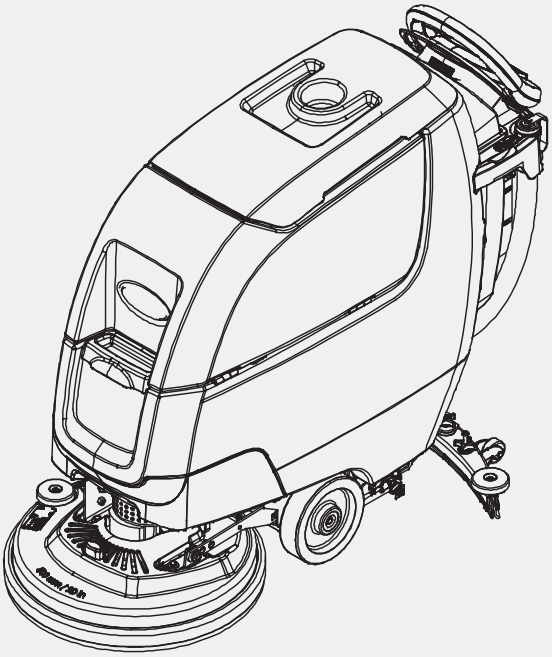
T300
T300e

Automatic Floor Scrubber

English EN
Service Manual



Hygenic ® Fully cleanable Recovery Tank
Tennant*True ® Parts*
IRIS ® a Tennant Technology

ec H2O® NanoClean

For the latest Parts Manuals and other language Operator Manuals, visit:

www.tennantco.com/manuals

9014510
Rev. 02 (10-2023)

INTRODUCTION

This manual is available for each new model. It provides necessary operation and maintenance instructions.

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

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

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

PROTECT THE ENVIRONMENT

Please dispose of packaging materials and used machine components such as batteries in an environmentally safe way according to your local waste disposal regulations.

Always remember to recycle.

Tennant Company
10400 Clean Street
Eden Prairie, MN 55344-2650
Phone: (800) 553- 8033 or (763) 513- 2850
www.tennantco.com

INTENDED USE

The automatic floor scrubber is intended for commercial use, for example in hotels, schools, hospitals, factories, shops, offices and rental businesses. It is designed to scrub hard floor surfaces (concrete, tile, stone, synthetic, etc.) in an indoor environment. Do not use this machine on carpeted surfaces. Use only recommended pads/brushes and commercially available floor cleaning detergents. Do not use this machine other than described in this Operator Manual.

MACHINE DATA

Please fill out at time of installation for future reference.

Model No. - _____

Serial No. - _____

Installation Date - _____

SERIAL NUMBER LOCATION

UNCRATING MACHINE

Carefully check machine for signs of damage. Report damages at once to carrier. Contact distributor or Tennant for missing items.

To uncrate the machine, remove straps, wheel blocks and shipping brackets. Using the supplied ramp carefully back the machine off the pallet. Make sure scrub head is in the raised position.

ATTENTION: Do not remove machine from pallet without using ramp, machine damage may occur.

CONTENTS

CONTENTS

SAFETY PRECAUTIONS

IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

The following warning precautions are used throughout this manual as indicated in their description:

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

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

The following information signals potentially dangerous conditions to the operator. Know when these conditions can exist. Locate all safety devices on the machine. Report machine damage or faulty operation immediately.

⚠ WARNING: To Reduce the Risk of Fire, Explosion, Electric Shock or Injury:

- **Read manual before operating machine.**
- **Do not use or pick up flammable materials.**
- **Do not use near flammable liquids, vapors or combustible dusts.**

  This machine is not equipped with an explosion proof motor. The electric motor will spark upon start up and during operation which could cause a flash fire or explosion if machine is used in an area where flammable vapors/liquids or combustible dusts are present.
- **Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away when charging.**
- **Disconnect battery cables and charger cord before cleaning and servicing machine.**
- **Do not charge batteries with damaged cord. Do not modify plug.**

  If the charger supply cord is damaged or broken, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard.
- **Do not use outdoors. Store indoors.**
- **Spinning pad/brush, keep hands away.**

⚠ WARNING: Magnetic Field Hazard. Magnetic pad driver/brush can be harmful to pacemaker wearers or medical implants.

This machine may be equipped with technology that automatically communicates over the cellular network. If the machine will be operated where cell phone use is restricted because of concerns related to equipment interference, please contact a Tennant representative for information on how to disable the cellular communication functionality.

FOR SAFETY:

1. **Do not operate machine:**
   - **Unless trained and authorized.**
   - **Unless operator manual is read and understood.**
   - **Unless mentally and physically capable of following machine instructions.**
   - **Under the influence of alcohol or drugs.**
   - **While using a cell phone or other types of electronic devices.**
   - **If not in proper operating condition.**
   - **In outdoor areas. This machine is for indoor use only.**
   - **In areas where flammable vapors/liquids or combustible dusts are present.**
   - **With pads or accessories not supplied or approved by Tennant. The use of other pads may impair safety.**
   - **In areas with possible falling objects.**
   - **In areas that are too dark to safely see the controls or operate machine.**
2. **Before operating machine:**
   - **Check machine for fluid leaks.**
   - **Make sure all safety devices are in place and operate properly.**
3. **When operating machine:**
   - **Use only as described in this manual.**
   - **Report machine damage or faulty operation immediately.**
   - **Wear closed-toe, non-slip work shoes.**
   - **Reduce speed when turning.**
   - **Go slowly on inclines and slippery surfaces.**
   - **Do not scrub on inclines that exceed 9% grade or transport on inclines that exceed 21% grade.**
   - **Follow site safety guidelines concerning wet floors.**
   - **Follow mixing, handling and disposal instructions on chemical containers.**
   - **Do not carry passengers on machine.**
   - **Use care when reversing machine.**
   - **Keep children and unauthorized persons away from machine.**
   - **Do not allow machine to be used as a toy.**

4. **Before leaving or servicing machine:**
   - **Stop on level surface.**
   - **Set the parking brake, if equipped.**
   - **Turn off machine and remove key.**
5. **When servicing machine:**
   - **Disconnect battery connection and charger cord before working on machine.**
   - **All work must be done with sufficient lighting and visibility.**
   - **All repairs must be performed by trained personnel.**
   - **Use Tennant supplied or approved replacement parts.**
   - **Do not modify the machine from its original design.**
   - **Do not jack up machine.**
   - **Avoid moving parts. Do not wear loose clothing or jewelry and secure long hair.**
   - **Do not disconnect the off-board charger's DC cord from the machine's receptacle when the charger is operating. Arcing may result. If the charger must be interrupted during charging cycle, disconnect the AC power supply cord first.**
   - **Do not use incompatible battery chargers as this may damage battery packs and potentially cause a fire hazard.**
   - **Inspect charger cord regularly for damage.**
   - **Keep work area well ventilated.**
   - **Avoid contact with battery acid.**
   - **Keep all metal objects off batteries.**
   - **Do not power spray or hose off machine.**
   - **Use a hoist or adequate assistance when lifting batteries.**
   - **Battery installation must be done by trained personnel.**
   - **Wear personal protection equipment as needed and where recommended in this manual.**

For Safety: wear protective gloves.

For Safety: wear eye protection.

6. **When loading/unloading machine onto/off truck or trailer:**
   - **Drain tanks before loading machine.**
   - **Use a ramp, truck or trailer that can support the machine weight and operator.**
   - **Do not operate the machine on a ramp incline that exceeds a 21% grade level.**
   - **Use a winch if ramp incline exceeds a 21% grade level.**
   - **Lower the scrub head and squeegee before tying down machine.**
   - **Turn machine off and remove key.**
   - **Set parking brake (if equipped).**
   - **Block machine wheels.**
   - **Use tie-down straps to secure machine.**

SAFETY LABELS

The safety labels appear on the machine in the locations indicated. Replace labels if they are missing or becom damaged or illegible.

WARNING LABEL - Located on recovery tank cover.

WARNING LABEL -
Spinning pad. Keep hands away.

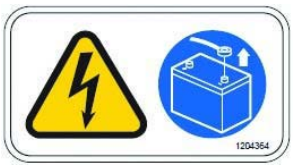
Located on disk scrub head model.

WARNING LABEL -
Spinning brush. Keep hands away.

Located on cylindrical scrub head model.

WARNING LABEL -
Magnetic Field Hazard. Magnetic pad driver/brush can be harmful to pacemaker wearers or medical implants.

Located on Insta-Click magnetic pad driver/brush.



WARNING LABEL -
Electrical hazard. Disconnect battery cables before servicing machine.

Located on circuit breaker panel.

FOR SAFETY LABEL
Do not power spray hose off machine. Electrical malfunctio may occur.

Located on control cor

WARNING LABEL -
Batteries emit hydrogen gas. Explosion or fire car result. Keep sparks and open flame away when charging.

Located on bottom sid of recovery tank.

WARNING LABEL - Flammable materials or reactive metals can cause an explosion or fire. Do not pick up.

Located near control console.

FOR SAFETY LABEL - Read manual before operating machine.

Located near control console.

FOR SAFETY LABEL - Do not power spray or hose off machine. Electrical malfunction may occur.

Located on control console

WARNING LABEL - Flammable materials can cause explosion or fire. Do not use flammable materials in tank(s).

Located on backside of solution tank cover.

WARNING LABEL - Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away when charging.

Located on control console and bottom side of recovery tank.

WARNING LABEL - Spinning pad. Keep hands away.

Located on disk scrub head model.

WARNING LABEL - Do not charge batteries with damaged cord. Electric shock can result. Disconnect charger cord before servicing.

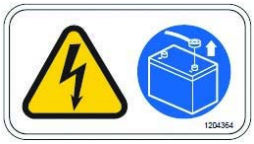
Located on control console.

WARNING LABEL - Spinning brush. Keep hands away.

Located on cylindrical scrub head model.

WARNING LABEL - Magnetic field hazard. Magnetic pad driver/brush can be harmful to pacemaker wearers or medical implants.

Located on Insta-Click magnetic pad driver/brush.

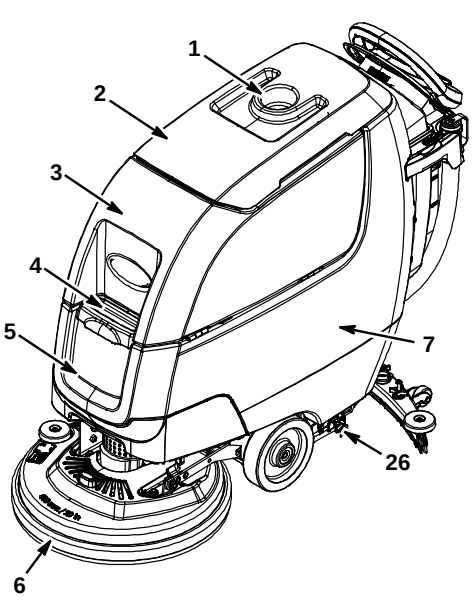


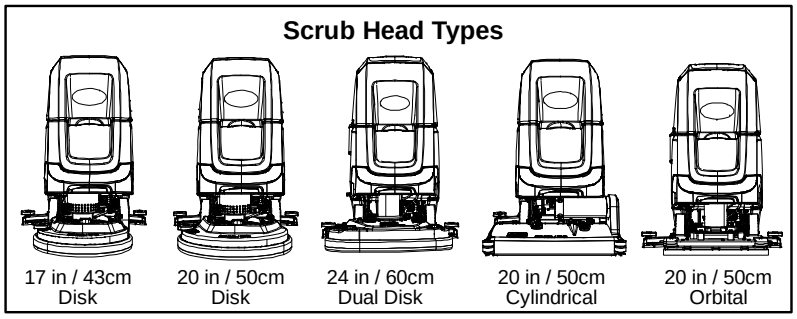
WARNING LABEL - Electrical Hazard. Disconnect battery cables before servicing machine.

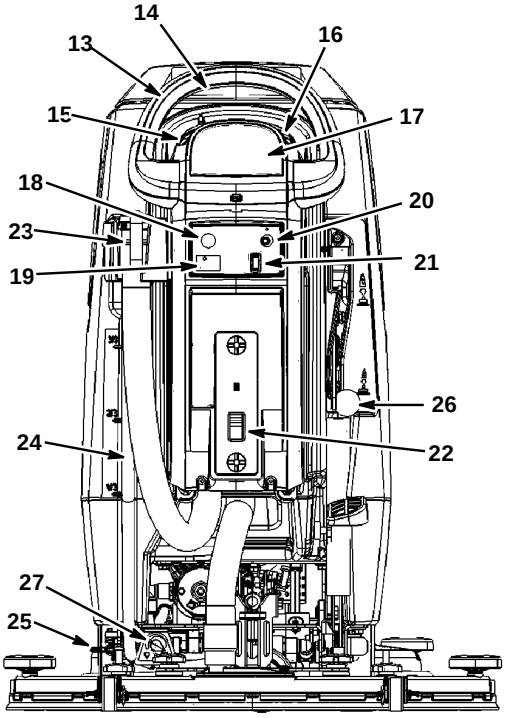
Located on circuit board panel.

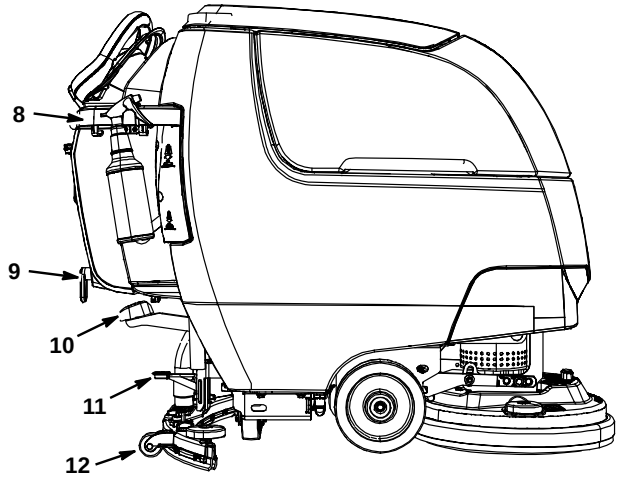
GENERAL INFORMATION

MACHINE COMPONENTS



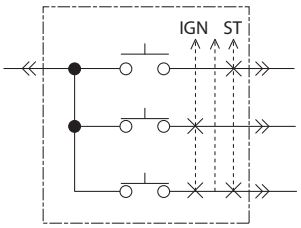




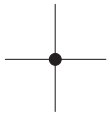


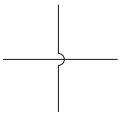
1. Cup holder/tray
2. Recovery tank lid
3. Recovery tank
4. Solution tank fill-port
5. Solution tank
6. Scrub head
7. Battery compartment
8. Accessory rail(s)
9. On-board battery charger cord hooks
10. Scrub head lift pedal
11. Squeegee foot pad
12. Squeegee assembly
13. Control handle
14. Control handle start bail
15. Speed control knob (drive model)
16. Forward/Reverse lever (drive model)
17. Control panel display
18. Emergency stop button
19. Hour meter
20. Key switch
21. ec-H2O on/off switch (option)
22. Off-board battery charger receptacle
23. Recovery tank drain hose
24. Solution tank level/drain hose
25. Parking brake
26. Dual down pressure lever (T300e option)
27. Solution flow control knob (T300e)

ELECTRICAL SCHEMATIC SYMBOLS



Key Switch


Connected


Not Connected


Connector

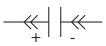

Energized


Adaptor Harness


Notes


Assembly


AC Plug

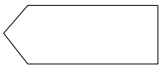

Capacitor


Battery

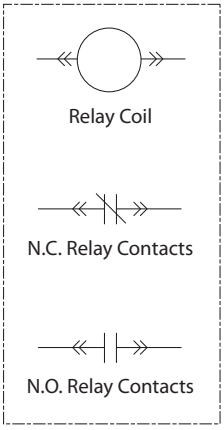

Circuit Breaker

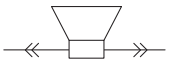

Fuse

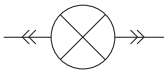

Diode

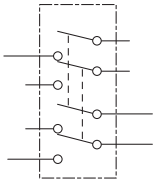

Single Continuation Tab

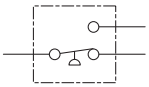

Double Continuation Tab

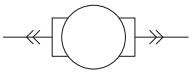


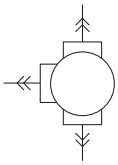

Horn or Alarm

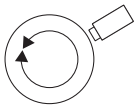

Light


DPDT Switch


Pressure Switch


Motor


3 Phase AC
Induction Motor


Motor Encoder

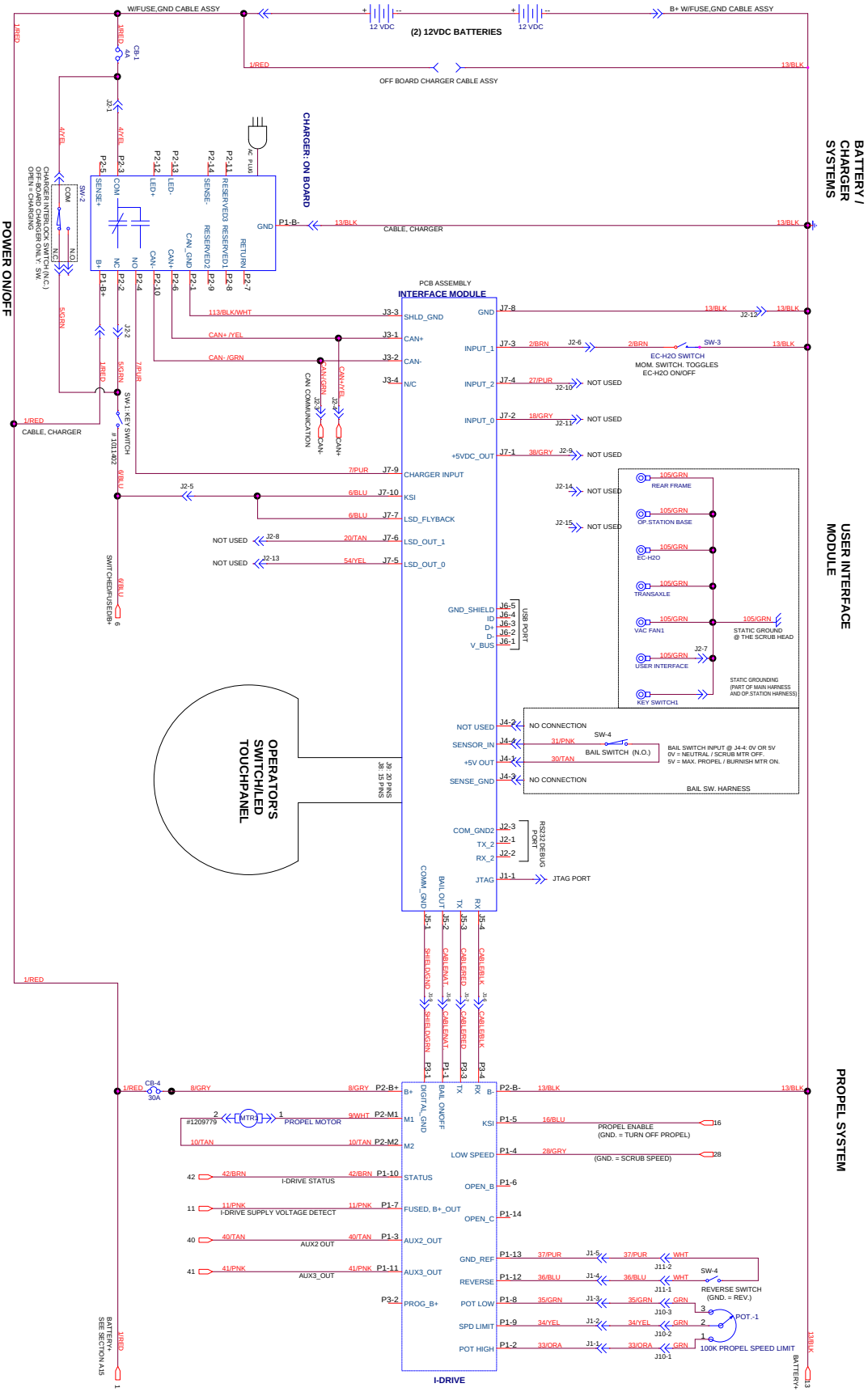

Sensor
(Variable Resistor)


Momenary Switch N.O.

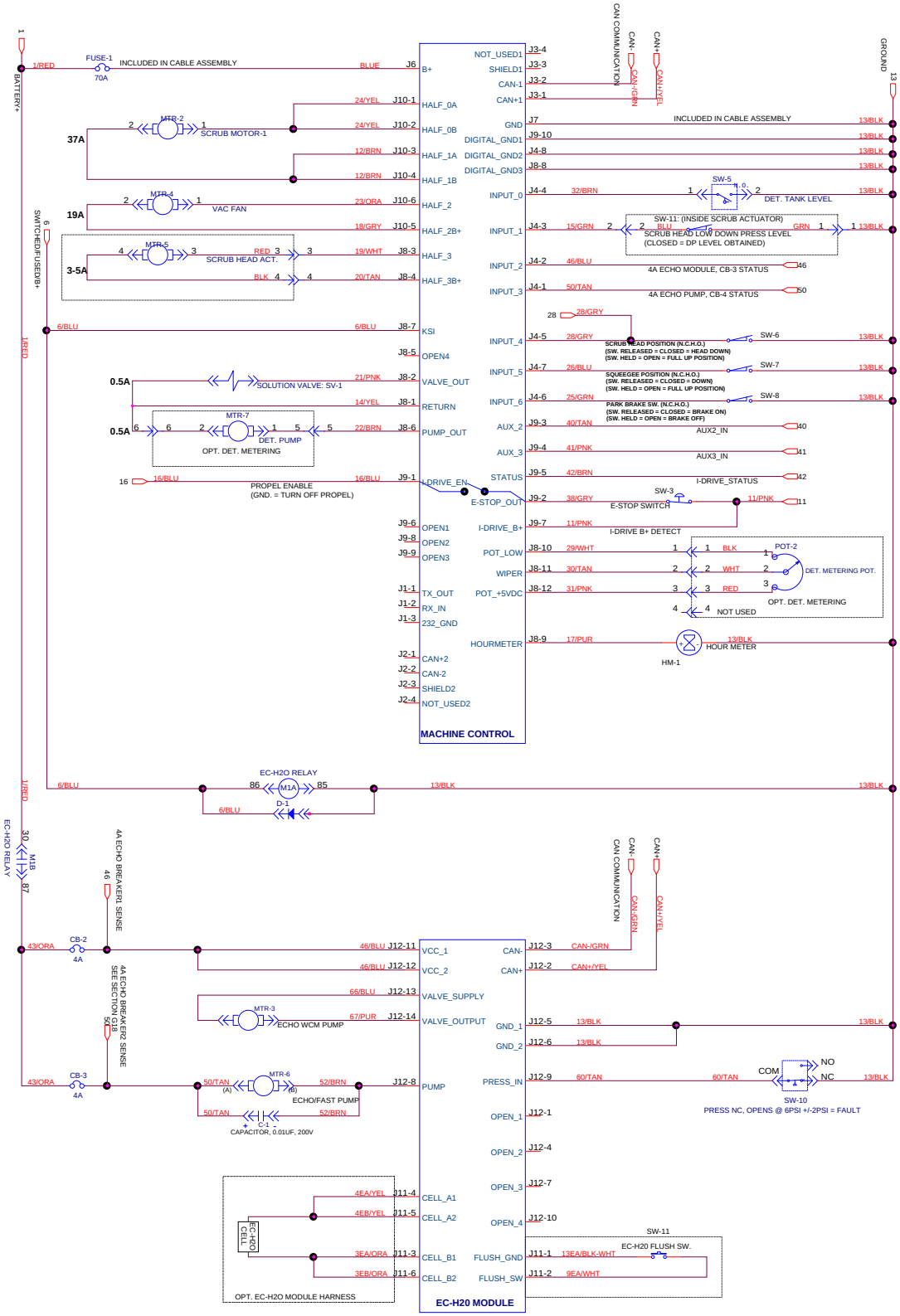

Contact Switch N.C.


Solenoid Valve

ELECTRICAL SCHEMATIC T300 (DRIVE MODEL) - 1 of 3

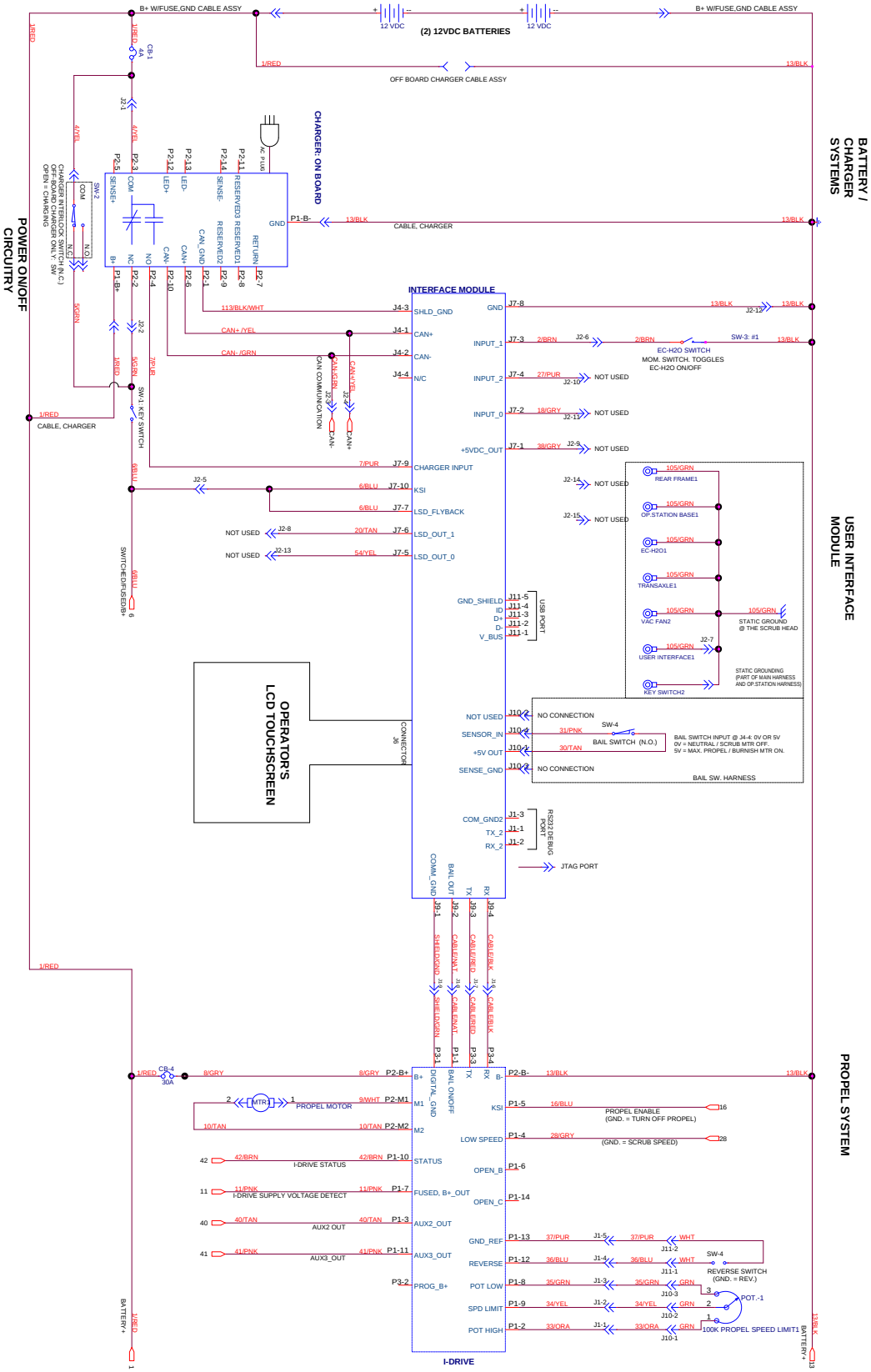


ELECTRICAL SCHEMATIC T300 (DRIVE MODEL) - 2 of 3

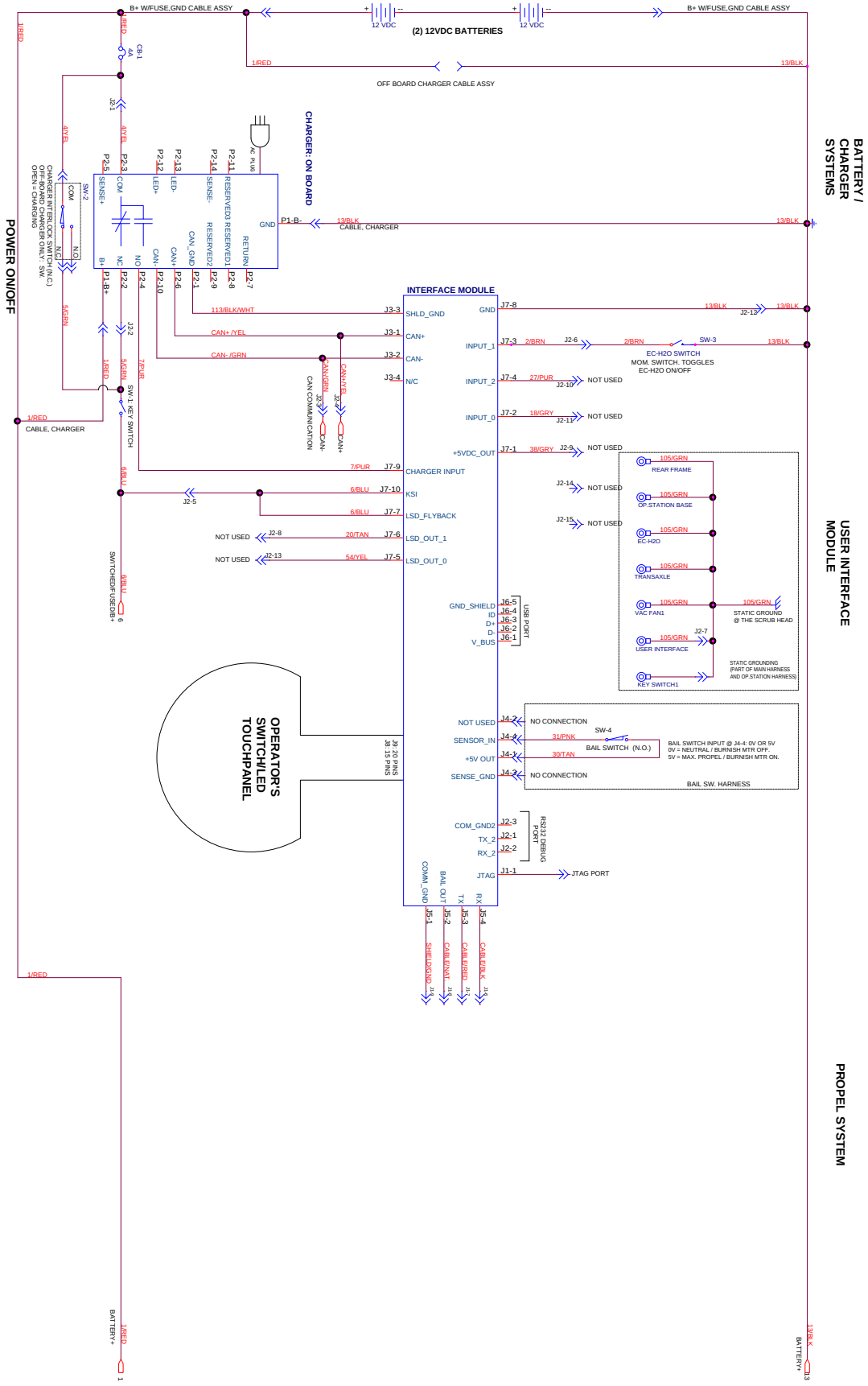


ELECTRICAL SCHEMATIC T300 (DRIVE MODEL) - 3 of 3

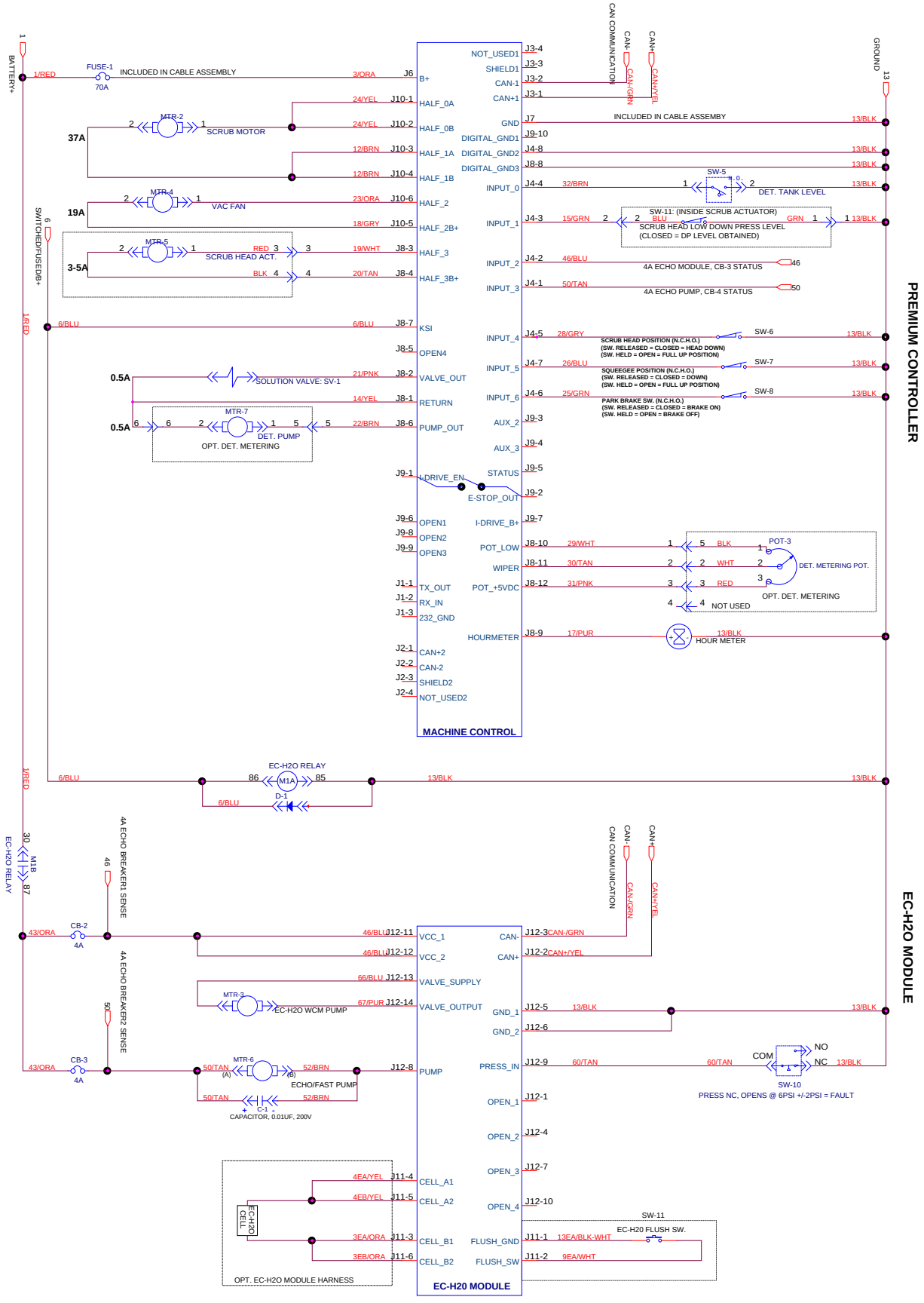
PAGE 3 = PAGE 1 WITH
OPTIONAL LCD TOUCHSCREEN.



ELECTRICAL SCHEMATIC T300 (PUSH MODEL) - 1 of 3

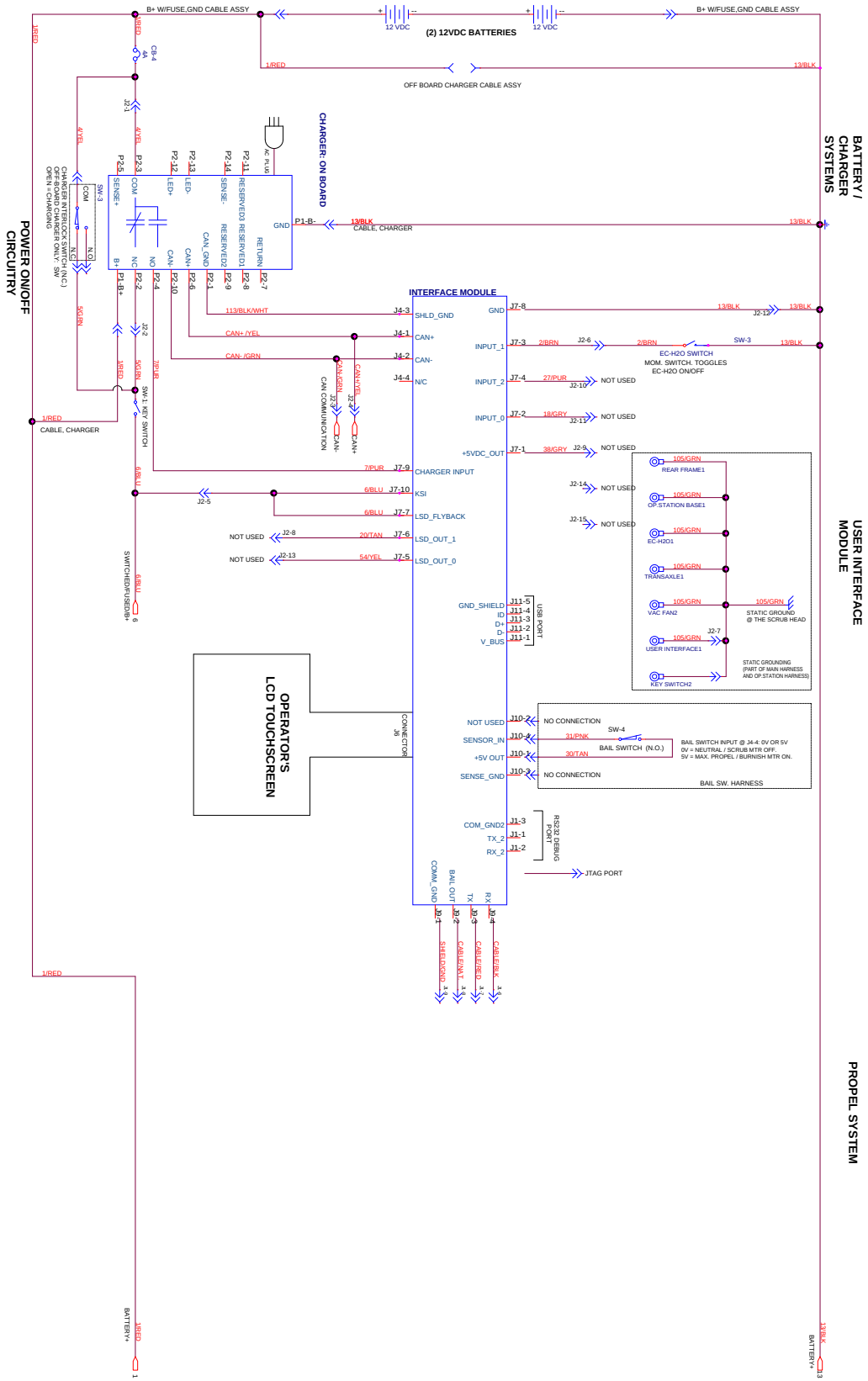


ELECTRICAL SCHEMATIC T300 (PUSH MODEL) - 2 of 3

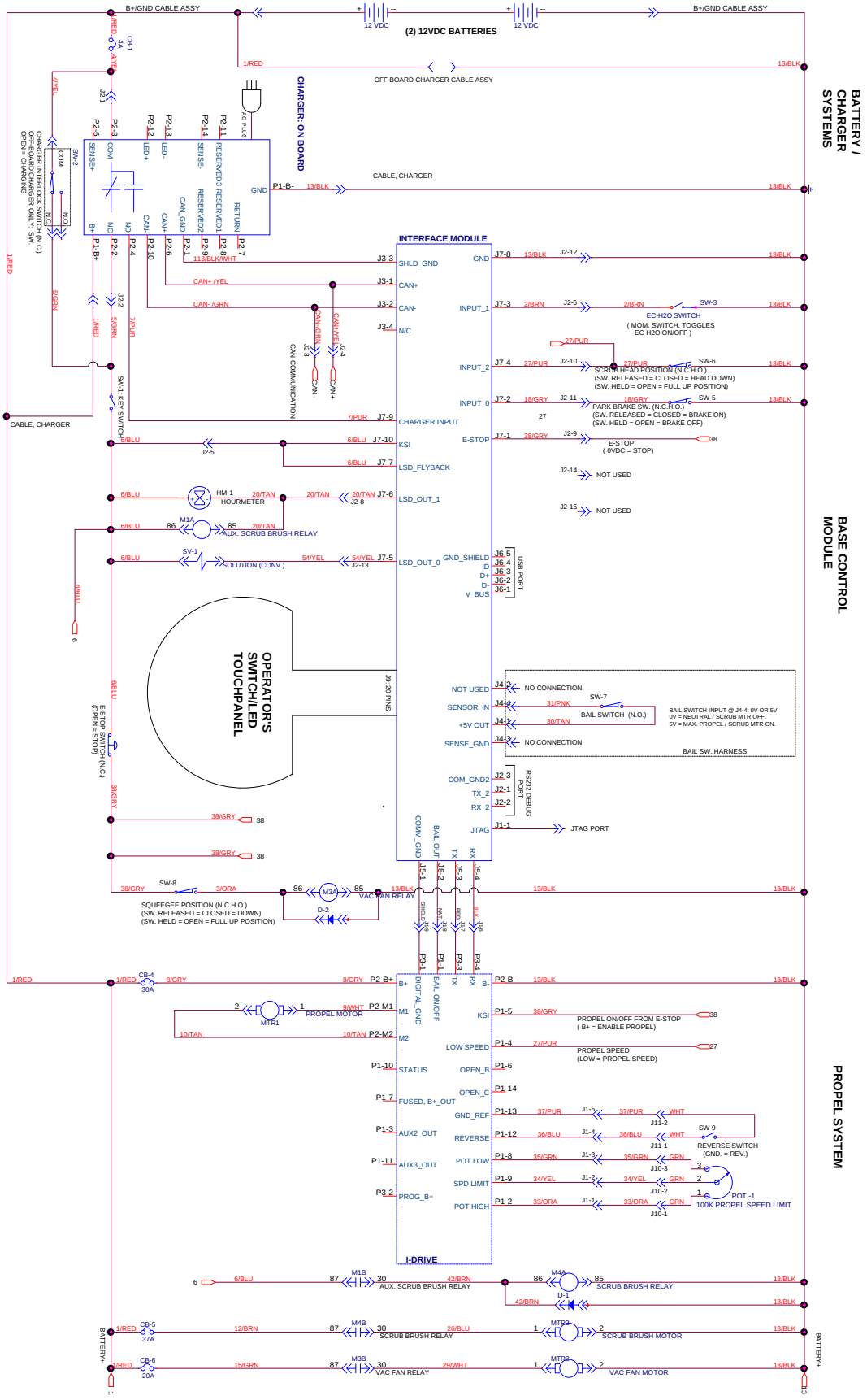


ELECTRICAL SCHEMATIC T300 (PUSH MODEL) - 3 of 3

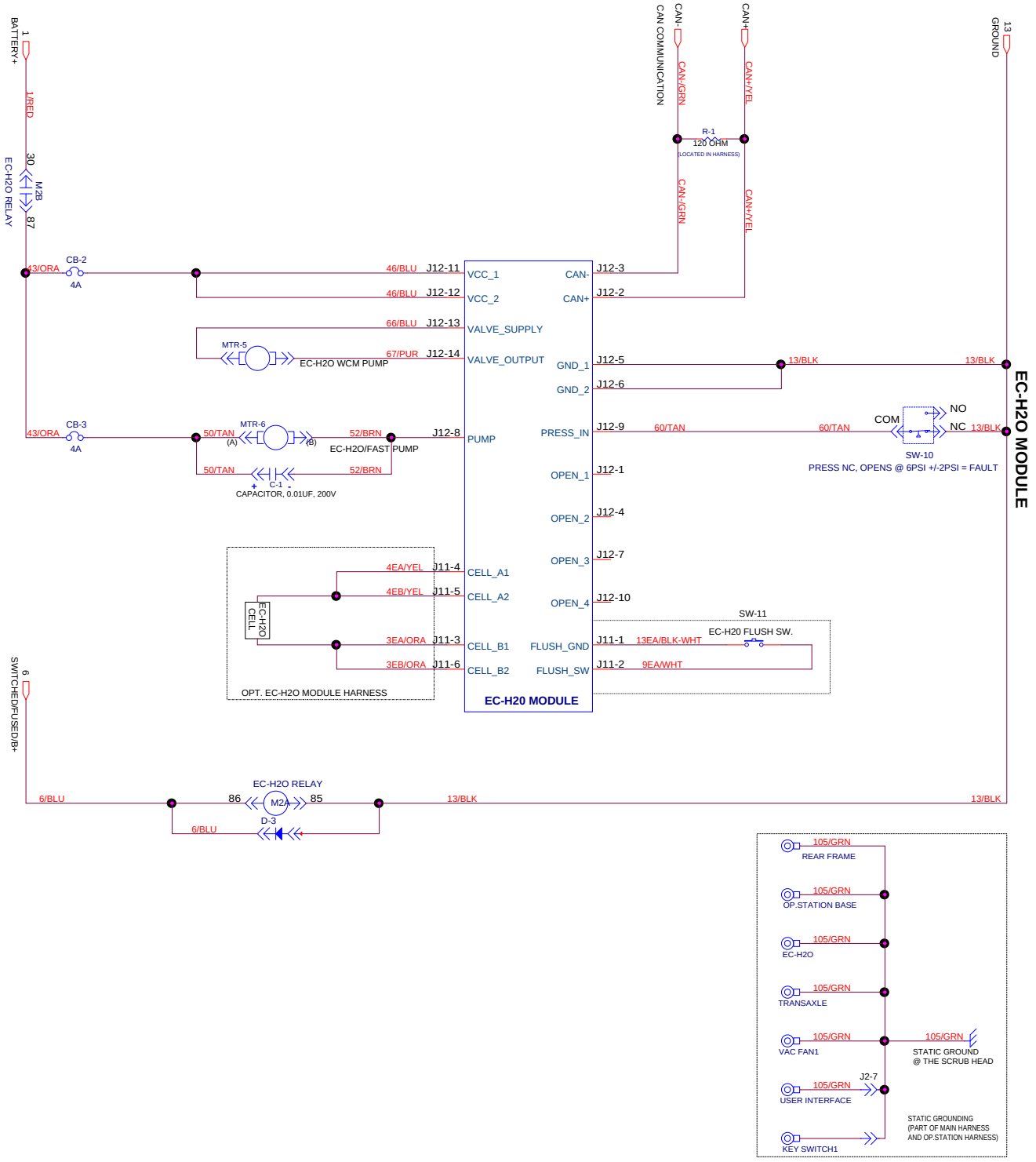
PAGE 3 = PAGE 1 WITH
OPTIONAL LCD TOUCHSCREEN.



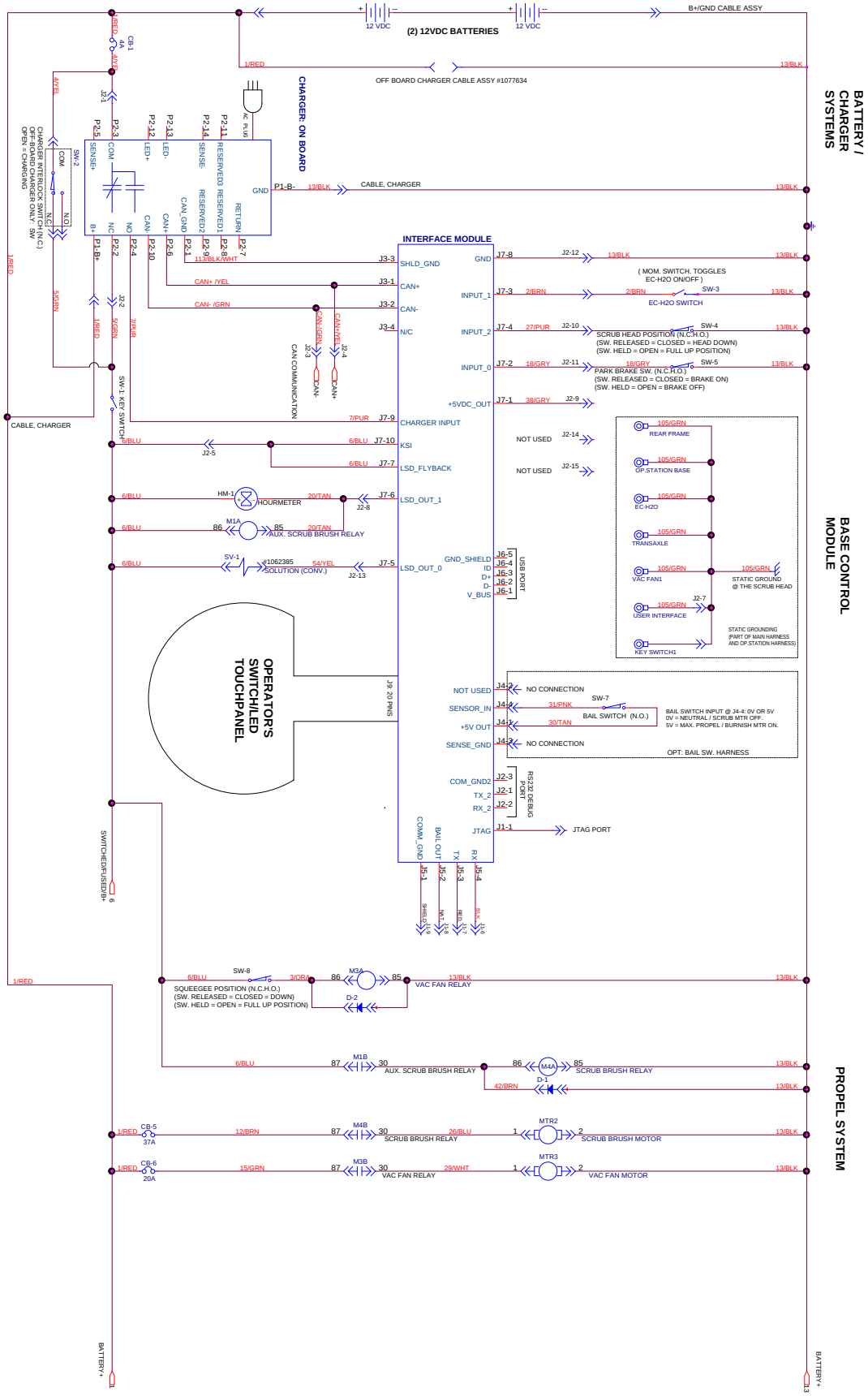
ELECTRICAL SCHEMATIC T300e (DRIVE MODEL) - 1 of 2



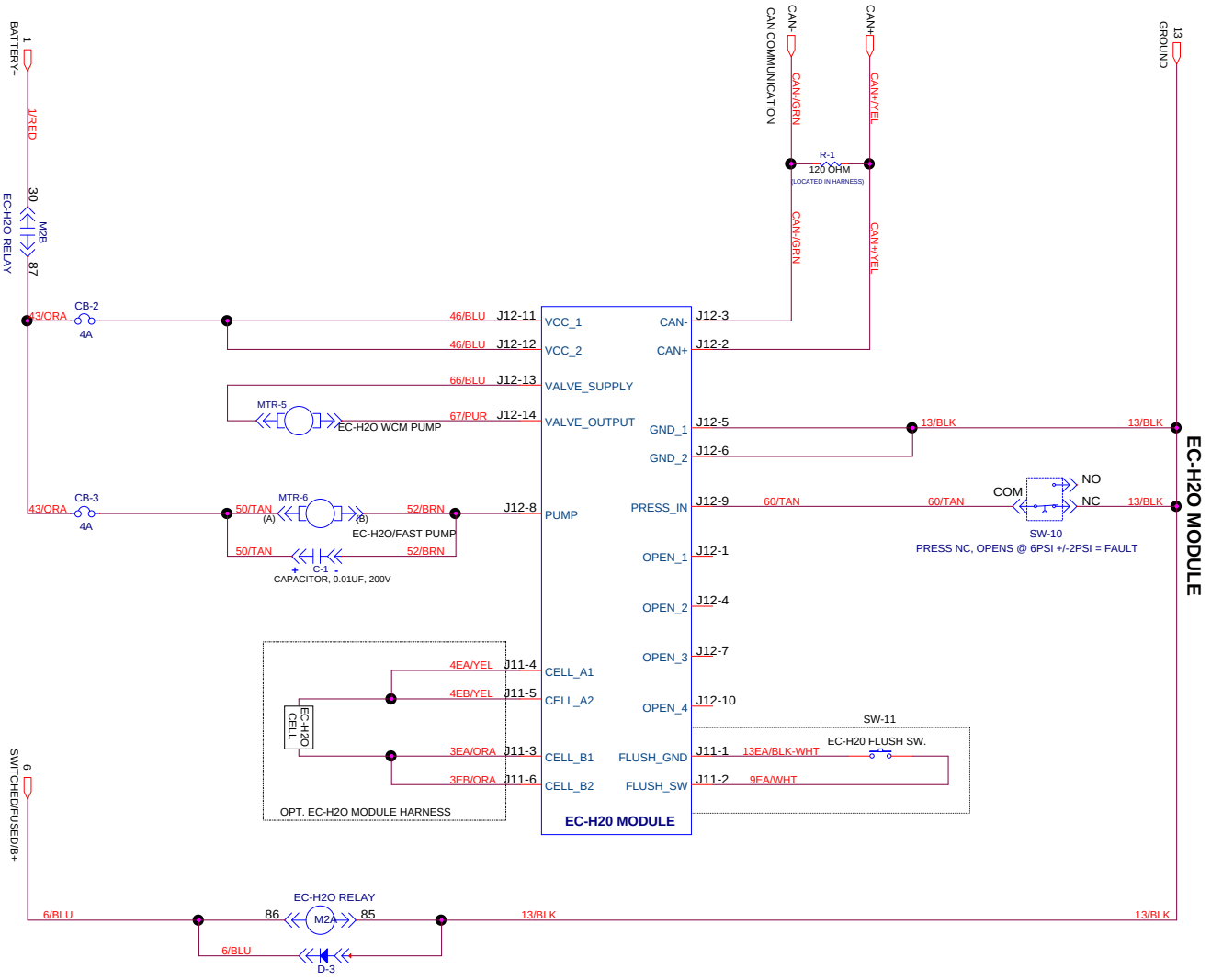
ELECTRICAL SCHEMATIC T300e (DRIVE MODEL) - 2 of 2



ELECTRICAL SCHEMATIC T300e (PUSH MODEL) - 1 of 2



ELECTRICAL SCHEMATIC T300e (PUSH MODEL) - 2 of 2



OPERATIONAL MATRIX

FUNCTION	ENABLED	DISABLED
Vacuum Fan	• Squeegee Lowered	• Squeegee Raised • Low Battery Voltage (Wet < 21.9 V, AGM < 22.7 V) • Fault • Battery Charger ON Interlock
Main Scrub Motor	• Head Lowered - Foot Pedal • Fwd/Rev Throttle Command or Bail activated on non-propel models.	• Head Raised - Foot Pedal • Neutral - Ready State or bail released on non-propel models. • Low Battery Voltage (Wet < 21.9 V, AGM < 22.7 V) • Fault • Battery Charger ON Interlock
Scrub Head Actuator (option)	• Head Lowered - Foot Pedal	• Head Raised - Foot Pedal • Low Battery Voltage (Wet < 21.9 V, AGM < 22.7 V) • Fault • Battery Charger ON Interlock
Propel (drive option)	• Fwd/Rev Throttle Command • Fwd/Rev Switch Input	• Neutral - Ready State • Propel Motor Controller Fault • Battery Charger ON Interlock
Solution Control (Conventional)	• Head Lowered - Foot Pedal • Solution Control ON • Fwd/Rev Throttle Command or Bail activated on non-propel models.	• Head Raised - Foot Pedal • Solution Control OFF • Neutral - Ready State or bail released on non-propel models. • Low Battery Voltage (Wet < 21.9 V, AGM < 22.7 V) • Fault • Battery Charger ON Interlock
Solution Control (ec-H2O NanoClean - option)	• Head Lowered - Foot Pedal • Solution Control ON • ecH2O Switch ON • Fwd/Rev Throttle Command or Bail activated on non-propel models.	• Head Raised - Foot Pedal • Solution Control OFF • ecH2O Switch OFF • Neutral - Ready State or bail released on non-propel models. • Low Battery Voltage (Wet < 21.9 V, AGM < 22.7 V) • ecH2O System Fault • Battery Charger ON Interlock
Severe Environment Detergent Pump	• Head Lowered - Foot Pedal • Severe Environment On (30 seconds or continuous) • Fwd/Rev Throttle Command or Bail activated on non-propel models. • Detergent Tank Not Empty	• Head Raised - Foot Pedal • Solution Control OFF • Neutral - Ready State or bail released on non-propel models. • Detergent Tank Empty • Low Battery Voltage (Wet < 21.9 V, AGM < 22.7 V) • Fault • Battery Charger ON Interlock

MOM001_1

FASTENER TORQUE

SAE (STANDARD)

Thread Size	SAE Grade 1	SAE Grade 2 Carriage Bolts	Thread Cutting Thread Rolling	SAE Grade 5 Socket & Stainless Steel	SAE Grade 8	Headless Socket Set Screws	Square Head Set Screws	
4 (.112)	(5) - (6.5)					(4) - (6)		Inch Pounds
5 (.125)	(6) - (8)					(9) - (11)		
6 (.138)	(7) - (9)		(20) - (24)			(9) - (11)		
8 (.164)	(12) - (16)		(40) - (47)			(17) - (23)		
10 (.190)	(20) - (26)		(50) - (60)			(31) - (41)		
1/4 (.250)	4 - 5	5 - 6	7 - 10	7 - 10	10 - 13	6 - 8	17 - 19	Foot Pounds
5/16 (.312)	7 - 9	9 - 12	15 - 20	15 - 20	20 - 26	13 - 15	32 - 38	
3/8 (.375)	13 - 17	16 - 21		27 - 35	36 - 47	22 - 26	65 - 75	
7/16 (.438)	20 - 26	26 - 34		43 - 56	53 - 76	33 - 39	106 - 124	
1/2 (.500)	27 - 35	39 - 51		65 - 85	89 - 116	48 - 56	162 - 188	
5/8 (.625)		80 - 104		130 - 170	171 - 265		228 - 383	
3/4 (.750)		129 - 168		215 - 280	313 - 407		592 - 688	
1 (1.000)		258 - 335		500 - 650	757 - 984		1281 - 1489	

METRIC

Thread Size	4.8/5.6	8.8 Stainless Steel	10.9	12.9	Set Screws
M3	43 - 56 Ncm	99 - 128 Ncm	139 - 180 Ncm	166 - 215 Ncm	61 - 79 Ncm
M4	99 - 128 Ncm	223 - 290 Ncm	316 - 410 Ncm	381 - 495 Ncm	219 - 285 Ncm
M5	193 - 250 Ncm	443 - 575 Ncm	624 - 810 Ncm	747 - 970 Ncm	427 - 554 Ncm
M6	3.3 - 4.3 Nm	7.6 - 9.9 Nm	10.8 - 14 Nm	12.7 - 16.5 Nm	7.5 - 9.8 Nm
M8	8.1 - 10.5 Nm	18.5 - 24 Nm	26.2 - 34 Nm	31 - 40 Nm	18.3 - 23.7 Nm
M10	16 - 21 Nm	37 - 48 Nm	52 - 67 Nm	63 - 81 Nm	
M12	28 - 36 Nm	64 - 83 Nm	90 - 117 Nm	108 - 140 Nm	
M14	45 - 58 Nm	102 - 132 Nm	142 - 185 Nm	169 - 220 Nm	
M16	68 - 88 Nm	154 - 200 Nm	219 - 285 Nm	262 - 340 Nm	
M20	132 - 171 Nm	300 - 390 Nm	424 - 550 Nm	508 - 660 Nm	
M22	177 - 230 Nm	409 - 530 Nm	574 - 745 Nm	686 - 890 Nm	
M24	227 - 295 Nm	520 - 675 Nm	732 - 950 Nm	879 - 1140 Nm	

GENERAL MACHINE DIMENSIONS/CAPACITIES/PERFORMANCE

MODEL	17 in / 43 cm Disk (Push)	20 in / 50 cm Disk (Push)	17 in / 43 cm Disk (Drive)	20 in / 50 cm Disk (Drive)
Length	51.25 in / 1302 mm	54 in / 1372 mm	51.25 in / 1302 mm	54 in / 1372 mm
Width	21 in / 508 mm	22 in / 559 mm	21 in / 508 mm	22 in / 559 mm
Height	43.1 in / 1095 mm	43.1 in / 1095 mm	43.1 in / 1095 mm	43.1 in / 1095 mm
Weight	220 lb / 98 kg	230 lb / 104 kg	230 lb / 104 kg	240 lb / 109 kg
Weight (with batteries)	366 lb / 166 kg	376 lb / 171 kg	390 lb / 177 kg	400 lb / 181 kg
GVW	457 lb / 207 kg	467 lb / 212 kg	482 lb / 219 kg	492 lb / 223 kg
Squeegee width	30.4 in / 772 mm			
Recovery tank capacity	14 gal / 53 L			
Solution tank capacity	11 gal / 42 L			
Severe environment tank capacity	0.4 gal / 1.5 L			
Scrubbing path width	16.9 in / 430 mm	19.9 in/ 505 mm	16.9 in / 430 mm	19.9 in / 505 mm
Down pressure - T300	Low: 47 lbs / 21.3 kg Med: 73 lbs / 33 kg High: 88 lbs / 40 kg	Low: 52 lbs / 23.5 kg Med: 77 lbs / 35 kg High: 92 lbs / 41.7 kg	Low: 47 lbs / 21.3 kg Med: 71 lbs / 32 kg High: 86 lbs / 39 kg	Low: 51 lbs / 23 kg Med: 76 lbs / 34.5 kg High: 90 lbs / 41 kg
Down pressure - T300e	47 lbs / 21.3 kg	52 lbs / 23.5 kg	47 lbs / 21.3 kg	51 lbs / 23 kg
Dual down pressure - T300e	88 lbs / 40 kg	92 lbs / 41.7 kg	86 lbs / 39 kg	90 lbs / 41 kg
Scrubbing speed	Pad assist		200 fpm / 61 mpm	
Transport speed	n/a	n/a	240 fpm / 73 mpm	
Reverse speed	n/a	n/a	144 fpm / 44 mpm	
Productivity rate - estimated actual	9,340ft2/hr / 868m2/hr	11,208ft2/hr / 1041m2/hr	12,453ft2/hr / 1157m2/hr	14,943ft2/hr / 1,388m2/hr
ec-H2O productivity rate - est. actual	9,668ft2/hr / 898m2/hr	11,602ft2/hr / 1078m2/hr	12,891ft2/hr / 1198m2/hr	15,469ft2/hr / 1,437m2/hr
Aisle turnaround width	52 in / 1321 mm	54.5 in / 1384 mm	52 in / 1321 mm	54.5 in / 1384 mm
Ramp incline for scrubbing	9% maximum			
Ramp incline for transporting	21% maximum			
Ramp incline for loading - empty tanks	21% maximum			
Solution flow rate	Low: 0.15 gpm / 0.57 L/min, Med: 0.35 gpm / 1.3 L/min, High: 0.5 gpm / 1.9 L/min			
ec-H2O solution flow rate	Low: 0.12 gpm / 0.45 L/min, Med: 0.25 gpm / 0.94 L/min, High: 0.35 gpm / 1.3 L/min			
Brush motor	24 VDC, 1hp / 0.75kW			
Propel motor	n/a	n/a	24 VDC, 0.23 hp / 0.175 kW	
Vacuum motor	24 VDC, 0.6 hp / 0.47 kW			
Water lift	42 in / 1067 mm			
Water lift - Quiet Mode	28 in / 711 mm			
ec-H2O solution pump	24 VDC, 1.0 gpm / 3.8 L/min, min open flow			
Machine voltage	24 VDC			

GENERAL MACHINE DIMENSIONS/CAPACITIES/PERFORMANCE

MODEL	17 in / 43 cm Disk (Push)	20 in / 50 cm Disk (Push)	17 in / 43 cm Disk (Drive)	20 in / 50 cm Disk (Drive)
Battery Capacity (NA/International)	2 - 12 V 105AH C/20 Wet, 2-12V 130AH C/20 Wet, 2 - 12V 155AH C/20 Wet, 2 - 12V 140AH C/20 Sealed/AGM			
Battery Capacity (EU)	2- 12V 120AH C/5 Wet, 2- 12V 58AH C/5 Sealed/TPPL, 2- 12V 76AH C/5 Sealed/Gel, 2- 12V 105AH C/5 Sealed/Gel			
Total power consumption	31.5A nominal	36.5A nominal	34.5A nominal	39.5A nominal
Battery Charger - on-board	100-240VAC, 50/60Hz, 24 VDC, 13A			
Battery Charger - smart off-board	100-240VAC, 50/60Hz, 24 VDC, 13A			
Protection grade	IPX3			
Sound pressure level L_{pA}* - T300e	67 dB(A)	67 dB(A)	67 dB(A)	67 dB(A)
Sound pressure level L_{pA}* - T300	64.9 dB(A)	64.9 dB(A)	64.9 dB(A)	64.9 dB(A)
Sound pressure level L_{pA}* - Quiet mode	57.8 dB(A)	57.8 dB(A)	57.8 dB(A)	57.8 dB(A)
Sound uncertainty K_{pA}*	0.8 dB(A)	0.8 dB(A)	0.8 dB(A)	0.8 dB(A)
Sound power level uncertainty L_{wA} - uncertainty K_{wA}*	84.3 dB(A)	84.3 dB(A)	84.3 dB(A)	84.3 dB(A)
Machine vibration at hand-arm*	<2.5 m/s2			
Ambient operating temperature	Min: 32°F/0°C, Max: 110°F/43°C			

*Values per EN 60335-2-72. Specifications are subject to change without notice.

*Values per EN 60335-2-72, Specifications are subject to change without notice.

GENERAL MACHINE DIMENSIONS/CAPACITIES/PERFORMANCE

MODEL	24 in / 60 cm Dual Disk	20 in / 50 cm Cylindrical Brush	20 in / 50 cm Orbital
Length	51.75 in / 1314 mm	50.5 in / 1283 mm	49 in / 1245 mm
Width	26 in / 660 mm	25 in / 635 mm	20.5 in / 521 mm
Height	43.1 in / 1095 mm	43.1 in / 1095 mm	43.1 in / 1095 mm
Weight	250 lb / 113 kg	250 lb / 113 kg	255 lb / 116 kg
Weight (with batteries)	410 lb / 186 kg	410 lb / 186 kg	415 lb / 188 kg
GVW	502 lb / 228 kg	502 lb / 228 kg	507 lb / 230 kg
Squeegee width	30.4 in / 772 mm		
Recovery tank capacity	14 gal / 53 L		
Solution tank capacity	11 gal / 42 L		
Severe environment tank capacity	0.4 gal / 1.5 L		
Scrubbing path width	23.6 in / 600 mm	19.7 in/ 500 mm	19.7 in / 500 mm
Down pressure - T300	Low: 57 lbs / 26 kg Med: 81 lbs / 36.7 kg High: 97 lbs / 44 kg	Low: 53 lbs / 24 kg Med: 60 lbs / 27 kg High: 64 lbs / 29 kg	Low: 63 lbs / 28.5 kg Med: 92 lbs / 42 kg High: 109 lbs / 49.5 kg
Down pressure - T300e	57 lbs / 26 kg	53 lbs / 24 kg	63 lbs / 28.5 kg
Dual down pressure - T300e	97 lbs / 44 kg	64 lbs / 29 kg	109 lbs / 49.5 kg
Scrubbing speed	200 fpm / 61 mpm		
Transport speed	240 fpm / 73 mpm		
Reverse speed	144 fpm / 44 mpm		
Productivity rate - estimated actual	18,264ft2/hr / 1697m2/hr	14,943ft2/hr / 1388m2/hr	14,943ft2/hr / 1388m2/hr
ec-H2O productivity rate - est. actual	18,906ft2/hr / 1756m2/hr	15,469ft2/hr / 1437m2/hr	15,469ft2/hr / 1437m2/hr
Aisle turnaround width	53.5 in / 1346 mm	52 in / 1321 mm	49 in / 1245 mm
Ramp incline for scrubbing	9% maximum		
Ramp incline for transporting	21% maximum		
Ramp incline for loading - empty tanks	21% maximum		
Solution flow rate	Low: 0.15 gpm / 0.57 L/min, Med: 0.35 gpm / 1.3 L/min, High: 0.5 gpm / 1.9 L/min		
ec-H2O solution flow rate	Low: 0.12 gpm / 0.45 L/min, Med: 0.25 gpm / 0.94 L/min, High: 0.35 gpm / 1.3 L/min		
Brush motor	24 VDC, 1hp / 0.75kW		
Propel motor	24 VDC, 0.23 hp / 0.175 kW		
Vacuum motor	24 VDC, 0.6 hp / 0.47 kW		
Water lift	42 in / 1067 mm		
Water lift - Quiet Mode	28 in / 711 mm		
ec-H2O solution pump	24 VDC, 1.0 gpm / 3.8 L/min, min open flow		
Machine voltage	24 VDC		

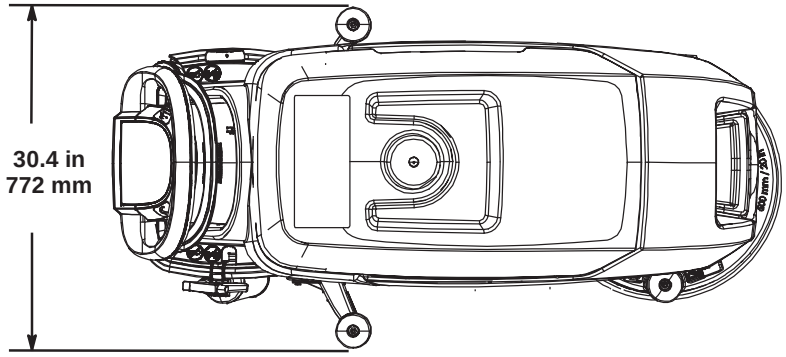
GENERAL MACHINE DIMENSIONS/CAPACITIES/PERFORMANCE

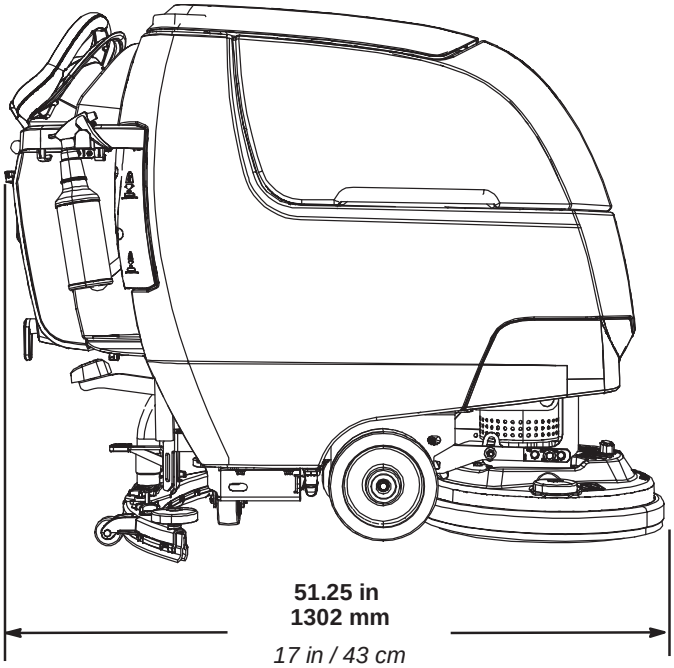
MODEL	24 in / 60 cm Dual Disk	20 in / 50 cm Cylindrical Brush	20 in / 50 cm Orbital
Battery Capacity (NA/International)	2 - 12 V 105AH C/20 Wet, 2-12V 130AH C/20 Wet, 2 - 12V 155AH C/20 Wet, 2 - 12V 140AH C/20 Sealed/AGM		
Battery Capacity (EU)	2- 12V 120AH C/5 Wet, 2- 12V 58AH C/5 Sealed/TPPL 2- 12V 76AH C/5 Sealed/Gel, 2- 12V 105AH C/5 Sealed/Gel		
Total power consumption	36A nominal	40A nominal	30A nominal
Battery Charger - on-board	100-240VAC, 50/60Hz, 24 VDC, 13A		
Battery Charger - smart off-board	100-240VAC, 50/60Hz, 24 VDC, 13A		
Protection grade	IPX3		
Sound pressure level L_{pA}* - T300e	67.7 dB(A)	67 dB(A)	67.5 dB(A)
Sound pressure level L_{pA}* - T300	66.5 dB(A)	64.7 dB(A)	65.3 dB(A)
Sound pressure level L_{pA}* - Quiet mode	59.1 dB(A)	57.2 dB(A)	57.6 dB(A)
Sound uncertainty K_{pA}*	0.8 dB(A)	0.8 dB(A)	0.8 dB(A)
Sound power level uncertainty L_{wA} - uncertainty K_{wA}*	83.8 dB(A)	85 dB(A)	83.5 dB(A)
Machine vibration at hand-arm*	<2.5 m/s2		
Ambient operating temperature	Min: 32°F/0°C, Max: 110°F/43°C		

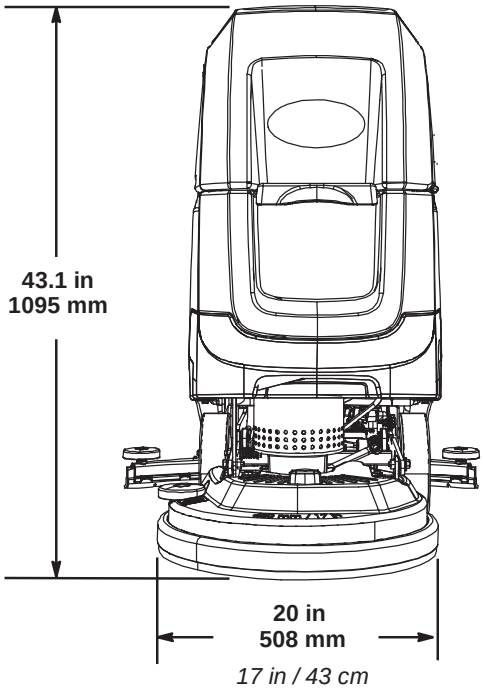
*Values per EN 60335-2-72. Specifications are subject to change without notice.

MACHINE DIMENSIONS

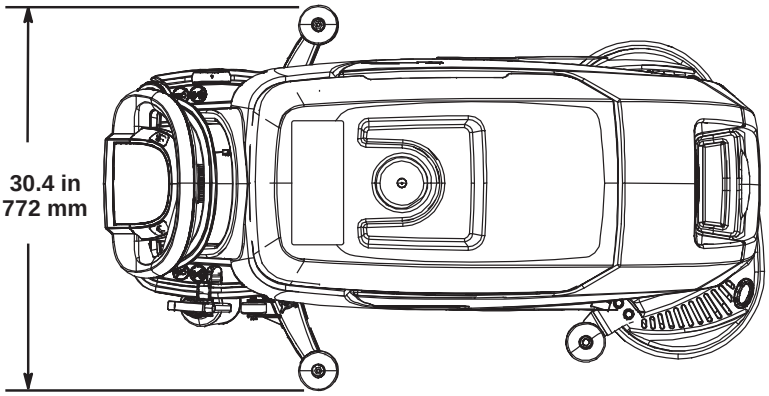
SINGLE DISK MODEL

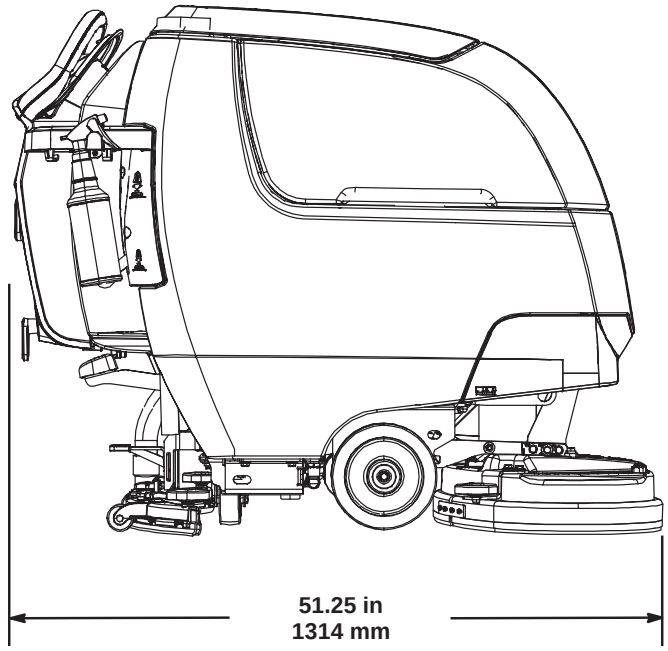


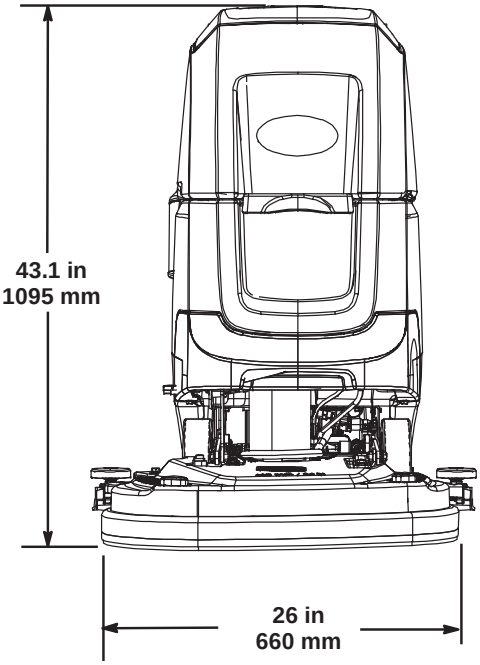




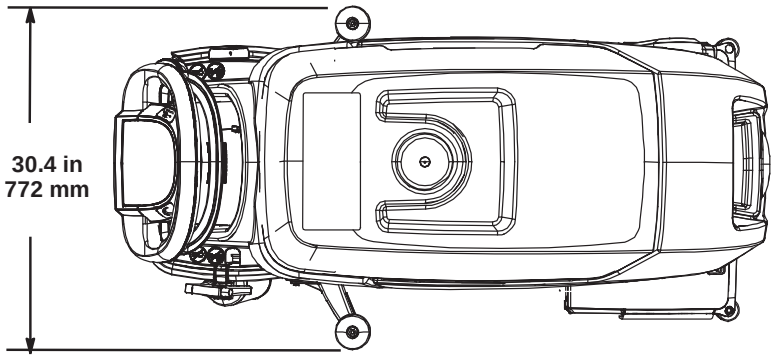
DUAL DISK MODEL

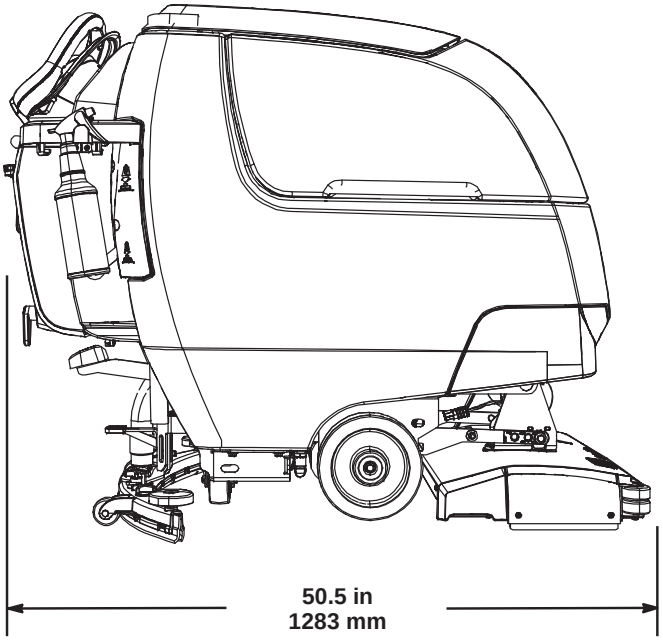


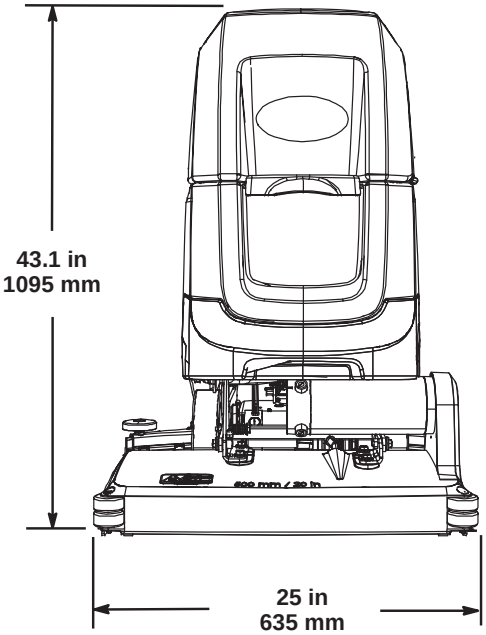




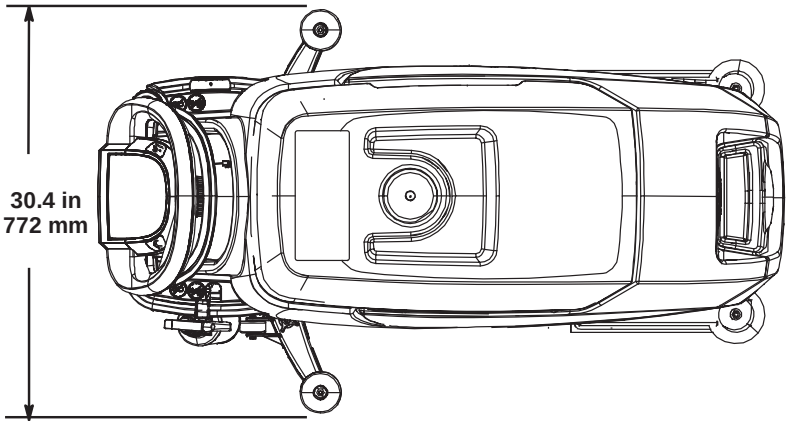
CYLINDRICAL BRUSH MODEL

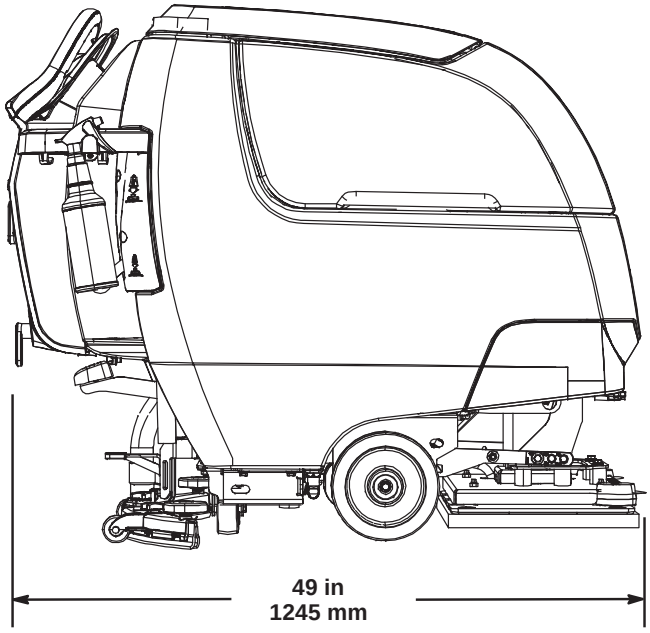


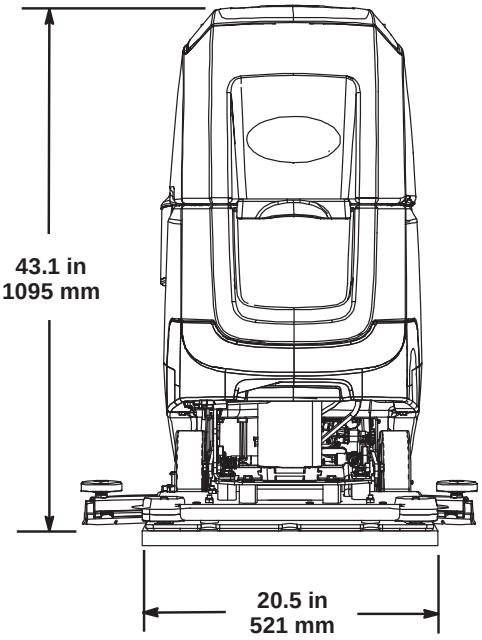




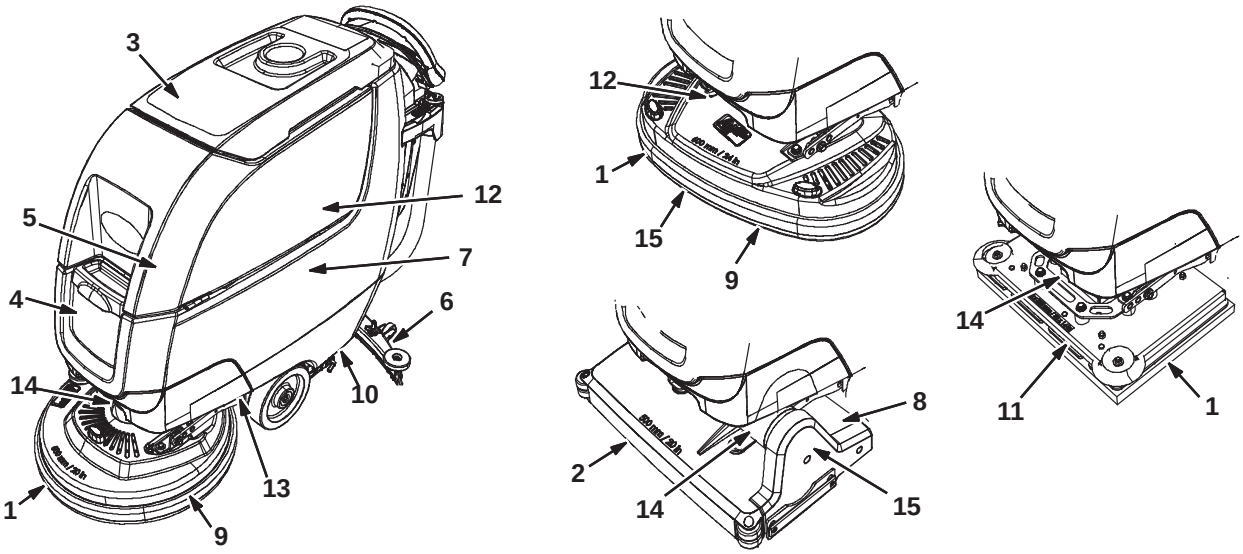
ORBITAL PAD MODEL







MAINTENANCE CHART



Interval	Person Resp.	Key	Description	Procedure
Dailey	O	1	Pad(s)	Check, flip or replace
	O	1	Brush(es)	Check, clean
	O	2	Cylindrical Brushes	Check, clean
	O	3	Recovery tank	Drain, rinse, clean float shut-off screenand debris tray if equipped
	O	4	Solution tank	Drain, rinse
	O	5	Severe environment tank (option)	Check, refill
	O	6	Squeegee	Clean, check for damage and wear
	O	7	Batteries	Charge if necessary
	O	8	Debris trough	Clean
	O	9	Scrub head skirt	Check for damage and wear
Weekly	O	7	Battery cells	Check electrolyte level
	O	6	Squeegee assembly drip trap reservoir	Check, clean
50 Hours	O	2	Cylindrical brushes.	Rotate brushes. Check for wear
	O	2	Cylindrical scrub head	Clean underside of scrub head
	O	3	Recovery tank lid seal	Check for wear
	O	10	Solution tank filter	Clean
100 Hours	O	7	Battery watering system (option)	Check hoses for damage and wear
200 Hours	O	7	Batteries, terminals and cables	Check and clean
500 Hours	T	11	Lower orbital isolators	Replace (4 qty)
750 Hours	T	12	Vacuum motor	Replace carbon brushes
1250 Hours	T	13	Propel motor	Replace carbon brushes
	T	14	Brush motor	Replace carbon brushes
	T	15	Brush belt	Replace belt

MACHINE MAINTENANCE

To keep the machine in good working condition, simply perform the following maintenance procedures.

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

FOR SAFETY: When servicing machine wear personal protection equipment as needed. All repairs must be performed by trained personnel.

AFTER DAILY USE

1. Drain and rinse out the recovery tank. See DRAINING TANKS in OPERATOR MANUAL.

2. Remove the debris tray and empty.

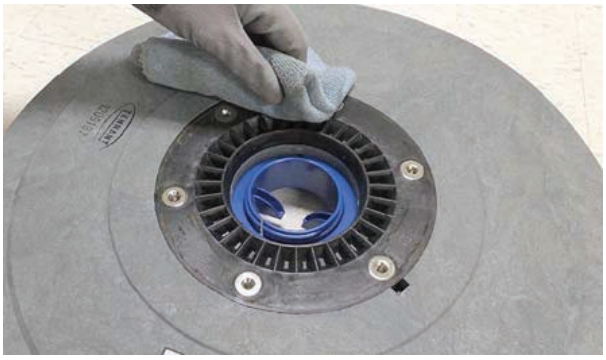
3. Remove and clean the float shut-off screen.

4. Drain and rinse out the solution tank.

5. Disk scrub head - Turn pad over or replace when worn.

Orbital scrub head - Turn the work pad over or replace when worn.

6. Click-Quick pad driver/brushes - clean any debris buildup from hub connection area.



7. Wipe the squeegee blades clean. Inspect blades for wear and damage. Rotate blade if worn. See SQUEEGEE BLADE REPLACEMENT.

8. Check the scrub head skirt for wear or damage. Replace if worn or damaged.

9. Clean the outside surface of the machine with an all purpose cleaner and damp cloth.

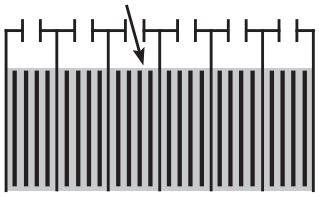
10. Cylindrical scrub head - Remove and clean debris trough.

11. Severe environment option - Refill the severe environment tank with a recommended cleaning detergent at full concentration. Replace cap.

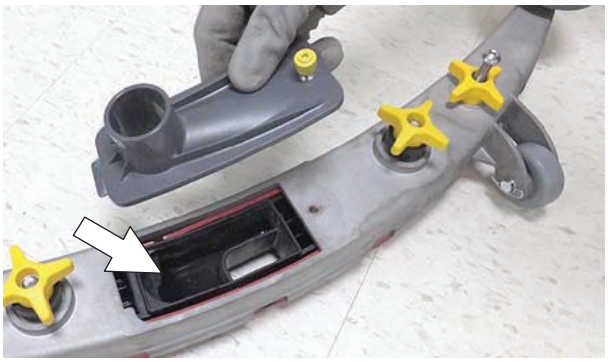
12. Charge batteries. See BATTERIES.

AFTER WEEKLY USE

1. Check the electrolyte level in all batteries. See BATTERIES.



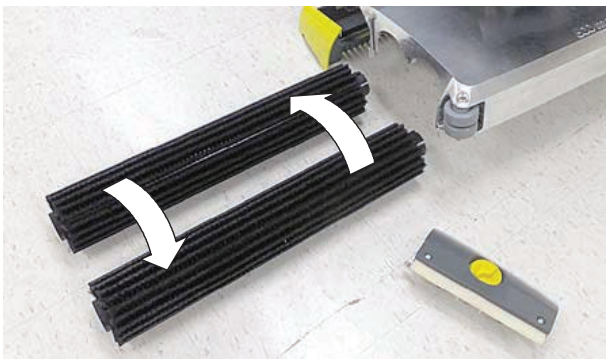
2. Remove the drip tray cover from the squeegee assembly and clean reservoir.



AFTER EVERY 50 HOURS OF USE

1. Remove the solution tank filter and clean screen. Turn the filter bowl counter-clockwise to remove. Make sure to drain solution tank before removing filter.

2. Cylindrical brushes - Rotate brushes from front to rear. Replace brushes when they no longer clean effectively.



3. Cylindrical scrub head - Remove debris buildup from underside of scrub head.

4. Inspect and clean the seal on the recovery tank lid. Replace seal if damaged.

AFTER EVERY 100 HOURS OF USE

If machine is equipped with the optional battery watering system, check the watering hoses and connections for damage and wear. Replace system if damaged.

FOR SAFETY: When servicing batteries, wear personal protection equipment as needed. Avoid contact with battery acid.

ELECTRIC MOTORS

Replace motor carbon brushes as indicated. Contact trained personnel for carbon brush replacement.

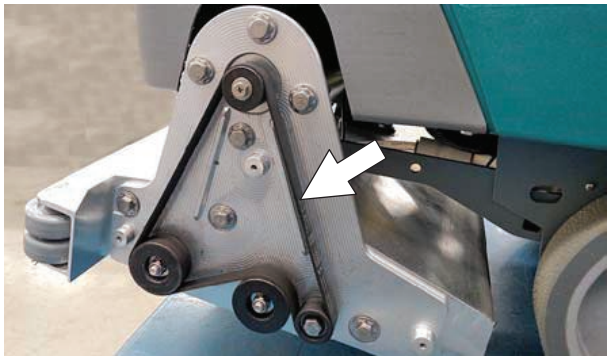
Carbon Brush Replacement	Hours
Vacuum motor	750
Propel motor (drive model)	1250
Disk brush motor	1250
Cylindrical brush motor	1250
Orbital brush motor	1250

BELTS

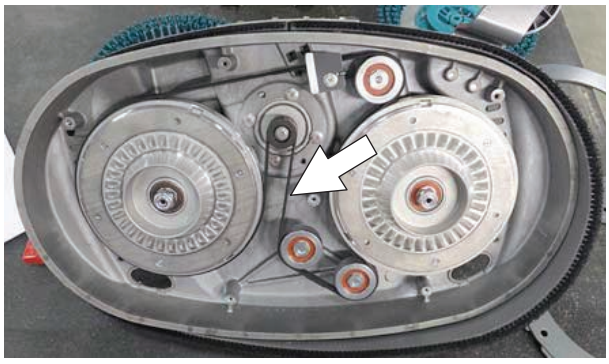
FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

Replace belts every 1250 hours.

Cylindrical Brush Drive Belt. See REMOVE/ REPLACE THE BRUSH BELT (CYLINDRICAL SCRUB HEAD MODEL).



Dual disk brush drive belt. See REPLACE THE BRUSH MOTOR BELT (DUAL DISK MODEL).



ORBITAL SCRUB HEAD ISOLATORS (LOWER)

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

Replace the four lower vibration isolators every 500 hours. The lower isolators (hidden) are located between the deck plate the driver plate. See REPLACE THE LOWER ORBITAL HEAD ISOLATORS.

BATTERIES

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

The lifetime of the batteries depends on their proper maintenance. To get the most life from the batteries;

- Do not charge the batteries more than once a day and only after running the machine for a minimum of 15 minutes.
- Do not leave the batteries partially discharged for long period of time.
- Only charge the batteries in a well-ventilated area to prevent gas build up. Charge batteries in areas with ambient temperatures 80°F / 27°C or less.
- Allow the charger to complete charging the batteries before re-using the machine.
- Maintain the proper electrolyte levels of flooded (wet) batteries by checking levels weekly.

Your machine is equipped with either flooded (wet) lead-acid or maintenance-free batteries supplied by Tennant.

FOR SAFETY: When servicing machine, keep all metal objects off batteries. Avoid contact with battery acid.

MAINTENANCE-FREE BATTERIES

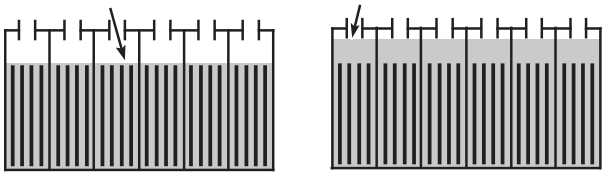
Maintenance-free (Sealed AGM) batteries do not require watering. Cleaning and other routine maintenance is still required.

FLOODED (WET) LEAD-ACID BATTERIES

The flooded (wet) lead-acid batteries require routine watering as described below. Check the battery electrolyte level weekly.

*NOTE: **Do** **Not** check the electrolyte level if the machine is equipped with the optional battery watering system. Proceed to MANUAL BATTERY WATERING SYSTEM (Trojan Battery Option).*

The electrolyte level should be slightly above the battery plates as shown before charging. Add distilled water if low. DO NOT OVERFILL. The electrolyte will expand and may overflow when charging. After charging, distilled water can be added up to about 3 mm (0.12 in) below the sight tubes.



NOTE: Make sure the battery caps are in place while charging. There may be a sulfur smell after charging batteries. This is normal.

CHECKING CONNECTIONS / CLEANING

After every 200 hours of use, check for loose battery connections and clean the surface of the batteries, including terminals and cable clamps to prevent battery corrosion. Use a scrub brush with a strong mixture of baking soda and water. Do not remove battery caps when cleaning batteries.

CHARGING BATTERIES

The charging instructions in this manual are intended for the battery charger supplied with machine. The use of other battery chargers not supplied and approved by Tennant are prohibited.

If machine is equipped with an off-board battery charger refer to the charger owners manual for operating instructions. Contact distributor or Tennant for battery charger recommendations if machine is not equipped with charger.

FOR SAFETY: The use of incompatible battery chargers may damage battery packs and potentially cause a fire hazard.

IMPORTANT NOTICE: The battery charger is set to charge the battery type supplied with your machine. If you choose to change to a different battery type or capacity (i.e. flooded (wet) lead-acid, maintenance-free, sealed, AGM batteries, etc.), The charger charging profile must be changed to prevent battery damage. See BATTERY CHARGER SETTINGS.

1. Transport machine to a well-ventilated area.

   WARNING: Lead-acid batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep covers open when charging.

2. Park the machine on a flat, dry surface, turn off machine and remove key.

FOR SAFETY: When servicing batteries, stop on level surface, turn off machine, remove key and set parking brake if equipped.

3. If the machine is equipped with flooded (wet) lead acid batteries check the battery electrolyte level weekly before charging. See FLOODED (WET) LEAD-ACID BATTERIES.

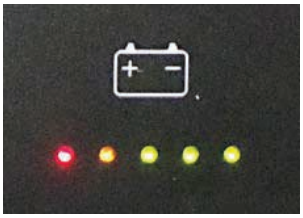
4. For models equipped with on-board chargers, remove the charger's power cord from the storage hooks and plug power cord into a properly grounded wall outlet.

   For models equipped with off-board chargers, first connect the charger DC cord into the machine battery charge receptacle then plug the AC power supply cord into a properly grounded wall outlet. Refer to the off-board battery charger owner manual for operating instructions.

FOR SAFETY: Do not disconnect the off-board charger's DC cord from the machine's receptacle when the charger is operating. Arcing may result. If the charger must be interrupted during charging, Disconnect the AC power supply cord first.

5. The charger will automatically begin charging and shut off when fully charged. The maximum charging cycle may take up to 6- 12 hours depending on battery type.

   On-board battery charger: The battery discharge indicator lights will ripple back and forth during the charging cycle. When all five lights repeatedly flash two times, the charging cycle is complete.



T300e/T300

T300 LCD

6. After charging batteries unplug the power supply cord and wrap cord around the cord hooks. For models equipped with an off-board charger, Always disconnect the AC power supply cord first before disconnecting charger from machine.

BATTERY CHARGER SETTINGS

The battery charger is set to charge the battery type supplied with the machine. If the battery type or capacity is changed, the charger charging profile must be changed to prevent battery damage.

The machine battery discharge indicator (BDI) must also be reprogrammed to match battery type to prevent battery damage and/or short run- time.

NOTE: For machines shipped without batteries, the battery discharge indicator and the on- board battery charger are set for GEL batteries as the default. If a different battery type is chosen, the settings must be changed as described as below.

NOTE: For machines shipped without batteries and supplied with an Off- Board Charger, the off- board battery charger is set for wet lead- acid batteries from the factory. The machine battery discharge indicator is set for GEL batteries as the default. The machine battery discharge indicator must be reprogrammed to match charger settings. See OFF-BOARD BATTERY CHARGER:.

IRIS MODELS: For models equipped with capability to report battery charging data via IRIS, Tennant recommends using the same battery type. If a different amp hour or battery type is desired, Contact Tennant Technical Support to report the new battery.

OFF-BOARD BATTERY CHARGER:

1. To change the off-board battery charger settings, See CHANGING OFF-BOARD BATTERY CHARGER SETTINGS.

2. To program the machine battery discharge indicator (BDI), see below:

Pro/Membrane Models - Service application software required, contact service.

Pro-Panel Model - See CHANGE ON-BOARD BATTERY CHARGER SETTINGS (Pro-Panel model).

ON-BOARD BATTERY CHARGER

Pro/Membrane Models - Service application software required, contact service. As an alternative, the charger profile may be manually changed. See CHANGING ON-BOARD BATTERY CHARGER SETTINGS (Pro-Membrane model). The battery discharge indicator automatically reprograms to match battery type when battery charger profile is changed.

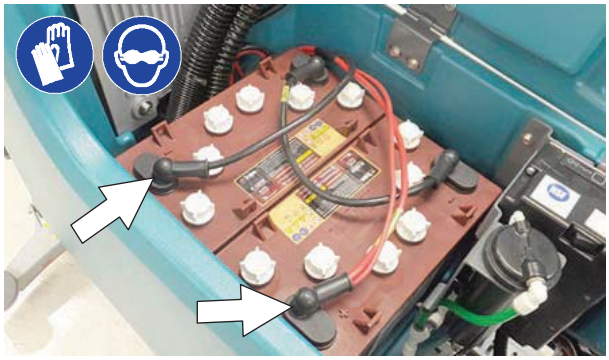
Pro-Panel Model - See CHANGE ON-BOARD BATTERY CHARGER SETTINGS (Pro-Panel model). Battery discharge indicator will automatically reprogram to match battery selection.

CHANGING ON-BOARD BATTERY CHARGER SETTINGS (Pro-Membrane model)

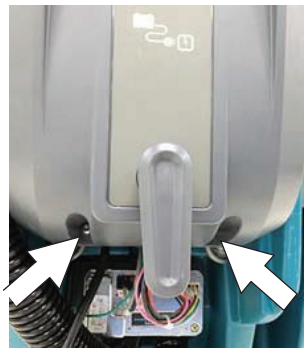
To manually change the on-board battery charger settings for a different battery type, carefully follow instructions as described below :

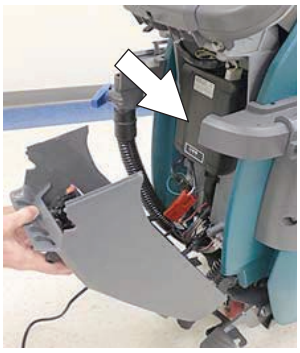
NOTE: The manual method is only an alternative if unable to change setting by use of the Service Application Software performed by Service.

1. Disconnect battery cables.

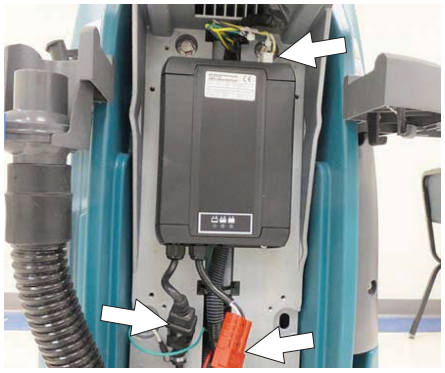


2. Unwrap the battery charger power cord from the cord hooks.
3. Using a T25 star screwdriver, remove the two screws located at the bottom of the control console to access battery charger.

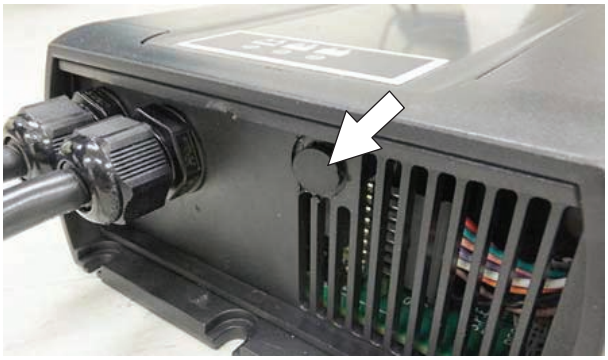




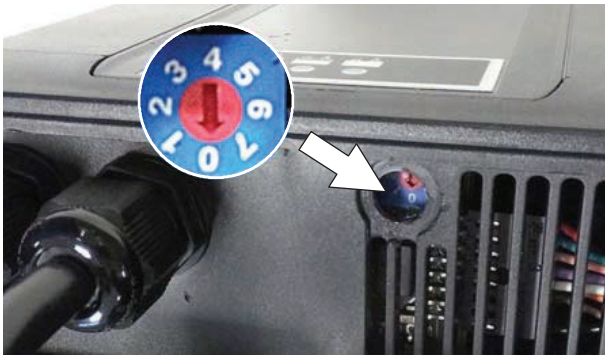
4. Disconnect the battery cable, power cord and wire harness from charger. Using a T25 star screwdriver, remove the four screws that mount charger to machine. Remove charger from machine.



5. Remove the black cap from bottom side of charger to access the profile dial.



6. Usie a small standard screwdriver to turn the dial to the appropriate battery type according to the following chart.



Dial Position	Battery Description Settings with AH Ranges
0	Factory setting* Programmed via CAN-Bus
1	Wet, Trojan 105- 155 AH
2	Wet, Enersys/Tab 105- 155 AH
3	AGM, Discover 80- 150 AH
4	AGM, Fullriver 80- 150 AH
5	AGM, TPPL, Enersys 20- 40 AH
6	Gel, Sonnenschein 80- 150 AH

**The CAN-BUS setting, dial position "0", is the software setting that is programmed to match battery type supplied with machine. When the dial is manually changed to a different setting, it should not be reset back to "0" otherwise battery damage may result. Service Application Software is required to reset dial back to "0". Contact Service.*

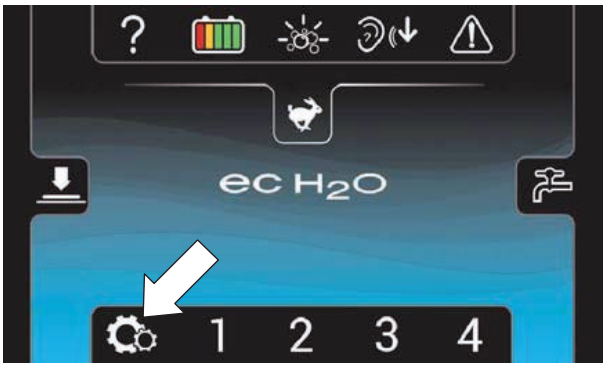
7. Replace the black cap on charger, reinstall battery *charger and replace control console.*
8. Reconnect the battery cable connection.
9. To set the BDI for the new battery type, plug the on- board battery charger cord into an electrical outlet. The machine's software will automatically reprogram the BDI to the new battery type.

CHANGE ON-BOARD BATTERY CHARGER SETTINGS (Pro-Panel model)

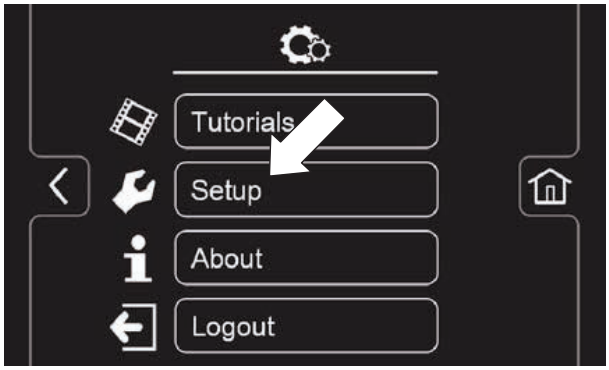
NOTE: To perform this procedure, machine must be in supervisor mode. See SUPERVISOR CONTROLS instructions in OPERATOR MANUAL.

To change the on-board battery charger settings for a different battery type :

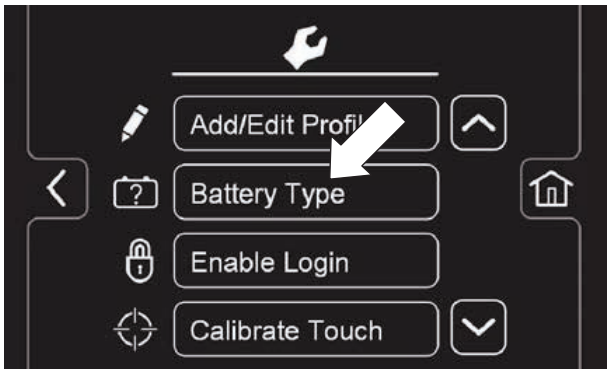
1. Turn the key switch ON.
2. Press the settings button located on the home screen.



3. Press the Setup button to access the Setup screen.

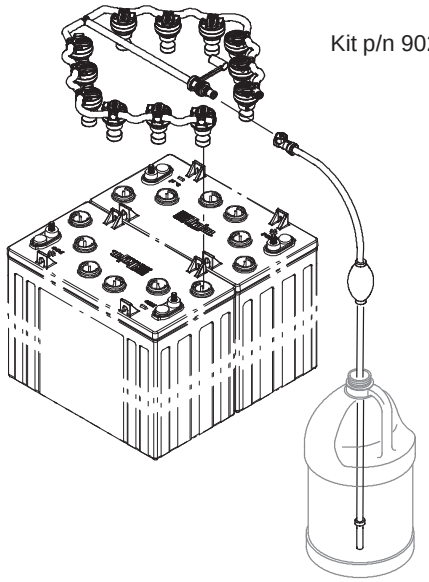


4. Press the Battery Type button to select the battery type installed in machine ().



MANUAL BATTERY WATERING SYSTEM (Trojan Battery Option)

The following instructions are for models equipped with the manual battery watering system option.



Kit p/n 9021730

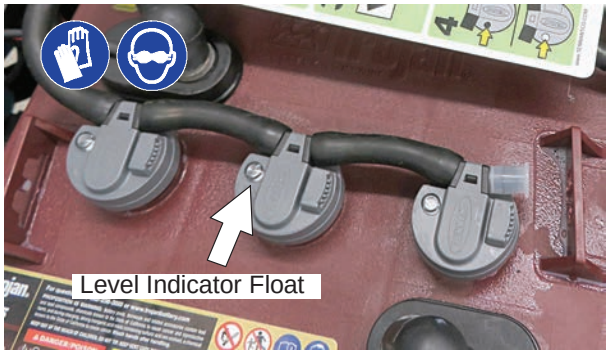
The optional manual battery watering system provides a safe and easy way to maintain proper battery electrolyte levels. It is designed exclusively for Trojan flooded (wet) lead-acid batteries.

FOR SAFETY: When servicing machine, wear personal protection equipment as needed. Avoid contact with battery acid.

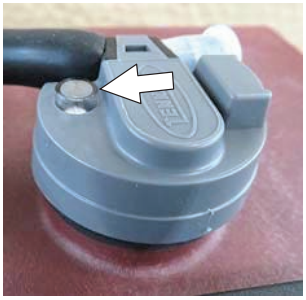
Before using the battery watering system check hoses and connections for damage or wear.

1. Fully charge batteries prior to using the battery watering system. Do not add water to batteries before charging, the electrolyte level will expand and may overflow when charging.

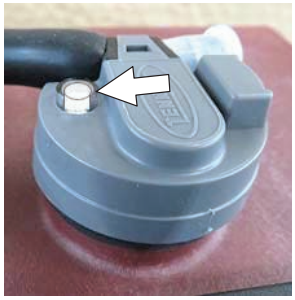
2. After charging batteries, check the electrolyte level indicator on each battery cap. If any of the indicator floats are low, add water as described in the next step.



3. If the level indicator has a low white float add water as described in the following instructions.



Low Float = Add Water

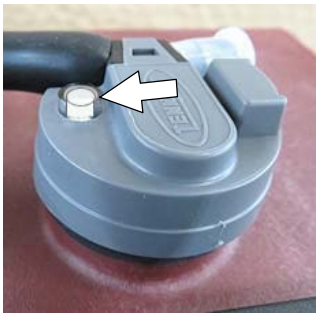


High Float = Full

4. Locate the battery fill hose coupler inside the battery compartment. Remove the dust cap and connect the hand pump hose.

5. Submerge the other end of the hand pump hose into a bottle of distilled water.

6. Squeeze the bulb on the hand pump hose until firm. The indicator float will rise when full.



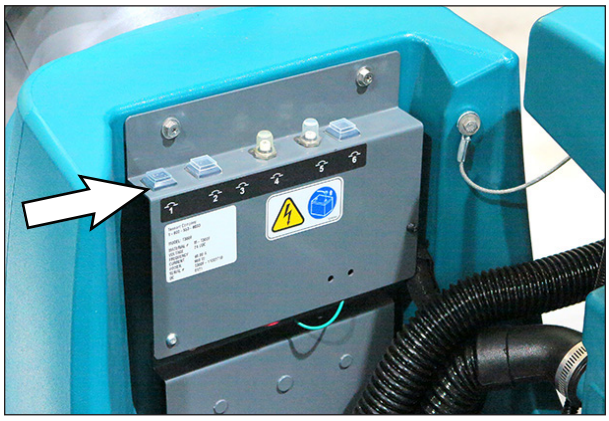
High Float = Full

7. After adding water, replace the dust cap on the battery watering distribution hose and store the hand pump hose inside the machine's battery compartment for future use.

CIRCUIT BREAKERS

The machine is equipped with resettable circuit breakers to protect the machine from a current overload. If a circuit breaker trips, disconnect the battery cable connections and reset the breaker by pressing the reset button after the breaker has cooled down. Reconnect the battery cable connections.

The circuit breaker panel is located inside the battery compartment to the rear of the batteries.



T300

Circuit Breaker	Rating	Circuit Protected
CB1	4 A	Key switch, control board
CB2	10 A	ec-H2O module / pump
CB3	30 A	Propel

T300e

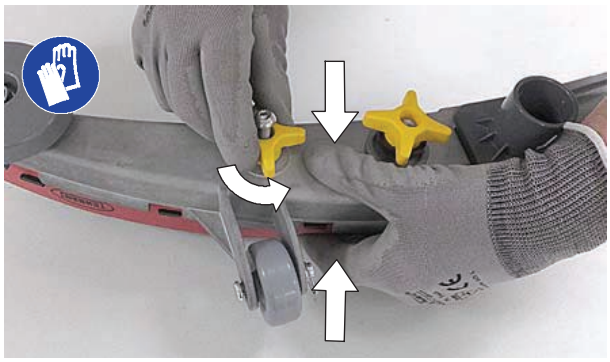
Circuit Breaker	Rating	Circuit Protected
CB1	4 A	Key switch, control board
CB2	4 A	ec-H2O module
CB3	4 A	ec-H2O pump
CB4	30 A	Propel
CB5	37 A	Brush motor
CB6	20 A	Vacuum motor

SQUEEGEE BLADE REPLACEMENT

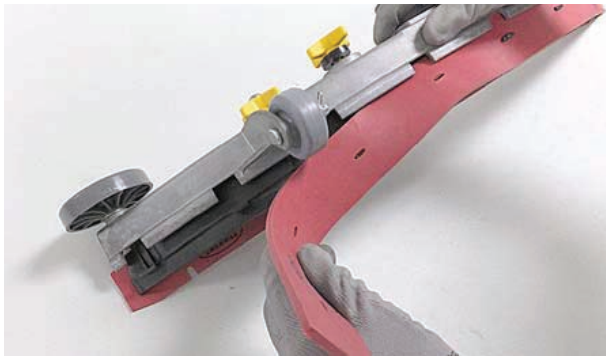
FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

Each squeegee blade has four wiping edges. When the blades become worn, simply rotate the blades end-for-end or top-to-bottom for a new wiping edge. Replace blade if all four edges are worn.

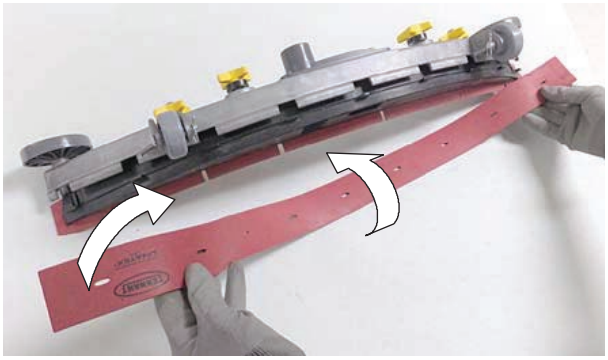
1. Remove the squeegee assembly from the machine.
2. Fully loosen the two outside knobs on squeegee assembly. This will separate the spring loaded blade retainer from squeegee frame. To loosen the knobs quickly, squeeze the blade retainer and squeegee frame together.



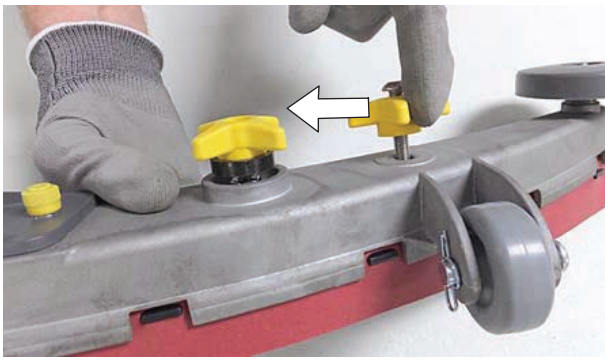
3. Remove worn blade(s) from the blade retainer.



4. Rotate the rear blade to a new wiping edge. Make sure to align the slots in the blade with retainer tabs.



5. Squeeze the squeegee frame and blade retainer together and re-tighten the two outside knobs.



ec-H2O NanoClean WATER CONDITIONING CARTRIDGE REPLACEMENT

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and set parking brake if equipped.

The water conditioning cartridge is required to be replaced when it reaches its maximum water usage or expiration time of when the cartridge was activated, which ever comes first. The control panel will signal a code when it's time to replace cartridge.

Depending on machine usage, on average, a new cartridge can last anywhere from 12 months for heavy machine usage to 24 months for light machine usage.

ATTENTION: During first time use and after replacing the water conditioning cartridge, the ec-H2O system will automatically override the selected solution flow rate for up to 75 minutes.

1. Park the machine on a level surface, remove the key and set parking brake, if equipped.
2. Lift the recovery tank to access the ec-H2O water conditioning cartridge. Drain recovery tank before lifting tank.

3. Disconnect the two hose connectors from the top of the cartridge by pressing the gray collars inward and pulling the connectors outward. Lift cartridge to remove.

4. Fill in the installation date on the new cartridge label.

5. Install the new cartridge and reconnect the two hoses. Make sure the hose connectors are fully inserted into the cartridge.

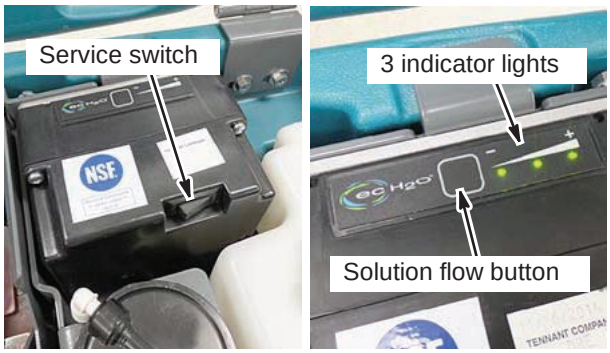
6. Reset timer for new cartridge.

   Carefully read and understand all steps first before performing procedure.

   a. Turn key on.

   b. Press and hold the service switch, located on the ec-H2O module, for 10 seconds. After releasing service switch, the three solution flow indicator lights will begin to (ripple) move back and forth.

   c. Within 5 seconds after releasing the service switch, while the three indicator lights are moving back and forth, quickly press and release the solution flow button located on ec-H2O module. The three indicator lights will then blink three times to indicate timer has been reset. Repeat process if the three



LOADING/UNLOADING MACHINE FOR TRANSPORTING

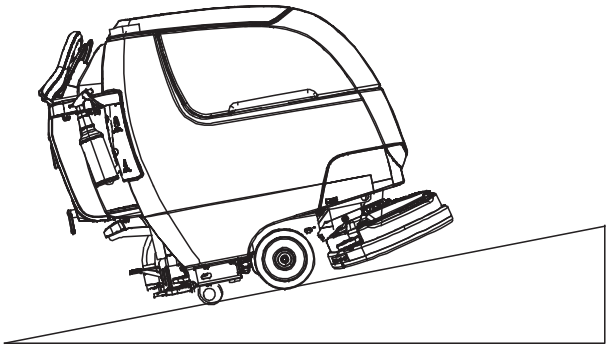
When transporting the machine by use of trailer or truck, carefully follow the loading and tie-down procedure:

1. Raise the scrub head and remove squeegee assembly.

2. Use a ramp that can support the machine weight and operator and carefully load machine. Do not operate the machine on a ramp incline that exceeds a 21% grade level. A winch must be used when ramp incline exceeds a 21% grade level.

FOR SAFETY: When loading/unloading machine onto/off truck or trailer, use a ramp that can support the machine weight and operator.

FOR SAFETY: Do not operate the machine on a ramp incline that exceeds a 21% grade level.



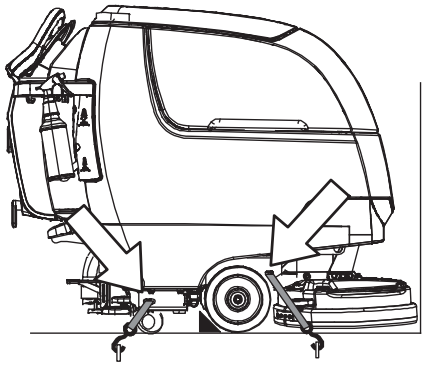
3. Once loaded, position the front of the machine up against the front of the trailer or truck. Lower the scrub head, turn key off and set parking brake, if equipped.

4. Place a block behind each wheel.

5. Using tie-down straps, secure the machine using the four tie-down brackets located on the machine frame. It may be necessary to install tie-down brackets to the floor of trailer or truck.

NOTE: When transporting machine in an open truck or trailer, secure recovery tank lid.

ATTENTION: Do not use control console area or accessory storage rails for tie-down locations, damage may occur.



STORING MACHINE

The following steps should be taken when storing the machine for extended periods of time.

1. Charge the batteries before storing machine to prolong the life of the batteries. Recharge batteries every 3 months.
2. Disconnect batteries before storing.
3. Drain and rinse recovery tank and solution tank.
4. Store the machine in a dry area with squeegee and scrub head in the up position.

ATTENTION: Do not expose machine to rain, store indoors.

5. Open the recovery tank lid to promote air circulation.

NOTE: To prevent potential machine damage store machine in a rodent and insect free environment.

FREEZE PROTECTION

Storing machine in freezing temperatures.

1. Completely drain solution tank and recovery tank.
2. Empty the water from the solution tank filter located under machine. Replace filter.
3. Pour 1 gallon / 4 liters of propylene glycol based recreational vehicle (RV) antifreeze into the solution tank.

   Models equipped with optional Severe Environment detergent tank - Lift out the tank and empty the detergent from tank. Pour a 1/4 gallon / 1 liter of propylene glycol based recreational vehicle (RV) antifreeze into the detergent tank.
4. Turn machine on and operate the solution flow system. Turn the machine off when the antifreeze is visible on floor.

   Models equipped with ec-H2O option - Operate ec-H2O scrubbing to cycle antifreeze through system.

   Models equipped with Severe Environment mode option - Press the Severe Environment button to cycle antifreeze through system.
5. After storing machine in freezing temperatures, drain any remaining antifreeze from the solution tank and from the optional Severe Environment detergent tank. Add clean water to solution tank and to optional detergent tank and operate the machine to flush system.

TROUBLESHOOTING

FAULT/ERROR CODES

Machine faults are displayed three different ways depending on the machine configuration: Refer to the Faults and Warnings table for fault codes, conditions, reasons, and remedies for the various fault codes.

Machines equipped with a membrane panel display faults on the BDI (Battery Discharge Indicator). If a fault is present, the BDI displays a combination of flashing and steady LEDs.

Machines equipped with the optional LCD panel offer additional fault detail. Note that in the table below some BDI faults correlate to several LCD fault codes that are more specific as to the circuit causing the fault.

A Service Diagnostics tool is available to provide additional fault detail. See SERVICE DIAGNOSTICS TOOL.

BDI (Battery Discharge Indicator) ☼ = Flashing	Pro-Panel LCD Faults (Option)	Fault Condition	Reason	Correction
	0x0010	Parking Brake	1. Flashing indicator indicates manual parking brake is engaged.	1. Release parking brake.
☼ ☼ ☼ ☼ ☼	0xFFF0	E-Stop activate fault	1. E-Stop pressed. 2. Large white i-Drive connector unplugged. 3. Large white i-Drive connector pin 7 disconnected. 4. i-Drive power wire unplugged. 5. Scrub controller board connector J9 pin 2 disconnected. 6. Scrub controller board connector J8 disconnected. 7. Scrub controller board connector J8 pin 7 disconnected.	1. Key off machine. 2. Press and reset E-Stop button. 3. Key on machine. 4. If fault persists, check harness connections between E-Stop and control module. 5. Replace or repair harness. 6. Replace E-Stop.
● ● ● ☼ ●	0x0201	Actuator Open Warning	Wiring, connector, or control board issue on actuator.	1. Check connectors and connector pins.
● ● ● ☼ ☼	0x0101	Scrub Motor Open Warning	1. Wiring, connector or control board issue on scrub motor. 2. J10 connector on scrub controller board unplugged. 3. Scrub controller board power disconnected. 4. Scrub controller in-line power fuse defective/blown. 5. Scrub controller board problem.	1. Check connections. Board gets power from key switch and battery. 2. If connections are good, replace control board.

BDI (Battery Discharge Indicator) ☼ = Flashing	Pro-Panel LCD Faults (Option)	Fault Condition	Reason	Correction
☼ ☼ ☼ ☼ ●	0x0102	Voltage/Power Loss	1. Scrub controller board not detecting power. 2. Intermittent control board power loss.	1. Check connections/wiring. 2. In-line fuse may be blown or bad. Replace in-line fuse.
	0x8001	Scrubbing Feature Disabled Remotely	1. Scrubbing feature remotely disabled by Tennant Admin.	1. Contact Tennant Admin/ Service to remotely enable scrubbing feature.
● ☼ ● ● ☼	0x0301	Valve Open Warning	1. Wiring, connector or control board issue with the valve. 2. Scrub controller board connector J8 pin 2 disconnected.	1. Check connections/wiring.
● ☼ ● ☼ ☼	0x0303	Valve Over Current Fault	1. Valve connections shorted. 2. Faulty valve. 3. Scrub controller board damaged.	1. Check connections/wiring. 2. Check supply voltage to control board. Should be equal to B+. 3. Check voltage drop across main contactor. 4. Replace valve. 5. Replace scrub controller board.
☼ ● ☼ ☼ ●	0x0307	Valve FET Fault	1. Control board problem. 2. Power/battery issue on startup.	1. Replace control board.
● ● ☼ ● ●	0x0501	Vacuum Motor Open Warning	1. Wiring, connector or control board issue on the vacuum. 2. J10 connector on scrub controller board unplugged. 3. Scrub controller board power disconnected. 4. Scrub controller in-line power fuse defective/blown.	1. Check connections and wiring. Board gets power from key switch, main contactor, and battery. 2. Replace defective/blown in-line power fuse.
● ● ☼ ● ☼	0x0601	Detergent Pump Open Warning	1. Wiring, connector or control board issue on the detergent pump. 2. Detergent pot connector unplugged. 3. Detergent pot connector pin 5 or 6 disconnected. 4. Scrub controller board J8 pin 1 or 6 disconnected.	1. Check connections/wiring.
● ● ☼ ☼ ●	0x0910	Propel Breaker Tripped Fault	1. Issue with propel motor, wiring or the i-Drive module. 2. Large white i-Drive connector unplugged. 3. Large white i-Drive connector pin 7 disconnected. 4. i-Drive power wire unplugged. 5. Scrub controller board connector J9 unplugged and bail activated. 6. Scrub controller board connector J9 pin 7 disconnected.	1. Disconnect battery and reset the circuit breaker. 2. Check connections/wiring.

BDI (Battery Discharge Indicator) ☼ = Flashing	Pro-Panel LCD Faults (Option)	Fault Condition	Reason	Correction
● ● ☼ ☼ ☼	0x0901	Propel Motor Open Fault	1. Motor on i-Drive not connected or detected.	1. Check motor, connectors, and relevant wiring between i-Drive and motor. 2. If trip is still present after everything has been checked and power has been cycled, i-Drive may be defective. Replace i-Drive.
☼ ● ● ● ☼	0x0900	Propel Generic Fault	1. Generic i-Drive fault. 2. Large white i-Drive connector pin 2, 8, or 9 disconnected. 3. User Interface speed pot connector unplugged.	1. Check motor, connectors, and relevant wiring to controller. 2. If trip is still present after motor, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0903	Propel Communication Lost Warning	1. Large white i-Drive connector pin 5 disconnected. 2. Small white i-Drive connector unplugged. 3. Small white i-Drive connector pin 3 or 4 disconnected. 4. Scrub controller board connector J2 or J8 unplugged. 5. Scrub controller board J9 pin 1 or 2 disconnected. 6. Scrub controller board J8 pin 7 disconnected. 7. Smaller of two console connectors unplugged. 8. User Interface board connector J4 or J9 unplugged.	1. Power cycle machine. 2. Check connections/wiring.
	0x0904	Propel Power Cycle Needed	1. i-Drive just programmed by service tech with new parameters. 2. i-Drive unit is faulty.	1. Power cycle machine. 2. Replace i-Drive.
	0x0905	Propel Current Limit Fault	1. Controller detects motor is drawing excessive current.	1. Check motor, connectors, and relevant wiring to controller. 2. If trip is still present after motor, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0908	Propel RAM Check Error	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x0909	Propel Data Check Error	1. i-Drive unit is faulty.	1. Replace i-Drive.

BDI (Battery Discharge Indicator) ☼ = Flashing	Pro-Panel LCD Faults (Option)	Fault Condition	Reason	Correction
☼ ● ● ● ☼ (Continued)	0x090A	Propel Tiller Low Reference	1. Propel controller not properly configured. 2. Controller detects Throttle Low Reference is outside normal range. Throttle Low Reference is located on pin 8 of 14-way Tiller connector.	1. Use Tennant Service Application software to ensure newly installed propel controller is properly configured. 2. Check throttle potentiometer, connectors, and relevant wiring to controller. If trip is still present after potentiometer, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x090B	Propel Gone to Sleep	1. Controller enters Sleep Mode.	1. Turn controller off and then on to wake system. To disable Sleep Mode, program parameter Sleep Timer to 0 minutes.
	0x090C	Propel EEPROM Write Error	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x090D	Propel EEPROM Write Timeout	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x090E	Propel EEPROM Busy at Startup	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x090F	Propel EEPROM Address Range	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x0911	Propel Forward ISO Test Fail	1. Controller detects Series Speed Limit Potentiometer Wiper is shorted to one of throttle references, either high or low. Series Speed Limit Potentiometer Wiper input is located on pin 1 of 14-way Tiller connector.	1. Trip is only applicable if an ISO-test resistor is fitted and programmed correctly. Check throttle potentiometer, programming, connectors, and relevant wiring to controller. 2. If trip is still present after potentiometer, programming, connectors, and wiring have been checked, controller may be defective. 3. Replace controller.
	0x0912	Propel Forward Input Range	1. Controller detects an error with Throttle Wiper. Throttle Wiper input is located on pin 1 of 14-way Tiller connector.	1. Check throttle potentiometer, programming, connectors, and relevant wiring to controller. 2. If trip is still present after potentiometer, programming, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0913	Propel Joystick Error Right 2	1. i-Drive unit is faulty.	1. Replace i-Drive.

BDI (Battery Discharge Indicator) ☼ = Flashing	Pro-Panel LCD Faults (Option)	Fault Condition	Reason	Correction
☼ ● ● ☼ (Continued)	0x0914	Propel Solenoid Brake	1. Controller detects a short circuit in solenoid brake.	1. Check solenoid brake, connectors and relevant wiring to controller. 2. If trip is still present after brake, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0915	Propel Brake Status Low	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x0916	Propel Brake Not Connected	1. Controller detects an open circuit in solenoid brake at start-up or in standby.	1. Check solenoid brake, connectors, and relevant wiring to controller. 2. If trip is still present after brake, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0917	Propel Brake Interlock Fault	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x0918	Propel Relay Interlock Fault	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x0919	Propel Relay Stuck Closed	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x091A	Propel Relay Coil Voltage	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x091B	Propel Watchdog Tripped	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x091C	Propel Positive Current Feedback Null	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x091D	Propel Positive Current Feedback Out of Range	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x091E	Propel Negative Current Feedback Null	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x091F	Propel Negative Current Feedback Out of Range	1. i-Drive unit is faulty.	1. Replace i-Drive.

BDI (Battery Discharge Indicator) ☼ = Flashing	Pro-Panel LCD Faults (Option)	Fault Condition	Reason	Correction
☼ ● ● ● ☼ (Continued)	0x0920	Propel Speed Control Wiper Warning	1. Controller detects Parallel Speed Limit Potentiometer Wiper is open circuit or has been shorted to one of the throttle references. Parallel Speed Limit Potentiometer Wiper input is located on pin 9 of 14-way Tiller Connector.	1. Check wiring to speed control potentiometer. 2. Power cycle machine. 3. If warning persists, replace speed control potentiometer. 4. Test high and low speed functions.
	0x0921	Propel Speed Control Reference	1. Propel speed control reference incorrect.	1. Check wiring to speed control potentiometer. 2. Power cycle machine.
	0x0922	Propel Throttle Trip Reference Warning	1. Propel throttle trip reference incorrect.	1. Check wiring to the bail sensor. 2. Power cycle machine.
	0x0923	Propel High Battery Voltage Warning	1. Controller detects battery voltage has exceeded approximately 35V on 24V controllers and approximately 45V on 36V controllers.	1. Check condition of batteries, connectors, and relevant wiring to controller. 2. If trip is still present after batteries, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0924	Propel High Battery Voltage 2 Warning	1. Controller detects battery voltage has exceeded approximately 45V on 24V controllers and approximately 49.5V on 36V controllers.	1. Check condition of batteries, connectors, and relevant wiring to controller. 2. If trip is still present after batteries, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0925	Propel Inhibit 1 Warning	1. Controller detects Inhibit 1 input is active, Inhibit 1 Speed has been set to ‘0’ and Inhibit 1 Operation has been set to ‘Latched’.	1. Check state of input, Inhibit 1 programming, connectors, and relevant wiring to controller. 2. If trip is still present after state of input, programming, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0926	Propel Inhibit 2 Warning	1. Controller detects Inhibit 2 input is active, Inhibit 2 Speed has been set to ‘0’ and Inhibit 2 Operation has been set to ‘Latched’.	1. Check state of input, Inhibit 2 programming, connectors, and relevant wiring to controller. 2. If trip is still present after state of the input, programming, connectors, and wiring have been checked, controller may be defective. Replace controller.

BDI (Battery Discharge Indicator) ☼ = Flashing	Pro-Panel LCD Faults (Option)	Fault Condition	Reason	Correction
☼ ● ● ☼ (Continued)	0x0927	Propel Inhibit 3 Warning	1. Controller detects Inhibit 3 input is active, Inhibit 3 Speed has been set to '0' and Inhibit 3 Operation has been set to 'Latched'.	1. Check state of input, Inhibit 3 programming, connectors, and relevant wiring to controller. 2. If trip is still present after state of input, programming, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0928	Propel Watchdog Warning	1. Propel controller watchdog tripped.	1. Power cycle machine.
	0x0929	Propel Bad Setting Warning	1. Bad setting programmed to i-Drive.	1. Reprogram i-Drive.
	0x092A	Propel Direction Inputs Disagree	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x092B	Propel Positive Feedback Voltage Null	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x092C	Propel Positive Feedback Voltage Out of Range	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x092D	Propel Output Voltage Tracking	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x092E	Propel Negative Feedback Voltage Null	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x092F	Propel Negative Feedback Voltage Out of Range	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x0930	Propel ROM Check Warning	1. The i-Drive memory is corrupted. i-Drive damaged.	1. Replace i-Drive.
	0x0931	Propel EEPROM Check Warning	1. The i-Drive settings are corrupted. i-Drive damaged.	1. Replace i-Drive.
	0x0932	Propel Internal 12V Error	1. The i-Drive hardware is damaged.	1. Replace i-Drive.
	0x0933	Propel Low Battery	1. Controller detects battery voltage has fallen below approximately 13.5V.	1. Check condition of batteries, connectors, and relevant wiring to controller. 2. If trip is still present after batteries, connectors, and wiring have been checked, controller may be defective. Replace controller.

BDI (Battery Discharge Indicator) ☼ = Flashing	Pro-Panel LCD Faults (Option)	Fault Condition	Reason	Correction
☼ ● ● ● ☼ (Continued)	0x0934	Propel Very Low Battery	1. Controller detects a sudden drop in battery voltage.	1. Check condition of batteries, connectors, and relevant wiring to controller. 2. If trip is still present after batteries, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0935	Propel Out of Time	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x0936	Propel Low Bridge Voltage	1. Power surge on propel module inputs causing damage to i-Drive circuitry.	1. Replace i-Drive.
	0x0937	Propel Bridge Voltage Greater Then Battery	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x0938	Propel Stack Overflow	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x0939	Propel Illegal State	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x093A	Propel Trip Sense Active	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x093B	Propel Trip Sense Not Active	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x093C	Propel Trip Latch Not Armed	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x093D	Propel Failed To Arm Trip Latch	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x093E	Propel Trip Latch Became Unarmed	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x093F	Propel Left Motor Shorted Low	1. i-Drive unit is faulty.	1. Replace i-Drive.
	0x0940	Propel Controller Fault	1. Each time controller trips with a suspected controller error, it records one instance of code ‘4401’ in controller System Log. Actual controller trip code is also recorded in controller Control Log. Number of ‘4401’ trips shown in System Log should equal cumulative number of trip occurrences shown in Control Log.	1. Check condition of batteries, connectors, and relevant wiring to controller. 2. If controller continues to trip after batteries, connectors, and wiring have been checked, controller may be defective. Replace controller.

BDI (Battery Discharge Indicator) ☼ = Flashing	Pro-Panel LCD Faults (Option)	Fault Condition	Reason	Correction
☼ ● ● ☼ (Continued)	0x0941	Propel Soft Belly Button Active	1. Controller detects Belly Button Switch has been operated at power-up.	1. Check Belly Button Switch, connectors, and relevant wiring to controller. 2. If trip is still present after switch, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0942	Propel Internal Temperature Sensor	1. i-Drive unit is faulty.	1. Replace i-Drive.
☼ ● ● ☼ ●	0x0906	Propel Motor Short Low Fault	1. Controller detects motor wiring has been shorted to Battery Negative.	1. Check motor, connectors, and relevant wiring to controller. 2. If trip is still present after motor, connectors, and wiring have been checked, controller may be defective. Replace controller.
	0x0907	Propel Motor Short High Fault	1. Controller detects motor wiring has been shorted to Battery Positive.	1. Check motor, connectors, and relevant wiring to controller. 2. If trip is still present after motor, connectors, and wiring have been checked, controller may be defective. Replace controller.
☼ ● ● ☼ ☼	0x0103	Scrub Motor Over Current Fault	1. Current draw higher than expected. 2. Higher current draw than hardware design limit.	1. Verify floor, pad, and down pressure combination are appropriate for machine. 2. Check actuator.
	0x0104	Scrub Motor Over Current 1 Fault	1. Current draw higher than expected.	1. Verify floor, pad, and down pressure combination are appropriate for machine. 2. Check actuator.
	0x0105	Scrub Motor Over Current 2 Fault	1. Current draw higher than expected.	1. Verify floor, pad, and down pressure combination are appropriate for machine. 2. Check actuator.
☼ ● ☼ ● ☼	0x0902	Propel High Throttle Fault	1. Bail is activated before turning on machine. 2. Bail did not release to full rest position due to obstruction. Controller detects Throttle Potentiometer has been displaced at start-up and parameter Throttle Operated At Power-Up has been set to ‘Trip’.	1. Release bail. 2. Key off and on. 3. If error persists, check for obstruction or damaged bail switch. 4. Replace switch or bail handle if damaged.

BDI (Battery Discharge Indicator) ☼ = Flashing	Pro-Panel LCD Faults (Option)	Fault Condition	Reason	Correction
☼ ● ☼ ☼ ●	0x0107	Scrub Motor FET Fault	1. Power/battery issue on startup. 2. Control board problem.	1. Check harness/ module power and ground connections. 2. Replace control board.
	0x0207	Actuator FET Fault	1. Control board problem. 2. Power/battery issue on startup.	1. Replace control board. FET detection includes motor, actuator, detergent pump, vacuum, and battery watering pump.
	0x0507	Vacuum FET Fault	1. Control board problem. 2. Power/battery issue on startup.	1. Replace control board. FET detection includes motor, actuator, detergent pump, vacuum, and battery watering pump.
	0x0607	Detergent Pump FET Fault	1. Control board problem. 2. Power/battery issue on startup.	1. Replace control board. FET detection includes motor, actuator, detergent pump, vacuum, and battery watering pump.
☼ ● ☼ ☼ ☼	0x0503	Vacuum Over Current Fault	1. Current draw higher than expected.	1. Check harness and vacuum.
	0x0504	Vacuum Over Current 1 Fault	1. Current draw higher than expected.	1. Verify vacuum load, damage, and/or usage conditions.
	0x0505	Vacuum Over Current 2 Fault	1. Current draw higher than expected.	1. Verify vacuum load, damage, and/or usage conditions.
☼ ☼ ● ● ●	0x0506	Vacuum Shorted Load Fault	1. Shorted load condition. 2. Some higher current draw than hardware design limit.	1. Check harness for damage or short between motor and control module. 2. Repair or replace harness if damaged. 3. Check for obstruction in vacuum fan assembly. 4. If not spinning freely, replace vacuum fan.
☼ ☼ ● ● ☼	0x0603	Detergent Pump Over Current Fault	1. Current draw higher than expected.	1. Check harness and pump.
	0x0604	Detergent Pump Over Current 2 Fault	1. Current draw higher than expected.	1. Verify detergent pump load, damage, and/or usage conditions.
	0x0605	Detergent Pump Over Current 1 Fault	1. Current draw higher than expected.	1. Verify detergent pump load, damage, and/or usage conditions.
☼ ☼ ● ☼ ●	0x0606	Detergent Pump Shorted Load Fault	1. Shorted load condition. 2. Higher current draw than hardware design limit.	1. Check harness, pump, and control boards.
☼ ☼ ☼ ● ☼	0x0106	Scrub Motor Short Fault	1. Shorted load condition. 2. Higher current draw than hardware design limit.	1. Check wire harness. Repair as necessary.

BDI (Battery Discharge Indicator) ☼ = Flashing	Pro-Panel LCD Faults (Option)	Fault Condition	Reason	Correction
● ☼ ☼ ☼ ●	0xF103	Charger CAN Communication Fault	1. Control boards are not communicating properly. 2. Board lost power (wiring issue). 3. Control board may be damaged.	1. Power cycle machine. 2. No communication with a network module. Use CAN open troubleshooting techniques.
	0xFF20	Scrub Controller CAN Communication Fault	1. Control boards are not communicating properly. 2. Board lost power (wiring issue). 3. Control board may be damaged.	1. Power cycle machine. 2. No communication with a network module. Use CAN open troubleshooting techniques.
☼ ☼ ☼ ● ●	0xF100	Charger Generic Warning	1. Error condition has occurred with charger unit.	1. Replace charger.
● ☼ ☼ ● ●	0xF101	Charger No Load Warning	1. Battery pack may not be plugged into charger. 2. Charger is bad.	1. Verify batteries are connected properly. 2. Verify wire harness continuity. 3. Replace charger.
● ☼ ● ● ●	0xF102	Charger Overheat Warning	1. Charger environment is not cool enough and cannot complete charge. 2. Charger is faulty.	1. Move machine to well-ventilated area. 2. Replace charger.
● ☼ ☼ ● ☼	0xF104	Charger Timer Phase I Warning	1. Batteries not charging correctly.	1. Check for low battery voltage.

T300/T300e ec-H2O NANOCLEAN ICON FAULTS

LED Fault Code and Icon ☼ = Flashing	LCD Fault Code (T300 Only)	Fault Condition	Cause	Correction
● ☼ ☼ ☼ ●	0x0704	ec-H2O CAN Communication Fault	1. Control boards are not communicating properly. 2. Board lost power (wiring issue). 3. Control board may be damaged. 4. ec-H2O connector unplugged (never plugged in). 5. ec-H2O connector pin 2 or 3 disconnected. 6. ec-H2O connector power pin disconnected.	1. Power cycle machine. 2. If error persists, carefully check all connectors and wiring at ec-H2O module. 3. Check if CB-2 is tripped. 4. Check relay M2 (aux contactor). Ensure contacts are closed, as this relay provides switched power to ec-H2O module. 5. Check for B+ (J12-11 and J12-12) and B- (J12-5 and J12-6). Ensure module powers on. Check blue for LED at top of module. If power is verified but ec-H2O module does not power up, it may need to be replaced. 6. Further CAN network troubleshooting guidance can be found at *CAN (CONTROLLER AREA NETWORK) CHECKOUT PROCEDURE* and *CAN (CONTROLLER AREA NETWORK) OPEN TROUBLESHOOTING.*
● ☼ ● ☼ ● ec H2O	0x0711	ec-H2O Pump Open Fault	1. ec-H2O pump wiring, connector or control board issue.	1. Control board is not detecting pump current. Check connections for voltage and verify if pump is operating.
● ☼ ☼ ☼ ☼ ec H2O	0x0713	ec-H2O Pump Over Current Fault	1. Current draw higher than expected.	1. Check pump operating current.
	0x0714	ec-H2O Pump High Current Warning	1. Current has exceeded set threshold for longer than 300mS. Could be caused by stalled motor.	1. Key cycle machine. 2. Check ec-H2O pump operating current. 3. If problem persists, replace ec-H2O pump.
	0x0715	ec-H2O Pump Higher Than Normal Current Warning	1. Current has exceeded set threshold for longer than 3000mS. Could be caused by a motor slowing down.	1. Key cycle machine. 2. Check ec-H2O pump operating current. 3. If problem persists, replace ec-H2O pump.
☼ ● ● ● ● ec H2O	0x0717	ec-H2O Pump FET short fault	1. Driver on control board damaged/shorted.	1. Key cycle machine. 2. If problem persists, replace ec-H2O module.

LED Fault Code and Icon ☼ = Flashing	LCD Fault Code (T300 Only)	Fault Condition	Cause	Correction
☼ ● ☼ ● ● ec H2O	0x0703	ec-H2O Circuit Breaker Tripped Warning	1. Detected module circuit breaker trip. 2. Scrub controller board J6 connector unplugged. 3. Scrub controller board J6 connector pin 1 disconnected.	1. Reset breaker. 2. Power cycle machine. 3. Check connector/wire connections.
	0x0712	ec-H2O Pump Circuit Breaker Tripped	1. Detected module circuit breaker trip. 2. Scrub controller board J6 connector unplugged. 3. Scrub controller board J6 connector pin 1 disconnected.	1. Reset breaker. 2. Power cycle machine. 3. Check connector/wire connections.
ec H2O Solid	0x0700	ec-H2O Generic Fault	1. Unrecognized fault code received. User interface firmware does not align with ec-H2O node firmware.	1. Use Service Diagnostics tool to ensure user interface and ec-H2O firmware are up to date.
	0x0716	ec-H2O Pump Short Fault	1. Current draw higher than expected, detected in <5 seconds when commanded to run.	1. Check wiring and pump for shorts. Repair/replace as necessary. See ec-H2O NanoClean troubleshooting guide for detailed troubleshooting instructions.
	0x072A	ec-H2O Cell Electrode Fault	1. Cell current is operating below allowed operating condition.	1. Refer to ec-H2O NanoClean Troubleshooting Guide. Guidance provided indicates addition of 1/2 tsp of salt per 10 gal of water to solution tank. 2. If problem persists, replace ec-H2O module.
	0x0727	ec-H2O Cell FET Faults	1. Control board problem. 2. Power/battery issue on startup.	1. Replace ec-H2O module.
	0x0741	ec-H2O WCM Pump Open Warning	1. Wiring, connector or control board issue on the ec-H2O pump.	1. Verify the water conditioning module micro pump is connected to machine harness and pump is functional.
	0x0746	ec-H2O WCM Pump Short Warning	1. Shorted load condition. 2. Some higher current draw than hardware design limit.	1. Check harness. 2. Verify water conditioning module micro pump is functional.

LED Fault Code and Icon ☼ = Flashing	LCD Fault Code (T300 Only)	Fault Condition	Cause	Correction
ec H2O Flashing	0x0702	ec-H2O Pressure Switch Active	1. The system pressure switch is detecting a trip or unconnected.	1. System pressure too high. 2. Check connections. Verify functionality of scrub head switch and parking brake switch. Connectors possibly wired to incorrect switches.
	0x0708	ec-H2O System Over Regulation Warning	1. Cell has operated over target current condition for last 50 treated gallons.	1. Check water in solution tank for presence of detergents.
	0x072B	Fault ec-H2O Cell Overcurrent Warning	1. Issue with water in solution tank.	1. Clean/rinse solution tank. Refill tank with clean water. 2. Change water source. 3. If problem persists, refer to ec-H2O NanoClean Troubleshooting Guide.
	0x0721	ec-H2O Cell Open Fault	1. ec-H2O cell wiring, connector or control board issue.	1. Check connector/wire connections.
	0x0726	ec-H2O Cell Short Warning	1. Shorted load condition. 2. Higher current draw than hardware design limit.	1. Refer to ec-H2O NanoClean Troubleshooting Guide.
	0x0728	ec-H2O Cell Over Regulation	1. Cell current exceeds set point for expected operation. Fault is indicated via a flashing blue light on ec-H2O module.	1. Ensure there is no detergent in solution tank. If there is, thoroughly drain and rinse tank, and add clean tap water. 2. If problem persists, refer to ec-H2O NanoClean Troubleshooting Guide.
	0x0729	ec-H2O Cell Under Regulation	1. Cell Current under set point for expected operation. Fault is indicated via a flashing blue light on ec-H2O module.	1. Fault typically occurs when very low-conductivity water is present in e-cell. No action required.
	0x0781	Detergent Tank Empty	1. Detergent tank is empty.	1. Fill detergent tank.
ec-H2O indicator blinking blue/red	0x0707	ec-H2O Water Conditioning Cartridge Expired Warning	1. ec-H2O water conditioning cartridge is expired.	1. Replace ec-H2O water conditioning cartridge.

FAULTS - OFF BOARD BATTERY CHARGER

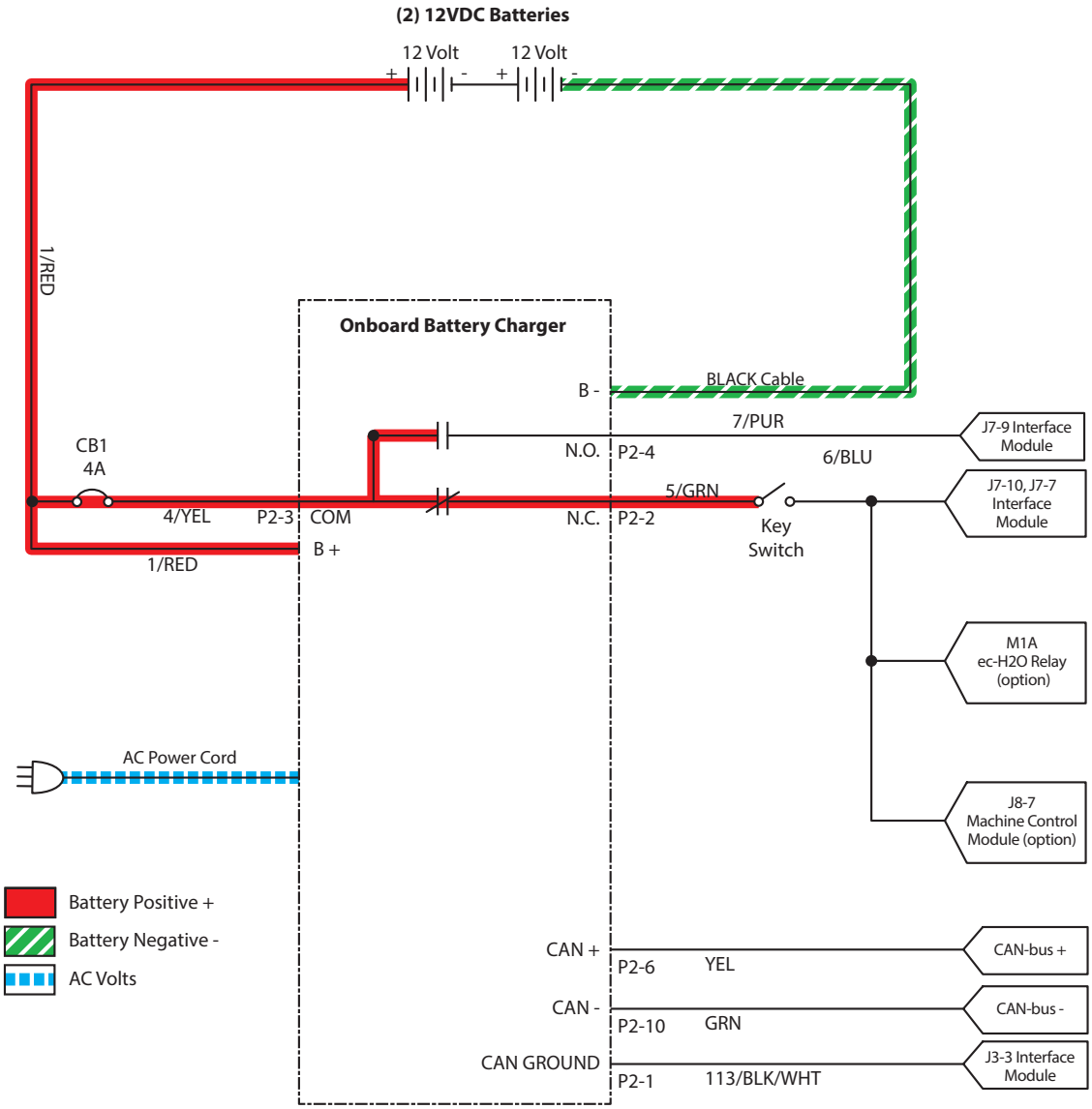
Error Code	Reason	Correction
Srt:IB IBmax	Output current has exceeded nominal current value by more than 10%.	Ensure there are no short circuits on battery or battery cables or there is an active load on battery that draws more current than charger can provide.
E01:Open Circuit	Current suddenly went to zero unexpectedly.	Check connection of clamps to battery and check voltage of battery elements to ensure there are no elements in an open circuit condition. Charger starts again after 5 seconds.
E02: Temperature	Internal thermic sensor has detected high temperature.	Operate charger in a well ventilated area.
E03: Timer	Safety timer of one of the phases has been activated.	Ensure charging current is set suitably for battery capacity and selected voltage corresponds to battery voltage. Also, ensure that there are no elements in short circuit and that battery is not sulphated.

TROUBLESHOOTING

FAULT CONDITION	REASON	CORRECTION
Hour Meter Not Powered	1. Hour meter wires disconnected. 2. Scrub controller board connector J8 pin 9 disconnected.	1. Check connections/wiring.
Bail Not Responding	1. Bail sensor is unplugged. 2. User Interface board defective.	1. Check connections. 2. Replace user interface board.
Parking Brake (Option) Always Reporting Disengaged	1. Parking brake switch disconnected. 2. Faulty wiring. 3. Scrub controller board connector J4 pin 6 disconnected.	1. Check connections/wiring. 2. Verify functionality of parking brake switch and ec-H2O pressure switch. Connectors possibly wired to incorrect switches.
Scrub Head Switch Not Functioning	1. Scrub Head switch disconnected. 2. Faulty wiring. 3. Scrub controller board connector J4 pin 5 disconnected. 4. Scrub controller board connector J9 pin 3 disconnected.	1. Check connections/wiring. 2. Verify functionality of scrub head switch and ec-H2O pressure switch. Connectors possibly wired to incorrect switches.
Vacuum Squeegee Switch Not Functioning	1. Vacuum squeegee switch disconnected. 2. Faulty wiring. 3. Scrub controller board connector J4 pin 7 disconnected.	1. Check connections. 2. Verify functionality of vacuum squeegee switch and ec-H2O pressure switch. Connectors possibly wired to incorrect switches.
Reverse Switch Not Functioning	1. Reverse switch connector unplugged. 2. Large white i-Drive connector pin 12 or 13 disconnected.	1. Check connections/wiring.
No Propel Response (no faults reporting)	1. Propel motor lead unplugged. 2. Large white i-Drive connector pin 1 disconnected. 3. Bail sensor is unplugged.	1. Check connections/wiring.
Scrub Head Not Spinning	1. This fault is looked up most often on a non-propel machine. No fault is reported by machine.	1. Verify bail switch is properly connected.
No Charge Mode LEDs	1. User Interface board is not receiving power from charger at J7-9.	1. Ensure pin connections between UI and charger connectors are not broken or unseated.

SYSTEM TROUBLESHOOTING

ONBOARD BATTERY CHARGING ON (Option)



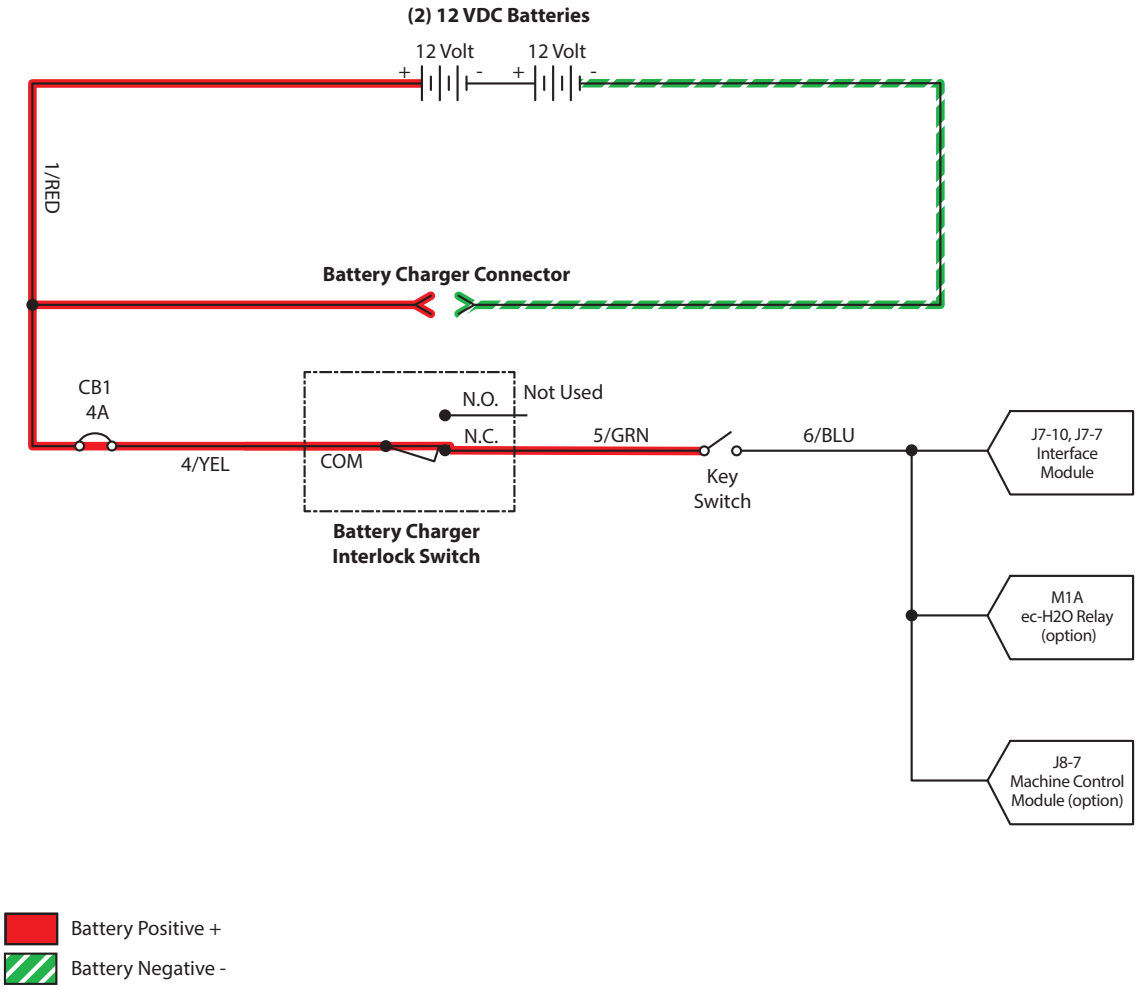
PMC021

BATTERIES FAILED TO CHARGE/REDUCED RUN TIME (ONBOARD CHARGER)

Step	Action	Value(s)	Yes	No
1	• Key On • Is there a flashing BDI fault or LCD Pro-Panel (option) fault code present?		See FAULT/ERROR CODES in TROUBLESHOOTING	Proceed to Step 2
2	• Key Off • Check AC power supply • Is rated AC supply voltage present?		Proceed to Step 3	Check AC supply circuit protection
3	• See BATTERY CHARGER SETTINGS and confirm proper charger settings • Is onboard charger set properly?		Proceed to Step 4	Reprogram battery charger
4	• Key Off • Inspect battery and charger cables for damage, corrosion, contamination or terminal problems • Do any of above conditions exist?		Repair or replace battery and/or charger cables	Proceed to Step 5
5	• Skip this step for sealed or AGM batteries • Key Off • Disconnect batteries • Check water level of all battery cells • Are lead plates submerged?		Proceed to Step 6	Add distilled water until lead plates are covered
6	• Key Off • Load test all batteries (AGM or Lead-Acid) • -or- • Test specific gravity of each cell using a hydrometer or refractometer (Lead-Acid) • Do batteries pass a load test or are all battery cells within 0.050 (50 points) specific gravity of each other?		Replace battery charger	Replace battery or batteries

Terms:
AC = Alternating Current
AGM = Absorbed Glass Mat
Specific Gravity = Relative density of a substance compared to water (1.000 specific gravity)

OFF BOARD BATTERY CHARGING ON (OPTION)



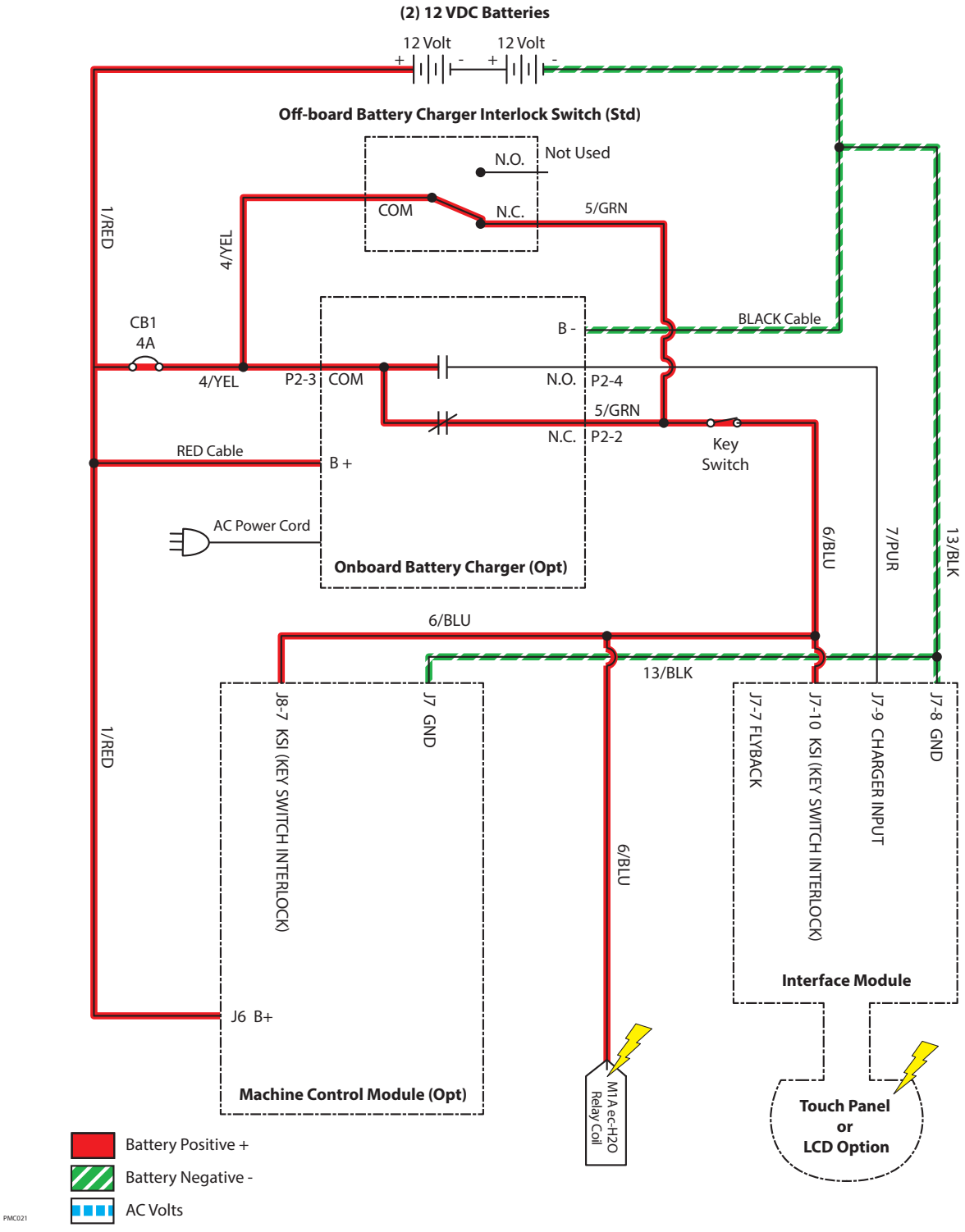
PMC021

BATTERIES FAILED TO CHARGE/ REDUCED RUN TIME (OFF BOARD CHARGER)

Step	Action	Value(s)	Yes	No
1	• Key On • Is there an LCD fault present on Off Board Charger?		See Off Board Battery Charger Faults in TROUBLESHOOTING	Proceed to Step 2
2	• Key Off • Check AC power supply • Is rated AC supply voltage present?		Proceed to Step 3	Check AC supply circuit protection
3	• Key Off • Inspect battery and charger cables for damage, corrosion, contamination or terminal problems • Do any of above conditions exist?		Repair or replace battery and/or charger cables	Proceed to Step 4
4	• Skip this step for sealed or AGM batteries • Key Off • Disconnect batteries • Check water level of all battery cells • Are lead plates submerged?		Proceed to Step 5	Add distilled water until lead plates are covered
5	• Key Off • Load test all batteries (AGM or Lead-Acid) • -or- • Test specific gravity of each cell using a hydrometer or refractometer ((Lead-Acid) • Do the batteries pass a load test or are all battery cells within 0.050 (50 points) specific gravity of each other?		Replace battery charger	Replace battery or batteries

Terms:
AC = Alternating Current
AGM = Absorbed Glass Mat
Specific Gravity = Relative density of a substance compared to water (water = 1.000 specific gravity)

POWER-UP ON

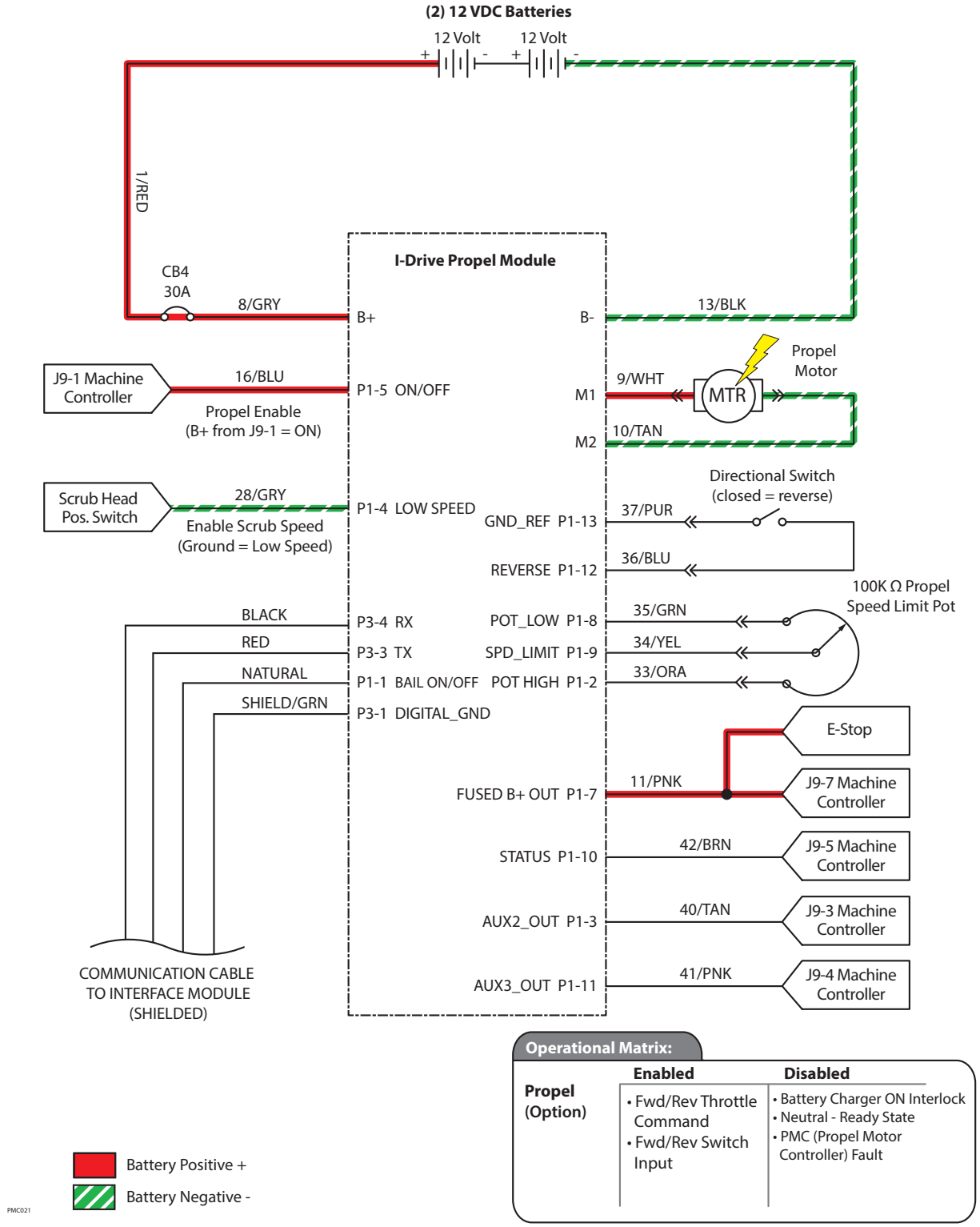

(2) 12 VDC Batteries
12 Volt
12 Volt
Off-board Battery Charger Interlock Switch (Std)
N.O.
Not Used
COM
N.C.
5/GRN
1/RED
4/YEL
CB1
4A
4/YEL
P2-3
COM
B -
BLACK Cable
N.O.
P2-4
5/GRN
N.C.
P2-2
Key
Switch
RED Cable
B +
AC Power Cord
Onboard Battery Charger (Opt)
6/BLU
7/PUR
13/BLK
6/BLU
13/BLK
J8-7 KSI (KEY SWITCH INTERLOCK)
J7 GND
J7-7 FLYBACK
J7-10 KSI (KEY SWITCH INTERLOCK)
J7-9 CHARGER INPUT
J7-8 GND
1/RED
6/BLU
J6 B+
Machine Control Module (Opt)
Interface Module
M1A ec-H2O
Relay Coil
Touch Panel
or
LCD Option
Battery Positive +
Battery Negative -
AC Volts
PMC021

MACHINE FAILED TO POWER UP

Step	Action	Value(s)	Yes	No
1	• Key On • Test the total battery voltage using a voltmeter • Is the total battery voltage greater than 20 VDC?		Proceed to Step 2	Recharge Batteries and Test Power-Up Circuit Operation
2	• Key Off • Firmly press circuit breaker #1 to reset • Is circuit breaker #1 tripped?		Reset and test power-up circuit operation	Proceed to Step 3
3	• Key On • Test voltage applied to the power-up subsystem as shown on electrical schematic • Are the electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or replace necessary components

Terms:
VDC = DC Voltage

T300 PROPEL SUBSYSTEM (OPTION)



Operational Matrix:

	Enabled	Disabled
Propel (Option)	• Fwd/Rev Throttle Command • Fwd/Rev Switch Input	• Battery Charger ON Interlock • Neutral - Ready State • PMC (Propel Motor Controller) Fault

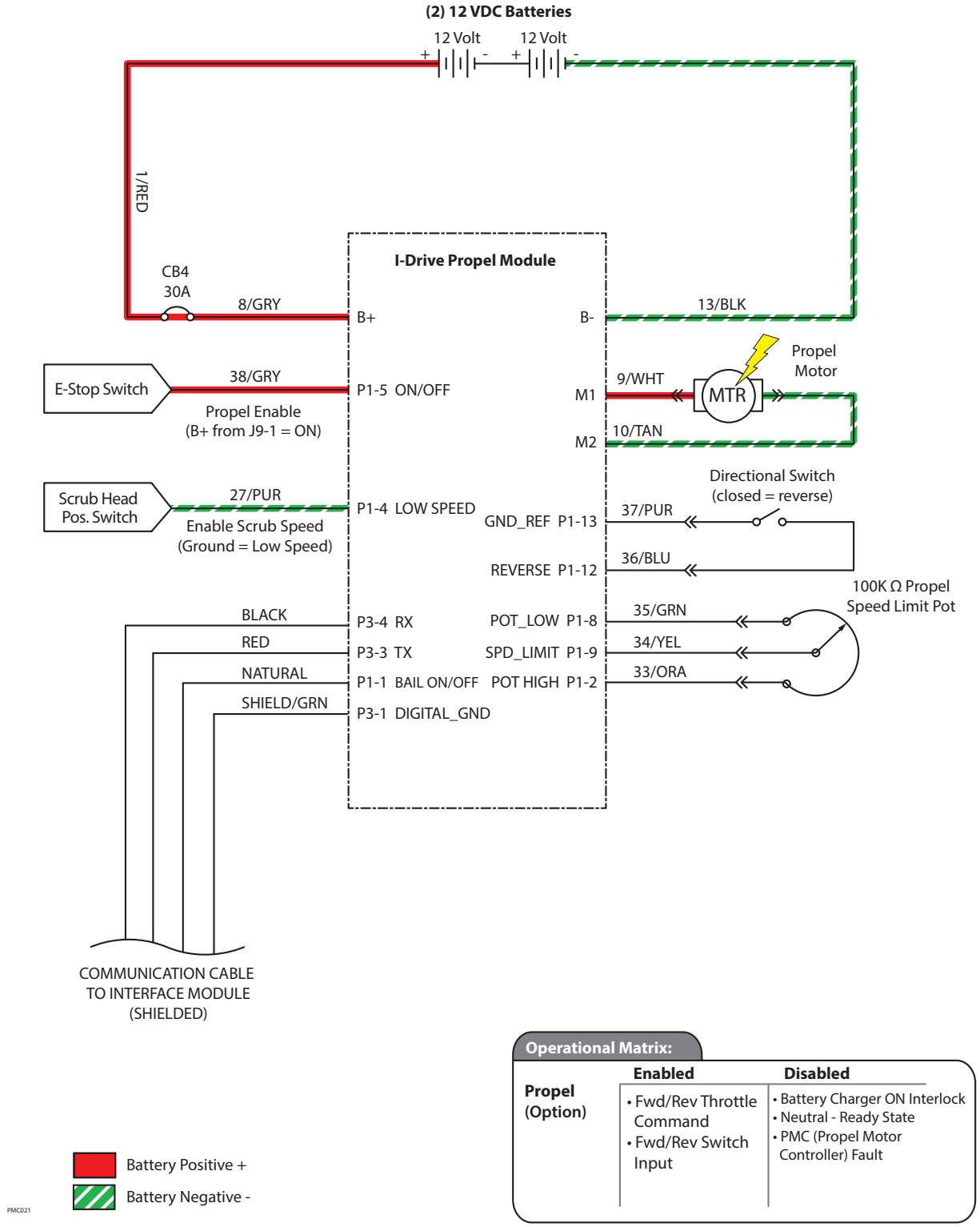
T300 FAILED TO PROPEL

Step	Action	Value(s)	Yes	No
1	• Key On • Enable propel • Is there a flashing BDI fault or LCD Pro-Panel (option) fault code present?		See FAULT/ ERROR CODES in TROUBLE-SHOOTING	Proceed to Step 2
2	• Key Off • Firmly press circuit breaker #4 to reset • Is circuit breaker #4 tripped?		Reset and test power-up circuit operation	Proceed to Step 3
3	• See SERVICE DIAGNOSTICS TOOL and confirm the software is properly configured to enable propel feature • Is software configured properly?		Proceed to Step 4	Reprogram software
4	• Key Off • Place machine on blocks so drive wheels are lifted off floor • Key On • Enable propel • Test voltage applied to propel subsystem as shown on electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or replace necessary components

Terms:

BDI = Battery Discharge Indicator

T300e PROPEL SUBSYSTEM (Option)



Operational Matrix:

	Enabled	Disabled
Propel (Option)	• Fwd/Rev Throttle Command • Fwd/Rev Switch Input	• Battery Charger ON Interlock • Neutral - Ready State • PMC (Propel Motor Controller) Fault

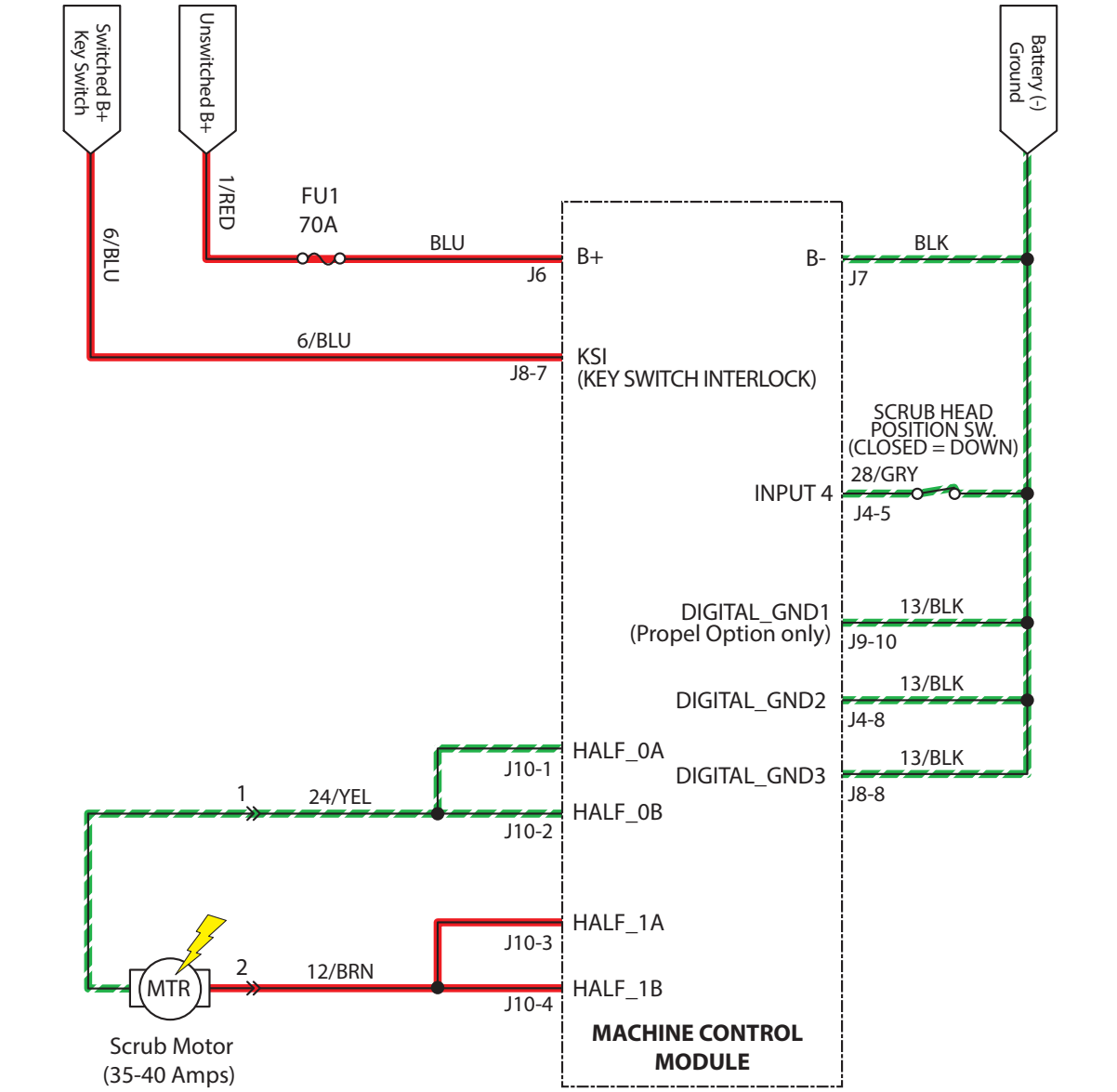
T300e FAILED TO PROPEL

Step	Action	Value(s)	Yes	No
1	• Key On • Enable propel • Is there a flashing BDI fault code present?		See FAULT/ ERROR CODES in TROUBLESHOOTING	Proceed to Step 2
2	• Key Off • Firmly press circuit breaker #4 to reset • Is circuit breaker #4 tripped?		Reset and test power-up circuit operation	Proceed to Step 3
3	• See SERVICE DIAGNOSTICS TOOL and confirm software is properly configured to enable propel feature • Is software configured properly?		Proceed to Step 4	Reprogram software
4	• Key Off • Place machine on blocks so drive wheels are lifted off floor • Key On • Enable forward propel • Test voltage applied to propel subsystem as shown on electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or replace necessary components

Terms:

BDI = Battery Discharge Indicator

T300 SCRUB MOTOR ON



Battery Positive +

Battery Negative -

PMC011

Operational Matrix:

	Enabled	Disabled
Scrub Motor	• Head Lowered - Foot Pedal • Fwd/Rev Throttle Command or Bail Activated on non-Propel models.	• Head Raised - Foot Pedal • Neutral - Ready State or Bail released on non-propel models. • Low Battery Voltage • Fault • Battery Charger ON Interlock

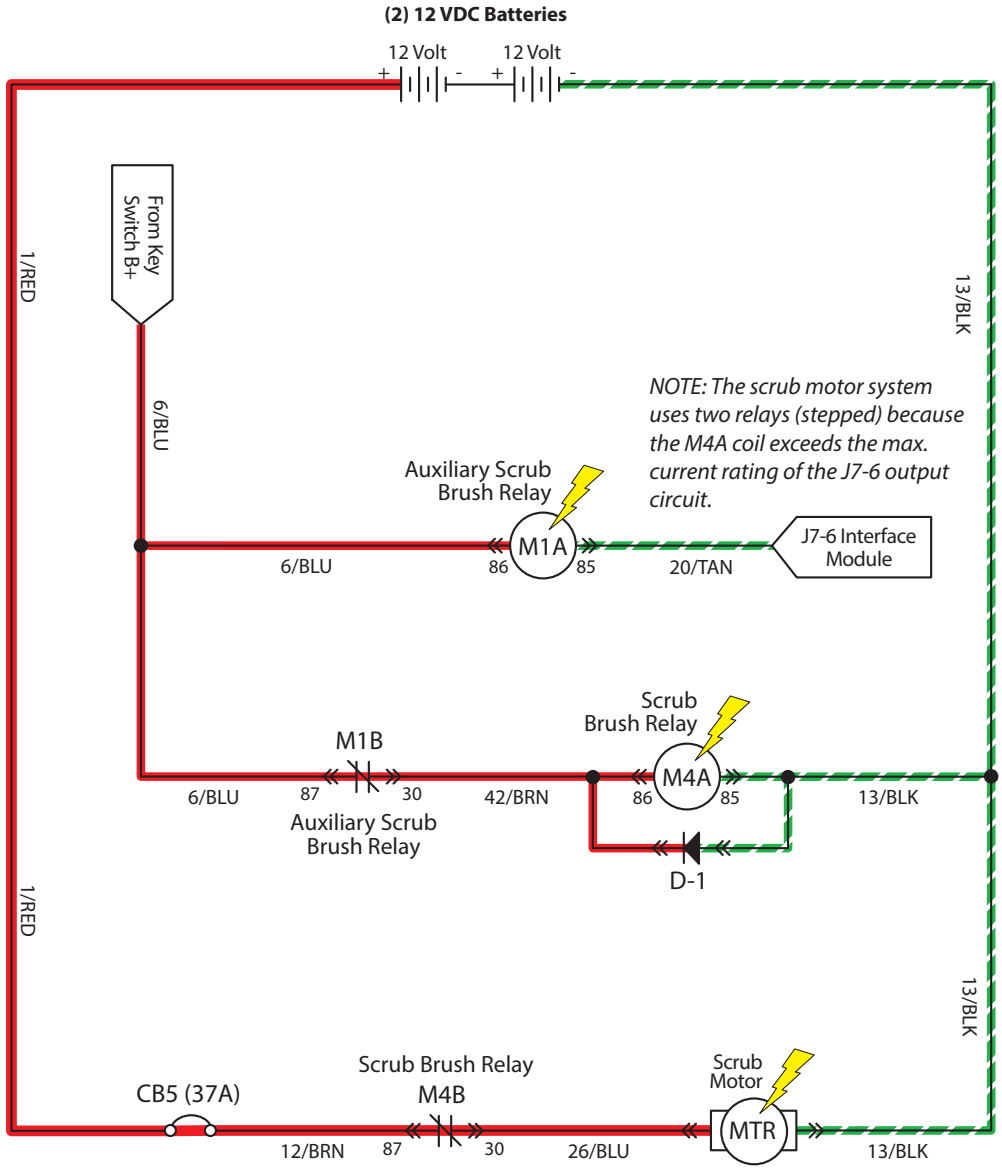
T300 SCRUB MOTOR FAILED TO TURN ON

Step	Action	Value(s)	Yes	No
1	• Key On • Enable scrub motor • Is there a flashing BDI fault or LCD Pro-Panel (option) fault code present?		See FAULT/ ERROR CODES in TROUBLE-SHOOTING	Proceed to Step 2
2	• Key On • Enable scrub motor • Test voltage applied to the scrub motor subsystem as shown on the electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or replace necessary components

Terms:

BDI = Battery Discharge Indicator

T300e SCRUB MOTOR ON



Battery Positive +

Battery Negative -

PMC021

Operational Matrix:

	Enabled	Disabled
Scrub Motor	• Head Lowered - Foot Pedal • Fwd/Rev Throttle Command or Bail Activated on non-Propel models.	• Head Raised - Foot Pedal • Neutral - Ready State or Bail released on non-propel models. • Low Battery Voltage • Fault • Battery Charger ON Interlock

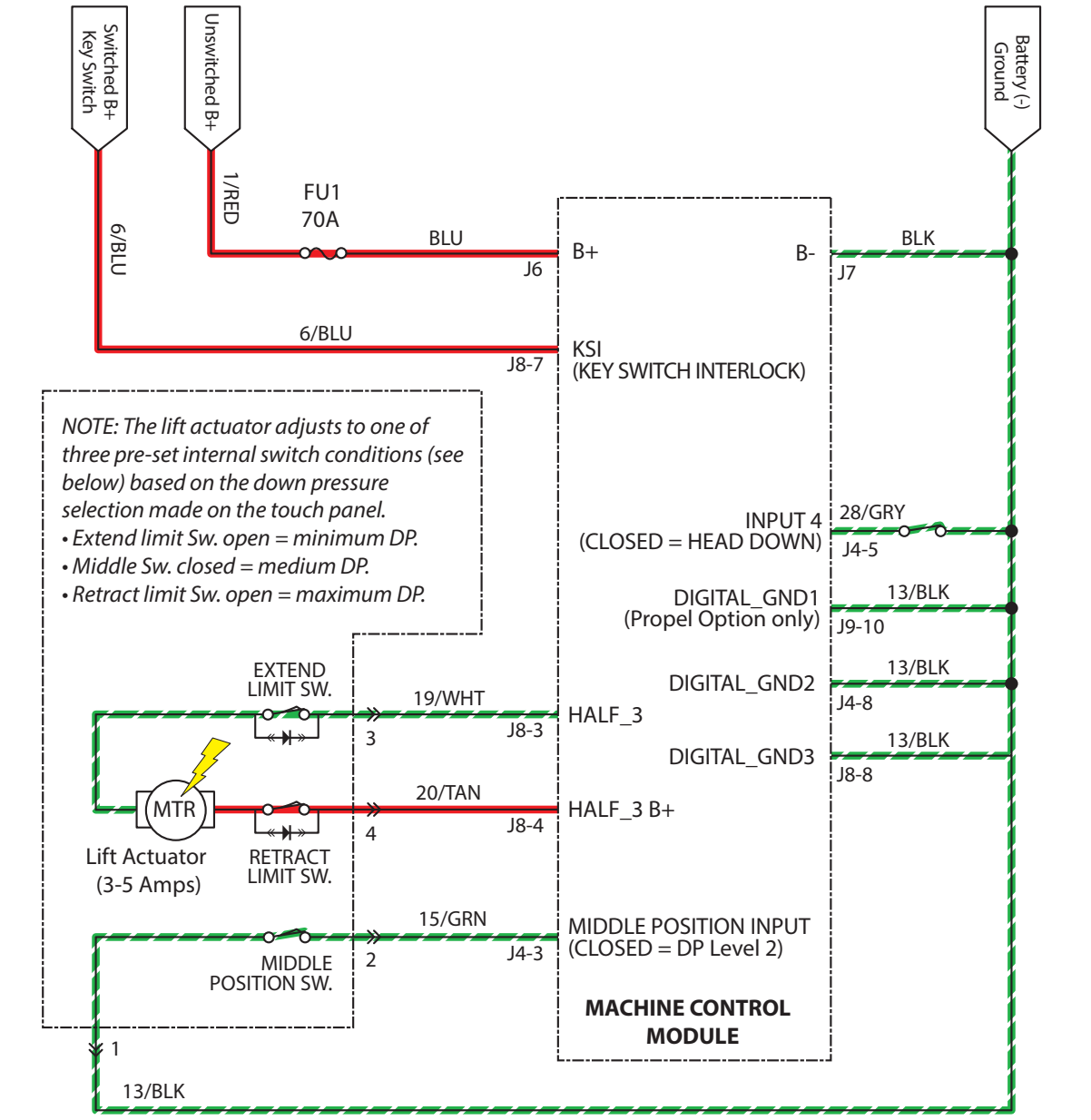
T300e SCRUB MOTOR FAILED TO TURN ON

Step	Action	Value(s)	Yes	No
1	• Key On • Enable scrub motor • Is there a flashing BDI fault code present?		See FAULT/ ERROR CODES in TROUBLESHOOTING	Proceed to Step 2
2	• Key Off • Firmly press circuit breaker #5 to reset • Is circuit breaker #5 tripped?		Reset and test power-up circuit operation	Proceed to Step 3
3	• Key On • Enable scrub motor • Test voltage applied to scrub motor subsystem as shown on electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or replace necessary components

Terms:

BDI = Battery Discharge Indicator

SCRUB HEAD LIFT ACTUATOR (OPTION)



Battery Positive +

Battery Negative -

PMC011

Operational Matrix:

	Enabled	Disabled
Lift Actuator (Option)	• Head Lowered - Foot Pedal	• Head Raised - Foot Pedal • Low Battery Voltage • Load Current Fault • Battery Charger ON Interlock

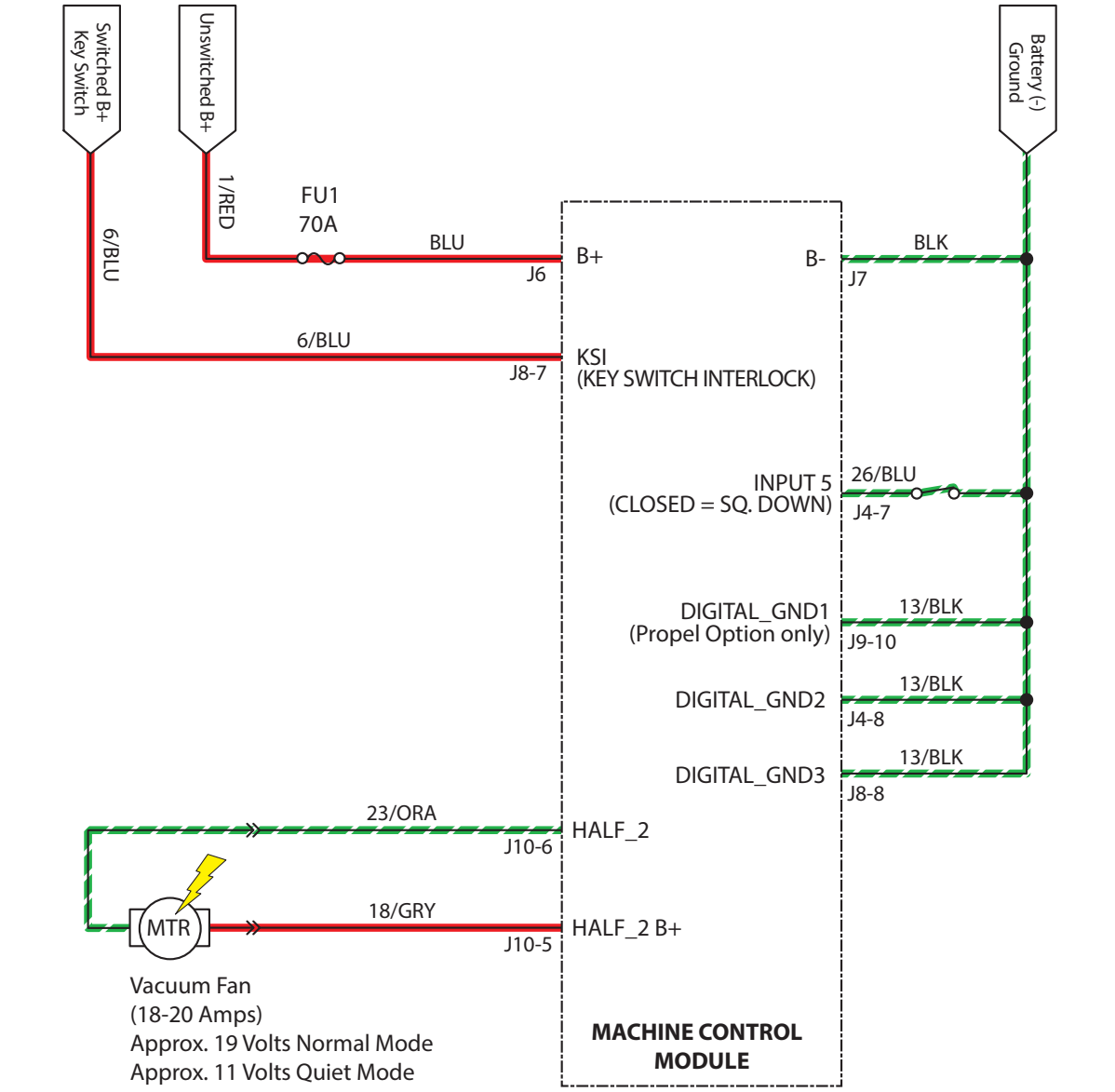
SCRUB HEAD FAILED TO RAISE/LOWER

Step	Action	Value(s)	Yes	No
1	• Key On • Enable lift actuator • Is there a flashing BDI fault or LCD Pro-Panel (option) fault code present?		See FAULT/ ERROR CODES in TROUBLE-SHOOTING	Proceed to Step 2
2	• See SERVICE DIAGNOSTICS TOOL and confirm software is properly configured to enable the automated down pressure feature • Is software configured properly?		Proceed to Step 3	Reprogram software
3	• Key On • Enable scrub motor • Test voltage applied to actuator subsystem as shown on electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or replace necessary components

Terms:

BDI = Battery Discharge Indicator

T300 VACUUM FAN ON



Battery Positive +

Battery Negative -

PMC011

Operational Matrix:

	Enabled	Disabled
Vacuum Fan	• Squeegee Lowered	• Squeegee Raised • Low Battery Voltage • Fault • Battery Charger ON Interlock

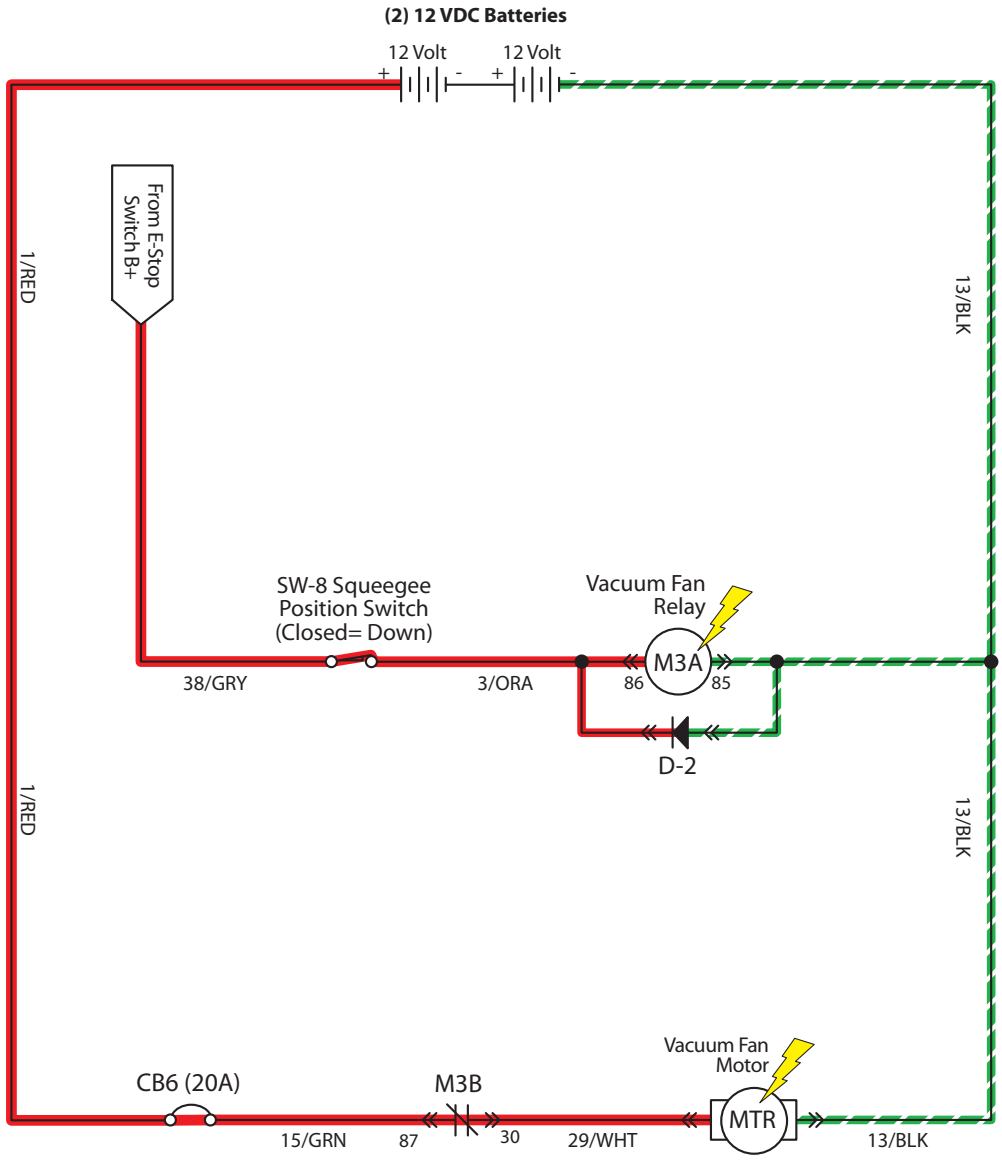
T300 VACUUM FAN FAILED TO TURN ON

Step	Action	Value(s)	Yes	No
1	• Key On • Enable vacuum fan • Is there a flashing BDI fault or LCD Pro-Panel (option) fault code present?		See FAULT/ ERROR CODES in TROUBLE-SHOOTING	Proceed to Step 2
2	• Key On • Enable vacuum fan • Test voltage applied to vacuum fan subsystem as shown on electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or re-place necessary components

Terms:

BDI = Battery Discharge Indicator

T300e VACUUM FAN ON



Battery Positive +

Battery Negative -

PMC021

Operational Matrix:

	Enabled	Disabled
Vacuum Fan	• Squeegee Lowered	• Squeegee Raised • Battery Charger ON Interlock

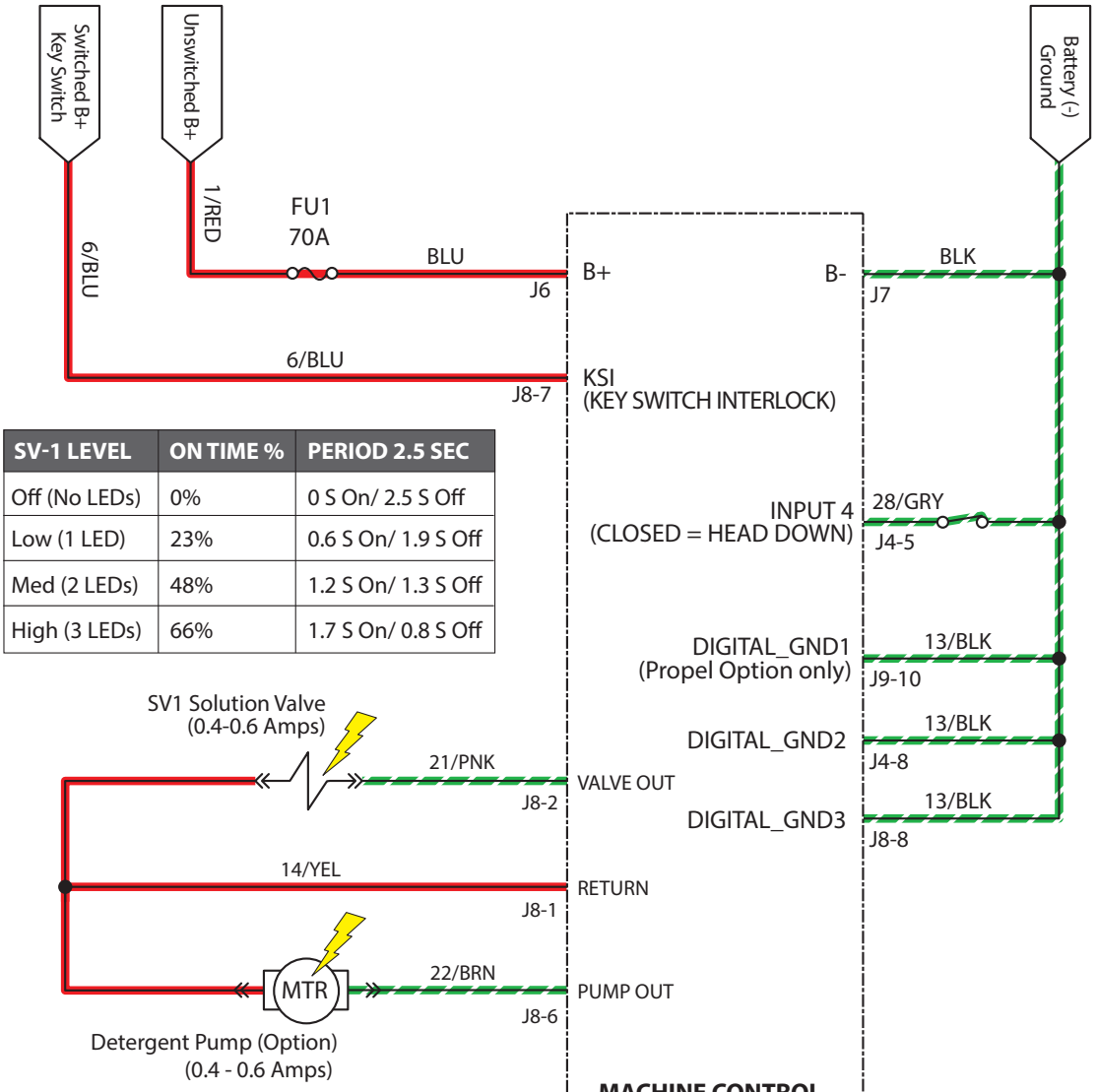
T300e VACUUM FAN FAILED TO TURN ON

Step	Action	Value(s)	Yes	No
1	• Key On • Enable vacuum fan • Is there a flashing BDI fault code present?		See FAULT/ ERROR CODES in TROUBLE-SHOOTING	Proceed to Step 2
2	• Key Off • Firmly press circuit breaker #6 to reset • Is circuit breaker #6 tripped?		Reset and test power-up circuit operation	Proceed to Step 3
3	• Key On • Enable vacuum fan • Test voltage applied to vacuum fan subsystem as shown on electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or replace necessary components

Terms:

BDI = Battery Discharge Indicator

T300 SOLUTION CONTROL ON (CONVENTIONAL)



SV-1 LEVEL	ON TIME %	PERIOD 2.5 SEC
Off (No LEDs)	0%	0 S On/ 2.5 S Off
Low (1 LED)	23%	0.6 S On/ 1.9 S Off
Med (2 LEDs)	48%	1.2 S On/ 1.3 S Off
High (3 LEDs)	66%	1.7 S On/ 0.8 S Off

NOTE: The detergent pump is part of the SE (Severe Environment) option. See SE troubleshooting for additional system details.

Battery Positive +

Battery Negative -

PMC011

Operational Matrix:

	Enabled	Disabled
Solution Control (Conventional)	• Head Lowered - Foot Pedal • Solution Control ON • Fwd/Rev Throttle Command or Bail activated on non-propel models.	• Head Raised - Foot Pedal • Solution Control OFF • Neutral - Ready State or bail released on non-propel models. • Low Battery Voltage • Fault • Battery Charger ON Interlock

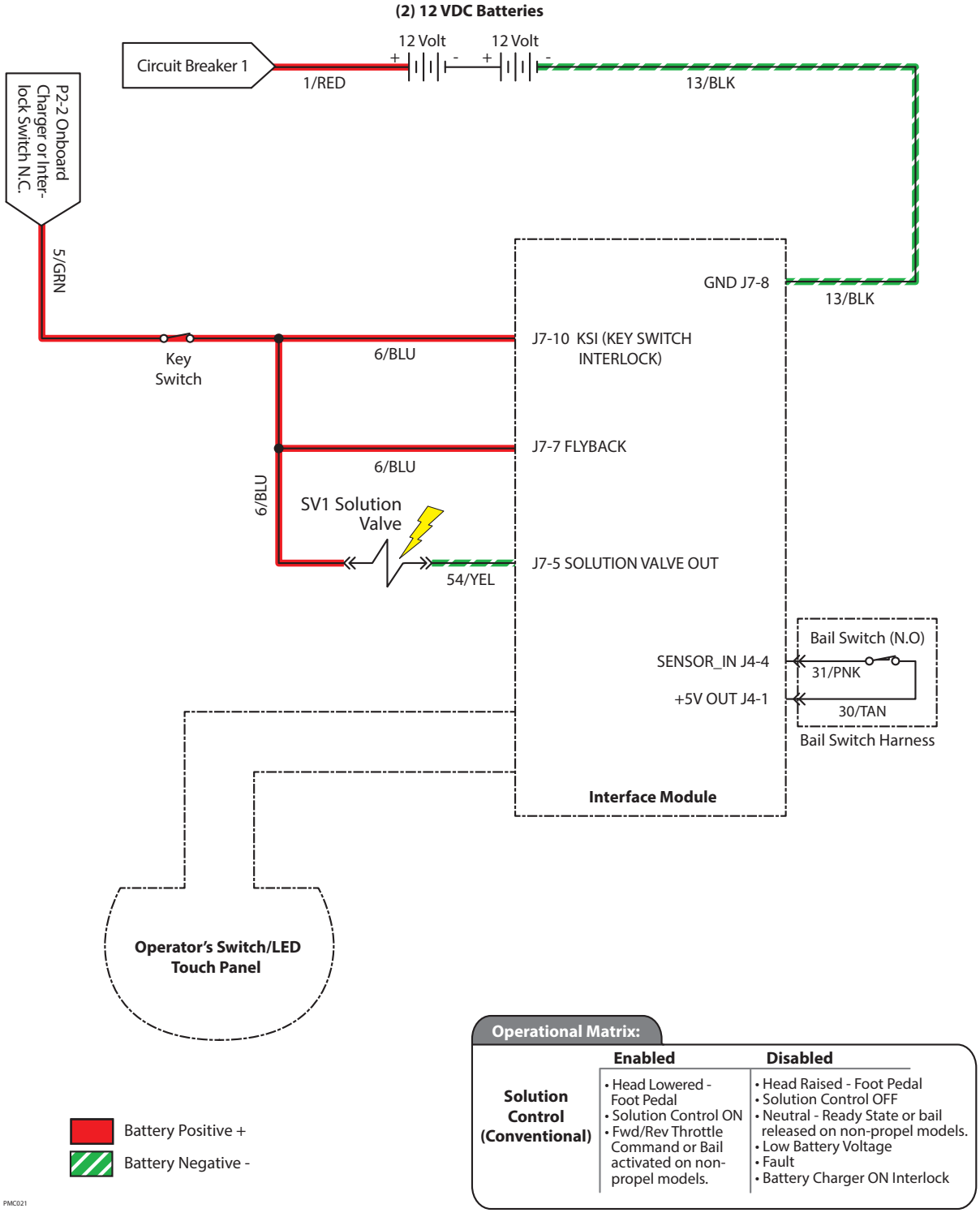
T300 SOLUTION CONTROL FAILED TO TURN ON (CONVENTIONAL)

Step	Action	Value(s)	Yes	No
1	• Key On • Enable solution control (conventional) • Is there a flashing BDI fault or LCD Pro-Panel (option) fault code present?		See FAULT/ ERROR CODES in TROUBLE-SHOOTING	Proceed to Step 2
2	• Key On • Enable solution control (conventional) • Test voltage applied to solution control (conventional) subsystem as shown on electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify Voltage drop location and repair or replace neces-sary compo-nents

Terms:

BDI = Battery Discharge Indicator

T300e SOLUTION CONTROL ON (CONVENTIONAL)



Operational Matrix:

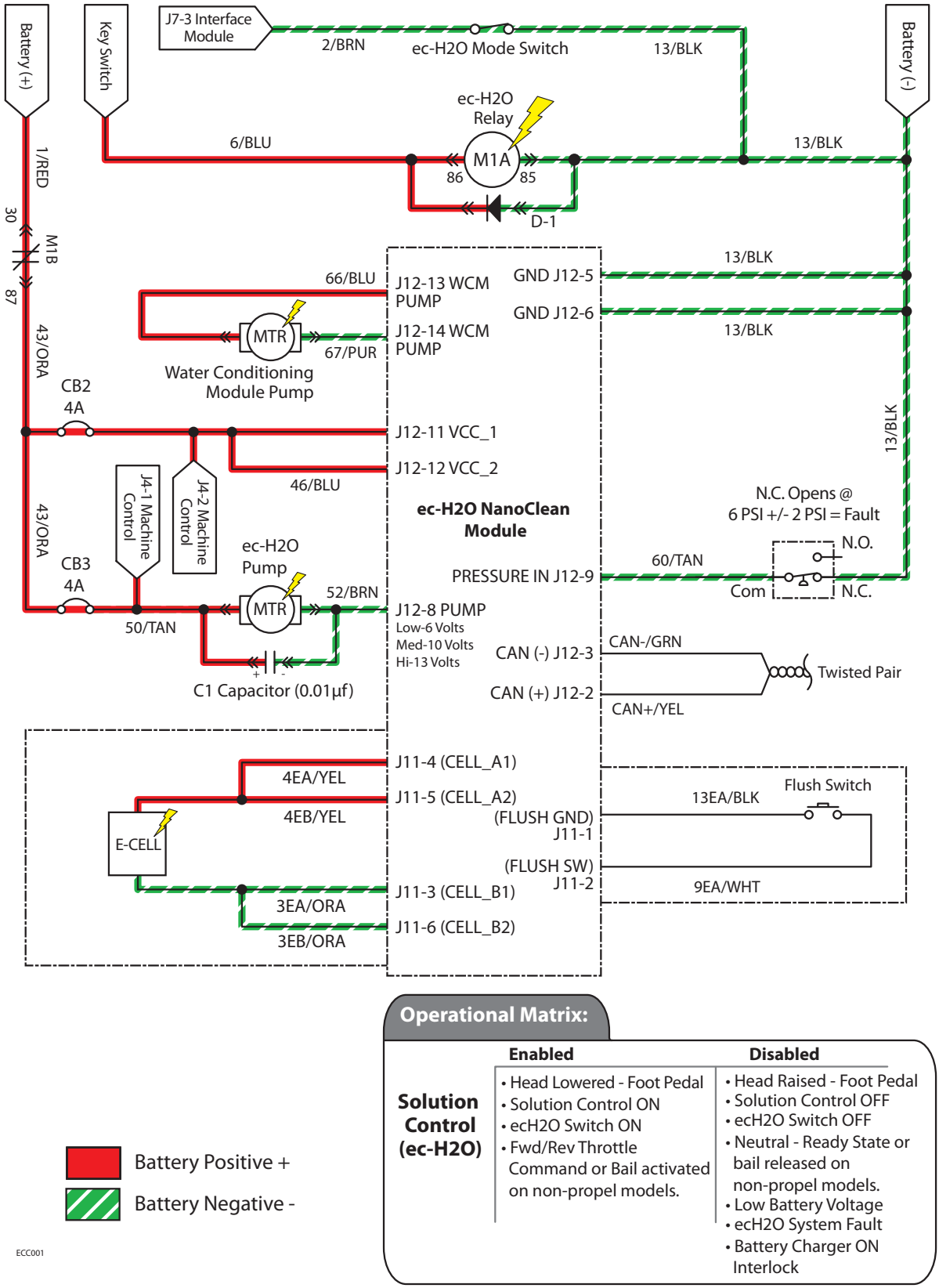
	Enabled	Disabled
Solution Control (Conventional)	• Head Lowered - Foot Pedal • Solution Control ON • Fwd/Rev Throttle Command or Bail activated on non-propel models.	• Head Raised - Foot Pedal • Solution Control OFF • Neutral - Ready State or bail released on non-propel models. • Low Battery Voltage • Fault • Battery Charger ON Interlock

T300e SOLUTION CONTROL FAILED TO TURN ON (CONVENTIONAL)

Step	Action	Value(s)	Yes	No
1	• Key On • Enable solution control (conventional) • Is there a flashing BDI fault code present?		See FAULT/ ERROR CODES in TROUBLESHOOTING	Proceed to Step 2
2	• Key On • Enable solution control (conventional) • Test voltage applied to the solution control (conventional) subsystem as shown on electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or replace necessary components

Terms:
BDI = Battery Discharge Indicator

T300 SOLUTION CONTROL ON (ec-H2O)



Operational Matrix:

	Enabled	Disabled
Solution Control (ec-H2O)	• Head Lowered - Foot Pedal • Solution Control ON • ecH2O Switch ON • Fwd/Rev Throttle Command or Bail activated on non-propel models.	• Head Raised - Foot Pedal • Solution Control OFF • ecH2O Switch OFF • Neutral - Ready State or bail released on non-propel models. • Low Battery Voltage • ecH2O System Fault • Battery Charger ON Interlock

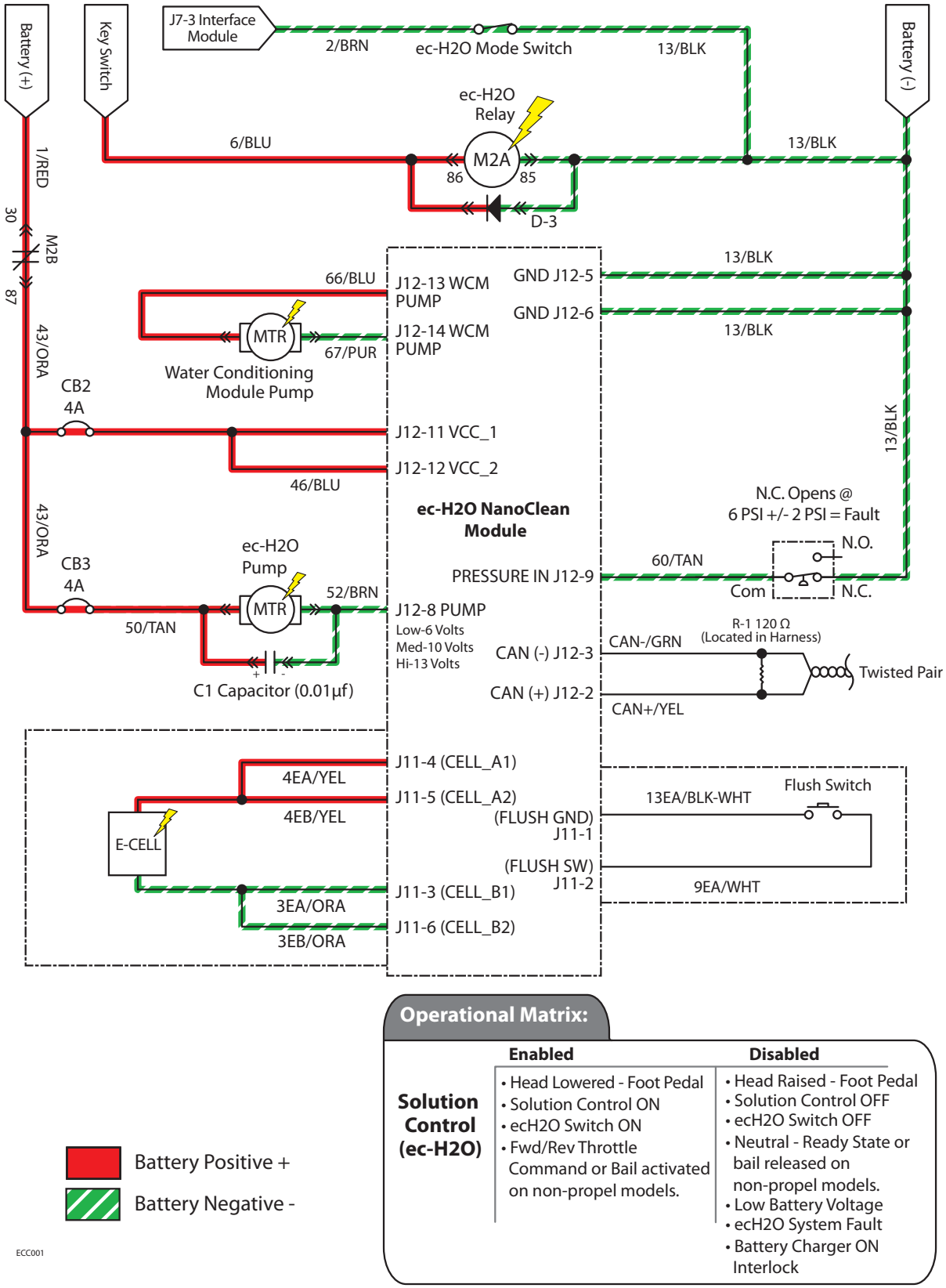
T300 SOLUTION CONTROL FAILED TO TURN ON (ec-H2O)

Step	Action	Value(s)	Yes	No
1	• Key On • Enable solution control (ec-H2O) • Is there a flashing BDI, ec-H2O fault or LCD Pro-Panel (option) fault code present?		See FAULT/ ERROR CODES in TROUBLE-SHOOTING	Proceed to Step 2
2	• Key Off • Firmly press circuit breakers #2 and #3 to reset • Are circuit breakers #2 and #3 tripped?		Reset and test power-up circuit operation	Proceed to Step 3
3	• Key On • Enable solution control (ec-H2O) • Test voltage applied to solution control (ec-H2O) subsystem as shown on electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or replace necessary components

Terms:

BDI = Battery Discharge Indicator

T300e SOLUTION CONTROL ON (ec-H2O)



Operational Matrix:

	Enabled	Disabled
Solution Control (ec-H2O)	• Head Lowered - Foot Pedal • Solution Control ON • ecH2O Switch ON • Fwd/Rev Throttle Command or Bail activated on non-propel models.	• Head Raised - Foot Pedal • Solution Control OFF • ecH2O Switch OFF • Neutral - Ready State or bail released on non-propel models. • Low Battery Voltage • ecH2O System Fault • Battery Charger ON Interlock

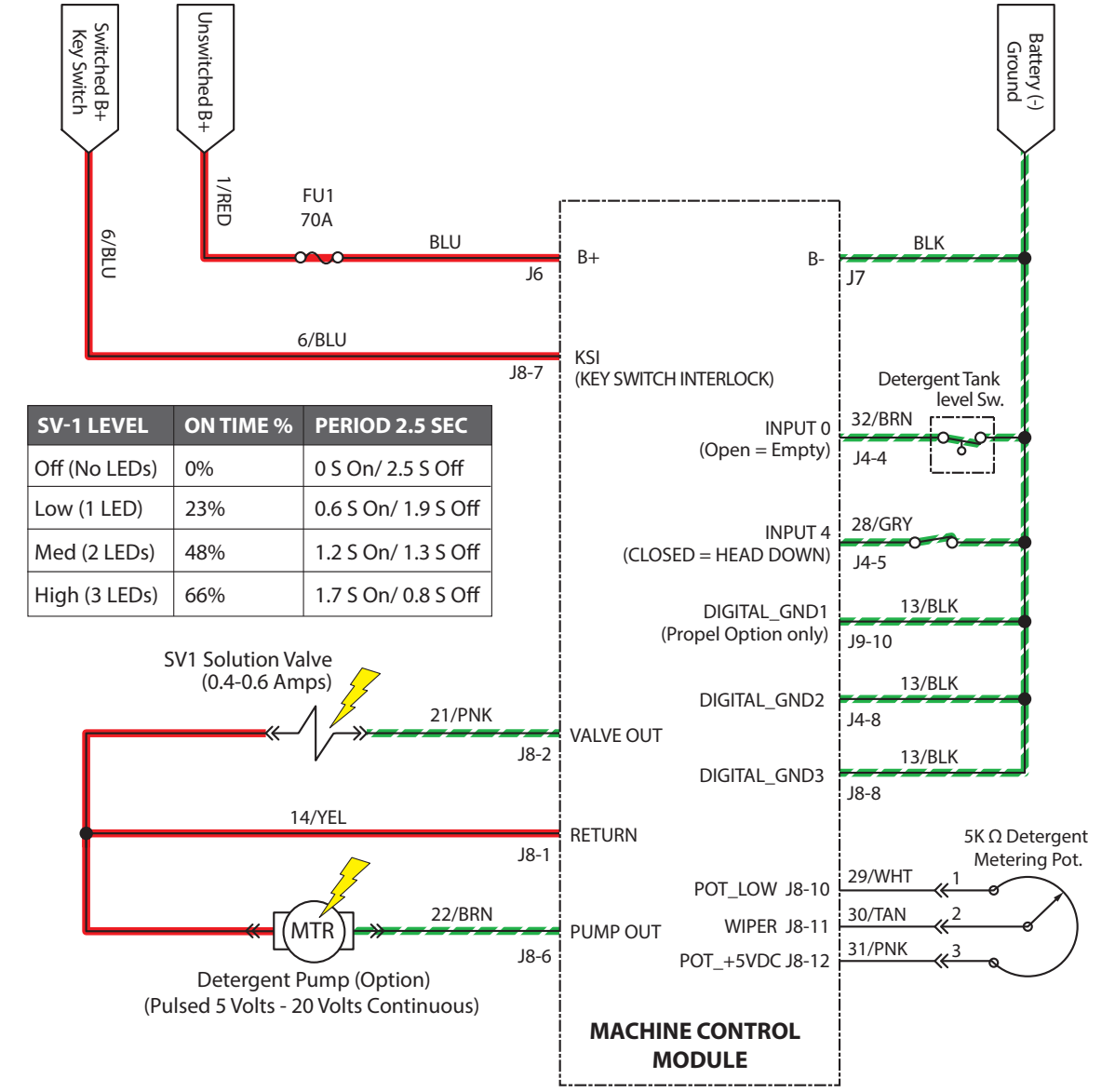
T300e SOLUTION CONTROL FAILED TO TURN ON (ec-H2O)

Step	Action	Value(s)	Yes	No
1	• Key On • Enable solution control (ec-H2O) • Is there a flashing BDI or ec-H2O fault present?		See FAULT/ ERROR CODES in TROUBLE-SHOOTING	Proceed to Step 2
2	• Key Off • Firmly press circuit breakers #2 and #3 to reset • Are circuit breakers #2 and #3 tripped?		Reset and test power-up circuit operation	Proceed to Step 3
3	• Key On • Enable solution control (ec-H2O) • Test voltage applied to solution control (ec-H2O) subsystem as shown on electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or replace necessary components

Terms:

BDI = Battery Discharge Indicator

T300 SE (SEVERE ENVIRONMENT) ON



SV-1 LEVEL	ON TIME %	PERIOD 2.5 SEC
Off (No LEDs)	0%	0 S On/ 2.5 S Off
Low (1 LED)	23%	0.6 S On/ 1.9 S Off
Med (2 LEDs)	48%	1.2 S On/ 1.3 S Off
High (3 LEDs)	66%	1.7 S On/ 0.8 S Off

Operational Matrix:

	Enabled	Disabled
SE (Severe Environment) Detergent Pump (Option)	• Head Lowered - Foot Pedal • Severe Environment On (30 seconds or continuous) • Fwd/Rev Throttle Command or Bail activated on non-propel models. • Detergent Tank Not Empty	• Head Raised - Foot Pedal • Solution Control OFF • Neutral - Ready State or bail released on non-propel models. • Detergent Tank Empty • Low Battery Voltage • Fault • Battery Charger ON Interlock

Battery Positive +

Battery Negative -

PMC011

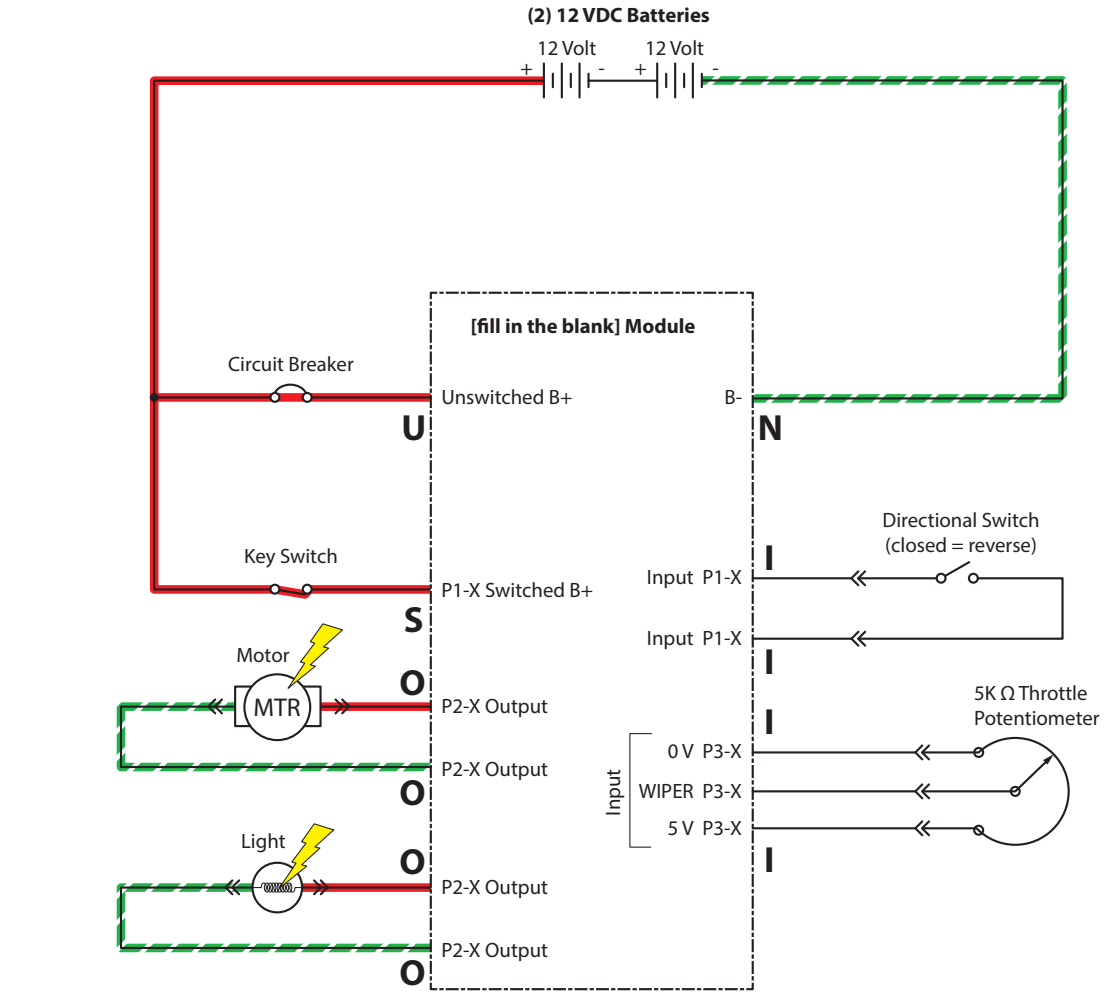
T300 SE (SEVERE ENVIRONMENT) FAILED TO TURN ON

Step	Action	Value(s)	Yes	No
1	• Key On • Enable SE (Severe Environment) detergent pump • Is there a flashing BDI fault or LCD ProPanel (option) fault code present?		See FAULT/ ERROR CODES in TROUBLESHOOTING	Proceed to Step 2
2	• Key On • Enable SE (Severe Environment) detergent pump • Test voltage applied to SE subsystem as shown on electrical schematic • Are electrical circuits operating as shown on electrical schematic?		Return to Step 1	Identify voltage drop location and repair or replace necessary components

Terms:

BDI = Battery Discharge Indicator

SUN-I/O CIRCUIT BOARD TESTING (UNIVERSAL SCHEMATIC)



NOTE: The "P1-X" or sometimes "J1-X" format refers to the plug or connector number followed by the pin number within that connector. For example, P1-4 means plug number 1, pin number 4. Use this information to locate and identify proper wires per the actual electrical schematic.

S = Switched (+)

U = Unswitched (+)

N = Negative (-)

I = Inputs

O = Outputs

SUN-I/O CIRCUIT BOARD TESTING PROCEDURE

Step	Action	Value(s)	Yes	No
1 ✓Switched (+)*	• Key On, circuits loaded (preferred) • All electrical components remain connected to wire harness • Use electrical schematic to identify all switched (+) power supply wires • Is there ***switched battery voltage (+)*** applied to circuit board?	Applied voltage must be within 1 volt of actual battery voltage	Proceed to Step 2	Identify voltage drop location and repair or replace necessary components
2 ✓Unswitched (+)*	• Key On, circuits loaded (preferred) • All electrical components remain connected to wire harness • Use electrical schematic to identify all unswitched (+) power supply wires • Is there ***unswitched battery voltage (+)*** applied to circuit board?	Applied voltage must be within 1 volt of actual battery voltage	Proceed to Step 3	Identify voltage drop location and repair or replace necessary components
3 ✓Negative (-)*	• Key On, circuits loaded (preferred) • All electrical components remain connected to wire harness • Use electrical schematic to identify all negative(-)/ground supply wires • Is there ***battery negative (-)*** applied to circuit board?	Applied voltage must be within 1 volt of actual battery voltage	Proceed to Step 4	Identify voltage drop location and repair or replace necessary components
4 ✓Inputs	• Key On • Manually exercise all input devices and observe status change using a multimeter • Use electrical schematic to identify all input circuits • Do all inputs function correctly?		Proceed to Step 5	Repair or replace necessary input components
5 ✓Outputs	• Key On • Disconnect battery and circuit board from wire harness and test output circuits for open or shorted circuits using an Ohmmeter. • Use electrical schematic to identify all output circuits • Is there an ***open*** or ***shorted*** 2 output circuit causing the trouble symptom?		Repair or replace necessary output circuit components	Replace circuit board.

1 Wire harnesses are components.
2 An open circuit has infinite resistance “O.L.”. A shorted circuit has “0” resistance. Always test through entire circuit.

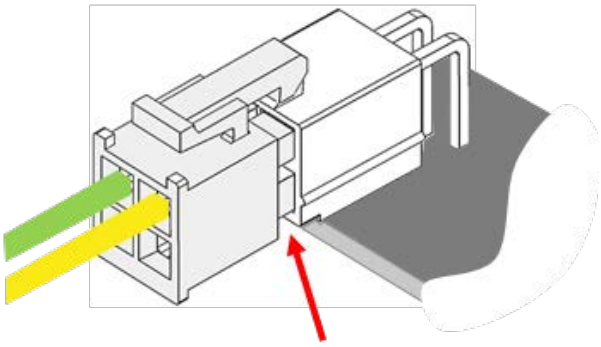
* Switched (+) and Unswitched (+) indicate positive battery voltage applied to circuit board. Negative (-) indicates battery negative (ground) as part of power supply to circuit board.

CAN (CONTROLLER AREA NETWORK) OPEN NETWORK ISSUES

Procedures to help investigate an issue with a CAN open network.

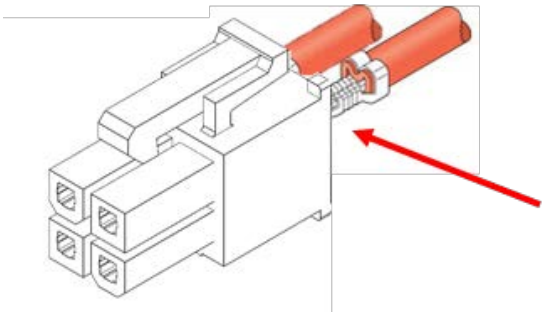
VERIFY CONNECTORS FULLY SEATED

Each node on the network has a connector for the CAN communication wires. A loose connection could cause a fault code error. Check each board individually to make sure the connectors are fully seated. There may also be other connectors within the harness that should be checked. If the connector is not fully seated, push in and power cycle the machine to see if the fault clears.



VERIFY PIN FULLY SEATED

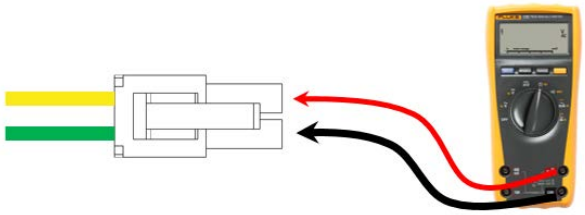
Sometimes a pin in the harness side of the connector may not be fully seated and may work loose over time. Verify the CAN communication wires are snapped into the connector. If pin is not seated, push in and power cycle machine to see if fault clears.



NETWORK RESISTANCE

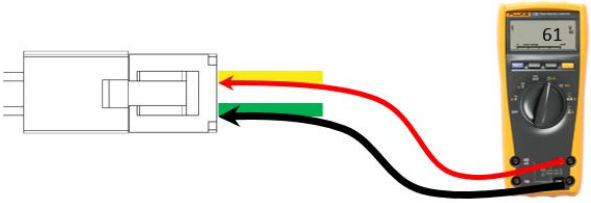
The network resistance must be correct for the network to operate correctly. Depending on which node the measurement is taken at and the method of measurement, the resistance may be one of two values: 121Ω or 61Ω. Any value other than these two means something is wrong with the network.

Method 1



1. Turn off machine power.
2. Locate a CAN node location on the machine.
3. Disconnect the connector containing the CAN wires.
4. Measure the resistance between the green and yellow wires.
5. Depending which nodes are still connected, resistance should be 61Ω or 121Ω.

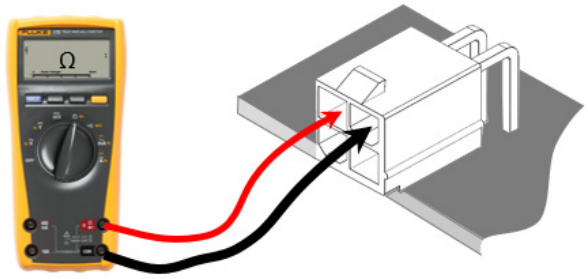
Method 2



1. Turn off machine.
2. Locate a CAN node location on the machine.
3. Carefully push probes into back of connector containing the CAN wires.
4. Since network remains connected in this mode, resistance should measure approximately 61Ω.

CHECK NODE (MODULE) RESISTANCE

Each node on the network has a connector for the CAN communication wires. Check each board individually to make sure the CANH and CANL resistance measurements are > 1M Ω for non-terminating nodes and 122Ω for terminating nodes. The CAN connections may be on their own connector (pictured below) or combined into another connector. See specific machine schematic for more details.



CHECK WIRE CONTINUITY TO NODE

A check can be made between two points on the harness verifying continuity of the wire harness. Check the yellow to yellow connections and the green to green.

MACHINE NODE TABLE

The following table outlines the CAN nodes by machine model. A standard node is one that is always present. Optional nodes are dependent on the customer order. Gray box = Terminating Resistor Locations. If only one box marked on a machine, the second termination is made in the harness.

Machine model	**Nodes**									
Master/ Slave	Master	Slave								
Optional Nodes	Standard	Standard	Standard	Standard	Standard	Standard	Optional	Optional	Optional	Optional
T300	User Interface	Scrub Controller	-	-	-	-	Charger	ec-H2O	-	-
T300e/ SS300	User Interface	-	-	-	-	-	Charger	ec-H2O	-	-

SERVICE

SERVICE DIAGNOSTICS TOOL

Machine software configuration, which is stored in the interface module, must be programmed if the i-Drive or interface modules are replaced or if optional features are installed.

Authorized service providers can download the Service Diagnostics software. Factory-Direct Tennant Service personnel have this software installed on their ServiceLink devices.

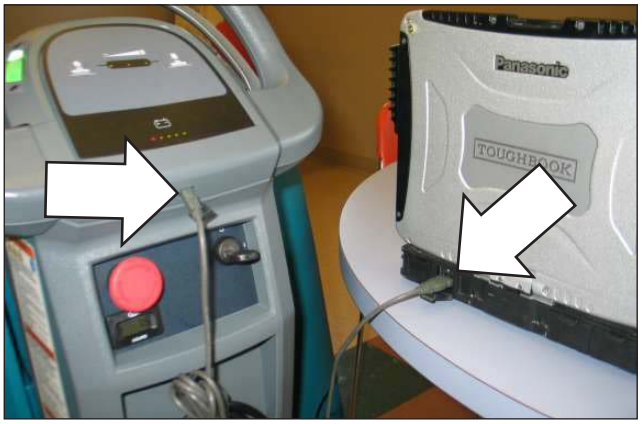
A USB cable connects from the service device to an external port on the control console (USB to mini USB adapter cable required). The SERVICE DIAGNOSTICS TOOL configures up to seven control modules depending on options. The interface module stores configuration data and communicates via RS232 serial communication with the i-Drive and through a CAN-Bus to all other modules.

- **Interface Module:** Located in the operator console.
- **Machine Control Module (T300-only option):** Located at the rear of the battery compartment beneath a cover.
- **IRIS Module (T300-only option):** Attached to the machine control module as an assembly.
- **i-Drive Propel Module (option):** Located above the rear squeegee assembly at the rear of the scrubber.
- **Onboard Battery Charger Module (option):** Located behind the console cover at the rear of the machine.
- **ec-H2O NanoClean Module (option):** Located beneath the recovery tank at the front of the machine.

PROGRAM A NEW INTERFACE MODULE

SYSTEM REQUIREMENTS: Windows® 7 Operating System, Microsoft .NET 4.5 or later, USB to Mini-USB cable.

1. Connect a USB cable from a service device to the machine.

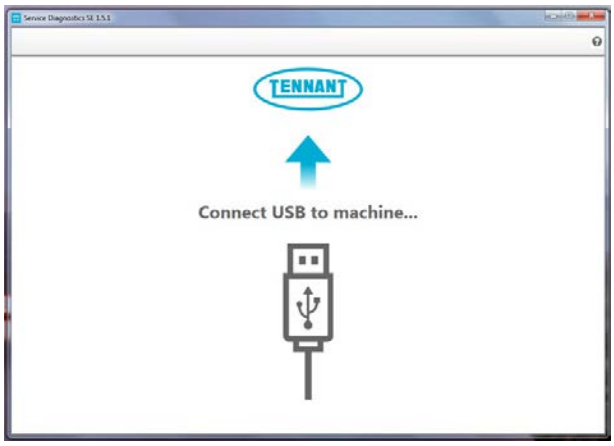


2. Turn the key switch ON.

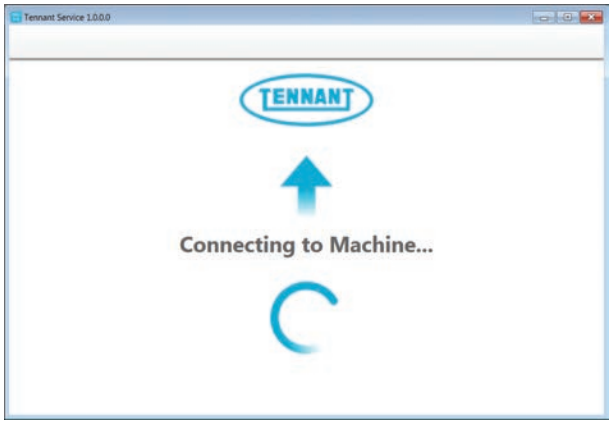
3. Double click the Service Diagnostics desktop shortcut or find the software in All Programs to launch the software.

NOTE: Service device may prompt a restart after installing the machine driver. Decline restart, close Service Diagnostics, and relaunch Service Diagnostics.

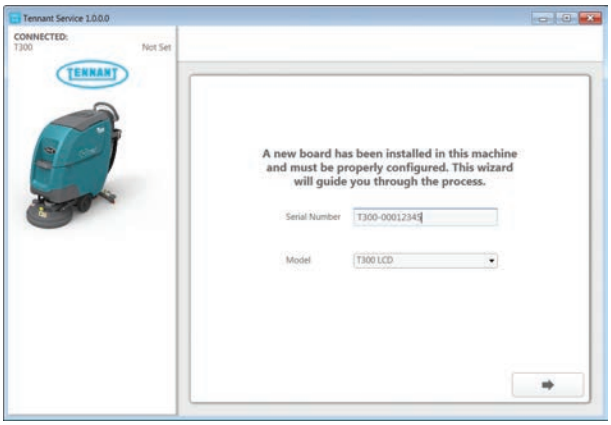
NOTE: Confirm key switch is ON and check USB cable connection to the machine if the screen below appears on the screen.



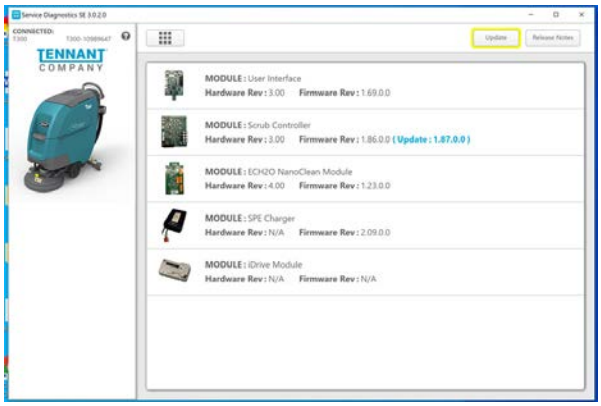
4. The Service Diagnostics tool now connects to the control module network.



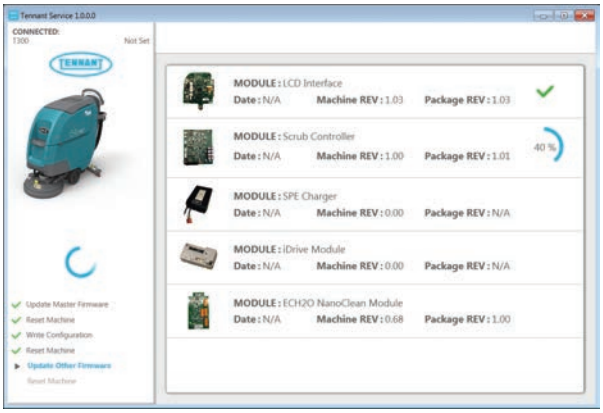
5. The Service Diagnostics tool automatically detects a new interface module installation. Enter the model and serial number and then click the arrow button.



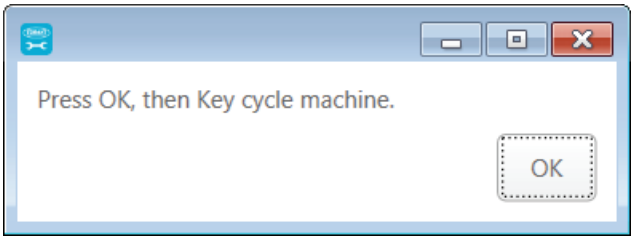
6. Inspect the actual machine configuration and match applicable configurations from the drop-down menus and then click on the arrow button.



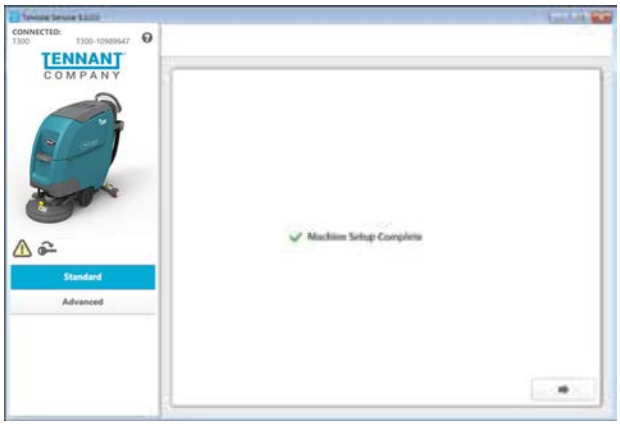
7. The programming process begins and all of the control modules are updated (if applicable).



8. The Service Diagnostic tool may prompt to cycle the key switch off/on during the process. If prompted, click the OK button and then cycle the key switch to allow programming to continue. Do not interrupt process unless prompted to do so.



9. Cycle the key switch to save selections after Machine Setup Complete appears on the screen.



UPDATE THE MACHINE FIRMWARE

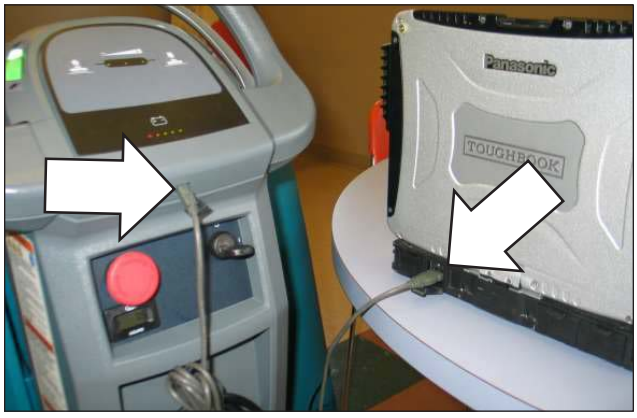
SYSTEM REQUIREMENTS: Windows® 7 Operating System, Microsoft .NET 4.5 or later, USB to Mini-USB cable.

Machine software configuration, which is stored in the interface module, must be programmed if the i-Drive or interface modules are replaced in the field or if optional features are installed.

Authorized service providers can download the Service Diagnostics software. Factory-Direct Tennant Service personnel have this software installed on their ServiceLink devices.

A USB cable connects from the service device to an external port on the control console. The SERVICE DIAGNOSTICS TOOL configures up to five control modules depending on options. The interface module stores configuration data and communicates via RS232 serial communication with the i-Drive and through a CAN-Bus to all other modules.

1. Connect a USB cable from a service device computer to the machine.

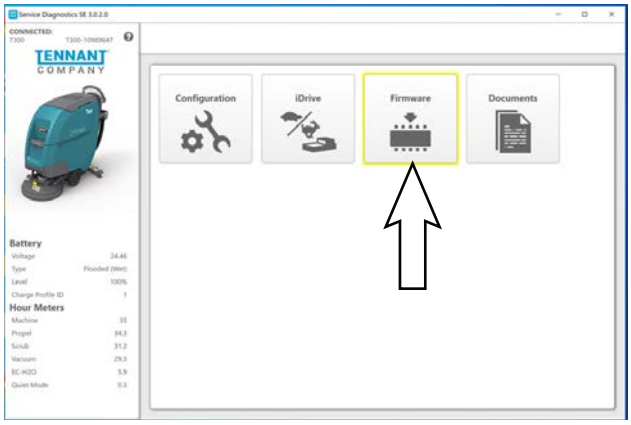


2. Turn the key switch ON.

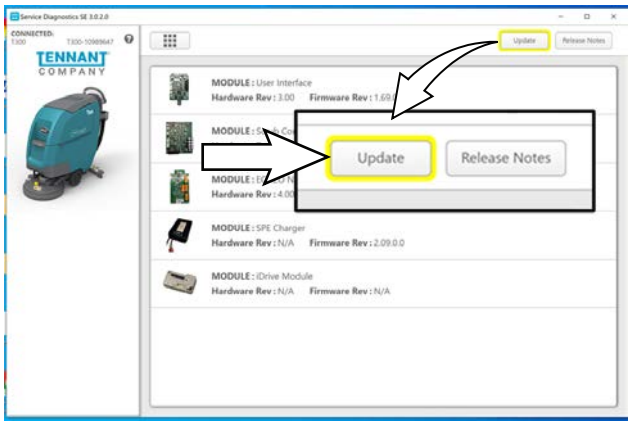
3. Double click the Service Diagnostics desktop shortcut or find the software in All Programs to launch the software.

NOTE: Service device may prompt a restart after installing the machine driver. Decline the restart, close Service Diagnostics, and relaunch Service Diagnostics.

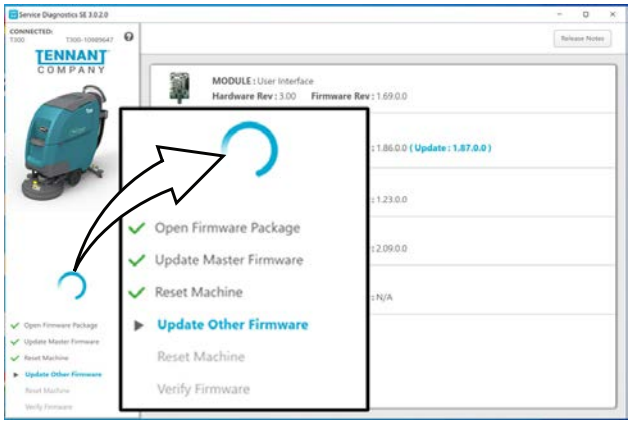
4. Check for machine software updates. A yellow highlight surrounding the Firmware button indicates that updates are available.



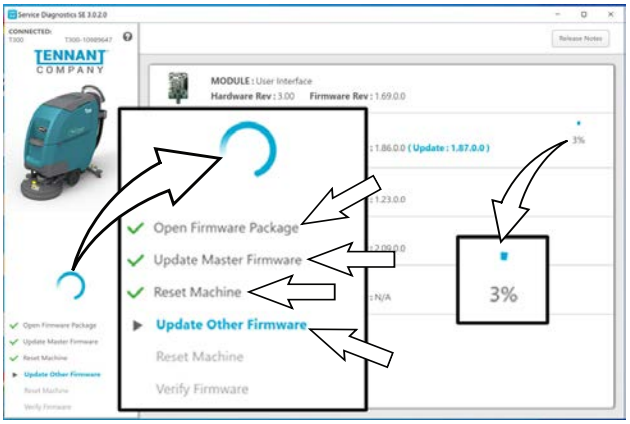
5. Click on the Update button to begin updating the modules.



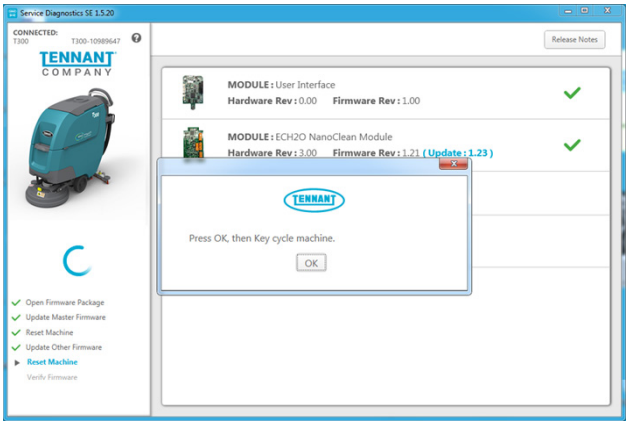
6. The firmware package opens and “Update Master Firmware” begins. The process indicator and firmware update status bar appear on the left side of the screen.



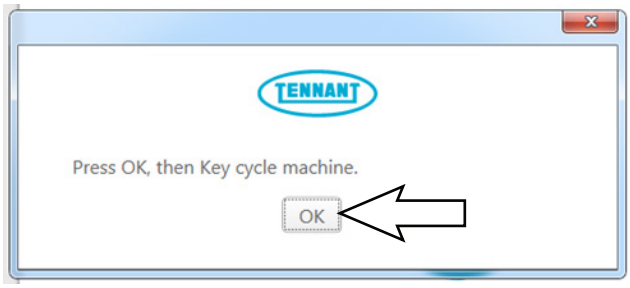
Allow firmware update package to update the machine operating system. Various update status indicators appear on screen while the firmware updates are occurring. Watch the on screen status indicators for the firmware update status.



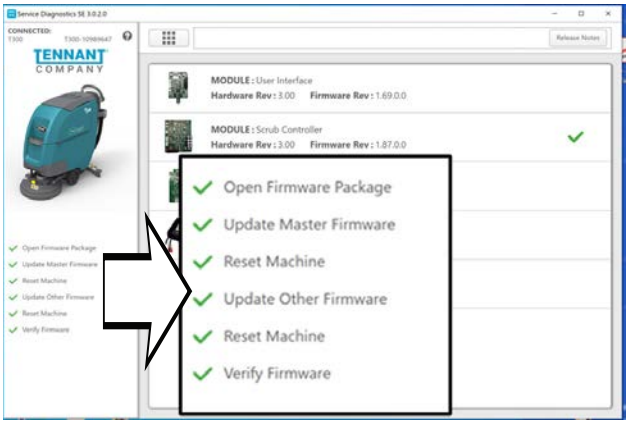
A prompt box to “Press OK, the Key cycle machine” will appear on the screen.



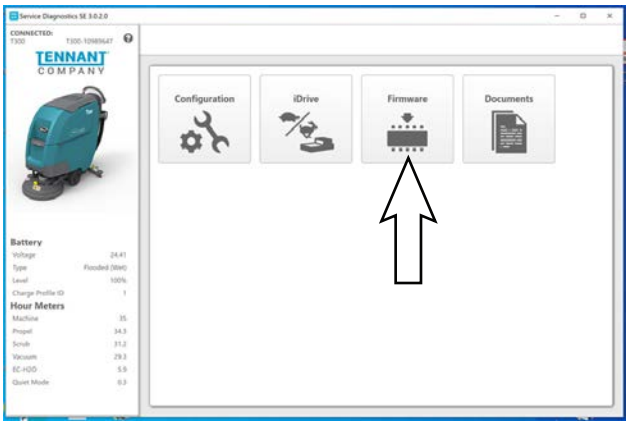
7. Press the OK button in the “Press OK, then Key cycle machine” prompt box and cycle the key switch.



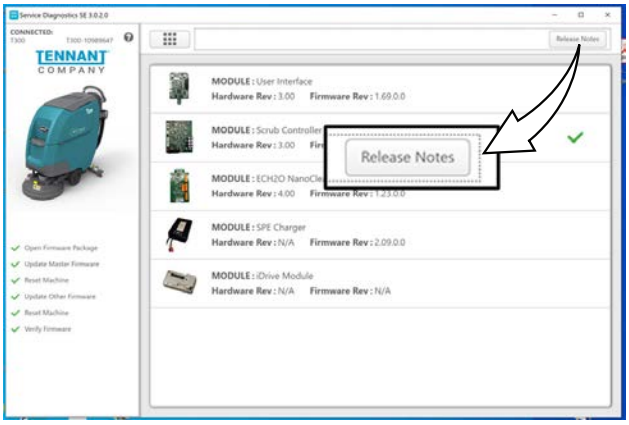
8. Allow the firmware update package to continue to update the machine operating system. The process indicator will eventually disappear from the screen and all items in the firmware update status bar will have check marks to the left to verify the firmware update has occurred.



The firmware updates are complete when there is no longer a yellow highlight surrounding the Firmware button.



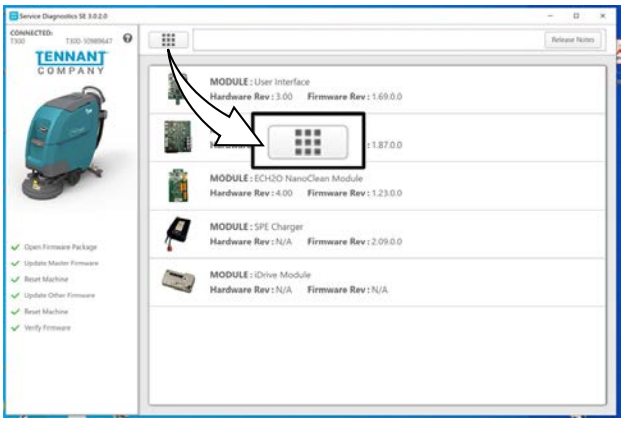
9. Click the Release Notes button to access the attached PDF notes for the firmware updates.



10. Refer to the PDF notes to confirm the firmware updates and fixes to the machine.

11. Cycle the key switch to save changes.

12. Click on the Main Menu button to return to the Main Menu.



PROGRAM THE i-DRIVE MODULE (OPTION)

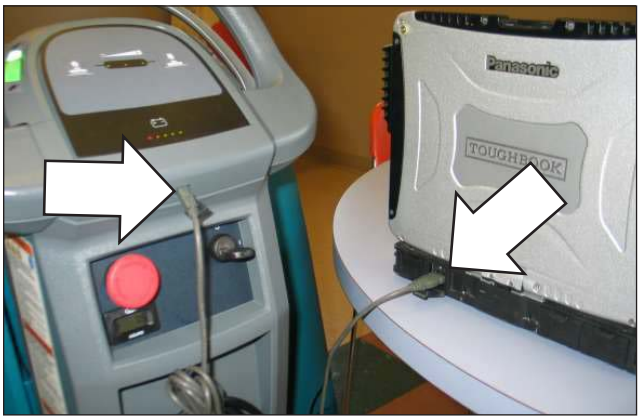
SYSTEM REQUIREMENTS: Windows® 7 Operating System, Microsoft .NET 4.5 or later, USB to Mini-USB cable.

Machine software configuration, which is stored in the interface module, must be programmed if the i-Drive or interface modules are replaced or if optional features are installed in the field.

Authorized service providers can download the Service Diagnostics software. Factory-Direct Tennant Service personnel have this software installed on their ServiceLink devices.

A USB cable connects from the service device to an external port on the control console (USB to mini USB adapter cable required). The SERVICE DIAGNOSTICS TOOL configures up to seven control modules depending on options. The interface module stores configuration data and communicates via RS232 serial communication with the i-Drive and through a CAN-Bus to all other modules.

1. Connect a USB cable from a service device to the machine.

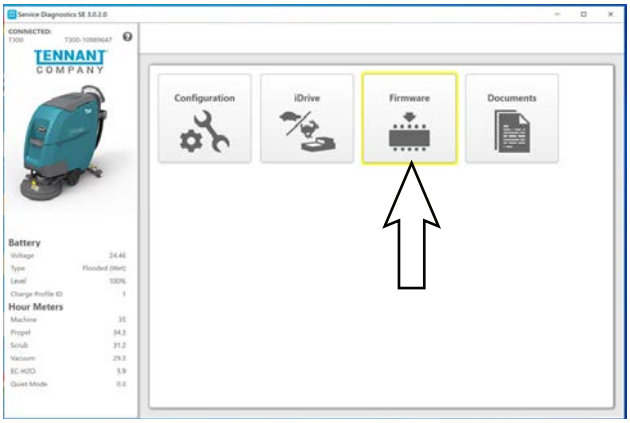


2. Turn the key switch ON.

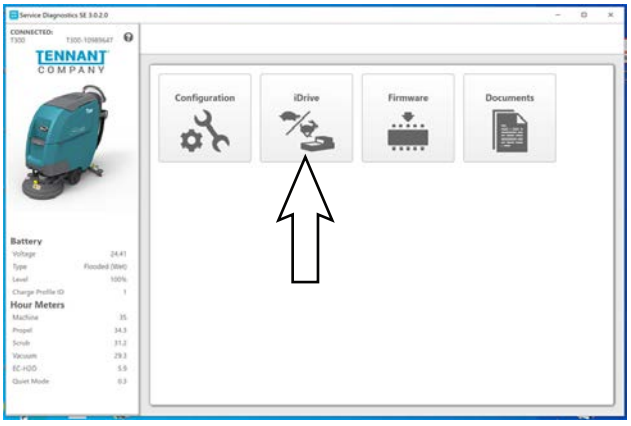
3. Double click the Service Diagnostics desktop shortcut or find the software in All Programs to launch the software.

NOTE: Service device may prompt a restart after installing the machine driver. Decline the restart, close Service Diagnostics, and relaunch Service Diagnostics.

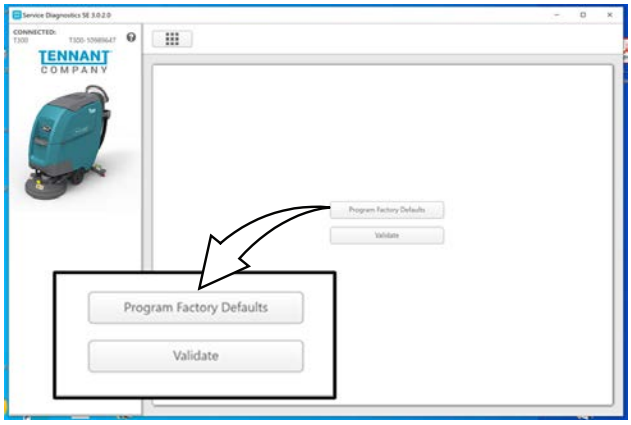
4. Check for machine firmware updates. A yellow highlight surrounding the Firmware button indicates that updates are available. Click on the Firmware button to install updates. If there are no firmware updates, proceed to the next step.



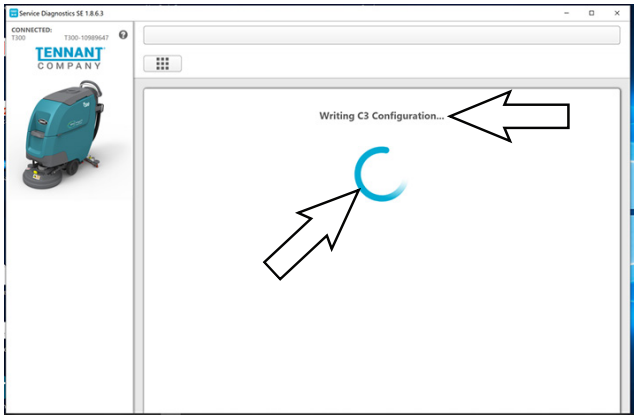
5. Click on the i-Drive button.



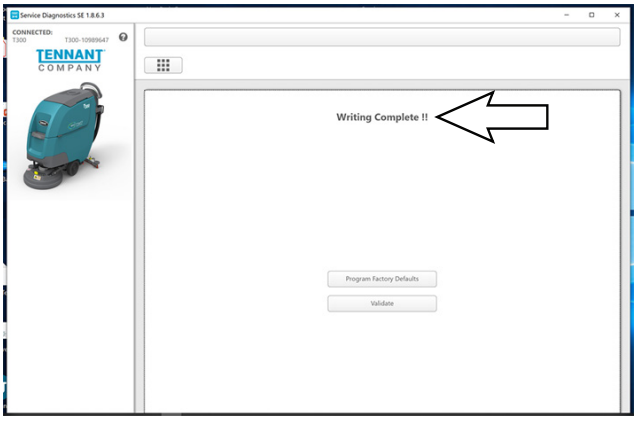
6. Click on the Program Factory Defaults to set the machine to the default factory settings.



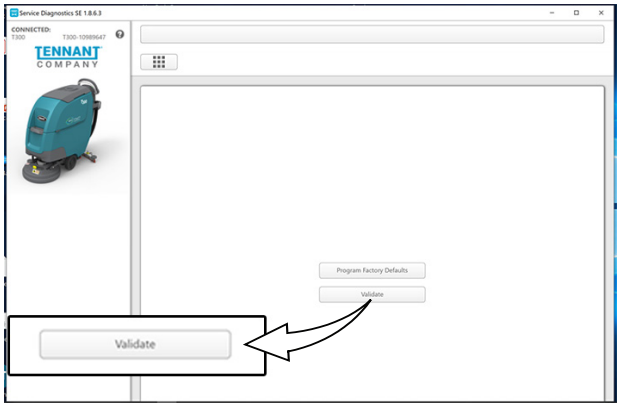
7. A process indicator will appear on the screen. Wait for configuration...to complete.



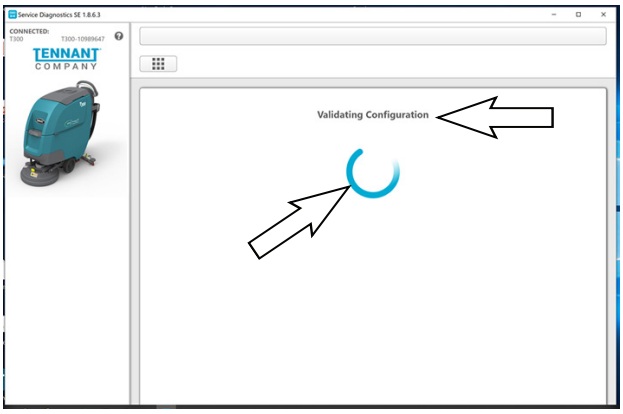
8. Writing Complete!! appears on the screen when programming factory defaults is complete.



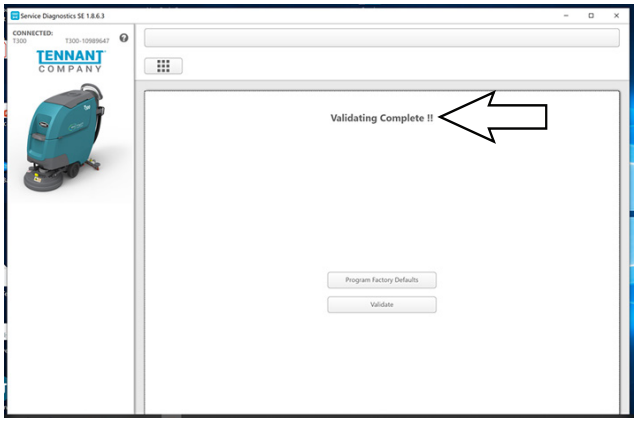
9. Click the Validate button to validate the factory default settings.



10. A process indicator will appear on the screen. Wait for Validating Configuration to complete.



11. Validating Complete!! appears on the screen when validation is complete.



12. Cycle the key switch to save changes.

RECONFIGURE THE MACHINE AFTER NEW HARDWARE/OPTION INSTALLATION

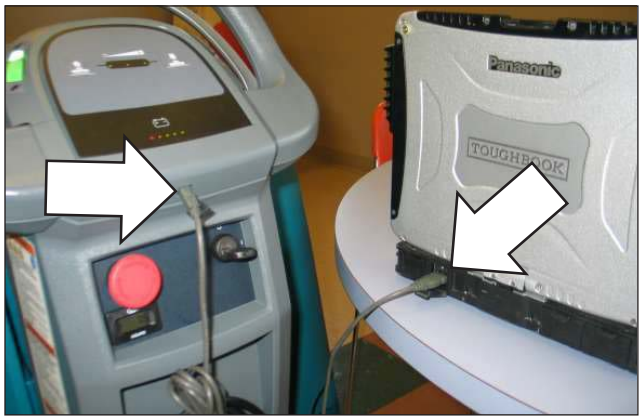
SYSTEM REQUIREMENTS: Windows® 7 Operating System, Microsoft .NET 4.5 or later, USB to Mini-USB cable.

Machine software configuration, which is stored in the interface module, must be programmed if the i-Drive or interface modules are replaced or if optional features are installed in the field.

Authorized service providers can download the Service Diagnostics software. Factory-Direct Tennant Service personnel have this software installed on their ServiceLink devices.

A USB cable connects from the service device to an external port on the control console (USB to mini USB adapter cable required). The SERVICE DIAGNOSTICS TOOL configures up to seven control modules depending on options. The interface module stores configuration data and communicates via RS232 serial communication with the i-Drive and through a CAN-Bus to all other modules.

1. Connect a USB cable from a service device to the machine.

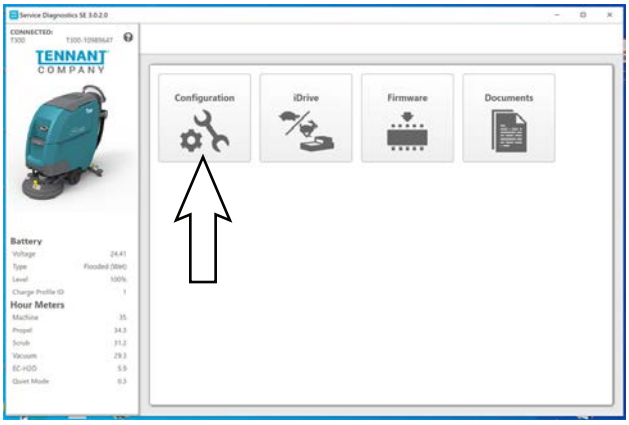


2. Turn the key switch ON.

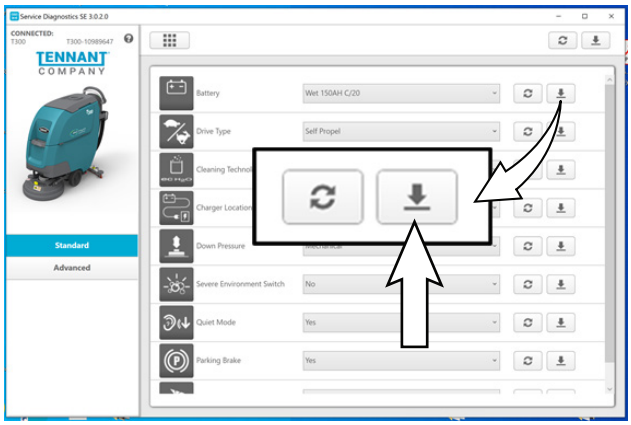
3. Double click the Service Diagnostics desktop shortcut or find the software in All Programs to launch the software.

NOTE: Service device may prompt a restart after installing the machine driver. Decline the restart, close Service Diagnostics, and relaunch Service Diagnostics.

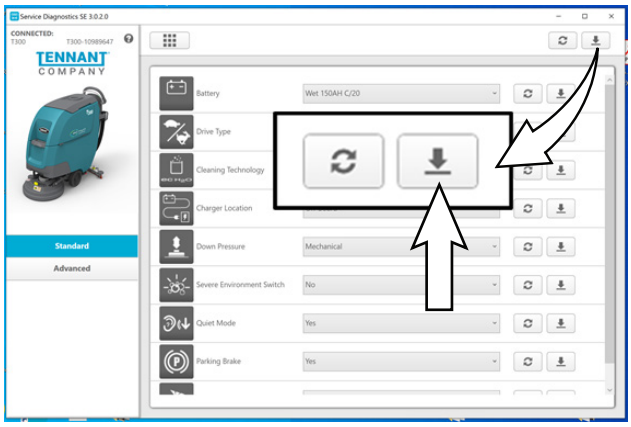
4. Click on the Configuration button to display a list of configurable options.



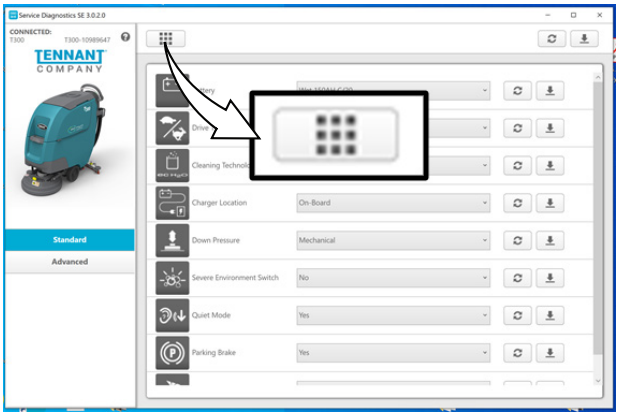
5. Select the configurable options that apply from the drop down menus and then click individual arrow buttons to launch individual module reprogramming (this is faster).



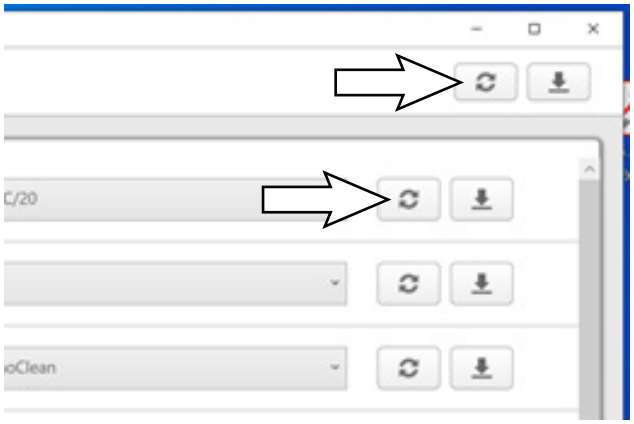
Or click the header arrow button to launch all module reprogramming (this is slower).



If not reconfiguring the machine, click the Main Menu button to return to the Main Menu.



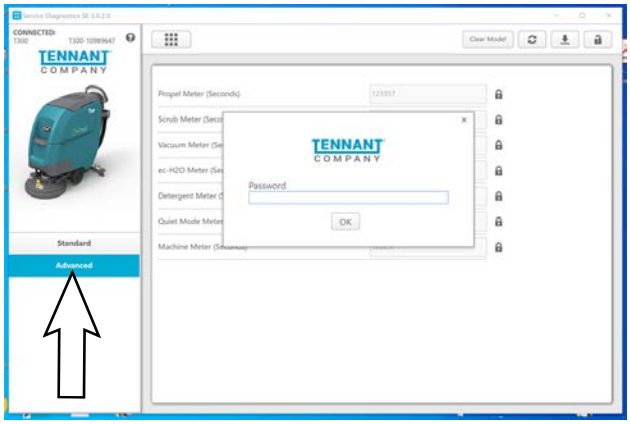
6. Click the refresh button to display the new configuration after reprogramming is completed.



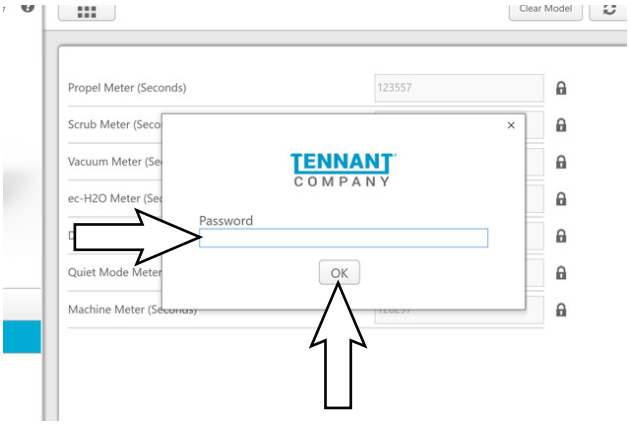
7. Cycle the key switch to save.

It is possible to perform advanced configuration updates, but a password is required to access the Advanced configuration options.

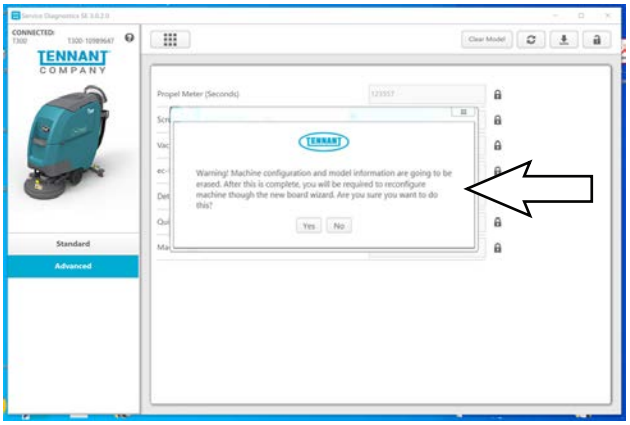
8. Click on Advanced in the menu located on the left side of the screen. A password box will appear on the screen.



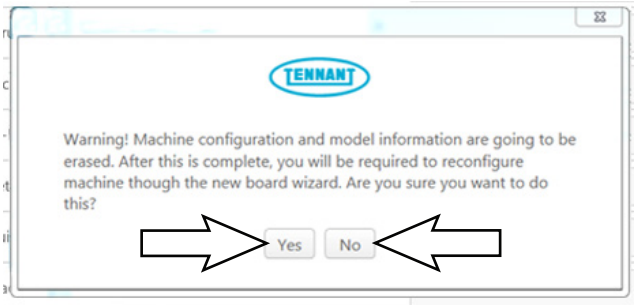
9. Enter the password into the password box and click the OK button. Contact T.A.C. (Tennant Assistance Center) for required password.



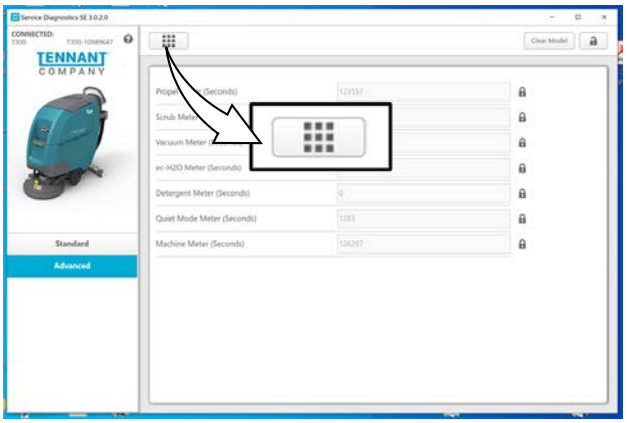
10. A warning box stating “Warning! Machine configuration and model information are going to be erased. After this is complete, you will be required to reconfigure machine through the new board wizard. Are you sure you want to do this?” appears.



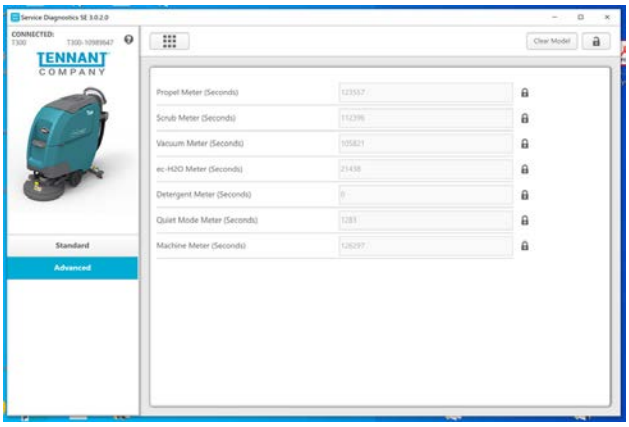
Select the Yes button if reconfiguring the machine for new hardware or option. Select the No button if not reconfiguring the machine.



If not reconfiguring the machine and No was selected, click the Main Menu button to return to the Main Menu.



11. Access the advanced configuration screen to reset component hours or record old hours on repair order for warranty purposes.



12. Cycle the key switch to save and exit the Advanced Configuration screen.

ACCESS SUPPORT DOCUMENTATION

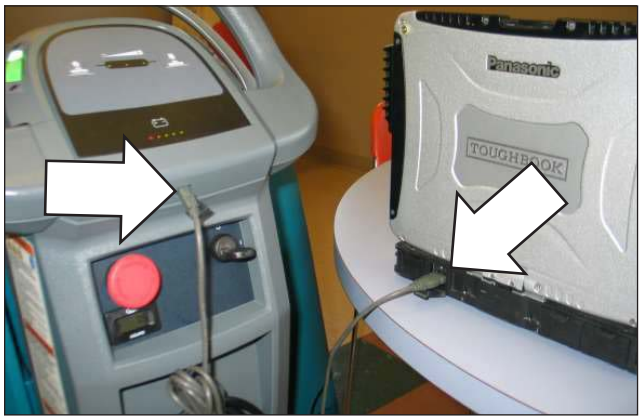
SYSTEM REQUIREMENTS: Windows® 7 Operating System, Microsoft .NET 4.5 or later, USB to Mini-USB cable.

Machine software configuration, which is stored in the interface module, must be programmed if the i-Drive or interface modules are replaced or if optional features are installed in the field.

Authorized service providers can download the Service Diagnostics software. Factory-Direct Tennant Service personnel have this software installed on their ServiceLink devices.

A USB cable connects from the service device to an external port on the control console (USB to mini USB adapter cable required). The SERVICE DIAGNOSTICS TOOL configures up to seven control modules depending on options. The interface module stores configuration data and communicates via RS232 serial communication with the i-Drive and through a CAN-Bus to all other modules.

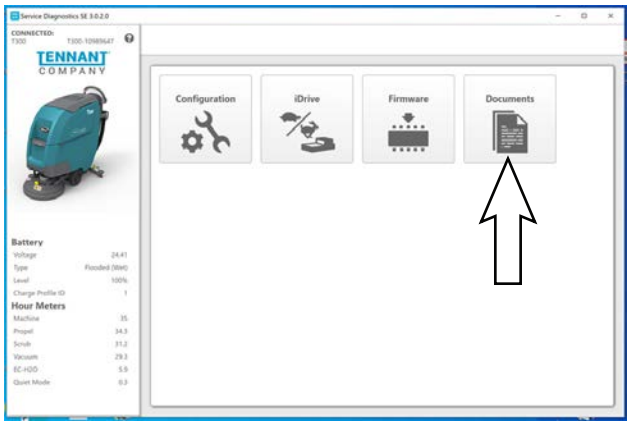
1. Connect a USB cable from a service device to the machine.



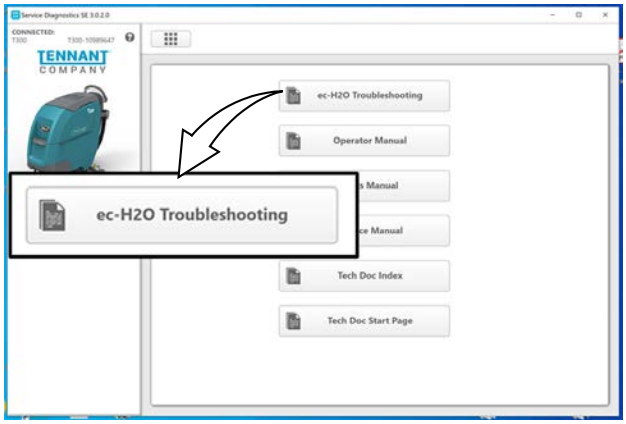
2. Turn the key switch ON.

3. Double click the Service Diagnostics desktop shortcut or find the software in All Programs to launch the software.

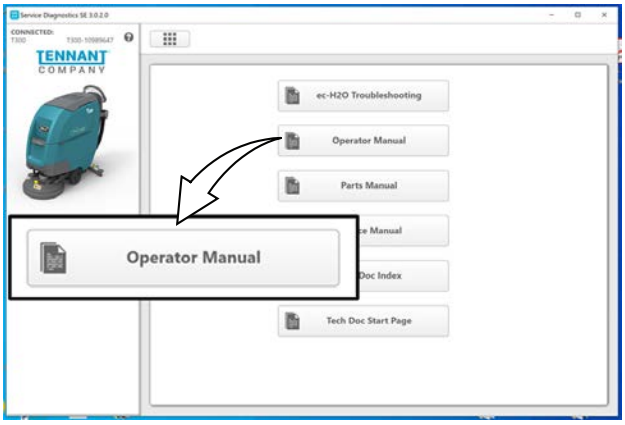
4. Click on the Documentation button to display a list of support documentation.



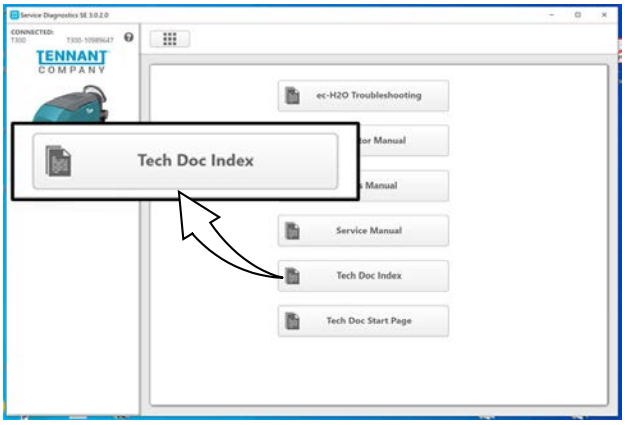
5. Click on the appropriate button to access needed support documentation. Click on the ec-H2O Troubleshooting button to access ec-H2O troubleshooting documentation.



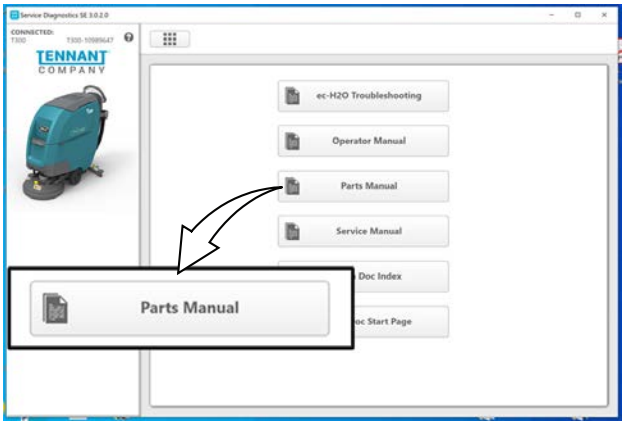
Click on the Operator Manual button to access the machine Operator Manual.



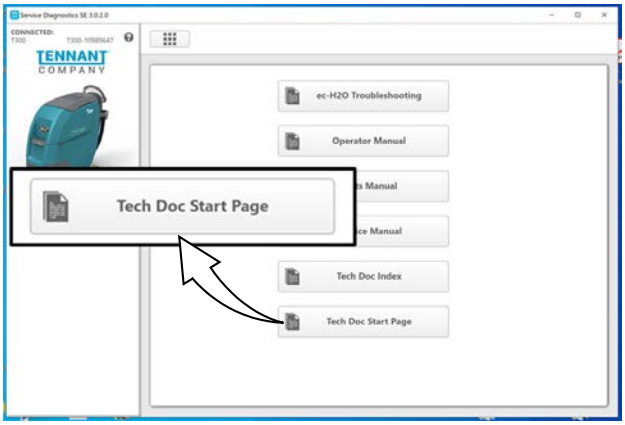
Click on the Tech Doc Index button to access the Technical Documentation Index.



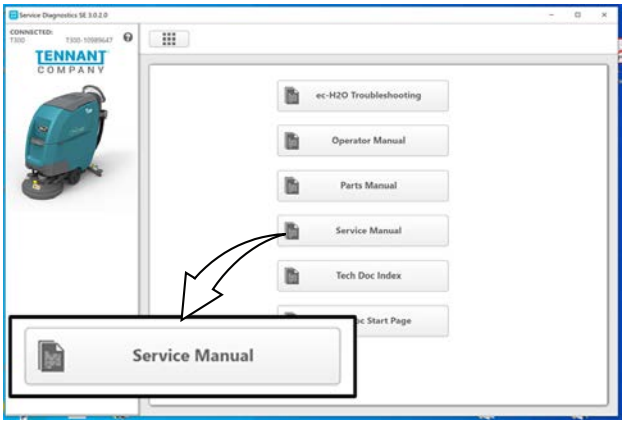
Click on the Parts Manual button to access the machine Parts Manual.



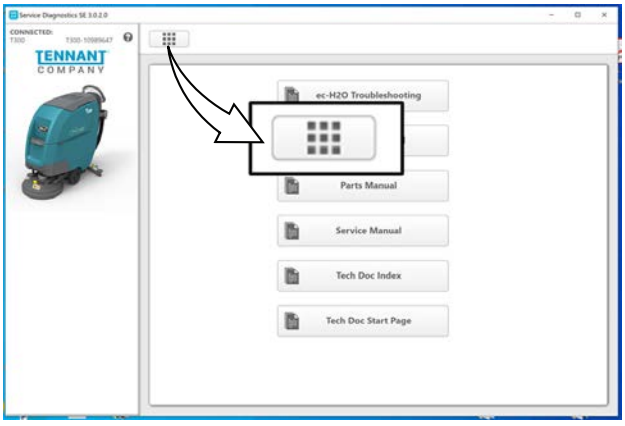
Click on the Tech Doc Start Page button to access the Technical Publications Start Page.



Click on the Service Manual button to access the machine Service Manual



6. Click on the Main Menu button to return to the Main Menu.



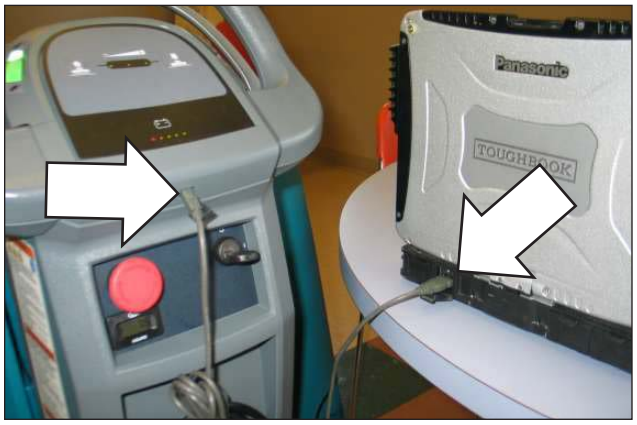
DISPLAY FAULT CODES ON SERVICE DEVICE

SYSTEM REQUIREMENTS: Windows® 7 OS, Microsoft .NET 4.5 *or later, USB to Mini-USB cable.*

Authorized service providers can download the Service Diagnostics software from the My Tennant portal by visiting www.tennantco.com. Factory-Direct Tennant Service has this software installed on their *ServiceLink* devices.

A USB cable connects from the service device to an external port on the control console. The SERVICE DIAGNOSTICS TOOL configures up to five control modules depending on options. The interface module stores configuration data and communicates via RS232 serial communication with the i-Drive and through a CAN-Bus to all other modules.

1. Connect a USB cable from a service device computer to the machine.

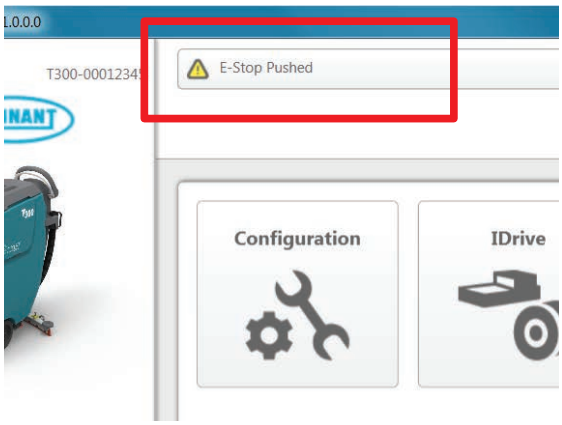


2. Turn the key switch ON.

3. Launch the software by double clicking the Service Diagnostics desktop shortcut or find the software in All Programs.

NOTE: Windows® may prompt a restart after installing the machine driver. Decline the restart, close Service Diagnostics, and relaunch Service Diagnostics.

4. Active faults scroll across the top of the home screen.



CHANGING OFF-BOARD BATTERY CHARGER SETTINGS

1. Disconnect charger from the machine and plug charger into power supply.

The middle LED will blink upon startup and the screen display “No Battery”.

2. Press and hold the two outside arrows for 12 seconds or until the middle IED turns solid yellow.

3. Press the middle button to activate the battery type options (algorithms). The left LED will turn red.

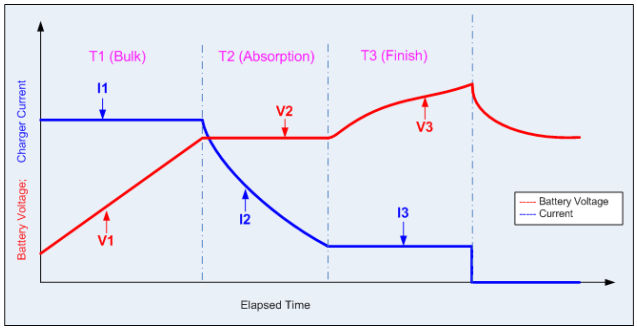
4. Press the up arrow button to scroll through the battery types (algorithms) until the desired battery type is located.

5. Press the middle button to select the battery type. The red LED light will turn off.

6. Press the up arrow button until “PROGRAMMING SAVE AND EXIT” screen is displayed.

7. Press the middle button to save the new settings. The screen will display “PROGRAMMING PARAMETERS SAVED”.

BATTERY CHARGER OPERATION



Above is a graph representing the I-U-I (constant current-constant voltage-constant current) charging strategy used to charge batteries. For flooded (wet) lead-acid batteries, the finish voltage can rise up to approximately 34 Volts (24 Volt System). The finish phase of the charge cycle causes out gassing bubbles to mix up the electrolyte and prevent sulphur build-up in the battery.

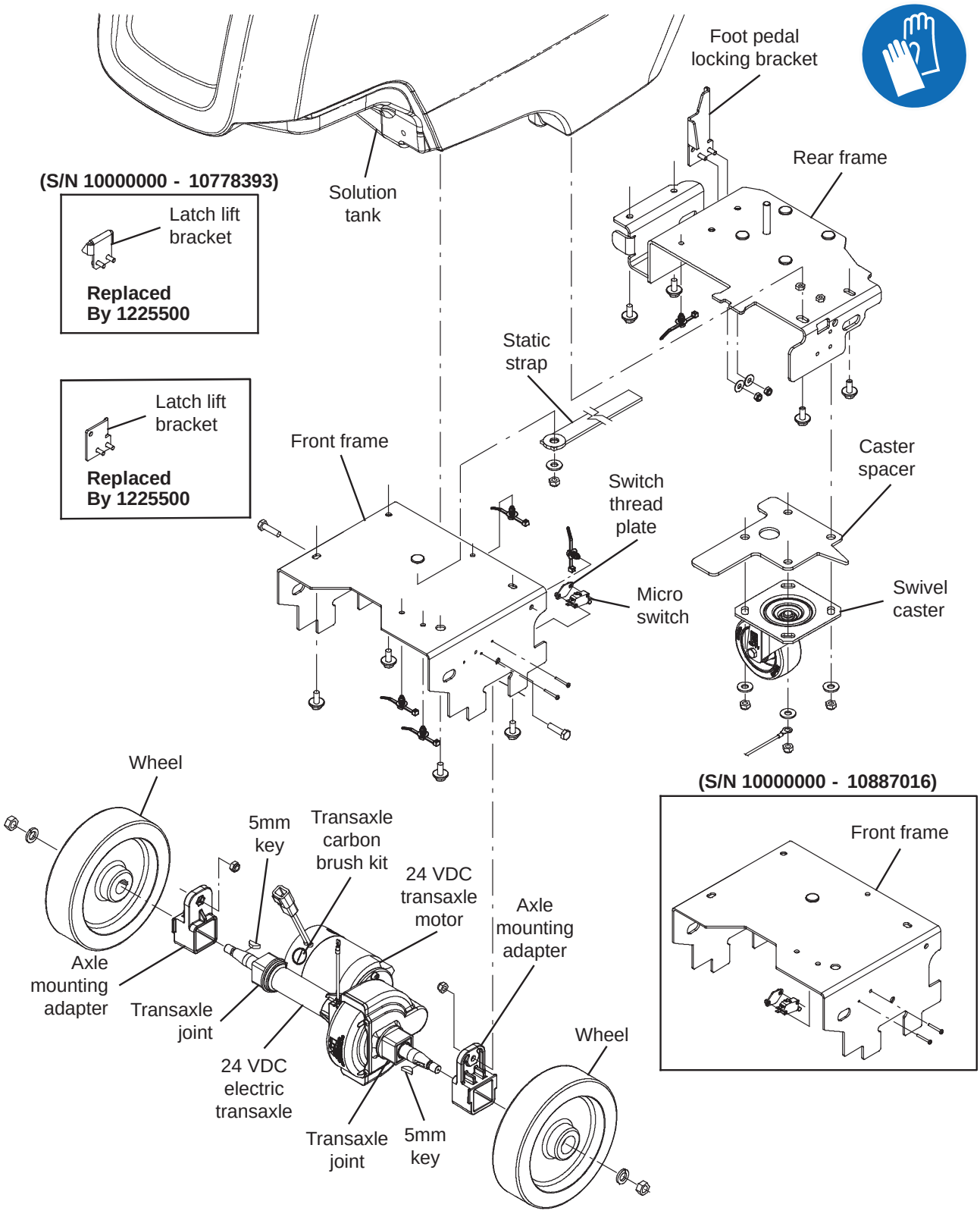
NOTE: Flooded (wet) lead-acid batteries outgas during a normal charging cycle. Always charge batteries in a well-ventilated area.

The length of charge time for each phase and overall charge time varies based on battery size, charger size, and battery conditions such as discharge level, age of battery, and temperature.

Equalization Charge Cycle - The equalization charge cycle automatically occurs once every 30 *complete* charge cycles on (wet) lead-acid batteries only. Charge current increases to higher levels during the equalization charge to mix layers of electrolyte that form as a result of repeated charging/discharging cycles. Maintenance-free batteries can become damaged from an equalization charge, which is why it is important to make sure the Tennant-specified charger is programmed for the battery being used. See BATTERY CHARGER SETTINGS. Maintenance-free batteries, such as AGM and Gel, use slightly lower finish voltages (approximately 31 Volts) to keep the batteries from outgassing. Water can not be added to maintenance-free batteries, so these batteries must be replaced if they are repeatedly over charged or the cells are dry due to an incompatible charger or charger setting.

CHASSIS

FRAME GROUP-PROPEL MODEL



REMOVE/INSTALL THE TRANSAXLE ASSEMBLY (PROPEL MACHINES ONLY)

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

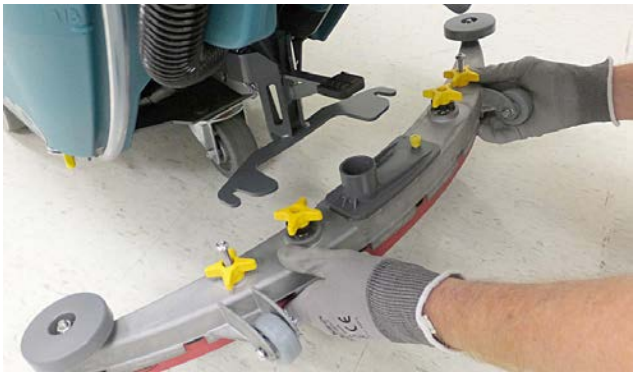
1. Completely drain the solution tank and the recovery tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

4. Remove batteries from the machine.

FOR SAFETY: When servicing machine, avoid contact with battery acid, keep all metal objects off batteries, and use a hoist or adequate assistance when lifting batteries. Use a non-conductive battery removal device.

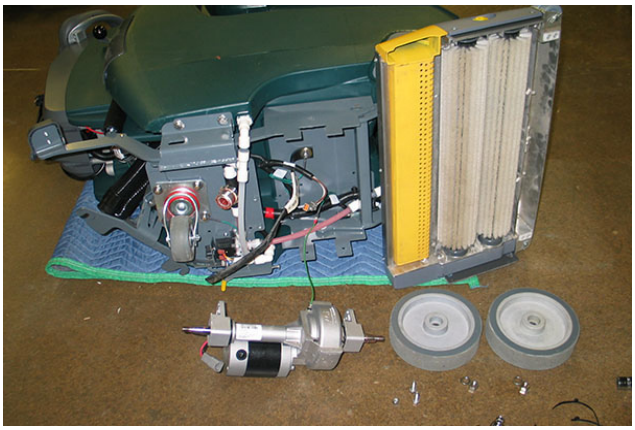
5. Remove rear squeegee assembly from the machine.



6. Place a protective blanket next to the left side of the machine.
7. Carefully lower the left side of the machine onto the protective blanket.

8. Remove wheel nuts. It will be necessary to raise the machine up and lower it to the right side to access the left side wheel.

9. Remove transaxle mounting hardware



10. If replacing the drive motor carbon brushes, see REMOVE/INSPECT/INSTALL THE DRIVE MOTOR CARBON BRUSHES (PROPEL MACHINES ONLY).

11. Assemble/reinstall transaxel assembly in reverse order of disassembly.

REMOVE/INSPECT/INSTALL THE DRIVE MOTOR CARBON BRUSHES (PROPEL MACHINES ONLY)

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

FOR SAFETY: When servicing machine, Disconnect battery connection and charger cord before working on machine.

NOTE: Carbon brushes should be replaced as sets.

1. Remove the transaxle assembly from the machine. See REMOVE/INSTALL THE TRANSAXLE ASSEMBLY (PROPEL MACHINES ONLY).
2. Remove the drive motor from the transaxle assembly.
3. Remove the plastic plug securing the carbon brush inside the drive motor.

4. Carefully remove the carbon brush from the drive motor.

5. Inspect carbon brushes. Replace carbon brushes if they are stuck or are less than 10 mm (0.375 in) in length.

6. Use compressed air to clean dust from inside the motor.
7. Repeat procedure to inspect/replace the remaining carbon brushes.
8. Reinstall the drive motor onto the transaxle assembly in reverse order of disassembly.
9. Reinstall the transaxle assembly onto the machine. See REMOVE/INSTALL THE TRANSAXLE ASSEMBLY (PROPEL MACHINES ONLY).

REMOVE/INSTALL THE SWIVEL CASTER

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

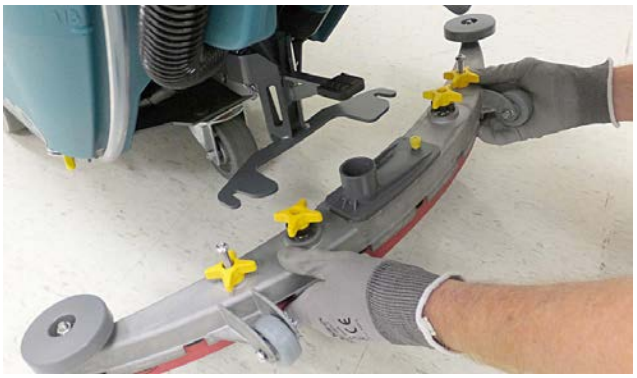
1. Completely drain the solution tank and the recovery tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

4. Remove batteries from the machine.

FOR SAFETY: When servicing machine, avoid contact with battery acid, keep all metal objects off batteries, and use a hoist or adequate assistance when lifting batteries. Use a non-conductive battery removal device.

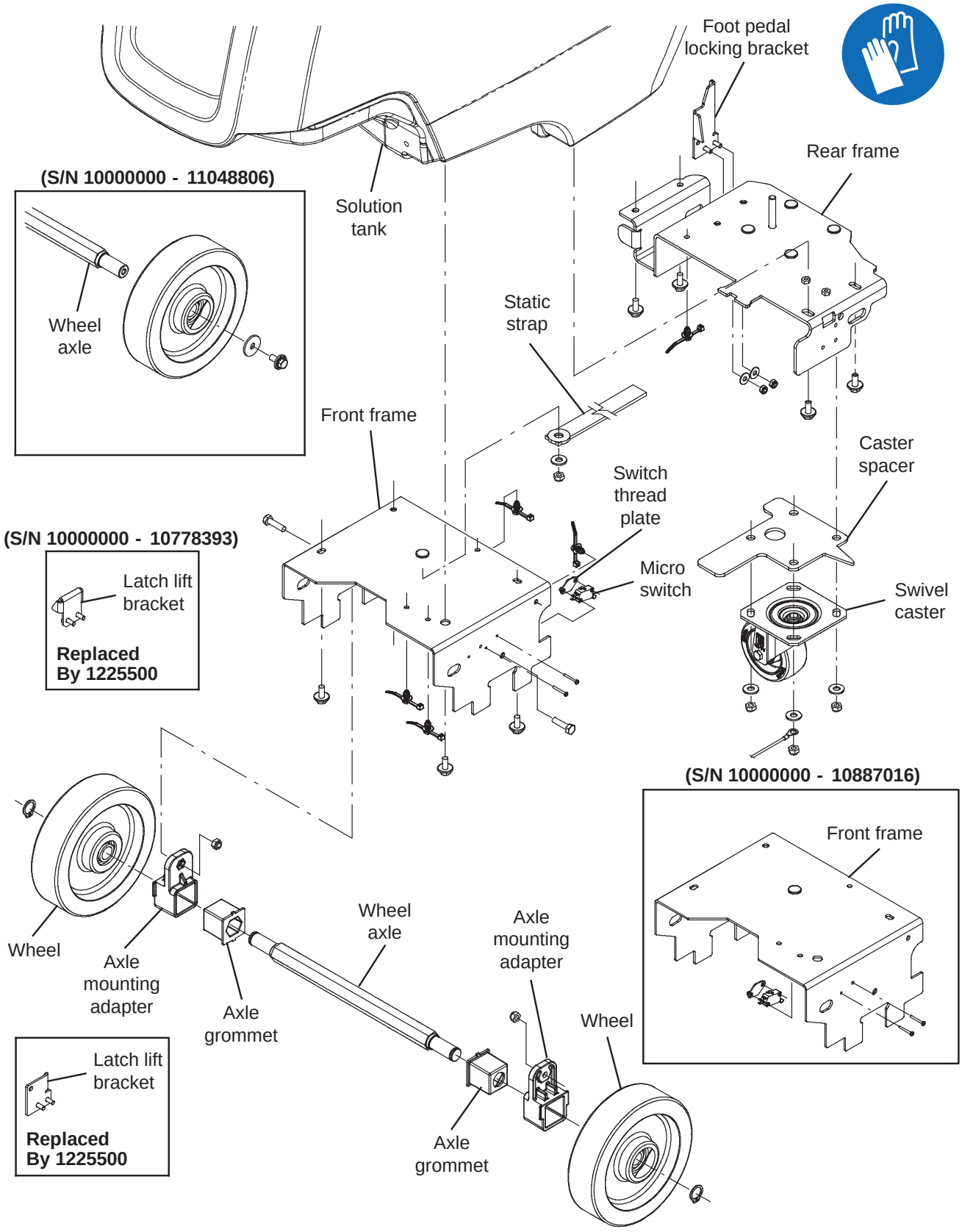
5. Remove rear squeegee assembly from the machine.



6. Place a protective blanket next to the left side of the machine.
7. Carefully lower the left side of the machine onto the protective blanket.

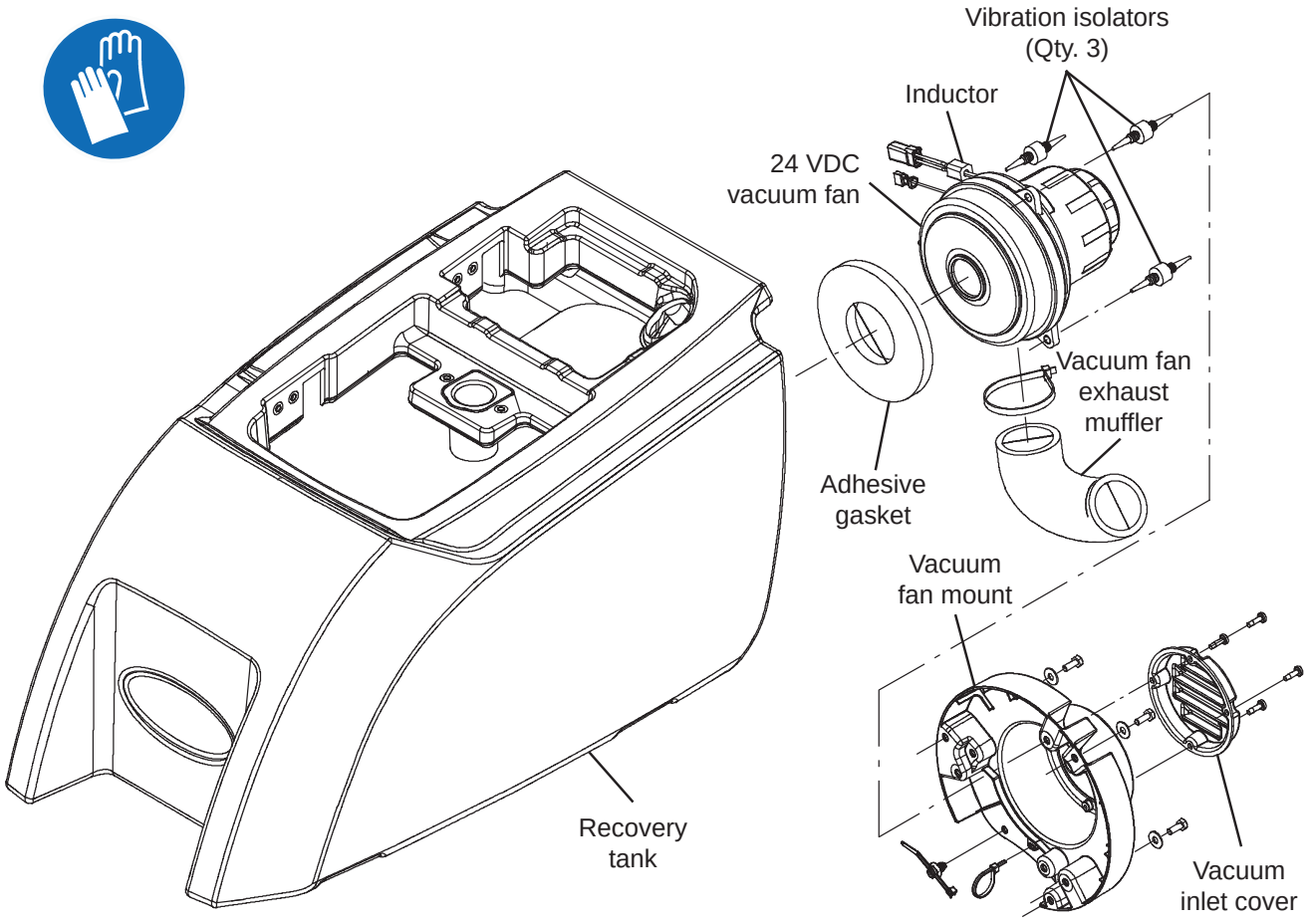
8. Remove the swivel caster from the machine.
9. Reinstall removed swivel caster/new swivel casters in reverse order of disassembly

FRAME GROUP-PUSH MODEL



SOLUTION SYSTEMS

REMOVE/INSTALL THE VACUUM FAN



FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Completely empty the recovery tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, Disconnect battery connection and charger cord before working on machine.

4. Remove rear squeegee hose from recovery tank.

5. Cut zip tie and disconnect main wire harness from the vacuum fan.

6. Remove vacuum fan mounting hardware.

7. Remove vacuum fan from the recovery tank.

8. If removing/inspecting/replacing vacuum fan motor brushes, proceed to REMOVE/INSPECT/REPLACE VACUUM FAN CARBON BRUSHES.

9. Install new vacuum fan assembly/reinstall the removed vacuum fan assembly in the reverse order of disassembly.

REMOVE/INSPECT/REPLACE VACUUM FAN CARBON BRUSHES

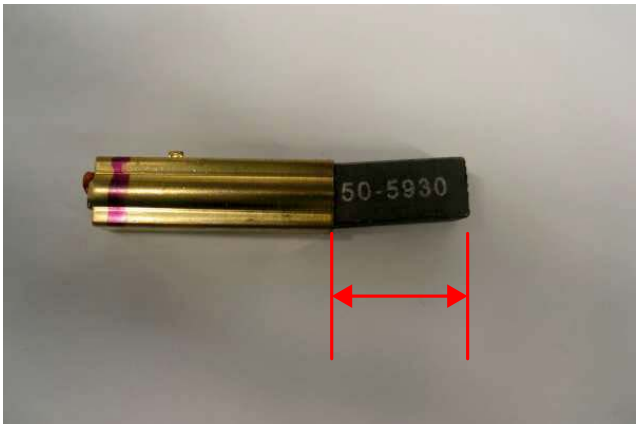
FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key and disconnect batteries.

1. Remove the hardware securing the vacuum fan to the recovery tank .

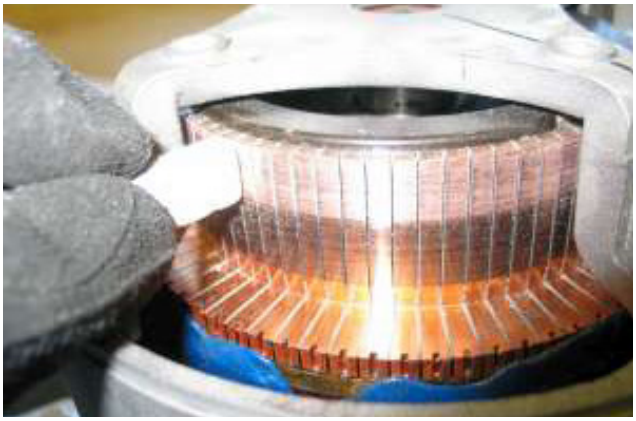
2. Loosen the carbon brush mounting hardware.

3. Lift up to release and remove carbon brushes.

4. Inspect carbon brushes. Replace carbon brushes if they are stuck or are less than 10mm (0.375 in).



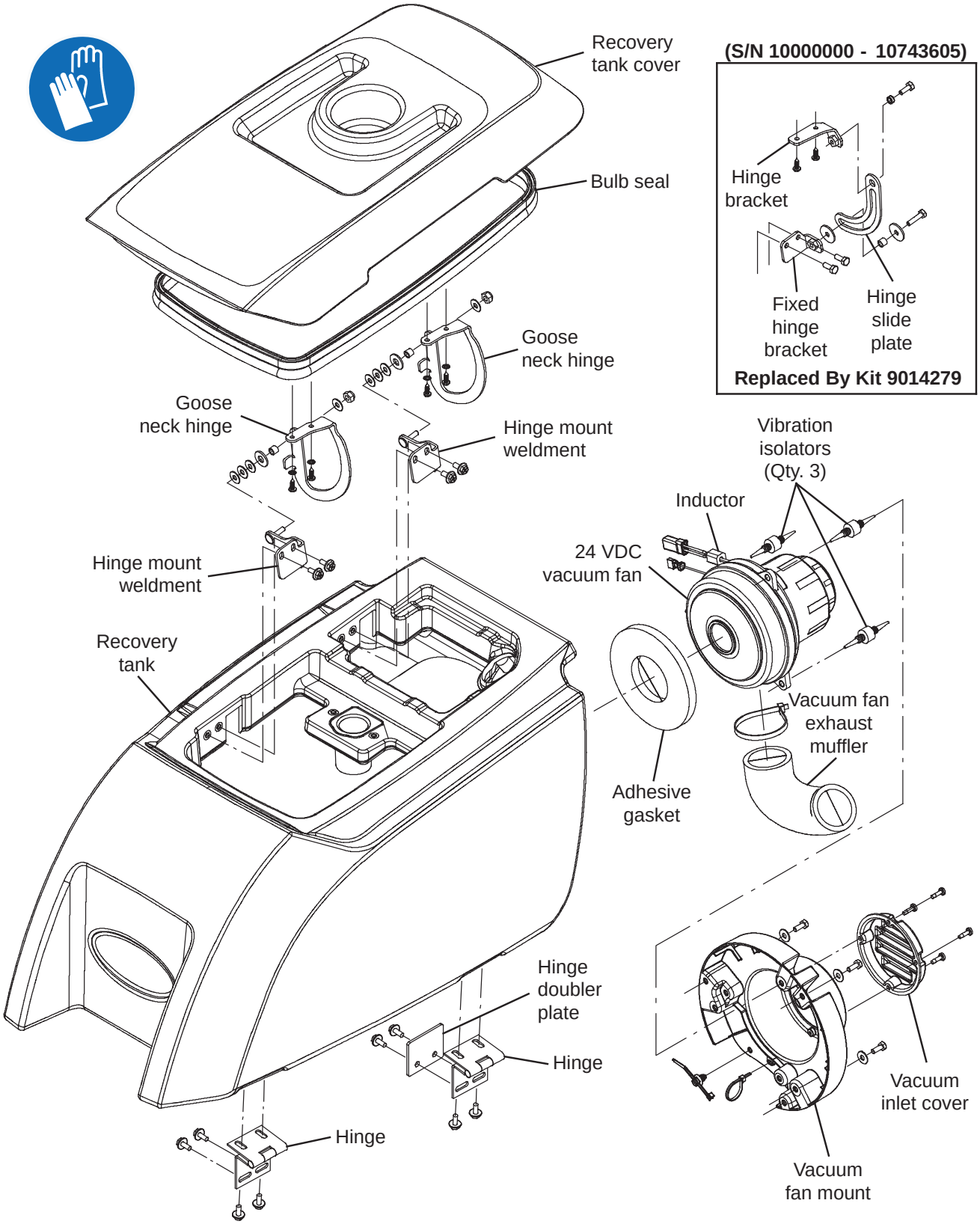
5. Use a stone to clean the commutator and then use compressed air to clean dust from inside the motor.

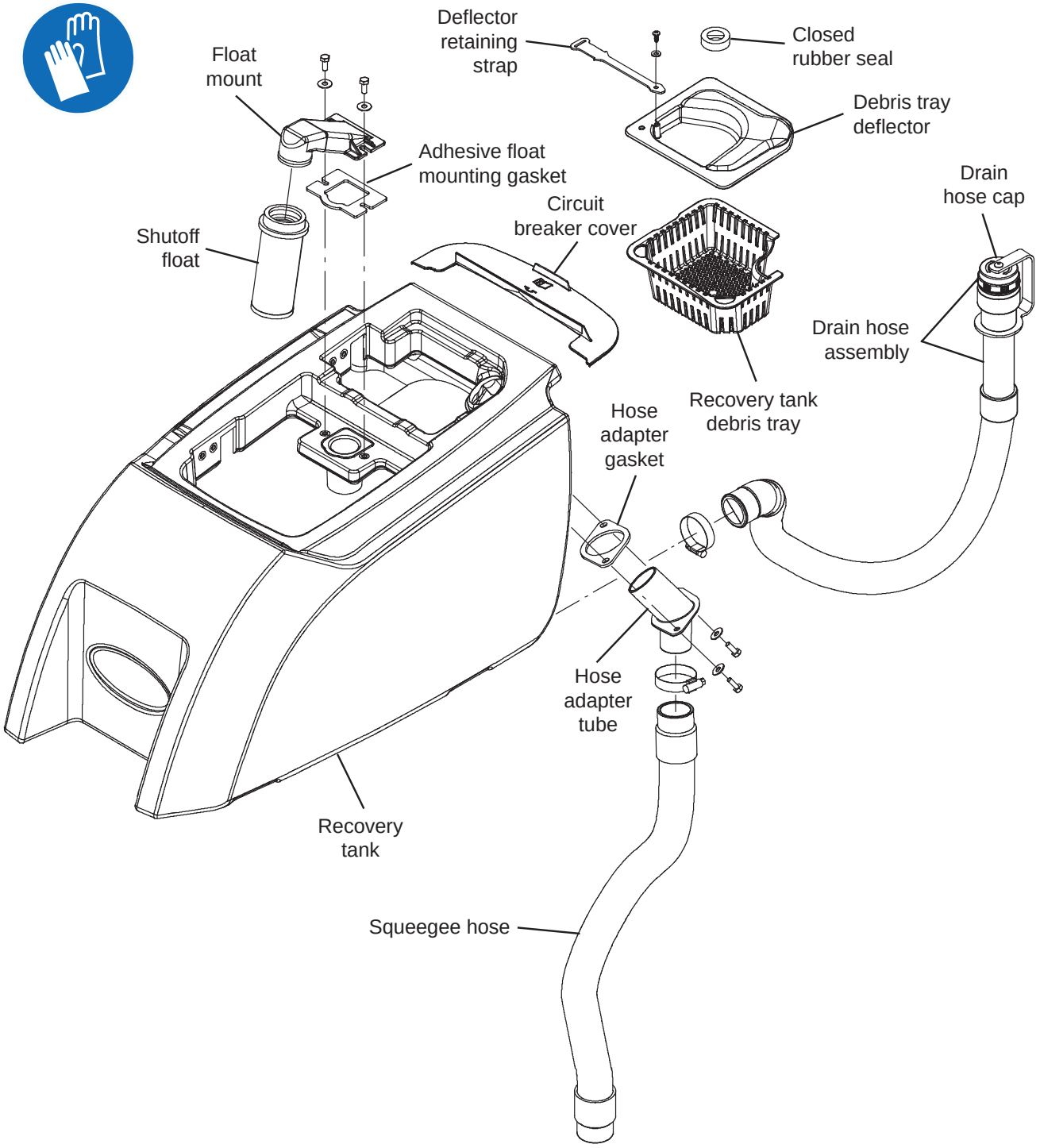


6. Reinstall the removed vacuum fan brushes/install the new vacuum fan brushes in reverse order of disassembly.

7. Reinstall the vacuum fan onto the machine. See REMOVE/INSTALL THE VACUUM FAN.

REMOVE/REPLACE THE RECOVERY TANK





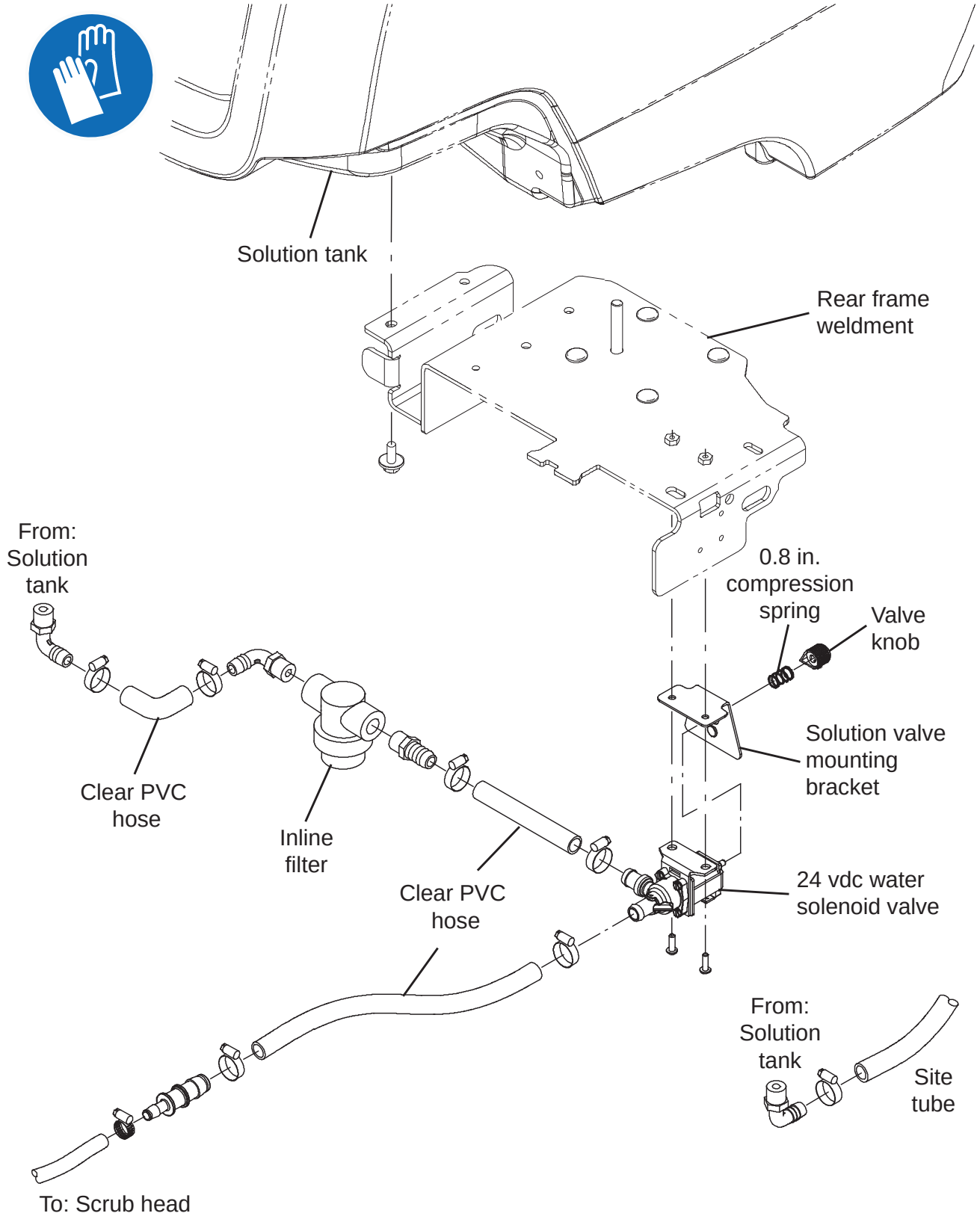
FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Completely empty the recovery tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, Disconnect battery connection and charger cord before working on machine.

4. Lift the recovery tank completely open.
5. Disconnect the main wire harness from the vacuum fan assembly.
6. Disconnect the vacuum hose from the recovery tank.
7. Disconnect the drain hose from the recovery tank.
8. Remove all parts and components from the recovery tank.
9. Remove the recovery tank from the machine.
10. Assemble components onto the removed/ replaced recovery tank in reverse order of disassembly.
11. Install the recovery tank onto the machine in reverse order of disassembly.

REMOVE THE WATER SOLENOID VALVE (T300E SHOWN)



FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Drain solution and recovery tanks.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

4. Remove batteries from the machine.

FOR SAFETY: When servicing machine, avoid contact with battery acid, keep all metal objects off batteries, and use a hoist or adequate assistance when lifting batteries. Use a non-conductive battery removal device.

5. Remove the squeegee from the machine.

6. Place a protective blanket next to the left side of the machine.
7. Carefully lower machine onto the left side onto the protective blanket.

8. Proceed to the next step for standard models. Loosen knob set screws and remove knob. Set knob aside.

9. Disconnect main wire harness from the water solenoid.
10. Remove the hardware securing the water solenoid to the solution valve mounting bracket/ rear frame weldment.

11. Disconnect the solution connectors from the water solenoid. *See* DISCONNECT HOSES FROM PTC (PUSH-TO-CONNECT) FITTINGS.

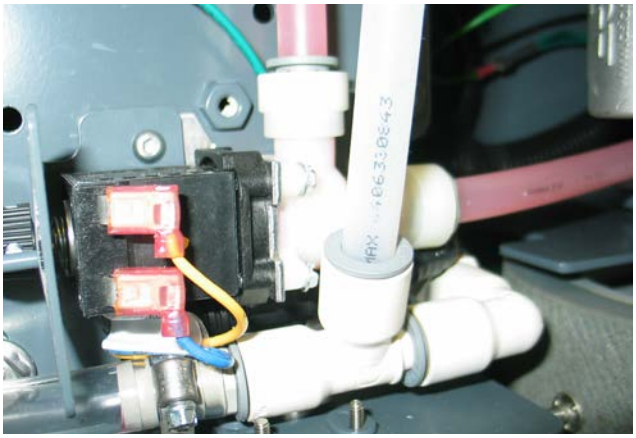
12. Install the new water solenoid onto the machine in reverse order of disassembly.

ADJUST THE WATER SOLENOID (T300E ONLY)

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

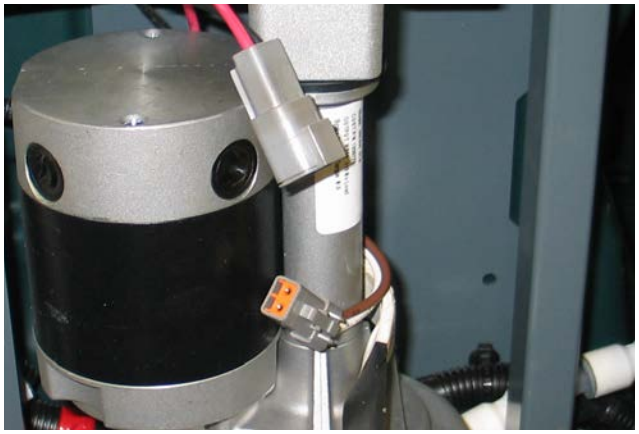
1. Loosen set screws and remove knob from water solenoid.

2. Disconnect the solution connectors from the water solenoid. *See* DISCONNECT HOSES FROM PTC (PUSH-TO-CONNECT) FITTINGS.



3. Disconnect the main wire harness from the transaxle motor (option).

NOTE: This is necessary to prevent movement while dispensing water during the adjustment process.

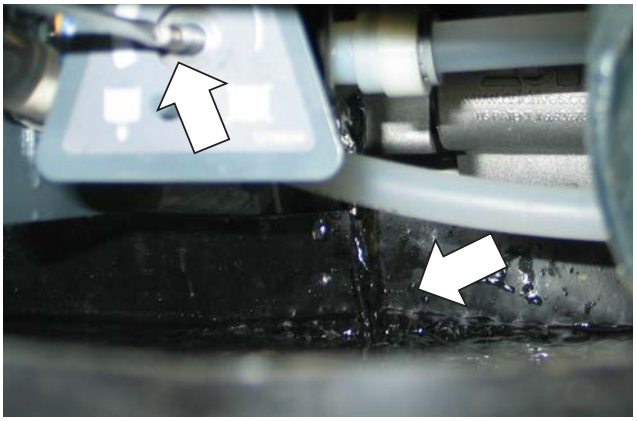


4. Add water to the solution tank.

5. Place a shallow catch basin below the water solenoid, turn on floor scrubber, and squeeze the handle to activate conventional solution flow.

NOTE: Attaching a zip tie will assist in holding the handle while making adjustments to the water solenoid.

6. Turn the solenoid valve stem completely counter clockwise for maximum water flow.



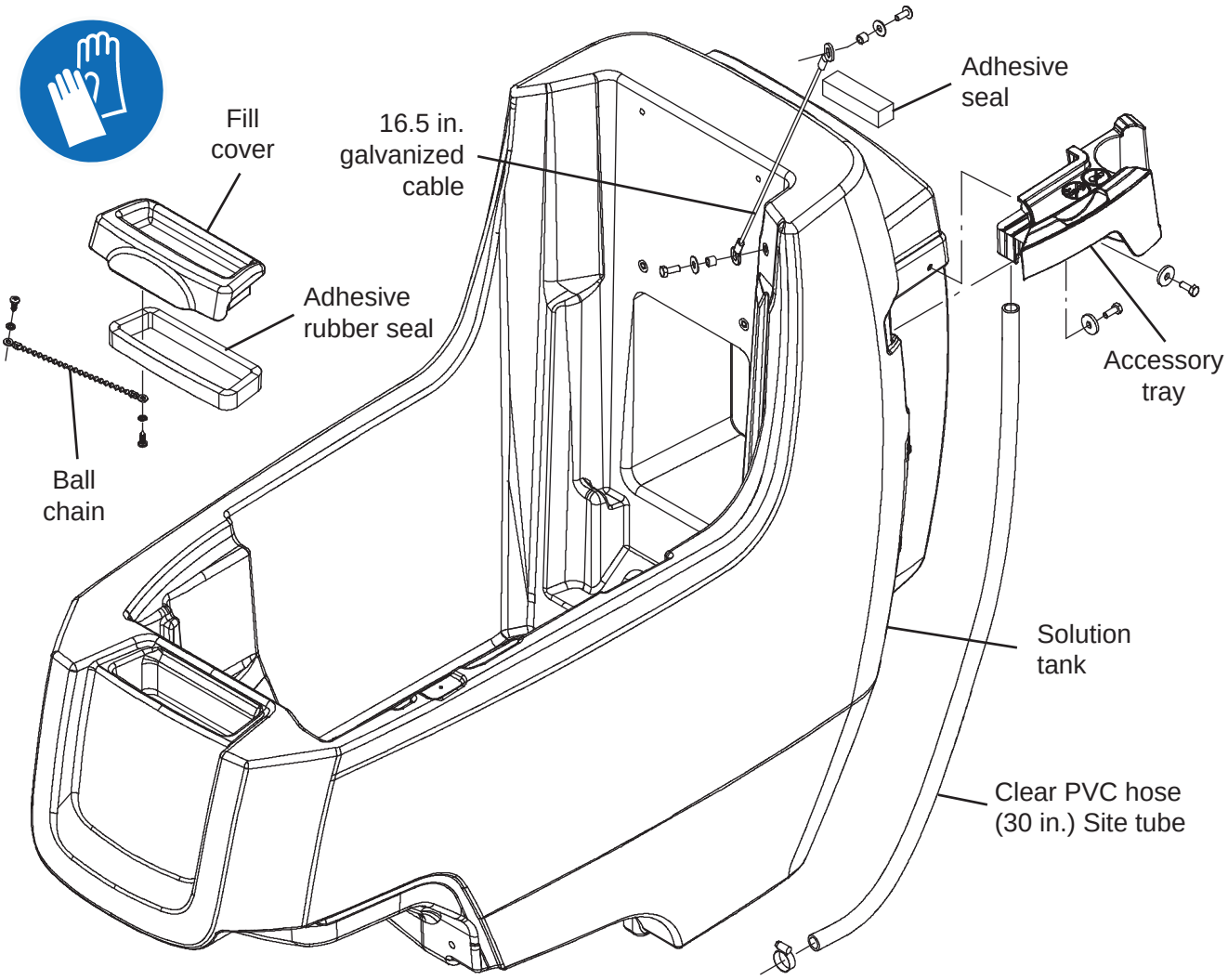
7. Slowly turn the valve stem clockwise until water flow stops. *Stop immediately when water flow stops.* This is the no-flow or clockwise knob setting.

8. Reinstall the adjustment knob against the stop pin as shown below.

NOTE: Tighten one set screw and then rotate the knob to gain access to the other set screw.

9. Reconnect PTC (Push-To-Connect) fitting to water solenoid valve, cut zip tie securing bail handle, and reconnect transaxle motor connection. Adjustment is complete.

REPLACE THE SOLUTION TANK



FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Completely empty the recovery tank and solution tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, Disconnect battery connection and charger cord before working on machine.

4. Lift the recovery tank completely open.

NOTE: Do Not discard any items removed from the solution tank. All removed items must be installed onto the new solution tank.

5. Remove the batteries from the machine.

FOR SAFETY: When servicing machine, avoid contact with battery acid, keep all metal objects off batteries, and use a hoist or adequate assistance when lifting batteries. Use a non-conductive battery removal device.

6. Remove the rear squeegee assembly from the machine.

7. Remove the recovery tank from the machine. See REMOVE/REPLACE THE RECOVERY TANK.

8. Remove the scrub head from the machine. See REMOVE/REINSTALL THE SCRUB HEAD.

9. Remove the scrub head lift assembly from the machine.

10. Remove optional ec-H2O components from the solution tank.

11. Remove the solution drain hose, tank cap/port fill strainer, and any other standard/optional accessories from the solution tank.

12. Remove all electronic components, control handle assembly, and controls from the machine. Place circuit board/electronic components in a safe place where they cannot be damaged. See applicable sections for removing electronic components and controls.

NOTE: To avoid damaging electronic components, a static ground strap must be worn at all times while handling circuit boards/control modules. Attach the other end of the static ground strap to the machine chassis.

13. Position a protective blanket or large section of cardboard next to the side of the machine that will be tipped onto the floor.

NOTE: Do Not allow the machine to drop when tipping it onto the blanket/cardboard. Components could be damaged if machine is allowed to drop.

14. Carefully tip the machine onto the blanket/ cardboard.

15. Remove the transaxle assembly from the machine. See REMOVE/INSTALL THE TRANSAXLE ASSEMBLY (PROPEL MACHINES ONLY).

16. Remove all remaining fittings, hoses, and components from the bottom of the machine.

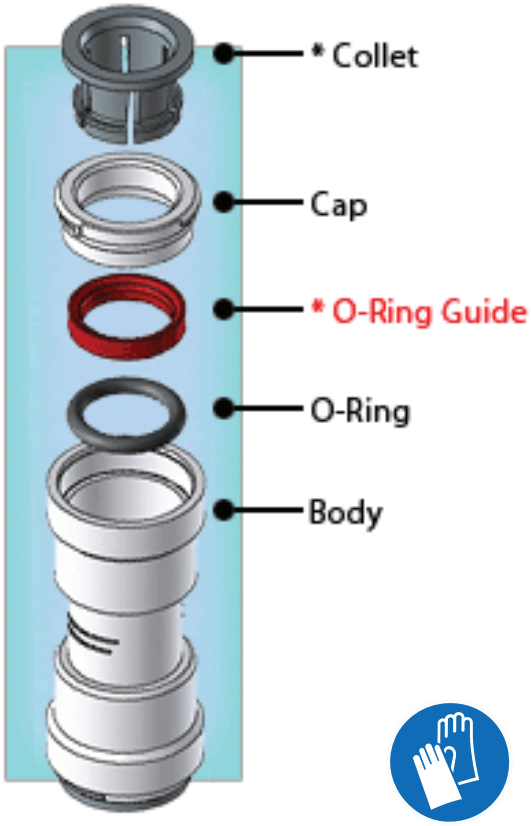
17. Remove the frame and all remaining parts and components from the bottom of the recovery tank.

18. Place the new solution tank onto the protective blanket/cardboard.

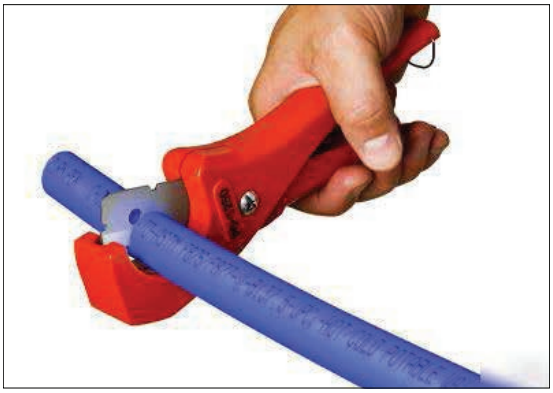
19. Install removed parts and components onto the new recovery tank in the reverse order of disassembly.

20. Reassemble remainder of machine still not assembled in reverse order of disassembly.

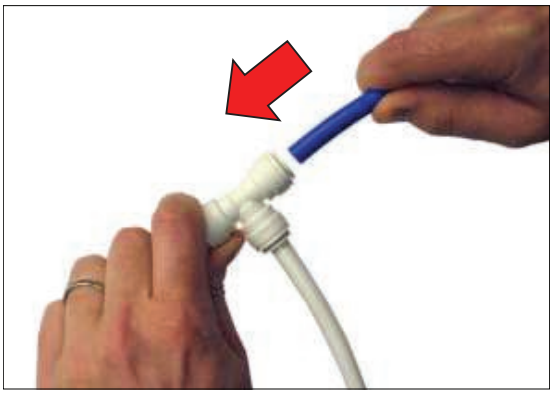
CONNECT HOSES TO PTC (PUSH-TO-CONNECT) FITTINGS



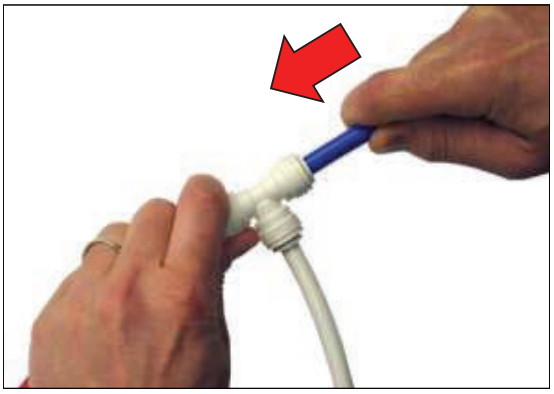
1. Cut the tube square. The outer diameter of the tubing must be free of score marks, burrs, or sharp edges.



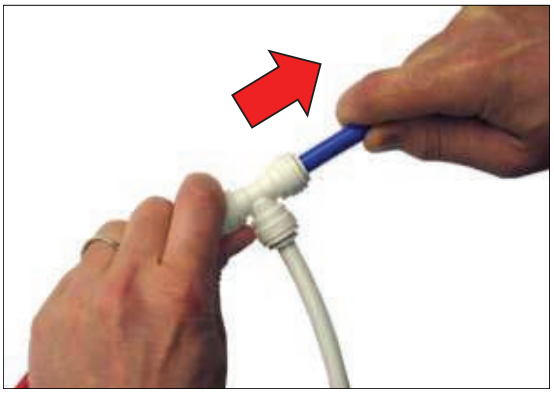
2. Insert tube into the fitting. The fitting will grip the hose before it seals.



3. Push into the tube stop. The stainless steel teeth inside the collet firmly hold the tube in position and the o-ring provides a permanent leak-proof seal.



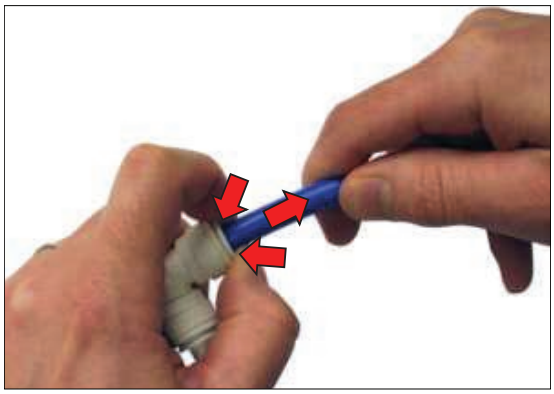
4. Pull on the fitting to ensure the hose connection is secure.



5. Test the fitting/hose connections for leaks prior to leaving the site.

DISCONNECT HOSES FROM PTC (PUSH-TO-CONNECT) FITTINGS

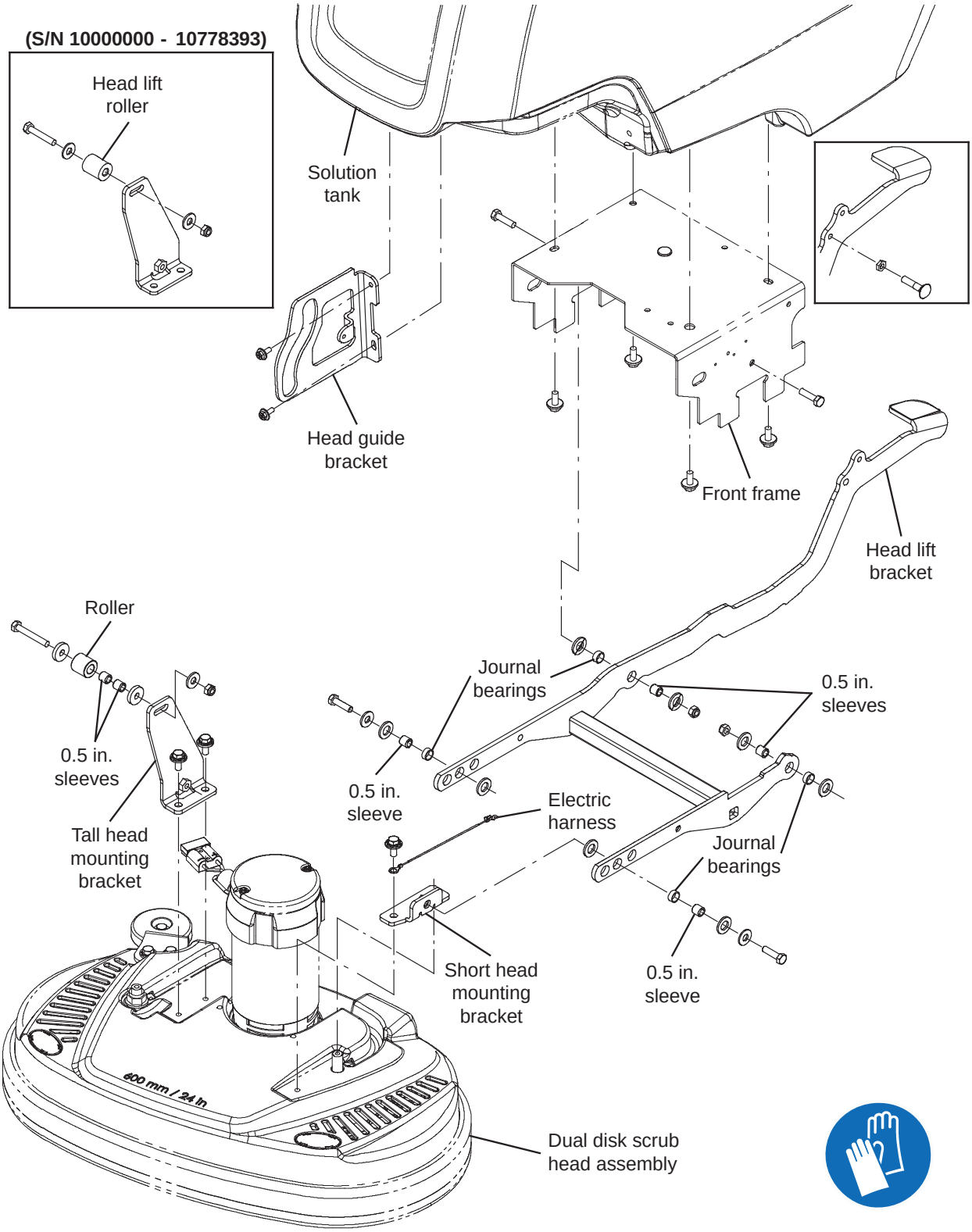
1. Push the hose into the fitting and push the collet squarely in against face of fitting to release the hose from the fitting. Continue to hold the collet held in against the fitting and pull the hose from the fitting.



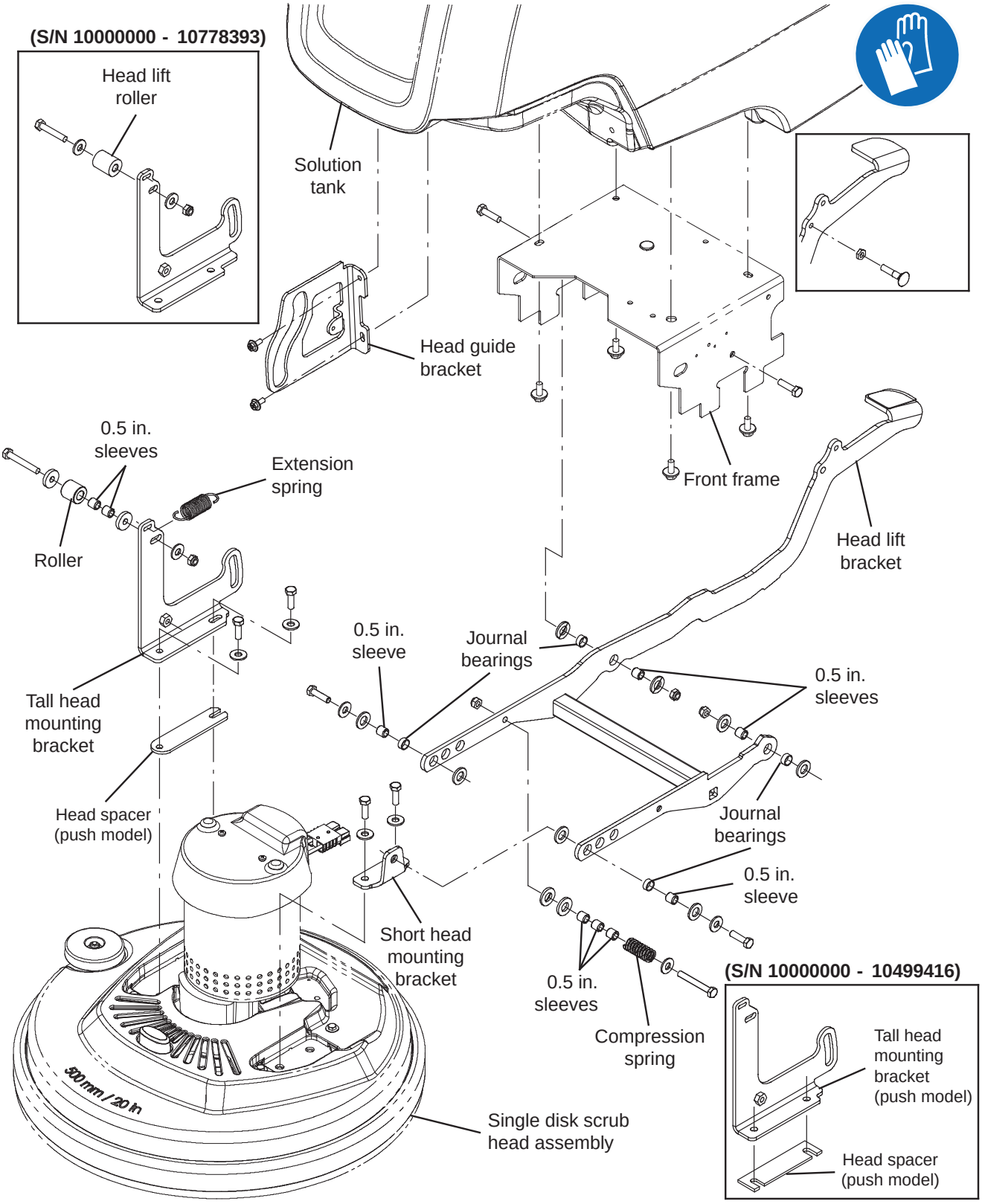
NOTE: Be sure there is no pressure in the system and the system is empty before disconnecting hose(s) from the fitting.

SCRUBBING SYSTEMS

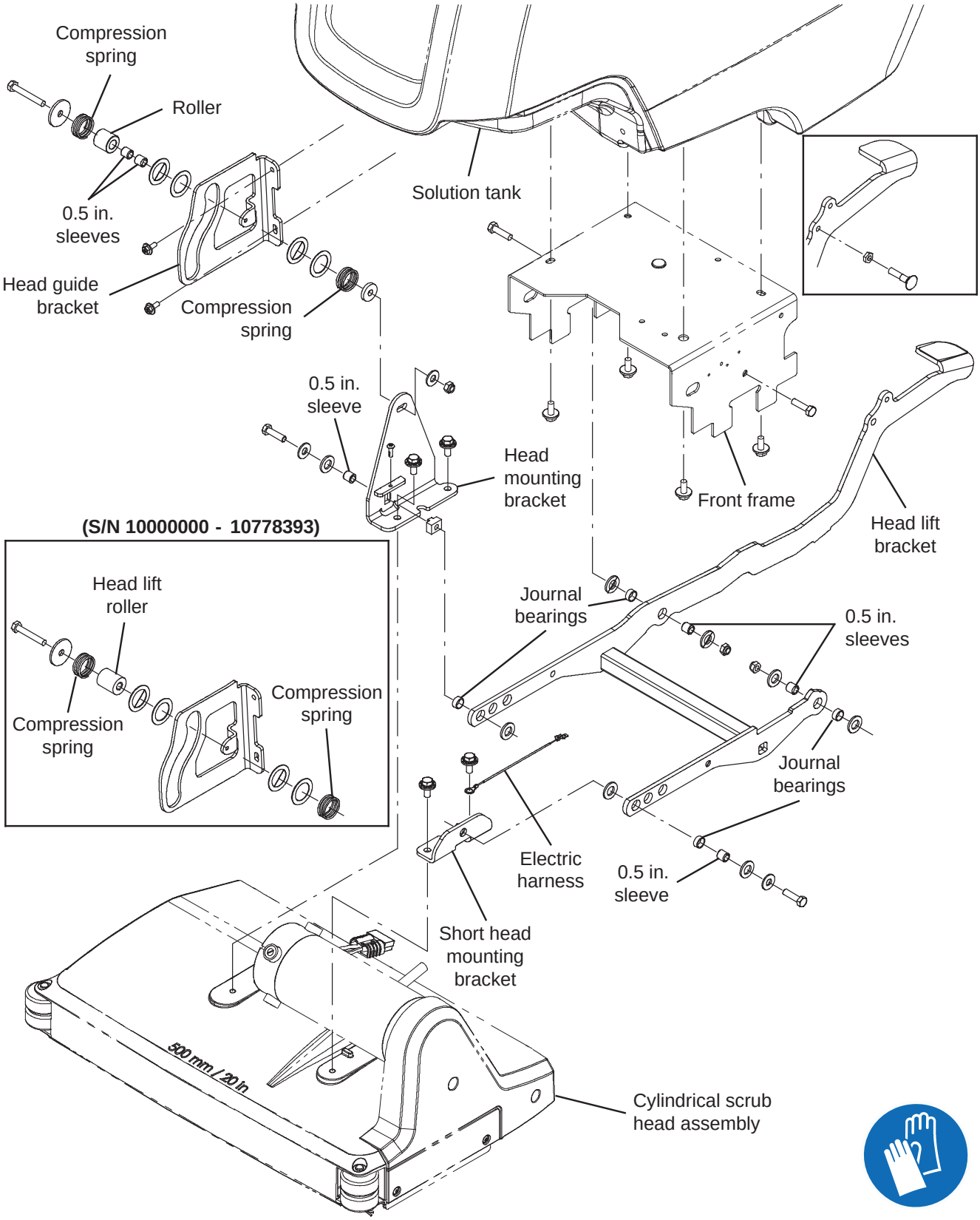
DUAL DISK SCRUB HEAD LIFT GROUP



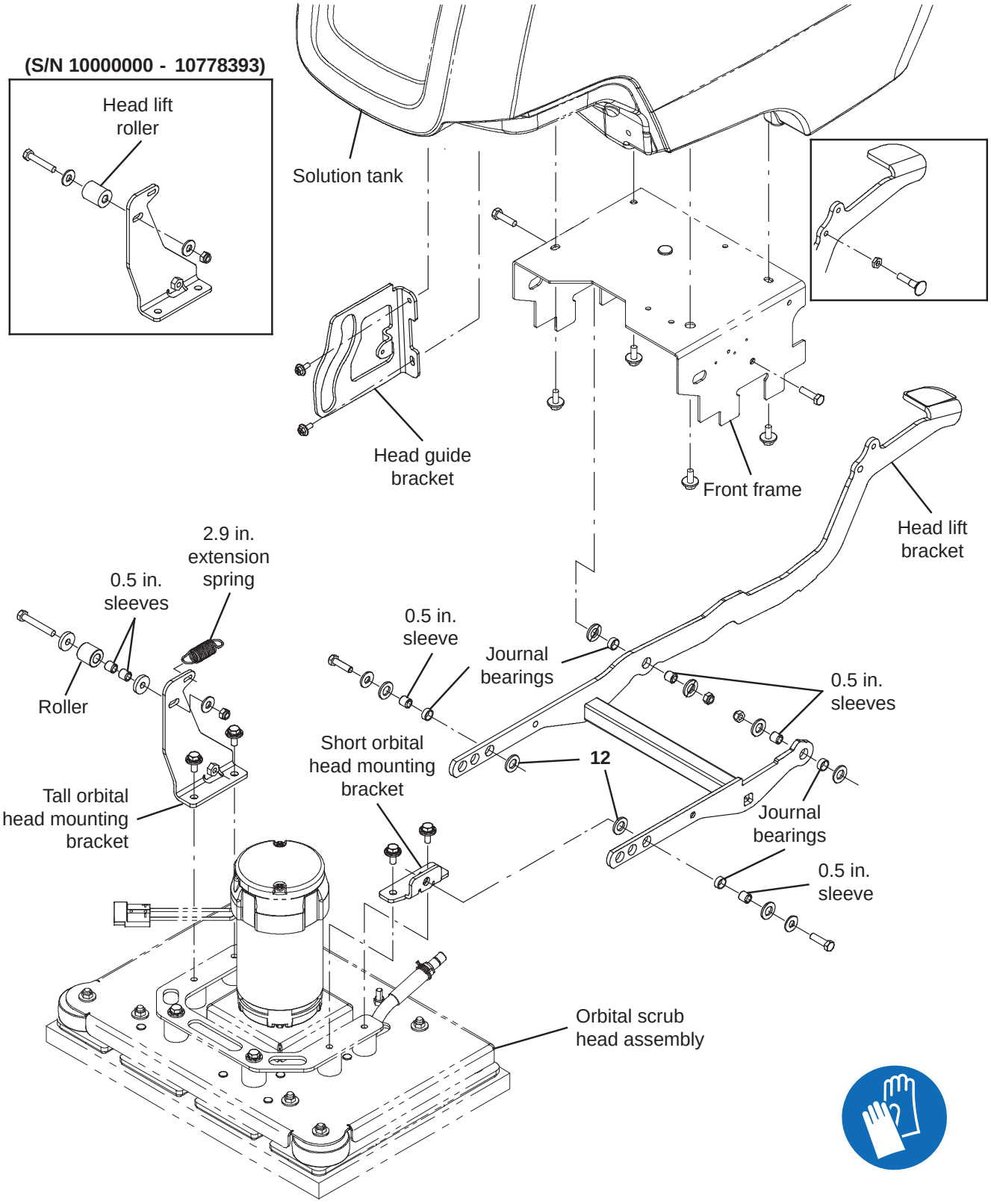
SINGLE DISK SCRUB HEAD LIFT GROUP



CYLINDRICAL SCRUB HEAD LIFT GROUP



ORBITAL SCRUB HEAD LIFT GROUP



REMOVE/REINSTALL THE SCRUB HEAD

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Completely drain the recovery tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

4. Remove debris tray from the scrub head (cylindrical only).

5. Remove scrub brushes from the scrub head.

6. Lower scrub head to floor.

7. Remove the hardware securing the scrub head cover to the machine.

8. Pull forward to remove the scrub head cover from the machine.

9. Disconnect the main wire harness connections from the motor.

10. Remove lift mechanism mounting hardware.

Note spacer and nylon washer orientation. Spacers and nylon washers must be oriented same for reassembly. Also, note hole selection for the configured scrub head type.

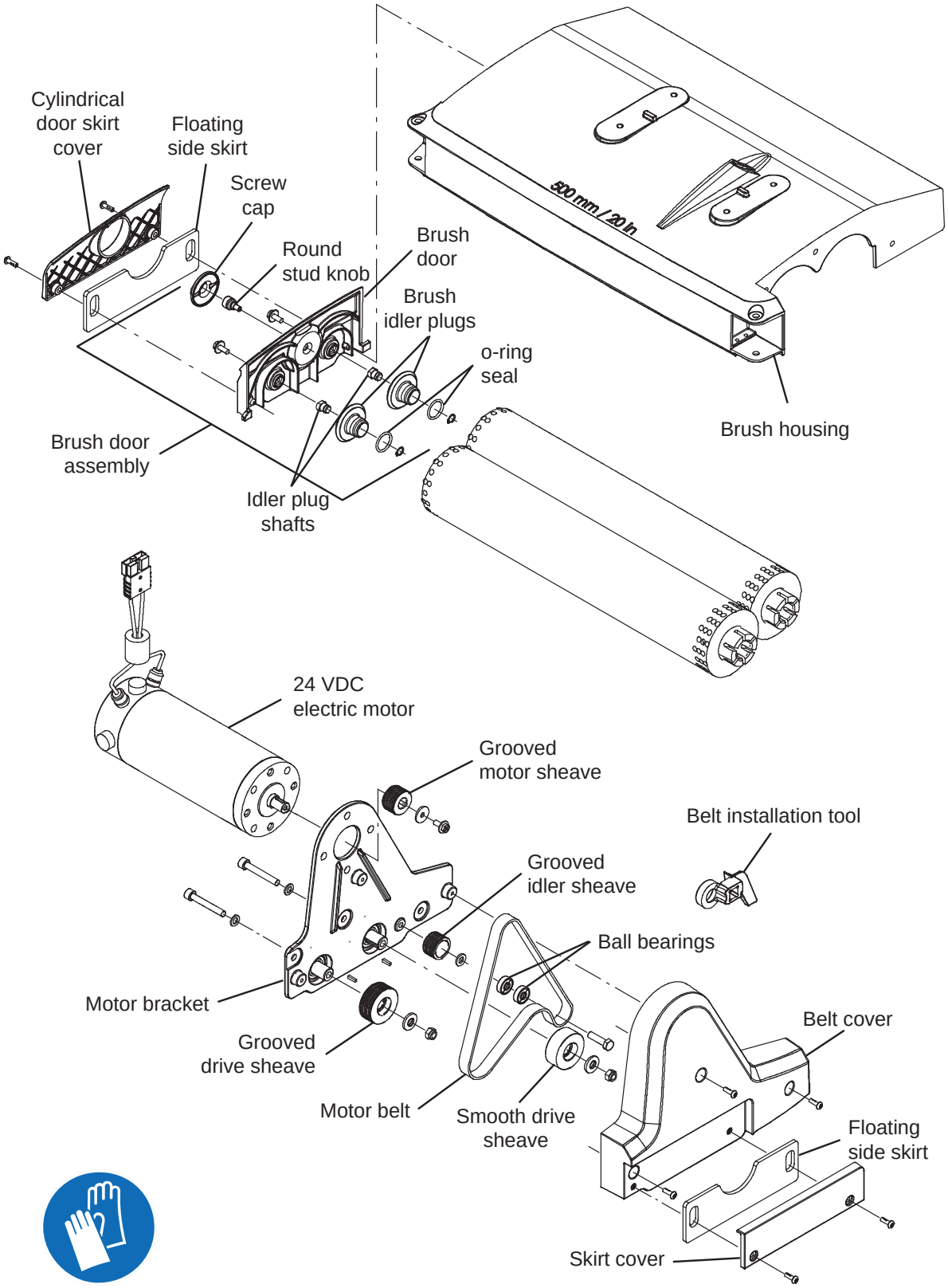
11. Remove scrub head assembly.

12. Reinstall scrub head onto machine in reverse order of disassembly.

13. Cylindrical Head Option Only: There are required brush pattern adjustments on the cylindrical scrub head. See CHECK/ADJUST THE CYLINDRICAL SCRUB BRUSH PATTERN.

14. Reinstall the scrub head cover onto the machine.

REMOVE/REPLACE THE BRUSH BELT (CYLINDRICAL SCRUB HEAD MODEL)



FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

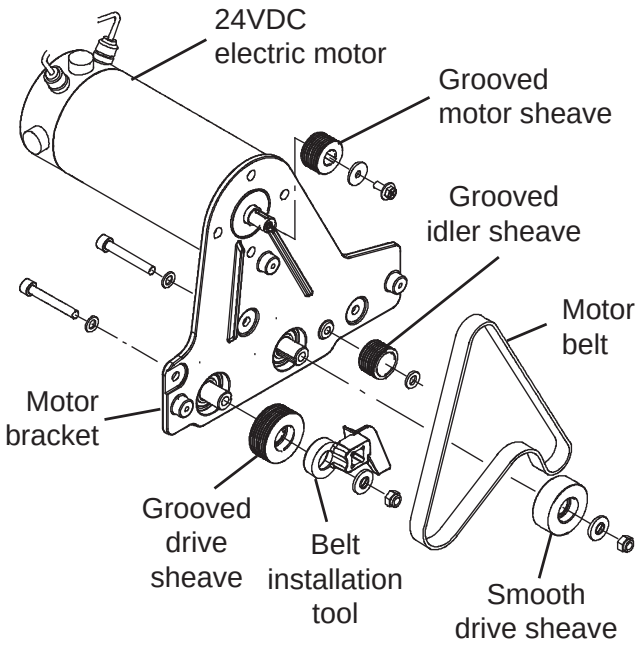
1. Completely drain the recovery tank.
2. Turn the key switch OFF.
3. Remove debris tray from the scrub head (cylindrical only).

4. Remove scrub brushes from the scrub head.

5. Remove the belt cover from the scrub head.
6. If the belt is still installed, remove the belt from the scrub head.
7. If replacing the scrub motor, proceed to REMOVE/REPLACE THE BRUSH MOTOR (CYLINDRICAL SCRUB HEAD MODEL).

   If replacing the belt, proceed to the following step.

8. Route the new belt around the brush motor sheave and the three brush drive sheaves

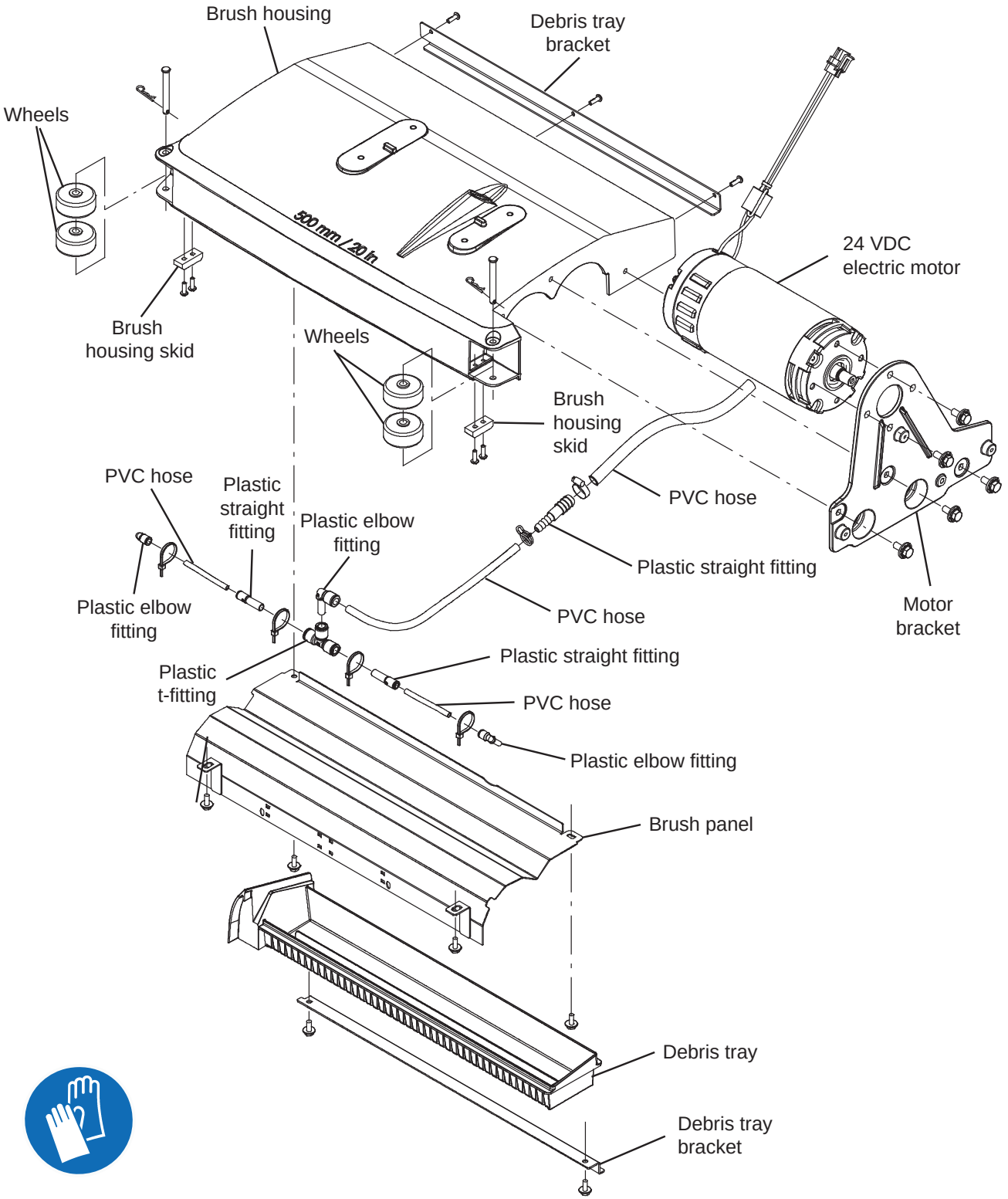


9. Remove the hardware securing the grooved drive sheave to the motor bracket and use hardware to install the belt installation tool onto the grooved drive sheave.
10. Use a wrench to turn the belt installation tool clockwise and use fingers to work the belt completely onto the sheaves.

NOTE: Take care to not pinch fingers in the belt and the sheaves while rotating the belt onto the sheaves.

11. Remove the belt installation tool from the grooved drive sheave and reinstall the hardware to secure the grooved drive sheave to the motor bracket.
12. Reinstall the belt cover onto the scrub head.
13. Reinstall the brushes into the scrub head.
14. Reinstall the debris tray into the scrub head.

REMOVE/REPLACE THE BRUSH MOTOR (CYLINDRICAL SCRUB HEAD MODEL)



FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Completely drain the recovery tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

4. Remove debris tray from the scrub head (cylindrical only).

5. Remove scrub brushes from the scrub head.

6. Remove the scrub head cover from the machine.
7. Remove the belt cover from the scrub head.
8. Remove drive belt from the scrub head. See REMOVE/REPLACE THE BRUSH BELT (CYLINDRICAL SCRUB HEAD MODEL).
9. Disconnect the main wire harness from the brush motor.
10. Remove the brush motor from the motor bracket.
11. If replacing the carbon brushes, proceed to REPLACE THE CYLINDRICAL BRUSH MOTOR CARBON BRUSHES.
12. Install the new brush motor/reinstall the removed brush motor in reverse order of disassembly.
13. Check and adjust the cylindrical brush pattern. Proceed to CHECK/ADJUST THE CYLINDRICAL SCRUB BRUSH PATTERN.

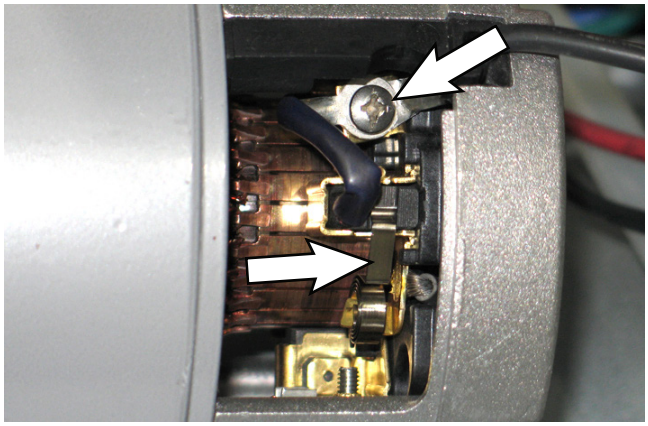
REPLACE THE CYLINDRICAL BRUSH MOTOR CARBON BRUSHES

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

FOR SAFETY: When servicing machine, Disconnect battery connection and charger cord before working on machine.

1. Remove the scrub head cover from the machine.
2. Remove the brush drive motor from the machine. See REMOVE/REPLACE THE BRUSH MOTOR (CYLINDRICAL SCRUB HEAD MODEL).
3. Loosen and remove the latch securing the retaining band to the brush motor.

4. Remove the pan screw securing the carbon brush wire to the cylindrical brush motor, remove the spring securing the carbon brush inside the motor, and remove the carbon brush assembly from the motor.



5. Use compressed air to clean dust from inside the motor.

6. Repeat previous steps to service the remaining carbon brushes.

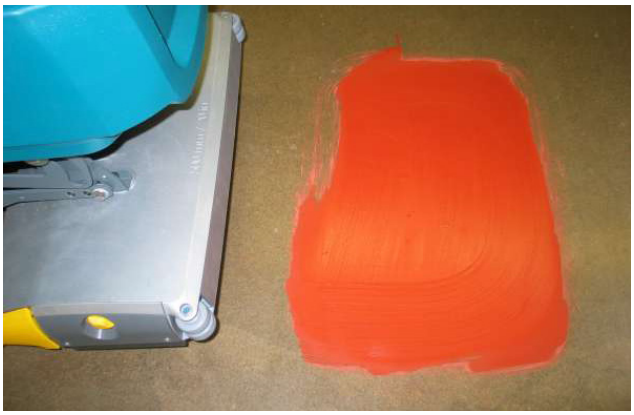
NOTE: Carbon brushes should be replaced as sets.

7. Reinstall the removed carbon brushes/install the new carbon brushes into the disk brush motor in the reverse order of disassembly.
8. Reinstall the retaining band onto the motor.
9. Reinstall the motor in reverse order of disassembly. See REMOVE/REPLACE THE BRUSH MOTOR (CYLINDRICAL SCRUB HEAD MODEL).

CHECK/ADJUST THE CYLINDRICAL SCRUB BRUSH PATTERN

NOTE: This procedure must be completed using a new set of brushes. Following this procedure using worn brushes may result in uneven brush wear and shortened brush life.

1. Remove the scrub head cover from the machine.
2. Apply chalk to a flat, level surface.

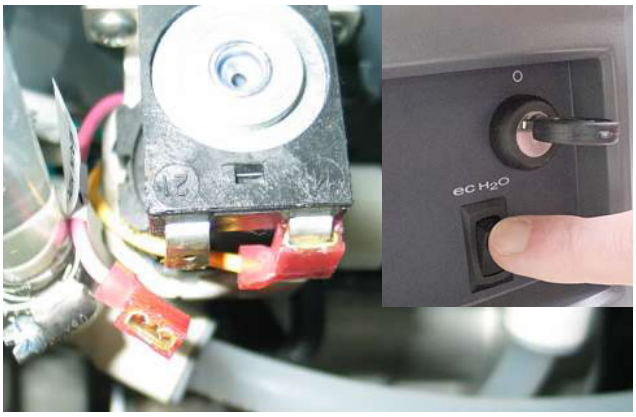


3. Disconnect the main wire harness from the transaxle motor.

NOTE: This must be done to keep the machine stationary during the brush pattern test.

4. Turn off ec-H2O (if equipped) and disconnect the main wire harness form the conventional water valve.

NOTE: This must be done in order to keep water from washing the chalk away from the floor. Purge any residual water by running the brushes for 30 seconds at another location before proceeding to following step.

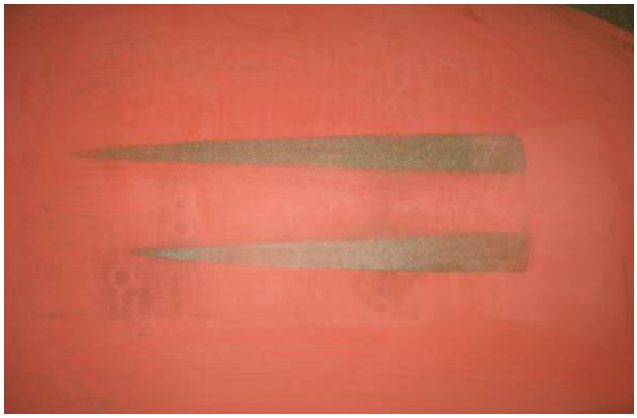


5. Move the scrubber so that the brushes are positioned over the chalk.

6. Set parking brake (if equipped).

7. Lower the scrub head to the floor and activate scrub brushes for 20 seconds and then release the handle.

8. Release parking brake (if equipped) and pull the machine from the pattern test site. Inspect the brush pattern. The pattern shown below has a severe taper and requires adjustment to achieve two parallel rectangles.



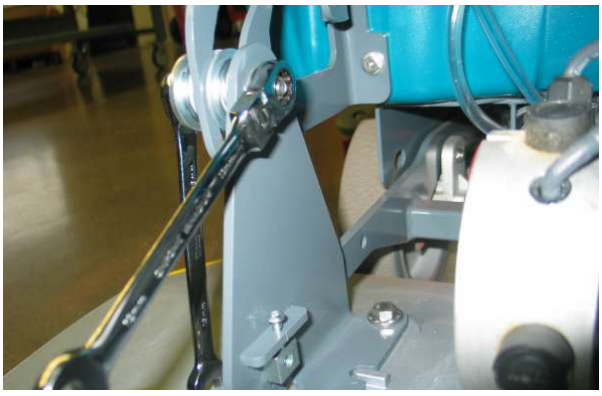
9. Lower the scrub head to the floor.

10. Loosen (do not remove) the right side linkage screw.

11. Turn the adjustment screw counterclockwise to increase down pressure on the right side or clockwise to decrease down pressure on the right side of the scrub brushes.

12. Reapply chalk and repeat steps 4-10 until the desired brush pattern is achieved and then retighten the linkage bolt with the head in the lowered position.

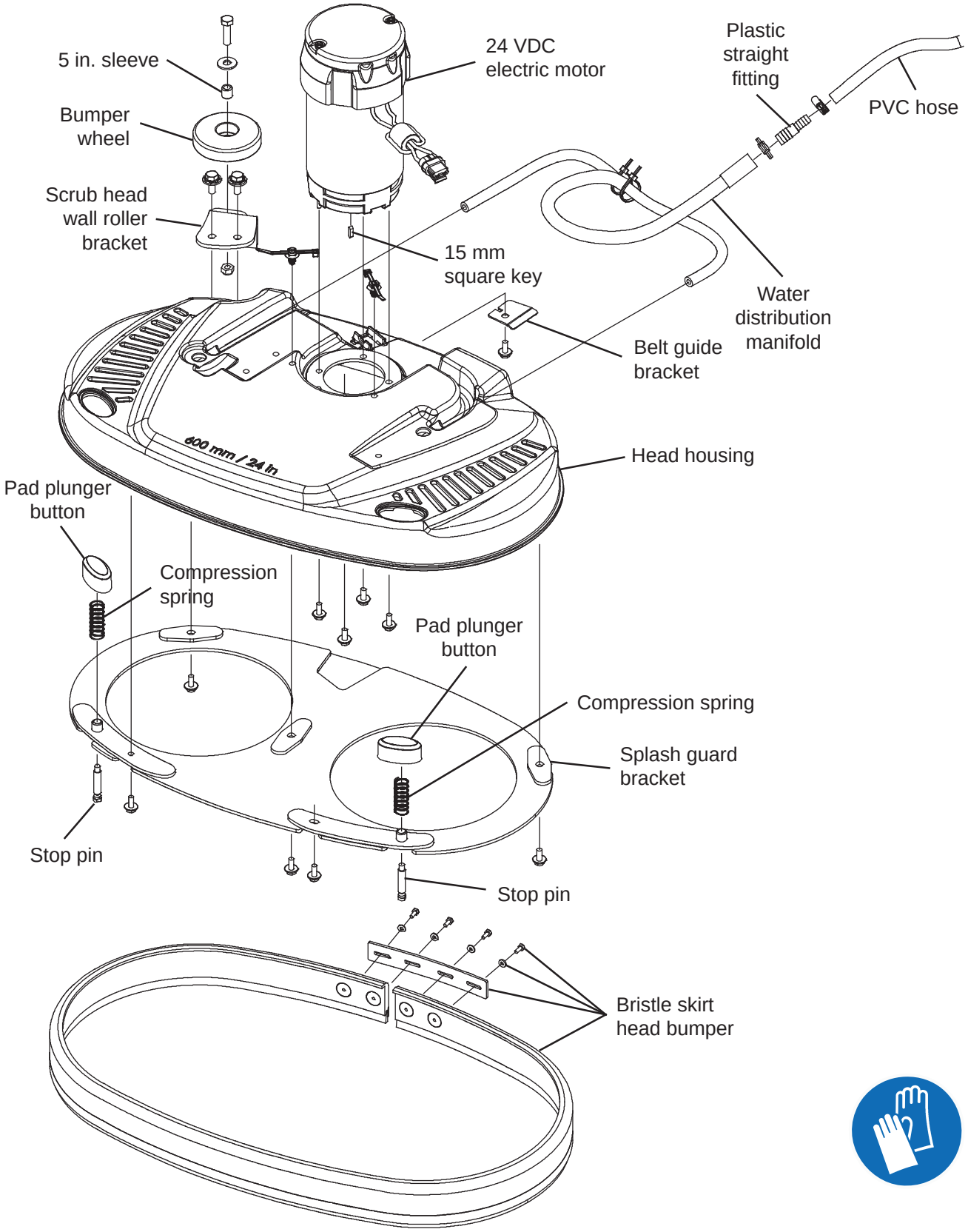
13. The taper adjustment is complete. If the pattern is uneven front-to-rear, the brush pattern can be further adjusted using the slotted top bolt. Loosen the hex nut just enough so the scrub head bracket moves freely and the scrub head settles flat on the floor. Tighten the top hex nut.



14. Tighten the top bolt and perform a final pattern check. Adjustment is complete.

15. Reinstall the scrub head cover onto the machine.

DUAL SCRUB BRUSH HEAD ASSEMBLY



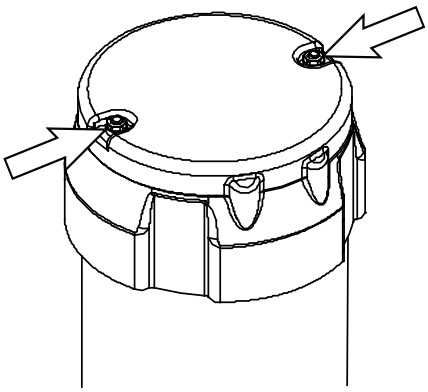
REMOVE/INSTALL THE DUAL SCRUB HEAD MOTOR CARBON BRUSHES

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

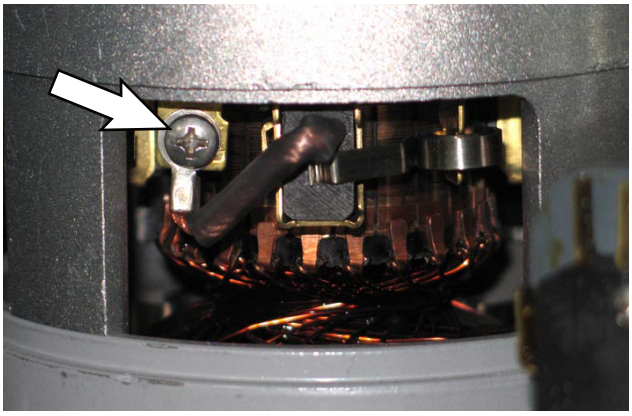
1. Turn the key switch OFF.
2. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, Disconnect battery connection and charger cord before working on machine.

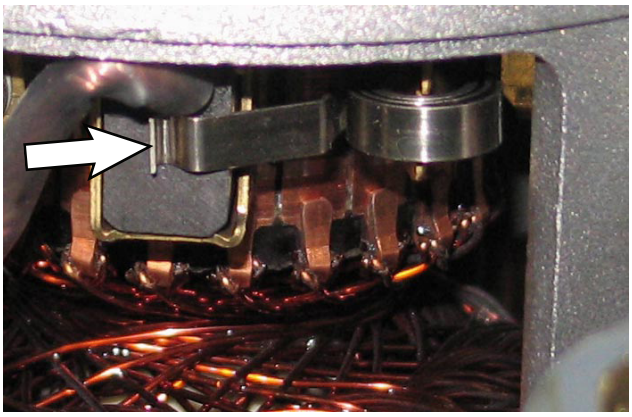
3. Remove the scrub head cover from the machine.
4. Remove the hardware securing the cap to the motor and remove the cap from the motor.



5. Remove the screw securing the carbon brush to the motor.



6. Lift the spring pressing the carbon brush into the motor from over the carbon brush and pull the carbon brush from the motor.



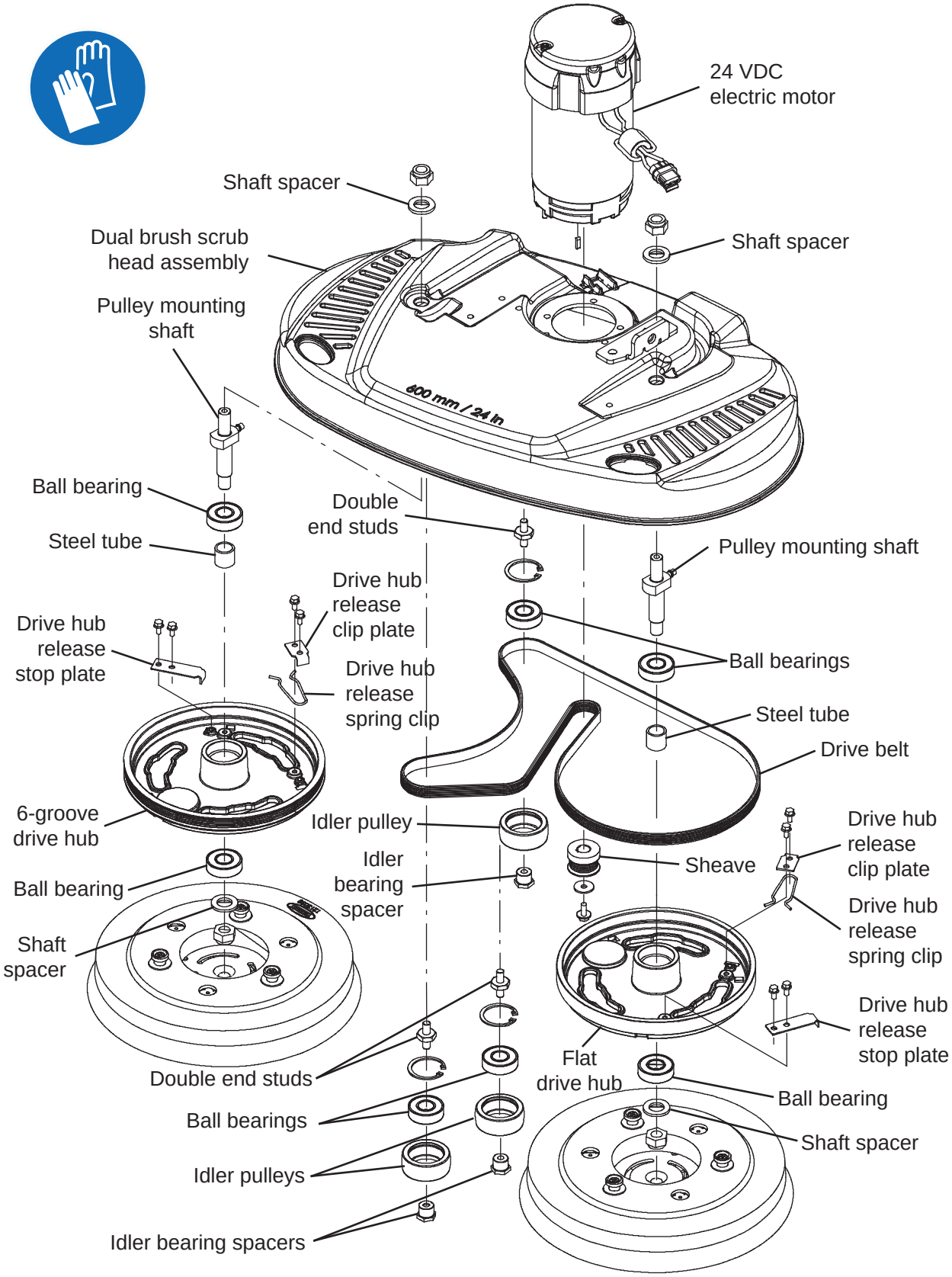
7. Use compressed air to clean dust from inside the motor.

8. Repeat previous steps to service the carbon brush located on the other side of the disk brush motor.

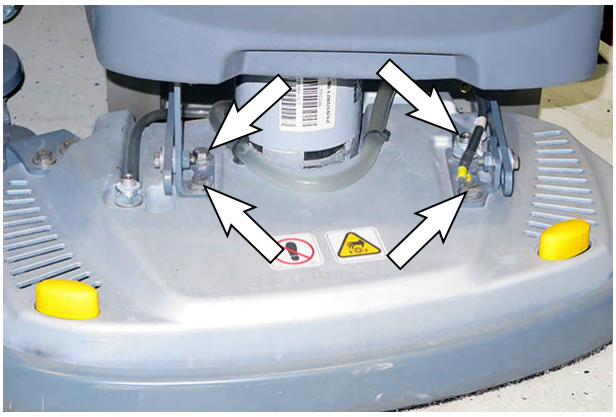
NOTE: Carbon brushes should be replaced as sets.

9. Reinstall the removed carbon brushes/install the new carbon brushes into the brush motor in the reverse order of disassembly.
10. Reinstall the scrub head cover onto the machine.

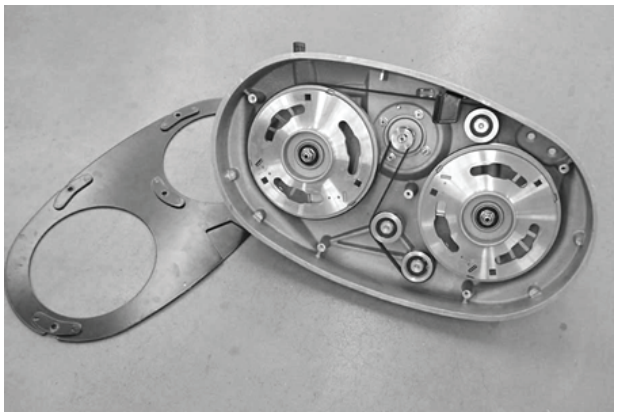
REPLACE THE BRUSH MOTOR BELT (DUAL DISK MODEL)



1. Remove the dual disk brush scrub head from the machine. See REMOVE/REINSTALL THE SCRUB HEAD.



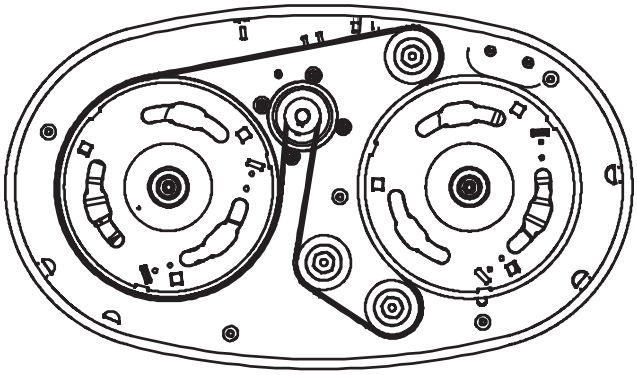
2. Carefully lay the scrub head bottom side up and remove both scrub brushes from the scrub head.



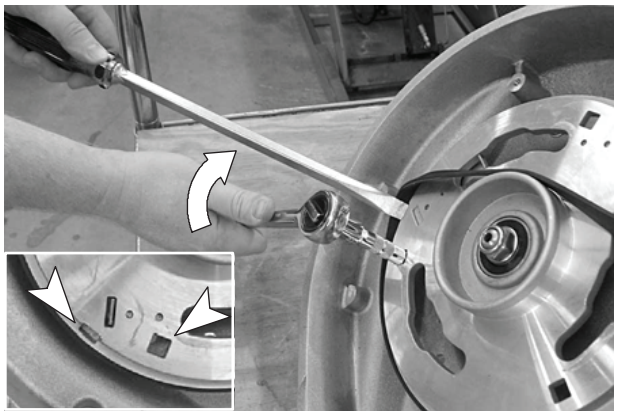
3. Remove the splash guard bracket from the scrub head.

4. If belt is still installed, remove the belt from the scrub head.

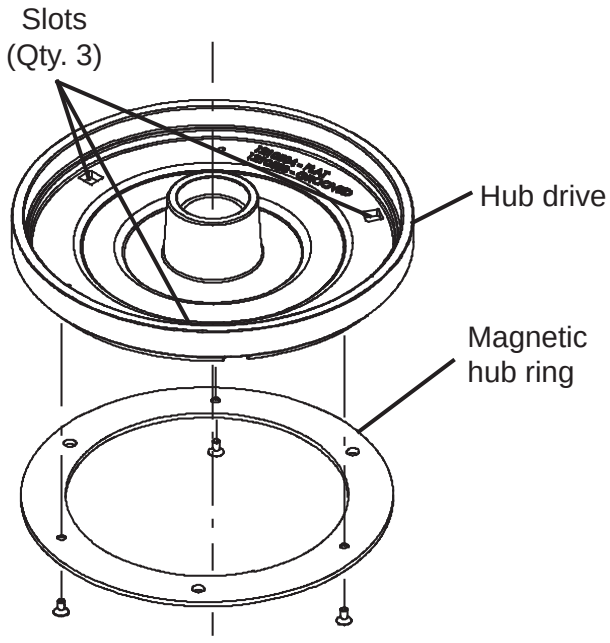
5. Install the new belt into the scrub head. Note belt routing below.



6. Fully install the belt onto the various scrub head components. Use a socket driver ratchet with an extension and a large flathead screwdriver as shown below.



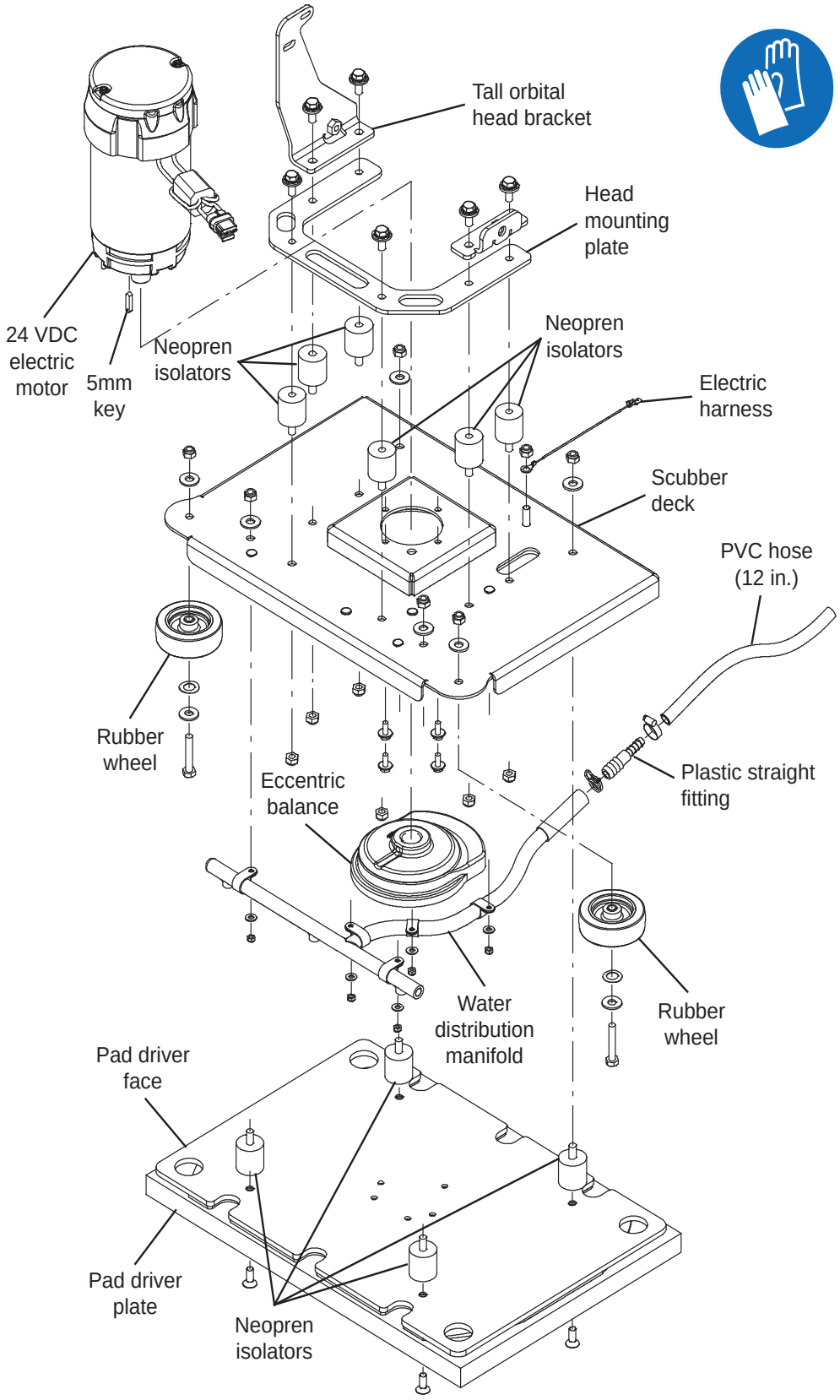
NOTE: Remove the magnetic hub ring from the hub drive to access the tool slots in the hub drive on machines equipped with an optional magnetic scrub head.



7. Reinstall the splash guard bracket onto the scrub head.

8. Reinstall the scrub head onto the machine. See REMOVE/REINSTALL THE SCRUB HEAD.

ORBITAL SCRUB HEAD ASSEMBLY



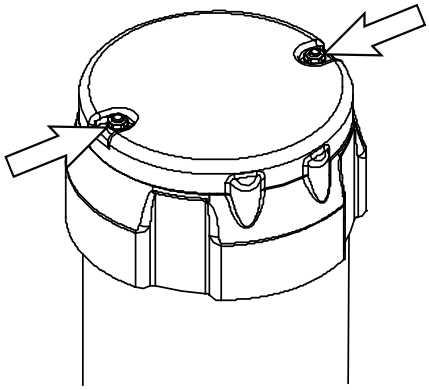
REMOVE/INSTALL THE ORBITAL SCRUB HEAD MOTOR CARBON BRUSHES

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

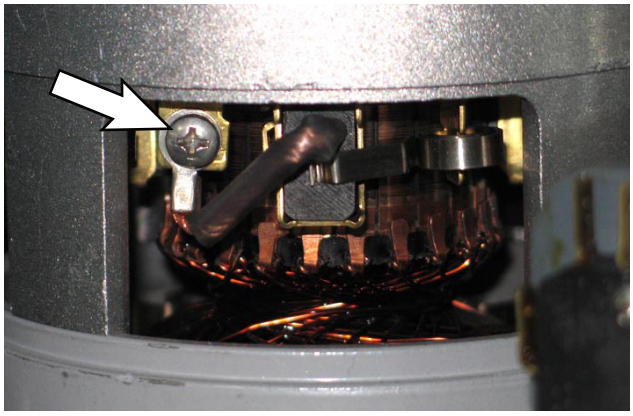
1. Turn the key switch OFF.
2. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, Disconnect battery connection and charger cord before working on machine.

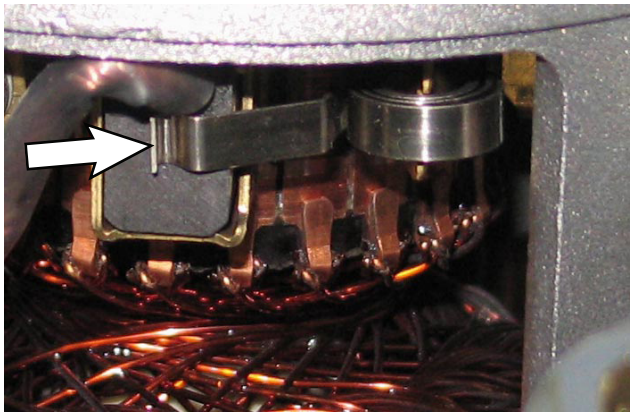
3. Remove the scrub head cover from the machine.
4. Remove the hardware securing the cap to the motor and remove the cap from the motor.



5. Remove the screw securing the carbon brush to the motor.



6. Lift the spring pressing the carbon brush into the motor from over the carbon brush and pull the carbon brush from the motor.



7. Use compressed air to clean dust from inside the motor.

8. Repeat previous steps to service the carbon brush located on the other side of the disk brush motor.

NOTE: Carbon brushes should be replaced as sets.

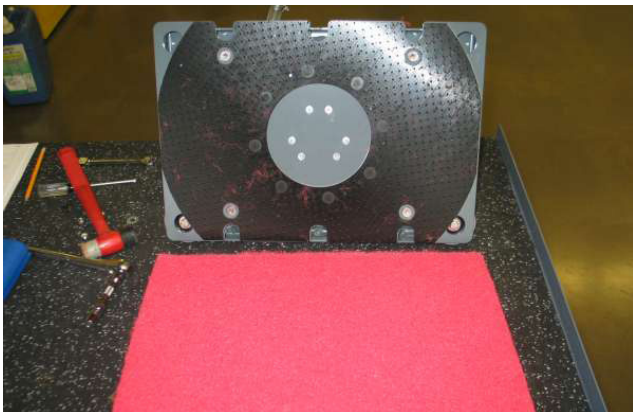
9. Reinstall the removed carbon brushes/install the new carbon brushes into the brush motor in the reverse order of disassembly.
10. Reinstall the scrub head cover onto the machine.

REPLACE THE LOWER ORBITAL HEAD ISOLATORS

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Remove scrub head assembly. See REMOVE/ REINSTALL THE SCRUB HEAD.
2. Loosen the hardware for the lower isolators.

3. Place the head upside down and remove the pads.



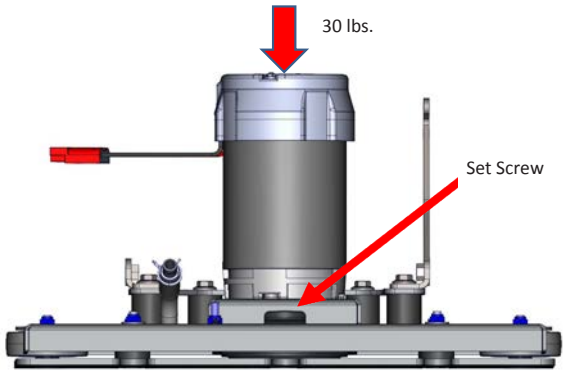
4. Remove the hardware securing the lower plate to the lower isolators.

5. Loosen the set screw securing the concentric motor weight to the motor shaft.

6. Remove the lower plate and the lower isolators.

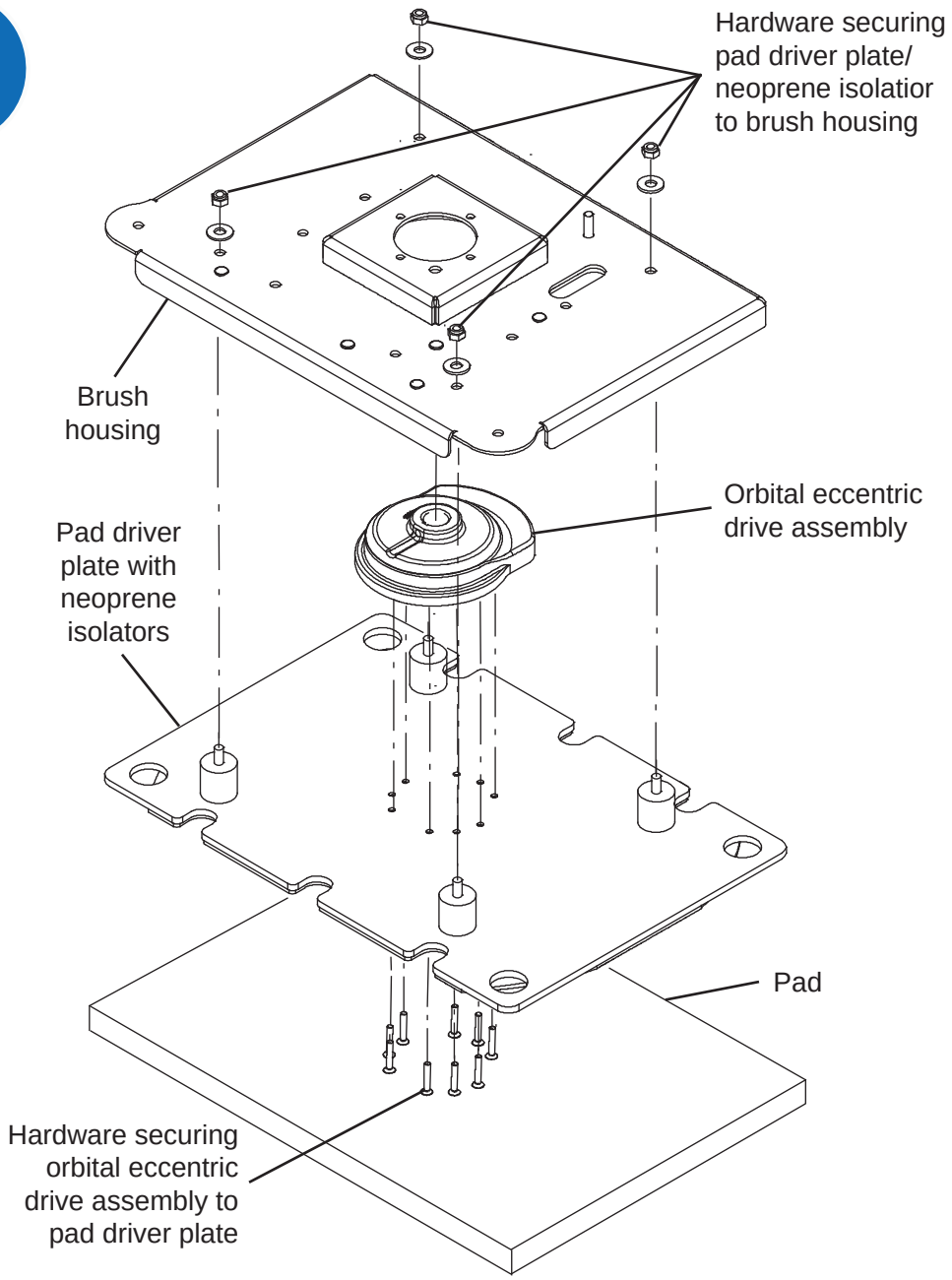
7. Install the new isolators/reinstall the removed isolators in reverse order of disassembly.

8. During reassembly, place a 30 lb weight on the top of the motor while tightening the motor shaft set screw. This weight simulates the actual down force on the scrub head and sets the shaft pre-load. Torque the set screw to 15 ft-lbs (20 Nm).



9. Reinstall the scrub head assembly onto the machine. See REMOVE/REINSTALL THE SCRUB HEAD.

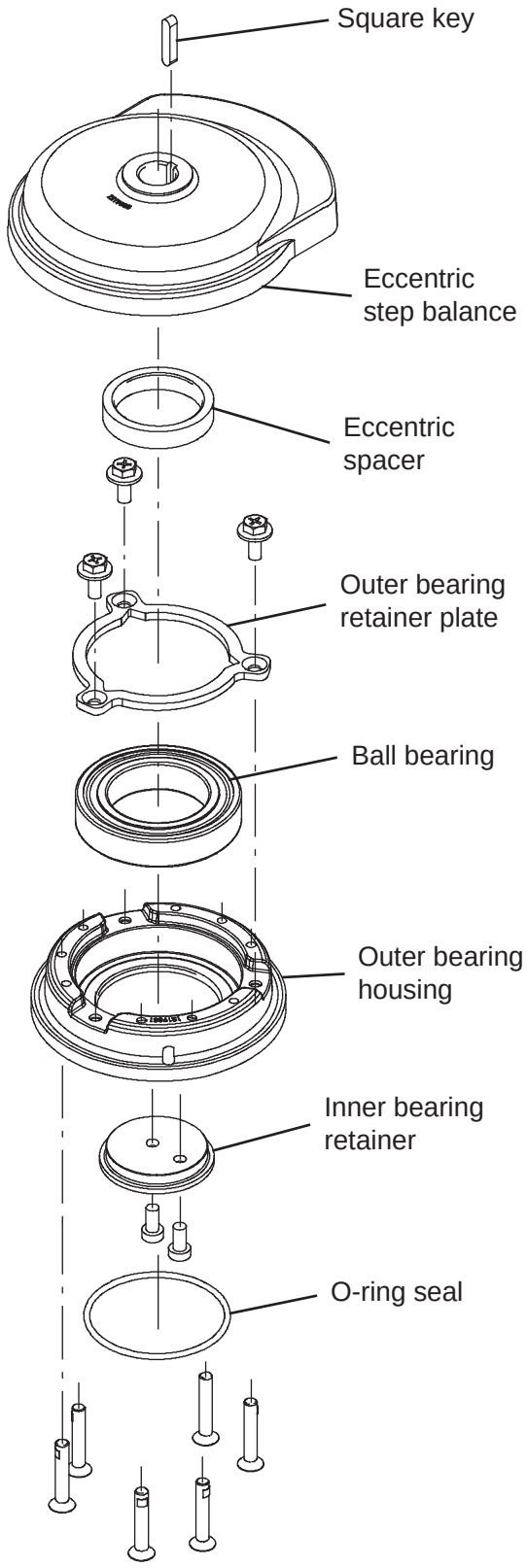
REMOVE/INSTALL/REPLACE THE ORBITAL SCRUB HEAD ECCENTRIC DRIVE ASSEMBLY



FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

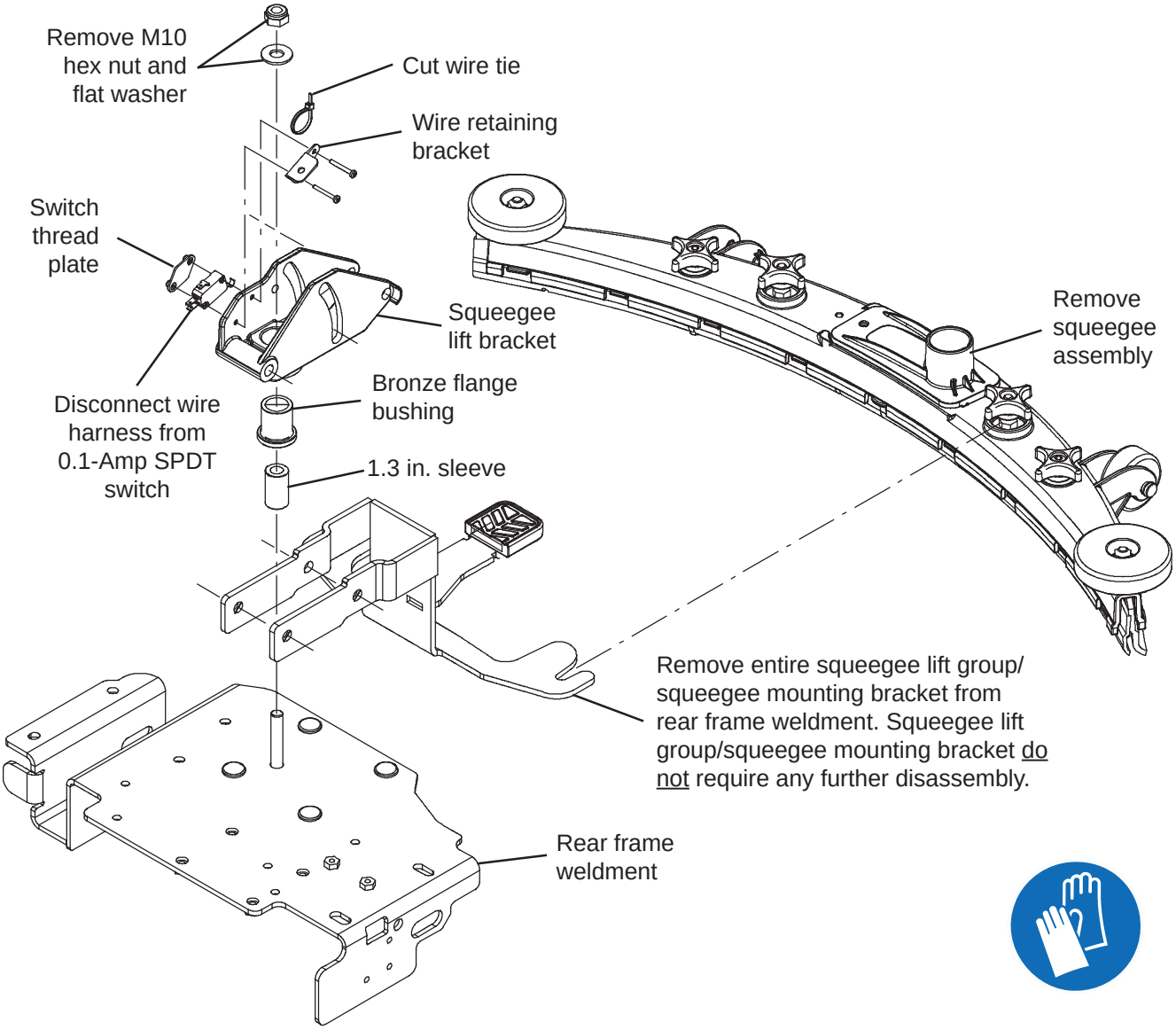
1. Raise the scrub into the completely raised position.
2. Turn the key switch OFF.
3. Remove the scrub pad from the machine.
4. Remove the hardware securing the orbital eccentric drive assembly to the pad driver plate.
5. Remove the hardware securing the lower isolators and pad driver plate to the brush housing.
6. Remove the orbital eccentric drive assembly from the motor. Do not lose the square key when removing the orbital eccentric drive assembly from the motor.

7. Disassemble the orbital eccentric drive assembly as necessary to perform maintenance.



8. Reassemble the orbital eccentric drive assembly in reverse order of disassembly.
9. Reinstall the orbital eccentric drive assembly onto the machine in reverse order of disassembly.
10. Reinstall the lower isolators and pad driver plate onto the machine.
11. Reinstall the hardware securing the orbital eccentric drive assembly to the pad driver plate.
12. Reinstall the scrub pad onto the machine.

REPLACE THE DOWN PRESSURE ACTUATOR (OPTION)

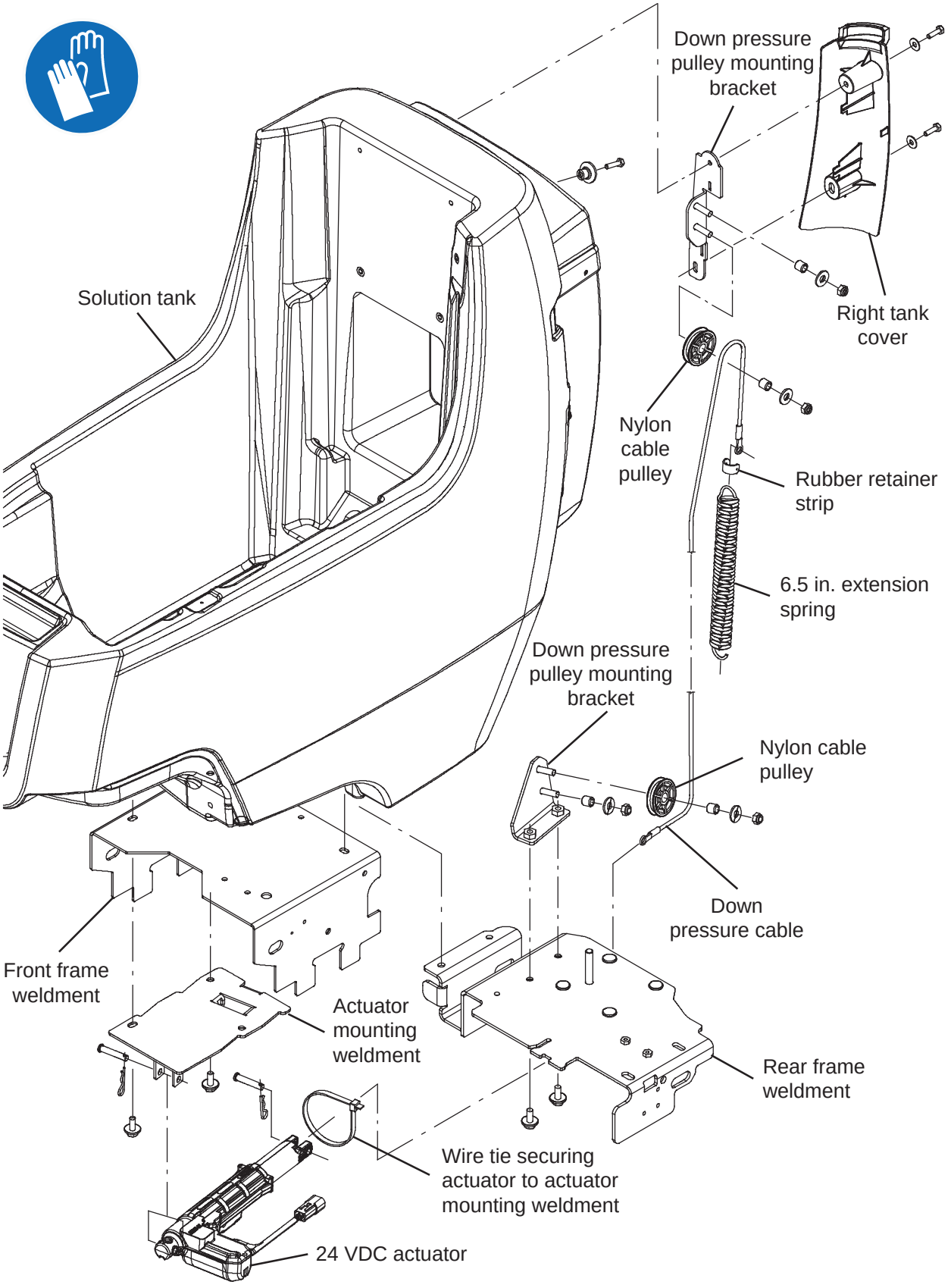


FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

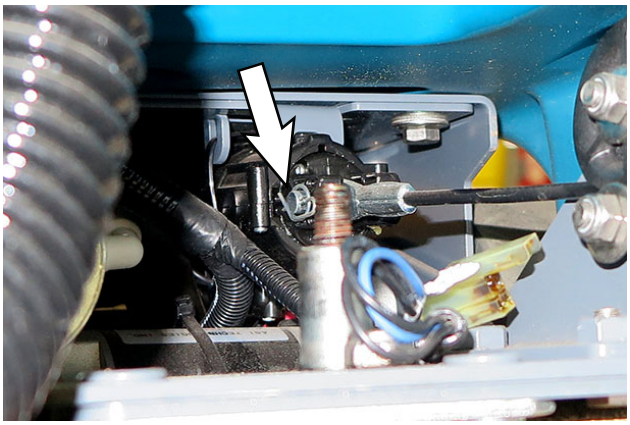
1. Turn the key switch OFF.
2. Completely lower the scrub head.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

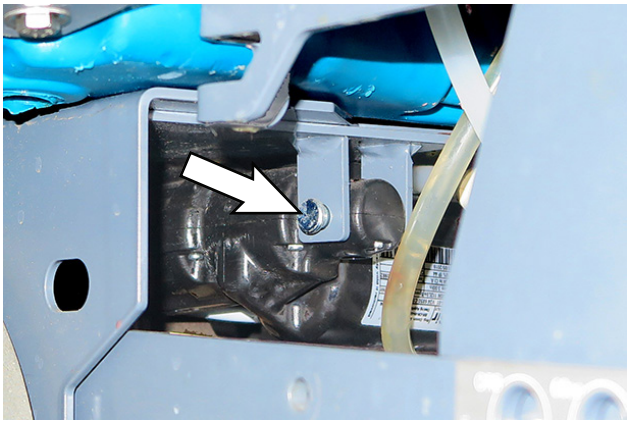
4. Disconnect the vacuum hose from the squeegee assembly and remove the squeegee assembly from the machine.
5. Cut wire tie securing the main wire harness lead connected to the SPDT switch from the machine.
6. Disconnect the main wire harness from the SPDT switch.
7. Remove the entire squeegee lift group squeegee mounting bracket from the rear frame weldment.


Down pressure pulley mounting bracket
Solution tank
Right tank cover
Nylon cable pulley
Rubber retainer strip
6.5 in. extension spring
Down pressure pulley mounting bracket
Nylon cable pulley
Down pressure cable
Front frame weldment
Actuator mounting weldment
Rear frame weldment
Wire tie securing actuator to actuator mounting weldment
24 VDC actuator

8. Cut the cable tie securing the actuator to the actuator mounting weldment.
9. Disconnect the main wire harness from the actuator.
10. Remove the clevis pin/cotter pin securing the down pressure cable to the actuator.

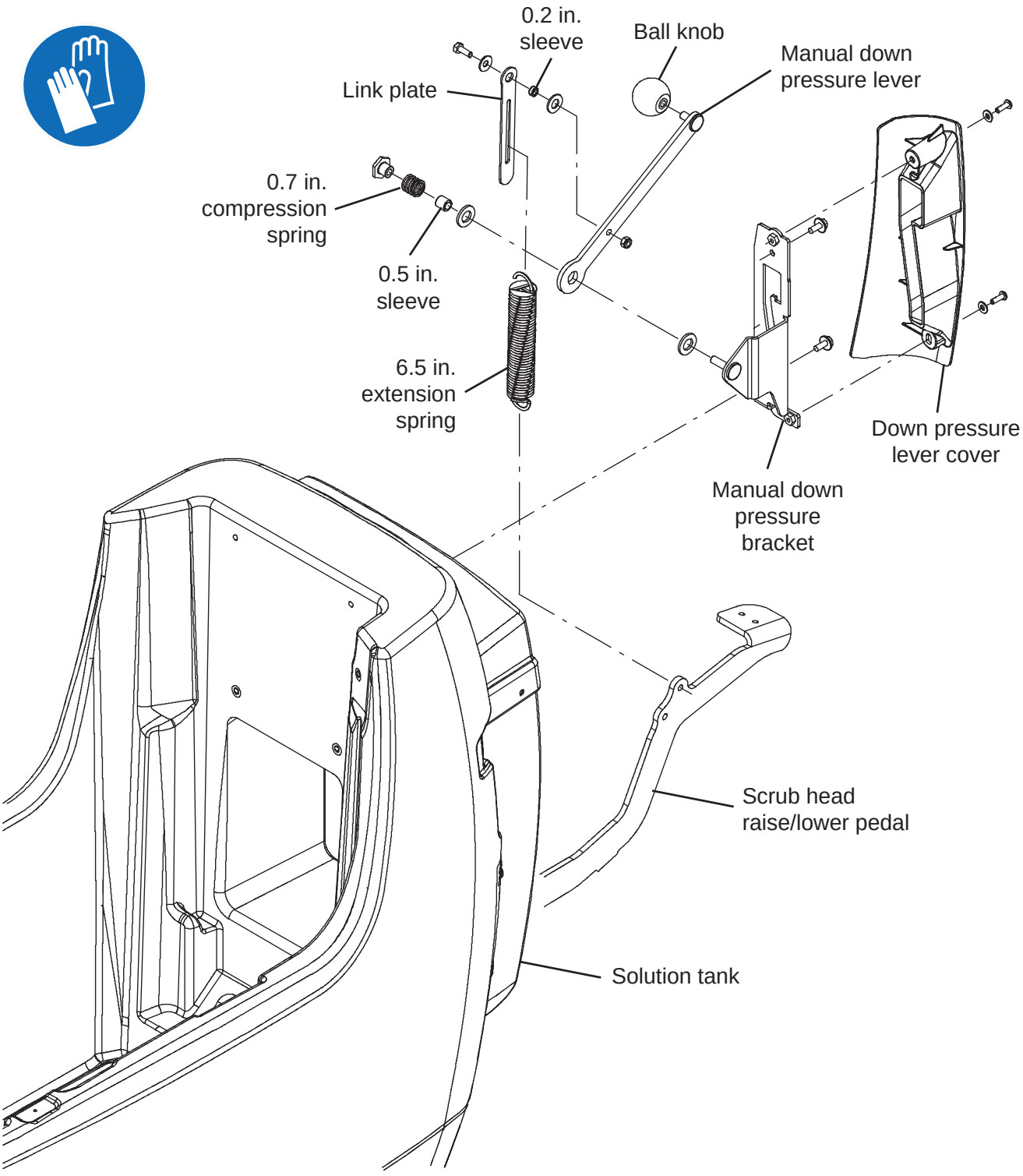


11. Remove the cotter pin/clevis pin securing the actuator to the actuator mounting bracket.

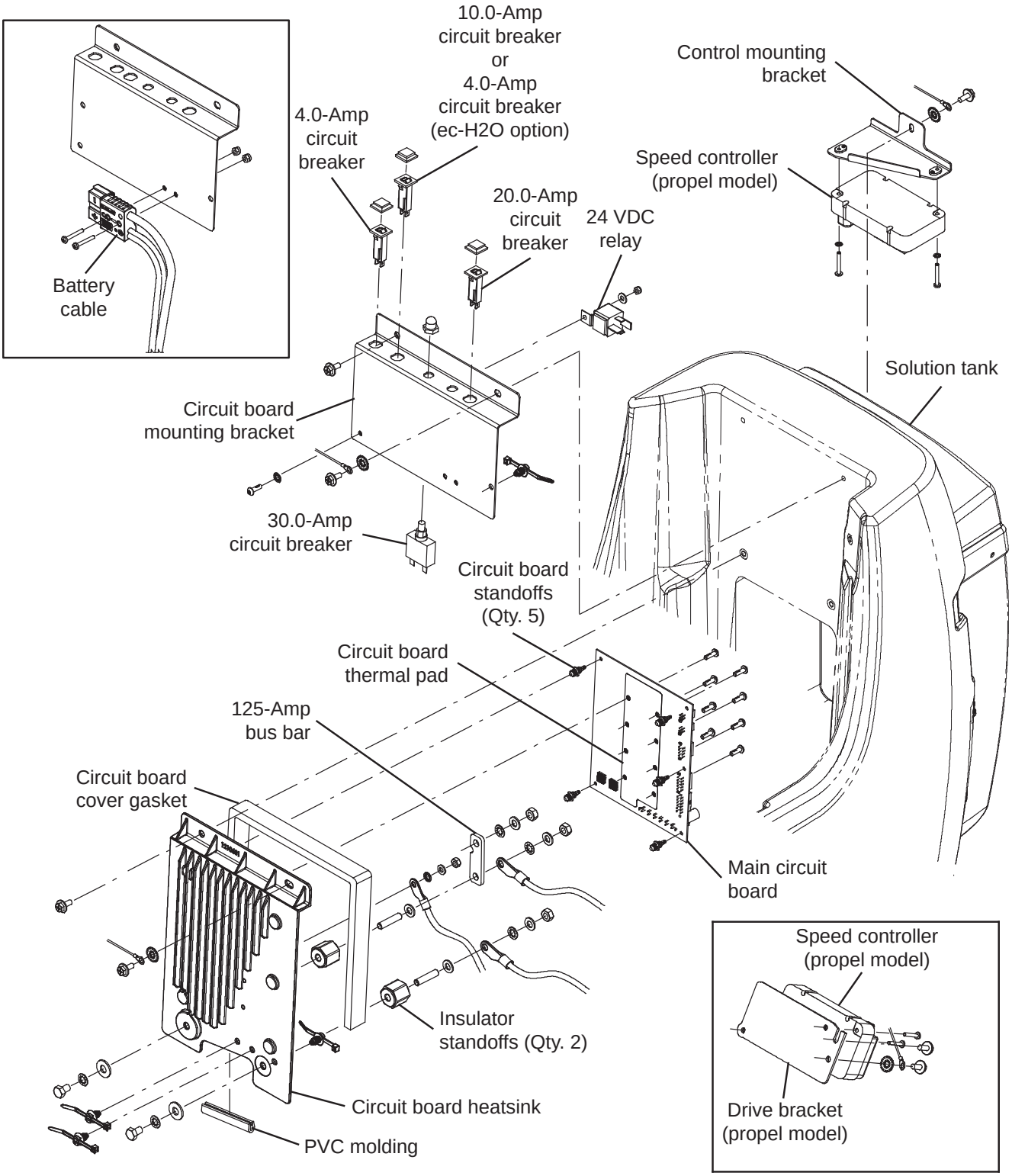


12. Use cotter pin/clevis pin to install the new actuator onto the actuator mounting weldment.
13. Use cotter pin/clevis pin to connect the down pressure cable to the actuator.
14. Use a cable tie to secure the actuator to the actuator mounting weldment.
15. Connect the main harness to the actuator and use a wire tie to secure main harness to the 24 actuator.
16. Reinstall the squeegee lift group squeegee mounting bracket onto the rear frame weldment.
17. Reconnect the main wire harness to the SPDT switch.
18. Reinstall the rear squeegee onto the machine.
19. Reconnect the battery cable to the battery.

MANUAL DOWN PRESSURE GROUP



CONTROL MODULES/CONTROLS/ ELECTRICAL



REMOVE THE MACHINE CONTROL MODULE (OPTION)

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped

1. Completely drain the solution tank and the recovery tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

4. Remove batteries from the machine.

FOR SAFETY: When servicing machine, avoid contact with battery acid, keep all metal objects off batteries, and use a hoist or adequate assistance when lifting batteries. Use a non-conductive battery removal device.

5. Cut zip ties securing hoses and wire harnesses to cover.

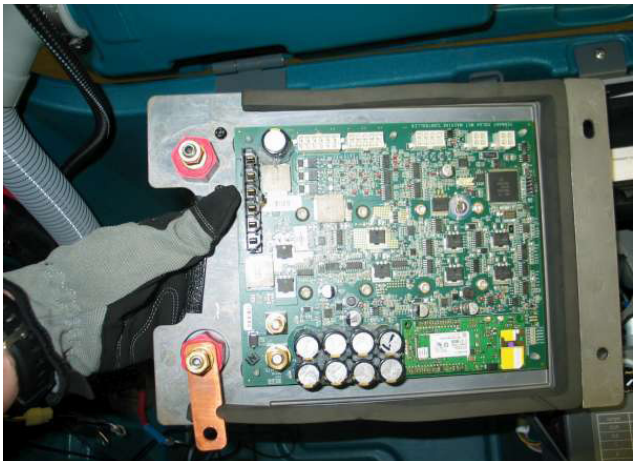
6. Remove the hardware securing the heat sink and machine control module assembly to the solution tank.

7. Carefully lower the heat sink and machine control module assembly.

NOTE: Be careful not to damage the IRIS antenna (option) when lowering the assembly.

8. Disconnect all electrical connections from the machine control module assembly.

9. Remove the heat sink and machine control module assembly from the scrubber.



10. Attach a static wrist strap to the battery (-) terminal to prevent ESD damage to the logic board.

11. Install control module onto machine in reverse order of disassembly.

NOTE: The torque specification for control module electrical cables is 52 in-lbs (6 Nm).

REPLACE THE i-DRIVE MODULE (OPTION)

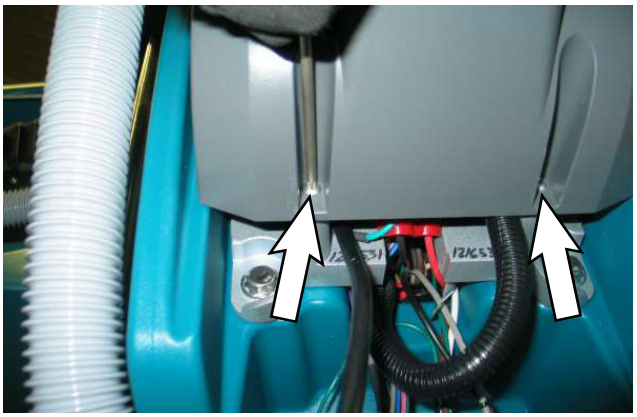
FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Turn the key switch OFF.

2. Disconnect the battery cable from the machine.

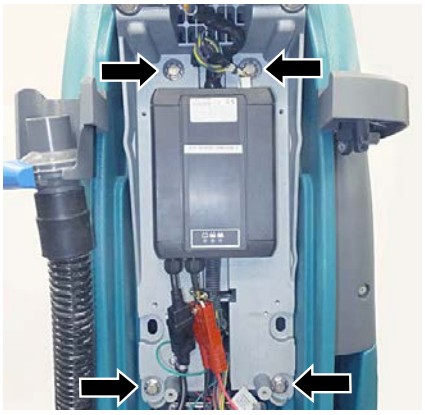
FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

3. Remove the hardware securing the console cover to the machine.

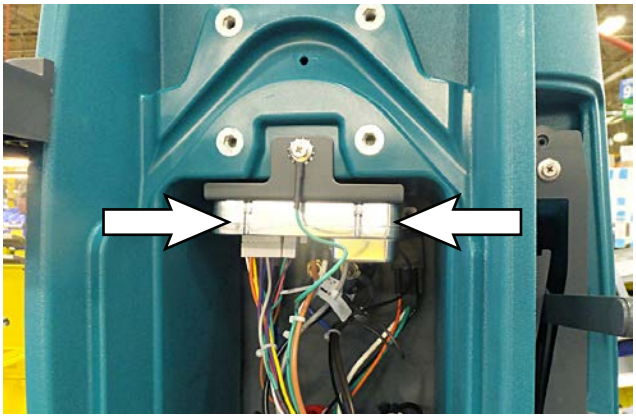


4. Carefully lower the console cover. Do Not break any wire/harness connections when lowering the console cover.

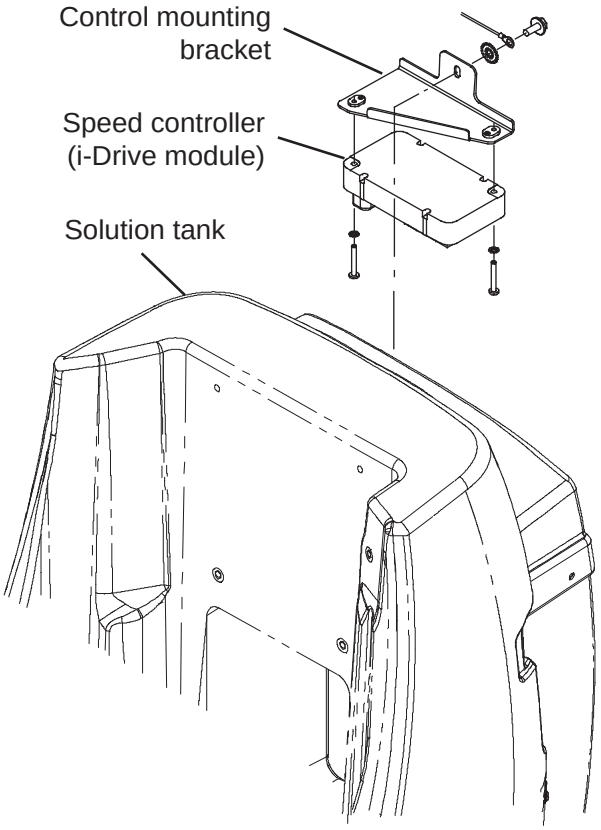
5. Remove the hardware to remove the control column frame from the solution tank.



6. Disconnect all harness connections from the i-Drive module.

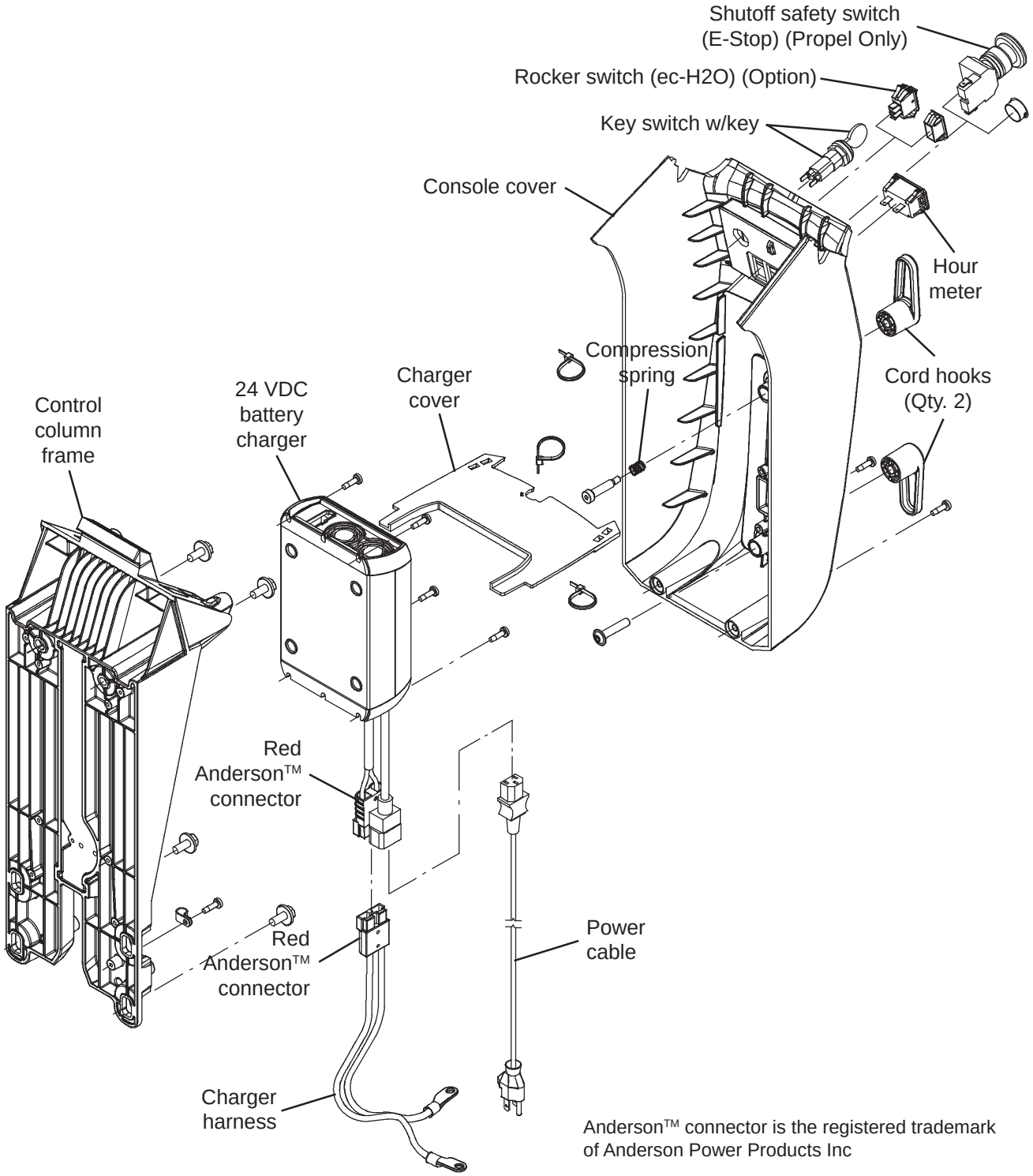


7. Remove the i-Drive module from the control mounting bracket.



8. Install the new i-Drive onto the control mounting bracket.
9. Connect harness connections to the i-Drive.
10. Reinstall the control column frame onto the solution tank.
11. Reinstall the console cover onto the machine.
12. Reconnect the battery cable to the machine.
13. Reconfigure machine for new i-Drive. The new i-Drive module must be programmed prior to machine operation. See SERVICE DIAGNOSTICS TOOL.

REMOVE THE ONBOARD BATTERY CHARGER (OPTION)



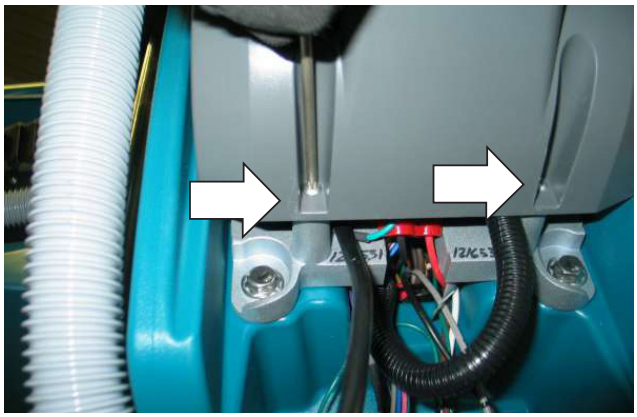
Anderson™ connector is the registered trademark of Anderson Power Products Inc

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Turn the key switch OFF.
2. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

3. Remove the hardware securing the lower console cover to the machine.



4. Carefully lower the console cover. Do Not break any wire/harness connections when lowering the console cover.

5. Disconnect the main harness connections from the charger.

6. Remove the battery charger from the control column frame.

7. Install on-board battery charger onto machine in reverse order of disassembly.

NOTE: This battery charger can be programmed for multiple battery configurations. Configuration data is stored in the interface module and will automatically configure a replacement battery charger once installed and following a power-up cycle. Reprogramming is required if the interface module has been replaced, or if a different type of battery is used (i.e. other than factory-installed equipment). See SERVICE DIAGNOSTICS TOOL.

Models equipped with the PRO-Panel LCD Touch Panel can be configured through the touch panel. All other models must be configured using separate configuration software via a mini-USB programming port on the back of the operator console. See SERVICE DIAGNOSTICS TOOL.

REMOVE THE INTERFACE MODULE

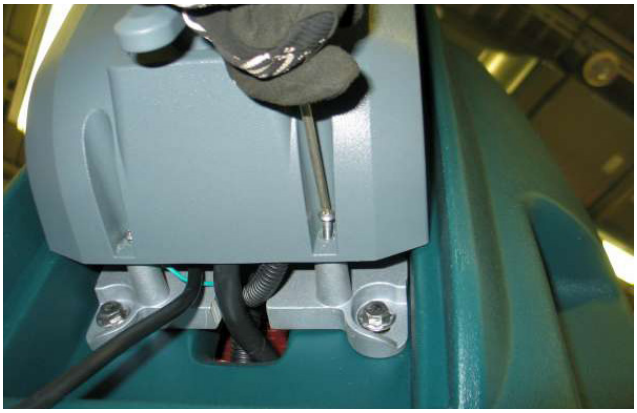
FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Turn the key switch OFF.
2. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

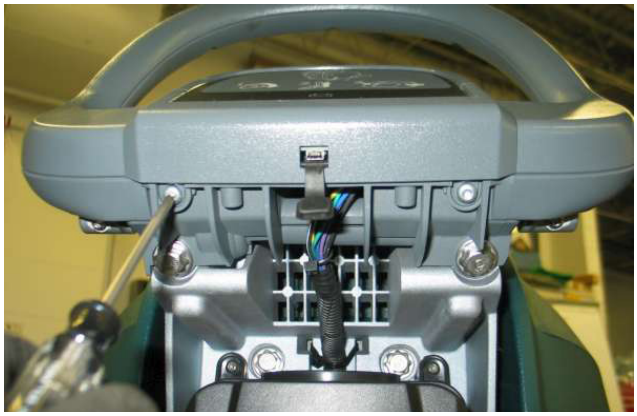
3. Attach a static wrist strap to the battery (-) terminal to prevent ESD damage to the logic board.

4. Remove the hardware securing the access cover to the machine.



5. Carefully lower access cover.

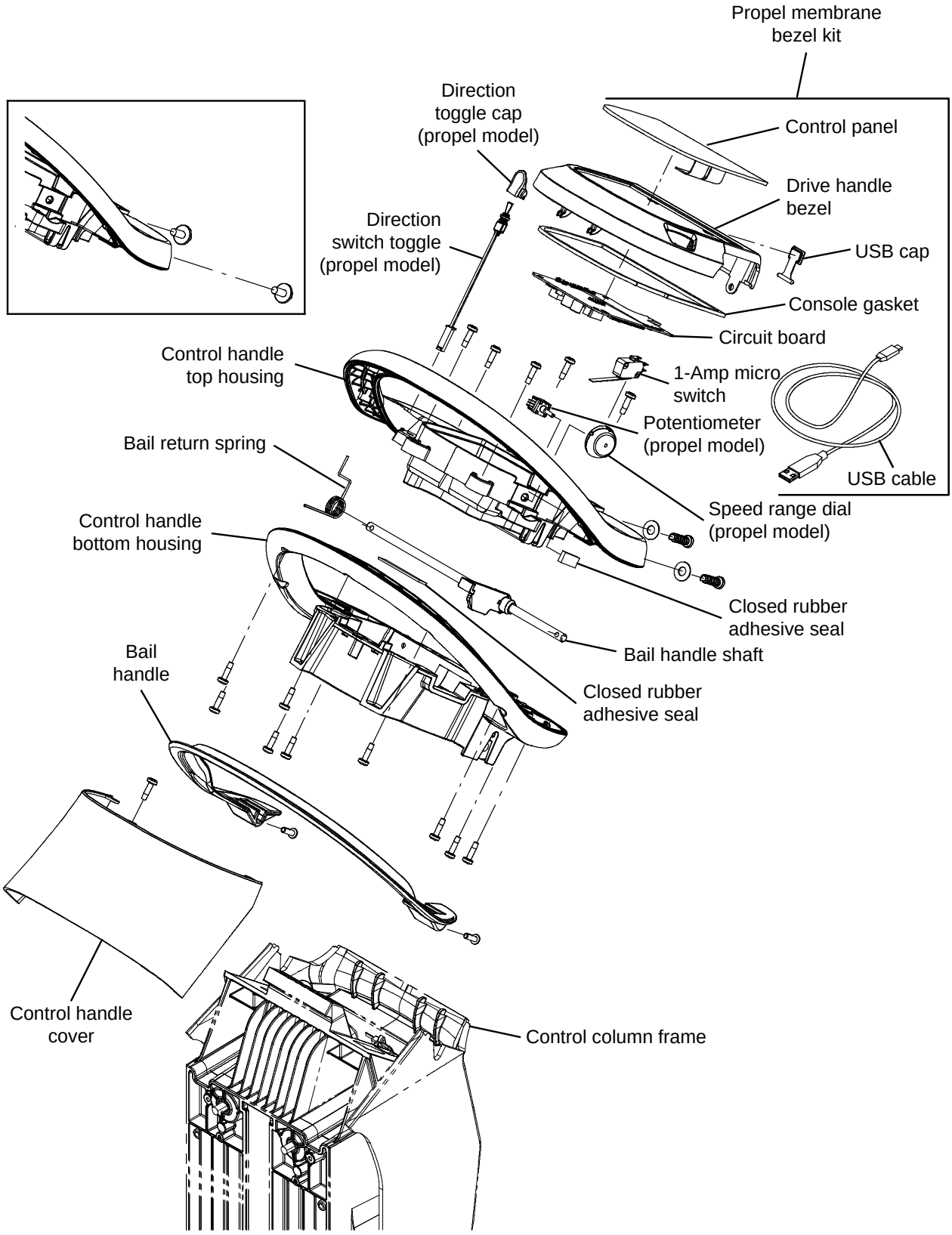
6. Remove the hardware securing the control panel top housing to the machine.



7. Carefully separate the control panel top housing from the machine.

8. Disconnect electrical connections and remove interface module.
9. Install the interface module onto the machine in reverse order of disassembly.
10. The new interface module must be programmed to operate in the Scrubber. *See SERVICE DIAGNOSTICS TOOL.*

DISASSEMBLE/ASSEMBLE THE CONTROL HANDLE ASSEMBLY

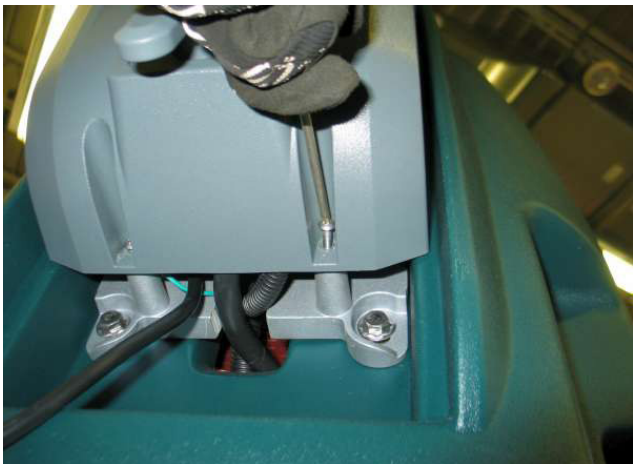


FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Turn the key switch OFF
2. Disconnect the battery cable from the machine.

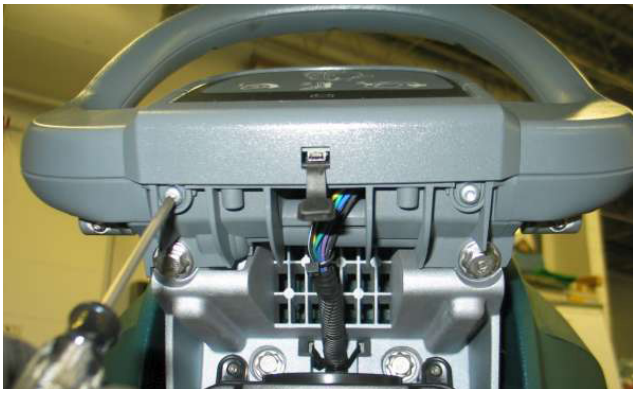
FOR SAFETY: When servicing machine, Disconnect battery connection and charger cord before working on machine.

3. Remove the hardware securing the control column cover to the machine.



4. Carefully lower access cover.

5. Remove the hardware securing the control panel top housing to the machine.



6. Carefully separate the control panel top housing from the machine.

7. If replacing/removing the speed range potentiometer, see REMOVE/INSTALL THE SPEED RANGE POTENTIOMETER.
8. If replacing/removing the direction switch, see REMOVE/INSTALL THE DIRECTION SWITCH.

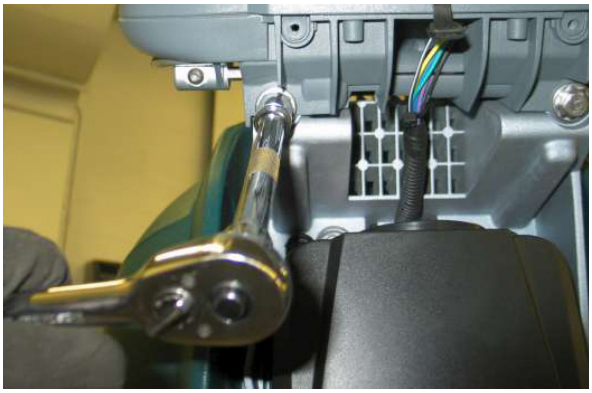
9. Remove the hardware securing the cover to the console.

10. Remove cover from the console.

11. Disconnect the main wire harness connections from the circuit board located behind the control panel.

12. Disconnect the main wire harness from the speed control potentiometer and the direction switch.

13. Remove the hardware securing the control panel housing assembly to the machine.

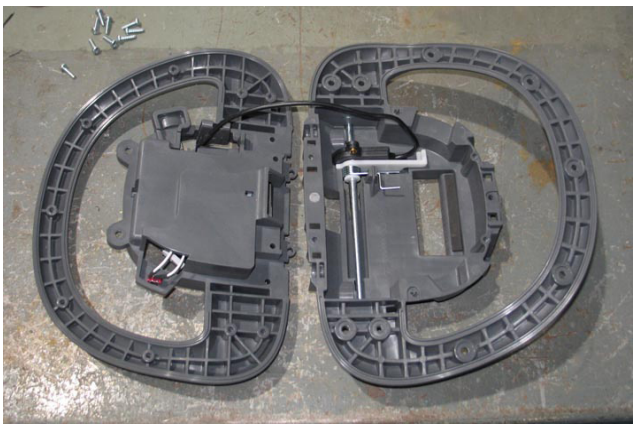


14. Lift up and forward to remove the operator console from the machine.

15. Remove the bail handle from the bottom control housing.

16. Remove the self tap screws from the front and rear of the operator console.

17. Separate the top control panel housing from the bottom control panel housing.



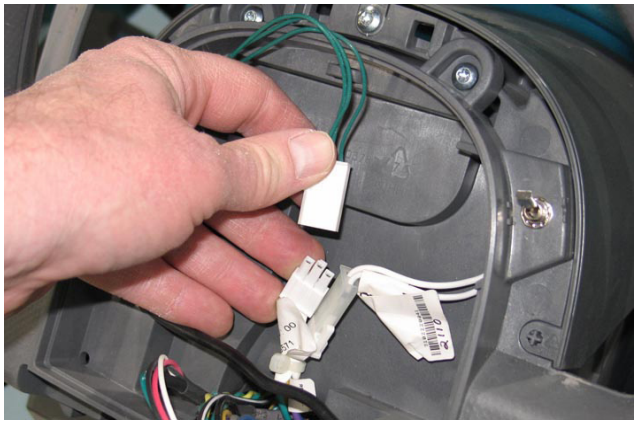
18. If replacing/removing the bail switch, see REMOVE/INSTALL THE BAIL SWITCH.

19. Reassemble the control handle assembly in reverse of disassembly.

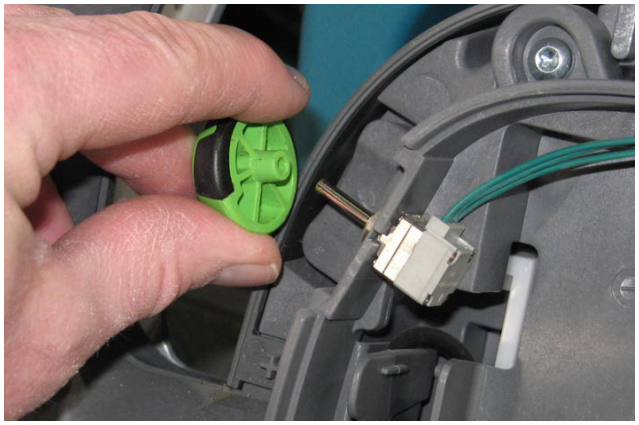
REMOVE/INSTALL THE SPEED RANGE POTENTIOMETER

1. Disassemble the control panel housing assembly. See DISASSEMBLE/ASSEMBLE THE CONTROL HANDLE ASSEMBLY.
2. Cut the cable tie securing the speed range potentiometer wires to the top control panel housing.

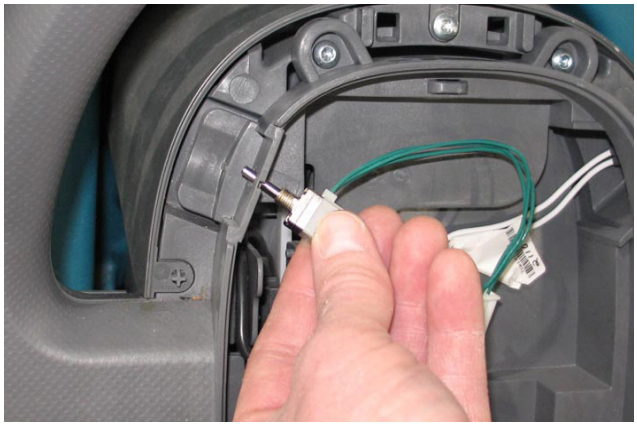
3. Disconnect the main wire harness from the speed range potentiometer.



4. Remove the knob from the speed range potentiometer.



5. Remove the hardware securing the potentiometer to the top control panel housing and remove the potentiometer from the top control panel housing.

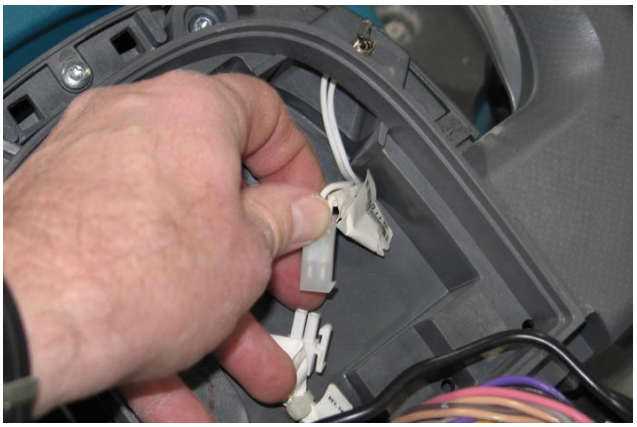


6. Reinstall speed range potentiometer and reassemble the control handle assembly in reverse order of disassembly if only replacing the speed range potentiometer.

REMOVE/INSTALL THE DIRECTION SWITCH

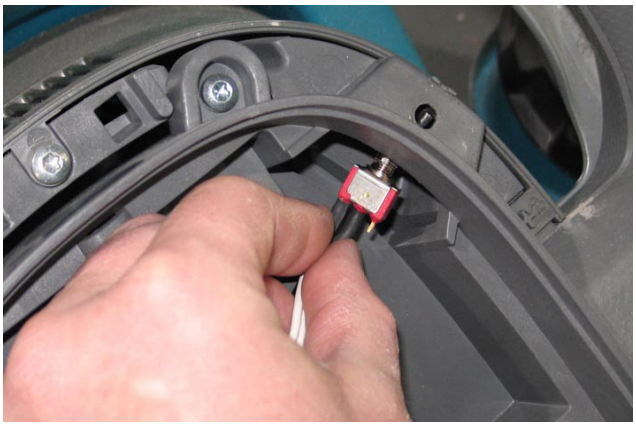
1. Disassemble the control panel housing assembly. See DISASSEMBLE/ASSEMBLE THE CONTROL HANDLE ASSEMBLY.

2. Disconnect the main wire harness from the direction switch.



3. Remove the knob from the direction switch.

4. Remove the hardware securing the switch to the top control panel housing and remove the switch from the top control panel housing.

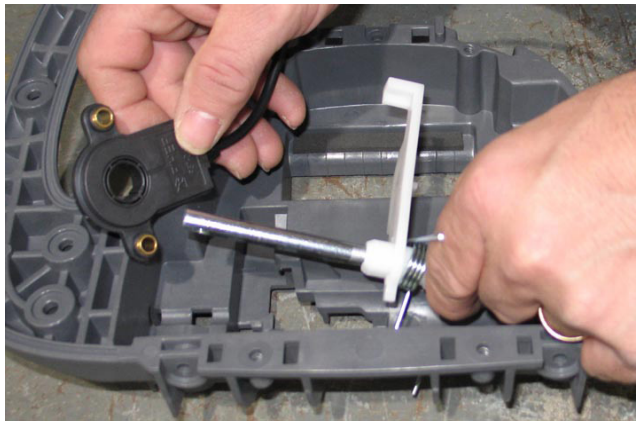


5. Reinstall the direction switch and reassemble the control handle assembly in reverse order of disassembly if only replacing the direction switch.

REMOVE/INSTALL THE BAIL SWITCH

1. Disassemble the control panel housing assembly. See DISASSEMBLE/ASSEMBLE THE CONTROL HANDLE ASSEMBLY.

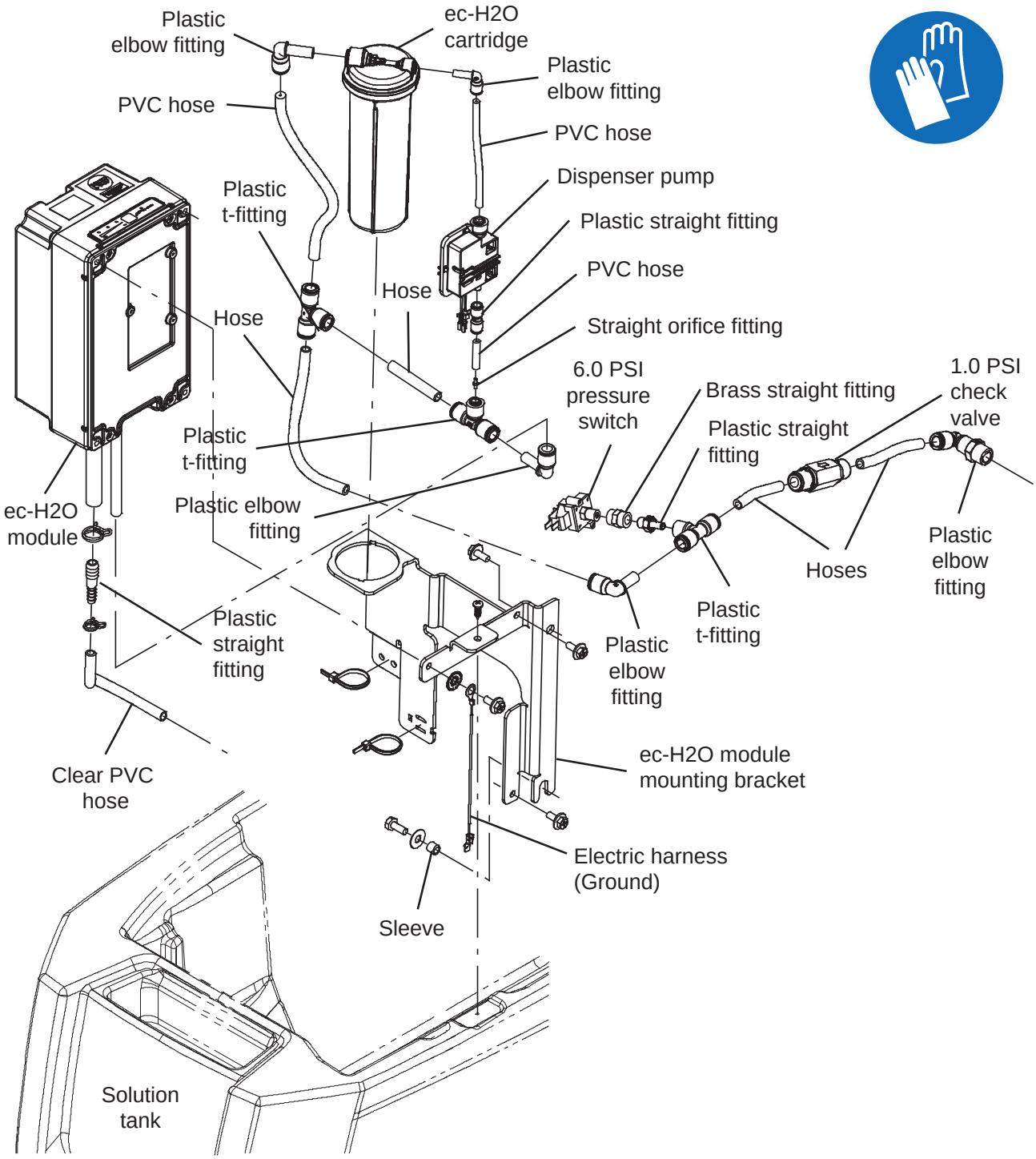
2. Release the bail return spring, rotate the bail handle shaft toward the bottom of the bottom control panel housing, and slide the bail handle shaft to the side to remove the shaft and rotary sensor from the bottom control panel housing.



3. Replace/reinstall the bail switch and reassemble the control handle assembly in reverse order of disassembly.

OPTIONS

REMOVE/INSTALL THE ec-H2O MODULE (OPTION)



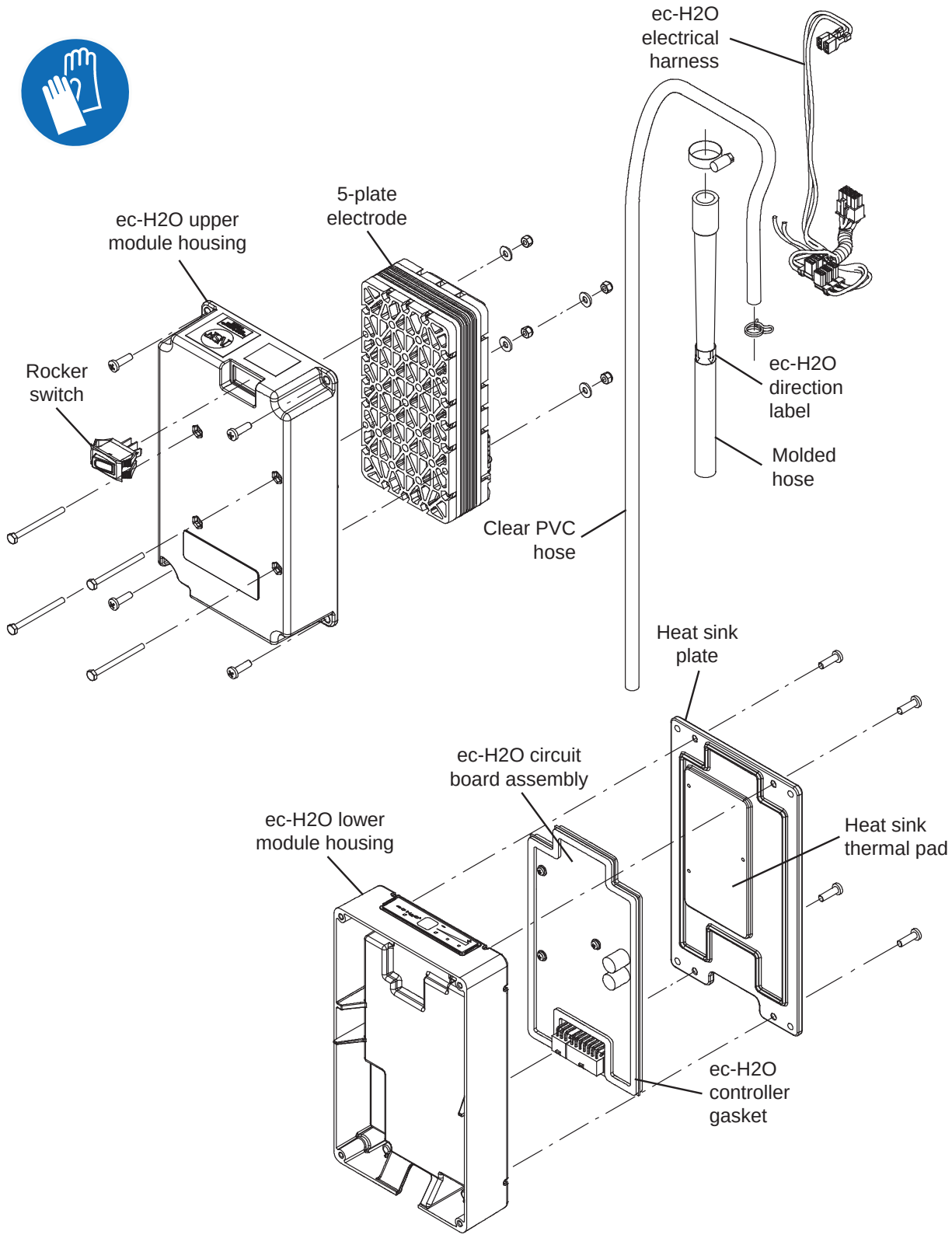
FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Completely empty the solution tank and the recovery tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

4. Disconnect the hoses/fittings from the ec-H2O cartridge and remove the ec-H2O cartridge from the ec-H2O module mounting bracket.
5. Remove the hardware securing the ec-H2O module mounting bracket to the solution tank.
6. Disconnect the main wire harness from the ec-H2O module and the ground harness installed on the ec-H2O module mounting bracket.
7. Disconnect all solution hoses from the ec-H2O module.
8. Remove the ec-H2O module/ec-H2O module mounting bracket from the machine.
9. If replacing/servicing the ec-H2O module, remove the ec-H2O module from the ec-H2O module mounting bracket.
10. If servicing/repairing the ec-H2O module, proceed to SERVICE THE ec-H2O NanoClean MODULE.
11. Reinstall the repaired ec-H2O module/install the new ec-H2O module and the ground harness onto the ec-H2O module mounting bracket.
12. Situate the ec-H2O module/ec-H2O module mounting bracket into the machine.
13. Connect the solution hoses to the ec-H2O module.
14. Connect the main wire harness to the ec-H2O module and the ground harness installed on the ec-H2O module mounting bracket.
15. Install the ec-H2O module/ec-H2O module mounting bracket onto the solution tank.
16. Reinstall the ec-H2O cartridge into the ec-H2O module mounting bracket and reconnect the hoses/fittings to the ec-H2O cartridge.
17. Reconnect the battery cable to the machine.

SERVICE THE ec-H2O NanoClean MODULE



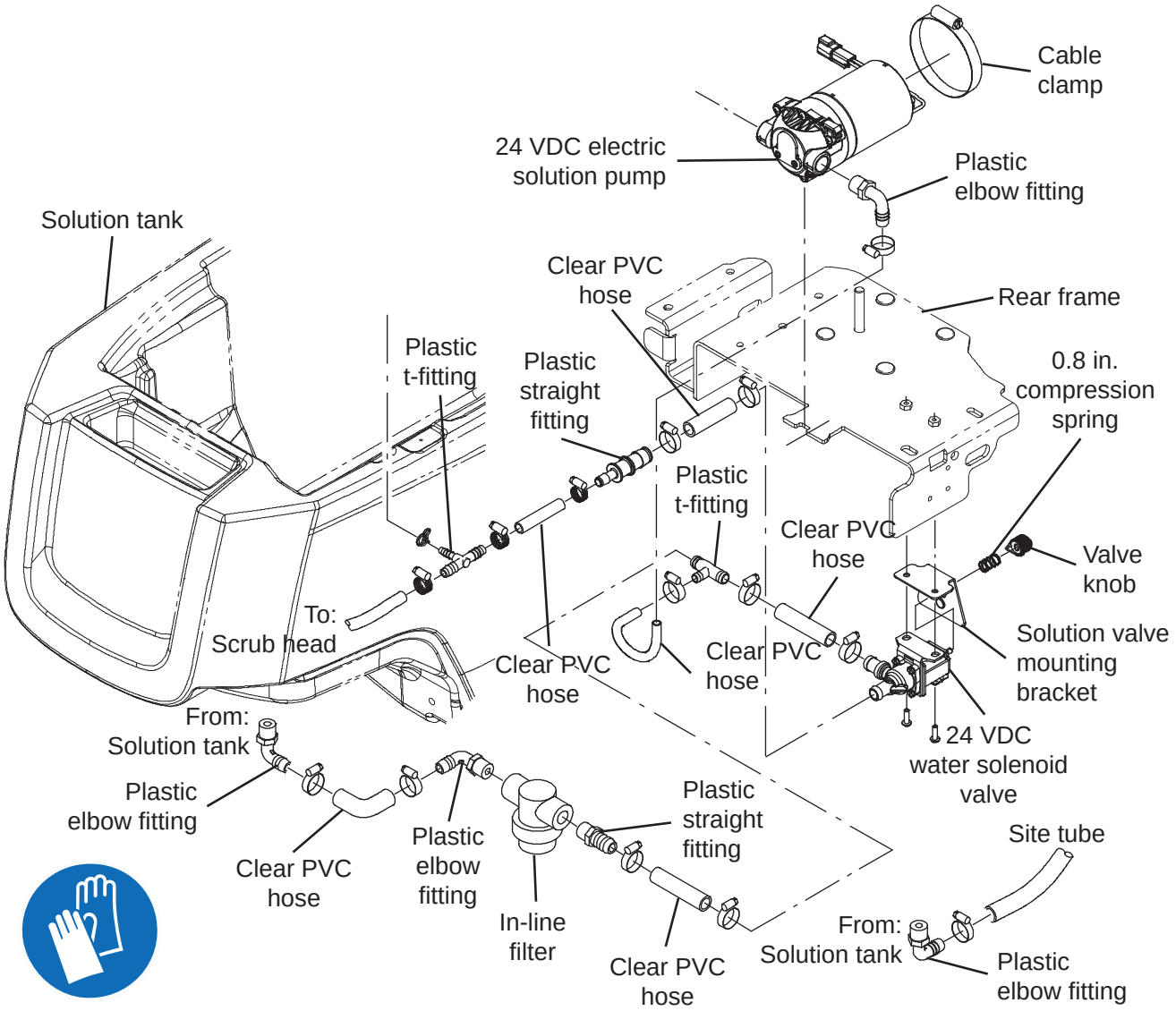
FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Turn the key switch OFF.
2. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

3. Remove the ec-H2O module from the machine. See REMOVE/INSTALL THE ec-H2O MODULE (OPTION).
4. Remove the ec-H2O upper module housing from the ec-H2O module.
5. Further disassemble the ec-H2O module as necessary to access/service/replace parts.
6. Reassemble the ec-H2O module in the reverse order of disassembly.
7. Reinstall the ec-H2O module onto the machine. See REMOVE/INSTALL THE ec-H2O MODULE (OPTION).

REPLACE THE ec-H2O SOLUTION PUMP (OPTION)



FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

1. Completely empty the solution tank and the recovery tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, Disconnect battery connection and charger cord before working on machine.

4. Remove the squeegee from the machine.

5. Cut wire tie securing the main wire harness lead connected to the 0.1-Amp SPDT switch from the machine.

6. Disconnect the main wire harness from the SPDT switch.

7. Remove the squeegee lift group squeegee mounting bracket from the rear frame weldment.

8. For better access to components located on bottom of machine, block up the back end of the machine so front of machine is resting on the scrub head. Note the scrub head must be fully raised to adequately raise the back of the machine.

NOTE: If necessary, tip the machine onto its side for easier access to the solution pump.

9. If tipping the machine: Remove the batteries from the machine.

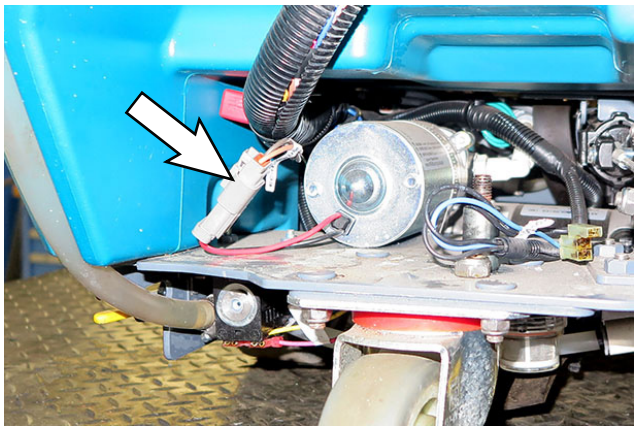
FOR SAFETY: When servicing machine, avoid contact with battery acid, keep all metal objects off batteries, and use a hoist or adequate assistance when lifting batteries. Use a non-conductive battery removal device.

10. If tipping the machine: Place a protective blanket next to the left side of the machine.

11. If tipping the machine: Carefully lower the left side of the machine onto the protective blanket.

12. Disconnect both solution fittings/hoses from the solution pump.

13. Disconnect the main wire harness from the solution pump.



14. Loosen the cable clamp securing the solution pump to the rear frame and remove the solution pump from the rear frame.

15. Connect the solution fittings/hoses to the solution pump.

16. Install the new solution pump onto the rear frame. Tighten the cable clamp to secure the solution pump to the rear frame.

17. Connect the main wire harness to the solution pump.

18. Reinstall the squeegee lift group squeegee mounting bracket onto the machine.

19. Reconnect the main wire harness to the 0.1-Amp SPDT switch.

20. Reinstall the squeegee onto the machine.

REPLACE THE WATER SOLENOID VALVE

1. Completely empty the solution tank and the recovery tank.

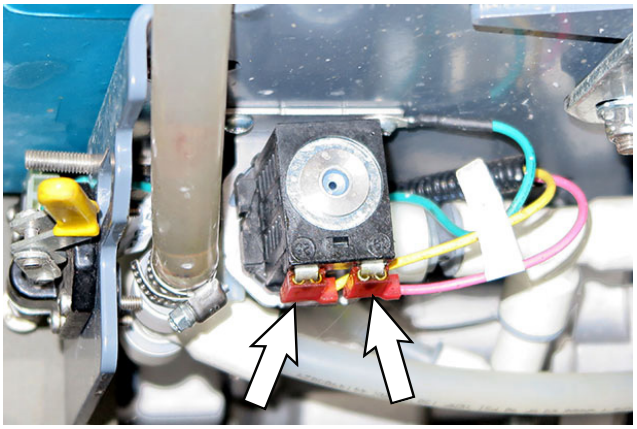
2. Turn the key switch OFF.

3. Disconnect the battery cable from the machine.

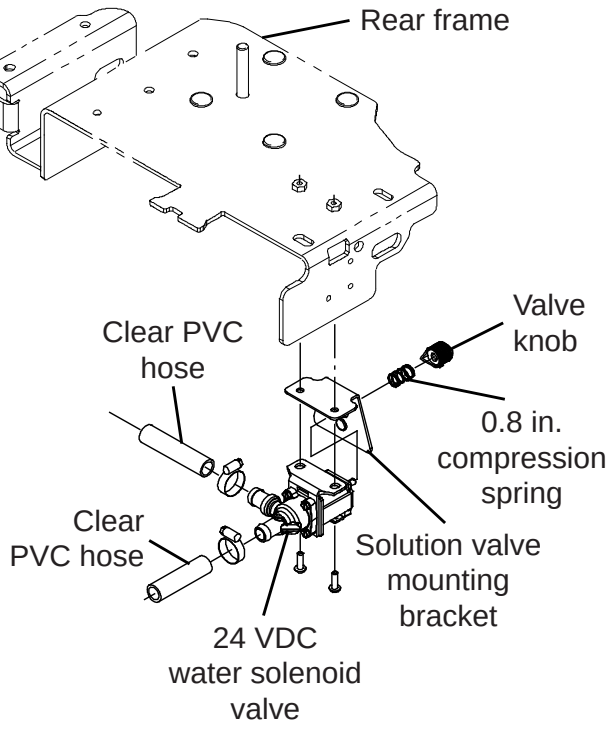
FOR SAFETY: When servicing machine, Disconnect battery connection and charger cord before working on machine.

4. Remove the squeegee from the machine.

5. Disconnect the main wire harness from the water solenoid valve.



6. Remove the knob/compression spring from the water solenoid valve.



7. Remove the hardware securing the water solenoid valve/solution valve mounting bracket to the rear frame.

8. Disconnect the PVC hoses from the water solenoid valve.

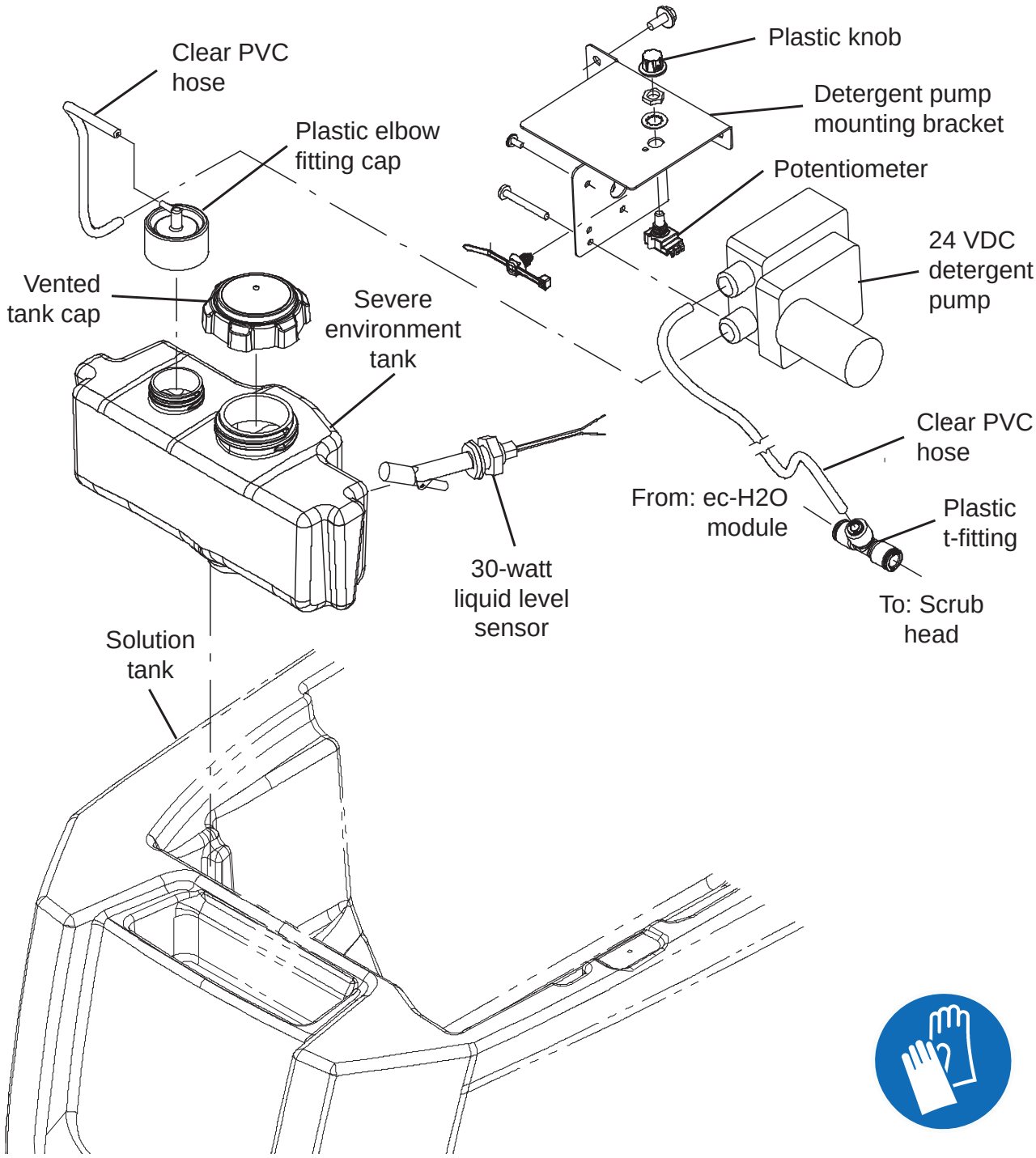
9. Connect the PVC hoses to the new water solenoid valve.

10. Install the water solenoid valve/solution valve mounting bracket onto the rear frame.

11. Connect the main wire harness to the water solenoid valve.

12. Install the compression spring/knob onto the water solenoid valve.

SE (SEVERE ENVIRONMENT) GROUP (OPTION)



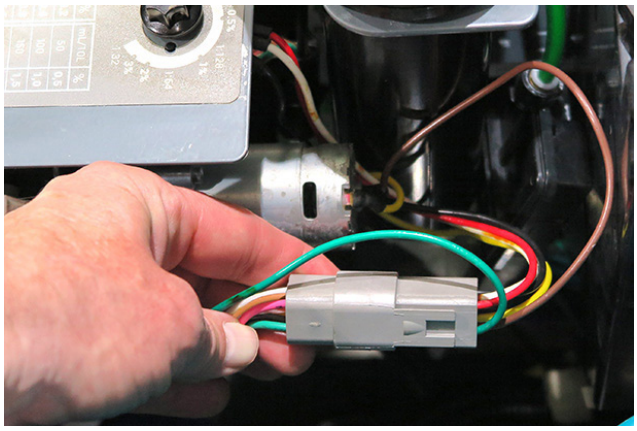
REMOVE/INSTALL THE SEVERE ENVIRONMENT DETERGENT PUMP ASSEMBLY

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

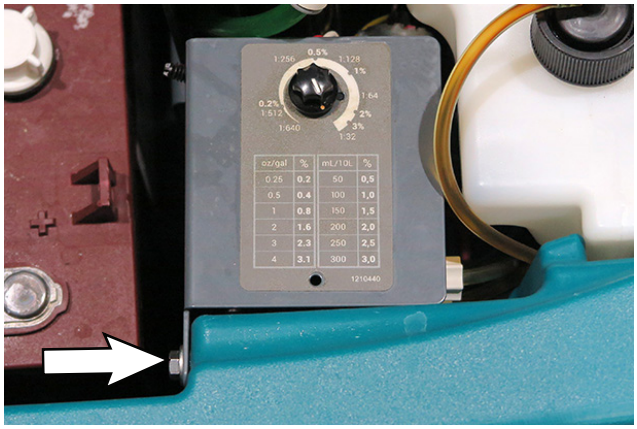
1. Completely empty the solution tank and the recovery tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, disconnect battery connection and charger cord before working on machine.

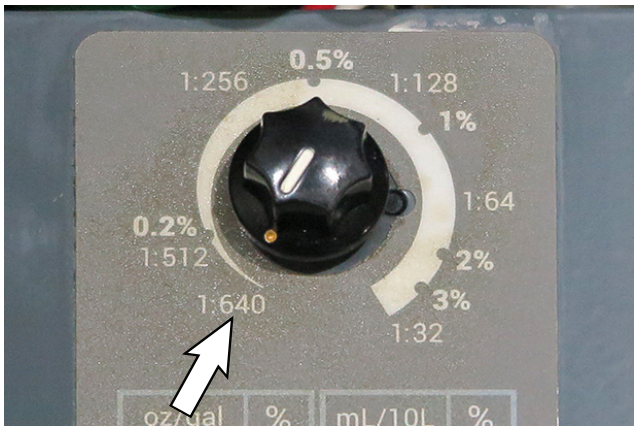
4. Lift the Severe Environment tank from the machine, completely empty all solution from the Severe Environment tank, and situate tank so it is out of the way.
5. Disconnect the main wire harness from the detergent metering assembly.



6. Remove the hardware securing the detergent pump assembly to the solution tank.



7. Carefully lift the detergent pump assembly/ mounting bracket from the machine.
8. Disconnect the solution hoses from the detergent pump IN and OUT ports.
9. Remove the plastic knob from the detergent pump assembly.
10. Remove the detergent pump from the detergent pump mounting bracket.
11. Assemble the detergent pump onto the detergent pump mounting bracket.
12. Connect all previously disconnected hose connections to the detergent pump.
13. Reinstall the detergent pump assembly onto the solution tank.
14. Connect the main wire harness to the detergent pump.
15. Reinstall the Severe Environment tank into the machine.
16. Turn the detergent pump assembly adjustment stem counterclockwise until it will not turn any further (placing detergent pump assembly at lowest setting).
17. Reinstall the plastic knob onto the detergent pump assembly so the indicator on plastic knob is pointed to the detergent pump assembly lowest setting.



18. Adjust the Severe Environment knob to the customer preferred setting.

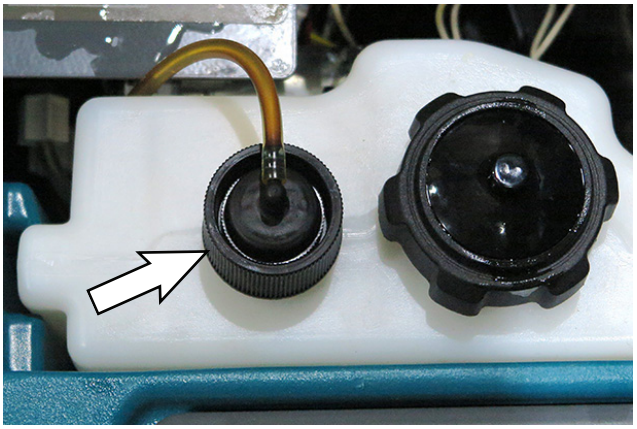
REMOVE/INSTALL THE SEVERE ENVIRONMENT DETERGENT METERING LIQUID LEVEL SENSOR

FOR SAFETY: Before leaving or servicing machine, stop on level surface, turn off machine, remove key, and set parking brake if equipped.

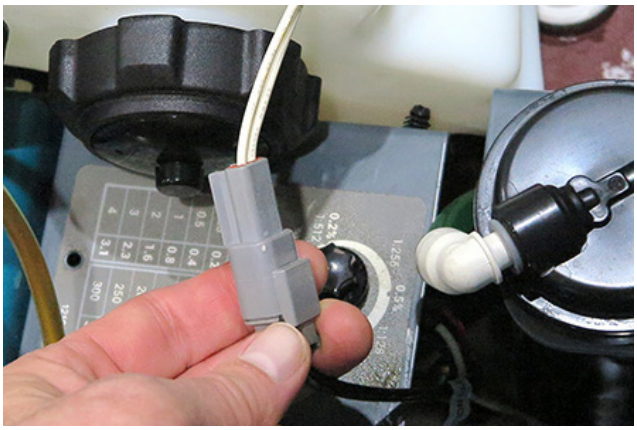
1. Completely empty the solution tank.
2. Turn the key switch OFF.
3. Disconnect the battery cable from the machine.

FOR SAFETY: When servicing machine, Disconnect battery connection and charger cord before working on machine.

4. Completely empty all solution from the Severe Environment tank.
5. Disconnect the solution hose cap from the solution tank.



6. Disconnect the main wire harness from the liquid level sensor.



7. Remove the plastic nut securing the liquid level sensor inside the Severe Environment tank and remove the liquid sensor from the tank.

8. Reinstall the liquid level sensor/install the new liquid sensor into the Severe Environment tank.
9. Connect the liquid level sensor to main wire harness.
10. Reinstall the Severe Environment tank into the machine.
11. Reinstall the solution hose cap into the detergent metering tank.