No. 3498-31340-6

⚠ **Read this handbook thoroughly and understand the whole information contained before trying to operate, inspect and service your machine!**

OPERATING & MAINTENANCE INSTRUCTIONS

3-WHEEL ROLLER

MODEL

R2-4 R2H-4

From 1R7 – 70520

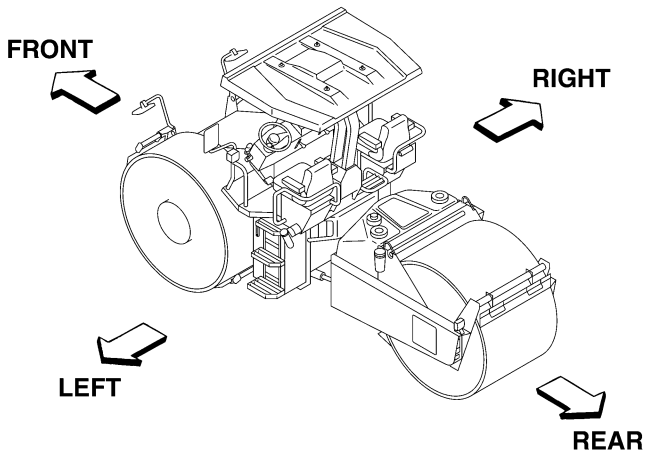
SAKAI

PREFACE

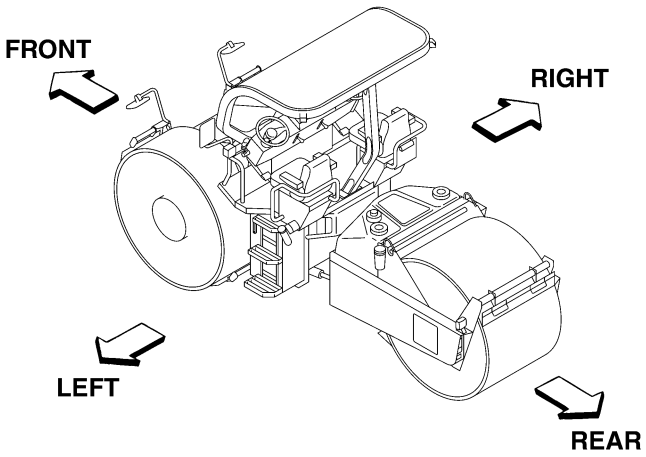
This operator's manual serves as a guide for the use of your SAKAI R2-4, R2H-4 3-Wheel Roller for those who are new to the machine, and also for the people who have experience in using the machine and want to refresh their knowledge for the machine.

Read this manual thoroughly and try to fully understand the information before operating your machine. Keep this handbook at hand whenever you do your work.
When an instruction manual is lost or is damaged and is not legible, replace it immediately.

The main subjects of this manual are:
(1) Basic precautions for safety, (2) Operation, (3) Daily maintenance and (4) Specifications.
For operation and maintenance of the engine, refer to the Engine Instruction Manual furnished separately. Descriptions in this manual can differ from the machine instructions of your machine due to the results of the investigation and improvement in its design. If you have any inquiry regarding your machine or this manual, contact our distributors.



R2-4, R2H-4 (with AWNING)



R2-4, R2H-4 (with ROPS)

CALIFORNIA
Proposition 65 Warning
Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

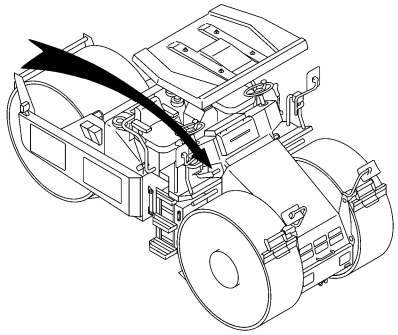
CONTENTS

MACHINE AND ENGINE IDENTIFICATION NUMBERS

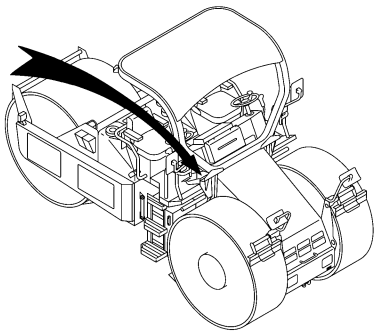
When ordering parts or making inquiries about your machine, the following information is requested.

(1) Machine model

Indicated on the nameplate of the dashboard in the operator's station.



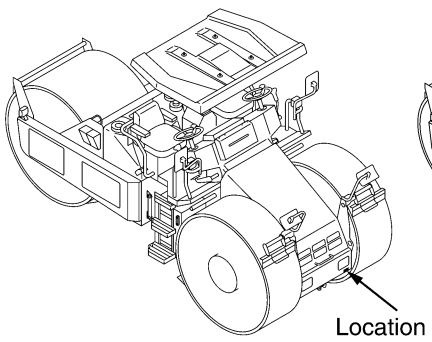
R2-4, R2H-4 (with AWNING)



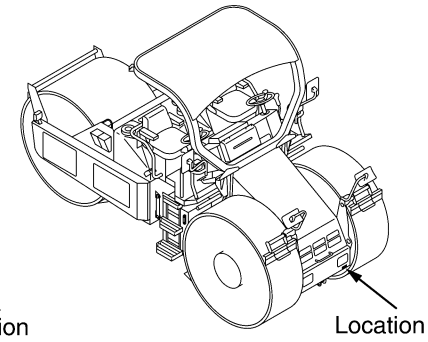
R2-4, R2H-4 (with ROPS)

(2) Machine serial number

R2-4 → 1R7 – ○○○○○
R2H-4 → 1R7 – ○○○○○

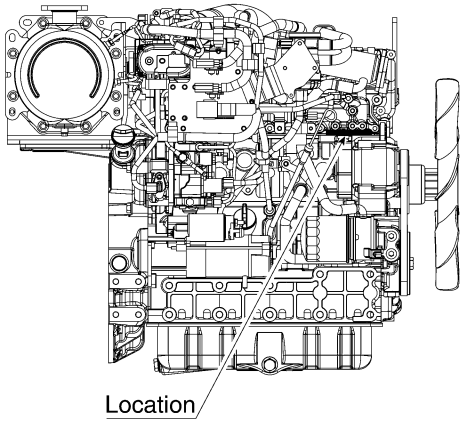


R2-4, R2H-4 (with AWNING)



R2-4, R2H-4 (with ROPS)

(3) Engine serial number



SAFETY NOTICES

For the safe use of your machine, correct handling and periodical maintenance are of utmost importance. Thoroughly read the safety precautions described in this manual. Do not attempt to operate and maintain your machine until you gain a full understanding of these safety statements.

This manual covers the proper and safe method of driving and handling of this machine for its intended use. When this machine is used in a manner other than those covered in this manual, you must assume responsibility for your own personal safety.

In this manual and on the machine, you will find safety notices. Each safety notice starts with a signal word as shown below:

⚠ **DANGER**	**Denotes that there is an extreme hazard. If you fail to take proper precautions, it is highly likely that you could be killed or seriously injured (The color of the symbol ⚠ is red).**
⚠ **WARNING**	**Denotes that there is a hazard. If you fail to take proper precautions, you could be killed or seriously injured (Symbol ⚠ is orange).**
⚠ **CAUTION**	**Calls attention to safety practices. If you fail to take proper precautions, you could be injured or cause damage to the machine (Symbol ⚠ is yellow).**

It is almost impossible for the safety notices in this manual and on the machine to cover all the potential dangers. Keep alert to possible dangers not mentioned in this manual and on the decales.

⚠ WARNING

Do not operate your machine before you read its operator's manual thoroughly.
Incorrect operation can kill or cause injury.
It is your responsibility to operate the machine safely.

☆ Making alterations to the machine.
Please do not make alterations to the machine without permission for safety reaseons.
We shall not be held responsible for injures, death or breakdowns caused by alterations.

☆ Basic precautions for safe operation of your machine are described beginning on page 4.

☆ To operate and work with your machine, you must be qualified.

1 BASIC PRECAUTIONS FOR SAFETY

1.1 General Precautions

■ Ensure proper management of health

- People under the influence of alcohol, drugs, lack of sleep or health problems must avoid driving or repairing the machine at all times, as it may lead to serious accidents.

■ Turn off cell phones

- Turn off cell phones while driving or repairing the machine. Never drive while talking on a cell phone, as it may lead to serious accidents.

■ Read the operator's manual thoroughly

- Understand the functions of the controls and gauges. Familiarize yourself with their location and how to operate them. Understand the meaning of all the symbols.

■ When an instruction manual is lost or is damaged and is not legible, replace it immediately

■ Understanding the uses for the machine

- This machine was developed and manufactured mainly for the purpose of rolling compaction in engineering works. Do not use it for any other purpose. In the case of vibratory rollers, use of vibratory operations under conditions of excessive compaction, or rock crushing operations can lead to premature wear of the rolls and damage to the machine.

■ Obey the worksite rules

- Follow noise standards and worksite rules such as matters forbidden or to be attended to, and working procedures.

■ Wear protective clothing appropriate to work

- Wear clothing, safety shoes and hard hat to suit your work.
- Do not wear clothing and accessories that tend to get caught in the controls or protruded portions of the machine. Do not wear oily clothing.
- Depending on the type of job, wear gloves, earplugs safety goggles or a mask.

■ Know the work area in advance

- Know the terrain, geology and conditions of the road surface at the worksite. Start working after securing safety such as stationing a guardsman or putting up barriers where there is a risk of falling of the machine or collapse of shoulder.

■ The operator must make prior checks when moving the machine to a hazardous area under unusual conditions

■ Provide against an accident

- Decide in advance the means of communication in an emergency. Know the location and use of an extinguisher and first-aid kit.

■ Realize the capability of the machine

- Thoroughly understand the performance of your machine and correctly operate the machine to meet the requirements of the job site. Operating the machine beyond its capabilities may lead to an accident. Use your machine within its capability.

■ The machines not equipped with ROPS must not be operated on the slope or unsafe ground

■ The machines not equipped with CABIN must not be operated in the bad weather or a harmful contaminated zone

■ Do not use a machine which has not been serviced correctly at regular intervals

- Before working, perform necessary inspections. Start operation only after making certain the machine is in good operating condition. If found to be abnormal, report to the responsible person and have the fault corrected. Operate the machine after making sure that it is safe to operate.

■ Do not allow anyone to enter the work area except for authorized personnel

- Always conduct the work paying attention to the workers around the machine.

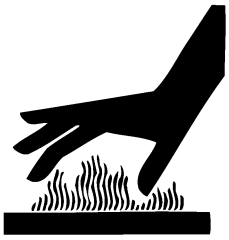
■ Beware when operating moving parts

- When operating moving parts such as covers, be sure to understand the way they move and take care not to get the hands and feet caught.

■ Operator must sit in the seat when operating the machine

■ Be careful of hot parts

- After your machine has operated for some time, the coolant, engine oil and hydraulic fluid will become hot and the pressure will build up. If, in this state, you try to remove the filler caps, drain the oil or replace the filters, you can get burned. Perform this work in accordance with the correct procedures with the machine cooled down.
- To remove the radiator cap, slowly loosen the cap to relieve the pressure with the engine stopped and the coolant cooled down (For the radiator cap with a lever, lift the lever to release the trapped pressure).
- When removing the filler cap on the hydraulic tank, release the trapped pressure by turning it out slowly to prevent the oil from gushing out (For the cap with a lever, lift the lever to release the trapped pressure).



- While the engine is running or immediately after it has been stopped, do not touch the engine, muffler, exhaust pipes, oil hydraulic pumps, oil hydraulic motors, lights, etc., as they will be hot.
- Resin and metallic parts may become hot under direct sunlight on a hot day. Direct contact with such parts may cause burns, so be sure to wear clothing and protective equipment appropriate for the job.

■ Be careful with fire

- The fuel, oil, and antifreeze will catch fire if open flames or ignition sources are used close to them. Particularly, the fuel is highly flammable.

- Do not smoke or use a match or cigarette lighter close to inflammables (combustibles).
- When refueling, stop the engine and do not smoke.
- The filler caps of the fuel and oil tanks must be kept tight.

■ Ensuring safety in a fire

- Machine fires may cause serious injuries or death, so stop the engine by turning the starter switch to the OFF position, then move away from the machine as quickly as possible.

■ While the engine is running or immediately after it has been turned off, do not touch the muffler, exhaust pipe or DPF

- While the engine is running or immediately after it has been turned off, do not touch the muffler, exhaust pipe or DPF, as they will be hot.

■ Mount on or dismount from your machine after it has come to a complete stop

- For getting on and off, face the machine and use the handrail and step.
- Watch your step when getting on or off the machine.
- Do not jump on or off a machine, particularly when it is moving.
- When getting on and off an articulated machine, straighten it out before stopping the machine. In the turned state, there is danger that personnel gets caught because the getting on and off space narrows.

■ Be careful not to fall

- Falling off the machine may cause serious injuries or death, so do not place your feet anywhere other than on the steps, and in the driver's seat.

■ Do not lock out yourself when leaving the machines

- Always bring the key with you by pulling it out from the starting switch when leaving the machine.

■ To handle the hydraulic fluid

- Wear safety goggles to protect your eyes from contact with hydraulic fluid. It can irritate your eyes.
  If the fluid contacts your eyes, flush with clean water for 15 minutes and get medical aid.
- The fluid can also irritate your skin. When handling it, wear rubber gloves to avoid contact with it. In case of skin contact, wash with soap and water.
- Be careful not to swallow the fluid. It can cause diarrhea and emesis.
  If swallowed, do not try to vomit. Get medical help immediately.

■ Do not use worn tires (Tire installed)

- Tires may be damaged when they are scratched on curb stones, when the machine runs over irregular surfaces of roads or projections on roads, and when the machine is operated suddenly.
- Continued use of damaged tires will cause them to blow out. Replace them with new ones.

1.2 Preparation for Safe Operation

■ Clean the step, operator's station and floor board and brake pedal

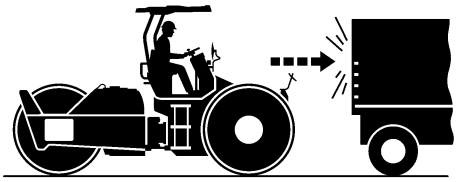
- Do not place parts, tools or unnecessary articles on the step, operator's station and floor board.
- Keep the step, floor board, brake pedal, controls and handholds free from muds, oil, ice or water, as they can cause slippage. Repair them if found to be damaged. Tighten loose bolts.
- Keep your boot soles free of oil or muds. They can slip, leading to an accident.

■ Inspect your machine before operation

- Check your machine for damage such as cracks and deformation. If found to be abnormal, operate the machine after taking a proper measure to secure safety.
- Check the level of fluids (fuel, engine oil, coolant, antifreeze and hydraulic oil). Add as necessary.
- Check the area where the machine has parked for signs of leakage of oil, fuel and water. If any leakage is noticeable, determine the cause and make corrections immediately.

■ Watch your distance

- When traveling on a road, bear in mind the stopping distance. Avoid excessive speed, and abrupt starting and stopping, and moving in a zigzag direction.



■ Understand ROPS functions (with ROPS)

- Ensure that there is no loose bolt, crack nor rust on the bodies and the attaching portions, of ROPS.
- Tighten bolts with the specified torques after ROPS are removed.
  Tightening torque : **496 N·m**
- Do not weld nor drill holes to the ROPS parts without the permissions from SAKAI, because it may decrease strengths of the ROPS.
- Be sure to wear the seatbelt during operation.

1.3 Before Starting the Engine

■ It is confirmed that hood and door is closed

- Please confirm hood and door has put it away in the confirmation before it gets on.

■ Adjust the operator's seat to your most effective operating position

- Sit on the operator's seat. Adjust the seat so that your back will make contact with the seat back when the brake pedal is pressed down to the full extent. Check to be sure that the brake pedal can be fully pressed down without difficulty when you twist your body for reverse run.
- Adjust the seat to allow proper operation of the steering wheel, levers, switches, etc.

■ Secure good visibility (with CABIN)

- Keep the windowpanel clean.
- Lock the windows and doors no matter whether they are open or closed.
- Do not leave the doors half-closed.

■ Secure forward and backward visibilities

- Adjust the rear view mirrors and under mirrors for good visibility. If dirty, clean them. If damaged, replace.

■ **Check that the horn, lamps and gauges work correctly**

■ **Before starting, make certain that each lever is in the neutral position and the parking brake is applied**

■ **When starting, sound the horn**

- Before starting the engine. Make sure there is no one in the immediate vicinity and there are no obstructions around the machine.

■ **Sit in the driver's seat and turn on the engine**

- Do not start the engine anywhere other than from the driver's seat as there is the danger of operational mistakes.

■ **Pay attention to ventilation**

- Exhaust fumes are dangerous if breathed in. When starting the engine in an enclosed area, provide good ventilation with windows and doors opened.

■ **Do not stand close to the exhaust gas pipe opening**

- The exhaust gas from the engine is dangerous.
- Exhaust fumes are harmful if breathed in.

1.4 After Starting the Engine

■ **Secure safety around the machine**

- Ensure that the area around the machine is clear of personnel and obstructions. Moreover, honk the horn, indicate your intention to move, and wait a while before moving off.

■ **Warm up the engine**

- Do not put your machine into motion immediately after the engine has started, let it idle for several minutes until it is at operating temperature.
- Check the area where the machine has parked for signs of leakage or oil, fuel and water. If any leakage is noticeable, determine the cause and make corrections immediately.

■ Have a trial run
- Make a test run in a safe place to check that there are no abnormal signs. If found to be abnormal, correct the fault before traveling again.
- Listen for unusual sounds, and check for abnormal temperature rise. If abnormal, park the machine in a safe place and find the source of trouble before operating.

1.5 During Operation

■ Strictly observe the traffic regulations
- Follow all the traffic regulations when driving on a public road.

■ Sit in the driver's seat before starting operation
- Sit in the driver's seat before starting operation. Be sure to wear the seat belt when provided.

■ Seat belt (with seat belt)
- Be sure to wear the seat belt during operation.

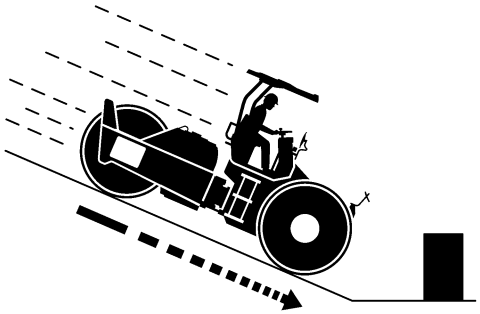
■ No other person but the operator
- This machine is a one-man roller. Do not allow anyone to get on. Only the operator is allowed on this machine while it is running or in operation.

■ Before mounting, be sure areas around the machine are safe
- Before getting on the machine, make certain that there are no obstacles around the machine and no workers under it. If some workers are present or close to the machine, tell them that the machine is about to move, warning them to stay away from it.

■ Do not try to get on or off a moving machine
- Get on or off the machine after making sure it has come to a complete stop and the parking brake is applied.

■ Do not let anyone enter the work area
- There is the danger of being run over causing serious injuries or death.
- If the driver does not have a clear field of vision, assign a conductor ensure peripheral safety.

■ To go uphill or downhill, run at a low speed. Do not attempt to shift speeds while traveling on a slope



- Shifting speeds on a slope can cause unexpected running down the slope.
- Going down hill at speeds other than low range can cause the machine to run down violently.

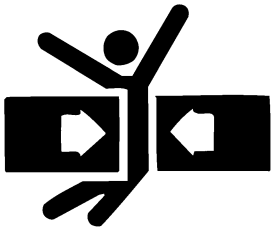
■ Refrain from inattentive driving

- Inattentive driving or driving relying on guess work can cause an accident. Use extreme care for workers present in the path of machine or around it. In case of danger, stop and sound the horn, and proceed when the area is clear of personnel or obstructions.

■ When changing the direction of travel, secure the safety on the path in the travel direction

■ Keep everyone away from the pinch points

- When making turns, do not allow anyone to come close to the pinch point.



■ At night, carefully drive the machine

- Nighttime driving tends to frustrate the sense of distance. Carefully drive the machine at a speed suited to illumination. Keep the headlamps and flood lamps lighted. If necessary, provide extra lighting in the work area.

■ Avoid long hours of continual operation

- Avoid long hours of continual operation as it may lead to loss of health.

■ Repair as soon as possible if found to be defective

- If the machine is found to be faulty, stop the machine and repair. Do not operate the machine until the problem is corrected. When any warning lamp indicates faulty operation, inspect the machine after moving it to the nearest safe location.

■ The machines not equipped with ROPS must not be operated on the slopes or unsafe ground

■ The machines not equipped with CABIN must not be operated in the bad weather or a harmful contaminated zone

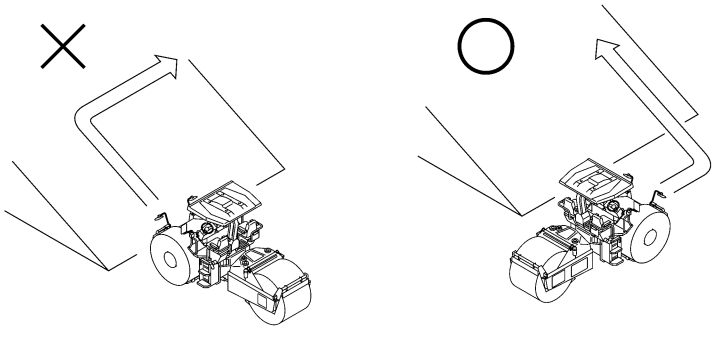
■ Do not operate the machine except from the operator's seat. Do not drive in a standing posture

- Do not throw your legs out or lean forward. Be sure to sit in the proper position while driving the machine.

■ While making turns, do not run at abnormally high speed and do not turn the steering wheel abruptly and sharply. High speed turns, especially on soft or uneven ground, could result in a rollover

■ For the traveling on structures such as a bridge, make certain that they can support your machine. Before traveling on the structure, you must know the load capacity of the structure and the load weight of the machine you are operating to insure safe travel across the structure

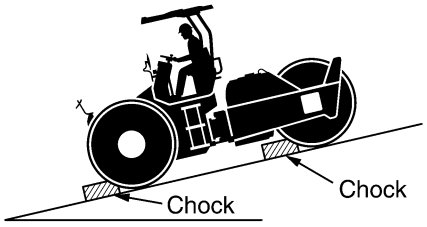
■ Do not make turns on a slope and do not travel across sidehill. If necessary to do so, go down straight along the slope to the flat ground, move sideways and go up straight to the destination



■ On a steep slope, run the machine at low speed

■ When parking

- Select level and hard ground. If necessary to park on a slope, chock the front of the drum and tire on the downside of the slope.
- When required to park on the public road, provide necessary markings such as flag, barriers and illumination. However, be sure they do not obstruct traffic.
- Stop the engine when getting off the machine. Remove the key from the starter switch, and make sure it is stored appropriately.

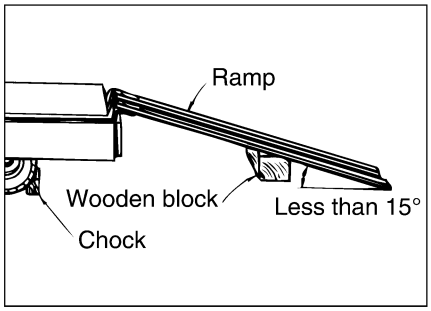


- Be sure not to get your hands caught in the chocks when handling them.

■ Beware of deformation in tires during long-term parking (if tires installed)

- The surfaces of tires in contact with the ground may become flattened, leading to their deformation (forming of flat spots) during long-term parking.
- The forming of flat spots may cause bounding or shaking during operation of the machine.
- After the forming of flat spots, driving the machine will restore the tires and remedy the situation.
- To prevent the forming of flat spots during long-term parking, inflate the tires to a higher pressure within the allowable range and drain the water from the sprinkler tank before parking. Furthermore, move the machine regularly.

1.6 Loading and Unloading



- Loading and unloading can accompany any danger. Use extreme care.
- Select level and hard ground leaving a sufficient distance from the shoulder of a road or bank.
- Use sturdy ramps with proper width, length and thickness which allow safe loading and unloading. If they deflect considerably under load, apply wooden blocks to reinforce the ramps.
- To prevent your machine from crosswise slippage, keep the ramps free from oil, mud, debris, etc. The drum must also be free from extraneous matter that can cause slippage.
- Do not steer your machine on the ramps. If the machine is facing in the wrong direction, go back off the ramp, correct the direction and try again.
- Do not use kinked, twisted or damaged wireropes for crane or winch operation. Use ones with ample strength.
- When loading is complete, fix the machine with wooden blocks placed under the drums and chains fastened to the machine.

1.7 Transportation

- Follow required regulations.
- Select a transporting route according to the overall width, overall height and gross weight of the trailer with the machine loaded.
- Know the maximum height clearance of the machine loaded on the transport trailer before hauling under bridges and other structures.

1.8 Handling the Battery

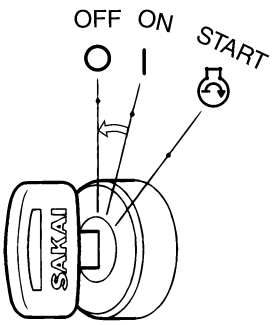
■ When handling the battery

- Battery electrolyte contains sulphuric acid. It will destroy clothing and skin. If it touches your clothing or skin, flush with large quantities of water.
- In case of eye contact, flush with clean water and get medical help.
- If swallowed, drink large amount of water, milk, beaten egg or vegetable oil, and get medical help.
- Wear safety goggles when handling the battery. Wear safety goggles, full face shield, rubber gloves and rubber apron when adding fluids to the battery.
- Keep cigarettes and flames away, and avoid recharging the battery in poorly ventilated places when there is a danger or generating sparks.

⚠ WARNING

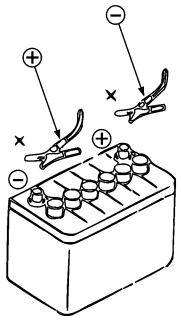
Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hand after handing.

- Inspect or handle the battery with the engine stopped and the starter switch in the OFF position.
- Turn the starter switch to the OFF position, then wait at least 30 seconds before removing the battery. An abnormality may arise in the ECM (engine control module).



- Keep metallic items such as tools away from the battery terminals.
- Tangled terminals may generate sparks due to improper connections, resulting in the danger of explosions. Make sure terminals are connected firmly.
- The battery is for starting the engine and operating electrical equipment on the machine. Do not use it for any other purpose.
- Do not charge battery when the top surfaces of the liquids are at the LOWER level (the minimum liquid level) or below. Not only the internal parts of the battery are degraded and the battery lifetime are shortened but also it can cause explosions if you continue on using the battery when the top surfaces of the liquids are at the LOWER level or below. Immediately supply water until the water level is between the UPPER and LOWER levels.

■ Jump-starting the engine



- Wear safety goggles when jump-starting the machine.
- When starting from another machine, do not allow the two machines to make contact with each other.
- When connecting the battery cables, start with the positive terminal. For disconnection, start with the negative one.
- Do not allow a tool to bridge between the positive terminal and machine body. This can generate dangerous sparks.
- Do not connect the booster cable to wrong the terminal. Never connect the positive terminal to the negative terminal or the body of the machine.
- Final connection to the engine block of the disabled machine can cause sparks. The connecting point should be as far as possible from the battery.

1.9 Towing

- Towing should only be carried out in emergencies and over short distances. A trailer should be used for long distance transport.
- The machine should not be operated while being towed.
- Follow the instructions in this manual to enable towing.
- Do not tow if the braking system has broken down, as it is dangerous.
- To tow the machine, use cables with ample strength.
- Do not perform towing on a slope.
- Be sure to attach a wire rope firmly to the towing hook.
- Do not use twisted, kinked or damaged cables when towing.
- Do not step over the wire rope.
- Keep everyone away from the space between the machine and the towing machine when connecting the two.
- Align the connection points of the disabled machine and the towing machine in a straight line when connecting the machines.

1.10 Before Servicing

■ Attach warning tags when servicing the machine

- Serious accidents can occur if the machine is unexpectedly started or controls carelessly touched by an unauthorized person.
- Attach a warning tag at a clearly visible location in the operator's station and insure the key has been removed from the starter switch.

⚠ DANGER

Do not operate.

Keep this warning tag, if not used, in tool box.

■ Setting the chocks

- Set chocks in front of and behind the roller drum (wheels) to prevent the machine from moving before beginning inspections or maintenance work.

■ Use proper tools

- It is very dangerous to use damaged or deteriorated tools or to use tools for other purposes than intended. Use correct tools for their intended use only.

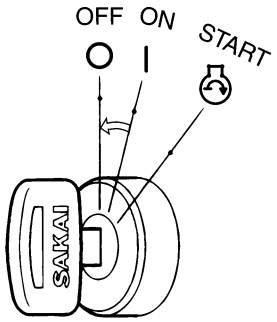
■ Change safety-related parts at regular intervals

- Change any seatbelt found to be abnormal even if it is within its recommended service interval.
- Change any ROPS found to be abnormal even if it is within its recommended service interval.
- Replace fuel hose, high pressure hydraulic hoses and liquid hoses regularly to prevent fire. Replace high pressure hoses of the power steering system every two years.

☆ Change these parts at regular intervals even if found to be normal. They will deteriorate as time goes on.

☆ Change any hose found to be abnormal even if it is within its recommended service interval.

■ Inspect or service your machine with the engine stopped



- If required to keep the engine running in such a case as radiator interior cleaning, perform the work with two persons. One of them should sit on the operator's seat getting ready for shutting down the engine. He must take care not to touch any of controls carelessly. Maintenance personnel must exercise extreme caution not to make contact with moving parts.

■ Supplying fuel, oils and grease

- Do not cover the filler port when refueling. Feeding fuel in an airtight tank might damage the fuel tank.
- Spilled fuel or oil will be slippery. Wipe up immediately. Keep the filler caps tight. Do not use fuel for flushing oil. Handle fuel and oil in a well ventilated area.

■ Check the coolant level in the radiator

- To check the coolant level, stop the engine and allow the engine and radiator to cool down before removing the radiator cap. Remove the cap by covering it with a rag before removing to prevent any fluid that could spray under pressure from causing a burn.

■ Illumination

- For inspecting the level of the fuel, oil, coolant and battery electrolyte, use explosion-proof illuminations. Failure to use this type of illumination can result in an explosion.

■ Make sure the gas dampers are properly maintained

- Before inspecting the engine room, make sure the gas dampers holding up the hood are firmly engaged. Furthermore, in machines with stays to prevent the hood from closing, make sure they are firmly in place.

■ Points to beware of when filling the sprinkler tank with water (on machine equipped with a sprinkler tank)

- Do not fill the tank with the water inlet blocked. It may damage the sprinkler tank.

1.11 During Servicing

■ Keep unauthorized persons away

- During service, do not allow persons not concerned to enter the work area, particularly when grinding or welding operation is performed or heavy hammers are being used.

■ Assume an appropriate posture while working

- An unnatural posture during maintenance work may cause injuries. Assume a posture that is appropriate for the work being carried out.

■ Keep your machine clean

- Spilled oil, grease or scattered debris are dangerous. Always keep your machine clean. Moisture that penetrates into the electrical system can cause malfunctions. Do not use water to clean sensors, connectors and the operator's station.

■ Take care not to get caught or crushed

- Be sure to fix the hood and other covers after opening them to prevent closing and avoid getting caught in them.
- If there is a need to crawl under the machine after it has been lifted, be sure to support it from underneath with a solid prop or block.

■ When repairing the electrical system

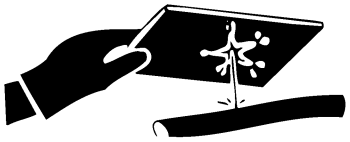
- Read the warnings in this manual regarding the handling of batteries, and make sure to have a thorough understanding in order to handle them appropriately and safely.
- When repairing the electrical system or welding, disconnect the negative cable from the battery to shut off the electricity. Carrying out work while the cables are connected to the negative terminal may cause electrocution or explosions.

■ Carefully handle high pressure hoses

- Do not try to bend or hit hoses against a hard object. Do not use hoses or pipes that are bent or damaged. They will burst.
- Replace damaged fuel hose, hydraulic hoses and liquid hoses. An oil, hydraulic and liquid fluid spill can cause a fire.

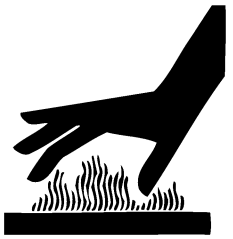
■ Be careful of high pressure hydraulic fluid

- Bear in mind that the working equipment hydraulic systems are under internal spressure. Do not perform adding, draining, inspection or servicing of the hydraulic systems until the internal pressure has been relieved. Hydraulic fluid leaking through a fine hole at high pressure can penetrate your skin and eyes. Inspect leakage by holding a hard board close to suspected leaks wearing goggles. If affected by high pressure oil, get medical help immediately.



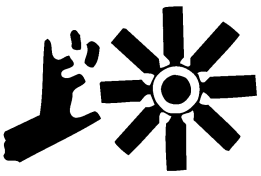
■ Be careful of hot parts

- After the machine has been operated for some time, the coolant, engine oil and hydraulic fluid will become hot.
- Removing the radiator cap or draining the coolant or oil can burn you. Perform this work in accordance with correct procedures after the systems have cooled down.



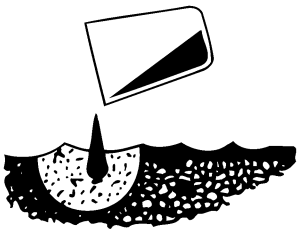
■ Use care when inspecting or servicing fan or belts in motion

- Do not wear clothing and accessories that tend to get caught in moving parts.
- Do not let your body or tools make contact with the fan blades or belts. They can be cut seriously.



■ Used oil disposal

- Do not throw used oil into a drain or waterway. Drain the oil from the machine into a proper container. Do not drain directly on the ground.
- Obey all local, state and federal environment regulations for the proper disposal of oil, fuel, coolant, battery electrolyte or any other fluids.



■ Take care in handling the gas damper

- Never dismantle it.
- Do not throw it into a fire.
- Do not damage the rod.
- Do not bend the tube or rod, or use it as a handle.
- When disposing of it, be sure to fix the gas damper, and drill a hole around 2 to 3 mm in diameter, about 20 to 30 mm from the edge on the tube bracket side. Dispose of it after releasing the gas pressure. When doing this, be sure to wear protective goggles because of the danger of oil inside or swarfs getting sprayed everywhere by the compressed gas inside.

■ Exercise extreme care when replacing and repairing tires (Tire installed)

- Disassembly, repair and reassembly of tires require special facility and knowledge. Have them repaired at work shop specialized in handling tires.
- An improperly fitted tire can separate from the rim when inflating.
- When dismounting a tire, chock other tires for safety.
- When welding job is carried out near the tires, use extreme care, as this can cause an explosion of the tires.

1.12 Safety Decals

Keep all decals clean. If lost, replace with new one. There are decals other than those shown below: Treat them in the same manner as the one shown here.

① 3998-16503-0

⚠ WARNING

1.When Handling the Machine:
- Operate only while seated.
- Use the handrails and steps when boarding and getting off.
- Never carry passengers.
- Never attempt to board or get off the machine while it is moving.

2.Preparation for Safe Operation
- Clean the steps, operator's station and floorboards.
- Obey the worksite rules.
- Sakai accepts no responsibility for any injury or damage to the machine caused by unapproved modification.
- Do not use a machine which needs repair or maintenance.
- Sound the horn immediately prior to starting the engine to warn people in the vicinity.

3.Starting the Engine
- Check that all operating levers are in the neutral position.
- Idle the engine for about 5 minutes to warm it up prior to commencing work.

4.Parking Precautions
- When parking the machine, park it on level ground, set the parking switch and set the roller chocks.
- Allow the engine to cool off by running it for about 5 minutes before stopping.
- When getting off the machine, remove the key from the ignition switch.

5.Precautions to Avoid the Machine Rolling Over
- Do not work in the vicinity of overhanging banks. or on grades steep enough to cause the machine to slide or roll over.
- Reduce speed prior to asking a turn.
- Pay particular attention when operating on uneven surfaces. as the machine may become unstable.

3998-16503-0

② 3998-16497-1

⚠ WARNING

- Thoroughly read the operator's manual before using the machine.
- Incorrect operation can cause severe injury or death.
- It is your responsibility to operate the machine safely

3998-16497-1

③ 3998-16501-0

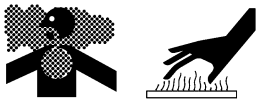
⚠ DANGER

Be Careful with Fire
- When refueling, stop the engine and do not smoke.
- The filter cap of the fuel tank must be kept tight.

3998-16501-0

④ 3998-16500-0

⚠ WARNING



- Avoid inhalation of exhaust gas.
- Avoid contact with exhaust pipe while engine is running and after it has been stopped. Contact with hot exhaust pipe will cause burns.

3998-16500-0

⑤ 1632-19017-0 (with AWNING only)

⚠ WARNING

Watch your step when lifting or folding the canopy.

1632-19017-0

⑥ 3998-16499-0 (2 locations)

⚠ WARNING

- Do not open the hood with the engine running.
- Contact with hot parts will cause burns.
- Contact with rotating parts will cause severe injury.

3998-16499-0

⑦ 3998-16502-0

⚠ DANGER

- Do not approach, or allow objects to touch the rotating parts.
- Body parts make contact with rotating mechanism will be severed.
- Do not open the radiator cap when fluid is hot.
- Radiator fluid is flammable. Avoid exposure to flame when radiator cap has been removed.
- Avoid contact with machine parts in the vicinity of the engine while engine is running and after it has been stopped. Contact with hot part will cause burns.

3998-16502-0

⑧ 3998-36002-0 (2 locations)

⑨ 3998-36003-0 (2 locations)

⑩ 3998-16205-0

CAUTION
TO PREVENT FREEZING, OPEN THE DRAINCOCK OF THE SPRINKLER PUMP AFTER OPERATION.

3998-16205-0

⑪ 1634-19012-0 (2 locations)

TOWING

Before towing the machine, carry out following operation; start engine, turn UNLOADER valve to NEUTRAL, and release brake.
When towing on a slope, be sure to drag rolls and carry out as described above.
If engine can't be cranked and/or if brake can't be released because of some causes, release brake manually before operating UNLOADER valve.

⑫ 3998-16524-1 (with AWNING only)

⚠ WARNING

- When the awning is folded,loosen the fastening bolt and unlock the lock pin.Then fold the supporting columns forward after making sure the damper which permits easy column lifting is working.
- If the damper is not working,be careful because the supporting columns can fold forward quickly.
- In case the damper fails to work, replace the damper.

3998-16524-1

⑬ 2998-96001-1

⚠ CAUTION

USE SPECIFIED FUEL ONLY
- Use of other than the specified fuel may result in damage to the engine.
- Please refer to the manual for details.

2998-96001-1

⑭ 3998-16730-0

⚠ CAUTION

Cautions on DPF Parked RGN
Please stop in without turning off the handle.
The exhaust is not hit to people and vehicles.
It will lead to burns and damage of vehicles.

3998-16730-0

⑮ 3998-16700-0

⚠ WARNING

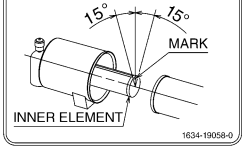
Be careful with DPF regeneration (automatic or manual cleaning)
- Avoid inhalation of exhaust gas.
- Do not DPF regeneration in an enclosed area.
- To avoid a fire,make sure there is nothing flammable around exhaust opening and muffler.
- Do not approach without contacting while DPF is regenerating and it has been stopped.

3998-16700-0

⑯ 1634-19058-0

⚠ CAUTION

Inner element of the air cleaner mounting so that the mark is within the ±15°from just above.



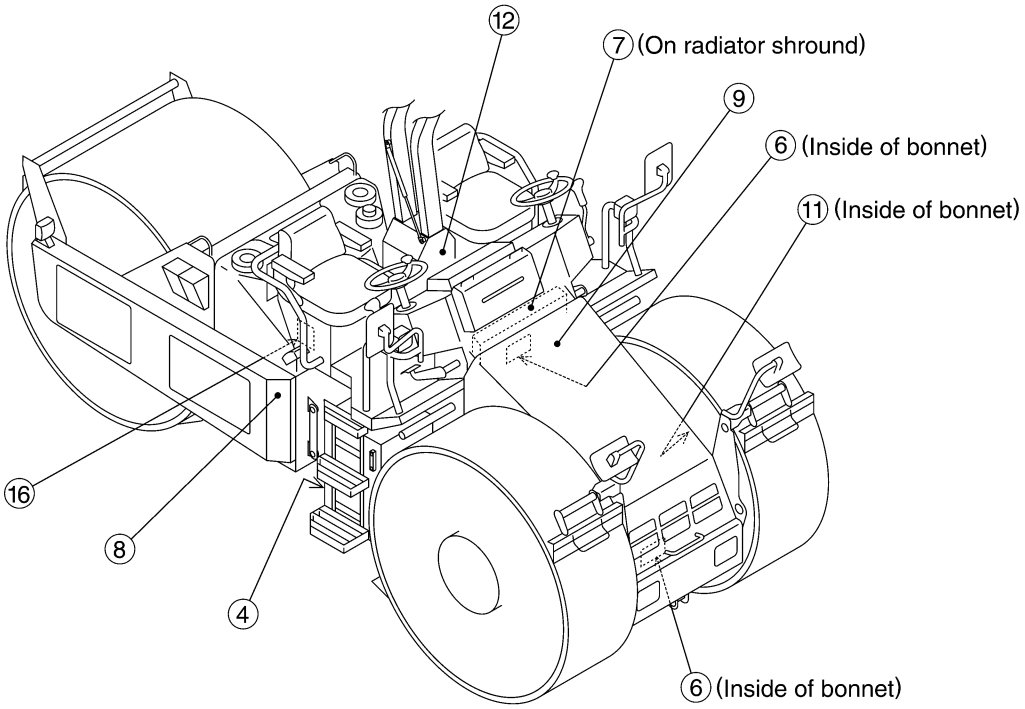
1634-19058-0

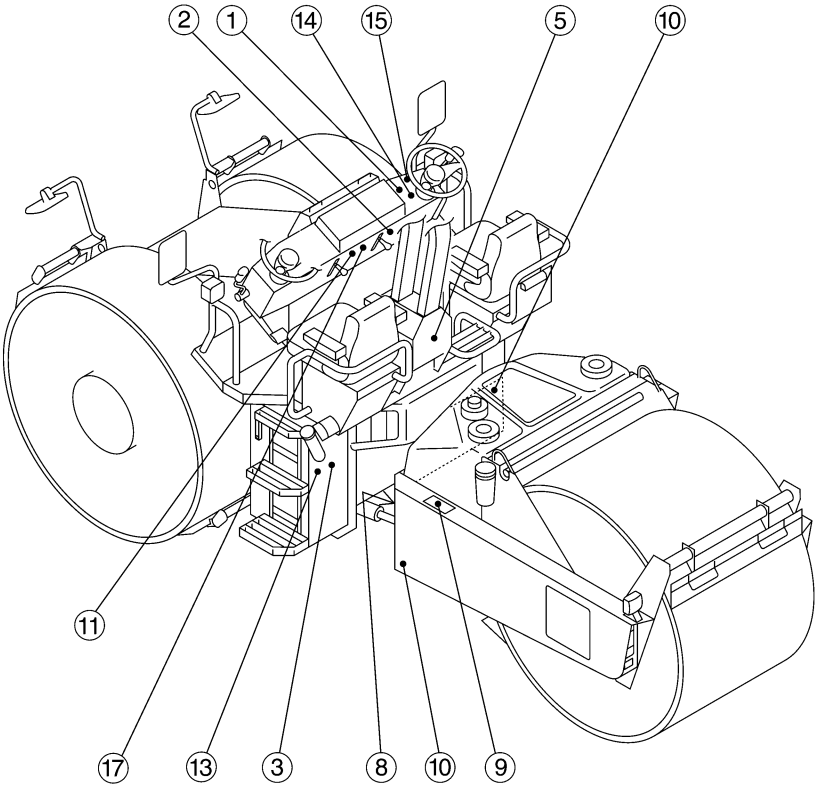
⑰ 3998-16511-0

⚠ WARNING

Replace the power steering high pressure hoses every two years.

3998-16511-0


⑫
⑦ (On radiator shround)
⑨
⑥ (Inside of bonnet)
⑪ (Inside of bonnet)
⑯
⑧
④
⑥ (Inside of bonnet)


②
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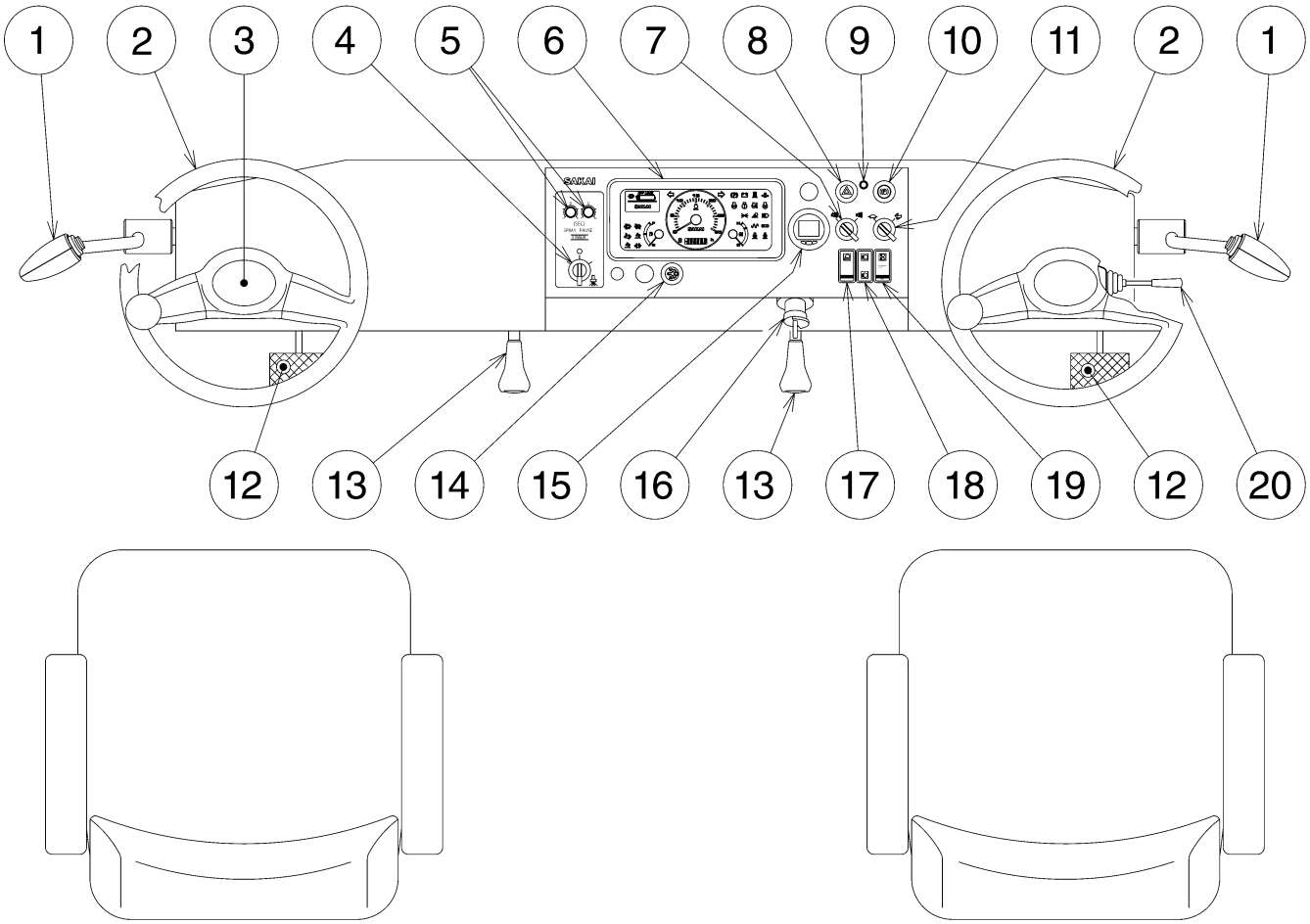
2 OPERATION

2.1 Instruments and Controls

2.1.1 Operator's station

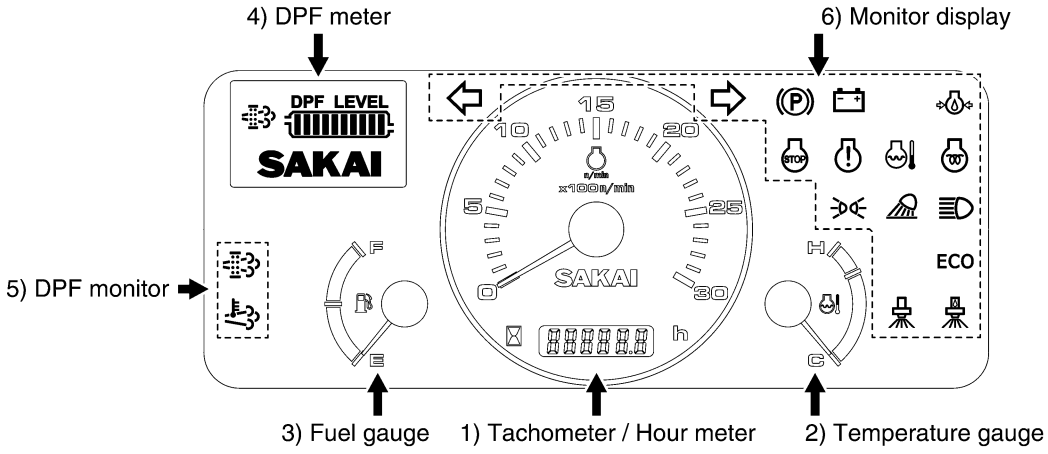


① Forward-Neutral-Reverse lever (F-N-R lever)
② Steering wheel
③ Horn switch
④ Sprinkler switch
⑤ Sprinkler timer
⑥ Combination meter
⑦ Back buzzer switch
⑧ Hazard warning switch
⑨ Hazard warning indicator lamp
⑩ Parking brake switch
⑪ Speed shift switch
⑫ Brake pedal
⑬ Throttle lever
⑭ Parked regeneration switch (black)
⑮ Voltage and warning indicator
⑯ Starter switch
⑰ Flood lamp switch
⑱ Dimmer switch
⑲ Lamp switch
⑳ Turn signal lever

2.1.2 Gauges, indicator lamps and warning lamps

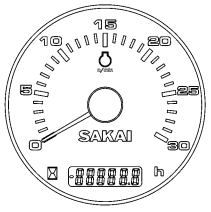
For safe execution of your job, fully understand the role and function of the systems involved.

Combination meter



1) Tachometer / Hour meter

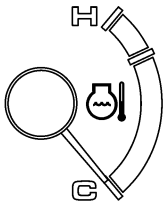
Indicates the engine RPM. The hour meter shows total operating hours. The service interval recommendation in this manual should be based upon the hour meter readings.



Tachometer / Hour meter

2) Temperature gauge

Indicates the coolant temperature. Zone close to symbol H indicates overheating. In case of overheating, run the engine at idling for about ten minutes before shutting it down. Then determine the cause.



Temperature gauge

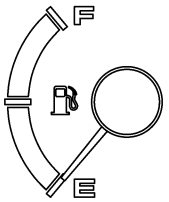
3) Fuel gauge

Indicates the fuel level in the tank.

E: The tank is empty.

F: The tank is full.

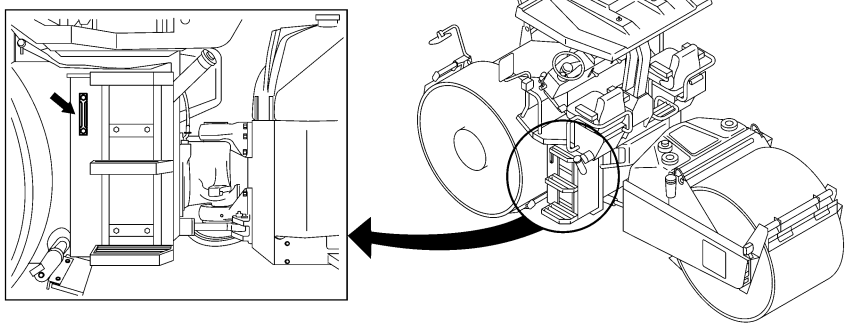
The fuel level can also be checked by looking in the sight glass as shown. Make a habit to refuel before the tank becomes empty.



Fuel gauge

⚠ CAUTION

Be sure to use fuel recommended by SAKAI (refer to page 92).



4) DPF meter

This meter indicates the amount of PM (particulate matter) that has accumulated on the DPF (diesel particulate filter).

DPF meter

5) DPF monitor

① DPF indicator lamp (amber)

Turned on : Indicates that DPF regeneration is being carried out automatically or manually.

Flashing : Indicates that PM (particulate matter) has accumulated in the DPF, and regeneration is required after parking.

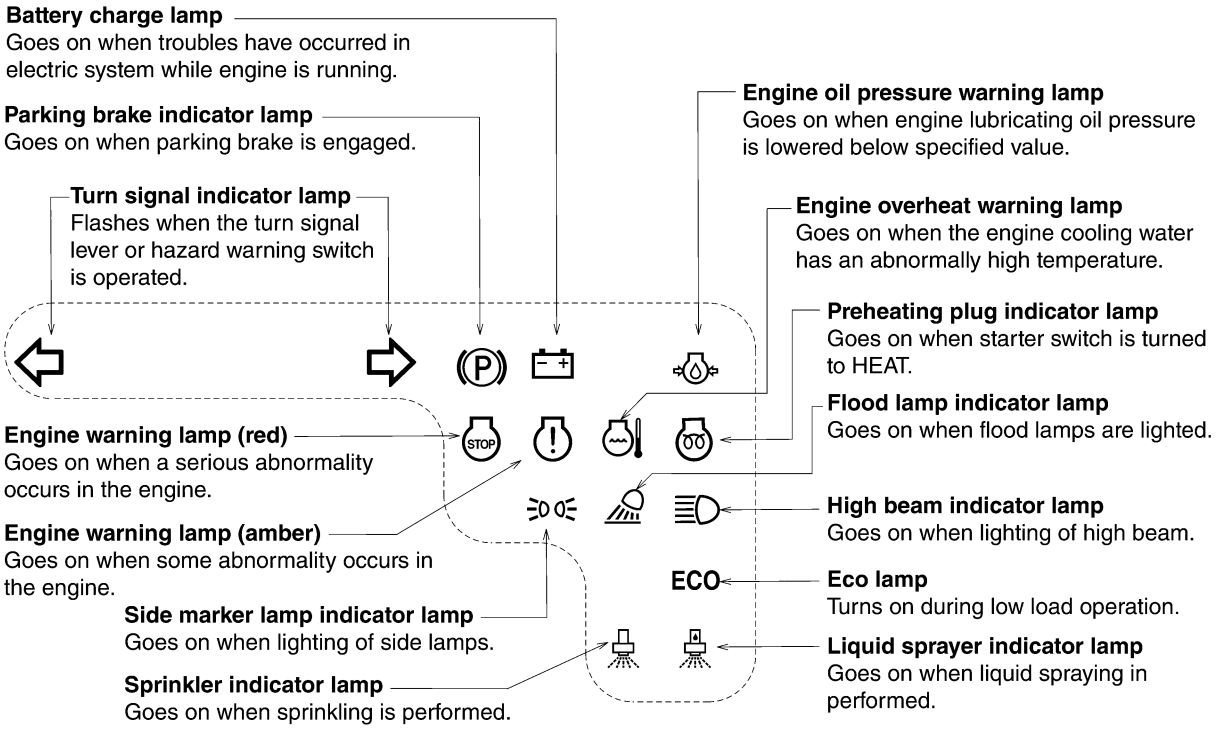
DPF indicator lamp (amber)

② Exhaust temperature indicator lamp (amber)

Turned on : Turns on when PM (particulate matter) accumulated in the DPF is being burned.

Exhaust temperature indicator lamp (amber)

6) Monitor display



★ Indicator lamps [⇦⇨ ECO]
Light up when corresponding systems have been operated.

★ Parking brake indicator lamp [Ⓟ]
It will flash once when the starter switch is turned to the ON position.
After that it will remain on while the parking brake is engaged, and turn off when it is released.

★ Engine oil pressure warning lamp [ ]
It will turn on when the starter switch is turned to the ON position, and turn off when the engine starts running.
It will turn on while the engine is running if the engine oil pressure drops below the specified value. Stop the machine and carry out an inspection.

★ Battery charge lamp [ ]
It will turn on when the starter switch is turned to the ON position, and turn off when the engine starts running.
It will turn on while the engine is running when a problem arises with the electric system. Stop the machine and carry out an inspection.

★ Engine warning lamp (red) [STOP]
It will turn on when the starter switch is turned to the ON position, and turn off when the engine starts running.
When the Engine warning lamp lights, it means a serious abnormality occurs with the engine.

★ Engine warning lamp (amber) [!]
It will turn on when the starter switch is turned to the ON position and turn off when the engine starts running.
Turns on while the engine is running when there is a problem with the engine system. If it turns on, park the machine in a safe place, stop the engine, and contact one of our sales offices or a factory designated by our company for advice.

★ Engine overheat warning lamp [ ]
It will turn on when the starter switch is turned to the ON position, and turn off when the engine starts running.
Turns on when the engine overheats. If it turns on, there is a possibility of overheating regardless of the thermometer reading. Park the machine in a safe place, stop the engine, put the throttle lever in the idling position, and let the engine idle to gradually cool it. If the lamp does not turn off, contact one of our sales offices or a factory designated by our company for advice.

★ Preheating plug indicator lamp [ ]
It will turn on automatically if preheating is required when the starter switch is turned to the ON position.
Turns off when preheating is completed.

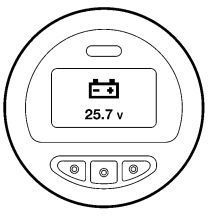
NOTE: When the flood lamp turns on, start the engine after it has turned off.

IMPORTANT

- **The window of the combination meter**
  The window of the combination meter may become invisible because of aged deterioration coused by fine sand or dust or ultraviolet. When any flaw or mist is found on the window, contact our branch offices or designated factory.
- **If the engine warning lamp or engine stop lamp do not turn off after starting the engine, or these lights turn on while driving, the engine has broken down or there is an error. Check to see if the problem can be identified.**

Voltage and warning indicator

Indicates the battery voltage.
It also turns on as a warning to indicate the need for manual regeneration of the DPF, or excessive rpm of the engine, e.g., when moving downhill.



Voltage and warning indicator

2.1.3 Switches

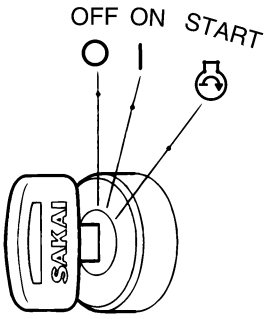
Starter switch

Starts and stops the engine.

OFF : The key can be removed in this position. All the electric systems are switched off. To shut down the engine, move the key to this position.

ON : The charging circuit and lamp circuit are charged with electricity. Let the key stay in this position after the engine has started.

START : The engine is cranked and gets started. The moment the engine has started, release the key. It will automatically return to the ON position.



Lamp switch / Dimmer switch

Has three positions.

OFF : All lamps are switched off.

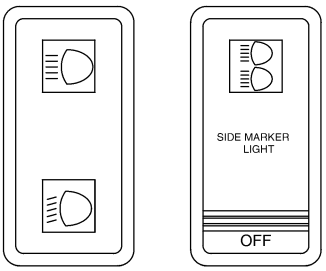
SIDE MARKER LIGHT : Side marker lamps and tail lamps come on.

: Then the head lamp lights up.

Turn on dimmer switch to switch over the upper beam and the lower beam of headlight.

: The upper beam of headlight lights up.

: The lower beam of headlight lights up.

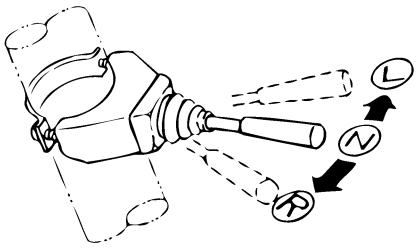


Turn signal lever

Turn signal lamp flashes when the turn signal lever is operated.

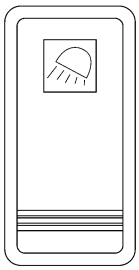
Left turn : Move the lever forward.

Right turn : Move the lever backward.



NOTE: The lever does not return to the OFF position even if the steering wheel is turned back.

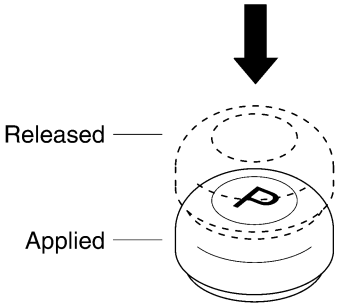
Flood lamp switch



Blank position : Flood lamps on the back of the machine turn off.

position : Flood lamps on the back of the machine turn on.

Parking brake switch



Use it as a parking brake.
Do not use while the machine is moving.
If the switch Ⓟ is pressed down, the parking brake applies with the indicator lamp Ⓟ on the monitor display lighted up.
When pressed again, the brake is released and the indicator lamp goes off.

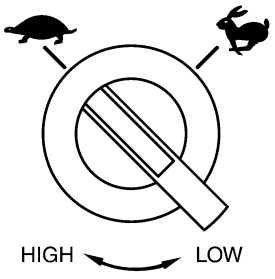
⚠ WARNING

- **To disengage the brake, be sure to press the button again instead of pulling it.**
- **When dismounting from the machine, press the button to apply the brake without fail.**

⚠ CAUTION

Never pull the switch up.

Speed shift switch

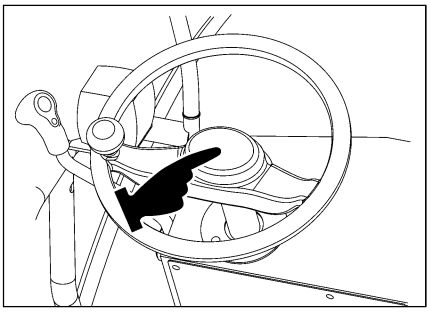


Selects two machine speed ranges.
Place the switch at the desired position.

LOW	0 – 8 km/h (0 – 5 mph)
HIGH	0 – 16 km/h (0 – 10 mph)

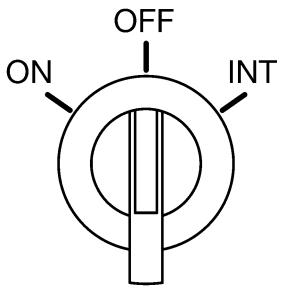
Horn switch

Pressing the button at the center of the steering wheel makes the horn sound.



Sprinkler switch / Sprinkler timer

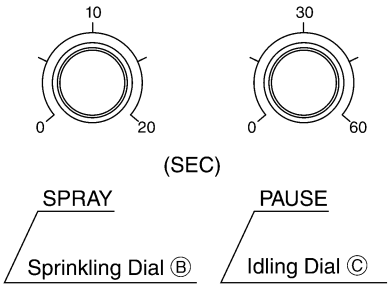
Switch Ⓐ selects the sprinkler modes.
ON : Continuous sprinkling is performed.
OFF : Sprinkling is shut off.
INT : Intermittent sprinkling takes place.



Sprinker switch Ⓐ

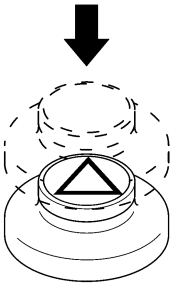
For the intermittent sprinkling, set the sprinkler timer at the desired sprinkling duration and idling duration (Sprinkling dial Ⓑ, idling dial Ⓒ). Then turn switch Ⓐ to the INT position. Sprinkling will start.

Sprinkling duration can be adjusted within 0 – 20 seconds with dial Ⓑ. Idling duration can be set within 0 – 60 seconds by turning dial Ⓒ. Adjust the dials to meet job conditions.



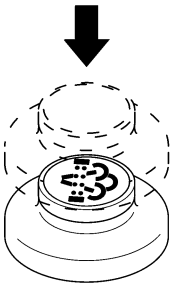
Hazard warning switch

Pushing the switch △ causes turn signal lamp, Hazard warning indicator lamp and Turn signal indicator lamp start to flash simultaneously. Pushing the switch again causes the lamps to go off.



Parked regeneration switch (black)

If the DPF indicator lamp (amber) flashes, press the switch in accordance with the manual regeneration procedure to begin DPF regeneration.



⚠ CAUTION

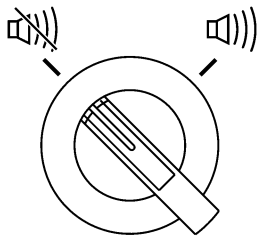
Pressing the switch when the DPF indicator lamp (amber) is off will not clean the DPF.

NOTE: Refer to "2.2.1 Handling the DPF" on page 36 for details on the conditions and points to beware of in manual regeneration.

Back buzzer switch

The warning buzzer may be turned off while reversing by operating this switch.
Select the mode to suit the conditions at the construction site.

position : The warning buzzer sounds while reversing.
position : The warning buzzer turns off.



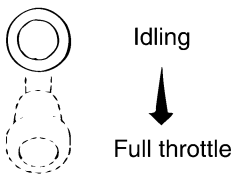
⚠ WARNING

- **Set it to the position unless the work (driving) requires otherwise.**
- **When setting it to the position, take adequate care to ensure the safety of others around you.**

2.1.4 Operating levers / pedals

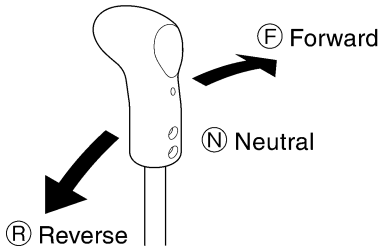
Throttle lever

Shift the engine RPM
The engine RPM increases when moved toward the operator.



Forward-Neutral-Reverse lever (F-N-R lever)

Moving the F-N-R lever forward or backward makes the machine travel forward or backward respectively. The neutral position Ⓝ brings the machine to a stop. The machine speed increases or decreases in proportion to the lever displacement.

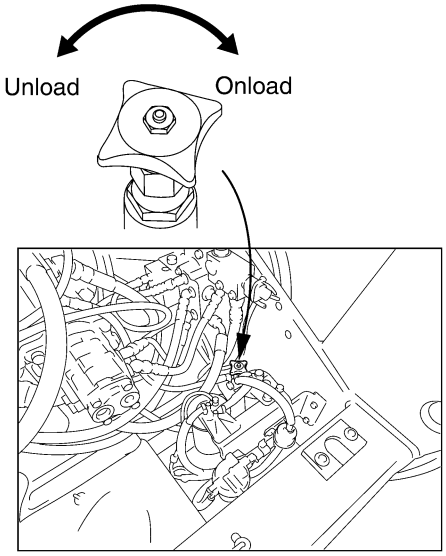


IMPORTANT

- **For normal braking, return the F-N-R lever back to neutral.**
- **In an emergency, depress the brake pedal. The F-N-R lever is simultaneously placed back to neutral along with the pedal movement. This combines the multi-disc static brake with the dynamic braking.**

Unloader valve

The unloader valve disengages the drive, playing a role like a clutch. Use this lever for towing the machine when the engine is disabled or when troubles have developed in the hydraulic drive.



☆ For towing (Unload):

- If engine can be started:
  With the engine running, turn the unloader valve counterclockwise to open and turn OFF the parking brake switch.
- If engine does not start:
  Disengage motor brake manually (refer to page 42).
  Turn the unloader valve counterclockwise to open.

☆ For normal traveling:
Turn the unloader valve clockwise to close.

⚠ WARNING

- **On a slope, use extreme care when handling the unloader lever and towing the machine.**
- **Be sure to apply the parking brake when operating the unloader valve.**
- **Unloading the unload valve will disengage the engine, so never get in front of or behind the machine.**

NOTE: With the lever in the UNLOAD position, the machine is not self-propelled. For normal travel, be sure to hold the valve in the ONLOAD position.

Brake pedal

Use it in emergencies. Carry out inspections in accordance with “3.3 Periodical Maintenance Points” (refer to page 70) after each use.
In an emergency, push down on the pedal to the full extent, and the machine will come to a sudden stop.

IMPORTANT

Do not use the pedal wherever practicable except for an emergency. If used during the compacting operation of asphalt pavement, this can cause damage to its surface.

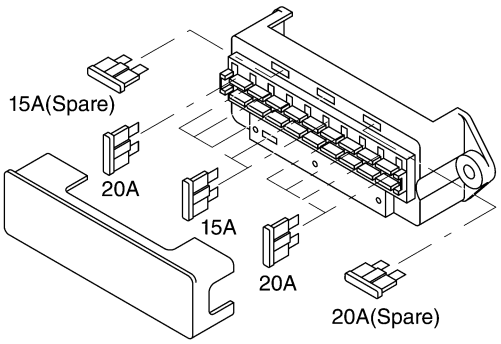
NOTE: Depressing the brake pedal brings the F-N-R lever into neutral position Ⓝ.

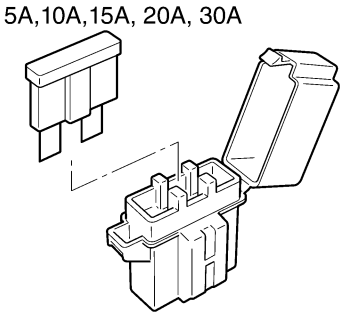
2.1.5 Fuse

⚠ WARNING

When changing a fuse, cut the power supply by turning the starter switch to the OFF position.

Fuses protect electrical components and wiring from burning. Change any fuse which has become powder-coated due to deterioration or which has a play between it and fuse holder. To replace fuses, take off the cover.
Be sure to use fuses of correct capacity.



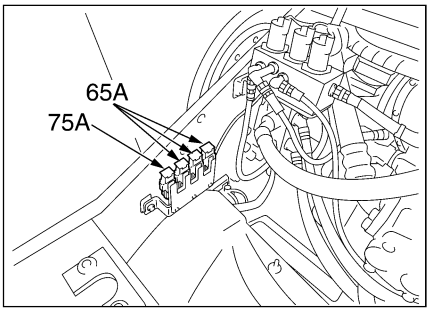


Line Fuse

2.1.6 Fusible link

⚠ WARNING

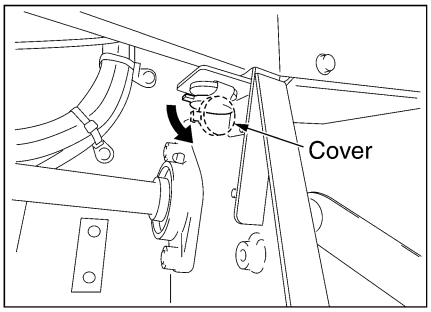
Be sure to turn off the electricity (by turning the starter switch OFF) before replacing the fusible link.



As with ordinary fuses, this protects electronic equipment and circuits from burnouts.
If the starter does not turn on when the starter switch is turned to the ON position, there is the possibility of a fusible link burnout caused by problems with the electronic equipment or circuits. Inspect and replace the fusible link after inspecting the electronic equipment and circuits.

Be sure to replace the fusible link with one of the same capacity.

2.1.7 Accessory socket



The accessory socket is found under the dashboard on the right.
The accessory socket may be used when the starter switch is turned to the ON position.
Open the cover, and a 12 V DC can be drawn from the socket for powering electronic equipment.

⚠ CAUTION

- **Use electronic equipment that consumes no more than 120 W (12 V, 10 A).**
- **Keep the cover closed when not in use to prevent foreign matter from getting inside.**
- **There is a possibility of the battery running flat when the accessory socket is used for a long time to power electronic equipment with the engine turned off or idling.**

2.2 Handling and Adjustments

2.2.1 Handling the DPF

About the DPF (diesel particulate filter)
The DPF is a filter, which collects PM (particulate matter) contained in the exhaust gas. To remove the PM collected in the DPF, it is burned (regenerated) automatically or manually. Be sure to observe the following to maintain the performance of the DPF.

- Always use fuel and lubricants designated or recommended by our company (refer to page 92).
- Do not modify the DPF muffler or exhaust pipe in any way. It may hinder its proper performance or lead to breakdowns.
- Do not use DPFs that have been dropped. The DPF consists of a ceramic catalyst installed inside the muffler. A strong impact may damage the DPF.

Regeneration the DPF
When the amount of PM accumulated in the DPF reaches a specified level, the PM is automatically burned (regenerated). When the PM cannot be removed automatically. It is burned manually.

⚠ WARNING

- **Do not carry out regenerating in enclosed spaces with poor ventilation, such as inside a garage or a room. There is the danger of carbon monoxide poisoning.**
- **Check to make sure there are no inflammables near the mouth of the exhaust pipe to prevent fires.**
- **Do not touch or let people go near the exhaust pipe or muffler, which will be hot during cleaning, and for a while after regenerating.**
- **Carrying out regenerating on painted roads may cause the paint to discolor.**
- **Carrying out regenerating in front of hedges may cause them to wither.**

Automatic regeneration
When the coolant temperature and exhaust temperature are at a specified level when the DPF indicator lamp turns on, the PM accumulated in the DPF will automatically be burned (automatic regeneration). The machine can be driven as usual during automatic regeneration. Moreover, if even one of the conditions strays from the specified level during automatic regeneration, it will stop. The DPF indicator lamp will turn off when automatic regeneration has been completed.

Manual regeneration

The PM accumulated in the DPF can be burned (manual regeneration) by following the procedures outlined below, while the DPF indicator lamp is flashing.
Failure to carry out manual regeneration, while the DPF indicator lamp is flashing, may lead to breakdowns.

Follow the procedures below to carry out manual regeneration.
1) Move the machine to safe location.
2) Shift F-N-R lever into neutral.
3) Push on the parking brake switch.
4) Keep engine rpm at idle.
5) Push on the parked regeneration switch.

The DPF indicator lamp will flash then turn on when the parked regeneration switch is pushed. The engine will automatically rev up and manual regeneration will begin. Manual regeneration will finish when the engine returns to idling and the DPF indicator lamp turns off.

⚠ CAUTION

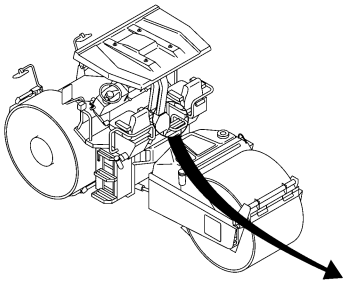
- **After burning (regeneration), do not turn the engine off immediately. Leave the throttle lever in the idling position for around 5 minutes, let the engine idle, and gradually let it cool. Stopping the engine suddenly without letting it cool may shorten the life span of engine parts.**
- **Continuing to drive the machine without carrying out manual regeneration, while the DPF indicator lamp (amber) is flashing, will turn on the engine warning lamp (amber) , and the engine output will be limited. Carry out manual regeneration immediately.**

Regeneration "RGN" of DPF for Roller Operator / Engine Diagnosis

Soot accumulated at DPF can be burned and regenerated automatically and/or manually. Maintain DPF and engine properly by following this instructions and/or operator manual.

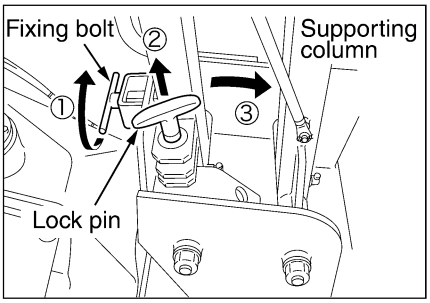
Level (Stage)	DPF Gauge DPF LEVEL	DPF indicator lamp (Amber)	Parked RGN switch (Black)	Engine warning lamp (Amber)	Parked RGN Request Warning Buzzer	Auto RGN	Parked Manual RGN	Limit of Engine Output	Operations
0 (No RGN Needed)	**1 ~ 9**	Lamp Off		Lamp Off	NO	No Need	No Need	NO	RGN is not required. Normal machine operation is available.
1 (Auto RGN)	**10 (Max)** RGN may start even below level 10 according to amount of soot left at DPF.	Lamp On		Lamp Off	NO	Applicable	No Need	NO	Normal machine operation is available. When DPF indicator lamp(amber) goes on during Auto RGN, keep engine RPM at Max for 30 min to perform best RGN.
2 (Requesting Parked RGN)		Blinking		Lamp Off	YES	Applicable	Applicable	NO	Perform parked manual regeneration within two hours.
3 (Parked RGN Urgent Request)		Blinking	Start Parked RGN by pushing the switch. Amber lamp blinking changes to light-on.	Lamp On	YES	Not Applicable	Applicable	YES	Perform parked manual regeneration promptly. Under the following conditions, contact one of our sales offices or a factory designated by our company for advice. ・Manual regeneration does not begin when the parked regeneration switch is pushed. ・After regeneration, the warning indicator lamp does not turn off.
General Cautions for Safe RGN	1. Don't perform Parked RGN in closed unventilated space. Poisoning by carbon monoxide gas can occur. 2. Don't touch and/or get close to "HOT" DPF and exhaust pipes during and after RGN to avoid burns. 3. Hot exhaust gas can ignite combustible material during RGN. Insure hot exhaust is dissipated away from combustible materials. 4. Exhaust smoke may be white during part of RGN. 5. Do not turn engine off immediately after regeneration of the DPF, but let it idle for around 5 minutes. Turning it off immediately may lead to breakdowns.						**Procedure of Parked RGN**		1. Move the machine to safe location. 2. Shift FNR lever into neutral. 3. Push on the parking brake switch. 4. Keep engine rpm at idle. 5. Push on the Parked RGN black switch. With a start of RGN, Amber lamp stops blinking and goes on. The DPF indicator lamp (amber) will flash, then turn on, after which the engine will rev up automatically, and manual regeneration will begin. Around 30 minutes later, the engine will return to idling, and the DPF indicator lamp (amber) will turn off when regeneration is complete. Be sure to idle the engine for around 5 minutes after regeneration.
Daily Check of Engine Oil Level and Oil Change	1. If engine oil level exceeds the upper level, change oil as soon as possible. Engine may be damaged by oil mixed with post-injected fuel during RGN. 2. Change oil when RGN interval gets shorter than 5 hours. 3. Be sure to use engine oil with grade of JASO DH-2 or API CJ-4.								

2.2.2 Awning (with AWNING only)



⚠ WARNING

When handling the awning, keep your feet away from the folding columns.



1) To fold the awning:
   ① Remove the fixing bolts by turning counterclockwise.
   ② Push the supporting columns slightly backward to free the lock pin. Pull off the lock pin from its locking hole while spinning it slightly.
   ③ Fold the supporting columns slowly forward.

⚠ CAUTION

When folding down the awning, use care not to bump your head against it.

   ④ Insert the lock pin into another locking hole.
   ⑤ Make sure the lock pin has entered into the locking hole positively.

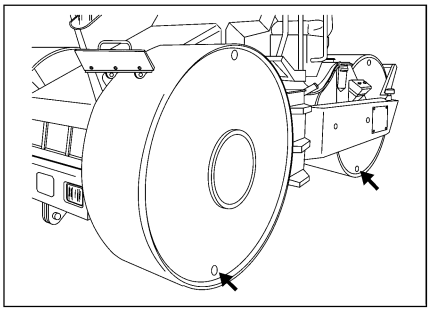
2) To set up the awning
   ① Raise the supporting columns slightly to free the lock pin. Pull off the lock pin from the locking hole.
   ② Stand the supporting columns.
   ③ Put the locking pin into the locking hole while turning it slightly to make the insertion easy.
   ④ Screw in the fixing bolt until tight by turning clockwise to fix the columns.

3) To transport the machine with the awing folded.
   ① Make certain the lock pin is positively in the locking hole.

⚠ WARNING

- **When the awing is folded, loosen the fastening bolt and unlock the lock pin. Then fold the supporting columns forward after making sure the damper which permits easy column lifting is working.**
- **If the damper is not working, be careful because the supporting columns can fold forward quickly.**
- **In case the damper fails to work, replace the damper.**

2.2.3 Ballast water



Each drum can be filled with ballast water.
1) Allow either of two plugs on the side of drum to come to the top.
2) Fill the drum from the top hole.
3) When filling is completed, replace and tighten the removed plug.

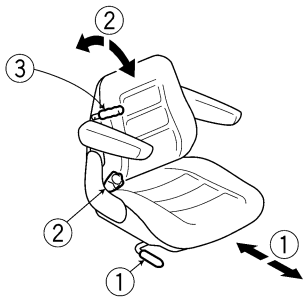
⚠ WARNING

Before filling the drums, be sure to engage the parking brake by pressing the parking brake button.

⚠ CAUTION

In cold weather, drain the drums by taking out the plugs to prevent freezing.

2.2.4 Seat adjustment



1) Pull the lever ① and adjust seat position longitudinally.
2) Turn the backrest adjust dial ② for optimum angle.
3) Move the suspension lever ③ to select suitable suspension for your body weight.

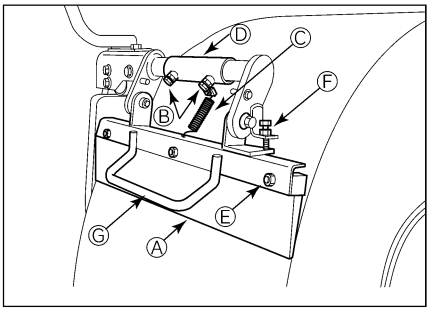
⚠ WARNING

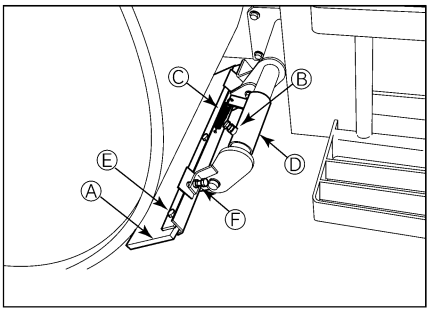
The adjustment will be necessary when operating the machine first or when operators are alternated.

2.2.5 Scraper adjustment and replacement

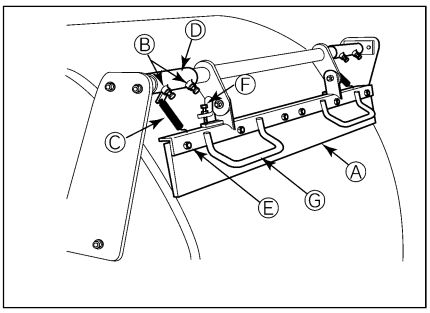
The procedures are the same for both the front and rear scrapers.

1) Pressure of scraper blade Ⓐ on drum
   ① Loosen bolts Ⓑ at two locations.
   ② With blade Ⓐ and the drum in contact with each other, rotate set pipe Ⓓ in the direction in which the spring Ⓒ is extended. This increases the pressure on the drum.
   ③ If necessary to reduce the pressure, turn set pipe Ⓓ in the direction in which the spring retracts.
   ④ Adjust bolt length Ⓕ so that the blade stops where it comes in contact with roll.



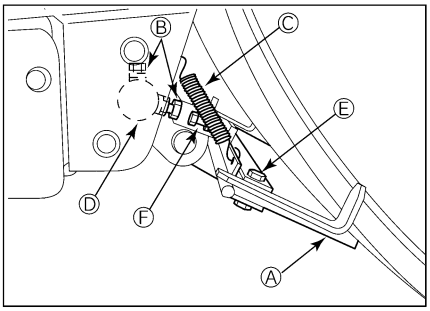


2) Scraper blade replacement
   ① Remove bolts Ⓔ (3 locations on the front scraper and 6 locations on the rear one).
   ② Replace the blades.
   ③ Replace bolts Ⓔ and tighten.



NOTE: The scraper blades can stay idle if held in the raised position as follows:

   ④ Grip the handle Ⓖ and lift the blade (Handles are provided at the front of front drum and rear of rear drum).



⚠ WARNING

- **When blade Ⓐ is lifted to separate from the drum, raise it slowly by supporting it with both hands not to allow your hands to be pinched between the drum and blade.**
- **Exercise care so as not to have your hands caught between the roll and blade when returning the lifted blade Ⓐ back to the original position.**

2.2.6 Disengaging the brake when towing

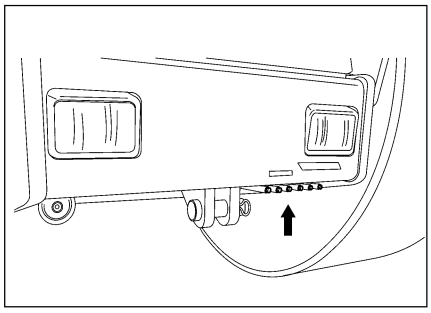
⚠ WARNING

- **On a slope, chock the drums and prepare for towing before disengaging the brake.**
- **Start with the front drums, proceeding to the rear one.**

For towing the machine when the engine is disabled or when troubles have developed in the hydraulic system for propulsion, disengage the brake as instructed below: The procedure is the same for both the front and rear brakes.

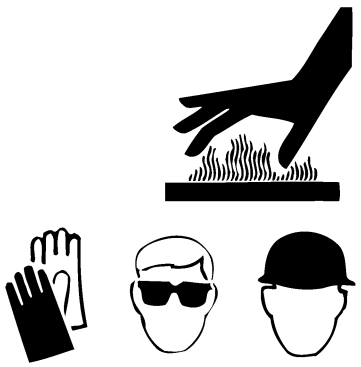
1) Front brake

① Remove the brake-disengaging bolts and washers from the machine frame.



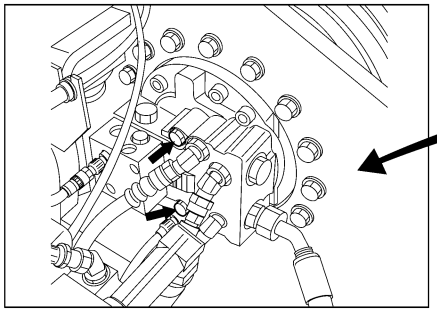
⚠ WARNING

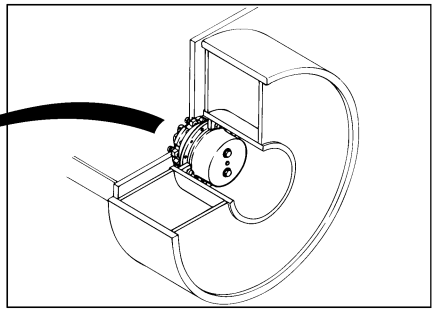
- **Do not try to release the brake immediately after a hot engine has been stopped. Let the oil cool down.**
- **For the brake disengagement, wear hard hat and safety goggles.**



② Remove the motor plugs (2 locations) from under the front frame.

NOTE: Conduct the work rapidly, as the oil will gush out when the plugs are taken off.





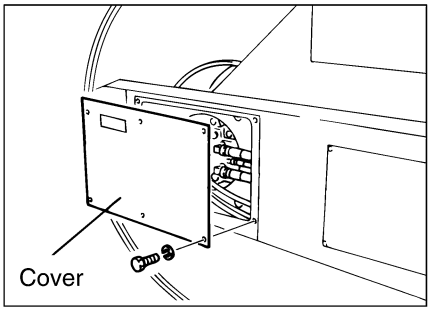
③ Screw in the removed bolts with the washers into the plug holes alternately. Screwing in them until they become a little tight will disengage the brake.

NOTE: Wash clean the brake release bolts and blank plugs before fitting to the motors.

2) Rear brake

① Loosen the cover securing bolts.

② Remove the bolts while pressing the cover on the frame.



⚠ WARNING

Hold the cover when removing the securing bolts, or else the cover will fall and cause injury.

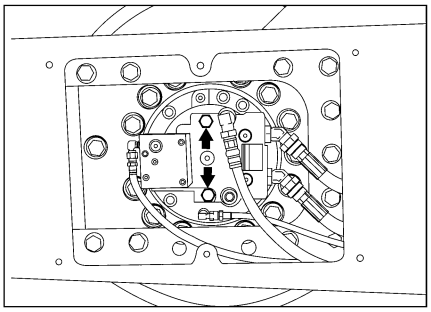
③Carefully lower the cover on the ground while supporting it by hands.

⚠ WARNING

When lowering the cover on the ground, hold it with both hands to prevent your feet from being caught between the cover and ground.

④Remove the brake release bolts and washers from the machine frame.

⑤Turn them into the plug holes alternately. When screwed in until they become a little tight, the brake will be disengaged.



NOTE: Perform the work rapidly, as the oil will gush out as the plugs are taken off.

3) When towing is complete, set the bolts and washers in the original position and fit the plugs in the motors securely.

2.3 Operation

⚠ WARNING

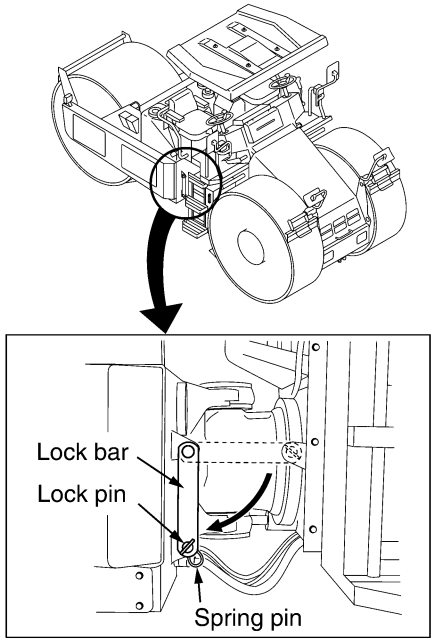
- **This machine is a one-man roller.**
- **Operate the machine from the operator's seat.**
- **Be sure to wear the seatbelt during operation (with seatbelt).**

2.3.1 Before-starting inspection

1) Check that the steering lock bar is in the carrying position.

⚠ WARNING

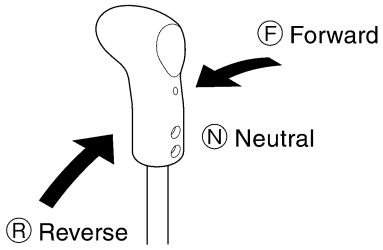
Make sure that the steering lock bar is connected in the carrying position before putting the machine in motion. Steering is impossible if the bar is in the steering lock position.



The bar is located at the right of the center of the machine.
To unlock the bar:
① Remove the spring pin.
② Pull out the lock pin.
③ Set the bar in the carrying position.

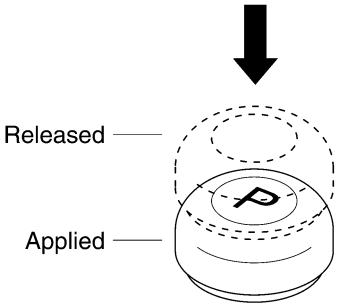
NOTE: Retain the lock bar in the locked position by inserting the lock pin into the lock holes. Fix the lock pin with the spring pin.

2) Check that the F-N-R lever is in the neutral position Ⓝ.



3) Check that the parking brake has been pressed.

NOTE: When the F-N-R lever is not at the neutral position Ⓝ, or when the parking brake has been released, the interlock will be activated, preventing the engine from starting. Be sure to check that the F-N-R lever is at the neutral position Ⓝ, and the parking brake has been pressed before starting the engine.

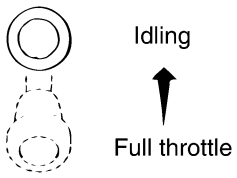


2.3.2 Starting the engine

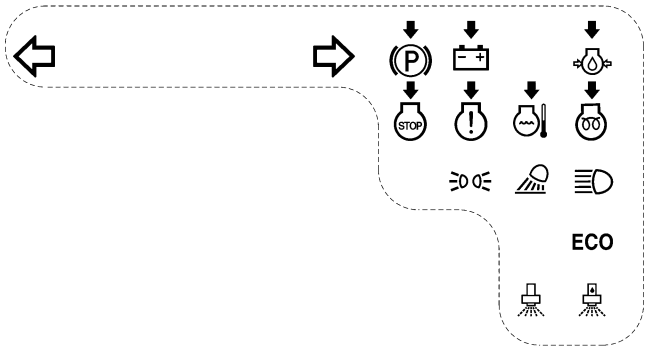
⚠ WARNING

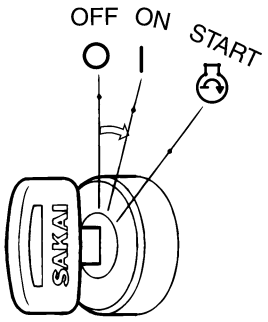
- **Check that there are no people or obstacles nearby, and honk the horn before starting the engine.**
- **Engage the parking brake, move the F-N-R lever to the neutral position Ⓝ before starting the engine.**

1) Set the throttle lever in a position slightly higher than IDLING.



2) Turn the starter switch to the ON position and check that the warning lamps and parking brake indicator lamp on the monitor display are on.

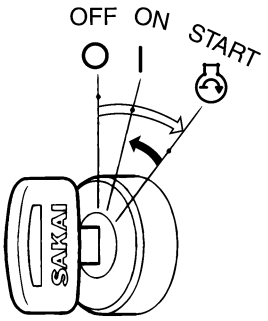




The engine is preheated automatically when it is cold. Hold the key in this position until the lamp on the monitor display goes out.
Start the engine after the preheating plug indicator lamp goes out.

NOTE: The various warning lamps will turn on when the starter switch is turned to the ON position, and only the hydraulic oil filter warning lamp will turn off after that.

3) Turning the key to the START position makes the engine start. Release the key the moment the engine has started. The key will automatically return to the ON position.



⚠ CAUTION

- **Do not allow the starter key to stay in the START position for more than 15 seconds.**
- **When the engine fails to start, or you want to restart the engine immediately after turning it off, wait around 30 seconds before restarting it.**
- **Check that the warning lamps on the monitor display go off immediately after the engine is started. If any of these warning lamps becomes bright while the engine is running, shut down the machine, determine the cause and rectify the fault.**

2.3.3 After starting the engine

Try not to move to operation immediately after starting but observe the following:

IMPORTANT

Avoid increasing the engine speed abruptly before warming-up run is completed.

1) Run the engine at around 1,200 rpm for about 5 minutes to warm it up. Warming-up run allows the lubricating oil to reach the vital parts of the engine and hydraulic system, gradually warm the engine, engine oil and hydraulic oil to prepare the machine for driving.
2) After the warm-up operation, check that:
   - Temperature gauge ..... Pointer falls near the center zone
   - Fuel gauge ..... Pointer falls between the E and F marks
   - Battery charge lamp ..... Has gone off
   - Engine oil pressure warning lamp ..... Has gone off
   - Engine warning lamp (red) ..... Has gone off
   - Engine warning lamp (amber) ..... Has gone off
   - Engine overheat warning lamp ..... Has gone off
   - DPF indicator lamp (amber) ..... Has gone off
3) Check for the color of exhaust gas, listen for unusual sounds and vibration. If abnormal, determine the cause and correct the problem.

⚠ WARNING

Keep staying at the driver's seat while starting the engine.

2.3.4 Traveling

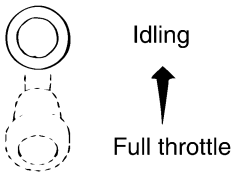
⚠ WARNING

- **When starting, operate the horn after securing the safety around the machine.**
- **Be sure to wear the seatbelt during operetion (with seatbelt).**

⚠ CAUTION

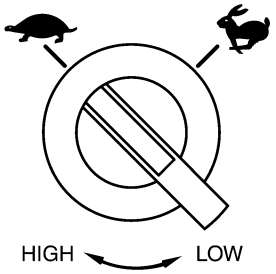
When travelling, do not turn the starter switch OFF.

1) Put the throttle lever in the “Idling” position.



2) Select HIGH or LOW speed by the operation of speed shift switch.

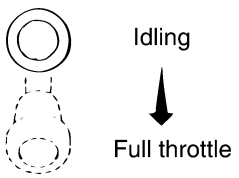
LOW	0 – 8 km/h (0 – 5 mph)
HIGH	0 – 16 km/h (0 – 10 mph)



⚠ WARNING

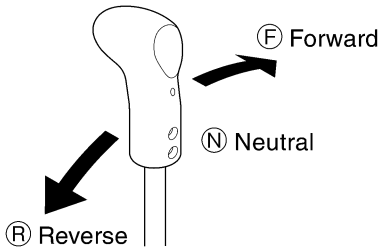
- **When traveling on steep slope, use the low speed stage and do not change the speed. While traveling, do not operate the speed shift switch.**
- **Selection of speed stage should only be made with the machine standing still.**

3) Speed up the engine by pulling down the throttle lever towards you.



4) Press down the parking brake switch to release the brake.
Check that indicator lamp (P) goes off.

5) Move the F-N-R lever in the direction to travel, and the machine will begin traveling.



⚠ CAUTION

Avoid abrupt operation of the F-N-R lever.

NOTE: The travel speed can be controlled by the throttle lever and F-N-R lever.

⚠ WARNING

Pay extreme attention to the area behind the machine when backing, since the space just behind it tends to be a blind spot.

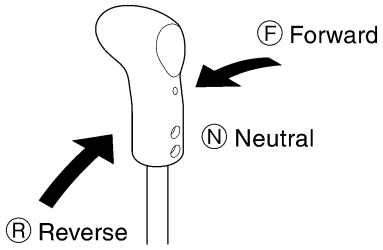
NOTE: If the engine speed drops frequently when the machine begins to move or while the machine is driving, increase the engine speed.

2.3.5 Stopping / Parking

⚠ WARNING

- **Avoid abrupt braking. Try to leave enough time for braking.**
- **Avoid parking on a grade.**
  If necessary to park on a grade, block the wheel to prevent unexpected moving down the grade.

1) Bring the F-N-R lever to the neutral position Ⓝ, and the machine will come to a halt.



⚠ CAUTION

For normal braking, move the F-N-R lever back to the neutral position Ⓝ. In an emergency, depress the brake pedal. The F-N-R lever is placed back to neutral through a linkage. This combines the multi-disc static brake with the dynamic braking.

2) Press the parking brake switch securely, and check that indicator lamp (Ⓟ) illuminates.

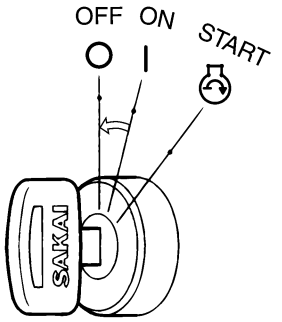
2.3.6 Stopping the engine

1) Cool down the engine at idling for about 5 minutes with the throttle lever in the “Idling” position.

IMPORTANT

- **Do not bring a hot engine to a sudden stop except for an emergency. This will shorten the life of its component parts.**
- **Do not also allow an overheated engine to come to a sudden stop, but run it at middle idling speed for gradual cooling down.**

2) Turn the starter key to the OFF position to stop the engine.



⚠ CAUTION

While travelling, do not turn the starter switch OFF.

3) Pull off the starter switch key.

⚠ WARNING

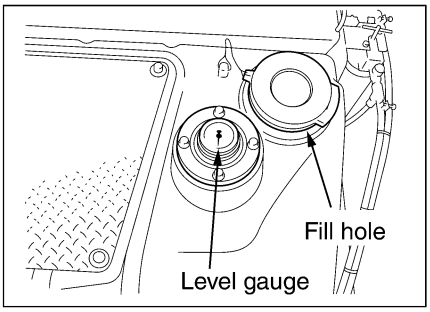
- **When dismounting from the machine, apply the parking brake by actuating the parking brake switch. Moreover, be sure to use the wheel chocks provided with the machine when parking on a slope.**
- **Remove the starter switch key.**

2.3.7 Check after stopping the engine

1) Perform the walk-around checks for oil and water leakage, abnormal signs around the drums.
2) Fill the fuel tank.
3) Remove waste paper if any from the engine compartment, as this will pose a possible fire hazard.
4) Scrape mud or other materials from and around the drums.

2.4 Sprinkler

Before sprinkling, check for the water level in the sprinkler tank on the gauge. Add water as necessary.



⚠ CAUTION

Do not fill the tank quickly. It may damage the sprinkler tank.

IMPORTANT

Use clean water wherever practicable.

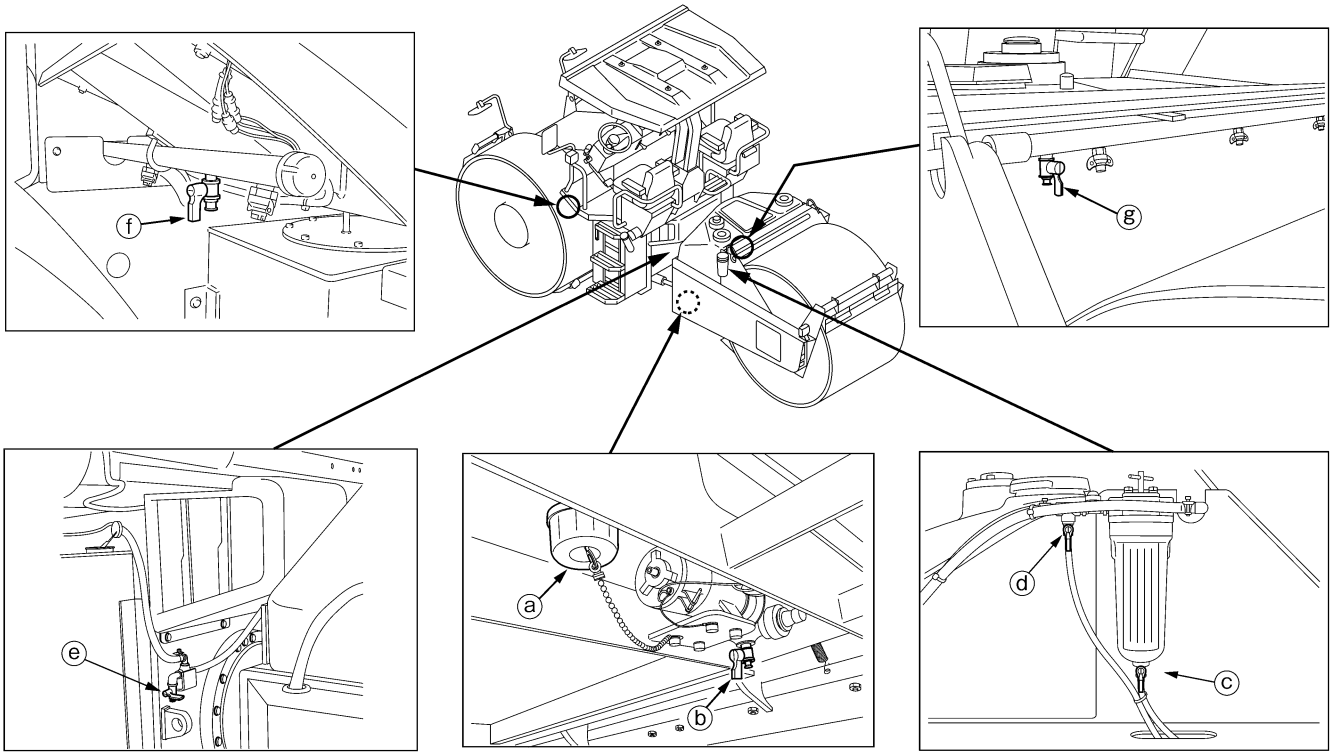
Two sprinkler modes are available continuous mode and intermittent (timer) one.
Select depending upon job conditions. For use, refer to page 31.

⚠ CAUTION

To avoid freezing, fully drain the sprinkler tank, pipes and filter in cold weather.

IMPORTANT

When compacting asphalt mixes, select ON to fully wet the drum surface, then switch to INT. Follow the same procedure for starting the work after a short break.



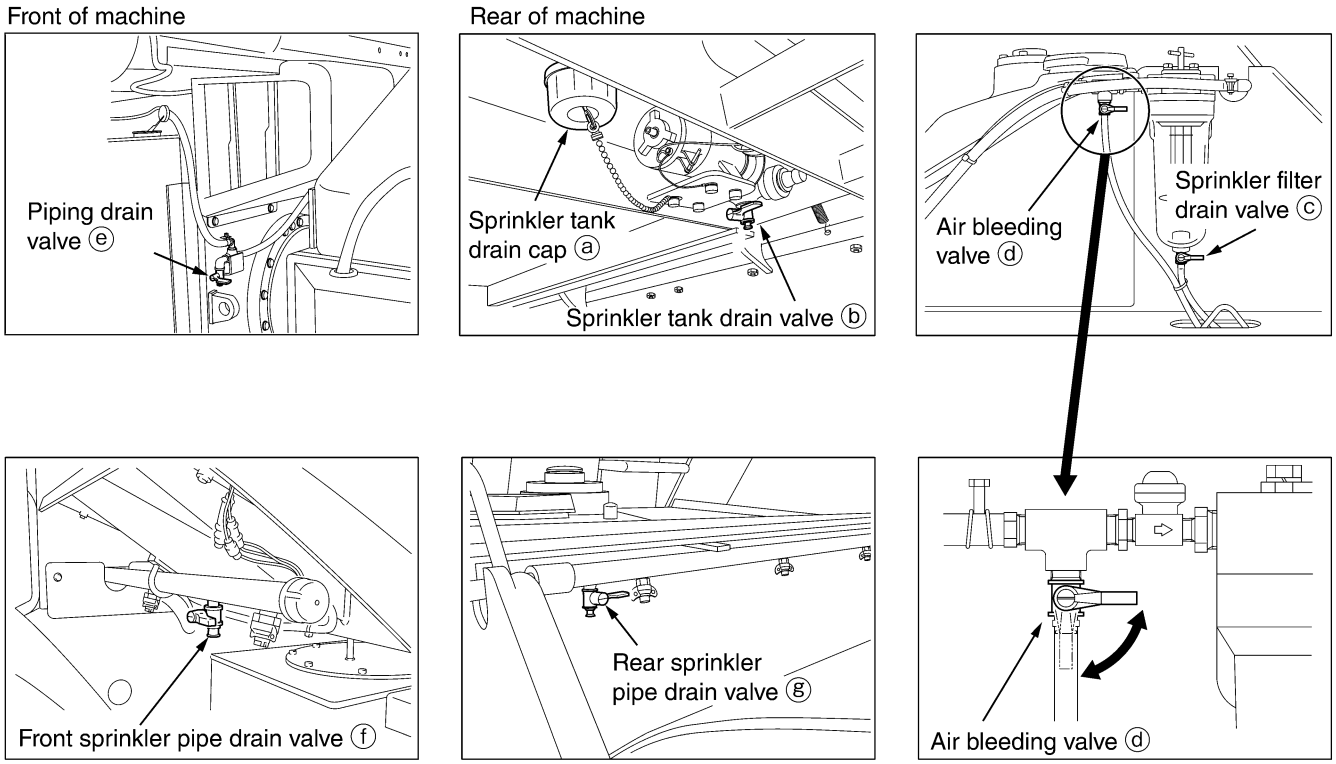
To drain water:

① Turn sprinkler tank drain cap ⓐ counterclockwise and completely drain the tank.
② Open sprinkler pump drain ⓑ sprinkler filter drain valve ⓒ air bleeding valve ⓓ and drain valve ⓔ of the piping in the center pin part in order to completely remove water.
③ Drain the front and rear sprinkler pipes by opening valves ⓕ and ⓖ .
④ In cold weather, also drain the hoses, pump and sprinkler nozzles.

⚠ CAUTION

- **Open the sprinkler tank cover when draining.**
- **Open the respective cocks when the weather is cold and after the operation is finished.**

Water may not come out of the sprinkler nozzle when an attempt is made is to spray water again after draining the water according to the procedure shown on page 52. In that case, operate the machine according to the procedure shown below.

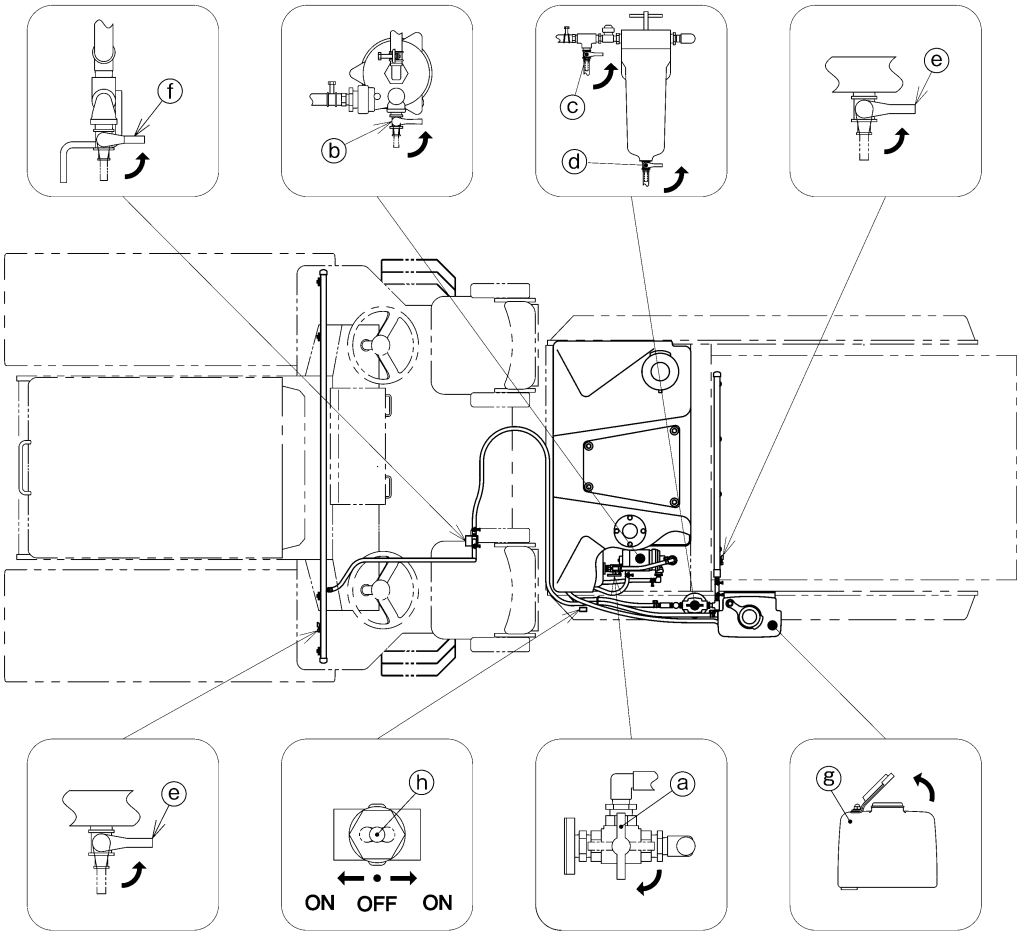


Supplement to draining method

① Check that all the caps and valves ⓐ – ⓖ have been closed.
② Start the sprinkler pump.
③ Repeatedly open and close the air bleeding valve ⓓ to remove the air from the pipeline. (Water will be discharged simultaneously).
④ After confirming that the air has been removed completely, close the air bleeding valve ⓓ .

How to circulate the antifreeze solution during cold times

Be sure to follow the procedures below when there is the possibility of freezing.



① Drain all water inside the sprinkler tank, sprinkler pipe, sprinkler filter and piping.
② Turn switch cock ⓐ to the position for sucking up antifreeze from the tank.
③ Close sprinkler pump drain cock ⓐ.
④ Close sprinkler filter cocks ⓒ and ⓓ.
⑤ Close sprinkler pipe cocks ⓔ on the front and back.
⑥ Close drain cock ⓕ on the hose piping.
⑦ Pour the antifreeze solution into antifreeze solution tank ⓖ.
⑧ Turn on antifreeze solution sprinkler switch ⓗ (left or right) and check to make sure the antifreeze solution comes out of the sprinkler nozzle.

2.5 Precautions for Work

2.5.1 Compaction operation

■ Change the direction of travel gently

- When changing the direction of travel during asphalt mix compaction, slowly shift the F-N-R lever.

■ Drive at a speed appropriate for the road surface conditions

- Drive slowly on uneven surfaces.

2.5.2 When going downhill

■ Use the F-N-R lever

- Run slowly by the operation of the F-N-R lever even if the travel distance is short.

■ Use the engine brake

- Go downhill by applying the engine brake along with the F-N-R lever operation.

⚠ WARNING

When going uphill, run at low speed. Do not attempt to shift speeds during travelling. The machine can slip down the slope.

2.5.3 On a slope

■ Working on a sidehill

- Work in an uphill / downhill direction, and avoid working on sidehill with the machine inclining sideways.

2.6 Applicable Jobs

The machines do a variety of jobs as listed below.
1) This machine is mainly used for:
   Static compacting work

2) Road rollers do a variety of jobs as listed below.

Work
- Asphalt road paving
- Dust removal treatment for road
- Road improvement
- Embankment construction
- Dam construction
- Construction of forestry and farm roads
- Foundation building
- Construction of sidewalk, shoulder and gutter foundation

Material to be compacted
- Asphalt pavement
- Crusher run
- Cement concrete
- Sands
- Soils
- Slag
- Soft rock

⚠ CAUTION

If the compaction material is hard, the rolls may wear prematurely due to rolling pressure or scratch.

Layers to be compacted
- Surface course, Binder course
- Base course
- Subgrade
- Embankment
- Shoulder
- Sidewalk

2.7 After Operation

Follow the procedures below to prevent the machine from falling into an unworkable condition the following morning caused by muds and other extraneous matter on the drum, or frozen drums:

1) Check to see if the engine coolant temperature is too high and the engine oil pressure is not normal. Also check the fuel level.
2) Remove muds and water from the machine. Muds can get into the seals together with water drops on the hydraulic cylinder piston rod. Damaged seals will result.
3) Park the machine on a hard and dry surface. If such a place is not available, cover the ground with hard plates.
4) Low temperature will cause a significant reduction of battery efficiency. Cover batteries or take them off from the machine and store in a warm place for the following day's operation. There is a danger of battery fluid leaking when removing the battery from the machine, so take care not to tilt the battery when doing so.
5) To prevent the sprinkler water from freezing, observe the following (See page 52 for draining water).

IMPORTANT

- **Drain water completely from the sprinkler system, as remaining water can cause damage to the system.**
- **Do not wash clean with high pressure water around the instrument panel or reverse side of the dash board. This can cause instrument failures.**
- **Avoid high pressure washing of the insulating material around the exhaust pipe. It may cause the insulation material to peel off.**

2.8 Loading and Unloading

⚠ WARNING

- **Use sturdy ramps with proper width, length and thickness which allow safe loading and unloading.**
- **If the ramps deflect considerably under load, apply wooden blocks to reinforce them.**
- **Loading should be conducted on a level and hard ground. Leave a sufficient distance between the machine and the shoulder.**
- **To prevent slippage on the ramps, keep the drums free from mud, oils, etc. The ramps must also be free of grease, oil and ice.**
- **Do not steer the machine on the ramps. If the machine is facing in the wrong direction, allow it to dismount from the ramps and correct the direction.**
- **Use only the properly rated capacity ramps for the machinery that is to be loaded / onloaded.**

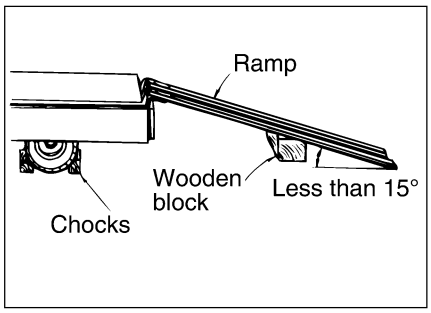
For loading and unloading, use ramps or a proper loading stand.

2.8.1 Use of a truck or trailer equipped with a winch

⚠ WARNING

Placing the unloader in UNLOAD position disrupts the power for traction. Do not enter the areas ahead of and behind the machine. It is very dangerous.

1) Engage the truck or trailer brake and chock its wheels.
   Fix the ramps so that the machine and truck or trailer are completely aligned.



☆ The angle between the ramps and ground must be less than 15 degrees.
☆ Leave a proper space between the ramps according to the width of the roller drum.

2) Decide the correct direction of run and make the machine run forward to the ramps.

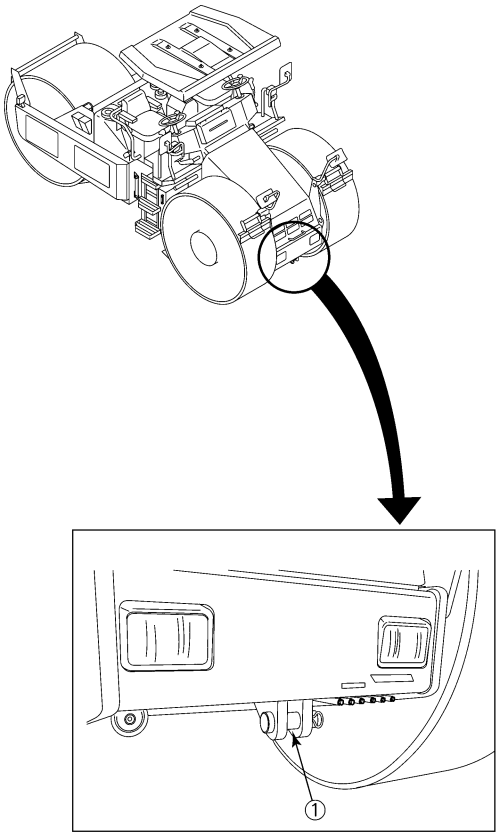
3) Draw the wire rope from the truck or trailer winch and put its hook on the hooking point ① of the roller.

4) Lift bonnet and place the unloader valve in unload position (refer to page 33).

5) With the engine running at idle, perform loading by means of the truck or trailer winch.

6) When the loading is completed, set the unloader valve back in the ONLOAD position.

7) Locate the machine correctly on the truck or trailer.

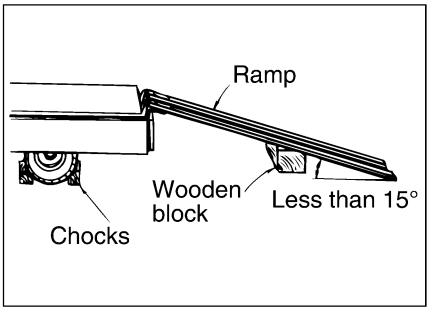


2.8.2 Self-propelling

1) Engage the truck or trailer brake and chock its wheels. Fix the ramps so that the machine and truck or trailer are completely aligned.

☆ The angle between the ramps and ground must be less than 15 degrees.

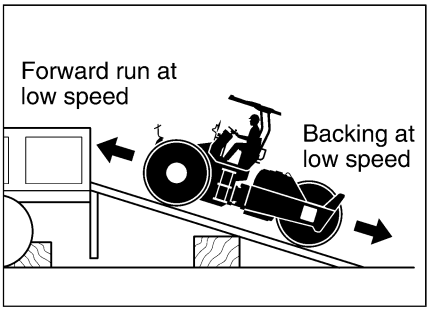
☆ Leave a proper space between the ramps according to the width of the roller drum.



2) Decide the correct direction of run and conduct loading or unloading at low speed.

   For loading, run forward at low speed.
   For unloading, run backward at low speed.

3) Locate the machine correctly on the truck or trailer.



2.9 After Loading the Machine

When the machine has been located properly on the trailer, tie it down as follows:

1) Press the parking brake switch to apply the parking brake. Place wooden blocks under the drums to prevent movement.
2) Fix the machine with ropes tied at the front and rear towing hook holes. Particularly, pay attention to sidewise skidding.

2.10 Transportation

⚠ WARNING

To decide the transporting route, check the width of the road, height and weight (including the roller) of the trailer. Obey relevant regulations.

For transportation, obey traffic regulations.

2.11 Operation in Cold Weather

In cold weather, take the following measures to prevent troubles such as starting difficulty and coolant freeze-up.

2.11.1 Fuel oil and grease

Use fuel and oil with low viscosity (refer to page 92).

2.11.2 Coolant

⚠ WARNING

Do not bring an open flame to the antifreeze or do not smoke when handling it. It is inflammable.

⚠ CAUTION

Never use methanol-, ethanol- and propanol-base antifreeze.

In freezing weather, add antifreeze to the coolant referring to the table below. Select the most suitable mix ratio according the lowest temperature in the job location.

Ambient temperature	-33°C (-27.4°F)	-26°C (-14.8°F)	-20°C (-4°F)	-16°C (3.2°F)	-11°C (12.2°F)
Amount of antifreeze	4.4 L (1.2 gal)	4.0 L (1.1 gal)	3.5 L (1.0 gal)	3.1 L (0.8 gal)	2.6 L (0.7 gal)
Amount of water	4.4 L (1.2 gal)	4.8 L (1.3 gal)	5.3 L (1.4 gal)	5.7 L (1.5 gal)	6.2 L (1.6 gal)
Ratio	50%	45%	40%	35%	30%

The rollers use a long-life coolant (non-amine type for general location: 35% in concentration ; for cold places: 50%). Change the coolant at lease every two years.
Use non-amine type long-life coolant when changing coolant.

IMPORTANT

Use of a high consistency antifreeze coolant in summer time can cause the engine to overheat depending upon job conditions. Use a coolant with the water-antifreeze ratio of 70 to 30.

2.11.3 Battery

⚠ WARNING

- **The battery contains diluted sulfuric acid, which will dissolve clothes and skin. Should you get battery fluid on your clothes or skin, wash it off immediately with copious quantities of clean water.**
- **If you get it in your eyes, rinse them straight away with clean water and immediately seek the help of a doctor.**
- **If you accidentally ingest it, drink copious quantities of water and immediately seek the help of a doctor.**
- **Always wear safely glasses when handling the battery.**
- **The battery generates hydrogen gas, so there is a danger of explosions. Avoid recharging the battery, keep cigarettes and flames away, etc., in poorly ventilated places when there is a danger of generating sparks.**
- **The inspection and handling of batteries should be carried out with the engine turned off and the starter switch in the OFF position.**
- **Turn the starter switch to the OFF position, then wait at least 30 seconds before removing the battery. An abnormality may arise in the ECM (engine control module).**
- **Be careful not to accidentally connect the two battery terminals with tools or other metallic objects.**
- **Tangled terminals may generate sparks due to improper connections, resulting in the danger of explosions. Make sure terminals are connected firmly.**
- **The battery is for starting the engine and operating electrical equipment on the machine. Do not use it for any other purpose.**

When the temperature decreases, the battery capacity will lower, possibly freezing the electrolyte.
The battery should be maintained in a good state at all times, with care taken to keep it warm in preparation for use the next morning.

The hydrometer atop the battery permits confirmation of the condition of the battery.
Green ····· Satisfactory (Good)
White ····· Charging is necessary (Charging necessary)
Red ····· Replacement is necessary (Electrolyte insufficient)

⚠ CAUTION

The power-supply voltage of this machine is 12 V.

2.12 When the Cold Season is Over

When winter is over and the warm season has come, proceed as follows:

1) Change oil and fuel with those for use in warm season referring to “Rating” on page 92.
2) If AF antifreeze is in use drain, the coolant completely, wash clean inside the cooling system, and then fill with non-amine type long-life coolant.

2.13 For a Long Storage Period

For leaving the machine unused for longer than one month, proceed as follows:

1) Store the machine in a closed area after cleaning.
2) Conduct oiling, greasing and changing of oil.
3) Grease lubricate the exposed portion of hydraulic cylinder piston rods.
4) Cover the battery after disconnecting the negative cable or take off the battery from the machine and store in a safe place.
5) If the temperature is expected to go down below 0°C, add antifreeze to the coolant.
6) Completely drain the sprinkler system.
7) Place the F-N-R lever in the neutral position Ⓝ, sprinkler switch in OFF, and apply the parking brake.
8) Place wheel chocks in front of and behind the rollers.
9) Remove the starter switch.

2.14 During the Storage Period

⚠ WARNING

If necessary to operate the machine for anti-corrosive purpose in closed area, ensure good ventilation keeping windows and doors open to prevent gas poisoning.

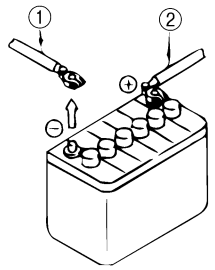
During storage, operate the machine at least once a month to prevent the oil films on the lubricated parts from deteriorating and to charge the batteries.

2.15 When the Battery has Discharged

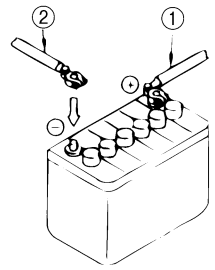
⚠ WARNING

- **To check and handle the batteries, keep the engine stopped with the starter switch in the OFF position.**
- **The batteries give off explosive gases. Do not smoke close to the batteries. Keep flames and sparks away from the batteries.**
- **The electrolyte is very corrosive and will harm your clothing or skin. If the electrolyte has come into contact with your clothing or skin, flush with sufficient amount of water. In case the electrolyte has gotten into your eyes, flush with water and get medical help.**
- **To disconnect the battery cables, start with the negative terminal (earth). When connecting, start with the positive terminal . Do not allow a metallic item to bridge between the positive terminal and machine body. This can generate sparks, causing an explosion.**
- **Loose battery terminals can cause sparks. An explosion will result. When connecting the terminals, make certain that they are tight.**

Disconnect with negative cable first



Connect with positive cable first



⚠ CAUTION

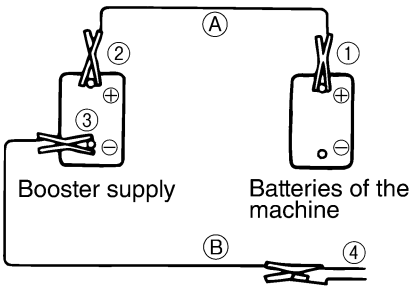
The power-supply voltage of this machine is 12 V.

2.15.1 Connection and disconnection of booster cables

When jump-starting the engine, connect the booster cables as follows:

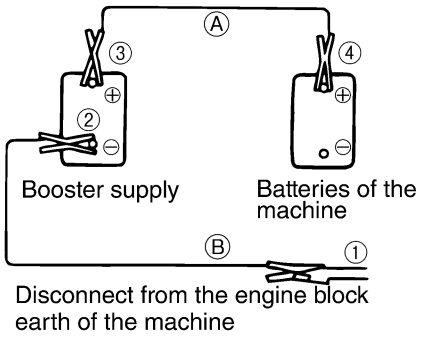
■ Connection of booster cables

1) Connect one end of the positive booster cable Ⓐ to the positive ⊕ terminal of the battery on the machine.
2) Connect the other end of the positive booster cable to the positive ⊕ terminal of the booster supply.
3) Connect the negative booster cable Ⓑ to the negative ⊖ terminal of the booster supply.
4) Connect the other end of the negative booster cable to a good earth of the engine block of the machine.



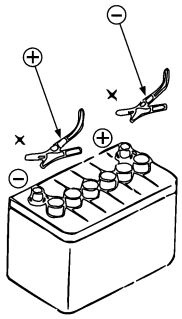
■ Disconnection of booster cables

1) Disconnect the negative booster cable Ⓑ from the engine block earth.
2) Disconnect the negative booster cable Ⓑ from the booster supply.
3) Disconnect the positive booster cable Ⓐ from the booster supply.
4) Disconnect the positive booster cable Ⓐ from the machine.



⚠ WARNING

- **Do not allow the positive ⊕ terminal to make contact with the negative ⊖ terminal when connecting the booster cables.**
- **Wear safety goggles when jump-staring the engine.**
- **Do not allow the machine to make careless contact with the booster supply.**
- **Do not make wrong connections. Connect the negative ⊖ cable to the engine block earth far away from the battery, as sparks may occur when connecting.**



⚠ CAUTION

- **Use booster cables and end clips of proper size suited to the battery capacity.**
- **Use the batteries of the equal capacity for the machine and booster supply.**
- **Check booster cables and end clips for signs of damage and corrosion.**
- **Connect the clips positively.**
- **The power-supply voltage of this machine is 12 V.**

3 PERIODICAL MAINTENANCE

3.1 Precautions

Whether or not the inspection service and lubrication are performed at the correct regular intervals exerts significant influence on the occurrence of trouble and service life of the machine. In this manual, typical intervals for inspection and service are given. However, flexibility should be introduced as to interval or type of services to enable your machine to always operate in the best condition.

⚠ WARNING

Be sure to take adequate care not to burn yourself when replacing filters, elements, oil, etc.

IMPORTANT

- **After maintenance and inspection record the result of inspection. Remember that replacement of filter elements, replenishment and change of oil and grease, and cleaning the radiator fines are important.**
  When draining a hot oil, use care not to get burned.
- **The disposal of waste oil and coolant, and used filters, elements, etc., should be handled by specialized disposal companies.**

General precautions

1) Always use SAKAI genuine parts for replacement.
2) Use lubricants recommended by SAKAI. Avoid mixing different brand lubricants.
3) For hydraulic oil replenishment, changing, level checking, filter cleaning or replacement, oiling and greasing, use extreme care to prevent dust from entering.
4) For checking oil level or changing oil, park the machine on a level and hard surface.
5) Change oil while its temperature remains high after operation.
6) For a long-term storage, fill the fuel tank, lubricate necessary points and run the machine for more than 20 minutes once a month.
7) In freezing weather, add antifreeze to the coolant according to the ambient temperature.
8) For the hydraulic pump and motor, have them serviced at authorized service shops.
9) Turn the starter switch OFF when performing services such as repairing broken wires, short circuits and tightening loose terminals.

Periodical replacement of essential maintenance parts

In order secure safety for work and travel, conduct inspection and services.
Further, for enhanced safety, following parts and components should be replaced periodically.
These parts are prone to material deterioration due to aging or physical change due to wear, while it is difficult to determine their useful limit by regular inspection, which makes it necessary to replace with new ones after certain period of service to maintain their perfect function.
If any abnormality is detected such as crack, deformation, wear or oil leakage, go ahead and replace them even if it is within scheduled replacement time.

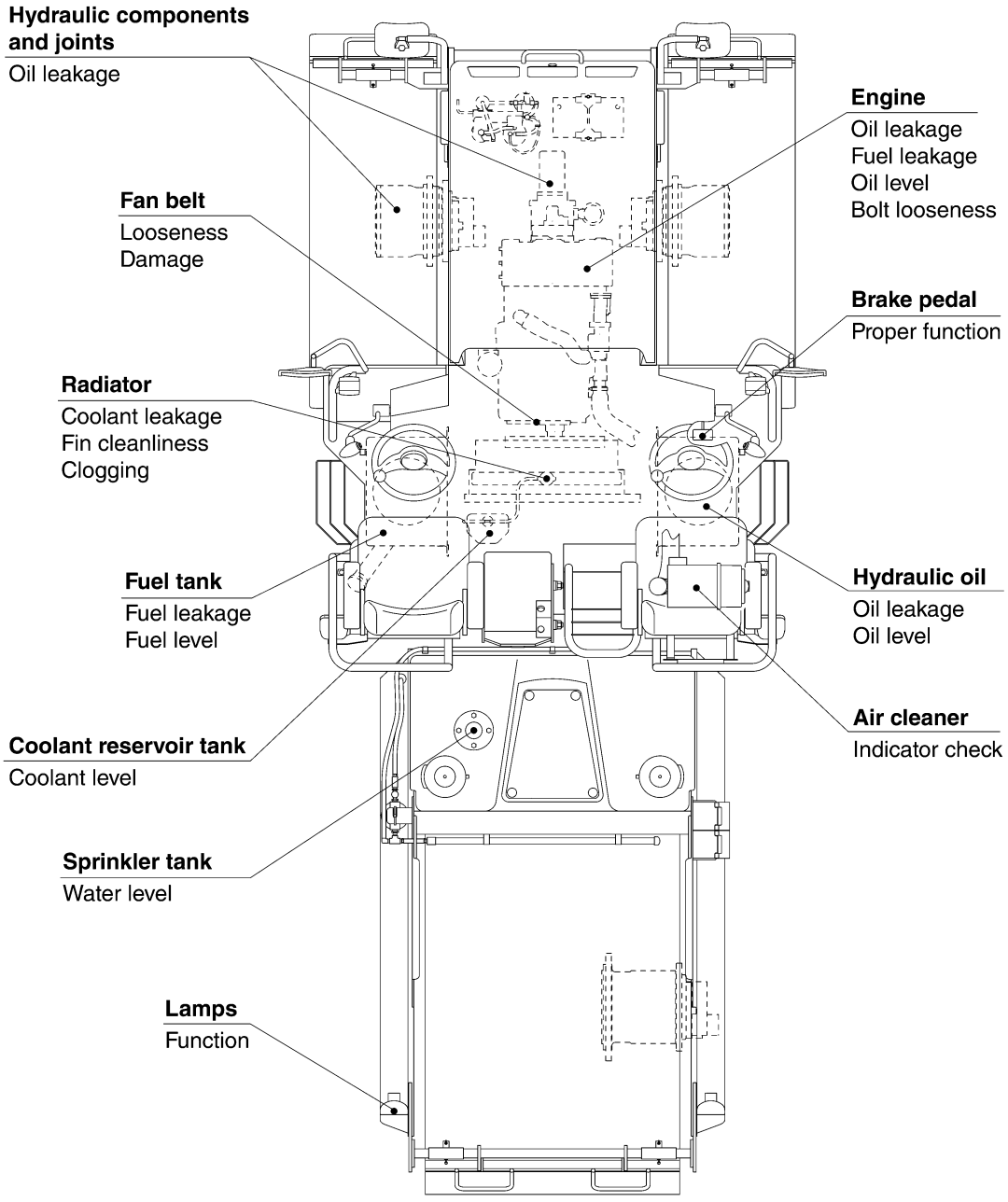
System or Mechanism	Part name	Periodical replacement maintenance part	Replacement period	Remarks
1 Brake system	Master cylinder	Seals (rubber parts)	2 years	
	Wheel cylinder	Seals (rubber parts)	2 years	
	Brake piping parts	Brake hose	2 years	
		Air hose	2 years	
	Operating parts	Cable	4 years	
2 Steering system	Orbitrol	Seals (rubber parts)	2 years	
	Hydraulic piping parts	Hydraulic hose	2 years	
	Steering cylinder	Seals (rubber parts)	2 years	
	Hydraulic pump	Seals (rubber parts)	4 years	
3 Power transmission system (inclusive of axle)	Axle	Seals (rubber parts)	4 years	
	Travel pump	Seals (rubber parts)	4 years	
	Travel motor	Seals (rubber parts)	4 years	
	Hydraulic piping parts	Hydraulic hose	4 years	
	Isolation rubber	Isolation rubber itself	4 years	
4 Fuel system	Piping parts	Fuel hose	2 years	
5 Engine related	Engine mounting parts	Isolation rubber	4 years	
	Seals (rubber parts)	Packing and others	4 years	
	Drive parts	V-belt	2 years	or 500 hours
	Piping parts	Engine drain hose	4 years	
6 Cooling system	Piping parts	Radiator hose	2 years	
		Radiator drain hose	4 years	
7 Control related parts	Cable	Cable	4 years	
8 Intake system	Piping parts	Intake hose	2 years	
		CAC hose	2 years	
9 Hydraulic system	Hydraulic piping parts	Hydraulic hose	4 years	

⚠ CAUTION

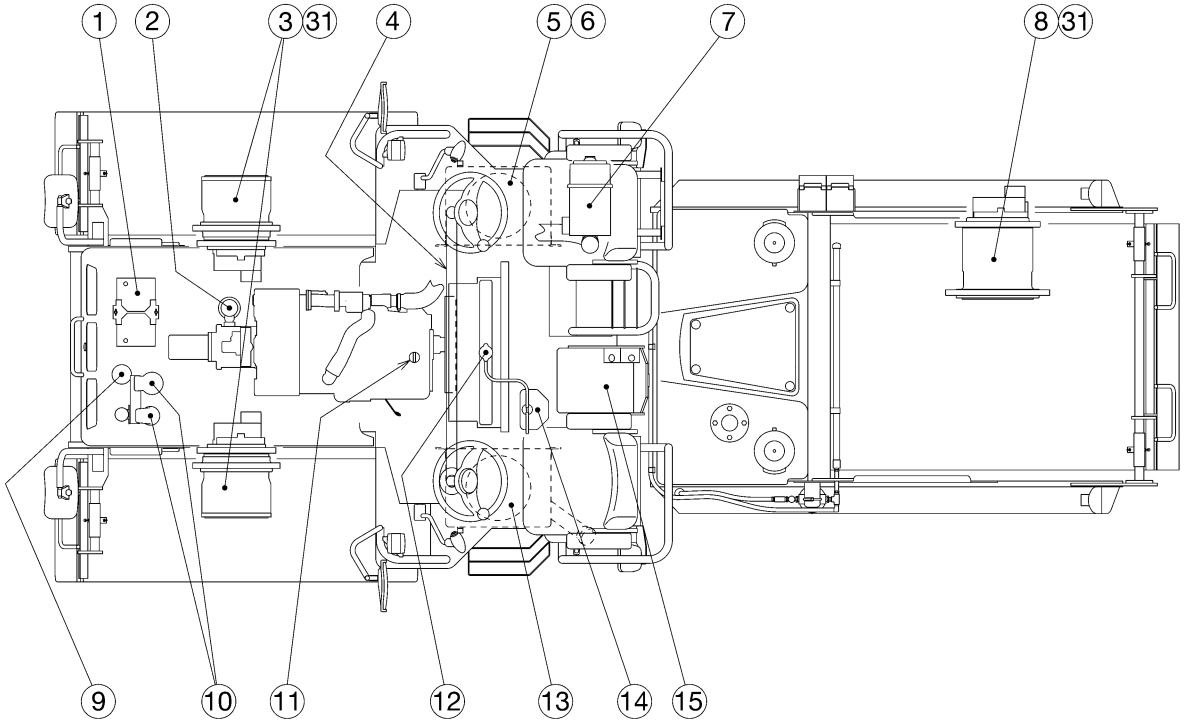
- **With a new machine, drain water the fuel sedimenter (refer to page 76), change the engine oil (refer to page 79), change the engine oil filter elements (refer to page 79) and adjusted the fan belt (refer to page 77), after 50 hours of operation for the first time only.**
- **When trouble occurs in the location indicated by the indicator lamp on the monitor display, sensor will work and corresponding lamp comes on. If this occurs, conduct necessary service regardless of the periodical service interval recommendation.**
- **Check the electric wiring at a regular interval not exceeding one month, when there is abnormality, replace it.**
  If there are some trouble on the electric wiring, replace them with new one.
  1)Damage to the wire harness and loose clamps
  2)Loose sockets
  3)Function of electrical systems
- **For the parts other than listed above, if there are some trouble on the parts at periodical inspection or daily check, replace them as soon as possible.**

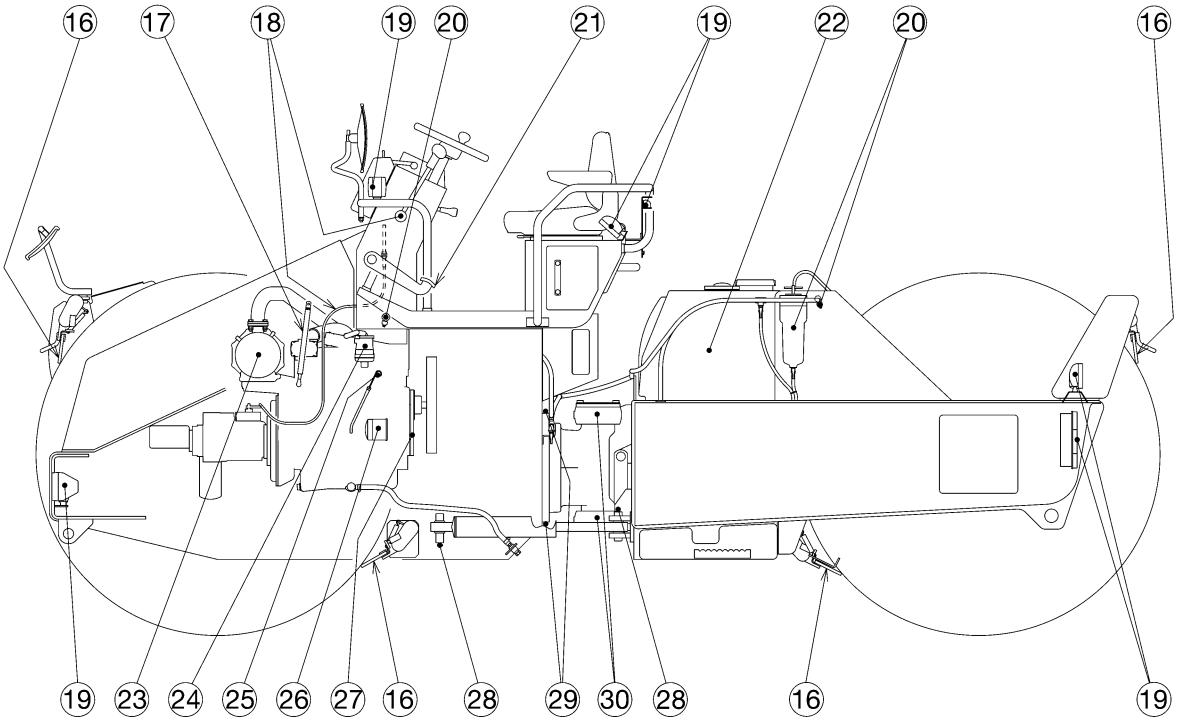
3.2 Walk-Around Checking

For efficient operation, daily, before-operation checking is very important. Before starting, perform walk-around checking for loose bolts, nuts and signs of leakage in addition to items as shown below.



3.3 Periodical Maintenance Points





* For with AWNING only

Interval	Sym-. bol.	Location	Inspection and service	Lubricant	Q'ty
Every 10 hours or daily	⑬	Fuel tank	Check level and replenish	Diesel oil	1
	⑭	Radiator reservoir tank	Check coolant level and replenish	Coolant	1
	㉕	Engine oil pan	Check level and replenish	Engine oil	1
	㉗	Fan belt	Check conditions		1
Every 50 hours	①	Battery	Check hidrometer and looseness		1
	④	Steering chain	Apply gear oil	Gear oil	1
	⑤	Hydraulic oil tank	Check oil level and replenish	Hydraulic oil	1
	㉑	Bake pedal	Apply grease	Grease	4
Every100 hours	⑨	Fuel sedimenter	Check and remove water and sediment		1
Every 250 hours	④	Steering chain	Check and adjust tension		1
	* ⑮	Sunshade supports	Apply grease	Grease	2
	㉗	Fan belt	Check and adjust tension		1
	㉘	Steering cylinder	Apply grease	Grease	2
	㉙	Tilt bearing	Apply grease	Grease	2
	㉚	Center pin	Apply grease	Grease	2
Every 500 hours	②	Line filter	Replace element		1
	⑨	Fuel sedimenter	Replace element		1
	⑩	Fuel filter	Replace element		2
	⑪	Engine oil pan	Change oil	Engine oil	1
	⑱	Control link	Apply grease and looseness	Grease	1
	㉖	Engine oil filter	Replace element		1
Every 500 hours or 3 months, or each time after brake pedal is used	㉛	Parking brake	Check function		3
Every 1000 hours	③	Gear case: Wheel motor	Change oil	Gear oil	2
	⑤	Hydraulic oil tank	Clean internals and change oil	Hydraulic oil	1
	⑥	Suction filter	Clean or replace filter element		1
	⑧	Gear case: Wheel motor	Change oil	Gear oil	1
Every 1500 hours	㉔	Oil separator	Replace element		1
Every 3000 hours	㉓	DPF	Clean		1
As required	⑦	Air cleaner	Clean or replace element		1
	⑫	Radiater	Clean		1
	⑬	Fuel tank	Discharge of water and dust, Clean inside		1
	⑯	Scraper	Adjust or replace blade		–
	⑰	Gas damper	Check or change		2
	⑲	Lighting	Bulb burn-out inspection		–
	⑳	Sprinkler filter, pipe and nozzle	Clean or replace element		–
	㉒	Sprinkler tank	Clean inside		1

* For with AWNING only

3.4 Maintenance Procedure

➡ **For servicing the engine, see the separate engine manual.**

(1) Every 10 hours or daily

⑬	**Fuel tank**

Check the fuel level with the fuel gauge or the level gauge. Add as necessary from fill hole. Fuel filler port cap can be opened with the starter key inserted.

⚠ WARNING

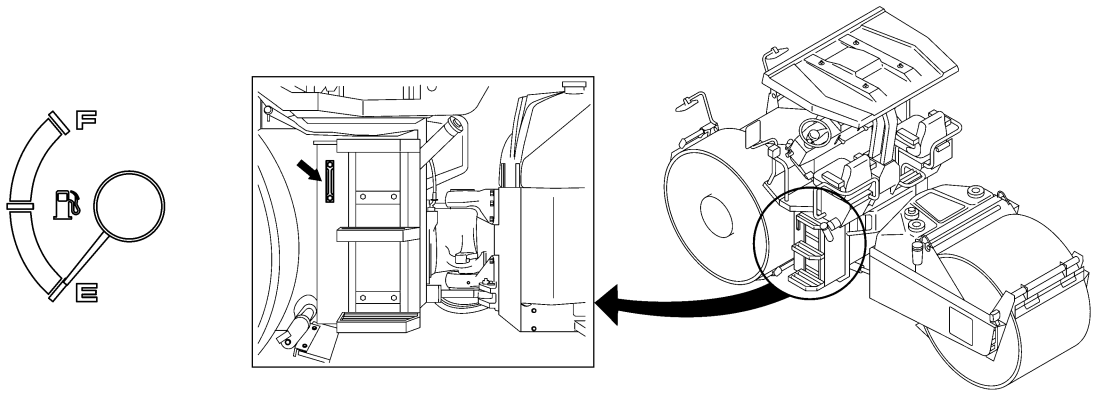
For refueling, park the machine on a level and solid surface.

⚠ CAUTION

Be sure to use fuel recommended by SAKAI (refer to page 92).

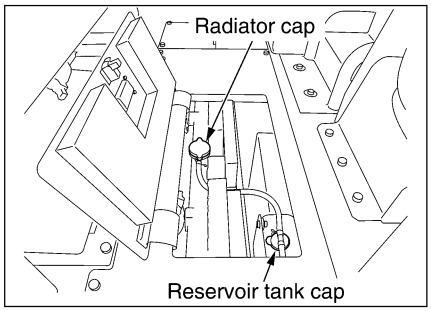
IMPORTANT

Strainer should remain installed while refueling.



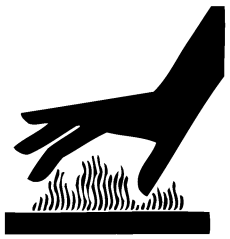
⑭	**Radiator reservoir tank**

With the cap removed, check to see if the coolant level is near the port. Add as necessary.
Further, run the engine at idling speed for a few more minutes and make sure that coolant level in reservoir tank is between L and H marks. If insufficient, replenish with the tank cap removed. Use soft water only.



⚠ WARNING

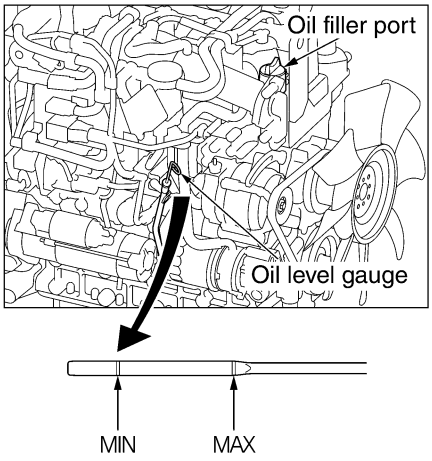
Do not remove the radiator cap while the coolant is not.



IMPORTANT

Replace the coolant with new ones two years.

㉕ Engine oil pan



Shutdown the engine and check the engine oil level. If it is not between MAX and MIN marks, add oil through the fill hole.

The engine oil level may rise

In engines installed with DPFs, some fuel may become mixed into the engine oil during cleaning (burning) of the DPF, diluting (increasing the amount of) the engine oil. If the level rises above the maximum level on the engine oil gauge, change the oil immediately as it may cause the engine to break down.

⚠ CAUTION

- **When intervals between DPF cleaning become five minutes or shorter, it is time to change the engine oil.**
- **Be sure to use engine oil recommended by SAKAI (refer to page 92).**

㉗ Fan belt

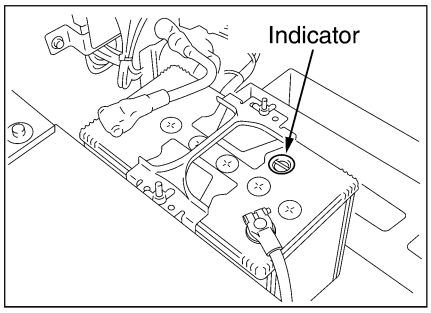
Check the fan belt for cracks and peeling and check the fan blade for scratches and cracks. Replace them with new ones if they have been damaged.

⚠ WARNING

Make certain that the engine is completely stopped to avoid any risks when checking looseness, tensions and damages for the fan belts. Also make certain that the key is removed from the starter switch.

(2) Every 50 hours

① Battery



1) The condition of the battery can be confirmed by checking the indicator at the top of the battery. Check the condition of the battery. Charge or replace it with a new one as necessary.

Green ····· Satisfactory (Good)
White ····· Charging is necessary (Charging necessary)
Red ····· Replacement is necessary (Electrolyte insufficient)

2) Retighten any loose terminal. Apply grease or vaseline to the terminals to retard rusting.
3) Be sure to tighten the battery holder if it is loose.

⚠ WARNING

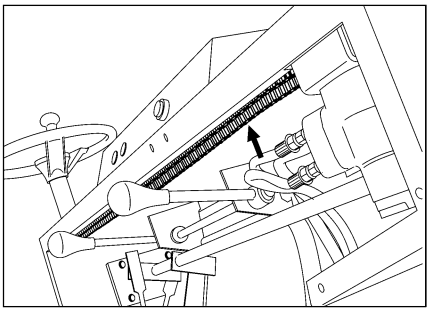
- **The battery contains diluted sulfuric acid, which will dissolve clothes and skin. Should you get battery fluid on your clothes or skin, wash it off immediately with copious quantities of clean water.**
- **If you get it in your eyes, rinse them straight away with clean water and immediately seek the help of a doctor.**
- **If you accidentally ingest it, drink copious quantities of water and immediately seek the help of a doctor.**
- **Always wear safely glasses when handling the battery.**
- **The battery generates hydrogen gas, so there is a danger of explosions. Avoid recharging the battery, keep cigarettes and flames away, etc., in poorly ventilated places when there is a danger of generating sparks.**
- **The inspection and handling of batteries should be carried out with the engine turned off and the starter switch in the OFF position.**
- **Turn the starter switch to the OFF position, then wait at least 30 seconds before removing the battery. An abnormality may arise in the ECM (engine control module).**
- **Be careful not to accidentally connect the two battery terminals with tools or other metallic objects.**
- **Tangled terminals may generate sparks due to improper connections, resulting in the danger of explosions. Make sure terminals are connected firmly.**
- **The battery is for starting the engine and operating electrical equipment on the machine. Do not use it for any other purpose.**

⚠ CAUTION

- **The power-supply voltage of this machine is 12 V.**
- **Use only batteries recommended by SAKAI (refer to page 88, 90).**

④ Steering chain

Lubricate the chain with gear oil.

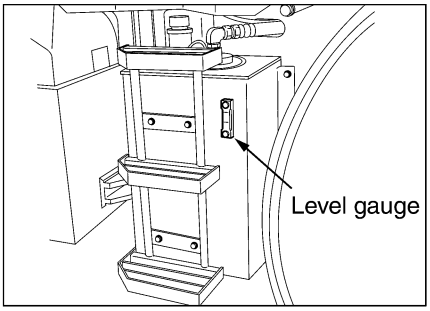


⚠ CAUTION

Be sure to use gear oil recommended by SAKAI (refer to page 92).

⑤ Hydraulic oil tank

Check the oil level with the sight glass on the side of tank.
The level is proper if it is between H and L marks.
If necessary, add the hydraulic fluid from the fill port.

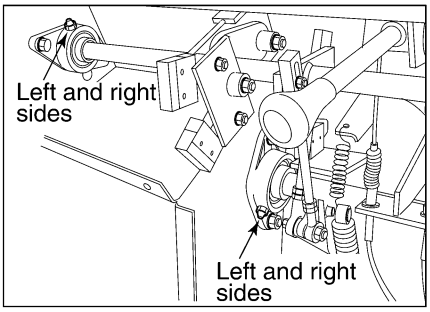


⚠ CAUTION

Be sure to use hydraulic oil recommended by SAKAI (refer to page 92).

㉑ Brake pedal

Grease the bearing units.



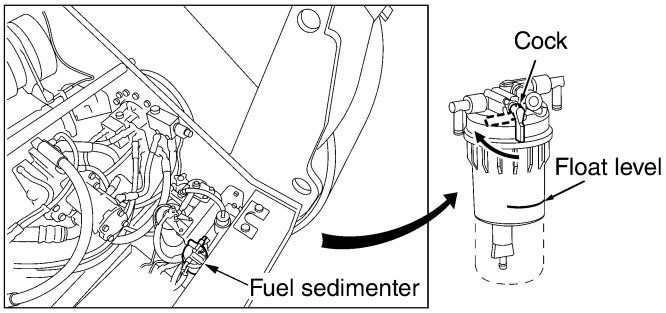
⚠ CAUTION

Be sure to use grease recommended by SAKAI (refer to page 92).

(3) Every 100 hours

⑨	**Fuel sedimenter**

Check the float level. If it comes up to the warning mark, take off the plug at the bottom and drain water.

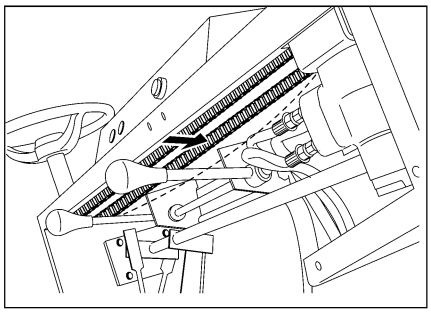


NOTE: After purchasing a new machine, drain water 50 hours after the initial operation.

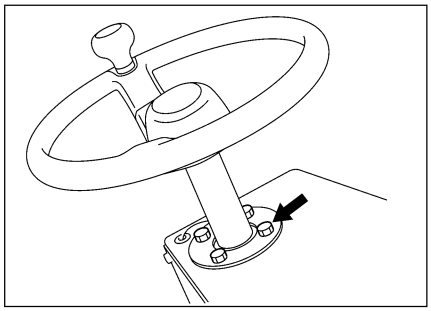
(4) Every 250 hours

④	**Steering chain**

1) Check the tension. A correctly adjusted chain sags 25 – 30 mm when pressed with a push of about 2 kg at midway of the chain in the back.

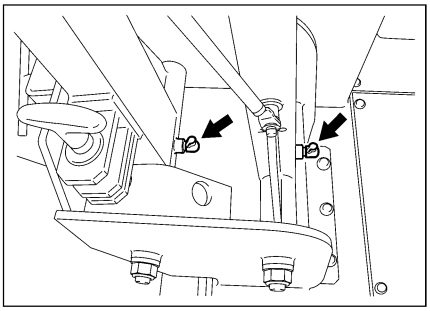


2) To adjust, loosen the four fixing bolts below the left hand side steering wheel and slide the steering column.



⑮ Sunshade supports

Supply grease to one point of the support on front and rear.

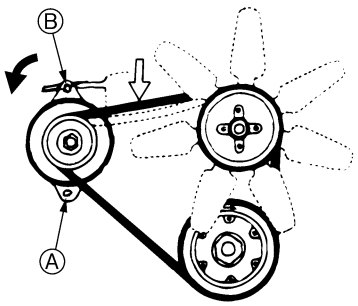


⚠ CAUTION

Be sure to use grease recommended by SAKAI (refer to page 92).

㉗ Fan belt

➡ **See the separate engine manual.**



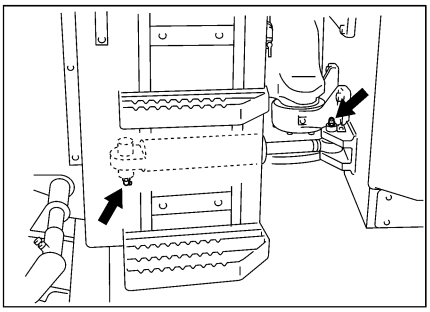
1) Check the fan belt for wear and damage. Replace as necessary.
2) Check tension of the fan belt.
   The deflection is recommended to be approx.
   10 – 12 mm when pressing the center of belt by hand at about 98N (10 kg).
3) The fan belt is adjusted by loosening the bolts on the alternator bracket Ⓐ and adjust plate Ⓑ, then tilting the alternator.

IMPORTANT

After purchasing a new machine, adjust the fan belt 50 hours after the initial operation.

㉘ Steering cylinder

Grease the fitting at two locations.

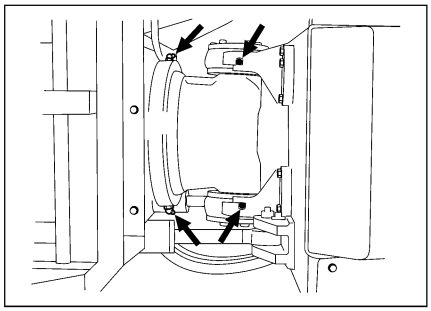


⚠ CAUTION

Be sure to use grease recommended by SAKAI (refer to page 92).

㉙	**Tilt bearing**
㉚	**Center pin**

Grease the bearing at four locations.



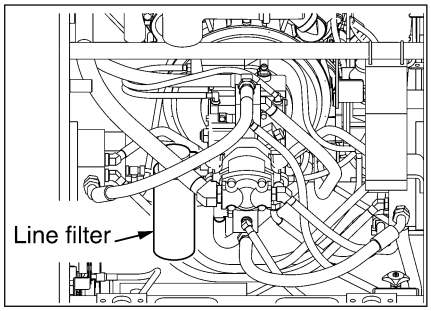
⚠ CAUTION

Be sure to use grease recommended by SAKAI (refer to page 92).

(5) Every 500 hours

②	**Line filter**

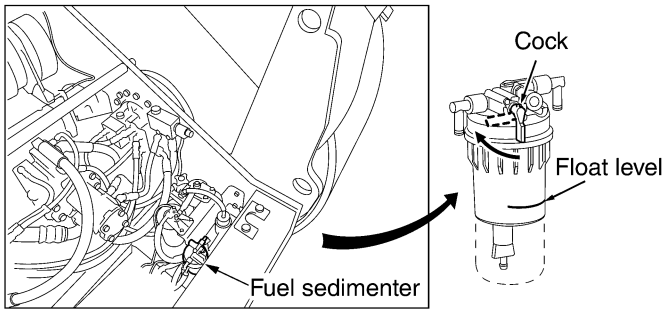
Change the element.



⑨	**Fuel sedimenter**

➡ **See the separate engine manual.**

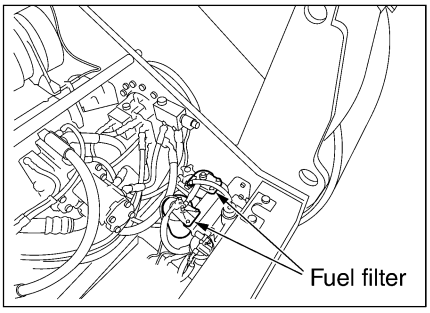
Change the element.



⑩ Fuel filter

➡ **See the separate engine manual.**

Change the element.



⑪ Engine oil pan

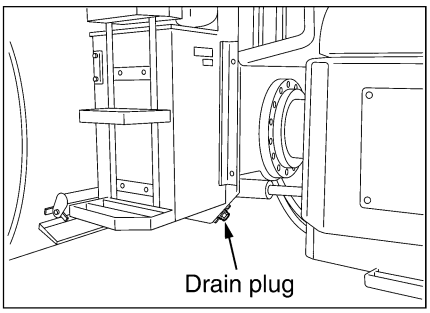
㉖ Engine oil filter

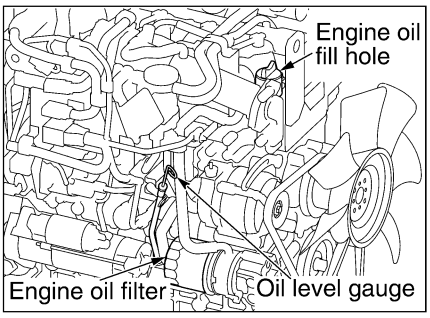
➡ **See the separate engine manual.**

1) After completion of operation and while the oil is warm, drain the oil with the drain plug removed.

⚠ WARNING

When draining a hot oil, use care not to get burned.





2) Refit the drain plug and fill the crankcase with the engine oil from the fill hole on the cylinder head cover.
3) Change the oil filter element.

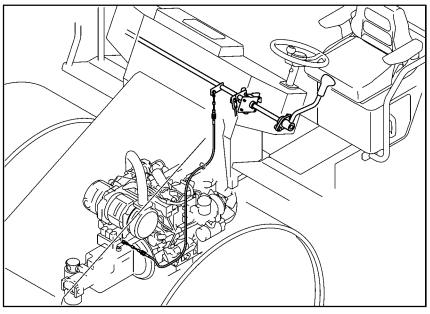
⚠ CAUTION

Be sure to use engine oil recommended by SAKAI (refer to page 92).

NOTE: After purchasing a new machine, change the oil and replace the oil filter element 50 hours after the initial operation.

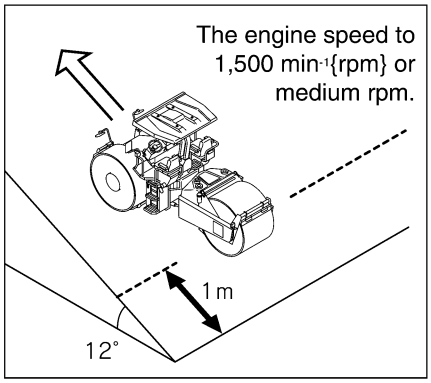
⑱ Control link

Check to make sure there is no slack in the F-N-R lever cable and various other control cables.
Check the bolts and nuts for looseness. Adjust the rod.



(6) Every 500 hours or 3 months, or each time after brake pedal is used

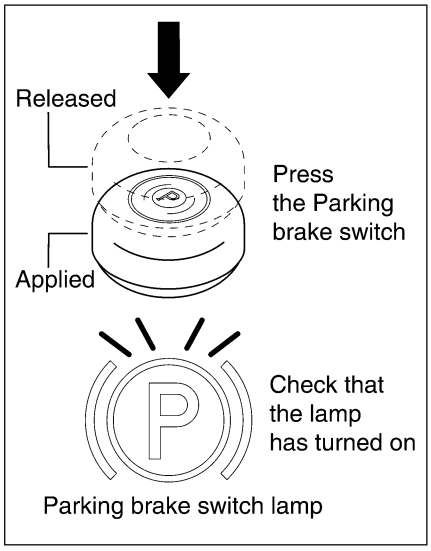
㉛ Parking brake



⚠ WARNING

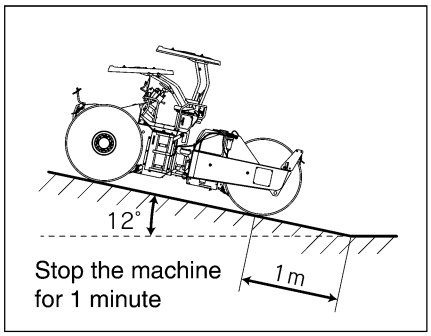
- **Ensure safety by checking to make sure there is no one and no obstacles near the machine.**
- **Keep your hands on the F-N-R lever and steering wheel during inspections.**
  The machine may move in unexpected ways during inspections, leading to accidents.

1) Adjust the engine speed to 1,500 min^{-1} {rpm} or medium rpm.
2) Be sure to move the machine onto asphalt pavement or an other hard surface with an upward inclination of 12° (20 %) with the engine left on.
3) Press the Parking brake switch Ⓟ to engage the parking brake. Check that the OK monitor lamp (Ⓟ) has turned on.
   If the lamp (Ⓟ) does not turn on, contact one of our sales offices or a factory designated by our company for advice.
4) Remain seated on the machine to make sure it remains completely still for 1 minute. If it moves, move it immediately to flat ground, stop using it, contact one of our sales offices or a factory designated by our company, and have it repaired.



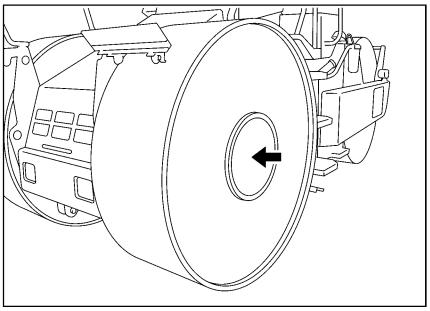
⚠ WARNING

- **This inspection must be carried out after each use of the brake pedal.**
  If the inspection is not carried out, the parking brake may malfunction when you try to use it next time causing a serious accident.
- **Making alterations to the machine.**
  Please do not make alterations to the machine without permission for safety reasons. We shall not be held responsible for injures, death or breakdowns caused by alterations.



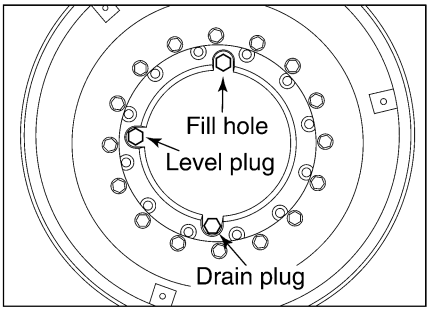
(7) Every 1000 hours

③	Gear case : Wheel motor



1) With the cover removed from the front drums, position the drums so that the drain plug comes to the bottom.
2) Remove the drain plugs and drain the oil while it is warm.

3) Refit the drain plugs and fill the oil through the fill holes until it overflows at the level holes.



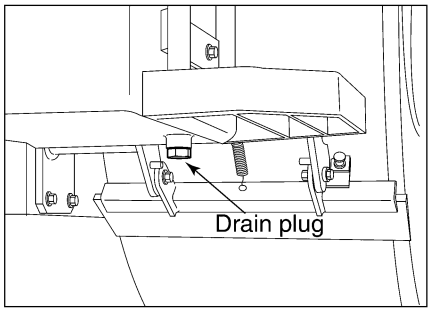
⚠ WARNING

When draining a hot oil, be careful not to get borned.

⚠ CAUTION

Be sure to use gear oil recommended by SAKAI (refer to page 92).

⑤ Hydraulic oil tank



1) Remove the drain plug and drain the oil while it is warm.
2) After cleaning the inside of the tank, fill the tank to the specified level with new hydraulic fluid.
3) Start and run the engine at idling for 2 – 5 minutes. When air bubbles have disappeared from the oil, stop the engine and check the oil level again.

⚠ WARNING

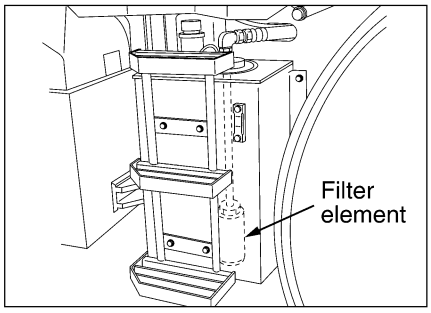
When draining a hot oil, be careful not to get borned.

⚠ CAUTION

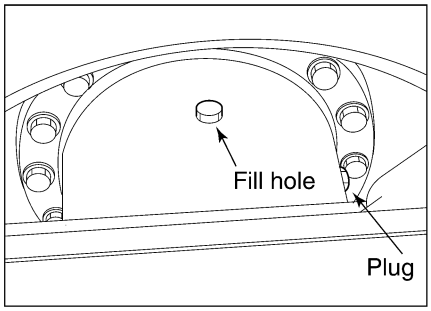
Be sure to use hydraulic oil recommended by SAKAI (refer to page 92).

⑥ Suction filter

Turn the filter counterclockwise viewed from the bottom, and change it.



⑩ Gear case : Wheel motor



1) Position the rear drum so that any one of the four plugs comes to bottom.
2) Remove the bottom plug and drain the oil while it is warm.
3) Refit the plug and fill oil from the top hole till it overflows through a side hole.

⚠ WARNING

When draining a hot oil, use care not to get burned.

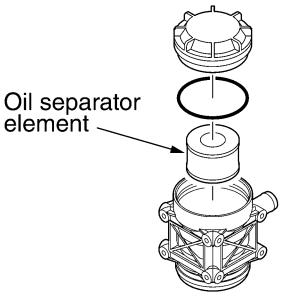
⚠ CAUTION

Be sure to use gear oil recommended by SAKAI (refer to page 92).

(8) Every 1500 hours

⑭	**Oil separator**

Open the cover, take out the oil separator element, wipe off the oil, and replace it with a new one.



(9) Every 3000 hours

⑧	**DPF**

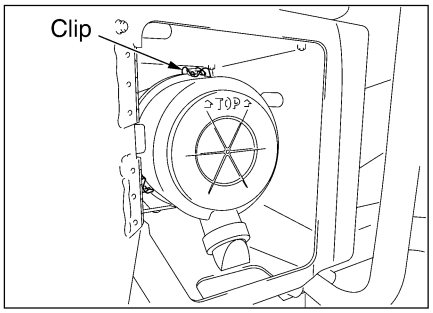
Ash accumulates in the filter when a DPF is used for a long time. The accumulation of too much ash will lower the performance of the DPF.
Contact one of our sales offices for advice on how to clean the DPF.

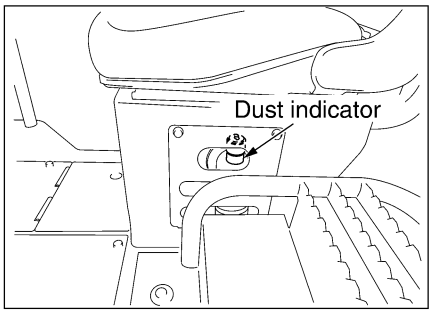
(10) As required

⑬ Air cleaner

When the red moving piece of the dust indicator reaches the service level (mark on the dust indicator), clean the outer element in the manner shown below.

1) Open the hood, remove the clip on the air cleaner case, and remove the cover.
2) Pull the outer element straight out of the element case so as not to damage the outer element.
3) Blow compressed air from the inside of the outer element for cleaning. The air pressure shall not exceed 686 kPa {7 kgf/cm²}. If the element has scratches, holes, or oil spots, replace it with a new one.



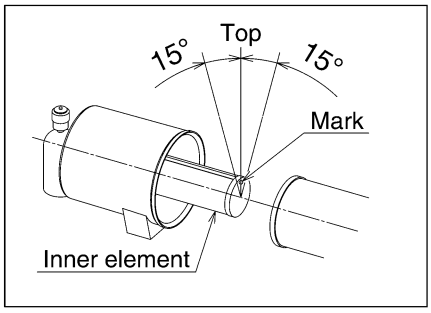


⚠ WARNING

- **Stop the engine before inspection, cleaning, or maintenance, otherwise dust will enter the engine, causing the breakdown of the engine.**
- **Wear protective goggles, a dust respirator, and other protective gear before cleaning the air cleaner and outer element in order to prevent dust from entering your eyes or nose.**

⚠ CAUTION

Attach the air cleaner inner element in such a position that the mark appears within 15° from the top.



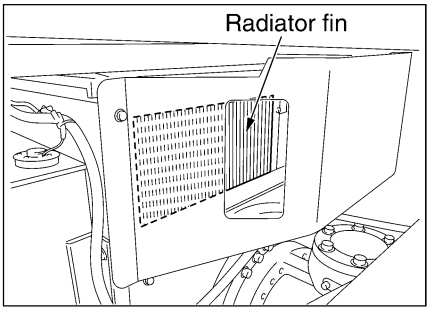
4) Attach the outer element and clamp it with a clip.

⚠ CAUTION

- **Clean only the outer element. Do not remove the inner element.**
- **If the red moving piece of the dust indicator still reaches the service level after the outer element has been cleared, replace the outer element with a new one.**
- **Replace the outer element every year or after it is cleaned five times when the machine is operated under normal conditions. Be sure to replace the inner element together with the outer element.**
- **Shorten the outer element cleaning and replacing intervals as necessary when our machine is used under severe conditions.**
- **Be sure to use our genuine element.**

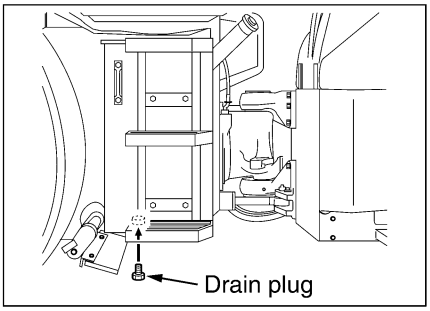
⑫ Radiator

Clean the cooling fins.



⑬ Fuel tank

1) With the drain plug removed, remove the water and sediment from the bottom of the tank.
2) If sedimentation is substantial, remove the drain plug and clean the interior of the tank.
3) When the necessary work and refueling are complete, tighten the filler cap positively.



⚠ WARNING

- **The fuel will catch fire if open flames or ignition sources are used close to it.**
- **Do not smoke or use a match or cigarette lighter close to it.**

NOTE: When removing the water and sediment from the tank filled with the fuel, the fuel will gush out if the drain plug is screwed out completely.

⑯ Scraper

When the gap between the drum and blade has grown large, adjust the scraper properly.
To clear muds accumulated between the roll and scraper blade, raise the blade.

⚠ WARNING

Exercise care not to pinch your fingers between the drum and blade.

See page 41 for adjustment.

⑰ Gas damper

Raise the hood, and check to see if it is supported by the gas damper.
When the hood is not supported by the gas damper, replace the gas damper with a new one.

⚠ WARNING

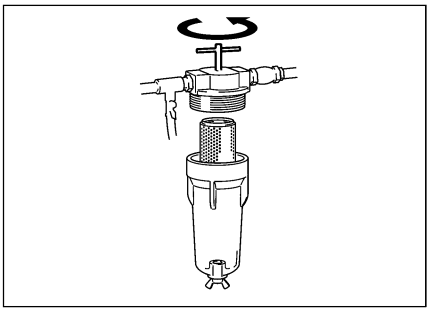
Even if the hood is held up by the gas dampers, make sure to lock it in place using the stay to prevent it from falling when inspecting the engine room.

⑲ Lighting

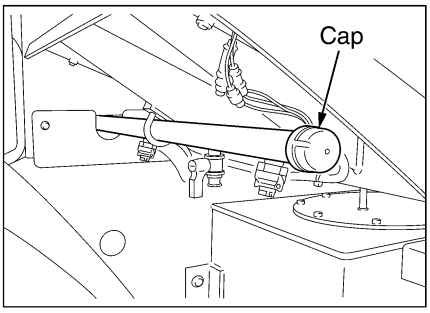
Operate the switches on control panel to confirm whether bulbs (turn signal lamps, head lamps, flood lamps, rear combination lamps) flash or light up. If any lamp does not flash or light up, the bulb has burnt out; replace it with a new one.

⑳ Sprinkler filter, pipe and nozzle

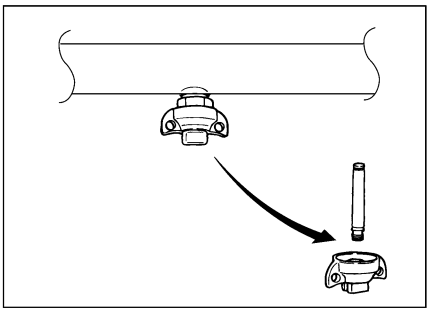
1) Sprinkler filter
Take off the filter case by turning counterclockwise as viewed from the bottom. Clean the element.



2) Sprinkler pipe
Remove the cap from both ends of each sprinkler pipe. Operate the sprinkler pump to wash out dust from inside the pipe.

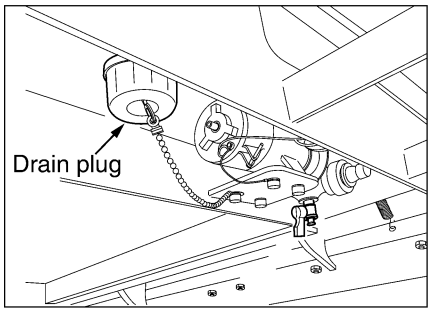


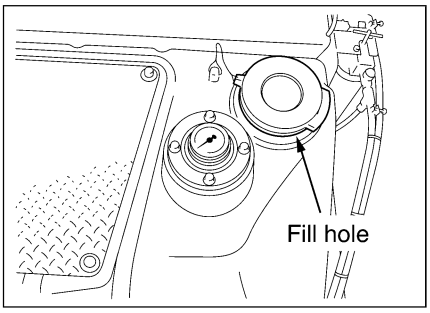
3) Sprinkler nozzle
- Turn the cap of “one-touch” nozzle to remove the cap and nozzle from sprinkler pipe.
- Turn-out the nozzle from cap and, further, turn-out filter from the nozzle.
- Clean the filter and clean the nozzle holes with needle or the like before replacing them to sprinkler pipe in the reversed order of removal.
- Turn-in the nozzle to cap so that the spray of water is directed across drum width.



㉛ Sprinkler tank

Remove the drain cap, feed water through the fill hole to clean the inside of the tank.



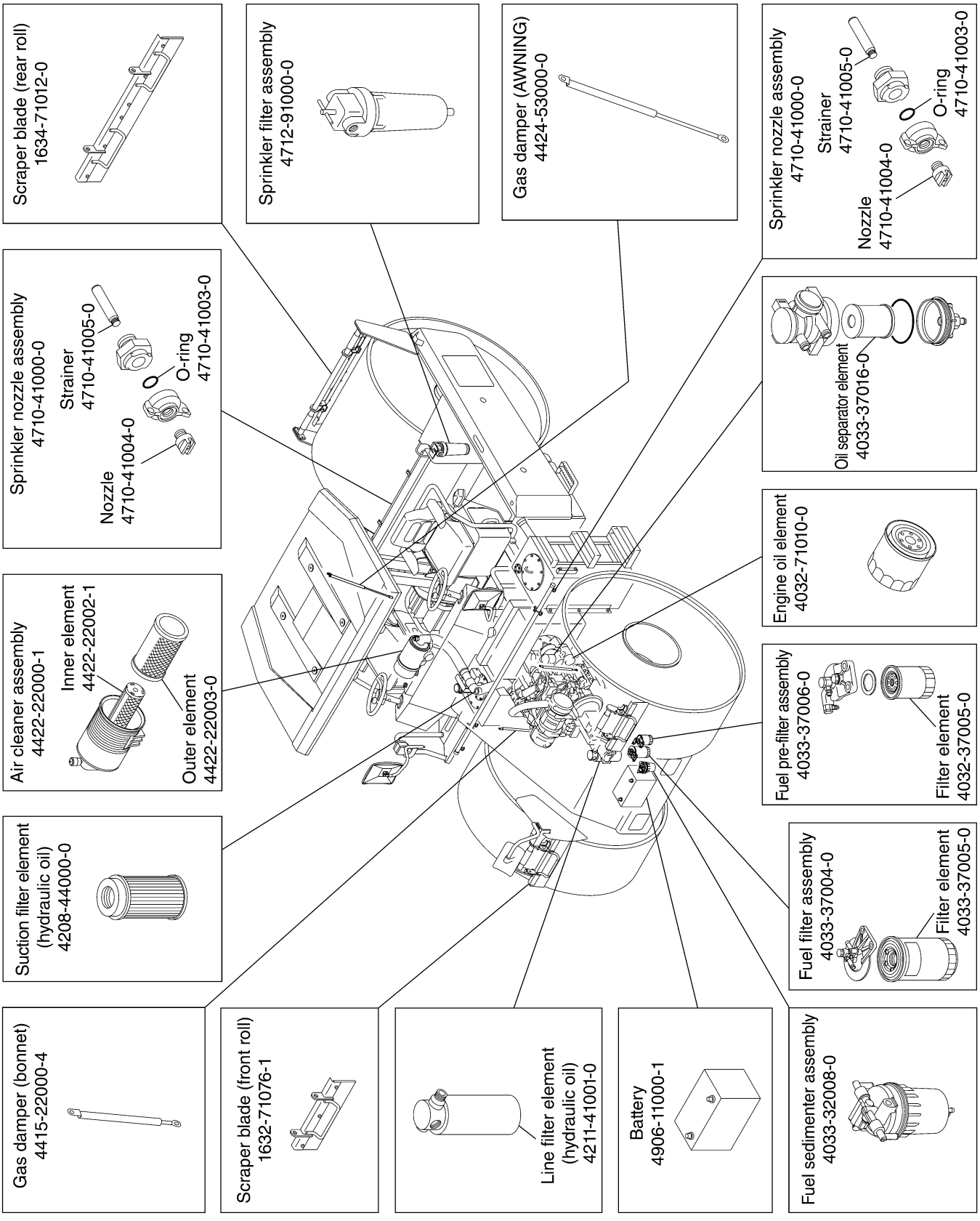


3.5 Consumable Parts

Replace consumable parts such as filter elements and air cleaner elements during periodical maintenance or before reaching the wear limit. Proper replacement of consumable parts will improve the overall life of the machine, resulting in cost-effective operations.
Use genuine SAKAI parts as replacement parts.
The part numbers are subject to change due to the improvements to the parts. When ordering parts, make sure to obtain the latest part numbers by checking with our distributorship or one of our certified service shops of the version, model name and model number of the machine in use.

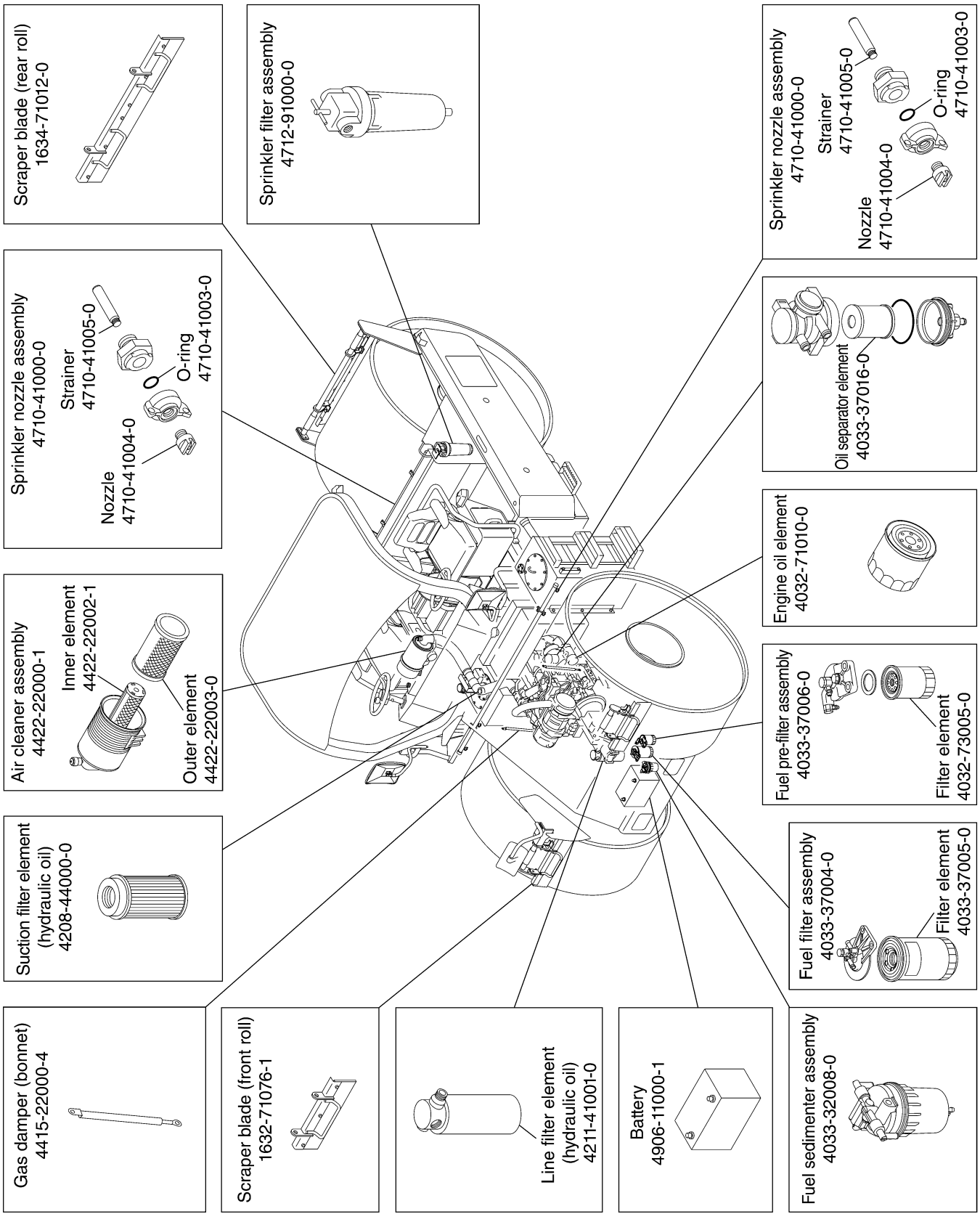
R2-4 R2H-4 (with AWNING)

Consumable Part	Part No.	Interval		Remark
		Annual replacement (year)	Replacement per operation (hours)	
Engine oil element	4032-71010-0		500	
Oil separator element	4033-37016-0		1500	
Fuel pre-filter assembly	4033-37006-0		500	
Filter element	4033-73005-0		500	
Fuel filter assembly	4033-37004-0		500	
Filter element	4033-37005-0		500	
Fuel sedimenter assembly	4033-32008-0		500	
Air cleaner element assembly	4422-22000-1		As required	
Inner element	4422-22002-1	1	Replacement simultaneously with the outer element	
Outer element	4422-22003-0	1	After cleaning five times	
Suction filter element (hydraulic oil)	4208-44000-0		1,000	Clean or replacement
Line filter element (hydraulic oil)	4211-41001-0		500	
Sprinkler filter assembly	4712-91000-0		As required	
Sprinkler nozzle assembly	4710-41000-0		As required	
Nozzle	4710-41004-0		As required	
O-ring	4710-41003-0		As required	
Strainer	4710-41005-0		As required	Clean or replacement
Scraper blade (front roll)	1632-71076-1		As required	
Scraper blade (rear roll)	1634-71012-0		As required	
Gas damper (bonnet)	4415-22000-4	2		
Gas damper (AWNING)	4424-53000-0	1		
Battery	4906-11000-1		As required	115D31R


Scraper blade (rear roll)
1634-71012-0
Sprinkler filter assembly
4712-91000-0
Gas damper (AWNING)
4424-53000-0
Sprinkler nozzle assembly
4710-41000-0
Strainer
4710-41005-0
Nozzle
4710-41004-0
O-ring
4710-41003-0
Sprinkler nozzle assembly
4710-41000-0
Strainer
4710-41005-0
Nozzle
4710-41004-0
O-ring
4710-41003-0
Air cleaner assembly
4422-22000-1
Inner element
4422-22002-1
Outer element
4422-22003-0
Oil separator element
4033-37016-0
Engine oil element
4032-71010-0
Suction filter element
(hydraulic oil)
4208-44000-0
Fuel pre-filter assembly
4033-37006-0
Filter element
4032-37005-0
Gas damper (bonnet)
4415-22000-4
Scraper blade (front roll)
1632-71076-1
Line filter element
(hydraulic oil)
4211-41001-0
Battery
4906-11000-1
Fuel filter assembly
4033-37004-0
Filter element
4033-37005-0
Fuel sedimenter assembly
4033-32008-0

R2-4 R2H-4 (with ROPS)

Consumable Part	Part No.	Interval		Remark
		Annual replacement (year)	Replacement per operation (hours)	
Engine oil element	4032-71010-0		500	
Oil separator element	4033-37016-0		1500	
Fuel pre-filter assembly	4033-37006-0		500	
Filter element	4033-73005-0		500	
Fuel filter assembly	4033-37004-0		500	
Filter element	4033-37005-0		500	
Fuel sedimenter assembly	4033-32008-0		500	
Air cleaner element assembly	4422-22000-1		As required	
Inner element	4422-22002-1	1	Replacement simultaneously with the outer element	
Outer element	4422-22003-0	1	After cleaning five times	
Suction filter element (hydraulic oil)	4208-44000-0		1,000	Clean or replacement
Line filter element (hydraulic oil)	4211-41001-0		500	
Sprinkler filter assembly	4712-91000-0		As required	
Sprinkler nozzle assembly	4710-41000-0		As required	
Nozzle	4710-41004-0		As required	
O-ring	4710-41003-0		As required	
Strainer	4710-41005-0		As required	Clean or replacement
Scraper blade (front roll)	1632-71076-1		As required	
Scraper blade (rear roll)	1634-71012-0		As required	
Gas damper (bonnet)	4415-22000-4	2		
Battery	4906-11000-1		As required	115D31R


Scraper blade (rear roll)
1634-71012-0
Sprinkler filter assembly
4712-91000-0
Sprinkler nozzle assembly
4710-41000-0
Strainer
4710-41005-0
Nozzle
4710-41004-0
O-ring
4710-41003-0
Air cleaner assembly
4422-22000-1
Inner element
4422-22002-1
Outer element
4422-22003-0
Suction filter element
(hydraulic oil)
4208-44000-0
Gas damper (bonnet)
4415-22000-4
Scraper blade (front roll)
1632-71076-1
Line filter element
(hydraulic oil)
4211-41001-0
Battery
4906-11000-1
Fuel sedimenter assembly
4033-32008-0
Fuel filter assembly
4033-37004-0
Filter element
4033-37005-0
Fuel pre-filter assembly
4033-37006-0
Filter element
4032-73005-0
Engine oil element
4032-71010-0
Oil separator element
4033-37016-0
Sprinkler nozzle assembly
4710-41000-0
Strainer
4710-41005-0
Nozzle
4710-41004-0
O-ring
4710-41003-0

3.6 Feeding Water and Lubricants

(1) General rules

1) Never feed water or lubricant with the strainer removed.
2) Use recommended lubricant and hydraulic fluid.
3) Do not use lubricants and hydraulic fluid of different brands.
4) When changing oil, drain it completely and clean the container with flushing oil before filling new oil.
5) Be sure to use fuels and greases designated / recommended by SAKAI. Faulty due to the use of those not designated/recommended by SAKAI is out of the scope of repair and guarantee.

(2) Capacity

Compartment		Type of fluid	Capacity in liters (gal.)
Fuel tank		Diesel oil	100 (26)
Engine oil pan		Engine oil	11.2 (3.2)
Hydraulic tank		Hydraulic oil	85 (22.5)
Radiator		Coolant	8.8 (2.3)
Sprinkler water tank		Water	680 (180)
Hydraulic motor	Front drum	Gear oil	3.2 x 2 (0.8 x 2)
	Rear drum		3.6 (1)

(3) Rating

Lubricant	Service classification	Ambient temp. and applicable viscosity rating			Applicable standards
		-15 – 30°C (5 – 86°F) Cold	0 – 40°C (32 – 104°F) Moderate	15 – 55°C (59 – 131°F) Tropical	
Engine oil	API grade “CJ-4”	SAE 10W-30	SAE 30	SAE 40	MIL-L-2104D
Gear oil	API grade “GL5”	SAE 80W-90	SAE 90	SAE 140	MIL-L-2105
Hydraulic oil	Wear resisting	ISO-VG32 over VI 140	ISO-VG46 over VI 140	ISO-VG68 over VI 110	ISO-3448
Grease	Lithium type extreme-pressure grease				NLGI-2
Fuel	Diesel oil				ASTM-D975-2D

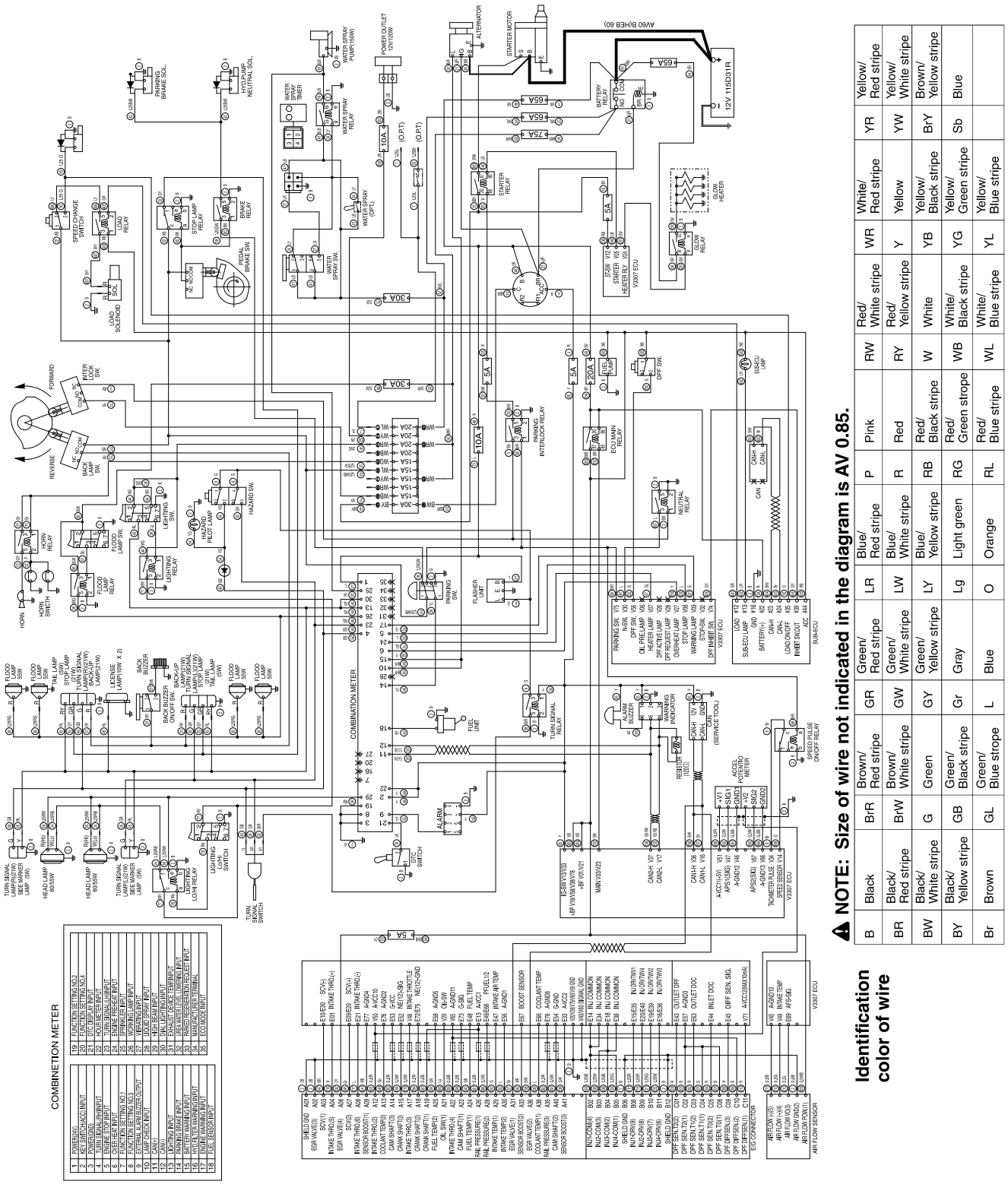
(4) Recommended lubricants

Lubricant / Oil company	Engine oil		Gear oil	Hydraulic oil	Grease
	API CJ – 4	JASO DH – 2	API GL 5	VG 46	NLGI – 2
Chevron	DELO 400 LE	DELO 400 LE	RPM UNIVERSAL GEAR LUBRICANTS	RANDO HDZ	MULTIFAK EP
BP	–	–	Energear HYPO-U	Bartran HV	Energrease LS – EP
CASTROL	Tection Extra	TECTION J – MAX 2	EPX GEAR OILS	Castrol Hyspin AWH	Castrol Spheerol EPL
Shell	Shell Rimula R4 L	Shell Rimula R4 L	Shell Spirax Spirax S2 A 90	Shell Tellus S2 V	Shell Alvania Grease EP
Exxon Mobil	Mobil Delvac 1 ESP	–	Mobilube HD	Mobil DTE 10 Excel	Mobilux EP

⚠ CAUTION

- **Fill the fluid reservoirs with the filters installed.**
- **Use recommended fuels and lubricants only.**

3.7 Electric Wiring Diagram



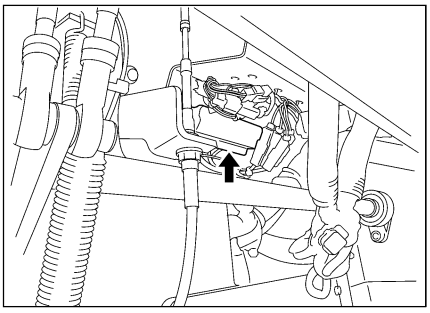
NOTE: Size of wire not indicated in the diagram is AV 0.85.

B	Black	BrR	Brown/ Red stripe	GR	Green/ Red stripe	LR	Blue/ Red stripe	P	Pink	RW	Red/ White stripe	WR	White/ Red stripe	YR	Yellow/ Red stripe
BR	Black/ Red stripe	BrW	Brown/ White stripe	GW	Green/ White stripe	LW	Blue/ White stripe	R	Red	RY	Red/ Yellow stripe	Y	Yellow	YW	Yellow/ White stripe
BW	Black/ White stripe	G	Green	GY	Green/ Yellow stripe	LY	Blue/ Yellow stripe	RB	Red/ Black stripe	W	White	YB	Yellow/ Black stripe	BrY	Brown/ Yellow stripe
BY	Black/ Yellow stripe	GB	Green/ Black stripe	Gr	Gray	Lg	Light green	RG	Red/ Green stripe	WB	White/ Black stripe	YG	Yellow/ Green stripe	Sb	Blue
Br	Brown	GL	Green/ Blue stripe	L	Blue	O	Orange	RL	Red/ Blue stripe	WL	White/ Blue stripe	YL	Yellow/ Blue stripe		

Identification color of wire

Fuse box

The fuse box houses five 15 A- and five 20 A-fuses lined up with spares fitted separately. Use fuses of correct capacity (refer to page 34).



NOTE: When a fuse is burnt, determine the cause before replacing.

Battery

★ When the battery is left unused for a long time or the electricity is used too much, the pole plates will be damaged, shortening its service life extremely.

★ When the battery will not be used for a long time, charge it sufficiently, leave it in the shade in a cool, dry place, and check its condition every month.

★ Keep the battery in a satisfactory condition at all time.

★ The battery should be in a satisfactory condition when the engine is to be started on cold days. Avoid starting the engine with the battery in a poor condition at any time.

⚠ WARNING

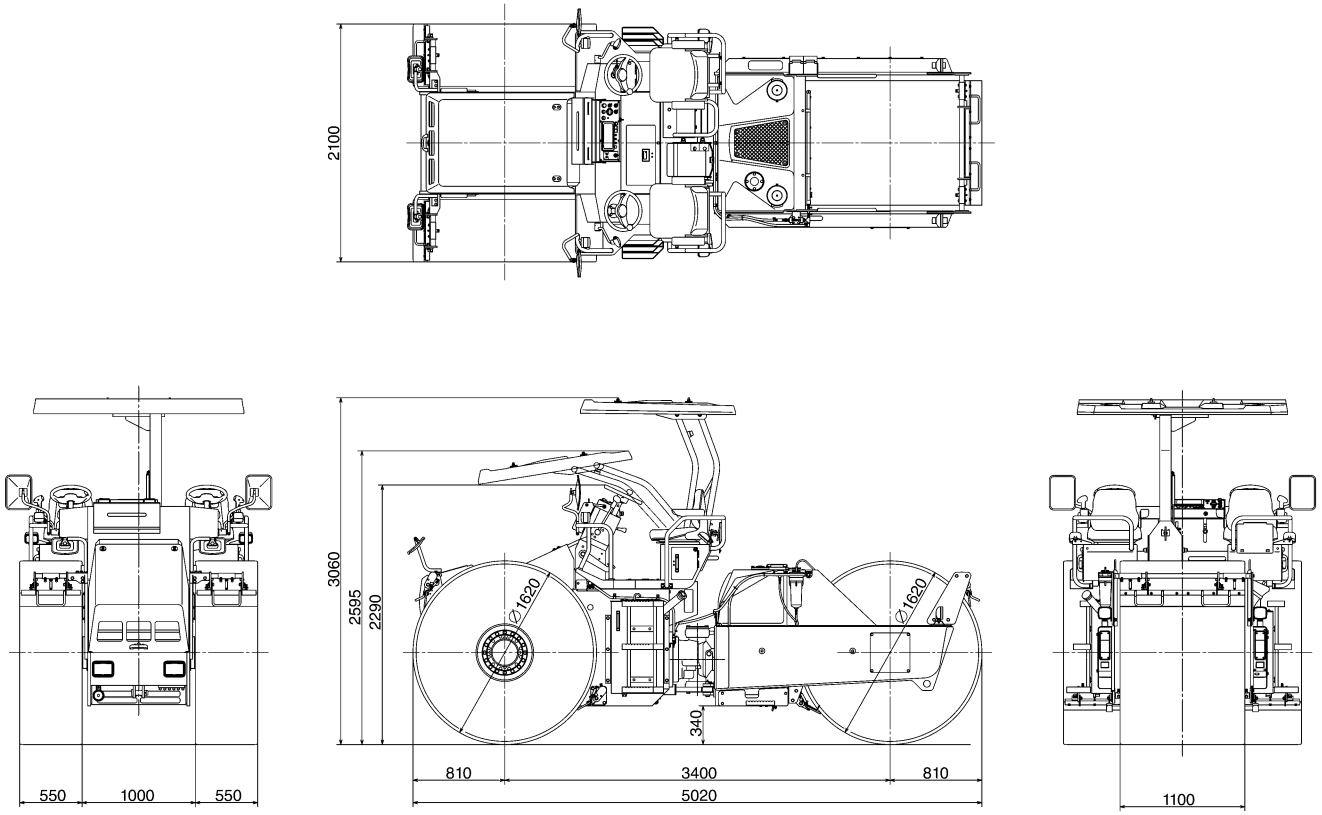
- **The battery contains diluted sulfuric acid, which will dissolve clothes and skin. Should you get battery fluid on your clothes or skin, wash it off immediately with copious quantities of clean water.**
- **If you get it in your eyes, rinse them straight away with clean water and immediately seek the help of a doctor.**
- **If you accidentally ingest it, drink copious quantities of water and immediately seek the help of a doctor.**
- **Always wear safely glasses when handling the battery.**
- **The battery generates hydrogen gas, so there is a danger of explosions. Avoid recharging the battery, keep cigarettes and flames away, etc., in poorly ventilated places when there is a danger of generating sparks.**
- **The inspection and handling of batteries should be carried out with the engine turned off and the starter switch in the OFF position.**
- **Turn the starter switch to the OFF position, then wait at least 30 seconds before removing the battery. An abnormality may arise in the ECM (engine control module).**
- **Be careful not to accidentally connect the two battery terminals with tools or other metallic objects.**
- **Tangled terminals may generate sparks due to improper connections, resulting in the danger of explosions. Make sure terminals are connected firmly.**
- **The battery is for starting the engine and operating electrical equipment on the machine. Do not use it for any other purpose.**

⚠ CAUTION

The power-supply voltage of this machine is 12 V.

4 SPECIFICATIONS

(1) R2-4 (with AWNING)

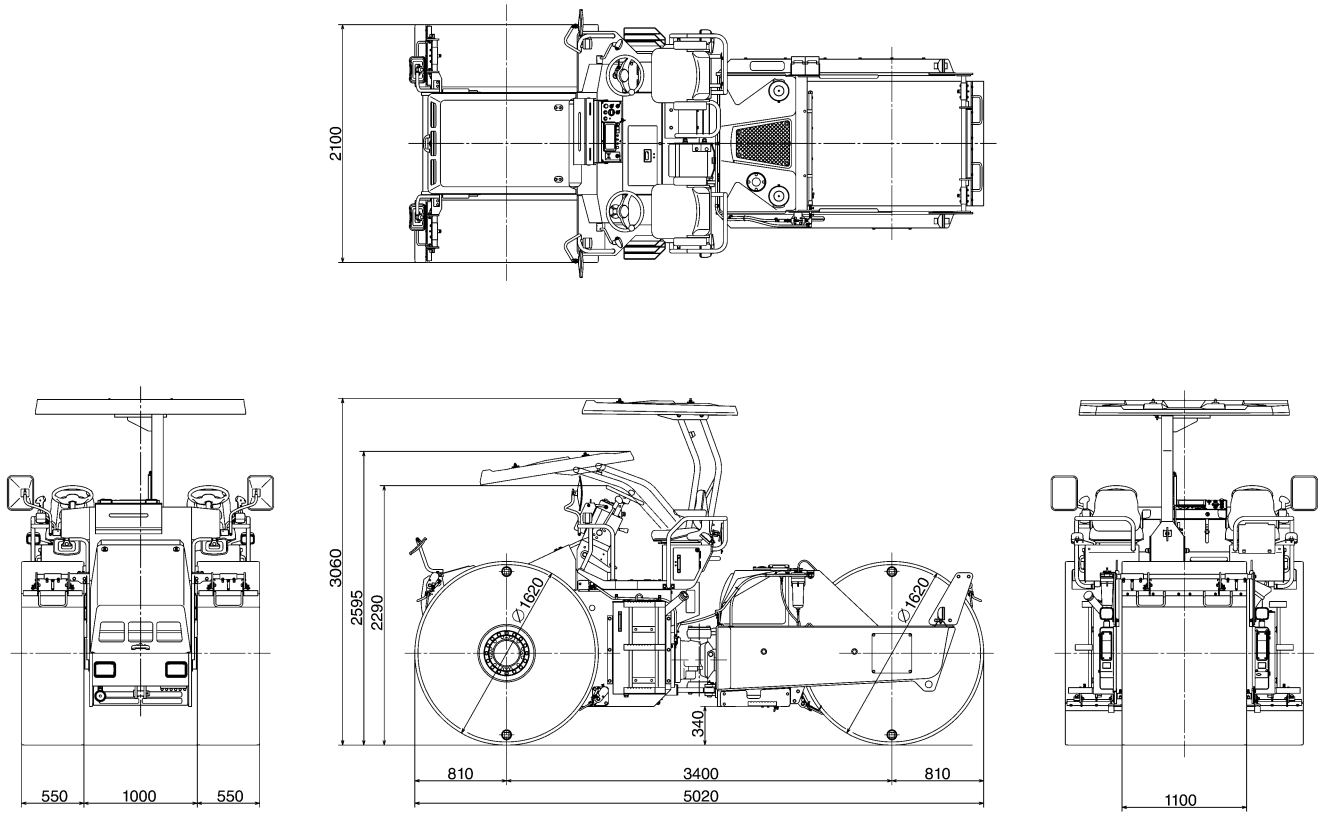


Model		R2-4 (with AWNING)
Weight		
Operating weight		9,800 kg (21,605 lbs)
On front axle		4,850 kg (10,690 lbs)
On rear axle		4,950 kg (10,915 lbs)
Dimension		
Overall length		5,020 mm (198”)
Overall width		2,100 mm (83”)
Overall height (with AWNING)		3,060 mm (120”)
Wheelbase		3,400 mm (134”)
Drum size (Dia. x Width)		
Front		1,620 mm x 550 mm(64” x 22”)
Rear		1,620 mm x 1,100 mm(64” x 43”)
Performance		
Travel speed	Low	0 – 8.0 km/h
(forward / reverse)		(0 – 5.0 mile/h)
	High	0 – 16.0 km/h
		(0 – 9.9 mile/h)

Performance	
Gradeability	25 degrees
Rolling width	2,100 mm (83”)
Minimum turning radius	6,300 mm (249”)
Engine	
Model	KUBOTA “ V3307-CR-T-EF05 ” Diesel Engine
Total displacement	3.331 L (203.3 cu.in)
Rated output	54.6 kW / 2,200 min^{-1} (73 HP / 2,200 rpm)
Max. torque	261 N·m / 1,500 min^{-1} (193 ft·lbs / 1,500 rpm)
Tank capacity	
Fuel tank	100 liters (26.4 gal)
Hydraulic tank	85 liters (22.5 gal)
Sprinkler tank	680 liters (179.6 gal)

NOTE: 1) Gradeability is the calculated value. It may vary with ground surface conditions.
2) According to European Standards (EN500-1, ISO 6165, etc.), the weight are defined as follows.
Operating weight : Fuel=50%, Water=50%, Operator=75kg.

(2) R2H-4 (with AWNING)

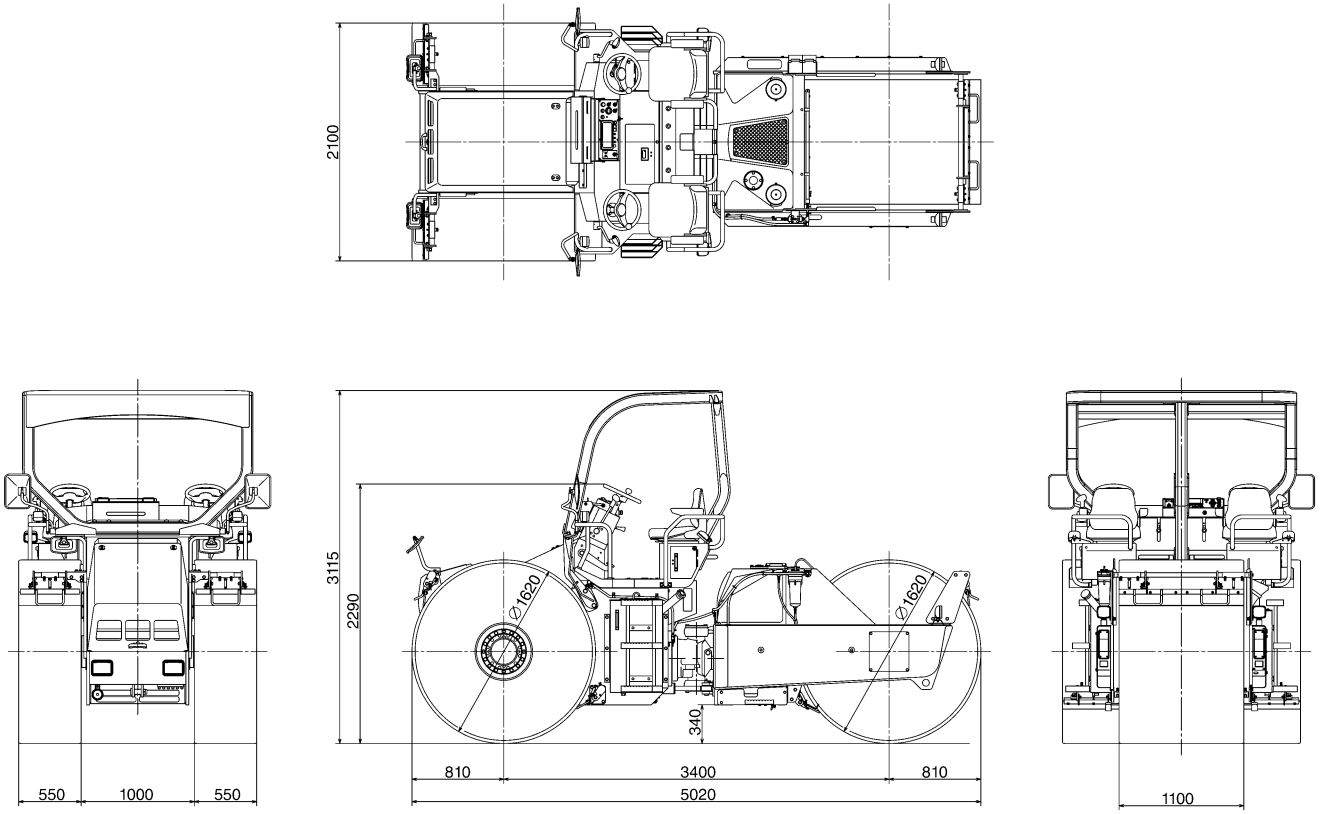


Model		R2H-4 (with AWNING)
Weight		
Operating weight		13,700 kg (30,205 lbs)
On front axle		6,760 kg (14,905 lbs)
On rear axle		6,940 kg (15,300 lbs)
Dimension		
Overall length		5,020 mm (198")
Overall width		2,100 mm (83")
Overall height (with AWNING)		3,060 mm (120")
Wheelbase		3,400 mm (134")
Drum size (Dia. x Width)		
Front		1,620 mm x 550 mm(64" x 22")
Rear		1,620 mm x 1,100 mm(64" x 43")
Performance		
Travel speed	Low	0 – 8.0 km/h
(forward / reverse)		(0 – 5.0 mile/h)
	High	0 – 16.0 km/h
		(0 – 9.9 mile/h)

Performance	
Gradeability	17 degrees
Rolling width	2,100 mm (83")
Minimum turning radius	6,300 mm (249")
Engine	
Model	KUBOTA " V3307-CR-T-EF05 " Diesel Engine
Total displacement	3.331 L (203.3 cu.in)
Rated output	54.6 kW / 2,200 min^{-1} (73 HP / 2,200 rpm)
Max. torque	261 N·m / 1,500 min^{-1} (193 ft·lbs / 1,500 rpm)
Tank capacity	
Fuel tank	100 liters (26.4 gal)
Hydraulic tank	85 liters (22.5 gal)
Sprinkler tank	680 liters (179.6 gal)

NOTE: 1) Gradeability is the calculated value. It may vary with ground surface conditions.
2) According to European Standards (EN500-1, ISO 6165, etc.), the weight are defined as follows.
Operating weight : Fuel=50%, Water=50%, Operator=75kg.

(3) R2-4 (with ROPS)

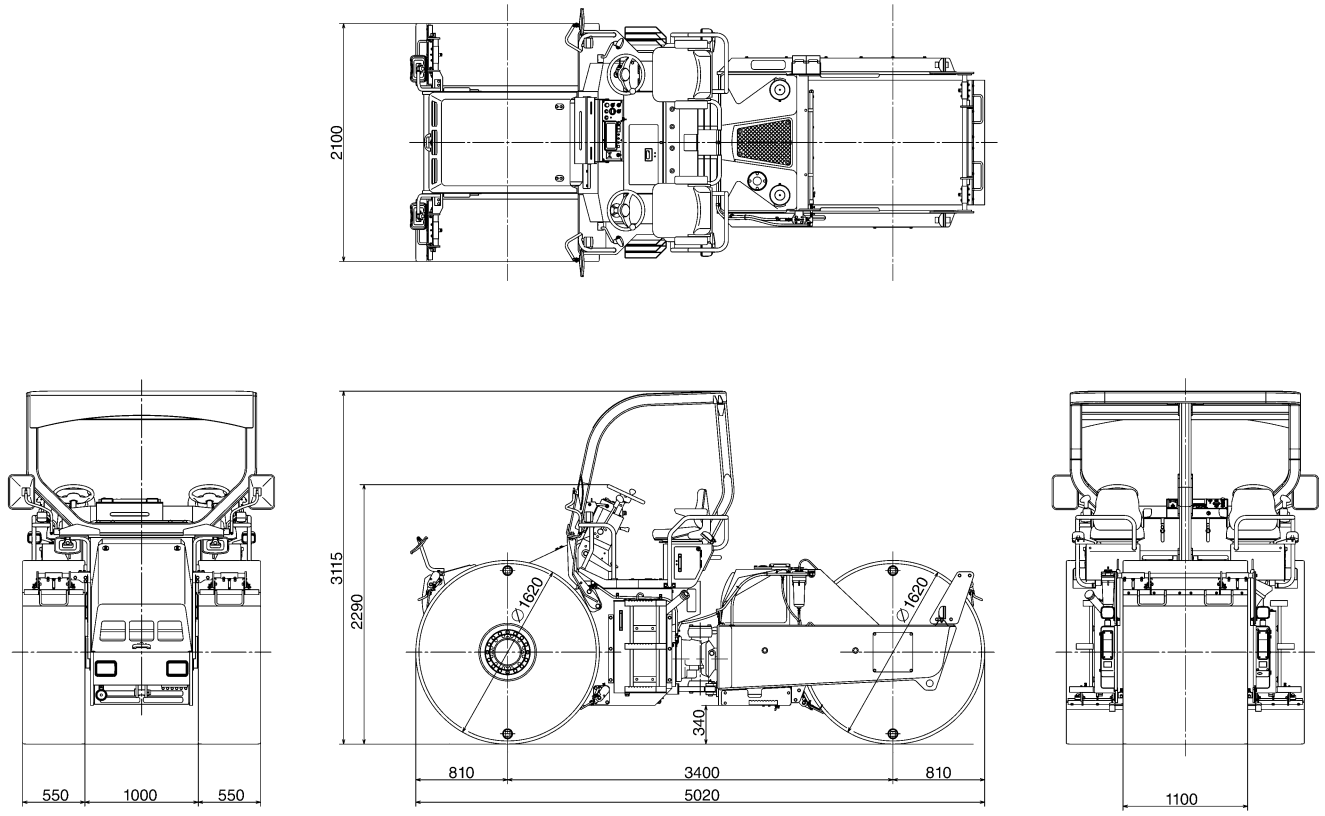


Model		R2-4 (with ROPS)
Weight		
Operating weight		10,060 kg (22,180 lbs)
On front axle		5,060 kg (11,155 lbs)
On rear axle		5,000 kg (11,025 lbs)
Dimension		
Overall length		5,020 mm (198”)
Overall width		2,100 mm (83”)
Overall height		3,115 mm (123”)
Wheelbase		3,400 mm (134”)
Drum size (Dia. x Width)		
Front		1,620 mm x 550 mm(64” x 22”)
Rear		1,620 mm x 1,100 mm(64” x 43”)
Performance		
Travel speed	Low	0 – 8.0 km/h
(forward / reverse)		(0 – 5.0 mile/h)
	High	0 – 16.0 km/h
		(0 – 9.9 mile/h)

Performance	
Gradeability	24 degrees
Rolling width	2,100 mm (83”)
Minimum turning radius	6,300 mm (249”)
Engine	
Model	KUBOTA “ V3307-CR-T-EF05 ” Diesel Engine
Total displacement	3.331 L (203.3 cu.in)
Rated output	54.6 kW / 2,200 min^{-1} (73 HP / 2,200 rpm)
Max. torque	261 N·m / 1,500 min^{-1} (193 ft·lbs / 1,500 rpm)
Tank capacity	
Fuel tank	100 liters (26.4 gal)
Hydraulic tank	85 liters (22.5 gal)
Sprinkler tank	680 liters (179.6 gal)

NOTE: 1) Gradeability is the calculated value. It may vary with ground surface conditions.
2) According to European Standards (EN500-1, ISO 6165, etc.), the weight are defined as follows.
Operating weight : Fuel=50%, Water=50%, Operator=75kg.

(4) R2H-4 (with ROPS)



Model		R2H-4 (with ROPS)
Weight		
Operating weight		14,040 kg (30,955 lbs)
On front axle		7,010 kg (15,455 lbs)
On rear axle		7,030 kg (15,500 lbs)
Dimension		
Overall length		5,020 mm (198")
Overall width		2,100 mm (83")
Overall height		3,115 mm (123")
Wheelbase		3,400 mm (134")
Drum size (Dia. x Width)		
Front		1,620 mm x 550 mm(64" x 22")
Rear		1,620 mm x 1,100 mm(64" x 43")
Performance		
Travel speed	Low	0 – 8.0 km/h
(forward / reverse)		(0 – 5.0 mile/h)
	High	0 – 16.0 km/h
		(0 – 9.9 mile/h)

Performance	
Gradeability	17 degrees
Rolling width	2,100 mm (83")
Minimum turning radius	6,300 mm (249")
Engine	
Model	KUBOTA " V3307-CR-T-EF05 " Diesel Engine
Total displacement	3.331 L (203.3 cu.in)
Rated output	54.6 kW / 2,200 min^{-1} (73 HP / 2,200 rpm)
Max. torque	261 N·m / 1,500 min^{-1} (193 ft·lbs / 1,500 rpm)
Tank capacity	
Fuel tank	100 liters (26.4 gal)
Hydraulic tank	85 liters (22.5 gal)
Sprinkler tank	680 liters (179.6 gal)

NOTE: 1) Gradeability is the calculated value. It may vary with ground surface conditions.
2) According to European Standards (EN500-1, ISO 6165, etc.), the weight are defined as follows.
Operating weight : Fuel=50%, Water=50%, Operator=75kg.

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