



Electronic Service Manuals

This electronic document is provided as a service to our customers. We do not create the contents of the information contained in this document. Should you have detailed questions pertaining to the information contained in this document, you may contact Michco, or the manufacturer which provided the original information in this electronic deliverable. Michco's only part in this electronic deliverable was the electronic assembly process. By providing this manual on line we are not guaranteeing parts availability.

You may contact Michco through the following methods:

Phone (517) 484-9312 or (800) 331-3339

2011 N. High St. -- Lansing, Michigan -- 48906

Fax: (517) 484-9836

Email: CustServe@Michco.com

Web site: www.Michco.Com

Parts Web site: www.FloorMachineParts.Com

Order Parts on Line at:

www.FloorMachineParts.Com

Directly to Parts & Service:

By Email: **Shop@Michco.com**

By Fax: (517) 702-2041

By Voice: Use numbers above.

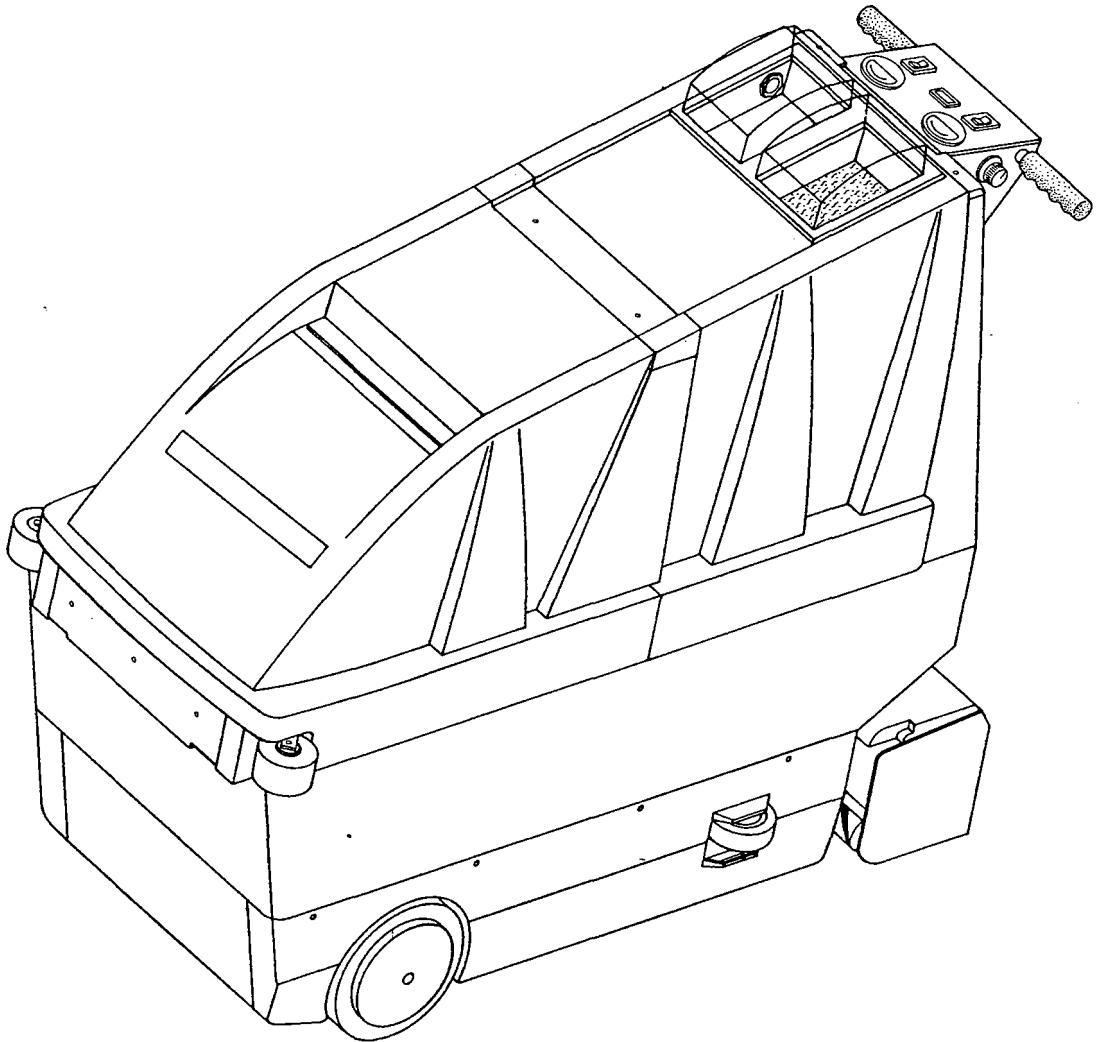
Serving the Cleaning Industry Since 1922

Notice: All copyrighted material remains property of original owners, all trademarks are property of respective owners. Manuals are subject to Manufacturer's reproduction limitations. Originals or reproductions were provided by manufacturers through a request. We make no warranty as to the correctness of information provided in this document and you assume all risk. By placing these manuals on line we are not declaring our corporation to be an manufacturer authorized dealer or provider, please check our web site for authorized manufacturers we represent.

- OPERATION
- SERVICE
- PARTS
- CARE

Hako
Minuteman®

C833345-B/E
Automatic Carpet Scrubber



Revised 12/91

ELECTRICAL REQUIREMENTS:

This piece of equipment employs two separate electrical systems, 24 Volt DC and 115 V AC.

BATTERY REQUIREMENTS:

2 x 12V 135/185 Amp Hour 20 Hr. Rate Deepcycle
4 x 6V 180 Amp Hour 20 Hr. Rate Deepcycle
220 Amp Hour 20 Hr. Rate Deepcycle

AC REQUIREMENTS:

115V AC 15 Amp grounded wall outlet.

BATTERY SERVICE AND INSTALLATION:

*Warning: Battery acid can cause burns. When working on or around batteries, wear protective clothing and safety glasses. Remove metal jewelry. Do not lay tools or metal objects on top of batteries.

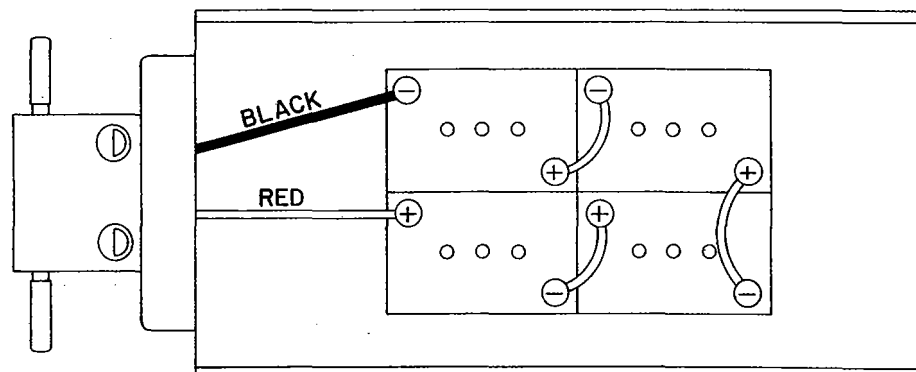
BATTERY INSTALLATION:

1. Disconnect tank drain hose from rear of machine.
2. Raise tank assembly by gripping side hand holds, underneath the lower side bumpers.
3. Disconnect vacuum and recovery hoses and finish tilting tank forward until in an upright position.
4. Install battery as shown below.

CHARGING OF BATTERIES:

Charging of batteries generates explosive gases. DO NOT CHARGE BATTERIES WHEN OPEN FLAMES OR SPARKS ARE PRESENT. DO NOT SMOKE. Make sure the charger is turned off before disconnecting it from the batteries. Charge the batteries in a well-ventilated area. Fluid levels should be checked before and after charging and maintained at the proper levels. If machine is not used for extended periods of time, batteries should be kept fully charged with a boost charge once a week.

BATT. CABLE
SET = 750060
JS 11-29-95

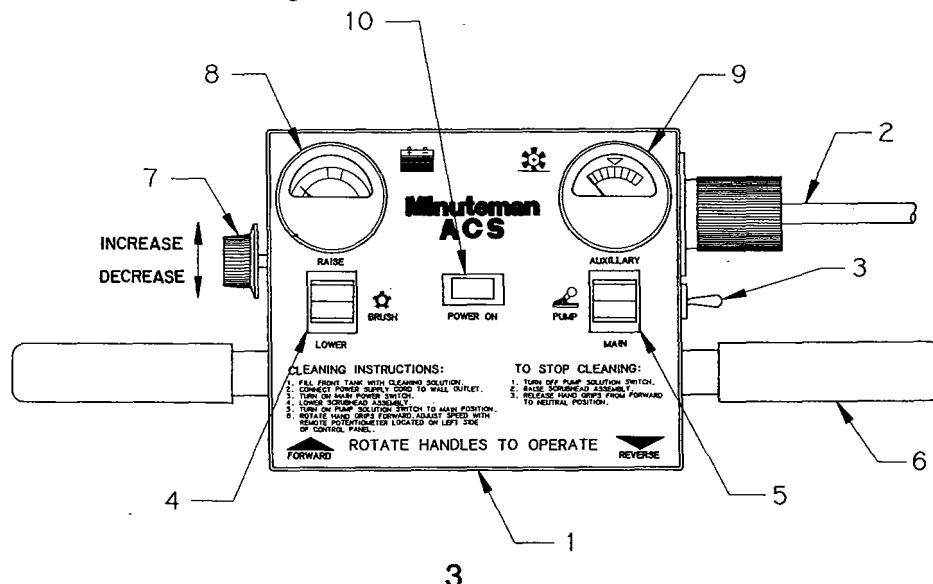


1. Operator View of Control Panel.
2. 115V AC Plug-In for Battery/Electric Model.
3. Main Power Switch: "ON" position activates all electrical systems.
4. Brush/Vac Shoe Raise and Lower Switch: Center position on switch stops function of raise/lower mode in segmented steps. NOTE: If switch is moved either to raise or lower position, function will be completed without moving switch to center position.
5. Pump Switch: To begin cleaning cycle, pump switch should be in main position. NOTE: In this position solution pump will only activate when scrub head is in completely lowered position and handle grips are rotated forward to activate drive system.

Center position is off.

Auxiliary position on switch allows solution pump to run independently of machine functions, i.e., auxiliary floor tool operation, drain solution tank.

6. Operator Handle: Forward rotation activates forward drive motion - backward rotation for reverse. Releasing handle to center location stops drive system. Special warning: Before reversing machine, speed control #7 should be turned to decrease direction.
7. To Increase or Decrease Working Speed: Turn knob as indicated.
8. Battery Condition Gauge: When gauge indicates low charge, refer to instructions on Page 2 for care and maintenance of batteries.
9. Brush Pressure Gauge: Adjust brush pressure until gauge indicator reads into center green zone. Refer to Page 4, Figure 2, Item 10 for adjustments.
10. Power "ON" indicator light.



1. Dirty solution recovery window.
2. Vacuum filter viewing window.
3. Vacuum filter.
4. Forward and reverse operator handle grips.
5. Drain hose stopper.
6. Recovery tank drain hose.
7. Vacuum scrub head hookup.
8. Spray Jet/Auxiliary floor tool hookup.
9. Scrub head assembly.
10. Brush pressure adjustment.
11. Circuit breaker 10 amp scrub brush drive motor.
12. Circuit breaker 3 amp scrub head raise/lower mechanism.

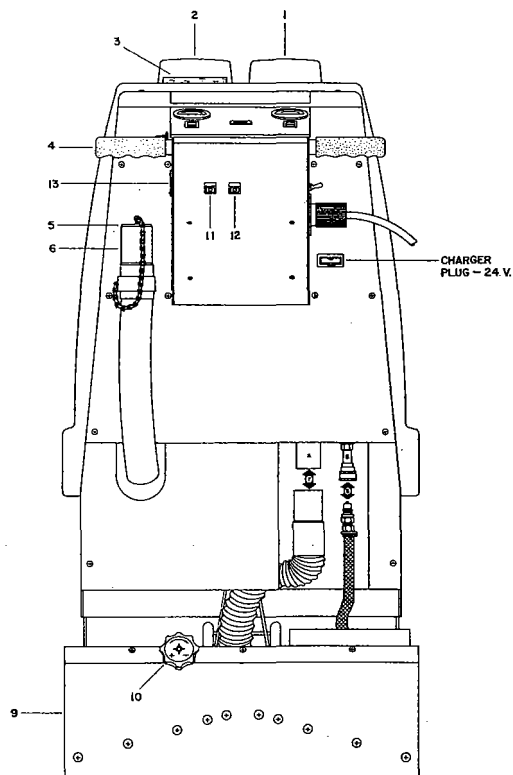


FIG. 2

OPERATING INSTRUCTIONS

1. Filling: Fill the solution tank with the desired amount of water and add liquid cleaning solution to the proper dilution ratio. DO NOT USE powdered cleaning chemicals. Powders are unlikely to dissolve thoroughly, resulting in clogging the inline solution filter. This can reduce or stop water flow to the pump and spray jets.
2. Connect power supply cord to grounded wall outlet.
3. Turn on main power switch.
4. Lower the scrub head assembly by moving rocker switch to lower position. NOTE: Scrub head assembly will fully rotate into position when machine is engaged in the forward direction. When reversing machine scrub head assembly does not need to be raised. Head will release automatically and return to correct position during forward cleaning operation.
5. Turn on pump switch to main position.
6. Rotate hand grips forward and adjust for cleaning speed desired.
7. Adjust scrub head assembly, Figure 2, Item 10, Page 4, until brush pressure gauge indicator reads in green zone.

To Stop Cleaning:

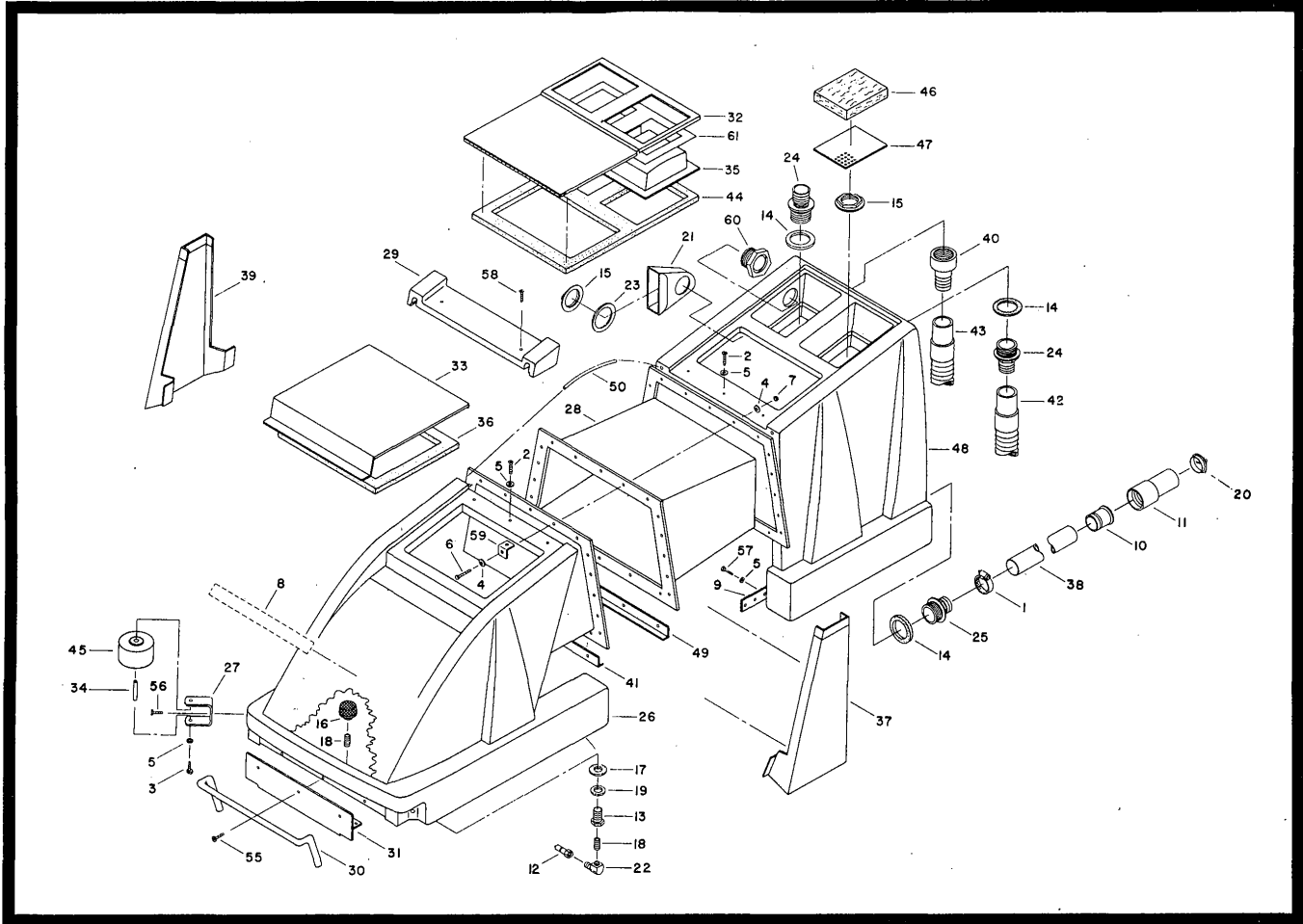
1. Turn off pump solution switch (center position) and continue forward cleaning mode for an additional two feet.
2. Raise scrub head assembly by moving switch to raise position.
3. Release handle grips from forward position to center neutral position.

Draining Recovery Tank:

Transport machine to proper drain site. Lower drain hose, Figure 2, Item 6, grasping hose cuff and plug, then lowering to drain. Remove drain plug, Item 5, to empty.

Accessory Attachments:

1. Turn master switch off.
2. Disconnect vac hose, Figure 2, Item 7 and attach vacuum hose from remote tool to tube A.
3. Disconnect solution hose, Figure 2, Item 8 and install remote tool solution hose to quick disconnect "B" turn pump solution switch, Figure 1, Item 5, to auxiliary.
4. If electric power head is used, attach power cable to Item 13, Figure 2, electrical outlet.
5. Turn on main power switch.
6. Lower scrub head assembly to activate vacuum motor.



LOWER SOLUTION TANK
BRACE # 833313

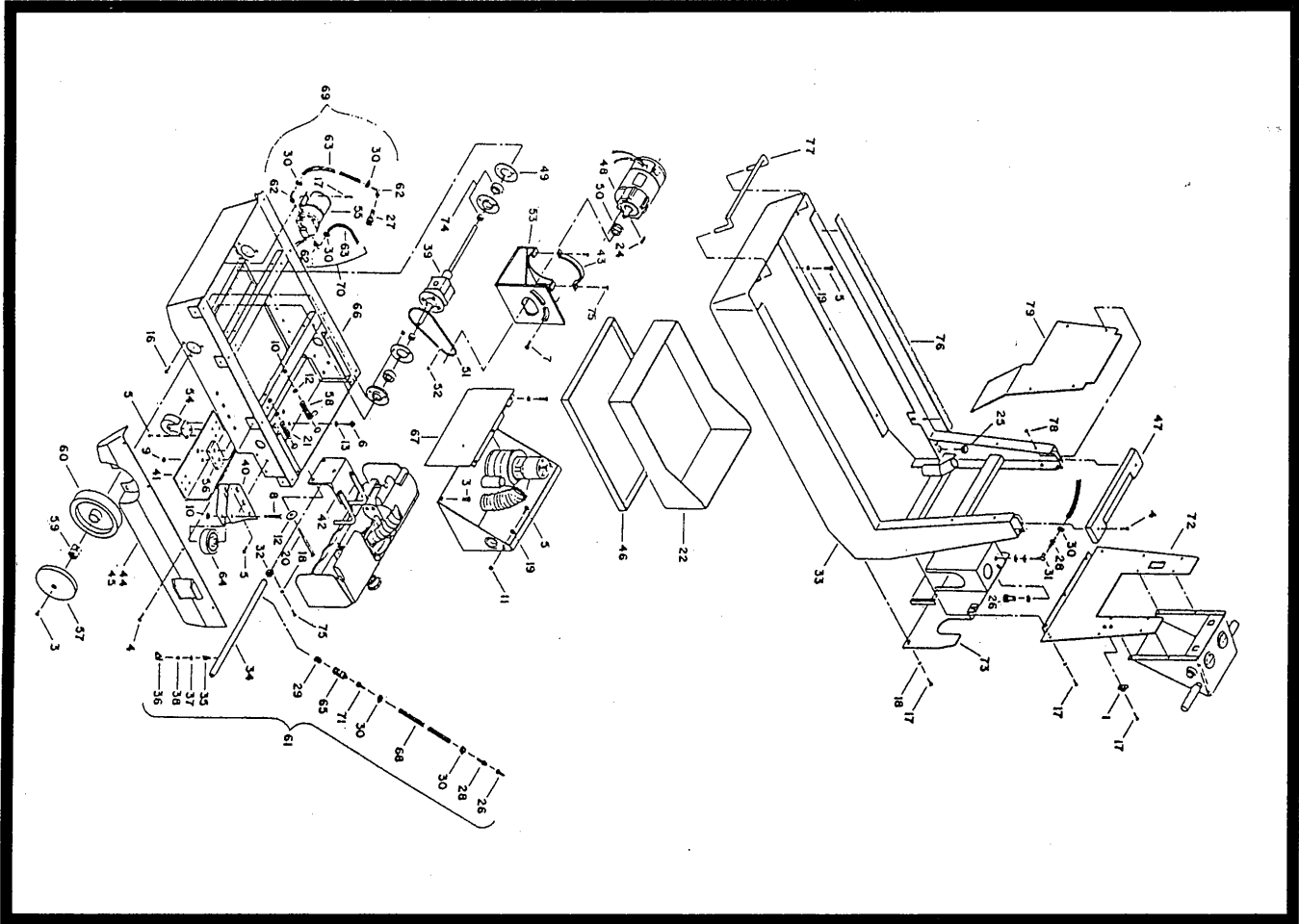
TANK ASSEMBLY

JS 40-14-86

ITEM	PART #	QTY.	DESCRIPTION	ITEM	PART #	QTY.	DESCRIPTION
1	270249	1	Hose Clamp #24	30	833088	1	Hinge Tube Mtg. Bkt.
2	710154	6	SCR-MC 10-32 x .562 SS	31	833188	1	Hinge Support L Bkt.
3	710353	2	SCR-MC 10-32 x .37 ST PL	32	833252	1	Tank Cover, Back
4	711505	44	WSR-Flat 1/4	33	833253	1	Tank Cover, Front
5	711553	8	WSR-Internal Lock #10	34	833254	2	Bumper Wheel Axle
6	712566	22	SCR-MC 1/4-20 x 1.25 SS	35	833311	1	Vac/Recover Plastic Wind
7	712667	22	Nut-Hex 1/4-20 SS Nyloc	36	833312	1	Gasket Diecut Front Cover
8	715091	1	Decal Diecut Minuteman ACS	37	833314	1	Tank Side Cover LH
9	760128	2	Tank Splice Bracket	38	833315	1	White Drain Hose 1.5 x 17"
10	760343	1	Tube Hose	39	833317	1	Tank Side Cover RH
11	805613	1	Hose Cuff 1.5	40	833324MCH	1	Adapter 1.5 x 1.5
12	828952	1	Hose Barb	41	833338	1	L Bracket Tank Retainer
13	828945	1	Bulkhead Fitting 1/4 x 3/4	42	833343	1	Vacuum Hose Assembly
14	828970	3	WSR Neop 1.81 x 2.37 x .09	43	833344	1	Squeegee Hose Assembly
15	828971	1	Nut 1 1/2 Pipe Thread	44	833359	1	Gasket Diecut Rear Cover
16	828974	1	Strainer	45	832896	2	Guide Wheel
17	828975	1	WSR Neop .75 x 1.5 x .09	46	833382	1	Foam Vac Filter
18	828981	2	Brass Nipple 1/4	47	833482	1	Pref Vac Screen
19	829463	1	SS Washer	48	833513	1	Recovery Tank
20	833316	1	Stopper	49	833531	1	L Bkt. Tank Retainer Lower
21	830448	1	Deflector	50	833547	2	Tube Plastic .312OD 4.5L
22	831306	1	Street 90 1/4 Brass	55	710178	6	SCR-MC 1/4-20 x .50 ST PL
23	831664	1	WSR SS 2.12ID x 2.75OD x .03	56	710985	2	SCR-SC 3/8-16 x .62
24	831812	2	Adapter 1.5MPT x 1.5HB AB	57	711202	8	BLT-HH 1/4-20 x .50 ST PL
25	831812MCH	1	Adapter Drain Hose	58	711125	2	SCR-ST-B 10 x .50 NI
26	832898	1	Tank, Solution	59	833323	2	L Bkt. Cover Mount ACS
27	832949	2	Bracket, Bumper	60	831081	1	Adapter
28	832986	1	Solution Bag	61	760263	2	Foam Tape 1/16 x 1/2
29	833053	1	Tank Top Cover ABS				

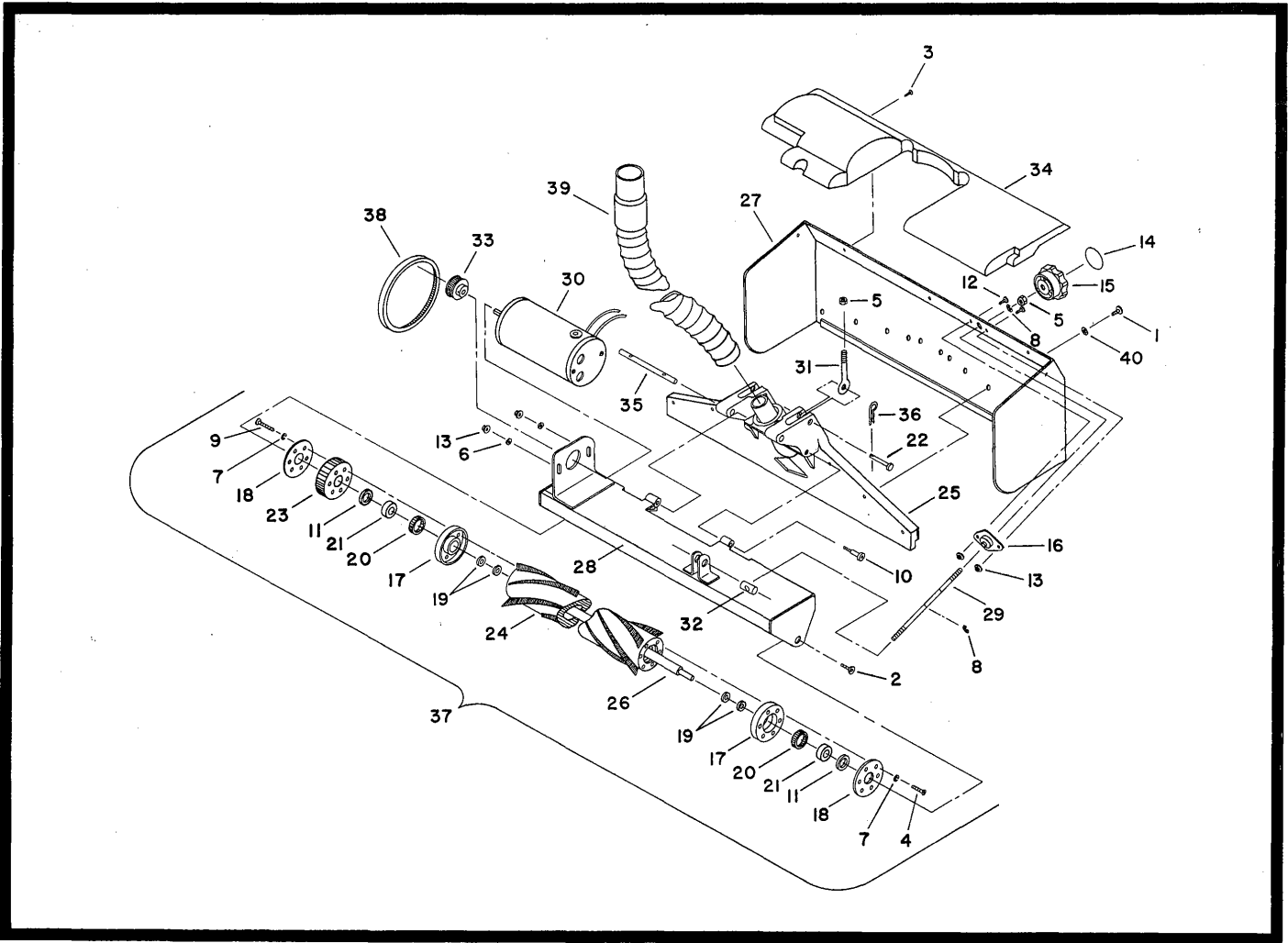
SIDE BRACES FOR TANK 833043 - 2
833042 - 2

Solution & Recovery
022310 - Complete Tank Assembly



BASE ASSEMBLY

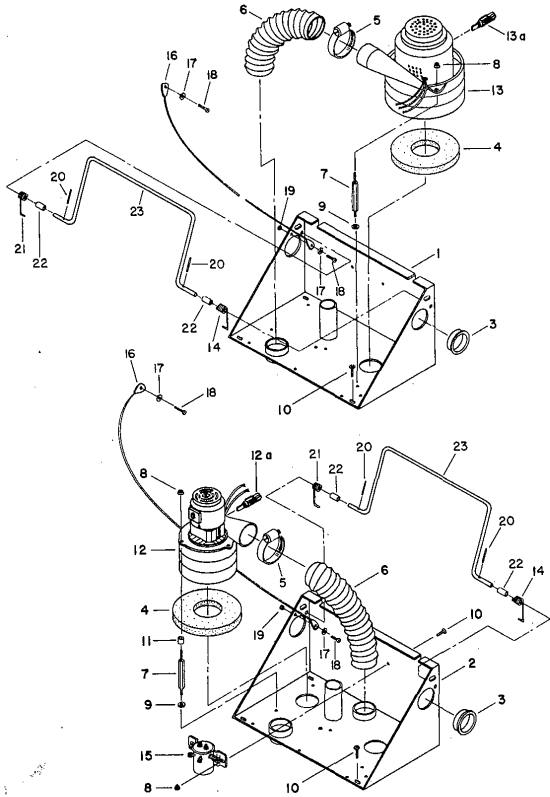
ITEM	PART #	QTY.	DESCRIPTION	ITEM	PART #	QTY.	DESCRIPTION
1	10-046	1	Clamp	42	833196	1	Plate, Scrub HD Mount
2	710128	3	SCR-MC 8-32 x .37 ST PL	43	760604	1	Bkt. Anti Rotation
3	710177	6	SCR-MC 1/4-20 x .37 ST PL	44	833260	1	Right Side Skirt
4	711105	16	SCR-ST-A 10 x .50 NI	45	833261	1	Left Side Skirt
5	711202	27	BLT-HH 1/4-20 x .50 ST PL	46	833276	1	Battery Tray Assembly
6	711231	2	BLT-HH 5/16-18 x 1.25	47	833279	1	Cover, Top
7	712083	2	BLT-HH 3/8-16 x .62 ST PL	48	740226	1	1/2 HP Motor Gearhead
8	711254	2	BLT-HH 3/8-16 x 2.50 ST PL	49	833289	4	Bearing Flangette
9	711374	2	Nut-Nloc 5/16-18	50	833290	1	14 Tooth Sprocket
10	711375	5	Nut-Nloc 3/8-16	51	760606	1	Dr Chain
11	711425	3	Nut-Flanged Wizz 1/4-20	52	833292	1	Chain Master Link #35
12	711515	6	WSR-Flat .44 x .87 x .07	53	750705	1	Motor Mtg. Bracket
13	711516	4	WSR-Flat .31 x 1.25 x .05	54	760251	2	Caster
14	711546	1	WSR-Helical 3/8	55	833299	1	Pump 100PSI 24V DC
15	711552	5	WSR-Internal Lock #8	56	833300	1	Rubber Pivot Mtg.
16	712042	10	Bolt-WSR HH 5/16-18 x .62	57	833301	2	Hub Cap
17	712822	28	SCR-THMS 10-24 x .50 ST PL	58	833302	1	Die Spring
18	711553	28	WSR-Internal Lock #10	59	833304	2	Trantorque Hub
19	711505	8	WSR-Flat 1/4	60	833305	2	Wheel 8-715 1.5 Bore
21	762339	2	Spring, Compression	61	833306	1	Spray Tube Asm
22	762369	1	Case, Battery Liner	62	833325	2	Elbow Pls 1/4MPT x 3/8 Barb
24	808821	1	SQ Key .187 x 1	63	833362	1	3/8 ID Nylon Reinfo Hose
25	809803	4	Bushing, Snap	64	833371	2	Moldon Wheel
26	828368	1	BH2-61 Male Coupler	65	833384	1	Check Valve 1/4AB-5LB
27	828952	1	Hose Barb	66	833433	1	Base Dolly Assembly
28	828952	1	3/8 Barb x 1/4 MPT	67	833435	1	Exhaust Baffle
29	828981	1	Brass Nipple 1/4	68	833447	1	Hose, Spray Pipe
30	829129	2	Hose Clamp Micro-Seal	69	833448	1	Pump Hose, Suction
31	831306	1	Street 90 1/4 Brass	70	833449	1	Pump Hose, Pressure
32	831418	2	Clamp Metal PVC Coated	71	833473	1	Hose Barb 1/4FPT x 3/8 Barb
33	832919	1	Trim Panel Weld Assembly	72	833524	1	Rear Panel
34	832972	1	Spray Tube	73	833532	1	Lower Rear Panel
35	833140	1	Body Inlet Conn.	74	881059	2	Bearing .75ID w/l Collar
36	833141	1	Cap	75	710153	2	SCR-MC 10-32 x .37 NI PL
37	833142	1	Gasket, Cap	76	760900	2	Lid Gasket .12 x 75 50" PS
38	833143	1	Spray Tip	77	833088	1	Hinge, Tube Mtg. Bkt.
39	833187	1	Differential	78	711105	4	Screw, FH #10
40	833190	2	Side Wheel Bracket Assy.	79	833268	1	Rear Electrical Panel Cover
41	833195	1	Bracket Caster Mount				



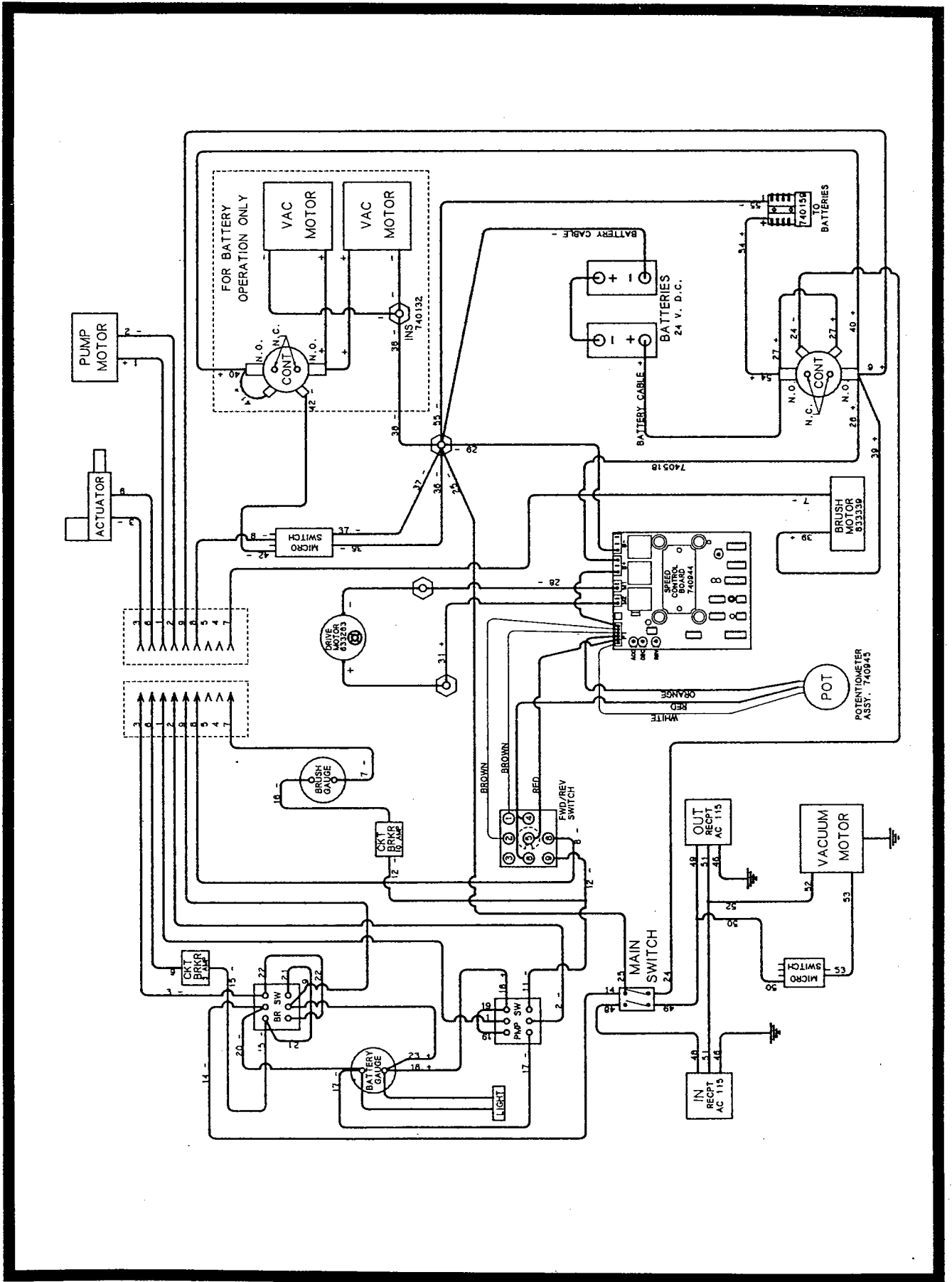
SCRUB HEAD ASSEMBLY

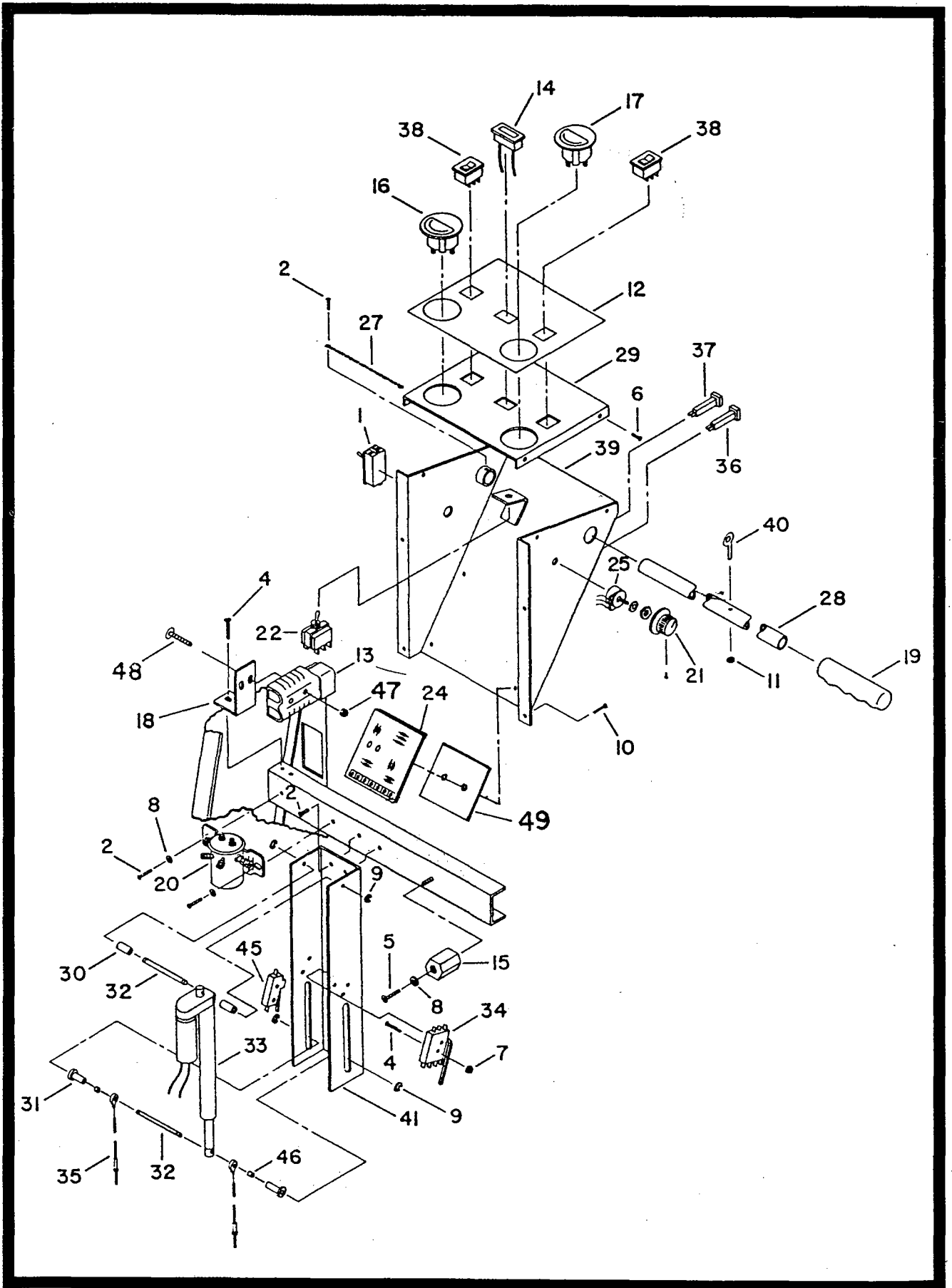
ITEM	PART NO.	QTY.	DESCRIPTION	ITEM	PART NO.	QTY.	DESCRIPTION
1	710178	10	SCR-MC 1/4-20 x .50 ST PL	21	828588	2	Bearing
2	710923	2	SCR-SC 5/16-18 x .62 ST PL	22	831965	2	Clevis pin
3	711104	5	SCR-ST-A 10 x .50	23	832903	1	Br pulley 3-40GR 5MM
4	711126	6	SCR-ST-B 10 x .75	24	832953	1	Brush core
5	711391	3	Nut-Hex Jam 3/8-16 ST PL	25	832964MCH	1	Vac shoe asy. machined
6	711503	2	WSR-Flat #10	26	832968	1	Brush shaft
7	711543	12	WSR-Helical #10	27	832969	1	Scrub head plate
8	711717	2	Retaining Ring-E Ext .37	28	833263	1	Brush head weldment
9	712066	6	SCR-ST-AB PH 10 x 1.25 PL	29	833281	1	Threaded rod adj SS
10	712081	2	BLT SDR 5/16/18 x .75 x .375	30	833339	1	Mtr 1/4 HP 24V DC CW
11	712310	2	WSR-Flat .52 x .87 x .06 PL	31	833341	2	Eye bolt 3/8-16 x 2 1/2
12	712811	2	SCR-MC 10-24 x .50 ST PL	32	833342	1	Shaft pivot SS
13	712908	4	Nut-Flanged Wizz 10-24	33	833357	1	Pulley mtr 20 tooth 5MM
14	715090	1	Decal Brush Pressure	34	833370	1	Splash shield ABS cover
15	760034	1	Knob, adj 3/8 x 16	35	833373	1	Rod adj pivot SS
16	760035	1	Bearing, flanged mounted	36	833374	2	Hairpin cotter 3/8
17	827894	2	Cup bearing	37	833375	1	Brush asm
18	827896	2	Cover bearing	38	833376	1	Belt HTD 5MM x 350MM
19	827903	4	Washer	39	833529	1	Vac hose asy
20	828145	2	Ring retaining	40	711554	10	WSR-Internal lock 1/4 ID

VACUUM BULK HEAD ASSEMBLY



ITEM	PART NO.	QTY.	DESCRIPTION
1	833280	1	Bulk head assembly
2	833255	1	Bulk head assembly battery
3	762400	1	Heyco bushing
4	828995	2	Gasket seal 2.5 x 6 x .62
5	760859	2	Hose clamp
6	833191	2	Hose 2 x 9
7	833265PLT	3	Threaded spacer
8	711425	6	Flanged wizz nut 1/4-20
9	711505	6	WSR flat 1/4
10	710177	3	SCR-MC 1/4-20 x .37
11	762371	6	Bushing .260 x .50 x .37
12	740225	2	Vacuum motor 24V
12A	809840	2	Carbon brush set of 2
13	830884	1	Vacuum motor 3 stage 115V
13A	255008	2	Carbon brush
14	900080	1	Torsion spring right hand
15	788147	1	Solenoid 24 volt DC
16	833436	1	Tilt cable
17	711506	1	WSR flat 5/16
18	712041	1	Shoulder bolt 1/4-20 x .44 x .37
19	711373	1	Lock nut 1/4-20
20	711615	2	Rollpin .12 x .75
21	900081	1	Spring left hand
22	833256	2	Bushing .39 x .51 x .87
23	833257	1	Lift bar





ELECTRICAL BOX ASSEMBLY

ITEM	PART #	QTY.	DESCRIPTION
1	380002	1	Switch, Toggle 1.5 HP
2	710153	8	SCR-MC 10-32 x .37 NI PL
3	710203	8	SCR-MC 6-32 x .37 ST PL
4	710153	4	SCR-MC 10 x 32 x .37
5	711203	2	BLT-HH 1/4-20 x 5/8
6	711105	4	SCR-ST-A 10 x .50 NI
7	711301	4	Nut-Hex 6-32 ST PL
8	711554	4	WSR-Loc 1/4
9	711720	4	Retaining Ring - E Ext. .25
10	712822	4	SCR-THMS 10-24 x .50 ST PL
11	712900	1	Nut-Hex 10-24 ST PL
12	715092	1	Decal Ins.
13	740159	1	Charger Plug 24V
14	740133	1	Light, Indicator 36V DC
15	740132	1	Terminal Insulator
16	740215	1	Gauge Brush Pressure
17	740216	1	Gauge Battery Cond
18	760130	1	Bkt, Mounting
19	762086	2	Grip, Handle
20	788147	1	Solenoid 24V DC
21	809874	1	Knob
22	827060	1	Switch Drive
23	829851	1	Flgd Twst Loc FM Midget
24	740944	1	Scr Control 24V DC
25	740945	1	Potentiometer Assy.
26	830540	1	Fig Male Recept 15 A 125
27	831598	1	Spring Ext .280 x 5.07
28	832855	1	Handlebar
29	832899	1	Cover, Handle Top
30	833277PLT	2	Actuator Top Bush Plated
31	833286PLT	2	Actuator Bottom Bush Plated
32	833294	2	Actuator Pin
33	833328	1	Actuator S24-17A8-04
34	833329	1	Actuator Switch
35	833331	2	Cable Assy. Vac Shoe Lift
36	833332	1	Circuit Breaker 10A
37	833333	1	Circuit Breaker 3A
38	833335	2	Rocker Switch
39	833372	1	Electrical Box Assembly
40	833378	1	Eye Bolt 10/24 1.50
41	833535	1	Actuator Support
42	828796	1	Connector
43	829880	1	Cord 75 Ft.
44	830292	1	Cord Assy. 75 Ft.
45	740129	1	Switch, Snap SPST NC
46	762073	2	Bushing
47	711373	2	Nut Nyloc 1/4-20
48	711210	2	BLT-HH 1/4-20 x 1.25
49	805637	1	Fiber Insulator

TROUBLE SHOOTING GUIDE

Use this guide to pinpoint problem areas that may arise with use of your ACS machine. **CAUTION!** Unplug supply cord and disconnect batteries before servicing machine components.

SOLUTION SYSTEM

- I. No water dispensed from spray jets.
 - A. The hose connection at the pump for the spray tube may not be tight. Disconnect and reconnect the fittings so they snap together securely.
 - B. The solution pump diaphragm may be damaged. Inspect by removing the pump head from the pump and inspect the diaphragm for cracks. Replace if required.
- II. Spray intermittent or streaked.
 - A. Solution hoses may be pinched or kinked. Replaced kinked hoses if found.
 - B. The filter strainer in the solution tank may be clogged. Clean the strainer thoroughly.
 - C. The spray jets may be clogged. Remove the end plug from the spray tube and flush out by turning the pump on. Remove the spray jets from the tube and clean as required. Do not clean out the hole in the jet with a pin or wire. This may cause damage to the jet causing permanent streaking.

SOLUTION RECOVERY SYSTEM

- I. Solution recovery is reduced.
 - A. Vacuum filter may be clogged. First check filter in recovery tank. Clean if required.
 - B. Check vacuum hoses for secure fit over the vacuum fittings. Tighten clamps where used. Also check hoses for cracks, kinks or clogging.
 - C. Check the seals on the tank covers for damage. Replace if needed. Make sure covers close freely without restrictions.
 - D. Make sure the drain hose on the back of the tank is sealed.
 - E. Check the vacuum slot on the scrub head for clogging. Clean out slot if required.
 - F. Vacuum motor brushes could be worn. Inspect and replace. If the motor has run through two sets of brushes, replace the motor.

ELECTRICAL SYSTEM D.C.

- I. Brush does not run.
 - A. The belt for the brush drive may be broken. Remove belt cover and inspect. Replace if broken or worn.
 - B. Check to see if circuit breaker button is tripped. Re-set.
 - C. Check motor carbon brushes for wear. Replace if worn out.

- D. Make sure the drive pulleys are secure to the motor and brush shafts.
- II. Pump motor does not run.
 - A. Check pressure switch for short circuit. By-pass the pressure switch by connecting the two black leads to the switch to one another. If the motor then runs, replace the pressure switch.
- III. Machine fails to run when handle switch is activated.
 - A. When the switch lever is activated a snapping or clicking sound should be heard. This is the solenoid activating. If not heard the solenoid may be malfunctioning. To check, install a jumper wire across the two large posts opposite each other on the side of the solenoid. Activate the switch lever. If the machine runs the solenoid is shorted and must be replaced.
 - B. Speed control may be shorted out.
 - C. Speed control potentiometer may be defective.
- IV. Machine surges or stalls when running.
 - A. Batteries may not be fully charged. Check with battery tester. Charge batteries if required.
 - B. Battery posts may be corroded. Clean posts and make sure terminals are secure.
 - C. Check the terminal block connections to make sure they are secure.

DRIVE TRAIN

- I. Drive train making knocking or clinking noise.
 - A. Chain may be too tight. Adjust chain tension so there is approximately 1/4" slack in chain span.
 - B. The motor bearings may be causing the noise. Replace the motor if bearings are causing the problem.

ELECTRICAL SYSTEM A.C.

- I. Vacuum motor does not start.
 - A. Inspect the micro switch lever inside the electrical enclosure to make sure it is functioning properly. As the scrub head is lowered the lever should activate the switch. Bend the switch lever to adjust function if required.
 - B. Check motor carbon brush.
 - C. Check plugs on power cord.

For all the above make sure all the electrical connections are secure. Make sure the cord to the wall outlet is secure.