

**PowerBoss®**  
The Power of Clean

# User Manual Nautilus & Nautilus CE Rider ScrubberSweeper

Models: Diesel, Gasoline, & LPG



PowerBoss®, Minuteman International, Inc.  
A Member of the Hako Group

#988749UM Rev. F 03/19

## **PREFACE**

Thank you for your purchase of the new industry standard for scrubber/sweepers. PowerBoss® takes great pride in offering the most dependable, reliable and best value in industrial power scrubbers and sweepers. We set the standard.

Our Customer Service Department would like to hear from you. If you see any errors, omissions or something that needs clarification in this User Manual, please let us know. We are working hard towards continually improving our processes--to benefit you, our valued customer.

Please copy the form below, fill out and comment on how you found our manual.

Thank you!

*The PowerBoss Team*

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

Country: \_\_\_\_\_

Type of equipment or model number: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Please return to:

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This is the User Manual for the PowerBoss® Nautilus Rider Scrubber/Sweeper.

This manual covers all Standard Nautilus machine variations beginning July 2015.

We believe this machine will provide excellent service for many years.

However, the best results will be obtained if:

- The machine is operated with reasonable care.
- The machine is maintained regularly per the maintenance schedule provided in this User Manual.
- The machine is maintained with PowerBoss® supplied or equivalent parts.

All right side and left side references to the machine (except for engine) are determined by facing the direction of forward travel. The front of the engine or engine fan faces the front of the machine. Some hardware considered to be common or locally available has been omitted from the parts section to make this manual clear. Be sure to use equivalent hardware when replacement becomes necessary.

The Model and Serial Number of your machine is shown on the I.D. name plate. This information is needed when contacting Technical Support or when ordering parts. The I.D. plate is mounted on the left side wall of the operator seating area.

Example I.D. Plate:



Parts may be ordered by phone, fax or e-mail from your local PowerBoss® parts and service center. Before ordering parts or supplies, be sure to have your machine Model Number and Serial Number handy. For your convenience Fill out the Machine Data block for future reference.

<b>MACHINE DATA</b> Fill out at installation	
Model Number:	_____
Serial Number:	_____
Engine Serial Number:	_____
Sales Rep.:	_____ Date of Install: _____

All information contained in this catalog is current at the time of printing. Minuteman International, Inc. reserves the right to make changes at any time without notice.

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## TECHNICAL SPECIFICATIONS

Model: Nautilus Rider Scrubber/Sweeper  
Model No.: PB45DSL, PB45GAS, PB45LP  
PB45DSLUK, PB45GASUK, PB45LPUK

Nautilus CE Rider Scrubber/Sweeper  
PB45DSLCE, PB45GASCE, PB45LPCE

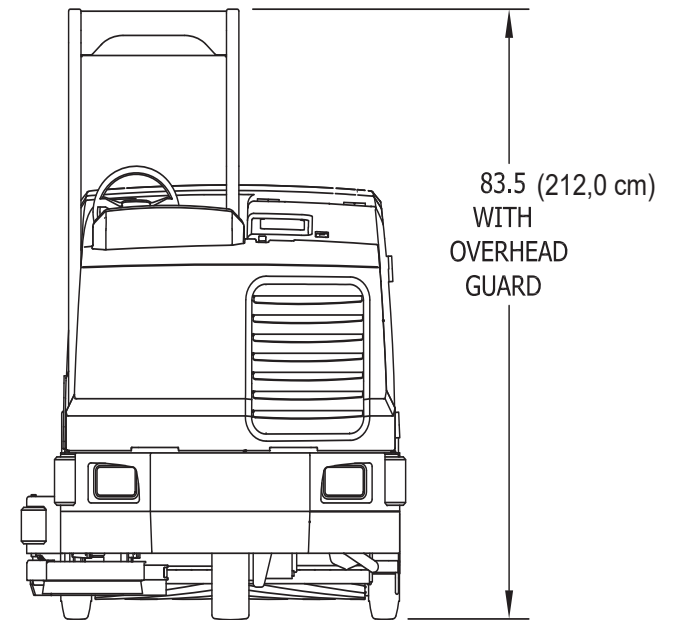
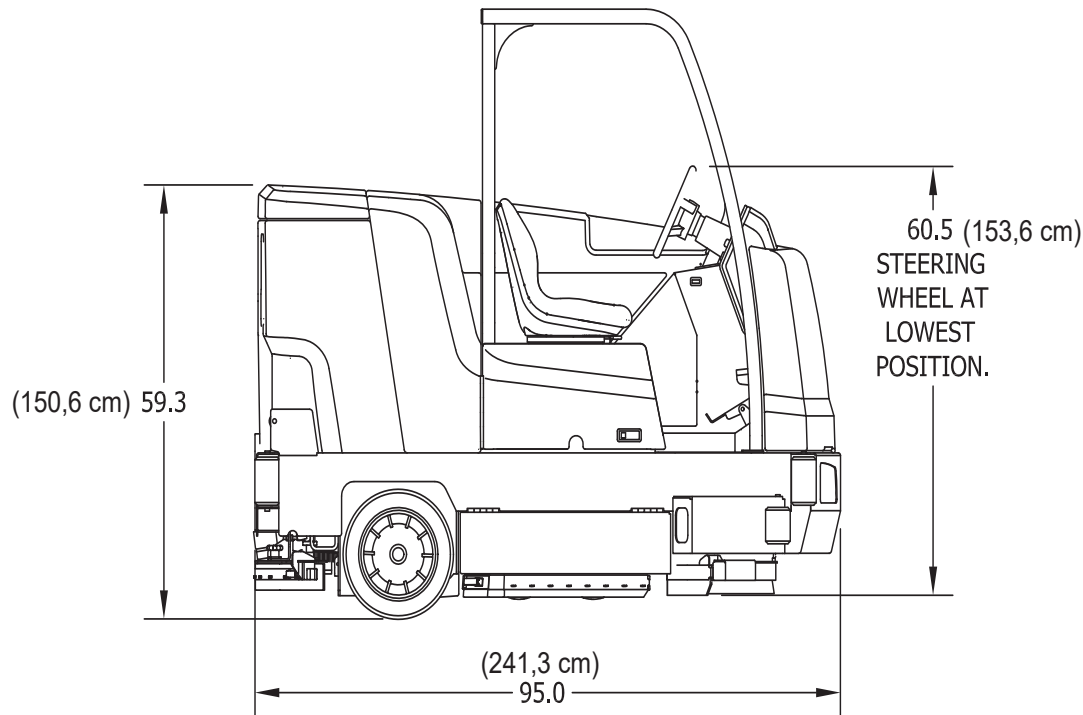
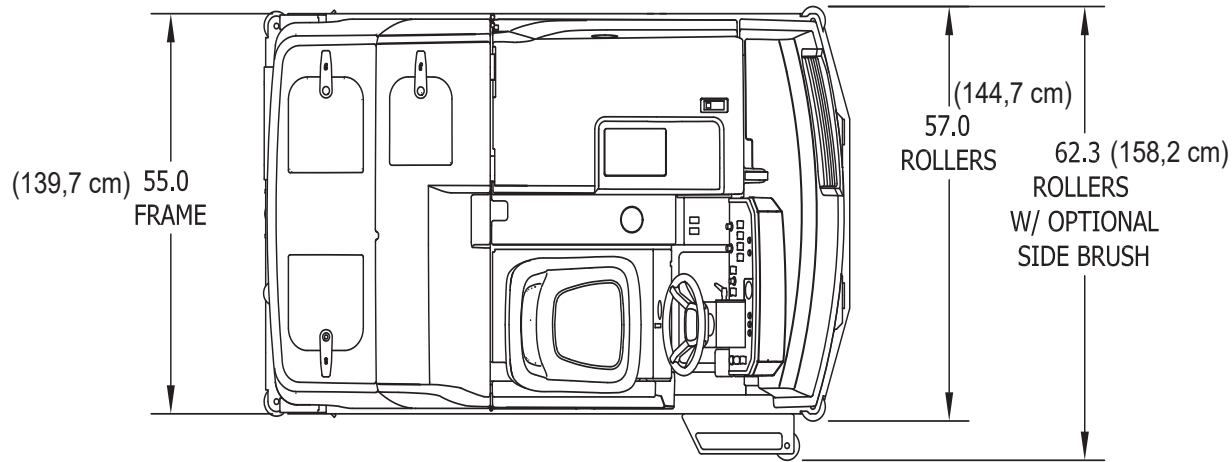
### GENERAL MACHINE SPECIFICATIONS

Length: . . . . . 95.0 in (241 cm)  
Width with side scrub brush retracted: . . . 60.5 in (153 cm)  
Width with side scrub brush extended: . . . 65.5 in (166 cm)  
Height to lowest steering position: . . . . . 60.5 in (153 cm)  
Height w/overhead guard: . . . . . 83.5 in (212 cm)  
Wheelbase: . . . . . 47.75 in (121 cm)  
Front tires (molded): . . . . . 16 in x 6 in  
. . . . . (40 cm x 15 cm)  
Rear tires (press on): . . . . . 18 in x 5 in  
. . . . . (45 cm x 12 cm)  
Aisle width U-turn: . . . . . 8 ft - 11.7 in (274 cm)  
Weight (Diesel engine) . . . . . 4,047 lb (1836 kg)  
Weight (Gas & LPG engines) . . . . . 4,027 lb (1826 kg)  
Maximum forward speed: . . . . . 7.7 mph (12,4 km/h)  
Maximum reverse speed: . . . . . 4.0 mph (6,4 km/h)  
Maximum climb angle (Traveling): . . . . . 10 deg. (17% grade)  
Maximum climb angle (Scrubbing): . . . . . 8 deg. (14% grade)

### SCRUBBING SYSTEM

Cleaning path (main brushes) . . . . . 45 in (114 cm)  
Cleaning path (w/optional side brush) . . . . 60 in (152 cm)  
Main brush diameter: . . . . . 12 in (30 cm)  
Main brush length: . . . . . 45 in (114 cm)  
Main brush speed: . . . . . 425 RPM  
Main brush force: . . . . . 200 lb - 400 lb  
. . . . . (90 kg - 181 kg)  
Side scrub brush diameter: . . . . . 16 in (40 cm)  
Side scrub brush speed: . . . . . 200 RPM  
Solution Tank capacity: . . . . . 105 gal (397 L)  
Recovery Tank capacity: . . . . . 105 gal (397 L)  
Demister chamber capacity: . . . . . 17 gal (64 L)  
(2)Debris trays, total capacity: . . . . . 2.1 ft<sup>3</sup> (0,06 m<sup>3</sup>)  
Vacuum fan speed: . . . . . 11,500 RPM  
Vacuum water lift: . . . . . 35 in (88 cm)

# TECHNICAL SPECIFICATIONS



dimensions shown in inches (cm)

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## **FEATURES**

### **AIR-MOVING SYSTEM**

- Internal sound insulation on vacuum impeller

### **ERGONOMICS SYSTEM**

- Roomy, open operator compartment for extra comfort
- Toe operated parking brake
- Adjustable, high-back seat
- Power steering and tilt steering wheel
- Unparalleled maintenance accessibility, hinged sides and covers require no tools.

### **HYDRAULIC SYSTEM**

- Protection for both auxiliary and propulsion pumps using separate 100 mesh suction strainer
- Hydraulic reservoir equipped with site gauge and dip stick for fluid level check and replacement
- Hydraulic filter equipped with color coded pressure gauge to indicate filter replacement

### **DRIVE-TRAIN SYSTEM**

- Industrial liquid-cooled engine
- Heavy-duty radiator & Tri-phase air cleaner
- Hydraulics protection package
- 4-Core Radiator

### **CHASSIS SYSTEM**

- Massive One-Piece, unitized 7ga, 0.188 in (0,48 cm) thick steel frame
- Soft-ride tires

### **ENVIRONMENTAL FRIENDLY FEATURES**

#### **LOWER EMISSIONS**

All gas and LP engines meet EPA and CARB specifications and have catalyst mufflers. Diesel operation is available, bio-diesel fuel can be used in Kubota engines.

#### **SAFER WORK ENVIRONMENT**

Orange machines are highly visible to others in the workplace, simple controls reduce operator error. Machine is equipped with a horn and an effective braking system. Some Safety Options available are: Overhead Guard, Backup Alarm, Safety Lights, and Fire Extinguisher.

## SAFETY INFORMATION

### IMPORTANT SAFETY INSTRUCTIONS

Operators must read and understand this manual before operating or maintaining this machine.

Do not operate this machine in flammable or explosive areas.

This machine is designed solely for removing dirt, dust and debris in an outdoor or indoor environment. PowerBoss does not recommend using this machine in any other capacity.

The following information indicate a potential hazard to the operator and equipment. Read this manual carefully and be aware when these conditions can exist. Take necessary steps to locate all safety devices on the machine and train the personnel operating the machine. Report any machine damage or faulty operation immediately. Do not use machine if it is not in proper operating condition.

### FOR SAFETY DURING OPERATION

Keep hands and feet clear of moving parts while machine is in operation.

Make sure all safety devices are in place and operate properly. All covers, doors and latches must be in place, closed and fastened before use.

During operation, attention should be paid to other persons in the work area and especially if small children are present.

Components can cause an explosion when operated near explosive materials or vapor. Do not operate this machine near flammable materials such as solvents, thinners, fuels, grain dust, etc.

Store or park this machine on a level surface only. To prevent unauthorized use, machine should be stored or parked with the parking brake set and the key removed.

This machine is designed for level operation only. Do not operate on ramps or inclines greater than 14 degrees (24.9% grade).

This machine is not suitable for picking up hazardous dusts.

Use caution when moving this machine into areas that are below freezing temperatures.

## **SAFETY WHEN SERVICING OR MAINTAINING THE MACHINE**

Stop on level surface, set parking brake and turn off machine.

Disconnect the power to the machine when servicing.

Avoid moving parts. Do not wear loose jackets, shirts, or sleeves when working on machine.

Avoid contact with battery acid. Battery acid can cause burns. When working on or around batteries, wear protective clothing and safety glasses. Remove metal jewelry. Do not lay tools or metal objects on top of battery.

Authorized personnel must perform repairs and maintenance. Use PowerBoss supplied replacement parts.

## **SAFETY SYMBOLS**

Five symbols are used throughout this manual to emphasize various levels of safety information. These symbols and the meaning of each are listed below.

 **DANGER**

**To warn of immediate hazards which will result in severe personal injury or death**

 **WARNING**

**To warn of hazards or unsafe practices which could result in severe personal injury or death.**

 **CAUTION**

**To warn of hazards or unsafe practices which could result in minor personal injury.**

**ATTENTION!**

**To warn of practices which could result in extensive equipment damage.**

**NOTE: To direct your attention to important equipment information or special instructions for preventing damage to equipment**

Symbols at the top of the list are the strongest warnings. However, all symbols represent important information which should be observed to protect you and others from harm and injury, and to prevent damage to the equipment.

## SAFETY DECALS

Decals directly attached to various parts of the unit are highly visible safety reminders which should be read and observed. Make sure the decals are replaced if they become illegible or damaged.

Safety decals located in the Operator compartment area:

#3342264:



(Read Manual)

#3301854:



#715967:



Safety decals located on the outside of the machine:

#3342650



(Pinch Point)

#715963



#3342978



(Hot Surface)

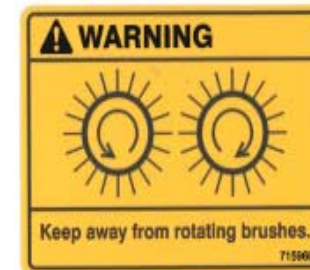
Safety Decal on inside of Recovery Tank Cover:

#715965



Safety decals on inside of Main Brush Side Doors:

#715968



Safety decals located in the Engine compartment area:

#3301730:



#3301733:

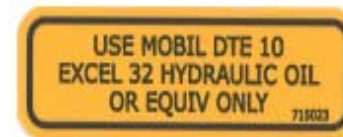


Safety decals located in Hydraulic Reservoir area:

#715966:



#715023:

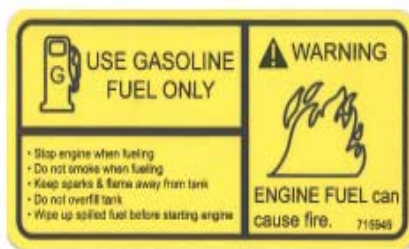


Safety decals located in Fuel Tank area:

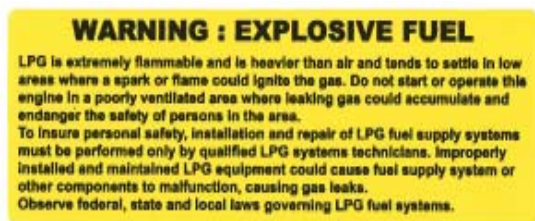
#715953:



#715949:



#3342971:





## BASIC POWERBOSS® SAFETY

PowerBoss® scrubbers should never be operated unless:

1. The operator is trained and authorized to operate the equipment and,
2. The equipment is functioning correctly.  
Malfunctioning equipment should be removed from service.

### **DANGER**

Keep cigarettes, matches and all other flame sources away from the machine. Gasoline, LP Gas, and diesel fuels are highly flammable. Lead acid batteries are equally dangerous due to the highly explosive hydrogen gas they emit.

### **WARNING**

Do not operate an LPG powered scrubber when any component in the fuel system is malfunctioning or leaking.

### **WARNING**

Before starting the engine, make sure that:

- \* You have read and understood this User Manual
- \* You are securely seated in the operator's seat.
- \* The parking brake is engaged.
- \* The directional control pedal is in neutral.
- \* The throttle is in idle.
- \* Hydraulic controls are in the OFF position.

### **WARNING**

During operation:

- \* Keep your hands and body clear of moving parts, especially when the bumper is partially or fully raised.
- \* Make sure others in the area stay clear of the machine, equipment, and moving parts.

**⚠ WARNING**

When leaving the scrubber unattended:

- \* Place the controls in the OFF position.
- \* Set the parking brake.
- \* Shut off the engine.
- \* Remove the key.

**⚠ WARNING**

When servicing or repairing the fuel system:

- \* Work in a properly ventilated area, do not smoke or allow an open flame near the fuel system.
- \* Never bypass safety components unless you are testing them.
- \* Never bypass the fuel filter lock, except when testing them (and always reconnect them after testing).
- \* Wear gloves to disconnect the tank coupling.

**⚠ WARNING**

During cleaning and maintenance:

- \* Always stop the engine and set the parking brake before servicing.
- \* Never use detergents or cleansers that are flammable or combustible.
- \* Never inflate a pneumatic tire without using a safety gage.
- \* Do not attempt any impeller adjustment unless you have shut off the engine. Never place your hands near the intake hoses or inlet when the engine is running.
- \* Always engage the bumper safety arm before servicing the hopper. Do not rely on the gas struts to keep the bumper raised.
- \* Never test for hydraulic hose leaks using your hand or any other part of your body. High pressure leaks can be very dangerous and should only be checked using a piece of paper.

## **WARNING**

Replace any defective safety components before operating the scrubber.

## **CAUTION**

Do not drive with the bumper in the raised position. Driving with the bumper raised increases the risk of damaging the bumper and other hazards.

## **CAUTION**

Travel slowly on grades.

## **CAUTION**

Place a block or chock behind the wheels when parking on inclines.

## **CAUTION**

Use special care when traveling on wet surfaces.

## **CAUTION**

Observe all proper procedures for operation and maintenance of the unit, as outlined in this manual.

## **CAUTION**

Remain alert at all times to people and equipment in and around your area of operation.

## **ATTENTION!**

Never push or tow this machine faster than 1 mph (1,6 km/h).

## **ATTENTION!**

Engage tow valve before towing or pushing.

## MACHINE OPERATION

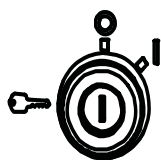
### OPERATING CONTROLS AND INDICATORS

The right dark gray portion of the instrument panel contains the engine function switches and indicators.

The left light gray portion of the instrument panel contains the scrubbing function switches and indicators.

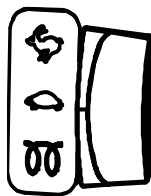
### IGNITION SWITCH

The ignition switch is located to the right of the steering column and is used to start and stop the engine.



### THROTTLE / GLOW PLUG SWITCH

The LPG and gasoline machines have a two speed throttle switch with idle, operating selection. The diesel machine has three position throttle with, glow plug, idle and operating selections. The throttle is located to the right of the steering column and adjusts the engine speed.



- The glow plug selection activates the glow plugs.
- The throttle should be in the IDLE position when starting the engine and immediately before shutdown.
- The operating position should be used during operation to ensure proper brush speed.

### MURPHY SWITCH

Only on the Diesel machines, the Murphy switch is a automatic diesel shutdown that occurs if the oil pressure is too low, below 5 psi (34 kPa), and/or the water temperature is too high, above 200°F (93.3°C). To restart the engine, press and hold the Murphy switch while turning the ignition switch. This will action will reset and clear the error code. Auto shutdown will continue if the oil pressure remains low or the water temperature is to high.

### LIGHT SWITCH

The light switch is located on the left side of the operator compartment. It operates the head lights and tail lights.



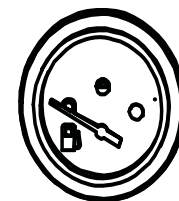
### HORN BUTTON

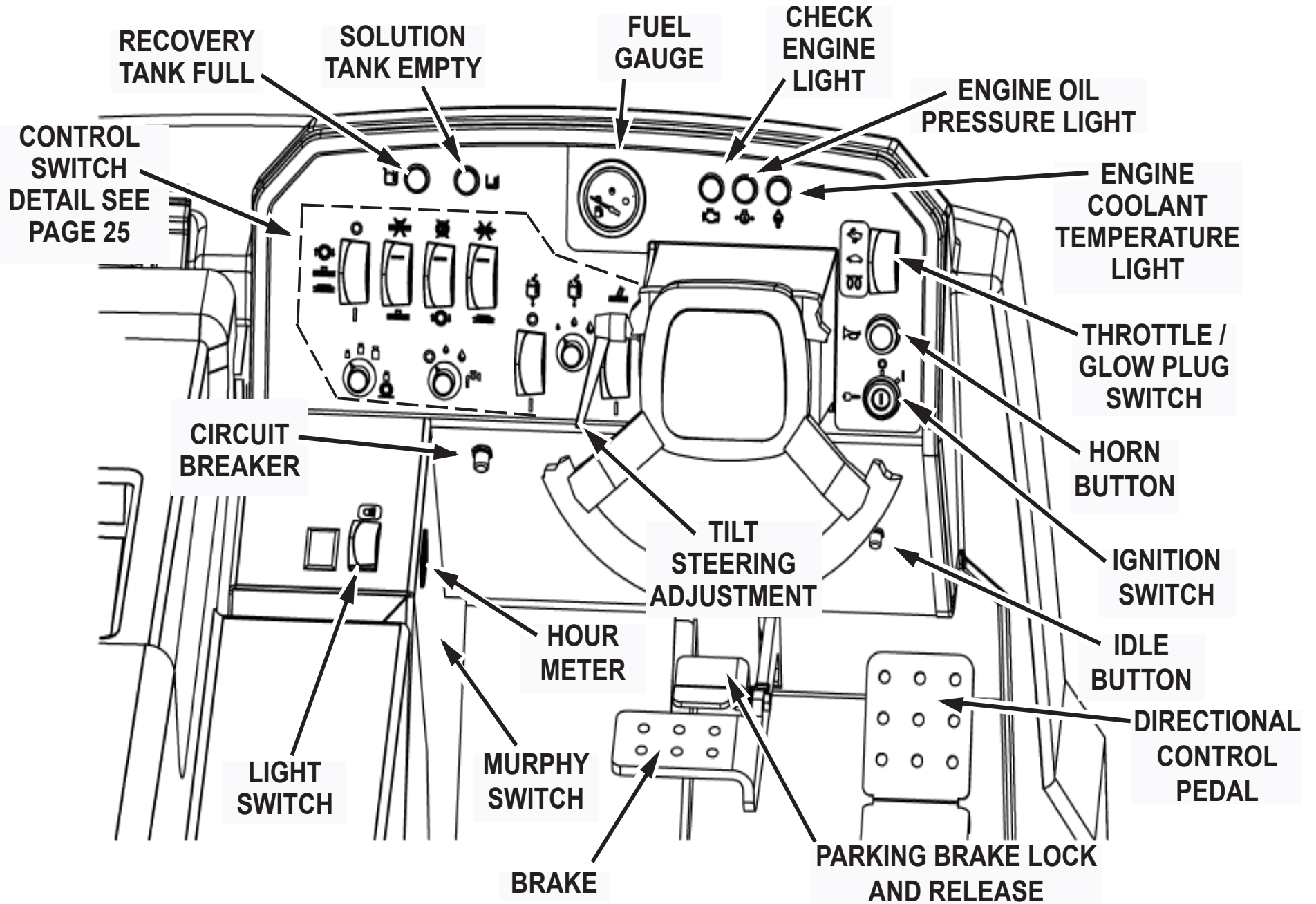
The horn is activated by pressing the horn button which is located to the right of the steering column below the throttle switch.



### FUEL LEVEL GAUGE

The gasoline and diesel models are equipped with a fuel gauge. The gauge is located in the upper left of the steering column. This gauge indicates the amount of fuel remaining in the tank. LPG machines do not have this gauge.





## CIRCUIT BREAKER

The Circuit Breaker is located on the lower left wall of the operator compartment. To reset the Circuit Breaker press the breaker button in until breaker stays in position.



## IDLE BUTTON

The Idle Button is located on the lower right wall of the operator compartment. When the squeegee is the down position and this button is pressed, it will lower the engine RPM to idle. This allows the operator to turn off the engine and keep the squeegee on the ground for adjustments.



## HOUR METER

The hour meter, located on the left side of the operator compartment. This meter records the number of hours the machine has been operated. The hour meter provides a helpful guide for performing routine maintenance tasks, located in the Maintenance Section of this manual.

## INDICATOR LIGHTS

### CHECK ENGINE INDICATOR

The check engine light will illuminate if a problem is detected. The engine will be automatically shut off.



### ENGINE OIL PRESSURE INDICATOR

The engine oil pressure light will illuminate if the oil pressure drops below 7 psi (48 kPa) indicating a problem which may result in damage to the engine. The engine will be automatically shut off.



### ENGINE COOLANT TEMPERATURE INDICATOR

The engine coolant temperature light will illuminate if the engine coolant temperature raises above 220°F (104.4°C). This indicates an overheated engine. The engine will be automatically shut off.



### RECOVERY TANK FULL INDICATOR

When the recovery tank is nearly full the red “full recovery tank” indicator lamp on the instrument panel will begin to blink on and off. When the lamp stops blinking and remains illuminated the tank is full. A few seconds later the scrubbing and squeegee systems automatically shut off and all components are raised to their stored positions. The vacuum fan will continue to operate for a short time.



### SOLUTION TANK EMPTY INDICATOR

When the solution tank is nearly empty a red indicator lamp on the instrument panel will blink on and off. When the lamp stops blinking and remains illuminated there is solution remaining for approximately 10 minutes of scrubbing time.



## **DIRECTIONAL CONTROL PEDAL**

The directional control pedal controls the speed and direction of the machine. It is also used for slowing the machine or stopping.

- To propel the machine forward, apply pressure to the front (top part) of the pedal, increasing pressure to increase speed.
- To propel the machine backward, apply pressure to the rear (lower part) of the pedal.
- To slow or stop the machine, move the foot pedal into neutral (release pressure on the pedal).
- For emergency stops, move the foot pedal past neutral and into the opposite position.

## **BRAKE / PARKING BRAKE**

The mechanical drum brakes on the two rear wheels are operated by pressing on the brake pedal. To engage the parking brake push on the brake pedal then depress the upper brake lock to set the parking brake. To release the parking brake depress the brake pedal.

## **TILT STEERING LEVER**

The steering wheel can be adjusted to provide the most comfortable position for the operator. To adjust the steering wheel loosen lever knob on the left side of the steering column, position the steering wheel and tighten the lever knob.

## **SEAT ADJUSTMENT**

The drivers seat is adjustable to provide the most comfortable position for the operator. The adjustment lever is at the bottom front of the seat. While sitting in the seat, push the lever to the right and pull forward or push back on the seat. Release the lever when the seat is in the proper location.

## **INSTRUMENT PANEL CONTROL SWITCHES**

The main scrubbing controls are located on the main instrument panel for easy access and operator identification. See additional information on the Instrument Panel Control Switches, starting on page 26.

### **GREEN “ONE TOUCH” SWITCH**

A green “One-Touch” switch operates the entire scrubbing function.

### **SQUEEGEE SWITCH**

This switch operates the Squeegee and Vac Fan.

### **SCRUB BRUSH SWITCH**

This switch operates the Scrub Brushes.

### **SIDE SCRUB BRUSH SWITCH - OPTION**

This switch operates the Side Scrub Brush.

### **SCRUB BRUSH FORCE SWITCH**

This switch controls the Scrub Brush Force and has three settings: Low, Medium, and High.

### **SOLUTION FLOW SWITCH**

This switch controls the Solution Flow and has three settings: Off, Normal, and High.

### **CHEMICAL METERING SWITCH - OPTION**

This switch operates the Chemical Metering.

### **CHEMICAL METERING FLOW SWITCH - OPTION**

This switch controls the Chemical Metering Flow and has three settings: Low, Medium, and High.

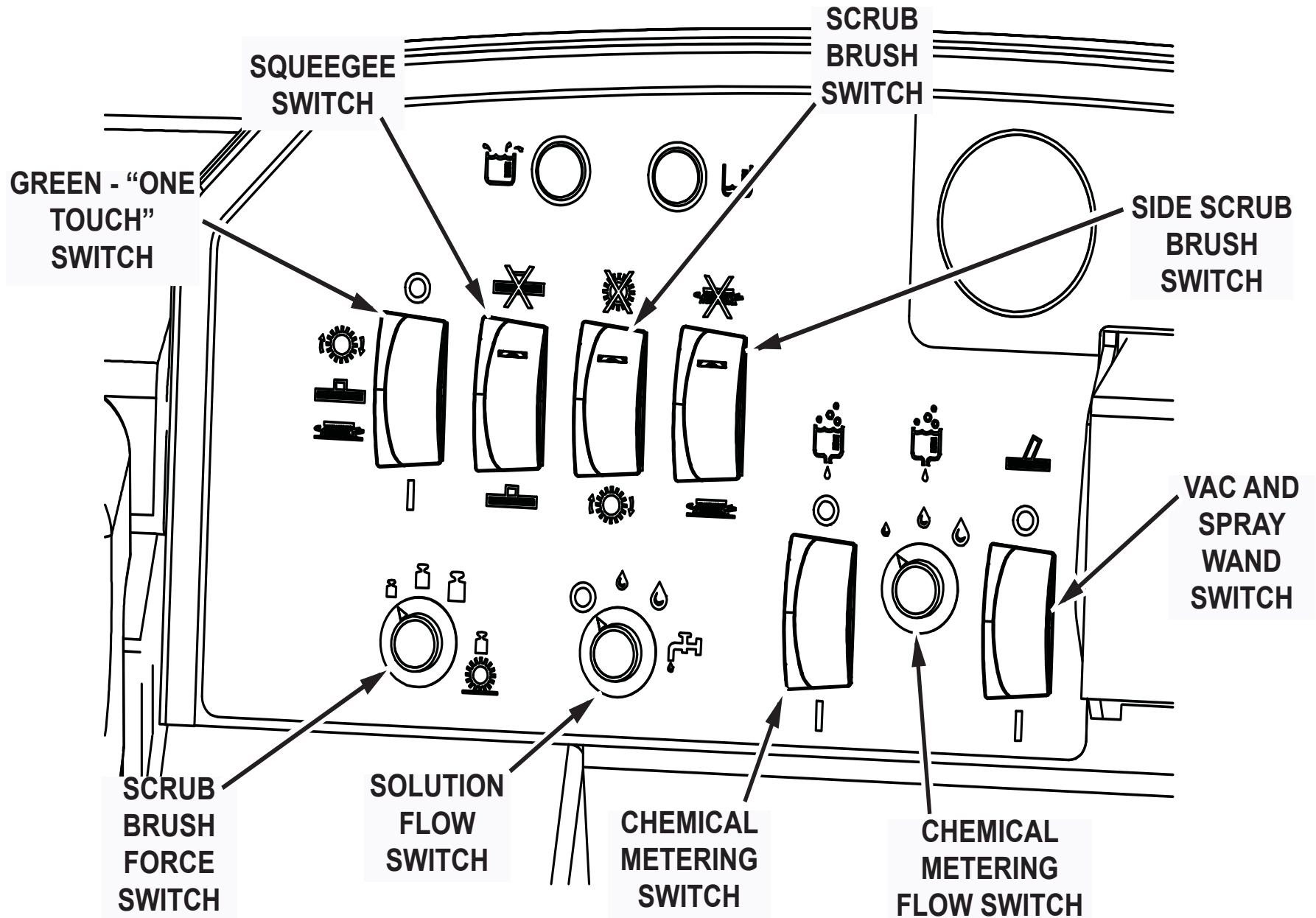
### **VAC AND SPRAY WAND SWITCH - OPTION**

This switch operates the Vac and Spray Wand.

### **SCRUBBING CONTROL DETAILS/FUNCTIONS**

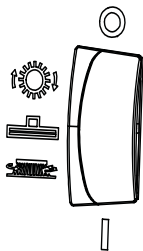
Below are the details and functions of the main scrubbing control switch indicators. These controls/switches are located to the left of the steering column for easy access and operator identification.





## GREEN “ONE-TOUCH” SWITCH

The green “One-Touch” switch operates the entire scrubbing function. When the One-Touch control switch is turned on the following takes place:



1. If the engine throttle switch is in the idle position the engine speed is automatically brought up to operating speed.
2. When the vehicle is in motion, the scrub head lowers to the floor, the main brushes turn on, and the solution control valve is activated. The solution flow will default to the last flow rate chosen but can be varied as required.
3. The main brush down pressure will default to the last setting used but can be varied as required.
4. The squeegee lowers to the floor and the vacuum fan turns on.
5. If installed the optional side scrub brush will extend, lower, and turn on, and the side brush solution flow will turn on.
6. If installed the chemical metering system will turn on.

## SQUEEGEE SWITCH

A separate Squeegee switch is provided. It can be used to prevent the squeegee functions from operating when the “One-Touch” switch is activated (Allowing for scrubbing only or double scrubbing operation). A red light on the switch will illuminate when this switch is in the off (“X”) position.



## SCRUB BRUSH SWITCH

A separate Scrub Brush switch is provided. It can be used to prevent the main scrub brush functions from operating when the “One-Touch” switch is activated (Allowing for squeegee only operation). A red light on the switch will illuminate when this switch is in the off (“X”) position.



## SIDE SCRUB BRUSH SWITCH - OPTION

A separate Side Scrub Brush Switch is provided as an option. It can be used to prevent the side brush from operating when the “One-Touch” switch is activated. A red light on the switch will illuminate when the scrub brush switch is in the on position and this switch is in the off (“X”) position.

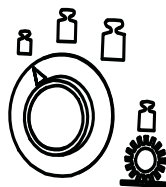


When the vehicle motion is stopped the brushes (including the side brush, if installed) and solution flow will automatically shut off. When the vehicle begins to move the scrub brushes and the solution automatically resume operation.

When the scrubber is driven in reverse the squeegee automatically raises from the floor.

## MAIN BRUSH SCRUB PRESSURE KNOB

The Main Brush Scrub Pressure is selected using a rotary control knob which provides three pressure settings: Light = 200 lb (90,7 kg); Medium = 300 lb (136,1 kg); and Heavy = 400 lb (181,4 kg). Upon start-up the system responds to the last pressure setting used. The scrubbing pressure can be changed while the scrubber is in operation.



## SIDE BRUSH SCRUB PRESSURE

The optional Side Brush Scrub Pressure is variable and automatically changes to balance with the setting of the main brush pressure.

## SOLUTION CONTROL KNOB

The solution flow is selected using a three position rotary knob which provides: Off, Low, and High solution flow.



The **Low flow setting** is for normal scrubbing, smooth floors, and light dirt. The flow rate is .88 gal/hr (3,33 L/hr), providing 2.0 hours of scrub time.

The **High flow setting** is for rough floors and heavy or compacted dirt. The high flow rate is 1.50 gal/hr (5,67 L/hr), providing 1.2 hours of scrub time.

Note: The solution flow starts and stops automatically when the solution flow switch is set in the low or high position.

The flow can be manually shut off when sufficient solution is already on the floor.

The side brush solution flow starts and stops automatically. This side brush has only one flow rate. The flow rate is factory set, but can be adjusted by turning the slotted screw on the solution solenoid valve located below the frame just behind the side scrub brush.

## **BASIC SCRUBBING/FILLING/ EMPTYING INFORMATION**

Adjust the machine speed scrub brush pressure and solution flow as required. Use the least amount of brush pressure and solution necessary for the scrubbing application.

When the recovery tank is full the recovery tank indicator light will illuminate and the scrubbing functions will shut off. It is then necessary to drain and clean the recovery tank and refill the solution tank before continuing the scrubbing operation.

## **CHOOSING THE CORRECT TYPE OF BRUSH (FOR YOUR SCRUBBING APPLICATION)**

The main and optional side scrub brushes are available in the following types:

### **Polypropylene brush**

This is a general-purpose brush good for most cleaning applications.

### **Nylon brush**

This is a soft brush good for light applications or when scrubbing coated floors.

### **80 grit abrasive brush**

This is a nylon brush impregnated with heavy abrasive grit for removing heavy stains and compacted dirt. This brush is good for heavy buildup grease or tire marks.

### **180 grit abrasive brush**

This is a nylon brush impregnated with mild abrasive grit for removing heavy stains and compacted dirt.

**Note:** Reference Nautilus Part Catalog for reordering main and side scrub brushes.

## FILLING THE SOLUTION TANK

Open the top cover of the solution tank. Begin filling the solution tank with clean water not to exceed 130°F (55.4°C). When the tank is approximately half full add the appropriate amount of detergent (Do not add detergent in solution tank if you are using the optional chemical metering system for applying detergent). Continue to fill the solution tank with water. The tank is full when the water level reaches the bottom of the metal level indicator (located inside the solution tank).

If the machine is equipped with an optional chemical metering system do not add detergent in the solution tank. Instead, place a container of cleaning solution into the chemical metering box and install the pump suction hose.

Note: Use only recommended cleaning detergents. Machine damage due to improper detergent usage will void the machine warranty.

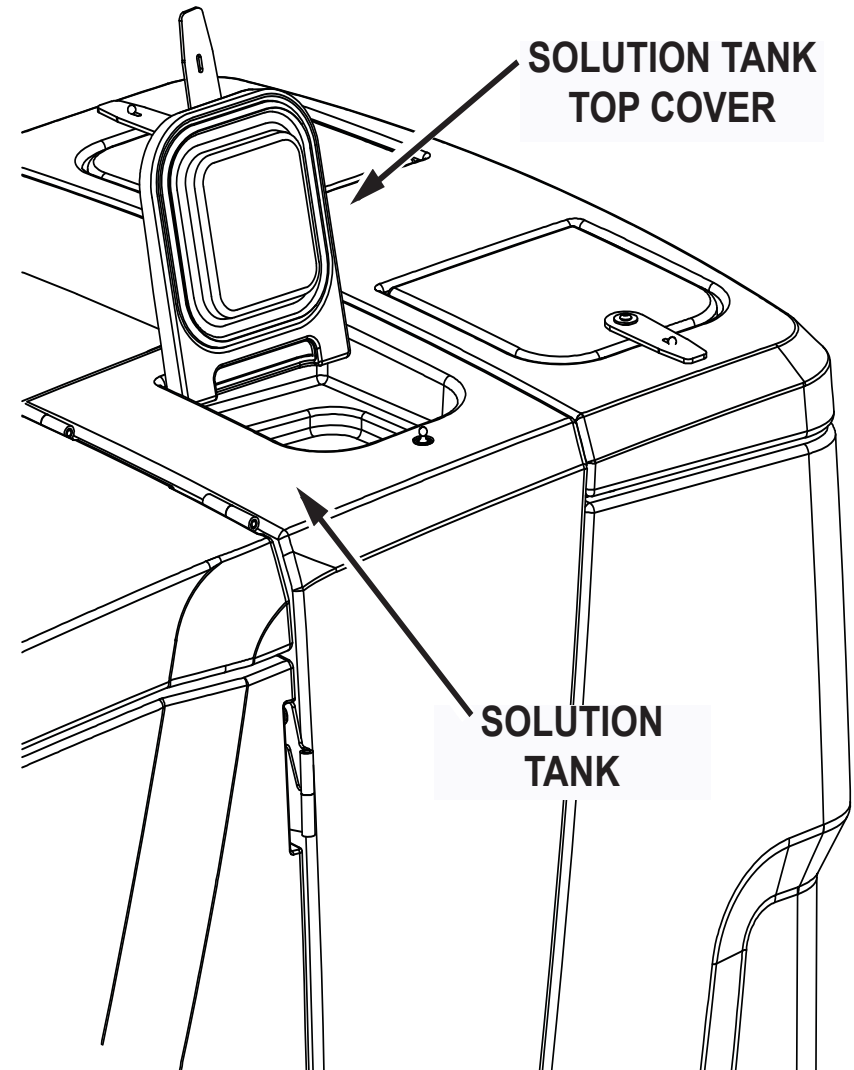


Fig. 1

## FILLING THE SOLUTION TANK USING THE AUTO-FILL OPTION:

1. Park the machine on a level surface and set the parking brake.
2. Turn the ignition key to the “on” position, do not start the engine.
3. A. Open the side door.  
B. Using the quick connector adapter on the end of a water supply hose connect the supply hose to the auto-fill connector located below the vacuum impeller.  
C. Turn on the water supply. The water will automatically shut off when the proper level is achieved.  
D. When the solution tank is full, turn off the water supply.  
E. Disconnect the garden hose and close the side door.
4. Turn the ignition key in the “off” position.

**⚠ WARNING**

**Flammable materials can cause an explosion or fire.  
Do not use or fill flammable materials in the tank(s).**

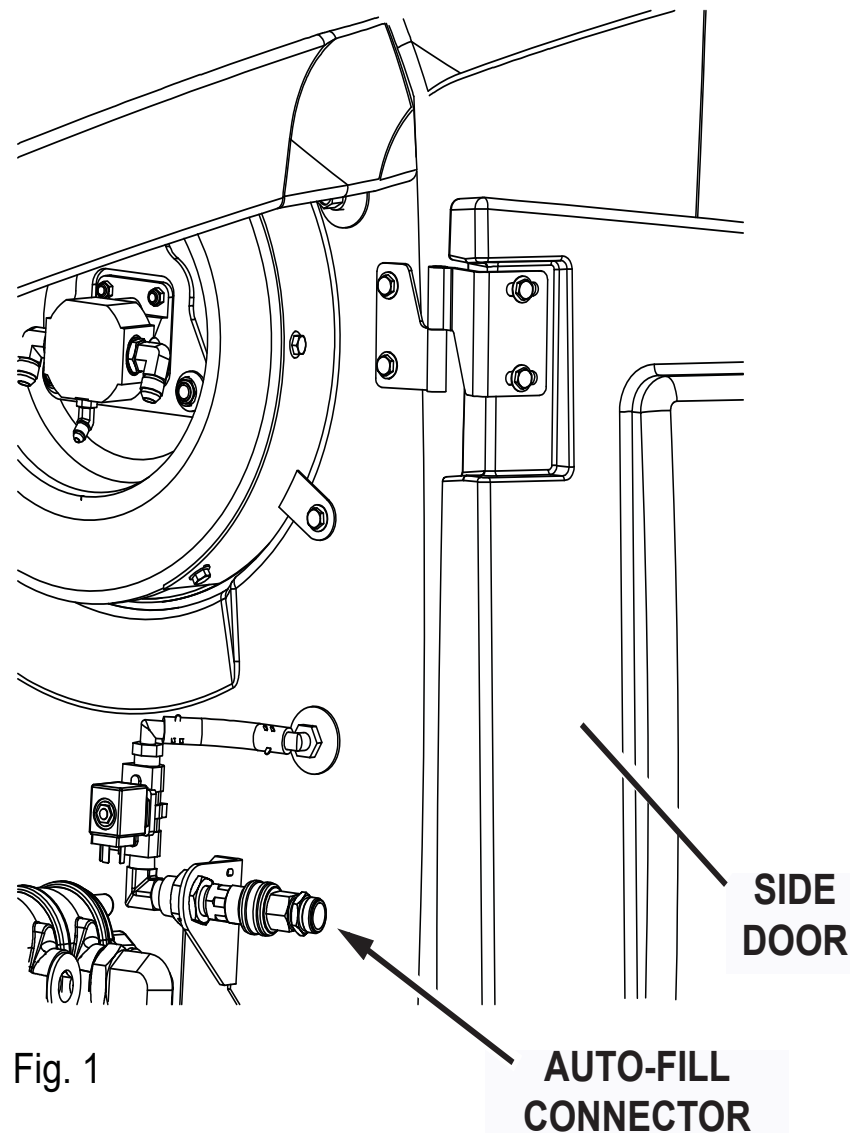


Fig. 1

## NORMAL SCRUBBING

This machine is equipped with one button scrubbing. It is not necessary to press all of the scrub function switches each time you begin scrubbing.



1. On LPG powered machines; Open the liquid service valve (turn valve counter-clockwise) on the LPG tank (See Fig. 1).
  2. Start the engine.
  3. Insure that the squeegee and brush switches (to the right of the green one-touch switch) are in the “on” position. Set the brush pressure switch to the lowest setting required for the scrubbing application. Set the solution control knob to the low flow position. (See Fig. 2)
- If the machine is equipped with chemical metering ensure that the chemical metering switch is in the “on” position.

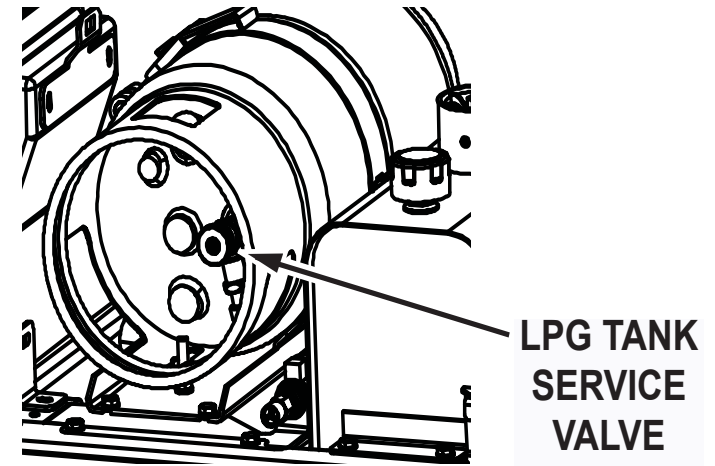


Fig. 1: LPG Tank - Location of Service Valve

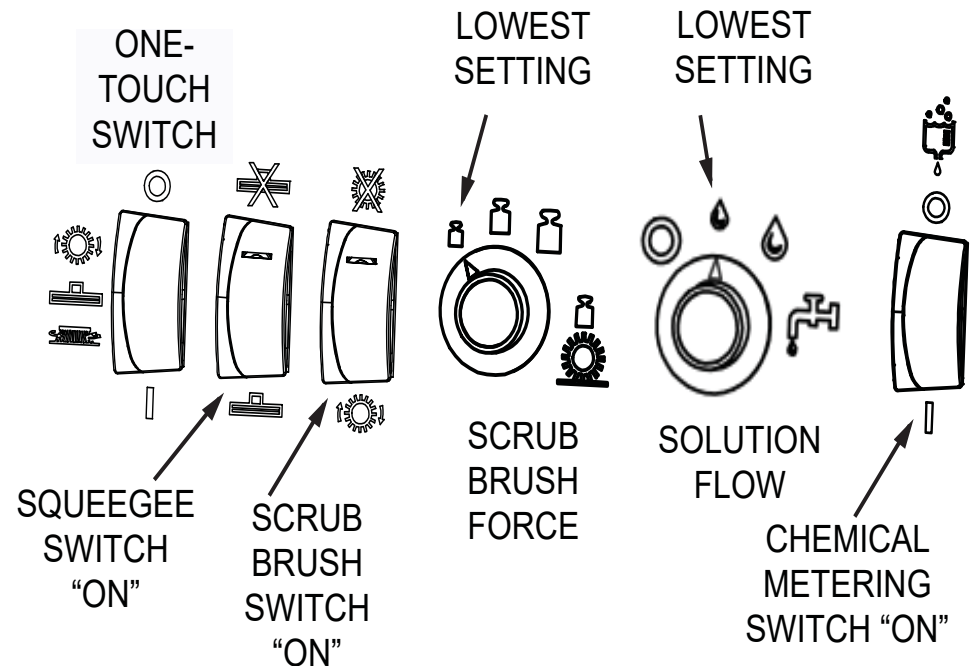


Fig. 2: Control Settings, before “One-Touch” selection

4. Press the top of the green one-touch button to begin scrubbing.

The engine speed will increase to operating speed, the squeegee will lower, the vacuum fan will start. When the vehicle is driven forward or backward the scrub brushes will lower and start and the solution flow will turn on.

If equipped with the optional side scrub brush: The side scrub brush will extend, lower, and turn on and the solution flow to the side scrub brush will turn on.

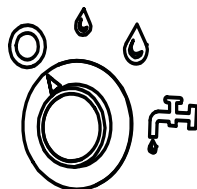
If equipped with optional chemical metering: Detergent will be added to the solution flow.

Note: when a new container of detergent has been installed a short amount of time is required for the detergent to mix with the water and reach the floor.

5. Drive the machine forward and scrub as required.
6. Adjust the solution flow as necessary.

The low setting is used for normal scrubbing, smooth floors, and light dirt.

The high setting is for rough floors and heavy or compacted grime.

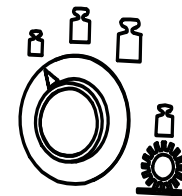


7. Adjust the scrub brush pressure as required.

There are three brush pressures available. For normal scrubbing use the lowest brush pressure.

Use the medium or high brush pressure for heavier grime as required.

Note: Higher brush pressures will result in higher brush wear.





## DOUBLE SCRUBBING

Double scrubbing is an effective way to remove heavy grime accumulation. This is accomplished by making two passes over the area to be cleaned, the first pass with the squeegee raised.

Note: When double scrubbing it is necessary to manually lock the side squeegee blades (and if equipped, the side brush squeegee blade) in the raised position.

1. Manually lock both side squeegee blades in the raised position. Open the scrub brush door. Lift the side squeegee assembly and rotate the lock arms counter-clockwise until they latch and lock the squeegee blade in the raised position. See Fig. 1.
2. If the machine is equipped with the optional side scrub brush, raise the side brush squeegee blade by removing the squeegee retaining strap, relocating the squeegee blade using the lowest positioning slots (highest squeegee position), then replacing the squeegee retaining strap. See Fig. 2.
3. Start the engine.
4. To begin double scrubbing first set the squeegee switch in the “off” position (an illuminated red light on each switch indicates that that function is turned off). This will turn off the vacuum fan and prevent the squeegee from lowering.

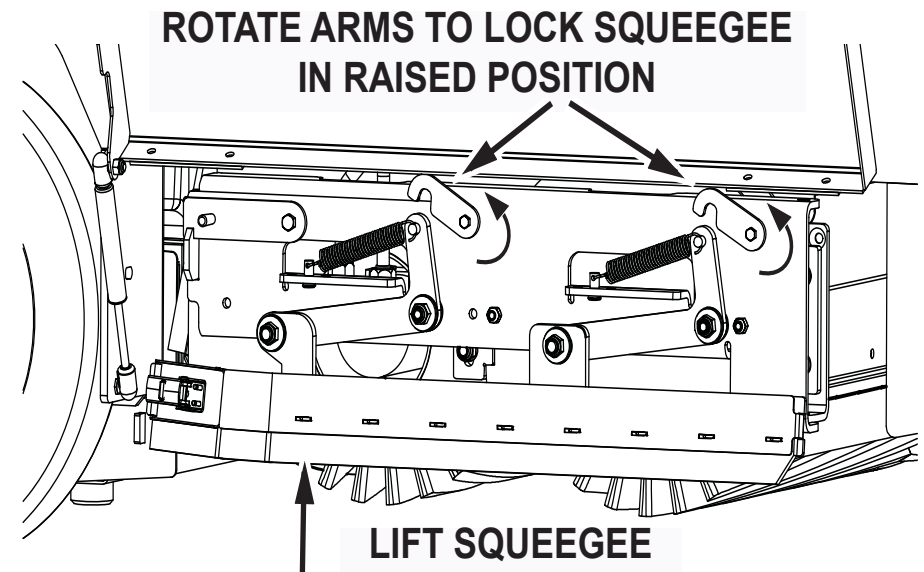


Fig. 1: Shows squeegee assembly retaining arms

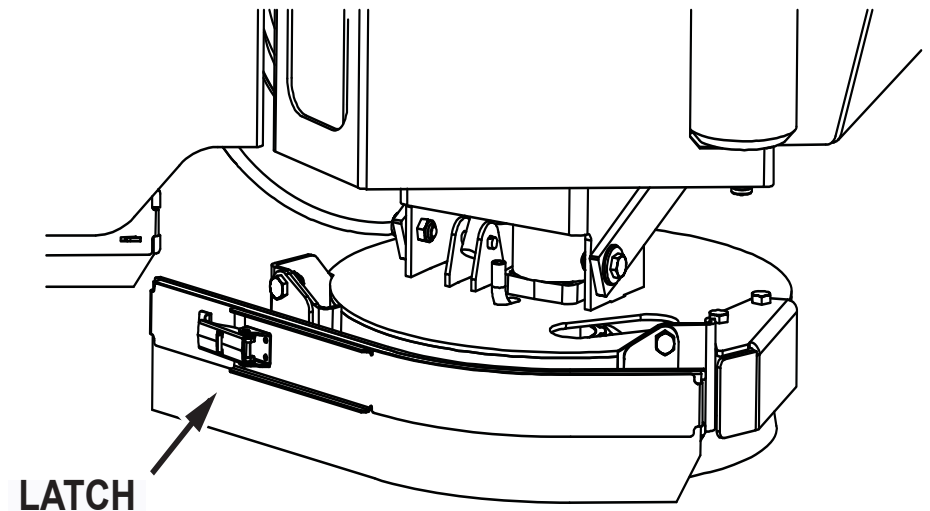


Fig. 2: Optional side scrub brush with squeegee

5. Press the top of the green one-touch button to begin scrubbing.
6. When double scrubbing use the maximum solution flow setting and a high brush pressure.
7. Make a pass over the area to be scrubbed. This will dispenses solution over the area allowing the detergent to soak on the floor. Let the solution remain on the floor for 5 - 10 minutes, then make a second pass with the squeegee lowered (squeegee switch in the "on" position).

Use caution when double scrubbing in areas where cleaning solution may run under storage racks or damage product.

**Note:** When finished double scrubbing, unlock the side squeegee blades and reposition the side brush squeegee blade to its original height.

## **STOP SCRUBBING**

1. Press the bottom of the green one touch button to stop scrubbing. The scrub brushes will shut off and raise, and the solution flow will shut off. After a few seconds the squeegee will raise and a few seconds later the vacuum fan will shut off.
2. Continue driving the machine forward until the squeegee raises.
3. If the engine throttle switch is set to the idle position the engine will automatically return to idle after the vacuum fan shuts off.
4. When finished set the controls back to the normal scrubbing position.

## WATER PICK UP MODE (SQUEEGEE ONLY)

For water pick up or cleaning spills the machine can be operated with the squeegee and vacuum system only.

1. Start the engine.
2. To begin operating with only the squeegee and vacuum system, insure that the squeegee switch is in the "on" position and set the scrub brush switch(s) to the "off" position (an illuminated red light on each switch indicates that that function is turned off). See Fig. 1.
3. Press the top of the green one-touch button to begin water pick up or cleaning spills.
4. The squeegee will lower and the vacuum fan will turn on.
5. Drive over the spill areas.

### **WARNING**

**Flammable materials can cause an explosion or fire.  
Do not use or fill flammable materials in the tank(s).**

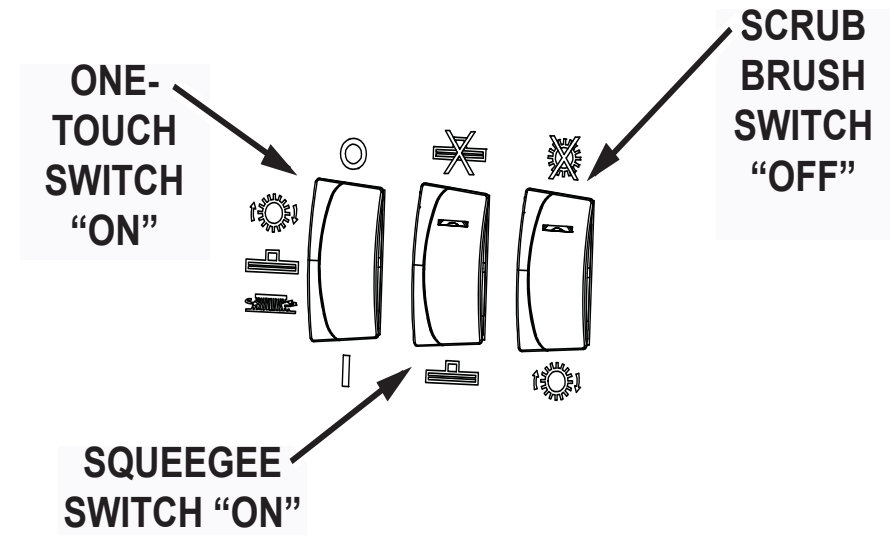


Fig. 1: Control Settings for Water Pick-up Mode

## STOP WATER PICK UP

1. Press the bottom of the green one touch button to stop squeegee operation. After a few seconds the squeegee will raise and the vacuum fan will shut off.
2. If the engine throttle switch is set to the idle position the engine will automatically return to idle after the vacuum fan shuts off.
3. When finished set the controls back to the normal scrubbing position.

## **DRAINING/CLEANING THE RECOVERY TANK**

**Note:** The recovery tank must be emptied and cleaned daily.

When the recovery tank is full or you are finished scrubbing the recovery tank must be drained and cleaned.

1. Drive the machine to an appropriate dump site. Shut off the engine and set the parking brake.
2. Open the recovery tank top covers. (See Fig. 1)
3. Place the end of the recovery tank drain hose on the floor near a floor drain. (See Fig. 1)
4. Slowly pull the drain valve into the open position. This valve is variable and can be used to slowly increase the flow of fluid draining from tank. (See Fig. 2)
5. When the tank is fully drained rinse out the tank with clean water.

**Note:** Do not use steam to clean the tank as this will damage the tank.

6. Rinse the float sensor, inside the Recovery Tank.

For cleaning stubborn debris from the recovery tank the rear cover may be removed for greater access.

7. When finished cleaning and draining the tank, push the drain valve into the fully closed and locked position.
8. Reinstall the drain hose onto the back of the recovery tank.
9. Close the recovery tank top covers.
10. Rinse off the exterior of the tanks as necessary.

RECOVERY  
TANK TOP  
COVERS

RECOVERY  
DRAIN  
HOSE



Fig. 1: Draining the Recovery Tank

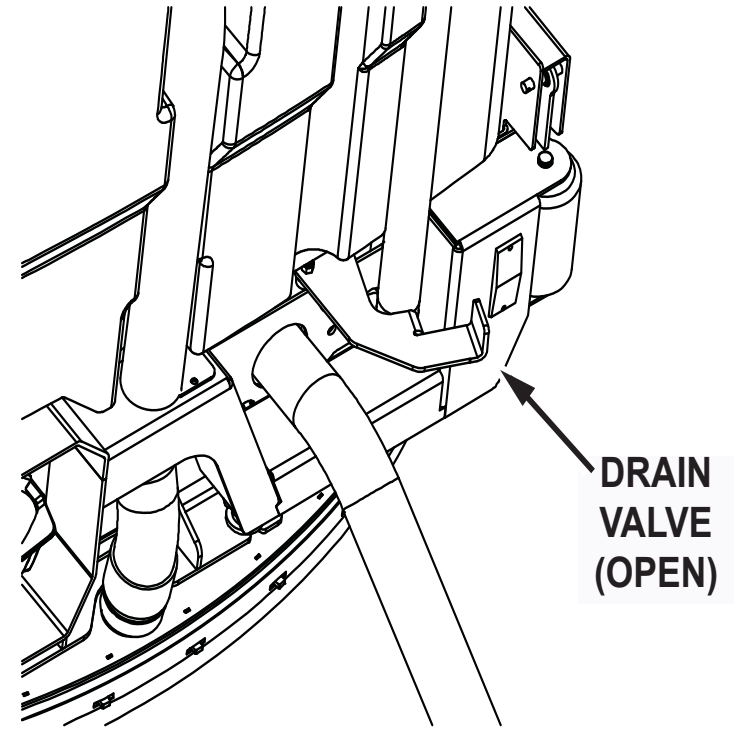


Fig. 2: Drain Valve

## EMPTYING/CLEANING THE DEBRIS HOPPER

**Note:** The debris hopper must be emptied and cleaned daily.

1. Drive the machine to an appropriate dump site. Shut off the engine and set the parking brake.
2. Swing the orange bumper lever arm out from under the rear bumper. (See Fig. 1)
3. Release the rear bumper latch located under the right side of the rear frame while lifting up on the bumper lever arm. (See Fig. 1)
4. Raise the bumper up until the safety arm locks into place. (See Fig. 1)

**Note:** The orange safety arm is located on the driver side of the rear bumper assembly. Insure that the lower end of the safety arm is securely locked into place over the mating bar on the frame.

5. Locate the orange hopper handle under the right rear corner of the machine and pull the hopper cradle back and down onto the floor. (See Fig. 1)

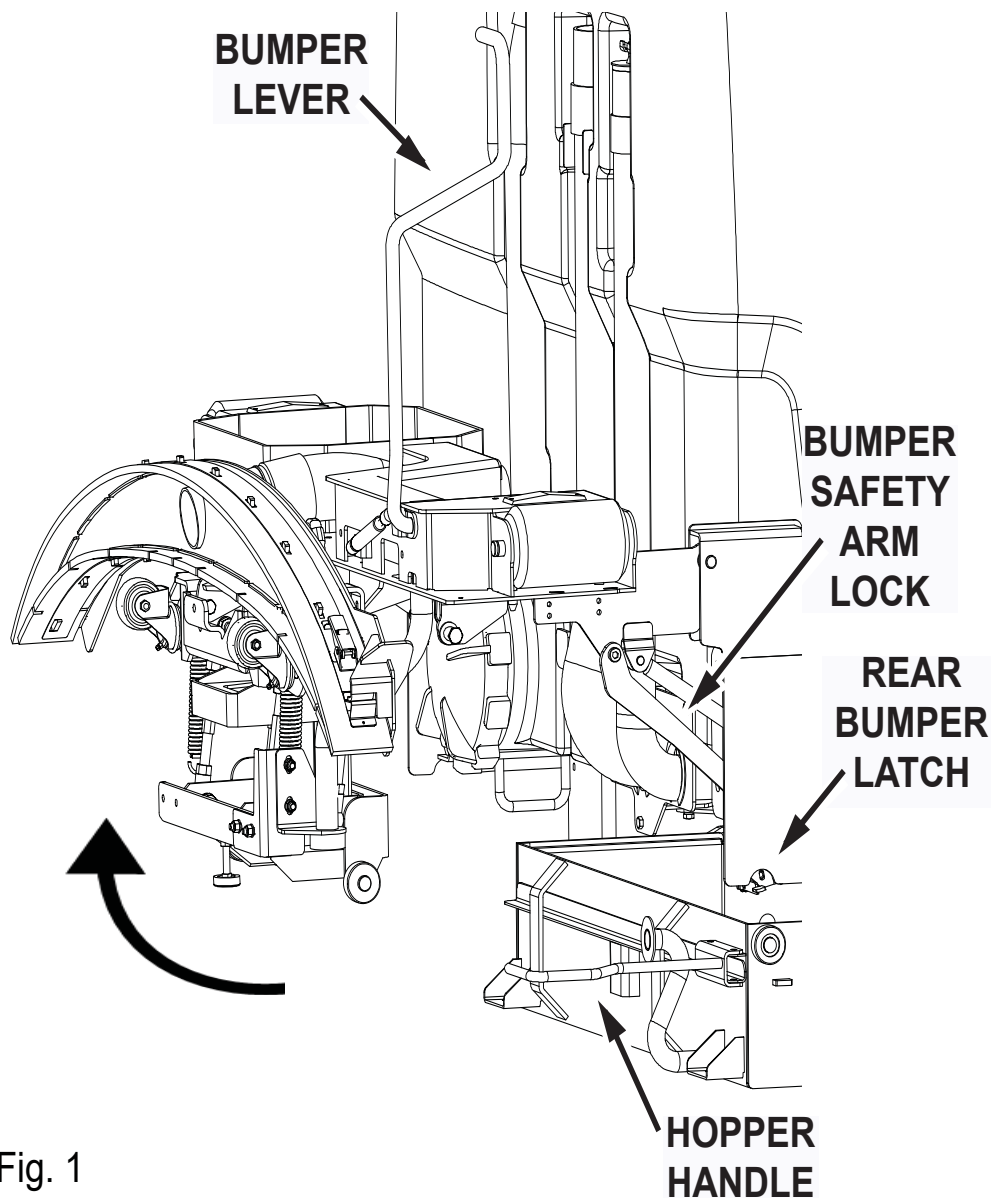


Fig. 1

6. Slide the hopper cradle out from under the rear bumper. (See Fig. 2)
7. Using the lift handle remove the hoppers from the hopper cradle and empty the debris into an appropriate container. (See Fig. 3)
8. Rinse the hoppers clean.
9. Rinse the hopper cradle clean.
10. Back flush the hopper vacuum hose located under the rear bumper to clear any debris from the vacuum hose. (See Fig. 4)
11. Replace the hoppers into the hopper cradle.
12. Position the hopper cradle so that the front set of wheels on the sides of the hopper cradle are just inside the machine rear wheel wells. From this position the hopper will be pushed into place when the rear bumper is closed. (See Fig. 1)
13. Lift the rear bumper slightly and disengage the safety arm. (See Fig. 1)
14. Using the orange bumper lever arm lower and then push the rear bumper closed insuring that the bumper retaining latch is engaged. Closing the bumper will push the hopper into its operating position.
15. Return the bumper lever arm to its stored position.

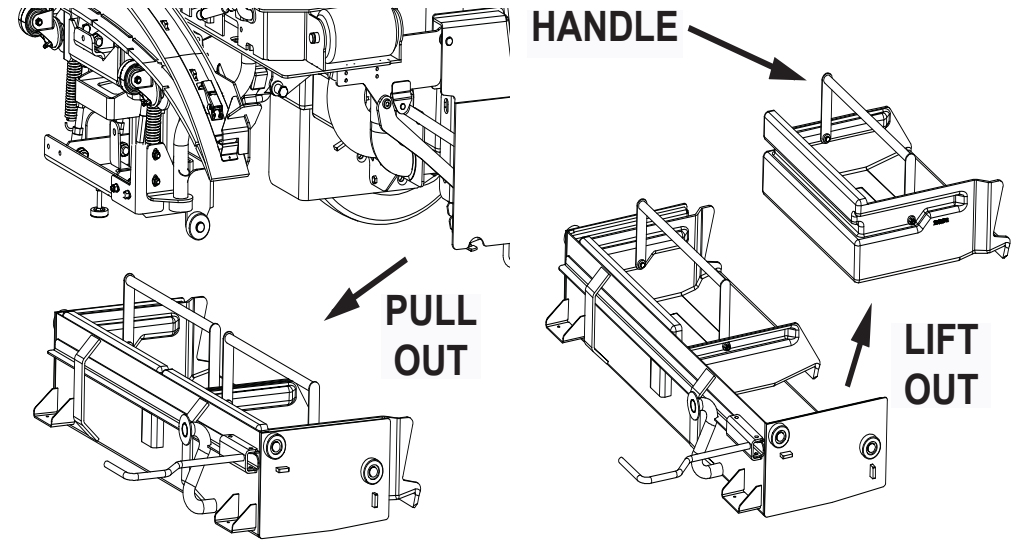


Fig. 2

Fig. 3

**WARNING: FLUSH  
WILL DISCHARGE  
HERE**

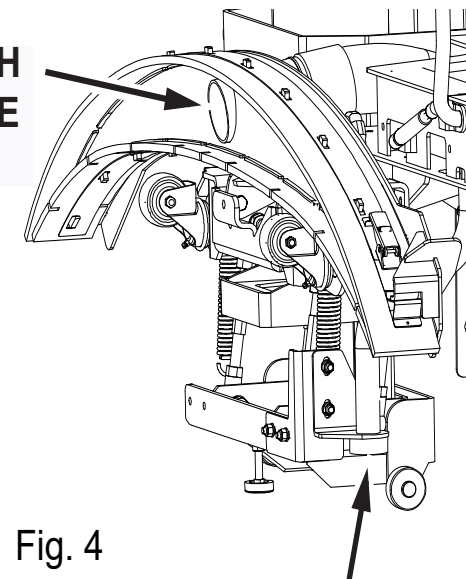


Fig. 4

**VACUUM HOSE  
BACK FLUSH AREA**

## DRAINING THE SOLUTION TANK

1. Drive the machine to an appropriate dump site. Shut off the engine and set the parking brake.
2. Open the solution tank top cover.
3. Grab the end of the solution tank drain and lower slowly to the floor near floor drain. (See Fig. 1)
4. Loosen and remove the cap. (See Fig. 1)

**Note:** Depending on the level of liquid in the solution tank the liquid may exit under pressure.

5. After tank has fully drained reinstall the cap.
6. Reinstall the drain hose onto the back of the recovery tank.
7. Close the solution tank top cover.

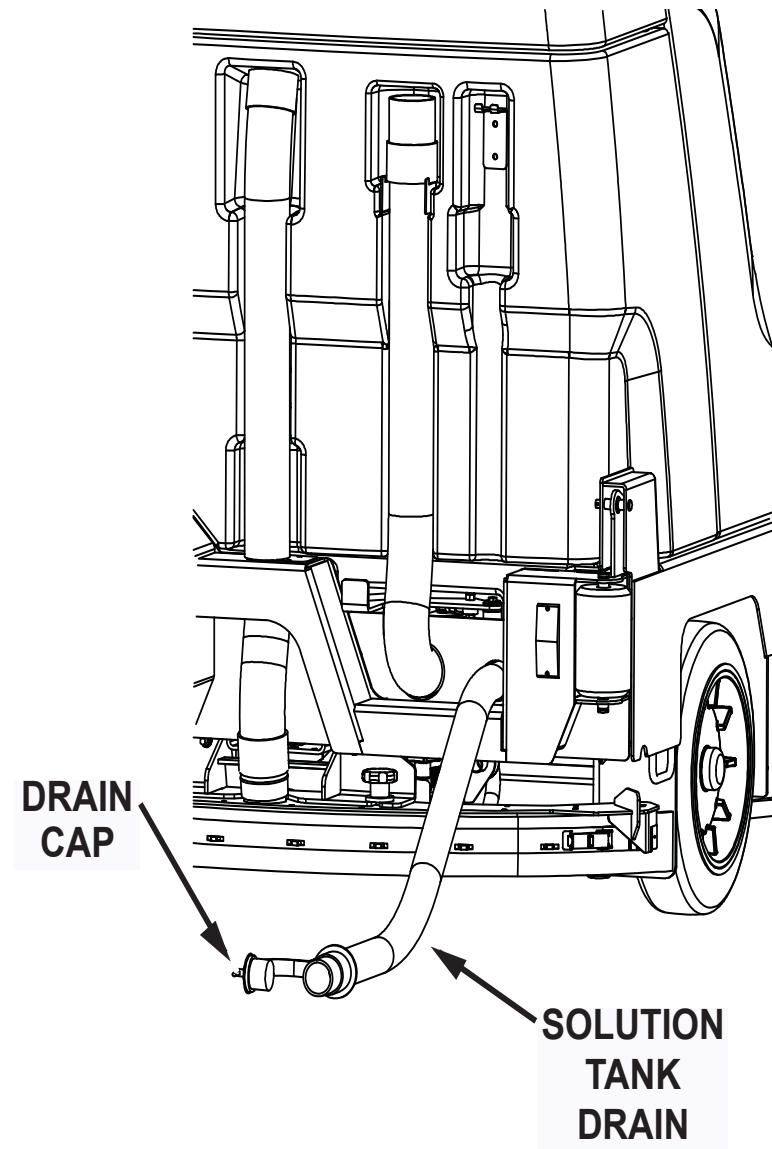


Fig. 1: Draining the Solution Tank



## OPERATING PROCEDURES

### PRE-OPERATION CHECKS

Prior to starting the engine, check the following:

1. Engine oil level is within the operating range -- indicated with small holes on the engine oil dipstick.
2. Engine coolant level is within the operating range -- indicated within "full" and "low" on the overflow bottle.
3. Fuel level. For LP powered machines, confirm the LP tank is turned on. To turn the valve ON, turn the valve counter clockwise until it stops. The valve is located on the LP tank.
4. Hydraulic fluid level is within the operating range -- indicated fluid level within the sight gauge.
5. Brakes, steering, and directional controls.
6. Signs of fluid leaks on and under the machine.
7. Condition of scrubbing brushes. Remove any strings and debris wrapped around them.

Fluid levels should be within the correct amounts to operate the machine.

Brakes, steering and directional controls should be functioning properly.

Hoses, lines and tanks should be free of damage and leaks.

Nautilus Rider Scrubber/Sweeper #988749UM Rev. F 03/19

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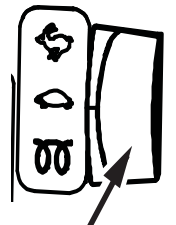
## STARTING

### **⚠ WARNING**

**Before starting the engine, sit in the operator's seat and make sure the parking brake is engaged.**

1. Make sure the directional control pedal is in the neutral position. LP engines: Confirm the LP tank valve is on.
2. Engage the parking brake.
3. Make sure the throttle is in the idle position.
4. LP and Gasoline-powered: Turn the ignition key to the start position (clockwise). When the engine starts, release the key.

Diesel-powered: Turn the ignition key to the "on" position (do not try to start). Press down and hold the Glow Plug Switch for 10-12 seconds, release the switch. Turn the ignition key to the start position (clockwise). When the engine starts, release the key.



**GLOW  
PLUG  
SWITCH**

### **⚠ CAUTION**

**If the engine fails to start, do not continue cranking for more than ten seconds. Allow the starter motor to cool between attempts.**

## DRIVING

The direction control pedal moves the machine forward and backward. To move the machine forward or backward, first release the parking brake.

- To move Forward: Apply pressure to the front of the directional control pedal, increasing pressure to increase speed.
- To move Backwards: Apply pressure to the rear of the directional control pedal, increasing pressure to increase speed.

## SLOWING AND STOPPING

Allow the directional control pedal to move into neutral. Step on the brake pedal.

## INCLINES OR SLIPPERY SURFACES

Always travel slowly when operating on inclines or slippery surfaces.

### **! WARNING**

**Do not travel across or turn on inclines, to maintain stability of the machine.**

**Always travel straight up or down on inclines.**

## STOP THE MACHINE

1. Stop scrubbing and drive the machine forward until the rear squeegee raises.
2. Stop the vehicle using the foot brake.
3. Push the engine throttle switch to idle.
4. Turn off the ignition key switch to the off position.
5. Remove the key.
6. Set the parking brake.
7. On LP powered machines turn the LP tank service valve OFF. To turn valve OFF, turn the valve clockwise until it stops. The valve is located on the LP tank. (See Fig. 1)

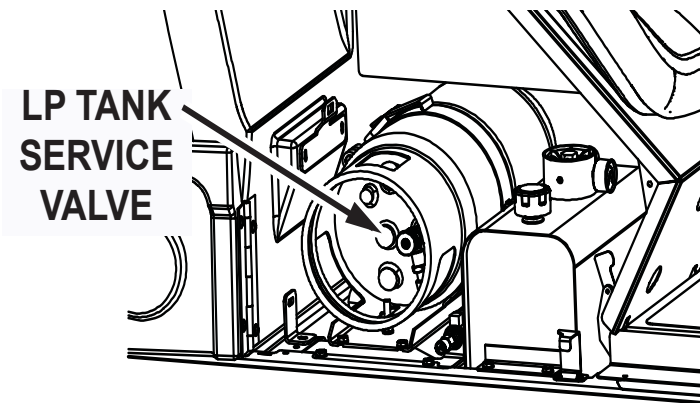


Fig. 1: LP tank, service area

## TRANSPORTING THE MACHINE

### USING A TRAILER OR TRANSPORT VEHICLE

1. Position the machine on the transport vehicle or trailer and apply the parking brake.
2. Tie the machine down using the tie down bars on both sides of the front corners and behind both rear wheels.

**Note:** Attach the tie downs to the tie down bars only.

### PUSHING OR TOWING THE MACHINE

Before towing or pushing the machine, turn the bypass valve located on the top of the propulsion pump 90 degrees as shown. See Fig. 2.

#### CAUTION

The tow control valve must be turned 90 degrees from the operating position.

Not turning the tow control valve will cause damage to the pump.

### ATTENTION!

Do not tow or push the machine a distance of more than 0.5 mi (0,8 km) or faster than 1 mph (1,6 km/hr). Exceeding these restrictions may cause damage to the hydraulic system. If towing will exceed the above restrictions, the rear wheel must be raised or supported by a dolly.

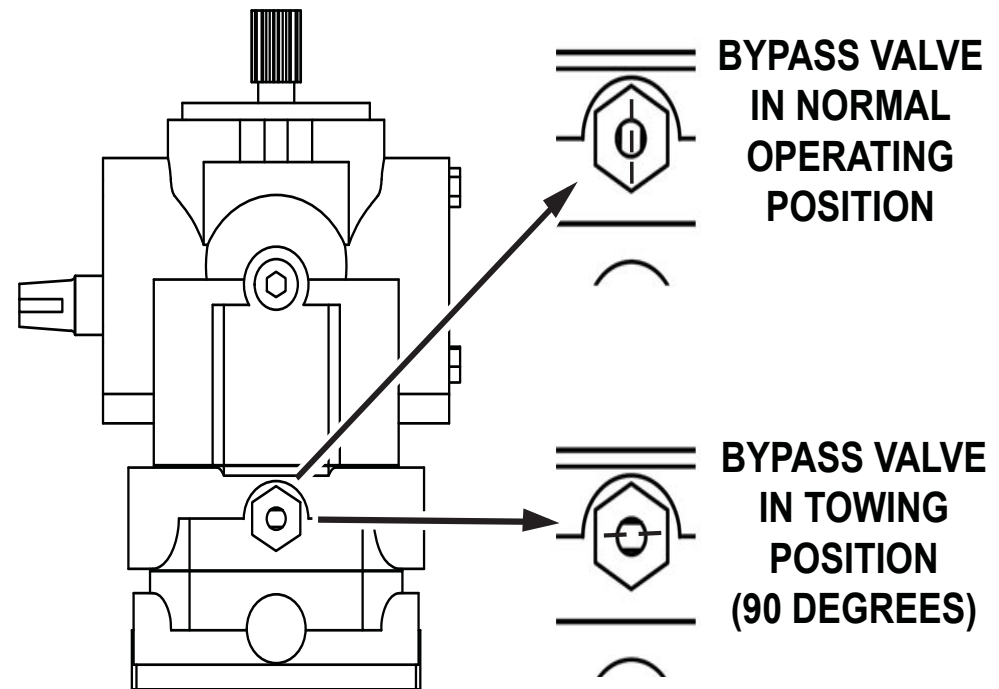


Fig. 2: Bypass Valve locations

## OPTIONS

### CHEMICAL METERING

The chemical metering option is used to meter the optimum amount of detergent onto the floor while scrubbing.

1. Place a full container of detergent (appropriate for the application) into the detergent container rack located on the top of the solution tank. (See Fig. 1)

**Note:** Use only recommended cleaning detergents. Machine damage due to improper detergent usage will void the machine warranty.

2. Remove the detergent container cap and replace it with the suction hose cap.
3. Set the chemical metering flow rate. (See Fig. 2)  
There are chemical flow rates available.  
For normal scrubbing use the lowest chemical flow rate.  
For heavier scrubbing use the medium or high chemical flow rate.
4. Turn on the chemical metering switch. (See Fig. 2)
5. When scrubbing, the correct amount of detergent will automatically be added to the solution delivery system.

**Note:** During the first use after a new container of detergent is installed it may take some additional time for the detergent to reach the floor.

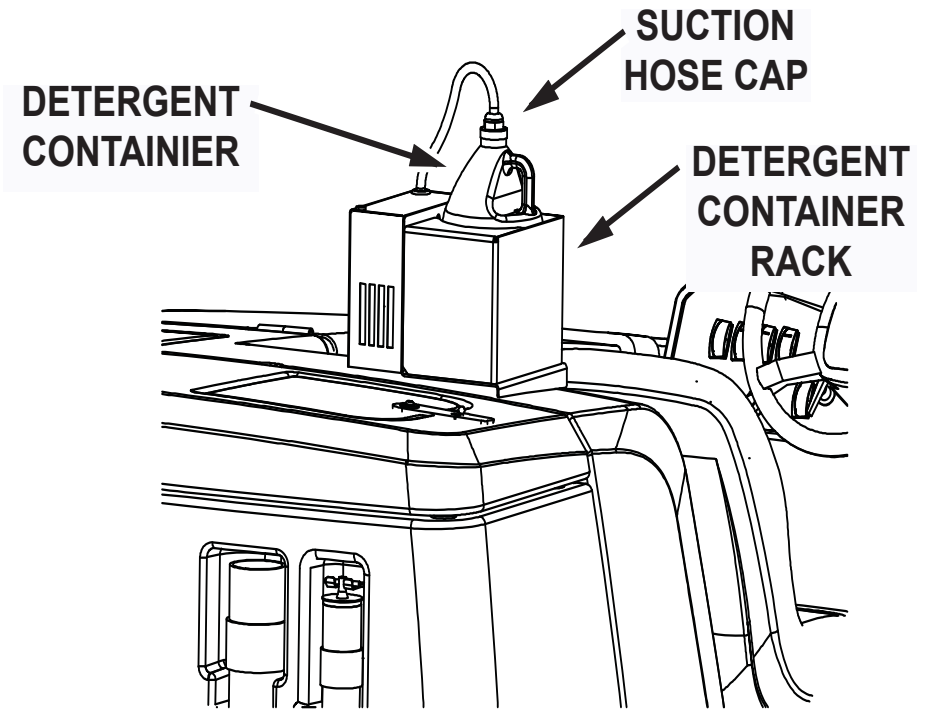


Fig. 1: Chemical Metering Option

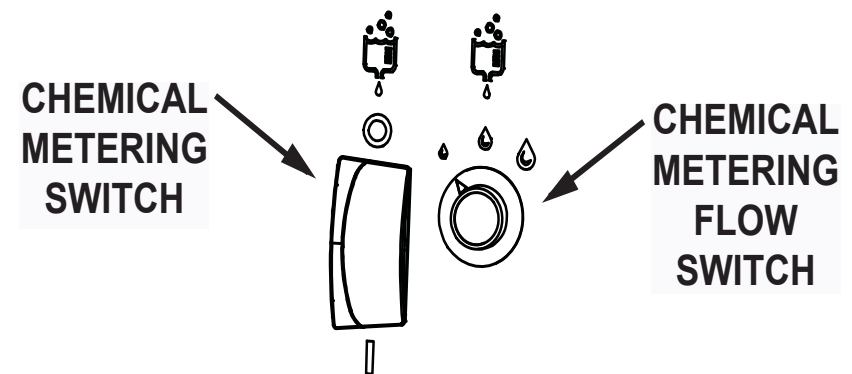


Fig. 2: Chemical Metering Controls

## AUTO-FILL

The auto-fill option allows for unattended filling of the solution tank.

The system automatically shuts off the flow of water to the solution tank when the tank is full. See the section on “filling the solution tank” for more details on this option.

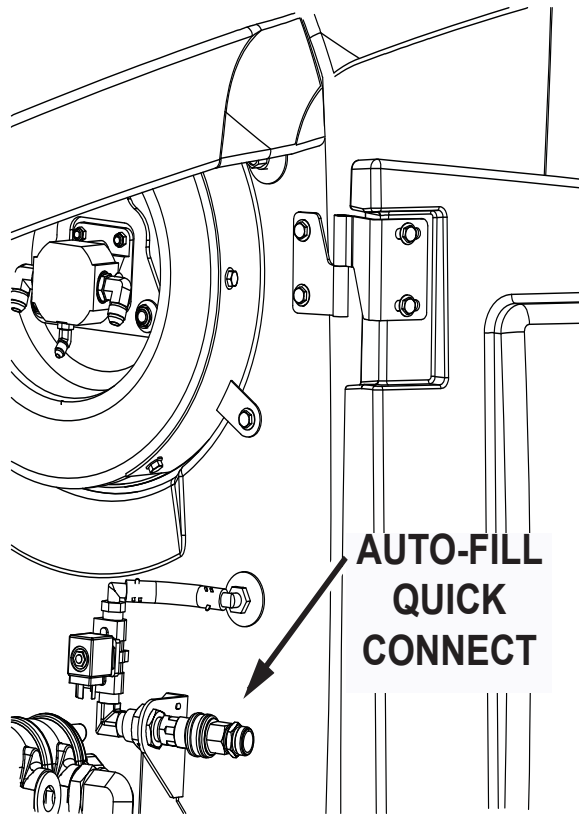


Fig. 1: Auto-Fill Quick Connect

## NEUTRAL START SENSOR (CE)

The Neutral Start Sensor safety option will not allow the engine to be started, if the Directional Control Pedal is pressed in the forward or backward position. The Pedal must remain in the neutral position to start the engine.

This safety option is standard on all Nautilus machines.

## OPERATOR SEAT SENSOR (CE)

The Operator Seat Sensor safety option senses when the operator of the vehicle is sitting in the driver seat. This sensor will automatically turn off the running engine, if the operator leaves the seat for longer than 3 seconds. If the parking brake is engaged it will bypass the seat contact switch so that the machine will continue to run so the mechanic can work on it.

This safety option is standard on Nautilus CE machines and available for other Nautilus machines.

## KEY LOCKED ENTRY DOORS (CE)

The Key Locked Entry Doors are a safety option that allows the operator to lock and unlock individual door panels on the machine with one key. This option includes: locks for all machine panel doors (except the LP tank door panel) and an

access key.

This safety option is standard on Nautilus CE machines and available for other Nautilus machines.

## **SPRAY AND VACUUM WAND**

The spray wand option is used to clean areas that are otherwise inaccessible.

1. Park the machine close to the area to be cleaned.
2. Lower the squeegee and shut off the engine.
3. Set the parking brake.
4. Remove the hose from the top of the rear squeegee.
5. Remove the spray wand tubes from the retainer clips and assemble the wand.
6. Remove the vacuum hose from the hose rack and attach the small end of the hose to the upper end of the wand and the large end of the hose to the machine squeegee hose.
7. Attach the wand solution hose to the quick disconnect fitting on the upper end of the wand and to the quick disconnect fitting located on the rear bumper of the machine between the tank drain hoses. (See Fig. 1)

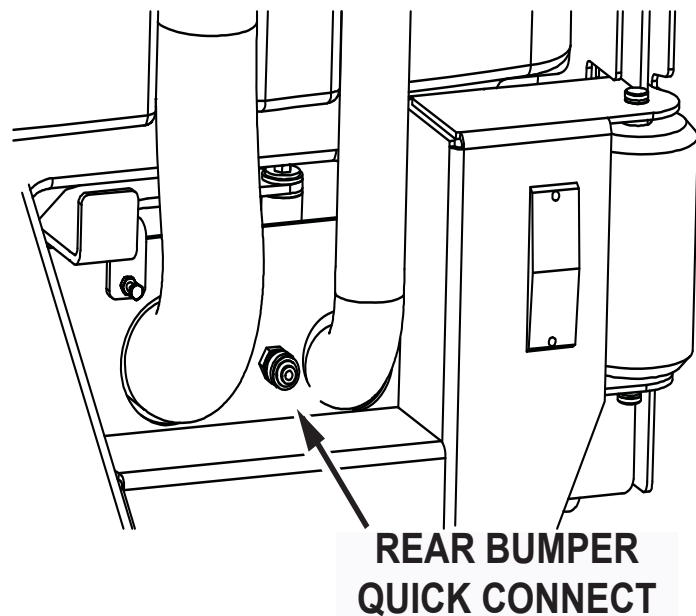


Fig. 1: Spray Wand Quick Disconnect

8. Start the engine.
9. Position the throttle switch to the “fast” position.
10. Lower the squeegee to turn on the vacuum system.
11. Turn the Vac & Spray Wand switch located on the instrument panel to the “on” position. (See Fig. 2)
12. Apply solution to the area to be cleaned by activating the solution valve lever on the upper end of the wand.
13. Use the brush bar on the lower end of the wand to scrub the area to be cleaned.
14. Vacuum the floor using the squeegee on the lower end of the wand.

- When wand cleaning is complete:
15. Turn off the Vac & Spray Wand switch.
  16. Shut off the engine.
  17. Remove the wand vacuum hose from the wand and the machine squeegee.
  18. Re-connect the machine squeegee hose onto the machine squeegee.
  19. Put the wand and wand vacuum hose in the wand clips and hose rack.

**! WARNING**

**Flammable materials can cause an explosion or fire.  
Do not vacuum/pick up flammable materials.**

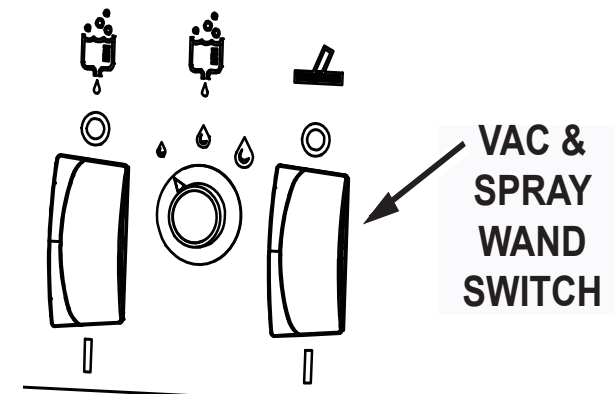


Fig. 2: Vacuum and Spray Wand Switch

## HEATED SOLUTION SYSTEM

The heated solution system uses a catalytic convertor to heat the water, running it through a heat exchanger. A temperature gauge is included in the option to inform the operator of the solution temperature.

The operator does not need to do anything to operate the heated solution system. It is automatic. The heated solution does not allow the operator to switch from hot to cold water. It provides hot water only. The system works in either the normal or high water flow setting. Because the heat exchanger must initially fill with water there is a slight delay between the start of scrubbing and the emergence of solution onto the floor. When the engine is initially started it takes a few minutes for the heat exchanger to reach the desired temperature so the initial water to the floor is at a relatively low temperature. As the engine exhaust temperature increases the water temperature also increases until a stable high temperature is provided. No preventative maintenance is required in the operation of this system.

**Note:** The system utilizes gravity to make the water flow through the system. No pump is required. The exhaust system with the heat exchanger gets no hotter than the standard exhaust system without a heat exchanger.





## **PREVENTATIVE MAINTENANCE**

### **Introduction**

Regular maintenance on your sweeper results in better cleaning, faster cleaning and a prolonged service life for the equipment and components. This section contains the following information to help you give your sweeper the maintenance attention it requires:

- A Scheduled Maintenance Chart
- Preventative Maintenance Instructions for Required Scheduled Maintenance Tasks

Because it is extremely important to your safety, you will see the following **WARNING** repeated throughout this section:

### **! WARNING**

**Never attempt to perform any service on the equipment or components until:**

- 1) The Vehicle is Parked on a LEVEL GROUND.**
- 2) The Engine is OFF.**
- 3) The Parking Brake is LOCKED.**
- 4) The Wheels are CHOCKED.**

SCHEDULED MAINTENANCE CHART					
FREQUENCY (IN HOURS)					SERVICE (BY MAINTENANCE AREA)
DAILY	50	100	200	500	
<b>ENGINE</b>					
		X			Pressure wash engine <i>NOTE: For additional maintenance requirements, refer to the engine manual.</i>
<b>AIR INTAKE SYSTEM</b>					
X					Empty rubber dust cup of air filter element.
X					Check air filter indicator
	X				Clean air filter. <i>NOTE: Clean more often in dusty conditions.</i>
			X		Replace air filter.
<b>ELECTRICAL SYSTEM</b>					
			X		Clean battery top.
<b>COOLANT SYSTEM</b>					
X					Check coolant level and fill as needed.
	X				Inspect radiator fins and clean as needed.
		X			Blow out radiator fins.

<b>SCHEDULED MAINTENANCE CHART</b>					
<b>FREQUENCY (IN HOURS)</b>					<b>SERVICE (BY MAINTENANCE AREA)</b>
<b>DAILY</b>	<b>50</b>	<b>100</b>	<b>200</b>	<b>500</b>	
<b>LUBRICATION POINTS</b>					
				<b>X</b>	Lubricate steering cylinder rod end.
				<b>X</b>	Lubricate steering fork.
			<b>X</b>		Lubricate scrub head lift arm bearings
				<b>X</b>	Hood Latches & Hinges Lubricate type - oil
<b>IMPELLER</b>					
<b>X</b>					Check for hydraulic fluid leaks from hoses and motor.
<b>HYDRAULIC SYSTEM</b>					
<b>X</b>					Check hydraulic reservoir gauge and fill as needed.
				<b>X</b>	Replace breather cap filter element.
				<b>X<sup>1</sup></b>	Replace hydraulic fluid and filter
<b>X</b>					Check function of directional control pedal (hydrostatic transmission) and adjust as needed.
				<b>X</b>	Clean hydraulic fluid strainer in reservoir.
	<b>X</b>				Inspect hydraulic oil cooler fins and clean as needed (if so equipped).
		<b>X</b>			Blow out hydraulic oil cooler fins with compressed air (if so equipped).
Notes: 1. Replace as indicated by hydraulic filter gauge.					

## SCHEDULED MAINTENANCE CHART

FREQUENCY (IN HOURS)					SERVICE (BY MAINTENANCE AREA)
DAILY	50	100	200	500	
<b>SWEEPING COMPONENTS</b>					
X					Inspect brushes for wear and remove strings and debris from bristles and drive assembly.
	X				Scrub head front & rear wear and damage, adjust or replace as needed.
				X	Preform brush taper pattern test and adjust if needed.
					Replace main scrub brushes as needed: Main Brushes needs to be replace if bristles are .5 in (1,3 cm) in length or less.
<b>STEERING</b>					
	X				Check for leaks.
<b>PARKING BRAKE</b>					
			X		Check for proper functioning and adjust as needed.
<b>WHEELS AND TIRES</b>					
X					Visually inspect for wear and damage. Repair or replace as needed.
	X				Check and tighten lug nuts. Torque to 100 lb·ft (135 N·m)
<b>SOLUTION DELIVERY BAR &amp; FILTER SYSTEM</b>					
			X		Visually inspect solution delivery bar. Keep solution bar holes free and clear of debris with small wire brush.
	X				Check water system Filter Element for debris. Clean or replace Filter Element as needed.
<b>MISCELLANEOUS</b>					
				X	Inspect latches and hinges. Tighten and lubricate as needed.
			X		Check anti-static strap on rear wall of broom chamber for damage or excessive wear. Replace as needed.

## **PREVENTATIVE MAINTENANCE INSTRUCTIONS**

### **ENGINE**

Maintenance requirements and service instructions for your Scrubber/Sweeper engine are outlined in the following parts of this Maintenance Section:

- Air Intake System
- Electrical System
- Fuel System
- Coolant System
- Lubrication

All basic maintenance tasks are listed with their recommended frequencies on the Planned Maintenance Chart in this manual. Important additional engine maintenance requirements and instructions are explained in the Engine Supplemental Catalog which comes with your machine.

### **WARNING**

**Never attempt to perform any service on the equipment or components until the Vehicle is Parked on a LEVEL GROUND, the Engine is OFF, the Parking Brake is LOCKED, and the wheels are CHOCKED.**

## AIR INTAKE SYSTEM

### Check Air Filter Service Indicator

The air filter service indicator shows when to change the air filter element. Check the indicator on a daily basis. The red indicator gradually becomes visible as the air filter elements load with dirt. It is not necessary to change the air filter elements until the red indicator reaches the top of the service indicator and locks into position.

1. Lift engine cover; Can check with engine "on" or "off".
2. Inspect air filter service indicator.

**Note:** The indicator may return to the nonviable position when the engine is shut off. To check, reset indicator and turn on the engine, if it locks in visible position again clean or change element.

### Air Filter Element Removal

1. Turn off the engine and set the parking brake.
2. Lift the engine top cover and side door.
3. Locate the air filter and loosen the retaining clamp.
4. Remove the dust cup.
5. Pull the rubber plug out of the dust cup and empty the contents.
6. Pull the air filter elements out of its housing.

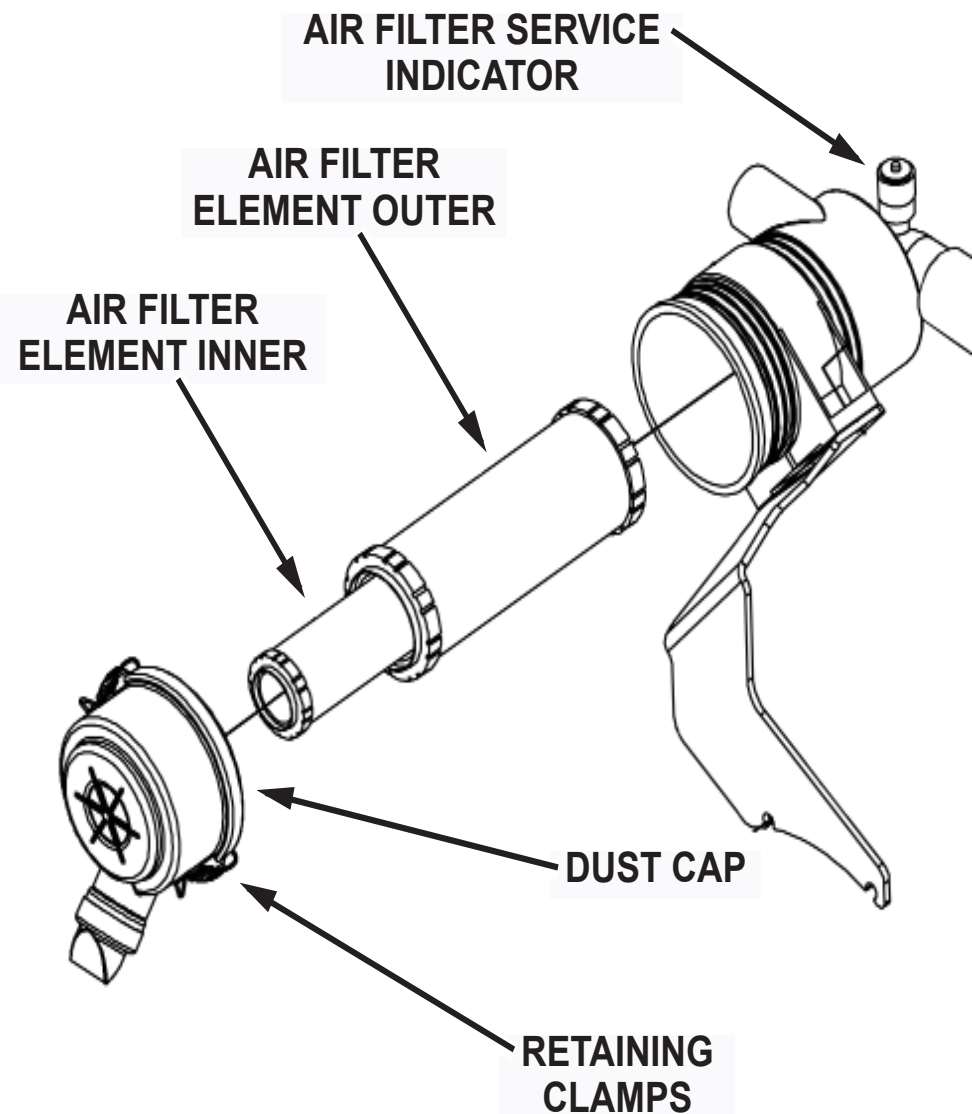


Fig. 1: Air Intake System

### **Air Filter Cleaning**

1. Once you have removed the air filter elements, empty the dust cup and clean the interior of the air filter housing.
2. Use an air hose to blow out the air filter elements. Air pressure should be 100 psi (689 kPa) or less.

### **Air Filter Inspection**

1. After you clean the air filter elements, check the elements for holes by passing a light bulb inside it.

### **Air Filter Installation**

1. Wipe out the air cleaner housing with a damp cloth. Be sure all dirt is removed.
2. Install the cleaned replacement filter elements so that the fins are at the far end of the housing. Be careful not to damage the fins.
3. Replace the rubber plug in the dust cup.
4. Replace dust cup, being sure embossed word “top” on cup is positioned correctly (up).
5. Tighten the retaining clips.
6. Check the condition of intake hoses and clamps. Close engine top cover and side door.

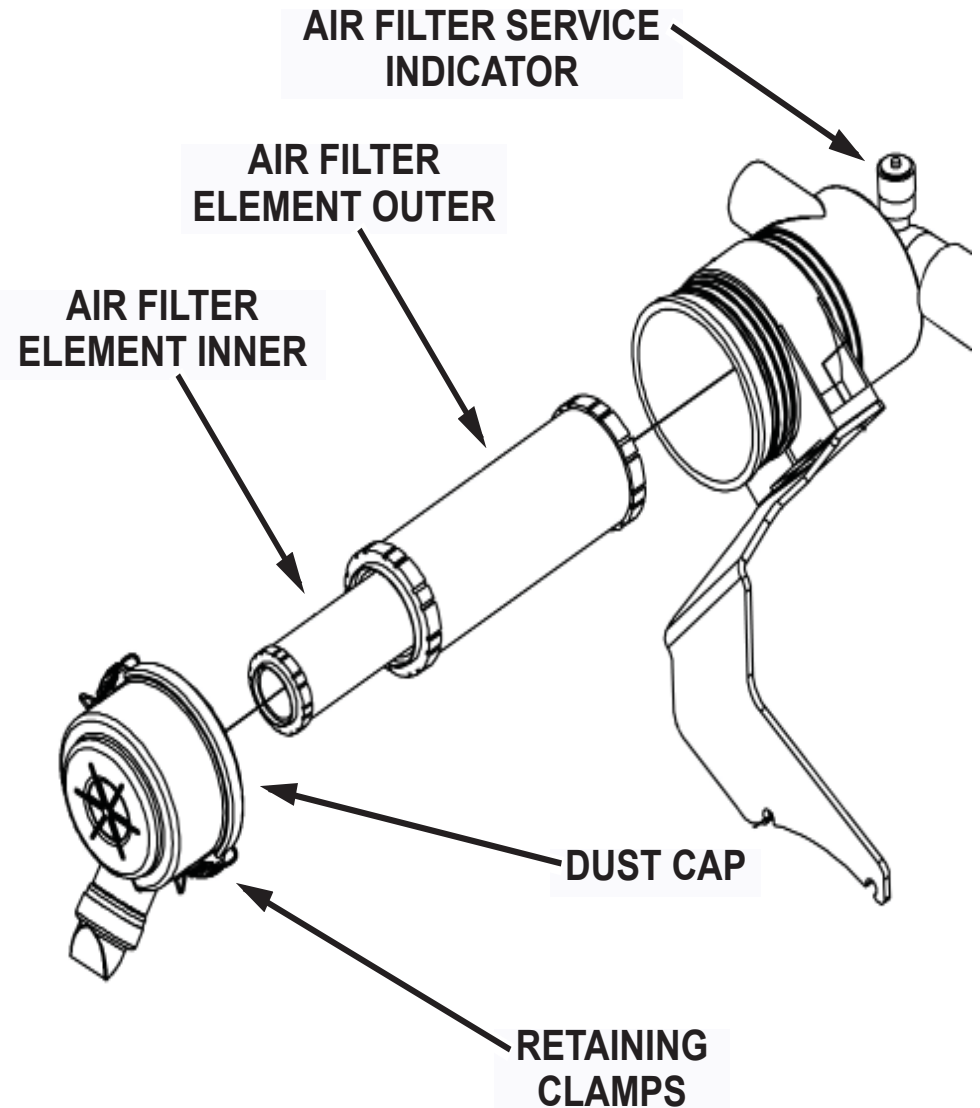


Fig. 1: Air Intake System



## ELECTRICAL SYSTEM

### Battery Cleaning

1. Combine baking soda and water in a strong solution.
2. Brush the solution over the battery top, including terminals and cable clamps. Make sure the solution does not enter the battery.
3. Using a wire brush, clean the terminal posts and cable clamps.
4. Apply a thin coating of petroleum jelly to the terminals and cable clamps.

### Battery Replacement

 **CAUTION**

**Remove the negative battery cable before you remove the positive battery cable. This is done to prevent accidental electrical shorting which can result in personal injury.**

1. Disconnect the negative (-) cable and then the positive (+) cable.
2. Remove the battery.
3. Install the new battery.
4. Connect the positive (+) battery cable first, then the negative (-) cable.

## Circuit Breaker

If the circuit breaker trips, it can be reset by pressing the reset button in the center of the breaker. (The circuit breaker is located below the left panel of the steering wheel). Press the reset button to reset the circuit breaker.

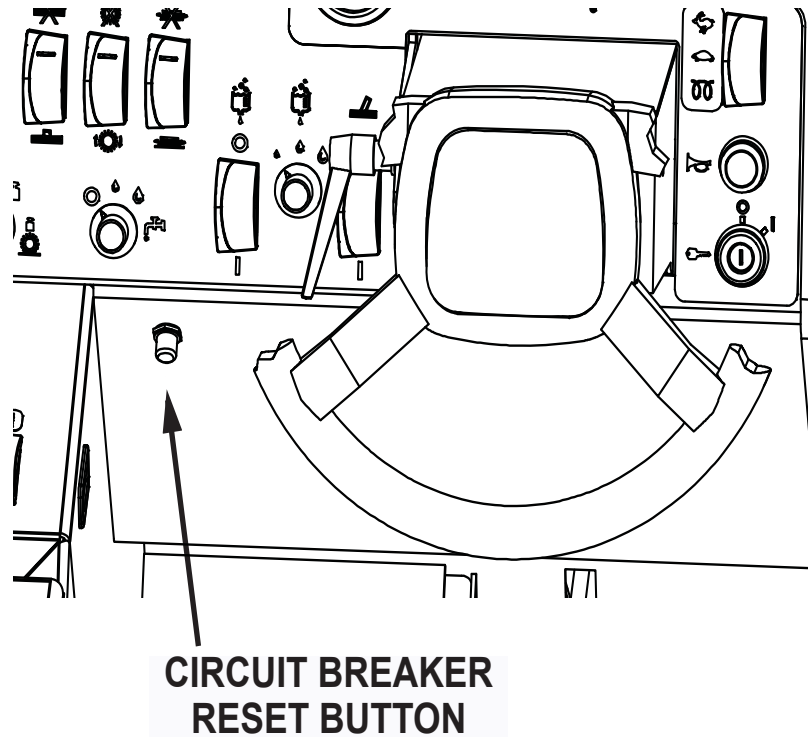
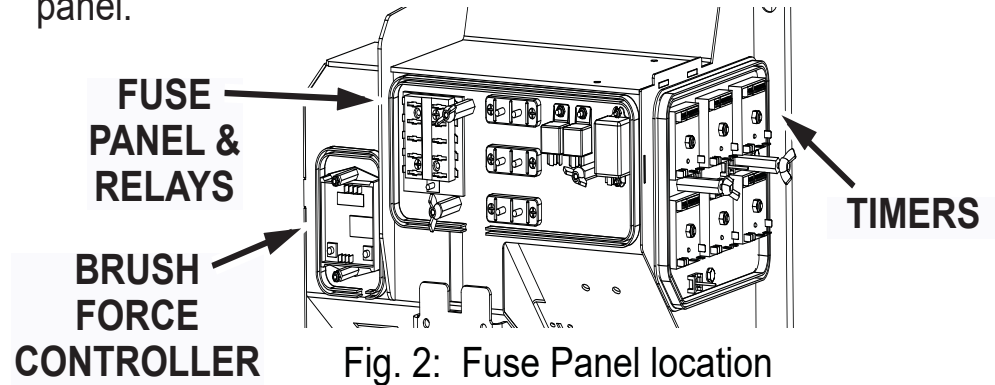


Fig. 1: Circuit Breaker location

## Fuses

The fuse panel is located behind the front cover. Open the front cover and remove the dust shield to access the fuse panel.



### Fuse Position:

1. Horn Switch; Engine Timer; Opt. Backup Alarm.
2. Head light; Tail light; Opt. Safety light.
3. R1-Opt. LP fuel level gauge; Solution Tank Empty light.
4. R2-Recovery Tank Full light; Float Timer; R3-Shutdown Timer; SV-2&3; SV-5&6; SV-13&14; Opt. Detergent Pump.
5. Squeegee Timer; Vac Fan Timer; SV-1&7.

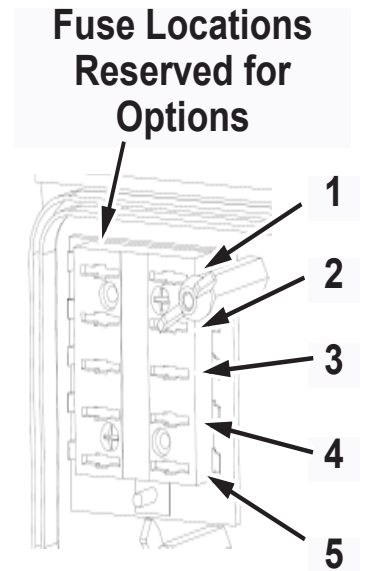


Fig. 3: Fuse Position

## FUEL SYSTEM

### **WARNING**

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

### **WARNING**

Never operate an LPG powered sweeper when any component in the fuel system is malfunctioning or leaking.

### **WARNING**

Replace any defective safety components before operation the sweeper.

### **WARNING**

During repair or servicing of the fuel system, work in a properly ventilated area and do not smoke or allow an open flame near the fuel system.

### **WARNING**

When disconnecting the tank coupling, always wear gloves. LPG fuel can freeze bare hands.

### **WARNING**

Under no circumstances should the fuel filter lock be bypassed, except when testing. After testing, always reconnect lock. Bypassing the fuel filter lock after testing creates a potential fire hazard.

## **COOLANT SYSTEM**

### **BLOWING OUT RADIATOR FINS**

**Note:** Make sure radiator is cool before blowing out the radiator fins with compressed air.

### **REVERSE FLOW FLUSHING**

1. At the engine, disconnect the hoses.
2. Make sure the radiator cap is on tight.
3. Using a hose clamp, attach a flushing gun onto the lower hose.
4. Turn on the water and fill the radiator.
5. To keep from damaging the radiator, apply air pressure slowly and carefully.
6. Shut off the air pressure, refill the radiator with water, and reapply the air pressure. You will need to repeat these steps until water flushed from the radiator runs out clear.
7. Inspect and clean the radiator cap.
8. Inspect and reconnect the hoses.
9. Refill the radiator with coolant.

**Note:** Use a 50/50 mixture of water and an anti-freeze with an ethylene glycol base.

## **LUBRICATION**

For all engine fuel types: Use a current API (American Petroleum Institute) Oil Service Classification that is suited to seasonal temperatures.

Refer to the Engine Manufacturer's Operator Manual for these specifications.

### **CHANGING ENGINE OIL**

1. Place a drain pan under the lowest end of the engine.
2. Remove the drain plug and allow the oil to drain into the pan.
3. Remove the used oil filter and replace with a new one.
4. Dispose of the oil and oil filter in an approved manner.
5. Remove the engine oil cap, add oil in the amounts listed in the engine manual, then secure the cap.

## LUBRICATION POINTS

### Steering Fork Bearings

The steering fork bearings are located above the front wheel.

### Rear Wheel Bearings

Repack the rear wheel bearings every 400 hours of operation using Lubriplate EMB grease and replace damaged seals.

### Squeegee Caster Bearings

Lubricate the squeegee caster bearings every 100 hours using Lubriplate EMB grease.

### Scrub Head Lift Arm Bearings

Lubricate the hopper lift bearings every 500 hours with light oil.

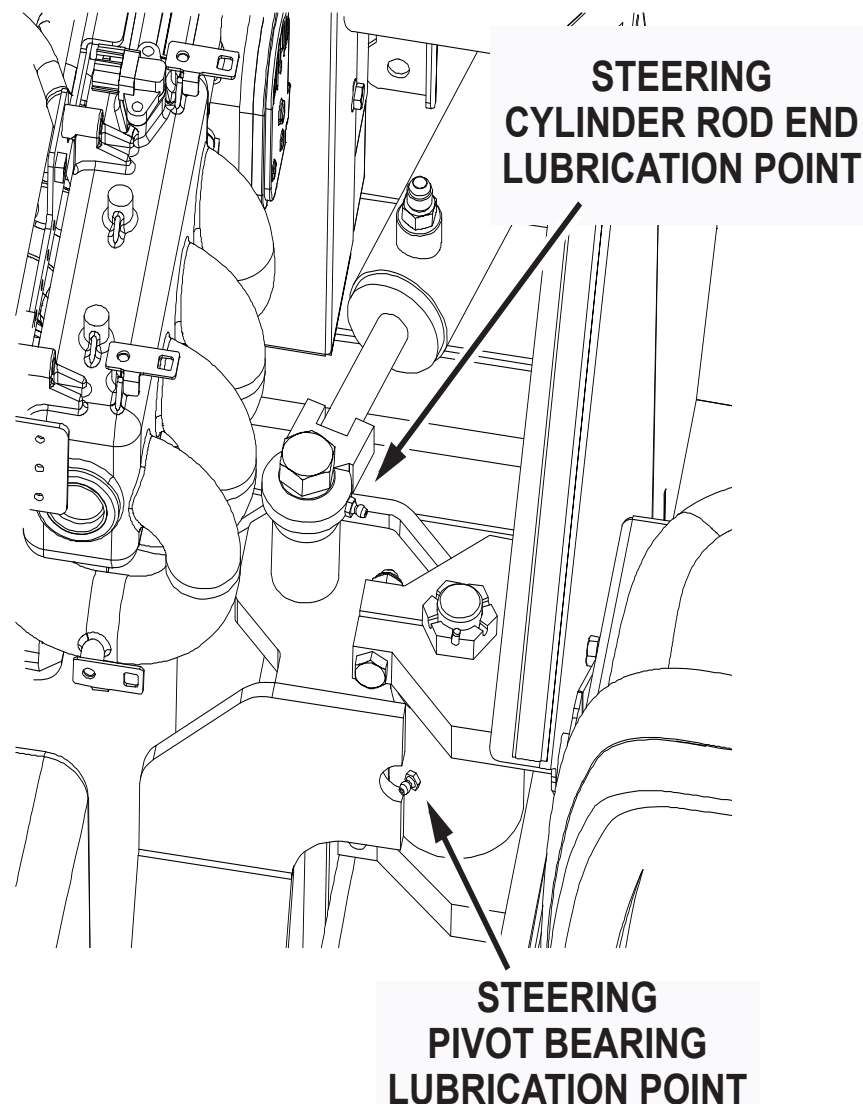


Fig. 1: Lubrication Points

## LATCHES & HINGES

Lubricate the cover hinges every 200 hours of operation with light machine oil. Lubricate the following:

- Front cover, hinges and latches
- Side doors, hinges and latches
- Top cover, hinges and latches
- Scrub head doors

The scrub head lift arm bearings are located on both sides of the machine just above the scrub head. These bearings can be best accessed when the scrub head is in the lowered position.

Lubricate the steering fork bearings every 100 hours using Lubriplate EMB grease.

## STATIC STRAP

A static strap prevents the buildup of static electricity in the machine. The static strap is attached to the frame in front of the left scrub door. Replace the static strap if it is damaged or no longer touches the floor.

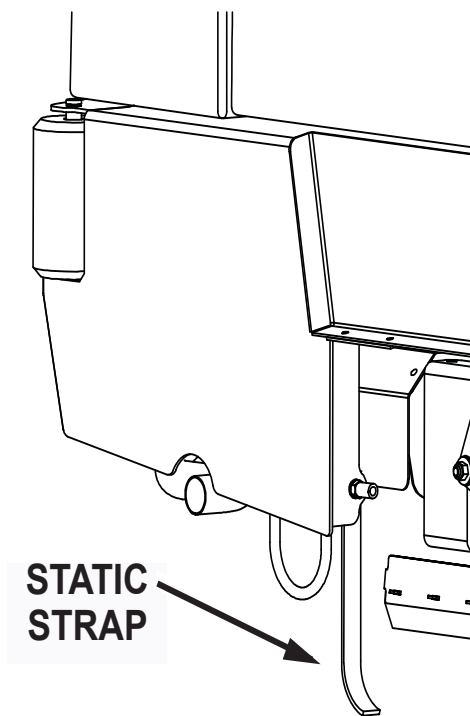


Fig. 1: Static Strap

## HYDRAULIC SYSTEM

### Hydraulic Fluid Reservoir

The hydraulic fluid reservoir is located behind the right side door under the operator seat. (See Fig. 1)

**Note:** The reservoir fill cap has a built-in breather and dip stick. Replace the cap every 100 hours of operation.

**Note:** The hydraulic oil filter contains a replaceable element. Replace the filter element every 100 hours of operation.

The reservoir has a sight gauge to quickly view if there is a sufficient amount hydraulic oil in the reservoir tank to run the machine. Check daily and add hydraulic oil as needed.

When the machine is cool unscrew the fill cap and check the fluid level on the attached dip stick. The fluid level should be between the high and low markers. The cap should be screwed down hand tight and unscrewed to get a proper oil level reading. Add or remove hydraulic fluid as needed.

**! CAUTION**

**DO NOT OVERFILL HYDRAULIC RESEVOIR TANK!  
DO NOT USE TRANSMISSION FLUID!**

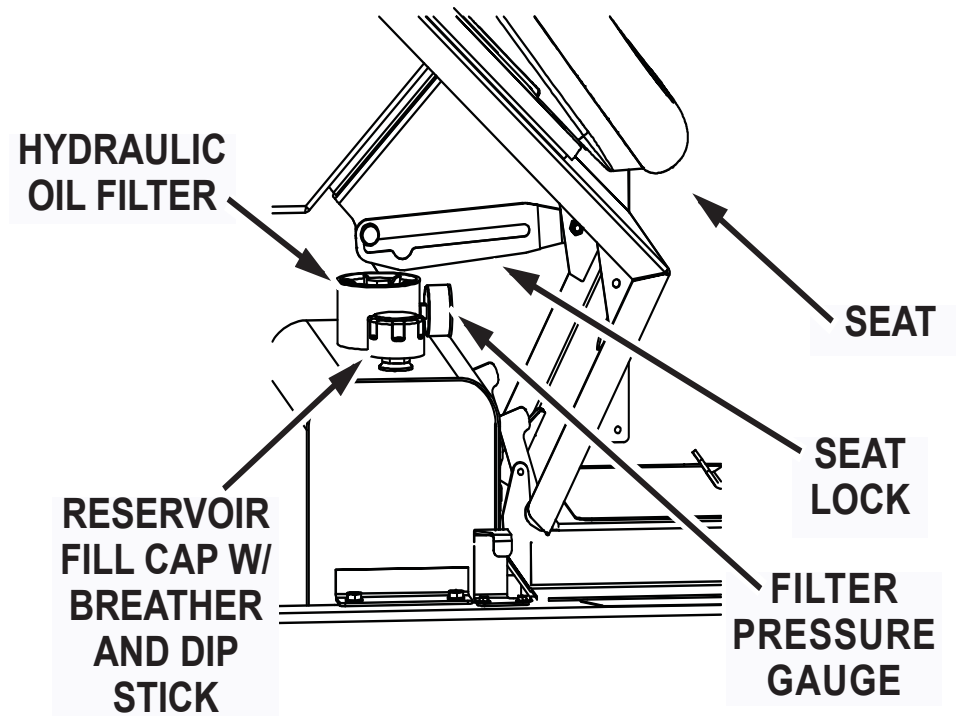


Fig. 2: Hydraulic Fluid Reservoir location

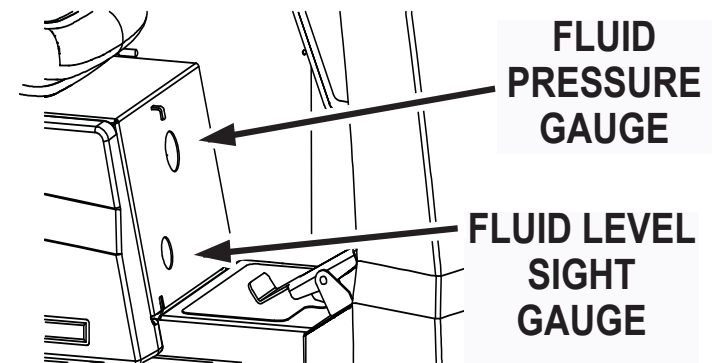


Fig. 3: Hydraulic Fluid Gauges

**⚠ CAUTION**

Minuteman International, Inc. recommends using:  
**Mobil DTE 10 Excel 32 Hydraulic Oil or equivalent.**

### Hydraulic Fluid Viscosity Specifications

#### Mobil DTE 10 Excel 32 - Viscosity, ASTM D 445

cSt @ 40°C (104°F): 32.7

cSt @ 100°C (212°F): 6.63

### Changing the Hydraulic Fluid

1. Turn off the engine and engage the parking brake.
2. Place a drain pan under the reservoir tank.
3. Remove the drain plug, unscrew with 5/16 in (8 mm) hex head wrench, located on the bottom of the reservoir and allow the fluid to drain.
4. Discard the fluid in an approved manner, then replace and retighten the drain plug.
5. Remove the fill cap located on top of the reservoir and fill the reservoir with the recommended hydraulic fluid: (Mobil DTE 10 Excel 32 Hydraulic Oil or equivalent).

**Note:** A minimum of 7 gal - 8 gal (26.5 L - 30.3 L) of hydraulic oil is needed to fill the empty reservoir tank to the correct amount. The maximum volume capacity of the hydraulic reservoir tank is 9.9 gal (37.5 L). Do not fill to this maximum capacity!

6. Visually see if the hydraulic oil level is at or above the sight gauge. Confirm the hydraulic oil level is within the high and low markers on the dip stick. Add or remove hydraulic fluid as needed. (Reference approximate fill line)
7. Verify the fill cap is hand tight to prevent leakage.
8. Start the machine, shut it off, then check for leakage.

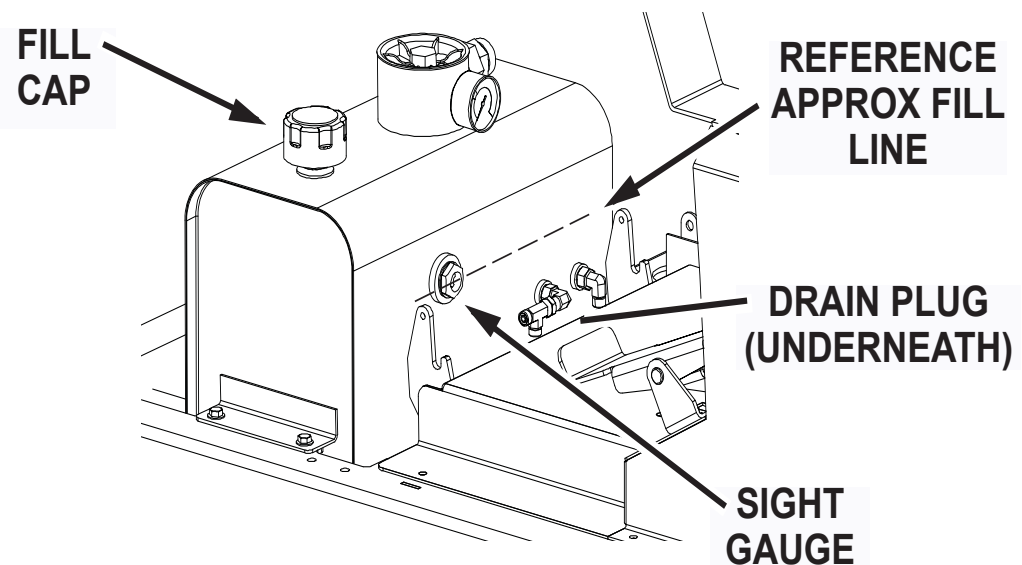


Fig. 1: Hydraulic Reservoir



## Hydraulic Fluid Filter

The reservoir tank has a pressure gauge to monitor hydraulic fluid pressure and to indicate when the hydraulic fluid filter needs to be replaced.

The pressure gauge needle indicates green, yellow, and red pressure zones. When the needle reaches the red pressure zone, the filter needs to be replaced.

**Note:** The pressure gauge should be observed when engine is on. This gauge can be viewed from the sight hole below the operator seat.

## Changing The Hydraulic Fluid Filter

1. Turn off the engine and engage the parking brake.
2. Access the filter by tilting the operator seat forward and engaging the seat lock. The fluid filter will be visible on top of the reservoir tank.
3. Unscrew the filter with a 15/16 in (24 mm) wrench, and remove the fluid filter from the top of the reservoir.
4. Screw the new filter in position and tighten with a 15/16 in (24 mm) wrench.

**Note:** Do not over tighten.

5. Start the machine, shut it off, then check for leakage.

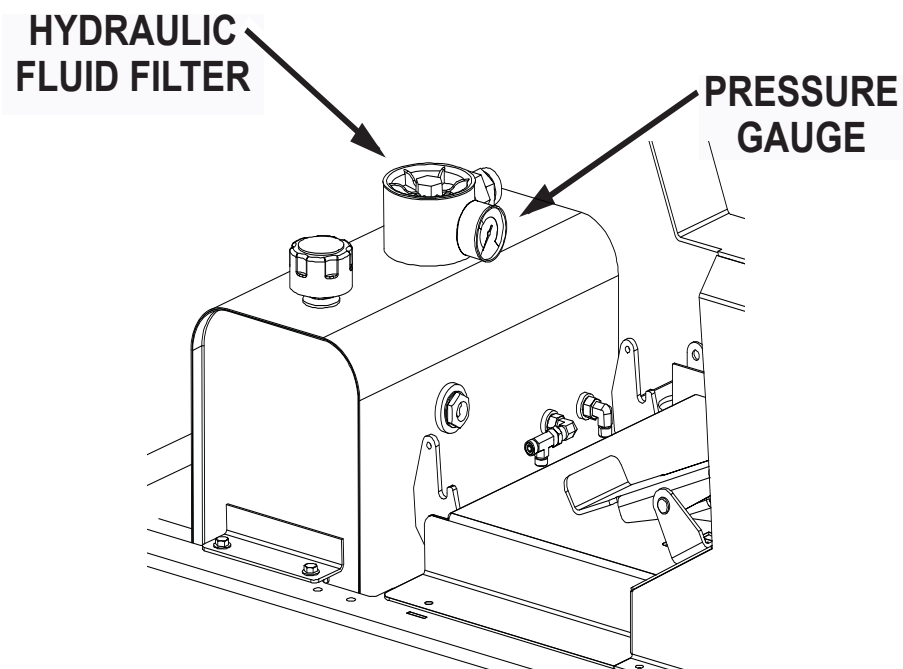


Fig. 2: Hydraulic Filter & Pressure Gauge

## Maintaining Hydraulic Oil Cooler Efficiency

Your machine is equipped with a hydraulic oil cooler, it is integrated with the radiator and utilizes exhausted radiator air from the engine fan to cool the hydraulic fluid.

To maintain its efficiency, periodically blow out the radiator and oil cooler fins with compressed air 100 psi (689 kPa) is maximum.

## Adjusting the Propulsion Pump Neutral Setting

If the machine does not remain in neutral when the foot pedal is released the following adjustment is necessary.

### **⚠ WARNING**

**Before starting the engine raise the front of the machine with a suitable floor jack so that the drive wheel is lifted off the floor. This will insure that the machine will not move forward or backward while the neutral setting is being adjusted!**

1. Raise the front of the machine with a suitable floor jack so that drive wheel is off the floor.
2. Slightly loosen the two bolts holding the Hydroback adjuster plate to the Hydroback mount so that the plates remain in contact but the adjuster plate can move.
3. Start the engine and position the throttle switch to the high speed position.
4. Push the directional control pedal in the forward direction and release, then push the pedal into reverse and release.
5. Note the direction that the drive wheel is rotating when the directional control pedal released.

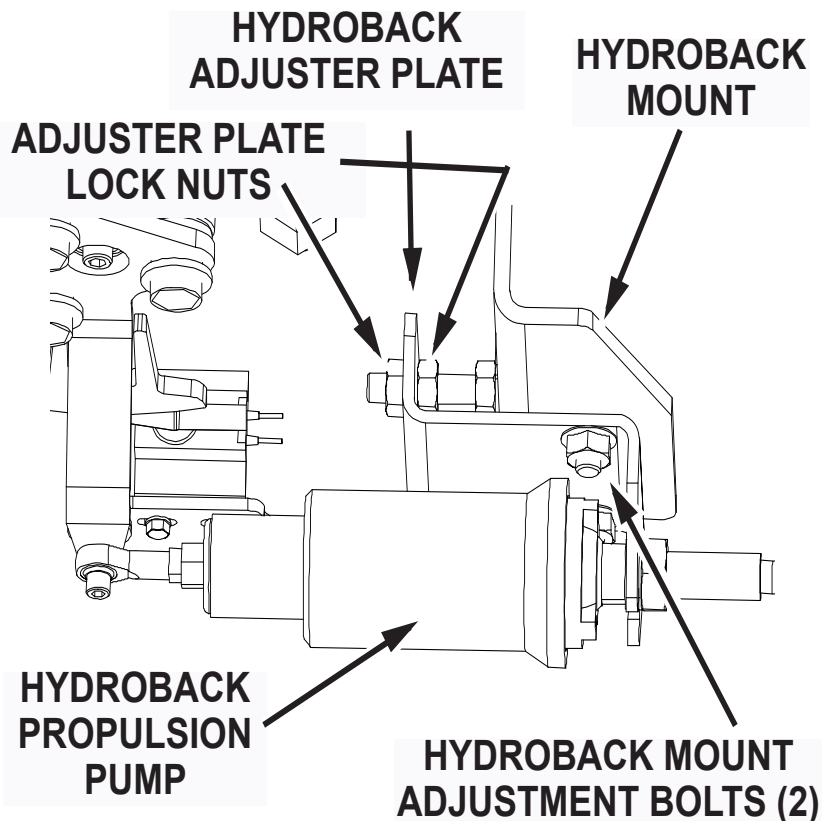


Fig. 1: Hydroback Propulsion Pump

6. **If the drive wheel rotates in the forward direction:** Slowly turn the lock nuts located on either side of the Hydroback adjuster plate so that the adjuster plate is moved to the right.
7. **If the drive wheel rotates in the reverse direction:** Slowly turn the lock nuts located on either side of the Hydroback adjuster plate so that the adjuster plate is moved to the left.

8. When the drive wheel comes to a complete stop tighten the two lock nuts.
9. Tighten the two fasteners holding the Hydroback adjuster plate to the Hydroback mount.
10. Repeat step 4 above to verify that the neutral position is correctly adjusted. If not repeat steps 1 through 9 above.
11. Turn off the engine and lower the machine to the floor.

Note: The Neutral Switch must be re-adjusted after adjusting the propulsion pump. See the Neutral Sensing Switch section on page 84.

## Drive Motor

After the first 50 hours of operation torque the motor shaft nut to 475 lb·ft (644 N·m) dry; 375 lb·ft (508 N·m) lubricated. Repeat this again after each 800 hours of operation.

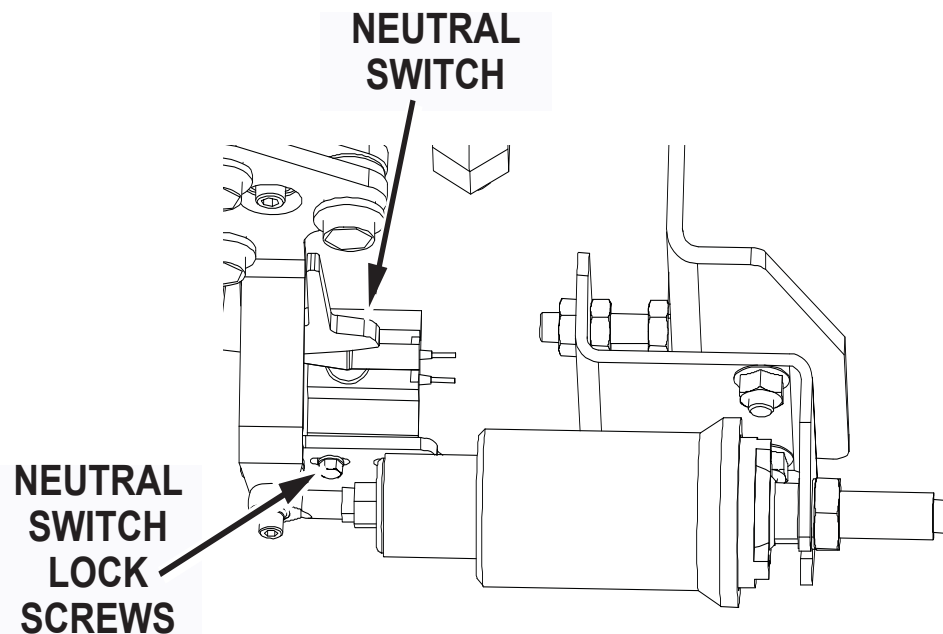


Fig. 2: Neutral Switch

## SCRUBBING COMPONENTS

### Scrub Brushes

This machine is equipped with two cylindrical scrub brushes. These brushes scrub the floor and also sweep debris into the debris hopper. These brushes should be checked daily for wear and damage as well as entangled string, plastic, or wire.

It is important for optimum debris pick up that the brushes be installed with the V-shaped bristle patterns pointing toward each other when viewed from above as shown.

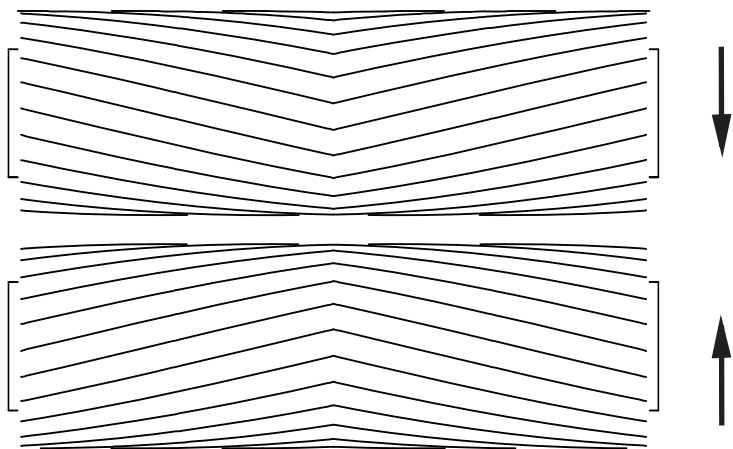


Fig. 1: Scrub Brush pattern

When installing the brushes insert the drive hub end of the brush into the scrub head. This automatically insures that the brush V-shaped pattern is positioned correctly.

To increase brush life these scrub brushes can be rotated front-to-rear.

The brushes should be replaced when the bristle length wears to .50 in (1,3 cm) in length.

**Note:** Always replace the cylindrical scrub brushes in sets to prevent poor scrubbing efficiency.

## Replace or Rotate the Cylindrical Scrub Brushes

1. Set the machine parking brake. (See Fig. 2)
2. Lift up the scrub brush side door.
3. Turn the solution flow switch to off position. (See Fig. 3)

In the following step when turning the ignition switch to the “run” position. **Do not start the engine!**

4. While watching the scrub brush; turn the ignition key on and then off, in quick steps, to lower the scrub head so that the scrub brush just clears the floor.

**For Safety:** Before leaving machine, turn off the machine, set the parking brake, and remove the key.

**Note:** In order to service both cylindrical scrub brushes the following steps must be performed on both sides of the scrubber.

5. Release the retaining latch at the rear of the side squeegee mount and swing the side squeegee mount open. (See Fig. 4)
6. Using the handles pull the brush idler plate away and free from the scrub deck. (See Fig. 5)
7. Pull the brush out from the scrub deck. (See Fig. 5)

**Note:** The scrub deck may have to be raised slightly to install new brushes.

**PARKING BRAKE**

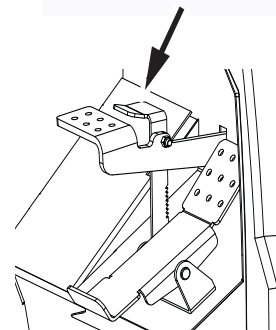


Fig. 2: Set the Praking Brake

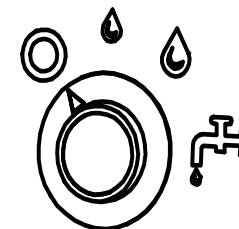


Fig. 3: Solution Flow Switch off

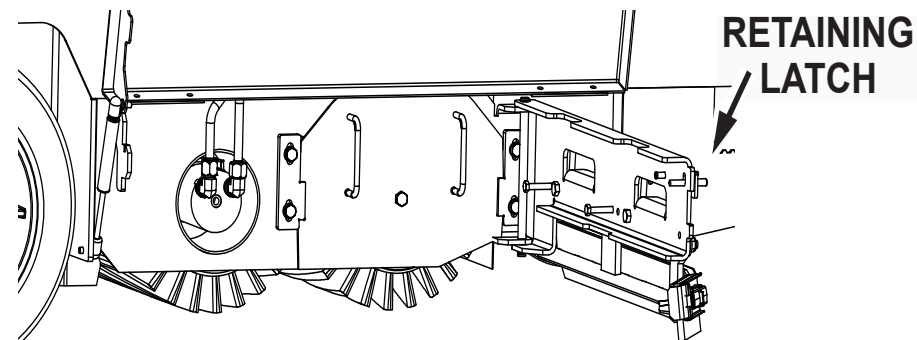


Fig. 4

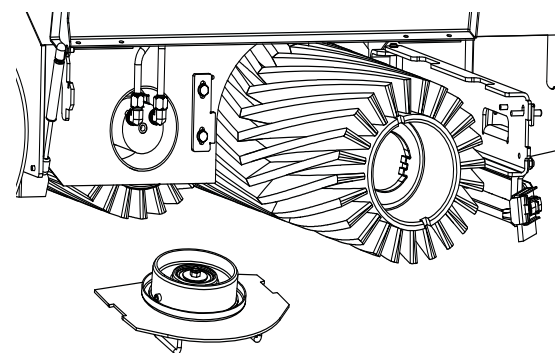


Fig. 5

8. Slide the new or rotated scrub brush into the scrub deck. Insure that the V-shaped bristle patterns on the brushes are pointing toward each other as viewed from above. (See Fig. 6)
9. Push the scrub brush onto the drive hub while rotating the brush counter-clockwise. Insure that the brush is fully seated onto the drive hub.
10. Install the idler hub into the end of the scrub brush while guiding the idler plate onto the two brush adjustment plates.
11. Close and latch the side squeegee mount. The side squeegee mount holds the brush idler plate in place.
12. Lower the scrub brush side door.
13. Repeat this procedure with the second cylindrical scrub brush on the other side of the scrubber.
14. Raise the scrub head.
15. Check and if necessary adjust the brush pattern as described in the section on **Checking the Scrub Brush Pattern**, page 69.

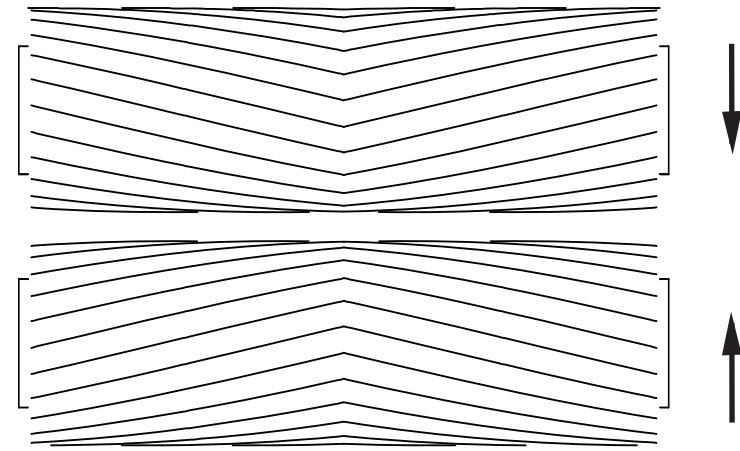


Fig. 6: Scrub Brush pattern

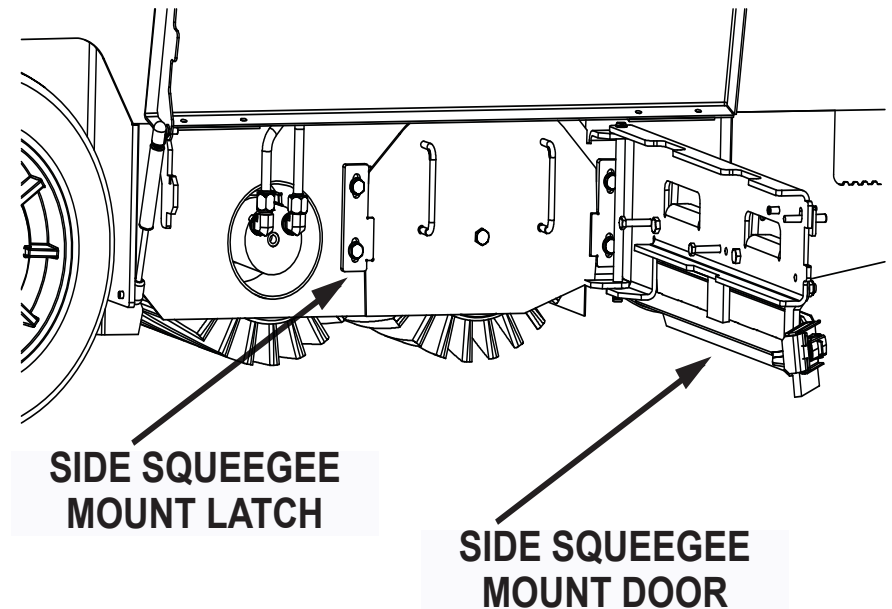


Fig. 7: Scrub Brush pattern

## Checking the Scrub Brush Pattern

For the best results perform the scrub brush pattern tests on a smooth even floor.

**Note:** Chalk or chalk powder applied to the floor will help to show the brush pattern. If chalk is not available allow the brushes to turn on the floor for 1 or 2 minutes. A polished brush pattern will be visible on the floor.

1. Raise the scrub deck.
2. Position the scrub deck over the chalked area.
3. Set the parking brake.

**For Safety:** Before leaving machine, turn off the machine, set the parking brake, and remove the key.

4. Lower the scrub head for 10-15 seconds. Do not allow the machine to move forward or backward.
5. Raise the scrub deck.
6. Release the parking brake and drive the machine away from the chalked area.

7. Check the width and shape of the brush patterns on the floor. If the long edges of the two brush patterns are parallel then a brush pattern adjustment is not required.

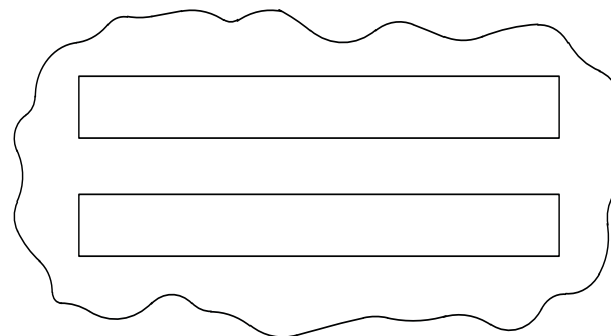


Fig. 1: Brush Pattern Correct

If only one of the scrub brush patterns is tapered then only that brush pattern must be adjusted. If both of the brush patterns are tapered then both brush patterns must be adjusted.

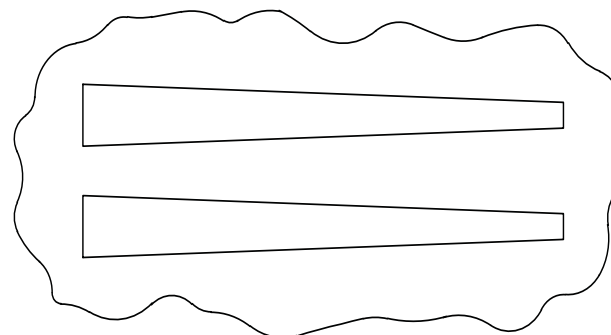


Fig. 2: Brush Pattern Incorrect

### Adjusting the Scrub Brush Pattern (Taper)

The front scrub brush pattern adjustment is located behind the right side scrub brush door.

The rear scrub brush pattern adjustment is located behind the left side scrub brush door.

1. Raise the scrub brush side door.
2. Release the retaining latch at the rear of the side squeegee mount and swing the side squeegee mount open.
3. Loosen the four pattern adjustment nuts located on either side of the scrub brush idler plate.
4. Raise or lower the scrub brush idler plate as necessary to correct the tapered brush pattern. Raising the idler plate will decrease the brush pattern width on that side of the scrub deck.

**Note:** Lowering the idler plate will increase the brush pattern width on that side of the scrub deck.

5. Tighten the four pattern adjustment nuts.
6. Close and latch the side squeegee mount. The side squeegee mount holds the brush idler plate in place.
7. Check the scrub brush pattern again and readjust if necessary.

The brush patterns should also be the same width. If one is wider than the other then the scrub brush pattern width must be adjusted.

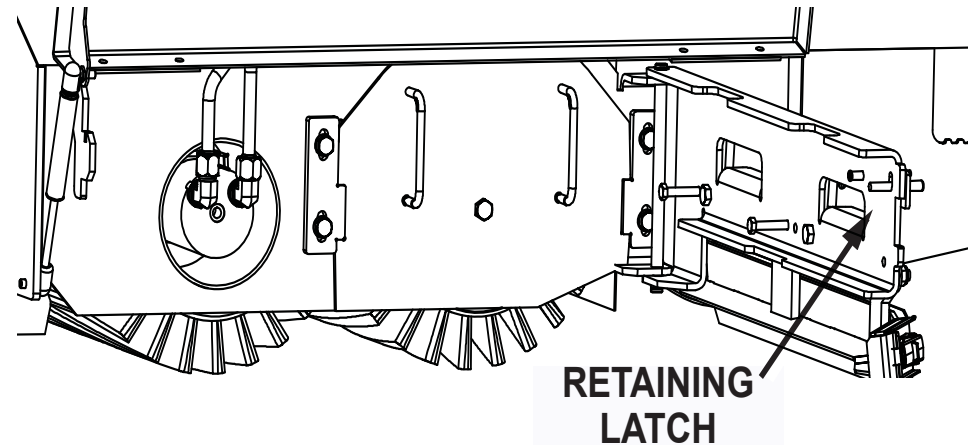


Fig. 1: Retaining Latch location

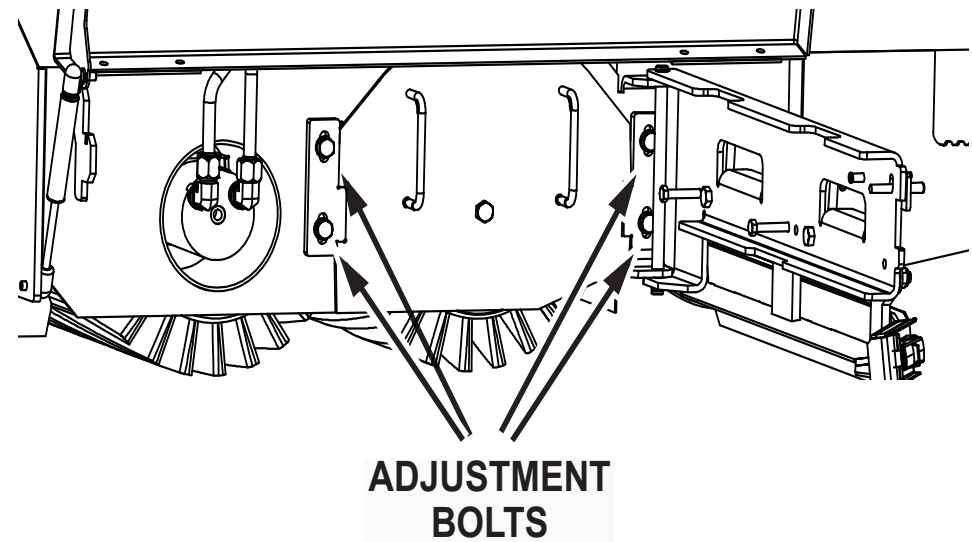


Fig. 2: Adjustment Bolts, location



## Adjusting the Scrub Brush Pattern (Equal width)

The width of the two scrub brush patterns should be equal. If they are not equal the level of the scrub deck must be adjusted front-to-back. (See Fig. 3)

1. Open the two side doors and raise the seat mount.
2. Lengthen or shorten the leveling rods located on each side of the machine above the scrub deck. Lengthening the rods will increase the front scrub brush pattern width. (See Fig. 4)
3. Adjust the leveling rods in equal amounts.
4. Check the scrub brush pattern again and readjust if necessary.

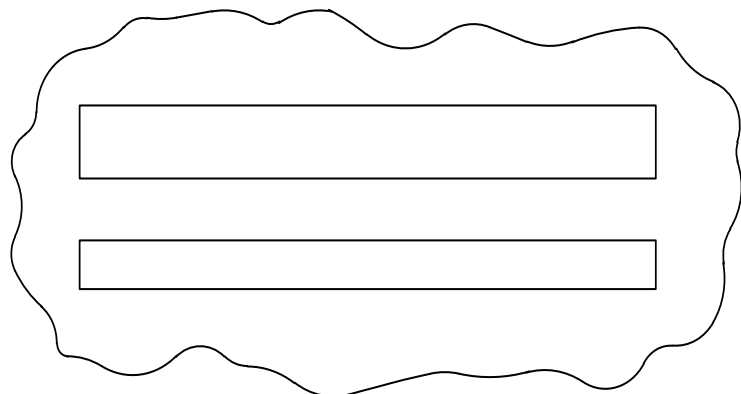


Fig. 3: Brush Pattern (width not equal)

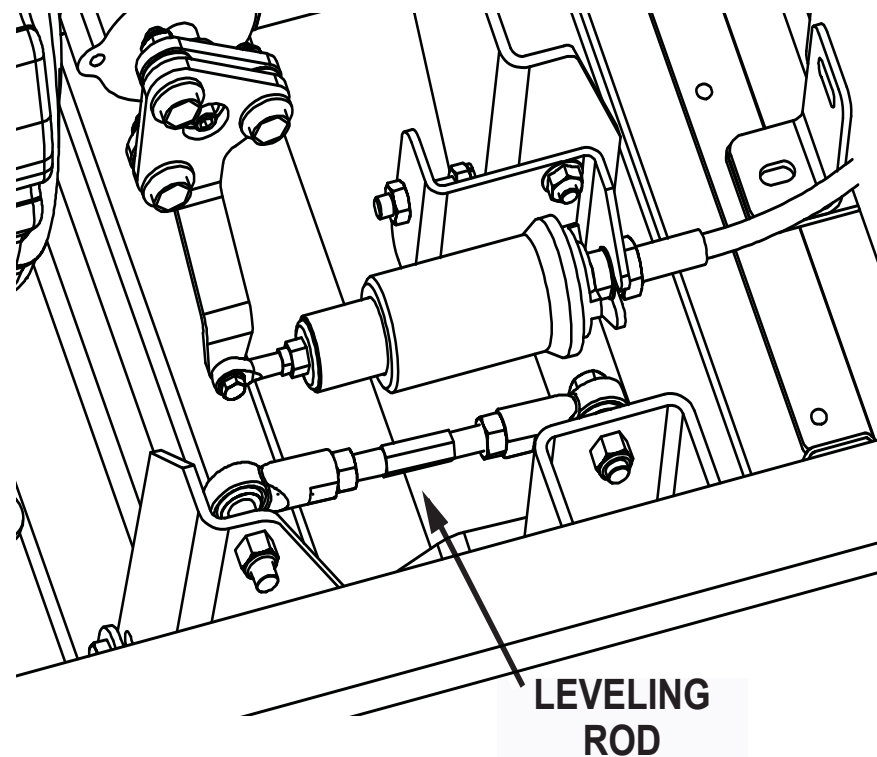


Fig. 4: Leveling Rod location

## **SIDE SCRUB BRUSH (OPTION)**

### **Replacing the Side Scrub Brush**

1. Raise the side scrub brush.
2. Turn off the machine.
3. Set the parking brake.

**For Safety:** Before leaving machine, turn off the machine, set the parking brake, and remove the key.

4. Rotate the brush until the brush release tabs are accessible through the opening in the brush guard.
5. Press the release tabs together. The brush will fall off of the brush drive hub.
6. Lift a new brush onto the brush drive hub to lock it into place.
7. Check to be sure that the brush is securely retained.

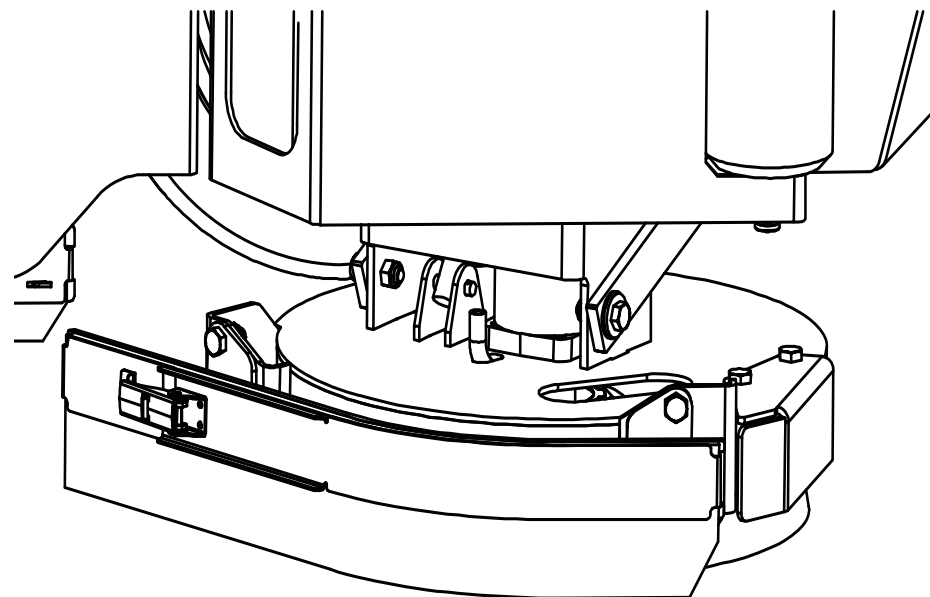


Fig. 1: Replacing the Side Scrub Brush

## SQUEEGEES

The right and left side squeegees control water during turns and channel water toward the center of the machine and into the path of the rear squeegee.

The rear squeegee channels water to the center of the squeegee where it is removed by the vacuum fan.

The optional side scrub brush squeegee channels water to the inside of the right side squeegee.

Check the squeegee blades daily for wear or damage. Replace or rotate the squeegee blades if the edges are torn or worn half-way through the thickness of the blade.

The rear squeegee blades must be adjusted to be level and for correct deflection.

### Lowering Squeegee for Adjustment (engine off)

To lower the squeegee for adjustment. Follow the steps below:

1. With engine running; Turn “on” green one touch and Squeegee switch. Squeegee will lower to the ground.
2. Press and hold “idle” push button.
3. Turn the engine “off” using the key switch, release the “idle” button.

4. Squeegee will remain on the ground. Repeat steps 1-3, if necessary.
5. The squeegee can be adjusted.

### Checking the Rear Squeegee Blade Flare

Squeegee flare is the amount of curl in the squeegee blade as it drags on the floor while the machine is moving forward. Correct squeegee blade flare is necessary for optimum water pick up. The correct flare adjustment is achieved when the squeegee wipes the floor dry with the least amount of deflection. It is important that this check be performed on an even, level surface.

1. Lower the squeegee.
2. Drive the machine forward approximately 2 ft (0,6 m).
3. Set the parking brake.
4. Examine the curl in the squeegee rubber to see that the flare is correct and that it is uniform around the entire back edge of the squeegee blade:

If the flare is uniform but the amount of flare is incorrect proceed to the section on **Adjusting the Rear Squeegee Blade Flare** on page 74.

If the flare is not uniform proceed to the section on **Leveling the Rear Squeegee** on page 75.

## Adjusting the Rear Squeegee Blade Flare

Be sure that the squeegee assembly is adjusted to level before performing the flare adjustment. It is important that this adjustment be performed on an even, level surface.

**Note:** Raising the squeegee casters increases the squeegee flare, lowering the casters reduces the squeegee flare.

1. Lower the squeegee.
2. Press and hold the idle button located under the key switch.
3. While holding the idle button turn off the engine key switch Set the parking brake.
4. Lift the squeegee assembly up by hand and allow it to rest back down on the floor. The squeegee blade should be standing straight up on the floor with no flair.
5. Loosen the locking knobs on the squeegee casters.
6. Adjust the casters until they clear the floor by .25 in (0,63 cm). Use a .25 in (0,63 cm) thick spacer for this procedure.
7. Check the squeegee flare (See **Checking the Rear Squeegee Blade Flare**).

8. Test the squeegee for water pick up.
9. Make fine adjustments to the caster height for optimum water pick up on the floor surface to be cleaned.

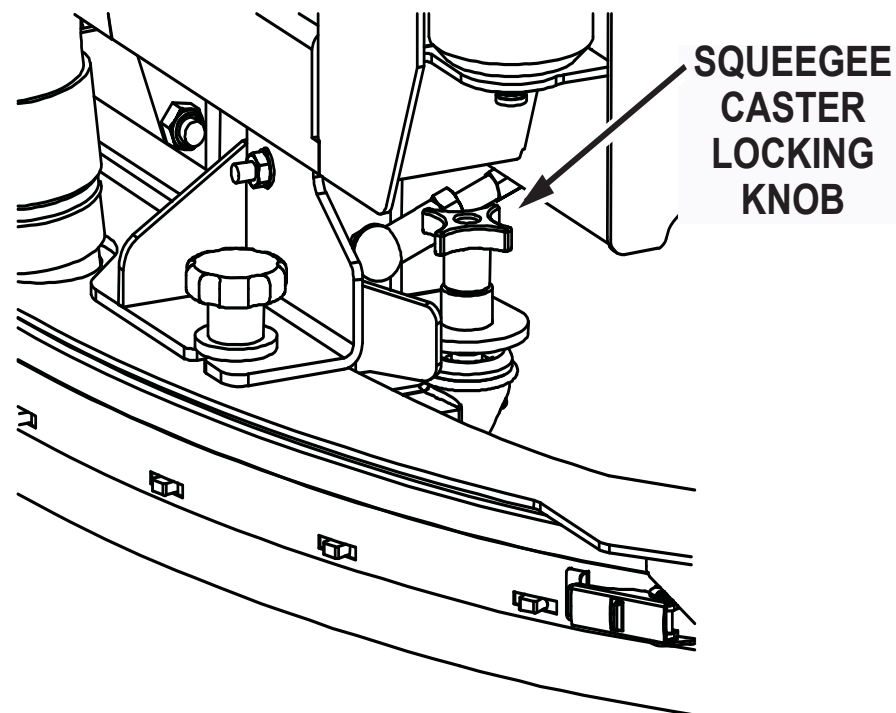


Fig. 1: Adjusting the Rear Squeegee Blade Flair

## Leveling the Rear Squeegee

Leveling the squeegee assembly provides a uniform flare of the squeegee blade. It is important that this adjustment be performed on an even, level surface.

1. Lower the squeegee.
2. Drive the machine forward approximately 2 ft (0,6 m).
3. Set the parking brake.
4. Examine the curl in the squeegee rubber around the entire back edge of the squeegee blade.

If the flare is not even across the rear squeegee blade proceed with the following:

5. Locate the two sets of adjustment nuts on the two squeegee adjustment rods.

**Note:** Raising the rear bumper and then lowering the squeegee will provide greater access to the adjusting nuts.

6. To lower the front of the squeegee turn the two adjustment nuts on each adjustment rod rearward (away from the front of the machine).

To lower the rear of the squeegee turn the two adjustment nuts on each adjustment rod forward (toward the front of the machine).

7. Lock the adjustment nuts.
8. If necessary proceed to **Adjusting the Rear Squeegee Blade Flare.**
9. Test the squeegee for water pick up.
10. Re-adjust to level the squeegee if necessary.

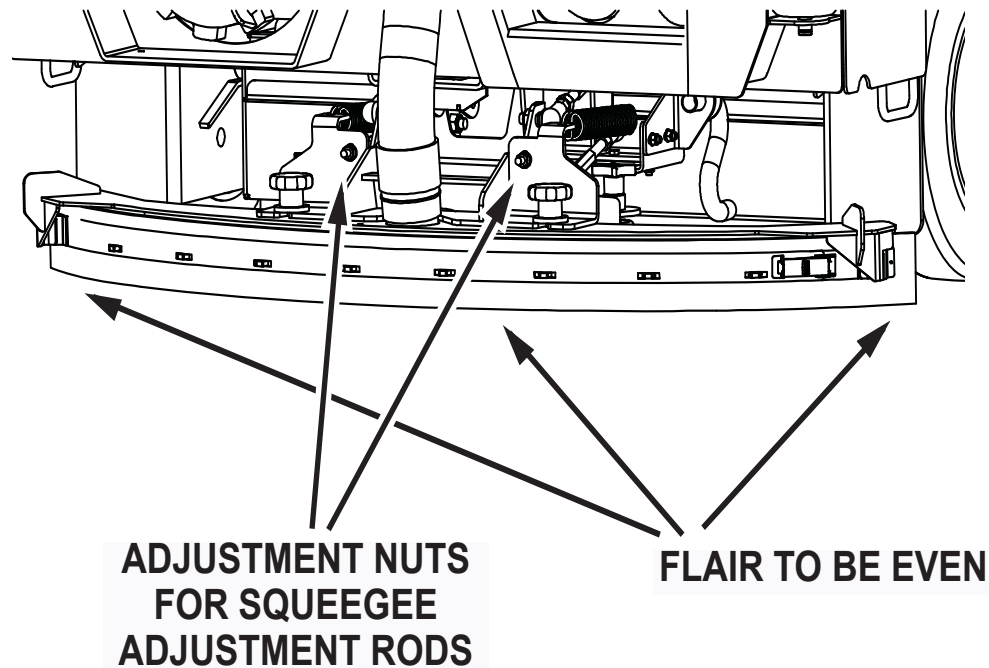


Fig. 2: Leveling the Rear Squeegee

## Turning or Replacing the Rear Squeegee Blades

Check the squeegee blades daily for wear or damage.

After the squeegee edge wears half-way through the thickness of the squeegee blade the squeegee blade can be turned over so that a new edge will be against the cleaning surface.

After the second edge wears the squeegee blade can be turned end-to-end to use the third edge, and finally turned over once again to use the fourth edge.

Replace any damaged squeegee blade.

**Note:** The rear squeegee blade can be accessed with the rear bumper raised or closed. With the rear bumper raised the outer squeegee can be turned or replaced without removing the squeegee tool from the machine. Servicing the inner squeegee is best done with the squeegee tool removed from the machine.

1. Insure that the rear squeegee is raised up off of the floor.
2. Shut off the engine and set the parking brake.

**For Safety:** Before leaving machine, turn off the machine, set the parking brake, and remove the key.

3. Raise the rear bumper.
4. Loosen the two squeegee retaining knobs. (See Fig. 1)
5. Pull the lower end of the squeegee hose from the squeegee tool. (See Fig. 1)
6. Lift the squeegee tool off of the squeegee frame

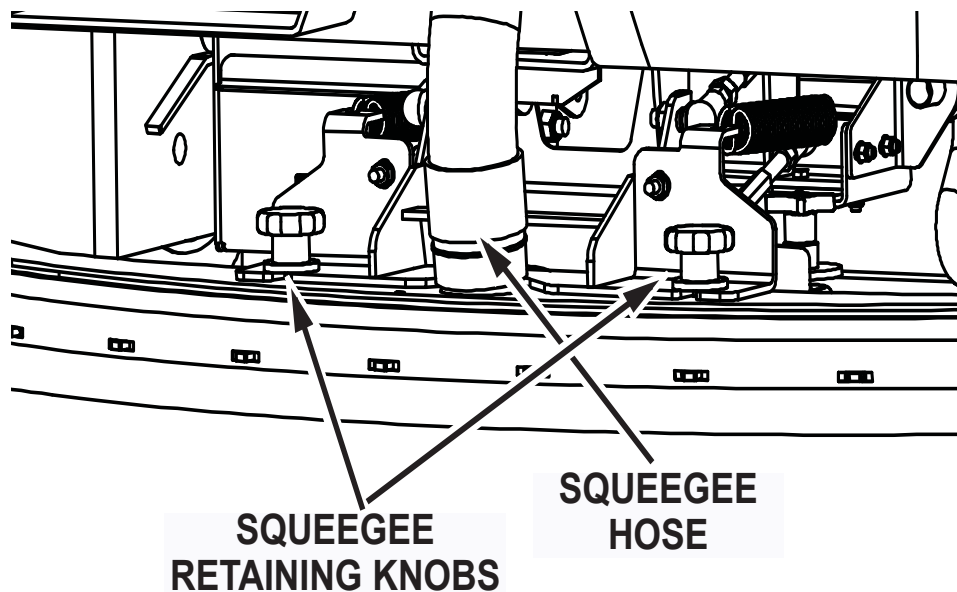


Fig. 1: Turning/Replacing the Rear Squeegee Blades

7. Remove the squeegee retainer bands. (See Fig. 2)

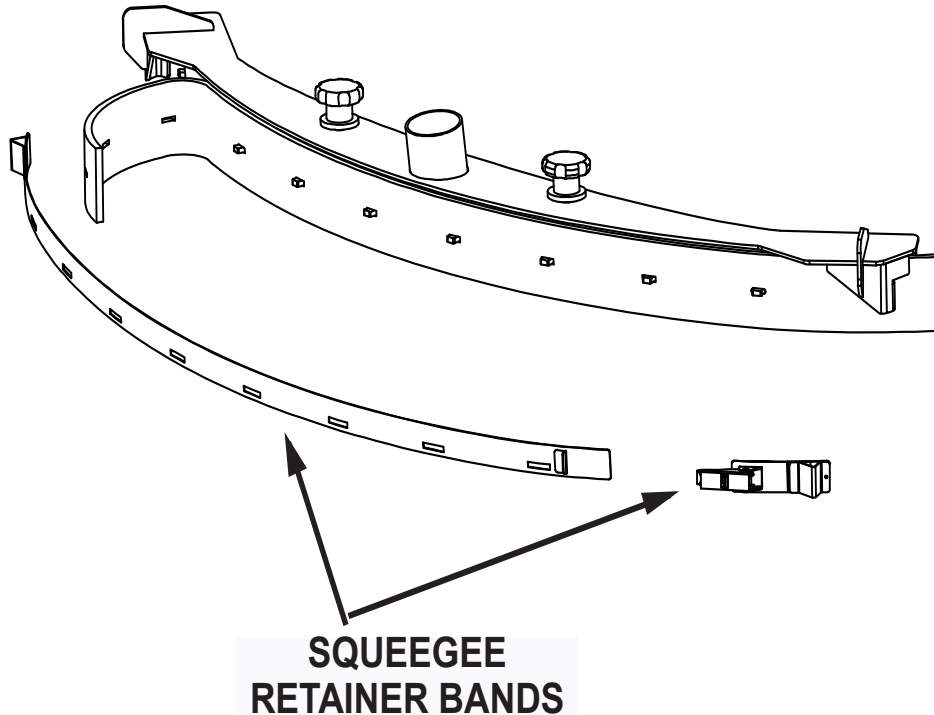


Fig. 2: Squeegee Retainer Bands

8. Replace or turn the squeegee blades by placing the blade onto the pins of the squeegee frame.
9. Replace the squeegee retainer straps and close the latch.

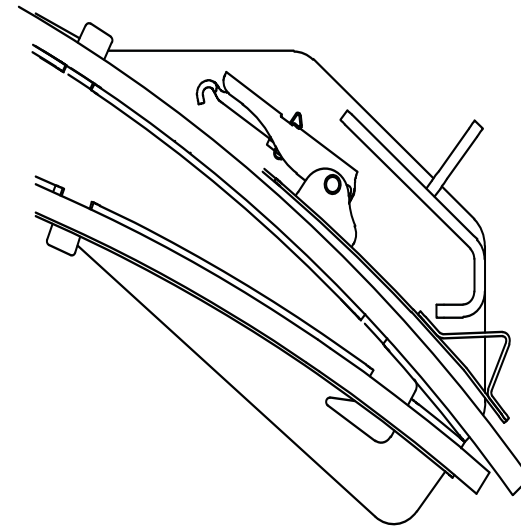


Fig. 3: Closing the Latches

**Note:** When reinstalling the squeegee tool insure that the washers below the squeegee retaining knobs are positioned between the knobs and the squeegee tool mount.

10. Lower the rear bumper.
11. Adjust the rear squeegee as shown in Adjusting the Rear Squeegee Blade Flare.

## SIDE SQUEEGEES

The right and left side squeegees control water during turns and channel water toward the center of the machine and into the path of the rear squeegee.

Replace the side squeegees if they become worn, damaged, or lose their shape.

### Replacing Side Squeegee Blades

1. Raise the scrub deck.
2. Turn off the machine and set the parking brake.

**For Safety:** Before leaving machine, turn off the machine, set the parking brake, and remove the key.

3. Raise the side squeegee door.
4. Open the latch on the side squeegee retaining strap and remove the retaining strap. (See Fig. 1)

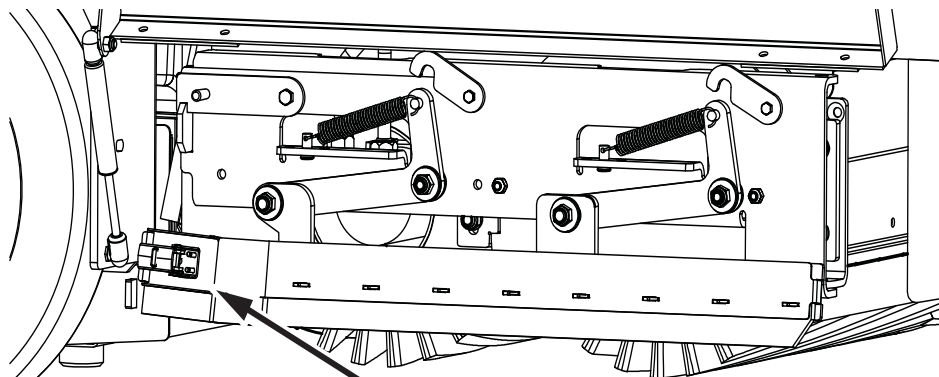


Fig. 1: Side Latch

5. Replace the side squeegee blade by placing the blade onto the pins of the side squeegee frame.

**Note:** Position the beveled edge of the side squeegee blade down and toward the front the machine.

6. Replace the side squeegee retainer strap by first hooking the forward end around the notch at the front edge of the side squeegee frame. (See Fig. 2)

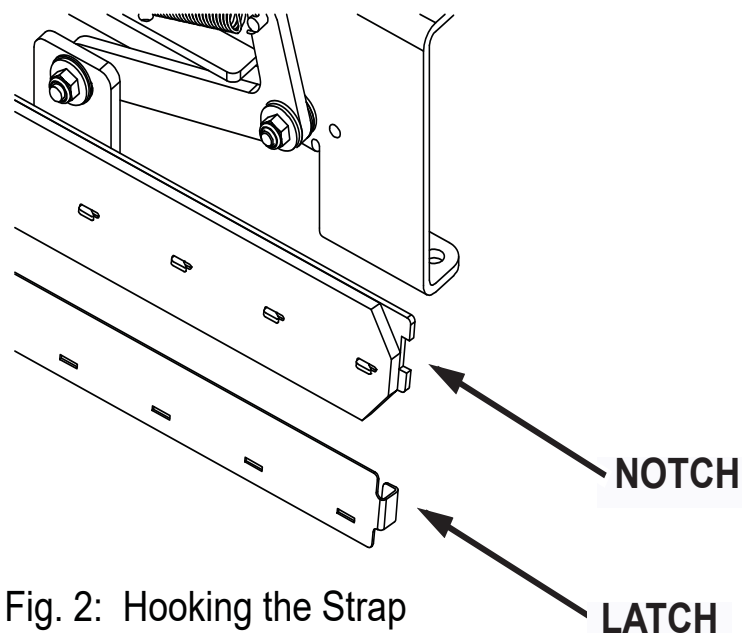


Fig. 2: Hooking the Strap

7. Close the latch on the side squeegee retaining strap and close the side squeegee door.
8. Repeat the procedure for the side squeegee on the other side of the machine.



## SIDE SCRUB BRUSH SQUEEGEE (OPTION)

The side scrub brush squeegee channels water to the inside of the right side squeegee and into the path of the rear squeegee.

Replace the side scrub brush squeegee if it becomes worn, damaged, or loses its shape.

### Replacing Side Scrub Brush Squeegee Blade

1. Open the latch on the squeegee retaining strap and remove the retaining strap. (See Fig. 3)
2. Replace the squeegee blade by placing the appropriate set of holes on the squeegee blade onto the pins of the side squeegee frame.
  - When the side scrub brush is new: Use the upper set of holes.
  - When the brush is moderately worn: Use the center set of holes.
  - When the brush is very worn: Use the lower set of holes.

**Note:** Position the beveled edge of the squeegee blade down and toward the front the machine.

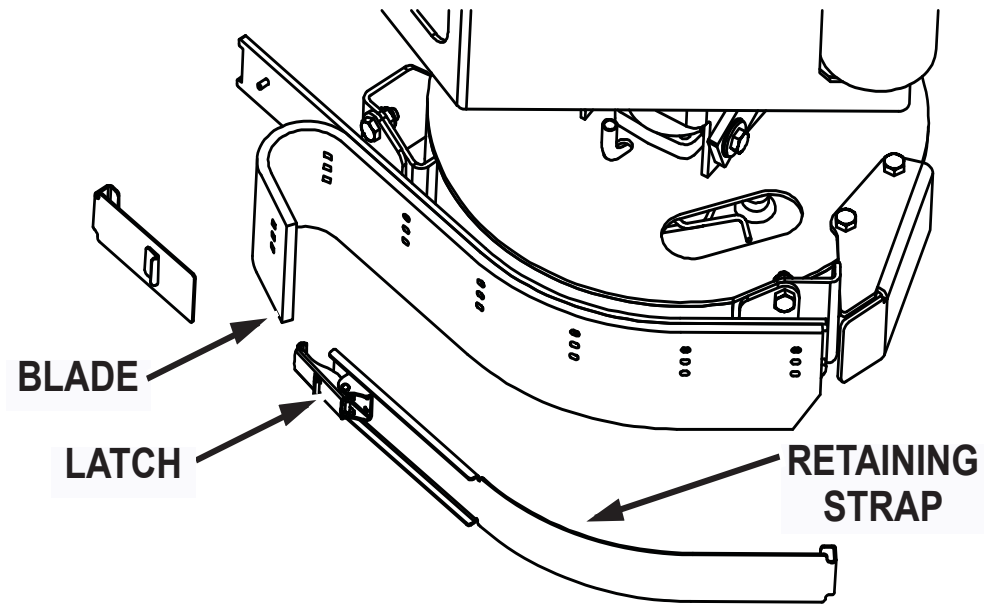


Fig. 3: Retaining Strap & Blade

3. Replace the squeegee retainer strap by first hooking the separate straps around the notches at the front and rear edge of the squeegee frame.
4. Close the latch on the side squeegee retaining strap.

## SKIRTS AND SEALS

### Scrub Deck Front Skirt

The Front Skirt is mounted to the front of the scrub deck.  
(See Fig. 1)

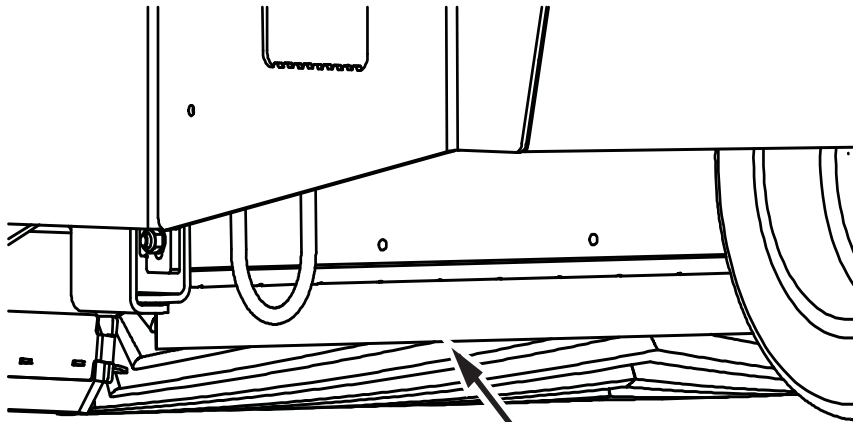


Fig. 1: Scrub Deck Front Skirt

**CHECK SKIRT  
FOR WEAR**

Check this skirt for wear or damage every 100 hours of operation.

### Scrub Deck Rear Skirt

The Rear Skirt is mounted between the rear of the scrub deck and the hopper cover. (See Fig. 2)

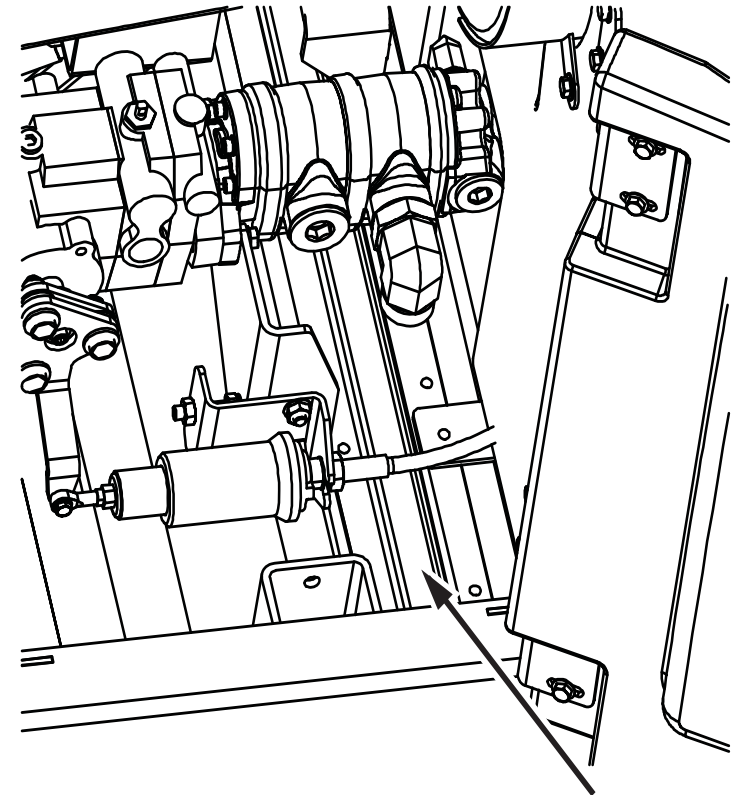


Fig. 2: Scrub Deck Rear Skirt

**CHECK SKIRT  
FOR WEAR**

Check this skirt for wear or damage every 100 hours of operation.

## Hopper Vacuum Seal

A seal is attached to the vacuum tube between the vacuum tube and the debris hopper. (See Fig. 3)

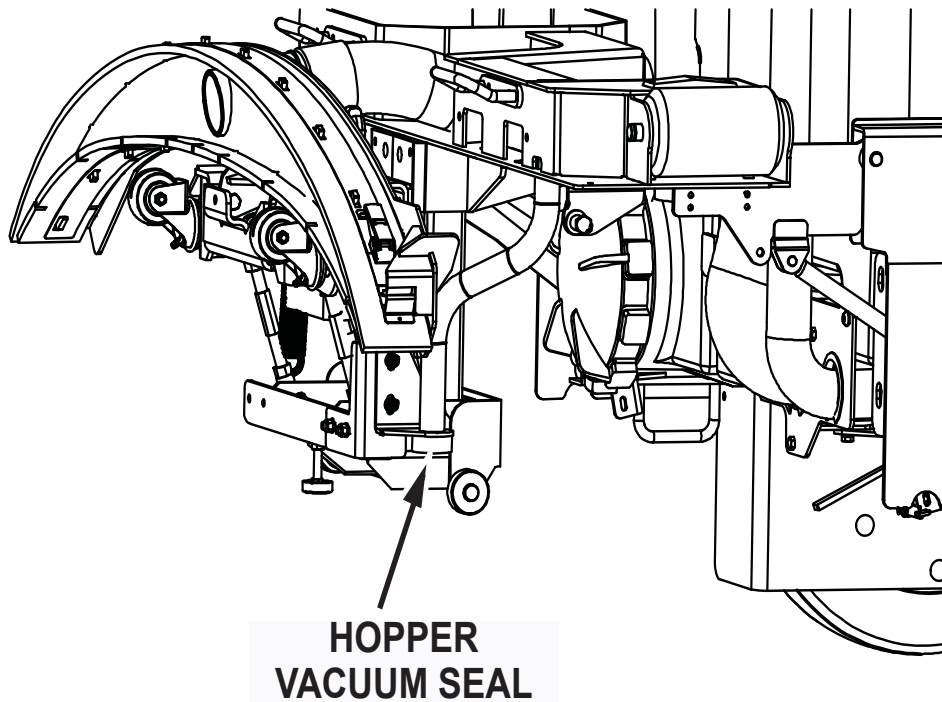


Fig. 3: Hopper Vacuum Seal location

Check this seal for wear or damage every 100 hours of operation.

## Cover Seals

The Cover Seals are attached to each of the solution and recovery tank covers. (See Fig. 4)

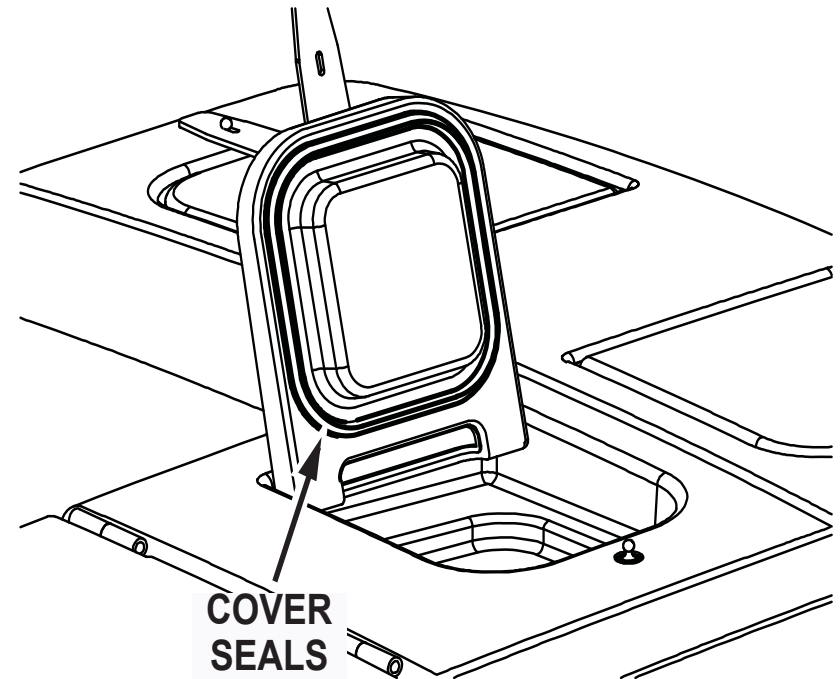


Fig. 4: Cover Seals

Check these seals for wear or damage every 100 hours of operation.

## BRAKES

### Service Brakes

The service brakes are operated by a foot pedal and connecting cables. (See Fig. 1)

Check the service brake adjustment every 200 hours of operation.

### Parking Brake

The parking brake is operated by a locking foot pedal that activates the service brakes. (See Fig. 1)

Check the service brake adjustment every 200 hours of operation.

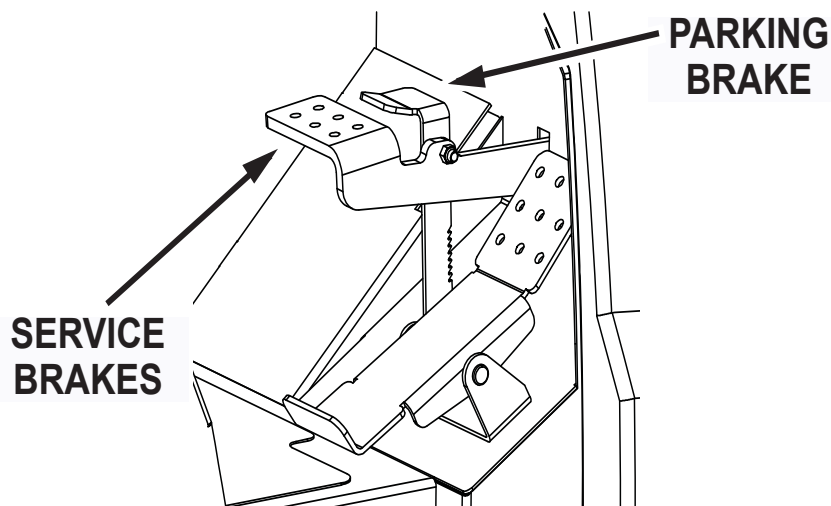


Fig. 1: Service and Parking Brakes

### Adjusting the Brake System

Both the service and parking brake are adjusted during the following cable length adjustment.

The brake cable adjustment is located under the operator compartment floor behind the front cover. (See Fig. 1)

1. Loosen the locking nut on the adjustment hex bar.
2. Adjust the length of the cable by turning the adjustment hex bar.

**Note:** The cable should be adjusted so that there is little play in the brake pedal but not so tight to cause the brakes to drag when the brake pedal is released.

3. Test the brakes and re-adjust is necessary.
4. Tighten the locking nut.

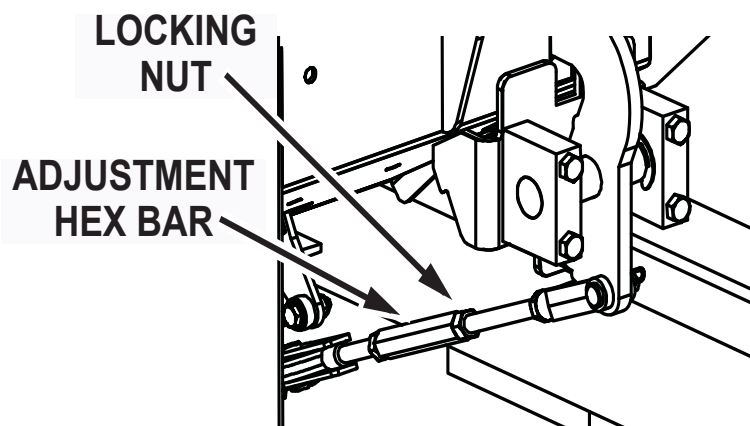


Fig. 2: Brake System Adjustment

## TIRES

The front and rear tires are solid press-on tires.

Check the tires for damage every 100 hours of operation.

### Changing Solid Tires

**Note:** The procedures that follow apply to SOLID TIRES ONLY!

#### Front Tires

1. Remove the tire from the vehicle by removing the 5 lug nuts.
2. Press the tire from the rim.
3. Press the new tire onto the rim.
4. Reinstall the tire on the machine.
5. Tighten the five wheel lug nuts to 90 lb·ft - 110 lb·ft (122 N·m - 149 N·m).

#### Rear Tires

1. Remove the tire from the vehicle by removing the center axle nut.
2. Pull the rear tire straight off of the axle.

3. Remove the inner and outer bearings. Note which is the inner bearing and which is the outer bearing so that they are reinstalled in the same location.
4. Press the tire from the rim.
5. Press the new tire onto the rim.
6. Clean the inner and outer bearing races and bores.
7. Clean the bearings. Inspect the bearings and races for wear, replace if necessary.
8. Grease the bearings with LUBRIPLATE EMB Grease or equivalent.
9. Install the bearings in the wheel. Insure that the bearing seals are seated correctly and being careful not to get any grease on the brake surface or brake pads.
10. Reinstall the tire on the machine by holding the wheel parallel to the side of the vehicle and firmly push it onto the axle.
11. Torque the wheel nut to 100 lb·ft (135 N·m)
12. Align the hole in the axle with the closest slot on the nut and install the cotter pin.
13. Install the hub cap.

## SENSING SWITCHES

### Adjusting the Neutral Sensing Switch

The Neutral Sensing Switch shuts off and raises the scrub brushes and turns off the solution flow whenever the vehicle is not in motion. When vehicle motion resumes the scrub brushes automatically turn on and lower and the solution flow is turned on.

The Neutral Sensing Switch is a normally open roller switch located below and inboard of the pump centering unit (Hydroback unit).

The switch is activated by a cam attached to the pump centering arm.

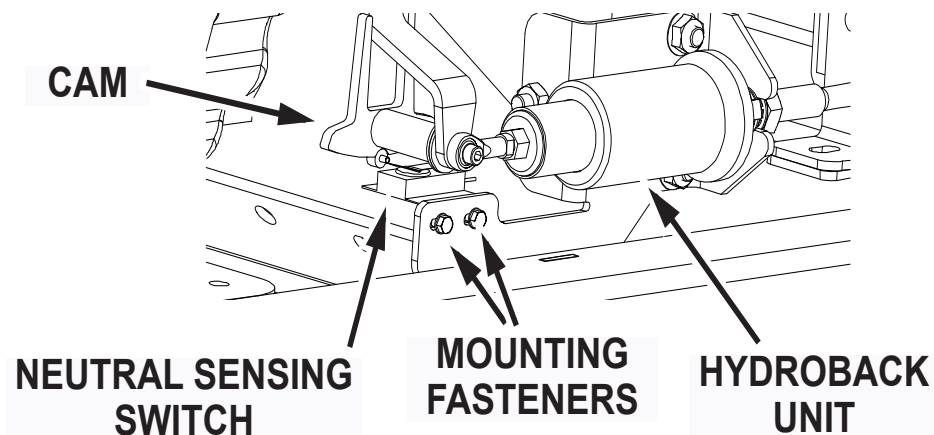


Fig. 1: Adjusting the Neutral Sensing Switch

### Neutral Sensing Switch Adjustment:

**Note:** Hydrostatic transmission neutral must be set before performing this adjustment.

The cable should be adjusted so that there is little play in the brake pedal but not so tight to cause the brakes to drag when the brake pedal is released. (See Fig. 1 & 2)

1. Slightly loosen the neutral switch mounting fasteners so that the switch can be repositioned by hand.

The adjustment can be monitored by listening to the sound of the switch as it opens and closes.

2. Begin the adjustment by moving the switch body so that the roller fits up into the half-round cut out in the cam. This is the neutral position and the switch should be open.

Insure that the switch body is kept level during adjustment.

3. Adjust the switch body so that that a very small amount of pump arm motion will force the roller down and close the switch.

This adjustment should be made while pushing the pump arm slightly forward by hand (towards the front of the vehicle) and then releasing the arm while listening for the switch to close and open.

It is important that the switch reacts quickly otherwise it will be necessary to drive the vehicle at too high a speed before the brushes become activated.

4. Insure that the switch also closes and opens when the pump arm is pushed slightly to the rear and released.
5. Tighten the switch fasteners and retest.

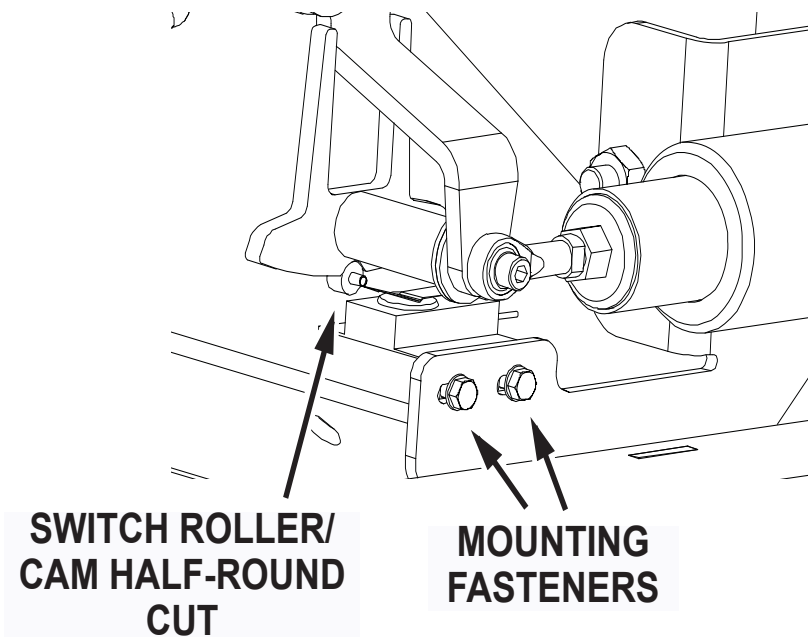


Fig. 2: Roller and Cam Position

## Adjusting the Nautilus Reverse Sensing Switch

To prevent squeegee damage a reverse sensing switch causes the rear squeegee to raise whenever the vehicle moves in reverse. When the vehicle is stopped or resumes forward motion the rear squeegee automatically lowers back to the floor.

The neutral sensing switch is a whisker-type switch located below the directional control pedal. The switch is activated by the directional control pedal arm. (See Fig. 3)

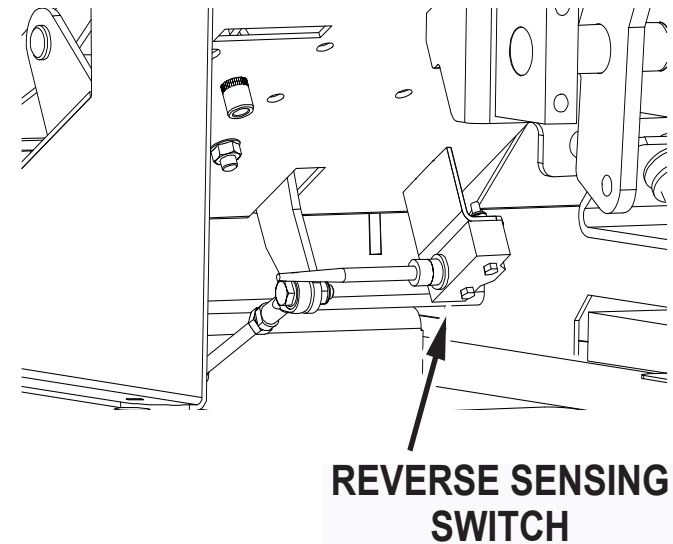


Fig. 3: Reverse Sensing Switch location

### Nautilus Reverse Sensing Switch Adjustment:

**Note:** The heel end of the directional control pedal, when in neutral, must be set to 0.75 in (1,9 cm) inch above the operator compartment floor before performing this adjustment.

1. Slightly loosen the neutral switch mounting fasteners so that the switch can be repositioned by hand. (See Fig. 1)

The adjustment can be monitored by listening to the sound of the switch as it opens and closes.

2. Adjust the switch body so that that the switch is already activated when the directional control pedal is in neutral and stays activated when the pedal is pushed in the forward direction. The switch should close immediately upon moving the pedal into the reverse direction. It is important that only a very small amount of reverse pedal movement closes the switch.

It is important that the switch reacts quickly in reverse otherwise the vehicle will have to travel too fast in reverse before the rear squeegee is raised or may not raise at all when moving in reverse at low speed.

3. Insure that the switch activates correctly when the directional control pedal is pushed slightly forward and released and when pushed slightly in reverse and released.
4. Tighten the switch fasteners and retest.

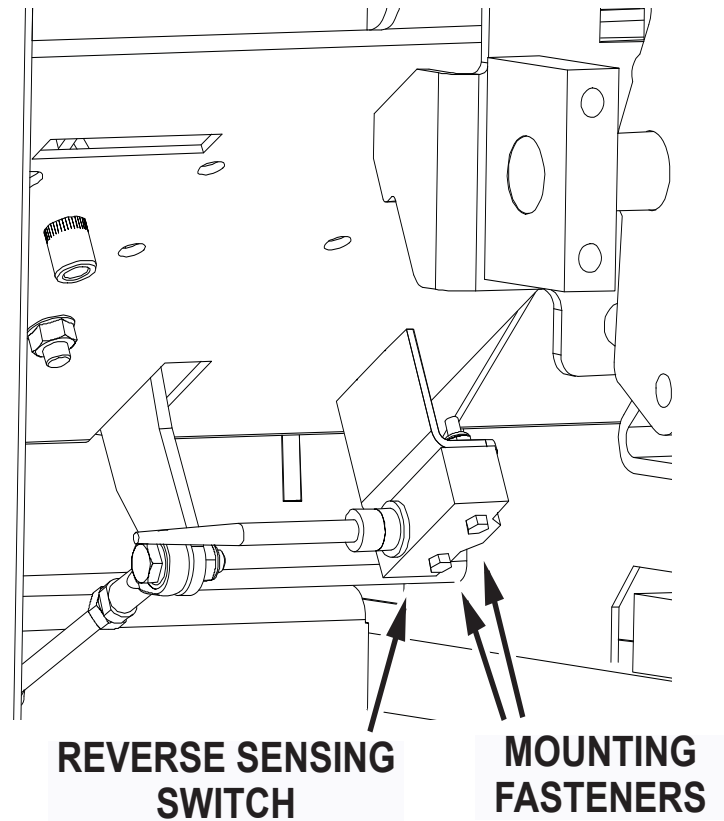


Fig. 1: Reverse Sensing Switch Fasteners



## COVERS

Many of the covers are removable to provide increased access for inspection or maintenance.

The top cover is removable by sliding the cover toward the left side of the machine.

The left side door is removable by lifting the door upwards.

The front cover is removable by first releasing the quick-disconnect at the frame end of the retaining cable then sliding the cover to toward the left side of the machine.

## Seat Mount Adjustment:

The seat mount is opened by pulling on the latch handle protruding out from the front of the seat mount then lifting the back of the seat mount.

The seat mount will lock in the raised position. To unlock the seat mount lift the seat mount lock arm and lower the seat mount.

The seat mount can be removed by first disconnecting the lock arm from the frame pin and then rotating the two seat mount hinge retaining bars toward the front of the machine. The seat mount can then be lifted off.

To reinstall the seat mount set the seat mount into the hinge receivers, reconnect the lock arm, and lower the seat mount. The seat mount retaining bars will latch automatically.

The left wall cover of the operator compartment can be removed by taking out the four attachment screws.

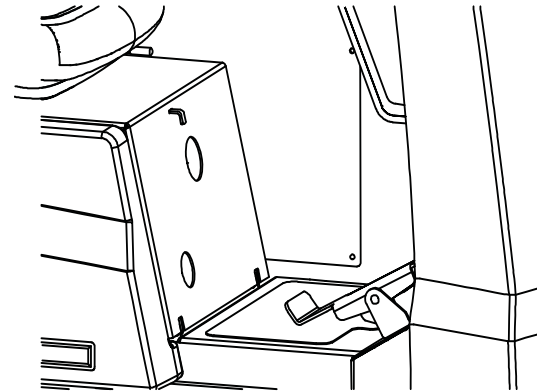


Fig. 1

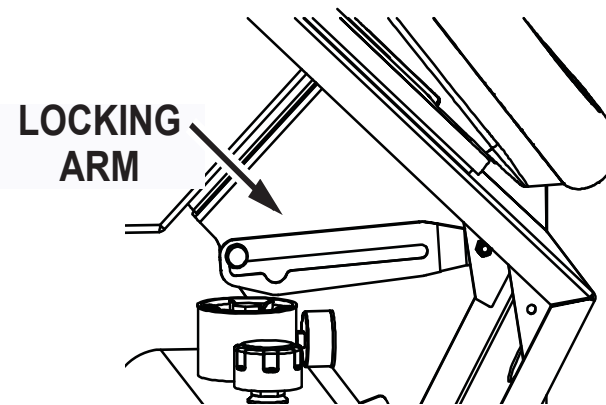


Fig. 2

## SOLUTION DELIVERY BAR & FILTER SYSTEM

### Solution Delivery Bar

Located under the machine and in front of the main brush housing, visually inspect the Solution Delivery Bar for plugged discharge holes. Clean the discharge holes with a small wire brush or pipe cleaner as needed. Keep the holes free and clear of debris. (See Fig. 1)

Check the Solution Delivery Bar every 200 hours of operation.

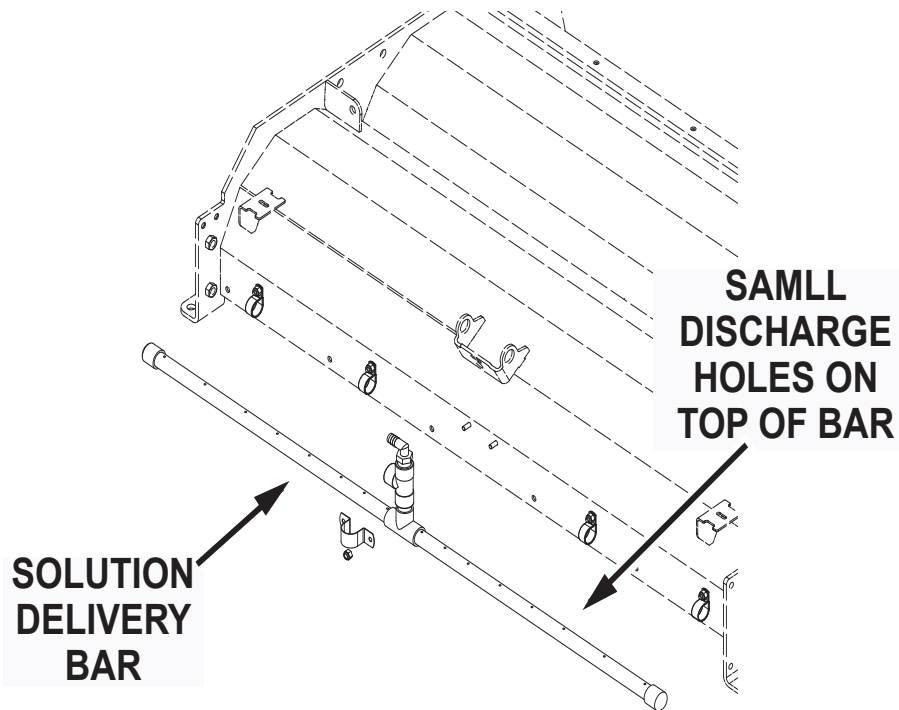


Fig. 1: Solution Delivery Bar shown with holes

### Solution Filter

Lift the operator side broom door to locate the solution filter. Visually inspect the filter element for debris. Clean filter element with fresh water and a small brush. Keep the filter element free of debris. (See Fig. 2)

1. Unscrew filter cap counter clockwise to remove the filter cap and filter element from base.
2. Clean filter element with fresh water and a small brush to remove debris.
3. Reassemble filter and screw filter cap back on to base.

Check the water Solution Filter every 50 hours of operation.

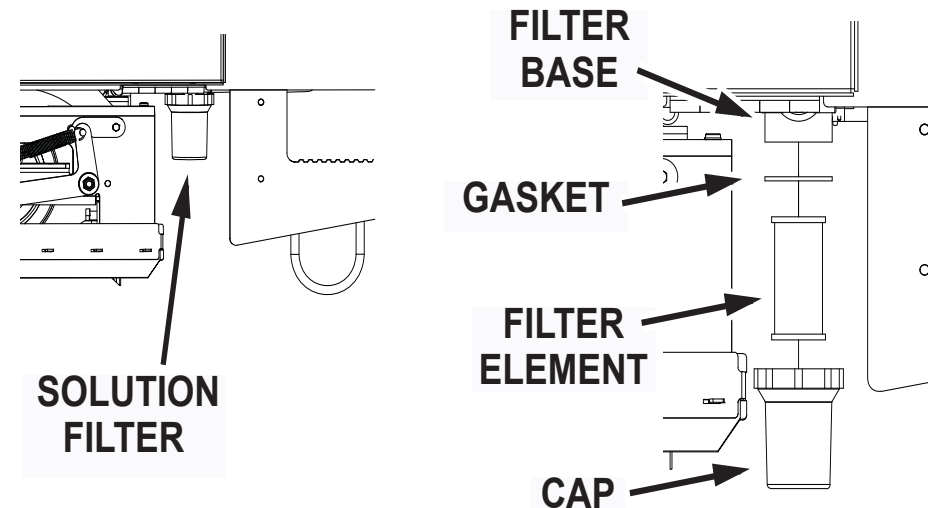


Fig. 2: Water Solution Filter with Exploded view

## TROUBLESHOOTING

This section provides information to assist in identifying maintenance trouble and provides possible causes and actions to correct the problem. Many of the solutions require servicing your machine. Service must be preformed by an approved authorized repair station.

### TROUBLESHOOTING CHART

PROBLEM	POSSIBLE CAUSE(S)	SOLUTION(S)
Engine will not start or runs roughly after start.	Battery dead.	Recharge or replace battery.
	Machine out of fuel.	Refuel
	Fuel filter plugged.	Clean or replace filter.
	Fuel line broken or obstructed.	Blow fuel line out with compressed air.
	Dirty air filter.	Clean or replace air filter.
	Problems with spark plugs, ignition points, ignition coil ignition switch, carburetor, Regulator, wiring harness.	Review engine manual for maintenance and troubleshooting procedures.
	Tank valve not fully opened.	Open the valve slowly.
	Fuel tank type does not match fuel supply.	Use the correct tank type for the fuel supply.
	Fuel tank and lines are covered with frost.	Open shut-off valve slowly to ¼ open, start.
NOTE: On machines with LPG fuel, also check the following:	Defective vacuum lock-off.	Replace or repair.

<b>TROUBLESHOOTING CHART</b>		
<b>PROBLEM</b>	<b>POSSIBLE CAUSE(S)</b>	<b>SOLUTION(S)</b>
Engine overheats.  NOTE: If coolant loss has not occurred, check for malfunction of the temperature sending unit.	Low coolant level.	Supply coolant.
	Fan blade installed incorrect	Reinstall (pusher type fan)
	Clogged radiator.	Flush radiator.
	Loose fan belt.	Tighten belt.
	Defective thermostat.	Replace thermostat.
Nautilus® machine moves slowly or does not move.	Parking brake is on.	Release brake.
	Directional control pedal jammed, damaged, or not adjusted properly.	Clear jam or adjust linkage.
	Tow valve in tow position	Move to drive position
	Low hydraulic fluid level.	Add hydraulic fluid.
	Hydraulic fluid temperature too high and too thin caused by excessive load, climbing, high environment temperatures, worn pump, or improper fluid.	Use the proper weight oil for the operation conditions; check pump.
	Hayes coupler failed	Replace
	Other problems with the hydraulics system: pump failure, motor failure, relief valve leaking or stuck open.	See Hydraulics System Problems in this section.
Tow Valve improperly set.	Turn to correct position.	

## TROUBLESHOOTING CHART

PROBLEM	POSSIBLE CAUSE(S)	SOLUTION(S)
Nautilus® machine creeps in neutral.	Directional control pedal, Propulsion Pump Neutral Setting is out of adjustment.	Perform the adjustment procedures.
Brushes do not turn or turn very slowly.	Hydraulic system problem:	See Hydraulics System Problems in this section.
	Motor	
	Control valve	
	Gear pump	
	Relief valve	
	Brush switch not on.	Press to on position.
	Foot pedal not depressed.	Press to forward position.
Scrub head will not lower.	Fuse blown.	Replace fuse.
	Loose scrub head switch wires.	Connect wires.
	Loose connection of plug at actuator.	Connect.
	Defective cylinder.	Replace cylinder.
	Defective scrub head switch.	Replace switch.
	Defective solenoid valve.	Replace solenoid valve or coil.

<b>TROUBLESHOOTING CHART</b>		
<b>PROBLEM</b>	<b>POSSIBLE CAUSE(S)</b>	<b>SOLUTION(S)</b>
Poor water pick-up	Recovery tank is full.	Empty the tank; if foaming badly, change detergent.
	Squeegee worn.	Replace squeegee.
	Debris caught in squeegee or pick-up tube.	Remove debris.
	Leak or clog in hose from impeller.	Repair leak, clear obstruction or replace hose.
	Squeegee out of adjustment.	Adjust squeegee.
	Engine not operating at high speed.	Check Throttle Switch Position.
	Impeller failure.	Check and repair.
Solution not being delivered.	Solution tank is empty.	Fill tank.
	Solution flow valve not functioning.	Check broom switch & pressure switches @ main pump.
	Delivery lines clogged.	Clear lines.
	Fwd/Rev Pedal not depressed.	Press pedal.
	Clogged solution filter element.	Clean filter element.
	Solution Bar, discharge holes clogged.	Clean discharge holes.

## TROUBLESHOOTING CHART

PROBLEM	POSSIBLE CAUSE(S)	SOLUTION(S)
Scrubber unit not cleaning the floor.	Brushes worn.	Replace.
	Need different type of brush or detergent.	Use manufacturer's recommended brushes / detergent.
	Debris caught in brush drive mechanism.	Clear obstruction.
	Brushes out of adjustment.	Adjust.
	Brush motor failure.	See Hydraulics System Problems.
Squeegee will not lower.	Loose or defective squeegee switch (on console).	Reconnect wiring or replace switch.
	Loose wire(s) at foot pedal.	Connect.
	Foot pedal switches need adjustment.	Re-adjust cams.
Squeegee will not raise in reverse or by console switch.	Foot pedal switches need adjustment.	Re-adjust cams.
	Defective solenoid valve.	Replace solenoid valve or coil.
	No power at valve.	Check fuse.
Scrubber leaving debris.	Hopper full.	Dump hopper.
	Brushes out of adjustment.	Adjust.
	Brushes bristles worn.	Check for wear and adjustment.
	Poor performance of brush drive mechanism.	Check for jam in broom chamber.
	Hopper flaps damaged or missing.	Replace or adjust clearance.

<b>TROUBLESHOOTING CHART</b>		
<b>PROBLEM</b>	<b>POSSIBLE CAUSE(S)</b>	<b>SOLUTION(S)</b>
Hydraulic control valve failure	Defective solenoid valve.	Replace solenoid valve or coil.
	Switch failure.	Check for loose or disconnected wires.
Hydraulic drive motor failure.	Insufficient oil supply.	Fill Reservoir.
	Motor leaking.	Replace seals.
	Drive pump coupler failed.	Replace.
	Key on motor shaft failed.	Replace key.
	Drive hub failed.	Replace.
Hydraulic gear pump failure.	Pump leaking.	Replace seals or RR Pump.
	Drive coupler failed.	Replace.
	Gears worn or scored.	Rebuild pump or RR Pump.
	Oil supply low.	Check and fill.
	Oil strainer clogged.	Replace strainer (inside reservoir).
	Incorrect oil.	Use recommended viscosity oil.
	Damage due to entry of air into hydraulic system.	Maintain correct hydraulic fluid level in reservoir. Keep suction hose fittings tight.



## TROUBLESHOOTING CHART

PROBLEM	POSSIBLE CAUSE(S)	SOLUTION(S)
Hydraulic variable displacement pump failure.	Pump leaking.	Replace seals.
	Relief valve(s) stuck.	Clean or replace relief valve(s) at the pump.
	Drive coupling malfunction.	Replace defective gears.
	Control linkage out of adjustment.	Adjust control linkage, check for binding.
	Charge pump gears worn or scored.	Replace defective gears.
	Damage due to entry of air into hydraulic system.	Maintain correct hydraulic fluid level in reservoir. Keep suction hose fittings tight.
Hydraulic system noisy.	Air in system.	Check fluid level in reservoir; check for loose connections or leaks.
	Relief valve dirty or damaged.	Clean or replace.
	Loose suction line.	Tighten fittings.
	Clogged section filter or pump inlet line.	Replace filter, clear line; change fluid in reservoir if dirty and flush system.
	Internal pump or motor damage.	Inspect and repair.

## CE DECLARATION OF CONFORMITY

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**PowerBoss**<sup>®</sup>  
The Power of Clean

- D** EG-Konformitätserklärung (entsprechend der EG-Richtlinie 2006/42/EG)
- GB** EC Declaration of Conformity (according to Directive 2006/42/EC)
- F** Déclaration de conformité pour la CEE (conforme à la directive de la CEE 2006/42/CEE)
- I** Dichiarazione CE di Conformità (ai sensi della direttiva CEE 2006/42)
- E** CEE Declaración de Conformidad (según la normativa de la CEE 2006/42/CE)

**PowerBoss Inc.**

erklären in alleiniger Verantwortung, daß das Produkt,  
declare under our sole responsibility, that the product,  
déclarons sous notre seule responsabilité que le produit,  
Dichiara sotto la propria responsabilità che il prodotto,  
declaramos bajo responsabilidad propia que el producto,

**Machine**

Nautilus Diesel (PB45DSLCE, PB45DSLUK) Nautilus Gas (PB45GASCE, PB45GASUK)  
Nautilus LP (PB45LPCE, PB45LPUK)

**D** auf das sich diese Erklärung bezieht, den einschlägigen grundlegenden Sicherheits- und Gesundheitsanforderungen der EG-Richtlinie 2006/42/EG, sowie den Anforderungen gemäß 2014/ 30 /EG entspricht. Zur sachgerechten Umsetzung der in den EG-Richtlinien genannten Sicherheits- und Gesundheitsanforderungen wurde(n) folgende Norm(en) und /oder technische Spezifikation(en) herangezogen:

CE

**GB** to which this declaration relates corresponds to the relevant basic safety and health requirements of the Directive 2006/42/EC, and to the requirements of the other relevant Directives 2014/ 30 /EC. For the relevant implementation of the safety and health requirements mentioned in the Directives, the following standard(s) and/or technical specification(s) has (have) been respected:

**F** faisant l'objet de la déclaration est conforme aux prescriptions fondamentales en matière de sécurité et de santé stipulées dans la Directive de la CEE 2006/42/CEE, ainsi qu'aux prescriptions des autres Directives de la CEE établies dans ce domaine 2014/ 30 /CEE. Pour mettre en pratique dans les règles de l'art les prescriptions en matière de sécurité et de santé stipulées dans les Directives de la CEE, il a été tenu compte de la/des norme(s) et/ou de la/des spécification(s) technique(s) suivante(s):

**I** é conforme ai requisiti essenziali di sicurezza e di tutela della salute di cui alla Direttiva CEE 2006/42 e sue successive modifiche, nonché ai requisiti di cui alle seguenti Direttive CEE 2014/ 30 . Per la verifica della Conformità di cui alle Direttive sopra menzionate, sono state consultate le seguenti, Norme Armonizzate EN:

**E** al cual se refiere la presente declaración corresponde a las exigencias básicas de la normativa de la CEE 2006/42/CE y referentes a la seguridad y a la sanidad, así como a las exigencias de la demás normativas de la CEE 2014/ 30 /CE. Con el fin de realizar de forma adecuada las exigencias referentes a la seguridad y a la sanidad mencionadas en las normativas de la CEE fué(ron) consultada(s) la(s) siguiente(s) normativa(s) y especificación(es) técnica(s):

**Date** 10/5/2017



Jack Hill  
Managing Director

Name der autorisierten Person, die für PowerBoss die technischen Unterlagen zusammenstellt:

Name of the person authorized for PowerBoss to compile the technical file:

Personne chargée du suivi du dossier technique:

Nome della persona autorizzata da PowerBoss a compilare il file tecnico:

Nombre de la persona autorizada por PowerBoss para la creación del fichero técnico: Sébastien Filippone

D, GB, F, I, E







# ***“The Power of Clean”***

**PowerBoss® is a Full Line Manufacturer of Sweepers and Scrubbers,  
for Industrial Facilities.**

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