

2730 WRANGLER 3330

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.

INTENDED USE

This machine is designed for 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 by or 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

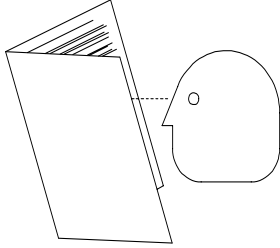


IMPORTANT SAFETY INSTRUCTIONS

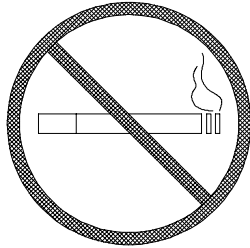
BATTERY POWERED EQUIPMENT



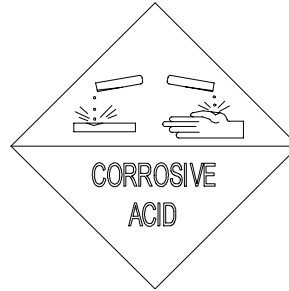
WARNING: Failure to observe these instructions can cause personal injury to machine operator or bystanders



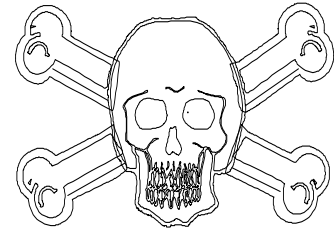
Read and understand all instructions before installing or charging batteries.



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

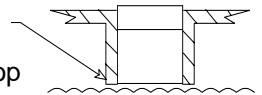
- **ALWAYS** read and understand all instructions before installing or charging batteries.
- **NEVER** attempt to install or charge batteries unless you have been trained to do so.
- **NEVER** allow an untrained person to install or charge batteries.
- **ALWAYS** remove all jewelry when working on or 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.
- **ALWAYS** check to ensure the battery water level covers the battery plates before charging.
- **ALWAYS** check water level after charging and add 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 or treated city water. Not well water.



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SAVE THESE INSTRUCTIONS



NOISE AND VIBRATION

NOISE

Sound pressure level at Operator position 72 dB(A)

VIBRATION

Weighted RMS acceleration value (ISO 5349) .367 m/s²

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)**.

- To fill the tank pour the water and cleaning chemicals through the filter that covers the opening at the front of the tank, or you may use the hose holder cutout.
- The amount of water in the tank is measured by the solution gage in the clear plastic tube at the right rear corner of the tank.
- The solution tank is emptied through the clear plastic tube at the right rear corner of 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 clearview 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.
- The float shut-off assembly does not shut off the vacuum motor.
- 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 EPA regulations.

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 "dead man" 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 round red button in the center is the master power switch; it controls the power to all components. Power on is indicated by the green light.
- Lower the brush lever, located at the right rear of the machine, to turn on the brush motors.
- Power Deck Lift Option. The first switch left of center sets the deck position to Float or Heavy. Set position switch while deck is in the up position. The center left switch raises and lowers the deck, the lift is off when in the middle position.
- Key Switch Option. Turns all components off / on.

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.

- Work Range - This is the green area in the middle of the meter. It shows the approximate amount of "power" available in the batteries. Observe this reading when operating the Wrangler.
- Recharge Range - This is the red area on the left of the meter. It shows when the batteries need to be recharged. Continued machine operation in this area will cause battery damage and potential machine damage.

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. Water will not flow until the brush motor is turning.
- The top circuit breaker is for the drive motor and is rated at 25 amps.
- The next circuit breaker is for the vacuum motor and is rated at 25 amps.
- The next two circuit breakers are for the brush motors and each is rated at 25 amps.
- The bottom circuit breaker is for the power deck lift option and is rated at 2 amps.
- The **right** lift arm is used to raise and lower the brush motor assembly. Brushes automatically turn on when lowered.
- The **center** lift arm is used to raise and lower the squeegee assembly.

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 local your EPA Regulations.

Battery Charging

For Machines with independent chargers:

- The charging plug is located on the left side of the rear panel.
- To recharge the batteries raise the charge plug cover and install the battery charger plug into the charging plug. The charge plug cover prevents the machine from moving while charging.
- This plug is gray on 36-volt machines.
- See charging instructions for more details.

For Machines with On Board Chargers:

- To recharge the batteries plug the charger cord, located at the rear of the machine, into an electrical outlet.
- When the cord is plugged into an outlet the machine is currently disabled.
- See charging instructions for more details.

Solution Filter Assembly

Attached to the outlet fitting of the solution tank is a filter. It is designed to stop debris from *entering the solution valve*.

If the water and chemical stops flowing during operation:

- Open the fitting (by hand), remove and clean the screen.
- Replace the screen and close fitting (by hand). 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 battery charge and charge as required.
- Check manual lever.

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 Wrangler 2730 or 3330 may use a dual (2) urethane blade system to recover liquids from the floor.

- The squeegee assembly has a wide, flat frame to help prevent damage, two (2) mounting knobs and two (2) small wheels to prevent "rollover" while in reverse.
- The squeegee assembly mounts to a metal bracket at the bottom center of the machine.

The Wrangler 2730 or 3330 may be equipped with an optional "curved" heavy-duty squeegee assembly. This system has gum rubber or Linatex rear blades and neoprene front blades.

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*.
- The side skirt assemblies attach to the front of the machine with *retaining pins* and are secured with a *retaining latch*.

Battery Packages

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

- Six (6) 6 volt, 225 Amp Hour Batteries.
- Six (6) 6 volt, 325 Amp Hour Batteries.
- Six (6) 6 volt, 395 Amp Hour Batteries.

Consult your local NSS authorized distributor for application recommendations.

MACHINE OPERATION

General Information

The Wrangler 2730 and 3330 are very maneuverable and are designed to scrub floors as you operate the machine from behind.

Preparing the machine for use

Install the Batteries:

- Turn off all switches and tilt the recovery tank open to expose the battery compartment.
- Batteries are heavy - use two people to install.
- Refer the to 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.

Prepare the Solution Tank:

- **Never** use water over $140^{\circ}F$ ($60^{\circ}C$) degrees. Excessively hot water may damage components such as the tanks.
- Pour all liquids through the mesh filter at the front of the solution tank, or use a hose and the hose holder cut out.
- Put 1 to 2 gallons of clean water into the solution tank first to help dilute the chemicals and prevent excess sudsing.
- Consult your local distributor for complete chemical advice. Dilute the cleaning chemicals according to the manufacturer's instructions.
- Add the cleaning chemicals to the solution tank and fill with water as needed.

Prepare the Recovery Tank:

- Make sure the drain plug of the recovery tank is closed tightly and in its holding clip.
- **Always** use a defoamer to protect the vacuum motor.
- **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.

Install a Pad Driver and Pad:

- There is a wide range of pads or brushes available for the many cleaning applications of this machine. Consult your local NSS authorized distributor for application recommendations.
- Turn the pad drivers upside down on the floor and remove the pad holding cup.
- Remove the center cutout of the 14" (35.5 cm.) pad (Wrangler 2730), or the 17" (43 cm) pad (Wrangler 3330). Place the pad on the face of the pad driver.
- The pad **must** be centered concentric 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 onto the drive casting.

Install the Squeegee Assembly:

- Place the squeegee lift arm in the storage (up) position.
- Loosen the two mounting knobs and slide the squeegee assembly onto the mounting plate.
- 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.

Squeegee arms keep the squeegee parallel to the floor. As the blades wear adjustment should not be required. For first time adjustment see "Adjusting the Squeegee assembly".

Install the Side Skirts:

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

The side skirt wiper blades will naturally wear with use and require adjustment or replacement. To adjust the skirts see "Adjusting the side skirts".

Operating the Machine

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 has the brush motors centered but the offset feature is part of the skirt design.

Before Use

- Remove as many obstacles as possible from the area to be scrubbed.
- Always 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 preclean 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.

Normal Cleaning

- Fill solution tank as directed.
- Put defoamer chemical in recovery tank.
- Install pad drivers / pads or brushes.
- Close and secure side skirts.
- Install squeegee assembly.
- 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.
- Twist the handle grips forward (away from you) to move forward. Twist handles grips backward (toward you) to move backward.
- 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.
- Resume cleaning operation.
- Refill solution tank and empty recovery tank as needed.
- When cleaning is complete, return the machine to the storage area and perform daily maintenance.

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.

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 before performing any maintenance.

Adjust 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.
- **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.

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.

Daily Maintenance

Battery Charging

- **The master power switch and all other switches must be turned OFF.**
- You must recharge the batteries when indicated by the battery meter. Read the battery meter while the machine is in use.
- Connect the battery charger plug (gray) to the machine's charging plug at the rear of the machine.
- Connect the battery charger power cord into a grounded A.C. outlet of the proper voltage.
- After a few seconds the amp meter (or light) will indicate the battery charger is operating.

- If the battery charger will not start operating, check the charging plug connections, the battery cable connections and the battery voltage.
- If the batteries have been discharged (used) too deeply, the battery charger will not start.
- Consult your local authorized NSS distributor or service center for assistance.
- When the recharge cycle is complete, the battery charger will turn off automatically. The amp meter will register "0" or the light will be off.
- Recharge the batteries at the end of every shift or when indicated by the battery meter.

Battery Electrolyte (Liquid) Level

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 water to the cell of a battery to adjust the liquid level. Distilled water preferred, **Do Not** use well 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.

Solution and Recovery Tanks

- Empty all liquids from both solution and recovery tanks.
- Rinse both tanks with clean water to prevent chemical residue build-up. Empty both tanks, allow to air dry.
- Remove any residue from screen and float ball to ensure proper operation. Replace float assembly in recovery tank.
- Leave recovery tank clear lid open to allow tank to air dry and prevent odors.
- 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.
- 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.
- 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 (25 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 EPA 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.

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 removing the chain guard and 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. Reinstall the chain guard.
- 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 appear 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.
- 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. This procedure should be performed by an NSS authorized distributor or service center. Failure to perform this procedure may result in poor machine performance, machine component damage and failure.

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.
Authorized Repair Service

Repair service for this machine must be performed by an NSS authorized 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.

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

- 1.220 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 or clean drinking 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.

OPTIONAL 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 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.

TROUBLE-SHOOTING

PROBLEM	CAUSE	SOLUTION
No Solution Flow.	Solution tank is empty. Low battery charge. Clogged filter. The solution valve is closed. Obstruction in the solution hose. Solution valve or linkage damaged. Solution hose kinked.	Fill the tank. Charge the batteries. Clean filter. Open the solution valve. Remove the obstruction. Repair / replace the valve linkage. Check for kinks and remove.
Solution Flow Does Not Stop.	Solution solenoid is damaged. Solution valve or linkage damage. Damaged seat and washer in valve. The valve stem is dirty. Hose disconnected or damaged.	Inspect wire connections and valve, repair / replace the solenoid. Repair / replace the valve linkage. Replace valve. Clean and lubricate valve stem. Reinstall or replace hose.
Will Not Pick Up Any Water From Floor.	Squeegee is up. Squeegee hose is off. Vac motor switch is off. Recovery tank is full. Vacuum shut-off float is stuck. Obstruction / damage in the squeegee, squeegee hose or standpipe. Leaking over gasket. Vac motor is not running. Recovery drain hose not plugged properly.	Lower squeegee. Reinstall hose. Turn vac motor switch "on". Empty tank. Clean screen and remove obstruction. Remove obstruction / repair damage. Remove old gasket / replace. Have an authorized serviceman repair. 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. Obstruction / damage in the squeegee, squeegee hose, or standpipe. Squeegee angle needs adjustment. Vacuum motor worn out. Recovery tank drain hose damaged. Vac filter clogged.	Clean squeegee. Reverse / replace squeegee blade. Remove obstruction / repair damage. Adjust angle. Repair / replace vac motor. Repair / replace recovery drain hose. Clean vac filter under top metal plate.
Batteries Do Not Seem To Run Long Enough.	Over charging batteries. (Charging too frequently). Tops of batteries are dirty / wet. Battery terminals are dirty / damaged. Electrolyte level is too low. Batteries are not fully charged. Charger is damaged. Battery is defective or worn out.	Monitor run time, and adjust charging frequency accordingly. Clean / dry, charge batteries. Clean terminals and connectors, replace damaged cables. Charge. Add distilled water and charge. Charge batteries for 8 hours. Have an authorized serviceman repair. Check cell voltage while discharging.
Cleaning Is Not Even.	Brush / pad is worn. Damage to brush assembly; casters or solution valve. Hoses may be kinked or obstructed	Replace brush / pads. Have an authorized serviceman repair. Repair / remove obstruction
Machine does not run.	Battery cables loose or not connected. Circuit breaker tripped. Batteries not charged.	Check and connect or tighten. Reset circuit breaker. Charge batteries.
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.

NOTE: If any problems remain after taking the above steps, contact your local authorized distributor / service station for further evaluation and repair.

NOTES



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