

# “WRANGLER 27”

## OPERATION MANUAL ILLUSTRATED PARTS LIST



THE NATIONAL SUPER SERVICE CO.  
Maumee, OH 43537 • 419/893-8771

### IMPORTANT Read Thoroughly

THE SAFETY PROCEDURES FOR SERVICE AND OPERATION MUST BE FOLLOWED TO PREVENT DAMAGE TO MACHINE AND PROPERTY, AND INJURY TO OPERATOR OR BY-STANDERS

**SAFETY PROCEDURES: Failure to observe can cause injury to Operator!**

#### — AVOID PERSONAL INJURY —

1. **NEVER** attempt to operate machine unless you have been trained in its operation.
2. **ALWAYS** operate this machine from the rear control panel, not from the side.
3. **ALWAYS** use extreme caution when operating machine on a ramp or loading/unloading a machine into or out of a truck.

#### FOLLOW THESE RULES

- a) **Never** turn machine on an incline
  - b) **Never** leave machine unattended
  - c) **Never** stop machine on ramp
  - d) **Never** attempt to climb a grade more than 20°
  - e) **Always** be sure ramp is secured to vehicle before attempting to load/unload
4. **ALWAYS** make sure battery charger is turned off when connecting/disconnecting to machine to prevent sparking. Lead acid batteries generate gases which can cause an explosion.
    - a) **Always** keep fire or sparks away from machine
    - b) **Always** charge machine only in areas with good ventilation
    - c) **Always** remove battery compartment cover when charging

5. **ALWAYS** wear eye protection and protective clothing when working with the batteries.
6. **ALWAYS** select low-speed when reversing machine to avoid injury to operator.
7. **NEVER** operate machine in an explosive atmosphere (grain dust or gas vapor).
8. **NEVER** use flammable liquids (gas, kerosene, solvents or thinners) to clean floor.
9. **ALWAYS** turn off master switch and brush switch when attaching pads or brushes.
10. **NEVER** operate machine with side skirts or covers removed.

#### — AVOID DAMAGE TO MACHINE —

1. **NEVER** store machine near furnaces, boilers or open flame which may damage machine.
2. **NEVER** operate machine when charger is plugged in.
3. **ALWAYS** keep machine from freezing.
4. **NEVER** spray machine with water.
5. **NEVER** store items on machine.
6. **NEVER** park near dock or on ramps — unit may roll free.



**WARNING: FAILURE TO OBSERVE RECOMMENDED MAINTENANCE OF BATTERIES, BATTERY CHARGER, AND MACHINE COMPONENTS AS INSTRUCTED CAN RESULT IN INJURY TO THE OPERATOR OR DAMAGE TO MACHINE.**



#### Repairs and Maintenance Warnings

When any electrical motor or switch service is required, maintenance should be done by an authorized service station or other qualified person.

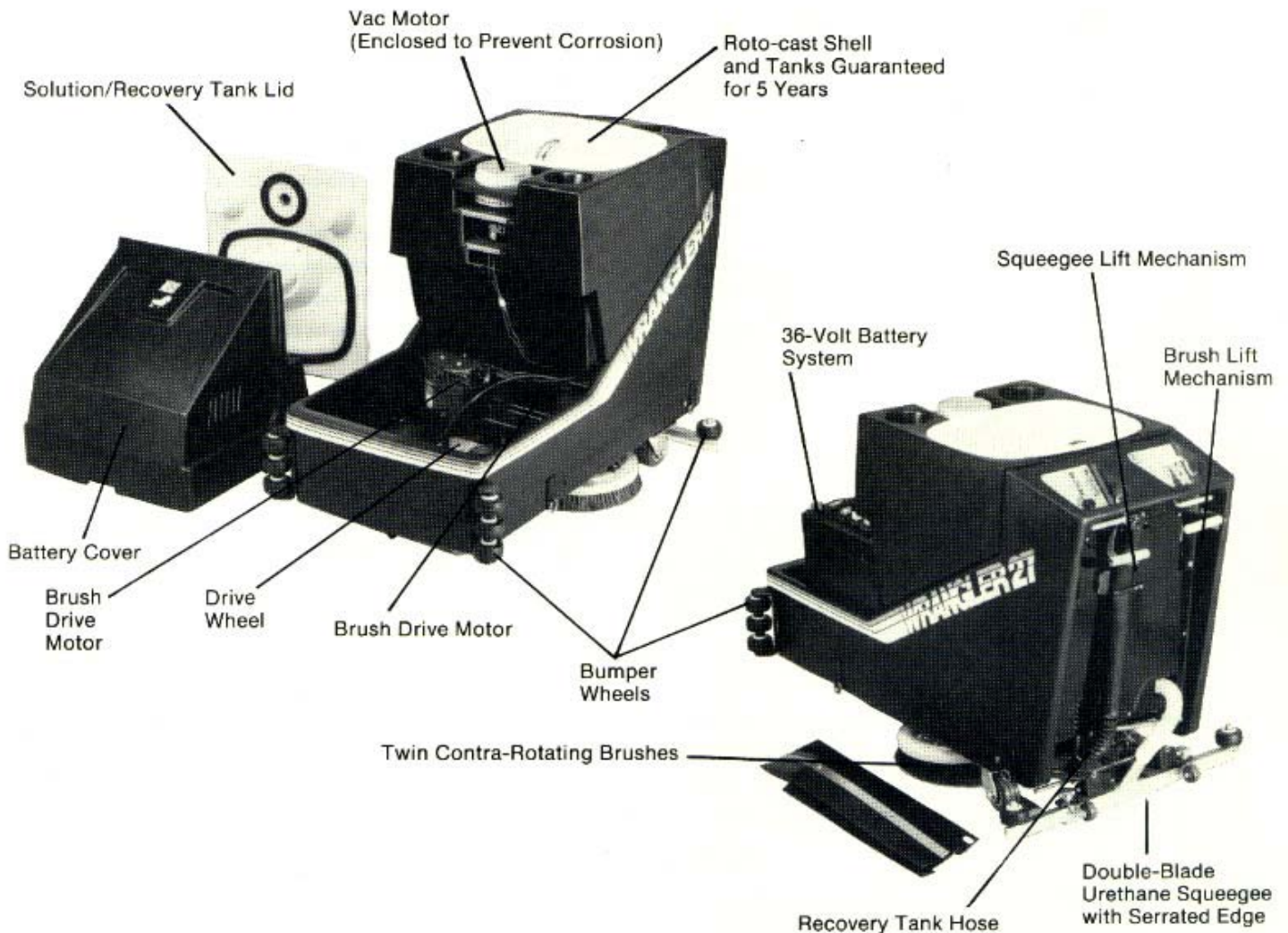
See Maintenance Section.

## ASSEMBLY

### Removal of Machine from Pallet

1. Carefully open top of carton. Never slice with carton knife to avoid damaging top of machine.
2. Remove side skirt wipers from the rear portion of the machine at each corner. Remove squeegee assembly from same area. Pull out inserts.
3. Remove from cardboard tray on top front of machine two pad driver assemblies, two battery terminals, and warranty card information.
4. The carton is stapled to the wooden pallet around the bottom of the machine. Using a screwdriver or pliers, pull staples and remove top carton from machine. Be careful not to scratch surface of the machine with staples in the carton.
5. The Wrangler is bolted to the wooden pallet by three hold-down bolts, two in the rear of the machine on the sides, and one on the motor bracket at the front of the machine. Loosen and remove hold down bolts completely from the pallet. Cut strap which holds brush head to pallet.
6. Raise the brush lever at the back of the machine to the up or transport position. Remove the styro-foam blocks used to support the brush mounting plates on the bottom of the machine.
7. Carefully grasp rear handle of machine and roll backwards off of shipping pallet.
8. Visually inspect the machine for damage before proceeding to install batteries. If you find concealed damage, contact your freight carrier for an inspection. Otherwise, proceed to install batteries as per the following instructions.

**WARNING: READ SAFETY PROCEDURES ON PAGE 1 PRIOR TO OPERATING OR SERVICING THIS MACHINE.**



## Battery Installation

### WARNING!

Read Before Installing or Servicing Batteries to Prevent Personal Injury or Damage to Machine

- Always wear eye protection and protective clothing.
- Service to be done only by authorized, trained personnel.
- Batteries are heavy — 2 people required for installation or removal.
- Never lay anything on top of batteries.
- Turn off all switches during installation and service.
- Slide batteries back into position as shown on battery installation decal — place foam battery block in front of batteries.
- Connect batteries as shown on battery installation decal.
- Use only 12 volt batteries (3 each) — Wrangler 27 -27 P/D.
- Use only 6 volt batteries (6 each) — Wrangler 33.
- Disconnect battery leads before performing any service or repairs.
- Batteries generate explosive gases — keep sparks, flames, burning cigarettes, or other ignition sources away at all times.
- Charge in a well ventilated area with Battery Compartment Cover Removed.



- Contains **ACID**. Avoid Contact.
- Antidote: **EYES** - Flush with water 15 min., call physician.
- **INTERNAL** - Drink water or milk. Follow with Milk of Magnesia, beaten egg or vegetable oil. Call Physician.

### Installing Batteries: See Figure #1

1. Check to make sure that all switches, particularly the master switch, are in the **off position**.
2. Grasp battery cover by hand — hold at the very front and center of the machine. Lift and pull cover forward and away from the machine and set it off to the side.
3. Remove styrofoam block and remove yellow vacuum seal cover from the top of the machine. Inside, remove battery cables and styrofoam block.
4. Align batteries beside machine as shown in the diagram.

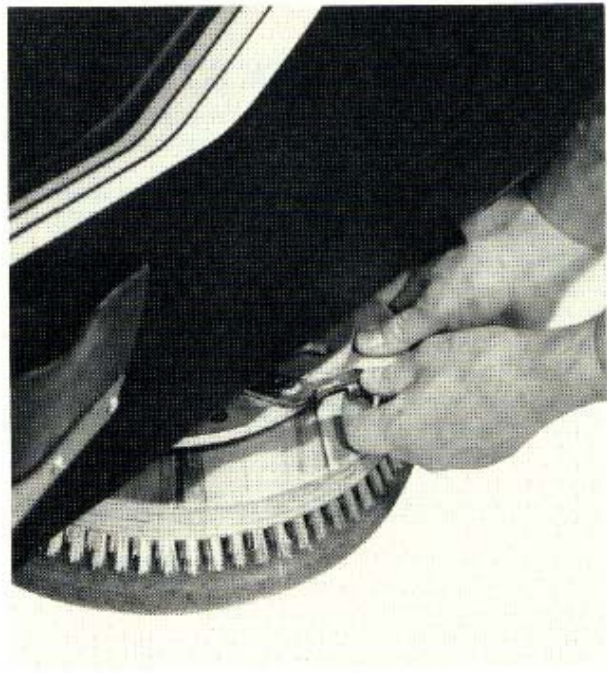


Figure #1  
Batteries

5. Have all positive (+) terminals pointed to the back of the machine, and all negative (-) terminals facing the front of the machine. **Because of the weight of the batteries, a minimum of two (2) people should install them.**
6. Carefully lift first battery and place in right hand side (from the operator's position) of the battery compartment. Continue to place batteries into machine until complete.
7. Check wiring instructions on machine before connecting battery leads.
8. Carefully connect battery leads to battery post terminals. Make sure that battery terminals are completely covered by battery cable connections. Otherwise, improper contact and battery damage and sparking will occur.
9. Connect all battery leads as discussed and double check to make sure battery leads are connected as per the wiring diagram.
10. Tighten all battery cables and battery posts. Push two batteries on the left hand side toward the back of the machine. Insert styrofoam block to keep batteries from changing position.
11. You are now ready to install the squeegee and pad drivers or brush assemblies.

**Brush Installation:** See Figure #2

1. Make sure all switches are off. Make sure brush assembly is in the up position.
2. If utilizing supplied pad drivers, remove pad holding cup from pad holder by pulling out on center tabs.
3. Install 14" diameter pad and re-install pad holding cup.
4. With side skirt wipers removed, turn brush mounting plate until push lock appears on side of machine.
5. Slide brush under machine, lining up three mounting studs and insert through openings on brush mounting plate. Adjustments may be needed. See Service Bulletin 86-005 in Trouble Shooting Section.
6. Open clip and turn brush toward the clip until it stops against the end of the stud. Push clip which holds brush lug in place by centrifugal force. Repeat procedure on opposite side.



**Figure #2**

**Maintenance of Brushes**

1. Always remove brushes after each use.
2. Rinse bristle and block area, removing all foreign material.
3. Never leave brushes attached to machine after use or blocks may swell causing difficulty in removal.
4. When new, brushes have a bristle length of 1 3/4". To prevent streaking and loss of scrubbing ability, replace brushes after bristles are worn to a maximum length of 1".

**WHAT BRUSH OR PAD DRIVER WORKS BEST?**

<b>Brush/Drivers</b>	<b>Part Number</b>	<b>When/Where Used</b>
Pad Drivers	27-254-1	Used with Scrubbing or Buffing Pads
Nylon Filled	27-251-1	Used for Light Scrubbing on Highly Polished Floors, Smooth Surfaces, Sealed Concrete — Lasts Much Longer than Bassine.
Bassine Scrub	27-250-1	Used for Light to Medium Scrubbing on Any Surface, Utilized for Intermittent Scrubbing Not Requiring Long Brush Life.
Grit Filled	27-252-1	Used for heavy Scrubbing of Any Surface, Particularly Concrete. Rarely Used on Sealed or Finished Floors, Except for Stripping.
Wire Filled	27-253-1	Used for Heavy Scrubbing on Unsealed Concrete. Particularly Effective for Removal of Heavy Grease Build-up — Very Aggressive.

**2 BRUSHES REQUIRED**

### **Installing Side Wiper Skirts:** See Figure #3

1. Pull and turn spring loaded clips away from area where side skirt mounts, both front and back.
2. Carefully take side wiper skirt and insert stud into hole in side of the machine.
3. Align stud and hole in skirt wiper on back of machine.
4. Pull key rings on skirt out and turn until they put pressure on skirt clip retainer, keeping it in place, both front and back.

### **Adjusting Side Wiper Skirts**

Side wiper skirts are designed to maintain and channel water to the squeegee. Running the machine with worn side wiper skirts may allow water to escape to the left and right side of the machine.

The side wiper is slotted for adjustment. To adjust side wiper skirt, follow this procedure:

1. Loosen side wiper skirt screws.
2. Install side wiper skirt assembly on machine.
3. Pull side wiper skirt down evenly so that it is depressed just slightly against the floor.
4. Tighten all screws. Operate machine with water and brushes in position. Turn machine to left and right and check for retention of water.

**CAUTION:** Adjusting side wiper skirts too long will allow the front wiper skirt blade to come in contact with brush or pad, which will damage it.

Under adjustment will allow water to escape.

5. Test machine before returning it to service.

### **Installing Squeegee:** See Figure #4

1. Lift squeegee lever and place in transport position.
2. Loosen squeegee holding knobs and slide into slot on squeegee mount plate.
3. Lower squeegee into operating position. Tighten adjustment knobs on left and right sides — finger tight.
4. Install vacuum hose.

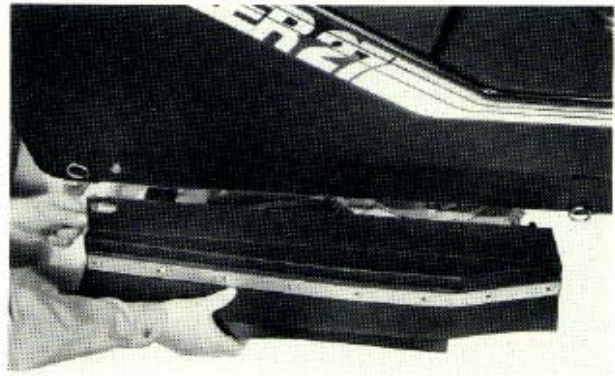
You are now ready to test machine. If streaking occurs while testing, see adjusting squeegee section to correct the problem.

### **Adjusting Squeegee**

Squeegee is adjusted for use at the factory. However, due to changes in floor composition and other variables, the Wrangler squeegee may need some minor adjustments.

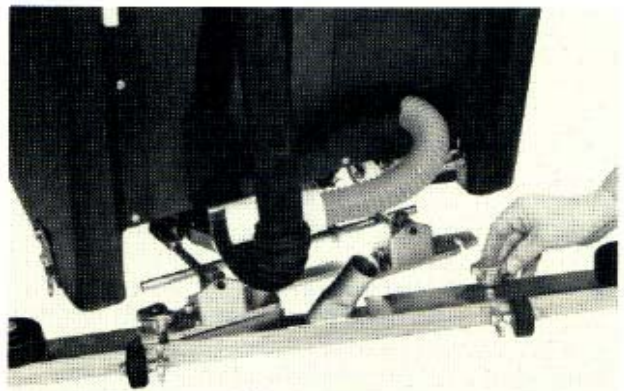
The squeegee should be adjusted so that the front and rear blades, #126, lay over just slightly like a window squeegee. Applying too much left or right pressure will not normally improve squeegee ability. Therefore, make small adjustments trying machine after each adjustment.

To change the pressure on the squeegee, adjust allen head bolt, item #122, on left and right hand side of the squeegee.



**Figure #3**  
**Side Wiper Skirt**

1. Insert Allen Wrench into item #122.
2. Lower brushes to the floor.
3. Turn solution valve approximately 1/4 turn open.
4. Adjust machine speed control so that engaging the dead-man lever causes the machine to creep forward very, very slowly.
5. Turn brushes on and immediately begin to move machine forward.
6. As the machine creeps forward, watch how the squeegee rubber, item #126, flexes and bends. Even bending should be noticed on both left and right hand side of squeegee.
7. Turning left and right hand allen head bolt, #122, in or out either increasing or decreasing left and right side pressure. Adjust each side until squeegee lays evenly.
8. Continue to test machine until squeegee works properly.
9. Over-tightening the allen bolt, item #12, can cause a reduction in the swing of the squeegee from right to left, or left to right. If this occurs, loosen the allen head bolt, item #122, on left and right side until squeegee swings freely. Only small adjustments are necessary for squeegee to work properly.
10. There are no springs or other tensioning devices. Item #122 is the only adjustment for the squeegee.



**Figure #4**  
**Squeegee**

### Solution Tank

The solution tank is filled at the front of the vacuum compartment. The tank holds 24 gallons. The fill level of the tank can be seen through the opaque recovery tank.

Emptying the solution tank is accomplished by opening valve on bottom rear right hand side of machine.

On later models, emptying of the solution tank is accomplished by holding the rubber drain hose on the right hand side rear of the machine near a drain or in a bucket. Flush the solution tank after each use, and if drain hose is clogged, use high pressure water inserted in drain hose to remove obstruction.

On a monthly basis mix solution of 1 gallon vinegar to 3 gallons of water and pour into solution tank.

Allow neutralizing solution to flow through drain hose and through brush head assemblies to help remove alkaline build-up caused by cleaning chemicals. After the use of the neutralizing solution, rinse solution tank with clear water and allow to dry.

**WARNING: Wear face shield when using high pressure water to remove obstructions.**

### Recovery Tank

The recovery tank is emptied by unscrewing plug (with hose in bucket or pointed toward drain). Flush recovery tank after each use. If drain hose is plugged, use high pressure water inserted in drain hose to remove obstruction.

Spray inside of tank with heavy duty cleaner/disinfectant and then rinse with hot water to eliminate scum build-up and offensive odors.

### Vacuum Cover

The vacuum cover must be in place for the vacuum to function properly. It provides a seal and connection between the vacuum motor and the recovery tank. The vacuum cover must be removed to add solution.

Periodically check vacuum cover seal which surrounds recovery tank and the seal that is around the vacuum motor. A damaged seal in either place can cause loss of suction. For further repair information, see "Maintenance Section".

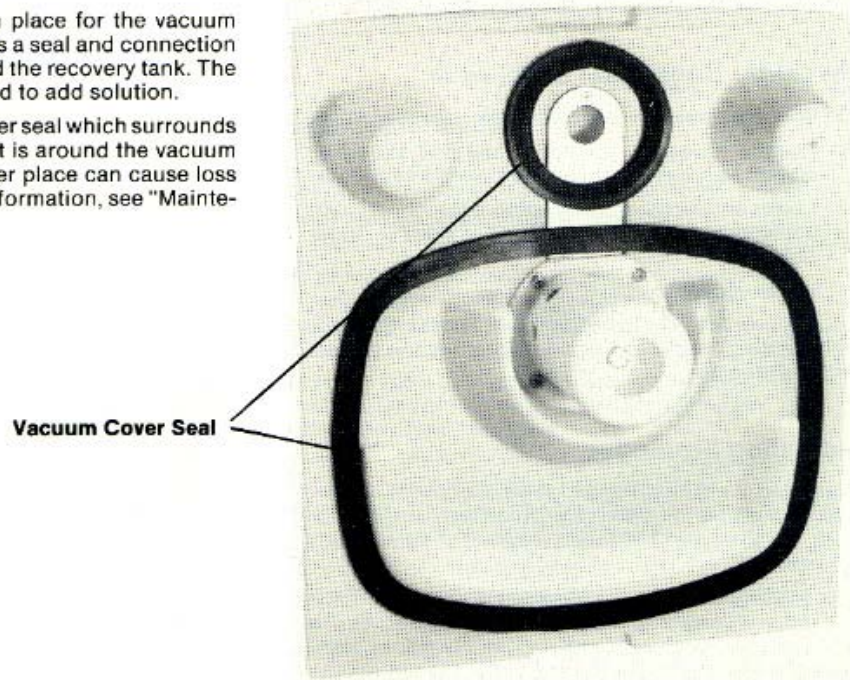
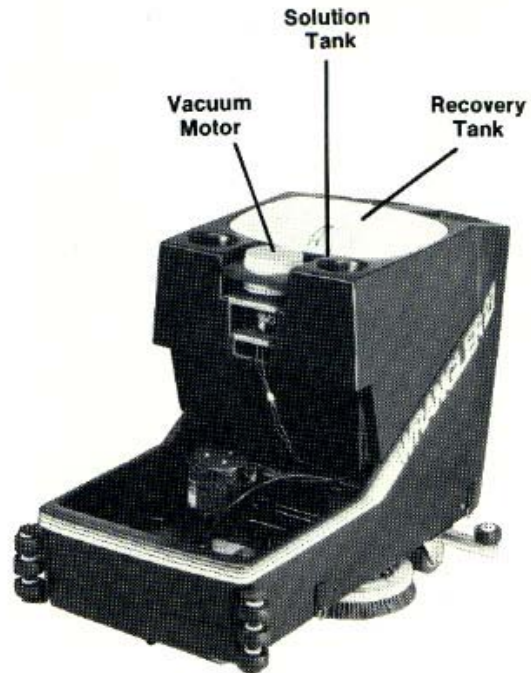


Figure #5

## Operation

The Wrangler 27 is designed to maximize cleaning efficiency. Cleaning efficiency is attained by utilizing the proper machine operating techniques and matching the machine with the proper cleaning chemical and brush or pad cleaning system.

Therefore, preparation is necessary in both machine and cleaning chemical to make the machine work properly. Your NSS distributor can assist in both the operation of the machine and can provide the proper chemicals to complete the function of the Wrangler.

Review unpacking and assembly information, paying particular attention to the proper attachment of the batteries and pad driver/brushes.

Before continuing to "Operating Instructions", the following items should be completed, as discussed in "Assembly" section:

1. Check water level on all batteries before charging.
2. Fully charge batteries.
3. Add water to solution tank, mix chemical as necessary.
4. Be sure recovery tank is empty and plug is in place and tight.
5. Install brushes or pads and pad drivers.
6. Install side wiper skirts.
7. Install squeegee assembly. Wipe blade to remove any dirt build-up.
8. Machine is now prepared for operation.

### Operating Instructions

Before attempting to operate your Wrangler, become familiar with the operation and location of all controls on the machine.

#### 1. Master Switch — See Figure #6, Item #1

Turn master switch, item #1, to the "on" position. When the master switch is in the "on" position and it is functioning properly, a red light will turn on. If the red light does not turn on, the battery connection has not been completed and you must review wiring diagram.

Master switch must be in the "on" position before any other switch on the control panel will operate.

#### 2. Speed Control Knob — See Figure #6, Item #2

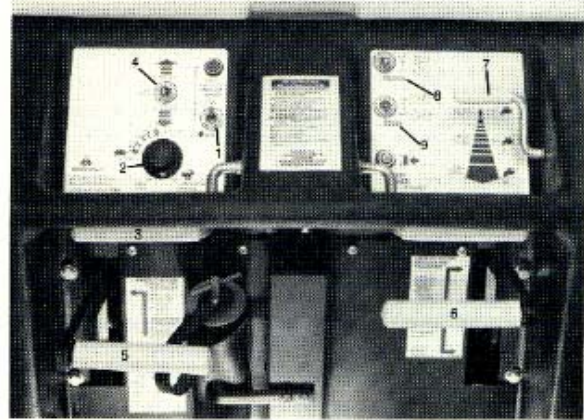
Turn speed control knob, item #2, to the "off" position. After all other switches have been activated the speed control knob can be adjusted to the proper speed necessary for your cleaning job. When the speed control knob is turned to the "off" position all power — forward and reverse — is eliminated. Slowly turning the speed control knob while squeezing switch lever, item #3, controls forward and reverse speed of the machine.

#### 3. Forward/Reverse Switch — See Figure #6, Item #4

The machine will not move in forward or reverse until the forward/reverse switch, item #4, has been turned to either forward or reverse.

#### 4. Switch Lever — See Figure #6, Item #3

With the forward/reverse switch in the forward position, squeeze switch lever, item #3, and slowly add power through the speed control knob until the machine starts to creep forward. With the speed control knob at the slow setting, turn for-



**Figure #6**  
**Control Panel**

ward/reverse switch to reverse location and test machine in reverse speed. Reverse speed is much slower than forward speed. Slowly adjust speed higher by speed control knob until machine moves backward slowly.

Practice moving the machine in either forward or reverse until familiarity with speed and control of the machine has been attained.

#### 5. Brush Control, Vacuum Motor, and Solution Control — See Figure #6

Transport the machine to an area where it is possible to practice scrubbing and vacuuming.

Turn master switch on, adjust speed control to the slow position, and turn the forward/reverse switch to the forward position.

Lower squeegee to the floor by lifting the squeegee control rod, item #5, to the right and allow squeegee to contact floor.

Lift brush control lever, item #6, and move it to the left, off of the transport position. Allow brush head to come in contact with floor.

**Float Position** — At this setting the Wrangler is applying 100# of brush pressure to the floor. This is called the "floating brush head position". For more brush pressure, push down on brush control lever, moving it to the right. This will lock brushes into the extra duty scrubbing position.

Pull solution lever, item #7, to the ¼-½ flow area.

Turn on vacuum motor switch, item #8, and you are now ready to turn on the brushes.

**Caution:** Never run brushes more than a few seconds while the machine is not moving or damage to floor or floor finish can result.

#### 6. Brush Switch — See Figure #6, Item #9

Turn brush switch on, item #9, and squeeze dead-man control lever, item #3.

Adjust speed control to either fast or slow operating speed to gain familiarity of control of machine at varying speeds.

Operate the machine as fast as possible, or until floor cleaning results are obtained.

Reduce speed when cleaning around walls or other obstructions. Reduce speed to slow position and reduce amount of solution flow when making turns to minimize over-wetting of the floor or puddles.

## **Floor Preparation**

Sweep area to be cleaned with dust mop or vacuum to remove all litter and surface dirt.

The lack of proper floor sweeping can cause squeegee streaking and other operating problems.

## **Special Cleaning Jobs**

### **Removing Surface Soil Build-Up**

Mix a solution of detergent cleaner in solution tank. Change pads to a medium scrubbing pad. Apply chemical with squeegee in the up position. **This is called "double-scrubbing". Use medium speed or slower to prevent skidding.**

Scrub floor with brush head in heavy scrub position. Apply solution while scrubbing and remove solution with squeegee in operating position on the second or third pass, depending on the amount of soiling.

This procedure is used for a surface build-up of old, discolored floor finish or other material.

**WARNING: This "double-scrubbing" method will make the floor very slippery. Use extreme care when walking on this surface.**

### **Stripping**

The Wrangler can be used to strip a moderate build-up of floor finish.

Utilize the most aggressive scrub pads available or grit-filled scrub brushes (see section on brushes for details).

Mix a solution of hot water and stripper and apply with mop to floor. Install heavy scrub brushes or scrub pads on machine.

Fill solution tank with clear water for rinsing.

Utilize double scrubbing method explained above with squeegee not in operation and double scrub floor, picking-up material on second or third pass rinsing floor.

Additional scrubbing/rinsing procedures may be necessary to completely clean the floor.

Important: For best scrubbing results, adjust brush head into the heavy scrub position.

### **Avoiding Alkaline Build-Up**

After you have completed scrubbing, rinse the solution tank with clean water to prevent alkaline build-up in solution control system.

Mix one gallon of vinegar or appropriate neutralizer with water in solution tank and allow to drain through brush head assemblies. This will prevent a gradual closing of the solution lines due to a build-up of alkaline material.

## **MAINTENANCE**

### **Vacuum Cover & Vacuum:** See Figure #5

The recovery tank cover and vacuum motor cover must be in position on top of the machine for proper vacuuming efficiency.

There are two gaskets that must be examined periodically to ensure good suction; the gasket that surrounds the recovery tank and the smaller gasket that forms the seal to the vacuum motor. Check gaskets regularly



**Figure #7  
Vacuum Motor & Filter**

to make sure that it is in place and that it is sealing properly.

Check float assembly to make sure that the float is not clogged by recovered materials and is functional.

**CAUTION:** If the float assembly does not function, recovered water and/or foam may be sucked into the vacuum motor and could cause damage.

Use low foaming chemicals or cleaners to prevent foam build-up in the solution tank.

Deposit by way of vacuum hose 2-4 ounces of de-foamer into the recovery tank before using chemicals that are known to foam to prevent damaging the vacuum motor.

### **Vacuum Motor & Filter:** See Figure #7

The vacuum motor is mounted in front of the recovery tank. To prevent premature failure of the vacuum motor, never run vacuum motor without filter in position. Clean vacuum filter daily to prevent a build-up of foreign material, which will stop or slow vacuum efficiency.

**CAUTION:** Avoid spraying water directly on vacuum motor or damage to motor may result. Never operate vacuum motor without filter in place.

Never attempt to service motor with master switch on. Always disconnect battery leads before attempting to service vacuum motor.

Vacuum motor carbon brushes should be checked for wear every 500 hours of use. Replace carbon brushes when they reach a length of  $\frac{3}{8}$ ".

After machine has been used for wet pick-up, remove solution/recovery tank cover and allow vacuum motor to run 2-3 minutes, which eliminates moisture build-up in the vacuum motor. Drying out the vacuum motor after each use will extend the life of your vacuum motor.



**Drive Motor and Chain:** See Drawing #A

**Drive Motor:**

The drive motor requires very little maintenance. Carbon brush life should be in excess of 4,000 hours and normally does not need to be checked during the first year of operation, check annually thereafter.

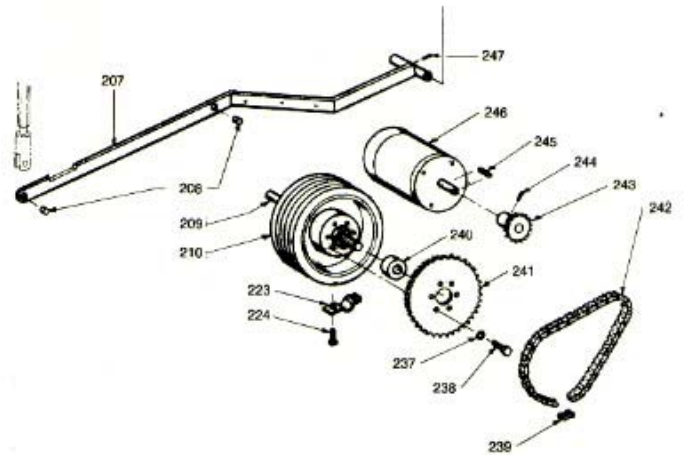
**Chain:** See Drawing #A

The Wrangler achieves its forward and backward motion by a direct drive connection between the drive motor and a sprocket and wheel assembly.

After the first 25 hours of use the chain, item #242, should be checked for tension to prevent wear of the sprocket and chain.

Tighten chain as necessary, removing slack from chain. Chain is tightened by loosening motor mounting bolts, item #256 and pulling motor forward. Tighten bolts and apply spray lubricant to chain and sprocket area.

Check chain tension after initial tightening every 250 hours of use, and lubricate as necessary with motorcycle chain spray lubricant.



**Drawing #A**

**Brush Drive Motor:** See Drawing #B

The brush drive motor turns the brush or pads at 320 rpms. The shaft of the motor is connected directly to the brushes. Therefore, there is no gear box or other connection mechanism requiring service between the motor and the brushes.

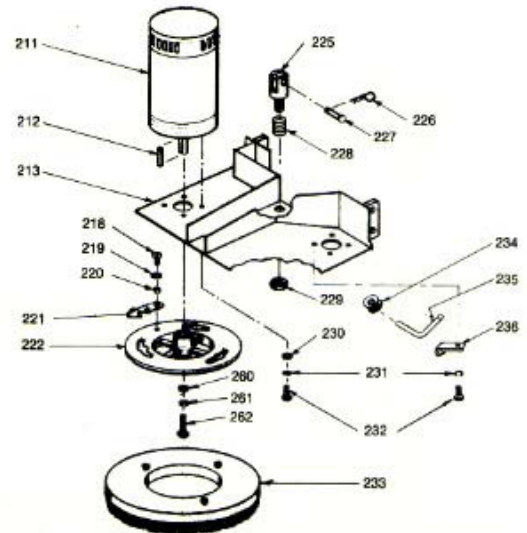
The carbon brush life on the brush drive motors is estimated at 2,000 hours. At 1500 hours of use carbon brushes should be checked and should be replaced at a length of 3/8".

Access to brush drive motor is accomplished by:

1. Removing batteries from machine.
2. Draining all solution and recovery tanks.
3. Disconnecting vacuum motor from power leads.
4. Removing hose cuff from vacuum hose, item #317, at squeegee.
5. Pushing vacuum hose and emptying hoses from solution and recovery tanks back underneath machine.
6. Tilt tank forward toward battery compartment and disconnect solution feed line to brushes.
7. Pull vacuum hose and solution and recovery tank dump hoses up through the bottom of the machine and remove the tank.

You now have access to service the brush drive motor.

8. Re-install tank in reverse order.



**Drawing #B**

## **Squeegee/Squeegee Rubbers:**

See Figure #8

Daily Maintenance on Squeegee Blades or Wipers:

Before and during use of machine, take a damp cloth saturated with cleaner or detergent and wipe outside and inside of squeegee to remove build-up of foreign material on squeegee blades.

Repeat above during use to prevent streaking and leaving residue on floors.

Squeegee Wear:

After extended use the squeegee rubber cartridge will wear. To improve squeegee performance and extend wear, the cartridge can be removed and can be turned or reversed for additional wear. Proceed as follows:

1. Turn off all switches and place machine on a level area. Raise squeegee to the transport position.
2. Loosen knobs, item #123, on left and right hand sides of squeegee until squeegee can be removed from squeegee bracket.
3. Take a  $\frac{1}{2}$ " wrench or adjustable wrench and an  $\frac{3}{16}$ " allen wrench and remove 4 allen bolts, item #135, from squeegee housing.
4. Remove squeegee channel, item #127. Remove squeegee from channel housing, item #137, and clean squeegee and channel housing. Note direction of squeegee before dis-assembly.
5. Reverse squeegee blade and re-install squeegee making sure that squeegee fits evenly into squeegee housing.
6. Re-install squeegee channel, pulling squeegee blade evenly on left and right hand side to the end of the channel.
7. Re-install 4 allen bolts into squeegee, bumper wheels and reverse tracking wheels.

**CAUTION:** Avoid overtightening squeegee cartridge into squeegee housing. Lay squeegee on flat surface, blade down to check for proper installation. Overtightening of blades will cause squeegee to bulge causing streaking and irregular wear.

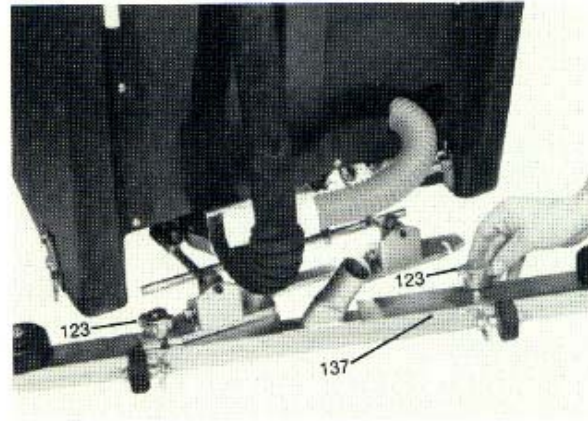
8. Re-install squeegee into squeegee mount and lubricate turning knobs with lithium grease or with anti-seize material called "Never-Seize". This will prevent corrosion and difficulty in removing at a later date.

## **Care of Polyethylene Parts**

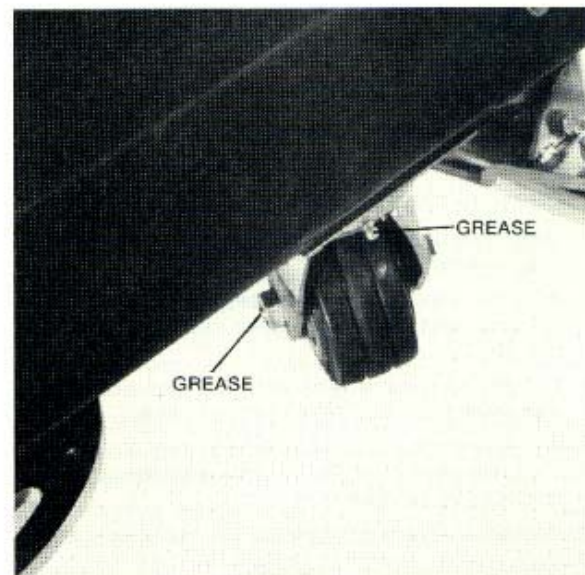
The Wrangler body and solution and recovery tank are constructed of polyethylene. To maintain a hi-gloss exterior finish on your Wrangler periodically wipe down all poly parts with a silicon base material, such as Armor-All. This will restore the machine to a "like-new" finish.

**Casters:** See Figure #9

Casters must be greased monthly to prevent damage to wheel bearings and pivot bearings. Use a (Shell Alvania EP-2) moisture resistant grease. Remove excess from casters before using machine.



**Figure #8**  
**Squeegee**



**Figure #9**  
**Caster**

## TROUBLE-SHOOTING FOR THE WRANGLER 27

Problem	Cause	Solution
No Solution Flow	The solution valve is closed. Obstruction in the solution hose. Solution valve or linkage damaged. Solution tank is empty.	Open the solution valve. Remove the obstruction. Repair/replace the valve/linkage. Fill the tank.
Solution Flow Does Not Stop	The solution valve is open. Solution valve or linkage damage. Solution valve is dirty. Damaged seat & washer in valve. The valve stem is dirty.	Close the solution valve. Repair/replace the valve/linkage. Clean the solution valve. Replace seat & washer. Clean & lubricate valve stem.
Will Not Pick Up Any Water From Floor	Squeegee is up. Vac motor switch is "off". Recovery tank is full. Vacuum shut-off float is stuck.  Foam filter is dirty. Obstruction/damage in the squeegee, squeegee hose or standpipe. Leaking cover gasket Vac motor is not running.	Lower squeegee. Turn vac motor switch "on". Empty tank. Open float valve/remove obstruction. Clean/replace filter. Remove obstruction/repair damage. Remove obstruction/repair damage. Have an authorized serviceman repair.
Will Not Pick Up All Water From Floor	Squeegee blade is worn/damaged. Obstruction/damage in the squeegee, squeegee hose or standpipe. Squeegee pressure needs adjustment. Vacuum motor worn out	Reverse/replace squeegee blade. Remove obstruction/repair damage. Adjust pressure. Replace vac motor
Batteries Do Not Seem To Run Long Enough	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.	Clean/dry, charge batteries. Clean terminals & connectors, replace damaged cables. Charge. Add distilled water & charge. Charge batteries for 8 hours. Have an authorized serviceman repair. Check cell voltage while discharging.
Cleaning Is Not Even	Brushes/pads are worn. Damage to brush assy., casters, or solution valve. Motors are not running	Replace. Have authorized serviceman repair.  Repair wiring, replace switch, replace carbon brushes. Push circuit breaker button, check fuses.
Machine Does Not Run	The machine loses power.	Reset circuit breaker.

**Note:** If problems remain after taking the above steps, contact your local authorized service station for further evaluation and repair.

# WRANGLER 27 and WRANGLER 27 P/D AUTOMATIC SCRUBBERS

## MAINTENANCE

### DAILY

1. Always remove brushes from machine to prevent warping and cracking of wood block. Clean and allow to air dry. Inspect brushes and pads for wear.
2. Empty and rinse out recovery tank. Check float assembly for freedom of movement. Check vacuum cover seal around recovery tank and vacuum motor for loose gaskets.
3. Clean vacuum motor filter. Run vacuum motor 2-3 minutes in open air to eliminate moisture build-up.
4. Clean and inspect squeegee blade for wear. Adjust pressure on floor if required.
5. Recharge batteries.

### WEEKLY

1. Check side wiper skirts for wear. Adjust pressure on floor if required.
2. Check liquid level of battery acid. Adjust to proper level, top of triangle with distilled water only when batteries are **FULLY CHARGED**.

3. Clean all polyethylene parts with a silicon based material, such as "Armor-All".

### MONTHLY

1. Flush solution tank and lines to neutralize alkaline build-up. Use a solution of 1 qt. vinegar to 3 gal. of water. Rinse with clear water.
2. Lubricate wheel and casters with a (Shell Alvania EP-2), moisture-resistant grease. Apply **ONLY 2** pumps with a hand-held grease gun.
3. Clean and lubricate squeegee and brush lift arm assemblies with a penetrating moisture-resistant lubricant (3M brand 4 WAY SPRAY or DRY LUBRICANT).
4. Check chain tension, adjust if required. Lubricate chain with a penetrating moisture-resistant lubricant (Wheel Drive Units Only).
5. Clean any corrosion from battery terminal connections using a solution of 1 lb. baking soda to one gallon water. Rinse with clear water. Check condition of battery with volt meter.
6. Replace vacuum motor filter.

### WARNING:

See Safety Statements on Page 3 before attempting service of batteries to prevent personal injury.

### BATTERY INSPECTION

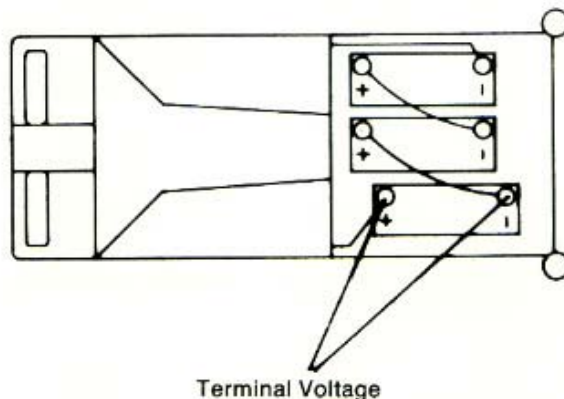
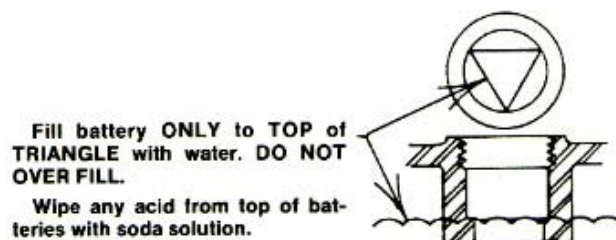
The condition of a battery may be checked by using a Hydrometer to check the specific gravity (strength) of the acid in each cell or a Voltmeter to check the voltage of each cell/battery. Variations in readings occur due to the chemical reaction taking place during use.

A problem cell/battery may be indicated by readings that show a spread of **more than .050** (50 points) in specific gravity or by 0.05 (5 points) in voltage when comparing the highest and lowest readings. The chart below is a guideline for your reference.

### Approximate State of Charge

	Specific Gravity 1.280 Initial Full Charge	12 Volt Battery Terminal Voltage	6 Volt Battery Terminal Voltage	Individual Cell Voltage
<b>Charged</b>				
100% .....	1.280	12.72	6.36	2.12
75% .....	1.240	12.48	6.24	2.08
50% .....	1.200	12.24	6.12	2.04
25% .....	1.170	12.06	6.03	2.01
<b>Discharged</b> .....	1.140	11.88	5.94	1.98

These readings should ideally be taken after a minimum of 30 minutes of machine running time. If a problem is detected contact your local Independent Battery Manufacturer's Association representative. National Super Service Company headquarters may be contacted for technical assistance.



### BATTERY CHARGING

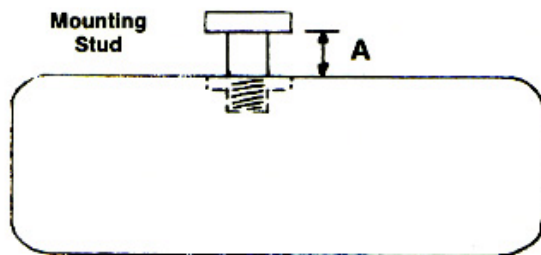
The battery charger supplied by National Super Service is fully automatic and energy saving. Operation is simple and safe by following six easy steps:

1. Remove battery cover during charging.
2. Connect charging plug to 36 volt battery receptacle.
3. Plug cord into **GROUND**ED 120 Volt A.C. outlet.
4. Set elapsed time indicator to "ON" position only.
5. Pilot light shows charger "ON".
6. Elapsed time indicator will stop when batteries are fully charged. Pilot light "OFF".

The battery charger operates only long enough to properly recharge the batteries. This controlled recharge reduces water consumption and increases battery service life by not over-charging.

### BATTERY WATER ADDITIONS

1. Always check acid level in battery **BEFORE** charging. The acid should be visible in the cell. If the acid is not visible, the top of the plates will be damaged during the charge cycle. Add just enough water to be visible.
2. After the batteries are fully charged, again check the acid level. If the level is at the triangle no adjustment is necessary. If the level is below the triangle, add water to bring level to the triangle. **DO NOT OVERFILL.**



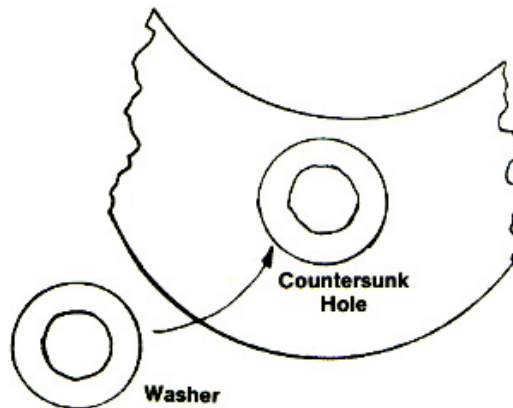
3. Final acid level adjustments are always made on a fully charged battery. If the adjustments are made on a discharged battery, the acid will boil over due to the normal increase in acid level during recharge.
4. Boiled over acid will cause battery and machine corrosion. It will also cause a reduction in battery performance and service life due to the reduction in acid strength.
5. Spilled electrolyte must be neutralized using a solution of 1 lb. baking soda to 1 gallon of water. Any corrosion may be scrubbed off by using a non-metallic brush. Rinse with clear water. Ensure that all vent caps are tightly closed to prevent solution from getting into the battery.

### SERVICE BULLETIN 86-005

SUBJECT: Difficulty in Installation or Removal of Pad Drivers/ Brushes on Drive Mounting Plate of Wrangler 27 and Wrangler 27 P/D Automatic Scrubbers

This situation can be corrected with the following procedure:

1. Remove mounting stud from wood block with a Phillips screwdriver.
2. Place a 1/32" thick flat washer into countersunk hole — part #10-987-1.
3. Install and tighten mounting stud into wood block.
4. Check fit on mounting plate.
5. Check mounting plate for nicks or burrs in slots.

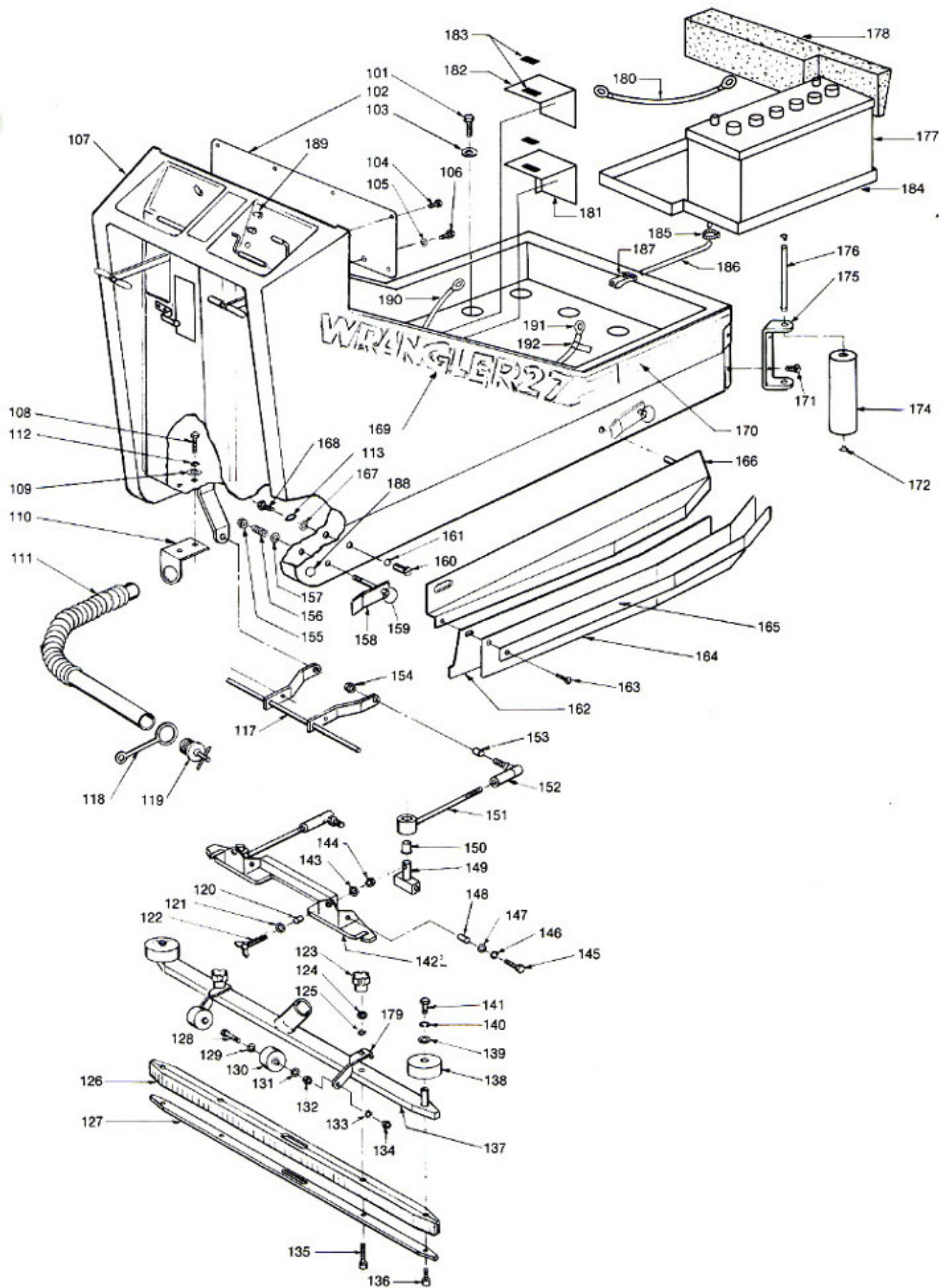


## Wrangler 27, Drawing #1

Item No.	Part No.	Part Name	Qty. Req'd.	Item No.	Part No.	Part Name	Qty. Req'd.
101		3/8-16 x 1 Hex Bolt	7	157		1/2 Flat Washer	4
102	27-9-086-3	Switch Panel	1	158	27-9-052-1	Latch	4
103		3/8 Fender Washer (1 1/2 o.d.)	7	159	10-9-980-1	Key Ring	4
104		#10 x 3/8 Pan Hd. Philips Type 25	6	160	27-9-057-6	Rear Skirt Pin	2
105		5/16 Flat Washer	3	161	50-9-170-1	Retaining Ring	2
106		5/16-18 x 3/4 Hex Bolt	3	162	27-9-067-1	Urethane Side Wiper	2
107	27-9-001-1	Chassis Housing	1	163		10-24 x 3/8 Round Hd. Philips Screw	16
108		1/4-20 x 3/8 Hex Bolt	2	164	27-9-058-1	Splash Guard	2
109		1/4 Flat Washer	2	165	27-9-059-1	Retainer Strap	2
110	27-9-180-6	Drain Hose Bracket	1	166	27-9-050-3	Left Skirt Only	1
111	27-9-187-1	Drain Hose, Recovery Tank	1	166	27-9-051-3	Right Skirt Only	1
112		1/4 Lock Washer	2	167		1/4 Flat Washer 3/4 OD	2
113		1/4 Lock Washer	2	168		1/4-20 x 1 1/4 Hex Bolt	2
117	27-9-113-6	Squeegee Lift Bracket	1	169	27-9-198-1	Left Wrangler Label	1
118	27-9-188-1	Plug Strap	1	169	27-9-199-1	Right Wrangler Label	1
119	27-9-562-1	Drain Plug, Recovery Tank	1	170	27-9-200-1	Front Body Stripe	5.5 ft
120	27-9-128-6	Bushing Spacer	2	171		3/8-16 x 3/4 Flat Head Screw	4
121		1/4 Flat Washer (SAE)	2	172	50-9-170-1	Retaining Ring	4
122	27-9-590-1	1/4-20 x 1 3/4 Thumbscrew, S/S	2	174	27-9-024-1	Bumper Roller	2
123	27-9-100-2	Squeegee Knob	2	175	27-9-565-3	Bumper Roller Bracket	2
124		5/16-18 Hex Nut	2	176	27-9-566-6	Bumper Roller Axle	2
125		5/16 Ext. Star Lock Washer	2	177	44-9-106-1	12 Volt Battery	3
126	27-9-106-1	Squeegee Blade	1	178	27-9-182-1	Battery Block	1
127	27-9-105-3	Inner Channel	1	179	27-9-099-6	Squeegee Roller Bracket	2
128		5/16-18 x 2 Hex Bolt	2	180	23-9-198-1	Battery Jumper Cable w/Ring Term.	2
129		5/16 Flat Washer	2	181	27-9-582-1	Right Brush Motor Shield	1
130	30-9-674-1	Wheel	2	182	27-9-583-1	Left Brush Motor Shield	1
131		5/16 Flat Washer	2	183	99-9-755-0	Velcro Hook	.5 ft.
132		5/16-18 Hex Nut	2		99-9-756-0	Velcro Loop	.5 ft.
133		5/16 Ext. Star Lock Washer	2	184	27-9-563-9	Battery Tray Ass'y.	1
134		5/16-18 Hex Nut	2	185	36-9-018-1	Hose Clamp	1
135		5/16-18 x 1 1/2 Socket Cap Screw - S/S	2	186	87-9-115-0	Battery Tray Drain Tube	.8 ft.
136		5/16-18 x 3/4 Socket Cap Screw - S/S	2	187	33-9-066-1	Drain Tube Control Valve	1
137	27-9-101-3	Squeegee Housing	1	188	06-9-076-1	Plug Button	1
138	27-9-028-1	Bumper Wheel	2	189	06-9-314-1	Rubber Switch Boot	1
139		5/16 Flat Washer	2	190	27-9-615-1	Negative Battery Cable, Black	1
140		5/16 Lock Washer	2	191	27-9-616-1	Positive Battery Cable, Red	1
141		5/16-18 x 1/2 Hex Bolt	2	192	23-9-276-1	Battery Terminal Warning Label	1
142	27-9-125-6	Squeegee Mount	1				
143		1/4 Flat Washer (SAE)	2	<b>ASSEMBLIES</b>			
144		1/4-20 Jam Nut	2	137	27-9-259-9	Squeegee Assembly	1
145		1/4-20 x 3/4 Hex Bolt	4	166	27-9-050-9	Left Skirt Assembly	1
146		1/4 Lock Washer	4	166	27-9-051-9	Right Skirt Assembly	1
147		1/4 Flat Washer	4				
148	27-9-128-6	Bushing Spacer	4				
149	27-9-130-1	Pivot Block	2				
150	27-9-137-1	Flange Bearing	2				
151	27-9-134-9	Pivot Arm Ass'y. w/Bearing	2				
152	27-9-138-1	Ball Joint	2				
153	27-9-075-6	Bushing Spacer	2				
154		1/2-20 Hex Nut	2				
155	27-9-556-1	1/2-13 Hex Lock Nut, Thin	4				
156	27-9-056-1	Latch Spring	4				

(Note: Item #137 includes the following Item Numbers: 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141 and 179).

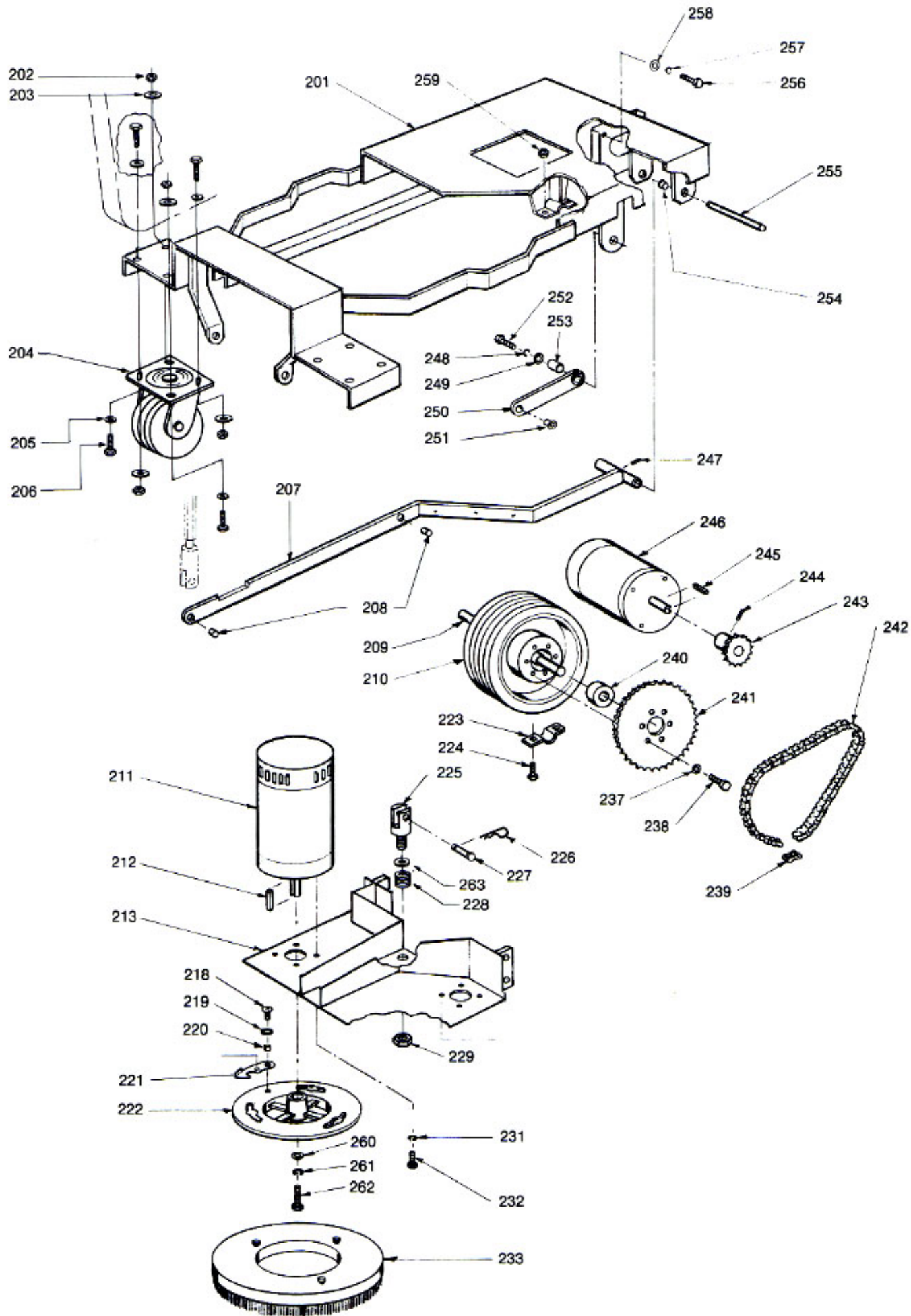
(Note: Item #166 includes the following Item Numbers: #162, 163, 164, 165 and 166).



## Wrangler 27, Drawing #2

Item No.	Part No.	Part Name	Qty. Req'd.	Item No.	Part No.	Part Name	Qty. Req'd.
201	27-9-035-3	Base Plate	1	27-9-570-1	Replacement Face w/Foam Cushion, 12½ Diam.	1	
202	-----	¾-16 Hex Nut	8	27-9-597-1	Replacement Face w/Foam Cushion, 13½ Diam.	1	
203	-----	¾ Flat Washer	8	27-9-569-1	Drive Lugs w/Mount Screws (pkg of 3)	1	
204	44-9-050-1	Caster	2	52-9-768-1	Pad Holding Cup, Male (center lock)	1	
	44-9-039-1	Caster Wheel Only, w/bearing		52-9-769-1	Pad Holding Base, Female (center lock base)	1	
205	-----	¾ Flat Washer	8	27-9-568-1	Mounting Screws For Base (pkg. of 3)	1	
206	-----	¾-16 x 1¼ Hex Bolt, S/S	8	237	-----	5/16 Lock Washer	6
207	27-9-070-3	Lift Arm	1	238	-----	5/16-18 x 1 Hex Bolt, S/S	6
208	27-9-075-6	Bushing Spacer	2	239	27-9-521-1	Master Link	1
209	27-9-030-2	Drive Wheel Axle	1	240	27-9-031-1	Ball Bearing	2
210	27-9-007-1	Drive Wheel, 10"	1	241	27-9-033-6	Wheel Sprocket	1
	27-9-007-9	Drive Wheel Ass'y, incl, #209, 210, 240		242	27-9-034-1	Chain, Includes #239	1
211	27-9-008-1	Brush Motor	2	243	27-9-032-6	Motor Sprocket Includes Set Screws	1
212	27-9-268-1	Motor Key ¼ x ¼ x 1	1	244	-----	5/16-18 x ¾ Set Screw	2
218	-----	¼-20 x ½ Truss Hd. Phillips Screw	2	245	27-9-268-1	Motor Key ¼ x ¼ x 1	1
219	44-9-062-1	¾ Spring Washer	2	246	27-9-010-1	Drive Motor	1
220	27-9-128-6	Bushing Spacer	2	247	-----	5/16-18 x ¾ Set Screw	1
221	27-9-021-6	Brush Plate Latch	2	248	-----	½ Lock Washer	8
222	27-9-020-2	Drive Plate Only	2	249	-----	½ Flat Washer	8
	27-9-248-9	Right Brush Drive Ass'y.	1	250	27-9-074-9	Lift Arm Ass'y. w/Flange Bearing	4
	27-9-249-9	Left Brush Drive Ass'y.	1	251	27-9-076-1	Flange Bearing	8
223	27-9-043-3	Axle Clamp	2	252	27-9-046-1	½-13 x 1¼ Hex Bolt	8
224	-----	¾-16 x 1 Hex Bolt, S/S	4	253	27-9-075-6	Bushing Spacer	8
225	27-9-090-6	Clevis	1	254	27-9-076-1	Flange Bearing	2
226	27-9-097-1	Hair Spring Cotter Pin	1	255	27-9-073-6	Lift Arm Pin	1
227	27-9-096-1	Clevis Pin ½ x 1½	1	256	-----	¼-20 x 1 Hex Bolt, S/S	4
228	27-9-595-1	Brush Pressure Spring	1	257	-----	¼ Lock Washer	4
229	-----	¾-11 Hex Lock Nut	1	258	-----	¼ Flat Washer	4
231	-----	¼ Split Lock Washer, S/S	8	259	-----	¾-16 Hex Lock Nut	4
232	-----	¼-20 x 1 Hex Bolt, S/S	8	260	-----	5/16 Flat Washer	2
233	27-9-250-1	Bassine Brush	2	261	-----	5/16 Ext. Star Lock Washer	2
	27-9-251-1	Nylon Brush	2	262	-----	5/16-18 x ¾ Hex Bolt	2
	27-9-253-1	Wire Brush	2	263	27-9-596-1	Brush Pressure Washer	1
	27-9-252-1	Nylo Grit Brush	2				
	27-9-254-1	Foam Block Pad Driver w/bristles	2				
	27-9-523-1	Replacement (Pad Holding) Split Ring Only for 27-9-254-1	2				
	27-9-524-1	Replacement Pad Holder, Includes Screws for 27-9-254-1	2				
	27-9-255-1	Easy Change Pad Driver	2				



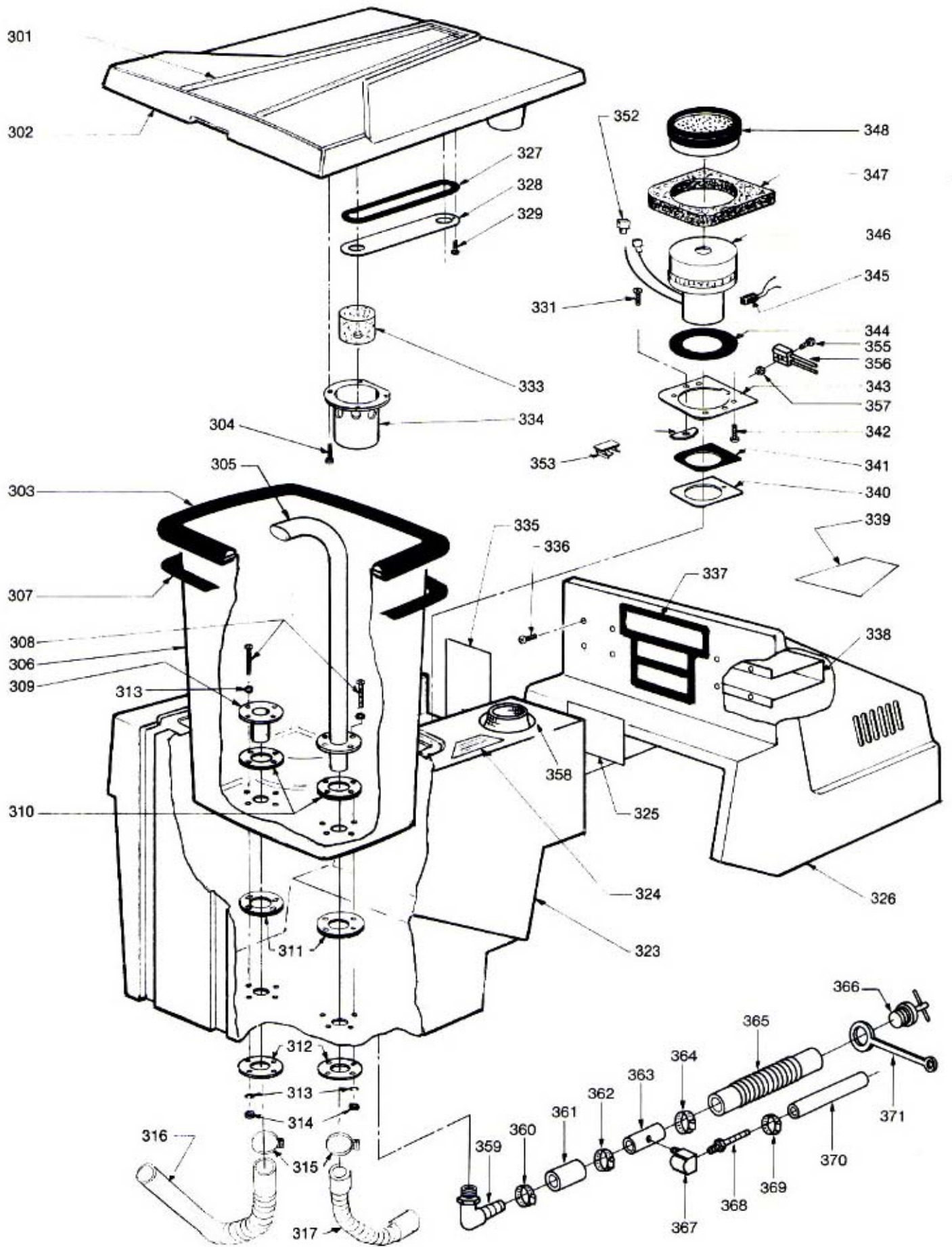


### Wrangler 27, Drawing #3

### Wrangler 27 300 Series Effective S/N 35H50855

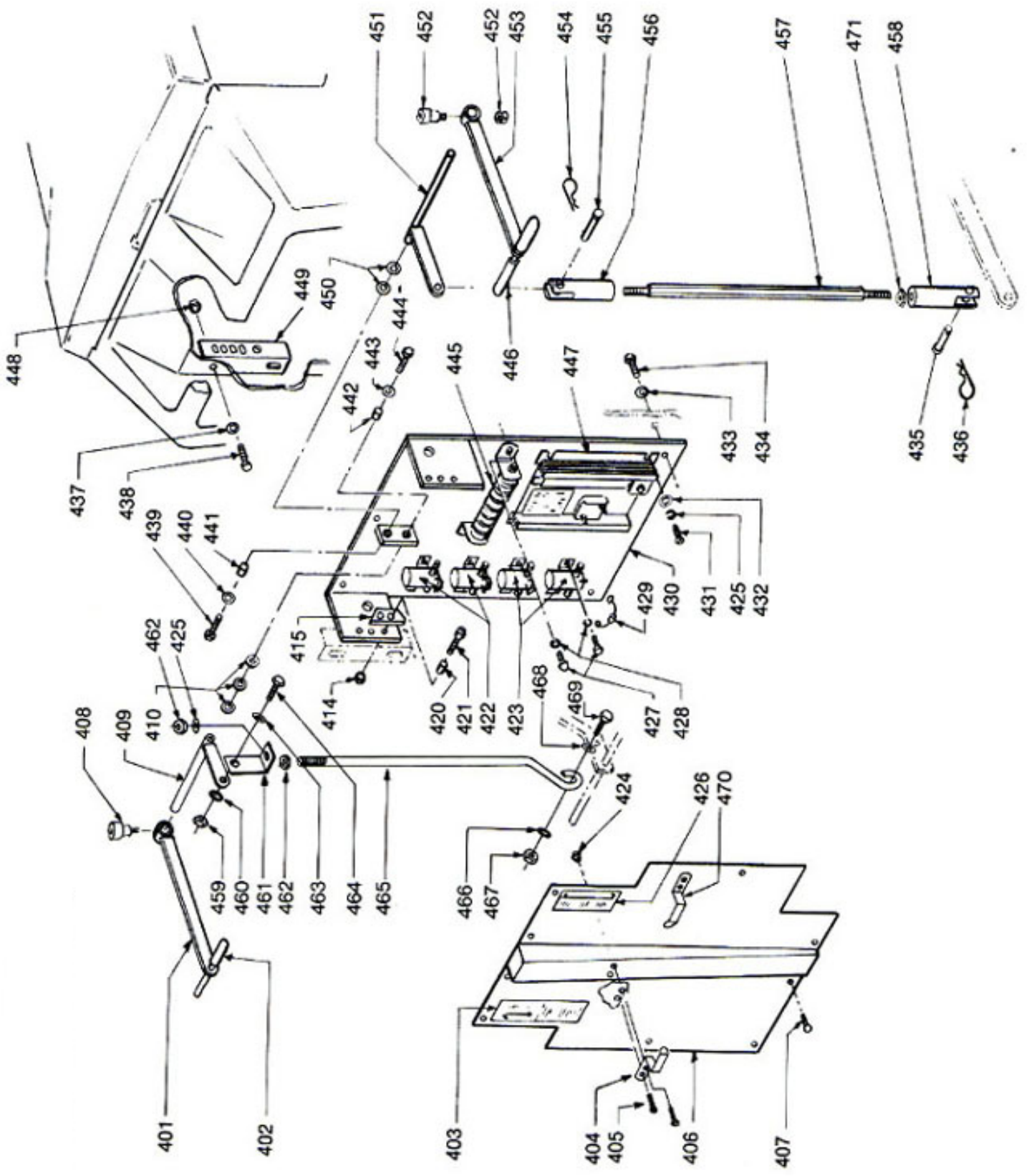
Item No.	Part No.	Part Name	Qty. Req'd.	Item No.	Part No.	Part Name	Qty. Req'd.
301	27-9-195-1	Vacuum Cover Label	1	303	27-9-577-1	Extruded Tank Gasket	1
302	27-9-005-1	Top Cover	1	318-322	-----	Obsolete	
*303	88-9-110-0	Gasket	64"	330	-----	Obsolete	
304	-----	1/4-20 x 3/4 Truss Hd. Philips Screw	4	332	-----	Obsolete	
305	27-9-175-3	Inlet Tube	1	348	27-9-575-9	Vac Filter w/Extruded Gasket	1
306	27-9-004-1	Recovery Tank	1	32-9-112-1		Vac Filter Only	
307	88-9-114-0	Gasket	8 ft.	27-9-575-1		Extruded Gasket Only	
308	-----	1/4-20 x 2 Rd. Head Philips Screw, S/S	8	349-351	-----	Obsolete	
309	27-9-173-3	Drain Tube	1	355	-----	6-32 x 1 Round Hd. Philips Screw	2
310	27-9-171-1	Tube Gasket 1/2" Thick	2	356	27-9-209-1	Charger Plug Ass'y. w/Wires #61	1
311	27-9-170-1	Tube Gasket 5/16" Thick	2	44-9-190-1		Charger Plug Only	
312	27-9-172-6	Washer	2	357	-----	6-32 Hex Nut	2
313	-----	1/4 Lock Washer, S/S	8	358	27-9-189-9	Solution Tank Filter	2
314	-----	1/4-20 Hex Nut, S/S	8	359	27-9-544-0	90° Nylon Hose Barb, 1"	1
315	36-9-562-1	Hose Clamp	2	360	23-9-214-1	Hose Clamp	1
316	27-9-187-1	Drain Hose, Recovery Tank	1	361	-----	Not Available, Cut 2" from #365	
317	27-9-029-9	Squeegee Vac Hose Ass'y.	1	362	23-9-214-1	Hose Clamp	1
*318	15-9-165-1	1/4 Pipe Nipple	1	363	27-9-587-1	Solution Pipe	1
*319	27-9-184-1	Washer	1	364	23-9-214-1	Hose Clamp	1
*320	27-9-185-1	Rubber Washer	1	365	27-9-541-1	Solution Drain Hose	1
*321	27-9-184-1	Washer	1	366	27-9-542-1	Solution Drain Plug, 1"	1
*322	27-9-183-1	1/4 NPT Lock Nut	1	367	27-9-585-1	Brass Elbow 90° x 1/4 NPT	1
323	27-9-003-1	Solution Tank	1	368	33-9-047-1	Brass Hose Barb 1/4 NPT x 1/2	1
324	27-9-190-1	Clean Water Label	1	369	27-9-584-1	Hose Clamp	1
325	27-9-194-1	Battery & Charger Label	1	370	87-9-113-0	1/2" Solution Hose	2 ft.
326	27-9-002-1	Battery Cover		371	27-9-549-1	Plug Strap, 1"	1
327	27-9-015-1	Gasket, Vacuum Chamber	1	**	27-9-589-9	Drain Hose Ass'y., Incl. #359-#370	1
328	27-9-016-6	Vacuum Chamber Plate	1				
329	-----	10-24 x 1/2 Flat Head Philips Screw	6				
*330	88-9-110-0	Gasket	2 ft.				
331	-----	1/4-20 x 1 Hex Bolt, S/S	2				
*332	-----	1/4 Lock Washer	2				
333	27-9-013-9	Float w/Weight	1				
334	27-9-012-1	Float Chamber	1				
335	27-9-192-1	Warning Label	1				
336	-----	#10 x 1/2 Self Tapping Screw	8				
337	27-9-163-1	Hood Cover Gasket	1				
338	27-9-047-3	Air Duct	1				
339	27-9-196-1	NSS Horse Label	1				
340	27-9-161-6	Air Plate	1				
341	27-9-162-1	Gasket					
342	-----	10-24 x 5/8 Self Tapping Rd. Hd. Screw	4				
343	27-9-160-6	Mount Plate	1				
344	46-9-010-1	Gasket					
345	27-9-257-1	Carbon Brush	2				
346	27-9-009-1	Vacuum Motor - Lamb	1				
	27-9-258-9	Vacuum Motor Ass'y.	1				
347	27-9-164-1	Gasket Vacuum Exhaust	1				
*348	32-9-112-1	Vacuum Filter	1				
*349	38-9-114-1	90° Elbow	1				
*350	38-9-066-1	3/8 Hose Barb	1				
*351	87-9-107-0	3/8 Vinyl Tubing	15"				
352	54-9-017-1	Male Push On Coupler	2				
353	27-9-011-1	Wire Clip	1				

\* Thru S/N 35H50854



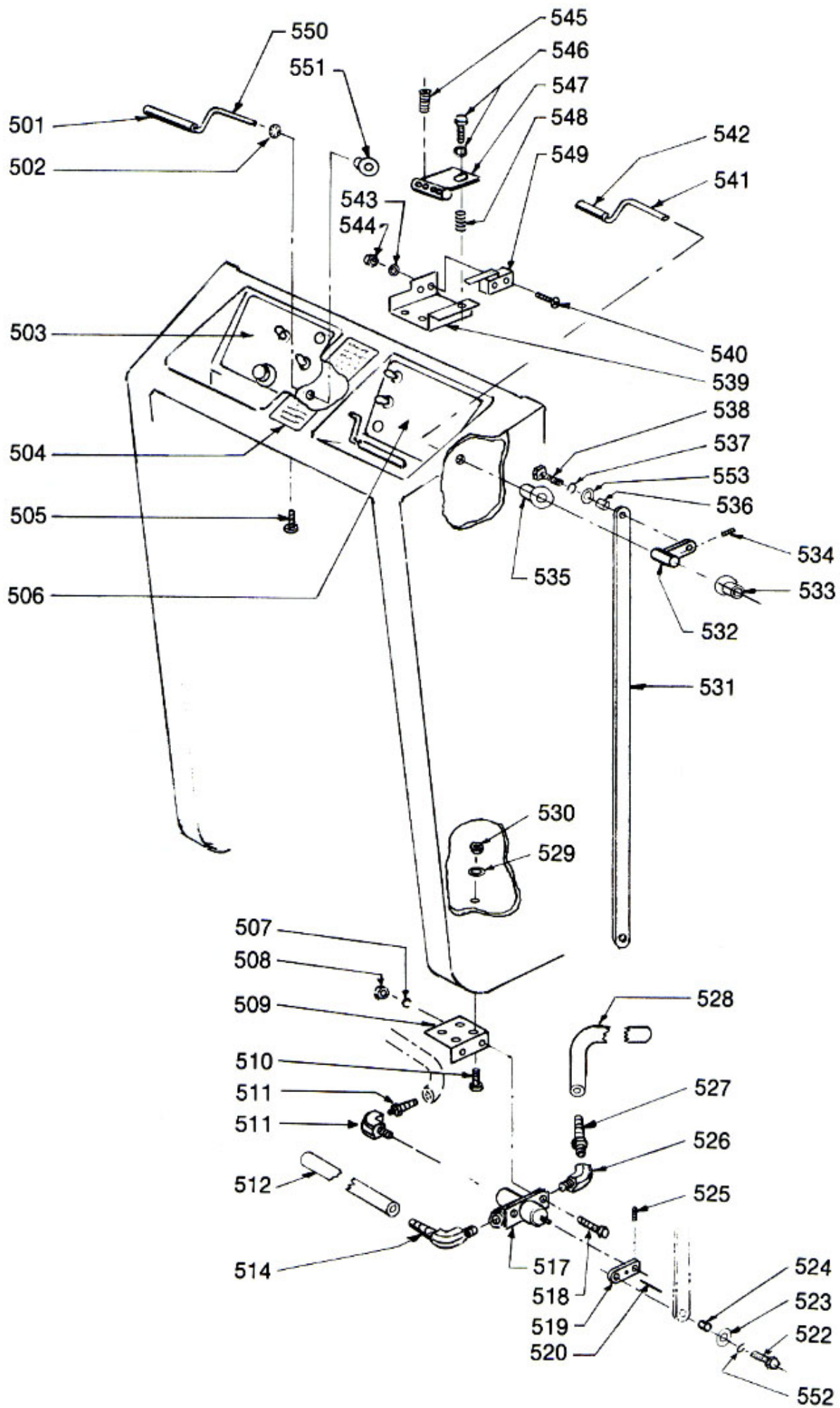
## Wrangler 27, Drawing #4

Item No.	Part No.	Part Name	Qty. Req'd.
401	27-9-120-1	Lift Handle, Squeegee	1
402	27-9-269-1	Handle Grip	2
403	27-9-193-1	Squeegee Control Label	1
404	27-9-538-3	Hose Clip	1
405	-----	10-24 x 1/2 Self Tap Philips Screw	4
406	27-9-085-3	Rear Panel	1
407	-----	#10 x 5/8 Pan Hd. Philips Type 25	9
408	27-9-087-1	Shoulder Screw	1
409	27-9-110-1	Lift Shaft-Squeegee	1
410	-----	1/2 Flat Washer	3
414	-----	1/4-20 Lock Nut	2
415	27-9-084-6	Lock Plate, Squeegee	1
	33-9-046-6	Lift Block, Brush	1
420	27-9-128-6	Bushing Spacer	1
421	-----	1/4-20 x 1 Socket Head Cap Screw	3
		1/4-20 x 1 1/4 Socket Head Cap Screw	1
422	27-9-202-1	Contactactor (4 Post)	2
423	27-9-203-1	Contactactor (6 Post)	2
424	-----	10-24 Lock Nut	2
425	-----	1/4 Lock Washer	4
426	27-9-191-1	Brush Control Label	1
427	-----	1/4-20 x 3/8 Truss Hd. Philips Screw	10
428	-----	1/4 Lock Washer	10
429	27-9-224-1	Silicon Rectifier (Diode)	4
430	27-9-080-3	Control Panel	1
431	-----	10-24 x 3/8 Rd. Hd. Philips Screw	4
432	-----	#10 Flat Washer	4
433	-----	5/16 Flat Washer	8
434	-----	5/16-18 x 3/4 Hex Bolt	8
435	27-9-096-1	Clevis Pin 1/2 x 1 1/2	1
436	27-9-097-1	Hair Spring Cotter Pin	1
437	-----	1/4 Flat Washer (SAE)	4
438	-----	1/4-20 x 3/4 Hex Bolt	4
439	27-9-046-1	1/2-13 x 1 1/4 Hex Bolt	1
440	-----	1/2 Flat Washer	1
441	27-9-075-6	Bushing Spacer	1
442	27-9-075-6	Bushing Spacer	1
443	-----	1/2 Flat Washer	1
444	27-9-046-1	1/2-13 x 1 1/4 Hex Bolt	1
445	27-9-201-1	Resistor	1
446	27-9-269-1	Handle Grip	
447	27-9-006-1	Speed Control (Incl. Potentiometer)	1
448	-----	1/4-20 Lock Nut	4
449	27-9-079-3	Angle Support	2
450	-----	1/2 Flat Washer	2
451	27-9-107-1	Lift Shaft, Brush	1
452	27-9-087-1	Shoulder Screw	1
		10-24 Lock Nut	
453	27-9-120-1	Lift Handle, Brush	1
454	27-9-097-1	Hair Spring Cotter Pin	1
455	27-9-095-1	Clevis Pin 3/8 x 1 1/4	1
456	27-9-092-6	Top Clevis	1
457	27-9-094-6	Lift Rod, Brush	1
458	27-9-091-6	Lower Clevis	1
459	-----	3/8-16 Hex Nut	1
460	-----	3/8 Int. Star Lock Washer	1
461	27-9-158-1	Lift Rod Bracket	1
462	-----	1/4-20 Hex Nut	1
463	-----	3/8 Flat Washer	1
464	-----	3/8-16 x 1 Hex Bolt	1
465	27-9-157-1	Threaded Lift Rod, Squeegee	1
466	-----	3/8 Int. Star Lock Washer	1
467	-----	3/8-16 Hex Nut	1
468	-----	3/8 Flat Washer	1
469	-----	3/8-16 x 1 Hex Bolt	1
470	27-9-537-3	Hose Clip	1
471	-----	1/2-13 Hex Nut	1



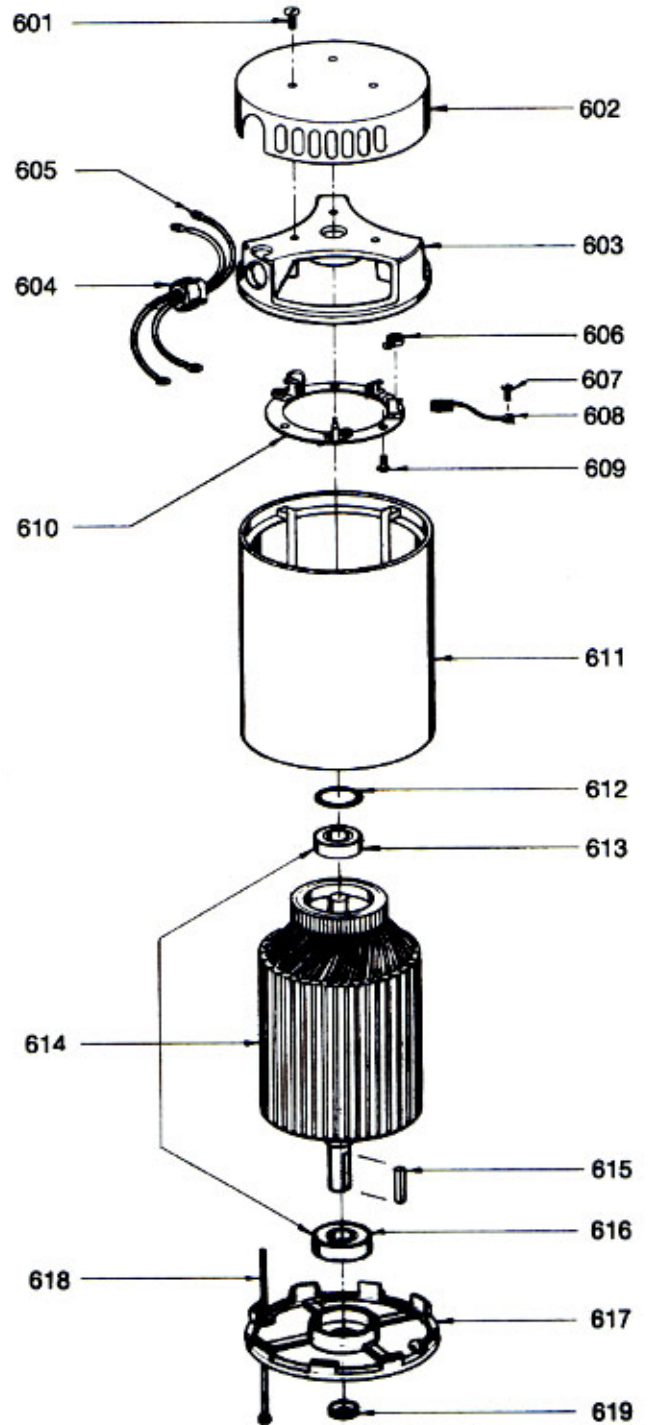
## Wrangler 27, Drawing #5

Item No.	Part No.	Part Name	Qty. Req'd.
501	27-9-152-1	Grip	2
502	27-9-156-1	Retaining Ring	2
503	27-9-246-1	Left Control Label	1
504	27-9-245-1	Operating Label	1
505	-----	1/4-20 x 1/2 Truss Hd. Philips Screw	2
506	27-9-247-1	Right Control Label	1
507	-----	1/4 Lock Washer	2
508	-----	1/4-20 Hex Nut	2
509	27-9-144-6	Valve Bracket	1
510	-----	1/4-20 x 3/4 Hex Bolt	4
511	27-9-585-1	90° Brass Elbow - 1/4 NPT	1
	33-9-047-1	Brass Hose Barb, 1/2 x 1/4 NPT	1
512	87-9-107-0	Vinyl Tubing to Left Brush	32"
514	27-9-179-1	90° Hose Barb - 1/4 NPT	1
517	27-9-140-1	Solution Valve	1
518	-----	1/4-20 x 5/8 Hex Bolt	2
519	27-9-141-6	Valve Lever	1
520	-----	3/16 x 1 Roll Pin	1
522	-----	1/4-20 x 3/4 Hex Bolt	1
523	-----	1/4 Flat Washer	1
524	27-9-128-6	Bushing Spacer	1
525	-----	3/32 x 5/8 Roll Pin	1
526	27-9-586-1	45° Brass Elbow - 1/4 NPT	1
527	38-9-066-1	Hose Barb x 1/4 MPT	1
528	87-9-107-0	Tubing to Right Brush	21"
529	-----	1/4 Flat Washer	4
530	-----	1/4-20 Lock Nut	4
531	27-9-142-1	Valve Link	1
532	27-9-143-6	Valve Arm	1
533	27-9-153-2	Flang Bearing	1
534	-----	10-24 x 3/4 Set Screw	1
535	27-9-153-2	Flange Bearing	1
536	27-9-128-6	Bushing Spacer	1
537	-----	1/4-20 Lock Washer	1
538	-----	1/4-20 x 3/4 Hex Bolt	1
539	27-9-150-6	Switch Bracket	1
540	-----	6-32 x 1 Round Hd. Philips Screw	2
541	27-9-146-6	Valve Handle	1
542	27-9-147-1	Valve Handle Grip	1
543	-----	#6 External Star Washer	2
544	-----	6-32 Hex Nut	2
545	-----	1/4-20 x 5/16 Set Screw	4
546	-----	3/8-16 x 20 Hex Bolt	1
Not Shown	-----	3/8 Flat Washer	1
547	27-9-154-6	Handle Mount	1
548	27-9-169-1	Spring	1
549	44-9-107-1	Switch	1
550	27-9-151-6	Switch Handle	2
551	27-9-155-2	Flange Bearing	2
552	-----	1/4 Lock Washer	1
553	-----	1/4 Flat Washer	1



## Brush Motor 27-9-008-1

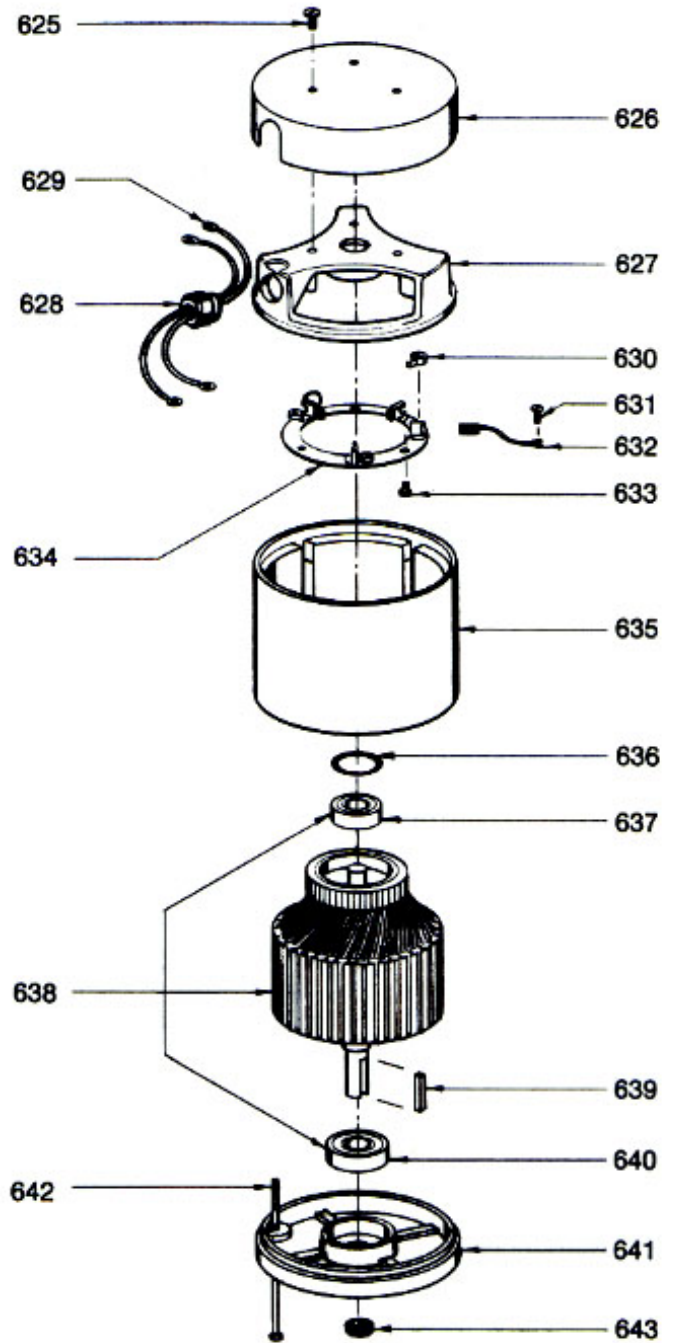
Item No.	Part No.	Part Name	Qty. Req'd.
601		1/4-20x3/8 Pan Head Screw	3
602	27-9-764-1	Top Cover	1
603	27-9-754-1	Top End Bell w/Brush Board Ass'y	1
604	27-9-763-1	Heyco	1
605	27-9-758-1	Lead Ass'y (1 wire w/terminals)	2
606	27-9-757-1	Brush Spring	4
607		10-32x3/8 Brass Pan Head Screw	4
608	27-9-756-1	Brush Ass'y (Carbon Brush w/lead & terminal)	4
609		10-24-x1/2 Self Tapping Rd. Hd. Screw	3
610	27-9-755-1	Brush Board Ass'y w/springs & brushes	1
611	27-9-750-1	Stator Frame Ass'y. w/magnets	1
612	27-9-759-1	Helical Washer	1
613	27-9-753-1	Bearing F.E. (Commutator End)	1
614	27-9-751-1	Armature Ass'y w/bearings	1
615	27-9-268-1	Shaft Key	1
616	27-9-752-1	Bearing, B.E. (Shaft End)	1
617	27-9-762-1	Bottom End Bell (Back End Bracket)	1
618	27-9-760-1	Thru Bolt	2
619	27-9-773-1	Shaft Seal	1





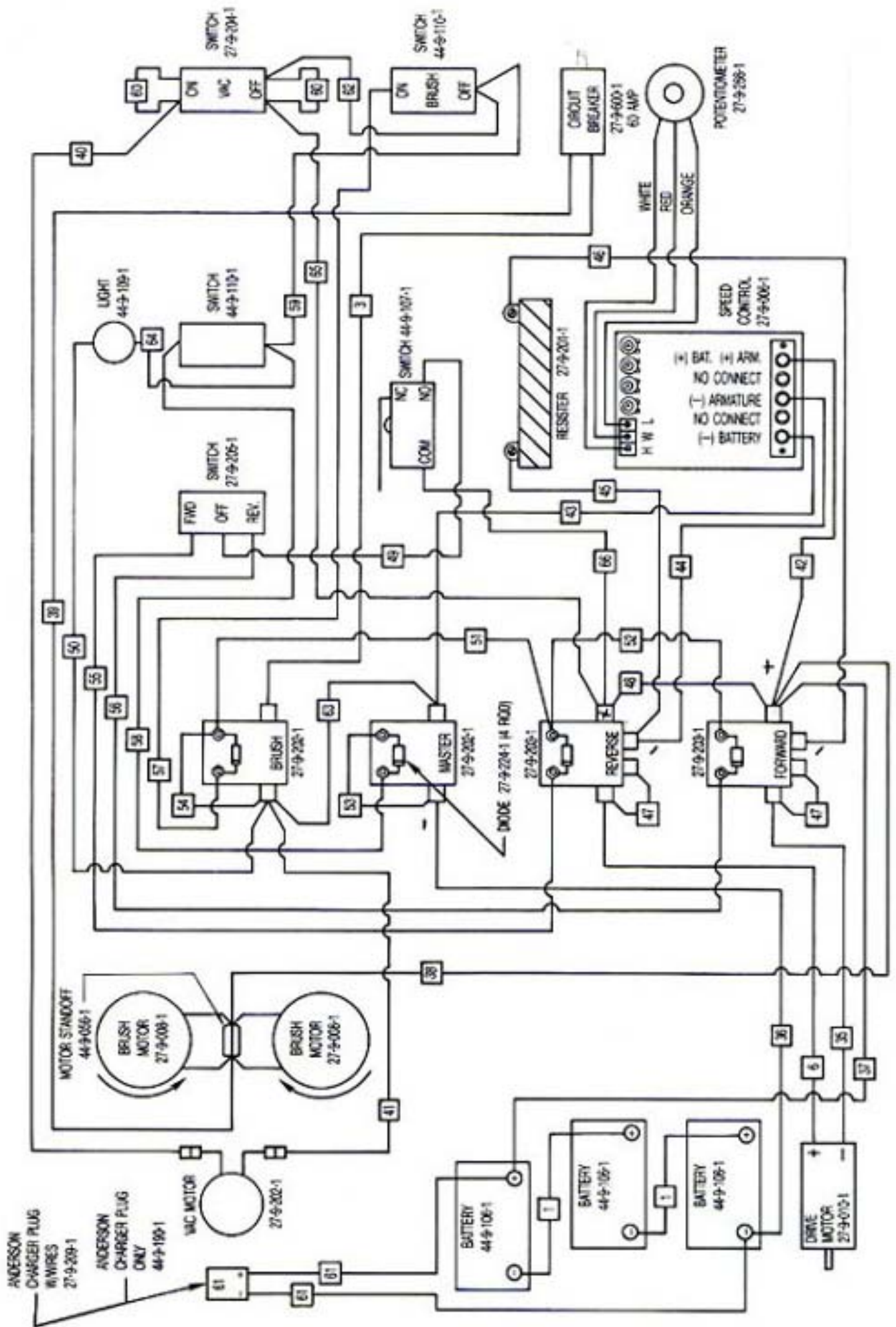
## Drive Motor 27-9-010-1

Item No.	Part No.	Part Name	Qty. Req'd.
625		1/4-20x3/8 Pan Head Screw	3
626	27-9-772-1	Top Cover	1
627	27-9-767-1	Top End Bell w/Brush Board Ass'y	1
628	27-9-763-1	Heyco	1
629	27-9-758-1	Lead Ass'y (1 wire w/terminals)	2
630	27-9-757-1	Brush Spring	4
631		10-32x3/8 Brass Pan Head Screw	4
632	27-9-769-1	Brush Ass'y (Carbon Brush w/lead & terminal)	4
633		10-24-x1/2 Self Tapping Rd. Hd. Screw	3
634	27-9-768-1	Brush Board Ass'y w/springs brushes	1
635	27-9-765-1	Stator Frame Ass'y. w/magnets	1
636	27-9-759-1	Helical Washer	1
637	27-9-753-1	Bearing F.E. (Commutator End)	1
638	27-9-766-1	Armature Ass'y w/bearings	1
639	27-9-268-1	Shaft Key	1
640	27-9-752-1	Bearing, B.E. (Shaft End)	1
641	27-9-771-1	Bottom End Bell (Back End Bracket)	1
642	27-9-770-1	Thru Bolt	2
643	27-9-773-1	Shaft Seal	1



# Wiring Diagram Wrangler 27

Marker & Item No.	Part No.	Gauge x Length	Terminals	Where Used
1	23-9-198-1	4 x 15	Ring Terminals (2)	Battery Jumper Cable (2 required)
3	44-9-120-1	6 x 14	#10 Ring-5/16 Ring	Circuit Breaker - Brush Solenoid
6	44-9-127-1	6 x 56	5/16 Ring - ¼ Ring	Drive Motor - Reverse Solenoid
35	27-9-210-1	6 x 56	5/16 Ring - ¼ Ring	Drive Motor - Forward Solenoid
36	27-9-211-1	4 x 60	Battery - 5/16 Ring	Negative Battery - Main Solenoid
37	27-9-615-1	4 x 60	Battery - 5/16 Ring	Pos. Battery - Forward Solenoid
38	27-9-616-1	6 x 56	5/16 Ring ¼ Ring	Brush Motors - Forward Solenoid
39	27-9-215-1	6 x 50	¼ Ring - #10 Ring	Brush Motors - Circuit Breaker
40	27-9-227-1	12 x 60	¼ Insulated Male Spade - Female Spade ¼	Vacuum Motor - Switch
41	27-9-228-1	12 x 60	¼ Insulated Male Spade - 5/16 Ring	Vacuum Motor - Solenoid
42	27-9-213-1	6 x 12	5/16 Ring - ¼ Ring	Forward Pos. Solenoid - Speed Control
43	27-9-229-1	6 x 12	5/16 Ring - ¼ Ring	Male Neg. Solenoid - Battery Speed Control
44	27-9-230-1	6 x 12	5/16 Ring - ¼ Ring	Reverse Neg. Solenoid - Armature Speed Control
45	27-9-212-1	6 x 22	5/16 Ring - 10 Ring	Reverse Solenoid - Resistor
46	27-9-231-1	6 x 22	5/16 Ring - 10 Ring	Resistor - Forward Solenoid
47	27-9-214-1	6 x 6	5/16 Ring (Both) (2)	Forward & Reverse Solenoid Term. - Term.
48	27-9-232-1	6 x 6	5/16 Ring (Both)	Forward Solenoid - Reverse Solenoid
49	27-9-216-1	14 x 12	¼ Female Spade (Both)	Forward/Reverse Switch - Deadman Switch
50	27-9-217-1	14 x 17	3/16 Female Spade - 5/16 Ring	Brush Solenoid - Light
51	27-9-218-1	14 x 8	#10 Ring (Both)	Brush Solenoid - Reverse Solenoid
52	27-9-233-1	14 x 8	#10 Ring (Both)	Forward Solenoid - Reverse Solenoid
53	27-9-219-1	14 x 6	5/16 Ring - 10 Ring	Main Solenoid Terminal - Terminal
54	27-9-234-1	14 x 6	5/16 Ring - 10 Ring	Brush Solenoid Terminal - Terminal
55	27-9-220-1	14 x 24	10 Ring - ¼ Female Spade	Reverse Solenoid - Forward/Reverse Switch
56	27-9-235-1	14 x 24	10 Ring - ¼ Female Spade	Forward Solenoid - Reverse/Forward Switch
57	27-9-221-1	14 x 26	¼ Female Spade - 10 Ring	Brush Solenoid - Brush Switch
58	27-9-236-1	14 x 26	¼ Female Spade - 10 Ring	Main Solenoid - Master Switch
59	27-9-222-1	14 x 10	¼ Female Spade w/Piggy Back (Both)	Brush Switch - Master Switch
60	27-9-223-1	14 x 3	¼ Female Spade w/Piggy Back (Both)	Vacuum Switch Jumper
61	27-9-209-1	———	Anderson Charger Plug w/wires, 36 Volt	Battery Charger to Batteries
	44-9-190-1	———	Anderson Charger Plug Only, 36 Volt	Battery Charger to Batteries
WIRES	———	10 x 30"	Anderson Crimpon - ⅜ Ring	Charger Plug to Battery
WIRES	———	10 x 22"	Anderson Crimpon - ⅜ Ring	Charger Plug to Battery
62	27-9-237-1	14 x 6	¼ Female Spade (Both)	Vacuum Switch - Brush Switch
63	27-9-238-1	6 x 13	5/16 Ring (Both)	Brush Solenoid - Main Solenoid
64	27-9-239-1	14 x 5	3/16 Female Spade - ¼ Female Spade	Master Switch - Light
65	27-9-240-1	12 x 34	5/16 Ring - ¼ Female Spade	Reverse Solenoid - Vacuum Switch
66	27-9-241-1	14 x 28	5/16 Ring - ¼ Female Spade	Reverse Solenoid - Deadman Switch
RED	27-9-242-1	18 x 30	Butt - Twist & Tin	Potentiometer - Speed Control
ORANGE	27-9-243-1	18 x 3	Butt - Twist & Tin	Potentiometer - Speed Control
WHITE	27-9-244-1	18 x 3	Butt - Twist & Tin	Potentiometer - Speed Control



ANDERSON  
CHARGER PLUG  
WIRES  
27-9-209-1

ANDERSON  
CHARGER PLUG  
ONLY  
44-9-199-1

MOTOR STANDOFF  
44-9-056-1

BRUSH MOTOR  
27-9-008-1

BRUSH MOTOR  
27-9-006-1

VAC MOTOR  
27-9-202-1

BATTERY  
44-9-106-1

BATTERY  
44-9-106-1

BATTERY  
44-9-106-1

DRIVE MOTOR  
27-9-070-1

BRUSH  
27-9-226-1

MASTER  
27-9-202-1

REVERSE  
27-9-205-1

FORWARD  
27-9-203-1

RESISTOR  
27-9-201-1

NC SWITCH  
44-9-107-1

POTENTIOMETER  
27-9-288-1

SPEED CONTROL  
27-9-006-1

CIRCUIT BREAKER  
27-9-600-1  
60 AMP

SWITCH  
27-9-204-1  
VAC  
ON  
OFF

SWITCH  
44-9-110-1  
BRUSH  
ON  
OFF

SWITCH  
27-9-205-1  
FWD  
OFF  
REV.

SWITCH  
44-9-110-1

LIGHT  
44-9-109-1

RESISTOR  
27-9-201-1

POTENTIOMETER  
27-9-288-1

SPEED CONTROL  
27-9-006-1

CIRCUIT BREAKER  
27-9-600-1  
60 AMP

SWITCH  
27-9-204-1  
VAC  
ON  
OFF

SWITCH  
44-9-110-1  
BRUSH  
ON  
OFF

SWITCH  
27-9-205-1  
FWD  
OFF  
REV.

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44-9-110-1

LIGHT  
44-9-109-1

RESISTOR  
27-9-201-1

POTENTIOMETER  
27-9-288-1

SPEED CONTROL  
27-9-006-1

CIRCUIT BREAKER  
27-9-600-1  
60 AMP



**THE NATIONAL SUPER SERVICE COMPANY**  
1355 TOMAHAWK DRIVE MAUMEE, OHIO 43537 (419) 893-8771