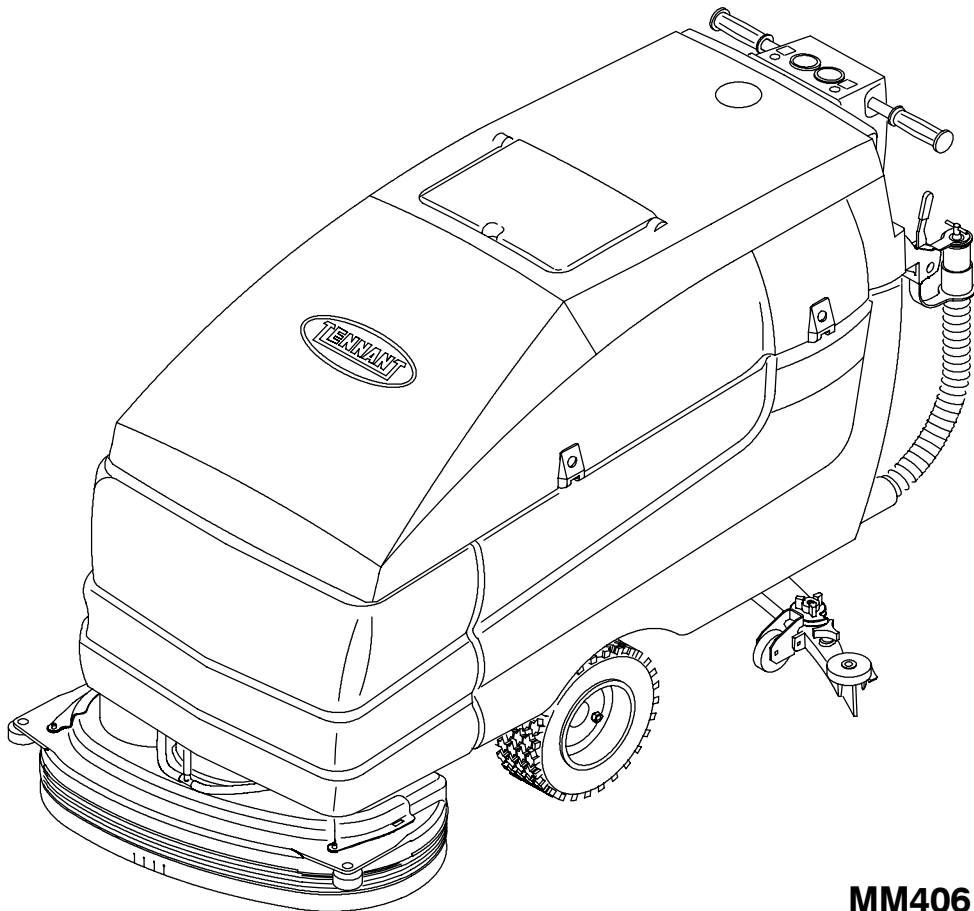




5680 5700 5700XP/XPS

Service Manual



MM406

Rev. 10 (6-03)





This service manual is intended to be an aid for the disassembly and reassembly of your TENNANT Model 5680/5700.

This manual is organized into four major groups: General Information, Chassis, Scrubbing, and Electrical.

General Information: Machine safety, transport, jacking, lifting, and storage. Machine specifications, Maintenance charts and Hardware information.

Chassis: Tire/wheel replacement, Parking brake adjustment and replacement, Caster replacement, Transaxle replacement, Transaxle drive motor replacement, and Static drag chain adjustment.

Scrubbing: Squeegee assembly replace and adjust, Scrubber head replace and adjust, Vacuum fan replacement, Solution/recovery tank replacement, Scrubbing troubleshooting chart, Power wand replacement and vacuum wand replacement.

Electrical: Battery maintenance and replacement, Charging instructions, Circuit breaker/relay replacement, Instrument panel replacement, Vacuum fan motor repair/replacement, Scrubber brush motor repair/replace, Lift actuator replacement, Electrical schematic, and Electrical troubleshooting.

FaST™: FaST™ Technology, FaST™ Schematic Operation Review, and FaST™ troubleshooting.

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SAFETY PRECAUTIONS

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



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

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

This machine is designed solely for scrubbing dirt and dust in an indoor environment. Tennant does not recommend using this machine in any other environment.

The following information signals potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Locate all safety devices on the machine. Then, take necessary steps to train machine operating personnel. Report machine damage or faulty operation immediately. Do not use the machine if it is not in proper operating condition.



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



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



WARNING: Flammable materials or reactive metals can cause an explosion or fire. Do not pickup.

FOR SAFETY:

1. Do not operate machine:
 - Unless trained and authorized.
 - Unless operation manual is read and understood.
 - In flammable or explosive areas unless designed for use in those areas.
2. Before starting machine:
 - Make sure all safety devices are in place and operate properly.
 - Check brakes and steering for proper operation (if so equipped).
3. When using machine:
 - Go slow on inclines and slippery surfaces.
 - Use care when backing machine.
 - Follow mixing and handling instructions on chemical containers.
4. Before leaving or servicing machine:
 - Stop on level surface.
 - Set parking brake (if equipped).
 - Turn off machine and remove key.
5. When servicing machine:
 - Avoid moving parts. Do not wear loose jackets, shirts, or sleeves when working on machine.
 - Block machine tires before jacking machine up.
 - Jack machine up at designated locations only. Block machine up with jack stands.
 - Use hoist or jack that will support the weight of the machine.
 - Wear eye and ear protection when using pressurized air or water.
 - Disconnect battery connections before working on machine.
 - Avoid contact with battery acid.
 - Use Tennant supplied or equivalent replacement parts.
6. When loading/unloading machine onto/off truck or trailer:
 - Turn off machine.
 - Use truck or trailer that will support the weight of the machine.
 - Use winch. Do not push the machine onto/off the truck or trailer unless the load height is 380 mm (15 in) or less from the ground.
 - Set parking brake after machine is loaded (option).
 - Block machine tires.
 - Tie machine down to truck or trailer.

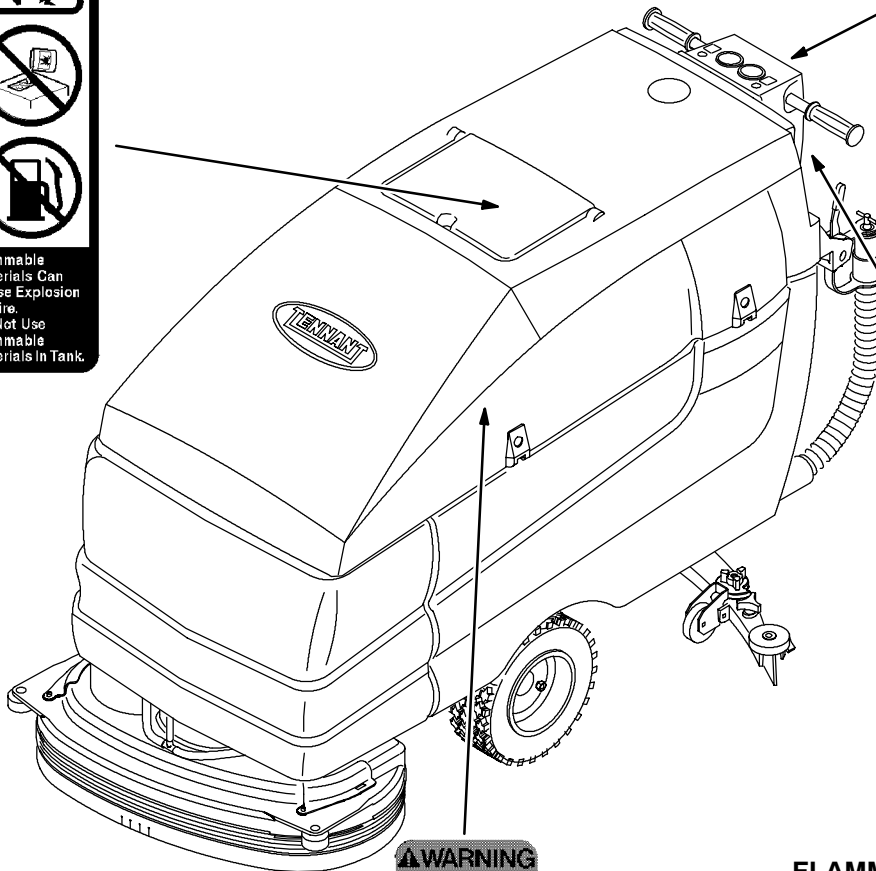
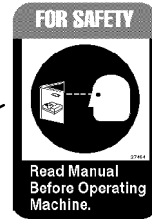
GENERAL INFORMATION

The safety labels appear on the machine in the locations indicated. If these or any label becomes damaged or illegible, install a new label in its place.

FLAMMABLE MATERIALS LABEL - LOCATED ON THE UNDERSIDE OF THE SOLUTION TANK COVER.



FOR SAFETY LABEL - LOCATED ON THE OPERATOR CONSOLE.



10066



FLAMMABLE SPILLS LABEL - LOCATED THE OPERATOR CONSOLE.



BATTERY CHARGING LABEL - LOCATED ON THE UNDERSIDE OF THE SOLUTION TANK.

SPECIFICATIONS

GENERAL MACHINE DIMENSIONS/CAPACITIES

Item	Dimension/capacity
Length with cylindrical scrub head	1600 mm (63 in)
Length with 700 mm (28 in) disk scrub head	1625 mm (64 in)
Length with 800 mm (32 in) disk scrub head	1660 mm (65.25 in)
Length with 900 mm (36 in) disk scrub head	1690 mm (66.5 in)
Width (less squeegee and scrub head)	720 mm (28.25 in)
Height	1090 mm (43 in)
Disk brush diameter for 700 mm (28 in) scrub head	355 mm (14 in)
Disk brush diameter for 800 mm (32 in) scrub head	405 mm (16 in)
Disk brush diameter for 900 mm (36 in) scrub head	455 mm (18 in)
Cylindrical brush diameter	150 mm (6 in)
Cylindrical brush length for 700 mm (28 in) scrub head	695 mm (27.37 in)
Cylindrical brush length for 800 mm (32 in) scrub head	795 mm (31.37 in)
Cylindrical brush length for 900 mm (36 in) scrub head	900 mm (35.37 in)
Squeegee width for 700 mm (28 in) scrub head	950 mm (37.5 in)
Squeegee width for 800 mm (32 in) scrub head	1065 mm (42 in)
Squeegee width for 900 mm (36 in) scrub head	1155 mm (45.5 in)
Scrubbing path width for 700 mm (28 in) scrub head	700 mm (28 in)
Scrubbing path width for 800 mm (32 in) scrub head	800 mm (32 in)
Scrubbing path width for 900 mm (36 in) scrub head	900 mm (36 in)
Solution tank capacity (recommended usage)	114 L (30 gal)
Solution tank capacity (maximum)	133 L (35 gal)
Recovery tank capacity to full sensor	114 L (30 gal)
Recovery tank capacity to top of tank	152 L (40 gal)
Transaxle 90 weight gear lubricant capacity	1.42 L (1.5 qt)
GVWR	690 kg (1520 lb)

GENERAL INFORMATION

GENERAL MACHINE PERFORMANCE

Item	Measure
Aisle turnaround width with 700 mm (28 in) scrub head	1685 mm (66.25 in)
Aisle turnaround width with 800 mm (32 in) scrub head	1700 mm (67 in)
Aisle turnaround width with 900 mm (36 in) scrub head	1715 mm (67.5 in)
Maximum rated climb and descent angle with empty tanks	8°
Maximum rated climb and descent angle with full tanks	6°

POWER TYPE

Type	Quantity	Volts	Ah Rating	Weight
Batteries	6	6	235 @ 20 hr rate	30 kg (67 lb)
	6	6	305 @ 20 hr rate	47 kg (104 lb)

Type	Use	VDC	Kw (hp)
Electric Motors	Scrub brush (disk)	36	0.45 (0.60)
	Heavy duty scrub brush (disk)	36	0.75 (1)
	Scrub brush (cylindrical)	36	0.56 (0.75)
	Vacuum fan	36	0.63 (0.85)
	Propelling	36	0.37 (0.50)
	Propelling for power steering (2)	36	0.19 (0.25)

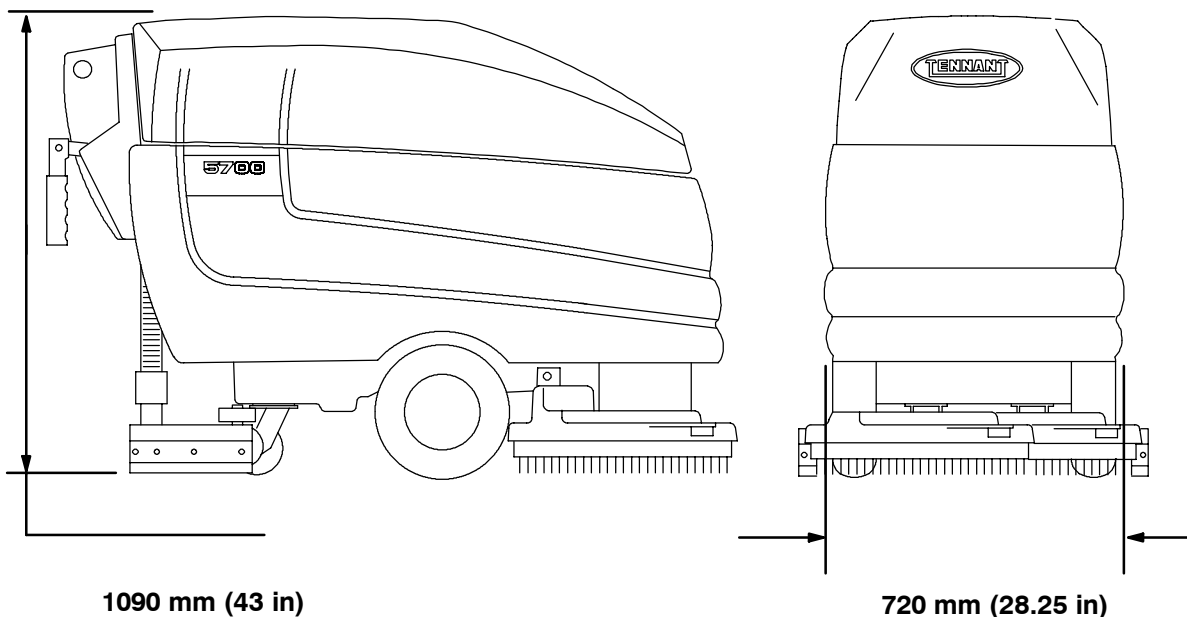
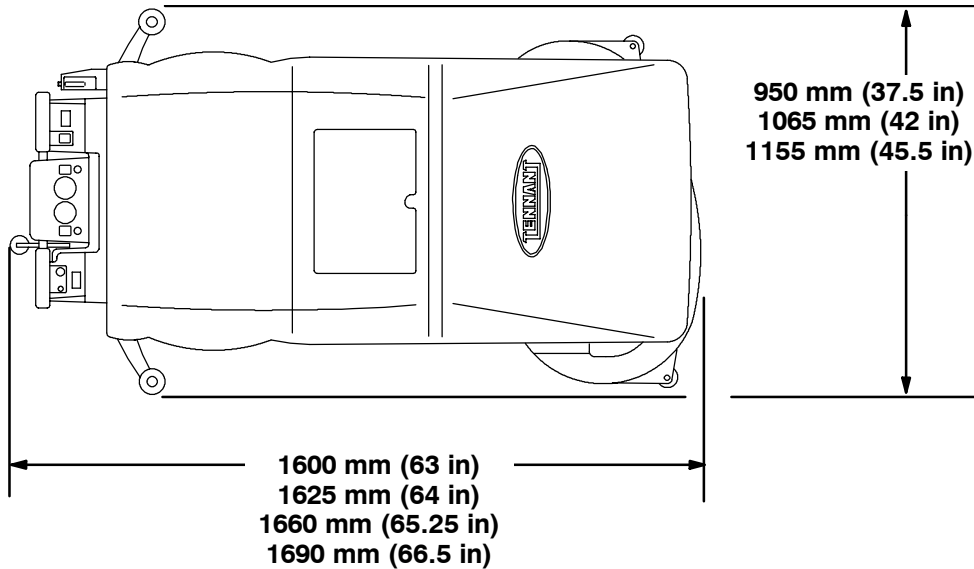
Type	VDC	amp	Hz	Phase	VAC
Chargers (Smart)	36	20	60	1	115
	36	30	60	1	115
Chargers (Smart) - International	36	20	50	1	230
	36	30	50	1	230
	36	20	50	1	245
	36	30	50	1	245

TIRES

Location	Type	Size	Pressure
Front (2)	Pneumatic	4.10/3.5 - 6	415 to 450 kPa (60 to 65 psi)
Front, 5680 (2)	Foam Filled, Non-marking	4.10/3.5 - 6	-
Front (2)	Solid (option)	1.2/3.0-6	-
Rear, casters (2)	Solid, non-marking	5 x 2 in	-

FaST™ SYSTEM (OPTION)

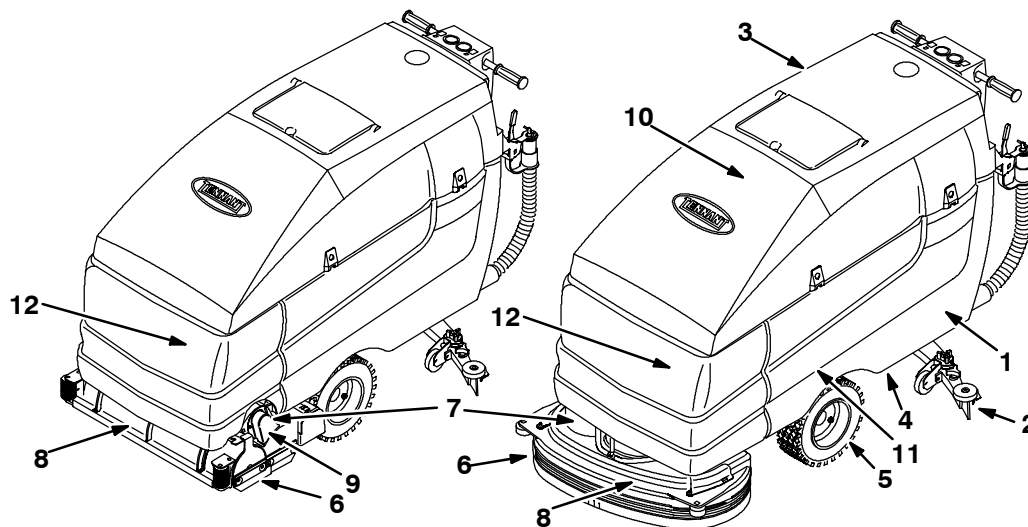
Item	Measure
Solution pump	36 Volt DC, 5A, 5.7 LPM (1.5 GPM) open flow, 45 psi bypass setting
Solution flow rate	0.83 LPM (0.22 GPM)
Detergent pump	36 Volt DC
Concentrate flow rate	0.9 CC/Minute (0.03 Ounces/Minute)
Concentrate to water dilution ratio	1:1000
Air pump	36 Volt DC, 0.6 Maximum Amp draw
Air pump flow rate	8.7 LPM (0.3 CFM) open flow



MACHINE DIMENSIONS

10189

MAINTENANCE



10066
10190

MAINTENANCE CHART

Interval	Key	Description	Procedure	Lubricant/ Fluid	No. of Service Points
Daily	2	Squeegee	Check for damage and wear	-	1
			Check deflection and leveling	-	1
	8	Scrub brushes or pads	Check for damage and wear	-	2
	1	Recovery tank	Clean tank	-	1
			Clean optical sensor	-	1(2)
	1	Recovery tank, ES™ mode	Clean ES™ filter	-	1
	3	Solution tank, ES™ mode	Clean	-	1
	3	Vacuum fan filter	Clean	-	1
		Machine	Check for leaks	-	1
	6	Disk scrub head skirt	Check adjustment	-	1
			Check for damage and wear	-	1
50 Hours	6	Cylindrical scrub head skirts	Check adjustment	-	4
			Check for damage and wear	-	4
	5	Front tires	Check air pressure	-	2
100 Hours	8	Cylindrical brushes	Check taper and rotate front to rear	-	2
	12	FaST™ Filter screen (option)	Clean	-	1
500 Hours	4	Rear casters	Lubricate	SPL	2
	9	Cylindrical scrub brush drive belts	Check tension	-	2
1000 Hours	10	Vacuum fan motor	Check motor brushes	-	1
1000 Hours	7	Scrub brush motors	Check motor brushes	-	2
	11	Propelling motor	Check motor brushes	-	1
	11	Transaxle	Check lubricant level	GL	1

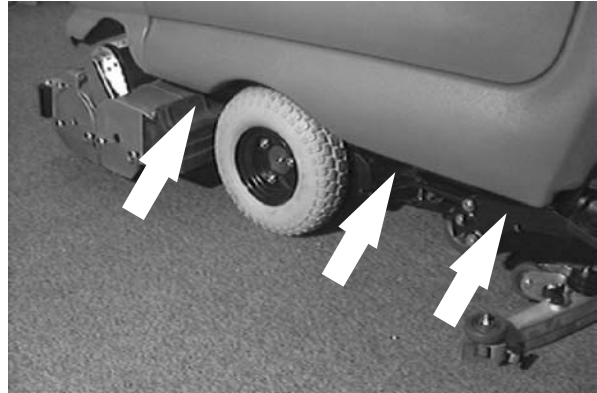
MACHINE JACKING

Empty the recovery and solution tanks before jacking the machine. You can jack up the machine for service anywhere under the recovery tank. Use a hoist or jack that will support the weight of the machine. Use a piece of wood to distribute the machine weight load.

Always stop the machine on a flat level surface and block the machine tires before jacking up the machine.

FOR SAFETY: When servicing machine, block machine tires before jacking machine up.

FOR SAFETY: When servicing machine, jack machine up at designated locations only. Block machine up with jack stands.



GENERAL INFORMATION

TO JACK UP THE MACHINE

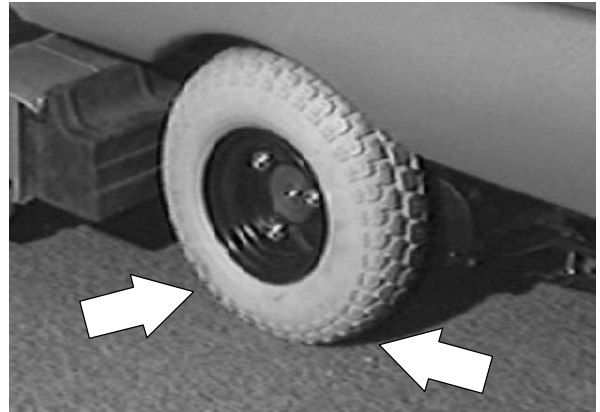
1. Park the machine on a level surface and empty the recovery and solution tanks.
2. Set the machine parking brake.

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.



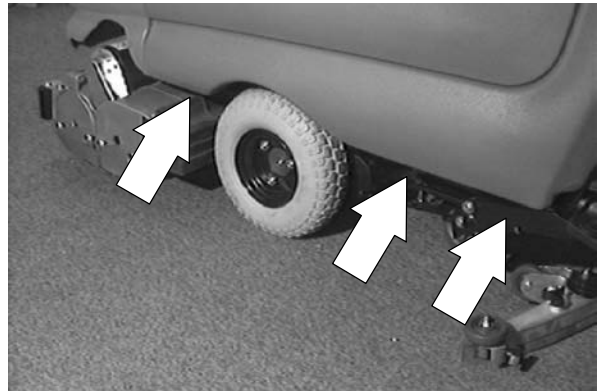
3. Block the machine tires that are not being jacked up, to secure the machine position.

FOR SAFETY: When Servicing Machine, Block Machine Tires Before Jacking Machine Up.



4. Use a jack that will support the weight of the machine. Use a piece of wood to help spread out the load and position the jack anywhere under the recovery tank.

FOR SAFETY: When Servicing Machine, Jack Machine Up At Designated Locations Only. Block Machine Up With Jack Stands.

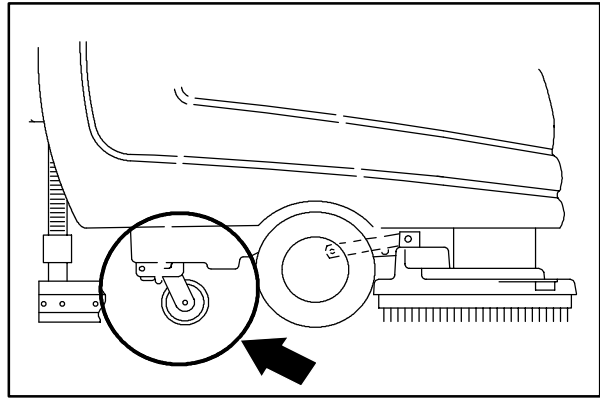


5. Block machine up with jack stands or similar devices under the recovery tank to secure the machine.
6. Lower the machine down on the jack stands.
7. Check to make sure the machine is secure.
8. When finished servicing the machine, raise the machine off the jack stands.
9. Remove the jack stands from under the machine.
10. Lower the machine.
11. Remove the blocks from the tires.

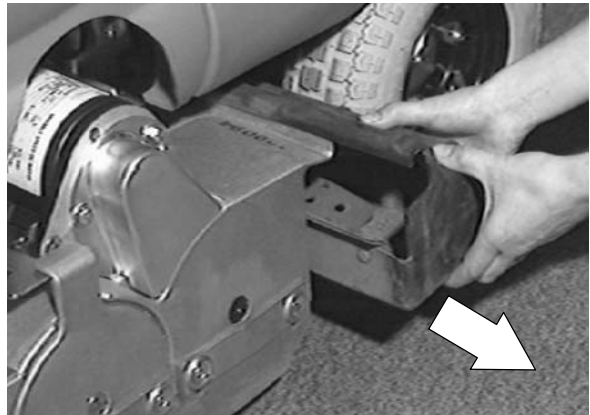
GENERAL INFORMATION

MACHINE LIFTING

1. Drive the machine in reverse to position the casters as shown.



2. Remove the debris hopper on machines with cylindrical scrub head.

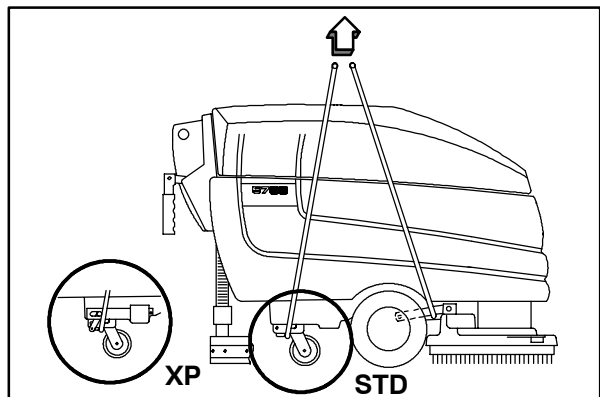


3. Raise the scrub head.



4. Empty the recovery and solution tanks.
Loop the straps around the front and rear of the machine as shown.

NOTE: The machine can be lifted using two 1" wide braided lifting straps rated at 1000lb (454kg) minimum.



PUSHING AND TRANSPORTING THE MACHINE

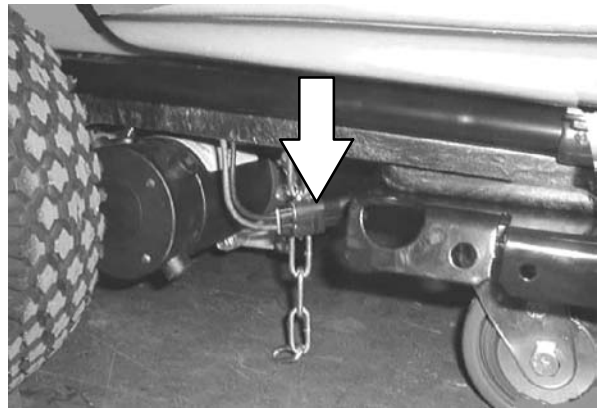
PUSHING THE MACHINE

If the machine becomes disabled, it can be pushed if necessary.

Unplug the drive motor from the electrical harness before attempting to push a disabled machine. The machine will become easier to maneuver when it is unplugged.

ATTENTION! Do not push the machine for a long distance and without unplugging the drive motor or damage may occur to the propelling system.

Only push a disabled machine for a *very short distance* and do not exceed 3.2 kp/h (2 mph). It is NOT intended to be pushed for a long distance or at a high speed.



GENERAL INFORMATION

TRANSPORTING THE MACHINE

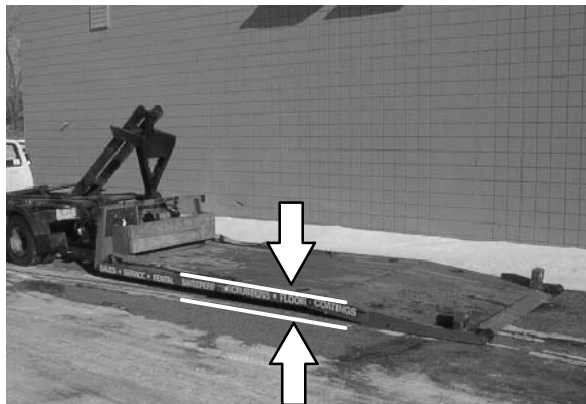
1. Position the rear of the machine at the loading edge of the truck or trailer.

FOR SAFETY: Use truck or trailer that will support the weight of the machine.

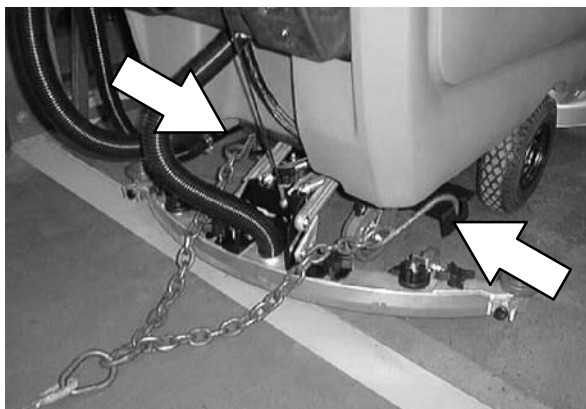
NOTE: Empty the recovery and solution tanks before transporting the machine.

2. If the loading surface is not horizontal or is higher than 380 mm (15 in) from the ground, use a winch to load machine.

If the loading surface is horizontal AND is 380 mm (15 in) or less from the ground, the machine may be pushed onto the truck or trailer.



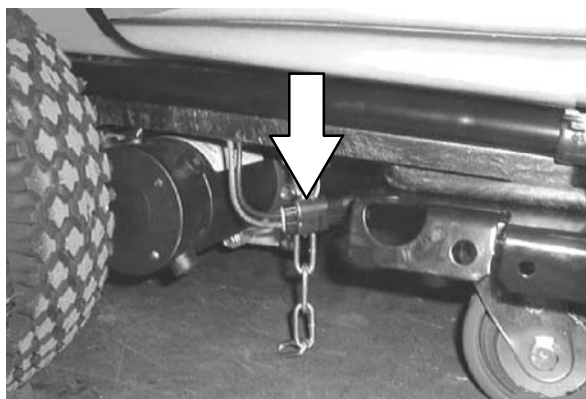
3. To winch the machine onto the truck or trailer, attach the winching chains to the rear tie down locations on either side of the machine frame by the rear casters.



4. Unplug the drive motor from the electrical harness before attempting to winch the machine. The machine will become easier to maneuver when it is unplugged.

FOR SAFETY: When loading machine onto truck or trailer, use winch. Do not push the machine onto the truck or trailer unless the loading surface is horizontal AND is 380 mm (15 in) or less from the ground.

5. Position the machine onto the truck or trailer as far as possible. If the machine starts to veer off the centerline of the truck or trailer, stop and straighten the machine.



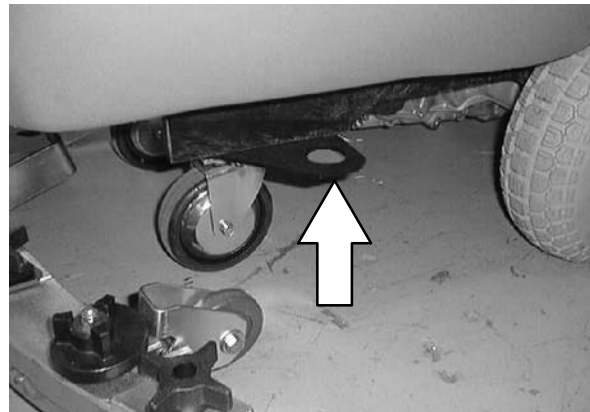
6. Lower the scrub head with the brushes installed, lower the squeegee, and set the machine parking brake, if equipped when transporting the machine. Block the machine tires and tie down the machine to the truck or trailer before transporting.

NOTE: *Do not* use the steering handles to secure the machine for transport.

Secure a strap over the top of the machine to prevent the machine from tipping.



The rear tie-down locations are on either side of the machine frame by the rear casters.



7. If the loading surface is not horizontal or is higher than 380 mm (15 in) from the ground, use a winch to unload machine.

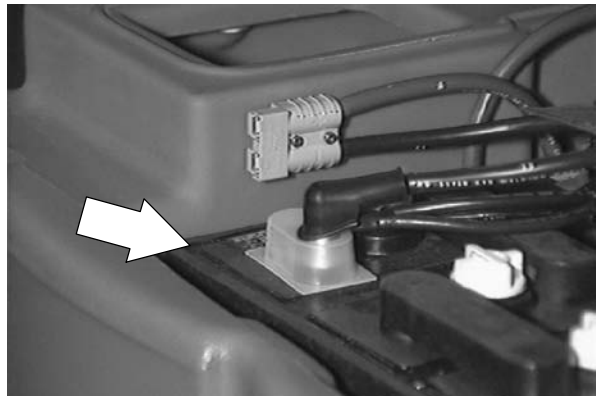
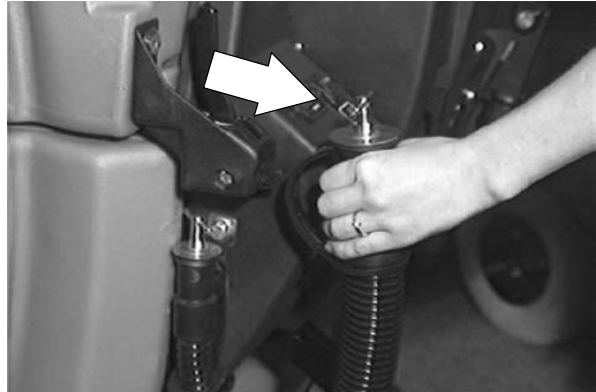
If the loading surface is horizontal AND is 380 mm (15 in) or less from the ground, the machine may be pushed off the truck or trailer.

FOR SAFETY: When unloading machine off truck or trailer, use winch. Do not push the machine off the truck or trailer unless the loading surface is horizontal AND 380 mm (15 in) or less from the ground.

STORAGE INFORMATION

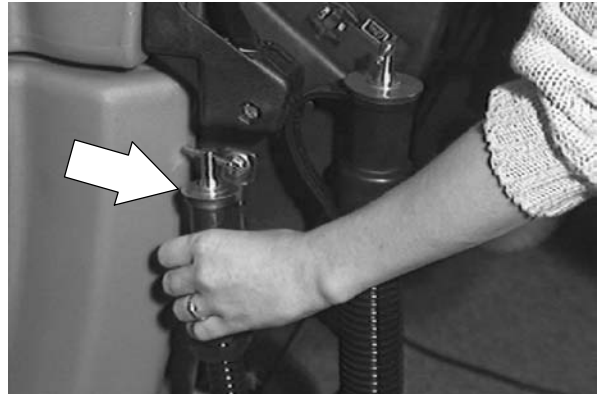
The following steps should be taken when storing the machine for extended periods of time.

1. Drain and clean the solution and recovery tanks.
2. Park the machine in a cool, dry area.
3. Remove the batteries, or charge them after every three months.

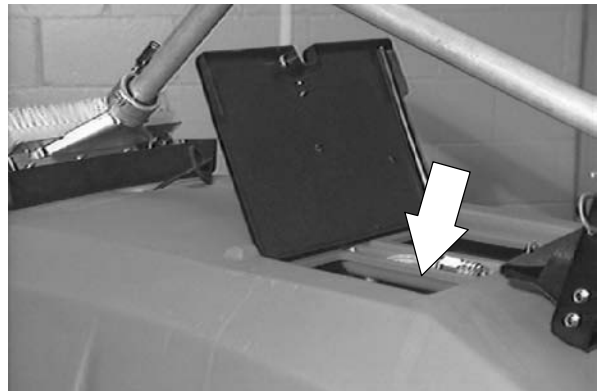


FREEZE PROTECTION

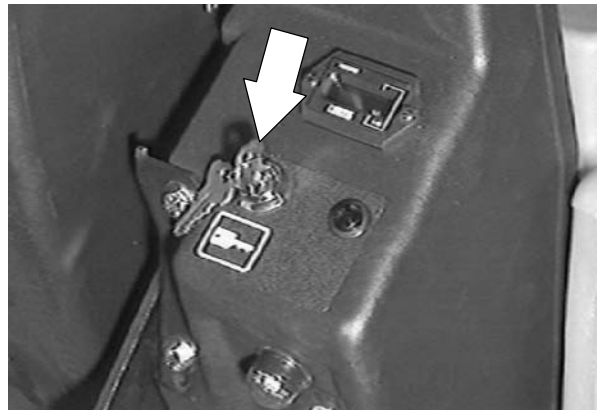
1. Be sure the solution tank is empty.



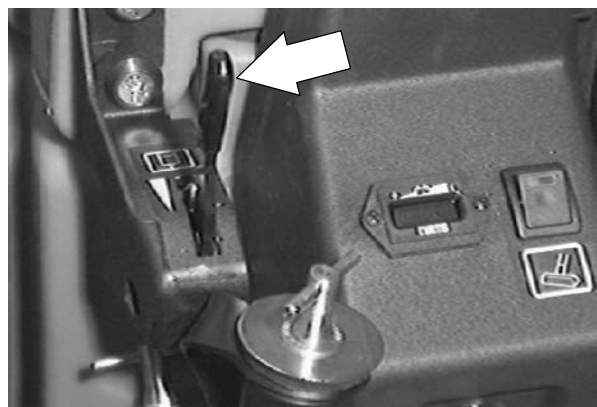
2. Pour 3.8 L (1 gal) of pre-mixed automotive-type windshield washer solution into the solution tank.



3. Turn the machine power on.



4. Start the solution flow. Start the power wand solution system or ES™ system to circulate the washer solution through the components.



5. The washer solution does not need to be drained from the solution tank.

GENERAL INFORMATION

HARDWARE INFORMATION

The following charts state standard plated hardware tightening ranges for normal assembly applications. Decrease the specified torque by 20% when using a thread lubricant. Do not substitute lower grade hardware for higher grade hardware. If higher grade hardware than specified is substituted, tighten only to the specified hardware torque value to avoid damaging the threads of the part being threaded into, as when threading into speed nuts or weldments.

STANDARD BOLT TORQUE CHART

Thread Size	SAE Grade 5 Torque ft lb (Nm)	SAE Grade 8 Torque ft lb (Nm)
0.25 in	7-10 (9-14)	10-13 (14-38)
0.31 in	15-20 (20-27)	20-26 (27-35)
0.38 in	27-35 (37-47)	36-47 (49-64)
0.44 in	43-56 (58-76)	53-76 (72-103)
0.50 in	65-85 (88-115)	89-116 (121-157)
0.62 in	130-170 (176-231)	117-265 (159-359)
0.75 in	215-280 (291-380)	313-407 (424-552)
1.00 in	500-650 (678-881)	757-984 (1026-1334)

NOTE: Decrease torque by 20% when using a thread lubricant.

METRIC BOLT TORQUE CHART





Thread Size	Class 8.8 Torque ft lb (Nm)	Class 10.9 Torque ft lb (Nm)
M4	2 (3)	3 (4)
M5	4 (5)	6 (8)
M6	7 (9)	10 (14)
M8	18 (24)	25 (34)
M10	32 (43)	47 (64)
M12	58 (79)	83 (112)
M14	94 (127)	133 (180)
M16	144 (195)	196 (265)
M20	260 (352)	336 (455)
M24	470 (637)	664 (900)

NOTE: Decrease torque by 20% when using a thread lubricant.

Exceptions to the above chart:

Check the machine for exceptions!

BOLT IDENTIFICATION

Identification Grade Marking	Specification and Grade
	SAE-Grade 5
	SAE-Grade 8
	ISO-Grade 8.8
	ISO-Grade 10.9

01395

THREAD SEALANT AND LOCKING COMPOUNDS

Thread sealants and locking compounds may be used on this machine. They include the following:

Loctite 515 sealant - gasket forming material. TENNANT Part No. 75567, 15 oz (440 ml) cartridge.

Loctite 242 blue - medium strength thread locking compound. TENNANT Part No. 32676, 0.5 ml tube.

Loctite 271 red - high strength thread locking compound. TENNANT Part No. 19857, 0.5 ml tube.

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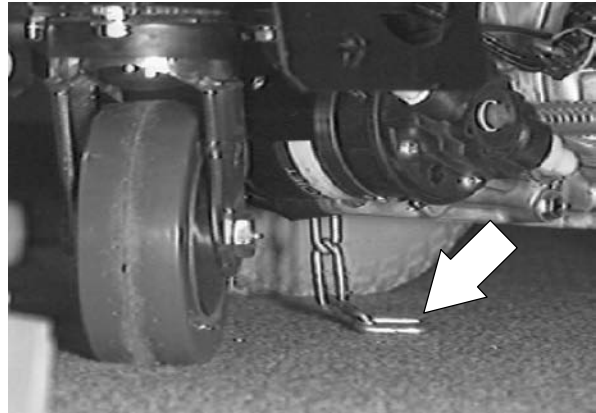
CHASSIS

This section includes information on the main chassis related components. These components include the tire and wheel assembly, propelling transaxle and drive motor, casters, parking brake (option), and static chain.

STATIC DRAG CHAIN

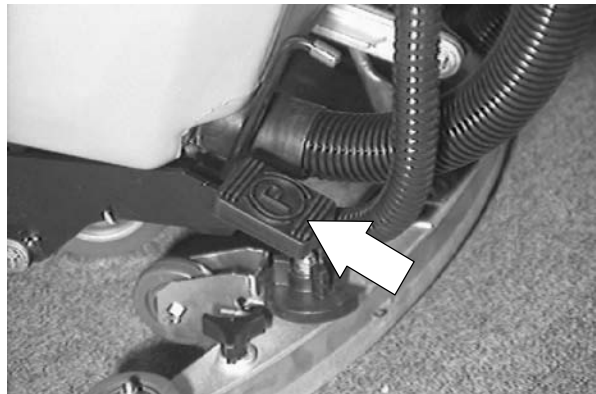
The static drag chain prevents build up of static electricity in the machine. The chain is attached to a bolt on the transaxle mount.

The chain should be in contact with the floor at all times.



PARKING BRAKE (optional)

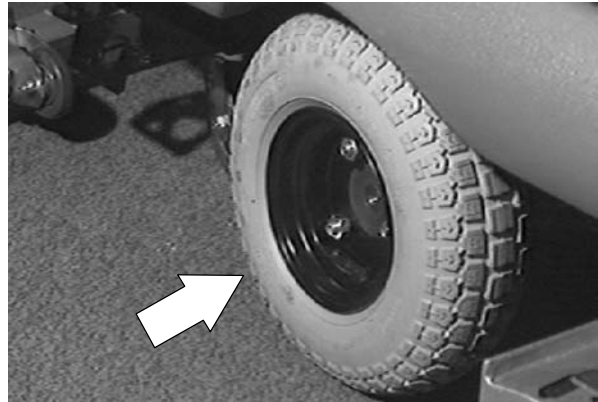
The parking brake (option) is set by pushing down on the pedal on the left side of the machine with your foot. When the parking brake is activated the transaxle is locked. The parking brake is released by pulling up on the red tipped release bar with your foot or finger.



FRONT TIRES AND WHEELS

The standard front machine tires are pneumatic. The optional tires are solid.

Tire air pressure in the pneumatic tires should be 415 – 450 Kpa (60 – 65 psi).

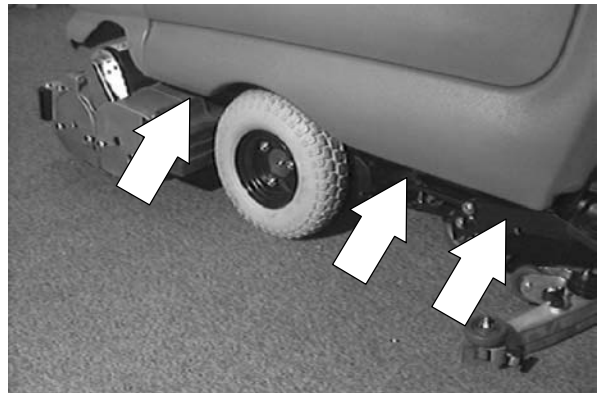


TO REPLACE FRONT TIRE AND WHEEL ASSEMBLY

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

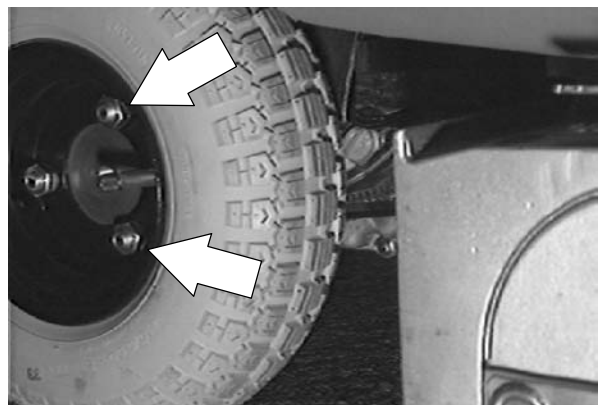
1. Jack up one side of the machine. Place a jack stand under machine. Use a piece of wood on top of the jack stand to help spread out the load.

FOR SAFETY: Block machine tires before jacking machine up. Jack machine up at designated locations only. Block machine up with jack stands.

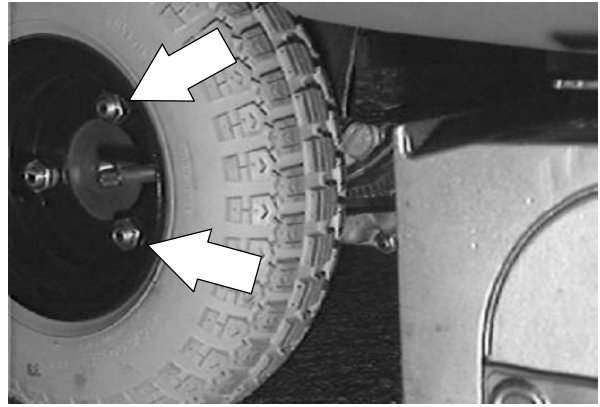


2. Remove the three wheel nuts holding the rim to the machine axle.
3. Remove the tire and wheel assembly from the machine.
4. Position the new tire and wheel assembly onto the machines axle studs.

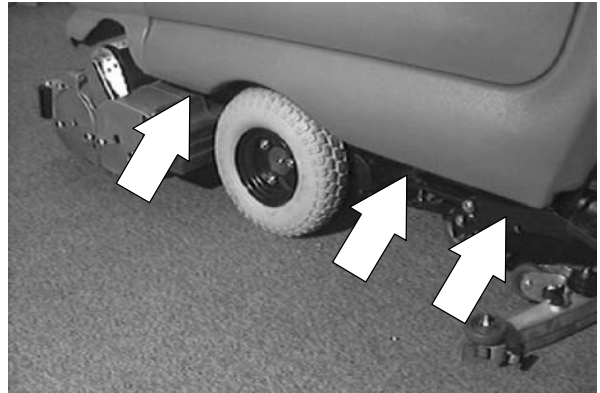
NOTE: Make sure the taper on the rim is facing the center of the machine. If the machine is equipped with pneumatic tires the valve stem should face the outside of the machine.



5. Reinstall the three wheel nuts and tighten to 102 - 117 Nm (75 - 85 ft lb).



6. Remove the jack stand and lower the machine.

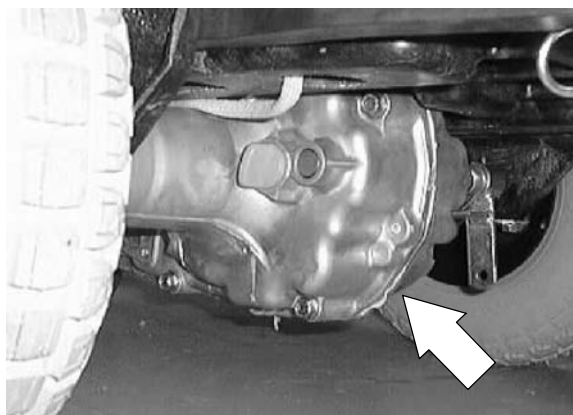


PROPELLING TRANSAXLE

The propelling transaxle transmits power from the drive motor(s) to the tires.

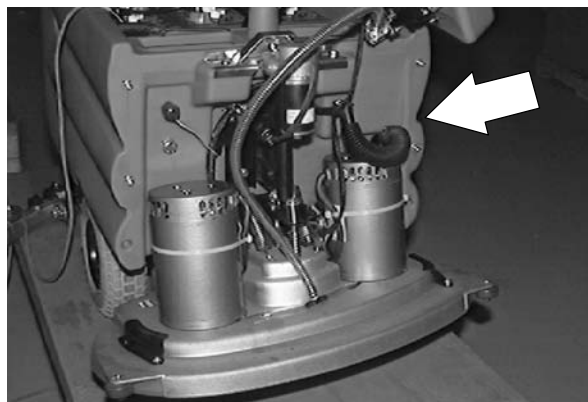
Remove one of the orange plugs marked **OIL** on either the right or left hand side of the transaxle. The lubricant should be up to the bottom edge of the hole.

Check the lubricant level every 1000 hours of operation. Use SAE 90 weight gear lubricant. The transaxle lubricant should never need changing.

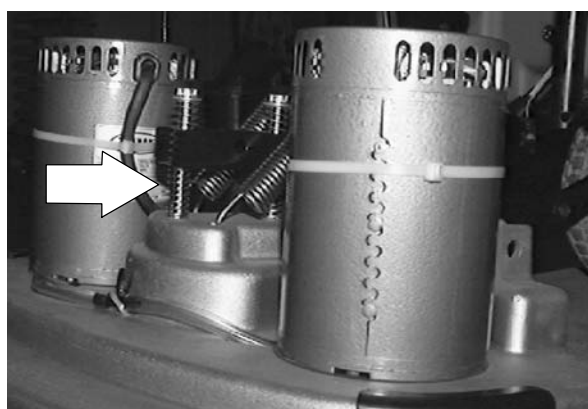


TO REMOVE PROPELLING TRANSAXLE

1. Remove the front cover.



2. Place a 50 mm (2 in.) tall block of wood between the scrub head lift bracket and the top of the scrub head.



CHASSIS

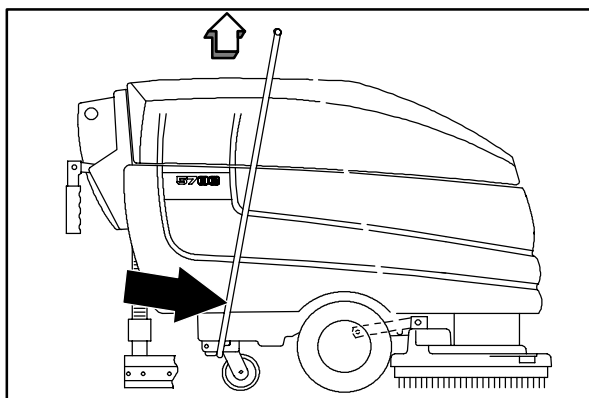
3. Lower the scrub head all the way to the floor.

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (option), Turn Off Machine And Remove Key.

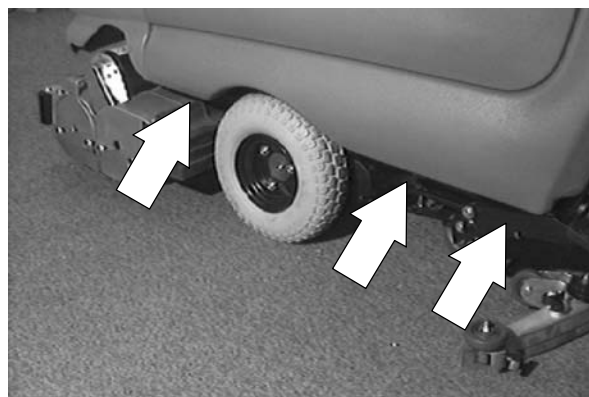


4. Lift the rear of the machine by placing a nylon strap all the way around the back of the machine and lifting with an overhead hoist or by using a floor jack under the center, rear of the machine.

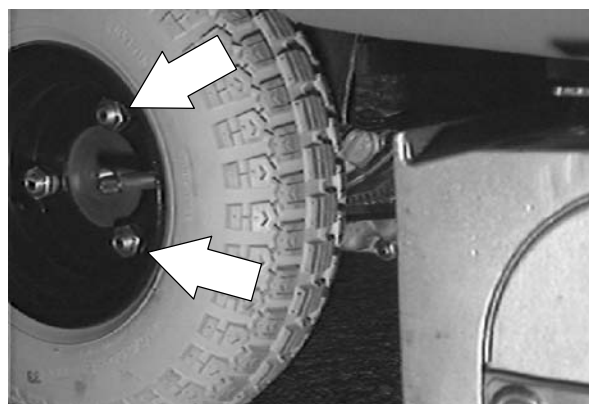
ATTENTION: DO NOT lift the machine with the steering handle.



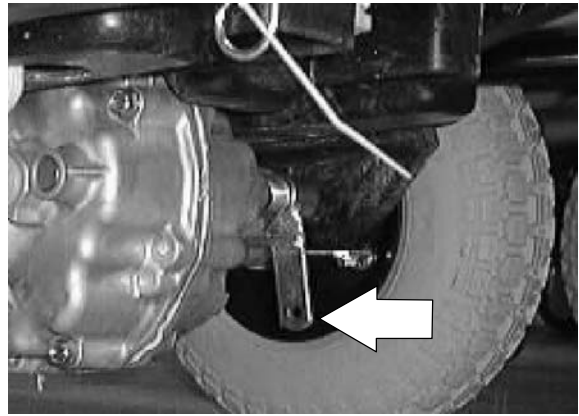
5. If the machine is lifted with a floor jack, make sure to support outside edges of the machine to keep it from tipping over.



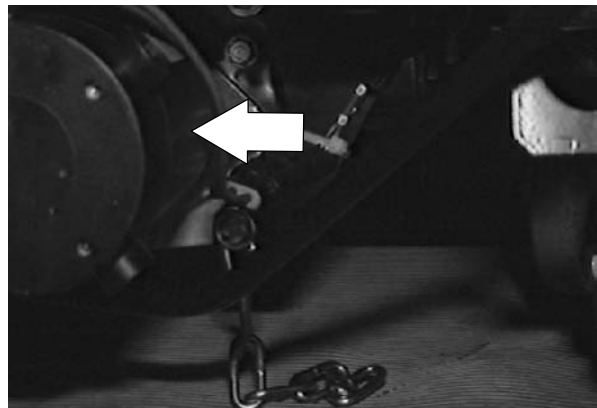
6. Lift the rear of the machine until the drive wheels are off the ground. Remove the three wheel nuts holding each wheel assembly to the machine. Remove the wheels and tires.



7. If the machine is equipped with a parking brake, remove the rod at the lever on the transaxle.

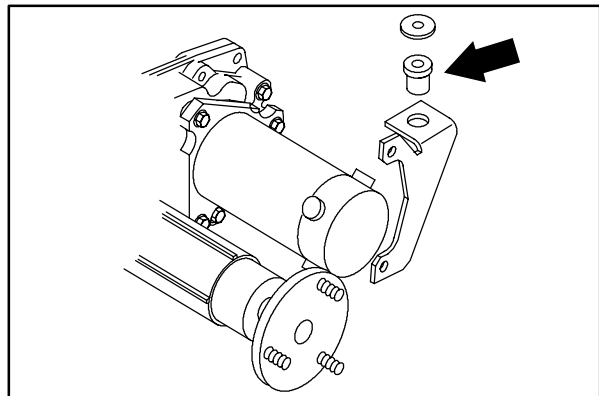


8. Cut any plastic wire ties holding the wires to the drive motor(s) and unplug the motor(s) from the main harness.



9. Remove the one M8 hex screw and washer holding the isolator and black bracket to the back of the tank frame.

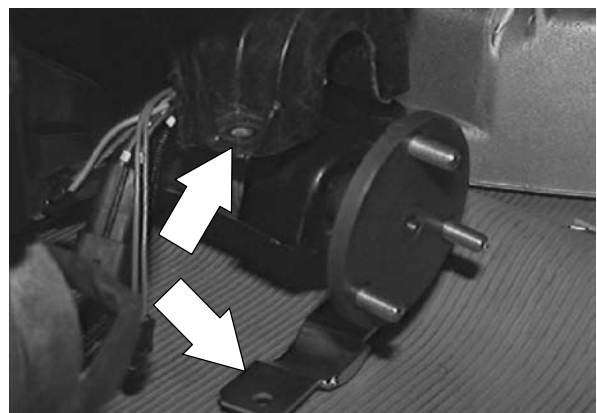
NOTE: The transaxle should be supported with a floor jack before the next step is attempted.



10. Remove the two M8 hex screws, washers, and two retainer brackets holding each side of the transaxle to the machine frame. Make sure to retain the frame support bracket.

NOTE: Care must be used when removing the transaxle from the machine so the breather cap and drive motor brush caps are protected from damage.

11. The transaxle can now be lowered and slid out the side of the machine.

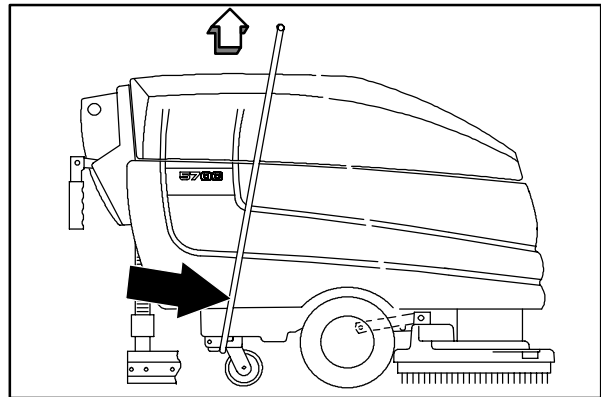


TO INSTALL PROPELLING TRANSAXLE

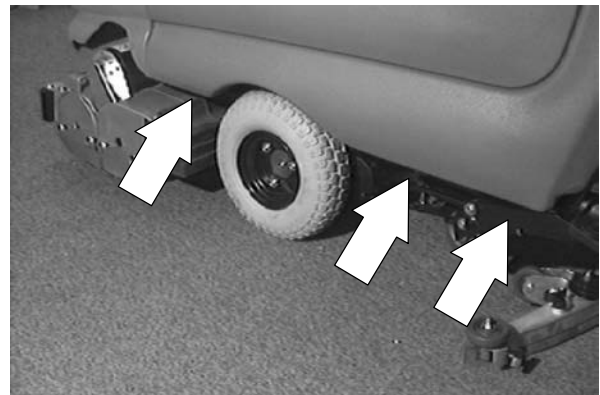
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (option), Turn Off Machine And Remove Key.

1. Lift the rear of the machine by placing a nylon strap all the way around the back of the machine and lifting with an overhead hoist or by using a floor jack under the center, rear of the machine.

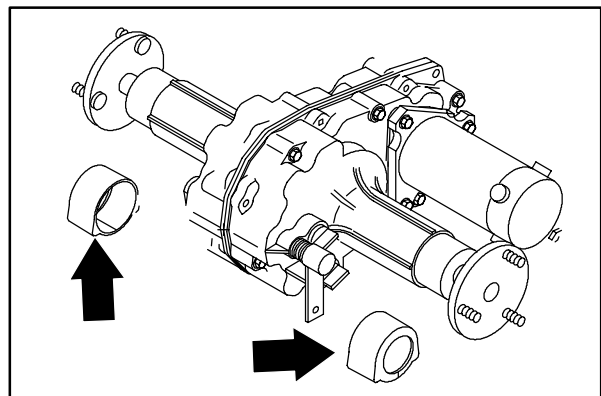
ATTENTION: DO NOT lift the machine with the steering handle.



2. If the machine is lifted with a floor jack, make sure to support outside edges of the machine to keep it from tipping over.



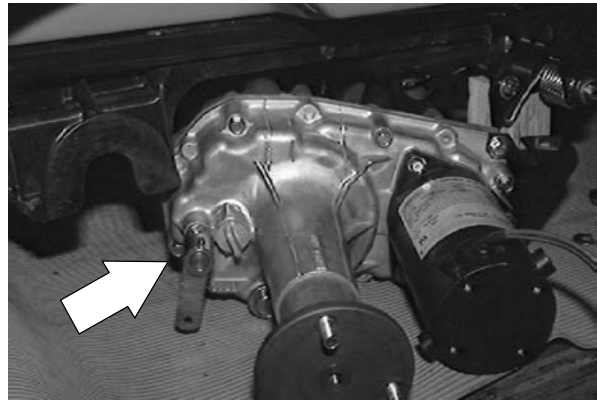
3. Make sure the two rubber isolators are in place at the end of each axle. If new isolators are being installed, they must be cut to fit around axle housing.



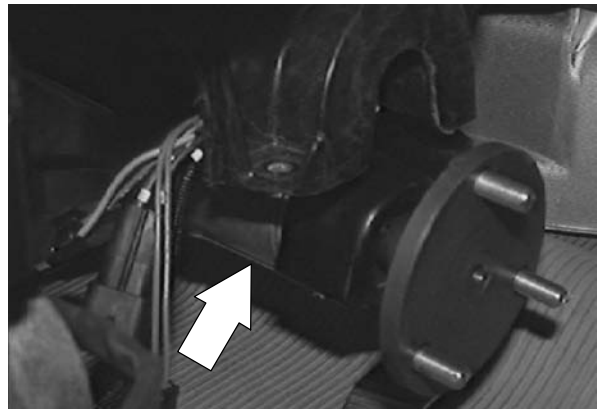
4. Position the new transaxle under the machine frame with the motor(s) facing to the rear.

NOTE: Care must be used when moving the transaxle under the machine so the breather cap and drive motor brush caps are protected from damage.

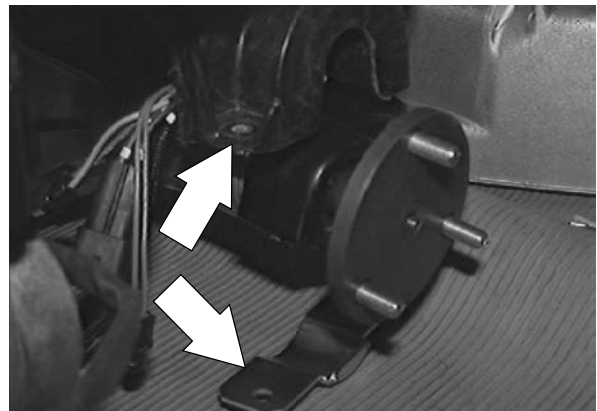
NOTE: Make sure the transaxle is filled with lubricant before installing in the machine.



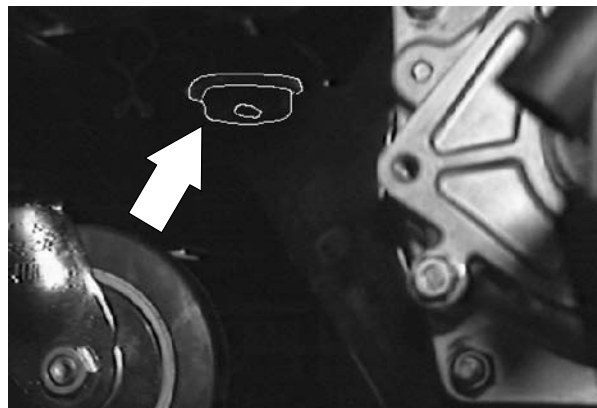
5. Using a floor jack or some other lifting device, lift the transaxle into position in the machine frame.



6. Install the one frame support bracket, two retainer brackets, four M8 hex screws, washers, and nyloc nuts holding the axle housing in the machine frame. Leave hardware loose for now.

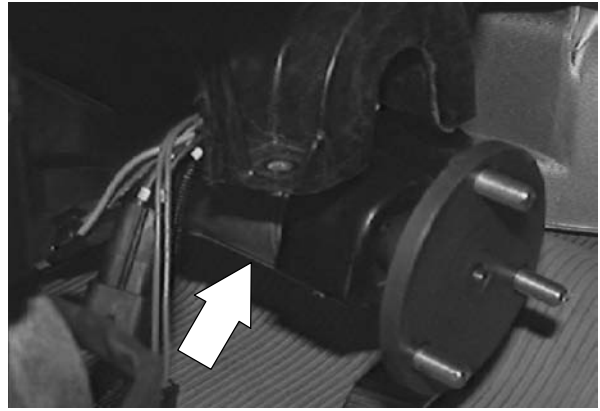


7. Reinstall the one M8 hex screw, washer, and isolator in the mounting hole of the black, rear mounting bracket. Tighten to 18 - 24 Nm (15 - 20 ft lb).

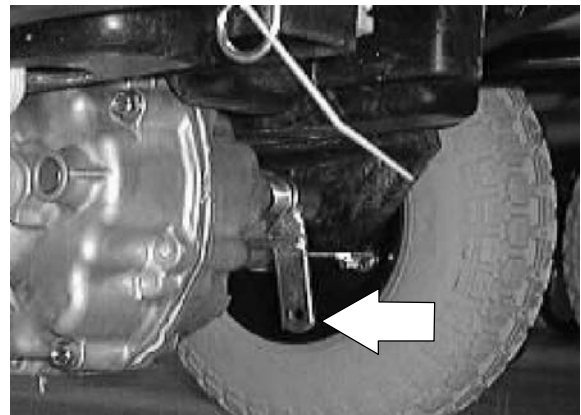


CHASSIS

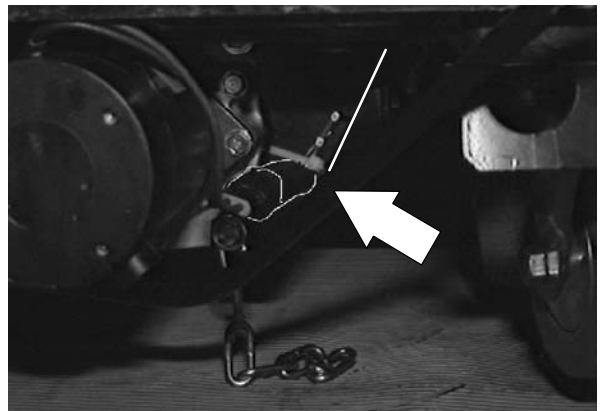
8. Go back and tighten the four M8 hex screws on the axle housing mount to 18 – 24 Nm (15 – 20 ft lb).



9. If the machine is equipped with a parking brake, reconnect the rod to the lever on the left side of the transaxle. If any adjustments are needed, loosen the jam nut and turn the clevis in or out to align holes.

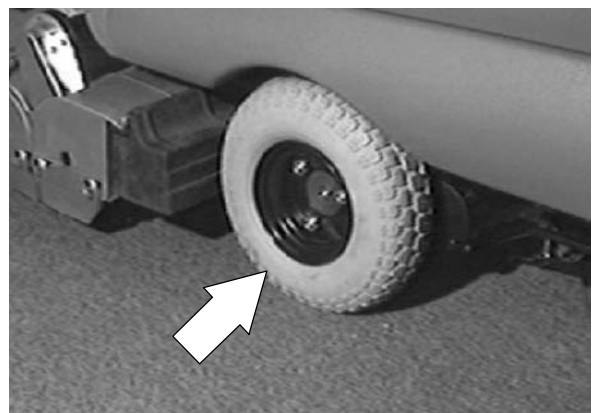


10. Reconnect the drive motor(s) to the main electrical harness. See schematic in the ELECTRICAL section of this manual.

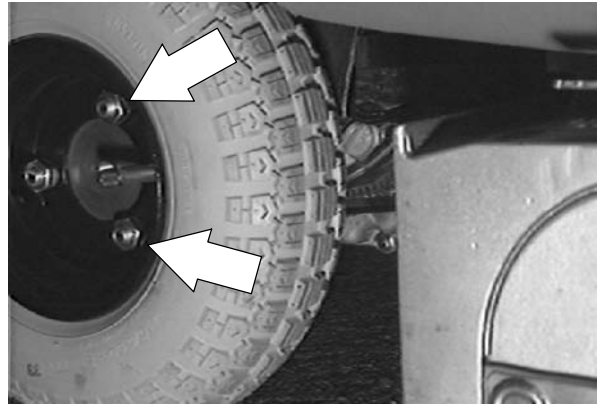


11. Position the tire and wheel assembly on the machine's axle studs.

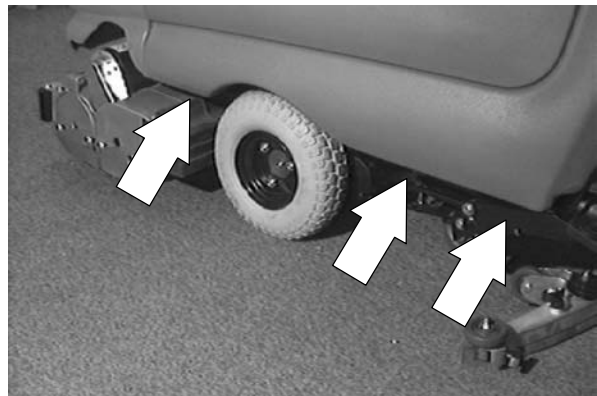
NOTE: Make sure the taper on the rim is facing the center of the machine. If the machine is equipped with pneumatic tires the valve stem should face the outside of the machine.



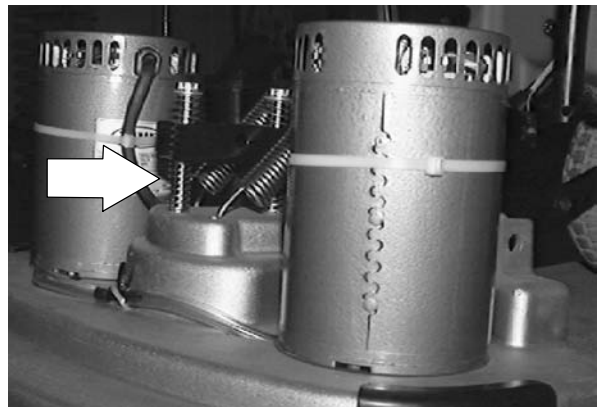
12. Reinstall the three wheel nuts and tighten to 90 - 117 Nm (65 - 85 ft lb).



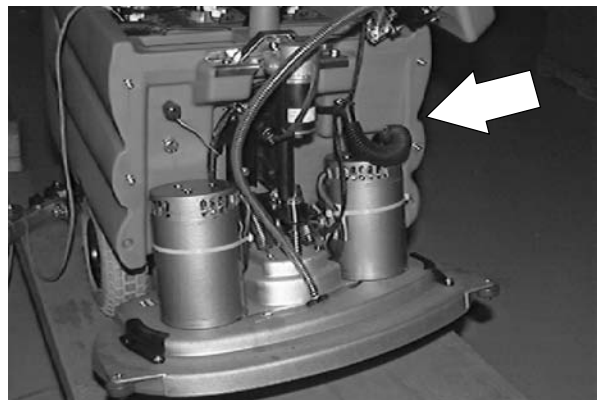
13. Remove the jack stands and lower the machine.



14. Raise the scrubber head and remove the wood block from under scrub head lift bracket.

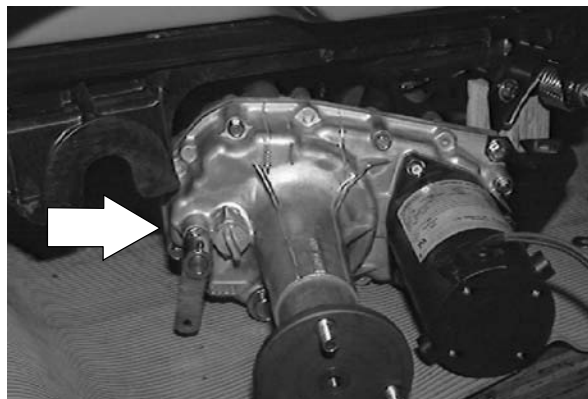


15. Reinstall the front cover and operate the machine. Check the transaxle for proper operation.



PROPELLING TRANSAXLE

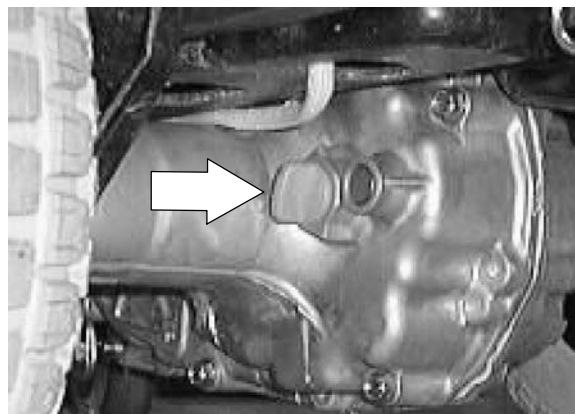
The 5680/5700 transaxle is engineered to last the life of the machine without any scheduled repairs. In the event repairs are needed, a bearing and seal kit and a gear kit are available. See *5680/5700 parts manual for repair part numbers*.



TO REPAIR PROPELLING TRANSAXLE

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

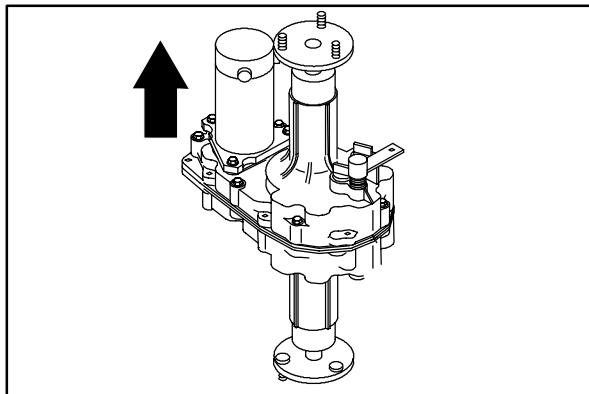
1. Drain the lubricant out of the transaxle.



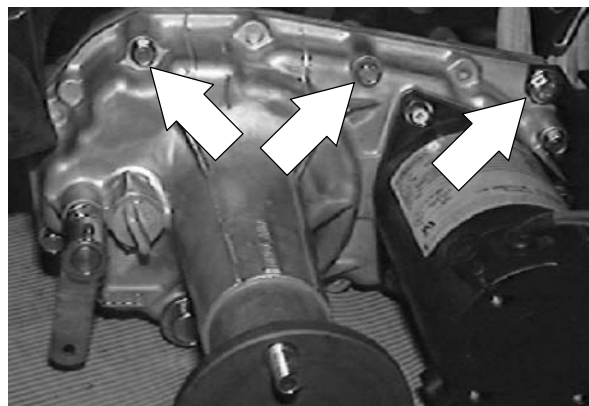
2. Remove the transaxle from the machine. See TO REMOVE PROPELLING TRANSAXLE instructions in this section.



3. After the transaxle is removed from the machine, place it in a large vice with the drive motor facing up.

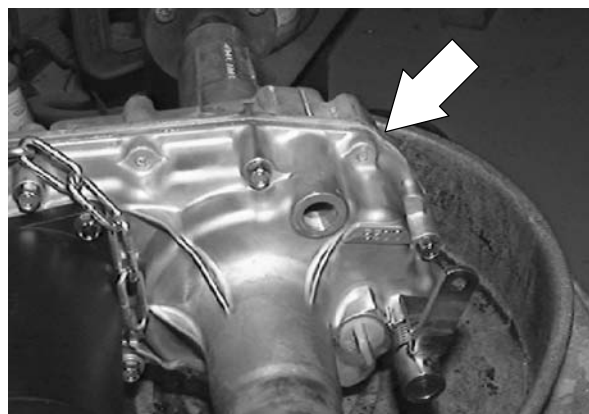


4. Remove the twelve M8 hex screws holding the two halves of the transaxle together.

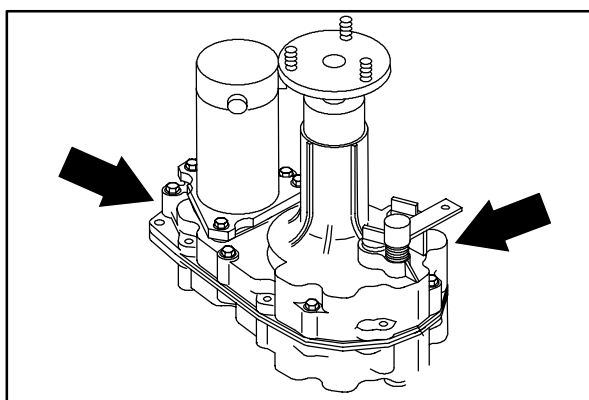


5. Use a large, flat blade screw driver to pry the two halves apart.

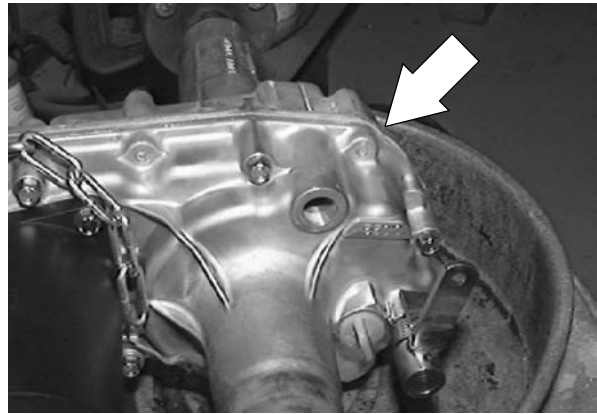
NOTE: There are two indentations provided in the transaxle housing for this purpose.



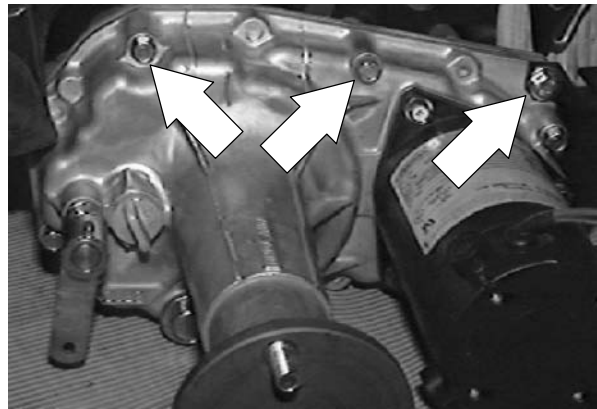
6. Carefully lift the top half of the transaxle housing off the bottom half.



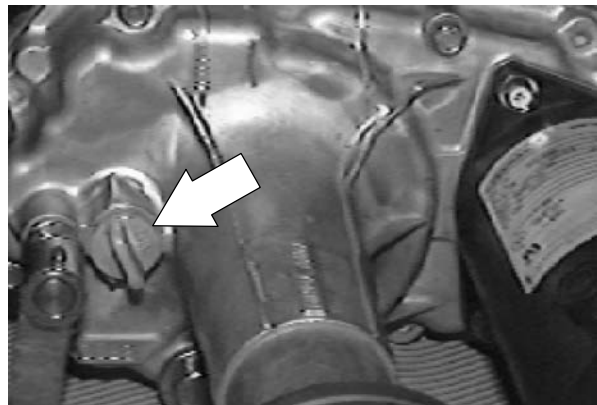
7. The shafts, gears, bushings, and bearings can all be removed at this point using only a snap ring pliers.
8. Reassemble the transaxle in the reverse order. Make sure that both mating surfaces are cleaned and free of any gasket material. Apply a bead of oil resistant, formable gasket material to one side.

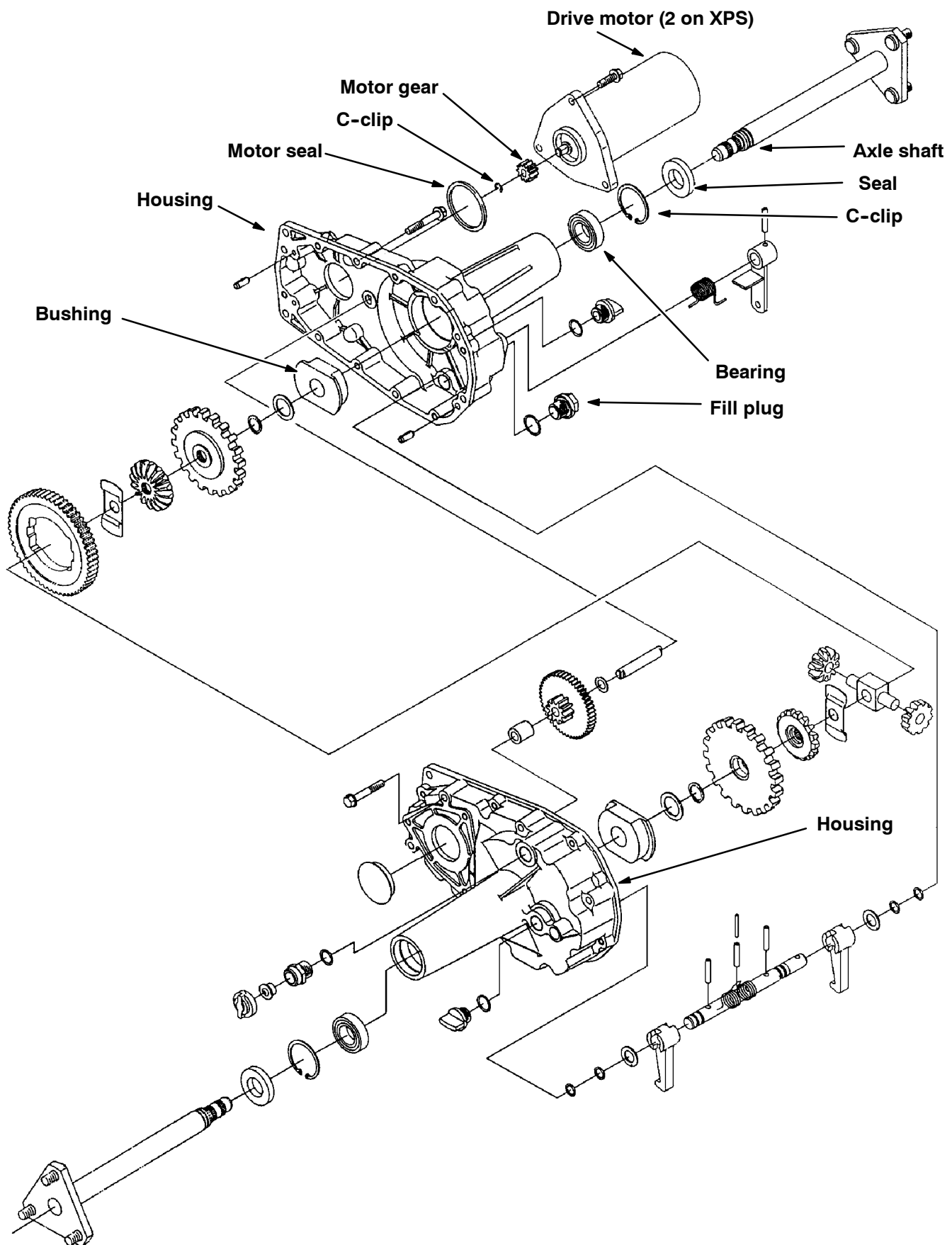


9. Assemble both halves together and tighten the twelve M8 hex screws to 18 - 24 Nm (15 - 20 ft lb).



10. Fill the transaxle with 90W gear lube to the bottom of the plug.

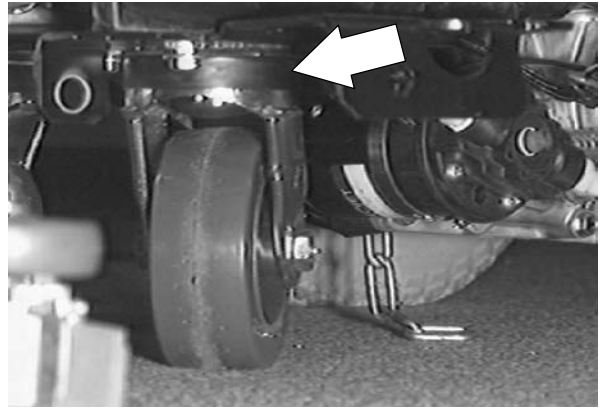




TRANSAXLE BREAKDOWN 5680/5700, 5700 XP and 5700 XPS

REAR CASTERS

The rear casters each have one grease fitting on the caster swivel. Lubricate the caster with a grease gun containing Lubriplate EMB grease (TENNANT part no. 01433-1) every 100 hours of machine operation.



TO REPLACE A REAR CASTER

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (option), Turn Off Machine And Remove Key.

1. Remove the squeegee frame. See TO REMOVE SQUEEGEE FRAME instructions in the SCRUBBING section of this manual.
2. Jack up the rear of the machine. Place a jack stand under machine.

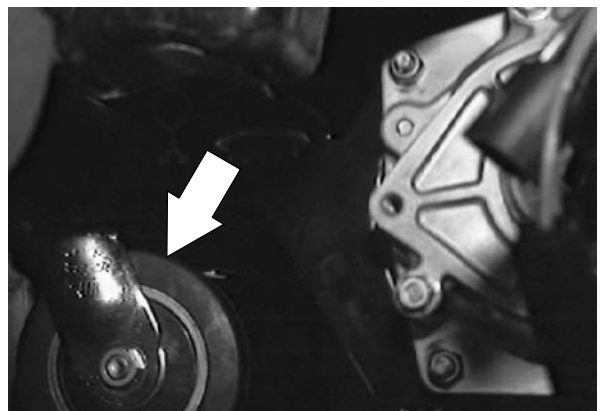
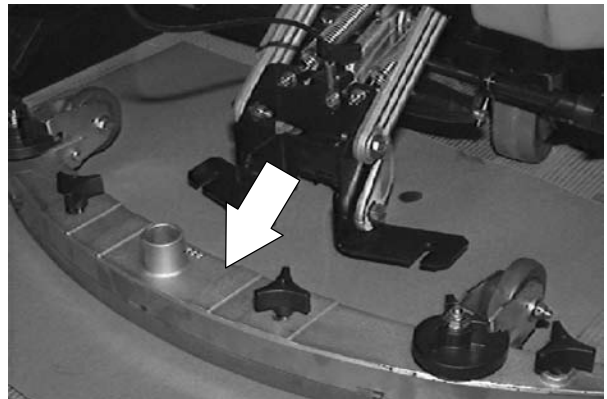
FOR SAFETY: Block machine tires before jacking machine up. Jack machine up at designated locations only. Block machine up with jack stands.

ATTENTION: DO NOT lift the machine with the steering handle.

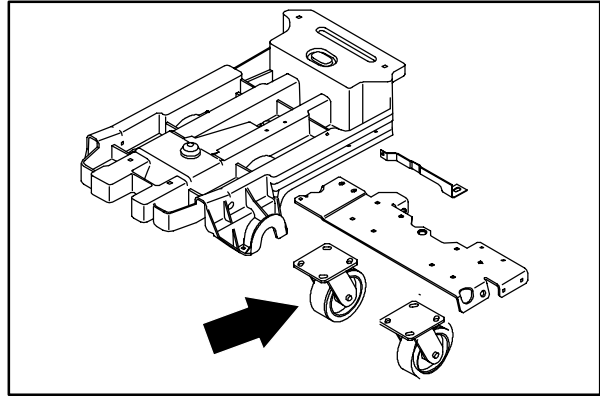
NOTE: DO NOT remove both casters at the same time.

3. Remove the four M8 hex screws, washers, and one nyloc nut holding the caster to the machine frame. Remove the caster from the machine.

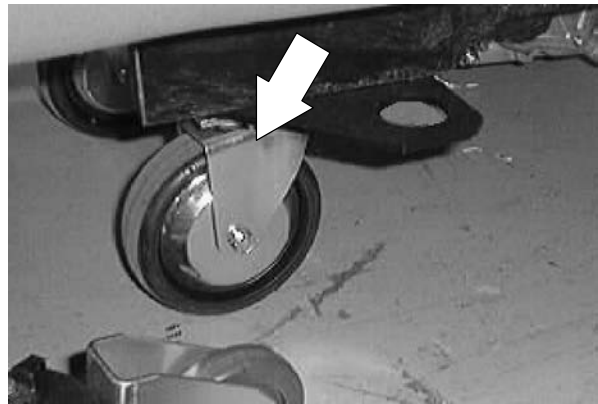
NOTE: One screw on the left hand caster attaches the squeegee centering spring. When replacing this caster, make sure to reinstall the spring.



4. Position the new caster on the caster mounting plate and reinstall the four M8 hex screws, washers and one nyloc nut. Tighten to 18 - 24 Nm (15 - 20 ft lb).

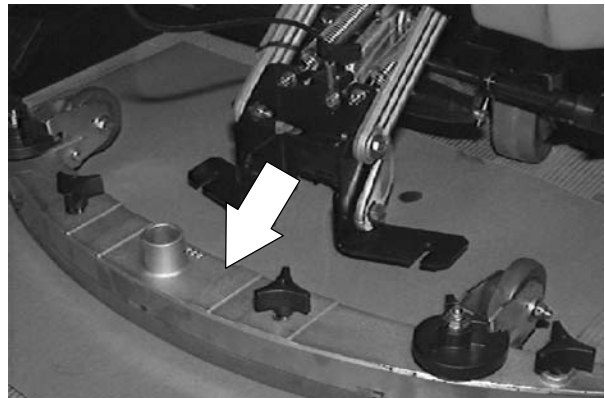


5. Lubricate the caster with a grease gun containing Lubriplate EMB grease (TENNANT part no. 01433-1).



6. Reinstall the squeegee frame. See TO INSTALL SQUEEGEE FRAME instructions in the SCRUBBING section of this manual.
7. Remove the jack stand, lower the machine to the floor.
8. Drive the machine and check to make sure the caster swivels properly.

NOTE: If both casters are removed at the same time, the squeegee pivot pin must be installed with the caster mounting plate left loose. After the pin is installed, aligned, and turns freely, the caster plate can be tightened.



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INTRODUCTION

When the scrubbing mode is used on the 5680/5700, water flows from the solution tank through the pinch valve to the solution solenoid valve to the scrub brushes. The brushes scrub the floor. As the machine is moved forward the squeegee wipes the dirty solution off the floor, which is then picked up and drawn into the recovery tank by the vacuum fan.

SOLUTION TANK

The solution tank holds the clean water and detergent mixture that will be applied to the floor for the scrubbing operation. The solution tank is the top tank on the machine. It can be opened for battery, vacuum fan, head lift actuator and water valve access.

The solution tank does not require regular maintenance except daily rinsing of any sludge or deposits. If any deposits do form on the bottom of the tank, rinse with a strong blast of warm water.

*NOTE: The water must not be hotter than 55° C (130° F), or tank damage may occur. **Do not** use steam to clean the tank.*

ES™ Option: The recovery tank should be partially filled with clean water after using the ES™ Option and clean water should be run through the pump until it is clear of any deposits.

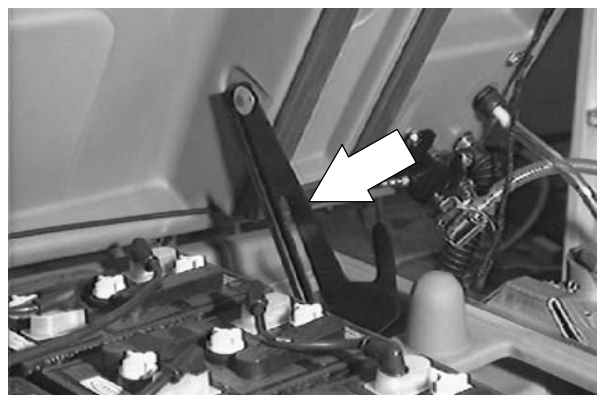
TO REMOVE SOLUTION TANK

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

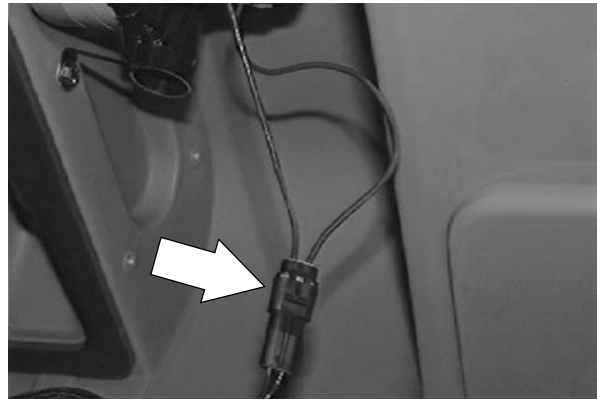
1. Make sure the solution tank is empty.



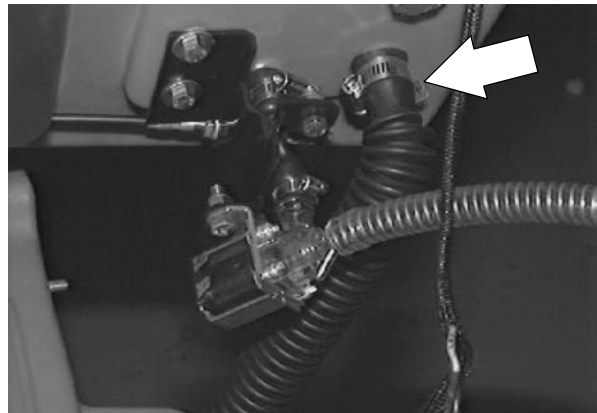
2. Raise the solution tank until the prop rod is engaged.



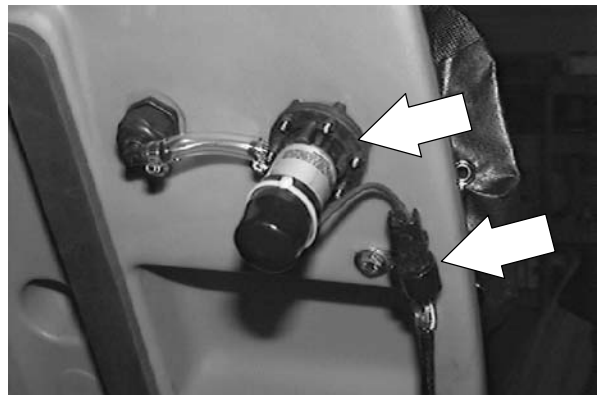
3. Unplug the vacuum fan(s) from the main harness.



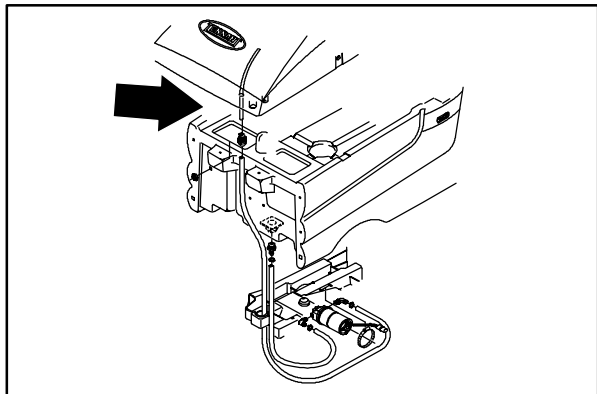
4. Loosen the worm drive clamp holding the flexible hose to the solution tank drain nipple. Pull the hose off the solution tank.



5. If the machine is equipped with a power wand, un-plug the pump from the main harness.

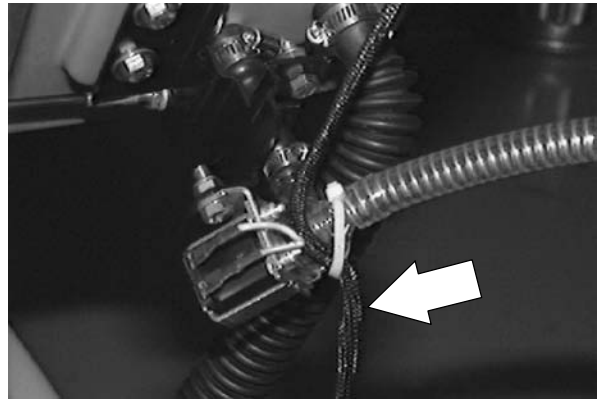


6. If the machine is equipped with ES™, disconnect the hose coming from the pump and going to the front of the tank. Loosen the collet at the tank and pull the hose out.



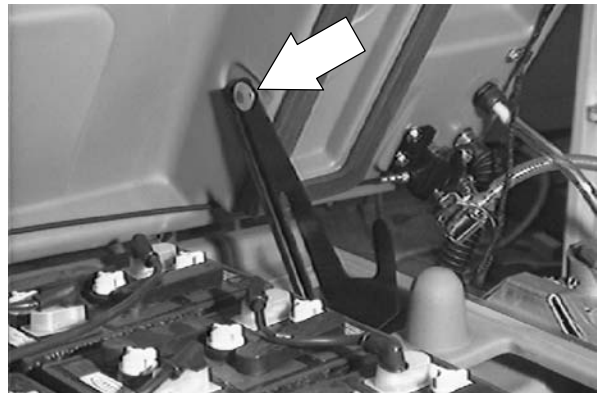
SCRUBBING

7. Disconnect the water solenoid valve from the main harness.



8. Remove the M8 hex screw holding the top of the prop rod to the solution tank.

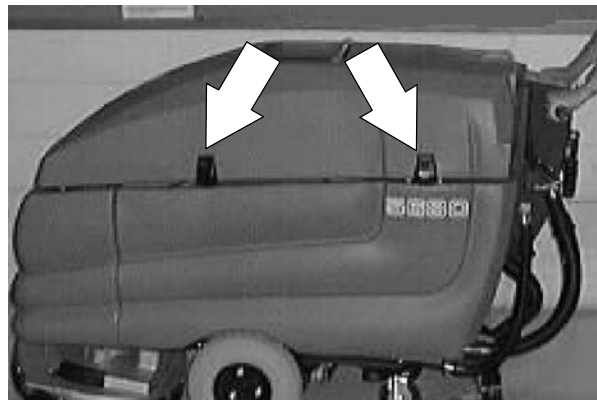
NOTE: Make sure to hold the solution tank in the raised position when working with the prop rod attachment hardware.



9. Close the solution tank.



10. Remove the two M8 flat head screws holding the hinges to the outside of the solution tank.



11. The solution tank can now be lifted off the machine.

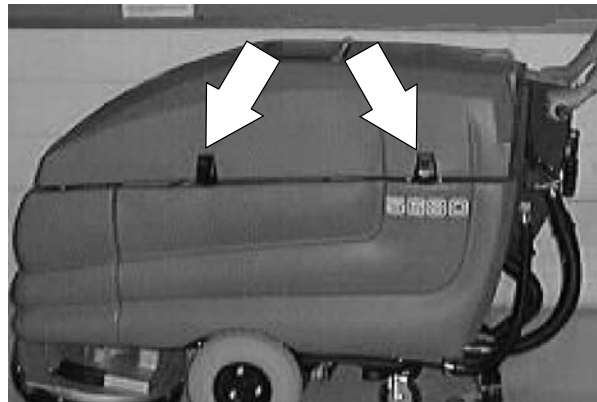
TO INSTALL SOLUTION TANK

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

1. Position the new solution tank on top of the recovery tank. Be careful not to damage the tank seals.



2. Align the two hinges with the threaded inserts in the tank. Install the two M8 flat head screws and tighten to 18 - 24 Nm (15 - 20 ft lb).



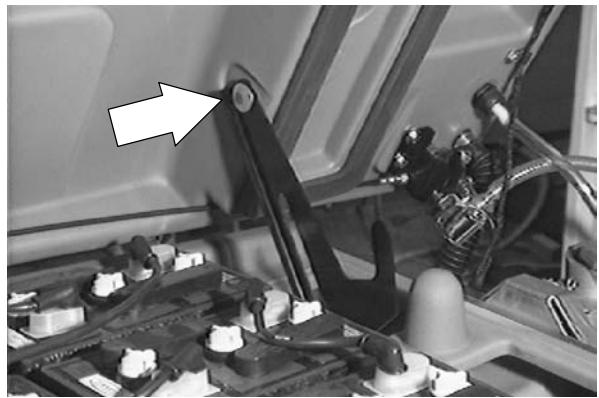
3. Raise the solution tank to the open position. Prop the solution tank open with a piece of wood or some other device.

NOTE: Make sure to hold the solution tank in the raised position when working with the prop rod attachment hardware.

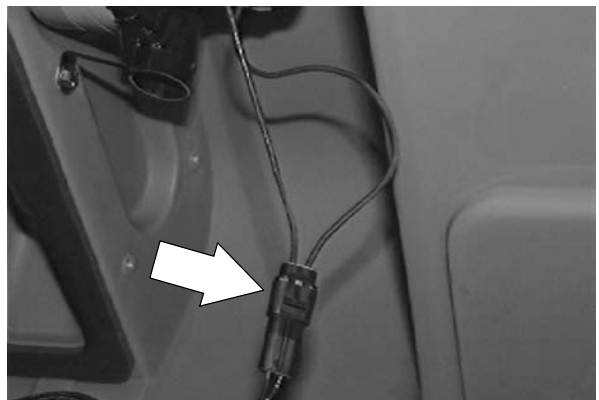


SCRUBBING

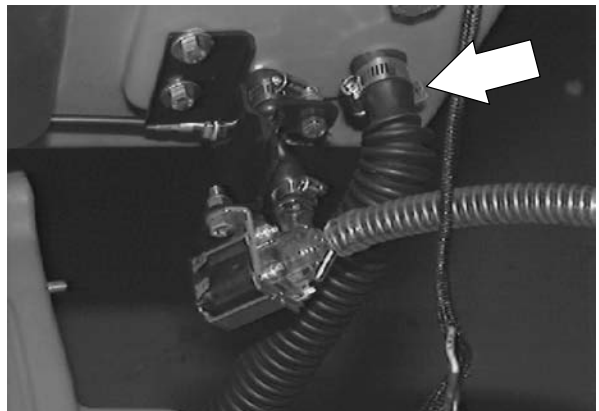
4. Align the top hole in the prop rod with the hole in the solution tank. Reinstall the M8 hex screw, sleeve, and washer. Tighten to 18 – 24 Nm (15 – 20 ft lb).



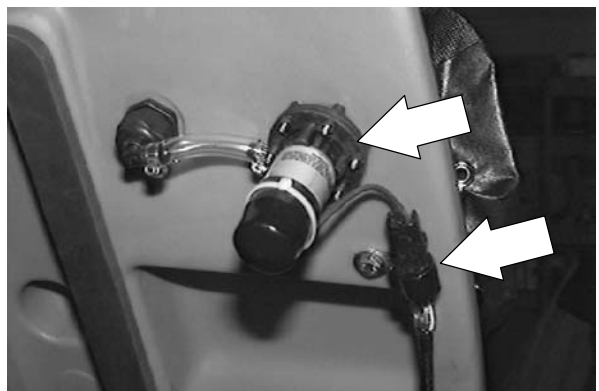
5. Plug the vacuum fan(s) into the main electrical harness.



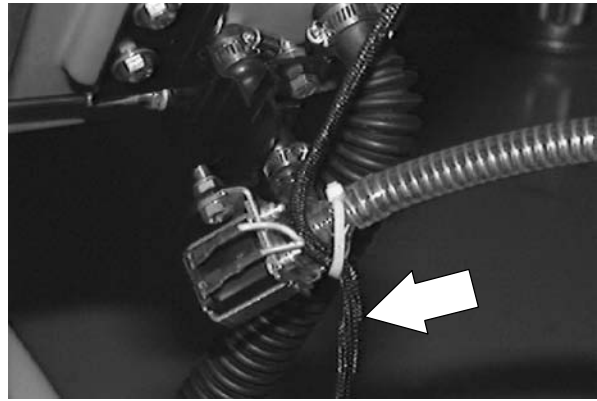
6. Position the flexible hose on the solution drain nipple. Hand tighten the worm drive clamp.



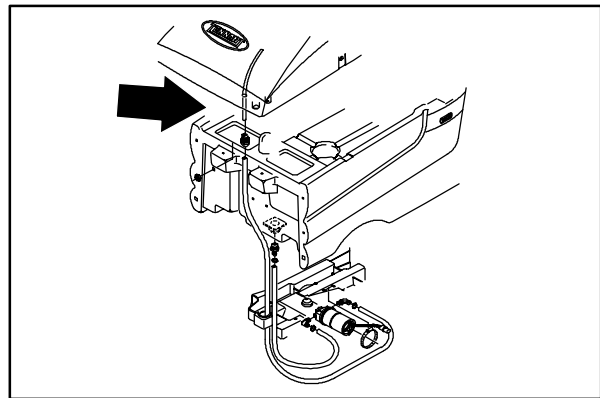
7. If the machine is equipped with a power wand, plug the power wand pump into the main electrical harness. See schematic in the ELECTRICAL section of this manual.



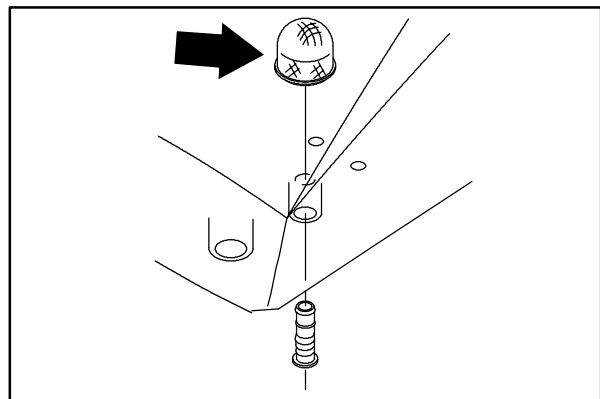
8. Plug the water solenoid valve into the main electrical harness.



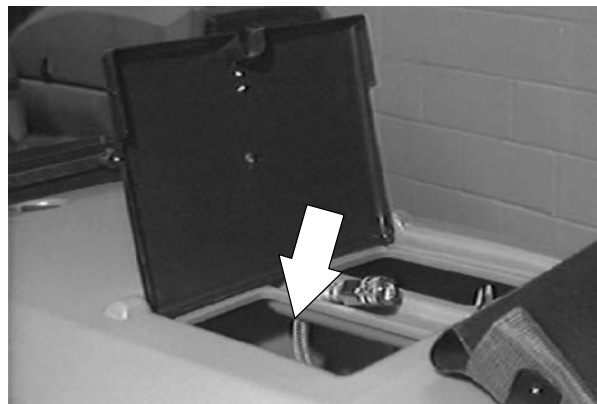
9. If the machine is equipped with the ES™ option, reinstall the hose leading from the pump to the front of the solution tank. Make sure the semi-rigid tube is in place inside the soft hose before tightening the collet. The semi-rigid tube must extend up, into the solution tank.



10. Reach inside the solution tank and check to make sure the small push on filters are in place over the solution valve and the power wand pump.



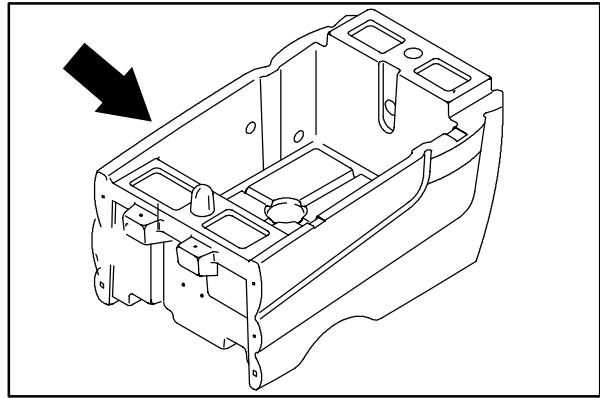
11. Close the solution tank and fill with water. Check for leaks and proper operation of the water valve and optional pumps.



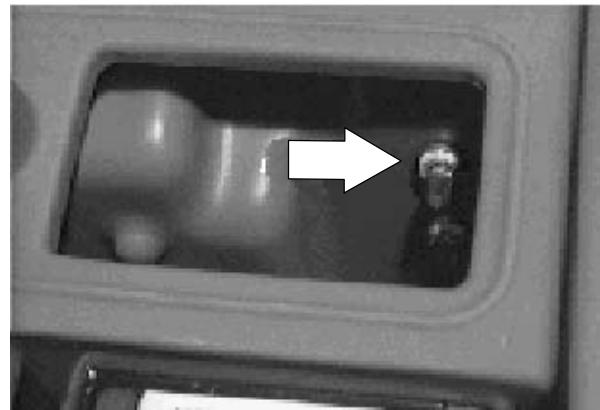
RECOVERY TANK

The recovery tank holds the used water and detergent solution pulled off the floor by the squeegee and scrubbing vacuum fan. The recovery tank is one of the machine's main frame components. The recovery tank should be drained and cleaned daily.

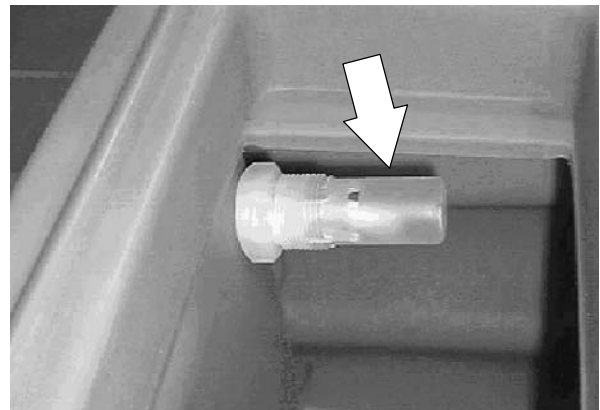
*NOTE: The water must not be hotter than 55° C (130° F), or tank damage may occur. **Do not** use steam to clean the tank.*



Rinse and wipe off the sensors daily on machines with optical sensors installed inside the recovery tank.



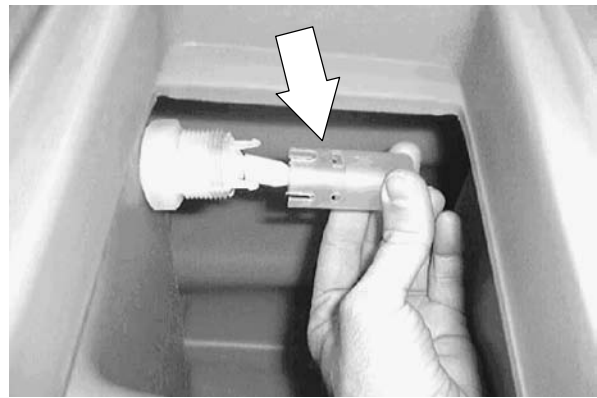
The magnetic float sensor is located inside the recovery tank.



Clean and check the float for proper operation every 100 hours of operation.

Remove cap: Press on the sides of the cap and pull the cap off.

Replacing cap: Snap the base into the smaller round holes on the sides of the cap with the square holes facing up and down.

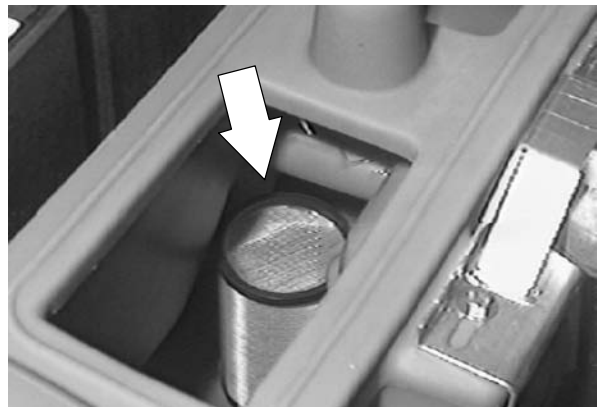


Check the sensor movement by inserting a small pin or screwdriver into the lower square hole and pressing up on sensor.



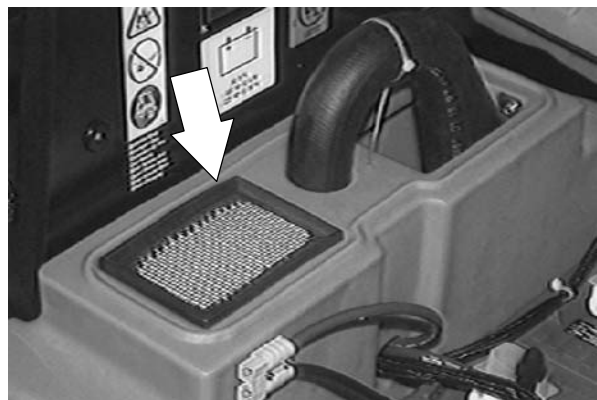
ES™ option: The ES™ filter should be cleaned daily.

NOTE: *Do not* use steam to clean the tank.



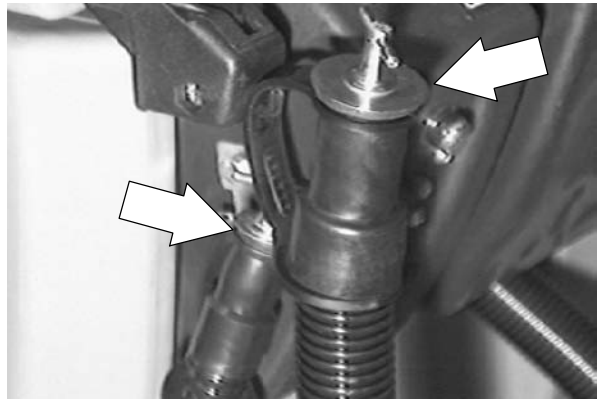
A vacuum fan filter is located in the recovery tank, for machines serial number 006956 and above. Remove and clean this filter daily. Clean by shaking dust or rinsing pleats with low pressure water. For machines below serial number 006956, a screen is located in the solution tank.

NOTE: Be sure the vacuum filter is dry before reinstalling it in the machine.



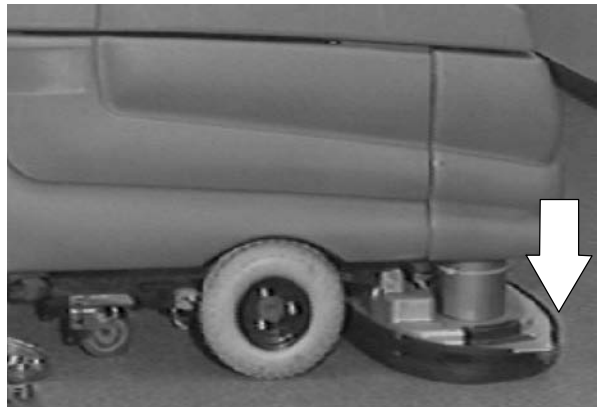
TO REPLACE RECOVERY TANK

1. Empty the solution and recovery tanks.

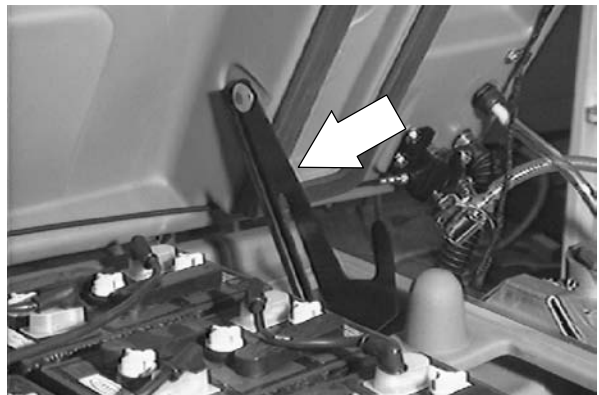


2. Lower the scrub head so the scrub brushes are resting on the floor.

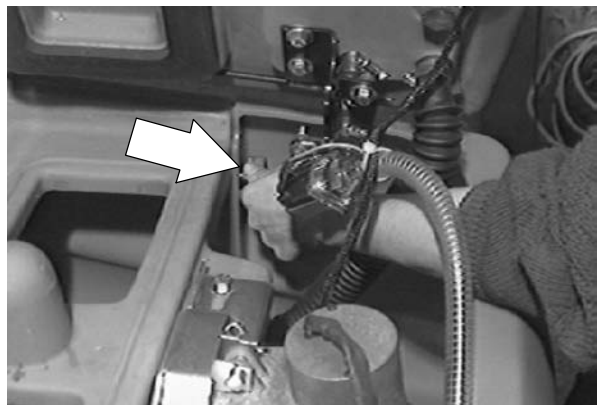
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.



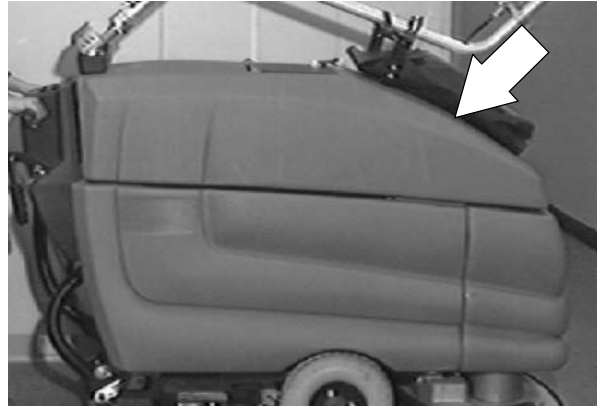
3. Raise the solution tank and engage the prop rod.



4. Remove the four M8 hex screws holding the front cover to the machine. Remove the cover.

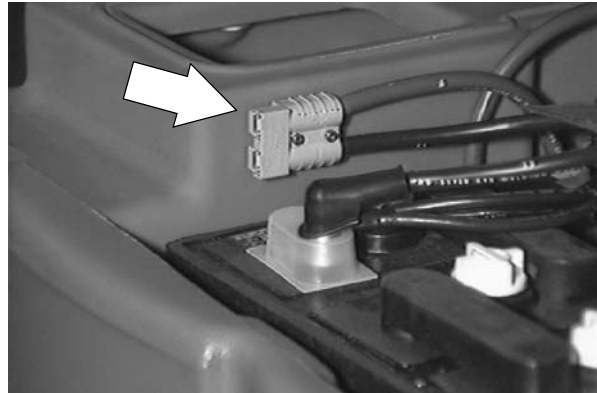


5. Remove the solution tank. See TO REMOVE SOLUTION TANK instructions in this section.

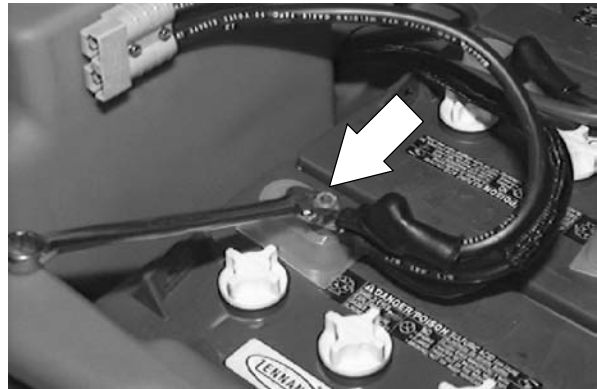


6. Disconnect the battery connector from the machine connector.

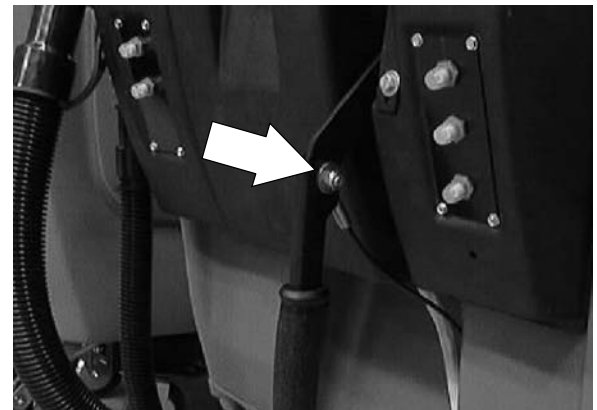
ATTENTION: Double check to make sure the batteries are disconnected from the machine.



7. Disconnect the batteries from the control panel, remove the battery cables, and remove the batteries from the machine.

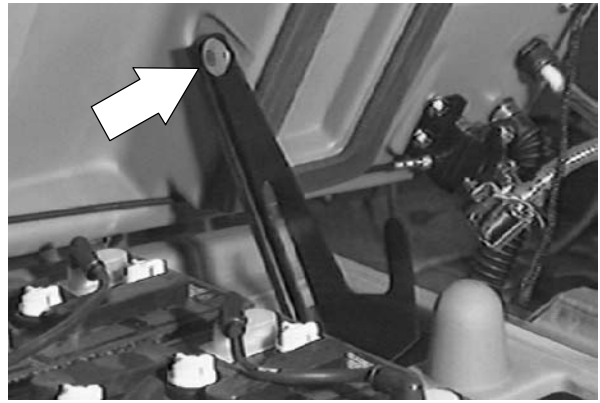


8. Disconnect the squeegee lift cable from the lift handle.



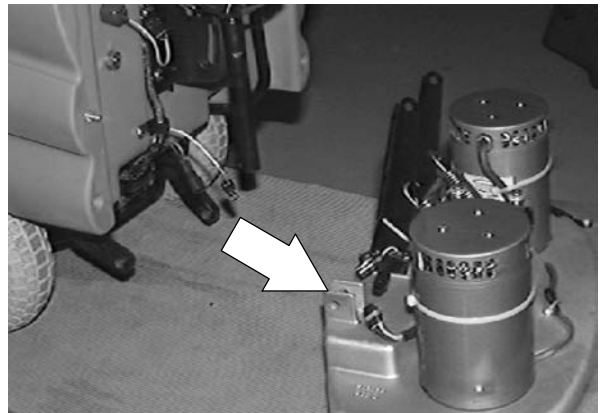
SCRUBBING

9. Remove the M8 hex screw, washer, and sleeve holding the prop rod to the recovery tank. Remove the prop rod from the machine.

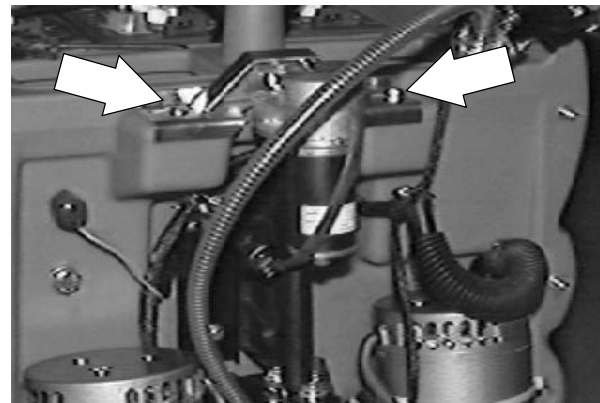


10. Remove the scrub head. See TO REMOVE SCRUB HEAD instructions in this section.

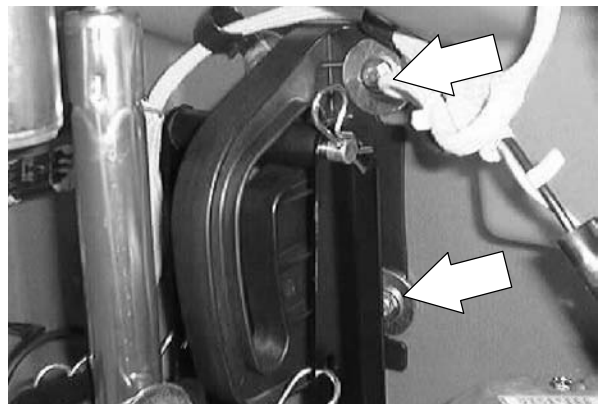
NOTE: Make sure to note the location of the actuator lift bracket hardware in the two slots.



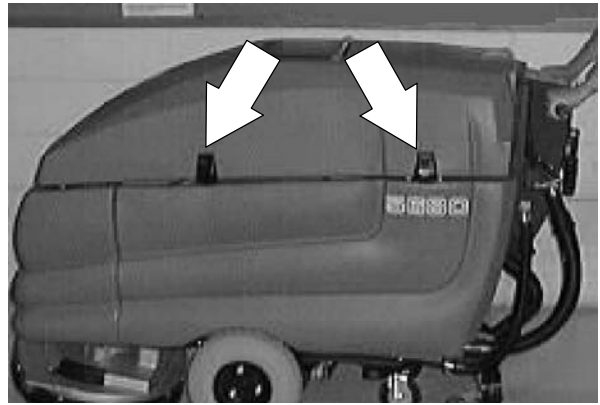
11. Remove the two M8 hex screws holding the scrub head lift actuator bracket to the front of the recovery tank. Remove the bracket from the machine.



12. Remove the four M8 hex screws holding the scrub head roller guide and brackets to the front of the recovery tank. Remove the roller guide from the machine.



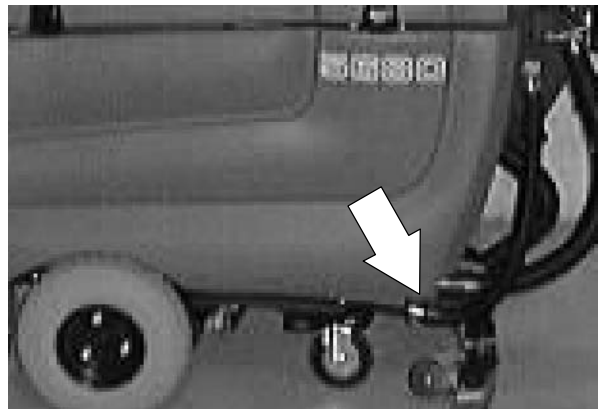
13. Remove the two M8 hex screws holding the two hinges to the recovery tank. Remove the hinges from the machine.



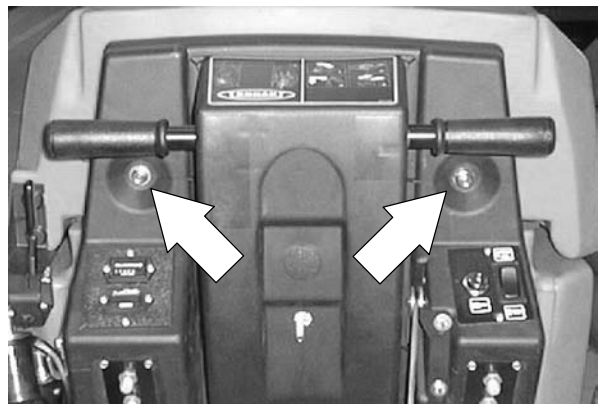
14. Remove the anti-foam elbow from the recovery tank.



15. Remove the drain hoses from the back of the recovery tank.

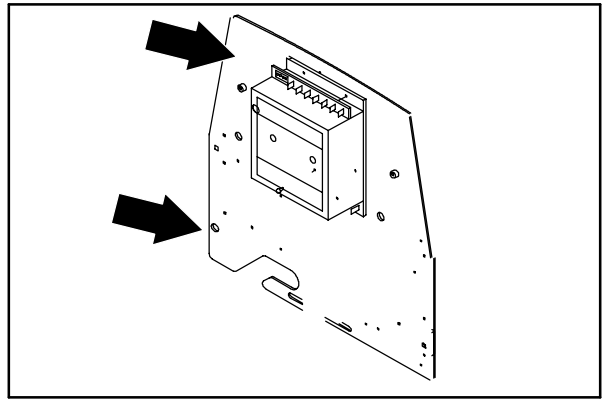


16. Remove the M8 hex screws holding the rear electrical panel to the electrical mounting plate. Tilt the panel out.

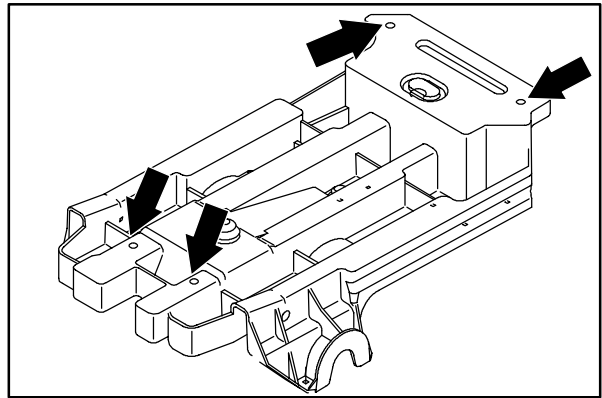


SCRUBBING

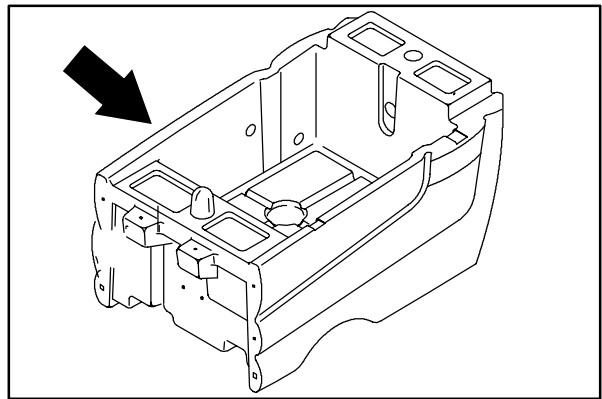
17. Remove the four M8 hex screws from the bottom of the electrical mounting plate. Drop the electrical mount panel back away from the recovery tank.



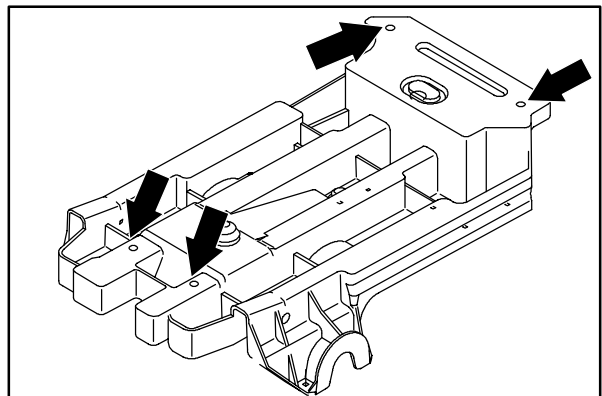
18. Remove the four M8 hex screws holding the frame and transaxle assembly to the bottom of the recovery tank. Remove the recovery tank from the frame and transaxle assembly.



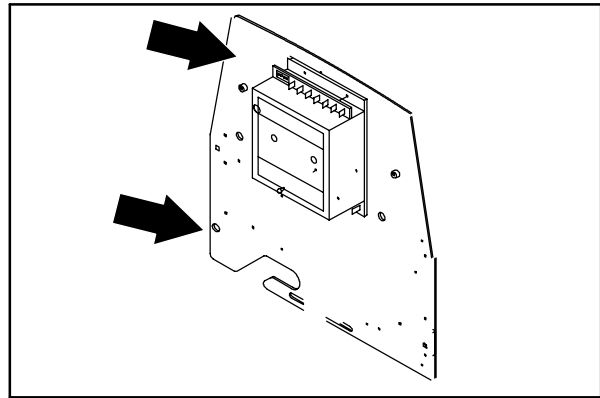
19. Place the new tank on top of the frame and transaxle assembly. Make sure the harness is routed in the same manner as it was removed.



20. Align the four holes in the transaxle frame with the four threaded inserts in the tank. Reinstall the four M8 hex screws and tighten to 18 - 24 Nm (15 - 20 ft lb).

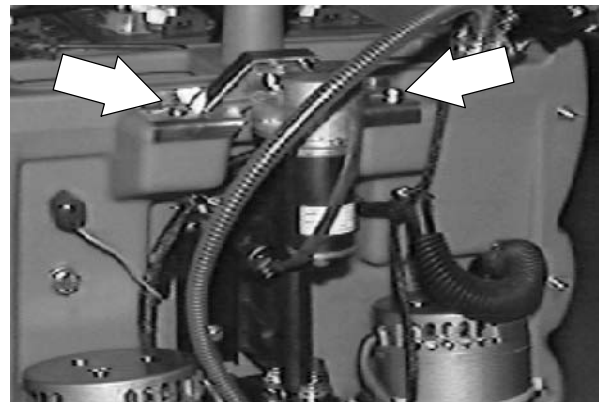


21. Position the electrical mounting plate, electrical components, electrical panel, and harness on the new tank. Reinstall the four M8 hex screws and tighten to 18 - 24 Nm (15 - 20 ft lb).

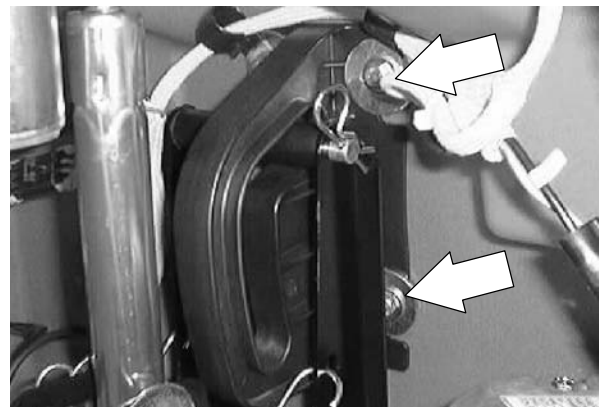


22. Reinstall the scrub head lift actuator bracket to the front of the recovery tank. Tighten the two M8 hex screws to 18 - 24 Nm (15 - 20 ft lb).

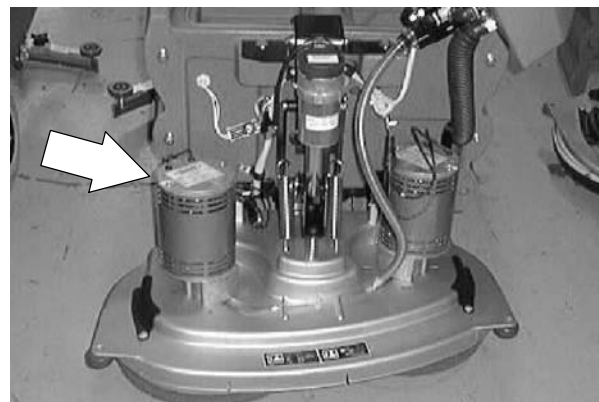
NOTE: Make sure to locate the bracket in the same position as it was removed from.



23. Reinstall the scrub head roller guide and brackets to the front of the recovery tank. Leave the hardware loose for now.

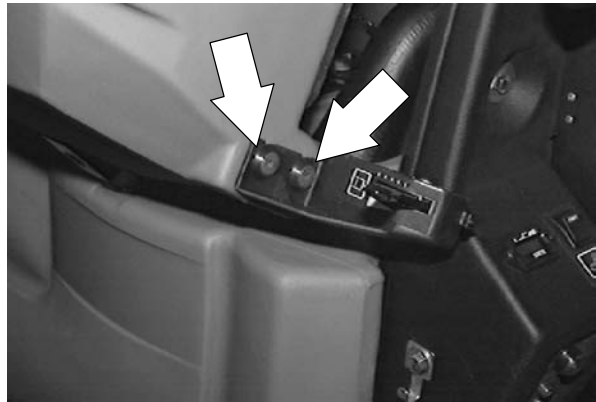


24. Reinstall the scrub head. See TO INSTALL SCRUB HEAD instructions in this section.

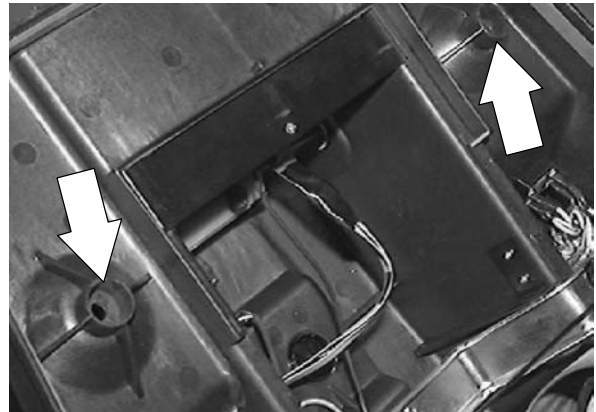


SCRUBBING

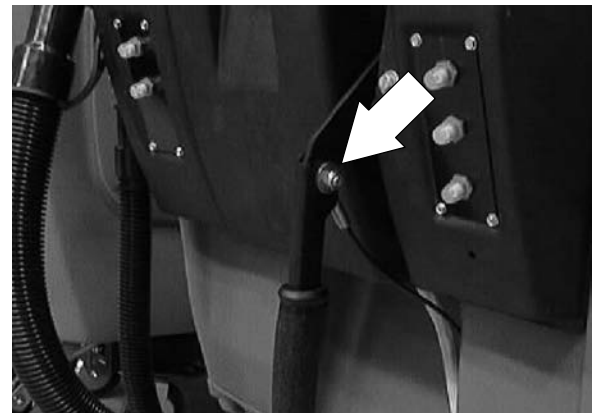
25. Position the water valve, water valve handle, and cable back on the LH side of the machine. Reconnect the solution drain hose to the scrub head.



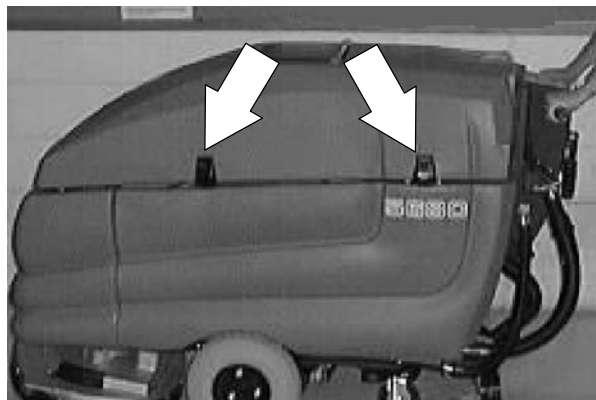
26. Tilt the electrical panel back in position and reinstall the M8 hex screws and washers. *Hand tighten the hardware.*



27. Reconnect the squeegee lift cable to the lift handle. Hand tighten to allow cable to pivot.



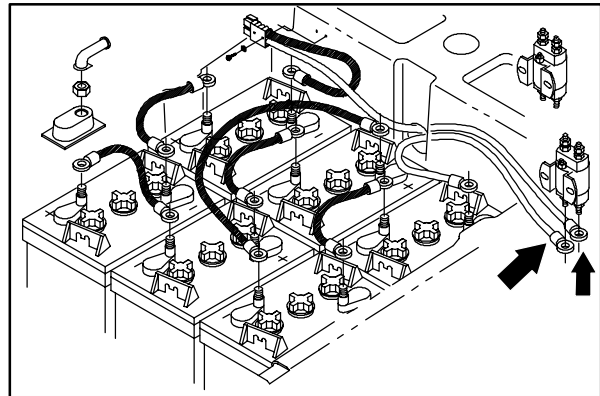
28. Reinstall the two hinges to the recovery tank and tighten the two M8 hex screws to 18 - 24 Nm (15 - 20 ft lb).



29. Reinstall the prop rod to the recovery tank. Tighten the M8 hex screw, washer, and sleeve to 18 – 24 Nm (15 – 20 ft lb).

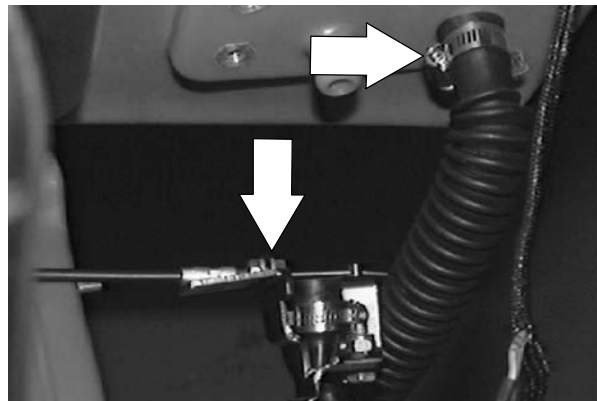


30. Reinstall the batteries and cables. See the diagram in the ELECTRICAL section for battery placement and cable arrangement.

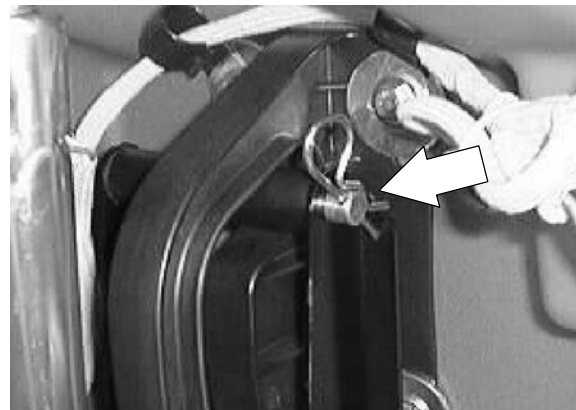


31. Reinstall the solution tank. See TO INSTALL SOLUTION TANK instructions in this section.

NOTE: After the batteries have been connected, the scrub head lift actuator adjustment procedure must be followed. This procedure can be found in the TO INSTALL SCRUB HEAD instructions in this section.

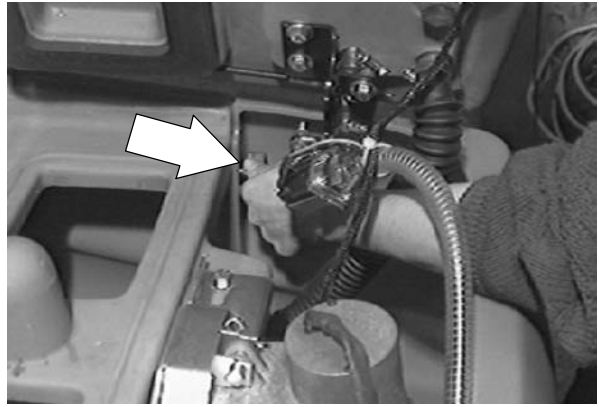


32. Position the scrub head roller guide so the roller is at the top of the slot. Tighten the four M8 hex screws to 18 – 24 Nm (15 – 20 ft lb).



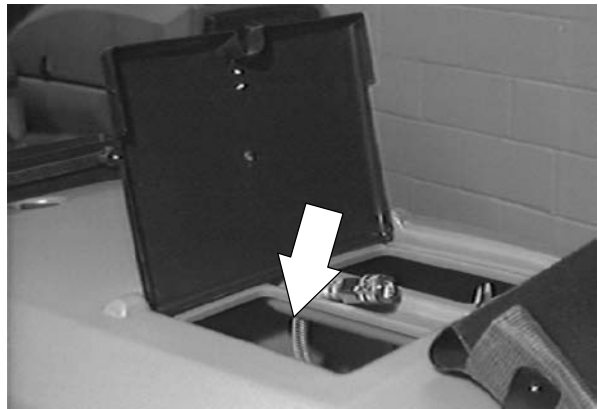
SCRUBBING

33. Reinstall the front cover.



34. Close the solution tank and fill with water.

NOTE: Check for leaks and proper operation of the machine and all the components.



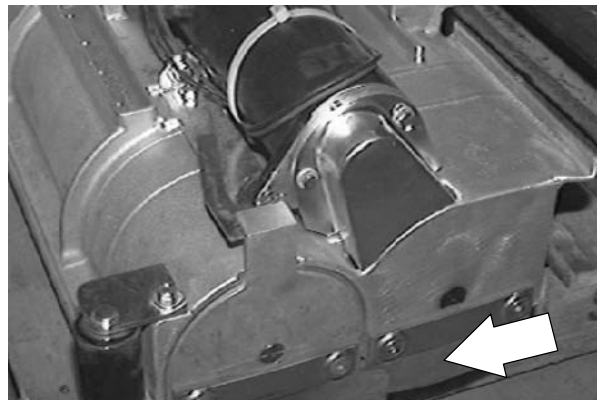
SCRUB HEAD

The scrub head includes the scrub brushes, electric motors, lift actuator and a solution dispensing system. The scrub head skirt controls over-spray from the scrub brush. Make sure the scrub head skirt touches the floor all the way around when the scrub head is lowered.

Check the disk brush scrub head skirt for damage or wear daily.



Check the cylindrical brush scrub head side skirts for damage daily.



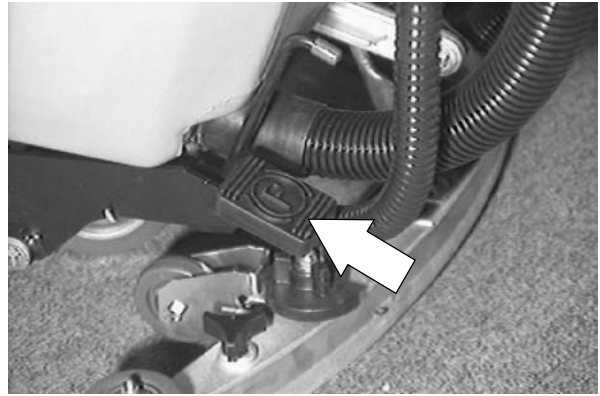
5680 high down pressure strap. Pulling this strap forward when the scrub head lift actuator is in the raised position will allow the scrub head to be used in a floor stripping mode. The actuator will return to the normal down pressure mode when the scrub head is raised.



SCRUBBING

TO REMOVE SCRUB HEAD

1. If machine is equipped with the optional parking brake, engage it at this time. If not, position a block of wood in front of each drive tire.

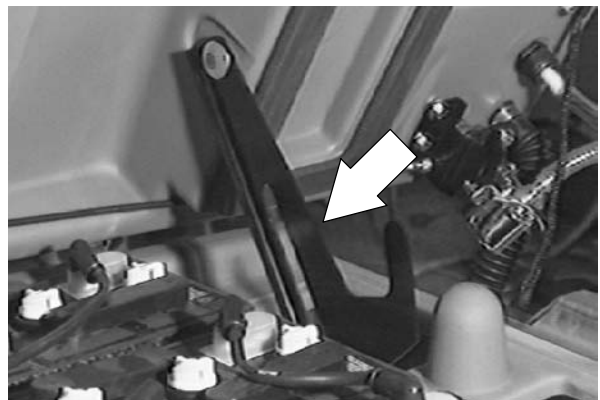


2. Lower the scrub head to the floor.

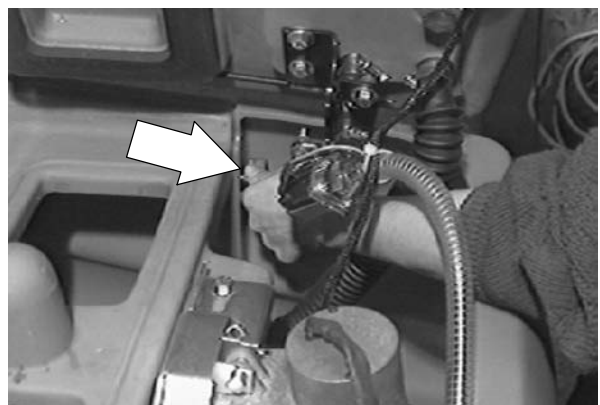
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.



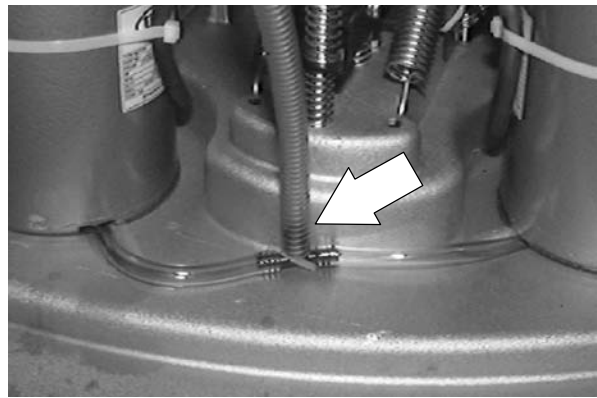
3. Raise the solution tank until the prop rod is engaged.



4. Remove the four M8 hex screws holding the front cover to the machine. Remove the cover.

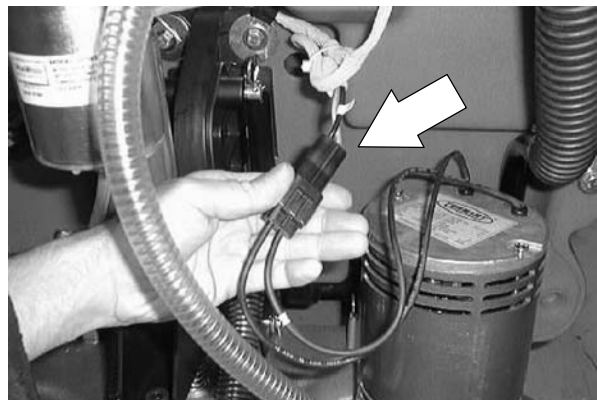


5. Disconnect the solution hose running from the solution tank to the scrub head.



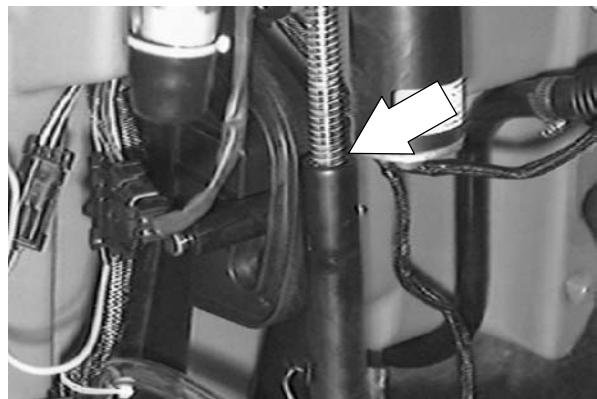
6. Unplug the **three** (two pin) connectors attaching the scrub head wire harness to the main harness.

NOTE: Do not disconnect the scrub brush motors from scrub head harness.

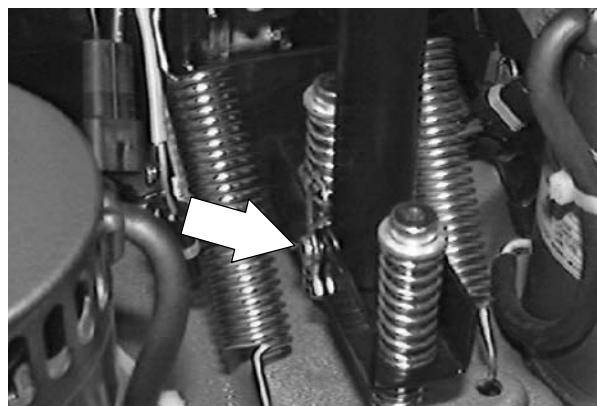


7. Mark the location of the actuator tube on the actuator shaft with a piece of tape or a colored marking pen.

NOTE: Be sure to mark the actuator position to keep the scrub head adjustment set correctly.

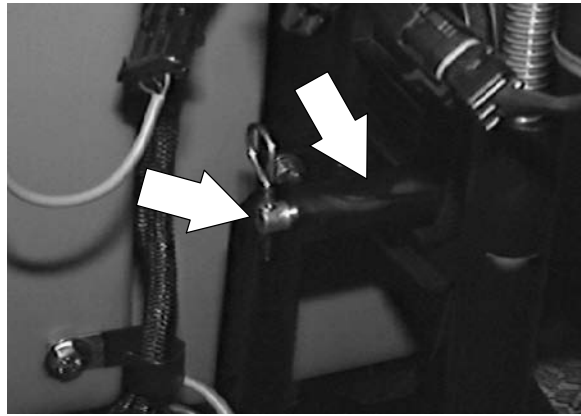


8. Remove the cotter pin and clevis pin from the bottom of the head lift actuator.

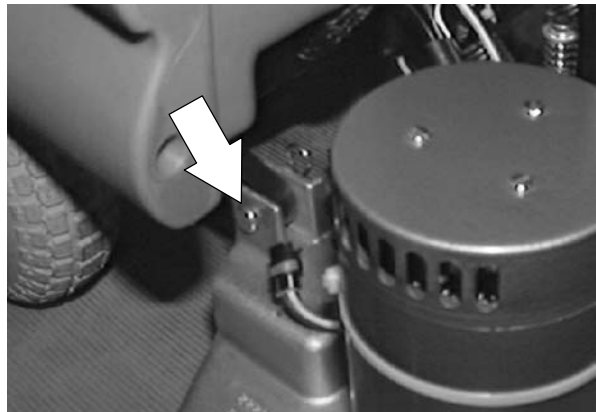


SCRUBBING

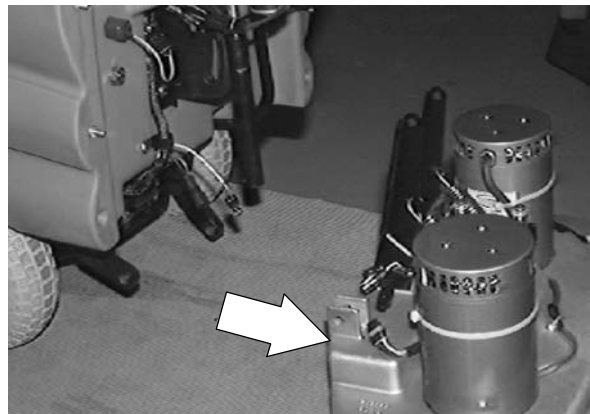
9. Remove the clevis pin and the roller from the scrub head roller guide bracket.



10. Remove the two hair pins and two clevis pins connecting the scrub head to the scrub head lift arms.



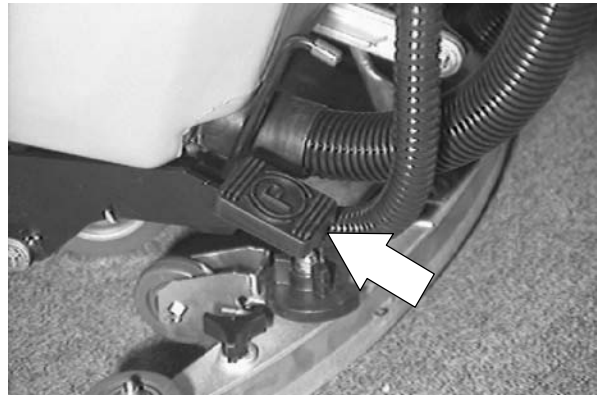
11. The scrub head can now be pulled out and away from the machine.



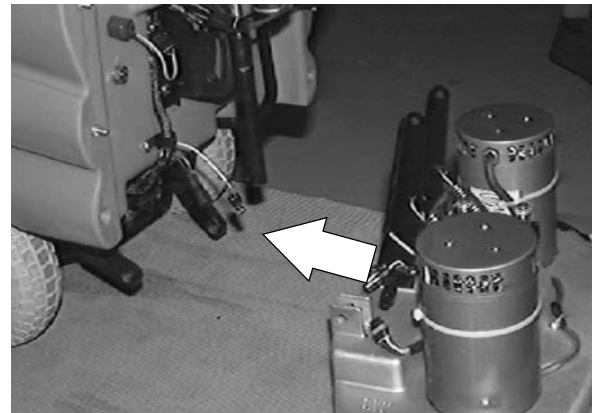
TO INSTALL SCRUB HEAD

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

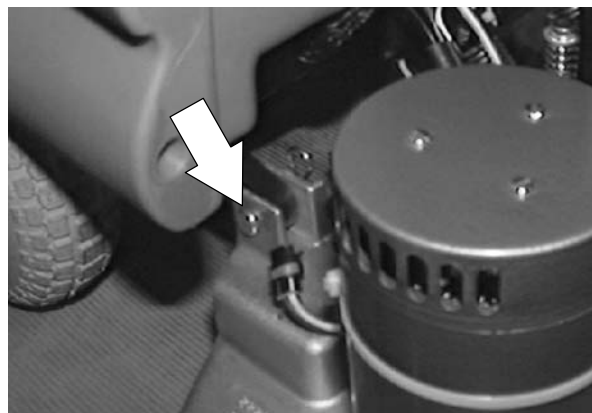
1. If machine is equipped with the optional parking brake, engage it at this time. If not, position a block of wood in front of each drive tire.



2. Position the scrub head in front of the machine.

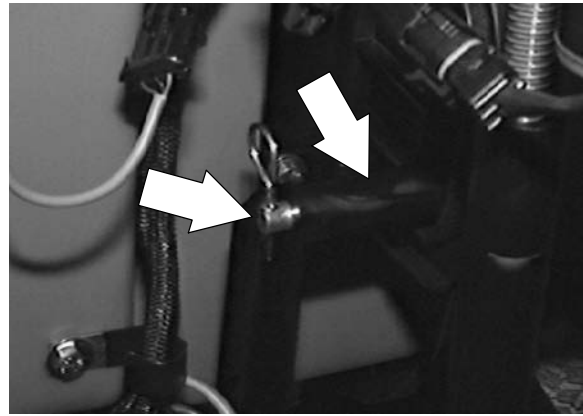


3. Align the mounting holes in the rear of the scrub head with the holes in the end of the scrub head lift arms. Install the two clevis pins and two hair pins.



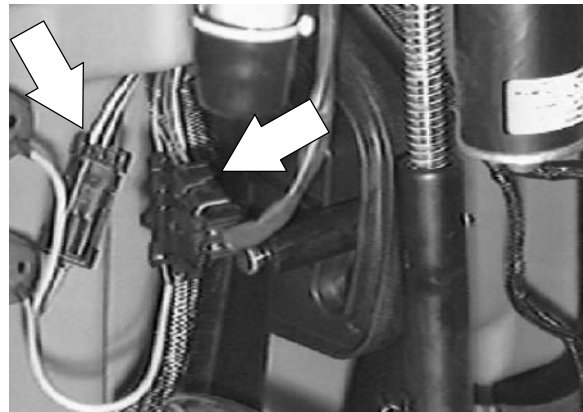
SCRUBBING

4. Align the the mounting hole in the top of the scrub head A-frame bracket with the roller after it is placed through the adjustable cam slot. Install the long clevis pin and hair pin.

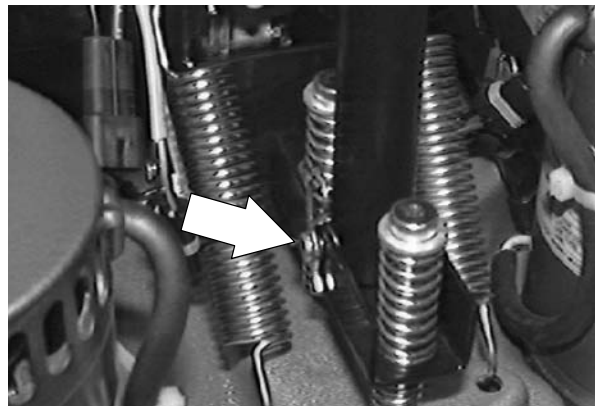


5. Plug the scrub head wire harness into the main harness. See the schematic in the ELECTRICAL section of this manual.

NOTE: If changing a scrub head, make sure the actuator tube lines up with the mark made earlier on the actuator shaft. If not, turn the actuator tube until it does.

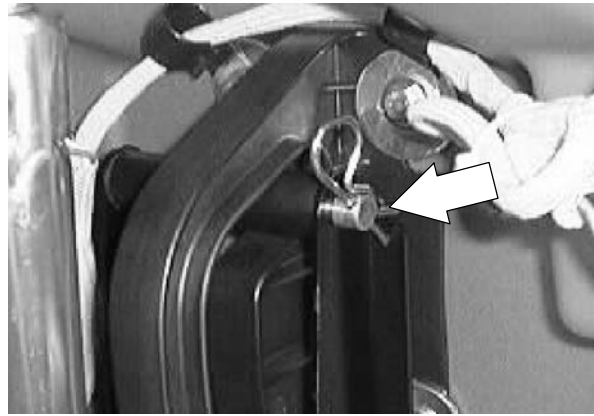


6. Align the mounting hole in the bottom of the scrub head lift actuator with the hole in the scrub head actuator mount bracket. Install the clevis and cotter pin.

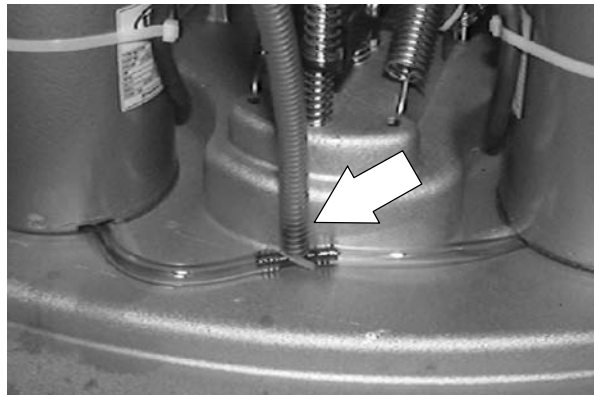


7. **On the 5680/5700 machine**, check the actuator by raising the scrub head until the top of the actuator tube is 9 mm (3/8 in.) from the bottom of the actuator head. If the actuator tube does not stop at that dimension with the brush switch on, remove the bottom clevis pin and turn the tube to achieve the proper dimension, then reinstall the clevis pin.
8. **On the 5700XP and 5700XPS**, check the actuator by turning on the key and gently rotating the speed handle forward until the propel circuit is lightly activated. Press the *scrub brush up and off* button. When the scrub brush stops going up, press the *scrub brush up and off* button once more. This will properly adjust the actuator.

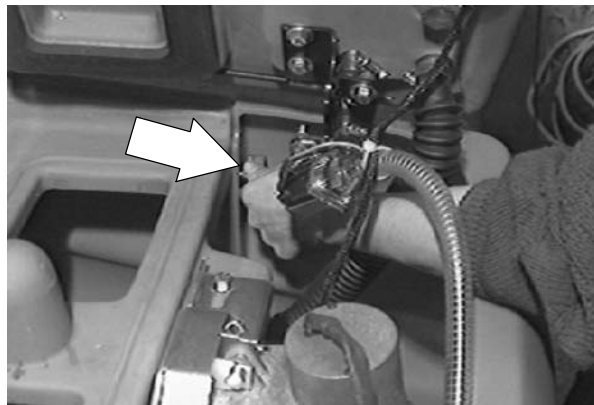
9. The scrub head guide roller should now be almost at the top of the slot on the roller guide bracket. If the roller is not at the top of the slot, loosen the four M8 hex screws and adjust the roller guide bracket so the roller just touches or is slightly away from the end of the slot. Re-tighten the screws to 18 - 24 Nm (15 - 20 ft lb).



10. Reconnect the solution hose running from the scrub head to the bottom of the solution tank.



11. Reinstall the front cover using the four M8 hex screws. Tighten to 18 - 24 Nm (15 - 20 ft lb).



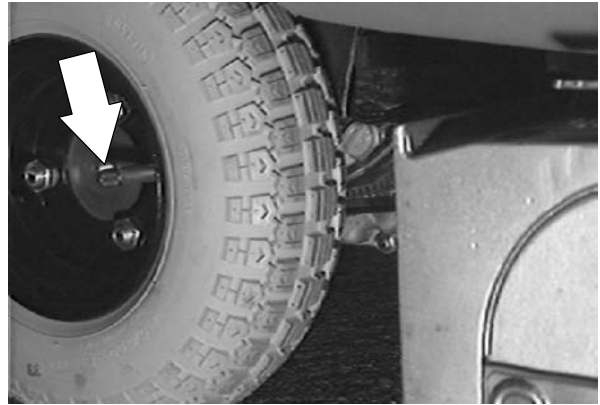
12. Lower the solution tank, operate the machine, check for proper operation.



SCRUBBING

TO ADJUST DISK BRUSH SCRUB HEAD

1. If the machine is equipped with pneumatic tires, the tire pressure needs to be checked before adjusting the scrub head, the pressure should read 415–450 kPa (60–65 psi).



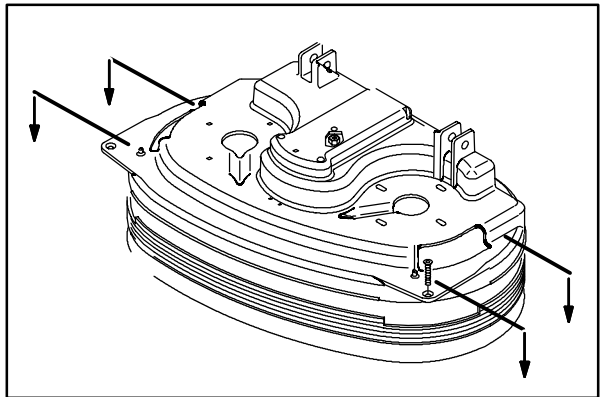
2. Lower the scrub head to the floor until the brush pressure gauge is in the middle of the green zone on the 5700. On the 5700 XP/XPS, the brush pressure should be on position 2 or 3. Turn off the machine and remove the key. Remove the front cover.

NOTE: On the 5680, push the scrubbing switch forward. The scrub head will lower to the floor. Turn off the key switch.

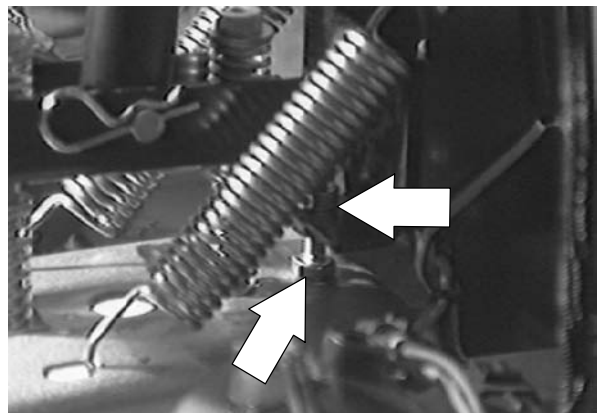


FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

3. The scrub head levelness is checked by measuring from the top of the scrub head to the floor at the four outside corners. Adjust if necessary per step 4.



4. Loosen the scrub head adjustment screw jam nut with a 17mm socket wrench. Use a 17mm open end wrench on the adjustment hex screw located under the pivot bracket to adjust the angle of the scrub head. Make sure to re-tighten the jam nut.

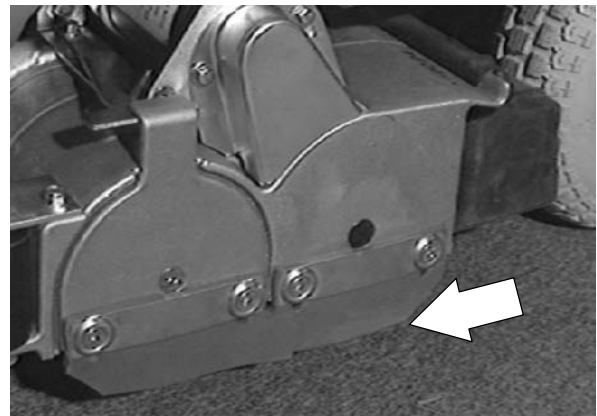


TO CHECK CYLINDRICAL BRUSH PATTERN

1. Apply chalk, or some other material that will not blow away easily, on a smooth, level floor.
2. With the scrub head up, position the machine scrub head over the test area.
3. If the machine is equipped with a parking brake, engage it now. Lightly turn the propel handles just enough to allow the scrub head to lower and operate, but not enough to cause the machine move forward.

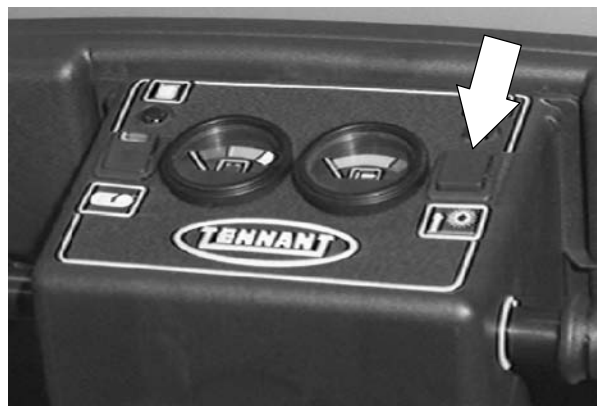


NOTE: Make sure the side skirts on the scrub head are not holding the scrub head and brushes up off the floor when checking the brush pattern. You may have to adjust them up or pull them to the side.



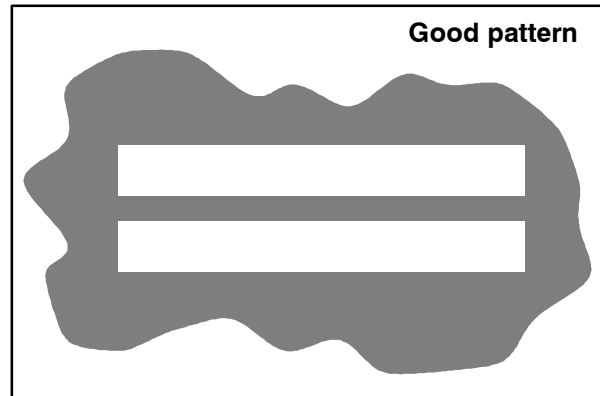
4. Lower the scrub head, allowing the brushes to spin on the floor in one spot for 15 to 20 seconds.

NOTE: If no chalk or other material is available, allow the brushes to spin for 1 to 2 minutes.

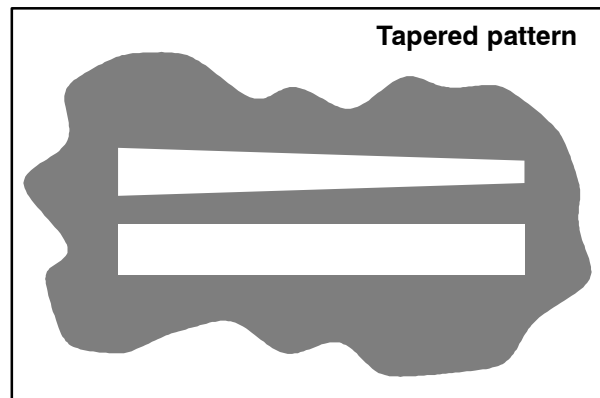


SCRUBBING

5. Raise the scrub head and drive the machine from the test area. Check both brush patterns to make sure they are the same width, *approximately 30 mm (1.25 in)*, from side to side. If both brush patterns look good, the adjustment procedure is complete. If either brush shows a tapered pattern go to step 6.



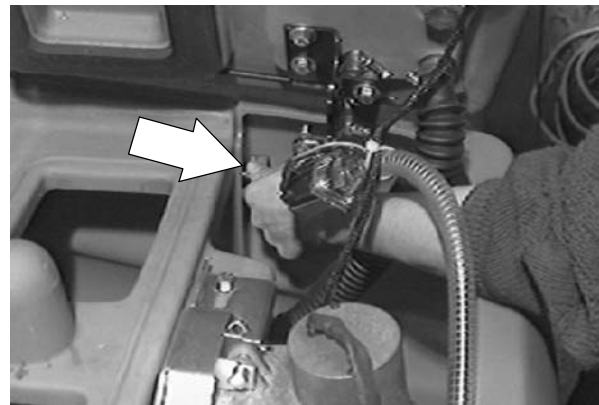
10355



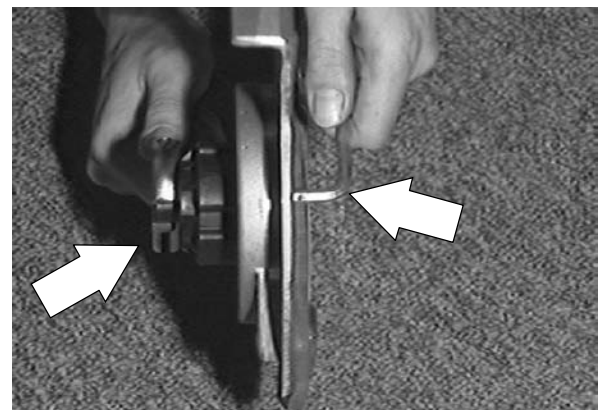
10356

6. Turn off the machine and remove the key. Remove the front cover. Remove the idler plate on the brush that showed a taper.

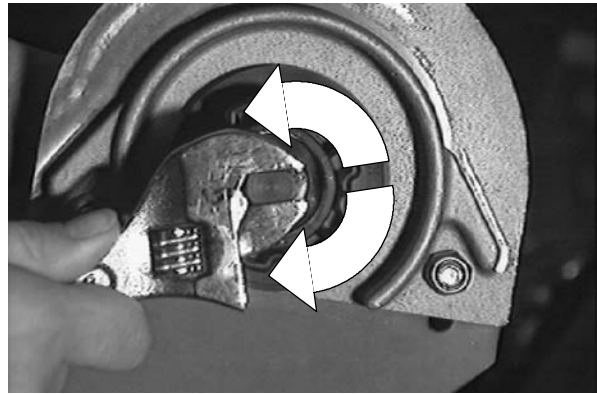
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Turn Off Machine.



7. Put a open end wrench on the flat of the idler eccentric shaft, loosen the flat head screw with a 7/32 in. allen wrench and turn eccentric shaft to raise or lower that end of the brush. **Re-tighten** the flat head screw while holding the flat of eccentric shaft.



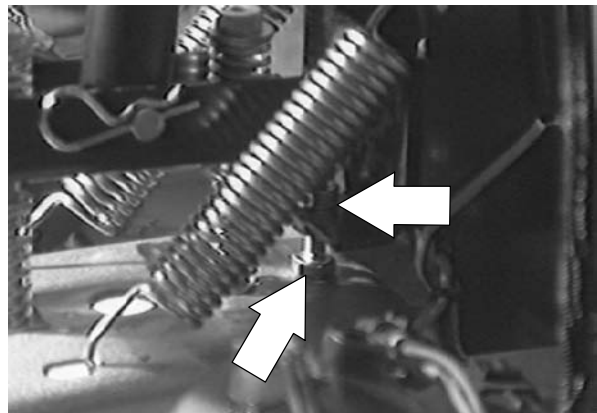
8. Reinstall the idler and re-check the brush pattern. Repeat these steps until a even brush pattern is obtained.



NOTE: Make sure to install the idler doors on the side they were removed from to avoid having to re-adjust the brush taper.



9. If the brush patterns are not both 40 ± 5 mm (1.5 ± 0.25 in) wide, then use a 17mm wrench on the M10 hex screw, located on the pivot bracket, to adjust the angle of the scrub head. Make sure to re-tighten the M10 jam nut.



SCRUBBING

TO ADJUST DISK SCRUB HEAD SKIRT (5700/5700XP/5700XPS)

Make sure the scrub head skirt touches the floor all the way around when the scrub head is lowered. Check the skirt for damage or wear daily.

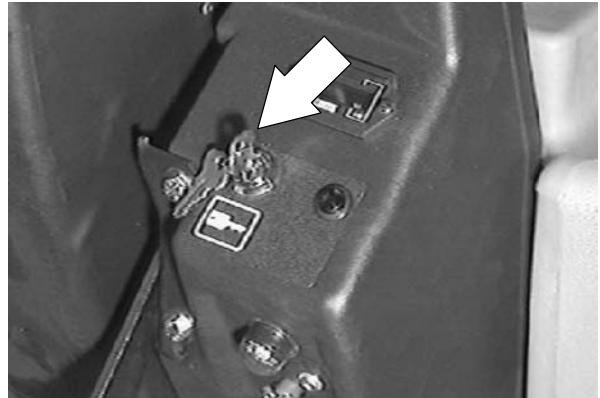
1. Lower the scrub head on a level floor until the brushes make contact.



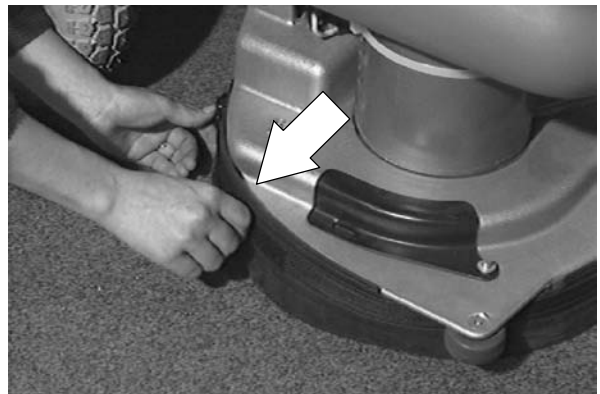
2. Turn the machine power off.

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Turn Off Machine.

3. Check to see if the scrub head skirt touches the floor all the way around the scrub head.



4. If the skirt is off the ground at any point around the scrub head, loosen the skirt strap, and pull the skirt down in that area.
5. Once the skirt is touching the floor all the way around, tighten the skirt strap back up.
6. Operate the machine and check for water spray coming from the scrub brushes.



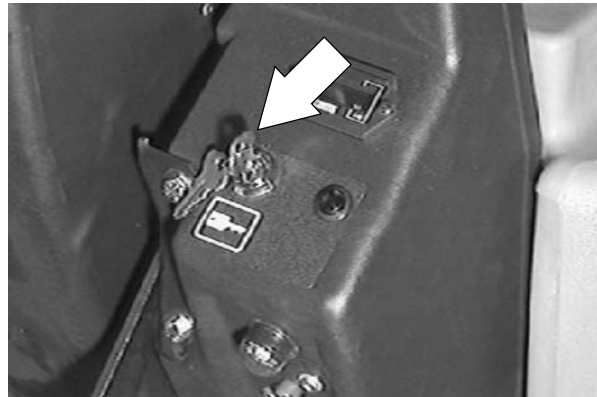
TO REPLACE DISK SCRUB HEAD SKIRT

1. Lower the scrub head on a level floor until the brushes make contact.

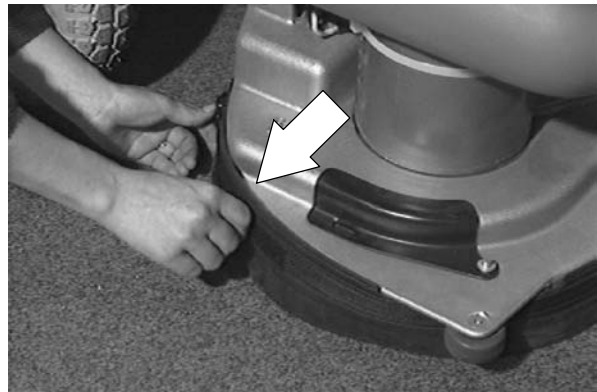


2. Turn the machine power off.

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Turn Off Machine.



3. Loosen the skirt strap, remove and discard the torn or worn out skirt.
4. Position the new skirt around the scrub head. Make sure the notches are in the correct place under the scrub head rollers. Make sure the skirt is touching the floor all the way around the scrub head.
5. Pull the strap tight, attach the velcro end of the strap to the velcro strip, re-check the skirt for proper adjustment.

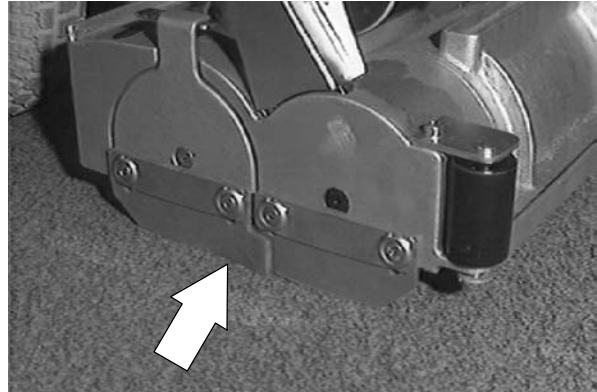


SCRUBBING

TO ADJUST CYLINDRICAL SCRUB HEAD SKIRTS

The four head skirts should just touch the floor. Check the skirts for damage or wear daily.

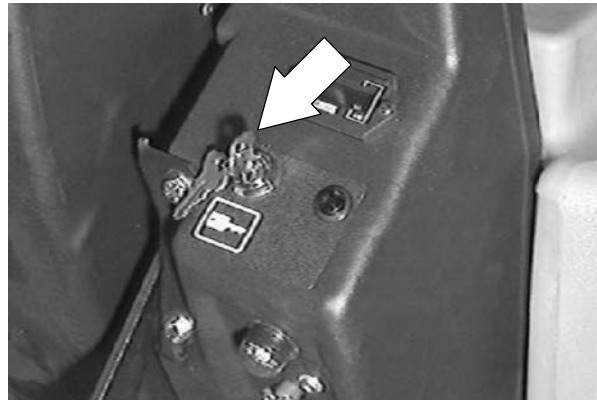
1. Lower the scrub head on a level floor until the brushes make contact.



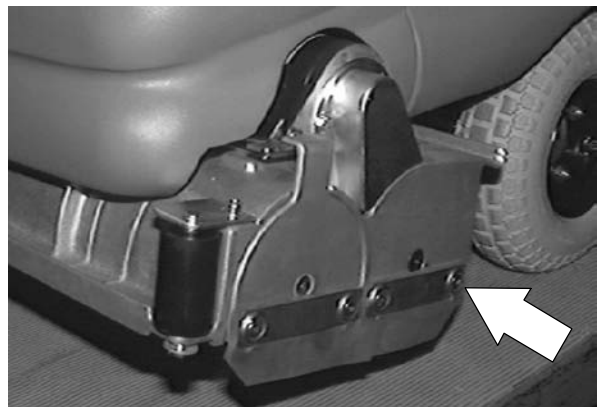
2. Turn the machine power off.

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Turn Off Machine.

3. Check to see if the four scrub head skirts touch the floor all the way around the scrub head.

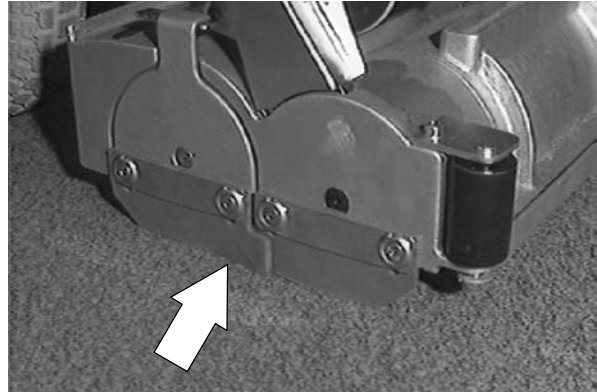


4. Loosen the two M8 flat head screws holding each of the four skirts and retainers to the scrub head.
5. Adjust the skirt down so it lightly contacts the floor. Hand tighten the M8 flat head screws.
6. Operate the machine and check the scrub head skirts for proper operation.



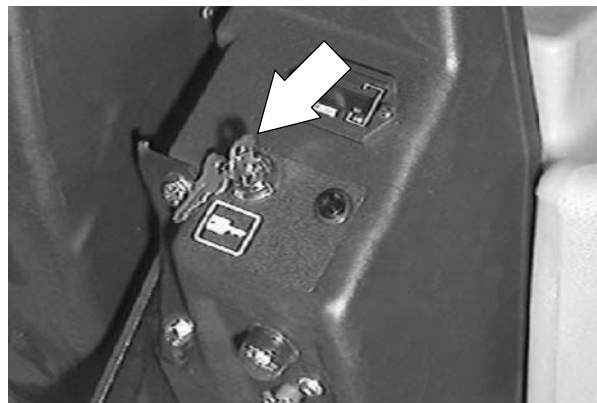
TO REPLACE CYLINDRICAL BRUSH SCRUB HEAD SKIRT

1. Lower the scrub head on a level floor until the brushes make contact.

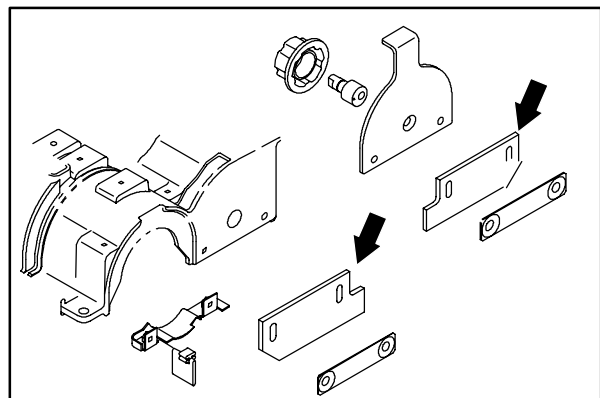


2. Turn the machine power off.

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Turn Off Machine.



3. Remove the two M8 flat head screws holding each skirt and retainer to the scrub head. Remove the skirt.
4. Position a new skirt under the skirt retainer and reinstall the two M8 flat head screws.
5. Adjust the skirt down so it lightly contacts the floor. Hand tighten the M8 flat head screws.
6. Operate the machine and check the scrub head skirts for proper operation.



SCRUB BRUSHES

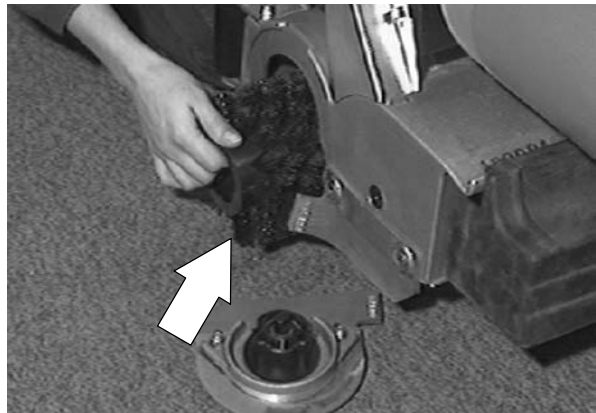
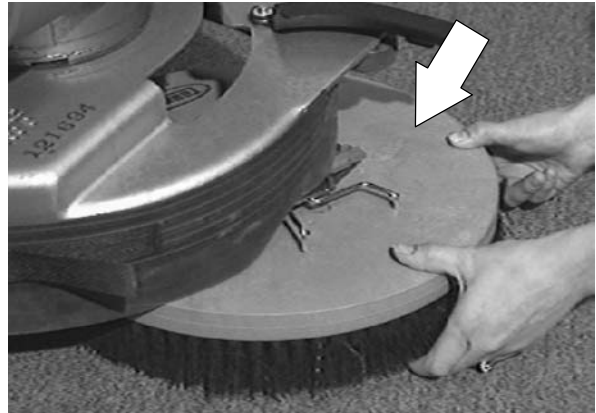
The scrub brushes should be checked daily for wire or string tangled around the brush or brush drive hub. The brushes should also be checked for any damage and wear.

The scrub brushes should be replaced if large amounts of bristles are missing, or if the remaining bristles' length is less than 10 mm (0.38 in).

NOTE: Be sure to replace brushes in sets. Otherwise one brush will be more aggressive than the other.

Cleaning pads must be placed on pad drives before they are ready to use. The cleaning pad is held in place by a pad holder.

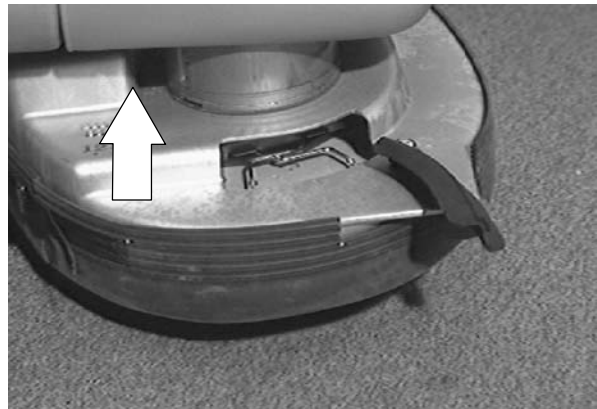
Cleaning pads need to be cleaned with soap and water after every use.



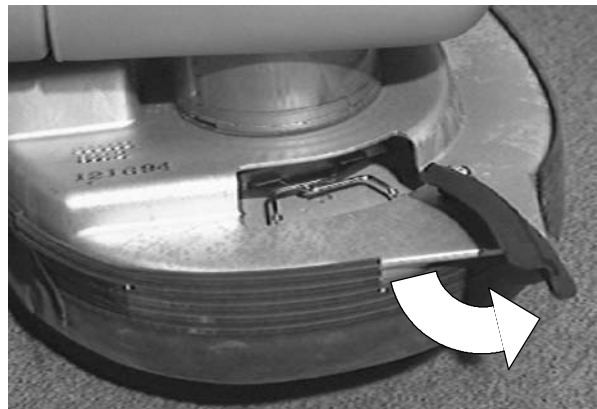
TO REPLACE A DISK SCRUB BRUSH

1. Make sure the scrub head is in the raised position.

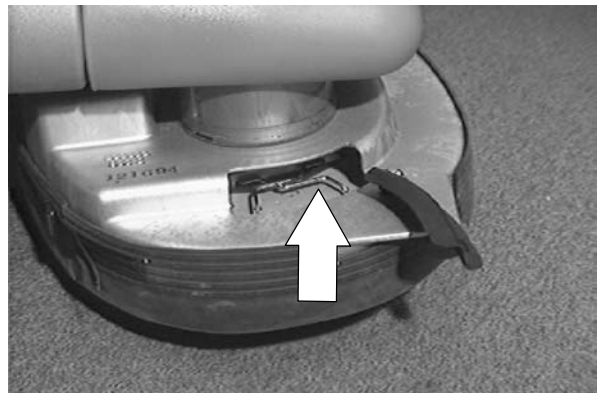
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Turn Off Machine.



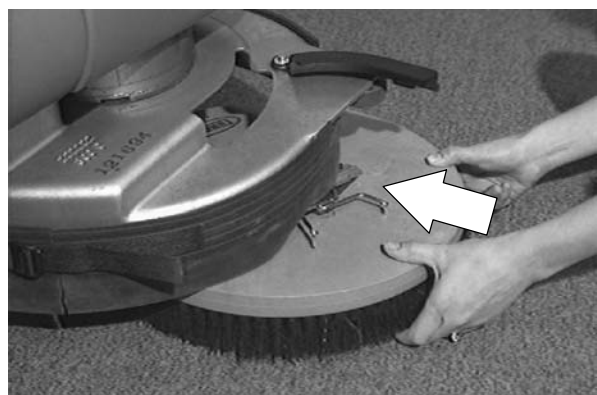
2. Open the access cover on the side of the scrub head over the brush that needs changing.



3. Turn the brush until you can see the brush retaining spring clip.
4. Pinch the two brush retaining spring clips together and drop the brush down and off the drive hub. *Remove the brush from the machine.*

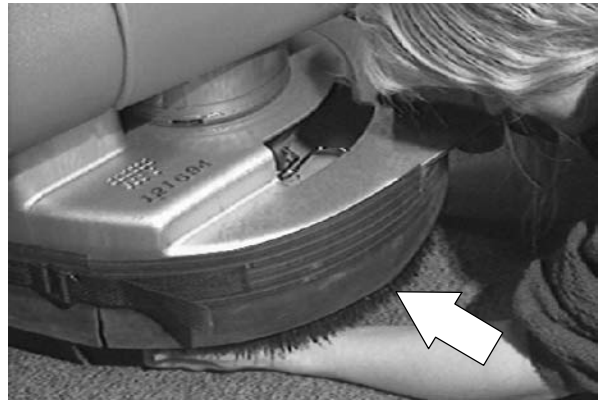


5. Slide the new scrub brush under the scrub head.

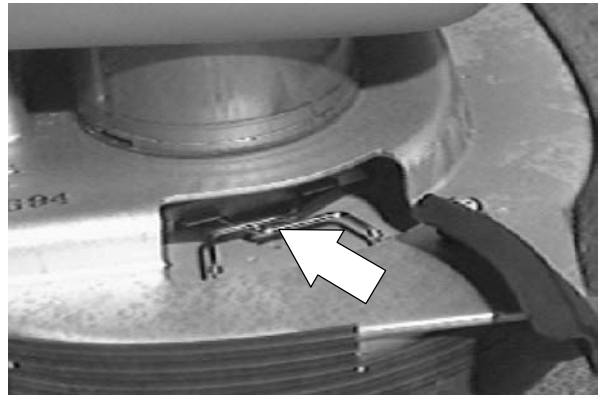


SCRUBBING

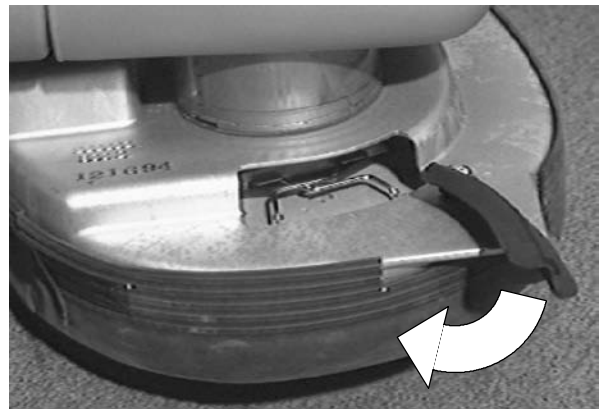
6. Hold the brush up and turn it until the hub in the brush lines up with the brush drive hub.



7. Push the brush up until the brush retaining spring clips snap over the edge of the drive hub.



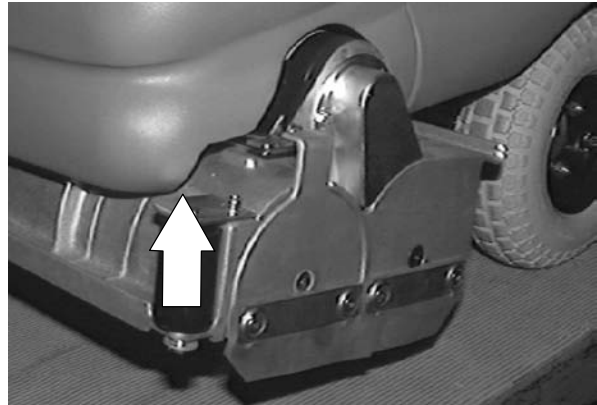
8. Close the access door, lower the scrub head, scrub with the machine, checking for proper brush operation.



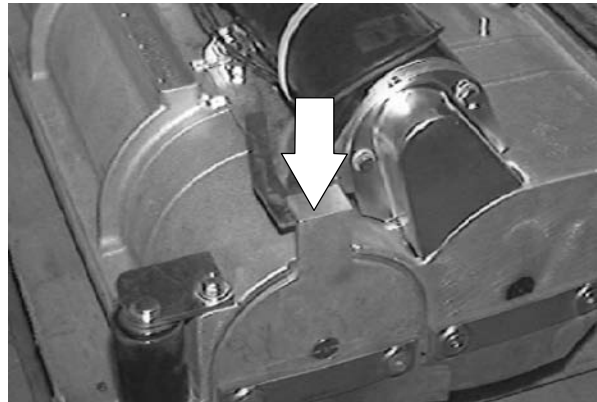
TO REPLACE A CYLINDRICAL SCRUB BRUSH

1. Make sure the scrub head is in the raised position.

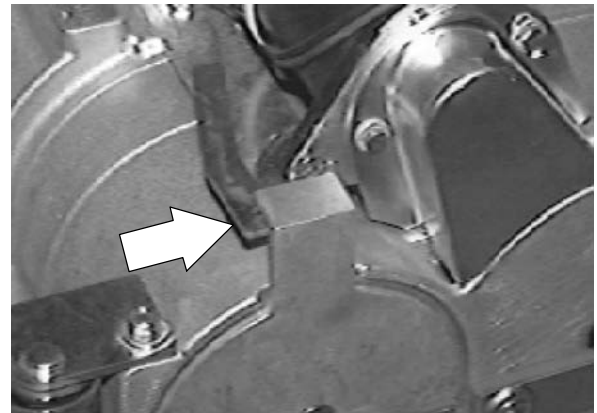
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Turn Off Machine.



2. The scrub brush must be removed from the end opposite the drive motor.



3. The brush idler plate is held in place with a spring clip. To remove the idler plate the spring clip must be pressed down flat to the top of the scrub head.



4. With the spring clip pressed down flat to the top of the scrub head, pull the bottom of the idler plate out of the end of the brush and off the spring clip.

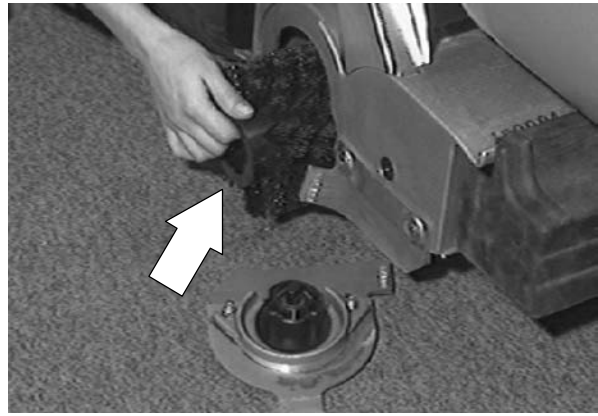


SCRUBBING

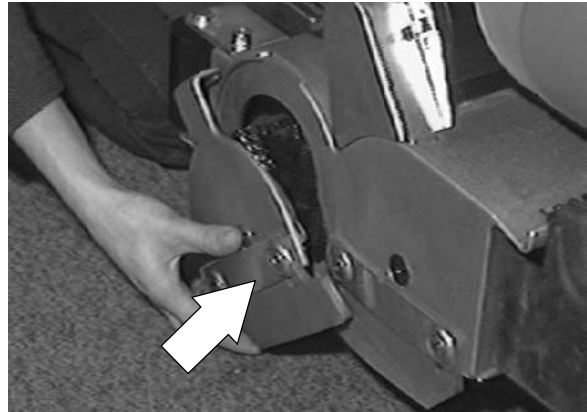
5. The scrub brush can now be removed from the machine.
6. Position the new scrub brush under the scrub head.

NOTE: One end of the cylindrical scrub brush has a double row of bristles. This end must be on the idler side of the scrub head.

7. Place the brush on the motor-drive end first.
8. Partially engage the idler plug into the other end of the scrub brush.

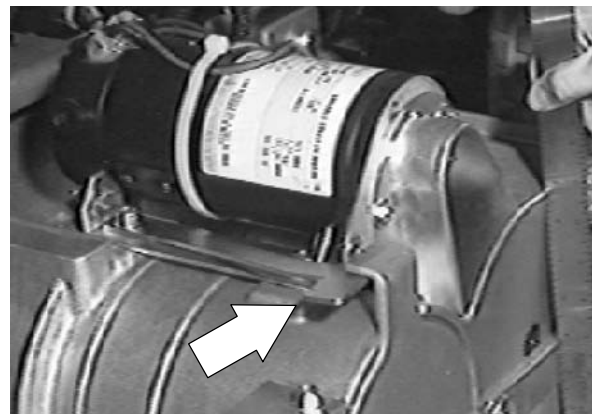


9. Position the idler plate on the scrub head, making sure that the notches on the idler plate engage the lip of the scrub head.



10. Push the spring clip down until the slot is positioned under the clip on the idler plate. Release the spring.
11. Start the brushes and check for proper brush pattern. See TO CHECK CYLINDRICAL BRUSH PATTERN instructions.

NOTE: Every 50 hours the front brush should be installed in the rear and the rear brush installed in the front to keep an even wear pattern on the bristles.



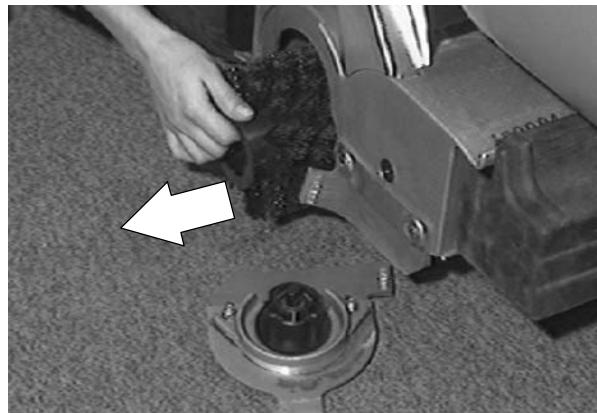
TO REPLACE CYLINDRICAL SCRUB BRUSH DRIVE BELT

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

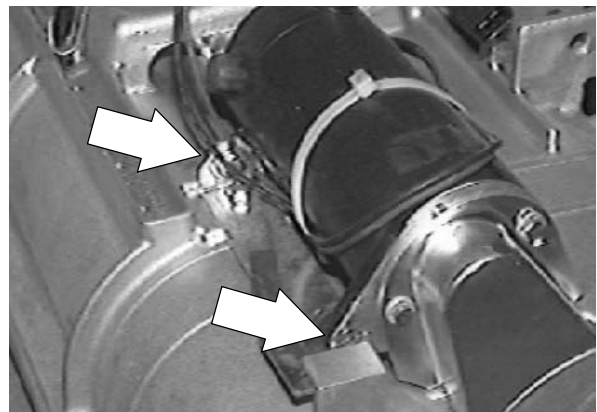
1. Raise the solution tank until the prop rod is engaged. Remove the four M8 hex screws holding the front cover to the machine. Remove the cover.



2. Remove the scrub brush from the motor that the belt needs to be changed. See TO REPLACE A CYLINDRICAL SCRUB BRUSH instructions in this section.

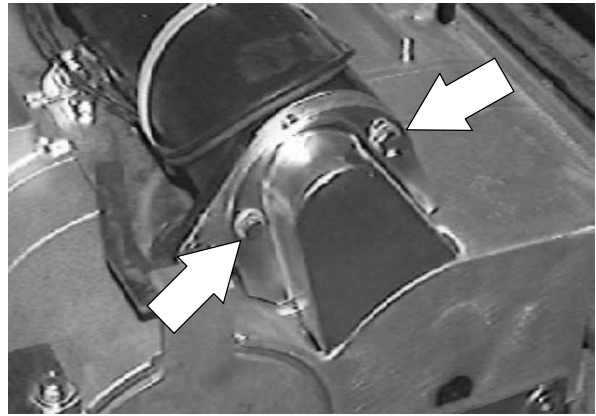


3. Loosen the front and rear pivot bolts on the brush motor.



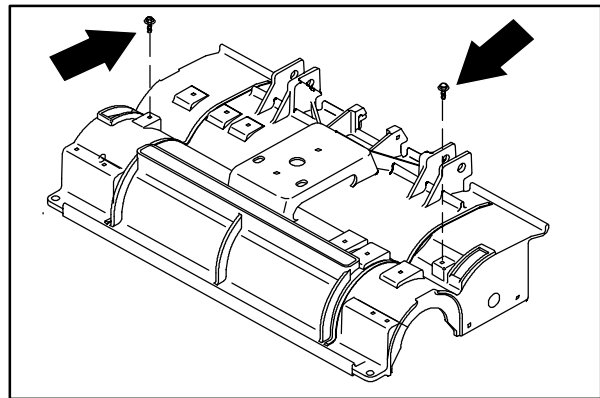
SCRUBBING

4. Remove the two M6 hex screws holding the belt cover on the motor that the belt needs changing. *Remove the belt cover from the scrub head.*

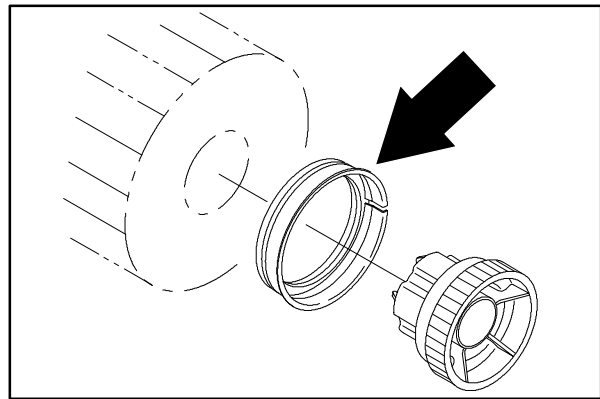


5. Loosen the M8 hex nut on the belt tension bolt under the motor. Turn the tension bolt down far enough to allow the belt to be slipped off the motor pulley. Push the drive belt down toward the lower pulley in the brush area.

NOTE: Make sure the scrub head is in the raised position before attempting to remove the drive plug rubber seal.

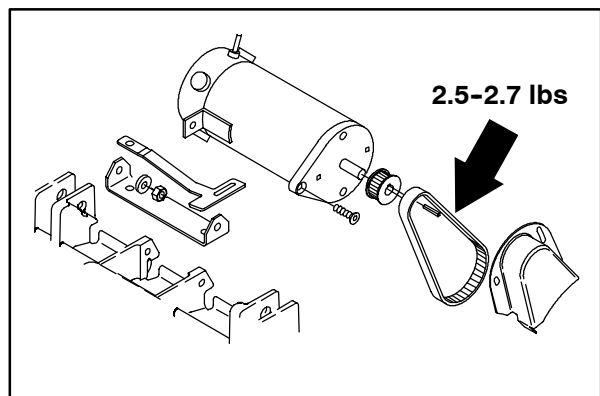


6. Using a needle nose pliers, pull the rubber seal off the brush drive plug.

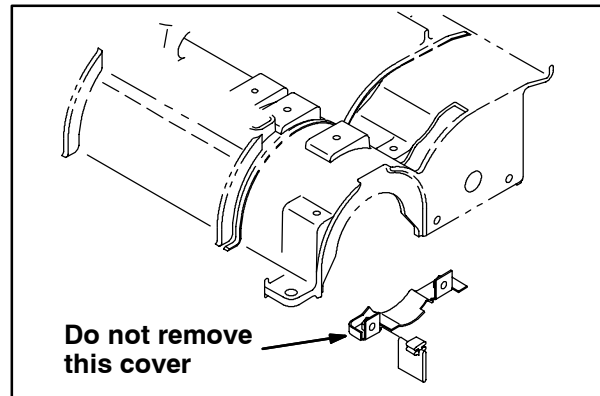


7. Pull the drive belt off the bottom drive pulley.

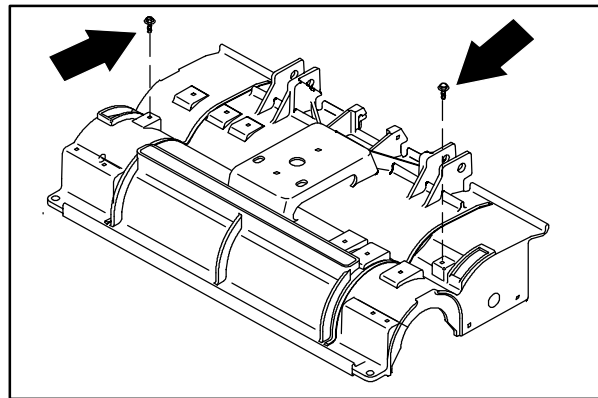
NOTE: It is a tight fit for the belt in the area of the lower belt cover and bottom pulley. Carefully work the belt past the lower cover, DO NOT remove the lower cover.



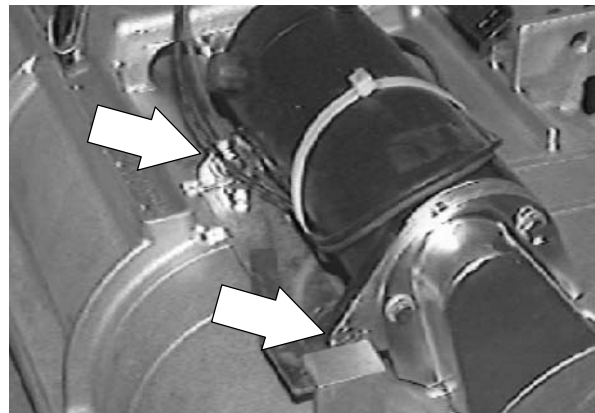
8. Slip the new drive belt past the lower belt cover and over the cogged pulley. Push the rest of the belt up to the drive motor and onto the drive pulley. Reinstall the rubber seal on the bottom drive pulley.



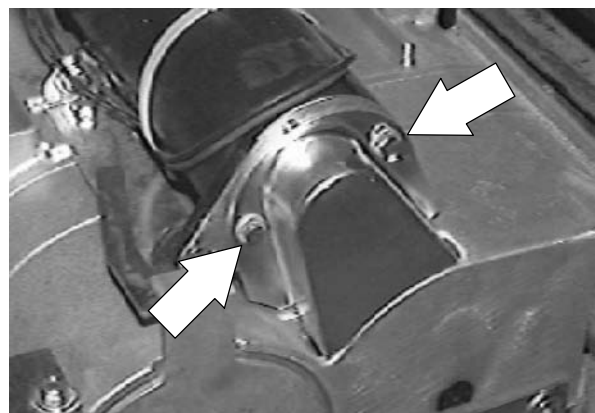
9. Using the M8 hex screw located under the brush motor, tension the belt by applying 2.5–2.7 lbs of force per belt at the middle of the span that is opposite the belt travel with a deflection of 0.10 inch.



10. Tighten the two pivot bolts to 18 – 24 Nm (15 – 20 ft lb). Re-check the belt tension.

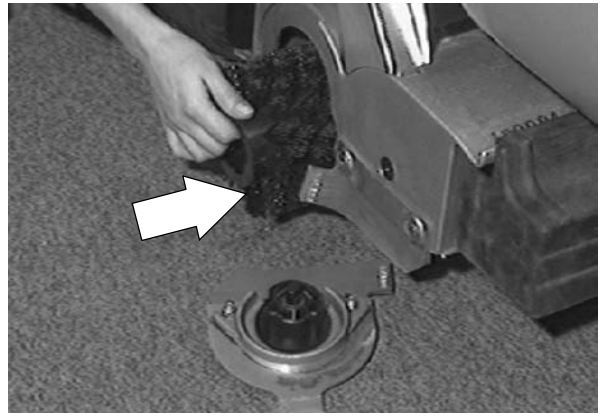


11. Reinstall the belt cover, two M6 hex screws, and washers. Tighten to 11 – 14 Nm (7 – 10 ft lb). Use a small amount of RTV on the flange of the belt cover to keep dust out.

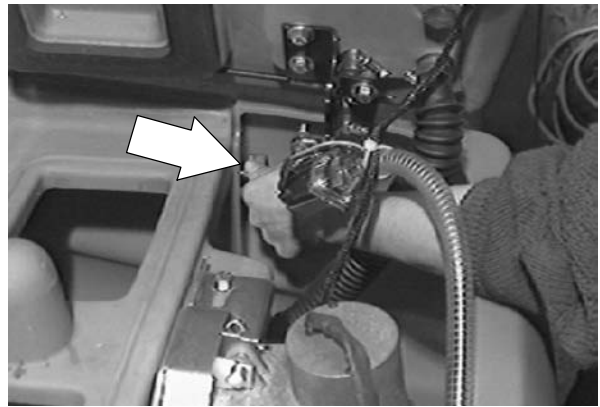


SCRUBBING

12. Reinstall the scrub brush. See TO REPLACE A CYLINDRICAL SCRUB BRUSH instructions in this section.



13. Reinstall the front cover using the four M8 hex screws. Tighten to 18 - 24 Nm (15 - 20 ft lb).



14. Lower the solution tank, operate the machine, check for proper operation.



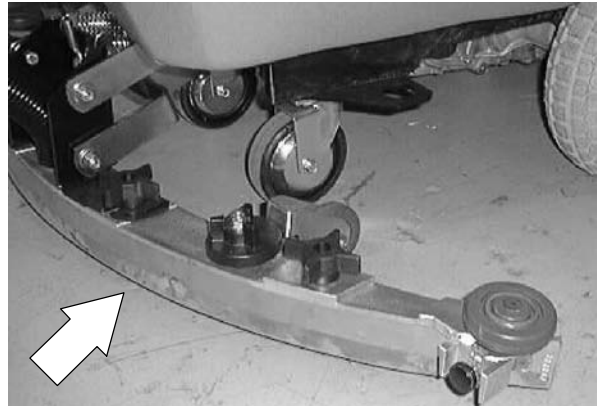
SQUEEGEE

The squeegee channels water into the vacuum fan suction. The front blade channels the water, and the rear blade wipes the floor.

Check the squeegee blades for damage and wear daily. Rotate or replace either of the squeegee blades if the leading edge is torn or worn half-way through the thickness of the blade.

The squeegee can be adjusted for leveling and deflection. The deflection and leveling of the squeegee blades should be checked daily, or when scrubbing a different type of floor.

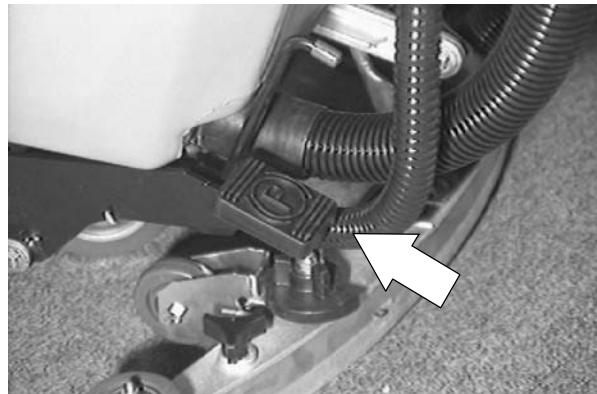
The squeegee can be removed from the squeegee pivot so the squeegee will not be damaged during transport of the machine.



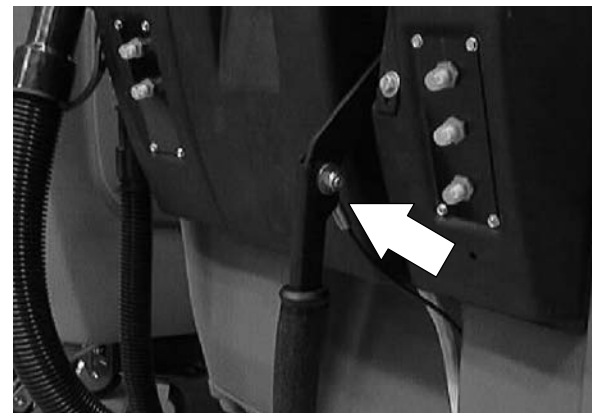
TO REMOVE SQUEEGEE FRAME

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

1. Turn the machine power off and set the parking brake if your machine has this option.

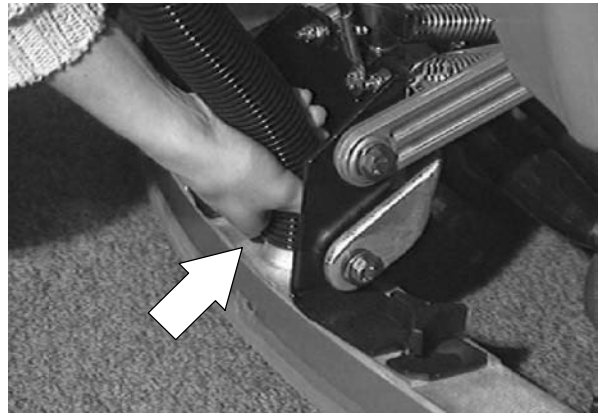


2. Make sure the squeegee is in the raised position.



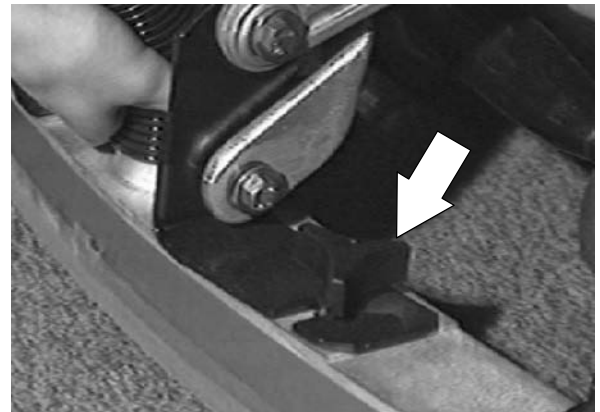
SCRUBBING

3. Remove the vacuum hose from the squeegee frame.

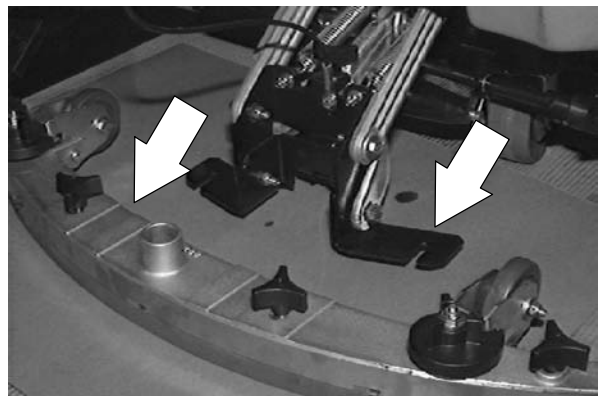


4. Locate the two plastic thumb screws on the squeegee frame. These are located near the vacuum hose.

5. Loosen the two plastic thumb screws 2-3 turns. *Do not remove the thumb screws.*



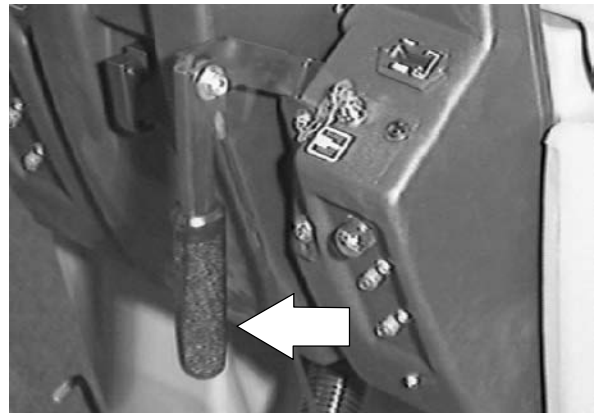
6. Remove the squeegee frame by pulling it straight back off the lift linkage assembly.



TO INSTALL SQUEEGEE FRAME

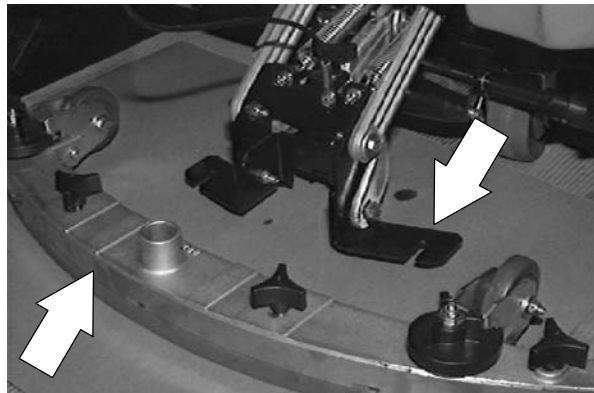
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

1. Make sure the squeegee lift linkage assembly is in the raised position.

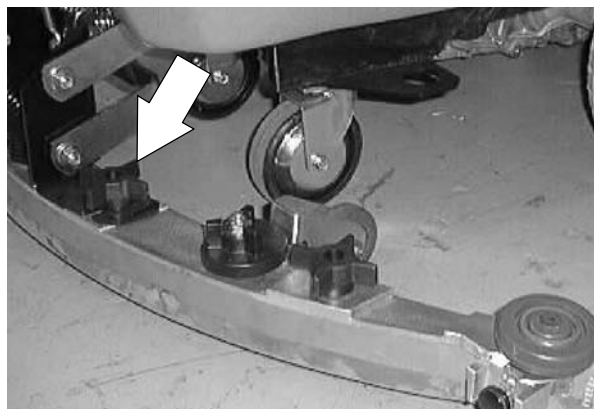


2. Place the squeegee frame under the squeegee pivot.

3. Line up the slots in the squeegee frame with the plastic thumb screws on the lift assembly.



4. Push the squeegee frame all the way forward in the slot. Hand tighten the thumb screws.

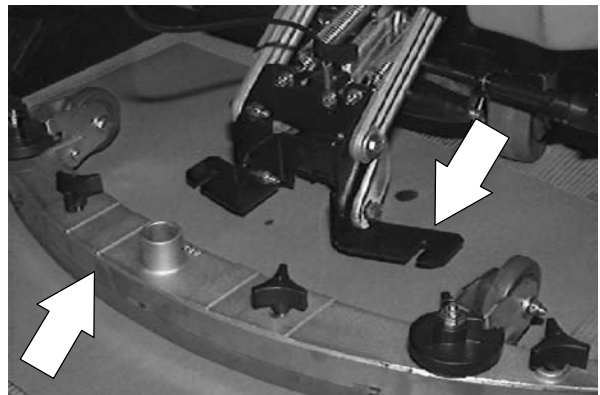


5. Reinstall the vacuum hose on the squeegee frame.

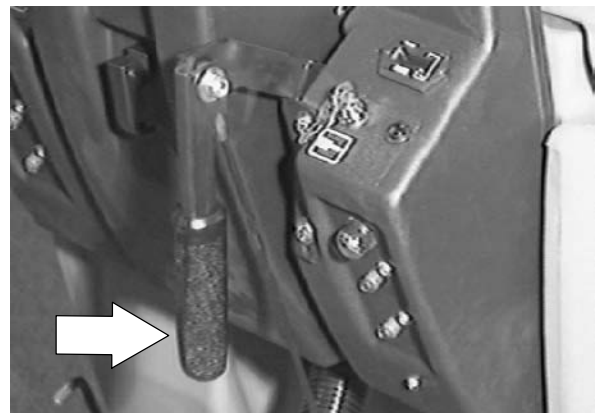
TO REMOVE SQUEEGEE LIFT ASSEMBLY

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

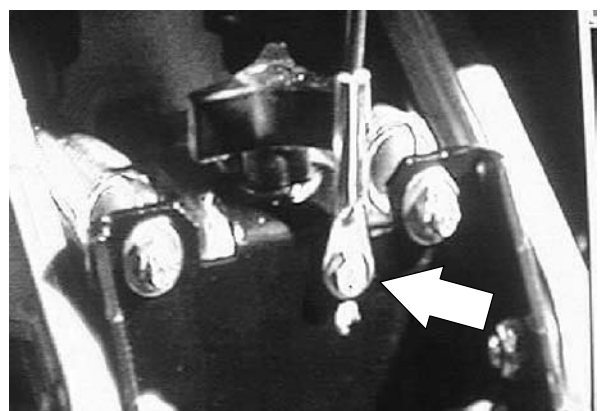
1. Remove the squeegee frame from the machine. See TO REMOVE SQUEEGEE FRAME instructions in this section.



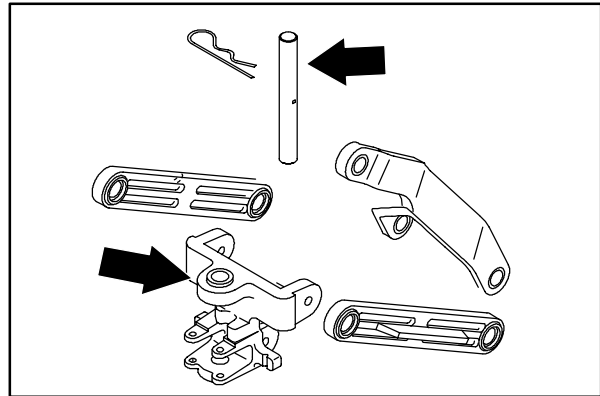
2. Lower the squeegee lift handle.



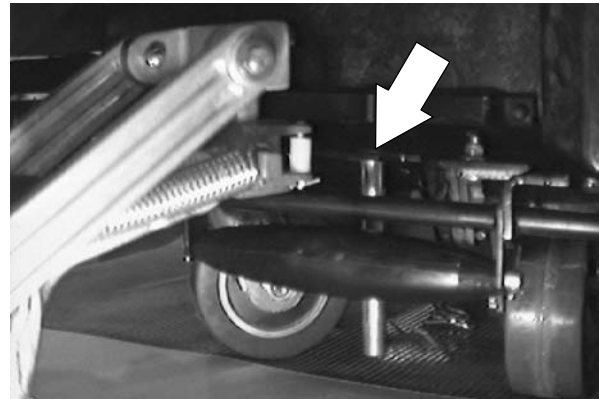
3. Disconnect the squeegee lift cable from the squeegee assembly.



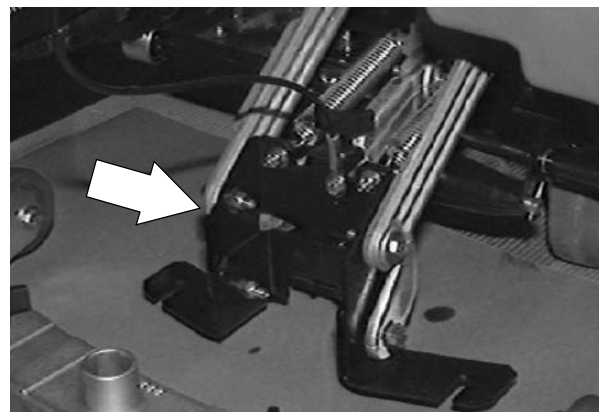
4. Locate the squeegee assembly pivot pin at the front, center of the lift assembly.
Remove the hair pin from the pivot pin.



5. Pull the pivot pin straight down and out of the machine.



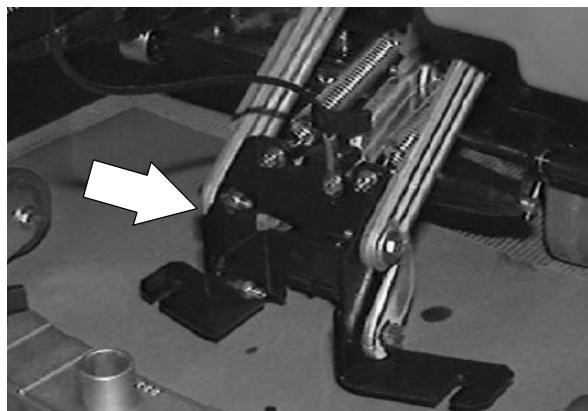
6. The squeegee lift assembly can now be removed from the machine.



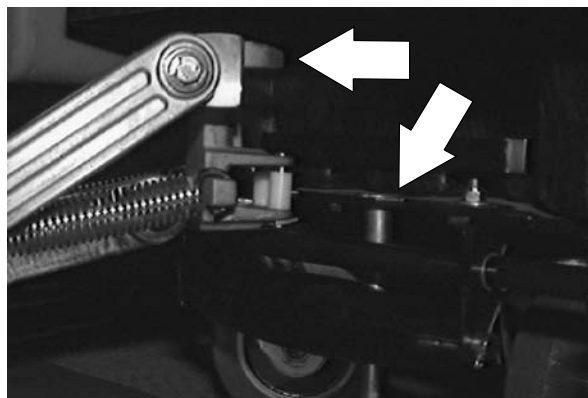
TO INSTALL SQUEEGEE LIFT ASSEMBLY

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

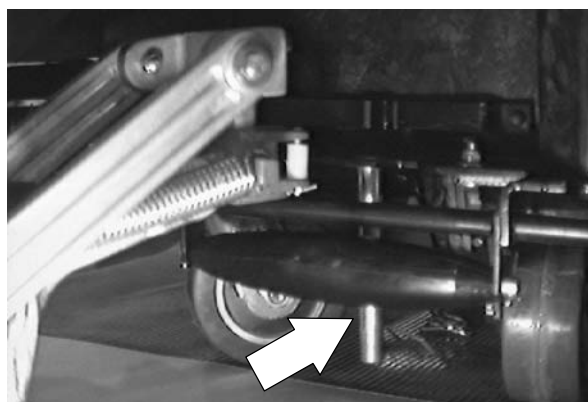
1. Position the lift assembly at the back of the machine.



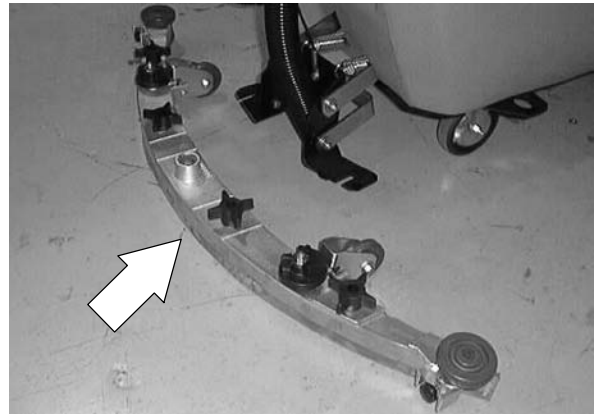
2. Align the hole in the aluminum pivot casting with the hole in the frame mounting bracket.



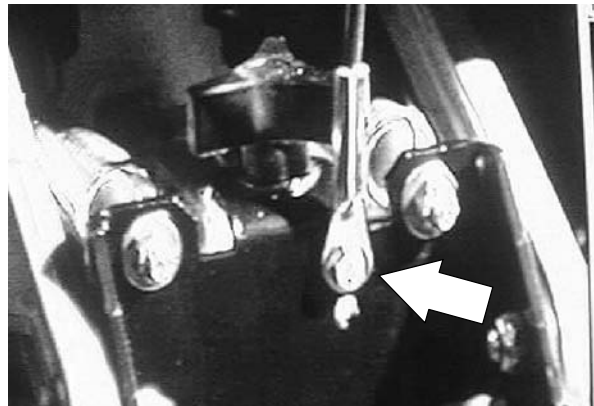
3. Push the pivot pin up into the bracket and casting. Reinstall the hair pin.



4. Reinstall the squeegee frame. See TO INSTALL SQUEEGEE FRAME instructions in this section.



5. Reconnect the squeegee lift cable. Re-use the M5 hex screw. There are two holes in the squeegee lift bracket. Using the lower hole will allow the squeegee frame to be lifted higher with the handle. *Reinstall the cable into the hole it was removed from.*
6. Operate the machine and check the squeegee for proper operation. See TO ADJUST SQUEEGEE instructions in this section.

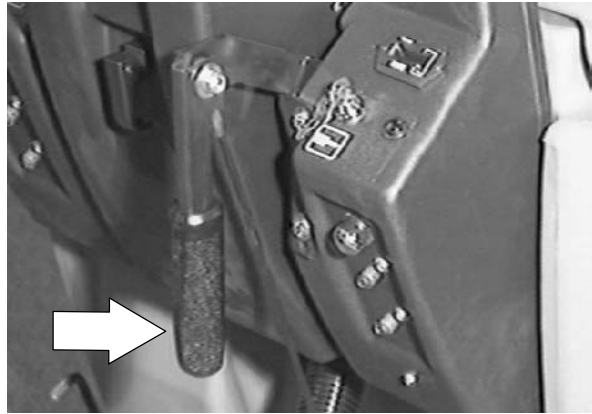


NOTE: If both casters are removed at the same time, the squeegee pivot pin must be installed with the caster mounting plate left loose. After the pin is installed, aligned, and turns freely, the caster plate can be tightened.

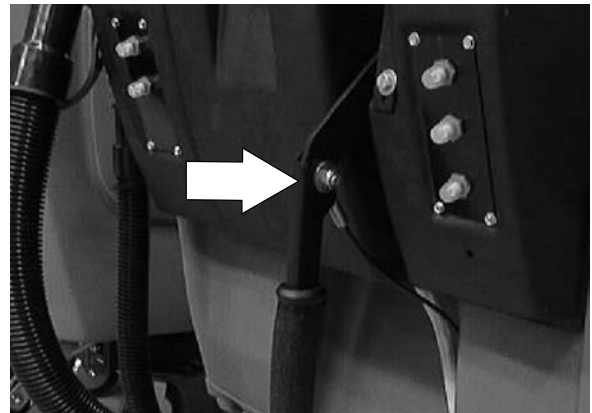
TO REPLACE SQUEEGEE LIFT CABLE

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

1. Lower the squeegee assembly to the floor.



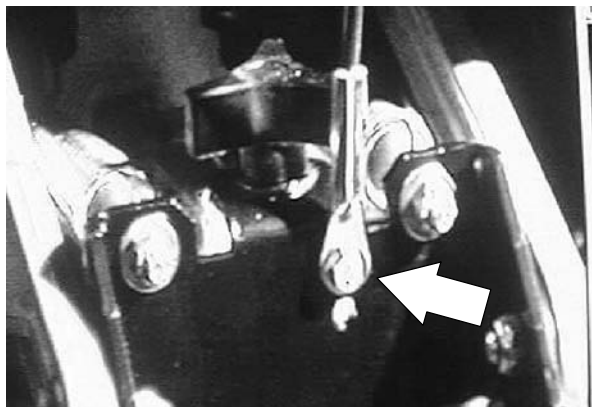
2. Remove the M8 flat head screw, plastic bumper, washer, sleeve, and M8 nyloc nut holding the squeegee lift cable to the lift handle.



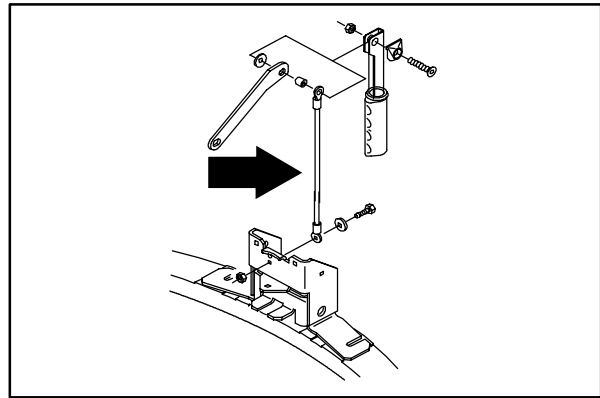
3. Remove the M5 hex screw and nyloc nut holding the lift cable to the squeegee frame.

NOTE: Make a note of which hole the bottom of the cable is installed in.

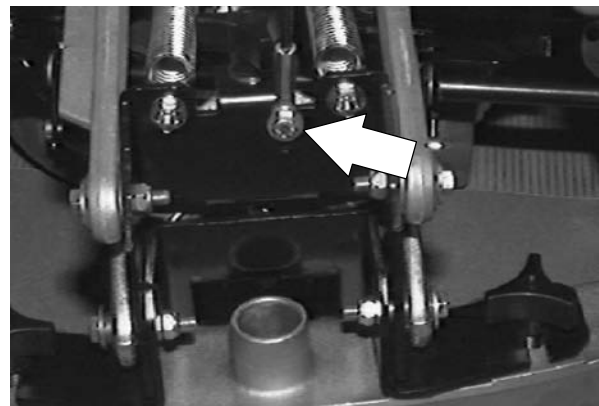
4. The squeegee lift cable can now be removed from the machine.



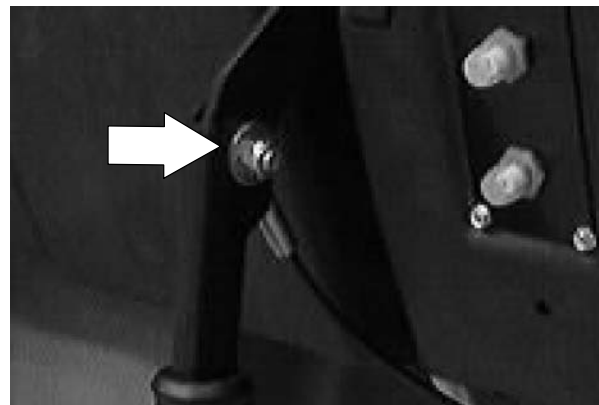
5. Position the new cable with the small hole end leading to the squeegee frame and the larger hole end leading to the lift handle.



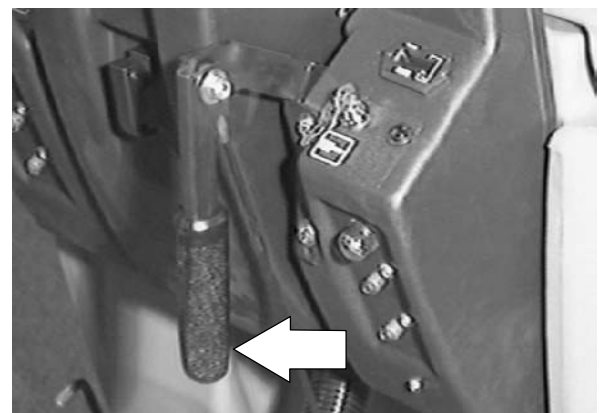
6. Reconnect the squeegee lift cable. Re-use the M5 hex screw. There are two holes in the squeegee lift bracket. Using the lower hole will allow the squeegee frame to be lifted higher with the handle. Reinstall the cable into the hole it came out of.



7. Reinstall the M8 flat head screw, plastic bumper, washer, sleeve, and nyloc nut in the lift handle end. Hand tighten to allow the cable to pivot freely.

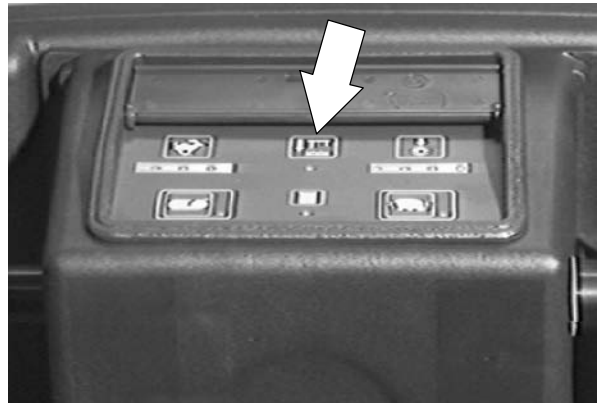


8. Raise the squeegee.



TO ADJUST AUTO SQUEEGEE LIFT

1. Lower the squeegee assembly to the floor.

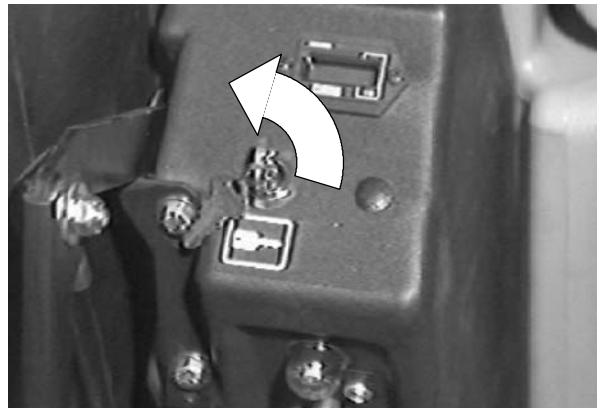


2. Drive the machine forward until the squeegee blades are rolled over.

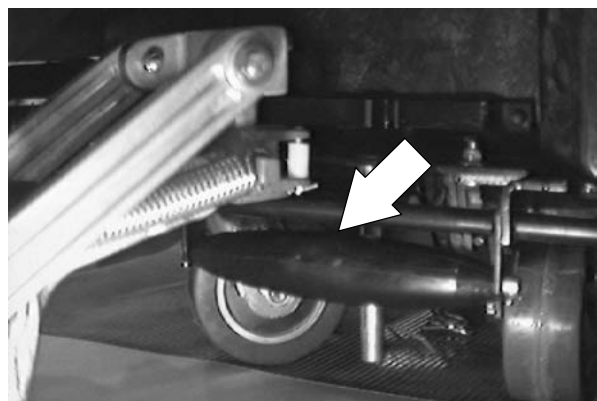


3. Turn off the machine with the squeegee in the down position.

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.



4. Check the gap between the top of the roller on the auto squeegee and the bottom of the "Y" bar on the squeegee arms. This gap should be (0.125 to 0.250 in.).

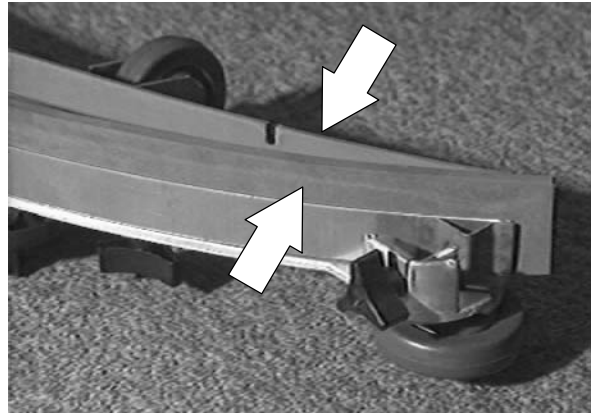


5. If the gap is more than (0.250 in.) or less than (.125 in.), the three hex screws holding the actuator mount bracket to the frame must be loosened and the bracket slid back until the gap is correct.
6. Tighten the three hex screws to 18 - 24 Nm (15 - 20 ft lb).
7. Operate the machine and check the squeegee lift for proper operation.



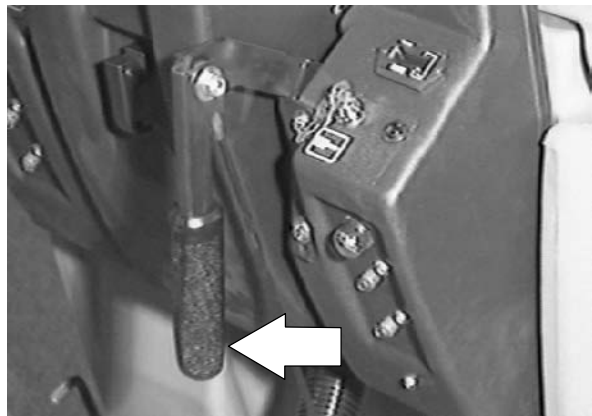
SQUEEGEE BLADES

The squeegee has two squeegee blades, front and back. The blades have four wiping edges. To use them all, start with one wiping edge. To use the next wiping edge, rotate the blade end-for-end. To use the next wiping edge, rotate the top edges down, bottom edges up. To use the last edge, rotate the blade end-for-end.



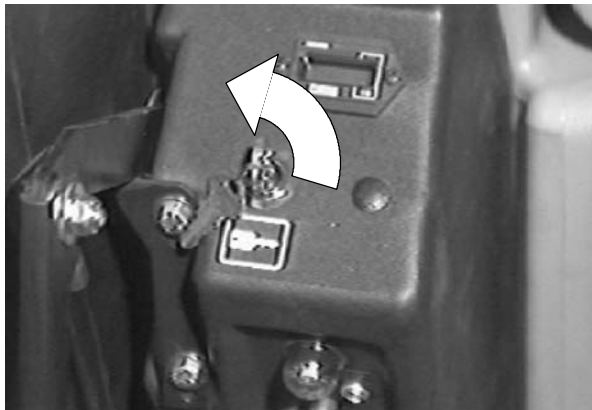
REPLACING OR ROTATING REAR SQUEEGEE BLADE

1. Make sure the squeegee is raised off the floor.

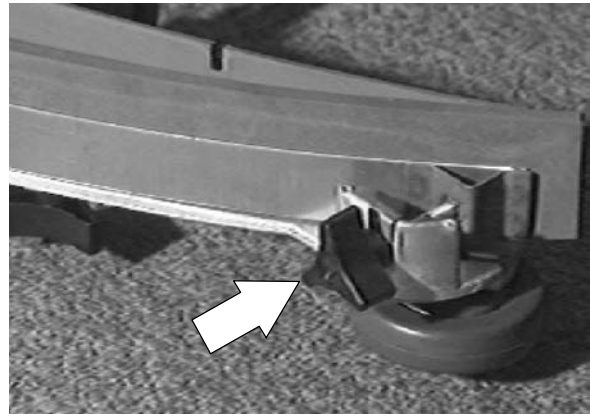


2. Turn the machine power off and set the parking brake if your machine has this option.

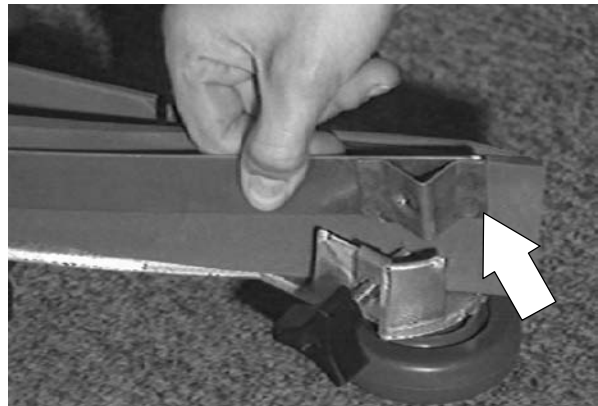
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.



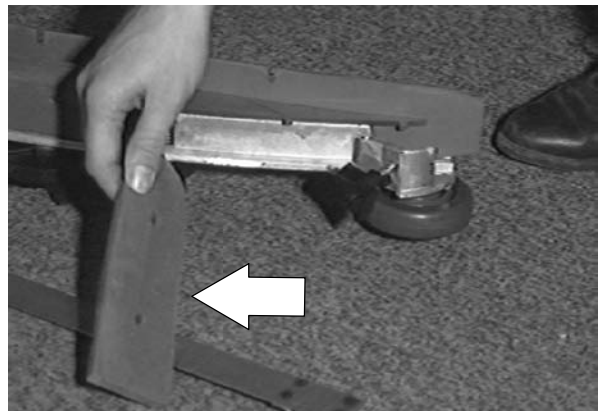
3. Loosen the two retention knobs, one at each the end on the squeegee.



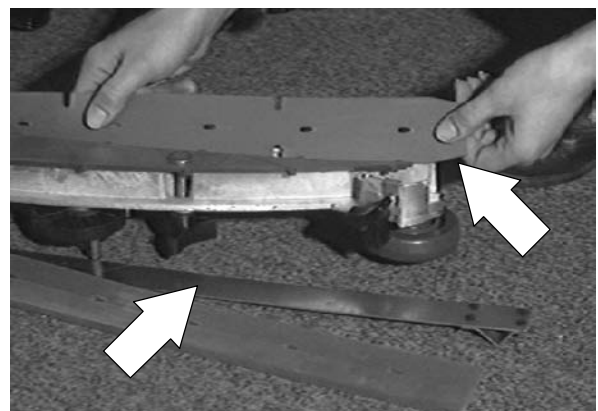
4. Pull off the rear retaining band.



5. Pull off the rear squeegee blade.

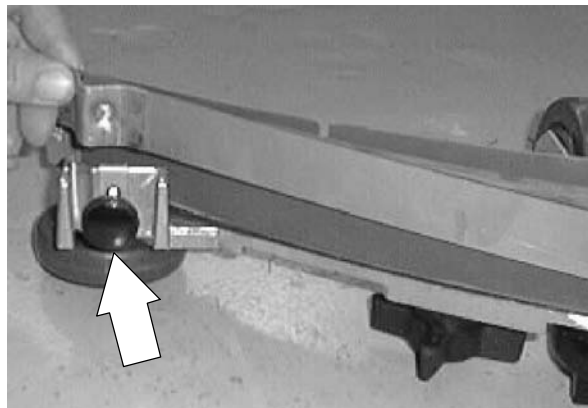


6. Insert the rotated or new squeegee blade and then insert the retainer band.



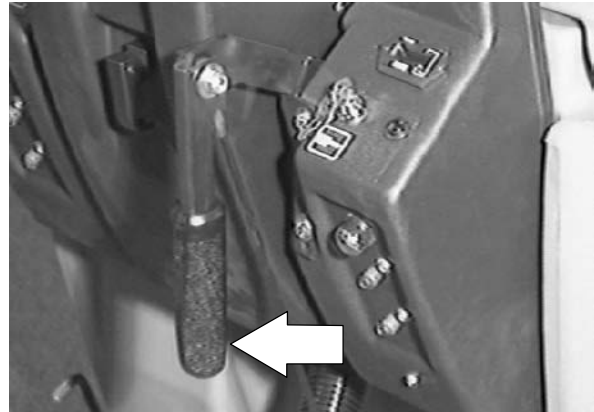
SCRUBBING

7. Tighten the two retention knobs.



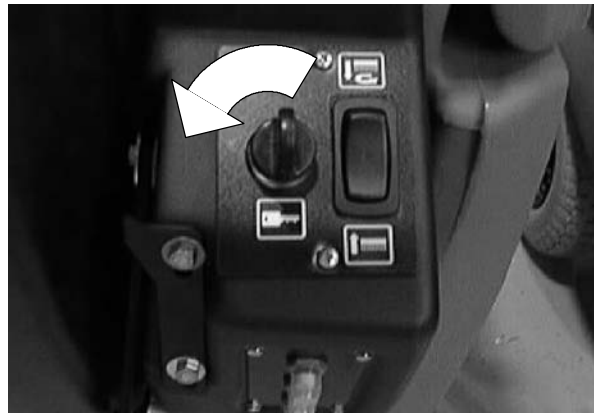
REPLACING OR ROTATING FRONT SQUEEGEE BLADE

1. Make sure the squeegee is raised off the floor.

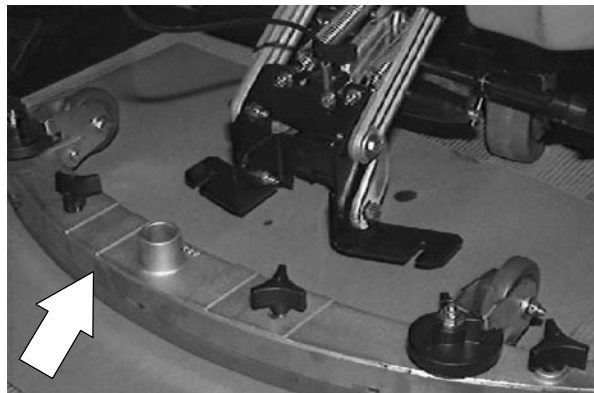


2. Turn the machine power off and set the parking brake if your machine has this option.

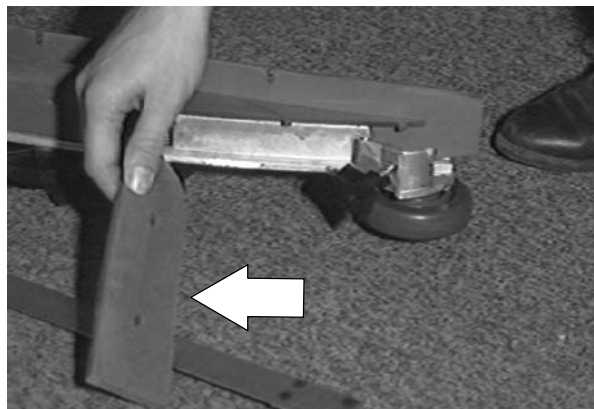
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.



3. Remove the squeegee from the machine. See TO REMOVE SQUEEGEE FRAME instructions in this section.

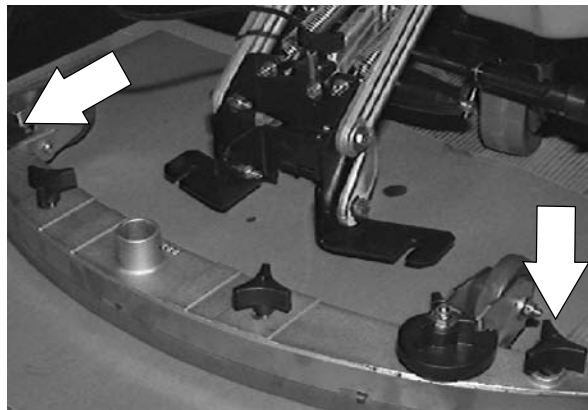


4. Remove the rear squeegee blade and retainer. See REPLACING OR ROTATING THE REAR SQUEEGEE BLADE instructions in this section.

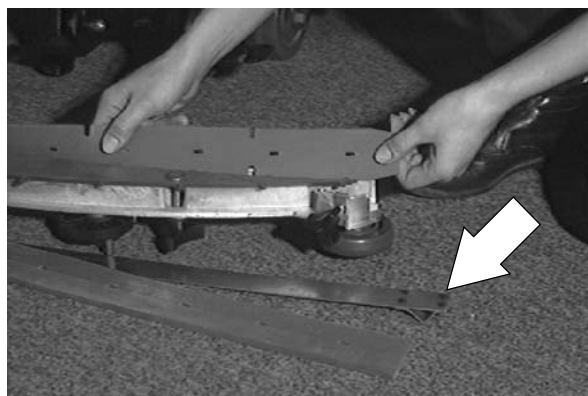


SCRUBBING

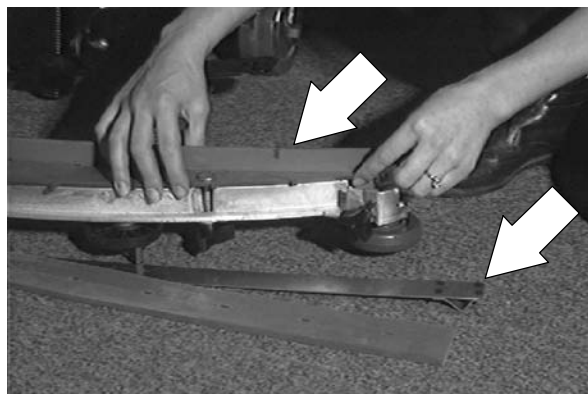
5. Loosen the two remaining knobs on top of the squeegee assembly.



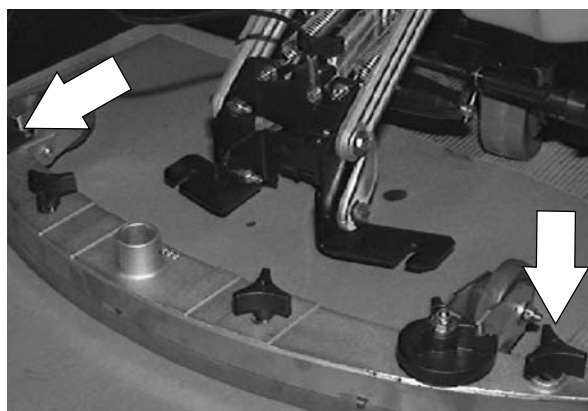
6. Pull the retainer plate back and pull off the front squeegee blade.



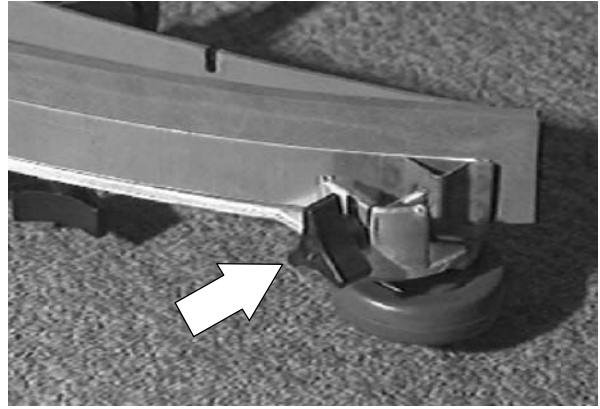
7. Insert the rotated or new, front squeegee blade in the squeegee frame, lining up the slots in the blade with the tabs on the retainer plate.



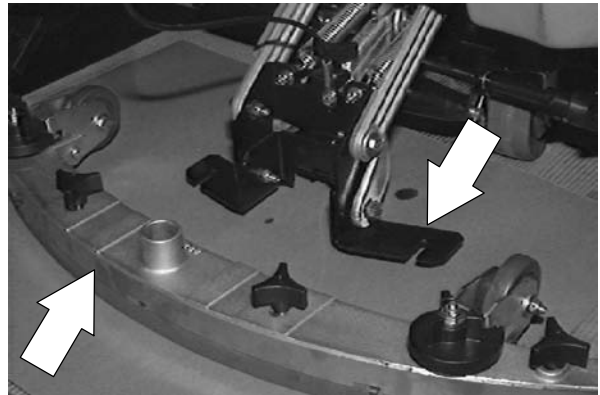
8. Push the retainer plate forward. Tighten the two outside knobs on top of the squeegee assembly.



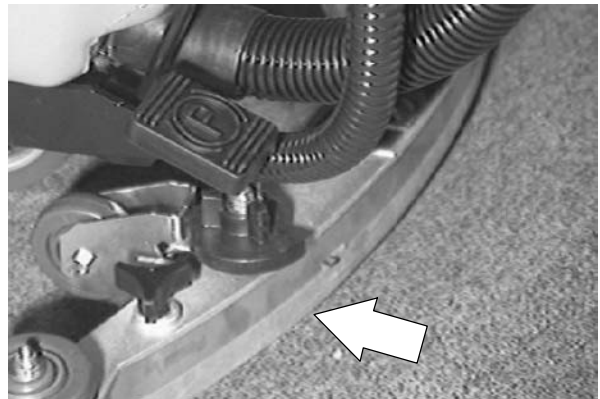
9. Insert the rear squeegee blade and retainer. Tighten the two rear blade retention knobs.



10. Install the squeegee assembly on the squeegee pivot. See TO INSTALL SQUEEGEE FRAME instructions in this section.



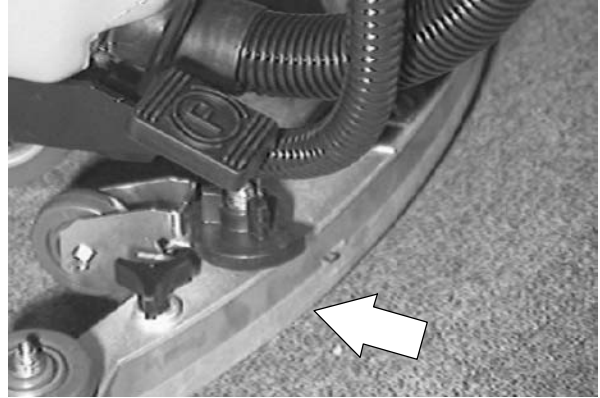
11. Adjust the squeegee blade leveling and deflection. See TO ADJUST SQUEEGEE instructions in this section.



SCRUBBING

TO ADJUST SQUEEGEE

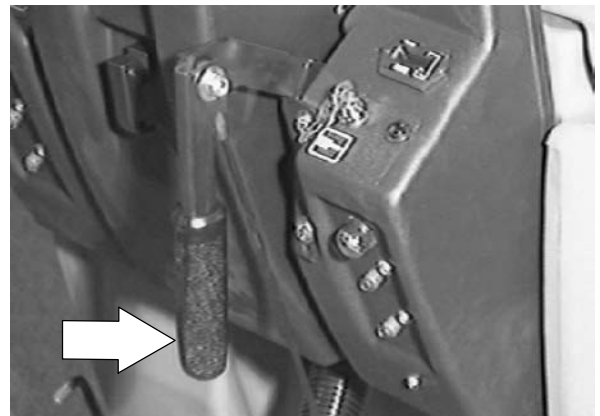
Leveling of the squeegee assures even contact the length of the squeegee blade with the surface being scrubbed. Make sure this adjustment is done on an even, level floor.



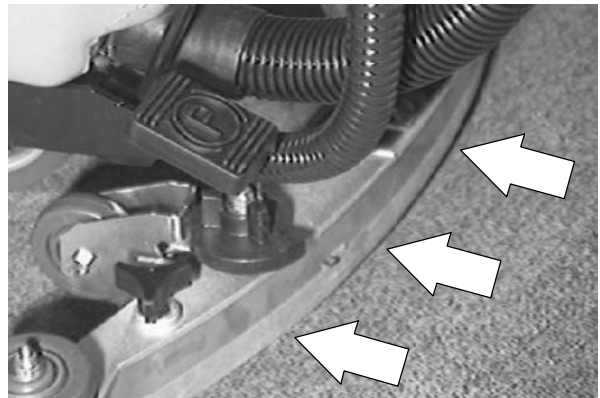
TO LEVEL SQUEEGEE (5700, 5700XP, 5700XPS only)

1. Park the machine on a level surface.
2. Lower the squeegee.

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

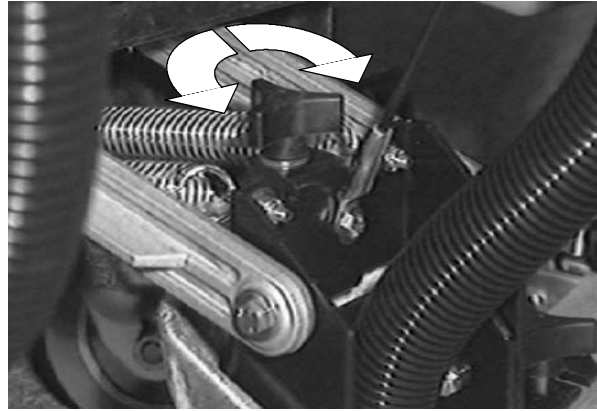


3. Make sure the squeegee is level with the floor over the full length of the squeegee blade.

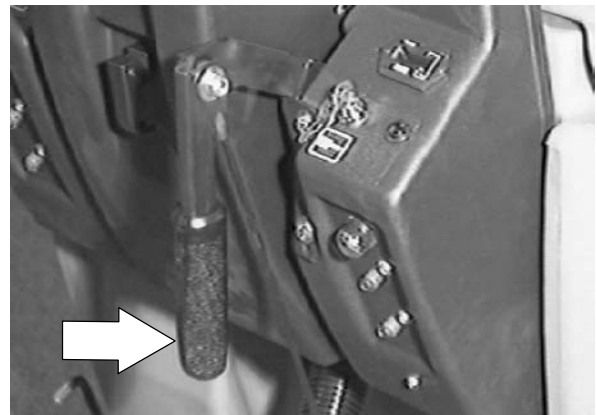


4. If the leveling is not the same over the full length of the blade, turn the squeegee leveling knob counter-clockwise to increase the deflection at the ends of the squeegee.

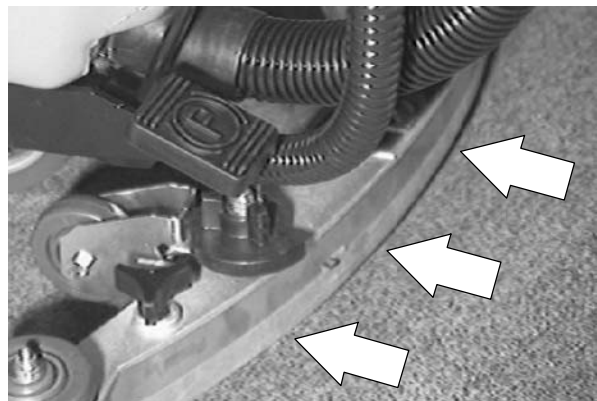
NOTE: Turn the squeegee leveling knob clockwise to decrease the deflection at the ends of the squeegee blade.



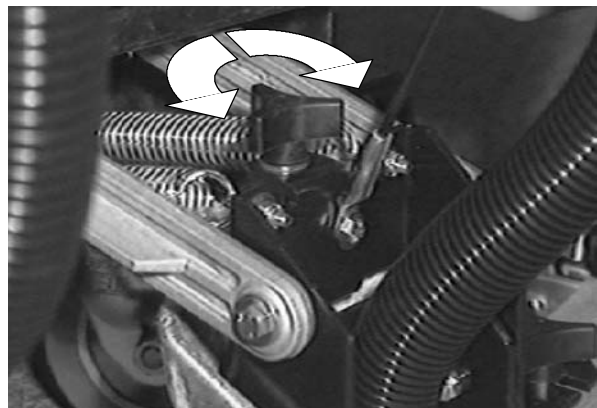
5. Raise and lower the squeegee blade again to check level with the floor.



6. Drive the machine forward to check the squeegee blade deflection.



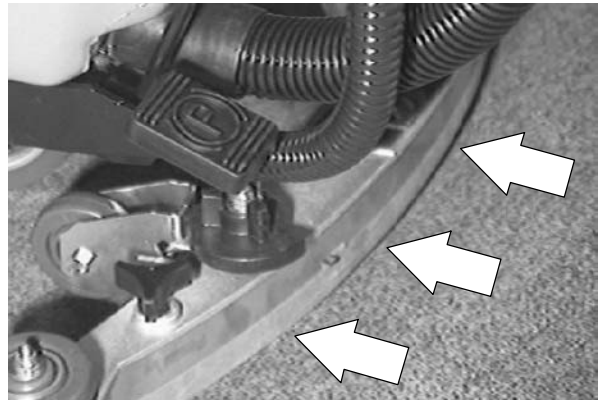
7. Adjust the squeegee blade deflection if necessary.



SCRUBBING

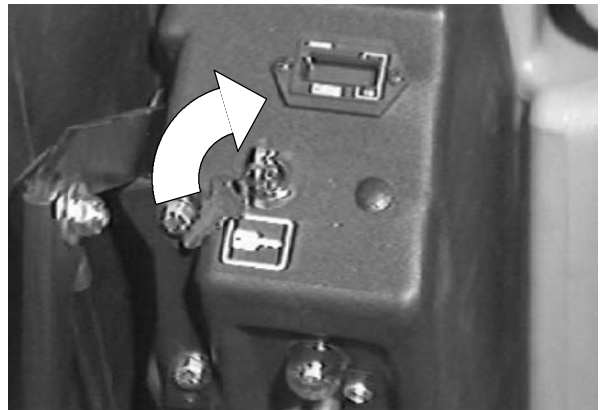
SQUEEGEE BLADE DEFLECTION

Deflection is the amount of curl the squeegee blade has when the machine moves forward with the squeegee lowered to the floor. The best deflection is when the squeegee wipes the floor just dry with a minimum amount of deflection.

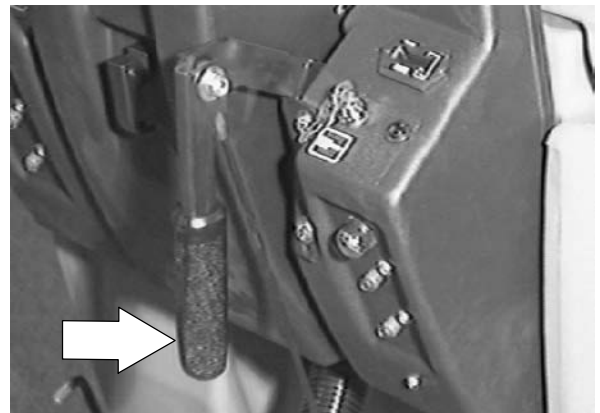


TO ADJUST SQUEEGEE BLADE DEFLECTION

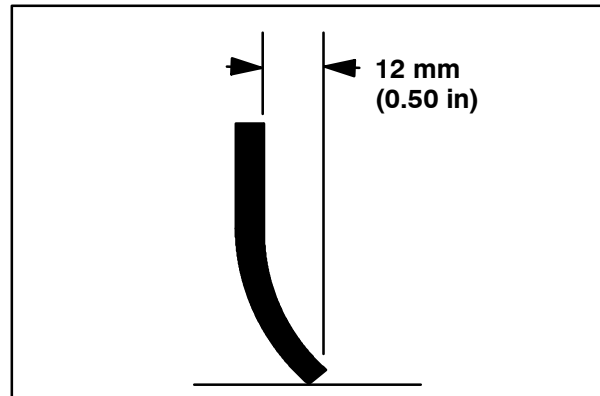
1. Turn the machine power on.



2. Lower the squeegee.

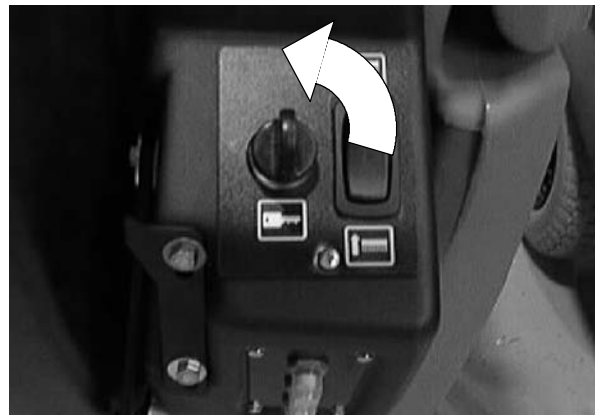


3. Drive the machine forward, and look at the deflection of the squeegee blade. The correct amount of deflection is 12 mm (0.50 in) for scrubbing smooth floors and 15 mm (0.62 in) for rough floors.



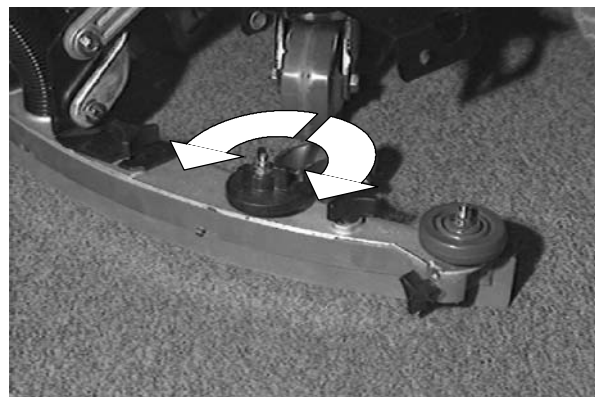
4. Turn the machine power off.

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.



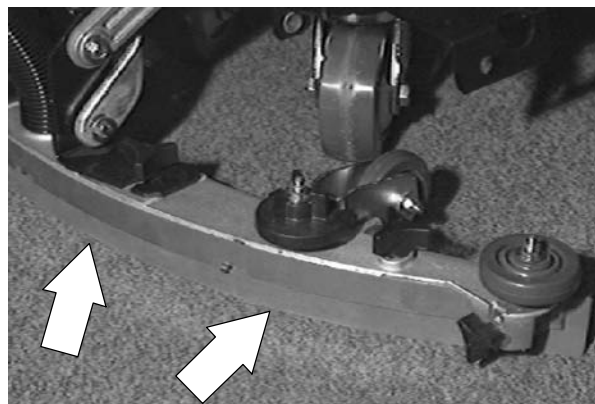
5. To adjust the amount of deflection, turn the squeegee deflection cams counter-clockwise to decrease the blade deflection.

Turn the squeegee deflection cams clockwise to increase blade deflection.



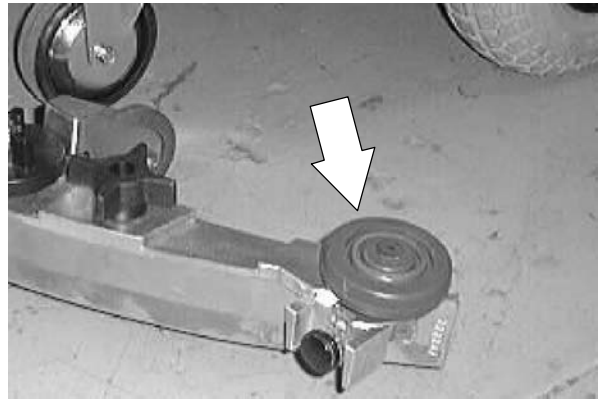
6. Drive the machine forward again to check the squeegee blade deflection.

7. Readjust the squeegee blade deflection if necessary.



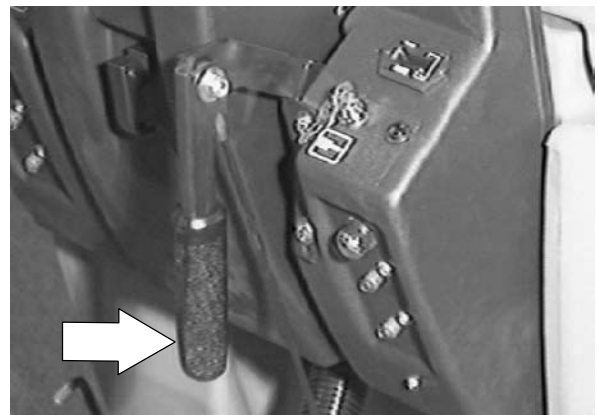
SQUEEGEE GUIDE ROLLERS

Guide rollers are located at each end of the squeegee to guide the squeegee blade end along a wall. Loosen the nut at the top of the guide roller and move the roller in or out to adjust how close the end of the squeegee blade comes to the wall. The squeegee blade end should be farther away from the wall when the floor curves up to the wall.



TO ADJUST SQUEEGEE GUIDE ROLLERS

1. Lower the squeegee assembly to the floor.
2. Drive the machine forward and up against a wall until the squeegee blades are rolled over.



3. Loosen the nut at the top of the guide roller and move the roller in or out to adjust how close the end of the squeegee blade comes to the wall.
4. Tighten the nut hand tight and drive the machine along the wall, checking for proper operation.



VACUUM FAN

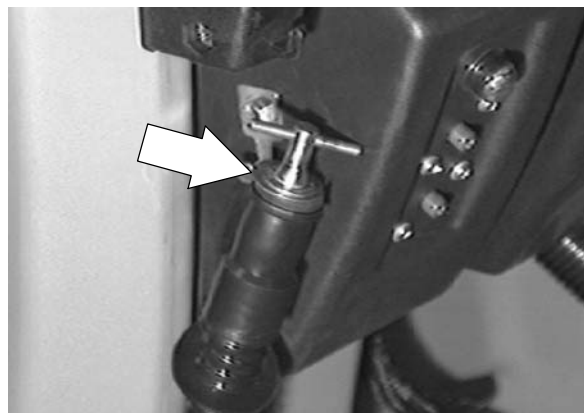
The vacuum fan, when activated, creates a vacuum in the recovery tank. Water is pulled from the rear squeegee to the recovery tank through the vacuum hose. The vacuum fan inlet filter in the solution tank should be cleaned daily.



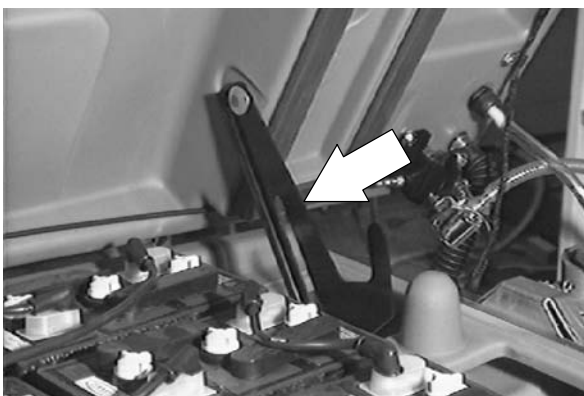
TO REPLACE VACUUM FAN (S)

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

1. Make sure the solution tank is empty.

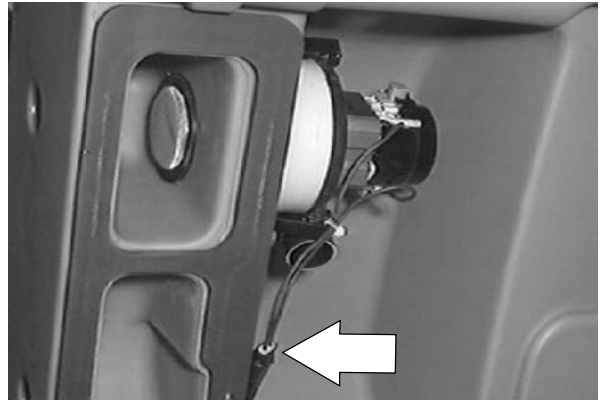


2. Raise the solution tank until the prop rod is engaged.



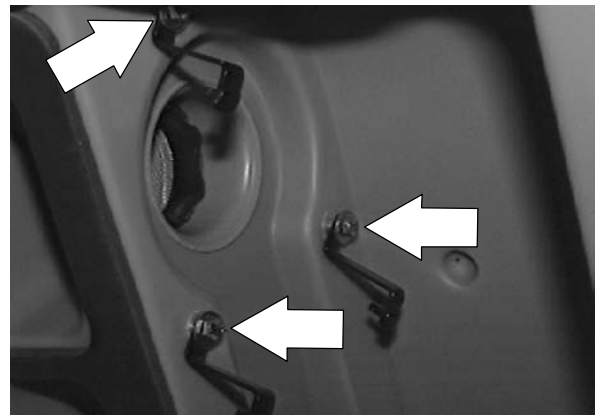
SCRUBBING

3. Un-plug the vacuum fan(s) from the main harness.

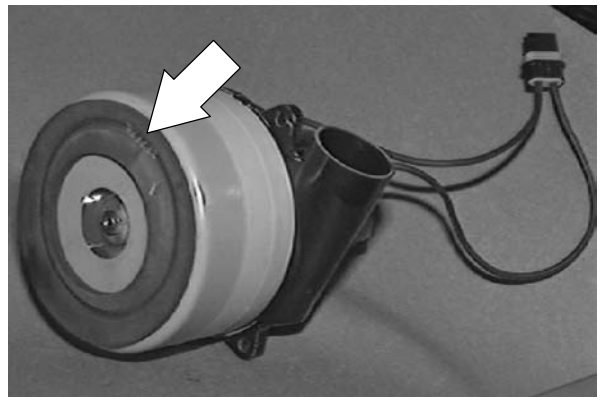


4. If the machine is equipped with one vacuum fan, loosen the three M8 hex screws holding the three mount brackets to the solution tank. Pull the brackets away from the fan and remove fan. If the machine is equipped with the dual fan option, the vacuum fans are bolted to a mounting plate, then to the solution tank. To remove the problem fan, follow the instructions for single fan removal.

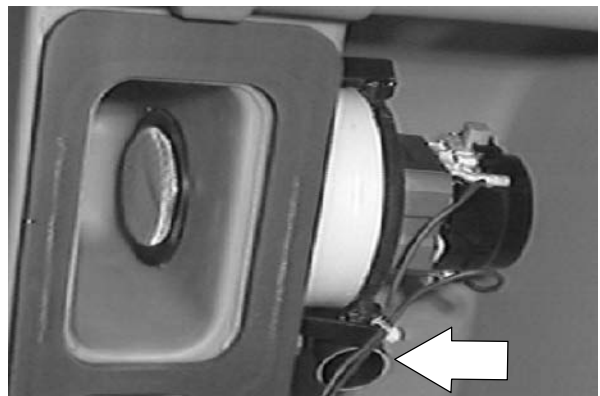
NOTE: The orientation of the vacuum fan exhaust tube before removing it from the machine.



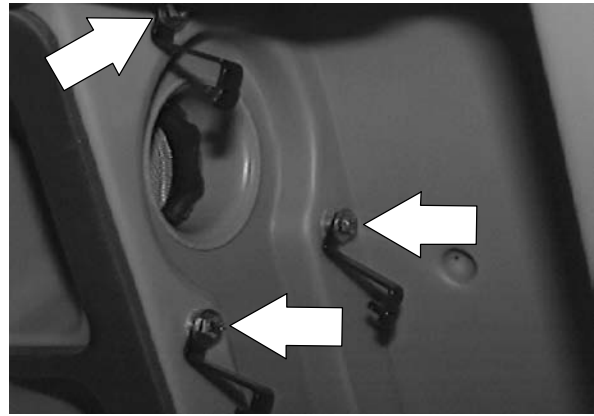
5. Prepare the new fan by installing a new seal on it's inlet side with the adhesive side to the fan.



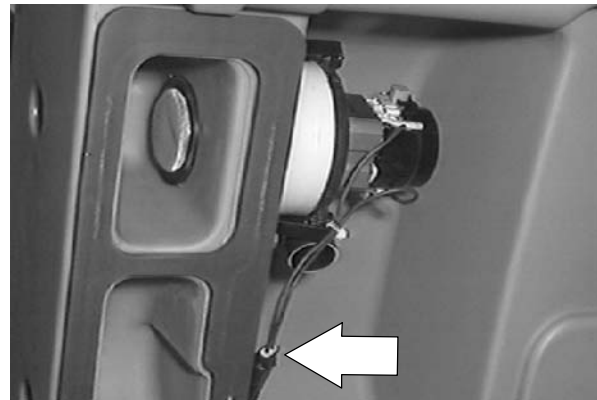
6. Position the new fan back on the solution tank. *Note the orientation of the fan exhaust tube.*



7. Reinstall the three vacuum fan mounting brackets, M8 hex screws, and washers. Tighten to 18 - 24 Nm (15 - 20 ft lb).



8. Plug the vacuum fan into the main harness. See electrical schematic in the ELECTRICAL section of this manual.



9. Start the machine and check the vacuum fan for proper operation.

POWER WAND

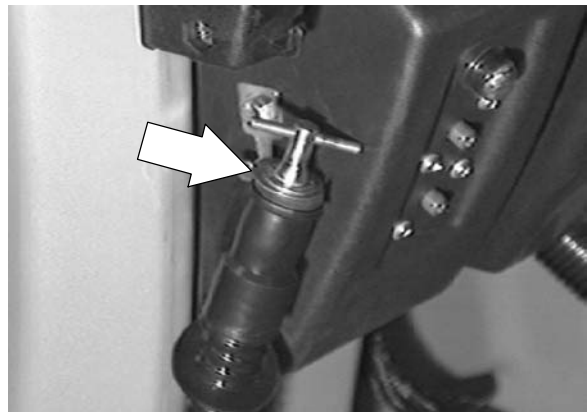
The power wand uses the machine's vacuum and solution systems. The power wand allows scrubbing of floors that are out of reach of the machine. The water is fed to the wand by an electric pump. There is a quick release fitting in the tank of the machine, under the cover on the solution tank where the power wands hose plugs in. The power wand handle and hose are stored on the machine solution tank.



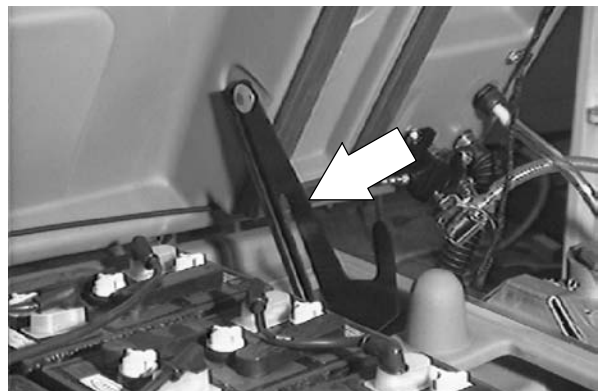
TO REPLACE POWER WAND PUMP

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

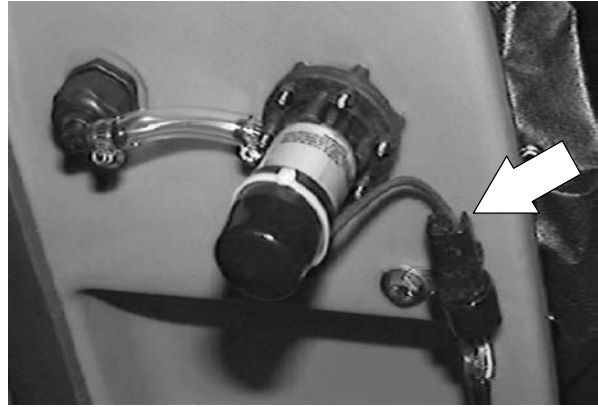
1. Make sure the solution tank is empty.



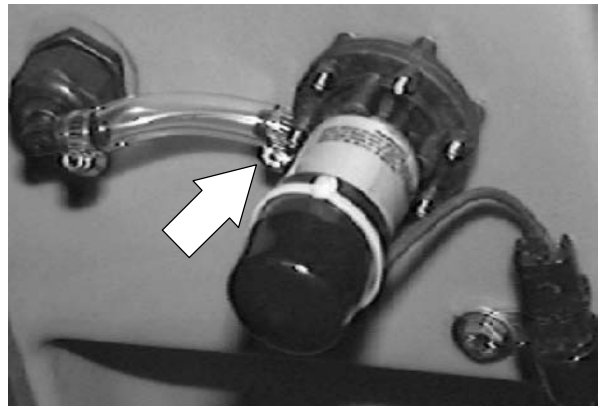
2. Raise the solution tank until the prop rod is engaged.



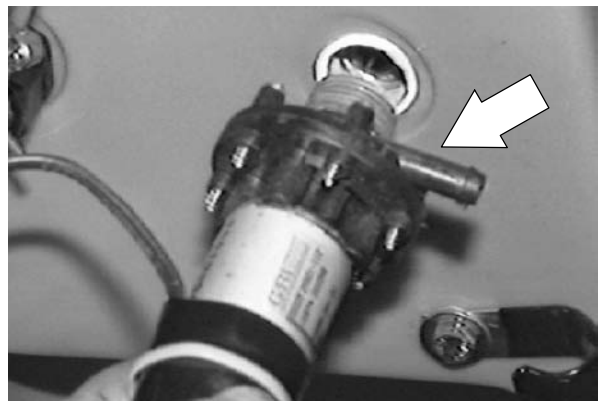
3. Un-plug the power wand pump from the main harness.



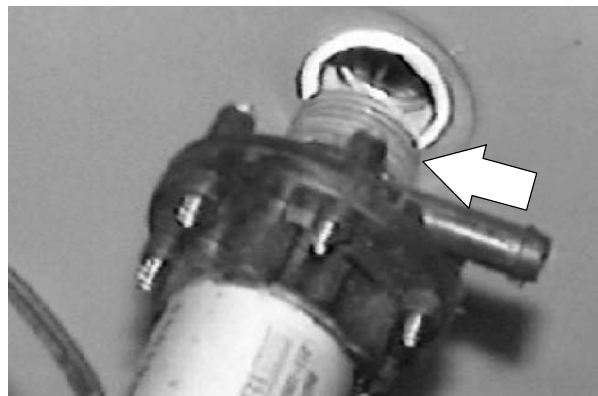
4. Remove the small worm drive clamp and hose leading from the power wand pump to the fitting on the solution tank. *Note the orientation of the pump inlet pipe.*



5. Remove the power wand pump by turning counter-clockwise. Remove the pump from the machine.

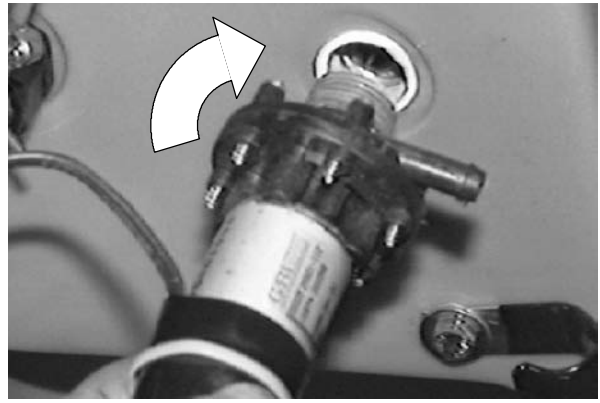


6. Place thread sealant RTV on the threads before installing the new pump.

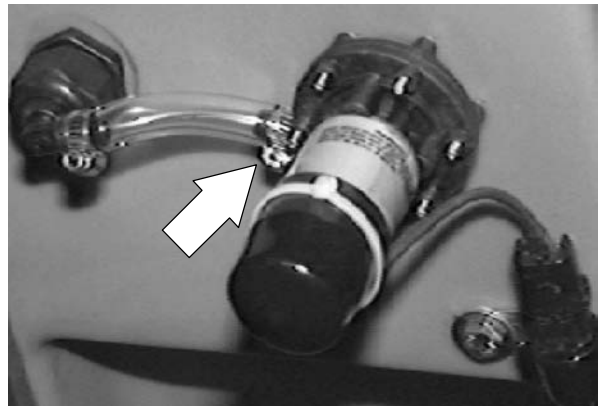


SCRUBBING

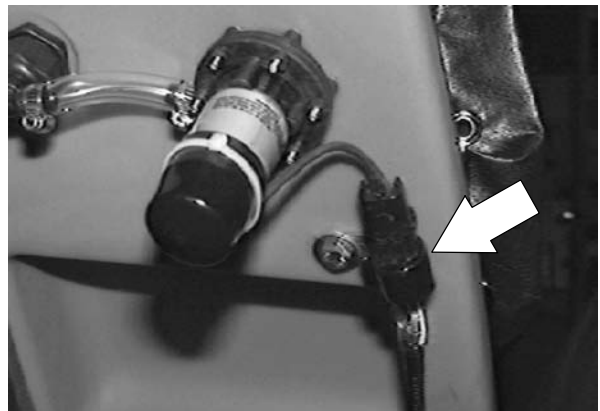
7. Turn the pump clockwise until tight, making sure the inlet pipe lines up with the fitting in the solution tank.



8. Reinstall the hose leading from the pump to the fitting on the solution tank. Hand tighten worm drive clamp.

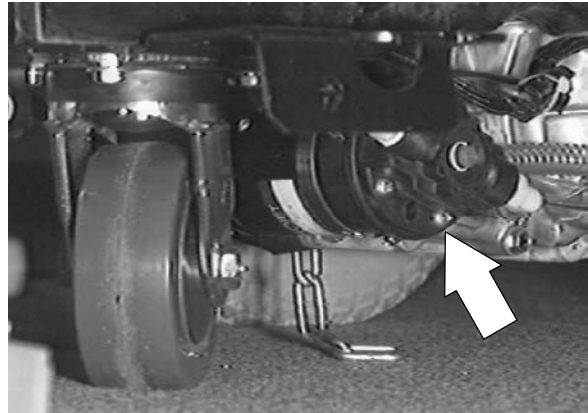


9. Plug the power wand pump into the main harness. See schematic in the ELECTRICAL section of this manual.



ES™ PUMP

When the ES™ system is activated, the pump pulls filtered water from the recovery tank and pumps it into the solution tank. This greatly extends the scrubbing time between solution tank filling and recovery tank dumping. Clean water should be pumped through the ES™ system after it is used in the scrubbing operation.

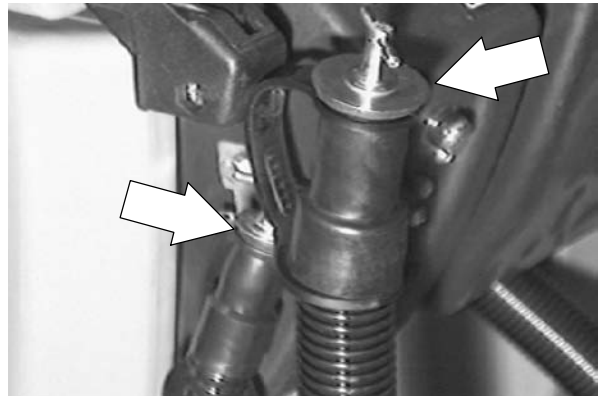


TO REPLACE ES™ PUMP

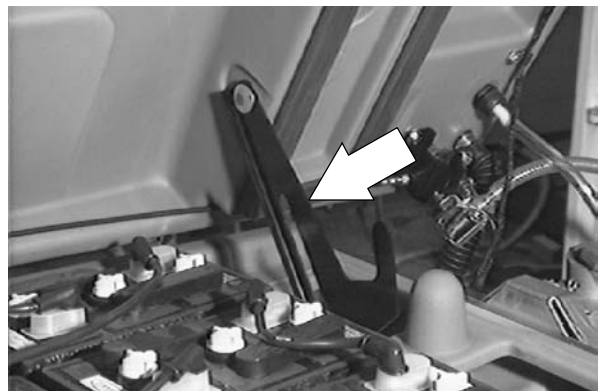
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

NOTE: Any light that enters the front of the recovery tank with the solution tank in the raised position, and reaches the liquid level sensor, may cause the ES™ pump to run erratically.

1. Make sure the solution and recovery tanks are empty.

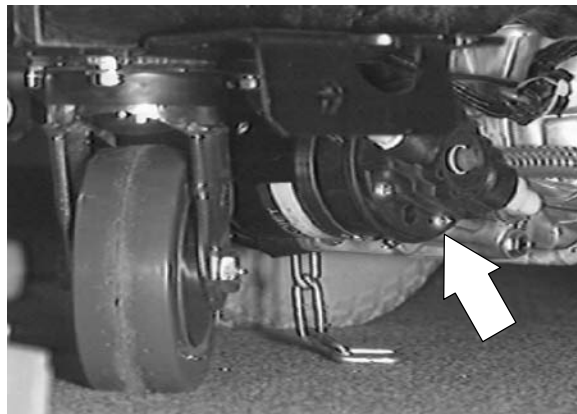


2. Raise the solution tank until the prop rod is engaged.

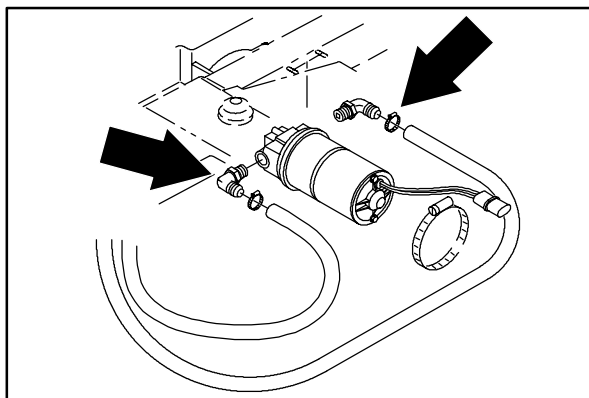


SCRUBBING

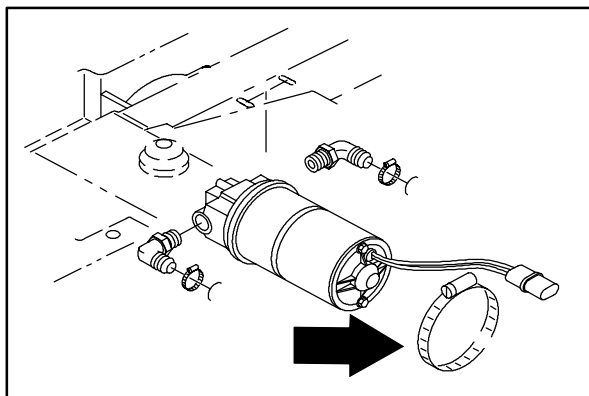
3. Locate the ES™ pump on the right bottom side of the machine. Unplug the pump from the main electrical harness.



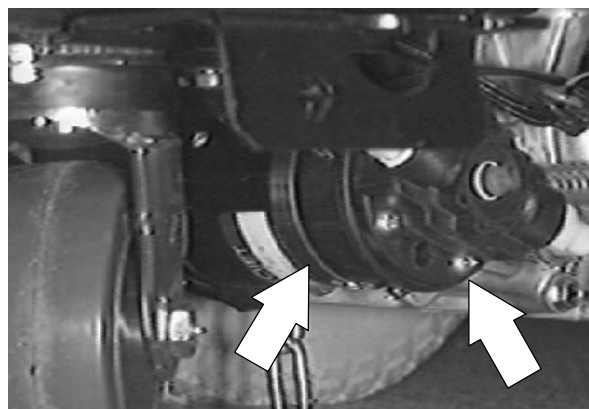
4. Loosen the worm drive clamps holding the two solution hoses to the pump. Disconnect the hoses from the pump.



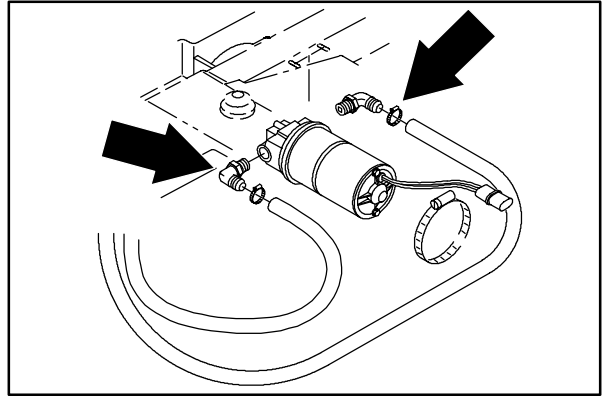
5. Loosen the large worm drive clamp holding the ES™ pump to the bottom of the frame. Remove the pump from the machine.



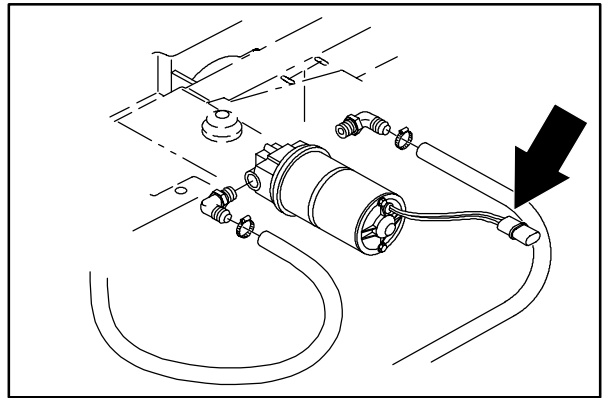
6. Position the new pump back under the frame. Reinstall the large worm drive clamp and hand tighten tight.



7. Reconnect the two solution hoses to the ES™ pump. Hand tighten the clamps.



8. Plug the ES™ pump into the main electrical harness. See schematic in the ELECTRICAL section of this manual.

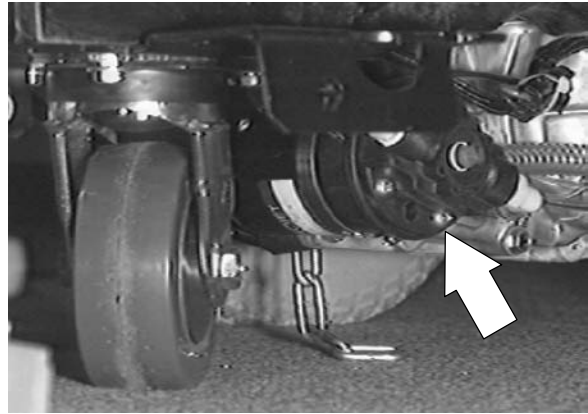


9. Operate the machine and check the ES™ pump for proper operation or any leaks.

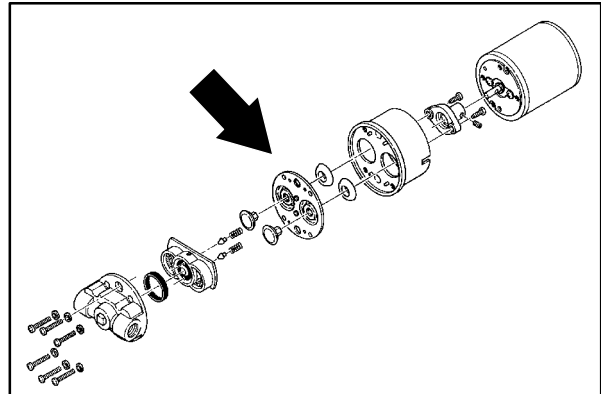
TO REPLACE ES™ PUMP DIAPHRAGM

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

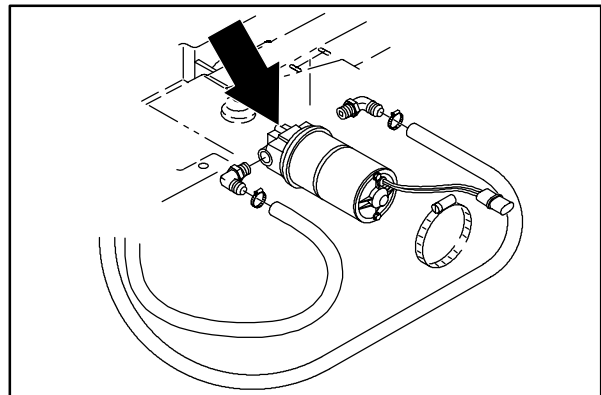
1. Remove the ES™ pump from the machine. See TO REPLACE ES™ PUMP instructions in this section.



2. Remove the six screws holding the end on the pump.
3. Disassemble the pump until the diaphragm is exposed.
4. See the 5680/5700 parts manual for repair kit part number.
5. Re-assemble the ES™ pump using the parts illustration.



6. Reinstall the pump in the machine. See TO REPLACE ES™ PUMP instructions in this section.

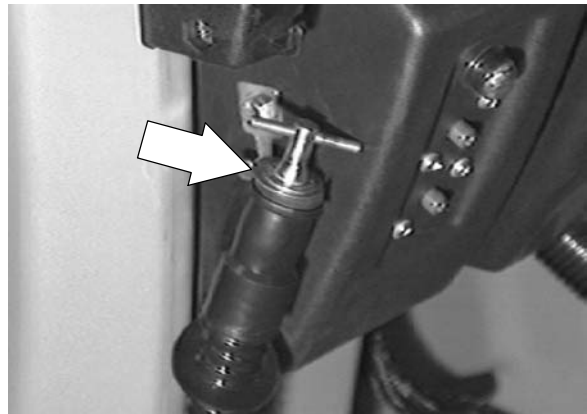


7. Operate the machine, checking the ES™ pump for proper operation.

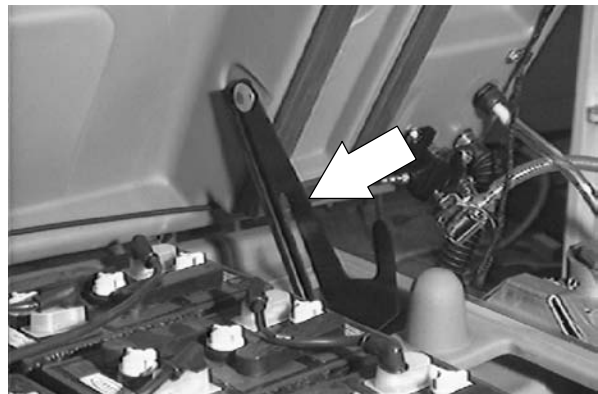
TO ADJUST WATER VALVE CABLE

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

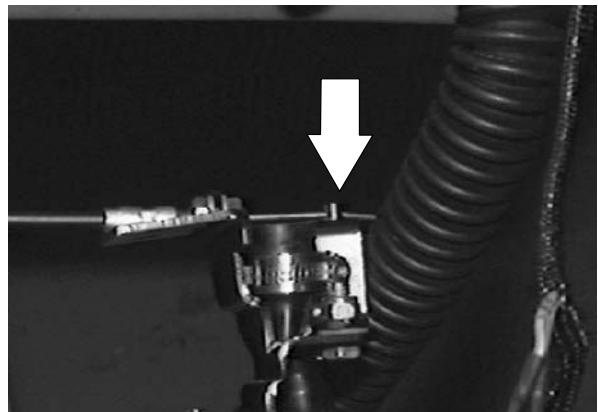
1. Make sure the solution tank is empty.



2. Raise the solution tank until the prop rod is engaged.

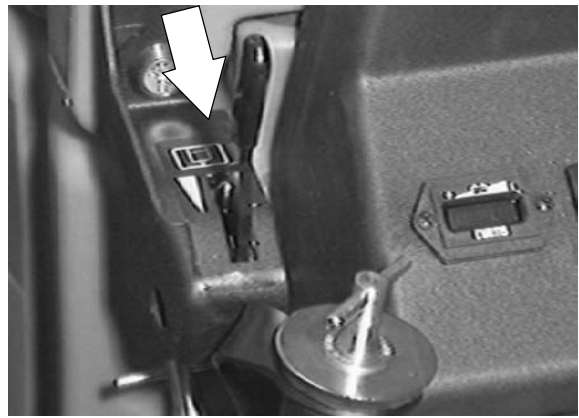


3. Loosen the swivel on the cable at the water valve end.

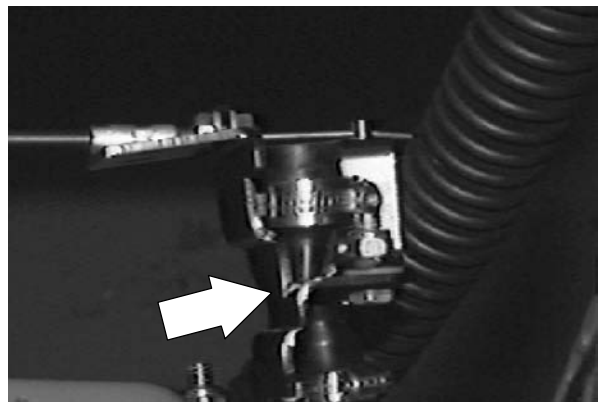


SCRUBBING

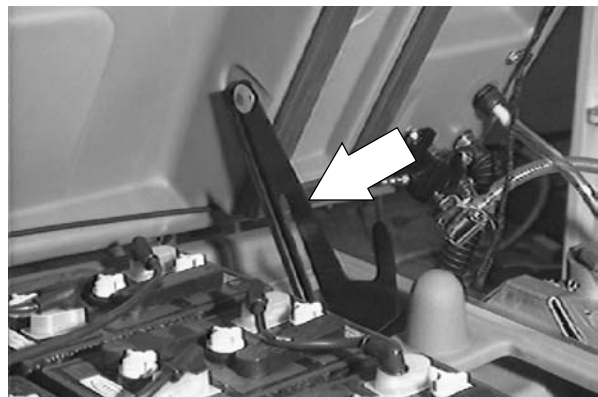
4. Move the water valve handle to the closed position. Leave (.12 in. – .20 in.) gap at the bottom of the handle slot.



5. Push the pinch valve closed by hand. With the pinch valve in the closed position, tighten down on the cable swivel.

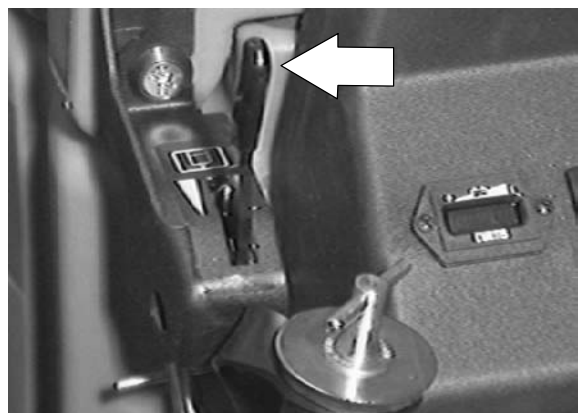


6. Close the solution tank and fill with water.



7. Open and close the valve handle. Check to make sure the pinch valve is properly controlling the solution flow.

NOTE: The water solenoid valve will only allow water to flow when the machine is in the forward propel mode.



MACHINE TROUBLESHOOTING

Problem	Cause	Remedy
Trailing water – poor or no water pickup	Worn squeegee blades	Rotate or replace squeegee blades
	Squeegee out of adjustment	Adjust squeegee
	Vacuum hose clogged	Flush vacuum hoses
	Vacuum fan inlet screen dirty	Clean inlet screen
	Recovery tank full	Drain recovery tank
	Vacuum fan will not turn on	Drain recovery tank
		Reset vacuum fan circuit breaker
	Recovery tank full sensor dirty	Clean sensor
	Debris caught on squeegee	Remove debris
	Foam filling recovery tank	Empty recovery tank; use less or change detergent; use a de-foamer
	Vacuum hose to squeegee or recovery tank disconnected or damaged	Reconnect or replace vacuum hose
	Solution tank not completely closed	Lower solution tank
	Torn seals on solution tank	Replace seals
	Vacuum fan cycling on and off	Drain recovery tank
Little or no solution flow to the floor	Solution tank empty	Fill solution tank
	Solution control cable broken or out of adjustment	Replace and/or adjust cable
	Solution flow turned off	Turn solution flow on
	Solution supply lines plugged	Flush solution supply lines
	Solution supply line filter dirty	Clean filter
	Solution solenoid clogged or stuck	Clean or replace
	ES™ mode: ES™ switch off	Turn ES™ switch on
Poor scrubbing performance	Debris caught on scrub brushes	Remove debris
	Improper detergent, brush, or pad used	Check with TENNANT representative for advice
	Worn scrub brush(es) or pad(s)	Replace scrub brush(es) or pad(s)
	Scrub brush motor circuit breaker(s) tripped	Reset circuit breaker(s)
		Adjust scrub brush down pressure, check with TENNANT representative for advice
	Low battery charge	Charge batteries
	Low scrub brush down pressure	Adjust scrub brush down pressure, check with TENNANT representative for advice
Poor propelling traction	Brush pressure set too high	Decrease brush pressure

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ELECTRICAL SYSTEM

The 5680/5700 electrical system consists of the batteries, electrical drive motors, scrub brush motors, vacuum fan motors, power control panel and related components. This section includes information on these components and their troubleshooting.

BATTERIES

The batteries are unique in that they hold their power for long periods of time. The lifetime of the batteries is limited by the number of charges the batteries receive. To get the most life from the batteries, charge them when the battery discharge indicator flashes. (XP and XPS only). The 5700 standard has an analog gauge.

Periodically clean the top surface of the batteries and the terminals, and check for loose connections. Use a strong solution of baking soda and water. Brush the solution sparingly over the battery tops, terminals, and cable clamps. Do not allow any baking soda solution to enter the batteries. Use a wire brush to clean the terminal posts and the cable connectors. After cleaning, apply a coating of clear battery post protectant to the terminals and the cable connectors. Keep the tops of the batteries clean and dry.

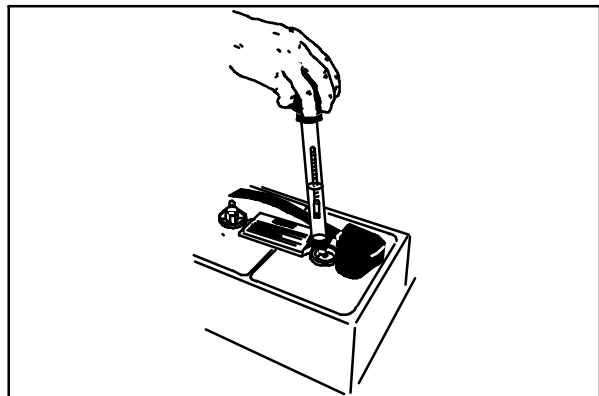
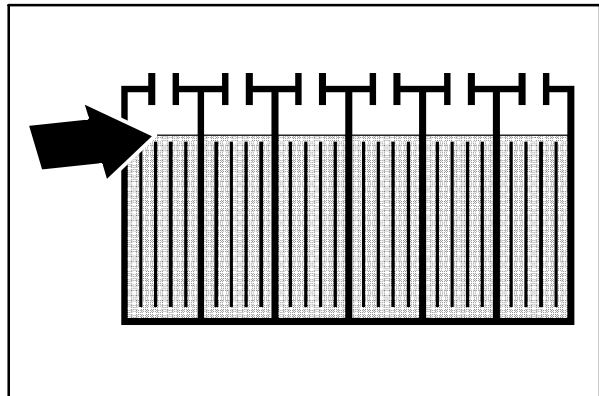
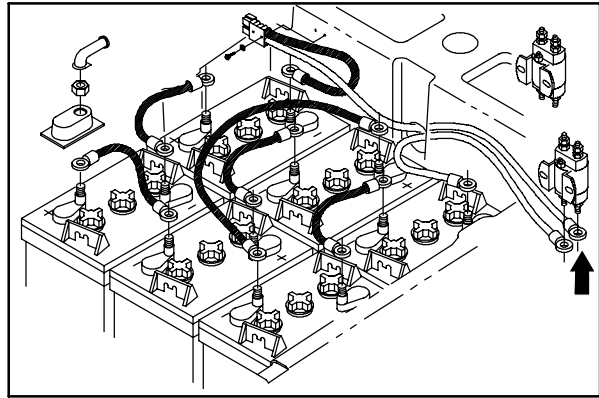
Keep all metallic objects off the top of the batteries, which may cause a short circuit. Replace any worn or damaged wires.

Check the electrolyte level in each battery cell before and after charging, and after every 50 hours of operation. Do not charge the batteries unless the fluid is slightly above the battery plates. If needed, add just enough distilled water to cover the plates. Never add acid to the batteries. Do not overfill. Always keep the battery caps on, except when adding water or taking hydrometer readings.

FOR SAFETY: When Servicing Machine, Avoid Contact With Battery Acid.

Measuring the specific gravity using a hydrometer is a way to determine the charge level and condition of the batteries. If one or more of the battery cells reads lower than the other battery cells (0.050 or more), the cell is damaged, shorted, or is about to fail.

NOTE: Do not take readings immediately after adding distilled water. If the water and acid are not thoroughly mixed, the readings may not be accurate. Check the hydrometer readings against the following chart to determine the remaining battery charge level:



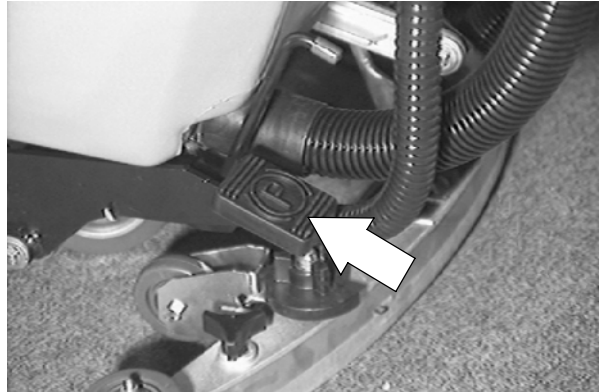
SPECIFIC GRAVITY at 27° C (80° F)	BATTERY CHARGE
1.265	100% Charged
1.185	50% Charged
1.148	25% Charged
1.110	Discharged
1.223	75% Charged

NOTE: If the readings are taken when the battery electrolyte is any temperature other than 27° C (80° F), the reading must be temperature corrected. Add or subtract to the specific gravity reading 0.004, 4 points, for each 6° C (10° F) above or below 27° C (80° F).

TO CHARGE BATTERIES

1. Drive the machine to a flat, dry surface in a well ventilated area.
2. Turn the machine power off and set the machine parking brake (optional).

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

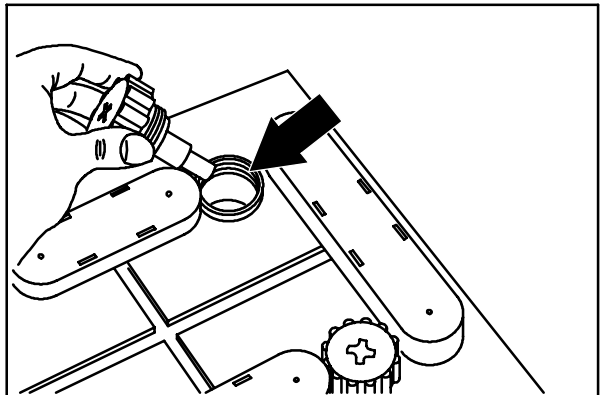


3. Lift up the solution tank to get access to the batteries.

NOTE: The solution tank must be empty.



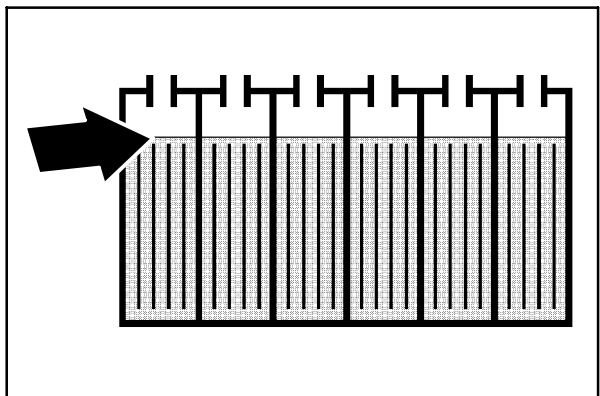
4. Check the water level in all the battery cells.



5. If the level is low, add just enough distilled water to cover the plates. DO NOT OVERFILL. The batteries can overflow during charging due to expansion.

NOTE: Make sure the battery caps are in place while charging.

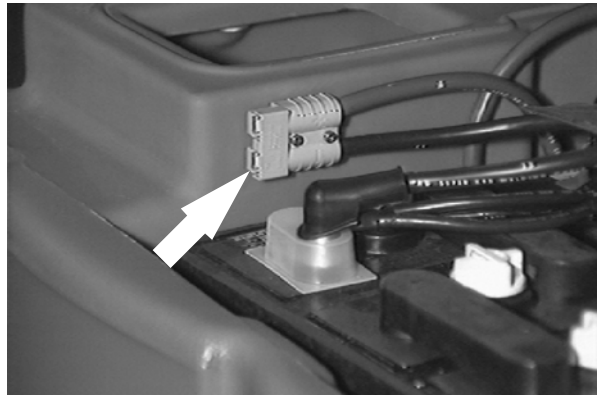
FOR SAFETY: When maintaining or servicing machine, avoid contact with battery acid.



6. Plug the charger connector into the battery connector.

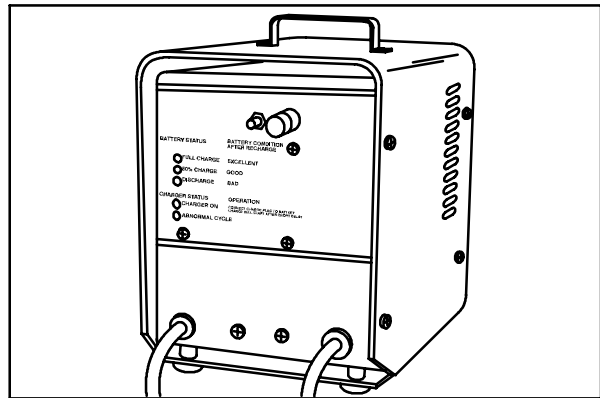


WARNING: Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep covers open when charging.



7. Plug the battery charger into the wall outlet.

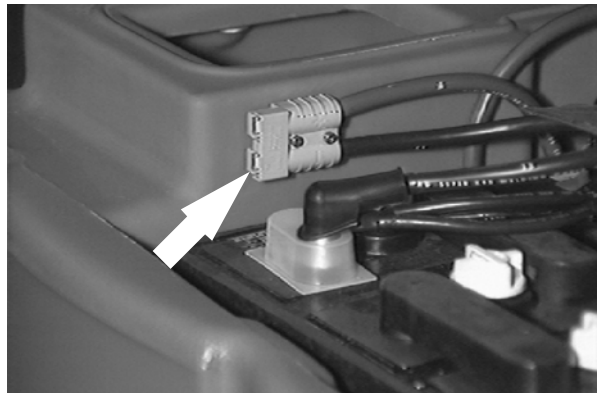
NOTE: If the red "ABNORMAL CYCLE" lamp lights when the TENNANT charger is plugged into a wall outlet, the charger cannot charge the battery and there is something wrong with the battery.



07224

8. The TENNANT charger will start automatically. When the batteries are fully charged, the TENNANT charger will automatically turn off.
9. After the charger has turned off, unplug the charger from the wall outlet.
10. Unplug the charger connector from the battery connector on the machine.

FOR SAFETY: When maintaining or servicing machine, avoid contact with battery acid.



11. Check the electrolyte level in each battery cell after charging. If needed, add distilled water to raise the electrolyte level to about 12 mm (0.4 in) below the bottom of the sight tubes.
12. Lower the solution tank.
13. Pull up on the support arm and rotate the stop arm out of the way to allow the solution tank to close completely.

PORTABLE BATTERY CHARGER
V SERIES MICROPROCESSOR CONTROL
MODELS V120-V240-V360

801-04

INSTRUCTION

C11524G 4293

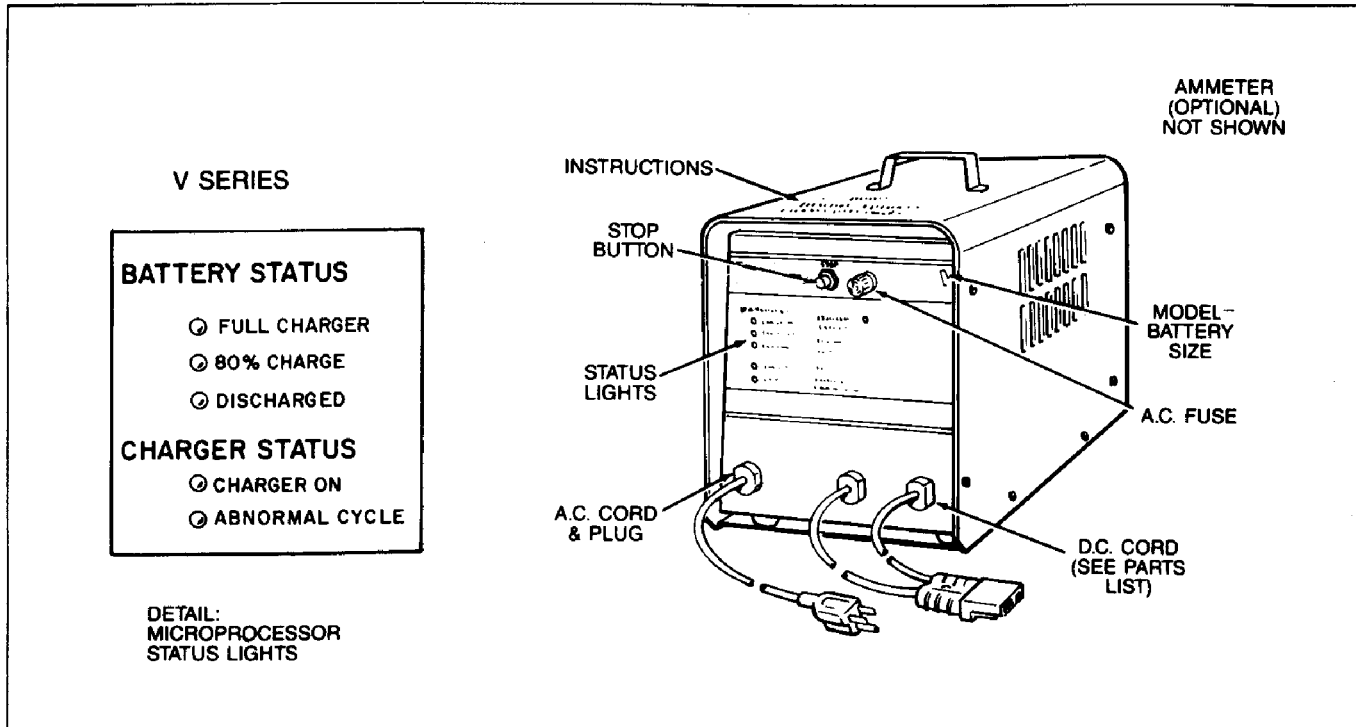


Figure 1. Battery Charger Model V

FEATURES

dv/dt microprocessor control circuit—State of the art microprocessor monitors battery condition and automatically determines when to shut the charger off.

Auto start/stop—Starts automatically after connecting charger to the battery. Eliminates potential operator error. No timers to set or buttons to push. Charger automatically stops after battery receives proper charge.

Fail-safe protection—Internal backup timer terminates

charge cycle in the event abnormal conditions prevent normal charger shutdown. Red Abnormal Cycle Charger Status light will illuminate to indicate above condition.

AC Interrupt Protection—In the event of an AC power interruption the charger automatically restarts upon the resumption of AC power.

Status Indicator Lights—Provides operator important operating information on both the charger and battery throughout the charge cycle.

Battery Status

Charge Complete—charger is off and battery is fully charged.

80% Charge—battery is gassing and approximately 80% charged.

Incomplete—battery is in a discharged state.

Charger Status

Charger ON—charger is energized and charging the battery.

Abnormal Cycle—charge was terminated by backup timer.

Energy Savings

Significant reductions in the cost required to charge a battery are made possible by the microprocessor control circuit. This is especially true with partially discharged batteries. Instead of running for a fixed period of time the automatic control terminates the charge cycle when the batteries are full.

OPERATION

Operation is completely automatic. Just connect battery to the charger and the automatic circuit takes control of the charge operation. By analyzing the rate of change in battery voltage, the charge control determines when the batteries are full and terminates the charge cycle. Batteries are completely charged each time - no overcharging or undercharging. The Automatic control is designed to extend battery life and reduce operation costs.

CHARGE CYCLE

In a typical charge sequence, when the charger is connected to the battery, the control circuit goes through an automatic self diagnostic check. Indicator lights flash indicating the check is in progress. After this sequence the red incomplete battery Status light illuminates. Following a short delay the charger initiates charge and the yellow Charger On indicator illuminates.

As the charge progresses the red incomplete light goes out and the yellow 80% Charge indicator illuminates.

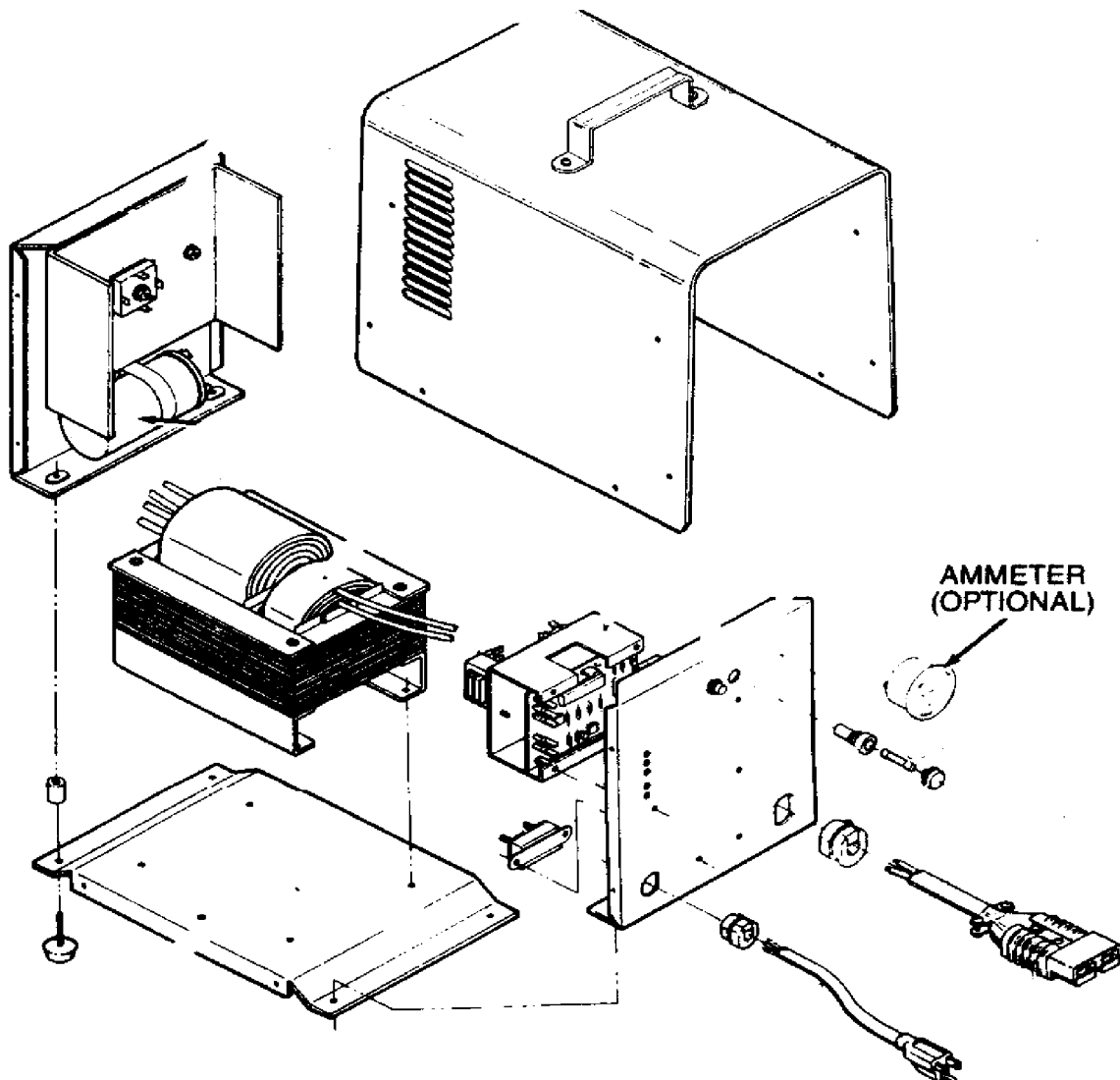
At this stage in the charge cycle the battery is gassing freely.

As the charge progresses further, the yellow indicator goes out and the green indicator illuminates indicating battery cell voltage is 2.5 volts per cell or more.

Finally when the microprocessor determines that the batteries are completely charged, the yellow Charger On light goes out indicating the charger is OFF. The green indicator remains on after charger turnoff to show the battery is in excellent condition. This Battery Status indicator remains on until the battery is disconnected from the charger.

THEORY OF OPERATION

The control circuit monitors rate of change of battery voltage. The microprocessor reads voltage at specific time intervals and stores the reading in memory. The stored reading is compared with the next reading. As long as the voltage rises faster than preestablished parameters, the microprocessor keeps cycling. As a battery approaches full charge the rate of change of voltage rise decreases. The automatic control determines if this rate of rise is proper to terminate the charge cycle.



2-1. INSTALLATION.

2-2. Installation of a charger consists of providing a proper AC power source and selecting a proper location. Even though the charger is portable, a permanent location for operation is strongly recommended. The permanent location must have enough room to bring in equipment for charging.

2-3. Always set the charger on a flat hard surface to insure proper air circulation under and around it. The area must be well ventilated, because explosive hydrogen gas is generated while charging the batteries. Exercise caution to avoid possible open flame or electrical sparks near the operation, the charger may be made accessible by keeping it on a sturdy, roller-type stand.

2-4. For general safety, do not place the charger on the floor. Make sure that the AC line cord (figure 1) and DC output cables do not obstruct traffic.

2-5. PRE-OPERATING PROCEDURE.

- a. Open cover on battery case and remove vent caps from battery.
- b. Check that each vent cap is clean and that each vent hole is open.

CAUTION Impurities in tap water will damage battery plates.

- c. Check fluid level in each cell and, if necessary, add enough filtered or distilled water to cover the battery plates, but do not allow fluid to rise into the cell filler necks. **ALWAYS FILL CELL, IF LOW, AFTER CHARGE CYCLE ONLY TO PROPER LEVEL. SEE BATTERY INSTRUCTIONS.**
- d. Check the specific gravity of each cell to determine the need for charging.
- e. Recharge the battery if any cell indicates a reading of 1.250 or less.

2-6. OPERATING PROCEDURE.

- a. Make sure the pre-operating procedure has been performed (para 2-5).

WARNING Hydrogen gas, formed while charging, is explosive. Avoid open flame or electrical spark near battery. To avoid accumulation of gas, be sure batteries are charged in a well ventilated area.

- b. Check that there is no open flame or electrical spark in the area.

CAUTION Improper A.C. power can damage the charger.

- c. Consult data plate on the charger to verify AC input power requirement.

WARNING An ungrounded or improperly grounded AC power source can cause severe electrical shock to the user.

- d. Connect the AC line cord into a properly grounded AC power source.
- e. Disconnect the battery from the electrical system at the DC connector.

NOTE Reverse polarity connection activates the circuit breaker and prevents the charger from operating.

- f. Connect the battery DC connector to the charger DC connector being careful to match polarity. The charger will start after a 5-second delay.
- g. After the charge is complete disconnect the DC connector from the battery. If the charge cycle needs to be interrupted, use STOP button to turn the charger off.
- h. Disconnect the AC line cord from the power source.
- i. Remove each battery cell vent cap and check the fluid level.

CAUTION Impurities in tap water will damage battery plates.

- j. Add, if necessary, enough filtered or distilled water to each cell to cover the battery plates, but not enough to allow fluid to rise into the cell filler neck.
- k. Replace the battery cell vent caps.
- l. Reconnect the battery to the electrical system.

3-1. PARTS IDENTIFICATION.

3-2. The parts list and illustration (page 5) identify replaceable parts. The callouts on the illustration correspond to the index number in the parts list. By visually comparing the part in the equipment, errors in ordering can be minimized.

3-3. ORDERING PARTS.

3-4. When ordering parts, be sure to include all of the following:

- a. Battery Charger Model No. (see data plate.)
- b. Battery Charger Serial No. (see data plate.)
- c. Battery Charger Spec. No. (see data plate.)
- d. Part number.
- e. Part name.
- f. Quantity of parts required.

TROUBLESHOOTING GUIDE MICROPROCESSOR dv/dt CHARGE CONTROL

Indicator Lamp Self Test Sequence

- A.C. Power Only — All 5 lamps flash 2 times, then each lamp flashes once.
- A.C. Power + D.C. Power — All 5 lamps flash 2 times, then each lamp flashes once, checking A.C. power. If D.C. is connected the test continues and all 5 lamps flash again then each lamp flashes once. When test completes there is a short delay and the charger turns on.
- No A.C. Power — No lamps will flash.

I. Will not turn on. No self test.

- A. Charge plug not connected to battery
1. Connect D.C. Plug.
- B. A.C. fuse or wall breaker open
1. See page 4.
- C. D.C. circuit breaker trips
1. See page 4.

E. Loose D.C. connection to control circuit.

1. Clean and tighten. Repair as found.
2. Check control circuit lead connections at both ends.

F. Loose A.C. connection in control circuit wires.

1. Check faston connections. Push tight.

G. If a loose connection is not found, bypass control circuit with a jumper across triac. (See connection diagram, place a jumper between points A & B). Plug in battery, turn wall connection "ON".

1. If charger is not on, contact Factory Service. Turn wall connection off and disconnect jumper.

WARNING THE FOLLOWING TEST REQUIRES WORKING IN CLOSE PROXIMITY TO HAZARDOUS HIGH VOLTAGES - BE EXTREMELY CAREFUL NOT TO TOUCH LIVE CONNECTIONS!!!!

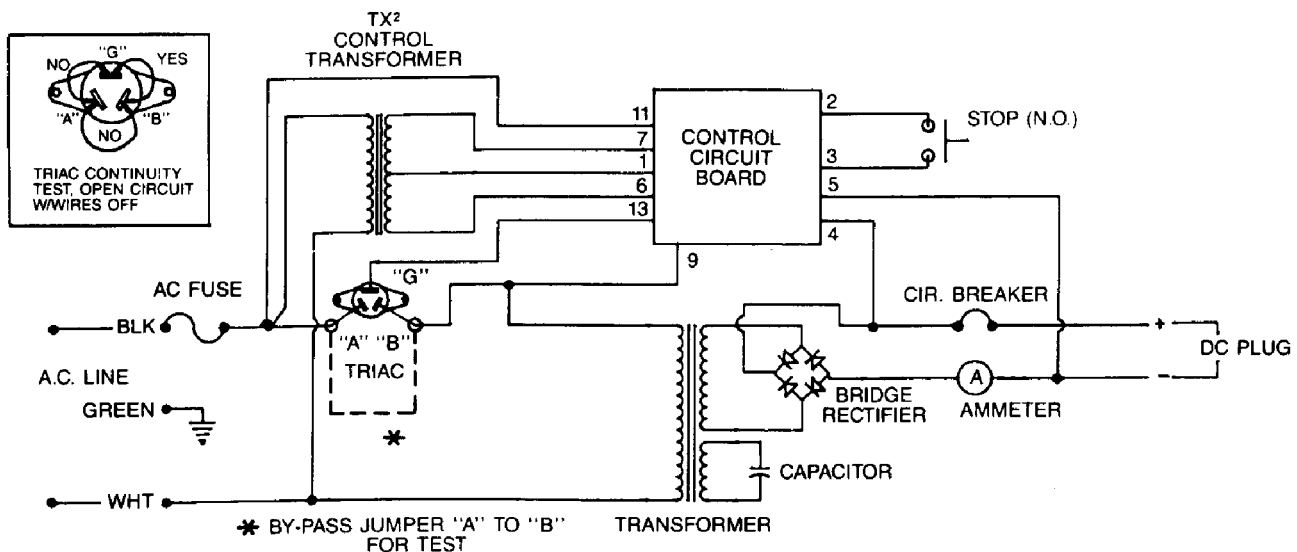
H. Turn Wall Connection "ON" and with a voltmeter set for 100 VAC check for 18V at the outside top connections of the small control transformer TX2.

1. If no voltage is found, turn off power and check wiring to TX2. If wiring is good, replace TX2.
2. If voltage is found remove control circuit and replace. (Contact factory for replacement.)

TURN WALL CIRCUIT OFF - DISCONNECT BATTERY PLUG

- D. Check that the circuit, battery, and charger are correct voltage.

CONNECTION DIAGRAM, V SERIES



TROUBLESHOOTING GUIDE

MICROPROCESSOR dv/dt CHARGE CONTROL

II. Will not turn on. Self test O.K.

A. Loose D.C. connection between battery and control circuit.

1. Clean and tighten. Repair as found.
2. Check control circuit lead connections at both ends.

B. Defective Triac.

1. Turn off power. Bypass control circuit with a jumper across triac. (See connection diagram.) Place jumper between points A & B. Plug in battery, turn wall connection "ON".
 - a. If charger turns on, turn off power, remove jumper, replace triac.
 - b. If charger does not turn on after triac replacement, turn off power, replace control circuit board.

III. Abnormal charge cycle lamp lit.

A. Battery not fully charged.

1. Battery and charger not matched. "Battery too big".
2. Check battery for shorted or open cell.
3. Check all D.C. connections between circuit board and battery.
 - a. Break D.C. connection to recycle and complete charge.
 - b. After complete charge, break D.C. connection and reconnect.

Charger should shut off in about 2 hours. If not shut off in 4 hours, contact factory for assistance.

IV. Does not turn off. Abnormal light not on.

A. Triac or Control Circuit failed.

1. Replace as required.

V. Early turn off (battery not charged). Less than 1 hour run time.

A. Loose D.C. connection.

1. Check all connections from battery to Control Circuit.
2. Test as in IIIA2 above.
3. If charger voltage and battery voltage are not matched. (Battery voltage being higher) Charger will shut off a few seconds after turn on.

Your charger incorporates very simple and reliable designs which makes troubleshooting relatively easy. Repair procedure involves testing individual components and isolating defective parts. The sequence of this procedure normally follows the flow of electricity through the circuit. Test procedures will be faster and more complete when a simple

A.C.-D.C. volt-ohmmeter is available and continuity tester (light) can be used.

WARNING Electric Shock Hazard-Before checking charger disconnect A.C. supply cord from receptacle and D.C. plug from batteries. Discharge capacitors with insulated screw driver.

NOTE For testing, charger will not operate unless connected to proper battery voltage or bypass jumper on triac.

TROUBLE	CAUSE	REMEDY
1. Low charge current	1.a Open condenser	1.a See Special Instructions #1 below.
	1.b Open bridge	1.b See Special Instructions #2 below.
2. A.C. Wall breaker trips.	2.a Shorted bridge rectifier	2.a See Special Instructions #2 below.
	2.b Shorted transformer primary	2.b Replace

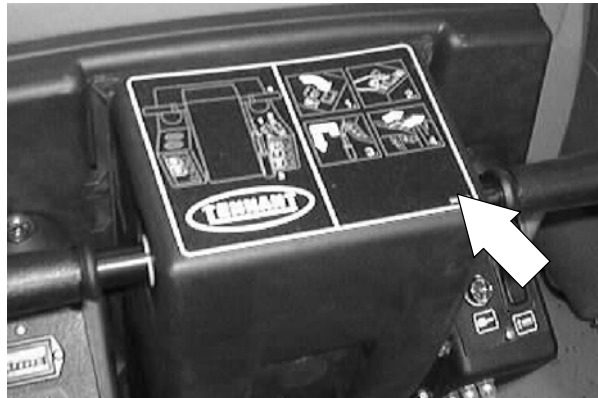
SPECIAL INSTRUCTIONS

#1 Condenser Check Out - Short out with insulated screwdriver before test. Disconnect leads, set ohmmeter to highest scale with leads to condenser terminals. If needle deflects (mid-scale) and is followed by a deflection in the opposite direction, condenser is good. If no deflection, condenser is open. A shorted condenser will indicate continuity.

#2 Bridge Rectifier Checkout - The full wave bridge rectifier can be tested for a defective diode either with a test light with a battery or a volt-ohmmeter. Set the ohmmeter to RX1K (highest scale). Touch one probe to the positive terminal on the bridge rectifier (marked), touch the other probe to the two unmarked terminals (A.C. terminals). Reverse the position of the ohmmeter probes and retouch the unmarked terminals with the probe that is not on the positive terminal. Repeat the process using the negative terminal on the bridge rectifier (marked). The needle (or light) should indicate continuity in one direction ONLY when checking the positive terminal and one direction ONLY when checking the negative terminal. Continuity in both directions or no continuity indicates a defective bridge rectifier; replace. To check for open diode, disconnect one of the A.C. leads from the rectifier and repeat the above test.

INSTRUMENT PANEL

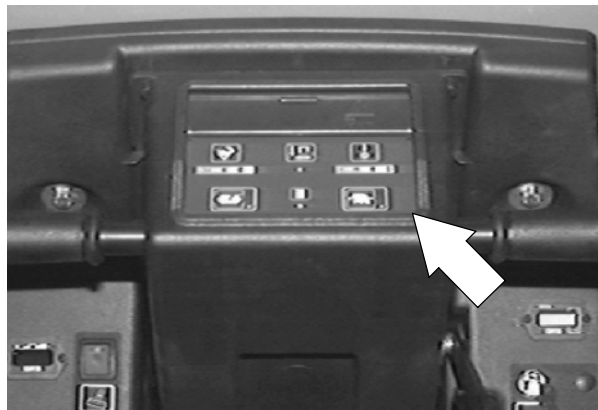
The Model 5680/5700 adjustable instrument panel contains the speed control handle, voltage meter, brush down pressure gauge, rocker switch, and adjustment latch. This panel can be adjusted up and down by the operator.



The inner panel contains the key, circuit breakers, hour meter, and any optional switches.



The optional 5700 XP instrument panel consists of a circuit board, a touch panel, and a water/dust resistant plastic enclosure. Its touch panel controls various machine functions, while its indicator lights keep the operator informed on the machine performance.

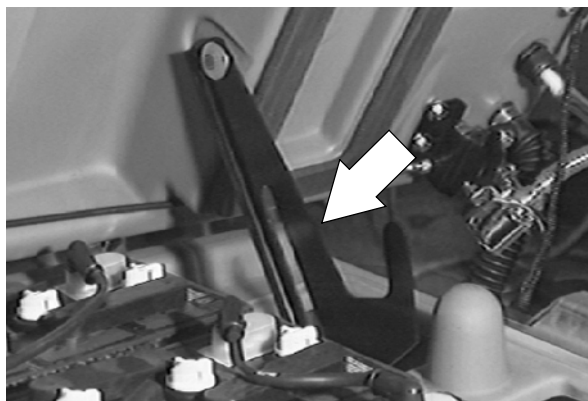


ELECTRICAL

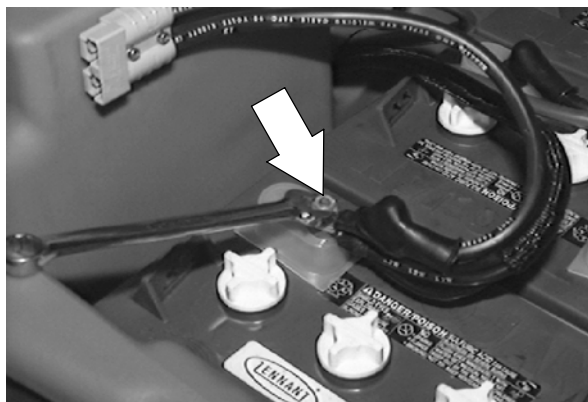
TO REMOVE INSTRUMENT PANEL

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

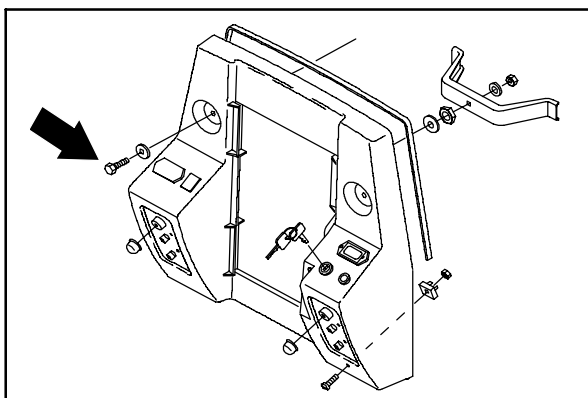
1. Make sure the solution tank is empty. Raise the solution tank and engage the safety arm.



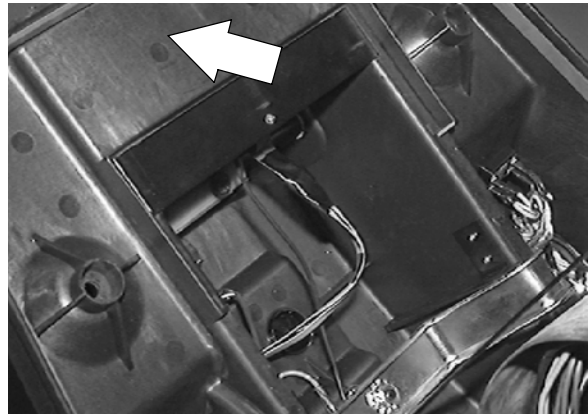
NOTE: Disconnect the negative battery cable from the battery nearest the back of the machine before servicing any electrical components.



2. Remove the M8 hex screws holding the rear electrical panel to the electrical mounting plate. Tilt the panel out.



3. Tilt the instrument panel assembly back until it is resting against the lanyard strap.



4. All of the electrical components that are contained in the instrument panel and on the electrical mount panel, can now be easily accessed.

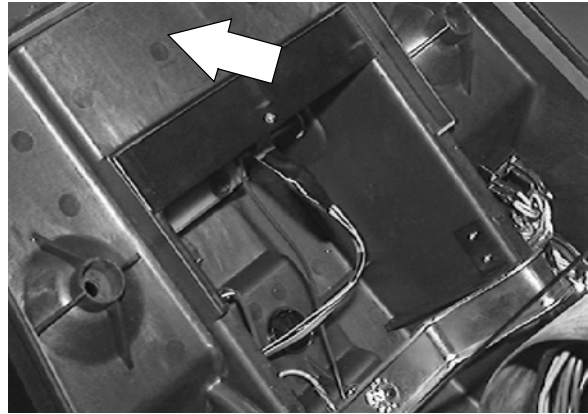


TO INSTALL INSTRUMENT PANEL

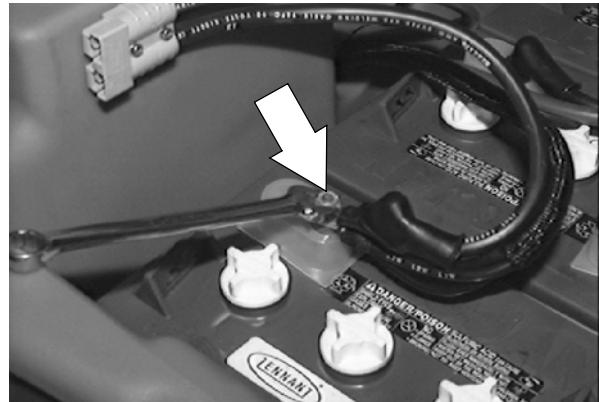
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Pivot the instrument panel assembly back up to the electrical mount panel. Reinstall the two M8 hex screws and hand tighten.

NOTE: Make sure all the wires are out of the way of any pinch points when pivoting the instrument panel back into position.



2. Re-connect the negative battery cable to the battery nearest the back of the machine.



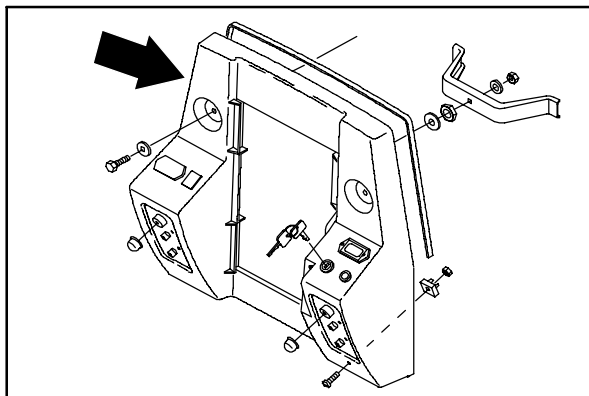
3. Close the solution tank and operate the machine, checking for proper operation.



TO REPLACE POWER CONTACTOR

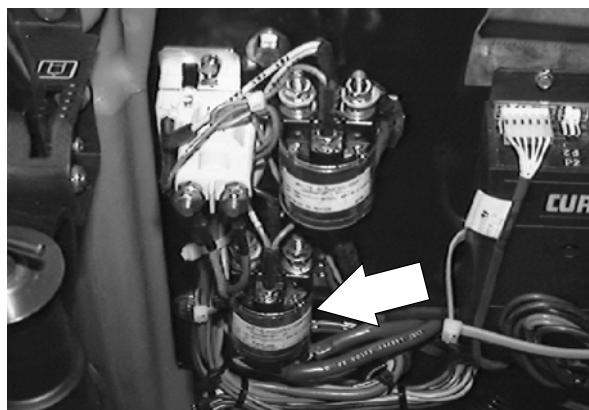
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

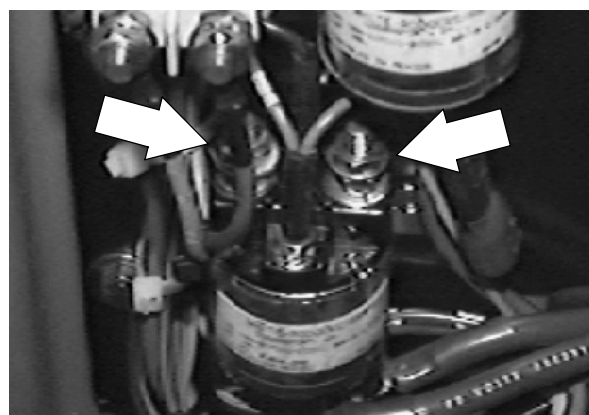


2. Locate the power contactor on the bottom, left side of the electrical mount panel.

ATTENTION: Double check to make sure the batteries are disconnected from the machine.

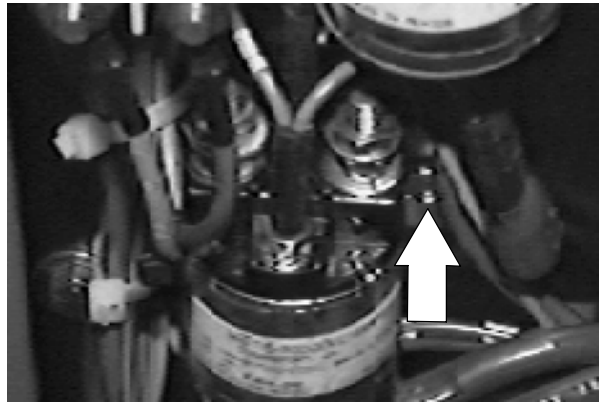


3. Disconnect the wire harness from the power contactor.

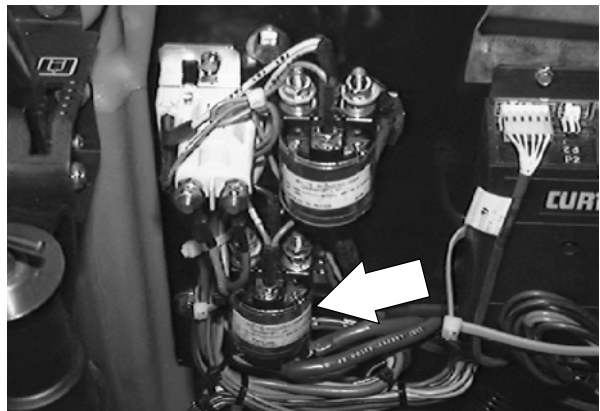


ELECTRICAL

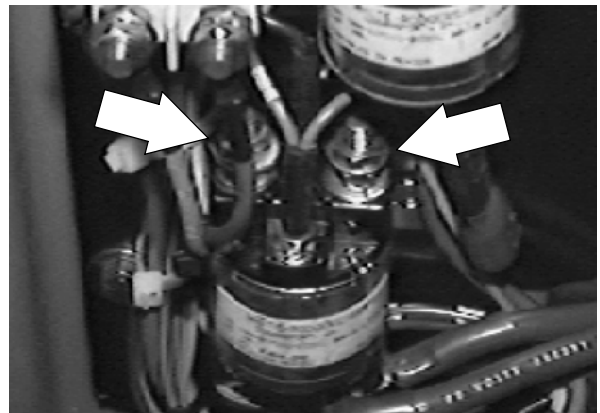
4. Remove the two M6 thread rolling screws holding the power contactor to the electrical mount panel. Remove the contactor from the machine.



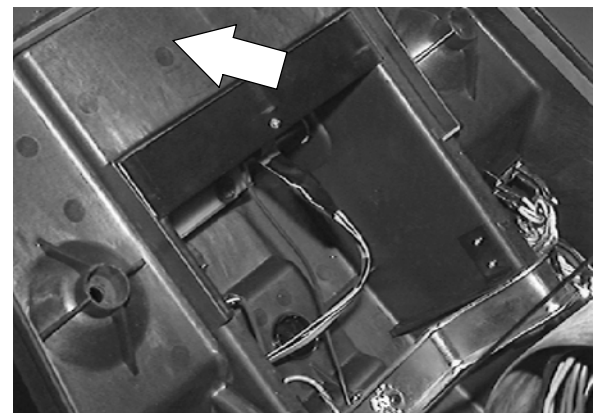
5. Position the new power contactor on the electrical mount panel. Reinstall the two M6 hex screws and tighten to 8 - 10 Nm (5 - 7 ft lb).



6. Reconnect the wire harness to the power contactor. See the electrical schematic in this section.



7. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.

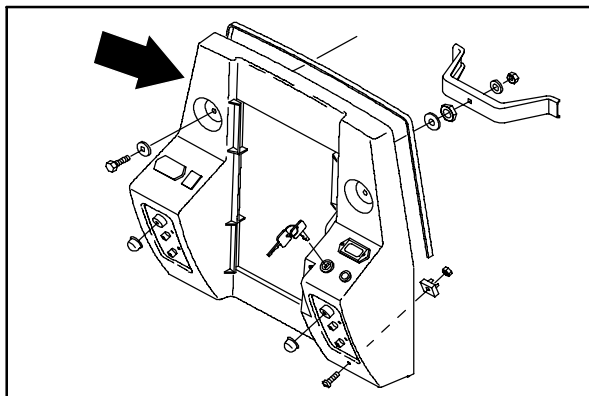


8. Operate the machine, checking for proper operation.

TO REPLACE 36 VOLT CONTACTOR

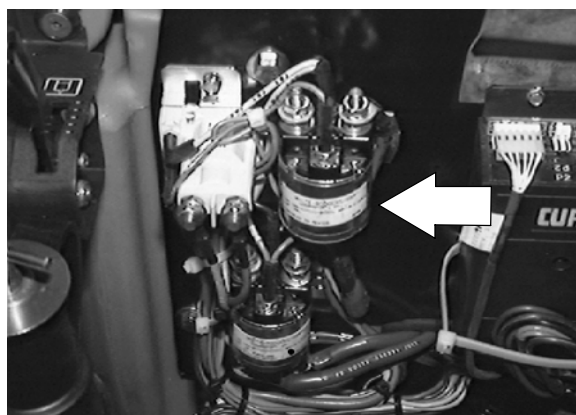
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

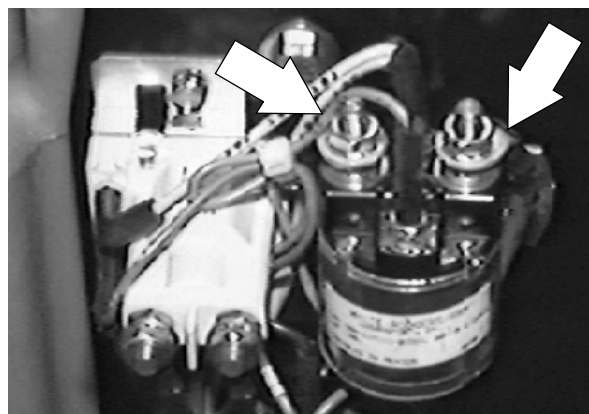


2. Locate the 36 volt contactor on the top, left side of the electrical mount panel.

ATTENTION: Double check to make sure the batteries are disconnected from the machine.

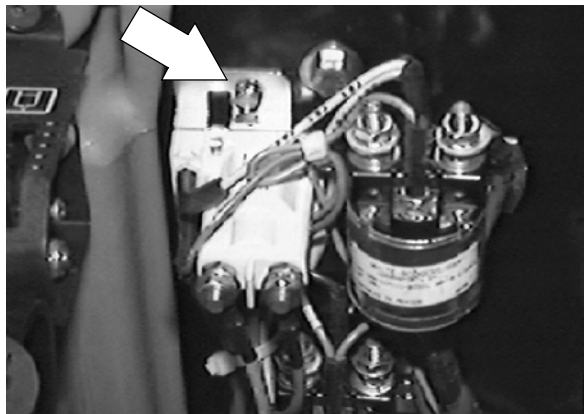


3. Disconnect the wire harness from the 36 volt contactor.

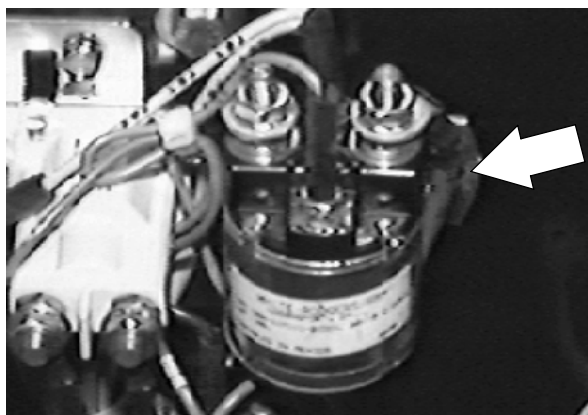


ELECTRICAL

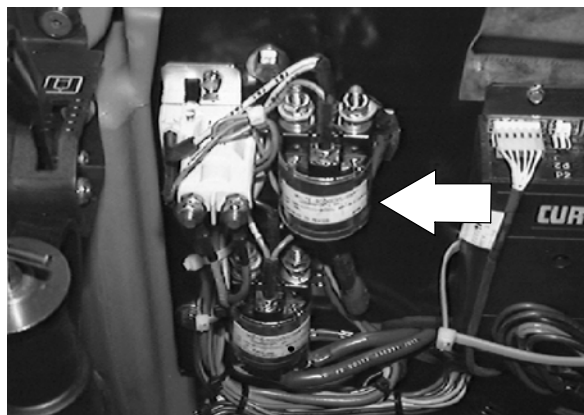
4. To access the left side hardware on the 36 volt contactor, it is necessary to remove the hardware on the smaller, white contactor. Leave the wires on the smaller, white contactor.



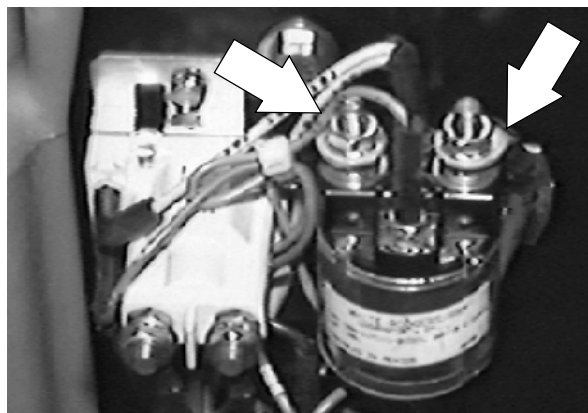
5. Remove the two M6 thread rolling screws holding the 36 volt contactor to the electrical mount panel. Remove the contactor from the machine.



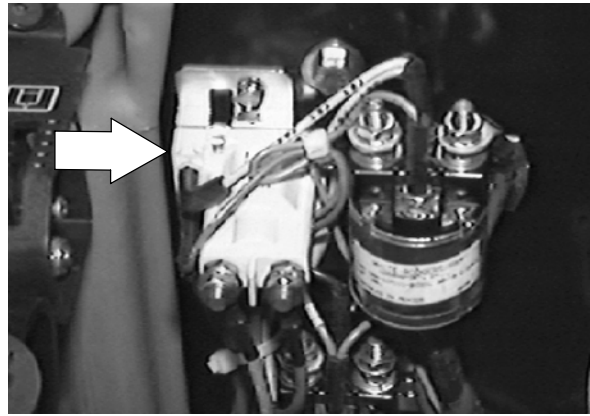
6. Position the new 36 volt contactor onto the electrical mount panel. Reinstall the two M6 thread rollers and tighten to 8 – 10 Nm (5 – 7 ft lb).



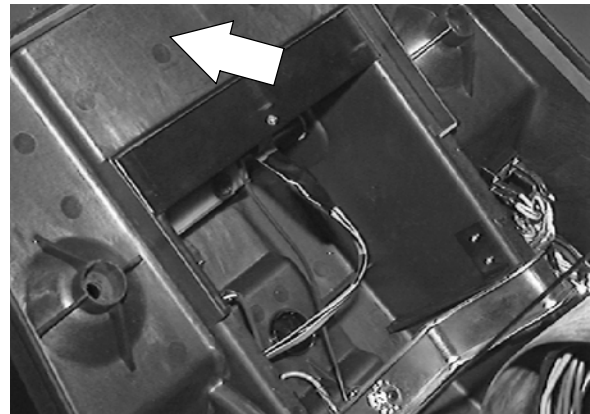
7. Reconnect the wire harness to the power contactor. See the electrical schematic in this section.



8. Reinstall the smaller, white contactor to the electrical mount panel. Reinstall the two M6 thread rollers and tighten to 8 – 10 Nm (5 – 7 ft lb).



9. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.

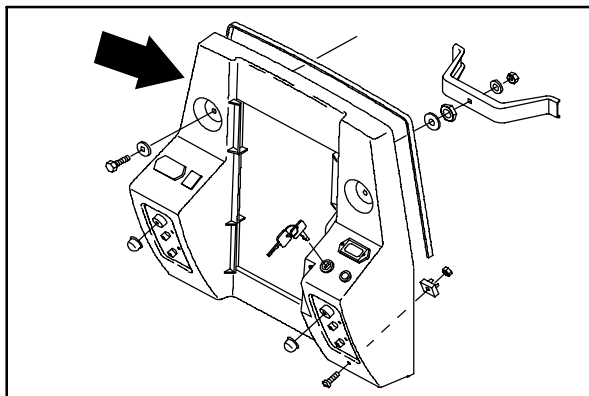


10. Operate the machine, checking for proper operation.

TO REPLACE WHITE SPST CONTACTOR

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

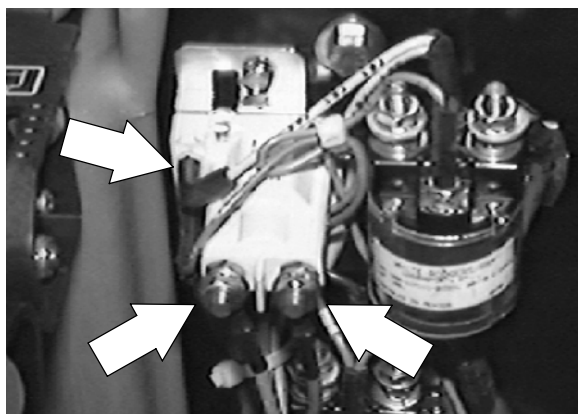


2. Locate the white SPST contactor on the left side of the electrical mount panel. Its the white contactor on the far left.

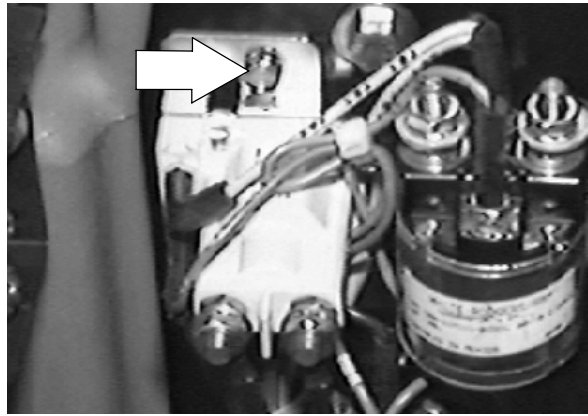
ATTENTION; Double check to make sure the batteries are disconnected from the machine.



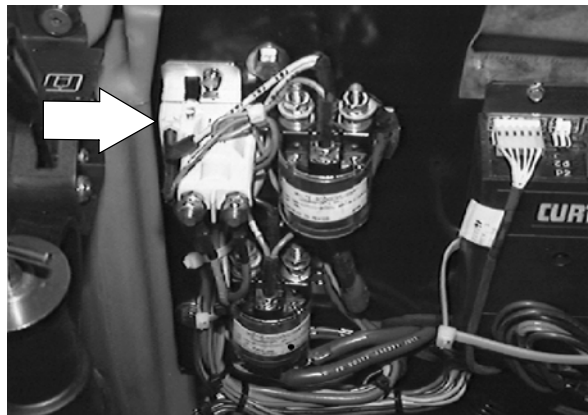
3. Disconnect the wire harness from the SPST contactor.



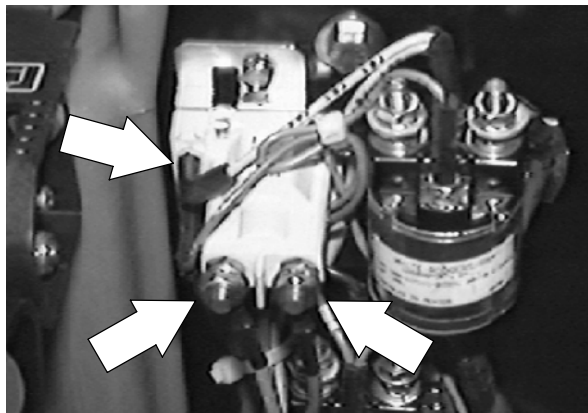
4. Remove the two M6 thread rolling screws holding the SPST contactor to the electrical mount panel. Remove the contactor from the machine.



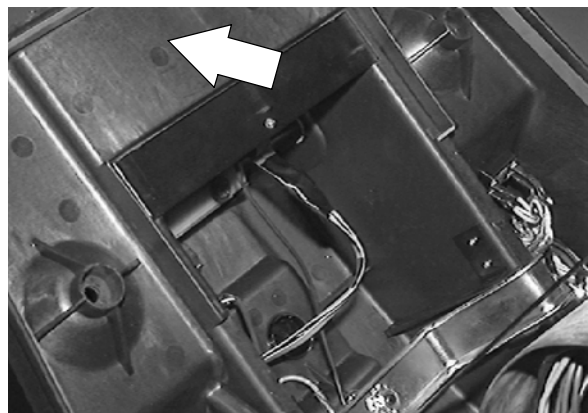
5. Position the new SPST contactor onto the electrical mount panel. Reinstall the two M6 thread rollers and tighten to 8 - 10 Nm (5 - 7 ft lb).



6. Reconnect the wire harness to the SPST contactor. See the electrical schematic in this section.



7. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.

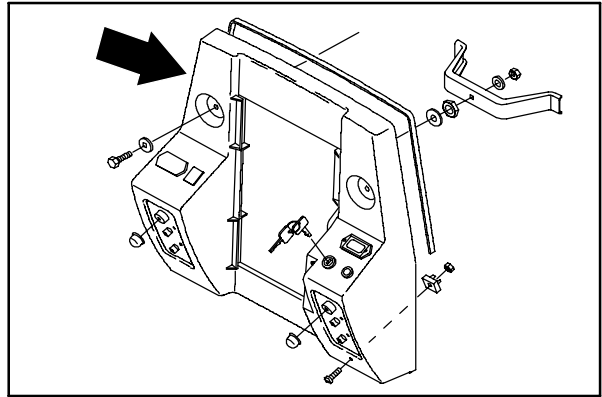


8. Operate the machine, checking for proper operation.

TO REPLACE 5680/5700 CONTROL RELAY

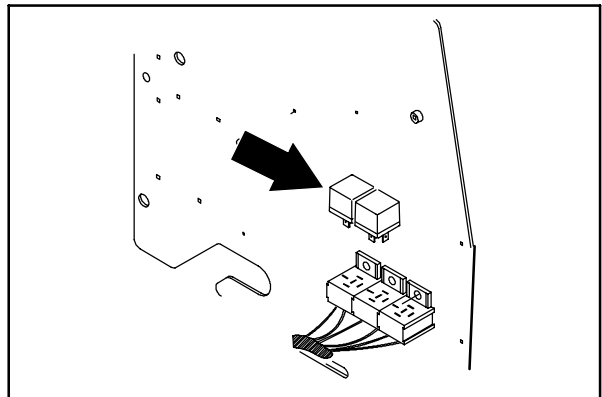
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.



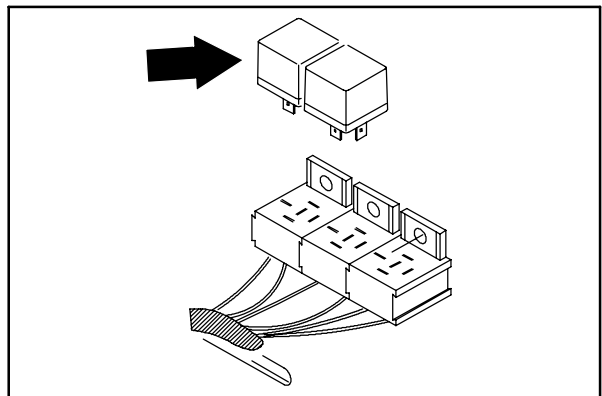
2. Locate the control relays on the right hand side of the electrical mount panel.

ATTENTION: Double check to make sure the batteries are disconnected from the machine.

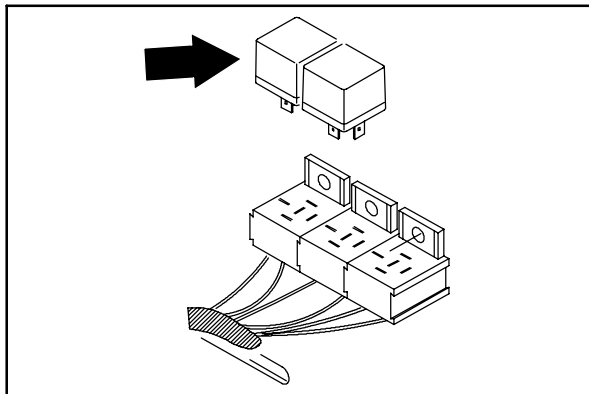


3. Remove the faulty relay by pulling it straight up.

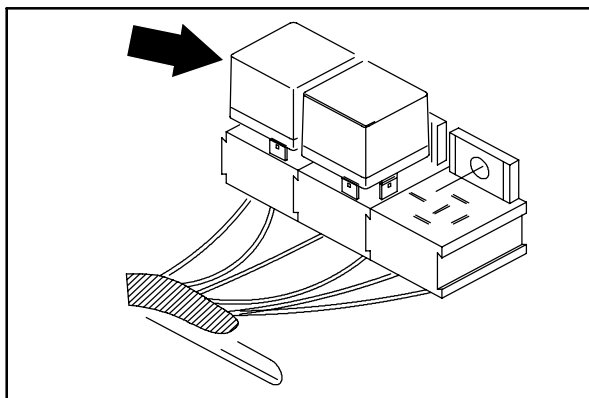
NOTE: A small, flat screw driver can be used to help pry the relay from mounting base.



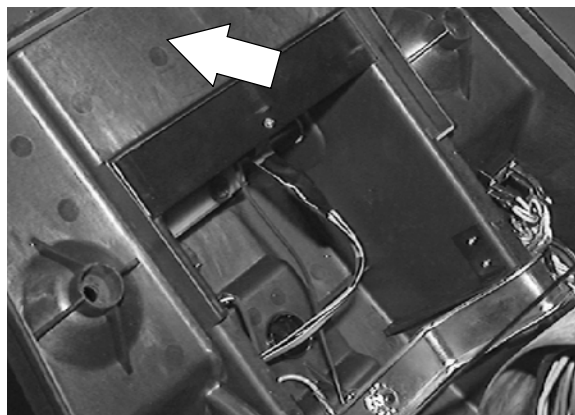
4. Position the new relay on the relay base. Make sure the male terminals line up with the female slots in the base.



5. Push the relay down into the base connectors.



6. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.

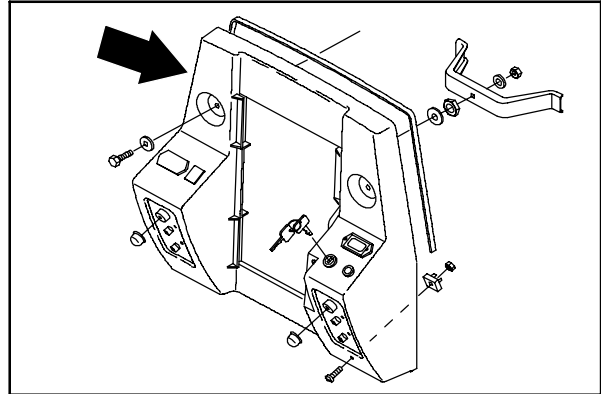


7. Operate the machine, checking for proper operation.

TO REPLACE SPEED CONTROLLER 5680/5700/5700 XP

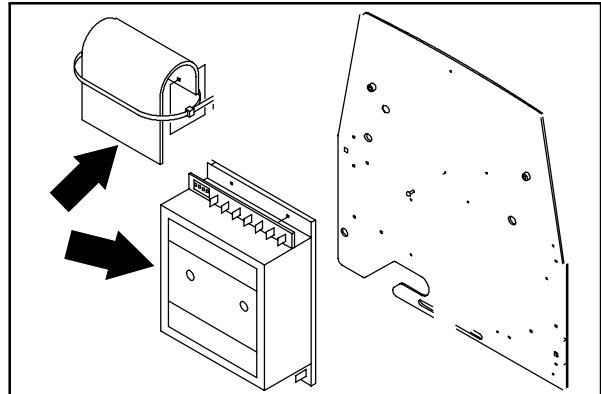
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

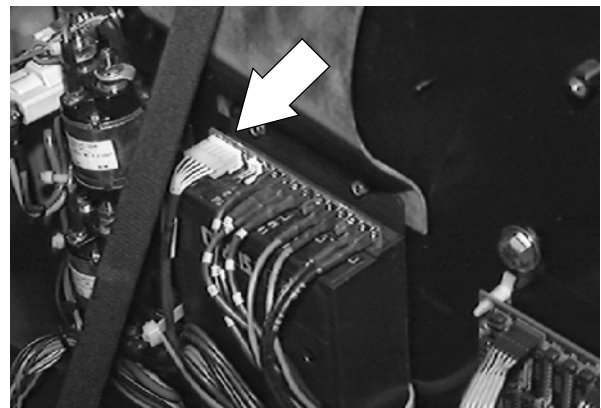


2. Locate the speed controller under the rubber shield in the center of the electrical mount plate. Pull the rubber flap up and out of the way.

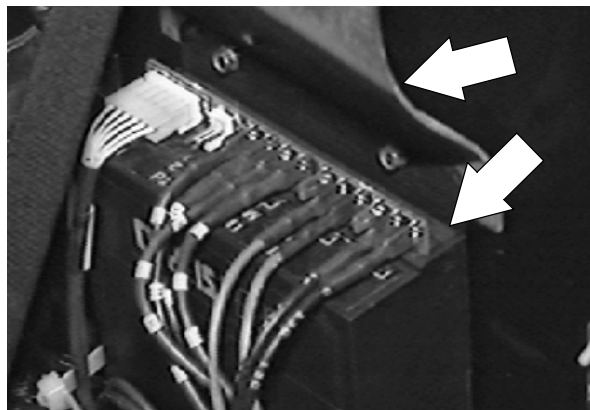
ATTENTION; Double check to make sure the batteries are disconnected from the machine.



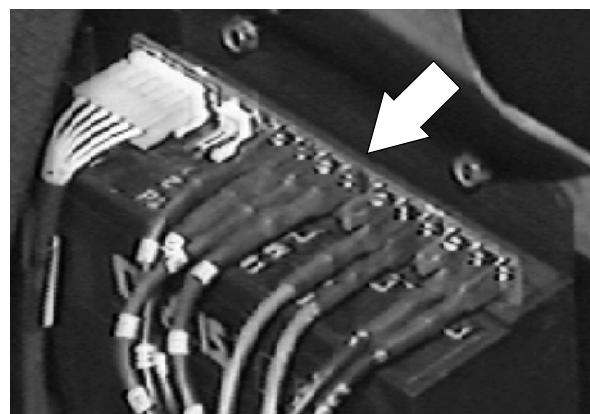
3. Disconnect the wire harness from the speed controller.



4. Remove the four M4 hex screws holding the speed controller to the electrical mount plate. Remove the speed controller from the machine. *Retain the rubber shield.*



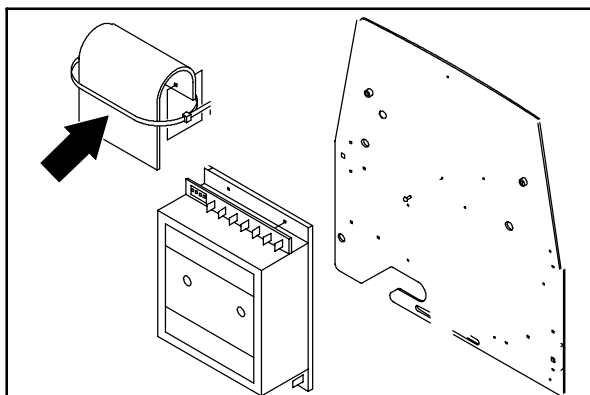
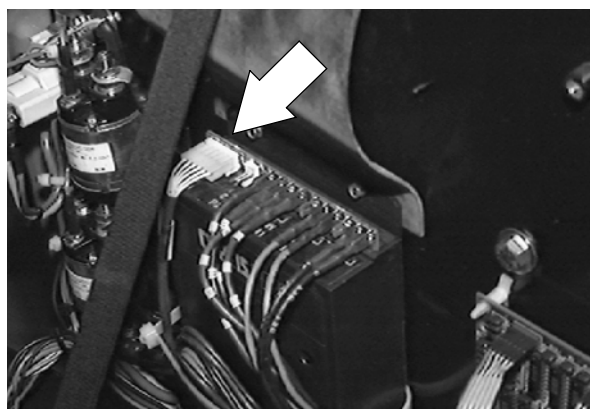
5. Position the new speed controller on the electrical mount plate. Make sure the electrical terminals are on top. Reinstall the rubber shield and the four M4 hex screws. Tighten to 223 - 290 Ncm (19 - 25 in lb).



6. Reconnect the speed control to the main harness. See ELECTRICAL SCHEMATIC in this section.

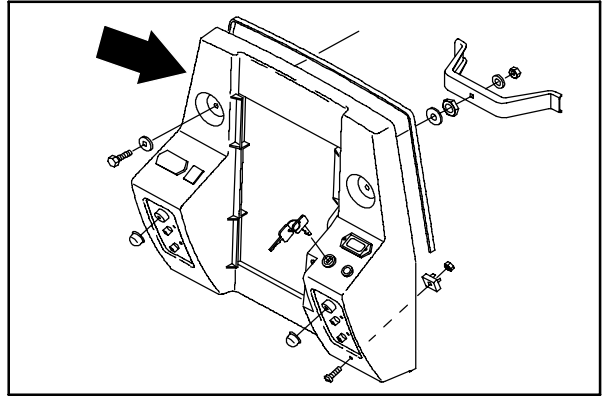
ATTENTION; On the 5700, when reconnecting the six pin connector to the controller, make sure the GREEN lead is on the right and the RED, WHITE, and BLACK leads are on the left

7. Put a small amount of dielectric grease on the terminals of this low voltage circuit to protect it against condensation and corrosion, (part # 86385).
8. Place the rubber shield back under the plastic tie.



9. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.

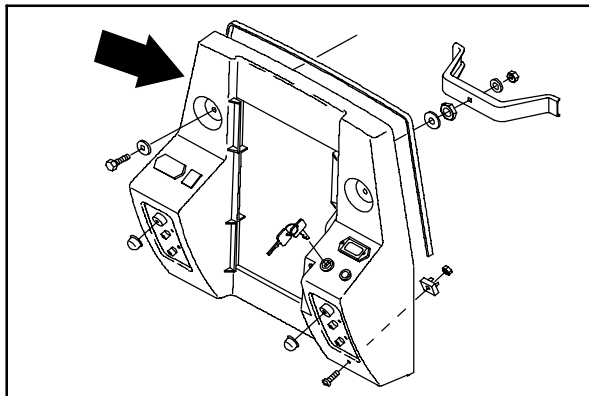
10. Operate the machine, checking for proper operation.



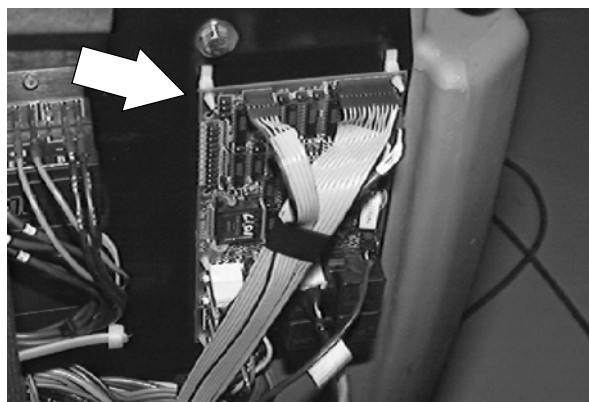
TO REPLACE ELECTRONIC CONTROL BOARD 5700 XP/XPS

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

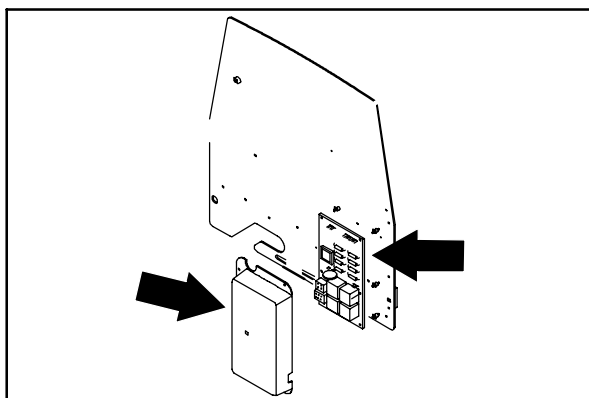


2. Locate the electronic control circuit board under the plastic cover on the lower right side of the electrical mount plate.

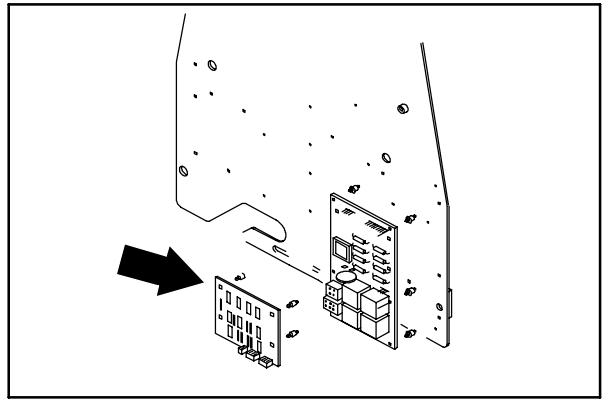


3. Remove the four M4 hex screws holding the plastic cover to the electrical mount plate. Remove the cover.

ATTENTION: Double check to make sure the batteries are disconnected from the machine.



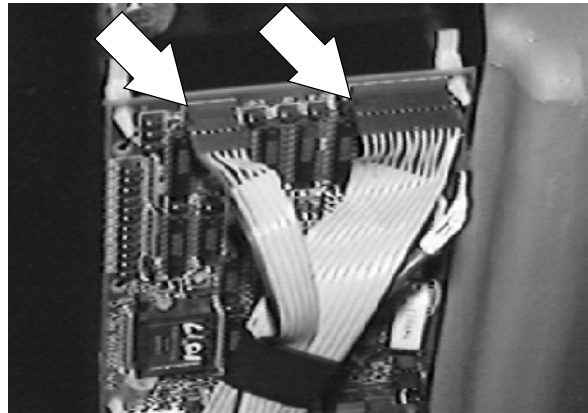
4. On the XPS model, the smaller circuit board must be removed first. See TO REPLACE ELECTRONIC CIRCUIT BOARD 5700 XPS instructions in this section.



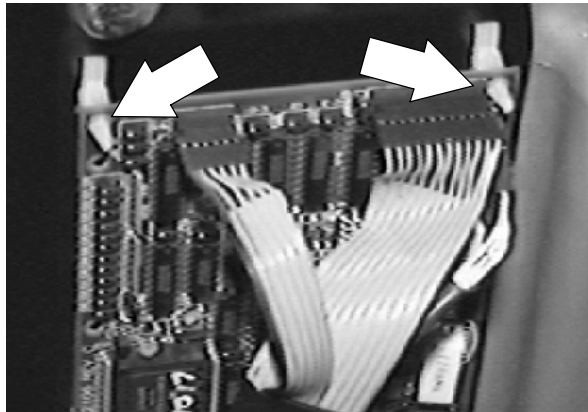
5. Carefully disconnect the ribbon cables and wire harness connectors on the electronic control board.

ATTENTION: On 5700 XP models only, serious damage will occur to the controller if the ribbon cable removed from terminal P1 is accidentally placed on terminal P6.

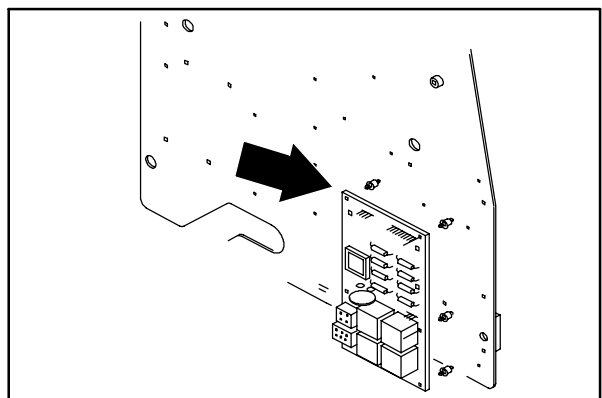
NOTE: The flat connector on the ribbon cable has a tight fit to the circuit board. Use two hands when carefully pulling it off the pins.



6. Using a small needle nose pliers, compress the tang on each of the circuit board clips holding the board to the electrical mount plate. Remove the board.

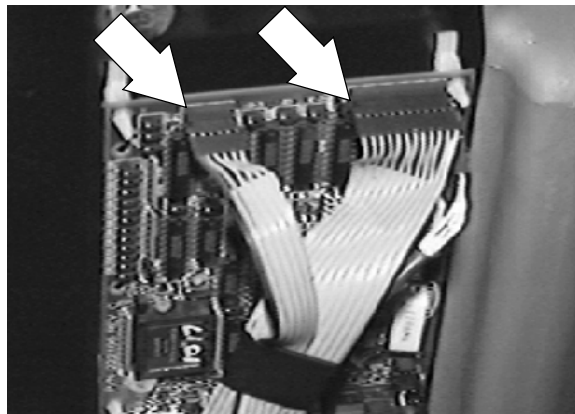


7. Position the new electronic control board onto the electrical mount plate. Gently push the board onto the circuit board clips.



8. Reconnect the electronic control circuit board to the main harness. See electrical schematic in this section.

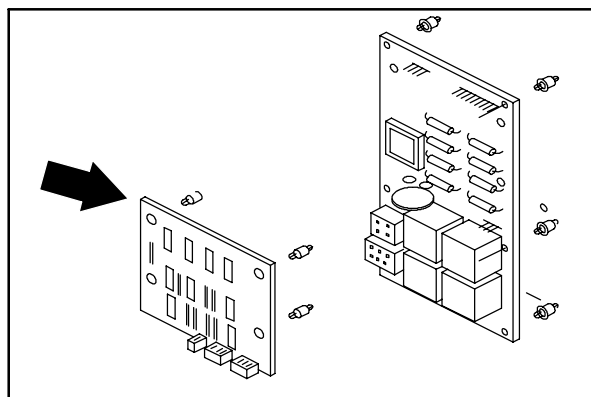
ATTENTION: On 5700 XP model only, serious damage will occur to the controller if the ribbon cable removed from terminal P1 is accidentally placed on terminal P6.



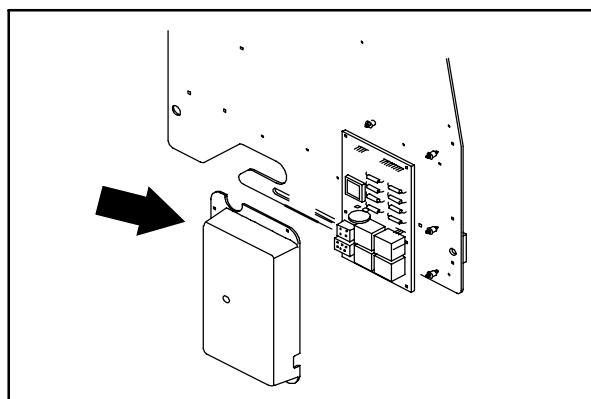
9. Reinstall the smaller circuit board. See TO REPLACE ELECTRONIC CIRCUIT BOARD 5700 XPS instructions in this section.

10. Put a small amount of dielectric grease on the terminals of this low voltage circuit to protect it against condensation and corrosion, (part # 86385).

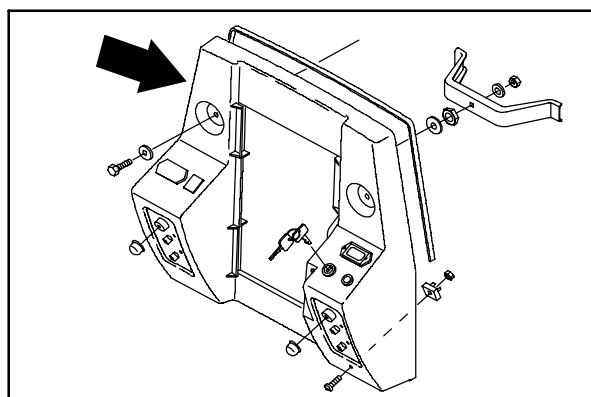
NOTE: The flat connector on the ribbon cable has a tight fit to the circuit board. Use two hands when carefully pushing it onto the pins.



11. Reinstall the plastic cover over the electronic control circuit board. Tighten the four M4 hex screws to 223 - 290 Ncm (19 - 25 in lb).



12. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.

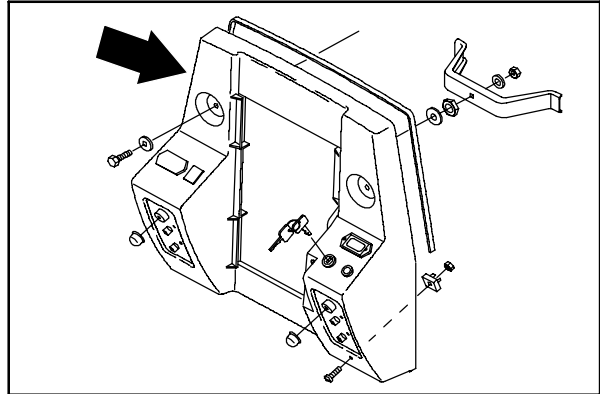


13. Operate the machine, checking for proper operation.

TO REPLACE PROPELLING CONTROL CIRCUIT BOARD 5700 XPS

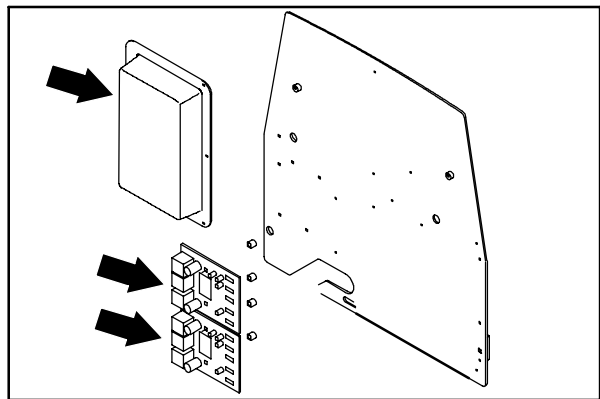
FOR SAFETY: Before Leaving Or
Servicing Machine; Stop On Level
Surface, Set parking brake (optional),
Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

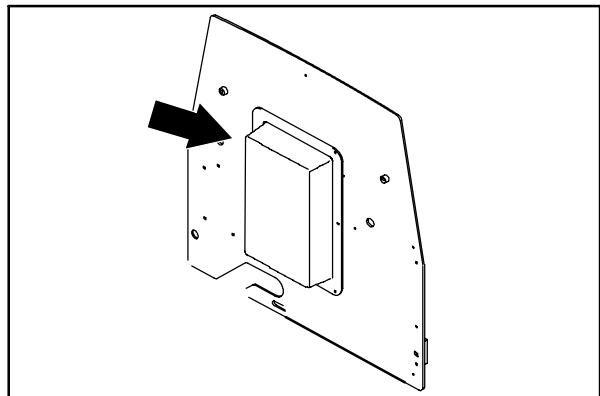


2. Locate the propelling control circuit boards under the plastic cover in the center of the electrical mount plate.

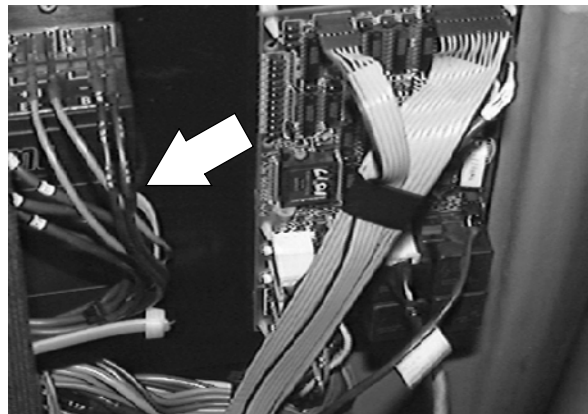
ATTENTION: Double check to make sure
the batteries are disconnected from the
machine.



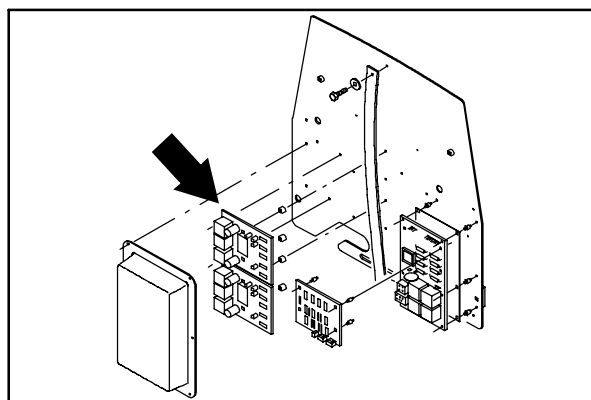
3. Remove the four M4 hex screws holding the plastic cover to the electrical mount plate. Remove the cover.



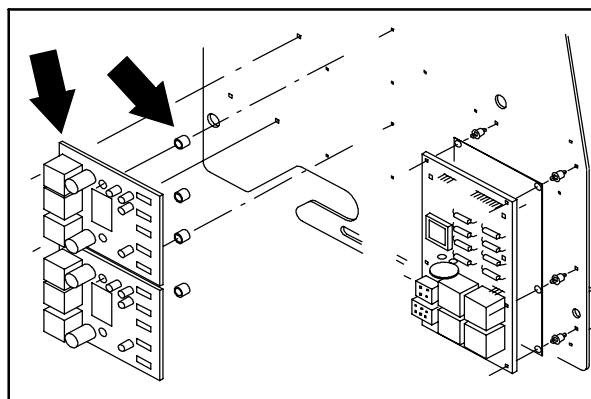
4. Carefully disconnect the wire harness connectors on the circuit board that needs replacing.



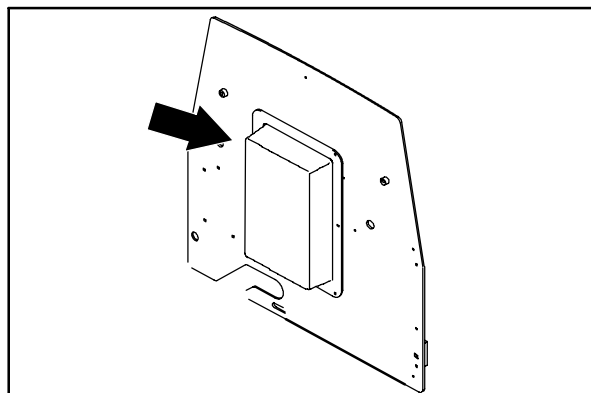
5. Remove the two M4 hex screws holding the circuit board to the electrical mount plate. Be careful not to loose the two spacers behind the board.



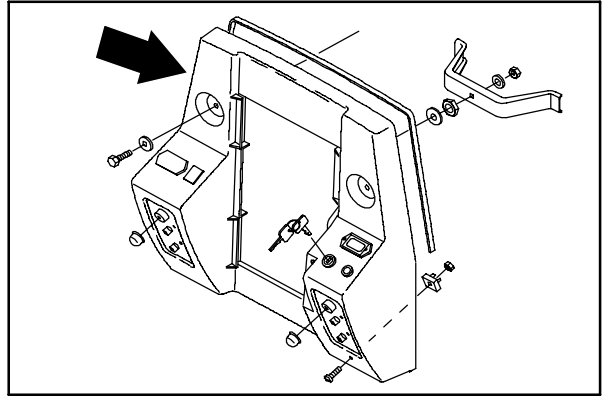
6. Position the new propelling control circuit board on the electrical mount plate. Place the two M4 hex screws through the circuit board and through the spacers. Align the hex screws with the mounting holes in the electrical mount plate. Lightly hand tighten.



7. Reconnect the propelling control circuit board to the main harness. See electrical schematic in this section.
8. Put a small amount of dielectric grease on the terminals of this low voltage circuit to protect it against condensation and corrosion, (part # 86385).
9. Reinstall the plastic cover over the propelling control circuit boards. Tighten the four M4 hex screws to 223 – 290 Ncm (19 – 25 in lb).



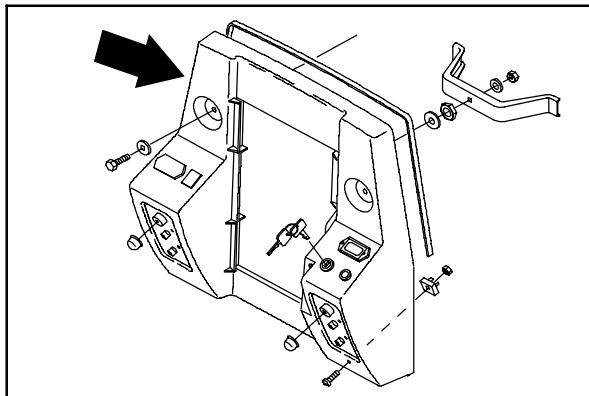
10. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.
11. Operate the machine, checking for proper operation.



**TO REPLACE ELECTRONIC CIRCUIT BOARD
5700 XPS**

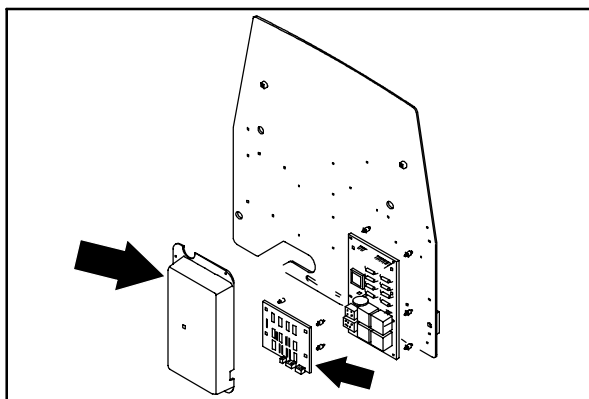
**FOR SAFETY: Before Leaving Or
Servicing Machine; Stop On Level
Surface, Set parking brake (optional),
Turn Off Machine And Remove Key.**

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

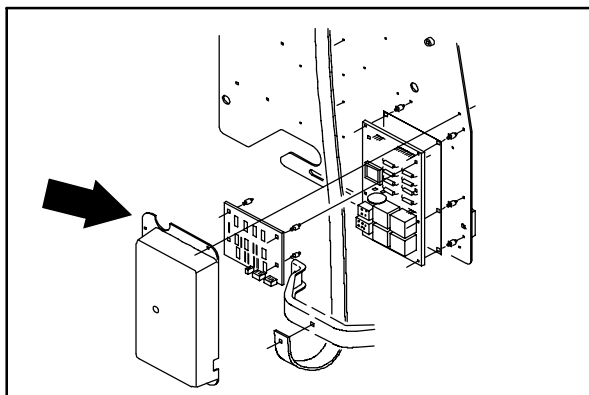


2. Locate the electronic circuit board under the plastic cover on the lower right side of the electrical mount plate.

**ATTENTION: Double check to make sure
the batteries are disconnected from the
machine.**



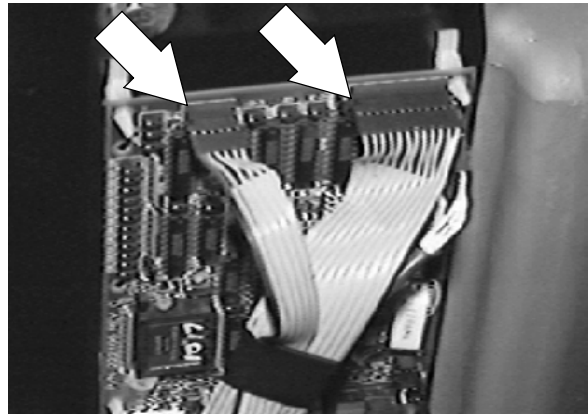
3. Remove the four M4 hex screws holding the plastic cover to the electrical mount plate. Remove the cover.



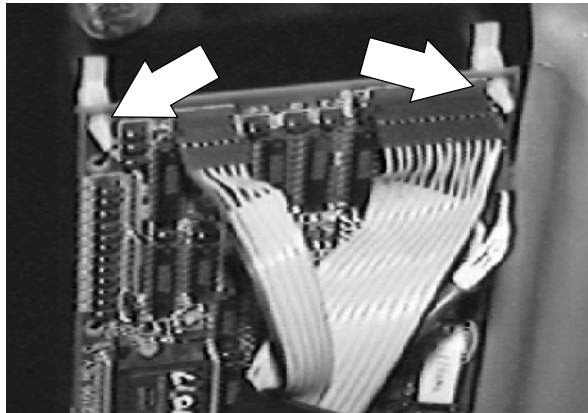
ELECTRICAL

4. Carefully disconnect the ribbon cables and wire harness connectors on the electronic circuit board.

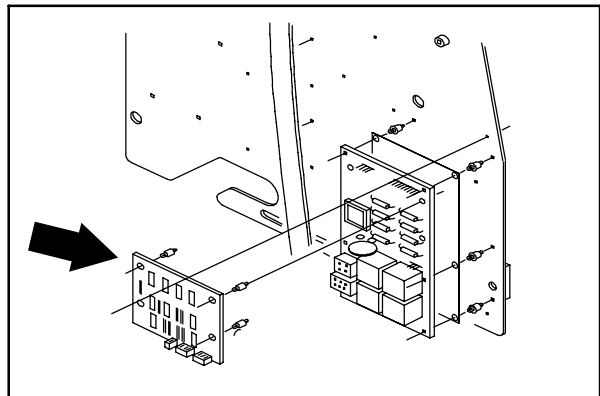
NOTE: The flat connector on the ribbon cable has a tight fit to the circuit board. Use two hands when carefully pulling it off the pins.



5. Using a small needle nose pliers, compress the tang on each of the circuit board clips holding the board to the electronic control board below it. Remove the board.



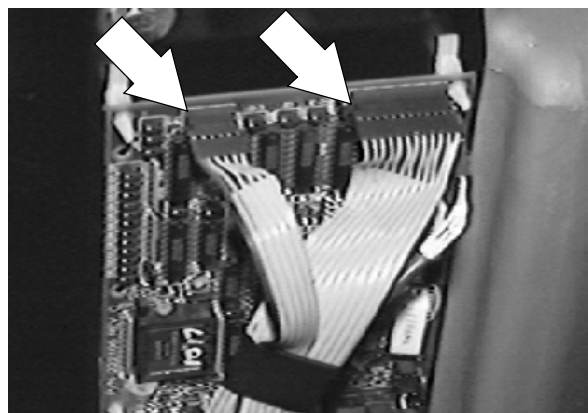
6. Position the new electronic circuit board on the electronic control board. Gently push the circuit board onto the clips.



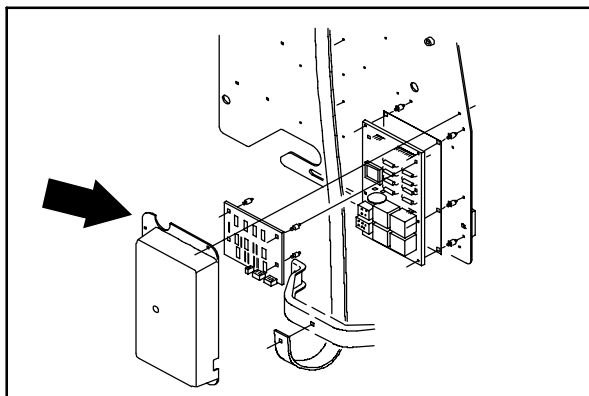
7. Reconnect the electronic control circuit board to the main harness. See electrical schematic in this section.

8. Put a small amount of dielectric grease on the terminals of this low voltage circuit to protect it against condensation and corrosion, (part # 86385).

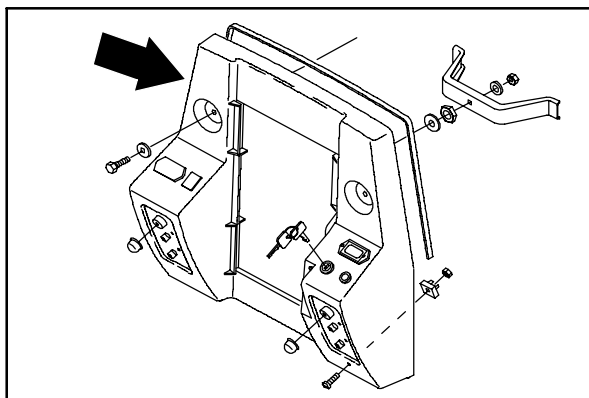
NOTE: The flat connector on the ribbon cable has a tight fit to the circuit board. Use two hands when carefully pushing it onto the pins.



9. Reinstall the plastic cover over the electronic control circuit board. Tighten the four M4 hex screws to 223 – 290 Ncm (19 – 25 in lb).



10. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.



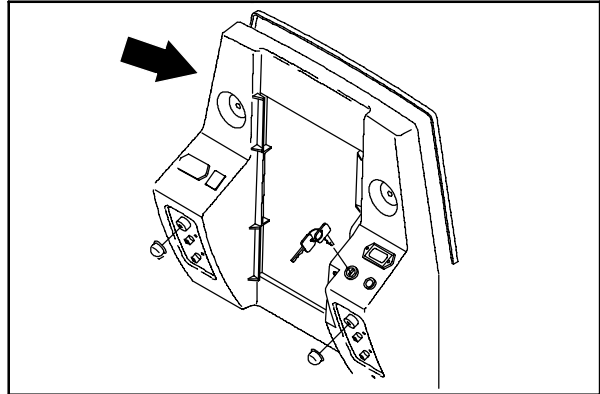
11. Operate the machine, checking for proper operation.

TO REPLACE THE 2.5A OR 10A RESETTABLE CIRCUIT BREAKERS

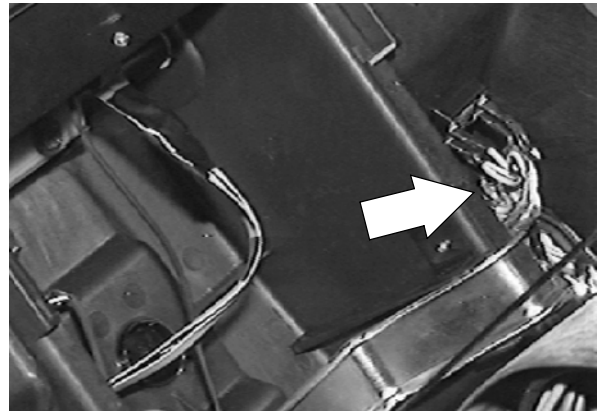
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

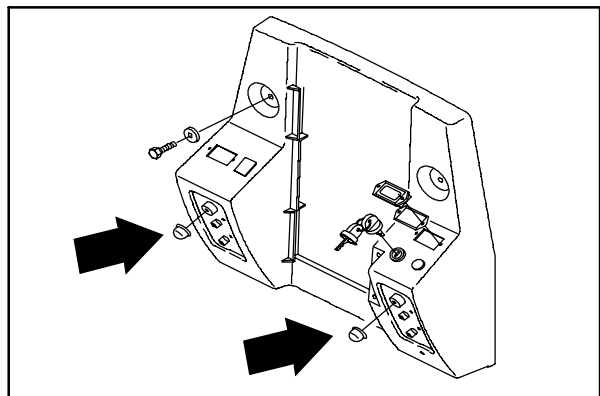
ATTENTION: Double check to make sure the batteries are disconnected from the machine.



2. Remove the wires leading to the faulty circuit breaker.

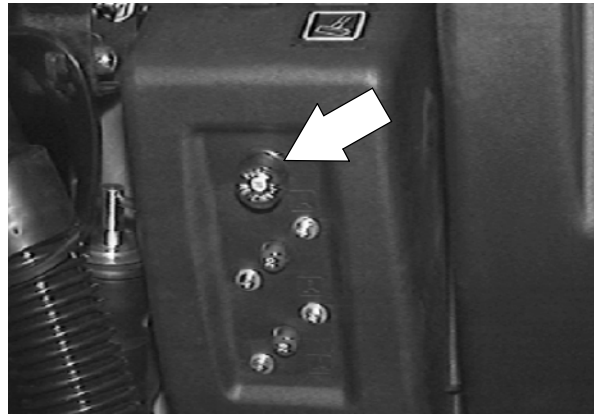


3. The 2.5A and 10A circuit breakers are held in with a round spring clip. Use a small flat screw driver and a needle nose pliers to remove the spring clip off the circuit breaker. If the clip is damaged when its removed, discard and use the new one supplied with the new circuit breaker.

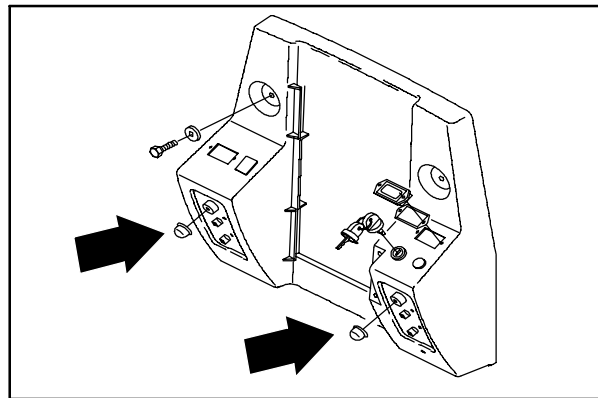


4. Push the circuit breaker outward until it is free of the instrument panel.
5. Remove and save the clear rubber boot.
6. Install the new circuit breaker in the mount hole.

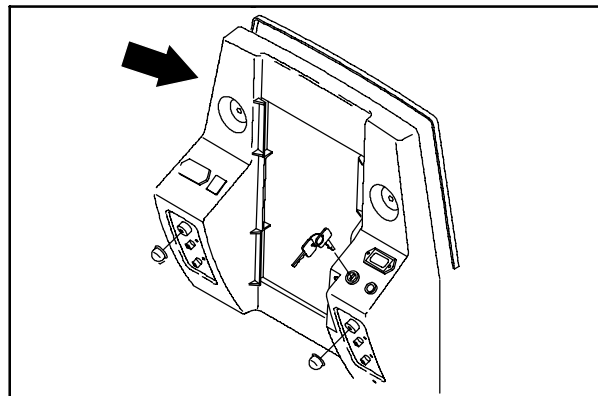
NOTE: The circuit breaker has a 'D' shape, and will only install one way.



7. Push the new locking ring all the way on the barrel of the circuit breaker. Reinstall the clear rubber boot.
8. Reconnect the wires to the circuit breaker. See the electrical schematic in this section.



9. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.



10. Operate the machine, checking for proper operation.

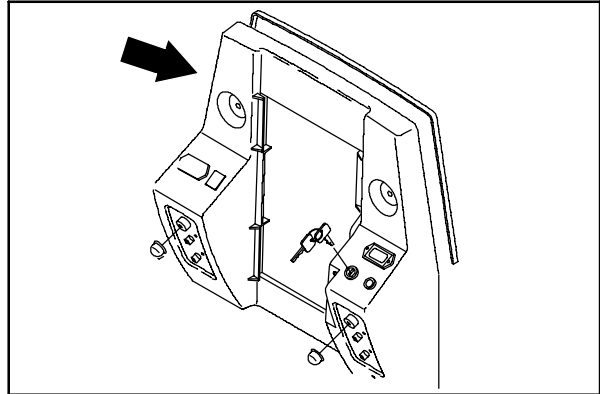
TO REPLACE THE 20 OR 25 AMP RESETTABLE CIRCUIT BREAKER

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

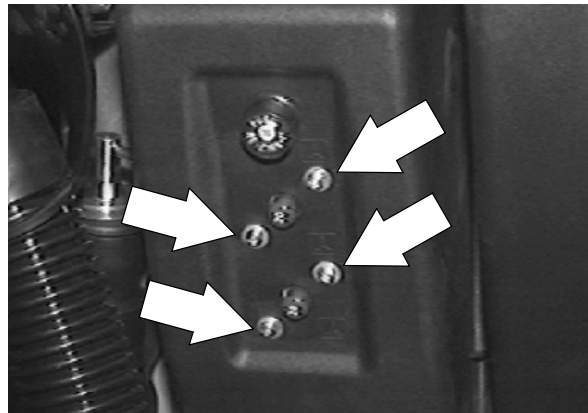
1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

ATTENTION: Double check to make sure the batteries are disconnected from the machine.

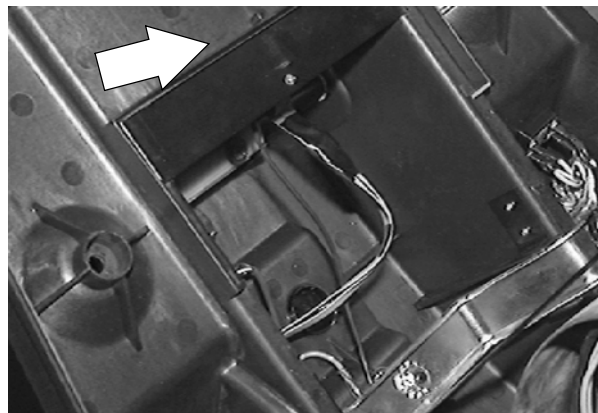
2. Remove the wires leading to the faulty circuit breaker.



3. Remove the two pan head screws holding the circuit breaker to the instrument panel. Remove the circuit breaker.
4. Position the new circuit breaker on the instrument panel. Reinstall the two pan head screws and hand tighten.
5. Reconnect the wires to the circuit breaker. See the electrical schematic in this section.



6. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.



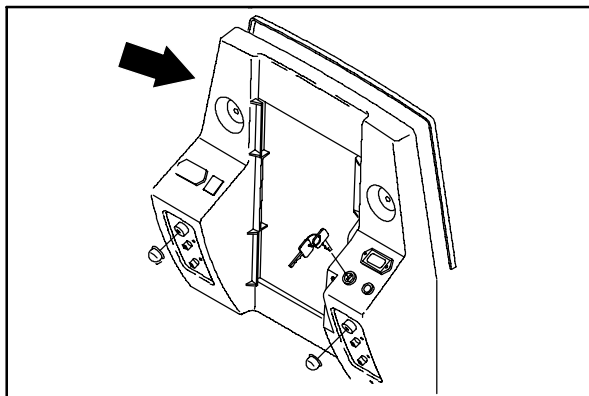
7. Operate the machine, checking for proper operation.

TO REPLACE TOUCH PANEL

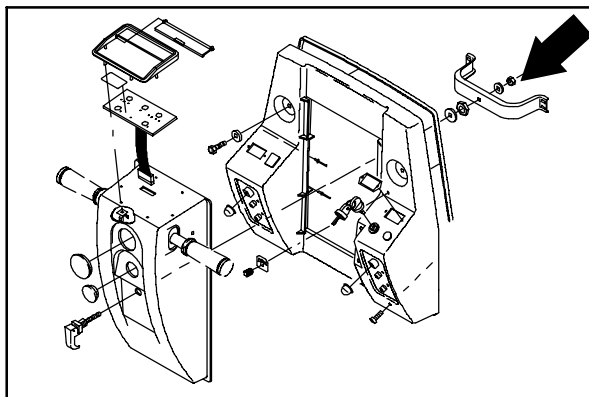
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

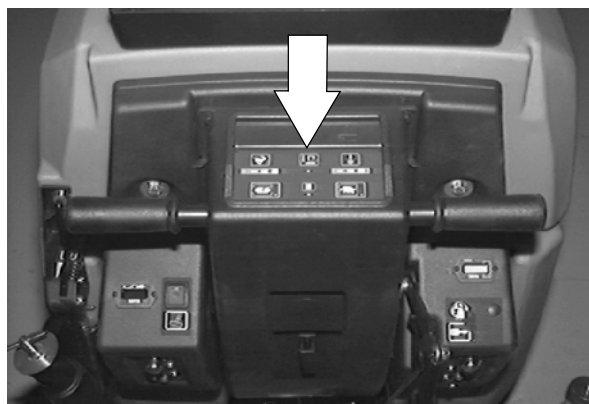
ATTENTION: Double check to make sure the batteries are disconnected from the machine.



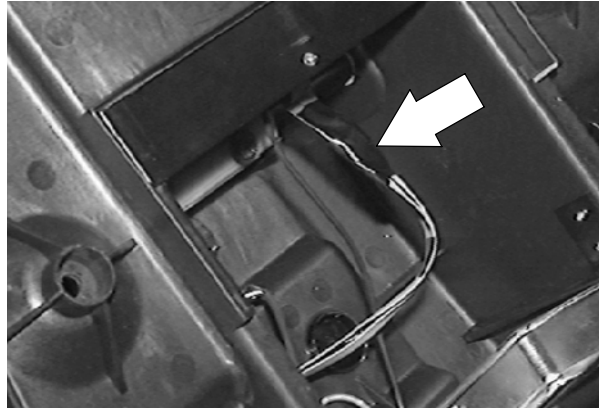
2. Remove the M8 hex nut and star washer holding the shroud locking bracket to the adjustable handle assembly. Remove the locking bracket from the machine.



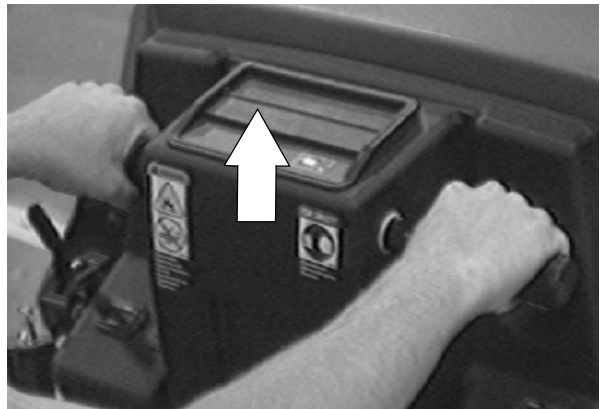
3. Push the adjustable handle assembly all the way down in its slot.



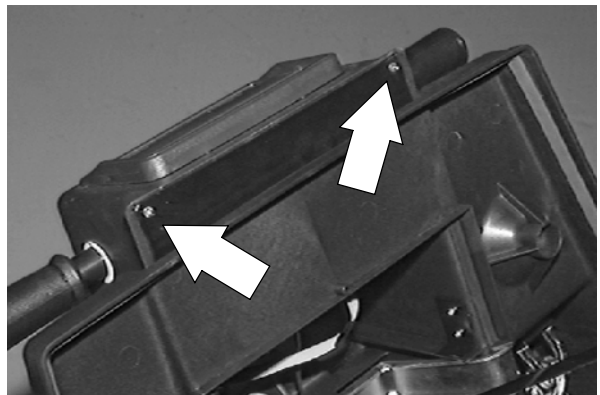
4. Remove the M3 flat head screw holding the touch panel drain cable and machine ground strap to the adjustable handle assembly shield plate.



5. Pull the adjustable handle assembly up in its slot until the shield plate is completely exposed.

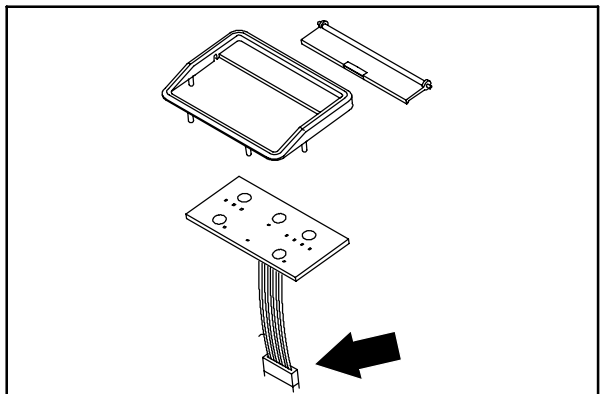


6. Remove the two M3 flat head screws holding the shield plate to the adjustable handle assembly. Remove the shield plate.

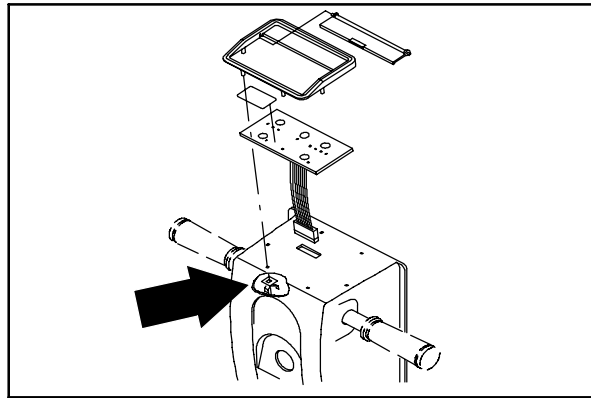


7. Unplug the touch panel flat film cable from the machine ribbon cable.

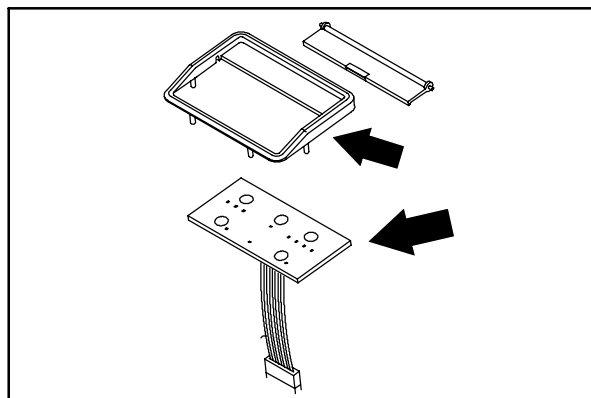
NOTE: The flat connector on the ribbon cable has a tight fit. Use two hands when carefully pulling the two cables apart.



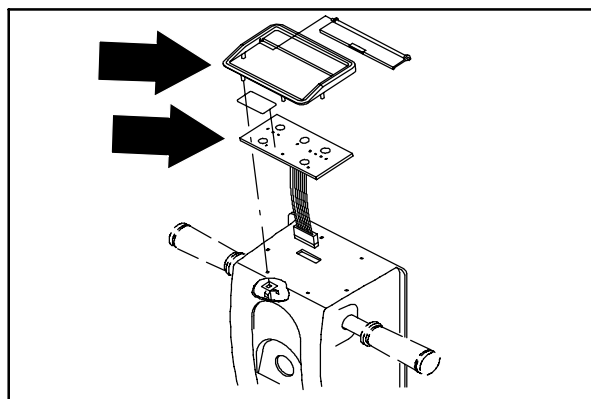
8. Remove the six pinch clips holding the touch panel shroud to the adjustable handle assembly. The touch panel is held in with adhesive. Carefully remove the touch panel from the machine.



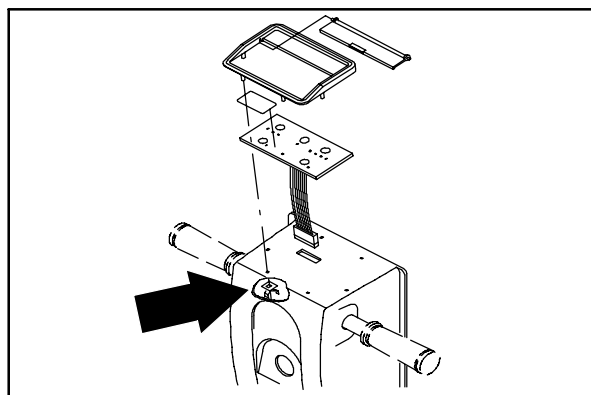
9. Place the touch panel in the plastic bezel before installing it on the machine. This will correctly locate the touch panel and plastic bezel. Remove the cover over the adhesive.



10. Install the touch panel and bezel on the adjustable handle assembly. Be sure to route the flat film cables carefully through the slot.



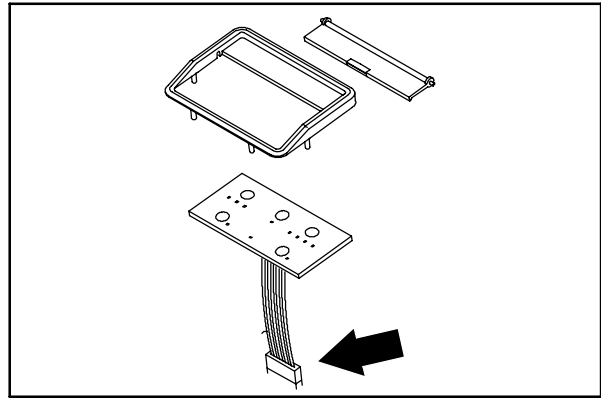
11. Reinstall the six pinch clips on the studs on the touch panel mount frame.



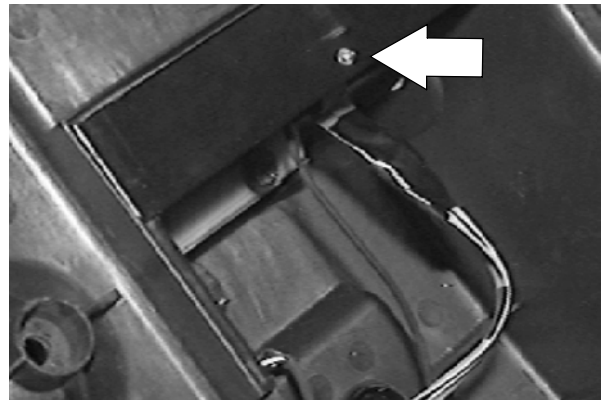
ELECTRICAL

12. Plug the flat film cables back in the machine ribbon cable. See electrical schematic in this section.
13. Put a small amount of dielectric grease on the terminals of this low voltage circuit to protect it against condensation and corrosion. (part # 86385)

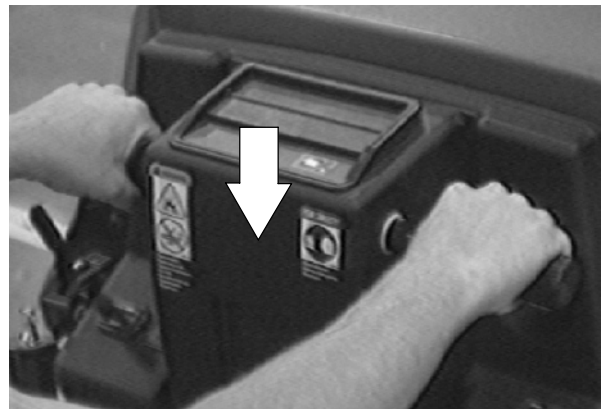
NOTE: The flat connector on the ribbon cable has a tight fit. Use two hands when carefully pushing the two cables together.



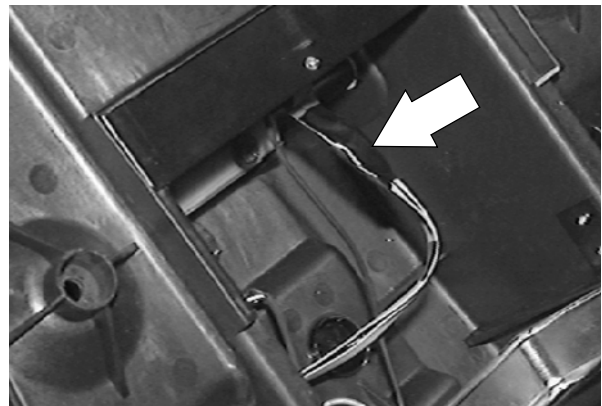
14. Reinstall the shield plate to the adjustable handle assembly. Reinstall the two M3 flat head screws and hand tighten.



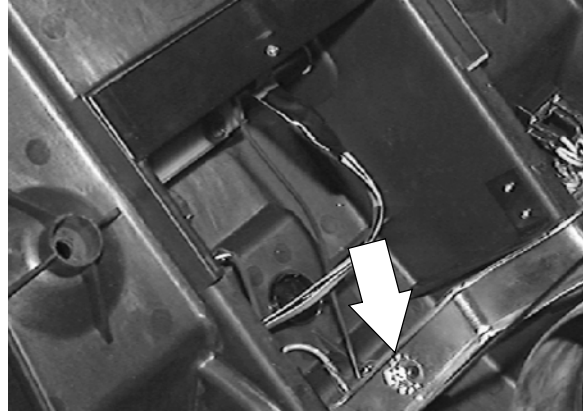
15. Push the adjustable handle assembly all the way down in its slot.



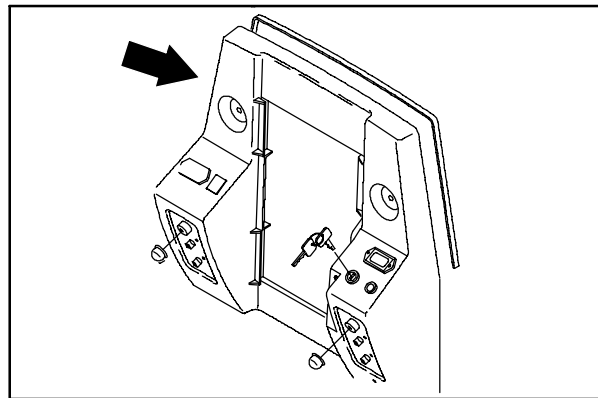
16. Reinstall the touch panel drain cable and machine ground strap to the center hole on the shield plate. Reinstall the one M3 flat head screw and lightly hand tighten.



17. Reinstall the shroud locking bracket to the adjustable handle assembly. Reinstall the M8 hex nut and star washer. Tighten to 12 – 16 Nm (9 – 12 ft lb).



18. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.



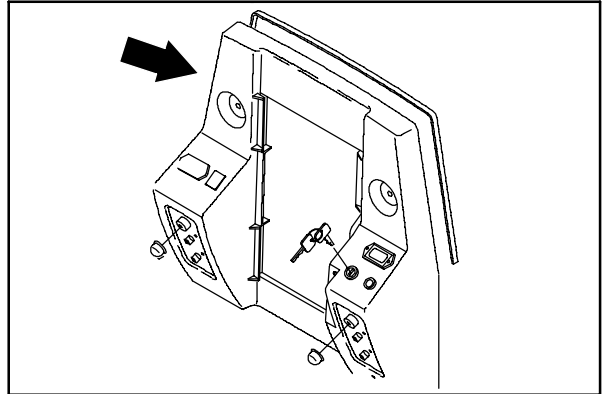
19. Operate the machine, checking for proper operation.

TO REPLACE BATTERY VOLT METER OR BRUSH PRESSURE GAUGE

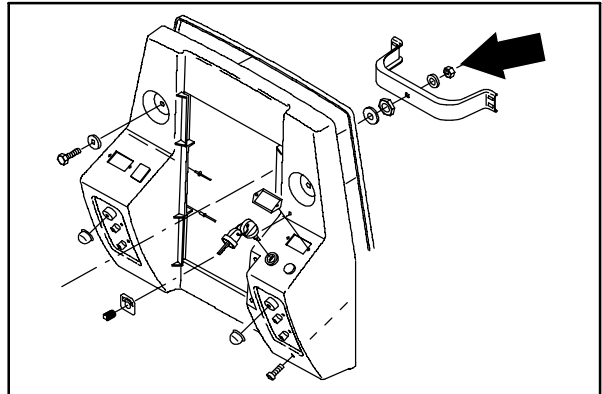
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

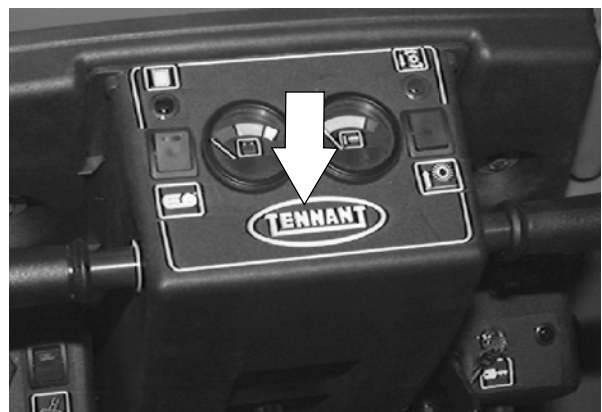
ATTENTION: Double check to make sure the batteries are disconnected from the machine.



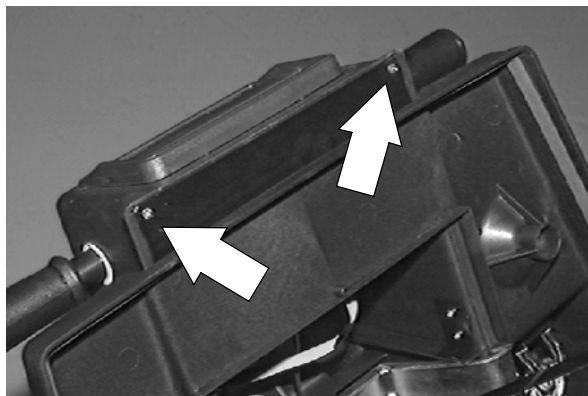
2. Remove the M8 hex nut and star washer holding the shroud locking bracket to the adjustable handle assembly. Remove the locking bracket from the machine.



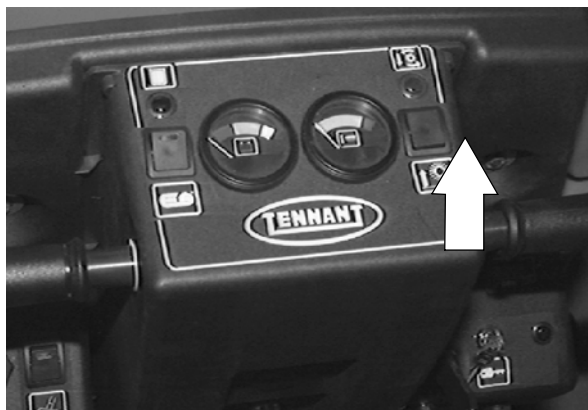
3. Push the adjustable handle assembly all the way down in its slot.



4. Remove the two M3 flat head screws holding the shield plate to the adjustable handle assembly. Remove the shield plate.

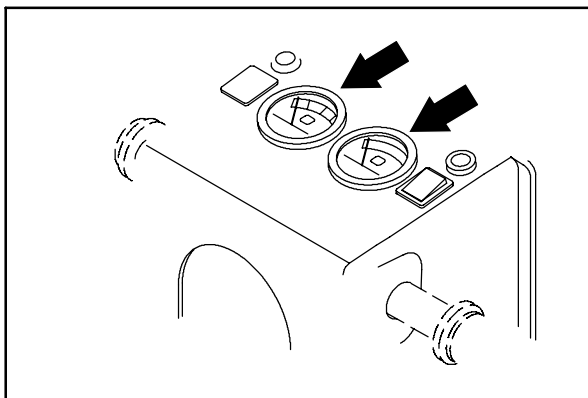


5. Pull the adjustable handle assembly all the way up in its slot.

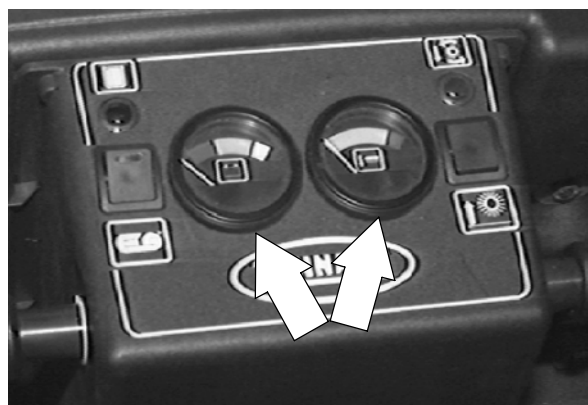


6. Remove the wires from the gauge terminals.

7. Remove the two small hex nuts holding the gauge retainer bracket to the gauge. Remove the gauge and bracket from the machine.

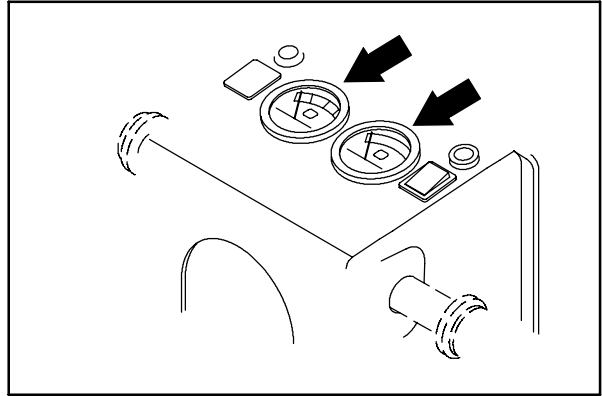


8. Position the new gauge back in the instrument panel. Make sure gauge face can be read properly from the operators area.

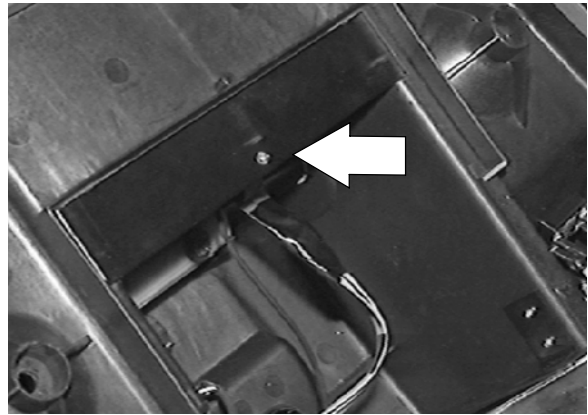


ELECTRICAL

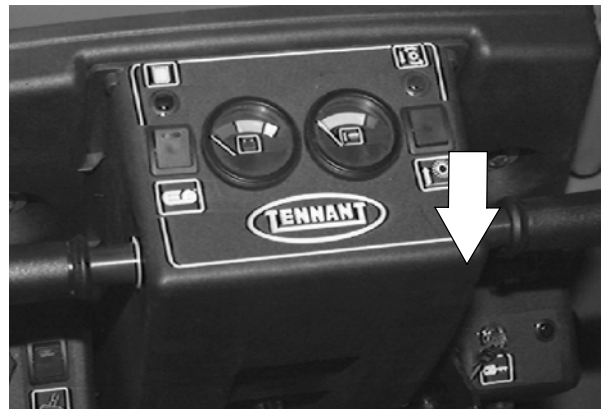
9. Reinstall the gauge retainer bracket and two small hex nuts. Lightly tighten the hex nuts until the gauge is held firmly in place.
10. Position the wires back on the gauge. See the electrical schematic in this section.



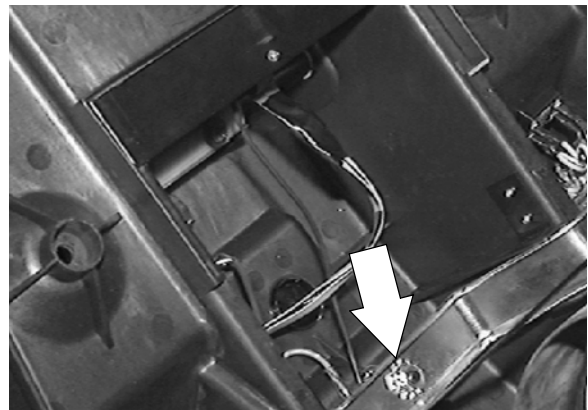
11. Pull the adjustable handle assembly far enough up in its slot so the shield plate can be reinstalled. Reinstall the two M3 flat head screws and hand tighten.



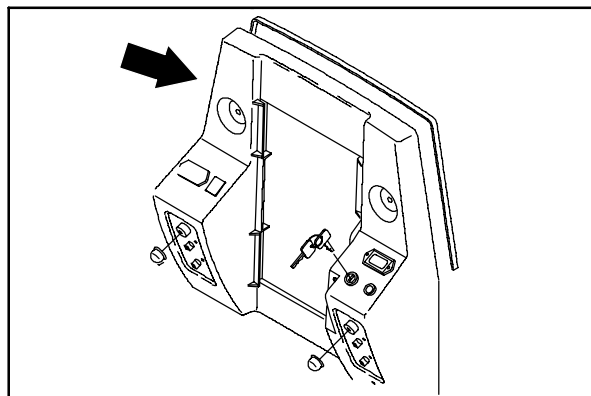
12. Push the adjustable handle assembly all the way down in its slot.



13. Reinstall the shroud locking bracket to the adjustable handle assembly. Reinstall the M8 hex nut and star washer. Tighten to 12 - 16 Nm (9 - 12 ft lb).



14. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.



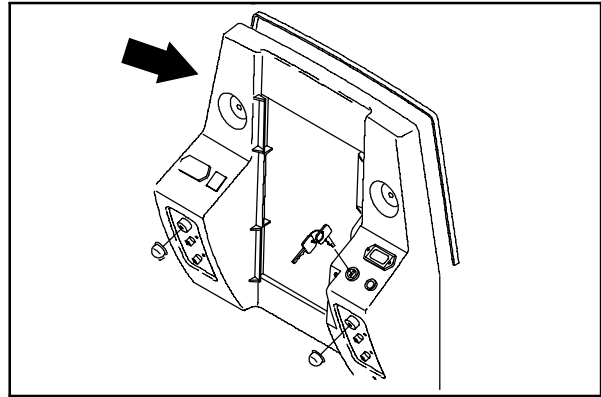
15. Operate the machine, checking for proper operation.

TO REMOVE STEERING HANDLE

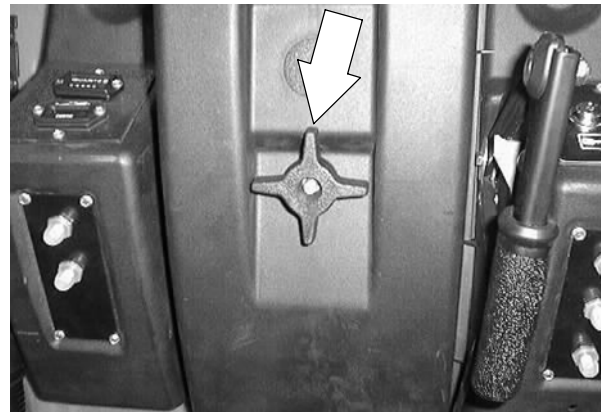
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

ATTENTION: Double check to make sure the batteries are disconnected from the machine.



2. Disengage the lock on the steering console and push it all the way down.



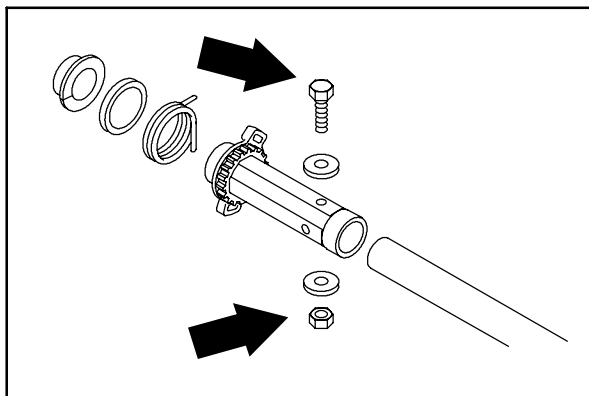
3. Remove the left hand rubber grip from the steering handle.

NOTE: The rubber grip has a very tight fit on the steering handle. You may have to cut the grip to remove it. Refer to the 5680/5700 parts manual for a replacement grip part number.

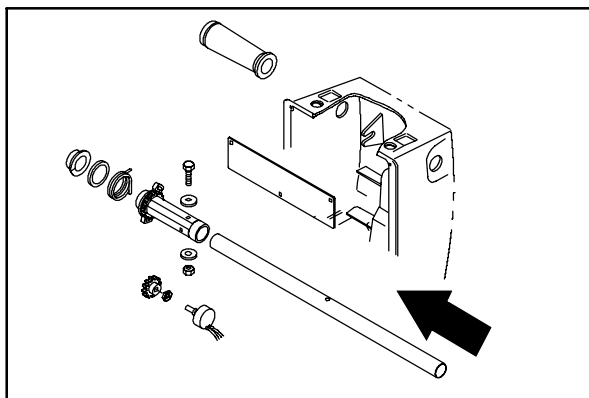


4. Remove the M6 hex screw and nyloc nut holding the white plastic speed control gear to the steering handle.

NOTE: The orientation of the speed control gear, torsion spring, and washer when removing the steering handle.



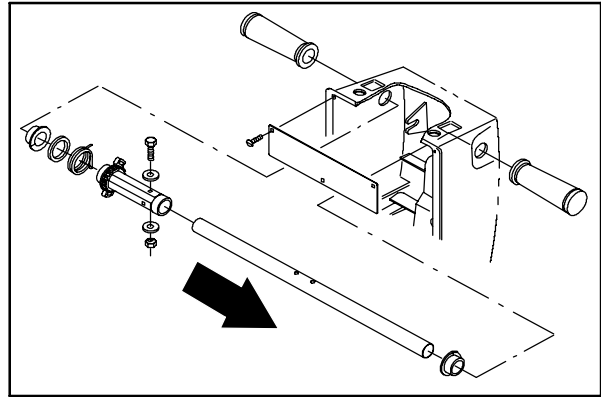
5. Slide the steering handle to the right of the machine. Reach in and hold the white plastic speed control gear, spring, and washer while pulling the handle out. Remove the handle, spring and gear from the machine.



TO INSTALL STEERING HANDLE

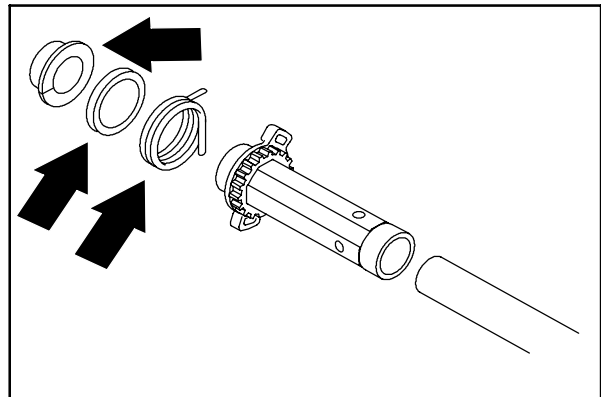
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Reinstall the steering handle in the console from the right hand side. Make sure the white flange bearing is in place in the steering console.

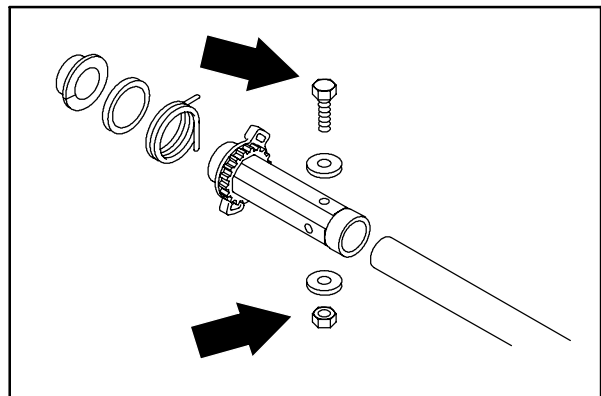


2. While pushing the steering handle into the console, slip the washer, spring, and speed control gear onto the shaft. The spring must be positioned with one ear on each side of the plastic boss inside the panel.

NOTE: Make sure the teeth on the speed control gear mesh with the teeth on the potentiometer gear when pushing the steering handle in.



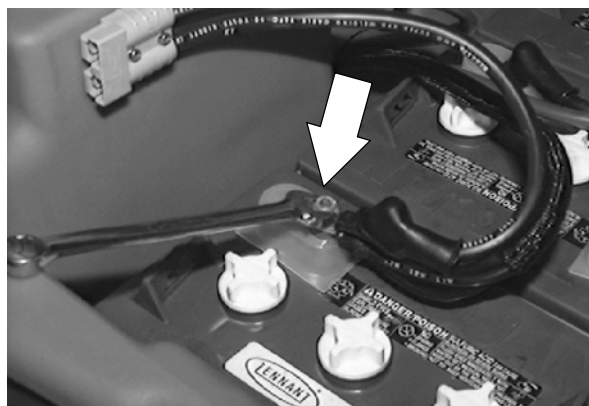
3. Align the hole in the steering handle with the hole in the speed control gear and install the M6 hex screw and nyloc nut. Tighten to 7.6 – 9.9 Nm (4 – 5 ft lb).



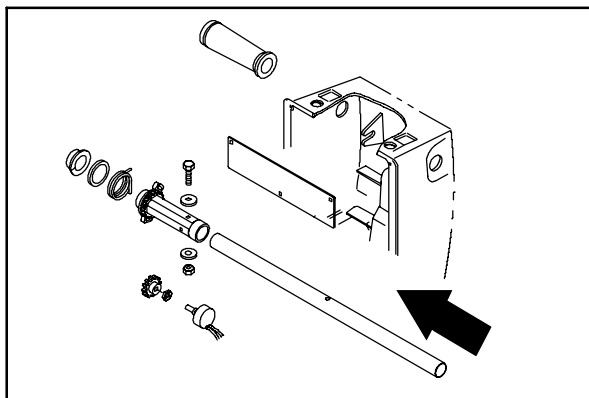
4. Reinstall the left hand rubber grip. Use a soap solution to help slide the grip onto the handle.



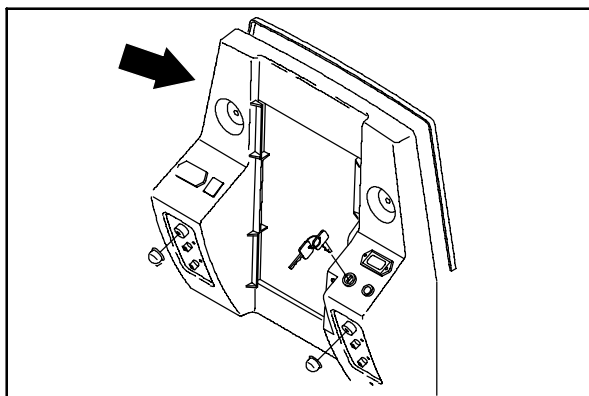
5. Re-connect the negative battery cable to the battery nearest the back of the machine.



6. Turn on the machine and check for proper neutral centering. If the machine creeps in either direction, grasp the body of the potentiometer and rotate it forward or backward until neutral is obtained.



7. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.



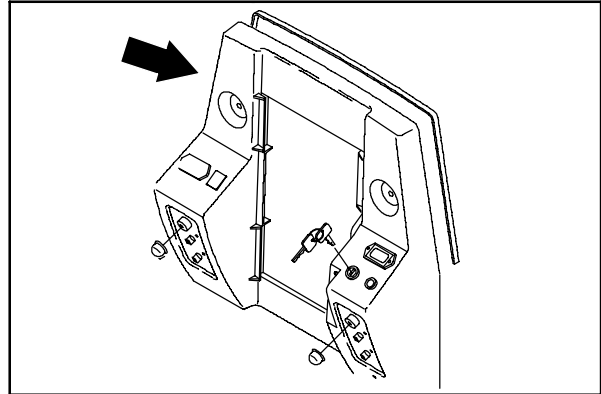
8. Reconnect the batteries, turn on the machine and check the steering handle for proper operation.

TO REPLACE SPEED CONTROL POTENTIOMETER ON 5680/5700 STANDARD

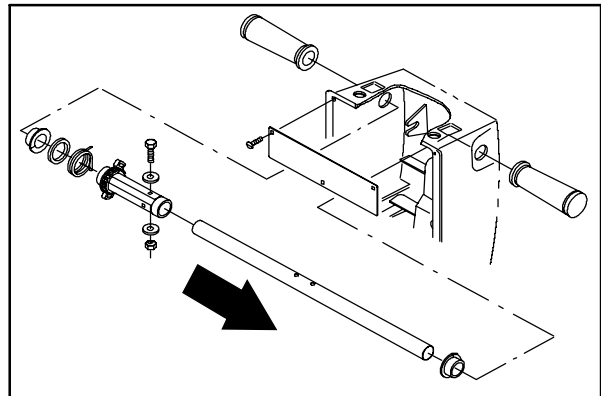
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

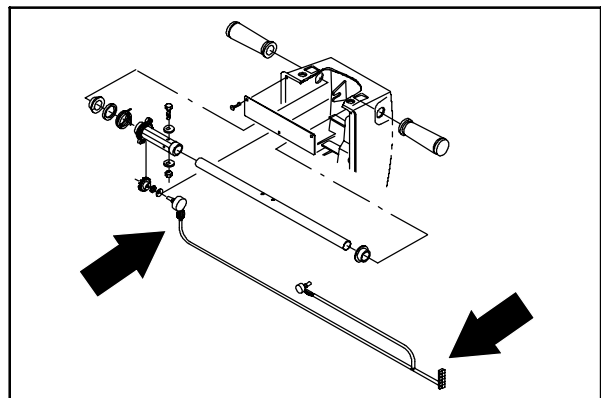
ATTENTION: Double check to make sure the batteries are disconnected from the machine.



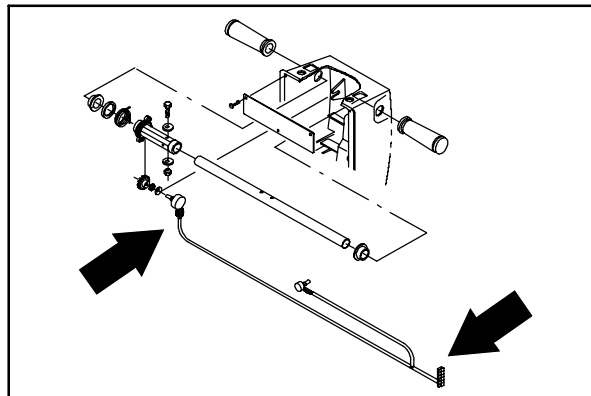
2. Remove the steering handle. See TO REMOVE STEERING HANDLE instructions in this section.



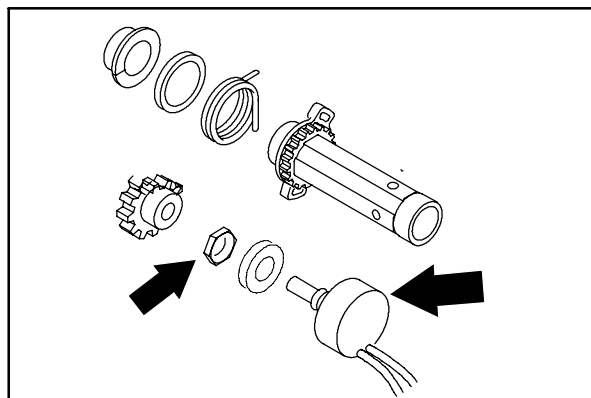
3. Locate the wire harness coming from the potentiometer. Lift the rubber flap and un-plug the white connector from the top left hand side of the propel controller.



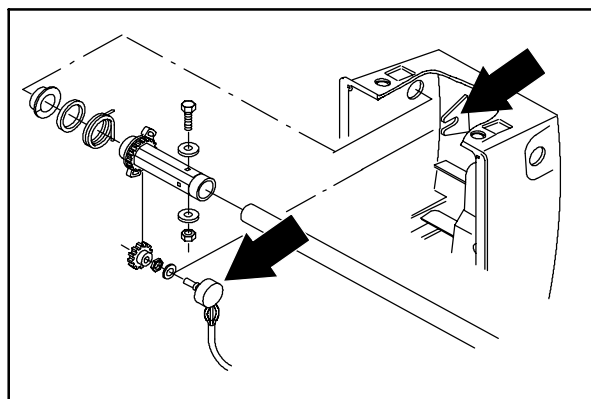
4. Un-plug the green wire from the B+ terminal of the propel controller.
5. Cut any of the plastic wire ties that are holding the potentiometer wire harness to the main harness.



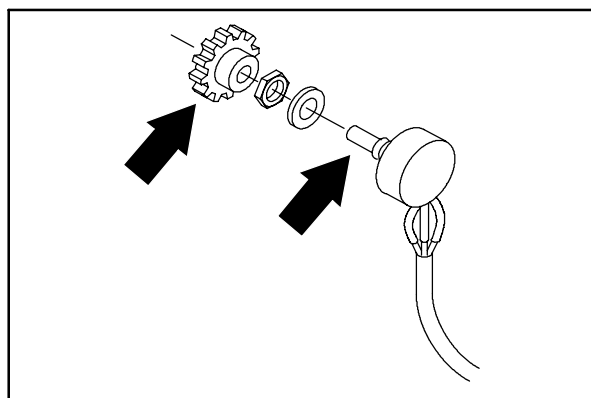
6. Loosen the jam nut that is holding the potentiometer to the steering console.



7. Pull the potentiometer straight out of the slot. Remove the potentiometer from the machine.



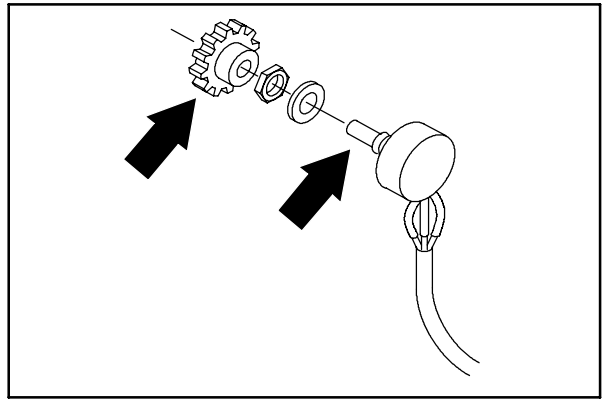
8. Loosen the set screw holding the gear to the potentiometer. Remove the gear.



ELECTRICAL

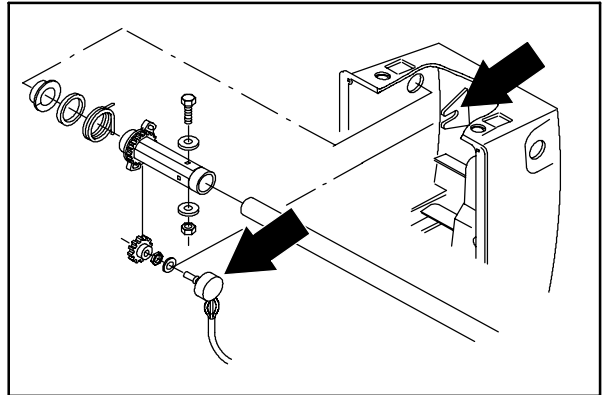
9. Reinstall the gear on the new potentiometer. Make sure the set screw is lined up with the flat on the shaft. Hand tighten set screw.

NOTE: The set screw on the gear should line up with the middle wire on the potentiometer.

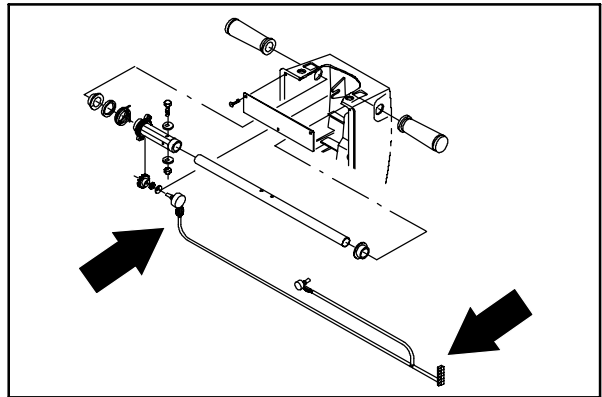


10. Position the new potentiometer back into the mounting slot. Make sure that the star washer is in place under the jam nut.

ATTENTION: Do not over tighten the jam nut. Lightly hand tighten only.

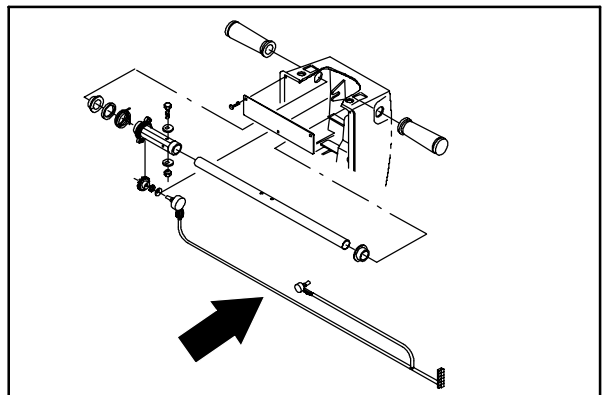


11. Route the wire harness back to the propel controller. Plug the white connector into the upper left hand side of the controller and the green wire back onto the B+ terminal. Position the rubber flap back under the plastic tie.



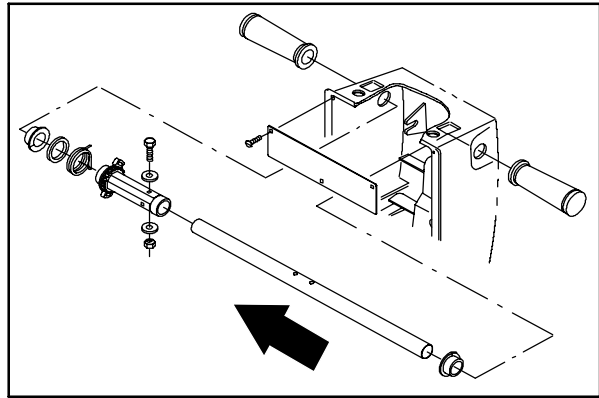
12. Put a small amount of dielectric grease on the terminals of this low voltage circuit to protect it against condensation and corrosion, (part # 86385).

13. Secure the potentiometer wire harness to the main harness routing with wire ties or electrical tape.

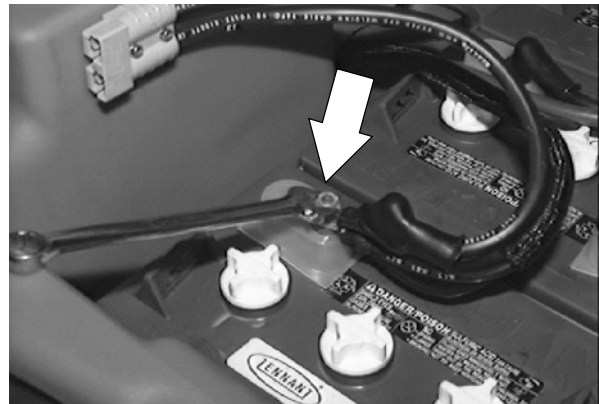


14. Reinstall the steering handle. See TO INSTALL STEERING HANDLE instructions in this section.

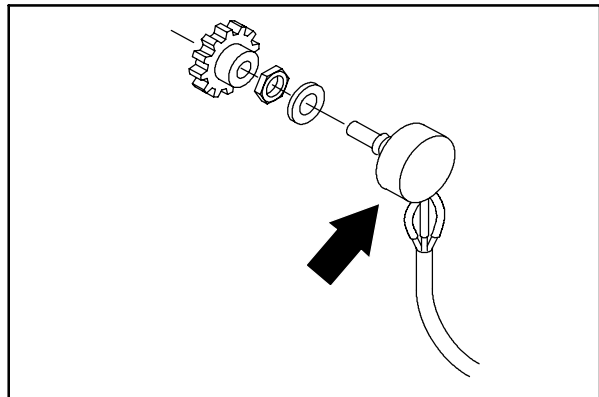
NOTE: Do not install the instrument panel at this time.



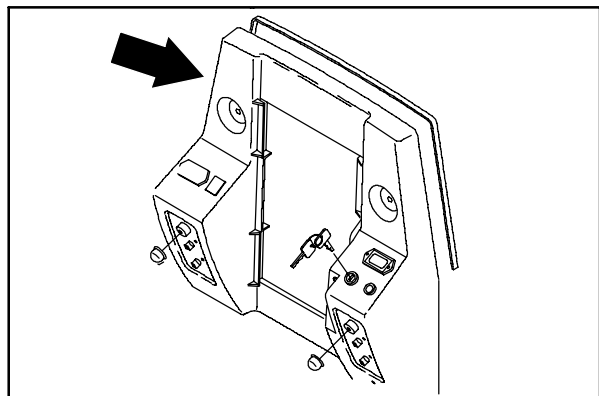
15. Re-connect the negative battery cable to the battery nearest the back of the machine.



16. Turn on the machine and check for proper neutral centering. If the machine creeps in either direction, grasp the body of the potentiometer and rotate it forward or backward until neutral is obtained.



17. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.

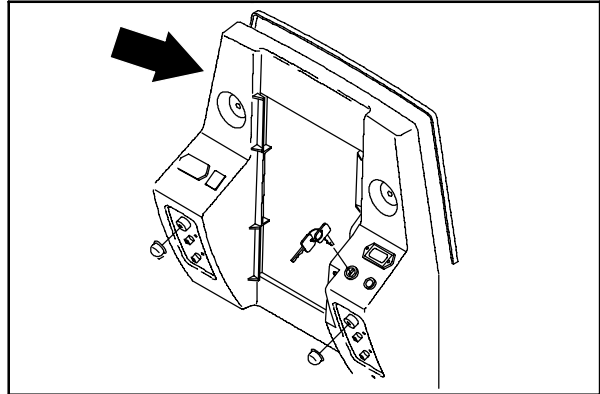


TO REPLACE SPEED CONTROL POTENTIOMETER ON 5700 XP

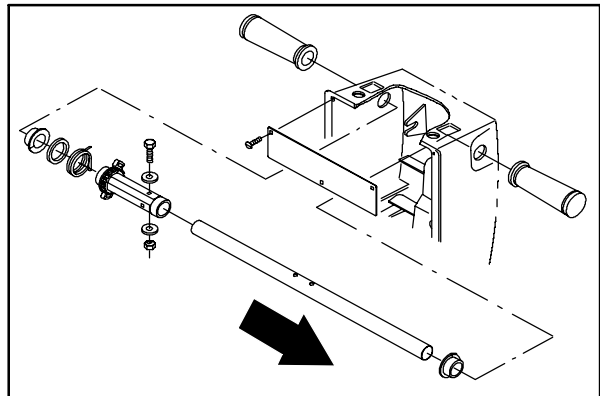
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

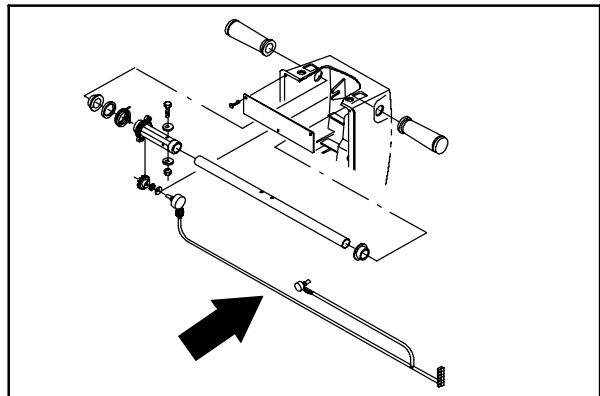
ATTENTION: Double check to make sure the batteries are disconnected from the machine.



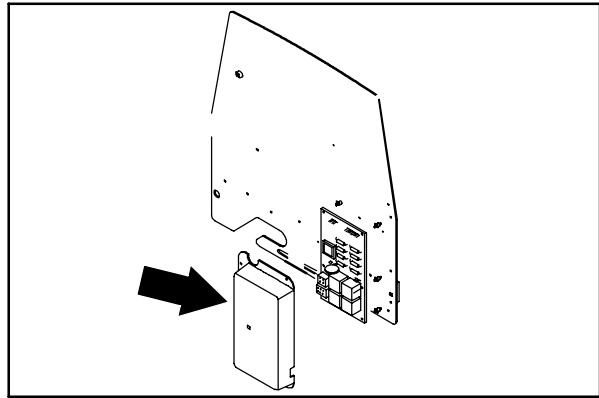
2. Remove the steering handle. See TO REMOVE STEERING HANDLE instructions in this section.



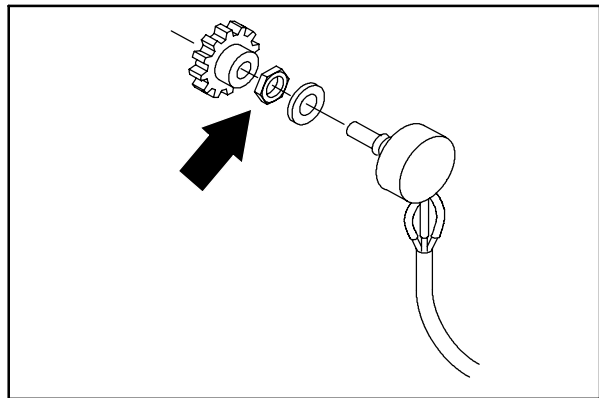
3. Locate the wire harness coming from the potentiometer and leading to the circuit board on the lower right hand side of the electrical mount panel.



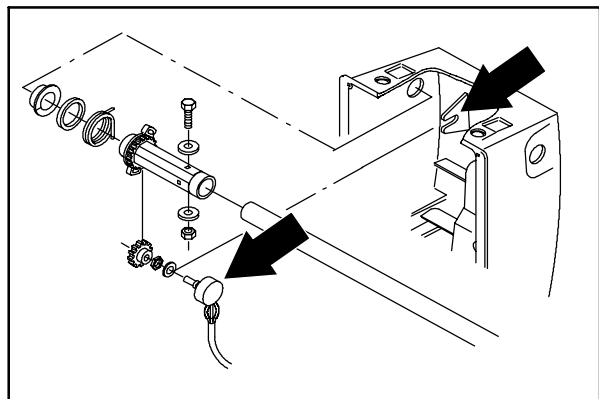
4. Remove the four M4 hex screws holding the plastic cover over the circuit board. Remove the cover.
5. Un-plug the small, red potentiometer harness connector on the right hand side of the circuit board.
6. Cut any of the plastic wire ties that are holding the potentiometer wire harness to the main harness.



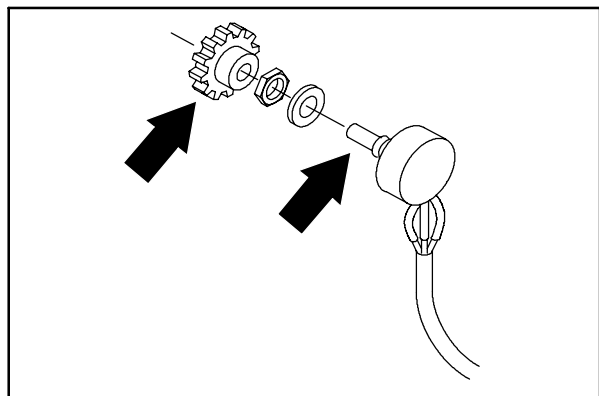
7. Loosen the jam nut that is holding the potentiometer to the steering console.



8. Pull the potentiometer straight out of the slot. Remove the potentiometer from the machine.

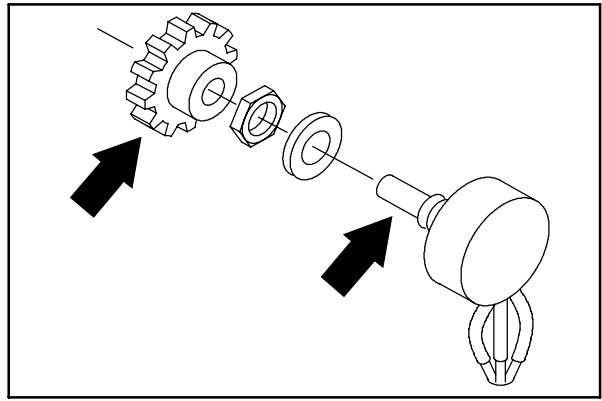


9. Loosen the set screw holding the gear to the potentiometer. Remove the gear.



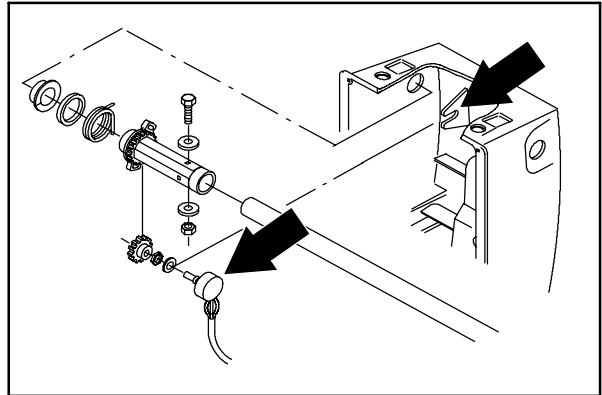
10. Reinstall the gear onto a new potentiometer. Make sure the set screw is lined up with the flat on the shaft. Hand tighten set screw.

NOTE: The set screw on the gear should line up with the middle wire on the potentiometer.



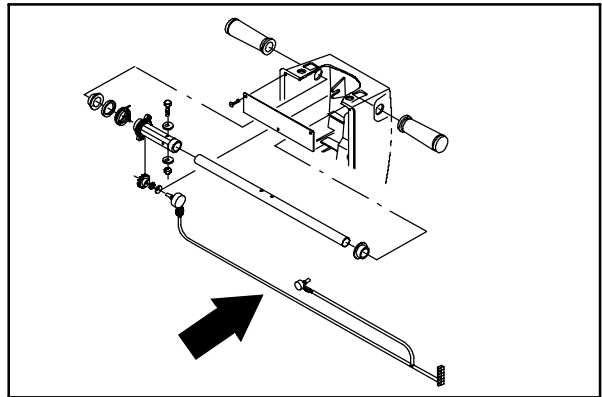
11. Position the new potentiometer back in the mounting slot. Make sure that the star washer is in place under the jam nut.

ATTENTION: Do not over tighten the jam nut. Lightly hand tighten only.



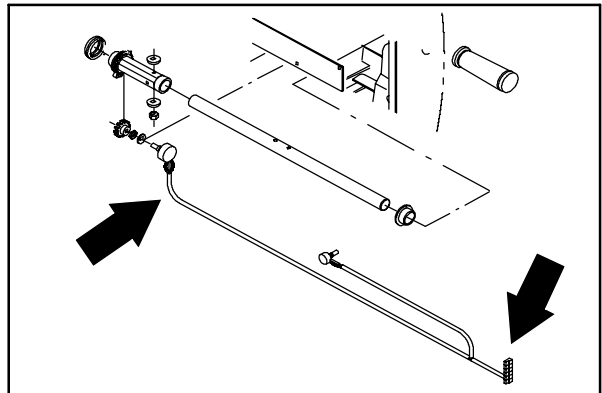
12. Route the wire harness back to the circuit board. Plug the small, red potentiometer harness connector back onto the right hand side of the circuit board.

NOTE: The red connector will only install with the two tabs pointing up and the wire pointing down. Do not force it on.



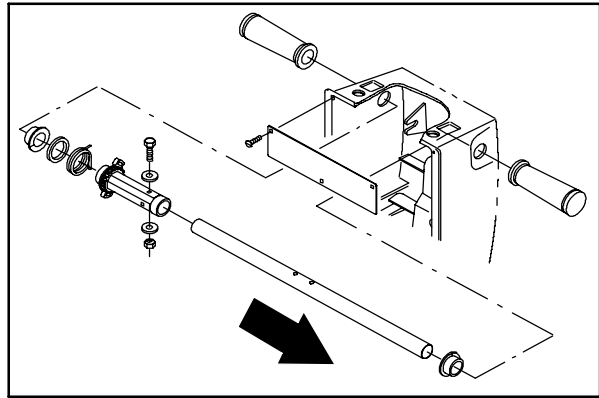
13. Put a small amount of dielectric grease on the terminals of this low voltage circuit to protect it against condensation and corrosion, (part # 86385).

14. Secure the potentiometer wire harness to the main harness routing with wire ties or electrical tape.

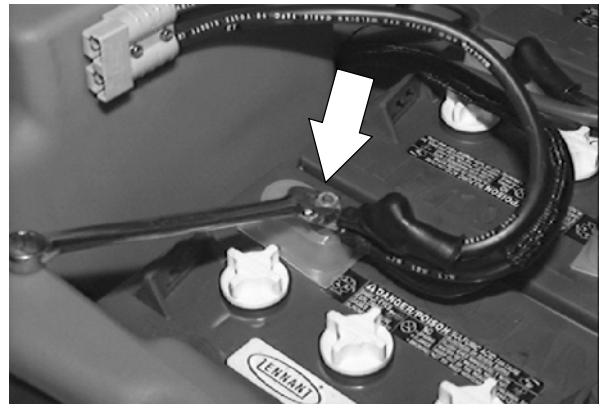


15. Reinstall the steering handle. See TO INSTALL STEERING HANDLE instructions in this section.

NOTE: Do not install the instrument panel at this time.

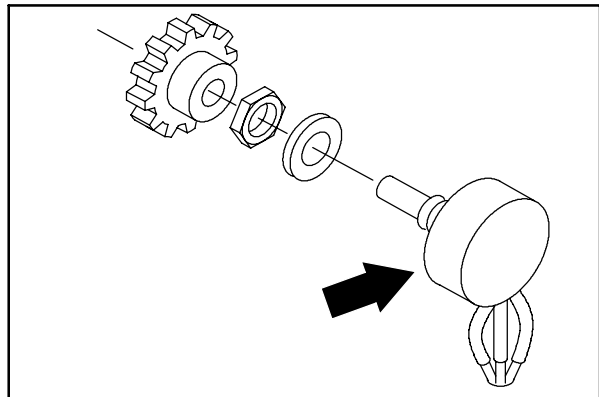


16. Re-connect the negative battery cable to the battery nearest the back of the machine.

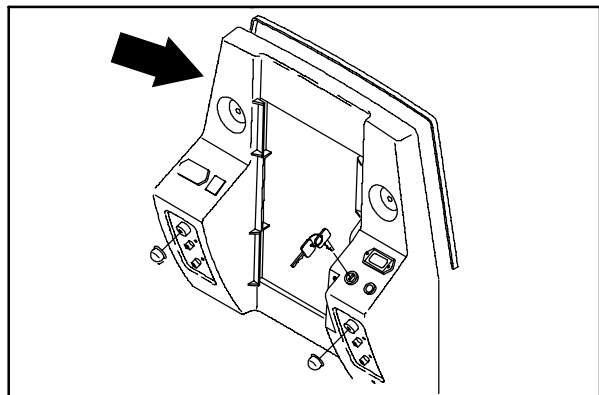


17. Turn on the machine and check for proper neutral centering. If the machine creeps in either direction, grasp the body of the potentiometer and rotate it forward or backward until neutral is obtained.

ATTENTION: Do not over tighten the jam nut. Lightly hand tighten only.



18. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.

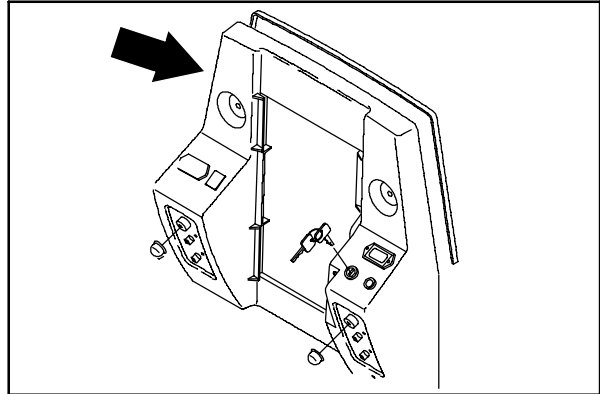


TO REPLACE FORWARD/REVERSE POTENTIOMETER ON 5700 XPS

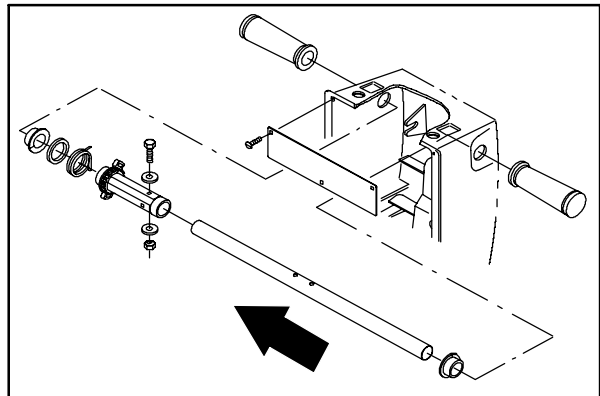
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.

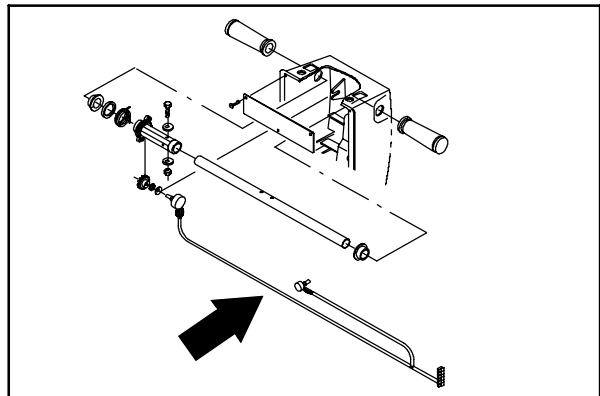
ATTENTION: Double check to make sure the batteries are disconnected from the machine.



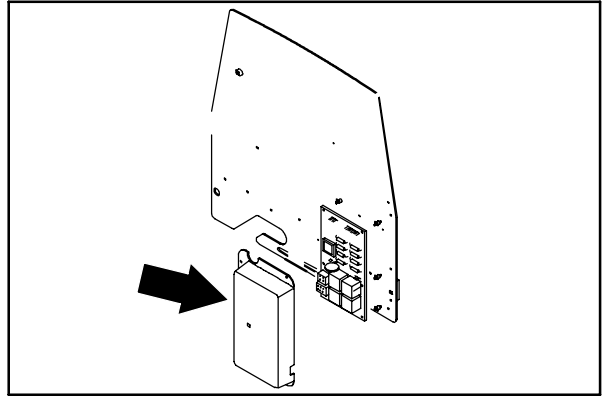
2. Remove the steering handle. See TO REMOVE STEERING HANDLE instructions in this section.



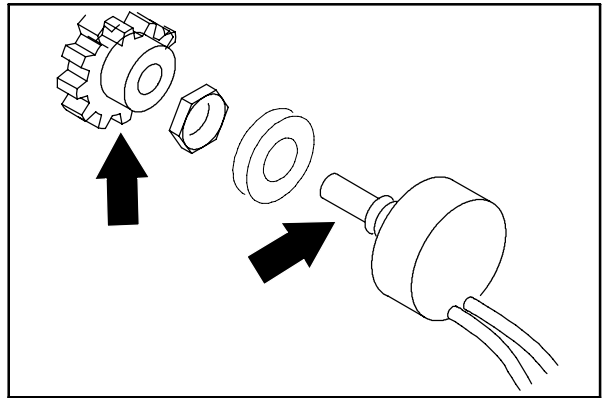
3. Locate the wire harness coming from the potentiometer and leading to the circuit board on the lower right hand side of the electrical mount panel.



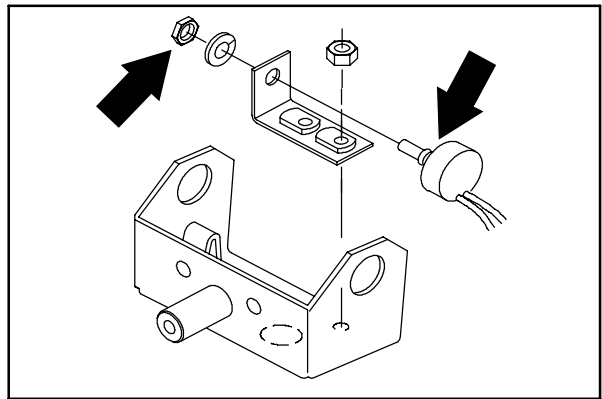
4. Remove the four M4 hex screws holding the plastic cover over the circuit board. Remove the cover.
5. Un-plug the small, red potentiometer harness connector at the bottom, center of the smaller power steering circuit board.
6. Cut any of the plastic wire ties that are holding the potentiometer wire harness to the main harness.



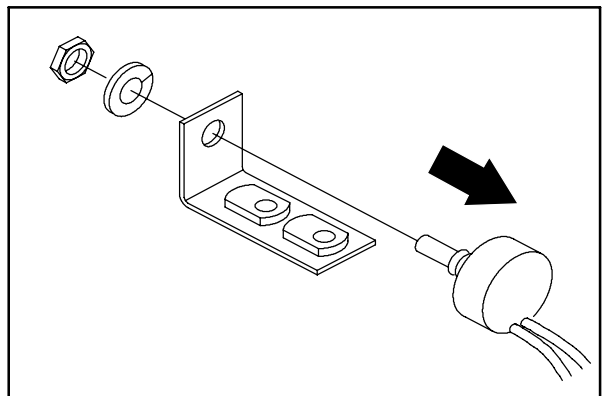
7. Loosen the set screw holding the gear to the potentiometer. Remove the gear.



8. Loosen the jam nut holding the potentiometer to the mount bracket.

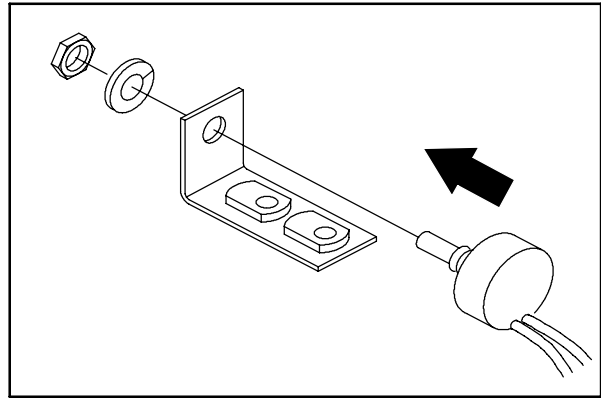


9. Pull the potentiometer straight out of the mount bracket. Remove the potentiometer from the machine.



ELECTRICAL

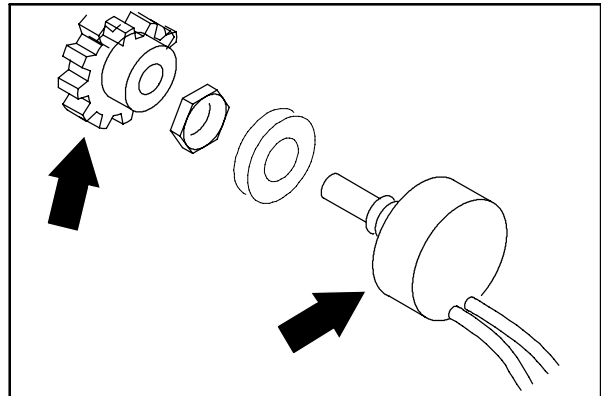
10. Position the new potentiometer back on the mount bracket. Make sure that the star washer is in place under the jam nut.



11. Reinstall the gear onto a new potentiometer. Make sure the set screw is lined up with the flat on the shaft. Hand tighten set screw.

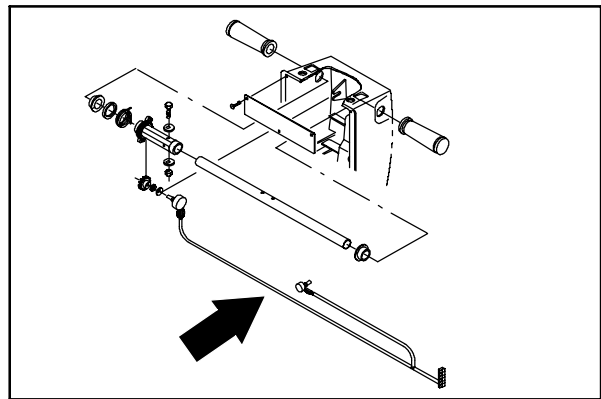
NOTE: The set screw on the gear should line up with the middle wire on the potentiometer.

ATTENTION: Do not over tighten the jam nut. Lightly hand tighten only.



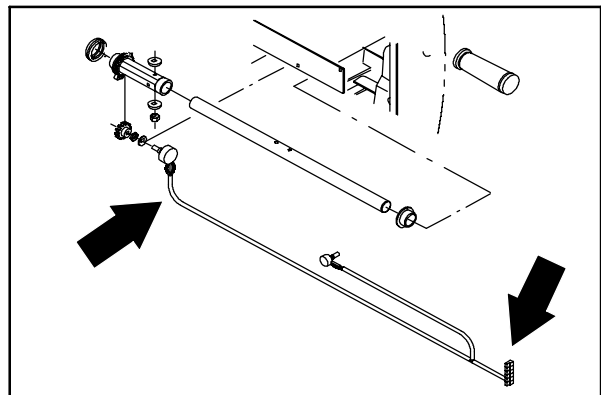
12. Route the wire harness back to the circuit board. Plug the small, red potentiometer harness connector back onto the right hand side of the circuit board.

NOTE: The red connector will only install with the two tabs pointing up and the wire pointing down. Do not force it on.



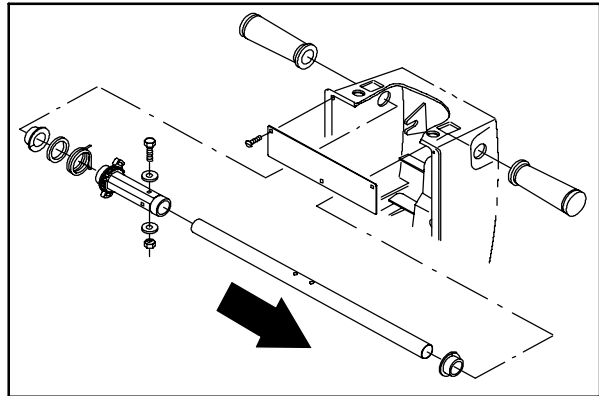
13. Put a small amount of dielectric grease on the terminals of this low voltage circuit to protect it against condensation and corrosion, (part # 86385).

14. Secure the potentiometer wire harness to the main harness routing with wire ties or electrical tape.

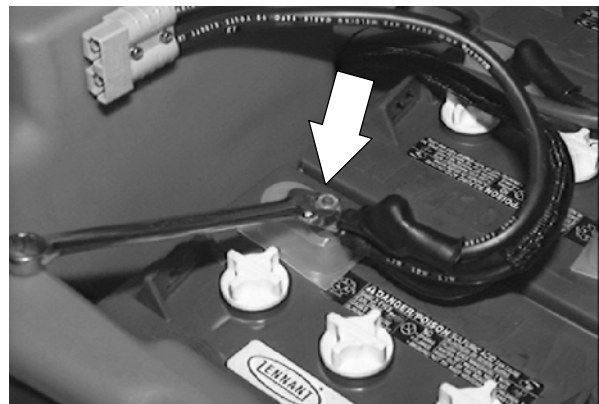


15. Reinstall the steering handle. See TO INSTALL STEERING HANDLE instructions in this section.

NOTE: Do not install the instrument panel at this time.

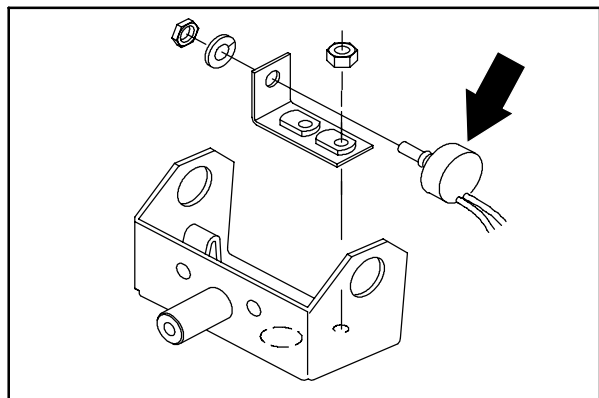


16. Re-connect the negative battery cable to the battery nearest the back of the machine.

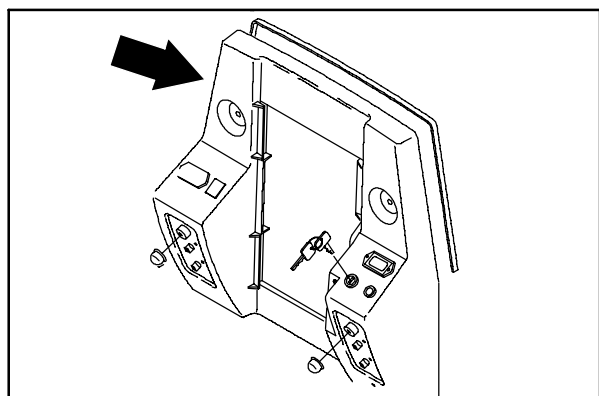


17. Turn on the machine and check for proper neutral centering. If the machine creeps in either direction, grasp the body of the potentiometer and rotate it forward or backward until neutral is obtained.

ATTENTION: Do not over tighten the jam nut. Lightly hand tighten only.



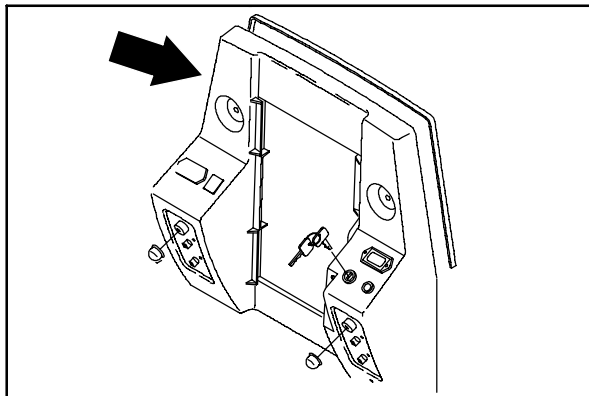
18. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.



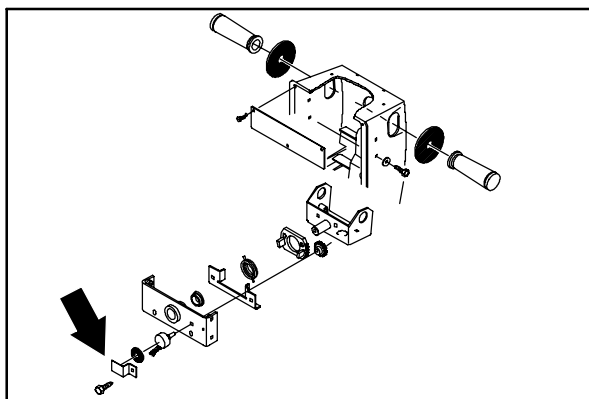
TO REPLACE STEERING POTENTIOMETER ON 5700 XPS

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

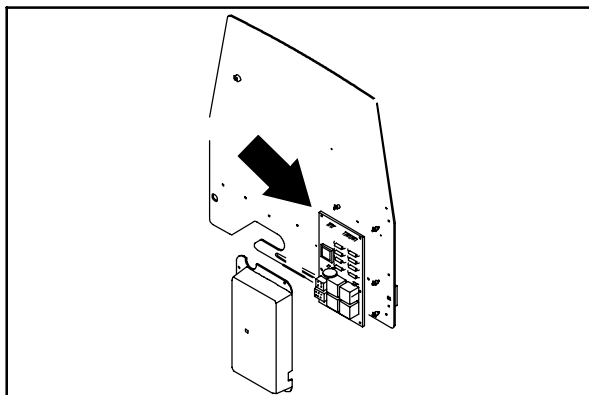
1. Remove the instrument panel. See TO REMOVE INSTRUMENT PANEL instructions in this section.



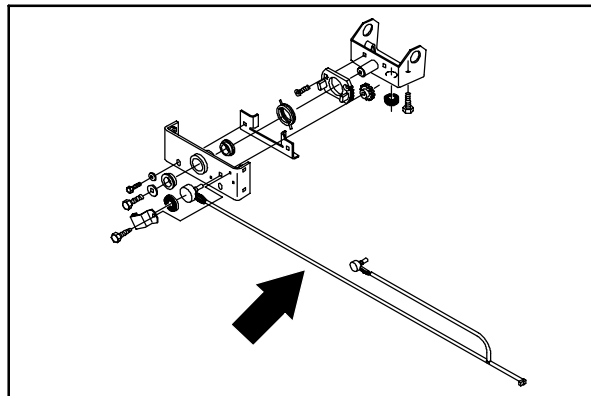
2. Remove the M6 hex screw holding the steering potentiometer clamp bracket to the steering pivot bracket. Remove clamp.



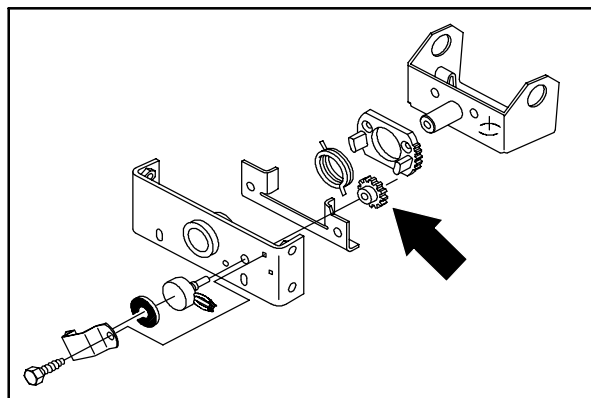
3. Disconnect the potentiometer from the circuit board.



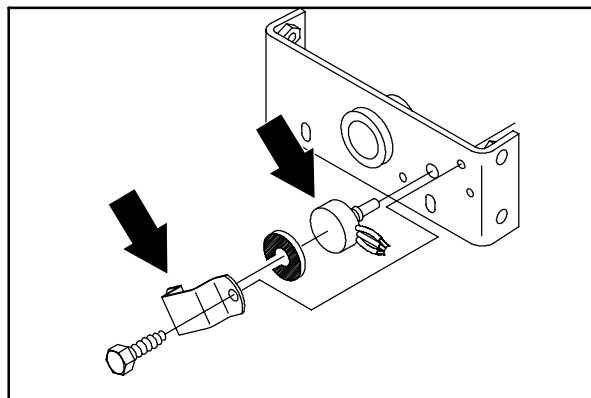
4. Cut any of the plastic wire ties that are holding the potentiometer wire harness to the main harness.



5. Loosen the set screw holding the gear to the potentiometer. Remove the gear.

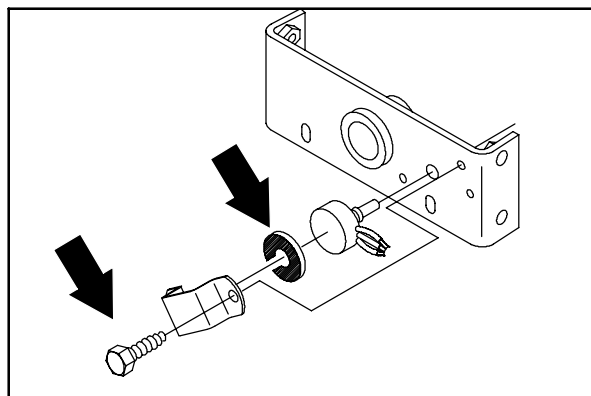


6. Remove the clamp bracket. Pull the potentiometer straight out of the hole and remove it from the machine.



7. Position the new potentiometer back on the mounting hole. Reinstall the clamp bracket. Tighten the M6 hex screw to 11 - 14 Nm (7 - 10 ft lb).

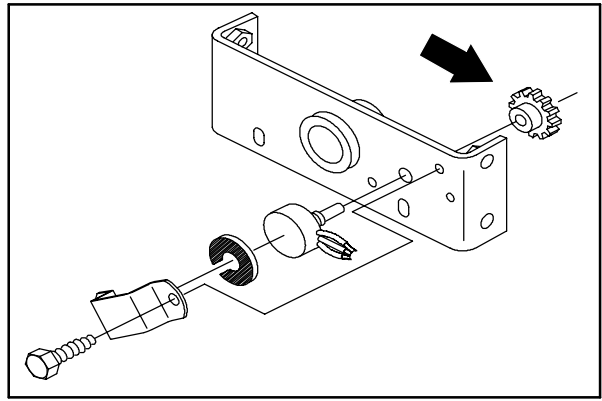
NOTE: Make sure the washer is in position.



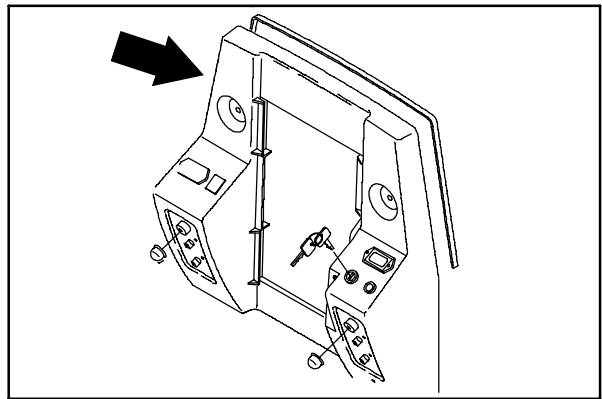
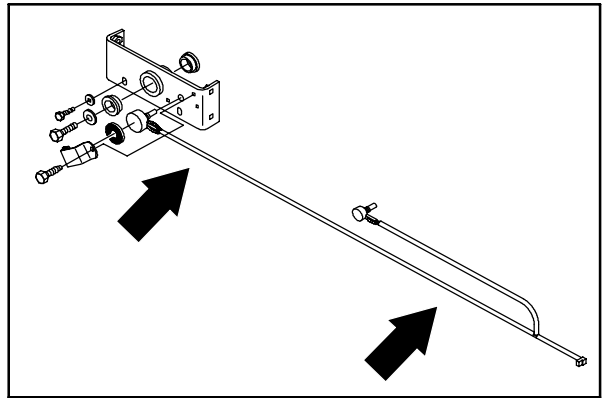
ELECTRICAL

8. Reinstall the gear on the new potentiometer. Make sure the set screw is lined up with the flat on the shaft. Hand tighten set screw.

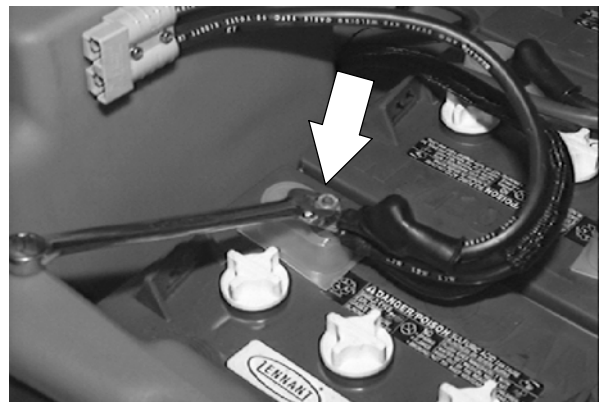
NOTE: The set screw on the gear should line up with the middle wire on the potentiometer.



9. Route the wire harness back to the circuit board.
10. Secure the potentiometer wire harness to the main harness routing with wire ties or electrical tape.
11. Put a small amount of dielectric grease on the terminals of this low voltage circuit to protect it against condensation and corrosion, (part # 86385).
12. Reinstall the instrument panel. See TO INSTALL INSTRUMENT PANEL instructions in this section.

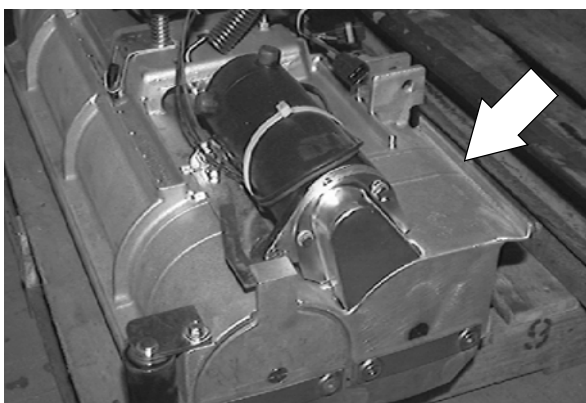
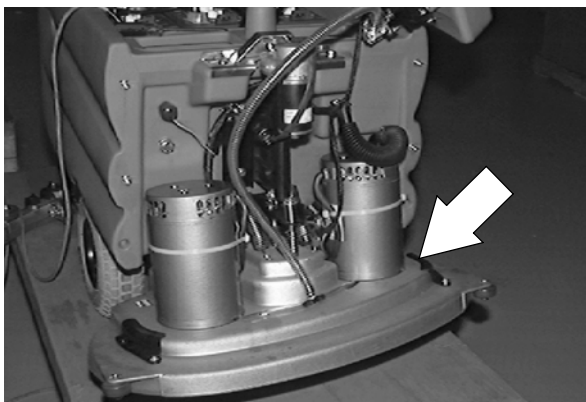
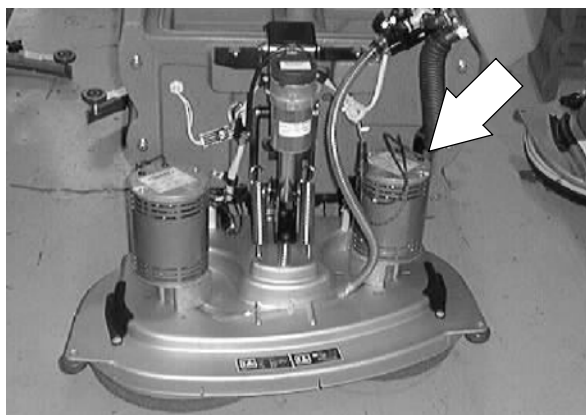


13. Re-connect the negative battery cable to the battery nearest the back of the machine.



SCRUB HEAD

The scrub heads are available in two brush type, and three widths. The scrub heads are interchangeable when the scrub brush motor circuit breakers, installed in the operator console, match the circuit breakers needed as shown in the circuit breaker chart.



ELECTRICAL

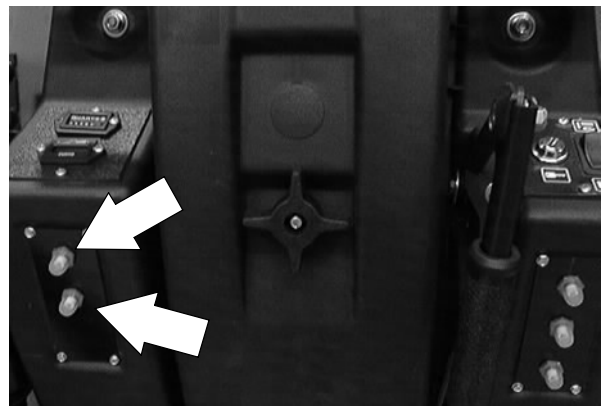
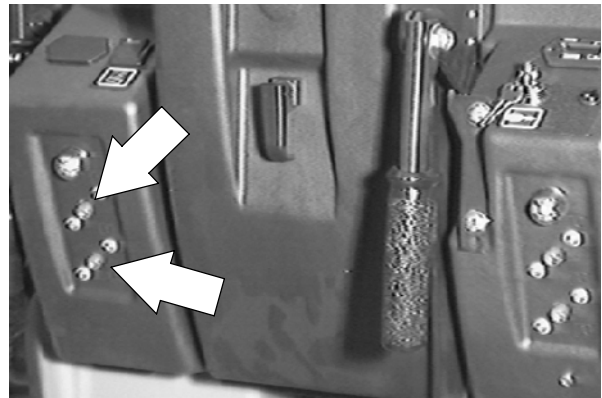
SCRUB HEAD CIRCUIT BREAKERS (800 HD Disk and 900 Disk only)

Scrub head	Disk	HD Disk	Cylindrical
Model 700 710 mm (28 in)	20 A	-	20 A
Model 800 815 mm (32 in)	20 A	35 A	20 A
Model 900 915 mm (36 in)	-	35 A	20 A

NOTE: To interchange the Model 800 HD disk or the Model 900 disk with one of the other available scrub heads, you must change the scrub brush motor circuit breakers in the operator console. Interchanging the scrub heads without changing the scrub brush motor circuit breakers will cause the scrub brush motors or circuit breakers to fail.

NOTE: When you change to a different width scrub head, be sure to install the appropriate width squeegee and machine front cover. The front cover for the cylindrical brush scrub head has a cutout on both sides for clearance when the head is in the raised position.

*NOTE: Heavy duty batteries **must** be used in conjunction with the **heavy duty** brush motors on the model 800 and 900 disk scrub head. Refer to the 5680/5700 parts manual for correct part numbers.*

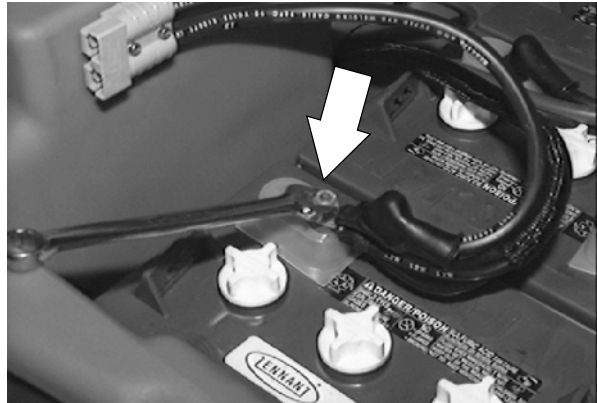


TO CHANGE SCRUB HEAD CIRCUIT BREAKERS

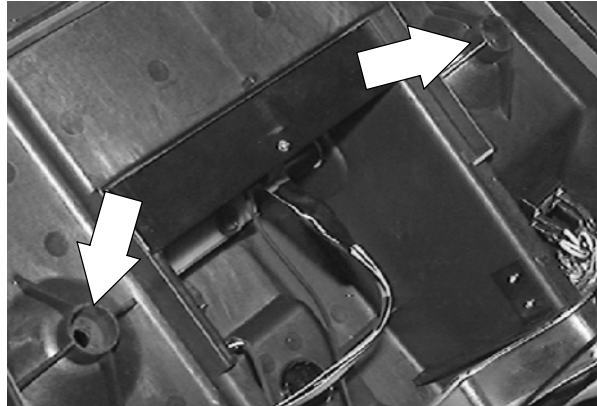
FOR SAFETY: Before leaving or servicing machine, stop on level surface and set parking brake (optional).

1. Disconnect the negative battery cable from the battery nearest the back of the machine before servicing any electrical components.

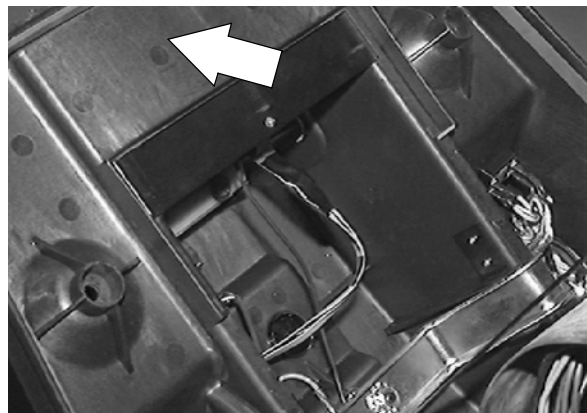
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.



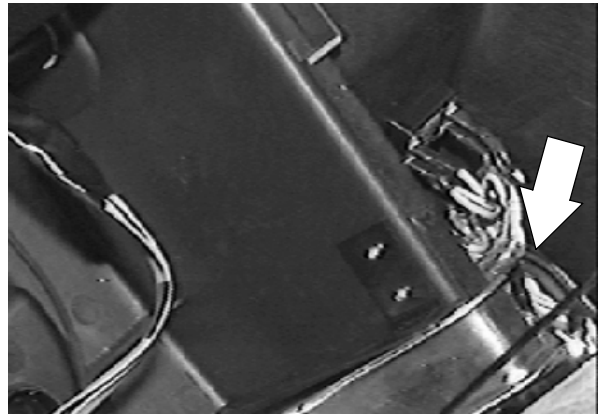
2. Remove the two M8 hex screws holding the top of the instrument panel to the electrical panel.



3. Tilt the instrument panel assembly back until the lanyard strap is tight.

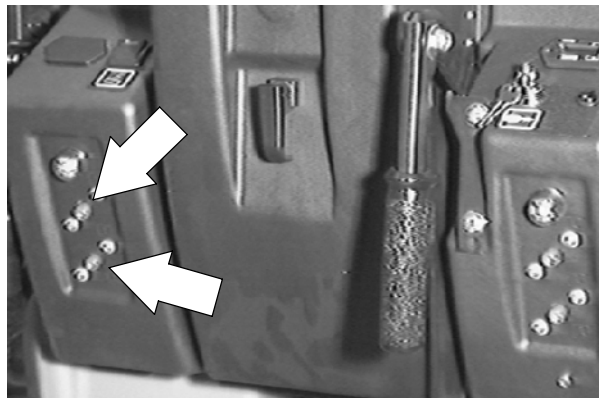


4. Locate the two scrub head circuit breakers on the lower, left hand side of the instrument panel.



5. Remove the two pan head screws holding each of the original circuit breakers to the panel.

ATTENTION: Double check to make sure the batteries are disconnected from the machine.

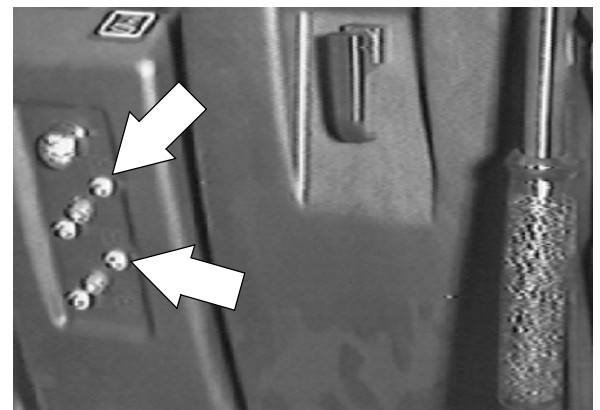


6. Pull the original circuit breaker out and disconnect the #60A, #60B yellow and #62A blue wires on all models. On the 5700 machine, disconnect the remaining #64A grey wire. On the 5700XP and 5700XPS machines, disconnect the remaining #64A purple wire. Remove both of the scrub head circuit breakers from the machine.



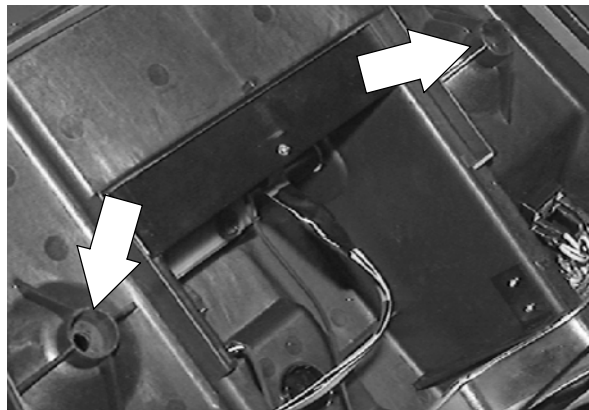
7. Reconnect the wires in the reverse order to the new circuit breakers.

8. Position the new circuit breakers on the instrument panel and reinstall the four pan head screws and tighten.

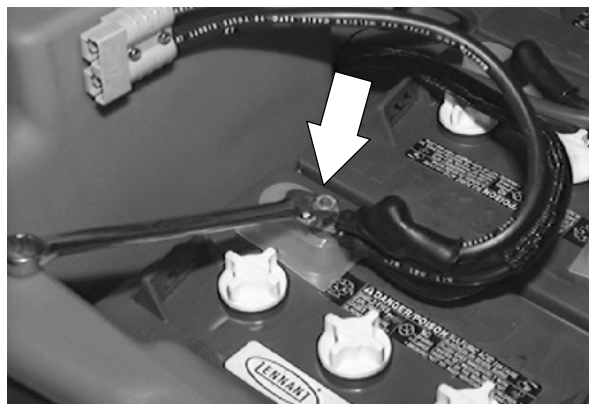


9. Pivot the instrument panel assembly back up to the electrical panel. Reinstall the two M8 hex screws and tighten.

NOTE: Make sure all the wires are out of the way of any pinch points when pivoting the instrument panel back into position.



10. Reconnect the battery cable to the rear battery.



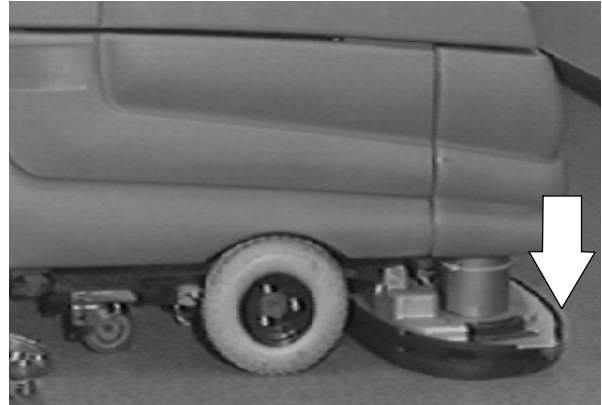
11. Lower the solution tank and operate the machine, checking for proper scrub brush operation.



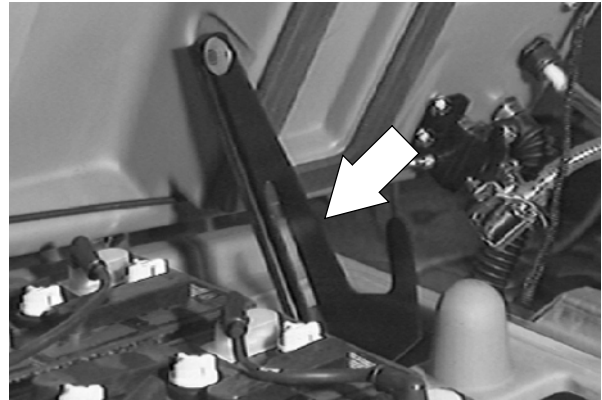
TO REPLACE SCRUB HEAD LIFT ACTUATOR (5700, 5700XP, 5700XPS)

1. Lower the scrub head all the way to the floor.

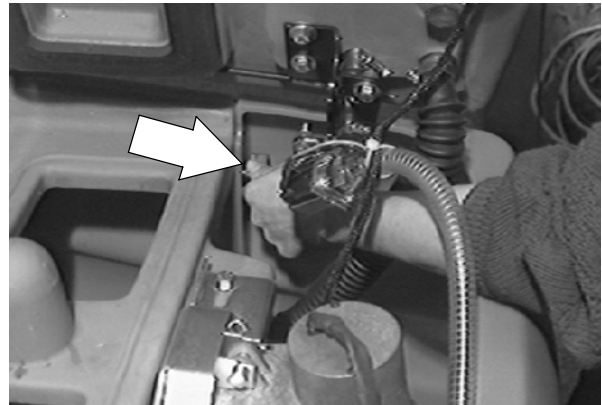
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.



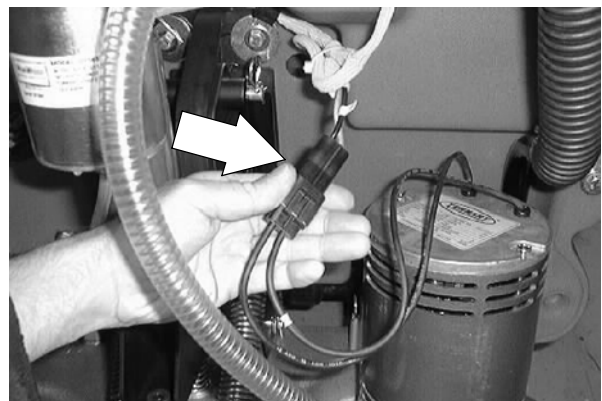
2. Raise the solution tank until the prop rod is engaged.



3. Remove the four M8 hex screws holding the front cover to the machine. Remove the cover.

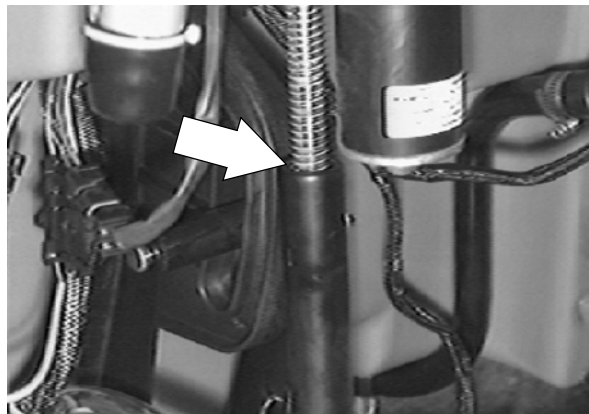


4. Unplug the scrub head lift actuator from the main harness.



5. Mark the location of the actuator tube on the actuator shaft with a piece of tape or a colored marking pen.

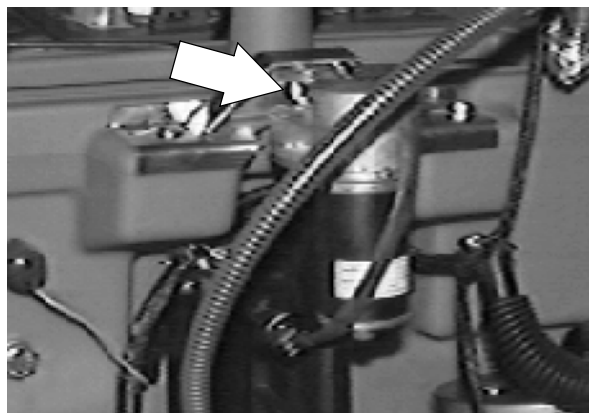
NOTE: Be sure to mark the actuator position to keep the scrub head adjustment set correctly.



6. Remove the cotter pin and clevis pin from the bottom of the head lift actuator.

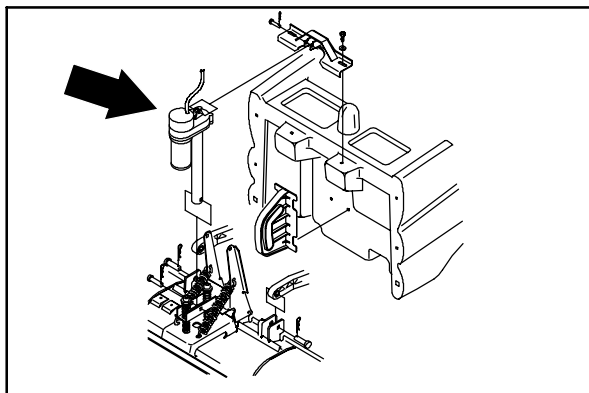


7. Remove the cotter pin and clevis pin from the top of the head lift actuator.

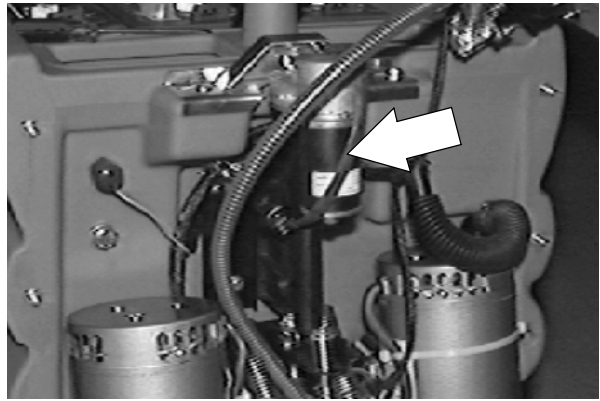


8. The head lift actuator can now be removed from the machine.

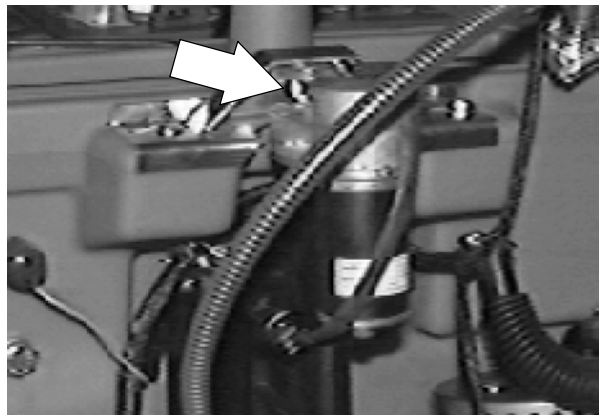
NOTE: Be careful not to rotate the actuator tube.



9. Position the new actuator on the machine with the motor on top and facing forward.

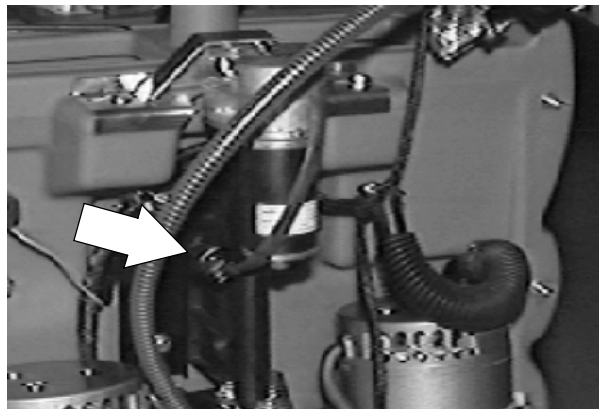


10. Align the mounting hole in the top of the scrub head lift actuator with the hole in the actuator mount bracket. Install the clevis and cotter pin.



11. Plug the actuator into the main harness. See the schematic in this section.

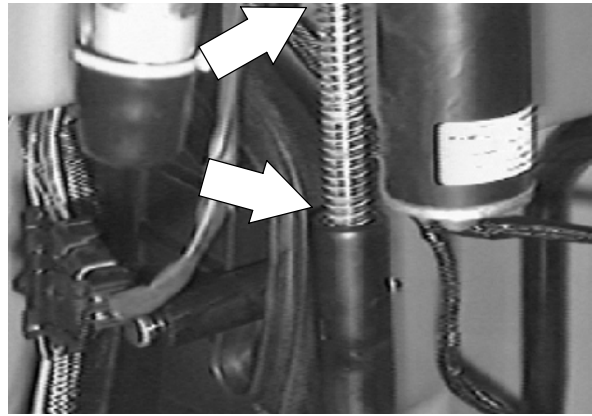
NOTE: Make sure the actuator tube lines up with the mark made earlier on the shaft of the actuator that was removed. If not, turn the actuator tube until it does.



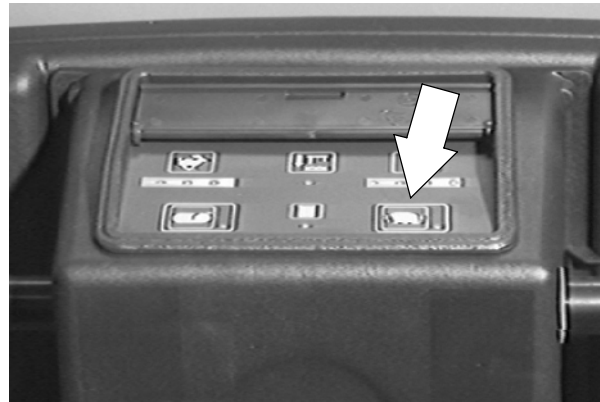
12. Align the mounting hole in the bottom of the scrub head lift actuator with the hole in the scrub head actuator mount bracket. Install the clevis and cotter pin.



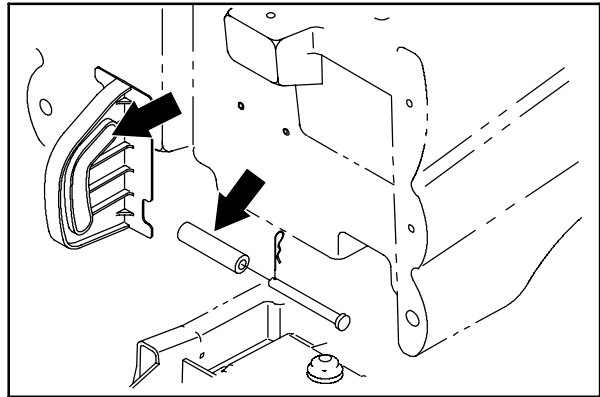
13. **On the 5700 machine**, check the actuator by raising the scrub head until the top of the actuator tube is 9 mm (3/8 in.) from the bottom of the actuator head. If the actuator tube does not stop at that dimension with the brush switch on, remove the bottom clevis pin and turn the tube to achieve the proper dimension, then reinstall the clevis pin.



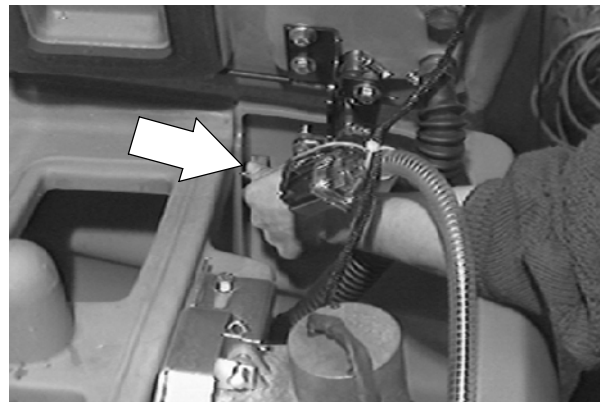
14. **On the 5700XP and 5700XPS**, check the actuator by turning on the key and gently rotating the speed handle forward until the propel circuit is lightly activated. Press the *scrub brush up and off* button. When the scrub brush stops going up, press the *scrub brush up and off* button once more. This will properly adjust the actuator.



15. The scrub head guide roller should now be almost at the top of the slot on the roller guide bracket. If the roller is not at the top of the slot, loosen the four M8 hex screws and adjust the roller guide bracket so the roller just touches or is slightly away from the end of the slot. Re-tighten the screws to 18 - 24 Nm (15 - 20 ft lb).



16. Reinstall the front cover using the four M8 hex screws. Tighten to 18 - 24 Nm (15 - 20 ft lb).



17. Lower the solution tank, operate the machine, check for proper operation.

TO REPLACE SCRUB HEAD LIFT ACTUATOR ON 5680 MACHINES

SPECIAL TOOLS / CONSIDERATIONS: Amp Meter, Measuring Device

(Estimated time to complete: 1 hour)

Carefully read and follow these instructions. The actuator can be easily damaged if not installed as instructed.

PREPARE MACHINE FOR INSTALLATION:

1. Empty the recovery tank.
2. Fill the solution tank with 3 to 5 gallons / 11 to 19 liters of water. This water will be used later when testing the actuator down pressure.
3. Park the machine on a clean level surface.
4. Lower the scrub head.

NOTE: If the scrub head is stuck in the raised position, place a block under the scrub head.

5. Turn off the machine.
6. To access the actuator, carefully lift the solution tank and remove the front shroud.

REMOVE OLD ACTUATOR:

1. Unplug the actuator from the main wire harness (Fig. 1).

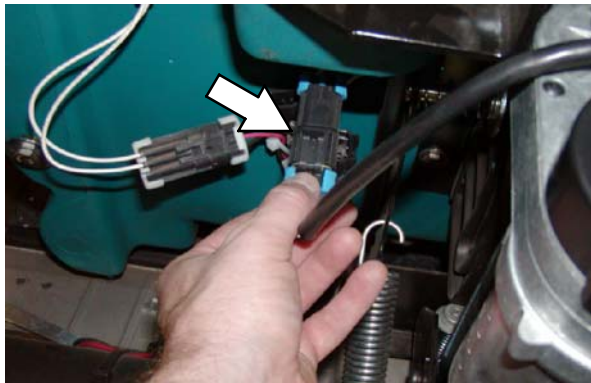


FIG. 1

2. Remove the lower clevis pin and spring from the actuator (Fig. 2). Set all hardware aside. If a block was used to support the scrub head, remove the block and carefully lower the scrub head to the floor.

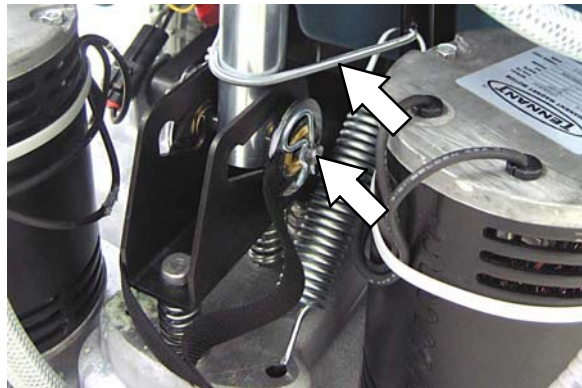


FIG. 2

3. Remove the top clevis pin that mounts the actuator bracket to the machine (Fig. 3a). Then remove the actuator bracket from the old actuator (Fig. 3b). Set all mounting hardware aside.



FIG. 3a

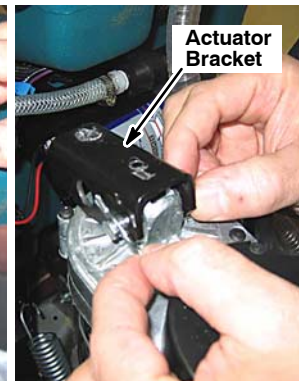


FIG. 3b

(5680 - continued)

INSTALL NEW ACTUATOR:

1. Connect the top end of the actuator to the machine using existing hardware (Fig. 4a). Do not connect the lower end of the actuator at this time.
2. Plug the actuator into the main wire harness (Fig. 4b)



FIG. 4a

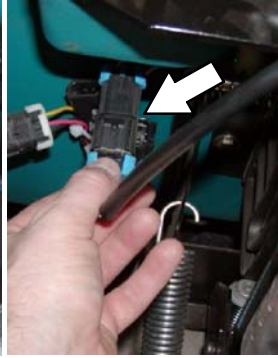


FIG. 4b

3. Locate the upper limit switch position on the actuator as described below:
 - 3a. Turn the tube until the distance between the top of the tube and the gearbox is $1\frac{1}{2}$ in / 38 mm or more (Fig. 5).

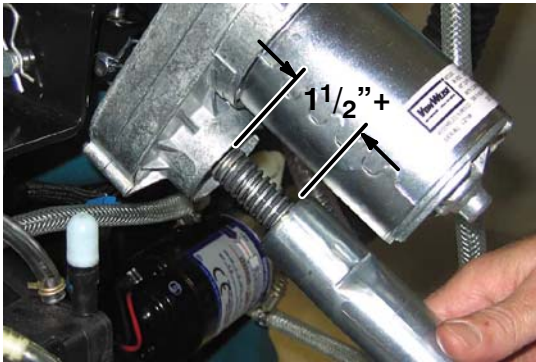


FIG. 5

- 3b. With the key turned off, press the bottom half of the scrub switch (raised position) (Fig. 6a).
- 3c. Turn on the key and allow the tube to spin freely until the actuator automatically shuts off (Fig. 6b). **Do not** touch the spinning tube.



FIG. 6a

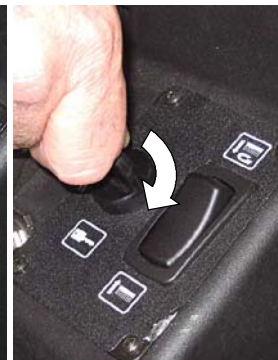


FIG. 6b

4. Locate the lower limit switch position on the actuator as described below:
 - 4a. Turn the tube until the distance between the gearbox and the tube notch is $1\frac{1}{2}$ in / 38 mm (Fig. 7). Adjust tube accordingly.

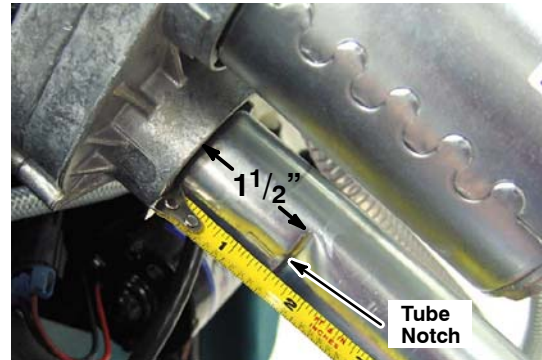


FIG. 7

- 4b. With key turned off, press the top half of the scrub switch (down position).
- 4c. This step may require an assistant. Firmly grip the actuator tube with your right hand and turn on the key with your left hand (Fig. 8). As the tube begins to extend, guide it down into the mounting bracket. Turn off key.

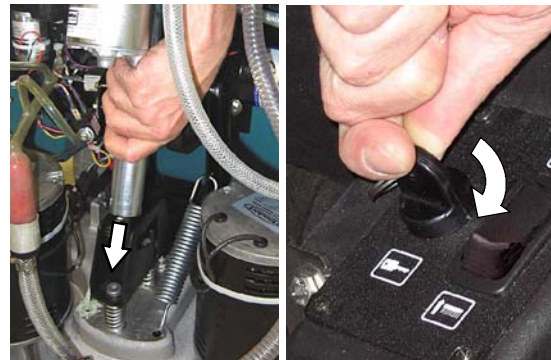


FIG. 8

- 4d. Align the tube holes with the mounting bracket (Fig. 9a). Reinstall the lower clevis pin, cotter pin, washers, scrub head strap handle and spring (Fig. 9b).

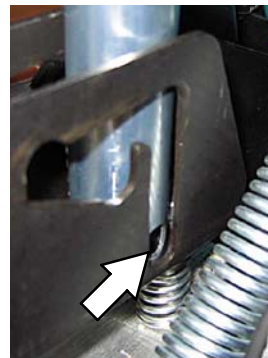


FIG. 9a

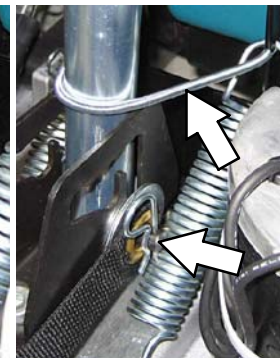
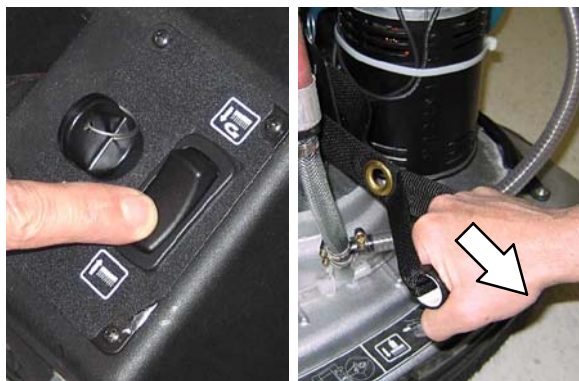


FIG. 9b

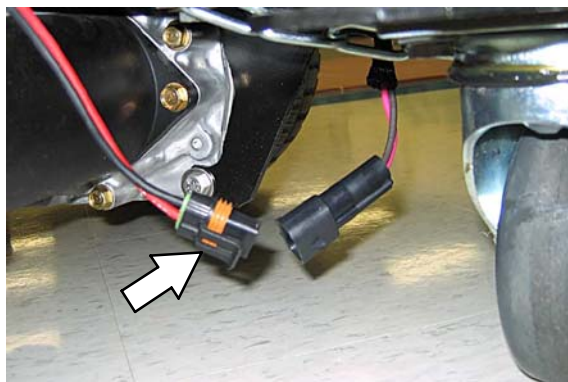
(5680 - continued)

TEST ACTUATOR FOR PROPER OPERATION:

1. For Disk Model: Raise the scrub head and pull the scrub head handle strap to set the scrub head in heavy down pressure (Fig. 10).

**FIG. 10**

2. Park the machine on a smooth floor. Turn off the key.
3. Unplug the transaxle wire harness connector to keep machine stationary while testing (Fig. 11).

**FIG. 11**

4. Turn on the key and lower the scrub head.
5. Using an amp meter, measure the amp reading at the positive battery cable while rotating the control handle (Fig. 12).

The measurement must read below 26 amps for a disk model or 38 amps for a cylindrical brush model.

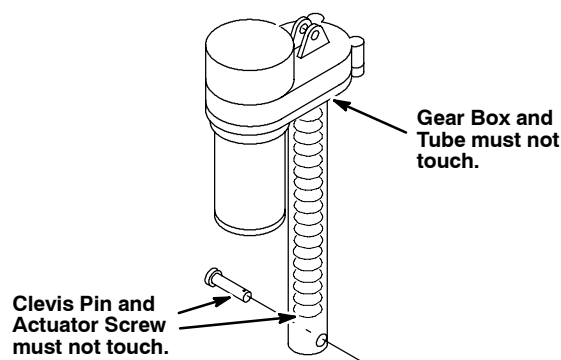
**FIG. 12**

NOTE: Machine must be tested with water on a smooth surface to ensure accurate reading.

If the amp reading exceeds the specified measurement or if the drive wheels slip during scrubbing, decrease the brush pressure as described below:

Lower the scrub head and disconnect the lower clevis pin. Turn the actuator tube *counter-clockwise* in half turn increments and repeat the test procedure until correct measurement is achieved.

NOTE: The clevis pin must not touch the bottom of the actuator screw and the top of the tube must not touch the gear box (Fig. 13).

**FIG. 13**

If the amp reading is too low, increase the brush pressure as described below:

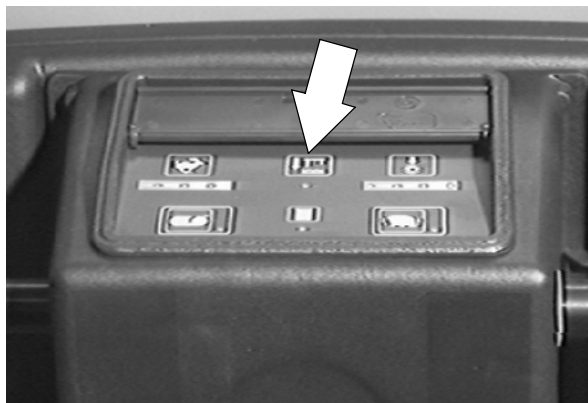
Lower the scrub head and disconnect the lower clevis pin. Turn the actuator tube *clockwise* in half turn increments and repeat the test procedure until correct measurement is achieved.

6. Reconnect the transaxle wire connector and reinstall the front shroud.

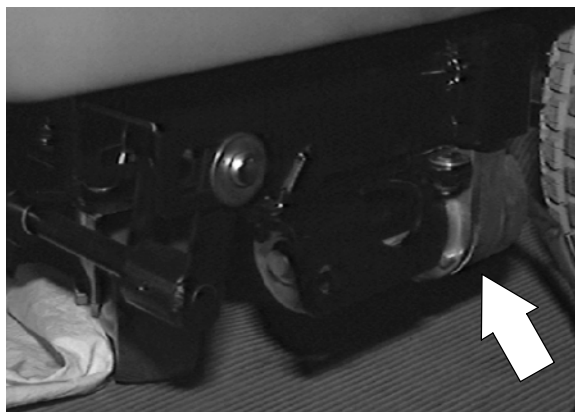
TO REPLACE SQUEEGEE LIFT ACTUATOR XP/XPS

**FOR SAFETY: Before Leaving Or
Servicing Machine; Stop On Level
Surface, Set parking brake (optional).**

1. Lower the squeegee to the floor. Turn off the machine.



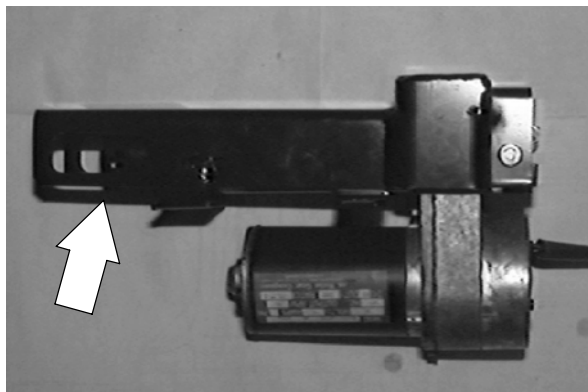
2. Locate the squeegee lift actuator on the lower right side of the machine. Un-plug the actuator from the main harness.



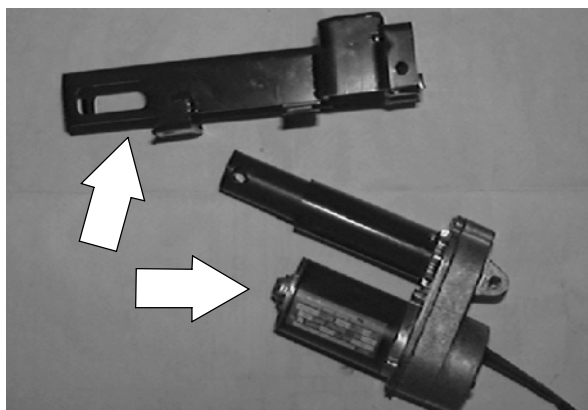
3. Remove the two hair pins and two clevis pins holding the squeegee lift actuator to the mounting bracket.



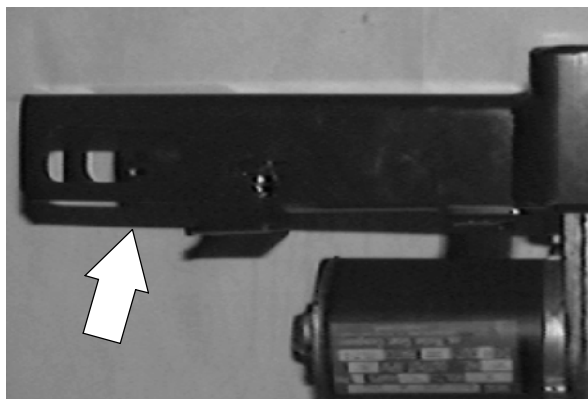
4. Remove the three M8 hex screws holding the actuator mounting bracket to the machine. Remove the mount bracket from the machine with the actuator inside it.



5. Remove the actuator from the mounting bracket.
6. Position the new lift actuator in the mounting bracket with the motor facing forward and down.



7. Position the actuator mount bracket on the machine. Reinstall the three M8 hex screws. Leave the hardware loose for now.

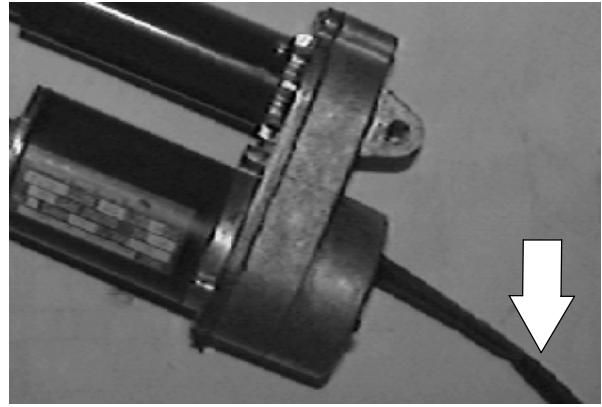


8. Reinstall the two clevis pins and hair pins.

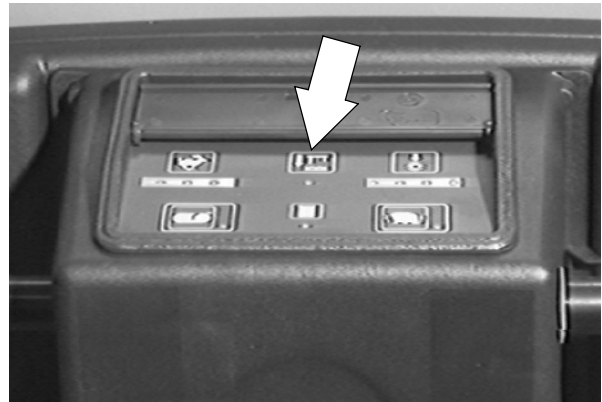


ELECTRICAL

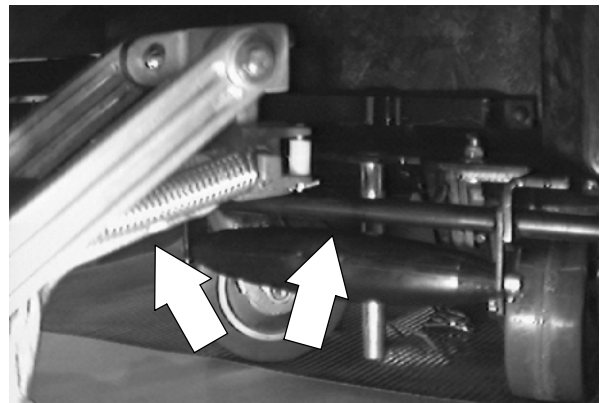
9. Reconnect the main electrical harness to the new lift actuator. See schematic in the ELECTRICAL section of this manual.



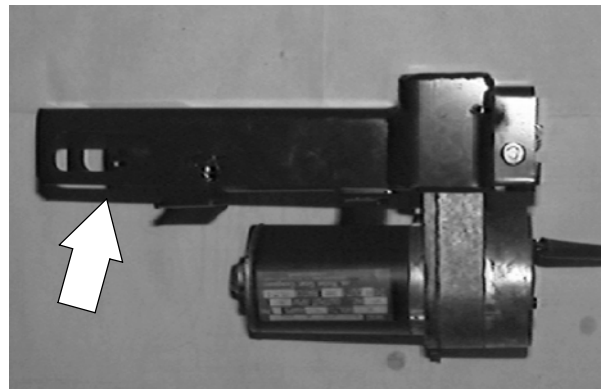
10. Start the machine and operate the auto squeegee.
11. Turn off the machine with the squeegee in the down position.



12. Check the gap between the top of the roller on the auto squeegee and the bottom of the "Y" bar on the squeegee arms. This gap should be (0.125 to 0.250 in.).
13. If the gap is more than (0.250 in.) or less than (.125 in.), the three hex screws holding the actuator mount bracket to the frame must be loosened and the bracket slid back until the gap is correct.



14. Tighten the three hex screws to 18 – 24 Nm (15 – 20 ft lb).



15. Start the machine and operate the squeegee lift. Check the actuator for proper operation.

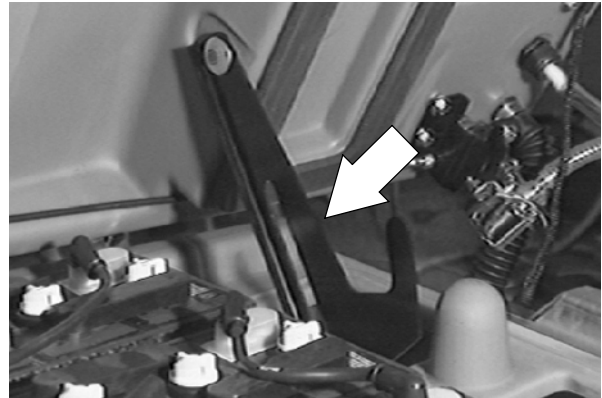
ELECTRIC MOTORS

The carbon brushes on the vacuum fan motor should be inspected after every 500 hours of machine operation. The scrub brush motors, and propelling motor carbon brushes should be inspected after every 1000 hours of machine operation.

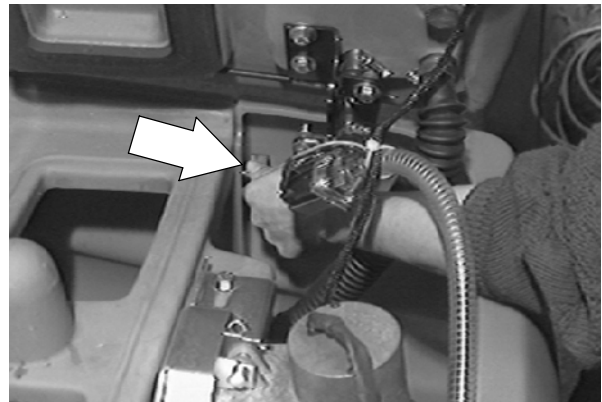
TO REPLACE STANDARD DISK SCRUB BRUSH MOTOR

1. Raise the solution tank until the prop rod is engaged.

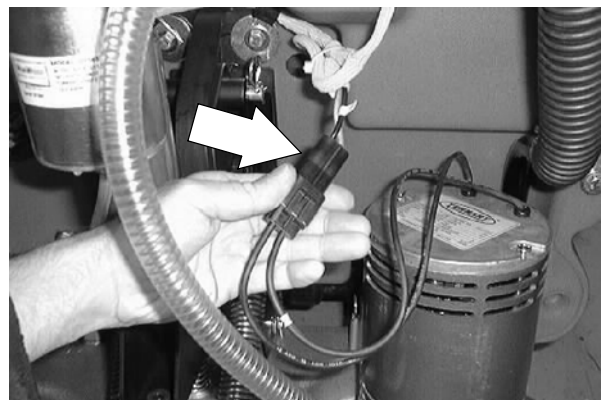
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.



2. Remove the four M8 hex screws holding the front cover to the machine. Remove the cover.

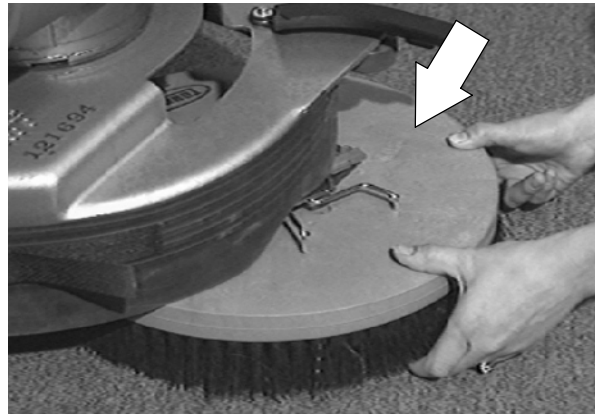


3. Unplug the brush motor from the scrub head harness.



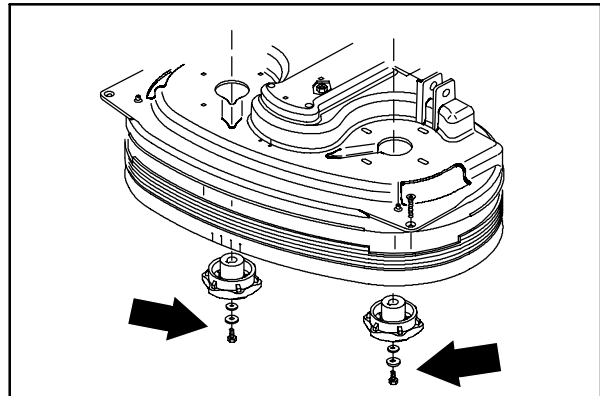
ELECTRICAL

4. Remove the scrub brush from the motor that needs to be changed. See TO REPLACE A DISK SCRUB BRUSH instructions in the SCRUBBING section.



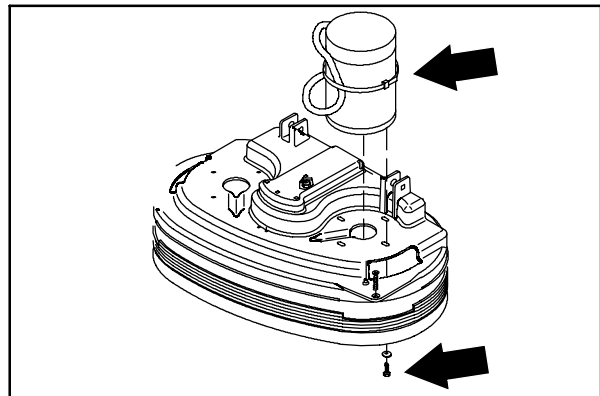
5. Remove the 0.31 in fine thread hex screw, Belleville washer and flat washer holding the brush drive plug to the bottom of the brush motor shaft.
6. Slide the brush drive plug off the brush motor shaft. Be careful not to lose the square key on the shaft.

NOTE: The right side motor is mounted in slotted holes. When removing this motor, mark the position so the proper brush overlap is maintained.

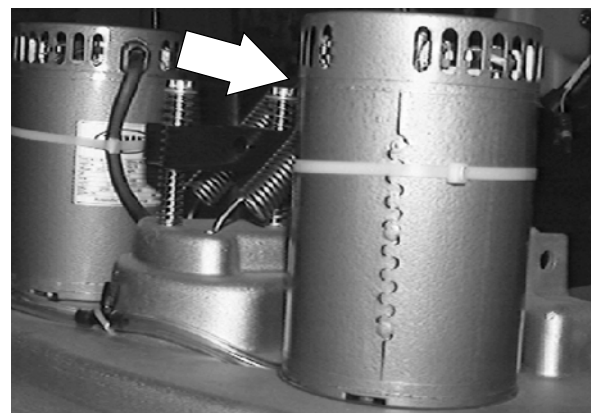


7. Remove the four 0.25 in hex screws and Belleville washers holding the brush motor to the scrub head.

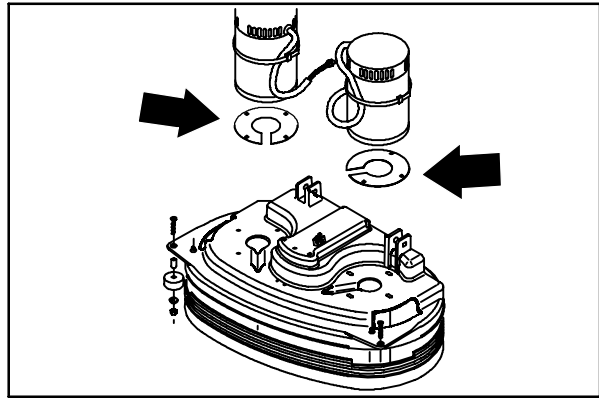
NOTE: The orientation of the wires coming out of the motor.



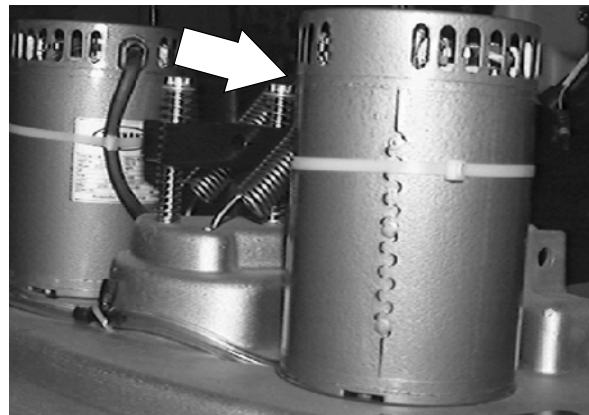
8. The brush motor can now be removed from the scrub head.



9. A new gasket should be installed between the motor and scrub head whenever a motor is changed.

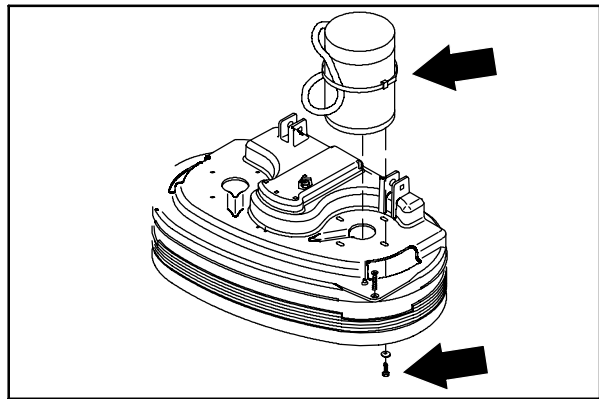


10. Position the new scrub brush motor on the scrub head. Make sure the motor electrical lead is pointed toward the center of the scrub head.



11. Align the four holes in the scrub head with the threaded holes in the motor. Reinstall the four 0.25 in hex screws and Belleville washers. Use loctite 242 blue and tighten to 11 - 14 Nm (7 - 10 ft lb).

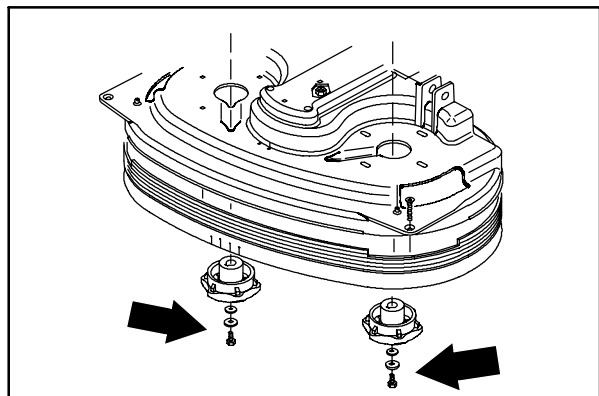
NOTE; The right side motor is mounted in slotted holes. When installing this motor, make sure that a slight amount of brush overlap is maintained for proper scrubbing performance.



12. Apply a small amount of EMB lubriplate water proof grease to the brush motor shaft. (part # 01433-1) *Make sure that the square key is in place and slide the brush drive plug onto the brush motor shaft.*

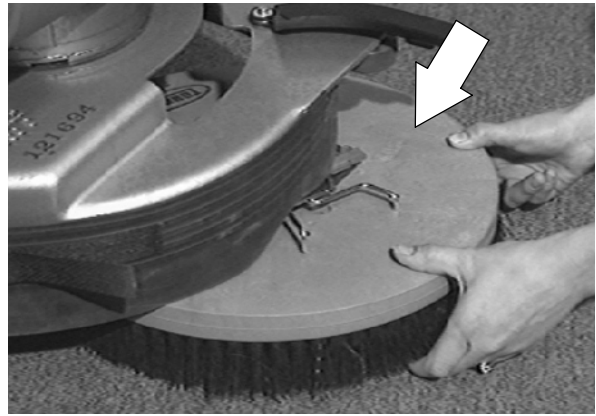
13. Reinstall the 0.31 fine thread hex screw, Belleville washer, and flat washer. Tighten to 18 - 24 Nm (15 - 20 ft lb).

NOTE: Make sure to install the belleville washer with the cup facing away from the bolt head.

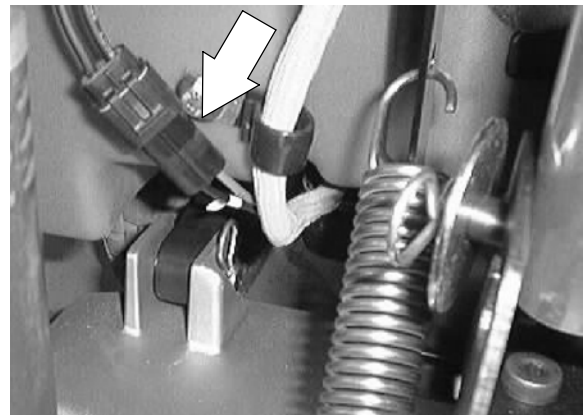


ELECTRICAL

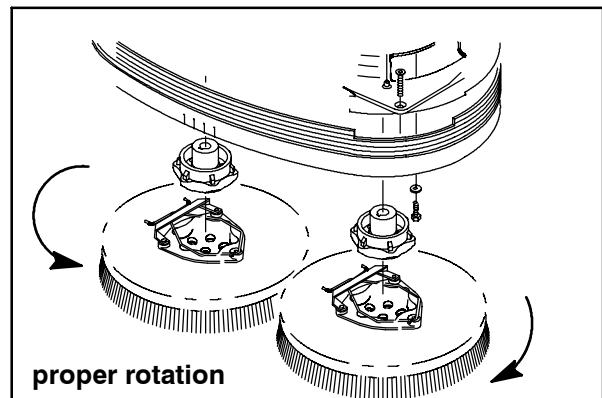
14. Reinstall the scrub brush. See TO REPLACE A DISK SCRUB BRUSH instructions in the SCRUBBING section.



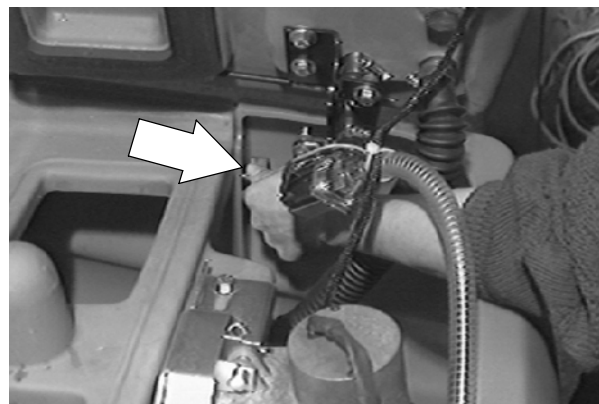
15. Plug the scrub brush motor into the scrub head harness. See the schematic in this section.



16. Start the machine and check the scrub head for proper brush rotation and overlap.



17. Reinstall the front cover using the four M8 hex screws. Tighten to 18 - 24 Nm (15 - 20 ft lb).



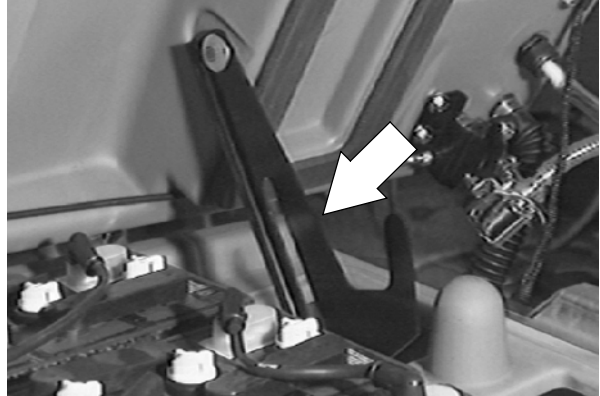
18. Lower the solution tank, operate the machine, check for proper operation.

TO REPLACE HEAVY DUTY DISK SCRUB BRUSH MOTOR

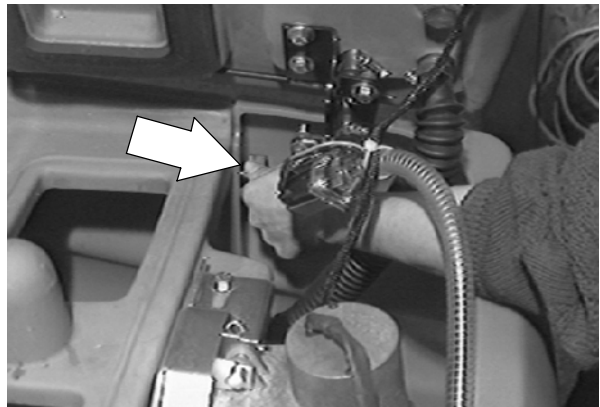
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Raise the solution tank until the prop rod is engaged.

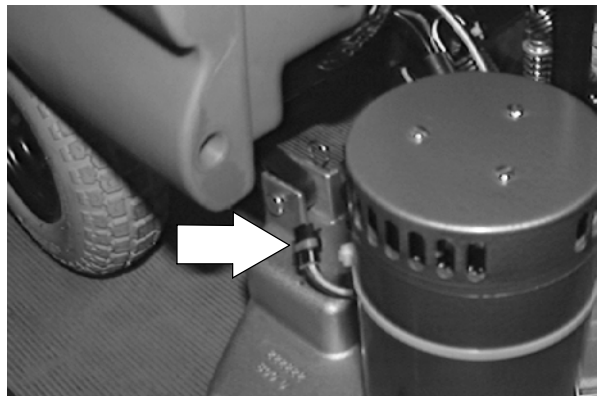
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.



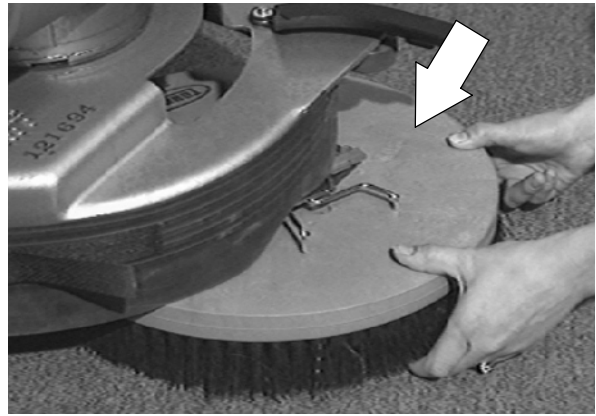
2. Remove the four M8 hex screws holding the front cover to the machine. Remove the cover.



3. Unplug the brush motor from the scrub head harness.

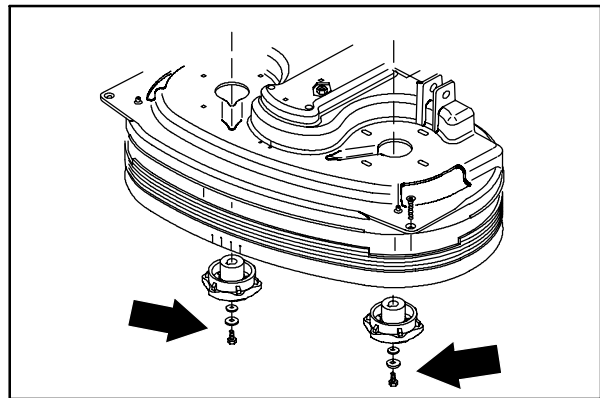


4. Remove the scrub brush from the motor that needs to be changed. See TO REPLACE A DISK SCRUB BRUSH instructions in the SCRUBBING section.



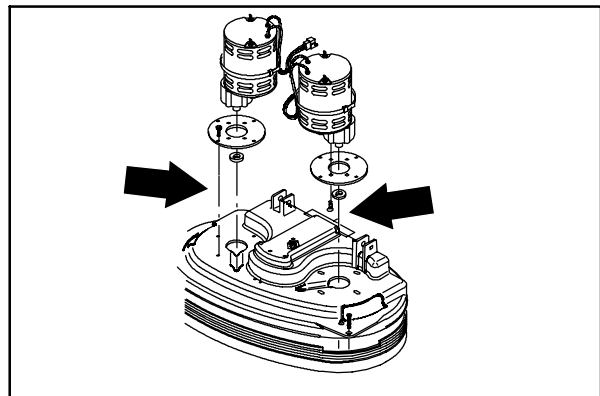
5. Remove the 0.31 in fine thread hex screw, Belleville washer and flat washer holding the brush drive plug to the bottom of the brush motor shaft.
6. Slide the brush drive plug and spacer off the brush motor shaft. Be careful not to lose the square key on the shaft.

NOTE: The right side motor is mounted in slotted holes. When removing this motor, mark the position so the proper brush overlap is maintained.



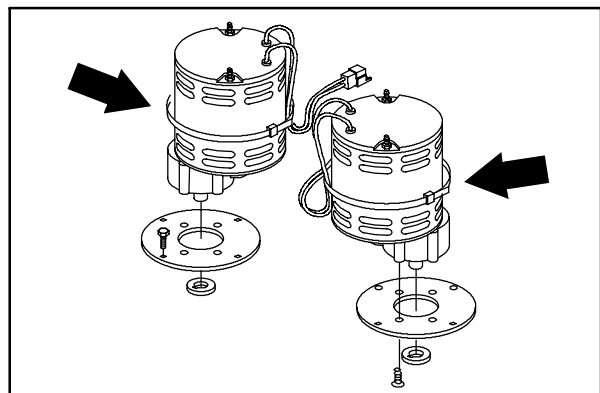
7. Remove the four M8 hex screws, washers, and nyloc nut holding the brush motor and adapter to the scrub head.

NOTE: The orientation of the wires coming out of the motor.

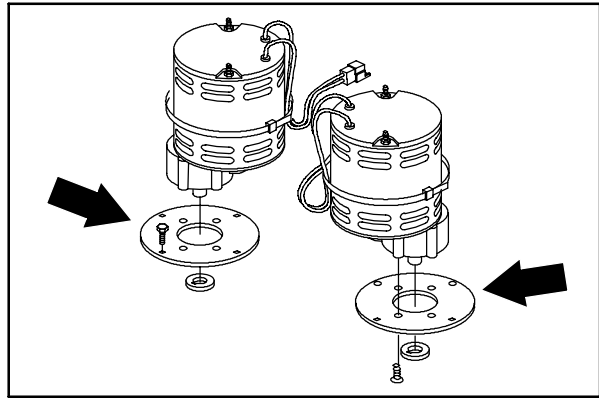


8. The brush motor and adapter can now be removed from the scrub head.

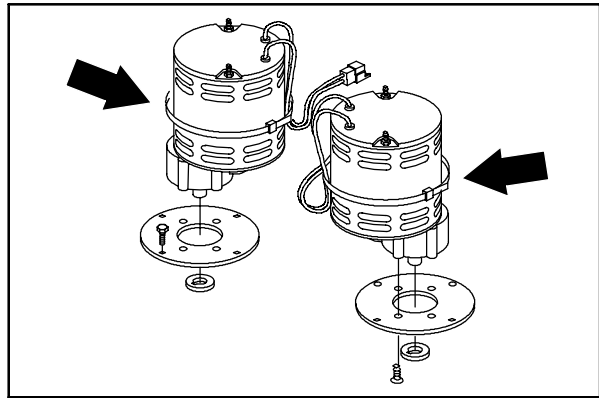
NOTE: The orientation of the wires coming out of the motor.



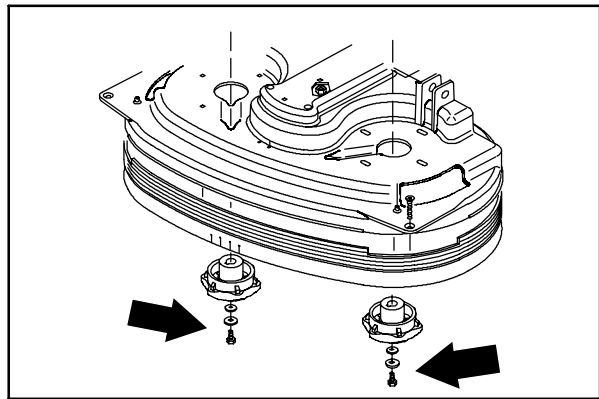
9. Remove the four 0.38 in. flat head screws holding the adapter to the bottom of the heavy duty brush motor. Remove the adapter.
10. The adapter plate can now be positioned on the new motor. Align the four holes in the adapter plate with the threaded holes in the brush motor. Reinstall the four 0.38 in flat head screws and tighten to 31 – 40 Nm (27 – 35 ft lb).



11. Position the new scrub brush motor and adapter plate on the scrub head. Make sure the motor electrical lead is pointed toward the center of the scrub head.
12. Align the four holes in the scrub head with the holes in the motor adapter plate. Reinstall the four M8 hex screws, washers, and nyloc nuts. Tighten to 18 – 24 Nm (15 – 20 ft lb).

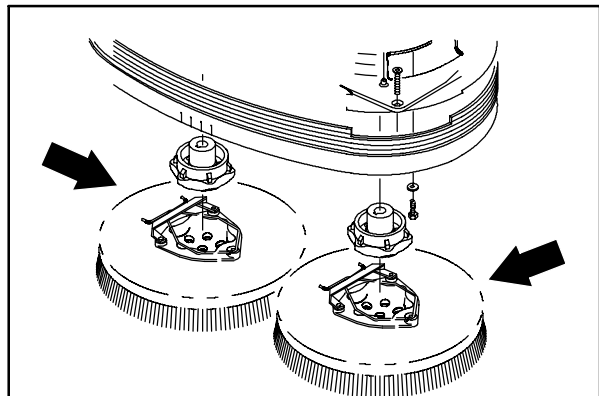


13. Apply a small amount of EMB lubriplate water proof grease to the brush motor shaft, (part # 01433-1).
14. Make sure that the spacer ring and square key are in place. Slide the brush drive plug on the brush motor shaft.
15. Reinstall the 0.31 fine thread hex screw, Belleville washer, and std. washer. Tighten to 18 – 24 Nm (15 – 20 ft lb).



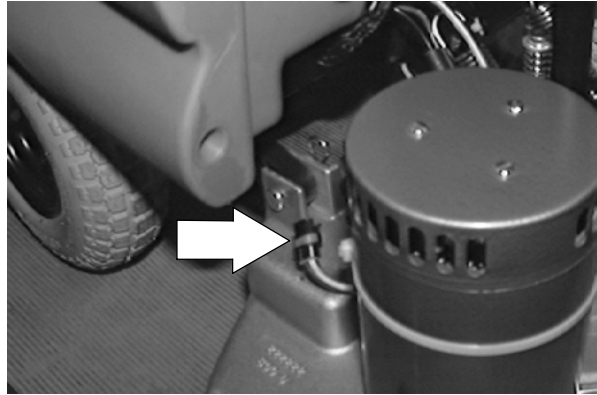
NOTE: Make sure to install the belleville washer with the cup facing away from the bolt head.

16. Reinstall the scrub brush. See TO REPLACE A DISK SCRUB BRUSH instructions in the SCRUBBING section.

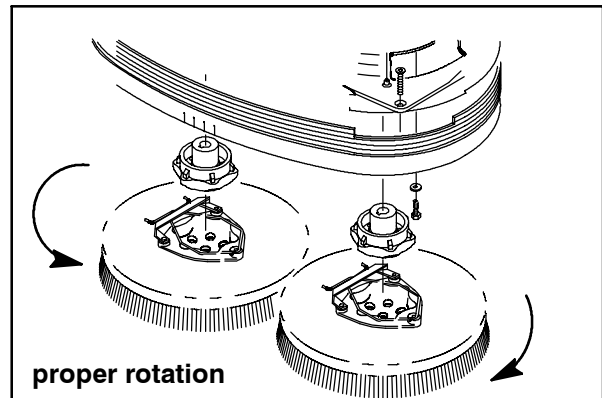


ELECTRICAL

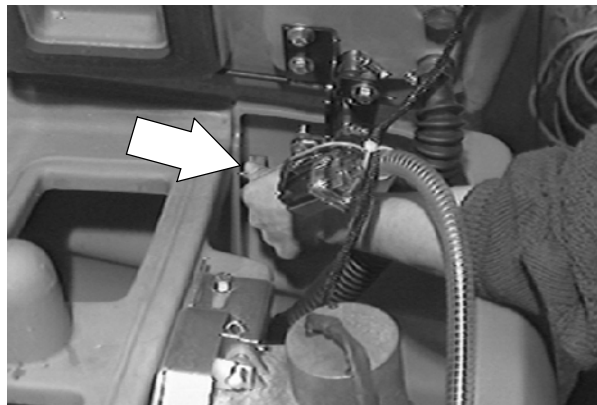
17. Plug the scrub brush motor into the scrub head harness. See the schematic in the ELECTRICAL section of this manual.



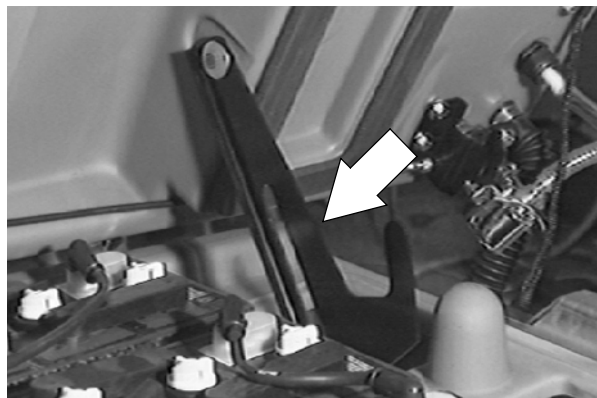
18. Start the machine and check the scrub head for proper brush rotation and overlap.



19. Reinstall the front cover using the four M8 hex screws. Tighten to 18 - 24 Nm (15 - 20 ft lb).



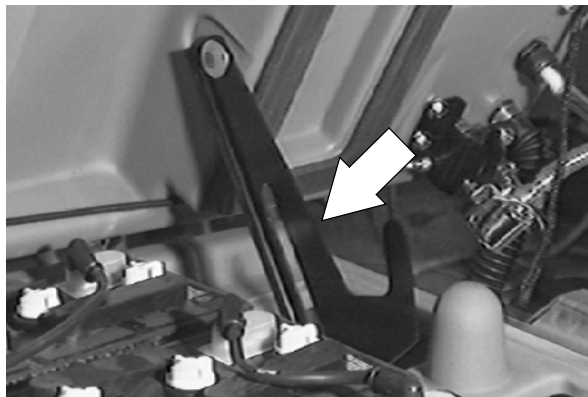
20. Lower the solution tank, operate the machine, check for proper operation.



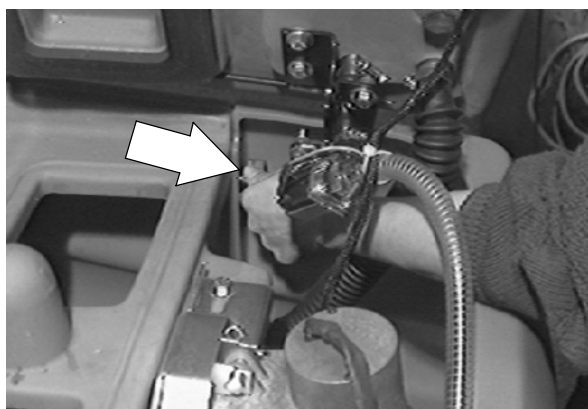
TO REPLACE CYLINDRICAL SCRUB BRUSH MOTOR

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

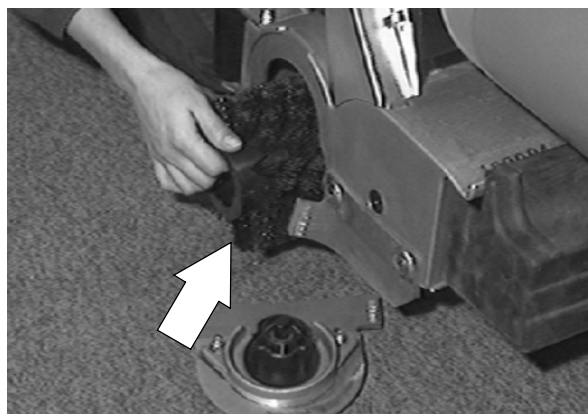
1. Raise the solution tank until the prop rod is engaged.



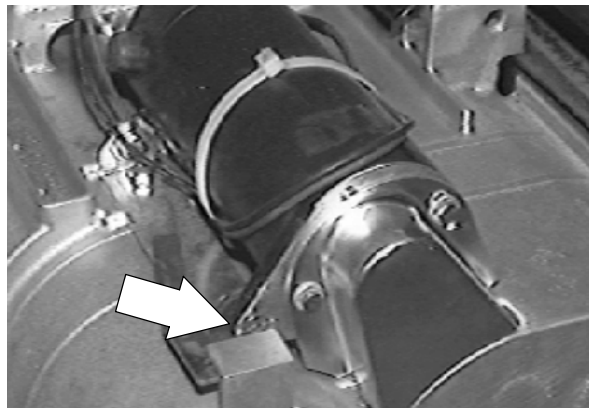
2. Remove the four M8 hex screws holding the front cover to the machine. Remove the cover.



3. Remove the scrub brush from the motor that needs to be changed. See TO REPLACE A CYLINDRICAL SCRUB BRUSH instructions in the SCRUBBING section.



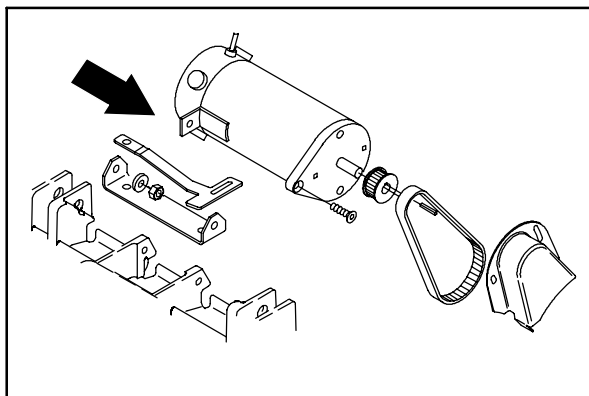
4. Loosen the front and rear pivot bolts on the brush motor.



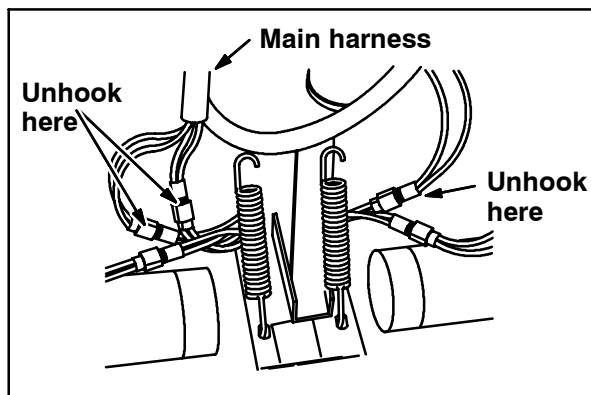
5. Remove the two M6 hex screws holding the belt cover on the motor that needs changing. Remove the cover from the scrub head.



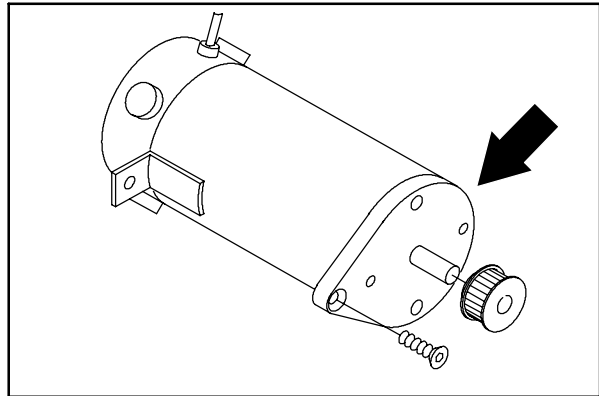
6. Loosen the M8 hex nut on the belt tension bolt under the motor. Turn the tension bolt down far enough to slip the belt off the pulley.



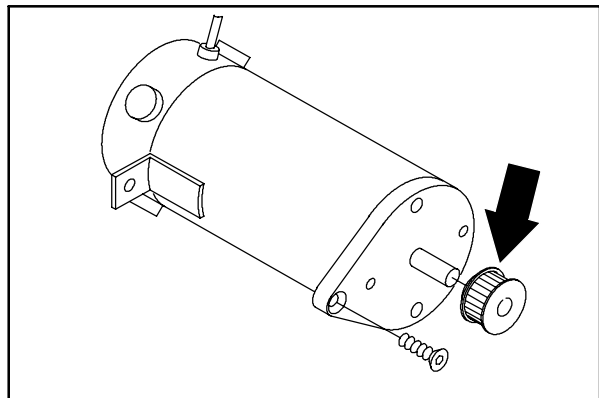
7. Unplug the brush motor from the scrub head harness.



8. Remove the one M8 flat head screw, one M8 hex screw and two M8 nyloc nuts holding the brush motor to the mounting bracket. The motor can now be removed from the machine.

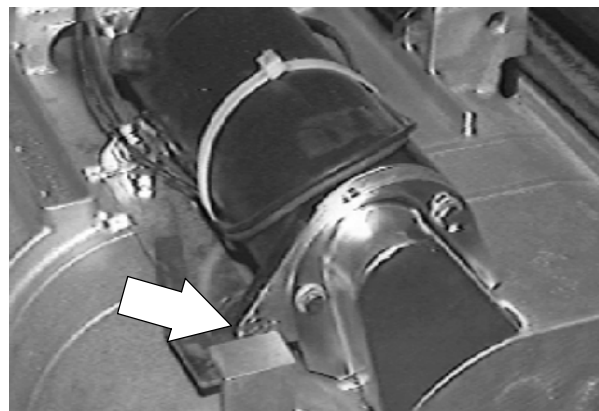


9. Loosen the set screws holding the cogged pulley to the brush motor shaft. Slide the pulley off the shaft. *Make sure not to loose the square key.*

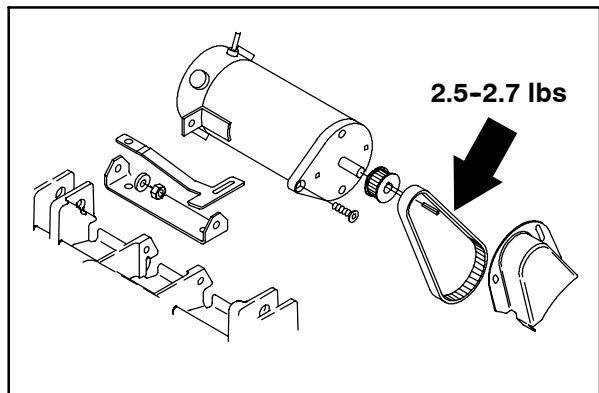


10. Reinstall the square key and cogged pulley on the shaft of the new motor.

11. Position the brush motor on the scrub head. Align the mounting holes on the motor with the holes in the mounting bracket on the scrub head. Reinstall the one M8 flat head screw, one M8 hex screw, and two M8 nyloc nuts. Snug the hardware for now.

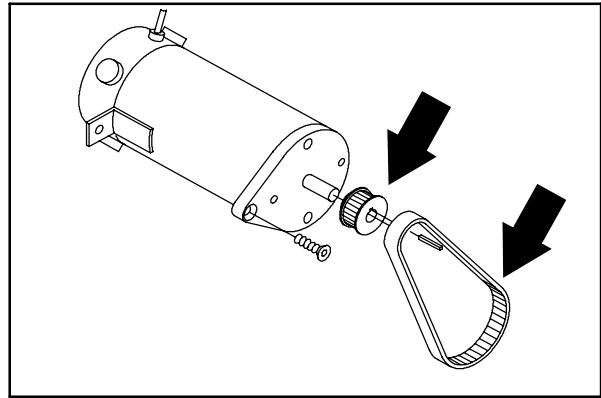


12. Slip the drive belt back over the cogged pulley.

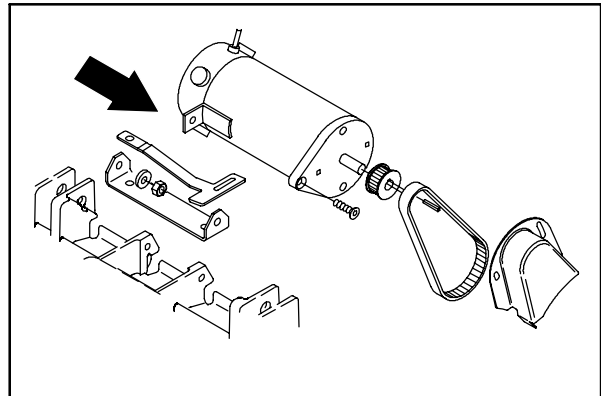


ELECTRICAL

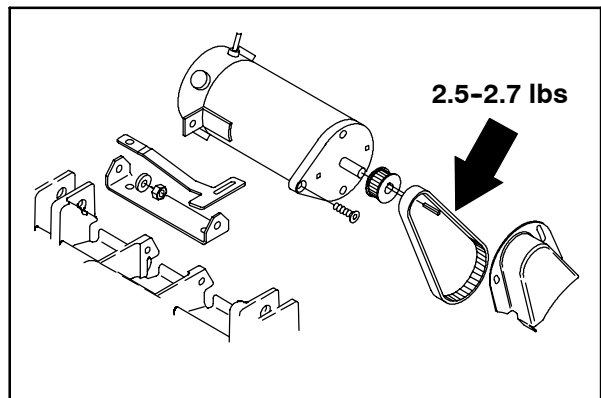
13. Align the top pulley with the bottom pulley. Make sure the belt is in the center of the bottom pulley. Hand tighten the set screws. Use loctite 242 blue on the threads.



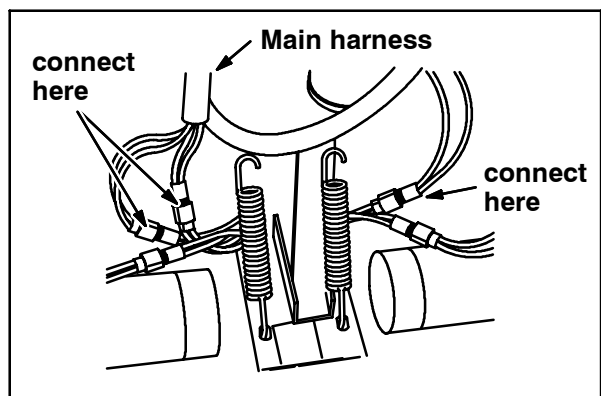
14. Using the M8 hex screw located under the brush motor, tension the belt by applying 2.5–2.7 lbs of force per belt at the middle of the span that is opposite the belt travel with a deflection of 0.10 inch.



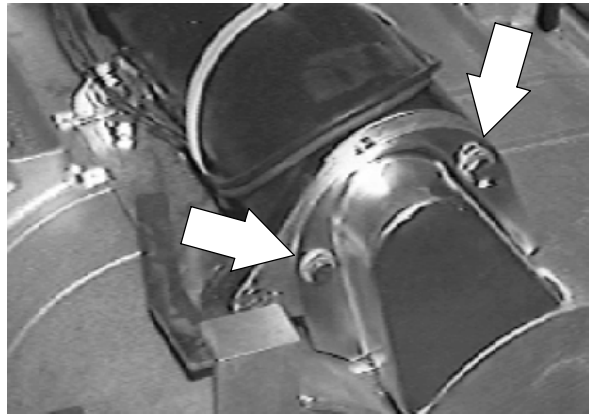
15. Tighten the two pivot bolts to 18 – 24 Nm (15 – 20 ft lb). Re-check the belt tension.



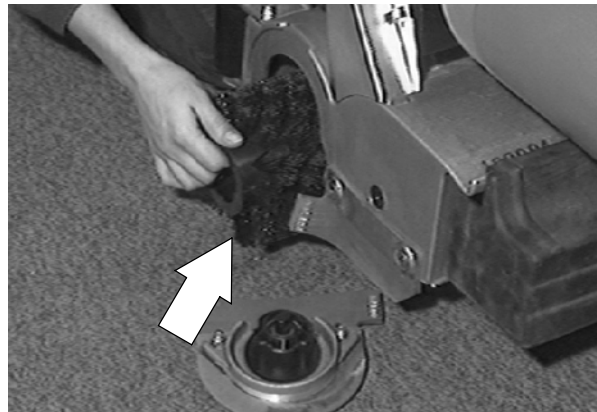
16. Plug the scrub brush motor into the scrub head harness. See the schematic in this section.



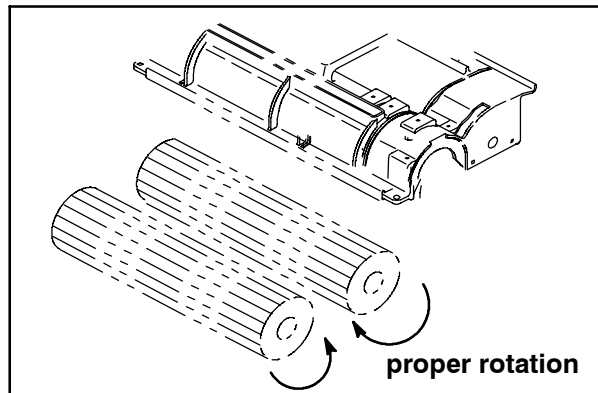
17. Reinstall the belt cover, two M6 hex screws, and washers. Tighten to 11 – 14 Nm (7 – 10 ft lb). Use a small amount of RTV on the flange of the belt cover to keep dust out.



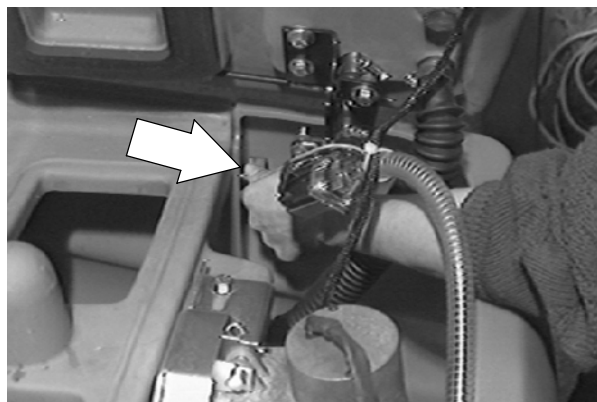
18. Reinstall the scrub brush. See TO REPLACE A CYLINDRICAL SCRUB BRUSH instructions in the SCRUBBING section.



19. Start the machine and check the scrub head for proper brush rotation.



20. Reinstall the front cover using the four M8 hex screws. Tighten to 18 – 24 Nm (15 – 20 ft lb).



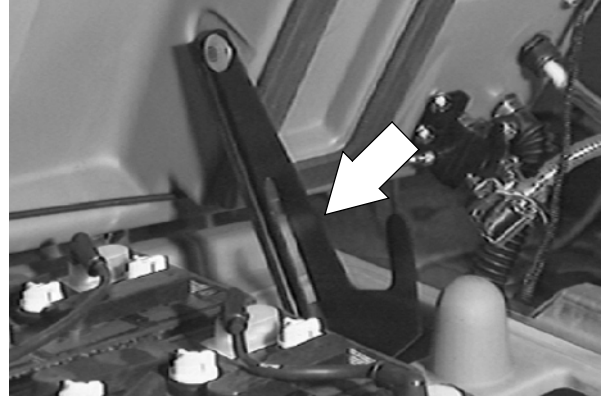
21. Lower the solution tank, operate the machine and check for proper operation.

ELECTRICAL

TO REPLACE DISK SCRUB BRUSH STANDARD MOTOR BRUSHES

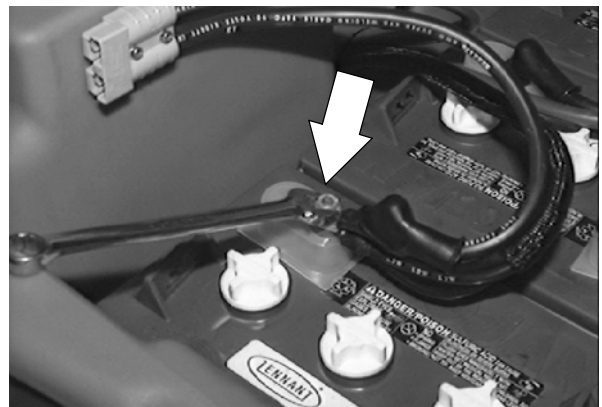
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Lift the solution tank and engage the prop rod.

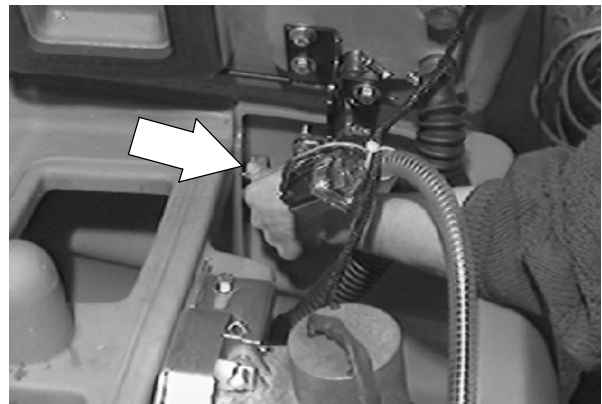


2. Disconnect the batteries from machine.

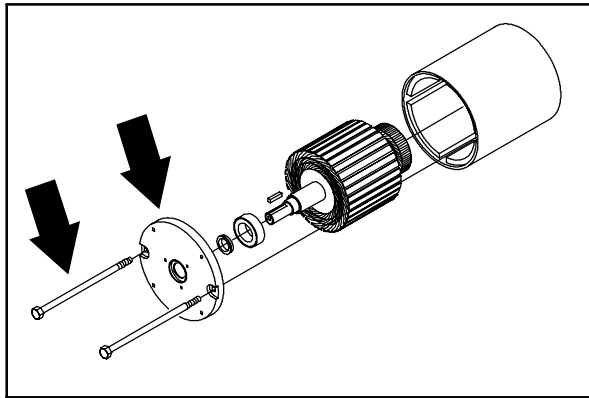
NOTE: Disconnect the negative battery cable from the battery nearest the back of the machine before servicing any electrical components.



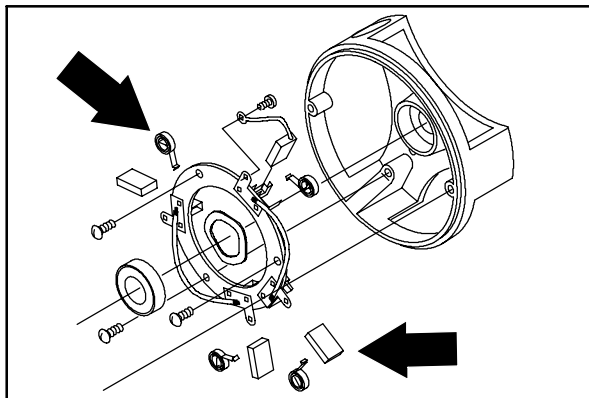
3. Remove the four M8 hex screws holding the front cover on the machine. Remove the cover.



4. Remove the three pan head screws holding the top cover to the scrub brush motor. Remove the cover.



5. Undo the spring clips holding the four motor brushes into the slots.

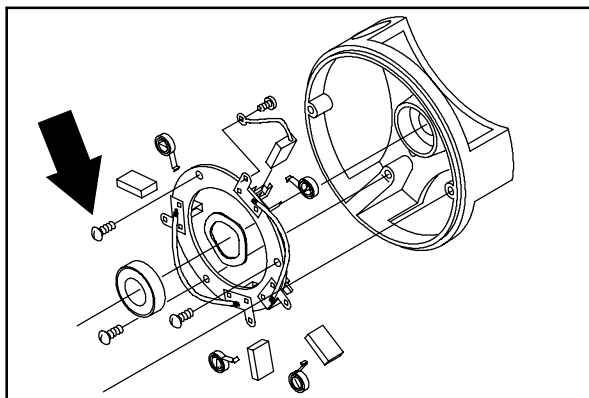


6. Remove the pan head screws holding the wire leads coming from the brushes to the motor plate.

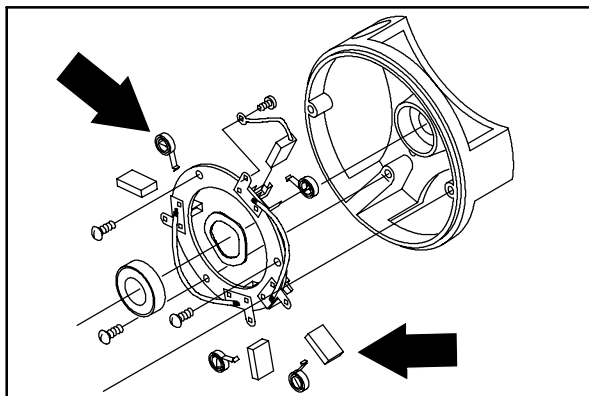
7. Remove the brushes from the motor.

8. Position the new brushes in the slots.

9. Position the spring clips back on top of the brushes.

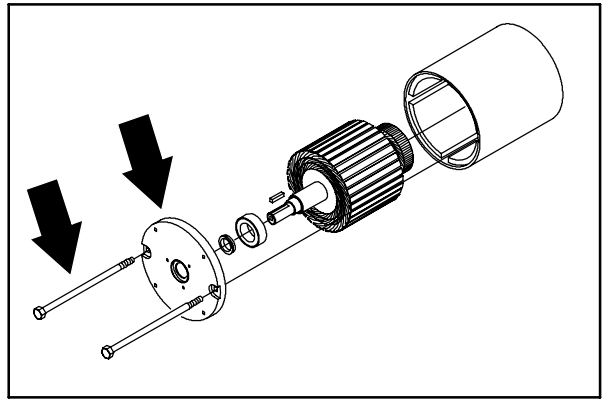


10. Reinstall the four wire leads to the motor plate using the four pan head screws. Hand tighten tight.

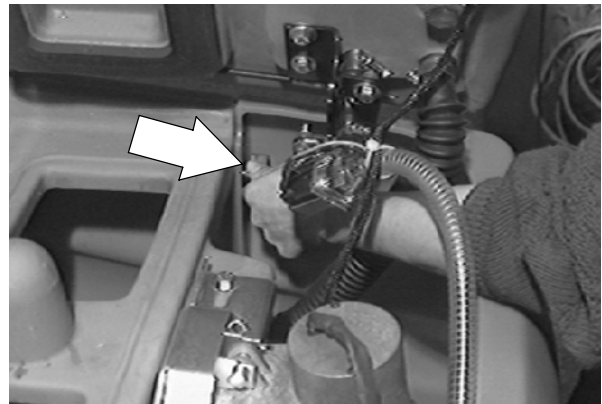


ELECTRICAL

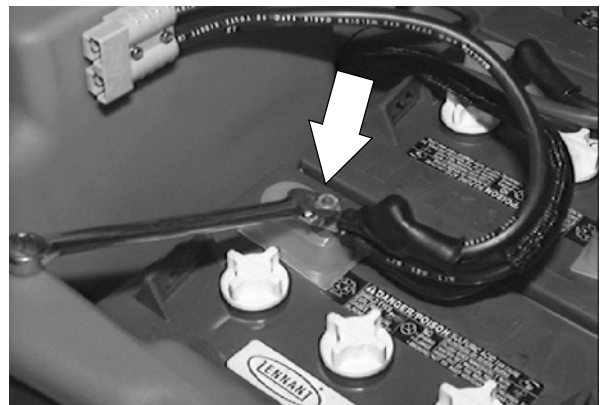
11. Reinstall the cover on top of the brush motor. Reinstall the three pan head screws and tighten to 11 - 14 Nm (7 - 10 ft lb).



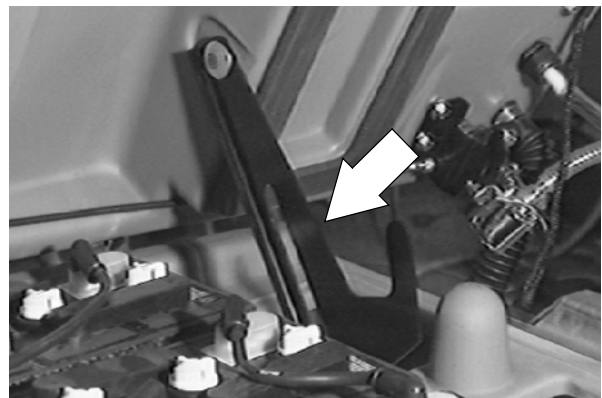
12. Reinstall the front cover. Reinstall the four M8 hex screws and washers. Tighten to 18 - 24 Nm (15 - 20 ft lb).



13. Re-connect the negative battery cable to the battery nearest the back of the machine.



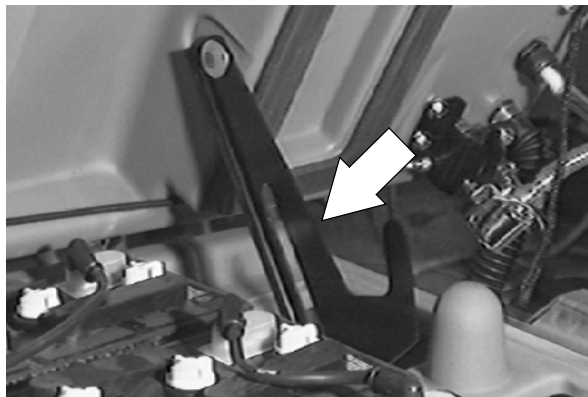
14. Close the solution tank and operate the scrub head, checking the scrub brush motor for proper operation.



TO REPLACE DISK SCRUB BRUSH HEAVY DUTY MOTOR BRUSHES

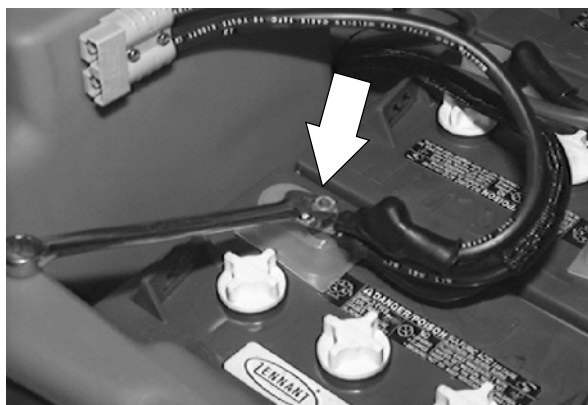
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

1. Lift the solution tank and engage the prop rod.

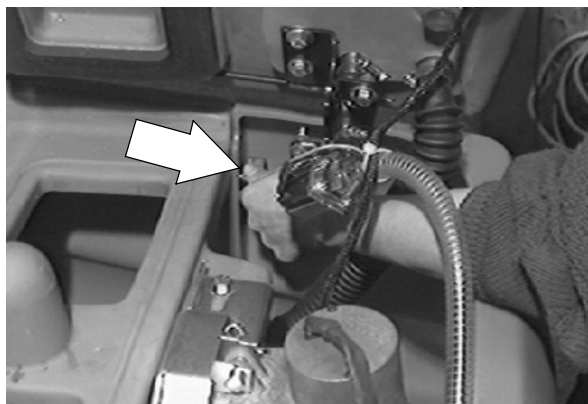


2. Disconnect the batteries from machine.

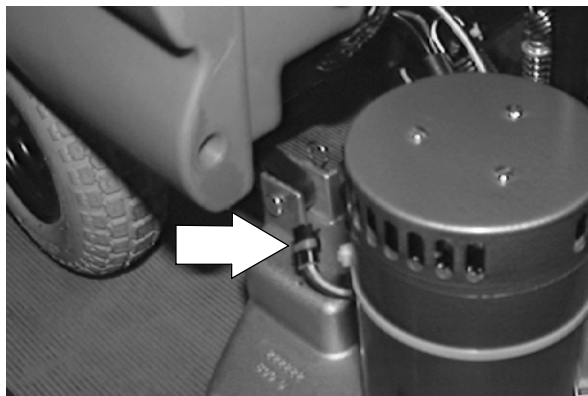
NOTE: Disconnect the negative battery cable from the battery nearest the back of the machine before servicing any electrical components.



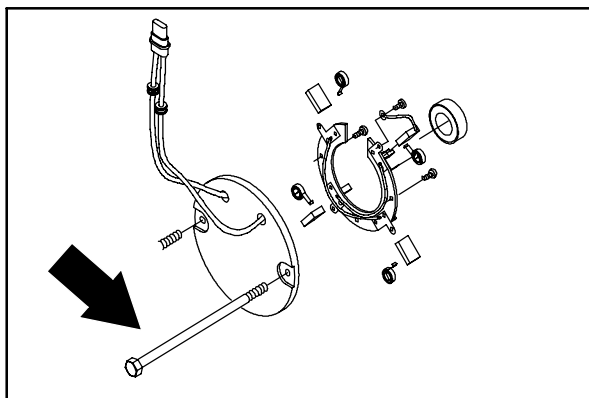
3. Remove the four M8 hex screws holding the front cover on the machine. Remove the cover.



4. Disconnect the brush motor from the main harness.

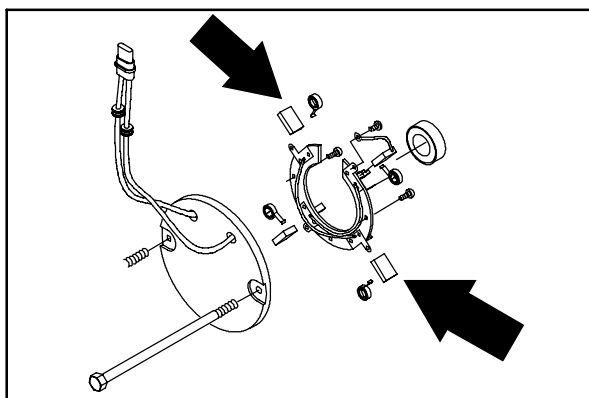


5. Remove the two long hex screws holding the end plate to the top of motor.

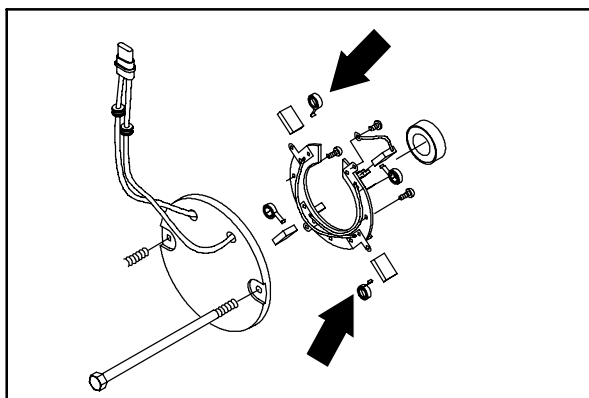


6. Carefully remove the end plate. The brushes and spring clips are attached to the end plate.

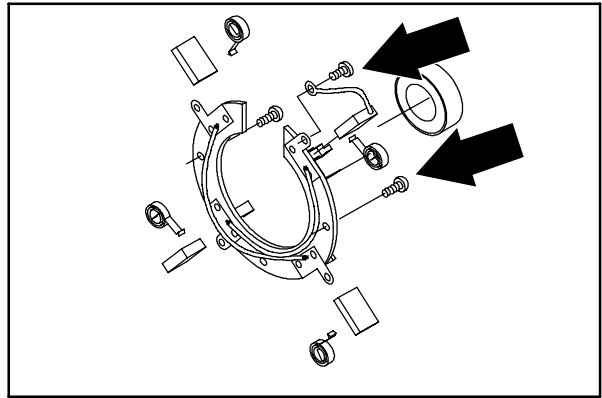
NOTE: There are marks on the motor and on the end plate that must line up when re-assembling brush motor.



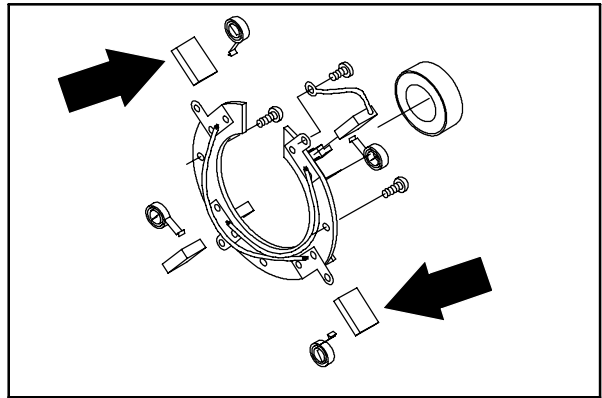
7. Undo the spring clips holding the four motor brushes in the slots.



8. Remove the pan head screws holding the wire leads coming from the brushes to the end plate.

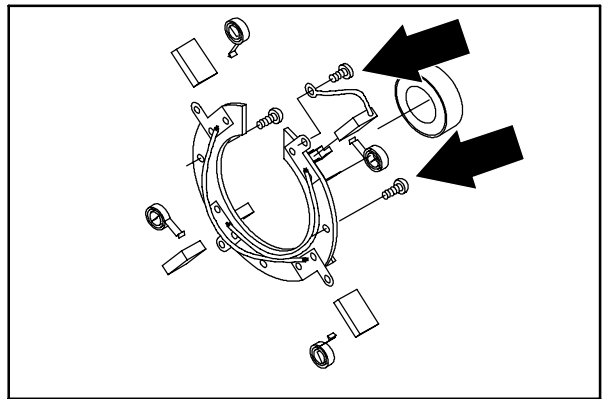


9. Remove the brushes from the end plate.
10. Position the new brushes in the slots.
11. Position the spring clips back on top of the brushes.



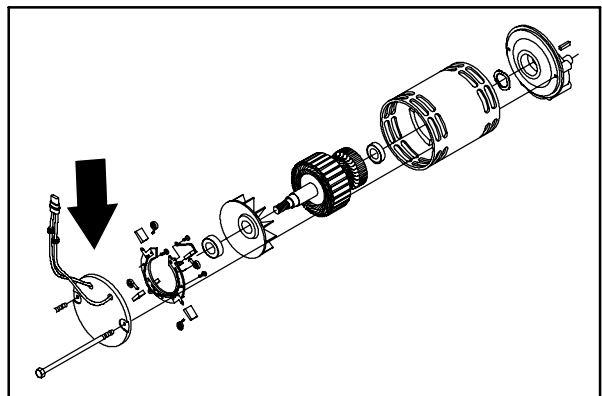
12. Reinstall the four wire leads to the end plate using the four pan head screws. Hand tighten tight.

NOTE: There are marks on the motor and on the end plate that must line up when re-assembling brush motor.



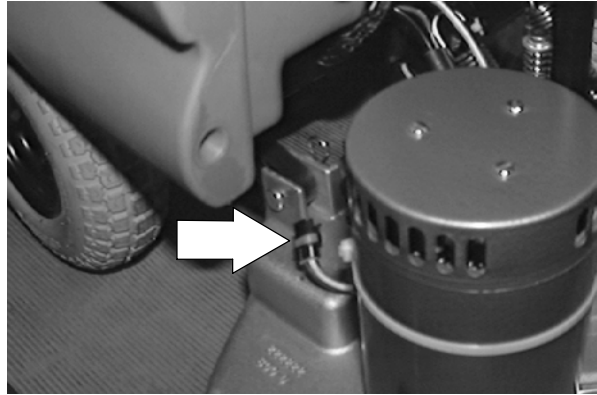
13. Reinstall the end plate and brushes back on the motor. Reinstall the two long hex screws and tighten to 11 – 14 Nm (7 – 10 ft lb).

NOTE: The brushes must be pushed back in the slots when installing the end plate to the motor.

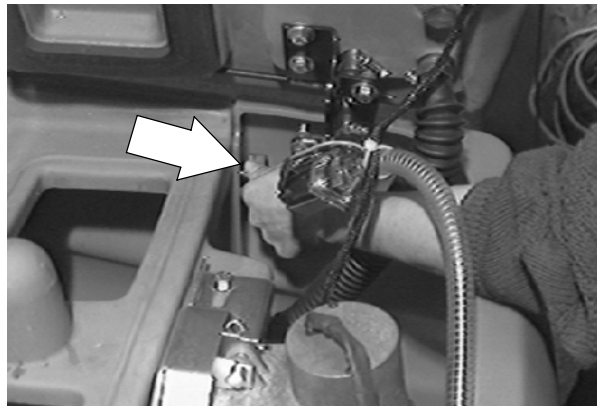


ELECTRICAL

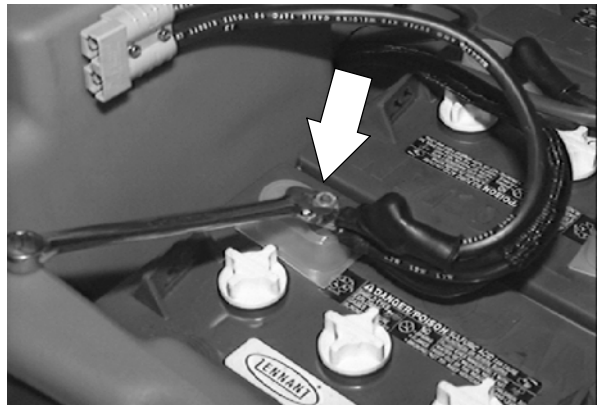
14. Reconnect the brush motor to the main harness. See schematic in this section.



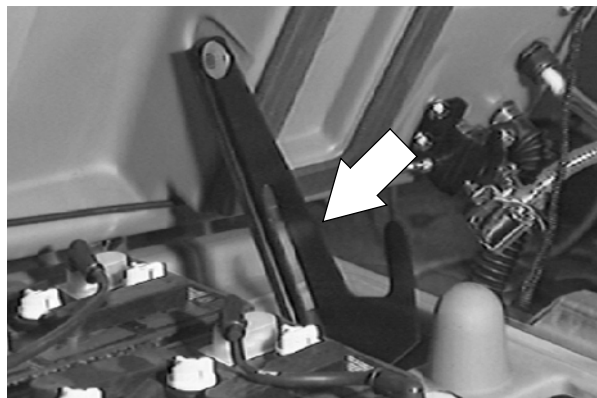
15. Reinstall the front cover. Reinstall the four M8 hex screws and washers. Tighten to 18 - 24 Nm (15 - 20 ft lb).



16. Re-connect the negative battery cable to the battery nearest the back of the machine.



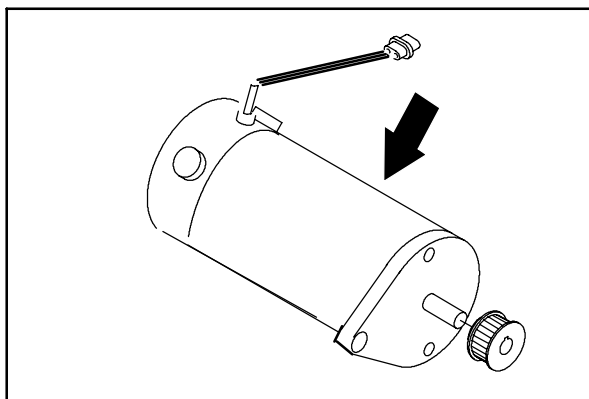
17. Close the solution tank and operate the scrub head, checking the scrub brush motor for proper operation.



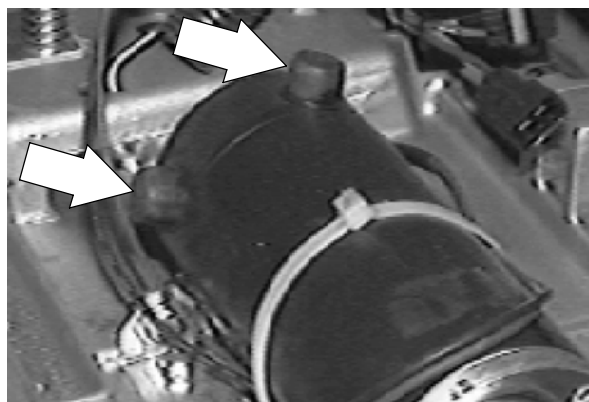
TO REPLACE CYLINDRICAL SCRUB BRUSH MOTOR BRUSHES

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

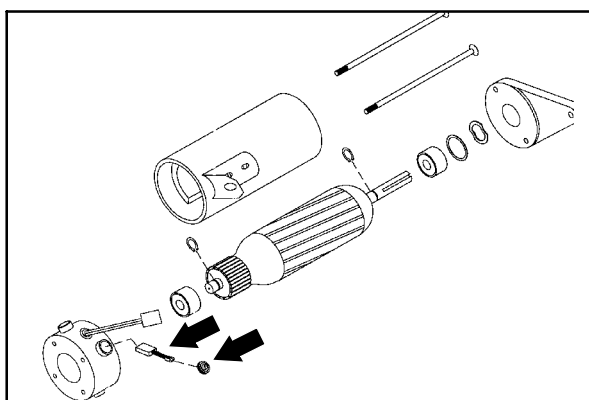
1. Remove the cylindrical scrub brush motor from the machine. See TO REPLACE CYLINDRICAL SCRUB BRUSH MOTOR instructions in the SCRUBBING section of this manual.



2. Remove the four plastic caps covering the brushes.



3. Remove the four allen screws that are holding the brushes in the motor.

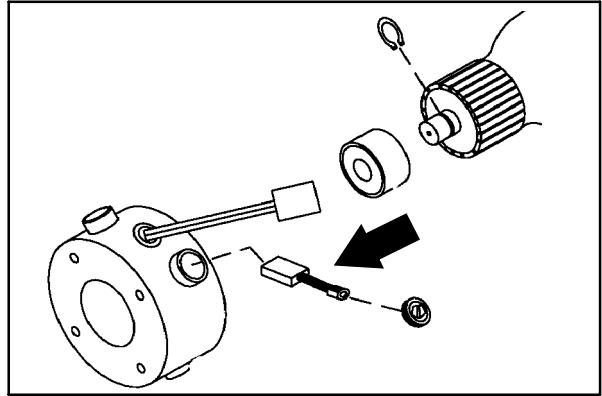


ELECTRICAL

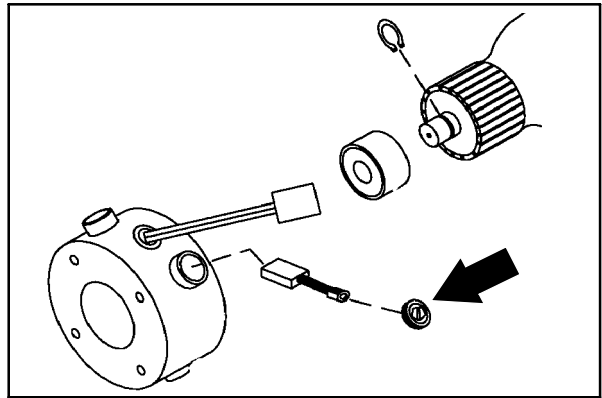
4. Pull the brushes and springs out of the motor.

NOTE: Note the orientation of the brass spring retainers in the brush slot.

5. Position the new brushes back in the motor.



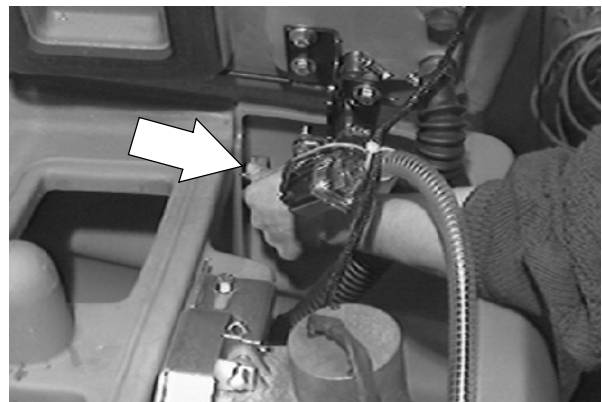
6. Reinstall the four allen screws that retain the brushes in their slot. Lightly hand tighten.



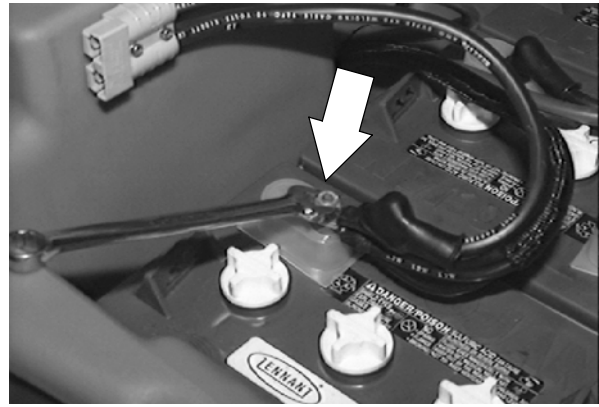
7. Reinstall the scrub brush motor to the scrub head. See TO REPLACE CYLINDRICAL SCRUB BRUSH MOTOR instructions in the SCRUBBING section of this manual.



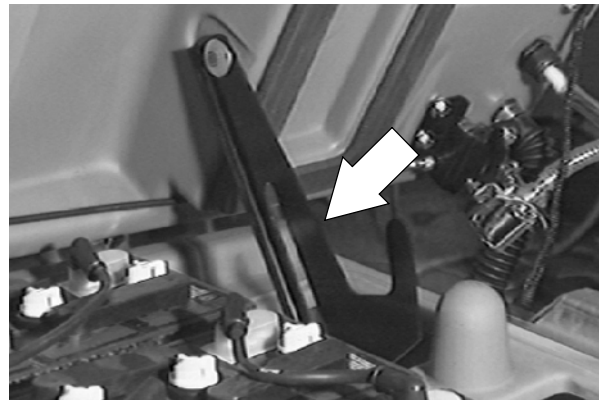
8. Reinstall the front cover. Reinstall the four M8 hex screws and washers. Tighten to 18 - 24 Nm (15 - 20 ft lb).



9. Re-connect the negative battery cable to the battery nearest the back of the machine.



10. Close the solution tank and operate the scrub head, checking the scrub brush motor for proper operation.

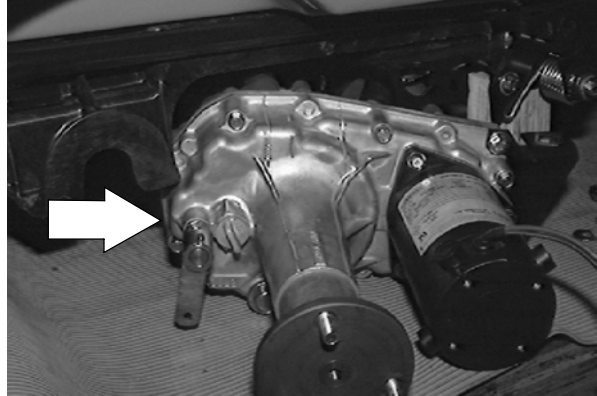


TO REPLACE PROPELLING TRANSAXLE DRIVE MOTOR

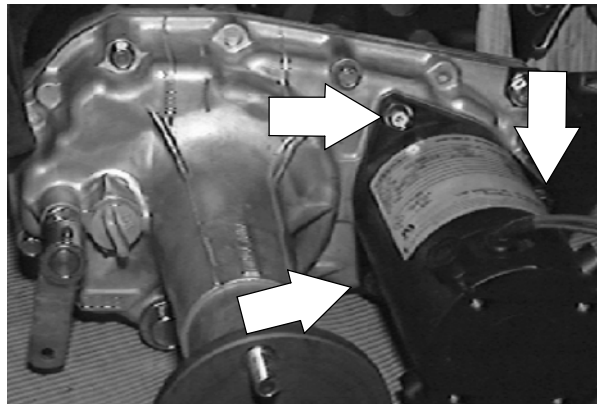
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake (optional), Turn Off Machine And Remove Key.

1. Remove the transaxle from the machine. See TO REMOVE PROPELLING TRANSAXLE instructions in the CHASSIS section.

2. After the transaxle is removed from the machine, place it in a large vice with the drive motor facing up.

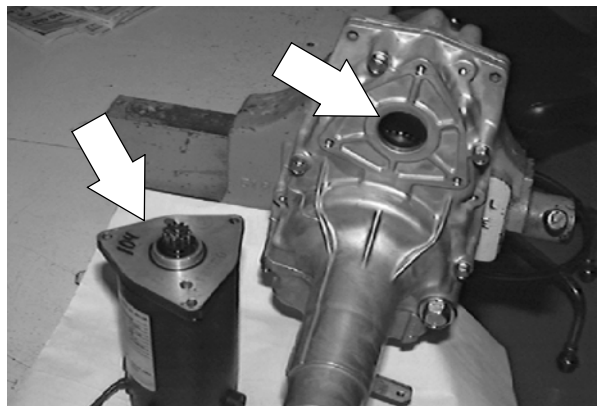


3. Remove the three M8 hex screws holding the electric drive motor to the transaxle housing.

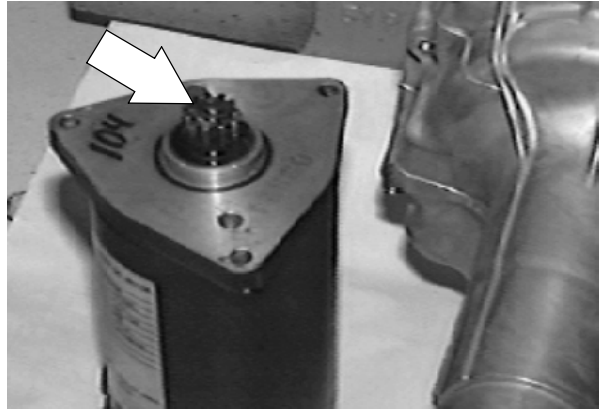


4. Pull the drive motor straight out of the transaxle.

NOTE: Note the orientation of the motor to the housing.

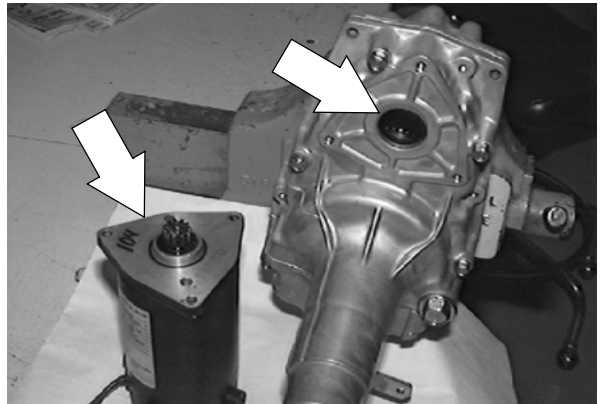


5. Remove the small C-clip holding the drive gear to the motor shaft. Remove the gear.
6. Place the gear on the shaft of the new motor. Make sure to line up the flat in the gear with the flat on the shaft. Reinstall the C-clip.

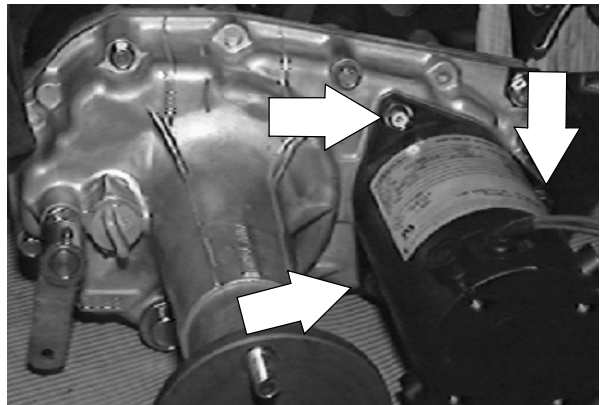


7. Position the new motor back on the transaxle. Make sure the teeth on the motor gear line up with the teeth on the transaxle gear.

NOTE: Note the orientation of the motor to the housing.

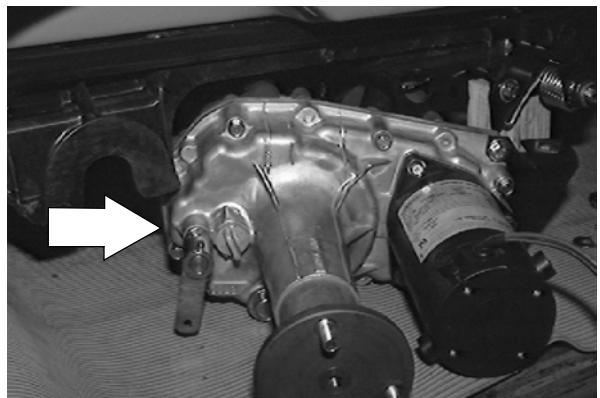


8. Reinstall the three M8 hex screws and tighten to 18 - 24 Nm (15 - 20 ft lb).



9. Reinstall the transaxle in the machine. See *TO INSTALL PROPELLING TRANSAXLE* instructions in the CHASSIS section.

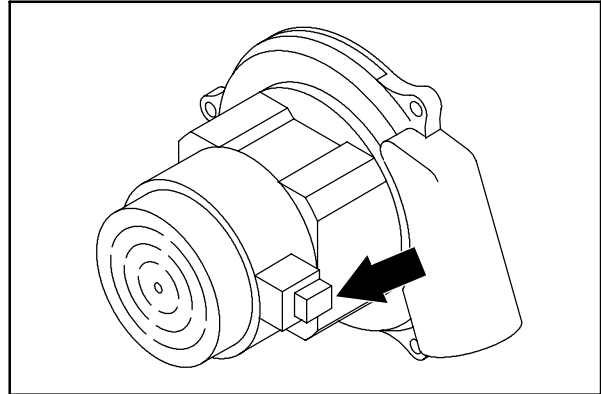
10. Operate the machine, checking for proper operation.



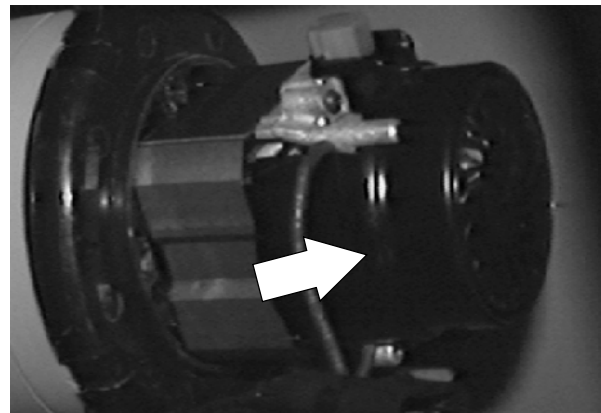
TO REPLACE VACUUM FAN MOTOR BRUSHES

FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set parking brake (optional), Turn Off Machine And Remove Key.

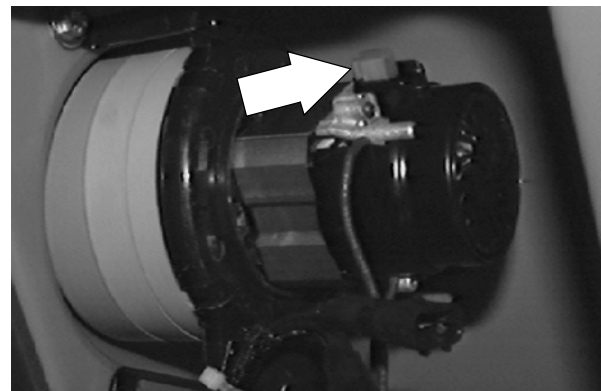
1. Remove the vacuum fan motor from the machine. See TO REPLACE VACUUM FAN (S) instructions in the SCRUBBING section of this manual.



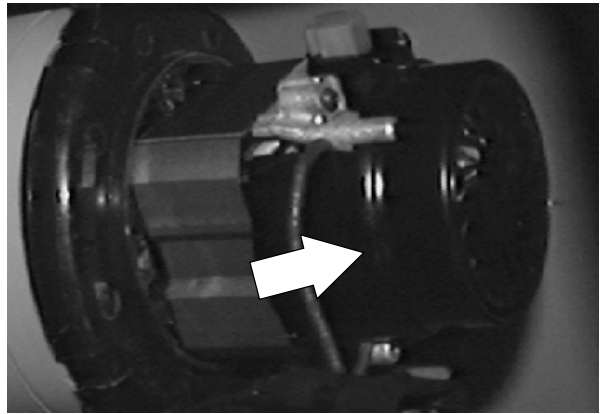
2. Remove the black plastic cover from on the top of the fan assembly by spreading the clips on both sides and lifting straight off.



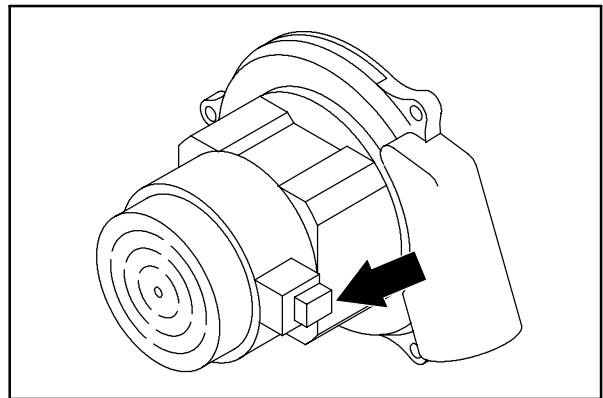
3. Remove the two pan head screws holding the brush retaining U-clip to the fan motor. Remove the U-clip.
4. Pull the green plastic housing back until the wire lead is exposed. Pull the wire lead connector straight out of the green plastic housing.
5. Push the wire lead connector in the new brush assembly.
6. Position the green plastic housing back in the motor. Reinstall the U-clip and two pan head screws and hand tighten tight.



7. Snap the black plastic cover back on the top of the motor.

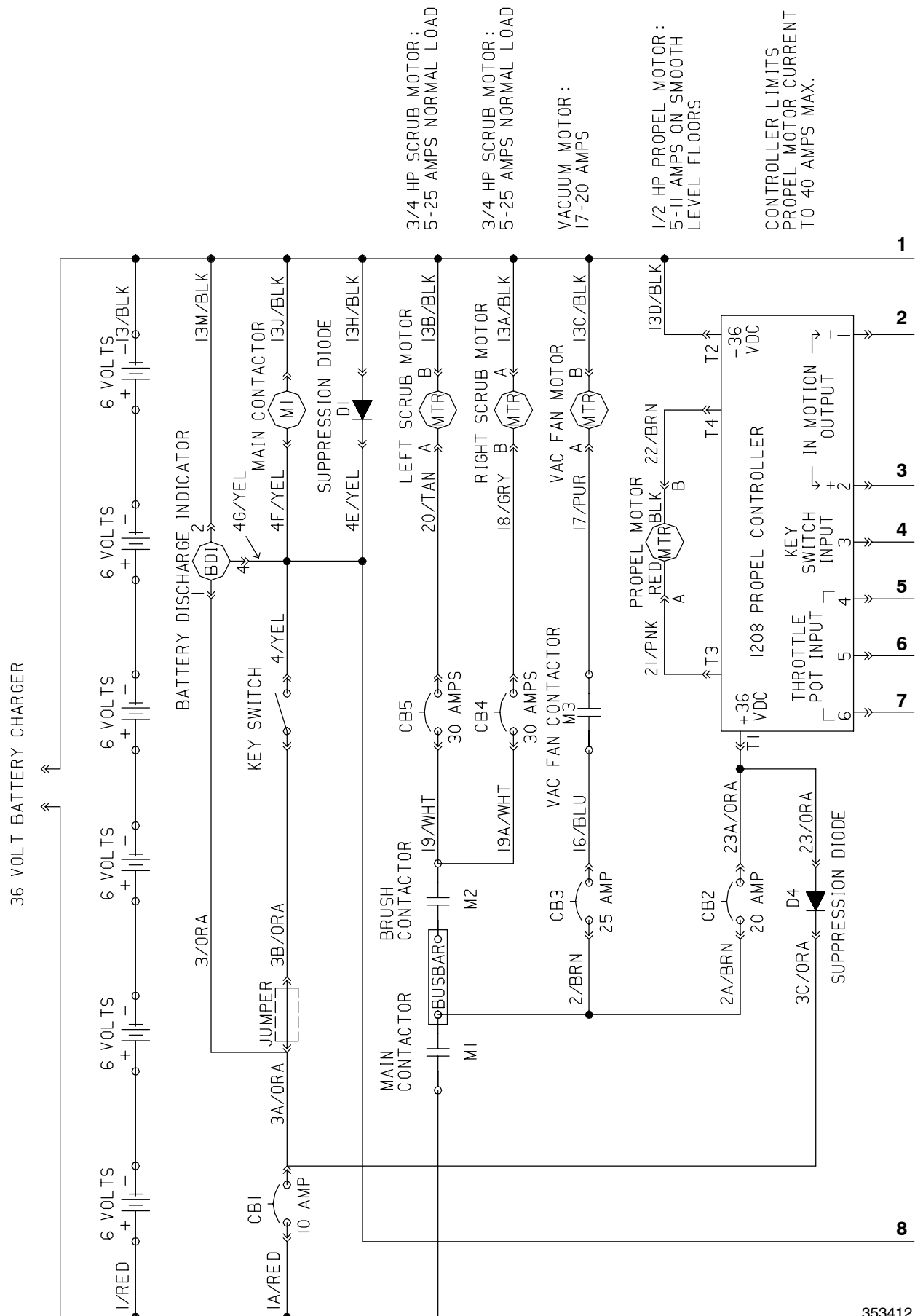


8. Reinstall the vacuum fan motor into the machine. See TO REPLACE VACUUM FAN (S) instructions in the SCRUBBING section of this manual.



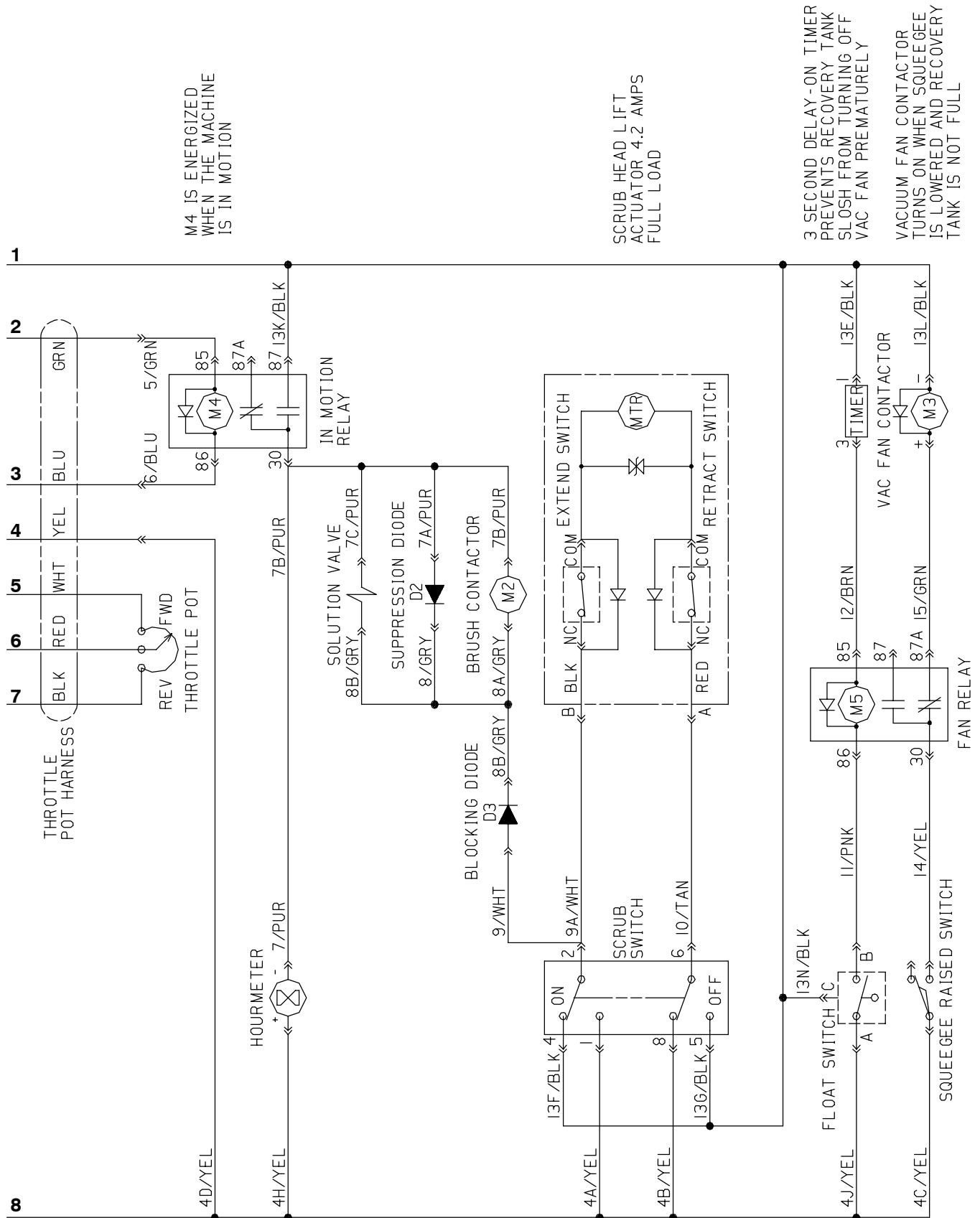
9. Operate the vacuum fan(s) and check for proper operation.

Electrical Schematic - 5680 (000000-012929)

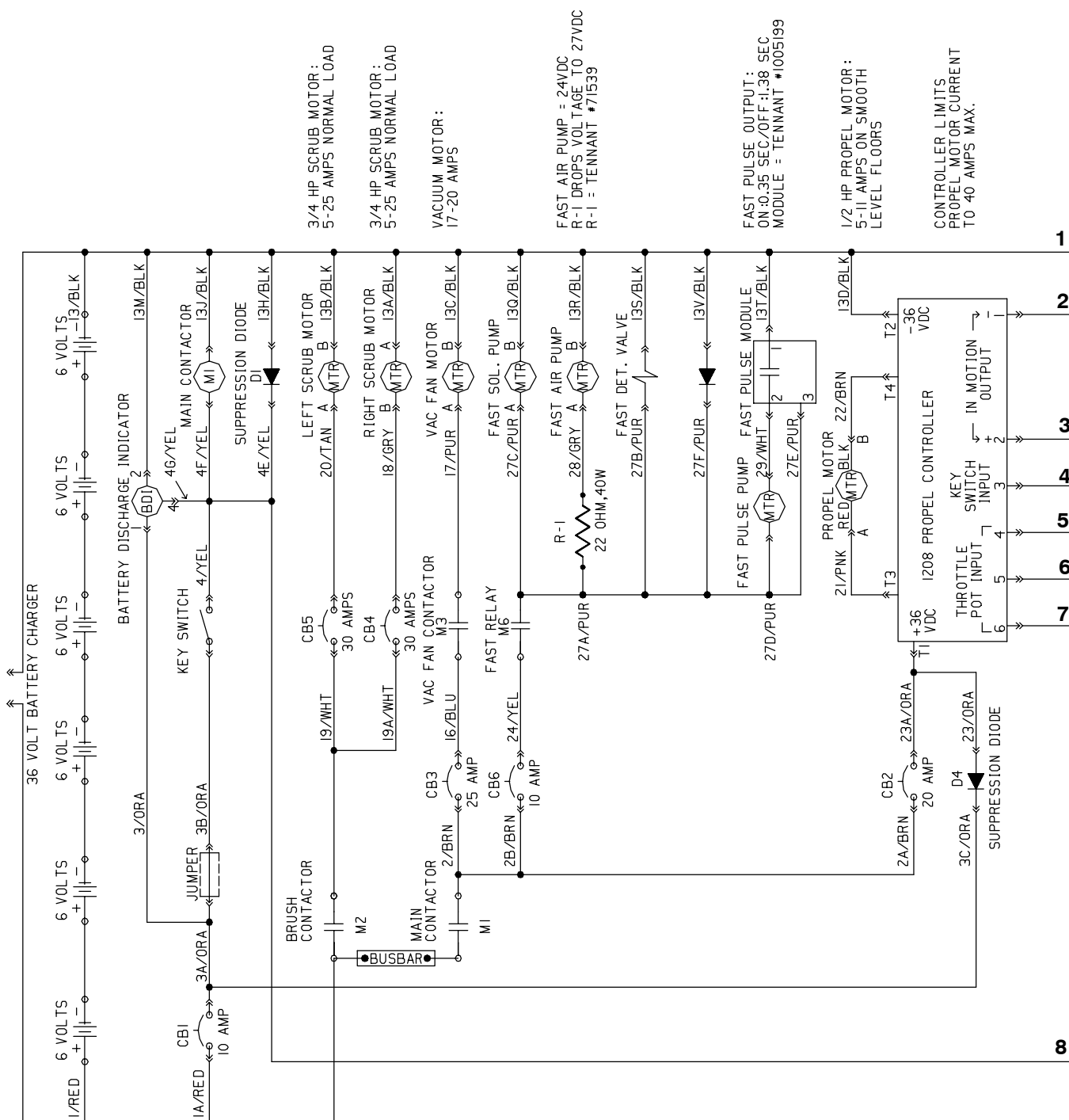


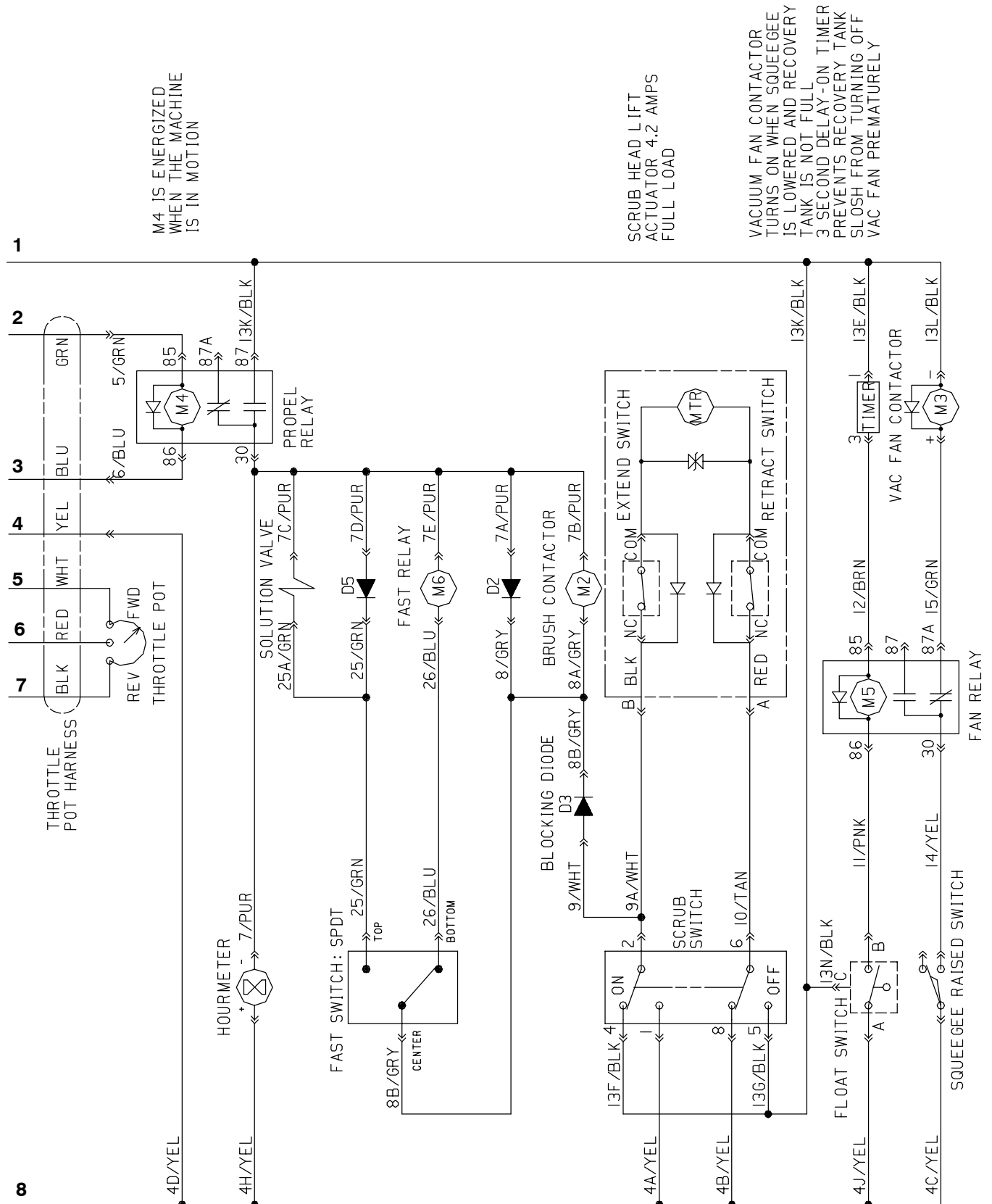
353412 - 5680

Electrical Schematic - 5680 (000000-012929)

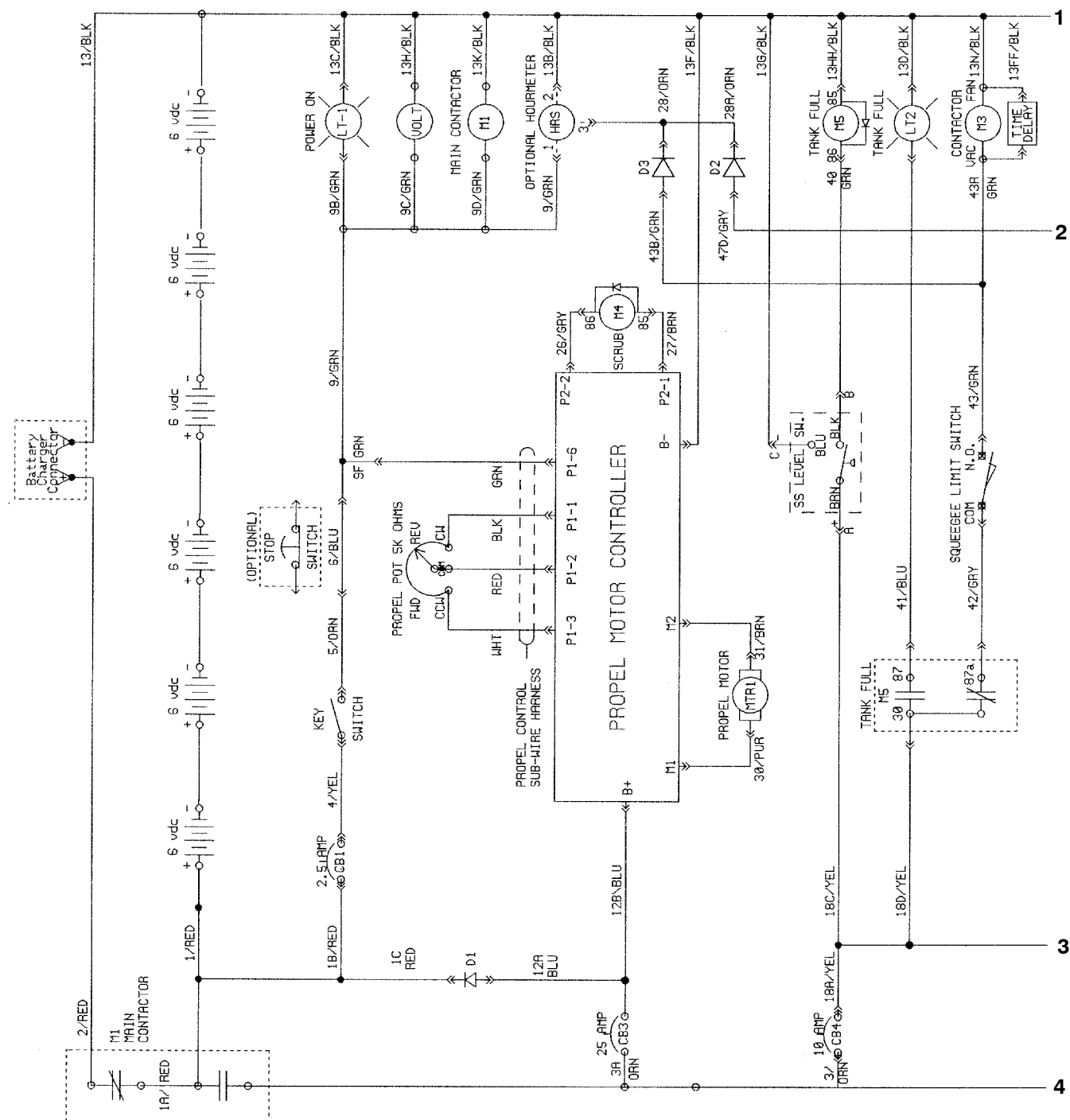


Electrical Schematic - 5680 (012930-)

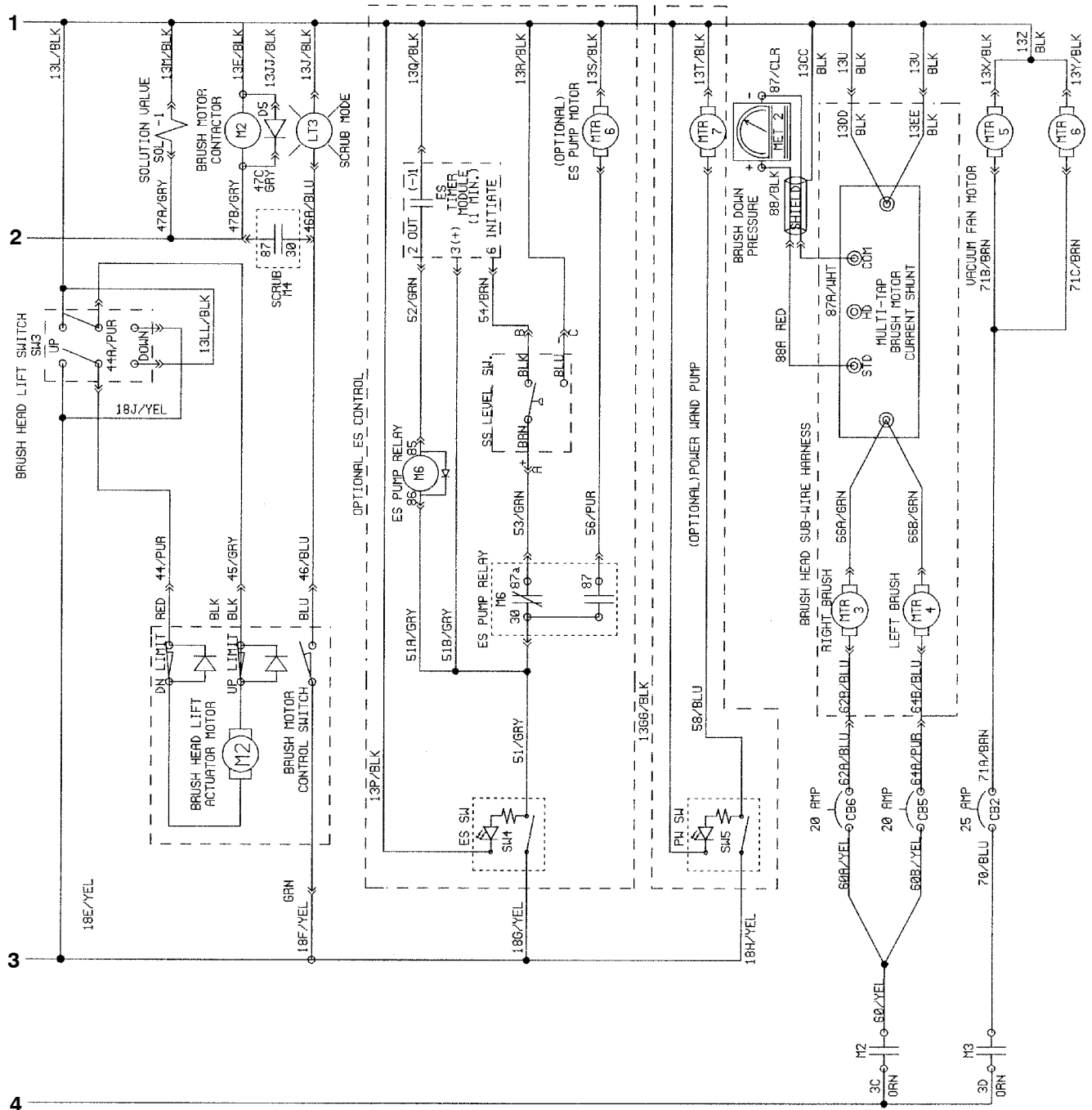


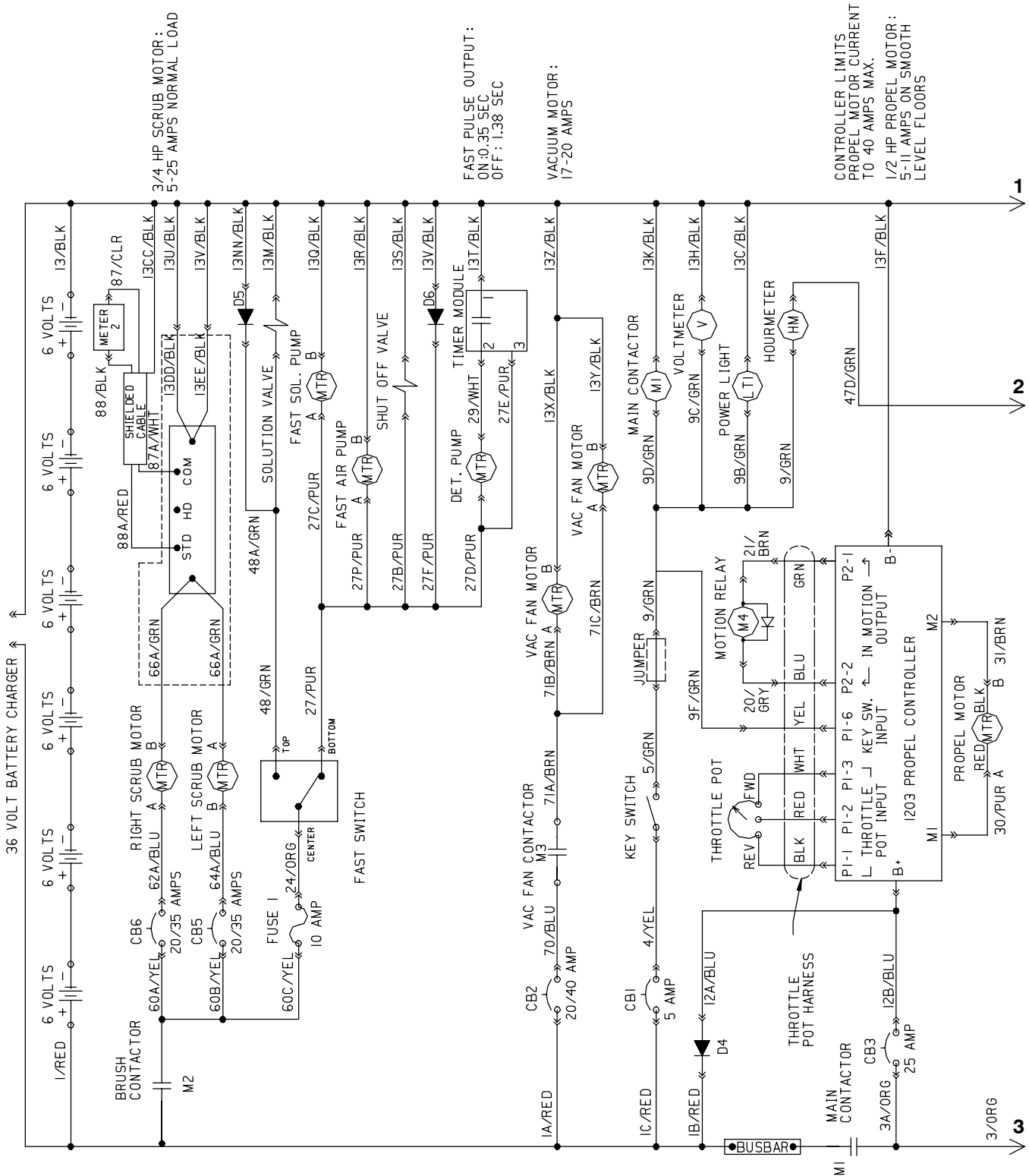


Electrical Schematic - 5700 (000000-021999)



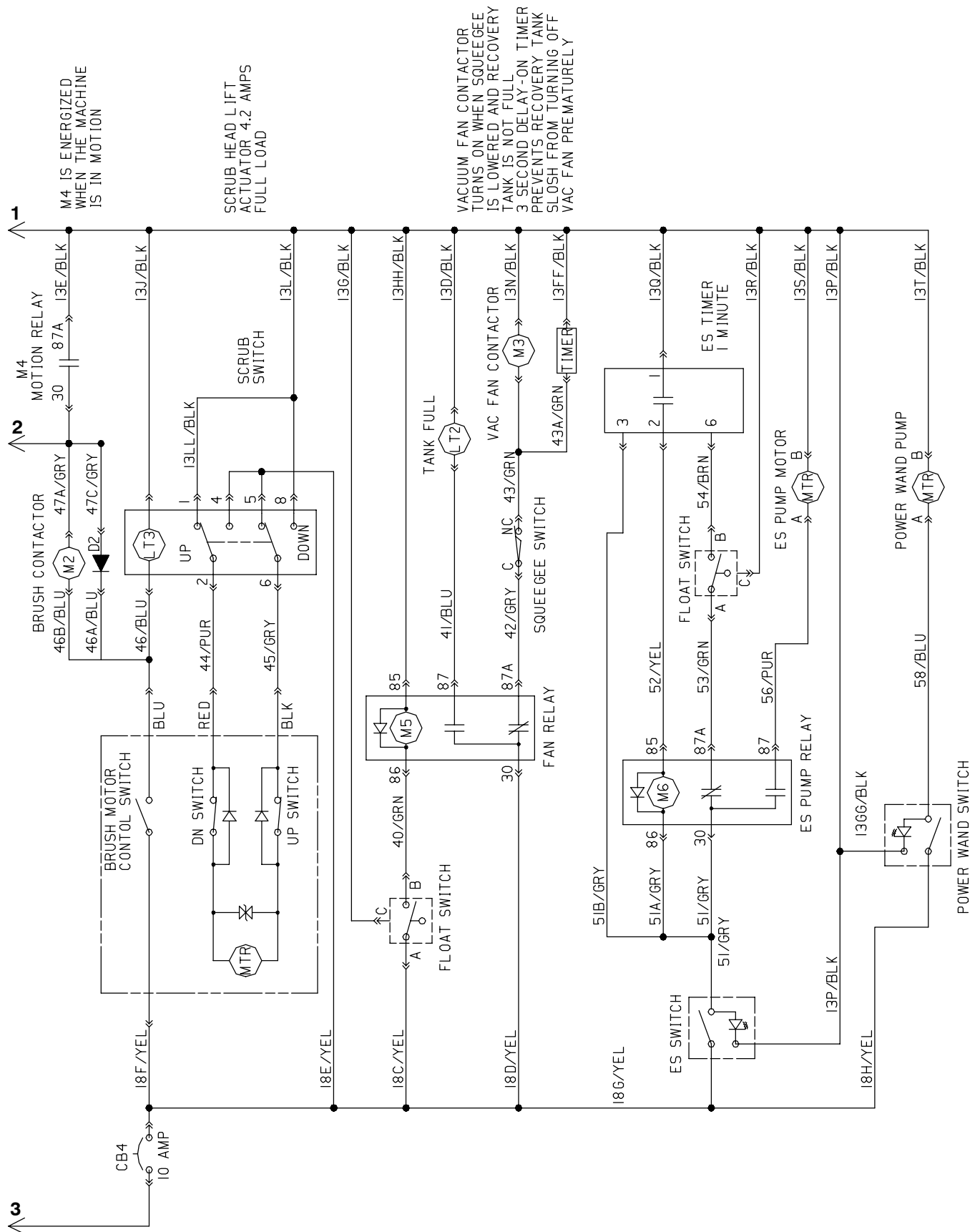
Electrical Schematic - 5700 (000000-021999)



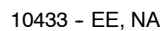


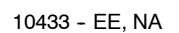
534040, 397904 - 5700, NA, JP, CE

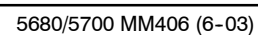
Electrical Schematic - 5700 (022000-)



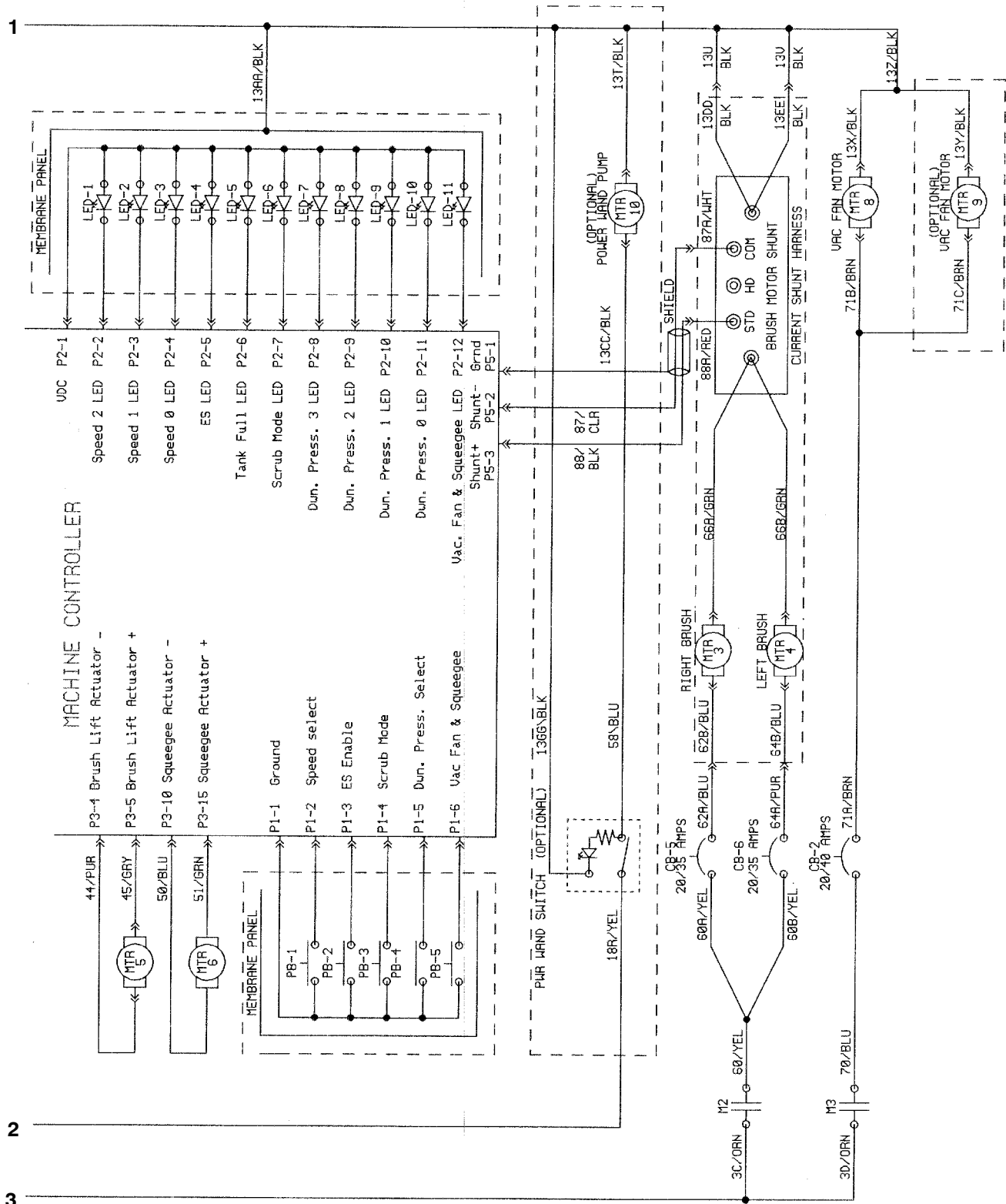
354040, 397904 - 5700, NA, JP, CE

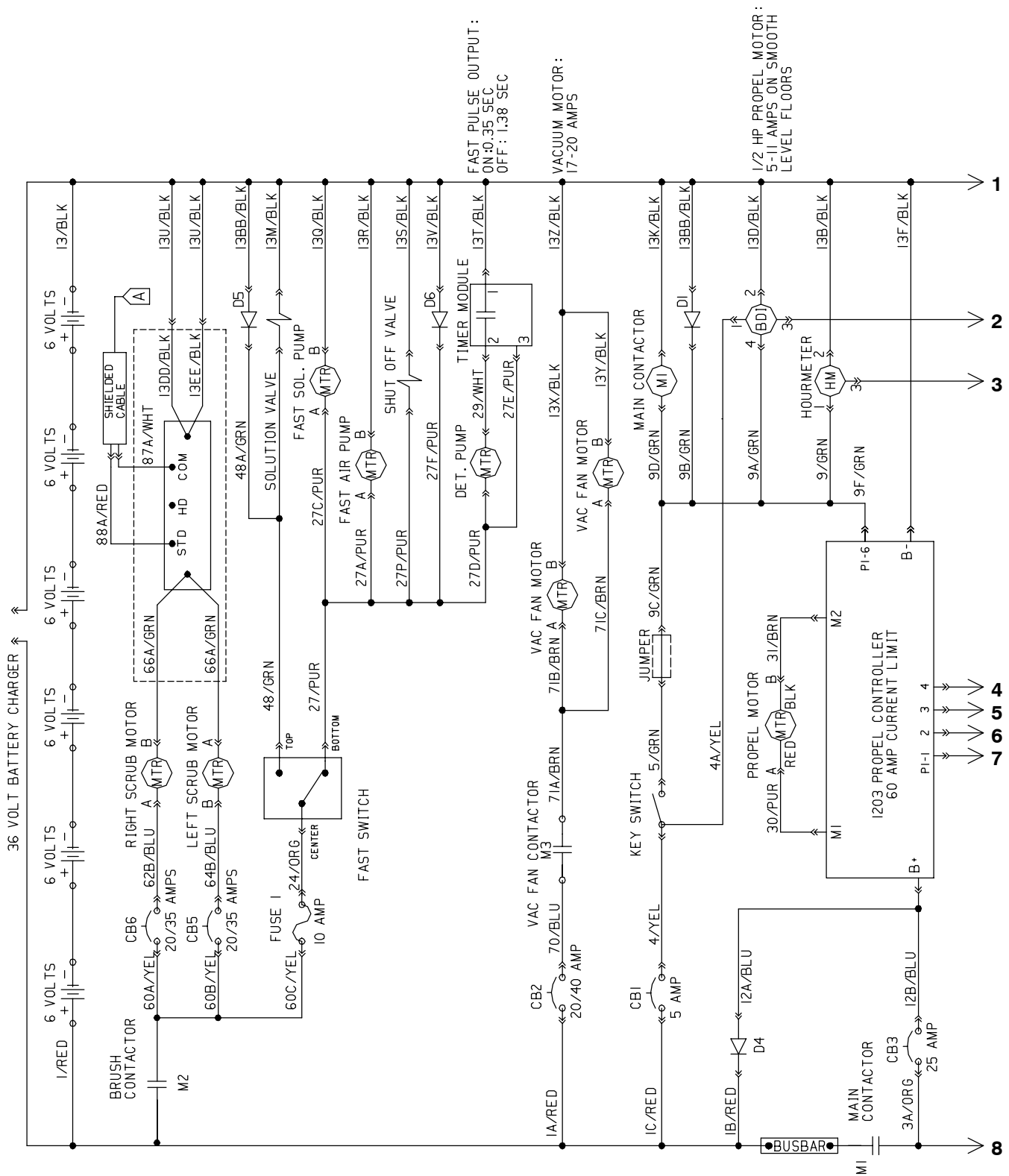




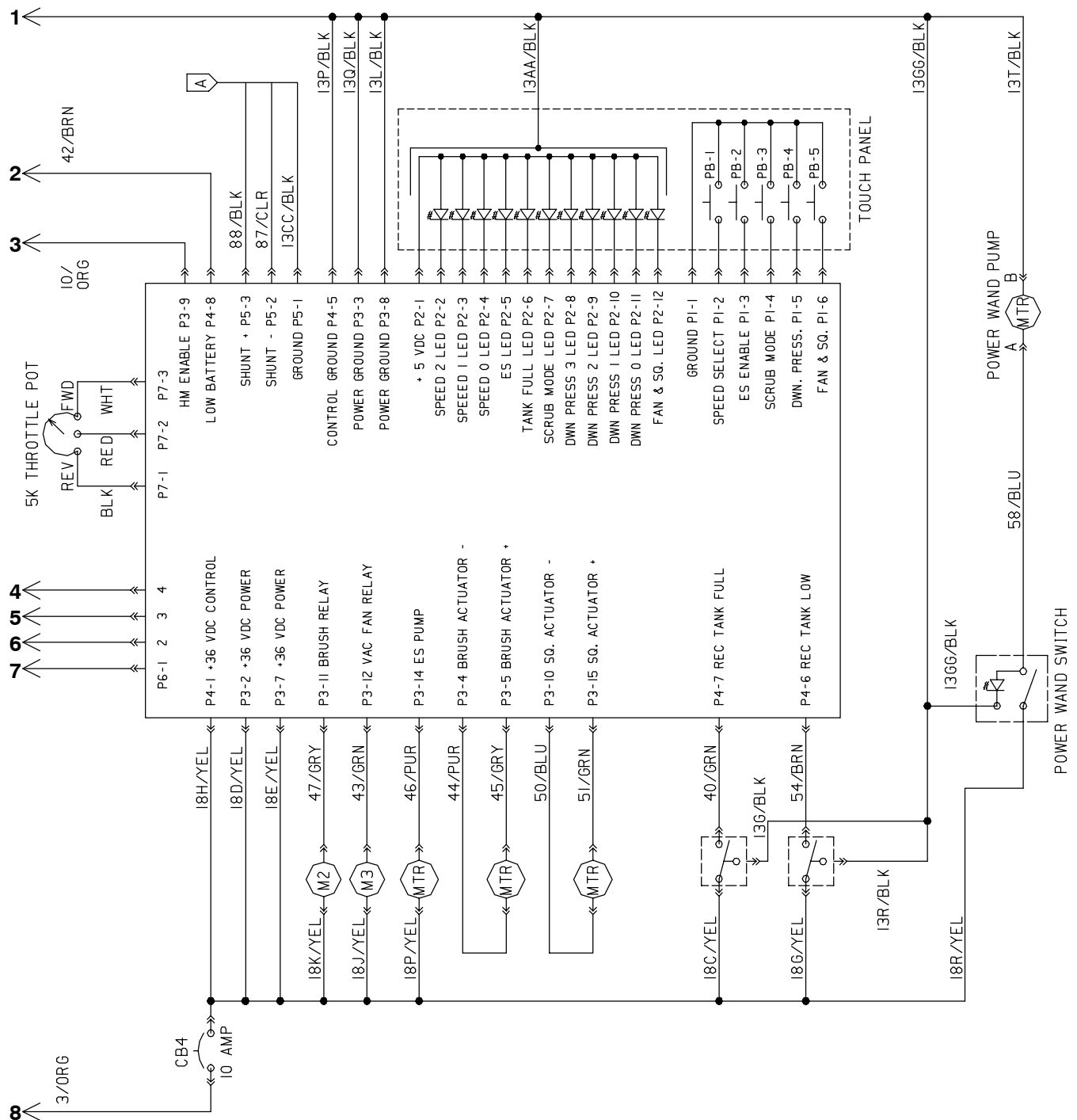


Electrical Schematic - 5700XP (000000-021999)



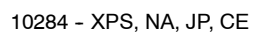


Electrical Schematic - 5700XP (022000-)

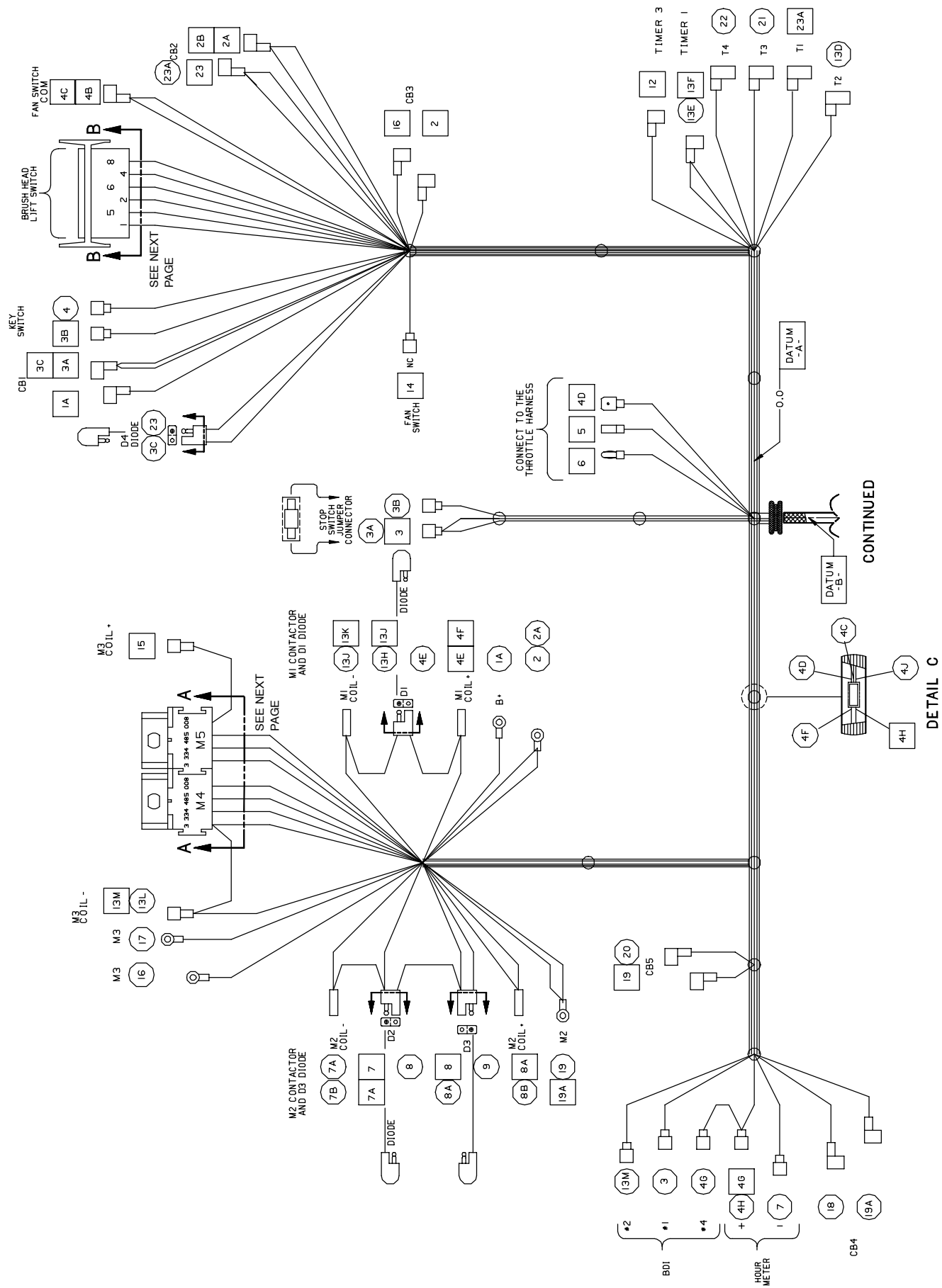


354041, 397910 - XP, NA, CE

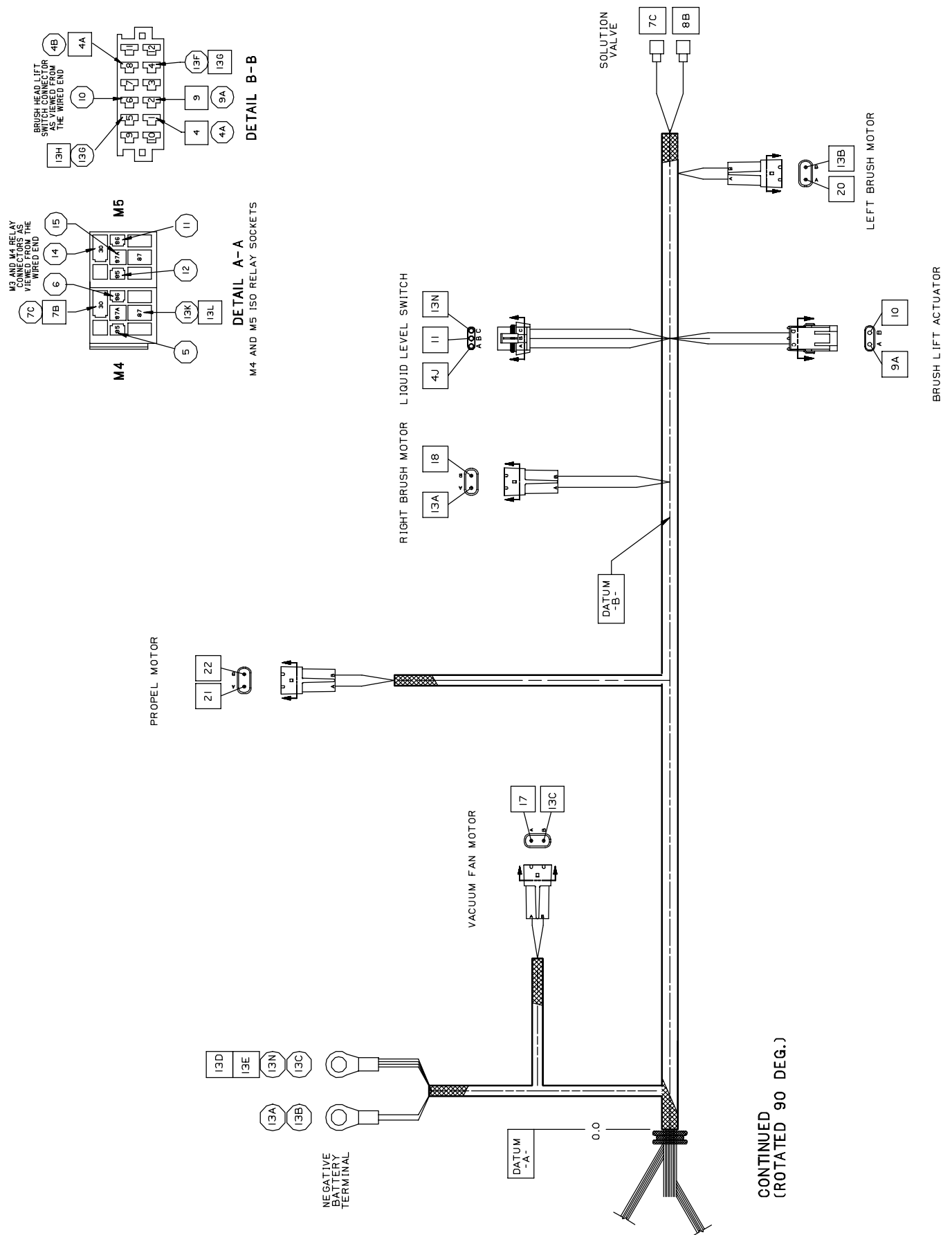




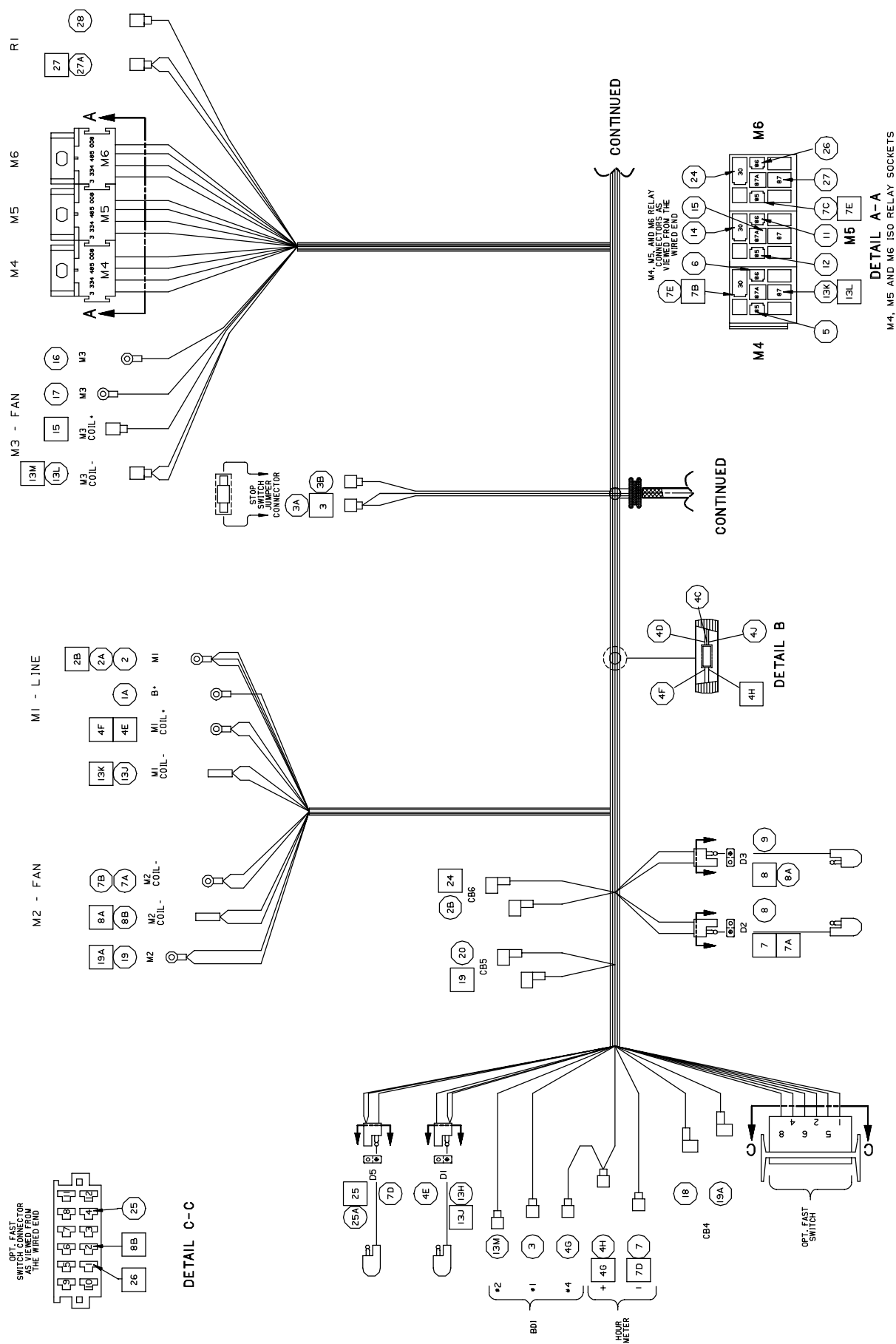
Wire Harness Group - 5680 (000000-012929) (1 of 2)



CONTINUED
(ROTATED 90 DEG.)

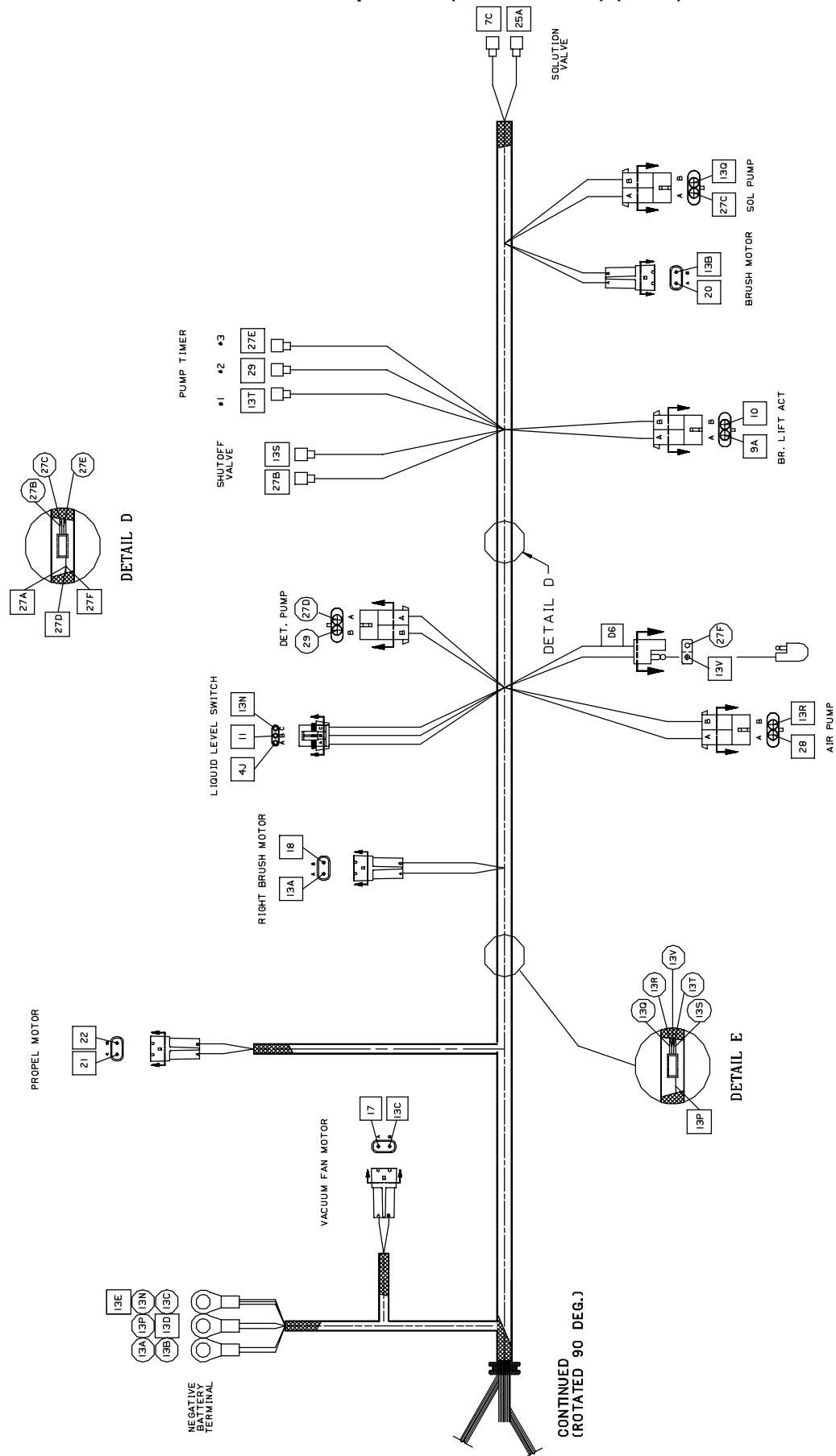


Wire Harness Group - 5680 (012930-) (1 of 3)

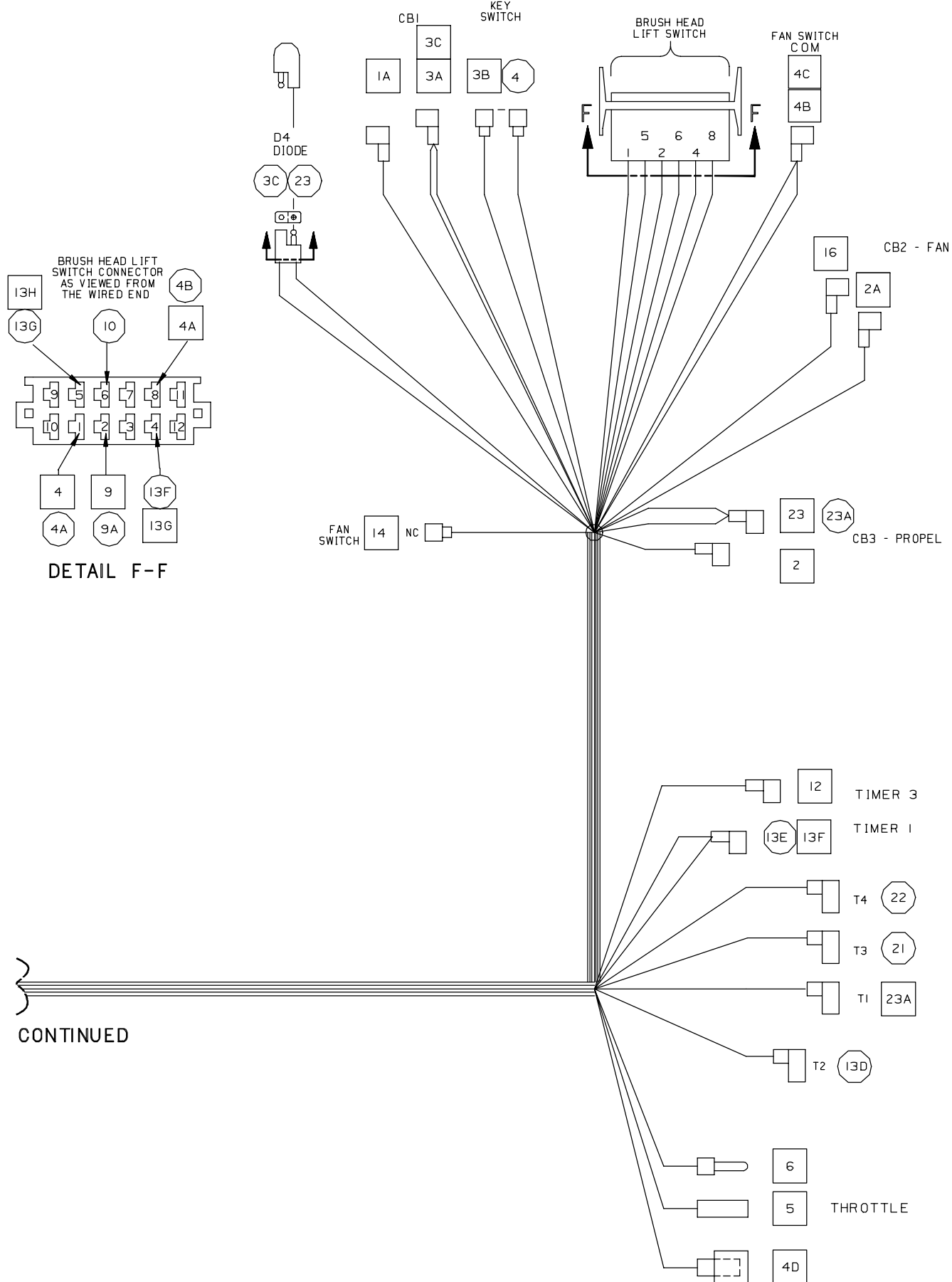


Wire Harness Group - 5680 (012930-

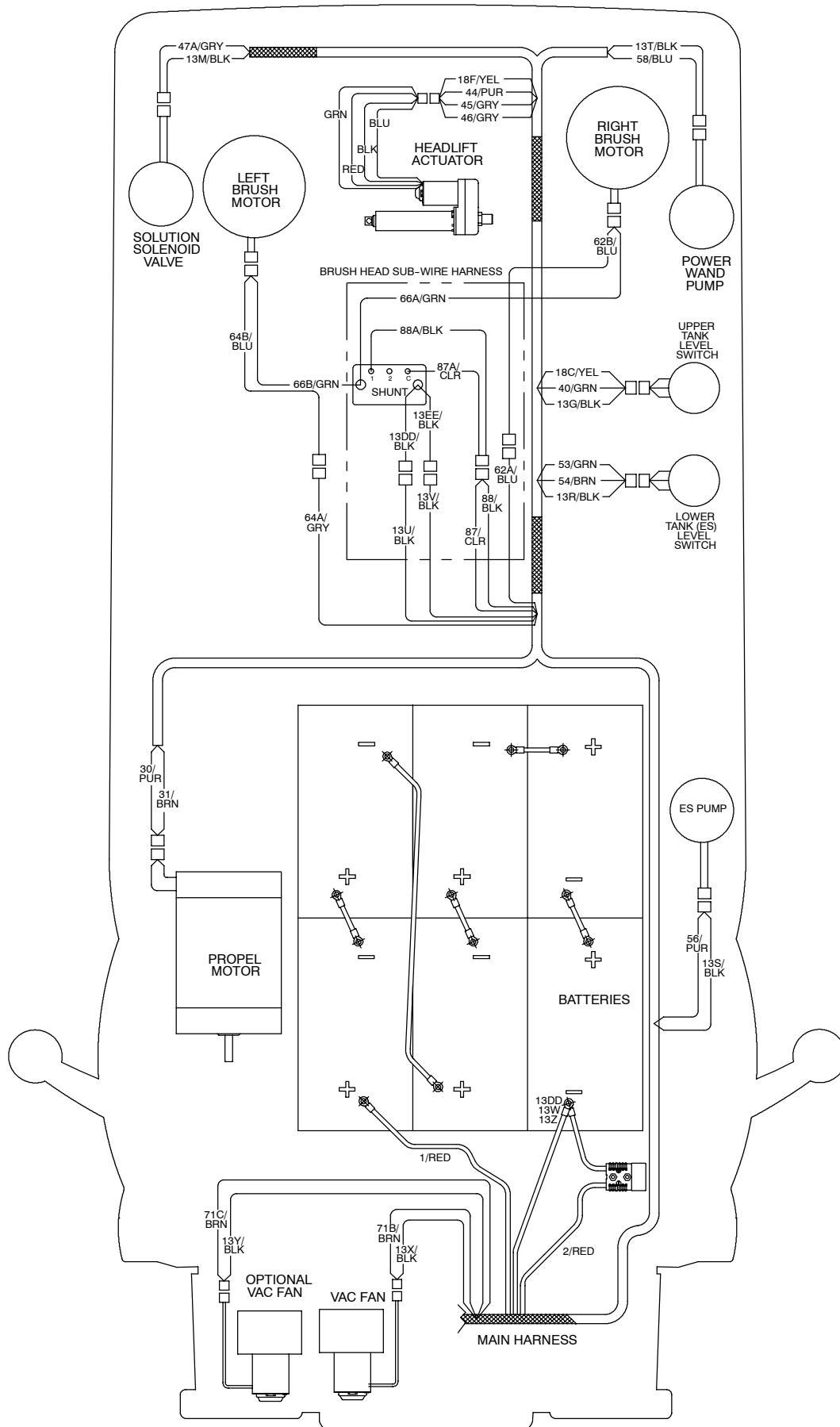
) (2 of 3)



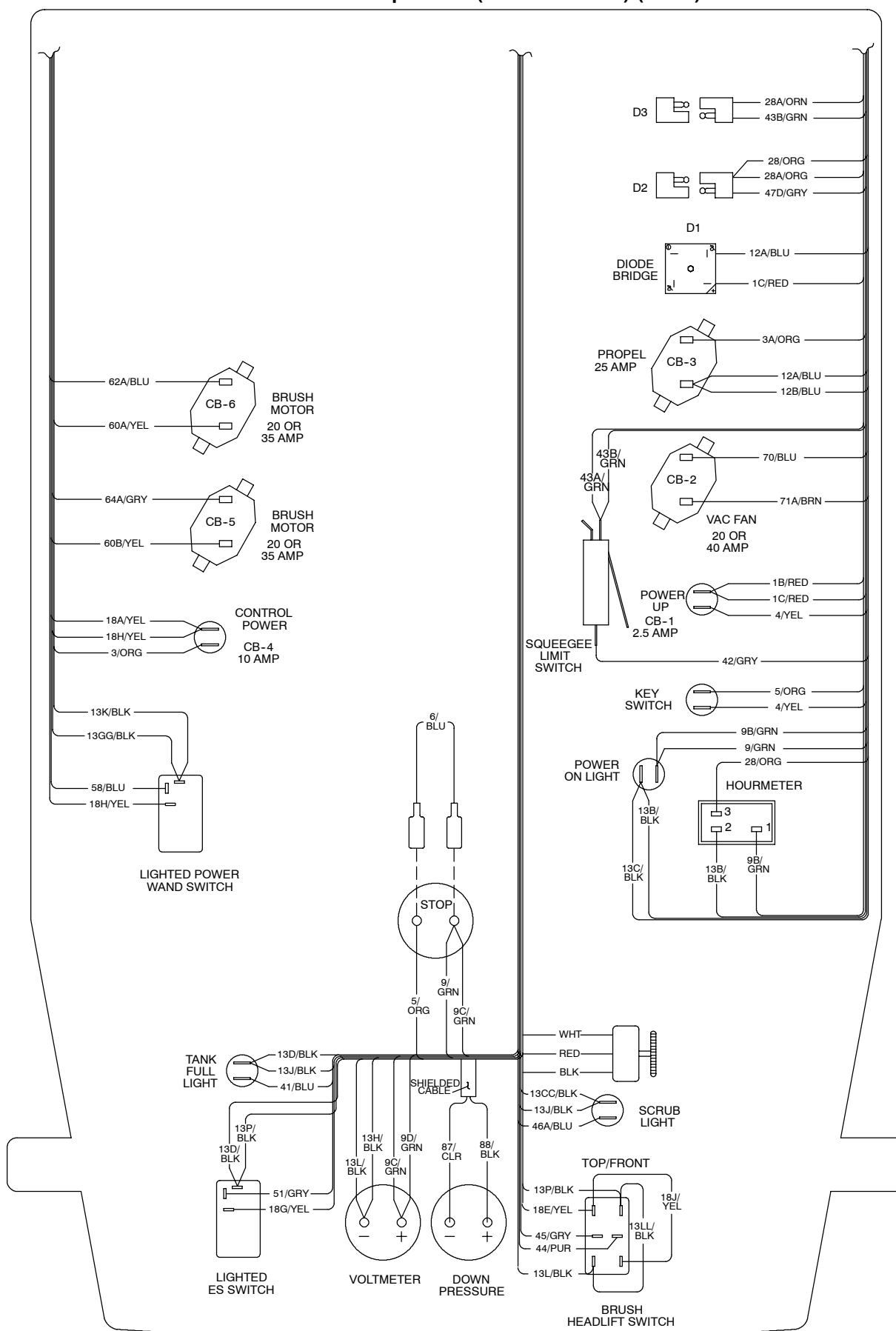
Wire Harness Group - 5680 (012930-) (3 of 3)



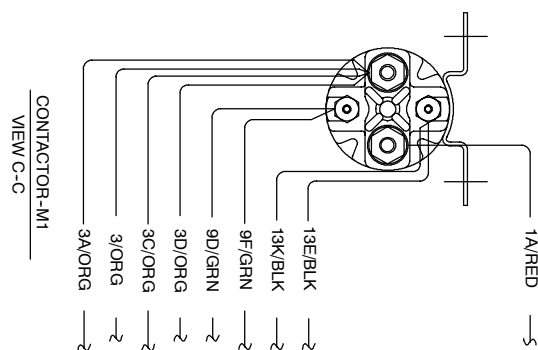
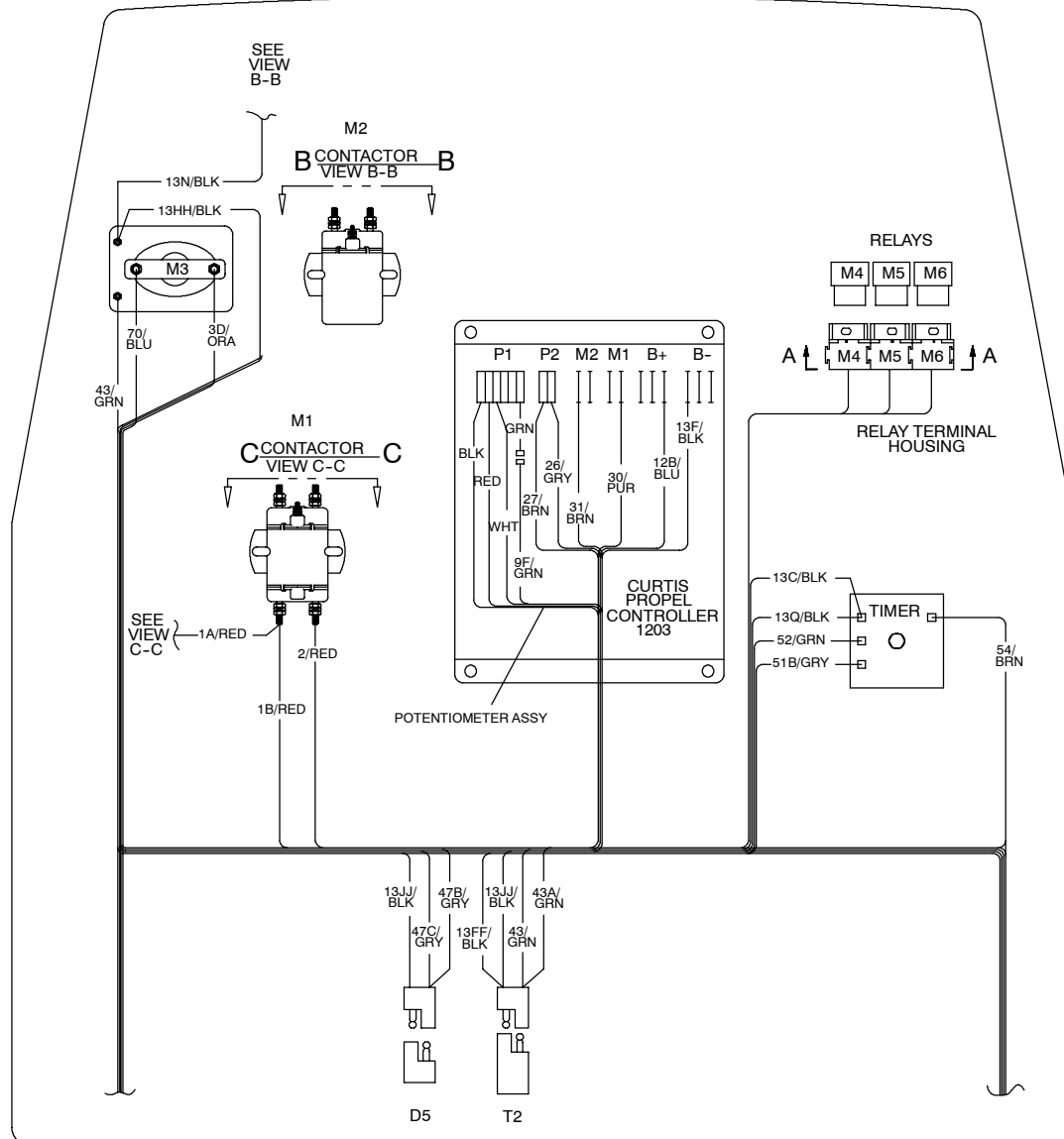
Wire Harness Group - 5700 (000000-021999) (1 of 3)



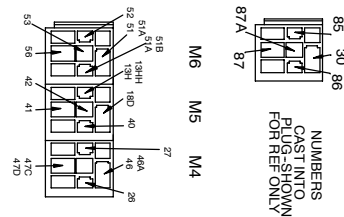
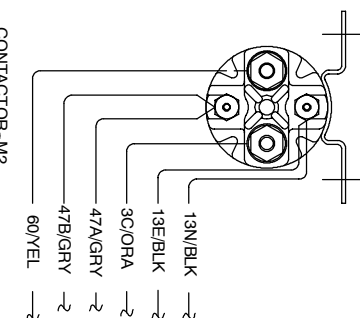
Wire Harness Group - 5700 (000000-012999) (2 of 3)



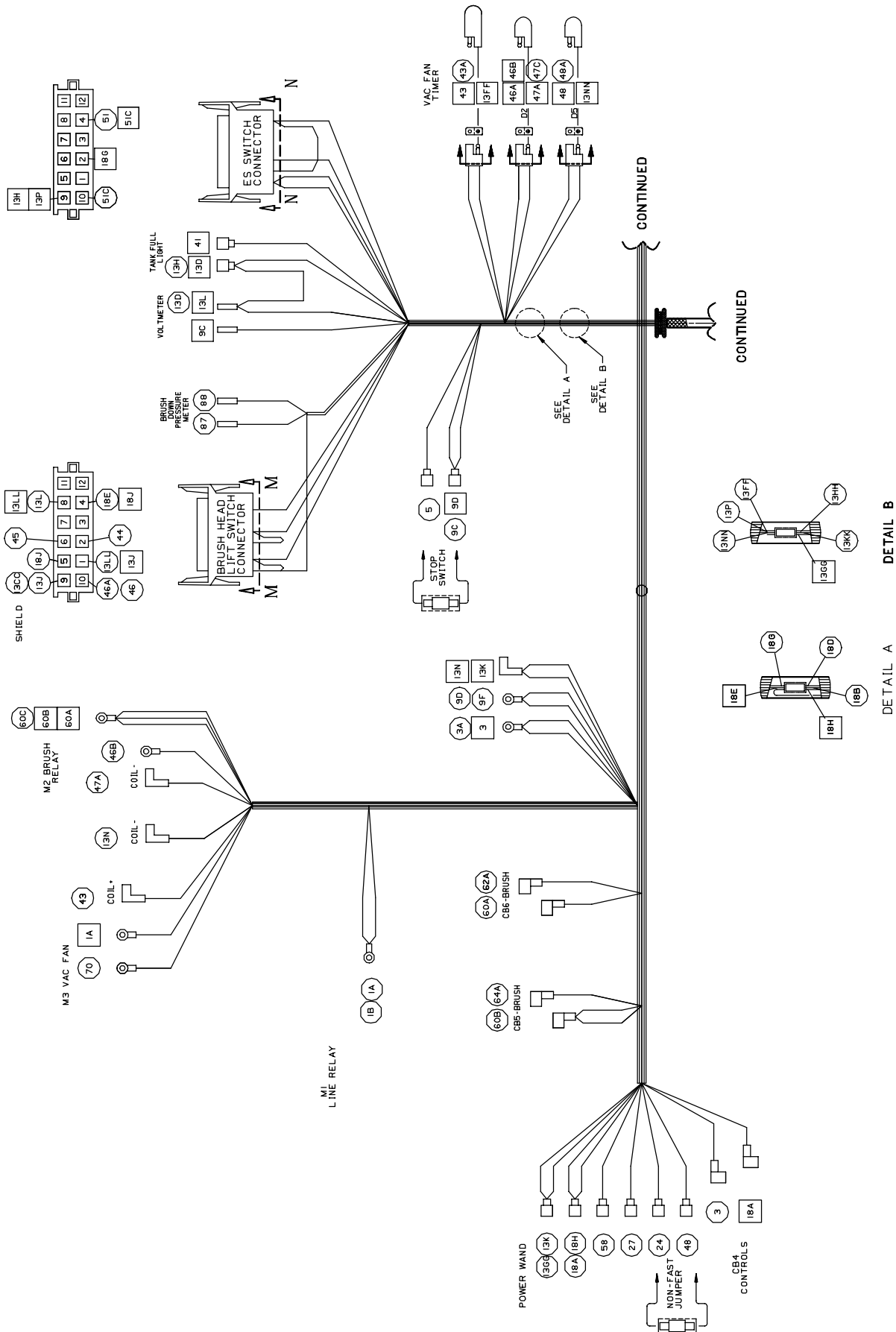
Wire Harness Group - 5700 (000000-012999) (3 of 3)



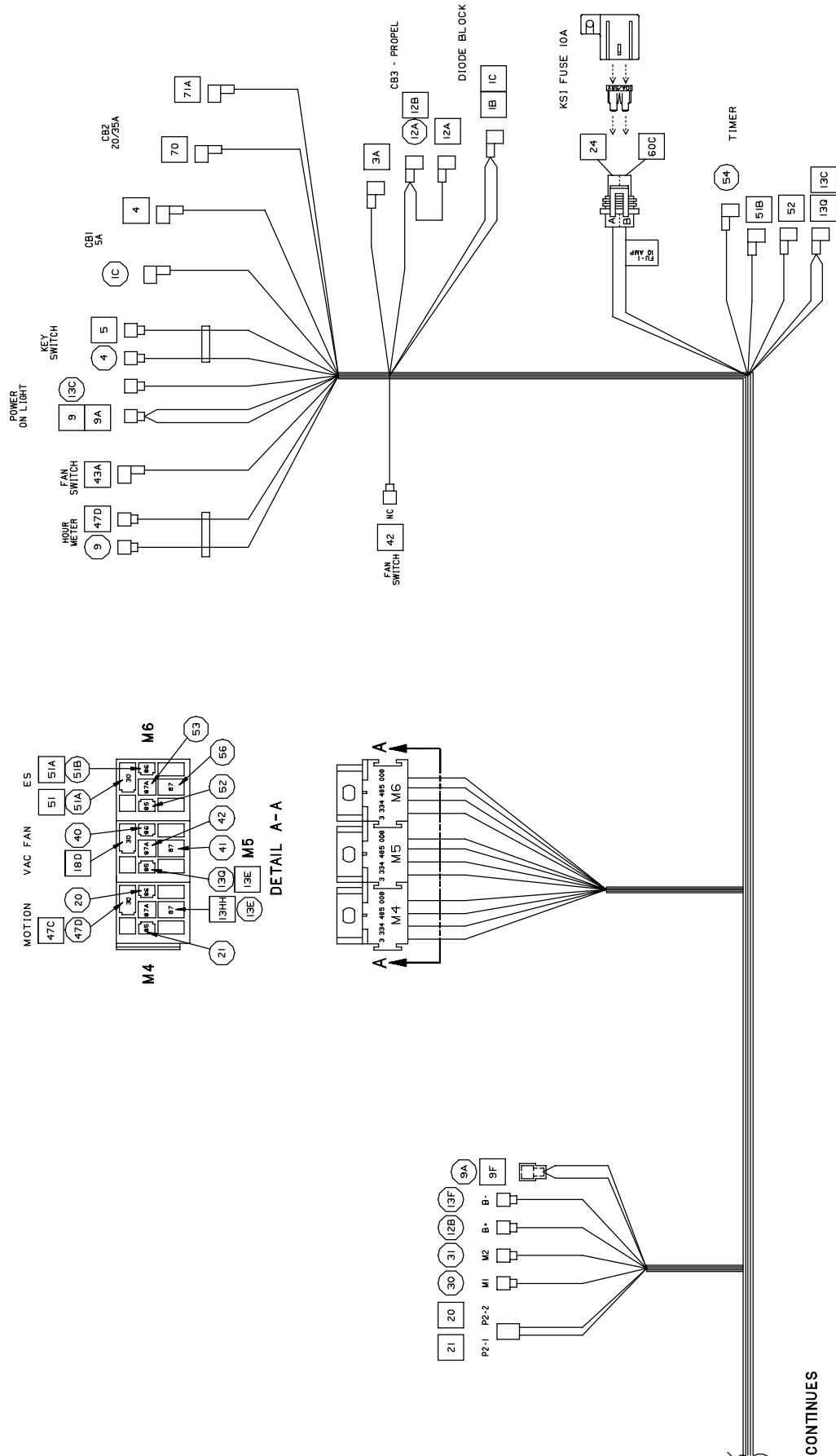
SECTION A-A

CONTACTOR-M2
VIEW B-B

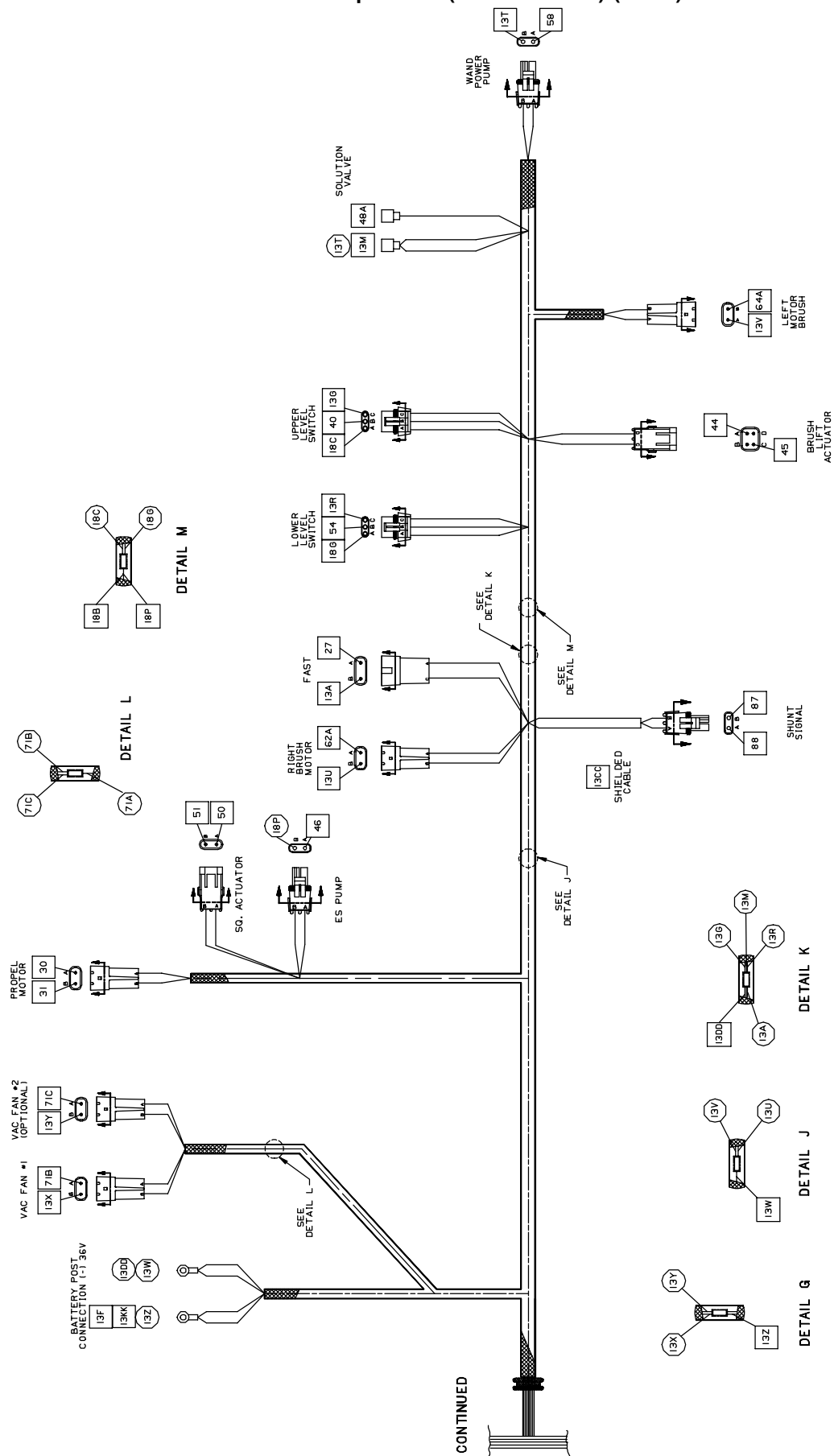
Wire Harness Group - 5700 (022000-) (1 of 3)



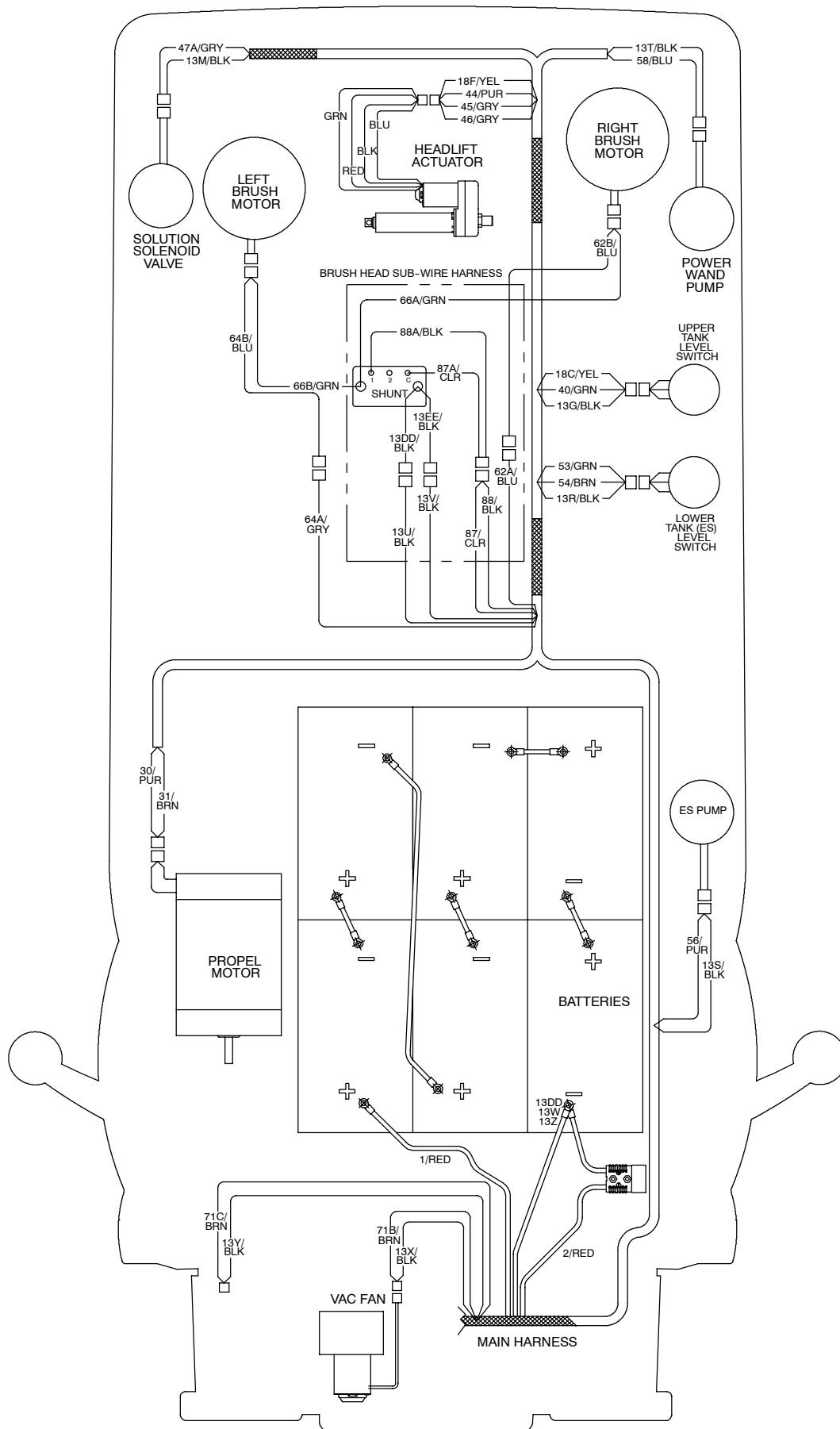
Wire Harness Group - 5700 (022000-) (2 of 3)



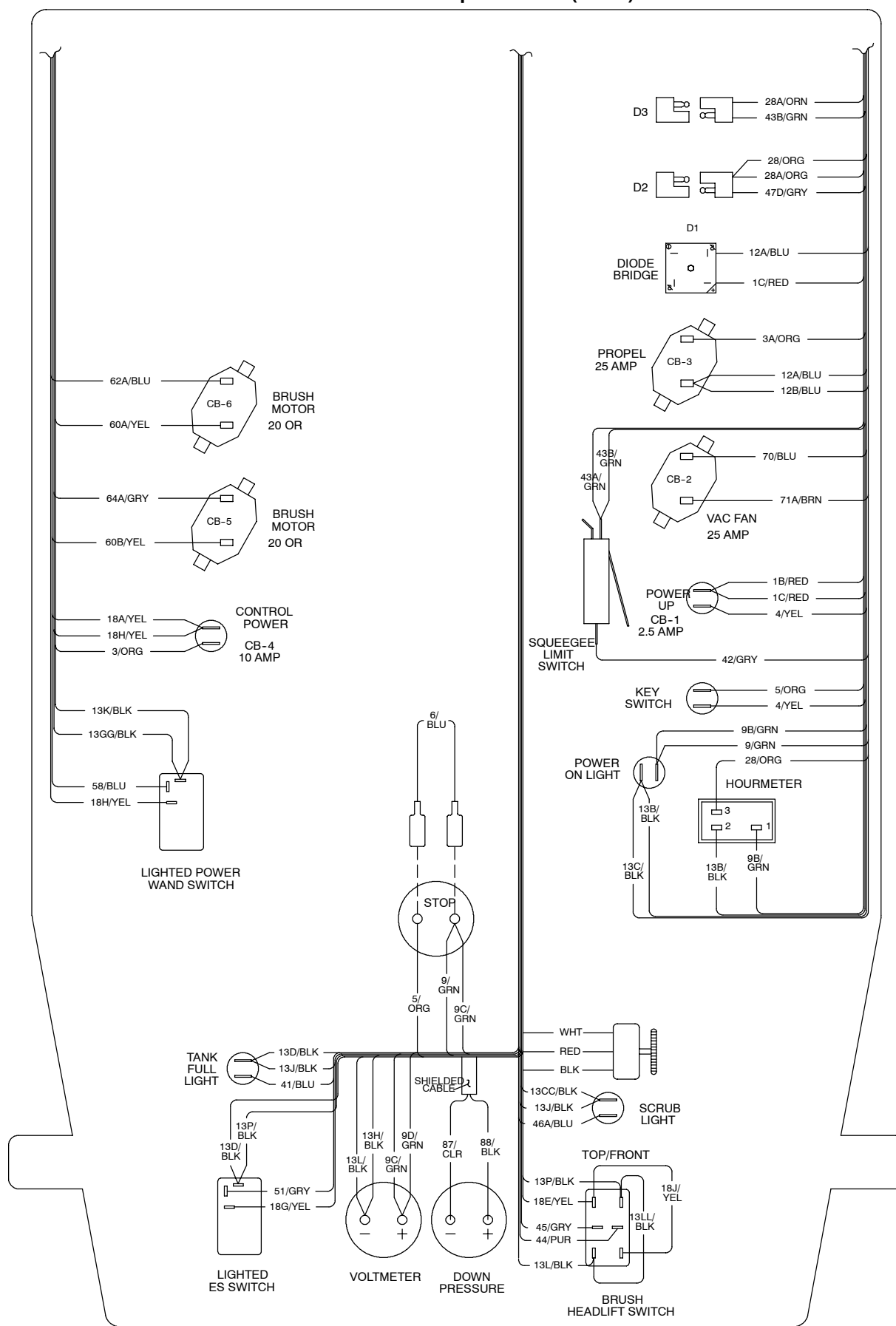
Wire Harness Group - 5700 (022000-) (3 of 3)



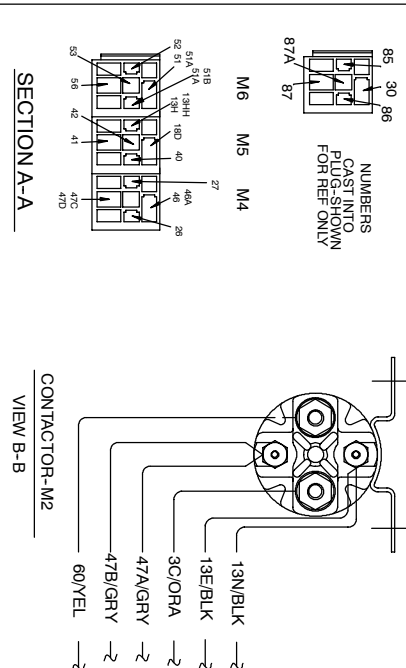
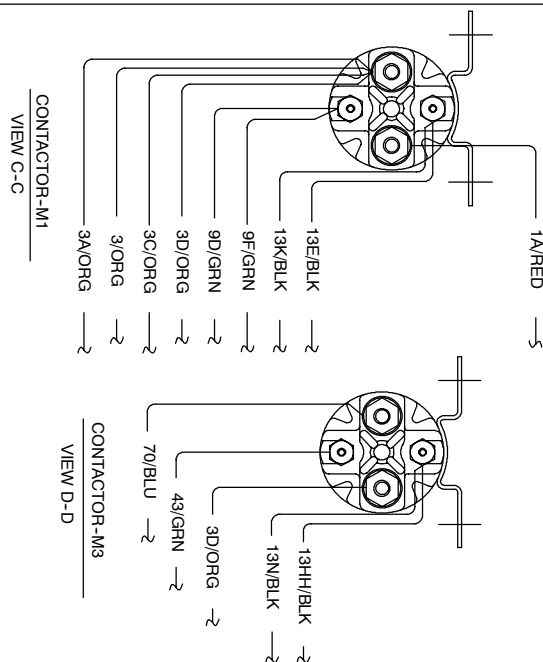
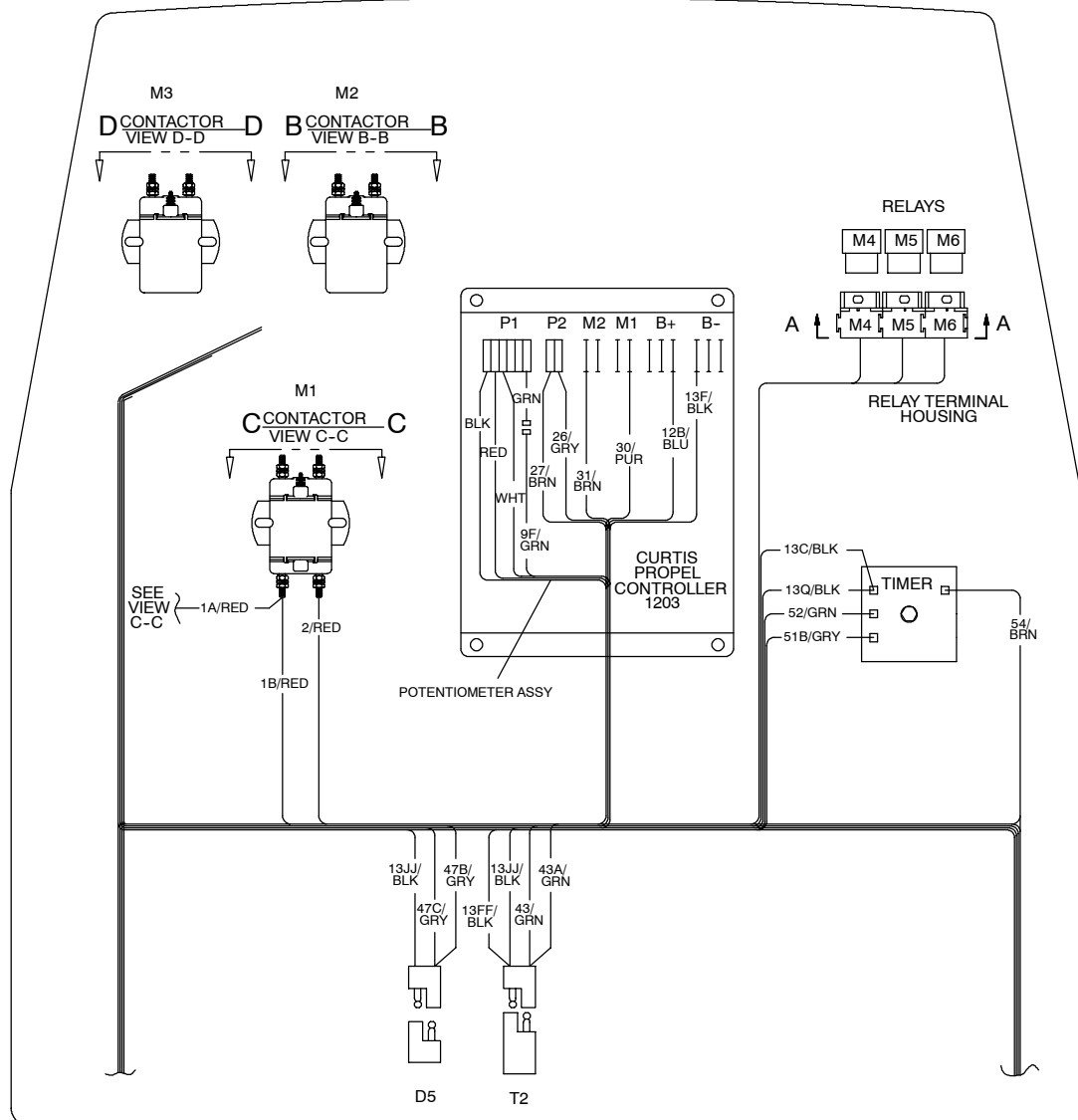
Wire Harness Group - 5700EE (1 of 3)



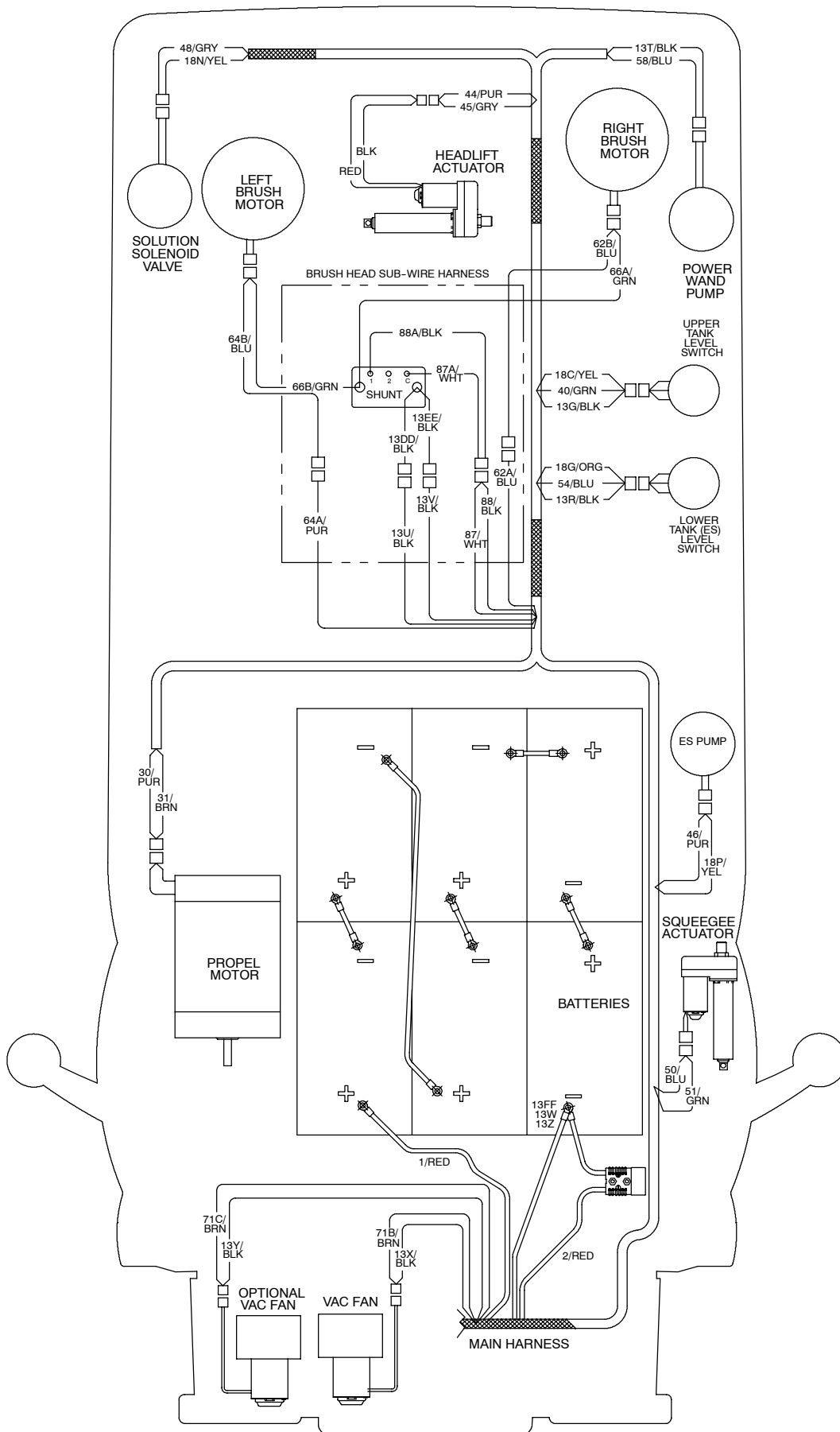
Wire Harness Group - 5700EE (2 of 3)



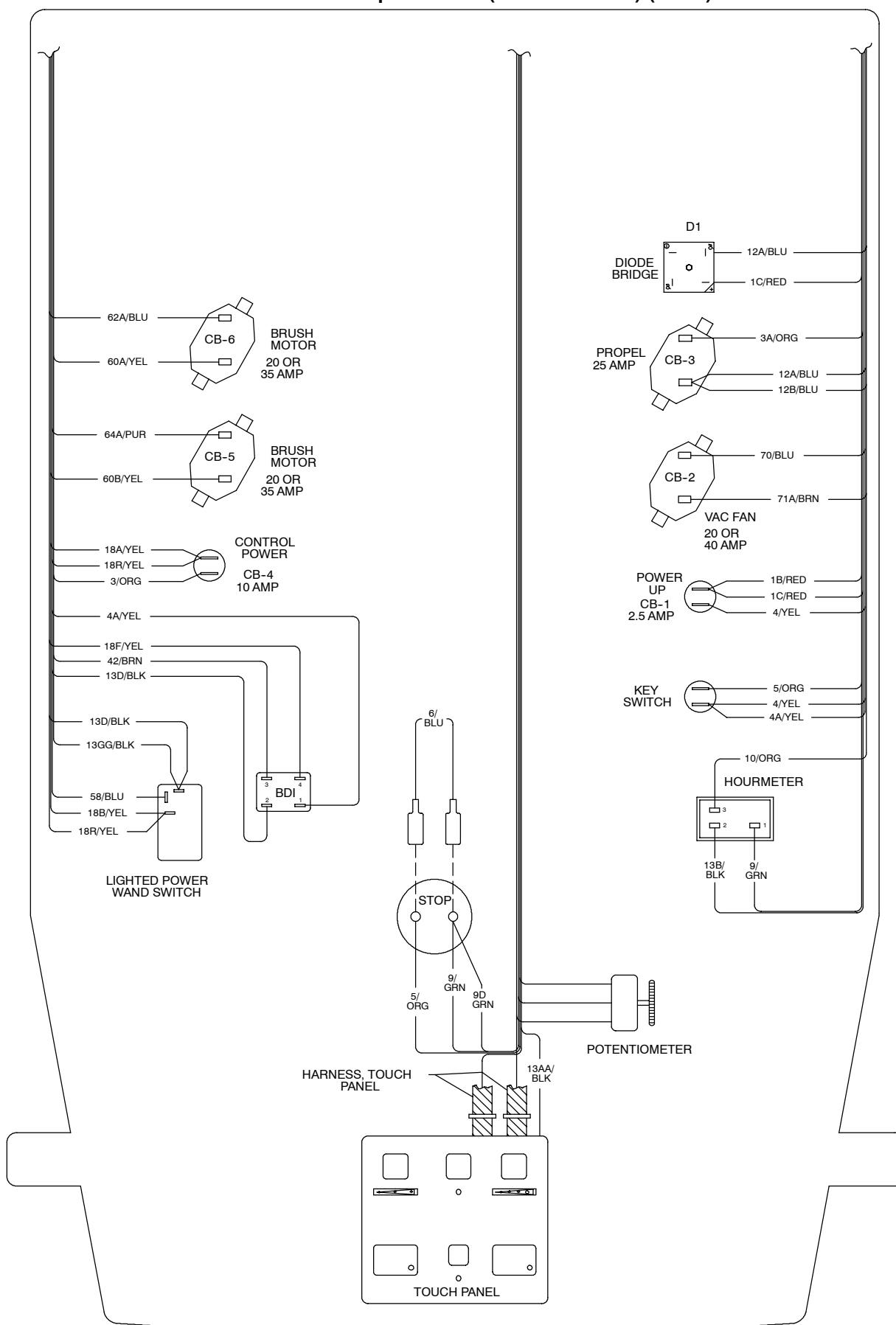
Wire Harness Group - 5700EE (3 of 3)



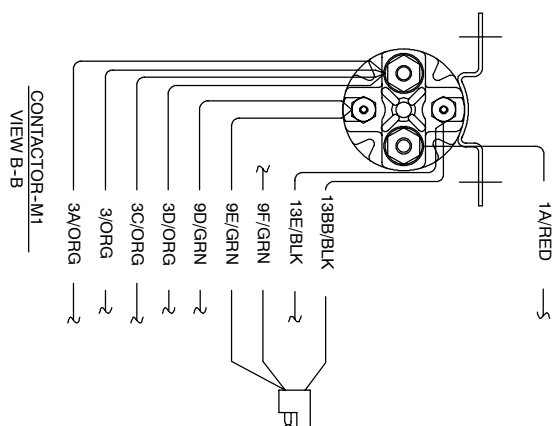
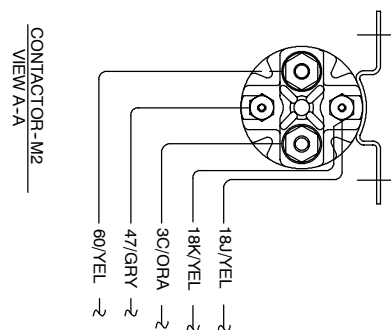
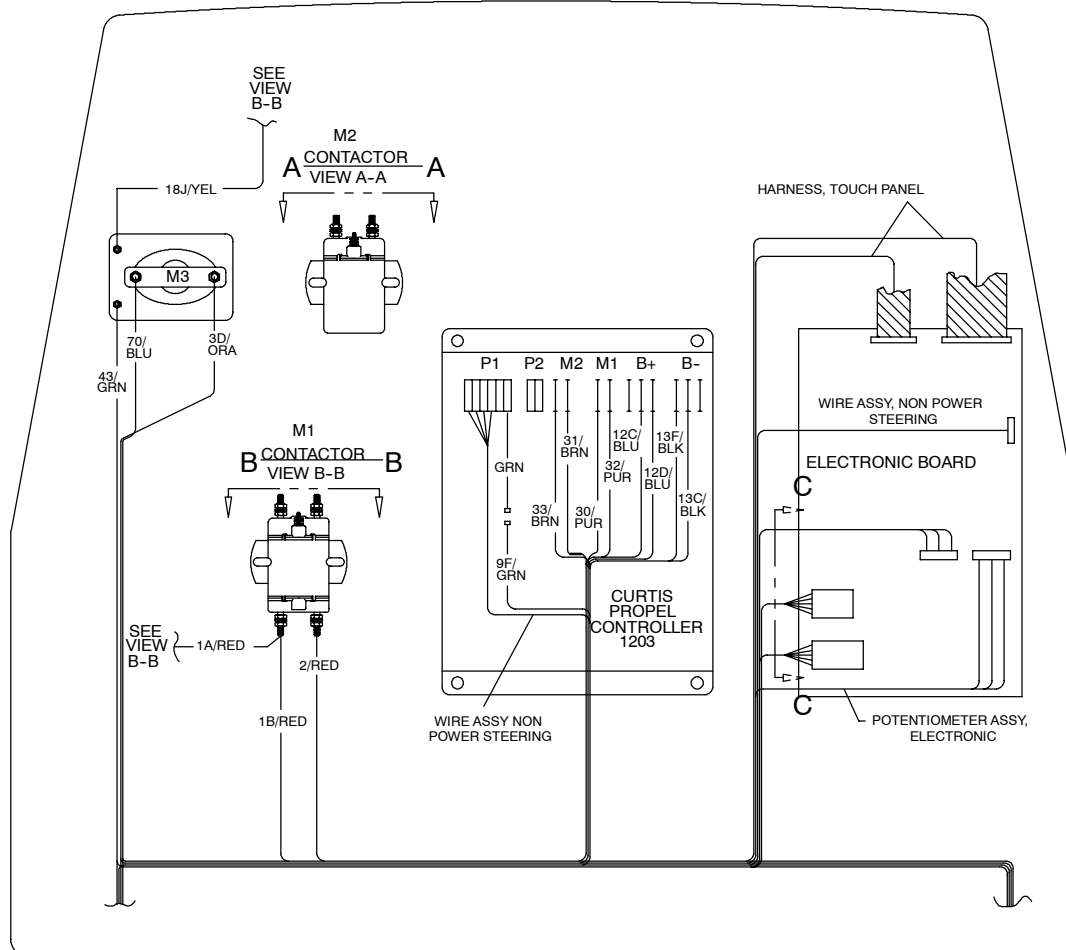
Wire Harness Group - 5700XP (000000-012999) (1 of 3)



Wire Harness Group - 5700XP (000000-012999) (2 of 3)



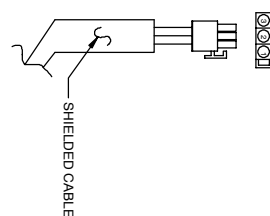
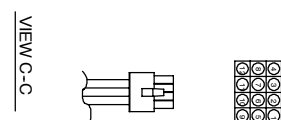
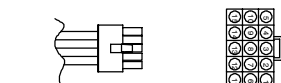
Wire Harness Group - 5700XP (000000-012999) (3 of 3)



SOCKET NO.	WIRE NO.
1	18D YEL
2	13Q BLK
3	44 PUR
4	45 GRN
5	
6	18E YEL
7	13L BLK
8	10 ORG
9	50 BLU
10	
11	47 GRN
12	43 GRN
13	48 GRN
14	46 PUR
15	51 GRN

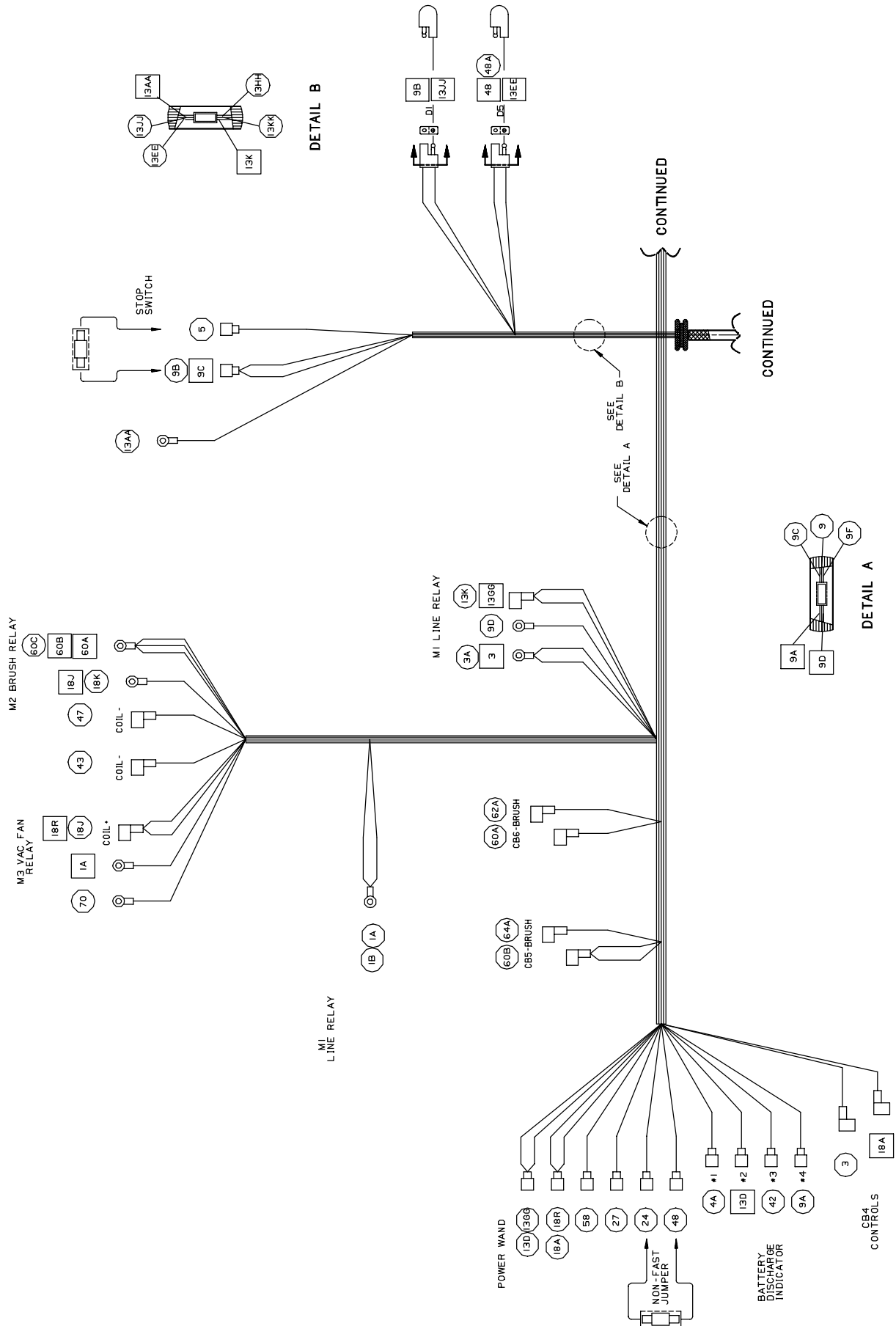
SOCKET NO.	WIRE NO.
1	18H YEL
2	—
3	—
4	—
5	13P BLK
6	54 BLU
7	40 GRN
8	42 BRN
9	—
10	—
11	—
12	—

SOCKET NO.	WIRE NO.
1	13CC SHLD
2	87 WHT
3	88 RED

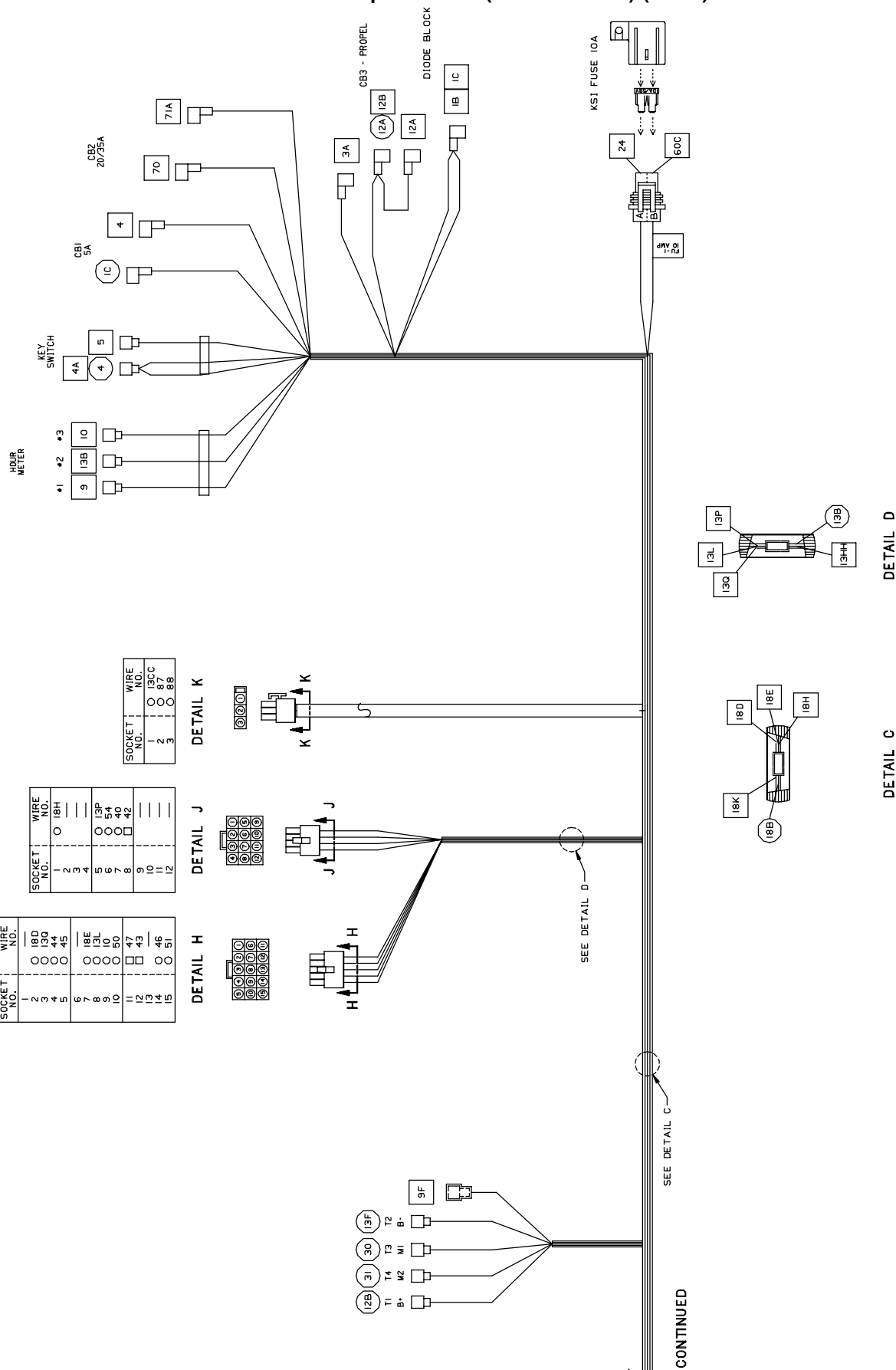


Wire Harness Group - 5700XP (022000-

) (1 of 3)

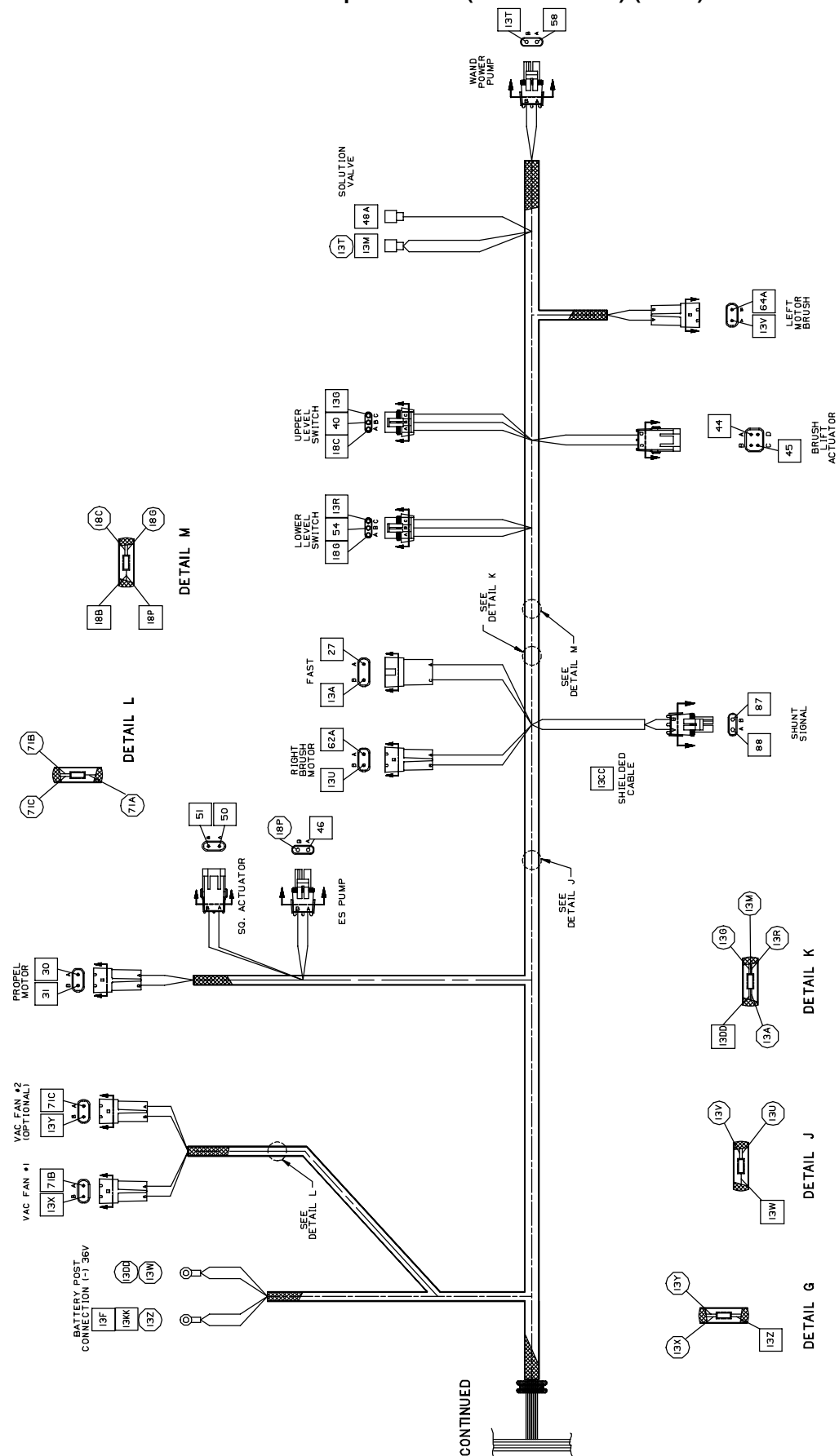


Wire Harness Group - 5700XP (022000-) (2 of 3)

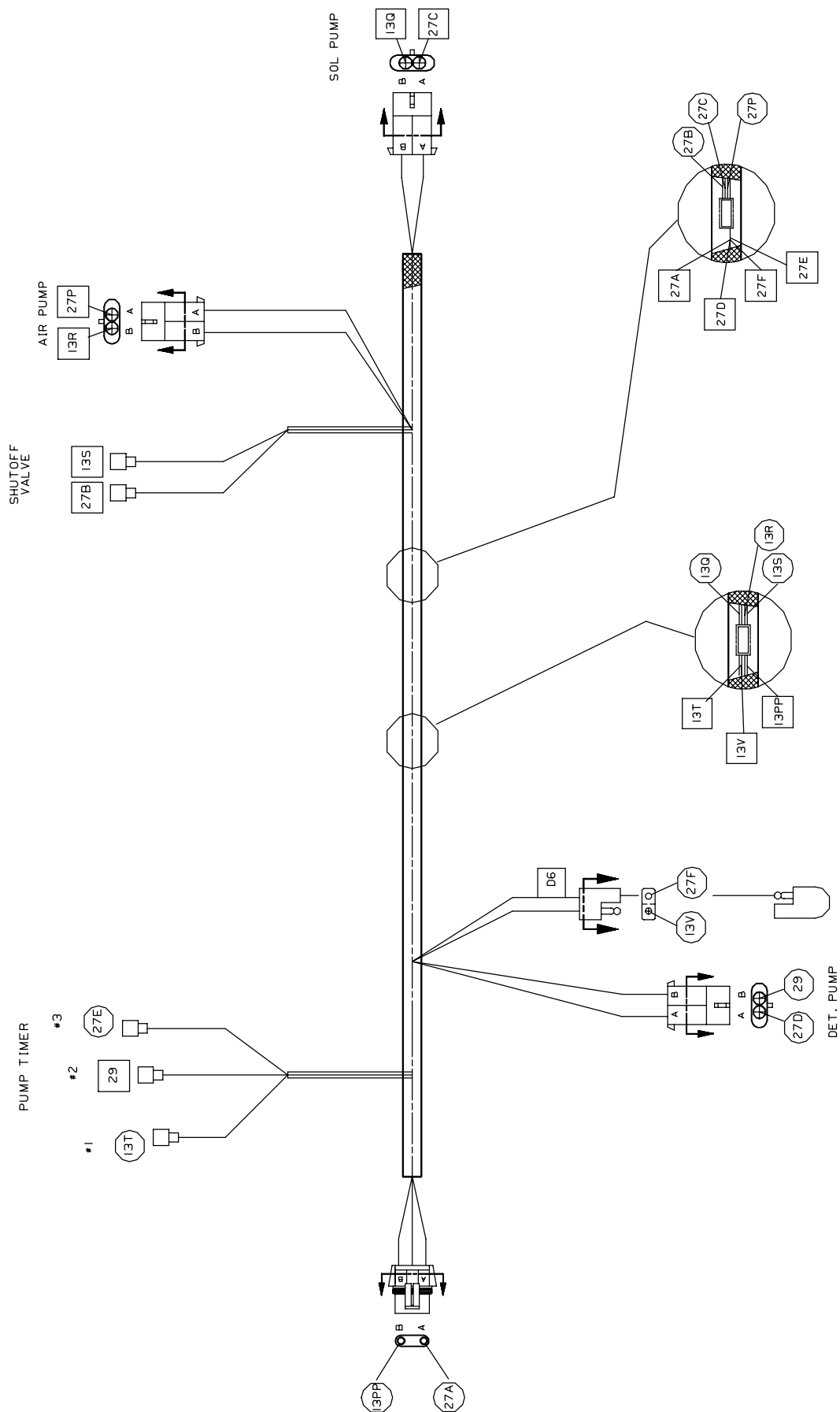


Wire Harness Group - 5700XP (022000-

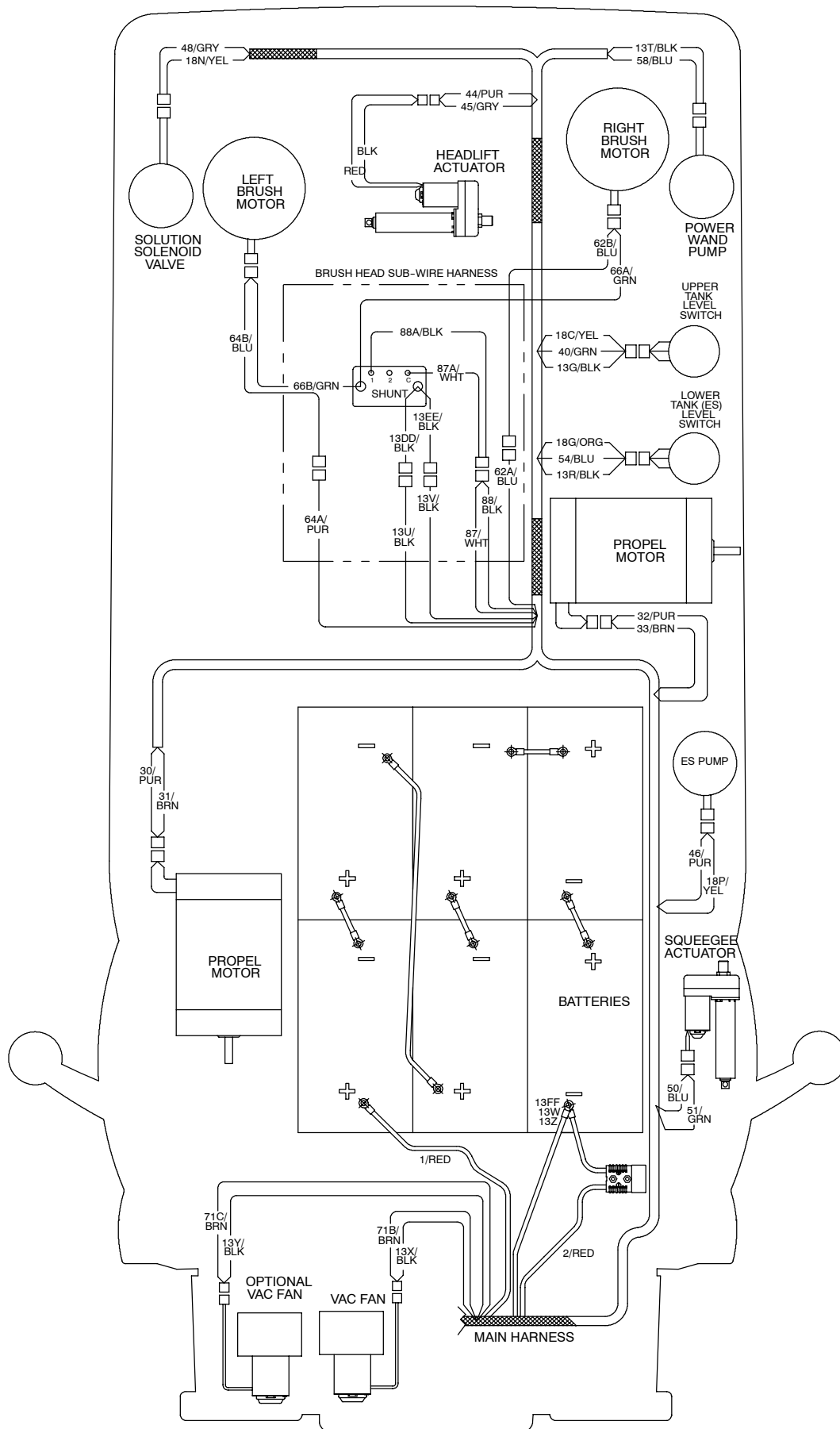
) (3 of 3)



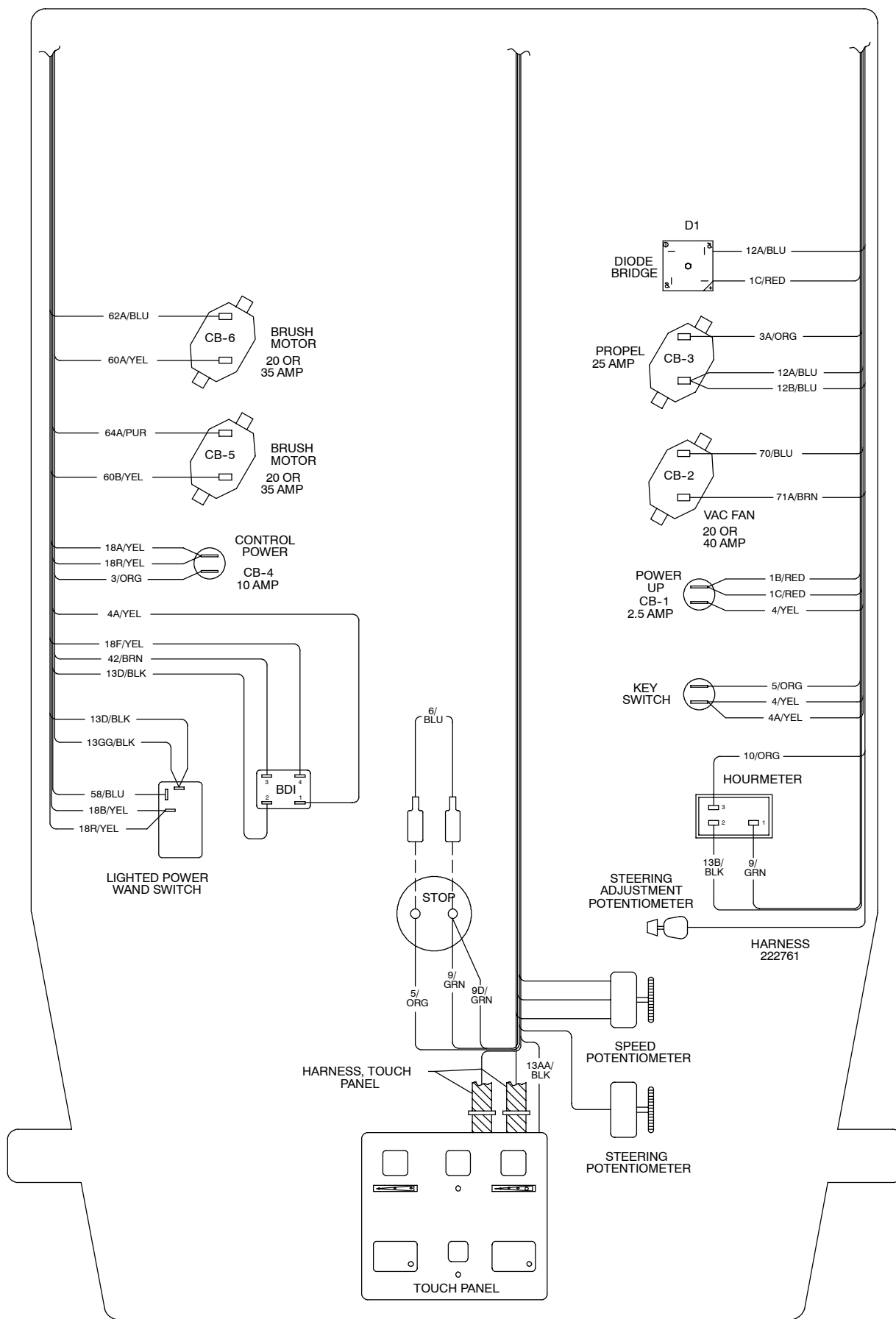
Wire Harness Group, FaST™ - 5700 and 5700XP



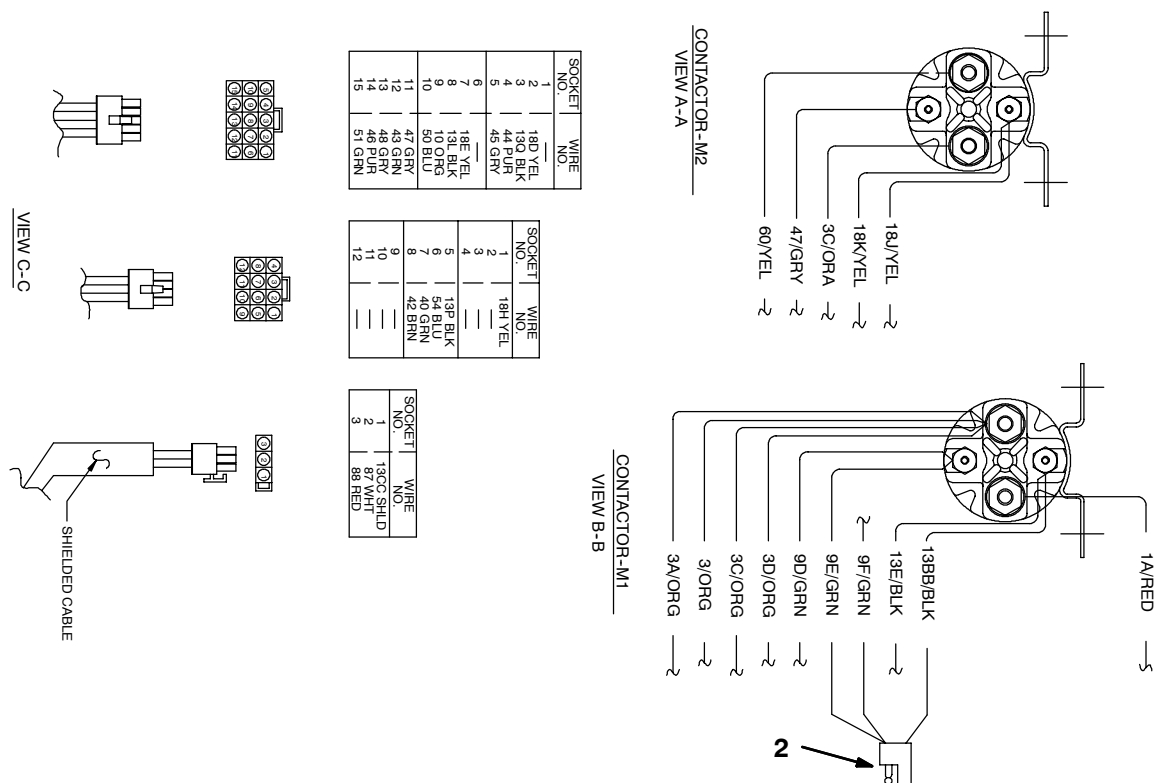
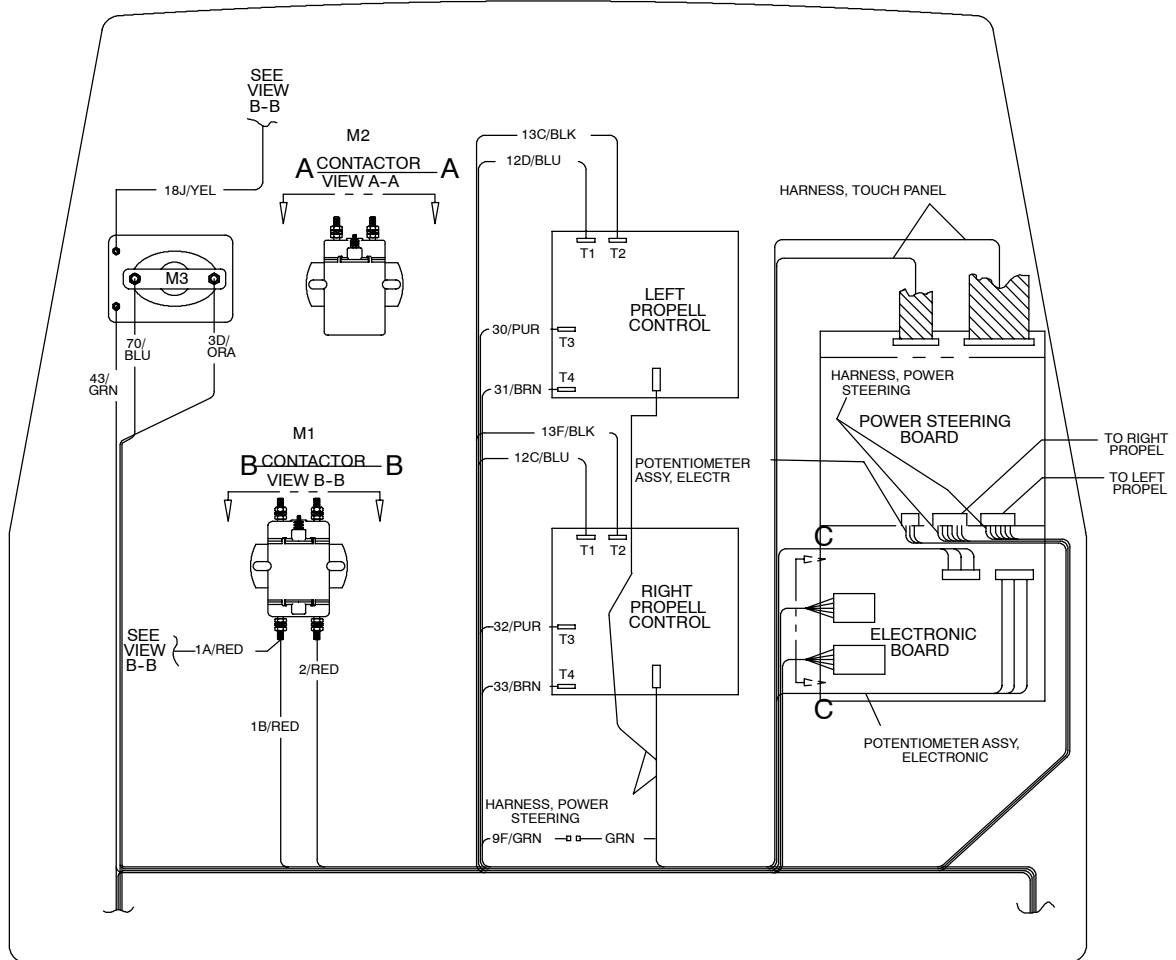
Wire Harness Group - 5700XPS (1 of 3)



Wire Harness Group - 5700XPS (2 of 3)



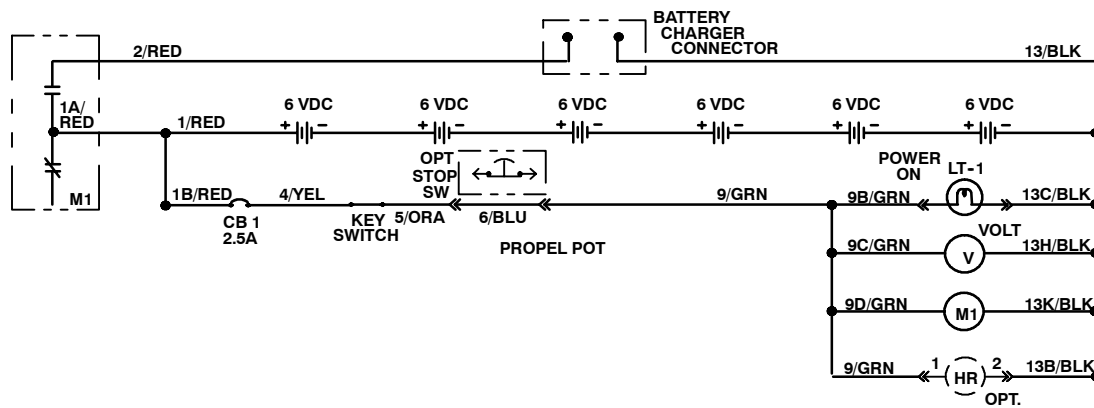
Wire Harness Group - 5700XPS (3 of 3)



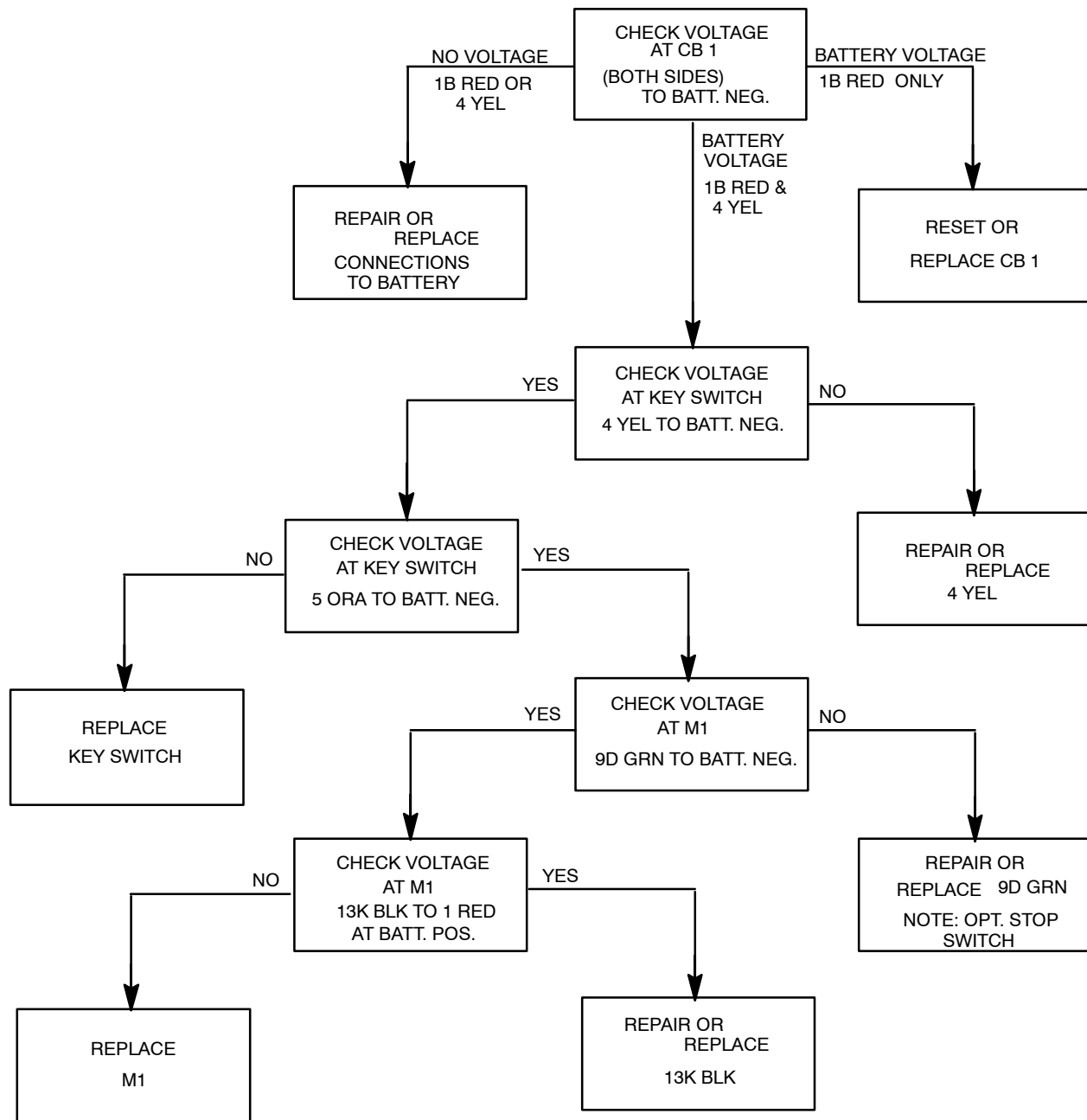
TROUBLESHOOTING

The troubleshooting charts that follow are organized so they lead you through the circuits. They include flow charts and instructions for you as to where to insert your test instruments.

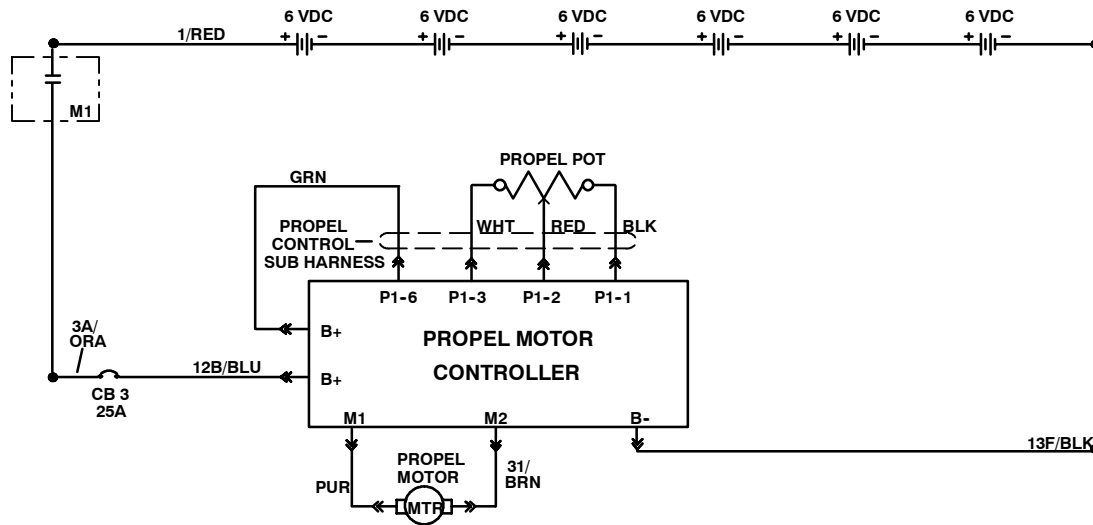
5700 POWER UP CIRCUIT



NO POWER (KEY ON)

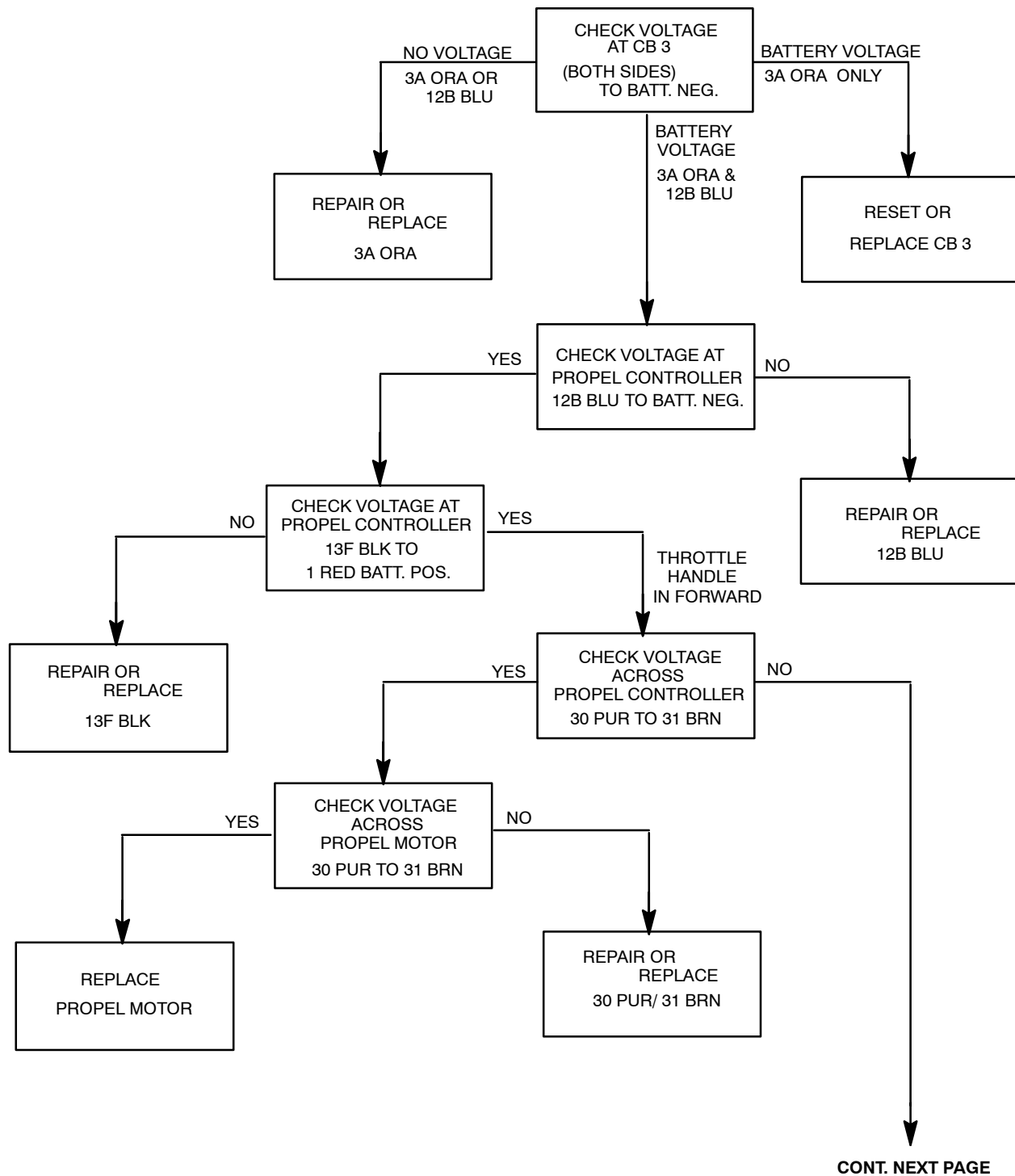


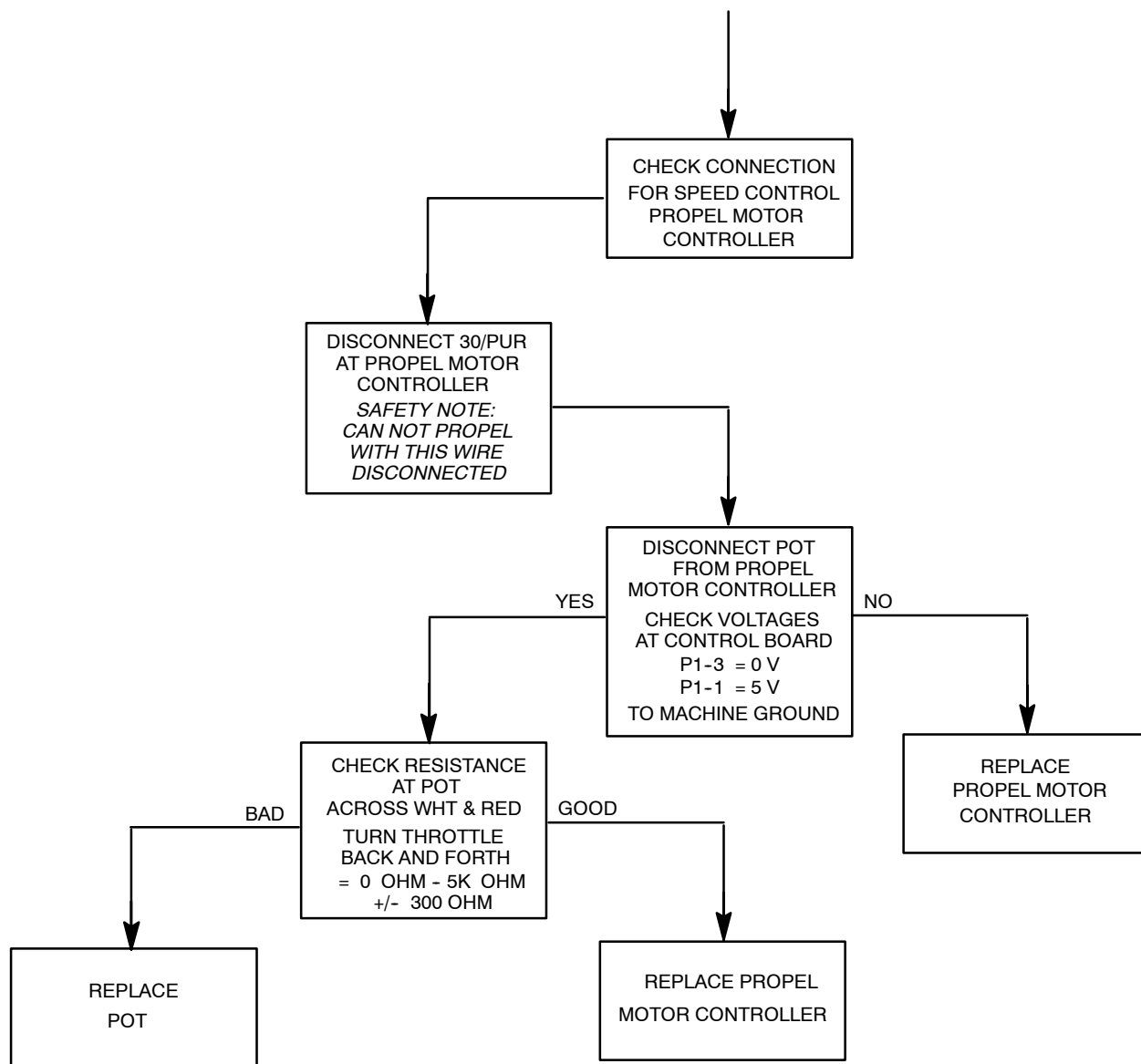
5700 PROPEL CIRCUIT



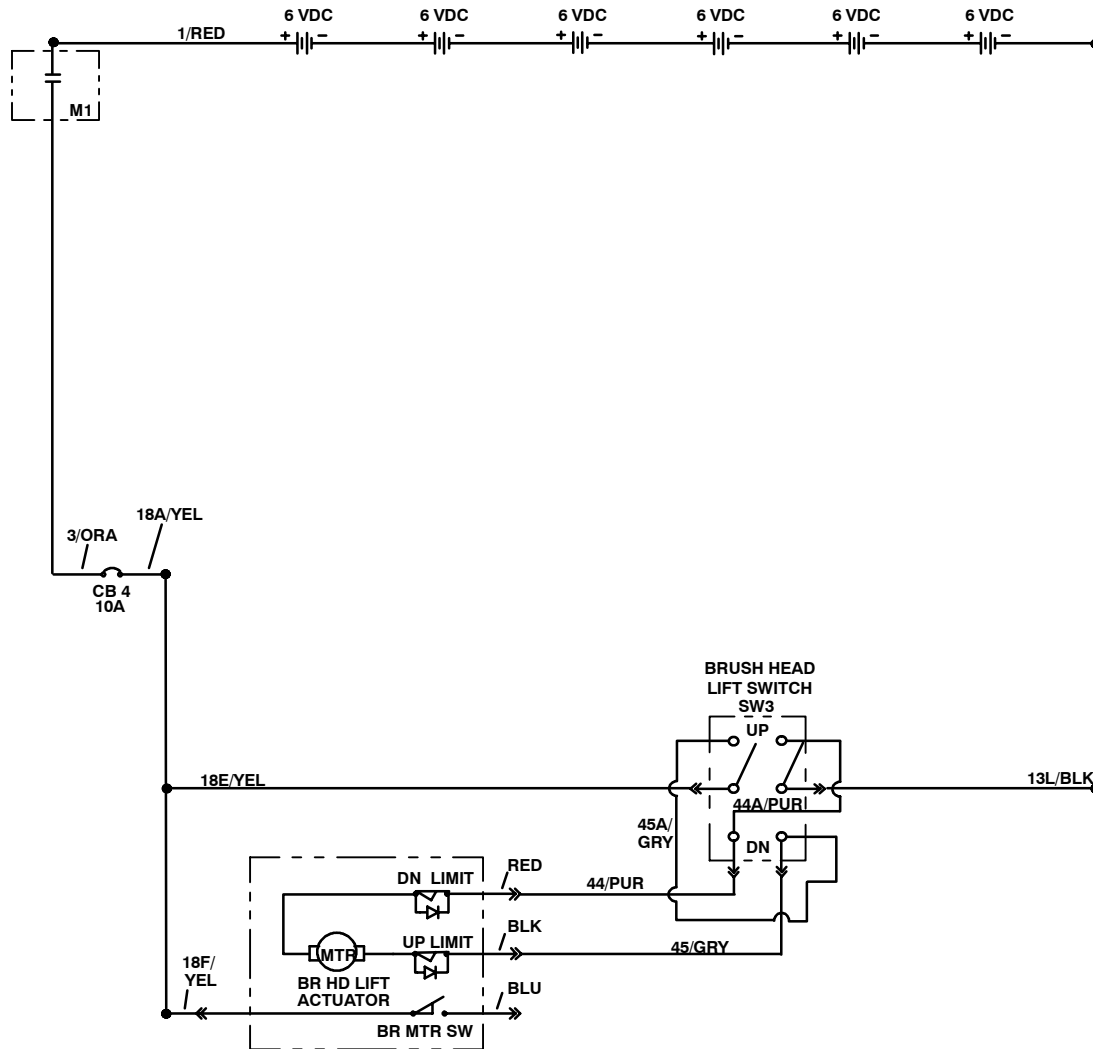
NO PROPEL

(POWER UP O.K.)



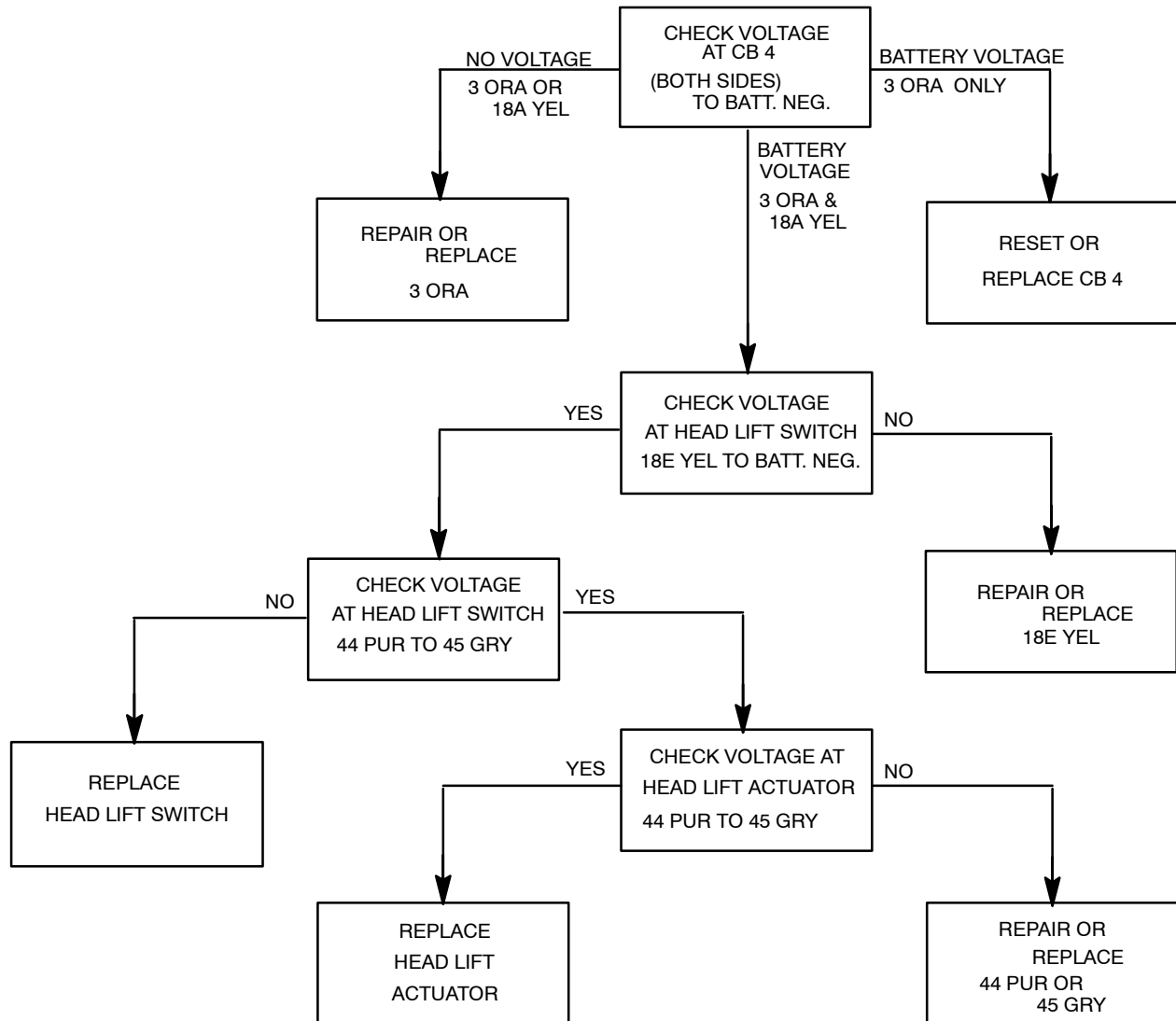


5700 HEAD LIFT CIRCUIT

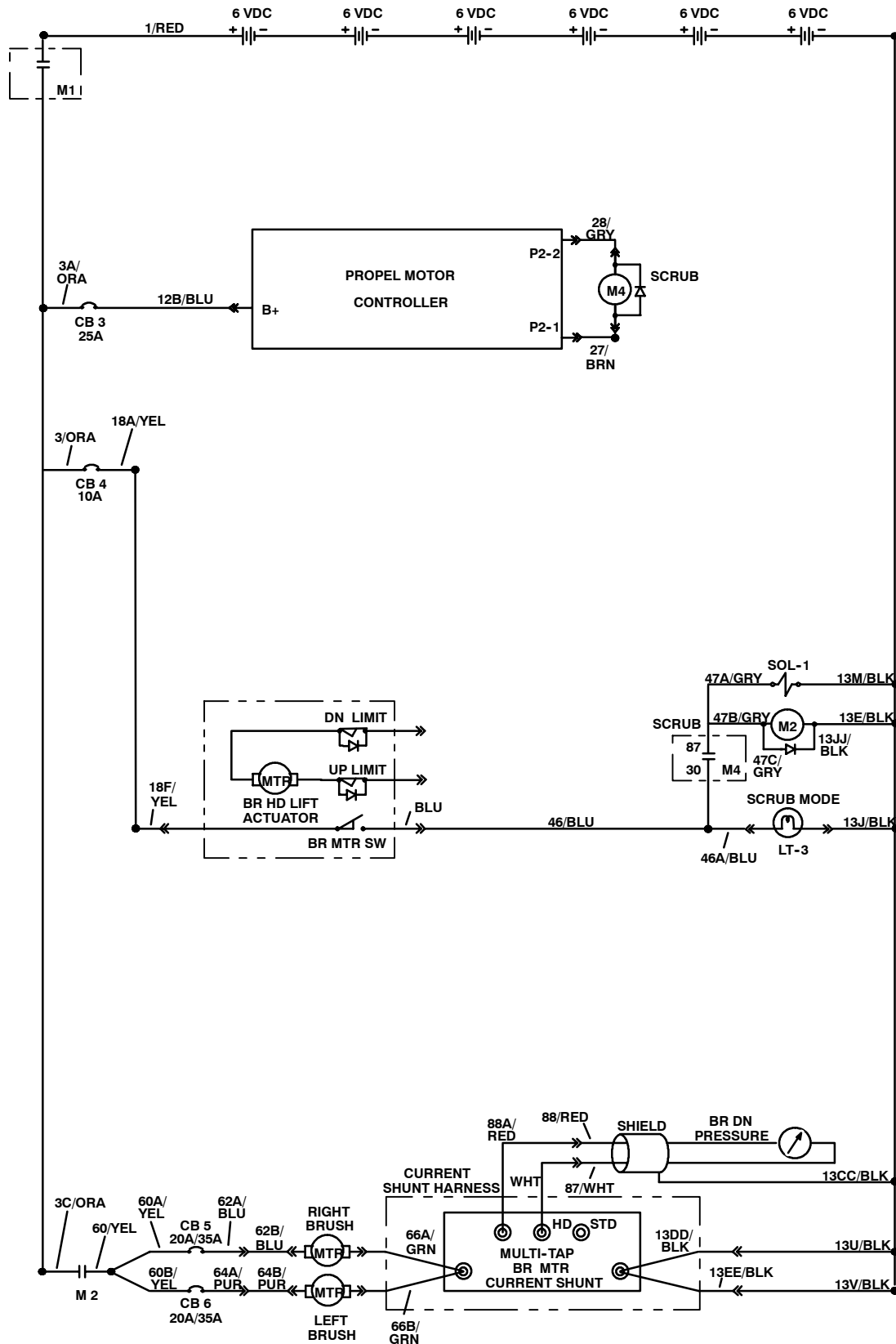


HEAD WILL NOT LOWER

(KEY ON & SW3 HELD IN DOWN POSITION)

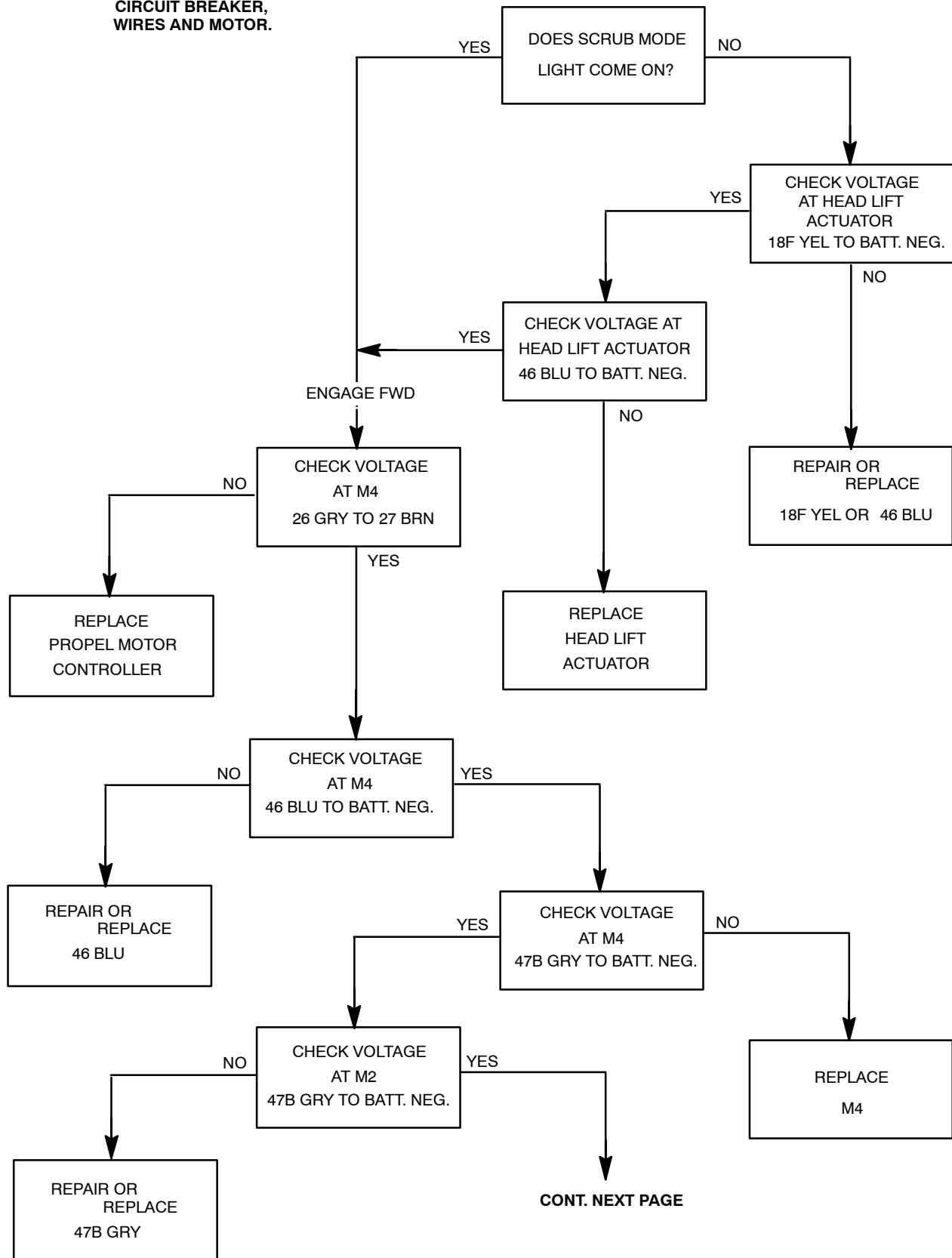


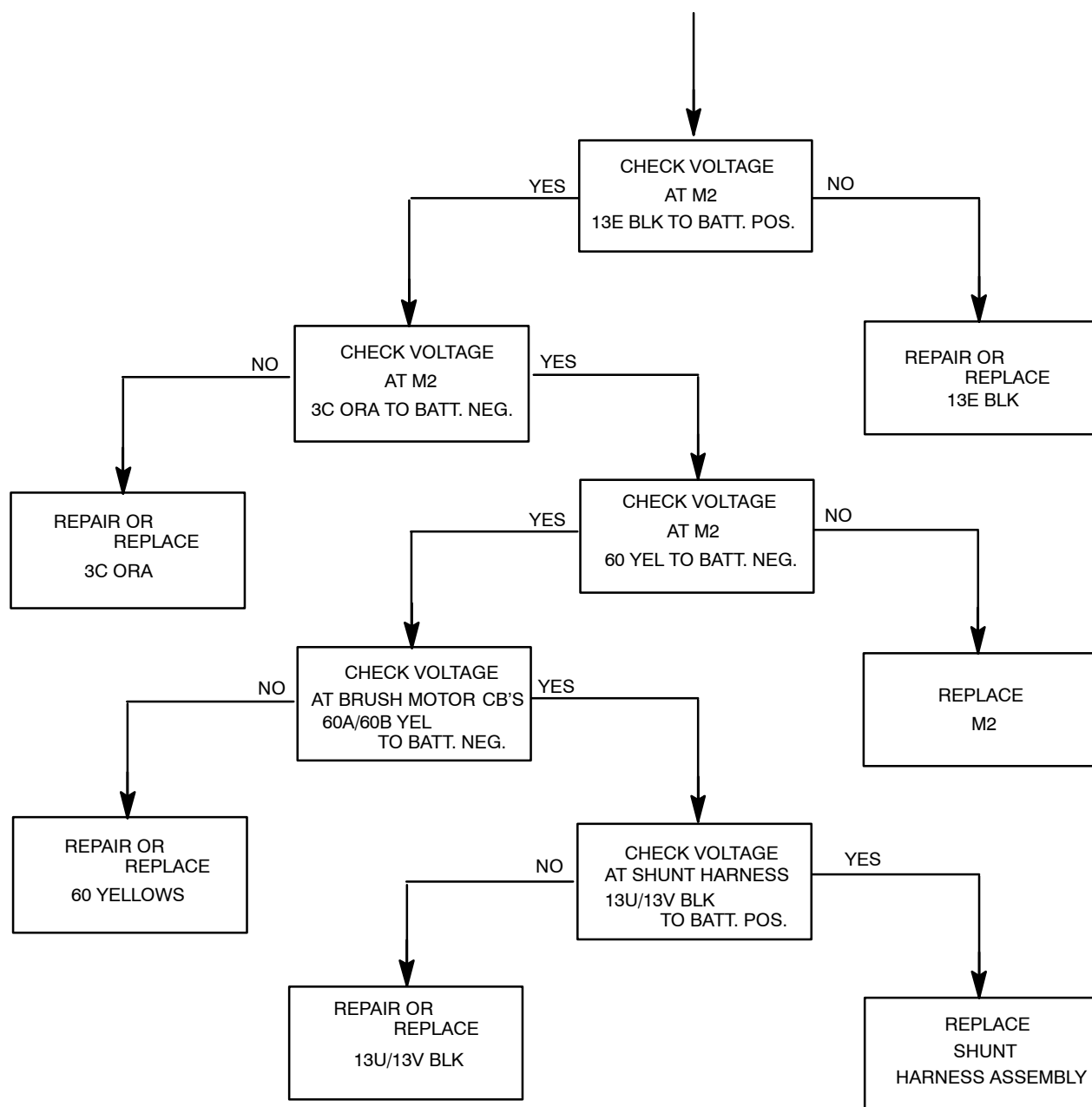
5700 BRUSH CIRCUIT



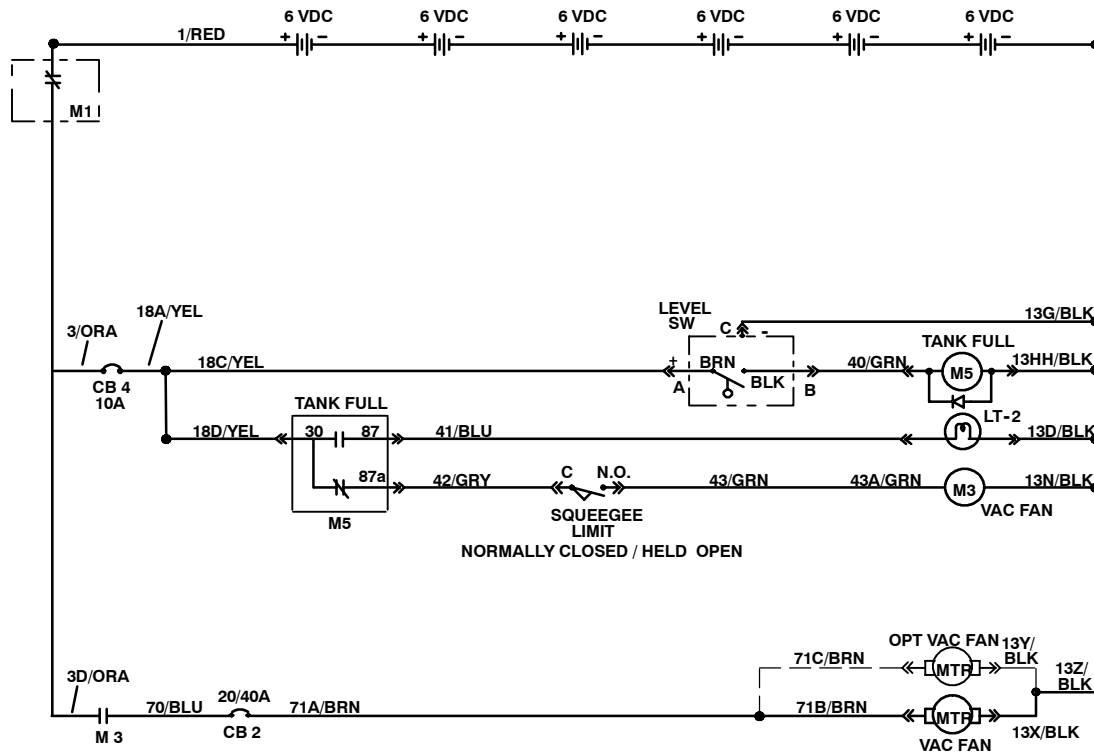
BRUSHES DO NOT RUN (HEAD LOWERS)

IF ONE MOTOR WORKS:
CHECK INDIVIDUAL
CIRCUIT BREAKER,
WIRES AND MOTOR.





5700 VAC FAN & SQUEEGEE CIRCUIT

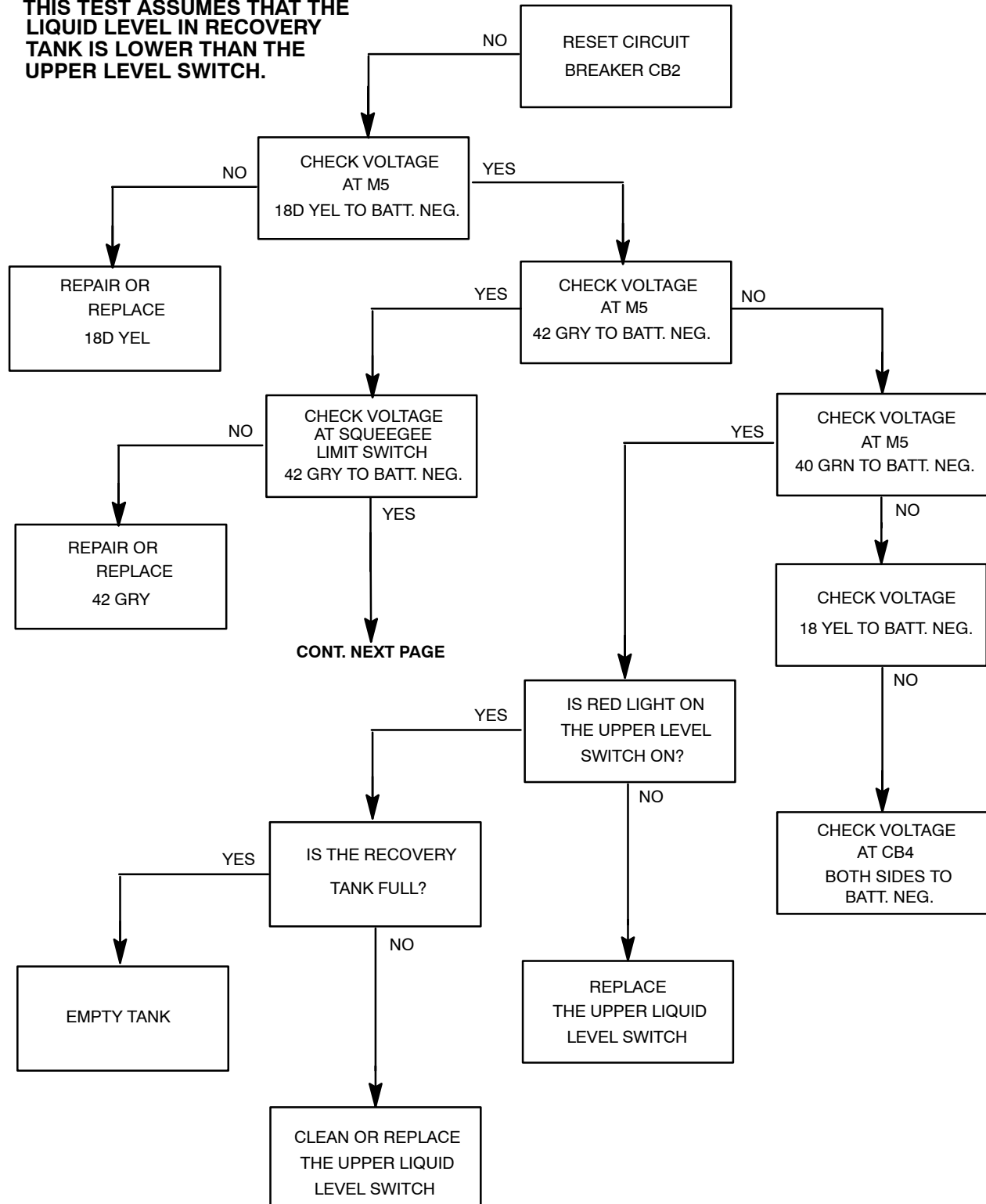


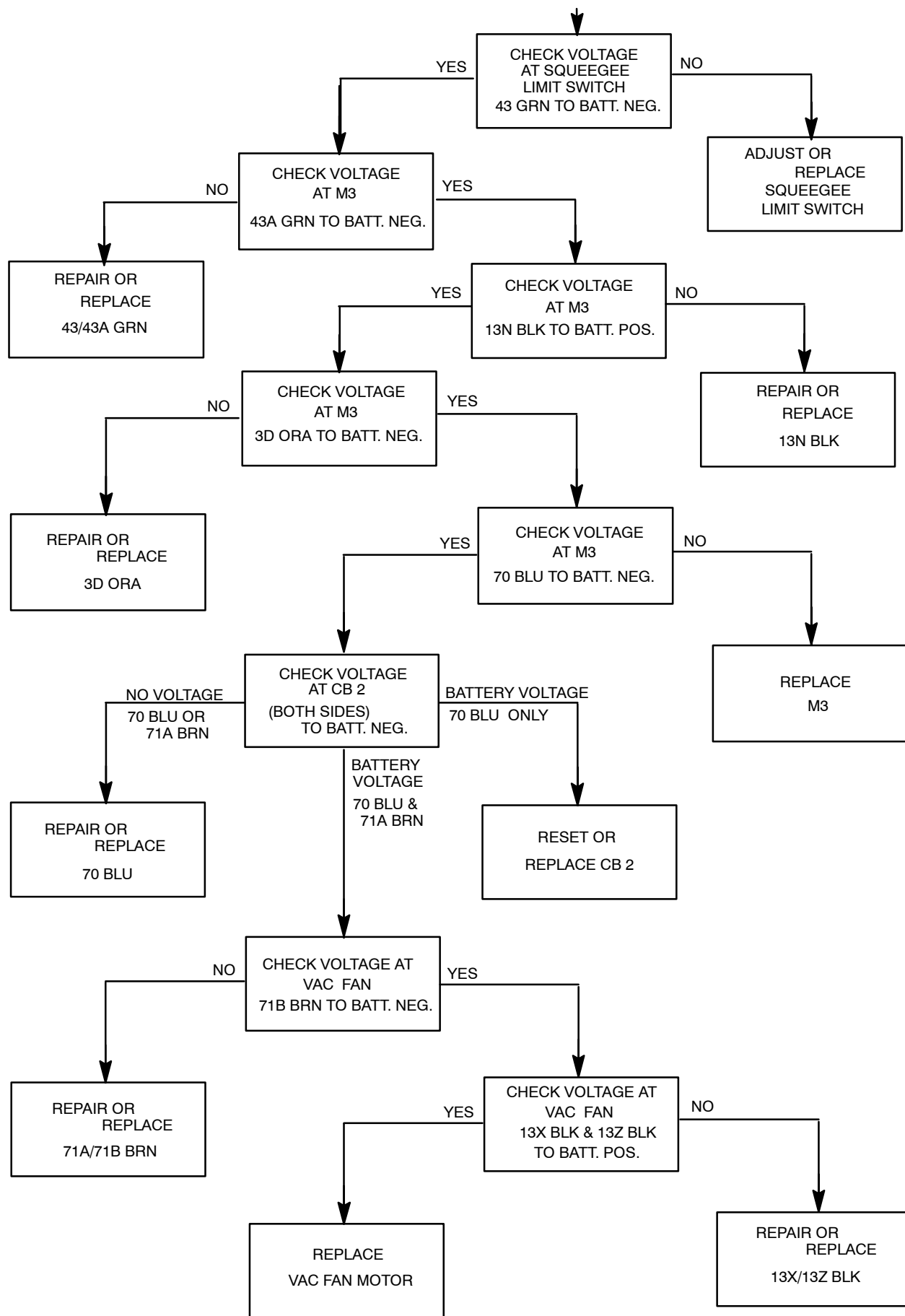
VAC FAN DOES NOT RUN

(SQUEEGEE IN DOWN POSITION)

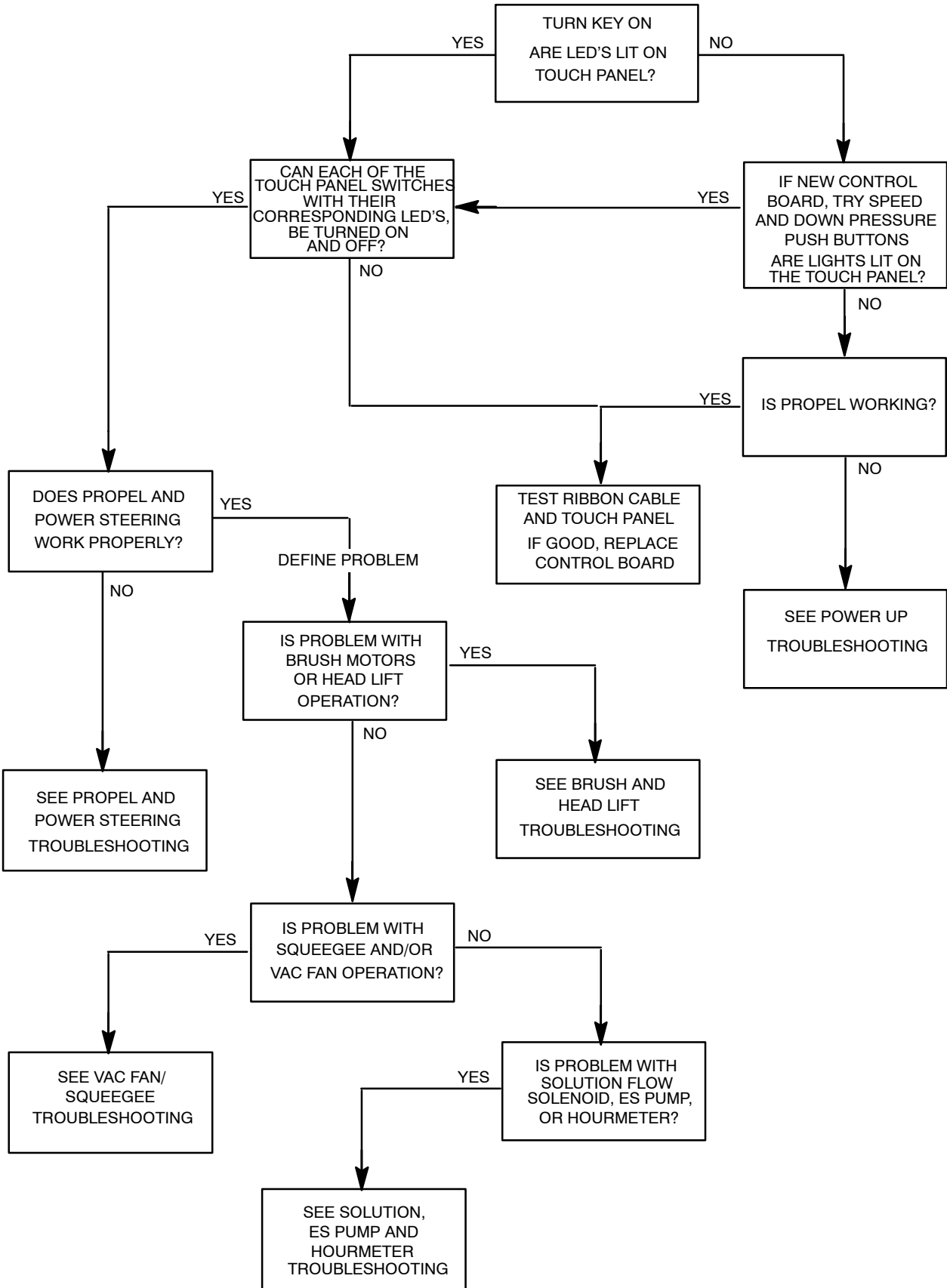
NOTE: THIS MACHINE USES SOLID STATE LIQUID LEVEL SWITCHES. MAKE SURE THAT THEY ARE CLEAN.

THIS TEST ASSUMES THAT THE LIQUID LEVEL IN RECOVERY TANK IS LOWER THAN THE UPPER LEVEL SWITCH.

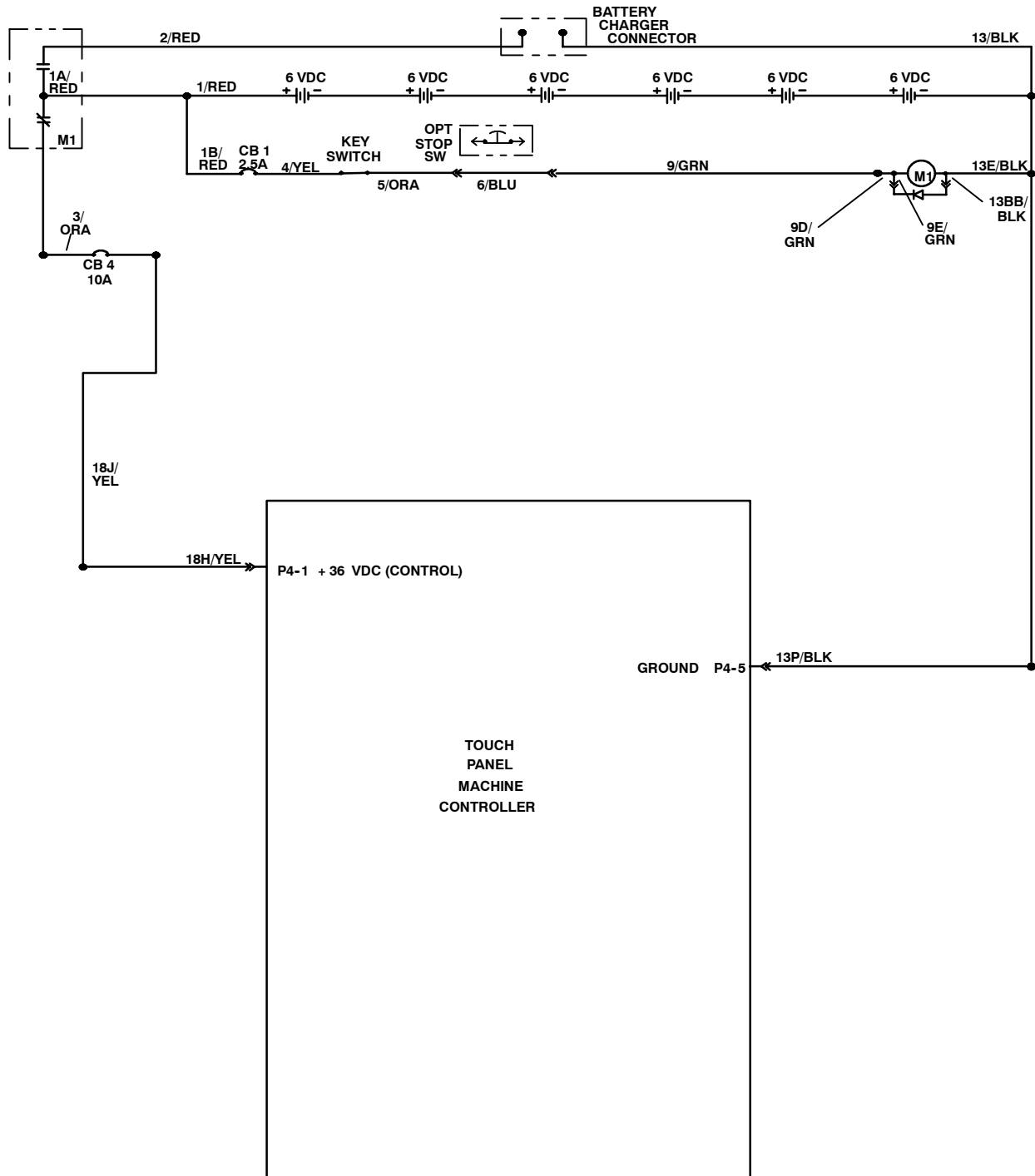




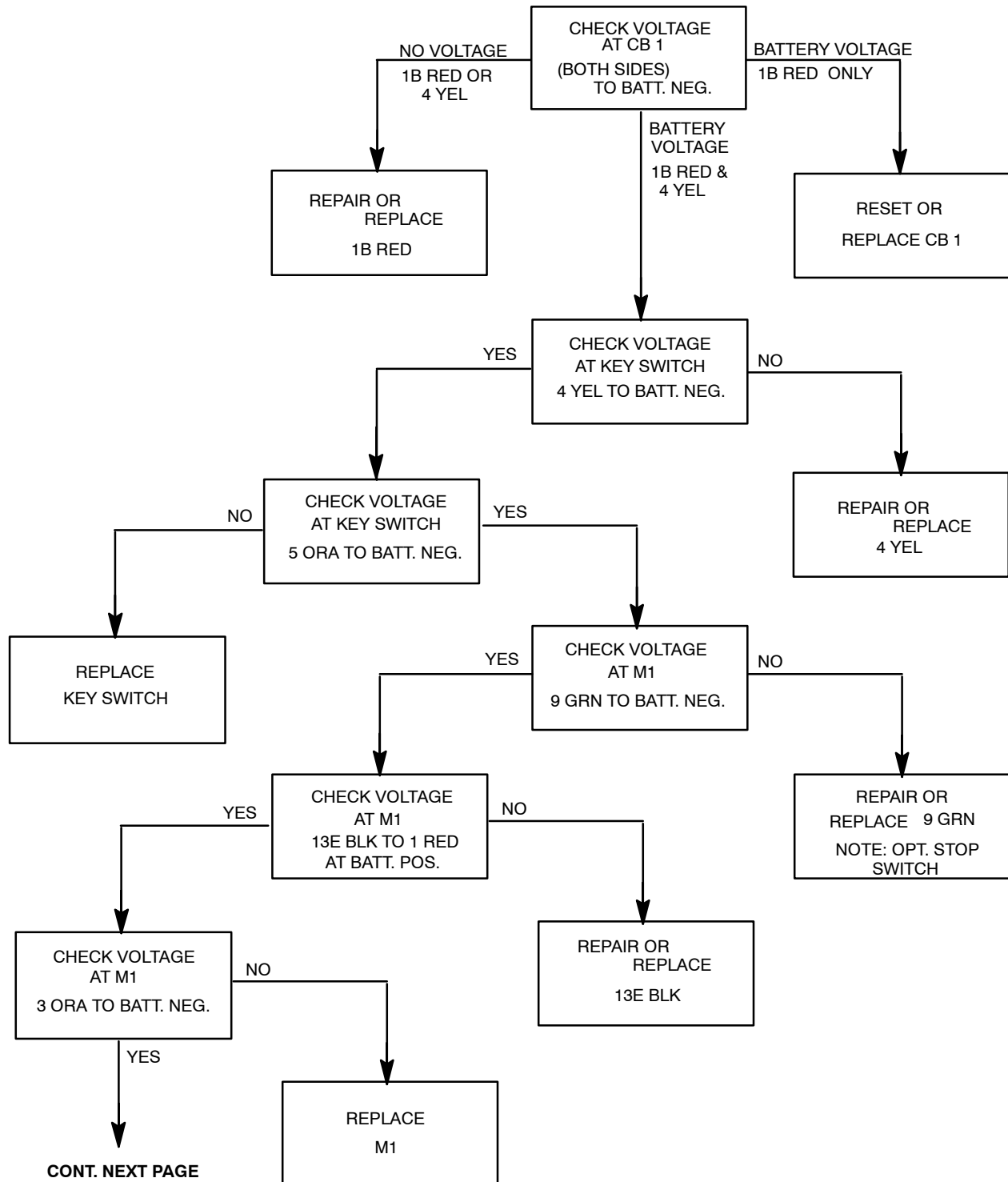
INITIAL TESTING

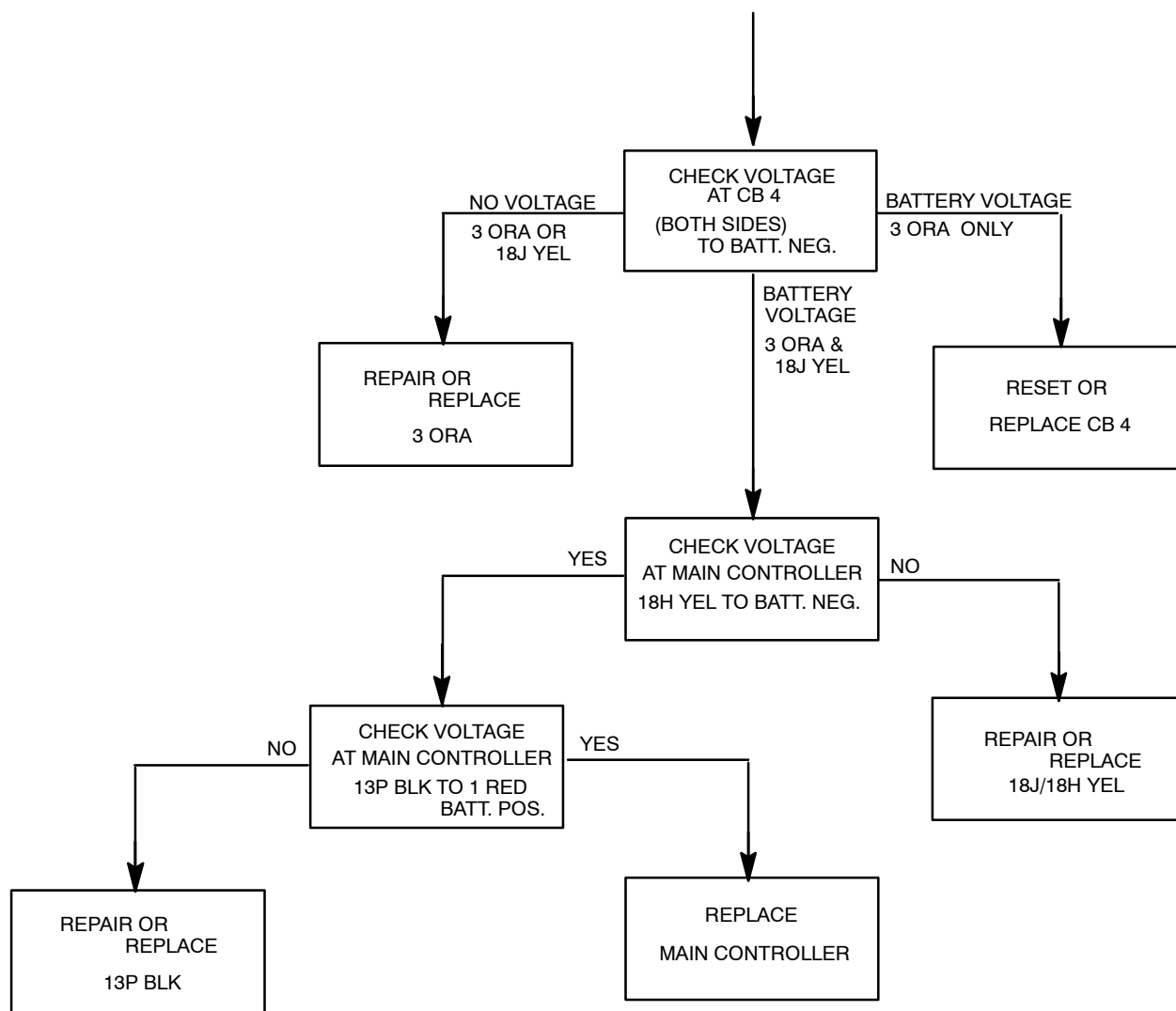


5700XP POWER UP CIRCUIT

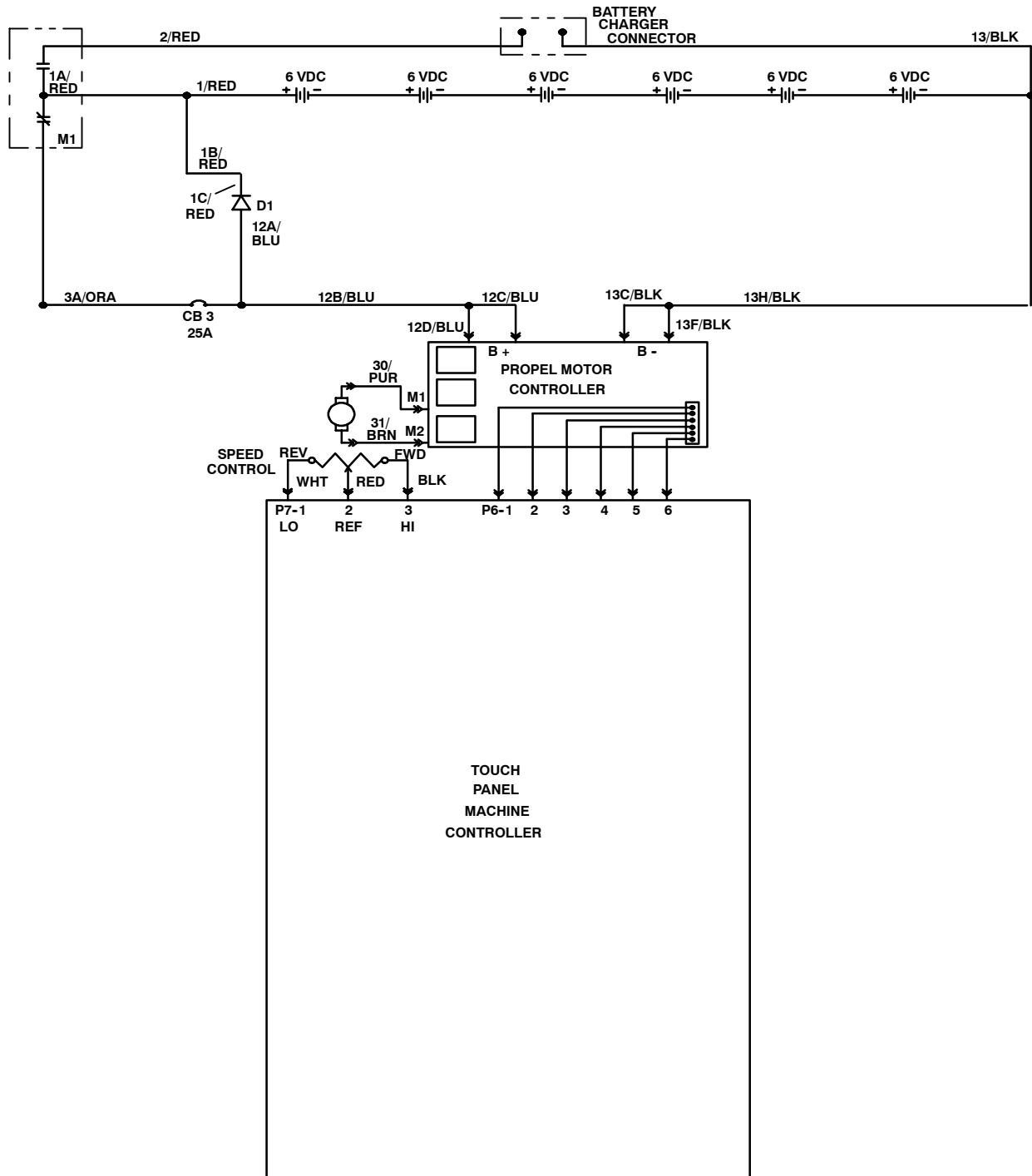


NO POWER (KEY ON)



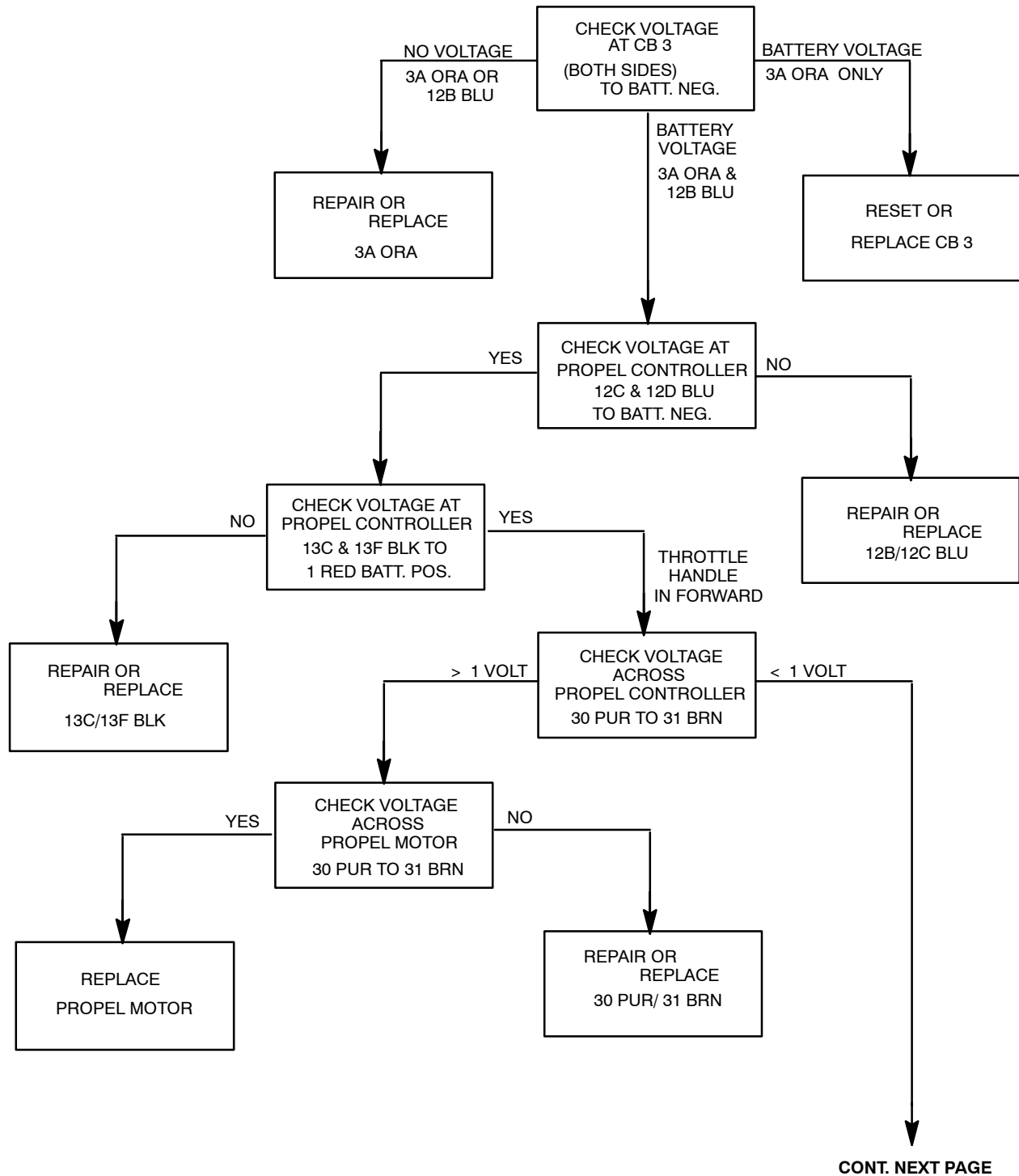


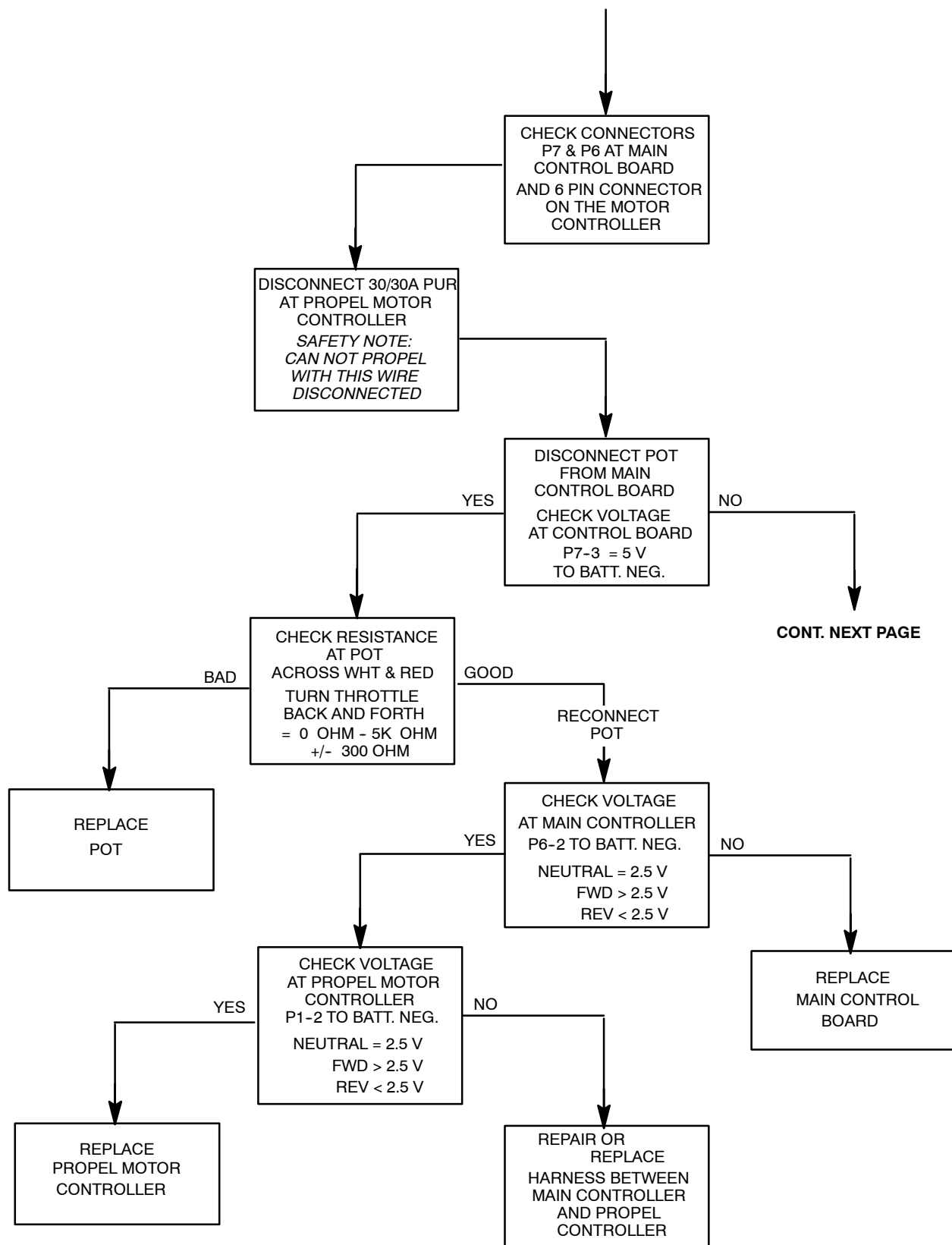
5700XP PROPEL CIRCUIT

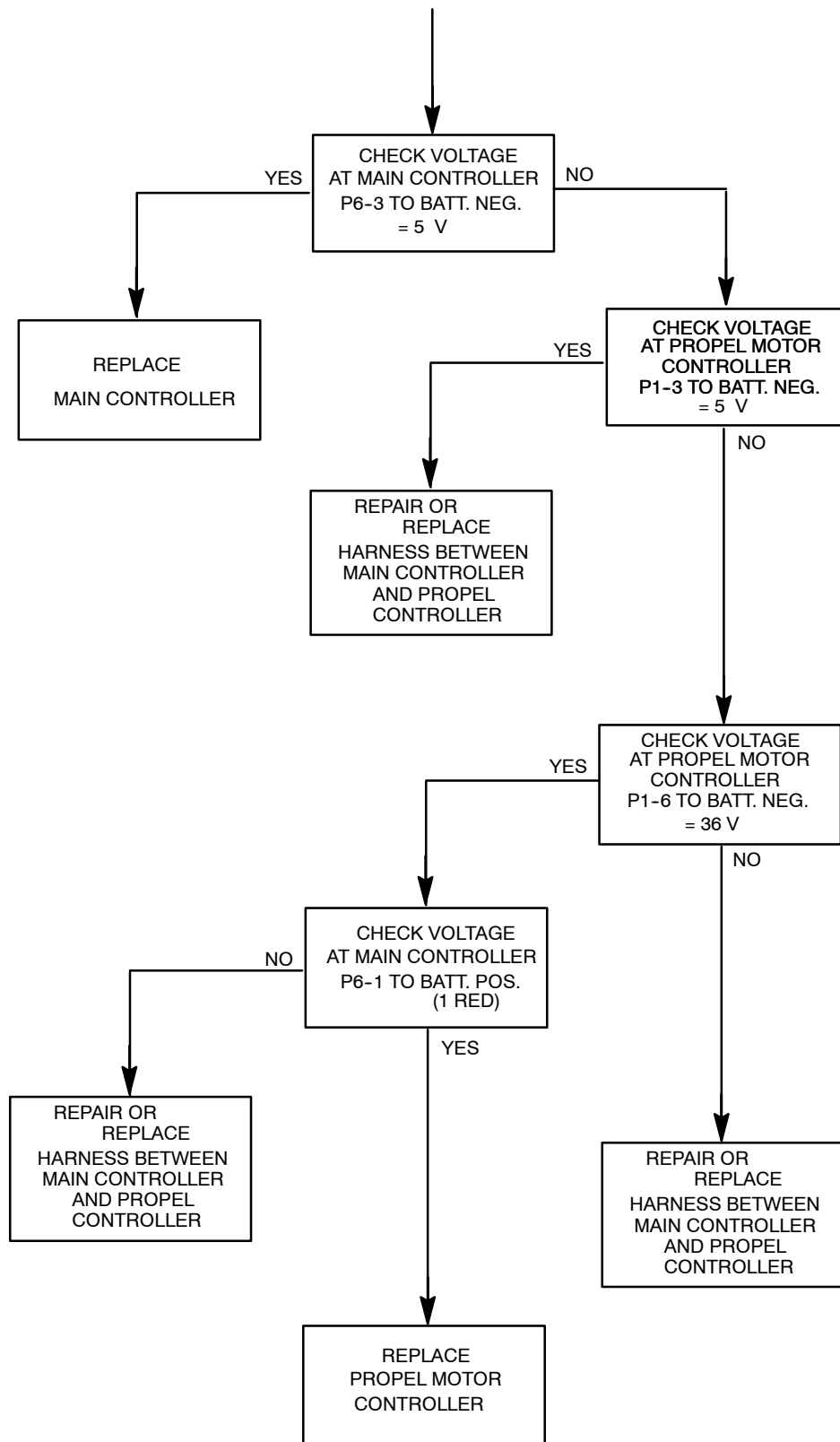


NO PROPEL

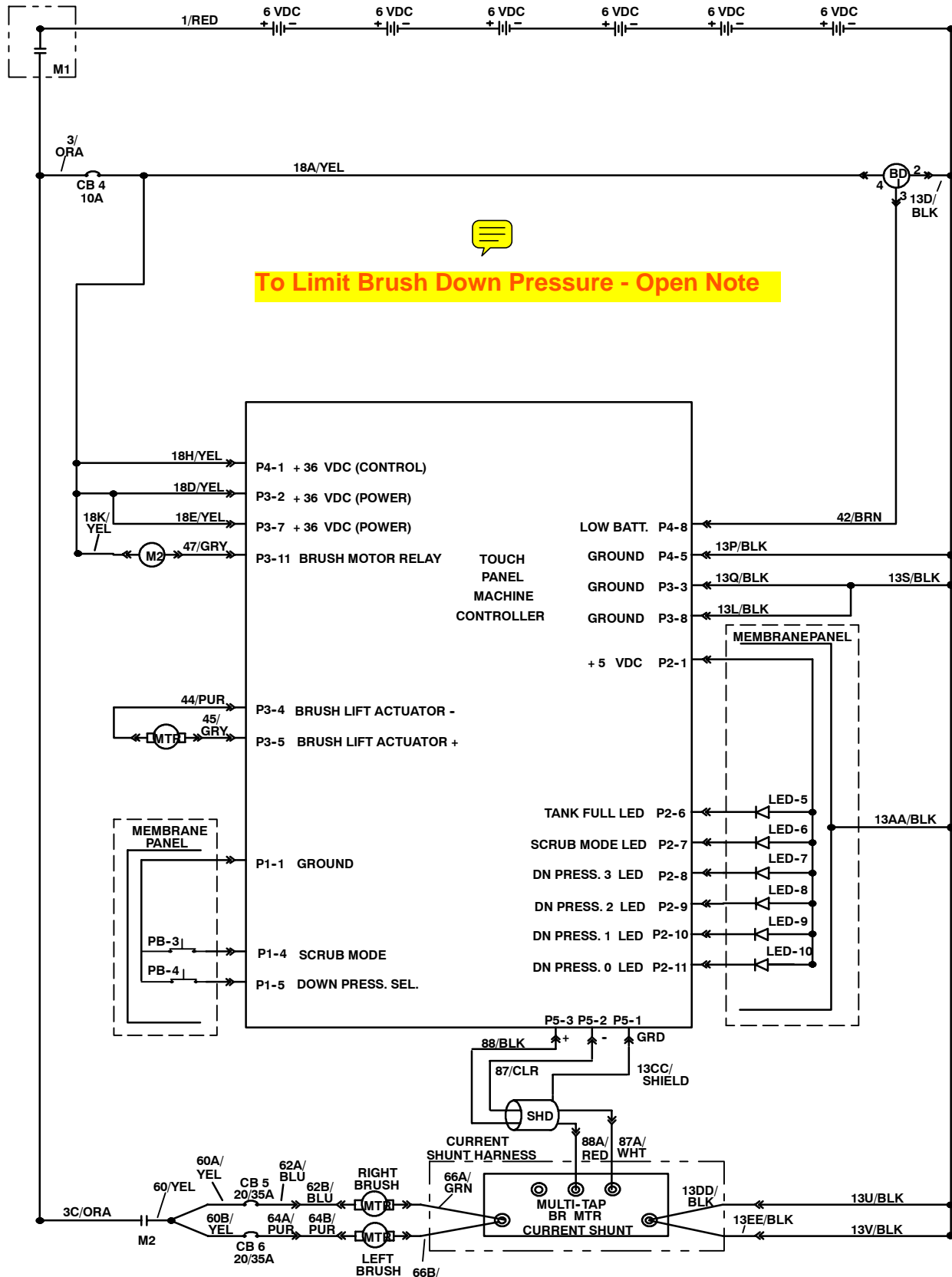
(POWER UP O.K.)
(LED'S ON TOUCH PANEL LIGHT)



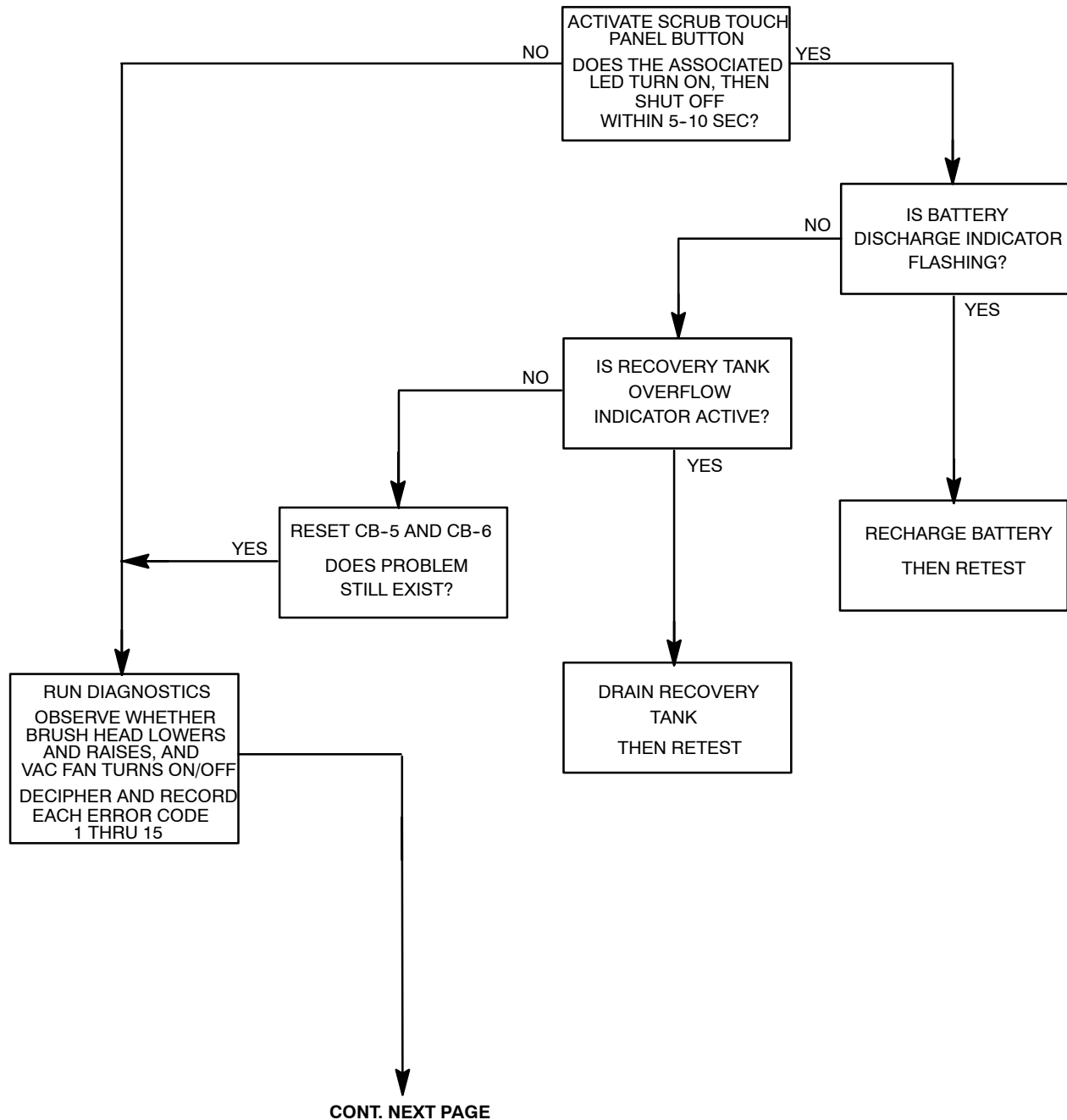


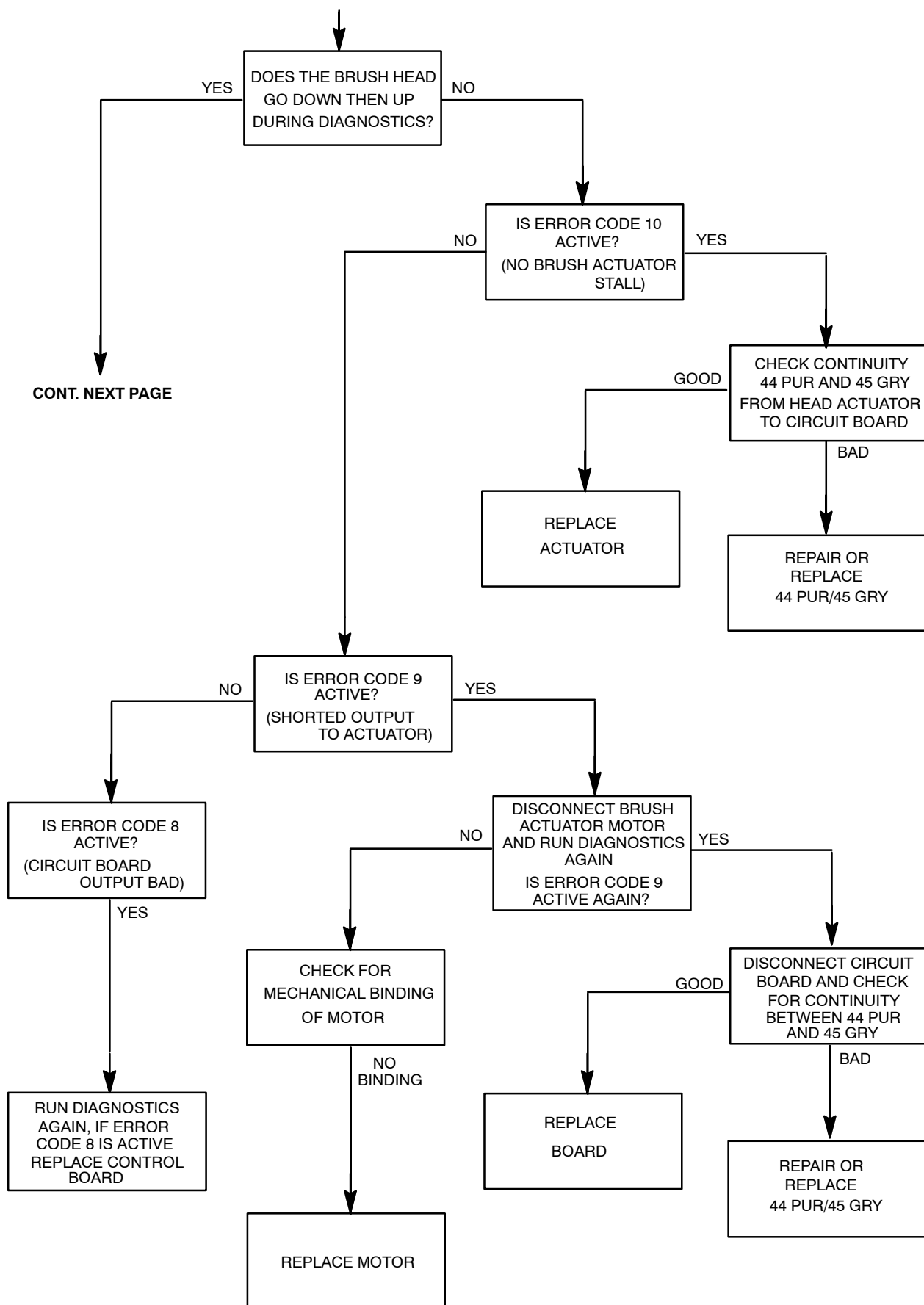


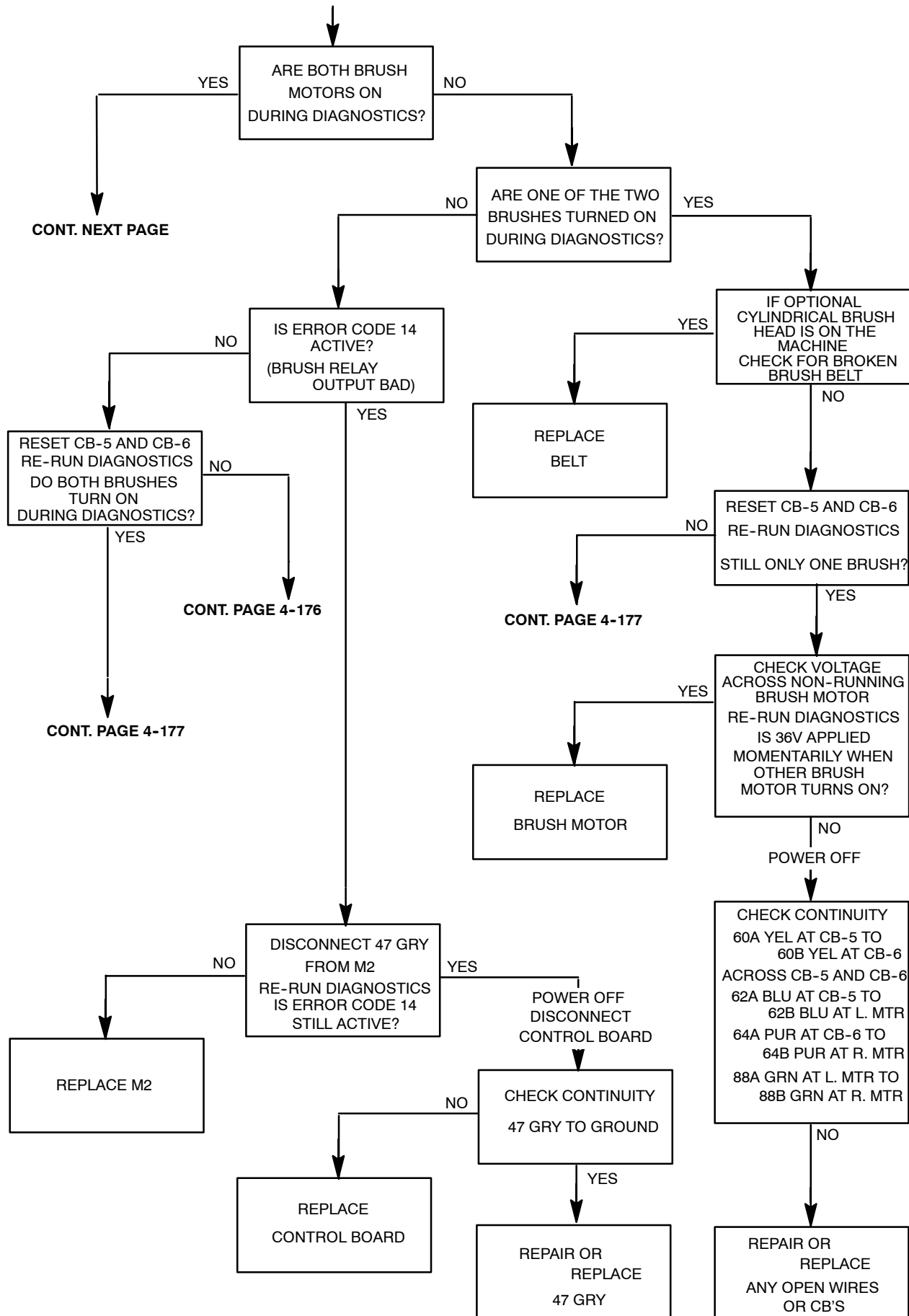
BRUSH/HEAD LIFT CIRCUIT

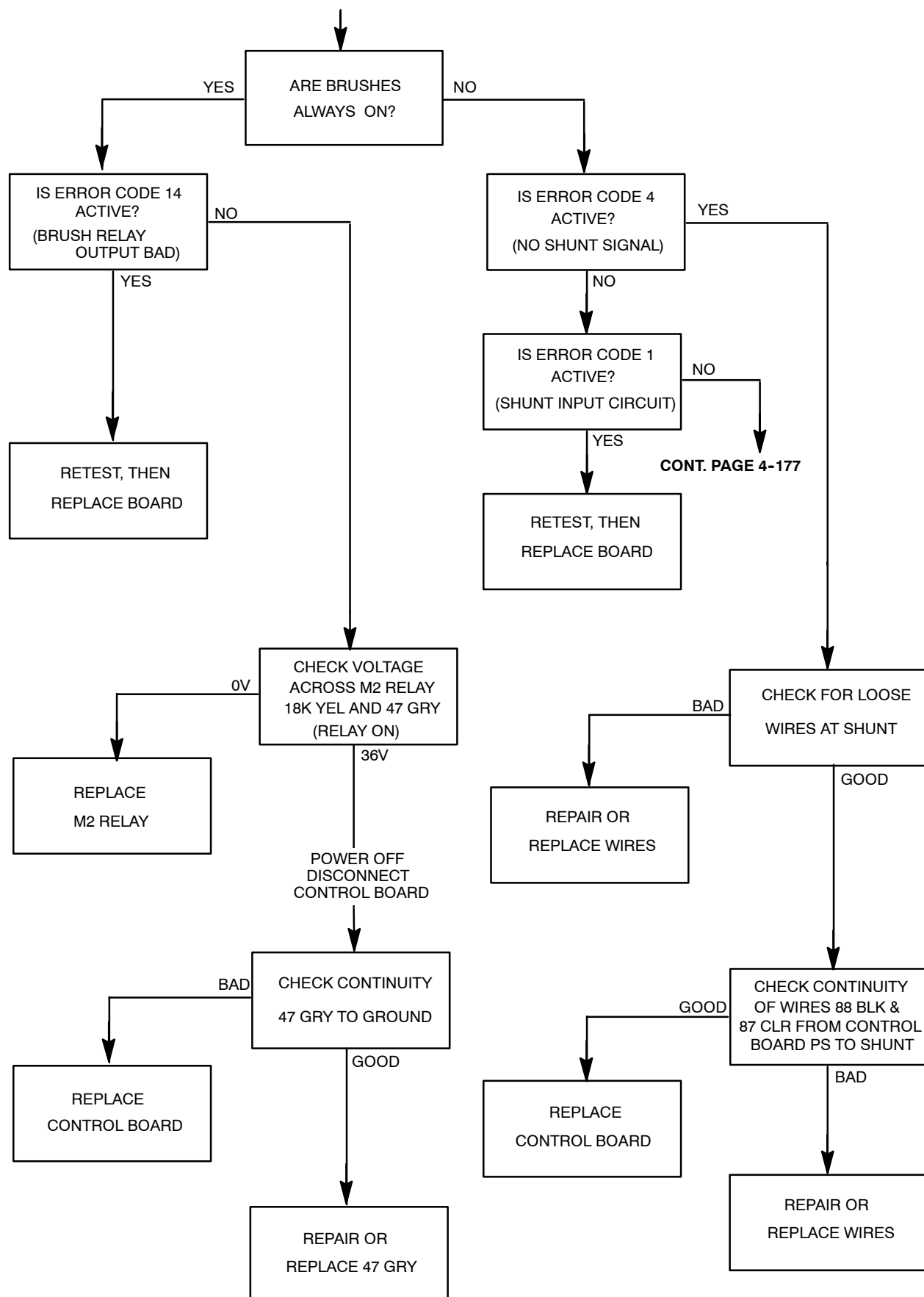


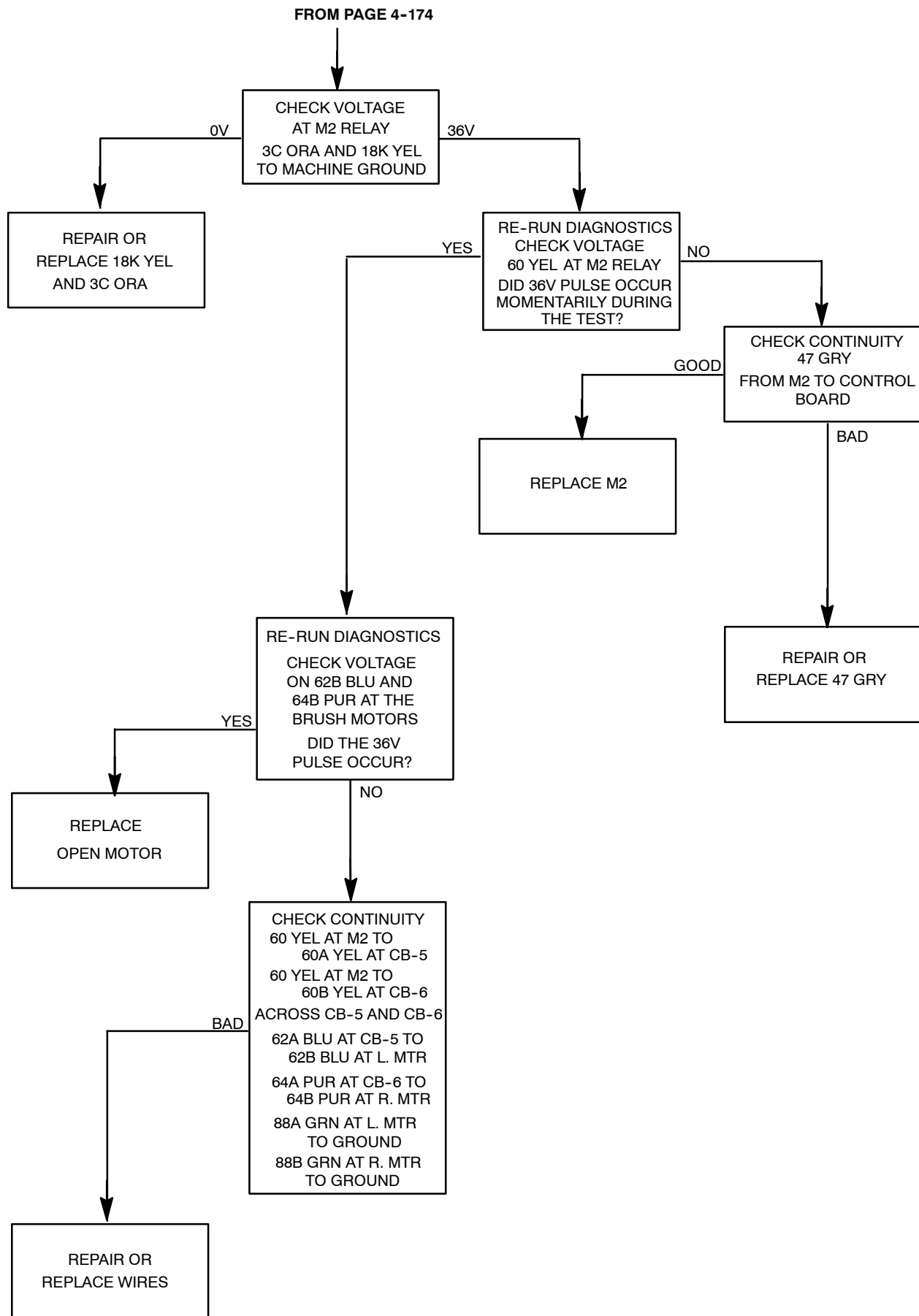
NO BRUSH OR HEAD LIFT

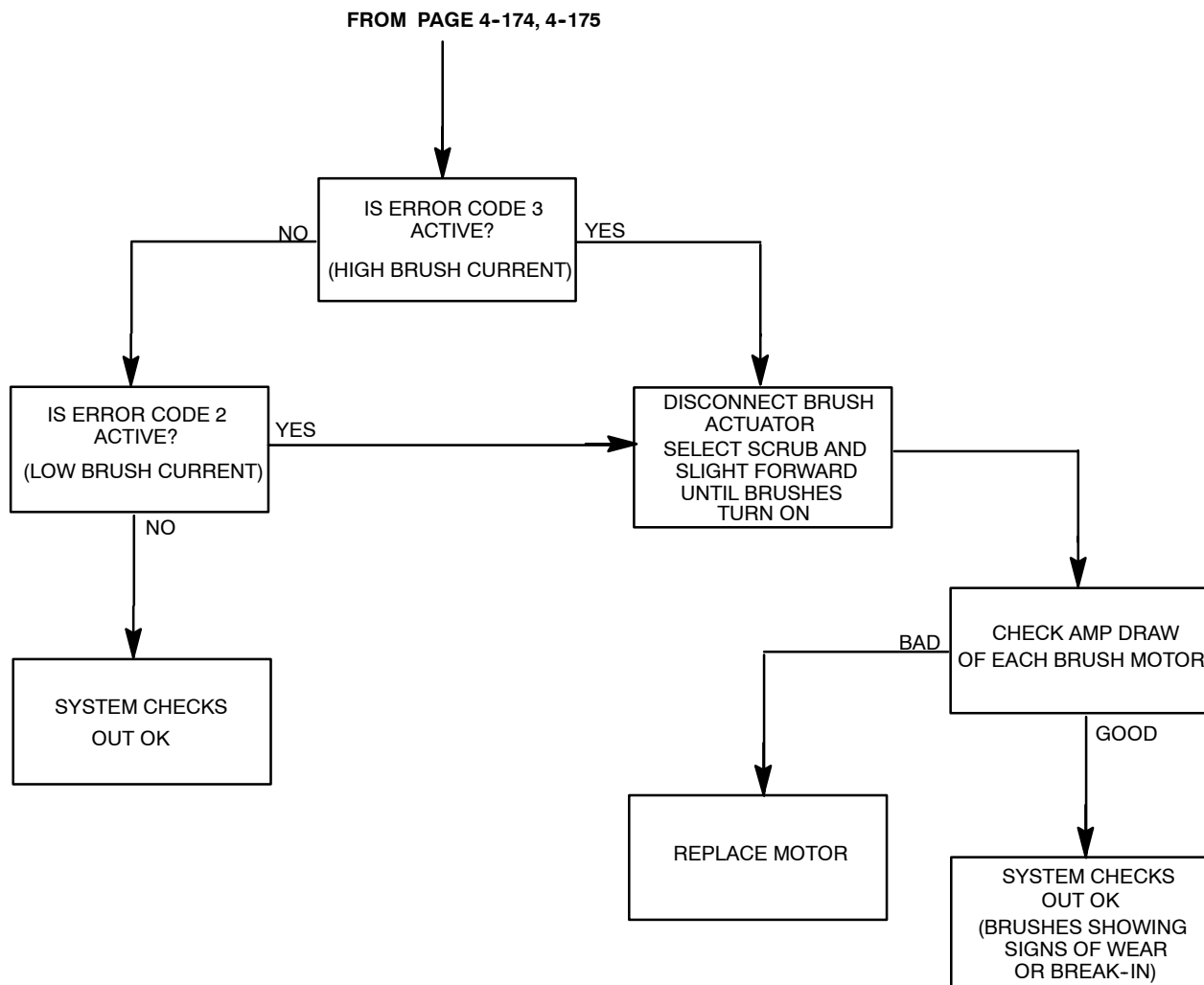




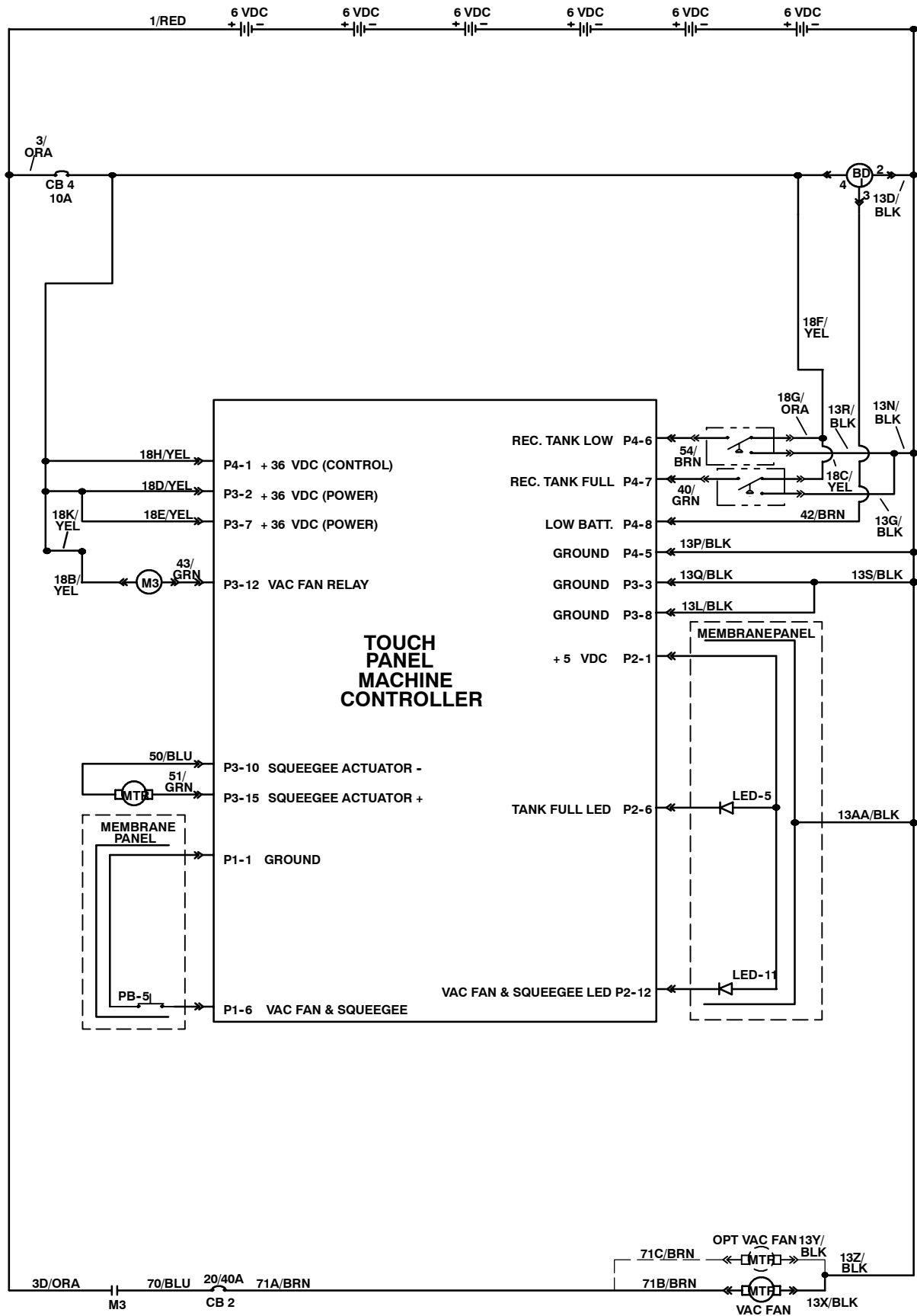






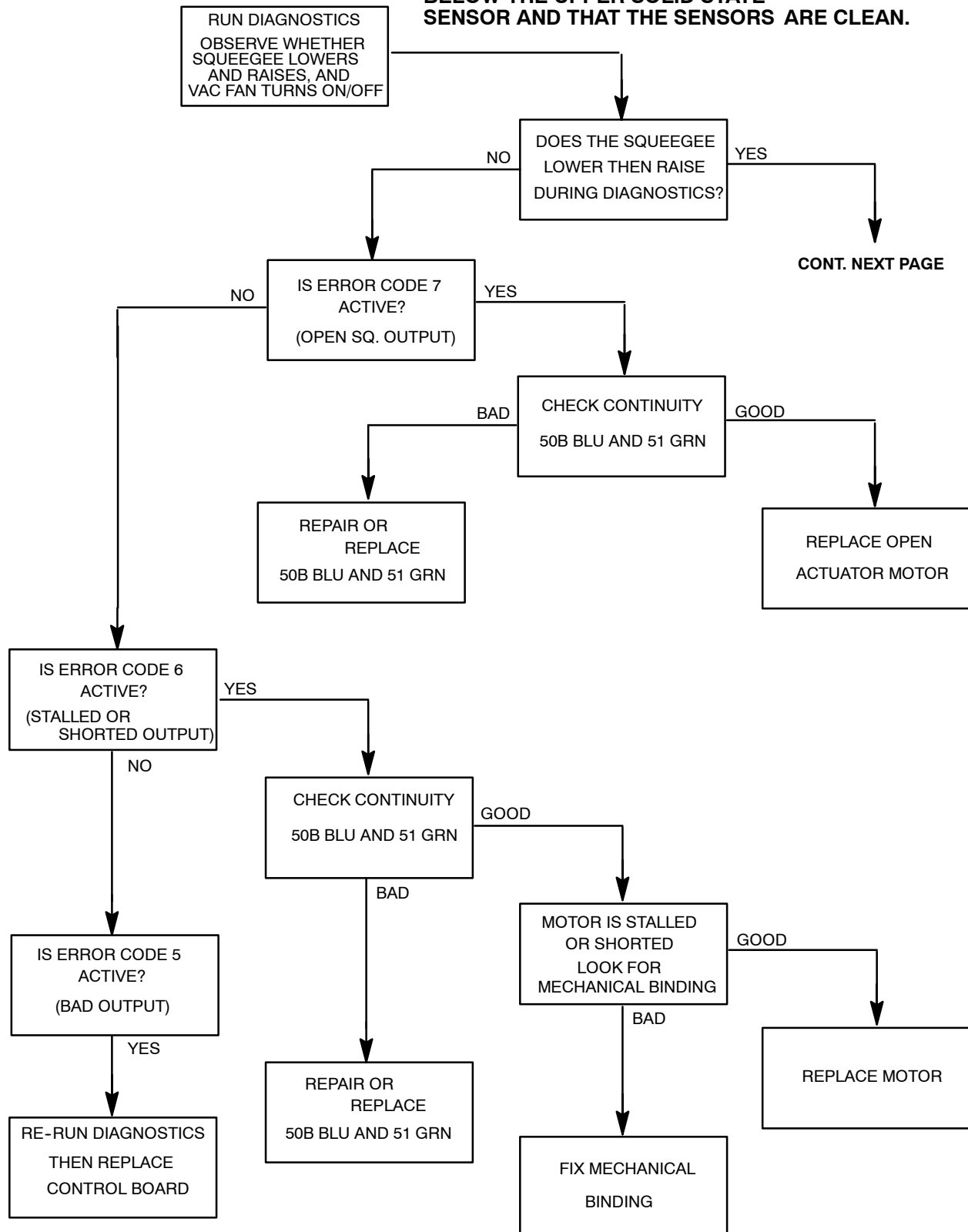


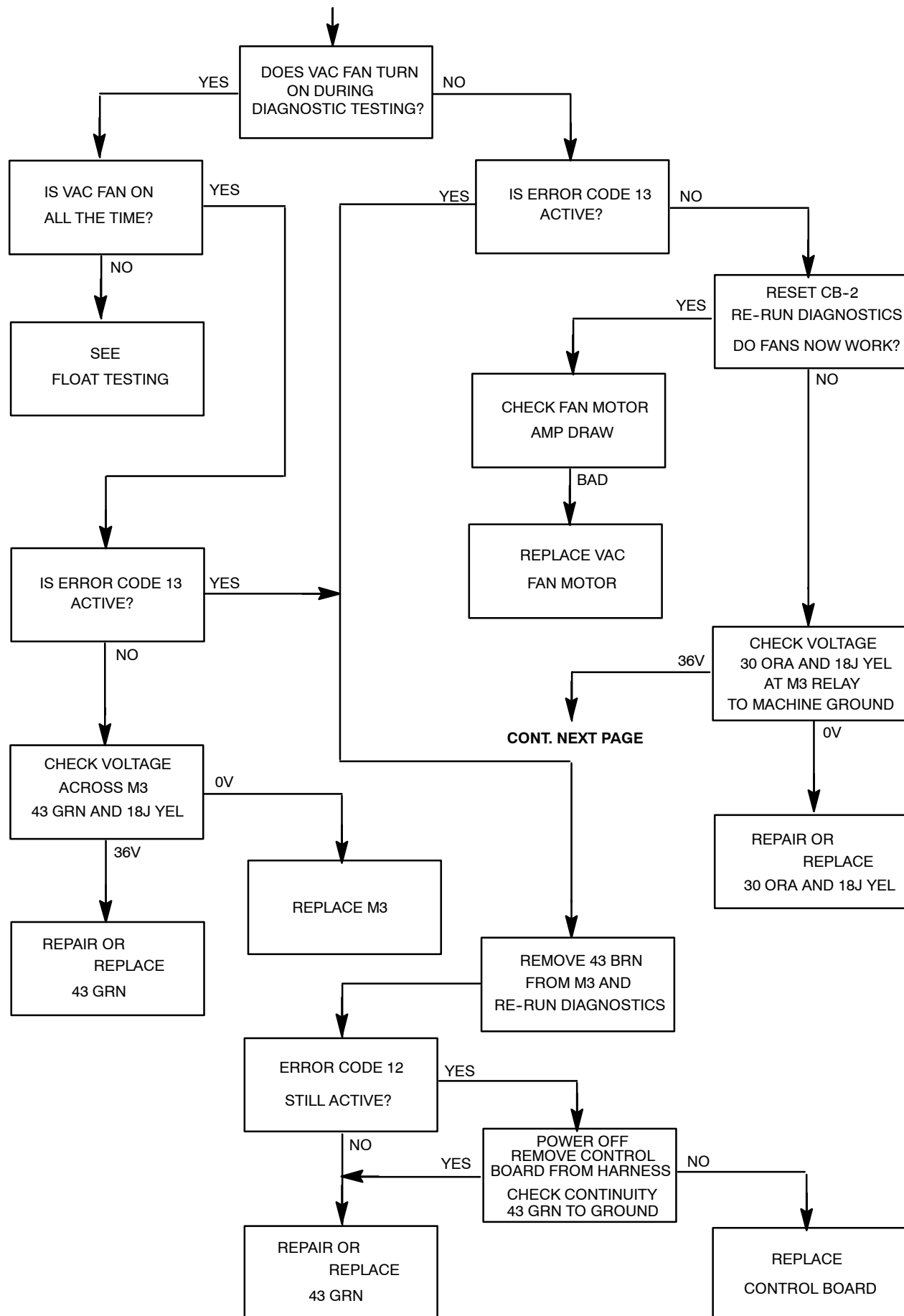
SQUEEGEE/VAC FAN CIRCUIT

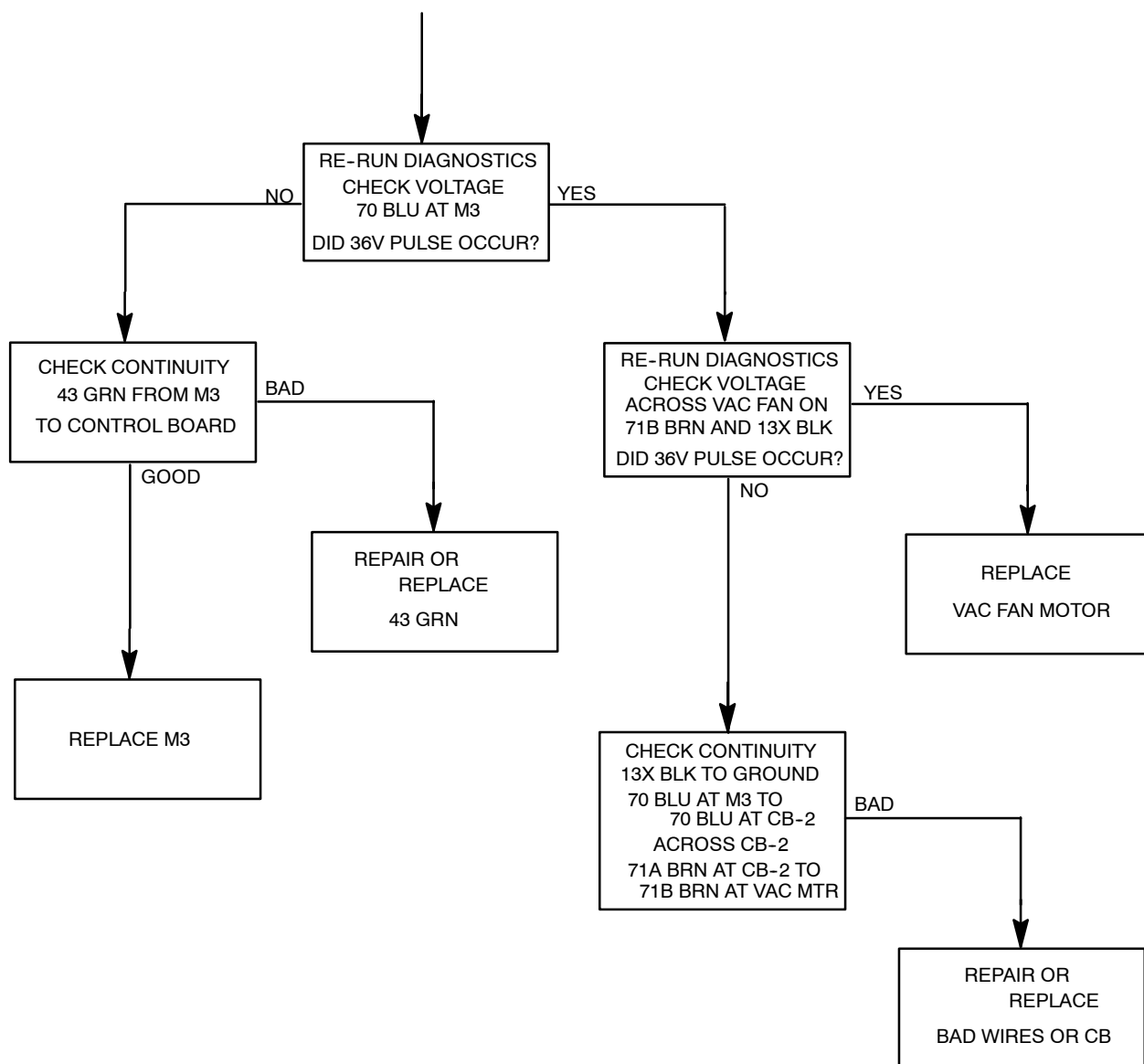


NO SQUEEGEE OR VAC FAN

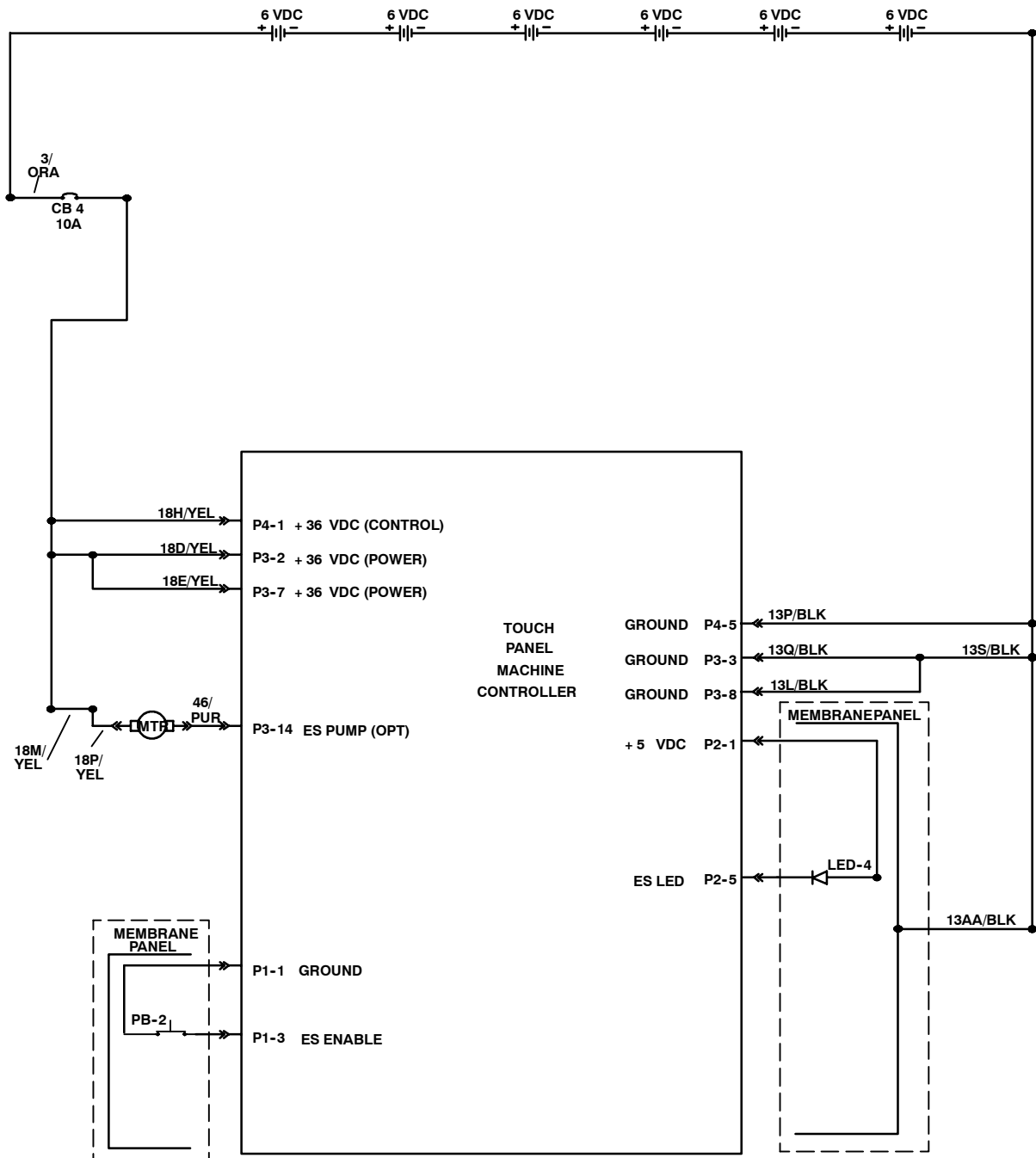
NOTE: THIS TEST ASSUMES THAT THE LIQUID LEVEL IN THE RECOVERY TANK IS BELOW THE UPPER SOLID STATE SENSOR AND THAT THE SENSORS ARE CLEAN.



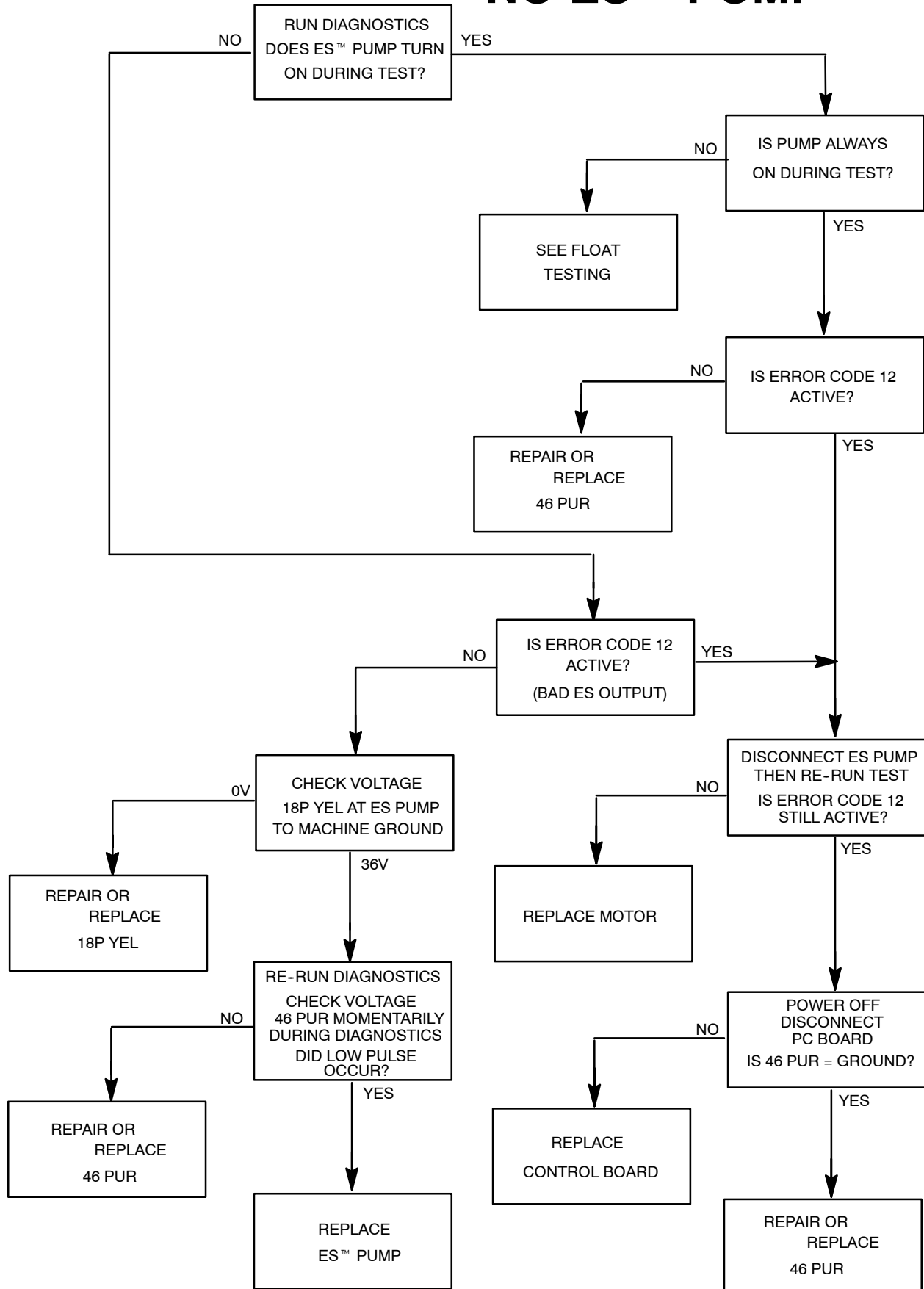




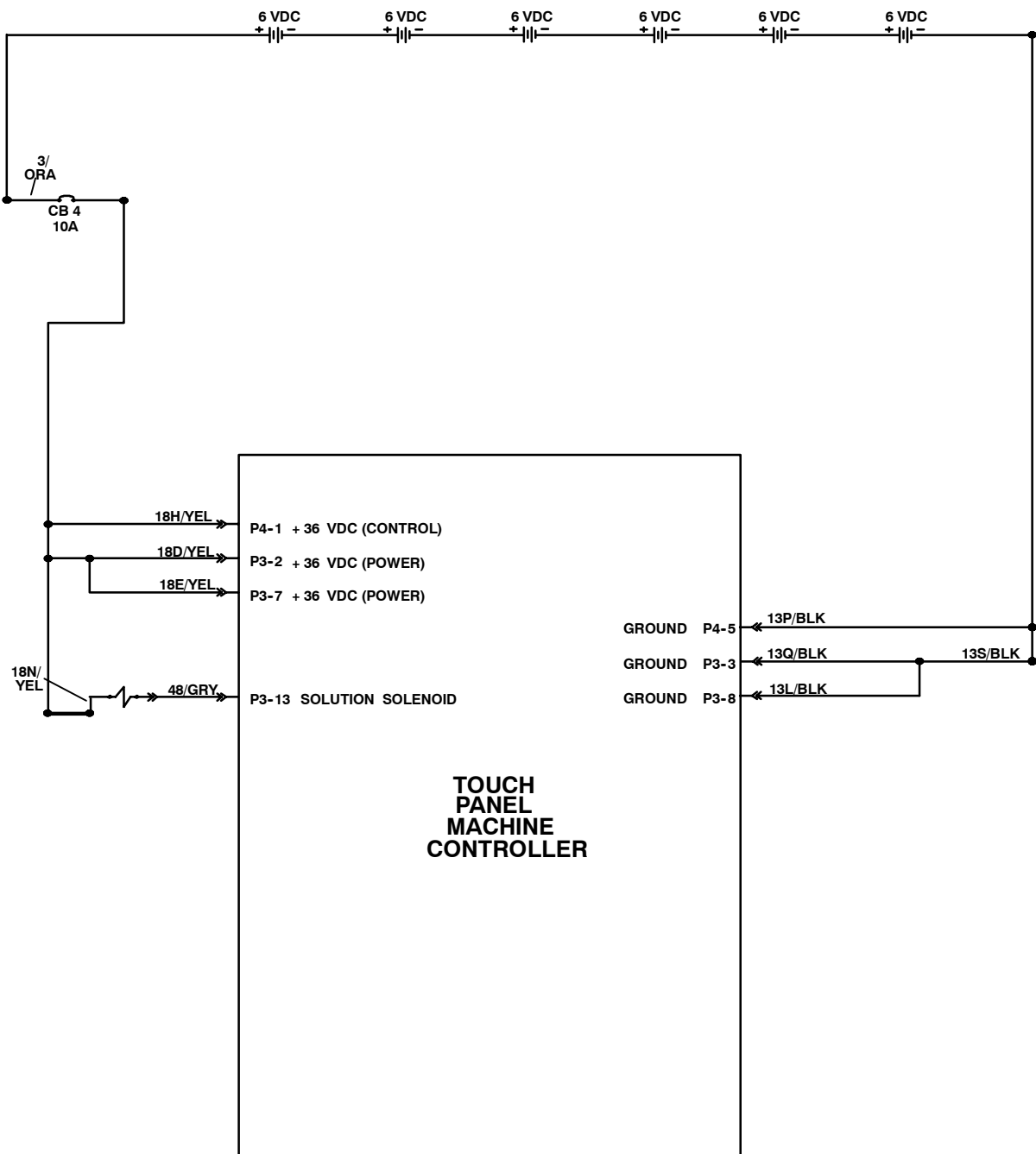
ESTM PUMP CIRCUIT



NO ES™ PUMP

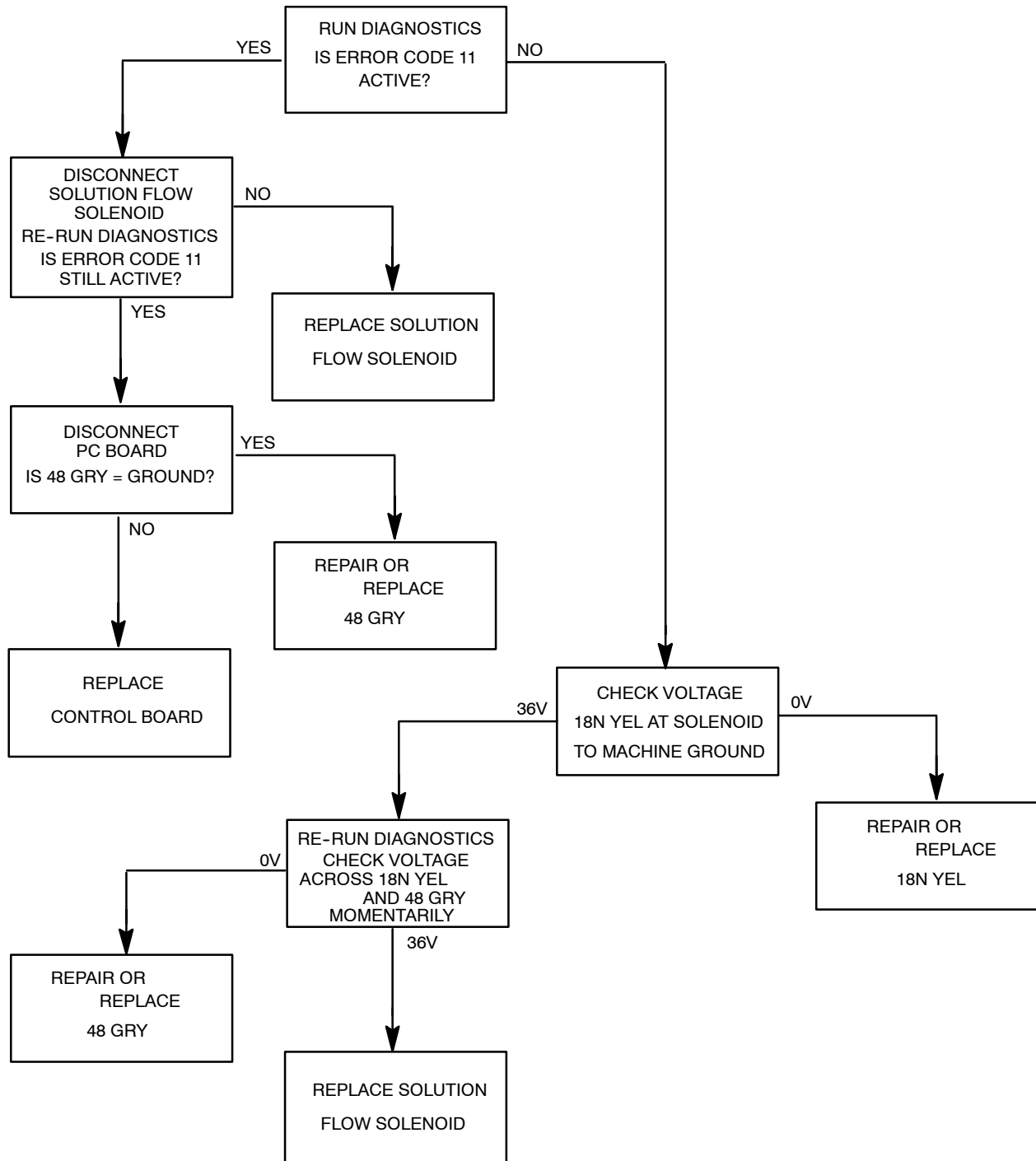


SOLUTION SOLENOID CIRCUIT

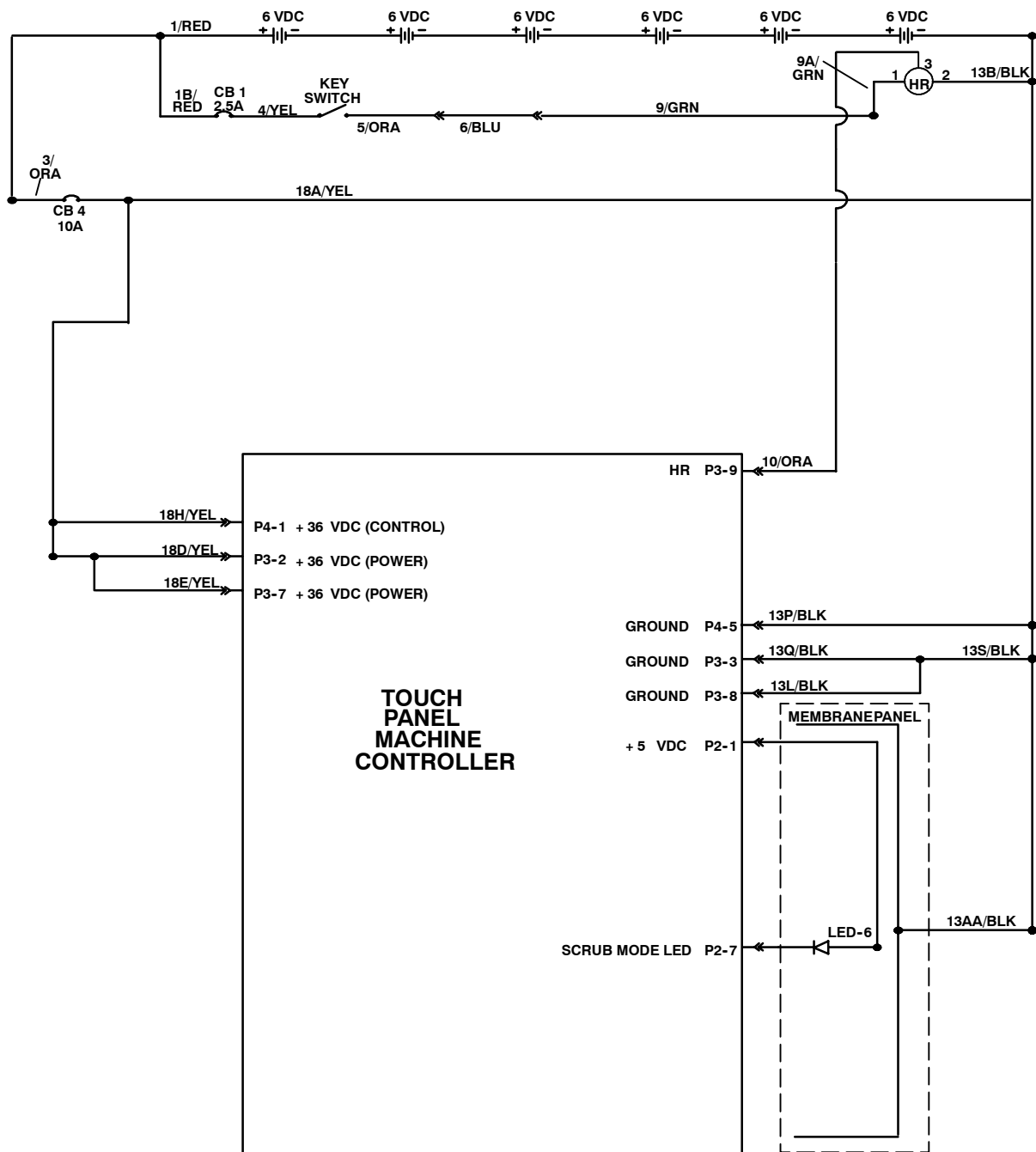


NO SOLUTION FLOW

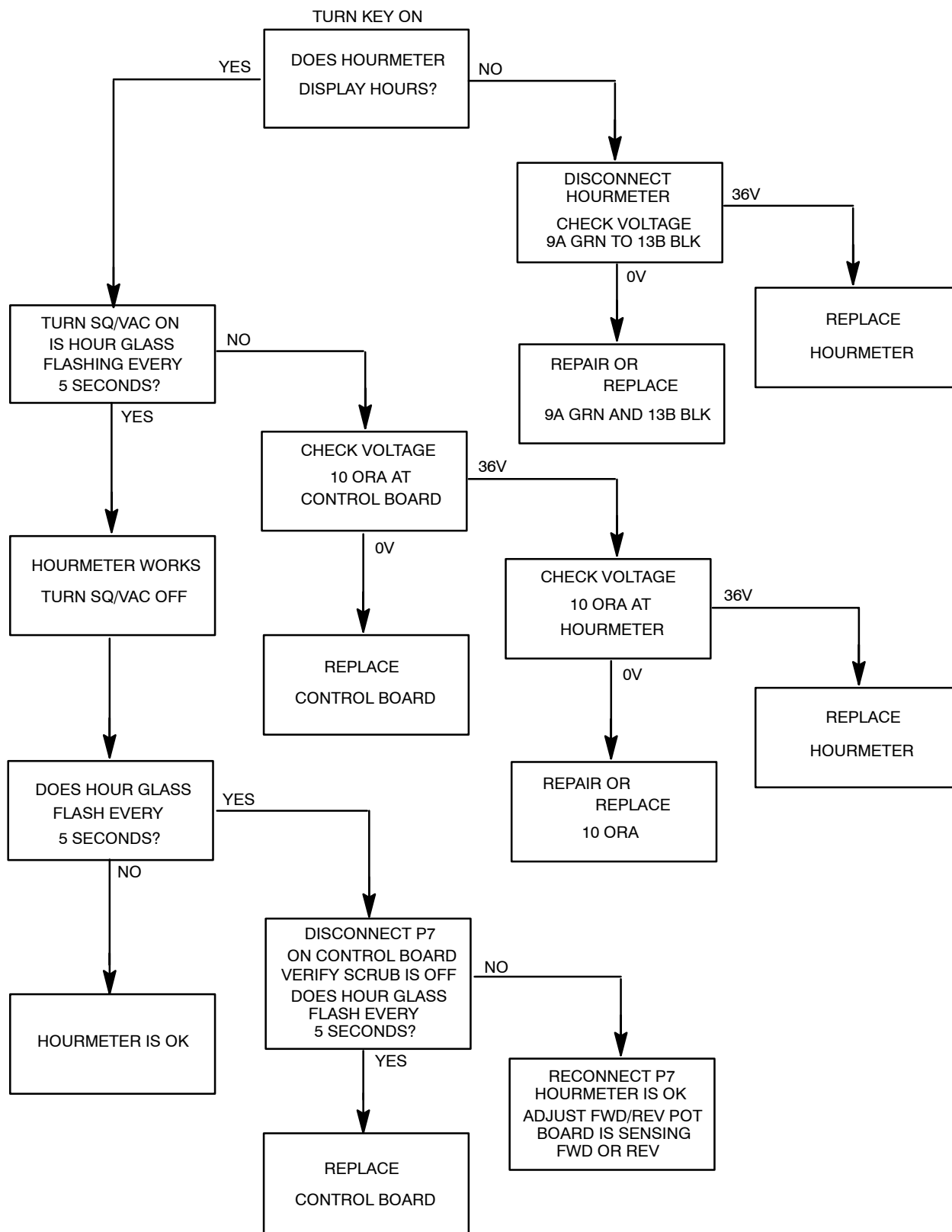
**NOTE: VALVE HANDLE MUST BE MECHANICAL FORWARD
AND MACHINE MUST BE PROPELLING FOR SOLUTION TO FLOW.**



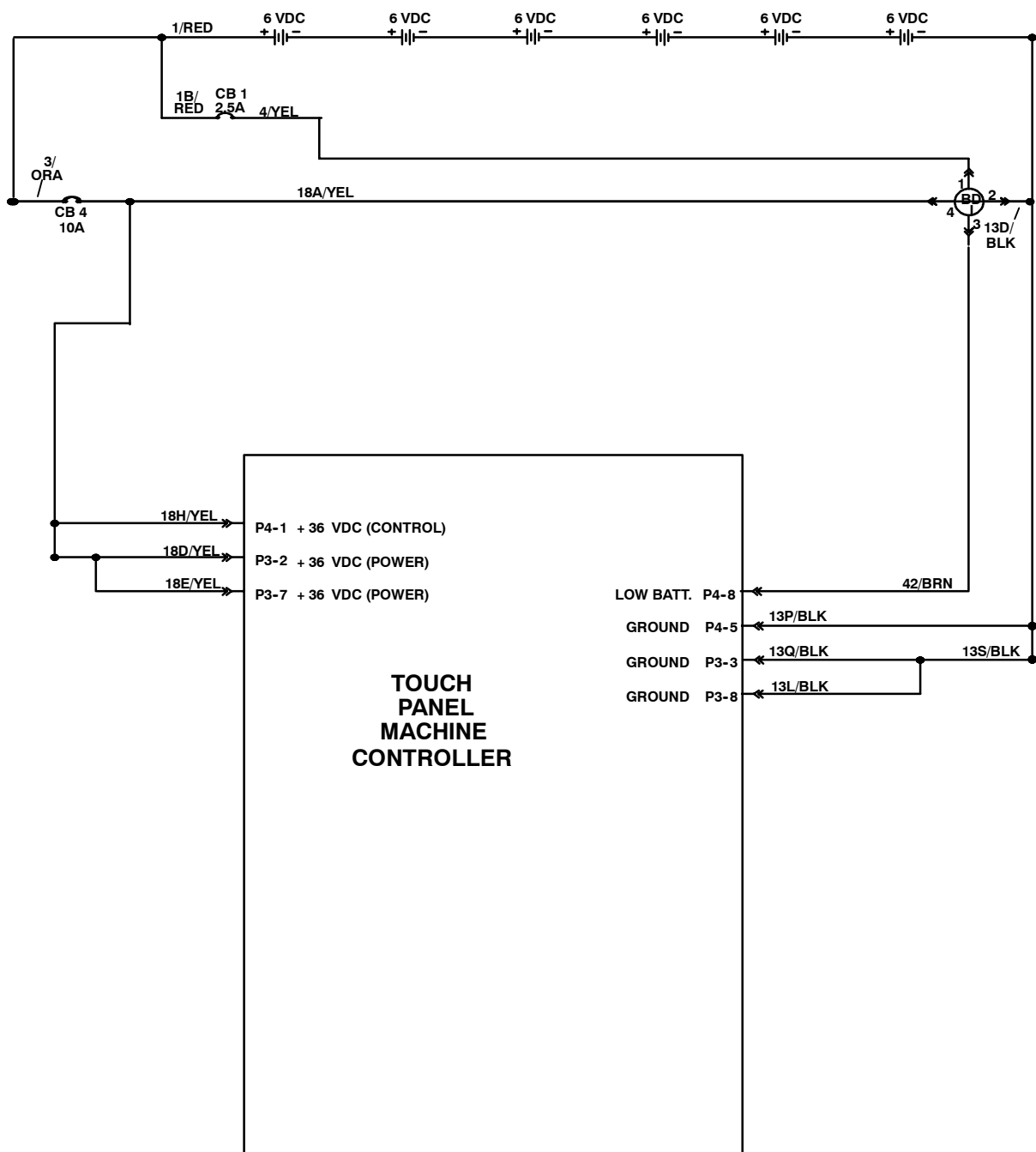
HOURLY METER CIRCUIT



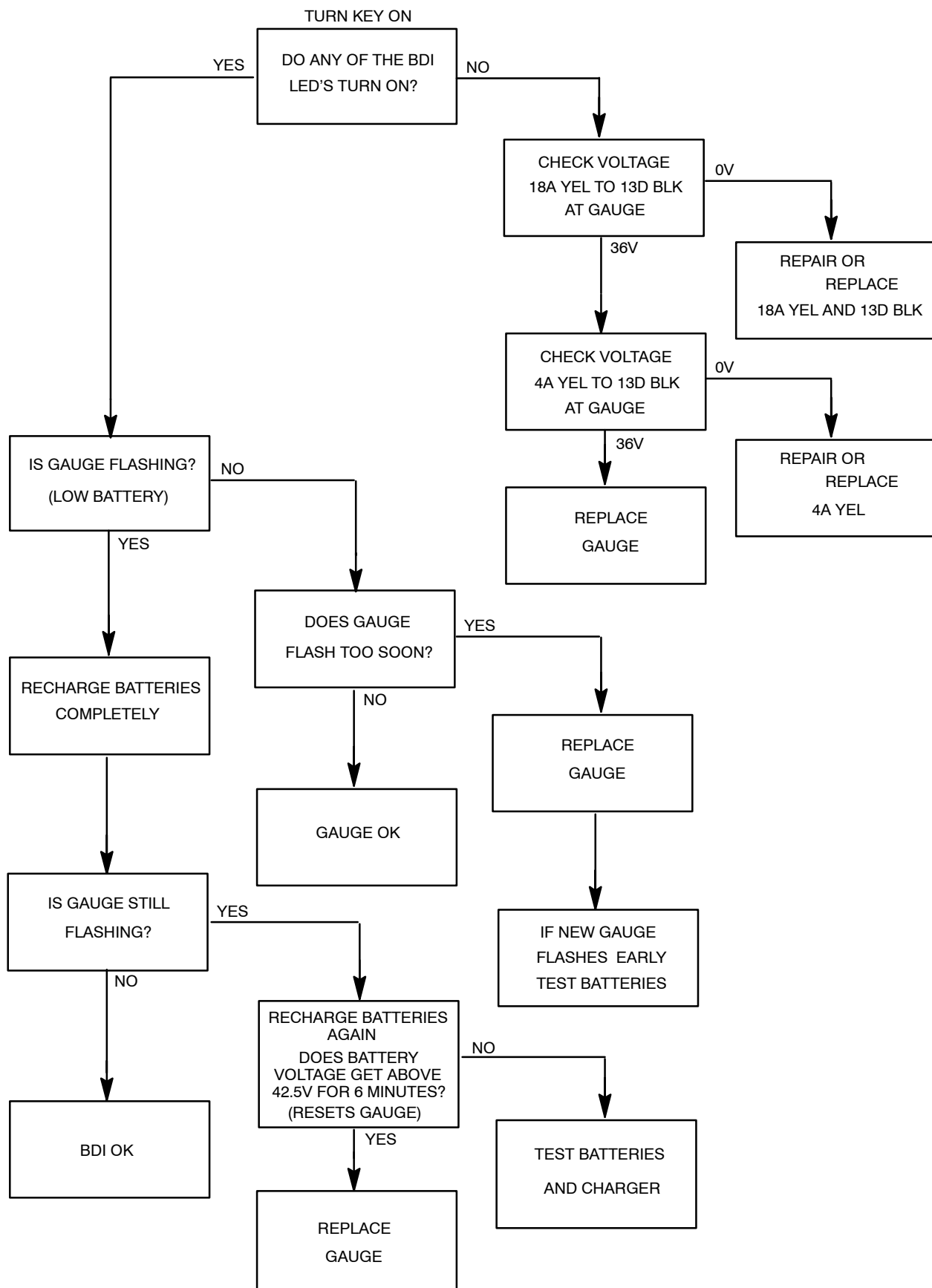
NO HOURMETER



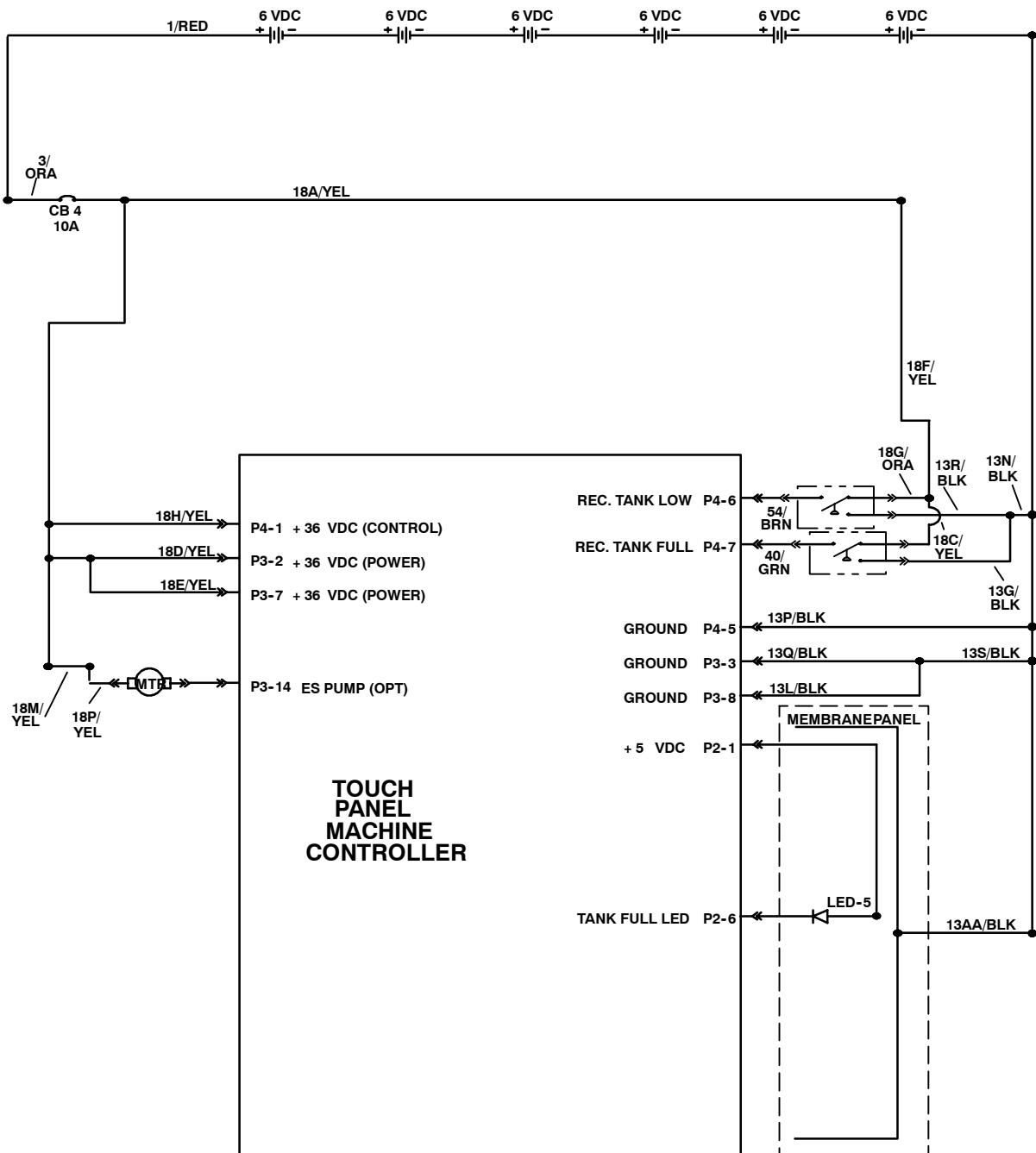
BDI CIRCUIT



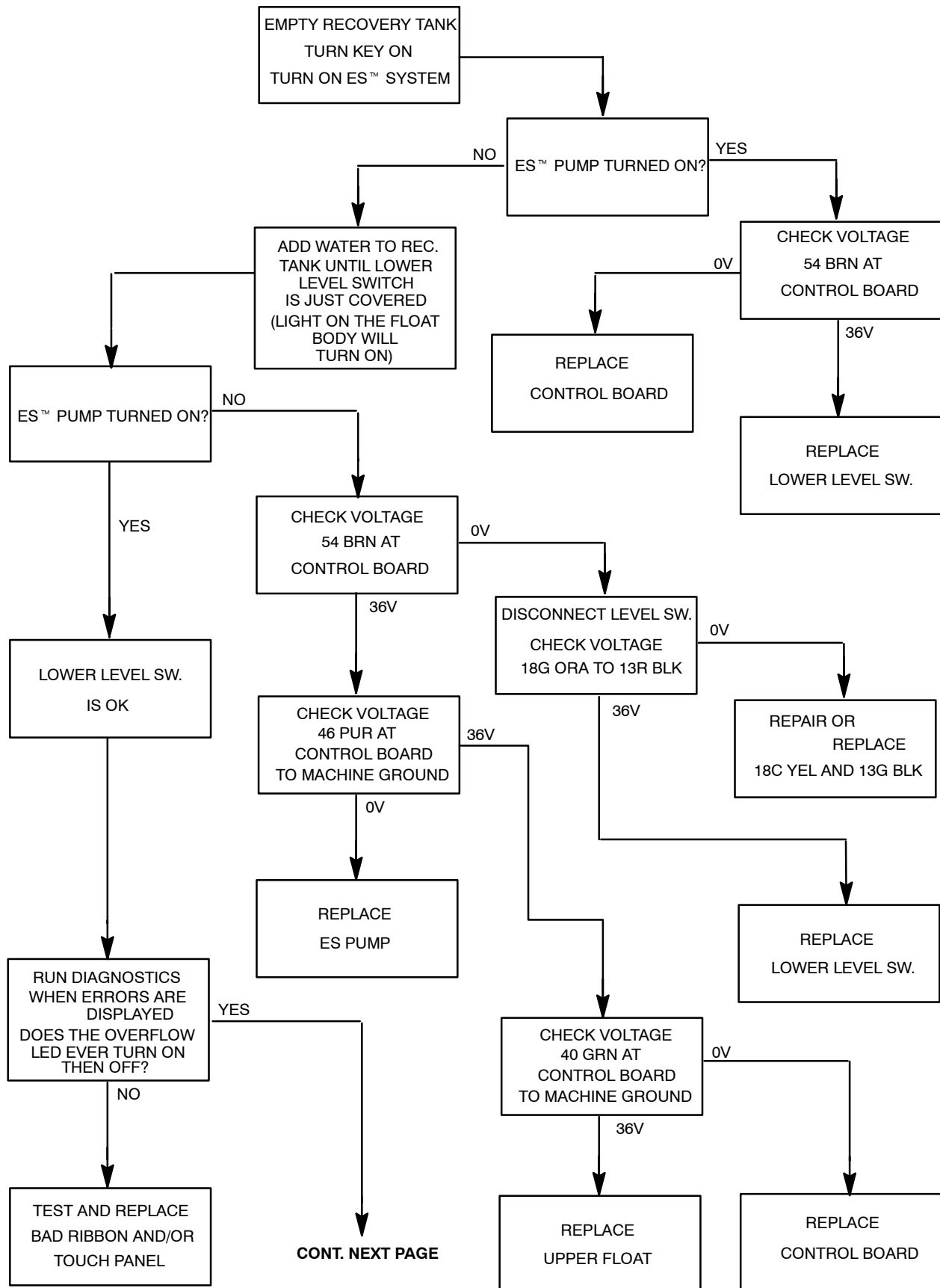
BDI MALFUNCTION

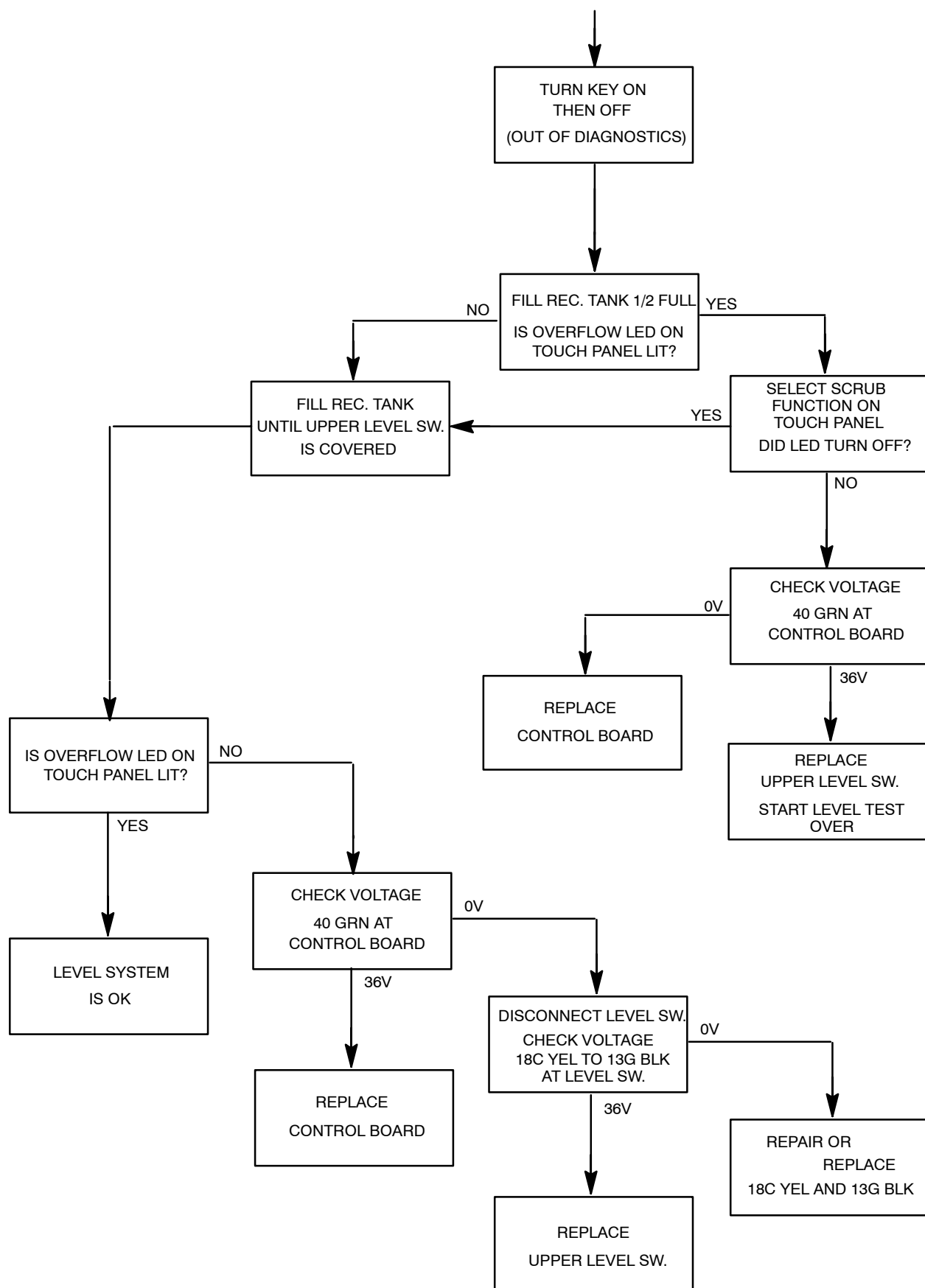


SOLID STATE LEVEL CIRCUIT

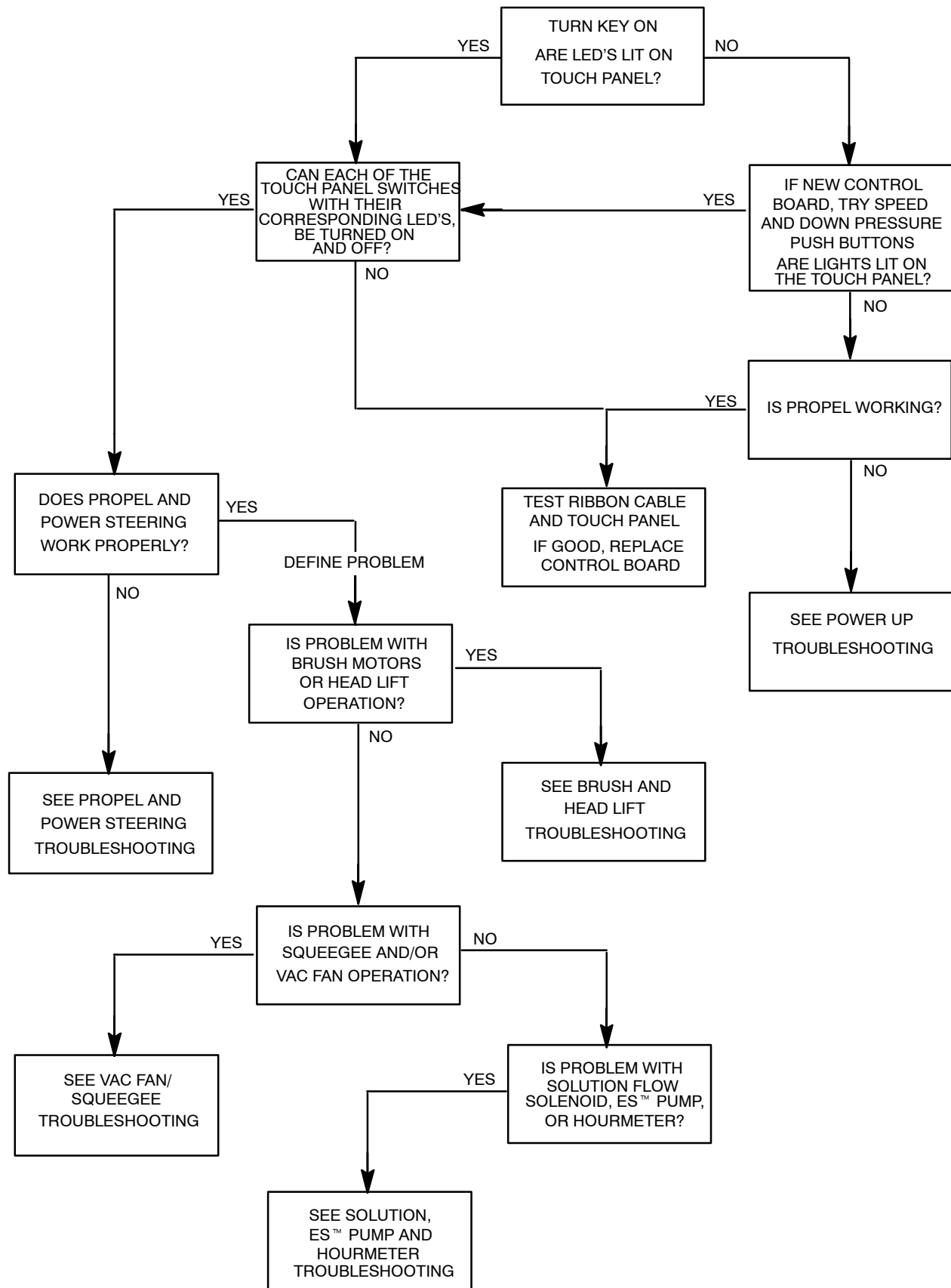


LEVEL TESTING

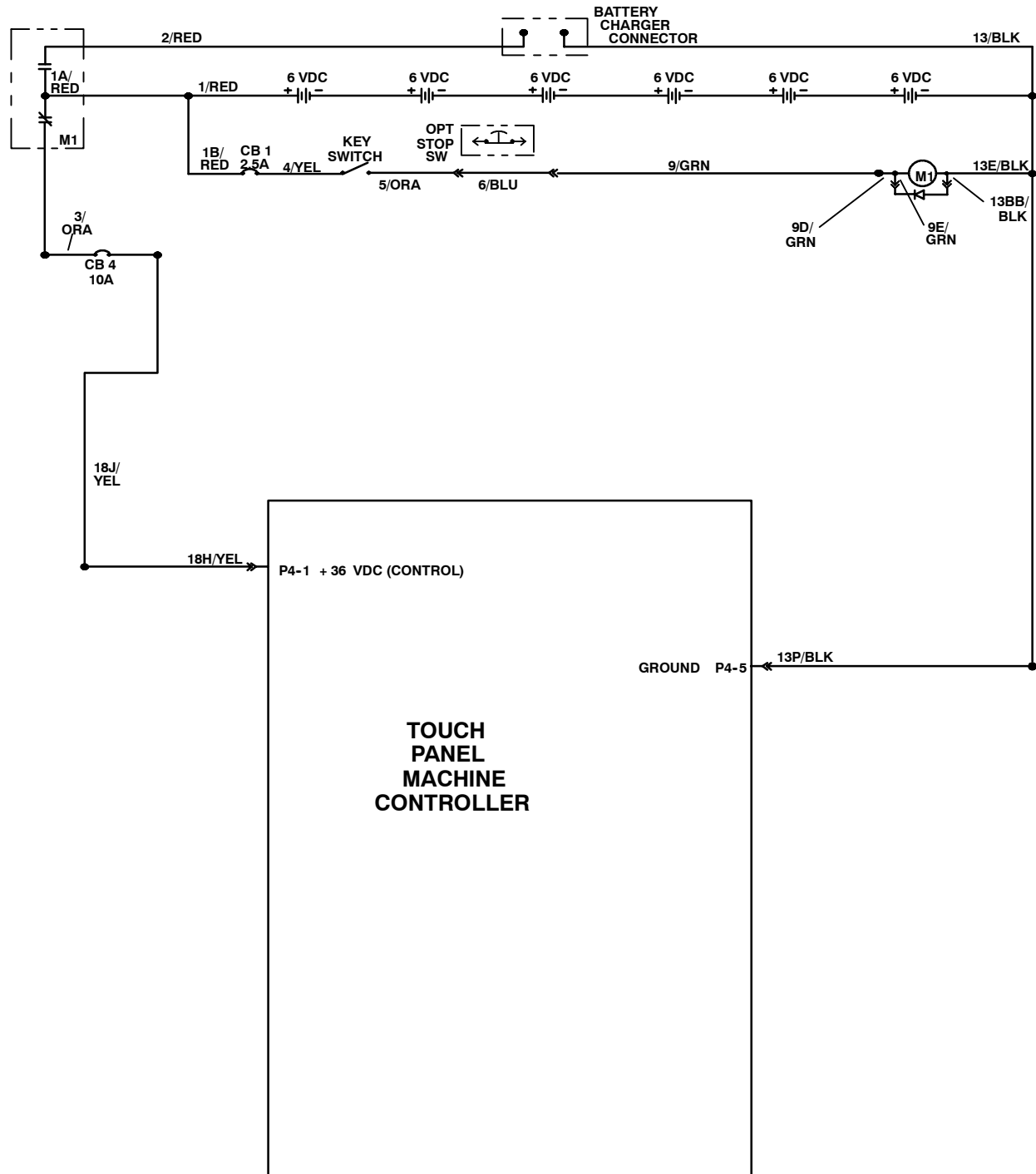




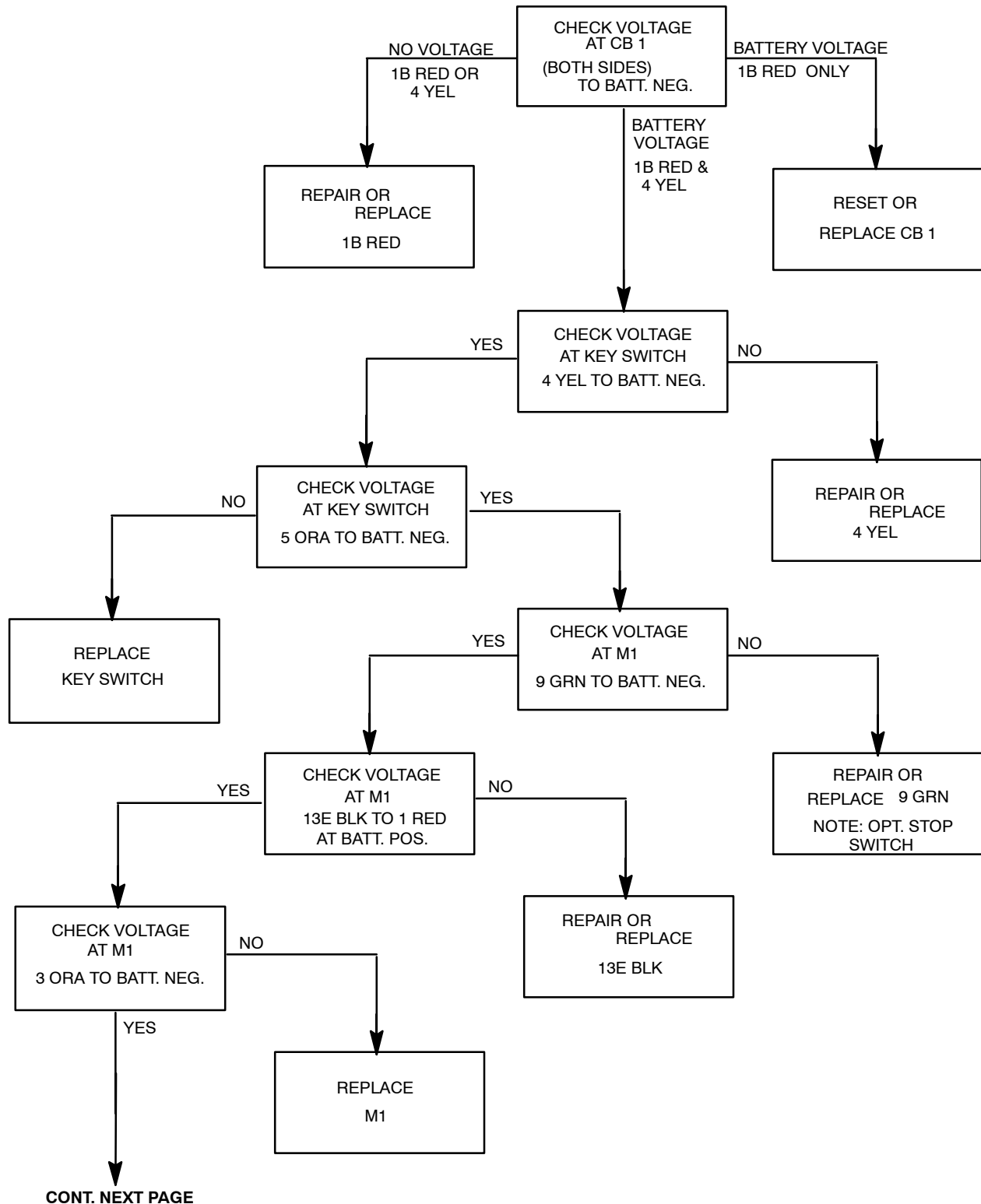
INITIAL TESTING

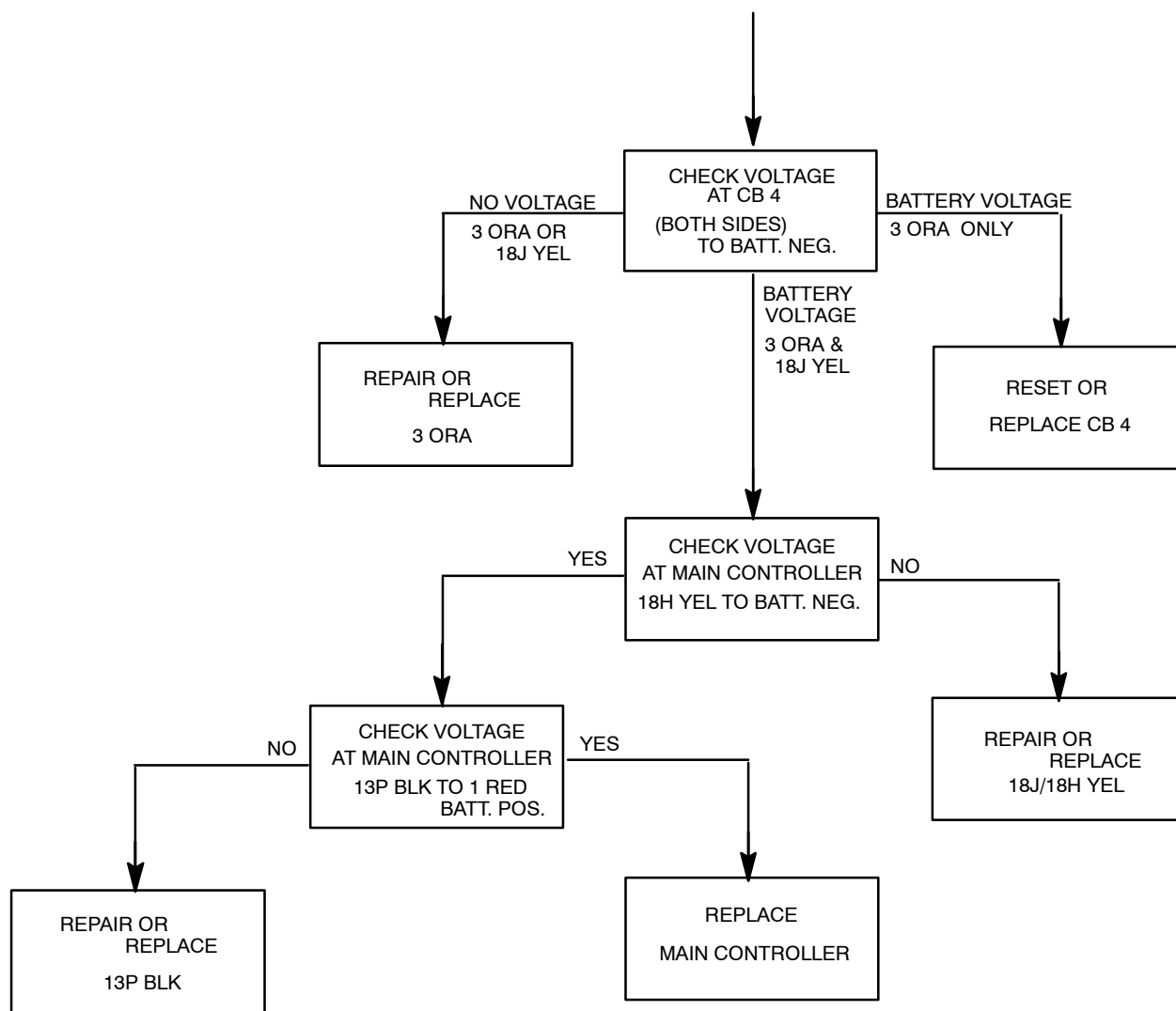


POWER UP CIRCUIT

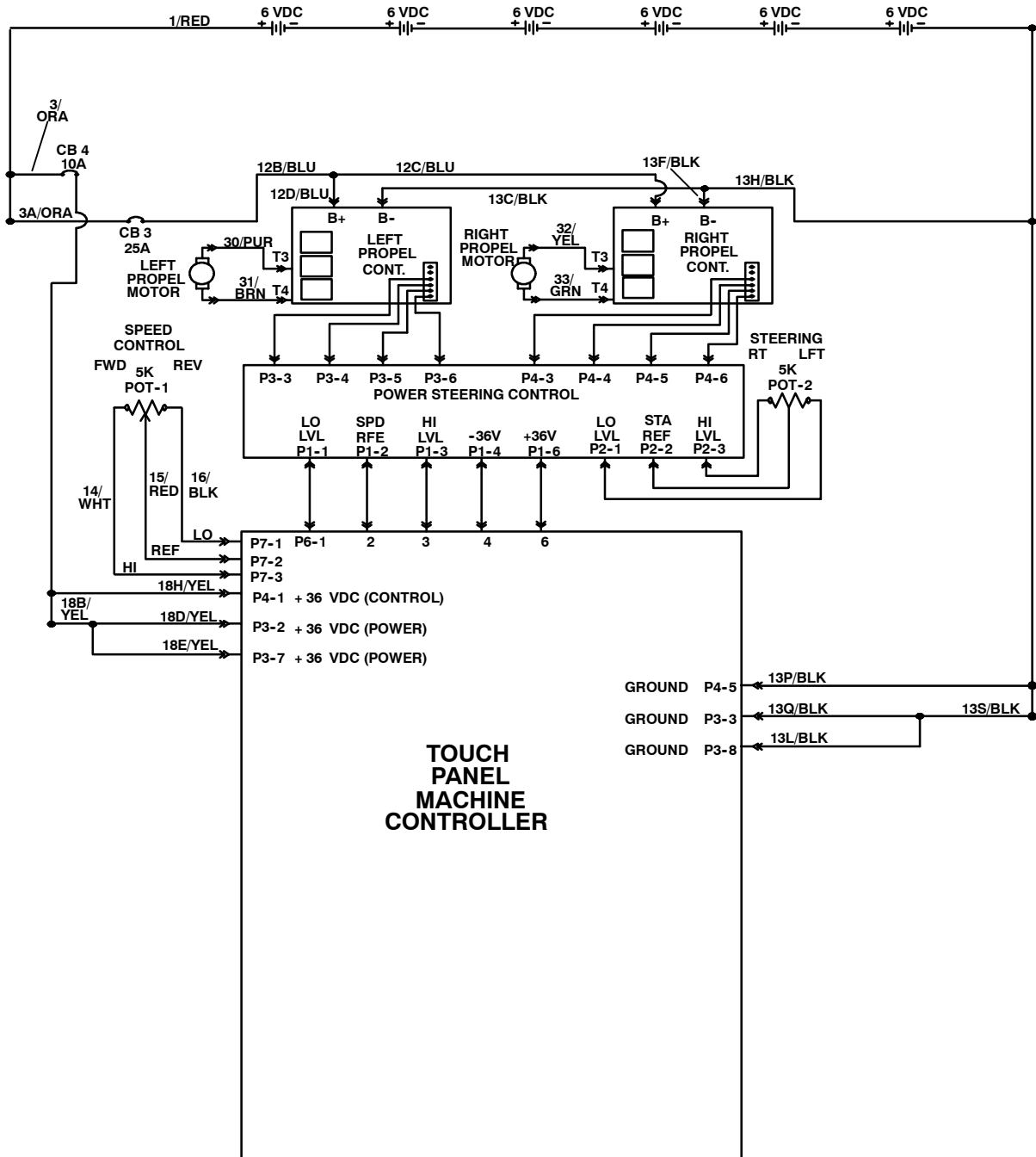


NO POWER (KEY ON)

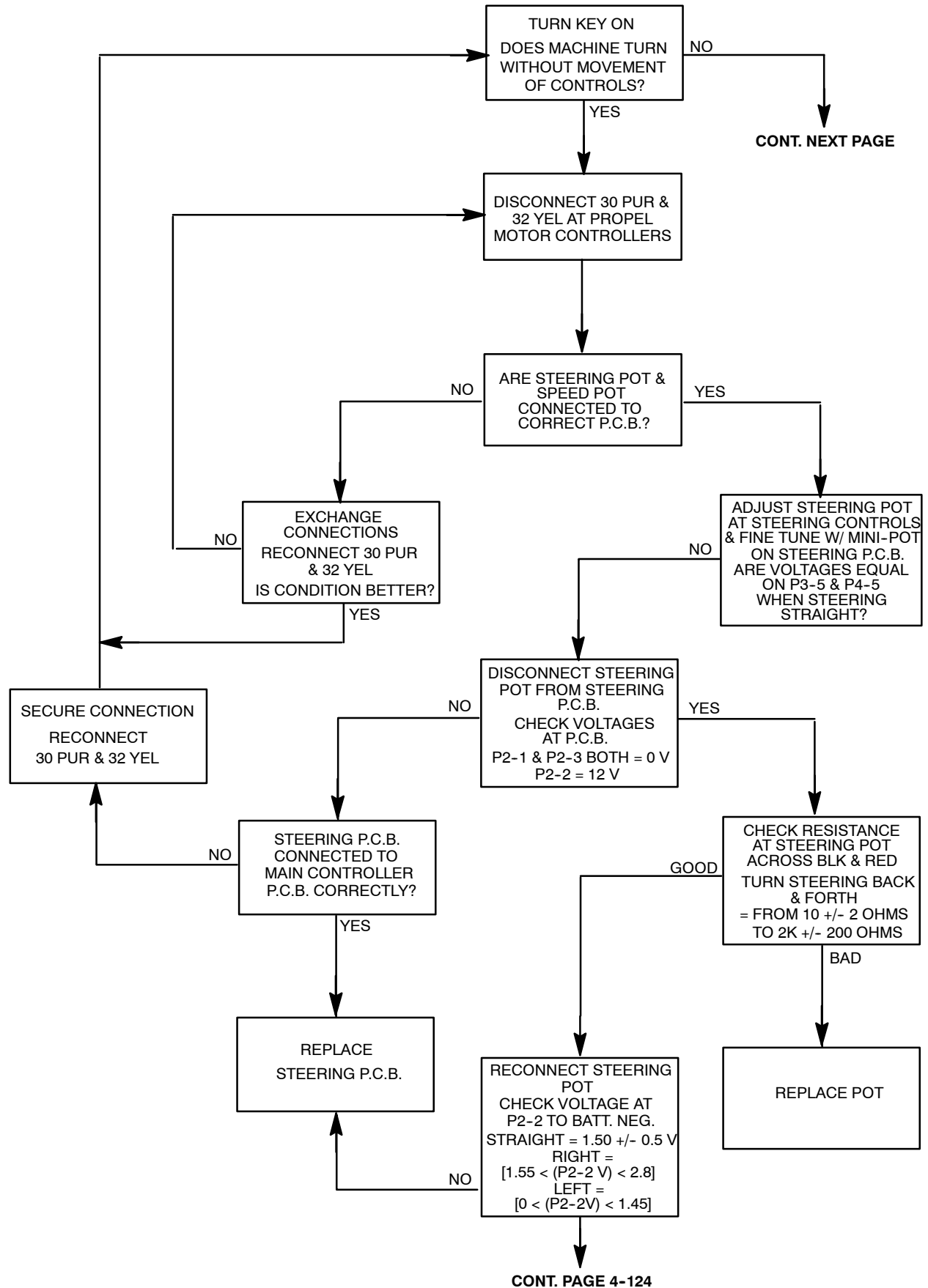


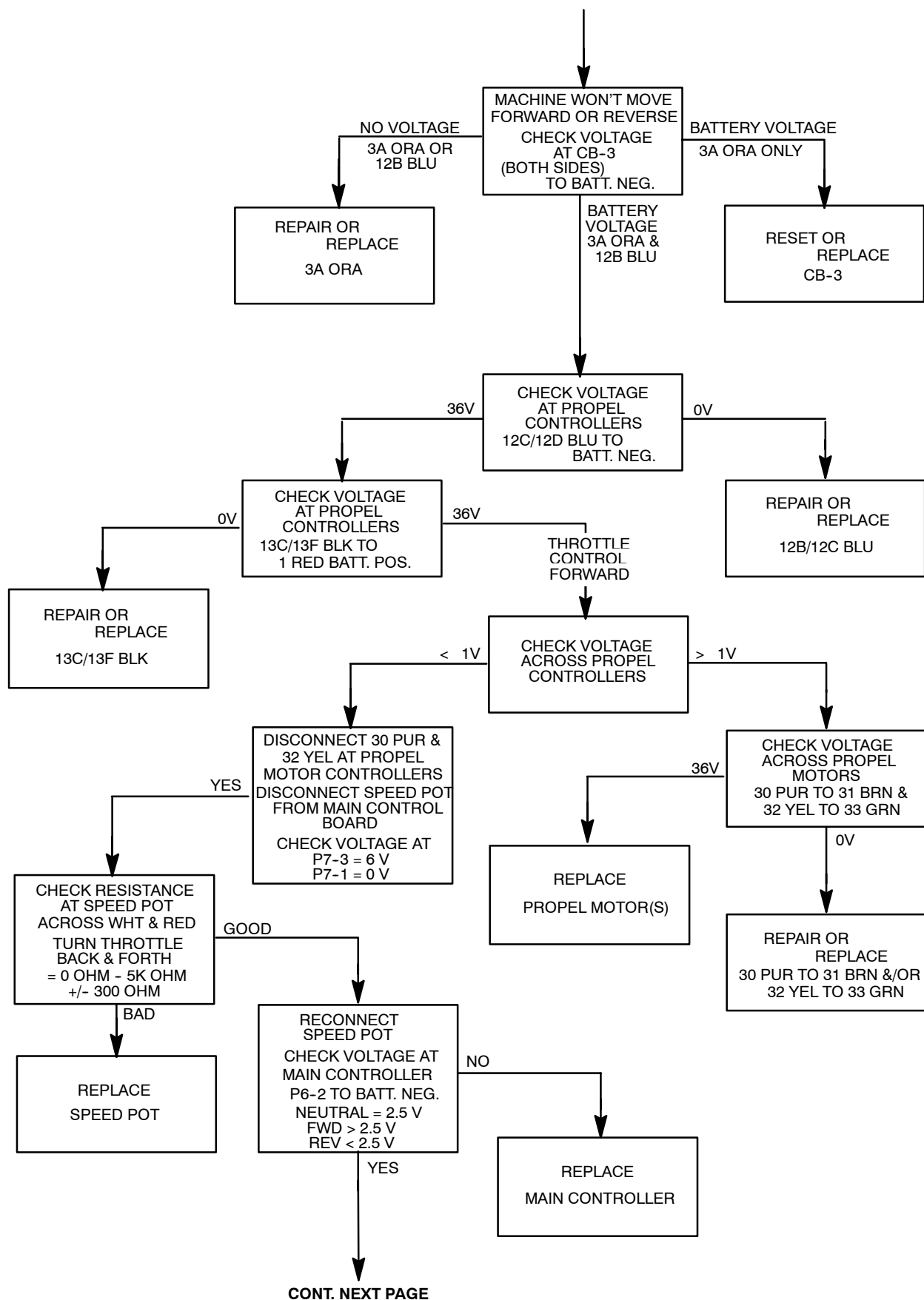


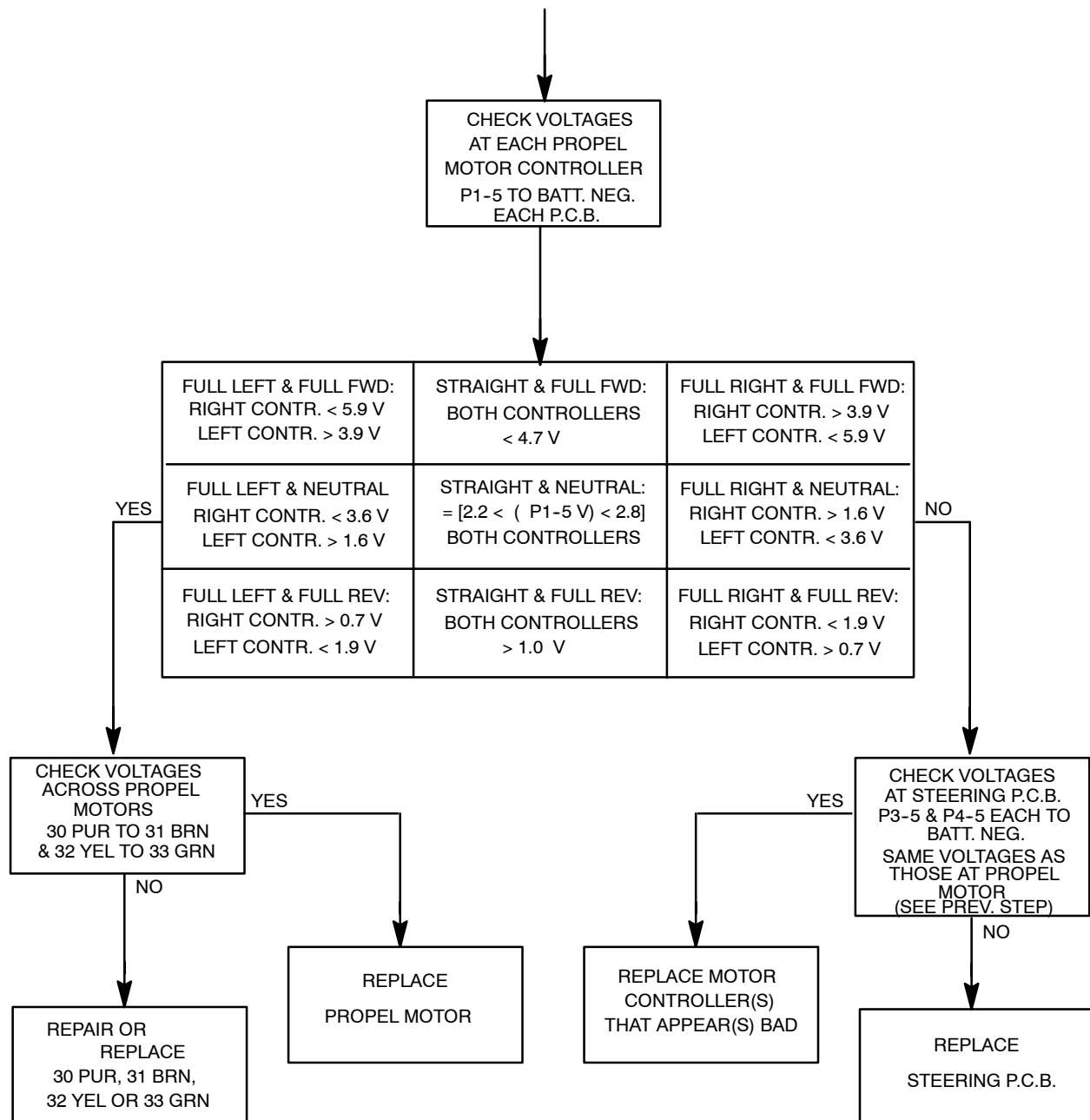
PROPEL & STEERING CIRCUIT



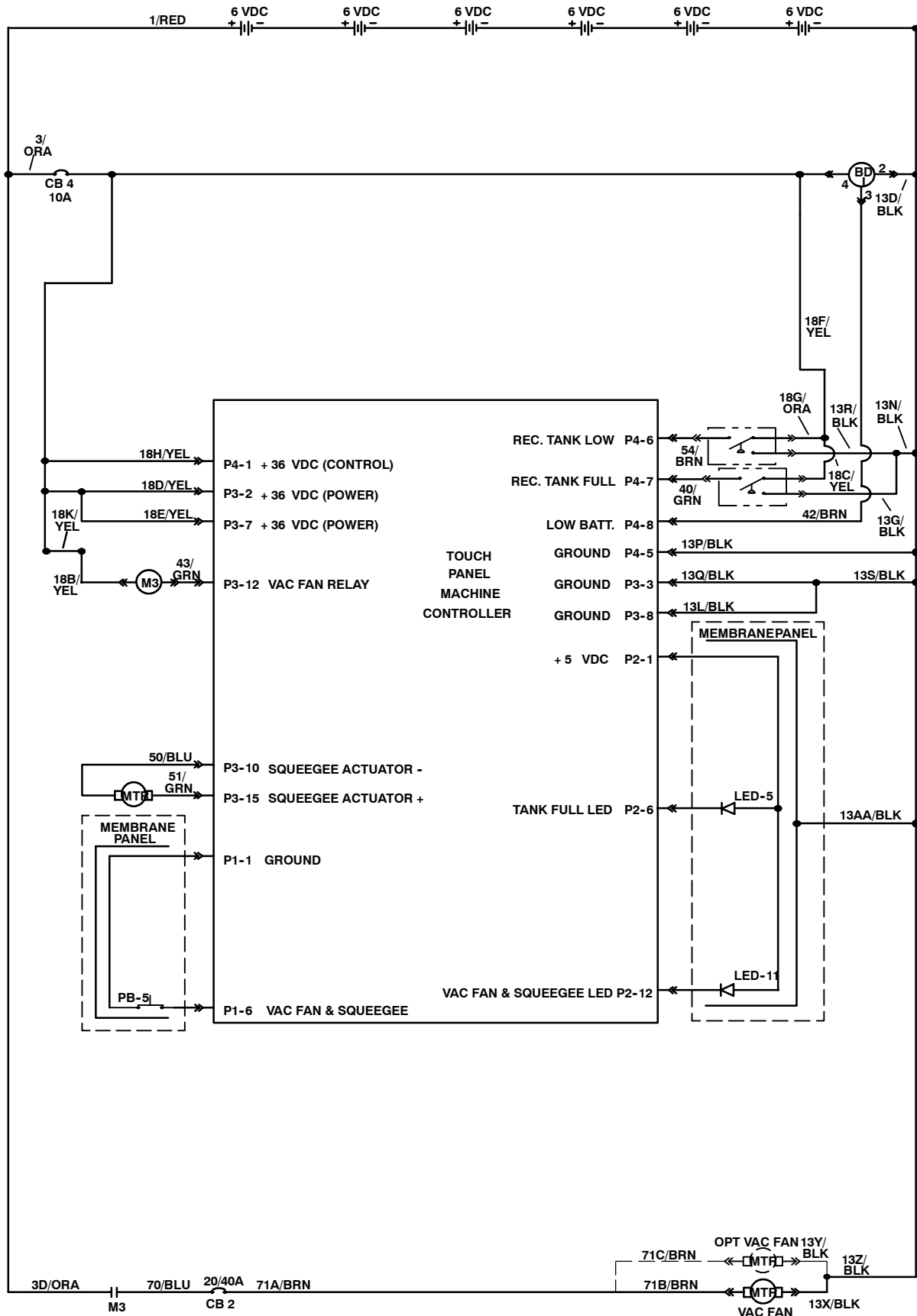
STEERING MALFUNCTION





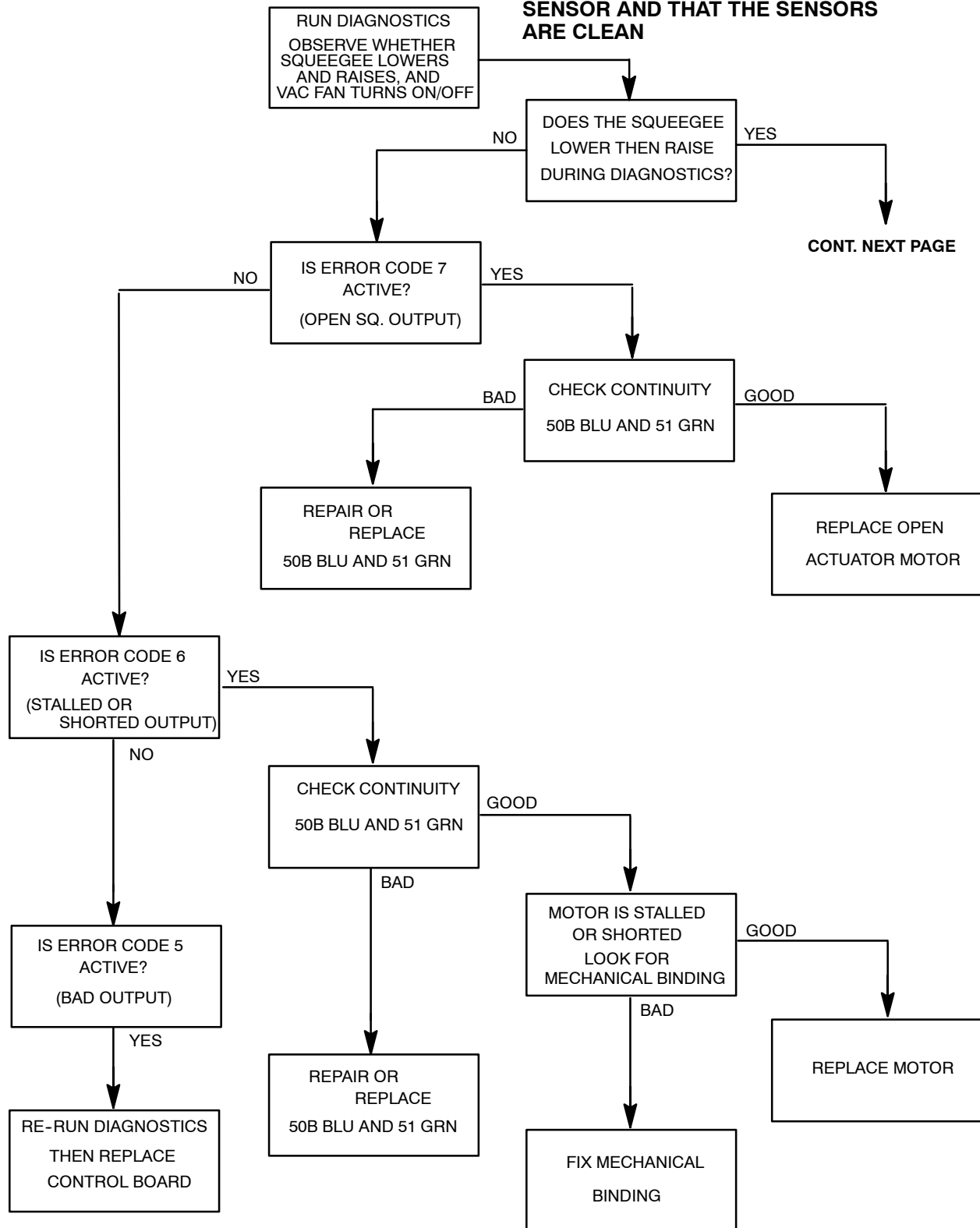


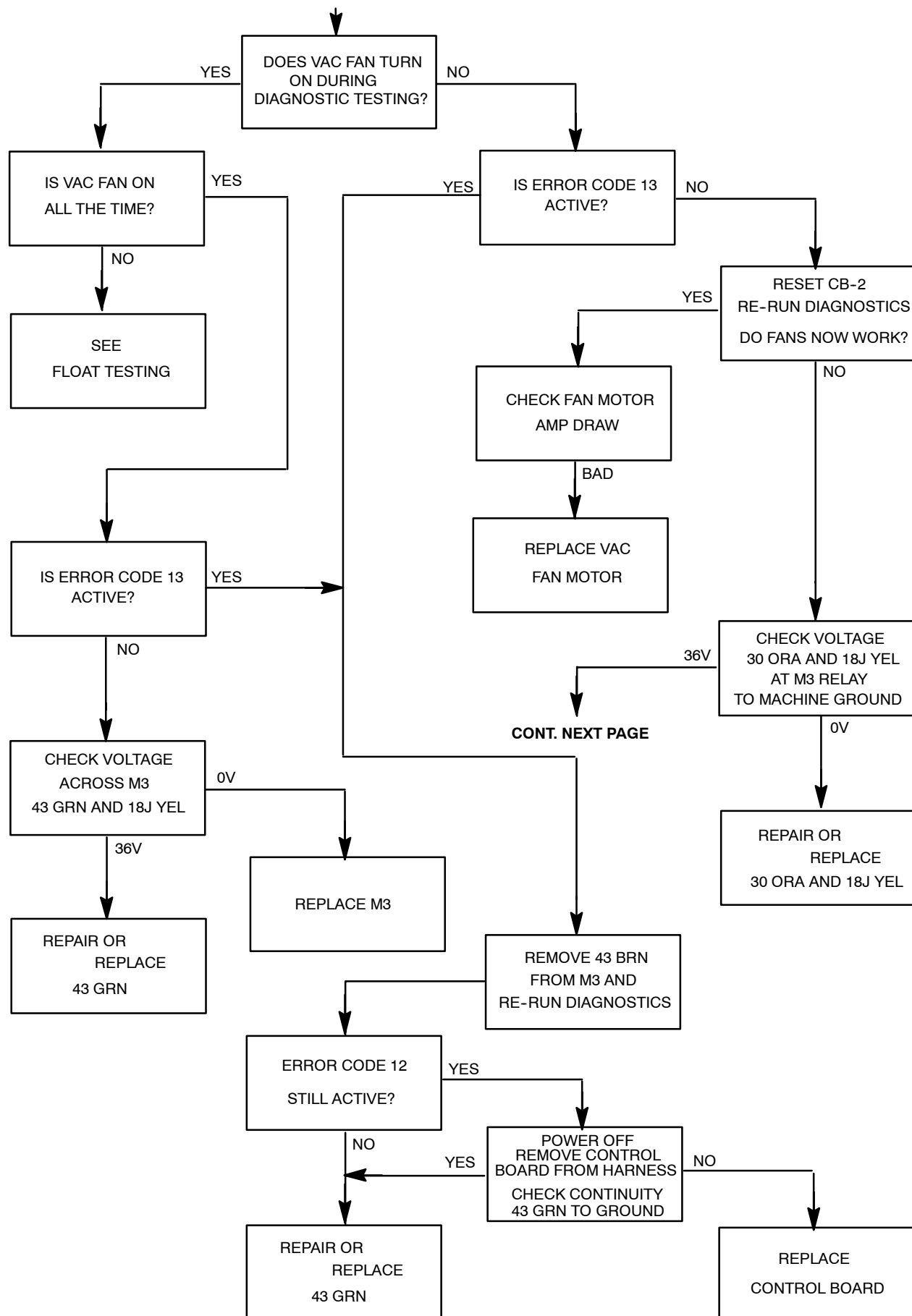
SQUEEGEE/VAC FAN CIRCUIT

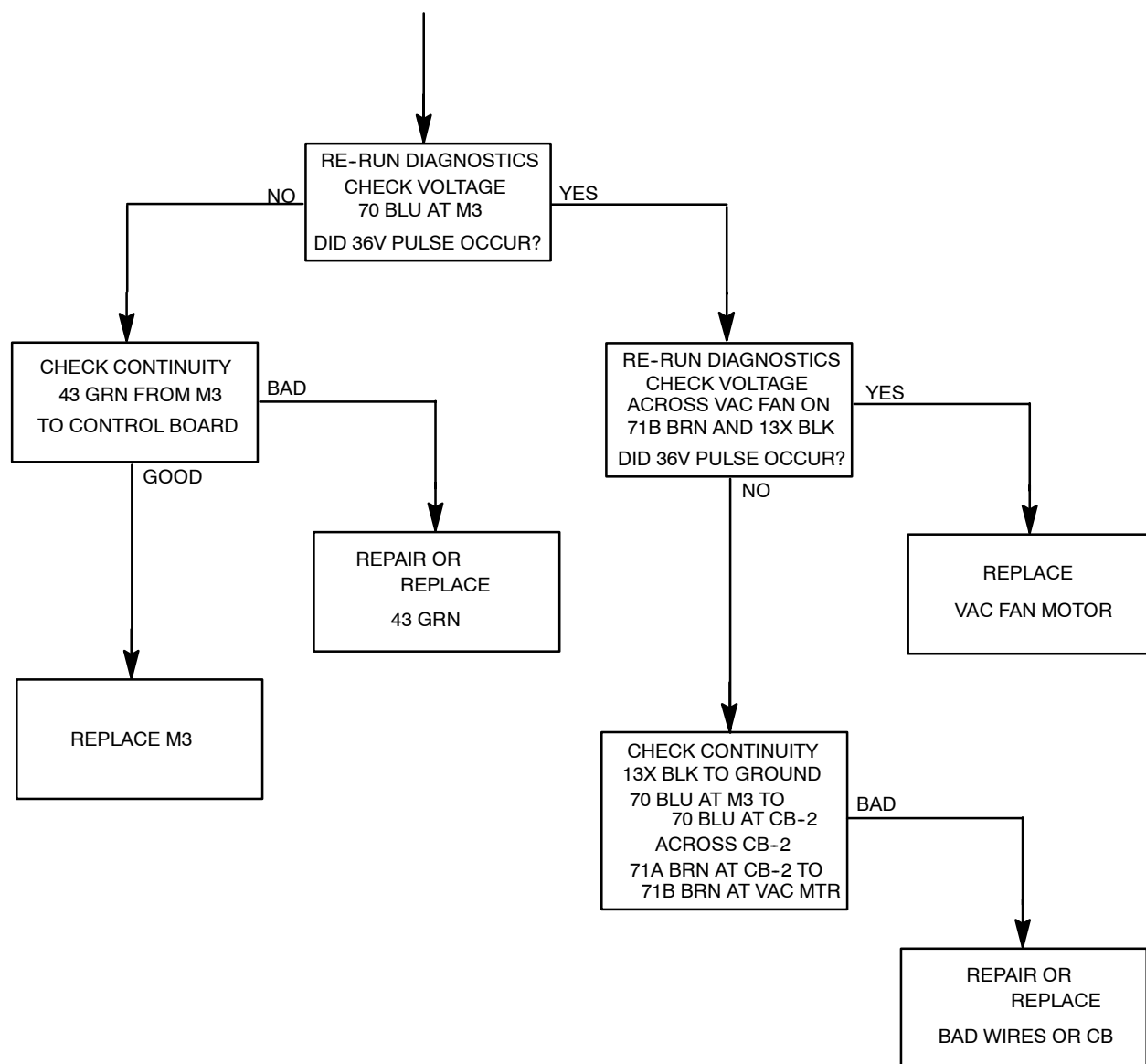


NO SQUEEGEE OR VAC FAN

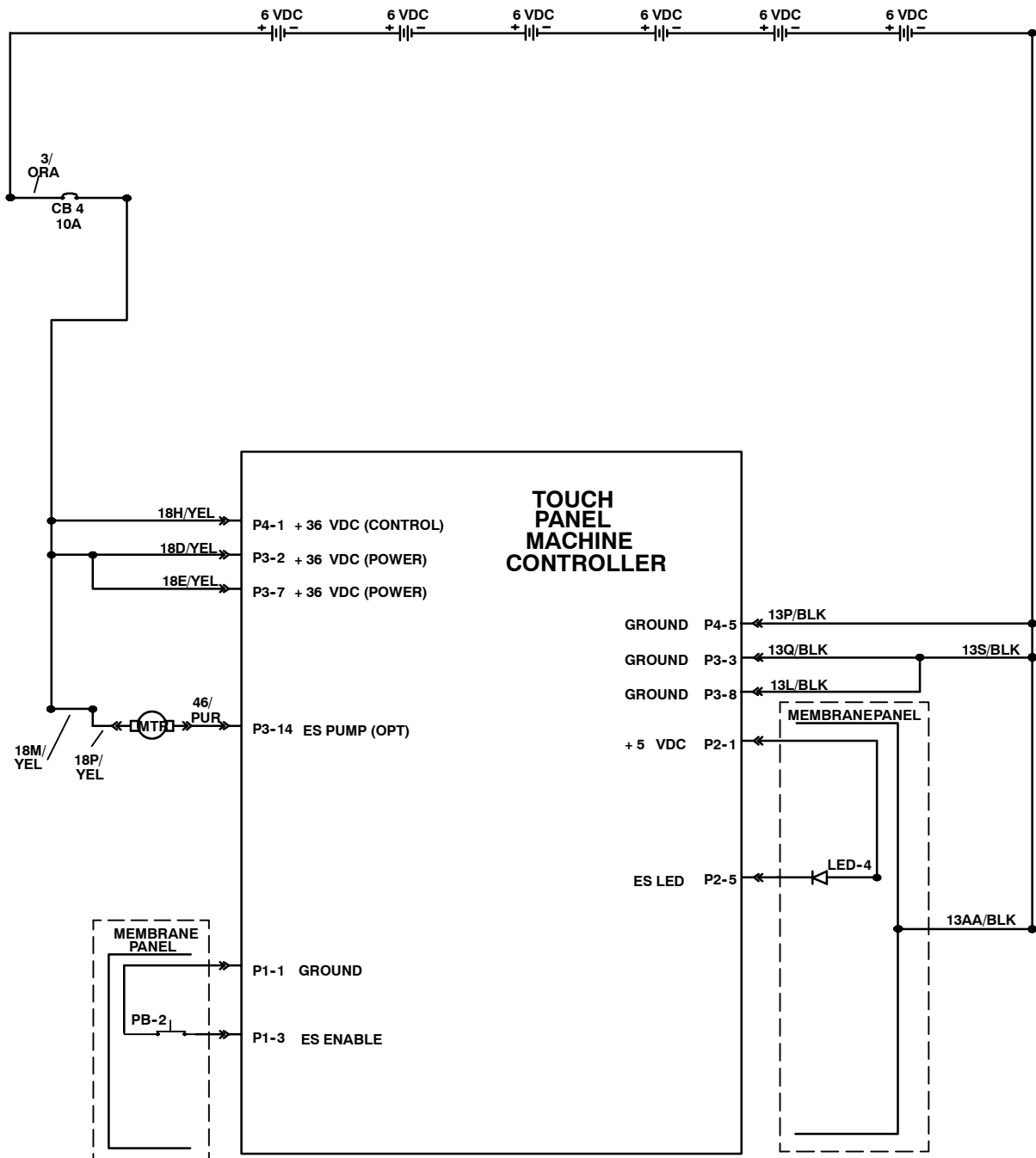
NOTE: THIS TEST ASSUMES THAT THE LIQUID LEVEL IN THE RECOVERY TANK IS BELOW THE UPPER SOLID STATE SENSOR AND THAT THE SENSORS ARE CLEAN



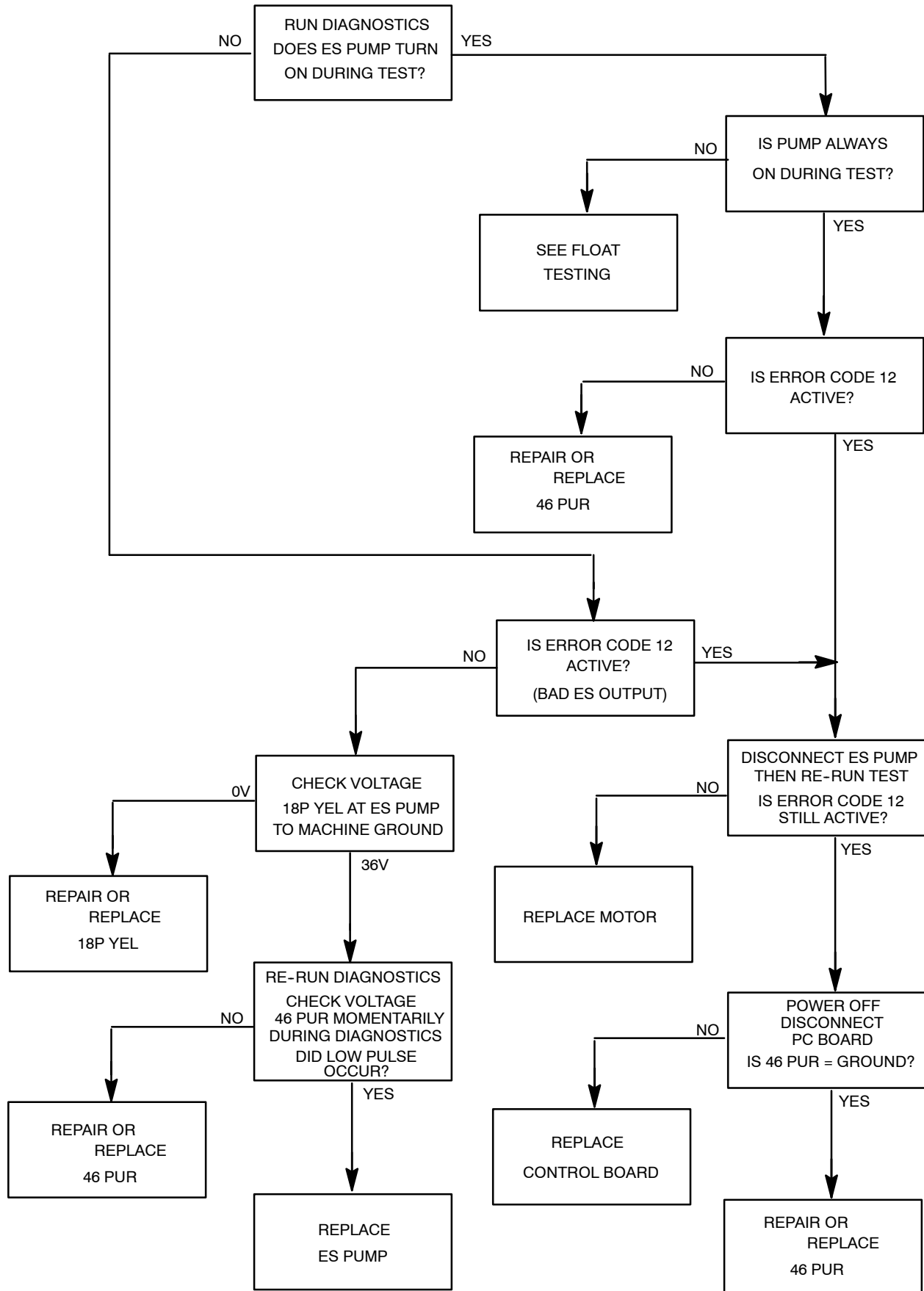




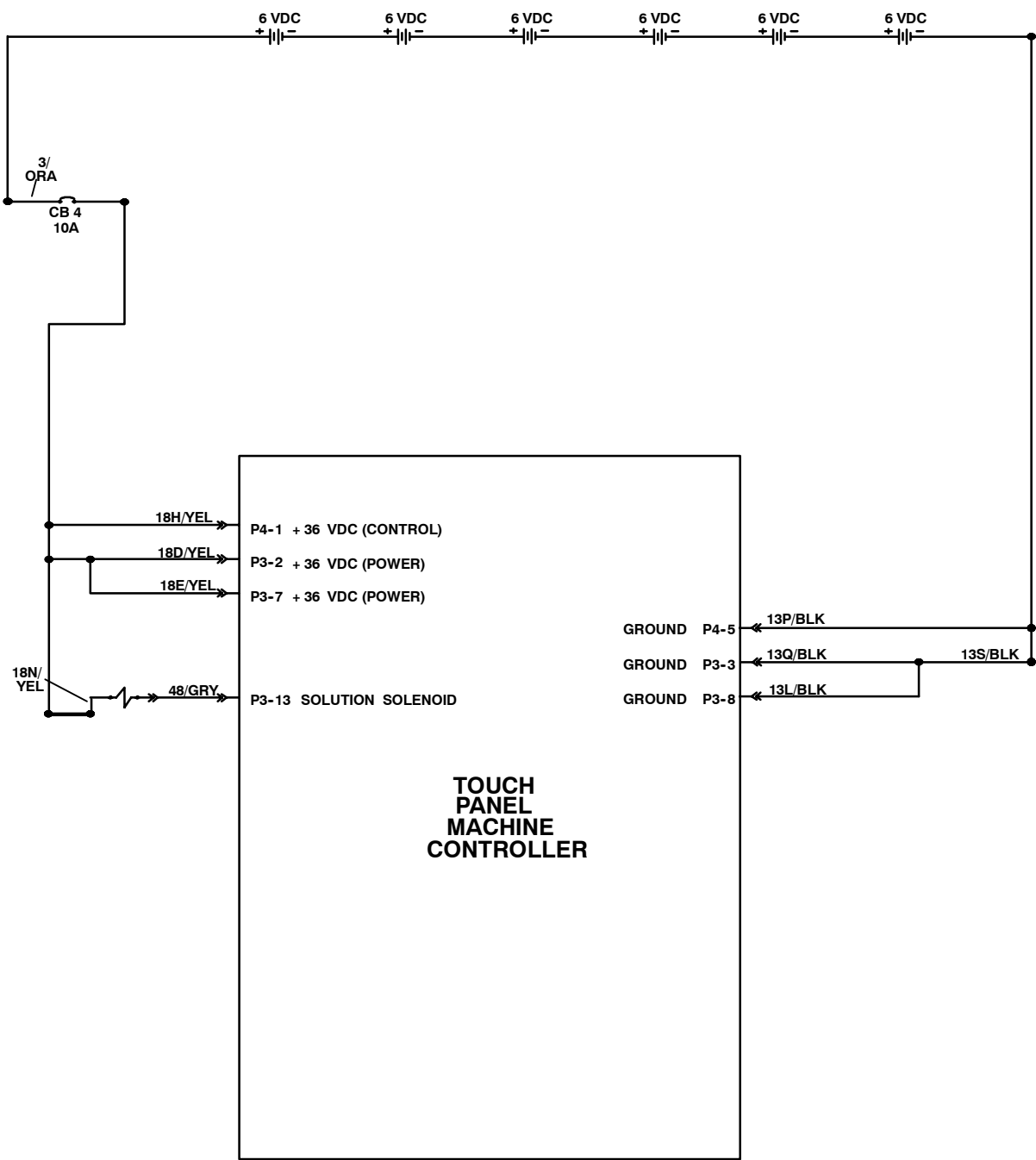
ESTM PUMP CIRCUIT



NO ES™ PUMP

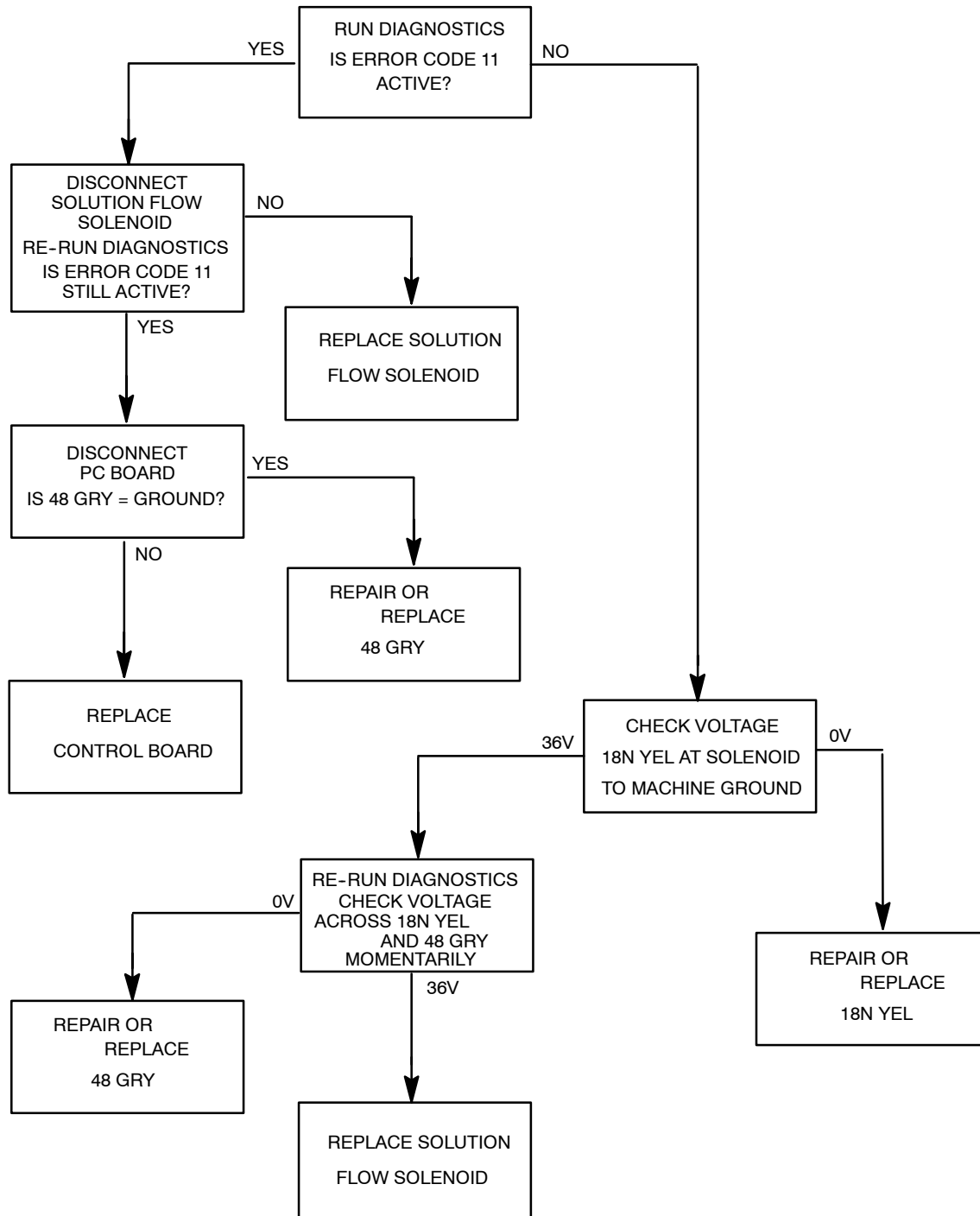


SOLUTION SOLENOID CIRCUIT

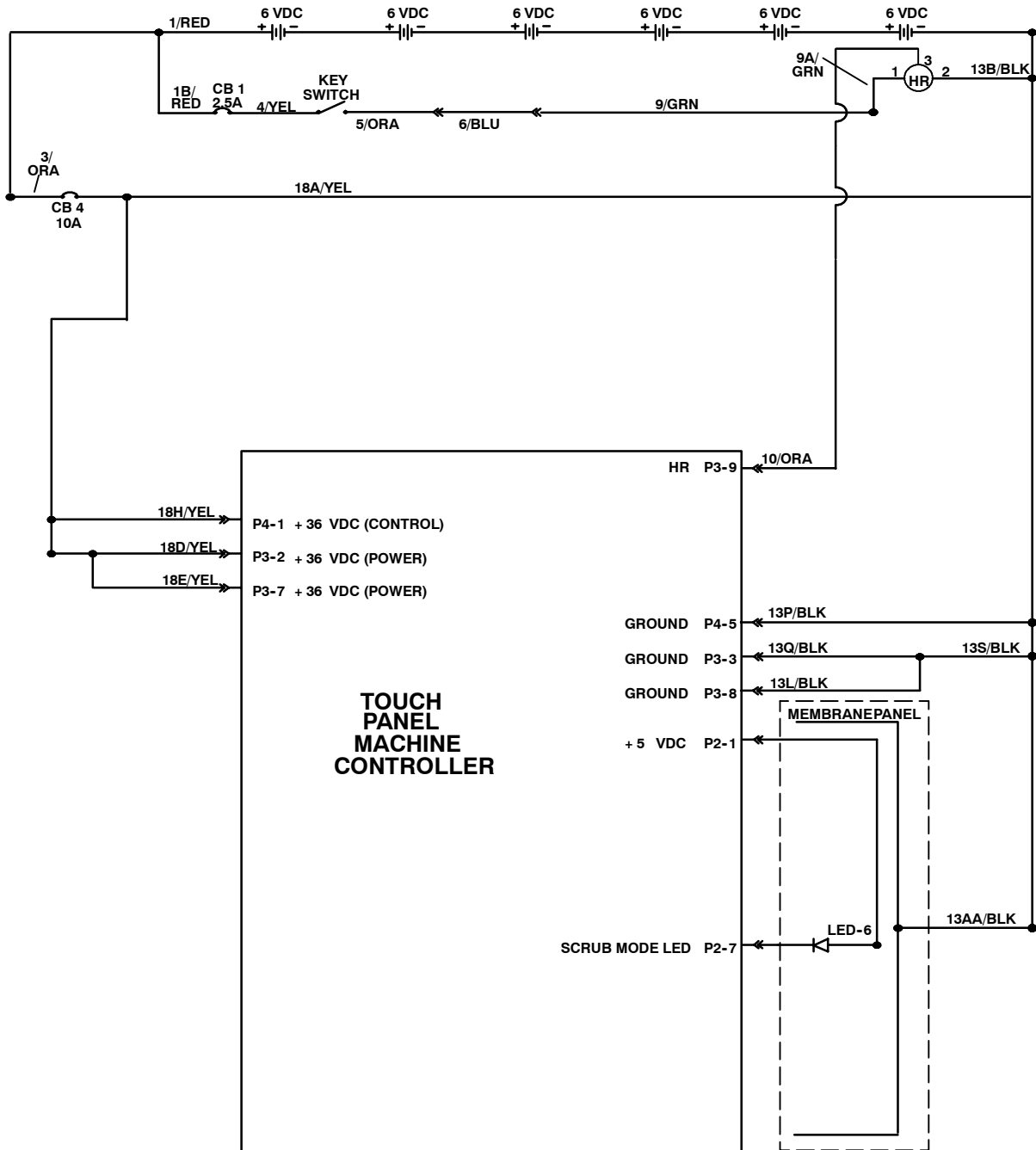


NO SOLUTION FLOW

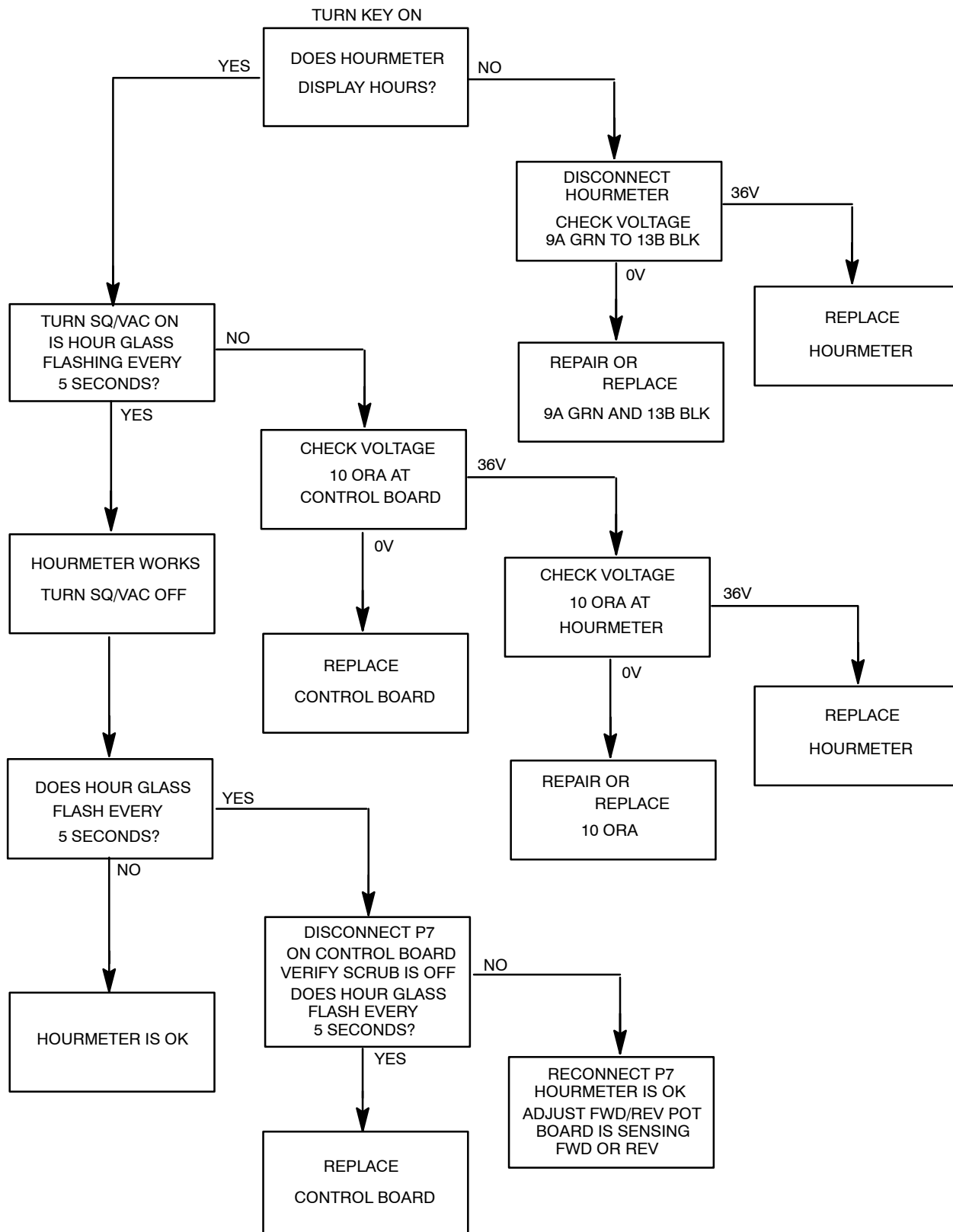
**NOTE: VALVE HANDLE MUST BE MECHANICAL FORWARD
AND MACHINE MUST BE PROPELLING FOR SOLUTION TO FLOW.**



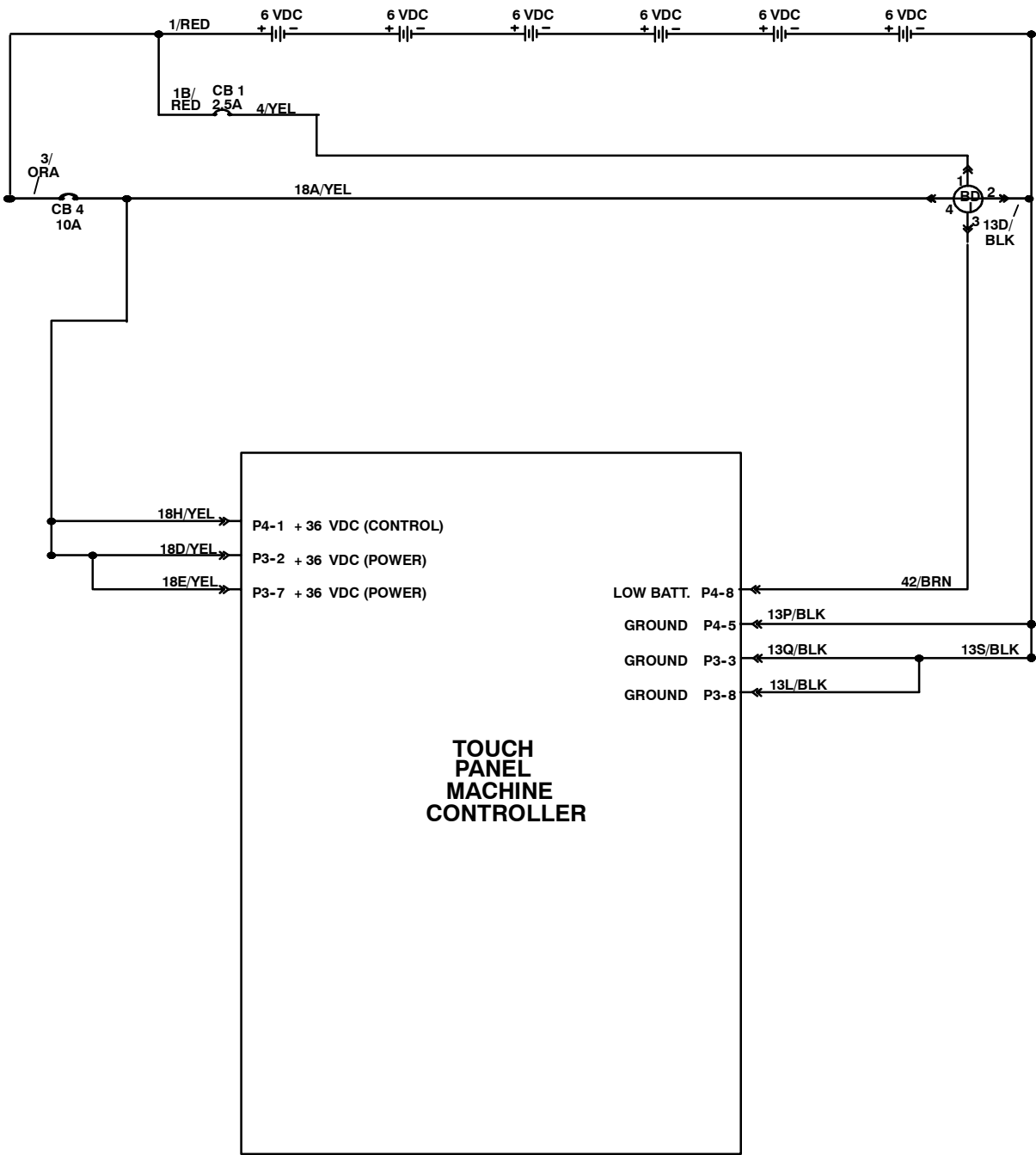
HOURLMETER CIRCUIT



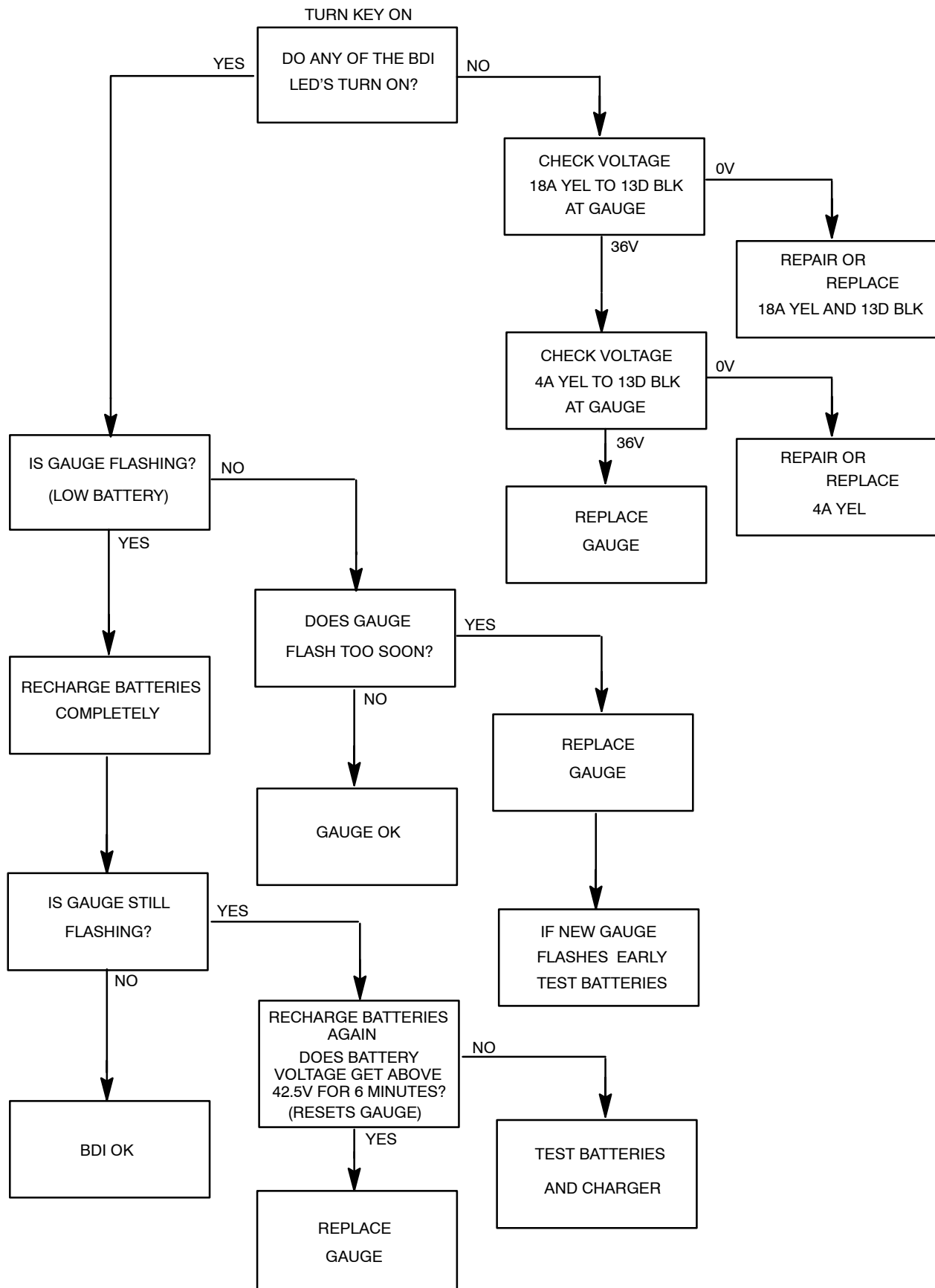
NO HOURMETER



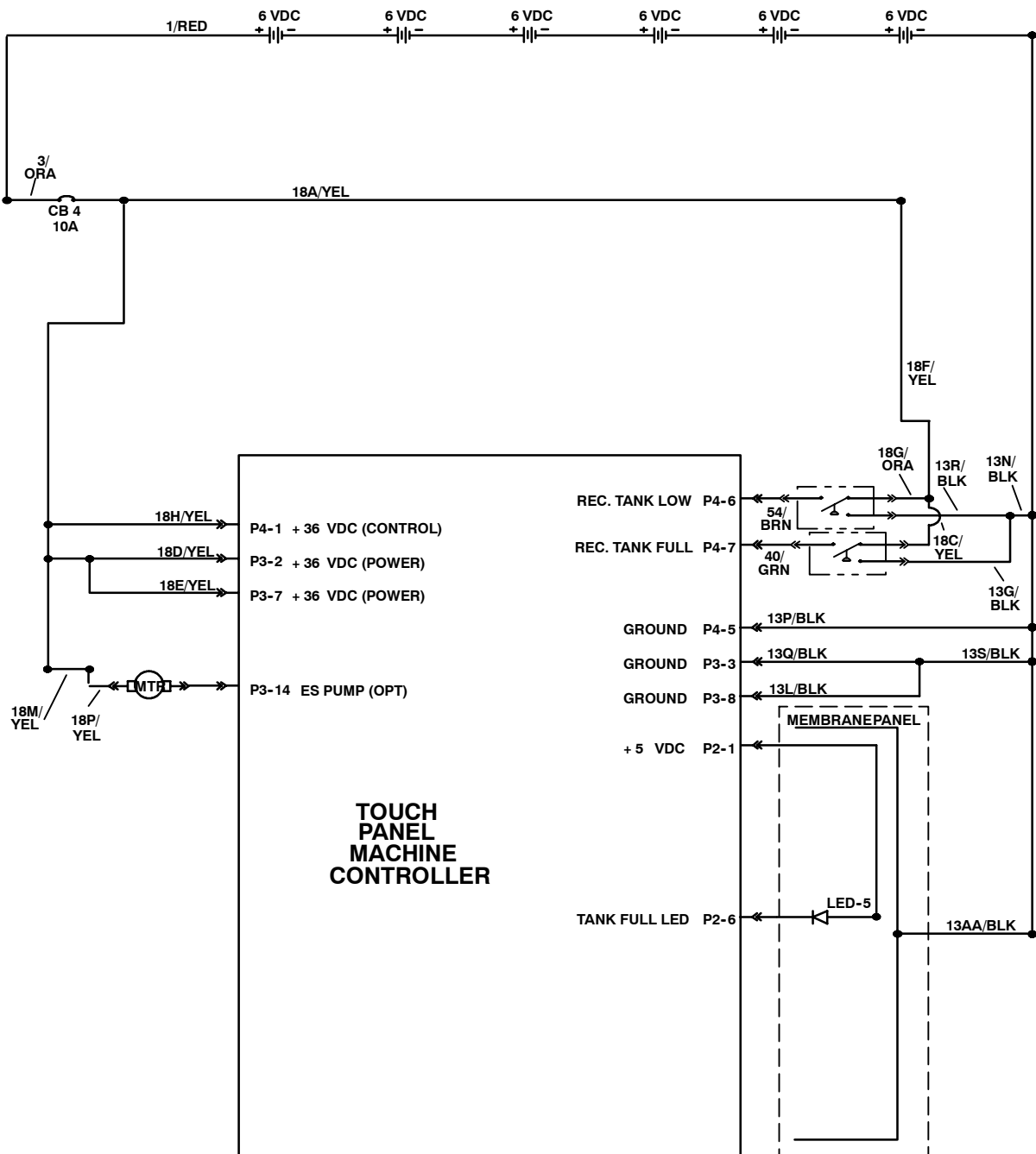
BDI CIRCUIT



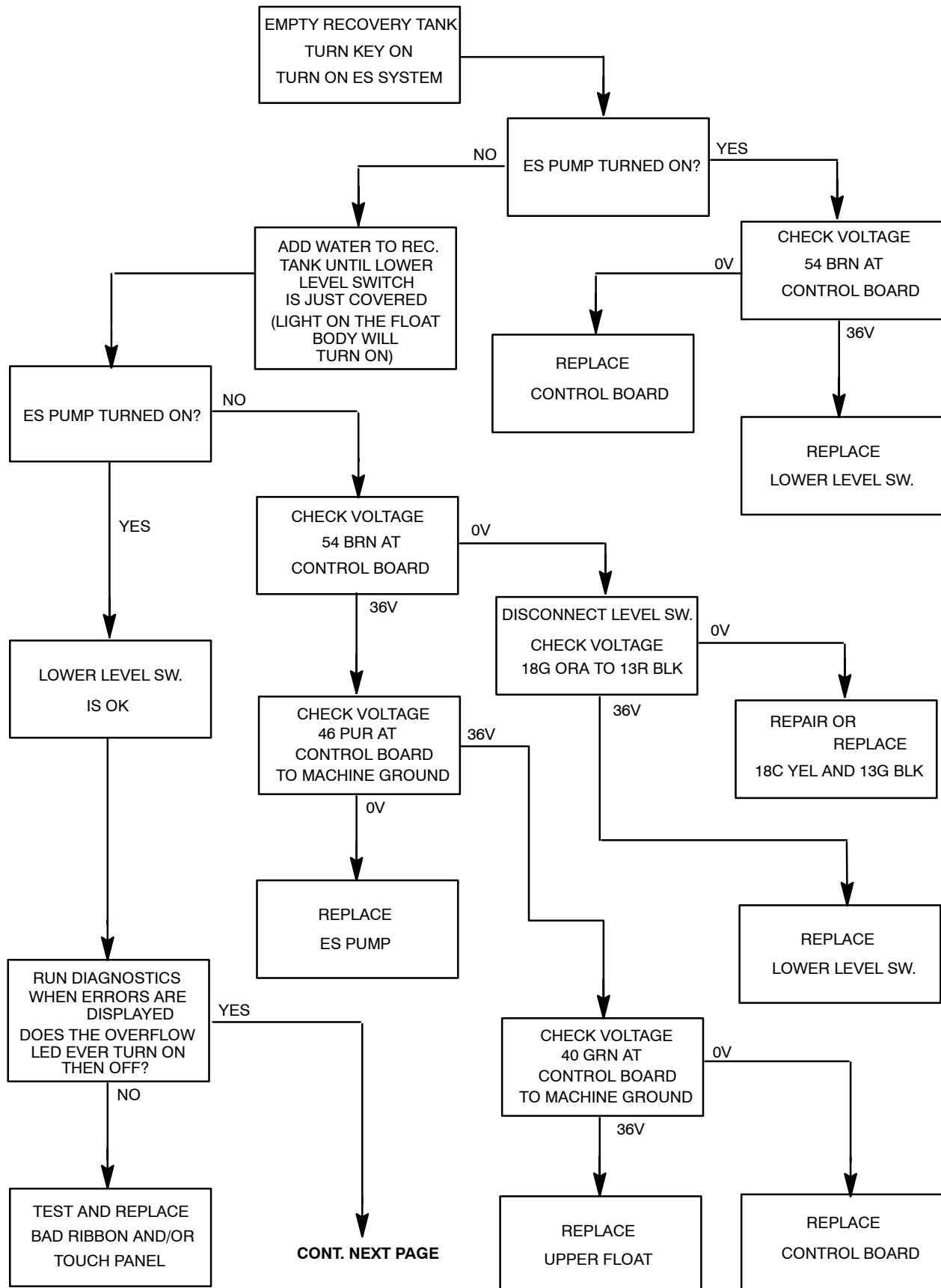
BDI MALFUNCTION

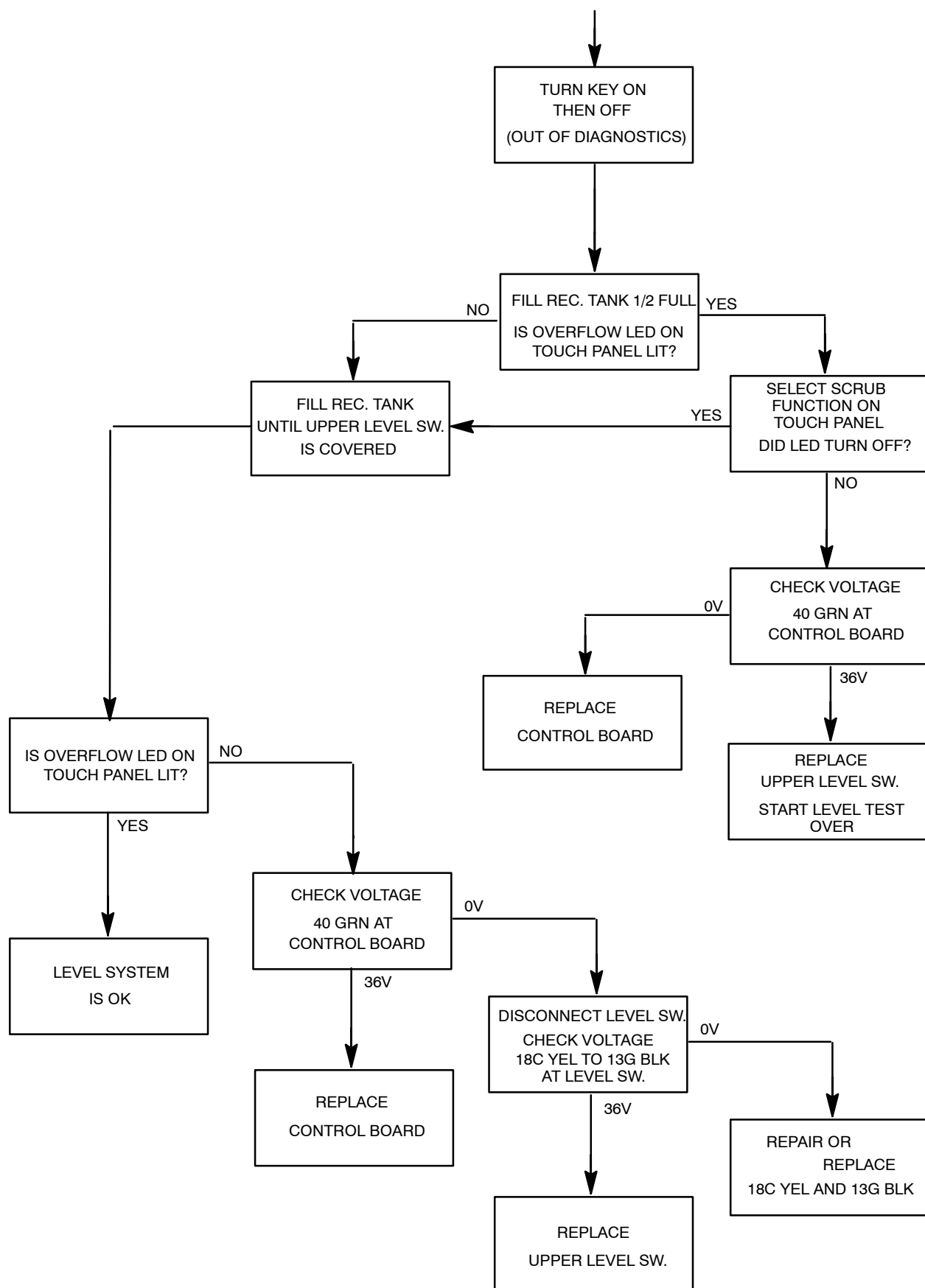


FLOAT CIRCUIT



LEVEL TESTING





MACHINE DIAGNOSTICS TEST PROCEDURE-MODEL 5700 XP / XPS

The 5700XP and 5700XPS can be tested to verify that the electrical components and systems are functioning properly. The machine's touch panel is used to perform this test.

TO RUN MACHINE DIAGNOSTICS

1. Turn the machine on-off key switch **OFF**.
2. While pressing squeegee/vacuum button on the touch panel, turn the key switch back on. The button must be held down to the count of ten. Release the button.

All outputs will turn on and off in sequence while running diagnostics.

NOTE: To get out of the diagnostics mode at any time turn the key off, then back on.

The diagnostics program will start and all three speed indicators will flash.

While the diagnostics program is running, the machine outputs will be turned on in the following order:

1. The brush and squeegee actuators are raised to the up position.
2. The vacuum fan is turned on. The squeegee runs down until the actuator stops. The actuator will then run up to the top position. The vacuum fan is turned off.
3. The brush actuator runs down for about 2 seconds and stops. The actuator runs up until it stops.
4. The brushes are turned on for about 3 seconds.
5. The water valve is turned on for about 2 seconds.
6. The ES pump is turned on for about 2 seconds.
7. The vacuum fan is turned on for about 2 seconds.
8. The brush is turned on for about 2 seconds.
9. The errors are displayed.

When all three speed indicator lights stop flashing the diagnostics program is complete and the error codes are displayed using the touch panel lights.

*NOTE: The three speed indicator lights represent the position of the forward/reverse potentiometer at this time. With the machines speed handle in the neutral position the number **two** indicator light should be on. This indicates a true neutral condition. If the number **one** or number **three** speed indicator light is flashing or is on, the forward/reverse potentiometer needs to be adjusted to achieve true neutral.*

- 3 Record the existing error codes and turn the key switch off and back on to get out of the diagnostic mode. Refer to the chart on the following page to identify diagnostic error codes.

DIAGNOSTIC FAILURE DISPLAY CODE

Indicator light on ↓	Brush pressure #1 indicator	Brush pressure #2 indicator	Brush pressure #3 indicator	Brush pressure #4 indicator	Symptom And Error-Code ↓
Scrub	Off	Off	ON	Off	Signal from brush motor/shunt is off. Code #1
	Off	Off	Off	ON	Low brush motor current. Code #2
	Off	Off	ON	ON	High brush motor current. Code #3
	Off	ON	Off	Off	No brush motor current. Code #4
Squeegee Vac-fan	X	X	ON	Off	Squeegee actuator output reads stall Code #5
	X	X	Off	ON	Early squeegee actuator stall Code #6
	X	X	ON	ON	No squeegee actuator stall Code #7
	ON	Off	X	X	Brush actuator output reads stall Code #8
	Off	ON	X	X	Early brush actuator stall Code #9
	ON	ON	X	X	No brush actuator stall Code #10
Overflow	ON	Off	Off	Off	Solution solenoid output bad Code #11
	Off	ON	Off	Off	ES output bad Code #12
	Off	Off	ON	Off	Vac fan output bad Code #13
	Off	Off	Off	ON	Brush motor output bad Code #14
	ON	ON	Off	Off	Hour meter output bad Code #15

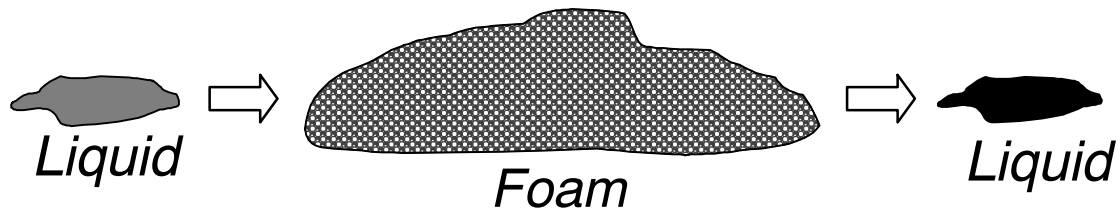
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FaST™ PRODUCT OVERVIEW	5-6
FaST™ SCHEMATIC	5-11
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FaST™ TEST POINTS	5-19



What is *FaST*™ ?

Foam Scrubbing Technology

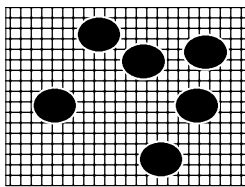


Self-Collapsing Foam Technology

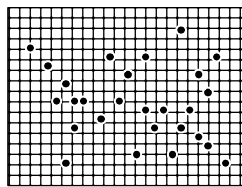


Why *FaST*™ Works

Increased Wetting and Surface Area using *FaST*™ technology



Conventional

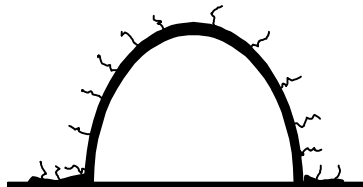


FaST

**Increased
Wetting**



Conventional



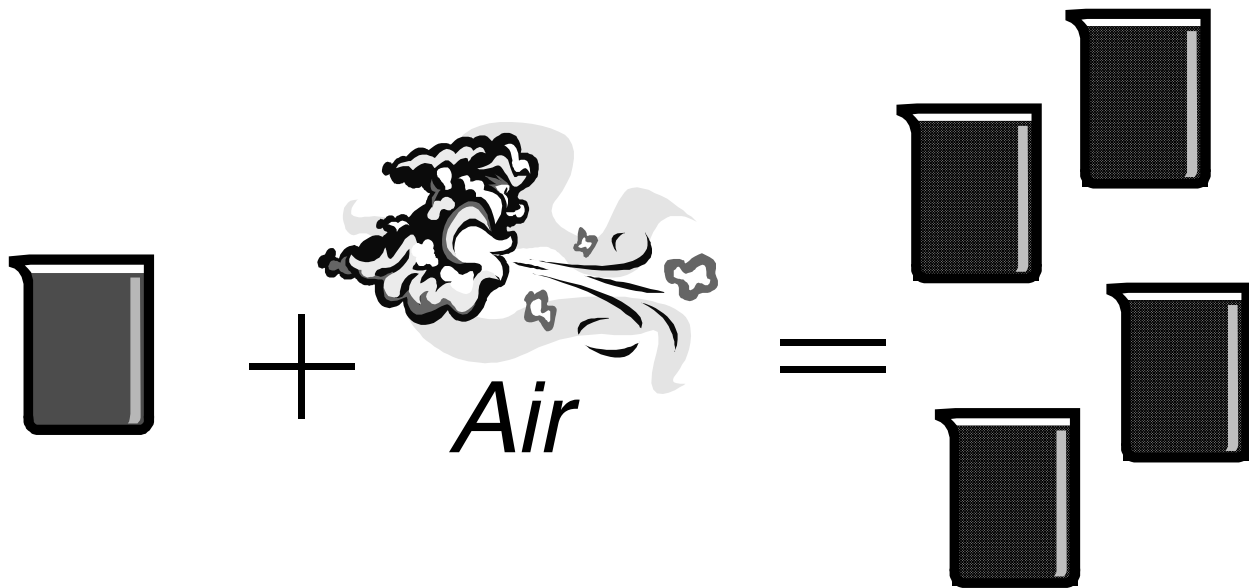
FaST

**Increased
Surface
Area**



How *FaST*™ Works:

Air Injection expands detergent/water solution to over four (4) times its original volume





FaST™ advantages

Less potential water left behind - reduced slip/fall



Conventional



FaST

Micro-dispersed bubbles allow FaST solution to dry quicker than conventional liquid.

Reduced detergent cost, waste, shipment cost, storage



Conventional

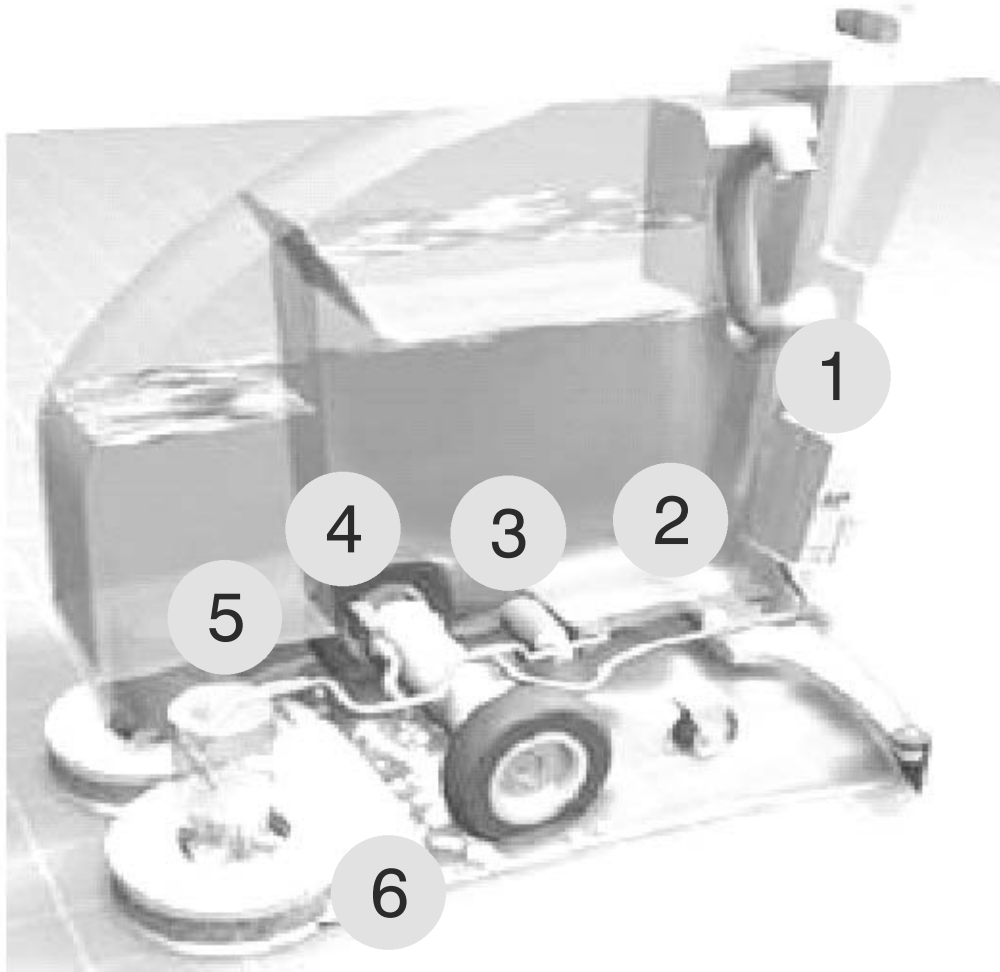


FaST

- On-board detergent metering
- One container lasts weeks
- Just drain recovery tanks and fill solution tank with water – no chemical mixing
- Less water used/recovered solution to dispose of – environmentally friendly



Product Overview:

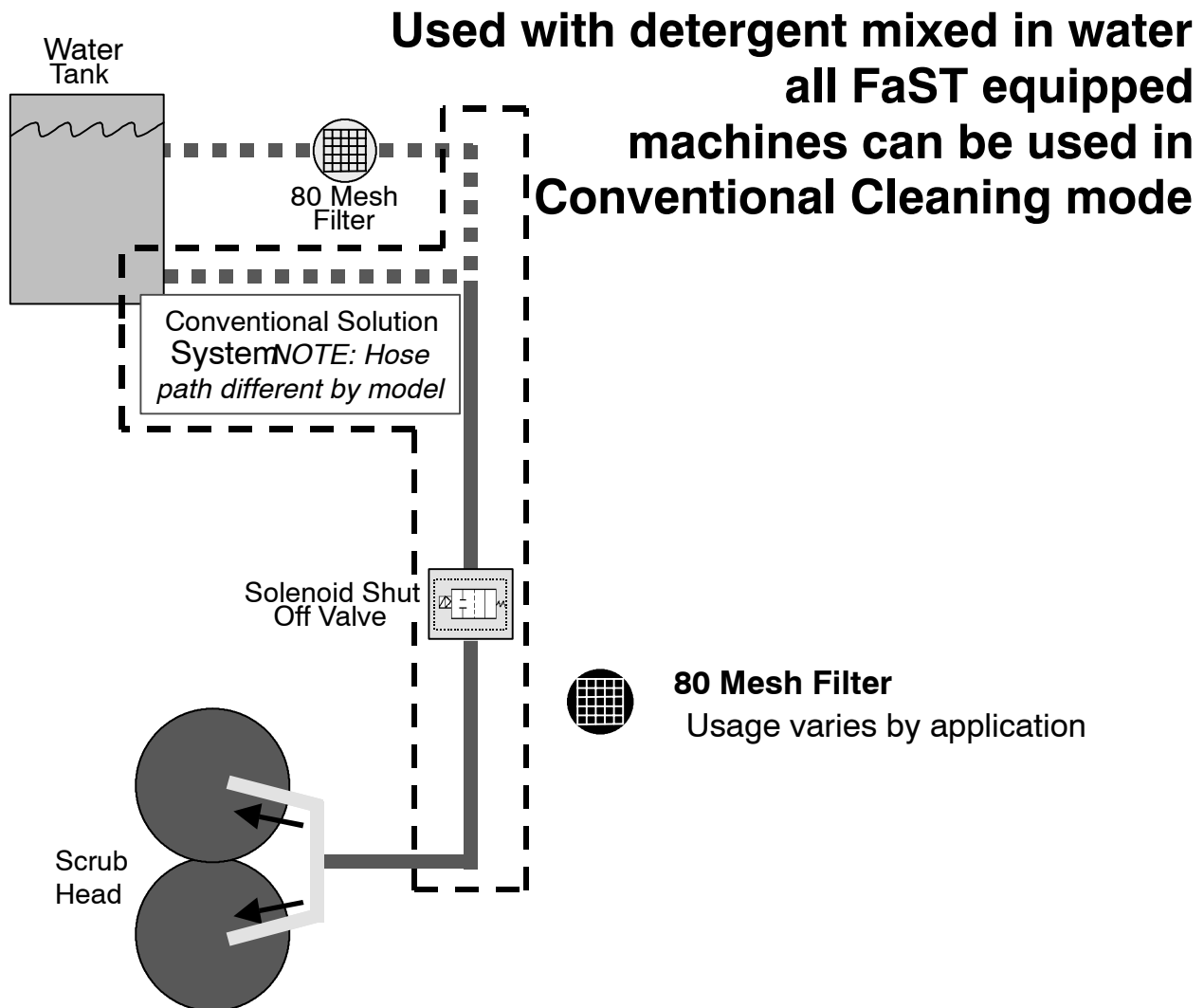


- 1. Detergent Concentrate**
- 2. Detergent Pump**
- 3. Water Pump**
- 4. Air Compressor**
- 5. Mixing Chamber**
- 6. Application to floor**



Major Systems

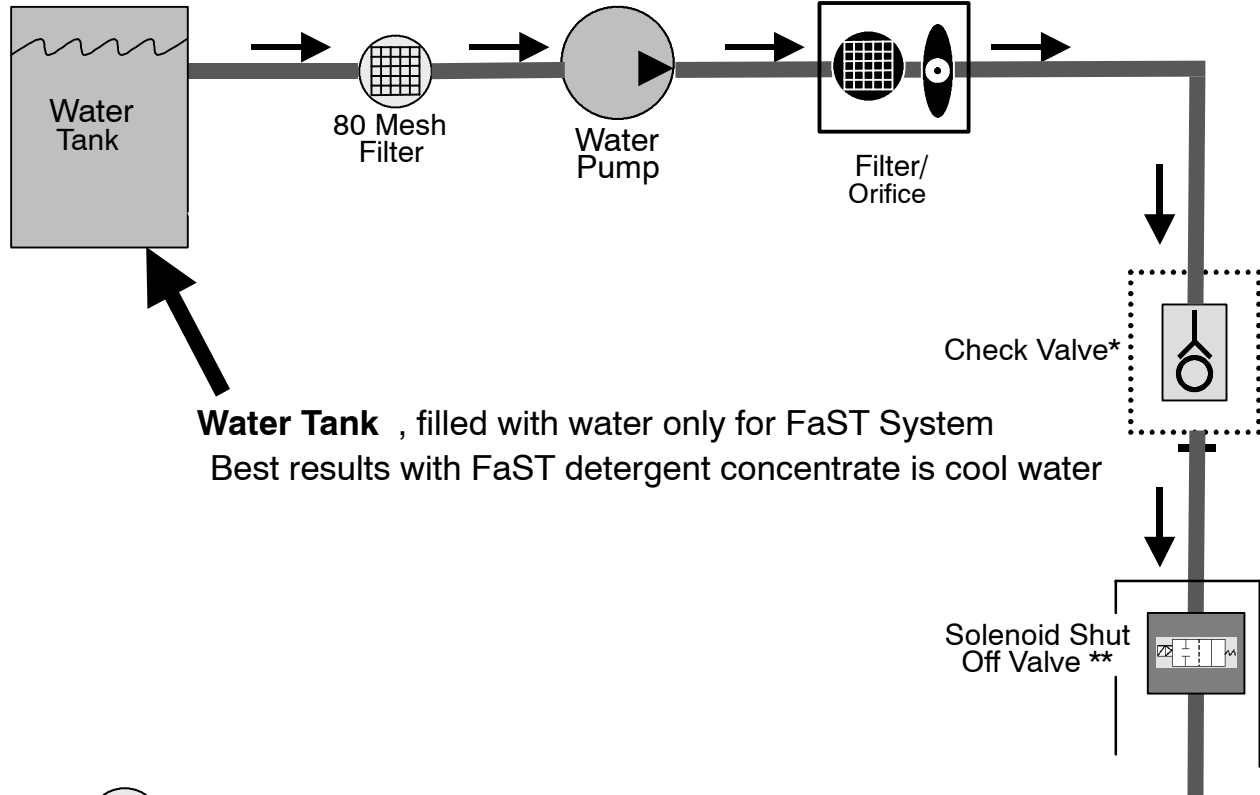
Conventional Solution System





Major Systems

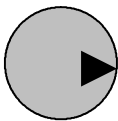
Water System



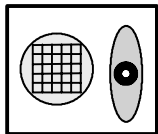
Water Tank , filled with water only for FaST System
Best results with FaST detergent concentrate is cool water



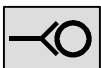
80 Mesh Filter , 0.005 Microns,
Located in bottom of solution tank or in line leading to water pump



Water Pump , 24 vDC or 36 vDC, depending on application
Pump runs continuously with FaST engaged
Pump has internal pressure relief valve set at 45 psi



Filter and Orifice , Orifice is 0.036 diameter
Filter prevents orifice from plugging
Lowers pressure to 2–3 psi and limits water flow after orifice
Assembly is: filter, washer, orifice in water flow direction



Check Valve , optional component depending on application

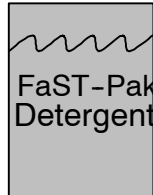


Shut Off Valve , 24 vDC or 36 vDC, depending on application
Located in pure water line or on water/detergent line
Valve is on with FaST engaged



Major Systems

Detergent System



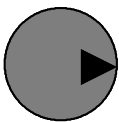
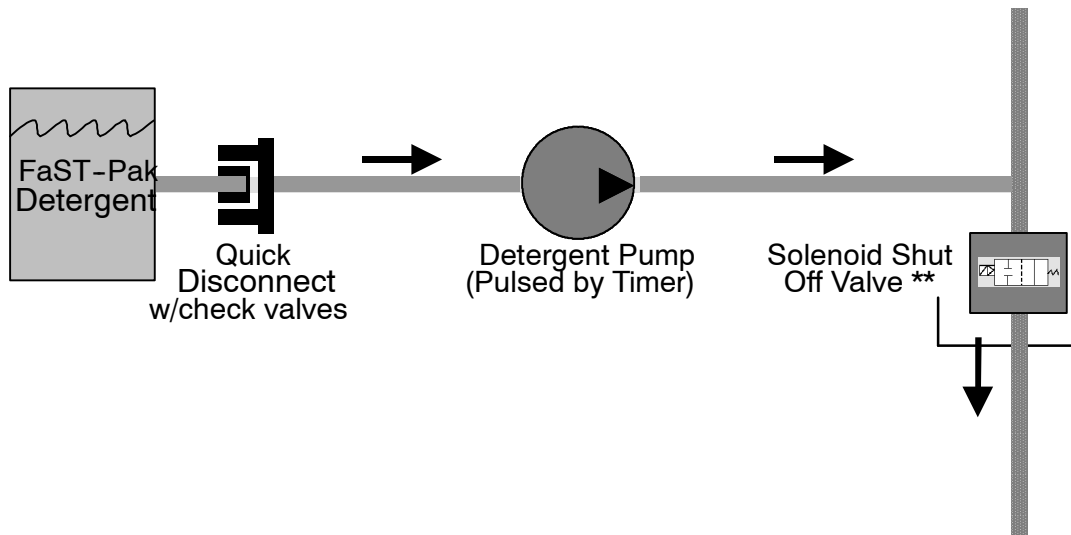
Detergent Concentrate

Tennant 365 detergent
FaST-Pak uses 1/2 of quick connector on each FaST-Pak
Check valve is internal with connector
Detergent will ☐thicken☐ if left exposed to air



Quick Disconnect

Detergent line is sealed when connector is disconnected from FaST-Pak
Connect this connector to the storage connector on the machine if the FaST system is not used for an extended period of time



Detergent Pump, 24 vDC or 36 vDC

Pump is pulsed by a blue timer at 0.5 hertz (once per every 2 seconds)
Timer pump is on with FaST engaged
(Note: You cannot tell if the pump is running by touch)
One of two pumps are used depending on application



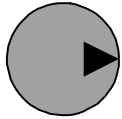
Shut Off Valve , 24 vDC or 36 vDC, depending on application

Located in pure water line or an water/detergent line
Valve is on with FaST engaged

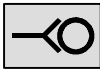


Major Systems

Solution Expansion

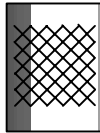


Air Pump, all 24vDC pumps, 36vDC FaST system(s) uses a power resistor
 Pump runs continuously with FaST engaged
 The air pump/compressor produces 20–30 psi, 20–25 inches of Hg
 By the use of added air to the detergent/water solution, the solution expands to over four (4) times its original volume after air is injected.



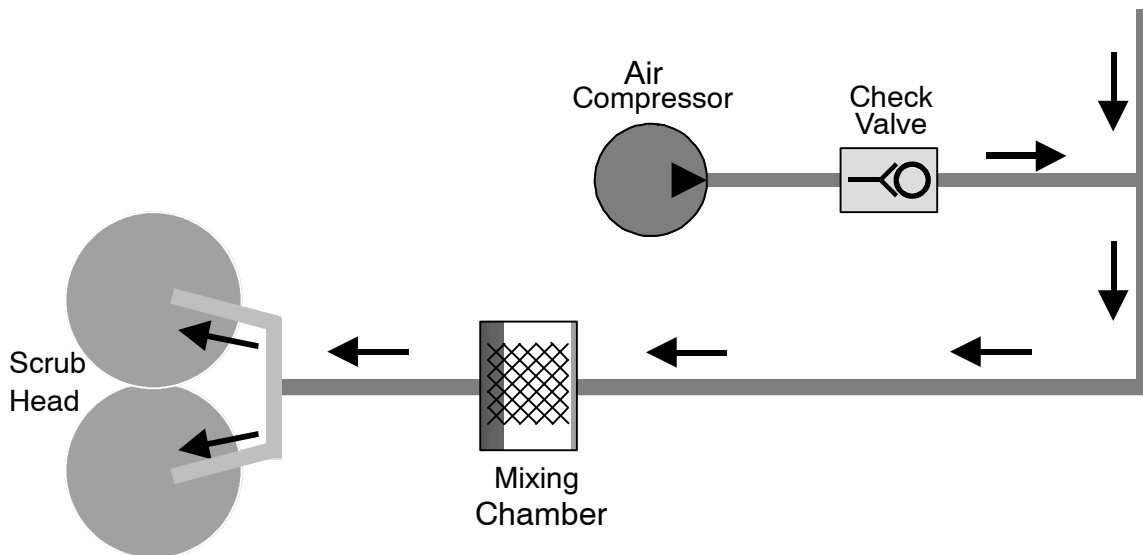
Check Valve

Prevents detergent/water solution from entering the air compressor/pump



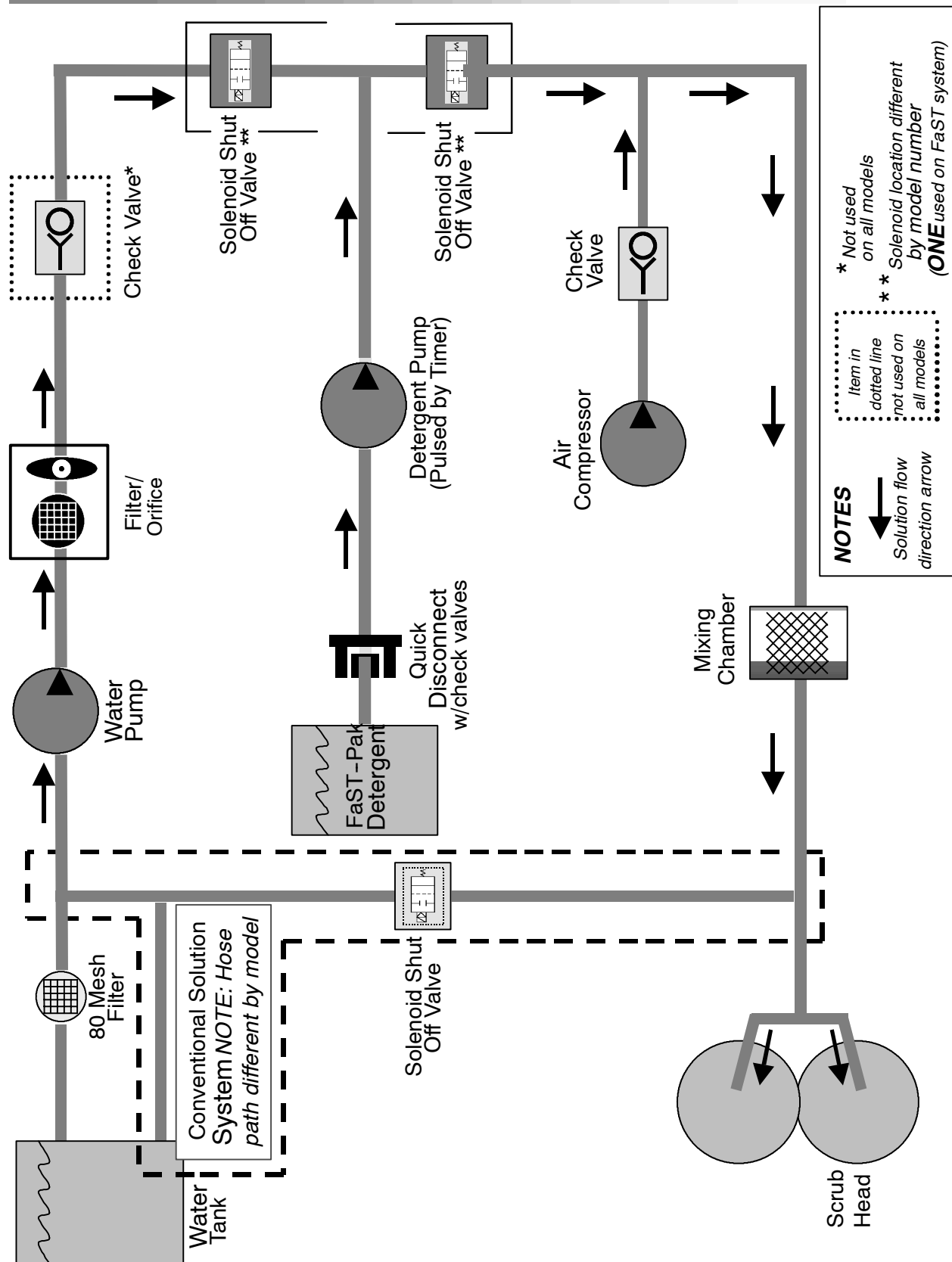
Mixing Chamber

Ensures proper mixing of detergent/water solution
 A media similar to a 3M Red Pad is used



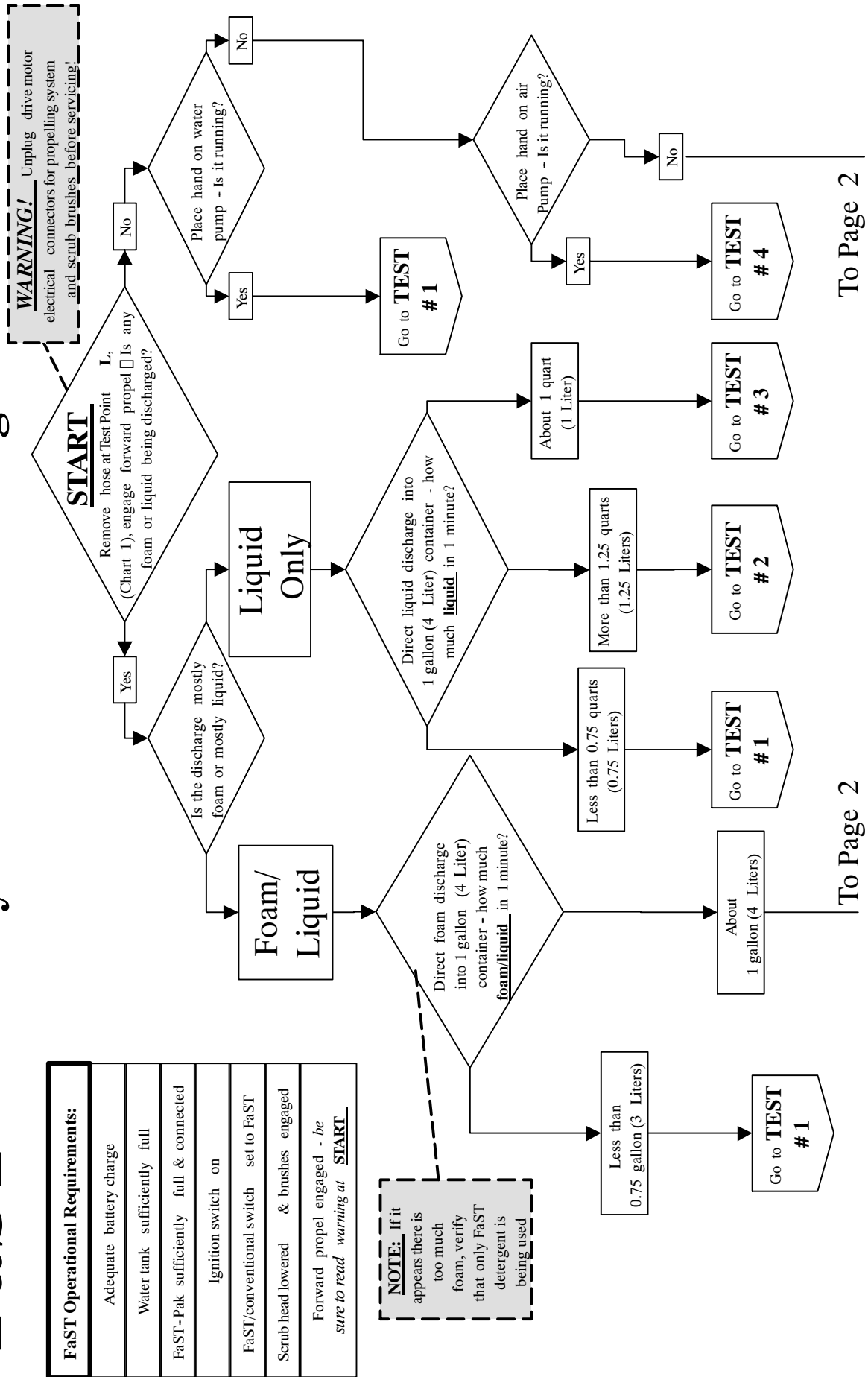


Schematic Operation Review



FaST Overall System Troubleshooting

Page 1 of 2

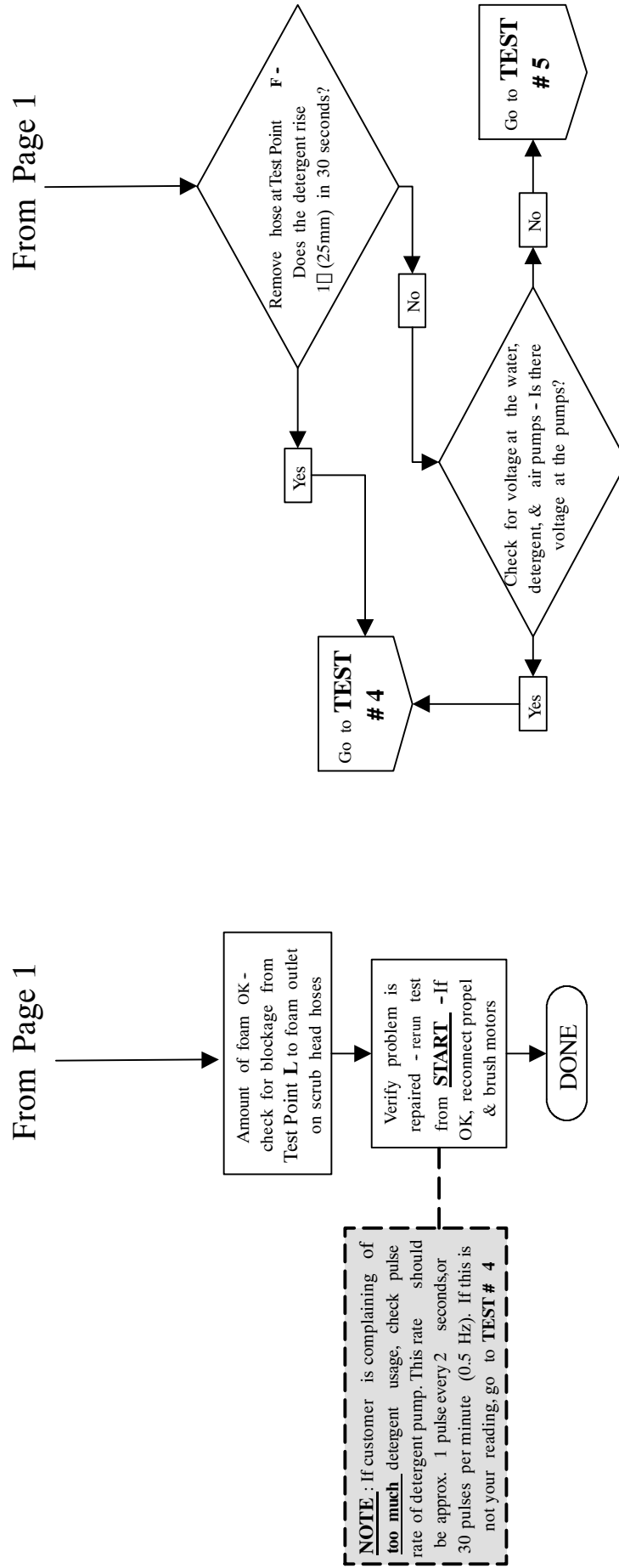


To Page 2

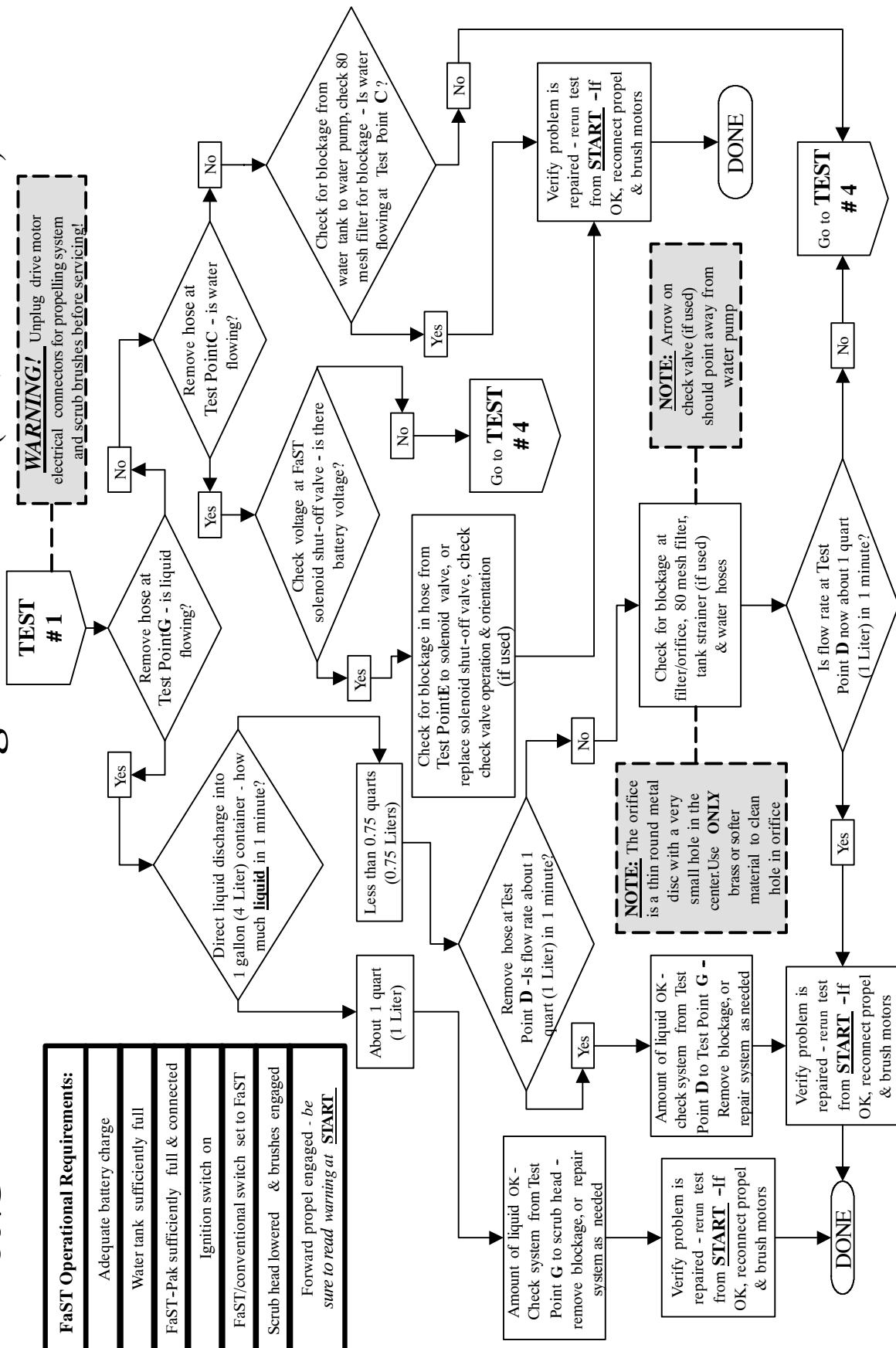
To Page 2

FaST Overall System Troubleshooting

Page 2 of 2

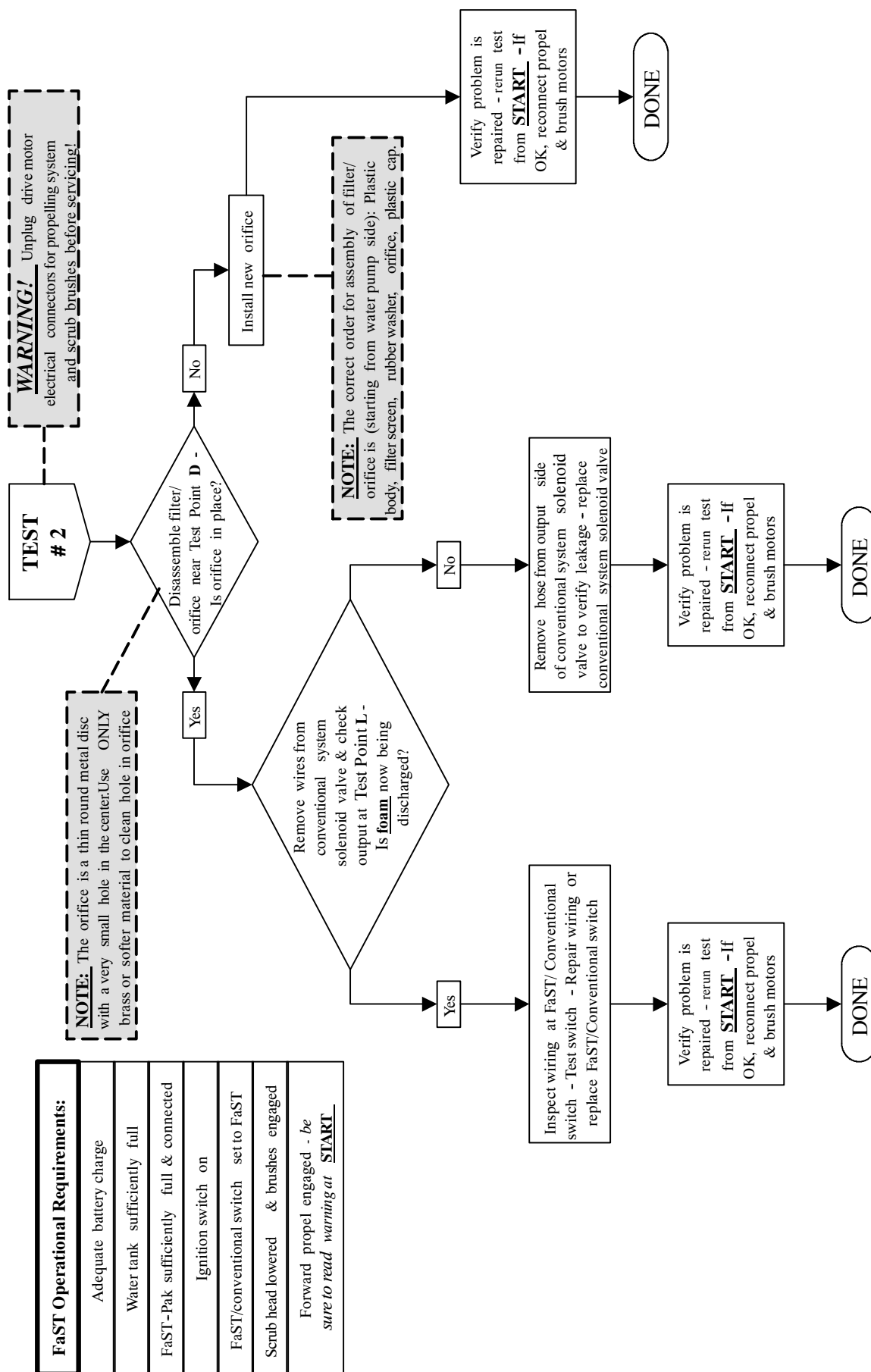


FaST Troubleshooting - TEST #1 (Low/no water or foam)



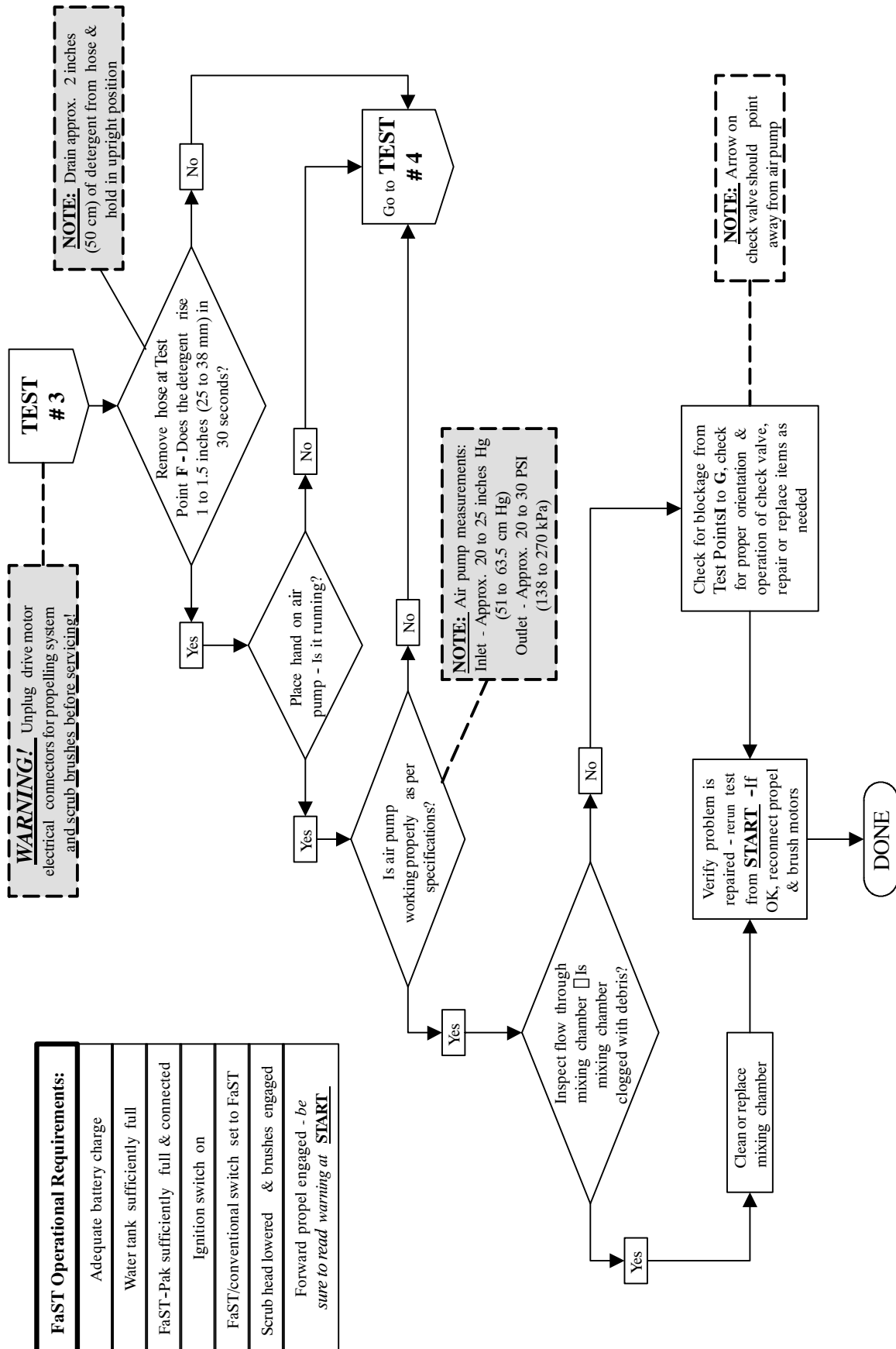
FaST Troubleshooting - TEST #2

(Too much water and low/no foam)



FaST Troubleshooting - TEST #3

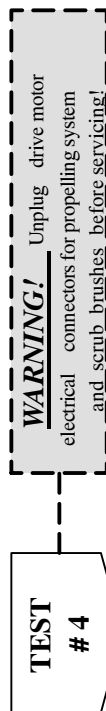
(Water OK, no foam)



FaST Troubleshooting - TEST #4

(Individual component testing)

FaST Operational Requirements:	
Adequate battery charge	
Water tank sufficiently full	
FaST-Pak sufficiently full & connected	
Ignition switch on	
FaST/conventional switch set to FaST	
Scrub head lowered & brushes engaged	
Forward propel engaged - <i>be sure to read warning at <u>START</u></i>	



Do components have the correct input voltage readings as listed below?

Yes

Repair or replace faulty component

Verify problem is repaired - rerun test from **START** - If OK, reconnect propel & brush motors

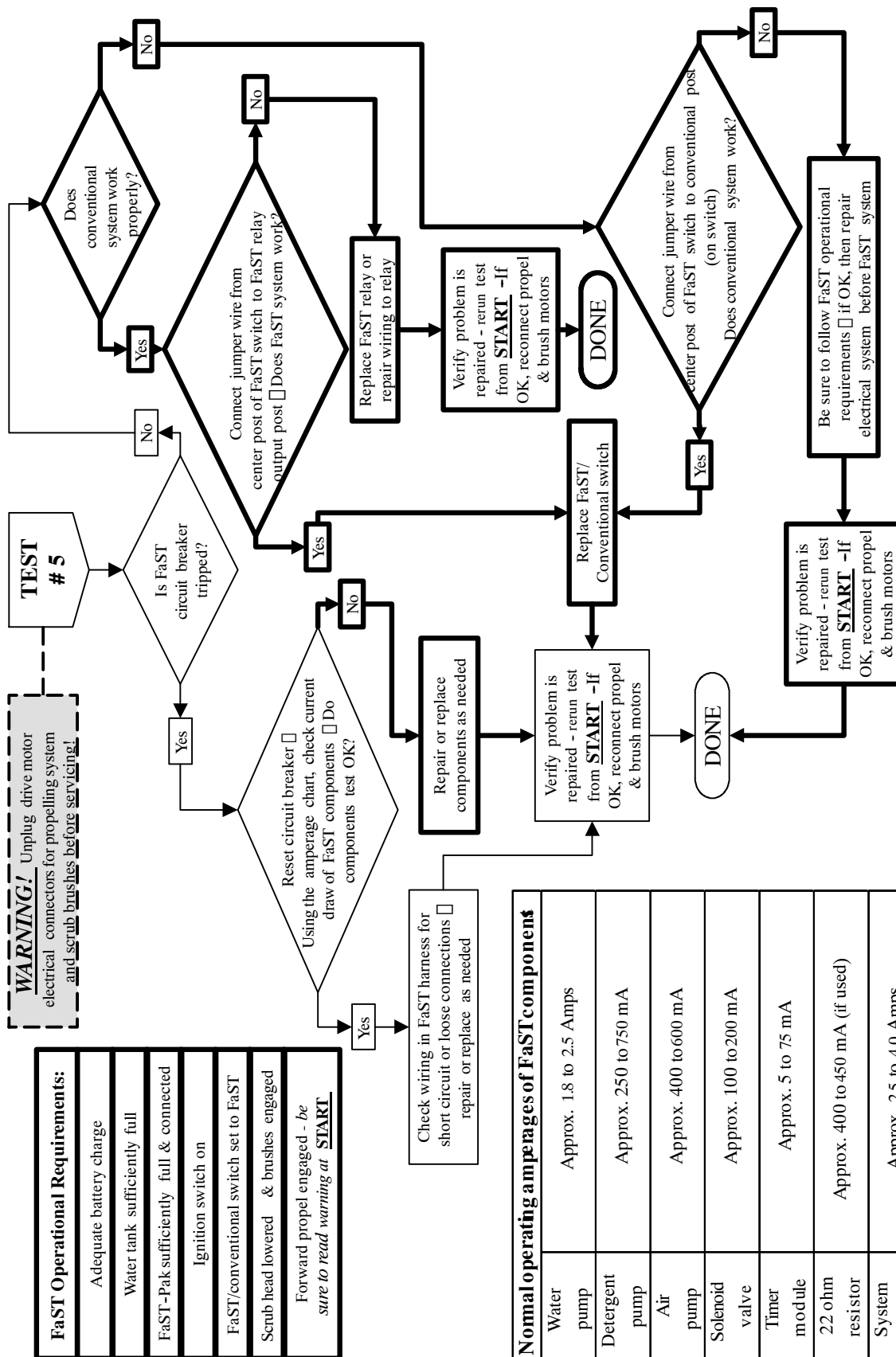
DONE

No

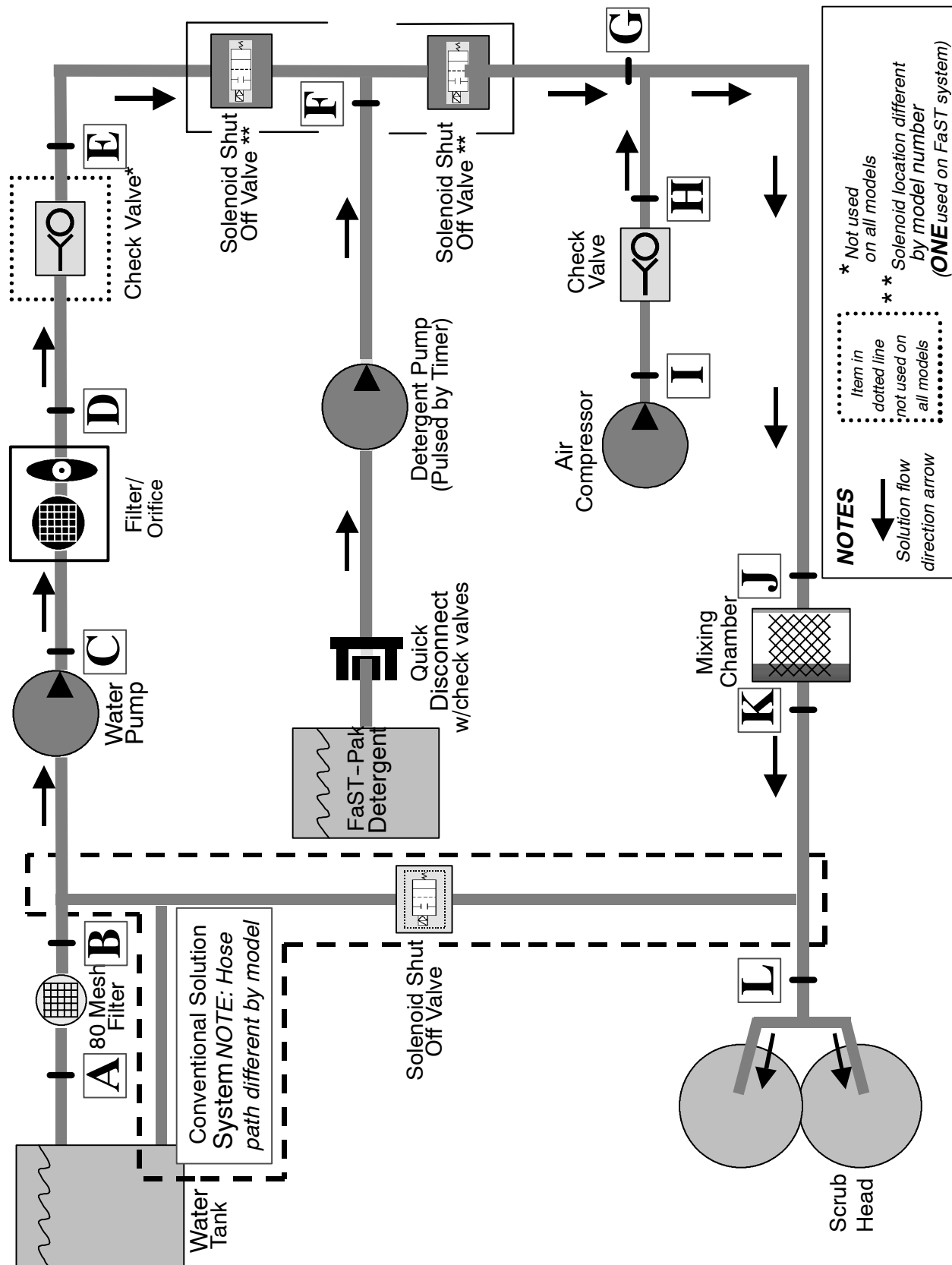
Go to **TEST #5**

Normal operating voltages at FaST components			
	24 vDC systems	36 vDC systems	
Water pump		Battery voltage	
Detergent pump		Battery voltage	
		Pulsed once every 2 seconds (If pulses are more or less than this, replace timer)	
Air pump		Battery voltage	26 to 28 vDC
Solenoid valve		Battery voltage	
Timer module		Battery voltage (at posts 1 & 3)	
22 ohm resistor		Not used	8 to 12 vDC Voltage drop across resistor

FaST Troubleshooting - TEST #5 (Overall electrical testing)



FaST Test Points - CHART #1





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Customer Number _____

Company _____

Address _____

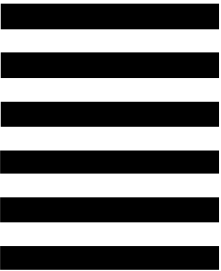
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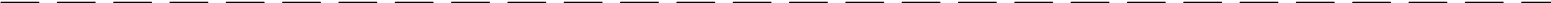
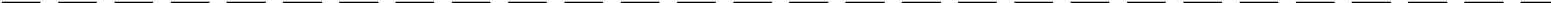
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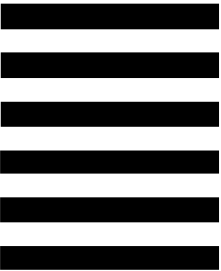
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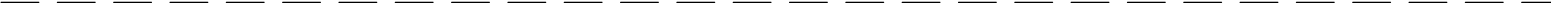
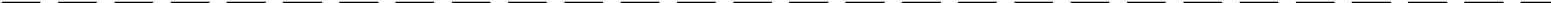
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