

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

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**OPERATING &
MAINTENANCE
INSTRUCTIONS**

SAKAI HEAVY INDUSTRIES, LTD.

VIBRATING
ROLLER

MODEL with ECO MODE

SW504

From SW504 → 1SW74 – 30101

SAKAI®

PREFACE

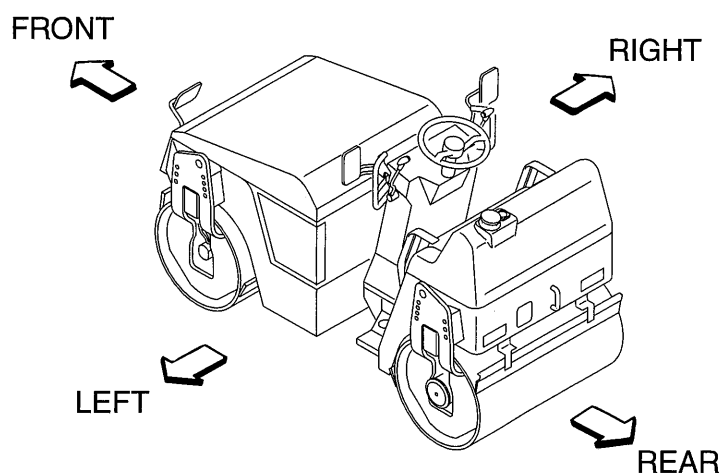
This operator's manual serves as a guide for the use of your SAKAI SW504 Vibrating Roller for those who are new to the machine, and also for the people who have experience in using the machine and want to refresh their knowledge for the machine.

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.



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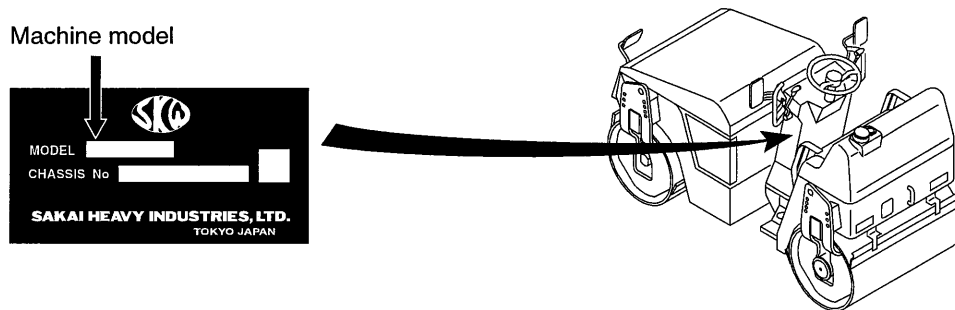


MACHINE AND ENGINE IDENTIFICATION NUMBERS

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

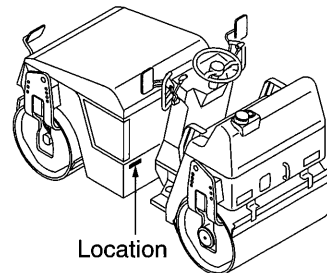
(1) Machine model

Indicated on the dashboard in the operator's station.

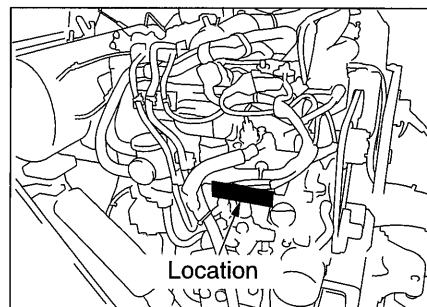


(2) Machine serial number

SW504 ⇒ 1SW74 – ○○○○○○



(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 decals.

 **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 reasons.
We shall not be held responsible for injuries, 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 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

■ Understand the intended uses of 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. Vibration rolling compaction under conditions of excessive compaction, or using it to crush rocks can damage the machine.

■ Obey the worksite rules

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

▲ WARNING: Negligence of these instructions can lead to accidents.

1 BASIC PRECAUTIONS FOR SAFETY

■ 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.
- Machine not equipped with ROPS cannot be operated on slopes or other dangerous places.
- Machine without cabins cannot be operated in, e.g., bad weather or contaminated areas.

■ 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

1 BASIC PRECAUTIONS FOR SAFETY

■ 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.



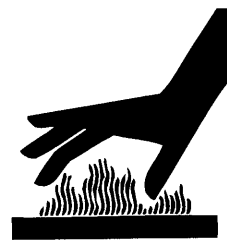
■ Beware when operating moving parts

- 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.
- Do not touch the muffler while the engine is running or immediately after it has been shut down. You can get burned.



▲ WARNING: Negligence of these instructions can lead to accidents.

1 BASIC PRECAUTIONS FOR SAFETY

■ Be careful with fire

- The fuel, oil, and anti-freeze 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.

■ 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.

1 BASIC PRECAUTIONS FOR SAFETY

■ 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

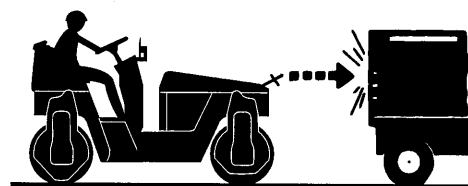
- Check your machine for damage such as cracks and deformation. If found to be abnormal, operate the machine after taking a proper measure to secure safety.
- Check the level of fluids (fuel, engine oil, coolant, anti-freeze and hydraulic oil). Add as necessary.
- Check the area where the machine has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

⚠ WARNING: Negligence of these instructions can lead to accidents.

1 BASIC PRECAUTIONS FOR SAFETY

■ 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 : **265 N•m** (When a tightening torque is M16)
343 N•m (When a tightening torque is M18)
- 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 be left in 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.

1 BASIC PRECAUTIONS FOR SAFETY

■ 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.

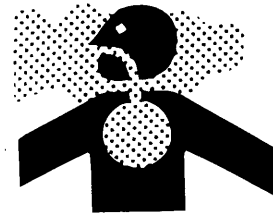


■ Sit in the driver's seat and turn on the engine

- 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

- The exhaust gas from the engine is dangerous.
- 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.

▲ WARNING: Negligence of these instructions can lead to accidents.

1 BASIC PRECAUTIONS FOR SAFETY

■ 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.

1 BASIC PRECAUTIONS FOR 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.



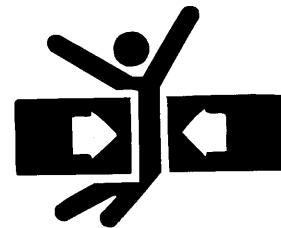
■ Refrain from inattentive driving

- Inattentive driving or driving relying on guess work can cause an accident. Use extreme care for workers present in the path of the roller 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.

⚠ WARNING: Negligence of these instructions can lead to accidents.

1 BASIC PRECAUTIONS FOR SAFETY

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

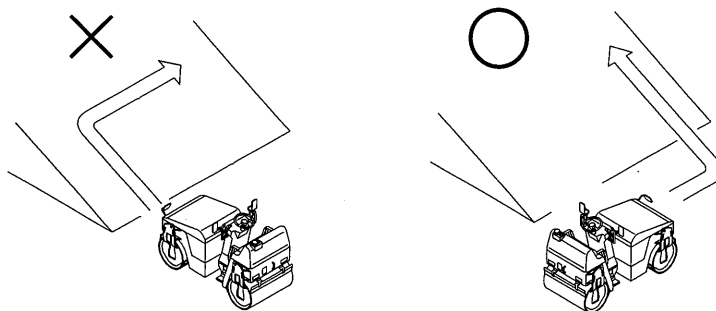
- **The machines not equipped with CABIN must not be operated in the bad weather or a harmful contaminated zone**

- **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**

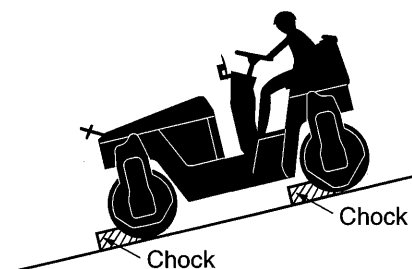


1 BASIC PRECAUTIONS FOR SAFETY

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

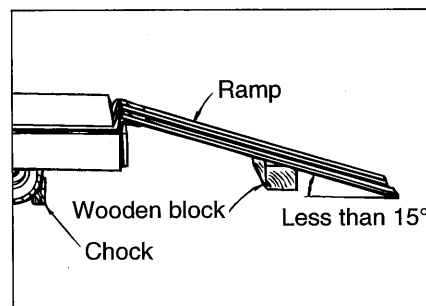
■ When parking

- 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.



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.

⚠ WARNING: Negligence of these instructions can lead to accidents.

1 BASIC PRECAUTIONS FOR SAFETY

1.8 Handling the Battery

■ When handling the battery

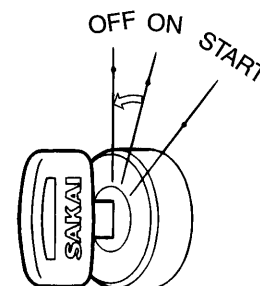
- Battery electrolyte contains sulphuric acid. It will destroy clothing and skin. If it touches your clothing or skin, flush with large quantities of water.
- In case of eye contact, flush with clean water and get medical help.
- If swallowed, drink large amount of water, milk, beaten egg or vegetable 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 handling.

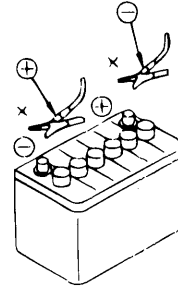
- Inspect or handle the battery with the engine stopped and the starter switch in the OFF position.
- Keep metallic items such as tools away from the battery terminals.
- Tangled terminals may generate sparks due to improper connections, resulting in the danger of explosions. Make sure terminals are 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.



1 BASIC PRECAUTIONS FOR SAFETY

■ 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.

⚠ WARNING: Negligence of these instructions can lead to accidents.

1 BASIC PRECAUTIONS FOR SAFETY

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.



■ 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.



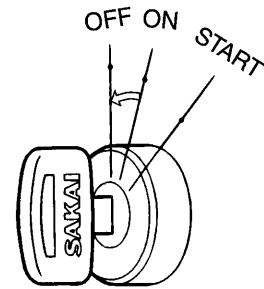
■ Change safety-related parts at regular intervals

- 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.

1 BASIC PRECAUTIONS FOR SAFETY

■ 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 machine 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.

▲ WARNING: Negligence of these instructions can lead to accidents.

1 BASIC PRECAUTIONS FOR SAFETY

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.



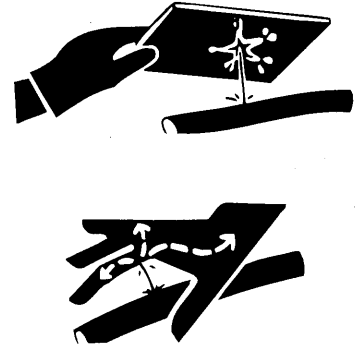
■ Carefully handle high pressure hoses

- 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.

1 BASIC PRECAUTIONS FOR SAFETY

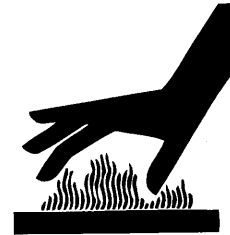
■ **Be careful of high pressure hydraulic fluid**

- Bear in mind that the working equipment hydraulic systems are under internal pressure. 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.



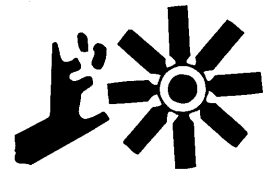
■ **Be careful of hot parts**

- 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.



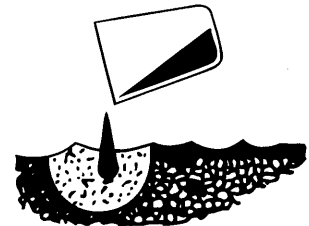
■ **Use care when inspecting or servicing fan or belts in motion**

- 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.



⚠ WARNING: Negligence of these instructions can lead to accidents.

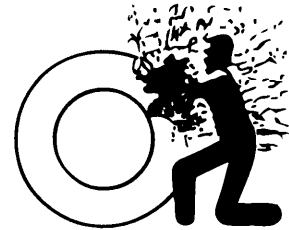
1 BASIC PRECAUTIONS FOR SAFETY

■ 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 dismantling 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 BASIC PRECAUTIONS FOR SAFETY

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 3998-16504-0

⚠ WARNING	
<p>1. When Handling the Machine:</p> <ul style="list-style-type: none"> 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. 	
<p>2. Preparation for Safe Operation</p> <ul style="list-style-type: none"> 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. 	
<p>3. Starting the Engine</p> <ul style="list-style-type: none"> 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. 	
<p>4. Parking Precautions</p> <ul style="list-style-type: none"> 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. 	
<small>3998-16504-0</small>	

⑥ 3998-16500-0

⚠ WARNING	
<ul style="list-style-type: none"> 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. 	
<small>3998-16500-0</small>	

⑩ 2998-96001-1

⚠ CAUTION	
USE SPECIFIED FUEL ONLY	
<ul style="list-style-type: none"> Use of other than the specified fuel may result in damage to the engine. Please refer to the manual for details. 	
<small>2998-96001-1</small>	

⑪ 1446-19030-0

SPRINKLER SYSTEM HANDLING	
<ol style="list-style-type: none"> When operating the sprinkler system, be sure to open the tank valve fully, and close all drain cocks (filter, pump, line and front and rear wheel drain cocks). In order to prevent leakage of water during storage, ensure that the tank valve is fully closed. 	
<small>1446-19030-0</small>	

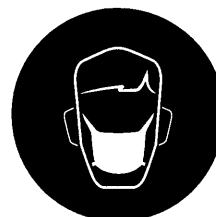
② 3998-16502-0

⚠ DANGER	
	<ul style="list-style-type: none"> Do not approach, or allow objects to touch the rotating parts. Body parts which make contact with rotating mechanism will be severed.
	<ul style="list-style-type: none"> Do not open the radiator cap when fluid is hot. Radiator fluid is flammable. Avoid exposure to flame when radiator cap has been removed.
	<ul style="list-style-type: none"> 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.
<small>3998-16502-0</small>	

⑦ 3998-16501-0

⚠ DANGER	
Be Careful with Fire	
<ul style="list-style-type: none"> When refueling, stop the engine and do not smoke. The filter cap of the fuel tank must be kept tight. 	
<small>3998-16501-0</small>	

⑫ 3998-06139-0



③ 3998-16505-0

⚠ DANGER	
	<p>Roll Over Prevention</p> <ul style="list-style-type: none"> 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 making turns. Pay particular attention when operating on uneven surfaces, as the machine may become unstable.
<small>3998-16505-0</small>	

⑧ 3998-36002-0
(2 locations)



⑬ 3998-16730-0

⚠ CAUTION	
Cautions on DPF Parked RGN	
<p>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.</p>	
<small>3998-16730-0</small>	

④ 3998-16491-2

⚠ WARNING	
<ul style="list-style-type: none"> Read the operator's manual thoroughly before operating the machine. Incorrect operation can cause severe injury or death. It is your responsibility to operate the machine safely. 	
<small>3998-16491-2</small>	

⑨ 3998-16499-0

⚠ WARNING	
<ul style="list-style-type: none"> Do not open the hood with the engine running. Contact with hot parts will cause burns. Contact with rotating parts will cause severe injury. 	
<small>3998-16499-0</small>	

⑭ 3998-16700-0

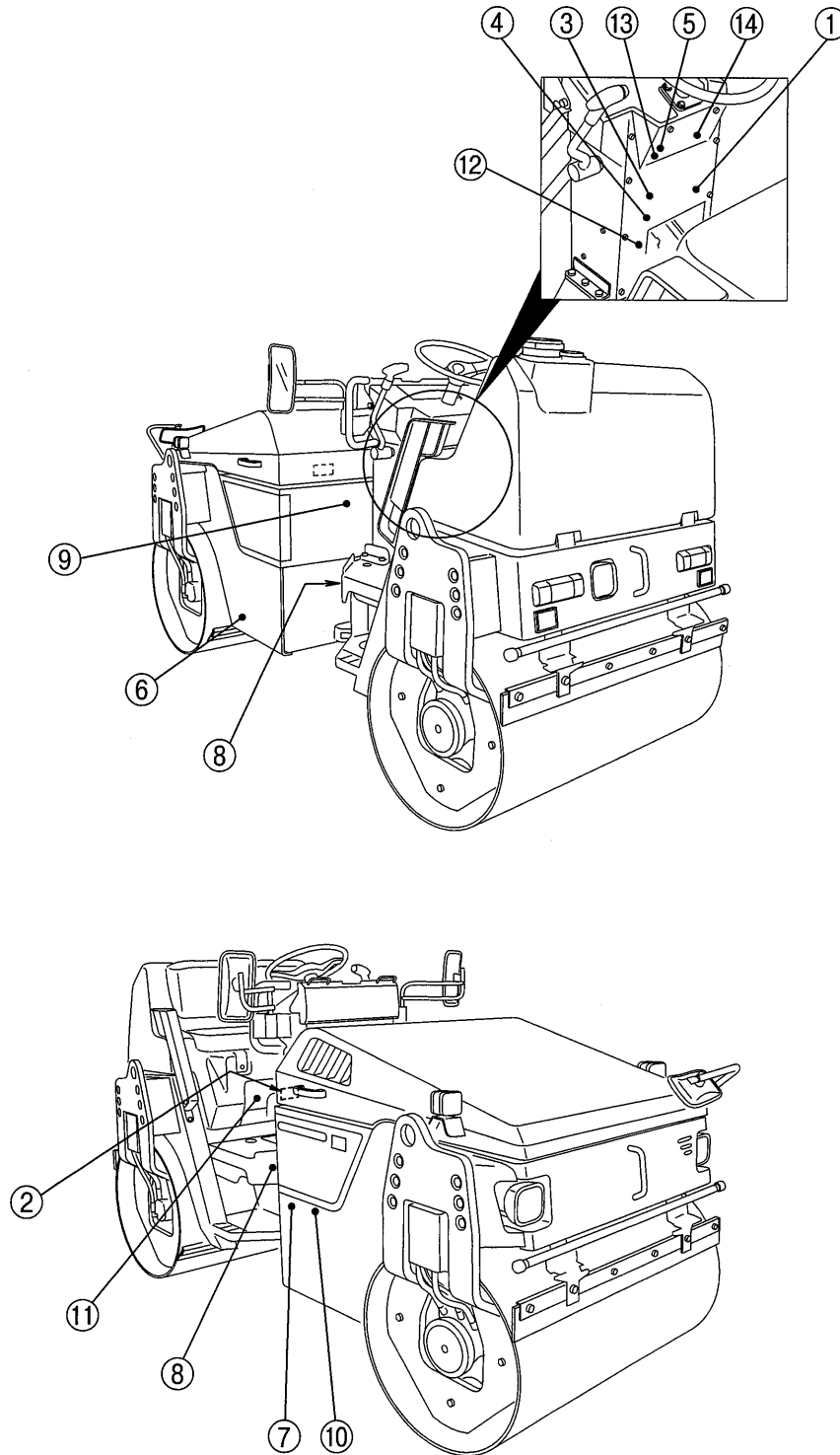
⚠ WARNING	
Be careful with DPF regeneration (automatic or manual cleaning)	
<ul style="list-style-type: none"> Avoid inhalation of exhaust gas. Do not DPF regeneration in an enclosed area. To avoid a fire, make sure there is nothing flammable around exhaust opening and muffler. Do not approach without contacting while DPF is regenerating and it has been stopped. 	
<small>3998-16700-0</small>	

⑤ 3998-16489-0

CALIFORNIA	
Proposition 65 Warning	
<p>Diesel engine and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.</p>	
<small>3998-16489-0</small>	

⚠ WARNING: Negligence of these instructions can lead to accidents.

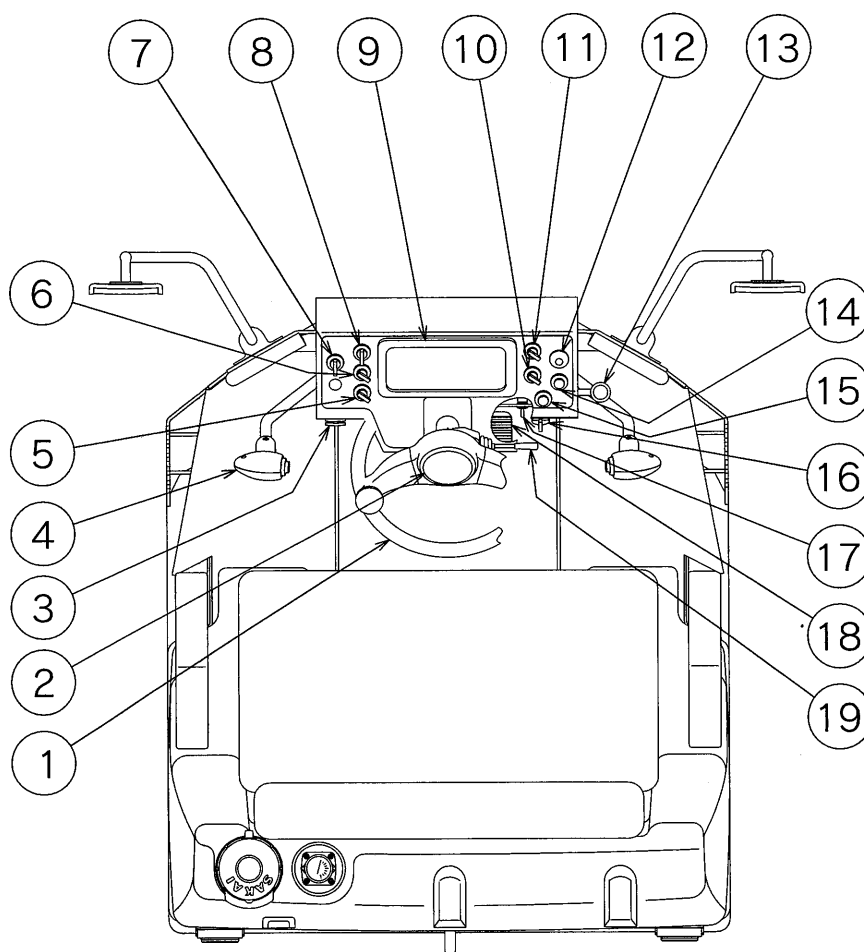
1 BASIC PRECAUTIONS FOR SAFETY



2 OPERATION

2.1 Instruments and Controls

2.1.1 Operator's station

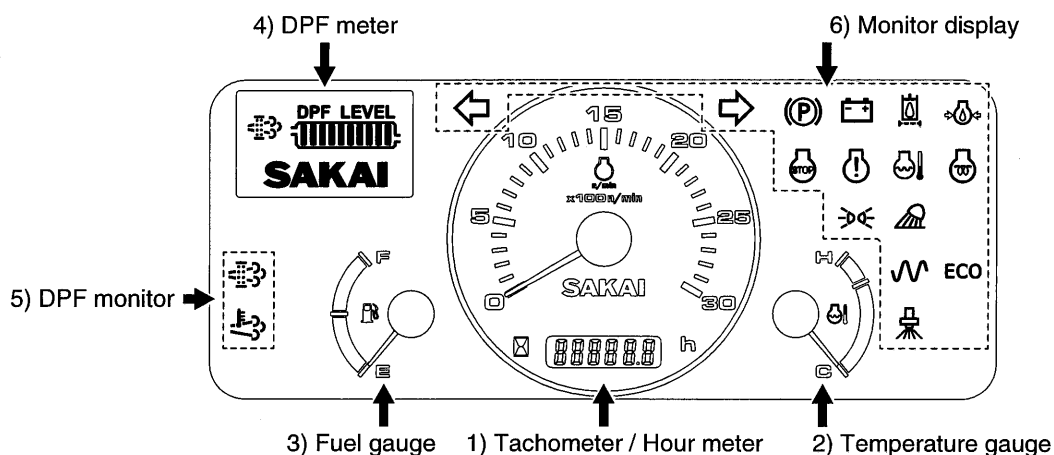


- | | | |
|--|------------------------------|-----------------------------------|
| ① Steering wheel | ⑧ Vibrator switch | ⑯ Starter switch |
| ② Horn switch button | ⑨ Combination meter | ⑰ Engine trouble diagnosis switch |
| ③ Accessory socket | ⑩ Lamp switch | ⑱ Brake pedal |
| ④ Forward-Neutral-Reverse lever (F-N-R lever) with vibrator switch | ⑪ Speed shift switch | ⑲ Turn signal lever |
| ⑤ Back buzzer switch (Option) | ⑫ Parking brake switch | |
| ⑥ Vibration selector switch | ⑬ Throttle lever | |
| ⑦ Sprinkler switch | ⑭ Hazard switch | |
| | ⑮ Parked regeneration switch | |

2.1.2 Gauges, indicator lamps and warning lamps

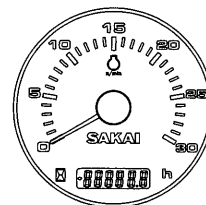
For safe execution of your job, fully understand the role and function of the systems involved.

Combination meter



1) Tachometer / Hour meter

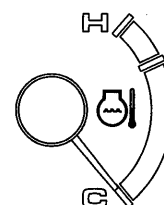
Indicates the engine RPM. The hour meter shows total operating hours. The service interval recommendation in this manual should be based upon the hour meter readings.



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

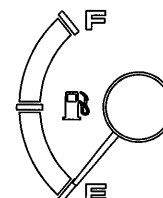
3) Fuel gauge

Indicates the fuel level in the tank.

E: The tank is empty.

F: The tank is full.

Make a habit to refuel before the tank becomes empty.



Fuel gauge

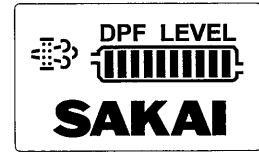
⚠ CAUTION

Be sure to use fuel recommended by SAKAI (refer to page 97).

2 OPERATION

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)

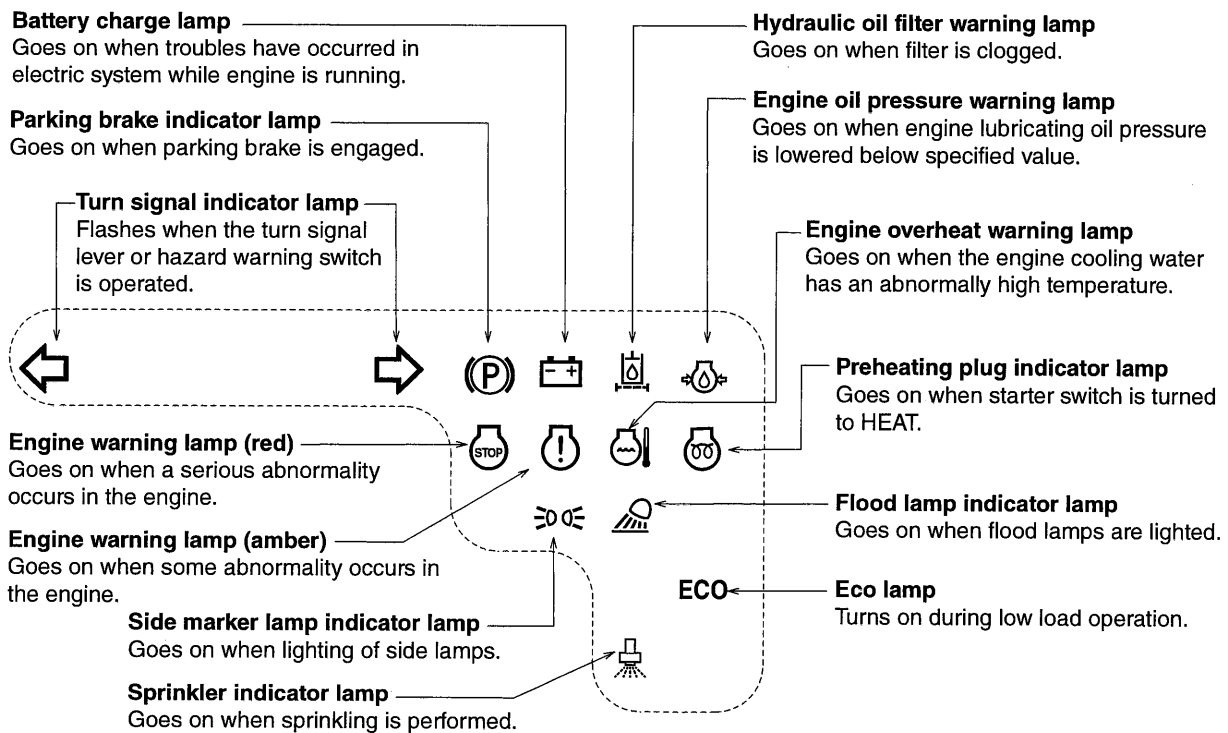
Turned on : Turns on when PM (particulate matter) accumulated in the DPF is being burned.



Exhaust temperature indicator lamp (amber)



6) Monitor display



★ Indicator lamps []
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.

★ Hydraulic oil filter warning lamp []
It will flash once when the starter switch is turned to the ON position.
After that it will turn on when the hydraulic oil filter becomes clogged. Stop the machine and carry out an inspection.

★ 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.

2 OPERATION

★ Engine warning lamp (red) []

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

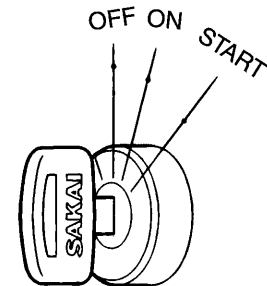
- **Hydraulic oil filter warning lamp**
The warning lamp may turn on when the engine revved up before it has warmed adequately.
Warm the engine adequately, and operate the machine after the lamp has turned off.
- **The window of the combination meter**
The window of the combination meter may become invisible because of aged deterioration caused 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.**

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.






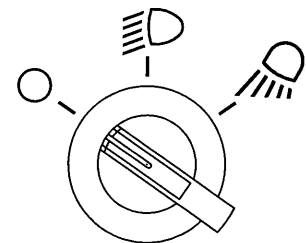
⚠ CAUTION

- When starting the engine, engage the parking brake and set the F-N-R lever in neutral.
- Be sure to engage the parking brake, remove the key from the ignition and carry it with you at all times when leaving the machine.

Lamp switch

Has three positions.

- : All lamps are switched off.
-  : The monitor display light and the headlamps and red indicators of the rear combination lamps will turn on.
-  : In addition, the flood lamps become bright. At this time, the indicator lamp  on the monitor display will go on.



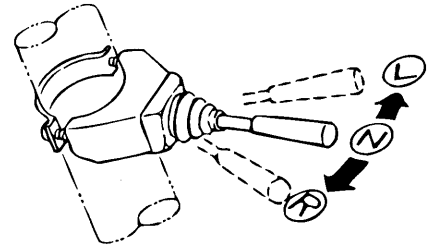
2 OPERATION

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.

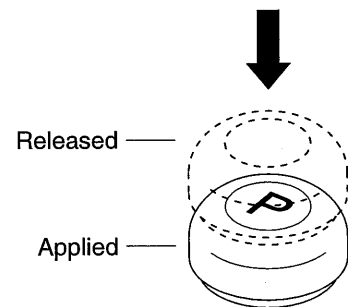


NOTE: The lever does not return to the OFF position even if the steering wheel is turned back.

Parking brake switch

If switch (P) is pressed down, the parking brake applies with the indicator lamp (P) on the monitor display lighted up.

When pressed again, the parking brake is released and the indicator lamp goes off.



⚠ WARNING

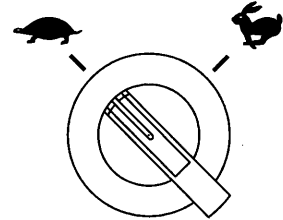
- To disengage the brake, be sure to press the switch again instead of pulling it.
- When dismounting from the machine, press the switch to apply the brake without fail.



⚠ CAUTION

- Never pull the switch UP.
- If the engine is shut down with the parking brake switch pushed down, the parking brake remains applied.

Speed shift switch

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



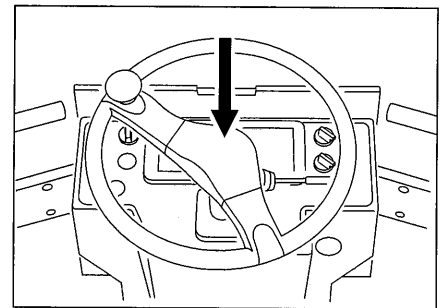
LOW 	0 – 7.5 km/h (0 – 4.7 mile/h)
HIGH 	0 – 10.0 km/h (0 – 6.2 mile/h)

IMPORTANT

**Change speed when the machine is completely stopped.
Do not change speed while the machine is running.**

Horn switch button

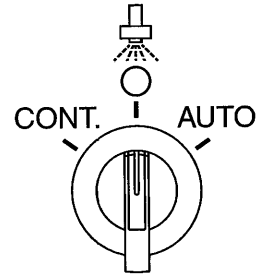
Pressing the button at the center of the steering wheel makes the horn sound.




2 OPERATION


Sprinkler switch

The water sprinkler can be switched between CONT. and AUTO. Select the mode to suit the conditions at the construction site.




CONT. position: Set the liquid spray switch to CONT. position to start spraying. The indicator lamp  on the monitor display lights up.

position: When spray is stopped, the indicator lamp on the monitor display is turned off.

AUTO position: Water will be sprinkled only while the machine is moving. Moreover, it will stop sprinkling water when the F-N-R lever is moved to the neutral position (●). The indicator lamp  on the monitor display will only turn on while water is being sprinkled.

Vibrator switch

Selects two choices;  position and AUTO position. Select either position to meet the job requirements.



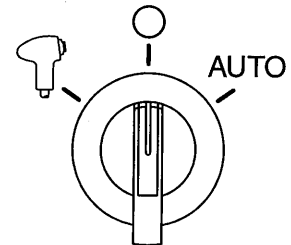
position : The vibrator switch on the F-N-R lever can be used to turn the vibrations ON or OFF. Pressing the switch will turn on the vibrations. Pressing the switch again will turn off the vibrations.




position : Vibration is shut off.

AUTO


position : Vibration is generated only when the machine is travelling. Vibration is shut down when the F-N-R lever is moved back to the neutral position (●).

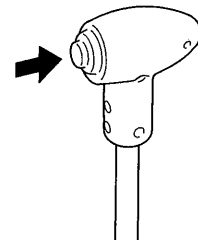


Vibrator switch

The indicator lamp  on the monitor display lights up only for vibration.

ON-OFF control of the vibrator is also made by the pushbuttons provided on the left-hand and right-hand F-N-R levers. Press either of them to work the vibrator. Press again to shut off vibration.

Ensure that the vibrator switch on the instrument panel is in the  position when operating the pushbutton switches.



Vibrator switch

NOTE: For vibratory compaction, run the engine at 2,100 min⁻¹ (rpm) or higher. Incline the throttle lever or F-N-R lever to adjust the vibration pressure transmission on slope so that the engine rpm may be 2,100 min⁻¹ (rpm) or more.



IMPORTANT

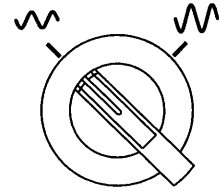
- Do not operate the vibrator on a hard area such as cement concrete pavement surface or the ground covered by thick steel sheets.
- Keep the vibrator stopped when the machine is at rest.
- Shut off the vibrator immediately when the machine has been caught in the mud during vibratory operation.

2 OPERATION


Vibration selector switch

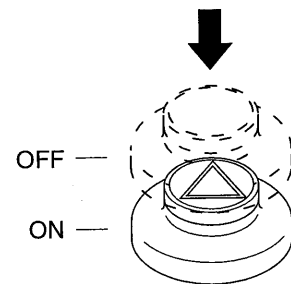
The amplitude of vibration can be changed to low or high. Select the amplitude according to the condition of the work site.

-  position: Causes vibration to start with low amplitude.
-  position: Causes vibration to start with high amplitude.





Hazard switch

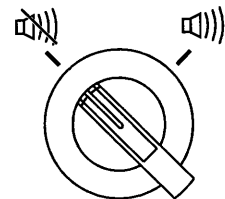
Pushing the switch  causes direction indicator lamp and indicator lamp Monitor display start to flash simultaneously. Pushing the switch again causes the lamps to go off.





Back buzzer switch (Option)

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.

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

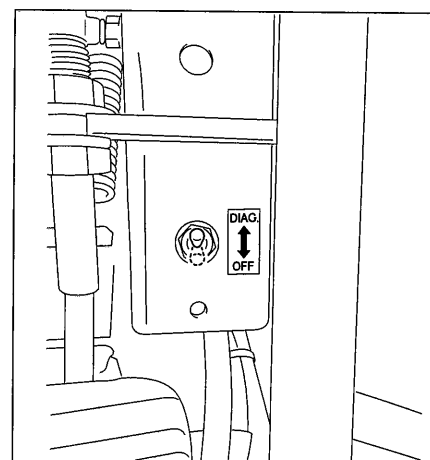
Pressing the switch when the DPF indicator lamp (amber) is off will not clean the DPF.



NOTE: Refer to 2.2.1 Handling the DPF on page 40 for details on the conditions and points to beware of in manual cleaning.

Engine Trouble Diagnosis Switch

This switch is used to carry out an engine trouble diagnosis when the engine warning lamp (red or amber) turns on. Stop the engine, and turn the switch to the ON position, then push the switch up (position shown in the diagram) to begin the engine trouble diagnosis. Refer to 2.18 Engine Trouble Shooting for more details.

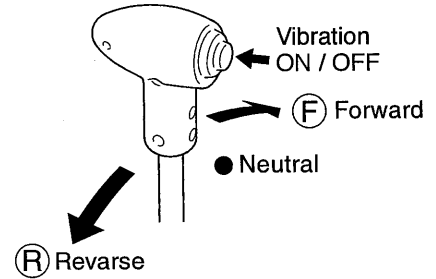


2 OPERATION

2.1.4 Operating levers and pedals

Forward-Neutral-Reverse lever (F-N-R lever) with vibrator switch

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. The vibrator ON-OFF control is easily made by the F-N-R lever top vibrator switch (refer to page 33).

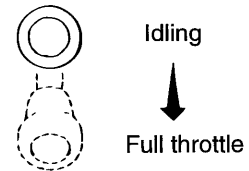


IMPORTANT

- For normal braking, return the F-N-R lever back to neutral.
- In an emergency, depress the brake pedal.
- This provides a quick braking with the F-N-R lever brought to the neutral position (●) through a mechanical linkage.

Throttle lever

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



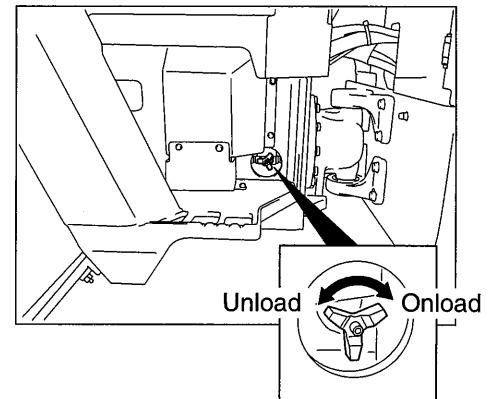
Unloader valve

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

Use the valve only for towing.

For towing (Unloader)

- When the engine turns on
Turn on the engine and turn the “unload” valve left as far as it will go to open it fully, and turn the brake switch off.
- When the engine does not turn on
Release the motor brake manually (Page 44 Manual releasing of brake).
Turn the unloader valve counter-clockwise to the fully open position.



For normal travelling (Onloader)

Turn the unloader valve clockwise to make sure it reaches to the fully closed position.

⚠ WARNING

- **On a slope, chock the wheels and use extreme care when handling the unloader valve and towing the machine.**
- **Be sure to apply the parking brake when operating the unloader valve.**
- **Do not tow machine over long distances.**
- **Unloading the unload valve will disengage the engine, so never get in front of or behind the machine.**

NOTE: For normal travel, be sure to hold the lever in the ONLOAD position.

Brake pedal

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 (●).

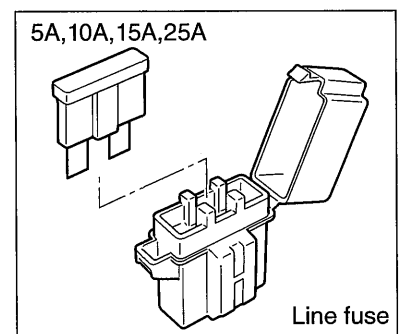
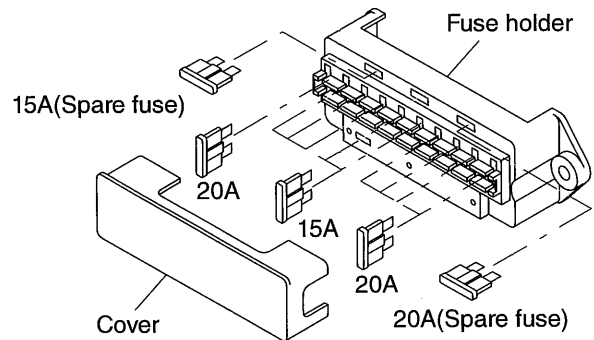
2 OPERATION

2.1.5 Fuse box

⚠ 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.



2.1.6 Fusible link

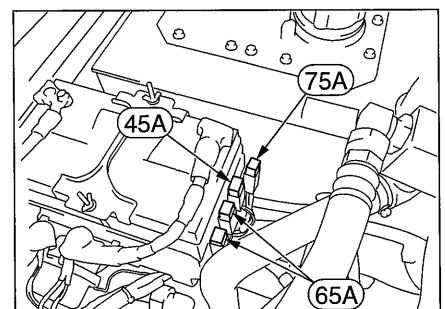
⚠ WARNING

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.

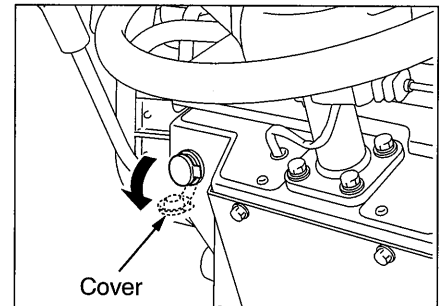
Be sure to replace the fusible link with one of the same capacity.



2.1.7 Accessory socket

The accessory socket 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.



⚠ WARNING

When connecting electronic equipment to the accessory socket, make sure it does not obstruct the raising and lowering of the F-N-R lever.

⚠ 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 96, 97)
- 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 parking brake switch.
- 4) Keep engine rpm at idle.
- 5) Push on parked regeneration switch.

The DPF indicator lamp will flash then turn on when the parked manual 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.**

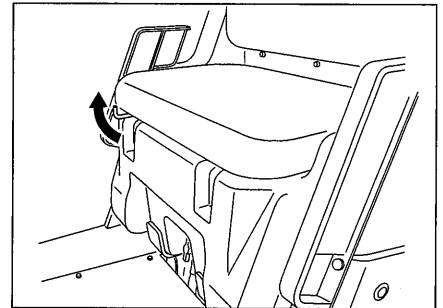
Regeneration "RGN" of DPF for Roller Operator / Engine Diagnosis

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) 	DPF Gauge (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)		 Lamp On		 Lamp Off	NO	Applicable	No Need	NO	Normal machine operation is available. When RGN lamp goes on during Auto RGN, keep engine RPM at Max for 30 min to perform best RGN.
2 (Requesting Parked RGN)	10 (Max) RGN may start even below level 10 according to amount of soot left at DPF.	 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 manual regeneration switch is pushed. • After regeneration, the warning indicator lamp does not turn off.
General Cautions for Safe RGN	<ol style="list-style-type: none"> 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. 								
Daily Check of Engine Oil Level and Oil Change	<ol style="list-style-type: none"> 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. 								
Procedure of Parked RGN	<ol style="list-style-type: none"> 1. Move the machine to safe location. 2. Shift FNR lever into neutral. 3. Push on parking switch. 4. Keep engine rpm at idle. 5. Push on Parked RGN black switch. With a start of RGN, Amber lamp stops blinking and goes on. <p>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.</p>								

2.2.2 Seat adjustment

Adjust the seat for your best operating position. Move the lever as shown by arrow. With the lever held in that position, slide the seat forward or backward as desired. When properly adjusted, release the lever.



⚠ WARNING

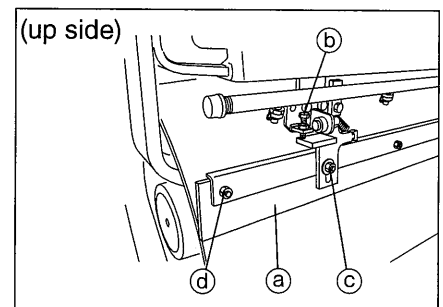
- The adjustment will be necessary when operating the machine first or when operators are alternated.
- Make adjustments to the seat while the machine is stationary, before you start work, or when the driver changes. Do not make adjustments to the seat while the machine is moving.
- Take care not to get your fingers, hands or feet caught when adjusting the seat.
- Adjust the seat only when there is one person on the machine.

2.2.3 Scraper adjustment and replacement

Roll scraper

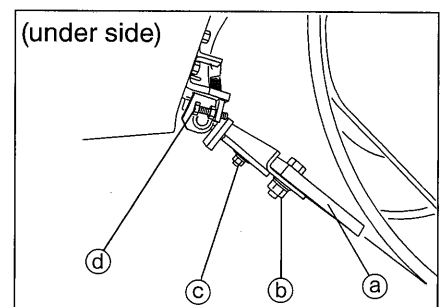
1) Clearance adjustment of scraper blades (a)

- ① Loosen set bolts (b) at 2 locations.
- ② Loosen nuts (c) at 2 locations. Slide blade (a) until they make contact with the roll.
- ③ Tighten nuts (c) at the position where the blade touches the roll.
- ④ Make adjustment with set bolt (b) again so that the clearance between the roll and blade will be 0.5 mm.



2) Replacement of scraper blades

- ① Remove nuts (c) at 2 locations and bolts (d) at 4 locations each.
- ② Replace blades (a) with new ones.
- ③ Refit and retighten bolts (d).



2 OPERATION

2.2.4 Disengaging the brake when towing

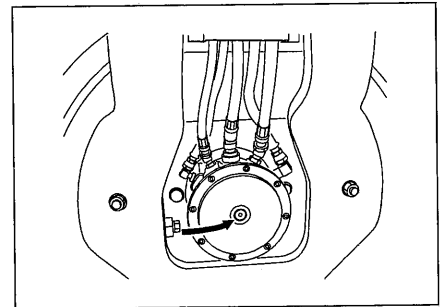
⚠ WARNING

On a slope, chock the drums and prepare for towing before disengaging the brake.

Adhere to the following procedures to release the brake when towing the machine due to problems with the engine or oil pressure circuit.

Disengaging the brake

- ① Remove the brake release bolts and washers (1 location) from the machine frame.
- ② Remove the plug of the hydraulic motor.
- ③ Put the bolt through the washer into the plug hole and tighten the bolt. The brake will be released when the bolt is tightened to a certain extent.
- ④ When towing is complete, set the bolts and washers in the original position and fit the plugs in the motors securely.



⚠ 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.



2.3 Operation

⚠ WARNING

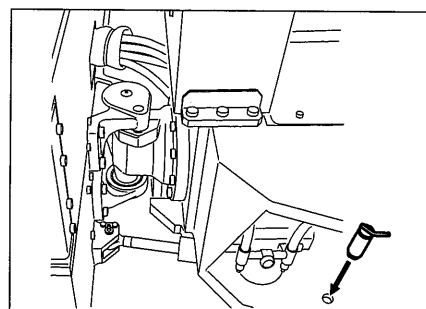
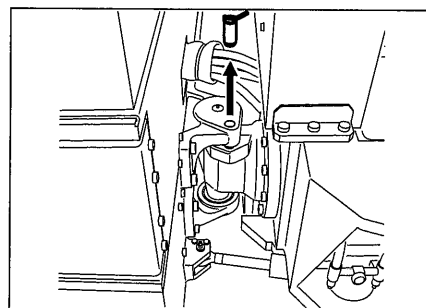
- This machine is a one-man roller.
- Operate the machine from the operator's seat.
- Be sure to wear the seatbelt during operation.

2.3.1 Before-starting inspection

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

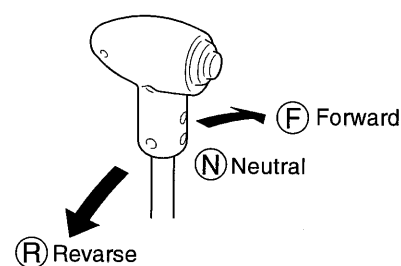
⚠ WARNING

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



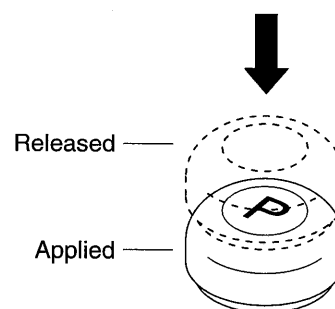
NOTE : Mount the removed lock pin in the innermost section of the step at the left of the machine.

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

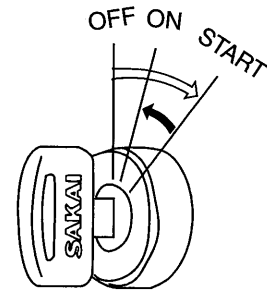


- 3) Confirm that the parking brake is engaged.

NOTE: When the F-N-R lever is not in the neutral position (●), or the parking brake has been released, the interlocking system goes into operation and the engine will not turn on. Be sure to confirm that the F-N-R lever is in the neutral position (●) position, and that the parking brake is engaged before starting the engine.



- 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 min⁻¹ (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 bringing up the engine oil and hydraulic oil to the working temperature.
- 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.
 - Charge lamp Has gone off.
 - Engine oil pressure warning lamp ... 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 OPERATION

2.3.4 Traveling



⚠ WARNING

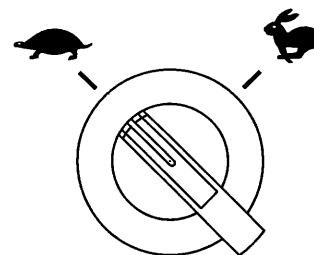
- When starting, operate the horn after securing the safety around the machine. Clear away obstacles on the road.
- Be sure to wear the seatbelt during operation.

⚠ CAUTION

Do not turn the starter switch OFF while the machine is in motion.

1) Select the desired speed by the operation of speed shift switch.


LOW 	0 – 7.5 km/h (0 – 4.7 mile/h)
HIGH 	0 – 10.0 km/h (0 – 6.2 mile/h)

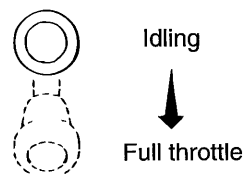


⚠ WARNING

- Do not operate the speed shift lever while driving the machine. Change the speed only when the machine is stationary.
- On a steep slope, run the machine at low speed.

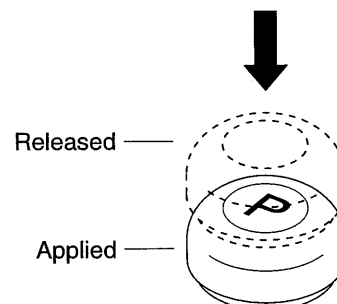
⚠ CAUTION

Increase the engine rpm when the speed change switch is set to HIGH SPEED ().



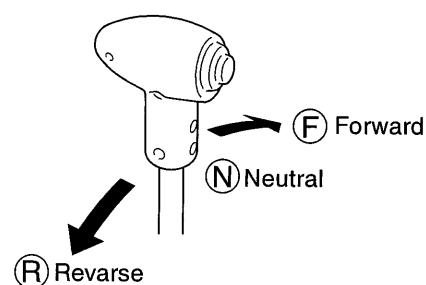
2) Speed up the engine by pulling the throttle lever towards you.

3) Press down the parking brake switch to release the brake. Check that indicator lamp (P) on the monitor display goes off.



- 4) 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. Increase the engine RPM when starting of the machine and when the engine speed drops drastically while driving.

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

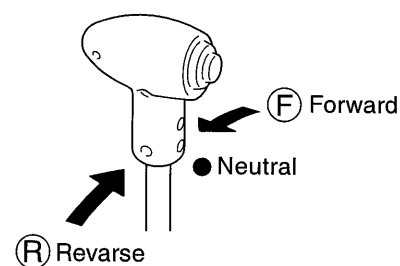
NOTE: If the engine speed drops frequently when the machine begins to move or while the machine is driving, increase the engine speed.

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 wheel to prevent unexpected moving down the grade.

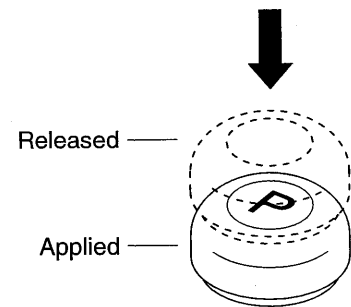
- 1) Bring the F-N-R lever to the neutral position (●), and the machine will come to a halt.

CAUTION
For normal braking, move the F-N-R lever back to the neutral position. In an emergency, depress the brake pedal.



2 OPERATION

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



2.3.6 Stopping the engine

- 1) Gradually cool down the engine at low idling for about 5 minutes.

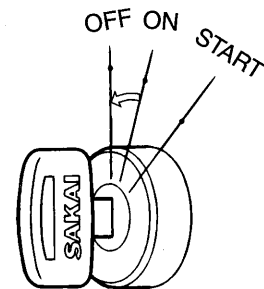
IMPORTANT

- 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

Do not turn the starter switch OFF while the machine is in motion.



- 3) Remove the starter key.

WARNING

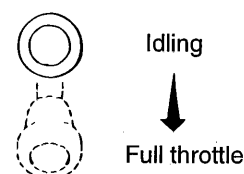
- When dismantling from the machine, apply the brake by pressing the parking switch button. If necessary to park on a grade, chock the wheels to prevent unexpected moving down the grade.
- Never fail to remove the starter key.


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. For transportation, obey traffic regulations.

2.4 Vibratory Operation


- 1) Run the engine at 2,100 min⁻¹ (rpm) or higher by operating the throttle lever.

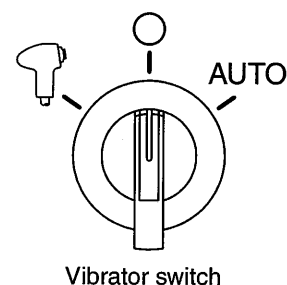


- 2) Select AUTO position or  position depending upon job requirements in the vibrator switch on the control panel.


 position: The vibrator switch on the F-N-R lever can be used to turn the vibrations ON or OFF. Pressing the switch will turn on the vibrations. Pressing the switch again will turn off the vibrations.

 position: Vibration is shut off.


AUTO position: Vibrator works only when the machine is travelling. Vibration is shut off if the F-N-R lever is brought back to neutral position ().

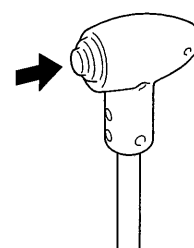


Vibrator switch

The indicator lamp  on the monitor display lights up only for vibration.

On-off control of the vibrator is also made by the pushbuttons provided on the left-hand and right-hand F-N-R levers. Press either of them to work the vibrator. Press again to shut off vibration.

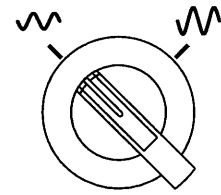
Ensure that the vibrator switch on the instrument panel is in the  position when operating the pushbutton switches.



Vibrator switch

2 OPERATION

The amplitude of vibration can be changed to low or high. Select the amplitude according to the condition of the work site.



Vibration selector switch

3) Proper travel speed for vibratory compaction is 2 – 6 km/h (1.2 mile/h – 3.7 mile/h), however, select speeds depending upon job requirements.

⚠ CAUTION

- Keep the vibrator shut off when the machine is not rolling.
- Stop vibration if the machine has encountered a running difficulty, for example, when it gets stuck in the mud.

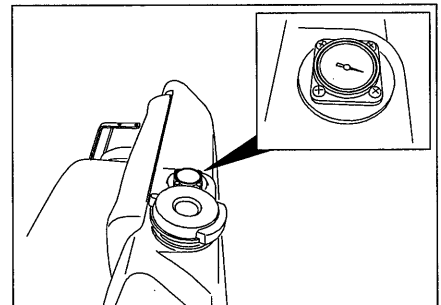
NOTE: Rev up the engine when there is a big drop in its rate of revolution during rolling compaction.

2.5 Sprinkler

1) Before sprinkling, check for the water level in the sprinkler tank with the sight gauge. Add water as necessary.

IMPORTANT

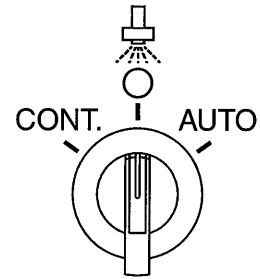
Use clean water wherever practicable.




- 2) The water sprinkler switch can be used to switch between continual sprinkling and sprinkling in coordination with the F-N-R lever.

Turn the switch to the CONT position to enable continual sprinkling.

Turn the switch to the AUTO position to enable sprinkling in coordination with the F-N-R lever.



The indicator lamp  on the monitor display will turn on only while water is being sprinkled.

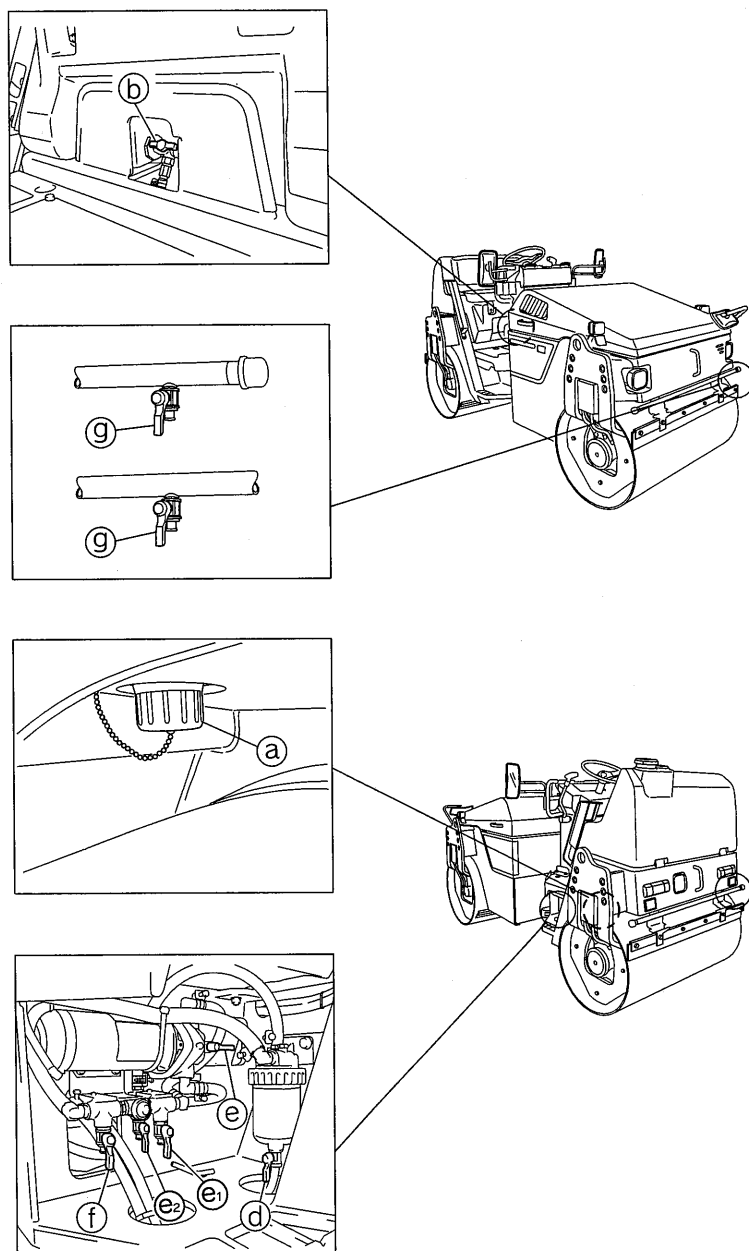
⚠ CAUTION

- Pay attention to the water level in the sprinkler tank. If the pump operates with the tank empty, this will cause a pump failure.
- To avoid freezing, fully drain the sprinkler tank, pump, sprinkler piping, and filter in cold weather.

IMPORTANT

When beginning rolling compaction of the asphalt, turn the water sprinkler switch to **CONT.** and switch it to **AUTO** when the surface to be rolled has become completely wet. Repeat the procedure when starting rolling compaction even after short breaks.

2 OPERATION



To drain water:

- 1) Turn sprinkler tank drain plug (a) counter-clockwise and completely drain the tank. (Be careful so as not to lose the packing after removal).
- 2) Fully close sprinkler tank selector valve (b), and then open sprinkler filter drain cock (d), sprinkler pump drain cock (e), and other drain cocks (e₁) (e₂) (f) to completely discharge water.
- 3) Open sprinkler pipe drain cock (g) at the front and rear to completely discharge water.
- 4) After confirming that the sprinkler tank is emptied completely, idle the sprinkler pump while all the drain cocks are open in order to completely discharge water from the pump.
- 5) Also drain the hoses, pump and sprinkler nozzles.

⚠ CAUTION

- Open the sprinkler tank cap when draining.
- Open the respective cocks when it is cold or after work.
- Open the sprinkler tank selector valve during sprinkling, and close all the cocks except ⑥ before turning on the sprinkler switch.
After confirming that water comes out, close cock ⑥.

2.6 Precautions for Work**2.6.1 Compaction operation****■ Do not operate the vibrator on hard location**

- Do not work the vibrator on a hard surface such as concrete pavement, as this can cause the machine to jump and give abnormal shock load. Damage to shock isolators will result.

■ 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.

NOTE: Increase the engine RPM when the engine speed drops drastically during rolling compaction.

2.6.2 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.

⚠ DANGER

Travel downhill with the F-N-R levers half tilted (half stroke) using caution not to allow the engine to exceed 2,100 min⁻¹ (rpm).

⚠ WARNING

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

2.6.3 On a slope

■ Working on a sidehill

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

2.7 Applicable Jobs

The machines 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

Layers to be compacted

- Surface course, Binder course
- Base course
- Subgrade
- Embankment
- Shoulder
- Sidewalk

2.8 Inspection and confirmation after work

Check the engine water temperature, condition of the hydraulic pressure of the engine, and the remaining quantity of fuel.

2.9 After Operation

Check for the coolant temperature, engine oil pressure and fuel level.

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) 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.
- 2) Park the machine on a hard and dry surface. If such a place is not available, cover the ground with hard plates.
- 3) Low temperatures, 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.
- 4) To avoid freezing, fully drain the sprinkler tank, pipes and filter in cold weather (refer to page 54).

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.

2.10 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.

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

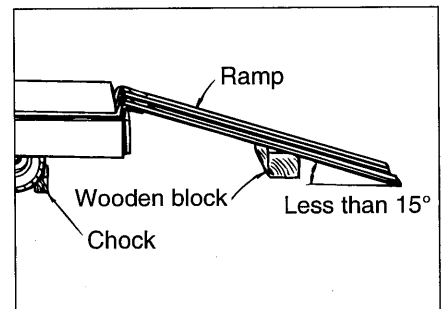
2 OPERATION

2.10.1 Use of a trailer equipped with a winch

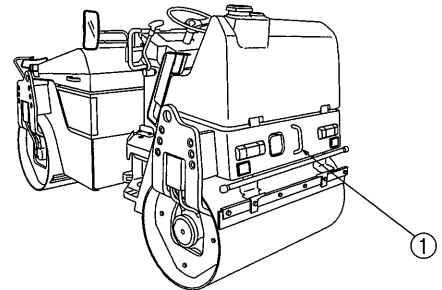
⚠ WARNING

- 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.
- Do not wash the area around the meter panel and the back of the instrument panel with pressure, otherwise the instrument and equipment may fail.

- 1) Engage the trailer brake and chock its wheels. Fix the ramps so that the machine and 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.

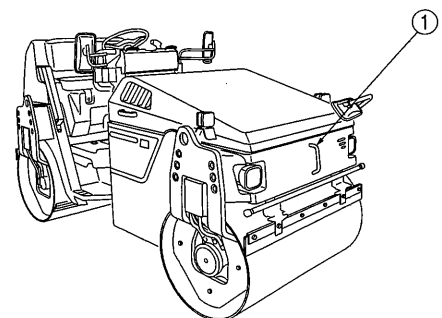


- 2) Decide the correct direction of run and make the machine run forward to the ramps.
- 3) Draw the wire rope from the trailer winch and put its hook on the hooking point ① of the roller.



- 4) Place the unloader valve to the UNLOAD position (See "Unloader valve" on page 37). There is an unload valve at the back of the right step.

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



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

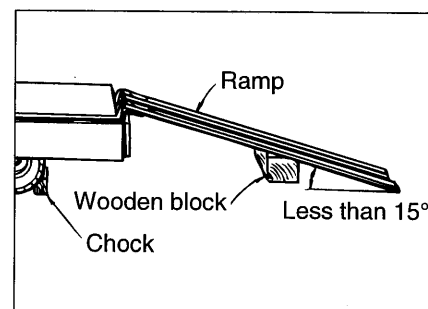
- 7) Locate the machine correctly on the trailer.

2.10.2 Self-propelling

1) Engage the trailer brake and chock its wheels. Fix the ramps so that the machine and 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.

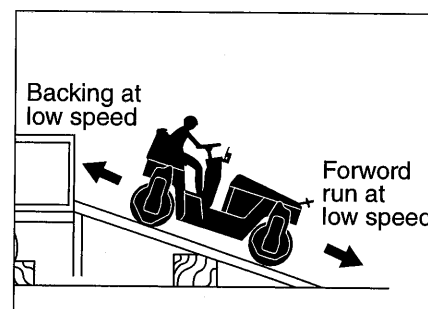


2) Decide the correct direction of run and conduct loading or unloading at low speed.

For loading, run backward at low speed.

For unloading, run forward at low speed.

3) Locate the machine correctly on the trailer.



2.11 After Loading the Machine

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

- 1) Press the parking switch button to apply the parking brake. Place chock 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.

2.12 Transportation

⚠ WARNING

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

For transportation, obey traffic regulations.

2 OPERATION

2.13 Operation in Cold Weather

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

2.13.1 Fuel oil and grease

Use fuel and oil with low viscosity (refer to page 94).

2.13.2 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.

Use soft water for coolant.

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

(gal.)

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 anti-freeze	3.3 L (0.9)	3.0 L (0.8)	2.6 L (0.7)	2.3 L (0.7)	2.0 L (0.6)
Amount of coolant	3.3 L (0.9)	3.6 L (1.0)	4.0 L (1.1)	4.3 L (1.1)	4.6 L (1.2)
Ratio	50%	45%	40%	35%	30%

Long-life coolant is used in our machine (non-amine type for general location: 35% in concentration; for cold places: 50%). Useful life of this antifreeze coolant is 2 years. Use non-amine type long-life coolant when changing coolant.

IMPORTANT

Use of machine with a rich coolant in summer time can overheat the engine depending job conditions.

Use a coolant of 30% solution in the hot season.

2.13.3 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 safety 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.
- 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.

2.14 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 97.
- 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.

2.15 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 water.
- 7) Place the F-N-R lever in the neutral position (●), turn the vibrator and sprinkler switches off and apply the parking brake.
- 8) Chock the machine.
- 9) Remove the starter switch key.

2.16 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.

2.17 When the Battery has Discharged

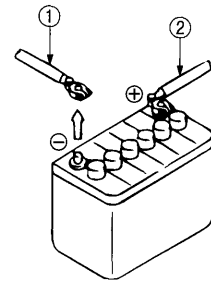
⚠ WARNING

- 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.

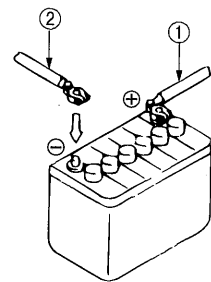
⚠ CAUTION

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

Disconnect with negative cable first



Connect with positive cable first

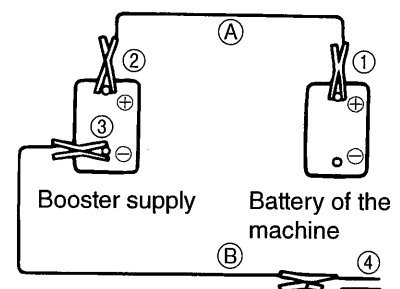


2.17.1 Connection and disconnection of booster cables

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

■ Connection of booster cables

- 1) Connect one end of the positive booster cable (A) to the positive \oplus terminal of the battery on the machine.
- 2) Connect the other end of the positive booster cable to the positive \oplus terminal of the booster supply.
- 3) Connect the negative booster cable (B) to the negative \ominus 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.



Connect to the engine block earth of the machine

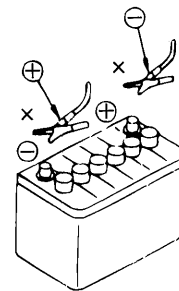
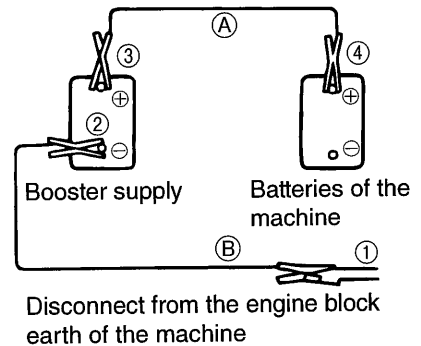
2 OPERATION

■ Disconnection of booster cables

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

⚠ WARNING

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

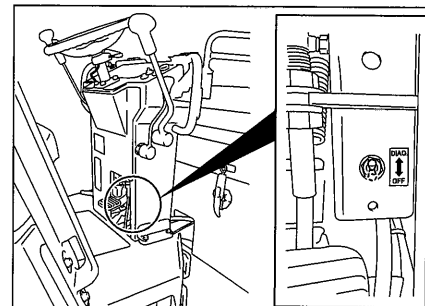


⚠ CAUTION

- 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 12V.

2.18 Engine Trouble Shooting

When an abnormality is detected in the engine or exhaust gas equipment, the machine has a function for displaying a self-diagnosis code. When the engine trouble diagnosis switch is pushed up (position shown in the diagram) and left in that position, the LCD part of the DPF meter on the combination meter will change to display a self-diagnosis code table.

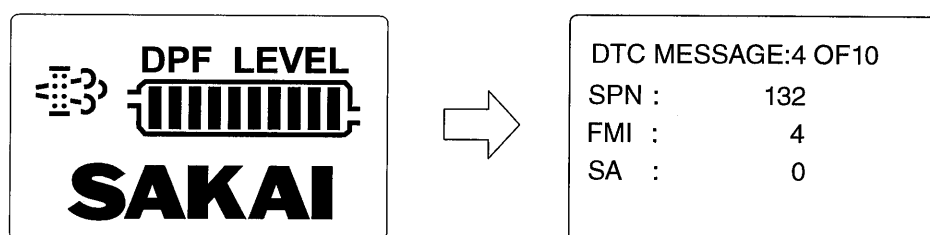


It will display the SPN showing a number to indicate the location and type of abnormality detected, the FMI to indicate its status, as well as the SA (Source Address) to indicate which unit, e.g., the ECU or ACU, the DTC was sent out from.

It will display a maximum of 10 DTCs from which alarms are currently being sent out.

The display will change every 5 seconds in the order, 1 of 10 → 2 of 10 → 3 of 10...

9 of 10 → 10 of 10 → 1 of 10.



If an alarm is sent out as the result of an engine trouble diagnosis, contact one of our sales offices or a factory designated by our company for advice.

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 fins 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 to 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.

3 PERIODICAL MAINTENANCE

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	2 years	
7 Control related parts	Cable parts	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

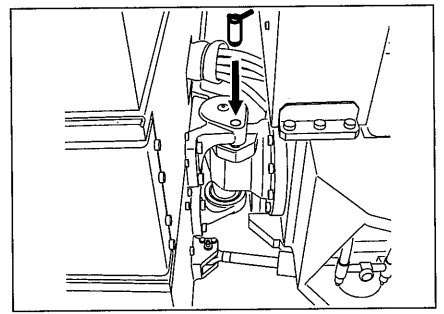
- **With a new machine, change the engine oil and change the engine oil filter elements after 50 hours of operation for the first time only (refer to page 75,76).**
- **When trouble occurs in the location indicated by the indicator lamp on the monitor display, sensor will work and corresponding lamp comes on. If this occurs, conduct necessary service regardless of the periodical service interval recommendation.**
- **If there are some trouble on the electric wiring, replace them with new one.**
- **Check the electric wiring at a regular interval not exceeding one month, when there is abnormality, replace it.**
 - 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 PERIODICAL MAINTENANCE

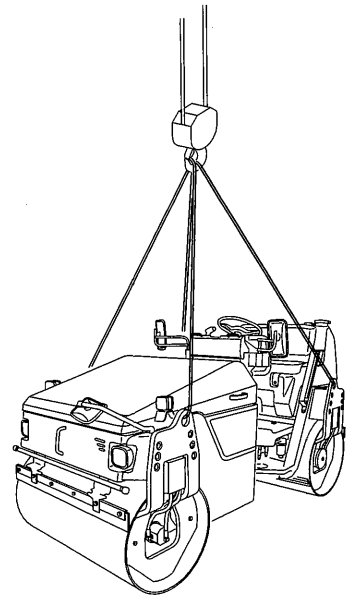
3.1.1 Lifting the machine on a hoist

⚠ WARNING

- When lifting, use sturdy wire ropes.
- Before lifting, lock articulation by means of locked bar located in the innermost section of the step at the left of the machine.

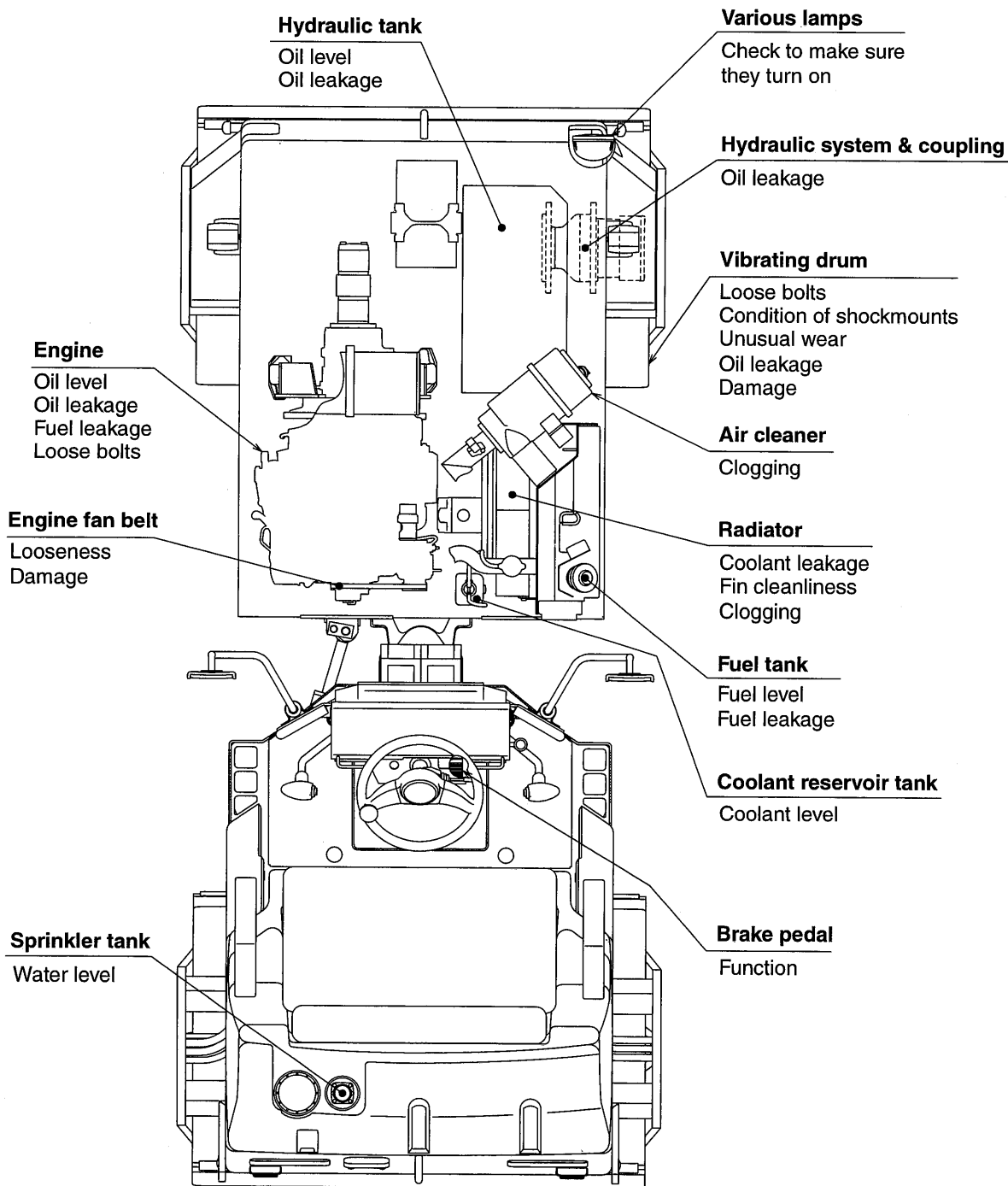


- 1) Put wire ropes securely on the hook and lifting points as shown.
- 2) If wire ropes make contact with other parts of the machine, put pieces of cloth or wooden blocks at the contact points. Carefully perform lifting.
- 3) When lifting, keep the machine properly balanced.
- 4) Mount it correctly at the specified position of the truck.

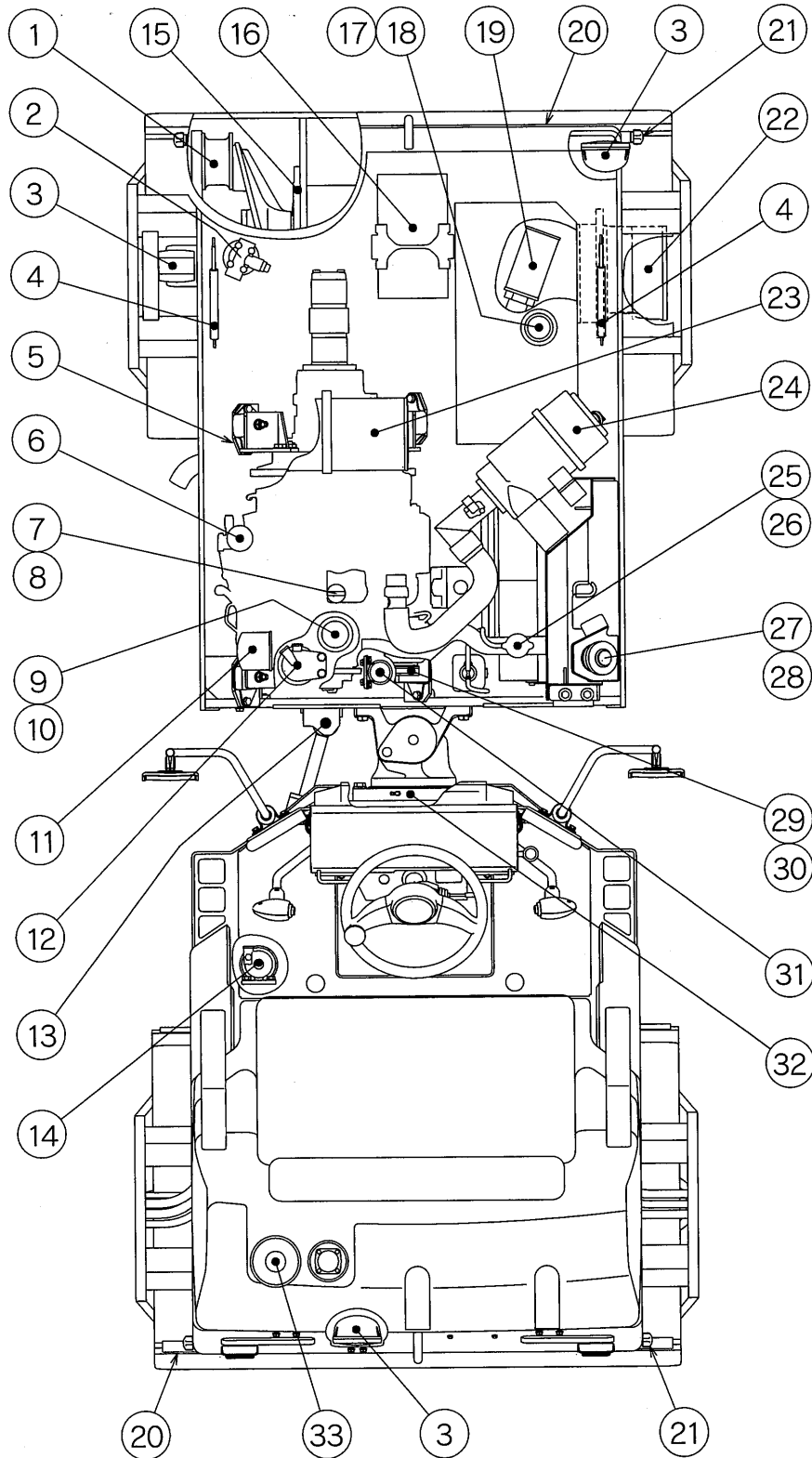


3.2 Walk-Around Checking

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



3 PERIODICAL MAINTENANCE

Interval	Ref. No.	Item	Service	Lubricant	Q'ty
Every 10 hours or daily	⑦	Engin oil pan	Check oil level,add as necessary	Engine oil	1
	⑯	Battery	Check hydrometer		1
	⑰	Hydraulic tank	Check oil level,add as necessary	Hydraulic oil	1
	⑳	Radiator	Check coolant level,add as necessary	Coolant	1
	㉓	Fuel tank	Check fuel level,add as necessary	Diesel oil	1
	㉕	Fan belt	Check looseness,ajust as necessary Checking for abnormal wear		1
Every 50 hours	⑨	Fuel sedimenter	Drain water		1
Every 100 hours	⑬	Cylinder pin	Apply grease	Grease	2
Every 400 hours	⑧	Engin oil pan	Change oil	Engine oil	1
	⑪	Engin oil filter	Replace element		1
	⑫	Fuel filter	Replace element		1
Every 500 hours	②	Line filter	Replace element		1
	⑩	Fuel sedimenter	Clean or replace element		1
	⑱	Hydraulic tank	Change oil,wash inside		1
	⑲	Suction filter	Clean or replace element		1
	㉒	Radiator	Clean fins		1
	㉔	Fuel tank	Wash inside		1
	⑳	Fan belt	Change belt		1
	㉑	Fuel pump	Operating inspections		1
Every 1000 hours	③	Tilt pin bearing	Apply grease	Grease	4
	⑤	Shockmounts (Engine mount)	Check cracks		4
	⑮	Vibrator	Change oil	Gear oil	2
Every 1500 hours	㉒	Wheel motor	Inspection and maintenance or replacement		2
	⑥	Engine oil separator	Replace element		1
Every 3000 hours	㉓	DPF	Clean inside,clean or replace filter element		1
As required	①	Shockmounts(Roll mount)	Check cracks		10
	③	Electric bulbs	Blowout check		1
	④	Hood shocks	Check injury or replacement		2
	⑭	Sprinkler filter	Clean element or replace		1
	㉒	Scrapper	Adjust or replace blade		4
	㉑	Sprinkler pipe,nozzle	Clean or replace		
	㉔	Air cleaner	Clean or replace element		
㉕	Sprinkler tank	Clean inside			

3 PERIODICAL MAINTENANCE

3.4 Maintenance Procedure

➔ For servicing the engine, see the separate engine manual.

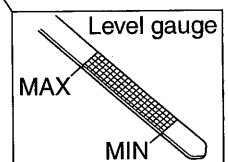
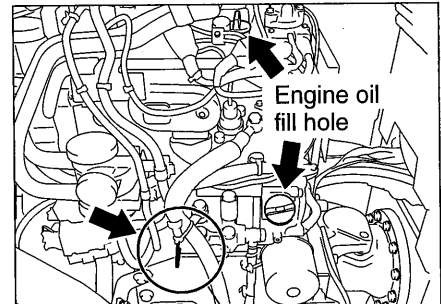
(1) Every 10 hours or daily

⑦ Engine oil pan

Shut down the engine and check the engine oil level. If it is not between MAX and MIN marks, add oil through the fill hole. Reinspect the level of oil after topping up the tank.

⚠ CAUTION

When feeding the engine oil, please use the designated engine oil by SAKAI (refer to page 97).



⑩ Battery

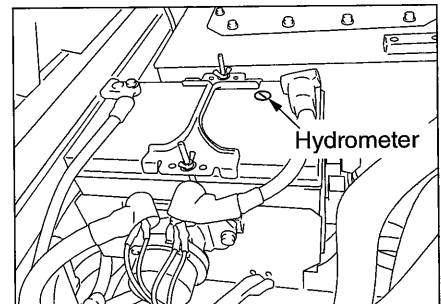
1) Check the condition of the battery and replace it as necessary.

Check the color of the hydrometer atop the battery to confirm 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.
- Use only batteries recommended by SAKAI (refer to page 94).

2) When the terminal is loose, tighten it sufficiently, and thinly apply vaseline or grease to prevent rusting.

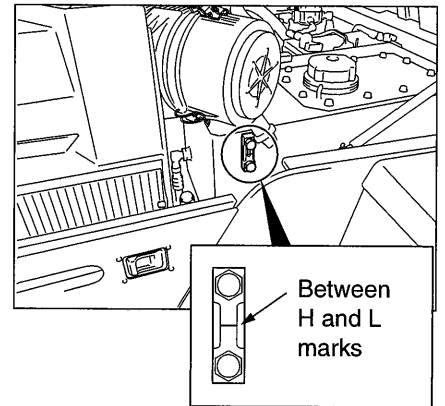
3) Be sure to tighten the battery holder if it is loose.

⑰ Hydraulic 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 oil from the fill port.

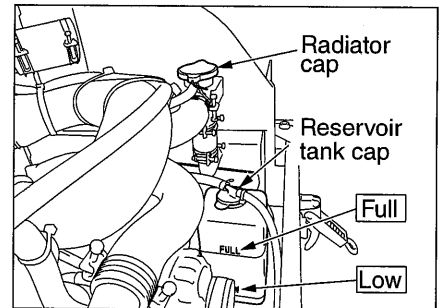
⚠ CAUTION

When feeding the hydraulic oil, please use the designated hydraulic oil by SAKAI (refer to page 97).



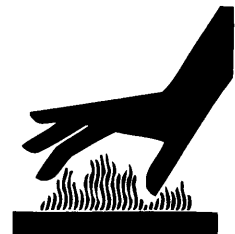
⑳ Radiator

With the cap removed, check to see if the coolant level is near the port. Add as necessary. Use soft water for coolant. Check to see if the coolant lever in the reserve tank is between **Low** and **Full** marks immediately after running the engine at idling for 2 to 3 minutes. If the level is lower than specified, add the coolant to the reserve tank. For the coolant, use soft water.



⚠ WARNING

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



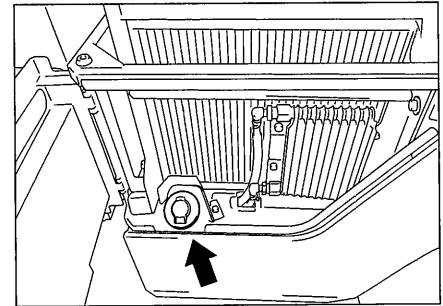
3 PERIODICAL MAINTENANCE

⑳ Fuel tank

Check the fuel level with the fuel gauge.
Add as necessary from fill hole.

To open the filler cap, insert the starter key.

NOTE: Never refuel with the strainer removed.

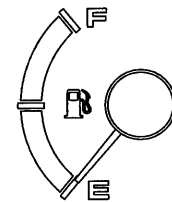


⚠ WARNING

Inspect the oil level by parking the machine on a flat, level ground.

⚠ CAUTION

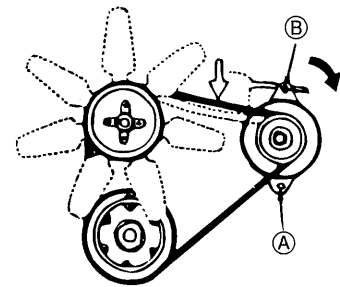
Be sure to use fuel recommended by SAKAI (refer to page 97).



Fuel gauge

㉑ Fan belt

- 1) Check the fan belt for wear and damage. Replace as necessary.
- 2) Check the tension. Depress the middle of belt with a push of about 9.8 N (10 kgf). A properly adjusted belt deflects about 7 – 9 mm.
- 3) To adjust, loosen alternator bracket bolt (A) and plate bolt (B), and slide the alternator.

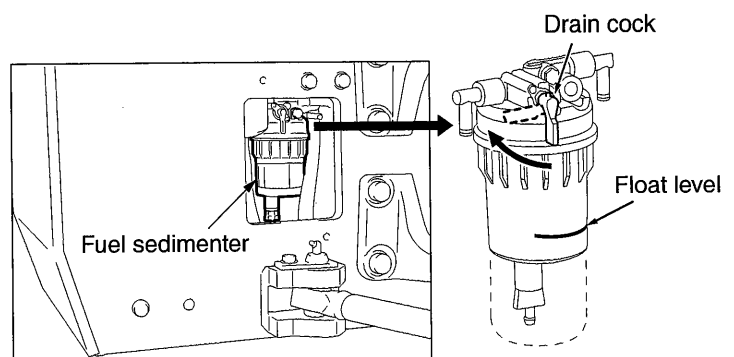


(2) Every 50 hours

㉒ Fuel sedimenter

Check the float level. If it comes up to the level mark, open the drain cock at the bottom and drain water.

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



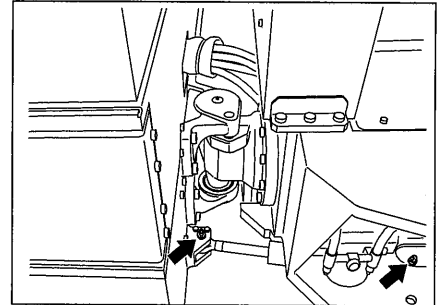
(3) Every 100 hours

⑬ Cylinder pin

Grease the fittings at two locations.

⚠ CAUTION

When lubricate the grease, please use the designated grease by SAKAI (refer to page 97).



(4) Every 400 hours

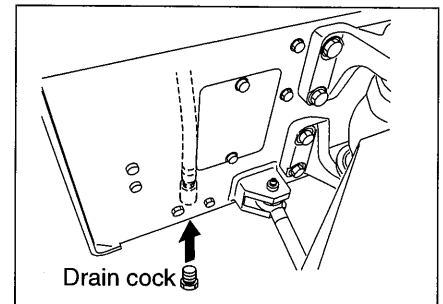
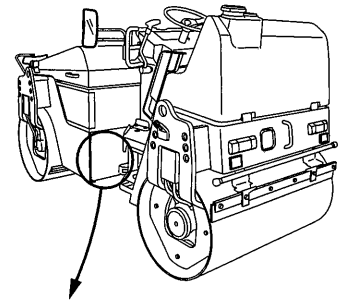
⑧ Engine oil pan

➔ 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.

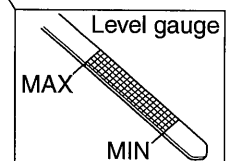
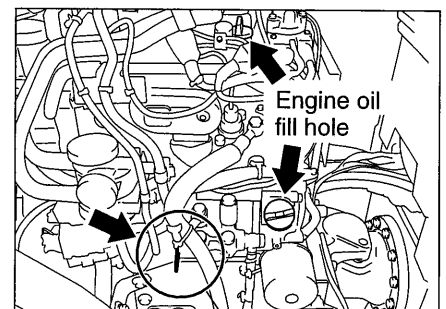


- 2) Refit the drain plug and fill the crankcase with the engine oil from the fill hole on the cylinder head cover.

NOTE: For a new machine, change oil at 50 operating hours for the initial time only.

⚠ CAUTION

When feeding the engine oil, please use the designated engine oil by SAKAI (refer to page 97).



- 3) After topping up with oil, check to make sure that the level is between the MAX and MIN marks on the oil level gauge.

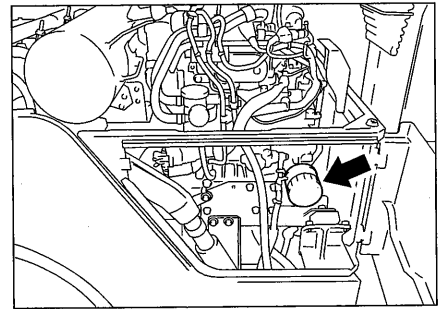
3 PERIODICAL MAINTENANCE

⑪ Engine oil filter

➔ See the separate engine manual.

Change the oil filter.

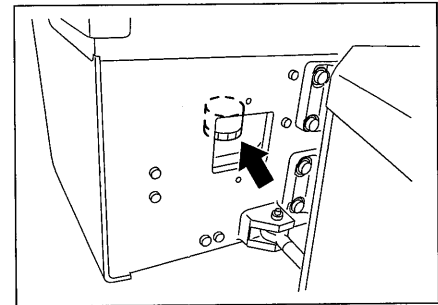
NOTE: For a new machine, change oil filter element at 50 operating hours for the initial time only.



⑫ Fuel filter

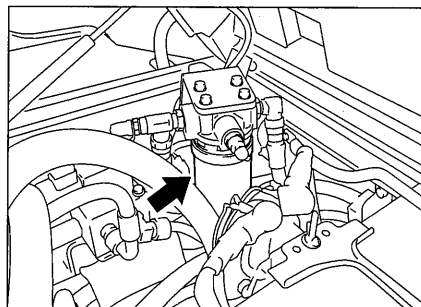
➔ See the separate engine manual.

Change the filter cartridge.

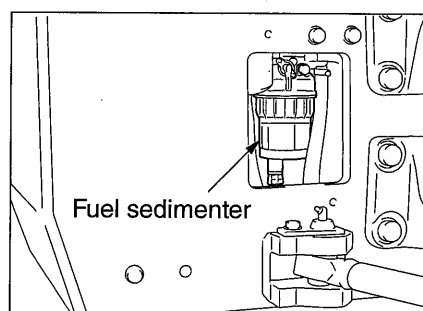


(5) Every 500 hours**② Line filter**

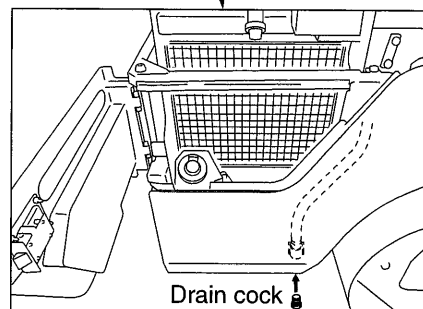
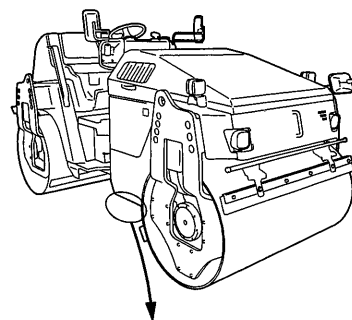
Remove the filter case by turning counter-clockwise as viewed from the bottom, and change the element.

**⑩ Fuel sedimenter**

Change the element.

**⑱ Hydraulic tank**

- 1) Remove the drain plug, and drain oil while it is warm.
- 2) Clean inside of the tank, and fill fresh oil to the specified level.
- 3) Start and run the engine at idling for 2 to 5 minutes. When the hydraulic oil has become free from air bubbles, stop the engine and recheck the oil level.

**⚠ WARNING**

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

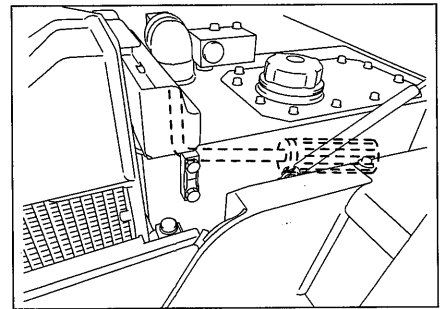
⚠ CAUTION

When feeding the hydraulic oil, please use the designated hydraulic oil by SAKAI (refer to page 97).

3 PERIODICAL MAINTENANCE

19 Suction filter

Take off the hydraulic tank cover. Take out and clean the strainer, change the strainer if necessary.

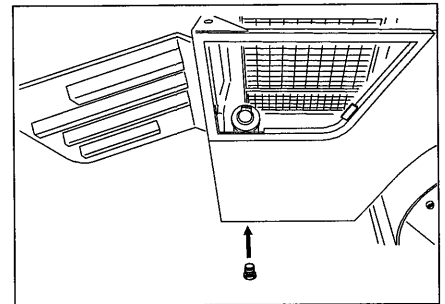


26 Radiator

Clean the cooling fins.

28 Fuel tank

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



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.

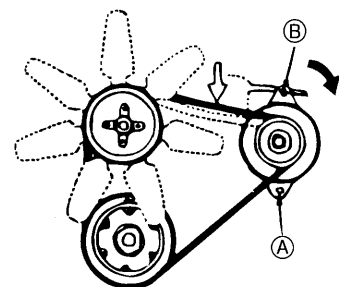
⚠ WARNING

- 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.



30 Fan belt

Change the fan belt.



③① Fuel pump

➔ See the separate engine manual.

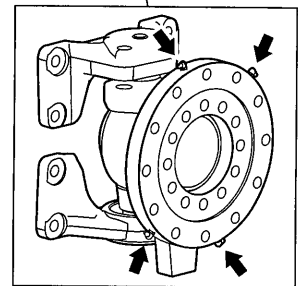
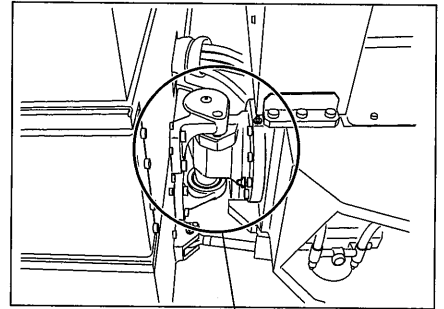
Check the operation of the pump.

③② Tilt pin bearing

Grease the fittings at four locations.

⚠ CAUTION

When lubricate the grease, please use the designated grease by SAKAI (refer to page 97).

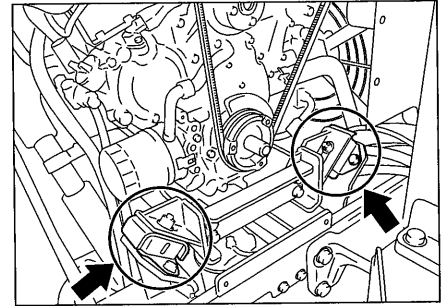


3 PERIODICAL MAINTENANCE

(6) Every 1,000 hours

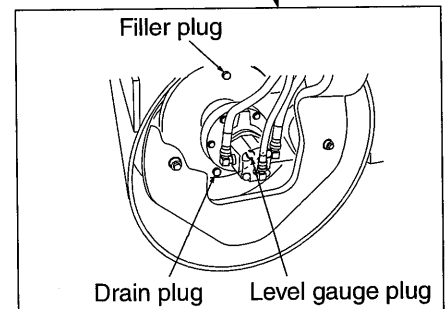
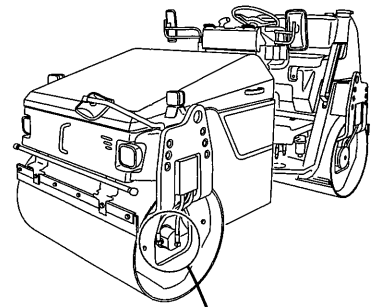
⑤ Shockmounts: Engine mount

Check the rubber blocks for cracks, and their mounting bolts for looseness.



⑮ Vibrator

- 1) Rotate the drum till the drain plug comes to bottom.
- 2) Remove drain plug, level gauge plug and filler plug.
- 3) Drain oil from vibrator.
- 4) Reinstall the drain plug after the completion of cleaning it.
- 5) Feed oil at filler port until oil flows out of level gauge hole.
- 6) Reinstall the level gauge plug as well as filler plug after cleaning them.



⚠ WARNING

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

⚠ CAUTION

When feeding the gear oil, please use the designated gear oil by SAKAI (refer to page 97).

22 Wheel motor

Replacement

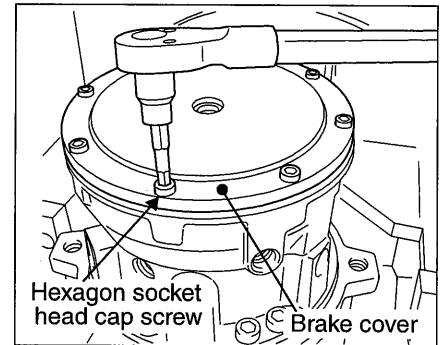
■ Disassembling order

1) Brake cover

Loosen eight hexagon socket head cap screws (D42) that are securing brake cover (D02).

Brake spring (D11) will lift brake cover (D02), so loosen the bolts uniformly.

	DCM0280	DCM0560
Bolt size	M6 x 20 L	M8 x 25 L
Width across flats	5 mm	6 mm

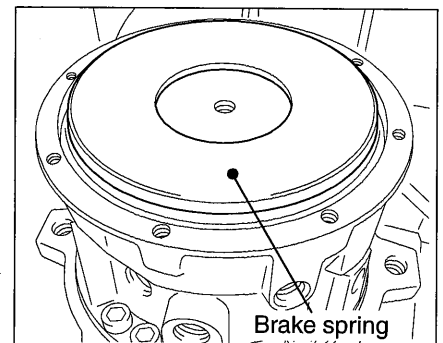


⚠ CAUTION

The last bolt is likely to break unless the bolts are loosened uniformly.

2) Brake spring

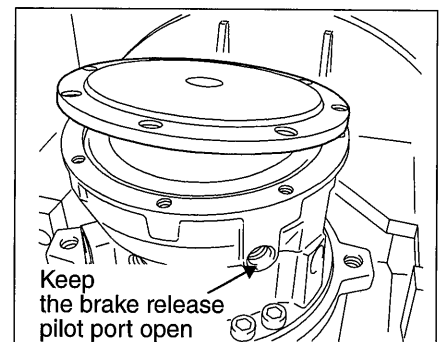
Remove brake cover (D02), and brake spring (D11) will appear. Remove it.



3) Preparation for removing brake piston

After removing O-ring (D53) and hexagon socket head plugs (D63) and (D64) with an O-ring at the forced brake release port, put brake cover (D02) on the brake housing.

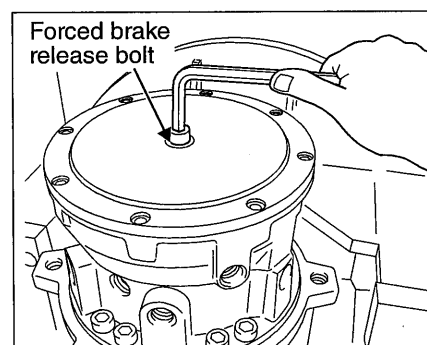
To prevent pressure retention during removal, keep the brake release pilot port open.



3 PERIODICAL MAINTENANCE

4) Brake piston

Tighten the hexagon socket head cap screw for forced brake release, and brake piston (D03) will be lifted.



< Bolt and washer for forced brake releasing >

	DCM0280	DCM0560
Bolt (pitch)	M10 x 25 L (1.5)	M12 x 30 L (1.75)
High-power washer	For M10	For M12
Outer dia.	19 – 23	22 – 27
Thickness	2.5 – 3.5	2.5 – 3.5

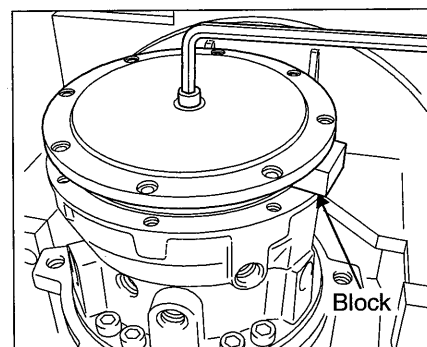
▲ CAUTION

For protection of the O-ring, be sure to use washer.

5) Removal of brake piston

After the bolt is tightened, loosen it once, put a block between the brake housing and brake cover (D02), and lift brake piston (D03).

Increase the thickness of the block until brake piston (D03) comes off, and repeat the same operation.

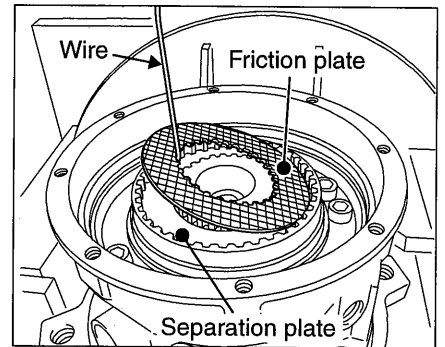


6) Brake plate

Take out brake shim (D14), separation plate (D13), and friction plate (D12). Use a wire with a curved tip to take them out easily.

Take out four to five separation plates (D13) and friction plates (D12), and brake shaft (D04) can be removed.

Take out all separation plates (D13) and friction plates (D12).



Part name	Qty
Brake shim	A / R
Separation plate	15
Friction plate	14

CAUTION

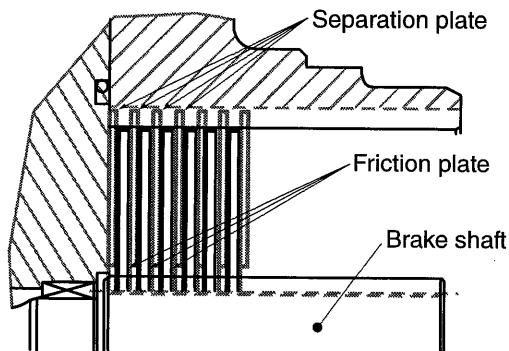
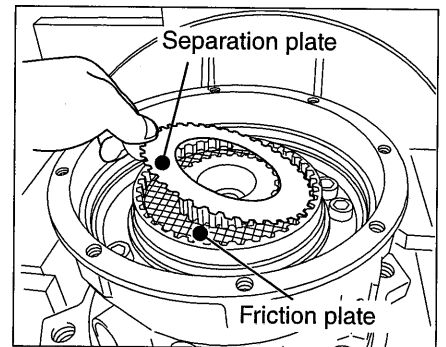
Exercise care so as not to lose the steel ball and brake shaft spring.

Assembling order

1) Brake plate

Set brake shaft (D04).

Set separation plate (D13) and friction palte (D12) alternately. The number of plates to set and the setting order should be correct.



CAUTION

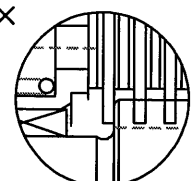
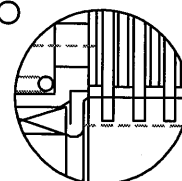
Set the brake shaft completely. When the brake plate is set while the brake shaft is not set completely, the friction plate may come off the spline.

<Normal state>

<Friction plate off the spline>

○

×

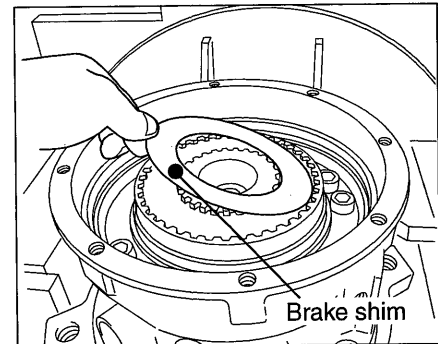


3 PERIODICAL MAINTENANCE

2) Brake shim

After setting separation plate (D13) and friction plate (D12), mount brake shim (D14).

Basically, shim (D14), which was used before disassembly, is used as it is. However, when the quantity of the stroke of brake piston (D03) is out of the specified range, add or remove shim (D14).



<Details of brake shim>

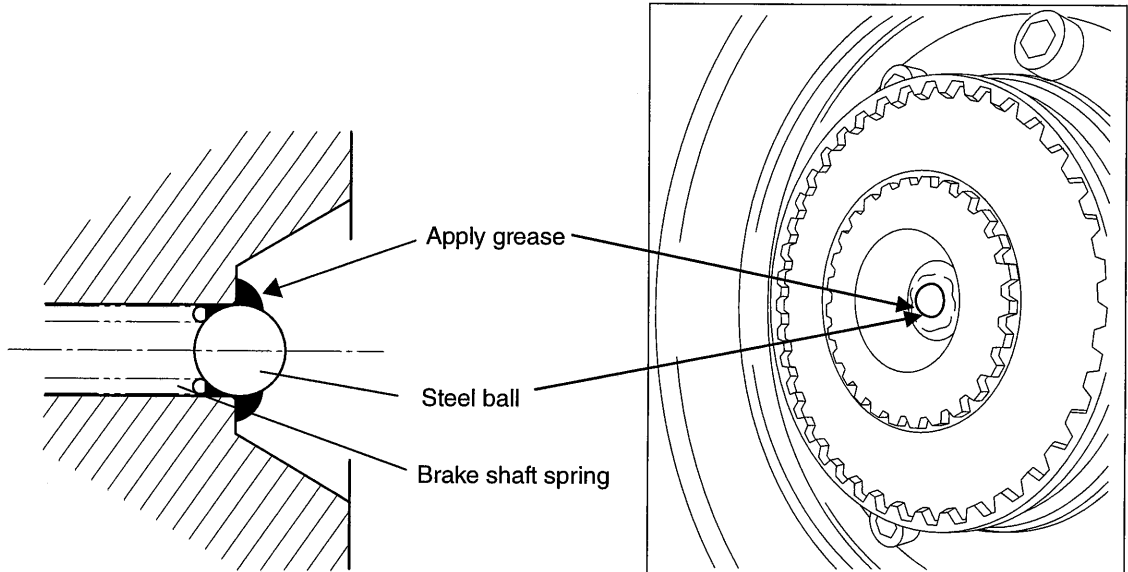
	DCM0280	DCM0560
DWG No.	1745162 - S	1745280 - S
Thickness of shim	0.8 x 1 sheet	0.8 x 1 sheet
	0.4 x 1 sheet	0.4 x 1 sheet
	0.2 x 1 sheet	0.2 x 1 sheet
	0.1 x 1 sheet	0.1 x 1 sheet

The “brake shim set” includes a package containing the shims shown in the table above provided for the purpose of servicing and maintenance.

3) Steel ball

Set brake shaft spring (D21) and steel ball (D22).

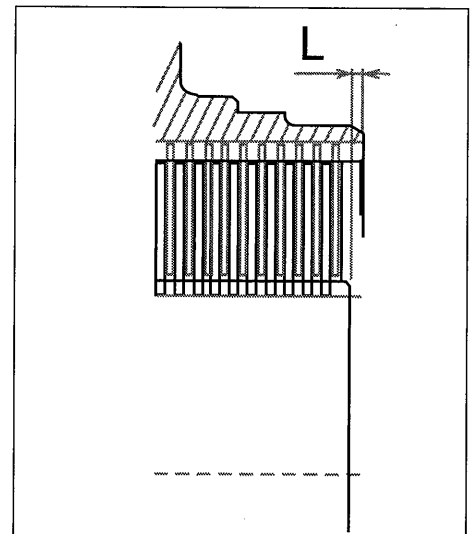
When the cam motor is to be placed horizontally during assembly (setting the brake from the side), apply a slightly hard grease to the circumference so that steel ball (D22) will not fall.



CAUTION

When the cam motor is to be placed horizontally during assembly, check that the brake shaft has been inserted completely. The condition is satisfactory when the distance between the spline edge of the brake housing and the brake shaft is within the range shown below.

	DCM0280	DCM0560
"L" in the figure at right	1.2 – 2.8 mm	1.3 – 2.9 mm

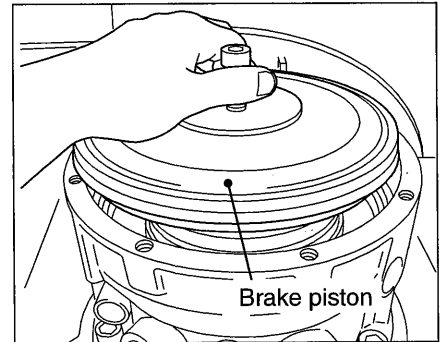


3 PERIODICAL MAINTENANCE

4) Brake piston

Set small O-ring (D51) in the brake housing and large O-ring (D52) in brake piston (D03).

Set brake piston (D03) in the brake housing. Slightly hammer the piston with a hammer to push it in completely.

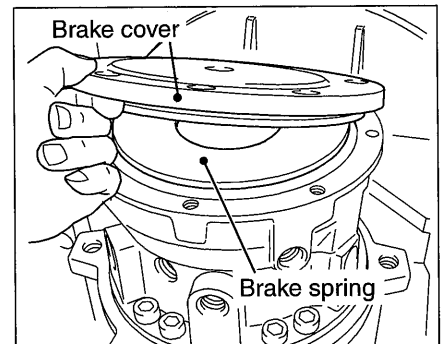


CAUTION

Apply mineral oil jelly to the O-ring to prevent scratching.

5) Brake spring

Put brake spring (D11) on brake piston (D03), and put brake cover (D02) in which O-ring (D53) is set.



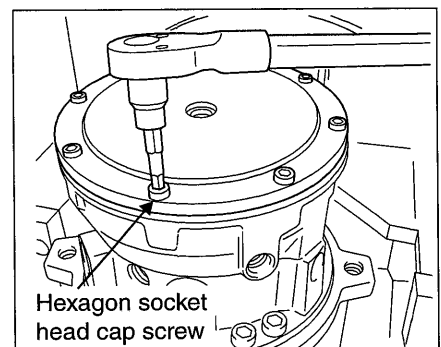
CAUTION

Apply mineral oil jelly to the O-ring to prevent scratching.

6) Brake cover

Tighten brake cover (D02) with hexagon socket head cap screw (D42).

Uniformly tighten the eight bolts.



CAUTION

The first bolt is likely to break unless the bolts are tightened uniformly.

<Tightening torque of hexagon socket head cap screw>

	DCM0280	DCM0560
Bolt size	M6 x 20 L	M8 x 25 L
Tightening torque	14 – 17 N·m	33 – 41 N·m

■ Inspection after replacement (measurement of the quantity of brake piston stroke)

The inspection specifications shown here are the values right after substitution of a new brake plate.

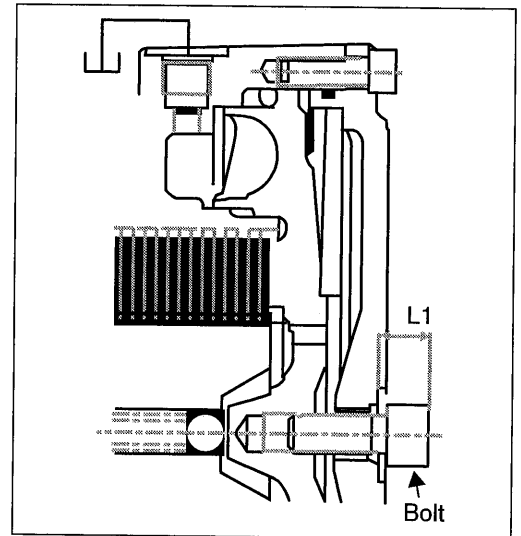
Remember that these specifications are different from the “Replacement standard” after use of brake, which is mentioned later.

1) Forced release bolt

- Attach the hexagon socket head cap screw for forced brake releasing. Allow the bolt to be out of contact with the seating surface without tightening the bolt completely.

	DCM0280	DCM0560
Bolt (pitch)	M10 x 25 L (1.5)	M12 x 30 L (1.75)

Leave the brake releasing pilot port open to the atmosphere (brake lock state). Measure the distance between the brake cover and the bolt head with a depth calipers <L1>.



2) Inspection of brake stroke

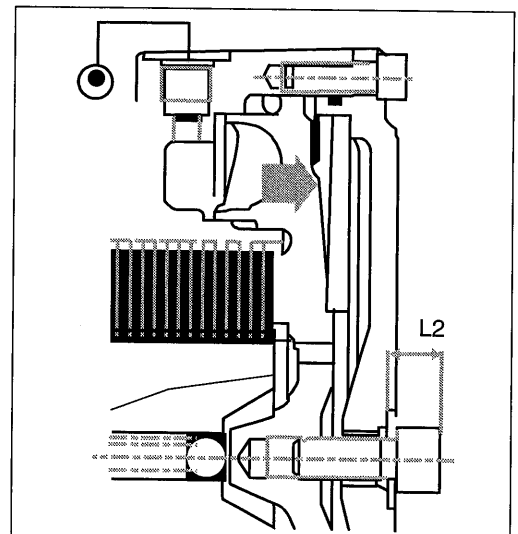
Measure the distance up to the bolt head with depth calipers when the complete release pressure is applied to the brake release pilot port <L2>.

Quantity of brake stroke = L2 - L1

★ Specified value

The condition is OK when the quantity of the brake stroke is within the range shown below. If it is out of the range, increase or decrease the number of shims.

	DCM0280 / 0560
Quantity of stroke when the brake plate is new	1.6 – 2.3



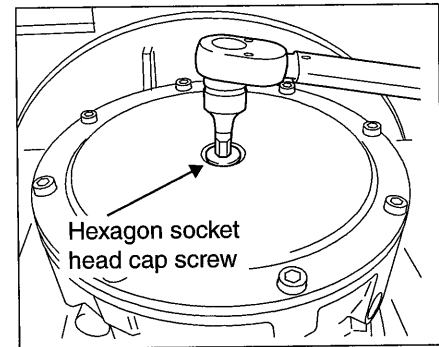
3 PERIODICAL MAINTENANCE

3) Installation of plug

Attach hexagon socket head cap screws (D63) and (D64) with an O-ring to the forced brake release port.

<Plug tightening torque of forced brake release port>

	DCM0280	DCM0560
Plug size	G1 / 4	G3 / 8
Width across flats	6 mm	8 mm
Tightening torque	27 – 31 N·m	46 – 52 N·m



The cam motor brake plate will cause slight initial shrinkage right after use because of the fit-in effect. Therefore, the initial quantity of stroke, when the cam motor brake is new, is set at a slightly higher value.

Replacement standard

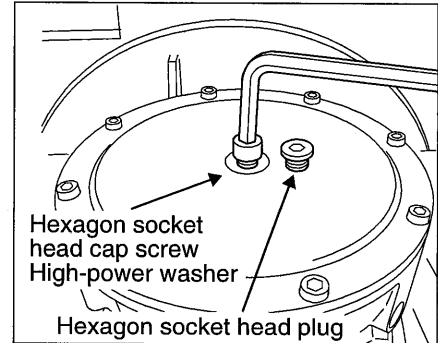
Replace all friction plates and separation plates in either of the following cases:

- 1) When the braking force is lower than the driving force of the hydraulic motor
(The hydraulic motor rotates when the HST driving force is applied, although the brake is activated).
- 2) When seizure of friction plates and separation plates occurs.
- 3) When the quantity of the brake piston stroke exceeds "3.5 mm" ... (refer to page 89).

Procedure for measuring the quantity of brake piston stroke (Replacement standard)

1) Removal of plug

Remove hexagon socket head cap screws (D63) and (D64) with an O-ring from the forced brake release port.

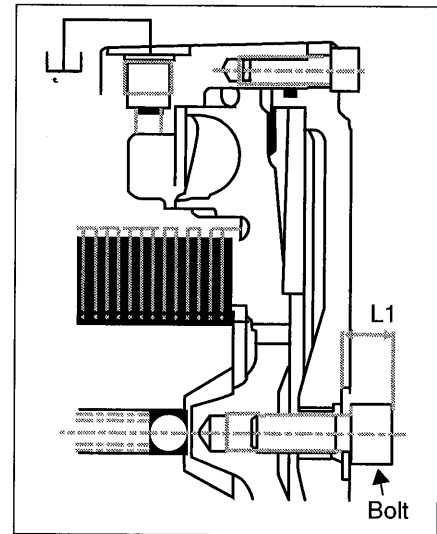


2) Forced release bolt

Attach the hexagon socket head cap screw for forced brake releasing. Allow the bolt to be out of contact with the seating surface without tightening the bolt completely.

	DCM0280	DCM0560
Bolt (pitch)	M10 x 25 L (1.5)	M12 x 30 L (1.75)

Leave the brake release pilot port open to the atmosphere (brake lock state). Measure the distance between the brake cover and the bolt head with depth calipers <L1>.



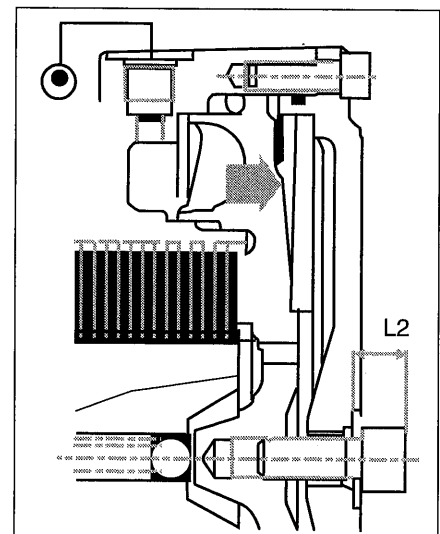
3) Inspection of brake stroke

Measure the distance up to the bolt head with depth calipers when the complete release pressure is applied to the brake release pilot port <L2>.

Quantity of brake stroke = L2 - L1

★ When the brake stroke exceeds the replacement standard shown below, replace all the friction plates and separation plates.

	DCM0280 / 0560
Standard quantity of brake stroke for replacement	3.5 mm



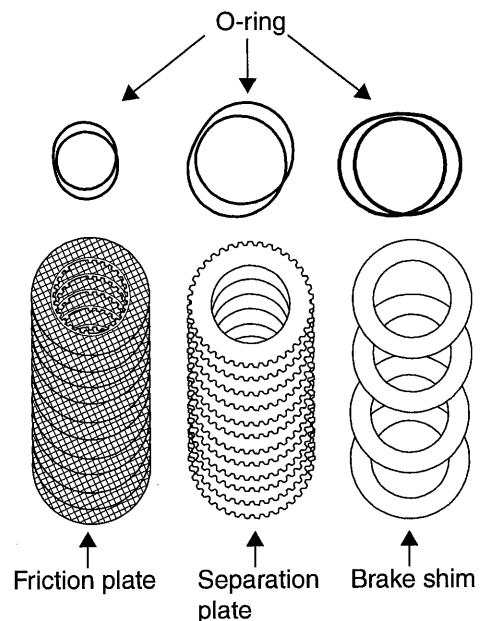
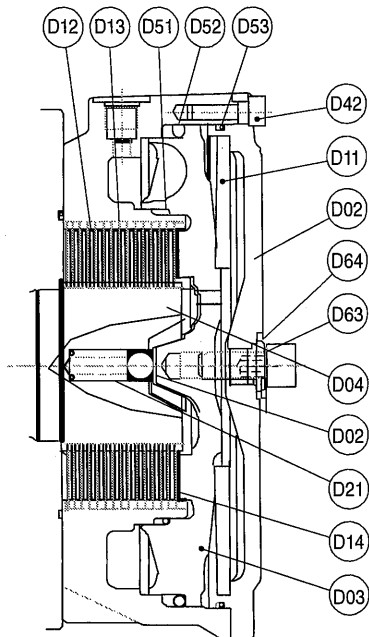
3 PERIODICAL MAINTENANCE

Replacement parts list

It is recommended to replace "friction plates" and "separation plates," as well as O-rings, with new ones.

No.	Parts name	Qty.	DWG No. (DAIKIN DWG. No./Standard nominal size)	
			DCM0280	DCM0560
D12	Friction plate	14	SP1988	SP2090
D13	Separation plate	15	1733585	1733704
D14	Brake shim set	1	1745162-S	1745280-S
D51	O-ring	1	KG1A105 / 1A G105	KG1A130 / 1A G130
D52	O-ring	1	KG1A155 / 1A G155	KG1A195 / 1A G195
D53	O-ring	1	KA1B164 / AS568-164	KA1B170 / AS568-170
The following are for reference.				
D02	(Brake cover)	(1)	(1723016-01)	(1714934-01)
D03	(Brake piston)	(1)	(1723017-01)	(1714935-01)
D04	(Brake shaft)	(1)	(1733583)	(1733702)
D11	(Brake spring)	(1)	(1733584)	(1733703)
D21	(Brake shaft spring)	(1)	(1745653)	(1745653)
D22	(Steel ball 12.7)	(1)	(HKW04)	(HKW04)
D42	(Hexagon socket head cap screw)	(8)	(AAM0602001 / M6 x 20,12.9T)	(AAM0802501 / M8 x 25,12.9T)
D63	(Hexagon socket head plug)	(1)	(HP11020-2)	(HP11020-3)
D64	(O-ring)	(1)	(KP1B011 / 1B-P11)	(KP1B014 / 1B-P14)

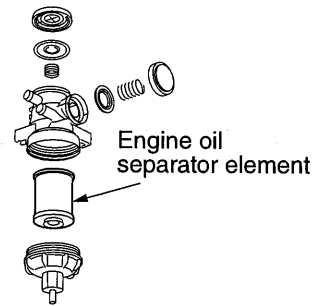
NOTE: The parenthesized parts shown in the table are for reference, and their replacement is unnecessary.



(7) Every 1,500 hours

⑥ Engine oil separator

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



(8) Every 3,000 hours

⑳ DPF

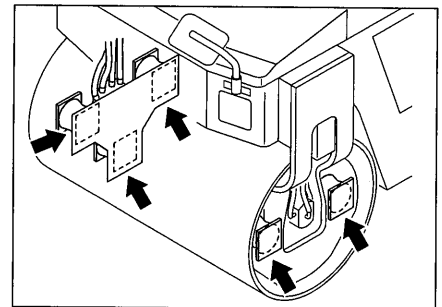
Ash accumulates in the filter when a DPF is used for a long time. The accumulation of too much ash will lower the performance of the DPF.

Contact one of our sales offices for advice on how to clean the DPF.

(9) As required

① Shockmounts: Roll mount

Check the rubber blocks for cracks, and their mounting bolts for looseness.



③ Electric bulbs

Make sure that all the electric bulbs (indicator and warning lamps inside the monitor display, turn signal indicator lamps, headlamps, Flood lamps and rear combination lamps) light up or blink by operating switches on the operation panel. If they do not light up, replace them with new ones.

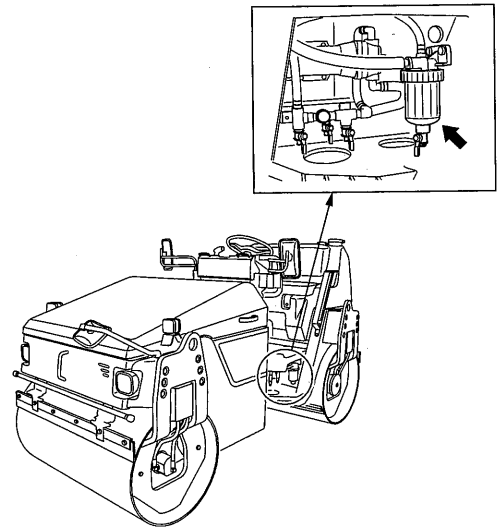
3 PERIODICAL MAINTENANCE

④ Hood shocks

Lift the hood up and check that the hood is retained up by gas dampers of the hood shocks. If the hood does not stay up, replace the hood shocks with new ones.

⑭ Sprinkler filter

Take off the filter case by turning counter-clockwise as viewed from the bottom. Clean the element. Change the element if necessary.



⑳ Scraper

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

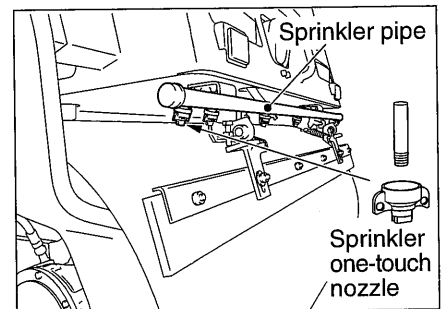
▲ WARNING

Be careful not to pinch your fingers between the roll and blade.

See page 43 for adjustment.

㉑ Sprinkler pipe, nozzle

- 1) Clean inside of the sprinkler pipe with the pipe cocks open and the water sprinkler operated.
- 2) Take off the one-touch removal nozzles from the sprinkler pipe. Take out nozzle filters.
- 3) Clean the filters. Use a needle or the like to clean nozzle hole. Refit the filters to the nozzles.

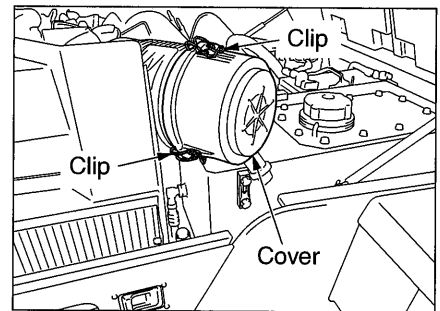


24 Air cleaner

- 1) Unclip and remove the cover, and pull out the element.
- 2) Blow compressed air from inside of the element to clean.

WARNING

Exercise caution not to get a speck of dust in your eye.



- 3) Check the element for damage, and replace the element when damage is found.
- 4) After washing, refit the element and cover. Fix the cover with the clip.

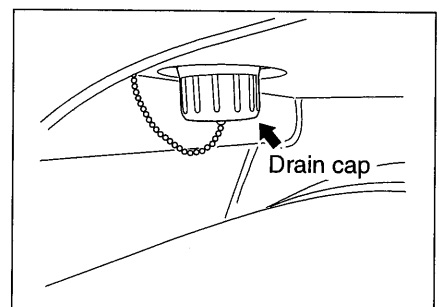
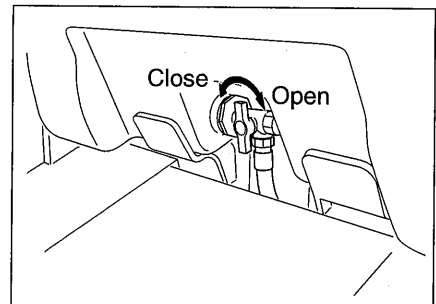
NOTE: In normal use, change the element once in every six cleanings.

33 Sprinkler tank

Close the selector valve located under the driver's seat by turning 90 degrees counter-clockwise.

Open the drain cap on the lower right of the driver's station. Drain the sediment from the tank with water fed from the fill hole.

When draining is complete, close the drain cap. Open the switchover valve by turning 90 degrees clockwise.



NOTE: Close the selector valve when splinkling operation is complete, water is drained and the machine is stored for long.

3 PERIODICAL MAINTENANCE

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.

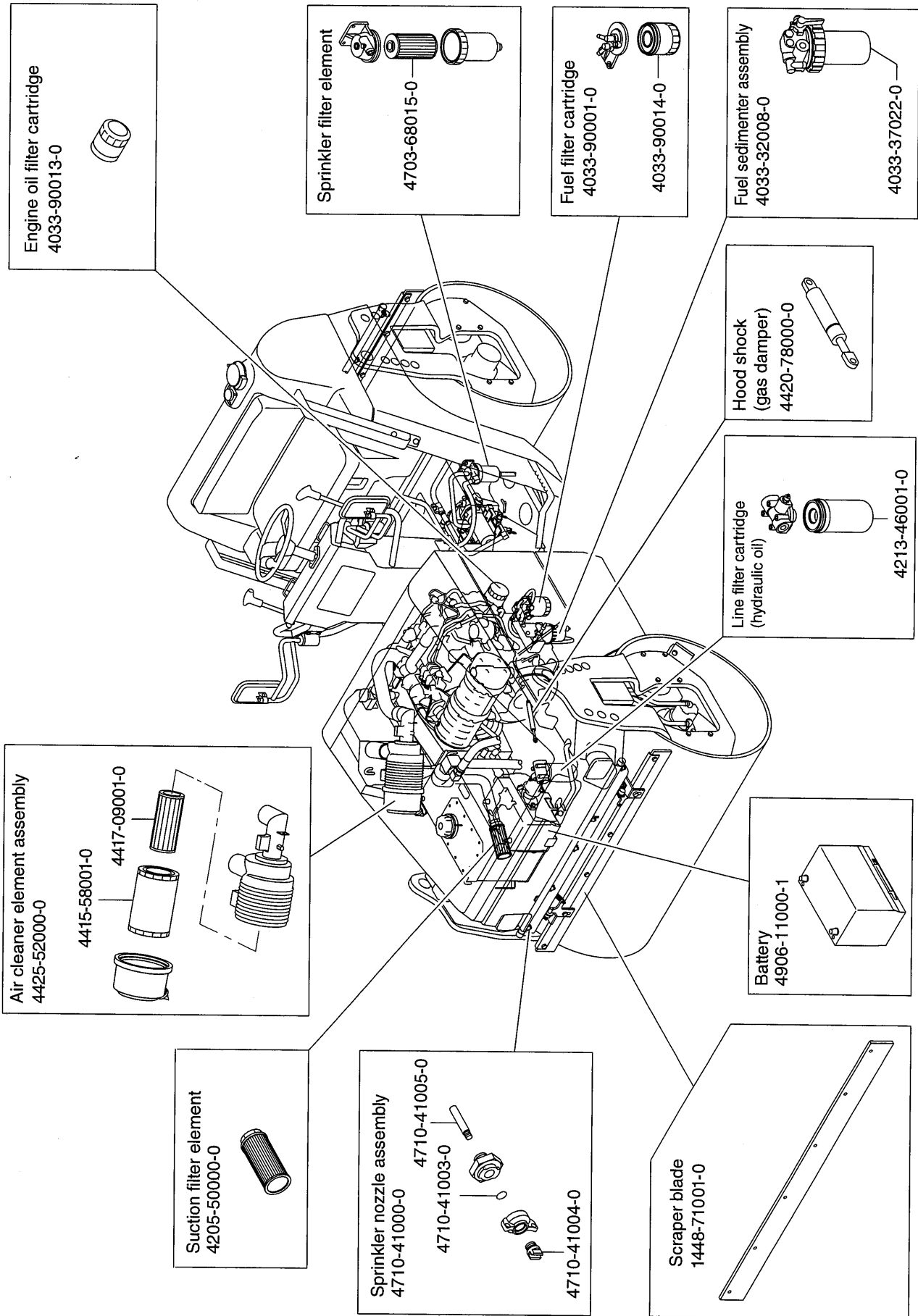
Use genuine SAKAI parts as replacement parts.

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.

Consumable Part	Part No.	Interval		Remark
		Annual replacement (year)	Replacement per operation (hours)	
Engine oil filter cartridge	4033-90013-0		200	
Fuel filter assembly	4033-90001-0			
Fuel filter cartridge	4033-90014-0		450	
Fuel sedimenter assembly	4033-32008-0			
Element	4033-37022-0			
Air cleaner element assembly	4425-52000-0		As required	
Inner element	4417-09001-0		As required	
Outer element	4415-58001-0		As required	
Suction filter element (hydraulic oil)	4205-50000-0		500	
Line filter cartridge (hydraulic oil)	4213-46001-0		500	
Sprinkler filter element	4703-68015-0		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	
Scraper blade (front wheel)	1448-71001-0		As required	
Scraper blade (rear wheel)	1448-71001-0		As required	
Hood shock (gas damper)	4420-78000-0	2		
Battery	4906-11000-1		As required	95D31R

3 PERIODICAL MAINTENANCE



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 replacing 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.)	
		SW504	SW504 WIDE DRUM
Fuel tank	Diesel oil	50 (13.2)	←
Engine oil pan	Engine oil	7.0 (1.8)	←
Hydraulic tank	Hydraulic oil	43 (11.4)	←
Radiator	Coolant	6.6 (1.7)	←
Sprinkler tank	Water	310 (81.9)	←
Liquid tank	Liquid	—	—
Vibrator case	Gear oil	6.0 x 2 (1.6 x 2)	←

(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 GL 5	SAE 75W-90	SAE 75W-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	Ambient temp -15 – -10°C		Ambient temp -10 – 55°C		
	*1 Diesel fuel ASTM · D975 NO.1-D S15 or S500		*2 Diesel fuel ASTM · D975 NO.2-D S15 or S500		

*1 For EPA regulation : Diesel fuel ASTM · D975 NO.1-D S15 ONLY

*2 For EPA regulation : Diesel fuel ASTM · D975 NO.2-D S15 ONLY

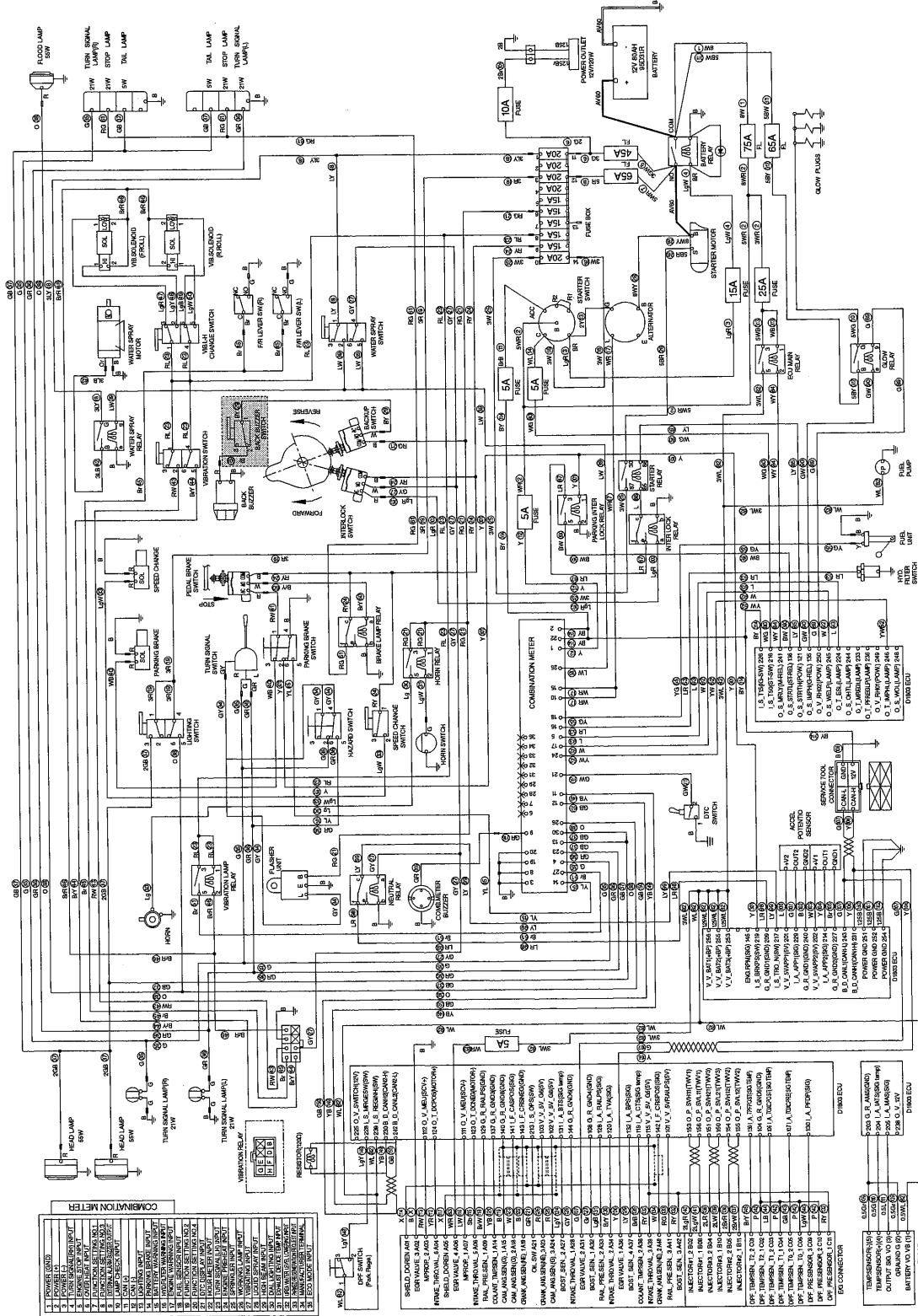
(4) Recommended lubricants

Lubricant Oil company	Engine oil API - CJ-4	Gear oil API GL 5	Hydraulic oil VG 46	Grease NLGI - 2
Chevron	DELO 400 LE	RPM UNIVERSAL GEAR LUBRICANTS	RANDO HDZ	MULTIFAK EP
BP	-	Energear HYPO-U	Bartran HV	Energrease LS - EP
CASTROL	Tection Extra	EPX GEAR OILS	Castrol Hyspin AWH	Castrol Spheerol EPL
Shell	Shell Rimula R4L	Shell Spirax S2 A 90	Shell Tellus S2 V	Shell Alvania Grease EP
ExxonMobil	Mobil Delvac 1 ESP	Mobilude HD	Mobil DTE 10 Excel	Mobilux EP

- CAUTION:**
- 1) Fill the fluid reservoirs with the filters installed.
 - 2) Use recommended fuels and lubricants only.

3 PERIODICAL MAINTENANCE

3.7 Electric Wiring Diagram



CAUTION: Size of wires not indicated by letters are 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	LB	Blue/Black stripe
BR	Black/Red stripe	Bw	Brown/White stripe	GW	Green/White stripe	LW	Blue/White stripe	R	Red	RY	Red/Yellow stripe	Y	Yellow	YW	Yellow/White stripe	WG	White/Green 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	BG	Black/Green stripe		

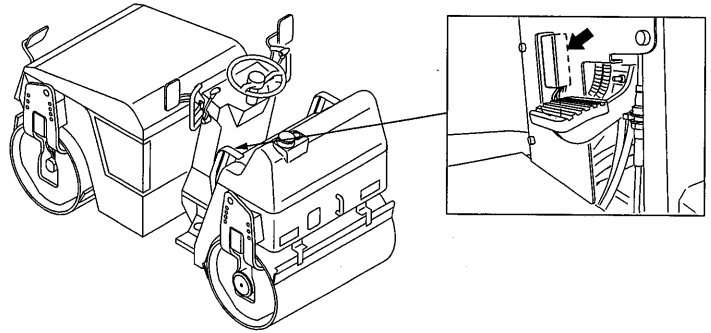
Color of wire

OPTION

Fuse box

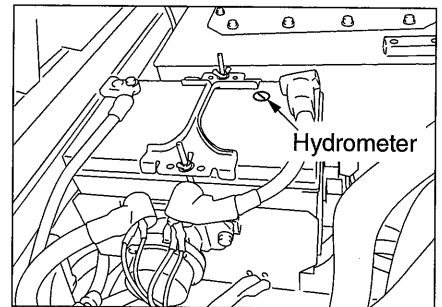
The fuse box houses five 15 A- and five 20 A- fuses lined up with spares fitted for 15 A- and 20 A- fuses. Use fuses of correct capacity (refer to page 38).

NOTE: When a fuse is burned, 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 times.
- ★ 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.



3 PERIODICAL MAINTENANCE

⚠ WARNING

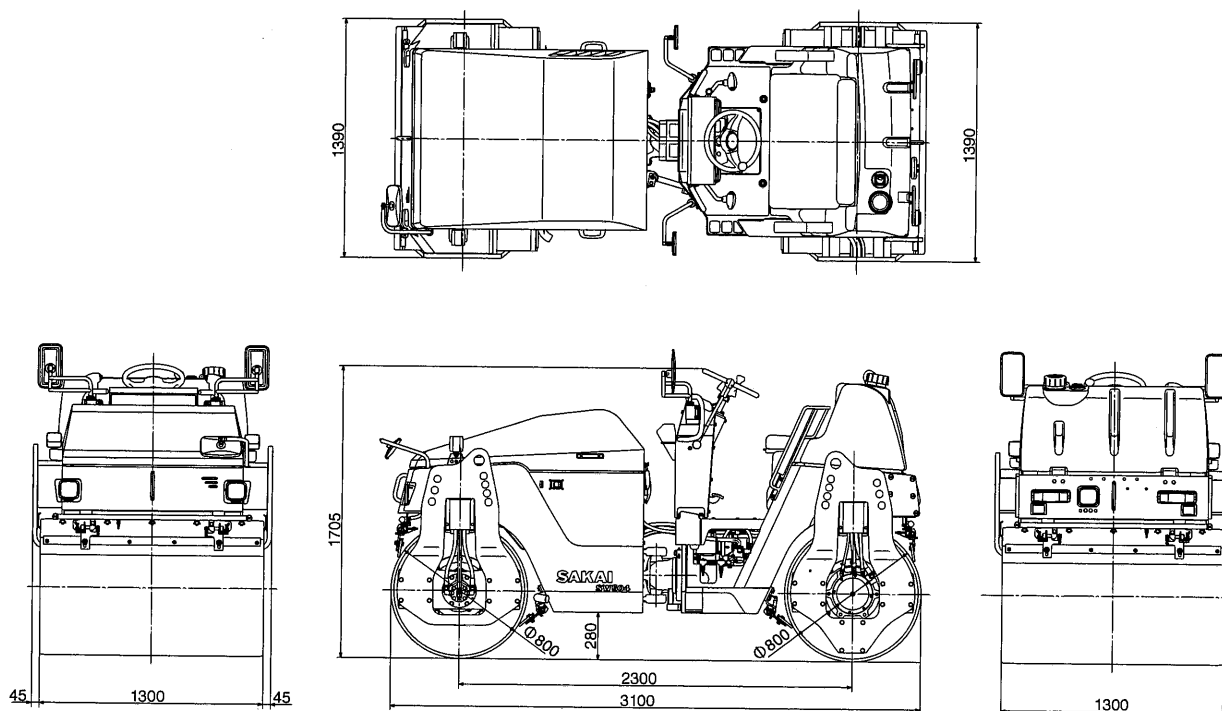
- The battery contains diluted sulfuric acid, which will dissolve clothes and skin. Should you get battery fluid on your clothes or skin, wash it off immediately with copious quantities of clean water.
- If you get it in your eyes, rinse them straight away with clean water and immediately seek the help of a doctor.
- If you accidentally ingest it, drink copious quantities of water and immediately seek the help of a doctor.
- Always wear safety 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.
- 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) SW504



Model	SW504	
Mass:		
Operating mass	3,990 kg (8,800 lbs)	
On front axle	1,990 kg (4,390 lbs)	
On rear axle	2,000 kg (4,410 lbs)	
Dimension:		
Overall length	3,100 mm (122")	
Overall width	1,390 mm (55")	
Overall height	1,705 mm (67")	
Wheelbase	2,300 mm (91")	
Wheel		
Front	Roll (dia. x width)	
	800 x 1,300 mm (31.5" x 51")	
Rear	Roll (dia. x width)	
	800 x 1,300 mm (31.5" x 51")	
Performance:		
Travel speed (forward/reverse)		
Low	0 – 7.5 km/h (0 – 4.7 mile/h)	
High	0 – 10.0 km/h (0 – 6.2 mile/h)	
Performance:		
Vibration system	Low	High
Frequency	55 Hz (3,300 vpm)	55 Hz (3,300 vpm)
Centrifugal force	26.5 kN (5,955 lbs)	34.3 kN (7,710 lbs)
Gradability	21 degrees	
Rolling width	1,300 mm (51")	
Minimum turning radius	4.3 m (169")	
Engine:		
Model	KUBOTA "D1803-CR-T-EF02" Diesel Engine	
Total displacement	1.826 liters (111 cu.in)	
Rated output	32.3 kW/2,400 min ⁻¹ (43.9 HP/2,400 rpm)	
Max. torque	148.3 N·m/1,500 min ⁻¹ (109 ft-lb/1,500 rpm)	
Tank capacity:		
Fuel tank	50 liters (13 gal)	
Hydraulic tank	43 liters (11.4 gal)	
Sprinkler tank	310 liters (82 gal)	

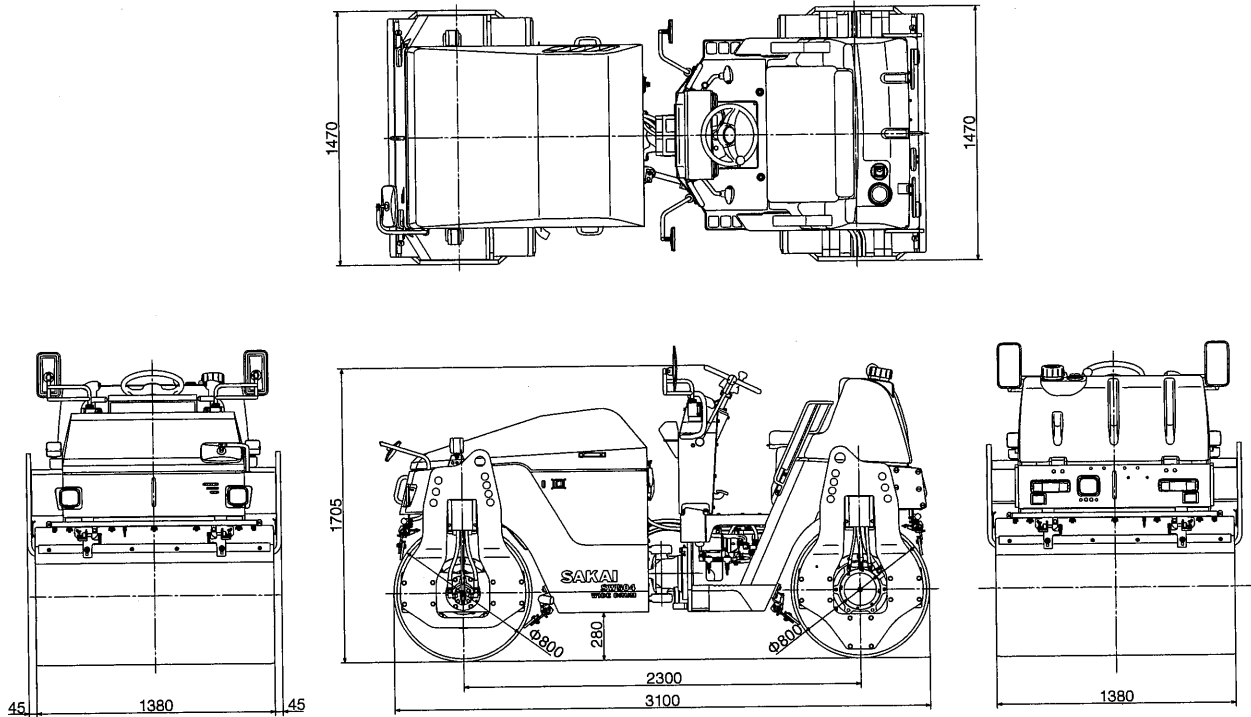
NOTE: 1) Gradability is the calculated value. It may vary with ground surface conditions.

2) According to European Standards (EN500-1, ISO 6165, etc.), the mass is defined as follows.

Operating mass: Fuel=50%, Water=50%, Operator=75kg

4 SPECIFICATIONS

(2) SW504 WIDE DRUM



Model	SW504 WIDE DRUM		Performance:	
Mass:			Low	High
Operating mass	4,130 kg (9,105 lbs)		Vibration system	
On front axle	2,060 kg (4,540 lbs)		Frequency	55 Hz (3,300 vpm) 55 Hz (3,300 vpm)
On rear axle	2,070 kg (4,565 lbs)		Centrifugal force	26.5 kN (5,955 lbs) 34.3 kN (7,710 lbs)
Dimension:			Gradability	20 degrees
Overall length	3,100 mm (122")		Rolling width	1,380 mm (54")
Overall width	1,470 mm (58")		Minimum turning radius	4.4 m (169")
Overall height	1,705 mm (67")		Engine:	
Wheelbase	2,300 mm (91")		Model	KUBOTA "D1803-CR-T-EF02" Diesel Engine
Wheel			Total displacement	1.826 liters (111 cu.in)
Front	Roll (dia. x width)		Rated output	32.3 kW/2,400 min ⁻¹ (43.9 HP/2,400 rpm)
Rear	Roll (dia. x width)		Max. torque	148.3 N·m/1,500 min ⁻¹ (109 ft·lb/1,500 rpm)
	800 x 1,380 mm (31.5" x 54")		Tank capacity:	
	800 x 1,380 mm (31.5" x 54")		Fuel tank	50 liters (13 gal)
Performance:			Hydraulic tank	43 liters (11.4 gal)
Travel speed			Sprinkler tank	310 liters (82 gal)
(forward/reverse)				
Low	0 – 7.0 km/h (0 – 4.3 mile/h)			
High	0 – 10.0 km/h (0 – 6.2 mile/h)			

NOTE: 1) Gradability is the calculated value. It may vary with ground surface conditions.

2) According to European Standards (EN500-1, ISO 6165, etc.), the mass is defined as follows.
Operating mass: Fuel=50%, Water=50%, Operator=75kg

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