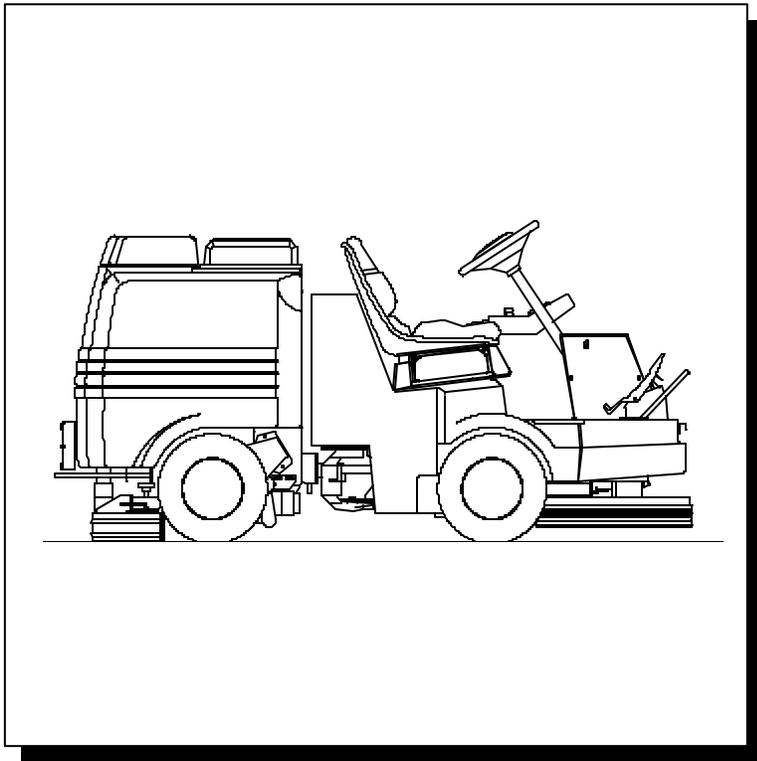


# Flex3



## SCRUBBER



Operating Instructions

**MODELS:** FLX3      FLXSP3  
FLX3T      FLXSP3T

**QUEST**® ... for Continuous Improvement.  
Windsor's Quality Management System is Certified ISO 9001.



*Read these instructions before using the machine*



# MACHINE DATA LOG/OVERVIEW

MODEL _____
DATE OF PURCHASE _____
SERIAL NUMBER _____
SALES REPRESENTATIVE # _____
DEALER NAME _____
OPERATIONS GUIDE NUMBER _____
PUBLISHED _____
Copyright 2003 Windsor Industries, Printed in USA

<b>YOUR DEALER</b>
Name: _____
Address: _____
Phone Number: _____

## OVERVIEW

The *Flex3™* is a revolutionary rider type scrubber with four wheel articulated design for superior maneuverability, simple operation, and low maintenance. The machine design permits access to areas even traditional walk behind machines cannot reach. The squeegee design, location, and steering geometry allows the operator to make tight turns while recovering full width of the scrub path. Controls are logically designed for easy touch button operation, strategically laid out at the operator's fingertips, easily reached from a comfortable seat. In addition, the four wheel stance continues the Windsor concept for operator comfort and stability. The *Flex3™* was designed from the ground up for ease of maintenance.

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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

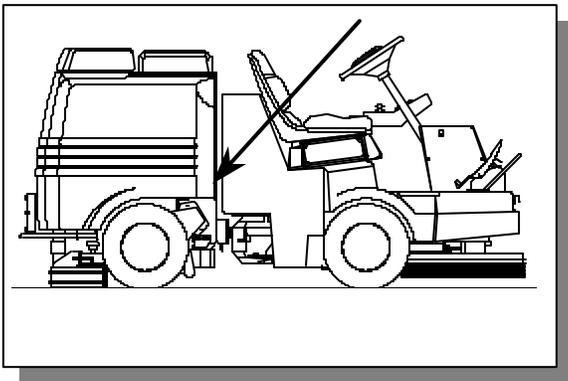
The HOW TO USE THIS MANUAL section will tell you how to find important information for ordering correct repair parts.

Parts may be ordered from authorized dealer. When placing an order for parts, the machine model and machine serial number is 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.

MODEL _____
DATE OF PURCHASE _____
SERIAL NUMBER _____
SALES REPRESENTATIVE # _____
DEALER NAME _____
OPERATIONS GUIDE NUMBER _____
PUBLISHED _____

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The model and serial number of your machine are located approximately where indicated.



The SAFETY section contains important information regarding hazard or unsafe practices of the machine. Levels of hazards is 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:

- Batteries
- Squeegee Assembly
- Scrub Head
- Differential Drive Chain
- Drive Wheel Chain
- Brakes
- Tires and Wheels
- Vacuum Motors
- Brush Motors
- Towing and Pushing Machine
- Storage
- Service Schedule
- Troubleshooting

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.
- **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** – column indicates the first machine the part number is applicable to. When the machine design has changed, this column will indicate serial number of applicable machine. The main illustration shows the most current design of the machine. The boxed illustrations show older designs. If column has an asterisk (\*), call manufacturer for serial number.
- **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 that came with the kit. It contains replacement parts numbers needed for ordering future parts.

**NOTE:** The 98# on the lower left corner of the front cover is the part number for this manual.

# IMPORTANT SAFETY INSTRUCTIONS

When using a battery powered 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.

If foam or liquid comes out of machine, **switch off immediately**.

**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.

**Only chemicals recommended** by the manufacturer shall be used.

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

## SAVE THESE INSTRUCTIONS

## **HAZARD INTENSITY LEVEL**

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 solution tank in raised position when charging. Keep sparks and flames away from the batteries.**

#### **! WARNING**

**Do not smoke around batteries.**

**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.**

#### **! WARNING**

**Avoid skin contact with the acid contained in the batteries.**

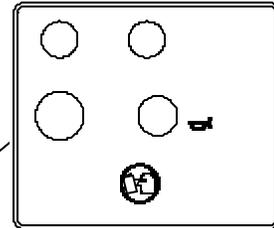
**Never allow metal to lie across battery tops.**

# SAFETY LABEL LOCATION

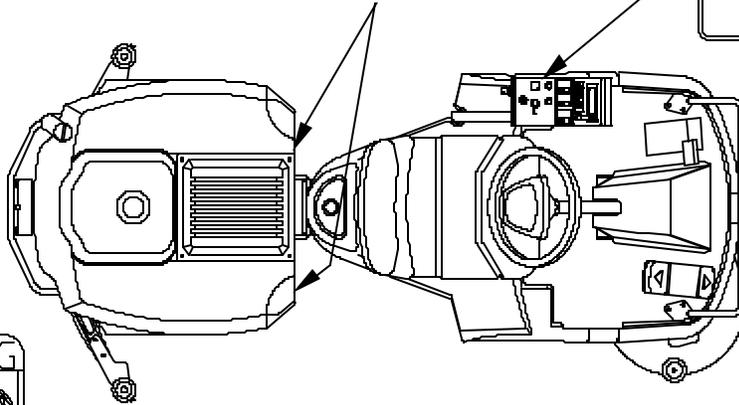
NOTE: These drawings indicate the location of safety labels on the Flex3™. If, at any time, the labels become illegible, promptly replace them.



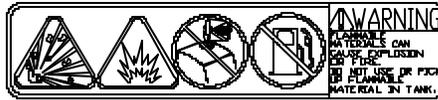
SAFETY DECAL 81925



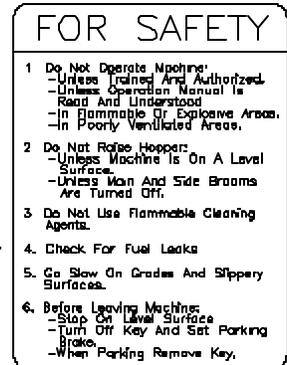
FOR SAFETY 500700



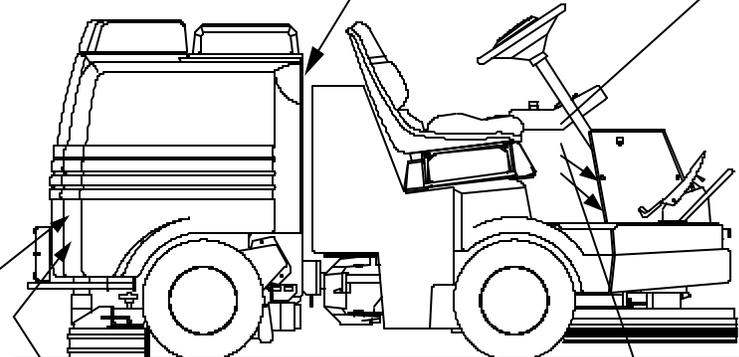
BATTERY CAUTION 80885  
LOCATED ON BACK SIDE OF FRONT  
BATTERY COMPARTMENT PLATE



SAFETY DECAL 81494



SAFETY DECAL 80814



SUPPORT WARNING 82448



LOCATED ON FRAME  
NEXT TO VACUUM INLET

SAFETY DECAL 81505



SAFETY DECAL 82447



LOCATED ON FRAME  
NEXT TO 82448 DECAL

## TECHNICAL SPECIFICATIONS

ITEM	DIMENSION/CAPACITY
Rated Voltage	36VDC
Rated Amperage	90 Amps
Batteries	6 x 6 Volt 360 AH @ 20hr rate
Scrub Brush Motors	2 x .75 hp (0.56 kW)
Vacuum Motor	2 x .75 hp (.056 kW) @ 18,000 rpm
Propelling Motor	2 hp (.745 kW) @ 2700 rpm, 27A
Mass (GVW)	2102 lbs. (953 kg)
Weight empty without batteries	914 lbs. (415 kg)
Solution Control	Gravity feed, fully variable with automatic shut-off in neutral
Solution tank capacity	35 gal. (132l)
Recovery tank capacity	35 gal. (132l)
Scrub brush diameter for 34 in. (86 cm) disk scrub head	17 in (43.0 cm)
Scrub brush diameter for 34 in. (86 cm) cylindrical scrub head	6 in (15.2 cm)
Scrub brush length for 34 in. (86 cm) cylindrical scrub head	32 in. (81.3 cm)
Scrub brush pressure	0-200 lbs. (0-91 kg)
Scrub brush speed (Disk)	200 rpm
Scrub brush speed (cyl)	800 rpm
Tires	4 x 16 in (40.64 cm) foam filled black knobby standard.
Maximum speed	6.2 mile/hour (10k/hr)
Coverage	49,300 sq. ft/hr (4,590 sq. m/hr) at 3.5 mph (5.6k/hr) with 2 in (5 cm) overlap.
Frame construction	Welded cold rolled steel and steel plate with epoxy powder coat finish.
Brakes	Dual self centering mechanical 6 in (15.24 cm) disc with hand lock parking brake.
Minimum aisle u-turn width	96 in (243.8 cm)

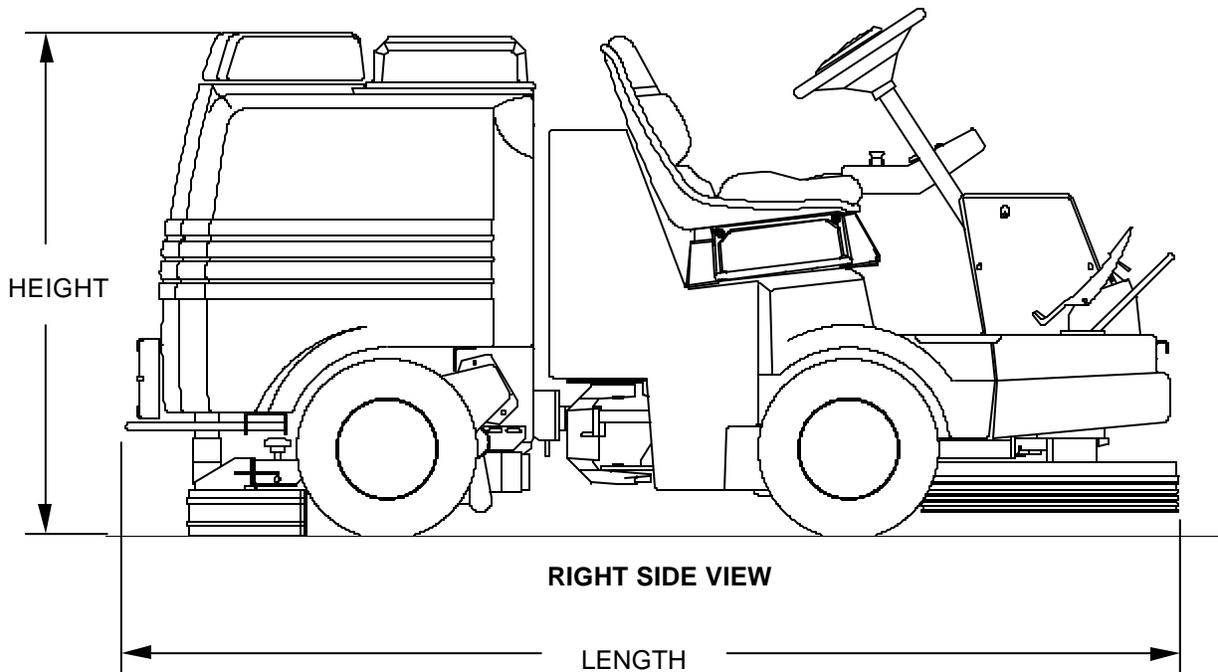
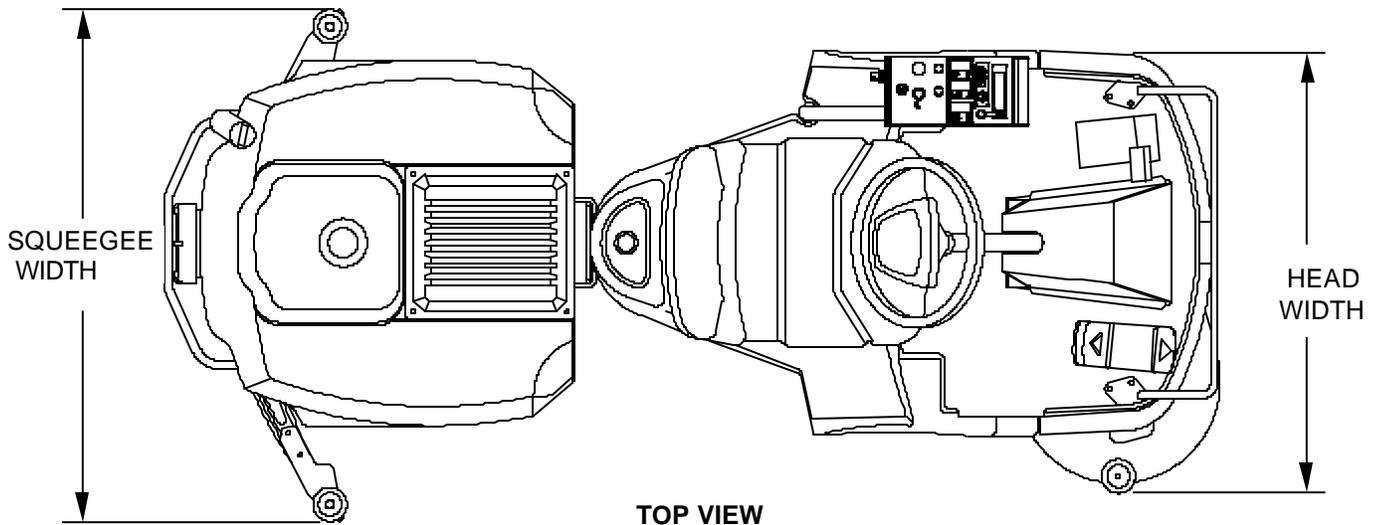
### SPECIAL NOTES:

The sound pressure level at the operator's ear was measured to be 76 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 dBA.

The weighted root mean square acceleration at the operator's arms was measured to be below 2.5m/s<sup>2</sup>. 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.

# TECHNICAL SPECIFICATIONS

ITEM	DIMENSION/CAPACITY
Height	44.5 in (113 cm)
Length with disk head	95.2 in (241.8 cm)
Length with cylindrical head	95.8 in (243.3 cm)
Width with standard squeegee	48.7 in (123.7 cm)
Width with tight squeegee	43.0 in (109.2 cm)
Width w/o squeegee	42.5 in (108.0 cm)



## HOW THE MACHINE WORKS

The *Flex3™* is a battery powered, self-propelled, hard floor scrubber intended for commercial use. The appliance applies a cleaning solution onto a hard floor, scrubs the floor with brushes, and then vacuums the soiled water back into the recovery tank.

The machine's primary systems are the solution system, scrub system, recovery system, and operator control system.

The function of the solution system is to store cleaning solution and deliver it to the scrub system. The solution system consists of the solution tank, strainers, valve and controls. The solution tank stores cleaning solution (water and detergent) until it is delivered to the scrub system. The strainers protect the valve from debris. The valve is a solenoid type valve, which controls the delivery of cleaning solution to the scrub system. The valve automatically prevents solution flow unless the scrub brushes are turned on and the machine is being propelled. The solution control switch controls the amount of cleaning solution delivered to the scrub system by controlling the amount of time the valve is open.

The function of the scrub system is to scrub the floor. The disk scrub systems consists of two rotary type disk scrub brushes, motors, scrub deck skirt, lift actuator and controls. The brushes scrub the floor as the motors drive the brushes. The brush drive hubs allow the scrub brushes to follow irregularities and changes in the floor without losing contact with the floor. The scrub deck skirts and side squeegees control the cleaning solution on the floor so that the squeegee can pick it up. The one touch switch controls the motors and lift actuator to turn the motors on and lower the deck, or turn the motors off and raise the deck. The brush pressure switch controls the down pressure on the scrub deck.

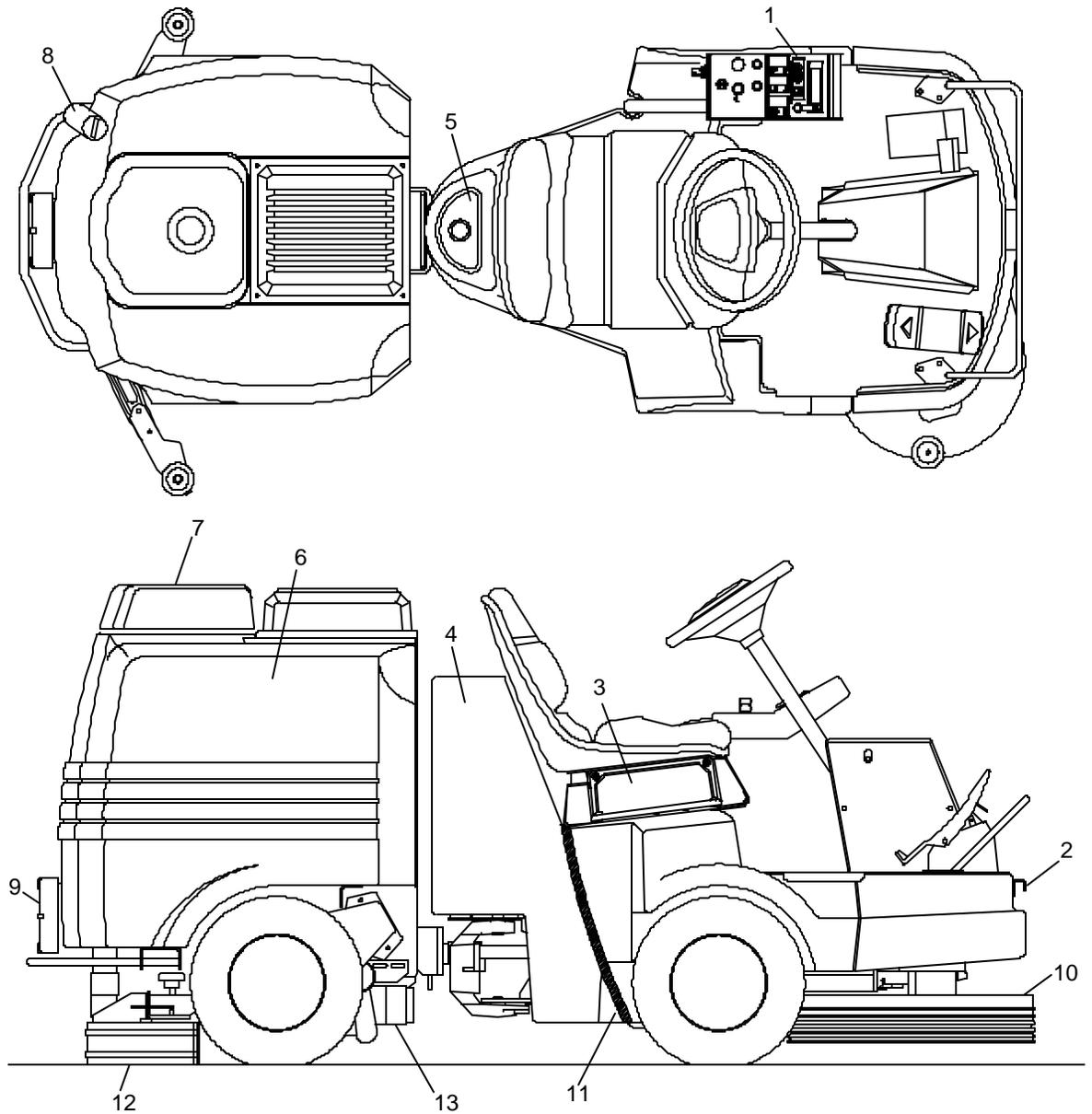
The scrub plus system consists of two cylindrical type brushes, motors, scrub deck skirts, hopper, lift actuator, and controls. The cylindrical scrub head is designed to eliminate debris that may be caught in the squeegee while scrubbing. Water is applied to the first scrubbing brush turning in a clockwise rotation when viewed from the right or operator's side of machine. The first brush scrubs dirt and debris between the brushes. The second scrubbing brush, turning in a counter clockwise rotation, picks up debris and throws it into a removable hopper. The larger debris that might catch under the squeegee is collected in the hopper. Water is allowed to drain out the hopper into the squeegee path where it is recovered from the floor. The scrub deck skirts control the cleaning solution on the floor so that the squeegee can pick it up. The one touch switch controls the motors and lift actuator to turn the motors on and lower the deck, or turn the motors off and raise the deck. The brush pressure switch controls the down pressure on the scrub deck.

The function of the recovery system is to vacuum the soiled water back into the recovery tank. The recovery system consists of the squeegee, vacuum motors, filter, recovery tank and controls. The squeegee wipes the dirty solution off the floor as the machine moves forward. The vacuum motors provide suction to draw the dirty solution off the floor and into the recovery tank. The filter protects the vacuum fan from debris and foam. The recovery tank stores the dirty solution.

The float switch in the tank activates the recovery tank full indicator, shuts off the scrub motors and solution flow, raises the scrub deck then squeegee, and shuts off vacuum motor.

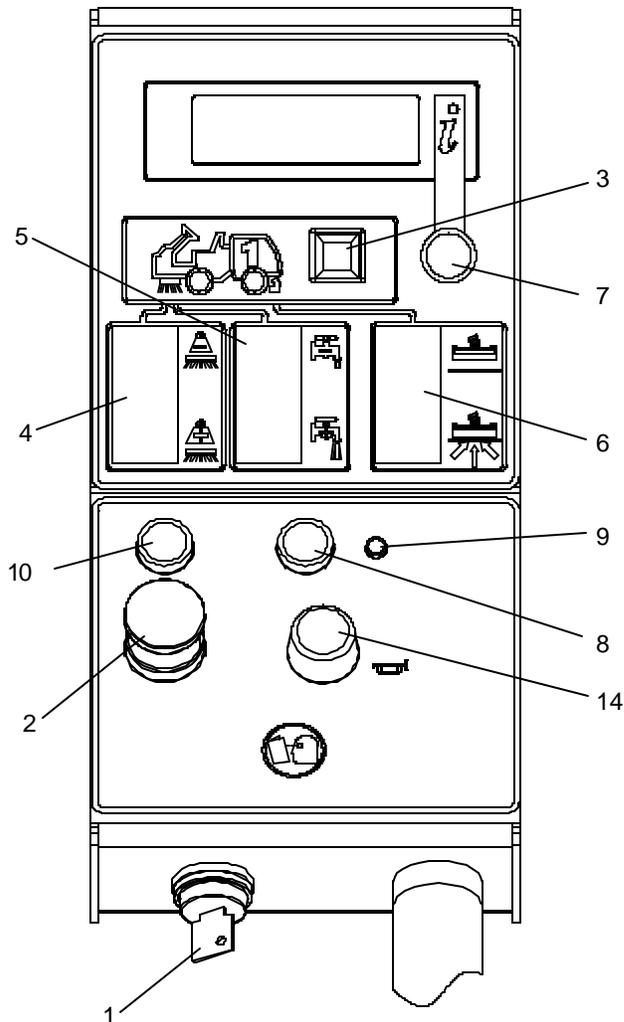
The function of the operator control system is to control the direction and speed of the machine. The directional control system consists of the direction/speed control pedal, steering wheel, brake pedal, propel controller, and drive wheels. The direction/speed pedal signals forward or reverse direction and speed. The controller interprets signals from the direction/speed pedal to command the drive wheel to propel or slow the machine. The steering wheel articulates the machine to travel in the direction desired by the operator. The brake can be used to hold the machine on slopes.

# COMPONENTS



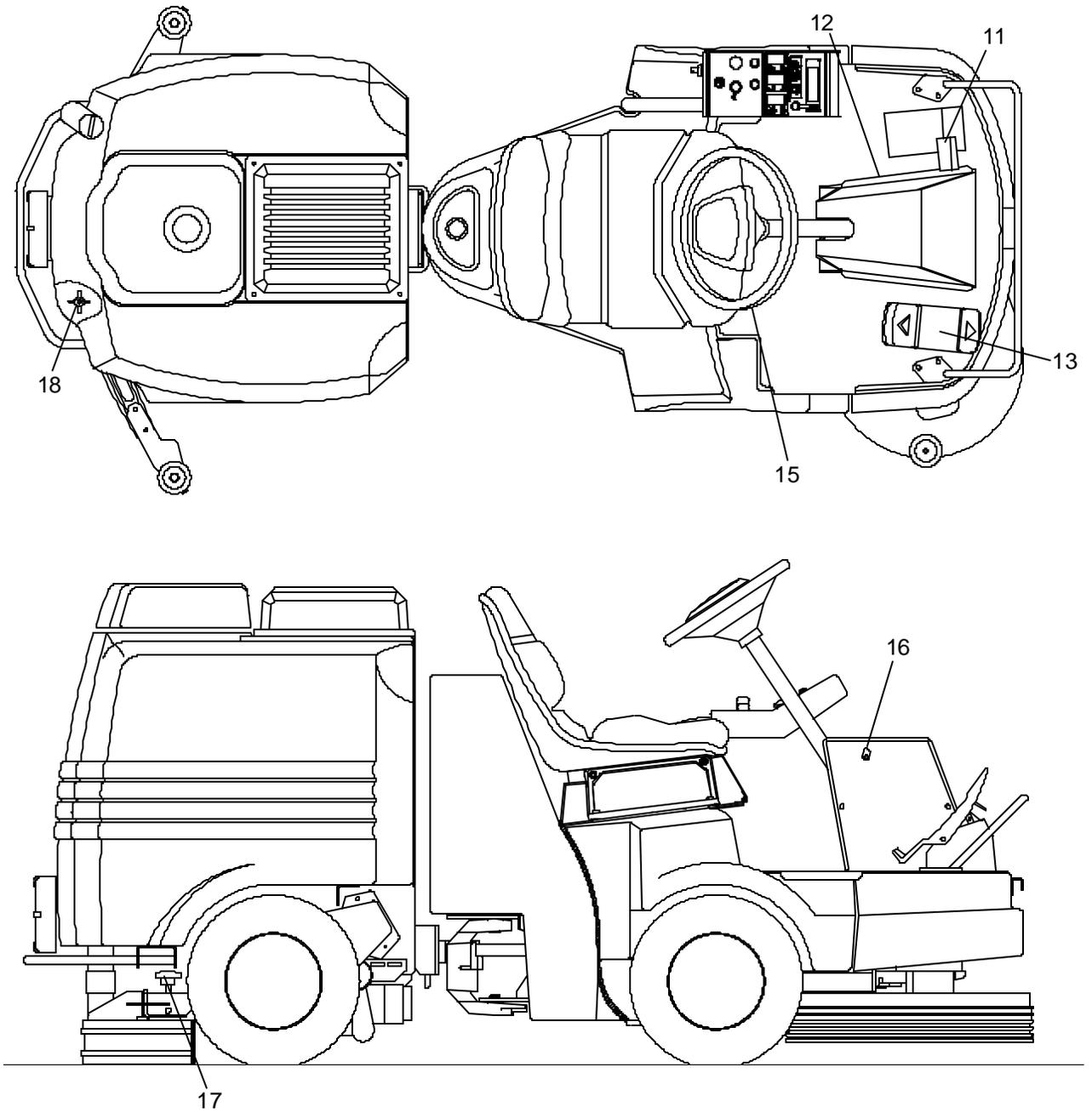
- |                        |                              |
|------------------------|------------------------------|
| 1. Control Panel       | 7. Recovery Tank Cover       |
| 2. Front Bumper        | 8. Recovery Tank Drain Hose  |
| 3. Electrical Cover    | 9. Recovery Tank Drain Cap   |
| 4. Solution Tank       | 10. Scrub Head               |
| 5. Solution Tank Cover | 11. Solution Tank Drain Hose |
| 6. Recovery Tank       | 12. Squeegee                 |
|                        | 13. Vacuum Motors            |

# CONTROLS



- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Key Switch</li> <li>2. Emergency Stop Button</li> <li>3. One Touch Switch</li> <li>4. Brush Pressure Switch</li> <li>5. Solution Control Switch</li> <li>6. Vacuum/Squeegee Switch</li> <li>7. Display Toggle Switch             <ul style="list-style-type: none"> <li>• Information Screen 1</li> <li>• Information Screen 2</li> <li>• Hour Meter</li> <li>• Fault Codes and Special Icons</li> <li>• Battery Meter</li> </ul> </li> </ol> | <ol style="list-style-type: none"> <li>8. Recycle Switch (Optional)</li> <li>9. Recycle Indicator Light (Optional)</li> <li>10. Headlight Switch (Optional)</li> <li>11. Brake Pedal</li> <li>12. Parking Brake Knob</li> <li>13. Directional Control Pedal and Speed Reduction Feature</li> <li>14. Horn Button</li> <li>15. Steering Wheel</li> <li>16. Steering Wheel Tilt Lever</li> <li>17. Squeegee Camber Adjustment Knob</li> <li>18. Squeegee Deflection Adjustment Knob</li> </ol> |
|---|--|

# CONTROLS

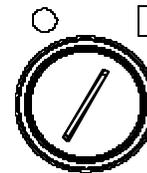
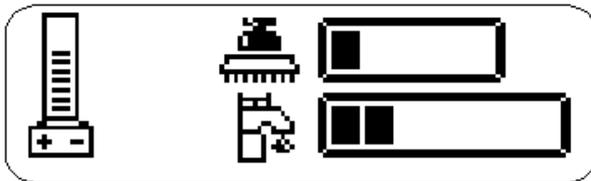


# CONTROLS

## 1. KEY SWITCH

Controls the power for the machine functions. To turn the machine power on, rotate key clockwise. When the key is turned on the battery symbol will flash for 12 seconds while the system runs self-diagnostics and returns scrub deck and squeegee to raised position, if necessary. The controller will not respond to other commands until this routine is complete. To turn the machine power off, rotate key counterclockwise.

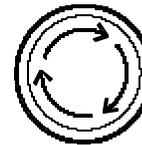
INFORMATION DISPLAY



## 2. EMERGENCY STOP BUTTON

This safety feature is designed to cut all power to the machine at any time. To shut the machine power off, push the Emergency Stop switch. To reset the machine, rotate the switch clockwise.

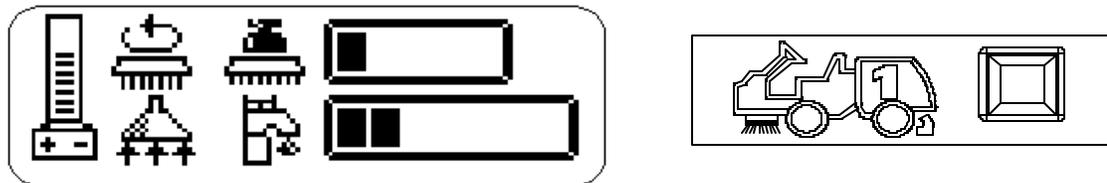
INFORMATION DISPLAY



## 3. ONE TOUCH SWITCH

This switch controls the scrub brushes and vacuum all in one touch. To start scrubbing, press the one touch switch. The brush drive motors will turn on, the scrub deck will lower to the “light scrub” position, the solution will flow at “two bars” rate, the squeegee will lower and the vacuum will turn on. The information display window will show which functions are operating. If the direction control pedal is in the neutral position for more than two seconds the brushes and solution flow will stop. If the one touch switch is activated without brushes installed, the brush motors will stop, the scrub deck will rise, and the brush pressure indicator will display error code 9000. To stop scrubbing, press the one touch switch. The brush drive motors will turn off, the scrub deck will raise the solution flow will stop, the squeegee will raise after a 15 second delay, and the vacuum motor will turn off. This delay is to clear the vacuum hose of recovered solution.

INFORMATION DISPLAY

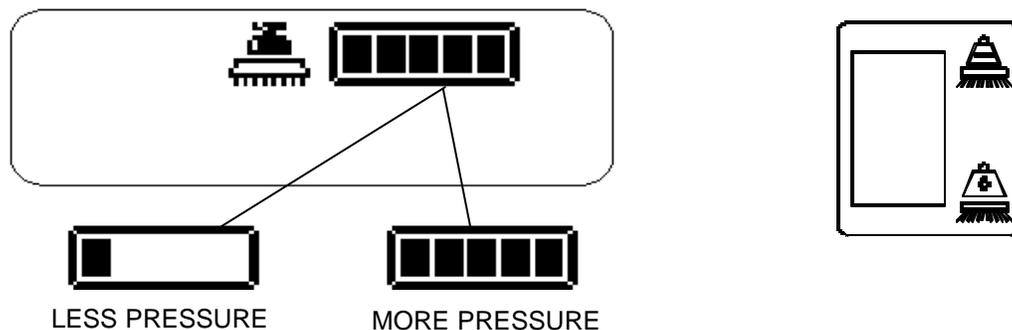


## 4. BRUSH PRESSURE SWITCH

This switch controls the amount of brush pressure to the floor. There are 5 different pressure settings. To decrease the amount of down pressure, press the top of the brush pressure switch (-). To increase the amount of down pressure, press the bottom of the brush pressure switch (+). The information display screen will show the amount of pressure.

**NOTE:** Press switch and hold momentarily each time to change brush pressure.

INFORMATION DISPLAY



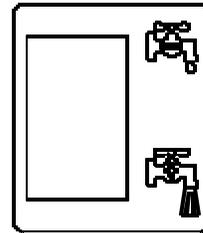
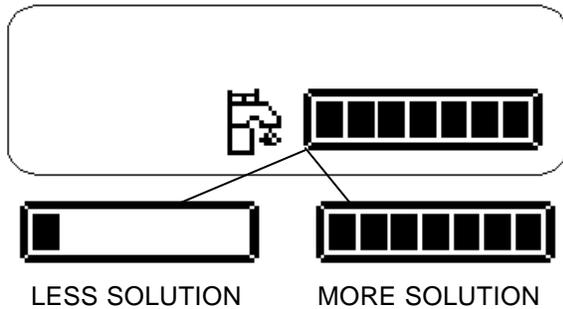
# CONTROLS

## 5. SOLUTION CONTROL SWITCH

This switch controls the amount of solution flow to the scrub deck. There are 5 different flow settings. To increase the solution flow, press the solution control switch (+). To decrease solution flow, press the top of the switch (-). If the brush motors are turned off or the direction control lever is in neutral, the flow is automatically interrupted until the motors are turned on again, or the drive pedal is moved forward or reverse. This feature prevents unintentional draining of the solution tank and allows the operator to adjust the solution flow to the scrub deck without resetting each time the scrubbing operation is interrupted. If recycling option is installed, this switch controls the amount of solution flow to the scrub deck by controlling the speed of the pump.

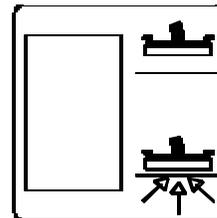
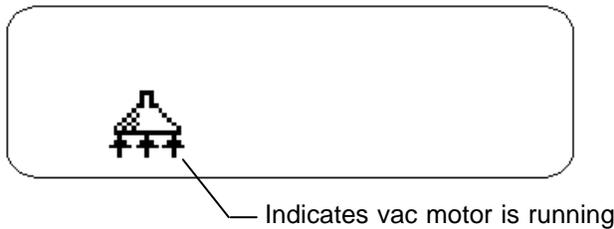
**NOTE:** Press switch and hold momentarily each time to change solution flow.

INFORMATION DISPLAY



## 6. VACUUM/SQUEEGEE SWITCH

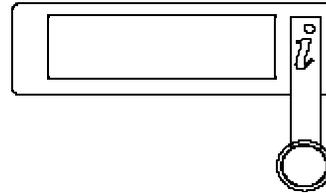
This switch independently controls the vacuum motor and squeegee position. To start the vacuum motor and lower the squeegee to the floor, press the bottom of the switch. To raise the squeegee and turn off the vacuum motor, press the top of the switch. The squeegee will raise after a 15 second delay, and the vacuum motor will turn off 15 seconds later, in order to clear vacuum hose of recovered solution.



## 7. DISPLAY TOGGLE SWITCH

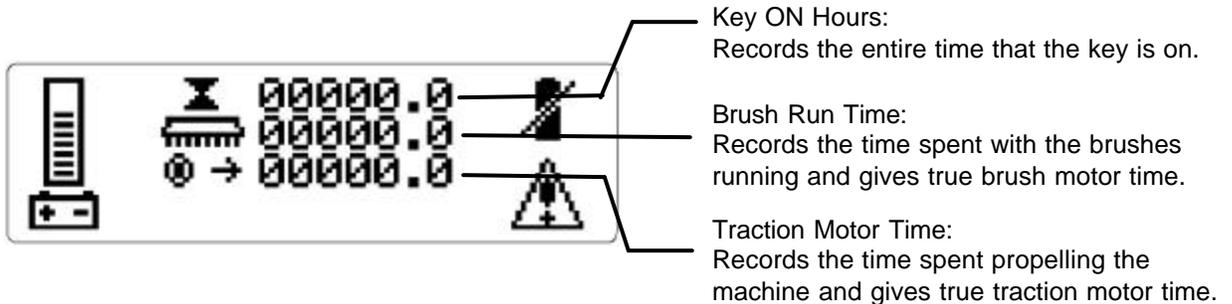
The display toggle switch allows you to change the information display screen. Two screens are available.

- INFORMATION DISPLAY –SCREEN 1

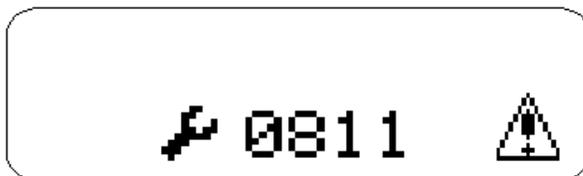


- INFORMATION DISPLAY –SCREEN 2

- The hour meter is viewed on screen 2 of the information display. Hours are displayed for key ON time, brush run time, and traction motor time.



- Fault codes/icon will appear on either display screen when the controller detects a problem within the electrical system. The codes/icons are used to assist users as well as service technicians in identifying and correcting problems. See troubleshooting section for more information on fault codes. The machine must be keyed off, then on again, to clear fault code after repair.



## CONTROLS

- Icon appears if throttle is depressed when the key is turned on. To correct, lift foot off of throttle. If this does not clear the icon, the throttle may be damaged and should be checked by a qualified service technician.



- The float switch is located inside the recovery tank. The purpose of the float switch is to notify the user that the recovery tank is full. When the float switch is activated, the scrub brush motors and solution flow will stop, the scrub deck will raise, the squeegee will rise after 60 seconds, and the vacuum motor will turn off 10 seconds later.



- The battery meter can be viewed at the left side of either information screen 1 or information screen 2. The level of battery charge is indicated by the horizontal bars in the battery meter box. When the batteries require charging, the icon will flash and a battery inhibit icon will appear on the right side of either information screen. Scrub and solution functions that are running when the battery inhibit icon appears will be automatically shut off. It is not possible to restart scrub functions while the battery inhibit is displayed. The controller reserves enough battery charge to allow pick-up of residual water and transport back to a charging station.



## 8. RECYCLE SWITCH (OPTIONAL)

This switch controls the solution recycle pump. To start recycle pump, press the switch. A green light above the circuit breakers will indicate that pump is on. The solution control switch will control the speed of the pump and therefore the amount of solution flow to the scrub deck. Make sure there is an adequate amount of water in recovery tank before starting recycle pump, and turn off recycle pump when water level reaches filter. To stop the solution recycle pump, press the switch. The pump will stop and the green indicator light will turn off, and the solenoid valve will resume control of solution flow to the scrub deck.



## 9. RECYCLE INDICATOR LIGHT (OPTIONAL)

This light will turn on when the recycle pump is on, and turn off when the recycle pump is off.



## 10. HEADLIGHT SWITCH (OPTIONAL)

Turns on optional headlight for improved visibility in low light areas.



# CONTROLS

## 11. BRAKE PEDAL

The brake pedal is located on the floor to the left side of the steering column pedestal. The pedal operates the disc brakes on the drive wheels. To slow or stop the vehicle, apply pressure to the brake pedal.

## 12. PARKING BRAKE KNOB

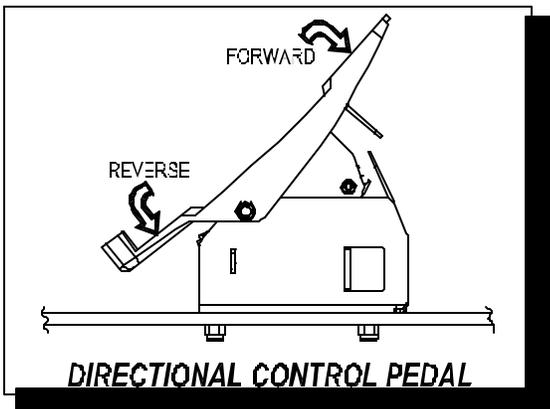
The orange knob located on the left side of the steering column pedestal is used to set the parking brake. To set the parking brake, fully depress the brake pedal and push the parking brake knob. To release the parking brake, fully depress the brake pedal. Then release pressure on the brake pedal. The parking brake knob will return to its' released position.

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

## 13. DIRECTIONAL CONTROL PEDAL AND SPEED REDUCTION FEATURE

This pedal controls the direction of travel and the speed of the vehicle. Slowly pressing the front of the pedal causes the machine to travel forward. Pressing the rear of the pedal causes the vehicle to travel in reverse. The vehicle speed can be controlled by varying the pressure on the front or rear of the pedal.

**FOR SAFETY: The vehicle can coast for a short distance after releasing the directional pedal. Remove the foot from pedal and use brakes to slow or stop the machine.**



### SPEED REDUCTION FEATURE

Maximum speed of machine can be decreased to 80% of maximum by disconnecting wire 41 white from wire 42 white, located at 20 pin connector at controller. Machine is set at 100% speed setting at factory.

## 14. HORN BUTTON

The horn button is located on the control panel at the left side of the steering wheel. The horn is activated by pushing the button.



## 15. STEERING WHEEL

The steering wheel articulates the machine to turn in the direction desired by the operator.

## 16. STEERING TILT LEVER

The steering tilt lever is located on the right side of the steering wheel. To engage the tilt adjustment, pull up on the lever and adjust the steering column to desired position. Release lever and allow it to lock into desired position.

## 17. SQUEEGEE CAMBER ADJUSTMENT KNOB

The squeegee camber adjustment knob is located at the center of the squeegee at the rear of the machine. (See maintenance section for adjustment).

## 18. SQUEEGEE DEFLECTION ADJUSTMENT KNOB

The squeegee deflection knob is located at the rear of the machine, on right side of the squeegee assembly. (See maintenance section for adjustment).

# MACHINE OPERATION

## 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.

1. Visually check for exterior damage, leaks, damaged or worn tires.
2. Check brushes or pads and drivers for proper installation and wear. Weekly check scrub deck skirts for proper contact with floor. See BRUSHES in MAINTENANCE SECTION.
3. Check debris hopper (cylindrical scrubhead) to be sure it is empty.
4. Check squeegee for wear and proper adjustment. See SQUEEGEE ADJUSTMENT in MAINTENANCE SECTION.
5. Check for securely attached drain hose, plug, and caps.
6. Check battery condition, recharge if necessary. See BATTERIES in maintenance section.
7. Check the brakes and steering for proper operation. See BRAKES and STEERING in MAINTENANCE SECTION.

## 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. The operator should be in the seat with foot on the brake pedal or with the parking brake on. The directional pedal must be in the neutral position to avoid unintentional movement.

**NOTE:** The Operator must be in position on the seat to activate machine in desired direction.

2. Turn the key switch clockwise to the "ON" position.
3. Release the brake, then press lightly on the directional pedal in the desired direction and drive to the filling area.

## FILLING THE MACHINE

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

1. Set squeegee and scrub deck to up position, set parking brake, and turn off key switch.
2. Remove solution tank cover.

### **! WARNING**

**Flammable materials can cause an explosion or fire. Do not use flammable materials in the tanks.**

3. The solution tank can be filled to the bottom lip of the fill inlet. Leave room for detergent. The solution tank capacity is 50 gallons (189 liters). The water must not be hotter than 140° (60°C) to prevent damage to the tank. Measure the required amount of chemical into the solution tank after filling with water. Dry chemicals should be thoroughly mixed before being added into solution tank. Commercially available, high alkaline floor cleaners are suitable for use in the solution system.
4. Inspect solution tank cover vent for obstructions. Replace solution tank cover.



## **MACHINE OPERATION**

### **TO STOP SCRUBBING**

1. Press the one-touch switch (#1) on the control panel. The brush motors will stop and the scrub deck will raise to the park position. After 15 seconds, the squeegee will raise, and 15 seconds later the vacuum motor will turn off. This delay is to clear the vacuum hose of recovered solution.
2. Allow directional pedal to return to neutral.
3. Apply brake to stop machine.
4. Turn key switch off.
5. Set parking brake.

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

### **EMERGENCY STOP PROCEDURE**

1. Turn key switch to off position. If an electrical problem is suspected push in emergency stop button.
2. Release pressure on directional pedal.
3. Apply brakes.

**NOTE:** *Turning the key switch off during normal running operation will stop all motors and actuators. When the key is turned back on the system will automatically return scrub deck and squeegee to raised position.*

### **DOUBLE SCRUB**

Floors which are heavily soiled or have thick accumulation of floor finish may not clean sufficiently with one pass. In these cases it will be necessary to double scrub.

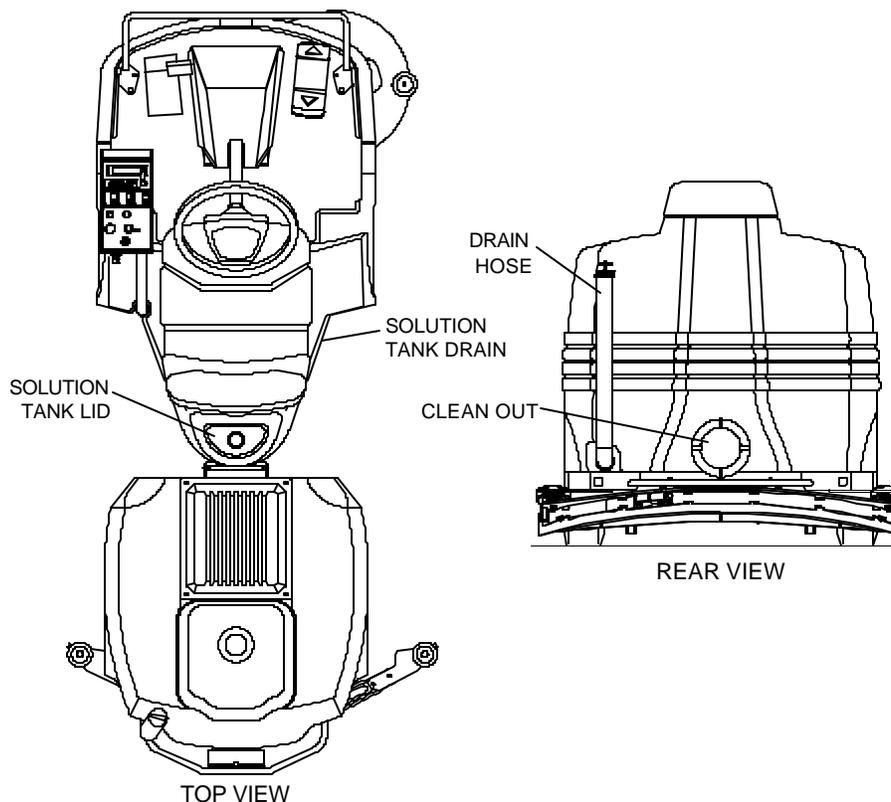
To double scrub, make the first pass over the surface being cleaned with the squeegee up, the solution on, and brushes down. This allows the solution to stay in contact with the soil while loosening the surface accumulation with the brushes. Allow time for the first application to stay in contact with floor. Length of time between the first and second pass depends on amount of accumulation and the type of chemical being used. A second scrubbing with the squeegee down and again the solution and brushes on will further loosen soil. The additional application of solution will further assist the difficult cleaning job. Caution should be used when double scrubbing, maintain safe driving speed on wet floors.

## EMPTYING AND CLEANING TANKS RECOVERY TANK

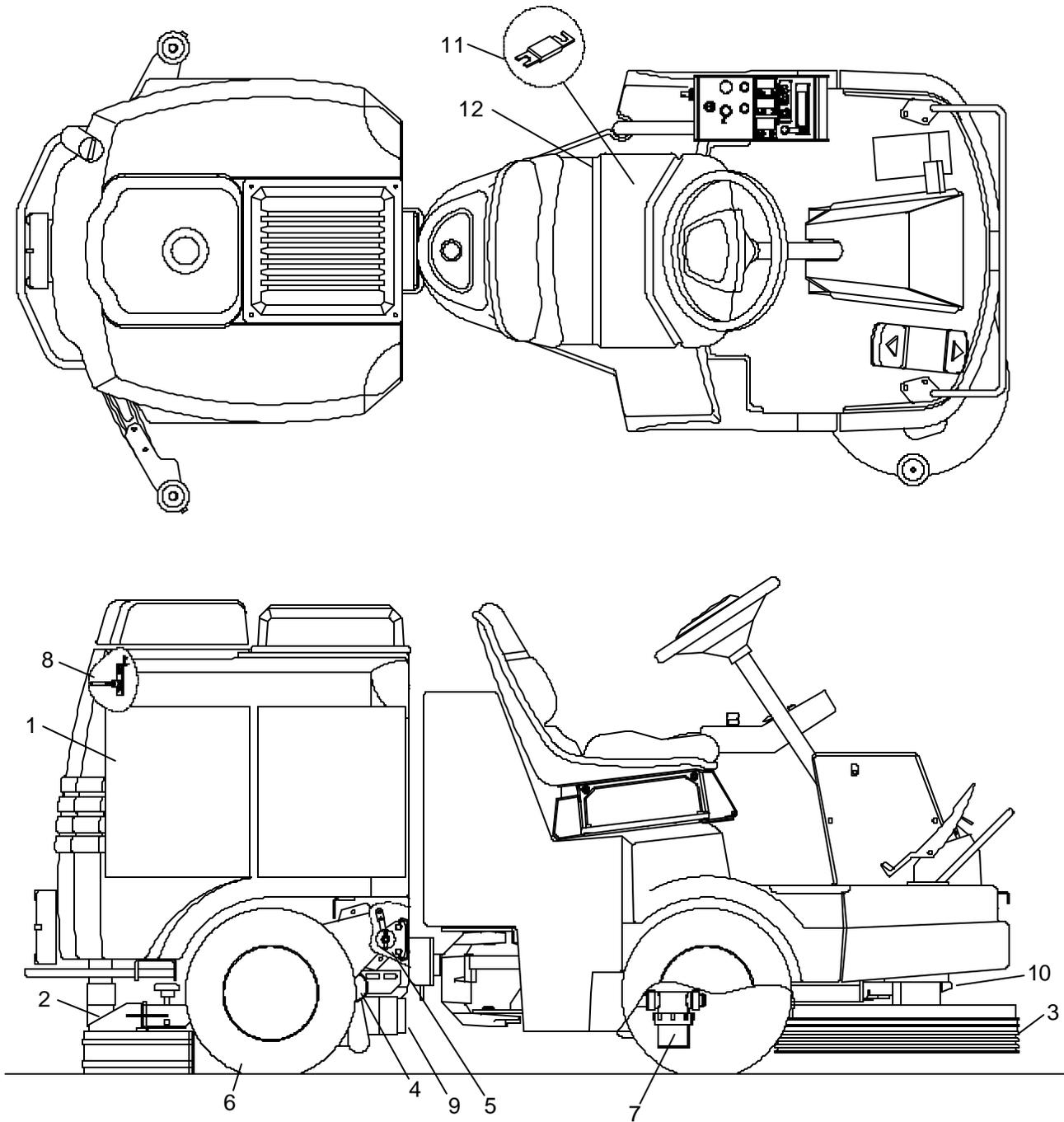
1. Touch the scrub deck switch (#1) on the console to raise the scrub deck, stop the motors, raise the squeegee and turn off vacuum motors and solution.
2. Park the machine next to a floor drain. Drain hose is on left rear corner of machine.
3. Turn off the key switch and set the machine's parking brake.
4. Unhook the drain hose from retainer. Unscrew T-handle on plug enough to loosen plug and lower hose in direction of drain. Stand behind end of hose. Recovered solution will come out with force. Slowly remove plug from drain hose.
5. Recovery tank should be flushed out with clean water on a daily basis. Direct water from fill hose into recovery drain hose. Repeat until clean water comes out of drain hose. Do not use water hotter than 140° F (60° C) to clean the tank. Damage to tank may occur.
6. Large debris or compacted dirt may be removed by clean out cap located at rear lower center of recovery tank. Regular flushing of recovery tank should make this step unusual.
7. Replace plug and secure drain hose in bracket.
8. If machine is to be stored, leave recovery tank cover open and drain hose off.

## SOLUTION TANK

1. Park the machine next to a floor drain. Drain hose is on right side at middle.
2. Turn off the key switch and set the machine's parking brake.
3. Unhook the small drain hose from the retainer. Unscrew T-handle on plug enough to loosen plug, then lower hose in direction of the drain. Slowly remove plug from drain hose.
4. Remove the solution tank cover.
5. Flush the solution tank out with clean water and run several gallons of clean water through systems. Do not use water hotter than 140° F (60° C) to clean tank. Damage may occur.  
*NOTE: Never allow solution to remain in tank. Damage to tank, seals and valves could occur.*
6. Replace the drain plug and secure drain hose in bracket.



# MAINTENANCE



- |                            |                       |
|----------------------------|-----------------------|
| 1. Batteries               | 7. Solution Strainers |
| 2. Squeegee Assembly       | 8. Float Switch       |
| 3. Scrub Head (Disk Shown) | 9. Vacuum Motors      |
| 4. Drive Chains            | 10. Brush Motors      |
| 5. Brakes                  | 11. Fuse              |
| 6. Tires and Wheels        | 12. Circuit Breakers  |

## 1. BATTERIES

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

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 case. Do not operate the machine if the batteries are in poor condition or if they have a charge level below 25%, specific gravity below 1.177.

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 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.

### ! WARNING

When servicing machine, avoid contact with 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

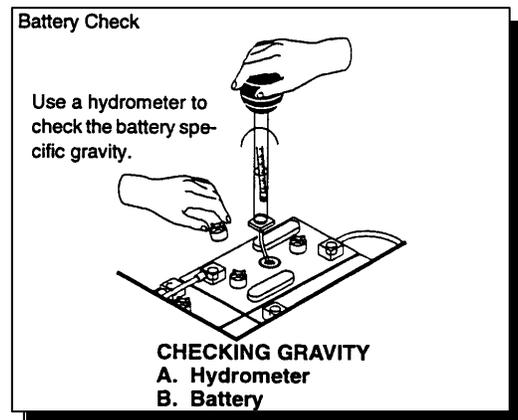
Charge batteries in a well ventilated area.

## 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. Do not add water until the battery is fully charged.

4. Wipe off the top of the batteries at least once a week.
5. Test battery condition with a hydrometer at least once a week.
6. Ensure that all connections are tight and all corrosion removed.
7. Every 4 to 6 months remove the batteries from the machine and clean the battery cases and battery compartment.

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



To find the correct specific gravity reading when the temperature of the battery electrolyte is other than 80° F (27° C).

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

SPECIFIC GRAVITY	BATTERY CONDITION
1.265	100% CHARGED
1.225	75% CHARGED
1.190	50% CHARGED
1.155	25% CHARGED
1.120	DISCHARGED

## MAINTENANCE

### TO CHARGE BATTERIES

**! WARNING** When servicing machine, avoid contact with 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.

1. Stop the machine in a clean, well ventilated area next to the charger.
2. Turn the machine off and set parking brake.

**FOR SAFETY:** Before leaving or servicing machine, stop on level surface, apply parking brake, turn off machine and remove key.

3. Raise the tank and raise the support arm to lock in place.

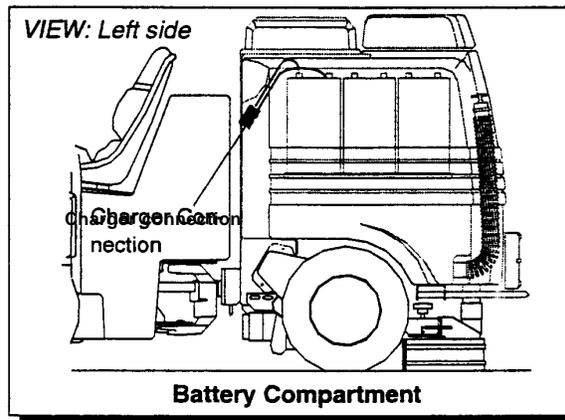
**! WARNING**

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

4. Check the electrolyte level in each battery cell. Before charging, add just enough water to cover up the plates. After recharging has completed, add just enough water to bring up the level to the indicator ring. If water level is too high before charging, normal expansion of the electrolytes may cause and overflow, resulting in loss of battery acid balance and damage to the machine.
5. Replace battery caps, and leave them in place while charging.
6. Unplug the battery connector from the machine. Unplug the battery charger from power outlet.

**FOR 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 first. Hazardous sparks may result.

7. Use a 36 volt DC charger that will automatically shut off when the batteries are fully charged to charge the six battery pack.
8. Plug the charger into the battery connector. Plug charger into power outlet. The charger gauge should indicate that the batteries are charging. If the charger does not automatically start up, verify that charger is plugged into batteries.
9. When the batteries are fully charged, disconnect the charger from the batteries.
10. Connect the batteries to the machine connector.
11. Check the electrolyte level. It should be up to the indicator ring. If necessary add distilled water.
12. Lower the tank.



## LOW BATTERY SHUT-DOWN

The electronic system is equipped with battery voltage sensors. When the batteries are exhausted to a preset level, the scrubbing system will shut down to protect the batteries from damage, and the battery lockout icon will appear on the display.



## TO REMOVE BATTERIES

1. Stop the machine in a clean area next to the charger.
2. Turn off machine and set parking brake.

**FOR SAFETY:** Before leaving or servicing machine, stop on level surface, apply parking brake, turn off machine and remove key.

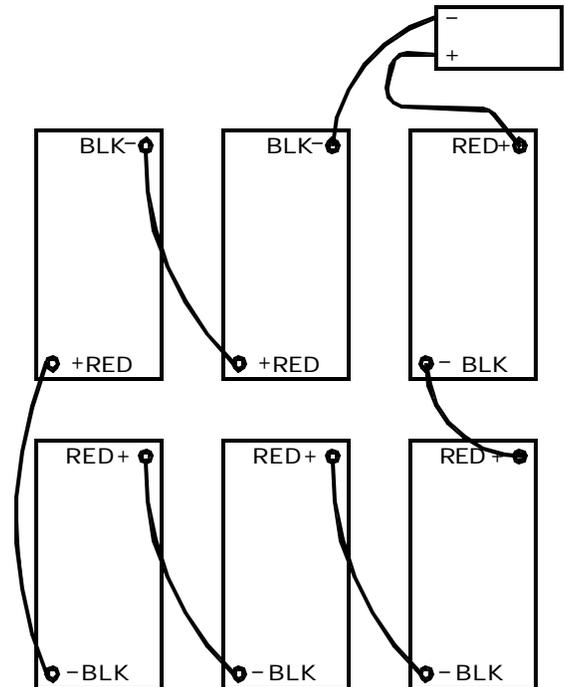
3. Drain recovery tank.
4. Raise the tank and raise the support arm to lock in place.
5. Disconnect battery pack from the machine.
6. Use the proper size open end wrench to disconnect main ground wire first and secure cable terminal away from batteries.
7. Disconnect main positive lead and secure cable terminal away from battery/batteries.
8. Loosen both terminals on each jumper cable and remove one at a time.
9. Prepare a suitable battery site to place batteries.
10. Attach suitable battery lifting device and lift batteries from the machine.

### **! CAUTION**

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

## TO REPLACE BATTERIES

1. Refer to diagram. Place batteries in battery compartment.
2. Connect all jumper cables positive to negative to the six batteries.
3. Connect the positive cable to battery in the position shown.
4. Connect negative cable to battery in the position shown.



# MAINTENANCE

## 2. SQUEEGEE ASSEMBLY

The steering geometry and the design of the squeegee assembly allows the squeegee assembly to follow the track of the scrub head even in hard turns. Turns are not pushed sideways around a pivot point but turn in an arc. This feature eliminates the need to use side squeegees. The assembly rides on the floor supported by two wheels that follow changing levels in the floor. Down pressure and squeegee flair is constant in relation to the floor. Spring tension is applied to the squeegee to maintain good contact with the floor

*NOTE: Refer to ADJUSTING SQUEEGEE below.*

Rollers are mounted on each end of the squeegee assembly to assist in rolling by obstacles. The squeegee assembly is easily removed from lift mechanism for service and transport.

### SQUEEGEE ADJUSTMENT

Adjusting the squeegee is a two-part process. First, the squeegee tool must have correct pitch in order for the squeegee blade to have the same deflection at each tip as well as at the center. The pitch adjustment is facilitated by the use of a spirit level mounted on the squeegee tool. The second adjustment is the amount of deflection or "bend" in the rear blade. This deflection is controlled by the height of the tool from the floor. That height is varied by the wheel adjustment.

#### TO ADJUST SQUEEGEE PITCH

1. Choose a smooth, level surface. Turn on the key switch, release the machine parking brake, lower the squeegee and drive forward at least 2 feet (60 cm).
2. With the squeegee down, stop the machine and set the parking brake. Do not allow the machine to roll back.

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

3. Determine the differences, if any, in deflection of the squeegee blade between each end and the middle. Proper adjustment is obtained when deflection is equal all the way across tool. This should correspond to the bubble being in the middle position of the spirit level.
4. To decrease the deflection of the squeegee blade at the ends, turn knob on squeegee trailing arm clockwise. To increase the deflection at the ends of the squeegee assembly, turn knob counter clockwise.

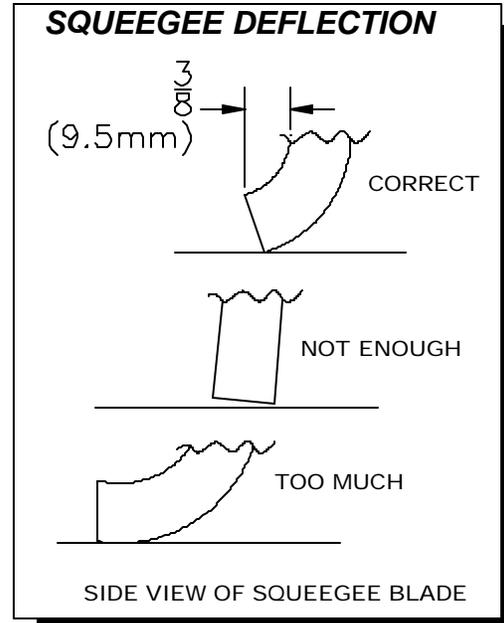
5. Again check the deflection of the squeegee blades. Repeat steps 1 through 4 until the deflection is equal across the entire rear squeegee blade.

#### TO ADJUST SQUEEGEE DEFLECTION

1. Choose a smooth, level surface. Lower the squeegee and drive forward at least 2 feet.
2. With the squeegee down, stop the machine and set the parking brake. Do not allow the machine to roll back.

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

3. Observe the amount of squeegee deflection. It should deflect 3/8in (9.5 mm) across the entire width of the squeegee.
4. To adjust the squeegee deflection, loosen knob on the squeegee slide bar.
5. Sliding bar to the left increases deflection. Sliding bar to the right decreases deflection.
6. Tighten knob on squeegee slide bar.
7. Turn on the key switch and release the parking brake. Raise and then lower squeegee assembly. Drive forward at least 2 feet (60 cm).
8. Repeat steps 2 through 7 until deflection of 3/8 in. (9.5 cm) is reached.



## TO REMOVE SQUEEGEE ASSEMBLY

1. With the squeegee in the up position, turn off the key switch and set the parking brake.
2. To remove squeegee tool to work on bench, raise the recovery tank and raise the support arm to lock in place.

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

3. Disconnect vacuum hose and loosen the two squeegee retaining knobs.
4. Pull squeegee assembly rearward from the lifting carrier.
5. With squeegee assembly on bench inspect or repair as necessary.
6. To reinstall, align squeegee assembly to lift carrier. Push forward until squeegee is fully engaged.
7. Tighten knobs.
8. Attach vacuum hose.

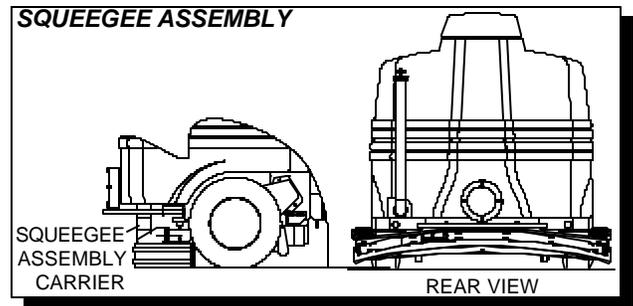
## TO REPLACE OR ROTATE REAR SQUEEGEE BLADES

1. With the squeegee in the up position, turn off the key switch and set the parking brake.

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

2. Unlock and pull open latch on rear of squeegee tool.
3. Remove blade retainer straps from squeegee tool.
4. Remove squeegee blade from locating pins on squeegee tool and rotate to new position or replace as required.
5. Install blade on locating pins of squeegee tool.
6. Install squeegee retainer straps.
7. Fasten and lock latch. Latch is adjustable. Adjust latch only tight enough to take up slack in retaining strap.

**NOTE: Changing of squeegee blades does not always necessitate a readjustment. Refer to section on adjusting squeegee.**



## TO REPLACE OR ROTATE FRONT SQUEEGEE BLADES

1. With squeegee assembly on bench, loosen retaining bolt and locking nut on the left side of the retaining strap.
2. Remove front retainer strap.
3. Remove squeegee blade from locating pins on squeegee tool and rotate to new position or replace as required.
4. Install blade on locating pins of squeegee tool.
5. Replace front retainer strap.
6. Secure strap by tightening retaining bolt and locking nut on retainer strap.

**NOTE: Changing of squeegee blades does not always necessitate a readjustment. Refer to section on adjusting squeegee.**

## MAINTENANCE

### 3. SCRUB HEAD-DISK

The scrub head consists of two rotary type scrub brushes, drive motors, and splash skirts. The operator can select one of five different down pressures on the touch control panel. Adjustments are made automatically by the machine when floor conditions change. There are no mechanical adjustments to be made by the operator. The drive hub allows brushes to follow irregularities and changes in floor without losing contact with floor.

### SCRUB BRUSHES

There are four different types of brushes available to cover applications from cleaning heavily soiled floors to polishing. A pad driver is also available to take advantage of the many cleaning pads on the market and further add to the flexibility of the machine. Please refer to the following to assist in selecting the proper brush or pad for the work at hand.

### UNCOATED FLOORS

**Aggressive Grit** is a nylon fiber impregnated with silicone carbide grit. It grinds away stain, soil, and removes surface material.

**Mild Grit** is a less aggressive silicone carbide grit suitable for cleaning medium soil conditions. Advantages are faster ground speed than nylon bristles on light solid applications.

**Nylon** is a general-purpose scrub brush with stiff bristles.

### FINISHED FLOORS

**Nylon** bristles are used in a variety of applications on coated or uncoated surfaces.

**Polypropylene** bristles work on a variety of floor surfaces. Does not soften in water

**White Pads** (Polishing) are used for dry polishing to achieve a high-gloss appearance, or surface washing on highly polished or burnished floors.

**Red Pads** (Buffing) are used for light-duty scrubbing. When used with a mild detergent they will provide surface cleaning without removing the finish.

**Blue Pads** (Scrubbing) are used for heavy-duty scrubbing and light stripping. The blue pads remove less finish than brown stripping pads, yet will remove black marks, stains and dirt.

**Brown Pads** (Stripping) are used for easy and complete removal of old floor waxes/finishes. They will quickly remove ground in dirt, black heel marks, and spills. When used with the proper stripper, this pad leaves the floor clean and ready for finishing.

### REPLACING OR INSTALLING SCRUB BRUSHES

The scrub brushes should be checked before each day's work for wire, string, wear, or damage. The scrub brushes should be replaced if brush bristles are missing or if shorter than 5/8 inch.

**NOTE:** For uniform scrubbing, scrub brushes must be replaced as a set.

1. With the scrub deck up, turn off the machine and set the parking brake.
2. Locate release lever on top of brush or pad driver. With finger rotate release lever against spring pressure counter clockwise. Brush/pad driver will release and drop down.
3. To reinstall, center the cut out of the release lever plate on brush/pad driver to be installed under the brush drive hub.
4. Raise brush/pad drive up until assembly contacts brush hub. Rotate slightly until drive engages release lever plate.
5. While holding upward pressure, rotate brush/pad driver assembly clockwise. When fully engaged, release lever plate will rotate under spring pressure to lock assembly.

**NOTE:** Check that release plate is completely closed and pad/brush is securely attached. Damage to driver or brush could occur.

6. Repeat the procedure for the opposite side of the machine.

## SCRUB HEAD-CYLINDRICAL

The dual cylindrical scrub head is designed to eliminate debris that may be caught in the squeegee while scrubbing. Water is applied to the first scrubbing brush turning in a clockwise rotation when viewed from the right or operator's side of machine. The first brush scrubs dirt and debris between the brushes. The second scrubbing brush, turning in a counter clockwise rotation, picks up debris and throws it into a removable hopper. The larger debris which might catch under the squeegee is collected in the hopper. Water is allowed to drain out the hopper into the squeegee path where it is recovered from the floor. The automatic operating procedure is the same as the disc machine.

## MAINTENANCE

The brushes should wear evenly side to side if properly adjusted. Scrub brushes should be exchanged front to back every 50 hours to ensure even wear since the rear brush contacts the floor with more force. It is not necessary to rotate end for end since swapping front to back puts the brushes in the opposite rotation, as well as balancing wear. Scrub brushes should be replaced as a set when bristle length wears to height of yellow PerformAlert™ bristles.

## SCRUB BRUSH REMOVAL

The scrub brushes are removed from the side of the machine. The front is removed from the right side and the rear is removed from the left side.

1. Unlatch idler side door.
2. Pull out on top of door until lip on door clears brush head.
3. Push down on door until hooks on door are free of scrub head side.
4. Pull out on door with a rocking motion to free idler door from end of brush.
5. Pull brush out with a rocking motion to free brush from drive hub.

## SCRUB BRUSH REPLACEMENT

1. Observe location of drive hub lugs. It is usually easier to position the lugs to the 12 o'clock-6 o'clock position (vertical) or 9 o'clock-3 o'clock position (horizontal).
2. Orient brush notches to match the position of the drive hub lugs and slide onto hub. It may be necessary to lift the drive side of the brush.
3. Push brush until a positive stop is felt. The idler plate cannot be installed until the brush is fully sealed on the drive hub.
4. Allow brush to drop below scrub deck. Line up lugs on idler plate with notched in brush and fully insert plate onto brush.
5. Line up hook on idler door with notches on side of scrub head.
6. Slide idler door up until lip rests on top of scrub head.
7. Latch door into position.

## **MAINTENANCE**

### **DUMPING HOPPER**

The removable hopper is located behind the rear scrub brush. If the hopper becomes full, it will not accept any more debris. Remove the hopper by sliding it out from the operator's side of the machine. The hopper can then be dumped from the top or the left side door can be removed to dump debris from the end. The side door is also convenient for flushing the hopper clean with running water.

### **BELT REPLACEMENT**

1. Remove scrub brushes.
2. Remove four bolts securing broom drive seal and retainer.
3. Slacken belt tension by means of jack bolt under motor.
4. The drive hub may be unscrewed from the inside. Flats are provided on interior drive pulley axle to facilitate removal.
5. Place belt on motor pulley then pull down into scrub head.
6. Insert drive hub from inside of scrub head and through lower loop of belt.
7. Screw axle into side of scrub head.
8. Re-tension belt to deflect 1/8" at center of span when a pressure of 4 pounds is applied.
9. Install broom drive seal and retainer.
10. Install scrub brushes.

### **SCRUB DECK ADJUSTMENT**

Scrub deck adjustment consists of two types of adjustments. The first is to insure the individual brushes make the same width pattern end to end. Any tapered brush pattern should be adjusted out. The second is to make the pattern of equal width between front and rear brushes. Unequal patterns are caused by the scrub deck not being parallel to the floor. Proper adjustment is obtained when the contact patterns of the brushed on the floor show two 1" rectangles the width of the brushed. The rectangles should be parallel to each other.

### **TESTING, ADJUSTMENT OF INDIVIDUAL BRUSHES**

1. Move the machine to an unfinished area of floor to avoid marking finish.
2. With water valve off, lock brakes, and lower scrub head to floor. Allow brushes to run until automatic shut off occurs. It may be necessary to repeat this step in the same location until a good mark can be seen on the floor. This can be accomplished by touching lightly the directional pedal to restart the scrub deck without moving the machine.
3. Raise the scrub deck and note the brush patterns on the floor. There should be two rectangles with parallel sides. If the pattern is tapered, proceed as follows.

### **ADJUSTMENT OF INDIVIDUAL BRUSHES**

The brush pattern is adjusted front he idler side only. The idler shaft is locked into position by means of an allen head screw on the idler door. The shaft is secured in an eccentric position. With the screw loose the shaft may be rotated by means of the flats machined on the interior side of the shaft to achieve different heights.

1. Determine if idler is to be moved up or down to balance the pattern.
2. Remove idler door on brush to be balanced.
3. Measure distance of axle from top of door and record.
4. Loosen allen head screw from outside door.
5. Rotate shaft to new position. Hold shaft in position.
6. Tighten allen head screw.
7. Install door on machine.
8. Re-start and readjust as necessary.

### **LEVELING THE SCRUB HEAD**

Leveling the cylindrical head is accomplished by a single bolt and lock nuts located in the adjustment channel at rear, center of the scrub deck. To increase pattern width on rear brush, loosen lock nuts on socket head cap screw and adjust screw cap down. To increase pattern width on front brush, adjust screw up. After adjustment, be sure to tighten lock nuts.

## 4. DIFFERENTIAL DRIVE CHAIN

The differential drive chain transfers power from the drive motor to the differential. Check the chain condition every 200 hours of operation. A tight chain causes wear on bearings, chain, and increased power consumption. A worn chain causes wear on the sprocket.

### ADJUSTING DIFFERENTIAL DRIVE CHAIN

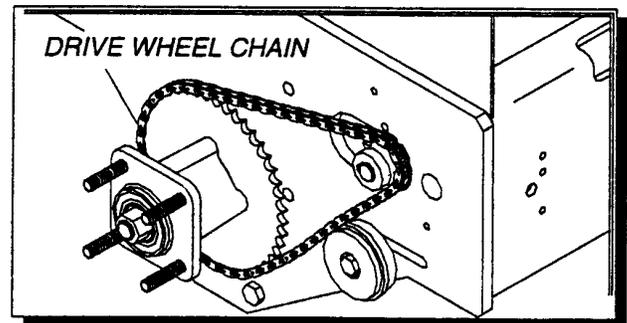
**FOR SAFETY:** Before leaving or servicing machine: Stop on level surface, set parking brake, turn off machine and remove key.

1. From underneath the rear of machine loosen the two motor mounting bolts. Do not remove bolts. For ease of service, bolts screw into nut plates. It is not necessary to use a backup wrench.
2. There are two nuts on the threaded rod attached to the motor position bracket. Loosen the nuts.
3. Tighten the nut in front of frame cross member to increase chain tension. Screw the nut to the rear of frame away from the motor to decrease chain tension. On the slack side, chain should deflect between 1/2" and 3/4" measured midway between the center lines of the sprockets.
4. Tighten nuts against each other to fix adjustment.
5. Tighten motor mounting bolts.

## DRIVE WHEEL CHAIN

The drive wheel chains transfer power from the differential shaft to the drive wheels. Check chain condition and tension every 200 hours of operation. The chain should deflect 1/2 in (13 cm) on the side opposite the idler. Lubrication of drive chain is not recommended. Clean dirt and grease build up from chain to eliminate the abrasive effects.

### ADJUSTING THE DRIVE WHEEL CHAINS



1. Turn off machine with key switch and set parking brake.

**FOR SAFETY:** Before leaving or servicing machine; Stop on level surface, set parking brake, turn off machine and remove key.

2. Loosen the two bolts on the chain tension plate.
3. Slide the plate to adjust tension.
4. Tighten chain tensioner mounting bolts.

# MAINTENANCE

## 5. BRAKES

The brake pedal and the parking brake operate the two self-centering rear axle disc brakes. With the parking brake set, the brakes should hold machine from moving with full throttle in either forward or reverse. This brake check should be performed in the pre-run check before each days operation. The disc and calipers should be inspected every 200 hours of operation for cracks and disc wear. The disc brakes should be adjusted so that the disc pads are as close to the disc as possible, without causing brakes to drag.

**FOR SAFETY: Before leaving or servicing machine; Stop on level surface, set parking brake, turn off machine and remove key.**

1. Remove batteries from machine. (Refer to section on BATTERY REMOVAL).
2. Jack up rear of machine and support on jack stands. (Refer to section on JACKING MACHINE).
3. Once machine is secure on jack stands, release parking brake.
4. Locate the brake adjustment screw on each brake caliper.
5. Loosen the lock nut and turn the adjusting screw to adjust each brake so pad just contacts brake disc. Repeat on opposite side. Adjust both sides for equal contact. Arms should be in same position relative to each other.
6. Lower machine and reinstall batteries.

## 6. TIRES AND WHEELS

Inspect tires for proper inflation, cuts and abrasions. Tires should be inflated to 60 psi (4 bars) front and rear (pneumatic tires only).

Check lug nuts for tightness. Lug nuts should be tightened to 80 foot-pounds (11 kg-meters). Wheels should be checked for cracked or bent rims.

## 7. SOLUTION STRAINERS

The solution strainers are located behind each front wheel of the FlexCat3. The solution strainers protect the solenoid valve from debris. If there is little or no solution flow to the ground, check the strainers for debris. Drain the solution tank and clean the solution strainers. To remove the strainer, turn the bottom part of the strainer counterclockwise until the bottom is separated. Clean out the debris from the wire mesh and re-assemble. Make sure the O-ring gasket is in place when re-assembled.

## 8. FLOAT SWITCH

The float switch is located inside the recovery tank. The purpose of the float switch is to notify the user that the recovery tank is full. When the float switch is activated, the scrub brush motors and solution flow will stop, the scrub deck will raise, the squeegee will rise after 60 seconds, and the vacuum motor will turn off 10 seconds later.



Icon appears on information screen 1 when float switch is activated.

## 9. VACUUM MOTORS

### **! WARNING**

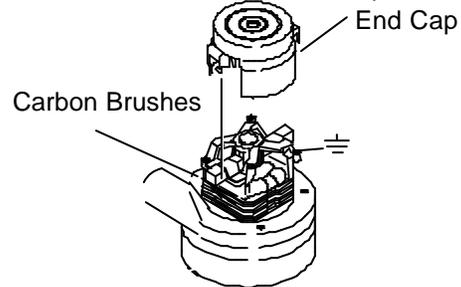
Do not use a pressure washer to clean around the vacuum motors. Use tap pressure only. Care must be taken so that water is not directed into vacuum motor air intakes.

### CHANGING VACUUM MOTORS

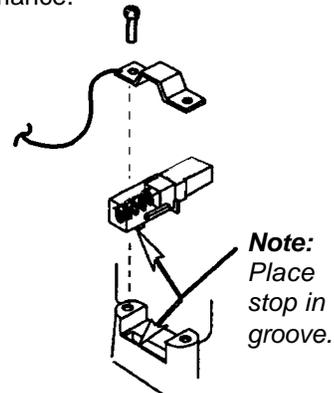
1. Remove two well-nuts from vacuum cover on each side. Slide vacuum cover off.
2. Remove three well-nuts holding vacuum motor on each side. Remove vacuum motor.
3. Disconnect vacuum motors at quick disconnect. Reverse steps to install.

## VACUUM MOTOR CARBON BRUSH REPLACEMENT

Vac Motor Carbon Brushes Replacement



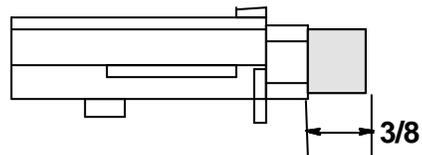
If armature commutator is not concentric, extremely pitted, or grooved the motor will need to be replaced or sent to a qualified service center to restore vac performance.



### **Important:**

These brushes wear quicker as the length shortens due to increased heat.

Spring inside brush housing will damage motor if brushes are allowed to wear away completely.



Periodically check the length of the carbon brushes. Replace both carbon brushes when either is less than  $3/8$ " long.

# MAINTENANCE

## 10. BRUSH MOTORS

### **! WARNING**

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

### CHANGING BRUSH MOTORS

1. Remove front bumper.
2. With the scrub deck in the stored position, disconnect brush motor wiring connector from harness.
3. Remove retaining bolt, lock washer, flat washer and star drive from brush motor shaft.
4. Remove 4 brush motor mounting bolts located under scrub deck.
5. Remove brush motor. If needed, lower scrub deck for more clearance.
6. Reverse steps to install.

## BRUSH MOTOR CARBON BRUSH REPLACEMENT

1. Scribe alignment marks on motor barrel to motor cap and motor barrel to motor frame.
2. Remove end cap from motor.  
**NOTE:** Motors contain two wave washers in cap. Do not lose these.
3. Release brush from spring tension. Remove screw connecting brush wire lead to brush holder. Clean brush holder to insure free movement.
4. Install new brush and reinstall connecting screw and lead.
5. When all new brushes are installed. Place all in retracted position, held into brush holder by spring tension.
6. Carefully place end cap onto bearing on motor shaft.  
**NOTE:** On motors use care to assure wave washer alignment.
7. With end cap in partially installed position, release all brushes to contact position with motor commutator.  
**NOTE:** Failure to insure all brushes are released will result in motor failure.
8. Reset end cap and realign with scribe marks on motor barrel.
9. Maintain alignment between motor barrel base and cap, and between motor barrel and motor frame. Reinstall the two attach bolts from cap into base

## 11. FUSE

The fuse is a one-time circuit protection device designed to stop the flow of electrical current in the event of an electrical overload. If fuse is blown, it must be replaced.

*The fuse is located inside the electrical compartment, under the seat.*

## 12. CIRCUIT BREAKERS

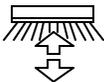
Interrupt the flow of power in the event of an electrical overload. When a circuit breaker is tripped, reset it by pressing the exposed button. If a circuit breaker continues to trip, the cause of the electrical overload should be found and corrected.



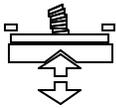
30 Amp  
Protects the left scrub brush motor.



30 Amp  
Protects the right scrub brush motor.



2 Amp. Protects the scrub deck actuator.



2 Amp. Protects the squeegee lift actuator.

# TRANSPORTING MACHINE

## TOWING OR PUSHING MACHINE

The machine may be towed for short distances at speeds not to exceed 5 m.p.h.. Be careful to avoid damaging machine. Attach towing device at tie-down points. The machine may be pushed by hand from the rear of recovery tank.

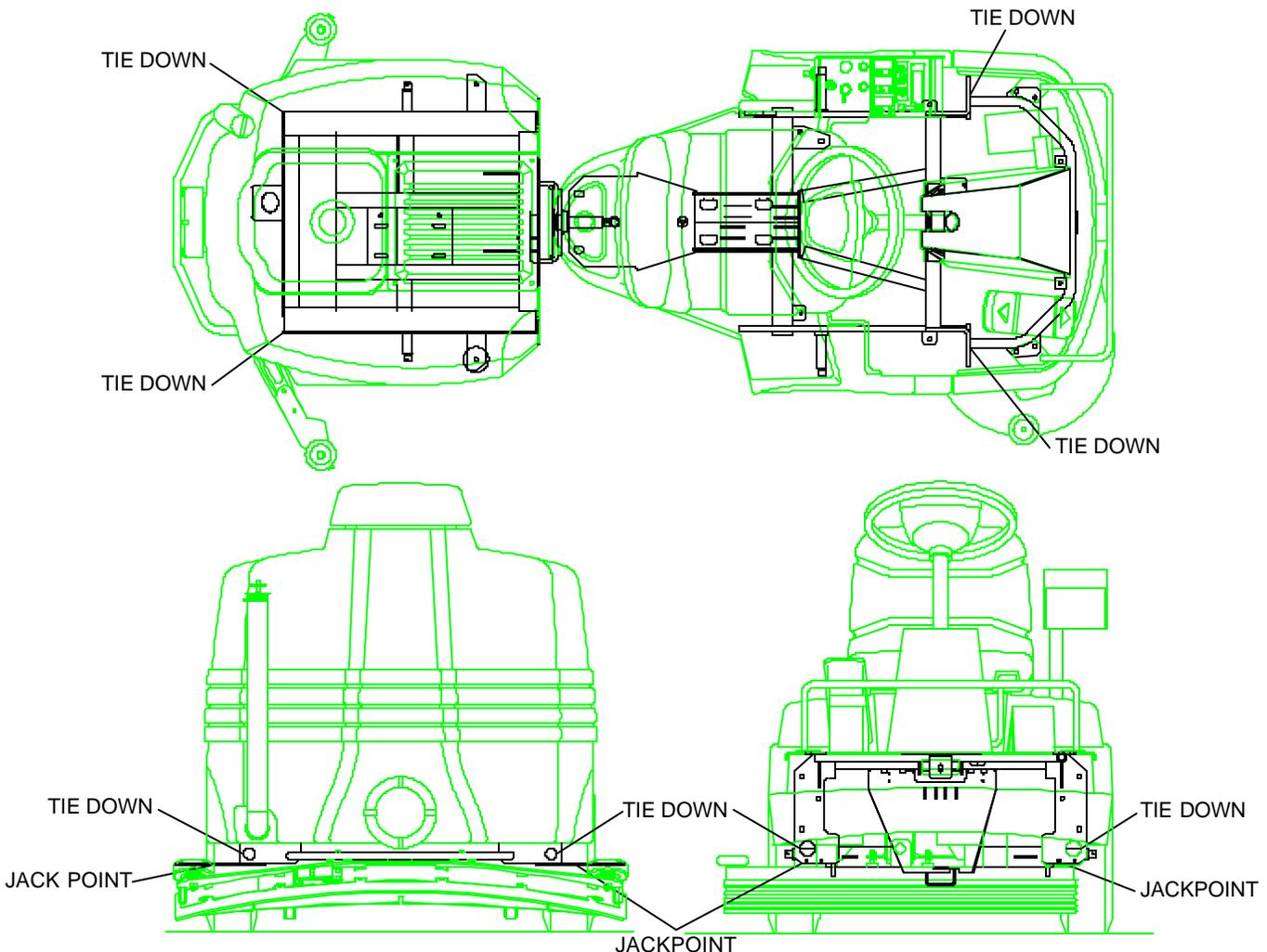
## MACHINE TIE-DOWNS

There are four tie-down points located at the corners of the machine. The front tie downs are 1 1/2-inch (3.8 cm) diameter holes in the frame on each side. The rear tie-downs are on the tank support bracket on either side of the machine at the rear. Tie-downs must be of proper type and strength. The combined strength of all tie-downs must be strong enough to lift two times the weight of the machine. Tie-downs must be positioned to prevent the machine from moving forward, backward, or to either side. Use all four corners of the machine with the tie-downs running out opposite directions. Tie-downs must be attached to the transporting vehicle securely.

## PREPARATION FOR TRANSPORTING

1. Remove squeegee tool to eliminate interference with tie-downs.
2. Scrub head must be in the up position before loading.

*NOTE: When transporting the machine on a trailer or in a truck, in addition to using tie-downs, be sure to set the parking brake and block tires to prevent the machine from rolling.*



## MACHINE JACKING

The machine may be jacked up for service or inspection by using the specified jack locations. Always block the tires when jacking up the machine.

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

The rear jack points are the tank support brackets just ahead of the rear squeegee. Remove the squeegee tool before jacking.

*NOTE: See SQUEEGEE TOOL REMOVAL in the Maintenance Section.*

## TO JACK UP MACHINE

1. Empty the recovery and solution tank.
2. Turn the key switch off and set the parking brake.

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

3. Block the tires that are not being raised to prevent the machine from rolling.

**FOR SAFETY: When servicing machine, block machine tires before raising machine.**

4. Using a jack of adequate capacity, raise the machine using the designated jack points.

**FOR SAFETY: When servicing machine, use hoist or jack of adequate capacity, jack machine at designated jack locations only. Block machine with jack stands when raised.**

5. When machine is raised, use jack stands at the designated jack locations.

**FOR SAFETY: Block machine at designated jack locations with jack stands when raised**

6. Slowly lower the machine onto the jack stands.
7. Be sure that the machine is secure.
8. Service or inspect the machine as required.
9. When finished working on the machine, raise the machine off the jack stands.
10. Remove the jack stands.
11. Lower the machine to the floor. Block wheels as they are lowered.
12. Remove wheel block after machine has been completely lowered.

## MACHINE STORAGE

If the machine is to be stored for extended periods of time, the following steps must be taken to minimize the chance of corrosion or deposits forming.

1. Drain both solution and recovery tank. Clean soil and chemical build up from tanks. Flush with clean water including the solution delivery system. Leave solution tank lid and recovery cover open.
2. Raise the rear squeegee assembly and the scrub deck.
3. Remove brushes and rinse with clean water. Dry thoroughly.
4. Wash squeegee blades with clean water.
5. Park the machine in a cool dry area.
6. Check the charge level on the batteries monthly. Recharge when batteries drop below 25% charge. If suitable space exist to store batteries, remove from machine.
7. Perform next lubrication interval.

# 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	*				
Check that recovery tank cover seals tightly	*				
Visually check for damaged or worn tires	*				
Check brushes or pads for proper installation	*				
Check vacuum hose connections	*				
Check that squeegee is securely attached and properly adjusted	*				
Check for securely attached drain hose, plug and caps	*				
Check brakes and steering for proper operation	*				
Clean out solution tank		*			
Run vacuum motors to dry		*			
Clean brushes or pads and check wear		*			
Clean squeegee blades and check wear		*			
Clean out recovery tank and vacuum filter		*			
Clean and inspect float shutoff		*			
Clean outside of tanks, check for damage		*			
Store with covers off tanks		*			
Charge batteries		*			
Check steering cables for wear.			*		
Clean off top of batteries			*		
Check battery cells with hydrometer			*		
Inspect scrub deck skirts			*		
Clean solution strainers			*		
Check battery connections are tight			*		
Clean battery cases and battery compartment				*	
Check parking brake adjustment					*
Check brakes discs and calipers for damage or wear					*
Clean pivot points on squeegee and scrub deck					*
Check all motors for carbon brush wear					*
Check motor commutators					*

**NOTE: Traction drive, wheels and batteries should be serviced based on traction drive hour meter. The scrub brush hour meter should be used for all other service schedule items.**

## MACHINE TROUBLESHOOTING

PROBLEM	CAUSE	ERROR CODE	SOLUTION
No power to machine	Battery disconnected		Check connections of all battery cable connections
	Emergency shut-off activated		Reset
	Battery cables corroded		Clean connections
	Main fuse blown		Replace fuse
	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.
	Controller overheated	7802/7801	Allow cool down period
	Loose motor connection	7800	Check wires and connections from controller to motor
	Loose throttle connections or faulty throttle potentiometer	0814	Check wires and connections from throttle to LCD and potentiometer resistance
	Loose seat switch connection or faulty seat switch		Check connections and switch continuity
Forward speed only	Faulty throttle		Check throttle
Reverse speed only	Faulty throttle		Check throttle
Poor or no water pick-up	Squeegee out of adjustment		Adjust squeegee
	Debris caught on squeegee		Remove debris
	Worn squeegee blades		Rotate or replace squeegee blades
	Vacuum hose clogged		Clear obstruction from hose
	Vacuum hose disconnected from squeegee or recovery tank		Reconnect vacuum hose
	Vacuum hose damaged		Replace hose
	Vacuum motor inlet filter dirty		Clean or replace inlet filter
	Recovery tank not sealed		Replace damaged seals
	Foam filling recovery tank		Empty recovery tank use less or different detergent Use defoamer
Squeegee will not go up/down	Circuit breaker tripped		Reset breaker
	Loose connection		Check wires and connections from controller to actuator
	Faulty actuator		Repair/replace actuator

## MACHINE TROUBLESHOOTING

PROBLEM	CAUSE	ERROR CODE	SOLUTION
Vacuum motors do not run, or run slowly	Recovery tank full		Drain recovery tank
	Recovery tank float switch dirty		Clean float switch
	Loose motor connection	7700	Check motor wires and connections
	Worn vacuum motor brushes		Replace brushes, check commutator
Poor scrubbing performance	Debris caught in scrub brushes		Remove debris
	Worn brushes or pads		Replace brushes or pads
	Improper detergent, brush or pad used		Contact equipment or application specialists
	Low scrub brush down pressure		Increase brush pressure
	Low battery charge		Charge batteries
Little or no solution flow to the floor	Solution tank empty		Fill solution tank
	Solution flow turned off or set too low		Turn on or increase flow setting
	Solution strainers plugged		Clean solution strainers
	Solution system plumbing obstructed		Clear obstruction from plumbing
	Solution solenoid valve obstructed or stuck		Clean or replace valve
	Vent hole in solution tank lid obstructed		Clear obstruction from vent hole
	Faulty solenoid valve connection		Check wiring to solution valve
Brush motors do not run, or run slowly	Circuit breaker(s) tripped	7600	Reset circuit breaker(s)
	Low battery charge		Charge battery
	Loose connection	7600	Check motor wires and connection
	Worn brush motor brushes		Replace brushes, check commutator
Scrub deck will not go down/up	Actuator circuit breaker tripped	9000	Reset breaker
	Loose connection	9000	Check motor wires and connections
	Faulty actuator	9000	Repair/replace actuator
Scrub deck goes down, then raises	No brushes or pad drivers on machine	9000	Install brushes or pad drivers
Error code not listed is displayed	Controller detects electrical problem		Contact service technician

## **MACHINE TROUBLESHOOTING - CONTROLLER FAULT CODES**

<b>ERROR CODE</b>	<b>PROBLEM</b>	<b>SOLUTION</b>
None	LCD display on, but incomplete	Disconnect batteries and wait 1 minute before re-applying power.
0A01	Power down error	Disconnect batteries and wait 1 minute before re-applying power.
0204	Memory corrupt	Replace controller.
All 080_ codes	Throttle wiring	Check for short or open circuits in throttle wiring.
All 140_ Codes		Check for short circuit between B+ and traction output.
All 310_ Codes	Possible short circuit of motors, auxiliary outputs (headlight, recycle pump, or back-up alarm), wiring or damaged controller	Check for short circuits. If code is present after short circuits are repaired, replace controller.
7500	LCD module communications timeout	Wiring fault on 6-way serial link between controller and display.
7501	LCD module settings corrupt	Disconnect batteries and wait 1 minute before re-applying power.
All 760_ Codes	Brush motor or brush circuit fault	Check for short or open circuits in brush motors or wiring.
All 770_ Codes	Vacuum motor or vacuum circuit fault	Check for short or open circuits in vacuum motor(s) or wiring.
7800	Traction motor open circuit fault	Check for open circuit on propel motor or wiring.
7801	Traction motor overcurrent error	Check for short circuit on propel motor or wiring.
7802	Traction motor in power foldback state	Propel motor current has exceeded current limit for the foldback time.
All 790_ Codes	Emergency stop error	E-stop input active or wiring fault.
9000	Brush current requirement not satisfied	Check that brushes or pads are installed. Check for open circuit in scrub lift actuator, circuit breaker or wiring.