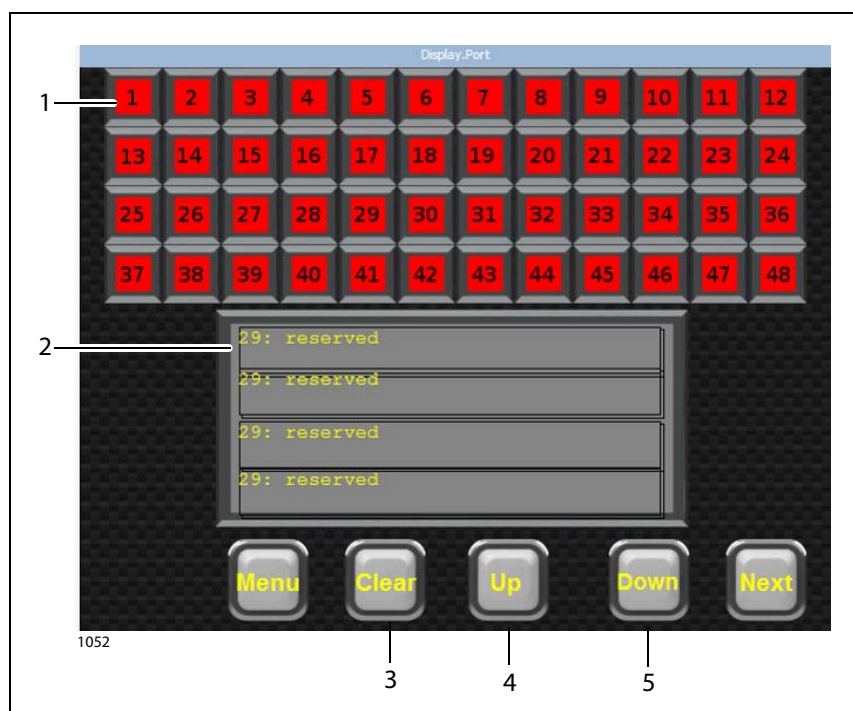


Figure 3-29. Fault Screen

MENU - Returns to Startup screen.

NEXT - Displays DM1, DM2 Screen.

Diagnostic Message (DM1, DM2) Screen

The DM1, DM2 screens display engine fault messages.

1. # - Indicates order of engine fault.
2. SPN - Suspect Parameter Number.
3. FM - Failure Mode.
4. OC - Occurrence Count.
5. Diagnostic message area - displays diagnostic messages.
6. CLEAR button - clears all current faults.
7. HISTORY button - displays engine fault history messages.
8. SCROLL button - allows operator to scroll through all engine diagnostic messages.

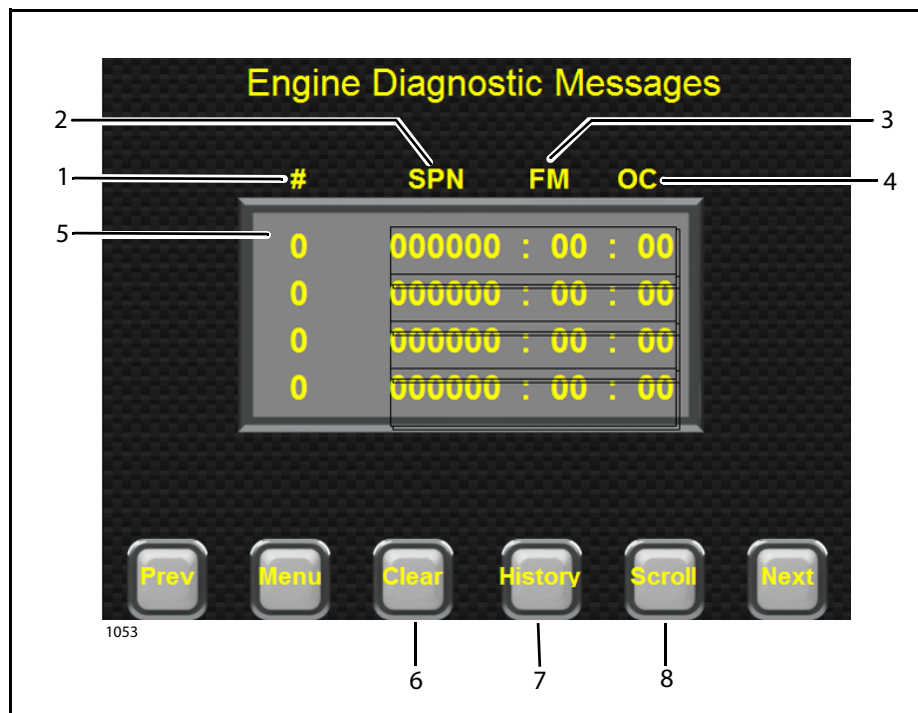


Figure 3-30. DM1, DM2 - Engine Diagnostic Message Screen

PREV - Displays Fault screen.

MENU - Returns to Startup screen.

NEXT - Displays Fault Icon screen.

Fault Icon Screen

The Fault icon screen will highlight and the fault icon will flash if a Fault is active.

1. Slope Warning indicator - Illuminates and sounds an alarm if pitch or roll exceeds 15°.
2. Low Fuel Warning - Illuminates when fuel level in the tank is nearing empty (15%) and the carrier is in danger of running out of fuel. The light will go out when fuel tank level reaches 20% of capacity.
3. Sensor/Comm Faults - Illuminates for CANbus communication failures.
4. Hydraulic System Caution - Illuminates when hydraulic system oil pressure is low, or temperature is out of normal operating limits.
5. Engine Warning – If this indicator light illuminates note the fault code and contact your Morooka Dealer for service. This lamp may also illuminate along with Low DEF Level.
6. Engine Stop – Illuminates when energized by a signal from the engine ECM. A warning buzzer will also sound. If this indicator light illuminates note the fault code and shut off the engine. Contact your Morooka Dealer for service.
7. Exhaust System Malfunction – At Level 1 the emission malfunction lamp will be on solid. At Level 2 the emission malfunction lamp will flash. At Level 3 the emission malfunction lamp will flash and stop lamp will activate. The engine may shut down or operate at 1000 Revolutions Per Minute (RPM).
8. DEF Level – illuminates when DEF tank level is low.

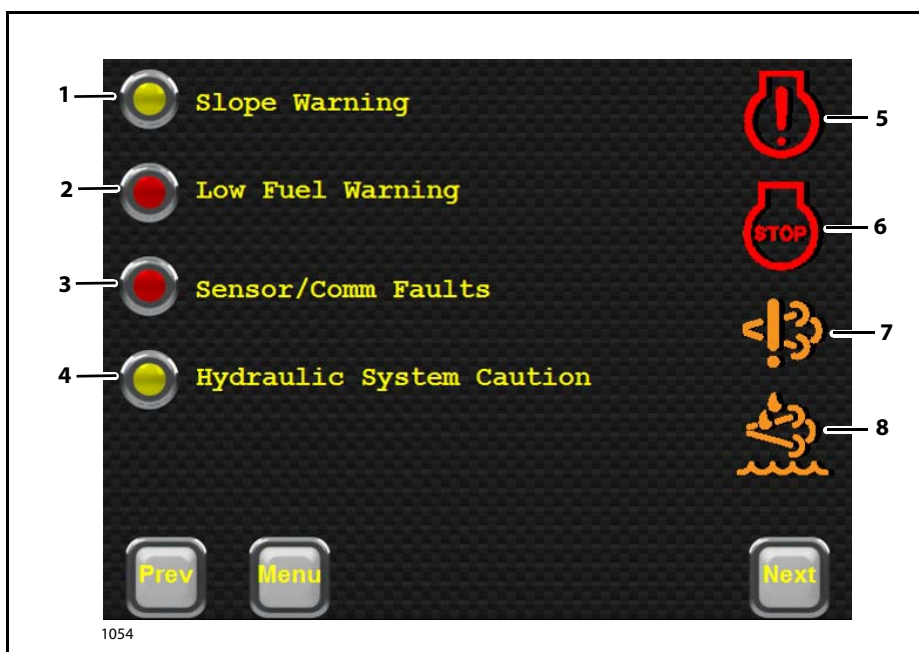


Figure 3-31. Fault Icon Screen

Press **PREV** to display the previous screen.

Press **MENU** to return to the Startup screen.

Operation Screens

Pressing the **OPERATION** button displays the Engine Info 1 Screen.

ENGINE INFORMATION 1 SCREEN

Engine Info 1 screen displays:

1. Engine Oil Pressure.
2. Engine RPM.
3. Engine Coolant Temperature.
4. Engine Percent Load at speed.

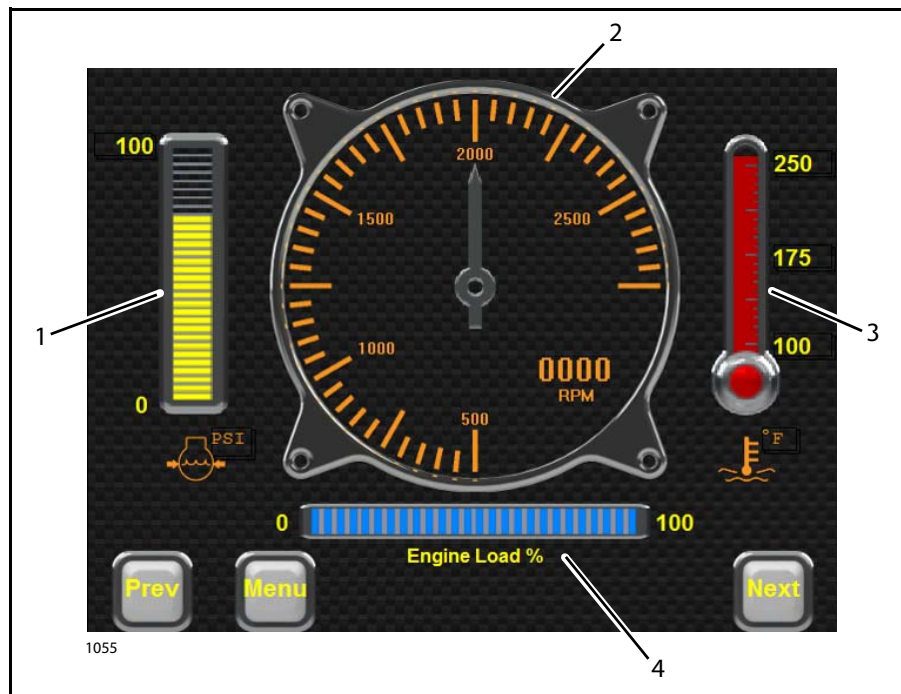


Figure 3-32. Engine Info 1 Screen

Press **PREV** to display the previous screen.

Press **MENU** to return to the Startup screen.

Press **NEXT** to display Engine Information 2 screen.

ENGINE INFORMATION 2 SCREEN

Engine Info 2 screen displays:

1. Fuel Level.
2. Fuel Economy - amount of fuel used per hour under current operating conditions.
3. DEF Level. The indicator shows the level of fluid in the DEF tank.

NOTICE

WHEN DEF TANK IS EMPTY, THE ECM SEVERELY RESTRICTS (DERATES) ENGINE RPM.

4. Intake Manifold Temperature.
5. Intake Manifold Pressure.
6. Battery Voltage Level.
7. Engine Hours.

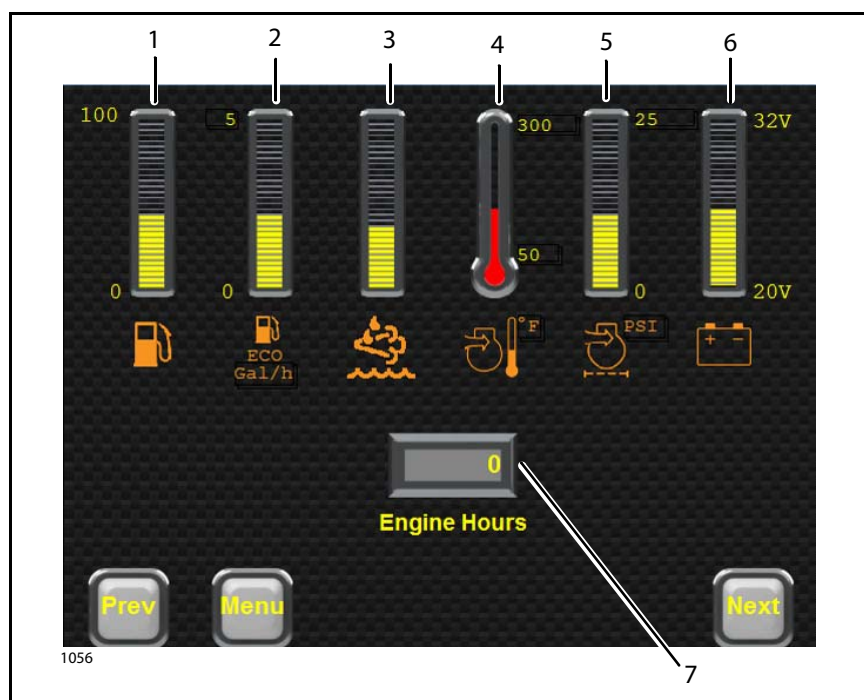


Figure 3-33. Engine Info 2 Screen

Press **PREV** button to return to Engine Info 1 screen.

Press **MENU** button to return to the Startup screen.

Press **NEXT** button to display Hydraulic Information screen.

HYDRAULIC INFORMATION SCREEN

The Hydraulic Info Screen displays the status of:

1. Hydraulic Filter A Pump.
2. Hydraulic Filter B Pump.
3. Dump Hydraulic Filter.
4. Hydraulic Oil Temp.

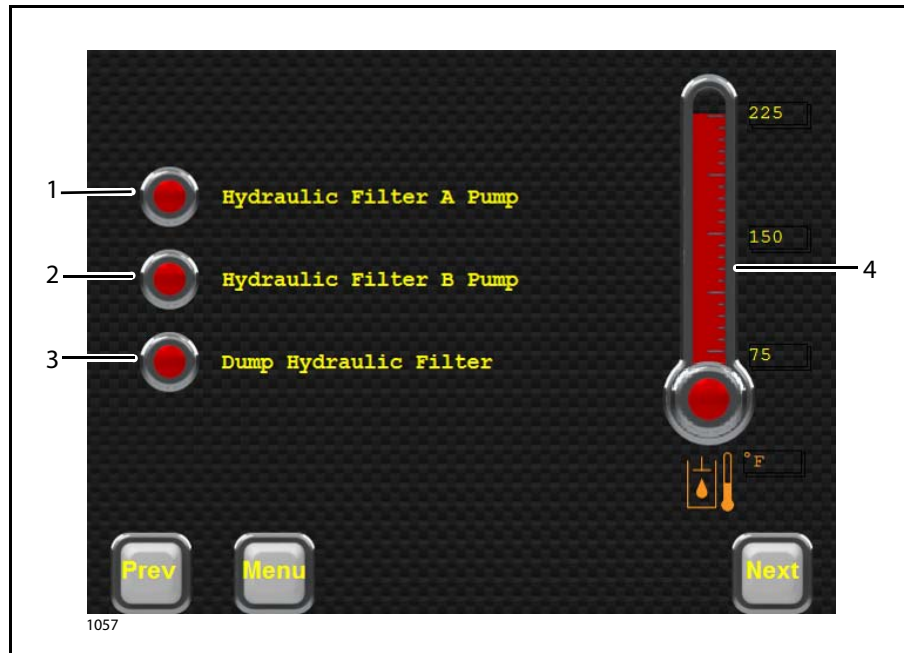


Figure 3-34. Hydraulic Information Screen

Press **PREV** button to return to Engine Info 2 screen.

Press **MENU** button to return to the Startup screen.

Press **NEXT** button to display Slope screen.

SLOPE SCREEN

The Slope Screen displays vehicle Pitch and Roll angles.

1. Roll angle indicator.
2. Percent slope.
3. Degree roll.
4. Pitch angle indicator
5. Percent grade.
6. Degree pitch.

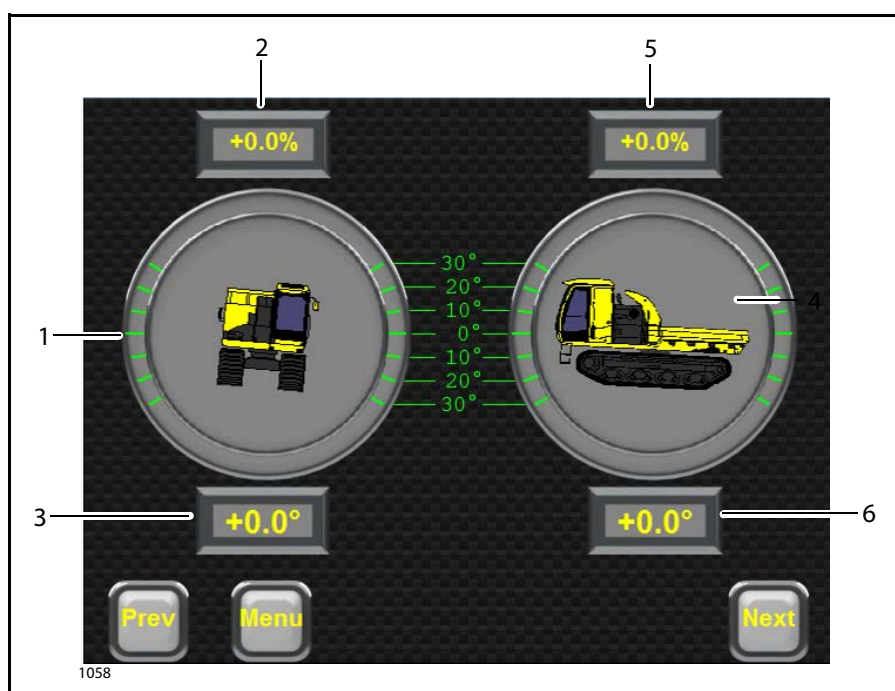


Figure 3-35. Slope Screen

Press **PREV** button to return to Hydraulic Information screen.

Press **MENU** button to return to the Startup screen.

Press **NEXT** button to display Option screen.

OPTION SCREEN

The Option screen displays engine load and track drive setting options.

1. Idle Mode. Displays green if idle mode is enabled in the program via the service tool.
2. Load Control. Disabled - not used on this machine.
3. Reverse Joystick Command. Displays green if reverse joystick option enabled.
4. Engine Load. Displays amount of load placed on the engine.
5. Propel Derate. Displays drive speed reduction (derate) based on engine load.

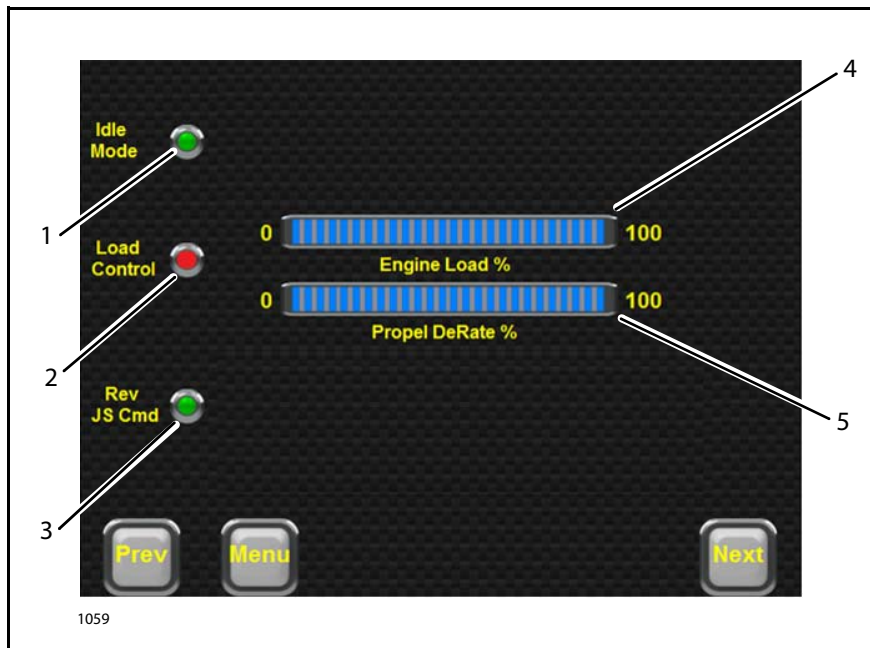


Figure 3-36. Option Screen

Press **PREV** button to return to Slope screen.

Press **MENU** button to return to the Startup screen.

THIS PAGE BLANK

SECTION 4. MACHINE OPERATION

4.1 BEFORE START

Adjust operator's seat before operation. Always adjust operator's seat after it has been used by another operator. Adjust operator's seat so you can operate joystick and display buttons easily with your back against the seat backrest.

⚠ WARNING

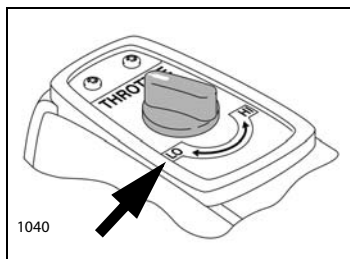
LOSS OF CONTROL. NEVER ADJUST SEAT WHEN MOVING. ADJUSTING SEAT WHILE MOVING CAN CAUSE LOSS OF VEHICLE CONTROL AND CAUSE DEATH OR SERIOUS INJURY.

NOTE: Armrest and seat belt are installed to prevent the operator falling from the operator's seat if machine tips at an angle when traveling.

Always lower armrest and fasten seat belt before starting operation.



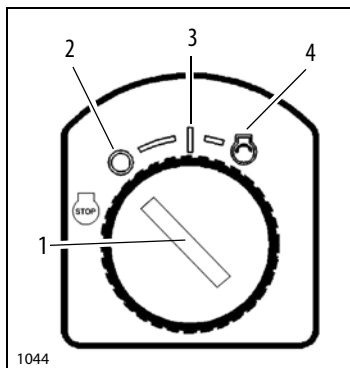
4.2 STARTING ENGINE



1. Set throttle to low speed (LO) position.

NOTICE

Engine damage. Wait for Morooka Startup screen to display and engine preheat light to go out before starting engine. Do not attempt to start engine immediately after inserting starting switch.



1. Turn key (1) to ON position (3) and wait for MOROOKA start screen (5) to appear on the display. If engine preheat icon (6) displays, wait until it goes out before attempting to start engine.
2. Check there are no persons or obstacles in the surrounding area, then sound horn and start engine.
3. Turn key to START position (4) and hold to activate starting motor. Release key after engine starts. Key returns automatically to ON position (2). Do not keep turning over starting motor for more than 15 seconds at a time.

NOTICE

Starter Damage/Battery drain. Do not crank starting motor continuously for more than 15 seconds. starting motor may fail or you may drain the batteries.



NOTE: In cold weather conditions, the intake air heater starts automatically to preheat intake air according to the condition of intake air temperature and coolant temperature. Starter motor may run longer in this situation.

NOTE: After extended shutdown or oil change the engine will not start until minimum cranking oil pressure is detected by the ECM. It may take more cranking time after an extended shutdown or oil change.

4. If engine does not start, return key to OFF position (2). Wait two minutes for batteries to recover and starting motor to cool down. Repeat steps 2 and 3.

NOTICE

ATTEMPTING TO START ENGINE WITHOUT STARTING MOTOR STOPPING COMPLETELY CAN DAMAGE STARTING MOTOR PINION AND ENGINE RING GEAR.

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

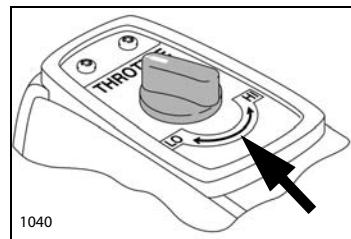
NOTICE

NEVER TURN KEY TO START POSITION WHILE ENGINE IS RUNNING. DAMAGE TO STARTING MOTOR PINION, INSIDE PARTS, OR ENGINE RING GEAR MAY RESULT.

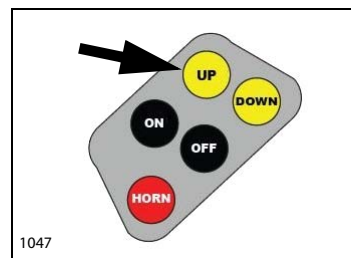
4.3 AFTER START

1. Keep throttle in the low speed position (LO) and run for five minutes under no load.

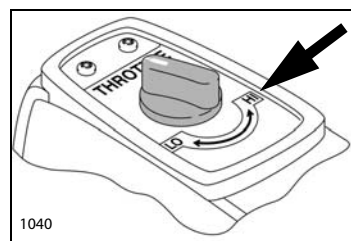
2. Adjust throttle to the mid-range speed position. Run for approximately 5 minutes under no load.



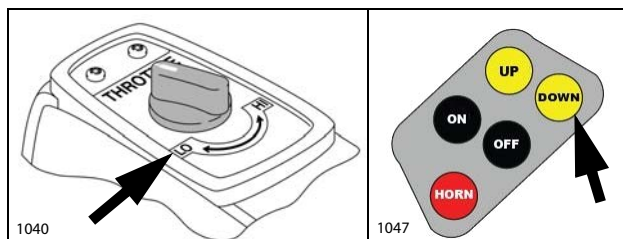
3. Press and hold dump control UP button on joystick until dump body is at maximum height. Run engine with dump body raised for approximately 5 minutes.



4. Keep dump body raised and turn throttle to high speed position (HI). Run engine in this condition for 2 - 5 minutes. This warms up hydraulic oil for smooth shifting and dump body operation.



5. Place throttle in LO speed. Press DOWN button on joystick to completely lower dump body.
6. Check display and backup alarm work normally.
7. Check there are no abnormalities in exhaust color, engine noise, or vibration.



4.4 DIESEL EXHAUST SYSTEM

Cummins QSL9 Tier 4 Final/Euro Stage IV off-highway engines require little to no operator interaction. Exhaust System icons in the Digital Display show system status. Exhaust system cleaning is programmed to be done automatically and requires no operator inputs.

These engines require Diesel Exhaust Fluid (DEF), known as AdBlue® in Europe. DEF is a Urea and Deionized water mixture injected into the exhaust stream to react with NOx to convert it to Nitrogen (N₂), Water (H₂O), and Carbon Dioxide (CO₂).

NOTE: NOx is the generic term for Nitric Oxide (NO) and Nitrogen Dioxide (NO₂). NOx is produced from reaction of nitrogen, oxygen, and hydrocarbons. These gases react to form smog and acid rain.

DEF icons in the Digital Display indicate when the DEF tank needs to be filled. A DEF gauge in the digital display shows the DEF tank fill level.

DEF System Warnings



DEF Icon – Illuminates when DEF level is low. Operator should refill DEF tank.



DEF Icon With Check Engine Icon – Illuminates when DEF level is critically low. If tank is not refilled immediately, power will be reduced. Operator should refill the DEF tank. Normal engine power will be restored after DEF tank is refilled.



Flashing DEF Icon With Check Engine Icon – Illuminates when DEF level is near zero. If tank is not refilled immediately, power will be further reduced. Operator should refill DEF tank. Normal engine power will be restored after DEF tank is refilled.



Flashing DEF Icon With Stop Engine Icon – Illuminates when DEF gauge has read zero for 30 minutes. Power will be limited to idle. Operator should stop equipment when it is safe to do so, and refill DEF tank. Normal engine power will be restored after DEF tank is refilled.

NOTE: If refilling DEF tank does not turn lamps off and restore normal engine power, contact your Morooka Dealer.

4.5 DRIVING

Check there is no one in the area around machine before starting. Check carefully around dump body behind machine.

When starting to move, check surrounding area is safe. Sound horn (1) to inform people you are starting to move. Squeeze trigger (2) and operate joystick (3) slowly. The more the joystick is moved, the faster the machine will travel. Do not start machine off suddenly.

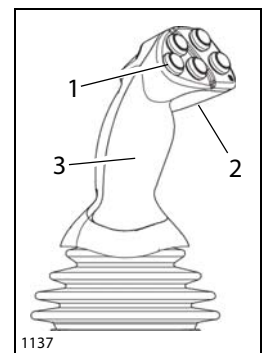
NOTE: When moving in reverse, check backup alarm sounds when joystick is operated in REVERSE positions.

Select a travel speed to match travel surface and ground condition when moving.

Changing Speed

Travel speed is changed by adjusting throttle and changing the amount the joystick is operated.

- The closer the joystick is to the center (neutral) position, the lower the travel speed.
- The further the joystick is from the N position, the higher the travel speed.



Changing Direction

NOTICE

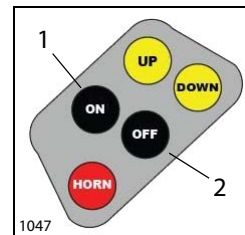
DRIVE TRAIN DAMAGE. WHEN SWITCHING BETWEEN FORWARD AND REVERSE, ALWAYS STOP MACHINE BEFORE CHANGING DIRECTION.

Move joystick in desired direction of travel.

NOTE: Check backup alarm sounds when joystick is operated in REVERSE positions.

Cruise Control

1. Press ON button (1) to engage cruise control. Release trigger and carrier will continue to move at current set speed and direction.
2. Press OFF button (2) to disengage cruise control.



Driving On Slopes

WARNING

ROLLOVER HAZARD. VEHICLE ROLLOVER CAN CAUSE DEATH OR SERIOUS INJURY. IT IS DANGEROUS TO MOVE MACHINE WITH DUMP BODY LOADED. IF SLOPE ALARM BUZZER SOUNDS, REDUCE ENGINE TO LOW SPEED AND MOVE JOYSTICK SLOWLY IN DIRECTION OF TRAVEL.

NOTE: If angle of slope or side slope exceeds 15°, the slope alarm buzzer at the rear of the operator's compartment sounds to warn the operator.

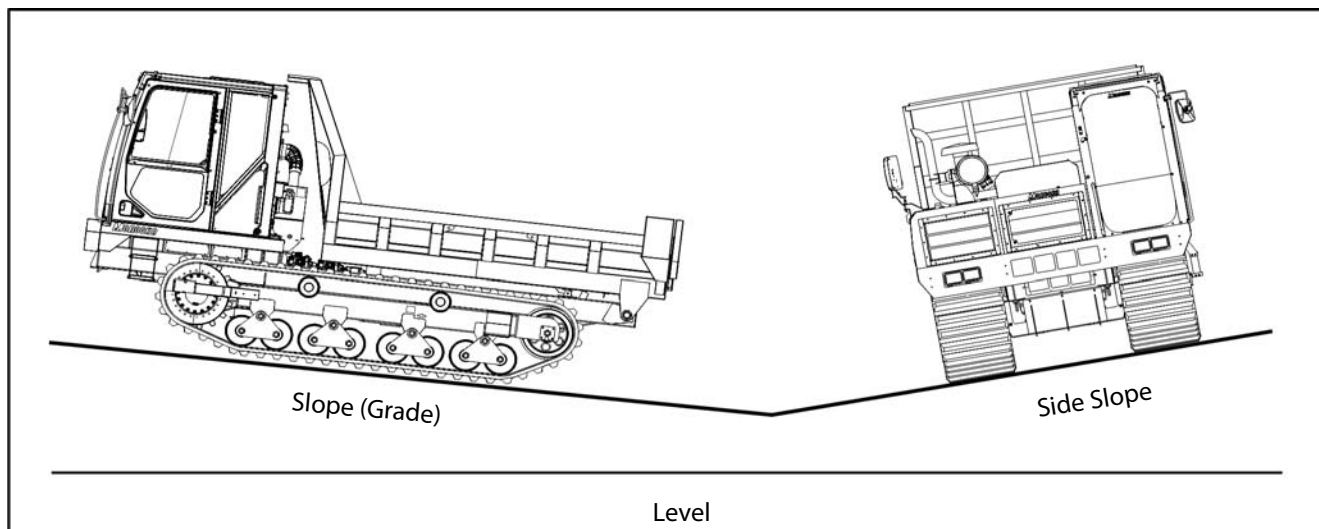


Figure 4-1. Slope and Side Slope

WARNING

LOSS OF CONTROL. IF MACHINE BECOMES UNSTABLE OR ANY DANGEROUS CONDITIONS EXIST AND MACHINE MUST BE STOPPED IMMEDIATELY; RELEASE JOYSTICK TRIGGER AND ALLOW JOYSTICK TO RETURN TO THE CENTER (N) POSITION, OR TURN ENGINE STARTING SWITCH TO THE OFF POSITION TO STOP ENGINE. FAILURE TO MAINTAIN CONTROL CAN RESULT IN DEATH, SERIOUS INJURY, OR DAMAGE TO PROPERTY AND EQUIPMENT.

- When traveling along a slope, move slowly and straight forward.
- When going down a slope, always run engine at low speed and operate joystick a maximum of half way from the N position. Traveling at excessive speed is dangerous and can cause loss of machine control.
- When going up a slope, run engine at low speed and keep joystick close to the N position. Always travel directly up the slope.
- Monitor slope and side slope angles using the slope angle display option.

NOTE: If the engine stops on a slope Release trigger and let joystick return to center position. Restart engine.

NOTICE

FUEL LEVEL. IF FUEL LEVEL IS LOW AND MACHINE IS ON A SLOPE OR TIPPING, ENGINE MAY SUCK IN AIR AND STOP. ALWAYS MAINTAIN A SUFFICIENT LEVEL OF FUEL IN FUEL TANK.

NOTICE

OIL LEVELS. WHEN OPERATING ON STEEP SLOPES, CHECK HYDRAULIC TANK AND ENGINE OIL LEVELS. ADD OIL TO THE HIGH LEVEL. THIS WILL PREVENT FAILURE CAUSED BY LACK OF OIL.

Water Operation

NOTICE

ENGINE DAMAGE. WHEN DRIVING MACHINE IN WATER, WATER CAN BE PULLED INTO THE RADIATOR FAN AND CAUSE FAN AND ENGINE DAMAGE. NEVER EXCEED 15° WHEN ENTERING WATER. BE EXTREMELY CAREFUL WHEN OPERATING MACHINE IN WATER.

- Do not operate machine in water deeper than top of carrier roller (1).

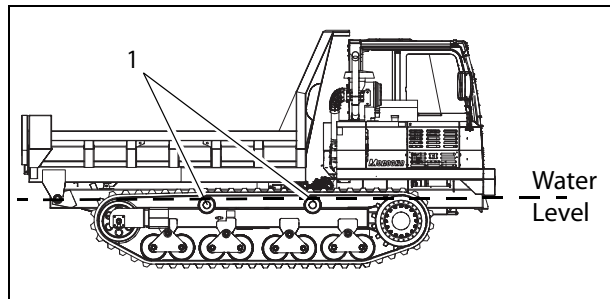


Figure 4-2. Maximum Water Depth

- Do not exceed 15° angle when entering water. Water will reach fan before machine levels off.

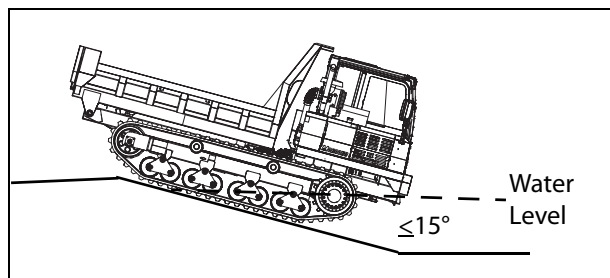
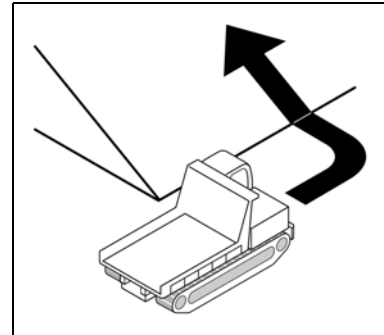


Figure 4-3. Maximum Angle Entering Water

- After water operation, grease parts that have been continuously submerged until used grease and moisture is forced out of bearings.

Operating Techniques

- Apply equal pressure to both tracks. Quick turns cause uneven wear. Make gradual turns. Sharp turns on a soft base like gravel can throw gravel on the track and drive hub, which crushes the gravel and causes premature wear on the drive hub.
- Make three-point turns to minimize chassis wear and ground damage. When working on inclines or slopes, move the carrier slowly and avoid making sudden directional changes. Working on crowns and depressions also creates uneven wear. Constant operation on a slope or hill in one direction can accelerate wear to idlers, rollers and guide lugs by placing greater forces on one side. Travel straight up or down the slope. Turn on level ground whenever possible to minimize chassis wear.
- Continuous turning on the same side can cause asymmetrical and accelerated wear. Alternate direction of turns or check for wear more often.
- Avoid driving on broken stone, jagged rocks, scrap iron or other recycled materials; crushed rock, recycled concrete or demolition rubble; rough asphalt or concrete. Avoid abrasive and contaminated environments.
- Operating machine with outside or inside edge of track turned up can cause damage to the edges and lugs of the rubber track. Avoid traveling with tracks on uneven ground, or surfaces with obstructions.
- Do not allow sides of tracks to contact curbs or walls to minimize damage and downtime.



Turn directly up or down slope.

Stopping

- Avoid stopping suddenly. Allow extra distance when stopping.
- Return joystick to the center (N) position to stop machine. The hydraulic brake is automatically applied and machine will stop.

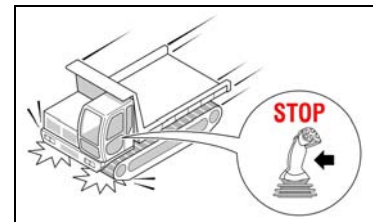
4.6 EMERGENCY STOP

There are 2 ways to make an emergency stop:

- Release joystick trigger and move joystick to center (N) position.
- Turn starting switch key to the OFF position to stop engine.

4.7 PARKING

- Choose firm, level ground to park machine.
- If machine must be parked on a slope, block tracks to prevent machine from moving.



Release trigger to stop.

4.8 SHUT DOWN ENGINE

Do not stop engine before it has cooled down. Stopping engine before it cools down will shorten the service life of the engine. Never stop engine suddenly except in emergency.

NOTICE

ENGINE DAMAGE. IF ENGINE HAS OVERHEATED, DO NOT STOP IT SUDDENLY. RUN ENGINE AT A MID-RANGE SPEED AND GRADUALLY COOL IT DOWN BEFORE STOPPING THE ENGINE.

1. Turn engine throttle to low speed and idle engine for 5 minutes to cool engine down.
2. Return key in starting switch to the OFF position.

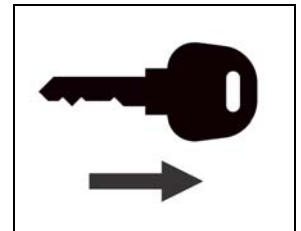
4.9 AFTER OPERATION

1. Turn off main power switch in battery compartment.
2. Perform a walk-around check and check the undercarriage, dump body, and bodywork; check for oil and coolant leaks. If any abnormality is found, repair it.
3. Fill fuel tank with fuel.
4. Fill DEF Tank.
5. Remove dead leaves, waste paper, or other flammable materials from around the engine that may cause fire.
6. Remove any mud or snow stuck to the undercarriage or dump body.

Locking

To prevent vandalism or theft:

- Remove key from start switch.
- Lock cab door.
- Lock fuel filler cap.
- Remove main power switch key.



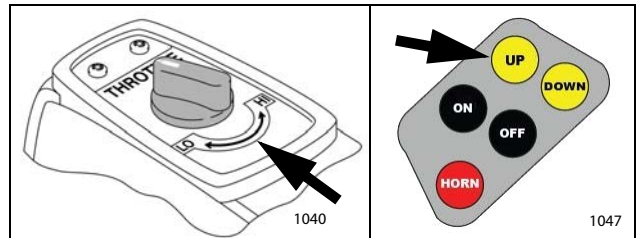
Lock and remove all keys.

4.10 DUMP BODY

- Always stop machine before operating dump body.
- Position a signal person to monitor safety in the surrounding area. Follow their signals when performing dumping operation.
- When leaving cab with dump body raised, use safety bar to prevent dump body from lowering.

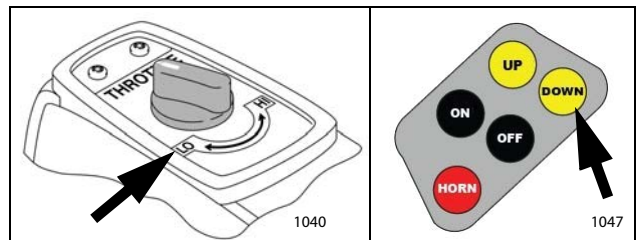
Raise Dump Body

1. Start engine.
2. Set throttle to medium speed.
3. Press and hold dump control UP button on joystick until dump body is at desired height.



Lower Dump Body

1. Place throttle in LO speed.
2. Press DOWN button on joystick to lower dump body.



Dump Body Safety Bar

⚠ WARNING

CRUSH HAZARD. UNCONTROLLED LOWERING OF DUMP BODY CAN CAUSE DEATH OR SERIOUS INJURY. ALWAYS INSTALL SAFETY BARS WHEN GOING UNDER THE DUMP BODY TO PERFORM INSPECTION AND MAINTENANCE.

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

MACHINE DAMAGE. SAFETY BAR ASSEMBLY DAMAGE. WHEN PLACING SAFETY BAR IN POSITION, NEVER START ENGINE AND OPERATE DUMP CONTROL BUTTON TO THE LOWER POSITION. SAFETY BAR ASSEMBLY MAY BREAK UNDER HYDRAULIC PRESSURE.

INSTALL SAFETY BAR

1. Start engine. Press joystick **UP** button and raise dump body fully.
2. Lift safety bars (1) and set it in holders (2) welded to bottom surface of dump body.

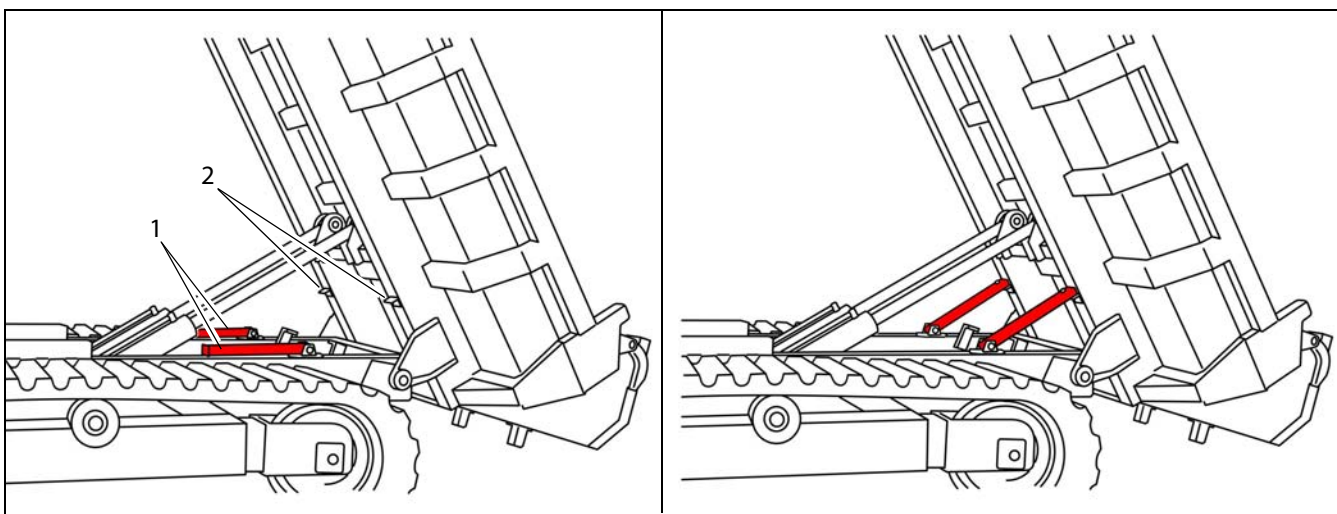


Figure 4-4. Safety Bar Installation

REMOVE SAFETY BAR

1. If dump body has settled on bars, raise dump body fully.
2. Lower safety bars (1) to flat positions on top of frame.

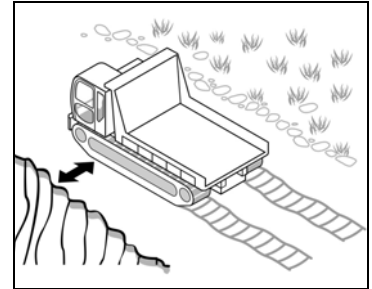
Precautions During Operation

Always follow these precautions when carrying out operations.

Failure to follow these precautions may lead to a serious injury or accident

WORK LOCATIONS

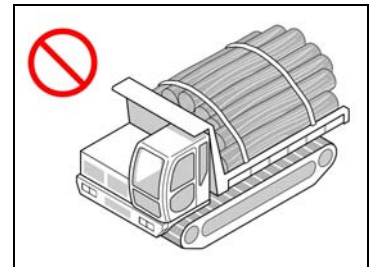
- Select firm, level ground.
- When working on slopes or extremely uneven ground, change in center of gravity when dump is operated may cause machine to tip over.
- Avoid edge of cliffs or ground which may collapse. If work must be done in such places, set up barriers to prevent machine from going near the edge or retaining walls, or position a signal person and take other necessary steps to ensure safety.
- When dumping a load from a high point, always use a signal person and follow their signals.
- Signal person must always check safety of the dumping point.



Keep aware of work area hazards.

LOAD PRECAUTIONS

- Do not overload machine.
- Do not fit side racks or plates, or make other modifications to extend size of dump body to increase load.
- When loading dump body, always spread load uniformly. Loading dump body unevenly will cause instability and may cause machine to tip over.
- Do not let loading bucket or crane hook hit dump body or flaps.
- When loading large rocks, first load dump body with fine soil, then load rocks on top.
- When handling long objects, such as logs or steel beams, load carefully and pay careful attention to center of gravity so load does not collapse or sway excessively during hauling operations. Tie down such loads securely with straps or other appropriate restraints rated for the material being carried.
- If necessary, use blocks and other methods to prevent load tie downs from slipping.
- When loading stacks of U-shaped ditch liners or concrete blocks, lay a steel sheet and secure with rope, and take other appropriate steps to prevent load from moving.



Load and tie down properly.

4.11 RUBBER TRACKS

Material properties used for the rubber tracks provide many advantages, such as low vibration, high drawbar pull, and ease of handling.

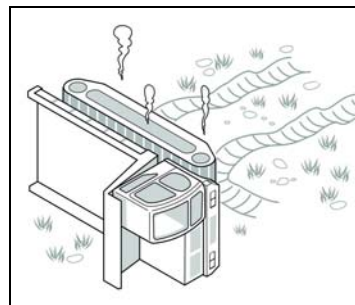
Prohibited Operations

- Turning operations or other operations on hard rocky ground, extremely rough rock, in places with many tree stumps, on steel rods or steel scrap, or places with many sharp objects, or on concrete surfaces will damage tracks.
- On riverbeds or other locations where there are large numbers of rocks of different sizes, rocks will get caught in the tracks and can cause damage or cause it to come off the roller.
- Do not let oil, fuel, or chemical solvent get on the tracks. Do not travel in places where there is oil on the road surface.
- Do not let 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 placing machine in long-term storage (3 months or more), store machine indoors where it is out of direct sunlight and rain. Always turn off master power switch to prevent draining batteries.

Precautions

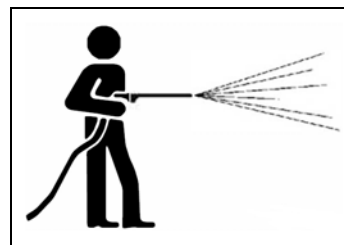
Always follow these precautions when using rubber tracks. Failure to follow these precautions may lead to a serious injury or accident.

- Do not make sharp turns on concrete surfaces.
- Do not let rubber tracks scrape against concrete walls.
- Sudden changes of direction will cause damage and premature wear to the rubber shoes. Avoid sudden turns as much 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.



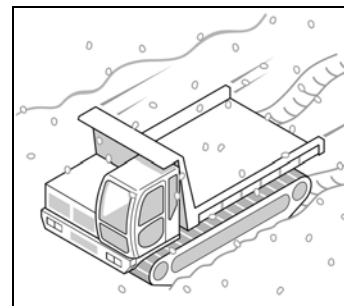
Avoid sudden turns.

- Avoid handling loads that produce oil when crushed (soy beans, corn, vegetables, etc.). If machine is used for handling such products, wash tracks thoroughly after use.
- When handling loads such as salt, ammonium sulphate, potassium chloride, potassium sulphate, or phosphates, wash tracks thoroughly after use.



Wash tracks after carrying oily or caustic materials.

- On snow or frozen road surfaces, rubber tracks slip easily. Be careful of slipping when traveling or operating on slopes.
- Always check tension to prevent rubber track from coming off. If tension is too loose there will be abnormal wear of the steel core and sprocket and track may come off. If the tension is too tight, travel speed will be reduced and there will be premature wear or damage to the undercarriage.



Be aware of slipping on poor road conditions.

4.12 COLD WEATHER OPERATION

If temperatures become low, it becomes difficult to start the engine, coolant may freeze, and hydraulic systems will not operate properly.

⚠ WARNING

RISK OF EXPLOSION. DO NOT USE STARTING FLUIDS WITH THIS ENGINE. THIS ENGINE IS EQUIPPED WITH AN INTAKE AIR HEATER. USE OF STARTING FLUID CAN CAUSE AN EXPLOSION AND RESULT IN SERIOUS INJURY, OR DAMAGE TO PROPERTY AND EQUIPMENT.

Fuel And Lubricants

Refer to Section 6, Specifications and Maintenance for fluid requirements and viscosities.

Coolant

Refer to Section 6, Specifications and Maintenance for coolant requirements.

Batteries

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

After Operation

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.

- Remove all mud and water from machine body. This prevents damage to seals caused by mud or dirt getting inside the seal resulting from water freezing and expanding the seals.
- Park machine on concrete or hard ground. If this is not possible, park machine on wooden boards.
- Open drain valve and drain any water from the fuel filter to prevent it from freezing.
- Battery capacity drops significantly in low temperatures. Cover battery or remove it from the machine, keep it in a warm place, and install it again the next morning. If electrolyte level is low, add distilled water before starting work. Do not add water after daily operation to help prevent fluid in the battery from freezing at night.

After Cold Weather

Refer to Section 6, Specifications and Maintenance for fluid requirements and viscosities.

NOTICE

IF FOR ANY REASON PERMANENT ANTIFREEZE CANNOT BE USED, AND AN ETHYL GLYCOL BASE ANTIFREEZE (WINTER, ONE SEASON TYPE) OR NO ANTIFREEZE IS USED; DRAIN COOLING SYSTEM COMPLETELY, FLUSH COOLING SYSTEM THOROUGHLY, AND FILL WITH FRESH WATER AND COOLANT TO SPECIFIED RATIO.

THIS PAGE BLANK.

SECTION 5. EMERGENCY PROCEDURES

5.1 JUMP STARTING

WARNING

FAILURE TO PROPERLY SERVICE BATTERIES MAY CAUSE PERSONAL INJURY. PREVENT SPARKS NEAR THE BATTERIES. THEY COULD CAUSE VAPORS TO EXPLODE. DO NOT ALLOW THE JUMP START CABLE ENDS TO CONTACT EACH OTHER OR THE MACHINE.

DO NOT SMOKE WHEN CHECKING BATTERY ELECTROLYTE LEVELS. ELECTROLYTE IS AN ACID AND CAN CAUSE PERSONAL INJURY IF IT CONTACTS SKIN OR EYES.

ALWAYS WEAR EYE PROTECTION WHEN STARTING A MACHINE WITH JUMP START CABLES. IMPROPER JUMP START PROCEDURES CAN CAUSE AN EXPLOSION RESULTING IN PERSONAL INJURY.

NOTICE

ALWAYS CONNECT THE BATTERY POSITIVE (+) TO BATTERY POSITIVE (+) AND THE BATTERY NEGATIVE (-) TO BATTERY NEGATIVE (-). JUMP START ONLY WITH AN ENERGY SOURCE WITH THE SAME VOLTAGE AS THE STALLED MACHINE.

TURN OFF ALL LIGHTS AND ACCESSORIES ON THE STALLED MACHINE. OTHERWISE, THEY WILL OPERATE WHEN THE ENERGY SOURCE IS CONNECTED.

NOTICE

TO PREVENT DAMAGE TO ENGINE BEARINGS AND TO ELECTRICAL CIRCUITS WHEN YOU JUMP-START A MACHINE, DO NOT ALLOW STALLED MACHINE TO TOUCH MACHINE BEING USED AS THE ELECTRICAL SOURCE. TURN ON BATTERY DISCONNECT SWITCH BEFORE MAKING THE BOOST CONNECTION TO PREVENT DAMAGE TO ELECTRICAL COMPONENTS ON THE STALLED MACHINE.

USE ONLY EQUAL VOLTAGE FOR STARTING. CHECK BATTERY AND STARTER VOLTAGE RATING OF YOUR MACHINE. USE ONLY THE SAME VOLTAGE FOR JUMP STARTING. USE OF A WELDER OR HIGHER VOLTAGE WILL DAMAGE THE ELECTRICAL SYSTEM.

SEVERELY DISCHARGED MAINTENANCE FREE BATTERIES DO NOT FULLY RECHARGE FROM THE ALTERNATOR AFTER JUMP STARTING. BATTERIES MUST BE CHARGED TO PROPER VOLTAGE WITH A BATTERY CHARGER. MANY BATTERIES THOUGHT TO BE UNUSABLE ARE STILL RECHARGEABLE.

NOTICE

WHEN STARTING A STALLED MACHINE USING JUMP-START CABLES OR AN AUXILIARY POWER SOURCE, DO NOT MAKE THE POSITIVE CONNECTION AT THE ALTERNATOR "B" TERMINAL. DAMAGE TO THE ALTERNATOR CAN OCCUR. ALWAYS CONNECT THE CABLES TO THE APPROPRIATE BATTERY POSTS.

1. Determine reason engine will not crank.
2. Turn start switch on stalled machine to the OFF position. Turn off all accessories.
3. Turn battery disconnect switch on stalled machine to the ON position.
4. Move machine being used as an electrical source near the stalled machine so jump-start cables can reach the stalled machine. **Do not allow machines to contact each other.**

SECTION 5 - EMERGENCY PROCEDURES

5. Stop engine of machine being used as an electrical source. If you are using an auxiliary power source, turn off the charging system.
6. Ensure battery caps on both machines are tight and correctly placed. Ensure batteries in the stalled machine are not frozen. Make sure batteries have enough electrolyte.

NOTICE

DO NOT CONNECT THE JUMP-START CABLE TO THE BATTERY POST. DO NOT ALLOW THE JUMP-START CABLES TO CONTACT THE BATTERY CABLES, THE FUEL LINES, THE HYDRAULIC LINES, OR ANY MOVING PARTS.

7. Positive ends of the jump-start cable are red. Connect clips at ends of jumper cable A to positive (+) terminal of stalled machine (1) and power source (2).
8. Connect one clip of booster cable B to the negative (-) terminal of the power source (3).
9. Connect other clip of booster cable B to engine block of the stalled machine.

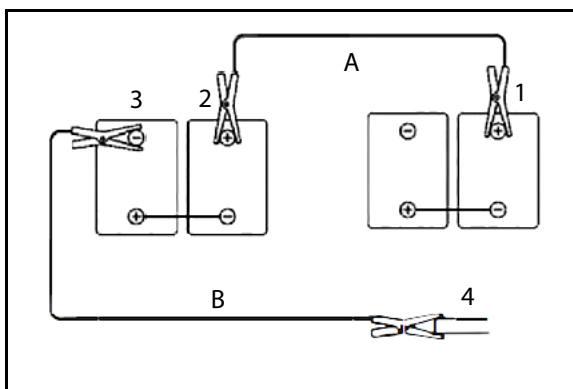


Figure 5-1. Battery Jumper Cable Connections

10. Start engine of machine being used as an electrical source or energize charging system on the auxiliary power source.
11. Wait at least 2 minutes before you attempt to start the stalled machine. Waiting allows batteries in the stalled machine to partially charge.
12. Attempt to start stalled engine.
13. Immediately after you start the stalled engine, disconnect jump-start cables in reverse order.

5.2 TOWING

NOTICE

DRIVE SYSTEM DAMAGE. TORQUE HUB DRIVES MUST BE DISCONNECTED IF CARRIER IS TOWED. ONLY TOW FOR SHORTEST DISTANCE POSSIBLE.

The parking brake is built into left and right travel motors and releases using hydraulic power generated when the engine is running. The parking brake is applied even if engine is stopped and there is no hydraulic power. If any failure prevents the parking brake from disengaging or the engine cannot be started, disconnect drive hub to allow hub to freewheel.

1. Make sure engine is off and key removed from machine to prevent accidental start.
2. Chock tracks at each end of undercarriage to prevent machine from rolling.
3. Wear appropriate Personal Protective Equipment.

Remove Torque Hub Sun Gear

NOTICE

CONTAMINATION DAMAGE. DIRT AND OTHER CONTAMINATION ENTERING THE TORQUE HUB CAN CAUSE DAMAGE AND EQUIPMENT FAILURE. CLEAN TORQUE HUB BEFORE REMOVING COVER. ALWAYS REINSTALL COVER BEFORE MOVING CARRIER.

NOTE: This procedure should only be performed by a qualified mechanic using proper tools.

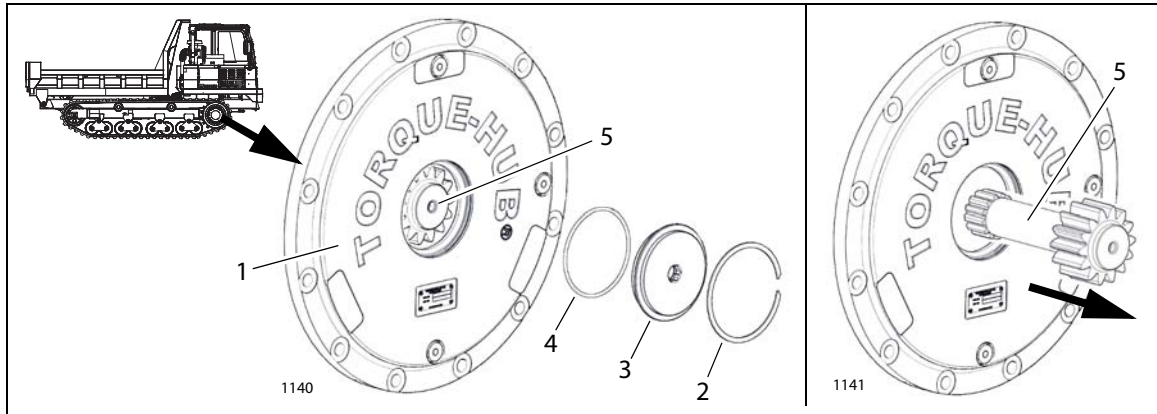


Figure 5-2. Torque Hub Sun Gear Removal

4. Clean torque hub (1). Place container beneath torque hub to catch oil when cap is removed.

NOTE: Prevent environmental damage. Catch oil in an appropriate container and dispose of following all applicable regulations.

5. Remove snap ring (2).
6. Unscrew and remove cover cap (3). Do not damage O-ring (4).
7. Allow oil to drain into container.
8. Remove sun gear (5).
9. Re-install O-ring (4) and cover cap (3).
10. Repeat on opposite side.

Tow Carrier

⚠ WARNING

UNCONTROLLED MACHINE. SEPARATED TOW CHAIN CAN RESULT IN UNCONTROLLED MACHINE AND CAUSE DEATH, SERIOUS INJURY, OR DAMAGE TO PROPERTY AND EQUIPMENT. USE ONLY CHAINS RATED FOR PULLING A MACHINE OF THIS SIZE AND WEIGHT.

1. Attach chains to two hooks at front or rear of machine.
2. Remove chocks before towing. Carefully pull machine to safety.
3. Position machine in a flat, safe area. Chock tracks at each end of undercarriage to prevent machine from rolling.
4. Remove tow chains.

Reinstall Sun Gear

NOTICE

CONTAMINATION DAMAGE. DIRT AND OTHER CONTAMINATION ENTERING THE TORQUE HUB CAN CAUSE DAMAGE AND EQUIPMENT FAILURE. CLEAN TORQUE HUB BEFORE REMOVING COVER. ALWAYS REINSTALL COVER BEFORE MOVING CARRIER.

NOTE: This procedure should only be performed by a qualified mechanic using proper tools.

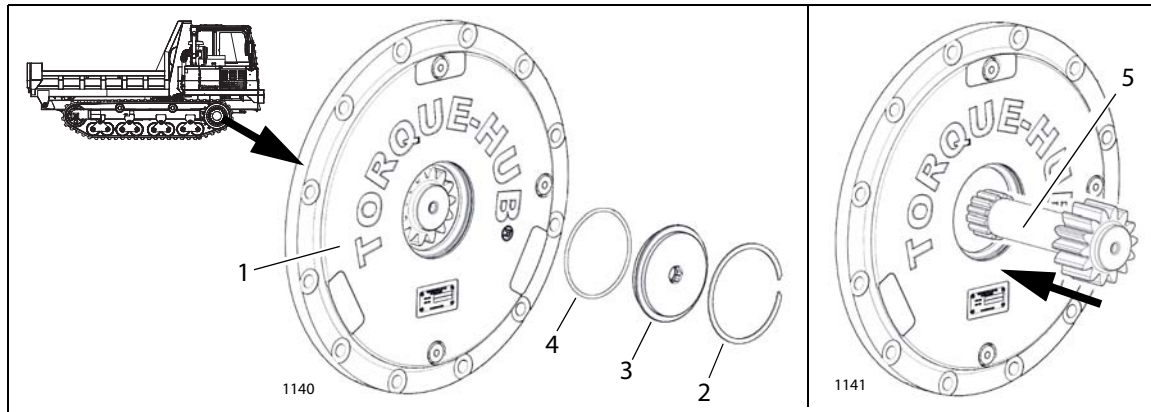


Figure 5-3. Torque Hub Sun Gear Installation

1. Clean torque hub (1). Place container beneath torque hub to catch oil when cap is removed.

NOTE: Prevent environmental damage. Catch oil in an appropriate container and dispose of following all applicable regulations.

2. Remove snap ring (2).
3. Unscrew and remove cover cap (3). Do not damage O-ring (4).
4. Allow oil to drain into container.
5. Install sun gear (5).
6. Re-install O-ring (4) and cover cap (3).
7. Refill hub with oil to correct level. (See Section 6, Specifications and Maintenance)
8. Repeat on opposite side.

SECTION 6. SPECIFICATIONS AND OPERATOR MAINTENANCE

6.1 INTRODUCTION

This section of the manual provides information to the operator for proper operation and maintenance of this machine.

6.2 OPERATING SPECIFICATIONS

Table 6-1. Operating Specifications

Gross Machine Weight	31,820 lb (14,434 kg)
Maximum Payload	33,100 lb (14,975 kg)
Maximum Travel Grade (Gradeability)	30°
Maximum Travel Grade (Side Slope)	22°
Ground Clearance	15 in (381 mm)
Max Dump Angle	61°
Maximum Drive Speed	
Unloaded	8.5mph (13.7 kph)
Loaded	5.4 mph (8.7 kph)
Electrical System Voltage	24 volts
Ground Bearing Pressure	
- Unloaded	3.6 psi (0.25 kg/cm ²)
- Loaded	7.1 psi (0.5 kg/cm ²)

Capacities

Table 6-2. Capacities

Fuel Tank	67 gal (253.6 L)
Hydraulic Tank	45gal (170.3L)
Diesel Exhaust Fluid (DEF) Tank	5 gal (18.9 L)
Drive Hub	9 qt (8.5 L)
Engine Crankcase	24qt (22.7 L) w/Filter
Coolant System	54.2 qt (51.3 L)

Engine Data

Table 6-3. Cummins QSL9 Tier 4 Final Specifications

Type	Liquid Cooled
Fuel	Ultra-Low Sulfur Diesel
Idle rpm	1000
Low rpm	1800
High rpm	2600
Alternator	24V, 85 Amp, belt drive
Battery (2)	1000 Cold Cranking Amps, 210 minutes Reserve Capacity, 12 VDC
Horsepower	325 Hp
Drive System	Automatic Hydrostatic (HST)

6.3 DIMENSIONAL DATA

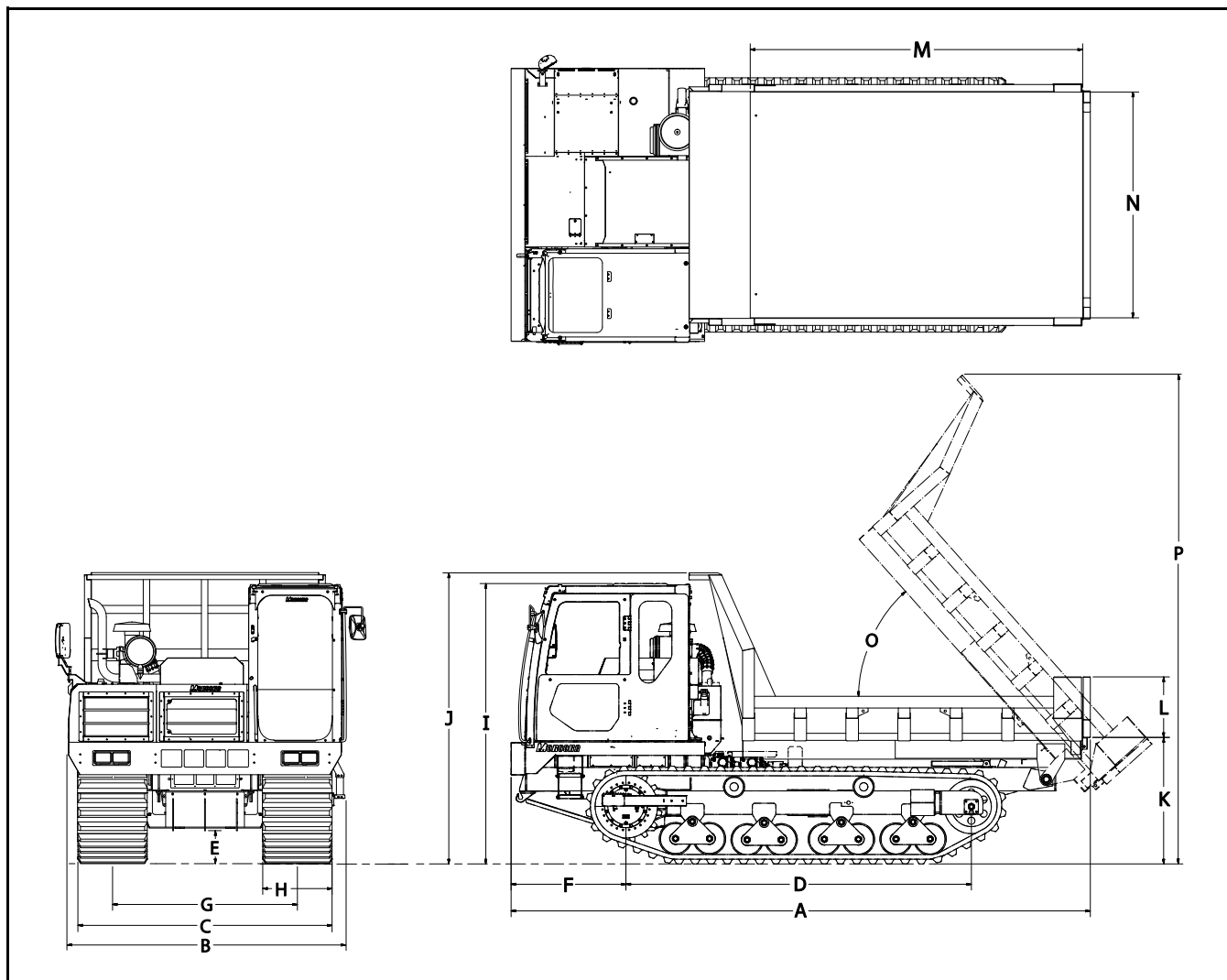


Table 6-4. Dimensional Data

A	Overall Length	245-5/8 in (6,239 mm)	I	Overall Height (Top of Cab)	119-3/8 in (3,031 mm)
B	Overall Width	125 in (3,175 mm)	J	Overall Height (Top of Dump Body)	124-3/8 in (3,159 mm)
C	Width (Outside of Track)	114 in (2,896 mm)	K	Ground Clearance to Bottom of Dump Body	56-1/2 in (1,382 mm)
D	Center of Idler to Center of Sprocket	146-3/8 in (3,718 mm)	L	Dump Body Height	25-3/4 in (654 mm)
E	Minimum Ground Clearance	14-3/8 in (366 mm)	M	Dump Body Length	145-3/8 in (3,694 mm)
F	Front of Machine to Center of Sprocket	51-5/8 in (1,311 mm)	N	Dump Body Width	98 in (2,489 mm)
G	Track Gauge	82-1/2 in (2,096 mm)	O	Maximum Dump Angle	61°
H	Track Width	31-1/2 in (800 mm)	P	Maximum Height Bed Raised	214 in (5,435.6 mm)

6.4 MAINTENANCE SCHEDULE

INITIAL 100 HOURS SERVICE
*Only after the first 100 hours for new machines
[1] Change engine lubricating oil, replace engine oil filter
[2] Replace hydraulic line filter
[3] Change oil in hydraulic tank
INITIAL 500 HOURS SERVICE
*Only after the first 500 hours for new machine
[1] Change oil inside travel motor reduction gear case
WHEN REQUIRED
*If necessary, perform these checks daily
[1] Check, adjust rubber track tension
[2] Check rubber track for damage and wear
[3] Clean and repair air cleaner
[4] Clean inside of cooling system (change coolant)
[5] Check, clean radiator fins, oil cooler fins, and 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 air filter of air conditioner
CHECK BEFORE STARTING
*Always perform the following checks before starting engine
[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 dust indicator
[6] Check, adjust fan belt tension
[7] Check, adjust air compressor belt tension
[8] Check electrical wiring
[9] Check operation of switches, lamps, and display
[10] Check operation of horn and alarm buzzer
EVERY 50 HOURS SERVICE
[1] Drain water, sediment from fuel tank
[2] Drain water, sediment from water separator
EVERY 100 HOURS SERVICE
[1] Check battery electrolyte level, add distilled water
EVERY 250 HOURS SERVICE
[1] Change engine lubricating oil, replace engine oil filter
[2] Replace water separator element
[3] Replace fuel filter
[4] Grease all parts of dump cylinder
[5] Grease dump body rear side flap opening rod
[6] Grease dump body hinge pin
[7] Grease dump body rear side flap opening lever
[8] Grease track roller pivot shaft
[9] Grease rear idler shaft

6.5 BASIC MAINTENANCE

NOTE: Refer to Engine Manufacturer Operation and Service manuals for service procedures not covered in this manual.

Oil

- Oil is used under extremely heavy-duty conditions (high temperature, high pressure) in the engine, hydraulic pump, motor, and work equipment. It becomes contaminated and deteriorates over time depending on conditions.
- Always use the grade and type of oil which matches the ambient temperature listed in this operation manual. Even if oil is not dirty, always change it at specified intervals.
- When adding oil, do not mix oils of different grades or brands.
- Always add oil to the specified oil level. Too much or too little oil can cause engine or equipment failure.
- When changing oil, always replace the oil filter at the same time.
- Be careful when handling oil to prevent water, dirty, or other impurities from getting into the oil.
- A large number of problems with the machine are caused by contaminated oil. Do not let impurities get into the oil. Always store oil indoors and carry out oil-filling operations in a dust-free environment.

NOTICE

IF OIL IS A MILKY WHITE, THERE IS WATER OR AIR IN THE CIRCUIT. CONTACT YOUR MOROOKA DEALER FOR ASSISTANCE.

Fuel

- This machine is equipped with an exhaust after-treatment system. Only use ultra low sulfur diesel as fuel.
- 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 completion of each day's work.
- If machine runs out of fuel, or when fuel filter has been replaced, it is necessary to bleed the circuit. Refer to the Caterpillar C7.1 Engine Operation and Maintenance Manual when carrying out this operation.

Coolant

- Do not use river water, well water, or water from simple water lines 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 lead to overheating.
- If engine overheats, allow engine to cool down, then add coolant.
- When using antifreeze, always follow the precautions given in the operation manual.

Grease

- Grease is used at connecting points of the dump body or travel lever linkage to prevent gouging or noise.
- Grease nipples not listed in this manual are 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. Wipe off all the old grease. Be particularly careful to wipe off grease at points where mud and dirt may stick and cause wear of rotating parts.

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 filters before 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.

Electrical Components

- It is extremely dangerous if electrical components become wet or the film covering them is broken. This may cause electrical shorts and machine malfunctions. Do not get water on electrical components when washing machine.
- Never remove any electrical components from the machine or disassemble them.
- Always contact your Morooka dealer before installing additional electrical equipment to your machine.
- After machine has been used near the sea or for spreading fertilizer, wipe electrical components carefully with a dry cloth to prevent corrosion.

Hydraulic System

- 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:
 - a. Stop machine on level ground. Lower dump body so that there is no pressure in the hydraulic cylinder circuit.
 - b. Stop engine.
 - c. Loosen hydraulic tank cap slowly, then remove it.
- Always wait for the temperature to go down before starting maintenance. Even when the temperature goes down, circuits are still under internal pressure. When removing plugs or hoses, do not stand directly in front of them and loosen connections slowly before removing.
- If high-pressure hoses, connections, or hydraulic equipment have been removed, always replace O-ring.
- When replacing or cleaning the hydraulic line filter or strainer, or when replacing or repairing hydraulic equipment or hoses, always bleed air from the circuit after completion of the operation.

6.6 MAINTENANCE AND LUBRICATION
NOTICE

LUBRICATION INTERVALS ARE BASED ON MACHINE OPERATION UNDER NORMAL CONDITIONS. FOR MACHINES USED IN MULTI-SHIFT OPERATIONS AND/OR EXPOSED TO HOSTILE ENVIRONMENTS OR CONDITIONS, INCREASE LUBRICATION FREQUENCIES ACCORDINGLY.

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	
Engine Crankcase With Oil Filter	Low Ash Engine Oil CJ-4 Only									24 qt 22.7 L
Hydraulic Oil Tank	Hydraulic Oil									45 gal 170.3 L
Sprocket Drive Torque Hub (ea.)	Gear Oil									9 qt 8.5 L
Fuel Tank	Ultra-Low Sulfur Diesel Fuel Only									67 gal 253.6 L
Cooling System	50% Water/ Glycol Mix									54.2 qt 51.3 L

1184B

Figure 6-1. Lubrication Specification Table

Air Filter

1. Check Restriction Indicator. Clean air cleaner assembly If indicator is red.

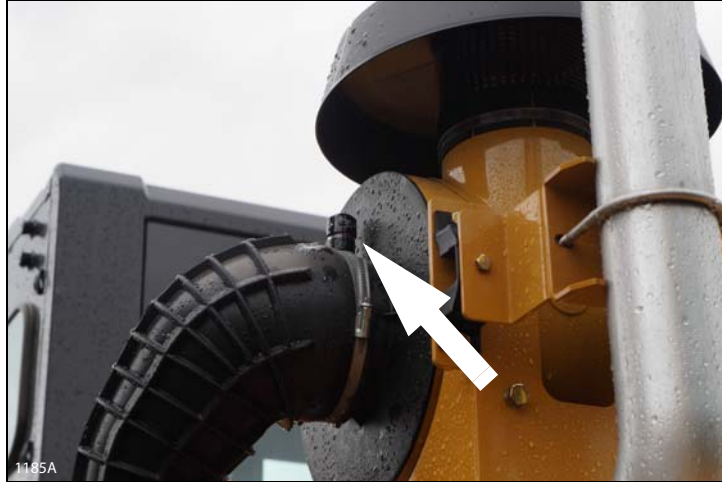


Figure 6-2. Air Filter Restriction Indicator

⚠ CAUTION

EYE INJURY. 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.

CLEAN AIR FILTER ASSEMBLY

1. Purge dust ejection valve (4) of dust by squeezing the valve until it opens. This may have to be performed multiple times depending on the severity of dust or debris found in the valve. If debris is not able to be purged from the valve, remove the valve and clean out by hand. See the Remove section of this procedure.
2. Remove wing nut (1) and pull outside element (2) from air cleaner housing (3).

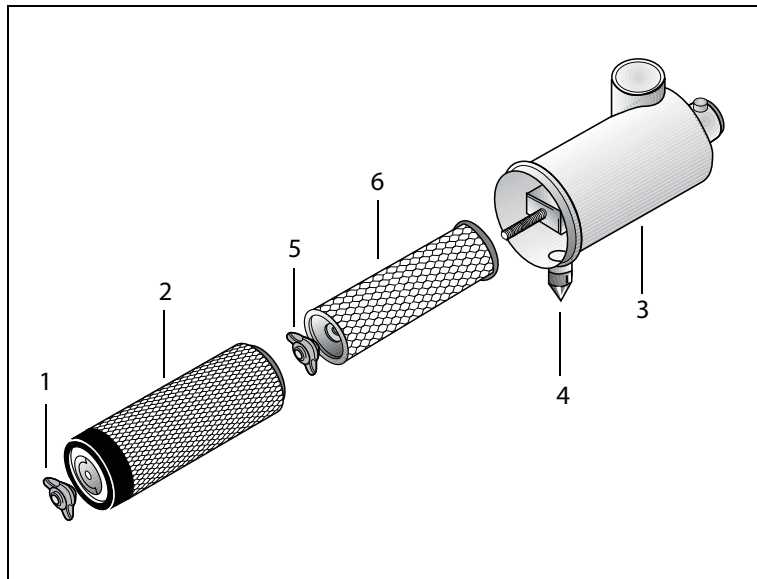


Figure 6-3. Air Cleaner Assembly

NOTICE

DO NOT HIT IT OR KNOCK OUTER ELEMENT AGAINST OTHER OBJECTS WHEN CLEANING.

DO NOT USE OUTER ELEMENT IF FOLDS OR SEAL ARE DAMAGED.

REPLACE OUTER ELEMENT WITH A NEW PART IF IT HAS BEEN CLEANED THREE OR FOUR TIMES, OR IF IT HAS BEEN USED FOR ONE YEAR.

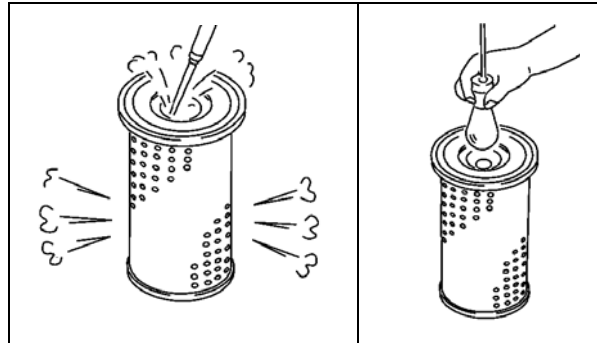
WHEN REPLACING THE OUTER ELEMENT, REPLACE INNER ELEMENT AT THE SAME TIME.

AFTER CLEANING OUTER ELEMENT, IF ENGINE EXHAUST GAS COLOR IS BLACK OR THERE IS LACK OF POWER, REPLACE OUTER ELEMENT.

WHEN REPLACING OUTER ELEMENT, REPLACE INNER ELEMENT AT THE SAME TIME.

NEVER CLEAN AND REUSE INNER ELEMENT. ALWAYS REPLACE WITH A NEW ELEMENT.

3. Blow with maximum 40 psi (0.27MPa) dry compressed air along folds from inside of element.
4. Blow along folds from outside of element, then blow from inside of element again.
5. After cleaning, shine a light from inside the element to check for small holes or thin places in the element. Replace if any defects are found.
6. Clean inside of valve (4) and housing (3).
7. Reinstall outer element in housing. Secure with wing nut.



REPLACE INNER ELEMENT

1. Remove outer element following instructions for Clean Air Filter Assembly.
2. Remove wing nut (5) and inner element (6).
3. Cover air connector end (air outlet) with a clean cloth or cloth tape.
4. Clean inside of body, then remove the cover fitted in Step 3.
5. Install new inner element in body.
6. Install outer element and cover following instructions for Clean Air Filter Assembly.

Coolant

⚠ CAUTION

PRESSURIZED SYSTEM. HOT COOLANT CAN CAUSE SERIOUS BURNS. TO OPEN THE COOLING SYSTEM FILLER CAP, STOP ENGINE AND WAIT UNTIL COOLING SYSTEM COMPONENTS ARE COOL. LOOSEN COOLING SYSTEM PRESSURE CAP SLOWLY TO RELIEVE PRESSURE.



Figure 6-4. Radiator Fill

NOTICE

THE CUMMINS QSL9 T4F ENGINE MUST BE OPERATED WITH A 1:1 MIXTURE OF WATER AND GLYCOL. THIS CONCENTRATION ALLOWS THE NOX REDUCTION SYSTEM TO OPERATE CORRECTLY AT HIGH AMBIENT TEMPERATURES.

Check coolant level when engine is stopped and cool. Only service or repair the engine cooling system with engine on level ground. This provides an accurate check of coolant level and helps prevent introducing an air lock into the coolant system.

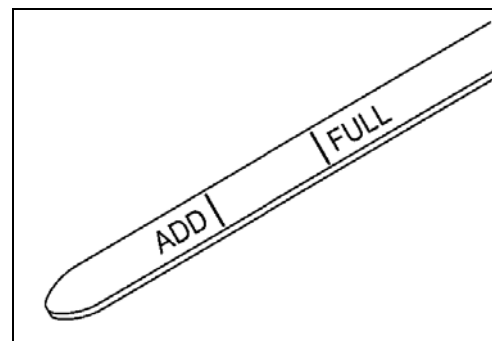
1. Clean cooling system filler cap and check condition of filler cap gaskets. Replace cooling system filler cap if filler cap gaskets are damaged. Reinstall cooling system filler cap.
2. Inspect cooling system for leaks.

Engine Oil and Oil Filter



Figure 6-5. Oil Dipstick and Fill Location

1. Raise dump body and install safety bars.
2. Pull out dipstick (1) and wipe oil off with a cloth.
3. Insert dipstick (1) fully into the gauge guide, and pull out again.
4. Oil level should be between FULL and ADD lines on the dipstick (1). If the oil level is below ADD line, Remove fill cap (2) and add engine oil. DO NOT overfill.
5. Recheck oil level and replace cap.



CHANGE ENGINE OIL AND FILTER

The oil filter is located on the left side of the engine.

1. Remove bolts and engine cover plate under chassis.
2. Connect a drain hose to oil pan drain valve.
3. Place a container under drain valve and hose to catch oil.
4. Turn drain valve left (counter-clockwise) and drain oil. Check drained oil. If there are large amounts of metal particles or dirt in the oil, contact your distributor.
5. After completely draining oil, turn drain valve right (clockwise) to close the drain valve.
6. Disconnect drain hose from oil pan drain valve.
7. Using a filter wrench, turn oil filter cartridge (5) to the left (Counter-clockwise) and remove it. clean up any spilled oil.
8. Clean oil filter mount and lightly coat gasket of new oil filter cartridge with clean engine oil.
9. Fill filter with new engine oil. Install new filter on mount by hand until tight, then turn an additional 1/4 turn.

NOTE: When installing a new filter cartridge, always tighten it by hand. Do not over tighten.

10. Remove filler cap and add specified amount of engine oil following specifications in this section. Check level with dipstick.

NOTICE

ENGINE DAMAGE. OVERFILLING ENGINE WITH OIL WILL DAMAGE ENGINE. IF ENGINE IS OVERFILLED, DRAIN EXCESS OIL UNTIL PROPER LEVEL DISPLAYS ON DIPSTICK.

11. Start engine and run at idle for several minutes. Check filter and engine for oil leaks.
12. Shut down engine and oil level. Add oil as needed.
13. When oil level is in normal range, close oil filler cap securely.
14. Reinstall engine cover plate and secure with bolts.

DEF Tank

In North America, commercial DEF that is API approved and meets all the requirements defined in ISO 22241-1 may be used in Cat engines equipped with SCR systems

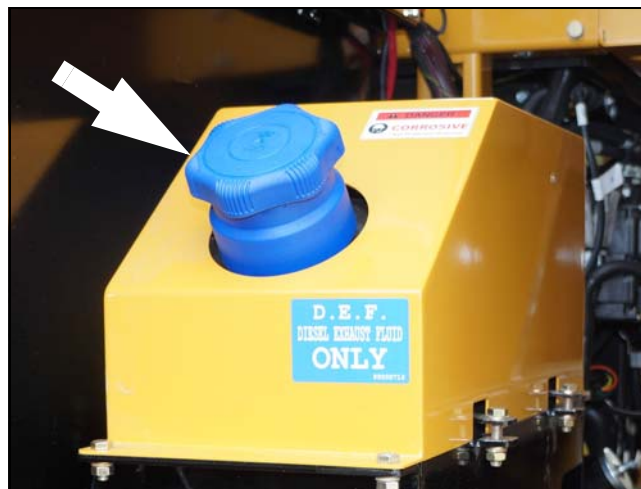


Figure 6-6. DEF Tank Fill

1. Ensure DEF cap and surrounding area is clean and free from dirt.
2. Remove DEF cap from tank.
3. Fill the tank with required amount of DEF. Ensure dirt is not introduced into the tank during filling. Do not over fill the tank. The DEF may require room for expansion.

NOTE: Opening on the DEF tank is a special diameter. Ensure the correct nozzle is used when filling the DEF tank.

4. Install DEF cap.

Fuel Tank

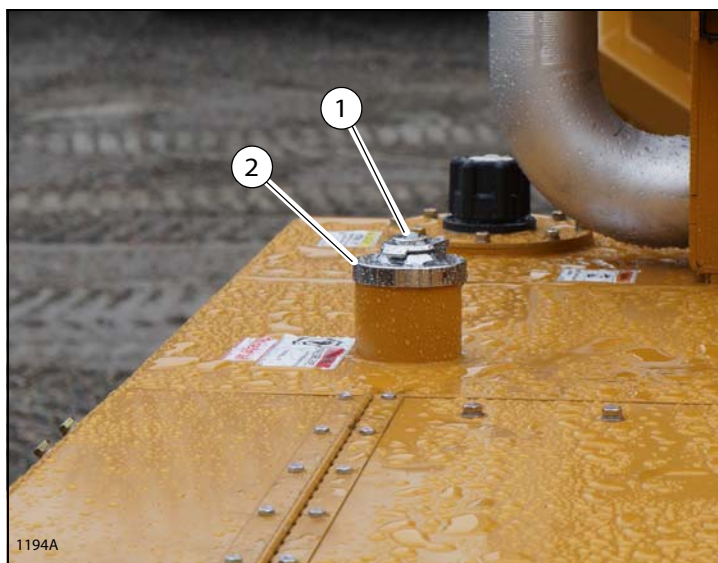


Figure 6-7. Fuel Tank

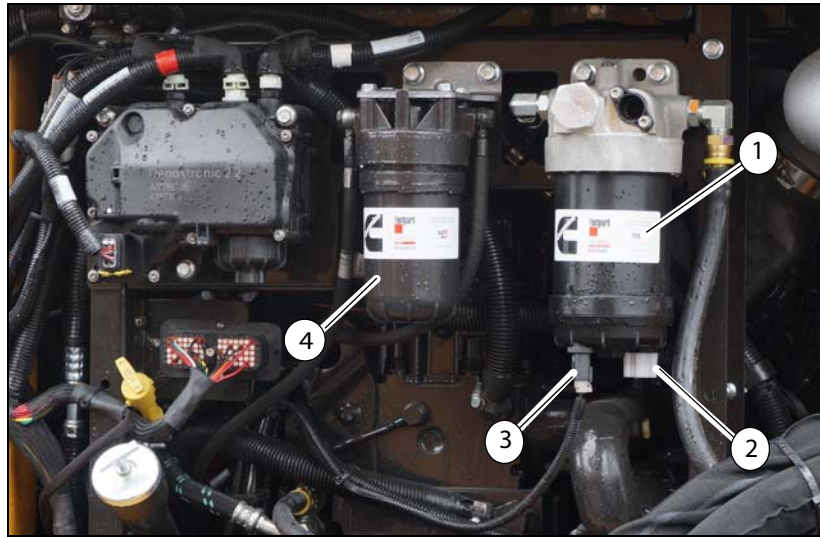
NOTICE

TIER 4 FINAL ENGINES REQUIRE USE OF ULTRA LOW SULFUR FUEL ONLY.

5. Release lock (1) on cap (2) with a key. Remove cap (2) from fuel tank and add fuel through the fuel filler.
6. Check breather hole on inside of cap. Clean if clogged.
7. After adding fuel, tighten cap (2) securely. Lock with a key.

NOTE: Always fill fuel and DEF tank after operation.

FUEL WATER SEPARATOR

**Figure 6-8. Fuel Filters**

Drain fuel-water separator (1) into a container and dispose of following local environmental regulations. Drain water and sediment daily.

1. Raise dump bed and install safety bars. Shut off engine.
2. Use your hand to open fuel water separator (1) drain valve (2). Turn valve counterclockwise approximately 3-1/2 turns until the valve drops down 1 in, (25.4 mm) and draining occurs.
3. Drain filter until only clear fuel is visible.

NOTICE

DO NOT OVERTIGHTEN VALVE OR DAMAGE TO THREADS MAY OCCUR.

4. Lift valve and turn clockwise until hand-tight.

REPLACE FILTERS

NOTE: It is recommended as a good practice to replace all filters at the same time. Filters must be 5 micron type.

1. Raise dump bed and install safety bars. Shut off engine.
2. Use your hand to open fuel water separator drain valve (3). Turn valve counterclockwise approximately 3-1/2 turns until the valve drops down 1 in (25.4 mm) and draining occurs.
3. Disconnect level sensor (3). Unscrew and remove primary filter (1).
4. Install new filter (1). Reconnect level sensor (3). Make sure valve (2) is closed.
5. Unscrew and remove secondary fuel filter (4).
6. Install new filter (4).

NOTE: Engine may have to be primed if it has been allowed to run out of fuel, or servicing and repairs have been made to the fuel system. Refer to engine manual for priming procedures.

7. Start engine and check fuel filters and system for leaks.

Hydraulic Oil and Filters

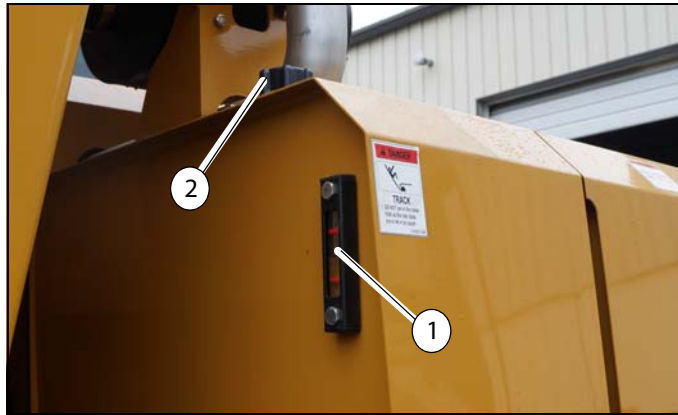


Figure 6-9. Hydraulic Tank And Level Indicator

1. Raise dump body.
2. Lower dump body.

NOTE: Check hydraulic tank oil level with dump body being lowered.

3. Use level gauge (1) on rear of hydraulic tank to check oil level and contamination. Oil level should be between top and bottom red lines on gauge.
4. If oil level is low, slowly remove filler cap (2) and allow pressure to release. Add hydraulic oil until proper level is indicated on sight gauge.
5. Check breather hole inside cap and clean if clogged. Reinstall filler cap.

HYDRAULIC FILTERS

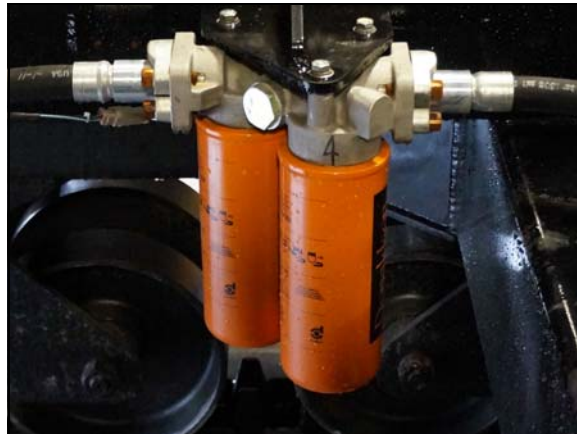


Figure 6-10. Hydraulic Filters

1. Raise dump bed and install safety bars. Shut off engine.
2. Slowly remove hydraulic tank filler cap and allow pressure to release.
3. Place appropriate container below filters. Unscrew and remove filters.
4. Lightly lubricate new filter gaskets with clean hydraulic fluid and install on filter mounts.
5. Tighten hand tight and an additional 1/4 turn.
6. Add hydraulic fluid and check level following procedures above.

Sprocket Drive Torque Hub

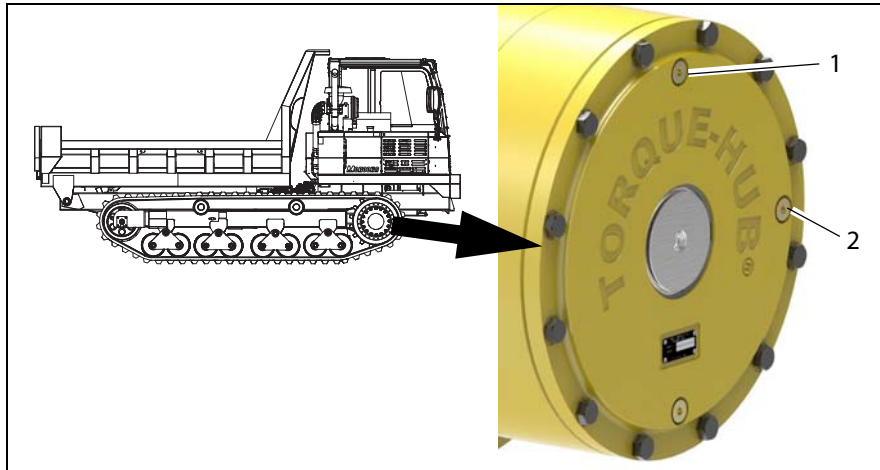


Figure 6-11. Sprocket Drive Hub Lubrication

1. Move machine until fill port (1) is at 12 O'clock position and check port (2) at 3 O'clock position. Remove both plugs.
2. Pour lubricant into fill port until it just starts to flow out of check port.
3. Reinstall plugs.

Washer Fluid

The washer fluid tank is located on the left side of the carrier behind the cab.

MIXING RATIO FOR WASHER FLUID

Change washer fluid mixture ratio according to the ambient temperature.

Mix concentrated window washer fluid with tap water following proportions in the table below, then fill the washer tank.

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



Figure 6-12. Washer Fluid Tank

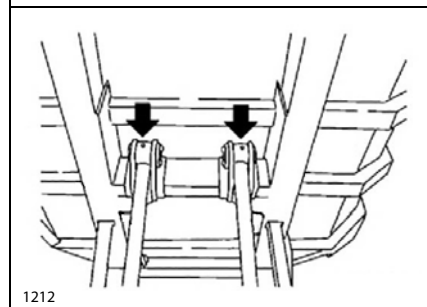
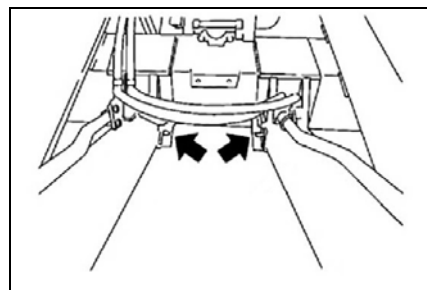
Location or Season	Mixing Proportion		Temperature
	Concentrated Fluid	Tap Water	
Normal	1/3	2/3	14°F (-10°C)
Winter in Cold Area	1/2	1/2	-4°F (-20°C)
Winter in Extremely Cold Area	Use Undiluted Fluid	None	-22°F (-30°C)

Grease Points

1. Clean grease nipples.
2. Apply grease with grease gun until old grease is extruded.
3. Wipe off extruded old grease.

LIFT CYLINDERS

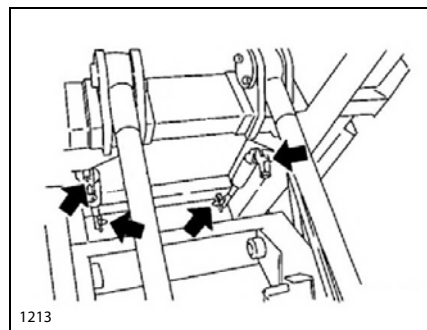
1. Raise dump body and secure with safety bars.
2. Grease lower pivot points on left and right lift cylinders.
3. Grease upper pivot points on left and right lift cylinders.



1212

DUMP BODY GATE RELEASE LEVERS

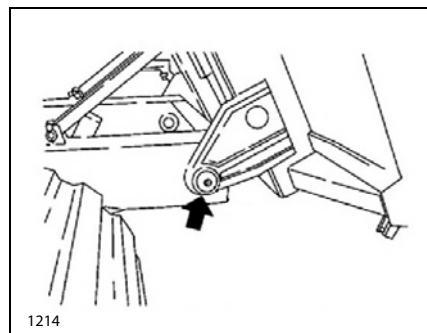
Grease upper and lower pivot points on left and right release levers.



1213

DUMP BODY PIVOT PIN

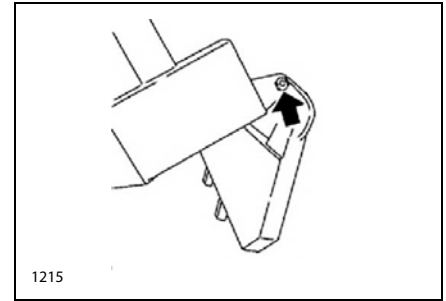
Grease pin on outside of dump body pivot on both sides of carrier.



1214

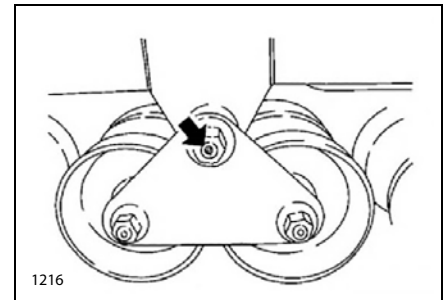
DUMP BODY GATE PIVOT PIN

Grease pin on outside of dump body gate pivot on both sides of carrier.



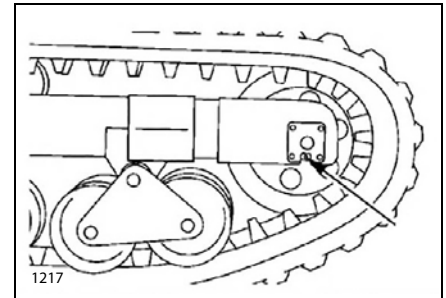
LOWER TRACK ROLLER PIVOT SHAFT

Grease lower track roller pivot shaft at four places on each side of carrier.



IDLER WHEEL SHAFT

Grease idler wheel shaft on both sides of carrier.



6.7 ROLLOVER PROTECTIVE STRUCTURE (ROPS)

The ROPS main purpose is to provide operator protection in the event of a machine rollover. The ROPS also absorbs energy during a rollover similar to energy absorbed by an automobile crumple zone.

⚠ WARNING

OPERATOR PROTECTION. THE ROPS STRUCTURE ON YOUR MACHINE IS SPECIFICALLY DESIGNED, TESTED AND CERTIFIED FOR THAT MACHINE. ANY ALTERATION OR MODIFICATION TO THE ROPS STRUCTURE COULD WEAKEN THE STRUCTURE. THIS PLACES THE OPERATOR INTO AN UNPROTECTED ENVIRONMENT.

- Modifications or attachments that cause the machine to exceed weight stamped on the certification plate also places the operator into an unprotected environment. Excessive weight may inhibit brake performance, steering performance, and the ROPS.
- Protection offered by the ROPS Structure will be impaired if the ROPS Structure has structural damage. Damage to the structure can be caused by an overturn, falling object, collision, etc.
- Do not mount items (fire extinguishers, first aid kits, work lights, etc.) by welding brackets or by drilling holes on the ROPS Structure. Welding brackets or drilling holes in the ROPS Structure can weaken the structure. Consult your Morooka dealer for mounting guidelines.

6.8 TRACKS

Cleaning

1. Wash rubber tracks daily to increase life, especially after operating in harsh environments such as mud or snow. When material builds up inside the track rails, more pressure is placed on track and chassis components.
2. Inspect upper drive rollers and lower drive roller assemblies during the work day, not just at the end. Clean with a high-pressure water sprayer.
3. During winter months, remove snow and ice from chassis at the end of each work day to prevent freezing of components.
4. Pay special attention to drive hubs and sprocket assemblies when cleaning the undercarriage. Those components are extremely vulnerable to wear. Lugs on tracks fit into the drive hubs. If drive hubs get asphalt in them, it acts like sandpaper. Over a period of time, the track rubs across accumulated asphalt and wears the lug completely off the track. If a water sprayer does not remove all dirt and debris lodged in the drive hubs, use a pry bar or other tool to push out the material.

Inspecting

⚠ WARNING

LOSS OF CONTROL. DAMAGED RUBBER TRACK MAY BREAK SUDDENLY WITHOUT WARNING DURING OPERATIONS AND CAUSE DEATH, SERIOUS INJURY, OR DAMAGE TO PROPERTY AND EQUIPMENT. IF THERE ARE LARGE CRACKS OR DAMAGE TO THE RUBBER TRACK, REPLACE TRACK IMMEDIATELY.

NOTICE

USING RUBBER TRACKS EXCEEDING WEAR LIMITS WILL CAUSE SLIPPING AND REDUCE DRAWBAR PULL. REPLACE WITH A NEW RUBBER TRACK IF WEAR LIMITS ARE EXCEEDED.

NOTE: Remove all mud and snow from rubber tracks before inspecting.

1. Check track lugs and exposed track to make sure there are no exposed wires. If there are cracks or deep cuts and wire in the core of the rubber track can be seen, replace the track. Damaged tracks cannot be repaired and must be replaced to prevent wear to other undercarriage components.
2. Measure track lug height (A) is within 1-3/4 in to 1-1/4 in (45 to 30 mm). Replace rubber track if lug height is less than 1-1/4 in (30 mm).

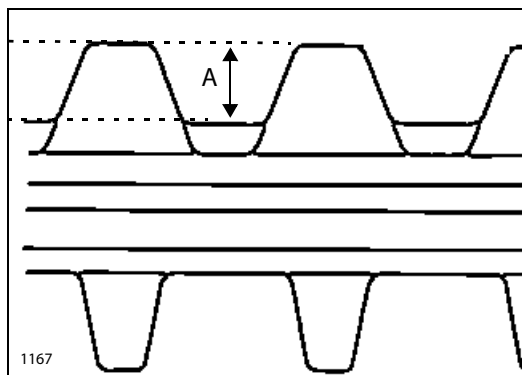


Figure 6-13. Lug Wear Measurement

3. Monitor track tension during actual working conditions and adjust as needed. When rubber tracks are too tight, it can cause the tracks to stretch or break in addition to excessive roller and idler wear. A rubber track that is too loose can de-track, leading to a damaged track and significant downtime.
4. Inspect chassis for excessive or uneven wear, and damaged or missing components.

Track Tension

Track tension is created by pumping grease into the track tension assembly through a grease fitting located behind the tension device cover plate. Grease displaces a cylinder which pushes the tension wheel/idler out from the track frame to tighten the track. Relieve from the tension device to reduce track tension.

1. Drive machine a short distance forward and backward. Stop engine.
2. Measure distance A from rear end of track frame to center of idler. Check within 16-3/4 in $\pm$ 3/4in (425 $\pm$ 20 mm).

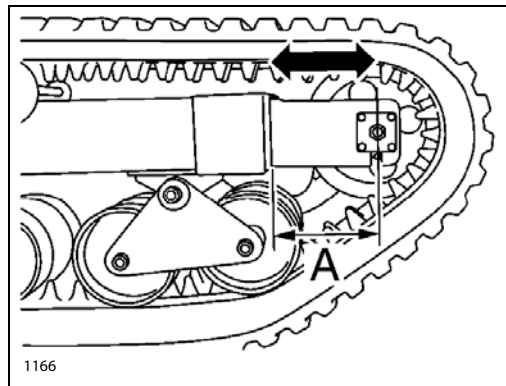


Figure 6-14. Track Tension Measurement

3. Adjust rubber track tension if dimension A is greater than the specified range.

⚠ CAUTION

IMPACT INJURY. TRACK TENSION ADJUSTER GREASE VALVE IS UNDER PRESSURE AND MAY FLY OUT AND CAUSE SERIOUS INJURY. NEVER LOOSEN VALVE MORE THAN ONE TURN. DO NOT STAND DIRECTLY IN FRONT OF THE VALVE WHEN ADJUSTING.

INCREASE TENSION

1. Remove two bolts (1), and grease valve cover (2).
2. Using a grease gun, pump grease into valve (3) until dimension A is within 16-3/4 in $\pm$ 3/4in (425 $\pm$ 20 mm).

NOTE: If dimension A does not enter the range above even when grease is pumped in, the rubber track must be replaced or there is a problem with the tension adjuster. Contact your Morooka dealer for assistance.

3. Drive machine a short distance forward and backward to make tension uniform. Recheck tension dimension A.
4. Repeat Increase or Decrease Tension steps as needed.
5. Install grease valve cover (2) and bolts (1).

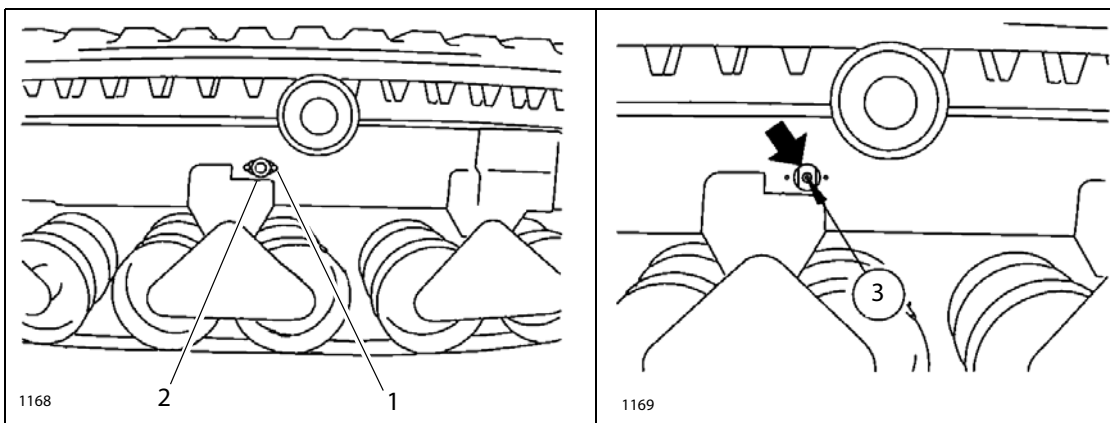


Figure 6-15. Adjust Track Tension

DECREASE TENSION

NOTICE

TENSION/IDLER WHEEL ASSEMBLY DAMAGE. NEVER APPLY PRESSURE TO TENSION/IDLER WHEEL WITH ANY MECHANICAL DEVICE. USE DOWNWARD PRESSURE ONLY ON CENTER OF TRACK TO RETRACT TENSION/IDLER WHEEL. APPLYING PRESSURE DIRECTLY TO TENSION/IDLER WHEEL MAY DAMAGE TENSION/IDLER WHEEL CYLINDER SEALS.

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

NOTE: Grease will escape from valve as idler wheel is retracted to loosen track.

2. Loosen valve (3) until dimension A is within 16-3/4 in $\pm$ 3/4 in (425 $\pm$ 20 mm). Tighten valve.
3. Drive machine a short distance forward and backward to make tension uniform. Recheck tension dimension A.
4. Repeat Decrease or Increase Tension steps as needed.
5. Install grease valve cover (2) and bolts (1).

Cab Fresh Air Filter

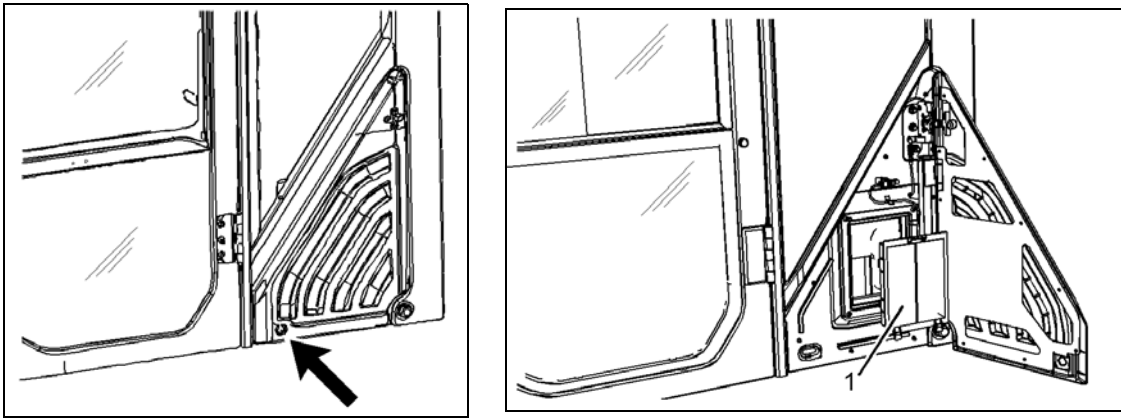


Figure 6-16. Cab Fresh Air Filter

The cab air filter is located on left side of the cab. Use ignition key to open the access panel.

1. Remove air filter (1).
2. Clean air filter with a maximum of 200 kPa (30 psi) pressure air.
3. Inspect air filter after cleaning. Replace air filter if damaged or badly contaminated.
4. Install air filter.
5. Close and lock filter cover.

Air Conditioner/Cab Heater Recirculation Filter

NOTICE

AN AIR RECIRCULATION FILTER ELEMENT PLUGGED WITH DUST WILL CAUSE DECREASED AIR CONDITIONER OR CAB HEATER PERFORMANCE AND SERVICE LIFE.

The air conditioner filter is located on the lower left side of the cab behind the seat.

1. Slide operator seat forward.
2. Slide filter element upward.
3. Tap air filter to remove dirt. Do not use compressed air to clean filter.
4. Inspect filter element. If filter element is damaged or contaminated, install a new filter element. Make sure filter element is dry.
5. Reinstall filter element.

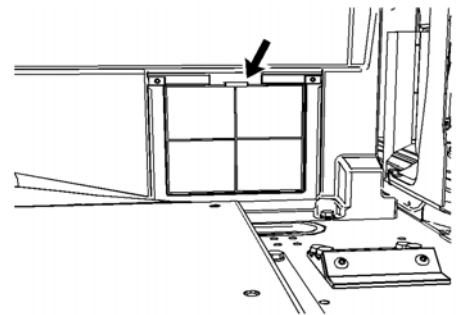
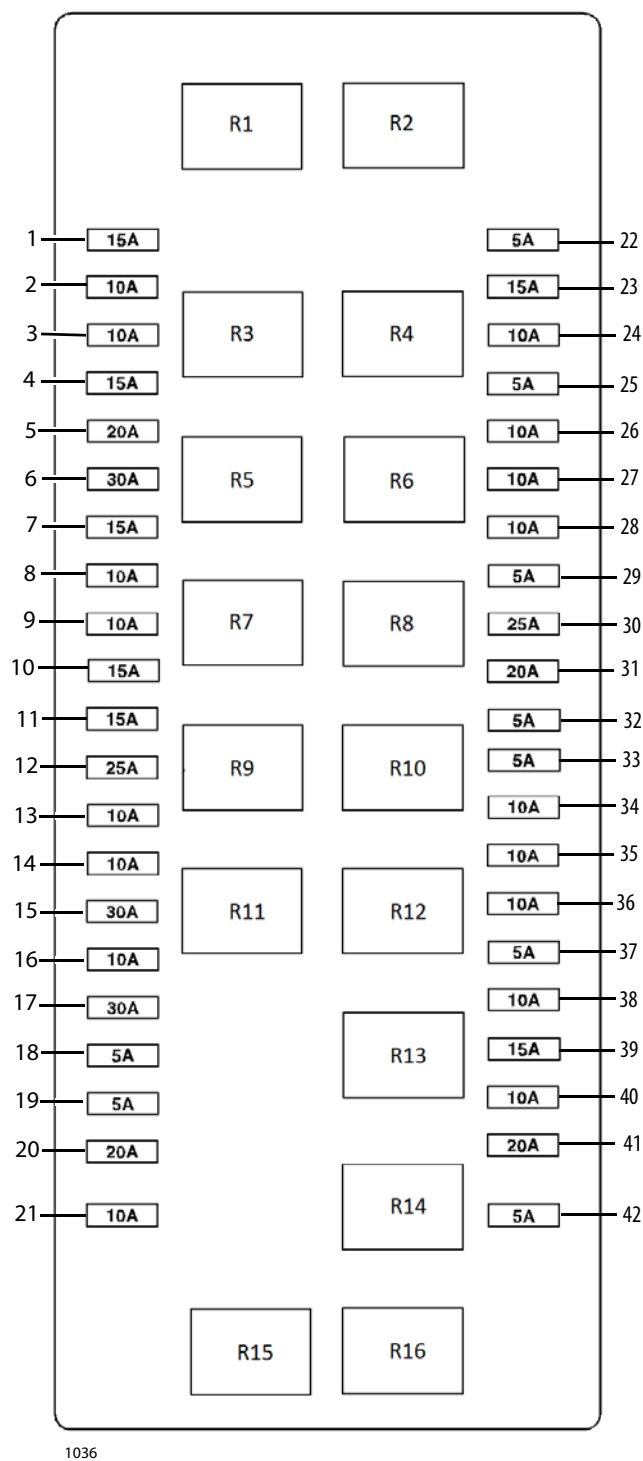


Figure 6-17. AC/Heater Recirculation

NOTICE

FAILURE TO REINSTALL THE FILTER ELEMENT FOR THE AIR CONDITIONING SYSTEM WILL CONTAMINATE AND DAMAGE THE SYSTEM COMPONENTS.

6.9 CAB FUSE AND RELAY PANEL



1036

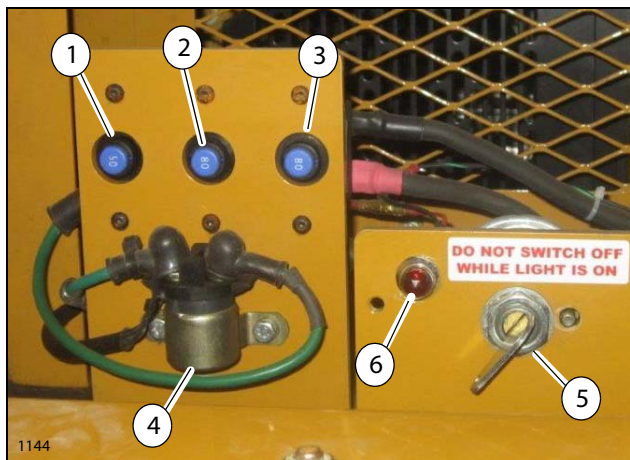
Fuse Descriptions					
1	15A	Spare - R1	22	5A	Spare
2	10A	Spare - R2	23	15A	Spare
3	10A	Key Switch	24	10A	Spare
4	15A	Radio/SW Panel	25	5A	24V Sensors
5	20A	A/C Blower	26	10A	Radio/SW Panel
6	30A	ECM	27	10A	Spare
7	15A	Spare - R3	28	10A	Spare - R10
8	10A	Spare	29	5A	Spare
9	10A	Spare	30	25A	Spare - R11
10	15A	DEF	31	20A	Horn
11	15A	Spare	32	5A	A/C Unit
12	25A	Spare	33	5A	Key ECM
13	10A	Spare - R5	34	10A	Mirror
14	10A	Spare	35	10A	Spare
15	30A	Spare	36	10A	12V Converter
16	10A	High Beam	37	5A	Radio
17	30A	Spare	38	10A	Wiper-Denso
18	5A	Spare	39	15A	Spare
19	5A	Spare	40	10A	Low Beam/Illum
20	20A	A/C Condenser	41	20A	Hydraulics
21	10A	Spare	42	5A	Backup Alarm

Relay Descriptions			
R1	Unused	R2	Unused
R3	Unused	R4	Horn
R5	Spare - Cab Lamps	R6	High Beams
R7	Spare	R8	Unused
R9	Unused	R10	Unused
R11	Unused	R12	Spare
	Blank	R13	Low Beams
	Blank	R14	Backup Alarm
R15	Spare	R16	Unused

Figure 6-18. Cab Fuse and Relay Panel

6.10 MAIN POWER CIRCUIT BREAKER PANEL

The main power circuit breaker panel is located in the left side of the battery compartment.



- | | | |
|---------------|--------------------|-------------------------------|
| 1. Glow Plugs | 3. Cab Power | 5. Main Power Disconnect |
| 2. Alternator | 4. Glow Plug relay | 6. System Shut Down Indicator |

Figure 6-19. Main Power Circuit Breaker Panel

6.11 TROUBLESHOOTING

If it is felt there is any abnormality, investigate the cause immediately and take action to prevent any serious failure. If the cause is unknown, contact your Morooka dealer for repairs. When contacting your Morooka dealer, give the machine and engine serial numbers.

Engine

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	Low fuel	Check fuel level. Add fuel.
	Air in fuel line	Bleed air from fuel line
	Fuel injection pump failure	Contact your distributor
	Engine failure	Contact your distributor
After warming up operation, [Engine oil pressure lamp] on meter box stays lighted up even when engine speed is raised (Engine 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 reads 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 contact 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
Engine exhaust white	Engine oil level is too high Improper air fuel	Adjust to correct amount Change specified fuel
Engine exhaust black	Clogged air cleaner Improper fuel Failure in engine	Check, clean Change to specified fuel Contact your distributor
Engine does not run smoothly	Air in fuel line Fuel filter clogged. Water in fuel filter Fuel system leak.	Bleed air from fuel line. Check, replace new parts, or repair
Engine stops when set to low speed	Engine Failure	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

Chassis

Problem	Main Causes	Remedy
Machine does not move	Parking break still applied Leakage of oil from hydraulic system Travel level cable disconnected Failure in hydraulic equipment	Release parking brake, or check brake piping 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, 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 track comes off	Rubber track tension too loose	Check, adjust
Abnormal wear of sprocket	Rubber track tension too tight	Check, adjust

Electrical System

Problem	Main Causes	Remedy
Voltage does not go above 21V when engine is running (Battery is not charging)	Defective wiring Loose fan belt Defective alternator Defective battery	Check, repair Check, adjust, or replace Contact your distributor
Head light dim	Battery charge is too low Defective alternator	Charge Contact your distributor
No lamps light up	Blown fuse Defective wiring Defective lamp switch	Check, repair, or replace parts
Individual head lamps, gauge lamps, do not light up	Blown bulb Defective wiring	Check, repair, or replace parts
Horn does not sound	Blown fuse Defective wiring Defective horn	Check, repair, or replace parts
Backup buzzer does not sound	Blown fuse Defective wiring Defective buzzer Defective backup switch	Check, repair Check, adjust, or replace
Slope alarm buzzer does not sound	Blown fuse Defective wiring Defective buzzer Defective slope alarm unit	Check, replace Contact your distributor

6.12 PERIODIC REPLACEMENT OF CRITICAL PARTS

Periodic Replacement Interval (Every 2 Years)

To extend machine life, Morooka recommends periodic inspection and replacement of critical parts (hydraulic hoses, fuel hoses, etc.), which are related to causes of fire and efficiency in the raising and lowering of the dump body, traveling, rotating, and stopping functions of the machine.

With these parts, the material changes as time passes and they easily wear or deteriorate. 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 machine remains fully functional.

Periodic Inspection

NOTICE

CHECK HYDRAULIC HOSES AND FUEL HOSES CAREFULLY FOR CRACKS, DETERIORATION, OR OTHER DAMAGE; AND THAT THERE IS NO LEAKAGE FROM CONNECTIONS.

WHEN CARRYING OUT CHECK BEFORE STARTING, ALWAYS CHECK GROUND UNDER MACHINE FOR FLUID LEAKS.

WHEN REPLACING HYDRAULIC OR FUEL HOSES, ALWAYS ORDER GENUINE PARTS. NEVER USE ANY IMITATION OR SUBSTITUTE PARTS.

WHEN ANY HYDRAULIC HOSE IS REPLACED, ALWAYS REPLACE O-RINGS AT THE SAME TIME. FAILURE TO DO THIS WILL CAUSE OIL LEAKAGE.

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

- Check hose clamps and replace them if they are deformed or cracked.
- Check and repair any hydraulic hoses, even if they are not listed as critical parts

Periodic Maintenance Interval	Inspection Items
Checks before starting	- Leakage of oil from caulked portions, connections of fuel hoses, and hydraulic hoses
Monthly inspection	- Leakage of oil from caulked portions, connections of fuel hoses, and 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, and hydraulic hoses - Damage to fuel hoses, hydraulic hoses (cracks, wear, gouging, swelling, crushing) - Interference with other parts

6.13 PERIODIC REPLACEMENT PARTS

NOTE: 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.)

Replacement Parts	Quantity	Replacement Interval
Fuel hose (fuel tank to fuel injection pump)	1	Every 2 years
Fuel hose (fuel injection pump to fuel tank)	1	
Hydraulic hose (main pump to/from rotary joint to/from left and right travel motors)	8	
Hydraulic hose (gear pump to main control valve)	1	
Hydraulic hose (main control valve to dump cylinder)	4	
Hydraulic hose (main control valve to swing motor)	2	Every 3 years
Seat belt	1	

THIS PAGE BLANK

SECTION 7. TRANSPORTATION AND STORAGE

7.1 TRANSPORTING CARRIER

Ramps

Always use ramps (1) which meet the following requirements:

- Strong ramps which can fully support machine weight.
- Ramps with a width greater than track width.
- Ramps of a length which will not form an angle exceeding 15° when placed against truck or trailer platform.

NOTE: If ramps are too long and bend excessively, use blocks (3) to support ramps as necessary.

- Ramps with hooks and a non-slip surface.

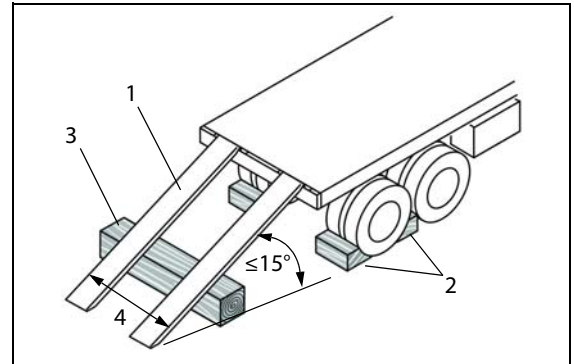


Figure 7-1. Loading Ramps

Loading And Unloading

⚠ WARNING

UNSTABLE SURFACE CAN CAUSE CARRIER TO SHIFT AND FALL DURING LOADING OR UNLOADING AND CAUSE DEATH, SERIOUS INJURY, OR DAMAGE TO PROPERTY AND EQUIPMENT. WHEN LOADING AND UNLOADING THE MACHINE, PARK TRAILER OR TRUCK ON A FLAT, FIRM ROADBED. KEEP A FAIRLY LONG DISTANCE BETWEEN ROAD SHOULDER AND MACHINE.

1. Load and unload on firm level ground only.
2. Stop truck engine and apply parking brake securely. Chock tires (2).
3. Set ramps (1) with center of machine aligned with truck or trailer and in line with the width of the tracks (4). Attach ramps securely.
4. Check left and right ramps are the same height.

⚠ WARNING

LOOSE MATERIAL OR SLIPPERY RAMPS CAN CAUSE CARRIER TO SHIFT AND FALL DURING LOADING OR UNLOADING AND CAUSE DEATH, SERIOUS INJURY, OR DAMAGE TO PROPERTY AND EQUIPMENT. MAKE SURE RAMP SURFACE IS CLEAN AND FREE OF GREASE, OIL, ICE AND LOOSE MATERIALS. REMOVE DIRT AND DEBRIS FROM TRACKS.

5. Place machine in line with the ramps. Approach ramps at low speed.
6. Never change direction of travel on ramps. If it is necessary to change direction, drive off ramps, correct direction, then drive on to the ramps again.
7. Return engine throttle to the low-speed position, turn the starting switch to the OFF position and stop engine. Remove starting key.
8. After loading, put blocks under front and rear of the tracks to prevent machine from moving. Tie machine down with chains or wire rope.

Transporting

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

7.2 LONG-TERM STORAGE

Preparation

When placing machine in storage for more than one month, do the following:

1. After every part is washed and dried, store machine in a dry building. Never leave it outdoors.
2. If carrier must be left outdoors, park machine on flat ground and cover it with canvas, etc.
3. Completely fill fuel tank, lubricate, and change oil before storage.
4. Apply a thin coat of grease to metal surface of the hydraulic piston rods and the idler adjusting rods.
5. Disconnect negative battery terminals. Cover or remove batteries from machine and store separately.
6. If temperature will go below 32°F (0°C), add additional anti-freeze to coolant.
7. When not using anti-freeze, drain all coolant and place a "No Coolant" sign in the cab.

During Storage

WARNING

ENGINE EXHAUST FUMES CAN KILL. IF IT IS NECESSARY TO START ENGINE IN AN ENCLOSED AREA, OPEN DOORS AND WINDOWS TO PROVIDE ADEQUATE VENTILATION.

NOTICE

IF COOLANT HAS BEEN DRAINED FROM MACHINE, FILL WITH COOLANT BEFORE STARTING ENGINE.

1. Start engine once a month and thoroughly warm-up machine.

NOTICE

BEFORE OPERATING DUMP BODY, WIPE OFF COAT OF GREASE FROM HYDRAULIC CYLINDER PISTON RODS. REPLACE GREASE BEFORE PLACING BACK IN STORAGE.

2. Move carrier for a short distance. Raise and lower dump bed.

After Storage

1. Wipe grease off hydraulic cylinder piston rods.
2. Remove drain plugs from hydraulic tank, fuel tank, engine oil pan, and travel motors, and drain any water.
3. Drain water from engine oil filter, fuel filter, and hydraulic line filter.
4. Perform pre-start inspections. Warm up machine thoroughly, then check all parts carefully.

PROPOSITION 65 WARNING

- Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm.
- Batteries also contain other chemicals known to the State of California to cause cancer.
- Wash hands after handling.

1122



WARNING:



Engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

1123



*Corporate Office
Morooka America
10487 Washington Highway
Glen Allen, VA 23059
USA
☎ (804) 368-0984*

www.MorookaAmerica.com