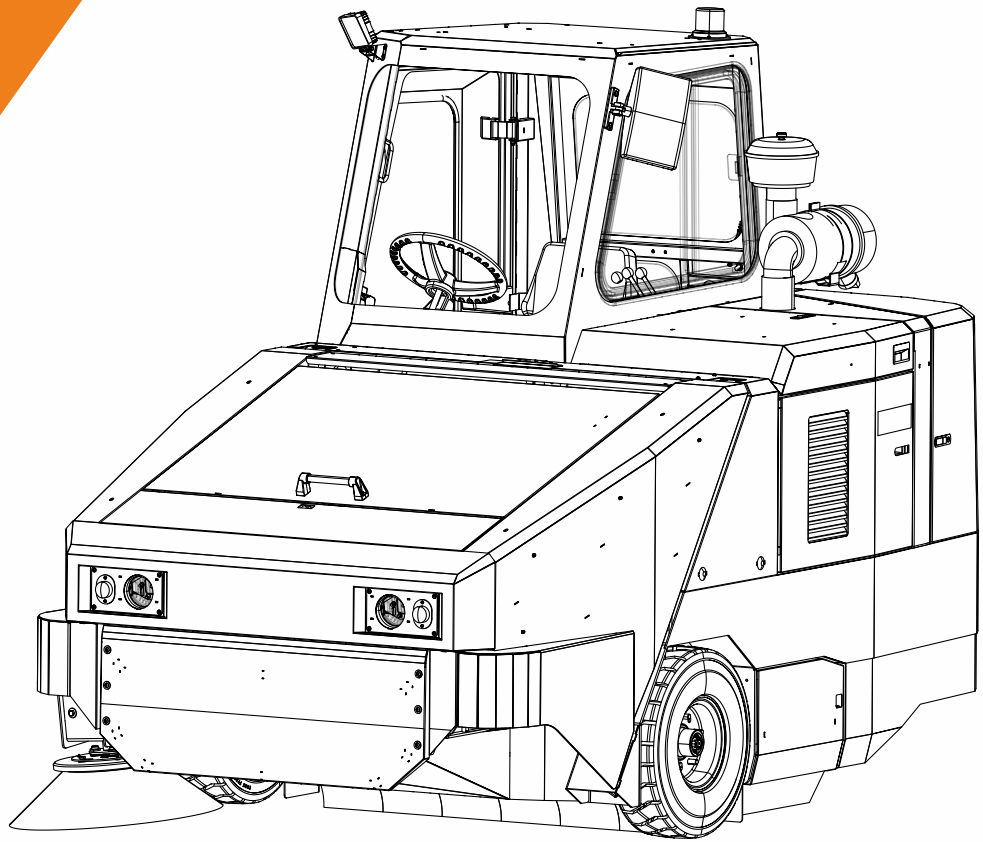
RD180

Ride-On-Sweeper
Diesel



Operator's Manual

Read this manual completely and understand the instructions before operating the machine.
"English Version"

TABLE OF CONTENTS

P/N: 557640003-00, Rev-A, 11/2020

Prepared by KM, NPM TD Dept.

IMPORTANT NOTE:

Roots Multiclean Ltd. (RMCL) is not liable for any legal claims that may arise as a direct or indirect result of the contents of this manual.

Roots Multiclean Ltd.
R.K.G. Industrial Estate, Ganapathy,
Coimbatore - 641 006, India.

MACHINE DATA

Please fill at the time of installation for future reference:

Model No. - _____

Serial No. - _____

Engine No. - _____

Installation Date - _____

OPERATOR'S MANUAL:

ROOTS philosophy is to continually improve all of its products. For this reason we may modify the design, appearance and engineering of our products periodically.
Therefore, some changes, modifications and improvements may not be covered in this manual.
For the latest Operator's Manual, visit:
www.rootsmulticlean.com/user-manual/

PREFACE

Dear Customer,

We are pleased with you having chosen the ***Rhino RD180*** for your cleaning requirements. Backed by our industry expertise that spans across two decades, we assure you that the machine comes with ROOTS promise of quality, efficiency and performance.

We advise you to carefully read through the instructions prior to the operation of the machine. This manual contains detailed instructions for the proper operation of the machine, along with important information regarding its handling, care, maintenance and service needs.

We are sure that you will find the machine and its performance to your utmost satisfaction. Once again, we thank you for choosing us as a trusted partner for your cleaning requirements.

Usage, Handling & Modification

Use of the product beyond the specified scope of functioning is deemed improper and the manufacturer cannot be held liable for any damages which may arise due to this.

This machine may be used only by persons who are trained or are familiar with the machine and are aware of the possible hazards involved. The appropriate Accident Prevention Regulations as well as applicable general regulations pertaining to Safety and Health at the work place must be adhered to by the user.

Modifications made to machine without the manufacturer's consent will relieve the manufacturer of responsibility and any possible liability for consequential damage.

Notes on Warranty

Refer the Warranty manual supplied along with the machine.

Acceptance of the Machine

On arrival of the machine at the shipping address, please check for any damage that may have occurred as a result of transit. In the event of any such damage, the purchaser is bound by responsibility to send a claim letter to the concerned authorized dealer with a copy of the invoice. The letter should be sent within 24 hours of receipt of the machine.

NOTE:
ILLUSTRATIONS SHOWN IN THIS MANUAL ARE FOR REPRESENTATIVE PURPOSE ONLY. ACTUAL PRODUCT MAY VARY.

ROOTS reserves the right to change the product or contents of this manual without prior information.

For Engine, Battery, Motors, Blowers or other OEM components related information kindly refer to their manufacturers manual supplied along with the machine for instructions regarding usage, maintenance and service.

Prior to first operation, read the manual carefully and strictly comply with the instructions contained.

The Operator's Manual is an integral part of the machine and must not be misplaced.

INTENDED USE

This ride-on power sweeper is intended for industrial use, for example in factories, large open spaces, car parks, cement industries, warehouses, etc. It is designed to sweep hard floor surfaces in an indoor/outdoor environment. This machine is not intended for sweeping wet or slushy areas. Do not use the machine on soil, grass or artificial turf. Use only recommended brooms.

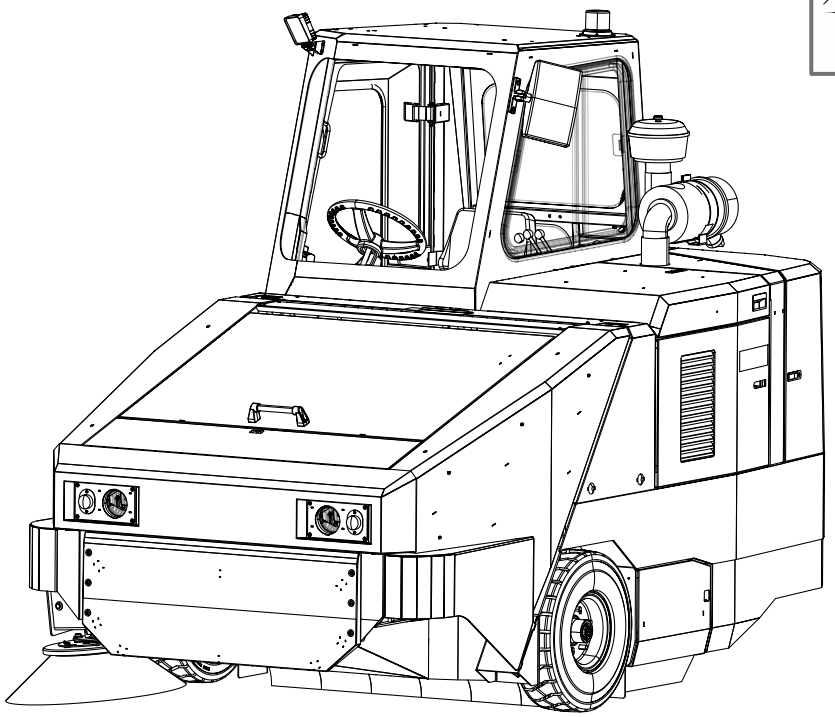
This machine is not intended for use on public roadways.

Do not use this machine in any other way other than described in this Operator's Manual.

WARNING:

When using indoors, ensure proper ventilation is available. Smoke Hazard.

TECHNICAL SPECIFICATION



SWEEPING PERFORMANCE

With One Side Broom - **19425 m²/hr @ 10.5 Km/hr**
Sweeping Speed - **8 to 11 Km/hr**

(Theoretical)

SWEEPING WIDTH

Without Side Broom - **1420 mm**
With One Side Broom - **1850 mm**

MAIN & SIDE BROOM

Main Broom Length - **1420 mm**
Main Broom Diameter - **400 mm**
Broom Type - **V-Shape**
Bristle Type - **POLY & WIRE**
Side Broom Diamater - **660 mm**

GRADABILITY

Max - **20 %**

WEIGHT

Unladen weight - **2860 kg**
(Without packing)

TECHNICAL SPECIFICATION

HOPPER

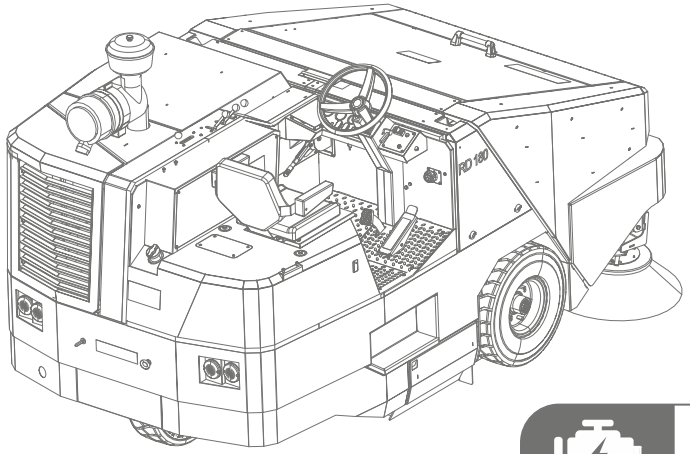
Hopper Volume (Theoretical)	-	**900 liters**
Dump Height	-	**1820 mm**
Lift Capacity	-	**900 kg**

FILTER

Filter Area - **18 m²**
No. of Filters - **9**

TANKS

Diesel Tank - **50 liters**
Hydraulic Tank - **58 liters**



FUEL

Fuel - **DIESEL**

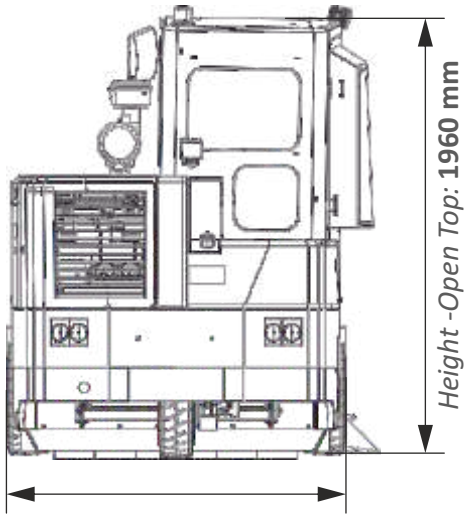
BATTERY

Battery - **12V, 80Ah**

ENGINE

Manufacturer	-	**MAHINDRA**
Model	-	**575 ELS-NA-BSIII CEV**
Displacement	-	**2979 cc**
No. of Cylinders	-	**4**
Horsepower	-	**35.4kW/47.5HP**

Length: Operation/Shipping - **3125/3340 mm**



Width: Operation/Shipping - **1796/2155 mm**

GENERAL SAFETY SYMBOLS

Read manual

Prior to first operation, read the manual carefully and strictly comply with the instructions contained.

Caution (the machine)

Important information on handling the machine in order to maintain operability.

Ecological hazard (the environment)

Due to use of substances representing an inherent danger to health of environment.

Safety Provisions (persons & goods)

Safety provisions in dangerous situation caused by misuse, inaccurate adherence to instruction or prescribed work routine.

SAFETY INSTRUCTIONS

Application

- The machine with working equipment must be checked to ensure that it is in proper working order and is operating safely prior to use. Otherwise, the machine must not be used.
- The machine is not suitable for sweeping dust which endangers health, unless expressly specified otherwise. Please follow the safety instructions in the operating manual.
- Never sweep explosive liquids, combustible gases, explosive dusts as well as undiluted acids and solvents. This includes petrol, paint thinner or heating oil which can generate explosive fumes or mixtures upon contact with the suction air. Acetone, undiluted acids and solvents must also be avoided as they can harm the materials on the machine.
- Do not sweep any burning or glowing object.
- The machine should not be used in sub-zero temperatures.
- If the machine is used in hazardous areas (e.g. filling stations) the corresponding safety provisions must be observed.
- The machine may only be operated on the surfaces approved by the company or its authorised representatives.
- Protect the machine from frost.

SAFETY INSTRUCTIONS

Operation

- This machine is not intended for use by persons (including children) with limited physical, sensoric or mental capacities or lack of experience and/or skills, unless such persons are accompanied and supervised by a person in charge of their safety or if they received precise instructions on the use of this machine.
- Children should be supervised to prevent them from playing with the machine.
- The operator must use the machine properly. The person must consider the local conditions and must pay attention to third parties, in particular children, when working with the machine.
- Never leave the machine unattended so long as the engine is running. The operator may leave the machine only when the engine has come to a standstill, the machine has been protected against accidental movement, and the parking brake has been applied.
- For devices fitted with ignition key, remove the ignition key to prevent accidental or unauthorized use.
- Prior to starting work, the operator must ensure that all protective devices are properly installed and function correctly.
- The operator of the machine is liable for accidents with other individuals or their property.
- Ensure that the operator wears tight-fitting clothes. Wear sturdy shoes and avoid wearing loose-fitting clothes.
- Check the immediate vicinity prior to starting (e.g. children). Ensure sufficient visibility.
- The machine may only be used by persons who have been instructed in handling the machine or have proven qualification and expertise in operating the machine or have been explicitly assigned the task of handling the machine.
- Do not open the hood when the engine is running.
- On sloped surfaces, the sloping angle and the driving direction should not exceed the values given in the Operating Instructions.

Transport

- The engine is to be brought to a standstill and the machine is to be fastened properly during transportation.

Maintenance

- Maintenance work may only be carried out by approved customer service outlets or experts in this field who are familiar with the respective safety regulations.
- Please observe the local safety regulations regarding portable commercially used machines.
- Always use appropriate gloves while working on the device.
- First switch off the machine and remove the ignition key before performing any cleaning or maintenance tasks on the machine, replacing parts or switching over to another function.
- Always disconnect the battery when working on the electrics.
- Do not clean the machines with a high-pressure water jet (danger of short circuits or other damage).

Spare Parts & Accessories

- To avoid risks, all repairs and replacement of spare parts may only be carried out by the authorised customer service personnel.
- Use only accessories and spare parts which have been approved by the manufacturer. The exclusive use of original accessories and original spare parts ensures that the machines can be operated safely and trouble free.

Machines with Diesel Engine

Read the operating instructions of the engine manufacturer before start-up and follow the safety instructions carefully.
Risk of explosion!

- Only fill up fuel while the engine is turned off.
- Use the fuel specified in the Operations Manual.
- Do not refuel the machine in enclosed spaces.
- Smoking and open flames are strictly prohibited.
- Ensure that no fuel reaches the hot open surfaces.
  Risk of injury.
- Do not close the exhaust.
- Do not bend over the exhaust or touch it (risk of burns).
- Allow the machine sufficient time to cool down before carrying out any maintenance and repair work.
- Ensure that there is adequate ventilation or provision for diverting the exhaust gas while operating the machine in closed rooms (risk of poisoning).
- Exhaust gases are poisonous and hazardous to health, do not inhale them.

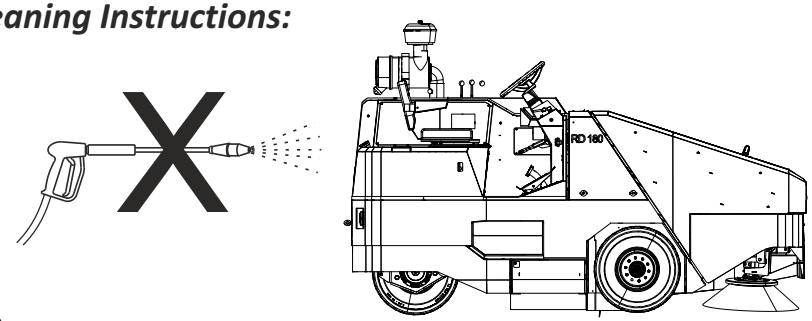
Pneumatic Tyres Equipped Machines

- In machines with screwed wheel rims: Please check and confirm that all the screws of the rim are tightened before correcting the tyre filling pressure.
- Check the pressure reducer on the compressor for the correct setting before correcting the tyre pressure.
- Do not exceed maximum tyre pressure.

DO NOT SWEEP OR VACUUM CORROSIVE/BATTERY FLUIDS/EXPLOSIVE/FLAMMABLE/MAGNETIC/RADIOACTIVE/ BIOHAZARD MATERIALS.

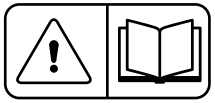
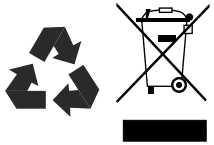
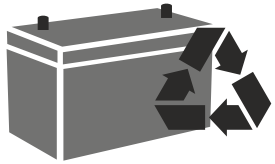
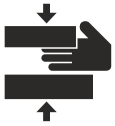
Wear PPE as necessary.

Cleaning Instructions:



WARNING: ***DO NOT CLEAN THE MACHINE WITH A HIGH PRESSURE CLEANER. THERE IS RISK OF DAMAGING THE ELECTRICAL PARTS OR RISK OF SHORT CIRCUIT!***

SYMBOLS & HAZARDS PICTORIAL DEFINITIONS

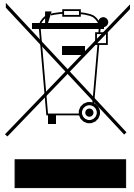
 Read Manual	 Information	 General Warning	 Caution	 Toxic Hazard
 Recycle/Do Not Throw In Garbage	 Environmental Hazard	 Battery: Recycle	 No Fire/Matches	 No Smoking
 No Passengers	 Do Not Throw In Garbage	 Hand Crush Hazard	 Static Electricity Hazard	 Hot Surface
 Do Not Start Tag	 Rotating Belt Hazard	 Wear Overalls	 Wear Gloves	 Wear Safety Shoes

SYMBOLS & HAZARDS PICTORIAL DEFINITIONS

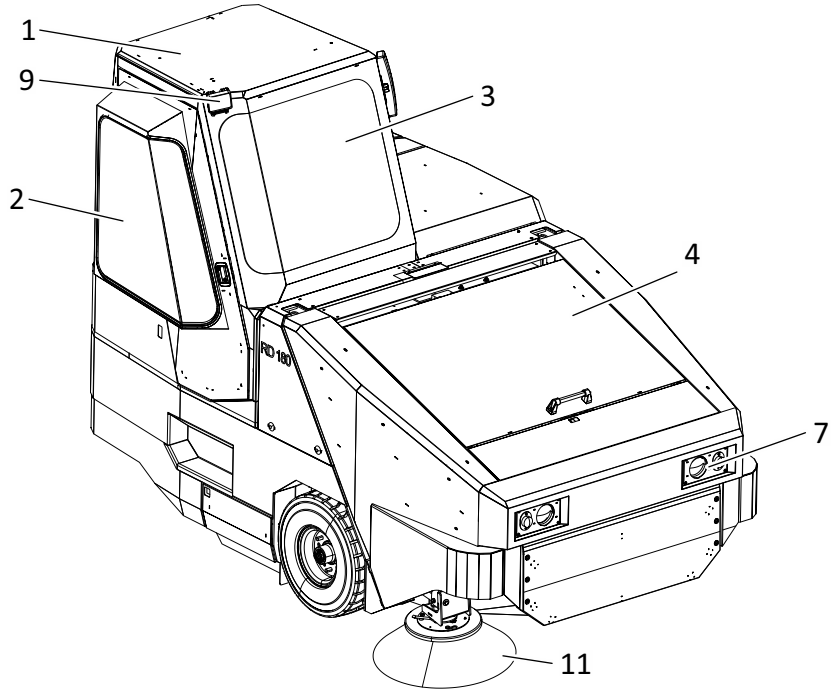
				
Wear Safety Glasses	**Wear Safety Helmet**	**Wear Ear Muff**	**Wear Respirator**	

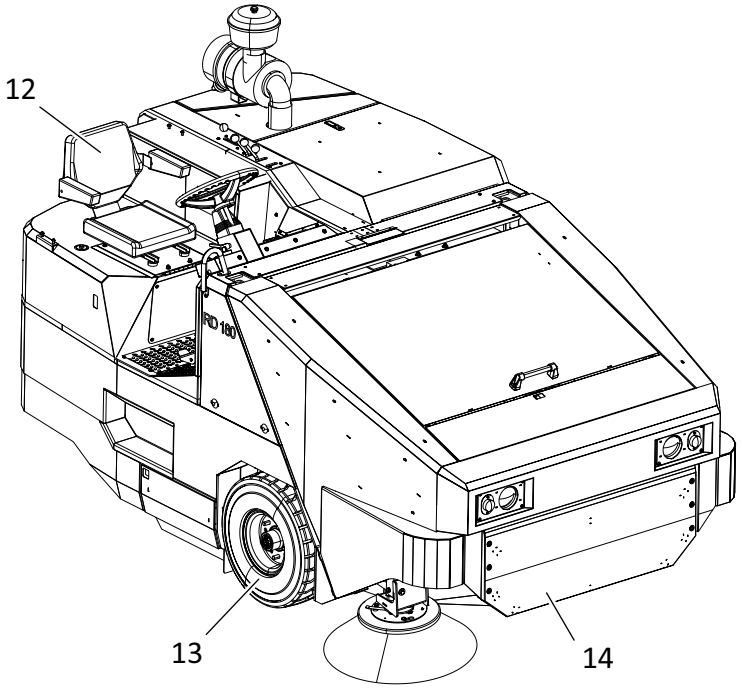
ENVIRONMENTAL RESPONSIBILITY

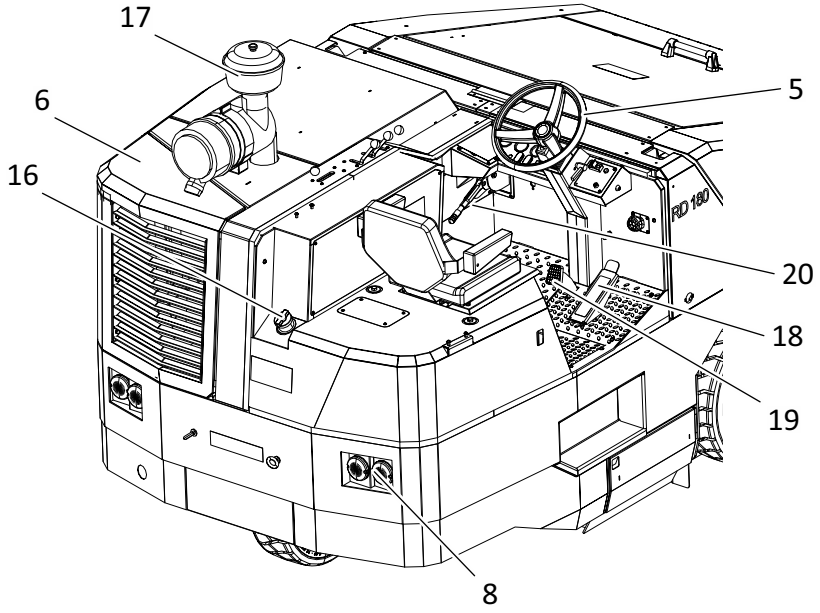
The packaging material can be recycled. Please do not place the packaging into the ordinary refuse for disposal, but arrange for the proper recycling.



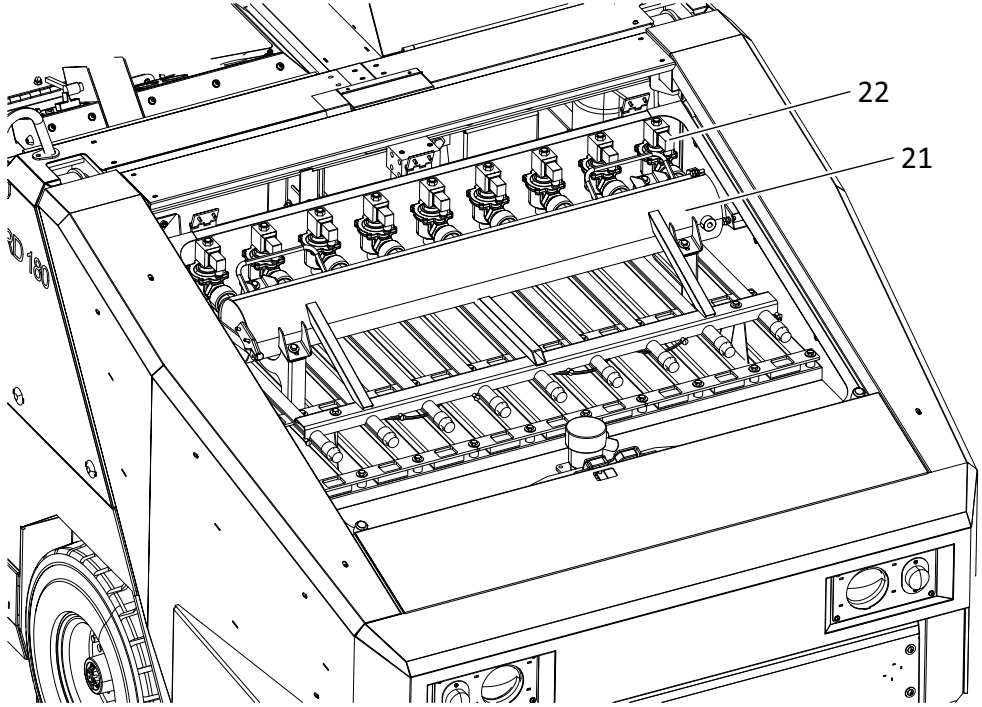
Old machines contain materials that can be recycled. Please arrange for the proper recycling of old machines. Batteries, electrical & electronic components contain substances that must not enter the environment. Please dispose off your old machine, batteries, electrical & electronic components using appropriate collection systems at the end of the product's life cycle.

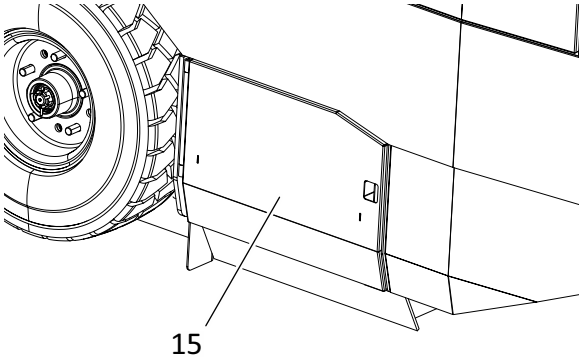


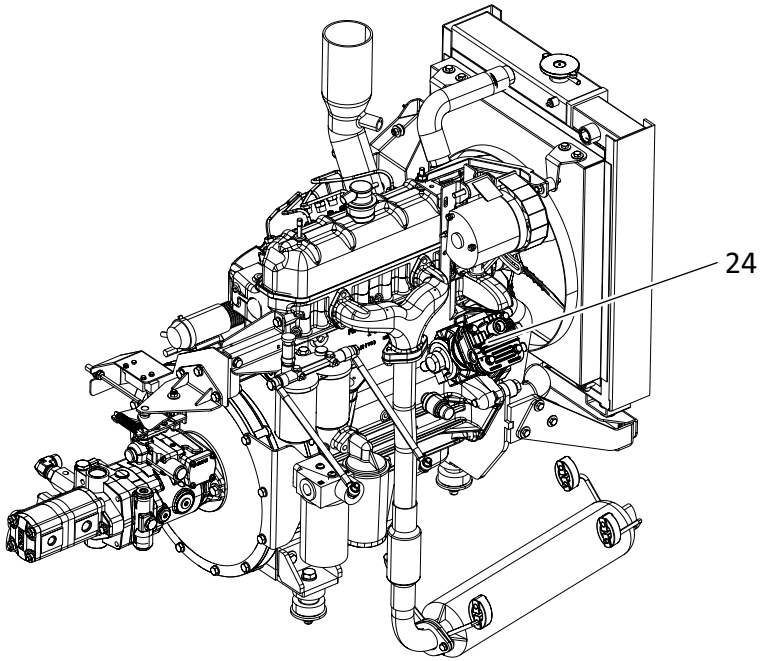


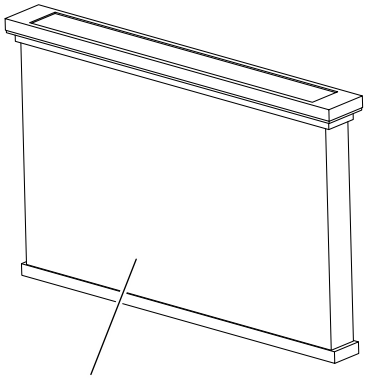


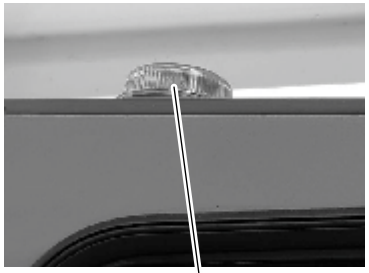
1. Operator Cabin
2. Cabin Door
3. Front Glass
4. Hopper
5. Steering Wheel & Dashboard
6. Engine Hood
7. Front Head Lamp w/indicator
8. Rear Lamp w/ indicator
9. Work Lamp
10. Beacon Lamp
11. Side Broom
12. Operator Seat
13. Front Wheel with Brake
14. Hopper Dumping Door
15. Main Broom Access Door
16. Fuel Filler with Cap
17. Pre-cleaner + Air Filter
18. Direction Control Pedal
19. Brake Pedal
20. Parking Brake





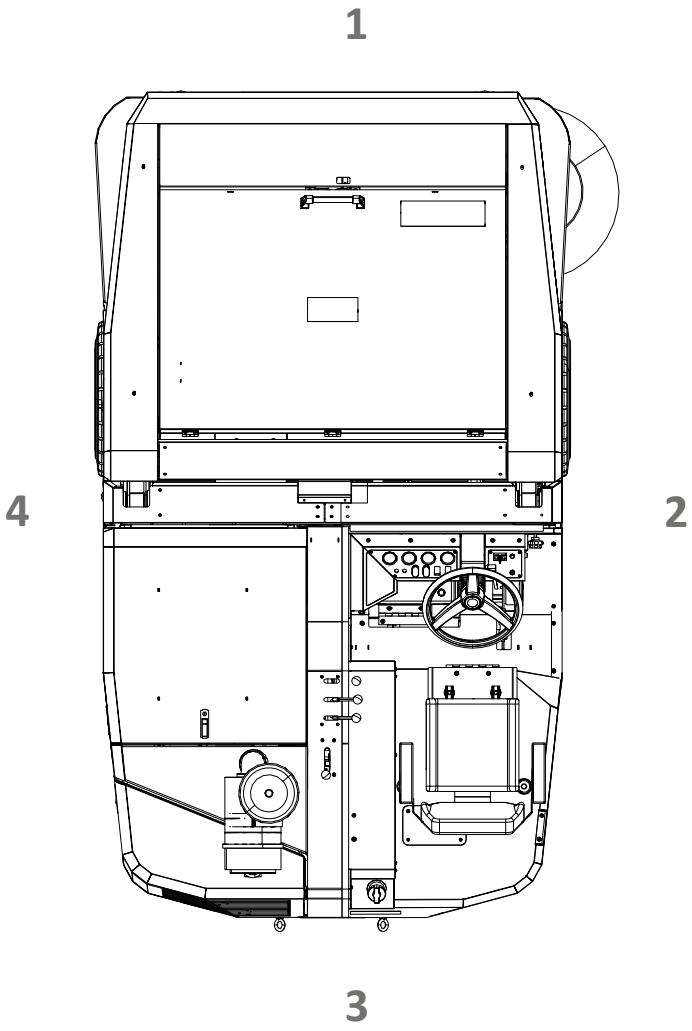






21. Panel Filter Purging System
22. Pneumatic Solenoid Valves
23. Panel Filter
24. Engine Group

Operator Orientation:



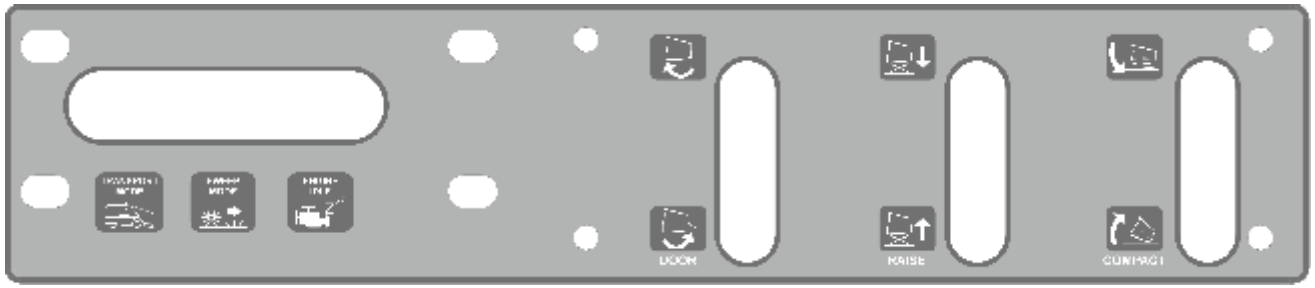
1. Front of the machine
2. Right of the machine
3. Rear of the machine
4. Left of the machine

RHINO POWER SWEEPER

ROOTS

RD 180

(1) *(2)* *(3)*



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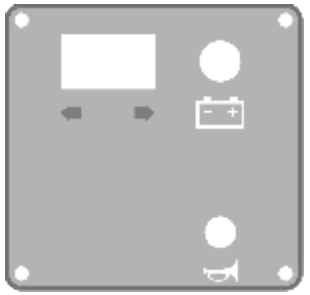

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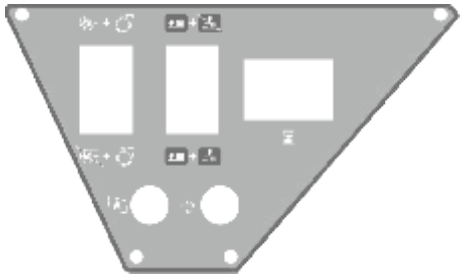

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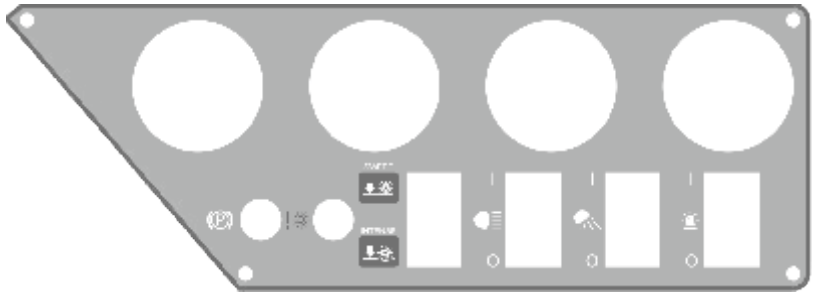
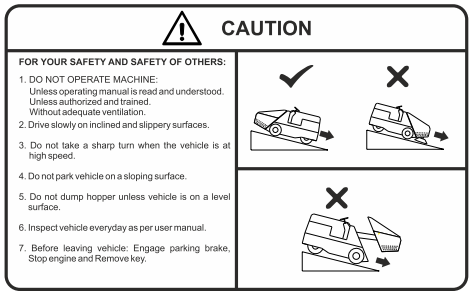


(7)

1. Product category sticker
2. Manufacturer's logo sticker
3. Product name sticker
4. Hopper & Throttle control sticker
5. Switch panel decal
6. Switch panel decal - LH
7. Switch panel decal - RH



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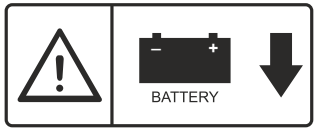

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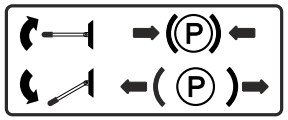

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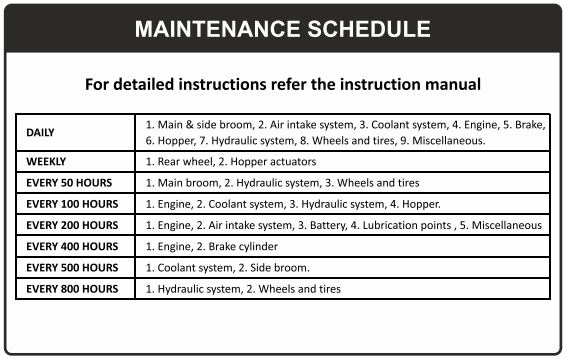

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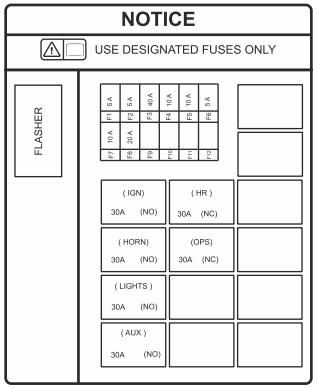

(9)

1. Machine safety sticker
2. Hopper lift arm safety warning sticker
3. Rotating belt keep away safety sticker
4. Diesel fuel safety sticker
5. Rotating belt keep away safety sticker
6. Battery location warning sticker
7. Parking brake safety sticker
8. Maintenance schedule sticker
9. Electrical fuses/relay location sticker

(1)

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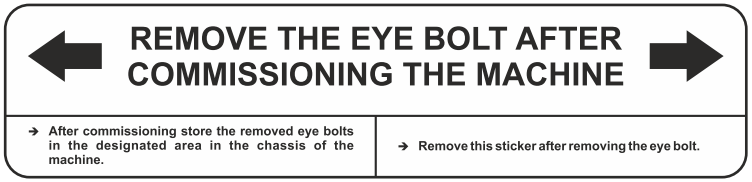
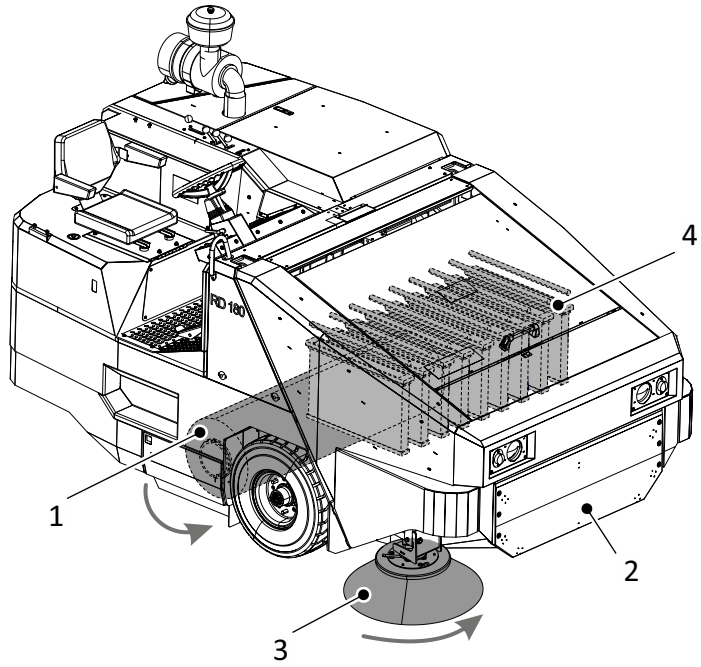


(6)

1. Yellow/Black stripe safety sticker
2. Yellow/Black stripe safety sticker
3. Yellow/Black stripe safety sticker
4. Grease point sticker
5. Safety stopper sticker
6. Commissioning instruction sticker

WORKING PRINCIPLE

Working Principle



Working Principle:

- The rotating main broom (1) throws the debris directly into the hopper (2).
- The side broom (3) sweeps the edges and corners and moves the debris to the path of the main broom.
- The fine dust from the swept debris is sucked by a centrifugal fan through a filter (4).

USEFUL TIPS:

- ✓ Never sweep long packing straps, ropes, threads, twines or wires as it could get entangled with the main and side broom and damage its mechanism.
- ✓ Make sure the area to be swept is dry.
- ✓ Position the machine in the direction of the wind, so that the wind blows the dust away from the machine.
- ✓ For optimum cleaning results, match the driving speed with the area to be swept.
- ✓ Switch off suction fan while sweeping in a damp area as it may damage the filter.
- ✓ Clean the dust filter at regular intervals depending on the intensity of the dust.
- ✓ When sweeping on a bad road make sure that the main broom is in float mode.
- ✓ Plan to sweep in long runs with minimal stopping or starting.
- ✓ Allow at least 5 inches of broom path overlap to ensure complete coverage of the area that is being swept.
- ✓ Avoid making sharp turns, bumping into posts or scraping the sides of the machine.

OPERATOR RESPONSIBILITY

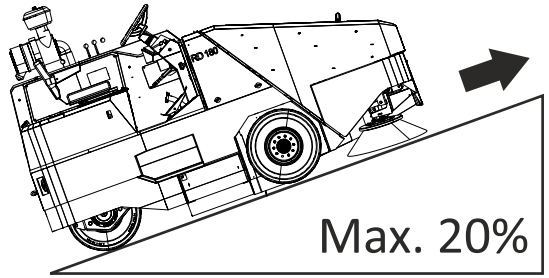
The operator's responsibility is to take care of the machine's daily maintenance and routine checkups to keep the machine in good working condition.
The operator must also inform the supervisor when scheduled maintenance of the machine is to be carried out.

CAUTION

Read this manual completely and understand before operating this machine. Also ensure that the persons who are going to operate this machine have also read and understood the contents of this manual.

Do not use this machine to collect any hazardous debris.
Do not use this machine as a transport equipment.

WARNING: Do not use this machine on surfaces exceeding a maximum of the given value for the gradient or slope.



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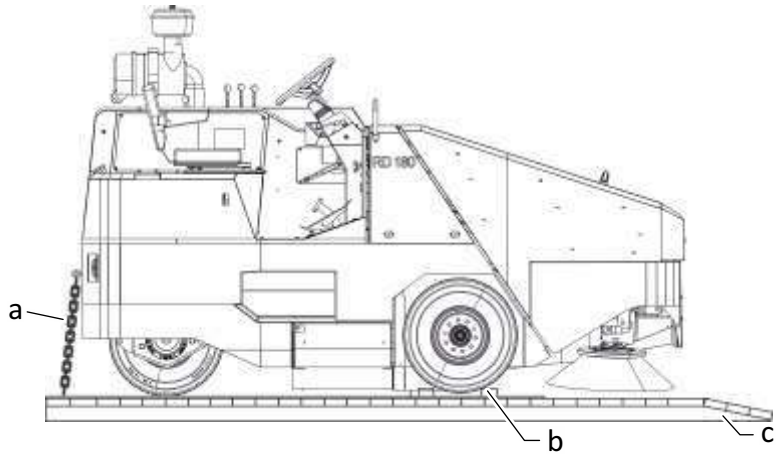
UNLOADING



To unload the machine follow the procedure as follows:

- ➔ Position the transport truck near a ramp.
- ➔ Remove the protective cover.
- ➔ Remove the strap belts/chains (a) that secure the machine.
- ➔ Remove the wheel blocks (b).
- ➔ Drive to unload the machine from the pallet (c) (if equipped).

CAUTION: Owner's personnel are not allowed to unpack the machine.

WARNING: The ramp's minimum load bearing capacity should be three tonnes. Risk of damage, Risk of injury.

- Do not use a forklift.
- Observe carefully when loading in a ramp: Ground clearance should be 80 mm.
- Risk/Danger of tipping over if gradient is too high.
- Do not unload the machine on an inclined ramp or platform.
- Do not unload the machine on wet areas.
- Use appropriate tools and safety devices.

Upon Unloading

- Check the machine for any transit damage such as dents, paint damage, scratches, leaks, etc.
- Check coolant level in the radiator.
- Check the engine oil level.
- Check the hydraulic oil level.
- Check the Main and Side Broom for damage.
- Connect the battery leads.
- Remove the eye bolts and store them in the machine for future use, also remove the eye bolt sticker and dispose it off after commissioning the machine.

If the coolant, oil, fuel levels are low top them up with the recommended grades.

WARNING:

- ➔ ***Do not smoke while refueling or topping up fluids.***
- ➔ ***Do not refuel or top up near open flames/fire.***
- ➔ ***Do not refuel or top up near a hot surface.***
- ➔ ***Do not use mobile phones while refuelling or topping up fluids.***

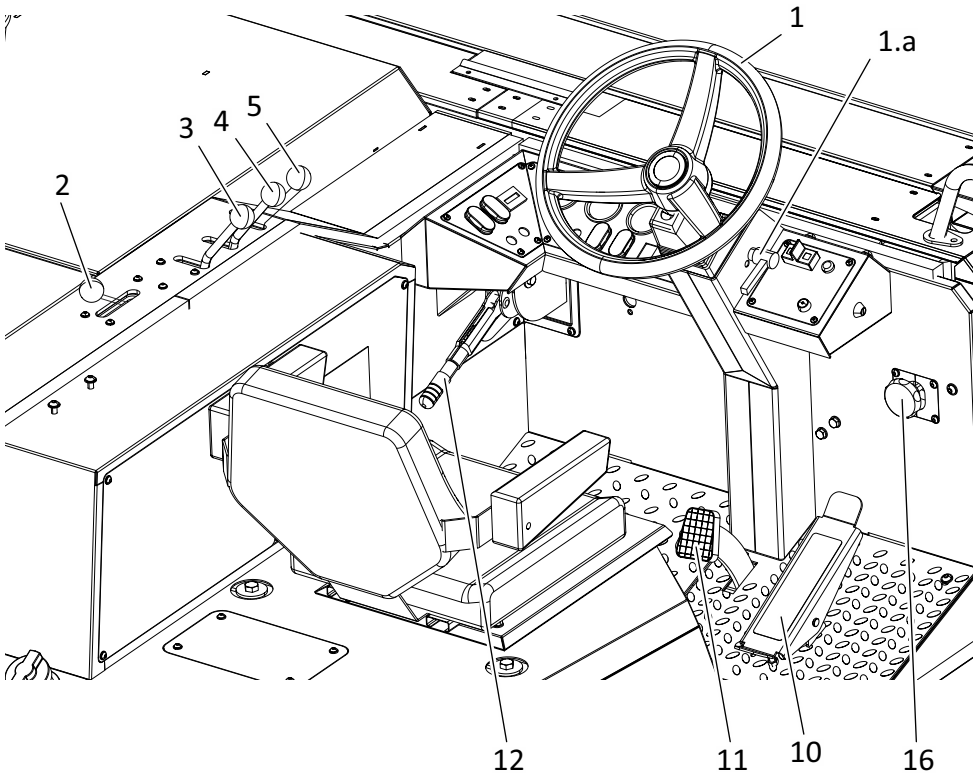
WARNING:

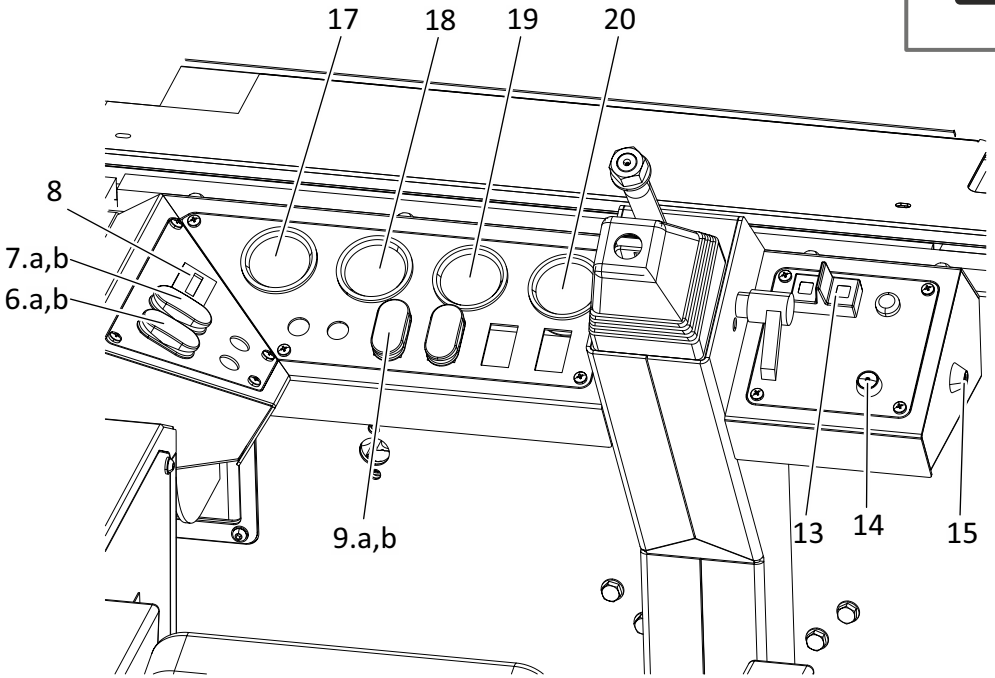
- ➔ ***Do not let fuel or oil to leak into the environment.***

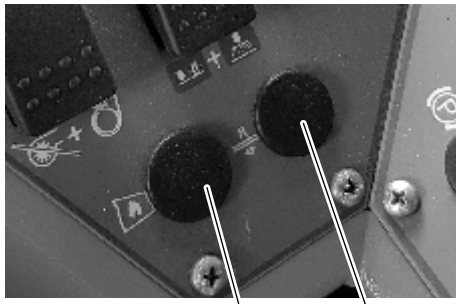
USE ONLY <u>DIESEL</u> FUEL.
DO NOT ADD ANY ADDITIVES.

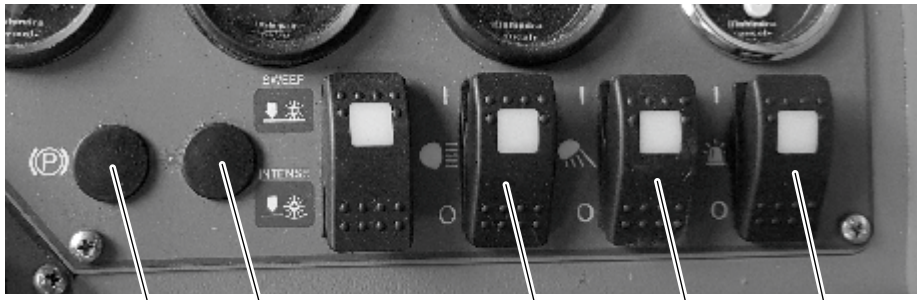
- Check the machine's invoice against the machine for the required accessories and serial number.

CONTROLLING AND INDICATING ELEMENTS

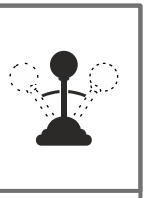








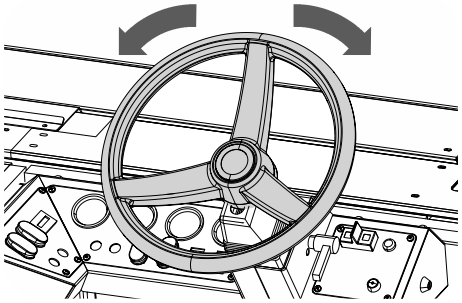
CONTROLS



1. Steering Wheel
1.a. Steering Wheel Adjustment Lever
2. Throttle Lever
3. Hopper Raise/Lower Lever
4. Hopper Door Open/Close Lever
5. Debris Compact System On/Off Lever
6.a. Impeller + Purging On Switch
6.b. Impeller Off + Purging On Switch
7.a. Main Broom On Only
7.b. Main & Side Brooms On
8. Hour meter
9.a. Normal Sweep Mode
9.b. Intense Sweep Mode
10. Direction Control Pedal
11. Brake Pedal
12. Parking Brake Lever
13. Indicator Switch
14. Horn Switch
15. Ignition Key Switch
16. Side Broom Adjustment Knob
17. Engine Oil Pressure Gauge
18. Engine Temperature Gauge
19. Battery Charge Indicator Gauge
20. Fuel Gauge
21. Fire in Hopper Indicator Lamp (if equipped)
22. Filter Clog Indicator Lamp (if equipped)
23. Parking Brake Indicator Lamp (if equipped)
24. Head Lamp Switch
25. Beacon Lamp Switch
26. Worklamp Switch
27. Main Broom Wear Indicator Lamp (if equipped)

CONTROLLING AND INDICATING ELEMENTS

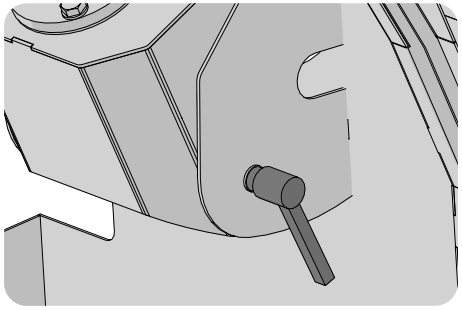
1. Steering Wheel:



The steering wheel controls the machine's direction. The machine is very responsive to the steering wheel movements.

LEFT **-** Turn the steering wheel to the left.
RIGHT **-** Turn the steering wheel to the right.

1.a. Steering Wheel Adjustment Lever:



The steering wheel tilt lever controls the angle of the steering wheel.

To adjust: Rotate the lever towards the operator, adjust the angle and push the lever back to secure.

2. Throttle Lever:

The engine speed can be controlled via a throttle lever assembly located in the operator's console. The lever is notched to set the required engine speed during the machine's operation.

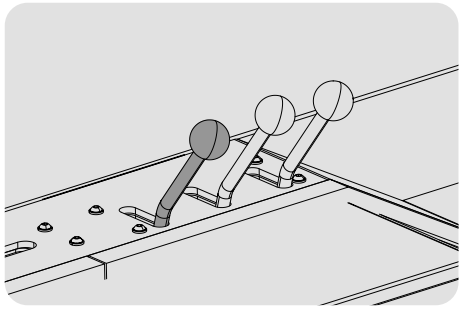
The lever positions are as follows:

Used for engine/machine idle condition.

Used for sweeping.

Used for driving.

3. Hopper Raise/Lower Lever:

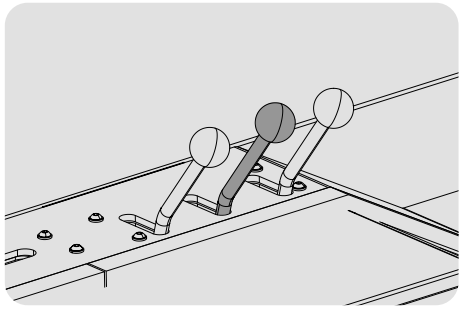


The hopper raising and lowering are controlled via a lever on the operator console.

Lever position leftward - Hopper lowers.

Lever position rightward - Hopper raises.

4. Hopper Door Open/Close Lever:



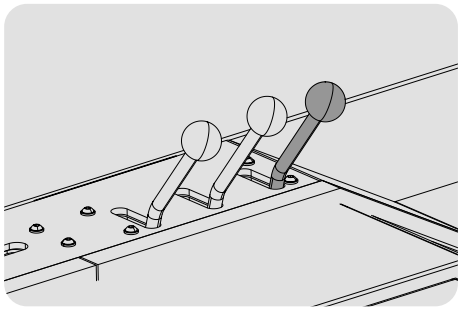
The hopper door open/close are controlled via a lever on the operator console.

Lever position leftward - Hopper door open.

Lever position rightward - Hopper door closed.

Note: *Hopper door opens automatically during sweeping operation. Activating main broom opens the door and switching it off closes the door automatically.*

5. Debris Compact System (DCS) Lever:



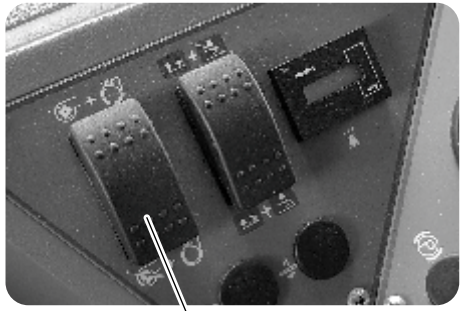
The debris compact system functions are controlled via a lever on the operator console. This DCS move the debris lying near the entrance of the door to the inner end of the hopper.

Lever position leftward - DCS compact mode.

Lever position rightward - DCS Off (Return to sweep mode).

COMPACT

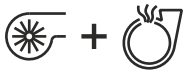
6. Impeller + Filter Purging Switch:



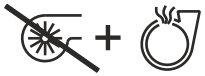
Impeller + Filter Purge Switch

This switch is used to switch On/Off the impeller and the filter purging system. The switch has three positions which are described below:

Switch position upwards - Impeller On & Filter Purging On

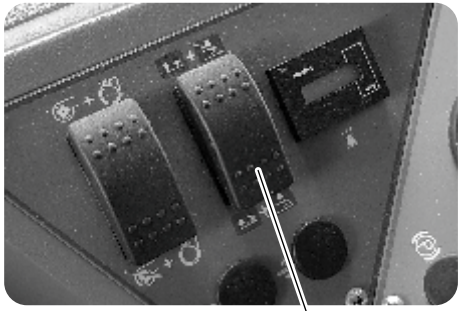


Switch position downwards - Impeller Off & Filter Purging On



Switch position middle - Impeller Off & Filter Purging Off

7. Broom Control Switch:



Broom Control Switch

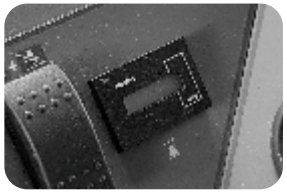
This switch is used to activate or deactivate the Main/Side Brooms. The switch has three positions which are described below:

Switch position upwards - Main Broom On & Side Broom Off

Switch position downwards - Main Broom On & Side Broom On

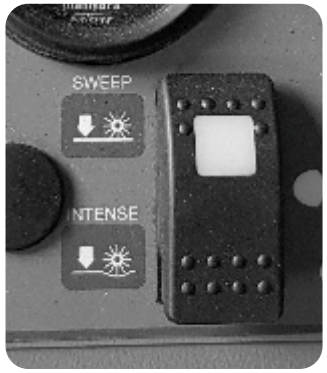
Switch position middle - Main Broom Off & Side Broom Off

8. Hour meter:



The hour meter displays the total number of hours the machine has run. This is useful to schedule maintenance of the machine.

9. Sweep Modes:

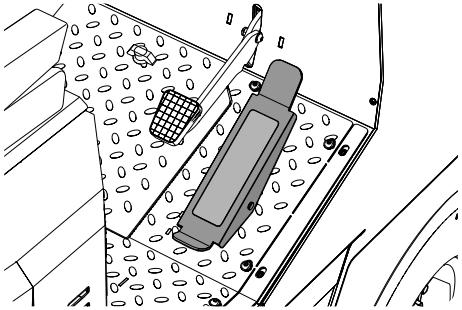


This switch is used to select between normal sweep or intense sweep. The switch has two positions which are described below:

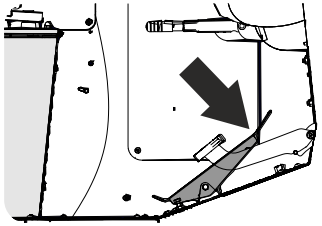
Switch position upwards - Normal Sweep

Switch position downwards - Intense Sweep

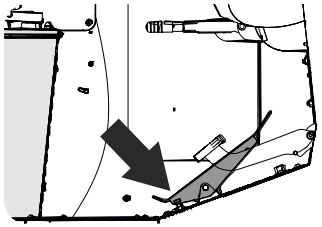
10. Direction Control Pedal:



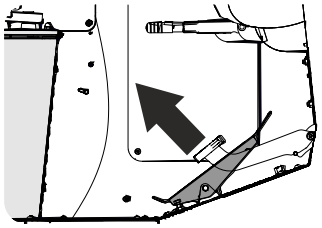
The directional pedal controls direction of travel and the propelling speed of the machine. You change the speed of the machine with the pressure of your foot; the harder you press the faster the machine travels.



Forward: Gently press the top of the directional pedal with the toe of your foot.

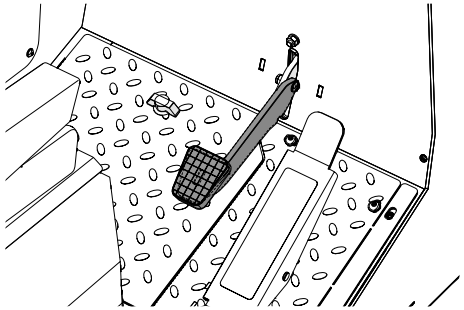


Reverse: Press the bottom of the directional pedal with the heel of your foot.
Note: *It is normal by design to see the machine achieve lower speed during reversing than forward.*

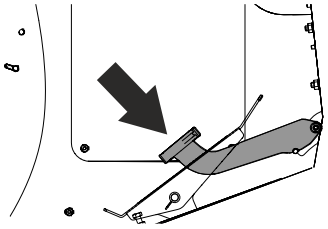


Neutral: Take your foot off the directional pedal and it will return to the neutral position.

11. Brake Pedal:



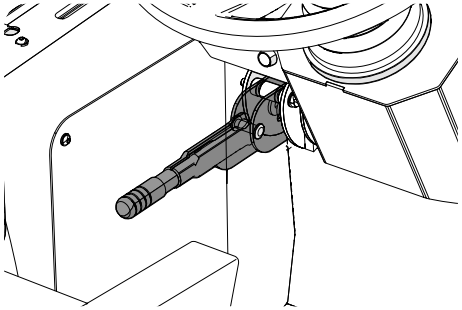
The brake pedal is used to slow or stop the machine.
The brakes are located at the front wheels of the machine.



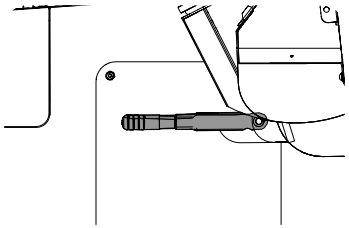
To Stop: Take your foot off the directional control pedal and let it return to the neutral position. Step on the brake pedal.

Note: *For normal slowing down of the machine or coming to a stop gently, there is no need to use the brake pedal. Only in case of emergency or during climbing up or down a gradient (ramps, etc.) pressing the brake pedal may be required.*

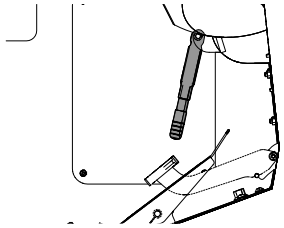
12. Parking Brake Lever:



The parking brake is used to hold the machine stationary when being parked after use. The parking brake lever is located below the steering column towards the left hand side.



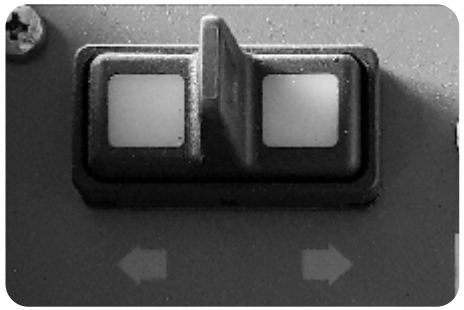
To Set: Pull the parking brake lever up.



To Release: Push the parking brake lever down.

Note: *Parking brake is intended for use only after the machine has come to a complete stop. Do not use it on a moving machine unless it is an emergency.*

13. Turn Signal Indicator Switch (if equipped):



The turn signal indicator switch is used to activate the indicator lamps located at the front and rear of the machine while turning to left or right. The blinking is indicated in the switch itself.

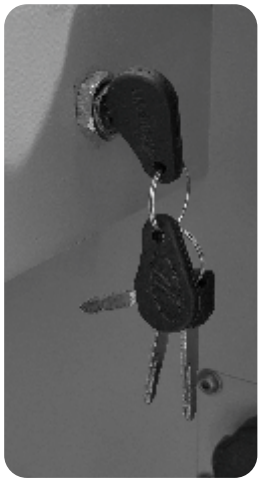
Left: Slide the switch to the left.
Right: Slide the switch to the right.

Note: *There is no self cancellation feature and the operator has to switch off the indicator manually.*

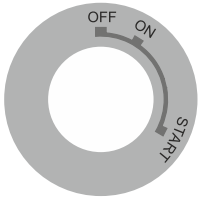
14. Horn Switch:

The horn switch is used to activate the horn. Push the switch to honk once.

15. Ignition Key Switch for Engine Start/Stop:

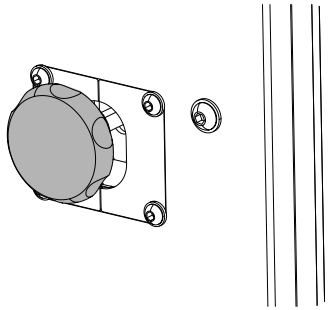


The ignition key switch starts and stops the machine's engine.
It is located at the right hand side of the steering wheel in the operator's console.

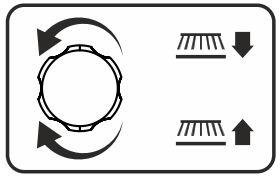


OFF - Engine & Electrical's are in Off condition.
ON - Electrical systems are powered up.
START - Engine starts. Release the key as soon as the engine starts.

16. Side Broom Adjustment Knob:



This knob is used to increase or decrease the side broom pressure.
Rotate the knob clockwise to decrease pressure.
Rotate the knob anti-clockwise to increase pressure.



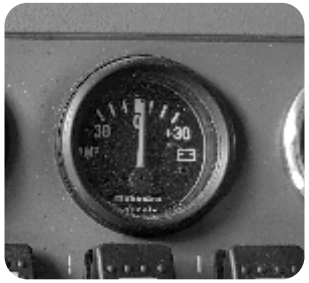
17. Engine Oil Pressure Gauge:

The engine oil pressure gauge is used to inform the operator that the engine oil pressure is higher/lower than the required operating parameter. The engine will automatically shut down if the oil pressure is lower than the permitted value. Check for the cause and correct it.

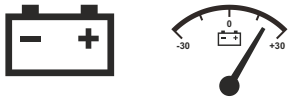
18. Engine Coolant Temperature Gauge:

The gauge shows the temperature value of the coolant. The engine will automatically shut down if the coolant temperature is more than the permitted value. Check the problem and have it corrected immediately.

19. Battery Charging Gauge:



The ampere gauge shows the performance of the alternator. The needle will indicate -30 if the alternator is not generating enough power and the needle will indicate +30 if any of the on-board electrical equipment is drawing power.



20. Fuel Gauge:

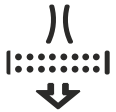
The fuel level gauge indicates how much fuel is in the tank. As the fuel tank empties, the needle moves towards the red zone of the gauge. The fuel tank is empty when the needle points at the RED marker.

WARNING: Do not let the fuel tank empty completely. Air can enter the fuel system. The fuel system will need bleeding before the next engine start.

21. Fire In Hopper Indicator Lamp (if equipped):

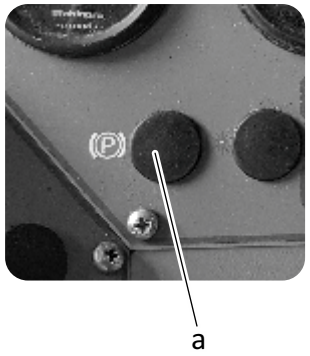
The fire in hopper lamp glows when a fire is present inside the hopper.

22. Filter Clog Indicator Lamp (if equipped):



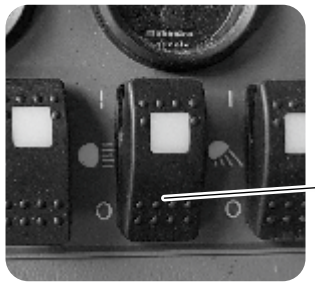
The filter clog lamp glows when the filters are clogged with dust.
Note: Activate the filter purging system to clear off the dust.

23. Parking Brake Indicator Lamp (if equipped):



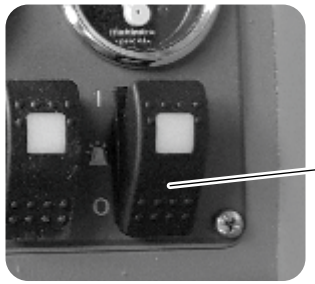
The parking brake lamp (a) glows when the parking brake is engaged to park the machine.

24. Headlamp Switch:



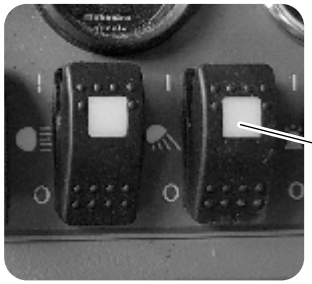
The headlamp switch is used to activate the headlamps and the tailamps of the machine.

25. Warning Beacon Lamp Switch (if equipped):



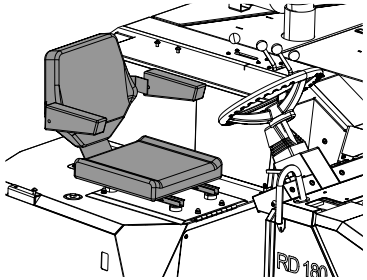
The warning beacon lamp switch is used to activate the warning beacon lamps (if equipped) which are used to warn others that the machine is in operation.

26. Worklamp Switch:

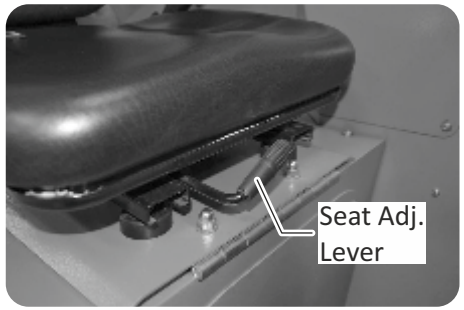


This switch is used to switch On/Off the front and rear worklamps during sweeping.

Operator Seat:



The operator seat can be adjusted forward or backward to suite the user's height. It has two foldable armrests and a seat belt *(if equipped)*.

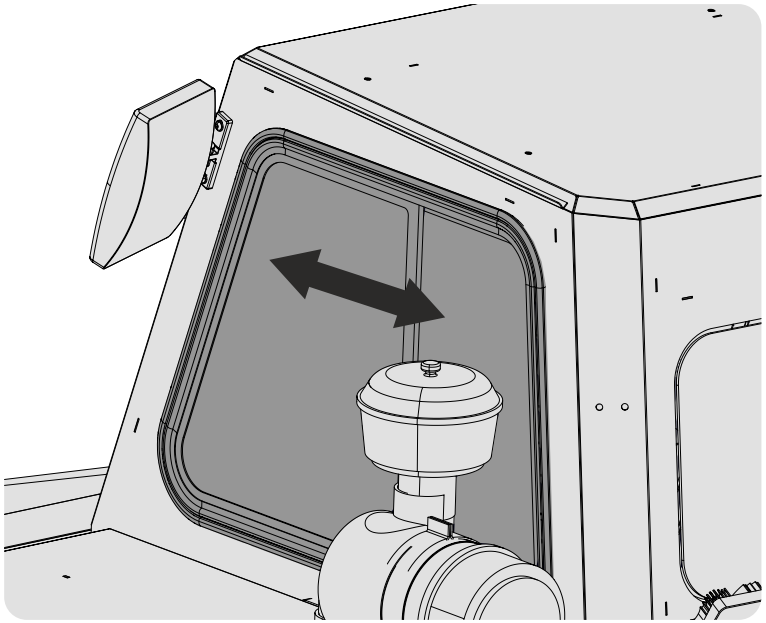


Pull the lever to slide the seat in forward or backward direction.

⚠ ***WARNING: Do not adjust the seat while the machine is in motion.***

Cabin Features

Sliding Window

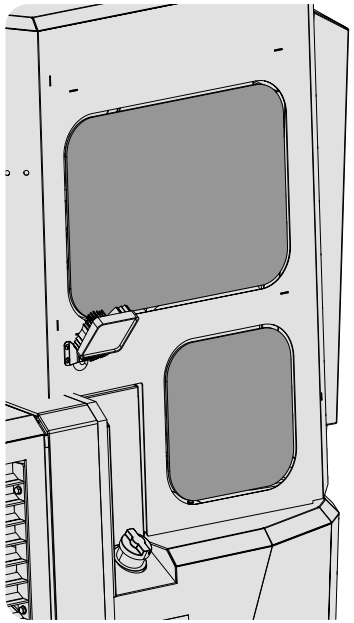


The cabin features a sliding window to add convenience to the operator. To open the window release the lock and slide the window sector backwards. To close the window sector, push the window forward till it locks.
To adjust the rear view mirror open the sliding window.
Note: Keep the sliding window closed when the air conditioning system is running (if equipped).

WARNING

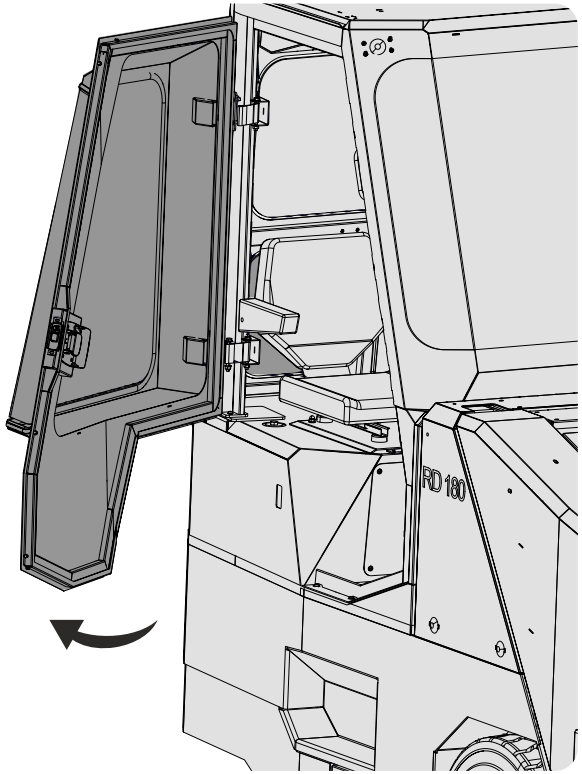
Do not open the window and let people sit while operating the machine. Risk of injury.

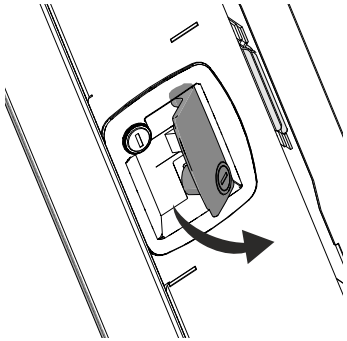
Rear Window



The cabin features a window located at the rear of the cabin. This window is helpful when backing up the machine.
Always keep window clear of any obstruction.

Main Cabin Door

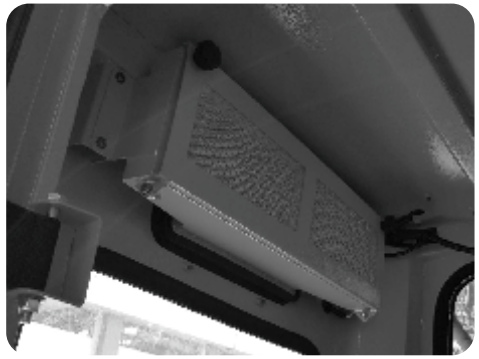




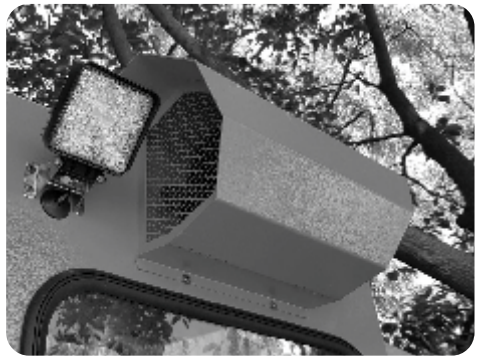
The main cabin door opens outwards. It has a lock mechanism to secure the door when the machine is in operation. It has a window to help the operator look at the sides during sweeping.
The door can be locked when the machine is not in use.
Note: Keep the door closed during sweeping, to prevent dust & debris entry into the cabin.

Cabin Fan (if equipped)

a



b

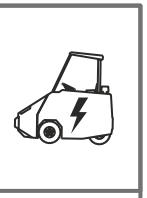


c

A pillar mounted fan (a) is used to circulate fresh air into the cabin. Also there is a blower (b) on top of the cabin which sucks in clean filtered air (c) from outside and circulates inside the cabin.
When using the fan always ensure that the sliding window and rear windows are closed.

Rear View Mirror

The machine is equipped with a rear view mirror to help the operator to check the rear of the machine during sweeping and also during backing up.
Keep the rear view mirror clean at all times.
Adjust the rear view mirror before driving the machine.



Machine Operation:

It is the operator's responsibility to be knowledgeable of all potential operating hazards and to take every reasonable precaution to ensure safety of oneself, others, animals, and property.

This section of the Operator's Manual is designed to familiarize, instruct, and educate safe and proper machine use to the operator. The operator must be familiar with the machine operation and all associated safety practices before operating.
Proper operation of the machine, as detailed in this manual, will help ensure years of safe and satisfactory use of the machine. ***READ, UNDERSTAND, and FOLLOW*** the safety messages. Serious injury or death may occur unless care is taken to follow the warnings and instructions stated in the safety messages. Always use good common sense to avoid hazards.

⚠ WARNING

Do not operate a damaged or malfunctioning machine. Risk of equipment failure or cause of injury or death or damage to property.

Operator Requirements:

Only qualified people are allowed to operate the machine. A qualified operator has to read and understand the owner's manual and should comply with its procedures. If any part of the operation and safe use of this equipment is not completely understood, consult an authorized dealer for a complete explanation.

If the operator cannot read the manuals for himself or does not completely understand the operation of the equipment, it is the responsibility of the supervisor to read and explain the manuals, safety practices, and operating instructions to the operator.

Employer Responsibilities:

a. Train the employee to operate the machine in a safe way.
b. Permit only qualified personnel to operate and service the machine.
c. Instruct all operators to maintain the shields and guards in its proper working condition at all times.
d. Ensure that the operators use approved Personal Protective Equipment at all times or whenever required.
e. Forbid the operators to carry additional people on the truck or the machine.
f. Ensure that nobody including the operator modifies or alters the machine or any of its function, doing so may cause fatal injury or death or it may damage the machine itself.
g. Ensure that children do not operate the machine.

Before Starting the Machine:

Before operating the machine, ensure that the equipment is working properly and that you are prepared for sweeping operations by checking the Pre-operative checklist and testing the machine functions.

Pre-Operative Checklist:

For the machine:

- ✓ Check engine oil level.
- ✓ Check engine coolant level.
- ✓ Check radiator and oil cooler fins for debris.
- ✓ Check hydraulic oil level.
- ✓ Check air filter indicator.
- ✓ Check seals and skirts for wear and damage.
- ✓ Check condition of the main/side brooms. Remove any straps, bands, ropes or other debris wrapped around them.
- ✓ Check sweeping pattern.
- ✓ Check hopper dust filter for blocks or damage.
- ✓ Check hopper seals and gaskets for wear and damage.
- ✓ Check brakes and steering for proper operation.
- ✓ Check fuel level.
- ✓ Check if debris hopper is empty.
- ✓ Check air pressure if equipped with pneumatic tires.
- ✓ Check proper function of all electrical systems.
- ✓ Check brake oil level.
- ✓ Check tension of the belts.
- ✓ Check purging system.

Worksite:

- Visually inspect the worksite before starting sweeping operation.
- Ensure that the operator is aware of the type of material to be collected.
- Ensure that there are no flammable materials in the vicinity of the machine during the sweeping operation.

Start-Up Test:

By identifying any problems before traveling to the worksite, you'll save unnecessary travel time and will be able to make repairs more easily with the proper tools.

WARNING: Never operate the machine in a closed building or without adequate ventilation. The exhaust fumes can be hazardous to your health.

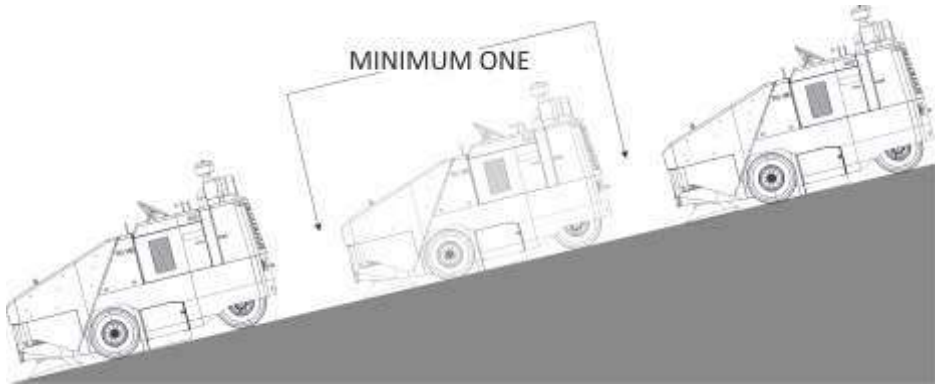
Driving in/around worksite:

Always follow the rules and regulations of the worksite while driving the machine.

While traveling the worksite road, always maintain a safe speed for the haul road conditions and grades. Never allow the machine to coast.

Pay attention to worksite road conditions to avoid rocks, holes, or other obstacles. Such obstacles not only present hazards to safe operation, but can needlessly damage tyres if not avoided.

Always maintain a safe distance behind the machine ahead, particularly on downgrades. A good rule-of-thumb to follow is to allow two (2) machine-lengths between machines for each 10 km/h of travel speed under normal operating conditions. Under adverse conditions, allow more room for safe operation. Such regulations would be established for the safety of everyone on the job.



When approaching downgrades, select the proper speed and use the brakes as required to maintain safe descent speed without over-speeding the engine or gaining excess travel speed.

STARTING THE MACHINE

Before starting the machine:

If applicable use the above safety devices:

1. Safety Eyewear
2. Earmuff
3. Safety Reflecting Jacket/Overalls
4. Safety Shoes
5. Safety Gloves
6. Dust Mask

WARNING:

- × **DO NOT SMOKE WHILE REFUELING OR TOPPING UP FLUIDS.**
- × **DO NOT REFUEL OR TOP UP NEAR OPEN FLAMES/FIRE.**
- × **DO NOT REFUEL OR TOP UP NEAR A HOT SURFACE.**
- × **DO NOT USE MOBILE PHONE REFUELING OR TOPPING UP FLUIDS.**

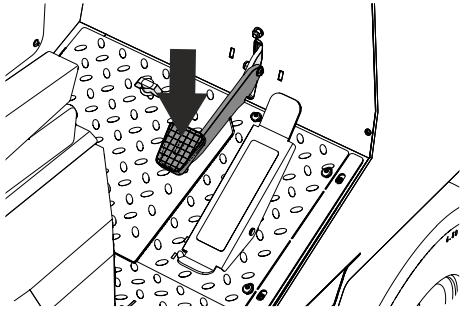
WARNING:
DO NOT LET FUEL OR OIL TO LEAK INTO THE ENVIRONMENT. THERE IS A RISK OF CONTAMINATION!

AVOID STATIC ELECTRICITY WHEN FUELING. AVOID DEATH OR SERIOUS INJURY FROM FIRE OR EXPLOSION.

DRIVING THE MACHINE

Starting:

1. Sit in operator seat, adjust seat position (if required) press parking brake, check if the direction control pedal is in neutral position.



2. Throttle should be in *idle* position.

Idle engine speed

3. Turn the ignition key to start position to start the engine.

NOTE: *If the engine does not start after 10 seconds, release key, wait for 1 minute and repeat the procedure again.*

⚠ ***WARNING: This machine emits toxic gases. Severe respiratory damage can be caused. Provide sufficient ventilation.***

After starting the engine wait for two minutes with engine speed set to idle for the pneumatic system to pressurize.

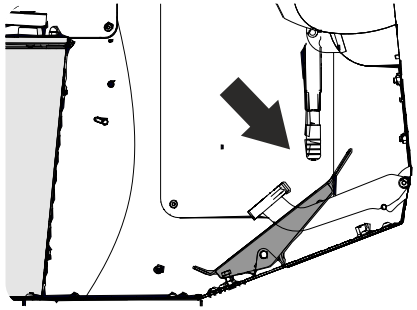
ECU Panel

NOTE: *If engine does not start in the first crank, do not continue cranking, open fuse panel box and check for any indication on the ECU panel. Switch off key and try again. If the problem persists contact an authorized service center.*

4. Throttle should be in *transport mode* position.

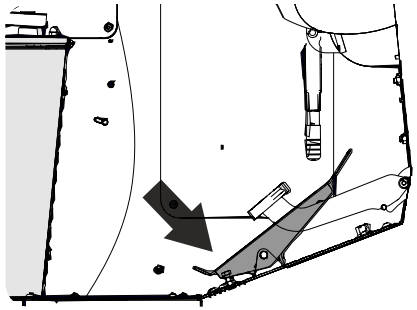
Driving:

5. Press the directional control pedal forward to propel the machine in the forward direction.



CAUTION: Ensure that the parking brake is disengaged before driving the machine.

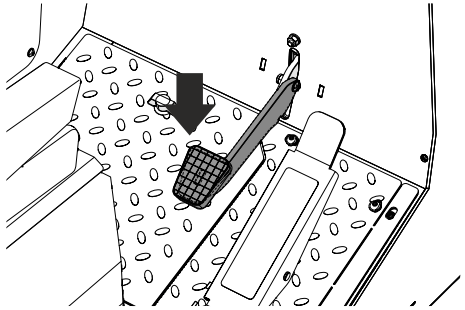
6. Press the directional control pedal backward to propel the machine in the reverse direction.



7. The speed of the machine varies with the pressure in which the directional control pedal is pressed.

Slowing & Stopping:

8. When the foot is taken off the pedal the machine will slow down and will coast to a stop.
   To stop or slow the machine quickly press the brake pedal downwards and release when stopped.



⚠ ***WARNING: Do not press the brake pedal simultaneously while the directional control pedal is operated. It will cause damage to the hydrostatic drive system.***

Driving on Inclined Surfaces:

- ☞ Drive slowly on downhill/uphill, on turns, wet grounds, ramps.
- ☞ Do not make sharp turns: machine might tip over.
- ☞ Do not adjust the driver seat while driving the machine.
- ☞ Do not drive with the hopper in raised position.
- ☞ Do not park the machine in slopes.
- ☞ Do not jack the machine in slopes.
- ☞ Do not go on a steep downhill with a filled hopper.
- ☞ Raise the hopper slightly before entering/exiting a ramp to prevent any damage to the hopper door.

⚠ ***CAUTION: Exercise caution for oncoming vehicles and other equipments and stationary objects, people or animals.***

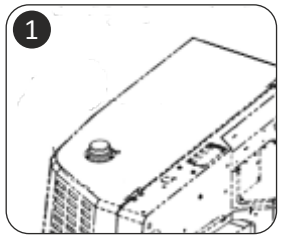
Driving with Headlamps & Optional Work Lamps:

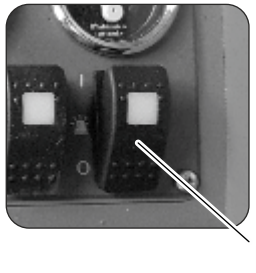
9. Use the headlamps to provide illumination in dark or low lit areas. Use the directional indicators while turning the machine in transport mode.

➢ Optional work lamps provide extra illumination on the corners/rear of the machine, they work in conjunction with the headlamps.

NOTE: *Switch Off the headlamps and work lamps when not in use. There is a risk of battery drain.*

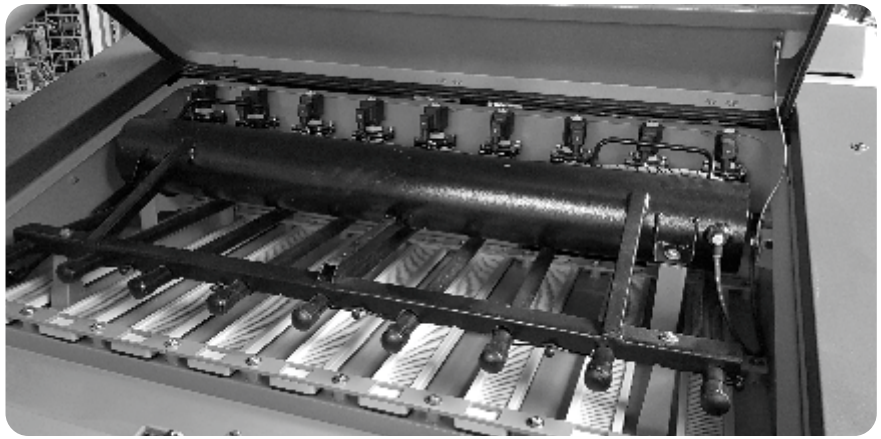
10. Always use the rotating warning beacon lamps (if equipped) when driving/operating the machine to warn others in the vicinity of the machine.



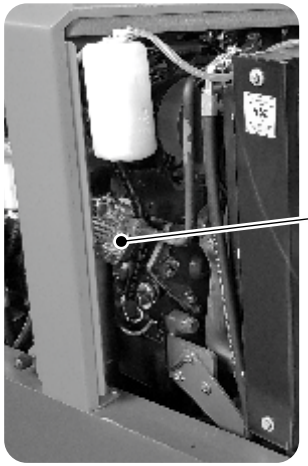


1. Beacon lamp placement without OHG.
2. Beacon lamp placement with OHG.
3. Push the switch upwards to switch ON the beacon lamp.

Filter Purging System:



The machine is equipped with a pneumatic purging system to clean the dust filters within the hopper. The air is supplied via a compressor located in the engine bay.
A series of solenoid valves are used to distribute compressed air to the filters.

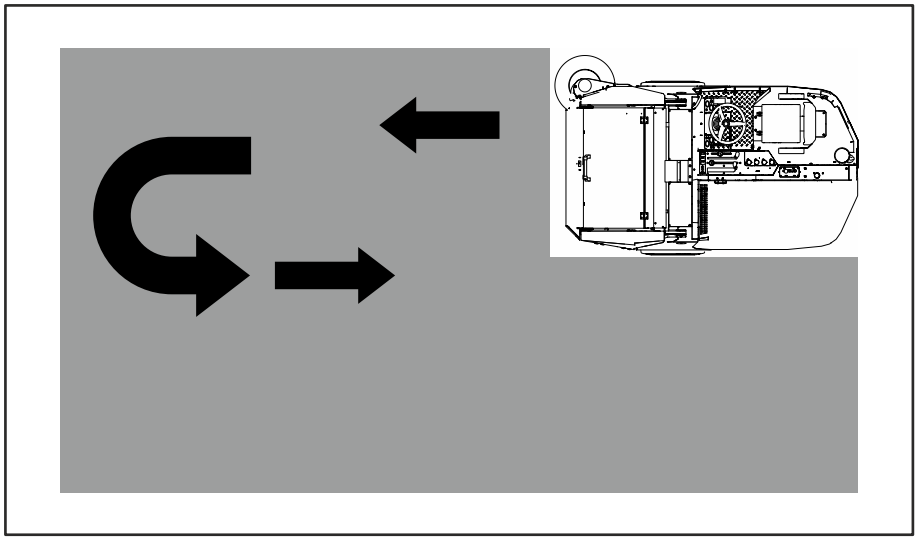


SWEEPING

Pick up oversized debris before sweeping. Flatten or remove bulky cartons from aisles before sweeping. Pick up pieces of wire, ropes, string, etc., which could become entangled in brooms.

Plan the sweeping in advance. Try to work in long runs with minimum stopping and starting. Sweep debris from very narrow aisles into main aisles ahead of time. Work an entire floor or section at one time. Sweep in a straight path as possible.
Avoid bumping into power and lamp posts or scraping the sides of the sweeper.

Avoid turning the steering wheel too sharply when the machine is in motion. The machine is very responsive to the movement of the steering wheel.
Avoid sudden turns, except in emergencies.

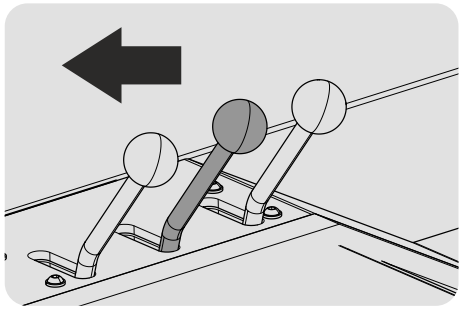


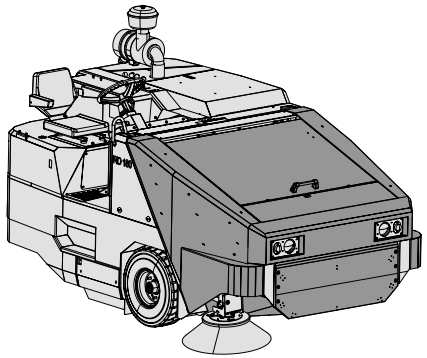
Start of Sweeping:

1. Set throttle positions as required.

Sweep Mode - For sweeping only.

2. Hopper should be completely lowered.





Lever position leftward - Hopper lowers.

Ensure that the panel filters are clean and dry and are locked securely in their position to prevent any leakage of dust during sweeping.

3. Lower the main broom and side brooms.

Switch position up - Main Broom On & Side Broom Off

Switch position down - Main Broom On & Side Broom On

Use the main broom for normal sweeping.
Use the side broom for edge sweeping only.

Note: *In highly dusty areas, it is advisable not to use the side brooms to avoid dust flying which will hamper visibility to the operator.*

Switch position up - Normal Sweep

Use this setting for all normal sweeping conditions.

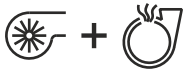
Switch position down - Intense Sweep

Use this function when heavy sweeping of debris is required, however this function is momentary as the switch is released the sweeping gets back to normal mode.

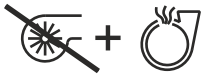
Warning: Do not use this setting for a longer period of time as there is a risk of excessive broom wear.

4. Switch On the vacuum suction /filter purging switch.

Switch position up - Impeller On & Filter Purging On



Switch position down - Impeller Off & Filter Purging On

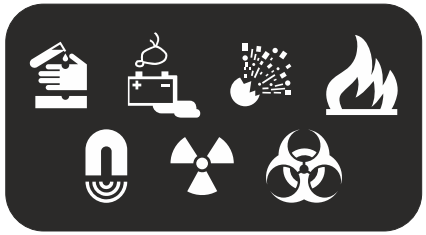


Push the switch up to activate the vacuum suction and filter purging system. The vacuum suction is used to suppress the dust cloud during sweeping.
Push the switch down to switch off the vacuum suction. In this setting the filter purging will continue to operate.

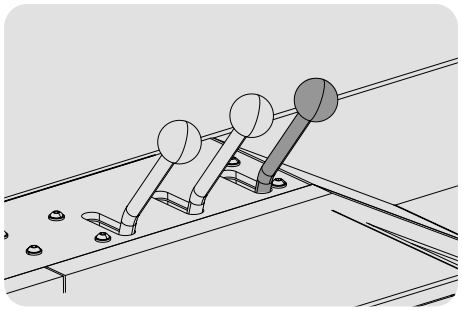
5. Sweep as needed.

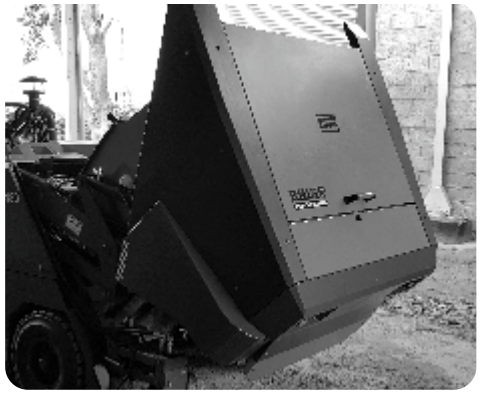
DO NOT SWEEP:

Corrosive/Battery Fluids/Explosive/Flammable Magnetic/Radioactive/Biohazard materials.



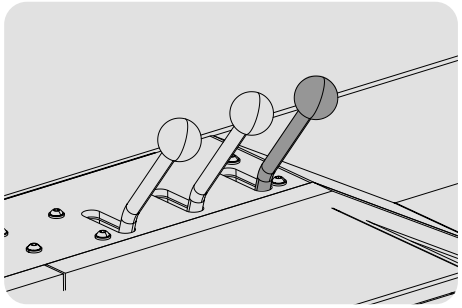
6. Activate the *Debris Compact System (DCS)* lever to move the debris from the rear entrance towards the inside of the hopper (compact mode).

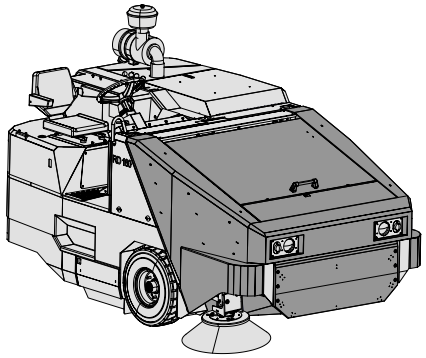




COMPACT

7. Return the hopper to its normal position to continue sweeping (return to sweep mode).



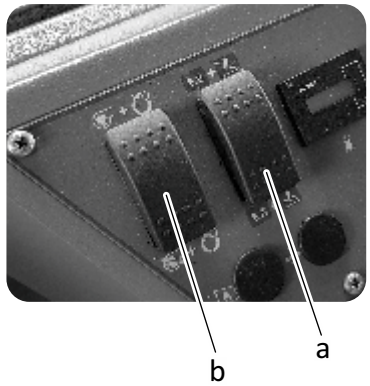


NORMAL POSITION

End of Sweeping:

1. Switch Off main broom and side broom (a): Set the switch position to neutral. Brooms will stop rotating and will be raised.

2. Switch Off vacuum suction and purging system (b): Set the switch position to neutral.

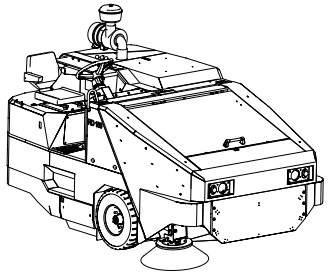


3. Set throttle position to idle. Operate the engine in idle speed for a minute.

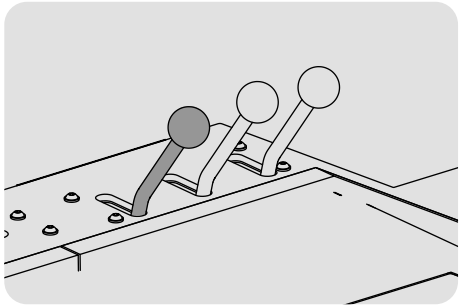
4. Engage parking brake.
5. Switch Off engine. Remove key.

Emptying the Debris Hopper:

1. Drive the machine at a slow speed to the desired dumping area.



2. Raise the hopper to its dumping position.



RAISE

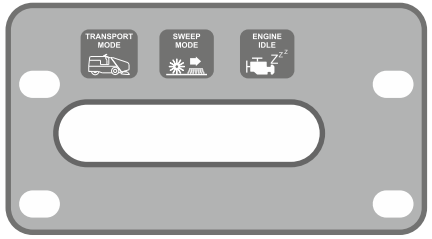
WARNING: Do not stand under a raised hopper.

3. Ensure that the hopper is in normal sweep position.

4. Open the hopper door to commence dumping of debris.

5. Close the door and lower the hopper completely.

6. Reduce throttle position to idle.



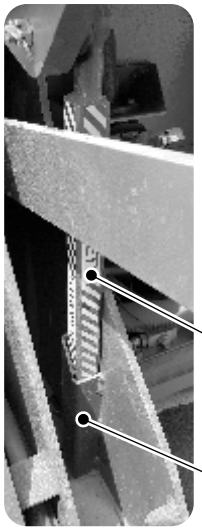
7. Engage parking brake.

8. Switch off engine and remove key.

Engaging the Hopper Safety Stopper

The safety stopper is a device used to prevent the hopper from falling down while cleaning or during maintenance works.

1. Engage parking brake.
2. Start the engine.
3. Lift hopper completely.
4. Release the safety stopper from its retaining position.
5. Place the safety stopper in the slot provided in the chassis.
6. Lower the hopper till it locks in position.
7. Switch off the engine and remove key.



⚠

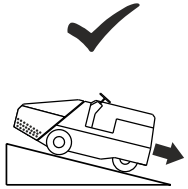
WARNING:
DO NOT STAND UNDER A RAISED HOPPER WITHOUT THE SAFETY STOPPER ENGAGED.

Disengaging the Hopper Safety Stopper

1. Engage parking brake.
2. Start the engine.
3. Raise hopper up completely.
4. Release the safety stopper from the locked position.
5. Place the safety stopper back in its storage position.
6. Lower the hopper.
7. Switch off the engine and remove key.

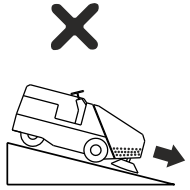
IMPORTANT SAFETY INFORMATION

ALWAYS

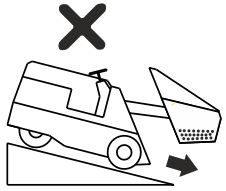


While sweeping or passing a ramp, always drive the machine with its front side facing uphill.

NEVER



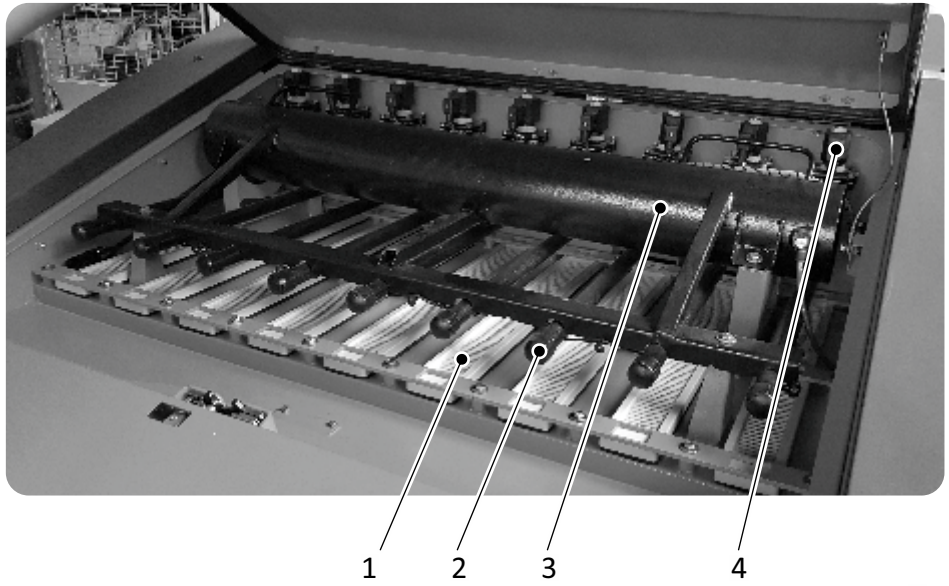
Never drive the machine downhill with a full hopper, there is a chance of losing traction and stability leading to risk of accidents.

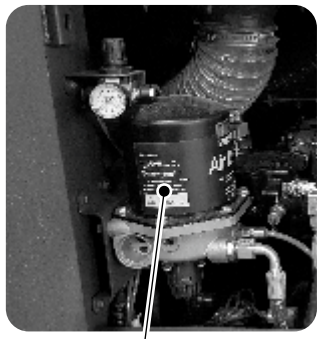


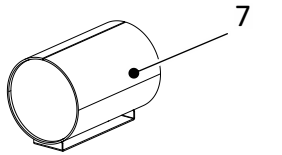
Driving downhill with a raised hopper is very dangerous and may cause the machine to tip over leading to loss of life or damage to the machine/environment.

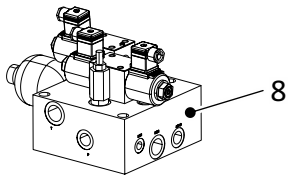
CLEANING THE DUST FILTERS

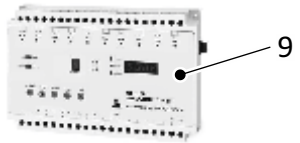
The machine is equipped with nine dust filters to filter out fine dust during sweeping operation. The dust filters are automatically cleaned by a pneumatic purging system.
The below procedure explains the purging operation:







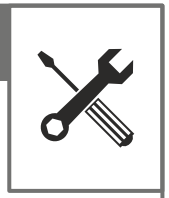




1. Dust Filter
2. Purging Pipe
3. Secondary Air Tank
4. Solenoid Valve
5. Air Drier
6. Air Compressor
7. Primary Air Tank
8. Pneumatic Manifold
9. Timer

1. Set throttle position to Idle.
2. Start the engine.
3. Keep engine speed in Idle.
4. Set purging switch to + position.
5. Air from the compressor (6) is passed through the drier (5) and stored in the primary tank (7).
6. When the purging switch is in operate condition, air from the primary tank is sent to the secondary tank (3).
7. A sequential timer (9) operates the solenoid valves (4) at a preset time of 25 seconds to spray compressed air to the filters (1) via tubes (2) directly above them.
8. A pneumatic manifold (8) controls the functions of the system.

MAINTENANCE



General Maintenance

This section describes the maintenance of the machine under the following sections:

- **LUBRICATION**
- **HYDRAULICS**
- **PNEUMATICS**
- **BROOMS**
- **TIRES & BRAKES**
- **PUSHING, TRANSPORTING THE MACHINE**
- **ELECTRICAL**
- **CLEANING THE MACHINE**
- **STORING THE MACHINE**
- **FREEZE PROTECTION**

WARNING

- ➔ ***Maintenance and/or repair operations must be done by skilled and authorized personnel; all operations on the electrical and pneumatic devices are to be performed by specialized personnel only.***
- ➔ ***Read this manual thoroughly before performing any repair or maintenance operations.***
- ➔ ***For repair and/or maintenance of high reach areas of the machine, use a suitable work lift or working platforms.***
- ➔ ***Use genuine Roots spare parts ONLY which are specifically designed for the machine.***
- ➔ ***USE suitable PPE at all times when working or servicing the machine.***

IMPORTANT!

- ➔ ***ALWAYS SWITCH OFF ENGINE AND REMOVE KEY BEFORE PERFORMING ANY MAINTENANCE OR REPAIR WORK.***

SAFETY PRECAUTIONS

Do not allow unauthorized personnel to service or maintain this machine. Study the Operator's Manual and Maintenance Manual before starting, operating or servicing this machine. Always follow procedures and safety precautions detailed in the Maintenance Manual.

Always attach a 'DO NOT START' or similar warning sign to ignition switch or a control before cleaning, lubricating or servicing the machine.

Never allow anyone to work on the machine while it is moving. Make sure no one is on the machine before working on it.

Do not work under or near unblocked or unsupported hopper. Always use the hopper safety prop.

Do not work under or near any unblocked or unsupported linkage, part or truck.

Always relieve pressure before servicing any pressurized system.

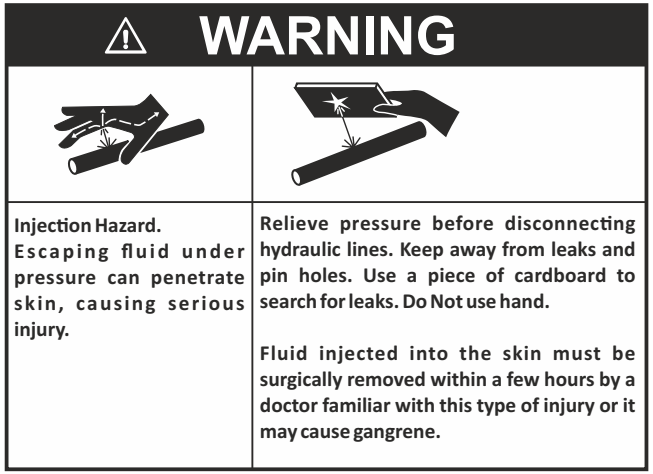
When changing oil in the engine, transmission and hydraulic systems, or removing hydraulic lines, remember that the oil may be hot and can cause burns to unprotected skin.

When working on or around exhaust components, remember that the components may be hot and can cause burns to unprotected skin.

Always deflate tyre before attempting to remove any embedded objects or removing the tyre and rim assembly from the machine.

WARNING

Escaping fluids under pressure can penetrate skin.
When working around battery area, keep all flames and sparks away from batteries.



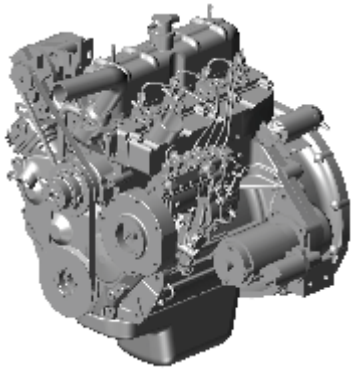
PREVENTIVE MAINTENANCE

Preventive Maintenance Instructions

LUBRICATION

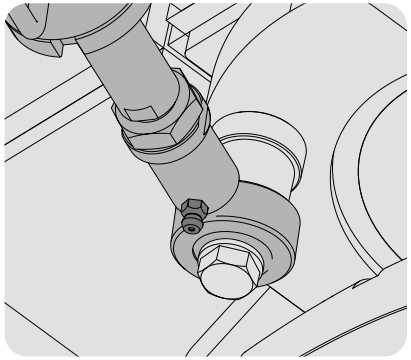
Engine:

Kindly refer the *Engine Operator's Manual* supplied along with this machine for service and maintenance of the engine.



Rear Wheel Actuator

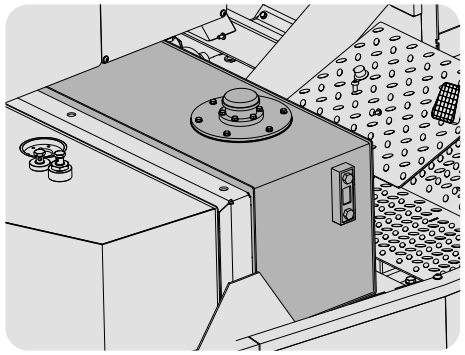
The rear wheel actuator pivots the rear wheel. The actuator has a grease fitting to lubricate the bearings.

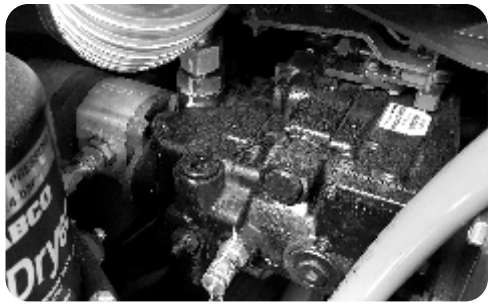


HYDRAULICS

Hydraulic Oil Tank

The hydraulic oil tank is located below the operator seat.
The hydraulic pump is located in the engine bay attached to the engine.
The hydraulic oil tank has a cap with a breather assembly.

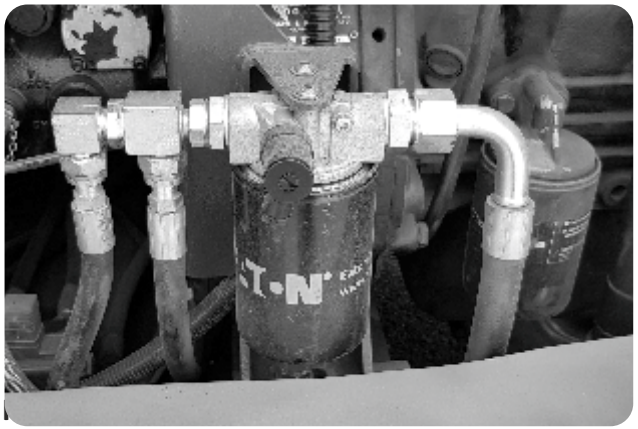




Check the hydraulic oil level at operating temperature every 100 hours of operation.
Ensure that the hopper is in completely lowered position.
The sight gauge is marked with FULL (black line) and ADD (red line) levels to indicate the level of hydraulic oil in the tank.

⚠ ***WARNING:***
Do not overfill the hydraulic oil.
Do not operate machine with low level of hydraulic oil. Damage to the system may occur.

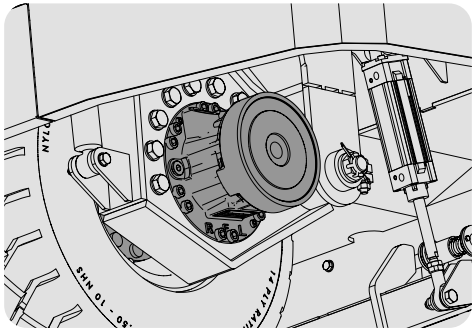
The hydraulic tank has a built-in filter system to remove any dirt or debris from the oil. The return line hydraulic oil filter is located in the engine bay.



Check the hydraulic hoses for wear or damage.
Pressurized hydraulic oil escaping from a small hole in the hose may lead to severe injury.
Seek medical help if any injury has been caused by pressurized hydraulic oil.
If any oil leak has been detected contact after sales service.

Hydraulic Traction Motor

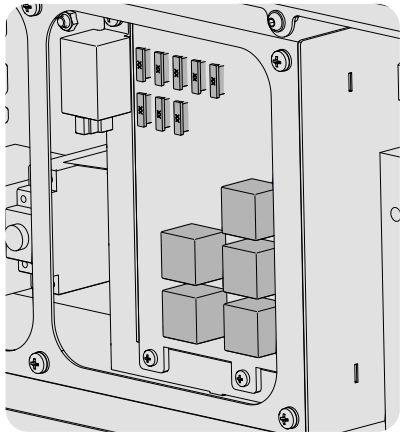
The hydraulic drive motor should be checked for leaks. Repair the hose fittings or other parts if any damage is noted. Refusing to do so may damage the motor.



Battery

The battery is located under the foot well of the operators cab.
Turn the lock to access the battery door.
The battery used for this machine is a maintenance free type. Do not try to open the plugs. Do not top up the battery with water.
Clean the battery and check the connections.

Electrical System

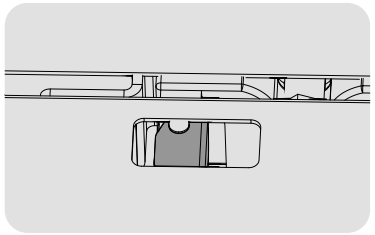


The electrical system of the machine has safety fuses to prevent any overloading or short circuit. Check the fuses.

DUST FILTER REPLACEMENT

Before leaving the machine: park on a level surface, stop engine, engage parking brake and remove key.

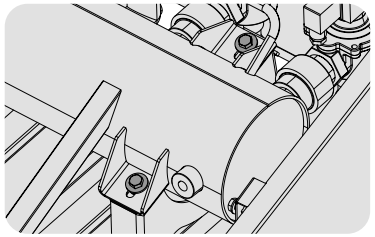
1. Open the hood of the hopper using the latch provided (a).
2. Disconnect the pneumatic and electrical connectors (b).
3. Unscrew the fastening bolts (6 nos) (c) to release the purging group.
4. Carefully lift the purging group (d) from the hopper and place it on a flat surface.
5. Remove the filter holders (e) to unlock the filters.
6. Remove the filters (9 nos) (f) from the hopper.
7. Clean the filter area with compressed air (g).
8. Replace with new filters.
9. Install the filter holders to secure the filters.
10. Place the purging group back in its location and secure them with the bolts 6 nos.
11. Reconnect the pneumatic and electrical connectors.
12. Start the machine and check if the purging system is working properly.



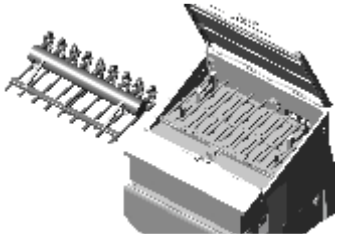
(a)

(b)

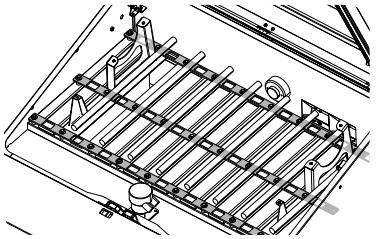
(b)



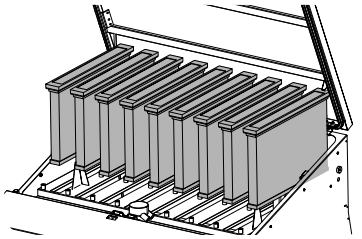
(c)



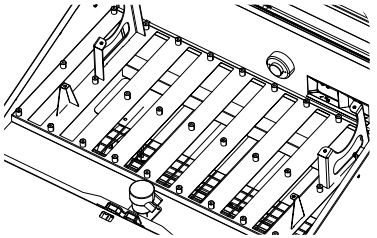
(d)



(e)



(f)



(g)

Compressed Air

CAUTION: Do not drop the filter down.

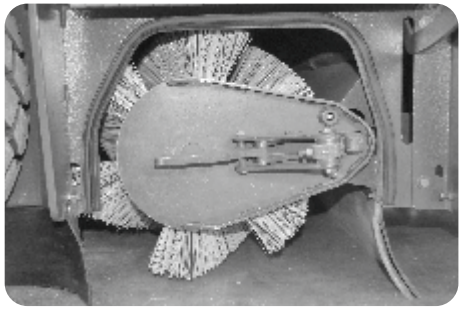
⚠ DANGER

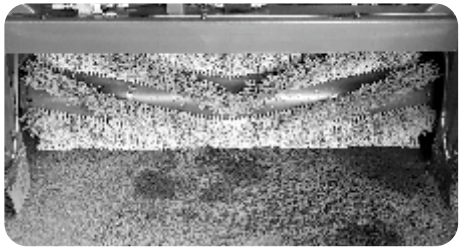
Inhalation hazard.

Do not breath in dust particles.

BROOMS

Main Broom

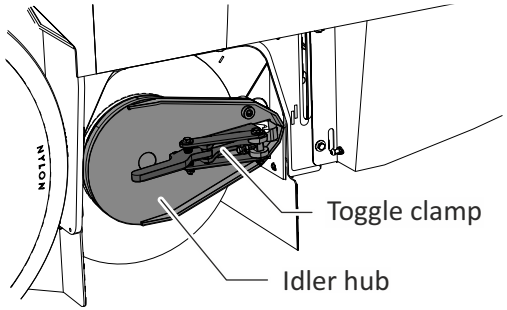




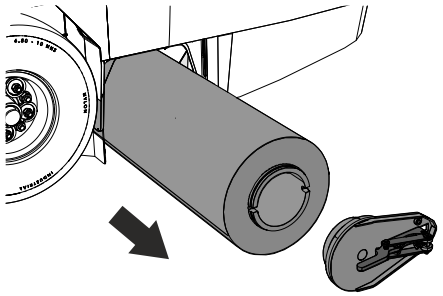
- The main broom used in the machine is of a cylindrical type and spans the width of the machine.
- The main broom sweeps the debris into the hopper.
- Check the main broom everyday for wear or damage.
- Remove any wires, ropes or strings from the main broom to avoid damage to the main broom, drive hub or other drive components.
- Adjust the main broom pressure by using the knob on the operators cab.
- Replace the broom if worn out/damaged or it no longer sweeps effectively.

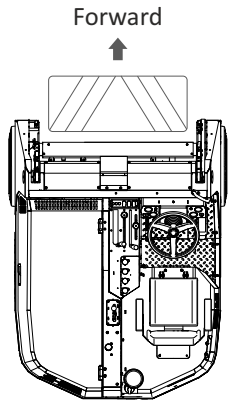
To replace the main broom:

1. Park the machine on a flat surface.
2. Engage parking brake.
3. Raise the main broom.
4. Stop the engine.
5. Remove key.
6. Open the left side door of the broom compartment.



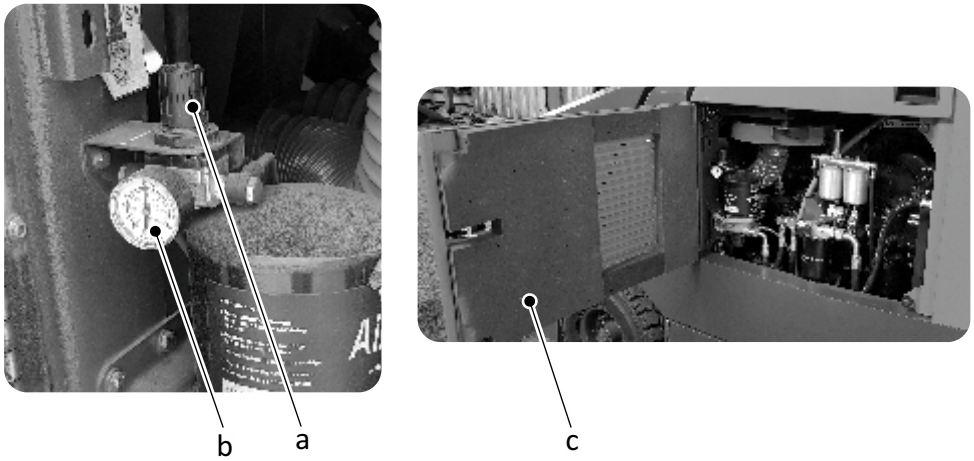
7. Remove the idler hub by operating the toggle clamp. *(Pull the toggle clamp towards the user).*
8. Grasp the main broom and pull it outward. **Wear safety gloves when handling the main broom.**



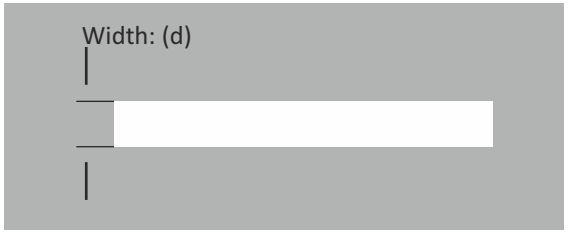


9. Place the new broom or the existing rotated end-to-end broom on the floor near the broom chamber access door.
10. Slide the main broom into its chamber till it engages on to the drive hub.
11. Now slide the idle side hub back in its position and secure it with the toggle clamp.
12. Close the broom chamber door.

Main Broom Pattern Checking and Adjusting

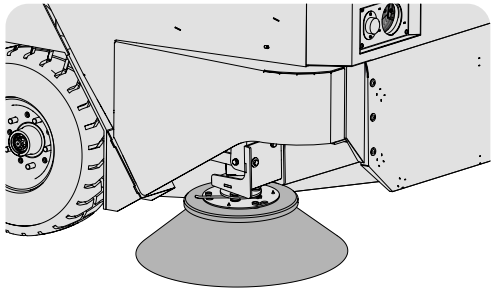


1. Start the engine.
2. Set throttle position in Idle.
3. Set main broom switch to + position.
4. Open the engine access doors (c).
5. Turn the knob (a) till the pressure gauge (b) reads 6 bar.
6. In this pressure setting the main broom pattern of 60 mm (d) is achieved.
7. Close the access doors.
8. Switch off the engine and remove key.

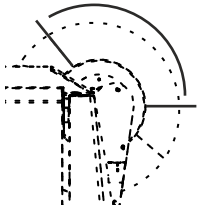


NOTE: Use only brooms recommended by the manufacturer.

Side Broom



The side broom sweeps debris from the edges/corners to the path of the main broom.
Check the side broom everyday for wear or damage.
Remove any ropes, strings or wires found in the side broom or its drive hub.
Check the pattern of the RIGHT side broom everyday. It should be at 10 o'clock to 3 o'clock position when the broom rotates.

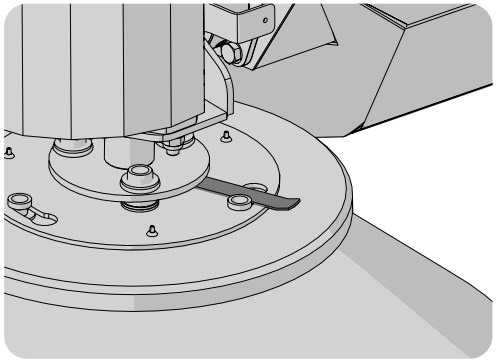


Right Side Broom

Replace worn out or damaged broom when it can no longer perform.

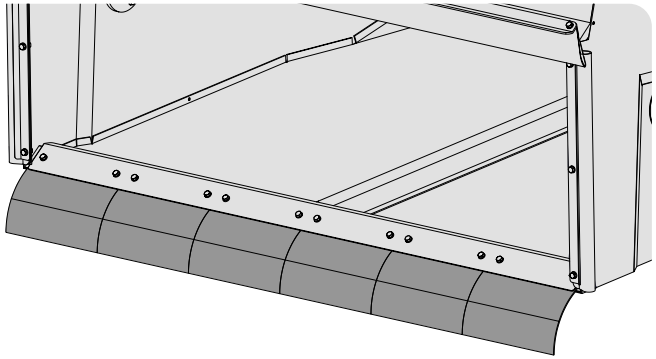
To replace the side broom:

1. Park the machine on a flat surface.
2. Engage parking brake.
3. Stop the engine and remove key.
4. Rotate the side broom by hand till the lift bar is visible. Wear safety gloves.
5. Lift the bar to disengage the side broom from its drive plate.
6. Slide a new broom onto the drive plate by aligning the three drive pins to the slot on the drive plate.
7. Push the broom till it snaps on to the retaining bar.



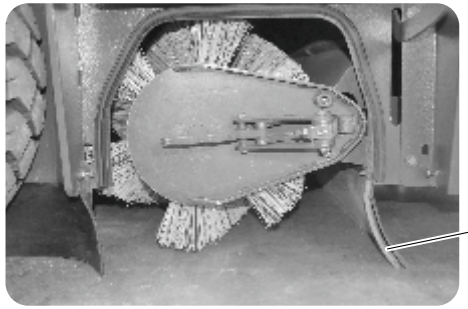
NOTE: Use only brooms recommended by the manufacturer.

Dirt Hopper Aprons

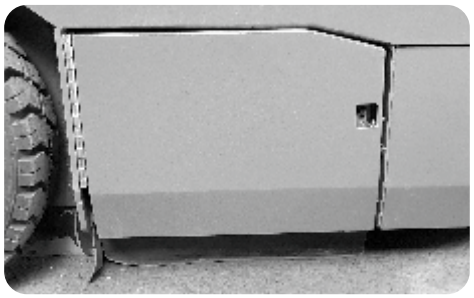


The dirt hopper aprons are located at the bottom rear of the hopper.
The aprons float over the debris to direct it into the hopper.
These aprons are prone to wear due to friction.
Inspect these aprons everyday. Replace if it is damaged to it no longer contacts the floor.
The dumping door aprons are segmented ones. Inspect them for wear or damage and replace if necessary.

Main broom chamber aprons

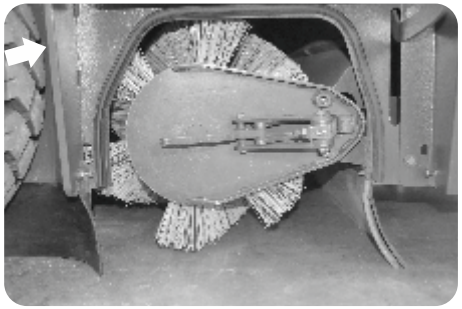


The broom chamber aprons are located on the bottom side of each door and at the rear of the main broom around the chassis.
Each of these aprons will be in contact with the floor at all times.
Check the aprons for wear or damage and adjust them if necessary.



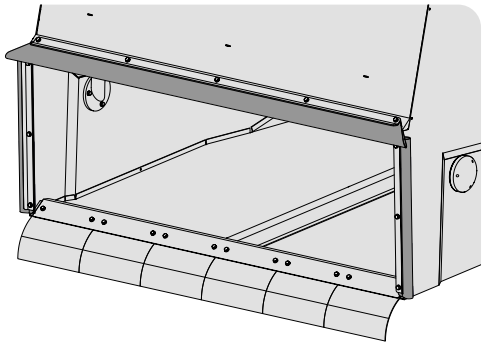
NOTE: Tyre pressure will affect the apron clearance, maintain correct tyre pressure at all times.

Broom door seals



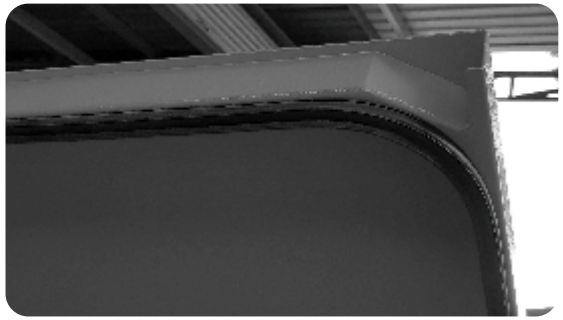
The broom door seals are located on both sides of the main broom doors on the chassis.
Check the seals for wear or damage and replace if necessary.

Dirt hopper seals



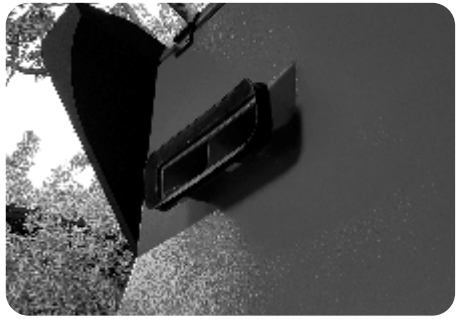
The dust hopper seals are located on both sides and bottom part of the chassis area that come in contact of the dust hopper as shown in figure.
Check the seals for wear or damage and replace if necessary.

Hopper filter door seals



The hopper filter door seals are located in the hopper. They seal the hopper when the door is closed.
Check the seals for wear and tear or damage and replace if necessary.

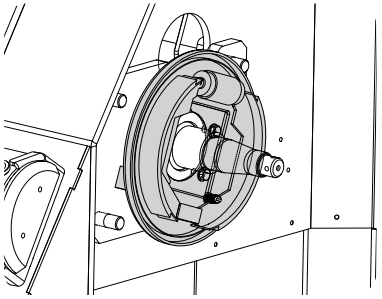
Hopper vacuum fan seal



The hopper vacuum fan seal is located on the inlet bracket.
Check the seals for wear or damage and replace if necessary.

TYRES AND BRAKES

Brakes

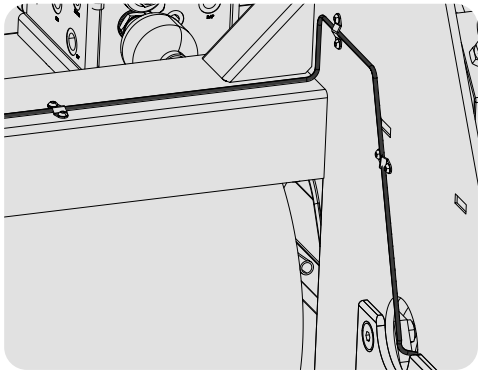


The hydraulic brakes are located on the front wheels which are of a drum type with self adjustment. The master reservoir is located in the engine bay.

Use only approved brake fluid.

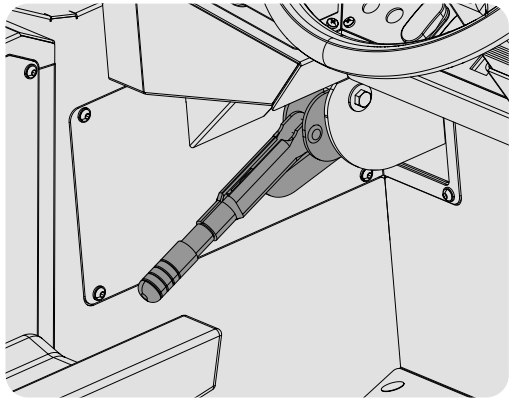
Do not spill brake fluid into the environment.

Brake Fluid Lines



The brake fluid lines are located at the front of the machine chassis which supply brake fluid to the front brakes activated via a brake pedal cylinder. Check the fluid lines and brake pedal cylinder, replace seals if necessary, replace fluid lines if damaged.

Parking Brake



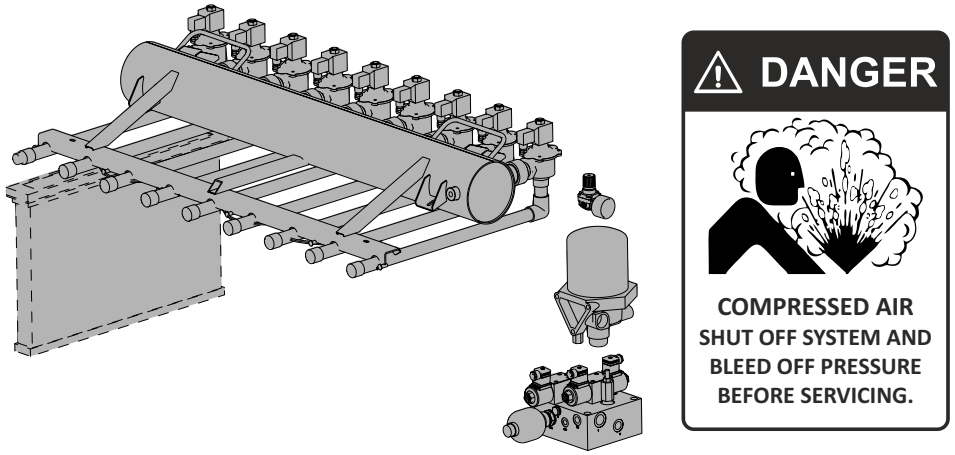
Check and adjust the parking brake if it becomes easy to set, machines rolls after engaging brake.

Wheels and Tyres

Ensure that the wheel bolts of front and rear wheel are tight at all times.

For pneumatic tyre equipped machine:
The proper tyre pressure is 100 psi at the front and 100 psi at the rear.

Pneumatic System



The pneumatic system is used for purging the primary bag filters on the machine.

Safety practices to be adhered while servicing the pneumatic system:

- ➔ Flying particles and debris – can result in eye injuries, cuts/scrapes or other significant injuries to almost any body part;
- ➔ High pressure air – can result in air injection into the body leading to potential injuries such as air embolism, ruptured ear drums or organs, and dislodged eye balls;
- ➔ High noise – can result in temporary or permanent hearing loss.
- ➔ Wear appropriate personal protective equipment (PPE) when using pneumatic tools and equipment, such as hearing protection and safety glasses with side shields or goggles. Additional PPE such as a face shield, gloves or steel-toed shoes, may also be required, depending on the hazards encountered.

- ➔ **Before conducting any repairs to the pressure system of air compressors, receivers or compressed air equipment, ensure all hazardous energy sources are locked and tagged out, and all pressure has been released.**

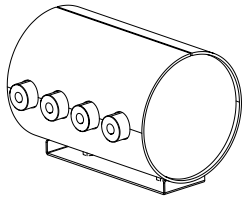
DANGER

Compressed Air.
Do not use for blowing off clothes or body.

DANGER

- × **Compressed air accidentally blown into the mouth can rupture the lungs, stomach or intestines.**
- × **Compressed air can enter the navel, even through a layer of clothing, and inflate and rupture the intestines.**
- × **Compressed air can enter the bloodstream, and death is possible if it makes its way to blood vessels in the brain.**
- × **Direct contact with compressed air can lead to serious medical conditions and even death.**
- × **Even safety nozzles which regulate compressed air pressure below 30 psi should not be used to clean the human body.**
- × **As little as 5 kg of compressed air pressure can blow an eye out of its socket. If an air pocket reaches the heart, it causes symptoms similar to a heart attack. Upon reaching the brain, pockets of air may lead to a stroke.**

Areas to check in the pneumatic system:



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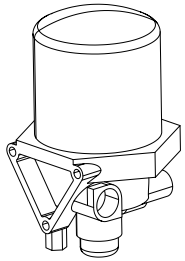

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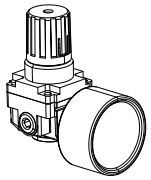

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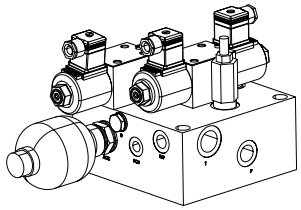

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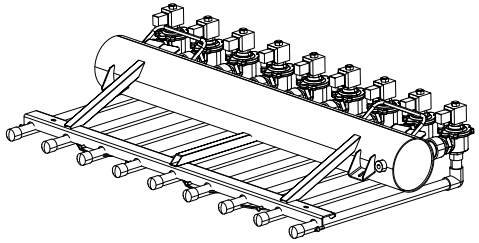

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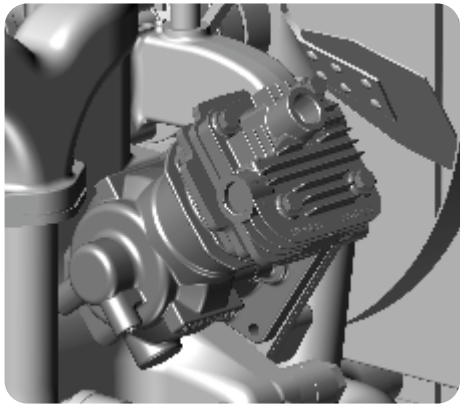


6

1. Main Tank
2. Air Dryer
3. Pressure Regulator with Gauge
4. Pneumatic Manifold
5. Purging Group
6. Air Compressor
7. Pneumatic Ancillary Components

1. Main Tank:
This tank is primarily used for storing the compressed air produced from the compressor. This is then distributed to the other pneumatic systems in the machine. The main tank is located within the chassis of the machine.

2. Air Dryer:
The air dryer provides outstanding & reliable protection against humidity in the air that is generated by the compressor. It has a filter cartridge which has to be services/replaced during a period of time.
Ensure that the drain for the water is not restricted or blocked.
The air dryer maintains the set pressure constantly by releasing the excess air at periodical intervals, this can be identified by a 'whoosh' sound.
Recommended service life of 2 years, as a result entire air system is kept operating safely and at peak performance.

WARNING

DO NOT dispose the used filter into the environment, There is risk of contaminating the environment.
DO NOT dispose the used filter in regular garbage, use appropriate methods.

3. Pressure Regulator with gauge:
This regulator is used to adjust the main broom. The gauge is used to read the pressure in bar.

4. Pneumatic Manifold:
The pneumatic manifold distributes the compressed air from the main tank to other pneumatic components in the machine.

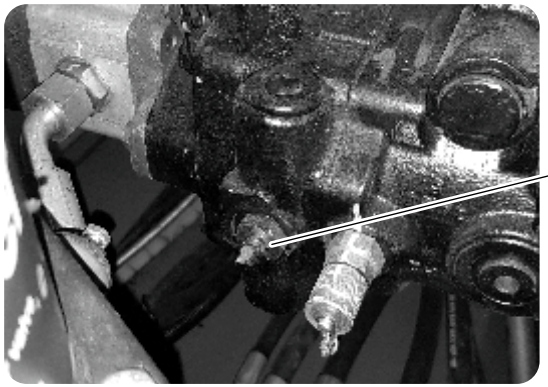
5. Purging Group:
This is the main part of the pneumatic purging system. This houses the secondary tank, solenoid valves and nozzles to spray air into the filters.

6. Air Compressor:
This is the main part of the pneumatic purging system. This houses the secondary tank, solenoid valves and nozzles to spray air into the filters.

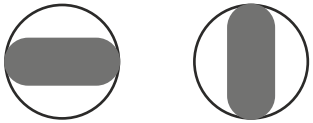
7. Pneumatic Ancillary Components:
The pneumatic system comprises of many components such as hoses, nozzles, connectors, solenoid valves.
Ensure that these components are not blocked by any dust or debris which may curb their function.
Check the hoses and connectors for lose connection.
Check the hoses for pin hole damage or ruptures. This can usually be found by the *'whoosh'* sound made by the air stream at the area of the leak.
Check the solenoid valves for proper function.
Check for any loose electrical connections in the solenoid valves.

PUSHING, TRANSPORTING AND TOWING THE MACHINE

Pushing or towing the machine

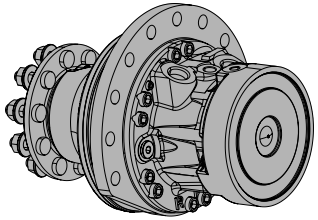


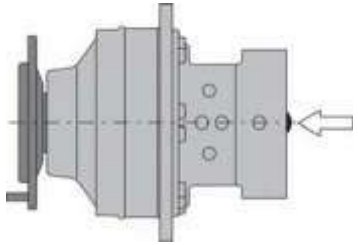
If the machine becomes disabled, it can be pushed from the front or rear of the machine.
The drive pump has a by-pass valve to prevent damage to the hydraulic system when it is being pushed or towed. For pushing or towing the machine, rotate the bypass valve plunger from horizontal position to vertical position.
Also the mechanical brake in the wheel motor has to be deactivated before pushing or towing the machine.
Do not push or tow the machine at a high speed.



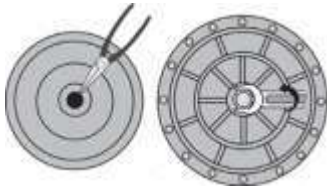
⚠ ***Do not push or tow the machine for a long distance without activating the by-pass valve.***

Mechanical brake deactivation of wheel motor



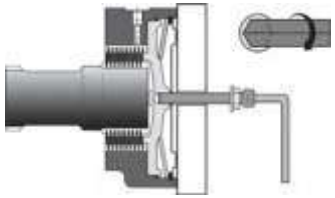


Step 1:



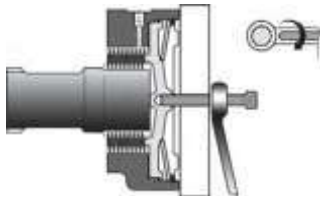
Remove the rubber plug from the brake protector. Loosen the metallic plug.

Step 2:



Tighten to the bottom of the threading without blocking the screw fitted with a nut and washer in the piston.

Step 3:



Then tighten the nut until the motor shaft turns freely, while holding the screw.

⚠ ***After releasing the brake, insert the rubber plug firmly.***

⚠ ***Do not push or tow the machine without deactivating the mechanical brake.***

TRANSPORTING THE MACHINE

Transporting the machine by truck:

1. Position the truck at the loading platform.
2. Drive the machine onto a loading platform which supports the weight of the machine.
3. Ensure that the truck is clean.
4. Ensure that the dirt hopper is empty and clean.
5. Drive the machine into the truck slowly.
6. After positioning machine in its desired position: turn off engine, engage the parking brake and remove key.
7. Place appropriate wheel blocks to prevent the machine from any movement.
8. Tie down the machine using industrial lashing straps until the machine is completely secure and no movement is found.
9. Ensure that the fuel tank is empty.
10. Remove key from the ignition.
11. Cover the machine using an industrial tarpaulin cover to protect it from the elements.

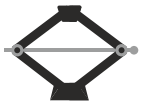
⚠ ***Ensure that the truck is on a level ground before loading the machine.***

Lifting the machine by using a crane onto a truck:

1. Position the truck on a flat surface.
2. Ensure that the truck is clean.
3. Drive the machine to the area of loading.
4. Ensure that the dirt hopper is empty and clean.
5. After positioning machine in its desired position: turn off engine, engage the parking brake and remove key.
6. Tie industrial grade lifting belts to the tie down points provided in the machine. Ensure it is secure.
7. Carefully lift and place the machine onto the truck.
8. Place appropriate wheel blocks to prevent the machine from any movement.
9. Tie down the machine using industrial lashing straps until the machine is completely secure and no movement is found.
10. Ensure that the fuel tank is empty.
11. Remove key from the ignition.
12. Cover the machine using an industrial tarpaulin cover to protect it from the elements.

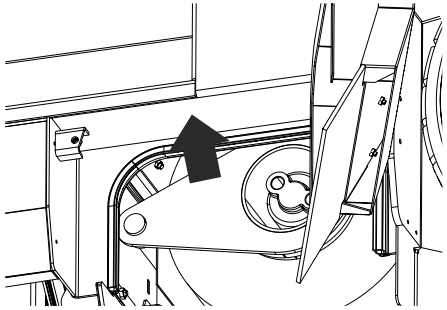
⚠ ***Ensure that the truck is on a level ground before loading the machine.***

JACKING THE MACHINE

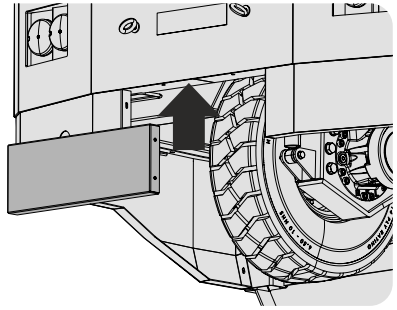


Always park the machine on a flat dry surface before jacking.
Ensure that the hopper is empty before jacking the machine.
The machine should be jacked up only using its designated jacking points, failure to do will cause damage/injury to machine or operator.
Use a jack which will support the weight of the machine.
Use jack stands to support the weight of the machine if hoisted up for a longer period of time.

The front jacking points are at the flat bottom portion of the machine which can be accessed by opening the broom chamber door.



Front



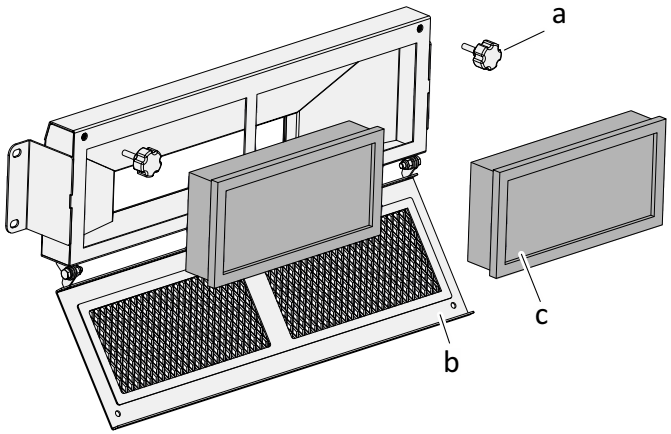
Rear

The rear jacking point is located at the middle of the rear bumper, to access it remove the rear skirt portion as in fig. Place a suitable jack. Use a jack stand if required.

⚠ ***When servicing or changing tyres, block the opposite tyres before raising the machine.***

CLEANING/REPLACING CABIN AIR FILTERS

The cabin air filters must be cleaned/replaced from time to time to ensure dust free air circulation inside the cabin.



To clean the filter:

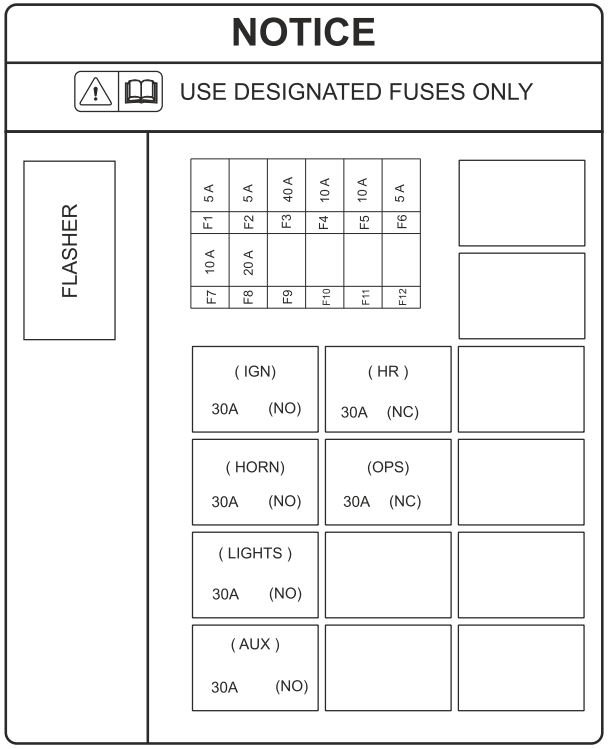
Remove the knobs (a), open the filter chamber cover (b), remove the filters (c). Clean the filters using compressed air. Place the filters back after cleaning. Clean the filters once a month.

To clean the filter:

Remove the knobs (a), open the filter chamber cover (b), remove the filters (c). Replace with new filters. Replace filters every 14 months of use.

ELECTRICAL MAINTENANCE

Fuse Details



IGN - Ignition
HR - Hour Meter
HORN - Horn
OPS - Operator Presence Switch (Optional)
LIGHTS - Lights
AUX - Auxiliary Controls

Safety Instructions for Battery

The below instructions have been established for your safety and have to be strictly observed.

Observe the instruction which must be mounted clearly at the charging point.

No Smoking.
No naked lights, embers or sparks in the vicinity, risk of fire and explosion.

Wear protective goggles and protective clothing when working on the batteries.

Do not tilt the battery.
Only use certified hoisting and transport equipment.

Keep children away from batteries.

Any splashes of acid in the eyes or on the skin must be rinsed thoroughly with plenty of clear pure water.
Then consult a doctor immediately.

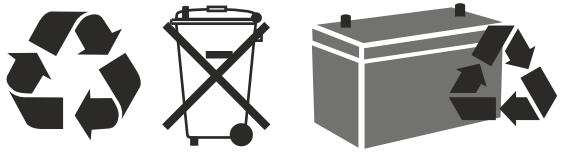
Risk of fire explosion, avoid short circuits.
Caution! Metal components in the battery cells are always under voltage, never place any foreign items or tools on the battery.

Electrolyte is highly corrosive.

Charge in a well-ventilated area.

Do not throw in garbage.

DISPOSAL OF BATTERIES



Old batteries with this sign are recyclable economic goods and should be brought back into the recycling process. Old batteries which are not brought back into the recycling process, have to be dealt with as dangerous materials under the observance of all regulations.

Areas to inspect in the electrical system:

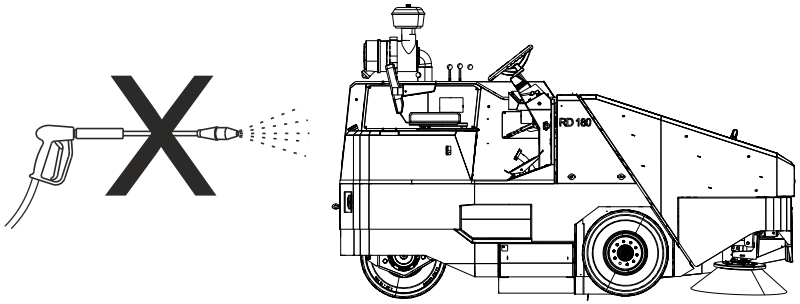
Check if the battery has charge in it.
Check for any blown fuses, replace if necessary.
Check the cables for loose connection, wear and tear or damage, replace if necessary.

CLEANING THE MACHINE

Clean the machine at the end of the day. Follow the procedure to clean the machine:

- Park the machine in the designated maintenance area.
- Switch Off engine and remove key.
- Engage parking brake.
- Clean the machine with compressed air. **Note: DO NOT PRESSURE WASH.**
- Wipe the machine with a soft damp cloth to remove dirt.

Caution: Ensure that water does not enter any electrical parts.



***WARNING:* DO NOT CLEAN THE MACHINE WITH A HIGH PRESSURE CLEANER. THERE IS RISK OF DAMAGING THE ELECTRICAL PARTS OR RISK OF SHORT CIRCUIT!**

STORING THE MACHINE

The following steps should be taken when storing the machine for an extended period of time.

- Clean the machine completely to remove any dirt.
- Clean the dust filters and hopper thoroughly.
- Park the machine indoors in a dry place.
- Ensure parking brake is engaged.
- Drain the fuel from the tank completely.
- Remove key and store in a safe place.
- Cover the machine with an automotive grade cover and secure it.
- If storing the machine in freezing temperatures refer *"FREEZE PROTECTION"* section.

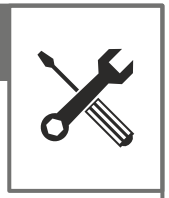
NOTE: Do not expose the machine to rain, store indoors only.

NOTE: To prevent potential damage to the machine store the machine in a insect and rodent free environment.

FREEZE PROTECTION

NOTE: Before leaving or servicing the machine, stop on a level surface, turn off key switch, engage the parking brake and remove key.

If the machine is used in a freezing environment replace the Engine Oil, Hydraulic Oil, Engine Coolant to the specification of that country immediately upon arrival to prevent machine damage.



MAINTENANCE TABLE

INTERVAL	MAINTENANCE AREA	THINGS TO CHECK
Daily	**Main & Side Broom**	Inspect brooms for wear and damage, remove strings and debris from bristles and drive assembly if found
	Air intake system	Empty & clean dust cup of pre-cleaner, Check the air filter clog indicator
	Coolant system	Check coolant level and top up as needed.
	Engine	Refer engine owner's manual, Check water seperator visually
	Brake	Check brake oil level and top up as needed
	Hopper	Inspect hopper aprons for wear or damage and replace as needed
		Use pneumatic purging system to clean the dust filters
	Hydraulic system	Check hydraulic oil level and top up as needed
	Wheels and tires	Visually inspect for deflation, wear and damage. Repair or replace as needed
		Check air pressure in the tires (for Pneumatic)
	Miscellaneous	Check belts for wear, Check the hydraulic hoses and fittings visually for any leaks or damage
	Hoses	Inspect the air hose from filter to engine for any damage & proper tightness of the hose clamps
	Purging system	Check pneumatic purging system for function
		Check all pneumatic hoses for loose connection.
		Check hose from air compressor to air dryer for leak or loose fitting
Weekly	**Rear wheel & Hopper Linkages**	All purpose grease to be applied once in a week
50 Hours	**Main Broom**	Rotate end-to-end
		Inspect broom chamber seals and aprons for wear and damage, adjust or replace as needed
		Perform main broom adjustment test and adjust as needed
	Hydraulic system	Check functioning of directional control pedal and adjust as needed
		Blow out hydraulic oil cooler fins with compressed air. (If so equipped)
	Wheels and tires	Check and tighten front & rear wheel nuts to 200 Nm torque. (For the first time only)

INTERVAL	MAINTENANCE AREA	THINGS TO CHECK
100 Hours	Engine	Refer engine owner's manual
	Coolant system	Inspect radiator fins and clean as needed
	Hydraulic system	Check functioning of directional control pedal and adjust if needed
		Check oil level and top up as needed
		Blow out hydraulic oil cooler fins with compressed air. (If so equipped)
	Hopper	Inspect hopper side structure and door seals for wear or damage. Adjust or replace as needed
		Inspect filter door seals for damages. Adjust or replace as needed
		Inspect pneumatic solenoids and air hoses for any loose connection or damage
	Mainbroom	Check the mainbroom pattern and readjust if required
200 Hours	Engine	Refer engine owner's manual
	Air intake system	Clean air filter. NOTE: Clean more often in dusty conditions
		Replace air filter
	Battery	Check water level, clean and tighten battery cable connection
	Lubrication points	Steering Cylinder (2 fittings) Lubrication type - grease
		Door Cylinder (2 fittings) Lubrication type – grease
		Hood Latches & Hinges - Lubrication type - oil
	Wheel	Check rear wheel support bearings - Lubrication
400 Hours	Engine	Refer engine owner's manual
	Brake cylinder	Check brake oil line, oil level and top up if needed
500 Hours	Coolant system	Drain and flush the coolant system and top up as needed
	Side broom	Check side broom lift cable, replace if needed
800 Hours	Hydraulic system	Clean hydraulic oil strainer and breather cap
		Replace hydraulic oil and filter
	Wheels and tires	Check & tighten front and rear wheel nuts. (Torque to 200 Nm)
		Check & tighten wheel motor nuts. (Torque to 640 Nm)
1500 Hours	Wheel	Check front and rear wheel nut to maintain the torque 200 Nm
2500 Hours	Hydraulic	Replace hydraulic oil filter, oil for hydraulic system and suction strainer in hydraulic oil tank

TROUBLESHOOTING CHART

Problem	Cause	Remedy
Engine	**Refer the engine manual supplied with the machine.**	
Machine creeps in neutral	Directional control pedal return spring is out of adjustment	Adjust pedal spring
Brooms do not turn or turn very slowly	Hydraulic system problem:	Refer Hydraulic System problems in this section
	Broom motor	
	Broom control valve	
	Gear pump	
	Relief valve	
Little or no vacuum in broom compartment	Filters clogged	Clean or replace filters
	Impeller failure	Check and repair
	Vacuum Bypass switch position	Select Vacuum ON
Machine moves slowly or does not move at all	Parking brake is engaged	Disengage parking brake
	Directional control pedal is jammed, or not adjusted properly	Clean the pedal, adjust linkage
	Tires skidding from contact with slippery surfaces	Clean tires
	Wheels jammed	Clear jam
	Low hydraulic oil level	Top up hydraulic oil
	Damaged or worn drive motor	Replace damaged part
Poor dust control	Debris or duct in impeller inlet	Clean the inlet
	Broom aprons or seals worn	Replace aprons
	Apron clearance from floor exceeds 1/8"	Adjust clearance
	Dust filters clogged	Clean dust filters
	Filter seals worn	Replace seals
	Poor seal with vacuum gasket	Check and adjust
	Pneumatic purging system not functioning	Check and activate pneumatic purging system
	Leak in pneumatic system	Check system and arrest leaks

TROUBLESHOOTING

Problem	Cause	Remedy
Machine leaves debris	Dirt hopper is full	Empty hopper
	Broom(s) out of adjustment	Adjust them
	Broom bristles worn	Replace broom(s)
	Broom drive performance poor	Check drive system
	Dirt hopper flaps are damaged or missing	Adjust or replace
	Dirt hopper misaligned	Check alignment
	Dust filters clogged	Clean filters
Dirt hopper does not raise or lower	Hydraulic system problem:	Refer Hydraulic System problems in this section
	Control valve	
	Gear pump	
	Lift cylinder	
	Relief valve	
Dirt hopper lift cylinder failure	Line to cylinder leak	Tighten fittings or replace hose
	Piston seals leaking	Replace seals
	Bent pistion rod	Replace cylinder rod
Dirt hopper does not rotate or rotates slowly	Dirt hopper load too heavy	Dump frequently
	Hydraulic system problem:	Refer Hydraulic System problems in this section
	Control valve	
	Gear pump	
	Lift cylinder	
	Relief valve	
Hydraulic control valve failure	Foreign matter in spool bore	Remove spool and clean
	Valve seals leaking	Replace seals
	O-Ring damaged	Replace O-Ring
	Relief valve stuck	Replace relief valve
Hydraulic motor failure	Motor leaking	Replace seals/gaskets
	Output shaft malfunction	Replace output shaft

TROUBLESHOOTING

Problem	Cause	Remedy
Hydralic gear pump failure	Pump leak	Replace seals or pump
	Gears worn out	Rebuild pump
Hydralic gear pump failure	Relief valve stuck	Clean or repalce
	Low oil supply	Top up oil
	Clogged oil filter	Clean filter
	Incorrect oil	Use recommended oil
	Damage due to entry of air into the hydraulic system	Maintain correct level in hydraulic tank. Keep all hose fittings tight.
Hydraulic variable displacement pump failure	Pump leaking	Replace seals/gaskets
	Relief valve(s) stuck	Clean or repalce
	Drive coupling malfunction	Replace coupling
	Pump gears worn or damaged	Replace gears or pump
	Damage due to entry of air into the hydraulic system	Maintain correct level in hydraulic tank. Keep all hose fittings tight.
Hydraulic system noisy	Air in system	Maintain correct level in hydraulic tank. Keep all hose fittings tight.
	Relief valve dirty or damaged	Clean or repalce
	Loose suction line	Tighten fittings
	Clogged filter or pump inlet	Clean or replace filter or line
	Internal pump or motor damaged	Check and repair

DO'S & DON'TS

Do's

- ✓ Always use the machine only on a level flat surface.
- ✓ Use the machine to collect only dry debris.
- ✓ Check machine visually for any damage before start of the shift.
- ✓ Check machine visually for any fluid leak before start of the shift.
- ✓ The operator must have read the user manual completely before operating the machine.
- ✓ The operator must be always cautious while driving the machine.
- ✓ The warning beacon must be switched ON before driving the machine (if equipped).
- ✓ Always use the turn signal indicators before negotiating a turn.
- ✓ Always have an eye on the gauges for any abnormal warnings.
- ✓ Use headlamps while operating the machine at night or during the day with poor visibility during fog.
- ✓ Check air pressure in the pneumatic tyres to avoid tyre and brush wear.
- ✓ Use the pneumatic purging system at all times for better dust filtration.
- ✓ Use side brooms only during sweeping corners or curbs.
- ✓ Store machine only in a covered garage.
- ✓ Only authorized service engineers should perform maintenance tasks on the machine.
- ✓ Always use only genuine spares.

Don'ts

- × Do not drive the machine in bad roads.
- × Do not drive the machine on soil, deep sand, slushy areas, etc.
- × Do not leave the ignition key in the machine when not in use or during service.
- × Do not collect hazardous materials.
- × Do not use the machine to transport people.
- × Do not use the machine to transport goods.
- × Do not use the machine as a platform to access overhead areas.
- × Do not use the machine to push/pull other equipments.
- × Do not drive the machine with the foot on the brake pedal.
- × Do not drive the machine with the hopper raised.
- × Do not drive the machine with low diesel fuel or low hydraulic fluid.
- × Do not transport the machine with the main broom lowered.
- × Do not operate the machine with a wet filter.
- × Do not make sudden and sharp turns.
- × Do not operate the machine on a gradient or slope higher than that of the recommended value.

OPERATOR NOTES

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