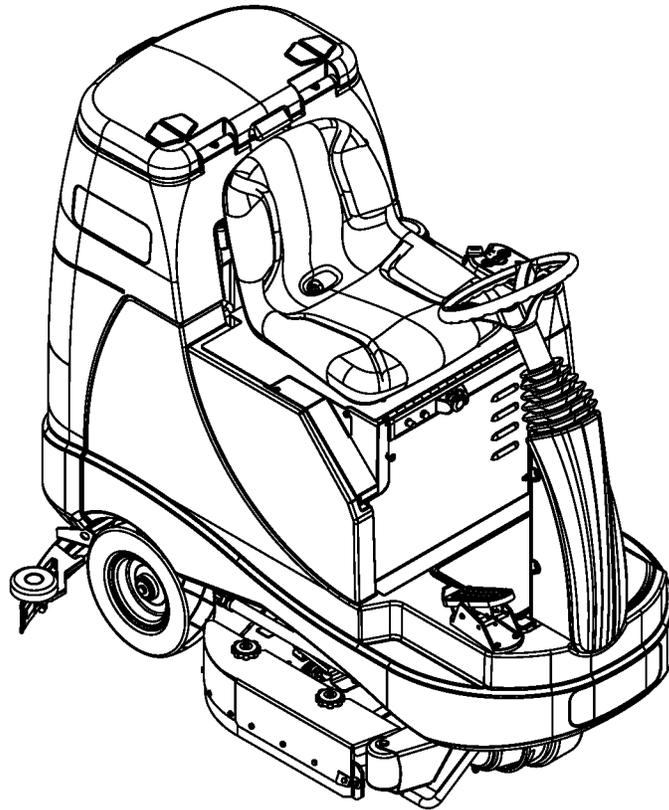


# **Advenger™**

## **2800ST, 3400ST**

### **BR 755, BR 855**

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### **Quick Start Service Manual**

**Advance MODELS:**

56601000, 56601001, 56601002,  
56601003, 56601004, 56601005, 56601006,  
56601007, 56601008, 56601009, 56601010,  
56601011, 56601012, 56601013, 56601019,  
56601020, 56601891, 56601892

**Nilfisk MODELS: 56601014, 56601015,  
56601016**



**English**

9/09 Revised 11/17 FORM NO. 56043121

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## Cautions and Warnings Symbols

Advance uses the symbols below to signal potentially dangerous conditions. Always read this information carefully and take the necessary steps to protect personnel and property.

### **DANGER!**

Is used to warn of immediate hazards that will cause severe personal injury or death.

### **WARNING!**

Is used to call attention to a situation that could cause severe personal injury.

### **CAUTION!**

Is used to call attention to a situation that could cause minor personal injury or damage to the machine or other property.



Read all instructions before using.

## General Safety Instructions

Specific Cautions and Warnings are included to warn you of potential danger of machine damage or bodily harm. This machine is for commercial use, for example in hotels, schools, hospitals, factories, shops and offices other than normal residential housekeeping purposes.

### **WARNING!**

- \* This machine shall be used only by properly trained and authorized persons.
- \* This machine is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge.
- \* While on ramps or inclines, avoid sudden stops. Avoid abrupt sharp turns. Use low speed down ramps.
- \* Keep sparks, flame and smoking materials away from batteries. Explosive gases are vented during normal operation.
- \* Charging the batteries produces highly explosive hydrogen gas. Charge batteries only in well-ventilated areas, away from open flame. Do not smoke while charging the batteries.
- \* Remove all jewelry when working near electrical components.
- \* Turn the key switch off (O) and disconnect the batteries before servicing electrical components.
- \* Never work under a machine without safety blocks or stands to support the machine.
- \* Do not dispense flammable cleaning agents, operate the machine on or near these agents, or operate in areas where flammable liquids exist.
- \* Do not clean this machine with a pressure washer.
- \* Only use the brushes provided with the appliance or those specified in the instruction manual. The use of other brushes may impair safety.
- \* Observe the Gross Vehicle Weight, GVW, of the machine when loading, driving, lifting or supporting the machine.

### **CAUTION!**

- \* This machine is not approved for use on public paths or roads.
- \* This machine is not suitable for picking up hazardous dust.
- \* Do not use scarifier discs and grinding stones. Advance will not be held responsible for any damage to floor surfaces caused by scarifiers or grinding stones (can also cause damage to the brush drive system).
- \* When operating this machine, ensure that third parties, particularly children, are not endangered.
- \* Before performing any service function, carefully read all instructions pertaining to that function.
- \* Do not leave the machine unattended without first turning the key switch off (O), removing the key and applying the parking brake.
- \* Turn the key switch off (O) and remove the key, before changing the brushes, and before opening any access panels.
- \* Take precautions to prevent hair, jewelry, or loose clothing from becoming caught in moving parts.
- \* Use caution when moving this machine in below freezing temperature conditions. Any water in the solution, recovery or detergent tanks or in the hose lines could freeze, causing damage to valves and fittings. Flush with windshield washer fluid.

- \* The batteries must be removed from the machine before the machine is scrapped. The disposal of the batteries should be safely done in accordance with your local environmental regulations.
- \* Do not use on surfaces having a gradient exceeding that marked on the machine.
- \* All doors and covers are to be positioned as indicated in the instruction manual before using the machine.
- \* This machine should only be used and stored indoors..

## SAVE THESE INSTRUCTIONS

### **Related Reference Sources**

Nilfisk-Advance provides Operator Manuals, Sales literature, Parts Lists, Technical Service Bulletins, and Instruction Sheets on our website [www.advance-us.com](http://www.advance-us.com) for 24/7 availability of information to order parts, operate, troubleshoot, or repair all current production and most pruned machine models.

**For the Advenger and ST please refer to the following documents for additional information:**

Parts List - Form Number 56042495

Operation Manual - Form Number 56041735 (English, Spanish)

**For the BR 755, 855 please refer to the following documents for additional information:**

Parts List - Form Number 56042496

Operation Manual - Form Number 56041738 (Danish, Norwegian, Swedish, Finnish)

Operation Manual - Form Number 56041739 (German, French, Netherlands, Russian)

Operation Manual - Form Number 56041740 (Spanish, Portuguese, Italian, Greek)

Operation Manual - Form Number 56041741 (Estonian, Latvian, Lithuanian, Slovenian)

Operation Manual - Form Number 56041742 (Slovakian, Czech, Polish, Hungarian)

Operation Manual - Form Number 56041743 (English, Turkish)

Curtis Programmer Manual 56043101

**TSB US2008-984** Batteries and Chargers

**TSB US2008-979** QuiQ Delta-Q Battery Charger Reprogramming Kit 56315732 Instructions

### **Diagnostic and Service Tools**

In addition to a full set of metric and standard tools, the following items are required in order to successfully and quickly perform troubleshooting and repair of Nilfisk-Advance commercial floor cleaning equipment.

- 1 Laptop computer loaded with current version of EZParts, Adobe Reader, and (preferably cellular) internet access
- 2 Digital voltmeter (DVM) with DC current clamp
- 3 Hydrometer
- 4 Battery load tester for checking 6V batteries
- 5 Bearing puller
- 6 Static control wrist strap
- 7 Set of torque wrenches
- 8 Hard (printed) copies of service manuals for all regularly serviced machines (available at [www.advance-us.com](http://www.advance-us.com) and other Nilfisk-Advance websites)
- 9 6" section of 1 1/2" PVC pipe with a 1" hole drilled into one side to check vacuum system against 1" lift spec
- 10 1 1/2" and 2 3/8" drill bit or hole cutter if a Dual Vac Kit is to be installed

**Also these tools available from Nilfisk-Advance, Inc.:**

|          |   |
|----------|---|
| 56407502 | Actuator Power Cord Adapter   |
| 56205281 | Water Lift Gauge  |
| 56206921 | Timer Bypass Kit (used to bypass timing function when troubleshooting shelf chargers) |
| 56409441 | Curtis Handheld Programmer  |
| 56409823 | Curtis Adapter Cable (Quad Plug)  |
| 56315732 | Delta-Q QuiQ Onboard Charger Interface Module   |
| 56422174 | Tire Puller Kit for Drive Wheel Assembly  |

# Technical Specifications

## GENERAL

|   |   |   |
|---|---|---|
| Machine Voltage   | 24 VDC  |   |
| Dimensions (without Squeegee and Scrub Deck)  | Length (W/squeegee): 60 in (152.4 cm)                         |   |
|   | Width (body): 27.5 in (70 cm)                                 |   |
|   | Height (Recovery tank): 51.7 in (131.3cm)                     |   |
| Scrub Deck and Squeegee Widths  | Scrub Deck Width:   | Squeegee Width:                           |
|   | 30.3 in (77 cm) 28 disc, REV                                  | 32.6 in (82.8 cm)                         |
|   | 36.3 in (92.2 cm) 34 disc                                     | 41.4 in (105.2 cm)                        |
|   | 31.6 in (80.3 cm) 28 cyl                                      | 32.6 in (82.8 cm)                         |
| Tank Capacities   | Solution Tank: 28 gal (106 l)                                 |   |
|   | Recovery Tank: dynamic: 25 gal (95 l); static: 28 gal (106 l) |   |
| Gross Weight (standard machine w/o options; w/full solution tank, empty recovery tank and heaviest batteries installed) | 1451 lbs (658 kg)   |   |
| Net Weight (standard machine w/o options, batteries or removable brushes; w/empty solution and recovery tanks)          | 536 lbs (244 kg)  |   |
| Static Wheel Loading  | Front: 615 lbs (279 kg)                                       | Rear: 836 lbs (379 kg)                    |
| Static Wheel Pressure   | Front: 174.7 psi (12.3 kg/cm <sup>2</sup> )                   | Rear: 124.7 psi (8.8 kg/cm <sup>2</sup> ) |
| Ingress Protection Code   | IPX3  |   |
| Sound Pressure Level (IEC 60704-1)  | 63.7 dB(A)  |   |
| Vibrations at the Hand Controls (ISO 5349-1)  | .26 m/s <sup>2</sup>  |   |
| Vibrations at the Seat (EN 1032)  | .05 m/s <sup>2</sup>  |   |
| Gradeability  | Transport: 16 % / 9 degrees                                   |   |
|   | Cleaning: 9 % / 5 degrees                                     |   |

### Battery Compartment Dimensions

Maximum Battery Compartment  
25" L X 15.5" W X 21" H

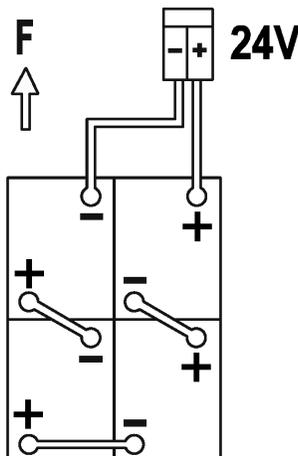
Without the Box:  
26.25" X 16" X 21"

Advance Models

FIGURE 1

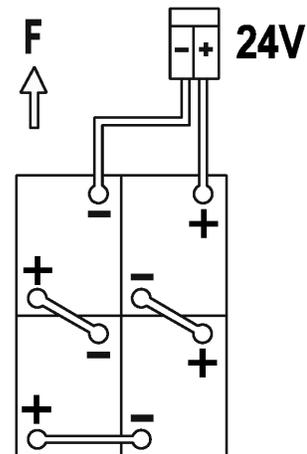
Nilfisk Models

**420A/H - 20HR - RATE**



**CAUTION:** Before changing batteries, consult TSBUS2008-984 or call Technical Service at USA: 800-989-2235 / Canada: 800-668-8400 Mexico: +52 (55) 2591 1002 ext.228

**420A/H - 20HR - RATE**



**CAUTION:** Before changing batteries consult TSBUS2008-984 or visit <http://www.nilfisk-advance.com>

## Technical Specifications

### Electrical Specifications

|                         |   |  |                    |
|-------------------------|---|--|--------------------|
| Batteries               | Number of Batteries 4 / Battery Voltage 6V 310 Ah wet   |  |                    |
|                         | Number of Batteries 4 / Battery Voltage 6V 420 Ah wet   |  |                    |
|                         | Number of Batteries 4 / Battery Voltage 6V 312 Ah AGM   |  |                    |
|                         | Standard Battery Capacity: 305 amp-hours @ 20-hour rate |  |                    |
| Onboard Battery Charger | 24-volt<br>Output 25A                                   | Manufacturer: Delta Q<br>Gel Compatible: Yes | Model: 912-2400-N1 |

### DRIVE SYSTEM

|                      |  |
|----------------------|--|
| Drive Wheel          | Diameter: 9.84 in (25 cm) / Width: 3.15 in (80 cm)<br>Type/Material: Blue Urethane |
| Drive Motor          | 1.05 HP (780 watts)  |
| Max. Transport Speed | Fwd: 3.91 mph (6.30 km/h)  |
|                      | Rev: 2.61 mph (4.20 km/h)  |

### SOLUTION SYSTEM

|   |  |  |  |           |
|---|--|--|--|-----------|
| Solution Control  | Pulse-control Solenoid Valve               |  |  |           |
| Advenger<br>BR 755, 855<br>Solution<br>Flow Rates<br>Disc and Cyl | (1) Regular Scrub                          | .38 gal/min (1.44 L/min) or 70 minutes per solution tank                             |  |           |
|   | (2) Heavy Scrub                            | .62 gal/min (2.35 L/min) or 40 minutes per solution tank                             |  |           |
|   | (3) Extreme Scrub                          | .92 gal/min (3.48 L/min) or 23 minutes per solution tank                             |  |           |
| Advenger<br>BR 755, 855<br>Solution<br>Flow Rates Disc<br>and Cy  | (1) Regular                                | Scrub Mode 0.2 gal/min (0.7 L/min) Floor Finish Removal Mode 0.1 gal/min (0.4 L/min) |  |           |
|   | (2) Heavy                                  | Scrub Mode 0.4 gal/min (1.5 L/min) Floor Finish Removal Mode 0.2 gal/min (0.7 L/min) |  |           |
|   | (3) Extreme                                | Scrub Mode 0.2 gal/min (3.0 L/min) Floor Finish Removal Mode 0.4 gal/min (1.5 L/min) |  |           |
| ST Solution<br>Flow Rates<br>(Average)                            | (1) Regular Scrub                          | .30 gal/min (1.13 L/min) or 60 minutes per solution tank                             |  |           |
|   | (2) Heavy Scrub                            | .48 gal/min (1.82 L/min) or 45 minutes per solution tank                             |  |           |
|   | (3) Extreme Scrub                          | .88 gal/min (3.33 L/min) or 30 minutes per solution tank                             |  |           |
| AXP™ / EDS™ System Available                                      | Advenger / BR 755, 855 only                |  |  |           |
| Detergent Ratios Available  | 400:1 = .25%<br>300:1 = .3%<br>256:1 = .4% | 200:1 = .5%<br>150:1 = .66%<br>128:1 = .8%   | 100:1 = 1%<br>64:1 = 1.5%<br>50:1 = 2% | 32:1 = 3% |
| Recycle System Available  | No   |  |  |           |

## RECOVERY SYSTEM

|   |                           |  |
|---|---------------------------|--|
| Vacuum Motor(s)                               | .75 HP (560-watt) 3-stage |  |
| Vacuum Water Lift (measured at recovery hose) | One Motor                 | Sealed: 63.0 in of Water (15.7 kPa)<br>1" Open-hole Aperture: 10.3 in of Water (2.6 kPa) |
|   | Two Motors                | Sealed: 65.0 in of Water (16.2 kPa)<br>1" Open-hole Aperture: 18.5 in of Water (4.6 kPa) |

## TECHNICAL SPECIFICATIONS

### SCRUB SYSTEM

|  |  |
|--|--|
| Scrub Deck Types                                 | Disc, Cylindrical and REV  |
| Scrub Brush/Pad Sizes and Types                  | REV and Disc: (2) 14 in (35.6 cm) Scrub Path: 28 in (71.1 cm)  |
|  | Disc: (2) 17 in (43.2 cm) Scrub Path: 34 in (86.4 cm)  |
|  | Cylindrical: (2) 27 in (68.6 cm) Scrub Path: 28 in (71.1 cm)   |
| Scrub Motors - Disc                              | Number of Motors 2<br>Right-hand/Single Motor: .64 HP (480 watts)<br>Left-hand Motor: .64 HP (480 watts) |
| Scrub Head Speeds - Disc                         | Right-hand/Single Motor: 215-260 RPM<br>Left-hand Motor: 215-260 RPM<br>REV approx 2,000 RPM             |
| Scrub Motors – Cylindrical                       | Right-hand Motor: .5 HP (373 watts)<br>Left-hand Motor: .5 HP (373 watts)                                |
| Scrub Head Speeds – Cylindrical                  | Right-hand Motor: 900 RPM / Left-hand Motor: 900 RPM   |
| Scrub Force 28" ST                               | (1) Regular Scrub: 75-85 lbs (32.7-37.0 kg)  |
|  | (2) Extreme Scrub (factory setting): 170-180 lbs (77.1-81.6 kg)  |
| Scrub Force 34" ST                               | (1) Regular Scrub: 95-105 lbs (41.4-45.7 kg)   |
|  | (2) Extreme Scrub (factory setting): 195-205 lbs (88.5-93.0kg)   |
| Scrub Force Advenger / BR 755, 855 - Disc        | (1) Regular Scrub: 70-90 lbs ( 31.8-39.2kg)  |
|  | (2) Heavy Scrub: 120-150 lbs (52.3-65.3kg)   |
|  | (3) Extreme Scrub: 180-220 lbs (78.4-95.8 kg)  |
| Scrub Force Advenger / BR 755, 855 - Cylindrical | (1) Regular Scrub: 45-60 lbs (20.4-27.2 kg)  |
|  | (2) Heavy Scrub: 70-80 lbs (31.8–36.3 kg)  |
|  | (3) Extreme Scrub: 90-100 lbs (40.8-45.4 kg)   |
| Scrub Force Advenger / BR 755, 855 - Cylindrical | (1) Regular Scrub: 80 lbs (36kg)   |
|  | (2) Heavy Scrub: 125 lbs (57kg)  |
|  | (3) Extreme Scrub: 175lbs (80 kg)  |

## MINIMUM AISLE TURN AROUND RADIUS (TURNING LEFT)

|   |                      |
|---|----------------------|
| 28" deck Advenger / BR 755, 855<br>and ST | 63 inches (1.63 m)   |
| 34" deck Advenger / BR 755, 855<br>and ST | 67.5 inches (1.71 m) |
| Cylindrical Advenger / BR 755, 855        | 63 inches (1.63 m)   |

## MINIMUM DOOR PASS-THRU WIDTH (SIDE SKIRTS ON, SQUEEGEE OFF)

|   |                     |
|---|---------------------|
| 28" deck Advenger / BR 755, 855<br>and ST | 31 inches (.79 m)   |
| 34" deck Advenger / BR 755, 855<br>and ST | 36.5 inches (.93 m) |
| Cylindrical Advenger / BR 755, 855        | 32 inches (.81 m)   |

## Transporting The Machine

### ⚠ CAUTION!

Before transporting the machine on an open truck or trailer:

- 1 Remove the Squeegee Assembly (11) and secure.
- 2 Tie the machine down securely at the Locations (A) shown in FIGURE 2.
- 3 Tape and strap all access doors and covers as necessary.
- 4 In temperatures below freezing, remove all water from the machine and flush with windshield washer fluid to prevent damage to valves and fittings.
- 5 Do not drive machine onto a ramp grade exceeding 16% (9 degrees) or damage to the machine may occur.



### Tie-Down Points

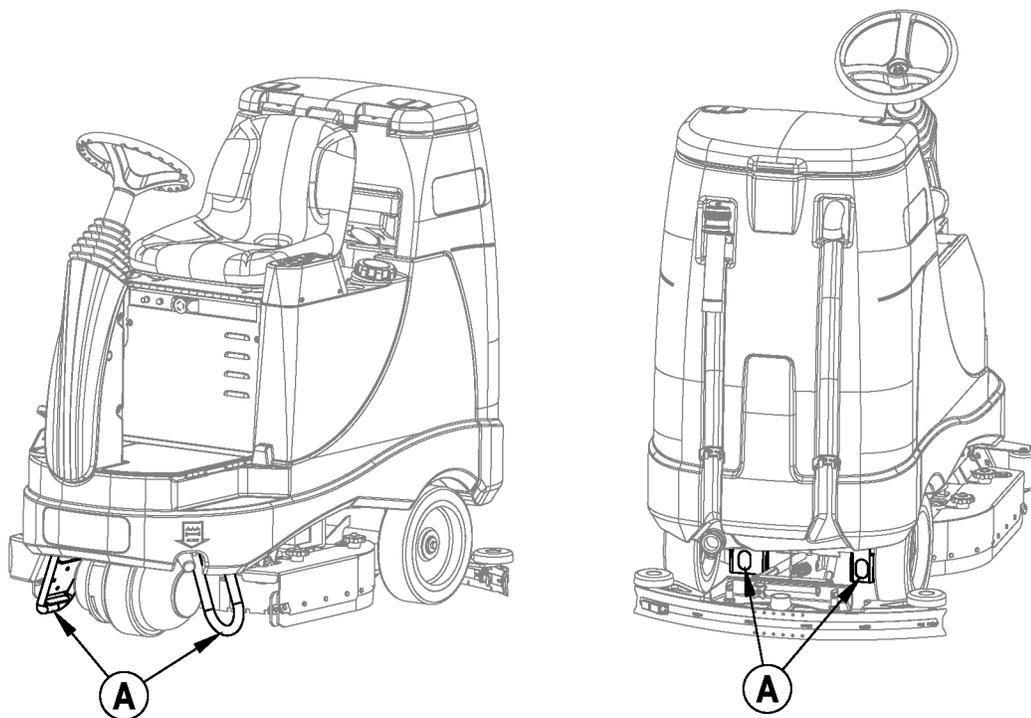


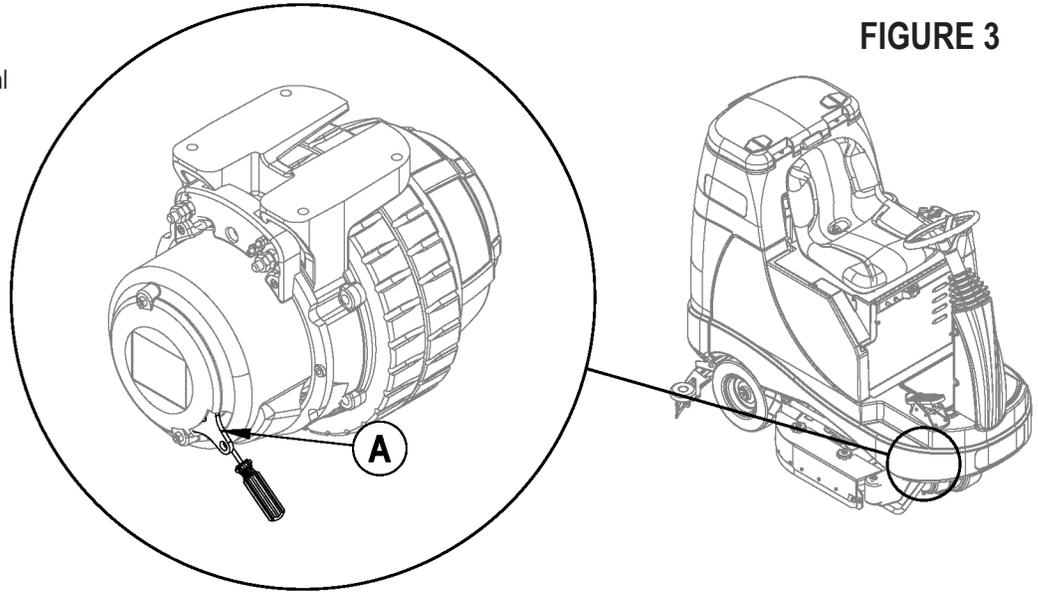
FIGURE 2

## Towing the Machine

### CAUTION!

The Drive Wheel (4) has a built in electromagnetic brake that is engaged whenever the Key Switch is Off or the Drive Pedal (3) is in the Neutral position, i.e. there is no power to the Speed Control. This brake can be manually overridden if necessary by inserting a medium to large screwdriver behind the Yoke (A) as shown in FIGURE 3. (A rubber door stop can also be used). This should only be done in the event you need to push or pull the machine.

Tow the machine for short distances only



**FIGURE 3**

## Jacking Points

**Front** - When facing the front of the machine and underneath looking up, place the jack to the left of the chain on the frame member (A) as shown in FIGURE 4.

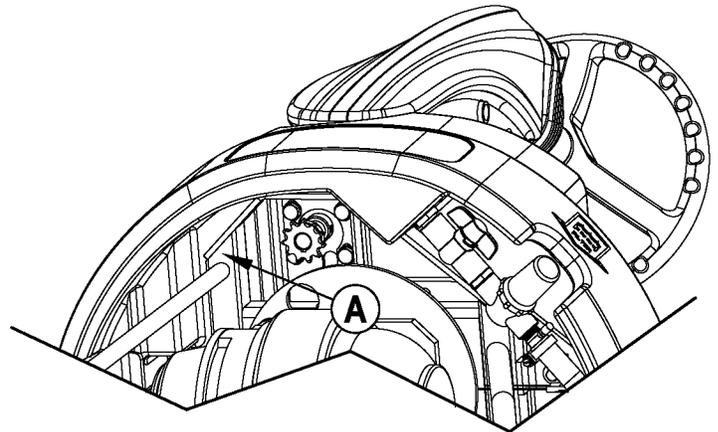


FIGURE 4

**Rear** – Remove Squeegee Assembly (11) to access these locations. Use a bottle jack at these points (B) as shown in FIGURE 5.

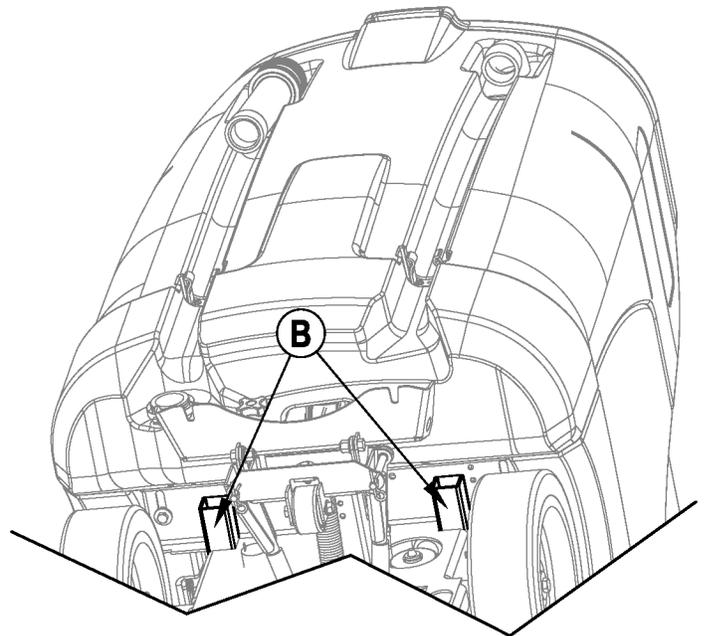


FIGURE 5

## Emergency Stop Knob

### **⚠ WARNING!**

The Emergency Stop Knob (7) disconnects power from the Speed Control and Drive Wheel.

**It does not disconnect the batteries**, but will continue to power the control board . Do not use the Emergency Stop Knob as a substitute for disconnecting the red Anderson battery connector inside the battery compartment.

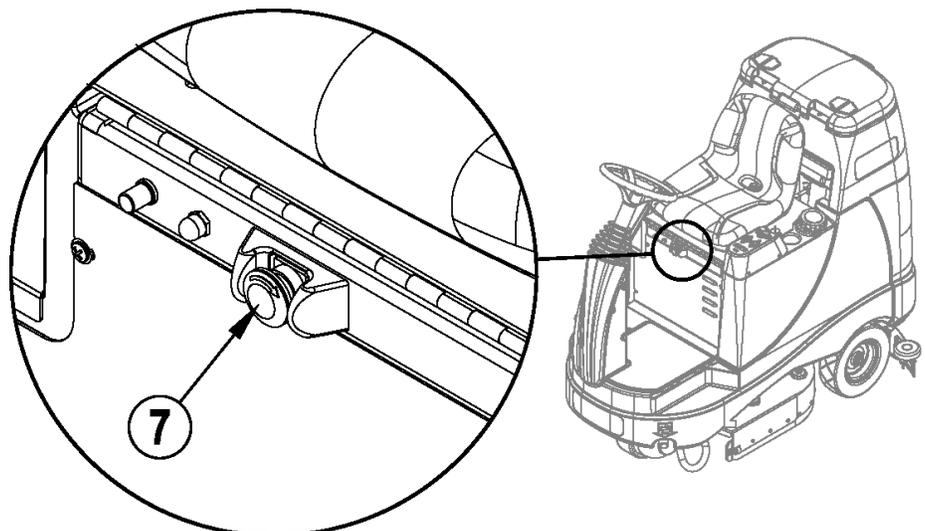
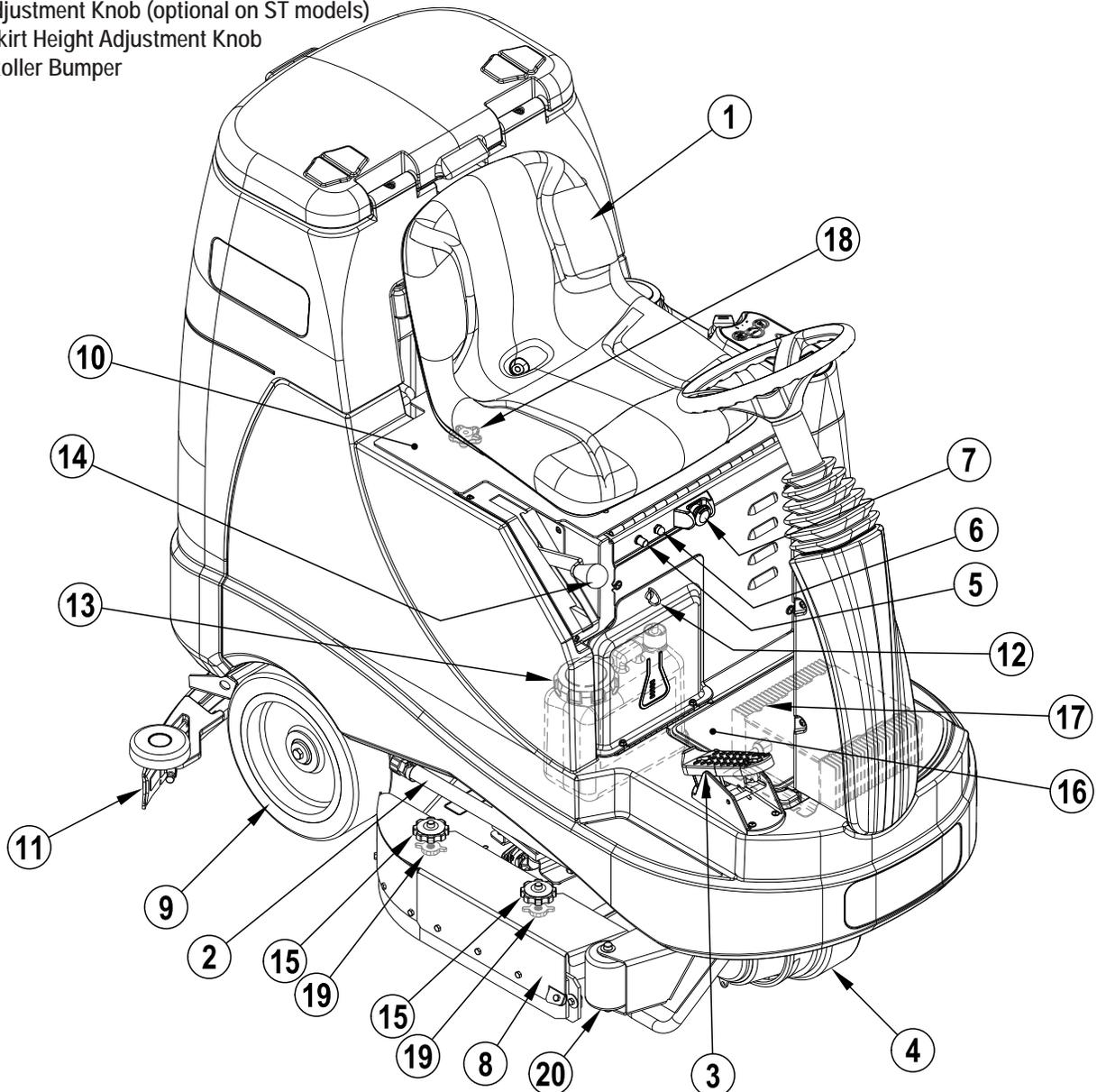


FIGURE 6

# Know Your Machine

## Machine Front RH View

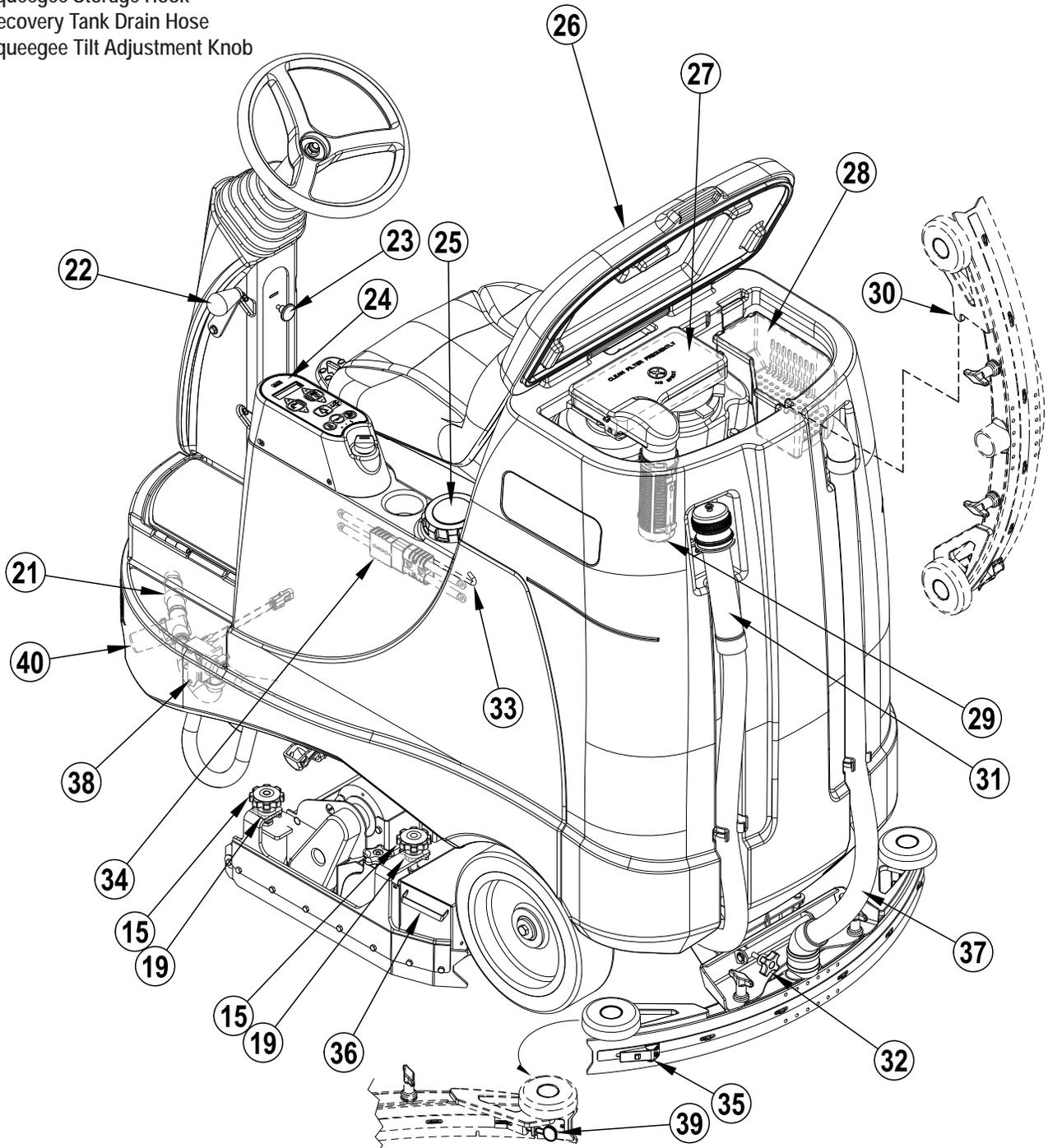
- 1 Operator's Seat
- 2 Solution Tank Drain Hose
- 3 Drive Pedal, Directional/Speed
- 4 Drive Wheel
- 5 Drive Wheel Circuit Breaker (70 Amp)
- 6 Control Circuit Circuit Breaker (10 Amp)
- 7 Emergency Stop
- 8 Scrub Deck
- 9 Rear Wheel
- 10 Battery Compartment (under seat)
- 11 Squeegee Assembly
- 12 Detergent Cartridge Access Cover (AXP/EDS or EcoFlex models only)
- 13 Detergent Cartridge (AXP/EDS or EcoFlex models only)
- 14 Scrub Deck Raise/Lower Lever (ST models only)
- 15 Deck Skirt Removal Knobs
- 16 Battery Charger Access Door
- 17 Battery Charger (optional)
- 18 Seat Adjustment Knob (optional on ST models)
- 19 Deck Skirt Height Adjustment Knob
- 20 Front Roller Bumper



## KNOW YOUR MACHINE

### Machine Rear LH View

- |    |   |    |  |
|----|---|----|--|
| 21 | Solution Shutoff Valve                      | 33 | Seat Prop-Rod                          |
| 22 | Squeegee Raise/Lower Lever (ST models only) | 34 | Machine Battery Connector              |
| 23 | Steering Wheel Tilt Adjust Knob             | 35 | Rear Squeegee Blade Removal Latch      |
| 24 | Control Panel                               | 36 | Hopper (Cylindrical models only)       |
| 25 | Solution Tank Fill Cover                    | 37 | Recovery Hose                          |
| 26 | Recovery Tank Cover                         | 38 | Solution Solenoid Valve                |
| 27 | Vacuum Motor Filter Housing                 | 39 | Front Squeegee Blade Removal Thumb Nut |
| 28 | Strainer Basket (optional on ST models)     | 40 | Solution Filter                        |
| 29 | Recovery Tank Shutoff Float                 |    |  |
| 30 | Squeegee Storage Hook                       |    |  |
| 31 | Recovery Tank Drain Hose                    |    |  |
| 32 | Squeegee Tilt Adjustment Knob               |    |  |

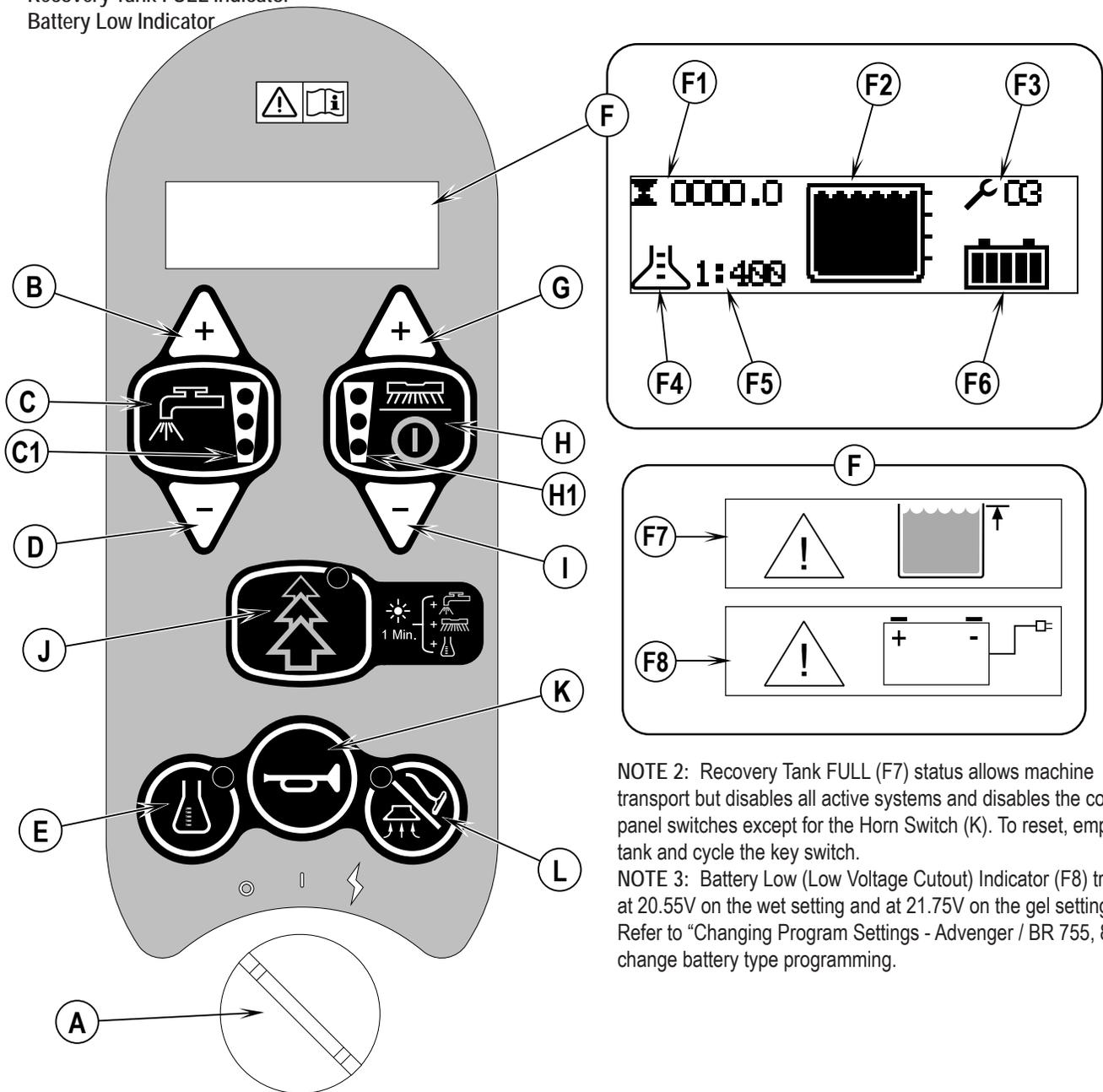


# KNOW YOUR MACHINE

## CONTROL PANEL (Advenger / BR 755, 855 Disc and Cylindrical models)

- A Key Switch
- B Solution Increase Switch
- C Solution ON/OFF Switch
- C1 Solution Flow Indicators (Normal, Heavy & Extreme)
- D Solution Decrease Switch
- E AXP/EDS (EcoFlex) ON/OFF Switch
- F Display
- F1 Hour Meter
- F2 Solution Tank Level Indicator
- F3 Fault Codes
- F4 AXP/EDS or EcoFlex Indicator (if so equipped)
- F5 Detergent Ratio Indicator
- F6 Battery Indicator
- F7 Recovery Tank FULL Indicator
- F8 Battery Low Indicator
- G Scrub Pressure Increase Switch
- H Scrub ON/OFF Switch
- H1 Scrub Pressure Indicators (Normal, Heavy and Extreme)
- I Scrub Pressure Decrease Switch
- J EverGreen (Burst of Power) Switch
- K Horn Switch
- L Vacuum/Wand Switch

NOTE 1: The display will go into Sleep Mode to save power if the machine is turned on, in Neutral pedal, and idle for more than 10 minutes. Closing the seat switch, moving the drive pedal, or pressing a control panel button will refresh the LCD display and LEDs.

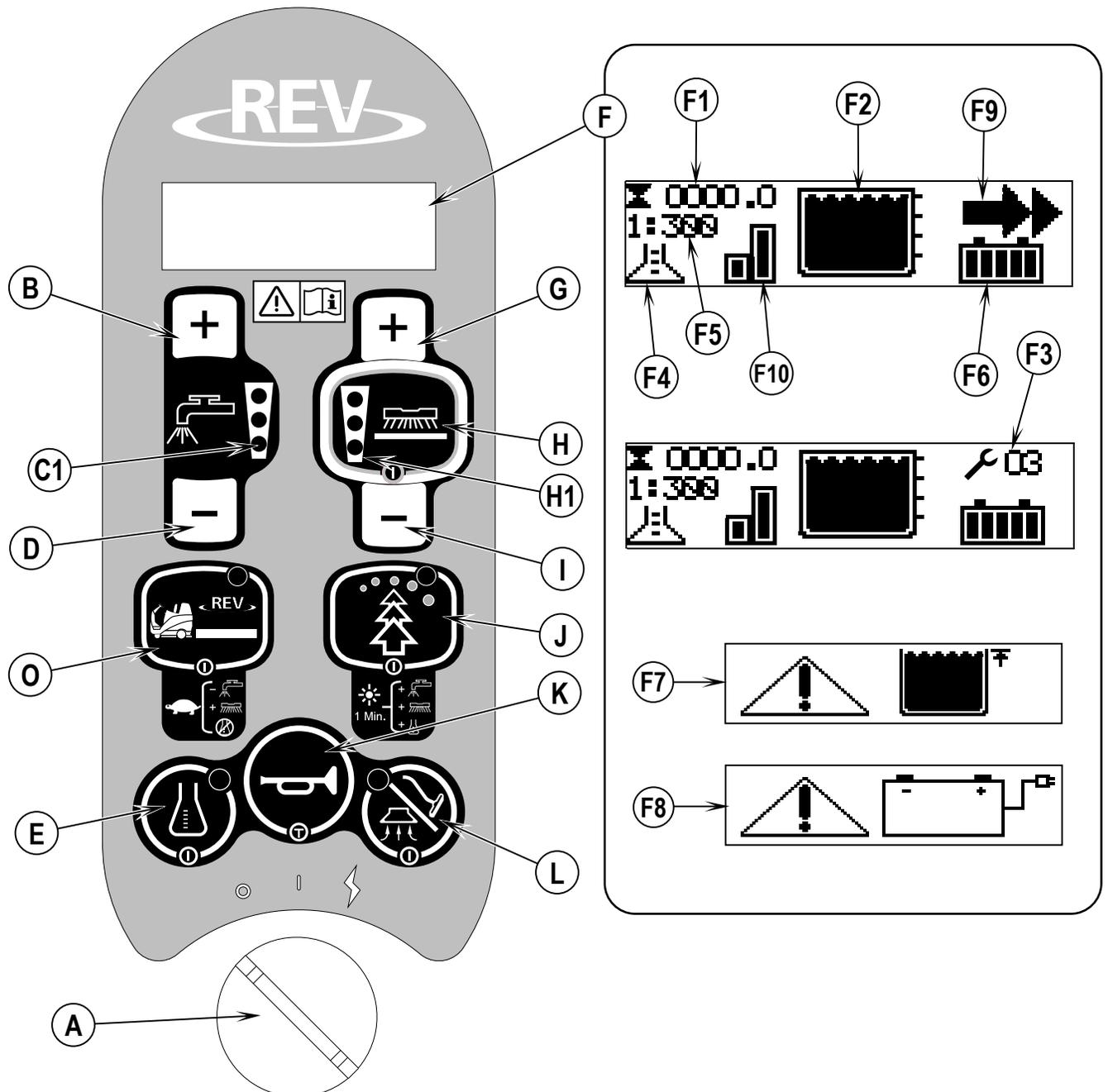


NOTE 2: Recovery Tank FULL (F7) status allows machine transport but disables all active systems and disables the control panel switches except for the Horn Switch (K). To reset, empty the tank and cycle the key switch.

NOTE 3: Battery Low (Low Voltage Cutout) Indicator (F8) triggers at 20.55V on the wet setting and at 21.75V on the gel setting. Refer to “Changing Program Settings - Advenger / BR 755, 855” to change battery type programming.

## CONTROL PANEL (REV models)

- A Key Switch
- B Solution ON / Increase Switch
- C1 Solution Flow Indicators (Normal, Heavy & Extreme)
- D Solution Decrease / OFF Switch
- E Detergent ON/OFF Switch
- F Display
- F1 Hour Meter
- F2 Solution Tank Level Indicator
- F3 Fault Codes
- F4 Detergent Indicator (if so equipped)
- F5 Detergent Ratio Indicator
- F6 Battery Indicator
- F7 Recovery Tank FULL Indicator
- F8 Battery Low Indicator
- F9 Floor Finish Removal Speed Indicator (low, high)
- F10 Detergent Indicator Bar Graph (off, weak, strong)
- G Scrub Pressure Increase Switch
- H Scrub ON/OFF Switch
- H1 Scrub Pressure Indicators (Normal, Heavy and Extreme)
- I Scrub Pressure Decrease Switch
- J Burst of Power Switch
- K Horn Switch
- L Vacuum/Wand Switch
- O Floor Finish Removal Mode Switch

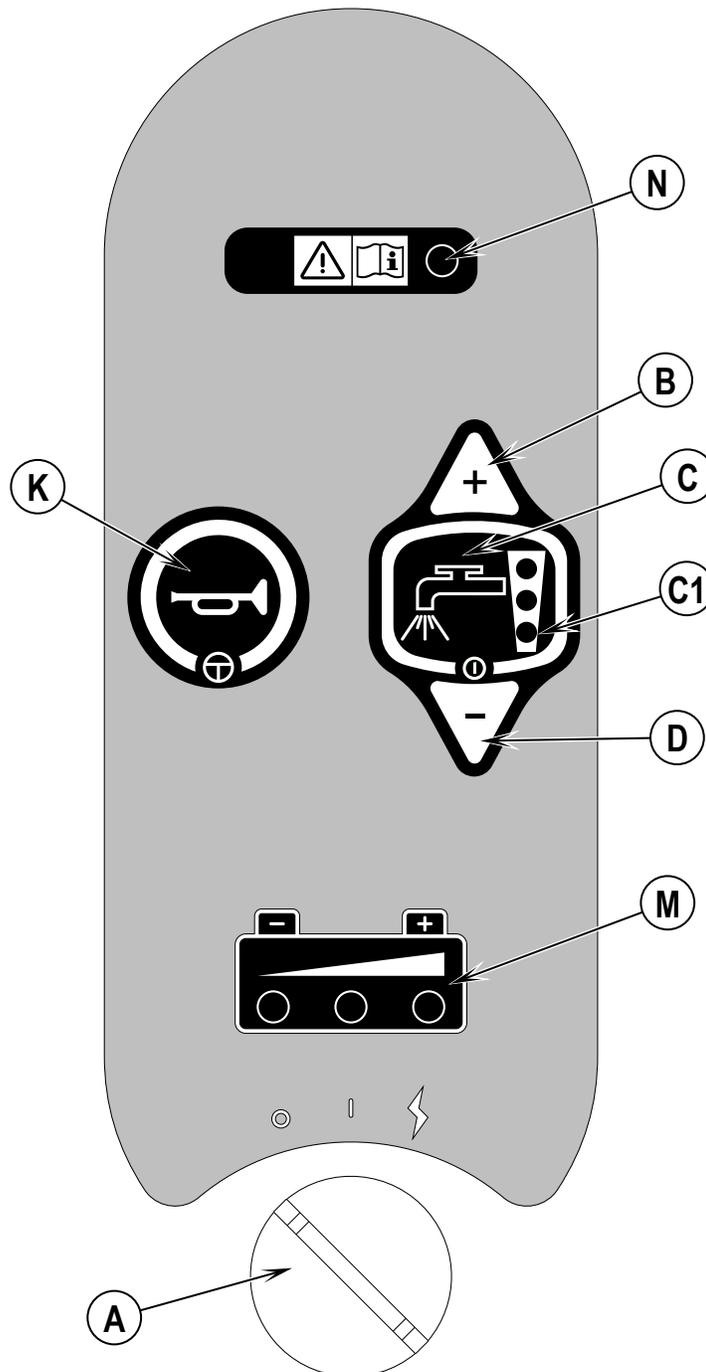


## KNOW YOUR MACHINE CONTROL PANEL (ST Models)

- A Key Switch
- B Solution Increase Switch
- C Solution ON/OFF Switch
- C1 Solution Flow Indicators (Normal, Heavy & Extreme)
- D Solution Decrease Switch
- K Horn
- M Battery Indicator
- N Fault Indicator

NOTE 1: Recovery Tank FULL status is indicated by the Solution Flow Indicator LED (C1) turning Off. This status allows machine transport but disables all active systems and disables the control panel switches except for the Horn Switch (K). To reset, empty the tank and cycle the key switch.

NOTE 2: Battery Low (Low Voltage Cutout) status is indicated by the red battery LED (M) flashing. It triggers at 20.55V on the wet setting and 21.75V on the gel setting. Refer to “Changing Program Settings - ST” to change battery type programming.



## KNOW YOUR MACHINE

As you read this manual, you will occasionally run across a bold number in parentheses – example: (2). A bold number refers to an item shown on the Know Your Machine pages unless otherwise noted (bold letters refer to items on the same page). Refer back to the Know Your Machine pages whenever necessary to pinpoint the location of an item mentioned in the text.

### **Basic Machine Operation**

(refer to Operator Manuals such as 56041735 / 56041743 (English) for detailed information regarding how to operate the machine):

- 1 Turn on the key to turn on the graphical display showing battery condition, hour meter, solution tank level and AXP/EDS dilution ratio if so equipped.  
ADVENGER / BR 755, 855: Pressing the red SCRUB ON / OFF button once will enable regular scrub mode. The deck and rear squeegee will be lowered to the floor.  
ST: Manually lower the scrub deck and squeegee using levers (14) and (22).
- 2 Depress the foot pedal forward to begin scrubbing. The brushes, water and vacuum will turn on.
- 3 When the machine stops the brushes and water will stop. The vacuum will continue to run for 10 seconds and then stop.
- 4 At any time the scrub mode can be changed to regular, heavy or extreme scrub by using the SCRUB + or SCRUB - button.
- 5 At any time the solution flow rate can be changed by using the SOLUTION + or SOLUTION - button.
- 6 If the scrub mode and solution flow rate are at different positions they can be reset or aligned using two methods.
  - A Use the SOLUTION + or SOLUTION - buttons to change the solution flow rate to match the scrub mode setting.
  - B Change the scrub mode using the SCRUB + or SCRUB - buttons. The scrub pressure and solution flow will automatically be aligned for optimized results.
- 7 To stop all scrubbing functions and transport the machine, (ADVENGER / BR 755, 855) press the red SCRUB ON / OFF button or [(ST) return the scrub deck and squeegee control levers to the up position]. The solution and brushes will stop, [(ADVENGER / BR 755, 855) the deck and squeegee will raise], and the vacuum will shut off after a 10 second delay.

**Main Controller Error Codes – Advenger / BR 755, 855 and ST**

| Advenger / BR 755, 855 Display Error Code | ST Service LED Blink Code * | Fault Description                          | System Affected        | Refer to page: |
|---|-----------------------------|--|------------------------|----------------|
| 3   | 1,1                         | Speed control fault                        | Wheel Drive            | 52             |
| 4   | NA                          | Scrub deck lift actuator overload          | Scrub                  | 32             |
| 5   | 1, 2                        | Brush motor overload                       | Scrub                  | 31             |
| 6   | NA                          | Squeegee lift actuator overload            | Squeegee               | 21             |
| 7   | 1, 3                        | Vacuum motor overload                      | Recovery               | 42             |
| 8   | 1, 4                        | Solution solenoid overload                 | Solution               | 47             |
| 9   | 2, 1                        | Vacuum contactor coil overload             | Recovery               | 42             |
| 10  | 2, 2                        | Brush motor contactor coil overload        | Scrub                  | 31             |
| 11  | NA                          | Chemical pump overload                     | AXP/EDS                | 47             |
| 30  | 2, 3*                       | Solution solenoid open                     | Solution               | 47             |
| 31  | 2, 4                        | Brush motor circuit open                   | Scrub                  | 31             |
| 32  | NA                          | Scrub deck lift actuator open              | Scrub                  | 32             |
| 33  | 3, 1                        | Vacuum motor circuit open                  | Recovery               | 42             |
| 34  | NA                          | Squeegee lift actuator open                | Squeegee               | 21             |
| 35  | 3, 2                        | Brush motor contactor coil open            | Scrub                  | 31             |
| 36  | 3, 3                        | Vacuum motor contactor coil open           | Recovery               | 42             |
| 37  | NA                          | Chemical pump open                         | AXP/EDS                | 47             |
| 60  | 3, 4                        | Brush motor circuit contacts stuck closed  | Scrub                  | 31             |
| 61  | 4, 1                        | Vacuum motor circuit contacts stuck closed | Recovery               | 42             |
| 62  | 4, 2                        | Solution solenoid control fault            | Probable board failure |                |
| 63  | 4, 3                        | Brush contactor coil control fault         | Probable board failure |                |
| 64  | 4, 4                        | Vacuum contactor coil control fault        | Probable board failure |                |

\* ST open circuit errors are only visible in Fault Recall Mode, accessible via the Hidden Menu. Refer to “Changing Program Settings - ST” section. Then verify fault by entering Service Test Mode.

## Speed Control Error Flash Codes

| STATUS LED FAULT CODES (TABLE 1) |                      |   |   |
|----------------------------------|----------------------|---|---|
| LED CODE                         | STATUS LIGHT DISPLAY | EXPLANATION                             | POSSIBLE CAUSE  |
| 1,1                              | 0 0                  | over-/under-temperature cutback         | 1. Temperature >97°C (206°F) or < -25°C (-13°F).<br>2. Excessive load on vehicle.<br>3. Operation in extreme environments.<br>4. Electromagnetic, foot or parking brake not releasing properly. |
| 1,2                              | 0 00                 | throttle fault                          | 1. Throttle input wire open or shorted.<br>2. Throttle pot defective.<br>3. Wrong throttle type selected.   |
| 1,3                              | 0 000                | speed limit pot fault                   | 1. Speed limit pot wire(s) broken or shorted.<br>2. Broken speed limit pot.   |
| 1,4                              | 0 0000               | battery voltage too low                 | 1. Battery voltage <17 volts.<br>2. Bad connection at battery or controller.  |
| 1,5                              | 0 00000              | battery voltage too high                | 1. Battery voltage >36 volts.<br>2. Vehicle operating with charger attached.<br>3. Intermittent battery connection.   |
| 2,1                              | 00 0                 | main contactor driver Off fault         | 1. Main contactor driver failed open.   |
| 2,3                              | 00 000               | main contactor fault                    | 1. Main contactor welded or stuck open.<br>2. Main contactor driver fault.<br>3. Brake coil resistance too high.  |
| 2,4                              | 00 0000              | main contactor driver On fault          | 1. Main contactor driver failed closed.   |
| 3,1                              | 000 0                | HPD fault present for >10 sec.          | 1. Misadjusted throttle.<br>2. Broken throttle pot or throttle mechanism.   |
| 3,2                              | 000 00               | brake On fault                          | 1. Electromagnetic brake driver shorted.<br>2. Electromagnetic brake coil open.   |
| 3,3                              | 000 000              | precharge fault                         | 1. Controller failure.<br>2. Low battery voltage.   |
| 3,4                              | 000 0000             | brake Off fault                         | 1. Electromagnetic brake driver open.<br>2. Electromagnetic brake coil shorted.   |
| 3,5                              | 000 00000            | HPD (High Pedal Disable) fault          | 1. Improper sequence of throttle and KSI*, push, or inhibit inputs.<br>2. Misadjusted throttle pot  |
| 4,1                              | 0000 0               | current sense fault                     | 1. Short in motor or in motor wiring.<br>2. Controller failure.   |
| 4,2                              | 0000 00              | motor voltage fault (hardware failsafe) | 1. Motor voltage does not correspond to throttle request.<br>2. Short in motor or in motor wiring.<br>3. Controller failure.  |
| 4,3                              | 0000 000             | EEPROM fault                            | 1. EEPROM failure or fault.   |
| 4,4                              | 0000 0000            | power section fault                     | 1. EEPROM failure or fault.<br>2. Short in motor or in motor wiring.<br>3. Controller failure.  |

\*NOTE: A KSI (key switch input) system problem is a specific HPD (high pedal disable) type operational fault, caused by the operator activating the Fwd/Rev drive pedal before turning on the main key switch or activating the throttle before sitting on the seat. This can be cleared by returning the operator's drive pedal to neutral and cycling the key switch OFF and ON.



## UNDERSTANDING CONTROL OF SQUEEGEE, SCRUB, AND RECOVERY SYSTEMS VIA MODES

Due to the unique One-Touch functions of the new Advenger / BR 755, 855 and ST, multiple systems are engaged via one action defined by the Mode that is chosen - Scrub Mode, Vacuum Mode, Floor Finish Removal or Wand Mode. The following tables outline the various components of the systems that are controlled in tandem by pressing a particular button or engaging the Drive Pedal in Forward, Neutral, or Reverse under normal machine operation. To bypass these systems, refer to the "Service Test Mode" section.

### Advenger / BR 755, 855

| Mode       | Operator Position | Seat Switch Status | Action   | Result   |
|------------|-------------------|--------------------|--|--|
| Scrub Mode | Seated            | Closed             | Press Scrub On                                 | Squeegee lowers (24V to M3 for 4 seconds - adjustable.)<br>Scrub deck lowers (24V to M4 for 3 sec., then pulsed signal)  |
|            |                   |                    | Press Foot Pedal Forward                       | Vacuum motor circuit On<br>Scrub motor circuit On<br>Solution Solenoid On<br>Chemical Pump On if equipped  |
|            |                   |                    | Press Foot Pedal Reverse                       | Solution Solenoid Off<br>Chemical Pump Off if equipped<br>Squeegee raises (reverse 24V to M3 for 4 seconds)<br>Pulsed voltage to M4 deck actuator maintaining down position<br>Brush motor circuit On<br>Vacuum motor circuit off after 10 seconds continuous in reverse |
|            |                   |                    | Foot Pedal in Neutral                          | Brush motor circuit Off but Enabled<br>Vacuum motor circuit Off after 10 sec. but Enabled<br>Pulsed voltage to M4 deck actuator maintaining down position<br>Squeegee in down position   |
|            |                   |                    | Press Scrub Off                                | Brush motor circuit Off<br>Scrub deck raises (reverse 24V to M4 for 3 sec.)<br>Squeegee raises after 10 sec. (reverse 24V to M3 for 4 seconds)<br>Vacuum motor circuit On for 20 seconds total<br>Solution Solenoid Off<br>Chemical Pump Off if equipped                 |
|            |                   |                    | Press Scrub Off Foot Pedal in Neutral >10 sec. | Brush motor circuit Off<br>Scrub deck raises (reverse 24V to M4 for 3 sec.)<br>Squeegee raises (reverse 24V to M3 for 4 seconds)<br>Vacuum motor circuit Off<br>Solution Solenoid Off<br>Chemical Pump Off if equipped   |
| Vac Mode   | Seated            | Closed             | Press Vac/Wand On                              | Squeegee lowers (24V to M3 for 4 seconds)  |
|            |                   |                    | Press Foot Pedal Forward                       | Vacuum motor circuit On  |
|            |                   |                    | Press Foot Pedal Reverse                       | Squeegee raises until Foot Pedal in Neutral or Forward again (reverse 24V to M3 for 4 sec.)<br>Vacuum motor circuit On for 10 seconds  |
|            |                   |                    | Press Vac/Wand Off                             | Squeegee raises after 10 sec (reverse 24V to M3 for 4 seconds) *<br>Vacuum motor circuit On for 20 seconds total *<br>* If drive pedal in Neutral >10 sec, squeegee will raise and vac motor circuit will be Off immediately with no delay.                              |
|            |                   |                    | Press Vac/Wand Off Twice                       | Squeegee raises immediately (reverse 24V to M3 for 4 seconds)<br>Vacuum motor circuit Off immediately  |
| Wand Mode* | Standing          | Open               | Press Vac/Wand On                              | Squeegee lowers (24V to M3 for 4 seconds)<br>Vacuum motor circuit On   |

|   |                    |  |
|---|--------------------|--|
| * Recovery Tank Full is disabled in Wand Mode | Press Vac/Wand Off | Squeegee raises (reverse 24V to M3 for 4 sec.)<br>Vacuum motor circuit Off |
|---|--------------------|--|

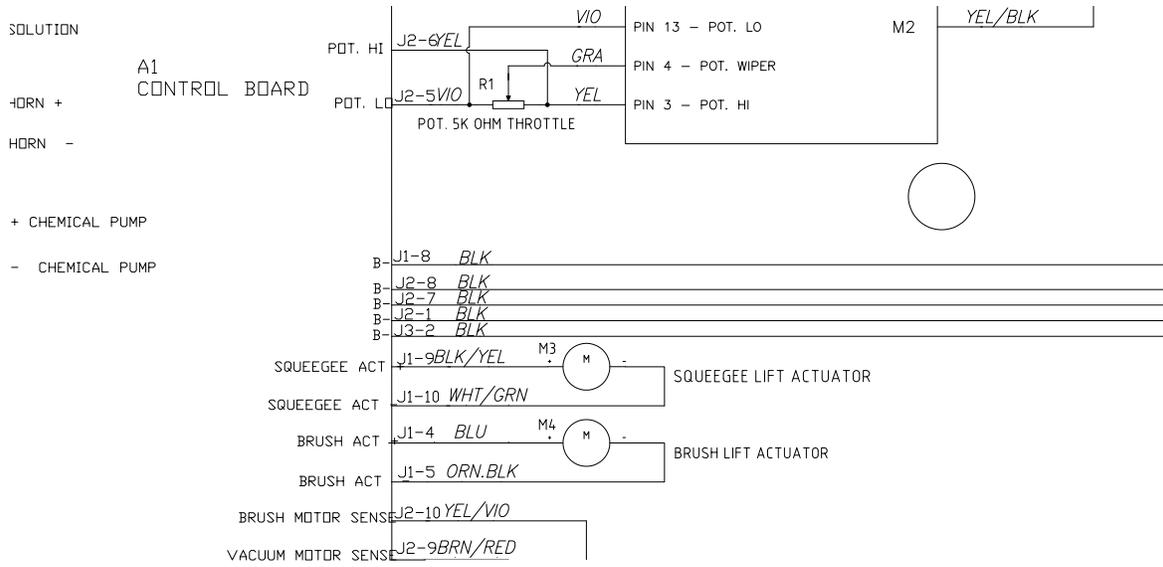
**UNDERSTANDING CONTROL OF SQUEEGEE, SCRUB, AND RECOVERY SYSTEMS VIA MODES  
ST**

| Mode       | Operator Position | Seat Switch Status | Action  | Result   |
|------------|-------------------|--------------------|---|--|
| Scrub Mode | Seated            | Closed             | Lower Scrub Deck  | Brush motor circuit enabled  |
|            |                   |                    | Lower Squeegee  | Vacuum motor circuit enabled   |
|            |                   |                    | Press Foot Pedal Forward                                      | Vacuum motor circuit On<br>Brush motor circuit On<br>Solution Solenoid On  |
|            |                   |                    | Press Foot Pedal Reverse<br>(Lift Squeegee to prevent damage) | Solution Solenoid Off<br>Brush motor circuit On<br>Vacuum motor circuit On for 10 seconds  |
|            |                   |                    | Foot Pedal Neutral  | Brush motor circuit Off but enabled<br>Vacuum motor circuit On for 10 seconds, then enabled<br>Solution Solenoid Off but enabled |
|            |                   |                    | Lift Scrub Deck   | Solution Solenoid Off<br>Brush motor circuits Off  |
|            |                   |                    | Lift Squeegee   | Vacuum motor circuit Off after 10 seconds  |
| Vac Mode   | Seated            | Closed             | Lower Squeegee  | Vacuum motor circuit enabled   |
|            |                   |                    | Press Foot Pedal Forward                                      | Vacuum motor circuit On  |
|            |                   |                    | Press Foot Pedal Reverse<br>(Lift Squeegee to prevent damage) | Vacuum motor circuit Off after 10 seconds  |
|            |                   |                    | Foot Pedal Neutral  | Vacuum motor circuit On for 10 seconds, then enabled   |
| Wand Mode  | Standing          | Open               | Lower Squeegee  | Vacuum motor circuit On  |
|            |                   |                    | Raise Squeegee  | Vacuum motor circuit Off after 10 seconds  |

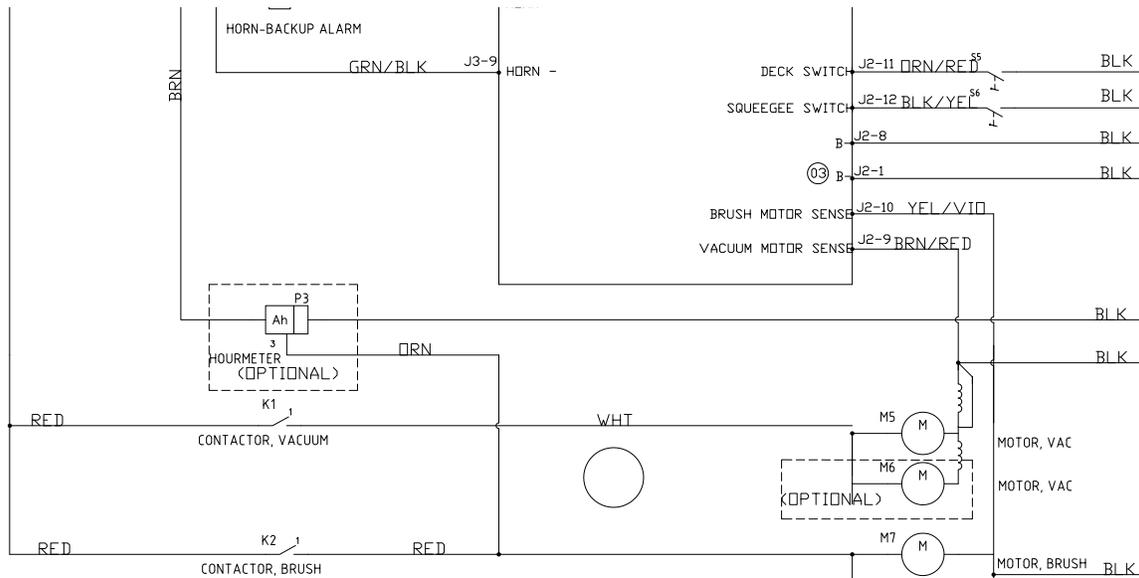
# SQUEEGEE SYSTEM

Refer to the section “Understanding Control of Squeegee, Scrub, and Recovery Systems via Modes” for explanation of control due to functionality of multiple systems in tandem.

## Advenger / BR 755, 855



## ST



## SQUEEGEE LIFT ACTUATOR CIRCUIT ERROR CODES AND MEASUREMENTS - ADVENGER / BR 755, 855

| Advenger / BR 755, 855 Display Error Code | ST Service LED Blink Code | Fault Description               | Troubleshooting Action   |
|---|---------------------------|---------------------------------|--|
| 6   | NA                        | Squeegee lift actuator overload | 1. Check for binding or frozen squeegee lift linkage and excessive weight on squeegee.<br>2. Check for short circuit in wiring or actuator motor. Repair or replace. |
| 34  | NA                        | Squeegee lift actuator open     | 1. Check for disconnected actuator wiring, open in wiring or defective actuator motor. Repair or replace.<br>2. Check controller output voltage at BLK/YEL wire.     |

| Actuator | Nominal Current (A) | Overload Current   | Wire Colors       |
|----------|---------------------|--------------------|-------------------|
| M3       | 2.5 - 3.5           | 5A for > 4 seconds | BLK/YEL & WHT/GRN |

### *Troubleshooting Squeegee Issues*

| Problem   | Possible Cause   |
|---|--|
| Not enough adjustment of squeegee tool by turning adjustment knob                         | Squeegee Mount Weldment Bracket is bent. Replace   |
| Squeegee is "hopping"   | Wheel isn't making contact with the floor - reposition wheel in slot on squeegee tool. Refer to "Squeegee Adjustments" section.  |
| Squeegee tips are being driven into the floor   | Adjust squeegee using Adjustment Knob turning CW to raise tips.  |
| <b>Advenger / BR 755, 855</b>   |  |
| Lift motor runs in both directions but does not raise or lower the squeegee tool assembly | 1. Threads in the moveable lift motor assembly drive tube are damaged (stripped).<br>2. Lift cable damaged (stretched or broken).  |
| Lift motor does not run and the display shows an error fault code                         | Lift motor electrical system failure - refer to chart in "Main Controller Error Codes" for service actions.  |
| <b>ST</b>   |  |
| Squeegee lift Linkage Arm at steering column keeps bending or breaking                    | Squeegee Lift Cable is too tight - follow instruction in "Squeegee Lift Cable Adjustment - ST" section.  |
| Squeegee lift Linkage Arm / Knob doesn't raise or lower squeegee                          | Cable Bushing under Eyelet of Squeegee Cable in Steering Column is worn or Weldment Linkage is bent/sheared because Squeegee Lift Cable is too tight. Follow instruction in "Squeegee Lift Cable Adjustment - ST" section. |

## Squeegee Adjustments

Correct squeegee alignment is critical to water pickup performance and life of squeegee blades. If the squeegee is not angled correctly or hops, use the following settings as nominal and adjust as necessary to achieve the required performance.

### Tilt – FIGURE 7

Factory setting is 0.625" nominal

### Wheel Height – FIGURE 8

Factory setting is 0.87" nominal

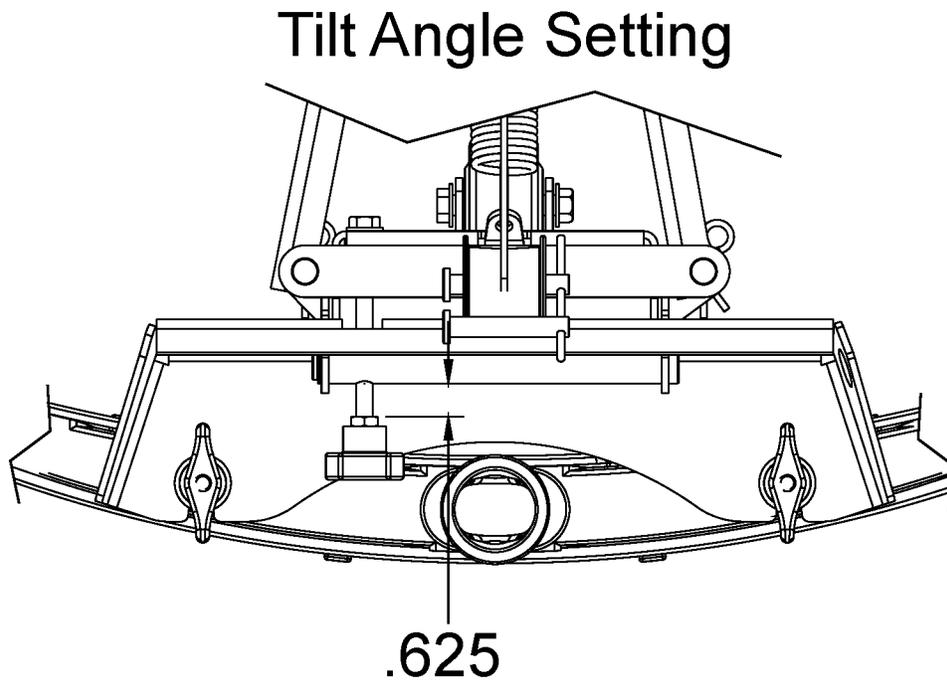


FIGURE 7

### Squeegee Wheel Height Adjust

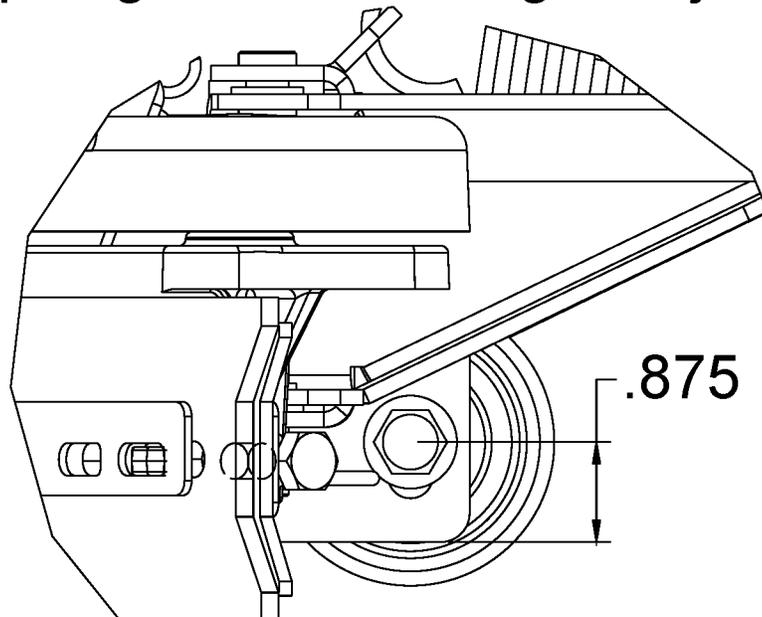


FIGURE 8

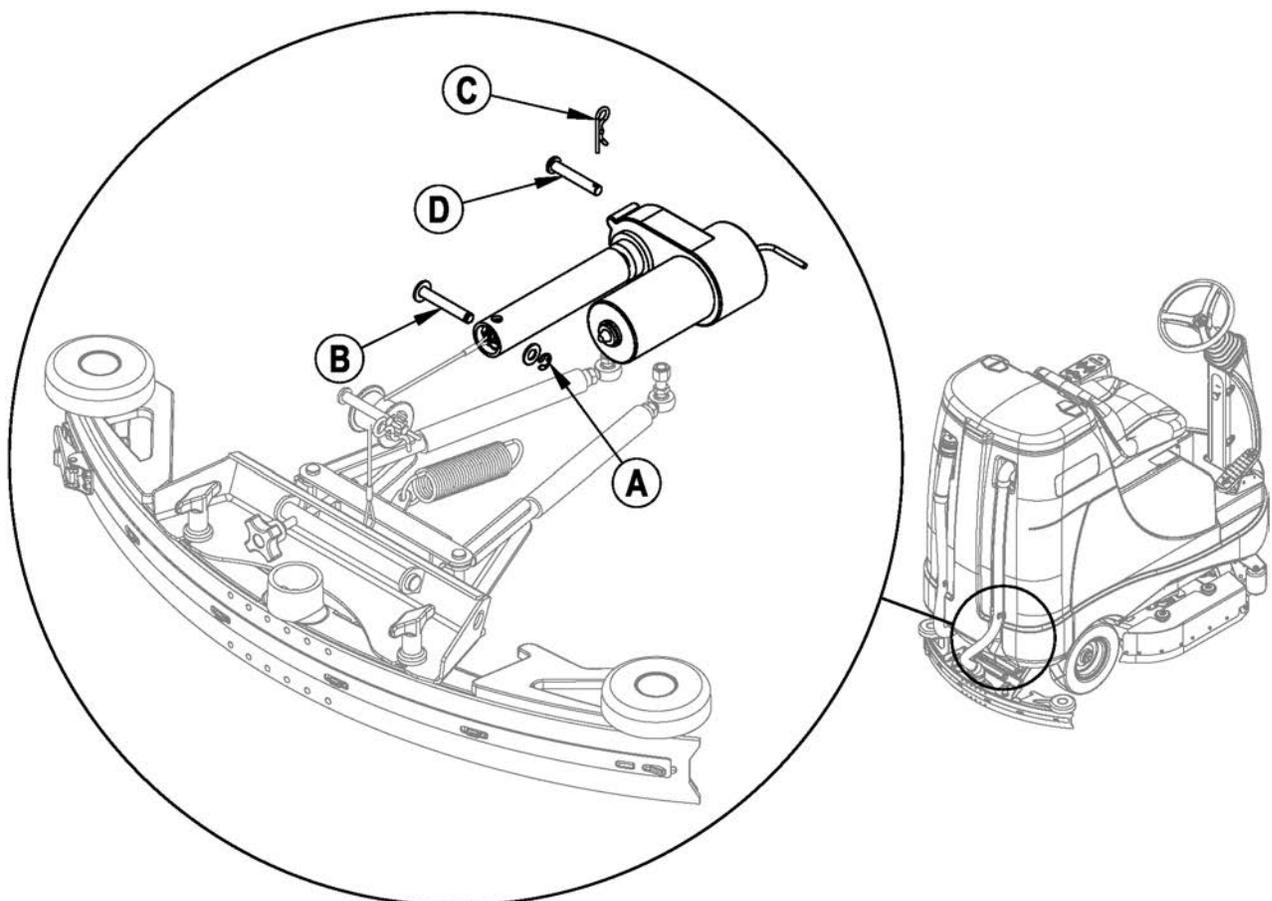
## Squeegee Lift Actuator Replacement - Advenger / BR 755, 855

### CAUTION!

The Recovery Tank is heavy and care should be taken in removing it. Two people recommended, or battery roll-out unit.

- 1 Lower the squeegee tool to the floor and then disconnect the battery pack at the red Anderson connector in the battery compartment.
- 2 Drain the recovery tank using the Recovery Tank Drain Hose (31).
- 3 Disconnect the squeegee hose from the squeegee tool and remove the tool from its mount.
- 4 Lift up the seat and unplug vacuum motor (and warning beacon if equipped) connectors located in battery compartment.
- 5 Open the hinged recovery tank cover and grip the top inside edge of the tank, then pull straight up to free it from the solution tank platform. Guide the tank off the rear of the machine to the floor.
- 6 See Figure 9. From the back of the machine, remove the Retainer Ring (A) securing the lift cable Pin (B) and separate the pin and cable from the motor drive tube housing and chassis mounts. Note: Don't lose the two plastic cable spacers positioned in motor drive tube.
- 7 Locate the wire tie that attaches the motor wiring to the chassis and then disconnect the motor harness
- 8 From underneath the machine remove the Hairpin (C) securing the lift motor Pin (D) and disassemble the motor from the chassis mount. Then pull the motor towards the machine front to remove it completely.  
NOTE: New replacement lift actuator motors do not come with the lift nut pre-adjusted.  
Follow the "Squeegee Lift Actuator Drive Nut Adjustment" procedure using 56407502 Actuator Power Cord Adapter to set the new lift actuator to the correct settings:
- 9 When finished, reassemble in reverse order.

FIGURE 9



## Squeegee Lift Actuator Drive Nut Adjustment - Advenger / BR 755, 855

### ⚠ WARNING!

- 1 Open the battery compartment and disengage the red Anderson battery connectors.
- 2 Connect the Scrub Deck Lift Actuator (completely assembled) to the Actuator Power Cord Adapter 56407502 (Figure 10) (see “Diagnostic and Service Tools”).
- 3 Connect the red alligator clip to the positive battery terminal.
- 4 Connect the black alligator clip to the negative battery terminal.
- 5 See Figure 11. Hold onto the metal nut (A) and press the rocker switch to run the motor and retract the nut towards the motor housing (the IN or Retract Limit).
- 6 With the motor laying on a flat surface, place a 3/8" pin or bolt through the top mounting holes (C) and the bottom (nut) mounting holes (D) because you will be measuring the distance between them..
- 7 Manually turn the metal nut (A) until the distance between the outer edge of one pin and the inner edge of the other pin\* matches the Retracted setting shown below.
- 8 Hold the metal nut and press the rocker switch, running the motor until it stops. If the measurement doesn't match 13.25" (33.65cm) as shown below, pry off the black cover (B) to access the Cam Adjuster.
- 9 Using a 1/2" socket, gently turn the adjuster CW to increase travel, CCW to decrease travel of the Drive Nut. Each click of the adjuster will change the nut travel by 0.09" (2.29mm) or just under 3/32".
- 10 After each adjustment, re-check the travel by holding the metal nut and running the actuator IN and OUT, checking against the values below.
- 11 Repeat until it is set correctly and replace the Cam Adjuster cover (B).
- 12 DO NOT TURN THE NUT before mounting - mark the position on the shaft if helpful.

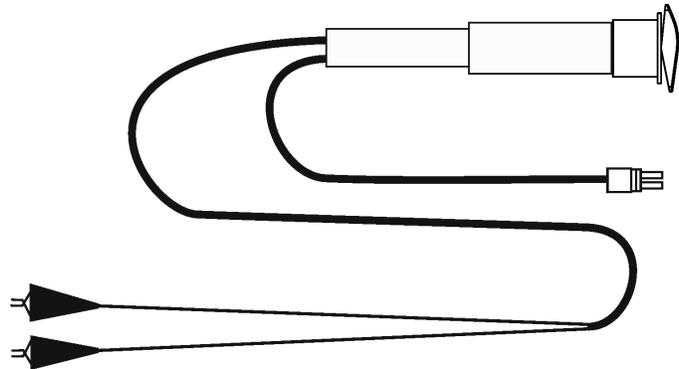


FIGURE 10

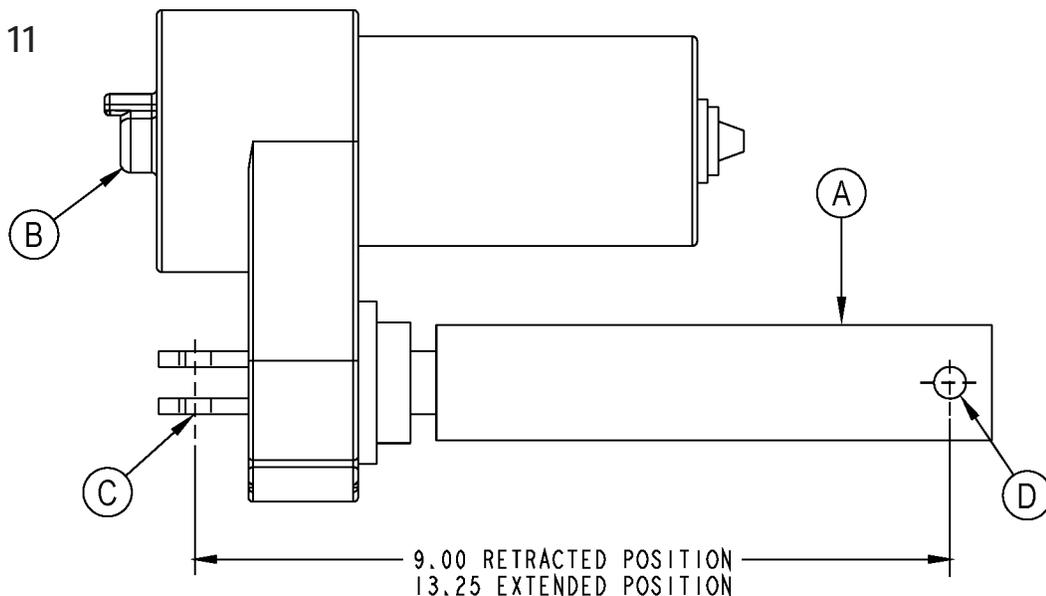
#### Actuator Setting – mounting hole center to center:

Retracted: 9.00" +/- .06

Extended: 13.25" +/- .06

\* It's not practical to measure center to center of the holes, so an outer edge to inner edge of the pins measurement is suggested.

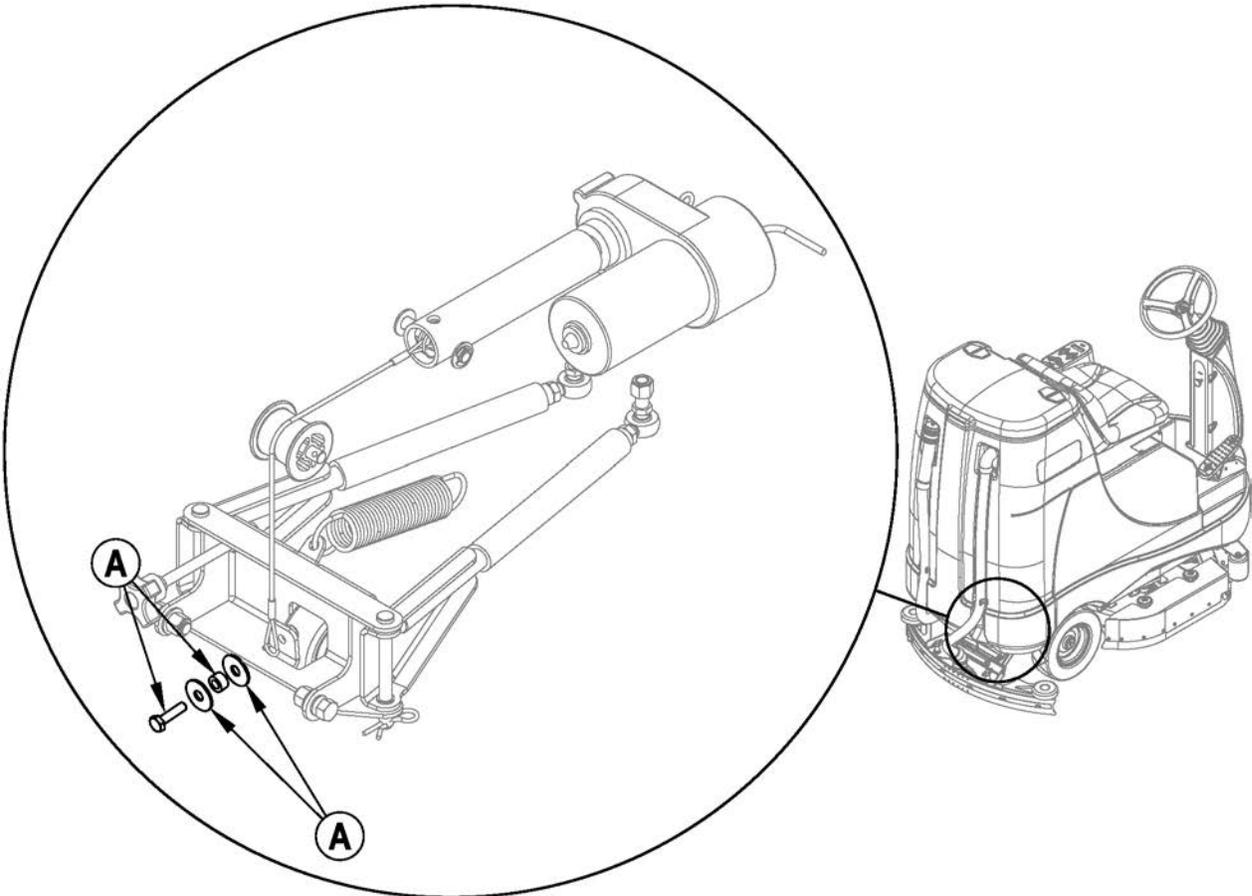
FIGURE 11



## Squeegee Lift Cable Replacement - Advenger / BR 755, 855

- 1 Follow steps 1-6 of "Squeegee Lift Actuator Replacement - Advenger / BR 755, 855" to disengage front end of lift cable under machine.  
NOTE: the motor does not need to be disconnected for this procedure.
- 2 See Figure 12. Using 7/16" wrenches, remove the hex head bolt and associated hardware (A) to free other end of lift cable.
- 3 Reassemble in reverse order and test for proper raise and lower functions.
- 4 When lifting the recovery tank back onto the machine, pay attention to the location of the foam tubes. Route them into the battery tray, otherwise they will crush.

FIGURE 12



## Squeegee Lift Cable Replacement - ST

### ⚠ CAUTION!

The Recovery Tank is heavy and care should be taken in removing it. Two people recommended, or battery roll-out unit.

#### REAR:

- 1 Lower the Squeegee Tool to the floor and then disconnect the battery pack at the red Anderson connector in the battery compartment.
- 2 Drain the recovery tank using the Recovery Tank Drain Hose (31).
- 3 Disconnect the Squeegee Hose from the Squeegee Tool and remove the tool from its mount via the two thumbscrews.
- 4 Lift up the seat and unplug the vacuum motor (and warning beacon if equipped) connectors located in the battery compartment.
- 5 Open the hinged recovery tank cover and grip the top inside edge of the tank, then pull straight up to free it from the solution tank platform. Guide the tank off the rear of the machine to the floor.
- 6 See Figure 13. Using 7/16" wrenches, remove the hex head bolt and associated hardware (A) from the Squeegee Pivot Bracket Weldment to free this end of the lift cable.
- 7 Loosen the Adjustment Nut (B) to free the cable from the slotted Cable Bracket.
- 8 Remove the Cotter and Clevis pins (C) at the white plastic roller to permit cable eyelet clearance as the cable is later pulled through from the front of the machine.

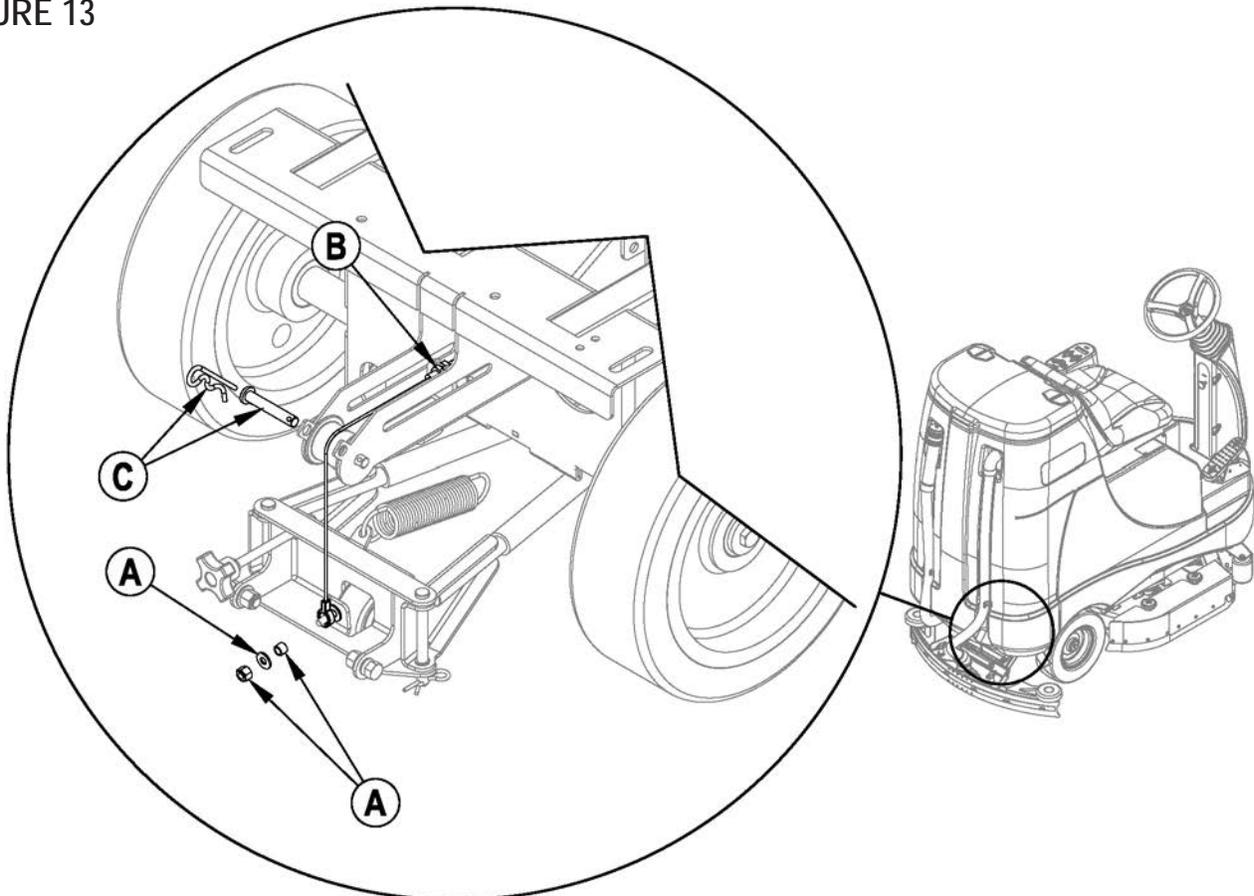
#### FRONT:

- 1 Follow the steps outlined in "Steering Column Assembly Shroud Removal" to allow access to Squeegee Lift Cable in the Steering Column.
- 2 Use a 1/2" wrench to loosen the cable nuts from the Linkage Arm to free the cable. Note condition of plastic bushing in eyelet and replace if worn.
- 3 Loosen Adjustment Nut to free cable from slotted Cable Bracket.
- 4 Using a 3/8" socket, remove charger and charger bracket underneath, exposing cavity through which cable passes.
- 5 Pull the cable through the machine from the front.

To reinstall the cable, reverse this procedure.

Follow instructions found in "Squeegee Lift Cable Adjustment – ST" to correctly set the Squeegee Lift Cable tightness.

FIGURE 13



## Squeegee Lift Cable Adjustment - ST

REAR – Figure 14

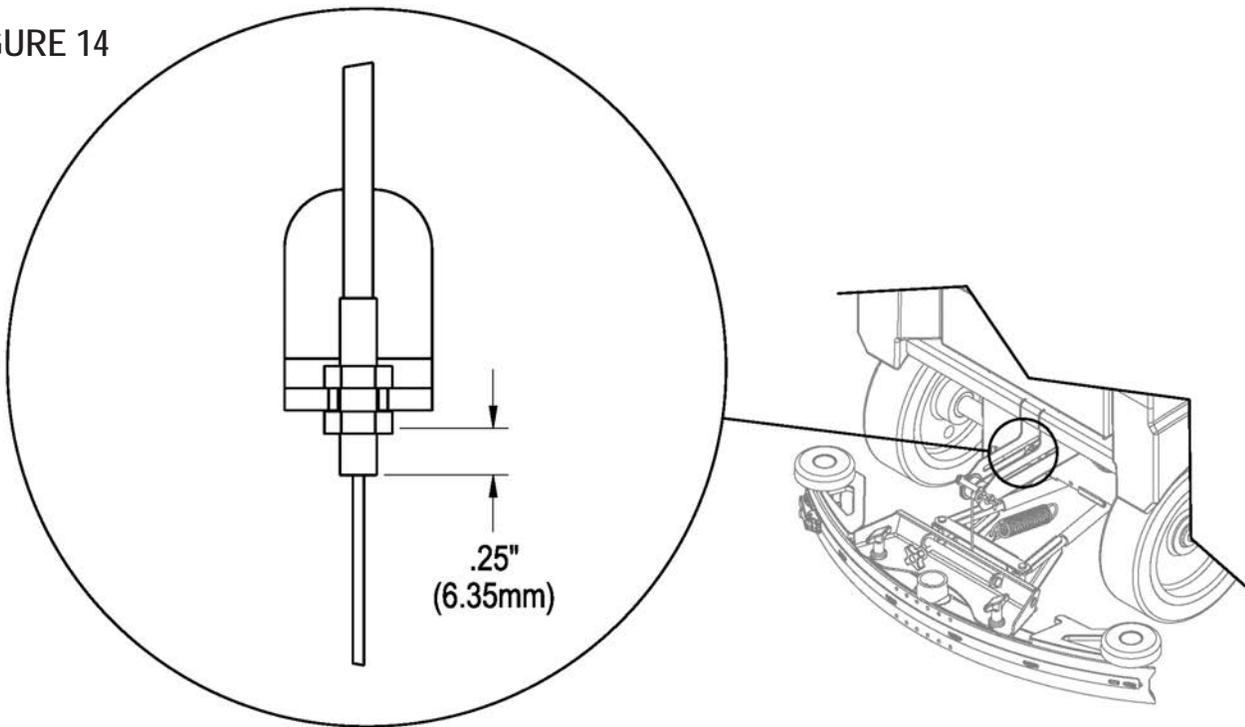
Factory setting is 0.25"

Follow steps 1 – 6 of Squeegee Lift Actuator Replacement - Advenger / BR 755, 855

- If the cable is too long and the squeegee doesn't lift off the ground, move the nut closest to the squeegee away from the machine, decreasing the distance from the nut to the reference end (Figure 14).
- If the cable is too short (squeegee doesn't reach the ground), back the nut towards the machine, increasing the distance from the nut to the reference end (Figure 14).

To check the adjustment, lift up on the Squeegee Lift Lever. It should not require excessive force. Too much force needed to move the handle means that the cable is too tight (short) and the nut should be adjusted accordingly.

FIGURE 14

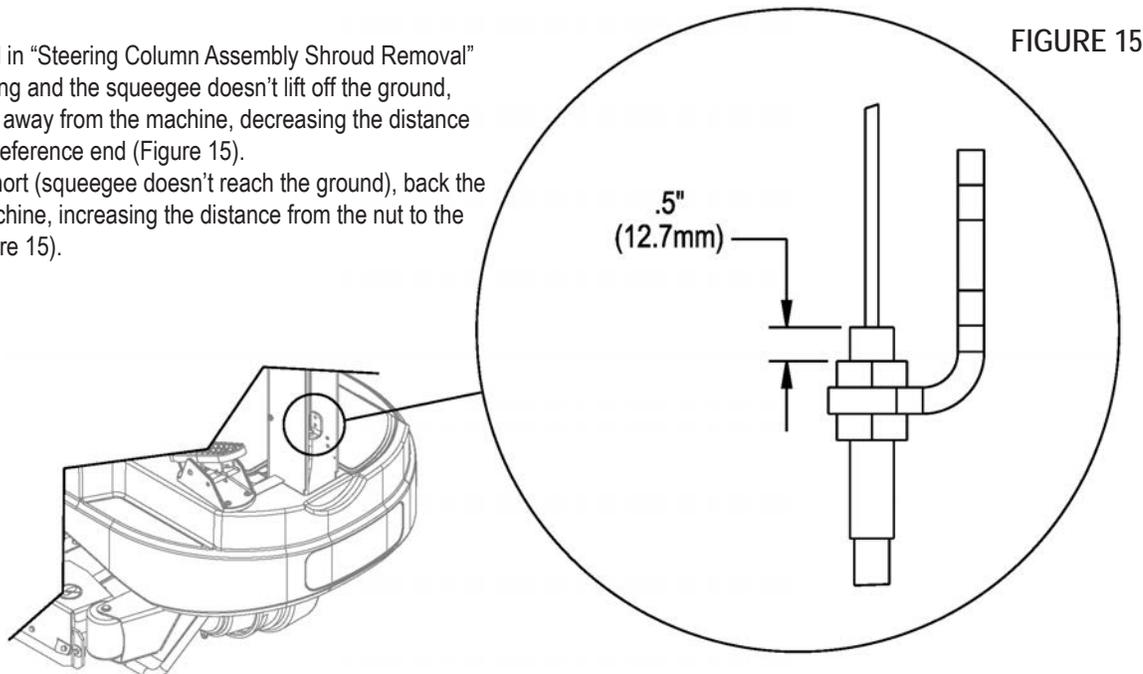


FRONT – Figure 15

Factory setting is 0.50"

Follow the steps outlined in "Steering Column Assembly Shroud Removal"

- If the cable is too long and the squeegee doesn't lift off the ground, move the upper nut away from the machine, decreasing the distance from the nut to the reference end (Figure 15).
- If the cable is too short (squeegee doesn't reach the ground), back the nut towards the machine, increasing the distance from the nut to the reference end (Figure 15).

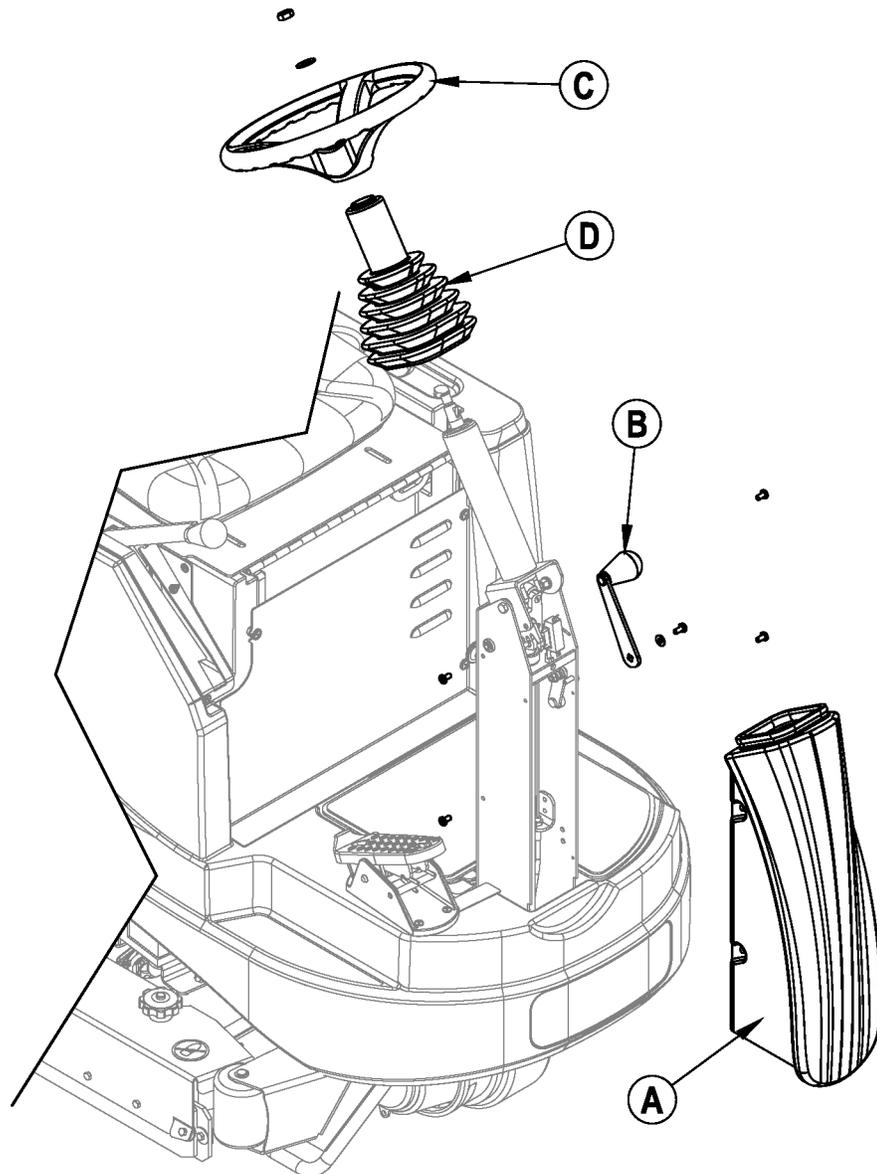


## Steering Column Assembly Shroud Removal

- 1 See Figure 16. Remove the 4 screws fastening the Lower Column Shroud (A) to the Lower Column Weldment.
- 2 (ST) Using a 7/16" socket, remove Squeegee Lift Knob and Linkage Arm (B).
- 3 Using a flat bladed screwdriver, pry off the steering wheel plastic center cap.
- 4 Using a 3/4" socket, remove the hex nut from the steering wheel center.
- 5 Pound the steering wheel (C) off from behind using a mallet, observing Woodruff key as it may fly off in the process.
- 6 Pull off accordion Steering Boot (D) from the upper steering column.
- 7 Lift the battery charger cover.
- 8 Pry the plastic Lower Column Shroud off of the weldment by starting on the left side (away from knob) so shroud can clear the Weldment Linkage bump on the right side (ST - you may want to tap the linkage in a bit to permit clearance).

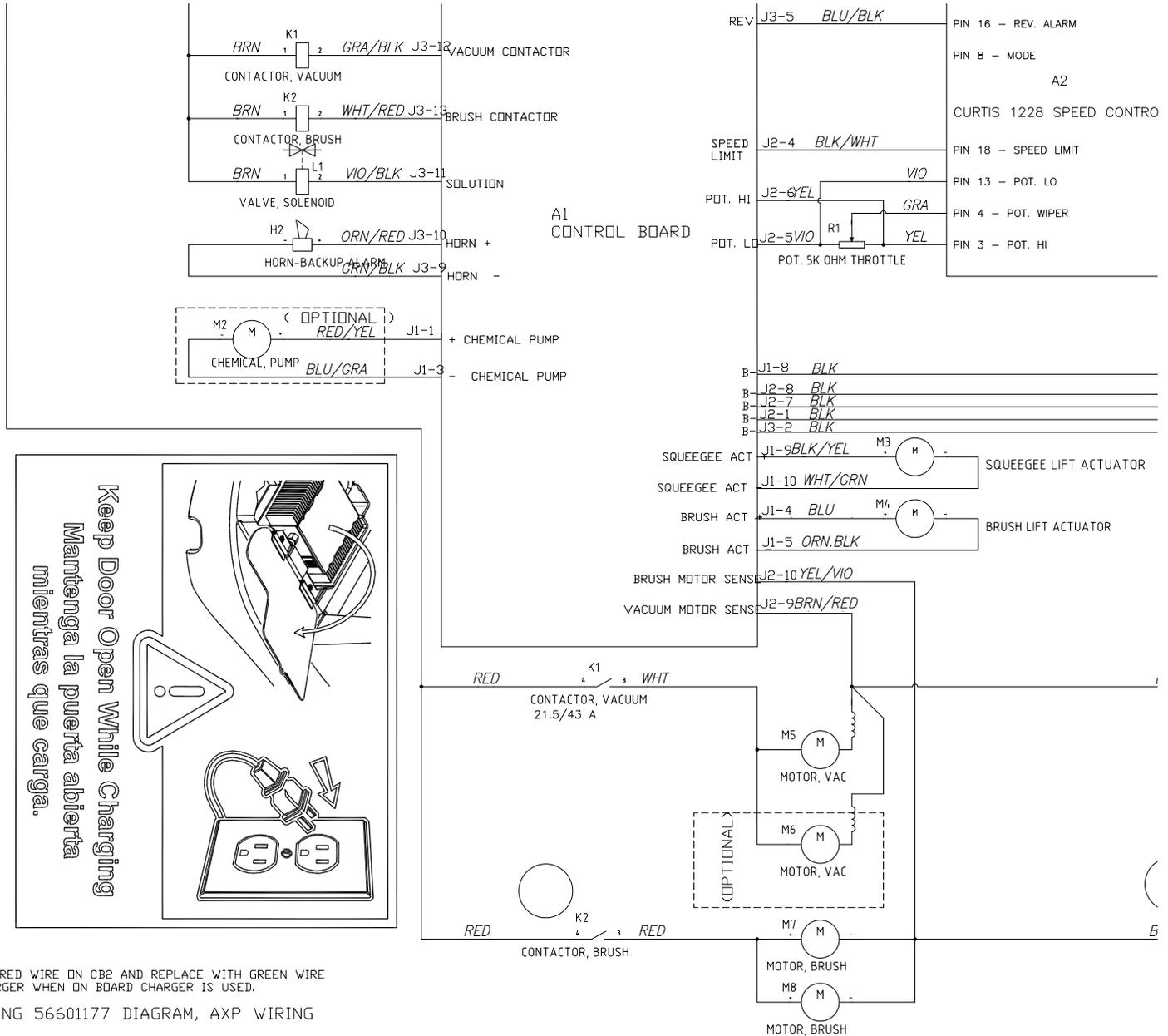
Reassemble in reverse order, applying a light coating of Silicone Spray or water to the inside of the Steering Boot to permit free travel over the shaft.

FIGURE 16



# SCRUB SYSTEM

Advenger / BR 755, 855 Disc and Cylindrical - pressing the Scrub On button with the seat switch closed causes the scrub deck and squeegee to drop. The control board provides 24V to the deck lift actuator M4; this signal is DVM measureable for 3 seconds and then becomes a pulsed signal while the deck is down. Pressing the drive pedal forward causes the brush and vacuum contactors K2 and K1 to energize. The 24V brush and vacuum motors M7, M8, M5, (M6) turn on; the pulsed solution solenoid L1 and chemical pump M2 turn on. Combined brush motor current is monitored via the YEL/VIO sense wire. Reversing the drive pedal turns off the solution solenoid and chemical pump, but the deck remains down and the brush motors stay on (for double scrub). Because multiple systems are engaged via one button, a further summary is provided in the section “Understanding Control of Squeegee, Scrub, and Recovery Systems via Modes.”



Advenger / BR 755, 855 REV -

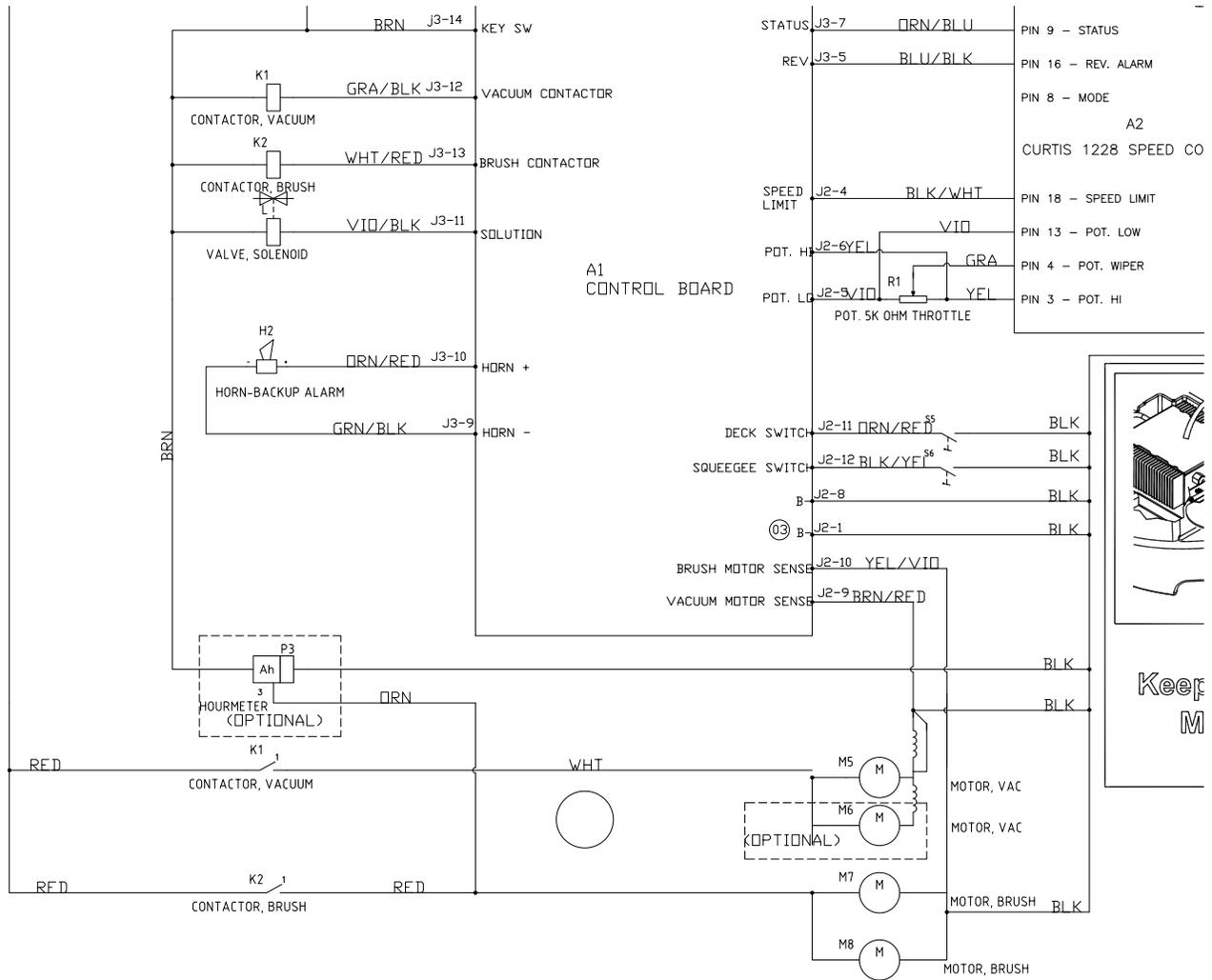
Scrub Mode -

The scrub mode operates like the Disc and cylindrical models

Floor Finish Removal Mode

When in the scrub mode, pressing the Floor finish Removal Mode Switch reduces the machine transport speed and modifies the deck pressure and solution flow rates. Pressing the Floor Finish Removal Mode switch again will slightly increase the transport speed. Pressing it a third time will exit the Floor Finish Removal mode and return to the scrub mode.

ST - with the seat switch closed, lowering the squeegee and brush deck and pressing the drive pedal forward causes the brush and vacuum contactors to energize. The 24V brush and vacuum motors turn on; the pulsed solution solenoid turns on. Combined brush motor current is monitored via the YEL/VIO sense wire. Reversing the drive pedal turns off the solution solenoid, but the brush motors stay on (for double scrub).



Keep M

## BRUSH MOTOR CONTROL AND LOAD CIRCUIT ERROR CODES AND MEASUREMENTS

| Advenger /<br>BR 755, 855<br>Display<br>Error Code | ST Service<br>LED<br>Blink Code            | Fault Description                           | Troubleshooting Action   |
|--|--|---|--|
| 5  | 1, 2                                       | Brush motor circuit overload                | <ol style="list-style-type: none"> <li>1. Check for binding in rotation of brushes or improper brush lift actuator operation.</li> <li>2. Check for mechanical interference of the brushes with the side skirts.</li> <li>3. Check the negative supply cable at the brush motor for a wiring problem, improper modifications, or poor connections at the YEL/VIO sense wire.</li> <li>4. Check that the deck is set correctly in the control board programming.</li> </ol>   |
| 10   | 2, 2                                       | Brush motor K2 contactor coil overload      | Check for short circuit in wiring or K2 contactor coil. Repair or replace.   |
| 31   | 2, 4<br>Visible<br>in Fault<br>Recall Mode | Brush motor circuit open                    | <ol style="list-style-type: none"> <li>1. Check for motor wiring open or defective motor</li> <li>2. Check the negative supply cable at the brush motor for a wiring problem or improper modifications (this is a special cable and must be replaced with original OEM due to sense wire).</li> <li>3. Check K2 contacts – if open circuit while scrub is on*, replace K2.</li> <li>4. Verify brushes are installed.</li> <li>5. Verify the brushes are touching the floor and there is no interference between the deck and the floor.</li> </ol> |
| 35   | 3, 2<br>Visible<br>in Fault<br>Recall Mode | Brush motor K2 contactor coil open          | <ol style="list-style-type: none"> <li>1. Check coil resistance (see chart below)</li> <li>2. Check for tight connections at contactor and WHT/RED wire to control board.</li> </ol> Repair or replace.  |
| 60   | 3, 4                                       | Brush motor circuit contacts stuck closed   | With no power to circuit, if contacts measure 0 ohms they're stuck. Replace K2.  |
| 63   | 4, 3                                       | Brush motor K2 contactor coil control fault | <ol style="list-style-type: none"> <li>1. If J3-13 is 24V referenced to B+ when Scrub switch is Off, replace control board.</li> <li>2. If J3-13 is 0V referenced to B+ when Scrub switch is Off, disable fault via Hidden Menu. Refer to "Control Board J1, J2, and J3 Pin Outs and Test Points" section.</li> </ol>  |

\* with Scrub On, the control board at the contactor coils should measure -24V for 2 seconds, then drop to -18V when referenced to B+. The solution solenoid when On should measure -24V or 0V referenced to B+.

| Brush Motor Type     | Scrub Pressure        | Nominal Current (A)<br>+/- 3A               | Overload Current (A) | Wire Colors       |
|----------------------|-----------------------|---|----------------------|-------------------|
| Disc                 | Low                   | 27  | 60                   | Red & Black       |
|                      | Medium                | 32  |                      |                   |
|                      | High                  | 40  |                      |                   |
| Cylindrical          | Low                   | 23  | 48                   | Red & Black       |
|                      | Medium                | 30  |                      |                   |
|                      | High                  | 35  |                      |                   |
| REV                  | Low<br>Medium<br>High | Does not use Target Amps for Scrub Pressure | 60                   | Red & Black       |
| Brush Contactor Coil | Nominal Resistance    | Nominal Current                             | Overload Current     | Wire Colors       |
| K2                   | 120 ohms              | 200 mA +/- 100 mA                           | 750 mA               | Brown & White/Red |

## SCRUB DECK LIFT ACTUATOR ERROR CODES AND MEASUREMENTS - ADVENGER / BR 755, 855

| Advenger / BR 755, 855 Display Error Code | ST Service LED Blink Code | Fault Description                 | Troubleshooting Action  |
|---|---------------------------|-----------------------------------|---|
| 4   | NA                        | Scrub deck lift actuator overload | <ol style="list-style-type: none"> <li>1. Check for improper actuator adjustment – refer to Actuator Drive Nut Adjustment section.</li> <li>2. Check for binding or frozen brush deck lift linkage and excessive weight on brush deck.</li> <li>3. Check for short circuit in brush motor and wiring. Repair or replace.</li> </ol> |
| 32  | NA                        | Scrub deck lift actuator open     | <ol style="list-style-type: none"> <li>1. Check for disconnected actuator wiring, open in wiring, defective actuator motor, or drift in motor current draw to less than 100mA (call factory for instructions). Repair or replace.</li> </ol>  |

| Lift Actuator | Nominal Current (A) | Overload Current   | Wire Colors         |
|---------------|---------------------|--------------------|---------------------|
| M4            | 2.5 – 3.5           | 5A for > 4 seconds | Blue & Orange/Black |

## Troubleshooting Scrub System Issues

It is unlikely that the scrub system will malfunction without generating an error code, so most issues will be found on the preceding tables. A few more machine-specific items are listed here:

| Problem                           | Possible Cause  |
|-----------------------------------|---|
| Advenger / BR 755, 855            |   |
| Scrub deck lift actuator overload | Mechanical interference between the deck and the ground.<br>Badly worn internal components of actuator. |
| ST                                |   |
| Brush motor overload              | Pin/spring location is too aggressive on the deck linkage for the floor/brush combination.              |

## Scrub Deck Lift Actuator Replacement - Advenger / BR 755, 855

- 1 Lower the scrub deck per the instructions found in “Service Test Mode.”
- 2 Quickly disconnect the batteries at the red Anderson battery connector inside the battery compartment. This is done not only for safety but to keep the deck from rising.
- 3 Unplug the Deck Lift Actuator connector. (Two connectors for REV deck)
- 4 Remove the Cotter Hairpins from the both ends of the actuator.
- 5 Remove the Deck Actuator.
- 6 Using the Actuator Power Cord Adapter 56407502 from your Nilfisk-Advance service tool kit, set the Extend and Retract limit switch positions as shown in the “Scrub Deck Lift Actuator Drive Nut Adjustment” section.

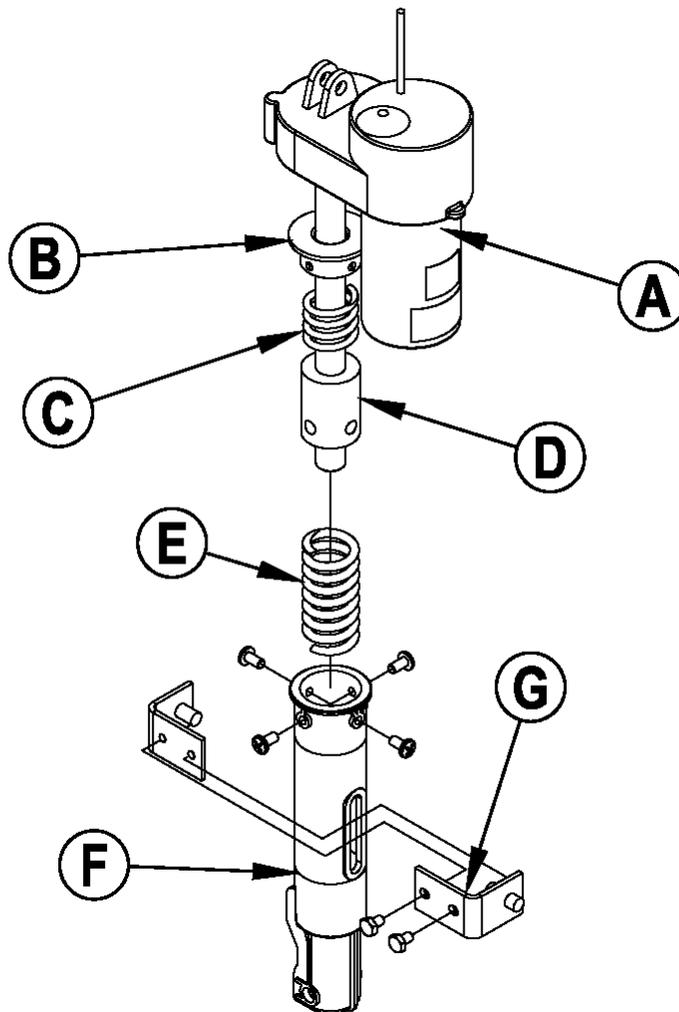
### ⚠ CAUTION!

Failure to set the lower stop correctly may result in damage to the Spring Housing (F). (Disc and Cylindrical Decks)

- 7 Then reassemble in reverse order after drive nut position has been set.

NOTE: to replace a portion of this assembly (items A - G), follow these instructions as they apply, noting component position in the diagram at right, and set limit switch end stops in accordance with the instructions found in “Scrub Deck Lift Actuator Drive Nut Adjustment” section.

FIGURE 17



## Scrub Deck Lift Actuator Drive Nut Adjustment -

### Advenger / BR 755, 855 Disc and Cylindrical

FIGURE 18

#### ⚠ WARNING!

- 1 Open the battery compartment and disengage the red Anderson battery connectors.
- 2 Connect the Scrub Deck Lift Actuator (completely assembled) to the Actuator Power Cord Adapter 56407502 (see “Diagnostic and Service Tools”).
- 3 Connect the red alligator clip to the positive battery terminal.
- 4 Connect the black alligator clip to the negative battery terminal.
- 5 Hold onto the plastic Spring Housing (F) /Drive Nut assembly and press the rocker switch to run the motor and retract the nut towards the motor housing (the IN or Retract Limit).
- 6 Measure the position of the Spring Housing Guide (B) in reference to the shoulder as shown in the figure below.
- 7 Manually turn the plastic Spring Housing (F) assembly until the position measure matches the figure below.
- 8 Hold the Spring Housing and press the rocker switch, running the motor until it stops but no further than 4” from the shoulder as **shown in the figure below or damage to the Housing may occur.**
- 9 If the measurement doesn't match 3.94” (100.08mm) as shown below, pry off the black cover (H) to access the Cam Adjuster. Using a 1/2” socket, gently turn the adjuster CW to increase travel, CCW to decrease travel of the Drive Nut. Each click of the adjuster will change the nut travel by 0.09” (2.29mm) or just under 3/32”.
- 10 After each adjustment, re-check the travel by holding the Spring Housing/Drive Nut assembly and running the actuator IN and OUT, checking against the values below.
- 11 Repeat until it is set correctly and replace the Cam Adjuster cover (H).

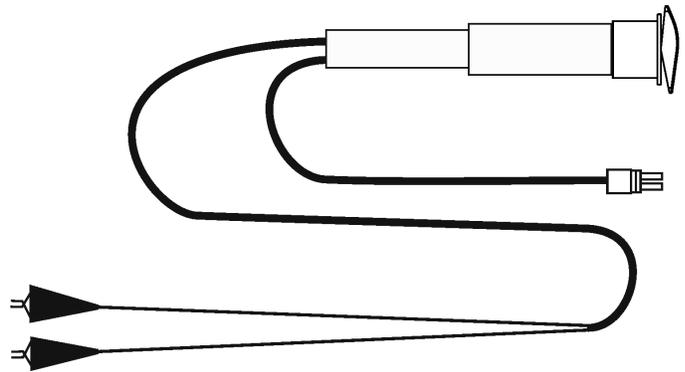
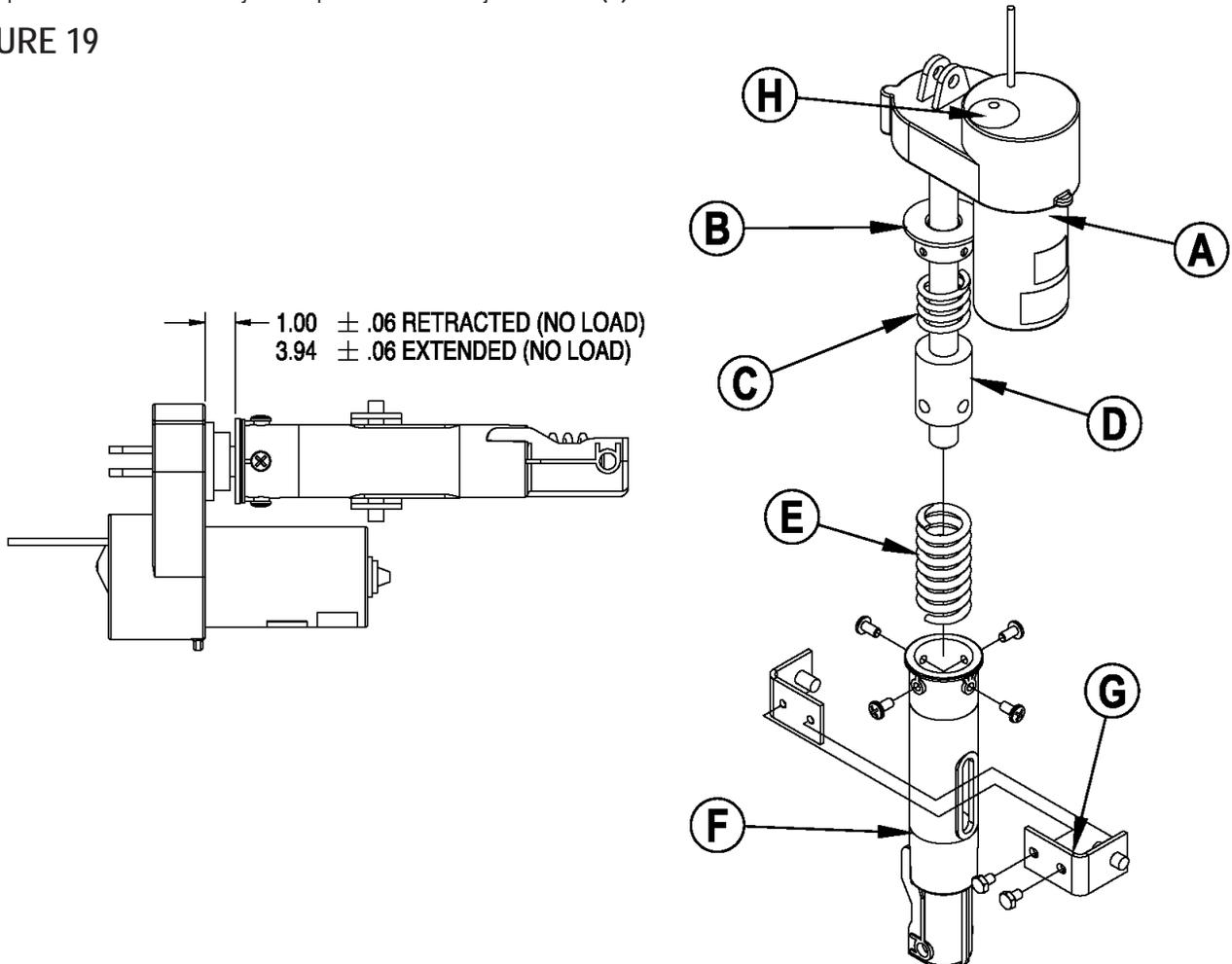


FIGURE 19

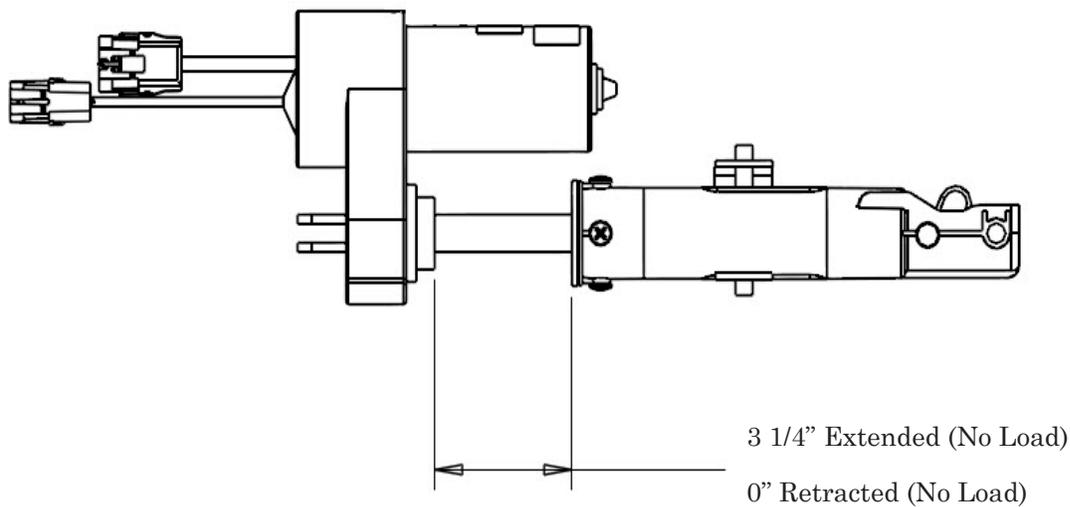


## Advenger / BR 755, 855 REV

The total travel of the actuator is not adjustable, however, the position of the spring housing must be “timed” to the fully extended motor position as follows:

### WARNING!

- 1 Open the battery compartment and disengage the red Anderson battery connectors.
- 2 Connect the Scrub Deck Lift Actuator two wire motor connector (completely assembled) to the Actuator Power Cord Adapter 56407502 (see “Diagnostic and Service Tools”).
- 3 Connect the red alligator clip to the positive battery terminal.
- 4 Connect the black alligator clip to the negative battery terminal.
- 5 Hold onto the plastic Spring Housing (F) /Drive Nut assembly and press the rocker switch to run the motor to the fully extended position.
- 6 Manually turn the plastic Spring Housing (F) assembly until the position measure matches the figure below in the extended position.



## Scrub DECK REMOVAL - Disc and REV

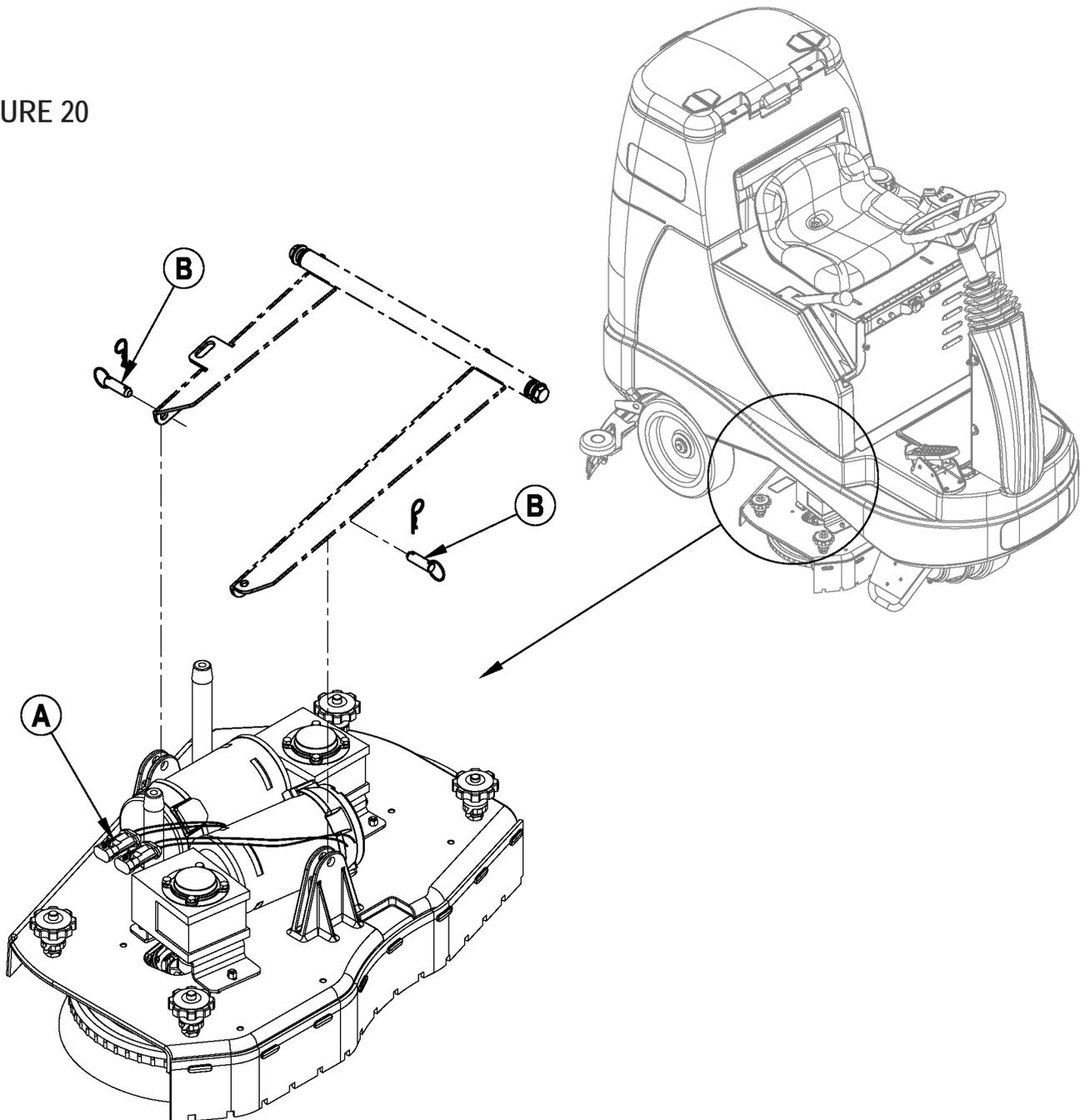
### ⚠ WARNING!

DISCONNECT BATTERIES BEFORE SERVICING.

#### Scrub Deck Removal / Re-installation

- 1 Remove both deck side skirt assemblies.
- 2 Lower the scrub deck with brushes (pads) installed. **STD / AXP / EDS SERVICE NOTE:** Don't turn the key switch off until after disconnecting the battery. This procedure is done to prevent the scrub deck from automatically raising when the key is turned off.
- 3 **See Figure 20.** Disconnect the solution system water line located on top of the scrub deck.
- 4 Disconnect brush motor wiring harness connectors (A) (under right side of machine) and actuator connector(s).
- 5 Remove the two (B) Hitch Pins that attach the scrub deck to the machine chassis linkage arm weldment.
- 6 From the right side of the machine pull the deck out from under the machine to complete the removal.
- 7 To install a scrub deck and roller bumper (if applicable), follow the previous steps in reverse order.

FIGURE 20



## Scrub Brush Motor Removal - DISC

(also needed for Carbon Brush check)

- 1 See SCRUB DECK REMOVAL-DISK to remove the scrub deck assembly.
- 2 **See Figure 21.** After removing the deck turn it over so the Brush Plates are on top.
- 3 Remove the hex socket screw (A) from the Motor Gimbal located at the Brush Plate center.
- 4 Remove the Brush Plate Assembly (B). NOTE: It may be necessary to pry the assembly off the motor shaft. Do not pry on the outer edge of the Brush Plate Assembly (B) as this could damage the plate. Pry using a flat screw driver (C) against the aluminum gimbal shoulder underneath the Brush Plate.

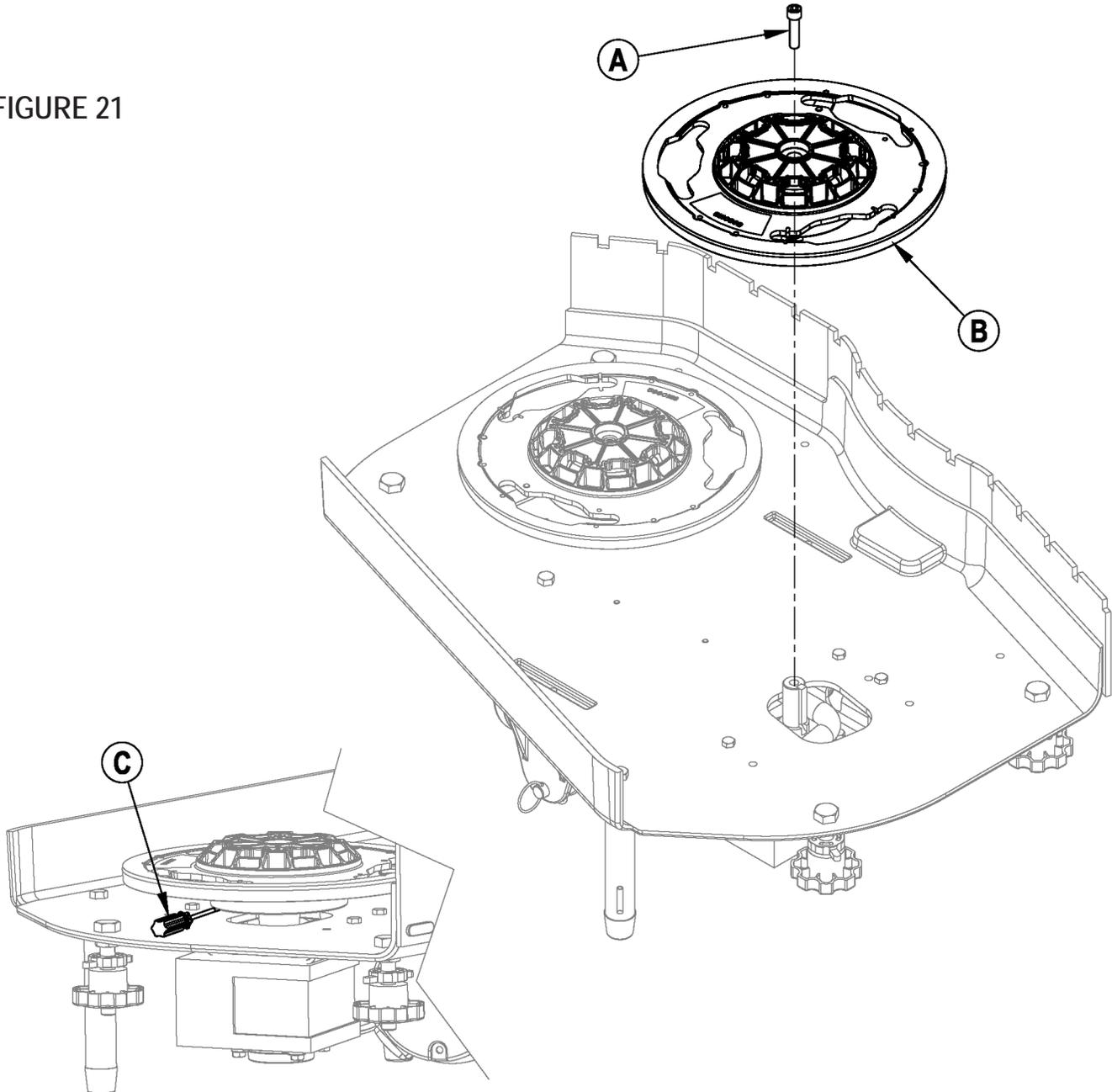


FIGURE 21

## Scrub Brush Motor Removal - DISC

- 5 See **Figure 22**. Mark the bolt locations (A) before removing them because one deck is used for all deck sizes and there are multiple configurations.
- 6 See **Figure 23**. Extract the solution hose (B) from the motor bracket (C).
- 7 Remove the bolts and nuts (D) and remove the motor assembly (E) from the deck.
- 8 Disassemble the existing scrub brush motor from the bracket.
- 9 Apply Loctite #242 to the motor bolts before fastening the new motor to the bracket.
- 10 Feed the hose back into the bracket making sure that the hose is pointed towards the shaft.

### ⚠ CAUTION!

If the hose is not positioned correctly, the scrub brush will be damaged (melted) due to lack of water.

- 11 Reattach the motor/bracket assembly to the deck making sure to use the correct holes. (If position is not correct, brushes will either interfere with each other or with the deck sides.)
- 12 Lubricate the Motor Gimbal and apply anti-seize to the socket head bolt before reassembly.
- 13 Press the Brush Plate firmly onto the motor shaft. If it is not pressed in completely, the deck will not be level, causing one motor to prematurely burn out. (see Caution).

### ⚠ CAUTION!

ST - the control board monitors total current drawn by both motors combined. It cannot differentiate if one is bound and pulling high current, or if one is forced into the floor while the other is barely making contact. To verify proper operation of each motor, monitor them individually with a current clamp while the machine is scrubbing.

- 14 Firmly tighten the socket head screw without over-torquing as damage to Motor Gimbal may occur.

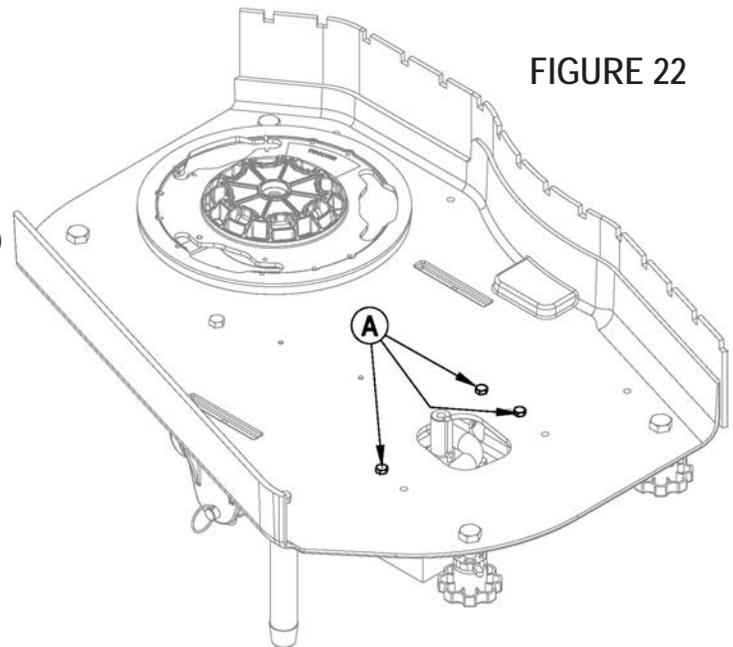


FIGURE 22

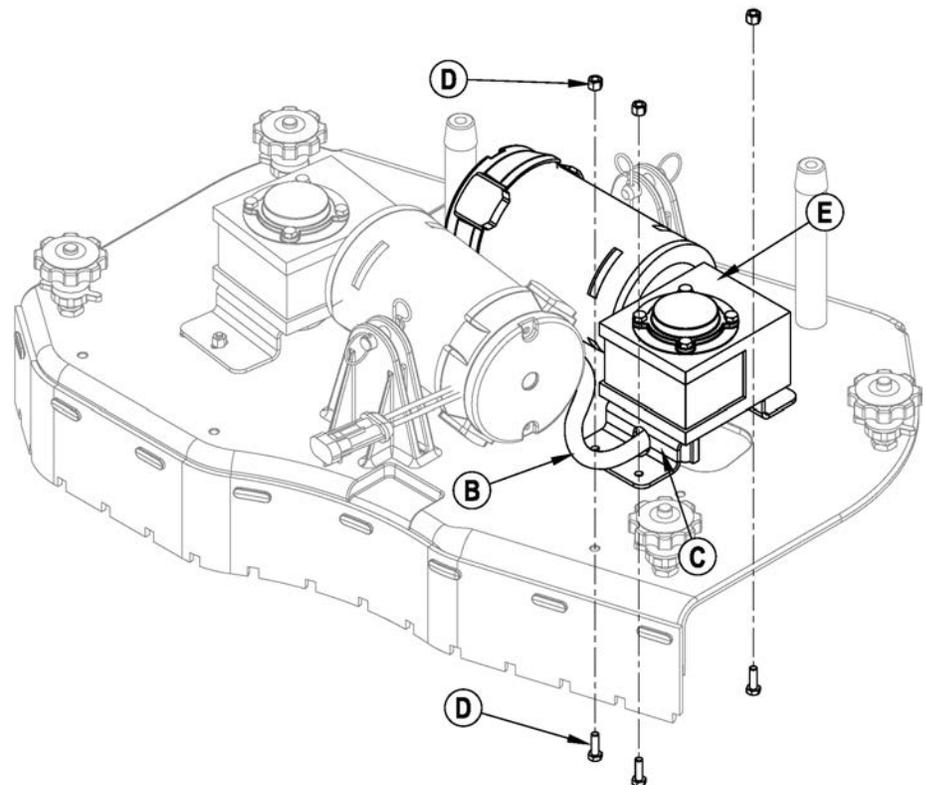
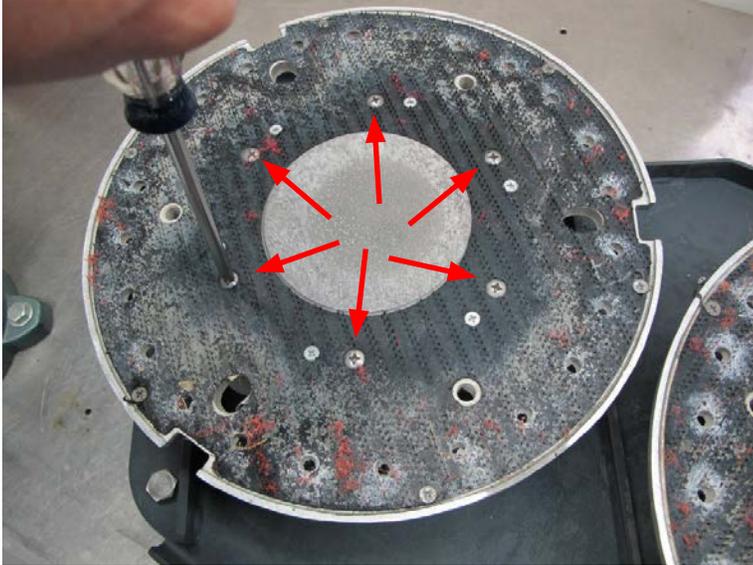


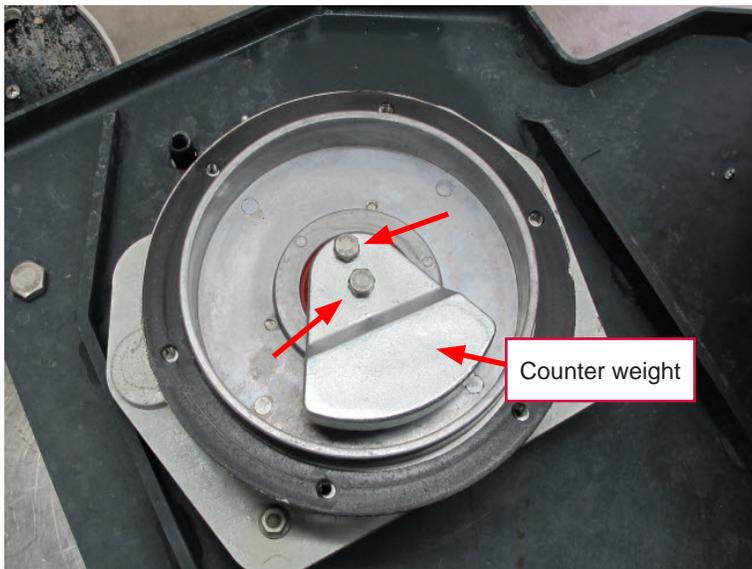
FIGURE 23

### Scrub Brush Deck Motor Removal - REV

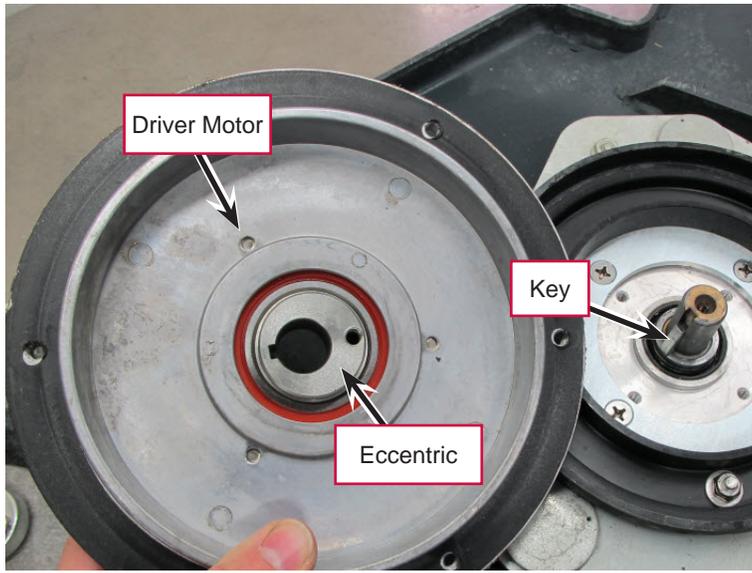
1. Remove the Brush Head from the machine. (See Removal and Installation, Brush Head.)
2. Flip the deck disc side up and remove the pads.
3. Remove the pad holder by removing the 6 attaching screws.



4. Remove the counter weight by removing the two attaching bolts



- Lift the driver motor with the eccentric from the brush motor shaft being careful not to lose the square-cut key.



- Note the orientation of the brush motor electrical leads relative to the deck to make sure you install the motor in the same position. You may want to mark the orientation of the brush motor to the motor plate. Then separate the brush motor from the motor plate by removing the 4 attaching screws and remove the motor.

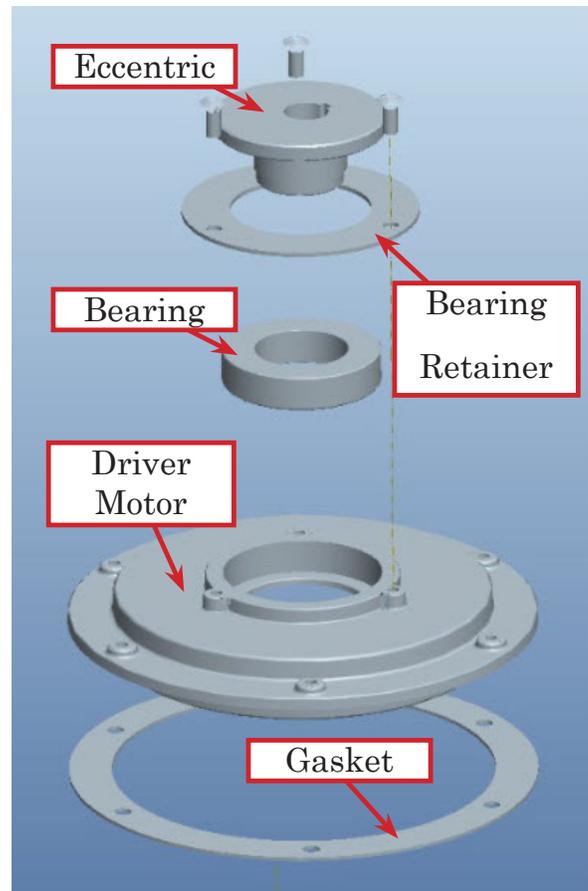


- Reassemble in reverse order noting the following:
- Use a small amount of Loctite Threadlocker blue 243 or equivalent on all fasteners.
- Apply Loctite Anti-seize (90101A) to the bore of the eccentric before installing eccentric on brush motor shaft.

## Drive Motor, Bearing and Eccentric (REV)

### Removal

1. Remove the brush head and brush motor according to the previous sections.
2. Press the eccentric out of the bearing inner race using an arbor press.
3. Remove the bearing retainer by removing the three fasteners.
4. Press the bearing out of the driver motor using an arbor press.



### Installation

1. Apply Loctite 609 retaining compound to the bearing bore in the driver motor and to the surface of the inner bearing race.



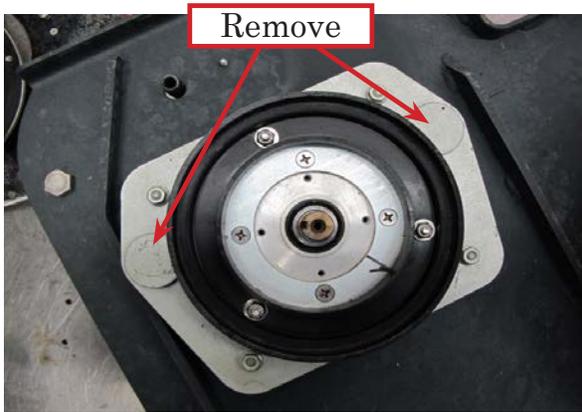
2. Press the bearing into the driver motor.
3. Install the bearing retainer.
4. Press the eccentric into the bearing.
5. Install a new gasket on the driver motor with the adhesive side toward the driver motor.
6. Apply Loctite Anti-seize (90101A) to the bore of the eccentric.



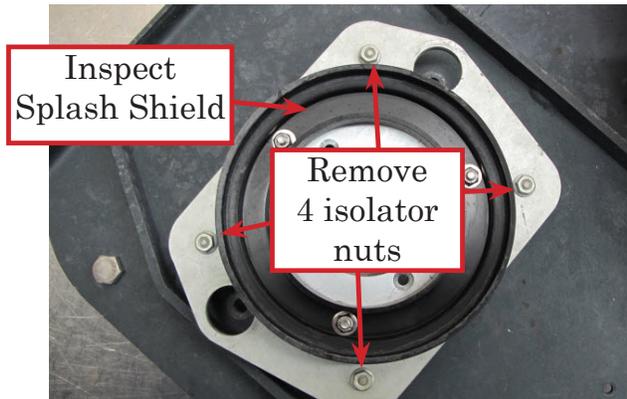
## Motor Plate and isolators (REV)

### Removal

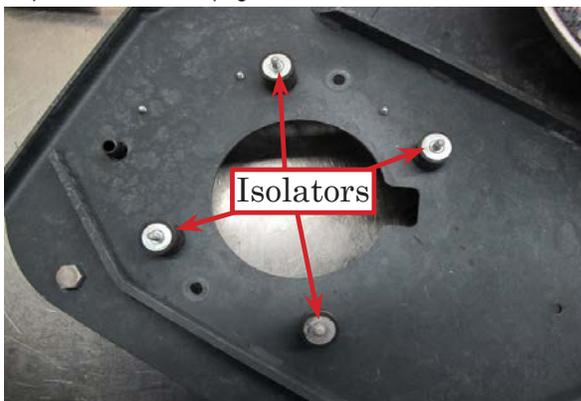
1. Remove the brush head from the machine.
2. Remove the brush motor.
3. Remove the retainers.



4. Remove the motor plate by removing the 4 isolator nuts. Inspect the splash shield and replace if damaged..



5. Flip the scrub head upright and remove each of the isolators from the brush head by removing the attaching nuts.



## Installation

1. Apply Loctite blue 243 threadlocker or equivalent to the threads of each isolator.



2. Install the isolators in the brush head. Position each one so that the color stripe it will be visible when the motor plate is installed. Torque each nut to 8-10 ft. lbs. (10.8- 13.5 N m). Install the 4 plastic covers over the nuts.



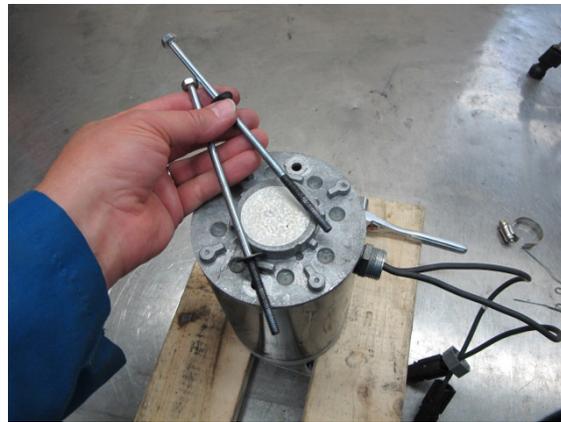
3. Apply Loctite blue 243 threadlocker or equivalent to the threads of each isolator. Install the motor plate and 4 isolator nuts. Torque each nut to 8-10 ft. lbs. (10.8- 13.5 N m). Ensure that the isolator rubber does not twist when you tighten the nuts. Visually inspect the color stripe to make sure that it is straight line and not twisted. If it is twisted, loosen the nut and repeat the procedure. It may be necessary to hold the isolator in position with your hand while tighten the nut.

### Scrub Motor Carbon Brushes (REV)

1. Remove the brush head from the machine.
2. Remove wire retaining nut and rubber packing.



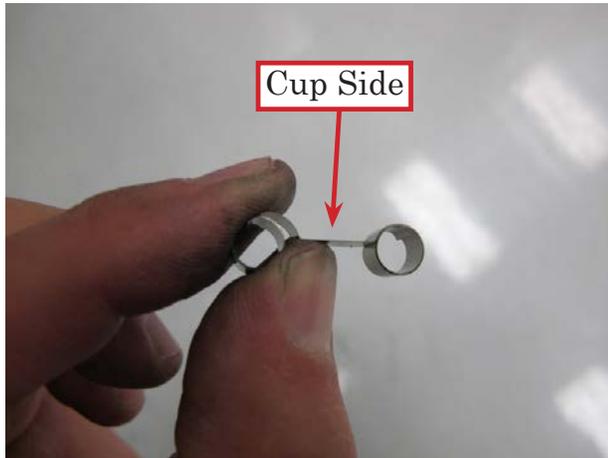
3. Mark orientation of end plates to motor housing and remove both through bolts.



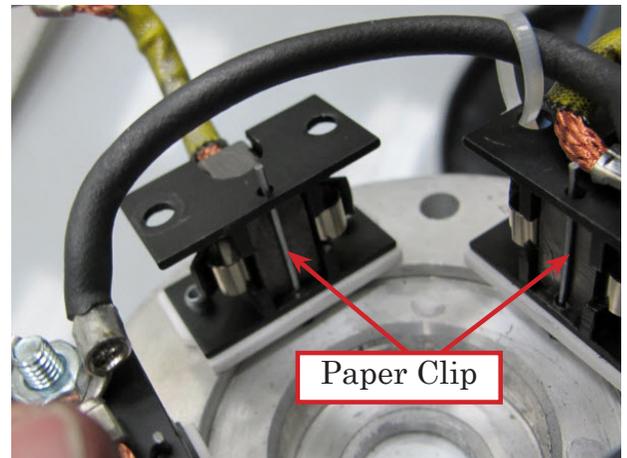
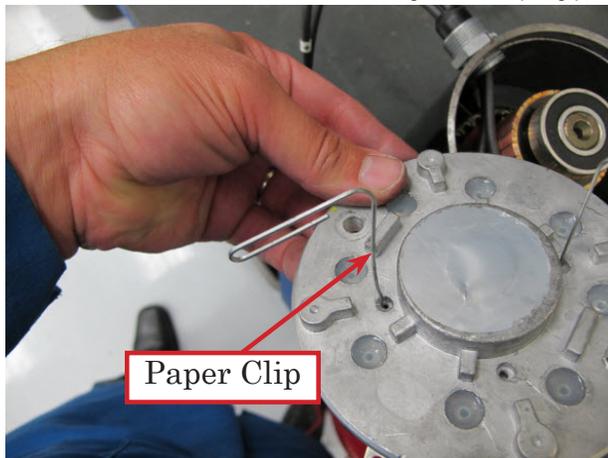
4. Remove end plate.



5. Replace the carbon brushes.
  - a. Observe how the springs roll when the brush is pushed back before taking it apart.
  - b. Remove a brush and spring.
  - c. Install a new brush and spring into the brush holder. Thread the brush wire lead through the brush holder. Position the back end of the brush in the “cup” of the spring so that the spring will unroll as the brush is pushed back once it is installed.



- d. Push brush back against the spring and insert a stiff temporary retaining wire (Paper clip) through the access hole in the end cover. (Remove silicone sealer from the holes) The wire must go through the holes in the brush holder just in front of the brush to hold the brush back against the spring pressure.

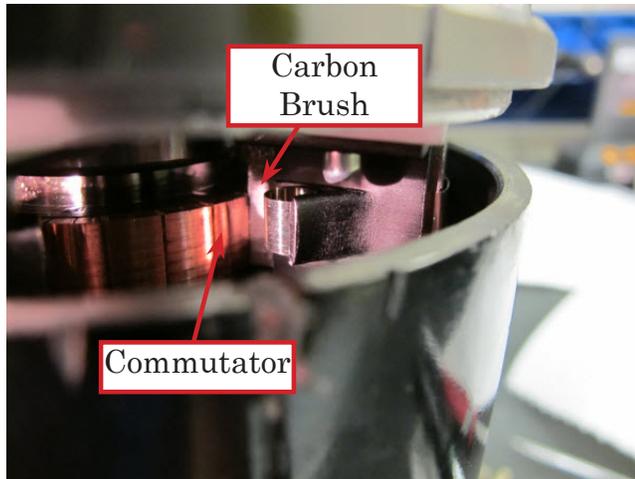


- e. Install the other three brushes.
6. Install the spring washer so that the “fingers” will press against the outside bearing race.



7. Install the end cover in stages.

- a. Install it far enough so that the brushes will contact the commutator when the temporary retaining wires are removed. Then remove the wires.



- b. Fully seat the end cover.
- c. Install the through bolts.
- d. Seal the retaining wire holes in the end cover with silicone sealant.

## Scrub DECK REMOVAL - Cylindrical

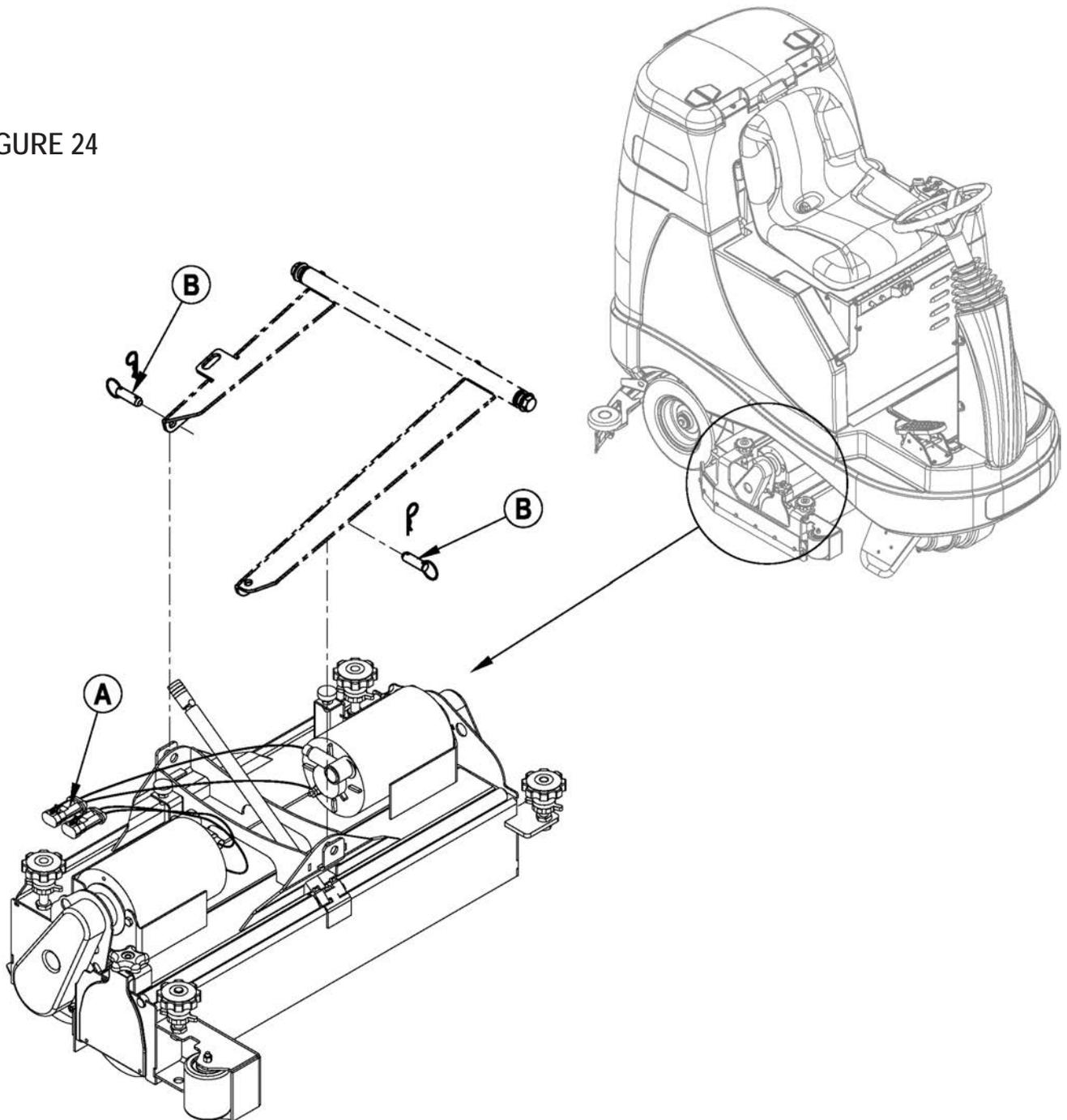
### ⚠ WARNING!

DISCONNECT BATTERIES BEFORE SERVICING.

#### Scrub Deck Removal / Re-installation

- 1 Remove both deck side skirt assemblies and the debris tray.
- 2 Lower the scrub deck with brushes installed. **STD / AXP / EDS SERVICE NOTE:** Don't turn the key switch off until after disconnecting the battery pack. This procedure is done to prevent the scrub deck from automatically raising when the key is turned off.
- 3 **See Figure 24.** Disconnect the solution system water line located on top of the scrub deck.
- 4 Disconnect both brush motor wiring harness connectors (A) (under right side of machine).
- 5 Remove the two (B) Hitch Pins that attach the scrub deck to the machine chassis linkage arm weldment.
- 6 From the right side of the machine pull the deck out from under the machine to complete the removal.
- 7 To install a scrub deck and roller bumper (if applicable), follow the previous steps in reverse order.

FIGURE 24

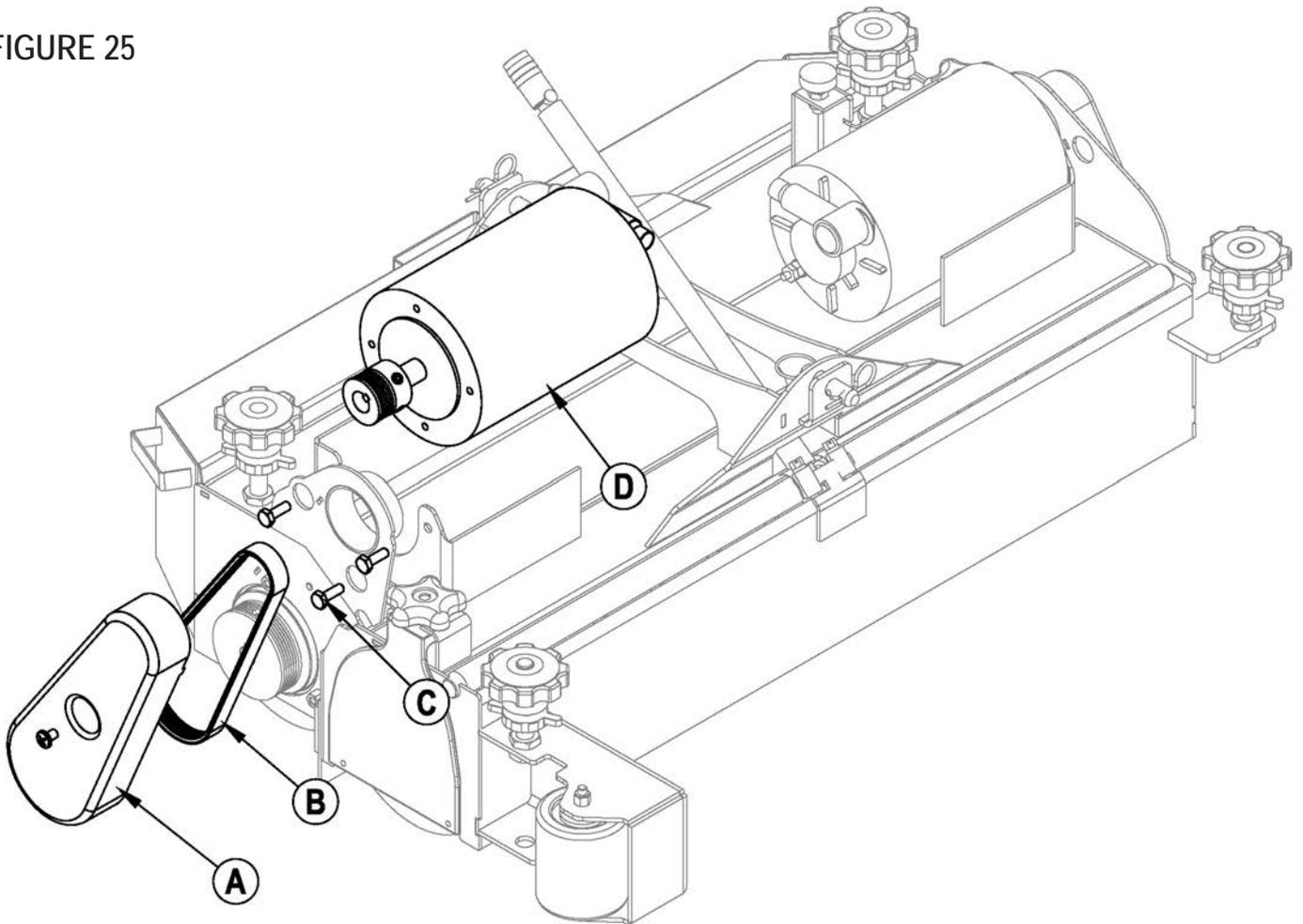


## Scrub Brush Motor Removal - Cylindrical

- 1 See SCRUB DECK REMOVAL-CYLINDRICAL to remove the scrub deck assembly.
  - 2 **See Figure 25.** Remove the Belt Cover (A) on each side. With an operator in the driver's seat with the key switch On and the increase scrub function selected press the drive pedal to start the scrub brushes and observe which brush motor needs to be replaced. Remove the Belt (B).
  - 3 Remove the wiring at both the Pos. & Neg. brush motor terminal studs and note the correct wiring connections (for reinstallation). Then remove the (3) Screws (C) and lift the motor (D) out from the scrub deck.
  - 4 Reassemble in reverse order, installing motors with wires pointing to the rear towards the hopper.
  - 5 Apply anti-seize to the motor shafts.
- \* Rotation from shaft end.

NOTE: the belts are self-tensioning.

FIGURE 25



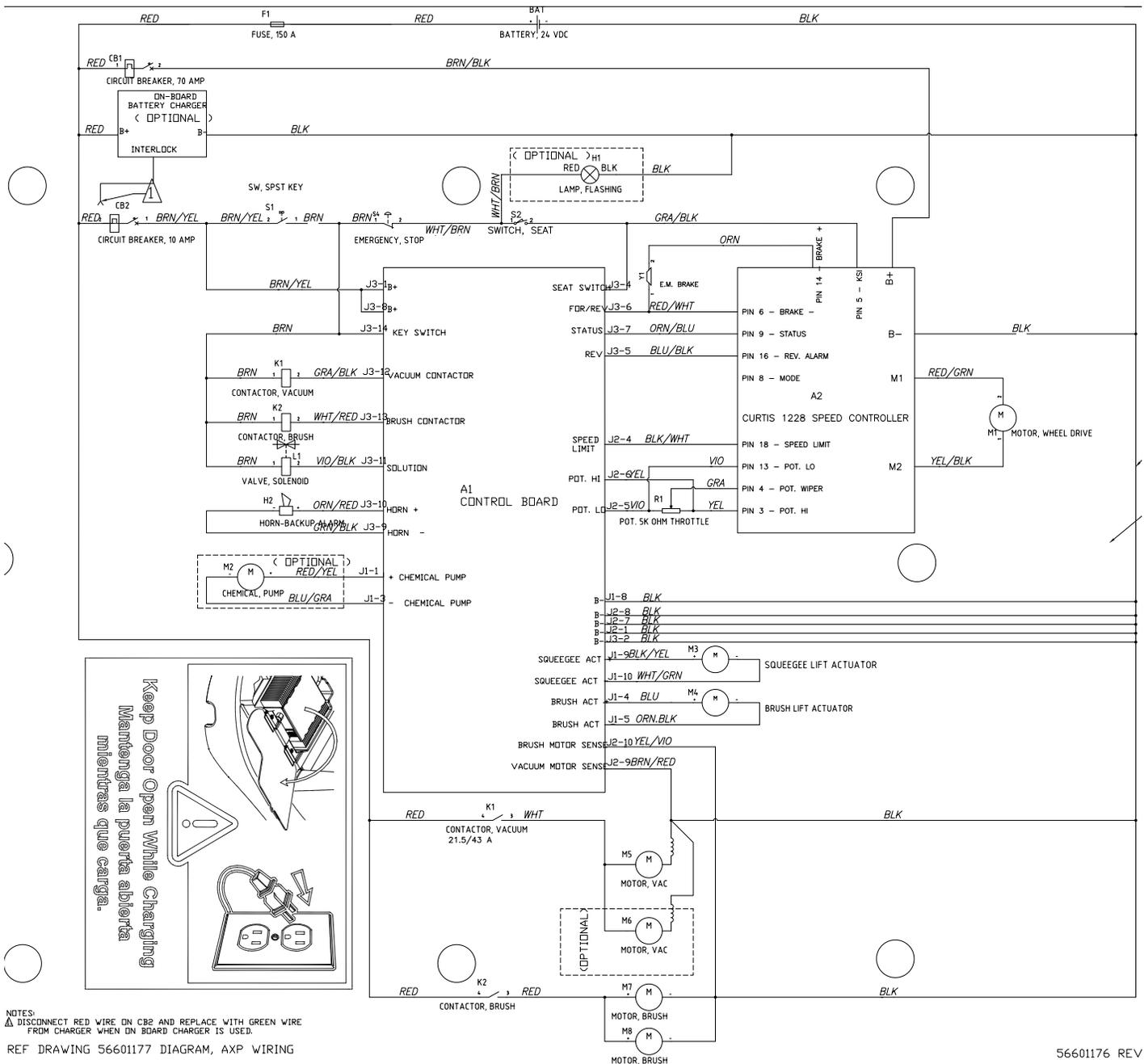
# RECOVERY SYSTEM

The recovery system is controlled via the control board output to contactor K1 coil, turning on one or both (if equipped) vac motors M5 (M6), with control board feedback provided via the BRN/RED vac motor current-monitoring sense wire.

Refer to the section “Understanding Control of Squeegee, Scrub, and Recovery Systems via Modes” for details about functionality of the Recovery System due to multiple systems operating in tandem under various seat switch and button configurations.

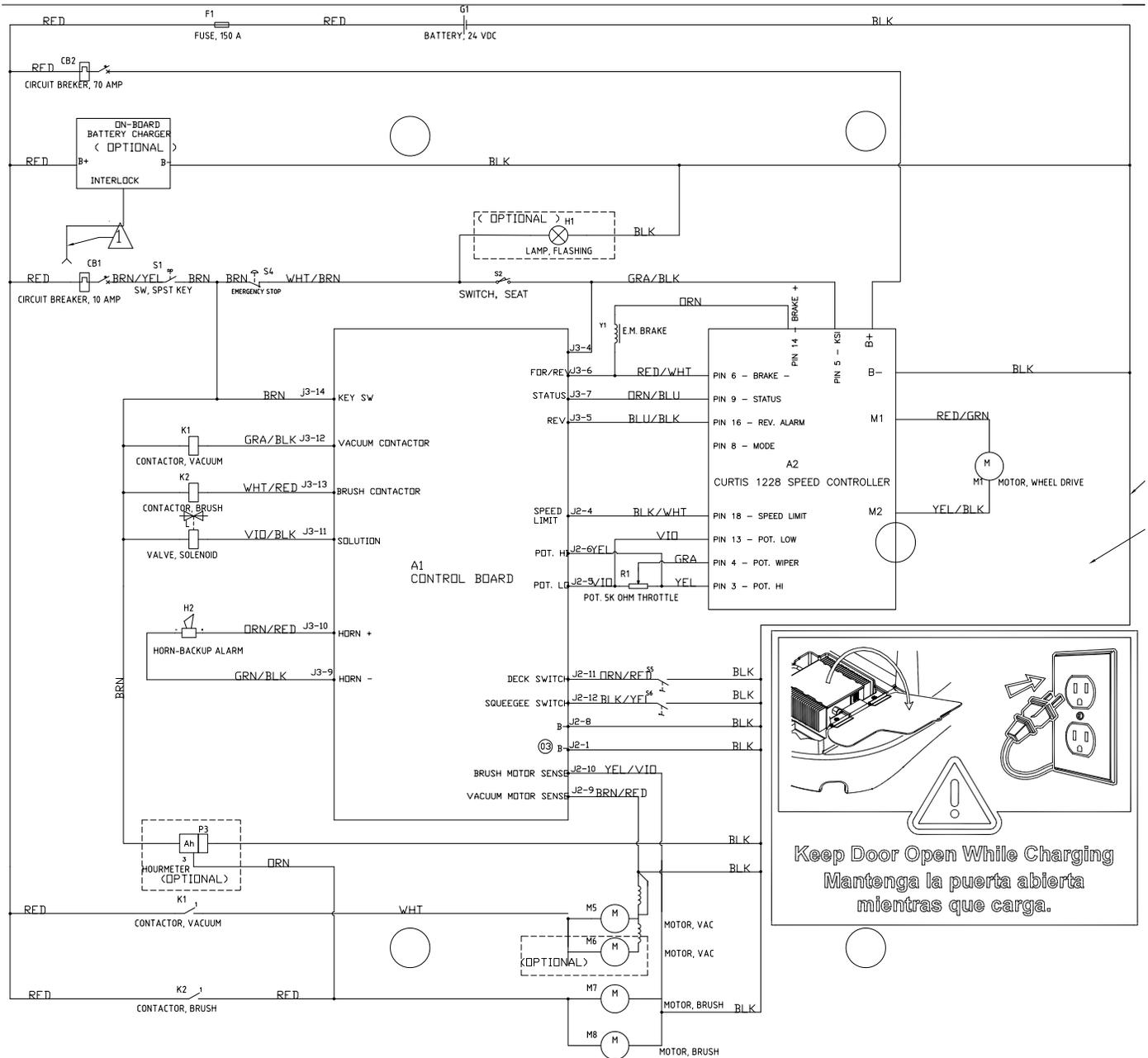
For the Recovery System to function properly, the systems mentioned above in addition to the Wheel Drive System must be operating properly in order for the vac motors to turn on unless by-passed by entering Service Test Mode for troubleshooting purposes.

## ADVENGER / BR 755, 855



NOTES:  
 ⚠ DISCONNECT RED WIRE ON CB2 AND REPLACE WITH GREEN WIRE FROM CHARGER WHEN ON BOARD CHARGER IS USED.  
 REF DRAWING 56601177 DIAGRAM, AXP WIRING

ST



**Keep Door Open While Charging**  
**Mantenga la puerta abierta**  
**mientras que carga.**

NOTES:  
 ⚠ DISCONNECT RED WIRE ON CB2 AND REPLACE WITH GREEN WIRE FROM CHARGER WHEN ON BOARD CHARGER IS USED  
 REF. DRAWING 56601179 DIAGRAM, ST WIRING

## RECOVERY SYSTEM ERROR CODES AND MEASUREMENTS

| Advenger / BR 755, 855 Display Error Code | ST Service LED Blink Code            | Fault Description                         | Troubleshooting Action  |
|---|--------------------------------------|---|---|
| 7   | 1, 3                                 | Vacuum motor circuit overload             | <ol style="list-style-type: none"> <li>1. Check for debris in vac motor</li> <li>2. Check for worn carbon brushes</li> <li>3. Check for defective/corroded motor bearings</li> <li>4. Check for short circuit in vac motor or wiring.</li> <li>5. Check the negative supply cable at the vac motor for a wiring problem, improper modifications, or poor connections at the BRN/RED sense wire.</li> </ol> Repair or replace. |
| 9   | 2, 1                                 | Vacuum K1 contactor coil overload         | Check for short circuit in wiring or K1 contactor coil.<br>Repair or replace  |
| 33  | 3, 1<br>Visible in Fault Recall Mode | Vacuum motor circuit open                 | <ol style="list-style-type: none"> <li>1. Check for motor wiring open or defective motor,</li> <li>2. Check the negative supply cable at the vac motor for a wiring problem or improper modifications (this is a special cable and must be replaced with original OEM due to sense wire).</li> <li>3. Check K1 contacts - if open circuit while vac is turned on (0V at J3-12), replace K1.</li> </ol>                        |
| 36  | 3, 3<br>Visible in Fault Recall Mode | Vacuum K1 contactor coil open             | <ol style="list-style-type: none"> <li>1. Check coil resistance (see chart below).</li> <li>2. Check for tight connections at contactor and GRA/BLK wire to control board. Repair or replace.</li> </ol>  |
| 61  | 4, 1                                 | Vacuum K1 contactor contacts stuck closed | With no power to circuit, if contacts measure 0 ohms they're stuck.<br>Replace K1.  |
| 64  | 4, 4                                 | Vacuum contactor coil control fault       | <ol style="list-style-type: none"> <li>1. If J3-12 is 24V referenced to B+ when Vacuum switch is Off, replace control board.</li> <li>2. If J3-12 is 0V referenced to B+ when Vacuum switch is Off, disable fault via Hidden Menu. Refer to "Control Board J1, J2, and J3 Pin Outs and Test Points" section.</li> </ol>   |

| Vacuum Motor          | Single/Dual        | Nominal Current (A)<br>+/- 3A | Overload Current (A) | Wire Colors        |
|-----------------------|--------------------|-------------------------------|----------------------|--------------------|
| M5                    | Single             | 20                            | 30                   | White & Black      |
| M5 + M6               | Dual               | 40                            | 60                   | White & Black      |
| Vacuum Contactor Coil | Nominal Resistance | Nominal Current               | Overload Current     | Wire Colors        |
| K1                    | 100 ohms           | 240 mA +/- 50 mA              | 750 mA               | Brown & Gray/Black |

## Troubleshooting Recovery System Issues

| Problem   | Possible Cause   |
|---|--|
| Advenger / BR 755, 855 and ST   |  |
| Poor water pickup from squeegee tool  | <ol style="list-style-type: none"> <li>1. Misadjusted squeegee tool - refer to "Squeegee Alignments" section</li> <li>2. Worn or damaged blades - refer to Operating Manual for instructions</li> <li>3. Leak in vacuum system - check for bad gasket, leaky hose, damaged tank, leaky drain valve.</li> <li>4. Restriction in vacuum system - check for debris in squeegee tool, vacuum hoses, float cage, or wherever air is forced to make a sharp turn.</li> </ol> |
| Vacuum motor keeps corroding and failing.   | Liquid is being pulled into vac motor due to excessive foam in recovery tank. Recommend defoamer and don't fill until shuts off automatically.   |
| Vacuum motor is normally dry, now it's wet and failing.   | Vacuum leak below the water line creating turbulence in the recovery tank, causing water to enter the vacuum motor.  |
| The control board doesn't indicate the recovery tank is full before the ball valve shuts off the vac motor. | <ol style="list-style-type: none"> <li>1. Check the vacuum motor sense wire (BRN/RED) for break or poor connection (mV signal).</li> <li>2. Check that cage for ball float is clean.</li> </ol>  |
| Display shows the recovery tank is full but it's not.   | Disable Recovery Tank Full automatic shut-off via Hidden Menu.   |
| ST  |  |
| Vacuum motor doesn't turn on  | <ol style="list-style-type: none"> <li>1. Go into Fault Recall mode and check for error code 3,1 for vac motor circuit problem.</li> <li>2. Check limit switch S6 in steering column. Moving the handle to the down position should move squeegee cable down and close switch S6 turning on the vac motor circuit if operating properly.</li> </ol>  |
| Vacuum motor contactor doesn't energize   | Go into Fault Recall mode and check for error 3,3  |

## Replacing a Vacuum Motor

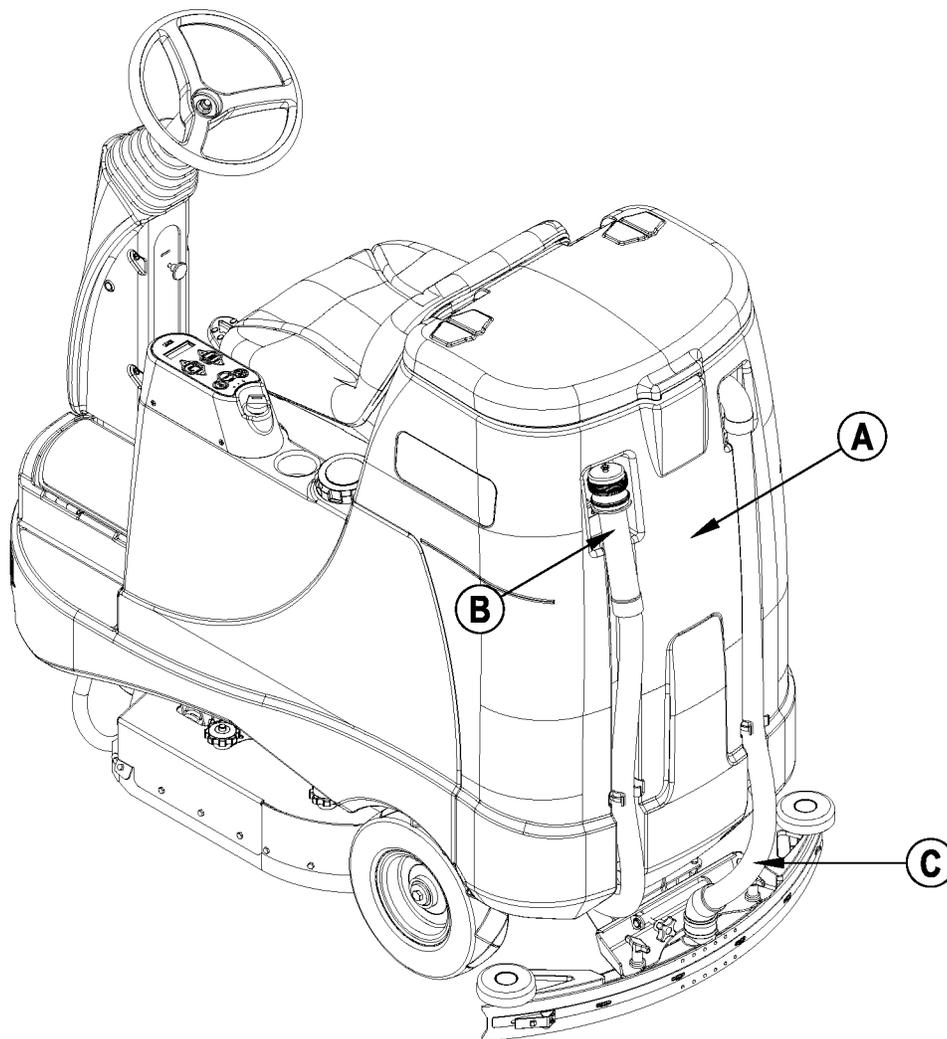
### WARNING!

DISCONNECT BATTERIES BEFORE SERVICING.

#### RECOVERY TANK REMOVAL

- 1 See Figure 26. Drain the Recovery Tank (A) using the Drain Hose(B).
- 2 Disconnect the Recovery Hose (C) from the squeegee.
- 3 Disconnect the vacuum motor wiring from the main harness. NOTE: Also disconnect optional Beacon wiring if installed.
- 4 Remove the Recovery Tank (A) from the machine.

FIGURE 26



## REPLACING A VACUUM MOTOR

### VACUUM MOTOR ASSEMBLY REMOVAL

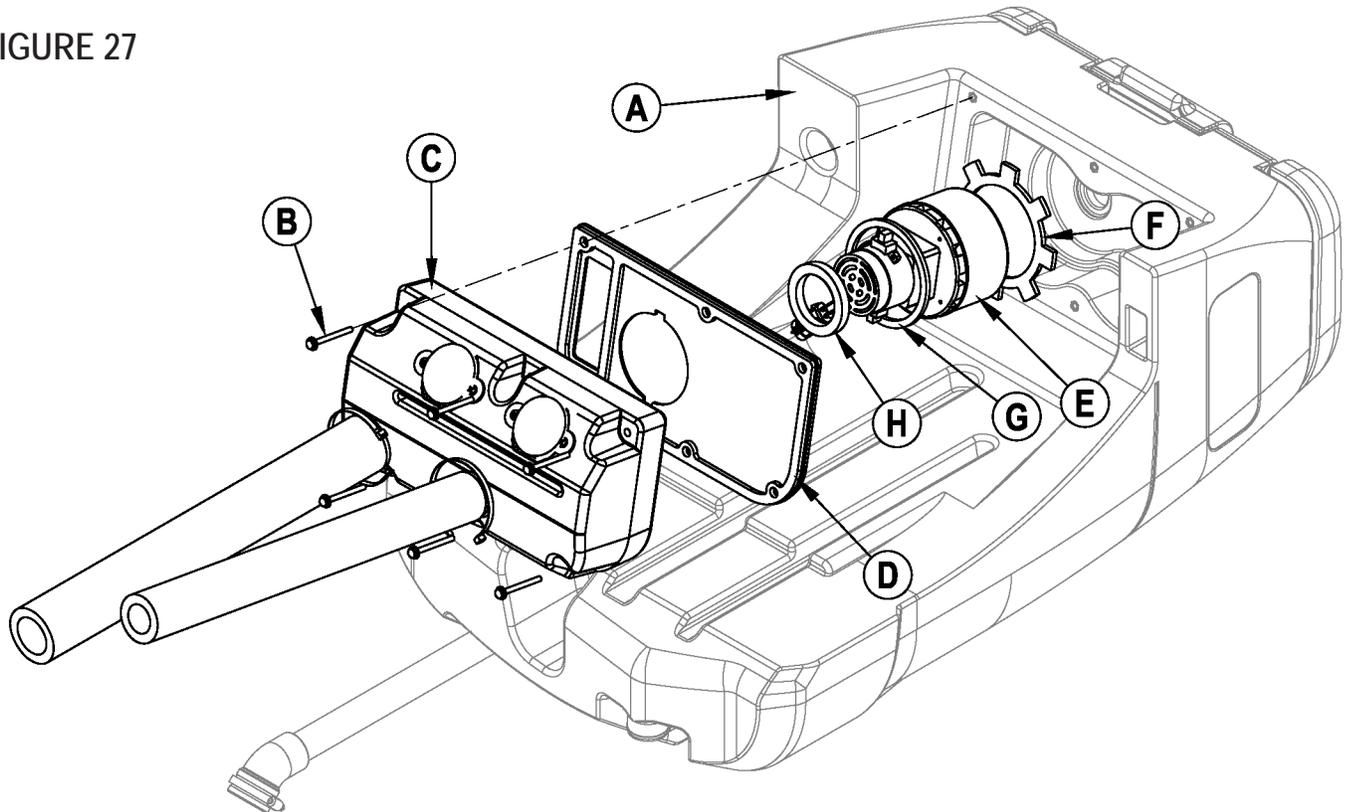
- 5 See Figure 27. Lay the Recovery Tank (A) on it's back.
- 6 Remove the (6) Screws (B) and remove the Vacuum Motor Cover (C) from the tank.
- 7 Remove Plate and Gaskets (D) and Vacuum Motor (E).

NOTE: The wires should be protruding up through the hole and not from around the edge of the plate. If they are coming from under the plate, examine for damage and repair if cut.

### VACUUM MOTOR ASSEMBLY INSTALLATION

- 8 Attach gaskets (F) and (G) to the new vac motor; attach gasket (H) to the Vac Motor Cover, and insert motor into base.
- 9 Reassemble in reverse order, paying attention to route wires up through hole and out towards the back in the groove of Vac Motor Cover (C).

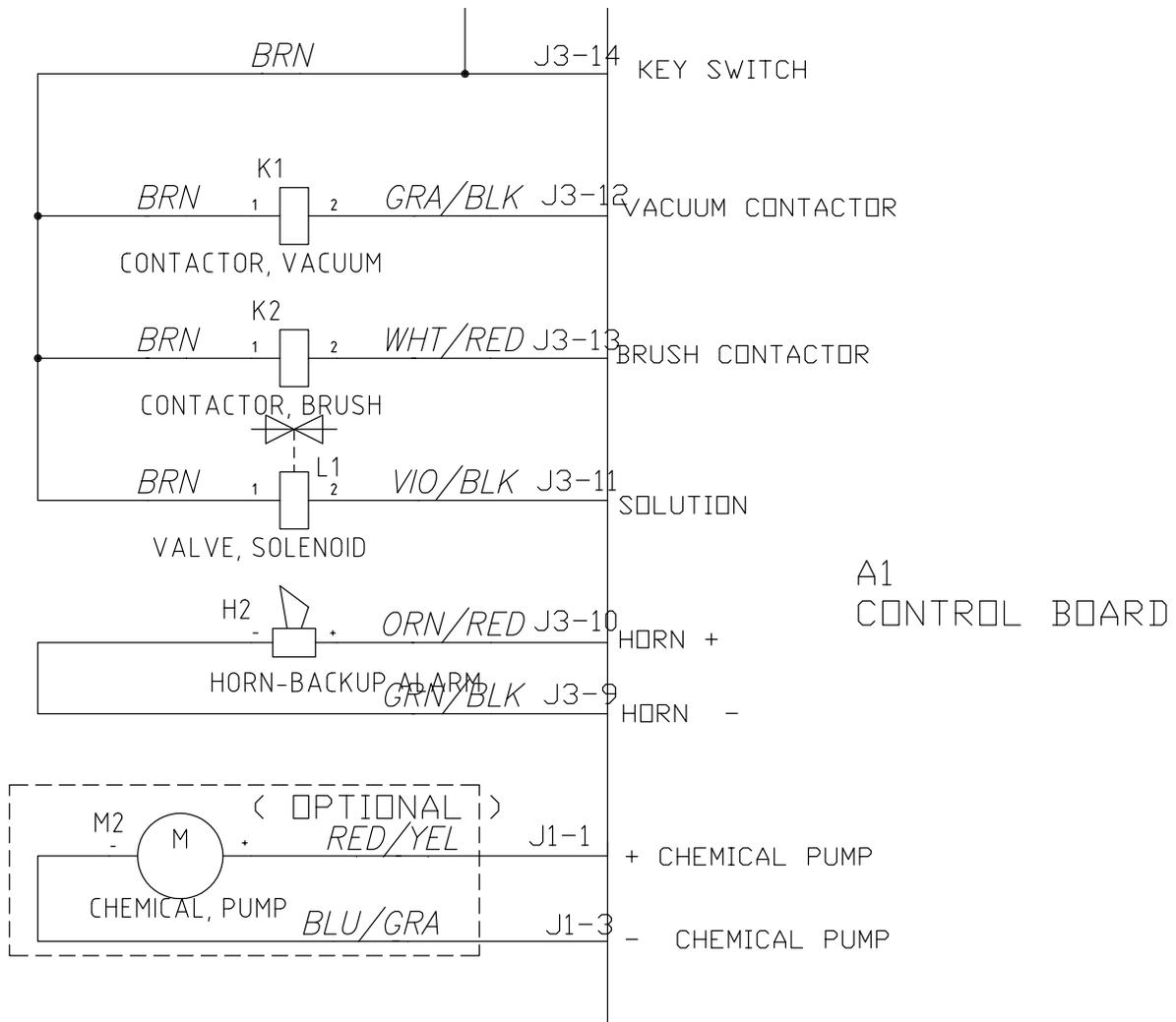
FIGURE 27



# SOLUTION SYSTEM

The Solution System is controlled via a pulsed 24V signal from the control board at J3-11 to the Solution Solenoid valve. On Advenger / BR 755, 855 machines, the solution flow rate is also controlled via feedback provided by a pressure sensor on the control board. For more details, refer to the “Solution System Control” section in this chapter.

To avoid clogging and malfunction of solution system components, it is recommended to avoid using chemicals that are known in the industry to cause performance degradation in commercial auto scrubbers. These chemicals include d-limonene (frequently found in “orange” type cleaners and not listed on the MSDS), and in hard-water areas, carbonates, silicates, and phosphates, which are listed on the MSDS.



## SOLUTION & AXP/EDS SYSTEM ERROR CODES AND MEASUREMENTS - ADVENGER / BR 755, 855 AND ST

| Advenger / BR 755, 855 Display Error Code | ST Service LED Blink Code            | Fault Description               | Troubleshooting Action  |
|---|--------------------------------------|---------------------------------|---|
| 8   | 1, 4                                 | Solution solenoid overload      | <ol style="list-style-type: none"> <li>1. Check for a wiring problem.</li> <li>2. Check coil resistance (see below).</li> <li>3. Replace solenoid if coil is shorted.</li> </ol>  |
| 11  | NA                                   | Chemical pump overload          | <ol style="list-style-type: none"> <li>1. Check for a wiring problem.</li> <li>2. Replace pump.</li> </ol>  |
| 30  | 2, 3<br>Visible in Fault Recall Mode | Solution solenoid open          | <ol style="list-style-type: none"> <li>1. Check for disconnected solenoid wiring plug, open in wiring, or open in solenoid (see below).</li> <li>2. Repair or replace.</li> </ol> Voltage at control board should be -24V referenced to B+.   |
| 37  | NA                                   | Chemical pump open              | <ol style="list-style-type: none"> <li>1. Check for disconnected plug or open in wiring.</li> <li>2. Repair or replace</li> </ol> When the pump is On, it makes a clicking noise. If the board output is correct it should appear as a pulsed signal to a DVM.  |
| 62  | 4, 2                                 | Solution solenoid control fault | <ol style="list-style-type: none"> <li>1. If J3-11 is 24V referenced to B+ when Solution switch is Off, replace control board.</li> <li>2. If J3-11 is 0V referenced to B+ when Solution switch is Off, disable fault via Hidden Menu. Refer to "Control Board J1, J2, and J3 Pin Outs and Test Points" section.</li> </ol> |

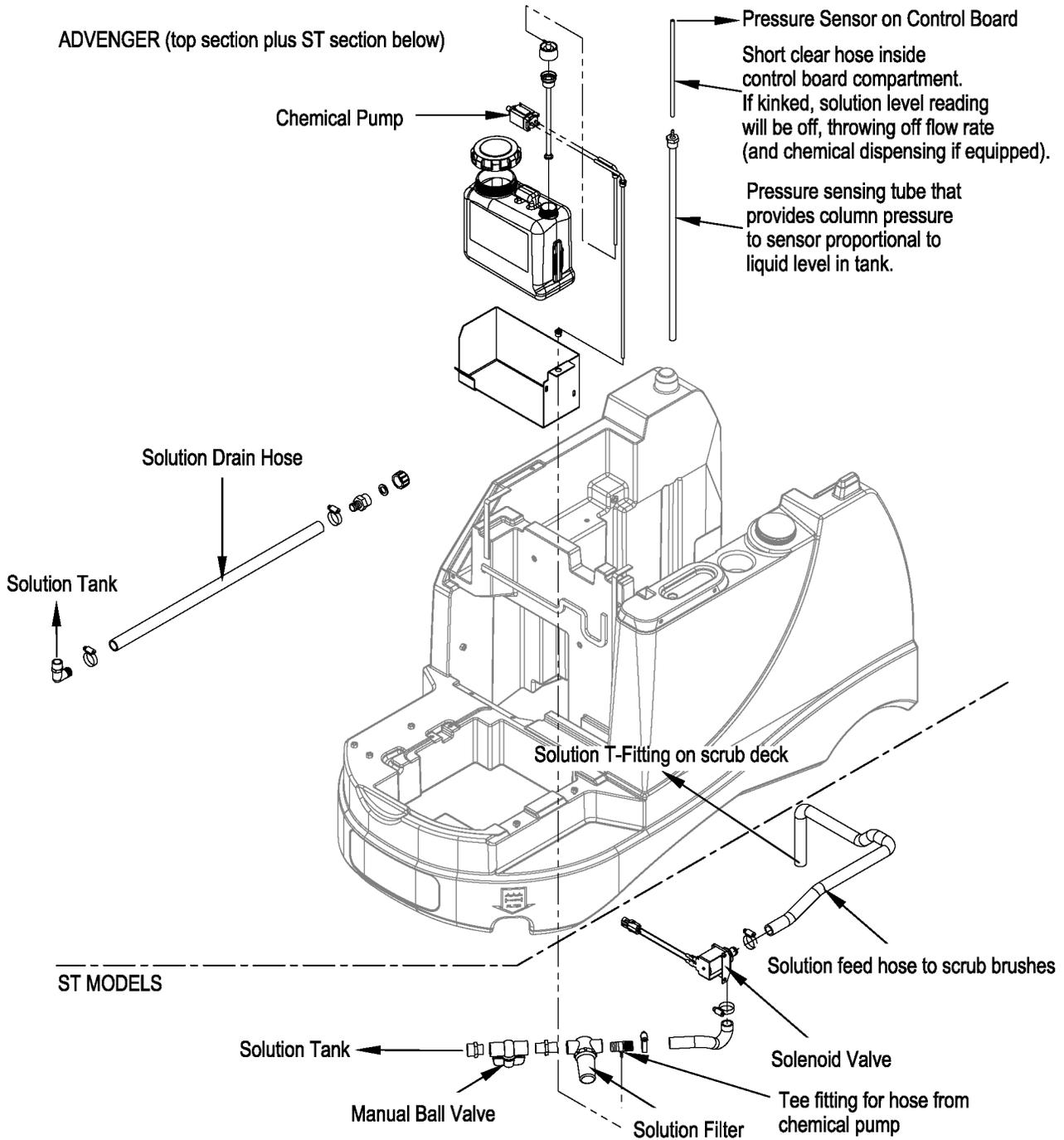
| Solution Solenoid | Nominal Resistance | Nominal Current | Overload Current | Wire Colors   |
|-------------------|--------------------|-----------------|------------------|---------------|
| L1                | 35 ohms            | 650 mA          | 750 mA           | BRN & VIO/BLK |
| Chemical Pump     |                    | Nominal Current | Overload Current | Wire Colors   |
| M2                |                    | PWM             | 870 mA PWM       | n/a           |

### Troubleshooting Solution & AXP/EDS System Issues

| Problem   | Possible Cause   |
|---|--|
| Inadequate or no solution flow  | No solution in the tank.<br>Red Solution Shutoff Valve (21) is in the Off position .<br>Clogged Solution Filter (20), valve L1, or hoses.<br>L1 Solution Solenoid Valve defect.<br>Main controller fault.  |
| <b>Advenger / BR 755, 855</b>   |  |
| Solution tank level indicator shows empty even though the tank is full  | Small clear hose at pressure sensor on control board is kinked - refer to "Replacing the Operator Control Panel" for instructions.   |
| Solution flow and/or chemical rate don't appear to follow programming   | <ol style="list-style-type: none"> <li>1. Air leak at hose connection to pressure sensor.</li> <li>2. Air leak at Pressure Sensing Tube fitting.</li> <li>3. Small clear hose at pressure sensor on Interface Control Panel is kinked.</li> </ol>  |
| Solution level indicator doesn't work after new control board installed | <ol style="list-style-type: none"> <li>1. Solution tank wasn't completely drained before installation of new Interface Control Panel. Completely drain the solution tank and the pressure differential should work properly again.</li> <li>2. Check for air leaks at re-connected hose fittings.</li> </ol> |
| Chemical rate doesn't match manufacturer specifications                 | Check that pump is wired correctly and that the polarity isn't reversed.   |

## Solution System Diagram

FIGURE 28



## Solution System Control

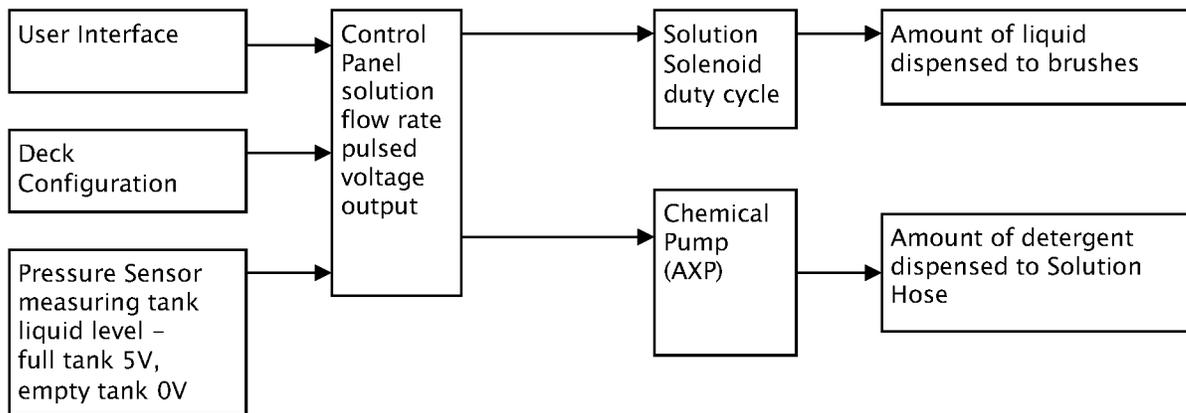
Advenger / BR 755, 855

The control board output of pulsed voltage signals driving the Solution System is controlled by the following three parameters:

- 1 The deck size and type (factory set but selectable via Hidden Menu).
- 2 The Solution Flow Rate chosen by the operator through the user interface.
- 3 The Liquid Level Sensor.

The liquid level in the Solution Tank is measured by the Pressure Sensor through the Pressure Sensing Tube. As the liquid level decreases, the pulsed feedback of the Pressure Sensor drives the control board to compensate for this drop in maximum output by adjusting the duty cycle of the solution solenoid, thereby keeping the flow rate constant.

FIGURE 29



A malfunction of either the Pressure Sensor, the Control Panel, or an air leak in the pressure sensing system may affect the performance of either the Chemical Pump or the Solution Solenoid, or both.

ST

The pulsed 24V output of the control board that controls duty cycle of the Solution Solenoid is driven by:

- 1 Control board programming of deck size and type (factory set but selectable via the Hidden Menu).
- 2 The Solution Flow Rate chosen by the operator through the user interface.

ST machines don't have a Pressure Sensor that monitors liquid level in the Solution Tank. Since the maximum output of the Solution Solenoid varies with liquid level, as the level drops in the tank, the output of the Solution Solenoid will also drop. As the tank empties, this results in a decrease in solution output to the brushes from the "full" rate.

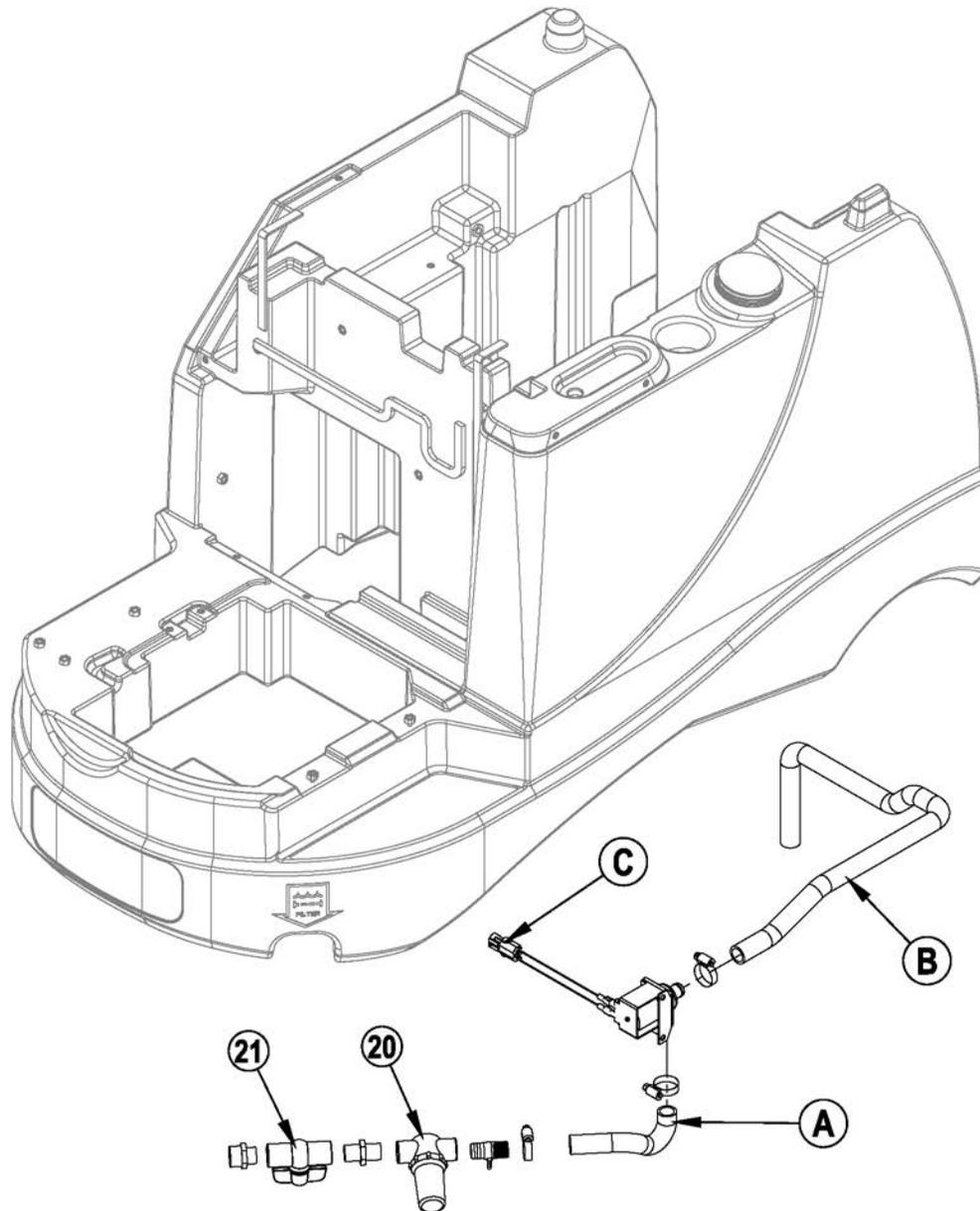
## Replacing the Solution Solenoid Valve

- 1 Advenger / BR 755, 855 - follow instructions found in “Service Test Mode” to lower the scrub deck.  
ST - manually lower the scrub deck.

### **⚠ WARNING!**

- 2 Quickly disconnect the batteries at the red Anderson connectors in the battery compartment (done for safety and to keep the deck from rising back up).
- 3 Reach under the front left side of the machine and manually close the red Solution Shutoff Valve (21) adjacent to the Solution Filter (20).
- 4 Using a flat blade screwdriver or 5/16” socket, loosen the two hose clamps on the valve and remove the black Solution Hose (A) from the inlet side and the clear hose (B) coming from the deck manifold.
- 5 Using a 7/16” socket, remove the bolt fastening the Solution Solenoid to the machine.
- 6 Unplug the valve body at the connector (C).
- 7 Replace the valve and reassemble in reverse order.

FIGURE 30

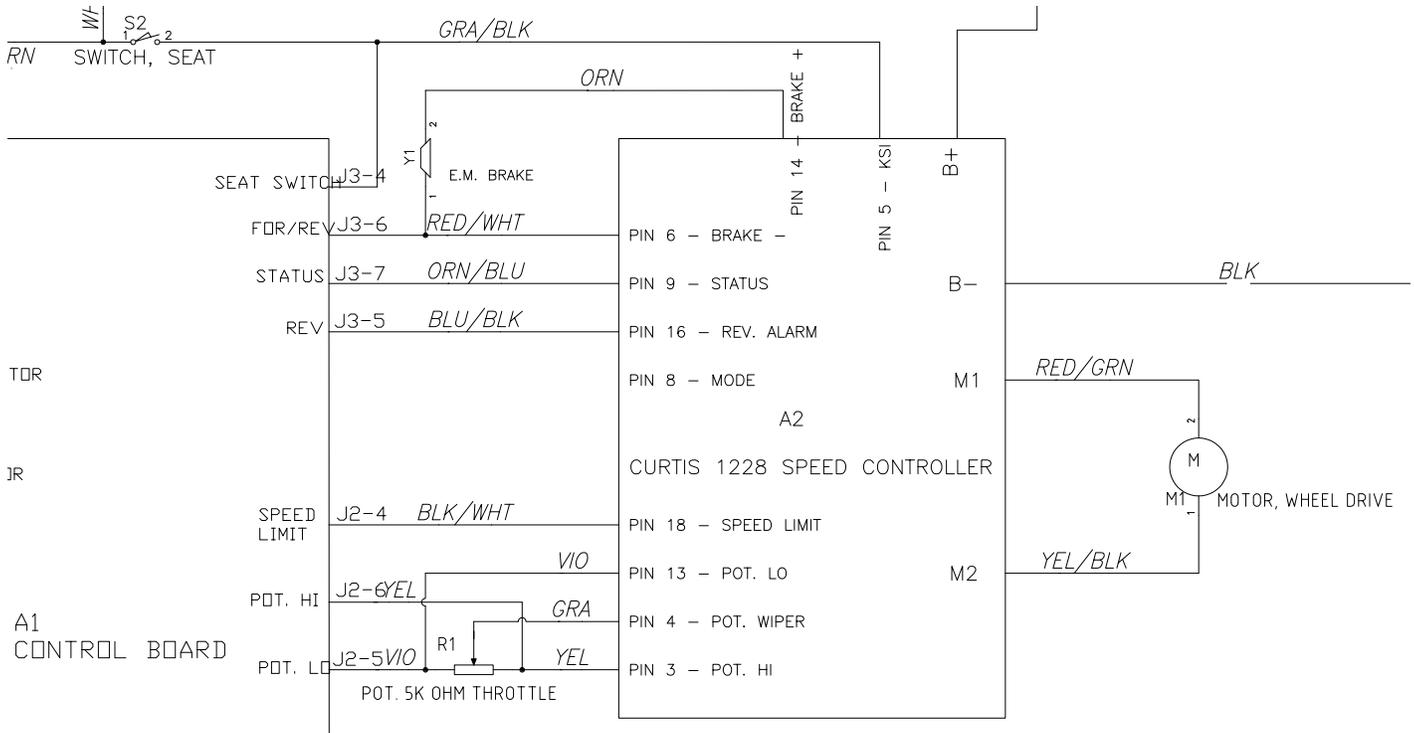


# WHEEL DRIVE SYSTEM

The drive wheel assembly is directly connected to the Curtis 1228 speed control, which not only provides an output signal of 24V to the drive wheel for forward and reverse movement, but also monitors current and temperature, and controls the electromagnetic brake. It is the same for both the Advenger / BR 755, 855 and ST models. The speed control is programmable through, and can be monitored via, the Curtis Handheld Programmer 56409441 and Curtis Adapter Cable with Quad Plug 56409823, listed in the recommended “Diagnostic and Service Tools” section of this manual. For information on how to use the Curtis programmer, please refer to the Curtis Programmer Manual 56043101.

The 5k Ohm throttle pot R1 in the foot pedal controls drive speed and forward/reverse movement. The throttle pot input to the main control board also determines whether or not the scrub and vacuum systems will engage, and is therefore critical to machine performance. If the control board senses a Neutral position of the foot pedal, it will not engage these other systems unless placed in Service Test Mode or one of the vacuuming-only modes.

The Electromagnetic Brake is engaged whenever the foot pedal is in Neutral, and released for forward or reverse motion.



## WHEEL DRIVE CIRCUIT ERROR CODES AND MEASUREMENTS

| Advenger / BR 755, 855 Display Error Code | ST Service LED Blink Code | Fault Description  | Troubleshooting Action  |
|---|---------------------------|--|---|
| 3   | 1, 1                      | Speed control fault (will disable all systems unless fault detection is disabled in the Hidden Menu) | <ol style="list-style-type: none"> <li>1. Verify connector at Drive Pedal is connected</li> <li>2. Refer to “Speed Control Flash Codes” section</li> <li>3. Repair</li> <li>4. Reset machine via key switch.</li> </ol> |

| Wheel Drive Motor | Typical Current (A) Transport, Full Throttle | Typical Current (A) Scrub Mode, Level Floor | Wire Colors  |
|-------------------|--|---|--|
| M1                | 15 - 20                                      | 15 - 50                                     | Red/Green and Yellow/Black (2 wires combined - required to prevent overheating if rotor locks) |

### Troubleshooting Drive Wheel Issues

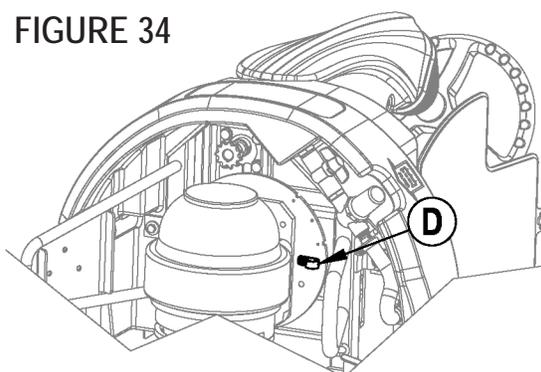
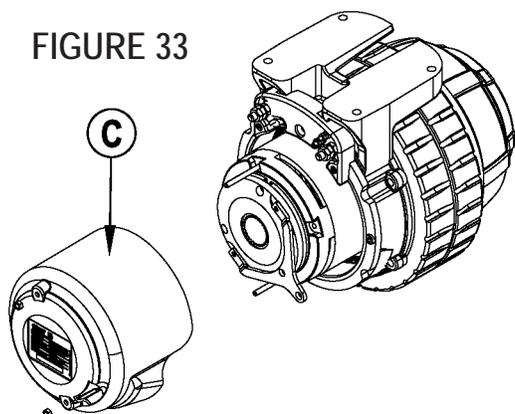
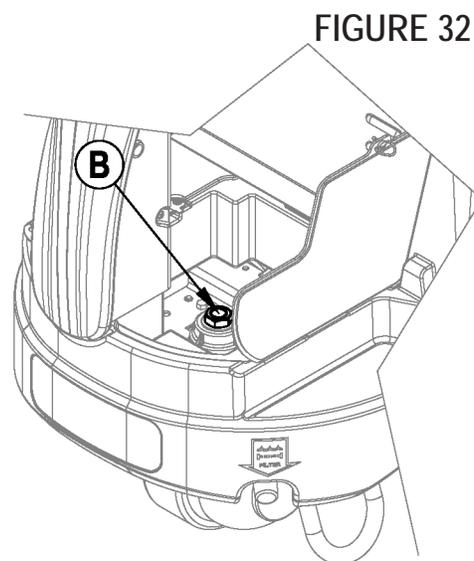
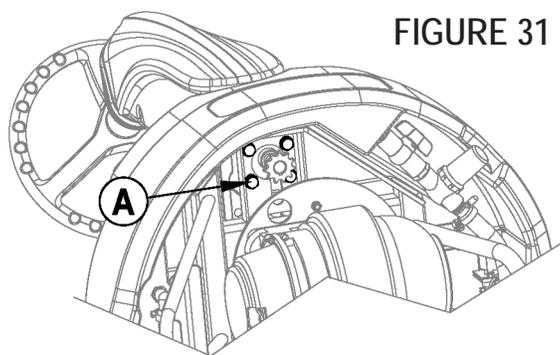
| Problem  | Possible Cause  |
|--|---|
| Advenger / BR 755, 855 - the LCD indicates E03 and the chemical LED flashes a code             | <ol style="list-style-type: none"> <li>1. Verify connector at Drive Pedal is connected.</li> <li>2. Refer to “Speed Control Flash Codes” section.</li> <li>3. Repair</li> <li>4. Reset machine via key switch.</li> </ol>   |
| ST - the Fault Indicator LED is blinking 1, 1 and the Extreme Solution Flow LED flashes a code | <ol style="list-style-type: none"> <li>1. Verify connector at Drive Pedal is connected.</li> <li>2. Refer to “Speed Control Flash Codes” section.</li> <li>3. Repair</li> <li>4. Reset machine via key switch.</li> </ol>   |
| The wheel drive motor will not run in forward or reverse.                                      | <ol style="list-style-type: none"> <li>1. Batteries need charging (low battery voltage, recharge batteries)</li> <li>2. Wheel Drive Motor Circuit Breaker (CB1) tripped (reset 70A circuit breaker)</li> <li>3. Control Board Circuit Breaker (CB2) tripped (reset circuit breaker)</li> <li>4. Emergency Stop Knob (7) tripped (pull out and twist)</li> <li>5. Safety Switch (S2) in seat not closed (check seat switch)</li> <li>6. Defective Wheel Drive Motor (replace motor)</li> <li>7. Defective Throttle Potentiometer (R1) (replace)</li> </ol> |
| The wheel drive motor will <i>only</i> run in either forward or reverse.                       | <ol style="list-style-type: none"> <li>1. Test the Fwd &amp; Rev (R1) wiring outputs (pins 3, 4 &amp; 13) at the speed control for an open. Repair wiring or replace the R1 pot.</li> <li>2. Controller can't change electrical polarity to wheel motor - replace the (A2) speed control.</li> </ol>  |

## Replacing the Drive Wheel Assembly

### ⚠ WARNING!

Park the machine on a dry flat surface, turn the main key switch (J) to the Off position and disconnect the battery pack at the red Anderson connectors inside the battery compartment.

- 1 Block the rear wheels.
- 2 Jack up the front of the machine as shown in “Jacking Points” section or use a hoist to lift up the front end of the machine.
- 3 See Figure 31. Using a 17mm socket, loosen but don't remove the four bolts (A) at the steering sprocket to allow the chain to release some.
- 4 Using a 3/8" magnetic socket, remove the four bolts holding the charger in place, and move the charger over to the side.
- 5 See Figure 32. Using a 1 7/16" socket, remove the hex nut (B) at the top of the Spindle Weldment.
- 6 See Figure 33. Turn the Drive Wheel to the right and remove the motor wiring cover (C).
- 7 Using a 13mm and a 7mm socket, remove the nuts and wires from the drive motor.
- 8 See Figure 34. Turn the motor towards the left. Using a 7/16" socket and wrench, remove the P-clamp (D).
- 9 Jack up the front end of the machine enough to allow the wheel to slip free from the machine.
- 10 See Figure 31. Using a 17mm socket, remove the four bolts (A) at the top to free the motor from the Steering Plate.



## REPLACING THE DRIVE WHEEL ASSEMBLY (CONTINUED)

11 Reassemble the drive wheel in reverse order, attaching the motor wires as shown.

### **⚠ CAUTION!**

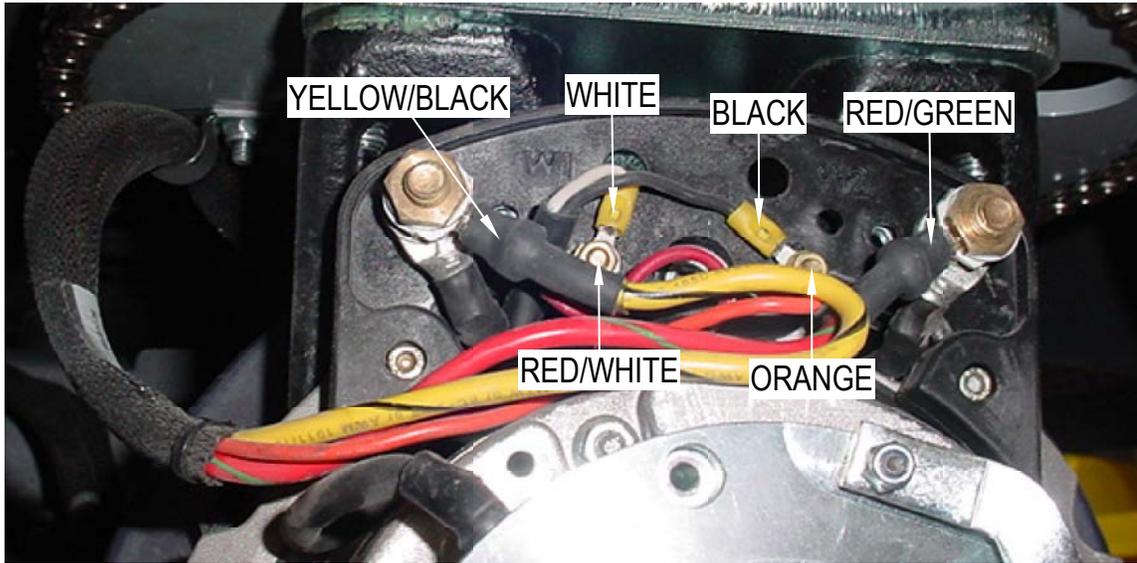
Use a Torque Wrench set at 20 ft-lb to retighten the 1 1/2" hex nut at the top of the steering spindle.

#### NOTE:

Orient the wires in such a way as to minimize bending at the crimps for optimum motor performance.

There are (2) each YEL/BLK and RED/GRN going to each post.

FIGURE 35



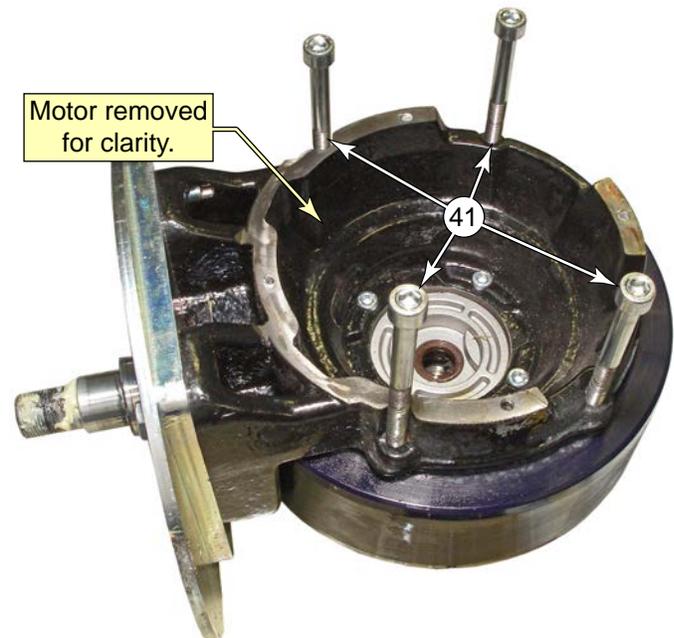
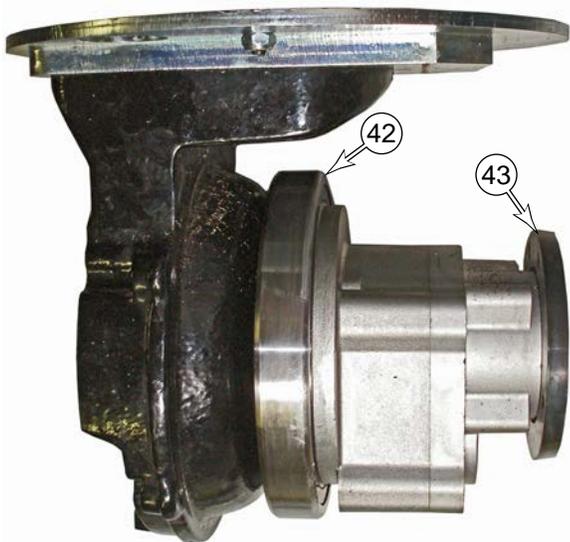
## Replacing the Drive Tire

Replacing the drive tire (metal wheel with urethane tire) requires the tire pulling kit (56422174). The drive tire may be replaced without removing the drive assembly from the machine, but you may find it easier to remove the drive wheel assembly.

1. To reduce the weight of the machine, drain both the recovery and solution tanks. To lower the center of gravity of the machine, you may even choose to remove the recovery tank from the machine.
2. Block both sides of the machine at the rear lifting points (15) to keep the machine stable and prevent it from rolling. To prevent tipping, it is also a good idea to chain the machine down at the rear lifting points.
3. Raise the front of the machine by jacking at the center front flat surface of the solution tank.
4. Using a 5mm hex key, remove the four screws (38) that secure the drive hub (40) to the internal gearbox.
5. Using a 5mm hex key, remove the six screws (39) that secure the drive hub to the tire (wheel).
6. Insert the four wheel puller bolts (41) through the drive housing, and hand tighten them until they equally touch the metal wheel portion of the tire assembly.
7. Using a 5mm hex key, gradually tighten each bolt at about 1/2 to 1 turn at a time. Work in a crisscross pattern so each bolt pushes the wheel off the main bearing (42) equally. (The wheel hub (40) will come free after just a few turns.)

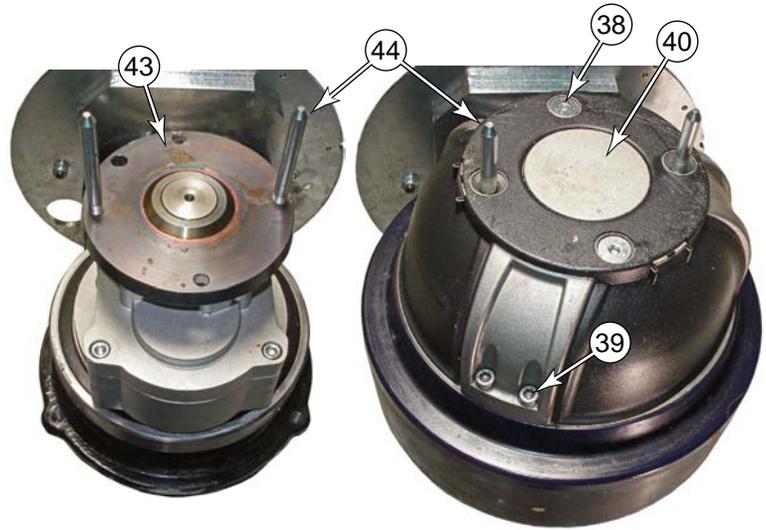


For reference, the wheel/tire presses over the main bearing (42). The drive hub (40) is lightly pressed onto the tapered disk (43) of the gearbox.



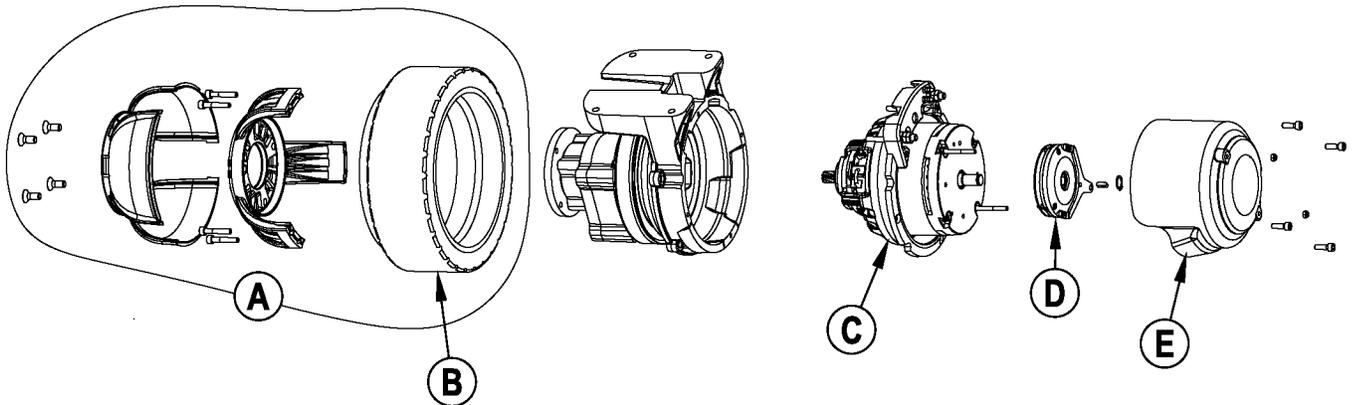
### Replacement Notes

1. Install the drive hub (40) to the new wheel/tire using the six socket head cap screws (39).
2. Remove the tire pulling bolts (41) from the drive housing.
3. Lightly install the two alignment pins (44) into two of the threaded holes of the gearbox output disk (43).
4. Slide the drive hub (with the new wheel/ tire) over the alignment pins.
5. Gently tap on the upper portion of the drive hub (40) to get the wheel started over the main bearing (42) until the mounting screws (38) can be started in their threads.
6. Remove the alignment pins (44), and replace them with the two remaining mounting screws (38).
7. In small increments, simultaneously tighten all four mounting screws to pull the drive hub tight to the gearbox output disk (43).
8. Finish reassembling the machine by reversing the disassembly steps.



The Drive Wheel is assembled as shown:

FIGURE 36



## Inspecting/Replacing the Drive Wheel Assembly Carbon Brushes

### ⚠ IMPORTANT!

To remove/replace/inspect the Carbon Brushes, observe the following:

- 1 The motor must come off of the machine.
- 2 The motor assembly must be kept vertical while being disassembled to prevent loss of gear oil.

### ⚠ WARNING!

Park the machine on a dry flat surface, turn the main key switch (J) to the Off position and disconnect the battery pack at the red Anderson connectors inside the battery compartment.

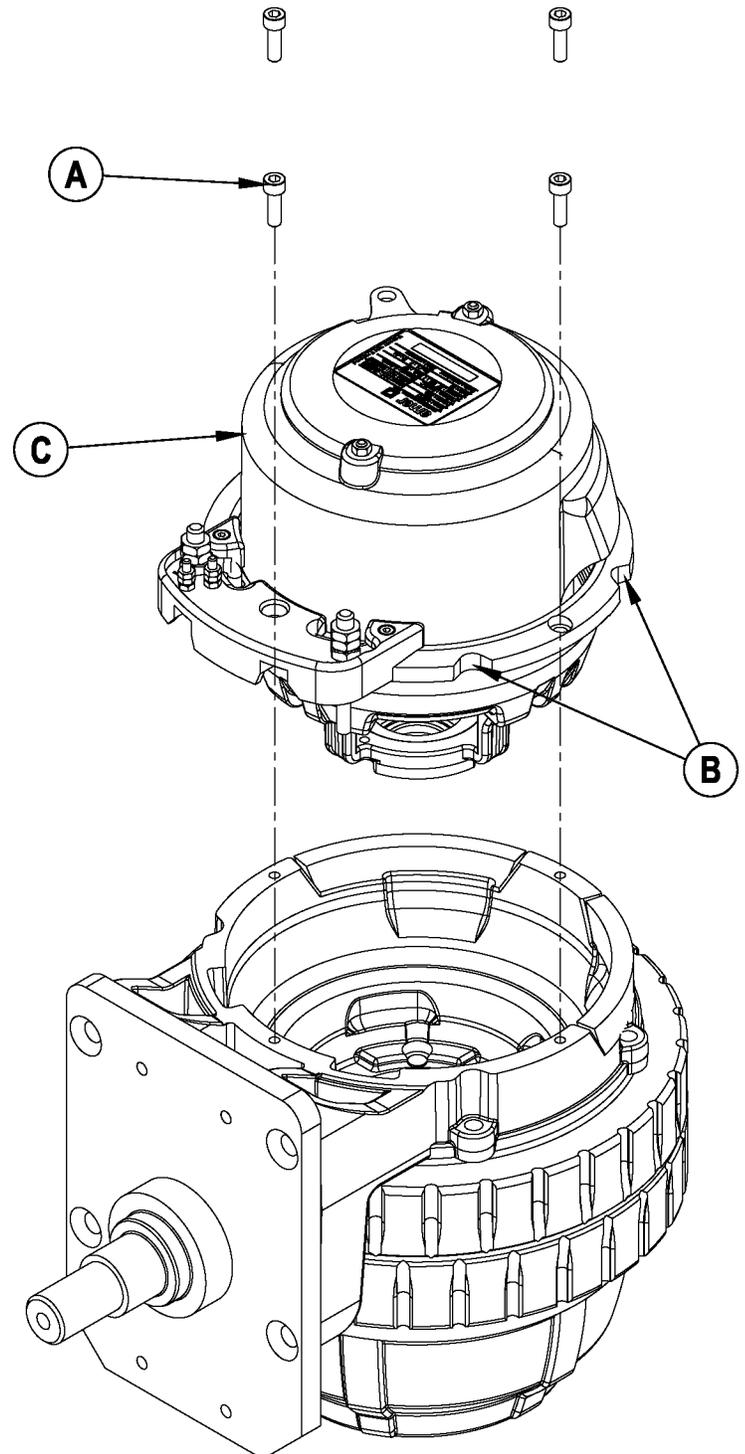
- 1 Follow the instructions in “Replacing the Drive Wheel Assembly”.
- 2 Place the motor assembly upright, motor side up, as shown.

### ⚠ CAUTION!

To prevent gear oil from draining from the gearbox, disassemble the motor with the Drive Wheel assembly in a vertical position. If some oil is lost, drain completely and refill the oil as indicated at the bottom of the page.

- 3 See Figure 37. Remove the four metric socket head cap screws (A) securing the electric motor to the casting.
- 4 Use a hard piece of wood or a brass drift punch to tap the motor mounting flange (3 notched locations (B)) to loosen.
- 5 Grip the motor/brake end bell and pull the motor (C) up and out of its housing.
- 6 Inspect the 4 carbon brushes and springs. A new carbon brush measures 3/4". If less than 1/4", replace.
- 7 Clean the foam filters, and blow out the motor.
- 8 If gear oil has been lost, drain and replace with 4.5856 oz (130 g) of Mobilgear 600 XP 150 or AGIP BLASIA 150 gear oil.

FIGURE 37



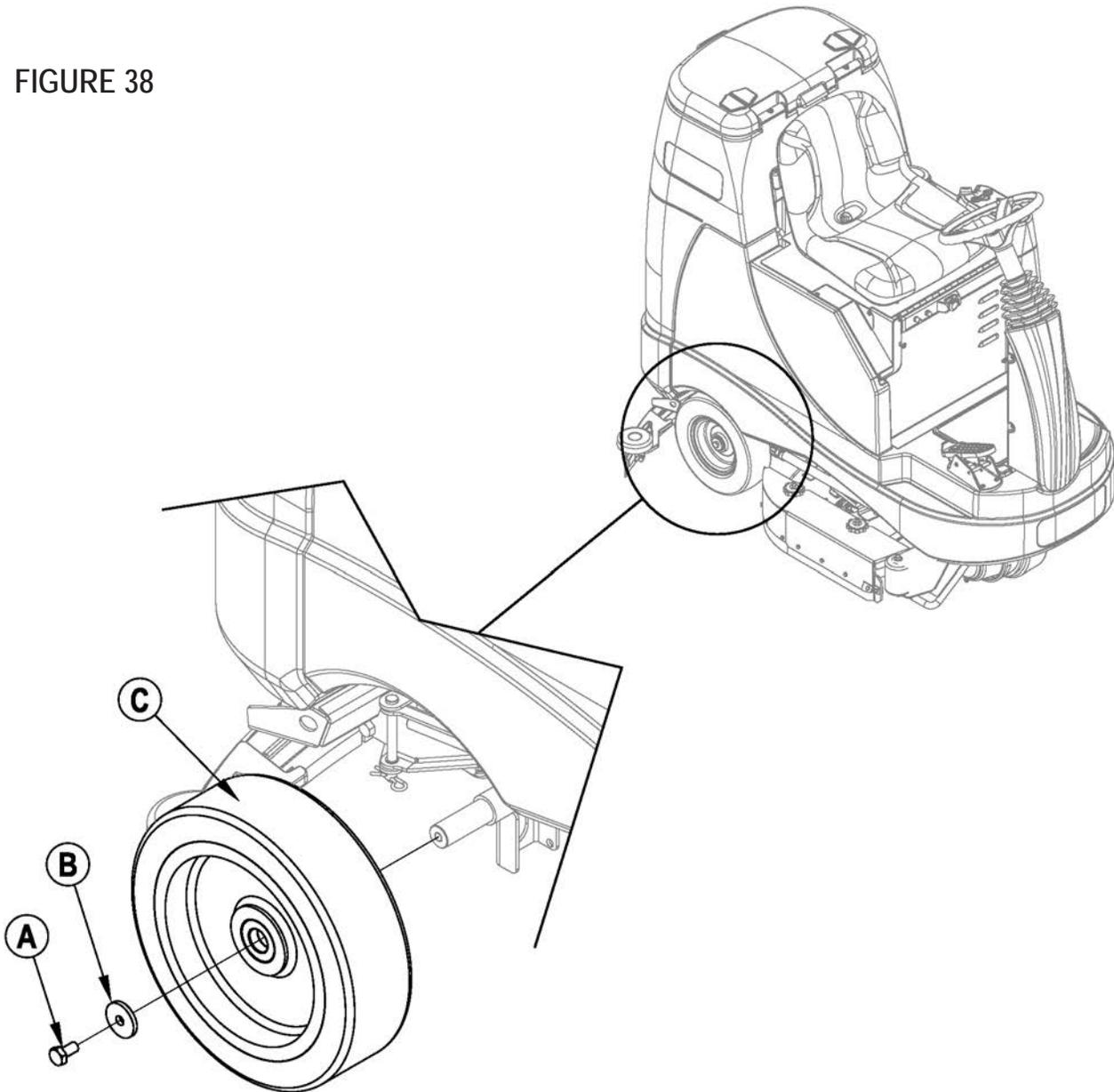
## Replacing the Rear Wheels

### **⚠ WARNING!**

Park the machine on a dry flat surface, turn the main key switch Off and disconnect the battery pack at the red Anderson connectors in the battery compartment.

- 1 Block the front Drive Wheel (4).
- 2 Jack the Rear Wheel (9) to be replaced per the instructions at the front of this manual in “Jacking Points” section.
- 3 To prevent injury, if the rear wheel bearing has frozen, replace the bottle jack with blocks or a jack stand before pounding the wheel.
- 4 See Figure 38. Use a 17mm socket to remove bolt (A), washer (B) and wheel (C).
- 5 If the bearing has seized, pound off the wheel and use a bearing puller to remove the inner race from the axle.
- 6 Apply anti-seize to the inner bearing surface of the new wheel; then replace wheel on axle.
- 7 Apply anti-seize to the bolt threads before refastening bolt, washer and wheel.

FIGURE 38



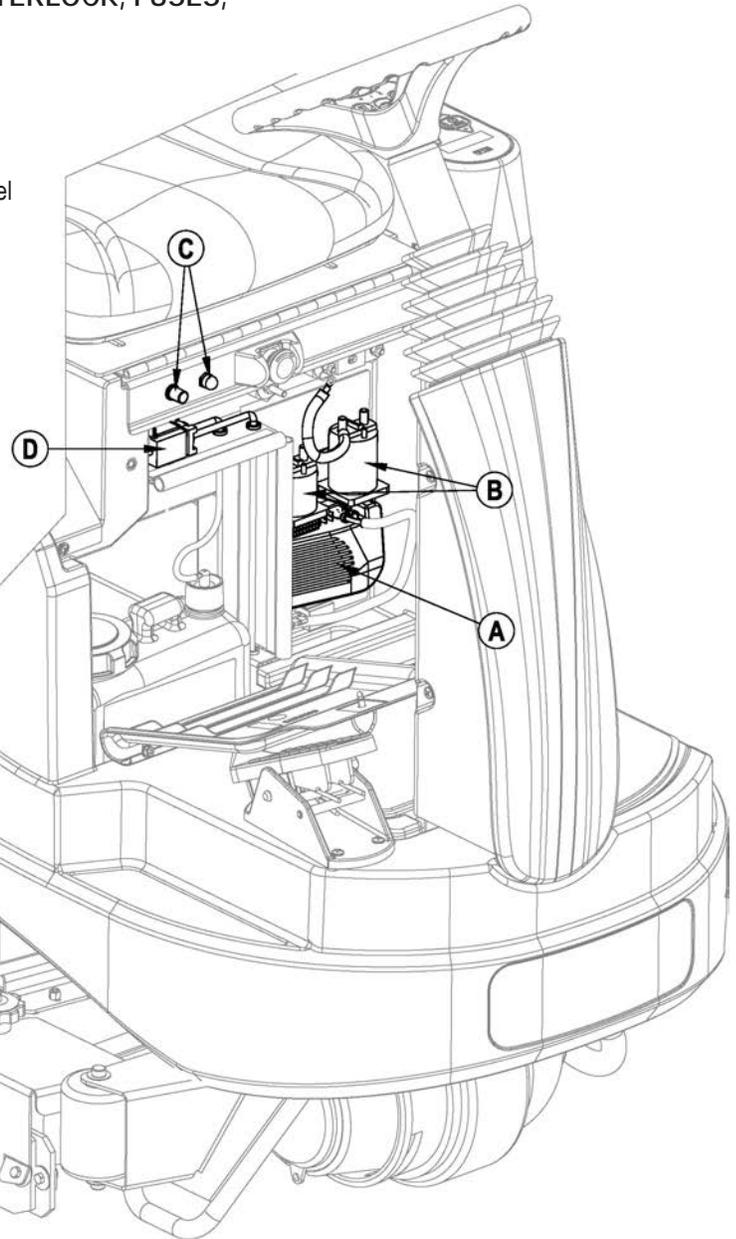
# ELECTRICAL SYSTEM

FIGURE 39

ACCESS TO PANEL: CHEMICAL PUMP, CHARGER INTERLOCK, FUSES, CONTACTORS, SPEED CONTROL

## ⚠ WARNING!

- 1 Open the battery compartment and disengage the red Anderson battery connectors.
- 2 Remove the 3 (AXP/EDS - 4) screws fastening the electrical panel to the front of the machine.
- 3 See Figure 39. Inside are found the following:
  - Curtis speed control (A) with Drive Wheel motor and logic connections
  - K1 and K2 contactors (B)
  - Fuses (C) - as shown with onboard charger green interlock wire connected. If no charger, red wire shown would be connected there instead.
  - Chemical pump (D) (below fuses)



## THROTTLE POTENTIOMETER WIPER MEASUREMENT (NEUTRAL POSITION)

Use a DVM and extended insulated probe tips (shown) to measure the throttle potentiometer Neutral voltage the wiper (pin 4, the GRA wire) referenced to the B-standoff (green wires).

## ⚠ WARNING!

Open the Electrical Access Panel carefully per step 2 above.  
Batteries must be connected to perform this measurement so extreme caution should be observed.

## ⚠ CAUTION!

Use only insulated test probes designed to backprobe. SPEED CONTROL IS POWERED during these tests.



Referenced to the negative battery standoff, the wiper voltage should read:  
Neutral: 2 - 3V  
Reverse: < 2V (engage pedal in reverse to measure)  
Forward: > 3V (engage pedal forward to measure)

| Pin | Function        | Wire Color |
|-----|-----------------|------------|
| 3   | 5kOhm Pot High  | YEL        |
| 4   | 5kOhm Pot Wiper | GRA        |
| 5   | Seat Switch     | GRA/BLK    |
| 6   | Brake -         | RED/WHT    |
| 9   | Error Status    | ORN/BLU    |
| 13  | 5kOhm Pot Low   | VIO        |
| 14  | Brake +         | ORN        |
| 16  | Reverse Alarm   | BLU/BLK    |
| 18  | Speed Limit     | BLK/WHT    |

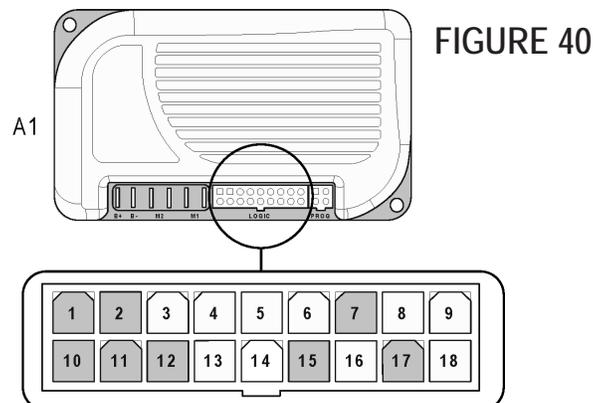


FIGURE 40

## Control board j1, j2, and j3 pin outs and test points

### ⚠ CAUTION!

Always take measurements at the end connectors for troubleshooting purposes. If readings taken there do not indicate the problem, check the control board as a last resort as damage to the board may occur (see Caution statements in “Replacing Operator Control Panel” section).

Use a DVM and extended insulated probe tips (shown) to take the following measurements.



### ⚠ CAUTION!

Use only insulated test probes designed to backprobe. CONTROL BOARD IS POWERED during these tests.

Perform steps 2 and 3 of “Replacing Operator Control Panel” section, observing noted Caution statements.

J1 - Advenger / BR 755, 855 only - Brush deck lift actuator, squeegee lift actuator, chemical pump

To backprobe J1 for voltages, leave J1 connected to the control board.

### Disc and Cylindrical

The following tables show the connector in the center, highlighted in gray with related information for the pin off to either side.

| Referenced to                          | Measure  | J1      |   |    |         | Measure   | Referenced to |
|--|--|---------|---|----|---------|---|---------------|
| B+                                     | +24V to M4 for 3 sec. deck downward travel<br>0V to M4 for 3 sec. deck upward travel | ORN/BLK | 5 | 10 | WHT/GRN | 0V to M3 for 3 sec. squeegee down travel<br>24V to M3 for 3 sec. squeegee up travel | B+            |
| B+                                     | 0V to M4 for 3 sec. deck downward travel<br>+24V to M4 for 3 sec. deck upward travel | BLU     | 4 | 9  | BLK/YEL | 24V to M3 for 3 sec. squeegee down travel<br>0V to M3 for 3 sec. squeegee up travel | B+            |
| B+                                     | Not measurable using DVM   | BLU/GRY | 3 | 8  | BLK     | B-  |               |
|  |  |         | 2 | 7  |         |   |               |
| B-                                     | Not measurable using DVM   | RED/YEL | 1 | 6  |         |   |               |
| Range of 24V measurements is 20 – 26 V |  |         |   |    |         |   |               |

Backprobe J2 - Speed Control outputs, ST deck and squeegee lever position, and sense wires, J2 connected at control board:

| Referenced to | Measure   | J2                               |   |    |         | Measure   | Referenced to |
|---------------|---|----------------------------------|---|----|---------|---|---------------|
| B-            | n/a   | YEL                              | 6 | 12 | BLK/YEL | ST squeegee lever switch S6<br>Closed sq down 0V<br>Open sq up 5V                 | B-            |
| B-            | n/a   | VIO                              | 5 | 11 | ORN/RED | ST deck lever switch S5<br>Closed deck up 0V<br>Open deck down 5V                 | B-            |
| B-            | n/a   | BLK/WHT                          | 4 | 10 | YEL/VIO | M7 & M8 sense<br>monitor brush heights for deck<br>actuator feedback<br>0-200 mV  | B-            |
|               |   |                                  | 3 | 9  | BRN/RED | M5 & M6 sense<br>monitor vac motors to determine<br>when tank is full<br>1-200 mV | B-            |
| B+            | Advenger / BR 755,<br>855 B- (ground) input<br>to board<br>+24V | Advenger /<br>BR 755, 855<br>BLK | 2 | 8  | BLK     | +24V  | B+            |
| B+            | B- (ground)<br>Input to board<br>+24V                           | BLK                              | 1 | 7  | BLK     | Advenger / BR 755, 855 +24V   | B+            |

Backprobe J3 - Output to Contactors, Solution Solenoid, Horn; Speed Control error status, EM Brake, reverse status, J3 connected at control board :

| Referenced to | Measure   | J3      |   |    |                | Measure   | Referenced to |
|---------------|---|---------|---|----|----------------|---|---------------|
| B-            | +24V flashed speed control status<br>error code                       | ORN/BLU | 7 | 14 | BRN            | Key switch +24V                                 | B-            |
| B-            | Speed control EM brake signal<br>+24V<br>(moving on / neutral off)    | RED/WHT | 6 | 13 | WHT/RED<br>*   | +24V for 2 sec to K2<br>then 18V pulsed voltage | B+            |
| B-            | Speed control reverse<br>direction +24V<br>(reverse off / forward on) | BLU/BLK | 5 | 12 | GRA/BLK<br>**  | +24V for 2 sec to K1<br>then 18V pulsed voltage | B+            |
| B-            | Seat switch +24V  | GRA/BLK | 4 | 11 | VIO/BLK<br>*** | Pulsed +24V                                     | B+            |
|               |   |         | 3 | 10 | ORN/RED        | -Output to horn +15V                            | B-            |
| B+            | Advenger / BR 755, 855 Ground<br>+24V                                 | BLK     | 2 | 9  | GRN/BLK        | +Output to horn +15V                            | B-            |
| B-            | Advenger / BR 755, 855 Power<br>+24V                                  | BRN/YEL | 1 | 8  | BRN/YEL        |   |               |

\* test point for brush motor contactor coil control error 63

\*\* test point for vacuum contactor coil control error 64

\*\*\* test point for solution solenoid control error 62

## Rev Measurements

The information in the following tables was taken from measuring a single machine with a REV deck. These values will vary from machine to machine based on battery charge level etc., however, they will still give you a picture of what normal should look like. Battery Negative used used for the black voltmeter lead and each pin location was back-probed with the red voltmeter lead unless otherwise specified.

### Connector J1

| Pin | Wire    | Circuit                   | Measured                          | Comment   |
|-----|---------|---------------------------|-----------------------------------|-----------|
| 1   | RED/YEL | Detergent Pump            | 2.05v Key on                      |           |
| 2   | -       |                           |                                   |           |
| 3   | BLU/GRY | Detergent Pump            | 2.08v Key on                      |           |
| 4   | BLU     | Deck Actuator             | 1.9v rest<br>24v Down<br>0.3v Up  |           |
| 5   | ORN/BLK | Deck Actuator             | 2.0v rest<br>24v Up<br>0.3v Down  |           |
| 6   | -       |                           |                                   |           |
| 7   | -       |                           |                                   |           |
| 8   | YEL/BLK | B- for Act. Pos. Switches | 0.06v                             | Vacuum On |
| 9   | BLK/YEL | Squeegee Actuator         | 2.1v Rest<br>0.3v down<br>24.1 Up |           |
| 10  | WHT/GRN | Squeegee Actuator         | 2.1v Rest<br>0.3v down<br>24.1 Up |           |

**Connector J2**

| Pin | Wire    | Circuit           | Measured                                    | Comment   |
|-----|---------|-------------------|---|---|
| 1   | BLK     | Ground            | 0.06v                                       | Vacuum On   |
| 2   | BLK     | Ground            | 0.06v                                       | Vacuum On   |
| 3   | -       |                   |   |   |
| 4   | BLK/WHT | Speed Limit       | 4.45v Transport<br>3.4v Scrub<br>1.1v Strip | Signal Out to Speed Controller  |
| 5   | VIO     | POT Low           | 0.38v                                       | From Speed Controller. Used for Speed Limit Signal  |
| 6   | YEL     | POT Hi            | 4.58v                                       | From Speed Controller. Used for Speed Limit Signal  |
| 7   | BLK     | Ground            | 0.05v                                       | Vacuum On   |
| 8   | BLK     | Ground            | 0.05v                                       | Vacuum On   |
| 9   | BRN/RED | Vac Motor Sense   | 0.153v                                      | Single Vac On. 22.6 A   |
| 10  | YEL/RED | Brush Motor Sense | 0.12v                                       | Brush motors on. (Do not run long off the ground)   |
| 11  | BLK/WHT | Act. Pos 2        | 4.9v Act Up<br>0.001 v Sw closed            | In Serv. Test Mode, press scrub + once. Let it stop, then press it two more times to drive until the switch closes to see the change. |
| 12  | RED/VIO | Act. Pos 1        | 4.9v Act Up<br>0.001 v Sw closed            | In Serv. Test Mode, press scrub + once. Let it stop, then press it again to drive until the switch closes to see the change.          |

**Connector J3**

| Pin | Wire    | Circuit           | Measured                             | Comment   |
|-----|---------|-------------------|--------------------------------------|---|
| 1   | BRN/GRN | B+                | 25.5v                                | Key Off or On                                     |
| 2   | BLK     | Ground            | 0.05v                                | Vacuum On   |
| 3   | -       |                   |                                      |   |
| 4   | BLK/GRY | Seat Switch       | 25.2v                                | Weight on Seat                                    |
| 5   | BLU/BLK | REV               | 24.5v N or FWD<br>1.5v REV           |   |
| 6   | RED/WHT | FOR/REV (Motion)  | 25.3v N<br>0.2v FWD or REV           |   |
| 7   | ORN/BLU | Status            | 1.2v No Code<br>24.5v - Unstable     | 24.5v for a bit, then cycles when there is a code |
| 8   | BRN/GRN | B+                | 25.1v                                | Key Off or On                                     |
| 9   | GRN/BLK | Horn -            | 13.2v Horn Off<br>0.01v Horn On      |   |
| 10  | ORN/RED | Horn +            | 15.0v                                | Horn on or off                                    |
| 11  | VIO/BLK | Solution Solenoid | 25v off<br>0.2v on                   | Cycles on low and medium. 0.2v steady on high     |
| 12  | GRA/BLK | Vac Contactor     | 25v off<br>0.19v on                  |   |
| 13  | WHT/RED | Brush Contactor   | 25v off<br>0.15v initial on<br>5v on | Stronger pull in. Limit current for hold in.      |
| 14  | BLU/ORN | Key Switch        | 25.1v                                | Key on  |

## Curtis Speed Control Installation Checkout Procedure

After installing a controller and before operating the vehicle, carefully complete the following checkout procedure. If you find a problem during checkout, refer to the Curtis programmer manual for more information.

The installation checkout can be conducted with or without the handheld programmer. The checkout procedure is easier with a programmer otherwise observe the Status LED for codes (located on operator panel wand indicator light).

### **WARNING!**

Put the vehicle up on blocks to get the drive wheel off the ground before beginning these tests.

Turn the key switch off and make sure that the seat switch is open, and the throttle (pedal) is in neutral.

Do not stand, or allow anyone else to stand, directly in front of or behind the vehicle during the tests.

Remove the electrical panel to access the controller.

- 1 Observe the error status fault indicator on the operator control panel. If a programmer is available, connect it to the programmer plug-in port
- 2 Sit on the seat and turn the key switch on. The programmer should “power up” with an initial display. If neither happens, check for continuity in the key switch circuit and controller ground.
- 3 If you are using a programmer, put it into diagnostic mode by pressing the DIAGNOSTICS key.
  - If there is no error detected, the display should indicate “No Faults Found”. Note: Before pressing the diagnostics key, wait until model # screen appears, if the throttle is activated prior to this screen appearing the controller will shut down.
  - If there is a problem, the control panel will flash a diagnostic code and the programmer will display a diagnostic message. If you are conducting the checkout without a programmer, refer to the Status LED Fault Codes table in “Speed Control Error Flash Codes” to diagnose the cause.
- 4 When the problem has been corrected, it may be necessary to cycle the key or seat switch to clear the fault code.
- 5 While sitting on the seat, operate the throttle. The motor should begin to turn in the selected direction. If it does not, verify the wiring to the controller, and the motor. The motor should run proportionally faster with increasing throttle. If not, refer to the Curtis manual.
- 6 Put the programmer into test mode by pressing the TEST key. Scroll down to observe the status of the forward, reverse and brake switch. Cycle each switch in turn, observing the programmer. Each input should show the correct state on the programmer.
- 7 Take the vehicle off the blocks and drive it in an open area. It should have smooth acceleration and good top speed.

## Replacing the Operator Control Panel

### ⚠ WARNING!

DISCONNECT BATTERIES BEFORE SERVICING.

### ⚠ CAUTION!

To prevent damage to the new control panel assembly due to static electricity (ESD), wear a properly grounded static control wrist strap before removing the new assembly from its protective static shielding bag and throughout the entirety of the installation process until the four screws attaching the assembly to the machine have been re-fastened.

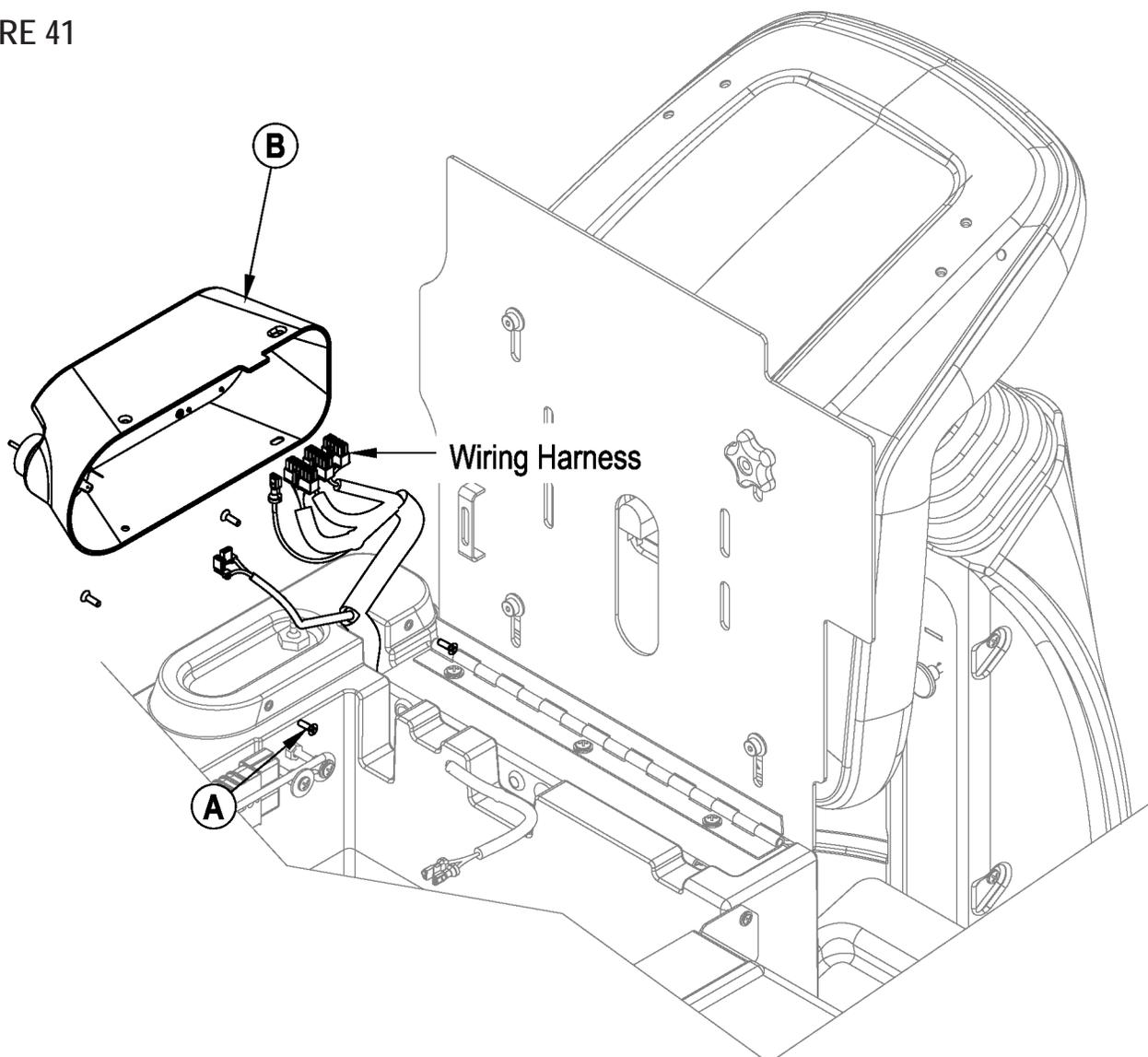
#### CONTROL PANEL REMOVAL

- 1 See Figure 41. Flip the seat forward and prop. Remove the (4) Screws (A) from the Control Panel Assembly (B) then lift and tilt the Control Panel Assembly (B) to access the underside.
- 2 Take note of the wiring connections for reassembly and then disconnect all wiring and the small clear hose. Advenger / BR 755, 855 - Completely drain the solution tank to prevent:
  - water squirting out of the fitting at the control board when the hose is removed
  - erroneous pressure reading due to a loss of pressure differential in Pressure Sensing Tube after the new control board is installed.

### ⚠ CAUTION!

DO NOT disconnect the small clear hose from the circuit board because this is connected to the pressure sensor and may damage the sensor and board. It should only be disconnected from the fitting on the top of the tank.

FIGURE 41



## REPLACING THE OPERATOR CONTROL PANEL

### CONTROL PANEL DISASSEMBLY, ASSEMBLY AND INSTALLATION

- 1 See Figure 42. Remove the Key Switch (A) from the panel assembly.
- 2 Remove the (5) Screws (B), the Circuit Board (C) and the Tab (D) from the panel assembly. NOTE: Save Items (A-D) and discard the panel assembly.
- 3 Follow all previous steps in reverse order to reassemble and install the control panel assembly using the new panel assembly (1 & 2) from the kit.

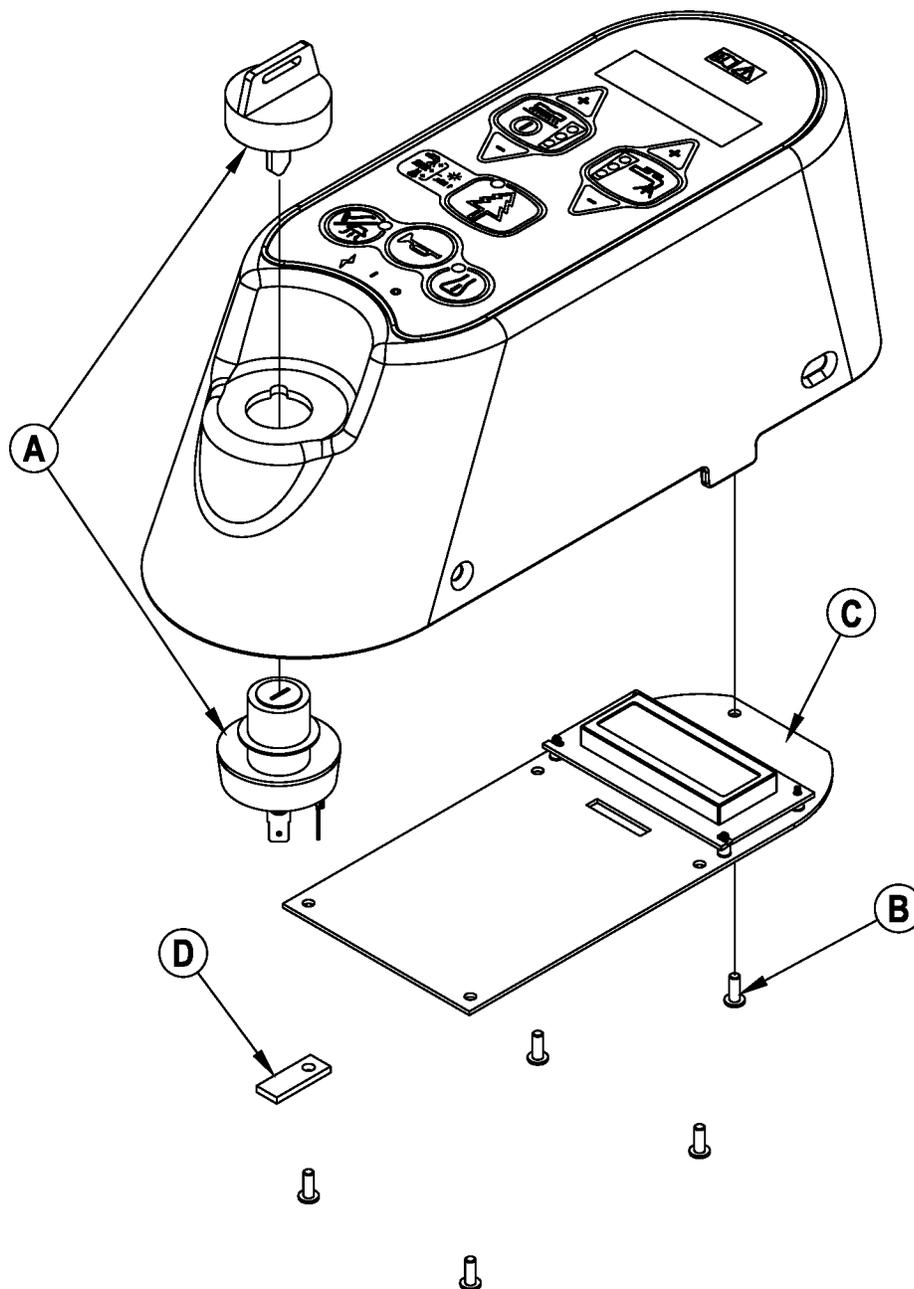
NOTE: the clear hose must not be kinked otherwise the Solution System will not function properly.

## **⚠ CAUTION!**

To prevent damage to the new control panel assembly due to static electricity (ESD), wear a properly grounded static control wrist strap before removing the new assembly from its protective static shielding bag and throughout the entirety of the installation process until the four screws attaching the assembly to the machine have been re-fastened.

The ribbon cable(s) and membrane switch grounding film are fragile - do not scratch or crease during assembly or they may be damaged.

FIGURE 42



# Programming Functions

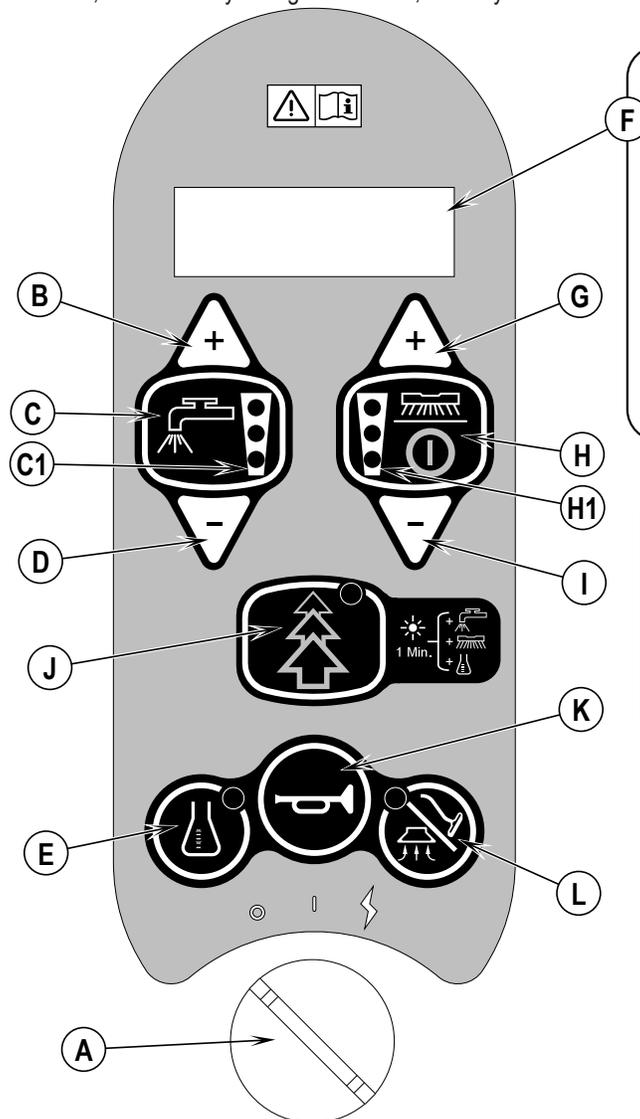
## Service Test Mode - ADVENGER / BR 755, 855 (Disc and Cyl.)

The purpose of Service Test Mode is to by-pass the lock-out function of the normal control system of components that are in an error state and allow those components to be manually turned on and off for troubleshooting purposes. (Components in an overload error state will still be locked out for safety reasons.)

Advenger / BR 755, 855 - Service Test Mode is accessed via the Hidden Menus. To enter, turn the key switch Off, then press and hold the Scrub and Vacuum switches together. Turn key switch back On and hold the switches for 2 seconds until the Solution and Scrub indicators both turn on. Release both switches - the display will now read "Programming Options." Scroll through the menu using the Solution + or - switches and enter program 16 for Service Test Mode.

| Advenger / BR 755, 855 Desired Action   | Press Switch | Toggles                  | LCD Display Indication *<br>ON/OFF |
|---|--------------|--------------------------|------------------------------------|
| Raise/lower scrub deck lift actuator M4 | G            | OFF...DOWN...OFF...UP    | DECK                               |
| Raise/lower squeegee lift actuator M3   | K            | OFF...DOWN...OFF...UP    | SQG                                |
| Activate solution solenoid L1           | C            | ENERGIZED...DE-ENERGIZED | SOL                                |
| Activate vacuum motor contactor K1      | L            | ENERGIZED...DE-ENERGIZED | VAC                                |
| Activate AXP/EDS pump M2                | E            | ON...OFF                 | CPUMP                              |
| Activate brush motor contactor K2       | H            | ENERGIZED...DE-ENERGIZED | BRUSH                              |

\* LCD also displays SPD speed control ON/OFF, actual battery voltage measured, and any error codes.



## Changing Control Board Program Settings

Although the Advenger / BR 755, 855 and ST are delivered with a standard factory preset configuration, there will be times, such as when a control board is replaced, when battery type is changed, or a different size scrub deck is installed, when some parameters in the control system software will need to be changed. Most programmable functions are outlined below. For more details, call the Technical Service Department at Nilfisk-Advance.

### IMPORTANT

**For field control board replacements, critical settings are highlighted below in bold letters.**

Advenger / BR 755, 855 and ST settings that can be changed per the following tables are:

1. Low Voltage Cutout (Depth of Discharge) - 20.55V wet battery or 21.75V gel/AGM battery
2. **Scrub Deck size** - 28" or 34"
3. **Number of Vacuum Motors** installed (single or dual configuration - to prevent over current detection malfunction)
4. Maximum speed while scrubbing as a percentage of travel speed (50% - 90%)
5. Recovery Tank Full automatic shut-off disable/enable.
6. Restore factory defaults
7. Fault Recall of previous error codes to aid in troubleshooting.
8. Fault Detection over-ride - disable Fault Detection so systems aren't shut down while in error state (exception is overload).
9. Solution Flow Rate lock-out

Advenger / BR 755, 855 models allow these additional programming changes to be made via the Hidden Menu:

NOTE: Replacement control boards come with Evergreen (EcoFlex) OFF and AXP/EDS (EcoFlex) disabled.

10. **Chemical (Detergent) Selection** - Turn AXP/EDS (EcoFlex) Off or On with display indicating US or European (ratio or %) format.
11. **Detergent Mode** - . Turn on Mode 1 (machine factory preset for US market) to enable standard Evergreen (EcoFlex) mode in which pressing the Evergreen (EcoFlex) button enables preset ratio for 60 seconds. Turn on Mode 2 (factory preset for the EU market) to run at a preset ratio. In this mode, pressing the Evergreen (Ecoflex) button increments the ratio (solution concentration) to the next stronger level for 60 seconds.

NOTE: To run the machine in a constant user-defined ratio, turn the Detergent Mode to Off and set the chemical ratio by pressing and holding the AXP/EDS (Chemical) On/Off switch (E).

12. Brush Pressure lock-out - during normal operation, the pressure settings that are locked out will not be selectable.
13. Chemical rate bias - AXP/EDS (EcoFlex) control set to 10% more or less chemical than the user programmed ratio
14. Deck down time - time for which the control system applies 24V to the deck actuator to raise or lower the scrub deck after the Scrub On switch is pressed (adjustable from 1 to 5 seconds).
15. Backup Alarm volume
16. Horn volume

## Changing Program Settings - Advenger / BR 755, 855 (Disc and Cyl.)

- 1 To enter this Hidden Menu, turn the key switch Off, then press and hold the Scrub and Vacuum switches together.
- 2 Turn key switch back On and hold the switches for 2 seconds until the Solution and Scrub indicators both turn on.
- 3 Release both switches - the display will now read "Programming Options." Scroll through the menus using the Solution + or - switches and enter the program number corresponding to the needed function.
- 4 To enter a submenu, press the Solution switch.
- 5 To save and go back to the main menu, press the Scrub switch.
- 6 To exit the hidden menu, turn the key switch off.

| Prog. | Function  | Option 1  | Option 2                  | Option 3   | Option 4, etc.                             |
|-------|---|---|---------------------------|--|--|
| 1     | DECK TYPE   | 28" disc /<br>BR 755                                    | 28" Cyl /<br>BR 755 C     | 34" disc /<br>BR 855   | --   |
| 2     | CHEMICAL SELECTION  | AXP On<br>US mode: X:XXX                                | EDS On<br>EU mode: %      | AXP/EDS Off  |  |
| 3     | DETERGENT MODE  | Off<br>no Evergreen<br>(board default)                  | Mode 1<br>US Evergreen On | Mode 2<br>EU or non-Evergreen<br>preset                            |  |
| 4     | VACUUM SELECTION  | 1 (single)  | 2 (dual)                  | --   |  |
| 5     | LOW VOLTAGE CUTOFF  | Wet battery 80%   | Gel/AGM Battery 70%       | --   |  |
| 6     | MAXIMUM SCRUB SPEED                                       | 100%  | 90%                       | 80%  | 50%  |
| 7     | LOCK OUT BRUSH PRES<br>(displayed pressure is locked out) | Low   | Med                       | High   | Low & Medium, Low &<br>High, High & Medium |
| 8     | LOCK OUT SOLUTION<br>(displayed rate is locked out)       | Low   | Med                       | High   | Low & Medium, Low &<br>High, High & Medium |
| 9     | RECOVERY TANK FULL<br>(automatic shutoff turned on)       | ENABLED   | DISABLED                  | --   | --   |
| 10    | CHEMICAL RATE BIAS  | NONE (equal)  | +10% MORE CHEM            | -10% LESS CHEM   | --   |
| 11    | DECK DOWN TIME  | Incremental from 1 to 5 seconds in 0.1 second intervals |                           |  |  |
| 12    | RESTORE FACTORY DEFAULTS                                  | NO  | YES                       | --   | --   |
| 14    | FAULT RECALL  | No faults<br>occurred - display<br>is "--"              | Error codes               | To erase history, press the Solution switch while<br>in this mode. |  |
| 15    | FAULT DETECTION   | ENABLED   | DISABLED                  |  |  |
| 17    | BACKUP ALARM VOL  | Off   | Low                       | Med  | High                                       |
| 18    | FWR ALARM VOL   | Off   | Low                       | Med  | High                                       |
| 19    | HORN VOL  | Off   | Low                       | Med  | High                                       |

## Changing Program Settings - ST

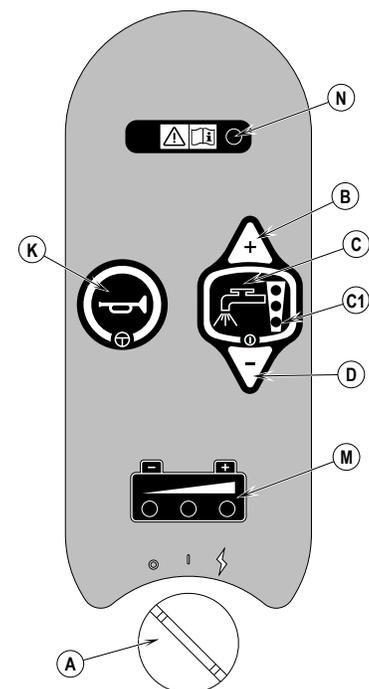
- 1 To enter this Hidden Menu, turn key switch Off, then press and hold the buttons shown in the table below simultaneously.
- 2 Turn key switch back On and hold for 2 seconds until the indicated LEDs for the desired function turn On, then release the switches.
- 3 Use the Solution + or - switches to change the setting. The fault code LED will blink at the same rate as the fault code display to show what the current setting is.

Press the Solution On/Off switch to save the setting, then turn key switch Off to exit the hidden menu.

| (1)<br>SWITCHES PRESSED              | B | D | C | K | (2)<br>INITIAL LED INDICATION |                 |                  |     |     |     | (3)<br>BLINKS |          |
|--------------------------------------|---|---|---|---|-------------------------------|-----------------|------------------|-----|-----|-----|---------------|----------|
|                                      |   |   |   |   | LOW<br>Solution               | MED<br>Solution | HIGH<br>Solution | RED | YEL | GRN | ★             | ★★       |
| FUNCTION                             |   |   |   |   |                               |                 |                  |     |     |     |               |          |
| Low Voltage Cutout                   | ● |   |   | ● |                               |                 | ●                |     |     |     | Wet           | Gel/AGM  |
| Scrub Deck Size                      |   |   | ● | ● | ●                             |                 |                  |     |     |     | 28"           | 34"      |
| Single/Dual Vac Motor                |   | ● |   | ● |                               | ●               |                  |     |     |     | S             | D        |
| Max Scrub Speed % of Transport Speed |   | ● | ● |   |                               | ●               | ●                |     |     |     | 50%           | 60% *    |
| Recovery Tank Full Shutoff           | ● | ● |   |   |                               |                 |                  | ●   |     |     | Enabled       | Disabled |
| Restore Factory Defaults             |   | ● | ● | ● |                               |                 |                  |     | ●   |     | No            | Yes      |
| Fault Recall                         | ● |   | ● | ● |                               |                 |                  |     |     | ●   |               |          |
| Fault Detection                      | ● | ● |   | ● |                               |                 |                  | ●   | ●   |     | Enabled       | Disabled |
| Solution Flow Rate Lockout           | ● |   | ● |   | ●                             | ●               | ●                |     |     |     | None          | Low **   |

\* 70% - 100% are 3 to 6 blinks respectively.

\*\* Medium, High, Low & Medium, Low & High, Medium & High are 3 to 7 blinks respectively.

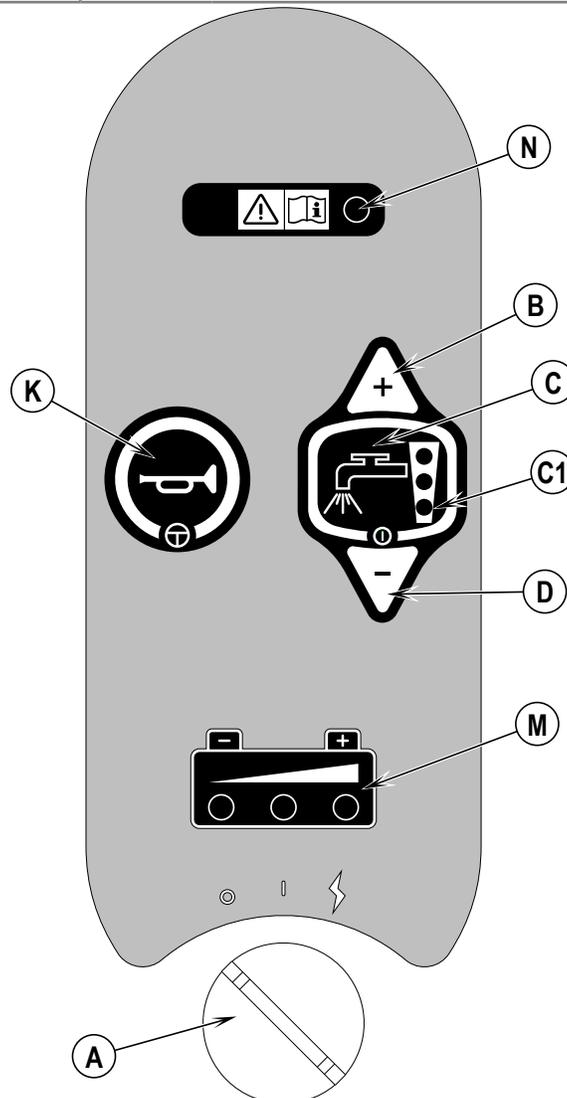


## Service Test Mode - ST

The purpose of Service Test Mode is to by-pass the lock-out function of the normal control system of components that are in an error state and allow those components to be manually turned on and off for troubleshooting purposes. (Components in an overload error state will still be locked out for safety reasons.)

ST - To enter Service Test Mode, turn key switch Off, then press and hold the three buttons B,C and D simultaneously. Turn key switch back On and hold for 2 seconds until the red, yellow, and green LEDs turn On, then release the switches.

| ST Desired Action                  | Press Switch                   | Toggles                  | LED Indication ON/OFF  |
|------------------------------------|--------------------------------|--------------------------|------------------------|
| Activate solution solenoid L1      | <b>C</b>                       | ENERGIZED...DE-ENERGIZED | Solution Med           |
| Activate brush motor contactor K2  | <b>B</b>                       | ENERGIZED...DE-ENERGIZED | Solution High          |
| Activate vacuum motor contactor K1 | <b>D</b>                       | ENERGIZED...DE-ENERGIZED | Solution Low           |
| <b>Other Status Indicators</b>     | <b>Indication</b>              |                          | <b>LED</b>             |
| Main control board                 | ST Service LED Blink Code      |                          | Fault Indicator        |
| Speed Control                      | Speed Control Error Flash Code |                          | Battery RED - Blinking |
| Speed Control                      | Forward/Reverse                |                          | Battery YELLOW - ON    |
| Speed Control                      | Reverse                        |                          | Battery GREEN - OFF    |

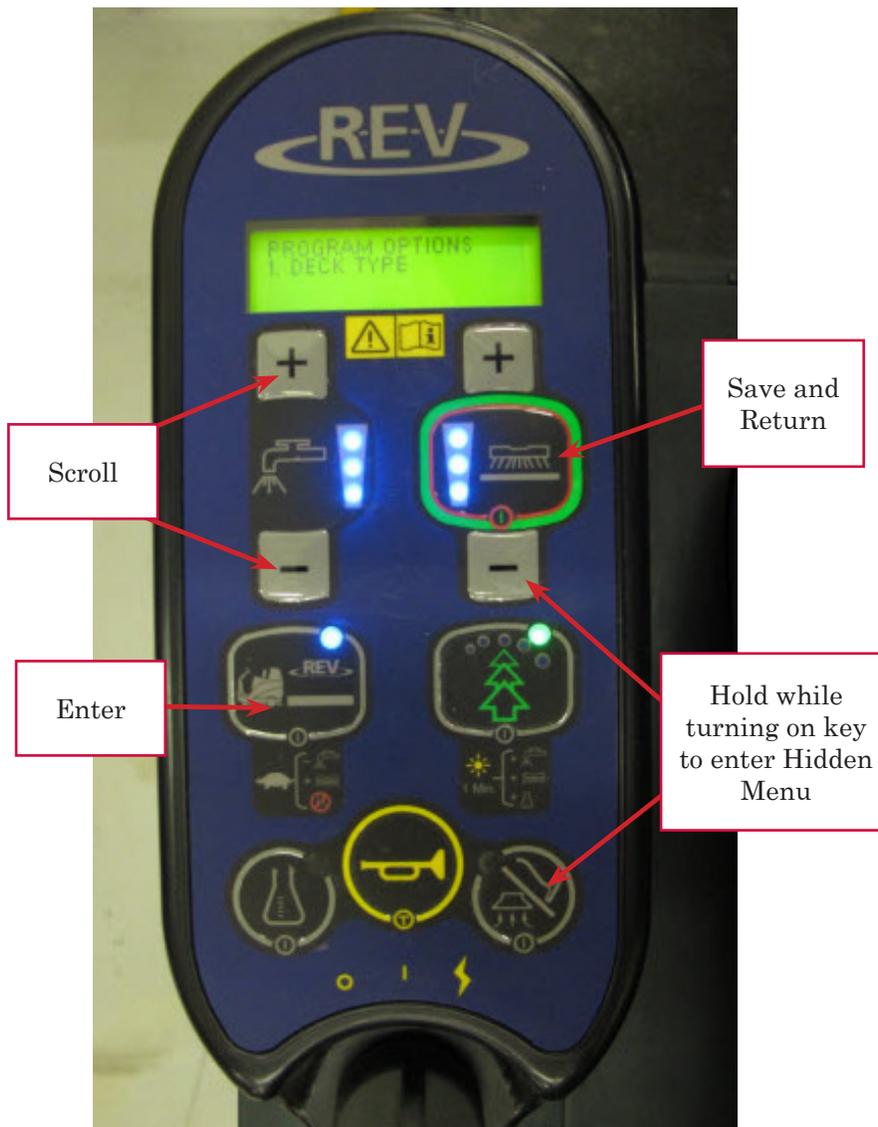


## Hidden Menu (REV)

Hidden menus are used to configure the main controller to match the machine that it is installed on (Programming Options) and to perform time-saving diagnostic tests (Service Test Mode). The service test mode is found as a menu item under programming options.

### Enter Hidden Menus

1. Turn the main power switch to the off position.
2. Press and hold the scrub ON/OFF switch and vacuum/wand switch.
3. While holding both switches, turn the main power key switch to the on position.
4. Continue to hold both switches for approximately 2 seconds until the display shows “Program Options”.
  - a. To scroll through the menu use the solution on/increase switch or solution decrease/off switches
  - b. To enter a sub menu press the Floor Finish Removal Mode Switch (Rev).
  - c. To save and return to the main menu press the scrub ON/OFF switch.



## Program Options (REV)

Program options must be set whenever the Main Controller has been replaced.

- **Scrub Deck Type** - This function configures the control unit current settings and flow rate settings for each of the scrub deck types. Note: After replacing the controller the machine will not operate until a deck type has been selected.
- **Chemical Selection** - Used to let the controller know whether the onboard detergent dispensing system has been installed and which market area the machine is in. The market area determines whether to show the detergent dilution rate as a ratio (US-style) or percentage (EU/Global-style) .
- **Vacuum motor quantity selection** - The main controller must be programmed for the number of vacuum motors installed so that the current overload protection and recovery tank full will function properly.
- **Low Voltage Cutout Selection** - The purpose of the special low battery voltage cutout function is to help prolong battery life. The scrub deck will be raised and the brush motors and solution solenoid valve will turn OFF automatically and cease to function when the batteries discharge to the selected cutout level. The cutout level is adjustable between two settings. The standard setting (wet cell/lead acid) is 20.55 volts and alternate setting (gel/maintenance free) is 21.75 volts.
- **Maximum Scrub Speed** - The control system is programmed to limit the maximum speed while scrubbing to a value less than that allowed for driving when not scrubbing (100%, 90%, 80%, 70%, and 60%).
- **Lock Out Brush Pressure** - Used to lock out any brush pressure settings Low, Medium, High, Low and Medium, Low and High, High and Medium. During normal operation, the pressure setting(s) that are locked out will not be able to be selected. Default is “None”
- **Lock Out Solution Flow Rate** - Used to lock out any solution flow rate settings: Low (Normal), Medium (Heavy), High (Extreme), Low and Medium, Low and High, High and Medium. During normal operation, the flow rate(s) that are locked out will not be able to be selected.
- **Recovery Tank Full Enable/Disable** - Used to enable or disable Recovery Tank Full automatic shutoff feature. Enable means that the automatic shutoff feature is turned on; disable means that the automatic shutoff feature is turned off.
- **Chemical Ratio Bias** - Used to increase or decrease the chemical mix rate by 10% to achieve a more or less concentrated mix than that determined by user programmed ratio
- **Deck Down Time Period Adjustment** - When the scrub on/off switch is pressed, the control unit will automatically lower the deck for a specified amount of time. The time that the deck is lowered is adjustable from 1 second to 5 seconds in 0.1 second increments.
- **Restore Factory Default** - This submenu should reset all parameters stored in the EEPROM except Brush on Time. Note: after restoring factory defaults, all of the program options must be reviewed and set appropriately. The machine will not work until at least the deck type is selected.
- **Display Revision Level** - The LCD display will show the revision level of the software in the control board.
- **Fault Recall** - Whenever the control unit detects an electrical system fault, one or more error codes are displayed and stored in the EEPROM. If it is desired, the error code (if any) from the previous operation for the machine can be recalled for troubleshooting purposes. If no fault code is present, the display will show a “-“
- **Fault Detection** - Normally, the main control unit will perform checks of the electrical system during operation. If a fault occurs in a particular system, that system (and possibly others) will be shut down. This can make troubleshooting the system difficult. This option will allow service personnel to disable some of the fault detection checks to facilitate troubleshooting. This will not disable the over-current protection on any of the systems.

- **Service Test Mode** - The purpose of the service test mode program is to assist the service repairperson with numerous quick short-cut troubleshooting procedures. These test instructions allow for the separate control of each individual electrical system component independent of the normal operator inputs. Exit by pressing the scrub on/off switch six times.
- **Backup Alarm Vol** - Used to adjust the volume of the back up alarm or turn it off.
- **FORWARD ALARM VOLUME** - Used to adjust the volume of the forward annunciation alarm or turn it off.
- **Horn Volume** - Used to adjust the horn volume or turn it off.
- **Save last scrub setting** - provides two choices of what happens when the key is turned off; 1) Remember last scrub settings. Solution flow, scrub pressure or 2) Factory default scrub settings (chemical remembered, low water, low pressure)
- **Burst Of Power** - This selection screen only applies when the machine does not have the chemical option installed. In that case, the Burst of Power button on the control panel can be set to perform in one of two ways: when disabled it is a non-functioning button, and when enabled it will attempt to make a temporary increase in the solution flow rate, brush pressure, and vacuum level when pressed. When the chemical option is installed, the Burst of Power button is always functional regardless of the value selected in this menu. When pressed, the Burst of Power button will attempt to make a temporary increase in the solution flow rate, brush pressure, vacuum level and chemical flow rate.
- **Panel Test** - This is a special mode that allows you to test each control panel switch. The display will indicate which switch was last pressed and then provide a count for each subsequent press. Exit by pressing the scrub on/off switch six times.

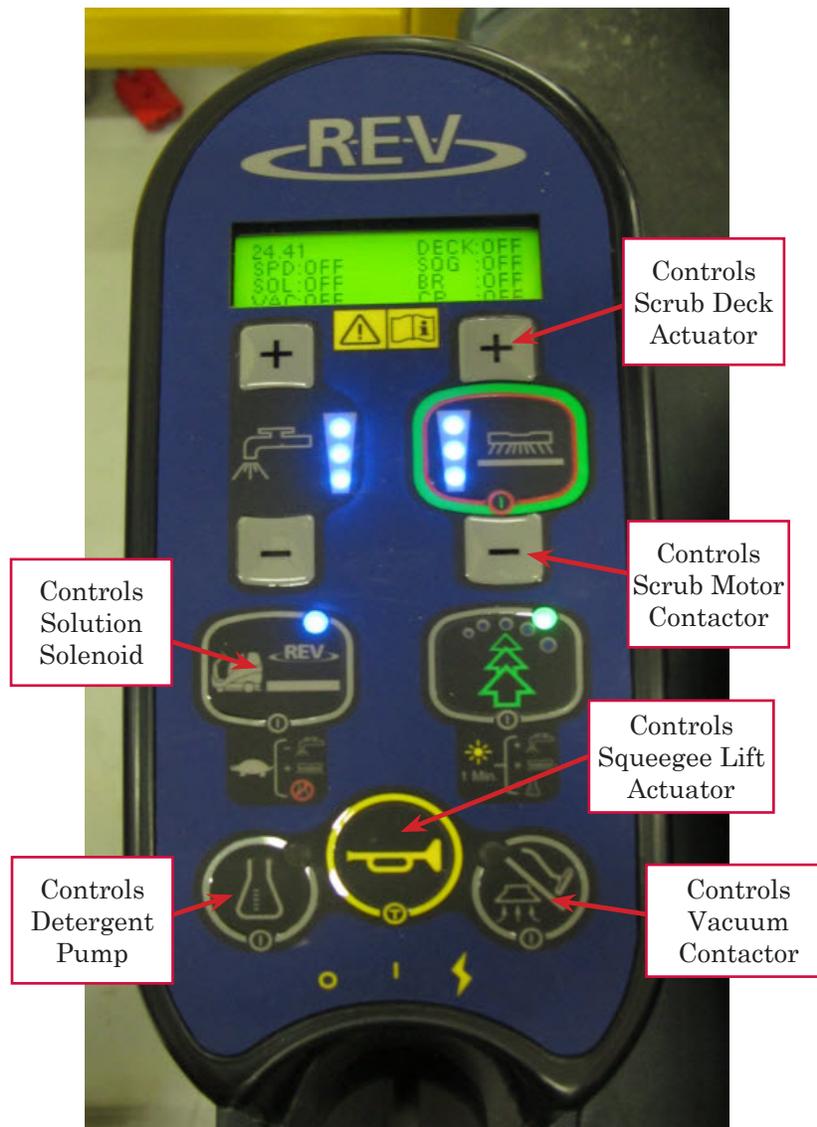
## Service Test Mode - ADVENGER / BR 755, 855 (REV)

The service test mode provides time-saving diagnostic tests. You can request that the main controller turn various outputs on and off without the normally required prerequisite inputs in order to quickly prove whether the output is working or not. The service test mode can also be used to verify some input signals.

The Service Test Mode is accessed via the Hidden Menu. Enter the program options and then scroll to the Service Test Mode.

### Output Tests

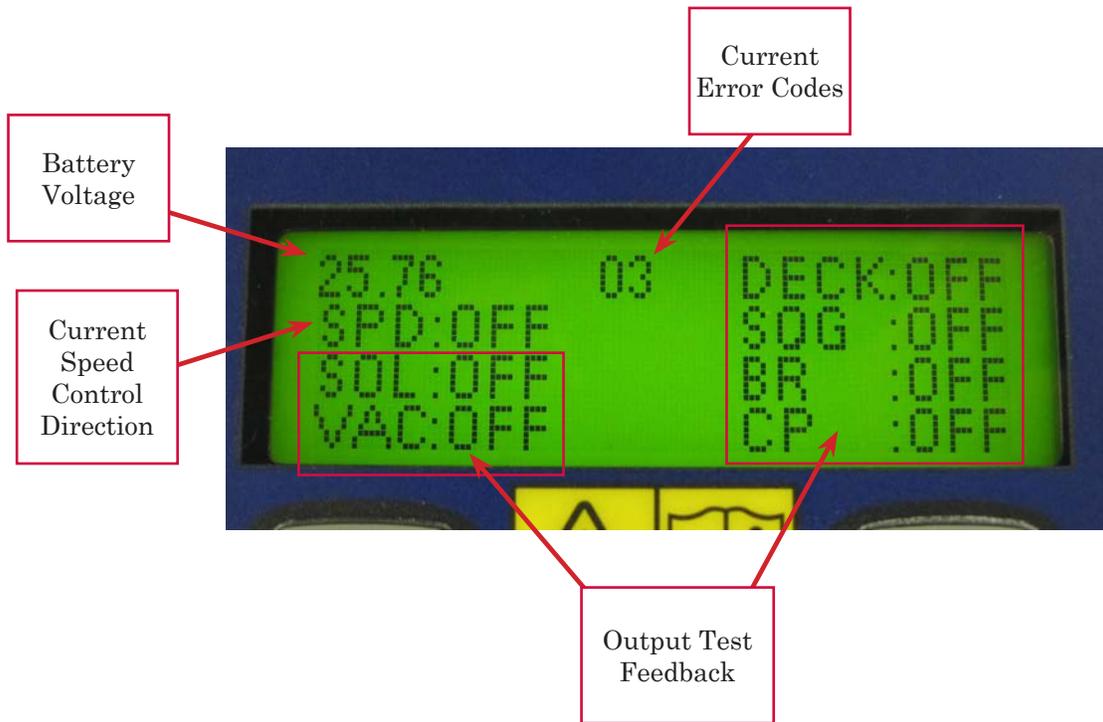
Once in service test mode use the control panel switches to request that various outputs are turned on/off. The LCD provides feedback to let you know that the controller saw your request and is attempting to carry it out.



Service Test Mode Switch Operation

### Input Tests

Once in service test mode the LCD displays output test feedback. It also displays current speed control direction, battery voltage to the main controller and any current error codes.

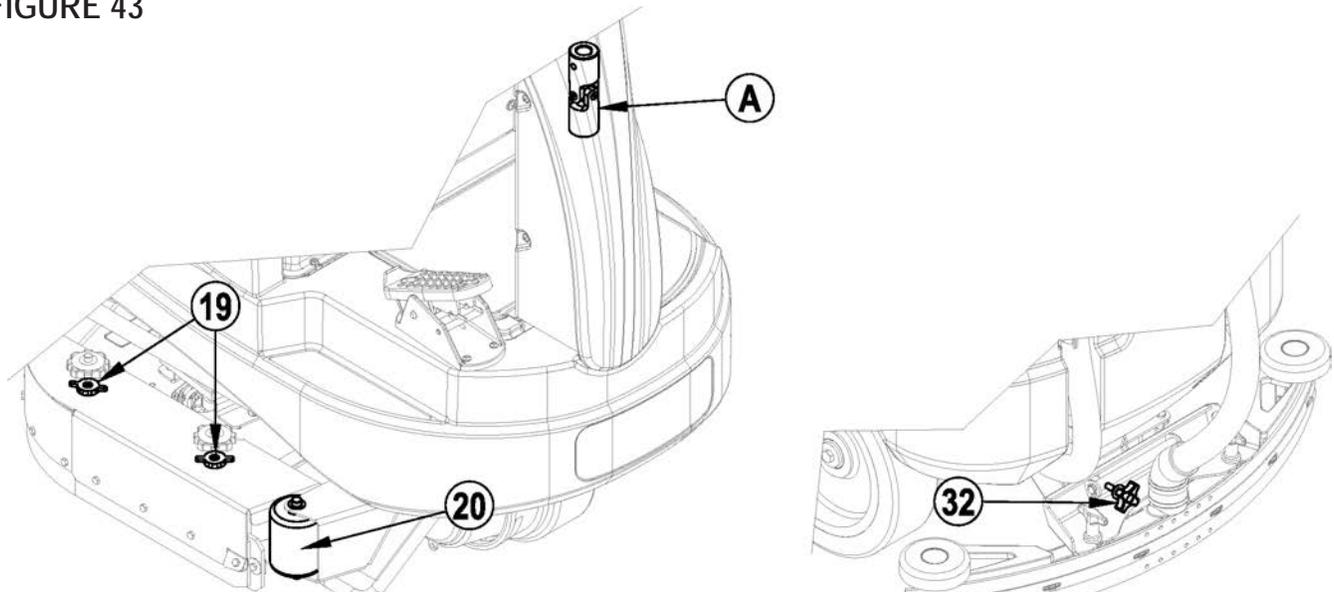


# MAINTENANCE SCHEDULES

## OPERATOR PREVENTIVE MAINTENANCE – MACHINE IN USE

| MAINTENANCE ITEM   | Daily | Weekly | Monthly |
|--|-------|--------|---------|
| Charge Batteries   | •     |        |         |
| Check/Clean Tanks & Hoses  | •     |        |         |
| Check/Clean/Adjust Squeegee  | •     |        |         |
| Check/Clean/Rotate Brushes/Pads  | •     |        |         |
| Empty/Clean Strainer Basket in Recovery Tank   | •     |        |         |
| Check/Clean Vacuum Shut-Off Float  | •     |        |         |
| Check/Clean vacuum motor foam filter(s)  | •     |        |         |
| Clean Hopper on Cylindrical System   | •     |        |         |
| Charge Batteries – full charge cycle 12-15 hrs   |       | •      |         |
| Check Each Battery Cell's Water Level (wet batteries)  |       | •      |         |
| Check/Clean/Adjust Scrub Deck Side Skirts  |       | •      |         |
| Check/Clean Solution Filter  |       | •      |         |
| Clean Solution Trough on Cylindrical System  |       | •      |         |
| Purge Detergent System (If equipped)   |       | •      |         |
| Lubricate Steering Chain   |       |        | •       |
| Lubricate Pivot Points for Squeegee & Scrub Deck Linkage   |       |        | •       |
| Lubricate Side Skirt Adjustment Knobs (19)   |       |        | •       |
| Lubricate Steering Wheel Shaft Universal Joint (A)   |       |        | •       |
| Lubricate Front Roller Bumper (20)   |       |        | •       |
| Lubricate Squeegee Tilt Adjustment Knob (32)   |       |        | •       |
| (ST) Check for Squeegee Cable Bushing wear inside Steering Column.<br>Wear indicates need for replacement and cable adjustment (too tight) |       |        | •       |

FIGURE 43



## MAINTENANCE SCHEDULES

### OPERATOR PREVENTIVE MAINTENANCE – MACHINE IN STORAGE

| MAINTENANCE ITEM                               | Daily | Weekly | Monthly | Yearly |
|--|-------|--------|---------|--------|
| Check Each Battery Cell's Water Level (wet)    |       |        | •       |        |
| Charge Batteries – full charge cycle 12-15 hrs |       |        | •       |        |

### SERVICE TECHNICIAN SUGGESTED MAINTENANCE

| MAINTENANCE ITEM   | Quarterly | Yearly     |
|--|-----------|------------|
| Clean battery tops and posts with baking soda solution   | •         |            |
| Inspect battery connections for tight, corrosion-free fit  | •         |            |
| Perform hydrometer battery check (wet batteries) to identify bad cells   | •         |            |
| Perform voltmeter check of individual batteries (gel/AGM) to identify bad cells  | •         |            |
| Perform battery load test to identify degraded batteries resulting in poor run time  | •         |            |
| Inspect vacuum motor carbon brushes for wear<br>(Replace if 9.5mm (3/8 inches) or shorter)   |           | 300 Op Hrs |
| Inspect brush motor carbon brushes<br>(Replace if 9.5mm (3/8 inches) or shorter)   |           | 500 Op Hrs |
| While brush motor being checked, also check for wear at Motor Gimbal inside Brush Plate.<br>Remove and replace if worn.  |           | 500 Op Hrs |
| Inspect drive motor carbon brushes<br>(Original carbon brush length is 19.1mm (3/4 inches). Replace when shorter than 6.3 mm (1/4 inches) to obtain the same motor efficiency as a new brush.) |           | 500 Op Hrs |

### RECOMMENDED MAINTENANCE MATERIALS

Typical adhesives and lubricants used on Advenger / BR 755, 855 include Loctite(R) Silver Grade Anti-Seize, Loctite formulas 242, 680, 414, 409, and No More Leaks(TM) 80724 sealant; Uniroyal M6325 Adhesive, CRC White Lithium Grease, Sprayon S00206 All-Purpose Silicone Lube, light machine oil such as 10W-30 motor oil, Mobil SHC 634 lube and Mobilgear 600 XP 150 (EU: AGIP BLASIA 150) gear case oil.

To clean wet batteries, baking soda will also be needed.



## PM Checklist

Advance Advenger 2805, 2905, 3405  
 Advance 2800ST, 3400ST  
 Nilfisk BR 755, 855  
 Disc and Cylindrical  
 PM Checklist

Customer \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ St \_\_\_\_\_ Zip \_\_\_\_\_

Model \_\_\_\_\_ Serial \_\_\_\_\_ Hours \_\_\_\_\_

**Defect Codes**

- A needs adjustment
- B binding
- C dirty or contaminated
- D damaged, bent or torn
- L leaks
- M missing
- W worn out

| Ref | OPERATIONAL INSPECTION ITEMS  | OK or N/A | Defect Codes (circle) | Does Not Work |
|-----|---|-----------|-----------------------|---------------|
| 1   | Steering  |           | A B                   |               |
| 2   | Drive Pedal Operational (check for Fwd/Rev Drive & any neutral creep)   |           | A B D                 |               |
| 3   | Seat Switch   |           | D                     |               |
| 4   | Electrical Parking Brake (Brake releases when the key is turned on and the drive pedal is engaged. Brake engages when machine is at rest.)                                    |           | A B W                 |               |
| 5   | Drive System Performance (refer to Curtis Programmer Manual SM56043101 for speed control changes)   |           | Noisy<br>Sluggish     |               |
| 6   | Scrub System (Raise, Lower, auto scrubbing functions)   |           | A B                   |               |
| 7   | Scrub Brush (pressure settings Normal/Heavy/Extreme scrub for Advenger / BR 755, 855; Normal/Extreme for ST)  |           | A B                   |               |
| 8   | Squeegee System (Raise, Lower, ADVENGER / BR 755, 855 - Auto-raise in reverse)  |           | A B D                 |               |
| 9a  | Vacuum Performance Single Motor (sealed water lift 63", 1-inch open hole aperture 10")  |           | C L W                 |               |
| 9b  | Vacuum Performance Dual Motor (sealed water lift) (sealed water lift 65", 1-inch open hole aperture 18")  |           | C L W                 |               |
| 10  | Solution Control (On/Off, Increase & Decrease for Normal/Heavy/Extreme)   |           | A B L                 |               |
| 11  | Emergency Stop Knob   |           | B D                   |               |
| 12  | Tilt Steering Mechanism and Seat  |           | A B D                 |               |
| 13  | Optional Accessories  |           | D                     |               |
| 14  | Main Control Board Special Program Options and Fault Recall Mode– check all applicable program settings per Changing Program Settings section and examine stored fault codes. |           |                       |               |
| 15  | Battery Charger Programmed Correctly for Battery  |           | A                     |               |
| 16  | Battery Charger Operation   |           | D                     |               |

| Ref | VISUAL INSPECTION ITEMS                                       | Comments                | OK or N/A | Defect Codes (circle) | Does Not Work |
|-----|---|-------------------------|-----------|-----------------------|---------------|
| 17  | Scrub Brushes (check for wear and rotate)                     |                         |           | A B D W               |               |
| 18  | Scrub Brush Motor Carbon Brushes                              | Wear Limit 3/8"         |           | B L W                 |               |
| 19  | Scrub Brush Motor Gimbals                                     | In Brush Plates         |           | W                     |               |
| 20  | Auto Tension Belt – Wear and Tension (cylindrical)            |                         |           | A D W                 |               |
| 21  | Spring Retainers  | On Brush Plates         |           | D                     |               |
| 22  | Scrub Deck Skirt Position                                     | Slight Flare            |           | A B W                 |               |
| 23  | Solution Solenoid Valve                                       |                         |           | C L                   |               |
| 24  | Solution Tank, Delivery Hoses & Filter                        | Clean Filter Screen     |           | C L                   |               |
| 25  | Vacuum Motor Carbon Brushes                                   | Wear Limit 3/8"         |           | W                     |               |
| 26  | Vacuum Motor Gaskets & Filters                                |                         |           | L W                   |               |
| 27  | Vacuum Float Ball & Cage Assembly                             | Clean Float             |           | C M                   |               |
| 28  | Recovery Lid Gasket   |                         |           | C D L                 |               |
| 29  | Recovery Tank Drain Hose & Cap                                | Flush                   |           | C L                   |               |
| 30  | Recovery Tank Strainer Basket                                 | Clean                   |           | C D                   |               |
| 31  | Squeegee Pick-Up Tool and Hose                                | Back Flush              |           | C L                   |               |
| 32  | Squeegee Blades (clean & rotate)                              |                         |           | A C D W               |               |
| 33  | Squeegee Lift Actuator Motor (Advenger / BR 755, 855) & Cable |                         |           | A B D                 |               |
| 34  | (ST) Squeegee Lift Cable Plastic Bushing in Steering Column   | Cable too tight if Worn |           | W                     |               |
| 35  | Battery Condition (clean & water)                             | Load Test               |           | C W                   |               |
| 36  | Front Drive Wheel Motor Carbon Brushes                        | Wear Limit 1/4"         |           | C W                   |               |
| 37  | Drive Pedal Linkage Neutral Return                            |                         |           | A C                   |               |
| 38  | Steering Chain Lube & Tension                                 | 1/4" Deflection         |           | A B C                 |               |
| 39  | Steering Column Universal Joint                               |                         |           | A D                   |               |
| 40  | Rear Wheels   |                         |           | C                     |               |
| 41  | Sweep Hopper  |                         |           | C                     |               |

WORK COMPLETED BY:

ACKNOWLEDGED BY:

\_\_\_\_\_  
Service Technician Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Customer Signature

\_\_\_\_\_  
Date

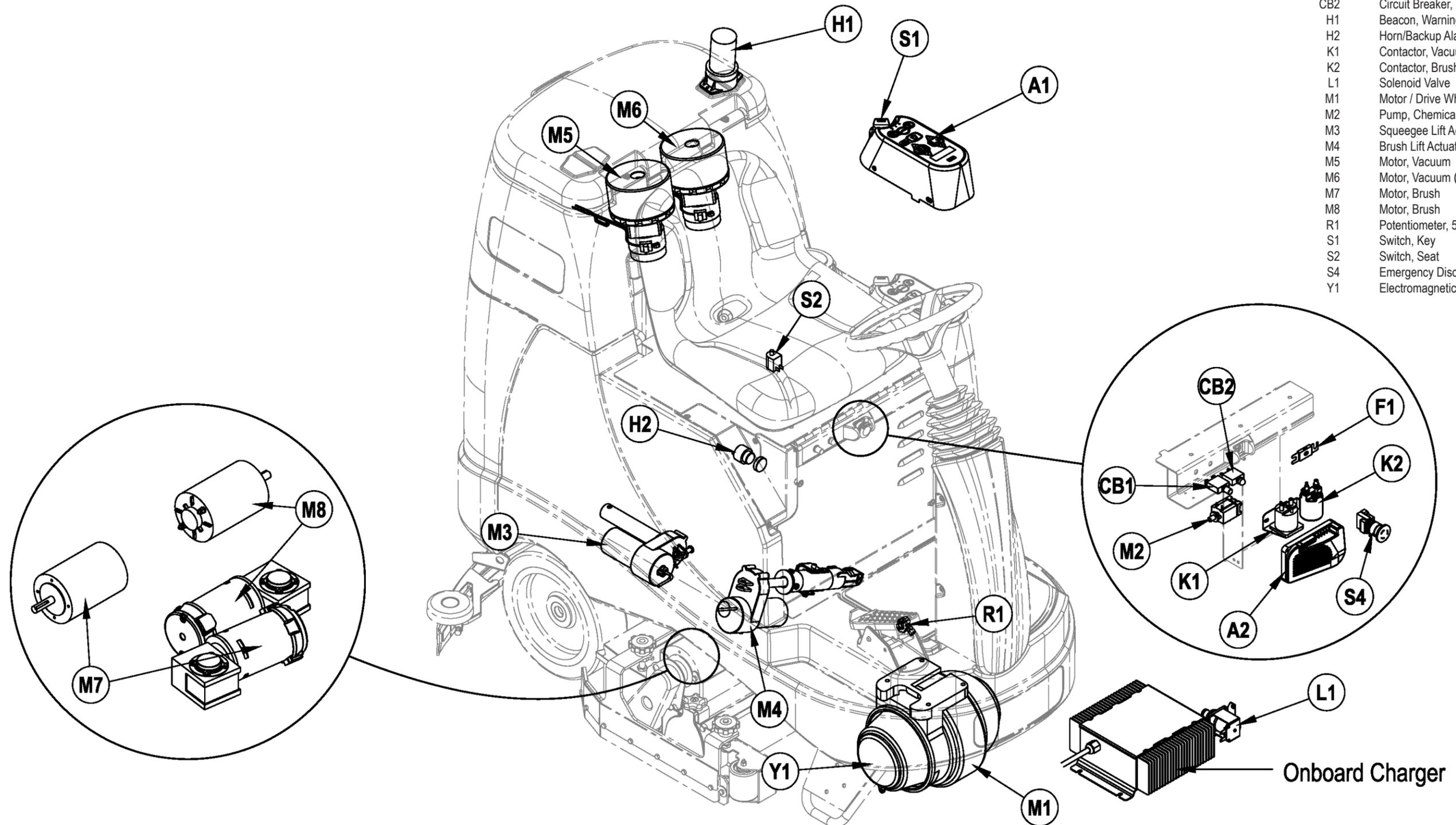
# Expanded Electrical System

# ELECTRICAL SYSTEM

## Component Location (Advenger/BR 755, 855)

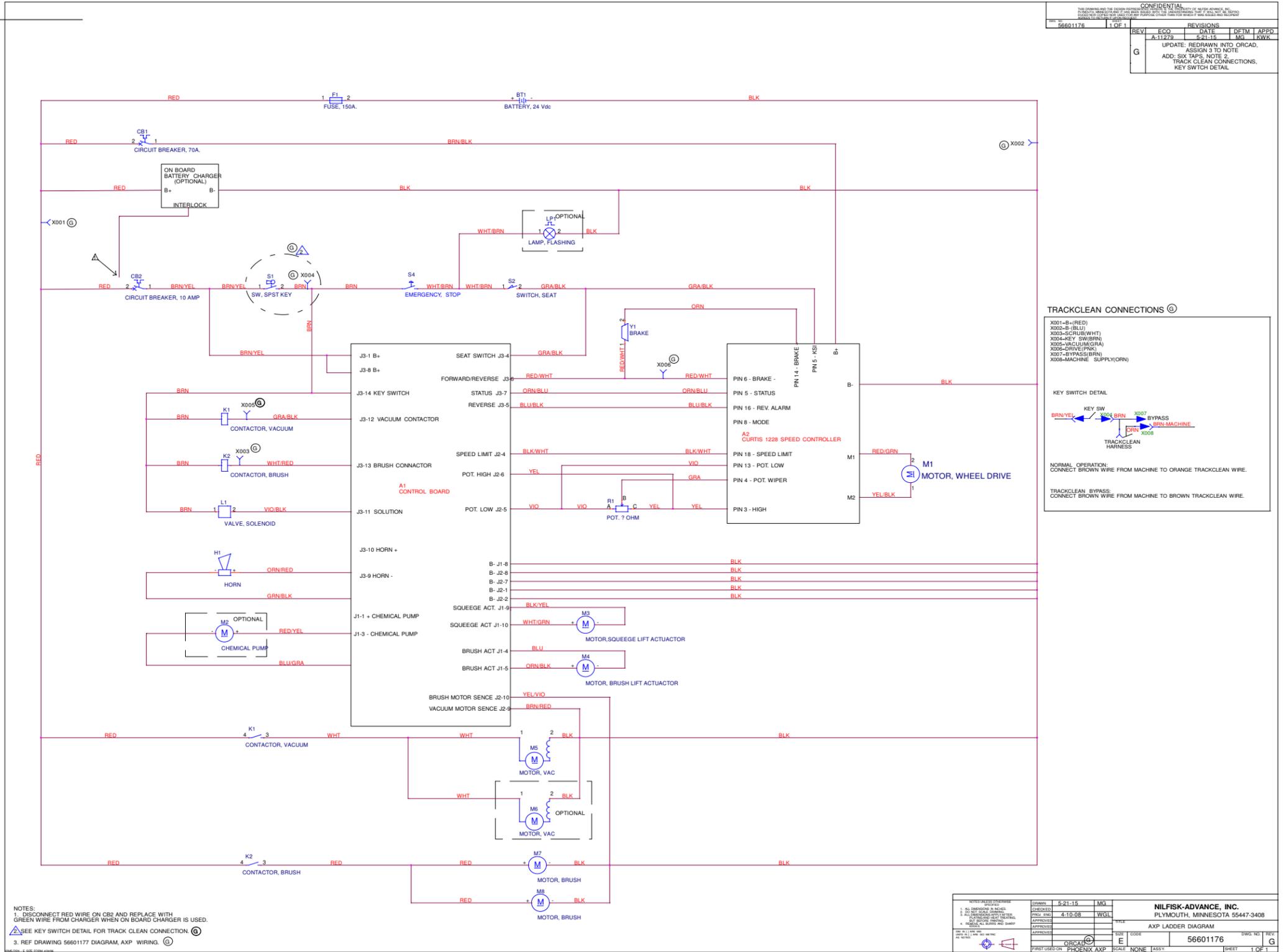
### COMPONENT LOCATION (Advenger / BR 755, 855)

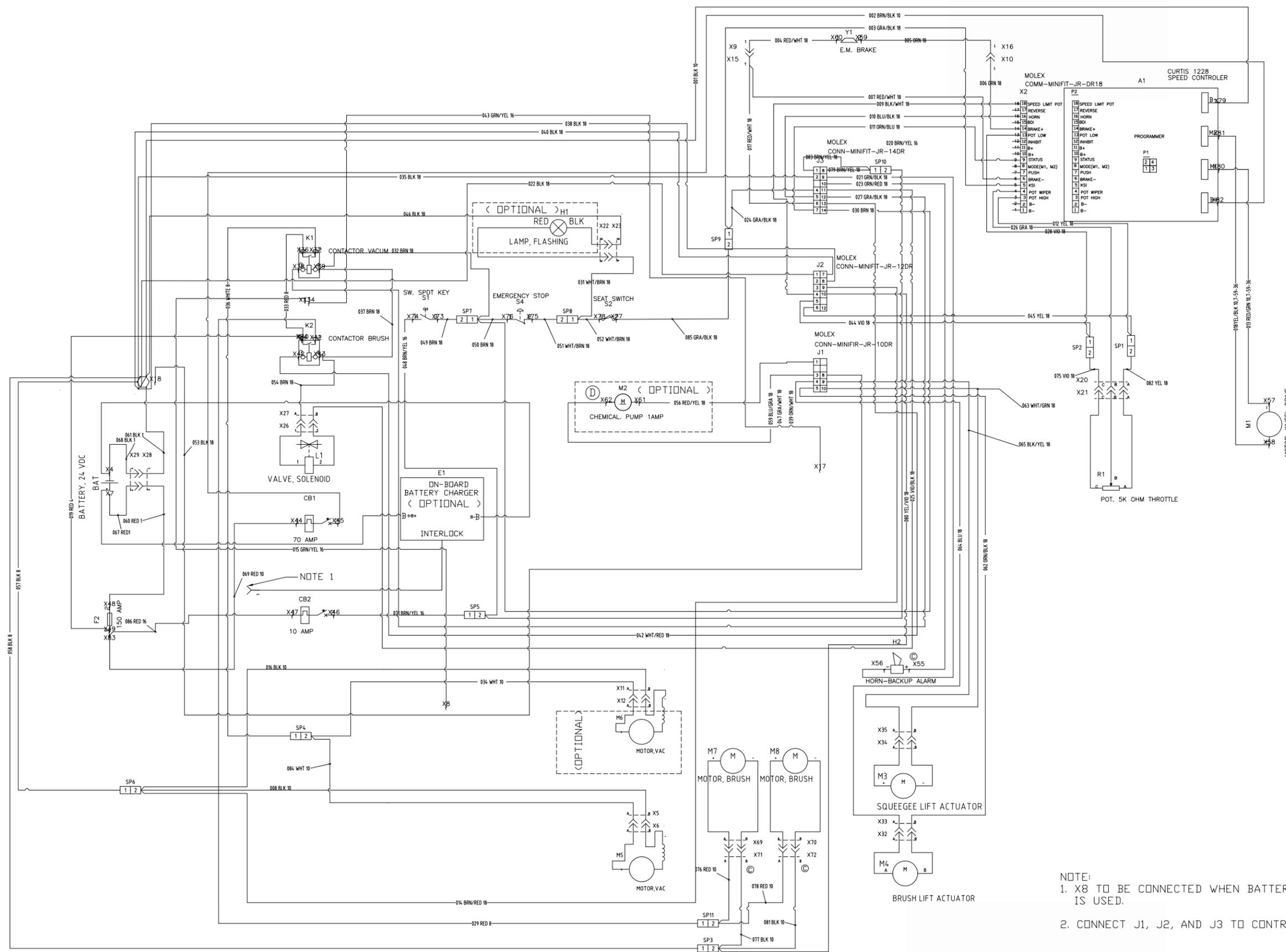
| Item | Description                   |
|------|-------------------------------|
| A1   | Control PCB Assy              |
| A2   | Controller, Speed             |
| F1   | Fuse 150 Amp                  |
| CB1  | Circuit Breaker, 70 Amp       |
| CB2  | Circuit Breaker, 10 Amp       |
| H1   | Beacon, Warning (optional)    |
| H2   | Horn/Backup Alarm             |
| K1   | Contact, Vacuum Motor         |
| K2   | Contact, Brush Motor          |
| L1   | Solenoid Valve                |
| M1   | Motor / Drive Wheel           |
| M2   | Pump, Chemical (AXP/EDS only) |
| M3   | Squeegee Lift Actuator        |
| M4   | Brush Lift Actuator           |
| M5   | Motor, Vacuum                 |
| M6   | Motor, Vacuum (Optional)      |
| M7   | Motor, Brush                  |
| M8   | Motor, Brush                  |
| R1   | Potentiometer, 5K             |
| S1   | Switch, Key                   |
| S2   | Switch, Seat                  |
| S4   | Emergency Disconnect          |
| Y1   | Electromagnetic Brake         |



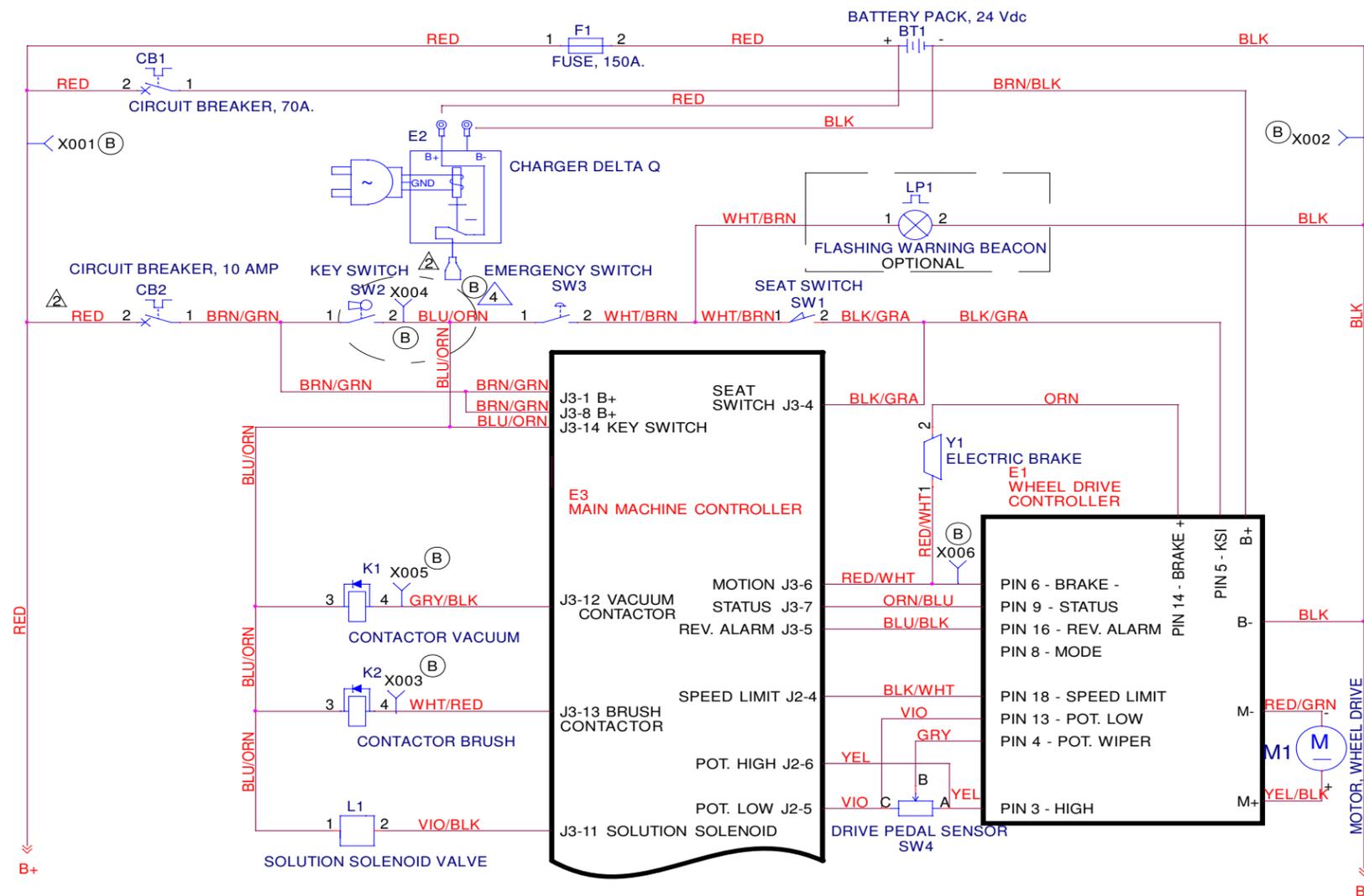
# WIRING DIAGRAM / SCHEMATIC 56601176 REV G Advenger / BR 755, 855 Disc and Cylindrical Decks)

| Item | Ref. No.   | Qty | Description                                  |
|------|------------|-----|--|
| A1   | 56601565   | 1   | Control PCB Assy                             |
| A2   | 56601061   | 1   | Controller, Speed                            |
| BAT  | N/A        |     | Battery                                      |
| F1   | 56412089   | 1   | Fuse, 150 Amp                                |
| CB1  | 56454429   | 1   | Circuit Breaker, 70 Amp                      |
| CB2  | 56507644   | 1   | Circuit Breaker, 10 Amp                      |
| H1   | 56307166   | 1   | Beacon, Warning (optional)                   |
| H2   | 56412177   | 1   | Horn/Backup Alarm                            |
| K1   | 56601183   | 1   | Contacteur 24v, 100 Amp                      |
| K2   | 56412179   | 1   | Contacteur 24v                               |
| L1   | 56601064   | 1   | Solenoid Valve Assy                          |
| M1   | 56601050   | 1   | Motor / Drive Wheel                          |
| M2   | 56315241   | 1   | Pump, Chemical                               |
| M3   | 56601147   | 1   | Actuator, Motor 24v                          |
| M4   | 56601432   | 1   | Lift Actuator Assembly                       |
| M5   | 56601132   | 1   | Motor, Vac 24vdc                             |
| M6   | 56601132   | 1   | Motor, Vac 24vdc (optional)                  |
| M7   | 56315061   | 2   | Motor, 24 Vdc, .5 Hp, 1800 Rpm (cylindrical) |
| M8   | 56315061   | 1   | Motor, 24 Vdc, .5 Hp, 1800 Rpm (cylindrical) |
|      | 56601134   | 2   | Motor Gearbox Assy (disk)                    |
| R1   | N/A        | 1   | Part of 56601052                             |
| S1   | 56303553   | 1   | Key Switch                                   |
| *    | 56303526   | A/R | Replacement Key Set                          |
| S2   | 7-82-00050 | 1   | Switch, Seat                                 |
| S4   | 56407130   | 1   | Disconnect, Emergency                        |
| Y1   | 56601507   | 1   | Brake, Electromagnetic                       |
|      | 56315124   | 1   | Charger, On-Board 24v TSBUS2008-984          |

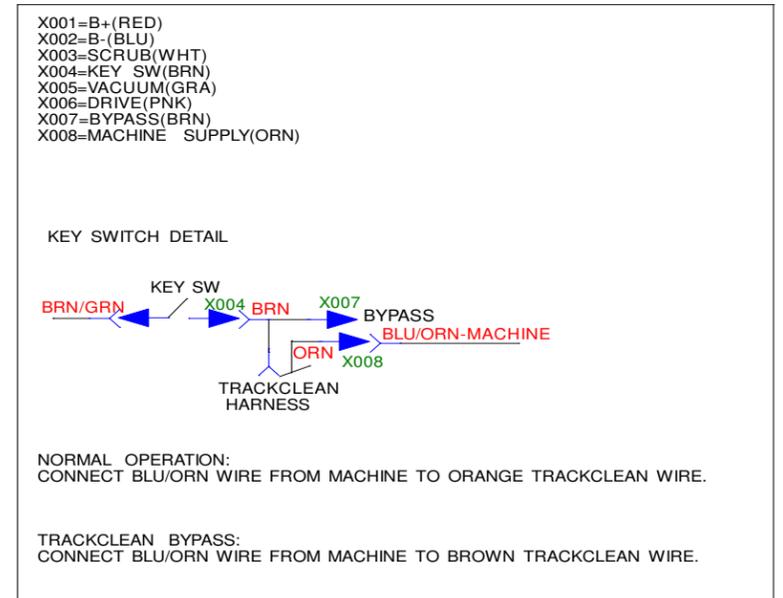


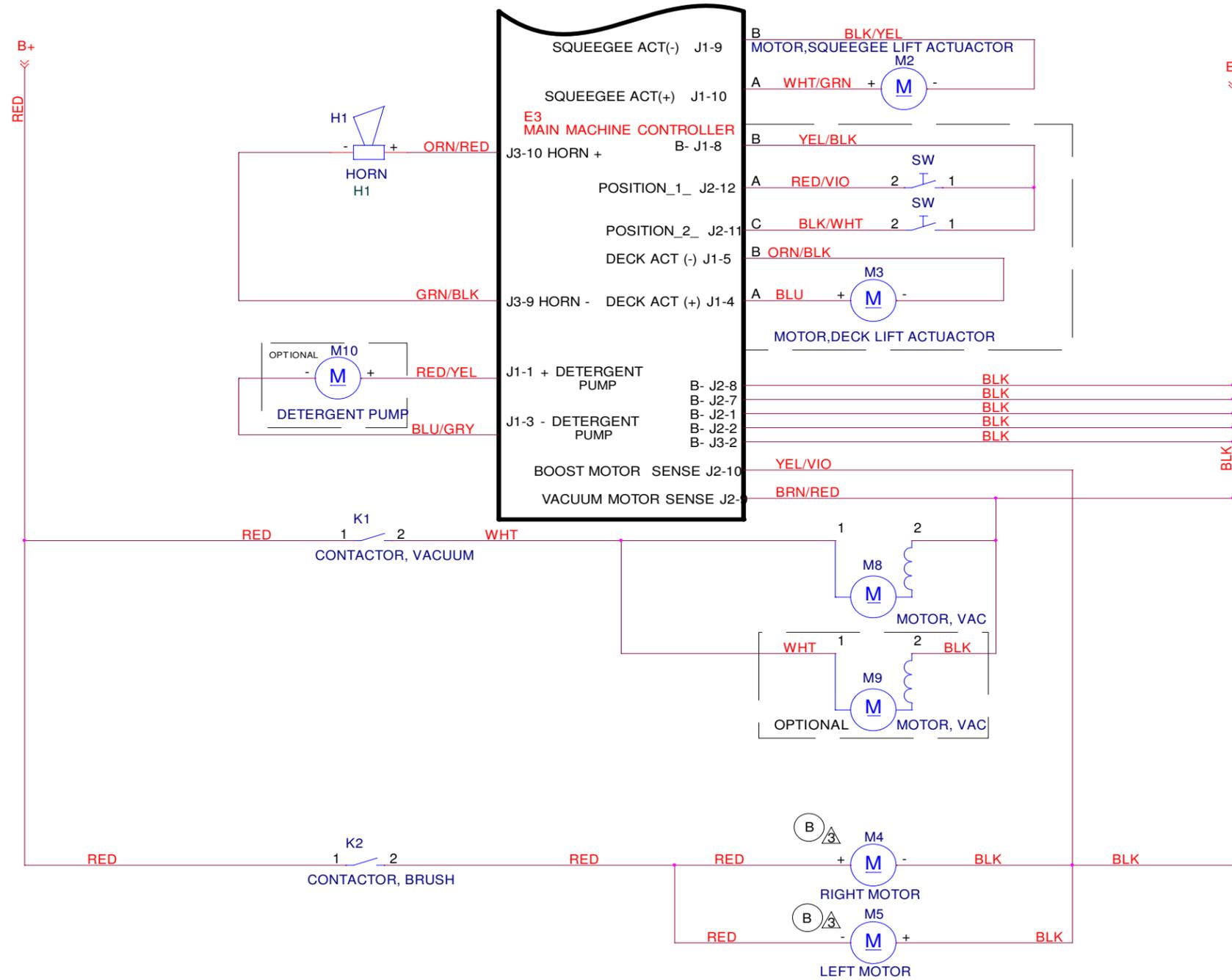


NOTE:  
 1. X8 TO BE CONNECTED WHEN BATTERY ROLLOUT OPTION IS USED.  
 2. CONNECT J1, J2, AND J3 TO CONTROL BOARD

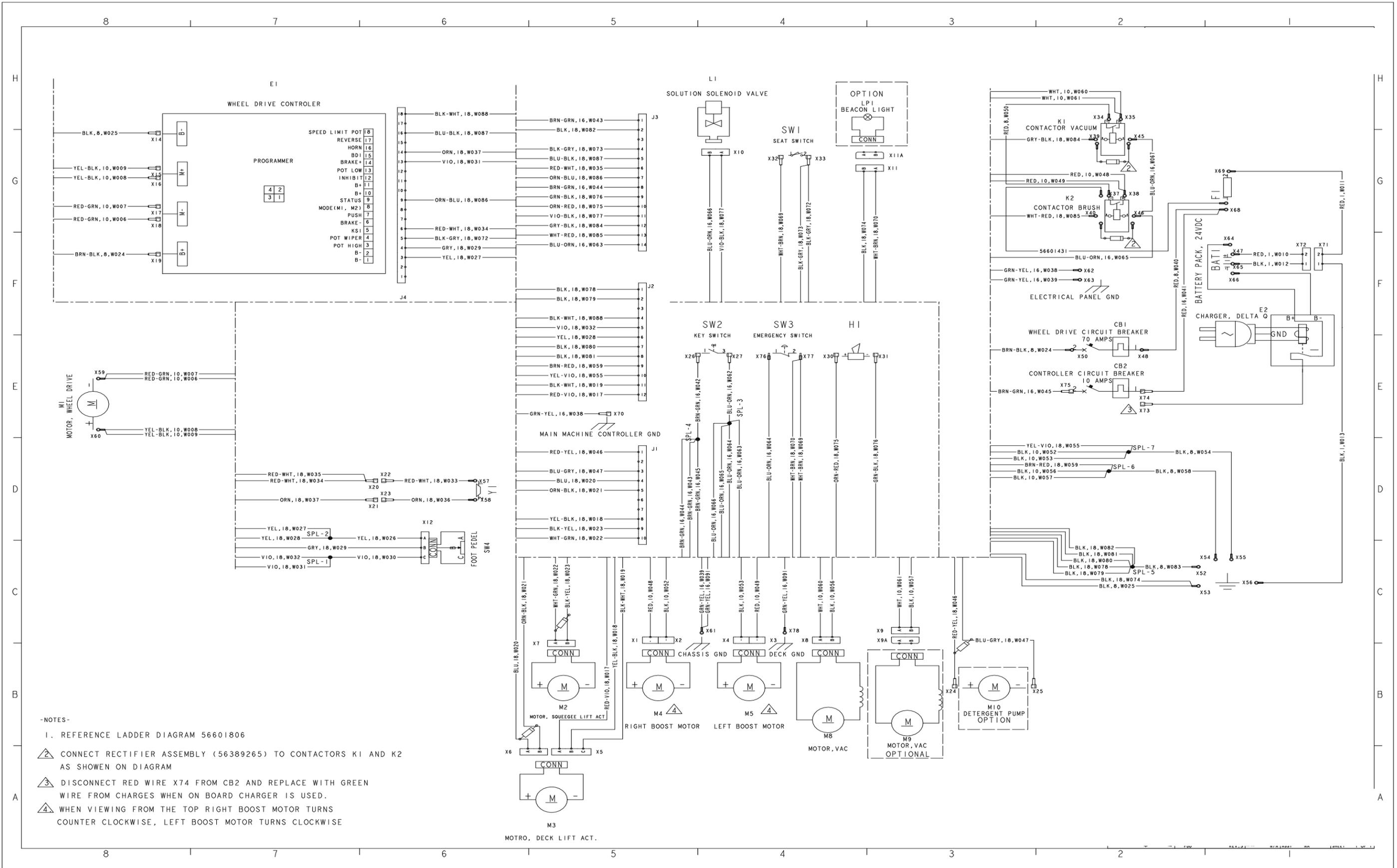


TRACKCLEAN CONNECTIONS (B)





# Wiring Harness Diagram (REV Deck) - 56601807 Revision A

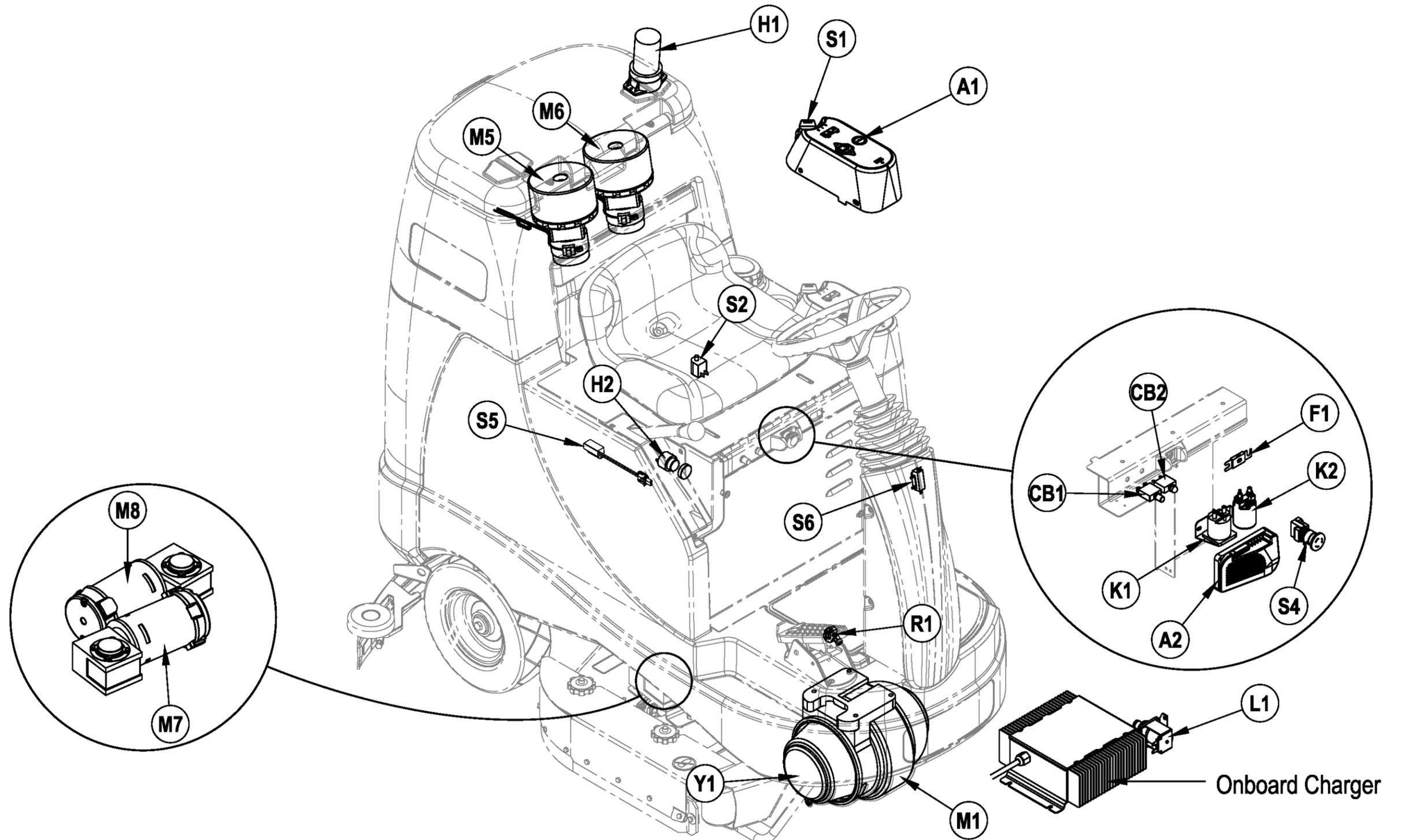


- NOTES-
1. REFERENCE LADDER DIAGRAM 56601806
  2. CONNECT RECTIFIER ASSEMBLY (56389265) TO CONTACTORS K1 AND K2 AS SHOWN ON DIAGRAM
  3. DISCONNECT RED WIRE X74 FROM CB2 AND REPLACE WITH GREEN WIRE FROM CHARGES WHEN ON BOARD CHARGER IS USED.
  4. WHEN VIEWING FROM THE TOP RIGHT BOOST MOTOR TURNS COUNTER CLOCKWISE, LEFT BOOST MOTOR TURNS CLOCKWISE

## Component Location (2800ST, 3400ST)

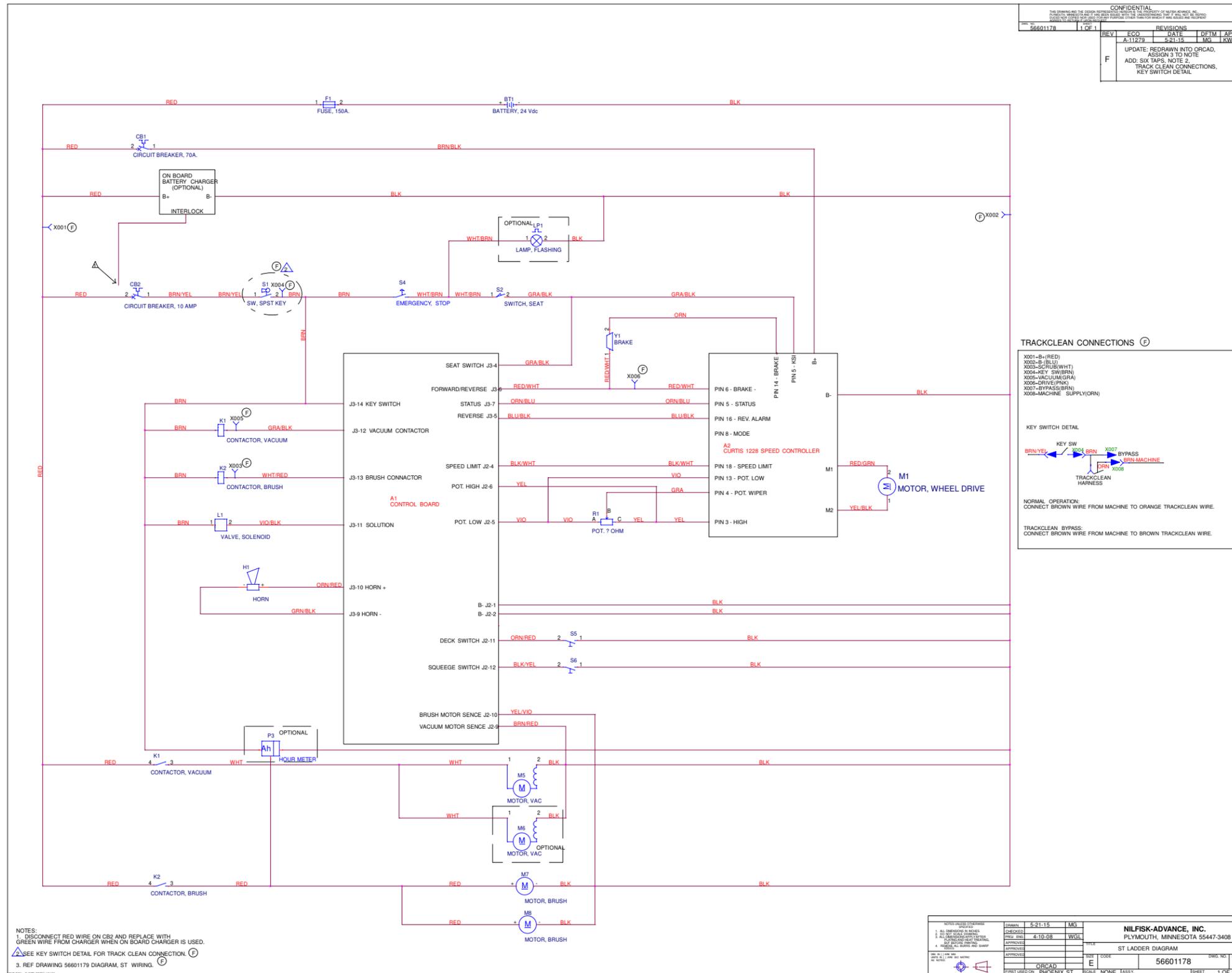
### COMPONENT LOCATION (2800ST, 3400ST)

| Item | Description                |
|------|----------------------------|
| A1   | Control PCB Assy           |
| A2   | Controller, Speed          |
| F1   | Fuse 150 Amp               |
| CB1  | Circuit Breaker, 70 Amp    |
| CB2  | Circuit Breaker, 10 Amp    |
| H1   | Beacon, Warning (optional) |
| H2   | Horn/Backup Alarm          |
| K1   | Contact, Vacuum Motor      |
| K2   | Contact, Brush Motor       |
| L1   | Solenoid Valve             |
| M1   | Motor / Drive Wheel        |
| M5   | Motor, Vacuum              |
| M6   | Motor, Vacuum (Optional)   |
| M7   | Motor, Brush               |
| M8   | Motor, Brush               |
| R1   | Potentiometer, 5K          |
| S1   | Switch, Key                |
| S2   | Switch, Seat               |
| S4   | Emergency Disconnect       |
| S5   | Deck Switch                |
| S6   | Squeegee Switch            |
| Y1   | Electromagnetic Brake      |



ELECTRICAL SYSTEM

WIRING DIAGRAM / SCHEMATIC (2800ST, 3400ST)

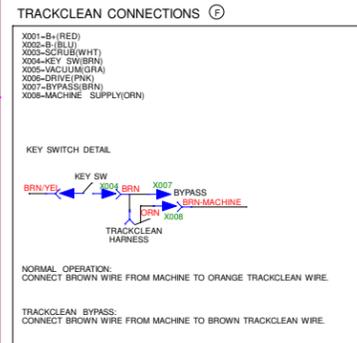


CONFIDENTIAL

| REV | ECO   | DATE    | BY | APPD |
|-----|-------|---------|----|------|
| A   | 11279 | 5-21-15 | MS | KWK  |
| F   |       |         |    |      |

UPDATE: REDRAWN INTO ORCAD. ASSIGN 3 TO NOTE. ADD: SIX TAPS, NOTE 2. TRACK CLEAN CONNECTIONS, KEY SWITCH DETAIL.

| Item | Ref. No.   | Qty | Description                         |
|------|------------|-----|-------------------------------------|
| A1   | 56601566   | 1   | Control PCB Assy                    |
| A2   | 56601061   | 1   | Speed Control                       |
| BAT  | N/A        |     | Battery                             |
| F1   | 56412089   | 1   | Fuse, 150 Amp                       |
| CB1  | 56454429   | 1   | Circuit Breaker, 70 Amp             |
| CB2  | 56507644   | 1   | Circuit Breaker, 10 Amp             |
| H1   | 56307166   | 1   | Beacon, Warning (optional)          |
| H2   | 56412177   | 1   | Horn/Backup Alarm                   |
| K1   | 56601183   | 1   | Contactora 24v, 100 Amp             |
| K2   | 56412179   | 1   | Contactora 24v                      |
| L1   | 56601064   | 1   | Solenoid Valve Assy                 |
| M1   | 56601050   | 1   | Motor / Drive Wheel                 |
| M5   | 56601132   | 1   | Motor, Vac 24vdc                    |
| M6   | 56601132   | 1   | Motor, Vac 24vdc (optional)         |
| M7   | 56601134   | 2   | Motor Gearbox Assy                  |
| M8   | 56601134   | 2   | Motor Gearbox Assy                  |
| R1   | N/A        | 1   | Part of 56601052                    |
| S1   | 56303553   | 1   | Key Switch                          |
| *    | 56303526   | A/R | Replacement Key Set                 |
| S2   | 7-82-00050 | 1   | Squeegee Switch                     |
| S4   | 56407130   | 1   | Disconnect, Emergency               |
| S5   | 56305053   | 1   | Deck Switch                         |
| S6   | 56601160   | 1   | Squeegee Switch                     |
| Y1   | 56601507   | 1   | Brake, Electromagnetic              |
|      | 56315124   | 1   | Charger, On-Board 24v TSBUS2008-984 |



NOTES:  
1. DISCONNECT RED WIRE ON CB2 AND REPLACE WITH GREEN WIRE FROM CHARGER WHEN ON BOARD CHARGER IS USED.  
2. SEE KEY SWITCH DETAIL FOR TRACK CLEAN CONNECTION. (E)  
3. REF DRAWING 56601179 DIAGRAM, ST WIRING. (E)

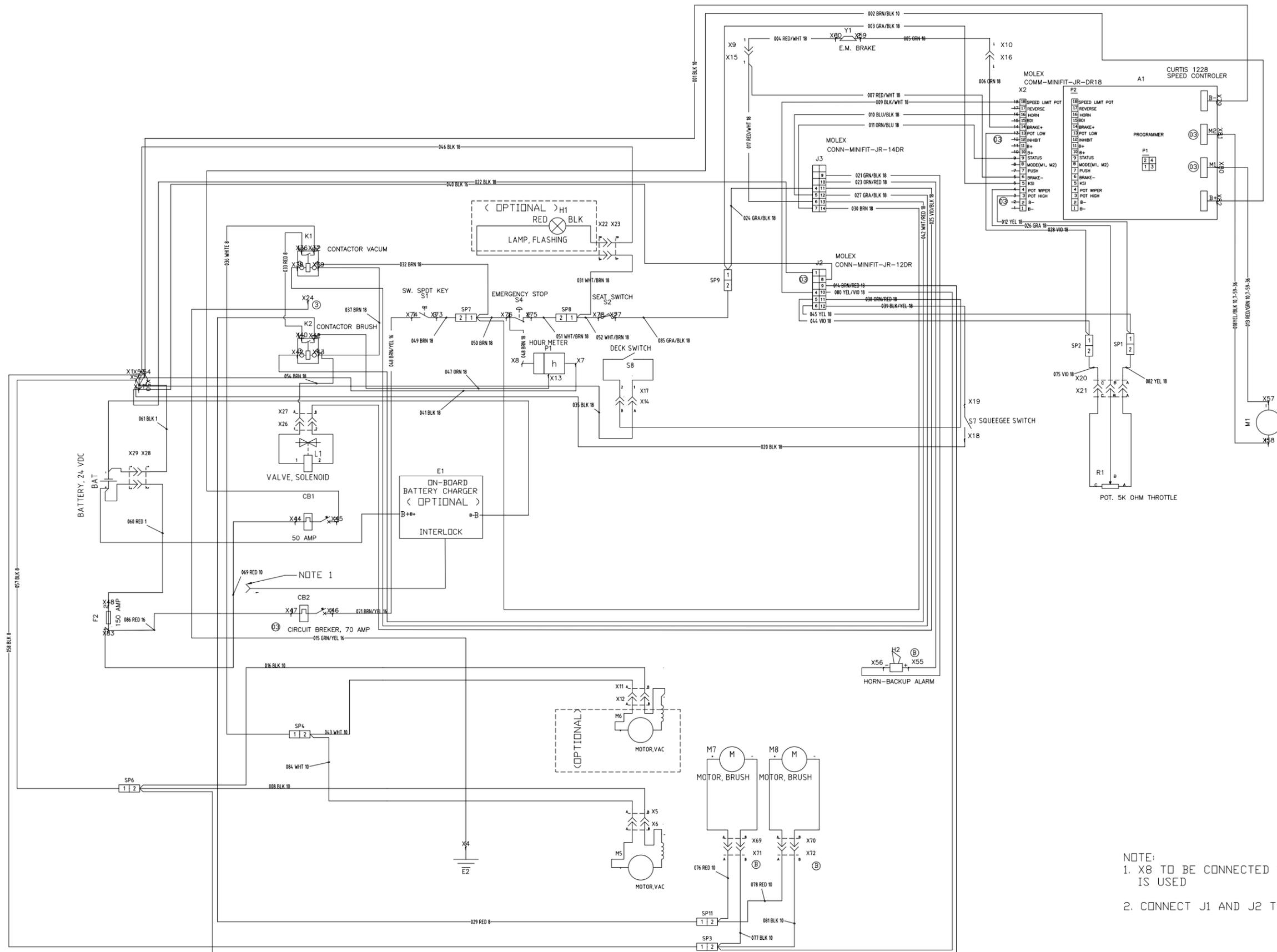
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|----------|---------|----|--|
| DATE     | 5-21-15 | MS |  |
| DESIGNED | WEL     |    |  |
| CHKD     | WEL     |    |  |
| APPD     |         |    |  |
| DATE     | 5-21-15 | MS |  |
| DESIGNED | WEL     |    |  |
| CHKD     | WEL     |    |  |
| APPD     |         |    |  |
| DATE     | 5-21-15 | MS |  |
| DESIGNED | WEL     |    |  |
| CHKD     | WEL     |    |  |
| APPD     |         |    |  |

NILFISK-ADVANCE, INC.  
PLYMOUTH, MINNESOTA 55447-3408

ST LADDER DIAGRAM

ORCAD  
FIRST USED ON: PROCEVA, ST  
SCALE: NONE  
SHEET: 1 OF 1

# ELECTRICAL SYSTEM



NOTE:  
 1. X8 TO BE CONNECTED WHEN BATTERY ROLLOUT OPTION IS USED  
 2. CONNECT J1 AND J2 TO CONTROL BOARD

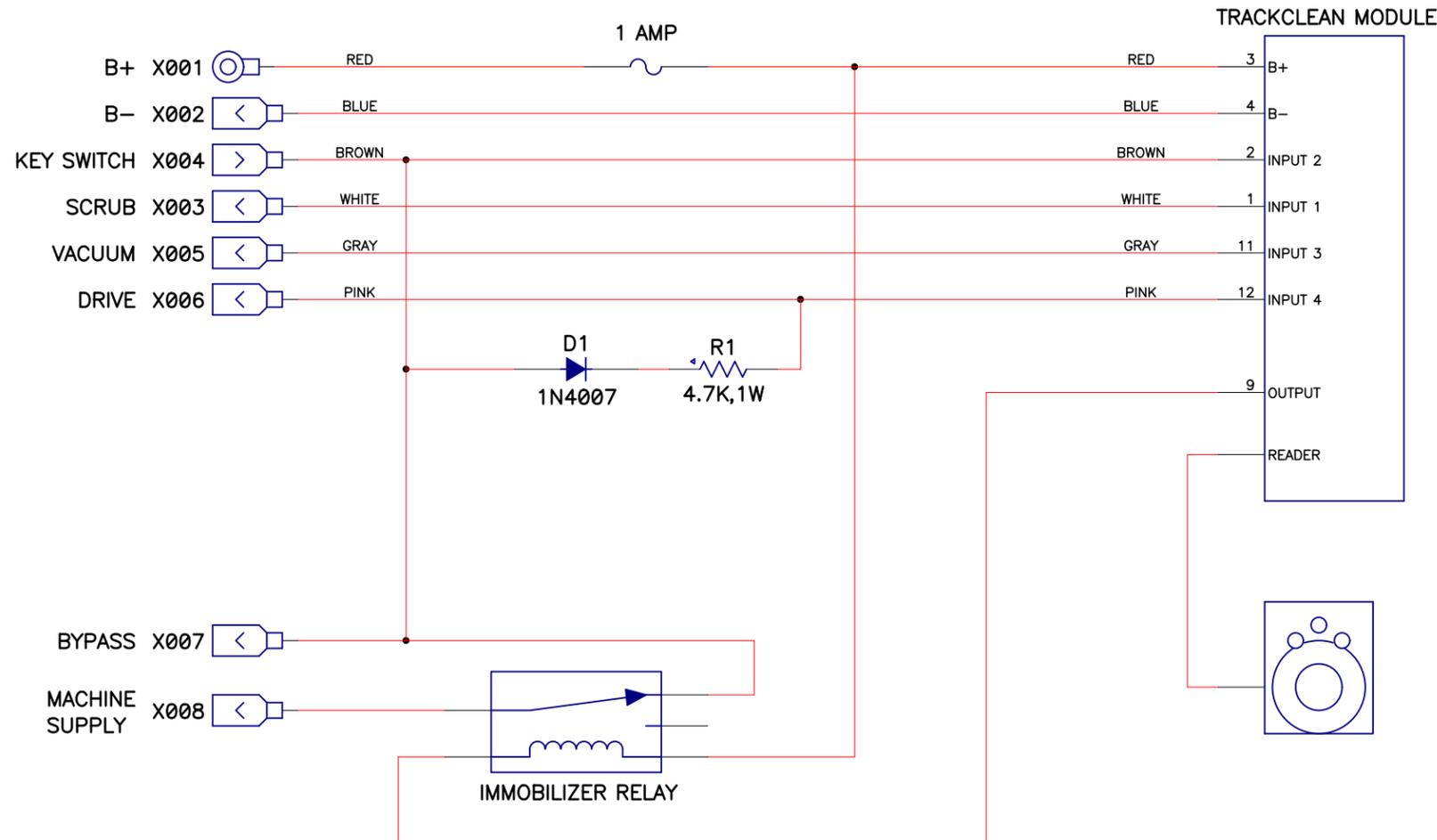
Track Clean Circuits With Access Control

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DWG # 56384529

| REVISIONS |         |         |      |      |
|-----------|---------|---------|------|------|
| REV       | ECO     | DATE    | DFTM | APPD |
| A         | A-11279 | 5-15-15 | KWK  | DZI  |
| RELEASE   |         |         |      |      |



NOTES:

1. TO BYPASS IMMOBILIZER, DISCONNECT MACHINE WIRE (ORANGE) FROM X008 AND CONNECT TO X007.

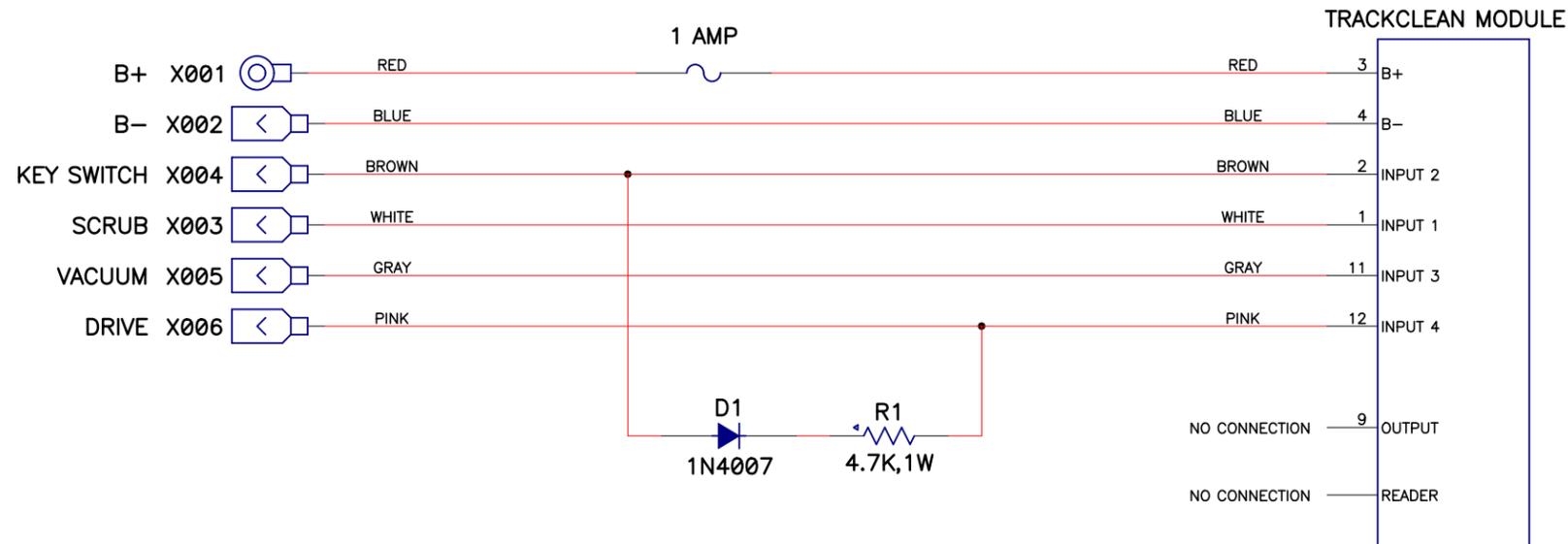
|               |         |     |                                |                |          |
|---------------|---------|-----|--------------------------------|----------------|----------|
| DRAWN         | 5-15-15 | KWK | NILFISK-ADVANCE, INC.          |                |          |
| CHECKED       |         |     | PLYMOUTH, MINNESOTA 55447-3408 |                |          |
| PROJ ENG      |         |     | SPRINGDALE, AR 72764           |                |          |
| APPROVED      |         |     | TITLE                          |                |          |
| APPROVED      |         |     | SCHEMATIC-W/RDR-ADVANGER TC    |                |          |
| FILENAME:     |         |     | SIZE                           | CODE           | DWG NO   |
| FIRST USED ON |         |     | B                              |                | 56384529 |
| ADVANGER      |         |     | SCALE:                         | ASSY: 56384518 | REV A    |
|               |         |     | SHEET: 1 OF 1                  |                |          |

**Track Clean Circuits Without Access Control**

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DWG # 56384530

| REVISIONS |         |         |      |      |
|-----------|---------|---------|------|------|
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| A         | A-11279 | 5-15-15 | KWK  | DZI  |
| RELEASE   |         |         |      |      |



|               |         |     |                                      |                |               |
|---------------|---------|-----|--------------------------------------|----------------|---------------|
| DRAWN         | 5-15-15 | KWK | <b>NILFISK-ADVANCE, INC.</b>         |                |               |
| CHECKED       |         |     | PLYMOUTH, MINNESOTA 55447-3408       |                |               |
| PROJ ENG      |         |     | SPRINGDALE, AR 72764                 |                |               |
| APPROVED      |         |     | TITLE                                |                |               |
| APPROVED      |         |     | <b>SCHEMATIC-W/O RDR-ADVENGER TC</b> |                |               |
| FILENAME:     |         |     | SIZE                                 | CODE           | DWG NO        |
| FIRST USED ON |         |     | B                                    |                | 56384530      |
| ADVENGER      |         |     | SCALE:                               | ASSY: 56384519 | REV A         |
|               |         |     |                                      |                | SHEET: 1 OF 1 |