



Operating instructions (ENG)

MODELS:

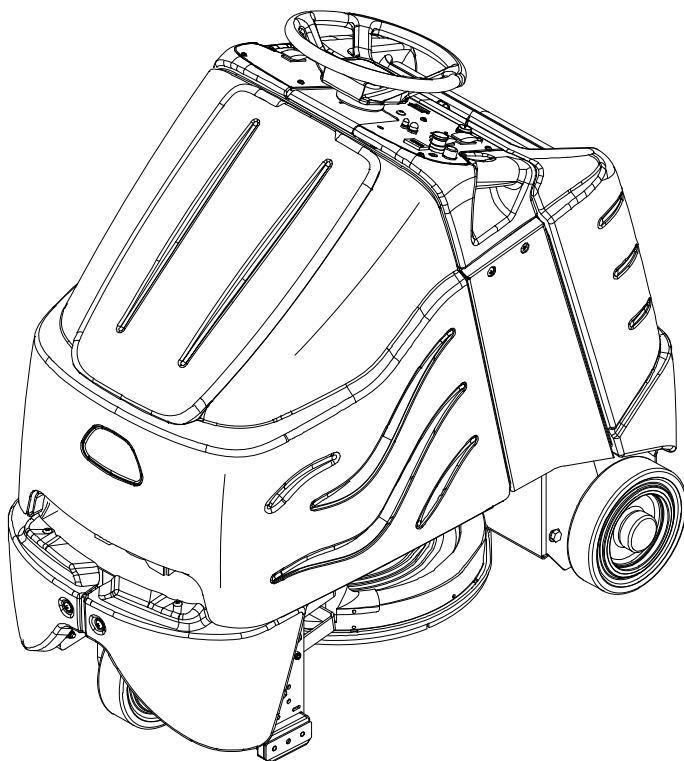
CB20
1.002-008.0

CBCD20
1.002-016.0

CBE20
1.002-010.0

CB20X
1.002-009.0

CBCD20X
1.002-021.0



From Serial #:

10020080000650

10020090000146

10020100000016

10020169000004

10020210000025

Read these instructions before using the machine.



Model:	_____
Date of Purchase:	_____
Serial Number:	_____
Dealer:	_____
Address:	_____
Phone Number:	_____
Sales Representative:	_____

Overview

The Chariot burnisher is a battery powered, ride-on, hard floor burnisher intended for commercial use. The appliance applies a high luster to hard floor surfaces.

Warranty Registration

Thank you for purchasing a Windsor product. Warranty registration is quick and easy. Your registration will allow us to serve you better over the lifetime of the product.

To register your product go to :

www.windsorind.com/WarrantyRegistration.aspx

For customer assistance:

1-800-444-7654



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How to Use This Manual

This manual contains the following sections:

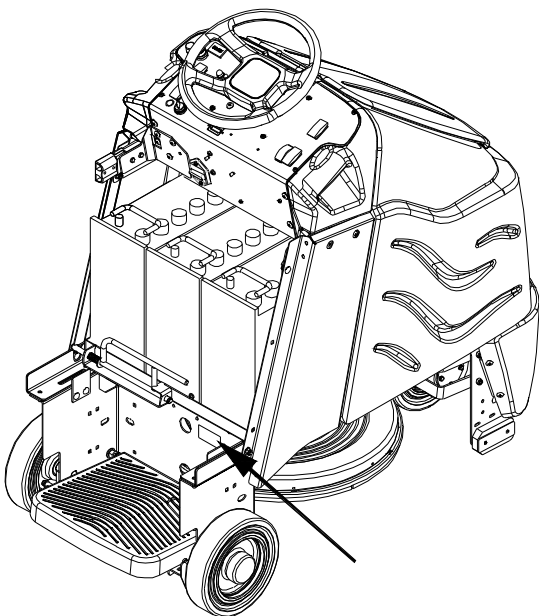
- HOW TO USE THIS MANUAL
- SAFETY
- OPERATIONS
- MAINTENANCE
- PARTS LIST

The HOW TO USE THIS MANUAL section will tell you how to find important information for ordering correct repair parts.

Model: _____
Date of Purchase: _____
Serial Number: _____
Dealer: _____
Address: _____
Phone Number: _____
Sales Representative: _____

Parts may be ordered from authorized Windsor dealers. When placing an order for parts, the machine model and machine serial number are important. Refer to the MACHINE DATA box which is filled out during the installation of your machine. The MACHINE DATA box is located on the inside of the front cover of this manual.

The model and serial number of your machine are located below the battery compartment of the machine.



The SAFETY section contains important information regarding hazard or unsafe practices of the machine. Levels of hazards are identified that could

result in product or personal injury, or severe injury resulting in death.

The OPERATIONS section is to familiarize the operator with the operation and function of the machine.

The MAINTENANCE section contains preventive maintenance to keep the machine and its components in good working condition. They are listed in this general order:

- Service Schedule
- Batteries
- Brush Deck
- Circuit Protection
- Vacuum Motor
- Drive Motor & Brake

The PARTS LIST section contains assembled parts illustrations and corresponding parts list. The parts lists include a number of columns of information:

REF - column refers to the reference number on the parts illustration.

PART NO. - column lists the part number for the part.

PRV NO. - reference number.

QTY - column lists the quantity of the part used in that area of the machine.

DESCRIPTION - column is a brief description of the part.

SERIAL NO. FROM - If this column has an (*) and a Reference number, see the SERIAL NUMBERS page in the back of your manual. If column has two asterisk (**), call manufacturer for serial number. The serial number indicates the first machine the part number is applicable to. The main illustration shows the most current design of the machine. When a boxed illustration is shown, it displays the older design.

NOTES - column for information not noted by the other columns.

NOTE: If a service or option kit is installed on your machine, be sure to keep the KIT INSTRUCTIONS which came with the kit. It contains replacement parts numbers needed for ordering future parts

IMPORTANT SAFETY INSTRUCTIONS

When using an electrical appliance, basic precaution must always be followed, including the following:

READ ALL INSTRUCTIONS BEFORE USING THIS MACHINE.



WARNING: To reduce the risk of fire, electric shock, or injury:

Use only indoors. Do not use outdoors or expose to rain.

Use only as described in this manual. Use only manufacturer's recommended components and attachments.

If the machine is not working properly, has been dropped, damaged, left outdoors, or dropped into water, return it to an authorized service center.

Do not operate the machine with any openings blocked. Keep openings free of debris that may reduce airflow.

This machine is not suitable for picking up hazardous dust.

Machine can cause a fire when operating near flammable vapors or materials. Do not operate this machine near flammable fluids, dust or vapors.

This machine is suitable for commercial use, for example in hotels, schools, hospitals, factories, shops and offices for more than normal housekeeping purposes.

Maintenance and repairs must be done by qualified personnel.

Disconnect battery before cleaning or servicing.

Before the machine is discarded, the batteries must be removed and properly disposed of.

Make sure all warning and caution labels are legible and properly attached to the machine.

During operation, attention shall be paid to other persons, especially children.

Before use all covers and doors shall be put in the positions specified in the instructions.

When leaving unattended, secure against unintentional movement.

The machine shall only be operated by instructed and authorized persons.

When leaving unattended, switch off or lock the main power switch to prevent unauthorized use.

This appliance has been designed for use with the brushes specified by the manufacturer. The fitting of other brushes may affect its safety.

Do not use on surfaces having a gradient of over 10% (6 degrees).

SAVE THESE INSTRUCTIONS

The following symbols are used throughout this guide as indicated in their descriptions:

HAZARD INTENSITY LEVEL

There are three levels of hazard intensity identified by signal words **-WARNING** and **CAUTION** and **FOR SAFETY**. The level of hazard intensity is determined by the following definitions:

WARNING:

WARNING - Hazards or unsafe practices which **COULD** result in severe personal injury or death.

CAUTION:

CAUTION - Hazards or unsafe practices which could result in minor personal injury or product or property damage.

FOR SAFETY: *To identify actions which must be followed for safe operation of equipment.*

Report machine damage or faulty operation immediately. Do not use the machine if it is not in proper operating condition. Following is information that signals some potentially dangerous conditions to the operator or the equipment. Read this information carefully. Know when these conditions can exist. Locate all safety devices on the machine. Please take the necessary steps to train the machine operating personnel.

FOR SAFETY:

DO NOT OPERATE MACHINE:

Unless Trained and Authorized.

Unless Operation Guide is Read and understood.

In Flammable or Explosive areas.

In areas with possible falling objects.

WHEN SERVICING MACHINE:

Avoid moving parts. Do not wear loose clothing; jackets, shirts, or sleeves when working on the machine. Use Windsor approved replacement parts.

WARNING:

Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep battery compartment open during charging. Keep sparks and flames away from the batteries. Do not smoke around batteries.

WARNING:

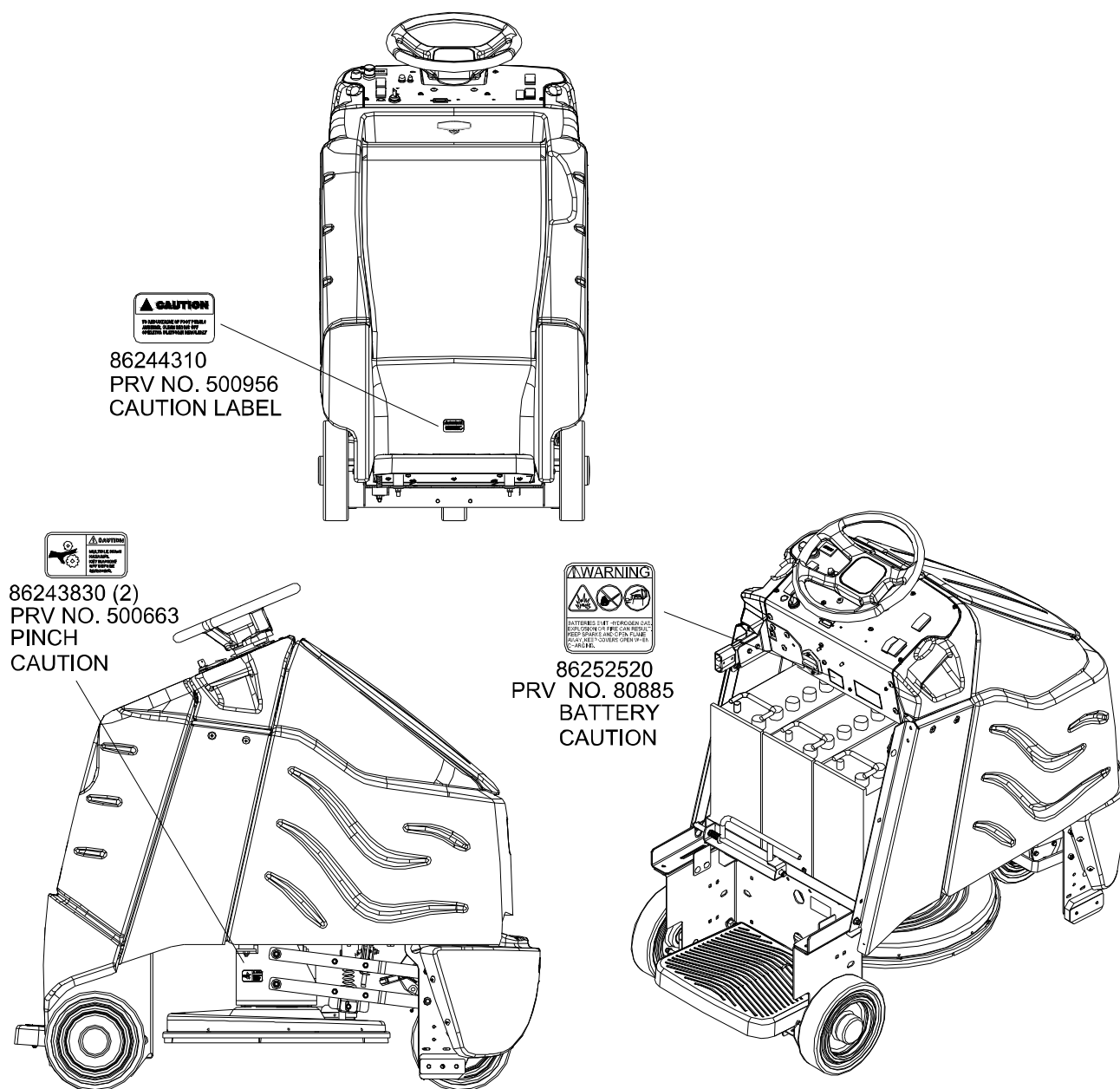
Disconnect batteries before working on machine. Only qualified personnel should work inside machine. Always wear eye protection and protective clothing when working on or near batteries. Avoid skin contact with the acid contained in the batteries.

WARNING:

Never allow metal to lie across battery tops.

Safety Label Location

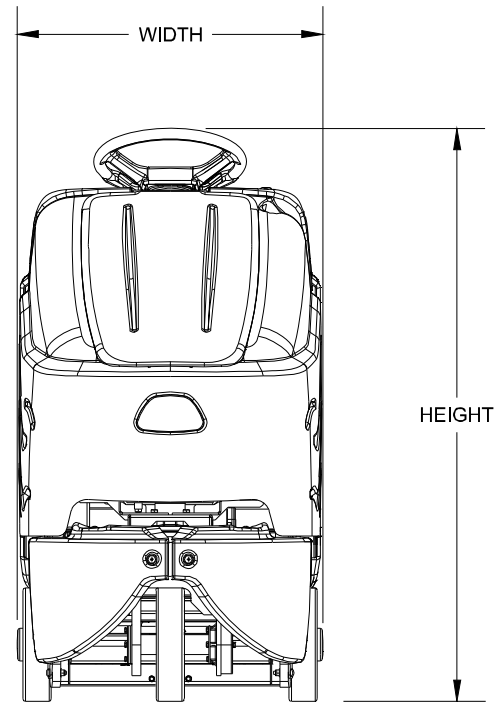
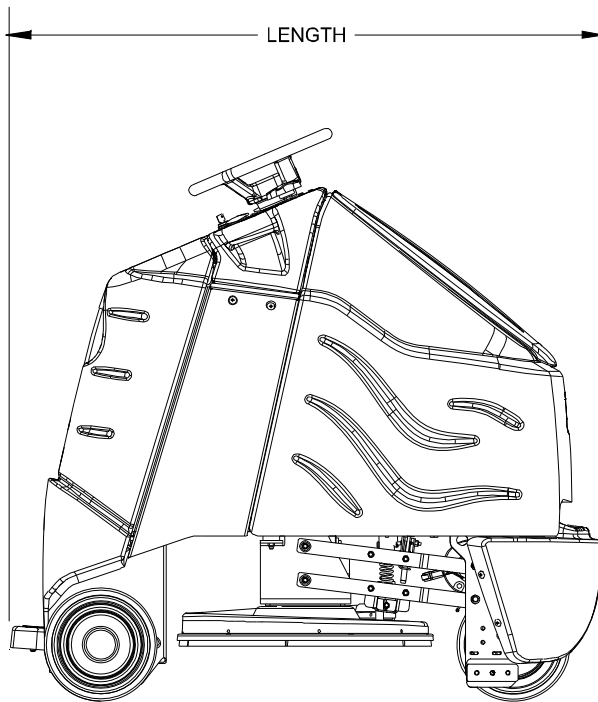
These drawings indicate the location of safety labels on the machine. If at any time the labels become illegible, promptly replace them.



Technical Specifications

ITEM	DIMENSION/CAPACITY
Nominal power	3420 W
Rated Voltage	36 Volts DC
Rated Amperage	95 amps
Batteries	3 X12 Volt 195-215 AH @ 20 hr. rate
Battery Compartment Dimensions	21 in. x 16 in. x 17 in. tall (533mm x 406mm x 432mm)
Propelling Motor	.75 HP (560 W)
Mass (GVW)	1,071 lbs (486 kg)
Weight empty without batteries	705 lbs (320 kg)
Tires	10" (254mm) Solid gray non-marking
Maximum Speed	3.5 miles/hour (5.6 Km/hour)
Frame Construction	Powder coated steel
Brake	Electrical parking brake, sets automatically whenever operator steps off platform or engages emergency stop.
Minimum aisle u-turn width	56 in. (1425 mm)
Maximum rated climb and descent angle	7.5 degrees

ITEM	MEASURE
Height	50.6 inches (1285 mm)
Length	52.5 inches (1330 mm)
Width	26.5 inches (670 mm)
Width of Burnishing Path	20 inches (508mm)

**SPECIAL NOTES:**

The sound pressure level at the operator's ear was measured to be 68 dBA. This was a nearfield, broad-band measurement taken in a typical industrial environment on a tile floor. This appliance contains no possible source of impact noise. The instantaneous sound pressure level is below 63 Pa.

The weighted root mean square acceleration at the operator's arms was measured to be below 2.5m/s². This was a tri-axial, third-octave-band measurement made during normal operation on a composite tile floor. The measurement and related calculations were made in accordance with ANSI S3.34-1986.

How This Machine Works

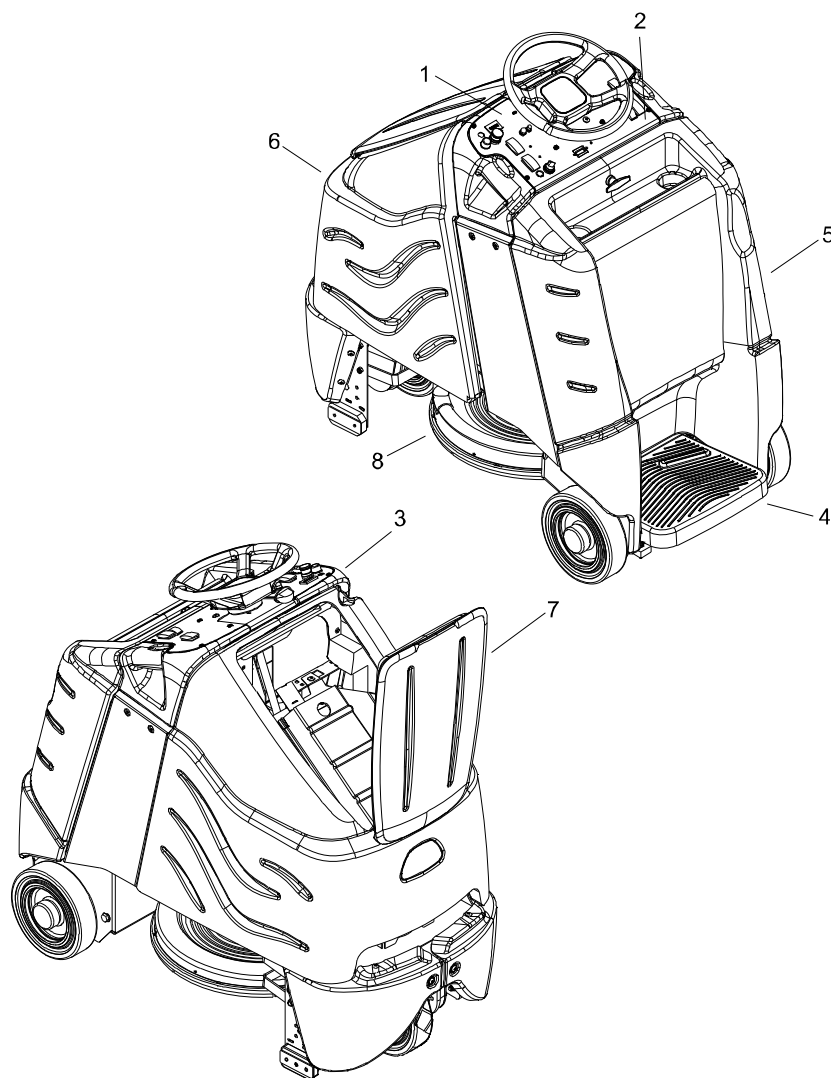
The Chariot is a battery powered, self propelled, hard floor burnisher intended for commercial use. The appliance spins a high-speed burnishing pad in contact with the floor surface to produce a high luster shine.

The machines primary systems are the burnishing system, the dust control system and the operator control system.

The function of the burnishing system is to spin a high-speed burnishing pad in contact with a floor surface that has had a burnishable floor finish applied. The burnishing pad can be lowered to the floor and raised by the operator, the operator can also control the pad pressure by use of the pressure switch. The burnishing pad will spin only when the machine is directed to move by the operator.

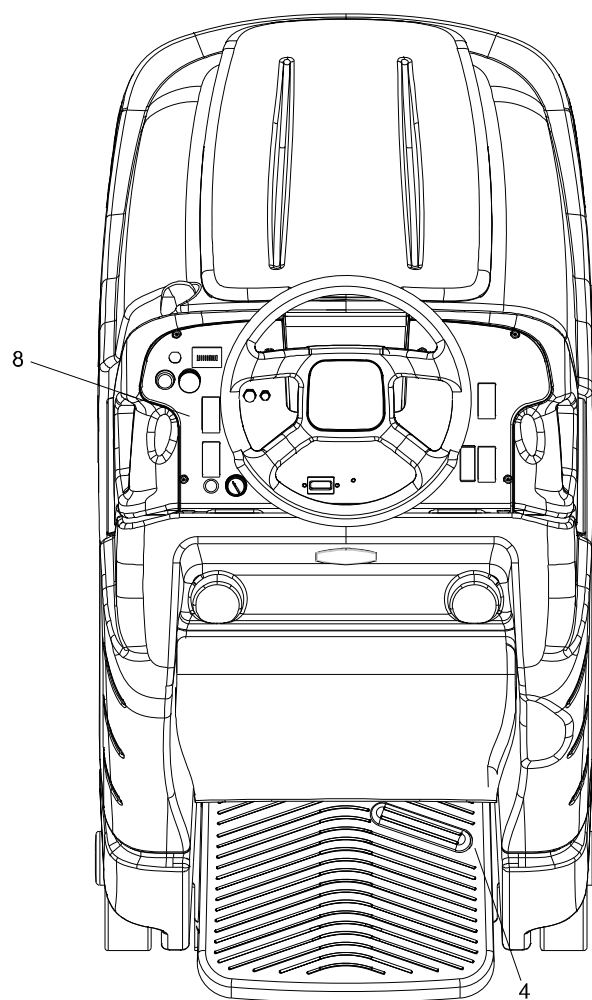
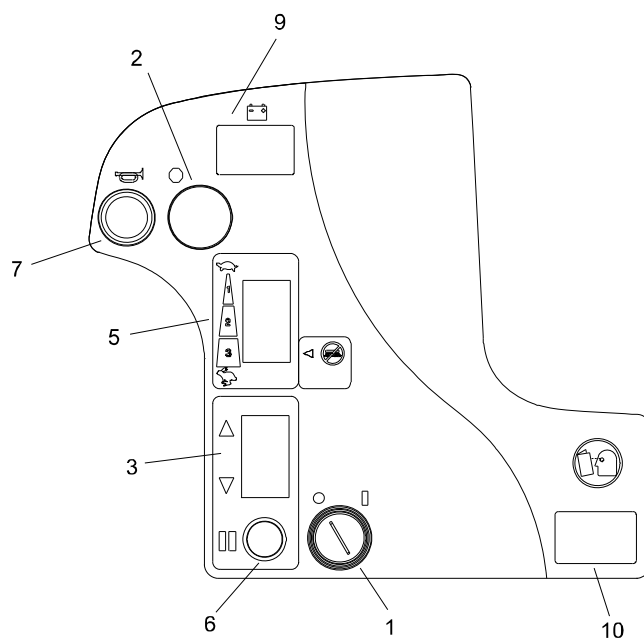
The function of the dust control system is to collect the dust that is created during the burnishing process. It is normal for a portion of the floor finish to be removed in the form of dust during the process. While burnishing, air movement is created within the burnishing head by the spinning pad. The dust that is also created is entrained in the air stream and transported to a filter bag where it is collected and separated from the air stream. The filter bag can be easily changed without releasing the collected dust

The function of the operator control system is to control the direction and speed of the machine. The directional control system consists of the direction control switch, throttle pedal, speed control switch, drive reset switch, emergency stop/brake switch, steering wheel, propel controller and drive wheel. The directional control switch signals forward or reverse direction. The controller interprets signals from the throttle pedal to command the drive wheel to propel or slow the machine. The drive reset switch is to make sure the operator is on platform before machine will propel. The steering wheel points the drive wheel in the direction desired by the operator. The parking brake automatically engages when the operator steps off the platform. The emergency stop/brake can be used to hold the machine on slopes.



Components

- | | |
|--------------------------|----------------------|
| 1. Control panel-Drive | 5. Rear cover |
| 2. Control Panel-Burnish | 6. Cover |
| 3. Control Housing | 7. Filter Access Lid |
| 4. Pedal Platform | 8. Burnisher Deck |



Drive Controls

1. Key Switch
2. Emergency Stop/Brake Switch
3. Directional Control Switch
4. Throttle Pedal
5. Speed Control Switch
6. Drive Reset Switch
7. Horn Button
8. Steering Wheel
9. Battery Charge level Indicator-Basic
10. Hour Meter-Basic

1. KEY SWITCH

Controls the power for machine functions.

To turn the machine power on, rotate key clockwise.

To turn the machine off, rotate key counterclockwise.

2. EMERGENCY STOP/BRAKE SWITCH

This safety feature is designed to cut all power to the machine at any time and apply parking brake.

To shut the machine power off, push the Emergency Stop Switch, this will also engage the parking brake and cause the machine to stop immediately.

To reset the machine, rotate the switch clockwise.

3. DIRECTIONAL CONTROL SWITCH

Controls the direction of travel of the vehicle. The position of the switch indicates direction of travel.

To travel forward, press the top of the switch.

To travel in reverse, press the bottom of the switch.

4. THROTTLE PEDAL

Controls the speed of the vehicle within the speed control setting selected. Pressing the pedal causes the machine to travel in the direction selected by the Directional Control Switch.

To increase speed, increase pressure on the pedal.

To decrease speed, decrease pressure on the pedal.

5. SPEED CONTROL SWITCH

Controls the maximum speed of the machine. There are two setting intended for scrubbing, speeds 1 and 2. Speed 3 is recommended for transport only, not scrubbing.

To increase speed, press the top of the switch.

To decrease speed, press bottom of the switch. Speeds can be adjusted at any time, whether machine is moving or not.

Basic: The position of the switch indicates speed setting.

Deluxe: The display indicates speed setting. When the key is turned on the controller will automatically adjust the speed to setting 2.

6. DRIVE RESET SWITCH

This safety feature is designed to ensure safe engagement of propel drive. Each time the machine power is turned on, and each time an operator steps on to the platform, the Drive Reset Switch must be pushed before machine will propel.

7. HORN BUTTON

The horn is activated by pressing the horn button.

8. STEERING WHEEL

The steering wheel turns the front wheel causing the machine to change direction.

9. BATTERY CHARGE LEVEL INDICATOR-BASIC

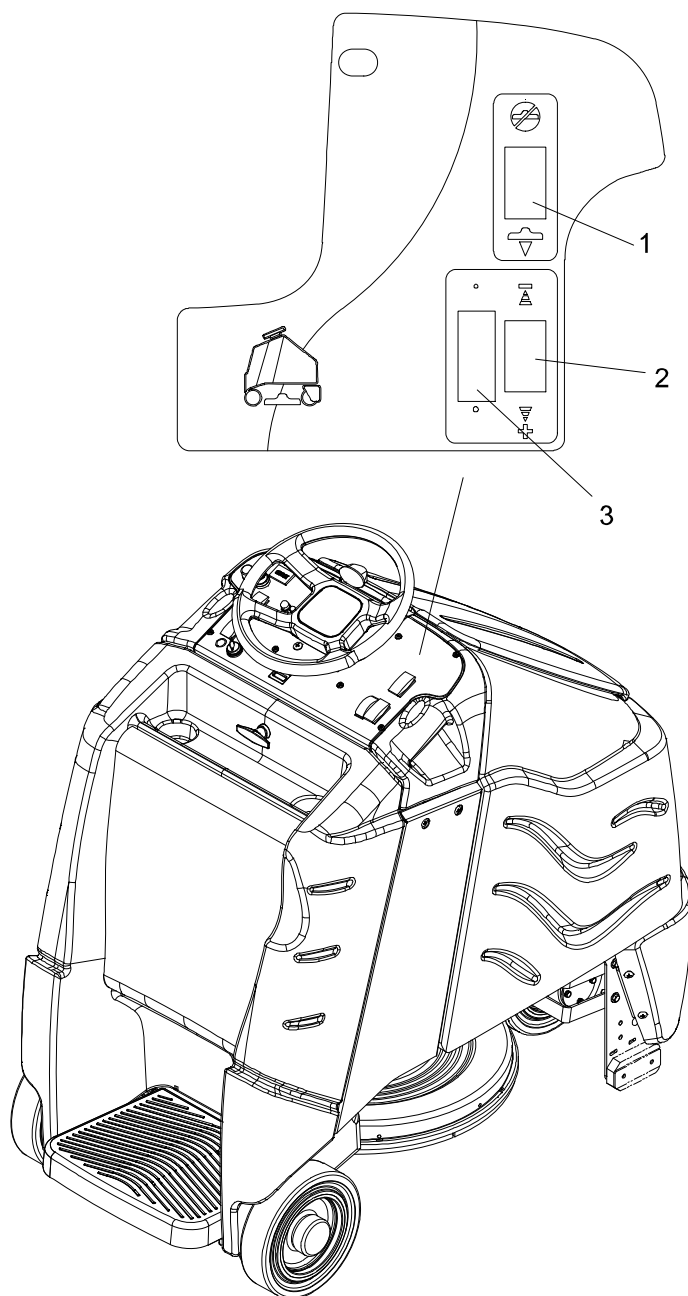
Indicates the charge level of the batteries.

The meter display is divided into 10 vertical bars. Bars illuminated on the far right indicate full charge. Bars flashing near the left side indicate the batteries should be recharged. Further operation of the machine could damage the machine or the batteries.

If the batteries are not fully recharged, the meter will continue to flash on the left side.

10. HOUR METER-BASIC

Records the number of hours the machine has been in operation. This information is useful in determining when to service the machine.



Burnisher Controls

1. Deck On/Off Switch
2. Pad Pressure Switch
3. Pad Pressure Meter

1. DECK ON/OFF SWITCH

Raises/lowers burnisher head.

To lower head, press the bottom of the switch. To raise head, press the top of the switch.

The motor will run only when the head is down and the machine is propelling.

2. PAD PRESSURE SWITCH

Press switch to adjust pad pressure.

3. PAD PRESSURE METER

Indicates relative pad pressure. "Green area" indicates proper pad pressure range.

Pre-run Machine Inspection

Do a pre-run inspection to find possible problems that could cause poor performance or lost time from breakdown. Follow the same procedure each time to avoid missing steps.

NOTE: See maintenance section for pre-run machine inspection checklist items.

Starting Machine

NOTE: Perform pre-run machine check before operating machine.

FOR SAFETY: Before starting machine, make sure that all safety devices are in place and operating properly.

1. Disconnect the battery charger.
2. Close the cover.
3. Turn or install a new burnishing pad as needed.
4. Stand on the operator platform. Throttle pedal must be in neutral position.
5. Turn the machine power on by turning key switch clockwise to the "ON" position.
6. Check the position of the Directional Control Switch to make sure the machine will travel in the direction intended.
7. Press the Drive Reset Switch.
8. Press lightly on the throttle pedal with right foot.

Operating the Machine

1. Lower or raise deck by pressing burnishing head switch.
2. The pad motor will only run when the burnishing head is lowered to within 2 inches of the floor.
3. The pad pressure is adjusted using the pressure switch at right of panel. The operator monitors the amp draw using the meter located on the control panel and ensures that the needle remains in the "green" operating range.

To prevent possible damage to the floor surface, always keep the machine moving while the pad is spinning.

4. When the head is down and the machine is propelled, the pad motor runs.
5. Return the machine to the battery charger when the battery light indicator meter indicates discharged batteries

Emergency Stop Procedure

Release the throttle pedal by lifting right foot.

Turn machine power off with key switch, by turning key switch counterclockwise.

If an electrical problem is suspected, push in emergency stop button. This will also engage the parking brake and cause the machine to stop immediately.

To Begin Burnishing

When operating the machine around people, pay close attention for unexpected movement. Use extra caution around children.

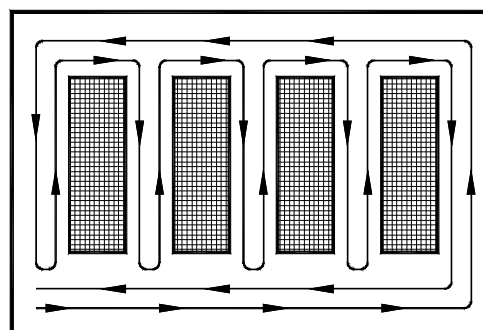
1. Stand on the operator platform. Throttle pedal must be in neutral position.
2. Turn machine power on.
3. Check position of Directional Control Switch to ensure that machine is set to travel in direction intended.
4. Press the Drive Reset Switch.

Normal Burnishing

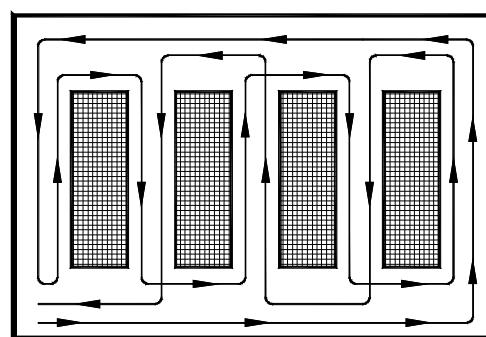
Plan the burnishing pattern in advance. The longest track is around the perimeter of the area to be burnished. For efficient operation, the runs should be the longest possible without turning, stopping, or raising or lowering the burnisher head.

In order to achieve the best possible results, the area which is to be burnished should be swept before burnishing.

INEFFICIENT BURNISHING PATH



RECOMMENDED BURNISHING PATH

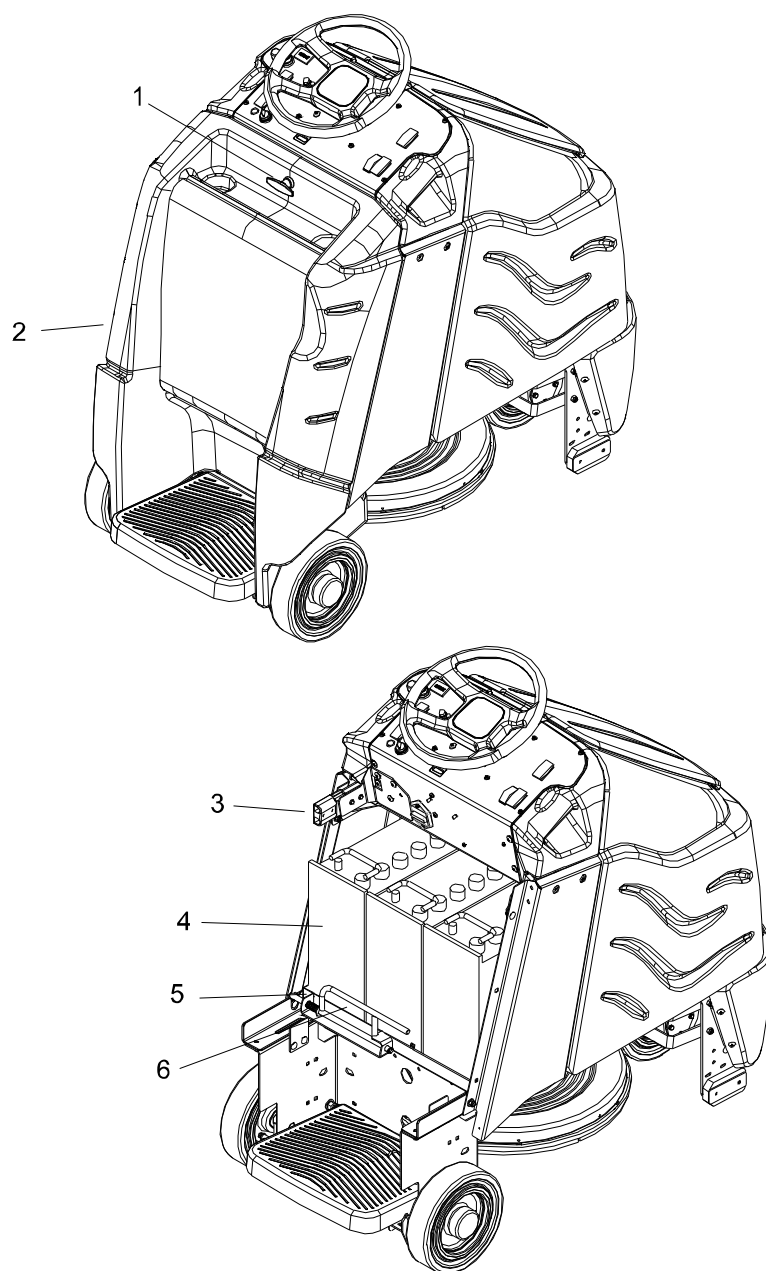


Maintenance

Service Schedule

MAINTENANCE	BEFORE EACH WORK PERIOD	AFTER EACH WORK PERIOD	50 HRS	100 HRS	200 HRS
Check water level of batteries after charging; add distilled water if necessary.	*				
Visually check for damaged or worn tires.	*				
Check pad for proper installation.	*				
Check dust vacuum hose connections.	*				
Check pedal(s), brake and steering for proper operation.	*				
Check dust bag.		*			
Charge batteries.		*			
Clean off top of batteries.			*		
Check battery cells with hydrometer.			*		
Check battery connections are tight.			*		
Clean battery cases and battery compartment.				*	
Clean and check drive tension chain for wear and tension.				*	
Check parking brake.					*
Clean pivot points on burnishing head.					*
Check drive motor for carbon brush wear.					*
Check steering chain tension.					*

The pad drive motor contains no carbon brushes and requires not service.



Batteries

1. Rear Cover Retainer Handle
2. Rear Cover
3. Battery Connector-Machine

4. Batteries
5. Battery Tray
6. Battery Tray Latch

Batteries

The batteries provide the power to operate the machine. The batteries require regular maintenance to keep them operating at peak efficiency.

The machine batteries will hold their charge for long periods of time, but they can only be charged a certain number of times. To get the greatest life from the batteries, charge them when their charge level reaches 25% of a full charge. Use a hydrometer to check the charge level.

Do not allow the batteries to remain in a discharged condition for any length of time. Never expose a discharged battery to temperatures below freezing. Discharged batteries will freeze causing cracked cases. Do not operate the machine if the batteries are in poor condition or if they have a charge level below 25% (specific gravity below 1.155).

Keep all metallic objects off the top of the batteries, as they may cause a short circuit. Replace worn or damaged cables and terminals.

Check the electrolyte level in each battery cell before and after charging the batteries. Never add acid to the batteries, use distilled water. Do not allow water level to fall below the battery plates. Portions of plates exposed to air will be destroyed. Do not overfill. Keep plugs firmly in place at all times.

CAUTION:

When servicing machine, avoid contact with battery acid.

WARNING:

Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep covers open when charging.

WARNING:

Wear eye protection and protective clothing when working with batteries.

WARNING:

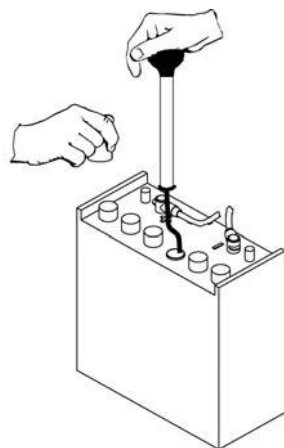
Charge batteries in a well ventilated area.

Battery Maintenance

1. When cleaning the batteries, use a solution of baking soda and water. Do not allow the cleaning fluid to enter the battery cells, electrolyte will be neutralized.
2. Maintain the proper electrolyte level in each battery cell. If a cell should accidentally overflow, clean immediately.
3. Wipe off the top of the batteries at least once a week.
4. Test battery condition with a hydrometer at least once a week. Test battery condition with a hydrometer at least once a week.
5. Ensure that all connections are tight and all corrosion removed.
6. Every 4 to 6 months, remove that batteries from the machine and clean the battery cases and battery compartment.

Checking Battery Specific Gravity

Use a hydrometer to check the battery specific gravity.



NOTE: Do not take readings immediately after adding distilled water, if the water and acid are not thoroughly mixed, the reading may not be accurate.

Check the hydrometer readings against this chart.

SPECIFIC GRAVITY @ 80° F (27°C)	BATTERY CONDITION
1.265	100% CHARGED
1.225	75% CHARGED
1.190	50% CHARGED
1.155	25% CHARGED
1.120	DISCHARGED

NOTE: If the readings are taken when the battery electrolyte is any temperature other than 80°F (27°C), the reading must be temperature corrected.

To find the corrected specific gravity reading when the temperature of the battery electrolyte is other than 80°F (27°): Add (+) to the specific gravity reading 0.004 (4 points), for each 10°F (6°C) above 80° (27°C).

Subtract (-) from the specific reading 0.004 (4 points), for each 10°F (6°C) below 80°F (27°C).

Charging Batteries

⚠ WARNING:

When servicing machine, avoid contact with battery acid.

⚠ WARNING:

Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep covers open when charging.

⚠ WARNING:

Wear eye protection and protective clothing when working with batteries.

⚠ WARNING:

Charge batteries in a well ventilated area.

Use a 36 volt, 20 amp maximum output DC charger which will automatically shut off when the batteries are fully charged.

1. Empty recovery tank.
2. Stop the machine in a clean, well ventilated area next to the charger.
3. Turn "OFF" machine.

FOR SAFETY: Before leaving or servicing machine; stop on level surface, turn off machine and remove key.

4. Unplug the machine from the battery pack. Remove front cover. Disconnect recovery hose from "Y" tube. Raise recovery tank and verify prop rod latch is safely engaged.

⚠ WARNING:

Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep covers open when charging.

5. Check the electrolyte level in each battery cell. Before charging, add just enough distilled water to cover the plates. After charging is complete, add just enough distilled water to bring up the level to the indicator ring. If the water level is too high before charging, normal expansion rate of the electrolyte may cause an overflow resulting in a loss of battery acid balance and damage the machine.

Maintenance

5. Replace the battery caps, and leave them in place while charging.
6. Unplug the battery connector from the machine.

SAFETY: When charging, connect the charger to the batteries before connecting the charger to the AC wall outlet. Never connect the charger to the AC wall outlet first. Hazardous sparks may result.

7. Plug the charger connector into the battery connector. Connect the charger AC plug to a wall outlet. The charger gauge should indicate that the batteries are charging.
8. When the batteries are fully charged, disconnect the charger from the AC wall outlet, then disconnect the charger from the batteries.
9. Connect the batteries to the machine connector.
10. Check the electrolyte level. It should be up to the indicator ring. If necessary, add distilled water.
11. Install the rear cover.

Changing Batteries

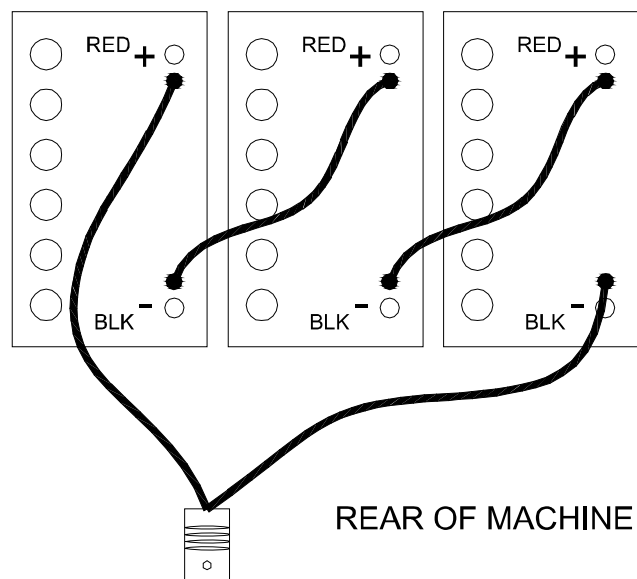
Stop the machine in a clean area next to the charger. Turn off machine.

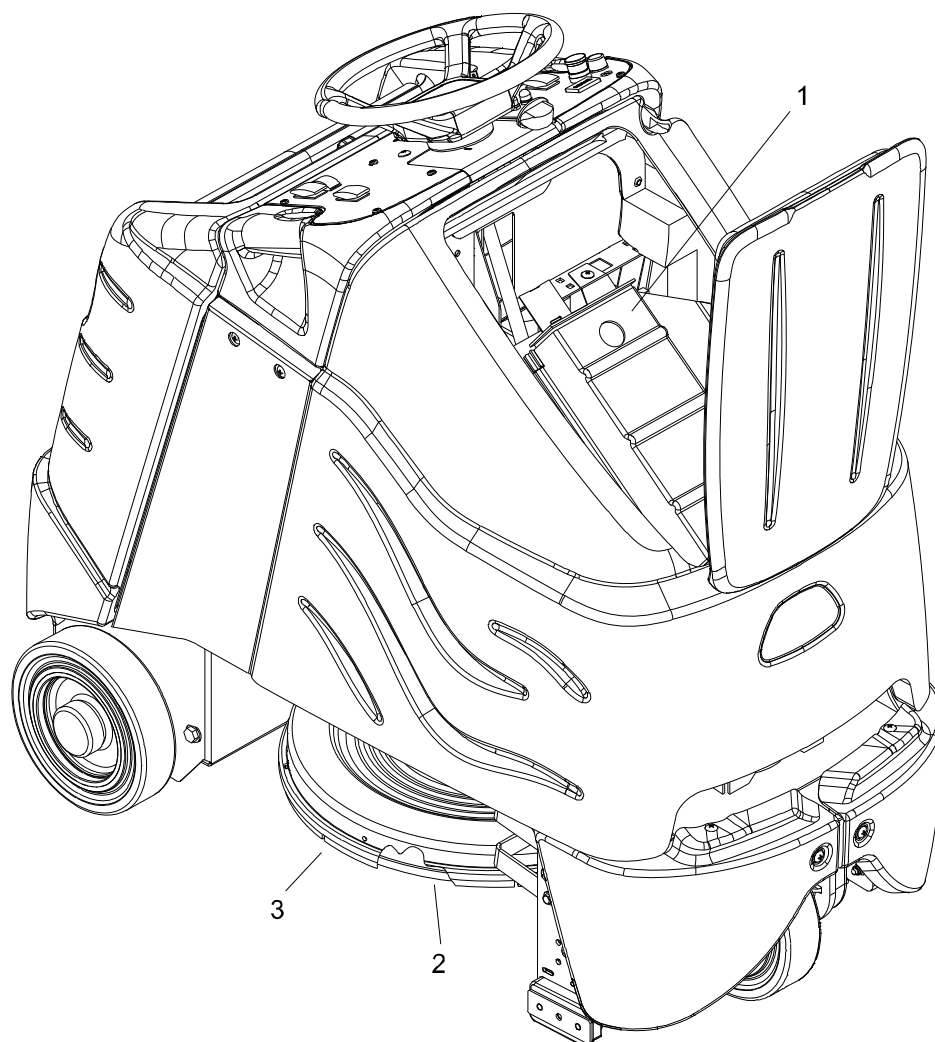
SAFETY: Before leaving or servicing the machine; stop on level surface, turn off machine and remove key.

1. Remove the rear cover.
2. Disconnect battery pack from machine.
3. Unlatch battery tray from machine and pull out to expose batteries.
4. Use the proper size open end wrench to disconnect main ground wire first and secure cable terminal away from batteries.
5. Disconnect main positive lead and secure cable terminals away from batteries.
6. Loosen both terminals on each jumper cable and remove one at a time.
7. Prepare a suitable site to place the batteries.
8. Attach suitable battery lifting device and lift batteries from the machine.

⚠ WARNING:

Batteries are a potential environmental hazard. Consult your battery supplier for safe disposal methods.





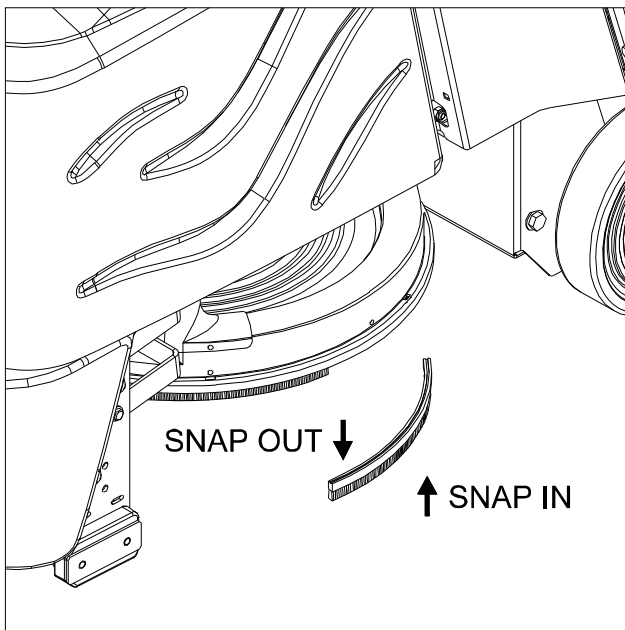
- 1. Dust Bag/Filter
- 2. Pads
- 3. Skirts

Dust Bag Replacement

1. Raise cover to expose filter cover.
2. Using lifting access hole, lift bag cover.
3. Carefully remove bag from hose.
4. Slide a new bag onto hose. Ensure bag is pushed on so that top of bag rest on top lip of filter cover.

Dust Control Skirts Replacement

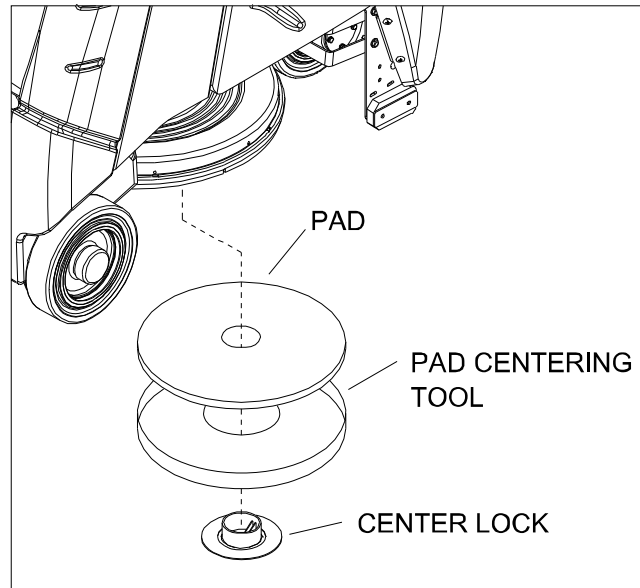
1. Replace skirts when worn, torn, or damaged in any way that allows dust to escape.
2. Remove skirt strips by pulling down.
3. Insert new skirt strips and snap them into place.



Pad Installation

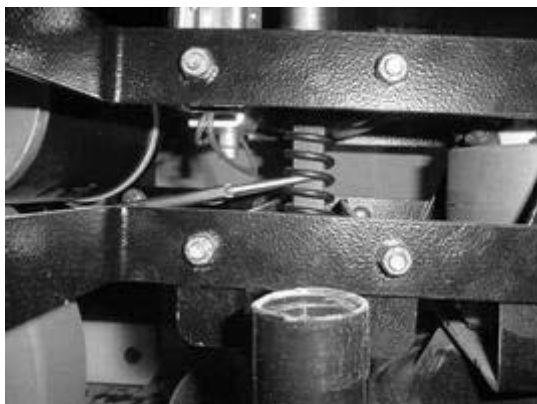
Install pad using the pad centering tool (86064370 - PRV NO. 66829).

1. Lay the pad in the pan and position under the pad driver. The edges of the pan will align the pad and driver.
2. Screw the center lock in place through the hole in the pan. The center lock has a right hand thread.
3. The pad centering tool can be stored under the hood.



Pad Driver Replacement

Turn key switch on to lower deck down. Use needle nose vise grips to clamp together spring retainer bars between spring.



Remove the four bolts holding deck assembly onto frame. Two bolts on each side.



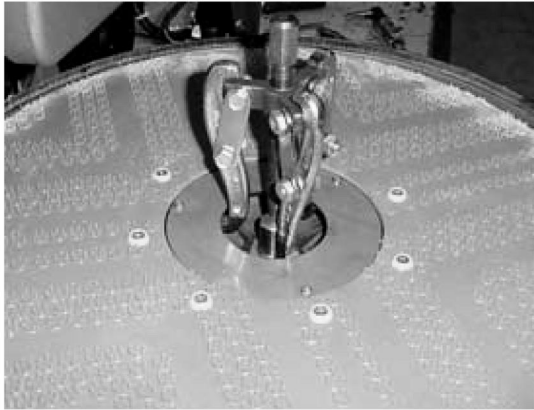
Label and remove wires coming off of motor. Disconnect by unplugging motor wire harness from machine wire harness. Take note cable tie locations.



Slide deck out from under machine and turn deck assembly over on to motor. Remove pad lock and pad.



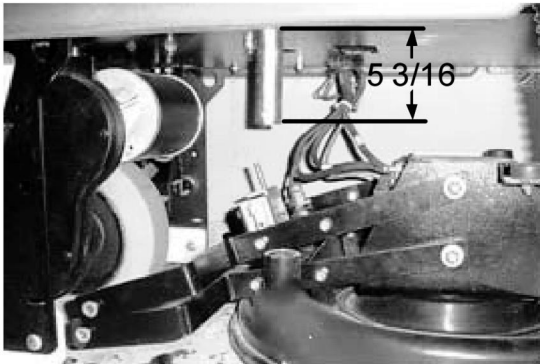
Attach metal ring (86082070 - PRV NO. 629000) using same screws that held pad lock keeper. Screw in spacer (862454470 - PRV NO. 739000) into motor shaft.



Use Gear puller to remove pad driver from motor shaft. Take care not to misplace motor shaft key.



Install new pad driver, motor shaft key, spacer, washer and bolt. Then install pad lock keeper, pad and pad lock. Turn deck assembly over onto pad.



Reattach wires to motor and connect motor wire harness to frame harness. Tie wires in place. Set actuator barrel by rotating barrel up or down to set barrel at $5\text{-}3/16 \pm 1/8$ from bottom of frame to bottom of barrel.

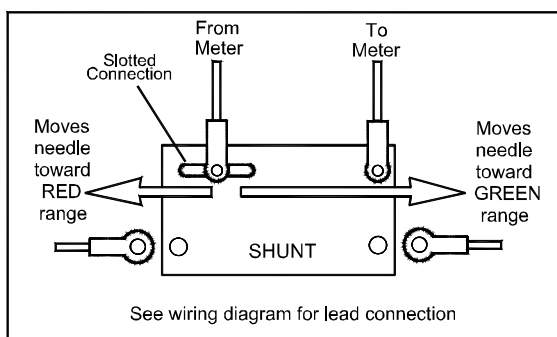


Reattach deck assembly to frame. Install actuator barrel on to spring retainer bars. Lift bottom of deck using your hand to align hole for clevis pin. Install clevis and rue ring.

Turn machine on, raise deck, drive machine check that machine is working properly. If not recheck actuator barrel and reset again if needed.

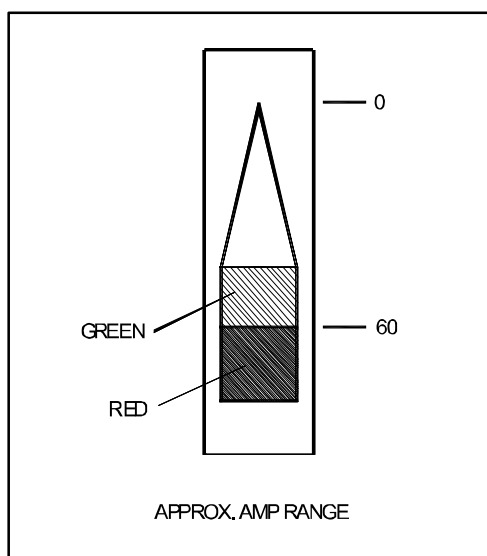
Shunt Replacement

This pad pressure meter adjustment is factory set. Over the course of time it may become necessary to adjust this setting using the slotted connection on the shunt.



Check the amp range when nuisance tripping of the pad motor controller indicates that the shunt may be out of adjustment.

1. Connect a DC ampere meter to the positive battery

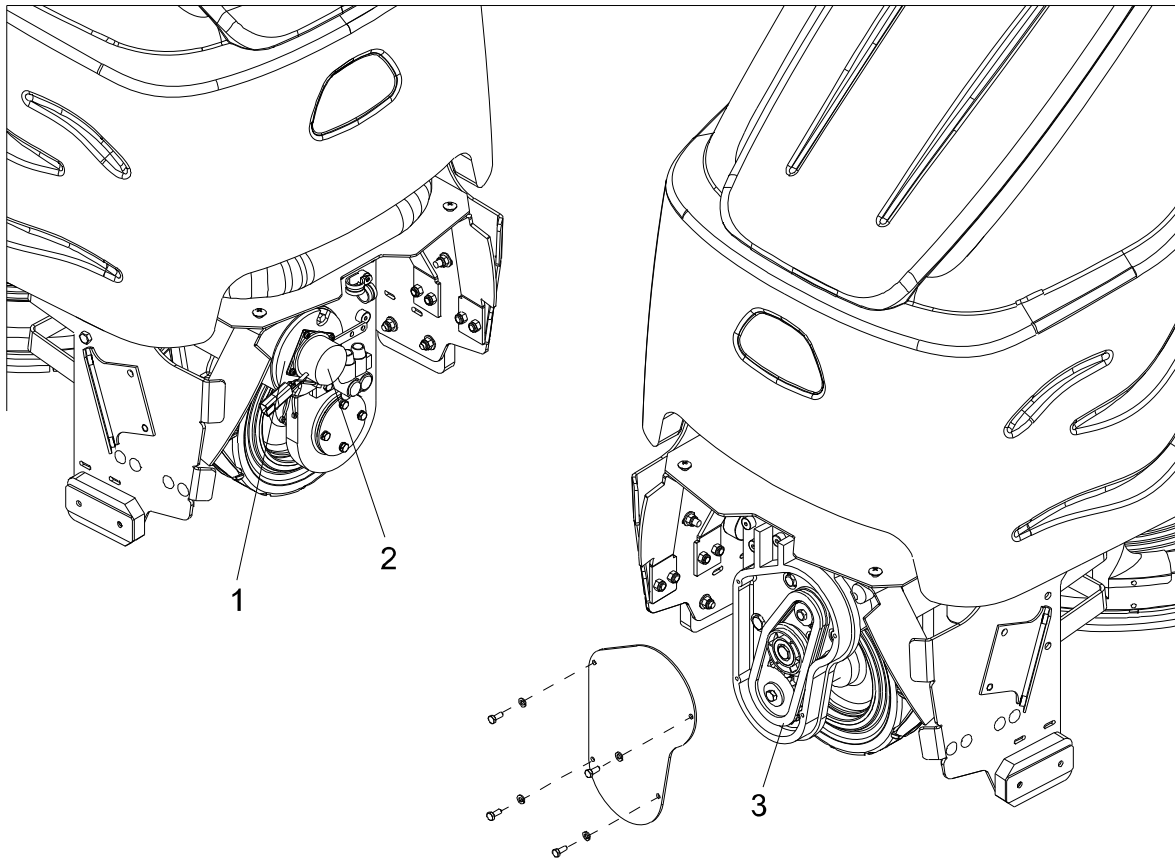


lead. Running the machine with a pad, lower the pad to the floor until it is operating at 60 5 amps.

2. Moving the wire in the slot, adjust the pad pressure meter until the needle sets at the line between the blue and red areas.

Burnisher Motor Carbon Brush Replacement

1. Mark location of cable lugs on motor housing.
2. Remove four screws from top cover. Remove cover from motor.
3. Remove four screws from brush housing. Lift brush housing off of motor commutator.
4. Clean excessive carbon deposits off of motor components with compressed air.
5. Prepare new brush assembly for use by inserting individual brush springs into brush guides. Check each brush to ensure proper movement after installing springs.
6. Locate new brush assembly according to locations marked in step 1. Depress brushes as required to insert brush housing over commutator.
7. Check that motor spins freely with new brushes installed. Replace four screws to secure brush housing. Replace motor cover.



Drive Motor & Brake

1. Drive Motor
2. parking Brake
3. Drive Chain

Electric Parking Brake Engagement

FOR SAFETY: Before leaving or servicing machine, stop on a level surface, turn off machine and remove key.

Electric Brake Engagement

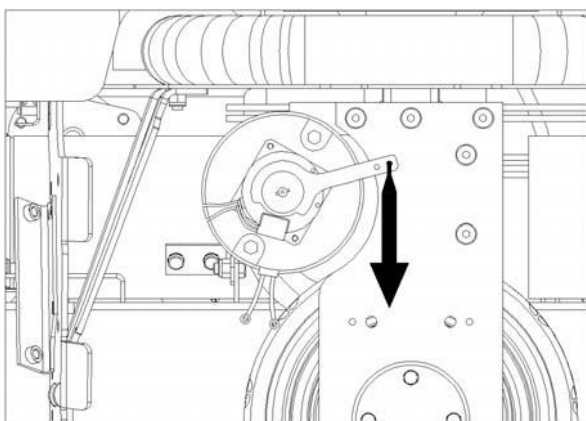
This machine is equipped with an electric parking brake.

The brake automatically engages and keeps the machine from moving whenever the operator steps off the platform or when emergency stop is engaged.

The brake has a mechanical over-ride that can be engaged so machine can be pushed or towed (slowly).

When the mechanical over-ride is engaged the machine cannot be driven.

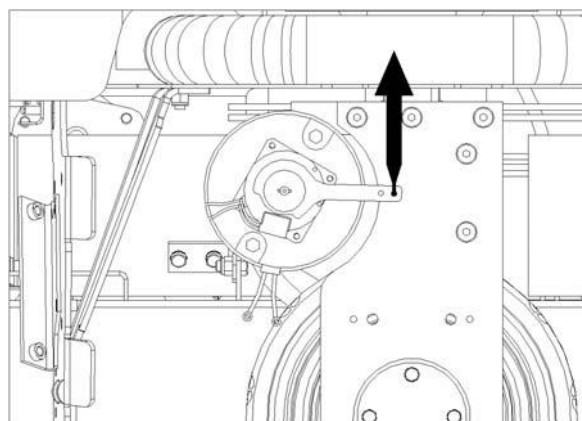
To engage brake:



1. Mechanical over-ride engaged. Machine can be pushed or towed (slowly).
2. Push lever firmly in direction of arrow

NOTE: There is an intermediate stop. Make sure lever is fully in the down position.

To disengage brake:



1. Mechanical over-ride disengaged Machine can be driven.
2. Push lever firmly in direction of arrow.

Drive Motor Carbon Brush Replacement

Do not use a pressure washer to clean around the motors. Use tap pressure only.

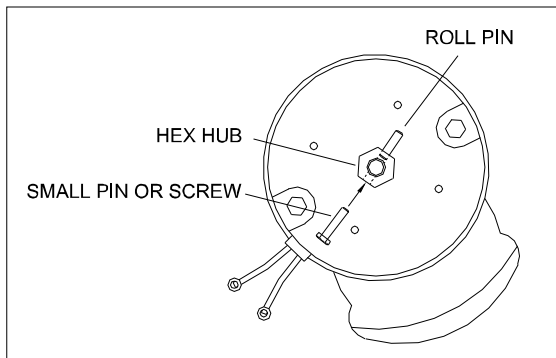
FOR SAFETY: Before leaving or servicing machine, stop on a level surface, turn off machine and remove key.

1. Disconnect batteries from machine.
2. Disconnect the electrical connection to the traction motor.

BRAKE REMOVAL

(Must be done to access carbon brushes)

3. Remove 4 mounting screws and remove brake.
4. Drive roll pin out of the hex hub enough to allow hex hub to slide off shaft. Its is recommended that the roll pin be left partially in the hex hub.

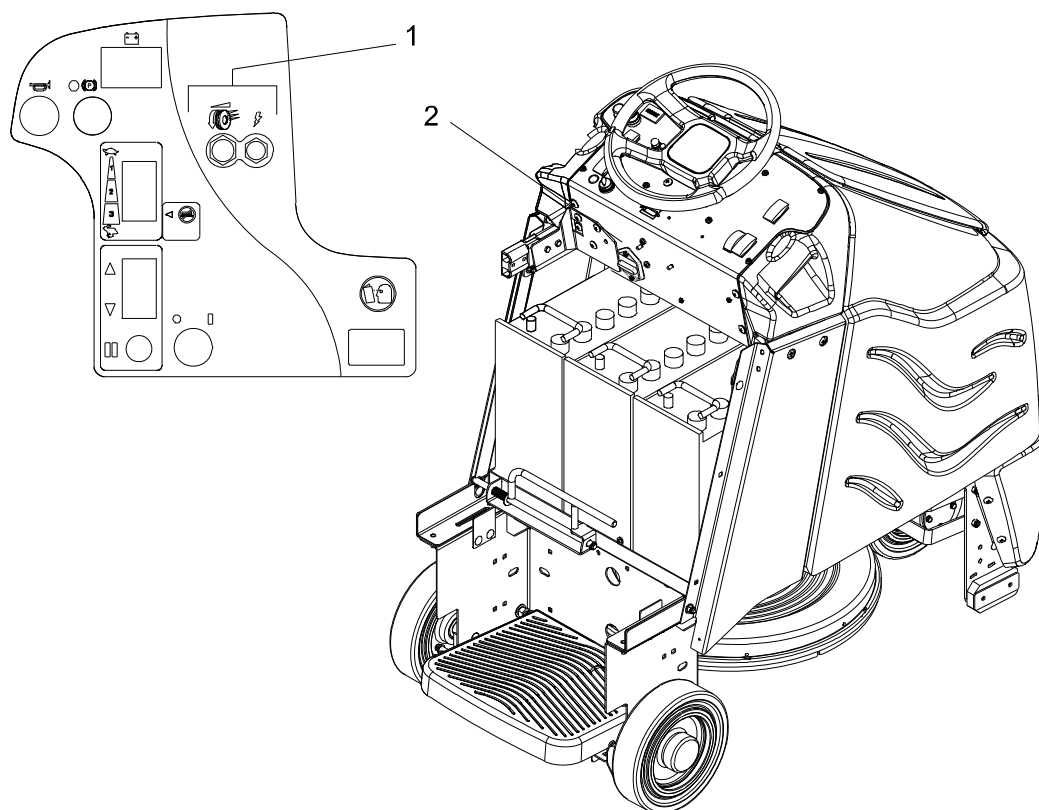


7. Install new brush and reinstall connecting screw and lead.
8. When all new brushes are installed. Place all in retracted position, held into brush holder by spring tension.
9. Carefully replace brush cap.

Reinstalling:

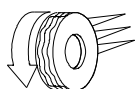
10. When replacing the hex hub, use a small pin or screw to help align the holes.
11. Drive the pin into the hub and make sure it is flush to the hex surface. The brake will not fit on the hub if the roll pin is protruding from the hub.
12. Replace the hub and use Lock-Tite on the screws.

5. Remove brush cap.
6. Release brush from spring tension. Remove screw connecting brush wire lead to brush holder. Clean brush holder to insure free movement.



Circuit Breakers

1. Circuit breakers interrupt the flow of power in the event of an electrical overload. When a circuit breaker is tripped, reset it by pressing the exposed button. If a circuit breaker continues to trip, the cause of the electrical overload should be found and corrected.
2. The burnisher motor breaker is a resettable circuit protection device, designed to stop the flow of electrical current to the burnisher pad motor in the event of an electrical overload. This protects the pad motor. If breaker is tripped, allow breaker to cool for several minutes. Once the breaker has cooled, reset by returning red flag to upward position.



30 Amp. Protects the propel motor.



3 Amp. Protects the machine controls.
(Basic only).

The breaker is located inside the battery compartment as shown.

Troubleshooting

PROBLEM	CAUSE	SOLUTION
No power to machine	Battery disconnected	Check all battery cable connections
	Emergency shut-off activated	Reset
	Battery cables corroded	Clean connections
	Faulty key switch	Replace switch
Little or no propel	Low battery charge	Charge batteries
	Machine turned on with pedal not in neutral position	Allow pedal to return to neutral. Restart
	Tripped circuit breaker	Reset circuit breaker
	Controller overheated	Allow cool down period
	Loose motor connection	Check wires and connections from controller to motor
	Faulty throttle circuit or potentiometer	Check wires and connections from throttle to controller and potentiometer resistance
	Faulty drive reset circuit or switch	Check wires, connections and switch
	Faulty platform circuit or switch	Check wires, connections and switch
	Brake over-ride engaged	Disengage brake over-ride
	Faulty brake circuit or over-ride switch	Check wires, connections and switch
Forward speed only Reverse speed only	Faulty forward/reverse switch	Replace switch
Deck won't go up or down	Circuit breaker tripped	Reset circuit breaker
Pad motor won't run	Circuit breaker tripped	Reset circuit breaker
	Faulty switch or connection	Check switch or connections
	Faulty relay	Check pad motor relay
Deck vibrates	Pad off center	Re-center or replace pad using pad install tool
Dust leaks from skirts	Dust hose blocked	Check for blockage and clear if needed

Controller Fault Codes

LED CODE	PROGRAMMER LCD DISPLAY	EXPLANATION	POSSIBLE CAUSE
1,1	THERMAL CUTBACK	over-/under-temperature cutback	1. Temperature >92°C or < -25°C. 2. Excessive load on vehicle. 3. Operation in extreme environments. 4. Electromagnetic brake not releasing.
1,2	THROTTLE FAULT 1	throttle fault	1. Throttle input wire open or shorted. 2. Throttle pot defective. 3. Wrong throttle type selected.
1,3	SPD LIMIT POT FAULT	speed limit pot fault	1. Speed limit pot wire(s) broken or shorted. 2. Broken speed limit pot.
1,4	LOW BATTERY VOLTAGE	battery voltage too low	1. Battery voltage >17 volts. 2. Bad connection at battery or controller.
1,5	OVERVOLTAGE	battery voltage too high	1. Battery voltage>36 volts. 2. Vehicle operating with charger attached. 3. Intermittent battery connection.
2,1	MAIN OFF FAULT	main contactor driver Off fault	1. Main contactor driver failed open.
2,3	MAIN CONT FLTS	main contactor fault	1. Main contactor welded or stuck open. 2. Main contactor driver fault. 3. Brake coil resistance too high.
2,4	MAIN ON FAULT	main contactor driver On fault	1. Main contactor driver failed closed.

LED CODE	PROGRAMMER LCD DISPLAY	EXPLANATION	POSSIBLE CAUSE
3,1	PROC/WIRING FAULT	HPD fault present for >10 sec.	1. Misadjusted throttle. 2. Broken throttle pot or throttle mechanism.
3,2	BRAKE ON FAULT	brake On fault	1. Electromagnetic brake driver shorted. 2. Electromagnetic brake coil open.
3,3	PRECHARGE FAULT	precharge fault	1. Low battery voltage. 2.KSI and throttle turned on at same time.
3,4	BRAKE OFF FAULT	brake Off fault	1. Electromagnetic brake driver open. 2. Electromagnetic brake coil shorted.
3,5	HPD	HPD (High pedal Disable) fault	1. Improper sequence of throttle and KSI. 2. Misadjusted throttle pot.
4,1	CURRENT SENSE FAULT	current sense fault	1. Short in motor or in motor wiring. 2. Controller failure.
4,2	HW FAILSAFE	motor voltage fault (hardware)	1. Motor voltage does not correspond to throttle request. 2. Short in motor or in motor wiring. 3. Controller failure.
4,3	EEPROM FAULT	EEPROM fault	1. EEPROM failure or fault.
4,4	POWER SECTION FAULT	power section fault	1. EEPROM failure or fault. 2. Short in motor or in motor wiring. 3. controller failure.