

# 2730 DB WRANGLER 3330 DB

## IMPORTANT SAFETY INSTRUCTIONS



**WARNING:** Failure to observe these instructions can cause personal injury to machine operator or bystanders.



**WARNING:** Fire or explosion hazard. **NEVER** operate this machine in an explosive atmosphere (grain dust, flammable liquids or fumes, etc.).



**WARNING:** Fire or explosion hazard. **NEVER** attempt to pick up flammable or combustible materials or use such materials in tank.



**WARNING:** Orange Oil (D-limonene) is not compatible with the plastics used in NSS automatic scrubbers and the Sidekick Chemical Metering System. Use of D-limonene may result in damage to the machine.



**WARNING:** This product contains a chemical known to the state of California to cause cancer and birth defects or other reproductive harm.

### INTENDED USE

This machine is designed for commercial use, scrubbing floors in an indoor environment. NSS does not recommend using this machine for any other purpose.

### FOR SAFETY:

- **ALWAYS** read and understand all instructions before operating or servicing machine.
- **ALWAYS** use this machine **ONLY** as described in this manual.
- **NEVER** attempt to operate this machine unless you have been trained in its operation.
- **NEVER** allow an untrained person to operate this machine.
- **NEVER** attempt to operate this machine if it is not working properly or has been damaged in any manner.
- **NEVER** disconnect or modify any switches or safety devices (circuit breaker).
- **NEVER** drop or insert any object into any machine opening.
- **NEVER** operate this machine with any air opening blocked. Keep all air openings free of dust, lint, hair, etc.
- **NEVER** pick up anything that is burning or smoking, such as cigarettes, matches or hot ashes.
- **NEVER** spray this machine with water or any liquids.
- **NEVER** allow the vacuum motor or battery-charging plug to get wet or a short may occur.
- **NEVER** operate this machine when the battery charger is plugged in.
- **NEVER** operate this machine with the side skirt removed.
- **NEVER** allow this machine to be used as a toy. Close attention is necessary when used near children.
- **ALWAYS** wear clean tennis shoes or "non-slip" shoes. Leather soled shoes will become extremely slippery when wet.
- **ALWAYS** keep face, fingers, hair or any other body part or loose clothing away from any machine opening or moving part (revolving brush, pad driver, or vacuum motor).
- **ALWAYS** turn the machine off when attaching pads or brushes.
- **ALWAYS** remove keys when this machine is left unattended.
- **ALWAYS** be sure that the ramp is secured to the vehicle before attempting to load / unload.
- **ALWAYS** use extreme caution when operating the machine on a ramp or loading / unloading this machine into or out of a truck / trailer. Use extreme caution if the ramp is wet, oily, or covered with cleaning chemicals.
- **NEVER** stop or turn the machine on a ramp or incline.
- **NEVER** attempt to climb a grade or operate this machine on a ramp or incline of more than 8 degrees.
- **NEVER** park or store the machine near a dock, on ramps, near a furnace, boiler, open flame, or other high heat source.
- **NEVER** allow this machine to freeze.
- **NEVER** expose the machine to rain, snow, or extreme temperatures.
- **NEVER** store any items on this machine.
- **ALWAYS** store this machine indoors in a dry, cool area.

**ALL REPAIR SERVICE MUST BE PERFORMED BY AN NSS AUTHORIZED DISTRIBUTOR/ SERVICE STATION USING ONLY NSS ORIGINAL EQUIPMENT PARTS.**

**SAVE THESE INSTRUCTIONS**



# IMPORTANT SAFETY INSTRUCTIONS

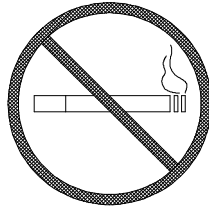
## BATTERY POWERED EQUIPMENT WITH ON BOARD CHARGERS



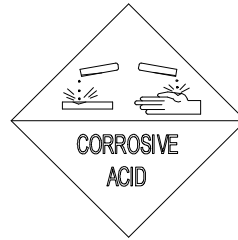
**WARNING:** Failure to observe these instructions can cause personal injury to machine operator or bystanders.



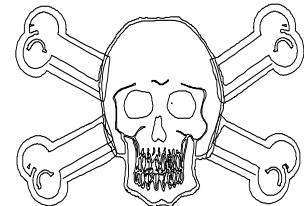
Read and understand all instructions before installing or charging batteries.



No smoking, open flames, or sparks while working with batteries.



Contains acid.  
Avoid contact



Poison. Causes severe burns. Avoid contact.



**WARNING:** Batteries emit hydrogen, which can cause fire or explosion.  
**NEVER** smoke, light a match, or cause a spark during operation or charging.  
**ALWAYS** charge in a well-ventilated area away from open flame.

### GENERAL

- **ALWAYS** read and understand all instructions before installing or charging batteries.
- **NEVER** attempt to install or charge batteries unless you have been trained to do so.
- **NEVER** allow an untrained person to install or charge batteries.
- **ALWAYS** remove all jewelry when working on or near the batteries.
- **ALWAYS** turn off all switches during installation and service.
- **ALWAYS** disconnect the battery leads before performing any service or repair.
- **ALWAYS** wear eye protection and protective clothing to avoid contact with battery acid.
- **NEVER** lay anything on top of batteries as arcing may occur.
- **IF CONTACT WITH BATTERY ACID OCCURS,** follow these instructions:
  - SKIN – rinse area with water.
  - EYES – Flush with water for 15 minutes.
  - INTERNAL – Drink water or milk. Follow with Milk of Magnesia, beaten egg or vegetable oil. Call a physician immediately.

### BATTERY INSTALLATION

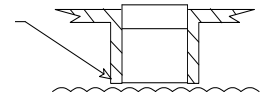
- **ALWAYS** use two people to install, as batteries are heavy.
- **ALWAYS** turn off all machine switches.
- **ALWAYS** position batteries as shown on the machine installation decal to maintain machine balance.
- **ALWAYS** connect batteries as shown on the machine installation decal to avoid shorting out the batteries and the electrical system.

### BATTERY CHARGING

- **ALWAYS** read instructions on charger carefully.
- **ALWAYS** use the NSS supplied charger with proper voltage rating.

**For lead acid batteries only, (does not apply to maintenance free batteries).**

- **ALWAYS** check to ensure the battery water level covers the battery plates before charging.
- **ALWAYS** check water level after charging and add distilled water if necessary to bring level to the bottom of the fill hole.
- **NEVER** overfill batteries as battery and machine damage may result.
- **ALWAYS** wipe any acid from the top of batteries using a soap solution.
- **ALWAYS** reattach caps to batteries. Do not charge with caps loose or removed.
- **ADD** only distilled water.



**For all types of batteries:**

- **NEVER** charge a frozen battery.
- **ALWAYS** plug the charger into an earthed socket outlet.
- **NEVER** touch uninsulated portion of output connector or uninsulated battery terminal.
- **ALWAYS** disconnect the AC supply before making or breaking the connections to the battery while charging.
- **NEVER** operate charger if the AC supply cord is damaged or if the charger has received a sharp blow, been dropped, or otherwise damaged in any way.

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# IMPORTANT SAFETY INSTRUCTIONS



## GROUNDING OF ELECTRICAL EQUIPMENT - BATTERY CHARGER

**WARNING:** Improper connection of the equipment-grounding conductor can result in a risk of electric shock. Check with a qualified electrician or service person if you are in doubt as to whether the outlet is properly grounded. Do not modify the plug provided with the charger. If outlet is not suitable for safe use; have a properly grounded outlet installed by a qualified electrician.

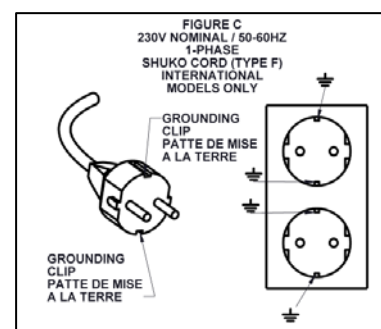
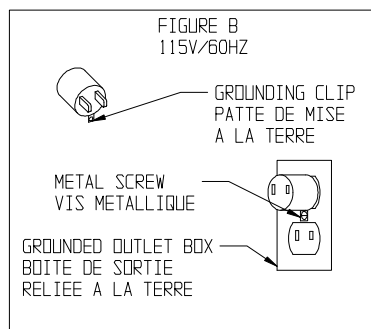
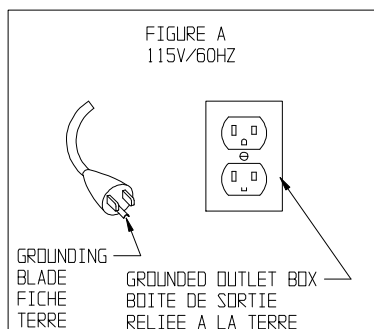
Always use a properly grounded 3-wire extension cord, which has male and female plugs. If 25 foot extension cords are used, the electrical carrying capacity should be no less than 14-3 ST., 50-foot extension cords no less than 12-3 ST

## GROUNDING INSTRUCTIONS

This charger shall be grounded while in use to protect the operator from electric shock. The charger is provided with a three-conductor cord and a three-contact grounding type attachment plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances. The green conductor in the cord is the ground wire. Never connect this wire to other than the grounding pin of the attachment plug.

Check nameplate on the charger to be sure **voltage** and **cycle** stated is the same as the electrical outlet. Do not attempt to plug a 120-volt charger into a 240-volt outlet or a 240-volt charger into a 120-volt outlet. If the cord provided with the charger has an attachment plug as shown in Figure A. below, it is intended for use on a nominal 120-volt circuit. If a properly grounded receptacle as shown in Figure A is not available, an adapter may be installed as shown in Figure B if the outlet box that houses the receptacle is grounded. Be sure to fasten the grounding tab (the green colored rigid ear, lug or the like extending from the adapter) with a metal faceplate screw.

If the cord provided with the charger has an attachment plug as shown in Figure C, it is intended for use on a nominal 240-volt circuit (single phase only). Changes to the attachment plug or use of adaptors to other plug types must be done in accordance with local regulations.



**NOTE:** In Canada, the use of a temporary adaptor may not be permitted by Canadian electrical code.

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# SAVE THESE INSTRUCTIONS

## NOISE AND VIBRATION

### NOISE

Sound pressure level at Operator position 66 dB(A)

### VIBRATION

Weighted RMS acceleration value (ISO 5349) .367 m/s<sup>2</sup>

## MACHINE INSPECTION

- Now that the machine is unpacked remember to recycle all packing materials.
- Inspect the machine for damage or missing components. If damage is found, contact the local freight company to file a freight claim.

## MACHINE COMPONENTS

### Solution Tank

The solution tank is the lower part of the machine body. It has a capacity of **30 gallons (114 liters)**.

- The amount of water in the tank is measured by the solution gage, which is located in the clear plastic tube at the right rear corner of the tank. This tube is also used to empty the tank.

### Recovery Tank

The recovery tank is the upper part of the machine body. It has a capacity of **33 gallons (125 liters)**.

- A round clear view lid assembly closes off the recovery tank's opening.
- The recovery tank has a foam sensitive float shut-off assembly. As the water level rises, the float ball will rise into the tube and shut off the airflow of the vacuum. NOTE: The float shut-off assembly does not shut off the vacuum motor.

### Operator Control Panel

The operator control panel is located at the upper rear area of the machine. This panel has components that control various machine functions.

- In the middle of the panel are two (2) rubber twist grips. These grips rotate forward and backward to control the direction and speed of the machine. The farther the grips are rotated, the faster the machine will move. These twist grips have a feature that returns the machine to the neutral position when the handles are released.
- The left *toggle switch* turns on and off the vacuum motor.
- The red button is the EMERGENCY STOP switch; Pushing this button removes power from all motors. The master power switch must be turned off, then turned back on, to resume machine operation.
- The right *toggle switch* (or optional key switch) is the Master Power Switch.

### Battery Meter

The battery meter is located on the right side of the operator control panel and shows the state of charge of batteries during operation and recharge.

- When the batteries are fully charged, all of the bars will be lighted.

- Normal working range is from fully charged down to only red bars lighted.
- Operation can continue into the red zone; however, the controller will turn off the brush and vacuum motors once battery drops to a minimum level. The machine can then be driven to a convenient charging location.

### Rear Panel

- The solution control lever is located on the left of the rear panel. This lever controls the solution valve and the amount of liquids put on the floor while cleaning. **Pull up** on the handle to **open** the valve. **Push down** on the handle to **close** the valve.
- The top circuit breaker (25 A) is for the drive motor.
- The next circuit breaker (25 A) is for the vacuum motor.
- The next two circuit breakers (30 A) are for the brush motors.
- The bottom circuit breaker (25 A) is for the main power to the controller.
- The **right** lift arm is used to raise and lower the brush motor assembly. Brushes automatically turn on when lowered, and the twist grips are moved.

### Battery Compartment Drain Hose

This hose is located on the left side of the machine inside the rear panel. The hose uses a pinch clamp to hold the hose closed. This hose collects any spilled liquids from the battery compartment area.

- Inspect hose for liquid level on a weekly basis.
- Dispose of liquids according to your local and federal regulations.

### Canister / Strainer Assembly

Attached to the valve, under the left side of the solution tank is a canister strainer. It is designed to stop debris from entering the solution solenoid.

*If the water and chemical stops flowing during operation:*

- Turn off solution control valve on rear panel.
- Remove the canister and screen, and remove all debris.
- Replace the screen and canister. Check for any liquid leaks.

### Solution Solenoid

Attached to the top of the brush deck is a solenoid valve designed to stop *solution flow when the machine is not moving. If the water and chemical stops flowing:*

- Check canister / strainer assembly for debris.
- Check manual lever.

### Sidekick Chemical Dispensing (optional)

- On board chemical dispensing is available either factory installed, or as a retrofit kit.
- Controls for chemical dispensing are located on the Operator Control Panel.

### Drive Motor

This machine is powered forward and reverse by a 36-volt drive motor.

- The speed is electronically controlled for smooth increase and decrease of speed.
- The motor moves the drive wheels through a chain and sprocket system.
- This motor has carbon brushes that must be serviced on a regular basis. The carbon brushes have an expected life of 2,000 operating hours. Refer to the maintenance section later in this book.

### Brush Gear Motor

This machine has two (2) 36-volt brush motors located at the front of the machine. The motors are attached to a gearbox to turn the pad drivers or brushes.

- The left motor rotates *clockwise*.
- The right motor rotates *counterclockwise*.
- These motors have carbon brushes that must be serviced on a regular basis. The carbon brushes have an expected life of 2,000 operating hours. Refer to the maintenance section later in this book.

### Vacuum Motor

This machine has a 36-volt vacuum motor.

- The vacuum motor is attached to the underside of the top tank.
- This motor has carbon brushes that must be serviced on a regular basis. The carbon brushes have a maximum expected life of 700 operating hours. Refer to the maintenance section later in this book.

### Squeegee Assembly

The squeegee assembly is available in both straight and curved. The straight squeegee uses a dual (2) urethane blade system. The "curved" squeegee has a urethane rear blade and a neoprene front blade.

### Side Skirt Assemblies

This machine is equipped with left and right side skirt assemblies. The side skirt assemblies are designed to contain the liquids in the cleaning area *under the machine*; they channel the liquids toward the squeegee, and prevent splashing on the *outside of the machine*.

## PREPARING THE MACHINE

### Installing the Batteries:

- Turn off all switches (except the EMERGENCY STOP) and tilt the recovery tank open to expose the battery compartment.
- Batteries are heavy - use two people to install.
- Refer to the wiring diagram inside the battery compartment. Align batteries in the compartment as shown on the diagram.
- Install battery cables as shown on the wiring diagram.
- Tighten bolts and hex nuts with a wrench.

Caution: Do not short across two terminals with a wrench.

- Loose or improper battery connections will cause battery or machine damage and possible personal injury.

### Battery Charging

- To recharge the batteries plug the charger cord, located at the rear of the machine, into an electrical outlet (100/115/230 50/60 HZ VAC).

**CAUTION: Make sure the battery type LED on the charger matches the type of battery installed in your machine! EXCEPTION-TROJAN AGM'S TO BE CHARGED WITH GEL SETTING.**

- When the cord is plugged into an outlet the machine will become disabled.

See Battery Charger section for more details.

### Preparing the Solution and Recovery Tanks:

- **Never** use water over  $140^{\circ}F$  ( $60^{\circ}C$ ) degrees.
- Excessively hot water may damage components such as the tanks.
- Put 1 to 2 gallons of clean water into the solution tank first to help dilute the chemicals and prevent excess suds. Dilute the cleaning chemicals according to the manufacturer's instructions. **See Sidekick instructions if equipped with on-board dilution control.**
- Fill the tank by pouring the water and cleaning chemicals through the mesh filter that covers the opening at the front of the solution tank, or you may use the hose holder cutout.
- Make sure the drain plug of the recovery tank is closed tightly and in its holding clip.
- **Always** use a defoamer to protect the vac motor.
- Consult your local distributor for complete chemical advice.

### Install a Pad Driver and Pad:

- There is a wide range of pads or brushes available for the many cleaning applications. Consult your NSS authorized distributor for recommendations.
- Turn the pad drivers upside down on the floor and remove the pad holding cup.
- Remove the center cutout of the pad, 14" (35.5 cm.) Wrangler 2730, 17" (43 cm) pad Wrangler 3330. Place the pad on the face of the pad driver.
- The pad **must** be centered on the driver to prevent wobbling or bouncing.
- Install and secure the pad holding cup to the pad driver. Turn the pad driver over so that the pad faces the floor.
- Raise the brush motors into the transport position.
- Align the lugs of the pad driver with the slots of the drive casting.
- Turn the lugs of the pad driver toward the latch; close the latch around the lugs to lock them onto the drive casting.

### Install a Brush:

- Raise the brush motors into the transport position.
- Align the lugs of the brush with the slots on the drive casting.
- Turn the lugs of the brush toward the latch; close the latch around the lugs to lock them onto the drive casting.

### Install the Squeegee Assembly:

- Place the squeegee lift arm in the storage (up) position.
- The squeegee assembly mounts to a metal bracket at the bottom center of the machine, using two (2) mounting knobs. Loosen the mounting knobs and slide the squeegee assembly onto the mounting plate.
- The squeegee assembly has two (2) small wheels to prevent “rollover” while in reverse. The roller wheels must face the operator. Hand tighten the mounting knobs. **Do not** use pliers to tighten knobs, as this will defeat the “break-away” design.
- **Do not** add any weights or other pressure to the squeegee mechanism. This will not improve the performance and will shorten the life of the blades.
- It is recommended that, with new blades, the rear wheels be adjusted to their lowest position. Loosen the two screws on the bracket rotate the bracket downward as far as it will go, then tighten the screws. Perform this adjustment on both wheels/brackets.
- When the squeegee becomes worn, and the wiping edge no longer contacts the floor properly, further use may be possible by adjusting the rear wheels upward enough to restore proper engagement of the blades wiping edge with the floor. Be sure to adjust the wheels back down fully when a new blade is installed.

### Install the Side Skirts:

- Position the skirts at the front left and right sides of the machine.
- Remove the skirt retaining pins from the mounting bracket.
- Align the side skirt holes with mounting bracket holes, insert and secure with retaining pins. Close side skirts around machine and secure with skirt retaining latch.

### Prepare the Sidekick Chemical dispenser (if equipped)

**\*\*\*CAUTION: Purging the Sidekick lines may dispense a small amount of the chemical directly onto the floor. If using wax stripper or harsh chemicals, be sure to purge the lines in an area that cannot be damaged by the chemical in use.**

- Place a container filled with the desired cleaning chemical into the bottle holder located at the front of the machine.
  - The bottle holder accepts F-style rectangular containers, and some smaller round containers.
  - Empty F-style containers are available from NSS, order part #9590171.
- Ensure all hose fittings are tight, then insert the suction tube into the chemical bottle, and tighten the cap.
- Turn on the Scrubber then press the “ON” button on the Sidekick. The ON indicator will illuminate.
- Press and hold the PURGE button on the Sidekick until you see the supply line to the pump filled with the chemical.

- Select the desired dilution ratio as recommended by the chemical manufacturer.
- The Sidekick Chemical dispenser is ready for use.

## Operating the Machine

**Do not operate the machine with the battery meter needle in the red zone.**

The Wrangler 2730 has the brush motors offset to the right side of the machine. This offset allows you to clean the edge of the floor or obstructed areas (walls or shelving) with the right side of the machine. The 3330 have the brush motors centered but the offset feature is part of the skirt design.

### Normal Cleaning

- Sweep and dust mop the floor to remove dirt and debris before scrubbing. Accumulations of dirt or debris on the floor will reduce cleaning performance.
- You may also need to pre-clean some types of spills or stains before scrubbing.
- Plan your work so that you make long, straight paths with the fewest amount of turns possible, overlapping each cleaning path about 2 in. (5 cm.) to prevent streaking and dirty areas.
- Move machine to area to be cleaned.
- Place warning signs “Wet Floor” in area.
- Turn on master switch.
- Turn on vacuum motor switch.
- Lower the brush motors and squeegee assembly into the operating position on the floor. Brush motors will automatically turn on when lowered and moving in forward or reverse.
- Lift solution valve handle to start liquid flow to floor. Adjust amount of flow as needed. Close the solution valve completely 10 ft. (3m.) before turning at the end of each cleaning path. This reduces the amount of liquid on the floor when you make the turn.
- Reopen the solution valve when you have started your next cleaning path. Repeat this procedure on each path.
- NOTE: Solution will not flow until brushes turn on.
- Watch the level of liquid in the recovery tank and listen for the float shut-off to change of the sound of the vacuum motor. When the vacuum airflow stops, you must turn off the vacuum motor, and empty the recovery tank.
- Take the machine to an approved disposal drain and turn off all switches.
- Raise the rubber flap at the front of the machine and pull out the flexible rubber drain hose. Raise the end of the hose above the level of the recovery tank, loosen and remove the hose drain plug. Carefully lower and direct the drain hose into the drain.
- When the recovery tank is empty, replace and tighten the drain plug. Place the drain hose back into the machine and secure the plug end in the clamp. **Do not** obstruct the lift mechanism or brush motors.

### Special Cleaning

This machine may be used to perform special cleaning jobs other than “normal” scrubbing.

### Double Scrubbing

- This procedure provides deeper cleaning on heavily soiled floors. One or more cleaning passes are made before picking up the chemicals with the squeegee. This allows dwell time. Best results are achieved by placing the brush motors in the heavy scrub position.

**Caution:** The floor surface becomes extremely slippery in this operation. This machine should be operated only in slow to medium speed and great care should be taken when walking on this wet surface.

### Stripping

- This procedure is used to remove moderate build-up of floor finish from the floor. The most aggressive pads or grit brushes are used in this procedure.
- The stripper solution is applied to the floor with a mop and then double scrubbed as above. Stripping solution should not be put into the solution tank. Clean water from the solution tank is applied to the floor to keep the chemicals and finish in a “liquid” condition. The floor surface becomes extremely slippery in this operation. This machine should be operated only in slow to medium speed and great care should be taken when walking on this wet surface.
- If equipped, the scrubber may be used to apply the wax stripper using the Sidekick Chemical dispenser. Set the dilution ratio to the rate recommended by the chemical manufacturer. If the wax stripper you are using requires dilutions stronger than 20:1, then you will need to apply the stripper with a mop.
- After applying the stripper, thoroughly purge the Sidekick Chemical dispenser lines with clean water to remove all traces of wax stripper. Purge the lines while the scrub brushes are positioned over a floor drain. **Purging the Sidekick’s lines will dispense chemical thru the scrub pads and onto the floor.**

### Sidekick Chemical Dispenser Operation

**\*\*\*CAUTION: Purging the Sidekick lines may dispense a small amount of the chemical directly onto the floor. If using wax stripper or harsh chemicals, be sure to purge the lines in an area that cannot be damaged by the chemical in use, such as over a floor drain.**

See **Preparing the Machine** for instructions on how to connect the chemical bottle, and purge the lines.

After proper connection of the chemical supply line and purging, the Sidekick Chemical Dispenser provides fully automatic chemical dilution during scrubbing operations. The Sidekick measures the amount of water flowing out of the solution tank, and pumps the correct amount of chemical into the water line to provide the ratio of water to chemical according to the dilution ratio selected on the control panel.

The pump will not operate unless water is flowing from the solution tank (except when the purge button is pressed). This means the Solution Control valve must be on, and the brushes must be spinning.

### Basic Operation

- Turn on the Scrubber.
- Turn on the Sidekick Chemical Dispenser.
- Select the desired dilution ratio by pressing the Select Dilution button until the light next to the desired ratio is illuminated.
- The scrubber can be turned off, and when the scrubber is turned back on, the Sidekick will recall the last dilution setting.
- During use, the Purge button may be pressed to provide an extra dose of chemical for heavily soiled areas (always follow chemical manufacturer’s usage directions).

### To Change Chemicals

- Loosen the cap on the chemical bottle, and remove the suction line from the chemical bottle.
- Dispose or store any remaining chemical according to local and federal regulations.
- Place the suction line into a container of clean water.
- With the machine over a floor drain, press and hold the purge button until the clean water is drawn thru the pump and dispensed at the brushes.
- Remove the suction line from the container of clean water. Replace the container of clean water with a container of the desired chemical, and install the suction line.
- Press and hold the Purge button until chemical is seen being drawn up to the pump, and pumping down the tube from the pump to the tee fitting below the machine.
- **After each use, always flush the Sidekick lines with clean water** to prevent dried chemical from accumulating in the lines.

## MACHINE MAINTENANCE

Routine maintenance is critical to ensure proper machine operation and cleaning performance. Perform all maintenance procedures as follows.

**Always turn OFF all machine switches (except the EMERGENCY STOP) before performing any maintenance.**

### Adjusting the Squeegee Assembly:

- Turn the vacuum motor ON and open the water valve slightly.
- Squeegee blades should lie over slightly (like a window squeegee) when the machine is moving.
- If adjustment is required adjust the blade angle by removing the rear bolt of the top squeegee arm, turn the arm into or out of the ball joint to change the angle as needed.

### Adjust Side Skirt Wiper Blades:

- Install the side skirts on the machine.
- Loosen the retaining strip screws.



- Pull down evenly on the entire length of the wiper blade so that it firmly touches the floor.
- Tighten all screws and test run machine for splashing under the blades.
- **Do not** adjust blades too low, as it will cause damage and excessive wear to the blades.

#### **Replace Side Skirt Wiper Blades:**

- Remove the side skirt assembly from the machine.
- Remove the retaining strip and screws.
- Remove the old wiper blade and replace with a new blade.
- Replace the retaining strip, and screws, do not tighten.
- Pull down evenly on the entire length of wiper blade so that it firmly touches the floor.
- Tighten all screws and test run the machine for liquid splashing under the blades.
- **Do not** adjust blades too low, as it will cause damage and excessive wear to the blades.

#### **Sidekick Chemical Dispenser**

- Purge the lines with clean water after each use.
- The squeeze tube under the see-through cover on top of the pump requires periodic replacement approximately every 500 hours (depending on chemicals used).
- To replace the squeeze tube:
  1. Remove ferrule nuts from pump
  2. Unscrew the pump cover, exposing the squeeze tube.
  3. Remove the damaged squeeze tube and replace with a new squeeze tube.
  4. A screwdriver can be inserted in the spinner hub and rotated as the tube is being replaced to ease insertion. It is important not to twist the tube as it is being inserted and the fittings should be inserted "flat side up"
  5. Add grease from the included packet.
  6. Re-install cover and resume normal operation.

### **Daily Maintenance**

#### **Battery Charging**

- **The master power switch and all other switches (except the EMERGENCY STOP) must be turned OFF.**
- You must recharge the batteries when indicated by the battery meter, and after every use. Read the battery meter while the machine is in use.  
\*350 AH batteries normally require 14 ½ -16 ½ hours to fully charge.
- NEVER let the batteries sit overnight after the machine has been run for more than 1 hour since last recharge.
- See Battery Charger section.

#### **Battery Electrolyte (Liquid) Level (Flooded only)**

Inspect the electrolyte level of at least one cell in each battery before charging. The liquid must be visible above the internal plates. Do not charge the batteries if the liquid is below the plates.

- Add only distilled water to the cell of a battery to adjust the liquid level. **Do not** use well or tap water. Before charging, add only enough water to cover the top of the internal plates. After charging, add only enough water to bring the level to the bottom of the fill tube.
- **Do not** overfill the battery liquid level, this will cause electrolyte (acid) spill. Spilled electrolyte (acid) can cause machine damage and personal injury. Clean up and dispose of all spills immediately.
- See the battery-warning sheet (page 2) for more details.
- If machine is equipped with battery Auto-Fill system, fill batteries prior to charging.

#### **Battery Packages**

The Wrangler 2730 or 3330 is a 36 volt system and is available with two battery packages:

- Six (6) 6 volt, 235 Amp Hour Batteries.
- Six (6) 6 volt, 350 Amp Hour Batteries.

Consult your local NSS authorized distributor for application recommendations

#### **Solution and Recovery Tanks**

- The recovery tank is emptied through a large rubber hose at the front of the machine. Remove the plug and drain the liquids according to your local and federal regulations.
- **Every time** you empty the recovery tank, we recommend that you add at least 4 to 6 ounces of defoamer chemical into the recovery tank before resuming work. Vacuum the defoamer into the empty recovery tank through the squeegee vac hose.
- At the end of the day empty all liquids from both solution and recovery tanks. Rinse both tanks with clean water to prevent chemical residue build-up, allow to air - dry to prevent odors.
- Remove any residue from screen and float ball to ensure proper operation. Replace float assembly in recovery tank.
- Check clear lid for airtight seal.
- Check the drain hose for damage.
- Inspect and clean the vac filter located under the top metal plate. Every 50 hours.

#### **Pad Drivers or Brushes**

- Remove either pad drivers or brushes from machine after use.
- Rinse with clean water to prevent chemical residue build-up. \*\*\*NOTE: prolonged exposure to some wax stripper brands may degrade the squeegee material. Rinsing after use in a wax floor stripping application is highly recommended.
- Allow to air-dry by installing in drying position on front of solution tank, on a peg or upside down on a shelf.
- Inspect for wear or damage. Repair or replace as needed.

#### **Squeegee Assembly**

- Remove squeegee assembly from machine.
- Rinse with clean water to prevent chemical residue build-up. \*\*\*NOTE: prolonged exposure to some wax stripper brands may degrade the squeegee material.



Rinsing after use in a wax floor stripping application is highly recommended.

- Allow to air dry, it can be stored on top of the machine for drying.
- Inspect the squeegee assembly, linkage, and vacuum hose, for wear, damage or obstruction. Repair or replace as needed.
- Remove debris from squeegee hose and entrance to recovery tank.

#### **Weekly Maintenance (20 Hours)**

- Verify all daily maintenance has been performed.
- Check all battery terminal and cable connections. Tighten as needed. Loose connections are dangerous and can cause personal injury and machine damage.
- Clean any corrosion from battery terminals and cables.
- Drain all liquids from battery compartment. Dispose of according to local and federal regulations.
- Check solution flow to pad drivers / brushes. Remove, inspect and clean the solution filter assembly.
- Flush clean solution tank and hoses with a mixture of 8 oz. (250ml.) white vinegar to one-gallon (4 liter) warm water.
- Repair or replace any worn or damaged components as needed.
- Inspect the squeeze tube in the Sidekick Chemical dispenser for cracks or leaks.

\*\*\*\***CAUTION**\*\*\*\* Inspect and replenish water in every cell of every battery weekly. Failure to maintain proper electrolyte level in all cells will cause premature battery failure and void the warrantee.

#### **Monthly Maintenance (100 Hours)**

- Verify all daily and weekly maintenance has been performed.
- Inspect vacuum motor filter under metal plate on top of recovery tank. Clean or replace as necessary.
- Check casters for wear or damage.
- Grease both pillow block bearings on the drive axle and the caster swivel bearings. Use a hand held grease gun and a high grade of water resistant lithium base grease.
- Lubricate the drive chain and sprockets with a foaming spray type lubricant. A motorcycle spray type chain lube would be appropriate.
- **Do not** use your finger to apply lubricant.
- Check chain tension, and adjust as needed. Check chain tension by squeezing the chain midway between the sprockets. The chain should flex 1/4" (6mm) on each side.
- Adjust chain tension by loosening the four (4) hex bolts of the drive motor mount. Slide the drive motor toward the drive wheel to loosen chain. Slide drive motor away from the drive wheel to tighten the chain. Tighten all four hex bolts.
- Inspect all mechanical linkages, pivot points and ball joints for freedom of movement. Use a penetrating spray lubricant that is water resistant. **Do not** use WD 40 lubricant.

- Check Return Spring of the twist grip handles. If it appears weak or does not return the twist grips to the neutral position, replace spring.
- Inspect all fasteners (bolts, screws, nuts) at mechanical linkages, pivot points and ball joints for tightness. Tighten as needed.
- Equalize the batteries (**flooded cell only**).
- Clean polyethylene body components to remove chemical and liquid residue and maintain a "like new" appearance.
- Remove top cover plate and clean the filter. Replace filter as required.
- Repair or replace any worn or damaged components.
- Tighten and Lube the drive motor chain.

#### **Mandatory Periodic Maintenance**

It is **mandatory** that the following maintenance procedure be performed at the described interval. Failure to perform this procedure may result in poor machine performance, machine component damage and failure. This procedure should be performed by an NSS authorized distributor or service center. Repairs performed by an unauthorized company will void the machine warranty. If you require assistance finding an authorized service center, please contact NSS Enterprises, Inc.

After every **450-500 hours** of operation you must inspect vacuum motor carbon brushes for wear. Replace the vacuum motor carbon brushes when they are 7/16in. (11mm) in length.

After every **650-700 hours** of operation you must inspect drive motor carbon brushes for wear. Replace the drive motor carbon brushes when they are 3/8in. (9mm) in length.

After every **650-700 hours** of operation you must inspect brush motor carbon brushes for wear. Replace the brush motor carbon brushes when they are 1/2in. (13mm) in length.

#### **Battery Replacement Notes**

- Entire Pack.
  - It is always recommended to replace all batteries in the pack at the same time.
- One or more batteries out of the pack. This is not recommended. Replacing just one or two batteries out of the pack can lead to the following:
  - Overcharging the new, or the remaining original, batteries.
  - Undercharging the new, or remaining original, batteries.
  - Over discharging either the new or the remaining original batteries.
- If you wish to only replace some of the batteries in the pack, follow these steps for best results:
  - Replacement batteries must always be of the same battery manufacturer, model, and amp-hour rating as the remaining batteries in the pack.
  - Never mix batteries from different manufacturers in the same pack.

- Fully charge both the new battery, and the remaining original batteries. (s.g. = 1.265 minimum, use a hydrometer)
- Use a replacement battery that is close to the same age as the remaining original ones.
- Do not run the machine as long for about 20 cycles. For example, if you used to get 4 hrs runtime, only run it for 2.5 hrs, and then charge the batteries completely.
- Opportunity charge. Equalize after 30 days.
- The above steps will provide the best opportunity for the new battery(s) to join the pack.

## ACTIVATION OF DRY CHARGED BATTERIES

NSS supplies some batteries in a “dry charged” condition without any acid (electrolyte) in the battery. The batteries cannot be used in this condition; they must be activated by the addition of the battery acid (electrolyte). Failure to follow this procedure will cause severe damage to the batteries.

### Materials Required

- 1.265 Specific Gravity, Sulfuric Acid, to fill batteries.
- Rubber gloves and safety eye protection handling Sulfuric acid.
- Plastic funnel to pour Sulfuric acid into batteries.
- Adjustable wrench and pliers to install battery cables.

### Filling Procedure

- Remove the cap from each cell of the batteries.
- Fill each cell with Sulfuric acid fully to the bottom of the access hole.
- Allow the batteries to absorb the acid for a period of one hour. During this time the acid level in each cell will drop and the batteries will become warm.
- Refill each cell with Sulfuric acid to a point 1/4” (6mm) below the bottom of the access hole.
- Replace the cap in each cell of the batteries.
- Neutralize any spilled acid with bicarbonate of soda. Rinse the battery case clean with clean water and dry the battery case.
- Batteries are heavy - use two people to install.
- Refer to wiring diagram inside the battery compartment. Align batteries in compartment as shown on diagram.
- Install battery cables as shown on wiring diagram
- Tighten bolts and hex nuts with a wrench.
- **Caution:** Do not short across two terminals with a wrench.
- Loose or improper battery connections will cause battery or machine damage and possible personal injury.
- Connect the charger to the machine and allow it to perform one complete charging cycle, (8 – 12 hours).
- Liquid level adjustment during the life of the batteries should be made with distilled water.

If dry charged batteries have been filled with acid (electrolyte) and are placed in storage, the batteries must be recharged every 30 days to prevent damage.

## BATTERY AUTO-FILL INSTRUCTIONS

**WARNING:** When working with Lead-Acid batteries and Battery Acid observe all battery manufacturers’ safety precautions.

**Caution:** This option is not for well or tap water.

- Connect the regulated hose system to water supply. Aim the purge into drain or bucket and turn on water supply. When air is removed from the system disconnect quick coupler by pushing the button labeled CPC.
- Check the system for leaks by connecting the regulated hose system quick connect to the Auto-Fill quick connect. After connection the red balls in the flow indicator will spin indicating water flow. When the balls stop spinning check the system for leaks and IMMEDIATELY disconnect the quick coupler.
- Place the dust cover over the male quick coupler on the Auto Fill system. Turn off water supply and remove the regulated hose system. Reinstall the purge quick coupler and store in a safe place.
- We recommend you remove the hose swivel and valve from one cell to check the electrolyte level after the first fill.

## Battery Charger

The onboard battery charger supplied with this machine is capable of charging lead acid batteries from 185 to 350ah capacity. There is no need to change algorithms or settings based on battery manufacturer, or battery size.

The charger can also be set to charge flooded (wet) cell, AGM, or Gel batteries. LED’s on the charger indicate which type of battery the charger is set to charge. One setting is for Flooded and AGM batteries, the other setting is only for GEL batteries.

Depending on the battery charger model, the charger can operate on 100/115/230 VAC 1ph 50/60 HZ power, and will automatically detect these input voltages. Before connecting the battery charger to power, check the label on the battery charger to verify the proper input power.

## Determining Your Battery Type

**CAUTION: DIFFERENT BATTERY TYPES HAVE DIFFERENT CHARGING REQUIREMENTS. FAILURE TO PROPERLY IDENTIFY YOUR BATTERY TYPE AND SET THE CHARGER ACCORDINGLY WILL RESULT IN BATTERY DAMAGE, AND VOID THE WARRANTY.**

Your machine may have been ordered with batteries installed at the NSS factory. The standard battery type, normally supplied by NSS, is the Flooded (wet) cell lead acid battery. Gel and AGM sealed batteries may also be available at customer request.

Flooded (wet) batteries can be easily identified by the removable cell caps. Removing the caps allows inspection of the liquid electrolyte (sulfuric acid) level in each cell.

AGM (Absorbed Glass Mat) batteries are sealed, maintenance free batteries. They do not have cell caps

intended for removal. Look for “**AGM**” printed on the tops or sides of the batteries.

Gel (gelled electrolyte) batteries are also sealed, maintenance free batteries. They do not have cell caps intended for removal. Look for “**GEL**” printed on the tops or sides of the batteries.

## Battery Charger Indicator LED's

Your battery charger is equipped with LEDs that indicate the following:

- Battery Type Setting. Either of these two LEDs will be illuminated, anytime the charger is plugged in, to signal which type(s) of batteries the charger is configured to charge. The two options available are:
    - Wet / AGM: When this LED is illuminated, the charger is configured to charge either flooded (wet), or AGM batteries.
    - Gel Cell. When this LED is illuminated, the charger is configured to charge Gel batteries ONLY.
- EXCEPTION: Trojan AGMs are to be charged with the Gel setting.**
- State of Charge Indicators. Four additional LEDs provide information about the charge level of the batteries during charging.
    - 30%, 60%, 90% and 100%.

○ Fault Indications. During charging, the charger provides feedback about the charge process and any problems detected. It will provide feedback and signal the type of problem by flashing LEDs as described below:

Wet/AGM (Amber)	Gel Cell (Amber)	30 (Red)	60 (Red)	90 (Red)	100 (Green)	Meaning
On	Off					Charger is set for Wet/AGM batteries.
Off	On					Charger is set for Gel batteries.
One light on*		On	Off	Off	Off	Charger cycle is in process - bulk stage
One light on*		On	On	Off	Off	Charger cycle is in process - bulk stage
One light on*		On	On	On	Off	Charger cycle is in process - absorption stage
One light flashing*		Off	Off	Off	Flashing	Charger nearing the end of the charge cycle.
One light on*		Off	Off	Off	On	Charge cycle is complete.
One light on*		Flashing	Off	Off	Flashing	Damaged battery detected. One or more batteries failed to complete the charge cycle. Check battery water levels. Batteries can be used, but will not provide full run time.
One light on**		Flashing	Off	Off	Off	No batteries detected. Check that the battery pack is plugged into the machine. Check wiring.
One light on*		Flashing	Flashing	Off	Off	Batteries failed to climb above 1.74 volts per cell within the first three hours of charging. The batteries are damaged and will need to be replaced.
One light on*		Off	Flashing	Flashing	Off	Charge cycle time out. The charge cycle did not finish in the allowed time. Check the battery water levels. Unplug the charger and plug it back in. Allow the batteries to charge again. If the code is repeated, then it is likely that the batteries are damaged.
One light on*		Flashing	Flashing	Flashing	Off	Charge cycle time out. The charge cycle did not finish in the allowed time. Check the battery water levels. Unplug the charger and plug it back in. Allow the batteries to charge again. If the code is repeated, then it is likely that the batteries are damaged.
One light on*		On	Off	On	Off	Internal over temperature. The charger's internal temperature exceeded the maximum permitted. If possible, move the machine to a cooler location. Unplug the charger and plug it back in. Allow the batteries to charge again.

\* The light that is on depends on the charger configuration (Wet/AGM or Gel Cell)

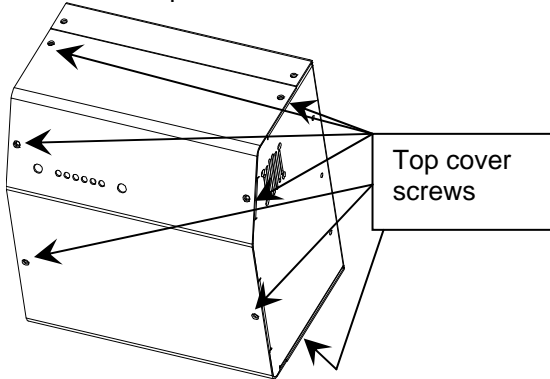
\*\* The light (Wet/AGM or Gel Cell) will only stay on for two seconds

## Changing the Battery Type Setting

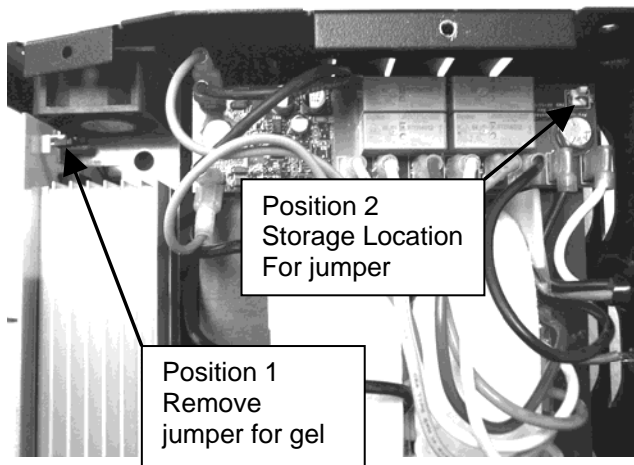
The standard setting for the onboard battery charger is Flooded/AGM. **EXCEPTION:** If your machine was ordered from NSS equipped with Gel batteries, then the charger was configured for Gel batteries at the factory.

### Configuring the Charger for Gel batteries:

1. Remove the top cover.



2. Pull the jumper off the board (position 1), and then store the jumper for later use at position 2. See photo below.
3. Reinstall the top cover.



### Configure the Charger for Flooded/AGM batteries

1. Remove the top cover
2. Pull the jumper from the storage location (position 2), and install the jumper at position 1.
3. Reinstall the top cover.

### Operating the Battery Charger

**CAUTION: DIFFERENT BATTERY TYPES HAVE DIFFERENT CHARGING REQUIREMENTS. FAILURE TO PROPERLY IDENTIFY YOUR BATTERY TYPE AND SET THE CHARGER ACCORDINGLY WILL RESULT IN BATTERY DAMAGE, AND VOID THE WARRANTY.**

The battery charger is fully automatic. Simply plug the charger into a suitable wall outlet, and the charger will charge the batteries. The green 100% LED will be continuously illuminated when the charge cycle is complete.

A bubbling, or boiling sound coming from the batteries during the last few hours of the charge is normal. The batteries may be warm, but not too hot to touch.

### Equalizing the batteries (Flooded only)

The batteries should be equalized once every 30 days to ensure maximum battery life.

To equalize the batteries:

- Plug in the charger, and fully charge the batteries (until the green 100% LED is on continuously).
- Unplug the charger from the wall outlet, then plug it back in.
- The charger will run for 2 hrs, holding the batteries at a constant voltage, and equalizing each cell.

### Battery Do's and Don'ts:

- a. You do not have to fully discharge the batteries before charging. They do not have a "memory".
- b. Plug the charger in anytime the machine is not in use.
- c. NEVER let the electrolyte level fall below the tops of the plates (flooded cell batteries). This will damage your batteries almost immediately, and void the battery warrantee. They can tell if this happened.
- d. NEVER refill the batteries with well or tap water (flooded cell batteries).
- e. NEVER overfill the batteries(flooded cell batteries).
- f. NEVER let the batteries sit discharged overnight (or between shifts).
- g. ALWAYS check the electrolyte level about every 3 or 4 charge/discharge cycles BEFORE CHARGING.
- h. ALWAYS refill the batteries with distilled water (if needed) AFTER CHARGING.
- i. ALWAYS fully recharge the batteries after use (until the green LED comes on).
- j. ALWAYS equalize the batteries **(Flooded only)** every 30 days.
- k. NEVER OVER DISCHARGE!
- l. NEVER charge GEL batteries with the charger set to FLOODED/AGM.
- m. NEVER charge FLOODED/AGM batteries with the charger set to GEL. **EXCEPTION-TROJAN AGM'S TO BE CHARGED WITH GEL SETTING.**

\*\*The charger has been tested on batteries from the following manufacturers:

- Trojan flooded cell
- US Battery flooded cell
- Deka flooded cell
- Crown gel
- Concord gel
- Discover AGM

### Opportunity Charging

Opportunity charging is charging the batteries when an opportunity presents itself, such as during breaks, and is done **in addition to a full charge cycle**.

Opportunity charging is recommended, as this extra charging time will help raise the operating voltage of the batteries, and will help ensure maximum cycle life.

NOTE: Trojan AGM batteries should be charged with the GEL setting.

**TABLE 1**  
**Battery Types**

<b>NSS Part Number</b>	<b>Crown Part Number</b>	<b>Battery Volts</b>	<b>System Volts</b>	<b>Amp Hour</b>	<b>Battery Type Setting</b>
4491061	1-1470	12	36	210	Flooded/AGM
3390361	1-1435	6	24 & 36	235	Flooded/AGM
2392111	1-1427	12	24	115	SPE CURVE 0
6393651	1-1428	12	24	145	SPE CURVE 0
2392731	1-12145	12	24	100	SPE CURVE 1
6491931	1-1437	6	24 & 36	200	Gel
2691501	1-1450	6	36	350	Flooded/AGM

## TROUBLE-SHOOTING

PROBLEM	CAUSE	SOLUTION
No Solution Flow.	Solution tank is empty.	Fill the tank.
	Clogged filter.	Clean filter.
	The solution valve is closed.	Open the solution valve.
	Obstruction in the solution hose.	Remove the obstruction.
	Solution valve or linkage damaged.	Repair / replace the valve linkage.
	Solution hose kinked.	Check for kinks and remove.
Solution Flow Does Not Stop.	Solution solenoid is damaged.	Inspect wire connections and valve, repair / replace the solenoid.
	Solution valve or linkage damage.	Repair / replace the valve linkage.
	Damaged seat and washer in valve.	Replace valve.
	The valve stem is dirty.	Clean and lubricate valve stem.
	Hose disconnected or damaged.	Reinstall or replace hose.
Will Not Pick Up Any Water From Floor.	Squeegee is up. Squeegee hose is off.	Lower squeegee. Reinstall hose.
	Vac motor switch is off.	Turn vac motor switch "on".
	Recovery tank is full.	Empty tank.
	Vacuum shut-off float is stuck.	Clean screen and remove obstruction.
	Obstruction / damage in the squeegee, squeegee hose or standpipe.	Remove obstruction / repair damage.
	Leaking over gasket.	Remove old gasket / replace.
	Vac motor is not running.	Have an authorized serviceman repair.
	Recovery drain hose not plugged properly.	Install drain hose plug properly.
Will Not Pick Up All Of The Water From The Floor.	Debris on squeegee blades. Squeegee blade is worn / damaged.	Clean squeegee. Reverse / replace squeegee blade.
	Obstruction / damage in the squeegee, squeegee hose, or standpipe.	Remove obstruction / repair damage.
	Squeegee angle needs adjustment.	Adjust angle.
	Vacuum motor worn out.	Repair / replace vac motor.
	Recovery tank drain hose damaged.	Repair / replace recovery drain hose.
	Vac filter clogged.	Clean vac filter under top metal plate.
Runtime is less than when new	Electrolyte level is too low.	Add distilled water and charge.
	Batteries are not fully charged.	Allow charger to run a full cycle.
	Battery terminals are dirty / damaged.	Clean terminals and connectors
	Batteries are sulfated. Don't let low batteries sit overnight without charging.	Equalizing the batteries, maybe 2 or 3 times, will help reduce the sulfation.
	Battery is defective or worn out.	Check for fault codes on the battery charger while the battery charger is operating. Have an authorized serviceman test the batteries (s.g./charged volts/load test).
	Tops of batteries are dirty / wet.	Clean / dry, & clean terminals
	Charger is damaged.	Have an authorized serviceman repair.

Cleaning Is Not Even.	Brush / pad is worn.	Replace brush / pads.
	Damage to brush assembly; casters or solution valve.	Have an authorized serviceman repair.
	Hoses may be kinked or obstructed	Repair / remove obstruction
Machine does not run.	Battery cables loose or not connected.	Check and connect or tighten.
	Circuit breaker tripped.	Reset circuit breaker.
	Batteries not charged.	Charge batteries.
Battery meter is flashing code	LED's scroll left to right = throttle pot adj.	Throttle pot neutral not set to 2.50kohm
	All LED's flash = estop button pushed	Release estop button.
Brushes will not shut off.	Brush deck switch arm may be bent or broken.	Bend the arm on the switch upward, or replace the switch.
Sidekick pump not operating	Turned off, water valve is off, brushes turned off.	Ensure pump, solution valve, and brushes are on.
	Improper wiring. Sensor plugged.	Inspect/repair by qualified technician Remove sensor and blow air (5psi max) thru in the opposite direction as the arrow on the part to clear the obstruction.
Sidekick operating, but not pumping chemical	Vacuum leak at fittings on bottle cap, Squeeze tube cracked, chemical bottle empty.	Check fittings at bottle cap for leaks. Replace squeeze tube if cracked. Fill chemical bottle.
<b>NOTE: If any problems remain after taking the above steps, contact your local authorized distributor / service station for further evaluation and repair.</b>		



## Wrangler 2730 & 3330 Diagnostic Codes:

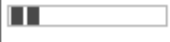
Below is a list of self-help actions. Try to use this list before you contact your service agent. Go to the number in the list which matches the number of flashing bars and follow the instructions.

### 1 Bar



The battery needs charging, there is a bad connection to the battery or dependent on programming, may indicate that the battery lockout function is active and the controller is in a restricted mode of operation. Check the connections to the battery. If the connections are good, try charging the battery.

### 2 Bar



There is a bad connection to the motor. Check all connections between the motor and the controller.

### 3 Bar



The motor has a short circuit to a battery connection. Contact your service agent.

### 4 Bar



The battery charge level has fallen below the Battery Lockout Level and the controller is inhibiting certain machine functions. Charge the battery.

### 5 Bar



Not used.

### 6 Bar



The controller is being inhibited from driving, this may be because the battery charger is connected.

### 7 Bar



A throttle fault is indicated. Make sure that the throttle is in the rest position before switching on the machine.

### 8 Bar



A controller fault is indicated. Make sure that all connections are secure.

### 9 Bar



The parking brakes have a bad connection. Check the parking brake and motor connections. Make sure the controller connections are secure.

### 10 Bar



An excessive voltage has been applied to the controller. This is usually caused by a poor battery connection. Check the battery connections.



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