

# SC430

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## ***Service Manual***

**Model numbers:**

**Nilfisk SC430 53B GO 50000334**

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## General Information

### General Machine Description

The SC430 is a walk-behind commercial floor scrubbing machine designed to wash and dry commercial floors. The machine is powered by on-board batteries. The machine is equipped with a single-disc scrubbing pad, a controlled solution flow dosing system, and a rear squeegee with vacuum suction. The machine also has an on-board solution tank and wastewater recovery tank. This machine is not to be used outdoors, on carpets, or on coarse floors.

### Service Manual Purpose and Application

This Service Manual is a technical resource intended to aid service personnel in maintaining and repairing the SC430 to ensure optimum performance and long service life. Please read this manual carefully before performing any maintenance and repair procedure on the machine.

### Other Reference Manuals and Information Sources

Document Name	Document Number	Document Type
SC430 53B Go Full Pkg, Instructions for Use	N/A	User Manual/Parts List

### Parts And Service

Service and repairs must be performed only by authorized personnel or Nilfisk Service Centers. The authorized personnel is trained directly at the manufacturer’s premises and has original spare parts and accessories.

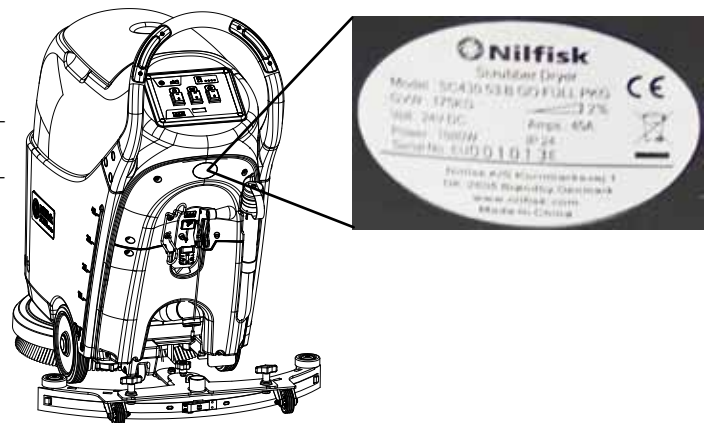
Contact Nilfisk Retailer indicated below for service or to order spare parts and accessories, specifying the machine model and serial number.

### Name Plate

The Model Number and Serial Number of your machine are shown on the Nameplate on the machine. This information is needed when ordering repair parts for the machine. Use the space below to note the Model Number and Serial Number of your machine for future reference.

MODEL NUMBER \_\_\_\_\_

SERIAL NUMBER \_\_\_\_\_



## Safety

### Symbols

It is important for you to read and understand this manual. The information it contains relates to protecting your safety and preventing problems. The symbols below are used to help you recognize this information.



**Warning:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



**Caution:** Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

**Caution:** When used without the Safety Alert Symbol, indicates a potential situation which, if not avoided, could result in property or machine damage.



**Note:** Indicates an important informational message.

### General Safety Instructions

These safety instructions are included to warn you of potential bodily injury or property damage.



**Caution!** Read and understand all safety warnings and instructions. Failure to follow the warnings and instructions may result in electric shock, fire, and/or serious injury.

- To avoid personal injury, this machine should be used only by properly trained and authorized persons.
- Do not operate the machine near toxic, dangerous, flammable and/or explosive materials. This machine is not suitable for collecting dangerous or hazardous materials.
- In case of fire, use a powder fire extinguisher, not a water-based extinguisher.
- Do not use on surfaces having a gradient exceeding that marked on the machine. While on ramps or inclines, avoid sudden stops when loaded. Avoid abrupt sharp turns.
- Disconnect the power source and/or batteries before servicing electrical components
- Never work under a machine without safety blocks or stands to support the machine.
- Do not dispense flammable cleaning agents, operate the machine on or near these agents, or operate in areas where flammable liquids exist.
- When using floor cleaning detergents, follow all safety and handling instructions of the respective manufacturer.
- Battery charging may produce highly explosive hydrogen gas. Charge the batteries only in well-ventilated areas and away from ignition sources or open flames.
- When operating this machine, ensure that third parties, particularly children, are not endangered.
- Take precautions to prevent hair, jewelry, or loose clothing from becoming caught in moving parts.

### Property Damage Messages

- Storage and operation temperature must be above 0°C and a humidity between 30% and 95%, non-condensing.
- Before use, all doors and hoods should be properly latched.
- This machine is not approved for use on public paths or roads.
- This machine is only approved for hard surface use.
- Use brushes and pads supplied with the machine or those specified in the User Manual. Using other brushes or pads could reduce safety.
- Do not wash the machine with direct or pressurised water jets, or with corrosive substances.
- Do not allow the brush/pad to operate while the machine is stationary to avoid damaging the floor.
- Use only factory authorized parts and accessories.
- This machine must be properly disposed of in accordance with local laws and regulations.

### Lifting The Machine



**Caution!** Never work under a machine without safety stands or blocks to support the machine.

### Transporting The Machine



**Caution!** Before transporting the machine on an open truck or trailer, make sure that . . .

- All covers are closed
- The recovery tank and detergent tank are empty
- Batteries (if so equipped) are disconnected
- The machine is securely fastened in place on the transport

## Technical Specifications

<b>Model</b>	<b>SC430 53B</b>
Machine Height	1100mm (43.3 in.)
Solution tank capacity	40 liter (10.5 gal.)
Recovery tank capacity	40 liter (10.5 gal.)
Diameter of transport wheel	200mm (8 in.)
Diameter of guide wheel	64mm (2.5 in.)
Power of vacuum system motor	350w
Maximum gradient when working	2% (Max)
Sound pressure level at workstation	70dB(A) ±3dB(A)
Standard batteries	(2×12V) 24V 105Ah AGM
Battery compartment size (W x L x H)	340 x 330 x 260mm
Vacuum system circuit capacity	1200 mm H <sub>2</sub> O
Cleaning width	510mm (20 in.)
Squeegee width	760mm (30 in.)
Machine length	1140mm (45 in.)
Machine width without squeegee	550mm (21.6 in.)
Brush diameter	510mm (20 in.)
Dry Weight	135kg (297 lb) with batteries
Gross weight of the machine ready for use	175kg (386 lb)
Brush motor power	560W
Brush speed	150rpm
Brush /pad-holder Maximum pressure	35kg (77 lb)
Packing size (Lx W x H)	1270 x 650 x 1270 mm

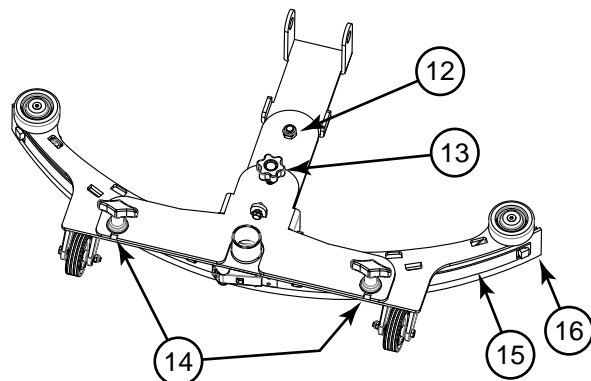
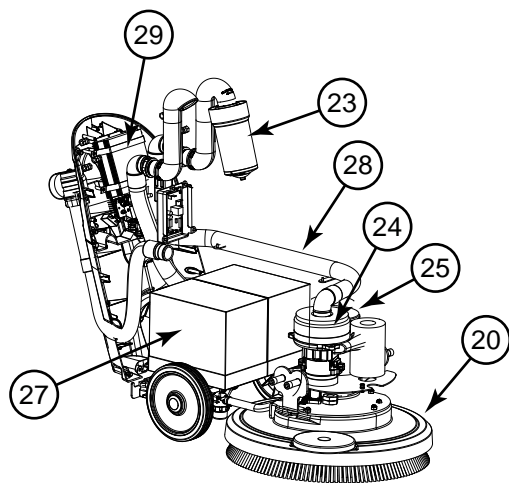
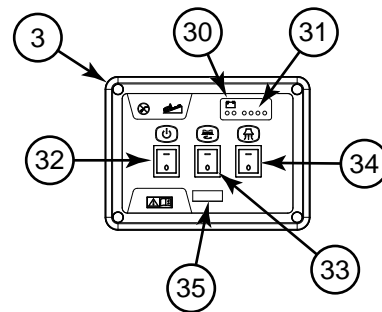
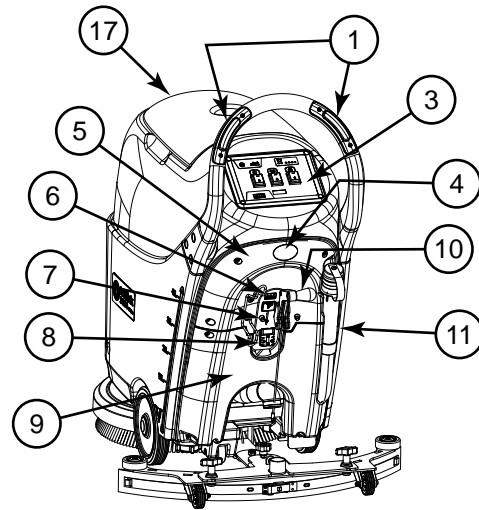
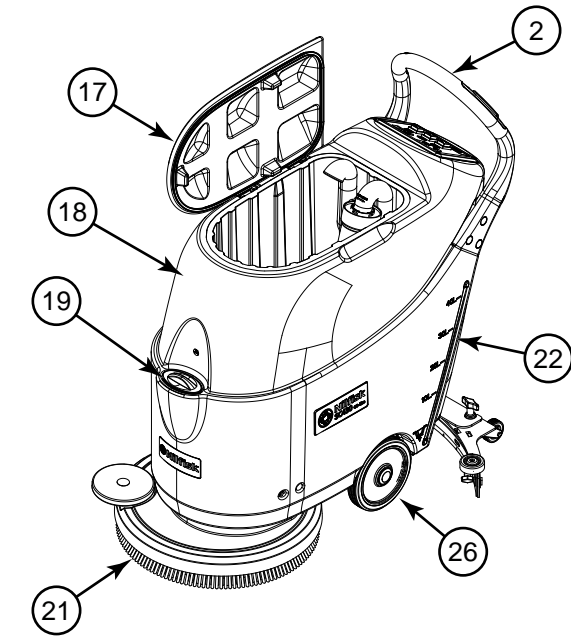
## Maintenance Schedule

Procedure	Daily, after use	Weekly/ Monthly	Every 6 Months	Annually
Charge Battery	X			
Clean squeegee blades	X			
Inspect pad/brush	X			
Clean solution and recovery tanks	X			
Inspect recovery tank seal	X			
Inspect squeegee blades for damage		X		
Clean the solution filter		X		
Inspect for loose fasteners and electrical connections			X <sup>1</sup>	
Inspect/replace scrub motor brushes (battery model)				X
Inspect/replace vacuum motor brushes				X

1 Also perform this inspection after the initial 10 hours of new machine usage.

## Know Your Machine

- |                        |                          |                         |                           |
|------------------------|--------------------------|-------------------------|---------------------------|
| 1. Brush Switches      | 10. Squeegee Lift Handle | 19. Solution Tank Fill  | 28. Vacuum Tube           |
| 2. Handle              | 11. Recovery Tank Drain  | 20. Scrub Deck          | 29. On-Board Charger      |
| 3. Control Panel       | 12. Squeegee Pivot       | 21. Brush/Pad Holder    | 30. Battery Low LED       |
| 4. Serial Number Plate | 13. Squeegee Adjust      | 22. Solution Sight Tube | 31. Battery Level LEDs    |
| 5. Control Cover       | 14. Squeegee Thumbscrews | 23. Shut-Off Float      | 32. Power Switch          |
| 6. Charging Indicator  | 15. Squeegee Clip        | 24. Vacuum Motor        | 33. Brush/Solution Switch |
| 7. Circuit Breakers    | 16. Squeegee Blade       | 25. Brush Motor         | 34. Vacuum Switch         |
| 8. Battery Disconnect  | 17. Recovery Tank Lid    | 26. Wheels              | 35. Hour Meter (optional) |
| 9. Lower Cover         | 18. Recovery Tank        |                         |                           |



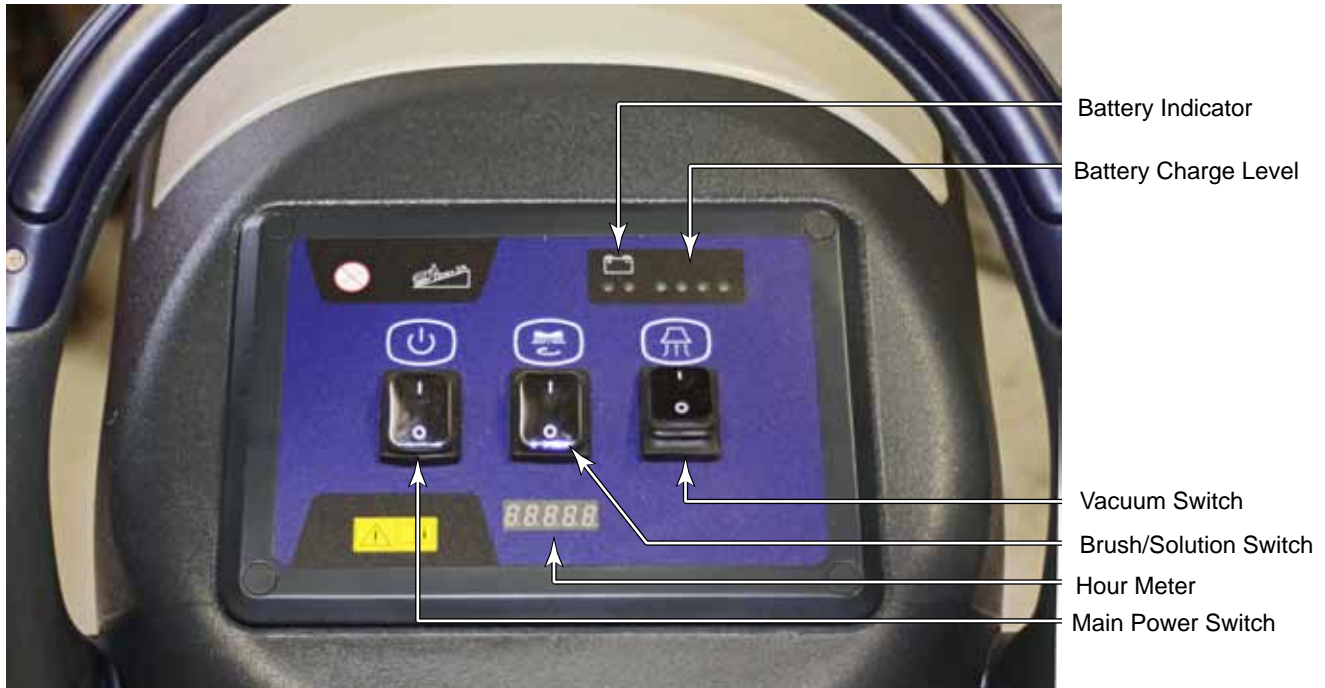
## Control System

### Functional Description

The SC430 utilizes a main machine controller to turn on various machine functions. It receives operator switch inputs, and activates various solenoids and components. Each of the machine components is described below. Refer to the machine [Block-Style Schematic](#) on [page 12](#) for details.

### Control Panel

The control panel (display) provides the main operator interface for the machine. It provides battery status and contains the switches for operating the machine.



### Main Power Switch

The main power switch controls power to the main control board and the hour meter. For the hour meter, both the positive and negative power leads are switched. For the control board, only the negative power lead is switched. Positive power is always present at the control board, but passes through a 30-amp circuit breaker.

This arrangement reduces the total amperage flowing through the main power switch. The power consumed by the brush motor and vacuum motor do not pass through this switch. Only their control signal power passes through this switch. This reduces the likelihood of the switch contacts being damaged by high amperage current flow.

### Battery Charger

The battery charger is semi-autonomous, and is always connected to the batteries unless the main battery disconnect is unplugged. The charger is microprocessor-controlled to provide the optimal charge-curve to the batteries depending on the battery type. The battery type, voltage, and max. current is determined by DIP switches inside the charger. The charger also contains a small normally-closed relay that opens whenever the charger is plugged in to building power. This relay serves to notify the machine's control board that the

charger is plugged in and active, so that the control board can disable all machine functions while being charged. When the charger is unplugged, the circuit is closed and the machine is enabled. When the charger is plugged in, the circuit is open and the machine is disabled.

### ***Vacuum Motor***

The vacuum motor is controlled by a relay built in to the main control board. This relay switches the positive power to the vacuum motor. This is fused through the same circuit breaker that provides power to the control board. The negative power to the motor is unswitched and unfused from the battery.

### ***Solution Solenoid***

The solution solenoid is a 24-volt magnetically controlled valve that permits fluid to gravity-flow to the scrub deck. Power to the solenoid comes from a relay on the machine control board. This relay switches the negative power to the solenoid. The solution solenoid is active only when the solution switch is closed, and at least one of the brush switches are closed. This causes the solution solenoid to be active only if the scrub system is active. No solution will flow unless the brush is also active.

### ***Brush Motor***

The brush motor is controlled by a power relay adjacent to the control board. The positive power to the motor passes through the second 30-amp circuit breaker. This circuit breaker serves only the brush motor. The negative power to the motor is switched by the brush relay. Both positive and negative power to the relay coil comes from the machine control board.

### ***Vacuum, Brush/Solution, and Brush Switches***

These switches are low-power control signals to the machine control board. They share a common positive lead from the control board, and return that positive signal back to the control board when closed. The two brush switches are in series with the brush/solution switch, and in parallel with each other. The circuit is complete only when the brush/solution switch is active and either of the brush switches are closed.

### ***Hour Meter***

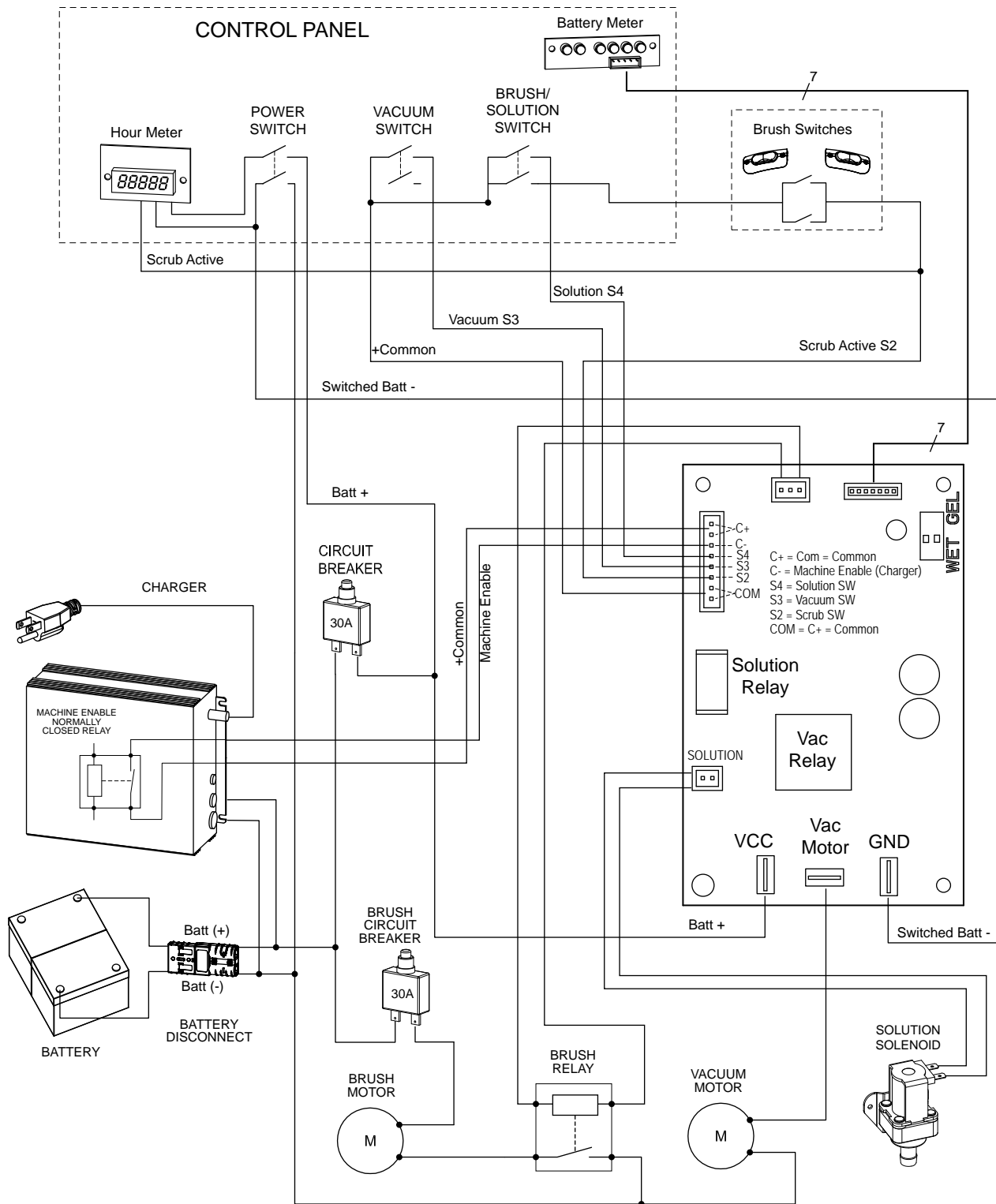
The hour meter is a simple clock that receives power from the main power switch, but is enabled only when the scrub switches are closed.

### ***Battery Meter LEDs***

The battery meter LEDs are controlled by the main control board based on the voltage of the battery. Each successive LED turns on at a higher voltage level, depending on the position of the Wet/Gel DIP switch. The operating voltage range of a wet battery is lower than a gel battery, so the LEDs will turn on at lower voltage for wet versus gel batteries. When the battery is fully depleted, the 2 red LEDs will flash, and the machine will shut down.

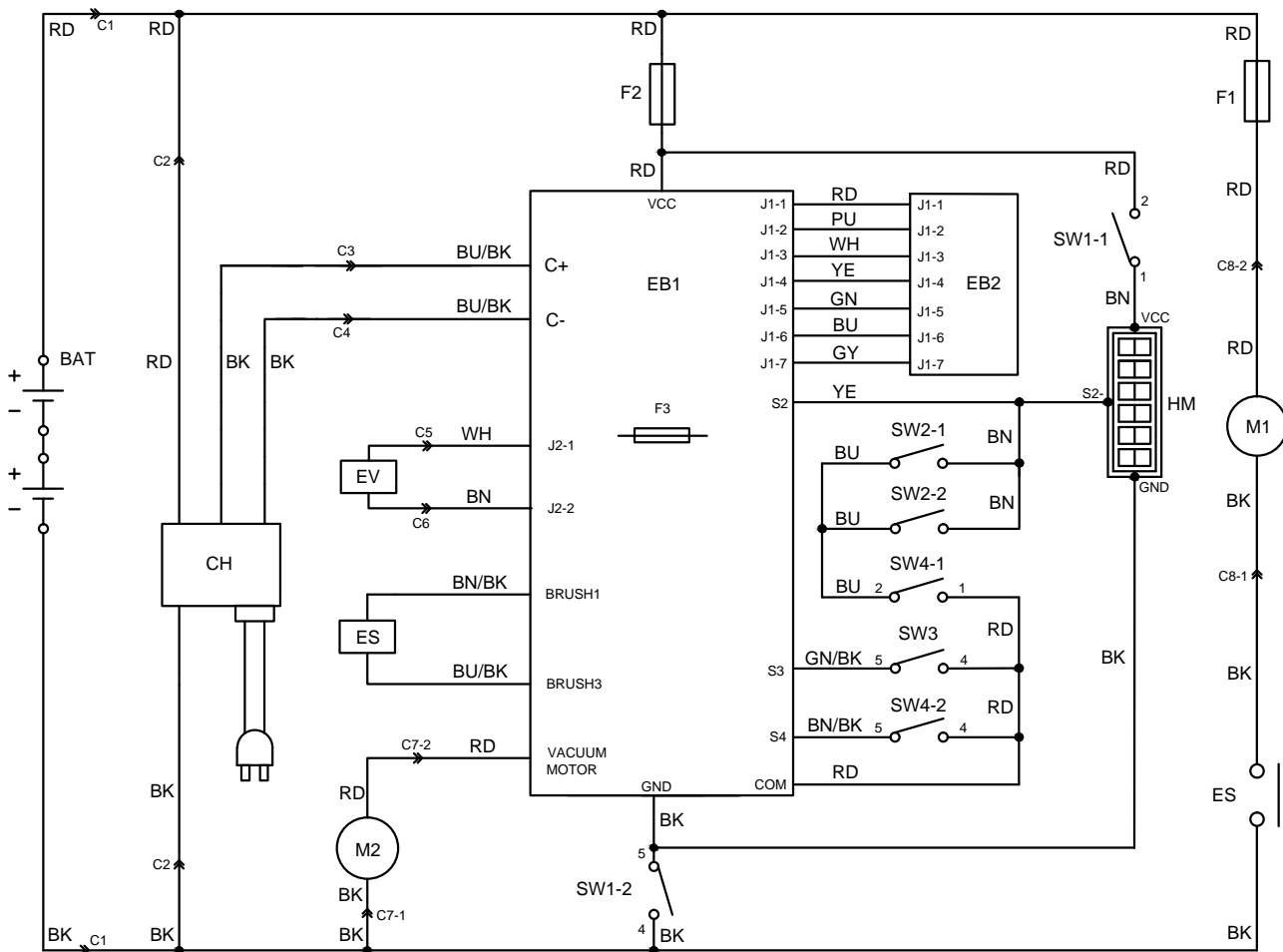
## Block-Style Schematic

The following shows the electrical controls schematic in an icon-based block style.



### Ladder-Style Schematic

The following shows the electrical controls schematic in a ladder style format.



Drawing VF91056, Rev 05

COMPONENTS	
BAT	24V BATTERY
C1	BATTERY CONNECTOR
C2-C4	BATTERY CHARGER CONNECTOR
C5-C8	CONNECTOR
CH	BATTERY CHARGER (OPT)
EB1	CONTROL PANEL BOARD
EB2	LED BOARD
ES	CONTACTOR
EV	SOLENOID WATER VALVE
F1	BRUSH MOTOR CIRCUIT BREAKER
F2	VACUUM CIRCUIT BREAKER
F3	SOLENOID WATER VALVE FUSE
M1	BRUSH MOTOR
M2	VACUUM SYSTEM MOTOR
SW1	POWER SUPPLY SWITCH
SW2	BRUSH ACTIVATION PUSH-BUTTONS
SW3	VACUUM SWITCH
SW4	BRUSH SWITCH
HM	HOUR METER

COLOUR CODES	
BK	BLACK
BU/BK	BLUE/BLACK
BN/BK	BROWN/BLACK
BN	BROWN
BU	BLUE
GN	GREEN
GN/BK	GREEN/BLACK
GY	GREY
PU	PURPLE
RD	RED
WH	WHITE
YE	YELLOW

## Troubleshooting

The following sections present some common troubleshooting scenarios based on symptoms.

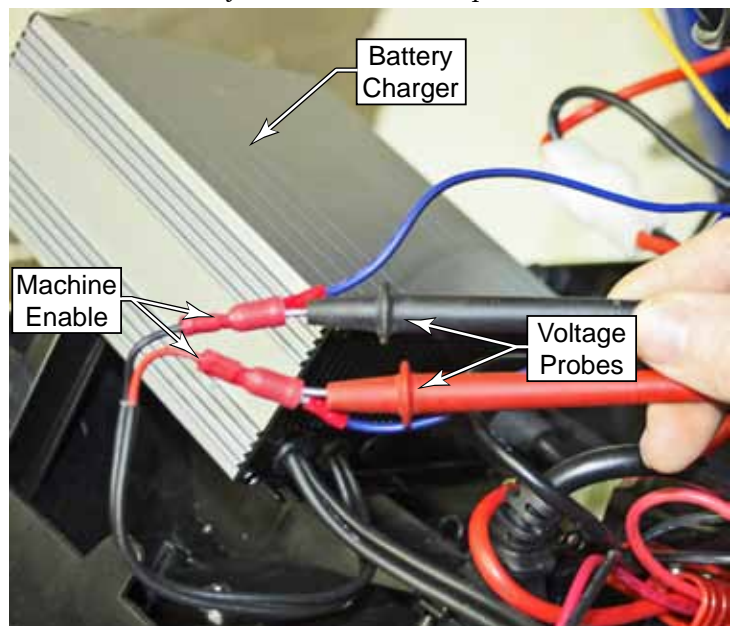
### Whole Machine Not Functioning

The symptom of “whole machine not functioning” means that the vacuum motor does not run, brush motor does not run, and solution solenoid does not engage. If the whole machine is not functioning, it is an indication of a power failure, control board failure, or a battery charger failure. Make the following inspections:

1. Make sure the battery charger is not plugged in to building power. The machine is disabled when plugged in to power.
2. Turn on the main power switch and observe the lights on the control panel. During normal operation, the following should take place:
  - If present, the hour meter will illuminate immediately.
  - The two red LEDs below the battery icon will illuminate for about 1 second.
  - When the red LEDs turn off, the green battery level LEDs will turn on.
3. If the hour meter does not illuminate, then power is not reaching the main power switch. Check the following:
  - Make sure the battery disconnect plug is firmly connected.
  - Make sure the circuit breaker labeled “Vacuum” is not tripped by pressing in on the button.
  - Remove the [Rear Covers \(Control Cover\)](#) described on page 17 and begin checking voltages, starting at the main power switch and working back toward the batteries.
4. Unplug the battery disconnect and measure the battery voltage to ensure the batteries are not fully depleted. Reconnect the plug when done.
5. If the red LEDs below the battery icon do not illuminate for 1 second during startup (and the batteries are not depleted), then it is likely that the control board is not getting power or the control board is faulty.
  - With the main power switch on, check the voltage between VCC and GND at the top of the control board. If power is present, then the main control board is faulty and needs to be replaced.

### Machine Enable Circuit

6. If the red LEDs illuminate but the green LEDs do not illuminate (and the battery voltage measured above is not depleted), then it is likely that the controller believes the machine is being charged.
  - Inspect the 2 machine enable wires between the control board (C- and C+) and the charger for breaks or an open circuit. An open circuit on these wires will disable the machine as though it was being charged.
  - Measure the voltage between these two wires as you cycle the machine power switch and cycle the battery charger power, and compare the results to the table data on [page 15](#).



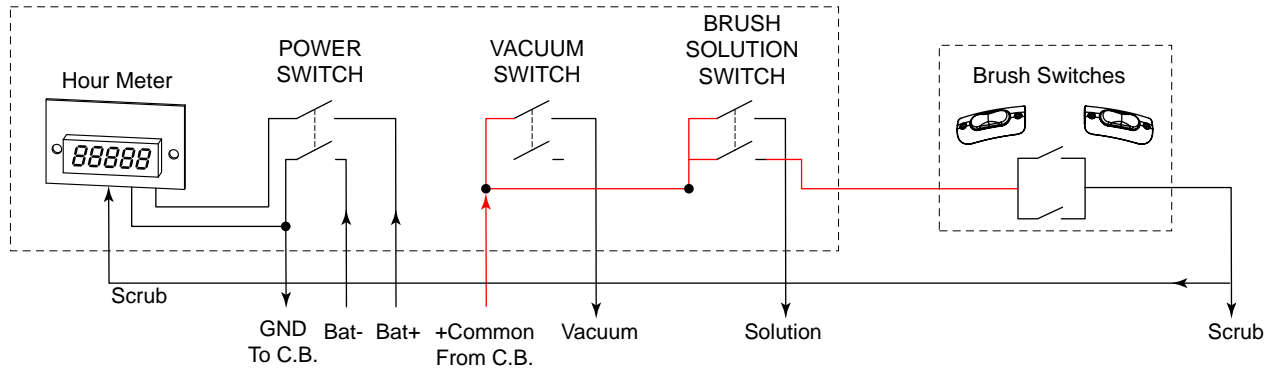
Charger and Power Switch Status	Voltage between Machine Enable and +Com				Charger relay resistance w/o control board ‡
	Normal	Open circuit at Controller	Open circuit at charger	Short Circuit †	
Charger = off Power = off	0 V	0 V	0 V	0 V	0 Ω (short)
Charger = off Power = on	0 V	0 V	24 V	0 V	N/A
Charger = on Power = off	0 V	0 V	0 V	0 V	∞ Ω (open)
Charger = on Power = on	24 V	0 V	24 V	0 V	N/A

† Column-4, Short Circuit isn't specifically applicable to the scenario because the machine would be functioning. However, the machine would also be fully functional when the charger was plugged in.

‡ **Important:** To avoid damaging your multimeter, make sure to disconnect the control board before checking the resistance of the charger relay contacts. Leave the machine turned off.

- The **Red** entries in the table above are the measurements that are indicative of the associated failure modes.
- If all of your measurements show 0 volts (columns 2 and 4 above), turn the machine power off, disconnect the wires, and measure the resistance of the relay contacts in the charger with the charger unplugged and then plugged in. Compare these to the results in the last column of the table above.
- Briefly jumper the two wires together and turn the machine on. If the machine functions normally, then the battery charger is faulty and needs to be replaced.

## Power, Vacuum, Solution, and Brush Switches



Checking the function of the switches in the operator's control panel is typically required for other troubleshooting procedures. The main power switch provides the negative power (GND) to the control board. So nearly all troubleshooting procedures rely on verifying the function of the main power switch. The remaining switches use a shared positive power (+Com) from the control board, which should also be checked.

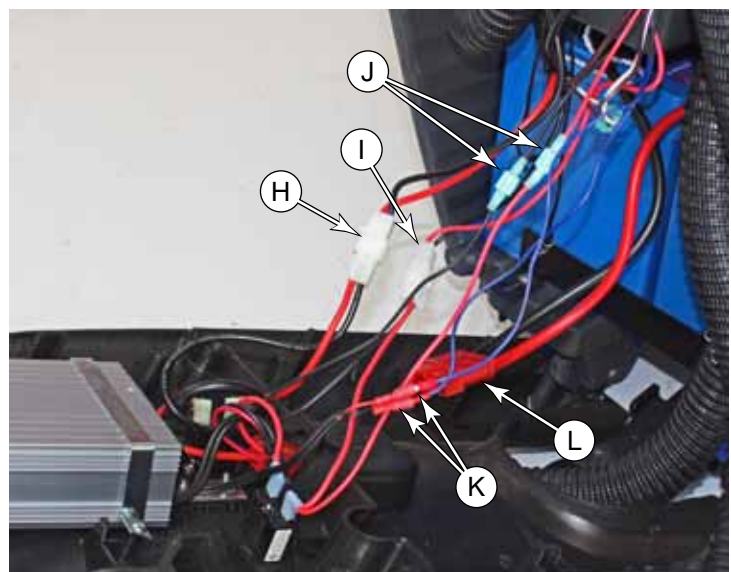
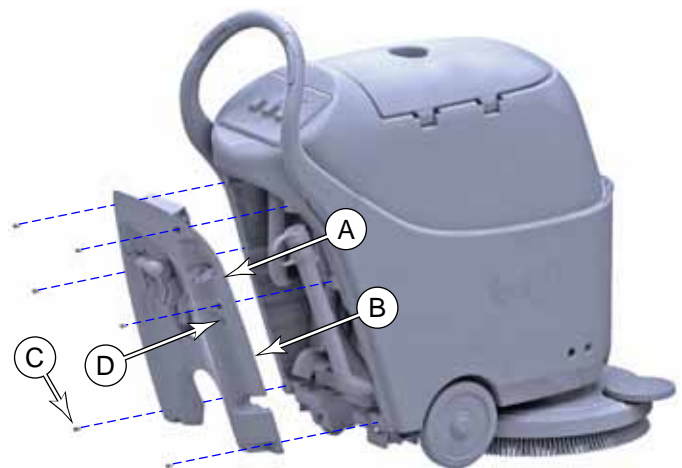
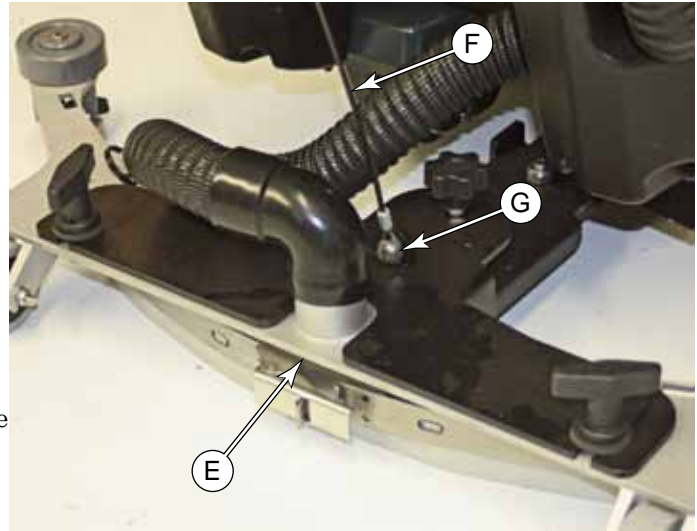
1. Verify incoming battery power at the main power switch (24V between terminals).
  - Note that these switch terminals will provide convenient battery +/- reference test points for the remaining examinations.
2. Verify outgoing power at main switch. Terminal-to-terminal should be 0 volts when the switch is off, and 24 volts when the switch is on.
3. Verify that the control board is providing +Com at the vacuum, solution, and brush switches.
  - When main power switch is on, voltage between Bat- and +Com should be the same as battery voltage.
  - When the main power switch is off, the voltage between Bat- and +Com should be 0 volts.
4. Verify the outgoing power from the vacuum, solution, and brush switches.
  - When the switch is off, the voltage between Bat- and the wire leading to the control board should be 0 volts.
  - When the switch is on, the voltage between Bat- and the wire leading to the control board should be 24 volts.

## Removal and Installation

### Rear Covers (Control Cover)

The rear covers provide access to the control board, brush relay, batteries, and battery charger. Even though the upper and lower covers are separable, it is sometimes best to remove them as a single cover.

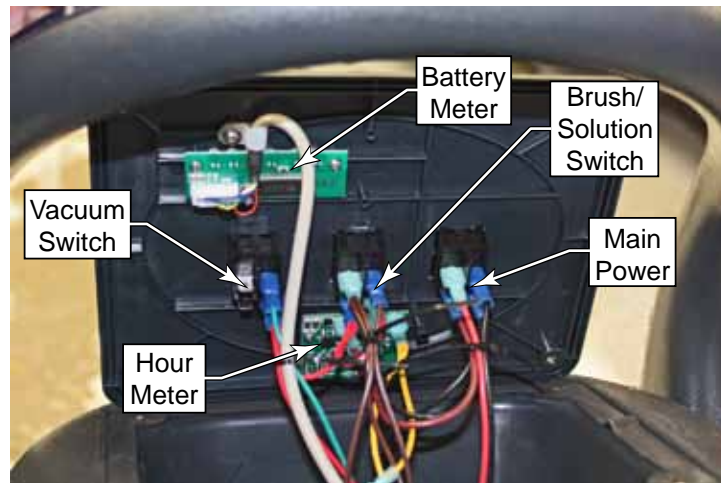
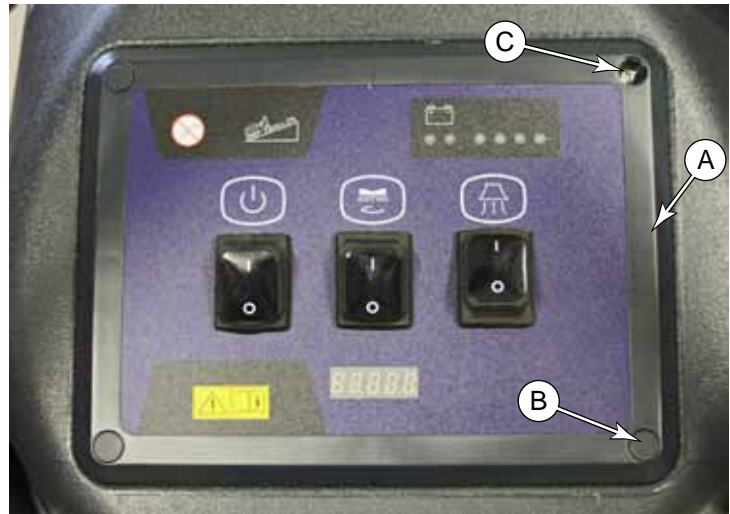
1. Unplug the machine from power.
2. (Optional) You may wish to remove the squeegee assembly **(E)**. When the upper cover is removed, the squeegee will no longer be lifted by the lift cable **(F)**.
3. (Optional) If you need to separate the cover from the machine entirely, you will need to remove the squeegee lift cable **(F)**. Remove the bolt **(G)** and remove the cable.
4. Free the recovery drain hose from its clip and lay it to the side.
5. Remove the 6 screws **(C)** that secure the upper **(A)** and lower **(B)** covers to the machine.
  - The 2 screws **(D)** at the top of the lower cover do not need to be removed at this time, but may be removed later if you wish to separate the upper and lower covers.
  - During reassembly, you may find it easier to install the covers separately. Install the upper cover first.
6. Free the covers from the vacuum and recovery hoses, and remove the covers.
7. To separate the cover(s) from the machine, remove the following wire connectors and tethers:
  - Brush motor power **(H)**
  - Vacuum motor power **(I)**
  - Control board power wires **(J)**
  - Machine enable wires **(K)** from battery charger
  - Main battery disconnect **(L)**
8. Either remove the screw from each of the 3 support cords (tethers), or unwrap the tether from the eyelet.



## Control Panel

The control panel contains the machine control switches, battery indicator LEDs, and the optional hour meter.

1. Disconnect the main battery connector.
2. Carefully pry up the 4 screw covers **(B)**. Take care not to damage them or the bezel.
3. Remove the 4 screws **(C)** that secure the control panel **(A)**.
4. Carefully lift the control panel up to expose the wiring below.
5. Remove the battery meter connector from the battery meter circuit board.
6. Using tape or other label, make note of which wiring bundles are connected to each of the 3 switches, and remove the wires from each switch.
  - During replacement, take care not to mix the positive and negative wires on each side of the main power switch.
7. Unplug the 3 wire terminal lugs from the hour meter.

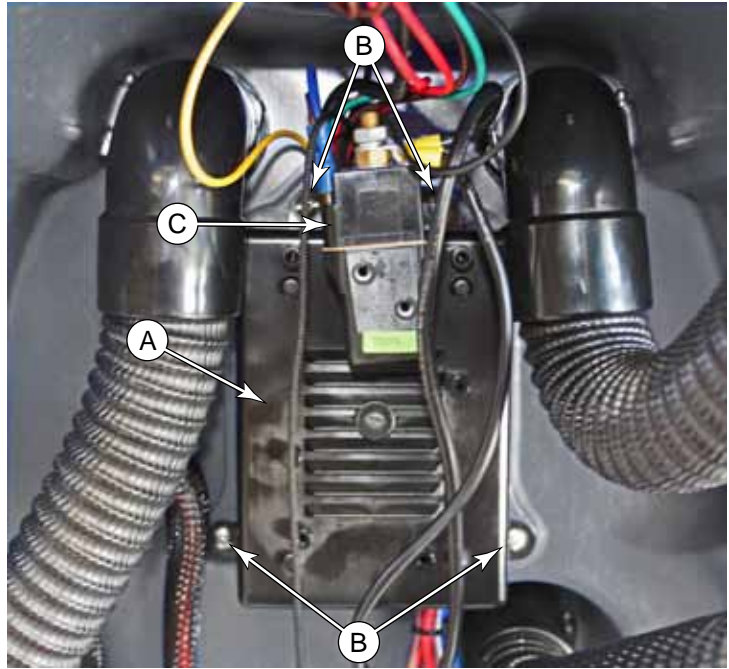


## Control Board

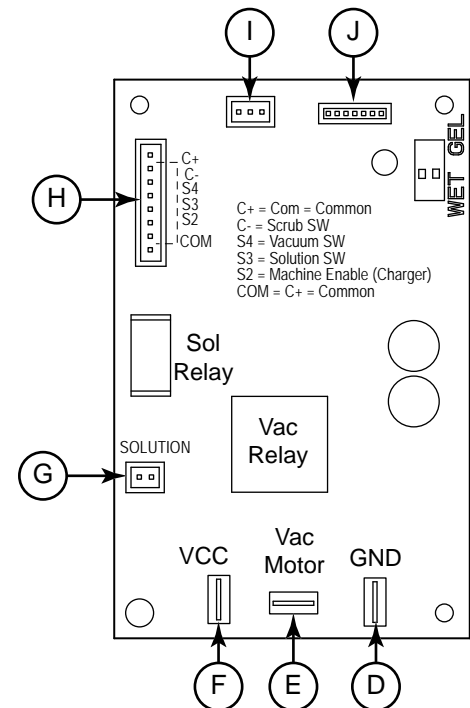
### Brush Motor relay

The control board is located between the recovery and drain hoses behind the upper rear cover of the machine. The brush motor relay is attached to the control board enclosure. The two procedures are interrelated.

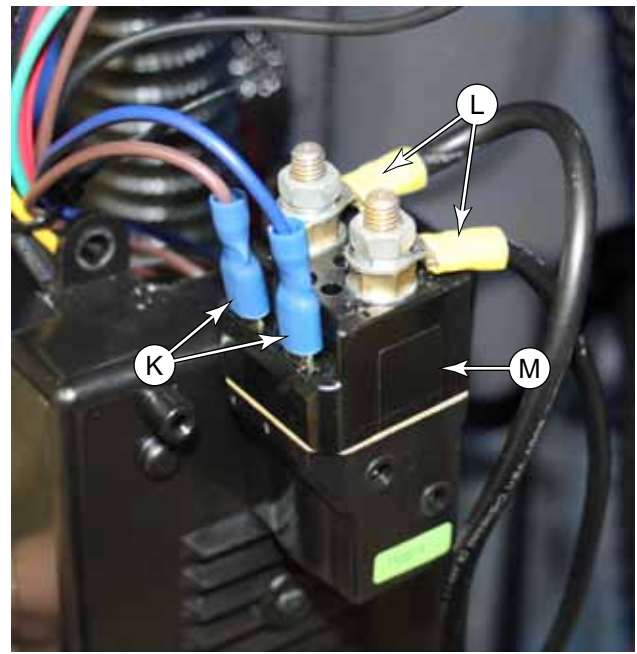
1. Remove the [Rear Covers \(Control Cover\)](#) described on page 17.
  - Make sure to unplug the main battery disconnect during the procedure.
2. Remove the 4 screws **(B)** that secure the control board enclosure to the machine.



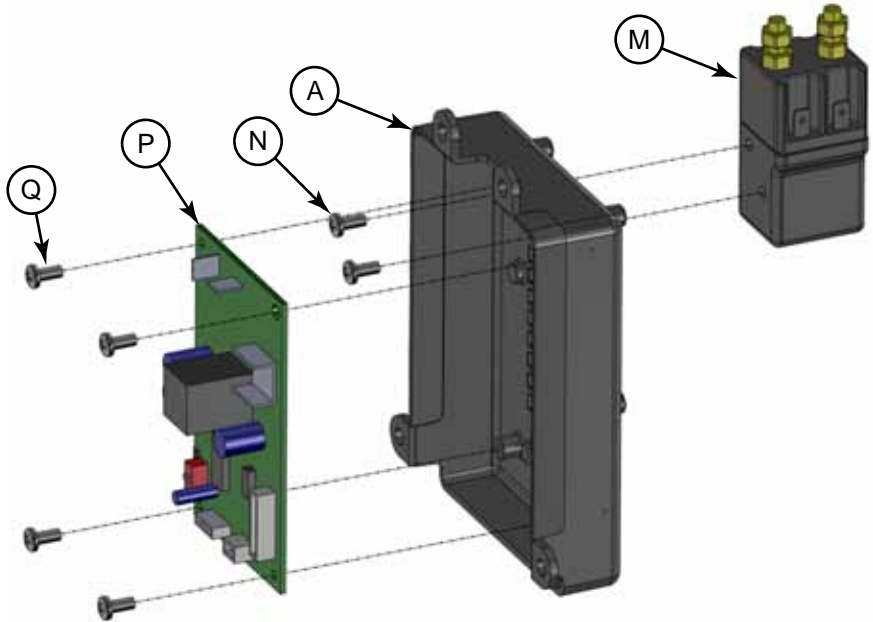
3. Carefully move the control board away from the machine enough to reach the electrical connections on the back side. Remove the following connectors:
  - Main power negative/ground **(D)**
  - Main power positive **(F)**
  - Vacuum motor positive **(E)**
  - Solution solenoid **(G)**
  - Operator switches **(H)**
  - Brush motor relay coil **(I)**
  - Battery level LED board **(J)**



4. Remove the 2 coil wires (**K**) from the brush relay (**M**).
5. Remove the two power wires (**L**) from the brush relay.



6. Remove the 4 screws (**Q**) that secure the control board (**P**) to the enclosure (**A**), and remove the control board.
7. Remove the 2 screws (**N**) that secure the brush relay (**M**) to the enclosure, and remove the relay.

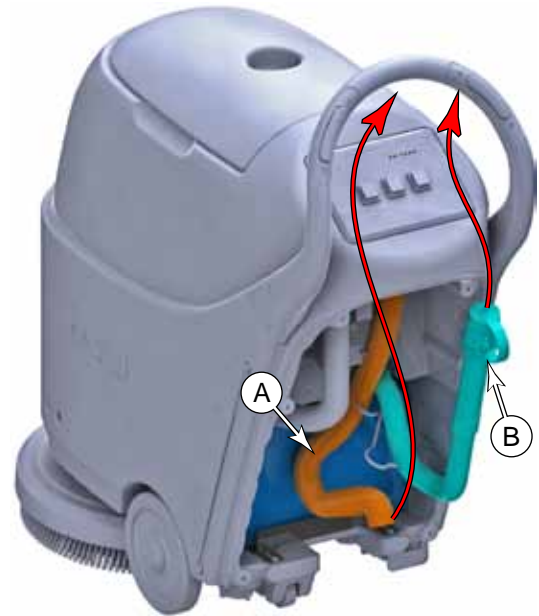


## Batteries

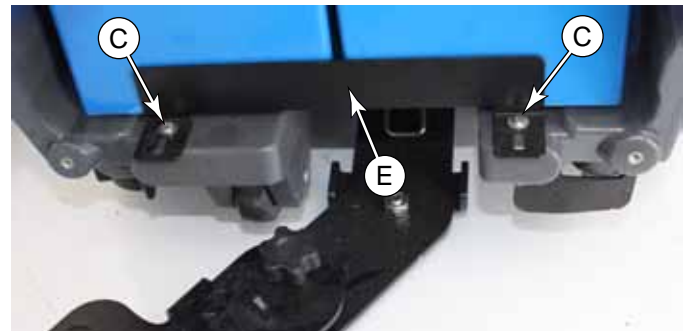


**Caution:** Care must be taken to avoid shorting the battery terminals or battery wires. Never rest tools on top of the batteries, as they can contact and short across the battery terminals.

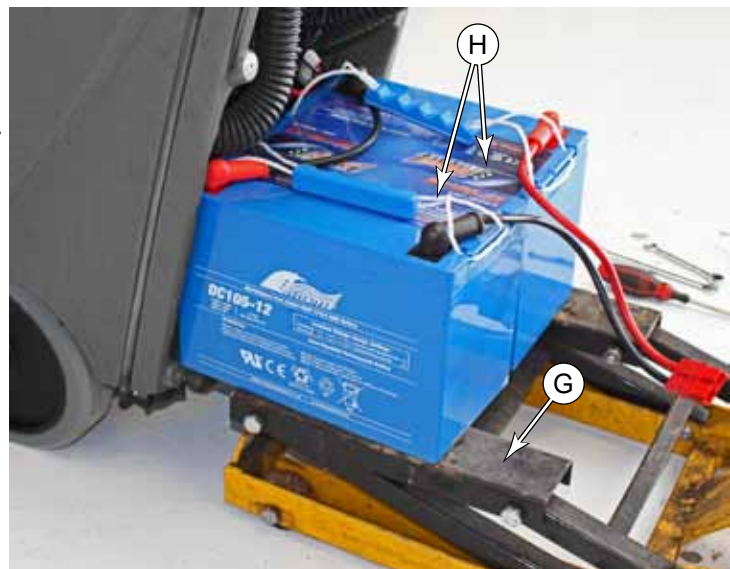
1. Remove the Squeegee Assembly.
2. Remove the [Rear Covers \(Control Cover\)](#) described on page 17.
  - For battery access, only the lower cover need be removed. Remove the 2 screws marked **(D)** in the procedure.
  - Remove the squeegee lift cable **(F)** in the procedure.
  - Unplug the main battery disconnect in the procedure.
3. Route the vacuum hose **(A)** and recovery drain **(B)** through the operator's handle to keep them out of the way during the procedure.



4. Remove the 2 screws **(C)** that secure the battery retaining bracket **(E)**, and remove the bracket.



5. Position a platform or lift **(G)** in back of the machine that matches the height of the battery compartment.
6. Simultaneously slide both batteries **(H)** out of the machine and onto the lift.
  - The batteries are not mechanically joined, but they are connected by the rear battery cable, and must be moved together.

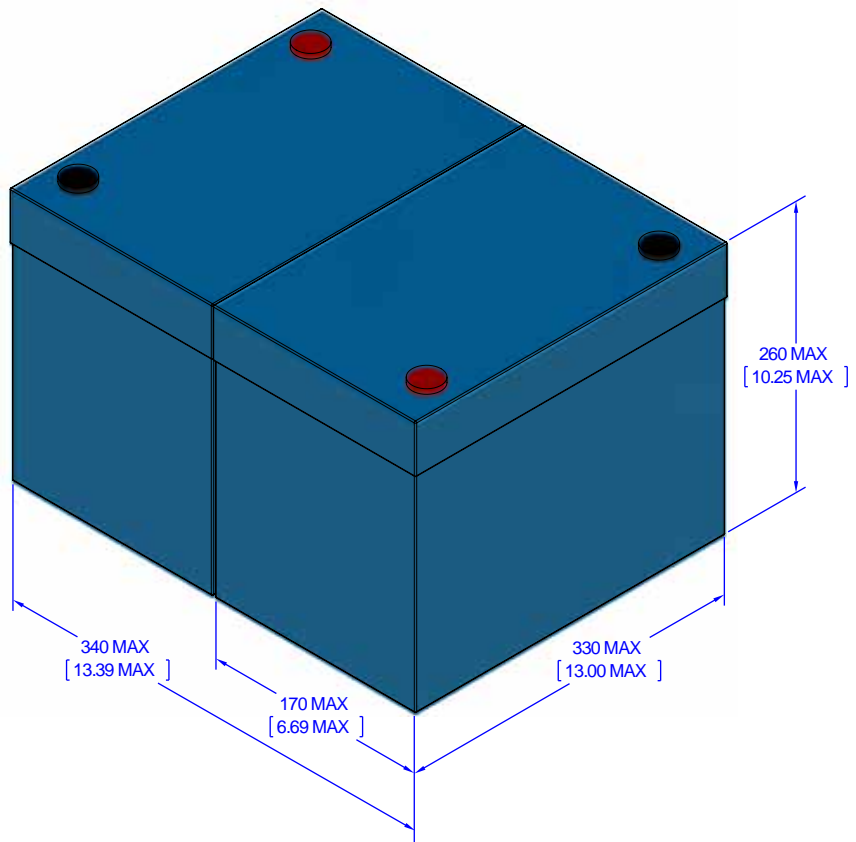


Make sure the replacement batteries fit the machine. They may be either wet-type, AGM-type, or Gel 12-volt batteries, but AGM is preferred. The original batteries are:

- L:307 x W:169 x H:211 mm

The machine maximum capacity is:

- L:330 x W:170 x H:260 mm
- L:13.0 x W:6.7 x H:10.25 in.



**Caution:** Care must be taken to correctly connect the battery cables to avoid damaging the machine or the batteries.

7. Slide the protective boots (I) off of each terminal.

8. For easier access, you may temporarily remove the carrying handles (J).

9. Remove the terminal bolts and transfer the rear jumper (K) from the old batteries to the new batteries. Make sure to connect this from positive to negative between the two batteries.

- Torque the terminal bolts to:  
7.1-8.0 ft-lbs, 85-95 in-lbs, or 9.6-10.7 N•m

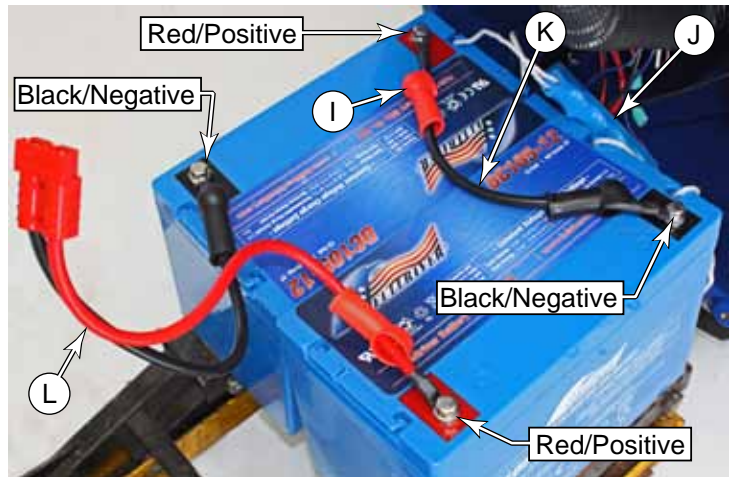
10. Remove the terminal bolts and transfer the battery cable (L) from the old batteries to the new batteries. Make sure to connect this from positive to negative between the two batteries.

- Torque the terminal bolts to:  
7.1-8.0 ft-lbs, 85-95 in-lbs, or 9.6-10.7 N•m

11. To verify proper connection of the battery cables, check the voltage at the battery disconnect connector (L). The voltage should be nominally 24 volts. If not, recheck the cable connections.

12. Slide the protective boots (I) back over the terminals.

13. Replace the carrying handles if they were removed.



Because the machine is frequently tilted, it is important that the batteries fit properly front-to-rear to prevent them from moving during machine use. For batteries that are less than the maximum size, 24 mm spacers are used to fill the space in front of the battery.

- For batteries less than 310 mm (12.25 in) long, use 1-24mm spacer
  - For batteries less than 285 mm (11.25 in) long, use 2-24mm spacers
14. As needed, place 0, 1, or 2 spacer bars **(M)** against the forward wall of the battery bay **(N)**.
  15. Slide the batteries into the battery bay until they are pressing against the forward wall **(N)** or spacer **(M)**.
  16. Reinstall the battery retaining bracket **(E)**.
  17. If the battery type has not changed, finish the reassembly. Otherwise complete the procedure below to set the battery type.



### Setting AGM/Wet Battery Type

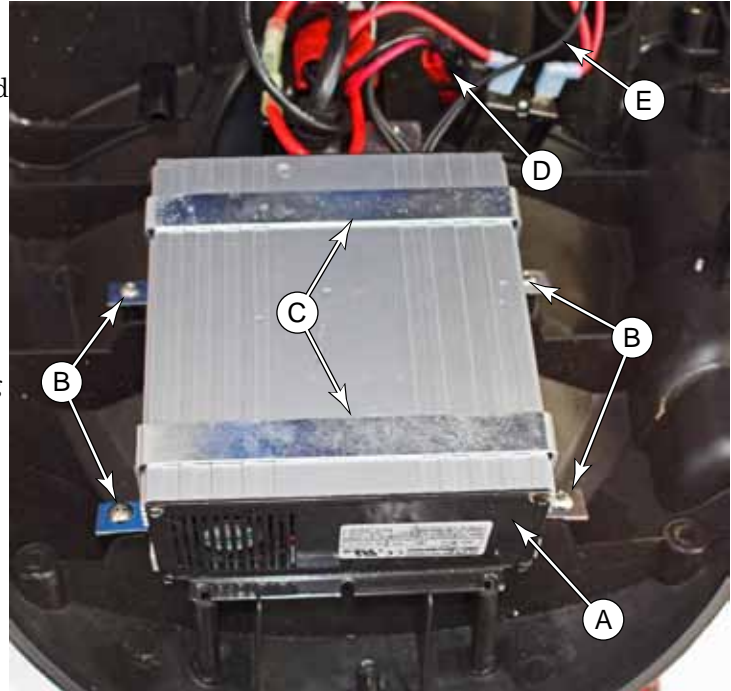
The battery charger uses different charging curves, depending on the battery type. This is controlled by a dip-switch setting in the charger. Additionally, the battery level LEDs on the control panel will function differently for the different battery types. This is controlled by a dip-switch setting on the control board.

1. Complete the procedure to remove the [Battery Charger](#) described on page 24. The end of the procedure contains the settings for the charger's dip-switch settings.
  - It is not necessary to disconnect any wires from the charger. Just free the charger from the rear cover to access the dip-switches.
2. Remove the control board enclosure as described on [page 19](#), but it is not necessary to unplug any wires.
3. The dip-switches are located at the bottom-left corner of the control board. Move both switches to either "Wet" or "GEL", as necessary. (Use "GEL" for AGM batteries.)

### Battery Charger

The battery charger is located on the inside of the rear cover, and is connected directly to the batteries. The charger is microprocessor controlled and uses different charging curves for optimal performance for different battery types.

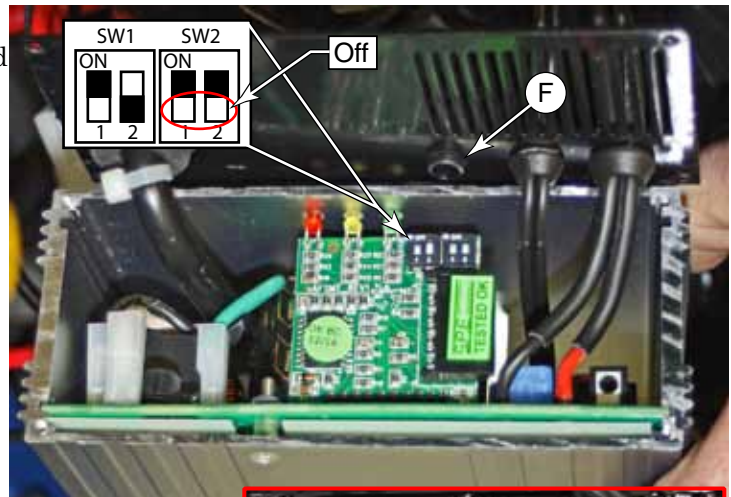
1. Remove the [Rear Covers \(Control Cover\)](#) described on page 17.
2. Disconnect the cable connector (D) leading to the batteries.
3. Disconnect the two wire terminals (E) leading to the control board.
4. Remove the 4 screws (B) that secure the mounting straps (C) to the cover, and remove the charger (A).



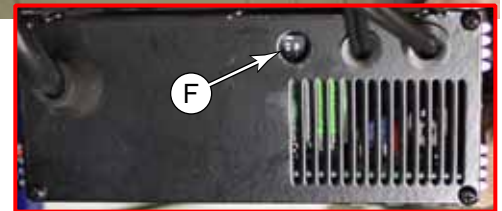
### Battery Type Dip-Switches

The charger’s functions are controlled by 4 dip-switches (2-pair) inside the back cover. The second 2 switches should never be touched unless the charger has been replaced and their position needs to be confirmed. They set the battery voltage (24V) and maximum amperage (10A), and should always be in the Off position.

The first 2 switches are accessible through a plastic plug without opening the charger. These switches set the type of charge curve used for each type of battery. The curve type signifies the manner and magnitude in which current and voltage are applied to the battery during its distinct phases of the charge cycle.



1. Only if the charger is new and the 2nd pair of DIP switches need to be confirmed, is it necessary to remove the rear cover.
2. Remove the plastic plug covering the DIP switch access hole (F).
3. Set the first 2 DIP switches according to the table data below.
4. Replace the plastic plug.



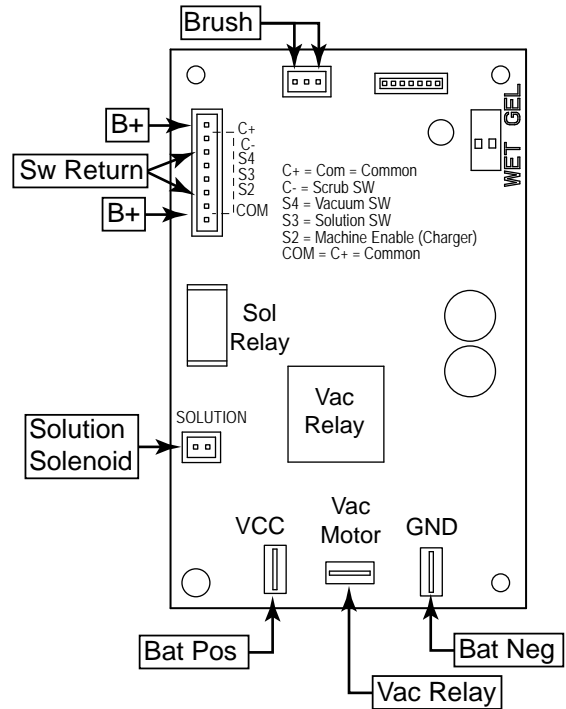
Battery Type/Brand	Curve Type	SW1		SW2	
		D1	D2	D1	D2
Lead-acid (Wet) batteries	IUIa-ACD	On	Off	Off	Off
Gel batteries, Exide-Sonnenschein	IUIa-GEL	Off	Off		
HAZE Gel and Most AGM batteries (Default)	IUUO-GEL	Off	On		
Discover AGM batteries	IUIUa-GEL	On	On		

## Specifications

### Shop Measurements

The following table represents actual machine voltage measurements. Because battery voltage will vary with level of charge, those values within 0.1 volts of the current battery voltage are listed simply as “B+”.

Taking a measurement between VCC and GND terminals when the main power switch is on will establish your current battery voltage (B+).



Test Point	Reference Point	Active	Inactive	Comment
Vac Relay	GND	B+	0V	Active-high
Solution Solenoid	Itself	B+	0V	Active-high, polarity not important
Com, C+	GND	B+	B+	Always active power to switches
C-, Machine Enable	GND	B+	0V	See <a href="#">page 14</a>
S4, Solution Switch	GND	B+	0V	Active-high switch return
S3, Vacuum Switch	GND	B+	0V	Active-high switch return
S2, Scrub Switches	GND	B+	0V	Active-high switch return
Brush Relay	Itself	B+	0V	Active-high, polarity not important

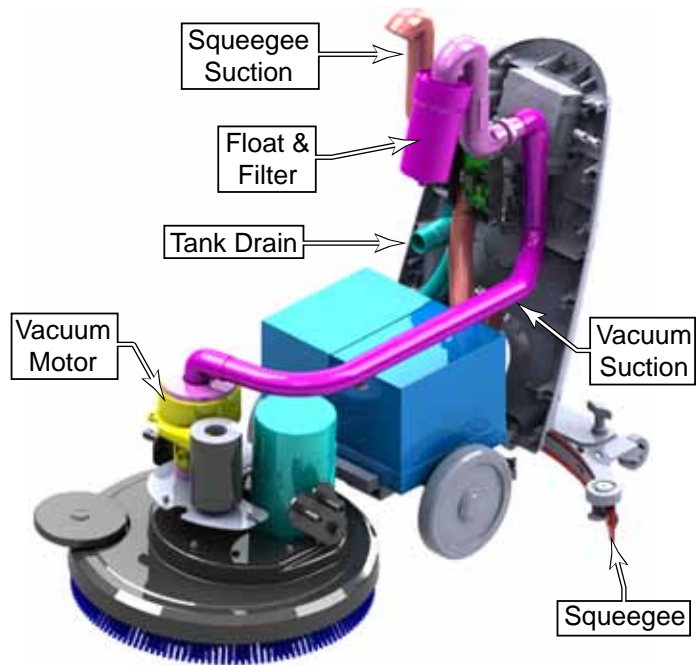
## Recovery System

### Functional Description

The purpose of the recovery system is to remove water from the floor. The vacuum motor creates negative pressure in the recovery tank by sucking air out of the tank through the vacuum suction hose. To protect the vacuum motor from ingesting water, a ball float is located at the end of the vacuum suction hose inside the recovery tank. When the tank's water level reaches the float ball, the ball rises until it blocks the inlet of the suction hose.

The negative pressure inside the recovery tank (not shown) causes air/water to be drawn in through the squeegee suction hose. The recovery tank serves to isolate the air/water stream in the squeegee suction hose from the air-only stream in the vacuum suction hose. The water and debris drawn in through the squeegee suction hose falls out of the stream into the bottom of the recovery tank. A separate tank drain hose is used to drain this water and debris from the tank.

The squeegee suction hose draws air/water from the squeegee assembly. The squeegee consists of two squeegee blades: a forward, notched blade, and a rear scraping blade. The notched blade permits water to pass into the space between the two blades, where it is drawn into the suction hose.



## Troubleshooting

The following sections present some common troubleshooting scenarios based on symptom.



**Warning!** *Risk of electrical shock. Some of the procedures below require examining parts of the machine while electrical power is present. Use care when examining or troubleshooting the machine when power is present. Always disconnect power from the machine before and after these examinations are performed.*

### Vacuum Motor

The vacuum motor circuit gets its positive-power from the control board, and negative-power direct from the battery disconnect. Failure of the vacuum motor can generally be isolated to 1 of 3 areas: motor brushes, control board failure, or switch failure. The brushes may be the most likely cause, but it is easiest to eliminate other causes before disassembling the machine.

1. Verify that the vacuum switch is functioning by performing the procedure [Vacuum Motor Brushes](#) described on page 30.
2. Check the voltage from the control board when the vacuum should normally be running. The voltage between the “Vac Motor” terminal and “GND” terminal should be 24 volts. If 24 volts is not present, replace the control board.
3. Remove the vacuum motor from the machine (a prerequisite to replacing the motor brushes), and check the voltage at the motor. If 24 volts is present, then replace the brushes as described on [page 30](#).

### Weak Suction

The most common cause for weak suction is a vacuum leak, but it may also be caused by a blockage.

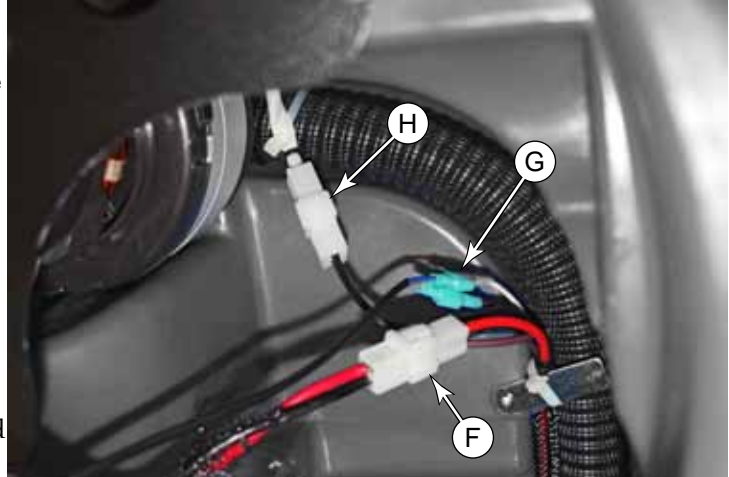
- A blockage can be identified as the cause if the vacuum pressure feels weak when air is flowing, but feels strong when completely blocked (high static pressure). If a blockage is suspected:
  - Inspect and clean the float/filter canister in the recovery tank.
  - Inspect the suction lines for obstruction.
- A vacuum leak can be identified as the cause if the vacuum pressure is low when blocked or unblocked. If a vacuum leak is suspected:
  - Make sure the recovery tank cover is properly closed and seated.
  - Make sure the recovery tank cover gasket is not damaged or torn.
  - Make sure the recovery tank drain hose is not open.
  - Inspect the squeegee suction hose for tears or holes.
  - Inspect the squeegee blades for tears, and proper trim adjustment ([page 46](#)).
  - Inspect the vacuum suction hose between the vacuum motor and recovery tank.

## Removal and Installation

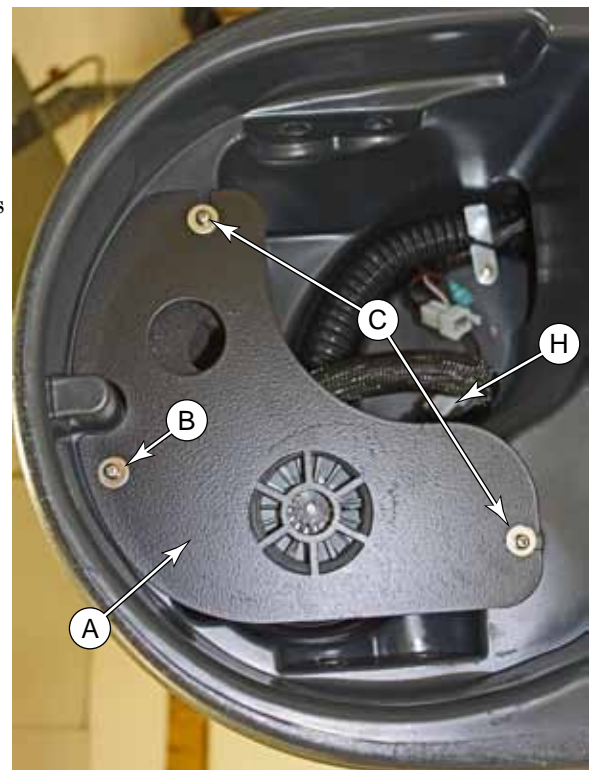
### Vacuum Motor

The vacuum motor is located above the scrub deck. The inlet to the vacuum motor comes from the recovery tank via a flexible hose. The exhaust from the motor passes through a sound attenuator and out of the machine above the scrub deck.

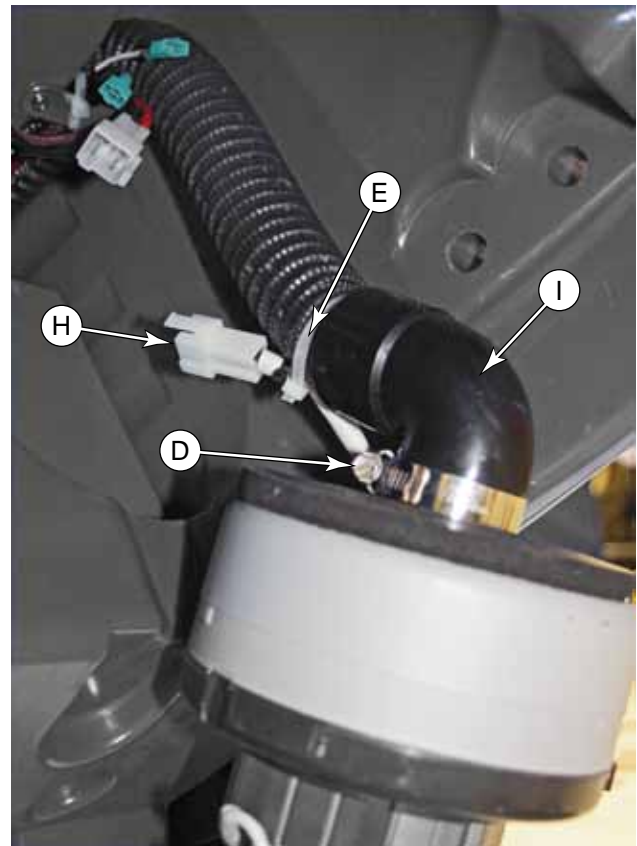
1. Make sure the solution and recovery tanks are empty. Excess weight in the tanks can throw off the balance of the machine when the weight of the scrub deck is removed from the machine.
2. Remove the [Scrub Deck](#) described on page 34.
  - When disconnecting the motor connector **(F)** and solution solenoid connectors **(G)** in the procedure, also disconnect the vacuum motor connector **(H)**.
3. Prop the machine up so it does not tilt forward while working under the recovery tank.



4. Remove the forward-most mounting screw **(B)** from the vacuum plate **(A)**.
5. Loosen, but do not remove, the two rearward mounting screws **(C)** from the vacuum plate **(A)**. (The screws may be removed, but reinstallation is easier when the screws remain in position.)
6. Slide the vacuum plate out from the mounting screw slots, and support the motor as you remove the plate.

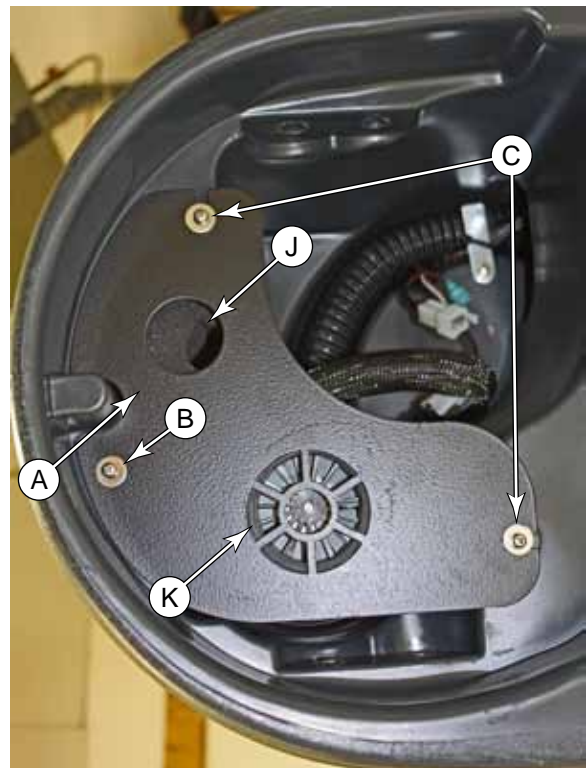


7. Carefully cut the wire tie (**E**) that holds the motor connector (**H**) to the vacuum hose.
8. Loosen the hose clamp (**D**) and remove the motor from the vacuum hose.



### Replacement Notes

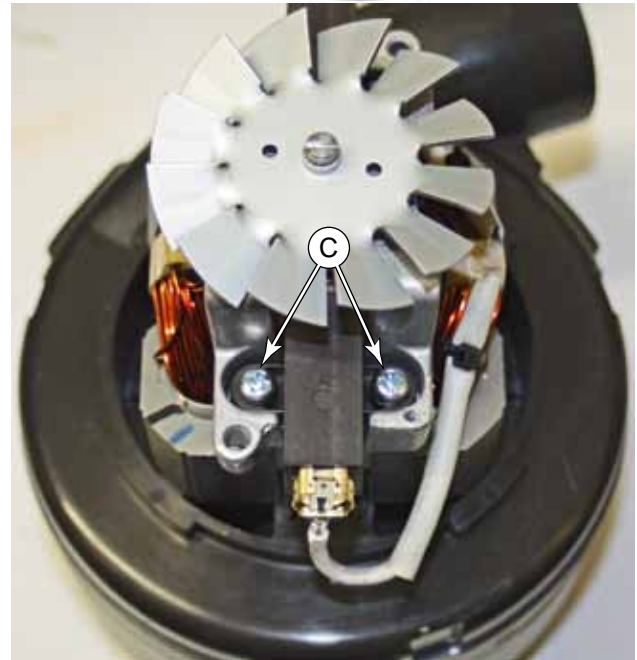
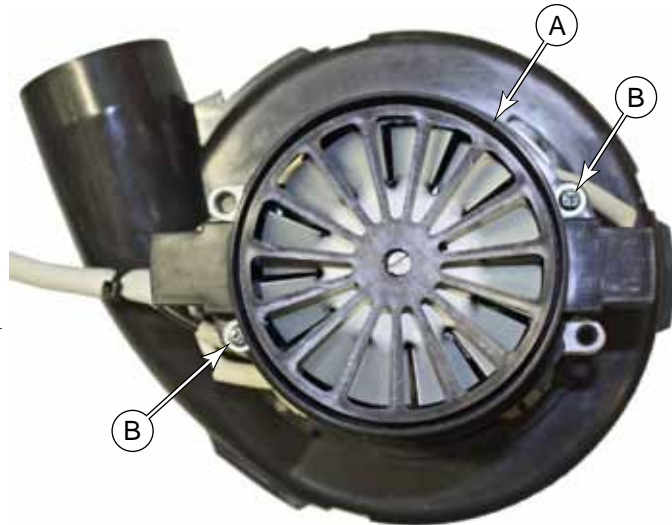
- The rotational position of the vacuum hose elbow (**I**) determines the rotational position of the blower's exhaust (**J**), which must line up with the hole in the vacuum plate. To set this position, leave the hose clamp (**D**) slightly loose, put the motor in position and rotate the motor as needed. Then lower the motor to tighten the hose clamp.
- The vacuum motor is supported by the lower gasket (**K**) against the vacuum plate. You may find it helpful to temporarily hold the gasket to the motor with a piece of tape while positioning the vacuum plate. Remove the tape after the plate is installed.
- Reinstalling the vacuum plate and motor is easiest if the rearward mounting screws (**C**) are in position but left loose.
- Before installing the forward screw (**A**), make sure the exhaust (**J**) and motor gasket (**K**) are centered in their respective holes.



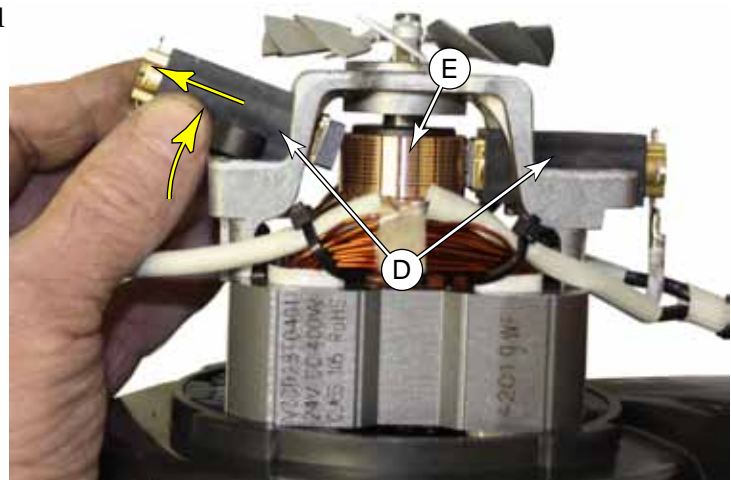
## Vacuum Motor Brushes

The vacuum motor brushes are a wear item that should periodically be inspected and replaced.

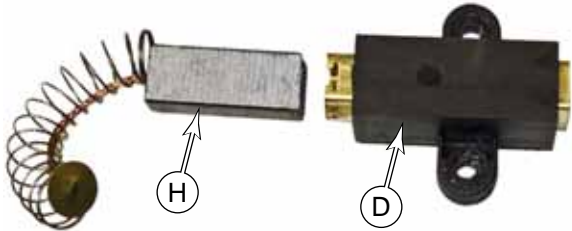
1. Make sure the solution and recovery tanks are empty. Excess weight in the tanks can throw off the balance of the machine when the weight of the scrub deck is removed from the machine.
2. Remove the [Scrub Deck](#) described on page 34.
3. Remove the [Vacuum Motor](#) described on page 28.
4. Remove the two screws **(B)** that secure the brush cover **(A)**, and remove the cover.
5. Remove the two screws **(C)** that secure the brush holder **(D)** to the motor.



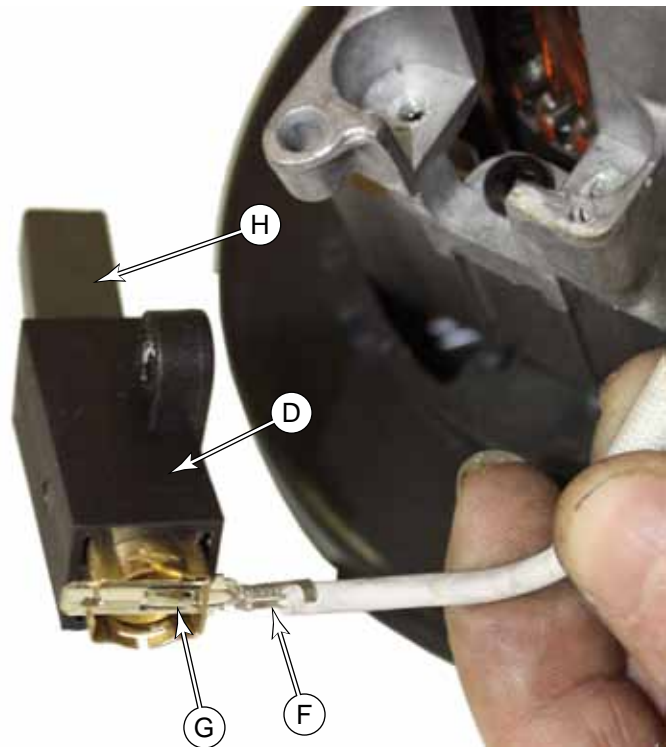
6. Tilt the brush holder **(D)** out of its pocket, and slide it away from the motor.
7. Examine the commutator bars **(E)**. If any are damaged or missing, replace the motor.



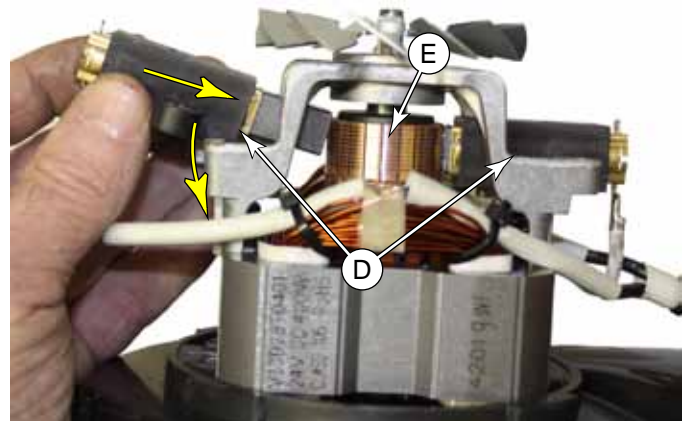
8. Press in on the retaining tab **(G)** and slide the brush wire **(F)** out of the brush holder.
9. Slide the brush **(H)** out the rear of the brush holder **(D)**.
10. Slide the new brush into the brush holder.



11. With the brush and its spring contact plate fully inserted into the brush holder, replace the brush wire **(F)** into the brush holder. The brush wire also serves to retain the brush, so it needs to be installed before the brush holder is replaced in the motor.



12. Align the tip of the carbon brush **(H)** against the commutator **(E)**.
13. Slide the brush holder inward, compressing the spring.
14. Lower the brush holder into the pocket in the motor housing.
15. Reinstall the two retaining screws **(C)**.
16. Repeat the process for the second brush.
17. Before replacing the brush cover, examine the cooling fan impeller for damaged or bent blades.
18. Replace the brush cover **(A)**.



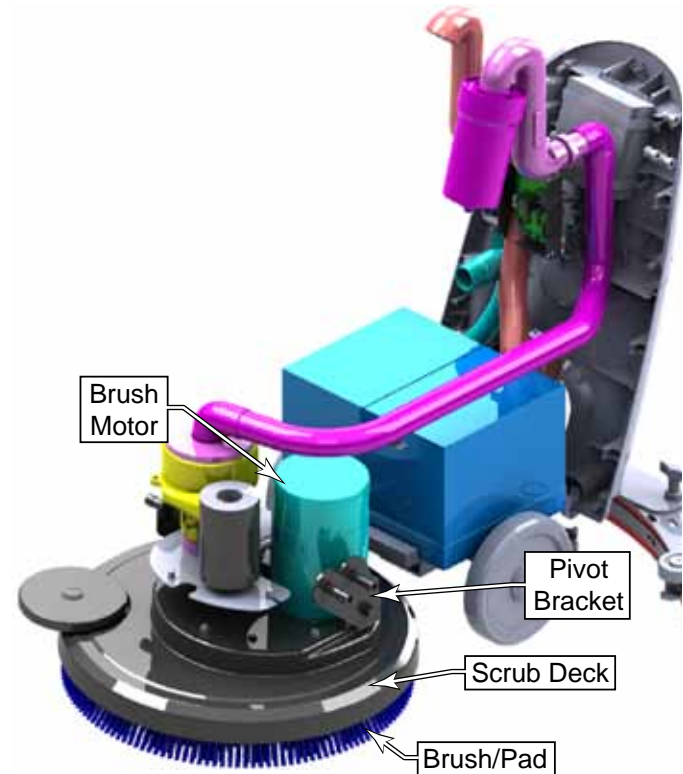
19. Reinstall the vacuum motor in the machine as described on [page 29](#).

## Scrub System

### Functional Description

The scrub system consists of scrub brush or pad, which is powered by a drive belt from the brush motor. The drive belt and pulleys results in nearly a 10-to-1 speed reduction of the brush. This significant speed reductions results in a proportional increase in torque.

The scrub deck floats on a pair of pivot brackets. This allows the scrub brush/pad to rest flat on a floor as the machine moves. The left of these pivot brackets is rigid in height position, but the other floats vertically. This applies a slightly greater force on the left side of the scrub pad, which in turn assists in propelling the machine forward.



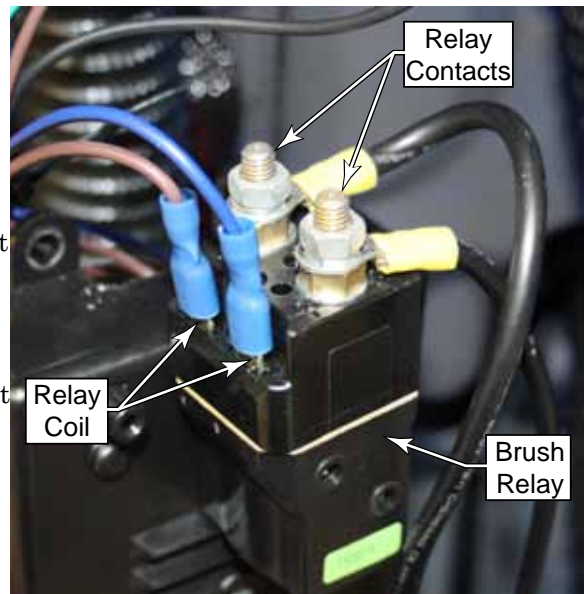
## Troubleshooting

### Brush Motor

The brush motor is a DC-powered, internally commutated (carbon brush) motor. The motor receives positive battery power through its own dedicated 30-amp circuit breaker. Negative battery power comes from the brush relay located adjacent to the control board. The brush relay coil receives both positive and negative power directly from the control board. Failure of the brush motor can generally be isolated to the 30-amp circuit breaker, the brush relay, the motor's carbon brushes, the control board, or the brush switches in the machine handle.

If the brush motor is non-functional, make the following inspections and observations. The sequence of the following examinations is based on ease of access, and not necessarily by likelihood to occur.

1. Check the function of the brush circuit breaker.
2. Hold both brush switches closed. If the brush motor works with one switch but not the other, then the switch or the wires at the switch are the cause.
3. Verify the function of the switches by performing the procedure [Power, Vacuum, Solution, and Brush Switches](#) described on page 16.
4. Turn the solution switch on and hold both brush switches.
  - If solution does not flow, then the most likely cause is the control board itself, or the brush switch connection at the control board. If 24 volts is present between C- and GND on the control board, then the control board has failed.
  - If solution does flow, the control board is not likely the cause, but one more check (brush relay coil voltage) is required to eliminate the control board as the cause.
5. Check the voltage across the brush motor relay coil.
  - If 24 volts is not present (and the above examination was complete), then the control board is faulty and must be replaced.
  - If 24 volts is present, then the function of the relay will be identified or eliminated in the next step below.
6. Check the voltage between battery positive and the output lug of the brush relay that leads to the brush motor.
  - If 24 volts is not present but the coil had 24 volts in the previous step, then the relay has failed and must be replaced.

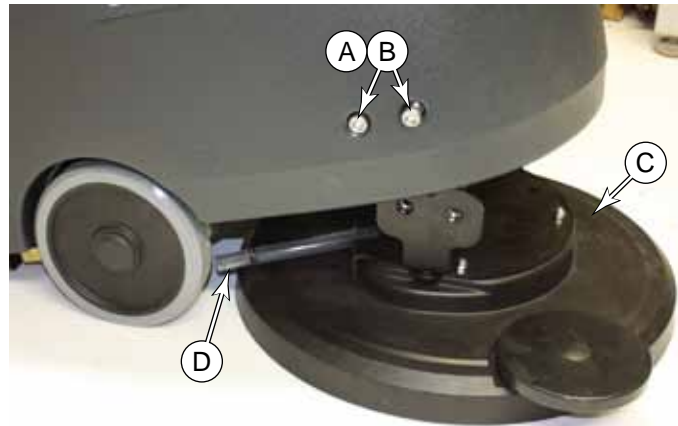
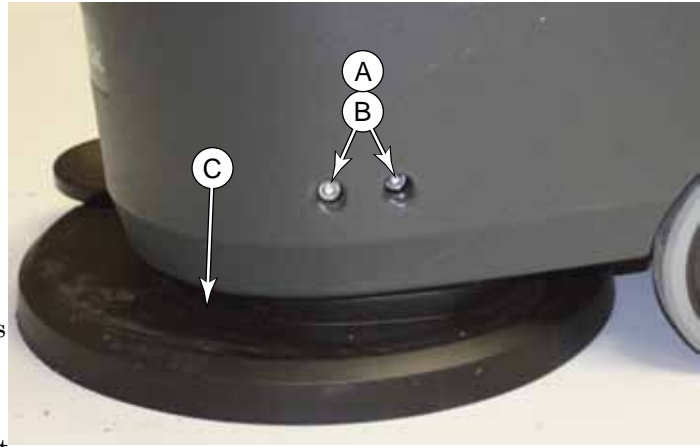


## Removal and Installation

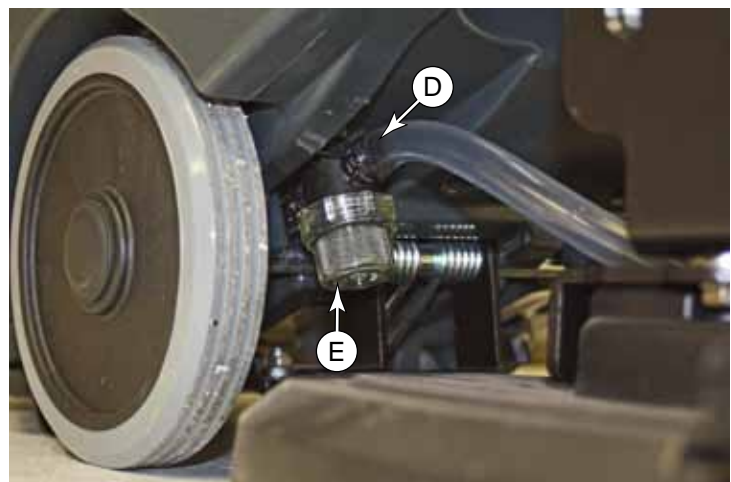
### Scrub Deck

Removing the scrub deck is a prerequisite procedure for many other procedures that require access to the components on or above the scrub deck. Among other items, this provides access to the brush motor, solution solenoid, and vacuum motor.

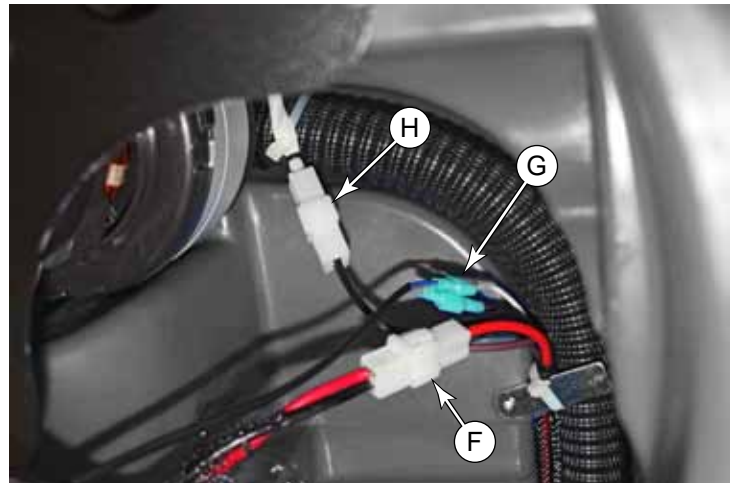
1. Make sure the solution and recovery tanks are empty. Excess weight in the tanks can throw off the balance of the machine when the weight of the scrub deck is removed from the machine.
2. Remove the squeegee to permit the machine to tilt back farther without obstruction.
3. Remove the brush or pad holder from the machine, and rest the scrub deck on the floor as shown.
4. Using a 10mm hex key, remove the 4 socket head cap screws (A) and spacer sleeves (B) that secure the scrub deck (C) to the machine.
5. Slowly tilt the machine back until it is stable and resting on the rear idler wheel. The scrub deck (C) should remain on the floor.



6. Disconnect the solution hose (D) from the solution filter (E).
7. Move the scrub deck forward, but not so far that you pull on the wires.



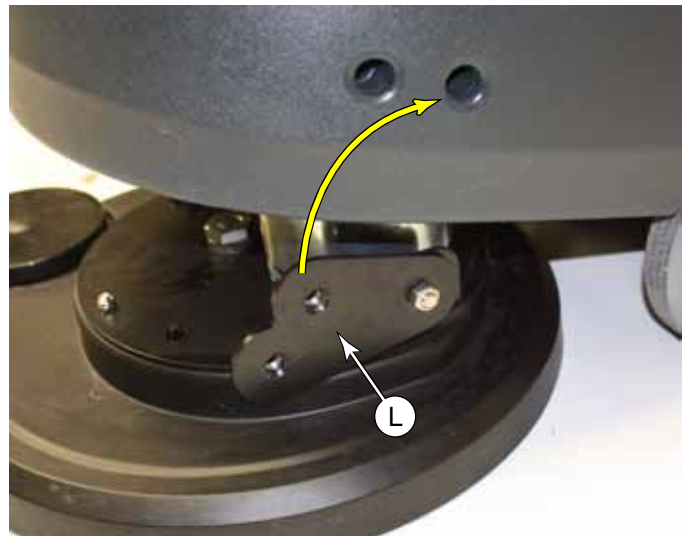
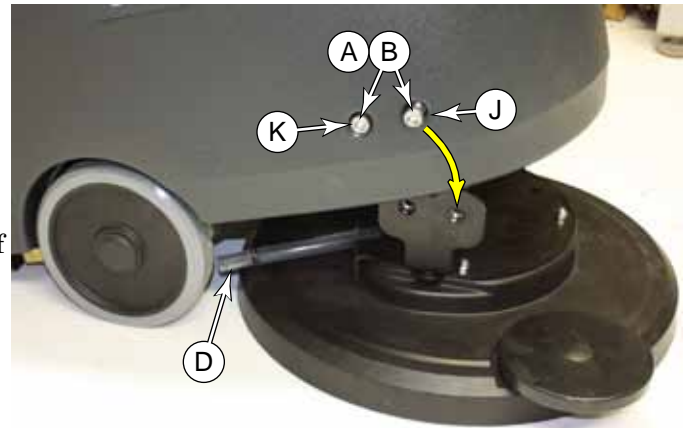
8. Disconnect the motor connector (**F**) and solution solenoid connectors (**G**). It is not necessary to disconnect the vacuum motor connector (**H**), unless you need to service the vacuum motor.



### Replacement Notes

The replacement procedure is the reverse of the disassembly. When installed in the machine, the scrub deck floats on two pivot brackets to aid the operator to propel the machine. The right bracket is rigid, and the left bracket both rotates and slides vertically.

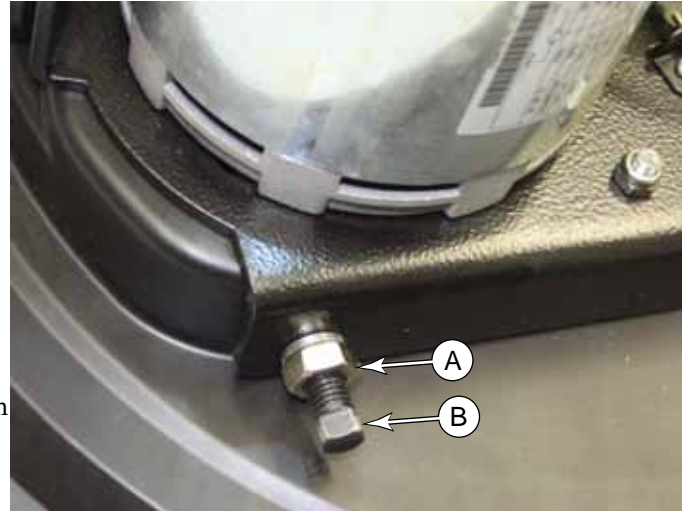
1. Move the scrub deck close enough to the machine to be able to reconnect the electrical connectors, and plug in the motor and solenoid connectors.
2. Move the scrub deck into position below the machine. Verify the position by temporarily lowering the machine to ensure it clears the top of the brush motor. Raise the machine back up.
3. Reconnect the solution line (**D**) to the filter.
4. While holding the left bracket vertical, lower the machine down onto the scrub deck. Make sure the deck mounting brackets line up with the mounting holes.
5. Starting with the right-front hole (**location J**) begin threading the cap screw and spacer (**A&B**), into the mounting bracket.
  - Make sure the screw is not cross-threading into the bracket.
  - Thread the screw far enough to be fully engaged, but leave it loose for now.
6. As necessary, slightly lift the rear of the scrub deck to align the screw holes, and insert the cap screw and spacer into the right-rear hole (**location K**). Leave it loose for now.
7. While holding the left mounting bracket (**L**) aligned with the holes, insert the cap screws and spacers to the left side.
8. After all 4 screws are loosely installed, tighten them all down.



## Brush Drive Belt

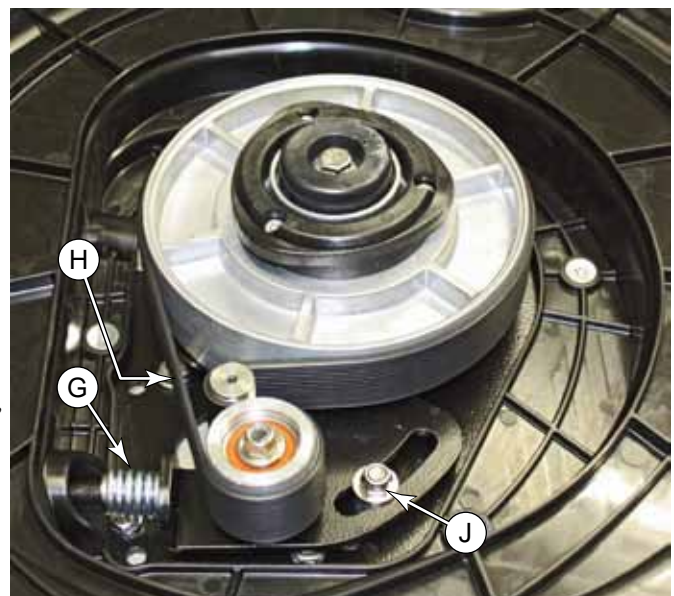
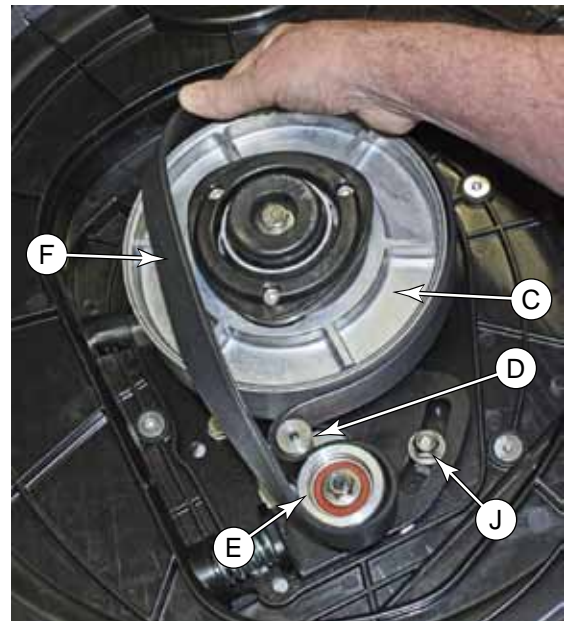
The brush drive belt should be periodically inspected and replaced. The drive belt is ribbed for better engagement with the motor shaft. Belt tension is controlled by a spring loaded idler pulley.

1. Although not required, it is much easier to perform this procedure with the scrub deck removed from the machine. Remove the scrub deck as described on [page 34](#).
2. Loosen the belt tension clamping nut (**J** shown below).
3. Using a 19mm wrench, loosen the belt tension jam nut (**A**).
4. Using a 12mm open-end wrench, fully loosen (but do not remove) the belt tension screw (**B**).
5. Starting at the pad hub (**C**), lift the drive belt (**F**) off the pulleys (**C&E**) and off the motor shaft (**D**).



## Replacement

1. Before replacing the belt, inspect the idler and brush hub bearings. The pulleys should turn smooth and easily, but not so easy that they freewheel-spin. Replace if necessary.
2. Wrap the ribbed side of the belt around the motor shaft. Make sure the ribs are aligned and the top rib on the drive belt is in the top groove on the motor shaft.
3. Wrap the smooth side of the drive belt around the idler pulley (**E**).
4. Finish wrapping the belt around the brush hub (**C**).
5. Begin tightening the belt tension screw (**B**) and make sure the tension spring (**G**) is correctly in position.
6. Continue tightening the tension screw until reasonable hand pressure against the belt at (**H**) deflects the belt approximately 1/8" (3mm).
  - Make sure the tension spring is not fully compressed, and that there is at least some gap between the coils.
7. While holding the tension screw (**A**) from turning, tighten the jam nut (**B**).
8. Retighten the belt tension clamping nut (**J**).



## Motor Carbon Brushes (Battery Model)

The motor brushes provide an electrical connection to the spinning rotor. The motor contains 4 brushes. The brushes will wear over time and must be replaced. The copper strips on the rotor that the brushes contact are called the commutator bars, and these are connected to the individual windings on the rotor.

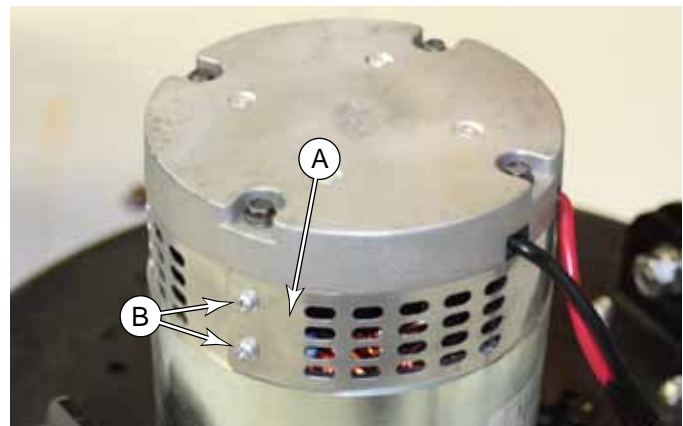
1. Remove the [Scrub Deck](#) described on page 34.

**Caution:** The position of the end bell (top cap) of the motor is critical to the operation and clearances within the motor. Do not remove the end bell. Do not loosen the screws securing the end bell.

**Caution:** Take care to not drop any objects into the motor. The motor contains permanent magnets, which may make retrieving metal objects difficult.

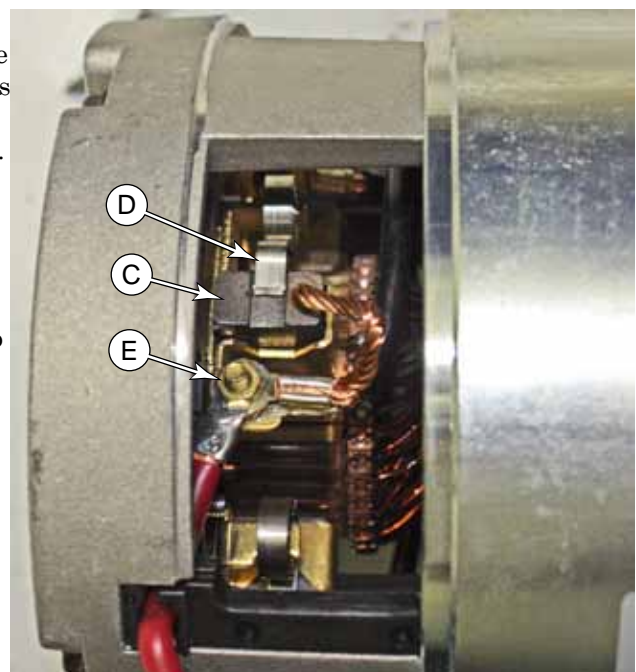


2. Remove the two screws (B) that secure the brush shield (A) to the motor, and remove the shield. Take care when loosening the last screw, as the shield is springy and may fling the last screw.

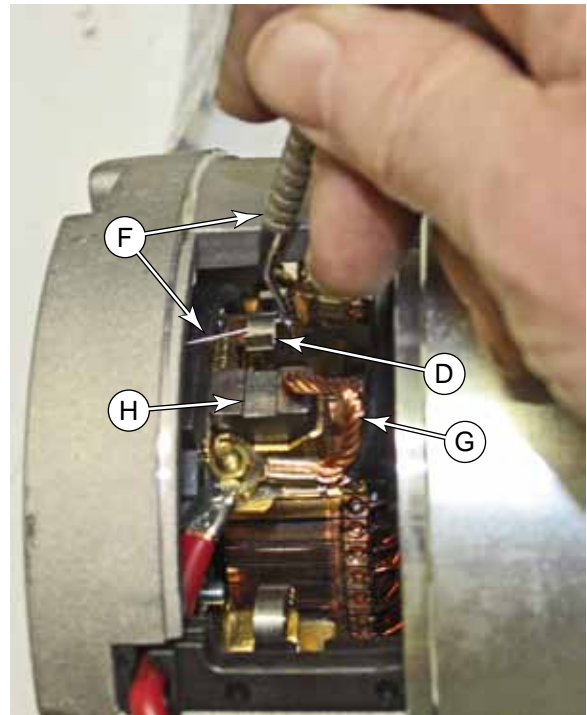
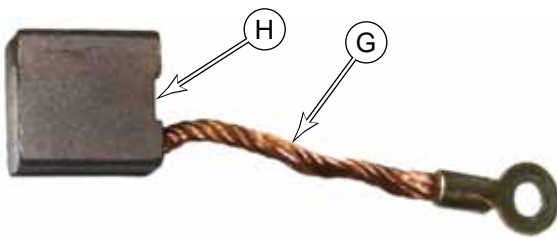


The components of the brush mechanism are shown. There are 4 of these mechanisms spaced around the motor. The coiled spring (D) presses against the top of the carbon brush (C), pressing it against the commutator bars of the rotor. The carbon brush has a flexible, embedded wire that connects to the incoming power connections (E).

3. Remove the terminal nut (E).
  - Take care not to bend the terminal. Hold the terminal from twisting as you loosen the nut.
  - Take care to not drop the nut (or anything else) into the motor.
4. Remove the brush wire from the terminal.



5. Using a small hooked tool, such as a dental tool (**F**), lift the spring (**D**) off the top of the brush. Take care to not release the spring or uncoil it.
6. While holding the spring away from the brush, slide the old brush (**C**) out of the brush holder, and slide in the new brush.
  - Make sure the embedded brush wire (**G**) is facing toward the bottom of the motor (toward the output shaft).
7. Release the spring and make sure it is position in the depression (**H**) in the center of the brush.
8. Connect the wire (**G**) to the terminal (**E**) and tighten the nut. Take care to not bend the terminal.



9. Repeat the steps for the other 3 brushes.

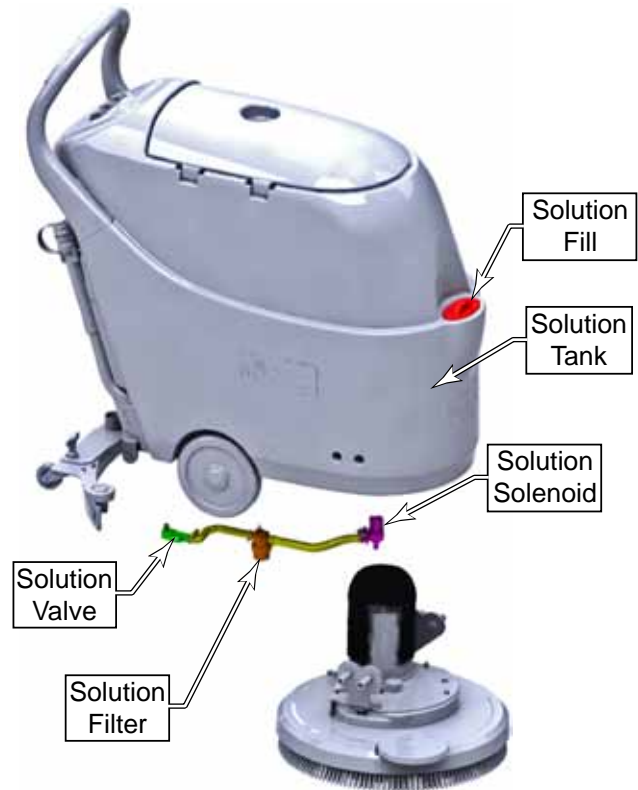
## Solution System

### Functional Description

The solution tank is molded into the main body of the machine, and is located below the recovery tank. It is comprised of the hollow interior of the main body of the machine.

The solution exits the solution tank at the lower-right corner through a flow-control and shutoff valve. The solution then passes through a filter, before reaching the solution solenoid. The solution valve can be adjusted to control the amount of solution flow. The solution solenoid is strictly on/off.

The exit of the solution solenoid is positioned above the scrub brush/pad to put solution into the scrubbing area. The solution solenoid can be active only when the scrub motor is active.

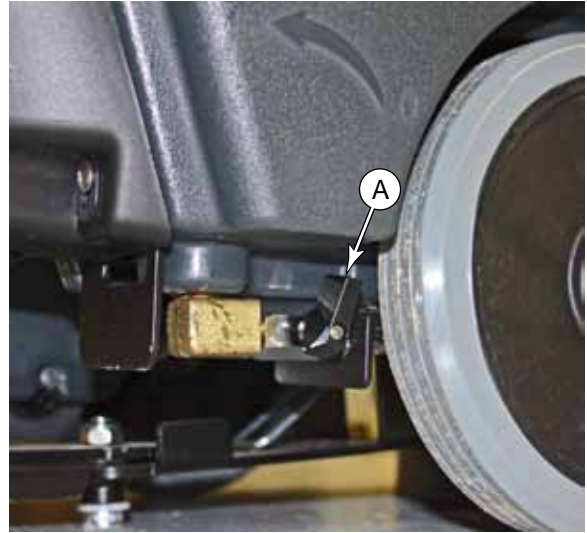


## Maintenance and Adjustment

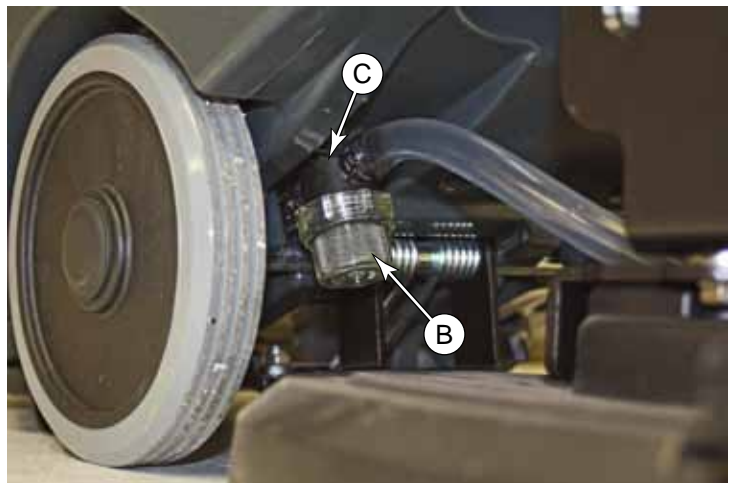
### Solution Filter Cleaning

The solution filter prevents large particles from fouling the solution solenoid, and must be cleaned periodically.

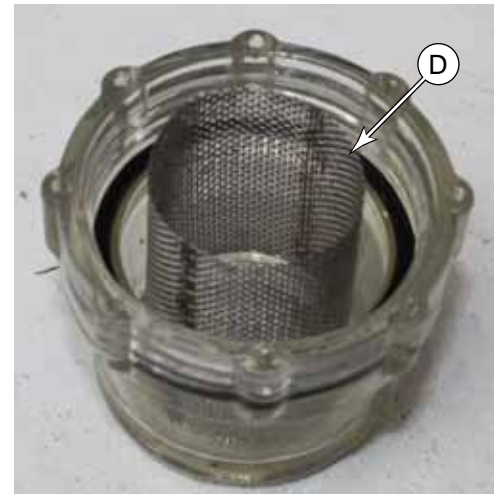
1. Turn off the solution valve **(A)** by rotating the handle perpendicular to the flow.
  - Note that there will still be some water in the lines when you remove the filter.



2. Tilt the machine up to access the filter just behind the scrub deck.
3. Unscrew the filter bowl from the filter body.



4. Rinse the filter bowl and screen **(D)**. **Do Not** try to remove the screen from the bowl.



## Troubleshooting

The following sections present some common troubleshooting scenarios based on symptom.



**Warning!** *Risk of electrical shock. Some of the procedures below require examining parts of the machine while electrical power is present. Use care when examining or troubleshooting the machine when power is present. Always disconnect power from the machine before and after these examinations are performed.*

### Solution Solenoid

The solution solenoid will be active only when the brush motor is active. If the brush motor is not functioning, troubleshoot the brush motor first. The solution solenoid receives both positive and negative power directly from the control board. Failure of the solution solenoid can generally be isolated to 1 of 3 areas: the solenoid itself, the control board, or the solution switch.

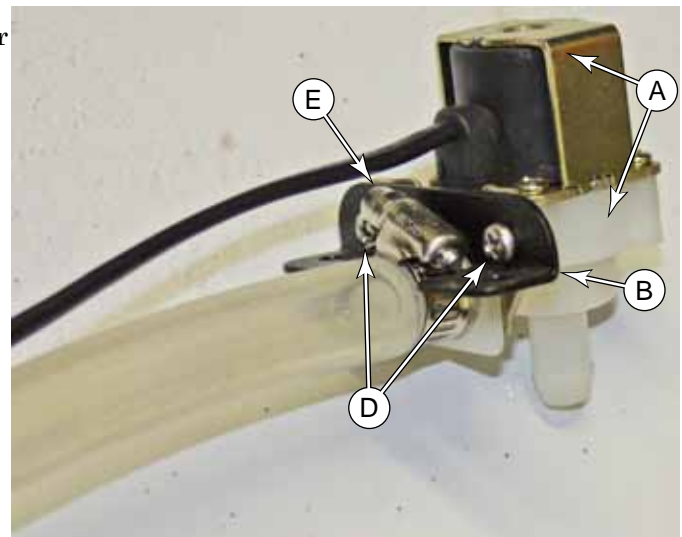
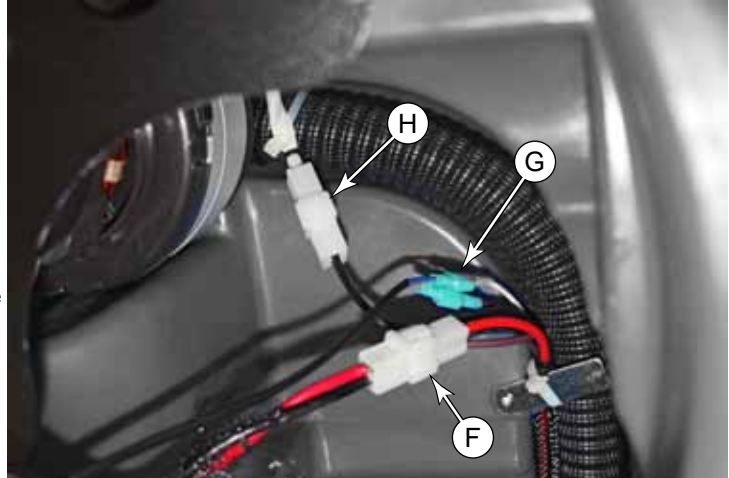
1. Verify that the solution switch is functioning by performing the procedure [Power, Vacuum, Solution, and Brush Switches](#) described on page 16.
2. Check the voltage from the control board at the wire connectors just below the control board. If 24 volts is not present between the two wires, replace the control board.
3. Lower the brush deck out of the machine (a prerequisite to replacing the solenoid), and check the voltage at the solenoid. If 24 volts is present, then replace the solenoid as described on [page 42](#).

## Removal and Installation

### Solution Solenoid

The solution solenoid is located on the scrub deck. The inlet to the solution solenoid comes from the solution filter, and the outlet points downward into the center of the scrub brush.

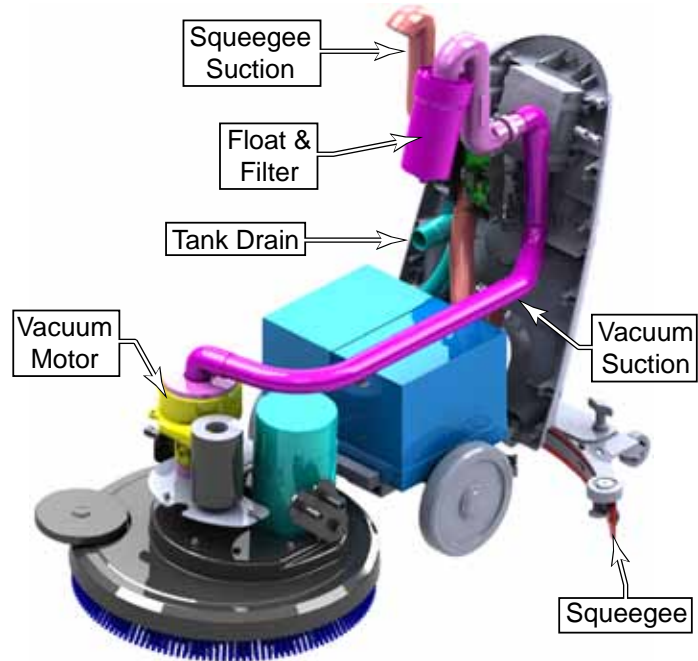
1. Make sure the solution and recovery tanks are empty. Excess weight in the tanks can throw off the balance of the machine when the weight of the scrub deck is removed from the machine.
2. The scrub deck needs to be lowered from the machine, but it doesn't need to be completely removed. Remove (or partially remove) the [Scrub Deck](#) described on page 34.
  - When disconnecting the solution solenoid connectors (**G**) in the procedure, it is not necessary to disconnect the brush motor connector (**F**) unless you wish to completely remove the scrub deck.
3. Prop the machine up so it does not tilt forward while working under the recovery tank.
4. Remove the two mounting screws (**C**) that secure the mounting bracket (**B**) to the scrub deck, and remove the solution solenoid assembly (**A**).
5. Remove the two mounting screws (**D**) and transfer the mounting bracket (**B**) from the old solenoid to the new solenoid.
6. Loosen the hose clamp (**E**) and transfer the solution hose from the old solenoid to the new solenoid.



## Squeegee System

### Functional Description

The squeegee suction hose draws air/water from the squeegee assembly. The squeegee consists of two squeegee blades: a forward, notched blade, and a rear scraping blade. The notched blade permits water to pass into the space between the two blades, where it is drawn into the suction hose.

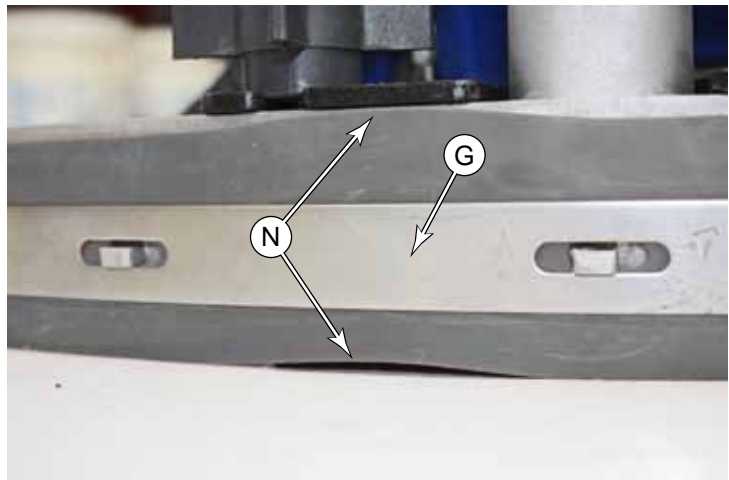


### Troubleshooting

#### Floor Streaks

Generally, floor streaks are caused by a problem with the squeegee. However, they can also be caused by weak suction (see [Weak Suction](#) described on page 27).

- During normal operation, debris can get trapped under the squeegee blades. Periodically raise the squeegee blade to clear debris.
- Clean and inspect the squeegee blades.
- If the streaks consistently appear at the center or outside edges of the squeegee, check the [Squeegee Trim Adjustment](#) described on page 46.
- If streaks are consistently occurring at specific locations on the squeegee blade, check to make sure the blade is flat and without waves (**N**).
- If the waves (**N**) keep reappearing after being corrected, it is an indication that the retaining strap (**L**) is not tightened enough to hold the squeegee blade from slipping.

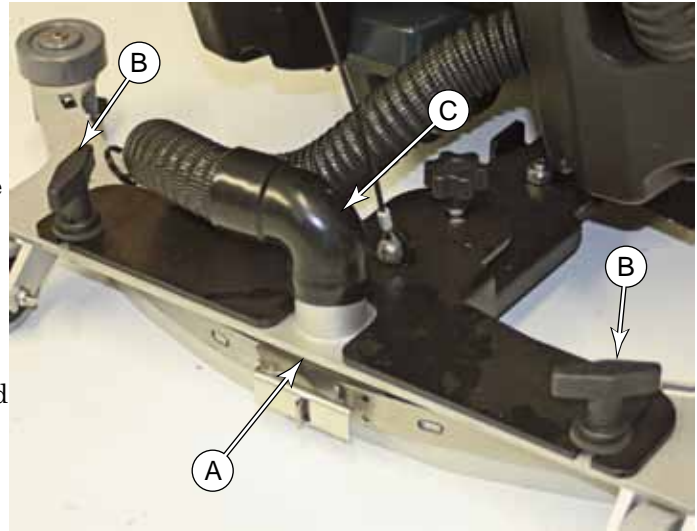


## Maintenance and Adjustment

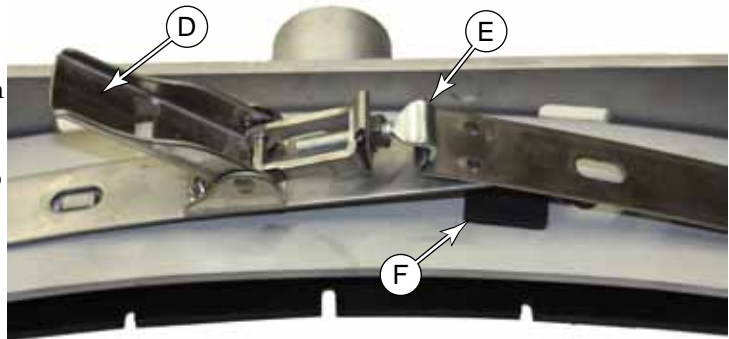
### Squeegee Blade Changing

The two squeegee blades periodically need to be changed as they wear. The blades may be flipped or reversed to a fresh edge up to 3 times before replacement is required. During replacement, it is important for the blades to be installed flat without waves, and then also adjusted to rest flat against the floor.

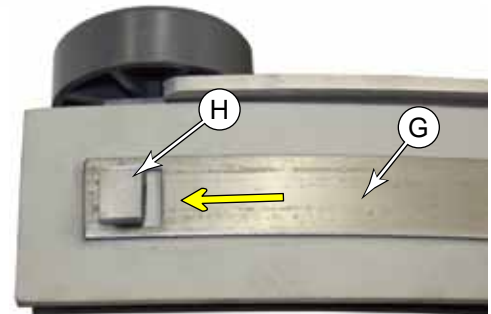
1. Remove the squeegee suction hose (C) from the squeegee assembly (A).
2. Loosen the two thumbscrews (B) and slide the squeegee assembly out of the mounting slots, and remove the squeegee.



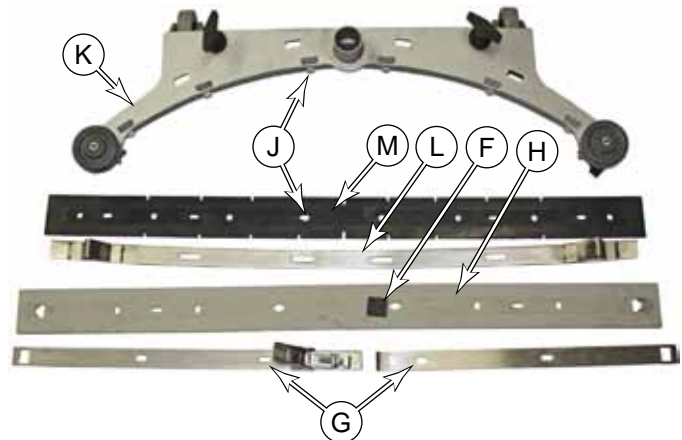
3. Pull out on the latch (D) to release the tension on the retaining strap.
4. Separate the retaining hooks (E) from the two halves of the retaining strap.
5. Slide each retaining strap (G) toward the outside, and lift them off the edge retaining hooks (H).
6. Remove the backing pad (F), and retain it for placement after rotating or replacing the squeegee blade.



7. Remove the squeegee blade from the squeegee frame.
  - The squeegee can be rotated and/or flipped 3 times to expose a new edge (4 edges total) to the lower front. If all 4 edges are worn, replace the squeegee blade with a new one.



8. Lay the squeegee blade (H) over the frame (K), and make sure the tabs and slots (J) are aligned.
9. Replace the strap (G) and make sure the backing pad (F) is positioned at the seam between the straps.
10. Before tightening the latch, make sure the blade is straight without waves.



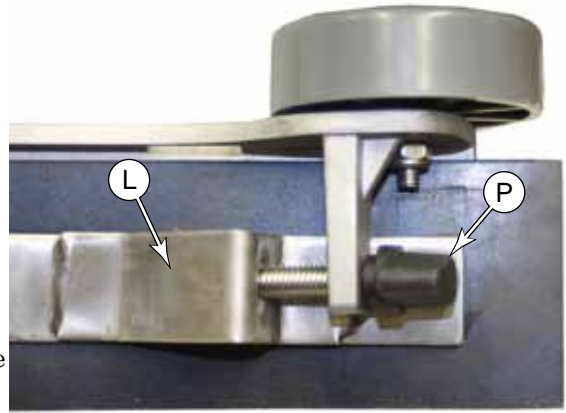
11. Loosen the clamping thumbscrew (**P**) on the rear strap (**L**), and remove the strap from the frame.

12. Remove the rear squeegee blade.

- The squeegee can be rotated and/or flipped 3 times to expose a new edge (4 edges total) to the lower front. If all 4 edges are worn, replace the squeegee blade with a new one.

13. Lay the squeegee blade (**M**) over the frame (**H**), and make sure the tabs and slots (**J**) are aligned.

14. Replace the strap (**L**) and retighten the clamping thumbscrew until the strap is tight against the frame.



15. Rest the squeegee assembly flat on the floor and examine the edge of each blade (front/rear) to make sure it is flat without any waves (**N**).

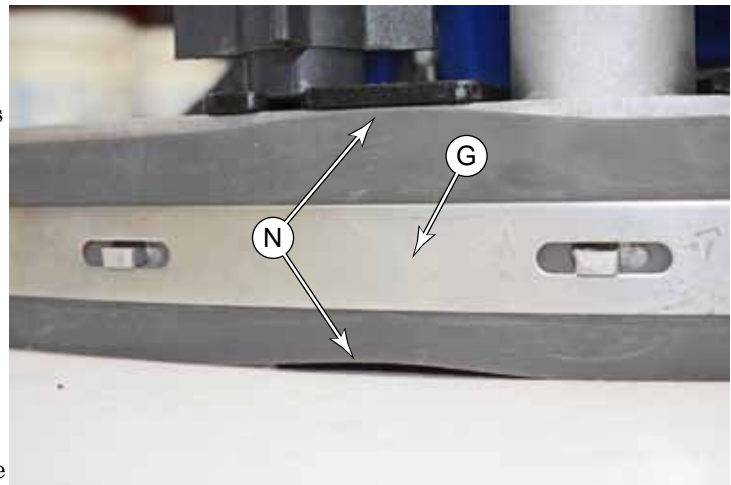
- Make this examination with the squeegee assembly still removed from the machine. There should be no unnecessary downward force on the squeegee blades.
- If there are waves, loosen the strap and straighten the blade.

16. Examine both front and rear squeegee blades to make sure they are the same height, and that both blades rest flat on the floor when the squeegee frame is sitting level.

- Because the squeegee is curved, it is important that the blades be level with the frame, and then the frame will be adjusted level to the floor in the next procedure.

17. Reinstall the squeegee assembly to the machine.

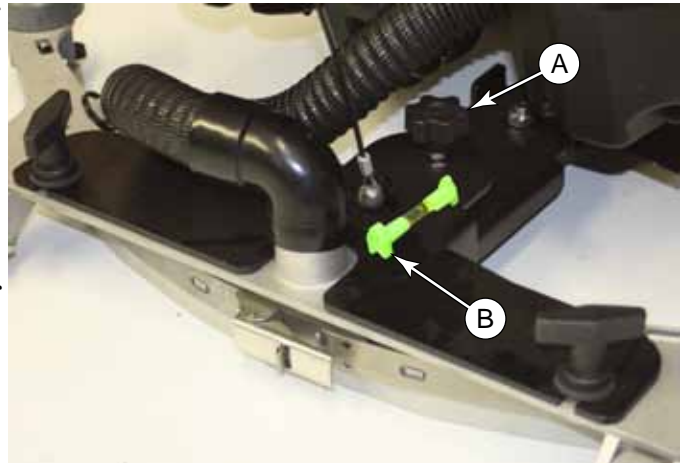
18. Perform the [Squeegee Trim Adjustment](#) described on page 46



## Squeegee Trim Adjustment

The squeegee trim adjustment ensures that the squeegee frame is level with the floor when the squeegee is in the lowered, operating position. If the trim is out of adjustment, the squeegee can leave streaks of water at either the center or the edges of the squeegee.

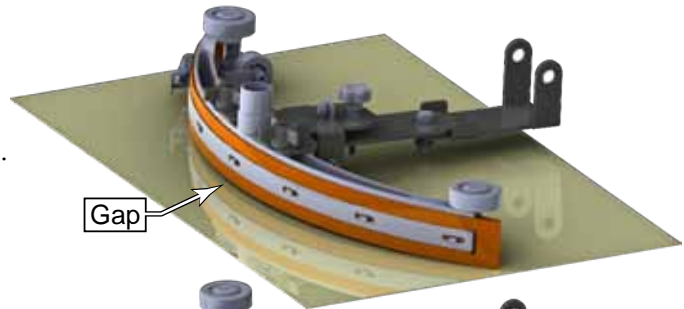
1. If this procedure is not being performed as a follow-up to replacing the squeegee blade(s), then make the blade examinations described on [page 45](#) beginning with [step 15](#).
2. With the machine parked on a level surface, lower the squeegee to the floor.
3. Examine the contact area between the squeegee blades and the floor. The squeegee blades should be in even contact with the floor.



- A small bubble level (**B**) may be used to set the frame of the squeegee to be level with the floor.

4. If the squeegee is tilted up, there will be a gap at the center, and the level's bubble will be toward the rear of the machine.

- Turn the adjustment knob (**A**) counterclockwise.



5. If the squeegee is tilted down, there will be a gap at the outsides of the squeegee, and the level's bubble will be toward the front of the machine.

- Turn the adjustment knob (**A**) clockwise.

