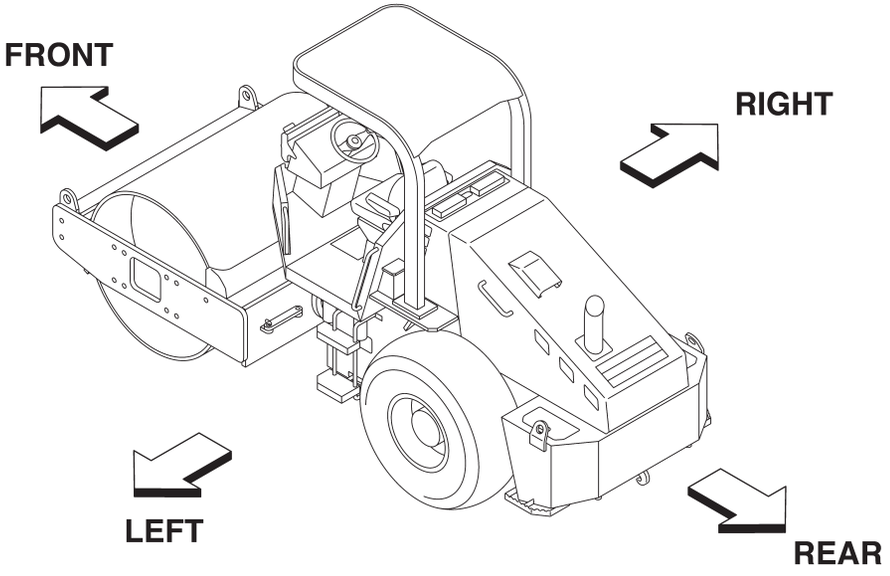
PREFACE

This operator's manual serves as a guide for the use of your Sakai SV412 Series 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.

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.



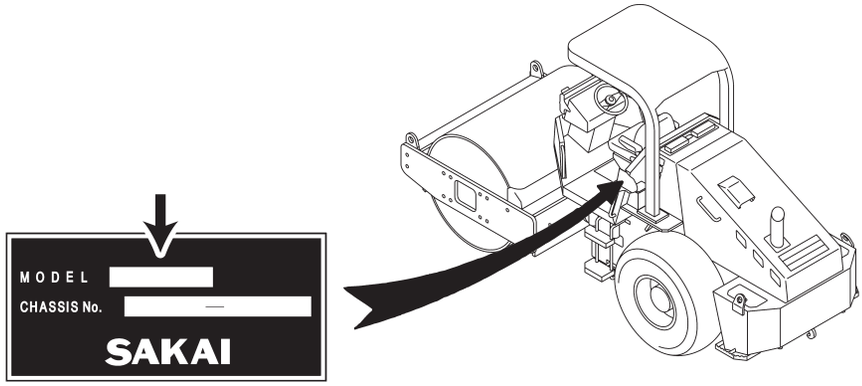
CONTENTS

MACHINE AND ENGINE IDENTIFICATION NUMBERS

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

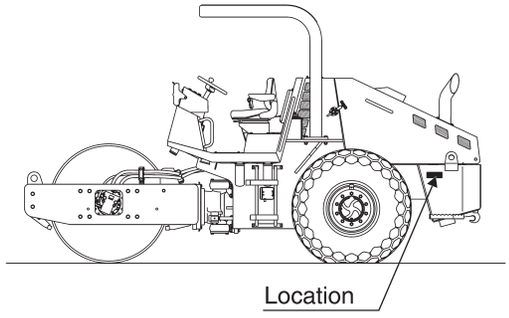
(1) Machine model

Indicated on the nameplate of the left side of the operator's seat.

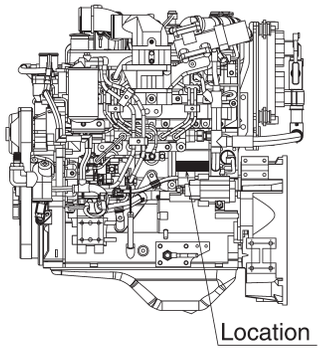


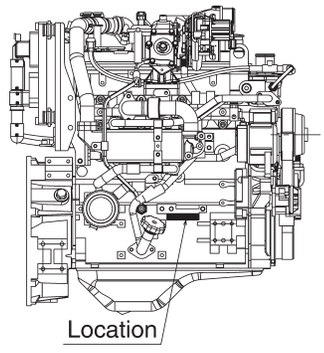
(2) Machine serial number

SV412D ⇨ 3SV50–○○○○○
SV412T ⇨ 3SV50–○○○○○
SV412TF ⇨ 3SV50–○○○○○
SV412TB ⇨ 3SV50–○○○○○
SV412FB ⇨ 3SV50–○○○○○



(3) Engine serial number





SAFETY NOTICES

For the safe use of your machine, correct handling and periodic 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 a manner, other than that 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 or 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.

☆ Non-approved modifications can pose safety-related problems. Before making any modifications, consult your distributor. For an injury or damage to the machine caused by non-approved modifications, Sakai accepts no responsibility.

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

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

1 BASIC SAFETY PRECAUTIONS

1.1 General Precautions

■ 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.

■ Understand the intended purposes of the roller

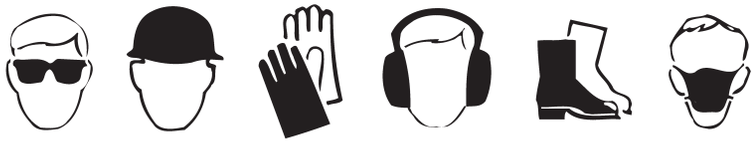
- This roller is developed and manufactured mainly for rolling compactions of road constructions and repairing. Working with vibrations under excessive rolling compactions or using for crushing operations may cause damages to this machine. Do not use for any other purposes than rolling compactions in civil engineering works.

■ Obey the worksite rules

- Follow the worksite rules such as posted warnings, precautions, and hazards. Follow work procedures established for your job site.

■ Wear protective clothing to suit the work

- Personal protective equipment such as, but not limited to, hearing protection, safely shoes and hard hat.
- Do not wear loose clothing and accessories that could get caught in the controls or protruded portions of the machine. Do not wear oily clothing.
- According to the type of jobs, wear safety goggles or mask.



■ Know the work area in advance

- Know the terrain, geology and conditions of the road surface at the worksite. Beware of weak spots in the base that could collapse, causing the machine to tip over.

■ Provide against an accident

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

■ Know 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.

■ 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.

■ 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, shut off the engine, allow the coolant to cool down, then using a rag to cover the radiator cap, slowly loosen the cap and relieve the pressure. (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 slowly to prevent the oil from gushing out.

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

■ Be careful with fire

- The fuel, oil, and anti-freeze will catch fire if open flames or ignition sources they are exposed to, or come in contact with. Fuel is especially flammable and explosive.
- 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.

■ 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.
- Do not jump on or off a machine, particularly when it is moving.

■ 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

- 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

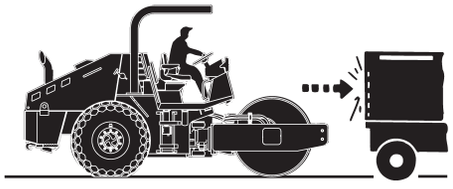
- Do not place parts, tools or unnecessary articles on the step, operator's station and floor board.
- Keep the step, floor board, controls and handholds free from muds, oil, ice or water, as they can cause slippage. Repair them if found to be damaged. Tighten loose bolts.
- Keep your boot soles free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

■ Know the stopping distance

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



■ Understand ROPS functions (with ROPS)

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

1.3 Before Starting the Engine

■ It is confirmed that hood is closed

• Please confirm hood has put it away in the confirmation before it gets on.

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

• Sit on the operator's seat. Adjust the seat so that your back will make contact with the seat back when the brake pedal is depressed to the full extent. Check to be sure that the brake pedal can be fully depressed without difficulty when you twist your body for reverse run.

■ 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.

■ Pay attention to ventilation

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

■ Do not stand close to the exhaust gas pipe opening

• Exhaust fumes are noxious 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. Pay particular attention to dead spaces. Before starting, sound the horn.

■ Warm up the Engine

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

■ Have a trial run

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

1.5 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. Radios are not permitted.

■ 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.

■ Seatbelt

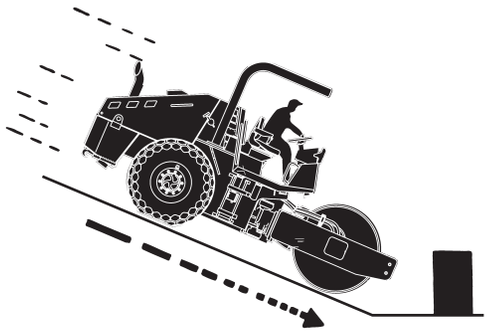
• Be sure to wear the seatbelt during operation.

■ 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.

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

- 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.



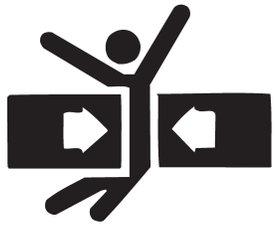
■ Refrain from inattentive driving

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

■ Repair as soon as possible if found to be defective

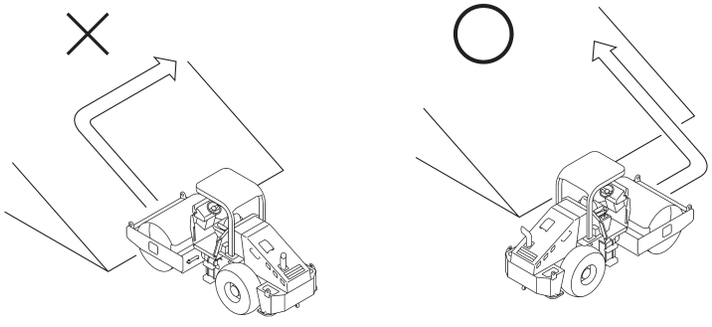
- If the machine is found to be faulty, stop the machine and repair it. Do not operate the machine until the problem is corrected. When any warning lamp indicates faulty operation, inspect the machine after moving it to the nearest safe location.

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

■ While making turns, do not run at a 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

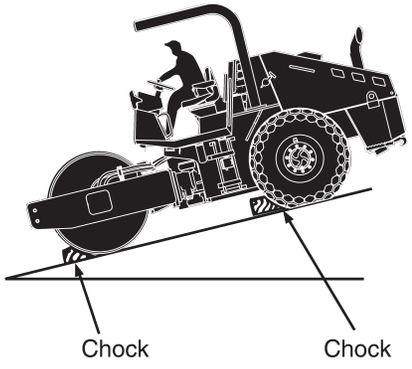
■ For the traveling on structures such as a bridge, make certain that they can support your machine. Before traveling on the structure, you must know the load capacity of the structure and the load weight of the machine you are operating to ensure safe travel across the structure

■ 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

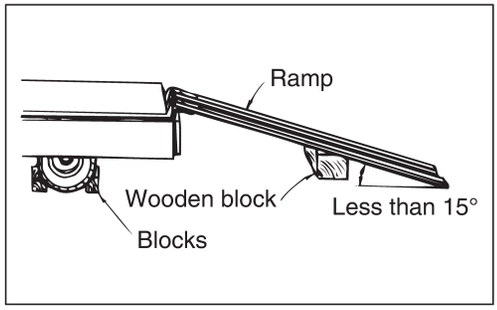


■ When parking

- Select level and hard ground. If necessary to park on a slope, block the front of the drums on the downside of the slope.
- When required to park on a public road, provide necessary delineators such as flags, barriers and illumination. However, be sure they do not obstruct traffic.
- When getting off the machine, stop the engine and remove the key from the ignition switch.



1.6 Loading and Unloading



- Loading and unloading can be very dangerous. Use extreme care.
- Select level and hard ground leaving a sufficient distance from the shoulder.
- 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, allow it to dismount from the ramps, correct the direction and try again.
- Do not use kinked, twisted or damaged cables for crane or winch operation. Use cables with ample strength.
- When loading is complete, secure 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 roller loaded.
- Know the maximum height clearance of the machine loaded on the transport trailer before hauling under bridges and other structures.

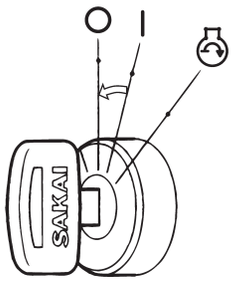
1.8 Handling the Battery

■ When handling the battery

- Battery electrolyte contains sulphuric acid. It will destroy clothing and skin. If it touches your clothing or skin, flush with large quantities of water.
- In case of eye contact, flush with clean water and seek 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.
- The battery generates flammable gases that can cause an explosion. Do not smoke close to the battery. Keep the battery away from flames, sparks and ignition sources.

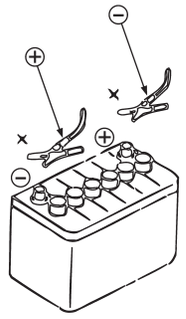
⚠ WARNING

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



- Inspect or handle the battery with the engine shut down and the starter key in the "○" position.
- Keep metallic items such as tools away from the battery terminals.
- Loose terminals can cause sparks leading to an explosion. Secure the terminals tightly.
- The battery shall be exclusively used for starting engine of this machine. Do not use the battery for any other purposes.

■ 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 and make a connection between the positive terminal and machine body. This can generate dangerous sparks.
- Do not connect the booster cable to wrong terminal. NEVER connect the positive terminal to the negative.
- 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

- To tow the machine, use cables with ample strength.
- Do not perform towing on a slope.
- Do not use twisted, kinked or damaged cables when towing.
- Keep everyone away from the space between the machine and the towing vehicle when connecting the two.
- Align the connection points of the disabled machine and the towing vehicle in a straight line when connecting the machines.

1.10 Before Servicing

■ Attach warning tags when servicing the machine

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

⚠ DANGER

Do not operate.

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

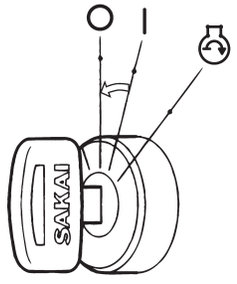
■ Use proper tools

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

■ Change safety-related parts at regular intervals

- Replace fuel hose and high pressure hydraulic 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 deteriorate over time.
  - ☆ Change any hose found to be abnormal even if it is before its recommended service interval.

■ Inspect or service your machine with the engine stopped



- If required to keep the engine running in such as when flushing the radiator, perform the work with two persons. One person should sit on the operator's seat ready to shut down the engine if necessary. 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 and oils

- Spilled fuel or oil will be slippery. Wipe up immediately. Keep the filler caps tight. Do not use fuel as a flushing oil. Handle fuel and oil in a well ventilated area.

■ Check the coolant level in the radiator

- To check the coolant level, shut down 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 burn-proof illuminations. Failure to use this type of illumination can result in an explosion.

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.

■ 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.

■ When repairing the electrical system

- For repairing the electrical system or for conducting welding, disconnect the negative cable from the battery to shut off the electricity.

■ 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 and hydraulic hoses. An oil or hydraulic fluid spill can cause a fire.

■ Be careful of high pressure hydraulic fluid

- Bear in mind that the working equipment hydraulic systems are under internal 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 any leakage by holding a hard board close to suspected leaks and wear goggles. If skin or eyes are penetrated by high pressure oil, get medical help immediately.

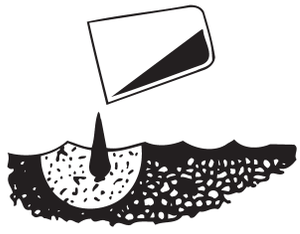
■ Be careful of hot parts

- 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

- Secure loose clothing and keep articles away that could get caught in moving parts.
- Do not let your body or tools make contact with the fan blades or belts. Moving fan belts and blades can cause serious injury or death.

■ 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.

■ Exercise extreme care when replacing and repairing tires

- Disassembly, repair and reassembly of tires require special facility and knowledge. Have them repaired at work shop specialized in handling tires.
- Improperly fitted rim can separate if the tire is inflated. When inflating tires, do not work in front of the rim. Use correct inflation pressure.
- When dismounting a tire, chock other tires for safety.
- When welding job is carried out near the tires, use extreme care, as this can cause an explosion of the tires.

1.12 Safety Decals

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

① 3998-16504-0

⚠ WARNING

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

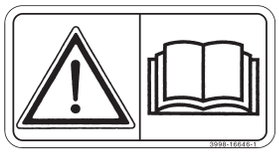
2.Preparation for Safe Operation
- Clean the steps, operator's station and floorboards.
- Obey the worksite rules.
- Sakai accepts no responsibility for any injury or damage to the machine caused by unapproved modification.
- Do not use a machine which needs repair or maintenance.
- Sound the horn immediately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

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

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

3998-16504-0

② 3998-16646-1



3998-16646-1

③ 3998-16500-0 (2 locations)

⚠ WARNING

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

3998-16500-0

④ 3998-16489-0

CALIFORNIA
Proposition 65 Warning

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

3998-16489-0

⑤ 3998-16499-0 (2 locations)

⚠ WARNING

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

3998-16499-0

⑥ 3998-16695-0

⚠ DANGER

- Do not open the radiator cap and the auxiliary tank cap when fluid is hot.
- Radiator fluid is flammable. Avoid exposure to flame when the cap has been removed.

3998-16695-0

⑦ 3998-16505-0

⚠ DANGER

Roll Over Prevention
- 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.

3998-16505-0

⑧ 3998-19678-0 (2 locations)

3998-19678-0

⑨ 3998-16536-0

⚠ DANGER

- Avoid contact with the machine parts in the vicinity of the engine while engine is running and after it has been stopped. Contact with hot parts will cause burns.

3998-16536-0

⑩ 3998-16501-0

⚠ DANGER

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

3998-16501-0

⑪ 3998-16507-1

⚠ CAUTION

Lubricate all grease fittings daily prior to commencing work.

3998-16507-1

⑫ 3998-16510-0

⚠ CAUTION

Refill the specified quantity of oil in the vibrator case when changing oil.

3998-16510-0

⑬ 3998-16468-1

⚠ CAUTION

PREVENT THE LOCKING OF PARKING BRAKE
When the vehicle storage for the long term, release the parking brake and travel te vehicle for a little while. Them put the parking brake on again. Do this operation once a mont at least.

3998-16468-1

⑭ 3998-16559-0

DANGER EXPLOSIVE GASES
Cigarettes,flames or sparks could cause battery to explode.Always shield eyes and face from battery.Do not charge or use booster cables or adjust post connections without proper instruction and training.
KEEP VENT CAPS TIGHT AND LEVEL
POISON CAUSES SEVERE BURNS
Contains sulfuric acid.Avoid contact with skin,eyes or clothing.In event of accident flush with water and call a physician immediately.
KEEP OUT OF REACH OF CHILDREN

3998-16559-0

⑮ 3998-06139-0

⑯ 2998-96001-1

⚠ CAUTION

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

2998-96001-1

⑰ 3998-16680-0

⚠ CAUTION

Reference service manual for special fillprocedure. Failure to follow this procedure can result in severe engine damage.

3998-16680-0

⑱ 1411-19036-2

⚠ WARNING
- Travel downhill in Rabbit may cause engine damage.
- Use Turtle on slopes.
- RPM MAX: **2500 rpm**
- Do not attempt to shift speeds during travelling.

1411-19036-2

⑲ 1404-19188-0 (OPTION)

⚠ WARNING
- Travel downhill in Rabbit may cause engine damage.
- Use Turtle on slopes.
- RPM MAX: **2500 rpm**
- Do not attempt to shift speeds during travelling.

1411-19188-0

⑳ 1418-19035-1

⚠ CAUTION

Do not shift gears during operation.

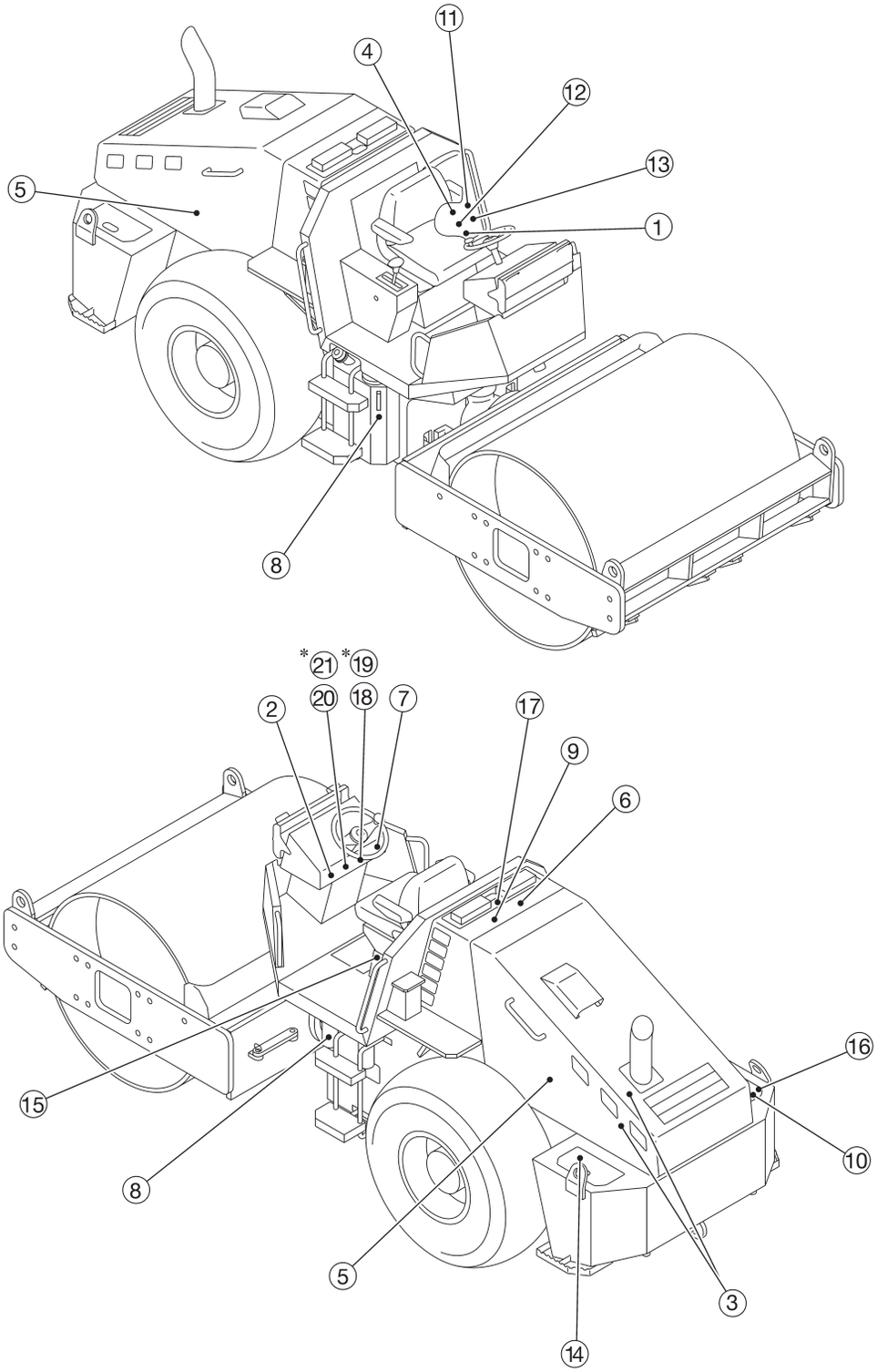
1418-19035-1

㉑ 1404-19189-0 (OPTION)

⚠ CAUTION

Do not shift gears during operation.

1418-19035-1

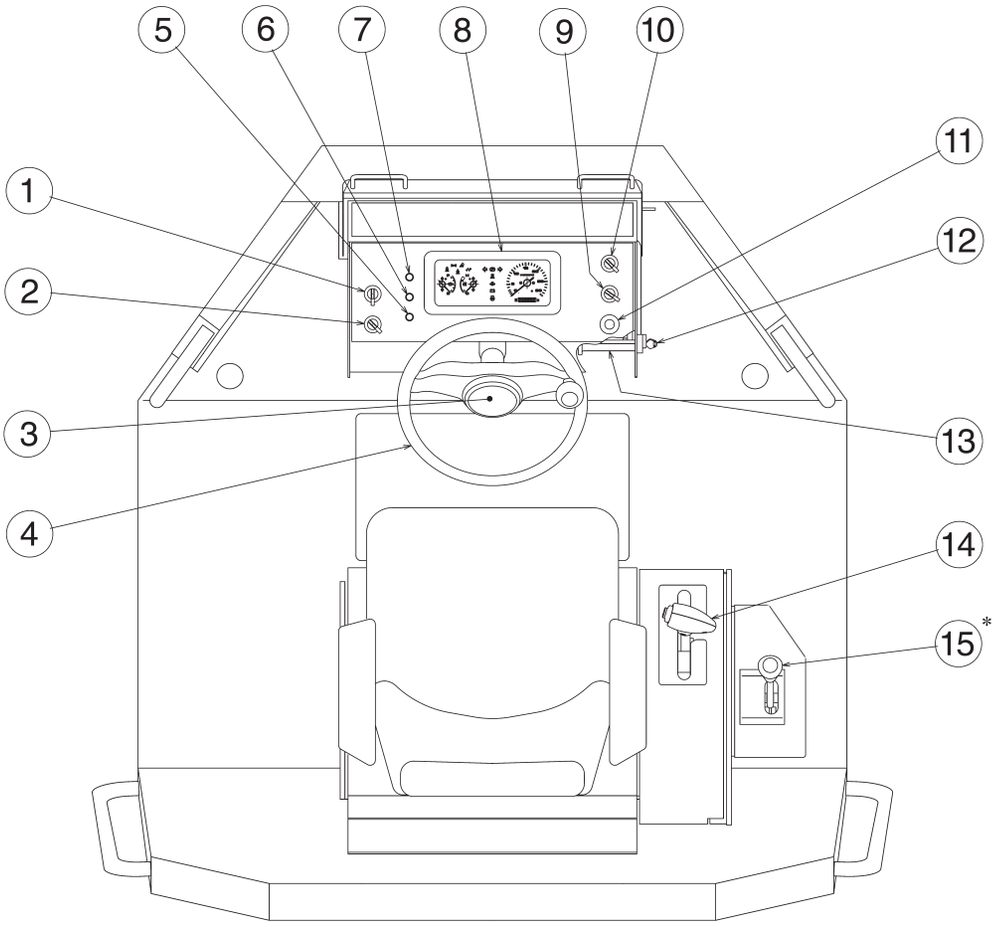


∗ : Option specification

2 OPERATION

2.1 Instruments and Controls

2.1.1 Operator's station



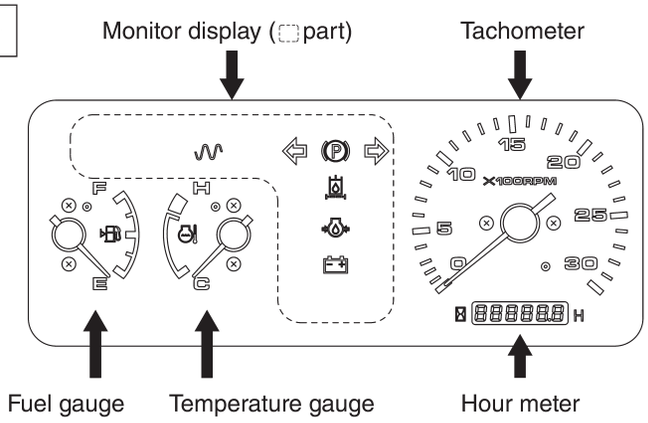
① Vibrator switch
② Vibration selector switch
③ Horn switch button
④ Steering wheel
⑤ Engine wait to start lamp
⑥ Engine warning lamp
⑦ Engine stop lamp
⑧ Combination meter
⑨ Engine speed select switch
⑩ Speed change switch
⑪ Parking brake switch
⑫ Starter switch
⑬ Brake pedal
⑭ Forward-Neutral-Reverse (F-N-R) lever with vibration switch
⑮ Leveling blade lift lever

* For SV412TB,SV412FB only.

2.1.2 Gauges, indicator lamps and warning lamps

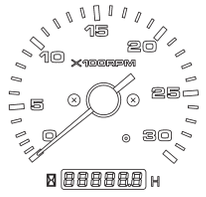
For safe execution of your job, fully understand the role and function of the systems involved.

Combination meter



Tachometer / Hour meter

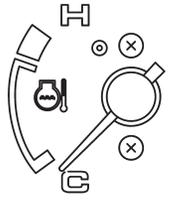
Indicates the engine RPM. The hour meter shows total operating hours. The service interval recommendation in this manual should be based upon the hour meter readings.



Tachometer / Hour meter

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.

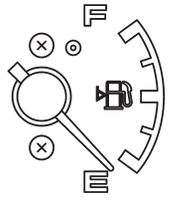


Temperature gauge

Fuel gauge

Indicates the fuel level in the tank.
E: The tank is empty.
F: The tank is full.

Replenish fuel appropriately before the fuel runs down.

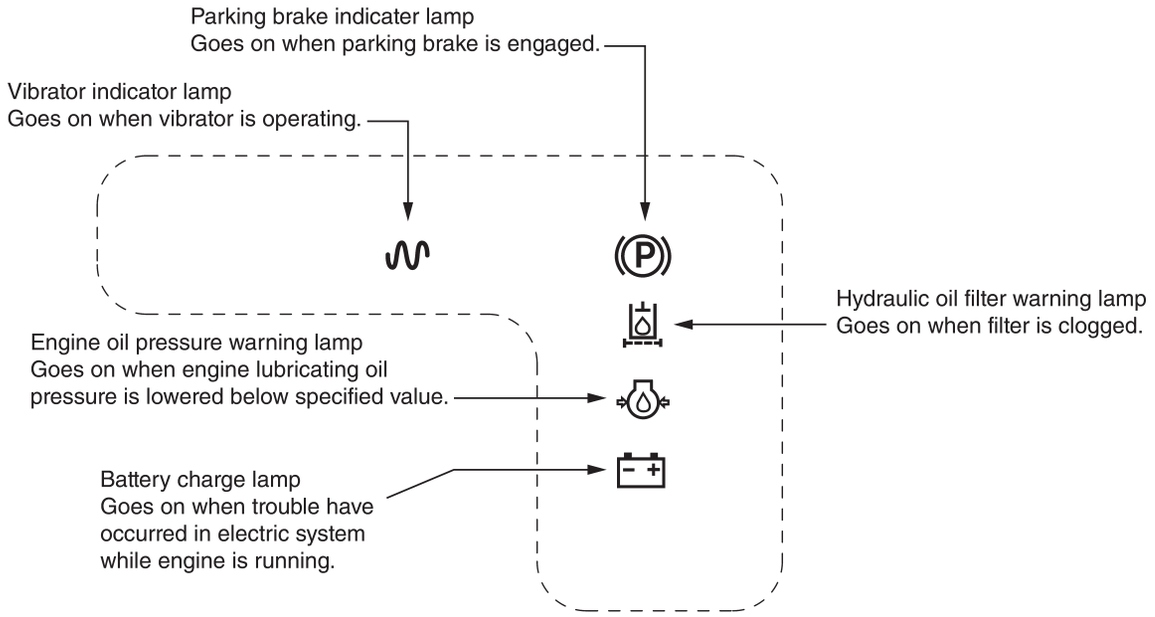


Fuel gauge

⚠ CAUTION

Be sure to use fuel recommended by SAKAI (refer to page 74).

Monitor display



★ Indicator lamps [Ⓟ ∿]
Light up when corresponding systems have been are operating.

★ Warning lamps [🔋 🛢]
Go on when the starter switch is turned to the " I " position and go off when the engine has started. If any light up while the engine is running, this indicates a faulty condition. Stop the engine and trace the source of trouble.

★ Checking for warning lamps and parking brake indicator lamp
They should turn on light when the starter switch is " I " position. If not, there is some trouble. Check and repair the combination meter or wiring harnesses.

⚠ CAUTION

Hydraulic oil filter warning lamp may go on when the engine rpm is increased before the engine has been warmed up enough. Keep the engine idling until the lamp goes off, before starting your work.

Engine check lamp

When the start switch is set to the " I " position ,self-diagnosis of the engine will start.
When the result is normal. Three lamps will goes out.
If the lamp remains lit or it lights during operation, it means there is any trouble with the engine. Stop the vehicle to check the engine.

★ ENGINE STOP

When the engine stop lamp lights, it means a serious abnormality occurs with the engine. Stop the vehicle and the engine, and receive proper checking / maintenance or repairing.

★ WARNING

When the warning lamp lights, water may be accumulated in the fuel pre-filter.
Drain the fuel pre-filter. (See P59.)
If the lamp lights just because the water is accumulated in the fuel pre-filter, it will go out after draining.
If the lamp does not go out, the engine may be abnormal. Receive proper checking / maintenance or repairing before a serious failure occurs.

★ WAIT TO START

When the wait to start lamp is lit, it means self-diagnosis of the engine, and the engine should not be started.
Must wait to start the engine. The most common reason for this is to wait for the intake air heaters to complete a pre-heat cycle during cold ambient conditions.

IMPORTANT

For the details of the engine check lamp, see the instruction Manual of the engine.

2.1.3 Switches

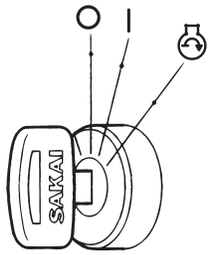
Starter switch

Starts and stops the engine.

" ○ " position : 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.

" I " position : The charging circuit and lamp circuit are charged with electricity. Leave the key in this position after the engine has started.

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

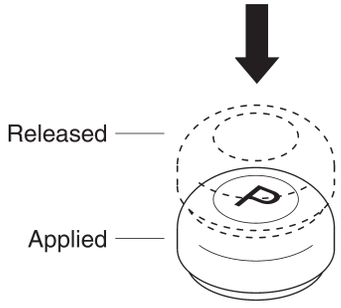


⚠ CAUTION

Set the Forward - Neutral - Reverse (F-N-R) lever in the neutral position and press down the parking brake switch before starting the engine. Unless these conditions are met, the engine will not start.

Parking brake switch

If switch Ⓟ is pressed down, the parking brake will be applied with the indicator lamp Ⓟ on the dashboard lit up.
When pressed again, the brake is released and the indicator lamp goes off.



⚠ WARNING

- **To disengage the brake, be sure to press the button again instead of pulling it.**
- **Always press the button to apply the parking brake before dismounting from the machine.**

⚠ CAUTION

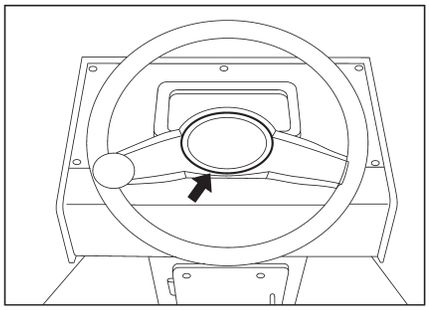
Never pull the switch UP.

⚠ IMPORTANT

In an emergency, apply brake by pressing the parking brake switch button.

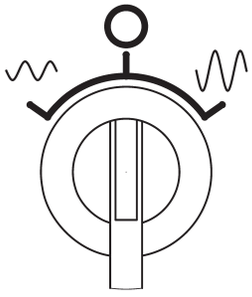
Horn switch button

Pressing the button at the center of the steering wheel sounds the horn.



Vibrator switch

By means of vibrator switch located on the panel, selection of vibration amplitude and On-Off is mode.



Vibrator switch

position : Turning the vibrator switch clockwise causes the vibration to start with high amplitude.

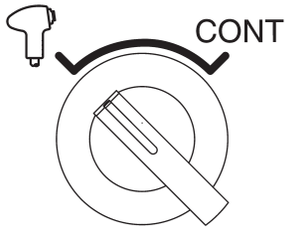
○ position : Vibration is shut down.

position : Turning the vibrator switch counter clockwise causes vibration to start with low amplitude.

NOTE: For vibratory rolling, run the engine at FULL.

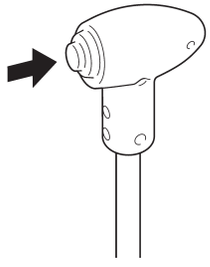
Vibration selector switch

Selection can be mode between the vibration switch installed to the Forward-Neutral-Reverse (F-N-R) lever and the other one located on the panel.



Vibration selector switch

position : Vibration can be turned ON or OFF with the switch located on the Forward-Neutral-Reverse (F-N-R) lever. Pressing this switch causes the vibration to start and pressing it again to stop. This vibration switch on the lever should be used with the vibrator switch on the panel placed at or position.



Vibration switch

CONT position : Have this switch placed at this position when vibration is not to be actuated.

NOTE: For vibratory rolling, run the engine at FULL.

IMPORTANT

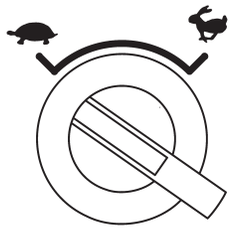
- **Do not operate the vibrator on a hard area such as cement concrete pavement surface or the ground covered by thick steel sheets.**
- **Keep the vibrator stopped when the machine is at rest.**
- **Shut off the vibrator immediately when the machine has been caught in the mud during vibratory operation.**

Speed change switch

Selects two vehicle speed ranges.

	(Low)	(High)
Speed	0～6 (0～3.7)	0～10 (0～6.2)

km / h (mile / h)

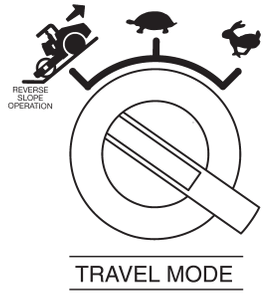


Speed change switch

(Option:Manual Traction Control)

	(REVERSE SLOPE OPERATION)	(Low)	(High)
Speed	0～7 (0～4.3)	0～6 (0～3.7)	0～10 (0～6.2)

km / h (mile / h)



Speed change switch
(Option : Manual Traction Control)

IMPORTANT

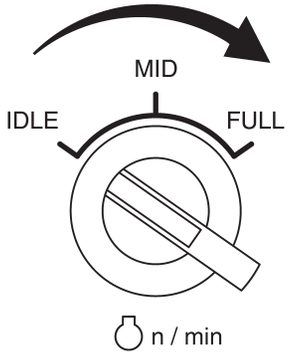
Be sure to shift gears while the vehicle is being stopped. Do not shirt gears during running.

Engine speed select switch

Shifts the engine RPM.

(±50 min^{-1})

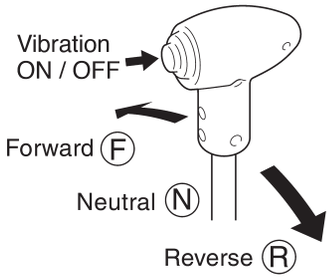
Engine speed	IDLE	MID	FULL
	900 min^{-1}	1850 min^{-1}	2400 min^{-1}



Engine speed select switch

2.1.4 Operating levers / pedals

Forward-Neutral-Reverse (F-N-R) lever with vibration 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 vehicle speed increases or decreases in proportion to the lever displacement.

Provided at the knob of the lever is the vibration switch for turning on or off the vibration.

IMPORTANT

- **For normal braking, return the F-N-R lever back to neutral.**
- **In an emergency, depress the brake pedal or press the parking brake button.**

Leveling blade lift lever (SV412TB, SV412FB)

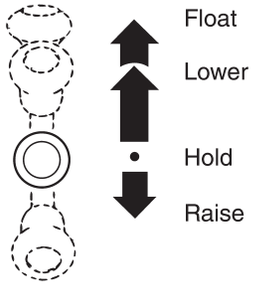
The leveling blade is operated from a single control lever.
The lever has four positions; RAISE, HOLD, LOWER and FLOAT.

Raise : To raise the blade, pull the lever backward. The lever automatically returns to the Hold position when released.

Hold : When this position is selected, the blade stays in any position.

Lower : To lower the blade, push the lever forward. The lever automatically returns to the Hold position when released.

Float : Push the lever forward to its full extent. In this position, the blade becomes free to ride up and down over the ground, following the ground configration as the machine travels. The lever stays in the Float position even if it is released.



Brake pedal

In an emergency, push down on the pedal to the full extent, and the machine will come to a sudden stop.

NOTE: After depressing the brake pedal, return the F-N-R lever to the Ⓝ position, otherwise the vehicle will not start.

IMPORTANT

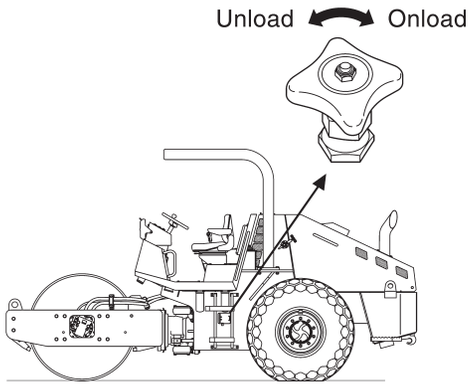
- **Do not use the pedal wherever practicable except for an emergency.**
- **The F-N-R lever permits usual braking.**

2.1.5 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.

Towing Speed:
At of less than 0.5 km / h (0.3 mile / h)
Towing Distances:
Within 100 m (328ft)

For towing:
Turn the knob counter-clockwise (Unload).
For normal traveling:
Turn the knob clockwise (Onload)



⚠ 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.**

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

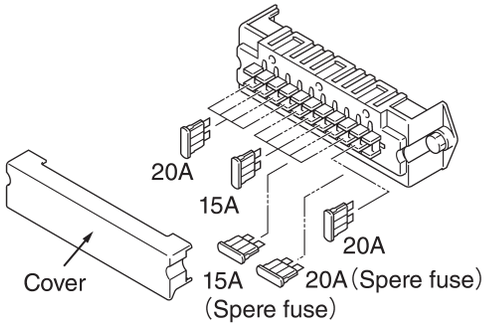
2.1.6 Fuse box

⚠ 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 play between it and fuse holder. To replace fuses, take off the cover. Be sure to use fuses of correct capacity.

Using improperly rated fuses may result in poor machine performance, damage to the electrical system, or safety problems, such as an electrical fire.

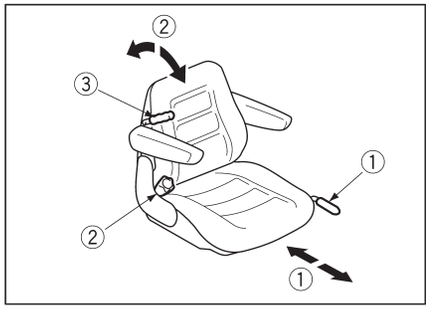


2.2 Handling and Adjustments

2.2.1 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.
Adjust your seat position to suit you as follows:

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



⚠ WARNING

- **The seat shall be adjusted before starting any works or when the driver is switched over the other person while the machine is completely stopped. Do NOT adjust the seat while the machine is in motion.**
- **Some unexpected troubles may be accidentally caused if moving the machine without completely fixing the seat such as while sliding the seat. Before moving the machine, make certain that the seat is completely fixed after making proper adjustments.**
- **Do not pinch your fingers, hands or legs while adjusting the seat.**
- **Adjust seat only when one person rides on the machine.**
- **Adjust seat only when the machine stays on the flat ground.**
- **Adjust the seat so that your back is in close contact with the back of the seat while seated and when stepping on the brake pedal down to the floor. Adjust the seat so as to be able to certainly step on the brake pedal when twisting your body around to look back in order to move the machine backwards.**

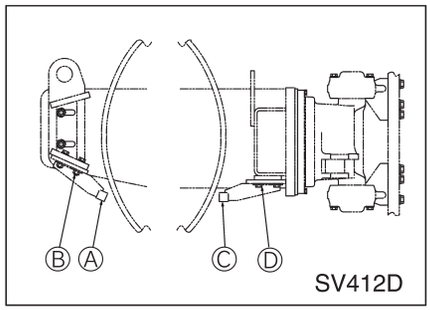
IMPORTANT

Be sure to wear the seatbelt during operation.

2.2.2 Scraper adjustment and replacement

SV412D

1) Clearance adjustment of scraper Ⓐ
   ① Loosen bolts and nuts Ⓑ at 8 locations.
   ② Provide a clearance of 20 mm between scraper and the drum.
   ③ Retighten bolts and nuts Ⓑ at 8 locations.

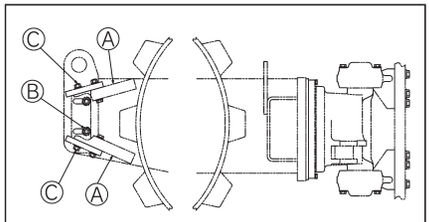


SV412D

2) Clearance adjustment of scraper Ⓒ
   ① Loosen bolts Ⓓ at 8 locations.
   ② Provide a clearance of 20mm between scraper and the drum.
   ③ Retighten bolts Ⓓ at 8 locations.

SV412T, SV412TB

1) Clearance adjustment of scrapers Ⓐ
   ① Loosen bolts and nuts Ⓑ at 4 locations.
   ② Provide a clearance of 20mm between scrapers Ⓐ and the drum.
   ③ Retighten bolts and nuts Ⓑ at 4 locations.

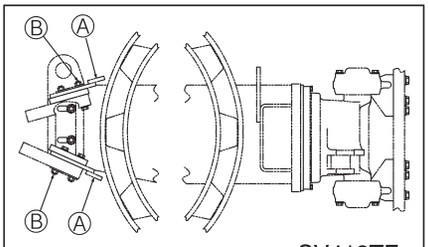


SV412T
SV412TB

2) Replacement of scrapers Ⓐ (9 pieces on top and 9 pieces at bottom.)
   ① Remove bolts and nuts Ⓒ .
   ② Replace scrapers Ⓐ with new ones.
   ③ Refit and retighten bolts and nuts Ⓒ .

SV412TF, SV412FB

1) Clearance adjustment of scraper blades Ⓐ .(One at the right and one at the left)
   ① Loosen bolts and nuts Ⓑ (8 locations respectively at top and bottom)
   ② Provide a clearance of 20mm between scrapers Ⓐ and the drum.
   ③ Retighten bolts and nuts Ⓑ (8 locations respectively at top and bottom)



SV412TF
SV412FB

2) Replacement of scraper blades Ⓐ
   ① Remove bolts and nuts Ⓑ (8 locations respectively at top and bottom)
   ② Replace scraper blades Ⓐ with new ones.
   ③ Refit and retighten bolts and nuts Ⓑ (8 locations respectively at top and bottom)

2.2.3 Disengaging the brake when towing

⚠ WARNING

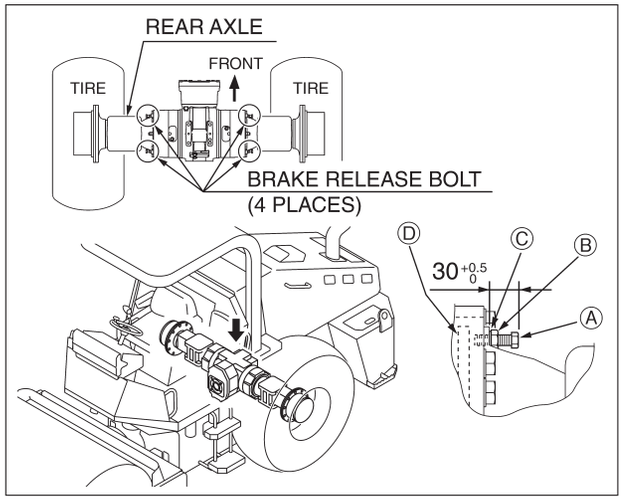
- **On a slope, chock the drums and prepare for towing before disengaging the brake.**
- **Avoid a long-distance towing.**

For towing the machine when the engine is disabled or when trouble has developed in the hydraulic propulsion, system disengage the brake as instructed below:

1) Rear brake

① Loosen the lock nuts Ⓑ . Tighten bolts Ⓐ so as to fasten them onto the pressure plate Ⓓ .

② Using a wrench, tighten the bolts Ⓐ in an alternate sequence by 1/4 turn at a time so as to compress the belleville washers and disengage the braking disks.



IMPORTANT

Tighten max by one turn.
When it is overtightened,it may be broken.

③ After towing is completed, remove bolts Ⓐ completely with nuts Ⓑ and seals Ⓒ . Then replace seals Ⓒ apply silicone - based.
Tecon Lupu / 101 grease to the bolts Ⓐ and install all parts again.

④ Adjust bolts Ⓐ to obtain a jut of $30^{+0.5}_{0}$mm. Then lock into position with nuts Ⓑ .

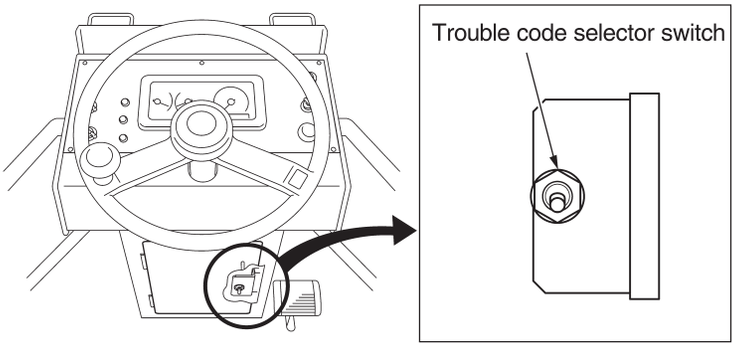
2) Turn the unloader valve counterclockwise to release it.
Refer to " Unloader valve " on page 28 for its operation method.

⚠ 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 , safety goggles and safety gloves.**

2.2.4 Engine troubleshooting

Engine troubleshooting can be conducted using the trouble code selector switch.
During normal operation, do not operate switches.
Set switches as shown in the figure during the normal operation.



IMPORTANT

When operating the trouble code selector switch, see the engine manual.

2.3 Operation

⚠ WARNING

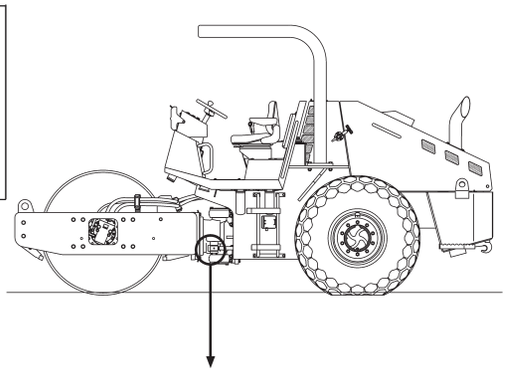
- **This machine is a one-man roller.**
- **Operate the machine from the operator's seat.**
- **Be sure to wear the seatbelt during operation.**

2.3.1 Before-starting inspection

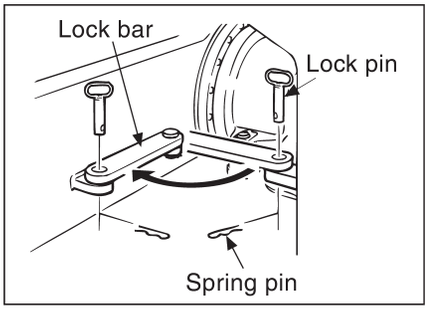
1) Check that the steering lock bar is in the carrying position.

⚠ WARNING

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

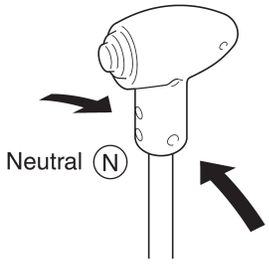


The bar is located at the left of the center of the machine.
To unlock the bar:
① Remove the spring pin.
② Pull out the lock pin.
③ Set the bar in the carrying position.

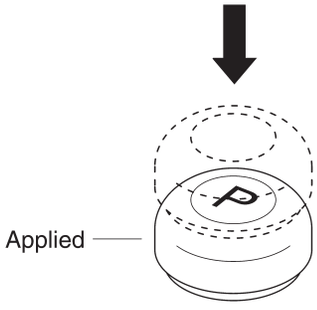


NOTE: Retain the lock bar in the locked position by inserting the lock pin into the lock holes. Fix the lock pin with the spring pin.

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



3) Check that the parking brake has been pressed.



NOTE: Set the Forward - Neutral - Reverse (F-N-R) lever in the neutral position and press down the parking brake switch before starting the engine.
Unless these conditions are met, the engine will not start.

2.3.2 Starting the engine

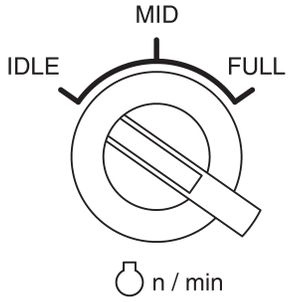
⚠ WARNING

- **Check that there are no people or obstacles around the vehicle and beep the horn before starting the engine.**
- **Set the Forward-Neutral-Reverse (F-N-R) lever in the neutral position and press down the parking brake switch before starting the engine. Unless these conditions are met, the engine will not start.**

1) Set the engine speed select switch in the IDLE position.

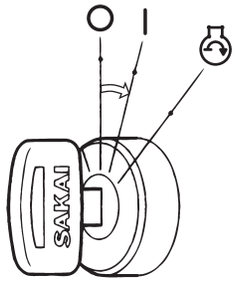
(±50min^{-1}{rpm})

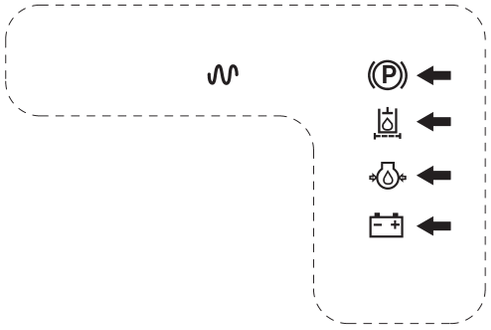
	IDLE	MID	FULL
Engine speed	900min^{-1}{rpm}	1850min^{-1}{rpm}	2400min^{-1}{rpm}



Engine speed select switch

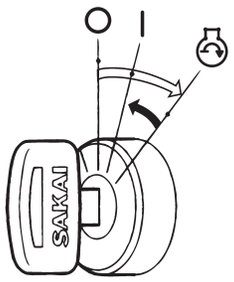
2) Turn the starter switch to the " I " position and check that the warning lamps and parking brake indicator lamp on the monitor display are on.





3) Start the engine after the engine check lamp lights up and goes out.

4) Turning the key to the " " position makes the engine start. Release the key the moment the engine has started. The key will automatically return to the " I " position.



⚠ CAUTION

- **Do not allow the starter key to stay in the " " position for more than 15 seconds.**
- **When you fail to start the engine, restart it after waiting for about 30 seconds.**
- **If the engine does not start, allow an interval before trying again.**
- **Check that the warning lamps on the monitor display go off immediately after the engine is started. If any of these warning lamps stay on 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 the machine immediately after starting but practice the following:

IMPORTANT

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

1) Run the engine at idling 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, while 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.
   - Engine check 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

Do not step away from the driver seat during starting the engine.

2.3.4 Traveling

⚠ CAUTION

While travelling, do not turn the starter switch "○" .

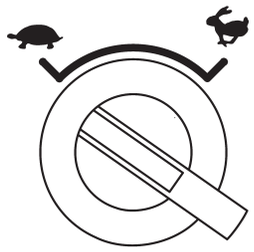
⚠ WARNING

- **When starting, operate the horn after securing the safety around the machine.**
- **Be sure to wear the seatbelt doring operation.**

1) Select the desired speed by the speed change switch.

	(Low)	(High)
Speed	0～6 (0～3.7)	0～10 (0～6.2)

km / h (mile / h)

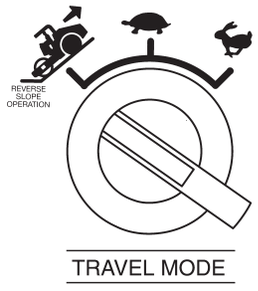


Speed change switch

(Option : Manual Traction Control)

	(REVERSE SLOPE OPERATION)	(Low)	(High)
Speed	0～7 (0～4.3)	0～6 (0～3.7)	0～10 (0～6.2)

km / h (mile / h)



Speed change switch
(Option : Manual Traction Control)

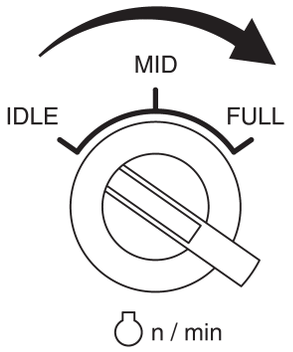
IMPORTANT

Be sure to shit gears while the vehicle is being stopped. Do not shift gears during running.

⚠ WARNING

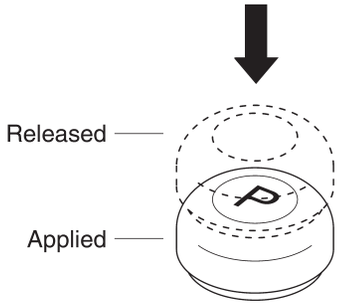
On a steep slope, run the machine at low speed. Do not attempt to shift speed while travelling.

2) Turn the engine speed select switch to increase the engine speed.

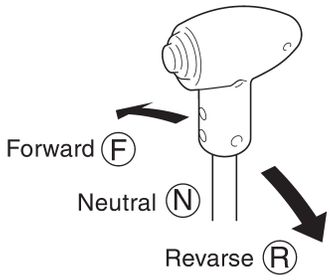


Engine speed select switch

3) Press down the parking brake switch button to release the brake. Check that indicator lamp (Ⓟ) 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 engine speed select switch and F-N-R lever.

⚠ WARNING

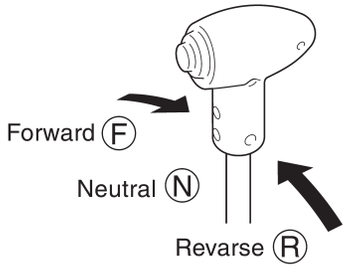
Pay extreme attention to the area behind the machine when backing, since the space just behind it tends to be a blind spot.

2.3.5 Stopping / Parking

⚠ WARNING

- **Avoid abrupt braking. Leave enough space for braking safely.**
- **Avoid parking on a grade.**
- **If necessary to park on a grade, block the drums 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.



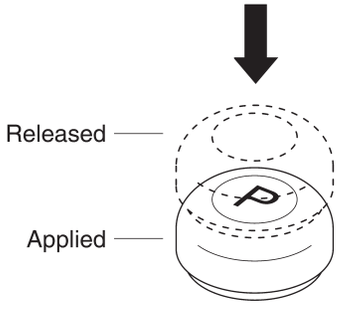
⚠ CAUTION

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

IMPORTANT

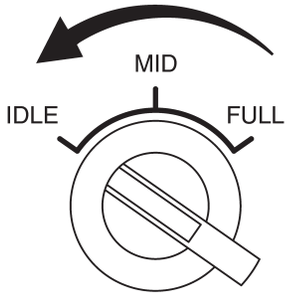
After depressing the brake pedal, return the F-N-R lever to the neutral position, otherwise the vehicle will not start.

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



2.3.6 Stopping the engine

1) Set the engine speed select switch at the IDLE position, wait for about 5 minutes with the engine idling to gradually cool the engine.



Engine speed select switch

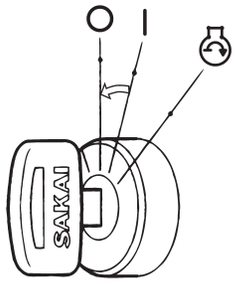
IMPORTANT

- **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 "○" position to stop the engine.

⚠ CAUTION

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



3) Remove the starter key.

⚠ WARNING

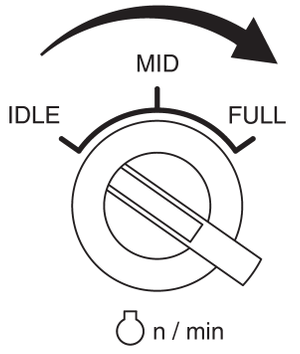
- **When dismounting from the machine, apply the brake by pressing the parking brake button. If necessary to park on a grade, block the wheels to prevent unexpected moving down the grade.**
- **Never fail to remove the starter key**

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.
5) When transporting the machines, please ensure safety by strictly complying with the applicable laws and regulations.

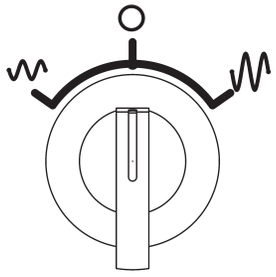
2.4 Vibratory Operation

1) Turn the engine speed select switch clockwise to set the engine RPM to FULL.
2) Use the vibrator switch Ⓐ installed at the control panel on the top of the dashboard to select low or high amplitude and ON / OFF of vibration.



Engine speed select switch

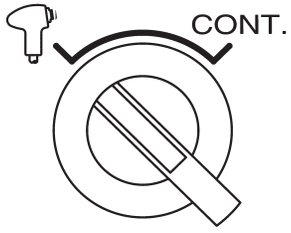
position: Turning the vibrator switch clockwise causes the vibration to start with high amplitude.
OFF position: Vibration is shut down.
position: Turning the vibrator switch counter clockwise causes vibration to start with low amplitude.


Vibrator switch Ⓐ

NOTE: For vibratory rolling, run the engine at FULL.

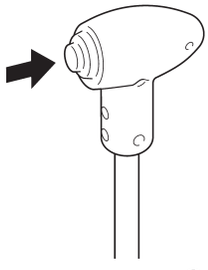
Vibration can be turned ON / OFF with the vibration switch Ⓒ . Select a suitable setting depending on a working site condition .

position: Vibration can be turned ON or OFF with the switch located on the F-N-R lever. Pressing this switch causes the vibration to start and pressing it again to stop.
This vibration switch on the lever should be used with the vibrator switch on the panel placed at or position.



Vibration selector switch Ⓑ

CONT position: Have this switch placed at this position when vibration is not to be actuated.
At this point, use the amplitude vibrator switch Ⓐ to turn ON / OFF vibration.


Vibration switch Ⓒ

3) Proper travel speed for vibratory compaction is 2 ~ 5km/h (1.2 ~ 3.1 mile / h), however, select speeds depending upon job requirements.

IMPORTANT

- **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.**
- **Set the speed change switch in the LOW position during vibratory rolling compaction. Use the HIGH position only for driving on flat straight roads.**

2.5 Precautions for Work

2.5.1 Compaction operation

■ Understand the intended purposes of the rollers

- This roller is developed and manufactured mainly for rolling compactions of road constructions and repairing. Working with vibrations under excessive rolling compactions or using for crushing operations may cause damages to this machine. Do not use for any other purposes than rolling compactions in civil engineering works.

■ Do not operate the vibration on a hard location

- Do not work the vibration 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.

2.5.2 When going downhill

■ Use the F-N-R lever

- Run slowly going downhill. Do not use excessive speed. Avoid changing speed if possible when going downhill. Start slowly and end slowly on steep downgrades.

■ Use the engine brake

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

⚠ WARNING

- **When going uphill, run at low speed. Do not attempt to shift speeds during travelling. The machine can slip down the slope.**
- **When going downhill, adjust the travel speed not to allow the engine speed to exceed 2,500 rpm.**

2.5.3 On a slope

■ Working on a sidehill

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

2.6 Applicable Jobs

1) This machine is mainly used for:
   - Static compacting work
   - Vibratory compacting work

2) Road rollers do a variety of jobs as listed below.
   This machine most effectively handles works or materials marked ☆ .

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

2.7 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 temperature will cause a significant reduction of battery efficiency. Cover batteries or take them off from the machine and store in a warm place for the following day's operation.

2.8 Loading and Unloading

⚠ WARNING

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

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

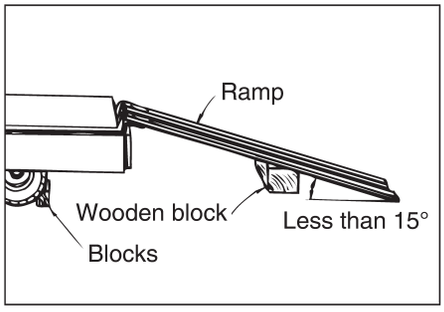
2.8.1 Use of a trailer equipped with a winch

⚠ WARNING

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

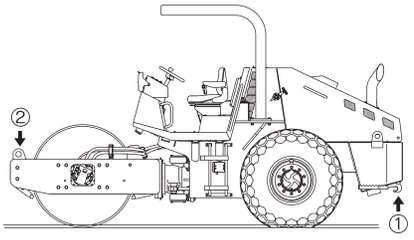
1) Engage the trailer brake and chock its wheels. Fix the ramps so that the machine and trailer are completely aligned.

☆ 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 or ② (One each on right and left) of the roller.



4) Place the unloader valve located at the operator's station to the UNLOAD position (See "Unloader valve" on page 28).

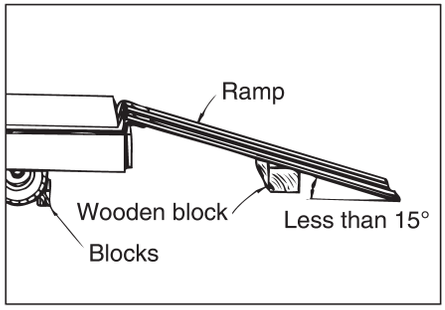
5) With the engine running at idle, perform loading by means of the trailer winch.

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

7) Locate the machine correctly on the trailer.

2.8.2 Self-propelling

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

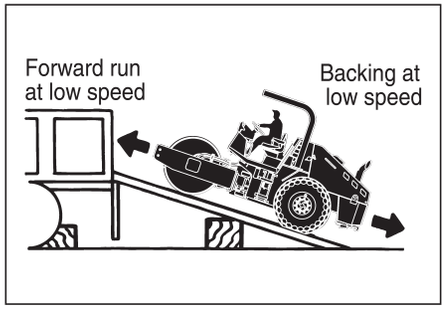


☆ The angle between the ramps and ground must be less than 15 degrees.

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



3) Locate the machine correctly on the trailer.

2.9 After Loading the Machine

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

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

2.10 Transportation

⚠ WARNING

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

For transportation,odey traffic regulations.

2.11 Operation in Cold Weather

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

2.11.1 Fuel oil and grease

Use fuel and oil with low viscosity. See “Rating” on page 74.

2.11.2 Coolant

⚠ WARNING

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

⚠ CAUTION

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

For the cooling water, mix the antifreeze in water.
Use softened water as the water to be mixed.
Please refer to the following table for the mixing ratio.

Ambient temperature	Always
Amount of anti-freeze	10 ℓ (2.6gal)
Amount of water	10 ℓ (2.6gal)
Ratio	50%

Our vehicles are filled with a long-life coolant (non-amine type).
The validity of the antifreezer is for two years.
Use non-amine type long-life coolant when changing coolant.

2.11.3 Battery

⚠ WARNING

- **Batteries generate explosive gases. Do not use an open flame close to batteries.**
- **The battery electrolyte is corrosive. Keep the electrolyte away from your eyes and skin. If you are affected by the electrolyte, flush with large quantities of water and get medical help.**

At low temperature, batteries are less efficient. The level of charge is lowered and batteries will tend to freeze. Maintain batteries fully charged wherever practicable, and give attention to heat insulation at night for the next day's operation.

Check the color of the hydrometer attached to the battery top to charge or replace the battery.

Green ····· Satisfactory
Black ····· Charging is necessary
Semitransparent ····· Replacement is necessary

2.12 When the Cold Season is Over

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

1) Change oil and fuel with those for use in warm season referring to “Rating” on page 74.
2) If AF-PT antifreeze is in use, drain the coolant completely, wash clean inside the cooling system, and then fill with clean water (city water).

2.13 For a Long Storage Period

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

1) Store the machine in a closed area after cleaning.
2) Conduct oiling, greasing and changing of oil.
3) Grease lubricate the exposed portion of hydraulic cylinder piston rods.
4) Cover the battery after disconnecting the negative cable or take off the battery from the machine and store in a safe place.
5) If the temperature is expected to go down below 0°C, add antifreeze to the coolant.
6) With F-N-R lever placed at neutral position Ⓝ and vibrator switch at " ○" position, have the parking brake engaged.
7) Chock the machine.
8) Remove the starter switch key.

2.14 During the Storage Period

⚠ WARNING

If necessary to operate the machine in indoor storage space, ensure good ventilation keeping windows and doors open to prevent gas poisoning.

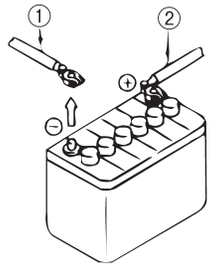
- During storage, operate the machine at least once a month to prevent the oil films on the lubricated parts from deteriorating and to charge the batteries.
- To prevent the brake linings from sticking to the brake drum, disengage the brake once a month. Exercise care not to allow the machine to move unexpectedly.

2.15 When the Battery Has Discharged

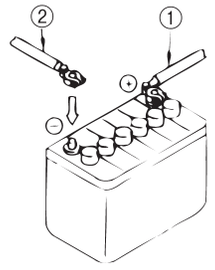
⚠ WARNING

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

Disconnect with negative cable first



Connect with positive cable first



⚠ CAUTION

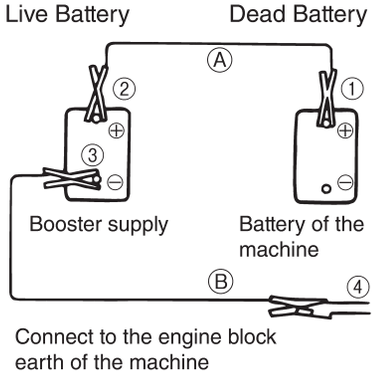
The power-supply voltage of this machine is 12V.

2.15.1 Connection and disconnection of booster cables

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

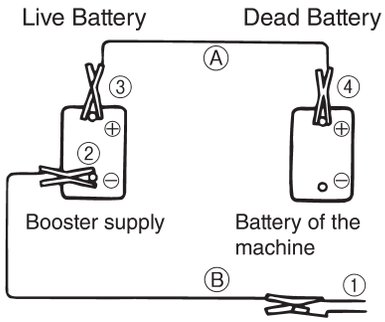
■ Connection of booster cables

1) Connect one end of the positive booster cable Ⓐ to the positive (+) terminal of the dead battery on the machine.
2) Connect the other end of the positive booster cable to the positive (+) terminal of the live power supply.
3) Connect the negative live power cable Ⓑ to the negative (–) terminal of the booster supply.
4) Connect the other end of the negative booster cable to a good earth ground on the engine block of the machine.



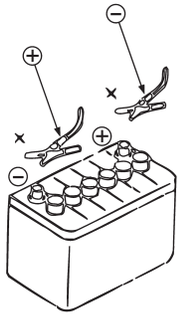
■ Disconnection of booster cables

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



⚠ WARNING

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



⚠ CAUTION

- **Use booster cables and end clips of proper size suited to the battery capacity.**
- **Use the batteries of the equal capacity for the machine and booster supply.**
- **Check booster cables and end clips for signs of damage and corrosion.**
- **Securely connect the clips.**

3 PERIODIC 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 problems and service life of the machine. In this manual, typical intervals for inspection and service are given. However, flexibility should be exercised as to interval or type of services to enable your machine to always operate in the best condition.

IMPORTANT

After maintenance and inspection, record the result of inspection. Remember that replacement of filters and elements, replenishment and change of oil and grease, and cleaning of the radiator fins is important.

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.

Periodic Replacement of Essential Maintenance Parts

In order secure safety for work and travel, conduct inspection and services.
Further, for enhanced safety, following parts and components should be replaced periodically. These parts are prone to material deterioration due to aging or physical change due to friction, 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 ensure they function as intended.
If any defects are detected such as crack, deformation or oil leakage, go ahead and replace them even if it is within scheduled replacement time.

3. PERIODIC MAINTENANCE

System or Mechanism	Part name	Periodical replacement maintenance part	Replacement period	Remarks
1.Brake system	Master cylinder	Seals (rubber parts)	2 years	Adopted machines only
	Wheel cylinder	Seals (rubber parts)	2 years	〃
	Brake piping parts	Brake hose	2 years	
		Air hose	2 years	Adopted machines only
	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	Adopted machines only
	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	4 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	
6. Cooling system	Piping parts	Radiator hose	2 years	
7. Control related parts	Cable	Cable	4 years	Adopted machines only

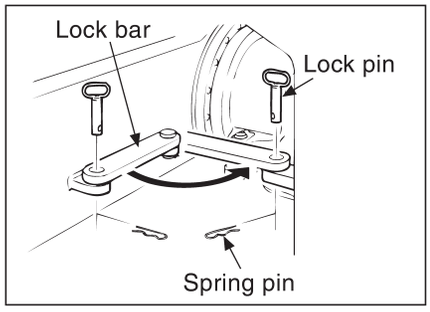
⚠ CAUTION

- **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 62)**
- **When trouble occurs in the location indicated by the indicator lamp on the dashboard display, sensor will work and the corresponding lamp comes on. If this occurs, conduct necessary service regardless of the periodic service interval recommendation.**
  1) The hydraulic filter (line filter) warning lamp ⇨ Replace elements
- **Check the electric wiring at a regular interval not exceeding one month:**
  1) Damage to the wire harness and loose clamps
  2) Loose sockets
  3) Function of electrical systems

3.1.1 Lifting the machine on a hoist

⚠ WARNING

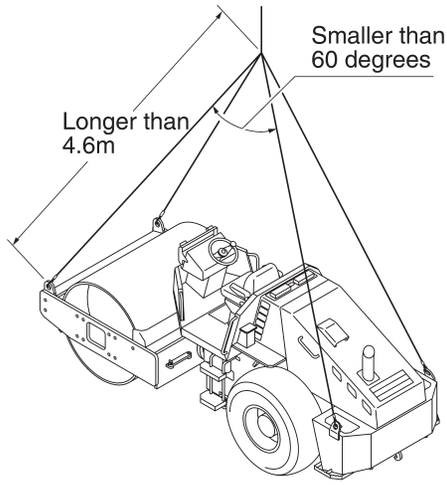
- **Get a qualified personnel to lift and lower the machine on a hoist.**
- **Use sturdy wire ropes.**
- **Lock articulation by means of lock bar located at the center of machine.**



⚠ CAUTION

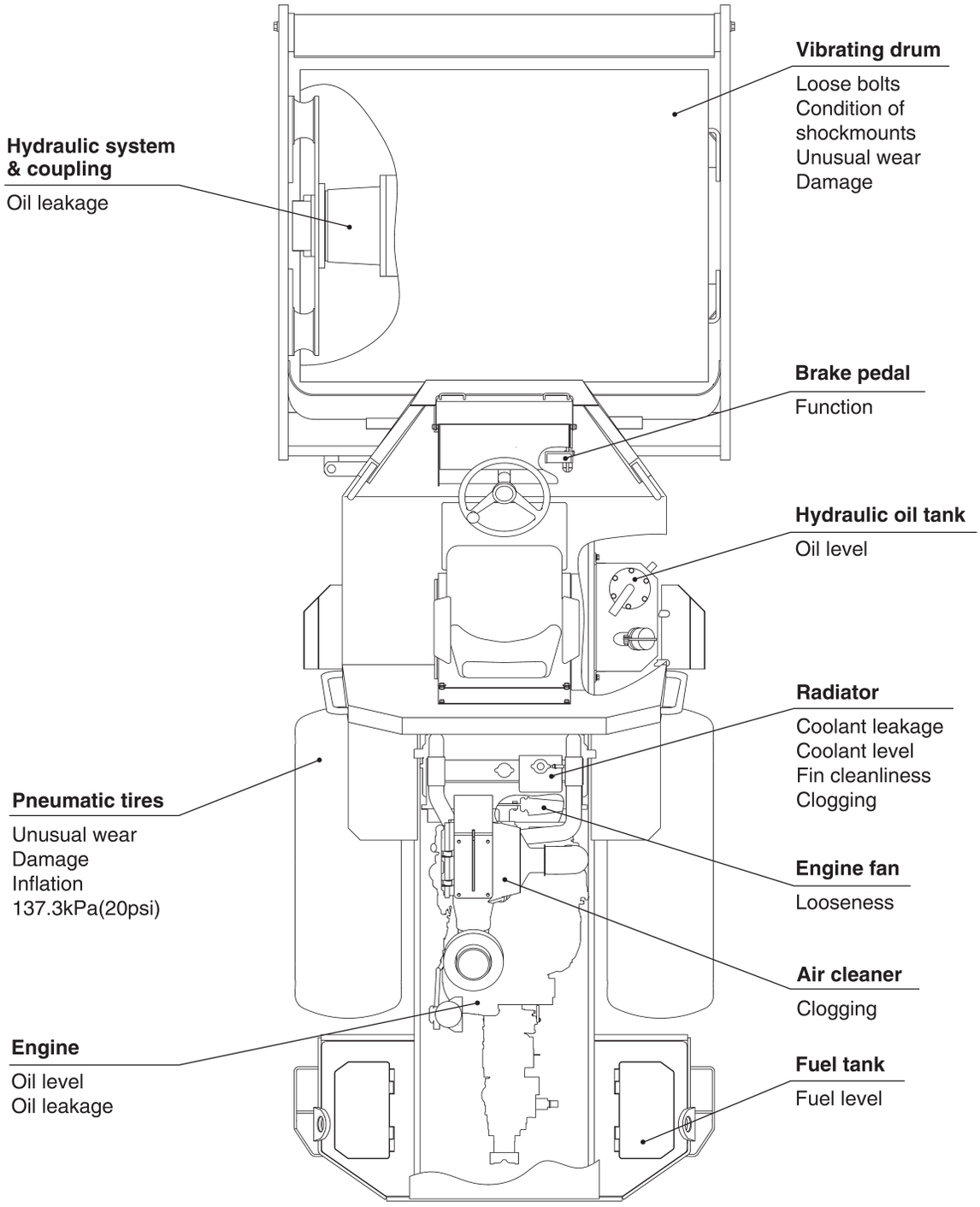
Remove POPS before starting lifting work.

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 ballanced.

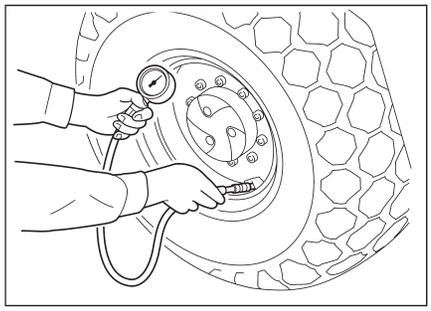


3.2 Walk-around Checking

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:



3.2.1 Tire inflation pressure check



Inflation pressure

Check that the inflation pressure of a tire is 137.3 kPa (20 psi) with a pressure gauge when the tire has cooled down. If the pressure reading exceeds the above range, adjust the pressure accordingly.

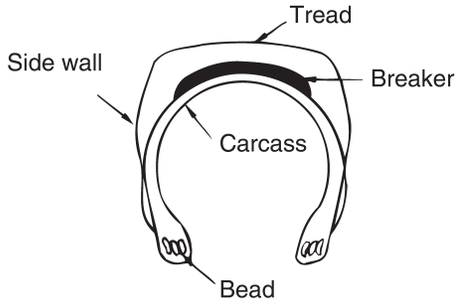
⚠ WARNING

Improper handling of a tire is dangerous and may cause flat tire and a rim to come off.
Do not work on a tire facing the rim, but from behind the tread of the tire while checking the inflation pressure or replenishing air into a tire.

3.2.2 Checking for external injury to a tire

Check any external injury to a tire, its size and its depth (whether it has reached the carcass or not), etc.

1) Check for any cuts on the tread.
2) Check for any cracks on a rim or deformation of rim flanges.



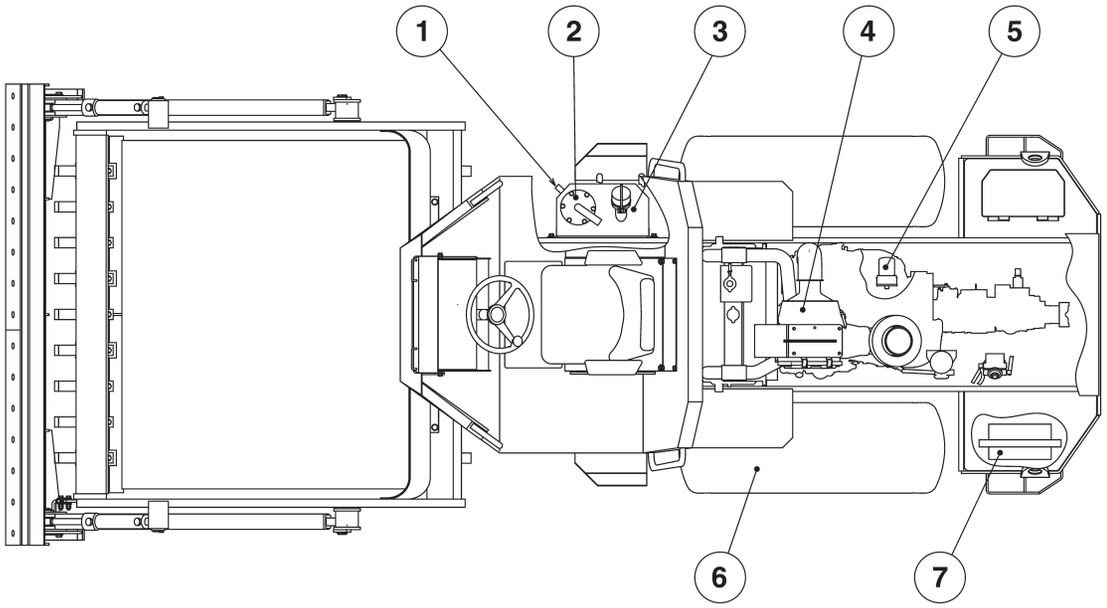
When a tire shows one or more of the following conditions, regard it as defective, and replace the tire with a new one for safety.

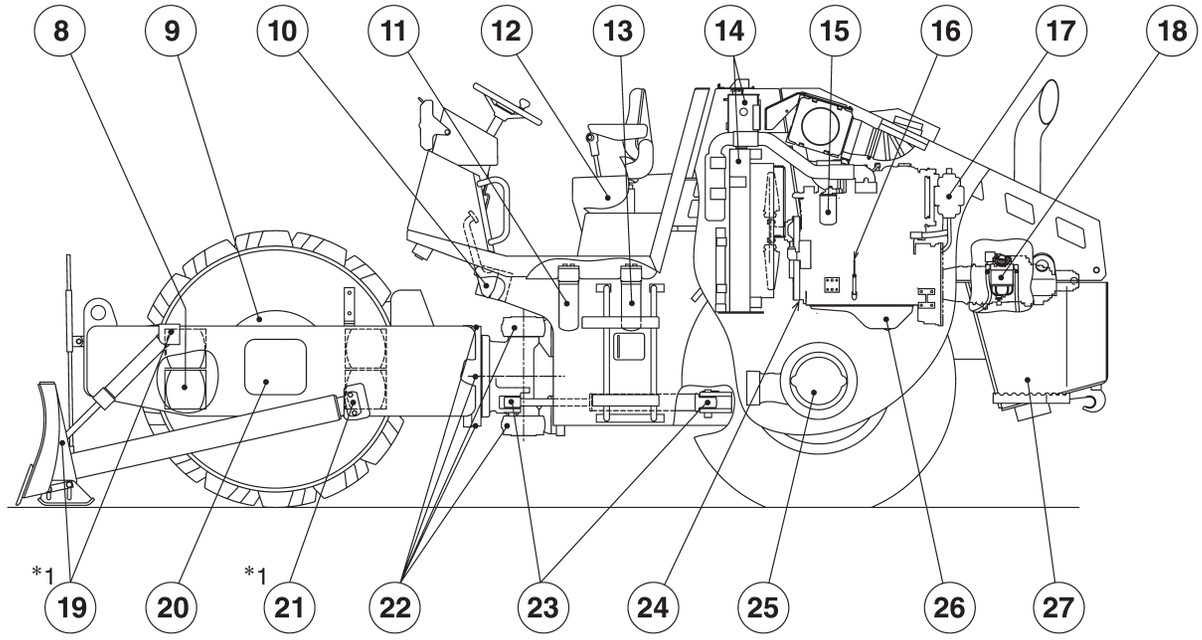
1) When the bead wire is cut, bent or significantly deformed
2) When the carcass ply is showing due to excessive wear
3) When damaged portion of the carcass exceeds one thirds of the tire width
4) When a tire has ply separation (peeling)
5) When radial cracks reach the carcass
6) When the tire is not regarded as durable due to abrasion, deformation, or abnormal flaw growth.

Please consult with an agency for maintenance in the following cases.

- When injury is found on the surface of a tire.
- When the degree of wear on the front, rear, right and left sides of a tire are extremely different.
- When a bent rim is found.

3.3 Periodic Maintenance Points





*1 SV412TB, SV412FB only

Interval	No.	Item	Service	Lubricant	Q'ty
Every 10 service hours or daily	④	Air cleaner	Check indicater		1
	⑭	Radiator and auxiliary tank	Check coolant level	Coolant	1
	⑯	Engine oil level gauge	Check oil level	Engine oil	1
	⑱	Fuel pre-filter	Check, drain water and dirt		1
	㉔	Fan belt	Check tension and unusual wear		1
Every 50 service hours	①	Hydraulic oil level gauge	Check oil level	Hydraulic oil	1
	⑦	Battery	Check hydrometer and looseness of terminal and appearance		1
	*⑲	Blade cylinder	Grease 4 places	Grease	4
	*㉑	Push rod anchor pin	Grease 2 places	Grease	2
Every 250 service hours	⑤	Engine oil filter	Change filter element		1
	⑧	Rubber dampers	Check for cracks		8
	⑨	Vibrator	Check oil level	Gear oil	1
	⑩	Brake	Grease 1 places	Grease	1
	⑳	Gear case: Wheel motor	Check oil level, add as necessary	Gear oil	1
	㉒	Center pin and tilt pin bearings	Grease 6 places	Grease	6
	㉓	Steering cylinder	Grease 4 places	Grease	4
	㉕	Differential case and final drive	Check oil level, add as necessary	Gear oil	1
	㉖	Engine oil pan	Change engine oil	Engine oil	1
Every 500 service hours	⑪	Hydraulic oil return filter	Change filter element		1
	⑫	Control link	Check for loose bolts and nuts Grease 1 place		1
	⑬	Hydraulic oil line filter	Change filter element		1
	⑮	Fuel filter	Change filter element		1
	⑱	Fuel pre-filter	Change filter element		1
	㉕	Differential and final drive	Change gear oil	Gear oil	1
Every 1000 service hours	②	Hydraulic oil suction filter	Clean filter element		1
	③	Hydraulic oil tank	Change hydraulic oil	Hydraulic oil	1
	⑨	Vibrator	Change gear oil	Gear oil	1
	⑳	Gear case: Wheel motor	Change gear oil	Gear oil	1
As needed	④	Air cleaner	Change filter element		1
	⑥	Tires	Check inflation		2
	⑭	Radiator	Clean fin		1
	⑰	Breather	Clean filter element		1
	㉗	Fuel tank	Drain water and dirt		1

* SV412TB, SV412FB only

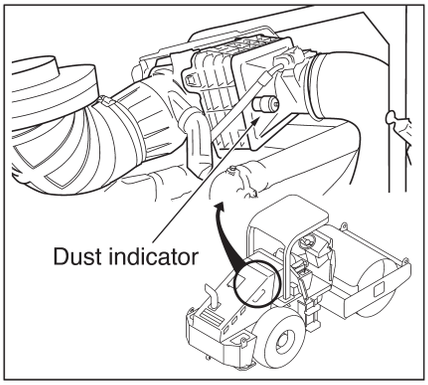
3.4 Maintenance Procedure

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

(1) Every 10 hours or daily

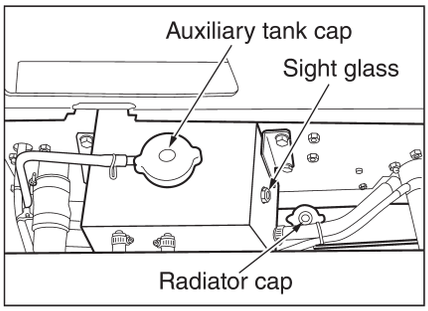
④ Air cleaner

When the red float of the dust indicator reaches the service level (a mark on the indicator), change the filter element (see page 68).



⑭ Radiator and auxiliary tank

Check to see coolant level in the sight glass, if coolant can not be seen, replenish with the auxiliary tank cap removed.Use soft water only.



⚠ CAUTION

Failure to follow this procedure can result in severe engine damage.

Fill : 1) Open heater valves that can be found beneath the engine, and turn the heater to "heat" mode (only the appropriate machine.)

2) Fill coolant at 3 gallons per minute (12 liters per minute) until coolant reaches the bottom of the fill neck. Wait for 1 minute, then top up coolant to the bottom of the fill neck if needed.

3) Start engine and run at "mid" speed for 1 minute or until engine warning lamp comes on.

4) Turn off engine and top up coolant to bottom of fill neck if needed.

5) Replace the cap.

⚠ WARNING

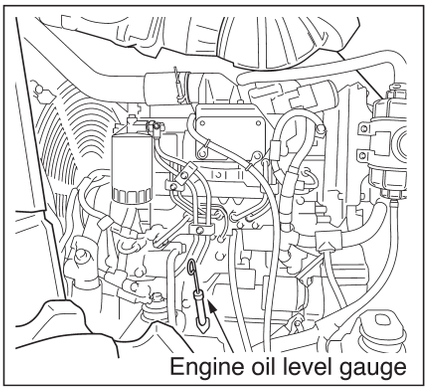
- **Do not remove the radiator cap and auxiliary tank cap while the coolant is hot.**
- **Hot water may be spouted out that can cause scald. Relieve pressure by slowly turning the cap after the water temperature is dropped, then remove the cap.**

NOTE: Replace LLC every two years. Replace the other types every year.

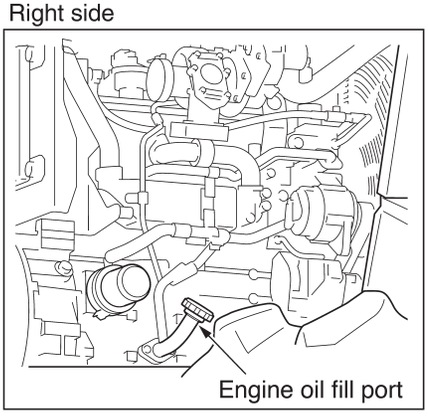
⑯ Engine oil level gauge

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.

Left side

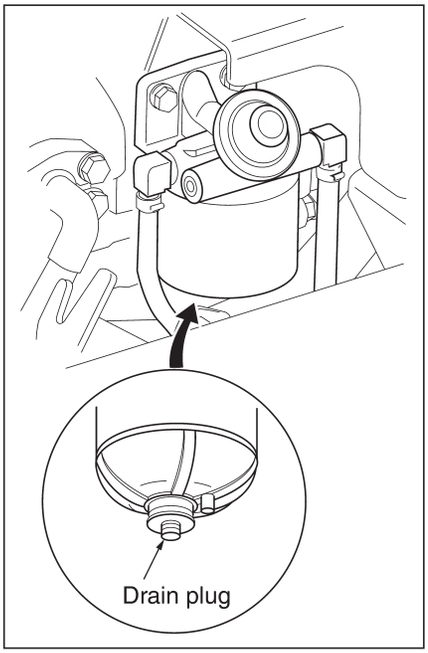


Right side



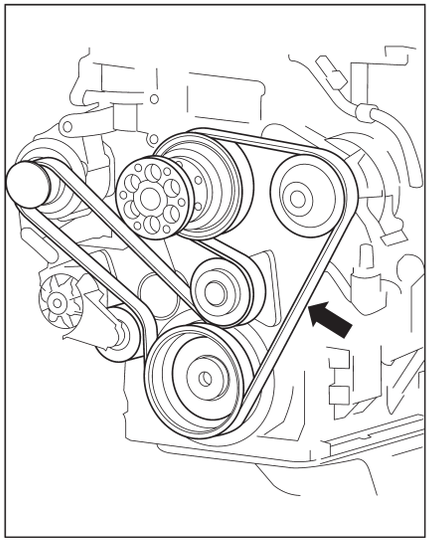
⑱ Fuel pre-filter

Check the filter for water at regular intervals and drain as necessary.



㉔ Fan belt

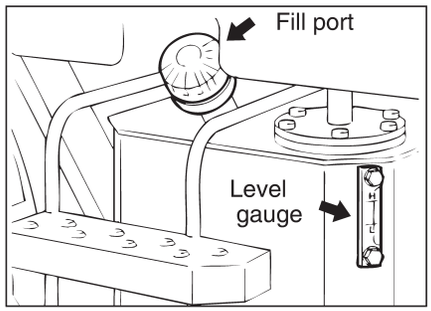
Check the fan belt for wear and damage. Replace as necessary.



(2) Every 50 hours

① Hydraulic oil level gauge

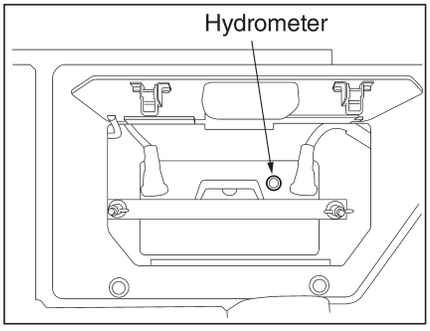
Check the oil level with the sight glass on the side of tank. The level is proper if it is between H and L marks when cold.
Of necessary, add the hydraulic fluid from the fill port.



⚠ WARNING

Be sure to use hydraulic oil recommended by SAKAI.

⑦ Battery

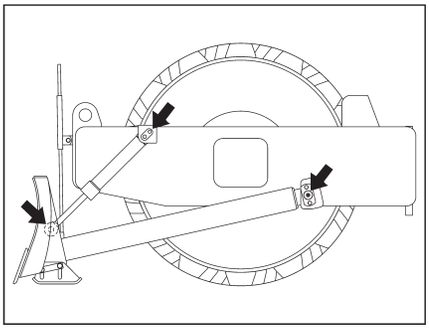


1) Check the condition of the battery and replace it as necessary.
   Check the color of the hydrometer atop the battery to confirm the condition of the battery.
   - Green ..... Satisfactory
   - Black ..... Charging is necessary
   - Semitransparent Replacement is necessary
2) When the terminal is loose, tighten it sufficiently, and thinly apply vaseline or grease to prevent rusting.

⑲ Blade cylinder (For model SV412TB, SV412FB)

㉑ Push rod anchor pin (For model SV412TB, SV412FB)

Apply grease



(3) Every 250 hours

⑤ Engine oil filter

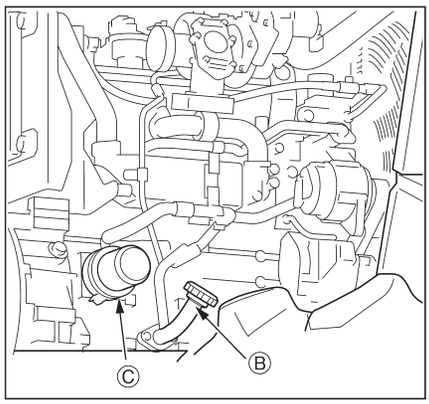
Change the filter element

㉖ Engine oil pan

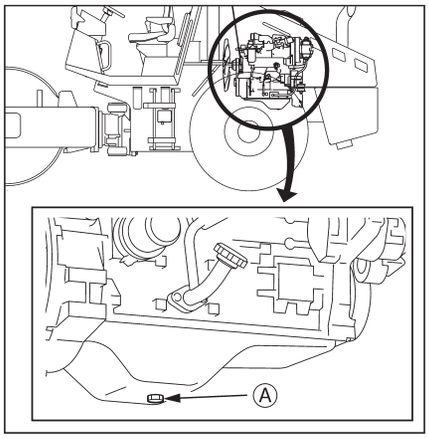
➡ **See the separate engine manual.**

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.



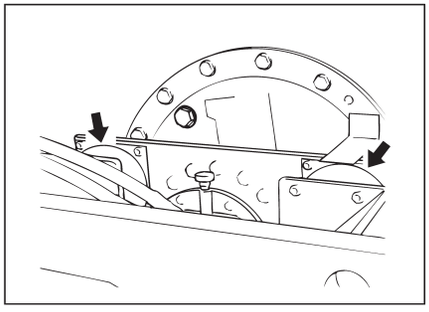
2) Refit the drain plug Ⓐ and fill the crankcase with the engine oil from the fill hole Ⓑ .
3) Change the oil filter element Ⓒ .



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

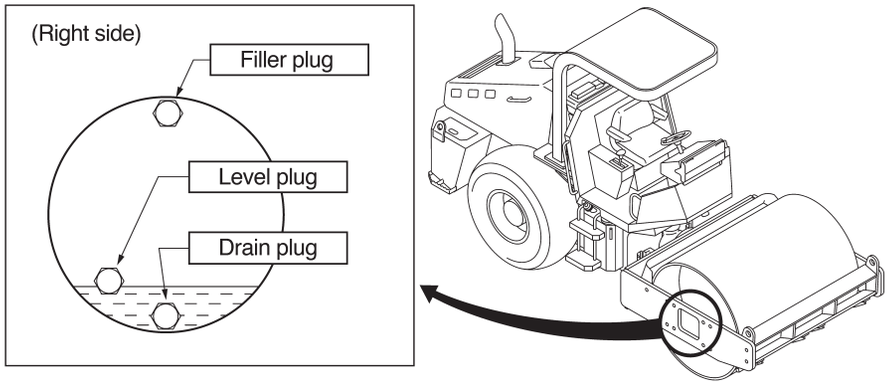
⑧ Rubber dampers

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



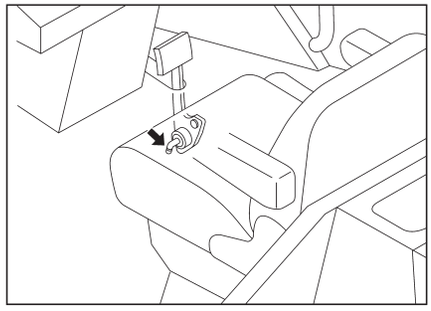
⑨ Vibrator

Check for the oil level and leakage.



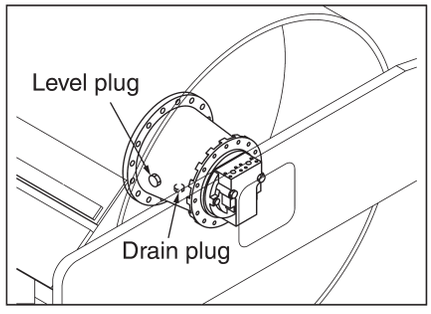
⑩ Brake

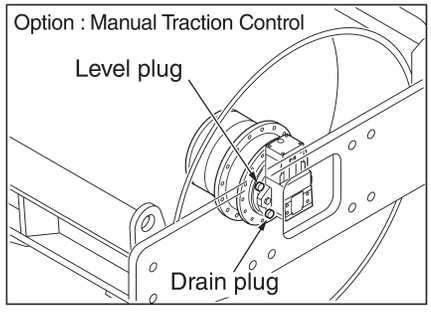
Apply grease to the brake pedal bracket.



⑳ Gear case : Wheel motor

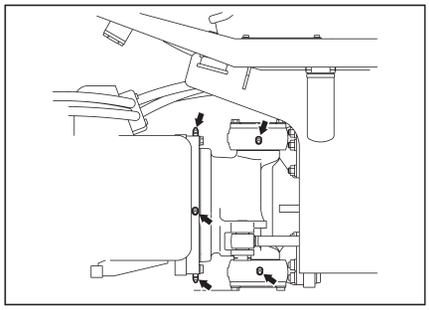
1) Position the drum so that the drain plug comes to the bottom.
2) Check for oil level, and add oil through the fill port as necessary.





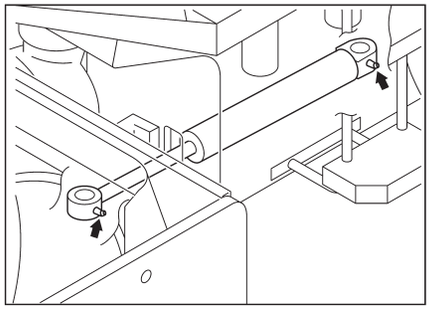
㉒ Center pin and tilt pin bearings

Apply grease at 6 locations.



㉓ Steering cylinder

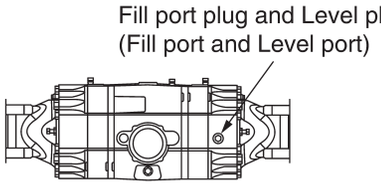
Apply grease at 4 locations.
The steering cylinder is provided on both sides of the machine.



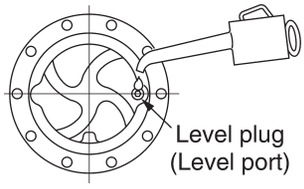
㉕ Differential case and final drive

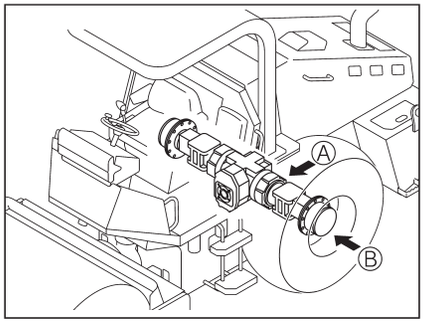
Check for oil level, and add oil through the fill port as necessary.

〈Differential case Ⓐ〉



〈Final drive Ⓑ〉



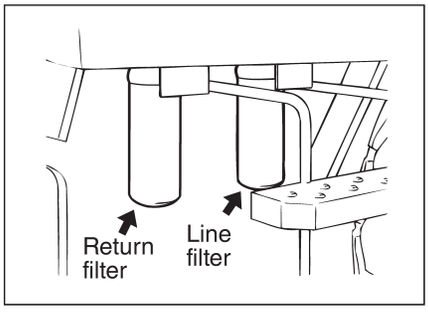


(4) Every 500 hours

⑪ Hydraulic oil return filter

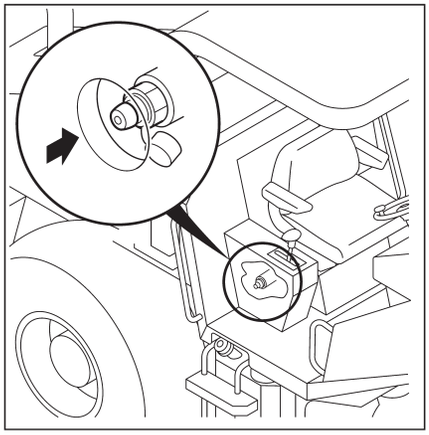
⑬ Hydraulic oil line filter

Change the filter elements.



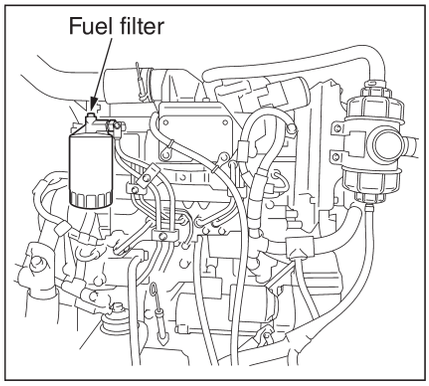
⑫ Control link

1) Check the nuts for looseness. Adjust the rod.
2) Apply grease to F-N-R lever shaft.



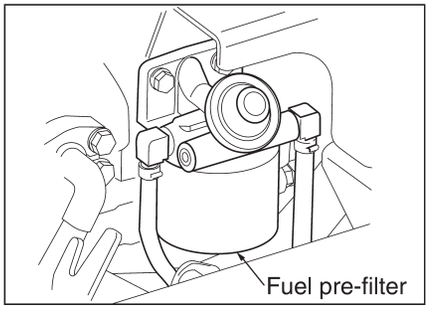
⑮ Fuel filter

➡ **See the separate engine manual.**
Change the filter element.



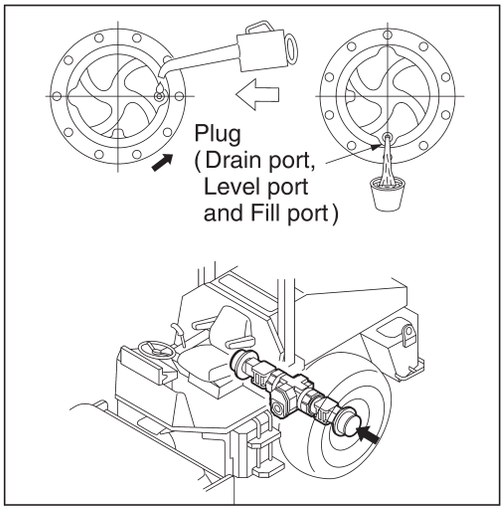
⑱ Fuel pre-filter

Change the filter element.



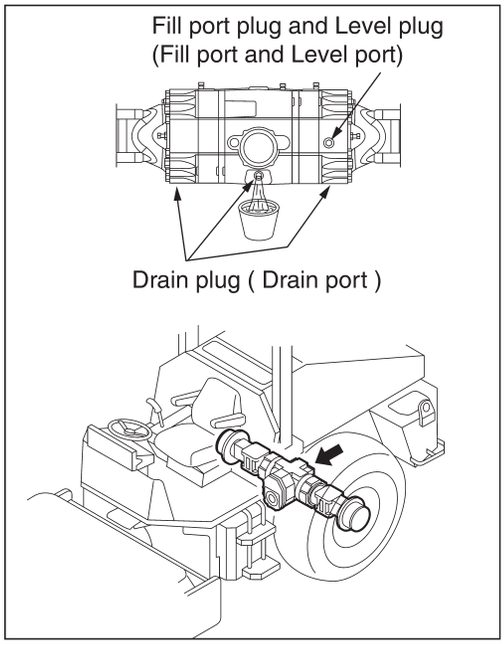
㉕ Final drive

1) Rotate the wheel till the drain port is located at the lowest position. Remove plug to drain oil.
2) At the final drive, adjust the position of plug until it is parallel to the ground.
3) Fill oil through the fill port till oil overflows from the level port.
4) When the final drive case is filled to the specified level, refit the removed plugs.



㉕ Differential case

1) Drain oil by removing the drain plug, fill port plug and level plug.
2) Refit the drain plug.
3) Fill oil through the fill port till it overflows from the level port.
4) Refit the removed plugs.



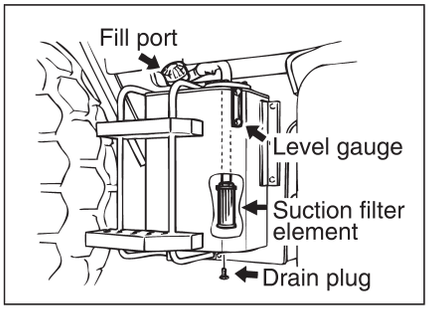
(5) Every 1,000 hours

② Hydraulic oil suction filter

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

③ Hydraulic oil 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.

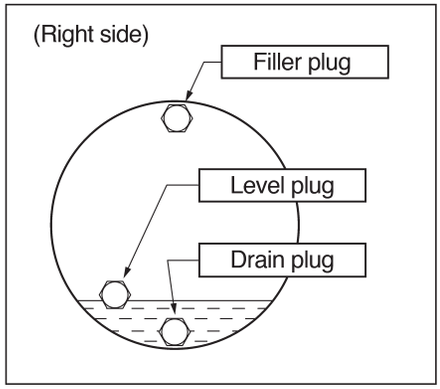


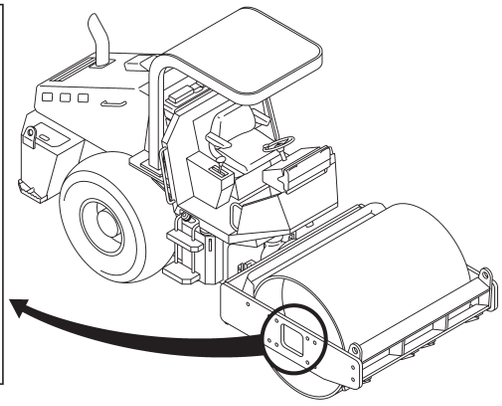
⚠ WARNING

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

⑨ 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) Clean the vibrator before reinstalling 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

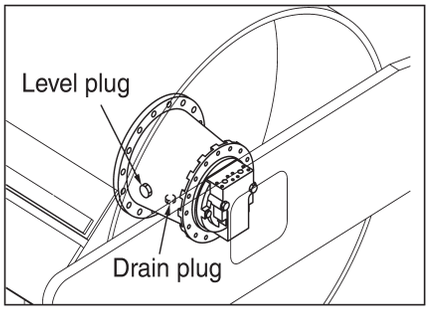
When draining a hot oil, use care not to get burned.

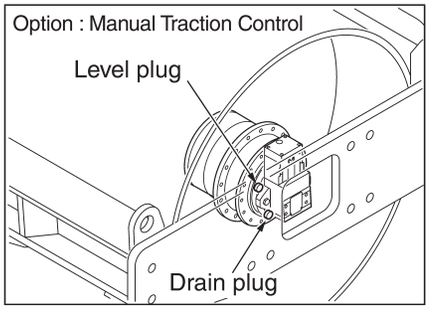
⚠ CAUTION

The oil capacity of the vibrator is 21 liters each. Do not fill more than 21 liters.

⑳ Gear case : Wheel motor

1) Position the drum so that the drain plug comes to the bottom.
2) Remove the drain plug and drain the oil while it is warm.
3) Rotate the drum so that a drain hole may come to top. Refit the drain plug and fill the oil through the fill hole until it overflows at the level hole.
4) Refit the level plug and drain plug.



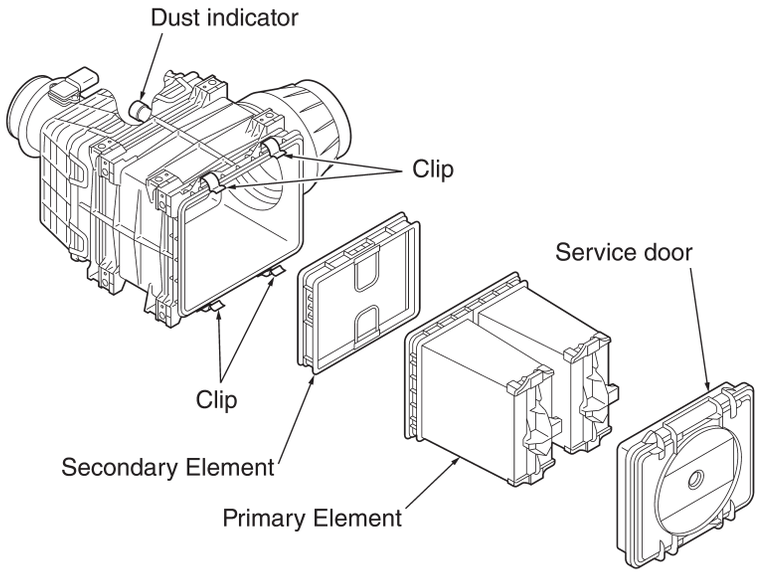


(6) As needed

④	**Air cleaner**

When the red float of the dust indicator reaches the service level (a mark on the indicator), change the element as described below.

1) Release the service door clips to remove the pre-cleaner from the main filter housing.
2) Primary Element:
   Grasp the handle in the center of the element and pull the filter element outward.
   Clean the inside of the housing with a damp rag to remove all loose dirt and dust.



3) Secondary Element

⚠ CAUTION

Take caution when removing the secondary element. Any loose debris can fall into the air intake plumbing leading directly to the engine. Clean the area around the secondary filter element and replace the secondary promptly to avoid engine contamination ingestion.

⚠ CAUTION

Do not attempt to clean the filter element. Cleaning filter elements by impact or compressed air voids the warranty and can degrade or damage the filter media leading to malfunction.

NOTE: The secondary element should be changed every third time that the primary element is changed, If the primary element has been breached then an inspection of the secondary filter must be performed and changed if necessary.

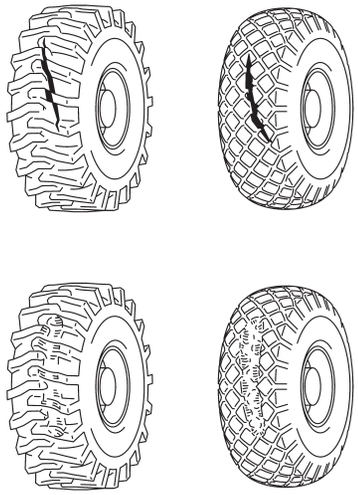
The secondary element is removed by pulling on the plastic ring tabs on the inside face of the filter element.

⚠ WARNING

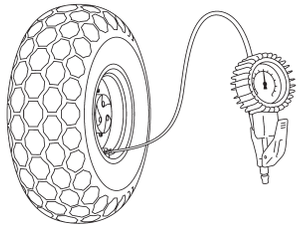
- **Stop the engine before inspection, cleaning, or maintenance, otherwise dust will enter the engine, causing the breakdown of the engine.**
- **Wear protective goggles, a dust respirator, and other protective gear before cleaning the air cleaner and outer element in order to prevent dust from entering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

4) Attach the element and service door it with a clips.

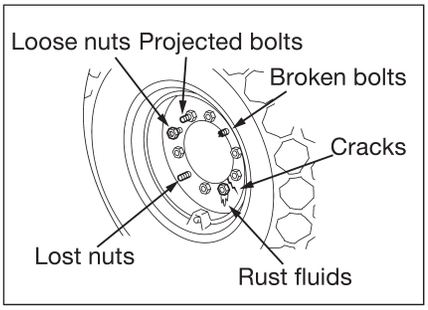
⑥ Tires



1) Check if there are wears and flaws.
   Please check if there are any cracks and damages such as wears on one side, partial wares, step-shaped wares, nails and stones stuck or cut into the tires on the contacting surfaces with the grounds, both side surfaces and all around of the tires. If you find any abnormal conditions, replace tires.
2) Check air pressures.Check air pressures with tire gauges when tires are cool enough, and make certain that they are at 137.3 kPa {20psi}. Adjust air pressures of the tires if they are NOT appropriate.
3) Check whether or not the wheel nuts are loose. Check if the wheel hub nuts are loose or fallen off or if wheel hub bolts are broken. Also check if there are any rust fluids and/or whether or NOT the lengths of all the wheel hub bolts projected out of the wheel hub nuts are the same.



Check the wheel hub nut for looseness. If it is loose, tighte'n it. Be sure to torque it to the specified value.
Tightening torque: **785 N · m**



⚠ CAUTION

- **Turn the wheel hub nut in the tightening direction during inspection.**
- **Excessive tightening of the wheel hub nut will lead to breakage of bolts or cracks in the disc wheel. Be sure to observe the specified torque.**

NOTE: Tighten the wheel hub nut 50 hours after purchase of a new vehicle or replacement of tires.

Roll

The roll may be worn deeply and broken depending on the operation method and the condition of the site. Check the roll occasionally in the same way as tires.

⑭ Radiator

Clean the cooling fins.

⚠ WARNING

Use the safety glasses or goggles during the use of compressed air.

IMPORTANT

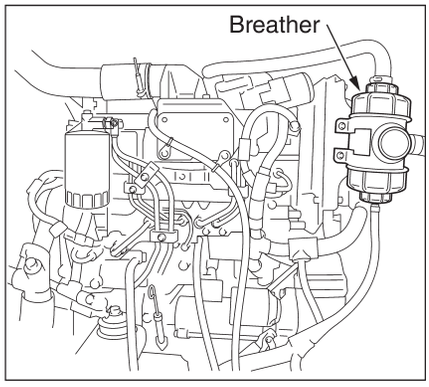
If the discharge rate of compressed air or tap water is too high, it can damage the radiator or the fins of the oil cooler. Keep a distance of 500mm or more between the nozzle and the core surface.

In case dirt or dust is attached, clean the radiator, the oil cooler and the core with compressed air or tap water.
It is to prevent performance decline of the cooling system.

IMPORTANT

Don't use any driver or steel spatula (or paddle). If it rubs the fins, it can damage the tubing.

⑰ Breather



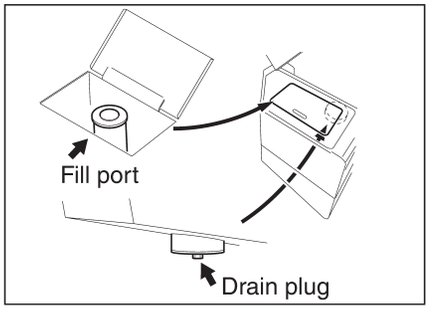
➡ **See the separate engine manual.**

Provide inspection and cleaning of the breather hoses and breather filter element.
When you find any damage, make sure to replace it.

㉗ Fuel tank

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

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.



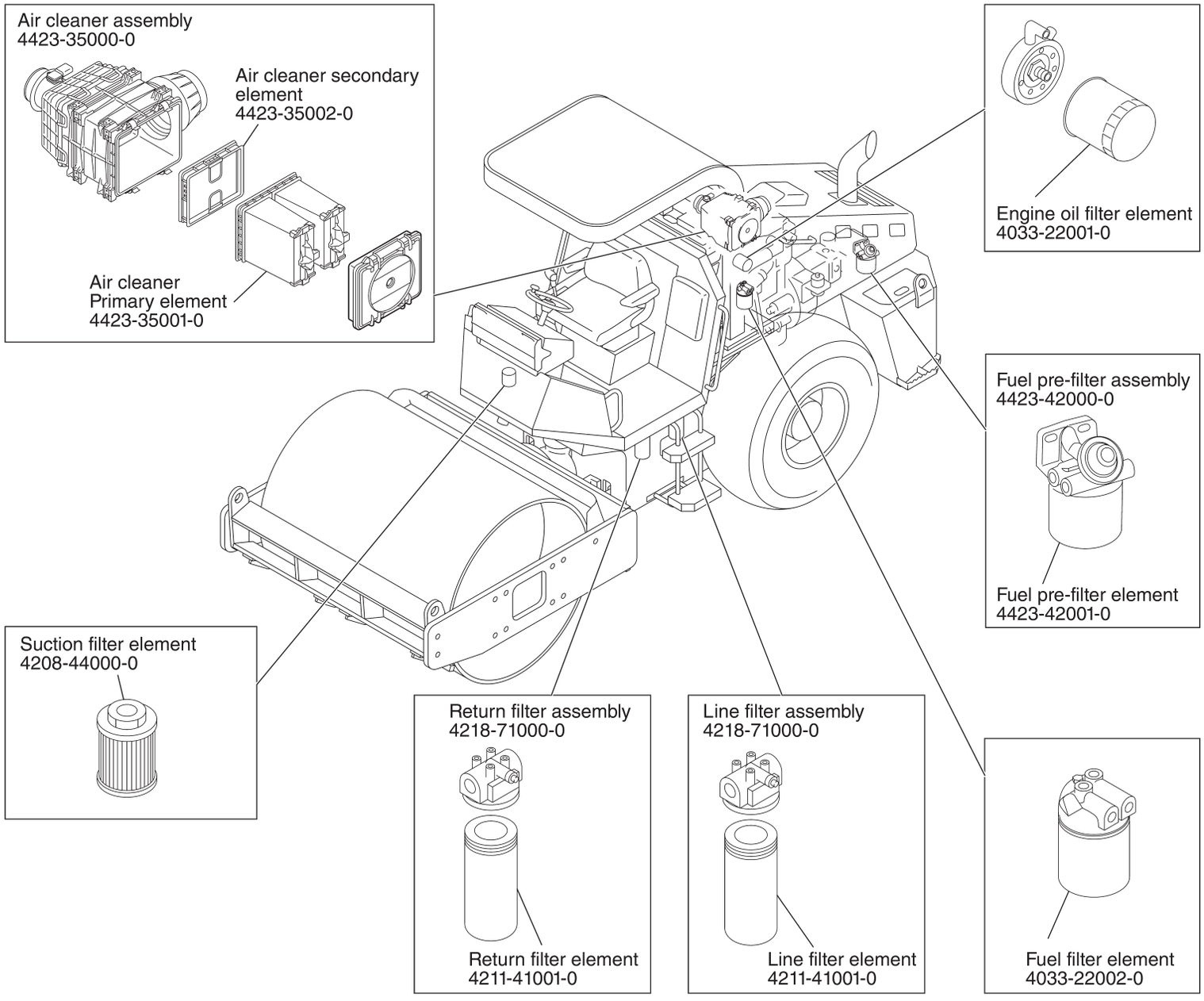
⚠ WARNING

- **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.**

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 vehicle in use.

Consumable Part	Part No.	Interval		Remark
		Annual replacement (year)	Replacement per operation (hours)	
Engine oil filter element	4033-22001-0	0.25	250	
Return filter assembly	4218-71000-0		As needed	
Return filter element (hydraulic oil)	4211-41001-0		500	
Line filter assembly	4218-71000-0		As needed	
Line filter element (hydraulic oil)	4211-41001-0		500	
Fuel pre-filter assembly	4423-42000-0		As needed	
Fuel pre-filter element	4423-42001-0	0.5	500	
Fuel filter element	4033-22002-0	0.5	500	
Suction filter element (hydraulic oil)	4208-44000-0		1000	
Air cleaner assembly	4423-35000-0		As needed	
Primary element	4423-35001-0		As needed	
Secondary element	4423-35002-0		As needed	They should be replaced with new ones once in every three times of Primary elements' replacement.


Air cleaner assembly
4423-35000-0
Air cleaner secondary element
4423-35002-0
Air cleaner Primary element
4423-35001-0
Engine oil filter element
4033-22001-0
Fuel pre-filter assembly
4423-42000-0
Fuel pre-filter element
4423-42001-0
Suction filter element
4208-44000-0
Return filter assembly
4218-71000-0
Return filter element
4211-41001-0
Line filter assembly
4218-71000-0
Line filter element
4211-41001-0
Fuel filter element
4033-22002-0

3.6 Fluid and Lubricant Capacities

(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) When fueling SAKAI machines, be sure to use the fuel that we specity or recommend. Nonconformance resulting from use of fuel and lube oil other than those specified or recomended by our company is not covered by our warranty and repair service.

(2) Capacity

Compartment	Type of fluid	Capacity in liters(gal.)	
		SV412	SV412 OPTION (Manual Traction Control)
Fuel tank	Diesel oil	172 (45)	←
Engine oil pan	Engine oil	7 (1.8)	←
Hydraulic oil tank	Hydraulic oil	50 (13)	←
Gearcase : Wheel motor	Gear oil	3.2 (0.8)	1.96 (0.5)
Radiator	Coolant	20 (5.3)	←
Vibrator	Gear oil	21 (5.5)	←
Differential	Gear oil	7.3 (1.9)	←
Final drives	Gear oil	1.25 x 2 (0.3 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 15W-40	SAE 15W-40	SAE 15W-40	MIL-L-2104B
Gear oil	API grade GL5	SAE 80W-90	SAE 90	SAE 140	MIL-L-2105
Hydraulic oil	Anti wear	ISO-VG32	ISO-VG46	ISO-VG68	ISO-3448
Grease	Lithium type extreme pressure				NLGI-2
Fuel	Diesel oil				ASTM D975-2D

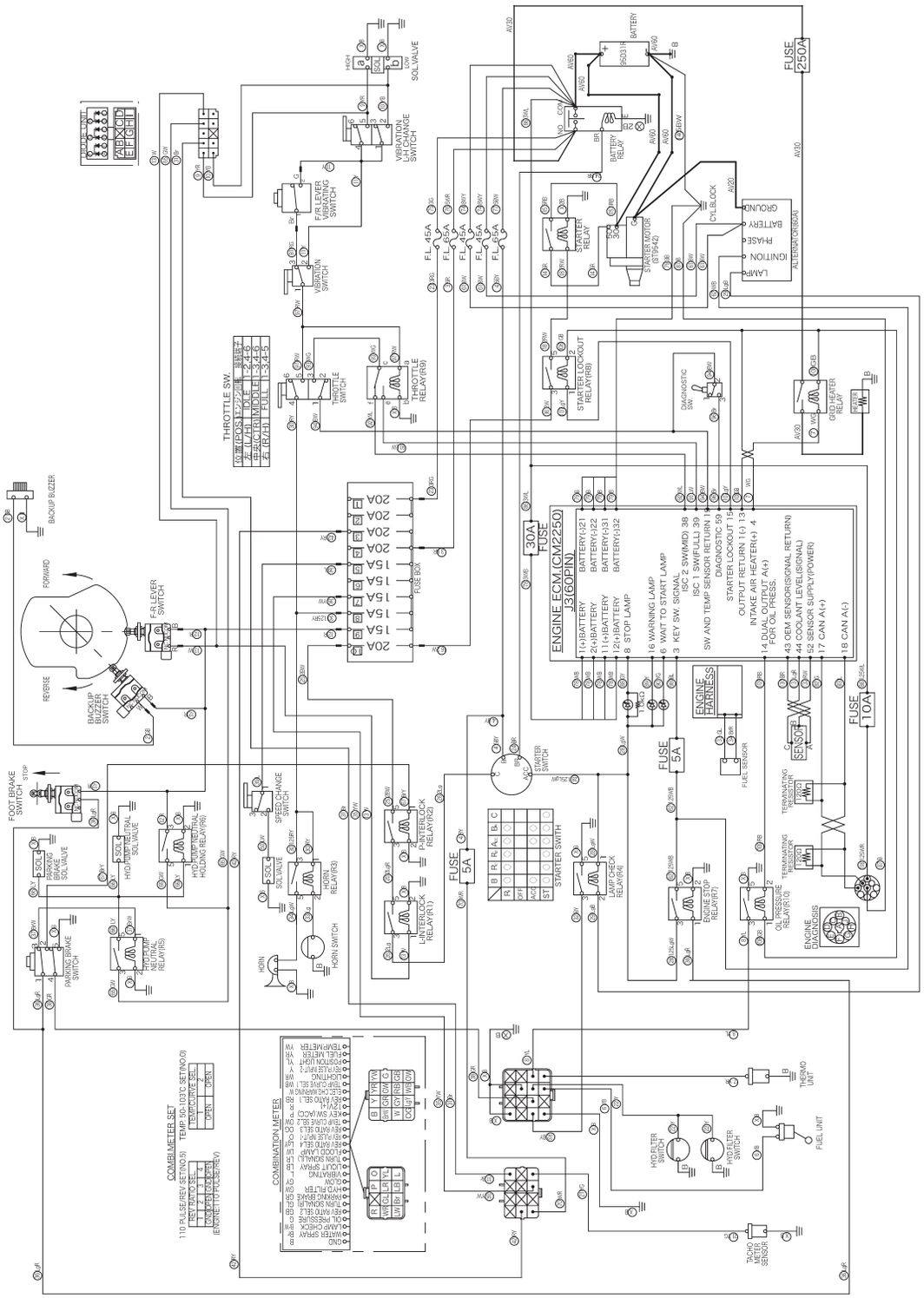
(4) Recommended lubricants

Lubricant / Oil company	Engine oil API – CJ4	Gear oil API GL 5	Hydraulic oil ISO-VG 46	Grease (NLGI – 2)
CHEVRON	DELO 400 LE	—	Rando HDZ 46	Multifak EP 2
BP	—	BP Energear HYPO – U	Bartran HV 46	BP Energrease LS – EP 2
CASTROL	Tection Extra	EXP GEAR OILS	Castrol Hyspin AWH 46	Castrol Spherrol ELP 2
EXXON MOBIL	Mobil Delvac 1 ESP	Mobilude HD	Mobil DTE 10 Excel 46	Mobilux EP 25
SHELL	Shell Rimula R4 L	Shell Spirax S2 A 90	Shell Tellus S2V 46	Shell Alvania Grease EP 2

CAUTION: 1) Fill the fluid reservoirs with the filters installed.
2) Use recommended fuels and lubricants only.
3) Use the hydraulic oils which specifications are as clean as ISO4406 18/13 or above.

3.7 Electric Wiring Diagram

SV412D / SV412T / SV412TF / SV412TB / SV412FB

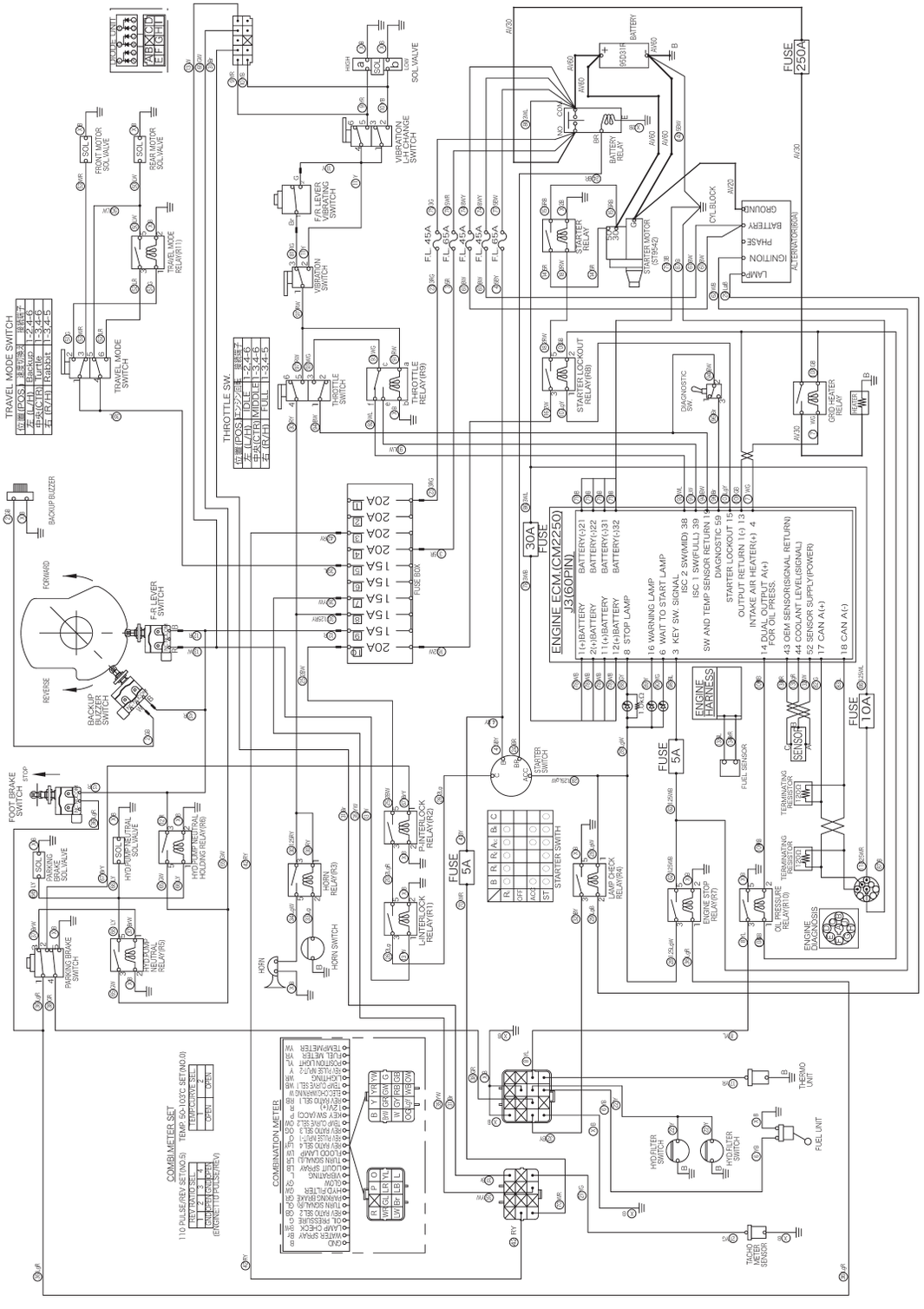


CAUTION: Size of wires not indicated by letters are AV 0.85.

Color of wire

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	BrW	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 strope	WB	White/ Black stripe	YG	Yellow/ Green stripe	Sb	Blue		
Br	Brown	GL	Green/ Blue strope	L	Blue	O	Orange	RL	Red/ Blue stripe	WL	White/ Blue stripe	YL	Yellow/ Blue stripe	BG	Black/ Green stripe		

SV412D / SV412T / SV412TF / SV412TB / SV412FB
Option (Manual Traction Control)



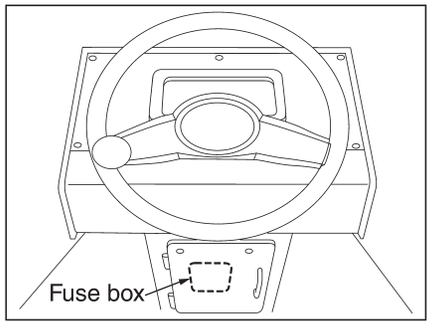
CAUTION: Size of wires not indicated by letters are AV 0.85.

Color of wire

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	BrW	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 strope	L	Blue	O	Orange	RL	Red/ Blue stripe	WL	White/ Blue stripe	YL	Yellow/ Blue stripe	BG	Black/ Green stripe		

3.8 Fuse box

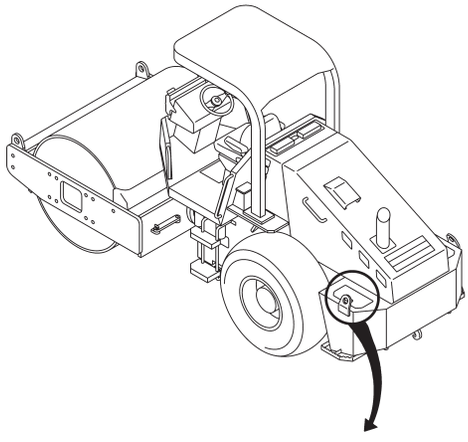
The fuse box houses five 15A-,five 20A- lined up with spares fitted for 15A-,and 20A- fuses. Use fuses of correct capacity. See page 28.

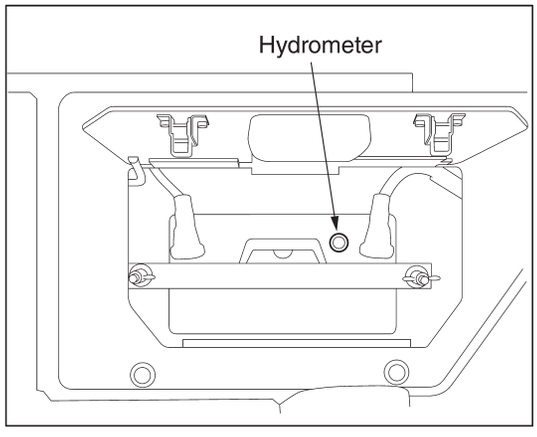


NOTE: When a fuse is burned, determine the cause before replacing.

3.9 Battery

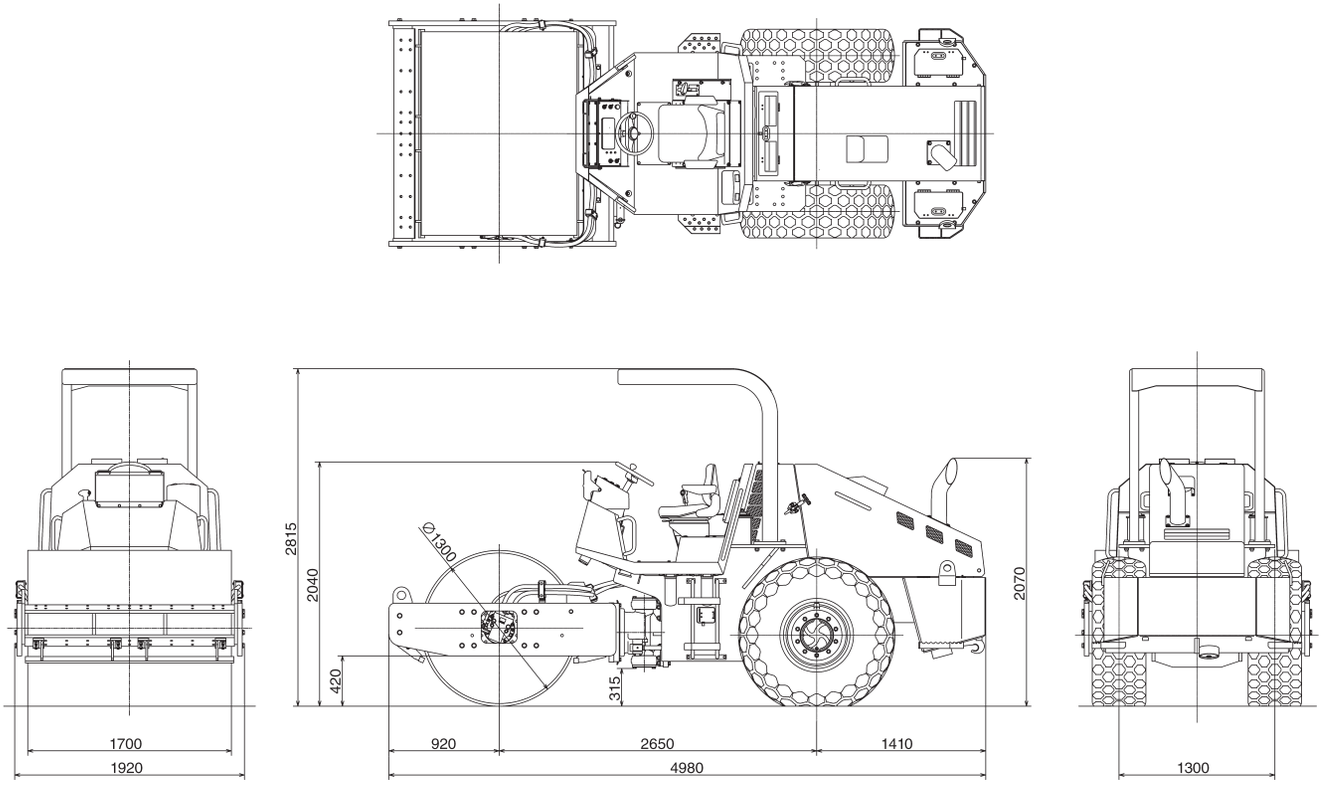
1) Leaving the battery unused for long without attention or using its power excessively at a time can cause damage to the plates, leading to a shortened life.
2) For long-term storage, charge it fully, store in a cool and dry place, and check the level of charge at least once a month.
3) Maintain the level of charge above 75%.
4) In cold weather, it is desirable to start the engine with the battery charged 100%. Do not try to start the engine with less than 75%.





4 SPECIFICATIONS

(1) SV412D



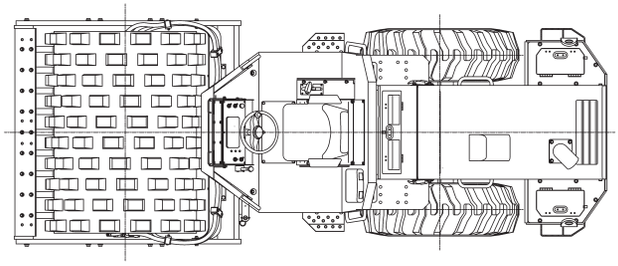
Model	SV412D
Weight:	
Gross weight	7,540 kg (16,620 lbs)
On front axle	3,600 kg (7,935 lbs)
On rear axle	3,940 kg (8,685 lbs)
Dimension:	
Overall length	4,980 mm (196”)
Overall width	1,920 mm (76”)
Overall height	2,815 mm (111”)
Wheelbase	2,650 mm (104”)
Wheel	
Front	Roll (dia. x width)
	1,300 x 1,700 mm (51” x 67”)
Rear	Tire
	16.9-24-6PR
Performance:	
Travel speed	
Low	0 ~ 6 km/h (0 ~ 3.7 mile/h)
High	0 ~ 10 km/h (0 ~ 6.2 mile/h)
* Reverse slope operation	0 ~ 7 km/h (0 ~ 4.3 mile/h)

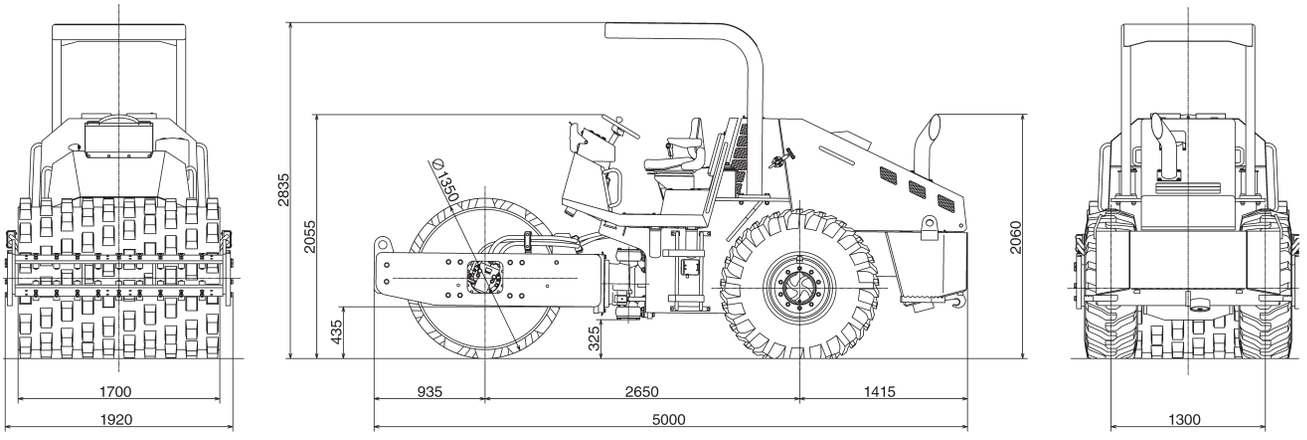
Vibrating power:		
	Low	High
Frequency	38 Hz {2,300 vpm}	30 Hz {1,800 vpm}
Centrifugal force	93 kN(20,905 lbs)	118 kN(26,525 lbs)
Gradability	61% (32°)	
Rolling width	1,700 mm (67”)	
Minimum turning radius	4.9 m (193”)	
Engine:		
Model	CUMMINS “QSB3.3” Diesel Engine with turbo charger	
Total displacement	3.262 litres (199 cu.in)	
Rated output	82kW {110 HP} /2,400 min^{-1}	
Max. torque	415N·m {306 lb-ft } /1,600 min^{-1}	
Tank capacity:		
Fuel tank	172 liters (45 gal)	
Hydraulic oil tank	50 liters (13 gal)	

* : Option

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

(2) SV412T





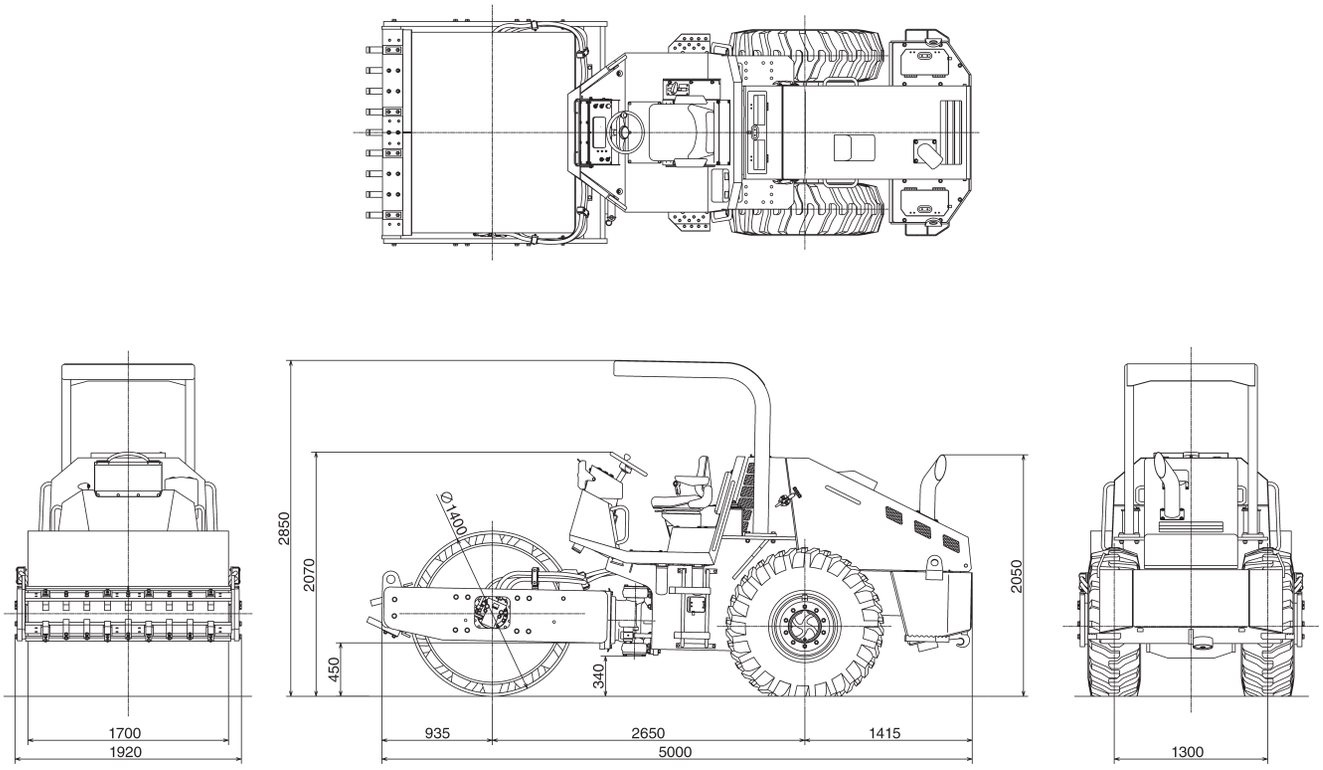
Model	SV412T
Weight:	
Gross weight	7,780 kg (17,150 lbs)
On front axle	3,820 kg (8,420 lbs)
On rear axle	3,960 kg (8,730 lbs)
Dimension:	
Overall length	5,000 mm (197”)
Overall width	1,920 mm (76”)
Overall height	2,835 mm (112”)
Wheelbase	2,650 mm (104”)
Wheel	
Front	Roll (dia. x width)
	1,350 x 1,700 mm (53” x 67”)
Rear	Tire
	16.9-24-6PR
Performance:	
Travel speed	
Low	0 ~ 6 km/h (0 ~ 3.7 mile/h)
High	0 ~ 10 km/h (0 ~ 6.2 mile/h)
* Reverse slope operation	0 ~ 7 km/h (0 ~ 4.3 mile/h)

Vibrating power:		
	Low	High
Frequency	38 Hz {2,300 vpm}	30 Hz {1,800 vpm}
Centrifugal force	103 kN(23,155 lbs)	127 kN(28,550 lbs)
Gradability	60% (31°)	
Rolling width	1,700 mm (67”)	
Minimum turning radius	4.9 m (193”)	
Engine:		
Model	CUMMINS “QSB3.3” Diesel Engine with turbo charger	
Total displacement	3.262 litres (199 cu.in)	
Rated output	82kW {110 HP} /2,400 min^{-1}	
Max. torque	415N·m {306 lb-ft } /1,600 min^{-1}	
Tank capacity:		
Fuel tank	172 liters (45 gal)	
Hydraulic oil tank	50 liters (13 gal)	

* : Option

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

(3) SV412TF



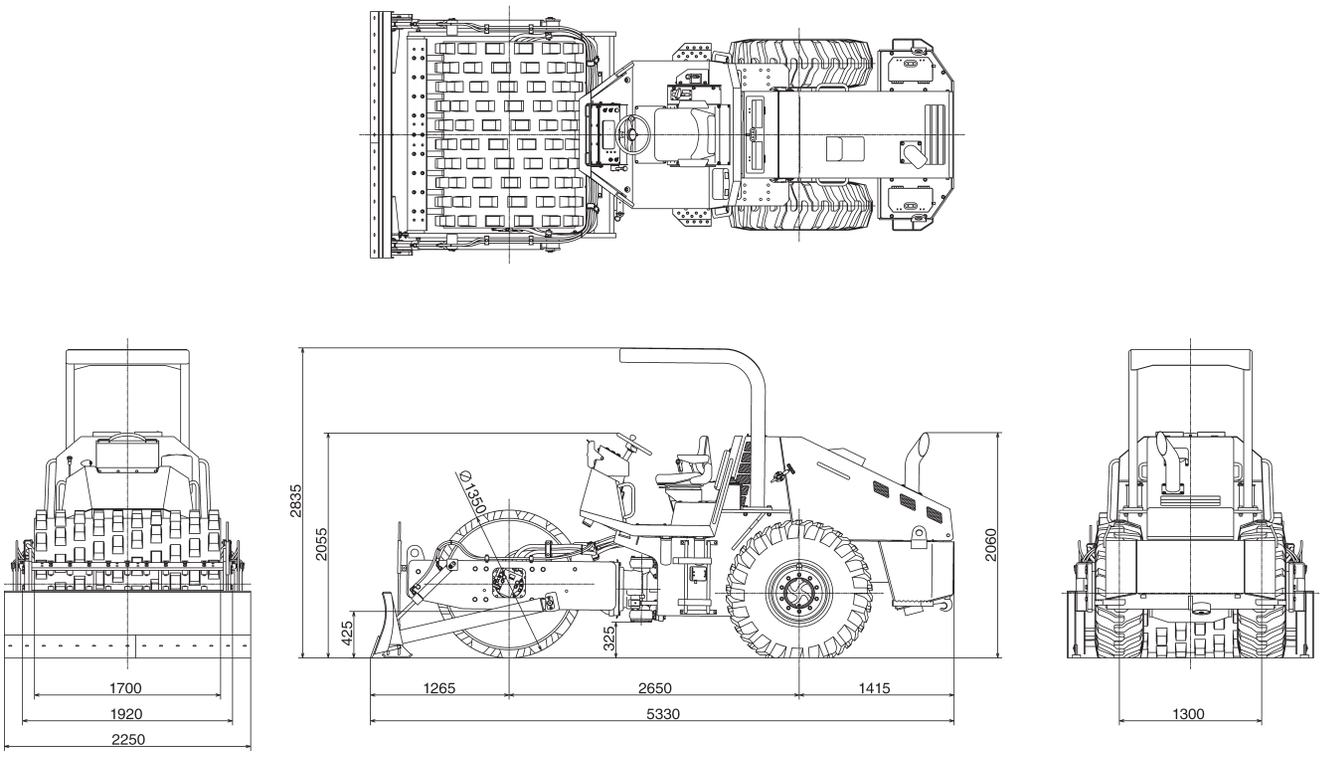
Model	SV412TF
Weight:	
Gross weight	9,050 kg (19,950 lbs)
On front axle	5,110 kg (11,265 lbs)
On rear axle	3,940 kg (8,685 lbs)
Dimension:	
Overall length	5,000 mm (197”)
Overall width	1,920 mm (76”)
Overall height	2,850 mm (112”)
Wheelbase	2,650 mm (104”)
Wheel	
Front	Roll (dia. x width)
Smooth	1,400 x 1,700 mm (55” x 67”)
Pad	1,350 x 1,700 mm (53” x 67”)
Rear	Tire
	16.9-24-6PR
Performance:	
Travel speed	
Low	0 ~ 6 km/h (0 ~ 3.7 mile/h)
High	0 ~ 10 km/h (0 ~ 6.2 mile/h)
* Reverse slope operation	0 ~ 7 km/h (0 ~ 4.3 mile/h)

Vibrating power:		
	Low	High
Frequency	38 Hz {2,300 vpm}	30 Hz {1,800 vpm}
Centrifugal force	103 kN(23,155 lbs)	127 kN(28,550 lbs)
Gradability	46% (25°)	
Rolling width	1,700 mm (67”)	
Minimum turning radius	4.9 m (193”)	
Engine:		
Model	CUMMINS “QSB3.3” Diesel Engine with turbo charger	
Total displacement	3.262 litres (199 cu.in)	
Rated output	82kW {110 HP} /2,400 min^{-1}	
Max. torque	415N·m {306 lb-ft } /1,600 min^{-1}	
Tank capacity:		
Fuel tank	172 liters (45 gal)	
Hydraulic oil tank	50 liters (13 gal)	

* : Option

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

(4) SV412TB



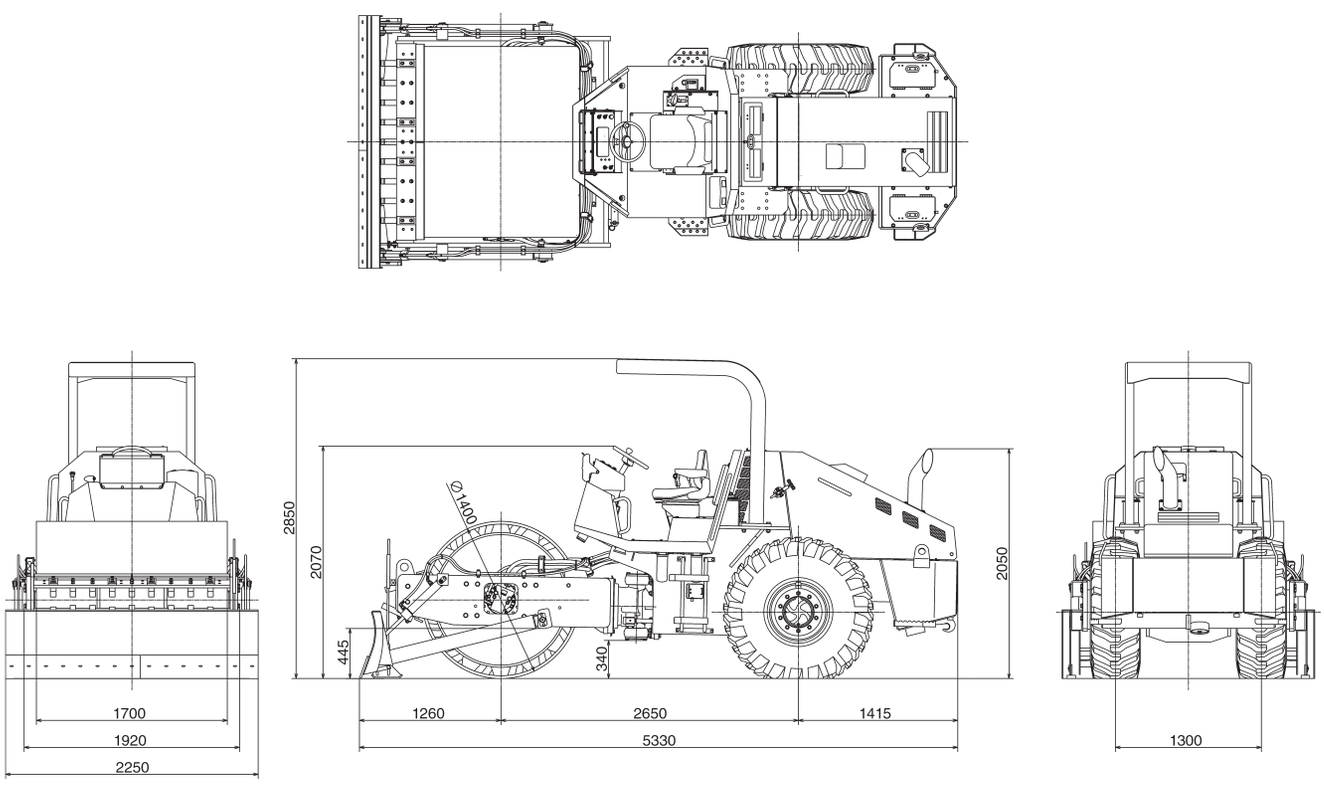
Model	SV412TB
Weight:	
Gross weight	8,200 kg (18,080 lbs)
On front axle	4,340 kg (9,570 lbs)
On rear axle	3,860 kg (8,510 lbs)
Dimension:	
Overall length	5,330 mm (210”)
Overall width	2,250 mm (89”)
Overall height	2,835 mm (112”)
Wheelbase	2,650 mm (104”)
Wheel	
Front	Roll (dia. x width)
	1,350 x 1,700 mm (53” x 67”)
Rear	Tire
	16.9-24-6PR
Performance:	
Travel speed	
Low	0 ~ 6 km/h (0 ~ 3.7 mile/h)
High	0 ~ 10 km/h (0 ~ 6.2 mile/h)
* Reverse slope operation	0 ~ 7 km/h (0 ~ 4.3 mile/h)

Vibrating power:		
	Low	High
Frequency	38 Hz {2,300 vpm}	30 Hz {1,800 vpm}
Centrifugal force	103 kN(23,155 lbs)	127 kN(28,550 lbs)
Gradability	55% (29°)	
Rolling width	1,700 mm (67”)	
Minimum turning radius	4.9 m (193”)	
Engine:		
Model	CUMMINS “QSB3.3” Diesel Engine with turbo charger	
Total displacement	3.262 litres (199 cu.in)	
Rated output	82kW {110 HP} /2,400 min^{-1}	
Max. torque	415N·m {306 lb-ft } /1,600 min^{-1}	
Tank capacity:		
Fuel tank	172 liters (45 gal)	
Hydraulic oil tank	50 liters (13 gal)	

* : Option

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

(5) SV412FB



Model	SV412FB
Weight:	
Gross weight	9,460 kg (20,855 lbs)
On front axle	5,630 kg (12,410 lbs)
On rear axle	3,830 kg (8,445 lbs)
Dimension:	
Overall length	5,330 mm (210”)
Overall width	2,250 mm (89”)
Overall height	2,850 mm (112”)
Wheelbase	2,650 mm (104”)
Wheel	
Front	Roll (dia. x width)
Smooth	1,400 x 1,700 mm (55” x 67”)
Pad	1,350 x 1,700 mm (53” x 67”)
Rear	Tire 16.9-24-6PR
Performance:	
Travel speed	
Low	0 ~ 6 km/h (0 ~ 3.7 mile/h)
High	0 ~ 10 km/h (0 ~ 6.2 mile/h)
* Reverse slope operation	0 ~ 7 km/h (0 ~ 4.3 mile/h)

Vibrating power:		
	Low	High
Frequency	38 Hz {2,300 vpm}	30 Hz {1,800 vpm}
Centrifugal force	103 kN(23,155 lbs)	127 kN(28,550 lbs)
Gradability	44% (24°)	
Rolling width	1,700 mm (67”)	
Minimum turning radius	4.9 m (193”)	
Engine:		
Model	CUMMINS “QSB3.3” Diesel Engine with turbo charger	
Total displacement	3.262 litres (199 cu.in)	
Rated output	82kW {110 HP} /2,400 min^{-1}	
Max. torque	415N·m {306 lb-ft } /1,600 min^{-1}	
Tank capacity:		
Fuel tank	172 liters (45 gal)	
Hydraulic oil tank	50 liters (13 gal)	

* : Option

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

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