



HATSUTA

OPERATOR'S MANUAL

**Core
Sweeper**

HS-806U

AUG.2020

Ver.1

Greeting

Thank you for purchasing this Hatsuta product.

The purpose of this Manual is to provide the user with proper handling and simple maintenance methods for assuring the best performance of this product. And, for the personal safety of the operator please also refer to this booklet. Please keep this booklet nearby and securely for an easy access and reference after reading through it.

Introduction

Please read this booklet for full understanding of operational methods and maintenance methods, and obtain necessary knowledge as an operator for safe and proper use. It is important that the user is responsible for operating this product properly.

A person who performs any maintenance of this product must have proper mechanical knowledge including of Engine, Hydraulics, Electric and other necessary areas of knowledge.

Any questions about maintenance and/or genuine spare parts please contact your dealer or us directly. When doing so, please let us know the model code and the production number.

In case of leasing or change of the ownership to other party, please attach this booklet to the product.

HATSUTA KAKUSANKI Co., Ltd.

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2. Unsafe Warning Signs and Explanations

This section discusses very important safety related items as Unsafe Warning Signs shown below. As they are closely related with personal safety and/or material damage please read carefully and comply.



Unsafe Warning Signs

These signs indicate items containing "Unsafe", "Warning", "Caution".

They are indications for assuring safety as follows:

Danger

When ignoring this "Danger" sign it may result death or serious injury.

Warning

When ignoring this "Warning" sign it may result death or serious injury.

Caution

When ignoring this "Caution" sign it may result personal injury.

Important

When ignoring this "Important" sign it may result mechanical damage or mechanical malfunction.

NOTE

This sign indicates "additional useful explanations" when operating this product.

1. Caution when using this product

Caution

- The content of this booklet may be altered for improvements without prior notice.
- When replacing parts, be sure to use "Hatsuta's genuine parts" or "Hatsuta approved parts".
- Hatsuta will take any responsibility for malfunctions or any damages caused by the use of any Non-genuine or Non-approved parts.

Before start using this product please be sure to read the following Manuals and fully understand the contents.

- ✓ Manual for this Hatsuta product
- ✓ Manual for the Engine
- ✓ Manual for the Battery

2. The purpose of this product

The purpose of this product is to pick-up fallen-leaves or grass clippings, and core-plugs after core aeration on the area covered with grass turf as below:

- ✓ Greens and Tees of golf course
- ✓ Soccer, baseball or other sports fields
- ✓ Maintained commercial turf nursery

Warning

- Do not use for other purposes or alter any mechanisms of this product.
- This product is not approved for driving on a public road. This vehicle cannot be driven on any public roads.
- Even on grass covered surface as noted above, do not drive over the terrain with severe surface movements, rocks and other hard objects located loosely on the surface or buried beneath the surface, excessively soft ground, or any area which may damage this vehicle.

3. For Safe Operation

- 1 Roll-Over Protection structure (ROPS)
- 2 Safety Mechanizms
 - 2.1 Starting the engine
 - 2.2 Safety Mechanisms
 - 2.3 Maintenance Switch

Must read this section for operating safely

Unproper use or lack of proper maintenance will result injuries and death.

Danger

- This product is designed for safe operation, and has gone through sufficient test runs and inspections before leaving the plant.
- This vehicle is equipped with the safety mechanisms. However, it is important to perform proper operation, handling, pre-start inspection, scheduled inspection, and other necessary regular mechanical management to assure the functionality of these safety mechanisms.
- Unproper operation or maintenance of this product may result serious personal injuries and accidents.

1. Roll-Over Protection Structure (ROPS)

- ROPS must NOT be removed from this product.
- Be sure to confirm the seatbelt is securely attached to this vehicle.
- Must fasten the seatbelt while operating this vehicle.
 - The seatbelt must be wrapped around the hucklebone and securely lock to the buckle at the other side of the seat.
 - To release the seatbelt, hold the belt and press the button on the buckle. Continue holding the belt while the belt is pulled into the belt holder smoothly.
 - It is recommended to practice unfastening seatbelt quickly for in case of emergency.
- Be careful not to hit any objects above with ROPS when going under.
- To assure the proper functionality of ROPS in emergency, it must be inspected periodically to confirm it is not damaged nor fastening bolts are loosened,
- Replace with a new ROPS, if ROPS sustained any damage.
- Do not operate this product, if ROPS has been repaired or altered.

2. Safety mechanisms

- Safety mechanisms on this product is to provide safety for the operator. Be sure to confirm these safety mechanisms functions properly before operating this vehicle.
- Repair immediately if the safety mechanisms have malfunctions.
- Must NOT alter the safety mechanisms. If the safety mechanisms are altered, all the manufacture's guarantees for the safety features will not be effective.

2.1 When starting the engine

- ✓ Site tightly in the seat
- ✓ Confirm the parking brake is on

- ✓ Throttle pedal is in the neutral (N) position

The engine can be started when above three conditions are met.

2.2 Safety mechanism functions

While driving/operating

- The engine will stop if the operator leaves from the seat. The operator must be seated and the seatbelt must be fastened while running this vehicle.
- The engine must be stopped before leaving from the seat.

Brush rotation

- The brush will rotate only if "the hopper sits tightly in the position on the hopper bed".
- If "the hopper is raised", the brush will be forced to stop.
- If "the hopper is lowered", the brush will resume rotating motion.

Warning

- Be sure to use the switch in the console for ON or OFF of the brush. Neglecting this may cause serious accidents.

2.3 Maintenance switch

- "The parking brake must be on" and "the throttle pedal is in the neutral position" in order to start the engine.
- The engine can be started without "sitting in the seat".
- The engine will stop if "the parking brake is released" or "move the throttle pedal to forward or reverse".
- The hopper can be raised or lowered while the brush is rotating.

Caution

- Do not leave from the machine and maintain close watch while the maintenance switch is in use. Notify and caution other personal nearby.
- Before starting the brush rotation test, notify and caution other personal nearby. Stone, dirt, sand, and other objects in the brush will fly out to the back side of the machine when turning the brush while the hopper is in raised position. Confirm the back side is clear of people.

4. Transportation

1. Before loading this product
2. When using loading-bridges to a truck
3. When pulling this product with a winch
4. Before transporting this product

1. Before loading this product

⚠ Danger

- Do Not load this product other than recommended methods. Loading the product improperly may result serious accidents.

⚠ Caution

- Be sure to confirm the hopper is empty. If any objects are in the hopper, removed them from the hopper.

NOTE

- When loading, the bottom of the hopper may be scraped with the floor. To avoid damaging the hopper, raise the hopper about 10 cm (4 inches) above the lowest position.

2. When using loading-bridges to a truck

- Use a truck equipped with hooks to secure loading-bridges.
- Use at least three (3) loading-bridges with the length of four (4) times or more of the height of the truck floor, to ensure the angle of the loading-bridge is less than 15 degrees. The width of the loading-bridge should be at least 30 cm (12 inches), and the maximum load of 0.5 ton or more, with anti-slip surface.
- Be sure to confirm the area around the loading operation is clear of people before loading.
- Must select the slow gear, with the full open throttle position for loading.

3. When pulling this product with a winch

- Must use designated pull-hook for this operation.
- Use rope or wire with maximum load of 2 ton or more.
- Pull this product slightly with a rope, select the gear to "N" position, turn the unload valve on the hydraulic pump to release the hydraulic pressure. (See drawing: How to release the unload valve) At last, release the parking brake, and pull with a winch.
- After securing the vehicle to the truck, perform the reverse steps of the pre-loading steps, apply the parking brake, reverse the hydraulic valve, and select the gear to "L" or "H" position.

4. Before transporting this product

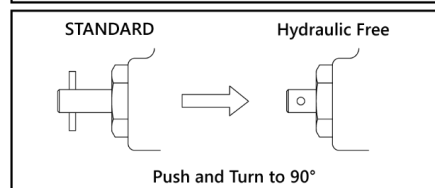
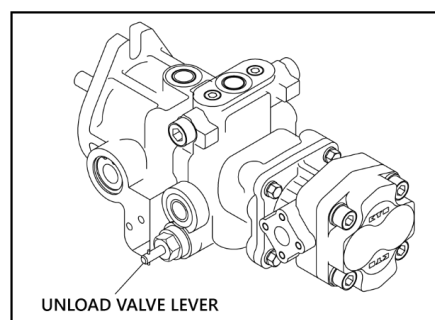
- Be sure to use wheel-blocks to prevent moving of this product on the platform while being transported, and secure this product to the truck using ropes or lashing belts.

Be sure to confirm the followings before transporting.

- ✓ Fuel cock is at closed position.
- ✓ Hopper is lowered to the bottom position.
- ✓ Hopper lid is closed completely.
- ✓ The brush box is at the lowest position, and the lever-free lock is released.



Pull hook location



How to release the unload valve.

5. Training

- 1 Things to know before operating this product
- 2 Safety on the slope
- 3 Before the operation
 - 3.1 Clothes while operating
 - 3.2 Pre-checking the vehicle and cautionary notes
- 4 Safety check of the area of operation
- 5 Fuel
- 6 Manipulation while driving
- 7 Manipulation while operating
- 8 Maintenance
- 9 Storing this product
- 10 Long-term storage
- 11 Battery
- 12 Polyurethane tire

1. Things to know before operating this product

- Before operating this product, read and fully understand the manuals and meaning of the warning sign stickers on the product, and manipulation instruction of this product.
- The operator and the mechanic must be performing their work under the responsibility of the owner or the supervisor while operating this product.
- In case the operator or the mechanic doesn't read Japanese, the owner or the supervisor is responsible for explaining the content of this booklet and letting the operator or the mechanic understand fully.
- The owner or the supervisor is responsible for providing all the operators and the mechanics of this product with proper training (driving and manipulation training, etc.).
- While driving/operating this product, pay attention to the surroundings and concentrate for the operation.
- Minor (18 years or younger), or person without sufficient driving knowledge/skill will not be allowed to drive this vehicle.
- The operational age varies by area or state. Be sure to check and comply with the local regulations before operating.
- The owner, the supervisor, and the operator are responsible for his/her safety as well as others, paying attention by the owner, the supervisor, and the operator will prevent accidents.
- The owner, the supervisor, the operator, and the mechanic will be responsible for personal injuries or material damages.
- This booklet contains safety information as needed.
- The meaning of "the left side" or "the right side" are as one sits on the operator's seat.

2. Safety on the slope

- Driving safely on the slope is the operator's responsibility. At any slope, pay attention for safe driving.

- The operator is required to measure the angle of the slope and judge if the safe operation is possible.
- For any slope steeper than 15 degrees, this vehicle must not be allowed to enter.
- There is no slope totally safe. Care must be taken entering any slope area. Once the vehicle starts sliding it will be very difficult to control with brakes.
- Do not operate while side-crossing a slope.

Major reasons for losing control on a slope

- ✓ Lack of tire traction
- ✓ Excess speed
- ✓ Unproper braking
- ✓ Conditions of the surface (bumpy ground, frozen surface, wet ground, rain, or snow)
- ✓ Lack of maintenance
- ✓ Excessive load, unproper weight distribution

3. Before the operation

3.1 Clothes while operating

- Put on the proper clothing for the type of work assigned. (such as Steel-toe shoes, long pants, hard hat or cap, safety glasses, ear muffler, etc.)
- Do not drive/operate with bare foot or sandals.
- Tidy up the clothes, tie long hair, prevent loosely hanging accessories for your own safety.

3.2 Pre-checking the vehicle and cautionary notes

- Must perform pre-check before operation.
- Must perform scheduled inspection by operational hours or periods based on the instruction in this booklet.
- Inspection must be performed on the flat ground with free of obstacles around and safe surroundings.
- Confirm, any person around other than assigned for mechanical maintenance work, such as personnel not assigned to perform maintenance work, person not involved with work, child (hereinafter referred to as

the “third person”), are not located nearby before starting mechanical maintenance.

- Mechanical maintenance personnel must have safety glasses on.
- Pre-check should be performed after confirming the hopper is empty. If the hopper has any contents in, remove the contents according to this booklet before pre-check.
- When performing pre-check while the hopper is at raised position, be sure to use hopper-cylinder lock.
- When checking the inside of brush box, be sure to use brush box drop-prevention lock.
- If the checking does not require turning the engine on, be sure to remove the ignition key from the vehicle.
- Be sure to confirm driving units (steering handle, throttle pedal, brake pedal, etc.), safety mechanisms, protective covers are properly placed and properly functioning. If any of these are not properly functioning, do not perform pre-check until they are repaired.
- When the mode has been changed to maintenance mode, be sure to confirm the area is free of other personnel and third person before performing pre-check involving starting the engine, turning the brush and activating other moving parts, and keep paying attention to avoid other persons coming near.

4. Safety check of the area of operation

- Check the area for intended drive/operation for any small stone and other obstacles, and other objects such as steel wire and tree branch which may cause obstruction of operation or cause damage, and remove them before operation.
- Any child must not be in the area of operation. If any child is present nearby, be sure to keep under supervision of an adult other than the operator.
- If any adult out-sider is to observe the operation, the owner or the supervisor is responsible to assign a person to accompany the observer.

5. Fuel

⚠ Warning

- Fuel must be handled with care as it is flammable.
- Fuel must be stored in approved container at specified location.
- Turn off the engine when refueling.
- Be sure to check fuel leakage in fuel pipe, joints and other fuel line before refueling. If any leakage is spotted, repair it immediately.
- Do not open fuel tank lid while the engine is still hot.
- Put on antistatic clothing or use antistatic plate before refueling.
- Refueling must be done out-side of a building.
- Fire is strictly prohibited when refueling. Do not smoke.
- If fuel was spilled over, do not start the engine, use dry cloth to wipe off the fuel. Then, relocate and refrain from use of any fire until the fuel is evaporated and flammable gas is completely diffused.
- Close the fuel tank lid firmly after refueling.

6. Manipulation while driving

- Do not start the engine in a small closed space without windows. Toxic carbon monoxide gas may get concentrated in such space
- Drive only under sufficient light.
- Use clear, specified drive path when relocating the vehicle. Do not use a path that no other person use.
- Care must be taken driving on a slope, and avoid even small bumps on a slope.
- Do not turn the vehicle on a slope.
- Do not park on a slope.
- While driving, keep the speed to maintain safety and try driving on paved road. Reduce speed drastically when driving over bumps, U-ditch covers and other obstacles.
- If protective bumper was damaged, malfunctioned or

lost while driving, repair immediately. Do not drive if protective bumper was not in place or not repaired.

- Do not drive with more than one person on board.
- Do not change transmission gear while driving up-hill. Change transmission before starting up-hill. If entered into an up-hill with undesired gear, confirm the rear is clear and slowly reverse the vehicle to a flat ground.
- Do not turn the starter motor for more than 15 seconds at one time. Wait 30 to 60 second after turning starter motor for 10 to 15 seconds.
- This vehicle is not permitted to drive on or use any public road or expressway. If needed to use public road, ask your local authority.
- In case any unusual noise or vibration was detected, park this vehicle at flat and safe ground, and repair immediately. If not possible to repair, do not use this vehicle.
- When reversing this vehicle, confirm the rear is clear, and keep the safe speed.
- When turning, crossing maintenance road or cart path, or turning blind corner, or coming out of a blind spot behind vegetation or tree, be sure to slow down to a safe speed or come to complete stop, check the right and the left side before crossing.
- Do not allow any person to drive this vehicle under an influence of an alcohol or any drug including a medication causing drowsiness.
- Do not drive or operate while handling cellphone, or listening to music.
- When turning the engine off, be sure to lower the engine throttle.
- With possibility of lightning strike, stop operating this vehicle, stay clear of the vehicle and take shelter to a safe location.
- Do not adjust the seat or height of the brush while driving. Park at safe location to do so, if needed.
- Try to avoid sudden start or sudden braking. Doing so will stress tire and vehicle frame to shorten the life span of the product drastically.
- If any obstacles such as tree branch, large stone, wire

are spotted while driving, operator must remove them before continue driving.

- This vehicle causes more vibration and noise than regular cars, and cause more physical stress. Periodic rest or change of operator is needed to carry out operation in length.

7. Manipulation while operating

- Before start operating, be sure to confirm the method of the assigned job, job area, and assure safety and efficiency of the job assigned.
- When turning ON the brush rotation switch, be sure to keep the throttle at low speed position.
- When turning while in the sweep operation, be sure to lift the brush box up.
- When discarding the contents of the hopper, be sure to remain seated.
- After the contents are discarded, do not swing the hopper by manipulating the lever. Swinging the hopper may cause severe damages to the hopper, hopper up/down cylinders, and hopper arms.
- When the contents are clogged in the hopper, turf off the engine and activate the parking brake for safety, put on safety glasses, mask, cap or hard hat, then use a long stick to remove the remaining contents down from the hopper. Pay attention to avoid the falling contents on the head while doing this.
- When the full-load buzzer and warning light go off while sweeping the core plugs, stop sweeping immediately and discard the contents.
- If more core plugs were collected into the hopper after the warnings, do not raise the hopper for dumping, and open the hopper lid to manually remove the contents.

Warning

- If the hopper was raised while having the over-loaded contents, hopper arms and/or cylinders may be damaged, and in the worst case, the vehicle may over-turn.
- Do not attempt to discard the contents near a cliff, on soft grounds, uneven grounds, unstable grounds, or any unsafe locations.

- Discarding contents must take place on a flat ground, (less than 5 degrees slope).
- Do not drive while the hopper is raised. For dumping, raise the hopper near the truck or the dumping site, then slowly back into the position.
- Do not step on or sit to the hopper while working.
- Do not attempt to load the hopper with person, animal or heavy objects.
- Adjusting the brush height must be done by one person.
- Dust will be spread around the vehicle while operating. Be sure to wear safety glasses and anti-dust mask.
- Select low-speed gear while operating. Use the speed-control function for safe and effective operation.
- When stopping the vehicle, point the front wheel to the direction of travel and stop on a flat ground.
- When adjusting the brush by using the brush height adjustment wheel, be sure to put on a pair of gloves.
- Before adjusting the brush, confirm the vehicle is parked safely.
- Do not stop the vehicle with the brush box lowered while the brush is still turning. It may damage the surface and severely damage the brush.

8. Maintenance

- The person who will perform the maintenance of this product must have sufficient training.
- Especially, performing the maintenance work on critical area such as engine, hydraulic, electric and welding, the person must have specified skills and knowledge for each area.
- When performing maintenance work, confirm the area is free of fire hazard, safe and flat and designated for performing maintenance work.
- Be sure to perform daily-maintenance work as well as pre-check before each operation and periodic scheduled inspection.
- When charging battery, read and fully understand the battery manual and charger manual first.

- If the maintenance work does not involve turning the engine on, turn off the engine and remove the ignition key from the vehicle.
- If the maintenance work requires turning the engine on, change the mode switch from operation mode to maintenance mode.

Danger

- The maintenance mode involves high risk and possible harm. Be sure to confirm there are no third person around before performing this work. When turning the engine on or activating any moving parts of the vehicle, be sure to let others nearby know by calling out or take other measures.
- While performing maintenance work, be sure to activate parking brake and use wheel stoppers to secure the vehicle.
- Keep the maintenance shop clean and tidy. Oil drops or tools left on the floor may cause slipping and injuries or damage machines.
- If oil, grease or fuel spilled on the floor while performing maintenance work, wipe off immediately. Especially when fuel was spilled on the floor, wipe off with cloth and wait until the fuel is evaporated completely.

Important

- After performing maintenance work, use air blower to blow off dried clippings, leaves first, then use water spray to wash off around the wheels, the brush box, and the hopper. Wash the inside of the brush box is especially important, as neglecting this will cause dirt caking and get hardened in the box, and cause severe scraping of the brush, and may destroy the brush in the worst case.
- Take care not to splash water on the engine or battery.
- When the wind is strong, avoid maintenance work outside, and work inside.
- Do not attempt to change the setting of the engine governor.
- Before performing maintenance work, be sure to remove the ground wire of the battery.
- When removing the battery, be sure to disconnect the negative (-) cable first, then disconnect the positive (+)

cable.

- Cover the removed connectors to prevent touching with the battery terminals.
- When connecting back the battery, take the reverse steps of removing the battery. Be sure to connect the ground wire last.
- Use proper tools suitable for performing intended maintenance work. Also, the regular tool management is needed.
- When lifting the vehicle with jack, be sure to use designated spots with jack.
- For lifting this vehicle, use jack or jack stand with load-bearing of 2 ton or more.
- When performing maintenance on hydraulic unit or hydraulic hose, be sure to check the hydraulic circuit schematics to understand the circuit first.
- Before removing hydraulic unit or hydraulic hose, be sure to check the pressure in the system, and if still pressurized, reduce the pressure first.
- Where pin-hole leakage in hydraulic hose is suspected, use paper or cardboard to detect the location of leakage.

Warning

- Highly pressurized oil may punch through the human skin, take a most caution while handling this.
- In case the hydraulic oil gets into the human body, it needed to be treated with surgical operation within several hours at a medical facility with experience of this type of treatment to prevent gangrene.

9. Storing this product

- Storage location must be free of fire hazard and designated covered area.
- Remove grass clippings, leaves and dirt before storing to prevent rusting and deterioration on the body.
- Do not store in closed space while the engine is hot.
- If covering with sheets for storing, do so after the engine and other heated parts are cooled down.
- To prevent fuel leak, close the fuel cock when storing.

- Be sure to remove the ignition key.

10. Long-term storage

- Drain the old oil and feed fresh oil while the engine is still warm.
- Drain the fuel tank, then reverse the fuel in the hose to thoroughly wash the fuel filter. Then, turn on the engine to use up the remaining fuel completely.
- Clean the vehicle and exterior of the engine. Any area with paint chipped or missing, repaint or apply anti-rust oil. Use the oil meets SAE30MIN-L2120 standard.
- Disconnect negative terminal of the battery.
- Polyurethane tires will deform due to long-term storage, but after resume driving the shape will return to the original. Using jack at designated points to lift the tires slightly will prevent deforming.

11. Battery

- Please read the manufacture's manual. Also, refer to the maintenance section of this manual.
- Remove and clean battery according to the direction in the maintenance section. Battery must be stored at up-right position. Battery must be kept at cool and dark location. If kept in the temperature above 26.7 degrees Celsius, it increases the rate of discharge. Storing the discharged battery in the temperature under -7 degrees Celsius, the electrolytes in the battery will freeze.

Important

Check the battery in storage every 60 to 90 days. If needed, recharge the battery.

12. Polyurethane tire

Important

- Polyurethane tires used on this vehicle are specially made for improving operational functions on turf. These tires do not have cushioning function, and will transmit strong shocks to the body frame while driving over small bumps or steps and cause twist on the steering wheel. Reduce speed drastically when driving over such areas and pass through slowly and safely.
- Ignoring this important warning may result severe

accident, malfunction or unexpected damage on the body frame, front fork of the front wheel, cover and other parts.

- Polyurethane tire absorbs moisture. It also absorbs oil when spilled over the tire or the tire driving over oil, and it may cause damage to turf grass. If oil was spilled on the tire or the tire drove over oil drops, wipe off the tire surface and wash the tire thoroughly with hot water washer or other washers.
- Avoid sudden braking and sudden acceleration. Excess pressure on the polyurethane tire may cause break or detaching of the material. Take an extra care especially when the vehicle is loaded as it may be more likely to happen.
- Polyurethane tire will wear. When excessively worn out, replace it immediately.
- In comparison to regular tires Polyurethane tire causes more stress on an operator. It is recommended to switch operators or take a rest at least every 2 hours.

6. Recycling and disposal

1. Recycling

It is recommended to recycle battery and steel material for protecting the environment and effective use of the resources. Recycling may be mandatory by law in some regions.

2. Disposal

Waste material resulted from maintenance or repair work may be properly disposed in accordance with the regional law.

(Example: Copper products, oil, antifreeze solution, rubber products, etc.)

7. Specifications

Specifications

	Model	HS-806U
Body dimensions	Length	2420mm
	Width	1610mm
	Height	1340mm
	Dry weight	850 kg
	Hopper Capacity	0.35
	Dumping height	1430mm
Drive unit	Tire size	Front ϕ 300mm Polyurethane tire Rear ϕ 450mm Polyurethane tire
	Transmission	2 speeds: High and Low
	Wheelbase	1500mm
	Rear wheel tread	1315mm
Engine	Model	BRIGGS & STRITTON VANGURD 356447
	Type	Air cooled 4 cycle OHV gasoline
	No. of cylinders	2
	Displacement	570cc
	Max. power output	13.4KW / 18HP
	Fuel	Unleaded gasoline
	Ignition type	Starter motor
Hydraulic unit	Pump	KAYABA PSV-10
	Motor	KAYABA MSF-16N
	High-pressure relief value	20.6MPa
	Filter	TAISEI SFT-06 ALPS AB-04
	Oil	ISO VG46#
Sweeping unit	Operation width	800mm
	Sweeping method	Flip-up by 6 brushes and rotors
Fuel tank and oil volume	Fuel tank	6 gallons (22.7 liters)
	Engine oil	1.6 liters (including filter)
	Hydraulic oil	23 liters
Electric	Ground	Negative (-)
	Battery	42B19R 12V

8. Warning Instruction Stickers

1. Handling of Warning/Instruction Stickers
2. Explanations of Warning/Instruction Stickers
3. Positioning of Warning/Instruction Stickers
4. Detail of Warning/Instruction Stickers

1. Handling of Warning/Instruction Stickers

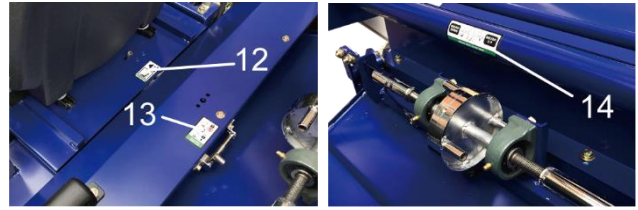
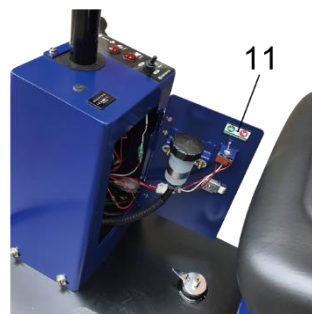
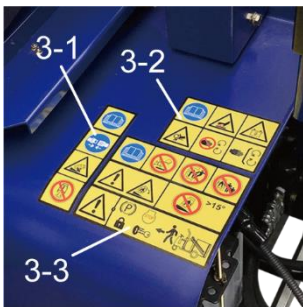
Important

- Warning and Instruction Stickers are placed on this product.
Always maintain the stickers clean, replace immediately if pealed off, stained, damaged, or deteriorated.
- Please contact and order needed replacement stickers to our dealership using the part number on the part list.

2. Explanation of Warning/Instruction Stickers

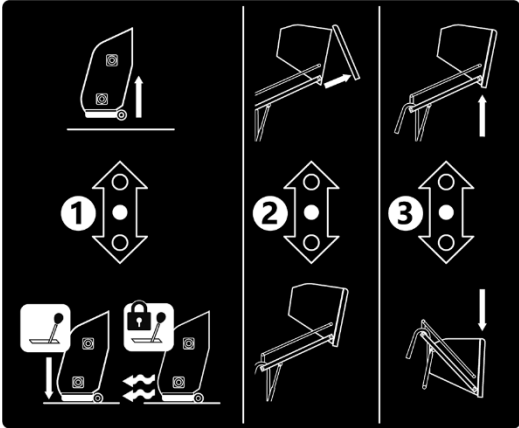

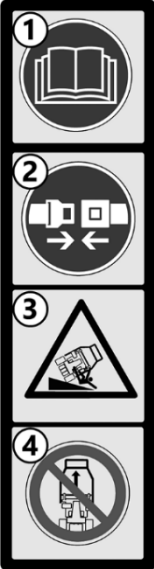
- Replace with new sticker if the sticker on the machine was damaged, missing, stained with paint, or unreadable.
- When replacing parts with stickers on, stickers are to be replaced also with new ones.
Contact and order the dealer the machine was purchased from for replacement stickers. Notify the label number when ordering.

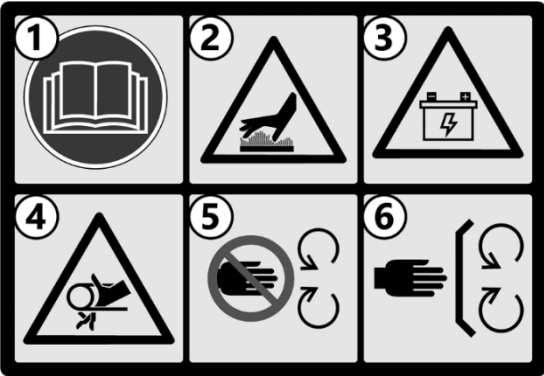
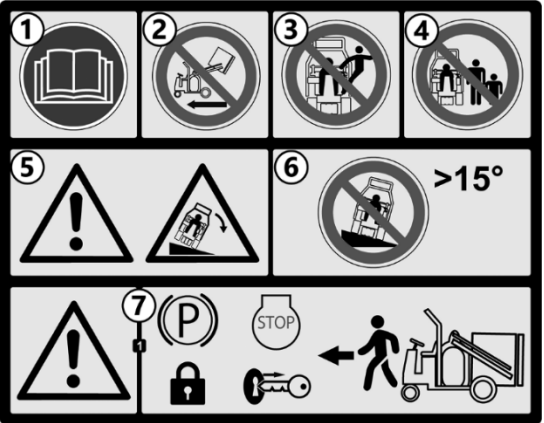

3. Positioning of Warning/Instruction Stickers

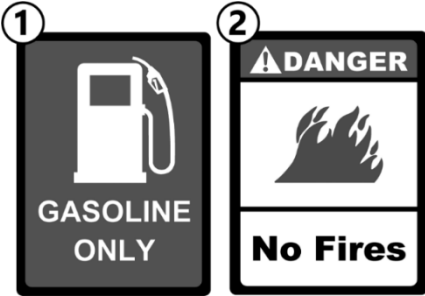
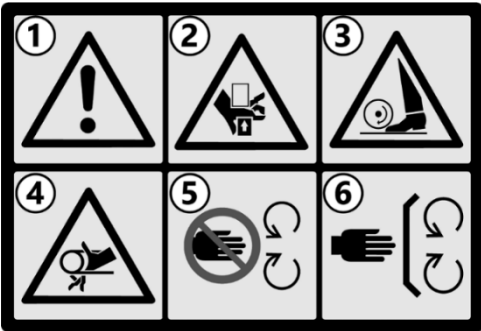
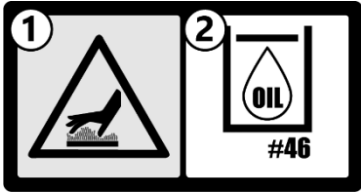



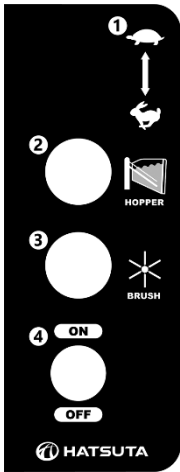

1	Manipulation lever
2	Driving speed change: High and Low
3	Warning
3-1	ROPS warning
3-2	Front Cover warning
3-3	General warning
4	Hopper fall-down prevention
5	Fuel Tank warning
5-1	Fire prohibited
5-2	Gasoline marking
6	Belt Cover warning
7	Hydraulic Oil warning
8	Brush Box handling warning
9	Manipulation panel
10	Handling of the Maintenance Switch
11	Maintenance Switch ON/OFF
12	Seat Lock
13	Brush Box fall-down prevention mechanism
14	Adjusting Brush

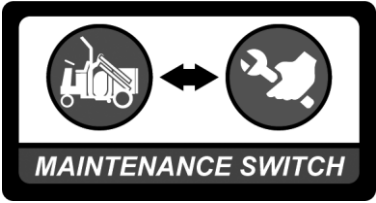

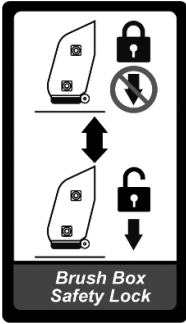
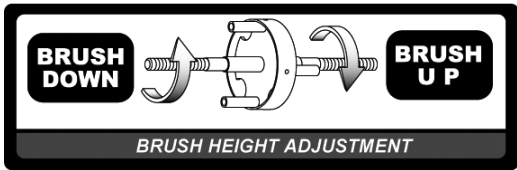
4. Detail of Warning/Instruction Stickers

<p>1</p>	<p>Lever manipulation sticker</p> 	<ul style="list-style-type: none"> ① Brush Box UP/DOWN ② Hopper Lid OPEN/CLOSE ③ Hopper UP/DOWN
<p>2</p>	<p>Transmission: HIGH/LOW speed change sticker</p> 	<p>Change of transmission for driving "L" is Low speed "N" is Neutral "H" is High speed</p>
<p>3-1</p>	<p>ROPS warning sticker</p> 	<ul style="list-style-type: none"> ① Read the manual ② Fasten Seatbelt ③ Without Seatbelt fastened, the operator may fall off from the vehicle while on slope ④ ROPS must NOT be removed

<p>3-2</p>	<p>Front Cover warning sticker</p> 	<ol style="list-style-type: none"> ① Read the manual ② The cover may be hot. Be careful of burning ③ Be careful of handling of the Battery ④ Be careful of catching fingers in the retracting belt ⑤ Do NOT put fingers in the retating unit ⑥ Protective guard cover needed for the rotating unit
<p>3-3</p>	<p>General warning sticker</p> 	<ol style="list-style-type: none"> ① Read the manual ② Do NOT drive while the hopper is at raised position ③ Do NOT drive with more than one (1) person on ④ Do NOT have anyone, other than the person involved with assigned work, come near ⑤ Be careful of driving on slope ⑥ Do NOT drive on a slope steeper than 15 degrees. ⑦ If stepping away from the machine, be sure to put Parking Brake ON, and remove the Ignition Key from the machine
<p>4</p>	<p>Hopper fall-down prevention</p> 	<ol style="list-style-type: none"> ① Do NOT get under the hopper ② If needed to get under the hopper, be sure to use the Safety Lock

<p>5-1</p> <p>5-2</p>	<p>Fire Prohibited sticker</p> <p>Gasoline marking</p> 	<ul style="list-style-type: none"> ① Refuel with Gasoline ② Danger: Must keep fire away anywhere near
<p>6</p>	<p>Belt Cover warning sticker</p> 	<ul style="list-style-type: none"> ① Caution ② Pay attention, not get fingers caught ③ Pay attention, not get caught into the rotating brush ④ Pay attention, not get caught in the turning belt ⑤ Do NOT push fingers into the turning unit ⑥ Protective guard cover needed for the rotating unit
<p>7</p>	<p>Hydraulic Tank warning sticker</p> 	<ul style="list-style-type: none"> ① Hydraulic Tank may be hot. Be careful of burning ② Use Shell Tellus S2M46 or equivalent for Hydraulic oil

<p>8</p>	<p>Brush Box handling warning sticker</p> 	<ul style="list-style-type: none"> ① Read manual ② This work involves possibility of cutting fingers. Be sure to put on gloves ③ This work involves possibility of sand or dirt get into the eyes. Be sure to put safety glasses on ④ Caution: Be sure to remove Ignition Key when working on this ⑤ Be careful of the rotating unit ⑥ Possibility of harming hands. Be careful ⑦ Sand or dirt may fly out. Be careful
<p>9</p>	<p>Manipulation Panel sticker</p> 	<p>Engine Throttle: (illustration of Turtle = Low, illustration of Rabbit = High)</p> <ul style="list-style-type: none"> ⑧ Hopper Full-Load Lamp Illuminated along with buzzer when the hopper is full ⑨ Brush rotation lamp: Illuminated when the brush is turned ON ⑩ Brush NO/OFF switch
<p>10</p>	<p>Maintenance Mode Switch handling warning sticker</p> 	<ul style="list-style-type: none"> ① Before activating the Maintenance Mode Switch, be sure to read manual <p>Be sure to read the manual thoroughly before using this switch to do maintenance.</p>

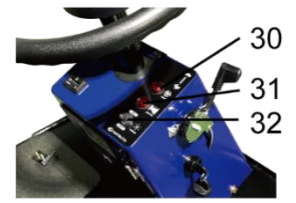
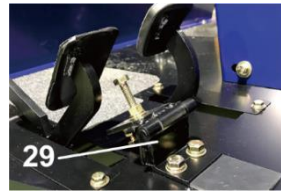
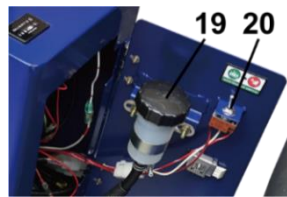
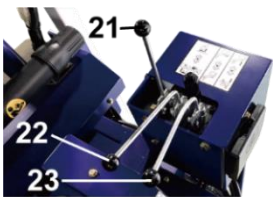
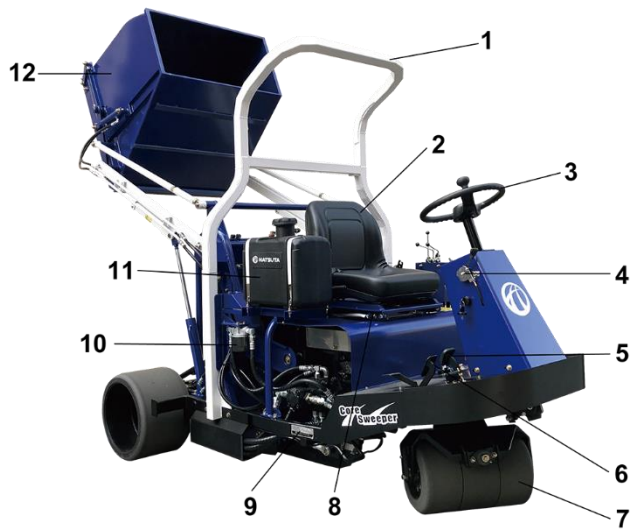
11	<p>Maintenance Mode ON/OFF switch sticker</p>  <p>The sticker features two circular icons: the left one shows a forklift, and the right one shows a hand holding a key. A double-headed arrow connects the two icons. Below the icons, the text "MAINTENANCE SWITCH" is written in a bold, sans-serif font.</p>	<ul style="list-style-type: none"> • ON/OFF switch for Maintenance Mode.
12	<p>Seat Unlock sticker</p>  <p>The sticker is divided into two sections. The top section shows a left-pointing arrow, a key icon, and a downward-pointing arrow next to a padlock icon. The bottom section shows a diagram of a seat with a release lever. Below the diagram, the text "SEAT UNLOCK" is written in a bold, sans-serif font.</p>	<ul style="list-style-type: none"> • Displays the location of the release key for the sensor detecting standing up from the seat, and how to use it,
13	<p>Brush Box fall-down prevention mechanism sticker</p>  <p>The sticker shows two diagrams of a brush box. The top diagram shows the brush box tilted downwards with a padlock icon and a downward arrow, indicating it is locked in the down position. The bottom diagram shows the brush box upright with a padlock icon and a downward arrow, indicating it is locked in the up position. A double-headed vertical arrow is between the two diagrams. Below the diagrams, the text "Brush Box Safety Lock" is written in a bold, sans-serif font.</p>	<ul style="list-style-type: none"> • Displays the location of the Brush Box fall-down prevention lock lever, and how to use it.
14	<p>Brush Adjustment sticker</p>  <p>The sticker shows a detailed diagram of a brush adjusting wheel. On the left side of the wheel, there is a button labeled "BRUSH DOWN". On the right side, there is a button labeled "BRUSH UP". Below the wheel diagram, the text "BRUSH HEIGHT ADJUSTMENT" is written in a bold, sans-serif font.</p>	<ul style="list-style-type: none"> • Displays the location of the Brush Adjusting Wheel and how to use it.

9. Parts' names

Operation guide

- 1 Names of parts
- 2 Specifications of each unit/operation methods
 - 2.1 R O P S
 - 2.2 Seat
 - 2.3 Steering Wheel
 - 2.4 Throttle Lever
 - 2.5 Brake Pedal
 - 2.6 Throttle Pedal
 - 2.7 Fron Tire
 - 2.8 Choke Lever
 - 2.9 Model Number Plate
 - 2.10 Htdraulic Oil Filter
 - 2.11 Fuel Tank
 - 2.12 Hopper (1) / Hopper Lid (2)
 - 2.13 Hopper Full-Load Sensor
 - 2.14 Hopper Cylinder Lock
 - 2.15 Brush Box
 - 2.16 Scraper/Brush Roller
 - 2.17 Inside of Brush Box
 - 2.17.1 Brush
 - 2.17.2 Rotor Plate
 - 2.17.3 Guide Plate
 - 2.18 Brush Box Lid
 - 2.19 Hydraulic Oil Tank
 - 2.20 Brake Oil Reservoir Tank
 - 2.21 Maintenance Mode Switch
 - 2.22 Brush Box Up/Down Lever
 - 2.23 Hopper Lid Open/Close Lever
 - 2.24 Hopper Up/Down Lever
 - 2.25 Fuel Cock
 - 2.26 Seat Cover Lock
 - 2.27 Brush Up/Down Wheel
 - 2.28 Pedal Stopper
 - 2.29 Brush Rotation Switch (1) / Rotation Warning Lamp (2)
 - 2.30 Hopper Full-Load Lamp (1)
 - 2.31 Brush Box Fall-Down Prevention Lock
 - 2.32 Front / Rear Tire

1. Names of parts



1	ROPS
2	Seat
3	Steering Wheel
4	Throttle Lever
5	Brake Pedal
6	Throttle Pedal
7	Front Tire
8	Choke Lever
9	Model Number Plate
10	Hydraulic Oil Filter
11	Fuel Tank
12	Hopper
13	Hopper Lid
14	Hopper Cylinder Lock
15	Brush Box
16	Hydraulic Oil Tank
17	Rear Wheel
18	Brush Box Lid
19	Brake Oil Reservoir Tank
20	Maintenance Mode Switch
21	Brush Box Up/Down Lever
22	Hopper Lid Open/Close Lever
23	Hopper Up/Down Lever
24	Fuel Cock
25	Seat Cover Lock
26	Brush Height Adjustment Wheel
27	Rotor Plate
28	Brush
29	Pedal Stopper
30	Brush Rotation Warning Lamp
31	Full-Load Lamp
32	Brush Rotation Switch

2. Specification of each unit/Operation methods

2-1 ROPS

This Roll-Over Protection Structure is designed to protect the operator when tipped over. This structure **MUST NOT** be removed from the vehicle for any operation.

2-2 Seat

The seat is equipped with seating-switch. When seated, the seating-switch get activated.

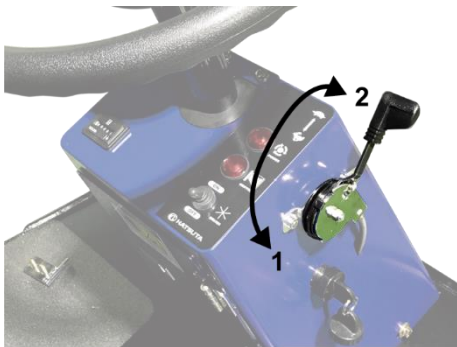
Seat-adjustment Lever is located right-lower side of the seat. Slide seat front or rear to select position while pulling the lever inward. Be sure to select seat position to safe and comfortable driving position before starting the engine.

2-3 Steering Wheel

Turning the steering wheel to change the direction of the front tire, left and right.

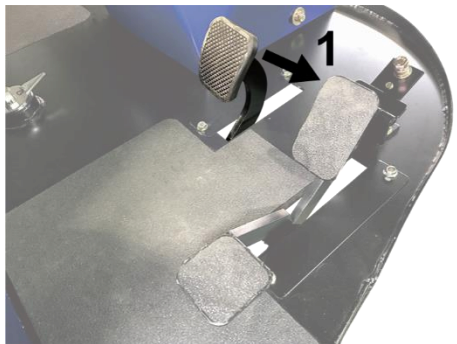
2-4 Throttle Lever

By pulling the lever towards "1" to increase the engine rotation rate, and by pushing the lever towards "2" to reduce the engine rotation rate.



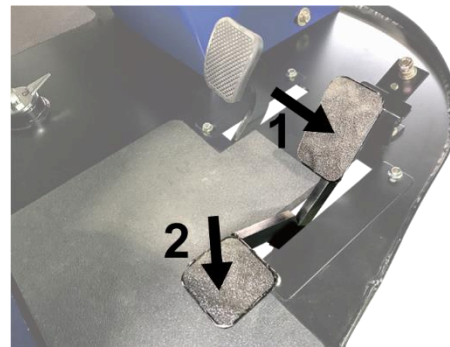
2-5 Brake Pedal

The brake pedal is located left side under the right foot. By stepping into the pedal, the vehicle will come to stop.



2-6 Throttle Pedal

The throttle pedal is located right side under the right foot. Pushing the pedal towards "1" to move the vehicle forward, and pushing the pedal towards "2" to reverse.



2-7 Front Tire

The front tire is Polyurethane tire of 300 mm. diameter. Refer to "5-12 Polyurethane tire"

2-8 Choke Lever

By pulling the lever towards your body, the choke will be ON = Close position. .

By pushing it back, the choke will be OFF = Open position
After warming the engine, be sure to push the choke lever to OFF = Open position.



Choke Open position



Choke Closed position

2-9 Model Number Plate

Model number plate contains the model and product No.

MODEL NAME	
PRODUCTION No.	
SERIAL No.	
 初田拡撒機株式会社 HATSUTA KAKUSANKI Co. MADE IN JAPAN	

2-10 Hydraulic Oil Filter

This filter collects dusts in the hydraulic system from operations. Replace the filter periodically according to the maintenance guideline. Be sure to use designated TAISEI SFT-06 ALPS AB-04 filter for replacement.



2-11 Fuel Tank

This 6 Gallon (22.7 Liter) fuel tank meets CARB/EPA standards.

Turn the lid anti-clockwise towards "2" to open, and turn clockwise "1" to close.

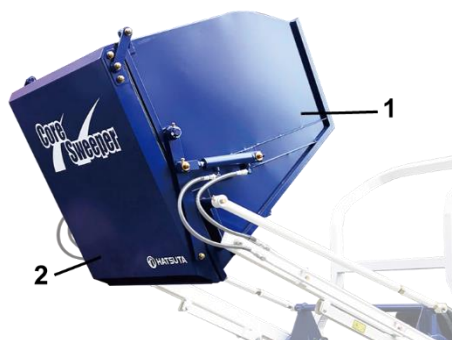
Be sure to confirm there is no source of fire around when refueling.



2-12 Hopper (1) / Hopper Lid (2)

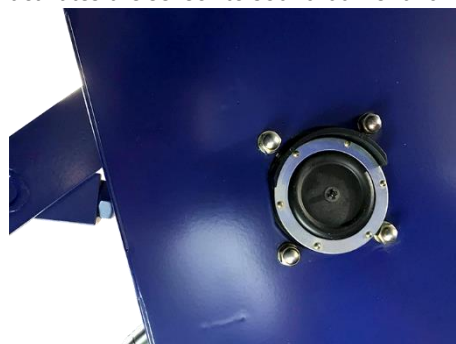
The hopper collects core-plugs and grass clippings. It holds up to 0.35 cubic meter.

If the seal on the lid came off or bent, it may result spilling of the contents. Repair or replace the seal if came off or damaged.



2-13 Hopper Full-Load Sensor

The full-load sensor is located left side in the hopper. When the accumulated contents reach the level, it pushes and activates the sensor to sound buzzer and full-load lamp.



2-14 Hopper Cylinder Lock

Use the hopper cylinder lock when working inside of the hopper at the hopper raised position.

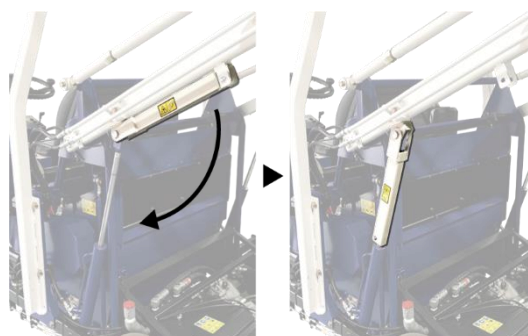


Important

To keep the raised position of the hopper, be sure to secure the hopper by using the hopper cylinder lock.

Operation method

1. Raise the hopper to the top position.
2. Release the "R" pin at the tip of the hopper cylinder lock, and pull the pin.
3. Fasten the hopper cylinder lock by wrapping around the cylinder.
4. Fasten the removed pin and "R" pin back to the original position.



2-15 Brush Box

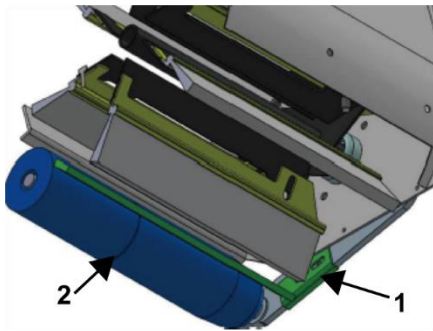
The most important unit for sweeping function. The brush box moves freely along the ground surface by manipulating the brush box lever to free the cylinder.

The brush height adjustment wheel is located at the upper side of the brush box, index no. 27, and the brush roller and the scraper are located at the lower side.

Refer 11-10 Brush box for operation /maintenance methods.

2-16 Scraper/Brush Roller

The purpose of the scraper "1" is to exfoliate dirt or sand stuck to the brush roller "2" and to stabilize the height of the brush.



2-17 Inside the Brush Box

The inside can be observed by removing the brush box lid. The brush "1" at the bottom, The rotor plate "2" at the top, and the guide plate "3" in the rear.

The brush scrapes up the core-plugs. The rotor plate sends the core plugs from the brush to the hopper, and the guide plate helps the core-plugs move up smoothly.

2-17-1 Brush

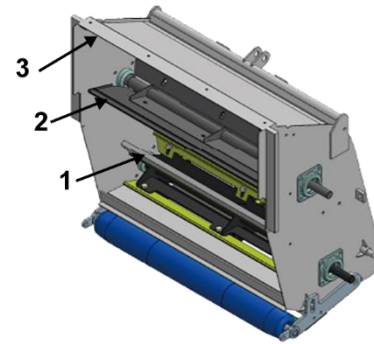
Located at the bottom in the brush box. Rotating brush sweeps up the core-plugs and grass clippings. The most important part of sweeping function. Refer to 10-10.2 Adjusting brush for adjustment.

2-17-2 Rotor Plate

Located at the upper-side of the brush box. By rotating, push core-plugs and clippings from the brush to the hopper.

2-17-3 Guide Plate

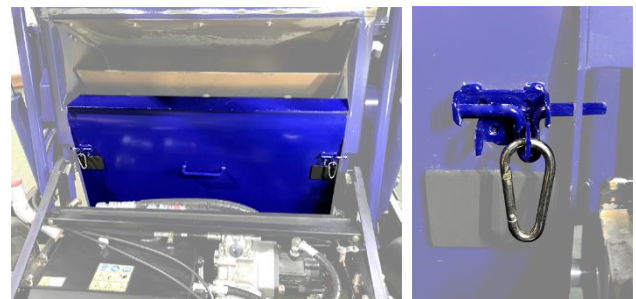
Acts as the guild wall to help move core-plugs and clippings smoothly to the hopper. Also protects the inside wall of the brush box from rubbing. This part requires periodical replacement.



2-18 Brush Box Lid

Lid can be opened for cleaning inside and maintenance of the brush box. Release the hinge before removing the lid for cleaning and maintenance.

When fastening back, be careful the bottom part NOT get caught, and close the hinge tightly, and at last, secure the hinge by the snap ring provided.



2-19 Hydraulic Oil Tank

It holds 18 Liters. Use ISO VG46# hydraulic oil.

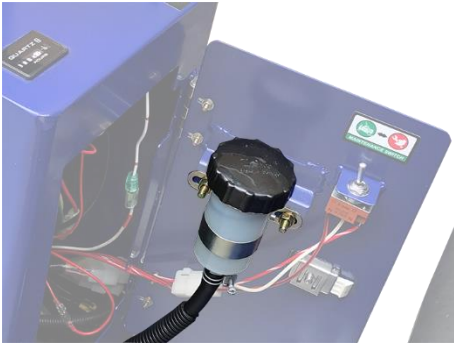
Remaining volume and quality of the hydraulic oil is very critical. Frequently check for remaining volume, deterioration, or clouding.



2-20 Brake Oil Reservoir Tank

Tank for brake oil.

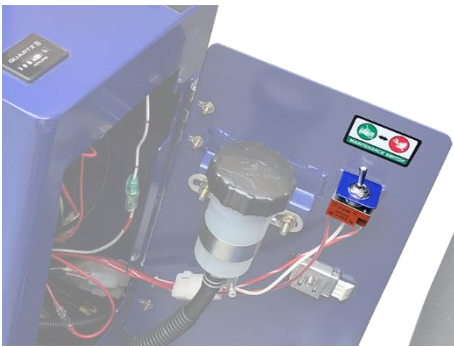
Check to see if sufficient volume remains in the tank, clean, not contaminated with water, before operation.



2-21 Maintenance Mode Switch

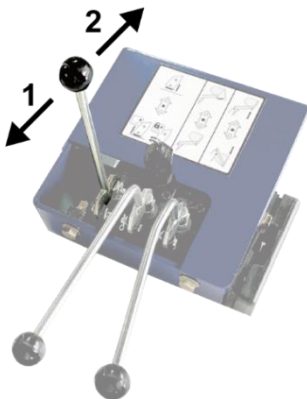
By turning ON, can confirm the function of the engine and brush box while performing maintenance work.

Refer to attached 3-2.3 Maintenance switch for caution notes.



2-22 Brush Box Up/Down Lever

By pulling the left lever towards "1", the brush box is lowered. By pulling the lever furthermore towards "1", activates the lock into the operation mode = free position. By pushing the lever towards "2", the brush box is raised. When letting the lever go, the brush box stops.



⚠ Caution

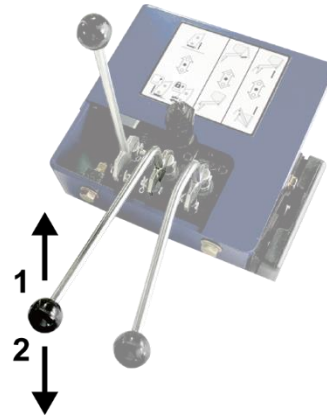
Keep the brush box at free-position when operating. If not at the free-position, brush box will not follow the contour

of the green and may damage the surface or damage the machine.

2-23 Hopper Open/Close Lever

While seated, raising the middle-lever towards "1", the hopper lid opens. Letting the lever go, it stops.

Lowering the lever towards "2", the lid closes. Letting the lever go, it stops.



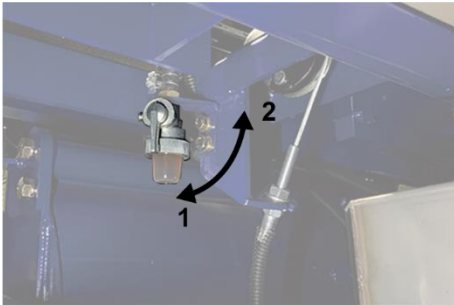
2-24 Hopper Up/Down Lever

While seated, raising the right-lever towards "1", the hopper moves up. Letting the lever go, it stops.



2-25 Fuel Cock

Located right side under the seat, below the fuel tank. Turn cock towards "1" to open. Turn the cock towards "2" to close. For storing or transporting, be sure to close the cock.



2-26 Seat Cover Lock

This mechanism is to prevent the seat suddenly opening when over-turned.

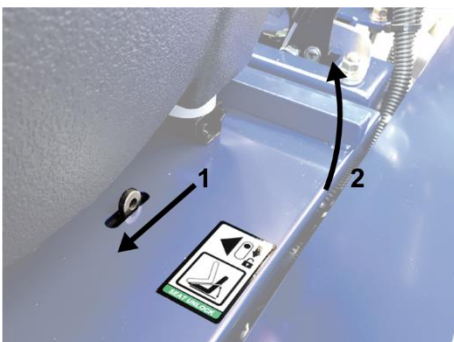
How to unlock the Seat Lock

Slide the seat forward.

Move the lever at the behind/below the seat towards "1" to release the lock.

Then, lift the seat towards "2" to open the seat cover.

To lock, return the seat to the original position until it clicks to lock.

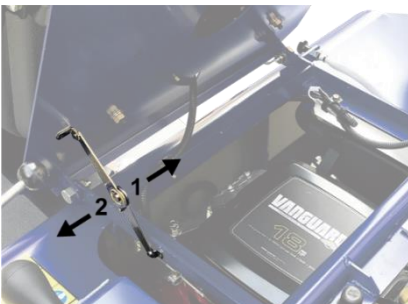


How to lock or unlock the seat cover.

This lock prevents the seat cover from falling while operating.

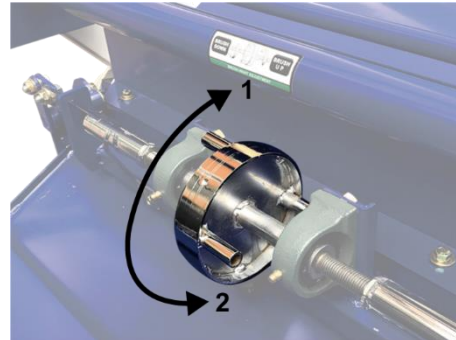
To lock, open the seat cover, pull the hinge, located front/left, towards "1".

To release, push it towards "2".



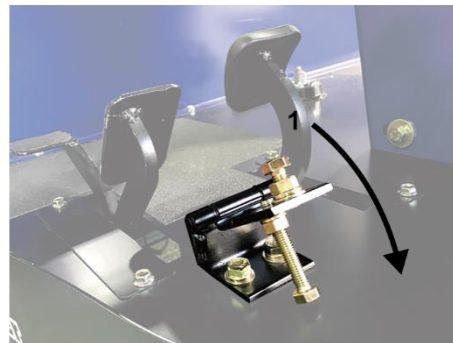
2-27 Brush Height Adjustment Wheel

Located at upper side of the brush box. By turning towards "1", lowers the brush, and by turning towards "2", raises the brush.

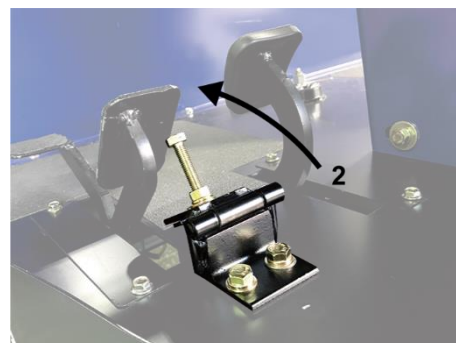


2-28 Pedal Stopper

Located at below the throttle pedal. When driving, turn the stopper towards "1" to prevent the stopper from touching the pedal.

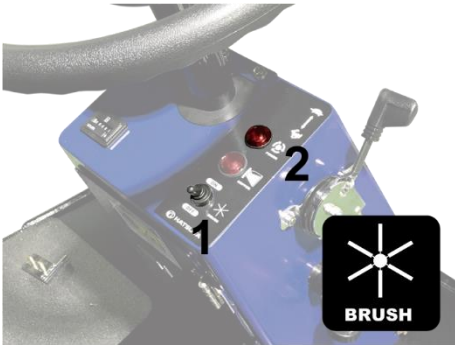


Turning it towards "2" to limit the pushing movement of the pedal and stabilizes the vehicle speed. Speed can be adjusted by adjusting the length of the bolt.



2-29 Brush Rotation Switch (1) / Rotation Warning Lamp (2)

By turning it ON, the brush and the rotor plate start turning and the lamp be illuminated. By turning it OFF, the brush and rotor plate stop and the lamp go out.



2-30 Hopper Full-Load Lamp (1)

When the full-load sensor was detects the load in the hopper, it activates the warning buzzer and the lamp be illuminated.

By turning OFF the brush rotation switch, the buzzer and the lamp stop.



2-31 Brush Box Fall-Down Prevention Lock

To prevent the brush box falling down while performing maintenance work. The lock mechanism is located on the brush box behind the seat.

How to lock the brush box

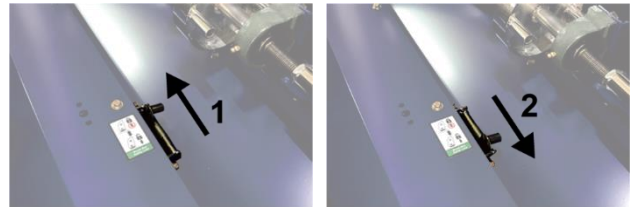
- 1 After turning the engine, raise the brush box to the top position.
- 2 Stop the engine, slide the lever of the brush box lock towards "1" that lock position.
- 3 Move the brush box lever to Free position, and confirm the brush box is stopped at above position.
- 4 Return the brush box lever to Neutral position.

How to unlock

- 1 After turning the engine on, raise the brush box to the

top position.

- 2 Stop the engine, and slide the brush box lock lever towards "2" that unlock position.
- 3 After use or when not using this function, be sure to maintain the brush box fall-down lock is at unlock position.



2-32 Front / Rear Tire

Front 300mm x3 and Rear 450 mm. diameter Polyurethane tire. Refer to "5-12 Polyurethane tire" for caution notes of use.

10. Manipulation/ Adjustment Procedures

- 1 Adjustments prior to operating
 - 1.1 Seat adjustment
 - 1.2 Pedal Stopper adjustment (operation speed adjustment)
 - 1.3 Brush height adjustment
 - 1.4 Front Rubber Plate adjustment
- 2 Starting/stopping the Engine
 - 2.1 Steps on starting the Engine
 - 2.2 Steps on stopping the Engine
- 3 Driving
- 4 Sweeper operation
- 5 Dumping the contents
 - 5.1 Dumping to a track
 - 5.2 Dumping to the ground surface

1. Adjustments prior to operating

1-1 Seat adjustment

Warning

- Do NOT attempt to adjust seat while driving as it may lead to causing accidents.

- Seat is equipped with sit-down switch. It is activated by sitting down on the seat.
- Front/rear slide adjustment lever is located at the bottom right of the seat. Slide the seat front or rear while pulling the lever. Select seat position to safe and comfortable driving position.

1-2 Operation speed adjustment

Warning

- Do NOT attempt of adjust operation speed while driving as it may lead to causing accidents.

NOTE

- Refer to Sweeper Operation section for operation procedures.

1. Move the vehicle to flat and safe location, and turn off the engine.
2. Set the pedal stopper to underneath the throttle pedal.
3. Loosen the nut on the adjustment bolt attached to the speed adjustment plate, and adjust the bolt depth.
4. Be sure to check the transmission is on "slow speed" position.
5. Turn on the engine, and move forward at full throttle.
6. Check the operation speed, and repeat steps 1 to 5 until the speed is at desired speed for operation.
7. After the desired speed was confirmed, firmly tighten the adjusting bolt and nut.

1-3 Brush height adjustment

Before each operation, be sure to adjust brush height. Brush height must be adjusted according to the types of grass clippings, core-plugs, or firmness of the ground such as soft or hard surface. Without proper height adjustment, the machine can't achieve designed performance.

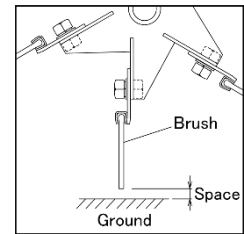
Warning

- Do NOT attempt to adjust brush height while driving

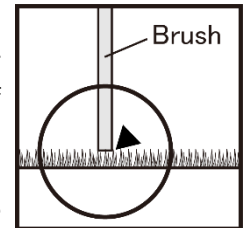
as may lead to causing accidents.

Steps on brush height adjustment

1. Park this vehicle on flat and firm ground, and pull the parking brake.

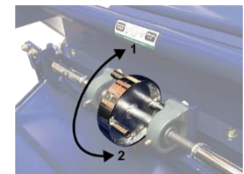


2. Turn off the engine.
3. Select maintenance mode.
4. Lower the brush box.
5. Confirm 5 to 8 millimeter clearance between the tip of the brush and the ground surface.



Also confirm the clearance between the brush pips and the ground surface is consistent throughout the width of the brush.

6. If the measured clearance is not at desired clearance, turn on the engine, and raise the brush box.
7. Turn off the engine, and rotate the brush height adjustment wheel to adjust the height of the brush. Rotate towards "1" to lower the brush. Rotate towards "2" to raise the brush.
8. Go back to the above steps 4 and 5, or repeat steps 4 to 7 until the clearance between the brush and the ground surface is correct
9. Test-run the machine for 1 to 2 meters, and fine tune the adjustment as needed.



The correct brush height varies due to surface conditions. It is important to perform 1 to 2 meters-long test-run at the actual site of each operation for confirming sweeper function.

Danger

- Be sure to turn off the engine when adjusting.
- When maintenance mode is ON, pay close attention to the rotating unit while performing this task.

Important

- Turn off the engine before adjusting brush height.

- Lowering the brush too much will increase the friction stress to the turf surface, and cause excessive brush wear and deformation, and shorten the lifespan of the brush.
- The brush height has to be correct in order to pick up core-plugs. Be sure to adjust brush height prior to operation and operate at the correct brush height.
- Brush tip action varies by condition of turf surfaces. It is recommended to adjust according to turf surface conditions.

1-4 Front Rubber Plate adjustment

Danger

Must NOT do this work while the engine and/or brush are in motion. Be sure to turn off the engine first.

Important

- At leaving the factory, the front rubber plate is set at the lowest position.
- Adjust the front rubber plate according to the size of core-plugs and volume.
If the front rubber plate is not properly adjusted, problems such as core-plugs getting pushed forward or the brush throwing core-plugs towards the front will occur.

- 1 Raise the brush box, and turn off the engine.
- 2 Lock the brush box by using the brush box fall-down prevention lock.
- 3 Loosen the nuts holding the front rubber plate.
- 4 Slide the front rubber plate up or down evenly as needed.
- 5 Firmly tighten the nuts to hold the plate.
- 6 Turn on the engine, raise the brush box, and release the fall-down lock.

2. Turning the engine ON/OFF

2-1 Steps to turn the engine ON

1. Confirm all the manipulation levers are at Neutral position, and the fuel cock is at open position.
2. Sit in the seat, confirm the parking brake is on.

3. Fasten the seat belt.
4. Pull the choke lever towards your body to close position.
5. Raise the throttle lever slightly to faster position.
6. Insert the ignition key and turn it to the "start" position to turn on the engine.
7. After the engine started, let go of the key (the key returns to "ON" position).
8. Slowly push the choke lever away from your body to "open" position.

Important

- Required conditions for starting the engine:
 - Operator is seated.
 - Parking brake is activated.
 - Throttle pedal is at neutral position.
 Unless every one of these conditions are met, the engine is unable to be turned on.
- The vehicle couldn't be driven if the maintenance switch is at maintenance mode.
- Be sure to warm up the engine when turned on.
- Starter motor may be damaged if activated for a long time continuously. If the engine failed to start, turn the ignition key to the "OFF" position, wait for 20 to 30 seconds, then turn the engine on. To protect the starter motor and preventing the battery run out, do not turn the starter motor for more than 5 seconds at a time.
- Do not keep the engine running in shed or closed environment without good ventilation. The air may be contaminated by exhaust gas, and gas poisoning may occur.
- In cold season or when the engine is cold, pull the choke lever to "close" position when turning on the engine. In warm season or the engine is still warm, turn on the engine with choke lever at "open" position.
- After attempting to start the engine three (3) times or more without success, the engine become flooded with fuel and is difficult to ignite. Then, push the choke lever to "open" position, select the throttle lever to "medium speed" position to re-start.

2-2 Steps to turn off the engine

1. Confirm the operation switches are at OFF position.
2. Activate the parking brake.
3. Return the throttle lever to "low" position.
4. Turn the key to "stop" position to turn off the engine.

3. Driving

Danger

- Sudden acceleration or sudden braking is dangerous.
- Be careful of turning the vehicle on slopes.
- Changing position of Sub-speed control lever must be done when the vehicle is at complete stop, and on a flat ground.
If changing position of the sub-speed control lever is needed while on a slope, slowly move the vehicle to a flat ground before changing.

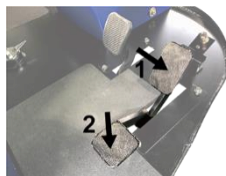
Warning

- Do NOT attempt to change speed setting while driving as the transmission may be damaged severely.

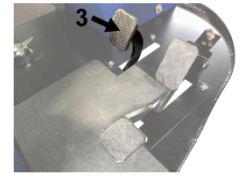
Caution

Except in sweeping operation, raise the brush box completely to the upper-most position when driving. If drove with the brush box still at low position, brush roller may be damaged.

1. Turn on the engine.
2. Raise the throttle lever to "mid-speed" position.
3. Raise the brush box to the upper-most position.
4. Press the brake pedal, and select sub-speed control lever to "high" or "low" position.
5. Release the parking brake.
6. Slowly push throttle pedal towards "1" to start the vehicle.



7. To stop, let go of the throttle pedal. For braking and to bring the vehicle to stop quickly, press the brake pedal.



8. To reverse the vehicle, push the throttle pedal towards "2".

NOTE

- The driving speed can be adjusted by the throttle lever and the throttle pedal. The maximum speed on a flat ground is about 18 km/hour.
- Two (2) positions on the sub-speed control unit. Select positions according to the terrain conditions and purpose. Use below guideline:
Traveling on a flat ground – at "high" speed.
In sweeping operation or traveling on slope – "low" speed.

4. Sweeper operation

Caution

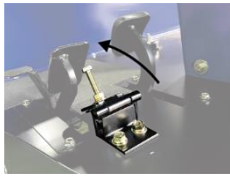
- Before start sweeping operation, check the terrain to make sure there are no unsafe terrain such as slope or cliff. If any such terrain is near the operation area, mark the boundary line and stay within the safe area to prevent the vehicle falling off or going out of control.

Important

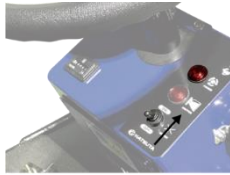
- Lower the hopper up/down lever to "down" position and confirm the hopper is at the bottom-most position. Also, turn the hopper lid open/close lever to "close" position and confirm the lid is shut completely.
- When turning on the brush rotation switch (electromagnetic clutch), be sure to do so with low engine rpm. Doing so with high rpm will damage the electromagnetic clutch.
- Maintain the vehicle on straight direction when sweeping, and make long radius turns when turning.
- When stopping the vehicle while sweeping, If the brush is at low position and still turning, turf will be damaged.
- When sweeping ability begins to fall while operating, check the inside of the brush box before attempting to adjust brush. If any dirt is clogged inside remove

them completely.

1. Park the vehicle at a safe location near the intended operation area, set the sub-speed control lever to "low" position, set the pedal stopper underneath the throttle pedal.



2. Move the vehicle to intended sweeping operation area, bring the engine rpm to low position, turn "ON" the brush rotation switch (electromagnetic clutch), then open the throttle to full power.



3. Slowly move the vehicle and securely lock the brush box up/down lever at "free" position. The brush box will be lowered and sweeping will begin.



4. Leaving the sweeping operation area or need to make turn, raise the brush box by manipulating the brush box up/down lever.
5. When stop sweeping operation, raise the brush box, lower the engine rpm, and turn "OFF" the brush rotation switch.

NOTE

- Sweeping operation speed may need to be adjusted according to the conditions of the object to be picked up.
- For example: as the diameter of core-plugs get larger, also the spacing of the coring get closer, the volume increases. Furthermore, wetter the core-plugs the weight increases. The speed needs to be lowered accordingly to maintain the efficient sweeping function.
- To increase the efficiency of sweeping, dry the core-plugs.
- The sweeping operation must be done at "low speed". Sweeping at "high speed" will decrease the sweeping efficiency as well as may hinder safe operation as the speed exceeds the vehicle design.

- This sweeper runs on HST system. It maintains the engine rpm high (the brush rotation is consistent), and at slow operational speed.
- Utilize the pedal stopper, to operate at consistent speed.

5. Dumping

When the hopper is full, activates the sensor and illuminates the full-load lamp and sound the warning buzzer.

When the full-load lamp and warning buzzer are activated, raise the brush box, and turn off the brush rotation.

The full-load lamp and the warning buzzer will stop when the brush rotation switch is turned "OFF".

Move the vehicle to dump site.

⚠ Danger

- Do NOT attempt to dump where the ground is uneven, more than 5 degrees angle slope, soft, close to a cliff or any condition may hinder safe dumping operation.
- If need to move the vehicle after high-dumping, lower the throttle and move slowly. If need to move long distance, lower the hopper temporarily before moving.
- Do NOT attempt to sudden acceleration or sudden stop while at the high-dump position.
- Do NOT swing the hopper by manipulating the lever while high-dumping.
- If over-load was suspected, do NOT high-dump, open the lid on a flat ground where the contents can be taken out. If high-dumping was attempted while the hopper was over-loaded, the excess weight may damage the cylinders, arms, or may cause overturning the vehicle.

⚠ Caution

- When high-dumping, pay attention for high voltage power line, tree branches, or any other obstacles above.
- After dumping, be sure to lower the hopper to the bottom position.
- Confirm there is no sources of fire in the dumping site or nearby. This vehicle carries flammable material such

as gasoline. Do NOT position or locate this vehicle close to fire.

- The wind may shift grass clippings to spray over the vehicle, muffler or body frame while dumping. Remove the clippings and clean the vehicle body immediately.

5-1 Dumping to a truck

1. Lower the throttle slightly, raise the hopper above the side/rear gate of the truck by turning “up” the hopper up/down lever.
2. Move the vehicle to position the hopper to be above the truck bed. Or, move the truck to position under the hopper.
3. Move the hopper lid open/close lever to “open” position and discharge the contents in the hopper.
4. If the hopper can be raised furthermore, raise the hopper to the upper-most position.
5. After discharging, manipulate the hopper lid open/close lever to close the hopper lid completely.
6. Move the vehicle forward slightly, and manipulate the hopper up/down lever to lower the hopper to the bottom position completely.

5-2 Discharging to the ground

1. Lower the throttle slightly, move the hopper lid open/close lever to “open” position to open the lid.
2. Move the hopper up/down lever to “up” position and raise the hopper to upper-most position, then discharge the contents.
3. After discharging, manipulate the hopper lid open/close lever to close the lid completely.
4. Move the vehicle, then manipulate the hopper up/down lever to lower the hopper to the bottom position.

NOTE

- This vehicle is equipped with safety mechanisms.
- To review the safety mechanisms, refer to 3-2 Safety mechanisms.

11. Maintenance

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- 19 Cleaning/washing vehicle
- 20 Pre-operation check/periodical check list

- 21 Maintenance check list by period/hours
- 22 Pre-operation/periodical maintenance check
log

1. Maintenance

To assure the designed function of this product and to use this product for a longtime, please follow and log the listed items provided for pre-operation/periodical check and maintenance.

Caution

- Fully understand the purpose of intended maintenance before each maintenance work.
- Use proper tools suitable for performing intended maintenance work.
- For safe work and keeping this product at its best condition, use HATSUTA genuine replacement parts. If other non-genuine parts are used, this product may not be covered by product warranty.

1.1 Preparation for maintenance

- Park this vehicle on a level and a safe location. Be sure to pull the parking brake on.
- Use wheel blocks in front and back side of the rear tire.
- Only if needed, open the steering post hinge, change to maintenance mode by the toggle switch located at the upper-side.

Danger

- While on the maintenance mode, the engine and the hydraulic units can be turned on without a person sitting in the seat, as all the safety mechanisms are shut off. (The vehicle can't be driven.) Pay attention for safety when using this mode.
- When turning on the engine, be sure to watch the surrounding area and confirm there are no safety risks around.

Important

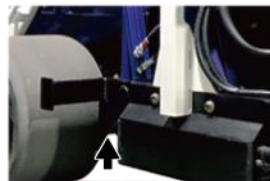
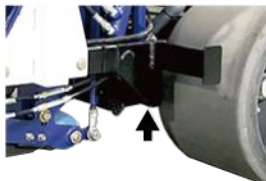
- If part of the vehicle is not clean, after checking the section for maintenance work to be done, clean the section. Cleaning prior to maintenance work will prevent sand and dust getting into eyes, and prevent them getting into the section to be disassembled.

2. Jack up

⚠ Warning

- Before jack up the vehicle, make sure the work area is suitable for safe work.
- As needed, use jack stand, chain block, or hoist.
- After the vehicle was raised by jack, use jack stand to secure the vehicle. If proper method was not used, the vehicle may shift and will lead to personal injuries.
- To jack up this vehicle, position jack to designated jack up points. By attaching jack to other than designated points, the frame may be damaged.

2.1. Jack up points



Left side

Right side

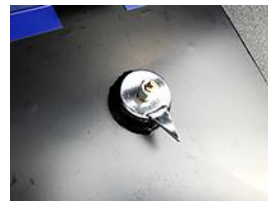
3. Grease up

Periodically add grease to prevent moving parts getting stuck and damaged.

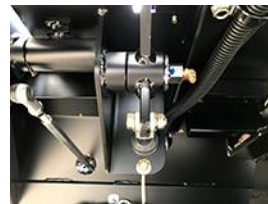
For grease up, lithium soap base grease or urea grease are recommended.

If specially designated type of grease or lubricant need to be used, the type is specified at each grease up position.

3.1 Grease up positions



1. Front tire upper-side



2. Behind the pedal



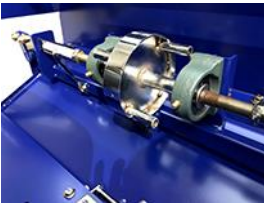
3. Front Fork bearing



4. Front Wheel Pillow bearing.



5. Electromagnetic Clutch received shaft Pillow block



6. Brush adjustment Pillow block and shaft



7. Upper-side of the upper arms located left and right side of the hopper



8. Upper-side of the lower arms located left and right side of the hopper



9. Upper-side of the hopper lid open/close arms located left and right



10. Behind the hopper lid open/close cylinders located left and right



11. Lower-side of the upper arms located left and right side of the hopper



12. Lower-side of the lower arms located left and right side of the hopper



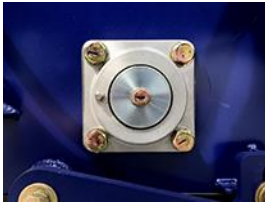
13. Front-side of the hopper lid open/close cylinders located left and right



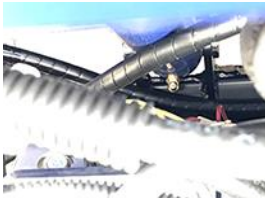
14. Lower-side of the hopper up/down cylinders located left and right



15. Upper-side of the hopper up/down cylinders located left and right



16. Brush shaft bearings located left and right



17. Lower-side of the brush box up/down cylinder.



18. Brush adjustment side

4. Engine

Watch for oil oozing out or fuel leak around the engine, if any, replace parts as needed.

Use air blower to clean, if any grass clippings, leaves and other combustible materials are on the muffler or on nearby parts.

4.1 Engine oil

The purpose of the engine oil is cooling, cleaning, sealing, and lubricating the engine. Before each use, be sure to follow the below steps to check the remaining oil and watch for contamination.

- ✓ Recommended oil type: SAE 10W30
- ✓ Required volume: 1.65 liters (3-1/2 Pint)
(including the engine oil filter)

※ See the engine manual for detail

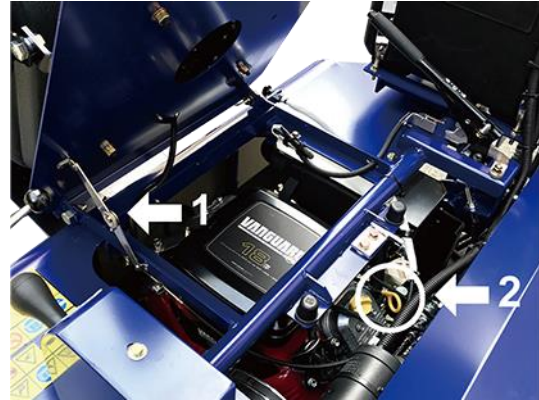
4.2 Checking engine oil

Make sure the engine is cooled down sufficiently.

1. Raise the hinge of the seat cover, and lock it.
2. Pull out the oil level gauge, wipe clean with rag.
3. Push the oil level gauge in to the limit, and then pull out to check the oil level.

4. If the oil level is between the MAX and the LOW lines, the oil level is sufficient.
5. After checking, push the oil level gauge back to the limit, push the hinge of the seat cover, and lower the seat.

※1 (Steps to raise the seat)



1. Seat cover lock hinge
2. Oil level gauge

4.3 Replacing and refilling engine oil

Important

- Excess or insufficient oil volume may cause engine malfunction or damage.
- Do NOT mix engine oil.
- Before use, check the remaining oil volume and condition. If the volume is insufficient, refill.
- For the first time use of this vehicle, replace with new oil after 8 hours of use, then replace after another 50 hours, then replace every 100 hours thereafter.
- Replace the oil filter after the first 50 hours, then replace every 200 hours thereafter.
- Be sure to use designated engine oil.

1. Raise the hinge of the seat cover, then lock it.
2. Either loosen the engine oil cap or pull out the oil gauge slightly.
3. Use drain plug at the bottom to drain the oil.
4. Re-wrap the drain seal tape every time after draining the oil. After completing the draining the oil, close the drain plug.
5. Utilize the oil gauge to keep checking the volume,

pore the correct volume of engine oil.

6. Close the oil cap.

5. Air cleaner

Air cleaner protects the internal parts of the engine from dust and other particles. If dust or polluting particles get into the engine, pollutes the engine oil, and causes friction damage inside. It is important to keep the air filter cleaned by sufficient cleaning.

5.1 Location of air filter

- ※ 1 Raise the seat by following the steps to raise the seat.

Remove the cover above the engine. Pre-cleaner and cartridge will be visible.

5.2 Cleaning of pre-cleaner

Pre-cleaner is to be maintained after every 25 hours of use by the flowing steps.

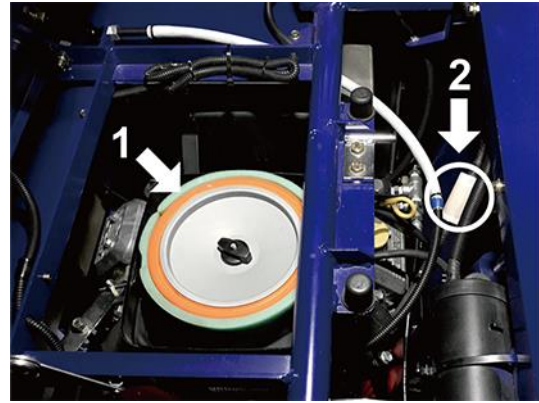
1. Remove the pre-cleaner from the cartridge.
2. Wash with liquid detergent or water.
3. Squeeze and dry with clean cloth.
4. Impregnate with engine oil, wipe off the excess oil with clean absorbing cloth.
5. Put it back to the cartridge.

5.3 Cleaning air cleaner cartridge

Turn the knob, remove the knob and the cover plate, then remove the pre-cleaner and the cartridge.

1. Hold the cartridge and lightly hit the flat surface to drop the dust.
2. If excessively dirty, replace with new one or wash with solution of hot water mixed with detergent containing low percentage of soap. Rinse it thoroughly, flow the water from inside to outside until the water is clean.
3. Dry thoroughly before use.
4. Return the cartridge and the pre-cleaner to the original position.

- ※ Do not use petroleum base solvent for cleaning.
※ Do not put oil on the cartridge.
※ Do not use air compressor for cleaning or drying the cartridge.



1. Outside : Pre-cleaner Inside : Air cleaner cartridge

6. V-belt

The purpose of the V-belt is to transmit the power from the engine to the actuation parts. If the V-belt was loosened, deteriorated, or damaged, it may cause decreasing of performance or lose of performance. Be sure to check before use.

6.1 Checking V-belt

- Press the center section of the belt to check the belt tension.
- Watch for crack, damage, or unusual wear. If any crack, damage, or unusual wear was found, replace the belt. Do not use the vehicle if damaged belt was unable to replace.
- If the belt was loosened, be sure to adjust the tension before use. By operating with loosened belt, the designed performance can't be achieved. Also leads to deterioration of the V-belt.

Warning

Be sure to turn off the engine before checking the belt.

Caution

If the cover was to be removed while checking, be sure to put it back securely to the original position. Operating without the cover attached, it may result serious accidents by person touching the rotating belt, or scattering objects.

6.2 Adjusting V-belt (engine to electromagnetic clutch)

1. Remove the engine front cover.
2. Lightly loosen the fixing nuts located the lower part of the engine.

3. Using the pull-bolt located below the engine, pull the engine towards your body.
4. Tension the belt at the below tension:
 - ✓ Tension 18N (1.83kgf)
 - ✓ Deflection 3mm (0.12inch)
5. Align the center of the engine and the clutch pulley.
6. Securely tighten the bolt/nut that are loosened earlier.
7. Put the cover back to the original position.

6.3 Replacing V-belt (engine to electromagnetic clutch)

1. Loosen the engine fixing nut, as the same steps as the above 6.2 Adjusting V-belt (engine to electromagnetic clutch)
2. Push the engine to loosen the V-belt.
3. Replace the V-belt.
4. Adjust V-belt, as the same steps as Adjusting V-belt (engine to electromagnetic clutch), and tension the belt at below tension.
 - ✓ Tension 20N (2.04kgf)
 - ✓ Deflection 3mm (0.12inch)
5. Tighten the engine fixing nut.
6. Put the cover back to the original position.

6.4 Adjusting belt (mid-pully to rotor shaft)

1. Remove the belt cover located left side of the brush box.
2. Loosen the nut of the belt tension pulley.
3. Push the belt tension pulley to press the V-belt.
4. Tension the belt at below tension.
 - ✓ Tension 36N (3.67kgf)
 - ✓ Deflection 6.3mm (0.25inch)
5. Fix the belt tension pulley.
6. Put the cover back to the original position.

6.5 Replacing belt (mid-pully to rotor shaft)

1. Loosen the nut of the belt tension pulley, as the same

steps as Adjusting belt (mid-pully to rotor shaft).

2. Remove V-belt and replace.
3. Push the belt tension pulley to press the V-belt.
4. Adjust belt, as the same steps as Adjusting V-belt (mid-pully to rotor shaft), and tension the belt at the below tension.
 - ✓ Tension 41N (4.18kgf)
 - ✓ Deflection 6.3mm (0.25inch)
5. Fix the belt tension pulley.
6. Put the cover back to the original position.

6.6 Adjusting V-belt (rotor shaft to Brush shaft)

1. Remove the belt cover located right side of the brush box.
2. Lightly loosen the bolt of the belt tension sliding plate.
3. Use the plate to press the V-belt.
4. Tension the belt at the below tension.
 - ✓ Tension 35N (3.57kgf)
 - ✓ Deflection 6mm (0.24inch)
5. Fix the belt tension sliding plate.

6.7 Replacing belt (rotor shaft to brush shaft)

1. Loosen the belt tension pulley nut, as the same steps as Adjusting V-belt (rotor shaft to brush shaft).
2. Loosen V-belt tension.
3. Remove V-belt and replace.
4. Push the belt tension pulley to press the V-belt.
5. Adjust as the same steps as Adjusting V-belt V (mid-pully to rotor shaft), and tension the belt at the below tension.
 - ✓ Tension 40N (4.08kgf)
 - ✓ Deflection 6.3mm (0.25inch)
6. Fix the belt tension pulley.
7. Put the cover back to the original position.

7. Throttle wire

Throttle wire fixes the upper and lower rpm of the engine and enables stable driving and operation.

7.1 Checking throttle wire

Move the throttle lever front and back to check the movement of the throttle wire.

- If the movement is too stiff or does not return smoothly, replace the wire.
- Also, if the speed setting returns from "high" to "low" unintentionally while driving or operating, adjust by lightly tightening the center nut located below the throttle lever.

7.2 Replacing Throttle wire

1. Remove the nut in the center of the throttle lever, and take out the wire.
2. Loosen the throttle wire fixing bolt on the engine side, and take out the wire.
3. Place a new throttle wire.
4. Connect the wire to the throttle lever.
5. Fix the throttle lever to Low speed side.
6. Fix the tip of the wire to the wire fixture on the engine side.
7. Move the throttle lever front and back, check the movement on the throttle side and the engine side.
8. Turn on the engine, adjust rotation to around 3300 rpm.

8. Choke wire

Choke wire is directly connected with choke, pulling the choke increases the mixture ratio of gasoline of incoming fuel mixture gas to help start the engine especially under the cold temperature.

8.1 Checking choke wire

Push and pull the choke wire several times to check the movements.

- If the movement is too stiff or too light, adjust the wire.
- If the choke wire is stuck or does not move, replace the choke wire.

8.2 Replacing choke wire

1. Loosen the nut of the choke lever.
2. Remove the choke wire fixing bolt on the engine side, and take out the choke wire.
3. Remove insulation from the choke wire, reattached it to a new choke wire.
4. Fix the choke wire lever at the fixing point.
5. Place the wire back to the position, and put through the choke wire fixture.
6. While pushing the choke lever firmly and pushing the choke wire stay to the end, fix the wire firmly.
7. Repeat pushing and pulling the choke lever to check the movements.

9. Brake

This product has two (2) systems of brake, foot brake to stop while driving and parking brake to ensure safely and firmly hold the vehicle. For safe driving and operation, be sure to check the brakes before use.

9.1 Checking foot brake

- Check the safety of the surrounding area, then move forward and push the brake pedal firmly to confirm the effectiveness of the foot brake.

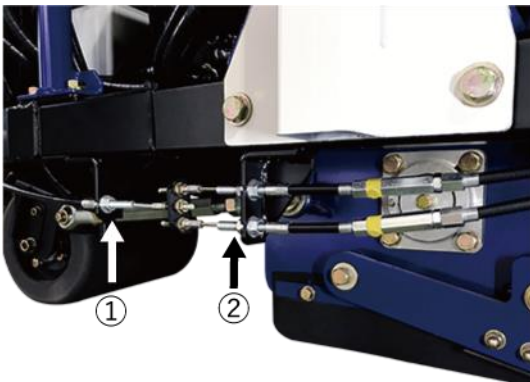
9.2 Checking parking brake

- Pull the parking brake lever firmly, select the transmission to Neutral position, then try to push the vehicle to check the effectiveness of the parking brake.
- Release the parking brake, push the vehicle to check if the brake is not being drugged.
- If the play of the brake pedal gets excessively and the remaining stroke of the brake be less than 50 mm., adjust the brake shoe.
- Test drive to see the effectiveness of the brake and the balance of braking force on left and right.
- Check to see if the brake oil has air contamination.
- Check to see the sufficient brake oil volume remains in the brake oil tank.
- Replace brake oil if contaminated.
- Check for any leak from the brake pipe system.

- The parking brake uses cable reaction system for balancing the left/right braking force. Pull the parking brake lever to the limit, about 20 Kg. force, to check the action range of the brake lever. (Pulled by 20 Kg. force should be 5 to 6 notches.) If this guideline was not met, adjust the brake.

9.3 Steps to adjust brake

1. Attach jack at jack up point, and set jack stand to raise the rear tires.
2. Set transmission to Neutral position.
3. Pull the parking brake 5 to 6 notches, check to confirm the effectiveness of left and right brakes. If not enough braking force was available, pull the wire by adjusting the wire behind the parking brake.
4. Pull the parking brake, check to see if both left and right brakes are effective, then release the parking brake to confirm both left and right brakes are released.
5. If both left and right brakes are not sufficiently effective, adjust "1" to pull the two (2) wires.
6. After adjusting "A" or "B" and pull the parking brake, if either left or right wheel is still turning.
7. As illustration "2" where the wheel still turns, release the adjuster fixture, and pull the wire to the point where the brake is effective.
8. When both left and right brakes are effective, release the parking brake, and confirm both left and right brakes are released.



- If the brake is still not sufficiently effective after pulling the wire, contact your dealer.

10. Brush box

This is the main and the most critical unit of this product, it sweeps up core-plugs and others by brush and rotor plate. The effectiveness of the sweeping capability may be reduced when dirt is stuck inside or the box was damaged. Neglecting the accumulating dirt may lead to serious damage of the machine, in worst case. Be sure to check inside of the brush box following the below steps, and repair if needed.

10.1 Checking brush/rotor plate

1. Seated in the seat, make sure the parking brake is firmly activated, turn on the engine.
 2. Manipulate levers to raise the brush box and the hopper to the upper most position.
 3. Turn off the engine, and remove the ignition key from the key cylinder.
 4. Apply the hopper cylinder lock.
 5. Apply the brush box fall-down lock.
 6. Release the hinge on the brush box lid, and remove the lid.
 7. Turn the rotor plate slowly to check the inside of the brush box.
- ✓ Contamination of dirt,
 - ✓ Damages on the guide plate or rotor plate,
 - ✓ Uneven wear of the brush,
 - ✓ Where brush/rotor plate are mounted.
- ※ When the brush is new, inside of the box may have some wear.

⚠ Caution

- Be sure to put on gloves, face mask, safety glasses before start inspecting the inside of the brush box.

⚠ Warning

- If unusual vibration or noise was detected, turn OFF the brush switch immediately.
- Turn OFF the engine, remove the ignition key, and look for the cause of the unusual noise from the brush/rotor, and make repair. Do not ignore and neglect repairing. Keep using without repairing may

lead to serious damage of the vehicle.

- When visually checking, be sure to put on safety glasses. Also, do NOT stand directly behind this vehicle, objects may fly out.

10.2 Adjusting brush

⚠ Caution

Before maintenance, confirm the hopper is empty.

Important

If the brush had uneven wear, missing section, bent tips, laid down outward, being too short, replacing is needed.

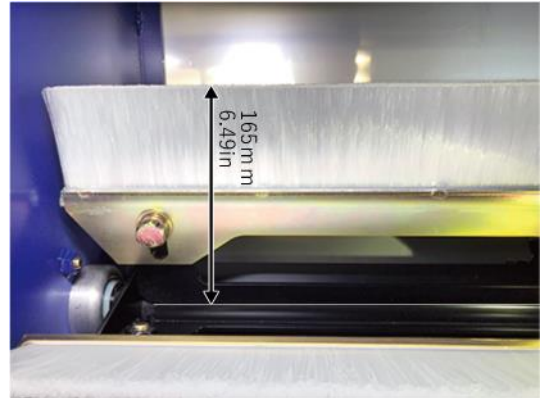
When the brush length get too short, reduces the flexibility and increases stress damage to the green surface, therefore replacing the brush is recommended.

When replacing the brush, all the brush needs to be replaced at the same time to maintain rotation balance and prevent vibration.

After the brush had wear, and the correct positioning of the brush still could not be achieved after brush height adjustments, then brush adjustment is necessary.

1. Use a scale to measure the length from the brush fixture stay on the brush shaft to the brush tip. If the length is less than 165 mm, then needs brush adjustment.
2. Follow the same steps as Cheking brush/rotor plate, open the brush box cover.
3. Loosen the bolt holding the brush.
4. Pull the brush out and use a scale to measure so that the length from the brush fixture stay to the brush tip is about 165 mm.
※ Be sure the length of the brush is consistent at left and right.
5. Tentatively tighten the bolt, turn the brush slowly by hand. Confirm the brush and the brush box do not interfere.
6. Firmly tigten the bolt.
7. Run the same adjustment steps on all the brush, and re-tighten all the bolts at last.
8. Return the brush box cover to the original position.

9. Turn on the engine, turn on the brush rotation switch to rotate the brush and check for vibration and interference in the box.



10.3 Replacing brush

If adjusting the brush length is no longer possible, then replace brush.

1. Follow the same steps as Checking brush/rotor plate, open the brush box cover.
2. Remove all the bolts of the brush.
3. After setting new brush and tentatively tighten the bolt, push the brush all the way in.
4. Tighten the bolt firmly at last.
5. Go through the same steps for all the brush, then re-tighten all the bolts at last.
6. Return the brush box cover to the original postion.
7. Turn on the engine, turn on the brush rotation switch to rotate the brush and check for vibration and interference in the box.

10.4 Adjusting rotor plate

⚠ Caution

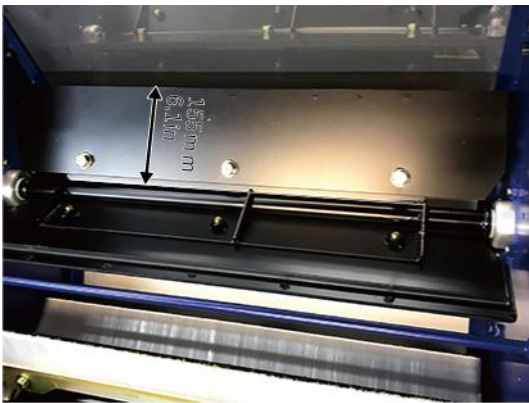
Before maintenance, confirm the hopper is empty.

Important

- Incorrect rotor adjustment will lead to vibration.
- If the rotor plate was deformed, cracked or damaged, and repaired by re-bending or welding, it may result losing rotation balance and lead to vibration, and furthermore, malfunction. Replace with new brush immediately.
- When replacing rotor, all the rotors need to be replaced at the same time to maintain rotation

balance and prevent vibration.

1. The distance measured from the rotor plate fixture stay on the rotor shaft to the tip of the rotor plate. If the distance is less than 155 mm, adjustment is needed.
2. Follow the same steps as Checking brush/rotor plate, open the brush box cover.
3. Lightly loosen the bolt on the rotor plate.
4. Pull the rotor plate out so that the distance measured as above step "1" be 155 mm and consistent on left and right side.
5. Go through the same steps on all the plates, then re-tighten the bolts at last.
6. Return the brush box cover to the original position.
7. Turn on the engine, turn on the brush rotation switch to rotate the brush and check for vibration and interference in the box.



10.5 Replacing rotor plate

If the rotor plate was deformed, cracked or damaged, replace rotor plate.

1. Follow the same steps as Checking brush/rotor plate, open the brush box cover.
2. Loosen the bolt on the rotor plate, remove the rotor plate.
3. Firmly push the new rotor plate towards the shaft, maintain consistent angle on left and right, and tentatively fix the plate.
4. Rotate rotor plate by hand, and confirm the plate do not interfere with any section.
5. Firmly fix rotor plate.

6. Go through the same steps on all the plates, then re-tighten the bolts at last.
7. Return the brush box cover to the original position.
8. Turn on the engine, turn on the brush rotation switch to rotate the brush and check for vibration and interference in the box.

10.6 Checking brush roller

Turn the brush roller by hand one by one to check if they turn smoothly and without rattling.

Repair as needed if sticking or rattling.

10.7 Checking scraper

Check to see any wear or dents on the scraper.

Check to see it is firmly fixed and parallel to the brush roller and the clearance is less than 0.5 mm.

If any wear or dents, or the clearance is too great, replace scraper.



10.8 Replacing scraper

1. Follow the same steps as Checking brush/rotor plate, open the brush box cover.
2. Remove nuts holding the scraper on both left and right side.
3. Remove the scraper stopper fixture, and remove the scraper.
4. Set new scraper and the stopper fixture, and lightly hold with nuts.
5. Adjust the clearance between the scraper and the roller.
6. After adjusting, firmly tighten both nuts on left and right side.

10.9 Checking front/side rubber plate

Check the rubber plate located below the brush box for

wear or damage. If it had wear or damage, replace with new plate.

10.10 Checking brush box movement

1. Switch to maintenance mode.
2. Turn on the engine.
3. Check the surroundings, especially the rear side of the machine, of free of other person, then turn ON the brush switch.
Raise and lower the throttle to check the rotating brush for vibration, noise, and visually check for uneven rotation.

11. Hopper/hopper lid

- The hopper holds objects collected. A full-load sensor is in the hopper, to help inform when heavy objects such as core-plugs are to be discharged. If this sensor did not function properly, excess load in the hopper may lead to over-turn or damaging the vehicle. Be sure to check before operation.
- The structure of the hopper lid is to retain the collected objects, especially to contain fine sand particles by tight sealing. If it had any gap or dent on the lid, it may spill the contents and in severe case, it leads to drastically reduces the operation capability. So, pay attention to the condition of the lid.

11.1 Checking hopper

1. Raise the hopper and attach the hopper fall-down prevention bar to the cylinder.
2. Open the lid. Check the inside for excess dirt or dirt scaling or cracking damage.
3. If any dirt or sand forming scale, use scraper to scrape dirt off.
4. If severe crack or deformation was detected, contact dealer.

11.2 Checking full-load buzzer

1. Turn the engine key one notch to ignition position, then turn ON the brush switch.
2. Lightly push the sensor switch located inside - left of the hopper.

3. Buzzer will sound along with the lump at the front cowl be illuminated.
4. Turn OFF both the brush switch and the engine key, and remove the key.

11.3 Checking hopper lid

- Check to see for any gap between the lid and the hopper.
- If the seal is detached, use glue to re-attach the seal or replace with new seal.

Important

If the lid was hit, the lid may get deformed and leads to spilling the contents. Replace immediately.

1 2. Fuel

Always use clean, fresh unleaded fuel.

Warning

Keep out any source of fire while refueling.
Do NOT smoke.
If the fuel is up to the lower side of the bottleneck, the tank is full.
Do not over fill. It may spill the fuel from the cap when driving or operating on slope.

Fuel tank capacity : 6 gallons (22.7 liters)

13. Fuel filter

Fuel filter is located between the fuel strainer and the engine, it keeps the fuel flowing to the carburetor. If the fuel filter is clogged, the engine performance may be restricted. Check before operating.

13.1 Checking fuel filter

- Check for any fuel leak.
- Check for any damage or stains.

13.2 Replacing fuel filter

1. Close the fuel cock.
2. Remove the hose clamp on the fuel filter.
3. Prepare dry rag, take out the hose from the fuel filter. Wipe clean any remaining gasoline seepage with rag.
4. Insert the hose into the new fuel filter at the correct angle, and tighten the clamp.

5. After making sure for no fuel is dripping, open the fuel cock, and check for any leakage.
6. If any leak was detected, be sure to replace.

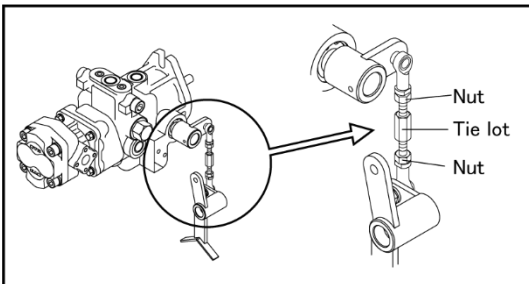
14. Hydraulic system

14.1 Neutral position

Neutral position is the position that the vehicle does not move neither forward nor reverse under full throttle after turning on the engine. This is called neutral.

14.2 Steps to positioning neutral

1. Jack up the vehicle on the stable base, and lift one of the rear wheels.
2. Position the sub-speed control lever to "high speed".
3. Release the parking brake lever to release the brake.
4. Turn on the engine, and manipulate the throttle lever to increase the engine rpm slightly.
5. If the wheel turns under this condition, adjust the neutral position of the pump as below steps.
6. Loosen the lock nut of the tie-rod located on the side of the hydraulic pump, adjust the length of the tie-rod until the wheel stops turning, then re-tighten the lock nut securely.



15. Hydraulic oil

The functional purpose of the hydraulic oil is transmitting movements, lubricating mechanisms, preventing rust, sealing and other purposes. Before use, be sure to inspect to confirm the sufficient volume and watch for contamination by following the below steps.

15.1 Oil tank

- ✓ Type of hydraulic oil: ISO VG46# (or equivalent)
- ✓ Tank capacity: about 18 liters

Check the gauge to confirm the sufficient volume of the hydraulic oil. Replace immediately. If the oil has emulsification and losing any clarity, replace immediately.

15.2 Hydraulic oil filter

Piston pump is highly accurate and especially sensitive to contamination with sludge, iron powder, rust, filling powder, and other dust particles. It is important to install proper filter to prevent contamination.

10 μ hydraulic oil filter is installed. Replace it after the first 100 hours, then replace once a year thereafter. By maintaining the clean hydraulic oil in the system, it helps to run the piston pump in good condition for a long time.



Hydraulic oil filter

Important

As contamination or deterioration of the hydraulic oil advances, it leads to malfunction of hydraulic mechanisms and may leads to malfunction of the vehicle with serious accidents.

If hydraulic oil has contamination or deterioration, replace the oil regardless of the recommended replacement schedule.

If the contamination or deterioration of the hydraulic oil was taking place at unusually fast pace, contact the dealer this product was purchased from.

15.3 Checking hydraulic oil

1. Turn on the engine.
2. Raise the hopper, turn off the engine when it reached the upper-most position, then lower the hopper fall-down prevention bar for safety.
3. Check the oil volume is at the designated oil level, and the oil is not deteriorated.
4. Check for any oil leak around the oil tank cap, below the oil tank, or underneath the vehicle.

15.4 Refilling hydraulic oil

Important

Do not mix different types of hydraulic oil.

Use Shell Tellus S2M46 (or equivalent)

1. Open the oil tank cap, use proper oil pot to refill until the gauge indicates the oil is at the desinated level.
2. Close the oil tank cap, then return the hopper safety bar to the original position.
3. Turn on the engine, and check and repeat the movements such as raise/lower hopper, open/close lid, raise/lower brush box, drive forward/back.
4. Turn off the engine, check for any oil leak from hydraulic units, hydraulic hoses, hose conections, and oil filter.

16. Hydraulic hose

Hydraulic hose system is a flexible piping system that transmits the hydraulic power. If any oil leakage from the hose takes place, it not only causes serious damage to the machine, but it may also cause serious damage to the turf grass where the machine operated on.

16.1 Checking hydraulic hose

Every day, check the hose system for oil leak, damage on the system, slacking, wear, loose connections, deterioration due to weather, and other deteriorations due to chemical reactions.

If necessary, repair or replace before operation.

Warning

When checking for pin-hole leakage from the hose or oil leak on the nozzle, Do NOT use hands. Use paper or cardboard to detect the leakage location.

Highly pressurized oil may punch through the human skin, take a most caution while handling this.

In case the hydraulic oil gets into the human body, it needed to be treated with surgical operation within several hours at a medical facility with experience of this type of treatment to prevent gangrene.

17. Polyurethane tire

Polyurethane tires used on this vehicle are specially made for providing exceptionally clean operation on turf as well as safely traveling between the operation areas. Be sure to inspect them before operation for assuring quality

operation and safe driving.

17.1 Checking polyurethane tire

Check for any large crack or detaching.

Re-tighten the wheel nuts periodically.

When polyurethane tire has damage, wear, or any other case that negatively affecting driving or operation, replace it immediately.

If oil was absorbed into the tire, wash the tire thoroughly with hot water washer or other washers.

17.2 Detaching/attaching front wheel

Must be done on a flat and level ground.

1. Pull the parking brake, secure the rear wheels by setting wheel blocks to hold the vehicle.
2. Use the front jack point, and raise the jack until the pressure is on the jack.
3. Remove bolts on the both sides of the front wheel.
4. Raise the jack slowly, set jack stands to fix the vehicle for safety.
※ You may work under the vehicle.
5. Slide the front wheel out.
6. Reverse the above steps to attache the front wheel.

17.3 Detaching/attaching rear wheel

Must be done on a flat and level ground.

1. Pull the parking brake, set wheel blocks on the opposite wheel intended to work on to secure the vehicle.
2. Use either left or right side jack point in the rear to set the jack.
3. Loosen the bolts on a rear wheel.
4. Jack up slowly until the wheel is off the ground.
5. Remove bolts.
6. Remove the wheel.
7. Reverse the above steps to attach the rear wheel.

18. Battery

Battery has important function of providing electric

current to starter motor for turning on the engine and storing electric power from the engine.

- ⚠ Danger**
- Before inspecting and maintaining battery, be sure to thoroughly understand the handling methods of the battery.
 - Battery contains electrolytes (diluted sulfuric acid). Do not allow to touch by any person not having proper knowledge or understanding harmfulness nature of handling battery or child, or it may result serious accidents.
 - Maintenance work of battery must be done with engine turned off and ignition key removed.
 - Be sure to disconnect the ground cable (-) before performing inspection/maintenance on battery.
 - In the event the battery solution was spilled on the body or clothes, wash immediately with a lot of water, then thoroughly wash with soap water to prevent burn injury or damaging clothes.
 - In the event the battery solution gets into the eyes, thoroughly wash with a lot of clean water such as tap water, then quickly seek medical treatment by ophthalmologist. Neglecting this may lead to lose of eyesight.
 - In the event the battery solution gets into the mouth or was swallowed, immediately drink a lot of drinking water, and seek medical treatment. Neglecting this may lead to burn injury in the mouth.
 - Do not over-turn the battery or apply shock to spill the battery solution.
 - When refilling the battery solution, be sure to put on protective clothes, safety glasses, rubber gloves and other necessary protective clothing.
 - Confirm there are no cracks on the casing, breakage, missing sections, leakage of solution, or dust deposit around the refueling cap and ventilation hole.
 - If any unusual smell or unusually rapid pace of losing the battery solution (such as once a month refilling was necessary) was detected, stop using. It may lead to ignition explosion and damaging the vehicle.

Battery on board

✓ 4 2 B 1 9 R

※ Use a battery with the same specification when replacing.

18.1 Checking battery

Wipe off dirt, stain with water moist cloth.

- ⚠ Warning**
- Using dry cloth for cleaning may cause ignition explosion by static electricity.
- ⚠ Caution**
- Use water to moist the cleaning cloth. Do not use benzene, paint thinner, gasoline or other organic solvent, detergent, chemically treated wiping cloth for cleaning the battery. It may cause damaging or solution leak of the battery.

Be sure to confirm the surface level of the battery solution is between the "Upper Level" and the "Lower Level" lines.

18.2 Refilling battery

Refill with battery solution (purified water) if the surface level of the solution is lower than the halfway between the "Upper Level" and the "Lower Level" lines. Refill the battery solution (purified water) to "Upper Level" line.

- ⚠ Danger**
- Do not use the vehicle or recharge the battery while the solution level is below the "Lower Level" line. It increases deterioration inside the battery and not only shorten the life of battery, but it may lead to explosion.
- ⚠ Warning**
- Do not over fill with purified water when refilling. If refilled more than the "Upper Level" line, it may lead to leakage of solution and damaging the vehicle.

18.3 Checking terminal connection

- Check to see the battery terminal and the terminal on the body are firmly connected. If the connection was loosened, connect them securely.
- If corrosion (showing white powder or surface rust) was detected, remove it with wire brush.
- Apply silicon electroconductive grease lightly on the terminal and the end of cable to prevent rust.

18.4 Detaching/attaching battery

1. Remove the front cover under the seat.

2. Disconnect the negative (-) terminal on the battery.
3. Disconnect the positive (+) terminal on the battery.
4. Remove the fixture holding the battery, while pointing the terminals up-wards, detach the battery.
5. Replace with new battery, securely hold the battery with fixture, firmly connect the positive terminal. Then, firmly connect the negative terminal.

⚠ Warning

- Be sure to fix the battery with holding fixture securely. If fixing was insufficient, it may lead to damage, short circuit, or damage the vehicle by leaked solution.
- If any unusual smell or unusually rapid pace of losing the battery solution (such as once a month refilling was necessary) was detected, stop using. It may lead to ignition explosion and damaging the vehicle.
- Be careful of the positive and the negative terminals touching the metal parts of the body when detaching the battery. When both terminals touch the body, cause short circuit and cause serious damage.

19.Cleaning/washing vehicle

Always clean and wash the vehicle to prevent dirt, sand, or grass on the vehicle. By keeping the vehicle clean, it prevents corrosion and rust on the vehicle. It also helps to detect problem area on the body at early stage.

⚠ Caution

- Do not use pressurized washer on the engine or to the electrical connections.

Important

- When lump of dirt is on the body, use the scraper included to remove dirt.
- Use dry rag to wipe off excess grease on the body.

20.始業・定期点検項目

Inspection List		Start up	1M or 50H	3M or 100H	6M or 200H	12M	24M	N O T E
Hydraulic Device	Oil/ Leakage	<input type="radio"/>						
	Oil/ Contamination	<input type="radio"/>						
	Oil/ Quantity	<input type="radio"/>						
	Oil/ Change					<input type="radio"/>		100h/ First time
	Oil filter/ Cleaning				<input type="radio"/>			
	Oil filter/ Change					<input type="radio"/>		100h/ First time
	Hydraulic hose/ Oil Leakage	<input type="radio"/>						
	Hydraulic hose/ Change						<input type="radio"/>	
	Hydraulic pump/ Oil Leakage	<input type="radio"/>						
	Hydraulic motor/ Oil Leakage	<input type="radio"/>						
	Hydraulic cylinder/ Oil Leakage	<input type="radio"/>						
	Operation lever (Stack valve) / Oil leakage	<input type="radio"/>						
Traveling Device	Engine oil	<input type="radio"/>						
	Air filter	<input type="radio"/>						
	Traveling pedal	<input type="radio"/>						
	Brake pedal	<input type="radio"/>						
	Brake oil/ Leakage	<input type="radio"/>						
	Brake oil/ Contamination	<input type="radio"/>						
	Brake oil/ Quantity	<input type="radio"/>						
	Brake oil/ Change						<input type="radio"/>	
	Parking brake	<input type="radio"/>						
	Tire	<input type="radio"/>						
Working Device	Brush/ Roter	<input type="radio"/>						
	Front and Side skirt	<input type="radio"/>						
	V-Belt	<input type="radio"/>						
	Electromagnetic clutch	<input type="radio"/>						
	Each Greese point			<input type="radio"/>				
	Each bolt/ Looseness	<input type="radio"/>						
	Abnormal part	<input type="radio"/>						

Caution

This table is only a guideline for inspection, and complying with the table does not mean guaranteeing the quality of the product.

Perform pre-operation/periodic inspection frequently, and if any problems were found, repair or replace the part quickly.

21. Period/Operation hour Inspection Sheet

After completing maintenance, fill in the Year/Month/Date and hour meter reading and mark "✓". Replace parts by operating hours or by recommended period whichever comes first.

Inspection/Replacement item and recommended hours of inspection	Year/Month/Date	/	/	/	/
	Hour meter reading when inspected	h	h	h	h
Engine Oil replacement	First 8 hours				
	Second 50 hours				
	Third time and thereafter 100 hours				
Oil Element replacement	200 hours or every 6 months				
Air Cleaner Element replacement	100 hours or every 12 months				
Fuel Filter replacement	800 hours or every 24 months				
Fuel Hose replacement	800 hours or every 24 months				
Hydraulic Oil replacement	500 hours or every 12 months				
Hydraulic Filter replacement	500 hours or ever12 months				
Hydraulic Hose replacement	800 hours or every 24 months				
Inspection/Replacement item and recommended inspection item	Year/moth/ date	/	/	/	/
	Hour meter reading when inspected	h	h	h	h
Engine Oil replacement	First 8 hours				
	Second 50 hours				
	Third time and thereafter 100 hours				
Oil Filter replacement	200h or 6 months				
Air Filter replacement	100h or12 months				
Fuel Filter replacement	800h or 24 months				
Fuel Hose replacement	800h or 24 months				
Hydraulic oil replacement	500h or 12 months				
Hydraulic oil filter replacement	500h or 12 months				
Hydraulic oil hose replacement	800h or 24 months				

22. Periodic Inspection Log

1. ___ month inspection
2. Circle the period for intended inspection.
3. Serial Number
4. Fill in the serial number placed on the body.
5. Result of inspection and overview of the maintenance
6. After inspection, fill in the check box with "✓" on the designated inspection item if no problems were found.
7. If problems were found during inspection, and necessary maintenance work was done, use designated symbol according to the below maintenance category to fill in the check box. If multiple tasks were performed, record the most critical item according to the priority list in the table.
8. If Inspection or maintenance involved disassembly, circle the check mark.
9. Name of the person performed inspection or maintenance.
10. Fill in the name of the person performed inspection or maintenance. If, the person performed inspection and the person performed maintenance was different, record both names.
11. Year/month/date of inspection and completion year/month/date of maintenance
12. Fill in the year/month/date of inspection, also fill in the year/month/date of maintenance work done.
13. Note (replaced parts, result of measurement, etc.)
14. Record the parts used for maintenance and measurements as needed.

Priority list of check symbols for recording

Rank	Category	Check symbol	Meaning
	Inspection	✓	Inspection result, no problems
1	Replace	×	Inspection result, replaced (parts, oil)
2	Repair	△	Inspection result, repaired (wear, damage)
3	Adjust	A	Inspection result, adjusted (for keep functioning)
4	Tighten	T	Inspection result, tightened (re-tightening)
5	Cleaning	C	Inspection result, cleaned (dust, oil)
6	Refuel	L	Inspection result, refueled (oil, fluid)

Start up Inspection Check List

Inspection	✓	Replace	×	Tightening	T
		Repair	△	Cleaning	C
Dismantle	○	Adjustment	A	Refueling	L

Type : _____

Serial number : _____

Result of Inspection and service information

ENGINE

- Engine/ starts, sound
- Throttle/ Low and High
- Exhaust gas/ Condition
- Air filter/ Contamination
- Fuel leakage
- Fuel filter/ Contamination
- Throttle and Brake wire/ Condition
- Engine oil/ leakage, contamination, Quantity

Work Device

- Rotor/ Abrasion, Damage
- Brush/ Abrasion, Damage
- Inside of Hopper/ Dirt, Damage
- Packing of Hopper Edge/ Abrasion, Damage
- Brush roller/ Damage, Wobble
- Scraper/ Abrasion
- Rubber/ Abrasion , Damage

Traveling / Brake

- Traveling pedal/ Slack, Neutral, Movement
- Tire/ Be Worn, Fissure, Damage
- Wheel nut/ Looseness
- Foot brake/ Effect
- Brake oil leakage, contamination, Quantity
- Paking brake wire/ Adjustment, Extend

Hydraulic Device

- Hydraulic Device/ Oil Leakage
- Hydraulic hose/ Oil Leakage, Damage
- Hydraulic oil/ Contamination, Quantity
- Coupling Parts/ Leakage

Electrical Equipment

- Battery/ Liquid quantity, Terminal
- Switch/ Test operation

Other

- Part of Thigtening/ Looseness
- Other

Power Transmission

- V-Belt/ Extend, Damage
- Rotating parts/ Abnormal noise, Vibration

Note

Inspection Date	Completed Date	Time of Use (h)
-----------------	----------------	------------------------

Signature _____

Periodic Inspection Check List

Inspection	✓	Replace	×	Tightening	T
		Repair	△	Cleaning	C
Dismantle	○	Adjustment	A	Refueling	L

Type : _____

Serial number : _____

1, 3, 6, 12 month Regular service

Result of Inspection and service information

ENGINE

- Engine/ starts, sound
- Throttle/ Low and High
- Exhaust gas/ Condition
- Air filter/ Contamination
- Fuel leakage
- Fuel filter/ Contamination
- Throttle and Brake wire/ Condition
- Engine oil/ leakage, contamination, Quantity
- Spark plug/ Condition

Traveling / Brake

- Traveling pedal/ Slack, Neutral, Movement
- Tire/ Be Worn, Fissure, Damage
- Wheel nut/ Looseness
- Foot brake/ Effect
- Brake oil leakage, contamination, Quantity
- Parking brake/ Effect
- Brake drum and Brake lining/ Gap
- Brake lining/ Abrasion
- Brake drum/ Abrasion, Damage

Electrical Equipment

- Battery/ Liquid quantity, Terminal
- Battery/ Charged capacity
- Switch/ Test operation
- Electric wiring/ Damage, Disconnection

Power Transmission

- V-Belt/ Extend, Damage
- Tension pulley/ Damage, Wobble, Abrasion
- Bearing, Pulley/ Damage, Wobble, Abrasion
- Electromagnetic Clutch/ Damage, Wobble, Abrasion
- Electromagnetic Clutch Fixing/ Damage

Work Device

- Rotor/ Abrasion, Damage
- Brush/ Abrasion, Damage
- Inside of Hopper/ Dirt, Damage
- Packing of Hopper Edge/ Abrasion, Damage
- Brush roller/ Damage, Wobble
- Scraper/ Abrasion
- Rubber/ Abrasion, Damage
- Hopper Lid/ Damage
- Hopper Lift Up/Down/ Movement fault
- Hopper Lid/ Movement fault
- Hopper and Hopper lid/ Gap
- Hopper Lid packing/ Damage, Peeling

Hydraulic Device

- Hydraulic Device/ Oil Leakage
- Hydraulic hose/ Oil Leakage, Damage
- Hydraulic Cylinder/ Oil Leakage
- Operation Lever/ Oil Leakage
- Hydraulic Motor/ Oil Leakage
- Hydraulic oil/ Contamination, Quantity
- Hydraulic oil filter/ Contamination
- Coupling Parts/ Leakage

Other

- Chassis, Each weld/ Damage,
- Part of Tightening/ Looseness
- Other

Note

Inspection Date	Completed Date	Time of Use
		(h)

Signature _____

12. Tightening torque

Important

- Refer to the table of tightening torque.
The manufacturer will not be responsible for any problems caused by unusual tightening or applying excessive torque.







Tightening torque standard

Bolt, screw

Important

- Fixing by bolts are used in many sections.
When start using this product, bolts and nuts may get loosened, be sure to re-tighten them.
- All the bolts and nuts, unless specially instructed, must be tightened using proper tool and at proper tightening torque.
- If excessive torque force was applied, screws will be deformed or damaged.
- Tightening torque force is determined by types of screw, strength, friction of screw surface and base surface.
- The table is made for zinc plating bolts or parker-processed bolts.
- It cannot be applied If the strength of male screw is weaker.
- Do not use screws with rust and sand on the surface. These screws cannot achieve sufficient holding function even designated torque was applied. Also, the surface friction gets too great, most of the torque force be lost in the friction, and the tightening force cannot be properly applied.
- Torque friction be reduced when screw gets wet, and it results excessive tightening.
- Do not use the bolt which excessive force was previously applied.
- Tightening with impact wrench will require skill.
- Practice may be required to perform consistent tightening work.

Metric Bolts

Class	Class 4.8				Class 8.8				Class 10.9			
	N-m	kgf-cm	lb-in	lb-in	N-m	kgf-cm	lb-in	lb-in	N-m	kgf-cm	lb-in	lb-in
Head Marking												
Size	N-m	kgf-cm	lb-in	lb-in	N-m	kgf-cm	lb-in	lb-in	N-m	kgf-cm	lb-in	lb-in
M5	3 - 5	30.59 - 50.99	26.55 - 44.26	44.26 - 61.96	5 - 7	50.99 - 71.38	44.26 - 61.96	61.96 - 88.51	7 - 10	71.38 - 101.97	61.96 - 88.51	88.51 - 123.91
M6	7 - 9	71.38 - 91.77	61.96 - 79.66	70.81 - 97.36	8 - 11	81.58 - 112.17	70.81 - 97.36	97.36 - 123.91	14 - 18	142.76 - 183.55	123.91 - 159.32	159.32 - 247.83
M8	14 - 19	142.76 - 193.74	123.91 - 168.17	203.57 - 256.68	23 - 29	234.53 - 295.71	203.57 - 256.68	256.68 - 336.34	28 - 38	285.52 - 387.49	247.83 - 336.34	336.34 - 513.36
M10	29 - 38	295.71 - 387.49	256.68 - 336.34	398.30 - 504.51	45 - 57	458.87 - 581.23	398.30 - 504.51	504.51 - 672.68	58 - 76	591.43 - 774.97	513.36 - 672.68	672.68 - 920.50
M12	52 - 67	530.24 - 683.20	460.25 - 593.02	593.02 - 752.34	67 - 85	683.20 - 886.75	593.02 - 752.34	752.34 - 1063.03	104 - 134	1060.49 - 1366.40	920.50 - 1186.03	1186.03 - 1663.99
M14	70 - 94	713.79 - 958.52	619.57 - 831.99	938.21 - 1186.03	106 - 134	1080.88 - 1366.40	938.21 - 1186.03	1186.03 - 1663.99	140 - 188	1427.58 - 1917.04	1239.14 - 1663.99	1663.99 - 2301.26
M16	88 - 112	897.34 - 1142.06	778.89 - 991.31	1345.35 - 1663.99	152 - 188	1549.94 - 1917.04	1345.35 - 1663.99	1663.99 - 2301.26	210 - 260	2141.37 - 2651.22	1858.71 - 2301.26	2301.26 - 3009.34
M18	116 - 144	1182.85 - 1468.37	1026.72 - 1274.54	1770.20 - 2124.24	200 - 240	2039.40 - 2447.28	1770.20 - 2124.24	2124.24 - 2855.16	280 - 340	2855.16 - 3466.98	2478.28 - 3009.34	3009.34 - 3982.95
M20	147 - 183	1498.96 - 1866.06	1301.10 - 1619.73	2168.50 - 2611.05	245 - 295	2498.27 - 3008.12	2168.50 - 2611.05	2611.05 - 3466.98	370 - 450	3772.89 - 4588.65	3274.87 - 3982.95	3982.95 - 5404.41
M22	295	3008.12	2611.05	-	-	-	-	-	530	5404.41	4691.03	5404.41 - 6831.99
M24	370	3772.89	3274.87	-	-	-	-	-	670	6831.99	5930.17	6831.99 - 8851.00
M27	550	5608.35	4868.05	-	-	-	-	-	1000	10197.00	8851.00	10197.00 - 14628.78
M30	740	7545.78	6549.74	-	-	-	-	-	1340	14628.78	11860.34	14628.78 - 19170.4



HATSUTA KAKUSANKI CO., LTD