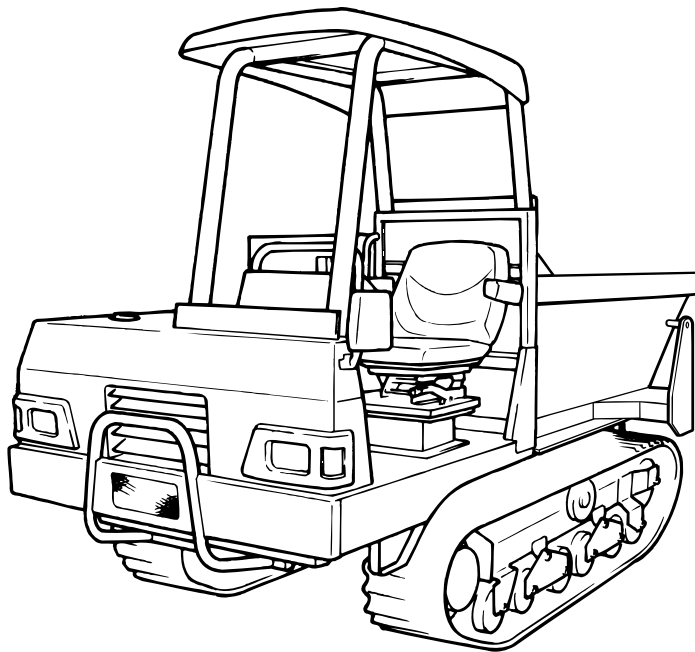


Rubber Crawler Dumper **S25**

Operation Manual



▲WARNING

Do not attempt to operate or service this machine before you have read and understood the whole contents of this manual.

This manual must be kept available so that every related personnel can read it whenever they attempt to understand operation / service on this machine.

3661 5503 000

CHIKUSUI CANYCOM ,INC.

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■Matsumoto Center	☎0263(47)7882	FAX	(47)8193				

Dealer Contact address / telephone.

NOTICE TO THE USER

Thank you for purchasing our product.

Please read and understand the contents of this manual for proper operation before using this machine.

WARNING

The user must know that this machine can be hazardous. Always follow the instructions in this manual when operating/servicing the machine.

WARNING

This machine is made only for hauling in a work place. Do not use it for other purposes. Driving this machine on a public road (or its equivalent) is illegal. We do not bear responsibility for an accident or a violation of traffic regulations.

WARNING

Do not remodel nor modify this machine. Do not remove any of the safety covers when operating this machine. This can cause a serious accident.

NOTICE TO THE USER COMPANY

⚠ CAUTION

This machine is a rough terrain hauler which is certificated in the governmental regulation. The operator of this machine must have an official permission. And the user of this machine has legal obligation to perform daily/regular/specified inspections. The regular inspection results must be kept for three years.

NOTICE TO THE LEASE/RENTAL BUSINESSES

⚠ CAUTION

Before lending this machine to your customers, always explain how to operate the machine and advise them to read this manual before operation.

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<GUARANTEE CERTIFICATE>

Attached at the end of this manual.

* Make sure to receive the certificate after receiving explanation of the operation.

<APPENDIX>

Engine Operation Manual (enclosed in Tool Bag)

* Make sure to read this appended manual as well as the manual of this machine.

1. INTRODUCTION

1.1 Purpose of This Manual

The purpose of this manual is to provide the user with appropriate information in detail about how to operate/service this machine.

This manual is made for the beginners to this machine.

1.2 Composition of This Manual

This manual is composed of the following chapters.

1. INTRODUCTION

This chapter explains the purpose/composition of this manual and warning terms used in this manual. It also includes the description of warning labels attached on this machine.

2. WARRANTY & AFTER-SALES SERVICE

This chapter describes contents of warranty and after-sales service for this machine.

3. RULES FOR SAFE OPERATION/WORK

This chapter describes the general safety rules which the user must observe when using/servicing this machine.

4. NAME&FUNCTION OF COMPONENTS

This chapter explains the names and functions of the component parts.

5. SPECIFICATION

This chapter describes the specifications of this machine and contents of the tool bag.

6. OPERATION

This chapter explains the preparation/operation procedure and how to use the control devices.

7. MAINTENANCE

This chapter gives information about the maintenance such as regular inspection, supplying oil / grease / lubricant / fluid, cleaning, replacement, adjustment, and after-use maintenance.

8. STORAGE (LONG TERM)

This chapter gives information about the long term storage of this machine.

9. TROUBLESHOOTING

This chapter describes the troubleshooting on this machine.

10. TRANSPORTATION OF THIS MACHINE

This chapter explains the procedure and cautionary points for transporting this machine.

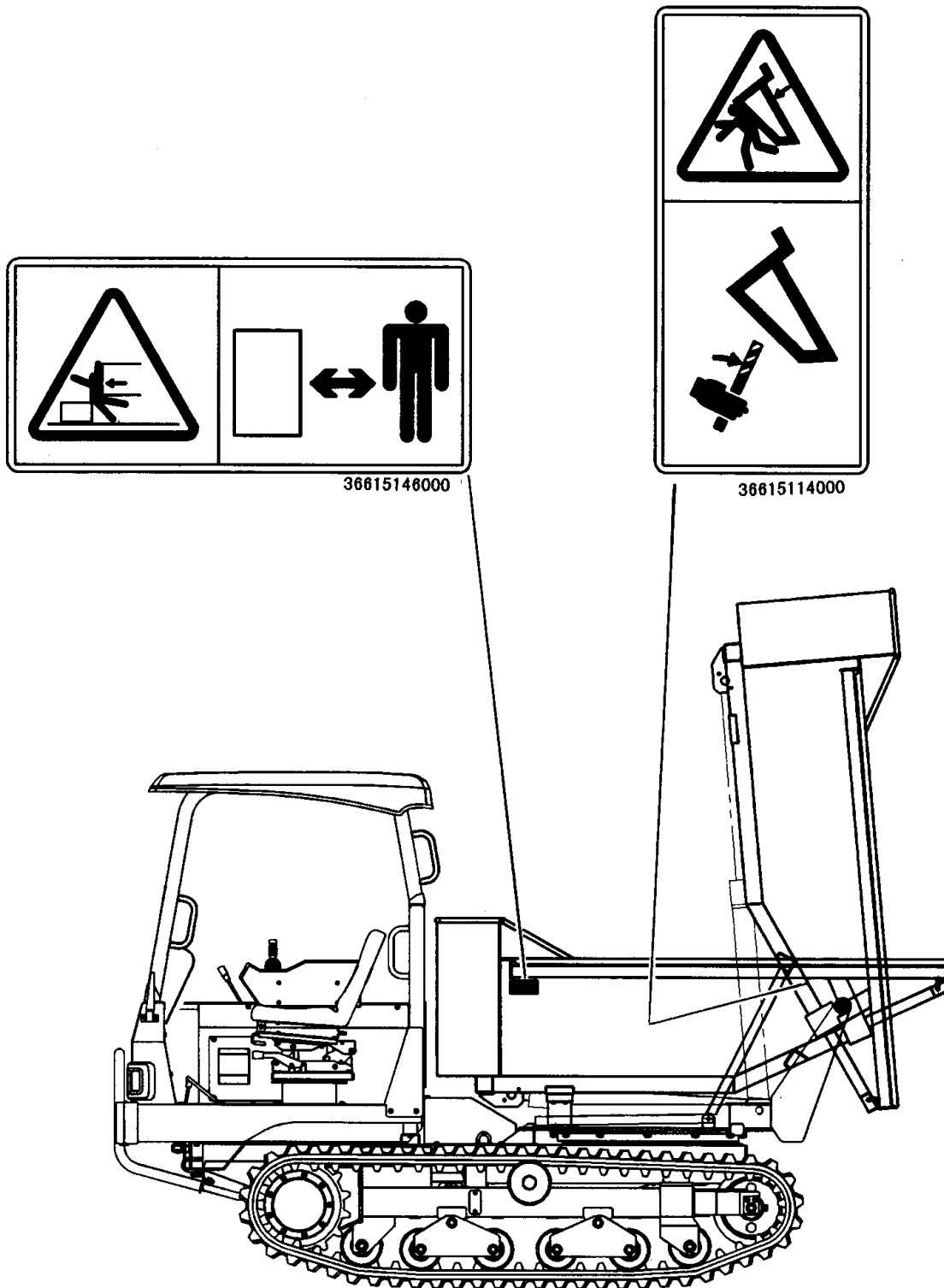
1.3 Safety Instruction in This Manual

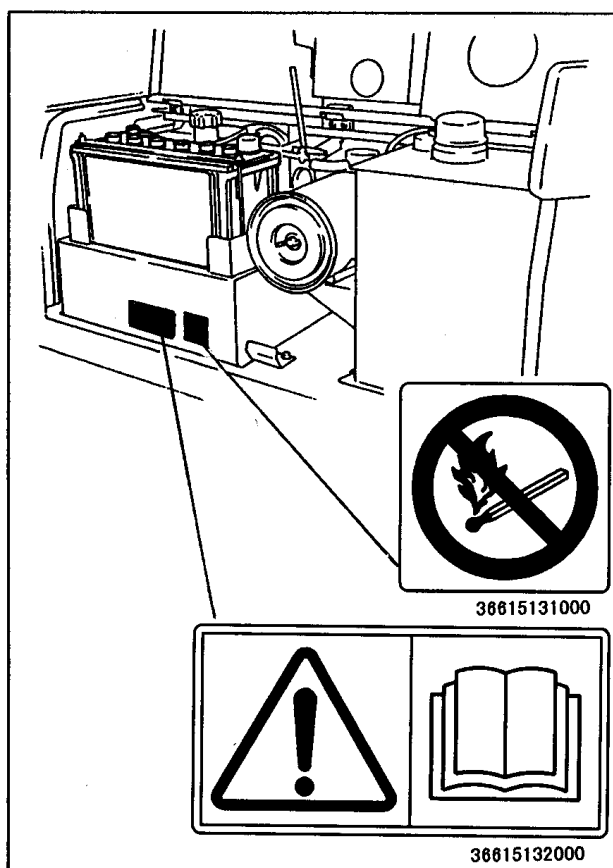
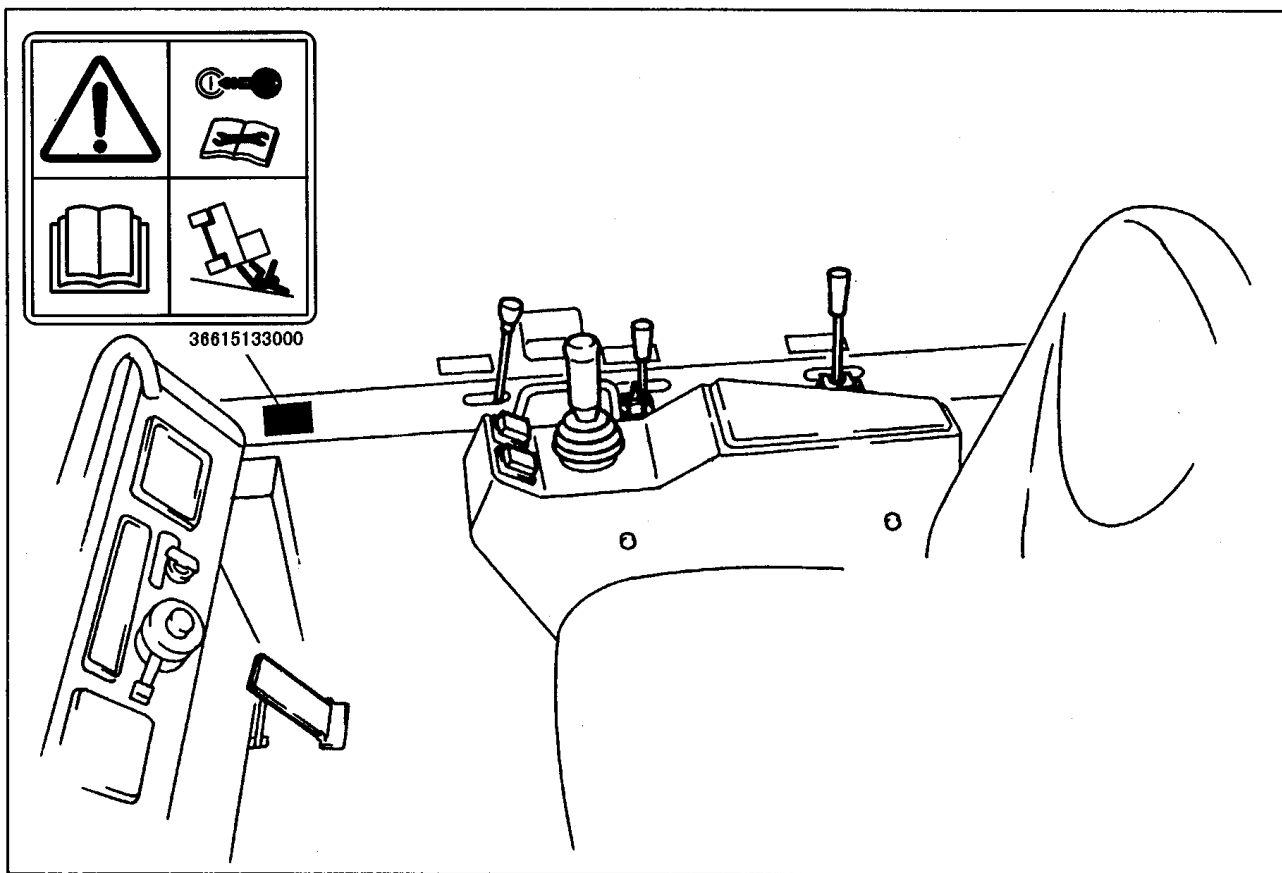
In this manual, the safety information is classified into the following four categories according to the degree of hazard (seriousness of possible accidents). Read and understand the contents below and always observe the safety instructions in this manual.

Category	Meaning
 DANGER	Indicates an imminently hazardous situation which will result in death or serious injury if the user does not follow appropriate instructions.
 WARNING	Indicates a potentially hazardous situation which could result in death or serious injury if the user does not follow appropriate instructions.
 CAUTION	Indicates a potentially hazardous situation which could result in injury to the user or damage to the machine if the user does not follow appropriate instructions.
<u>NOTE</u>	Used to emphasize information which needs particular attention.

1.4 Safety Labels on This Machine

This machine has following safety labels attached on it. If any of the safety labels is removed or the information on the labels becomes unreadable due to dirt or damage onto the label plates, always replace it with an appropriate new label. A new label is available from the dealership.





2. WARRANTY & AFTER-SALES SERVICE

Warranty

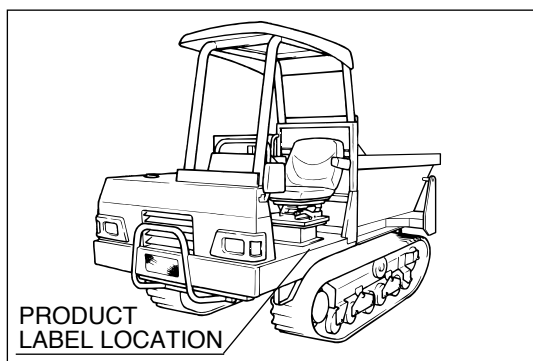
CHIKUSUI CANYCOM, INC. gives a warranty of new goods subject to the contents shown on the guarantee certificate. For more details, refer to the guarantee certificate attached at the end of this manual.

After-sales service

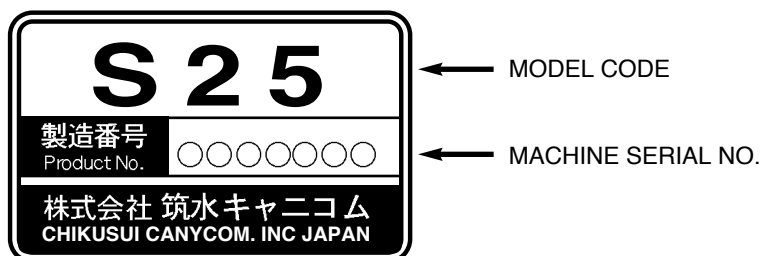
When you have a question or a trouble about the operation of this machine, please feel free to consult your dealer or one of our service centers.

Before making contact with us or one of our dealers, please confirm the model code, the product (serial) number, and the maker of the installed engine by checking the product label. (Refer to chapter 5 "SPECIFICATIONS" in this manual for the maker of the installed engine and the model code.  Page 13)

<Product Label Location>



<Product Label>



Service part supply period

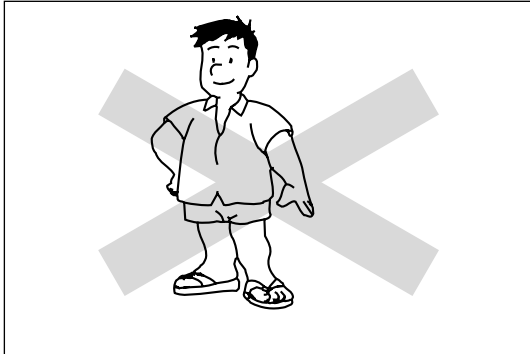
The service parts of this machine will be supplied until 7 years after the machine is discontinued.

3

RULES FOR SAFE OPERATION/WORK

3. RULES FOR SAFE OPERATION/WORK

This chapter describes the general safety rules which the user must observe when using/servicing this machine. Also follow other safety instructions shown in the other chapters to safely operate and work on the machine.

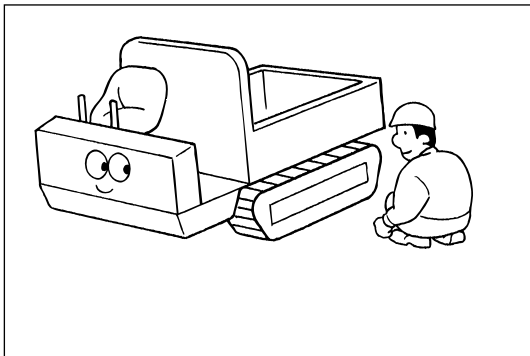


Safety Rules before Operation



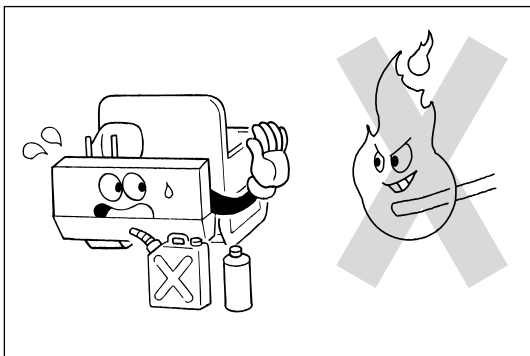
Always be dressed properly

Always wear an appropriate clothes for the machine operation. Do not operate or work on the machine while dressed in improper clothes or footwear such as sandals.



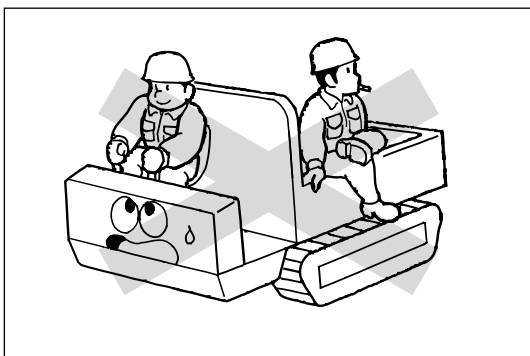
Always perform pre-operation check

Always check the machine before operation and service as necessary.



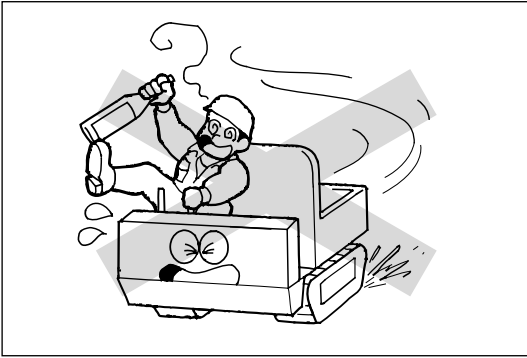
No fire

When you handle with fuel or greases, do not bring fire (tobacco, etc.) near to them. Exercise caution against fire whenever you charge the battery or service the engine.



No passenger

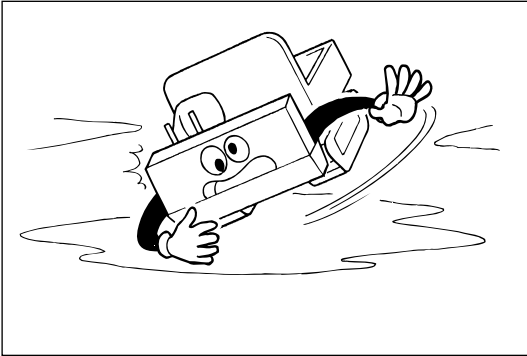
This machine allows one occupant only. Driving the machine with passenger(s) onboard is very dangerous. It may shift the center of gravity improperly and cause a serious accident such as turnover. Do not allow persons other than the driver to ride the machine.



No reckless operation

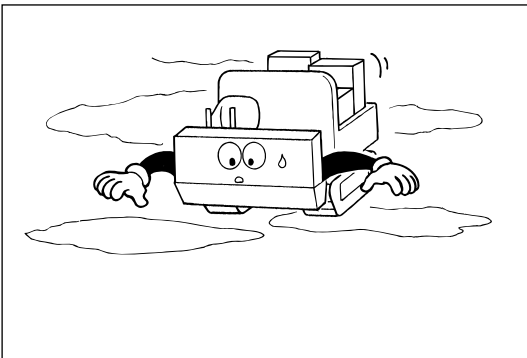
Driving the machine under the influence of alcohol or in poor health is very dangerous. Do not drive/operate the machine while you are in such conditions.

Do not allow the machine to be driven by young people who are not old enough to drive/operate this type of machine.



No abrupt operation

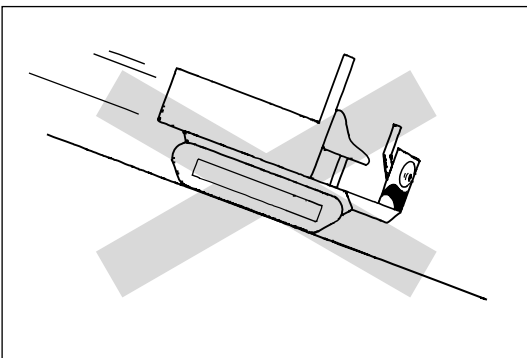
Do not perform abrupt operations such as sudden start, acceleration, turn, and braking. Keep driving safely. Before starting the machine, always check around for safety. Abrupt stop or turn on a soft ground or wet road can cause a slip or turnover of the machine. Keep yourself away from such dangerous situations.



Keep safety speed

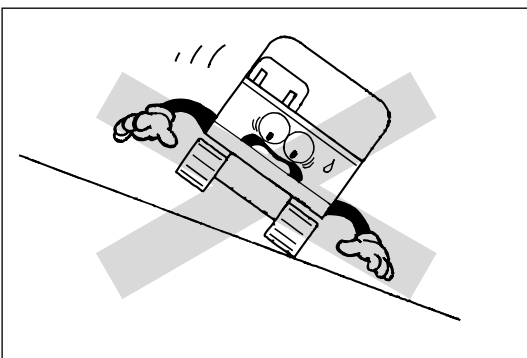
Keep a safety speed according to the road inclination or surface condition.

When driving on a public road, keep an appropriate speed for the traffic condition.



Use engine brake on downhill

Before going down a slope, set the HLP lever to "L (low speed)". This makes engine brake come into effect and ensure an appropriate speed for downhill drive.

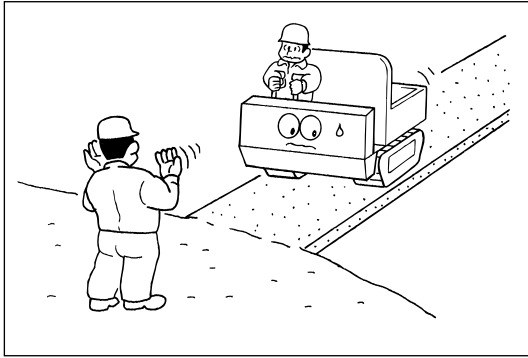


No crossing on slope

On a slope, always go up/down straightforwardly. Do not attempt to cross a slope even in a bias direction. It may cause the machine to turn over, resulting in a serious accident.

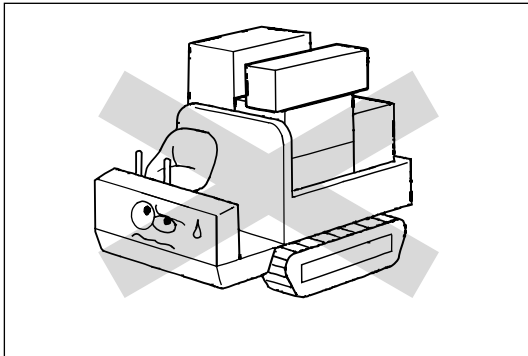
3

RULES FOR SAFE OPERATION/WORK



Guide driver in dangerous area

In a dangerous area (poor view ahead, narrow road, too much inclination or ups & downs), an appropriate person must guide the driver so that he can drive the machine safely.

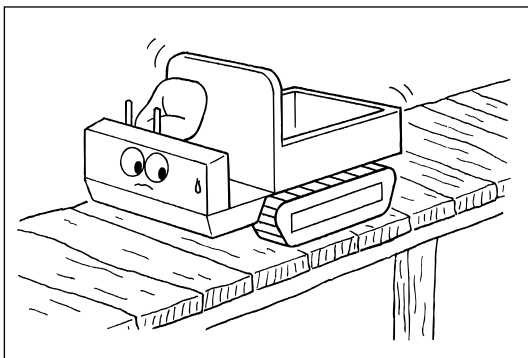


Safety Rules about Loading



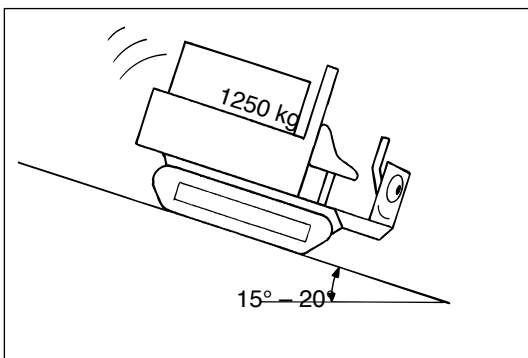
No overloading

Do not load the machine with heavier weight than the specified capacity.



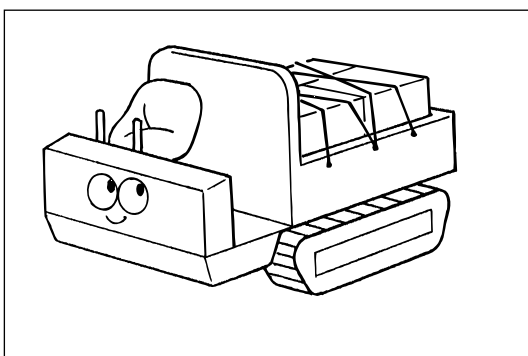
Care for total weight

Before crossing an area whose anti-weight capacity is critical (e.g. wooden bridge), always check if the total weight of the machine, luggage, and the driver is less than the allowable level. While crossing such an area, keep a constant speed and carefully drive the machine.



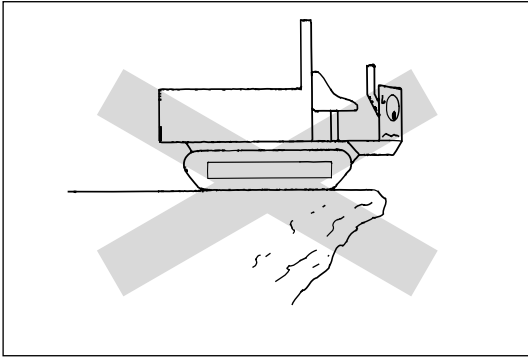
Special care for hauling on slope

On a slope from 15° to 20°, load weight must be 1250 kg or less. On a slope more than 20°, do not use this machine. Even if it is inevitable, do not load the machine with any luggage.



Place luggage in order

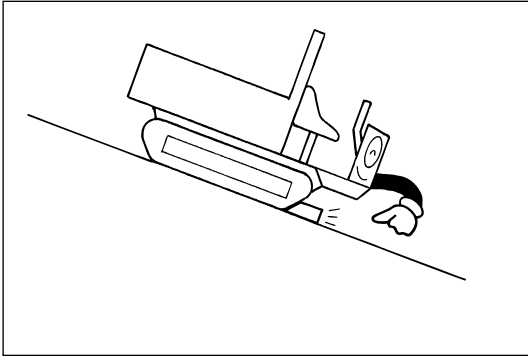
Luggage must be placed evenly and fixed with ropes to prevent weight unbalance. Also check if the luggage interrupts the rear view.



Safety Rules about Parking

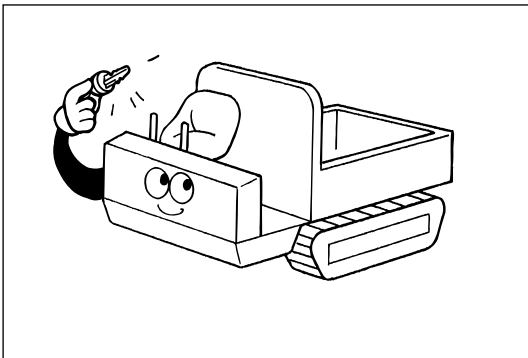
No parking in dangerous place

Do not park the machine on a slope or such dangerous places. A level and flat ground is suitable for parking.



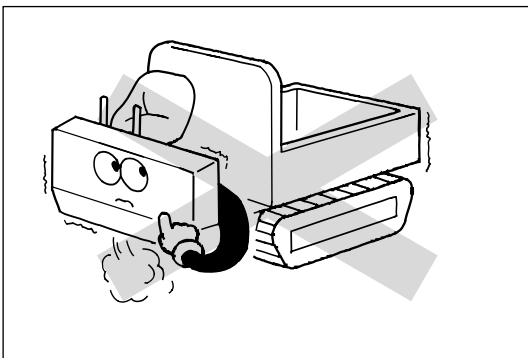
Always use stopper on a slope

If it is inevitable to park the machine on a slope, make sure to apply the parking brake and set stoppers under the crawler.



Safety check before parking

Before parking the machine, always set the HLP lever to "P (parking)" to apply the parking brake and stop the engine. And make sure to remove the engine key from the key cylinder.

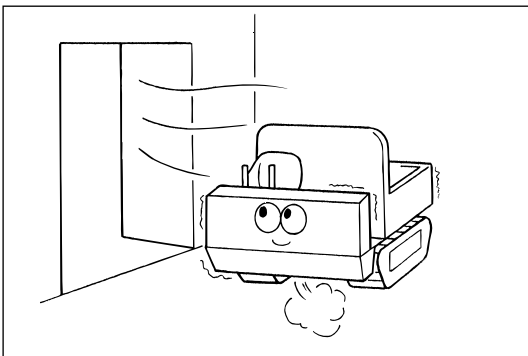


Safety Rules in Service

No service during engine operation

Do not service the machine during the engine operation.

Always stop the engine before stating service.



Keep appropriate ventilation

Keep appropriate ventilation to avoid exhaust gas intoxication when operating the engine inside an enclosed area.

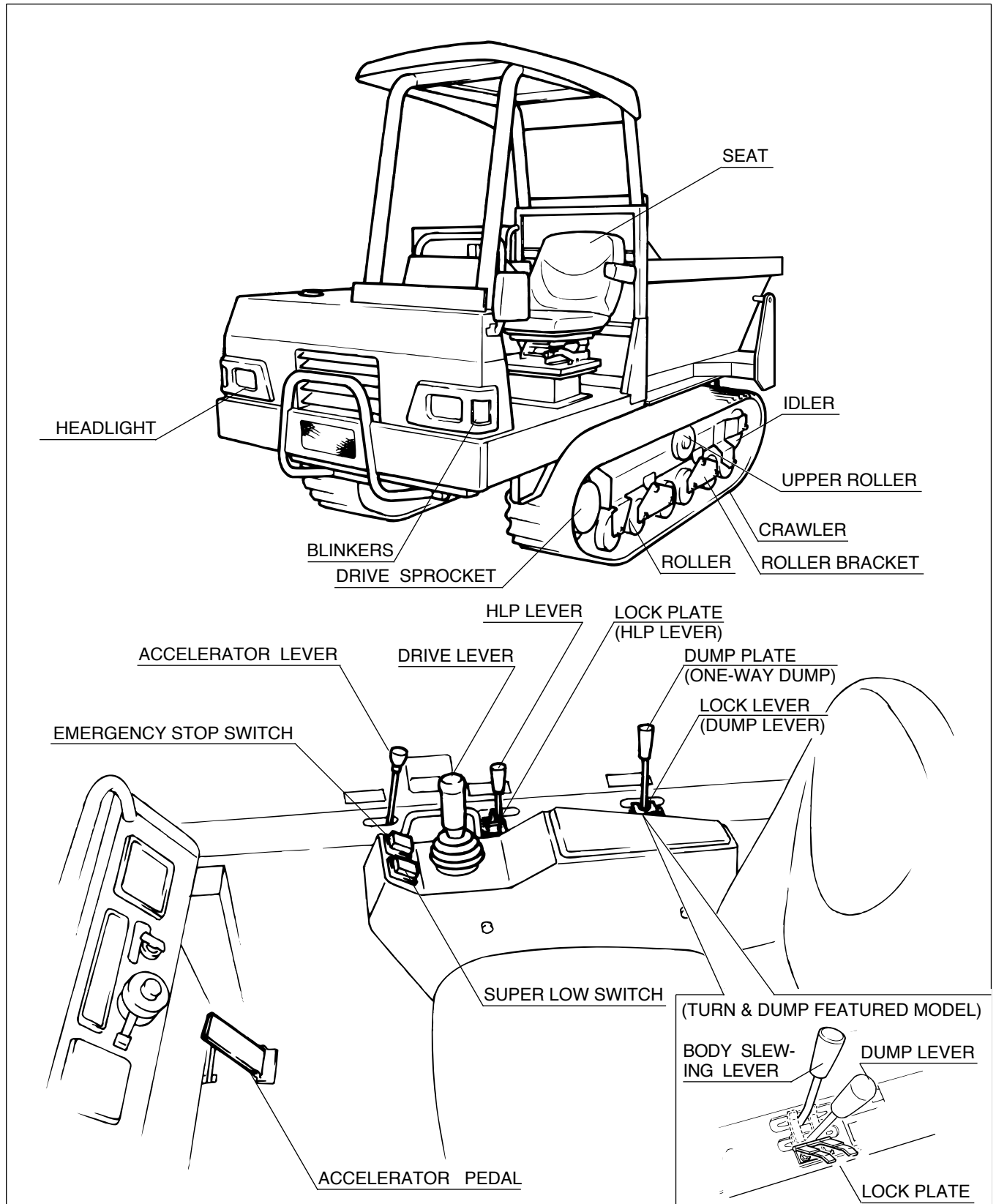
4

NAME & FUNCTION OF COMPONENTS

4. NAME & FUNCTION OF COMPONENTS

4.1 Operating Section

Name of components



Function of components

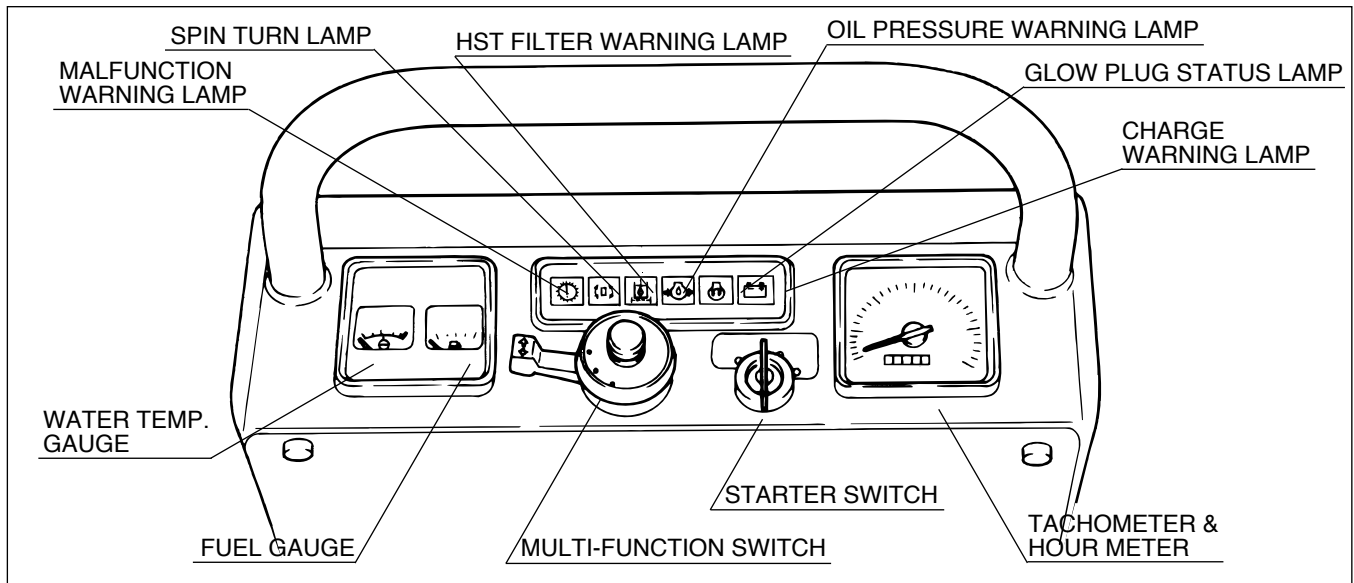
- HLP lever To changeover the vehicle speed range (L [low speed] or H [high speed]) and park the vehicle.
- Accelerator pedal To increase / decrease engine speed.
- Accelerator lever To increase / decrease engine speed.
Use the accel pedal in normal drive. Use the accel lever when starting on a slope or backing.
- Super low switch To run the vehicle at an extra low speed for example running on a narrow road or going down a slope at a moderate speed. While this switch is ON, the vehicle run at half the speed selected with the HLP lever (L or H).
- Steering lever To determine the vehicle running direction (forward or backward) and steer the vehicle. When you tilt the lever while pressing the button at the top of the lever, the vehicle performs spin turn. (👉 Page 22)
- Emergency stop switch To stop the engine immediately on an emergency.
* After using (turning ON) the emergency stop switch, always turn OFF the emergency stop switch and the starter switch.
- Lock plate (HLP lever) To lock the HLP lever.
This is a lock mechanism to prevent the HLP lever from moving from L or H position to P position unexpectedly and avoid damage to the brake.
- Dump lever (One-way dump) To raise or lower the luggage bed.
- Body slewing & dump lever To raise / lower / rotate the body.
(Turn & Dump featured model)

4

NAME & FUNCTION OF COMPONENTS

4.2 Meter&Gauge Section

Name of components



Function of components

- Oil pressure warning lamp Indicates whether the engine oil pressure is normal or not. The engine pressure is OK when this lamp comes off after the engine starts.
- Tachometer & hour meter Indicates the engine speed and the total operating time in one-tenth hours.
- Glow plug status lamp Indicates the status of the glow plug. It lights up when you turn the starter switch to "Preheat".
- Multi-function switch
 1. Light switch
Turn the switch. The low beam light will turn on at the first notch and the high beam light will turn on at the second notch.
 2. Blinkers switch
Turn the switch downward, then the left turn light will flash. Turn the switch upward, then the right turn light will flash.
 3. Horn switch
Press the switch. The horn sounds.
- HST filter warning lamp Turns on when the filter is clogged. Replace the filter if the lamp is illuminated.
- Starter switch Functions also as main switch. Turn the key to ON, then the electrical circuits are energized. Turn the key further to Start, then the starter is actuated. And turn the key to Preheat to energize the glow plug.
- Spin turn lamp Turns on when you press the button at the top of the steering lever, and flashes when the vehicle starts spin turn.
- Charge warning lamp Indicates the charged level of the battery. The battery is OK if the lamp comes off after the engine starts.
- Malfunction warning lamp Turns on if a malfunction occurs in the steering lever angle detecting circuit or the HST pump circuit. The circuits are OK if the lamp comes off after the engine starts.

5. SPECIFICATION

5.1 Machine Specifications

NOTE

Understand the specifications of this machine and use it properly.

Name / Model code				S25	
				Bucket type	One-way tipping
Weight		kg	2350		
Max. capacity		kN (kg)	24.5 (2500)		
Dimensions	Overall Length		mm	3610	
	Overall Width		mm	1550	
	Overall Height		mm	2215	
	Between Tumbler		mm	1960	
	Tread		mm	1230	
	Minimum ground clearance		mm	325	
	Body floor height		mm	915	
Dimension (body)	Inner dimensions	Length	mm	2200	1800
		Width	mm	1300	
		Height	mm	550	420
Engine	Model Name			KUBOTA V2203	
	Type			Water cooled 4 cycle 4 cylinder diesel	
	Cylinder (bore × stroke)		mm	87 × 92.4	
	Displacement		cm ³ (cc)	2197 (2197)	
	Nominal power		kW/min ⁻¹ (PS/rpm)	27.9 / 2400 (38.0 / 2400)	
	Max. torque		kg·m/rpm	13.0 / 1600	
	Starting system			electric starter	
	Fuel			Light oil	
	Fuel consumption		g/PS·h	190	
	Fuel tank capacity		Litter	40	
	Lubricant amount		Litter	9.7	
	Coolant amount		Litter	8.2	
	Battery type			100E41R	
	Battery capacity		V/AH	12 / 100	

Name / Model code				S25	
				Bucket type	One-way tipping
Running performance	Vehicle speed	Speed change		HST (2 step changeover + super low)	
		High speed	km/h	0 – 10	
		Low speed	km/h	0 – 6.5 (Super low: 0 – 3.5)	
	Min. turning radius		m	2.4	
	Gradeability		°	25	
HST oil amount			Litter	40	
Powertrain	Main driving system			HST (2 speed motor)	
	Steering system			2 pumps & 2 motors	
	Brake system			Wet-type multi disc brake	
	Crawler			320 × 58 × 90	
Dump system	Driving system			Hydralulic	
	Type			Turn & Dump	
	Hyd. pump	Type		Gear pump	
		Max. revolution	rpm	2400	
		Max. discharge flow	Litter/min	19.2	
		Relief pressure	MPa (kg/cm²)	11.8 (120)	
	Cylinder (bore × stroke)		mm	80 × 400	
	Performance	Max. rising angle	°	58	
		Lifting time	sec	Approx. 7	
		Lowering time	sec	Approx. 5.5	
	Oil amout		Litter	40	
Slewing device	Driving system			Hydraulic (Twin cylinder)	
	Max. rotating angle		°	90° both clockwise and counterclockwise	
	Slewing time		sec	Approx. 6.0 (90°)	
	Cylinder (bore × stroke)		mm	60 × 250	

* The specifications are subject to change without notice.

5.2 Contents of Tool Bag

No.	Item	Qty	Remark
1	Operation Manual (this manual)	1	
2	Engine Operation Manual	1	
3	Spanner	1	

6. OPERATION

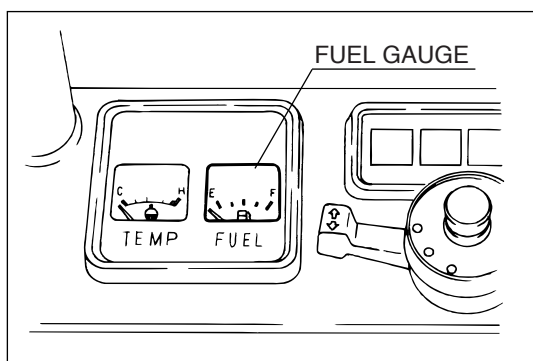
- Before reading this chapter, always read chapter 3 “RULES FOR SAFE OPERATION/WORK”.
(☞ Page 6 to Page 9)
- When operating the machine, always follow the instructions in this chapter. Do not perform any other operation but described in this manual.

6.1 Preparation

6.1.1 Fueling

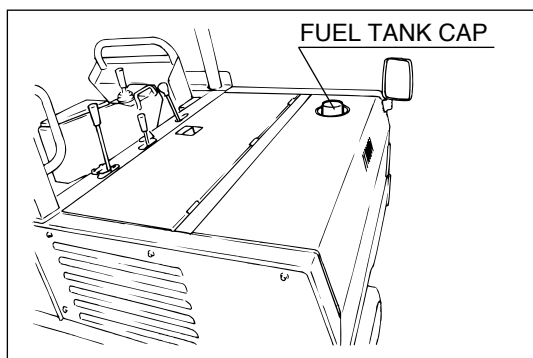
⚠ DANGER

- Do not bring fire (e.g. lighted tobacco) near the fuel or engine when fueling the machine. Doing so will cause explosion.
- Always stop the engine before fueling the machine.
- Take care that you don't allow fuel to overflow from the filling hole. If there is any spilt fuel, immediately wipe it off.



Checking fuel level

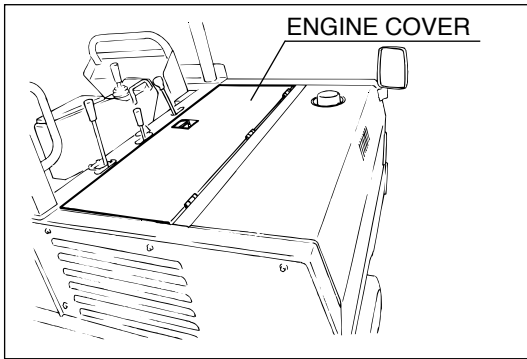
1. Turn ON the starter switch and check the fuel level on the fuel gauge. Add fuel as necessary.



Refueling

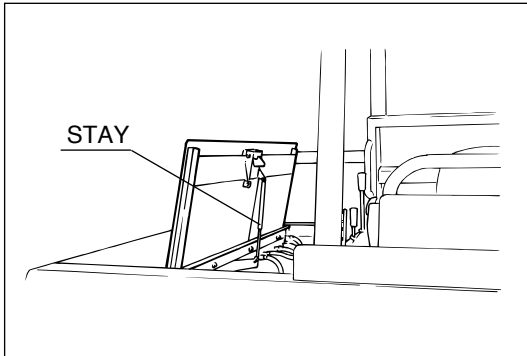
1. Open the fuel tank cap and add fuel.

Fuel to use: Light oil for diesel
Fuel tank capacity: 40 L



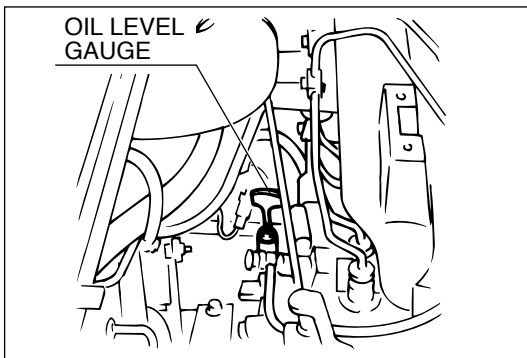
6.1.2 Checking and refilling engine oil

1. Open the engine cover.

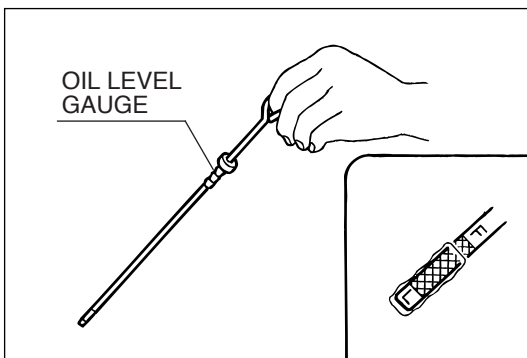


NOTE

Make sure to support the engine cover by using the stay attached on the machine.



2. Pull out the oil level gauge.



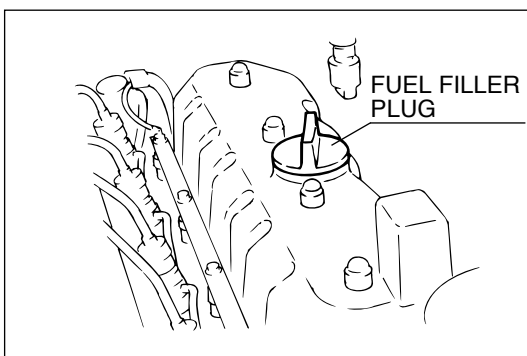
3. Check the engine oil level on the gauge.

Proper engine oil level:

**Between F and L on the oil level gauge
(Do not add oil to a level exceeding F marking)**

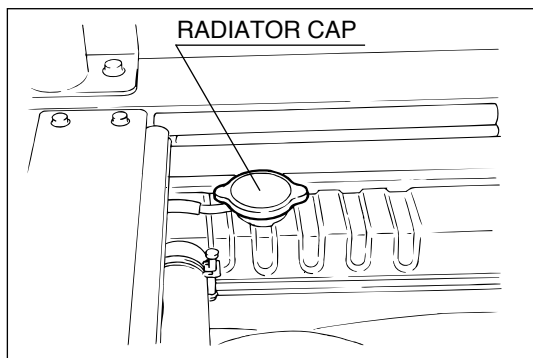
Notice:

Maximum amount of oil (up to F marking) is 9.7 L.



4. If the oil level is lower than L marking, remove the fuel filler plug and add appropriate type of oil.

Oil to use: **Page 33**



6.1.3 Checking and adding engine coolant

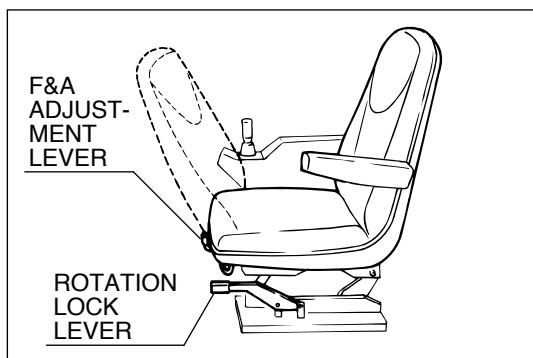
1. Open the engine cover. (☞ Page 16)
2. Remove the radiator cap.

⚠ CAUTION

Before removing the radiator cap, always verify that the coolant is cooled down (approx. 30 minutes are needed after the engine stops). If you open the radiator cap while the coolant temperature is high (during or immediately after engine operation), spouted hot coolant can cause a scald.

3. Visually check the engine coolant level and add clean water as necessary.

Total coolant (water) amount: 8.2 L



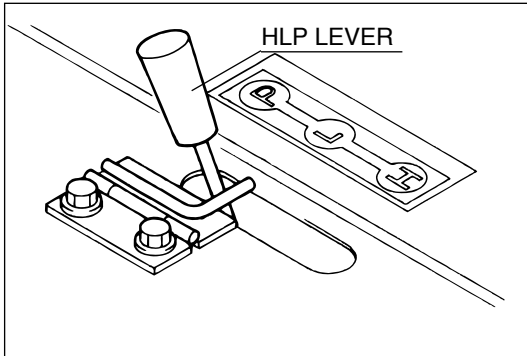
6.1.4 Adjusting seat position

1. Use the F&A adjustment lever to adjust the seat position in fore and aft direction.
2. Lift and hold the rotation lock lever while rotating the seat.

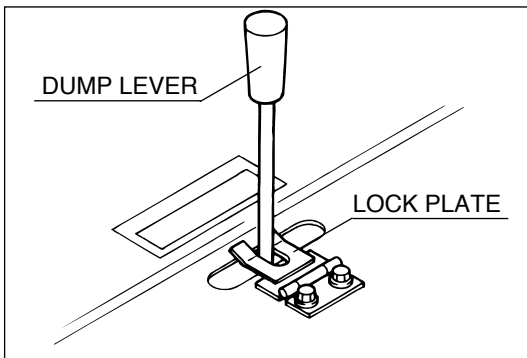
6.2 How to Start

⚠ DANGER

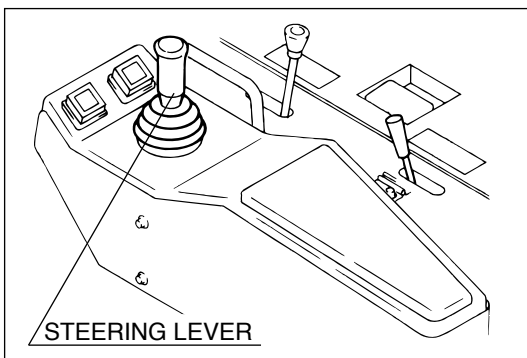
Before starting the engine, always verify that there is no inflammables around the machine. Maintain appropriate ventilation when starting the engine in an enclosed area.



1. Make sure that the HLP lever is set at P (parking).



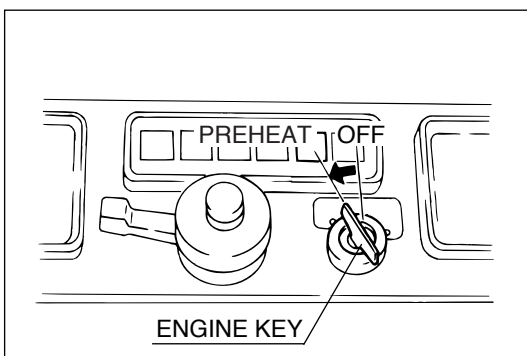
2. Make sure that the dump lever is set at Neutral and locked.



3. Make sure that the steering lever is set at Neutral.

NOTE

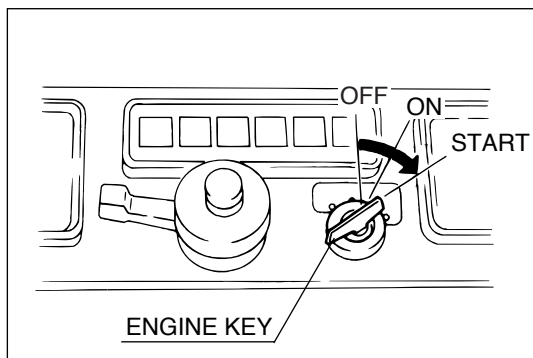
This machine is equipped with the safety switch which renders the engine unstartable unless the steering lever is set at Neutral.



4. Turn the engine key to Preheat and preheat the engine sufficiently.

NOTE

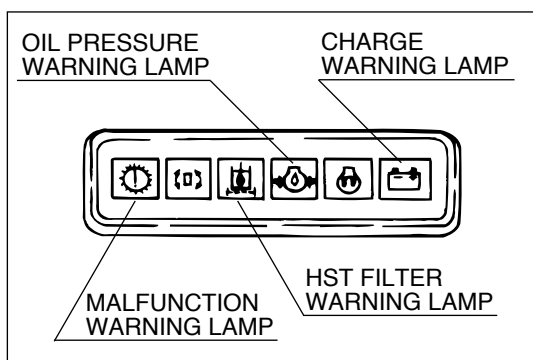
- Preheat the engine for approx. 10 seconds in normal ambient temperature or for approx. 20 – 30 seconds in extra low temperature (-5°C or lower).
- Preheating is not necessary when the engine is hot.



5. To start the engine, turn the engine key to Start while lightly depressing the accel pedal. (After the engine starts, allow the key to turn back to ON)

NOTE

- When the engine starts normally, two short beeps will be heard. Verify these sounds.
- Do not run the starter motor for more than 15 seconds. If the engine does not start in 15 seconds, turn the engine key back to ON, wait for about 30 seconds, and then restart the engine.
- Avoid frequent use of the starter motor. Once the engine starts, make sure to run the engine continuously for a while to charge the battery.



CAUTION

Do not turn the engine key to Start while the engine is running. Doing so will cause damage to the starter motor or the engine.

6. Verify that the warning lamps (Malfunction, HST filter, Oil pressure, charge) are off.

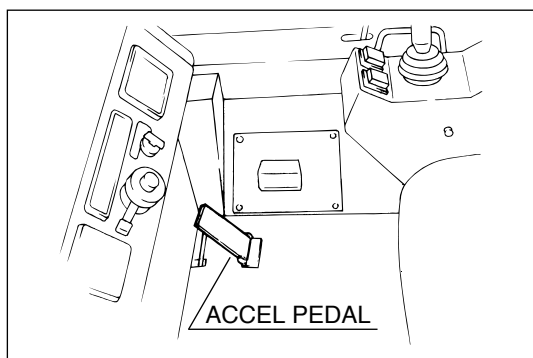
NOTE

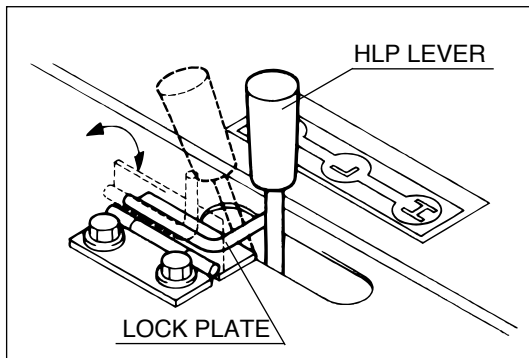
These warning lamps normally comes off after the engine starts. If any of them remains on, refer to chapter 9 “TROUBLESHOOTING” for an appropriate remedy.

7. Release the accel pedal and warm up the engine with no load.

NOTE

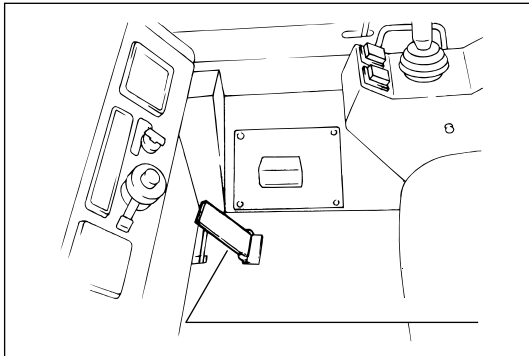
- Warming up the engine is important especially in winter and in cold areas. If you operate the machine before the engine is sufficiently warmed up, the engine or the hydraulic equipment may break down earlier.
- In an early period of use (a week or 40 – 50 operating hours after starting to use the machine), do not apply much load to the machine. Operate the machine with moderate load for running-in.





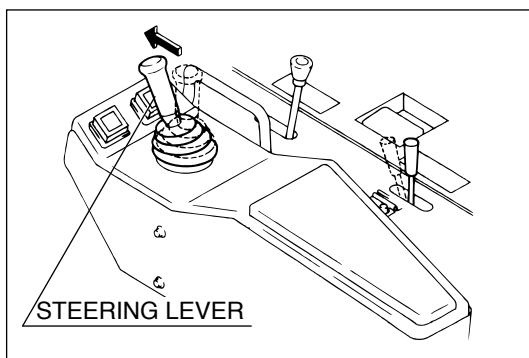
6.3 How to Drive

1. Verify safety around the machine.
2. Release the lock plate, set the HLP lever to L (low speed) or H (high speed), and relock the lock plate. (For the vehicle speed in each gear position [L or H], refer to chapter 5 "SPECIFICATION". ➡ Page 14)
3. Lightly depress the accel pedal to keep the engine running at a higher speed. (When using the accel lever, move the lever toward the high speed direction.)



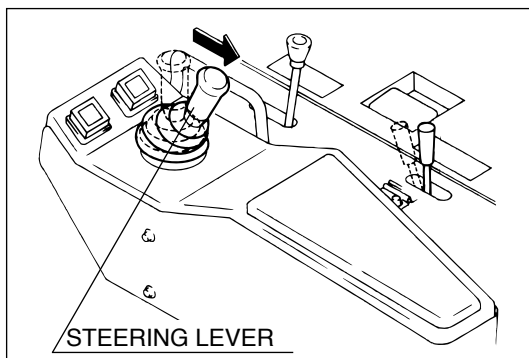
(Running forward)

4. Gradually move the steering lever forward so that the vehicle accelerates slowly in the forward direction.



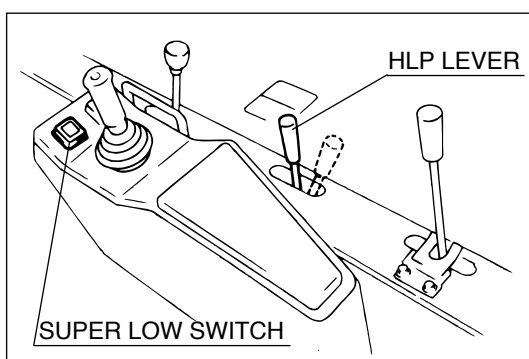
(Running backward)

4. Gradually move the steering lever backward so that the vehicle accelerates slowly in the backward direction.



(Changing gear)

4. Set the HLP lever to L (low speed) or H (high speed) according to your needs. (You can operate the HLP lever even while the vehicle is running.)



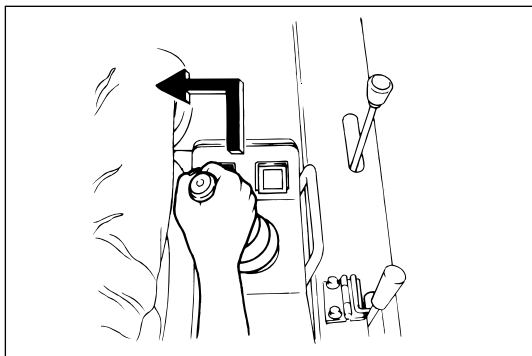
Notice:

While the super low switch is ON (lamp is on), the vehicle runs at half the speed which is normally expected at each HLP lever position (L or H).

(Making a turn)

⚠ DANGER

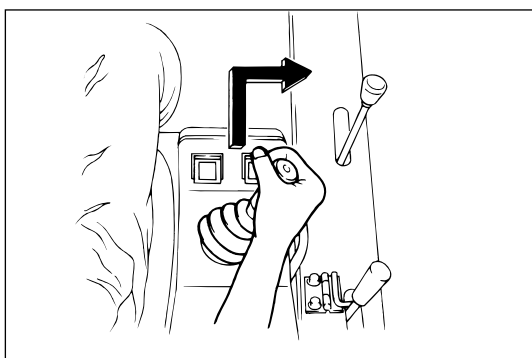
- Making a sudden turn at a high speed is very dangerous. Doing so will cause you to drop from the vehicle or the vehicle may turn over.
- Before making a turn, always verify safety around the machine.



■ Pivot turn

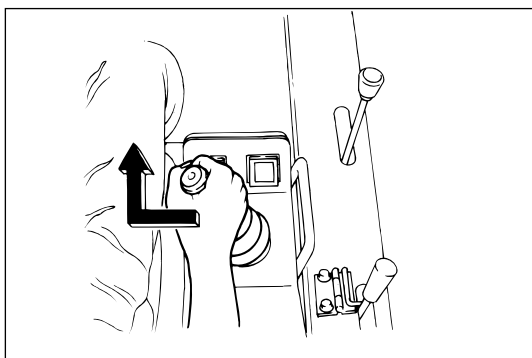
Left turn while running

4. Move the steering lever to the left. (for forward / backward turn)



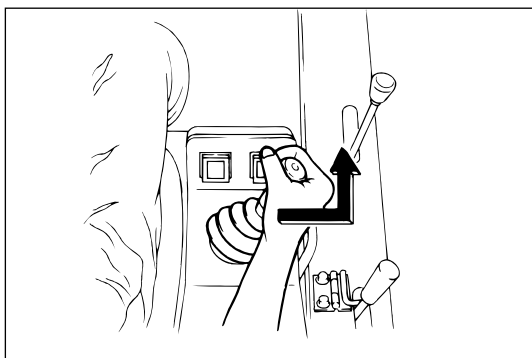
Right turn while running

4. Move the steering lever to the right. (for forward / backward turn)



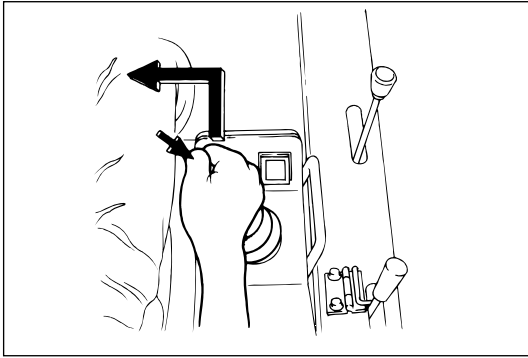
Left turn while stopping

4. Move the steering lever to the left and from there move it forward or backward.



Right turn while stopping

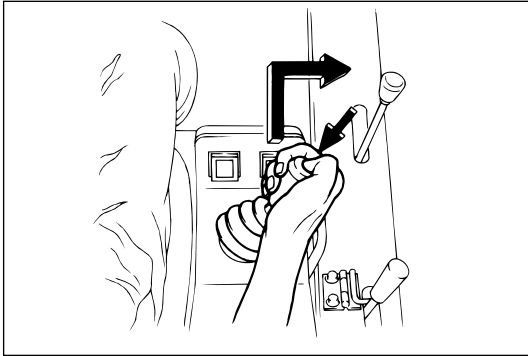
4. Move the steering lever to the right and from there move it forward or backward.



■ Spin turn

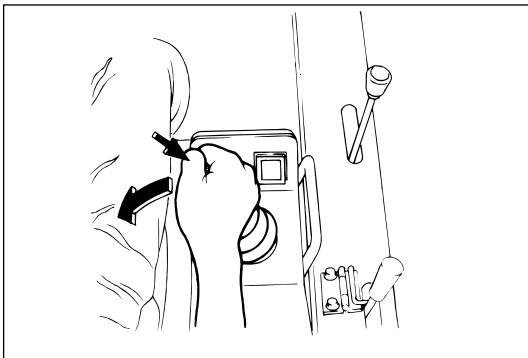
Left turn while running

4. Move the steering lever to the left while pressing the button at the top of the lever. The vehicle will make a spin turn counterclockwise. (when running forward)
Move the steering lever to the right while pressing the button at the top of the lever. The vehicle will make a spin turn counterclockwise. (when running backward)



Right turn while running

4. Move the steering lever to the right while pressing the button at the top of the lever. The vehicle will make a spin turn clockwise. (when running forward)
Move the steering lever to the left while pressing the button at the top of the lever. The vehicle will make a spin turn clockwise. (when running backward)



Left turn while stopping

4. Move the steering lever to the left while pressing the button at the top of the lever. The vehicle will make a spin turn counterclockwise.



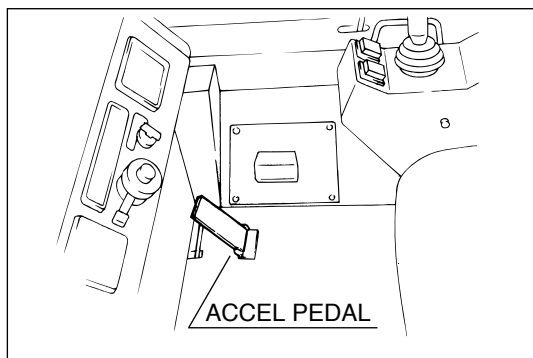
Right turn while stopping

4. Move the steering lever to the right while pressing the button at the top of the lever. The vehicle will make a spin turn clockwise.

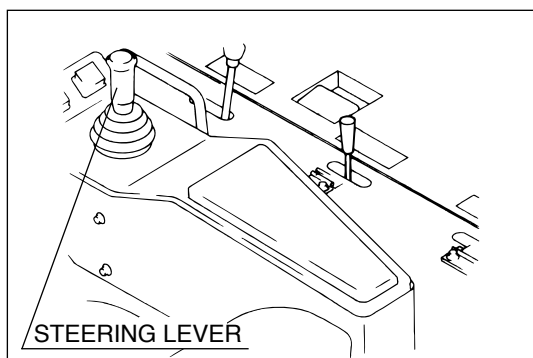
NOTE

- The vehicle make a spin turn if the button at the top of the lever is pressed even while it is making a pivot turn.
- The vehicle will not make a spin turn while the super low switch is ON (lamp is on).

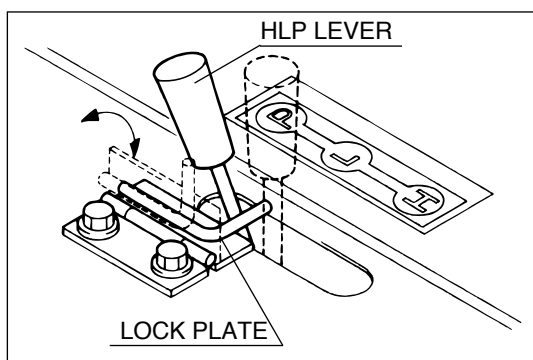
6.4 How to Stop



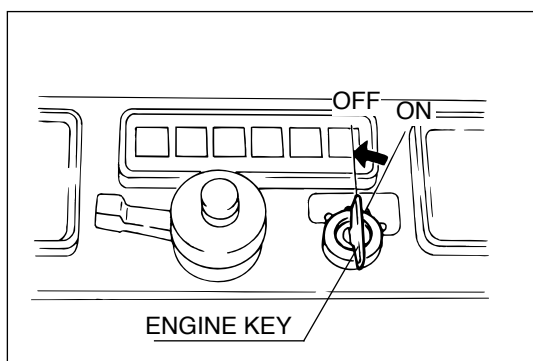
1. Slowly release the accel pedal to decelerate the vehicle. (or slowly move the accel lever to the slower speed position.)



2. Slowly move the steering lever back to Neutral.

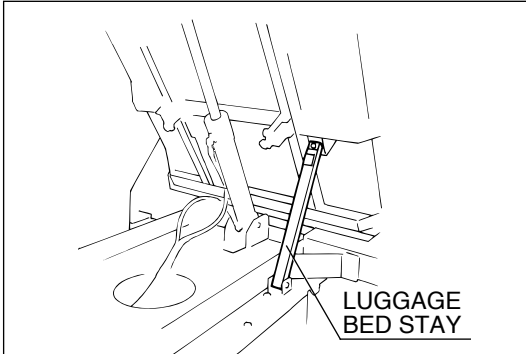
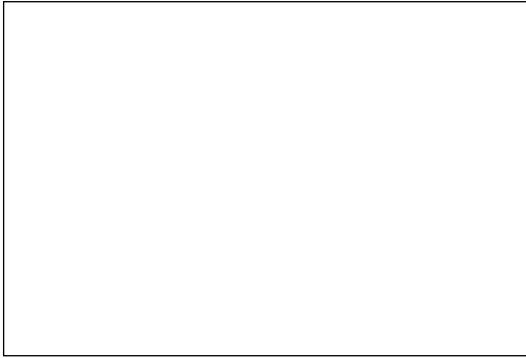


3. Unlock the lock plate and set the HLP lever to P (parking). (The parking brake is applied.)



4. Turn the engine key to OFF to stop the engine and remove the engine key.

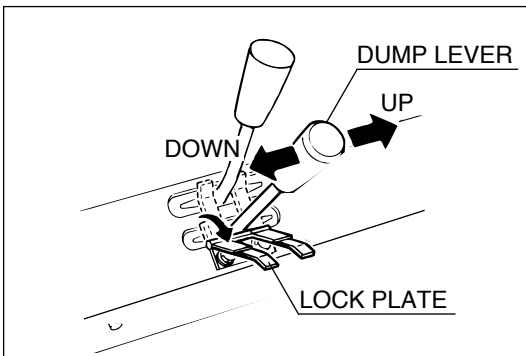
6.5 Dump Operation

**⚠ DANGER**

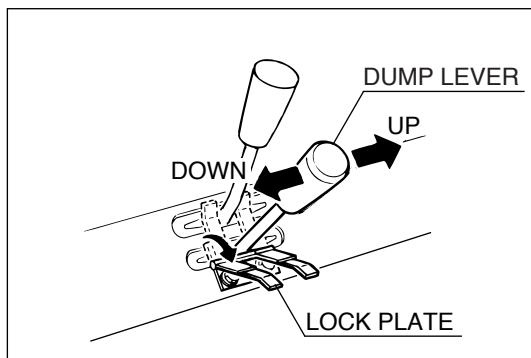
- When you work under the lifted-up luggage bed, always support the luggage bed with the attached luggage bed stay. At the same time, lock the dump lever with the lock plate. By doing these, the luggage bed is securely fixed.
- Before making a dump operation, always verify safety around the machine.

⚠ WARNING

Dump operation on a steep hill is very dangerous. Doing so makes the vehicle unstable and may cause an accident. If it is inevitable to make a dump operation on a slope, make the vehicle level by placing appropriate wooden blocks under the crawler.

**(Lifting body)**

1. Start the engine. Set the accel lever to the high speed position to raise the engine speed.
2. Unlock the lock plate for the dump lever.
3. Slowly move the dump lever toward Up.
4. When the body is fully raised, a pressure relief noise (whistle) will sound. When this sound is heard, immediately move the dump lever back to Neutral.



(Lowering body)

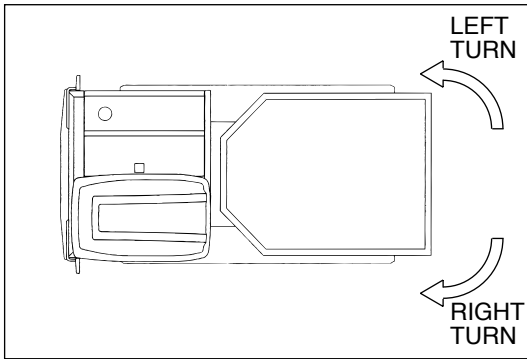
⚠ CAUTION

When the luggage bed is loaded, always lower the body slowly with a low engine speed so as not to damage the vehicle body.

1. Slowly move the dump lever toward Down.
2. When the body is fully lowered, a pressure relief noise (whistle) will sound. When this sound is heard, immediately move the dump lever back to Neutral.

NOTE

- This machine has a shock absorbing function in the dump cylinder to protect the cylinder and the vehicle body.
- Therefore, the body movement is slowed down at the beginning of raising operation and at the end of lowering operation.

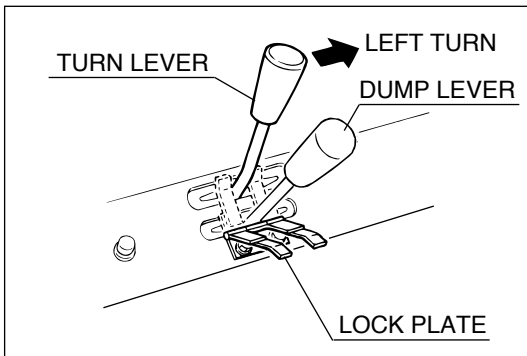


6.6 Body Turn

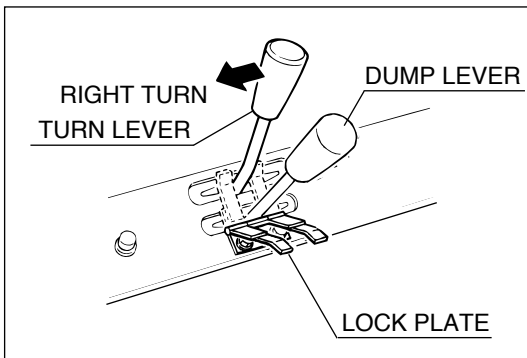
(Turning body counterclockwise)

1. Move the turn lever to the left turn position.

Max. turn angle: 90°



2. When the body turns to the maximum angle, a pressure relief noise (whistle) will sound. When this sound is heard, immediately move the turn lever back to Neutral.



(Turning body clockwise)

1. Unlock the lock plate.
2. Move the turn lever to the right turn position.

Max. turn angle: 90°

3. When the body turns to the maximum angle, a pressure relief noise (whistle) will sound. When this sound is heard, immediately move the turn lever back to Neutral.

7. MAINTENANCE

7.1 Regular Inspection Chart

Proper inspection/maintenance prevent an accident and breakdown. To maintain the machine's normal function and ensure daily safe operation, carry out the regular inspection according to the chart below.

The regular inspection consists of the yearly, monthly, and daily pre-operation checks.

NOTE

The chart below includes inspections which require technical knowledge or specified tools and measuring instruments. As to difficult inspections for the user, consult the dealer or one of our service centers.

Item	Content	Timing			Remark	
		Pre-op.	Monthly	Yearly		
■ Engine						
Base unit						
Startability	• Check if engine starts smoothly and make no abnormal noise.	Smooth start. No abnormal noise.	☐	☐	☐	
	• Check glow plug operation.	Normal operation.	☐	☐	☐	
Eng. speed	• Check if engine speed is proper at idling and unloaded max. speed. Check for smooth operation.	Proper engine speed. Smooth and continuous engine operation.		☐	☐	Request dealer for inspection.
	• Accelerate engine and check for accel lever drag, engine stall, knocking.	No drag, engine stall, nor knocking.	☐	☐	☐	
Exhaust	• After warming up engine, run engine from idling to high speed and check exhaust gas color and noise.	Normal exhaust gas color/noise.	☐	☐	☐	
	• Check for gas leak from muffler, exhaust pipe, etc.	No gas leak.		☐	☐	
Air cleaner	• Check case for crack and deformation, looseness at lid or connecting pipe.	No crack nor deformation in case. No looseness at lid and pipe.		☐	☐	
	• Check element for dirt or damage.	No sever dirt. No damage.		☐	☐	Cleaning/Replacement: 🔧 Page 42.

Item	Content	Timing			Remark
		Pre-op.	Monthly	Yearly	
■ Engine (Continue)					
Base unit					
Tightening	- Check cylinder head and manifold retaining bolts/nuts for looseness. * This check is dispensable if no gas or water leak is found at these areas.	No looseness.			
Compression pressure	- Check compression pressure. * This check is dispensable if no abnormality is found in engine operation and exhaust condition at idling and acceleration.	Proper pressure.			Request dealer for inspection.
Engine mount	Check engine base for crack and deformation.	No crack nor deformation.			
	Check bolts and nuts for looseness or missing.	No looseness nor missing.			
Lubricating system	Check oil amount and contamination.	Proper amount. No severe dirt.			Inspection / Replacement: Page 34.
	Check head cover, oil pan, and pipes for oil leak.	No severe oil leak.			
	Check oil filter for contamination and damage.	No severe dirt. No damage.			Replacement: Page 42.
Fuel system	Check fuel tank, injection pump, hose, and pipes for fuel leak.	No fuel leak.			
	Check fuel hose for damage and deterioration.	No damage nor deterioration.			
	Check fuel filter cartridge for dirt and clogging.	No severe dirt. No clogging.			Cleaning: Page 43.
	- Check injection nozzle pressure and condition. * This check is dispensable if no abnormality is found in engine operation and exhaust condition at idling and acceleration.	Proper injection pressure. Injection condition is OK.			Request dealer for inspection.
	Check inside fuel tank for water and deposit.	No water nor deposit.			Cleaning: Page 43.
Cooling sytem	Check coolant for proper amount and dirt.	Proper amount. No severe dirt.			Inspection/Refilling: Page 39.
	Check radiator, engine body, water pump, and hoses for water leak. Check radiator fins for blocking.	No water leak. No blocking.			

Item	Content	Timing			Remark	
		Pre-op.	Monthly	Yearly		
■ Engine (Continue)						
Cooling sytem	• Check hoses for damage and deterioration.	No damage nor deterioration.	☐	☐	☐	
	• Check radiator cap valve function.	Normal operation.	☐	☐	☐	
	• Check radiator cap valve seating face for damage.	No damage.	☐	☐	☐	
	• Check fan belt tension.	Deflection within specified range.	☐	☐	☐	Inspection / Adjustment: 👉 Page 45.
	• Check belt for wear and damage.	No severe wear. No damage.	☐	☐	☐	
	• Check cooling fan, cover, and duct for crack, damage, and deformation.	No crack, damage, nor severe deformation.	☐	☐	☐	
	• Check cooling fan/cover retaining bolts/nuts for looseness.	No looseness.	☐	☐	☐	
Electrical						
Charging system	• Check function with ampere meter.	Proper operation.	☐	☐	☐	Request dealer for inspection.
Battery	• Check electrolyte amount.	Proper amount.	☐	☐	☐	Inspection / Refilling: 👉 Page 40.
	• Check terminal for looseness and corrosion.	No looseness nor severe corrosion.	☐	☐	☐	
Wiring harness	• Check connection for looseness.	No looseness.	☐	☐	☐	
	• Check wiring harness for damage.	No damage.	☐	☐	☐	
■ Powertrain						
HST pump	• Make the vehicle run forward/backward and turn to check operation condition (noise, overheat).	Normal operation and no abnormal noise nor overheat.	☐	☐	☐	
	• Check oil amount in oil tank.	Proper amount.	☐	☐	☐	Inspection / Replacement: 👉 Page 36.
	• Check oil for contamination.	No severe dirt.	☐	☐	☐	Inspection / Replacement: 👉 Page 36.
	• Check oil tank for oil leak.	No oil leak.	☐	☐	☐	

Item	Content	Timing			Remark	
		Pre-op.	Monthly	Yearly		
■ Drive system						
Sprocket Idler Roller Upper roller	• Check for crack, deformation, and wear.	No crack, deformation, nor severe wear.	☐	☐	☐	
	• Run the vehicle and check axle for noise and overheat.	No abnormal noise nor overheat.	☐	☐	☐	
	• Check bolts/nuts for looseness and missing.	No looseness nor missing.	☐	☐	☐	
	• Check oil leak at axle.	No oil leak.	☐	☐	☐	
	• Run the vehicle and check if the roller bracket smoothly go up and down according to uneven ground.	Smooth operation.		☐	☐	
Crawler	• Check steel cord for cut and damage.	No cut nor severe damage.	☐	☐	☐	
	• Check rubber for break-off, deterioration, wear.	No severe break-off, deterioration, nor wear.	☐	☐	☐	
	• Check core wire for missing and bend.	No missing.	☐	☐	☐	
	• Check crawler tension.	No looseness nor too much tension.	☐	☐	☐	Adjustment: 👉 Page 47.
Crawler belt adjuster	• Inject grease in crawler belt adjuster cylinder and check operation.	Normal operation.		☐	☐	
Track frame	• Check for crack, deformation, damage, and wear at sliding area. Use flaw detector as necessary.	No crack, deformation, damage, nor severe wear.		☐	☐	
	• Check bolts/nuts for looseness and missing.	No looseness, missing.	☐	☐	☐	
■ Brake						
Parking brake	• Stop unloaded vehicle on a 1/5 slope and set HLP lever to Park. Check if vehicle keeps stopping.	Proper brake effect.	☐	☐	☐	
■ Hydraulic system						
Oil pump	• Check oil leak from pipe/hose fitting and sealing.	No oil leak.	☐	☐	☐	
	• Operate oil pump loaded and unloaded. Check for vibration, noise, and overheat.	No abnormal vibration, noise, nor overheat.		☐	☐	

Item	Content	Timing			Remark	
		Pre-op.	Monthly	Yearly		
■ Hydraulic system (Continue)						
Oil pump	• Apply load to oil pump and check discharge amount and pressure. This check is dispensable if there is no abnormal vibration, noise, nor overheat found in the above inspection.	Within specified range.			☐	
Piping (hoses, high pressure pipes)	• Check piping for crack, damage, aging, kink.	No crack, damage, aging, nor kink.	☐	☐	☐	
	• Check fitting for oil leak.	No oil leak.	☐	☐	☐	
	• Check piping installation and bolts/nuts for looseness and missing.	Proper installation. No bolt/nut looseness and missing.	☐	☐	☐	
Hydraulic cylinder	• Check operation.	Smooth operation.	☐	☐	☐	
	• After operating cylinder several strokes, check sealing for oil leak.	No oil leak.		☐	☐	
	• Apply load to cylinder in standstill. Check cylinder telescopic amount.	Telescopic amount be within specified range.			☐	
	• Check cylinder tube and rod for impact, crack, bend, and scratch.	No impact, crack, bend, nor scratch.		☐	☐	
	• Check cylinder mounting pin for wear and damage.	No excessive wear. No damage.	☐	☐	☐	
Control valve	• Move the spool and check operation.	Smooth operation.	☐	☐	☐	
	• Check installation condition.	Proper installation.		☐	☐	
	• Apply load (by operating hydraulic cylinder) and check operation.	Hydraulic cylinder must operate normally or stop surely.	☐	☐	☐	
	• Check valve body, piping, fitting for oil leak.	No oil leak.	☐	☐	☐	
■ Loading system						
Body (including tailgate and side gate)	• Check smooth operation of luggage bed raising/lowering and tailgate opening/closing.	Smooth operation.	☐	☐	☐	
	• Check if tailgate automatically opens when raising luggage bed and closes and locks when lowering luggage bed.	Smooth opening and sure locking.	☐	☐	☐	
	• Check for crack, deformation, wear.	No crack, deformation nor wear.	☐	☐	☐	

Item	Content	Timing			Remark	
		Pre-op.	Monthly	Yearly		
■ Loading system (Continue)						
	• Check retaining bolts/nuts for looseness and missing.	No looseness, missing.	☐	☐	☐	
	• While raising/lowering luggage bed, check looseness of frame/ luggage bed pin and dump cylinder mounting pin.	No severe looseness.		☐	☐	
■ Base unit / Safety device						
Frame & Base Unit	• Check for crack, deformation, corrosion.	No crack, nor sever deforamtion.	☐	☐	☐	
	• Check bolts/nuts for looseness and missing.	No looseness nor missing.	☐	☐	☐	
Cover	• Check for crack, deformation, corrosion.	No crack, severe deformation, nor corrosion.	☐	☐	☐	
	• Check cover opening/closing movement and lock function.	No abnormality in opening/closing/locking.		☐	☐	
Seat	• Check seat adjuster and lock function	Normal operation.		☐	☐	
	• Check bolts/nuts for looseness and missing.	No looseness, missing.	☐	☐	☐	
Labels	• Check if all specified safety/ information labels boards are attached properly.	No missing nor damage.		☐	☐	
Lamp, silencer, turn indicator	• Operate switches and check function.	Normal operation.	☐	☐	☐	
	• Check lamp for lens damage, water invasion.	No damage nor water intrusion.	☐	☐	☐	
Meter & gauges	• Run engine and check meter/ gauge operation.	Normal operation.	☐	☐	☐	
Lubricate & grease	• Check lubricating/greasing condition.	Proper lubrication/ greasing.		☐	☐	Greasing: 👉 Page 38.
Body stay	• Raise luggage bed and check installation of devices.	Secure installation.	☐	☐	☐	
	• Check for bend and deformation.	No severe bend nor deformation.	☐	☐	☐	
	• Check stay, stopper mount for crack and damage. Use flaw detector as necessary.	No crack nor damage.		☐	☐	
General test	• Run vehicle and operate loading system to check function.	Proper operation. No abnormal noise, vibration, nor overheat.			☐	

7.2 Oil / Grease / Lubricant / Fluid List

Item	Timing	Recommendation	Amount	Refer to
Fuel	As necessary.	Light oil for diesel	40 L	 Page 15
Engine oil	Add: Check daily and add as necessary. Replace: 1st: 50 operating hours. 2nd or later: every 200 operating hours.	API class CD or higher SAE class 10W-30	9.7 L	 Page 34
HST oil (also for oil pump)	Replace: 1st: 500 operating hours. 2nd or later: every 1000 operating hours.	Viscous hydraulic fluid VG46 * Use anti-abrasive fluid VG32 in cold area (-15°C or lower).	40 L	 Page 36
Sprocket lubricant	Replace: 1st: 200 operating hours. 2nd or later: 1000 operating hours.	Gear oil API class GL4 SAE class #90	0.8 L	 Page 37
Cylinder pin, roller fulcrum, etc.	Every 6 months. * No need for greasing for the first 6 months.	Multi-purpose lithium grease (No.2 equivalent)	—	 Page 38
Engine coolant	Add: Check daily and add as necessary. Replace: every 300 operating hours.	Mixture of water and antifreeze	8.2 L	 Page 39
Battery fluid	Check ever 50 operating hours and add as necessary.	Distilled water	—	 Page 40

7.3 Consumables (Service Parts) List

Item	Replace timing	Qty	Refer to
Air cleaner element	Every 1000 operating hours	1	 Page 42
Fuel filter cartridge	Every 500 operating hours	1	 Page 43
Engine oil filter cartridge	Every 400 operating hours (At first, replace after 50 operating hours.)	1	 Page 42
HST filter element	Every 500 operating hours	1	 Page 43
Suction filter element	Every 1000 operating hours	1	 Page 44
Battery	Replace if defect is found.	1	 Page 40
Crawler	Replace if defect is found.	2	 Page 47
Other consumables	Consult dealer or one of our service centers.	—	—

7.4 Supplying Oil

NOTE

Insufficient or inappropriate oil supply causes poor lubrication and malfunction, resulting in shorter life of the machine. Make sure to supply an appropriate amount of specified clean oil.

7.4.1 Engine oil

Check

1. Open the engine cover. (→ Page 16)
2. Pull out the oil level gauge.
3. Check the oil level, contamination and viscosity. If the oil level is improper (see below) or severe contamination or inappropriate viscosity is found, add / replace the engine oil.

Engine oil amount:

Between F and L on oil level gauge

Adding oil

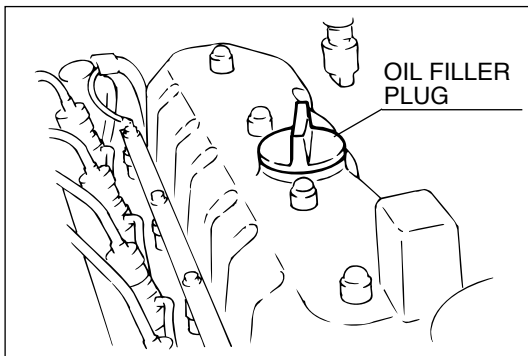
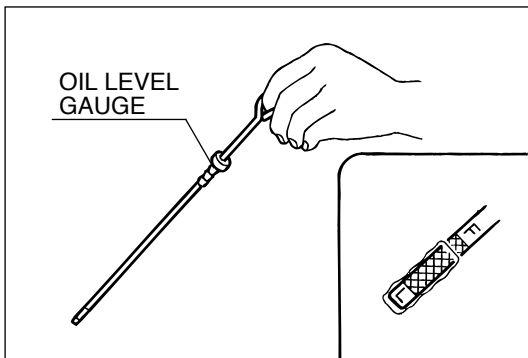
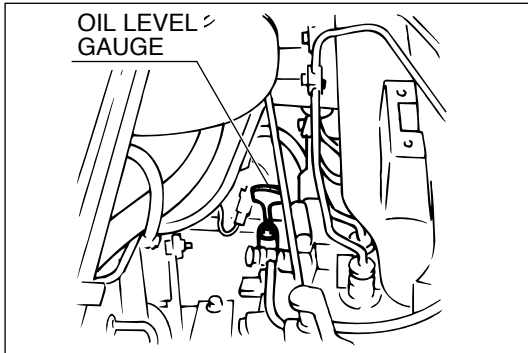
1. Remove the oil filler plug.

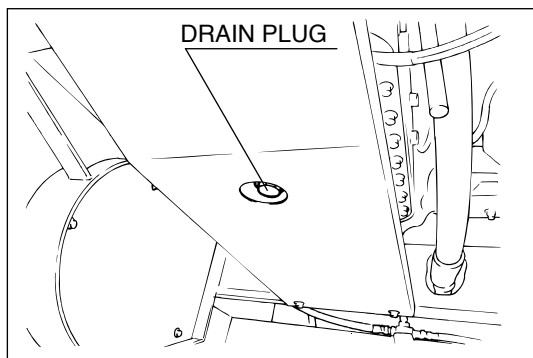
CAUTION

Do not attempt to remove the oil filler plug while the engine is hot. Always wait until the engine is cooled down. Otherwise you may scald yourself.

2. Add specified oil from the oil filler hole.

Oil to use: → Page 33.





Replacing oil

1. Prepare an appropriate container to collect drained oil.
2. Warm up the engine to raise oil temperature.
3. Stop the engine.
4. Remove the oil drain plug at the bottom of the engine and drain all oil from the crank case.

⚠ CAUTION

Be careful not to scald yourself with hot oil.

NOTE

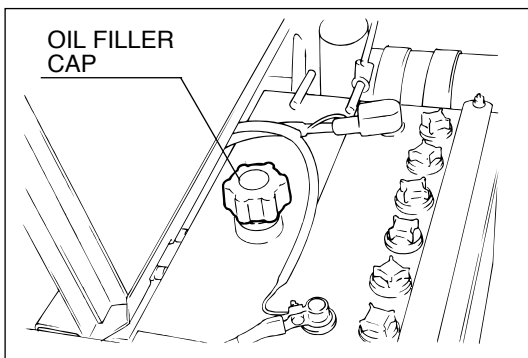
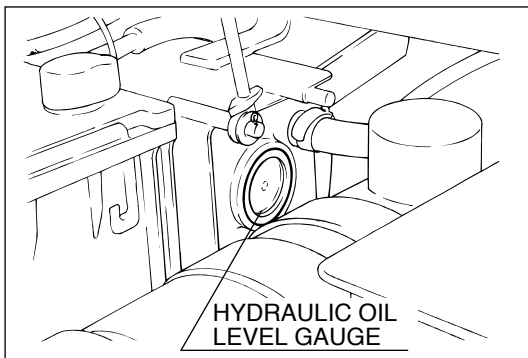
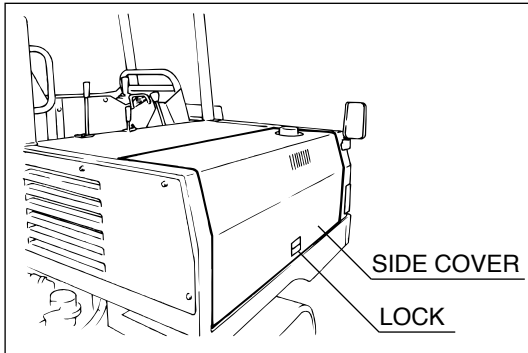
Dispose of drained oil appropriately.

5. Fit the oil drain plug.
6. Remove the oil filler plug and fill the engine with specified oil. (Refer to "Adding oil".)

7.4.2 HST oil (hydraulic oil)

NOTE

- If oil inside the hydraulic devices decreases, air can enter the hoses and cylinders. This will hinder the operation of hydraulic devices. Make sure to regularly check the oil amount and add the oil as necessary.
- The hydraulic oil is used also as HST oil. You only have to fill the hydraulic oil tank for HST oil supply.

**Checking oil level**

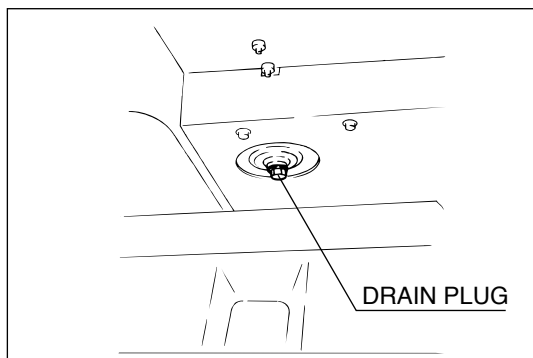
1. Unlock the side cover and open the side cover.
2. Support the side cover with the attached stay.
3. Visually check the oil level on the hydraulic oil level gauge and add oil as necessary.

Adding oil

1. Remove the filler cap of the hydraulic oil tank.
2. Add the specified oil from the filler hole.

Oil to use:  **Page 33.**

3. Fit the filler cap.
4. Start the engine and circulate the oil.
5. Check the oil level on the hydraulic oil level gauge.



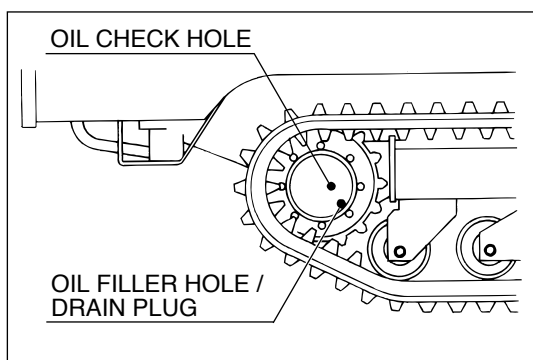
Replacing oil

1. Prepare an appropriate container to collect drained oil.
2. Remove the drain plug at the bottom of the hydraulic oil tank.

NOTE

Dispose of drained oil appropriately.

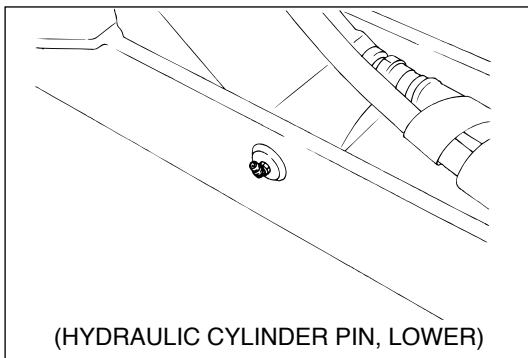
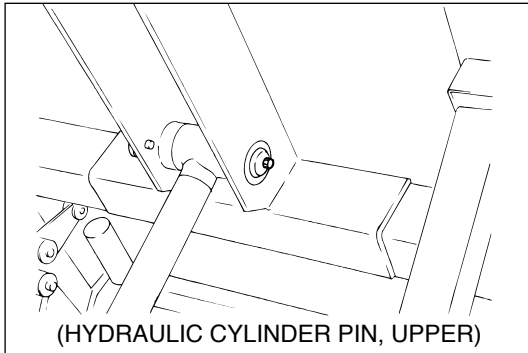
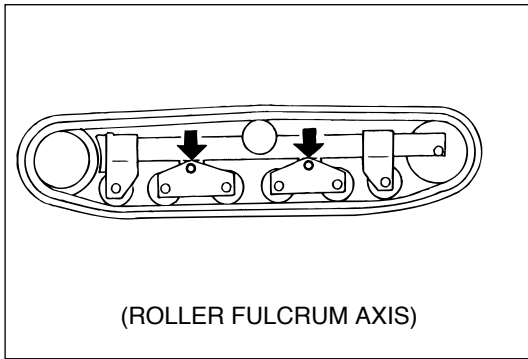
3. Fit the drain plug.
4. Remove the filler cap and fill the tank with oil. (Refer to "Adding oil".)



7.4.3 Sprocket lubricant (for reduction gears)

Replacing

1. Turn the sprocket so that the drain plug comes below.
2. Remove the drain plug and drain all oil inside. After that fit the drain plug.
3. Turn the sprocket so that the oil check hole is level with the sprocket wheel center and the oil filler hole comes over the check hole.
4. Add oil from the filler hole until the oil comes out from the check hole.



7.5 Greasing / Lubricating

NOTE

Insufficient or improper greasing or lubrication can cause mechanical burn or rust resulting in non-smooth operation of various mechanisms. Make sure to lubricate and grease the machine on a regular basis (every six months).

1. Use a hand grease pump or an air grease pump to grease at the following points.

Grease to use:  **Page 33.**

Notice:

When using a hand grease pump, pump it several times at every greasing point. If the pump handle becomes heavy to move during pumping operation, immediately stop pumping. When using an air grease pump, operate it for two or three seconds at every greasing point.

- a. Roller fulcrum axis (four points)
- b. Hydraulic cylinder pin (upper, lower)
- c. Luggage bed fulcrum (two points)
- d. Boss of gate hook lever (two points)
- e. Rotation bearing (four points) - Turn & Dump featured model
- f. Rotation hydraulic cylinder pin (four points) - Turn & Dump featured model

7.6 Supplying Fluid

7.6.1 Engine coolant

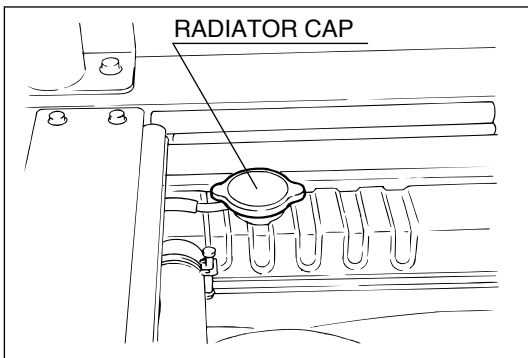
NOTE

If the coolant temperature gauge needle points near H, the engine cooling is not sufficient due to shortage of engine coolant. In such cases, always check the coolant amount.

Checking / adding coolant

CAUTION

Before removing the radiator cap, always verify that the coolant is cooled down (approx. 30 minutes are needed after the engine stops). If you open the radiator cap while the coolant temperature is high (during or immediately after engine operation), spouted hot coolant can cause a scald.



1. Open the engine cover. (→ Page 16)
2. Remove the radiator cap.
3. Visually check the coolant amount and add coolant as necessary.

Total coolant amount: 8.2 L

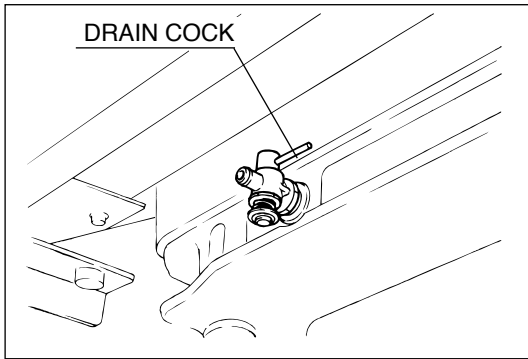
Mixing antifreeze (reference)

This machine is filled with coolant including 45% antifreeze.

The ratio of antifreeze should be changed according to the lowest ambient temperature in your region. Adjust the mixing ratio of water and antifreeze referring to the table below.

Temp.	Mixing ratio	Temp.	Mixing ratio
-10°C	30%	-30°C	50%
-15°C	35%	-35°C	55%
-20°C	40%	-40°C	60%
-25°C	45%		

* Temp. indicates the lowest ambient temperature -5°C.



Replacing coolant

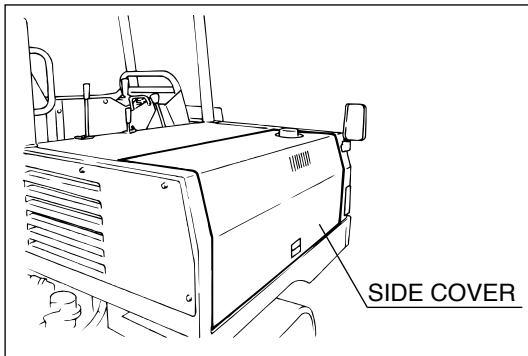
1. Prepare an appropriate container to collect drained coolant.
2. Open the drain cock at the lower end of the radiator.
3. Drain the coolant and clean inside the radiator.
4. Close the drain cock and refill the radiator with coolant.

7.6.2 Battery fluid

Checking / adding battery fluid

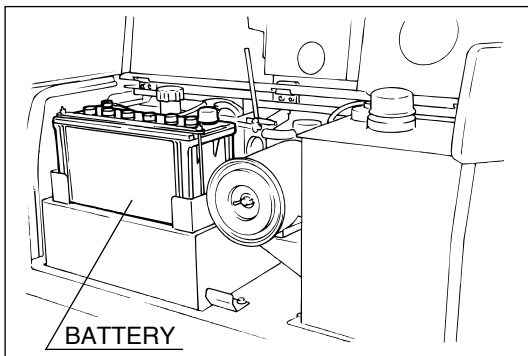
⚠ DANGER

The gas generated from the battery is inflammable. Do not bring fire (lighted tobacco, etc.) near the battery. Doing so may cause an explosion.



⚠ CAUTION

- Do not allow battery fluid to splash on your clothes or any part of your body. If you suffer even a little of battery fluid, immediately put off the contaminated clothes and clean the affected part of your body. Otherwise you may burn yourself due to sulfuric acid included in battery fluid.
- Before checking or removing the battery, always stop the engine and turn OFF the starter switch.



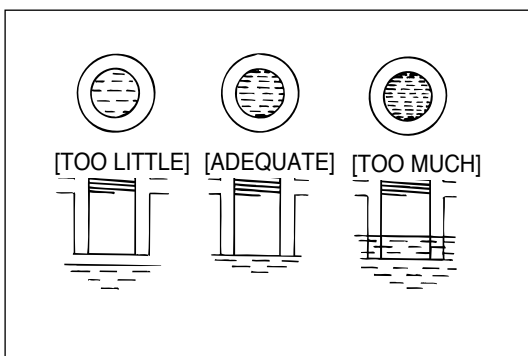
1. Open the side cover. (→ Page 36)
2. Visually check the battery fluid level and add fluid as necessary.

Proper battery fluid level:

Between upper and lower lines

(up to 10 mm over polar plate edge)

Battery fluid: Distilled water



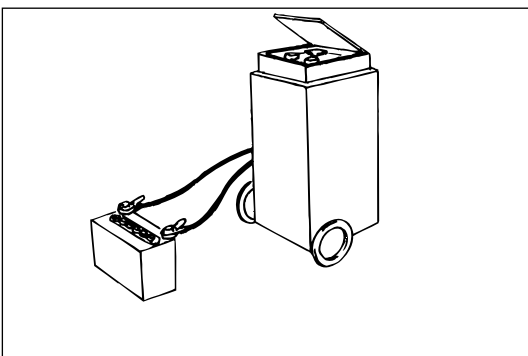
Charging

⚠ CAUTION

- Always remove the battery from the vehicle before charging the battery. Charging the battery on vehicle may cause damage to electrical parts or wiring harnesses.
- Do not make an error in connecting cables with the both terminal of the battery. A connection error, even for instant, will blow the fuse and render the battery not rechargeable.
- When disconnecting cables from the battery, start with the minus terminal. When connecting cables with the battery, start with the plus terminal. If you reverse the order, the battery may be shorted when the tool touches any conductive part of the battery.
- When reinstalling the removed battery, correctly connect the plus and minus cables and properly route and secure the cables with the tightening bolts so that they will not cause a short circuit with the other parts of the vehicle body.

NOTE

Quick charging is a method to charge a battery to some extent in a short time with a large amount of current. This method should be used only as temporary remedy. After quick charge, always recharge the battery fully according to the proper procedure as soon as possible. Otherwise the battery life will be extremely shortened.



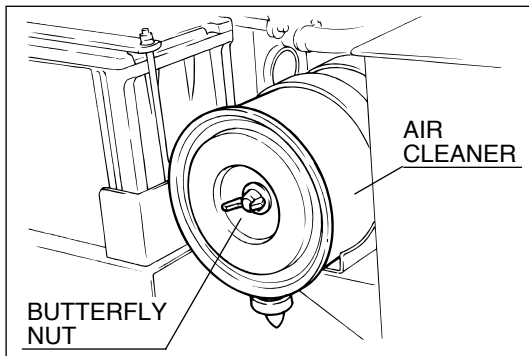
1. Remove the battery.
2. Connect a battery charger with the battery matching the polarities (plus to plus, minus to minus) and start charging. (Follow the instructions in the battery charger operation manual.)

7.7 Cleaning / Replacement

7.7.1 Air cleaner element

NOTE

Make sure to clean the air cleaner element on a regular basis. A severely contaminated air cleaner element will badly affect engine startability, power, and life.



Cleaning / replacing air cleaner element

1. Open the side cover. (👉 Page 36)
2. Loosen the element tightening butterfly nut.
3. Remove the air cleaner element.
4. Tap on the air cleaner element to drop dust from the element. Or blow compressed air inside the element.

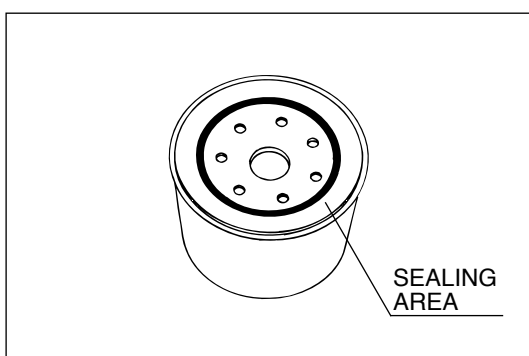
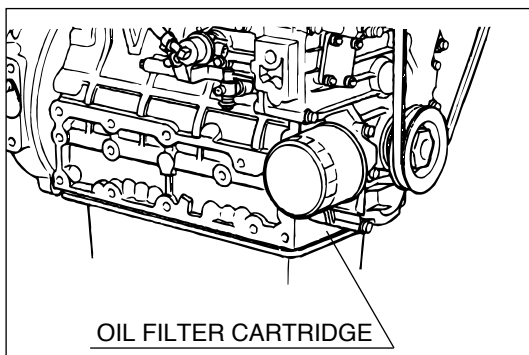
NOTE

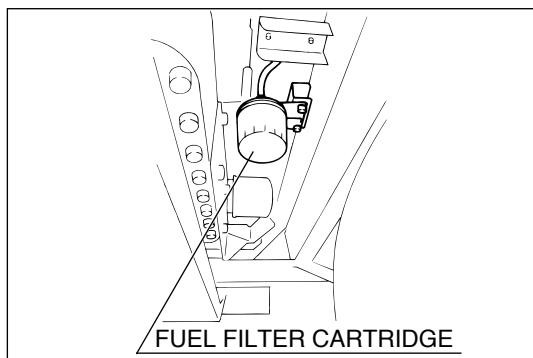
- **Do not use oil. The air cleaner is a dry type.**
- **Replace the element every 1000 operating hours with a new one.**
- **If the element is perforated, always replace it with a new one.**

5. Install the air cleaner element.

7.7.2 Engine oil filter cartridge

1. Open the engine cover. (👉 Page 16)
2. Turn the oil filter cartridge counterclockwise with an oil filter wrench and remove it.
3. Clean the engine side filter housing base.
4. Apply a thin coat of clean engine oil to the sealing face of a new oil filter.
5. Install the new engine oil filter and fully tighten it by hand.
6. Start the engine and check the cartridge for an oil leak.





7.7.3 Fuel filter cartridge

NOTE

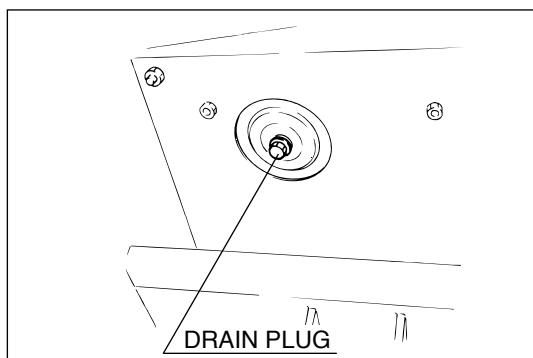
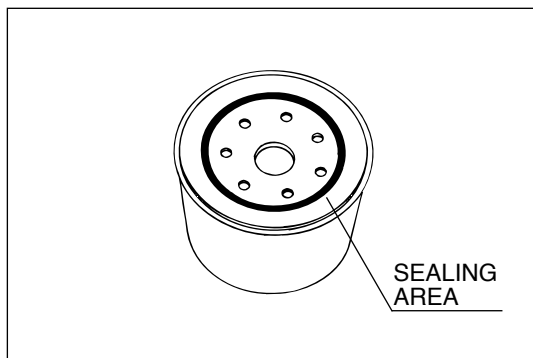
Replace the fuel filter cartridge every 500 operating hours.

1. Turn the fuel filter cartridge counterclockwise with an oil filter wrench and remove it.
2. Install a new fuel filter cartridge.

NOTE

Thinly apply fuel to the O ring and fully tighten the cartridge by hand. Do not use an oil filter wrench.

3. After installation, air-bleed the fuel system. (→ Page 46)

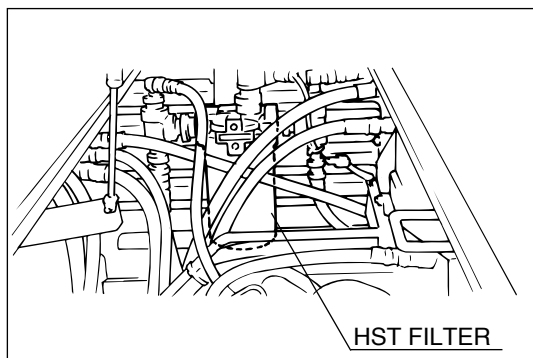


7.7.4 Draining water from fuel tank

NOTE

Drain water inside the fuel tank every 50 operating hours.

1. Loosen the drain plug at the bottom of the fuel tank and drain water and deposits inside the fuel tank.



7.7.5 HST filter element

NOTE

The HST filter lamp lighting indicates a replacement timing of the filter element.

1. Open the engine cover. (→ Page 16)
2. Remove the lower part of the filter.

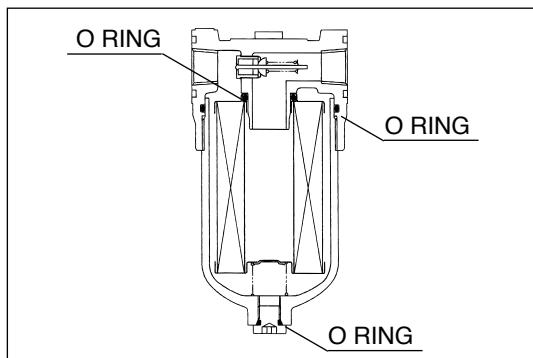
CAUTION

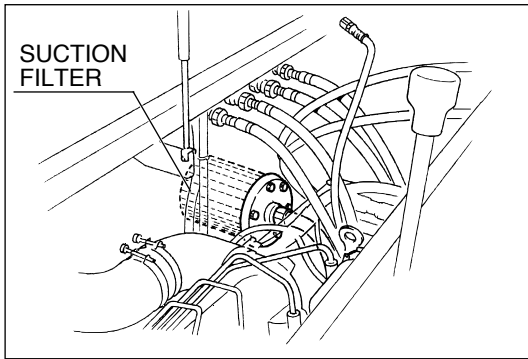
Be careful not to scald yourself especially while the oil is hot.

3. Remove the element and install a new element.
4. After replacing the HST filter element, check the oil level in the operation fluid tank and add oil as necessary. (→ Page 37)

NOTE

If the O ring is damaged, always replace it with a new one.





7.7.6 Suction filter element

NOTE

Whenever replacing the operation fluid, also replace the suction filter element.

1. Open the engine cover. (→ Page 16)
2. Remove the flange cover section and remove the suction filter.

⚠ CAUTION

Be careful not to scald yourself especially while the oil is hot.

3. Remove the element and install a new element.

NOTE

If the O ring is damaged, always replace it with a new one.

7.8 Adjustment

7.8.1 Tension of cooling fan belt

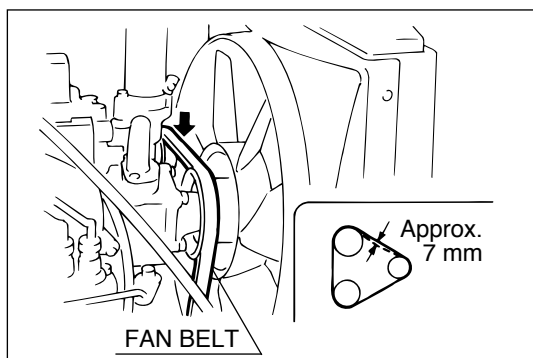
NOTE

- Insufficient belt tension will cause slip of the belt resulting in poor performance of the engine cooling system. What is worse, it may shorten the engine life.
- Checking / adjusting belt tension

CAUTION

Always stop the engine before checking the belt tension.

1. Open the engine cover. (☞ Page 16)



2. Push down the middle of the fan belt (as shown in the figure) to check tension.

Deflection:

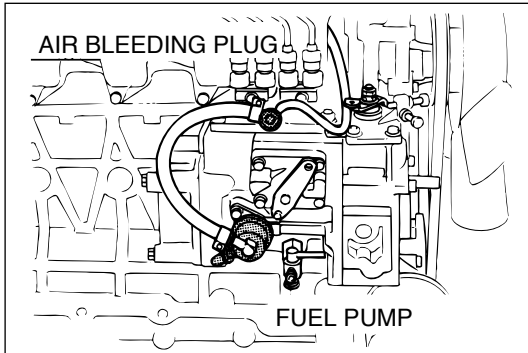
Approx. 7 mm when 5 kg force applied.

3. If the deflection is outside the above range, loosen the attaching bolt and move the alternator position to adjust the belt tension.

7.8.2 Air bleeding of fuel system

NOTE

If the engine is operated until all fuel in the fuel tank is consumed, air can enter the injection pump when the fuel tank is refilled. The air in the injection pump will prevent the engine starting. In such a case, air-bleed the fuel system following the procedure below. Air bleeding is also necessary after replacing the fuel filter or fuel pipe.



1. Refill the fuel tank with fuel.
2. Open the side cover. (→ Page 36)
3. Loosen the air bleeding plug.
4. Turn ON the starter switch to operate the fuel pump for about five seconds.
5. As soon as fuel comes out from the plug, tighten the plug.

7.8.3 Tension of crawler

NOTE

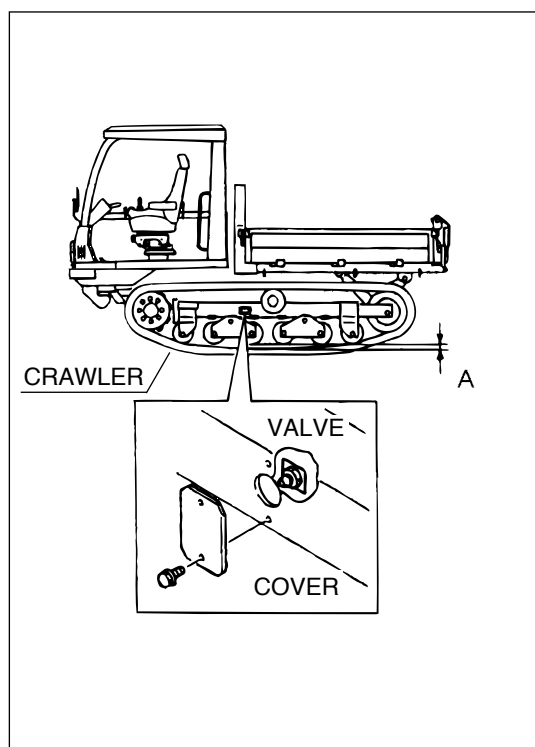
A new crawler elongates as it is used or in other words, the running distance increases. This can cause looseness between the crawler and the sprocket, resulting in need for adjustment. If the crawler tension becomes inappropriate, always readjust it. Otherwise the crawler may come off the sprocket or its life may be extremely shortened.

Adjusting crawler

1. Place the vehicle on a level ground.
2. Lift up the vehicle with jacks, etc. so that one crawler completely becomes off the ground.

CAUTION

Securely support the vehicle by using appropriate stay under the chassis.

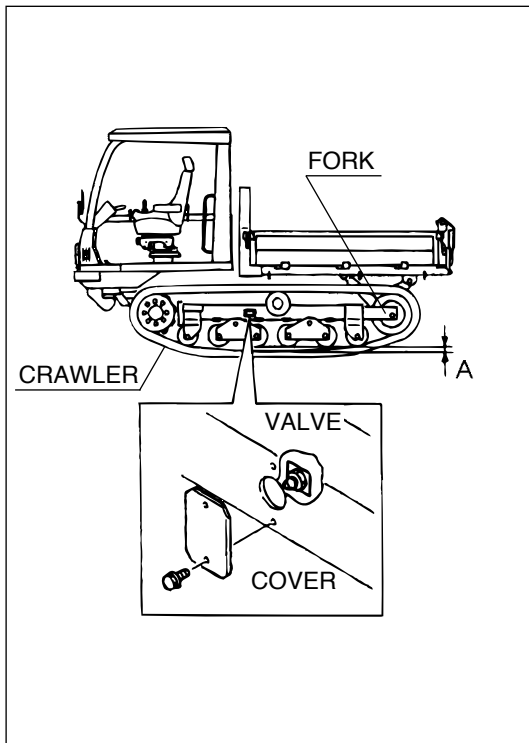


3. Remove the cover.
4. Adjust the crawler tension as follows: Using a grease pump, inject grease from the valve until the clearance between the crawler and the roller (A in the figure) is decreased to 3 – 4 cm (when the roller is level).
5. Refit the cover.

Installing / adjusting crawler

If the crawler comes off, reinstall and adjust it according to the following procedure.

1. Place the vehicle on a level ground.
2. Lift up the vehicle with jacks, etc. so that one crawler completely becomes off the ground.

**CAUTION**

Securely support the vehicle by using appropriate stay under the chassis.

3. Remove the cover.
4. Loosen the valve to decrease the cylinder inner pressure.
5. Remove the valve.
6. Push forward the fork.
7. First attach the crawler front (sprocket side) and then attach the crawler rear (idler side).

NOTE

- **The crawler is heavy. Be careful not to get injured.**
 - **Use a iron pipe or an equivalent tool to attach the crawler.**
8. Securely tighten the valve while exercising special caution not to pinch the O ring.
 9. Adjust the crawler tension as follows: Using a grease pump, inject grease from the valve until the clearance between the crawler and the roller (A in the figure) is decreased to 3 – 4 cm (when the roller is level).
 10. Verify that the crawler securely engages with the sprocket and the roller. Lower the vehicle.
 11. Refit the cover.

7.9 Electrical

7.9.1 Fuses

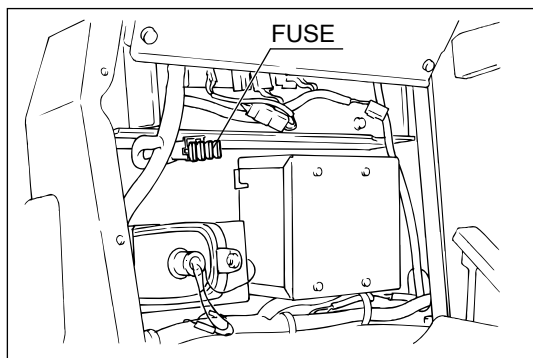
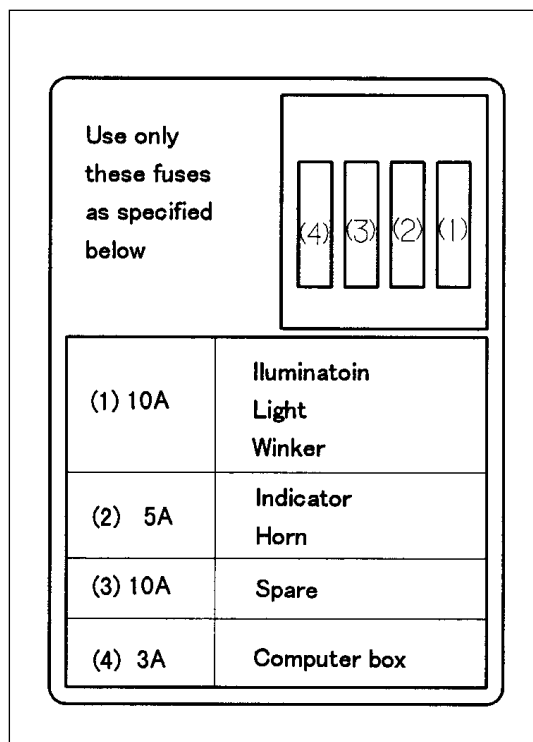
Checking fuse

NOTE

We equip the machine with fuses to prevent accidents in case of an electrical circuit failure. Whenever you find an abnormal condition in the electrical circuits, check the fuses.

1. Each fuse is related to some of electrical functions. Check appropriate fuse(s) referring to the following fuse list.

- Illumination, headlight, blinkers: 10A
- Indicator, horn: 5A
- Spare: 10A
- Computer box: 3A



Replacing fuses

CAUTION

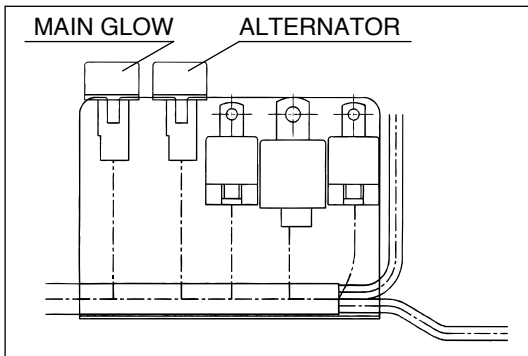
When a fuse is blown, first identify the cause and make a necessary repair. After that replace the fuse with a specified fuse. Do not use a fuse other than specified. Doing so may cause malfunctions. And our warranty does not cover such malfunctions.

1. Remove the cover under the meter & gauge section and remove the fuse.

7.9.2 Slob fuse

NOTE

The slob fuses protect the electrical circuits. If any of them is blown, first identify the cause and make an appropriate repair. After that, replace it with a genuine part.



- Main glow (50A)
- Alternator (30A)

7.10 After-Use Maintenance

(Normal use)

- Remove all dirt, water, and foreign objects from the body. Do not use water to wash the engine or the operation panel. Doing so will cause water intrusion and rust.
- We recommend you to cover the vehicle with a water-proof sheet when placing it outdoors.

(In cold season)

- Remove all dirt, water, and foreign objects from the body. Make sure to place the vehicle on a concrete floor, a dry firm ground, or wooden blocks. Any remaining dirt will freeze and cause malfunctions. (We recommend you to use wooden blocks laid transversely under the crawlers in an extremely cold area.)

NOTE

If the vehicle freezes and become inoperative, do not attempt to move it forcibly. Melt ice with (hot) water or wait until the vehicle is de-frozen. Our warranty does not cover malfunctions caused by neglect of the above instruction.

- We recommend you to cover the vehicle with a water-proof sheet when placing it outdoors.

8. STORAGE (LONG TERM)

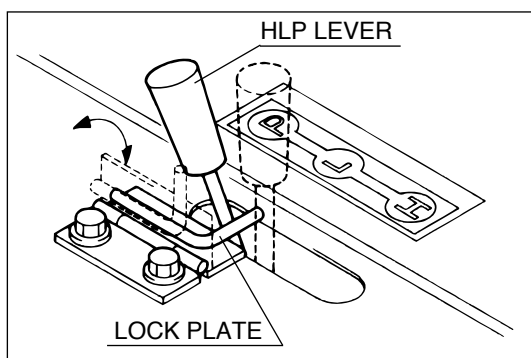
When storing the vehicle for a long period, follow the instructions and precautions shown below after performing after-use maintenance (→ Page 50).

⚠ DANGER

Do not store the vehicle, battery, nor fuel near fire or in a high ambient temperature. Doing so may cause a fire accident.

NOTE

Do not store the vehicle in a dusty or damp area. Make sure to cover the vehicle with a water-proof sheet after the engine cools down.



8.1 Vehicle Body

1. Clean the outer faces with cloth damped in oil. Grease appropriate points (→ Page 38)
2. Set the accel lever at the low speed position and HLP lever at P (parking).
3. Pull out the engine key.

8.2 Battery

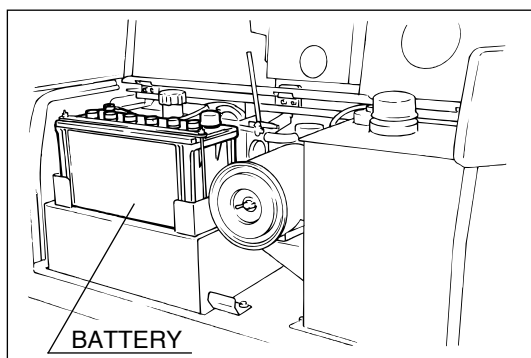
⚠ CAUTION

When disconnecting cables from the battery, start with the minus terminal. When connecting cables with the battery, start with the plus terminal.

1. Open the side cover and remove the battery from the vehicle.
2. Check the battery fluid level and add fluid as necessary. (→ Page 40)
3. Store the battery in a dry area with low temperature.

Notice:

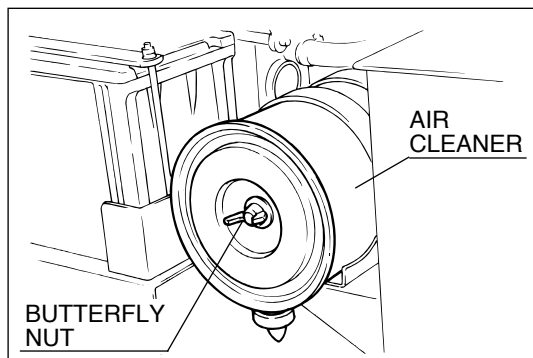
The battery keeps power for about six months without charging. But we recommend you to charge the battery before it is fully discharged. This will extend the battery life.



8.3 Engine

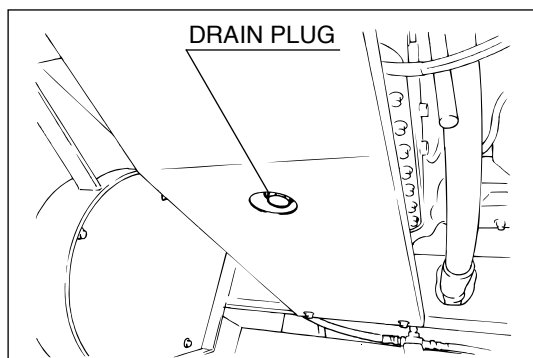
NOTE

- Remove all fuel from the fuel tank. Do not use fuel which has been left unused for a long time.
- Refer to the Engine Operation Manual for more details about long-term storage of the engine.



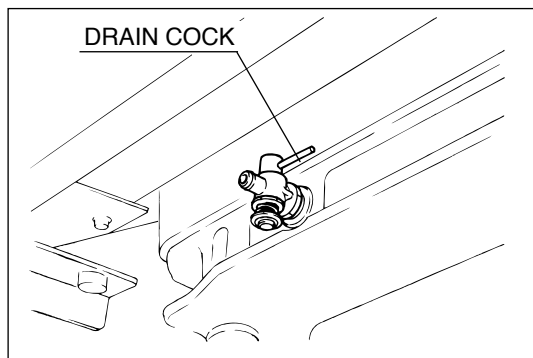
8.3.1 Cleaning air cleaner element

1. Open the engine cover. (→ Page 16)
2. Loosen the butterfly nut.
3. Remove the air cleaner element and thoroughly clean it. (→ Page 42)



8.3.2 Replacing engine oil

1. Drain all engine oil and refill the engine with new engine oil. (→ Page 34)



8.3.3 Draining engine coolant

1. Drain all coolant. (→ Page 37)

9. TROUBLESHOOTING

- If any malfunction or abnormal operation is found, immediately stop using the machine and make an appropriate repair referring to the troubleshooting chart shown below. If the malfunction is not listed in the chart or the suggested repair does not solve the problem, consult your dealer or one of our service centers.
- Some repair contents require specialized service knowledge. Request your dealer or one of our service centers for such repairs.

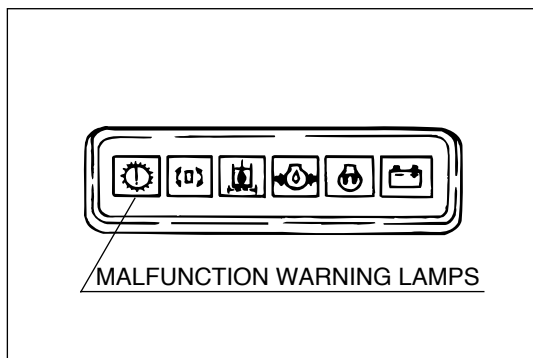
9.1 Troubleshooting Chart

Area	Malfunction	Possible cause	Repair
Engine	Engine do not start or difficult to start.	• Insufficient fuel • Air in fuel • Water in fuel • Poor battery charge (Poor starter performance) • Open circuit or contact failure in wiring • Poor amount or quality of engine oil • Starter switch, motor, relay malfunctions • Others	▶ Add (☞ Page 15) ▶ Air bleed (☞ Page 46) ▶ Drain water (☞ Page 43) ▶ Add battery fluid (☞ Page 40) ▶ Charge battery (☞ Page 41) ▶ Replace battery ▶ Repair (Consult dealer) ▶ Add or replace (☞ Page 34) ▶ Consult dealer ▶ Try to start engine following procedure in chapter 6-6.2 "How to Start". If engine still does not start, request dealer for repair.
	Engine stalls easily.	• Insufficient fuel • Air in fuel hose • Poor warm up	▶ Add (☞ Page 15) ▶ Air bleed (☞ Page 46) ▶ Fully warm up
	Engine stops abruptly.	• No fuel • Burn due to insufficient or deteriorated engine oil	▶ Add (☞ Page 15) ▶ Check and add (☞ Page 34)

Area	Malfunction	Possible cause	Repair
Engine	Improper idling (Irregular engine speed)	• Injection pump malfunction • Improper injection timing • Insufficient compression • Poor intake air (clogged air cleaner)	✦ Consult dealer ✦ Consult dealer ✦ Consult dealer ✦ Clean or replace (☞ Page 42)
	Poor power or acceleration	• Improper fuel • Improper engine oil viscosity • Improper accel adjustment • Poor intake air (clogged air cleaner) • Overload • Injection pump malfunction • Improper injection timing • Poor compression	✦ Replace fuel ✦ Replace oil ✦ Consult dealer ✦ Clean or replace (☞ Page 42) ✦ Decrease load ✦ Consult dealer ✦ Consult dealer ✦ Consult dealer
	Abnormal noise or vibration from/around engine	• Engine mounting bolt loosened • Others	✦ Additionally tighten ✦ Consult dealer
	Too early engine oil consumption	• Engine oil leak • Worn cylinder, piston ring	✦ Check and repair ✦ Check and repair (consult dealer)
	Engine overheat	• Insufficient engine oil • Insufficient coolant	✦ Add oil (☞ Page 34) ✦ Add coolant (☞ Page 39)
	Too early fuel consumption	• Fuel leak from fuel system • Clogged air cleaner • Injection pump malfunction • Improper injection timing • Poor compression	✦ Check and repair (consult dealer) ✦ Clean or replace (☞ Page 42) ✦ Consult dealer ✦ Consult dealer ✦ Consult dealer

Area	Malfunction	Possible cause	Repair
Engine	Too much black smoke (Abnormal exhaust)	• Poor compression • Improper fuel • Clogged air cleaner	✦ Check and repair (consult dealer) ✦ Replace fuel ✦ Clean or replace (☞ Page 42)
	White or blue smoke (Abnormal exhaust)	• Too much engine oil • Too low oil viscosity • Worn cylinder or piston ring	✦ Check and adjust oil amount (☞ Page 34) ✦ Replace oil ✦ Check and repair (consult dealer)
	Drag in accel lever operation	• Deformed or rusted accel rod/wire	✦ Replace (consult dealer)
Powertrain	Vehicle do not move with steering lever	• Parking brake applied • Hydraulic system malfunction • HST inner failure • Open circuit in wiring, micro-computer failure • Overload	✦ Release parking brake ✦ Refer to “Hydraulic system troubleshooting” (☞ Page 56) ✦ Consult dealer ✦ Consult dealer ✦ Decrease load
	Abnormal turn	• Hydraulic system malfunction • HST inner failure • Overload	✦ Refer to “Hydraulic system troubleshooting” (☞ Page 56) ✦ Consult dealer ✦ Decrease load
Brake system	Poor parking brake effect	• Hydraulic system malfunction • Worn brake disc in sprocket	✦ Refer to “Hydraulic system troubleshooting” (☞ Page 56) ✦ Consult dealer

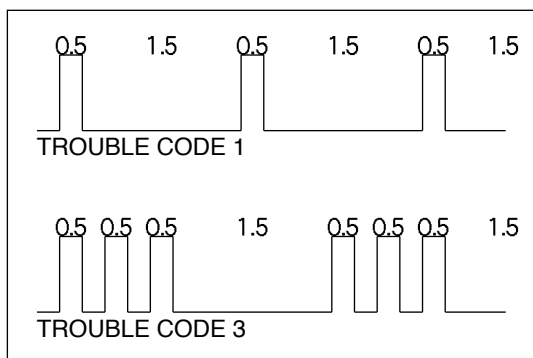
Area	Malfunction	Possible cause	Repair
Hydraulic system	No or improper operation of hydraulic system (hydraulic motor, cylinder)	• Insufficient or deteriorated fluid • Abnormal object in hydraulic circuit • Clogged filter element • Oil leak from hydraulic system • Poor discharge pressure of hydraulic pump • Others	◆ Add or replace oil (☞ Page 36) ◆ Remove foreign object ◆ Replace element (☞ Page 43) ◆ Check and repair ◆ Consult dealer ◆ Consult dealer
Chassis / body	Abnormal vibration, poor balance	• Detached crawler • Loose bolt of roller, upper roller, idler, sprocket • Damaged bearing	◆ Attach and adjust crawler (☞ Page 47) ◆ Check and additionally tighten ◆ Replace (Consult dealer)
	Poor straightforward running performance	• Damaged roller, upper roller, idler, sprocket	◆ Check and repair
Luggage bed	Unsmooth opening/closing of tailgate	• Improper adjustment • Foreign object in rotation area	◆ Readjust ◆ Remove foreign object
Safety system	Improper lamp operation	• Improper wiring • Burnt bulb • Blown fuse	◆ Correct wiring ◆ Replace bulb ◆ Replace fuse (Page 49)
	Warning lamp remains on after engine starts (1) Malfunction (2) HST filter (3) Charge (4) Oil pressure	• Failure in steering lever angle detection circuit, HST pump circuit • Clogged filter • Disconnected coupler/wiring • Insufficient engine oil or lubrication failure	◆ Refer to “9.2 Self-Diagnostic” ◆ Replace filter (☞ Page 44) ◆ Connect ◆ Add oil (☞ Page 34)
Safety device	No horn operation	• Disconnected horn terminal, open circuit • Blown fuse	◆ Connect or repair ◆ Replace fuse (☞ Page 49)



9.2 Self-Diagnostic

This machine has an micro computer in the control box.

The micro computer monitors the steering lever angle detection circuit and the HST pump circuit. If any failure is found in either circuit, the malfunction warning lamp in the indicator section flashes to show a trouble code corresponding to the failure.



Trouble code example

Trouble code 1

Turns on 0.5 second and off 1.5 seconds. Repeats this cycle.

Trouble code 3

Flashes three times at 0.5 seconds intervals and remains off 1.5 seconds. Repeat this cycle.

* In short, the lamp flashes the same times as the trouble code No.

● TROUBLE CODE CHART

Trouble code	Area	Content	Possible cause	Repair
1	Steering lever angle detection circuit (front and rear, +5 V)	Signal failure between steering lever front/rear angle detecting potentiometer and microcomputer (brown/black wire)	• Open circuit in wiring (brown/black) • Short to 5V line (pink/white) • Improper setting of angle detecting potentiometer • Disconnected terminal • Disconnected connector	• Repair open or short-circuit. • Reconnect terminal and connector. • If you have difficulty in repair, consult dealer or our service center.
2	Steering lever angle detection circuit (front and rear, GND)	Signal failure between steering lever front/rear angle detecting potentiometer and microcomputer (brown/black wire)	• Short to GND (black/yellow) • Improper setting of angle detecting potentiometer • Disconnected terminal • Disconnected connector	• Repair short-circuit. • Reconnect terminal and connector. • If you have difficulty in repair, consult dealer or our service center.
3	Steering lever angle detection circuit (left and right, +5 V)	Signal failure between steering lever left/right angle detecting potentiometer and microcomputer (orange/green wire)	• Open circuit in wiring (brown/black) • Short to 5V line (pink/white) • Improper setting of angle detecting potentiometer • Disconnected terminal • Disconnected connector	• Repair open or short-circuit. • Reconnect terminal and connector. • If you have difficulty in repair, consult dealer or our service center.
4	Steering lever angle detection circuit (left and right, GND)	Signal failure between steering lever left/right angle detecting potentiometer and microcomputer (orange/green wire)	• Short to GND (black/yellow) • Improper setting of angle detecting potentiometer • Disconnected terminal • Disconnected connector	• Repair short-circuit. • Reconnect terminal and connector. • If you have difficulty in repair, consult dealer or our service center.
5	HST pump control coil circuit (right)	Signal failure between HST pump rear control coil and microcomputer	• Open circuit in HST pump rear control coil • Open circuit in wiring • Disconnected terminal • Disconnected connector	• Repair open-circuit. • Reconnect terminal and connector. • If you have difficulty in repair, consult dealer or our service center.
6	HST pump control coil circuit (left)	Signal failure between HST pump front control coil and microcomputer	• Open circuit in HST pump front control coil • Open circuit in wiring • Disconnected terminal • Disconnected connector	• Repair open-circuit. • Reconnect terminal and connector. • If you have difficulty in repair, consult dealer or our service center.
7	Seat position detection circuit	Signal failure between seat position detector and microcomputer (front: light green/red wire, rear: light green wire). Front and rear detectors are on simultaneously.	• Short to GND (worn wiring, pinching) • Improper adjustment of seat position detector, detector failure	• Repair short-circuit. • Readjust seat position detector. • If you have difficulty in repair, consult dealer or our service center.

10. TRANSPORTATION OF THIS MACHINE

Loading and unloading the machine in/from truck

When loading and unloading the machine in/from truck, follow the procedure and instructions shown below.

1. Park the truck on a level and flat ground. Use stoppers under the truck wheels.
2. Prepare running boards with enough strength (durable against the machine and driver weight), width (1.2 times larger than crawler width), length (more than three times as long as the truck's luggage bed height), and abrasive surface. Place the boards as shown below so that the boards firmly keep their positions even when the machine rides on them. The angle of the running boards must be 20 degree or less.



3. Securely hook the running board hooks so that there is no difference in height between the boards and the truck's luggage bed.
4. Set the HLP lever to L (low speed) and the super low switch to ON. Slowly advance the machine onto the truck luggage bed.

⚠ DANGER

- Do not allow any one to come near the machine, truck, and running board while loading or unloading the machine.
- Do not make a turn on the running boards. The machine may drop down from the running boards.

⚠ CAUTION

After loading the machine in the truck, set the HLP lever to P (parking) to apply parking brake. Securely retain the machine with rope or wire and set stoppers under the crawlers.