

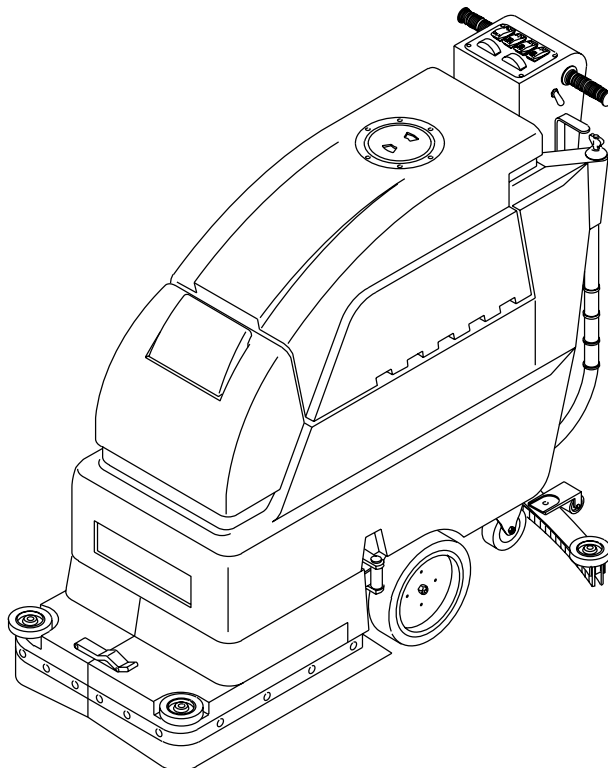


# Speed Scrub<sup>TM</sup> 2001HD

Automatic Scrubber

**Model No.:**  
**608311**  
**608312 – Pac**  
**609242 – Can. Pac**

**Operator and Parts Manual**



**NOBLES**  
12875 RANSOM STREET  
HOLLAND MI 49424 U.S.A.

**CUSTOMER SERVICE: 1-800-365-6625**  
**FAX: 1-800-678-4240**

**608310**  
**Rev. 00 (09-99)**

# OPERATION

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This manual is furnished with each new model. It provides necessary operation, maintenance instructions and an illustrated parts list.

**Read this manual completely and understand the machine before operating or servicing it.**

This machine will provide excellent service. However, the best results will be obtained at minimum costs if:

- The machine is operated with reasonable care.
- The machine is maintained regularly - per the machine maintenance instructions provided.
- The machine is maintained with manufacturer supplied or equivalent parts.

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## MACHINE DATA

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Please fill out at time of installation for future reference.

Model No.- \_\_\_\_\_

Install. Date - \_\_\_\_\_

Serial No.- \_\_\_\_\_

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Specifications and parts are subject to change without notice.

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## SAFETY PRECAUTIONS

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This machine is intended for commercial use. It is suited to scrub hard floors in an indoor environment and is not constructed for any other use. Use only recommended pads, brushes and cleaning detergents.

The following safety alert symbols are used throughout this manual as indicated in their description.

 **WARNING:** To warn of hazards or unsafe practices which could result in severe personal injury or death.

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


The following information signals potentially dangerous conditions to the operator or equipment:


**FOR SAFETY:**

- 1 **Do not operate machine:**
  - Unless trained and authorized.
  - Unless operation manual is read and understood.
  - In flammable or explosive areas unless designed for use in those areas.
- 2 **Before starting machine:**
  - Make sure all safety devices are in place and operate properly.
- 3 **When using machine:**
  - Go slow on inclines and slippery surfaces.
  - Use care when reversing machine.
  - Do not carry riders on machine.
  - Always follow safety and traffic rules.
  - Report machine damage or faulty operation immediately.
- 4 **Before leaving or servicing machine:**
  - Stop on level surface.
  - Turn off machine.

5 **When servicing machine:**

- Avoid moving parts. Do not wear loose jackets, shirts, or sleeves.
- Block machine tires before jacking machine up.
- Use hoist or jack of adequate capacity to lift machine.
- Wear eye and ear protection when using pressurized air or water.
- Disconnect battery connections before working on machine.
- Wear protective gloves when handling batteries or battery cables.
- Avoid contact with battery acid.
- Use manufacturer supplied or approved replacement parts.

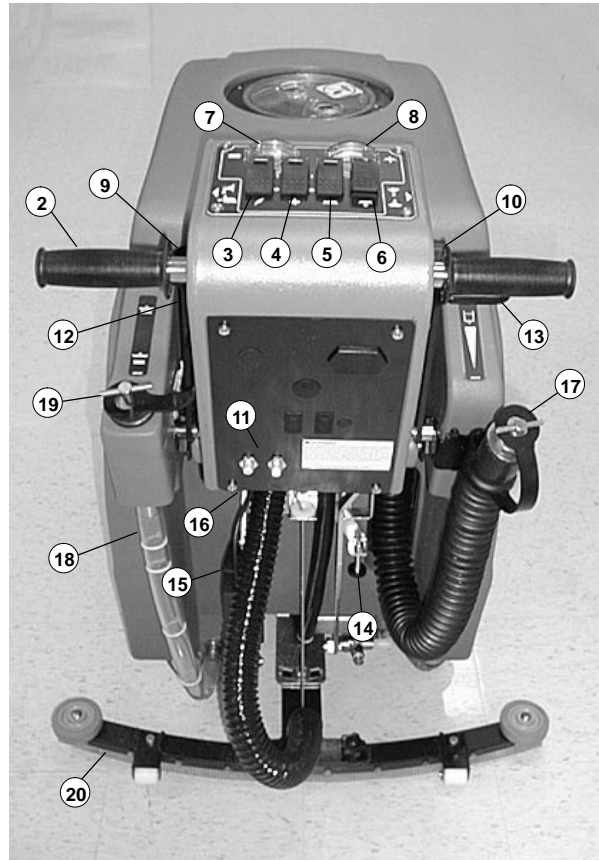
 **WARNING:** Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep covers open when charging.

 **WARNING:** Flammable materials can cause an explosion or fire. Do not use flammable materials in tank(s).

 **WARNING:** Flammable materials or reactive metals can cause explosion or fire. Do not pick up.










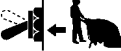







# OPERATION

## STANDARD MACHINE COMPONENTS



1. Control Console
2. Control Grips
3. Main ON/OFF Switch
4. Vacuum ON/OFF Switch
5. Brush/Solution ON/OFF Switch
6. Brush Pressure (Raise/Lower) Switch
7. Battery Meter
8. Brush Pressure Meter
9. Reverse Switch
10. Speed Control Knob
11. Main, Vac/Drive Circuit Breakers
12. Squeegee Lift Lever
13. Solution Flow Lever
14. Solution Flow Adjustment Knob
15. Scrub Head Actuator
16. Adjustable Control Console Levers
17. Recovery Tank Drain Hose
18. Solution Tank Drain Hose
19. Rear Fill Port
20. Squeegee Assembly
21. Recovery Tank
22. Recovery Tank Lid
23. Solution Tank
24. Solution Tank Fill Door
25. Safety Lights
26. Battery Compartment
27. Drive Wheels
28. Rear Casters
29. Brush Skirt
30. Skirt Housing
31. Skirt Housing Latch
32. Wall Rollers

CONTROL PANEL SYMBOLS

 Main Power	 Fast Speed	 Brush Motor Circuit Breaker	 Battery Charge Meter
 Vacuum	 Slow Speed	 Vacuum Motor Circuit Breaker	 Brush Pressure Meter
 Brush	 Reverse	 Main Power Circuit Breaker	 Read Manual Before Operating
 Less Brush Pressure	 Squeegee Up	 Solution Flow	
 More Brush Pressure	 Squeegee Down		

# OPERATION

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## MACHINE INSTALLATION

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### UNCRATING MACHINE

Carefully check carton for signs of damage. Report any damage at once to carrier. Check carton contents to ensure all accessories are included. Squeegee is packaged with machine. Batteries, battery charger and pad driver are packaged separately. (Not included with Pac #609242)

**ATTENTION: Battery installation must be accomplished after removing machine from shipping crate.**

To uncrate your machine, remove shipping straps and carefully lift or make a ramp using crate boards to remove machine from pallet.

**ATTENTION: Do not roll machine off pallet, damage may occur.**

---

### INSTALLING BATTERIES

**⚠ WARNING: Batteries emit hydrogen gases, explosion or fire can result. Keep sparks and open flame away.**

**FOR SAFETY: When servicing machine, wear protective gloves when handling batteries or battery cables. Avoid contact with battery acid.**

#### Battery Specifications:

Two 12 volt, deep cycle batteries. Consult with an Authorized Distributor for specific batteries. Maximum battery dimensions are 178mm(7 in) W x 381mm(15 in) L x 356mm(14 in) H.

1. Turn all switches to the OFF position.
2. Carefully hinge open recovery tank to access battery compartment. Remove loose battery cables from compartment (*Figure 1*).



FIG. 1

3. Carefully install batteries into battery tray at bottom of compartment and arrange battery posts as shown (*Figure 2*).

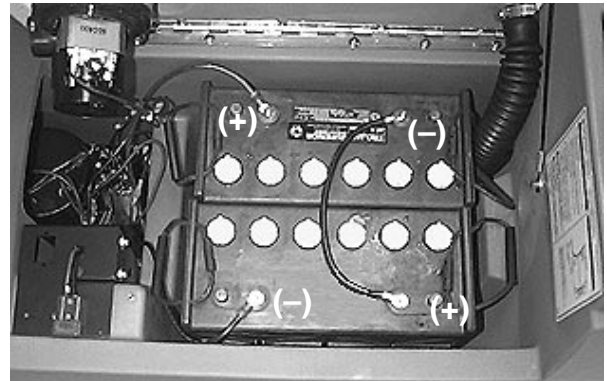


FIG. 2

**ATTENTION: Do not drop batteries into compartment, battery and machine housing damage may result. This damage is not covered by warranty.**

4. Connect battery cables to battery posts as shown (RED TO POSITIVE & BLACK TO NEGATIVE) (*Figure 2*).
5. Turn on the main switch and check battery meter charge level to ensure batteries are fully charged. Charge if necessary (*See BATTERY CHARGING*).

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## MACHINE SETUP

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### ATTACHING SQUEEGEE ASSEMBLY

1. Turn off machine.

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

2. Raise squeegee mount bracket. Pull back on squeegee lift lever to raise squeegee mount bracket (*Figure 3*).

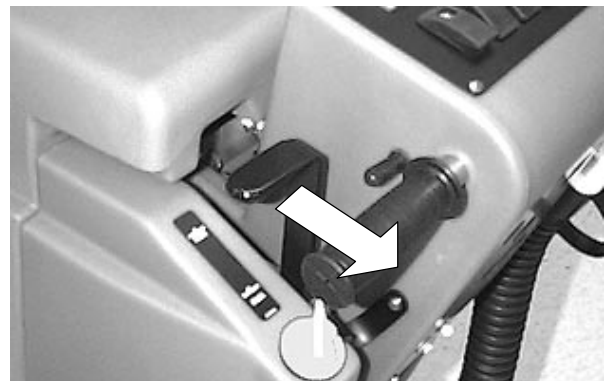


FIG. 3

- Loosen two thumb knobs on squeegee assembly and slide squeegee into slots on squeegee mount bracket. Squeegee roller wheels should face outward (*Figure 4*).



FIG. 4

- Tighten thumb knobs securely.
- Connect vacuum hose from machine to squeegee assembly (*Figure 5*).

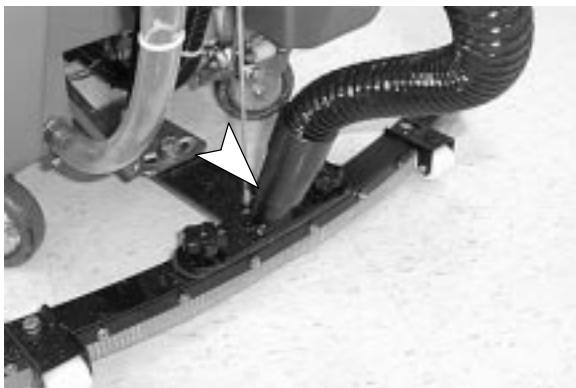


FIG. 5

## INSTALLING BRUSH OR PAD DRIVER

- Raise scrub head. Turn main switch on and press top half (–) of brush pressurer switch. Hold switch down until scrub head actuator turns off (*Figure 6*).



FIG. 6

- Turn off machine.

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

- Unfasten black latch at front of machine and hinge open skirt housing to access motor hub (*Figure 7*).



FIG. 7

- Select a recommended pad or brush that best meets your cleaning needs.

**NOTE:** Consult an authorized distributor to assist you in choosing the correct pad or brush for your specific cleaning need.

- (For Pad Installation)** Attach pad to pad driver before connecting driver to motor hub. Position pad on driver and secure with centerlock ring (*Figure 8*).



FIG. 8

- Attach brush/pad driver to motor hub. Align (3) mounting studs with slots in motor hub and give the driver a quick turn toward the spring clip located on motor hub. Be certain that spring clip locks into one of the studs before operating machine (*Figure 9*).

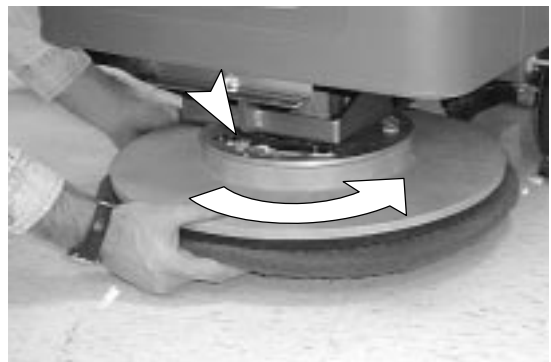


FIG. 9

# OPERATION

**NOTE:** Always make sure pad driver and motor hub surfaces are clean before installing driver. Clean surfaces will ease pad driver removal later.

7. Close skirt housing and refasten latch.

## FILLING SOLUTION TANK

1. Transport machine to filling station. Raise squeegee and brush when transporting.
2. Turn off machine.

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

3. Open solution fill door at front of machine and fill solution tank with 64L (17 gal) of clean water, 60°C (140°F) maximum temperature. Or you can use the rear fill port to fill solution tank. Twist off plug and insert hose to fill. The clear tube below the fill port has 19L (5 gal) increment markers to indicate amount of water in tank (Figure 10).

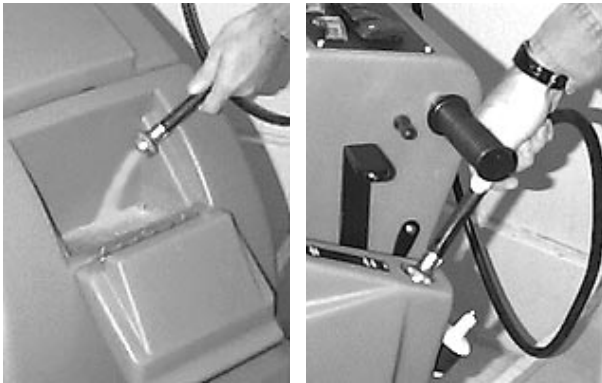


FIG. 10

**NOTE:** If filling with a bucket be certain that bucket is clean. This will prevent possible solution line clogs.

4. Add cleaning chemical. See proper dilution ratio instructions on bottle.

**ATTENTION: Use only recommended cleaning chemicals, DO NOT use substitutes. Consult an authorized distributor to assist you with the recommended cleaning chemicals.**

**⚠ WARNING: Flammable materials can cause an explosion or fire. Do not use flammable materials in tank(s).**

## MACHINE OPERATION

**FOR SAFETY: Do not operate machine, unless operation manual is read and understood.**

### PRE-OPERATION CHECKS

- Sweep and dust mop floor to remove particles and other debris.
- Check battery meter charge level to ensure batteries are fully charged (See *BATTERY CHARGING*).
- Check condition of pad or brush.
- Check condition of squeegee blades.

1. Adjust control grips to a comfortable operating height. Squeeze the two levers together, located under console, and lift or lower console to desired height (three settings) (Figure 11).

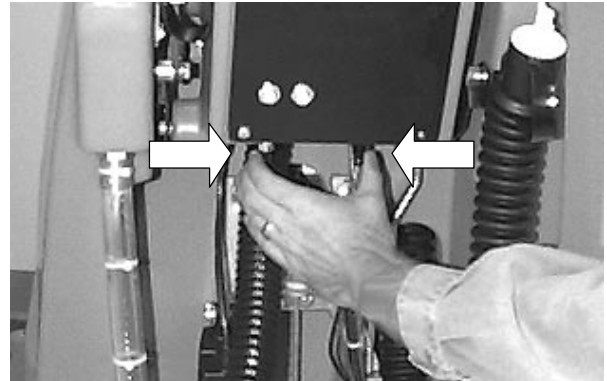


FIG. 11

2. Lower squeegee assembly. Disengage squeegee lift lever from the up position (Figure 12).

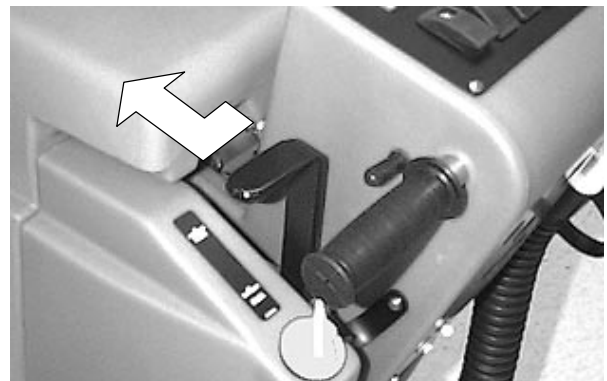


FIG. 12



- Lower scrub head to floor. Turn main switch on and press and hold bottom half (+) of brush pressure switch (Figure 13).

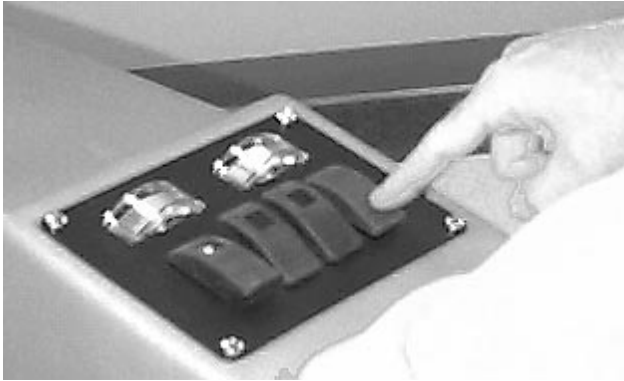


FIG. 13

- Turn on the vacuum and brush/solution switches.

**NOTE:** The brush and solution flow will not start until control grips are rotated.

- Adjust solution flow lever to desired amount. Push lever forward to activate solution flow. Push completely forward for maximum flow (Figure 14).



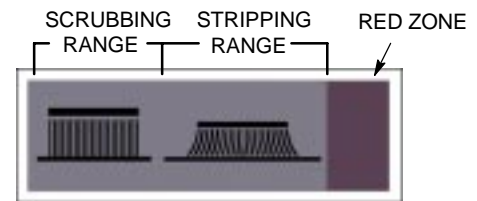
FIG. 14

- Before starting, turn speed control knob to slowest speed (Figure 15).
- Begin scrubbing by rotating control grips forward. Gradually increase your speed by turning speed control knob forward (Figure 15).



FIG. 15

- Once machine begins to move, check the needle position of the brush pressure meter. Only operate machine with needle in designated range per cleaning application. Use light brush pressure for scrubbing, heavier brush pressure for stripping. Never operate machine with the needle in the red zone. Depress brush pressure switch to properly adjust brush pressure (Figure 16).



PAD PRESSURE METER

FIG. 16

**ATTENTION:** To prevent possible floor damage and brush circuit breakers from tripping do not operate machine with brush pressure needle in the red zone.

- To operate machine in reverse, simply pull reverse switch backwards (one speed) (Figure 17).



FIG. 17

- To stop machine, release control grips.

# OPERATION

## WHILE OPERATING MACHINE

**FOR SAFETY:** When using machine, go slow on inclines and slippery surfaces.

**⚠ WARNING:** Flammable materials or reactive metals can cause explosion or fire. Do not pick up.

1. Observe amount of solution flow on floor. Adjust solution control lever to desired flow.

To increase or decrease the maximum solution flow, turn solution flow adjustment knob located at rear of machine. Turn knob clockwise to increase or counterclockwise to decrease maximum solution flow (*Figure 18*).

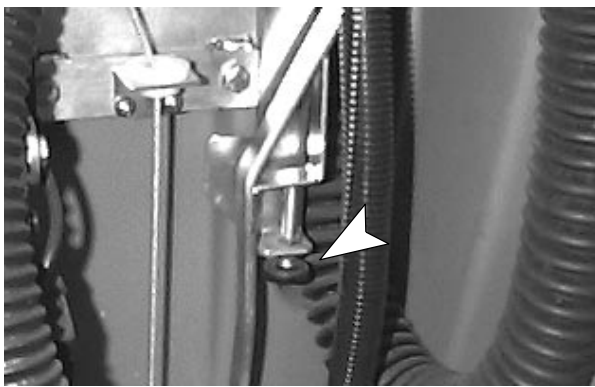


FIG. 18

2. Periodically check for foam buildup in recovery tank (*look through clear lid*). If excessive foam buildup begins to develop, pour a recommended foam control solution into recovery tank.

**ATTENTION:** Do not allow foam or water to enter vacuum standpipe, vacuum motor damage will result. Ball float shut-off will not keep foam out of standpipe. Vacuum damage due to foam or water is not covered by warranty.

3. Always operate at a slower speed when scrubbing around walls or obstacles.
4. Always reduce speed to maintain control when turning machine.
5. If squeegee leaves streaks, raise and wipe blades with a cloth. Pre-sweep area to prevent streaking.
6. Overlap each pass by 50mm (2 in).
7. Change or turn over pad when dirty.
8. Stay clear of floor obstructions, such as electrical plates or grates, they will destroy the pad.
9. During brief stops, you do not have to turn off any switches, the brush and solution flow will automatically stop when control grips are released.

10. Periodically check battery meter discharge level. When needle drops to the red zone, recharge batteries.

**ATTENTION:** Do not continue to run machine when battery meter needle is in the red zone, battery damage will result.

11. While cleaning, view clear tube gallon marker for remaining cleaning solution. Each mark on hose indicates 19 liters (5 gal).
12. When solution tank runs dry, turn off brush/solution switch, raise brushes and continue to vacuum until all dirty water is consumed. Then drain recovery tank. (*See DRAINING TANKS*).

## CIRCUIT BREAKERS

The machine is equipped with (3) circuit breakers to protect machine from damage.

If circuit breakers should trip, the breakers will not reset immediately upon tripping. Determine reason why breaker tripped, allow motor to cool and reset.

Brush motor circuit breaker will trip due to excessive overload on pad. Reduce pad pressure or replace pad if breaker should trip. Brush motor circuit breaker is located near charger plug.

The main (15amp) and drive/vacuum (35amp) circuit breakers are located at rear of machine (*Figure 19*).



FIG. 19

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## DRAINING TANKS

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Drive machine to floor drain and turn off machine.

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

---

### DRAINING RECOVERY TANK

Always empty recovery tank when refilling solution tank. You may refill solution tank while emptying recovery tank. To drain recovery tank, perform the following steps:

**ATTENTION: If recovery tank is not emptied between fill ups, foam or water will enter vacuum standpipe and damage vacuum motor. Float shut-off will not keep foam out of standpipe. Vacuum damage due to foam or water is not covered by warranty.**

1. Remove drain hose from holder, position hose over floor drain and twist off drain hose plug. To completely drain recovery tank, hinge open tank sideways and flip up tank support stand to rest tank on (Figure 20).

**NOTE: If using a bucket to drain machine, do not use same bucket for filling solution tank. This will prevent possible solution line clogs.**



FIG. 20

2. Rinse out recovery tank after each use. This will prevent a foul odor and recovery buildup. Unscrew clear lid on recovery tank. Use a hose to rinse out the recovery tank. Be careful not to spray water into float shut-off.
3. Replace drain hose plug tightly when tank is empty.

---

### DRAINING SOLUTION TANK

To drain leftover cleaning solution from solution tank, follow steps below:

1. Pull clear hose off hose barb at rear of machine and drain solution into floor drain or bucket (Figure 21).



FIG. 21

2. Rinse out solution tank and solution flow system with clean water after each use. This will prevent clogging due to chemical buildup. Use clear hose to drain solution tank.
3. Reconnect clear hose to hose barb. Be certain hose is completely pushed onto hose barb.

---

## BATTERY CHARGING

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**NOTE: Recharge batteries ONLY after a total of 30 minutes of use or more. This will prolong battery life.**

**ATTENTION: The following charging instructions are intended for chargers supplied with machine. Only use a charger with the following specifications to prevent battery damage.**

### CHARGER SPECIFICATIONS:

- OUTPUT VOLTAGE - 24 VOLTS
- OUTPUT CURRENT - 25 AMPS MAXIMUM
- AUTOMATIC SHUTOFF CIRCUIT
- FOR DEEP CYCLE BATTERY CHARGING

**NOTE: For optimum machine operation, keep batteries charged at all times. Never let batteries set in a discharge condition.**

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

**FOR SAFETY: When servicing machine, wear protective gloves when handling batteries or battery cables. Avoid contact with battery acid.**

1. Drive machine to a well-ventilated area for charging.

# OPERATION

- Turn machine off.

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

- Hinge open recovery tank to access batteries (Figure 22).



FIG. 22

- Check fluid level (A) in each battery cell before charging. If battery plates (B) are exposed, add just enough distilled water to cover plates by approximately 3mm (0.13 in). DO NOT OVERFILL. Overfilled batteries can overflow during charging due to expansion. Replace cell caps before charging (Figure 23).

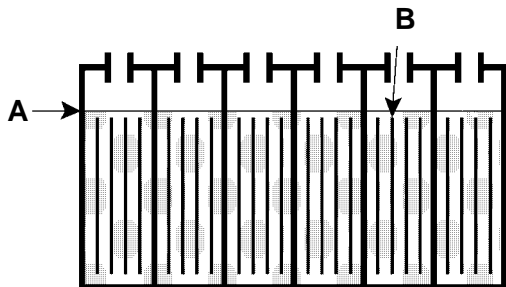


FIG. 23

- With charger disconnected from machine, plug charger's power cord into a grounded wall outlet (Figure 24).

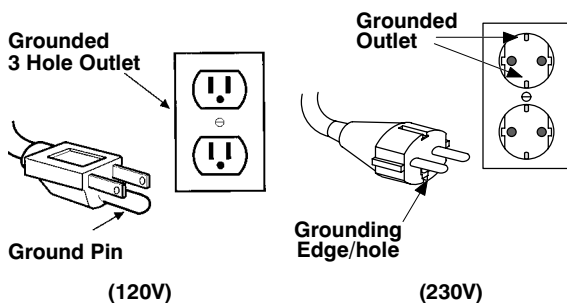


FIG. 24

**⚠ WARNING: To avoid an electrical hazard, charger MUST be grounded while in use to protect user from electric shock and serious injury.**

- Plug charger DC output connector to battery connector located near battery compartment. Flip up tank support stand and rest tank on stand (Figure 25).

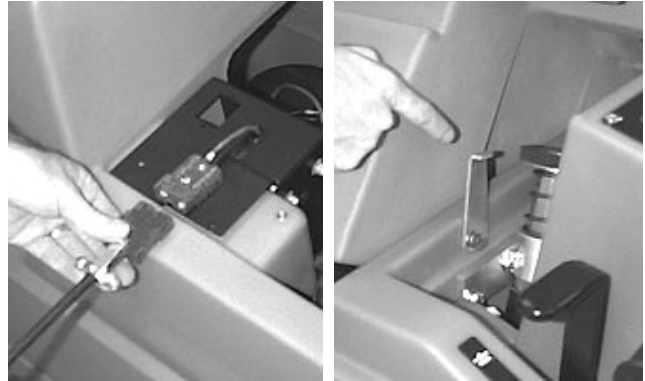


FIG. 25

- Charger will automatically begin charging and automatically shut off when fully charged.
- When disconnecting charger, always unplug charger from wall outlet first.
- After charging, check battery fluid level. Fluid level should be within 3mm (0.13 in) of full level indicator. Add distilled water if needed. DO NOT OVERFILL.

## MAINTENANCE

**FOR SAFETY: When leaving or servicing machine, stop on level surface and turn off machine.**

**FOR SAFETY: When servicing machine, disconnect battery connections before working on machine.**

**ATTENTION: Contact an Authorized Service Center for machine repairs. Machine repairs performed by other than an authorized person will void your warranty.**

To keep machine in good working condition, simply follow the daily, weekly and monthly maintenance procedures.

### DAILY MAINTENANCE

- Remove and clean pad or brush. Never use soiled pads when cleaning. Replace pad when it becomes loaded with residue.
- Remove and clean lint from float shut-off screen located in recovery tank (Figure 26).



**FIG. 26**

3. Drain and rinse tanks thoroughly. After draining tanks, hinge recovery tank until you can see vacuum intake hole at rear of tank. Remove any clogging debris in hole if necessary.
4. Raise squeegee and wipe it off with a dry cloth. Store squeegee in the up position to prevent squeegee damage.
5. Clean machine housing with a nonabrasive, nonsolvent cleaner.

**ATTENTION: Do not powerspray or hose off machine. Electrical component damage due to water is not covered by warranty.**

6. Recharge batteries if needed.

## WEEKLY MAINTENANCE

1. Flush out tanks and solution lines. Pour 750ml (24 oz.) of an acetic acid solution with 11.3L (3 gal) of hot water into solution tank. Over a floor drain, activate solution flow briefly to fill solution line. Shut off power and let machine set over night. Rinse with clean water afterwards.
2. Check fluid level in battery cells (See *BATTERY MAINTENANCE*).
3. Clean battery tops to prevent corrosion (See *BATTERY MAINTENANCE*).
4. Check for loose or corroded battery cables.

## MONTHLY MAINTENANCE

1. Lubricate caster grease fittings with a water resistant grease.
2. Lubricate all linkage pivot points with silicone spray then coat with a water resistant grease to maintain a smooth operation.
3. Check machine for water leaks and loose nuts and bolts.

## EVERY 250 HOURS OF OPERATION

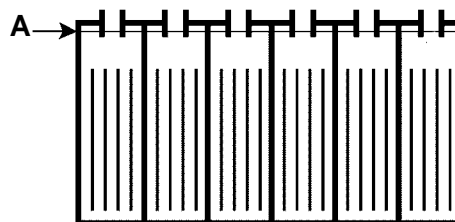
1. Check drive and brush motor for carbon brush wear, replace brushes if worn to a length of 10mm (0.38 in) or less.
2. Check vacuum motor for carbon brush wear, replace brushes when worn to a length of 10mm (0.38 in) or less.

## BATTERY MAINTENANCE

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

**FOR SAFETY: When servicing machine, wear protective gloves when handling batteries and battery cables. Avoid contact with battery acid.**

1. Always follow proper charging instructions (See *CHARGING BATTERIES*).
2. After charging, check fluid level (A). Fluid level should be within 3mm (0.13 in) of full level indicator. Add distilled water if needed. **DO NOT OVERFILL.** Overfilled batteries can overflow during charging due to fluid expansion (Figure 27).



**FIG. 27**

3. Keep battery tops and terminals clean and dry. To clean batteries:
  - a. Mix a strong solution of baking soda and water (Figure 28).

# OPERATION



FIG. 28

- b. Brush solution sparingly over battery tops, terminal and cable connectors.

**NOTE:** Do not allow baking soda solution to enter battery cells.

- c. Use wire brush to clean terminal post and cable connections.
  - d. After cleaning, apply a coating of clear battery post protectant to terminals and cable connections.
4. Check for loose or worn cables. Replace if worn.

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## TRANSPORTING MACHINE

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When transporting machine by use of trailer or truck, be certain to follow tie-down procedures below:

**FOR SAFETY: When using machine, go slow on inclines and slippery surfaces.**

1. Raise squeegee and scrub head.
2. Load machine using a recommended loading ramp.
3. Position front of machine up against front of trailer of truck. Once machine is positioned, lower scrub head and squeegee.
4. Place a block behind each drive wheel to prevent machine from rolling.
5. Secure machine using tie-down brackets located at rear of machine frame, if equipped. It may be necessary to install tie-down brackets to the floor of your trailer or truck.
6. Place tie-down straps over top of machine to prevent it from tipping.

**NOTE:** Do not use control grips to secure machine for transporting.

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## STORING MACHINE

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1. Before storing machine, be certain to flush tanks and drain machine of all water.
2. Store machine in a dry area with squeegee removed and pad driver in the raised position.
3. Remove recovery lid to promote air circulation.
4. When storing machine, raise pad scrub head and squeegee off floor to prevent damage.

**ATTENTION:** If storing machine in freezing temperatures, be certain to drain machine of all water. Damage due to freezing temperatures is not covered by warranty.

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## RECOMMENDED STOCK ITEMS

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Refer to the Parts List section for recommended stock items. Stock Items are clearly identified with a bullet preceding the parts description. See example below:

Ref.	Part No.	Description	Qty.
1	201183	ASM, STANDPIPE	1
2	168613	•FLOOR, SQUEEGEE	1
3	258187	•NIPPLE	1
4	101714	•DASHET	1
5	218248	NUT, FLANGED	1

**TROUBLE SHOOTING**

<b>PROBLEM</b>	<b>CAUSE</b>	<b>SOLUTION</b>
No power, nothing runs.	Faulty main switch.	Contact Service Center.
	Batteries need charging.	See CHARGING BATTERIES.
	Faulty battery(s).	Replace battery(s).
	Loose battery cable.	Tighten loose cable.
	MAIN circuit breaker has tripped.	Determine cause and reset breaker.
Brush motor does not run.	Brush/Solution switch is not turned on.	Turn on brush/solution switch.
	Control grips are not rotated.	Rotate control grips.
	Brush circuit breaker has tripped.	Clean or replace pad or brush and reset brush circuit breaker button.
	Faulty brush motor or wiring.	Contact Service Center.
	Carbon brushes worn.	Contact Service Center.
	Faulty brush switch or solenoid.	Contact Service Center.
Vacuum motor does not run.	Faulty vacuum switch.	Contact Service Center.
	Vacuum circuit breaker has tripped.	Remove obstruction and reset breaker.
	Faulty vacuum motor or wiring.	Contact Service Center.
	Carbon brushes worn.	Contact Service Center.
Drive motor does not run.	Drive motor circuit breaker has tripped.	Determine cause and reset breaker.
	Faulty speed control circuit board or connection.	Contact Service Center.
	Faulty solenoid.	Contact Service Center.
	Faulty drive motor.	Contact Service Center.
	Faulty wiring.	Contact Service Center.
	Worn carbon brushes.	Contact Service Center.
Drive motor runs, but not correctly.	Faulty potentiometer or speed control board.	Contact Service Center.
	Loose wire connection	Contact Service Center.
Little or no solution flow.	Solution flow lever in not activated.	Push solution flow lever forward.
	Low water level in solution tank.	Fill tank with water/solution.
	Solution line or solution tank filter is clogged.	Remove hose and blow compressed air through it. Flush solution tank after each use.
	Solution valve or solenoid is clogged.	Remove valve or solenoid and clean. Do not scratch inside of valve.
	Faulty solution switch or solenoid.	Contact Service Center.
	Solution flow adjustment knob needs adjusting.	Turn solution flow knob clockwise to increase flow.
Short run time.	Batteries not fully charged.	Charge batteries.
	Bad cell in one or more batteries.	Replace battery.
	Batteries need maintenance.	See BATTERY MAINTENANCE.
	Faulty charger.	Replace battery charger.

# OPERATION

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## TROUBLE SHOOTING –continued

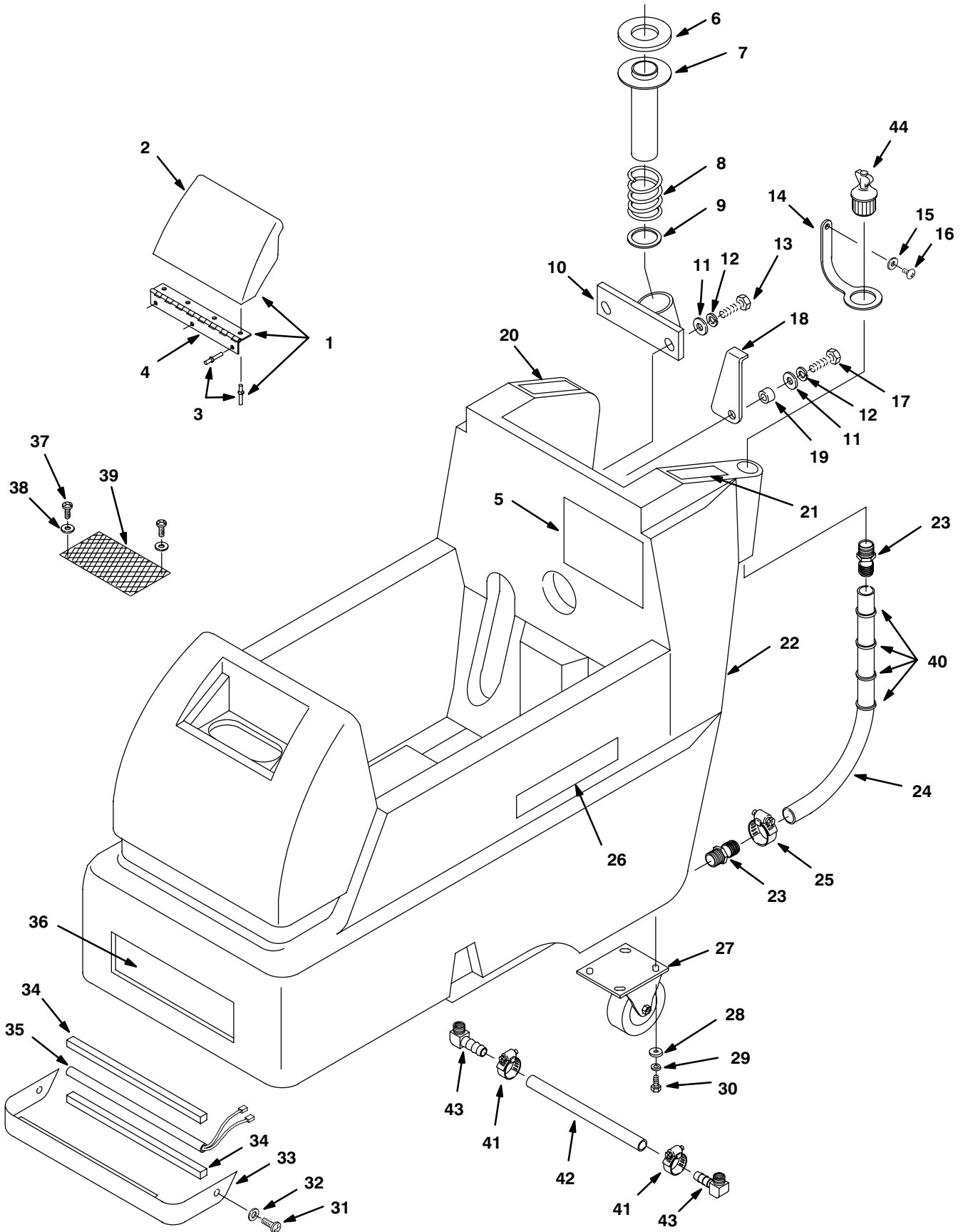
<b>PROBLEM</b>	<b>CAUSE</b>	<b>SOLUTION</b>
Poor water pick up.	Recovery tank is full.	Empty recovery tank.
	Ball float shut-off screen inside recovery tank is clogged.	Remove screen and clean.
	Squeegee is clogged with debris.	Clean squeegee.
	Squeegee blades are worn.	Replace squeegee blades.
	Squeegee thumbscrews are loose.	Tighten thumbscrews.
	Vacuum hose connections are loose or hose has a hole.	Push hose cuffs firmly on connections. Replace hose if damaged.
	Vacuum hose is clogged with debris.	Remove clogged debris.
	Recovery tank inlet hole is obstructed.	Empty recovery tank and tilt tank sideways to access inlet hole, remove obstruction.
	Tank gasket is defective.	Replace gasket.
	Drain hose plug is loose.	Tighten drain plug.
	Recovery tank lid is loose.	Tighten lid.
	Vacuum motor is loose.	Contact Service Center.
	Battery charge level is low.	Charge batteries. Do not run machine when battery meter is in the red zone.
Safety lights do not work.	Flasher is burned out.	Contact Service Center.



**SPECIFICATIONS**

<b>MODEL</b>	<b>2001HD</b>
LENGTH	1270mm (50 in)
WIDTH	790mm (31 in)
HEIGHT	990mm (39 in)
WEIGHT	220kg (487 lbs) –w/ batteries 323kg (712 lbs)
SOL./REC TANK CAPACITY	64L (17 gal)
SPEED CONTROL	Variable Fwd. / Fixed Rev.
CLEANING SPEED (MAX)	1923.6m <sup>2</sup> (20,000 sq. ft.) per hour
CLEANING PATH WIDTH	508mm (20 in)
PAD DIAMETER	508mm (20 in)
PAD PRESSURE	Variable 18–59kg ( 40–130 lbs)
SQUEEGEE WIDTH	787mm (31 in)
DRIVE SYSTEM	Transaxle, .2 h.p., 24V
BRUSH MOTOR	.75 h.p., 220 rpm, 24V, 20A, 550W
VACUUM MOTOR	.75 h.p., 3–stage 5.7", 24V, 21A, 550W
WATER LIFT	1720mm (68 in)
BATTERIES	2–12V, 215AH
RUN TIME PER CHARGE	Up to 4 hours
DECIBEL RATING AT OPERATOR'S EAR, INDOORS ON TILE.	77dB(A)

SOLUTION TANK GROUP



## SOLUTION TANK GROUP

REF	PART #	DESCRIPTION	QTY.
▽1	608518	ASM., SOLUTION TANK COVER, GREEN	1
▲2	608284	COVER, TANK, GREEN	1
▲3	140706	RIVET, POP	7
▲4	230626	HINGE, COVER	1
5	603233	DECAL, BATTERY RECHARGE	1
6	100151	●GASKET, TUBE ADAPTER	1
7	230664	ADAPTER, TUBE	1
8	140424	SPRING, TUBE ADAPTER	1
9	602878	WASHER	1
10	602847	BRACKET, VAC TUBE	1
11	140027	WASHER, FLAT	3
12	140015	WASHER, LOCK	3
13	200 031 488	SCREW, M8X1.25X20MM	2
14	600476	●STRAP, PLUG REAR FILL	1
15	140011	WASHER, FLAT	1
16	140350	SCREW, #10X1/2	1
17	200 031 488	SCREW, M8X1.25X20MM	1
18	230925	SUPPORT, RECOVERY TANK	1
19	140116	BUSHING	1
20	600649	DECAL, SOLUTION LEVER CE	1
21	600650	DECAL, SQUEEGEE LEVER CE	1
22	608295	TANK, SOLUTION, GREEN	1
23	150529	HOSE BARB	2

REF	PART #	DESCRIPTION	QTY.
24	607433	TUBING, 3/4"IDX24"	1
25	630369	CLAMP	1
26	608451	DECAL, "SPEED SCRUB 2001HD"	2
27	630002	●CASTER, 4"	2
28	140025	WASHER, FLAT	8
29	140333	WASHER, LOCK	8
30	140276	SCREW, M10X1.5X16MM	8
31	578 141 000	SCREW, M5X10MM	2
32	140018	WASHER, FLAT	2
33	600298	SHIELD, LIGHT	1
34	606242	GASKET, 1/2"X30"	1
35	130023	LIGHT, SAFETY	1
36	608184	DECAL, NOBLES LOGO	1
37	140826	SCREW, #6X3/4	2
38	140032	WASHER, FLAT	2
39	602529	●SCREEN, FILL	1
40	130040	WIRE TIE	4
41	140310	CLAMP	2
42	606238	TUBING, 3/8IDX18"	1
43	150419	ELBOW, 1/4MX3/8H 90°	2
44	621324	●PLUG, EXPANSION	1

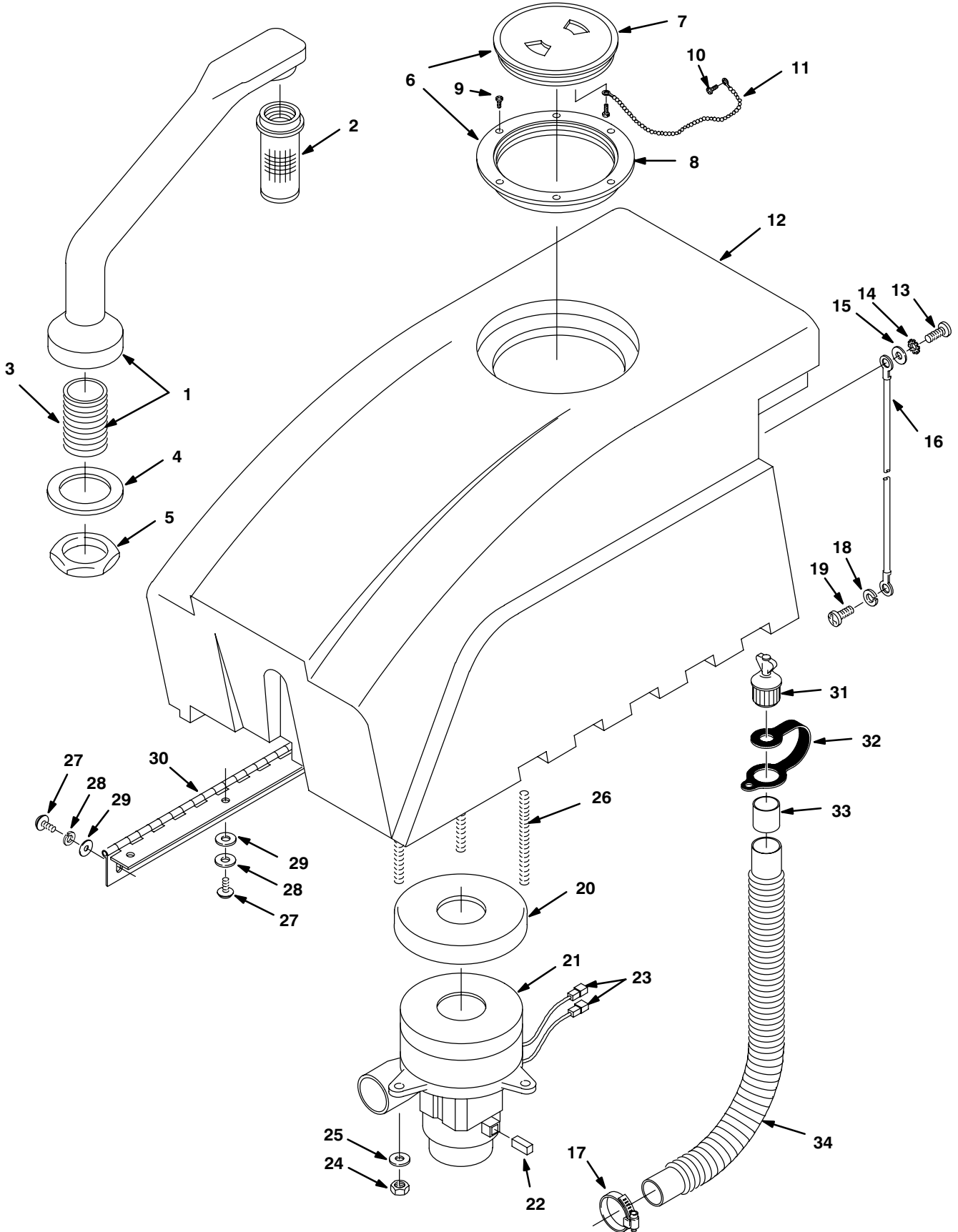
▽ ASSEMBLY

▲ INCLUDED IN ASSEMBLY

● RECOMMENDED STOCK ITEMS

# PARTS LIST

## RECOVERY TANK GROUP



**RECOVERY TANK GROUP**

REF	PART #	DESCRIPTION	QTY.
1	701103	ASM.,STANDPIPE	1
2	180613	●FLOAT, SHUT-OFF	1
3	230187	NIPPLE	1
4	101714	●GASKET	1
5	210240	NUT, FLANGED	1
∇6	100102	●ASM.,LID CLEAR W/STD HOLE	1
▲7	100105	●LID, CENTER CLEAR ONLY	1
▲8	100109	●LID, OUTER RING ONLY	1
9	140826	SCREW, #6X3/4	6
10	3701.6	SCREW, #6X3/8	2
11	230513	CHAIN	1
12	608297	TANK, RECOVERY, GREEN	1
13	578 187 000	SCREW, M06X1.0X12MM	1
14	140052	WASHER, 1/4 EXT	1
15	140000	WASHER, FLAT	1
16	140960	●CABLE	1
17	140308	CLAMP	1

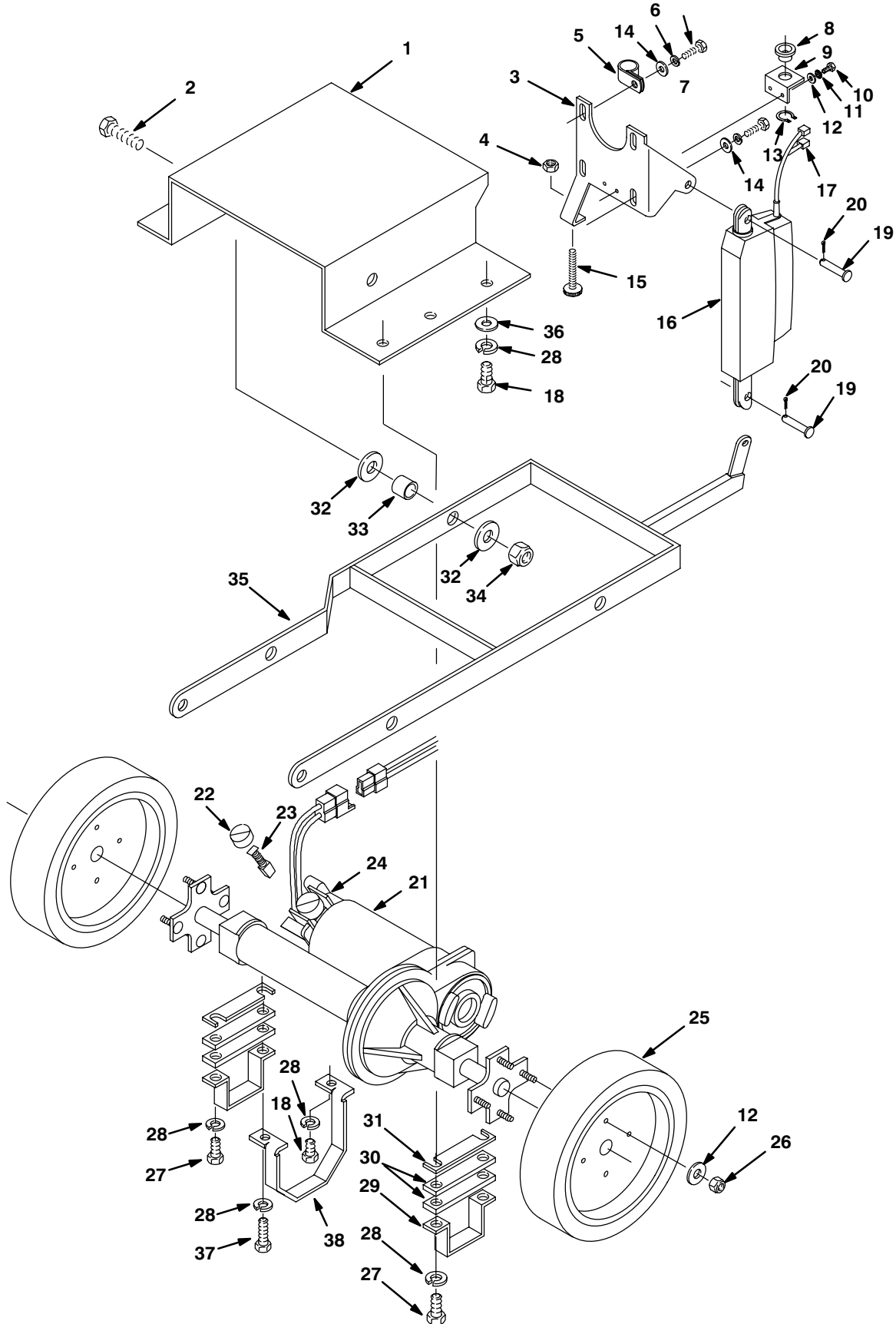
REF	PART #	DESCRIPTION	QTY.
18	140015	WASHER, LOCK	1
19	200 031 488	SCREW, M8X1.25X20MM	1
20	0174..10	●SEAT, NEOPRENE	1
∇21	130477	●MOTOR, VAC 5.7 /3 STAGE 24 VDC	1
▲22	190163	●CARBON BRUSH 2/PK	2
23	130096	TERMINAL, MALE DISCONNECT	2
24	140284	NUT	3
25	140000	WASHER, FLAT	3
26	140353	STUD	3
27	578 187 000	SCREW, M06X1.0X12MM	11
28	140052	WASHER, LOCK	11
29	140000	WASHER, FLAT	11
30	600311	●HINGE, RECOVERY TANK	1
31	621324	●PLUG, EXPANSION	2
32	578441	●STRAP, DRAINHOSE	1
33	630394	●SLEEVE, DRAINHOSE	1
34	630068	●HOSE, DRAIN	1

∇ ASSEMBLY

▲ INCLUDED IN ASSEMBLY

● RECOMMENDED STOCK ITEMS

DRIVE GROUP



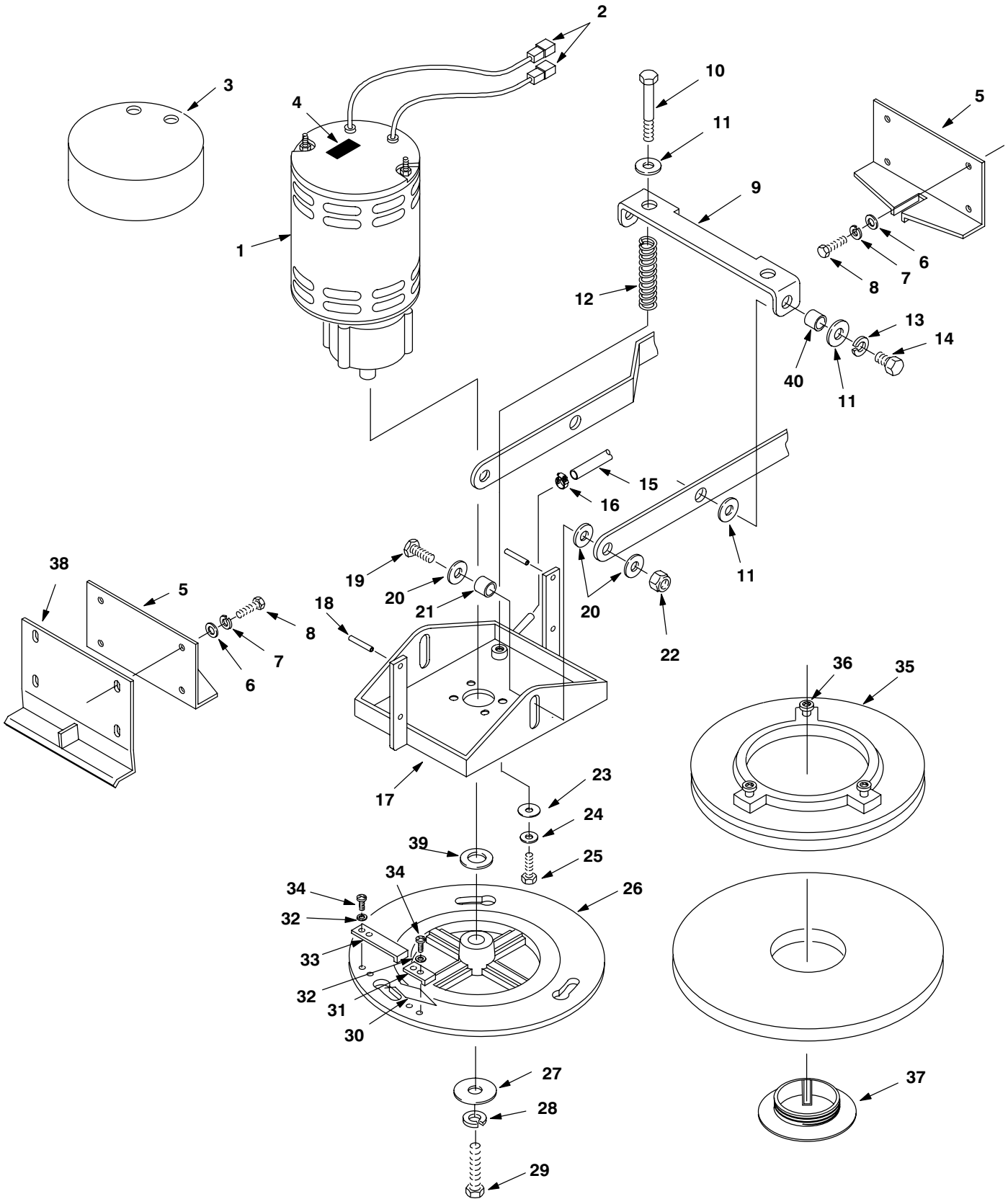
DRIVE GROUP

REF	PART #	DESCRIPTION	QTY.
1	600288	PLATE, BASE TRANSAXLE	1
2	140236	SCREW, 1/2-13X1 1/4	2
3	600292	BRACKET, ACTUATOR	1
4	140548	NUT	2
5	140314	CLAMP, INSULATED 3/4 ID	1
6	140015	WASHER, LOCK	4
7	200 031 494	SCREW, M8X1.25X30	4
8	621235	BUSHING, CABLE	1
9	630157	BRACKET, CABLE GUIDE	1
10	200 031 432	SCREW, M6X1/0X10	2
11	140052	WASHER, 1/4 EXT	2
12	140000	WASHER, FLAT	10
13	621 236 000	RING, RETAINING	1
14	140027	WASHER, FLAT	4
15	240191	●KNOB, 5/16-18X2	1
16	600952	●ACUTATOR	1
17	281 004 001	TERMINAL, QC	2
18	140276	SCREW, M10X1.5X16MM	2
19	604076	PIN, CLEVIS	2

REF	PART #	DESCRIPTION	QTY.
20	578421	PIN, COTTER	2
▽21	630126	●TRANSAXLE 20"	1
▲22	630503	●CAP	2
▲23	630504	●CARBON BRUSH	2
▲24	600606	●END BELL, TRANSAXLE MOTOR	1
25	640013	●WHEEL, 8"	2
26	630268	NUT	8
27	612 255 000	SCREW, M10X35MM	3
28	140333	WASHER, LOCK	6
29	602881	BRACKET, TRANSAXLE MOUNT	2
30	600304	SPACER, AXLE	4
31	602883	SPACER	2
32	140045	WASHER, FLAT	4
33	602882	BUSHING	2
34	140516	NUT	2
35	606702	BRACKET, HEAD LIFT	1
36	140028	WASHER, FLAT	2
37	601 094 000	SCREW, M10X45MM	1
38	603466	GUARD, TRANSAXLE	1

- ▽ ASSEMBLY
- ▲ INCLUDED IN ASSEMBLY
- RECOMMENDED STOCK ITEMS

BRUSH GROUP





BRUSH GROUP

REF	PART #	DESCRIPTION	QTY.
▽1	130491	●MOTOR, IMPERIAL	1
▲	190741	●ASM., BRUSH CARD	1
▲	190970	●BRUSH, CARBON	1
▲	140632	●KEY, 1/4X1	1
▲	630609	●ASM., GEAR BOX	1
▲2	130163	TERMINAL RING (NEGATIVE)	1
	130192	TERMINAL RING (POSITIVE)	1
3	100764	COVER, BRUSH MOTOR	1
4	606243	TAPE, ACRYLIC 1" X 12"	1
5	600300	PLATE, GUIDE	2
6	140003	WASHER, FENDER	8
7	140016	WASHER, LOCK	8
8	140272	SCREW, M6X1.0X16MM	8
9	606781	BRACKET, SPRING	1
10	607143	SCREW, 3/8-16X31/2	2
11	140028	WASHER, FLAT 3/8"	6
12	606782	SPRING, BRUSH PRESSURE	2
13	140017	WASHER, LOCK 3/8"	2
14	140201	SCREW, 3/8-16X3/4"	2
15	607433	TUBING, 3/4"IDX21"	1
16	140310	CLAMP	2
17	606704	BRACKET, BRUSH MOTOR MOUNT	1
18	140618	PIN, ROLL	4
19	140236	SCRW, 1/2-13X1-1/4	2

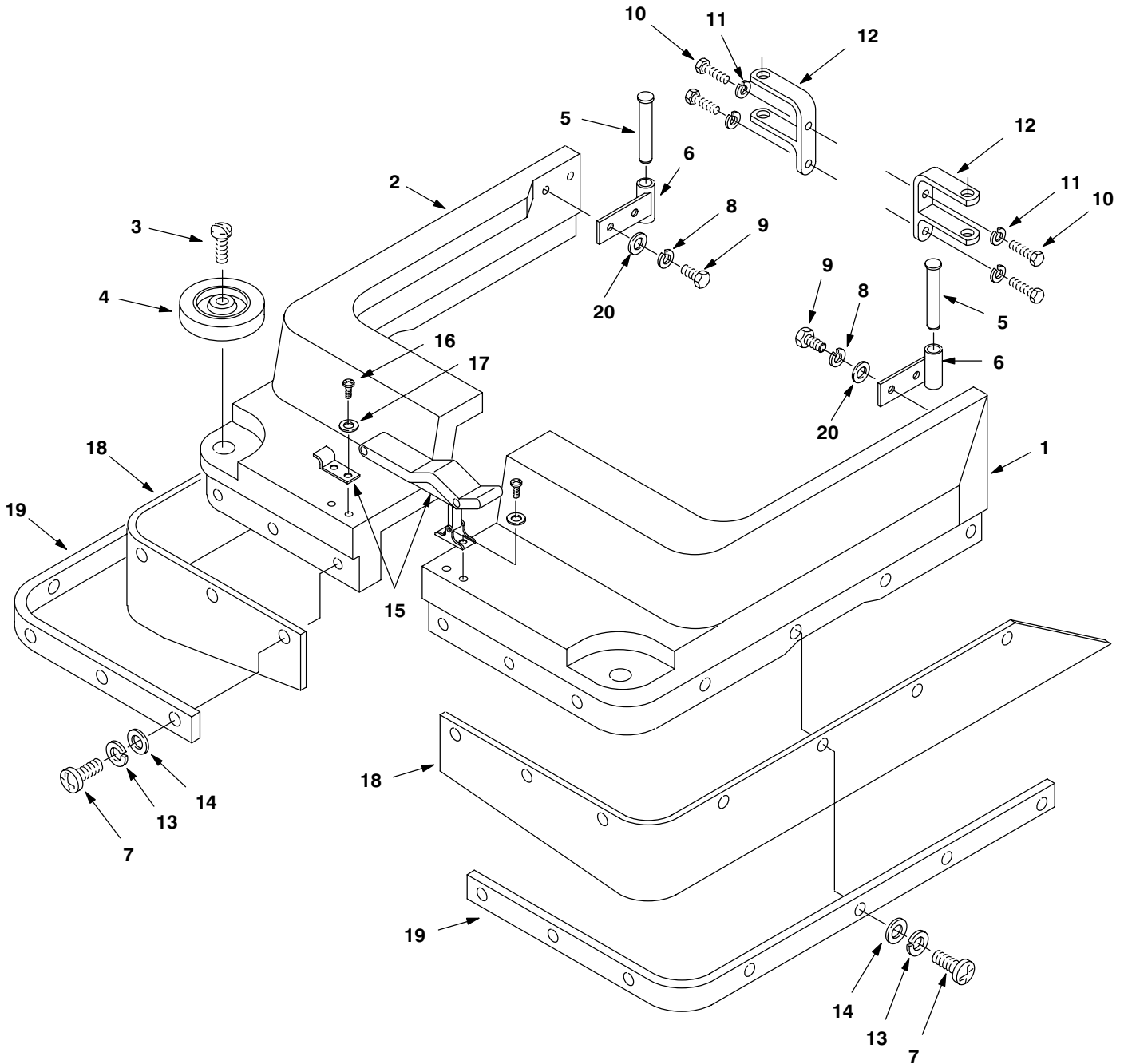
REF	PART #	DESCRIPTION	QTY.
20	140045	WASHER, .510X1.25X.06 FLAT	6
21	602882	BUSHING, 1/2IDX5/8ODX5/16	2
22	140516	NUT, 1/2-13	2
23	140028	WASHER, FLAT	4
24	140017	WASHER, LOCK	4
25	140202	SCREW, 3/8-16X1	4
26	230672	PLATE, DRIVER	1
27	25732	WASHER, FLAT	1
28	140015	WASHER, LOCK	1
29	140219	SCREW, 5/16-18X1	1
30	140417	●CLIP, SPRING	1
31	230651	●CLAMP, BRUSH PLATE	1
32	140018	WASHER, LOCK	4
33	230697	●STOP, DRIVER RELEASE	1
34	140887	SCREW, 10-24X3/8	4
▽35	240249	●ASM, PAD DRIVER, 20"	1
▲	100100	●RING, PAD RETAINER 11/2"	1
▲	100101	●RING, PAD RETAINER 1"	1
▲36	240254	●LUGS, W/SCREWS (SET OF 3)	1
37	25707	LOCK, UNIVERSAL CENTER	1
38	600299	SKIRT, FRONT LIP	1
39	140047	WASHER	1
40	140136	BUSHING, 3/8X1/2X.275"	2

▽ ASSEMBLY

▲ INCLUDED IN ASSEMBLY

● RECOMMENDED STOCK ITEMS

BRUSH SKIRT GROUP



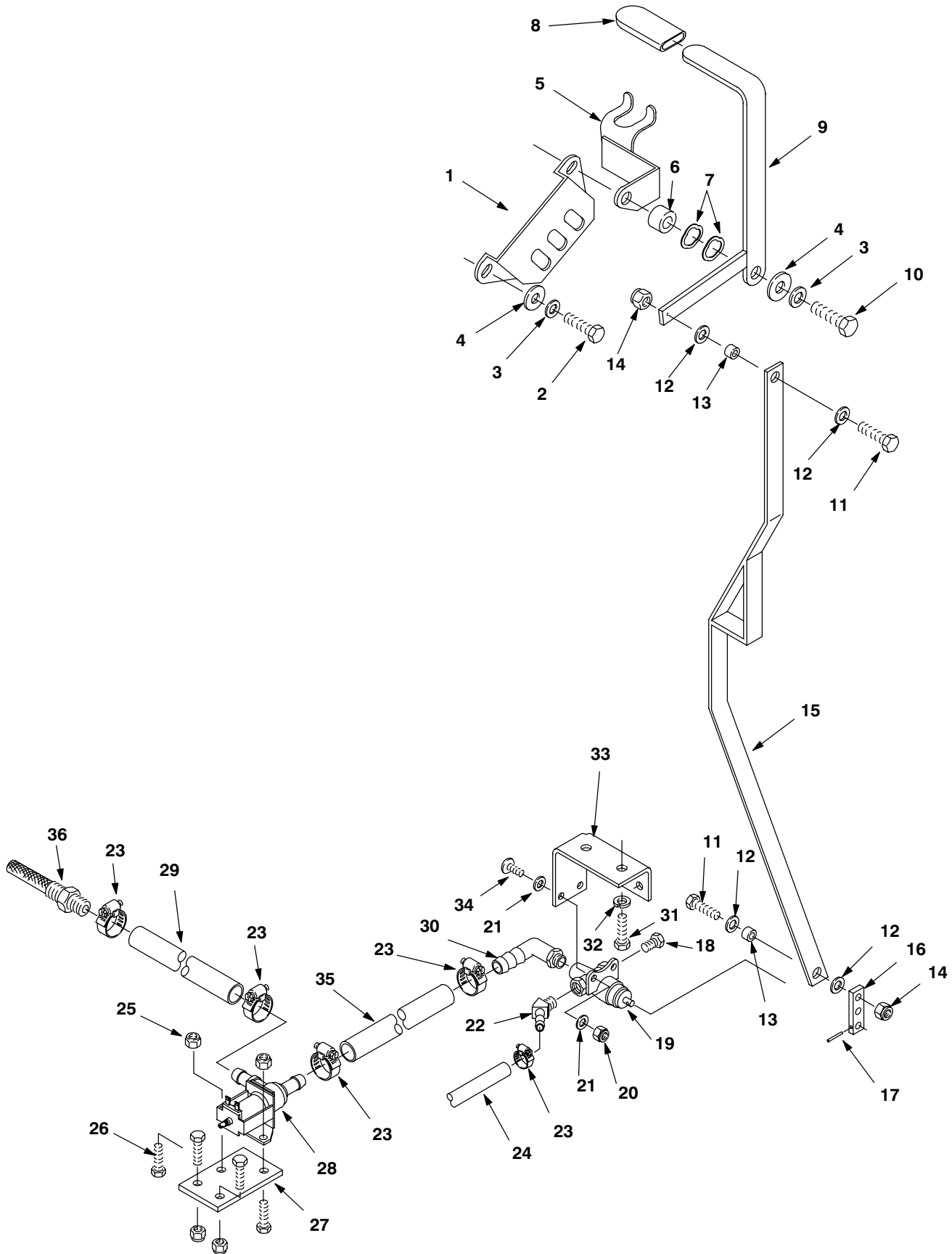
**BRUSH SKIRT GROUP**

REF	PART #	DESCRIPTION	QTY.
1	608306	SKIRT, 2001HD LEFT SIDE, GREEN	1
2	608308	SKIRT, 2001HD RIGHT SIDE, GREEN	1
3	603154	●SCREW	2
4	630450	●WHEEL, RUBBER	2
5	230943	●PIN, SKIRT	2
6	600301	BRACKET, SKIRT MOUNT	2
7	578144000	SCREW, M5X16MM	14
8	140015	WASHER, LOCK 5/16"	4
9	578 237 000	SCREW, M8X18	4
10	140272	SCREW, M6X1.0X16MM	4

REF	PART #	DESCRIPTION	QTY.
11	140016	WASHER, LOCK 1/4	4
12	600302	BRACKET, SKIRT MOUNT	1
13	140018	WASHER, LOCK #10	14
14	140011	WASHER, FLAT 3/16"	14
15	140932	●LATCH, HOOD W/ LATCH HOOK	1
16	200 070 340	SCREW, M4X.7X8MM	4
17	140023	WASHER, LOCK	4
18	606705	●SPLASH GUARD	2
19	606706	STRAP, SPLASH GUARD	2
20	140027	WASHER, FLAT 5/16"	4

● RECOMMENDED STOCK ITEMS

SOLUTION CONTROL GROUP



**SOLUTION CONTROL GROUP**

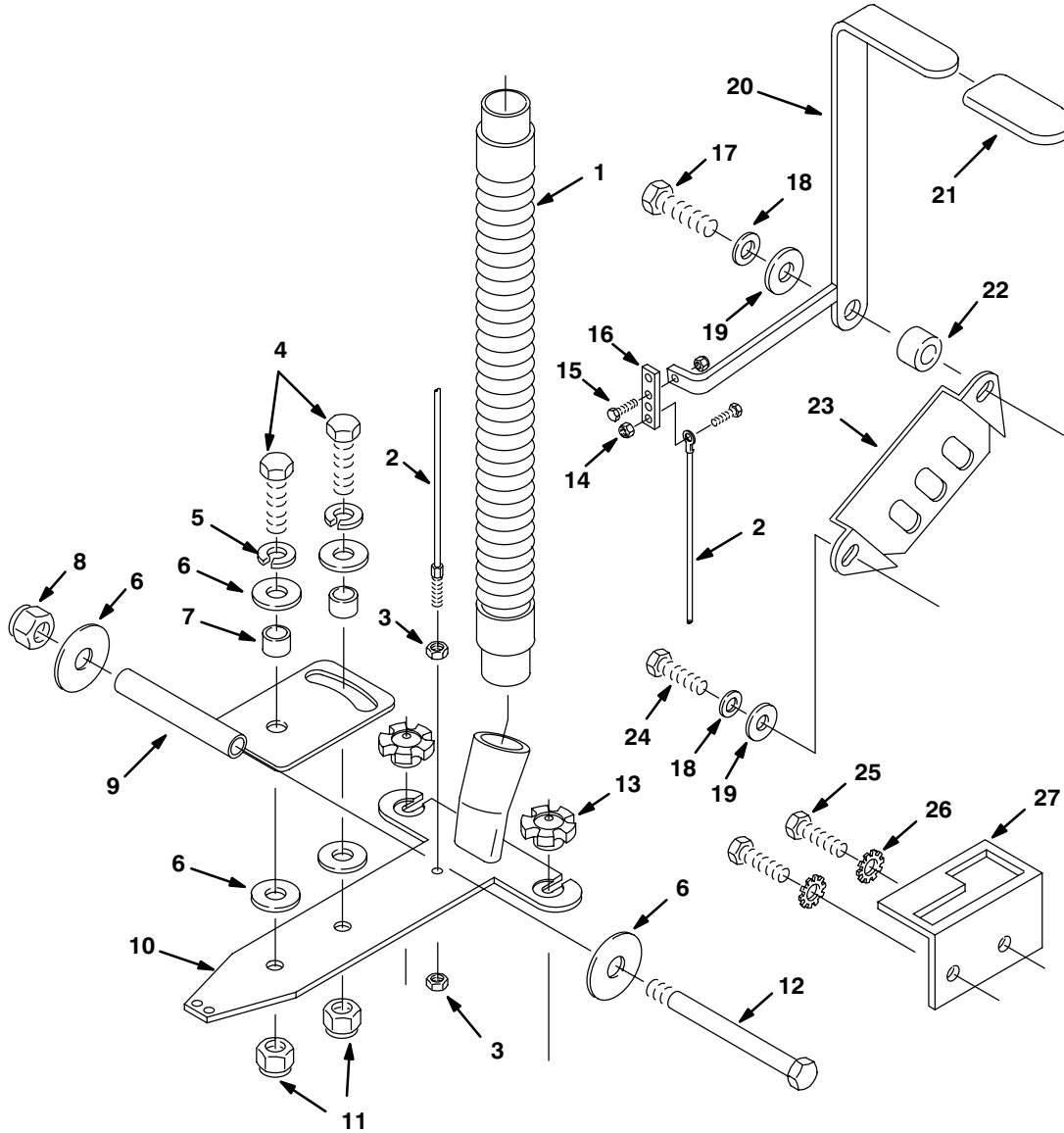
REF	PART #	DESCRIPTION	QTY.
1	230661	PLATE, LOCK CONTROL HOUSING	1
2	200 031 488	SCREW, M8X1.25X20MM	1
3	140015	WASHER, LOCK	2
4	140027	WASHER, FLAT	2
5	600280.BK	WELDMENT, DRAIN HOSE HANGER	1
6	230735	BUSHING	2
7	140060	WASHER, WAVE	2
8	200816	●GRIP, HANDLE	1
9	602884	HANDLE, SOLUTION VALVE	1
10	200 031 496	SCREW, M8X1.25X35	1
11	140208	SCREW, 1/4-20X1	2
12	140000	WASHER, FLAT	4
13	140134	BUSHING	2
14	140501	NUT	2
15	230718	LEVER, SOLUTION VALVE	1
16	230657	ARM, VALVE	1
17	140616	PIN, ROLL	1
18	150506	PLUG	1
19	210259	●VALVE, 3-WAY 5/16 PORTS	1

REF	PART #	DESCRIPTION	QTY.
20	140283	NUT	2
21	140011	WASHER, FLAT	4
22	28303	HOSE BARB	1
23	140310	CLAMP	5
24	607433	TUBING, 3/8"IDX1.67	1
25	069 762 303	NUT	4
26	140272	SCREW, M6X1.0X16MM	4
27	602879	PLATE, SOLENOID MOUNT	1
28	603310	●VALVE, SOLENOID 24 VDC	1
29	605100	TUBING, CLEAR, 5/8"X2"	1
30	150410	ELBOW, 1/4X5/8	1
31	140272	SCREW, M06X1.0X16MM	2
32	140016	WASHER, LOCK	2
33	600303	BRACKET, VALVE	1
34	578 144 000	SCREW, M5X16MM	2
35	605099	TUBING, CLEAR, 5/8"IDX3"	1
36	602929	●FILTER, SOLUTION TANK	1

● RECOMMENDED STOCK ITEMS

# PARTS LIST

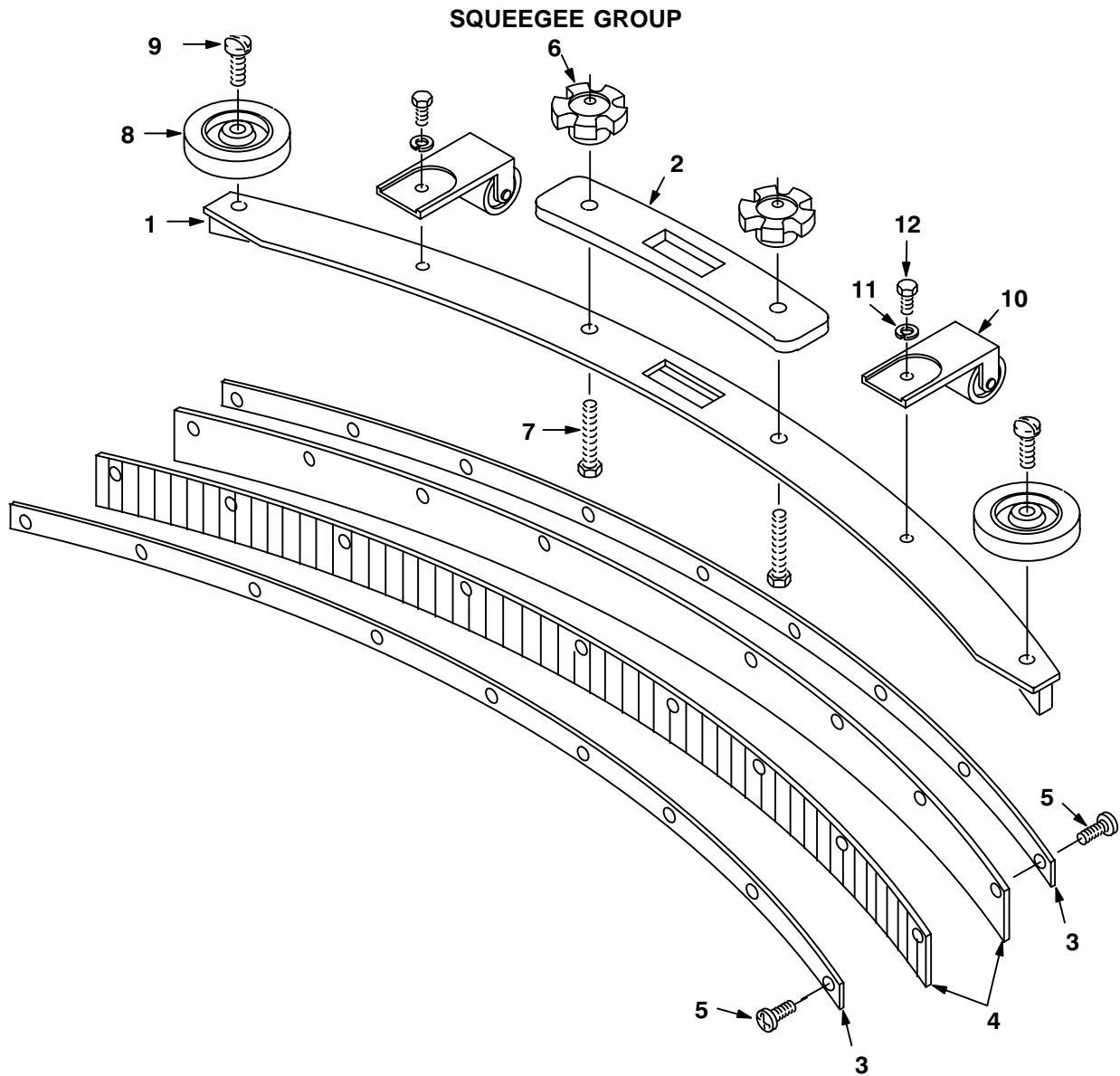
## SQUEEGEE CONTROL GROUP



REF	PART #	DESCRIPTION	QTY.
1	160613	●HOSE, VAC 1.5X30" W/CUFFS	1
2	630156	●CABLE, SQUEEGEE LIFT	2
3	140501	NUT	2
4	140236	SCREW, 1/2-13X1 1/4	2
5	140024	WASHER, LOCK	2
6	140045	WASHER, FLAT	6
7	140139	BUSHING	2
8	140516	NUT	1
9	600293	PIVOT, SQUEEGEE MOUNT	1
10	230730.BK	BRACKET, SQUEEGEE MOUNT	1
11	140509	NUT	2
12	602981	SCREW, 1/2-13X5 1/2	1
13	27257	●KNOB, 5/16-18	2
14	069 762 303	NUT	2

REF	PART #	DESCRIPTION	QTY.
15	140272	SCREW, M6X1.0X16MM	2
16	602880	PLATE, SQUEEGEE CABLE LINK	1
17	200 031 496	SCREW, M08X35	1
18	140015	WASHER, LOCK	2
19	140027	WASHER, FLAT	2
20	602885	HANDLE, SQUEEGEE LIFT	1
21	200816	●GRIP, HANDLE	1
22	604358	BUSHING SPACER	1
23	230661	PLATE, LOCK CONTROL HOUSING	1
24	200 031 488	SCREW, M8X1.25X20MM	1
25	140268	SCREW, M5X.8X12MM	2
26	140031	WASHER, LOCK	2
27	230712	PLATE, SQUEEGEE LOCK	1

● RECOMMENDED STOCK ITEMS



REF	PART #	DESCRIPTION	QTY.
▽	603262	●ASM., CURVED SQUEEGEE	1
▲1	602958	WELDMENT, SQUEEGEE	1
▲2	603260	●GASKET	1
▲3	602962	●PLATE, SQUEEGEE	2
▲4	603660	●BLADE, SQUEEGEE	2
▲5	140198	SCREW, 10-24X9/16, W/LOCK WASHER	24
▲6	27257	●KNOB, SQUEEGEE	2

REF	PART #	DESCRIPTION	QTY.
▲7	140221	SCREW, 5/16-18X1 1/4	2
▲8	630450	●WHEEL	2
▲9	140799	SCREW, 5/16-18X1 1/2	2
▲10	700844	●ROLLER SQUEEGEE	2
▲11	140015	WASHER, LOCK	2
▲12	140226	SCREW, 5/16-18X5/8	2

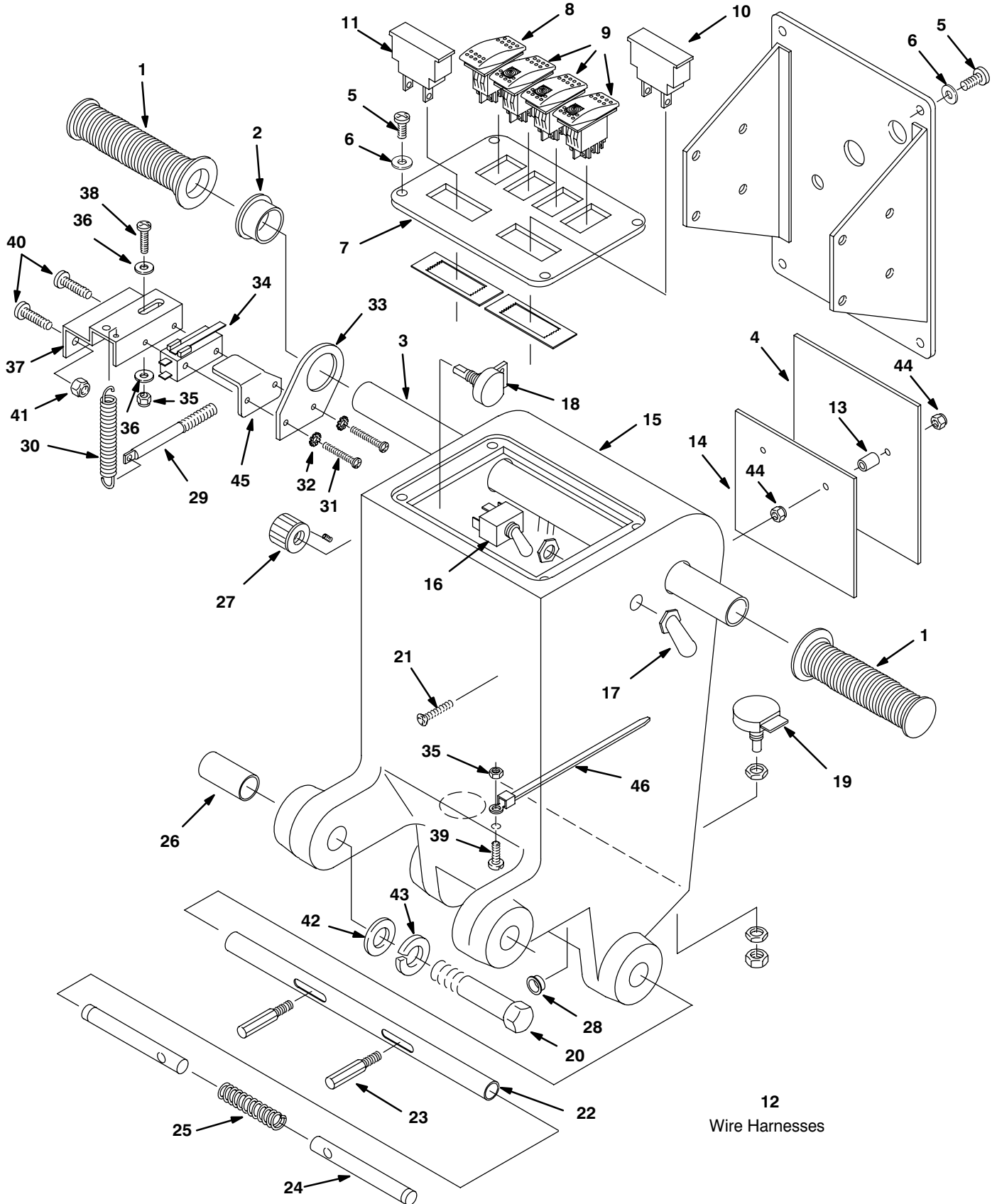
▽ ASSEMBLY

▲ INCLUDED IN ASSEMBLY

● RECOMMENDED STOCK ITEMS

# PARTS LIST

## CONSOLE GROUP





CONSOLE GROUP

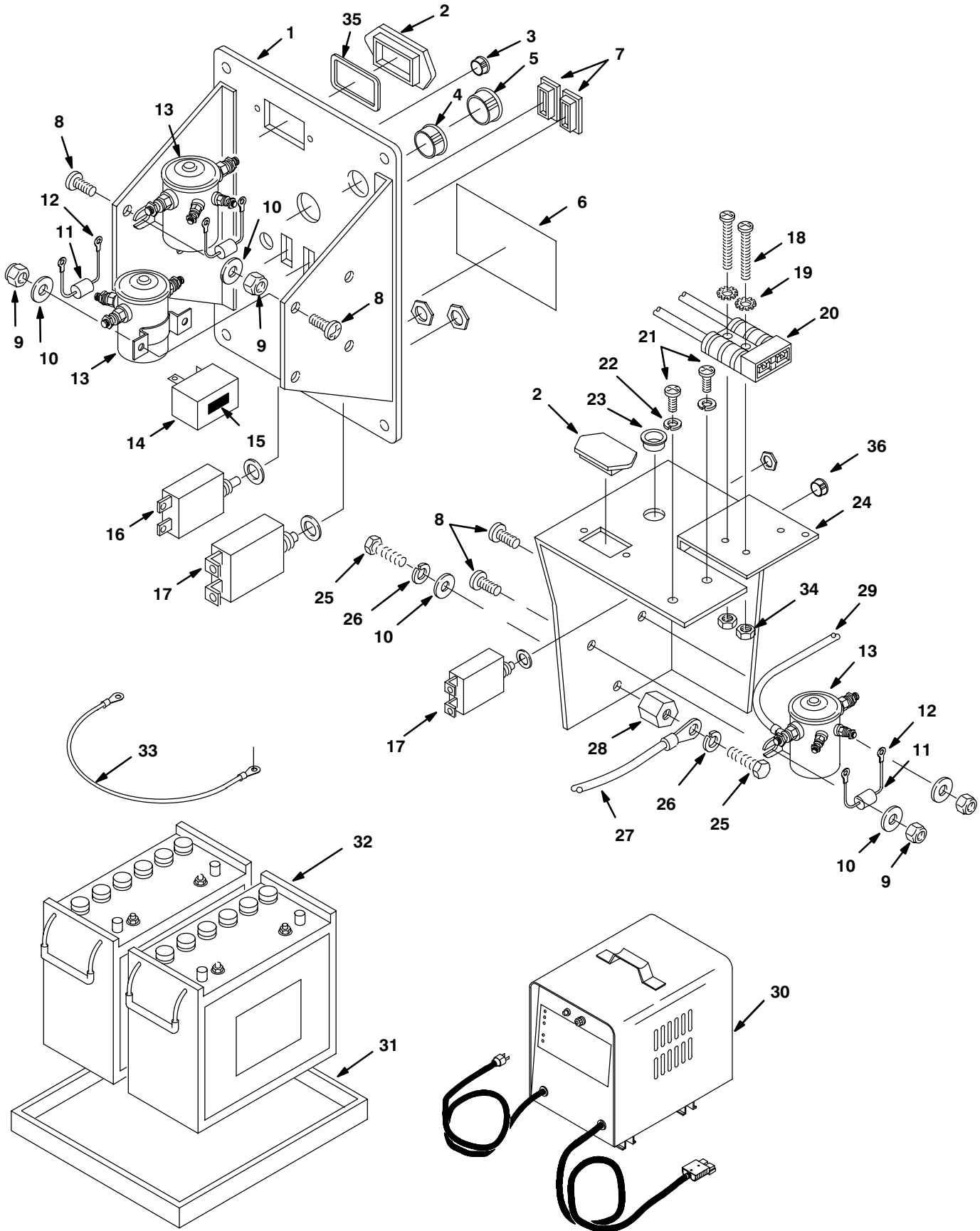
REF	PART #	DESCRIPTION	QTY.
1	200823	●GRIP, HANDLE TUBE	2
2	27099	BUSHING	1
3	604402	HANDLE, TUBE	1
4	630104	●SPEED CONTROL, PMB, 55 AMP	1
5	578 141 000	SCREW, M5X10MM	8
6	140018	WASHER, LOCK	8
▽	607144	ASM., SWITCH PANEL	1
▲7	602560	PANEL, SWITCH	1
▲8	603399	●SWITCH, DPDT MOM. ON/OFF/ MOM. ON	1
▲9	601107	●SWITCH, LIGHTED ROCKER	3
▲10	606020	●METER, BATTERY VOLTAGE 24V	1
▲11	606857	●GAUGE, BRUSH PRESSURE	1
▲12	602873	HARNESS CONSOLE W/POT. (NOT SHOWN)	1
	602874	HARNESS MAIN/SWITCH/CONSOLE (NOT SHOWN)	1
13	630261	SPACER	2
14	630128	HEAT SINK	1
15	608299	HOUSING, CONTROL, GREEN	1
16	601108	●SWITCH, TOGGLE	1
17	130753	●BOOT, SWITCH	1
18	130776	●POTENTIOMETER, 50K	1
19	130775	●POTENTIOMETER, 50K LOCK- ABLE	1
20	140351	SCREW, M12X1.75X70MM	2
21	630304	SCREW, M4X35MM	2
22	230715	TUBE, HANDLE ADJUSTMENT	1
23	230649	PIN, HANDLE ADJUSTMENT	2
24	230710	PIN, HANDLE LOCK	2

REF	PART #	DESCRIPTION	QTY.
25	140415	SPRING, LOCK PIN	1
26	140155	BUSHING	2
27	601110	●KNOB, SPEED CONTROL	1
28	603007	BUSHING, SNAP	1
29	602886	PIN, SPRING RETURN	1
30	601118	SPRING, EXPANSION	1
31	140829	SCREW, 6-32X1	2
32	140019	WASHER, LOCK	2
33	27098	BRACKET, SWITCH	1
34	130729	●SWITCH, ROLL	1
35	140552	NUT	2
36	140000	WASHER, FLAT	2
37	25671	MOUNT, SWITCH	1
38	140890	SCREW, 10-24X1/2	1
39	140900	SCREW, 10-24X3/4 TRSPHL	2
40	578 321 000	SCREW, M6X16MM	2
41	069 762 303	NUT	2
42	3148.816	WASHER, FLAT	2
43	140024	WASHER, LOCK	2
44	200 160 014	NUT	4
45	603830	PLATE, GUARD SWITCH	1
46	26561	CABLE TIE	1

● RECOMMENDED STOCK ITEMS

# PARTS LIST

## ELECTRICAL / BATTERY GROUP



**ELECTRICAL/BATTERY GROUP**

REF	PART #	DESCRIPTION	QTY.
1	602559	PANEL, CONTROL HOUSING	1
2	222519	PLUG	1
3	069 764 626	PLUG, HOLE 012.7	1
4	130161	PLUG, DOME .850	1
5	130175	PLUG, DOME .750	1
6	120649	DECAL, WARNING BATTERY	1
7	582150	PLUG, ACCESSORY SWITCH	2
8	578 321 000	SCREW, M6X16MM	6
9	140284	NUT, M6X1.0 NYLOCK	4
10	140000	WASHER, FLAT	4
11	130423	●DIODE, 400V	3
12	130125	RING, TERMINAL	6
13	130218	●SOLENOID, 24V	3
14	130021	●FLASHER, 24VDC	1
15	606243	TAPE, ACRYLIC, 1" X 12"	1
16	130737	●BREAKER, CIRCUIT BRUSH 10A	1
17	602951	●BREAKER, CIRCUIT 35 AMP	2

REF	PART #	DESCRIPTION	QTY.
18	140829	SCREW, 6-32X1	2
19	140019	WASHER, LOCK	2
20	27833	●CONNECTOR, RED 50A W/O CONTACTS	1
21	578 321 000	SCREW, M6X16MM	1
22	140018	WASHER, LOCK	2
23	130698	BUSHING, SNAP	4
24	602887	BRACKET	1
25	140553	SCREW, 1/4-20X1/2	2
26	140016	WASHER, LOCK	1
27	602871	CABLE, BATTERY #6 BLACKX20"	1
28	578427	STANDOFF	1
29	602872	CABLE, BATTERY #6 REDX28"	1
30	630121	CHARGER, 115V 60HZ 20 AMP	1
31	601991	TRAY, BATTERY	1
32	600394	BATTERY, 12V 215A	2
33	130364	●CABLE, BATTERY #6 BLACKX15"	1
34	140539	NUT, 6-32 KEP	2
35	603224	O-RING .929 ID X .996 OD	1
36	130208	PLUG, DOME	1

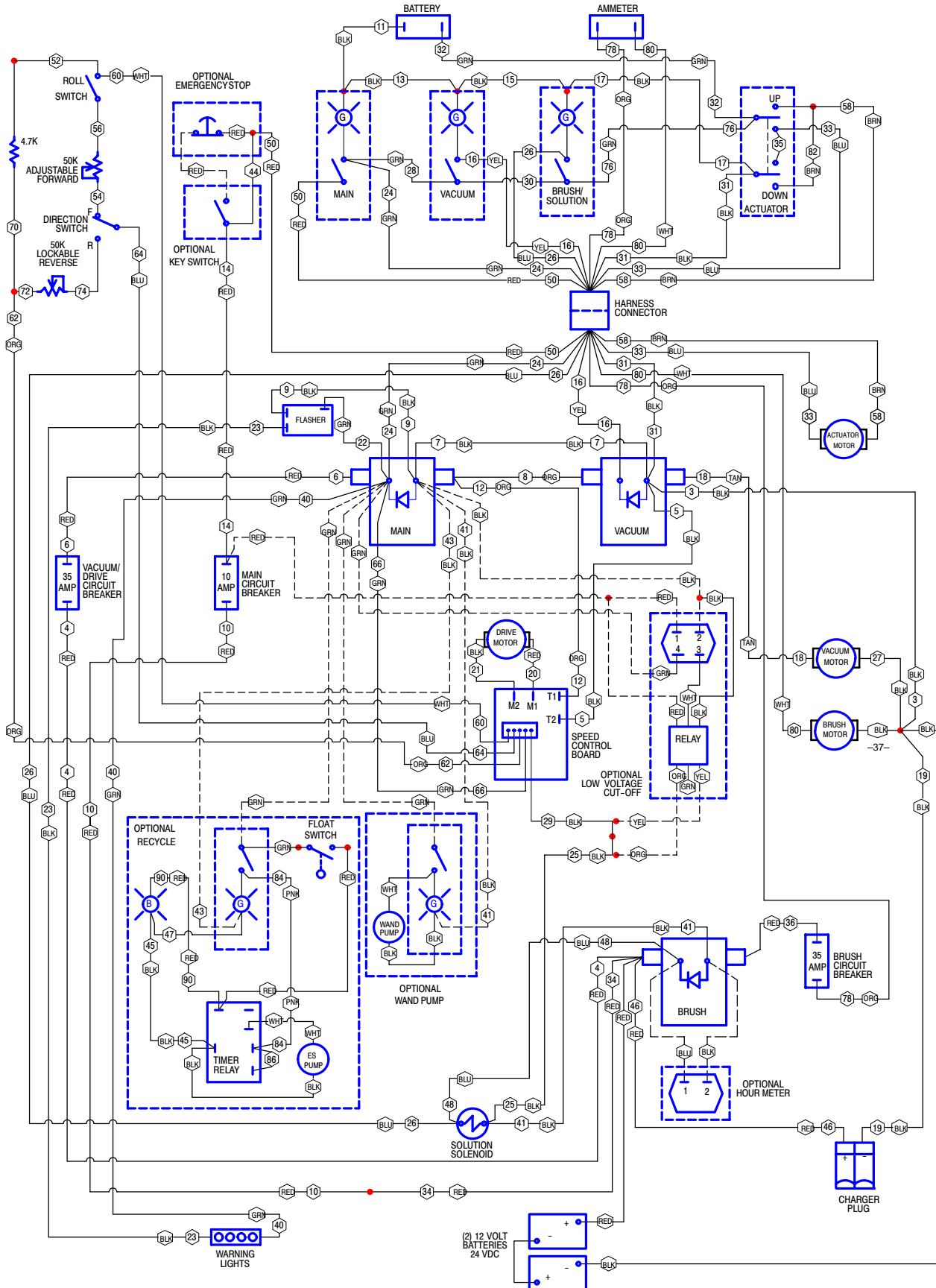
● RECOMMENDED STOCK ITEMS

**OPTIONS (Not Shown)**

REF	PART #	DESCRIPTION	QTY.
N/S	602993	KIT, KEY SWITCH	1
N/S	604357	KIT, AIR-FILLED TIRE	1
N/S	604259	KIT, FOAM-FILLED TIRE	1
N/S	602999	KIT, HOUR METER	1
N/S	603074	KIT, LOW VOLTAGE CUTOFF	1
N/S	602995	KIT, EMERGENCY STOP	1

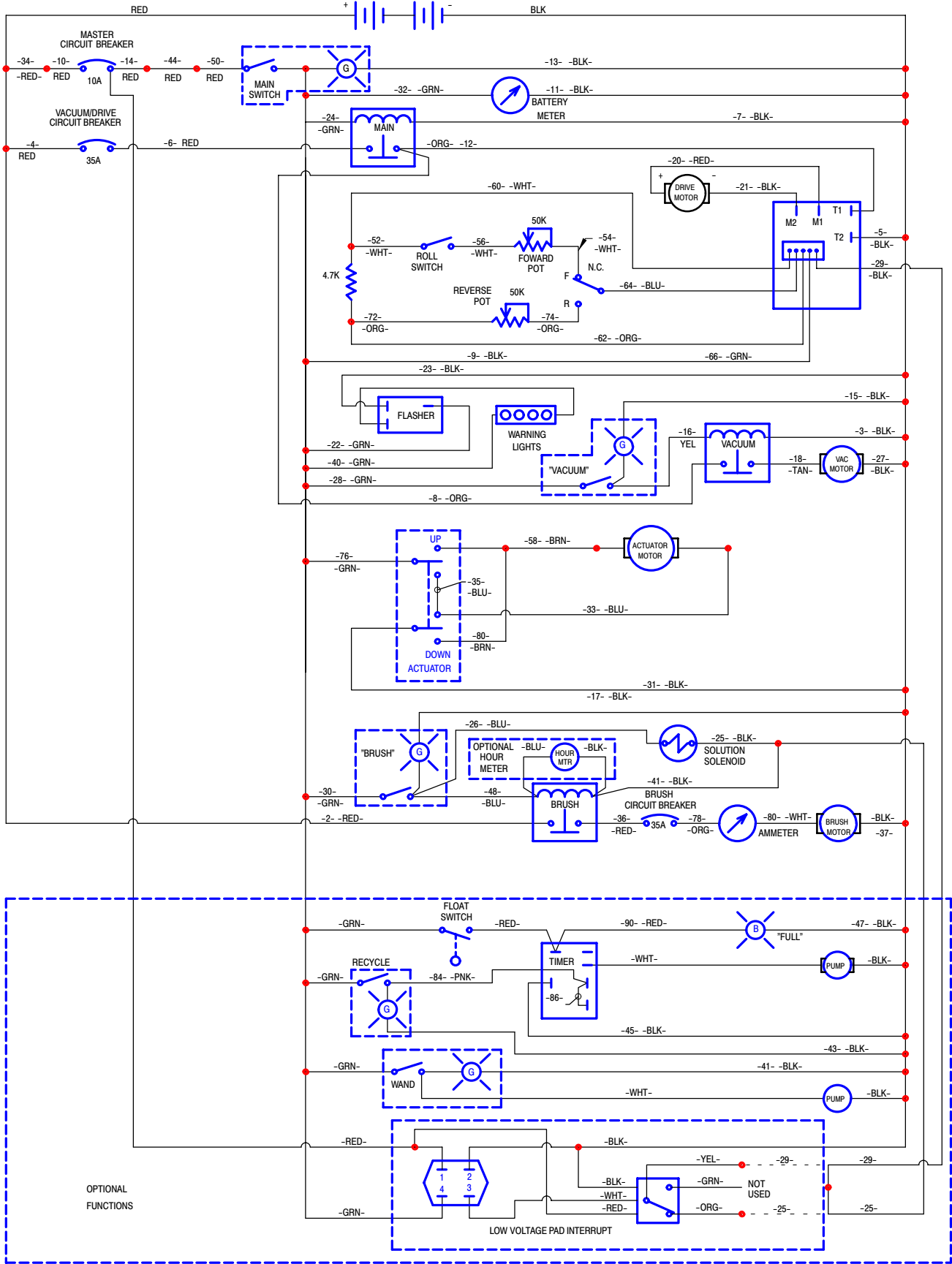
● RECOMMENDED STOCK ITEMS

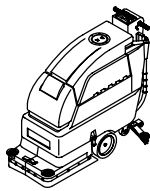
## WIRING DIAGRAM



LADDER DIAGRAM

(2) 12 VOLT BATTERIES  
24 VDC





# MAINTENANCE CHECK LIST WALL CHART

To maintain excellent service of this machine, perform this simple check list as described below. Refer to your Operator's Manual for further assistance.

DAILY	DESCRIPTION	PROCEDURE
EVERY 4 HOURS OPERATION	✓ BATTERIES	Recharge if needed.
	✓ PAD/BRUSH	Remove and clean. Replace if worn.
	✓ SQUEEGEE	Wipe off with a dry cloth. Store in "up" position. Inspect for damage.
	✓ REC/SOL TANKS	Drain and rinse thoroughly. Clean vacuum intake hole.
	✓ FLOAT SHUTOFF SCREEN	Remove and rinse thoroughly. Inspect for damage.
	✓ MACHINE	Clean with nonabrasive cleaner.
WEEKLY EVERY 20 HOURS OPERATION	✓ TANKS/SOLUTION LINE	Flush with .7L (24 oz.) acetic acid solution to 11.4L (3 gallons) of water. Rinse afterwards.
	✓ BATTERIES	Check water level, clean battery tops and inspect for loose or corroded battery cables.
MONTHLY EVERY 80 HOURS OPERATION	✓ MACHINE	Inspect for loose nuts, bolts and water leaks.
	✓ PIVOT POINTS	Lubricate with a water resistant oil.
	✓ FRONT CASTERS	Lubricate each caster grease fitting with a water resistant grease.
EVERY 250 HOURS OPERATION	✓ VACUUM, DRIVE AND BRUSH MOTOR	Inspect carbon brushes, replace if worn to 1cm (3/8 in) or less.

## TROUBLE SHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
<b>No power, nothing runs.</b>	Faulty main switch	Contact Service Center.
	Batteries need charging.	See CHARGING BATTERIES.
	Faulty battery(s).	Replace battery(s).
	Loose battery cable.	Tighten loose cable.
	MAIN circuit breaker has tripped.	Determine cause and reset breaker button.
<b>Brush motor does not run.</b>	Brush/Solution switch is not on.	Turn on brush/solution switch.
	Control grips are not rotated.	Rotate control grips.
	Brush circuit breaker(s) has tripped.	Clean or replace pad or brush and reset brush circuit breaker button.
	Faulty brush motor or wiring.	Contact Service Center.
	Carbon brushes worn.	Contact Service Center.
Faulty brush switch or solenoid.	Contact Service Center.	

*TRUBLE SHOOTING GUIDE continued on back side.*

## TROUBLE SHOOTING GUIDE - Continued

PROBLEM	CAUSE	SOLUTION
<b>Vacuum motor does not run.</b>	Faulty vacuum switch.	Contact Service Center.
	Vacuum circuit breaker has tripped.	Remove obstruction and reset breaker.
	Faulty vacuum motor or wiring.	Contact Service Center.
	Carbon brushes worn.	Contact Service Center.
<b>Drive motor does not run.</b>	Drive motor circuit breaker has tripped.	Determine cause and reset breaker.
	Faulty speed control circuit board or connection.	Contact Service Center.
	Faulty solenoid.	Contact Service Center.
	Faulty drive motor.	Contact Service Center.
	Faulty wiring.	Contact Service Center.
	Worn carbon brushes.	Contact Service Center.
<b>Drive motor runs, but not correctly.</b>	Faulty potentiometer or speed control board.	Contact Service Center
	Loose wire connection.	Contact Service Center.
<b>Little or no solution flow.</b>	Solution flow lever is not activated.	Push solution flow lever forward.
	Low water level in solution tank.	Fill tank with water/solution.
	Solution line or solution tank filter is clogged.	Remove hose and blow compressed air through it. Flush solution tank after each use.
	Solution valve or solenoid is clogged.	Remove valve or solenoid and clean. Do not scratch inside of valve.
	Faulty solution switch or solenoid.	Contact Service Center.
	Solution flow adjustment knob needs adjusting.	Turn solution flow knob clockwise to increase flow.
<b>Short run time.</b>	Batteries not fully charged.	Charge batteries.
	Bad cell in one or more batteries.	Replace batteries.
	Batteries need maintenance.	See BATTERY MAINTENANCE.
	Faulty charger.	Replace battery charger.
<b>Poor water pick up.</b>	Recovery tank is full.	Empty recovery tank.
	Float shutoff screen inside recovery tank is clogged.	Remove screen and clean.
	Squeegee is clogged with debris.	Clean squeegee.
	Squeegee blades are worn.	Replace squeegee blades.
	Squeegee thumbscrews are loose.	Tighten thumbscrews.
	Vacuum hose connections are loose or hose has a hole.	Push hose cuffs firmly on connections. Replace hose if damaged..
	Recovery tank inlet hole is obstructed.	Empty recovery tank and tilt tank sideways to access inlet hole, remove obstruction.
	Tank gasket is defective.	Replace gasket.
	Drain hose plug is loose.	Tighten drain plug.
	Recovery tank lid is loose.	Tighten lid.
	Vacuum motor is loose.	Contact Service Center.
	Battery charge level is low.	Charge batteries. Do not run machine when battery meter is in the red zone.
<b>Safety lights do not work.</b>	Flasher is burned out.	Contact Service Center.

**FOR SAFETY: When servicing machine, disconnect battery connections before working on machine.**