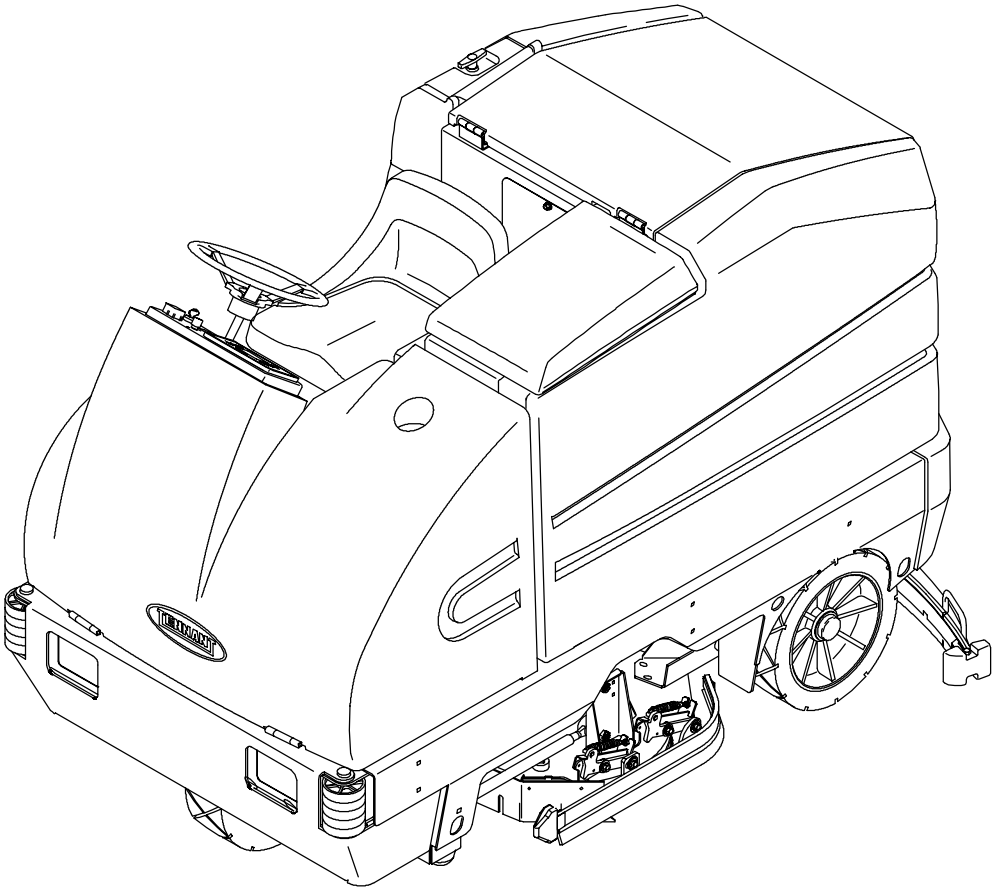
TENNANT

7300

Service Manual



330615
Rev. 02 (5-02)

This service manual is intended to be used as an aid in the detailed service, repair, and troubleshooting of your TENNANT Model 7300.

The set is organized into five major groups: General Information, Chassis, Scrubbing, Electrical, and Hydraulics.

General Information: Safety precautions, machine specifications, machine maintenance chart, machine tieing, machine jacking, machine storing, machine pushing or towing, and hardware information.

Chassis: Tire/wheel replacement, brake adjustment and replacement, steering adjustment and replacement.

Scrubbing: Scrub head repair/replacement, brush repair/replacement, skirt/seal repair/replacement, squeegee repair/replacement, solution and recovery tank repair/replacement, and scrubbing troubleshooting.

Electrical: Battery maintenance and replacement, electrical schematics, and electrical troubleshooting.

Hydraulics: Pump replacement/repair, filter replacement, hydraulic schematic, and hydraulic troubleshooting.

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CONTENTS

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.

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 explosion or fire. Do not pick up.

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.**
   - **In areas with possible falling objects unless equipped with overhead guard.**

2. **Before starting machine:**
   - **Make sure all safety devices are in place and operate properly.**
   - **Check brakes and steering for proper operation.**

3. **When starting machine:**
   - **Keep foot on brake and directional pedal in neutral.**

4. **When using machine:**
   - **Use brakes to stop machine.**
   - **Go slow on inclines and slippery surfaces.**
   - **Use care when backing machine.**
   - **Do not carry riders on machine.**
   - **Follow mixing and handling instructions on chemical containers.**
   - **Always follow safety and traffic rules.**
   - **Report machine damage or faulty operation immediately.**

5. **Before leaving or servicing machine:**
   - **Stop on level surface.**
   - **Set parking brake.**
   - **Turn off machine and remove key.**

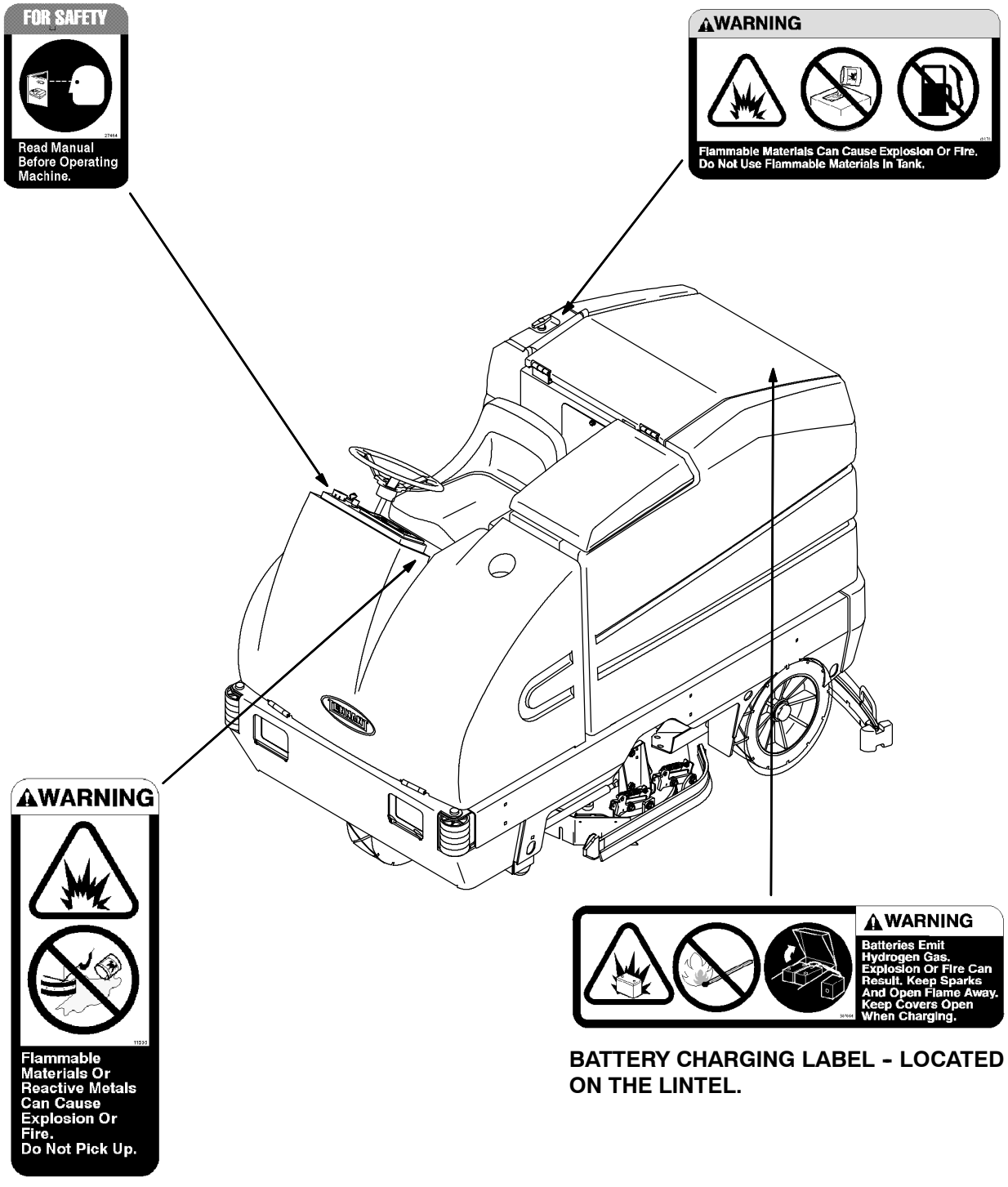
6. **When servicing machine:**
   - **Avoid moving parts. Do not wear loose jackets, shirts, or sleeves when working on machine.**
   - **Block machine tires before jacking machine up.**
   - **Jack machine up at designated locations only. Block machine up with jack stands.**
   - **Use hoist or jack 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.**

7. **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 drive 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.**
   - **Block machine tires.**
   - **Tie machine down to truck or trailer.**

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.

FOR SAFETY LABEL - LOCATED ON THE INSIDE OF THE OPERATOR COMPARTMENT.

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



BATTERY CHARGING LABEL - LOCATED ON THE LINTEL.

FLAMMABLE SPILLS LABEL - LOCATED ON THE INSIDE OF THE OPERATOR COMPARTMENT.

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SPECIFICATIONS

GENERAL MACHINE DIMENSIONS/CAPACITIES

Item	Dimension/capacity
Length	2134 mm (84 in)
Width, frame	1143 mm (45 in)
Width with rear squeegee	1300 mm (51 in)
Width with MaxPro™ 1200 scrub head option	1510 mm (53 in)
Height	1450 mm (57 in)
Height with overhead guard option	2070 mm (81.5 in)
Disc brush diameter for Max Pro™ 1000	510 mm (20 in)
Disc brush diameter for Max Pro™ 1200	406 mm (16 in)
Cylindrical brush diameter	229 mm (9 in)
Cylindrical brush length for Max Pro™ 1000	978 mm (38.5 in)
Cylindrical brush length for Max Pro™ 1200	1180 mm (46.5 in)
Rear Squeegee width for Max Pro™ 1000	1300 mm (51 in)
Rear Squeegee width for Max Pro™ 1200	1510 mm (59.5 in)
Scrubbing path width for Max Pro™ 1000	1020 mm (40 in)
Scrubbing path width for Max Pro™ 1200	1220 mm (48 in)
Solution tank capacity	216 L (57 gal)
Recovery tank capacity	216 L (57 gal)
Tank capacity with ES™ option	340 L (90 gal)
Propelling gear box 90 wt. gear lubricant capacity	2.7 L (2.7 qt)
GVWR	2060 kg (4580 lb)

GENERAL MACHINE PERFORMANCE

Item	Measure
Maximum forward speed	8.9 km/h (5.5 mph)
Maximum reverse speed	4.8 km/h (3mph)
Minimum turning radius, left	3620 mm (142.5 in)
Minimum turning radius, right	3680 mm (145 in)
Minimum isle turn width	2410 mm (95 in)
Maximum rated climb and descent angle with full tanks	6°
Maximum rated climb and descent angle with empty tanks	8°

POWER TYPE

Type	Quantity	Volts	Ah Rating	Weight
Batteries, Dry	1	36	500 @ 6 hr rate	617 kg (1370 lb)
	1	36	750 @ 6 hr rate	893 kg (1984 lb)
Batteries, Sealed	1	36	600 @ 6 hr rate	810 kg (1800 lb)
Batteries, Wet	1	36	380 @ 6 hr rate	436 kg (960 lb)
	1	36	500 @ 6 hr rate	617 kg (1370 lb)
	1	36	750 @ 6 hr rate	893 kg (1984 lb)

Type	Use	VDC	Kw (hp)
Electric Motors	Scrub brush	36	0.75 (1)
	Heavy Duty scrub brush	36	1.12 (1.5)
	Vacuum fan	36	0.63 (0.85)
	Propelling	36	3.4 (4.6)

Type	VDC	amp	Hz	Phase	VAC
Chargers	36	75	60	1	208–240–480
	36	75	60	3	208–240–480
	36	120	60	1	208–240–480
	36	120	60	3	208–240–480
	36	150	60	1	208–240–480
	36	150	60	3	208–240–480
	36	93	60	1	208–240–480
	36	93	60	3	208–240–480

STEERING

Type	Power source	Emergency steering
Front wheel controlled, universal joint to gear and chain	Manual	Manual
Front wheel, hydraulic cylinder and rotary valve controlled	Hydraulic (Option)	Manual

HYDRAULIC SYSTEM

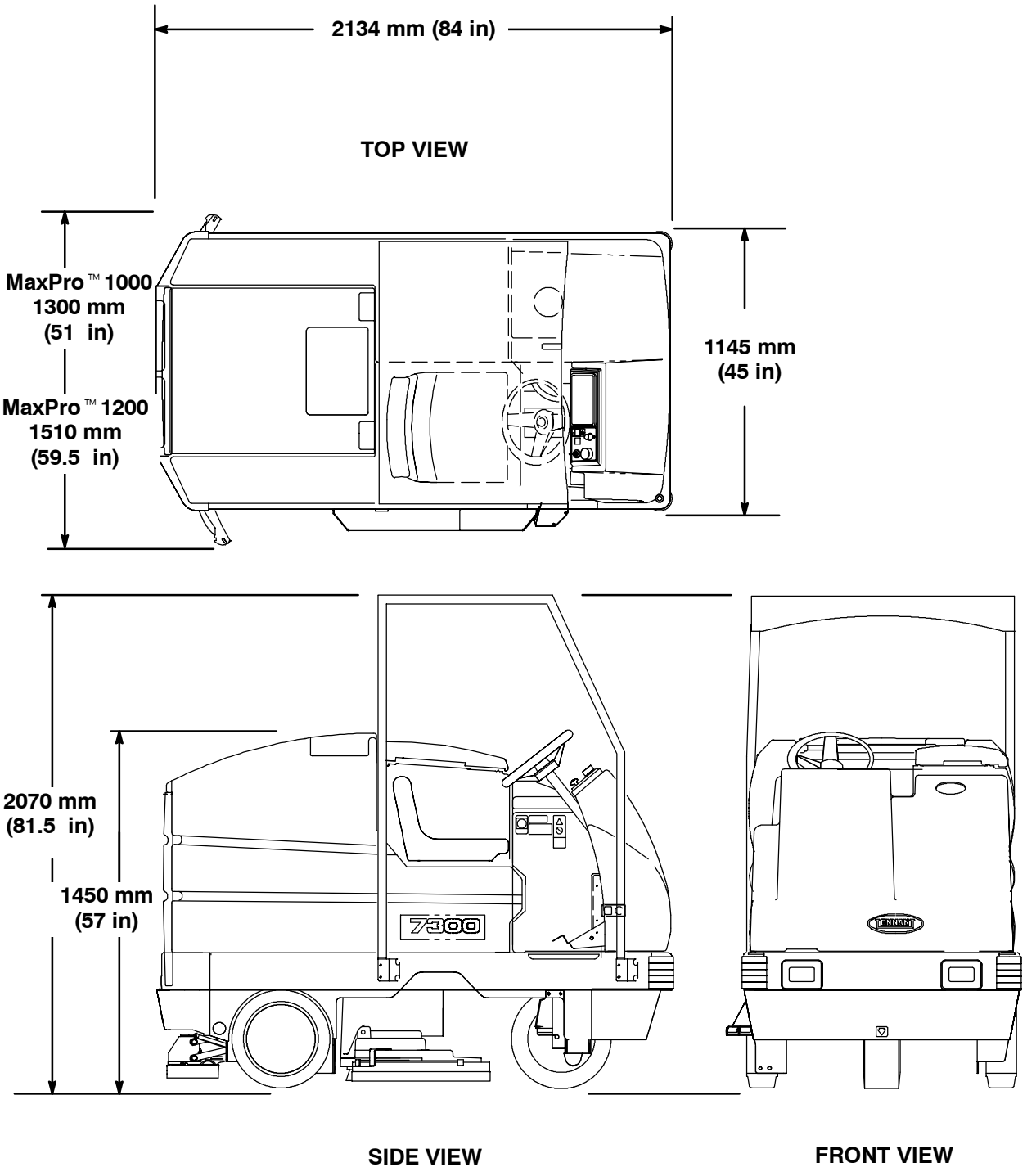
System	Capacity	Fluid Type
Hydraulic reservoir (Power Steering Option)	1.9L (0.5 gal)	TENNANT part no. 65869
Hydraulic total (Power Steering Option)	2.3L (0.6 gal)	TENNANT part no. 65870

BRAKING SYSTEM

Type	Operation
Service brakes	Mechanical drum brakes (2), one per rear wheel, cable actuated
Parking brake	Utilizes service brakes, cable actuated

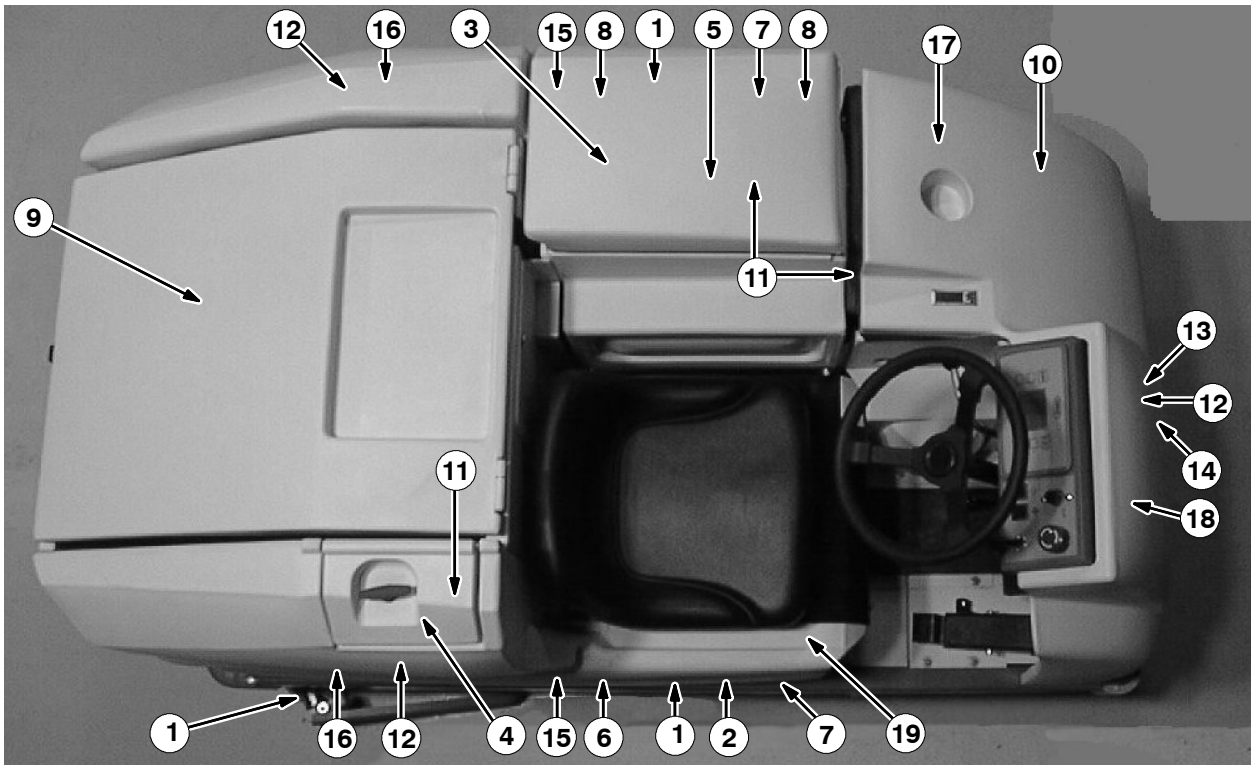
TIRES

Location	Type	Size
Front (1)	Solid	413 X 152 mm (16.25 x 6 in)
Rear (2)	Solid	406 X 127 mm (16 x 5 in)



MACHINE DIMENSIONS

MAINTENANCE



MAINTENANCE CHART

Interval	Key	Description	Procedure	Lubricant/ Fluid	No. of Service Points
Daily	1	Rear and side squeegees	Check for damage, wear and adjustment	–	3
				–	1
	2	Scrub brushes	Check for damage and wear	–	2
			Check for debris	–	2
	3	Recovery tank	Clean	–	1
	3	Recovery tank, ES™ mode	Clean ES™ filter	–	1
	4	Solution tank, ES™ mode	Clean and flush	–	1
	5	Vacuum fan filter	Clean and flush	–	1
	6	Debris trough (Cylindrical brushes only)	Check and clean	–	1
	–	Machine	Check for leaks	–	1
50 Hours	7	Cylindrical brushes	Check Taper	–	2
			Rotate front to rear	–	2
	8	Scrub head floor skirts (Disk brush heads only)	Check for damage and wear	–	1
	9	Battery cells	Check electrolyte level	DW	1

Interval	Key	Description	Procedure	Lubricant/ Fluid	No. of Service Points
100 Hours	16	Brakes	Check adjustment	–	1
	7	Cylindrical scrub brush drive belts	Check for damage and wear	–	1
	11	Front and tank cover seals	Check for damage and wear	–	1
	10	Hydraulic fluid (Power steering option)	Check fluid level	HYDO	1
	12	Front wheel support bearing	Lubricate	SPL	2
	13	Propelling gearbox	Check lubricant level	GL	1
	15	Scrub head drag link arm pivot points	Lubricate	SPL	8(4)
	12	Tires	Check for damage and wear	–	3
500 Hours	17	Vacuum fan motors	Check motor brushes	–	2
	12	Front wheel	■ Torque wheel nuts	–	1
	12	Rear wheel bearings	Check, lubricate, and adjust	SPL	1
	15	Scrub head gas spring	Check for wear and operation	–	1
	18	Steering gear chain	■ Check tension and lubricate	GL	1
	10	Hydraulic fluid (opt.)	Drain and replace	HYDO	1
	10	Hydraulic fluid filter (opt.)	Change filter element	–	1
	10	Hydraulic hoses (opt.)	Check for damage and wear	–	1
1000 Hours	13	Propelling gearbox	■ Change fill-level plug seals	–	1
			■ Change gear lubricant	GL	1
	19	Scrubbing brush drive motors	Check motor brushes	–	2,3
	13	Propelling motor	Check motor brushes	–	1

SPL – Special lubricant, Lubriplate EMB grease (Tennant part no. 01433–1)
GL – SAE 90 weight gear lubricant
HYDO – TENNANT or approved hydraulic fluid
DW – Distilled water

NOTE: Also check procedures indicated (■) after the first 50-hours of operation.

PUSHING, TOWING, AND TRANSPORTING THE MACHINE

PUSHING OR TOWING THE MACHINE

If the machine becomes disabled, it can be pushed from the front or rear, but only tow it from the front.

Only push or tow the machine for a *very short distance* and do not exceed 3.2 kph (2mph). It is NOT intended to be pushed or towed for a long distance or at a high speed.

ATTENTION! Do not push or tow machine for a long distance or damage may occur to the propelling system.

TRANSPORTING THE MACHINE

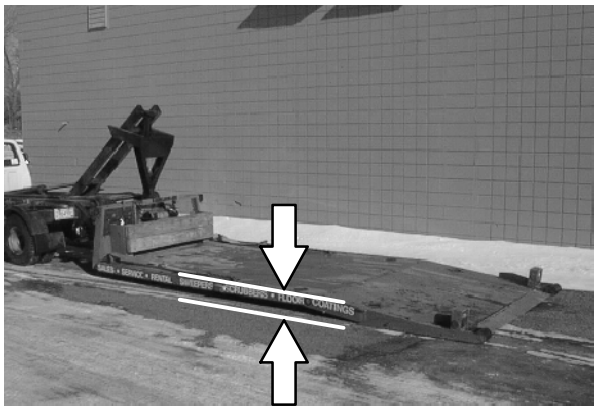
1. Position the front of the machine at the loading edge of the truck or trailer.

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

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

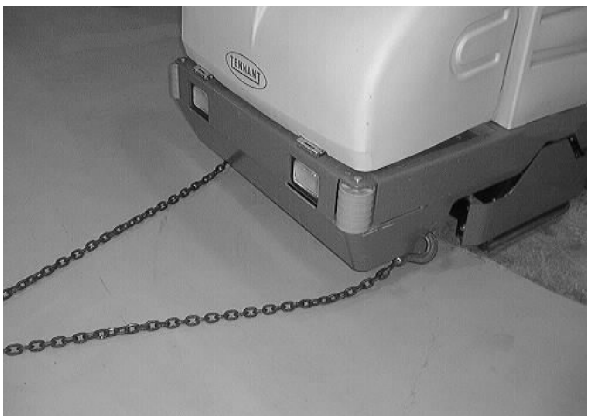
2. If the loading surface is not horizontal or is higher than 380 mm (15in) from the ground, use a winch to load machine.

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



3. To winch the machine onto the truck or trailer, attach the winching chains to the front tie down locations. The front tie-down locations are on the front sides of the machine. Make sure the machine is centered.

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

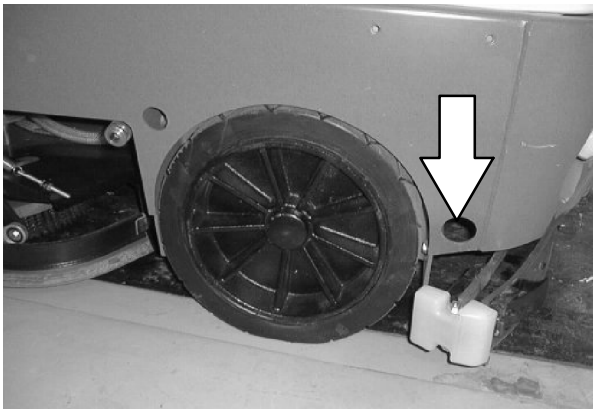


4. Position the machine onto the truck or trailer as far as possible. If the machine starts to veer off the centerline of the truck or trailer, stop and turn the steering wheel to center the machine.

5. Set the parking brake and block the machine tires. Tie down the machine to the truck or trailer before transporting.

   The front tie-down locations are on the front sides of the machine.

   The rear tie-down locations are on the rear sides of the machine.



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

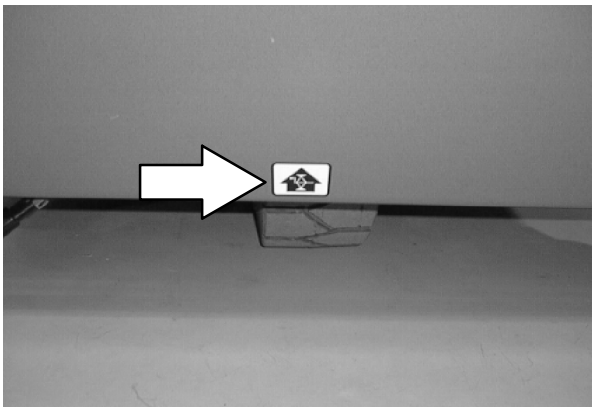
   If the loading surface is horizontal AND is 380 mm (15in) or less from the ground, the machine may be driven off the truck or trailer.

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

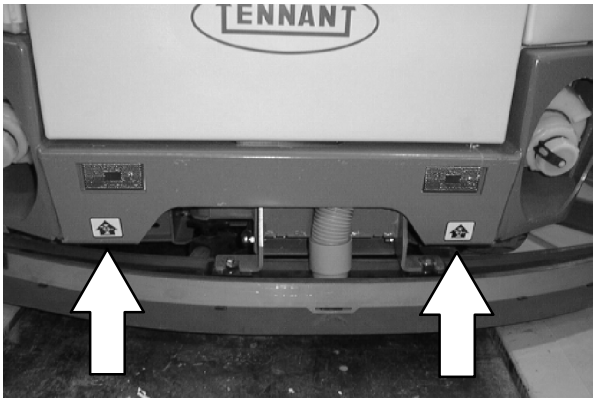
MACHINE JACKING

Empty the solution and recovery tanks before jacking the machine. You can jack up the machine for service at the designated locations. Use a hoist or jack that will support the weight of the machine. Always stop the machine on a flat, level surface and block the tires before jacking up the machine.

The front jacking location is in the center of the front bumper.



The rear jacking locations are located on the rear bumper, behind the rear tires.



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.

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.

   ES™ machines: Run clean water through the solution system and the ES™ solution pump.

2. Raise the rear squeegee and the scrub head.

3. Park the machine in a cool, dry area.

4. Remove the batteries, or charge them after every three months.

MACHINE TROUBLESHOOTING

Problem	Cause	Remedy
Trailing water – poor or no water pickup	Rear squeegee blades worn	Rotate or replace blades
	Rear squeegee out of adjustment	Adjust rear squeegee
	Rear squeegee raised	Lower rear squeegee
	Rear squeegee tube clogged	Flush squeegee tube
	Side squeegees raised	Lower side squeegees
	Side squeegee blades worn	Replace side squeegee blades
	Side squeegees out of adjustment	Adjust side squeegees
	Too much solution flow to floor	Reduce solution flow to floor
	Vacuum hose clogged	Flush vacuum hoses
	Recovery tank cover not seated	Reseat tank cover
	Recovery tank cover seal worn	Replace seal
	Recovery tank full.	Drain recovery tank
	Float stuck shutting off vacuum	Clean float
	Debris caught on rear squeegee	Remove debris
	Foam filling recovery tank	Empty recovery tank; use less or change detergent
	Vacuum hose to rear squeegee disconnected or damaged	Reconnect or replace vacuum hose
Vacuum fan will not turn on	Recovery tank full	Drain recovery tank
	Vacuum fan circuit breaker tripped	Reset circuit breaker
	Machine in reverse or neutral	Propel forward
	Vacuum fan failure	Contact Tennant service representative
Little or no solution flow to the floor	Solution tank empty	Fill solution tank
	Solution flow lever off	Open solution flow lever
	Solution supply lines plugged	Flush solution supply lines
	ES™ switch off	Turn ES™ switch on
	Manual control valve closed	Open valve more

Problem	Cause	Remedy
Poor scrubbing performance	Debris caught on scrub brushes	Remove debris
	Improper detergent or brushes used	Check with TENNANT representative for advice
	Scrub brush pressure not set properly	Replace scrub brushes
	Worn scrub brushes	Replace scrub brushes
Poor debris pick up with cylindrical brushes	One or both brushes installed with herringbone pattern wrong	Correct cylindrical brush configuration
ES™ system does not fill solution tank	Clogged solution pump or lines	Flush ES™ system
	ES™ float switch(es) stuck	Clean switch floats of debris
	Clogged ES™ pump filter	Clean ES™ filter
	Water levels too low in tanks	Add water to tanks

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

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THREAD SEALANT AND LOCKING COMPOUNDS

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

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

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

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

HYDRAULIC FITTING INFORMATION

HYDRAULIC TAPERED PIPE FITTING (NPT) TORQUE CHART

NOTE: Ratings listed are when using teflon thread seal.

Size	Minimum Torque	Maximum Torque
1/4 NPT	10 ft lb (14 Nm)	30 ft lb (41 Nm)
1/2 NPT	25 ft lb (34 Nm)	50 ft lb (68 Nm)
3/4 NPT	50 ft lb (68 Nm)	100 ft lb (136 Nm)

HYDRAULIC TAPERED SEAT FITTING (JIC) TORQUE CHART

Tube O.D. (in)	Thread Size	Maximum Torque
0.25	0.44-20	9 ft lb (12 Nm)
0.38	0.56-18	20 ft lb (27 Nm)
0.50	0.75-16	30 ft lb (41 Nm)
0.62	0.88-14	40 ft lb (54 Nm)
0.75	1.12-12	70 ft lb (95 Nm)
1.0	1.31-12	90 ft lb (122 Nm)

HYDRAULIC O-RING FITTING TORQUE CHART

Tube O.D. (in)	Thread Size	Minimum Torque	Maximum Torque
0.25	0.44-20	6 ft lb (8 Nm)	9 ft lb (12 Nm)
0.38	0.56-18	13 ft lb (18 Nm)	20 ft lb (27 Nm)
		*10 ft lb (14 Nm)	12 ft lb (16 Nm)
0.50	0.75-16	20 ft lb (27 Nm)	30 ft lb (41 Nm)
		*21 ft lb (28 Nm)	24 ft lb (33 Nm)
0.62	0.88-14	25 ft lb (34 Nm)	40 ft lb (54 Nm)
0.75	1.12-12	45 ft lb (61 Nm)	70 ft lb (95 Nm)
1.0	1.31-12	60 ft lb (81 Nm)	90 ft lb (122 Nm)

NOTE: Do not use sealant on o-ring threads.

*Aluminum bodied components

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INTRODUCTION

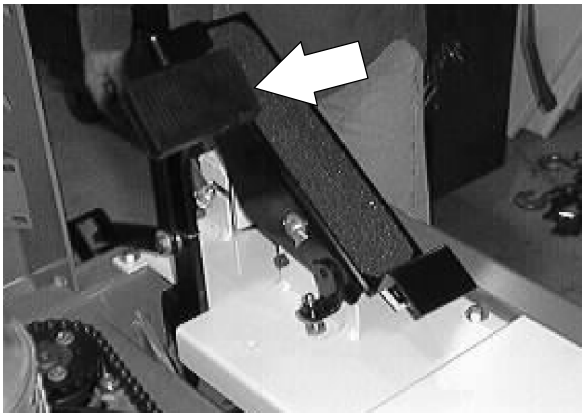
This section includes information on the main chassis related components for example, the steering, brakes, and tires.

BRAKES AND TIRES

SERVICE BRAKES

The mechanical service brakes are located on the rear wheels. The brakes are operated by the foot brake pedal located in the operators compartment.

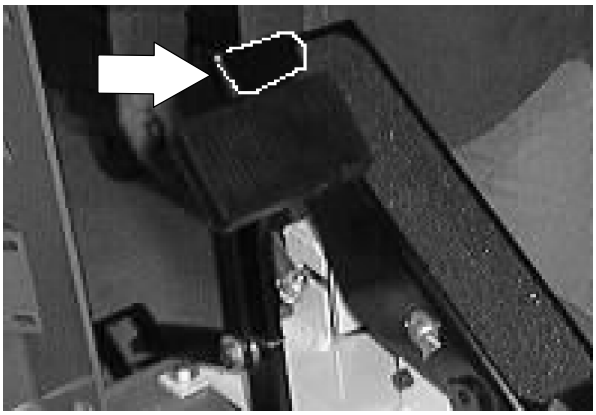
Check the brake adjustment every 200 hours of operation.



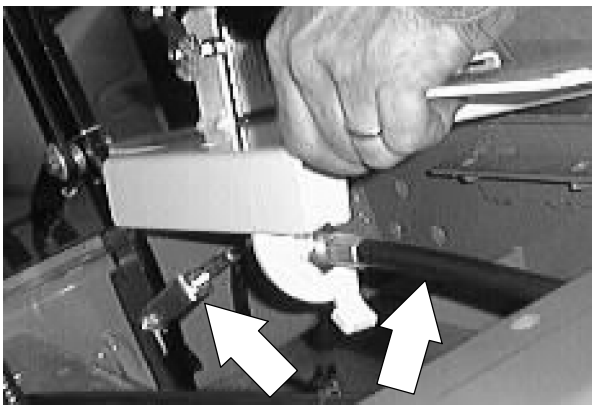
TO ADJUST SERVICE BRAKES

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

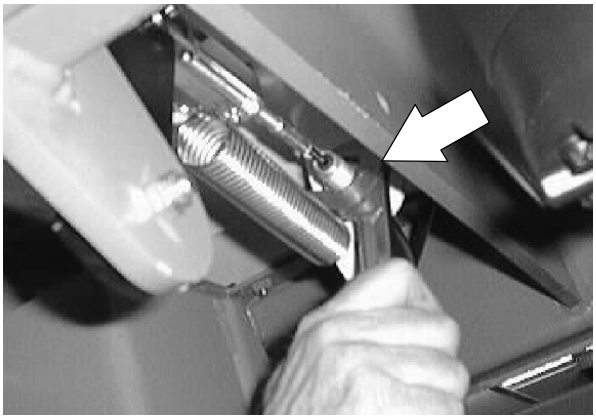
1. Make sure the parking brake is not engaged.



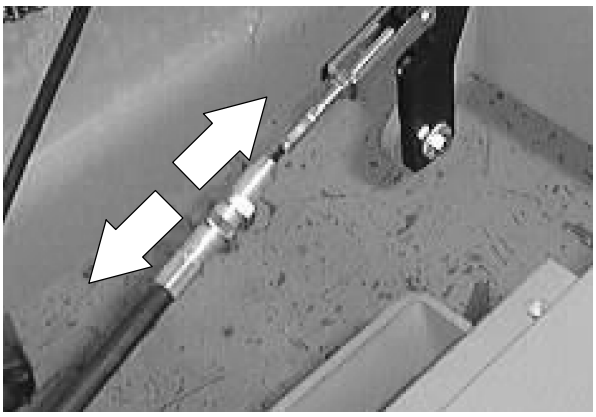
2. Go under the front, right corner of machine frame. Locate the brake cable assembly.



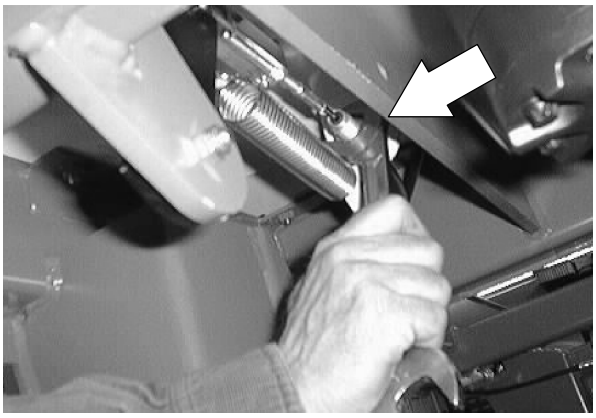
3. Loosen the large jam nuts on the brake cable at the floor plate mounting tab.



4. Move the brake cable forward or backward to adjust the pedal throw.

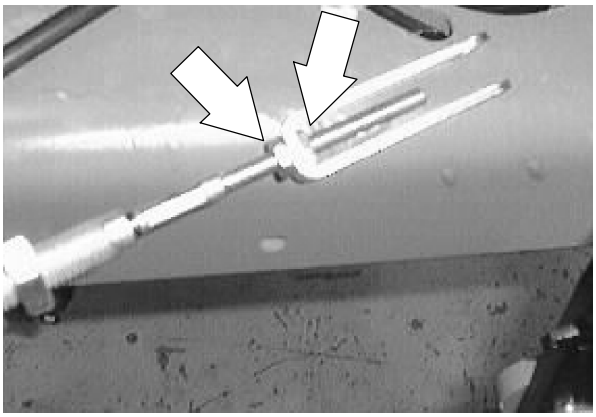


5. Retighten the large jam nuts on the brake cable at the floor plate mounting tab.

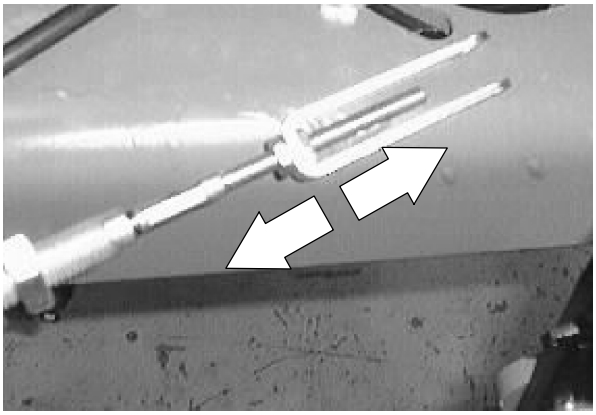


IF MORE ADJUSTMENT IS NEEDED:

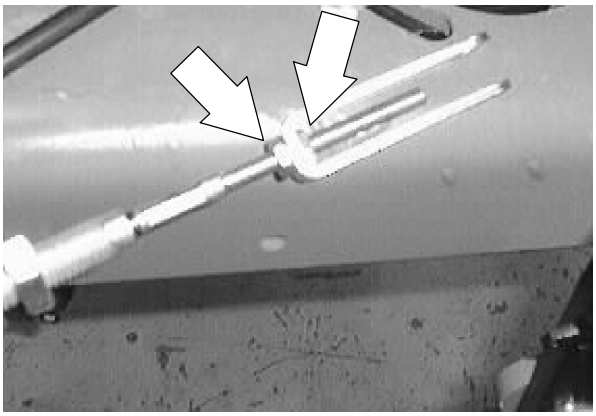
1. Loosen the smaller jam nuts on the brake cable at the clevis assembly.



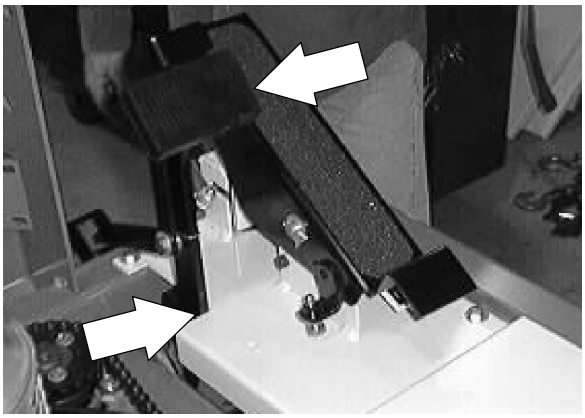
2. Move the brake cable forward or backward in the clevis assembly for additional adjustment to the pedal throw.



3. Retighten the two small jam nuts at the clevis assembly.



4. Go to the operators compartment and check the service brake pedal adjustment. The pedal should engage the service brakes with 1 inch of movement or less.

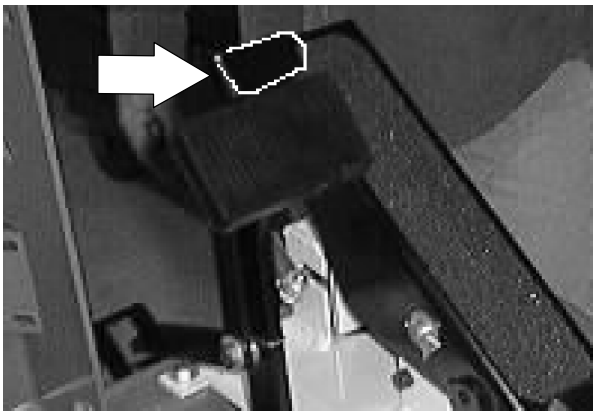


5. If needed, repeat adjustment procedure.

TO REPLACE BRAKE SHOES

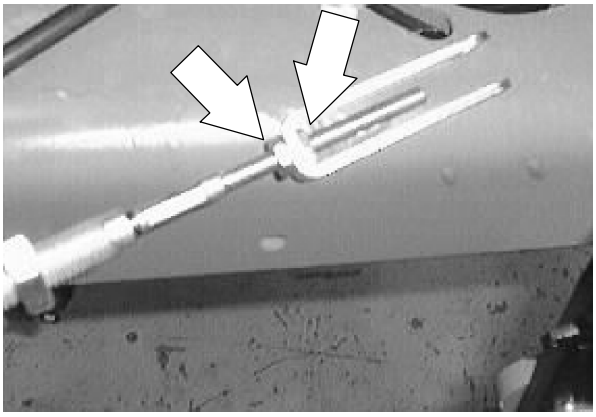
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

1. Make sure the parking brake is not engaged.



2. Go under the front, right corner of machine frame. Locate the brake cable clevis assembly.

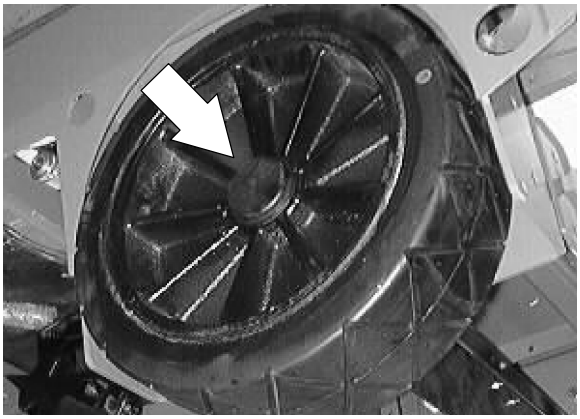
3. Loosen the jam nuts on the brake cable at the clevis until the brake cable goes slack.



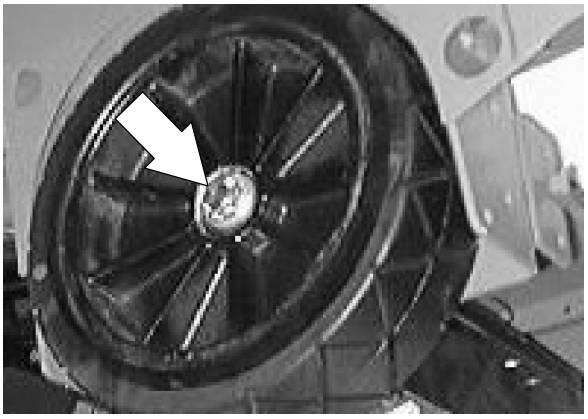
4. Jack up one rear corner of the machine. Place jack stands under machine.

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

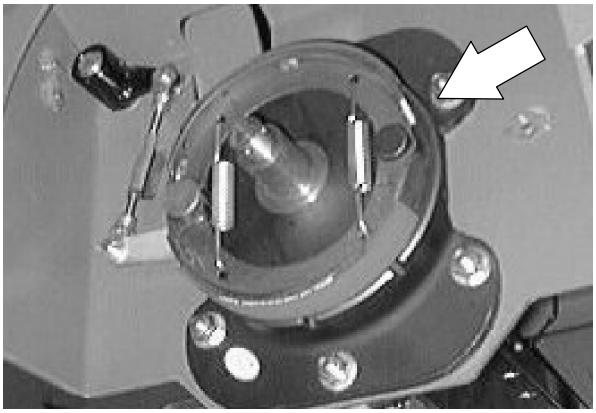
5. Remove the hub cap from the center of the tire and wheel assembly.



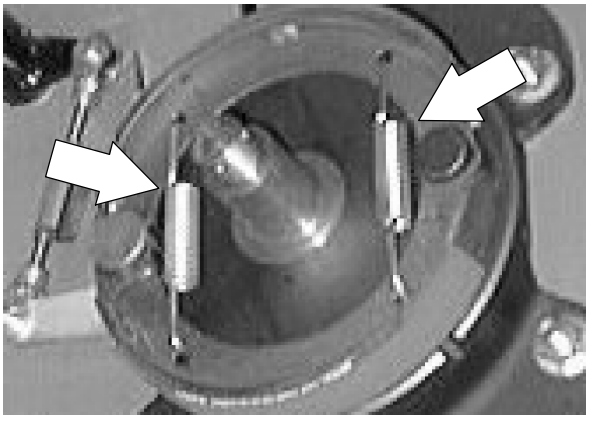
6. Remove the cotter pin, slotted nut, flat washer, and bearing cone.



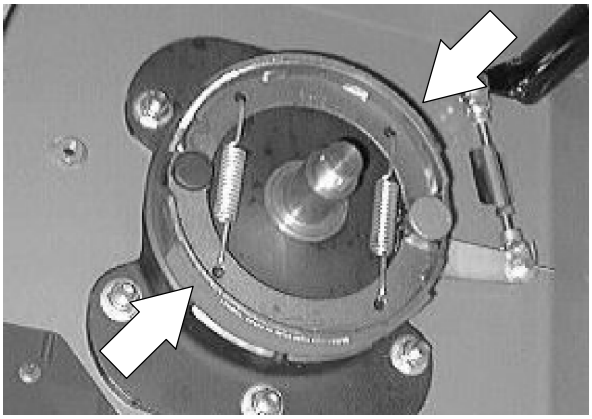
7. Remove the tire and wheel assembly from the machine.



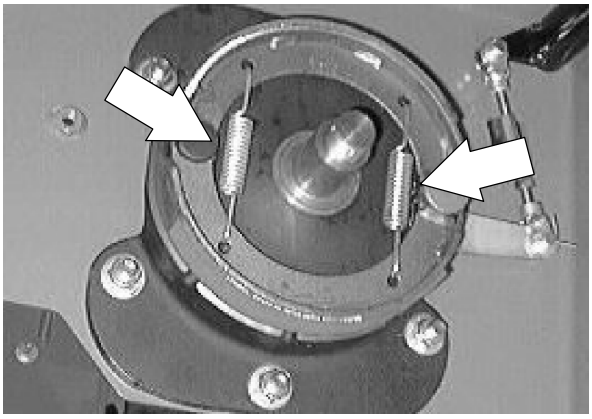
8. Remove the two springs holding the brake shoes together. Remove the old brake shoes.



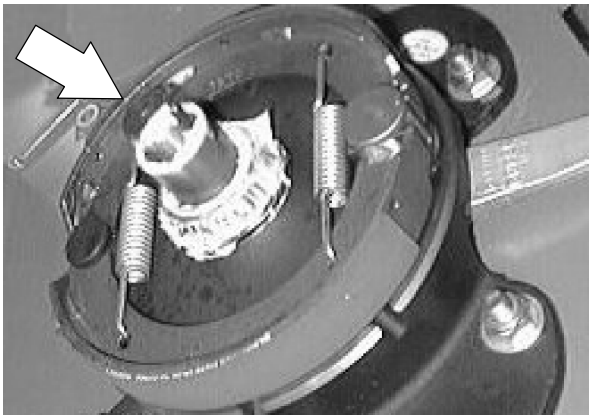
9. Position the new brake shoes on the brake mounting plate.



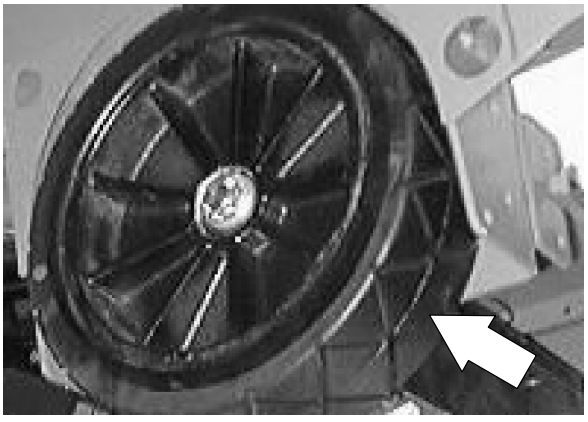
10. Reattach the two brake springs to the new brake shoes.



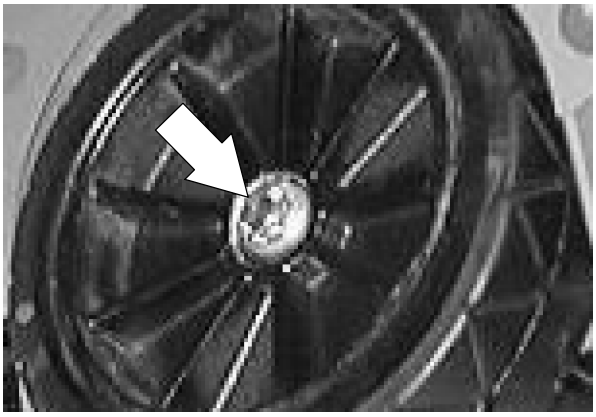
11. Pack the wheel bearings with Lubriplate EMB grease.



12. Slide the tire and wheel assembly on the axle.



13. Slide the outer bearing, flat washer and nut on the shaft.

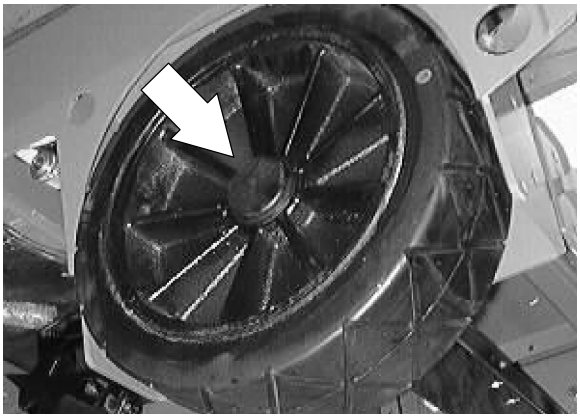


14. Tighten nut with hand wrench until wheel binds, then back nut off to nearest hole.

15. Insert a new cotter pin through nut and hole.

16. Spin the tire and wheel assembly. The tire should spin freely.

17. Reinstall the hub cap in the center of the wheel.

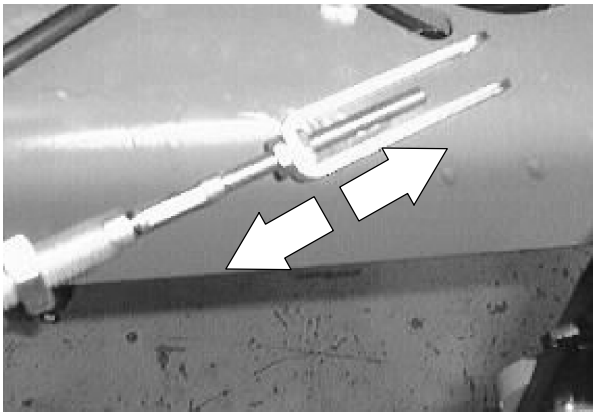


18. Lower the machine.

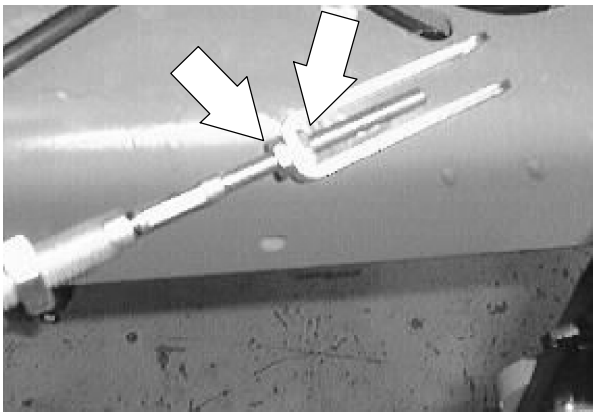
NOTE: Always replace brake shoes in sets.

19. Repeat the procedure on the other wheel.

20. Adjust the brake cable clevis until the brake cable is tight or until the brake pedal travels 25–50 mm (1–2 in) before engaging brakes.



21. Tighten the brake cable jam nuts at the clevis.



22. Operate the machine and check the brakes for proper operation.

REAR TIRES AND WHEELS

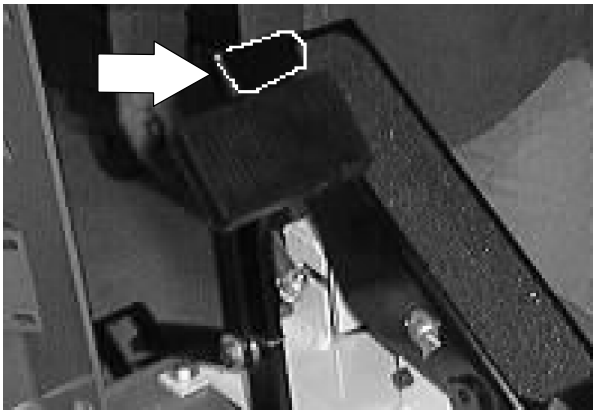
The rear tires are straight side wall – solid rubber.

Inspect the rear wheel bearings for seal damage, and repack and adjust every 1600 hours of operation. Use Lubriplate EMB grease (TENNANT part no. 01433–1).

TO REPACK REAR WHEEL BEARINGS

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

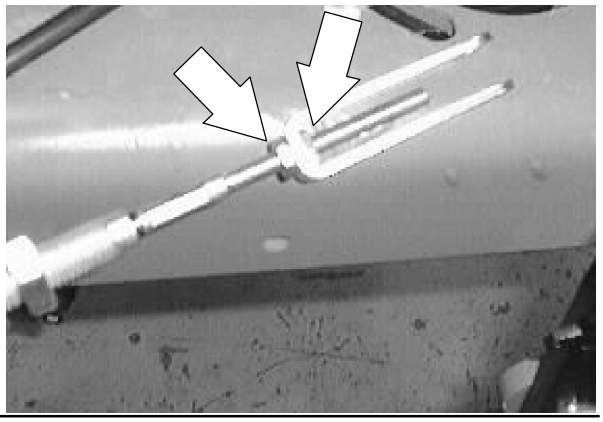
1. Make sure the parking brake is not engaged.



2. Go under the front, right corner of machine frame. Locate the brake cable clevis assembly.

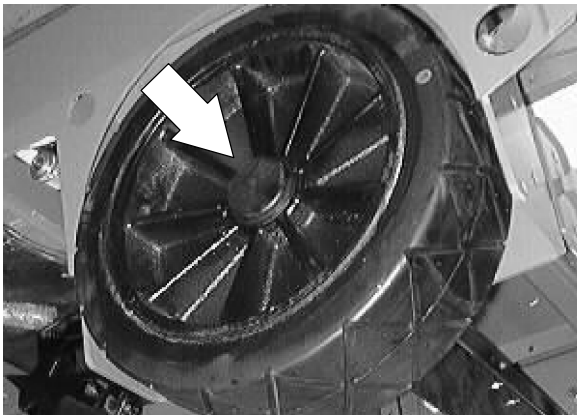
3. Loosen the jam nuts on the brake cable at the clevis until the brake cable goes slack.

4. Jack up one rear corner of the machine. Place jack stands under machine.

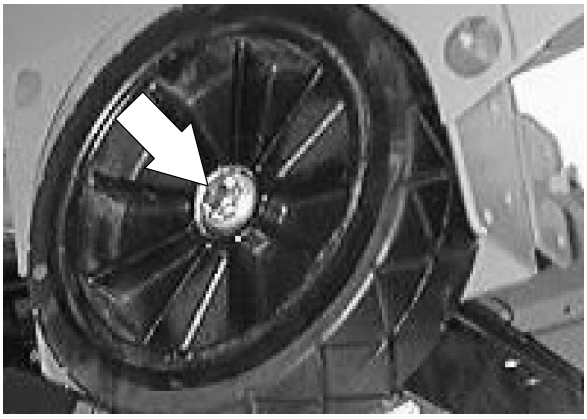


FOR SAFETY: Block machine tires before jacking machine up. Jack machine up at designated locations only. Block machine up with jack stands.

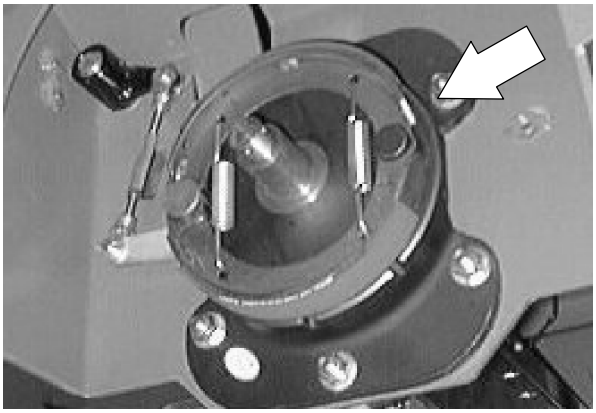
5. Remove the hub cap from the center of the tire and wheel assembly.



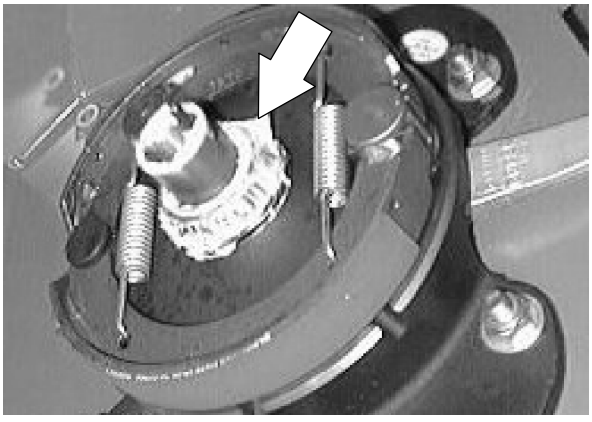
6. Remove the cotter pin, slotted nut, flat washer, and bearing cone.



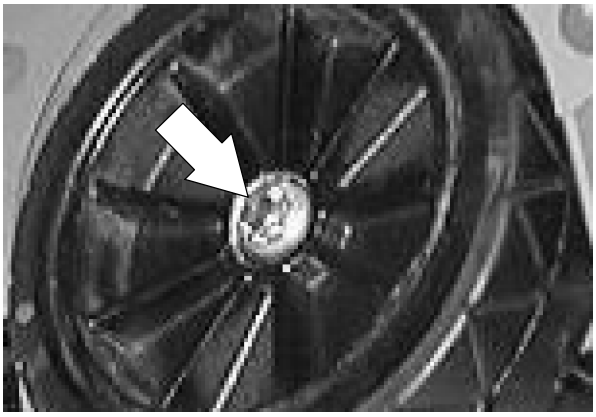
7. Remove the tire and wheel assembly from the machine.



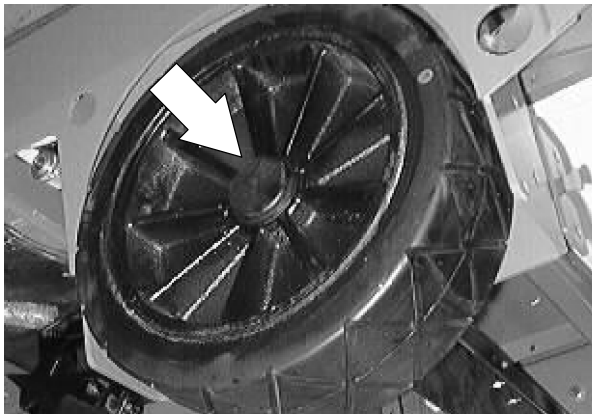
8. Pack the wheel bearings with Lubriplate EMB grease.



9. Slide the outer bearing, flat washer and nut on the shaft.



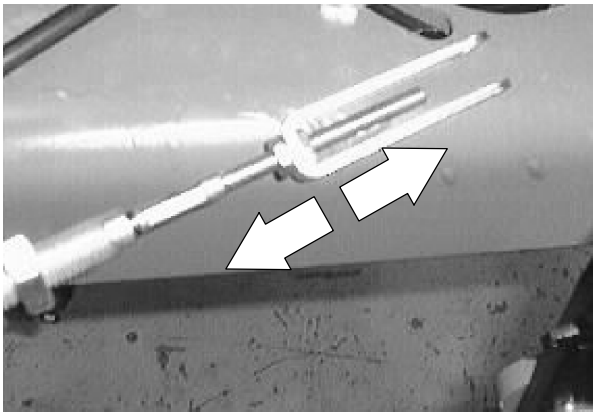
10. Tighten nut with hand wrench until wheel binds, then back nut off to nearest hole.
11. Insert a new cotter pin through nut and hole.
12. Spin the tire and wheel assembly. The tire should spin freely.
13. Reinstall the hub cap in the center of the wheel.



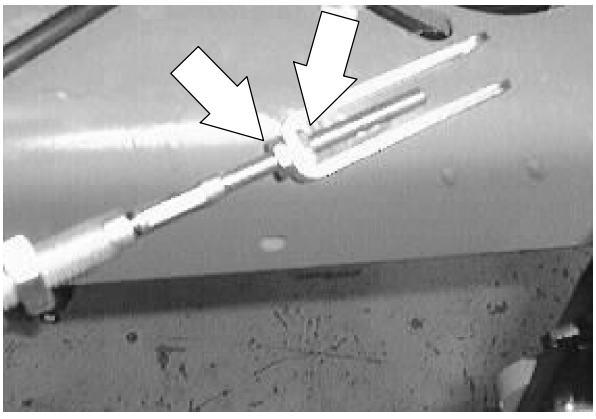
14. Lower the machine.

NOTE: Always replace brake shoes in sets.

15. Repeat the procedure on the other wheel.
16. Adjust the brake cable clevis until the brake cable is tight or until the brake pedal travels 25–50 mm (1–2 in) before engaging brakes.



17. Tighten the brake cable jam nuts at the clevis.

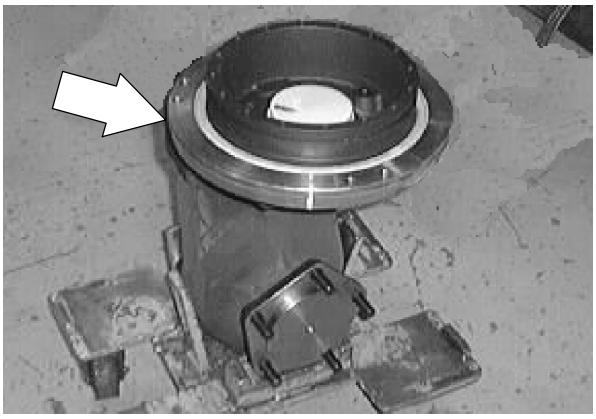


18. Operate the machine and check the rear wheels for proper operation.

FRONT TIRE AND WHEEL, AND WHEEL DRIVE SUPPORT

FRONT WHEEL SUPPORT AND BEARING

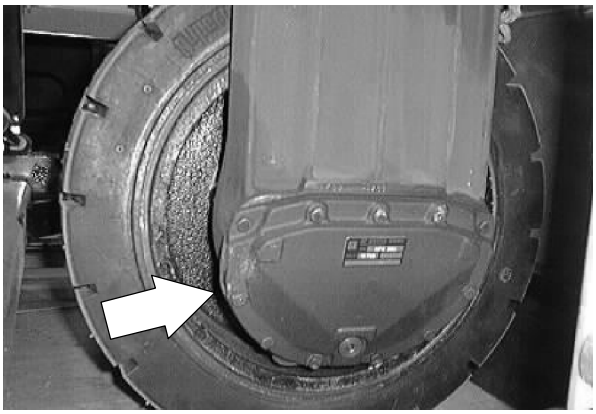
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.



The front wheel support bearing allows the gearbox and front wheel assembly to rotate freely. Raise the machine so the front wheel is off the ground. Fill one grease fitting with Lubriplate EMB grease (TENNANT Part No. 01433–1) while rotating the gearbox from stop to stop. Fill the second grease fitting while rotating the gearbox back to the original position. The bearing cavity is full when grease comes out of the fittings or out of the top seal. Apply the lubricant after every 200 hours of operation, or after steam cleaning the gearbox area.

Torque the front wheel nuts to 122 to 150 Nm (90 to 110 ft lb) after the first 50-hours of operation, and every 800 hours there after.

PROPELLING GEARBOX

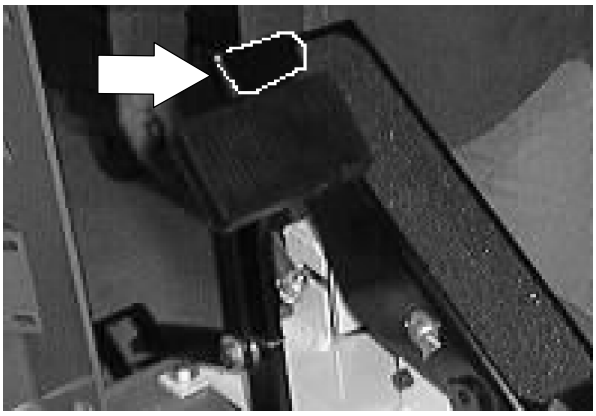


The propelling gearbox transfers power from the propelling motor to the front wheel. It is lubricated with SAE 90 weight gear lubricant. Check the lubricant level after every 100 hours of operation. Change the gear lubricant and the drain and fill-level plug seals after the first 50 hours of operation, and then after every 1000 hours of operation.

TO REPLACE FRONT DRIVE GEAR BOX

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

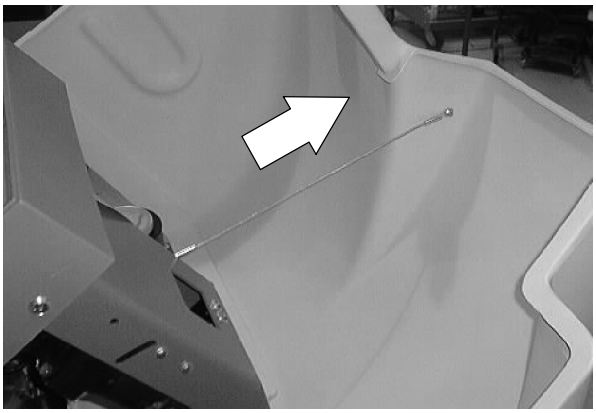
1. Engage the parking brake, block the rear tires.



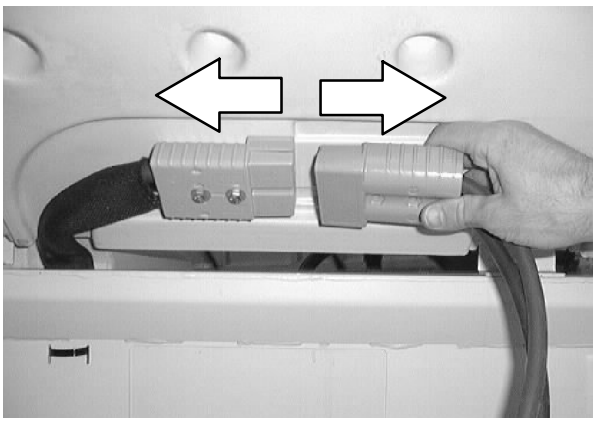
2. Jack up the front of the machine. Use jack stands to support the machine.

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

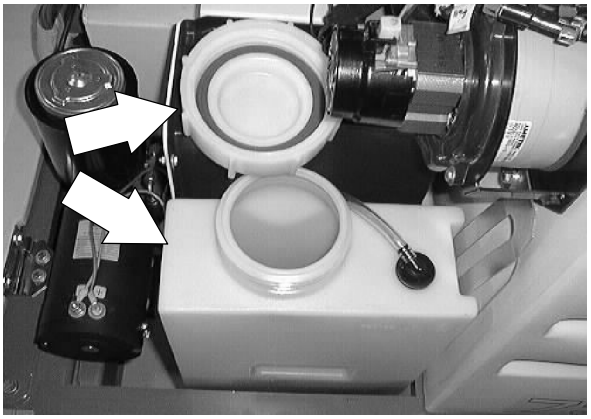
3. Open the front cover.



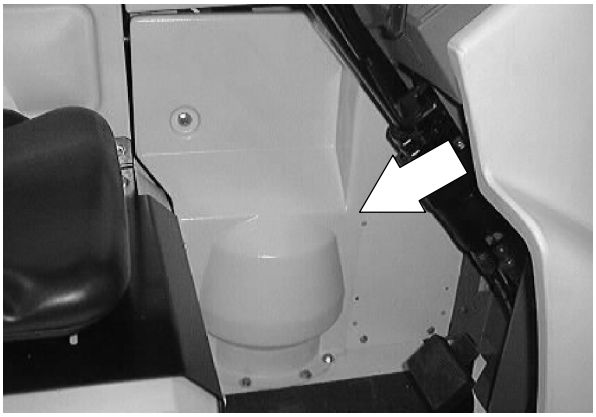
4. Open the battery cover and un-plug the battery connector from the machine.



5. Remove the detergent tank and control panel cover from the machine.



6. Remove the plastic drive motor cover.

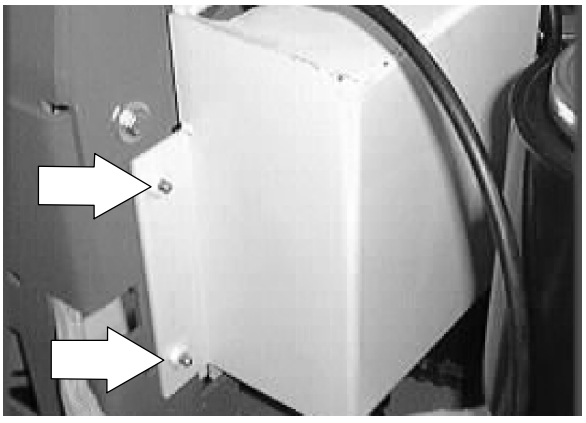


7. Remove the three hex screws holding the main electrical panel to the machine frame.

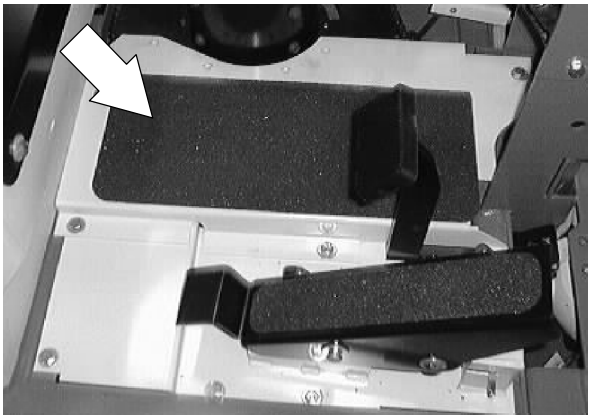
NOTE: Move the main panel back far enough so there is clearance to remove the large steering sprocket from the drive assembly.

8. Remove the hardware holding the smaller electrical panel to the left side of the steering support column.

NOTE: Move the small panel back far enough so there is clearance to remove the large steering sprocket from the drive assembly.

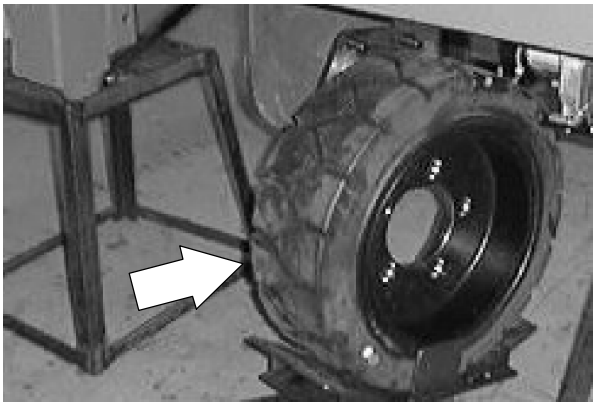


9. Remove the inside floor plate.

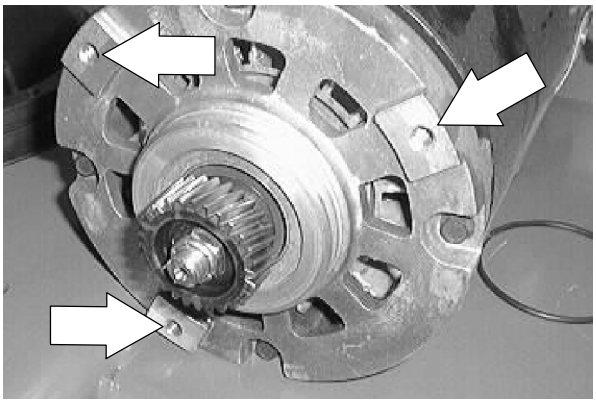


10. Mark and disconnect the four electrical cables leading to the drive motor.

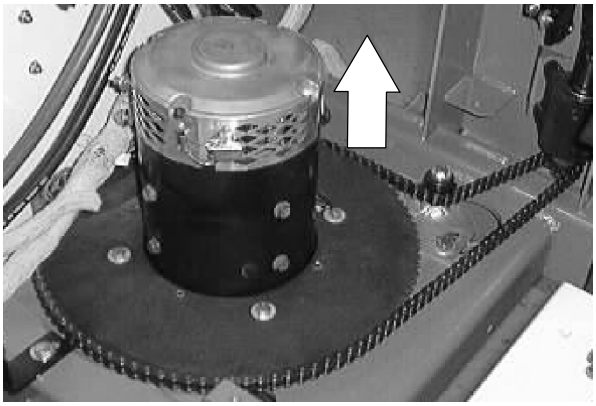
11. Remove the front tire and wheel assembly from the drive motor hub.



12. Remove the three M8 socket head cap screws holding the electric drive motor to the drive gear box.



13. Pull the drive motor straight up and out of the drive gear box. Remove it from the machine.

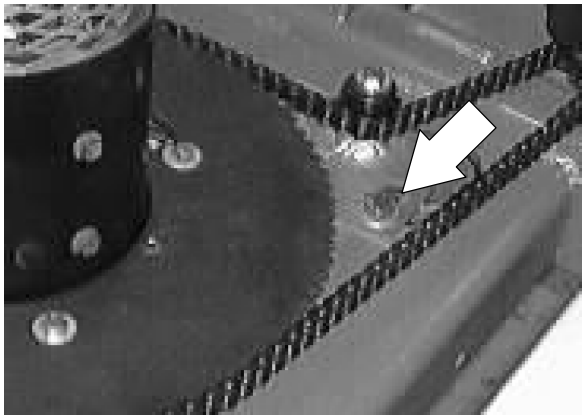


NOTE: Be careful not to lose the rubber o-ring that is on the bottom of the motor.

14. Place a drain pan under the drive gear box and drain the gear lube. Replace the plug.

MANUAL STEERING:

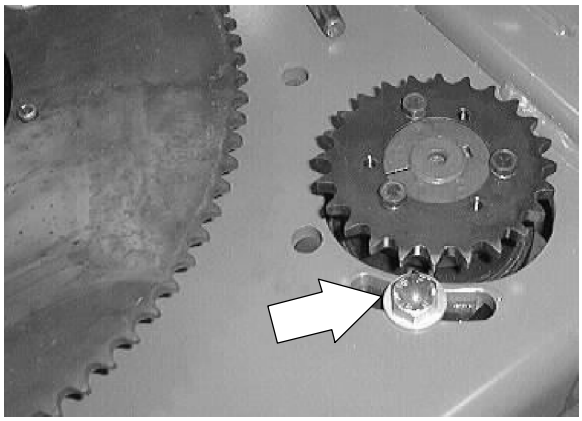
15. Loosen the two hex screws on the chain idler mounting plate. Slide the plate forward to gain slack in the steering chain.



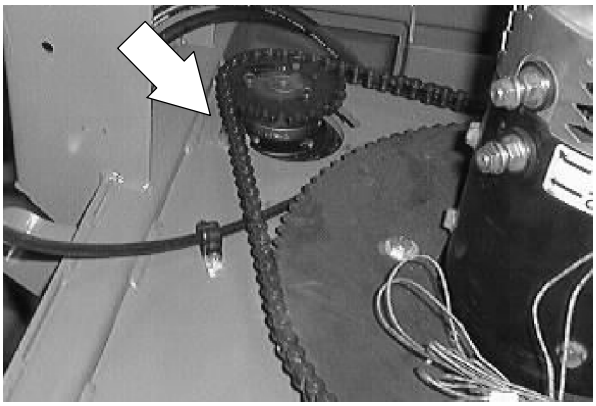
16. Drop the chain off the steering and idler sprockets.

POWER STEERING:

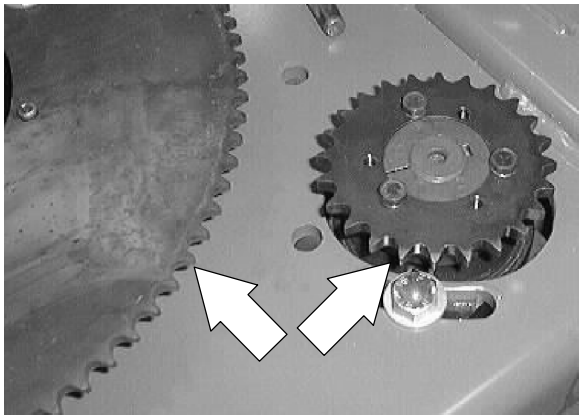
17. Loosen the hardware holding the hydraulic steering motor to the machine frame.



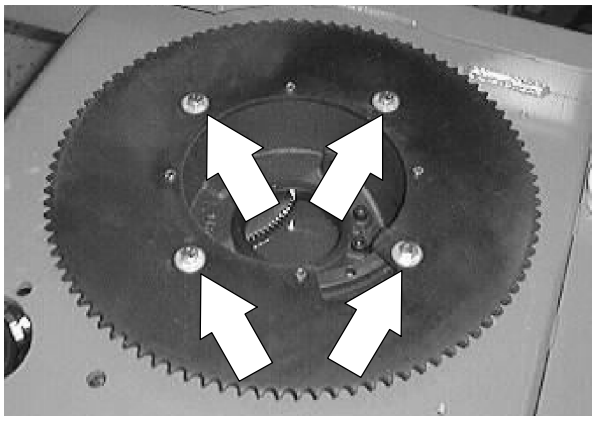
18. Push the steering motor in until there is slack in the steering chain.



19. Drop the chain off the steering and motor sprockets.



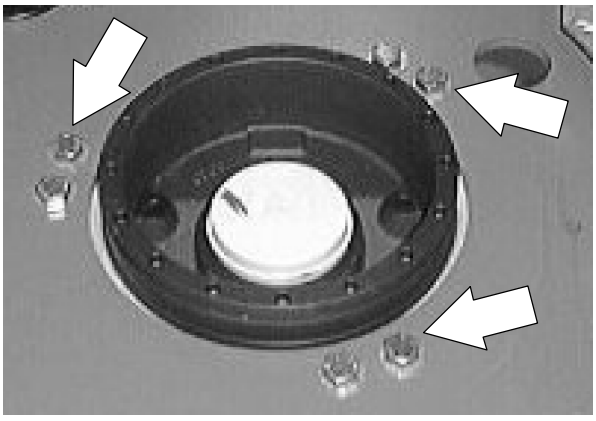
20. Remove the four hex screws holding the sprocket clips to the bottom of the steering sprocket. Lift the sprocket off the gear box upper ring.



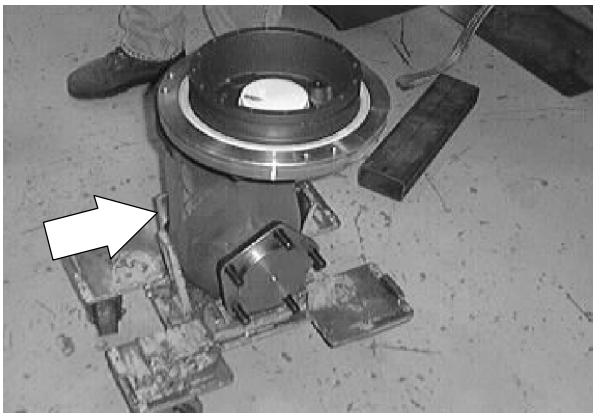
NOTE: A floor jack, transmission jack or some other lifting device must be placed under the drive gear box at this point to help in the removal.

21. Remove the six hex screws holding the drive gear box to the machine frame.

    CAUTION! The drive gear box is very heavy and tippy when the mounting hardware is removed.



22. Drop the drive gear box down and and pull it out the front of the machine.

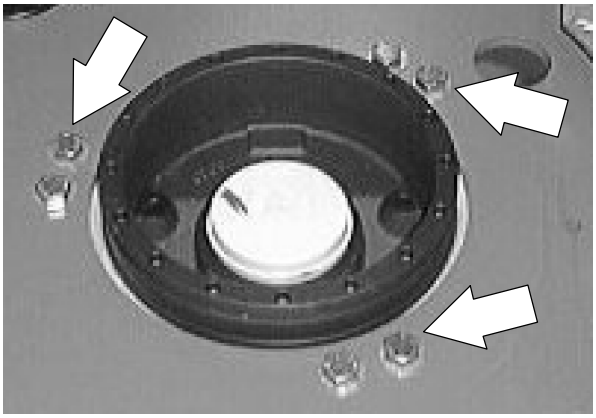


23. Make the necessary repairs on the drive gear box or prepare a new gear box for installation.

24. Place the gear box on the lifting device and position it back under the machine.

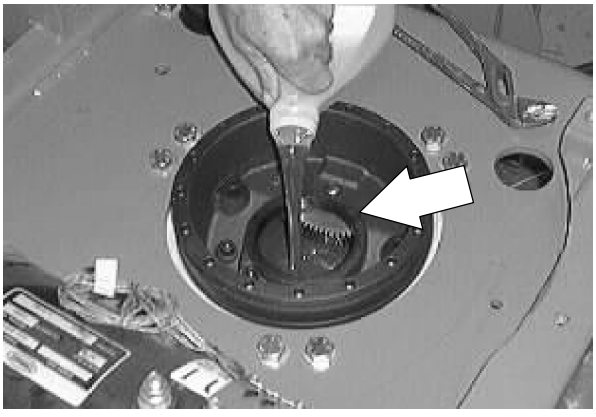
25. The gear box must be stood straight up and jacked into position. Be careful not to let it fall over possibly damaging the gear box or causing injury.

26. The six holes in the drive gear box upper ring must be lined up with the four holes in the machine frame.

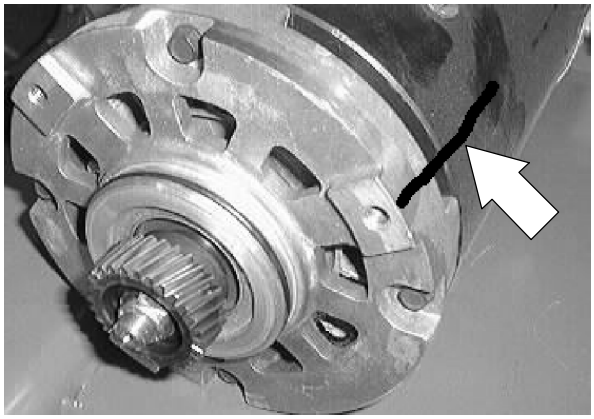


27. Reinstall the hex screws using 242 blue loctite and tighten to 64 – 83 Nm (50 – 60 ft lb).

28. Fill the gear box case through the large hole on top, with .75 gallon of 90 weight gear lube.



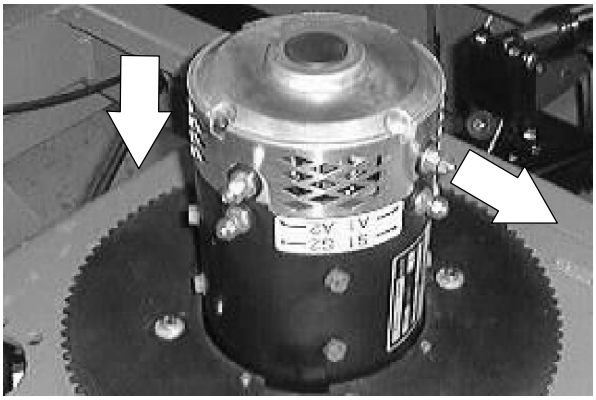
NOTE: Before the motor is reinstalled, mark the position of the threaded mounting holes in the bottom of the motor. Go far enough up the side of the motor so the mark can be seen when the motor is positioned in the drive gear box.



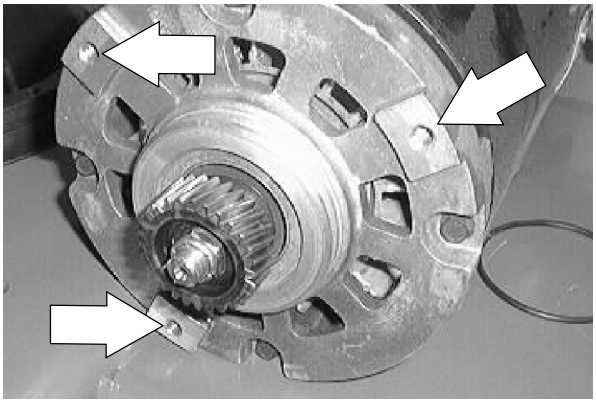
29. Position the electric drive motor back on the gear box housing.

NOTE: Make sure the electric cable studs are pointing towards the LH side of the machine.

NOTE: Make sure the O-ring in installed on the bottom of the motor.

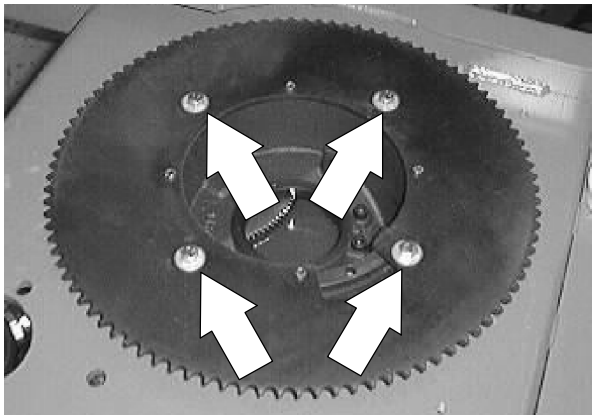


30. Reinstall the three M8 socket head cap screws holding the electric drive motor to the drive gear box. Tighten to 26 - 34 Nm (20 - 26 ft lb).



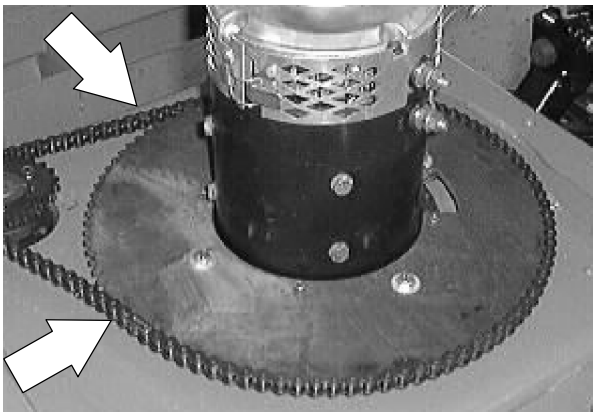
31. Install front tire. Tighten nuts to 122-150 Nm (90-110 ft lb).

32. Position the steering sprocket back on the top of the drive gear box. Line up the pins with the holes in the sprocket. Make sure to have the gear box pointing straight ahead with the tire mounting studs pointing towards the LH side of the machine.



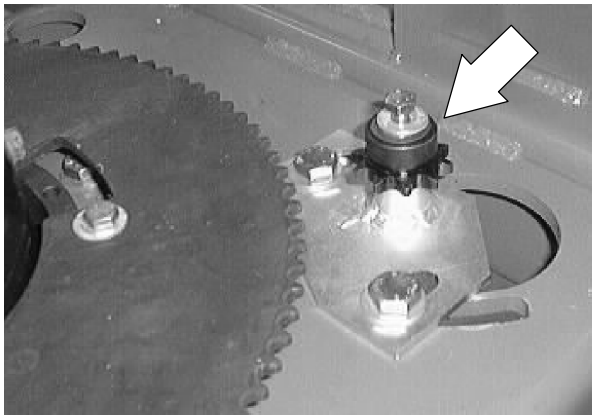
33. Reinstall the four sprocket clips, M8 hex screws and washers. Tighten to 18 – 24 Nm (15 – 20 ft lb).

34. Place the steering chain back on the large steering sprocket.



MANUAL STEERING:

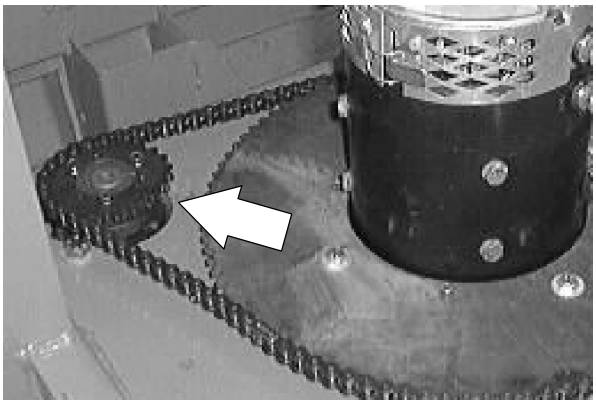
35. Pull the chain idler mounting up against the chain and tighten the two hex screws to 18 – 24 Nm (15 – 20 ft lb).



NOTE: The tension of the chain should be checked after the first 50 hours of operation and every 200 hours there after. The deflection should be 0.12 to 0.25 in (3 to 6 mm) between the steering sprocket and the idler sprocket when the steering wheel is turned the tightest position either direction.

POWER STEERING:

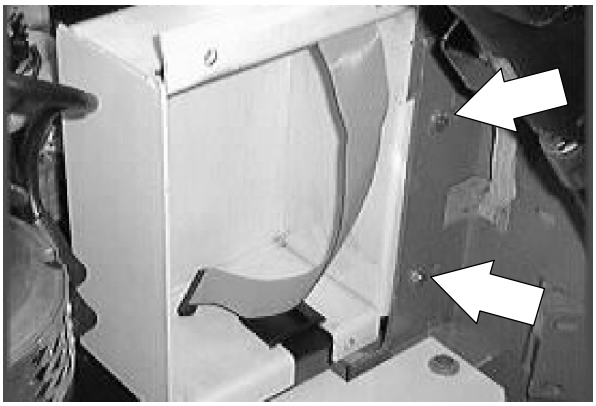
36. Use a pry bar to move the hydraulic steering motor away from the large sprocket until the chain is tight. Tighten the motor mounting hardware to 18 – 24 Nm (15 – 20 ft lb).



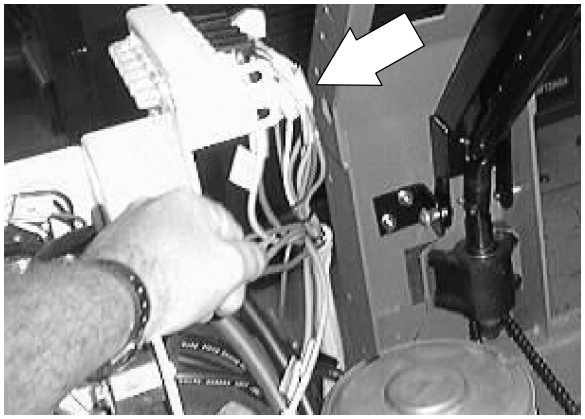
NOTE: The tension of the chain should be checked after the first 50 hours of operation and every 200 hours there after. The deflection should be 0.12 to 0.25 in (3 to 6 mm) between the steering sprocket and the idler sprocket when the steering wheel is turned the tightest position either direction.

37. Reconnect the four electrical cables going to the drive motor. See the schematic in the ELECTRICAL section of this manual.

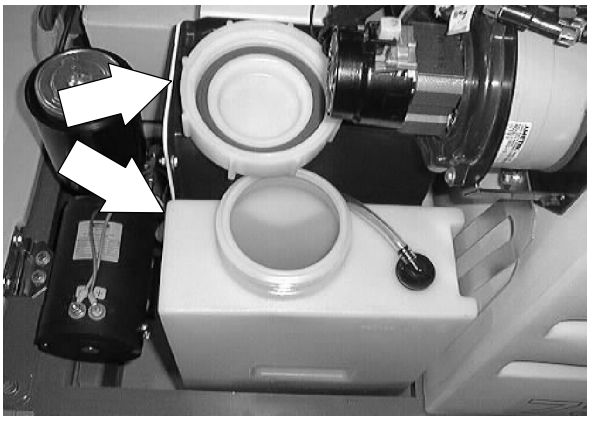
38. Move the smaller electrical panel into position on the left side of the steering column and reinstall the hardware. Tighten to 11 – 14 Nm (7 – 10 ft lb).



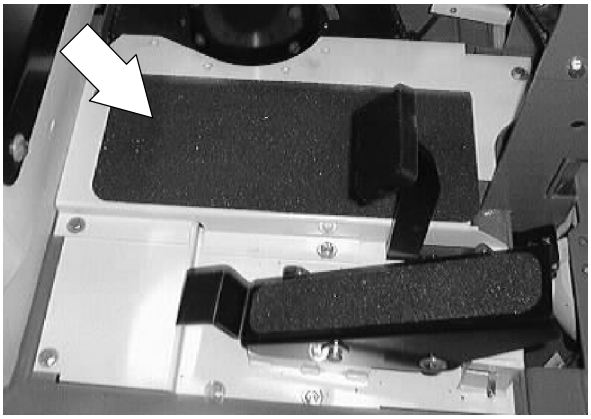
39. Move the larger electrical panel into position and reinstall the three hex screws. Tighten to 18 – 24 Nm (15 – 20 ft lb).



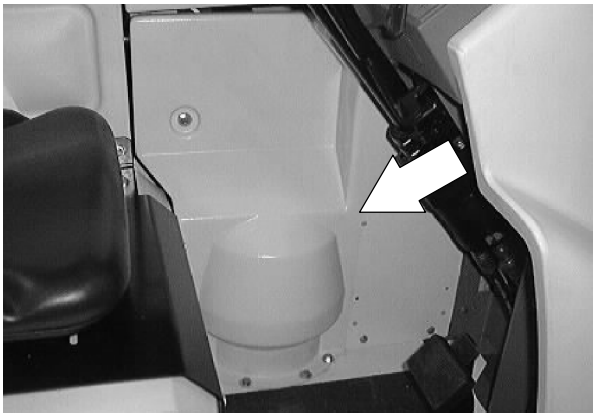
40. Reinstall the control panel cover and detergent tank.



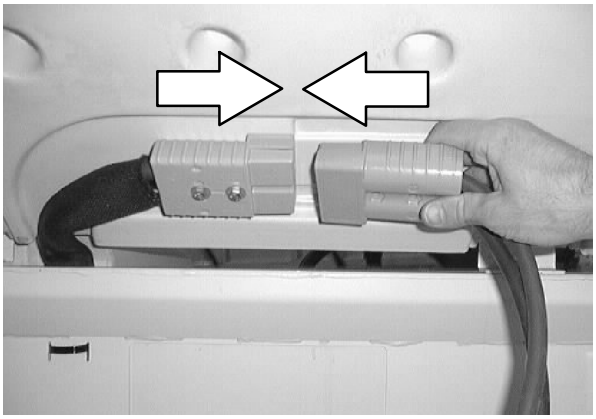
41. Reinstall the inside floor plate.



42. Reinstall the plastic drive motor cover.



43. Plug in the battery connector. Close the battery cover.



44. Close the front cover.

45. Lower the machine to the ground and check the gear box for proper operation.

STEERING

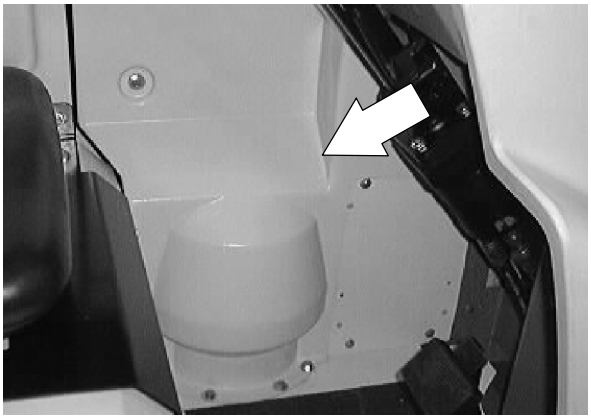
STEERING CHAIN

The steering chain controls the machine steering. The tension of the chain should be checked after the first 50 hours of operation and every 200 hours there after. The deflection should be 0.12 to 0.25 in (3 to 6 mm) between the large steering sprocket and the idler /motor sprocket when the steering wheel is turned the tightest position either direction.

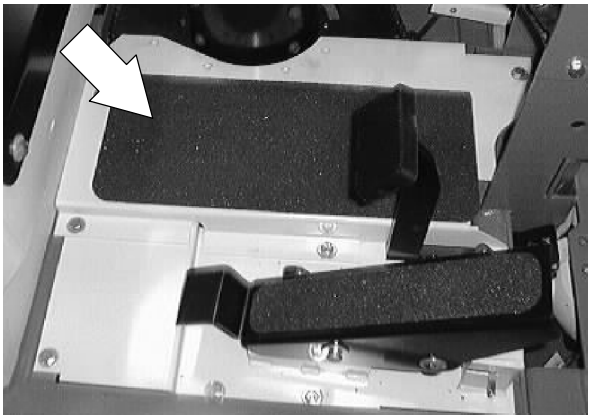
TO ADJUST STEERING CHAIN TENSION

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

1. Remove the plastic drive motor cover.

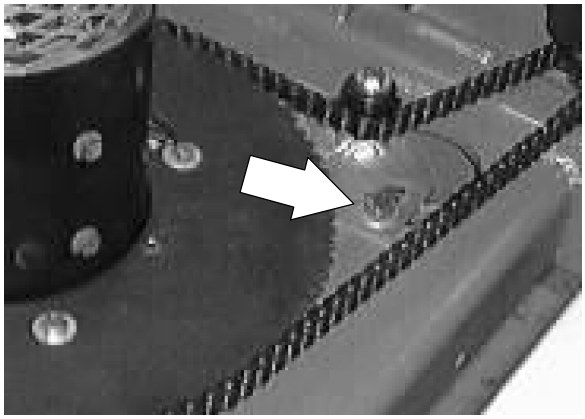


2. Remove the inside floor plate.

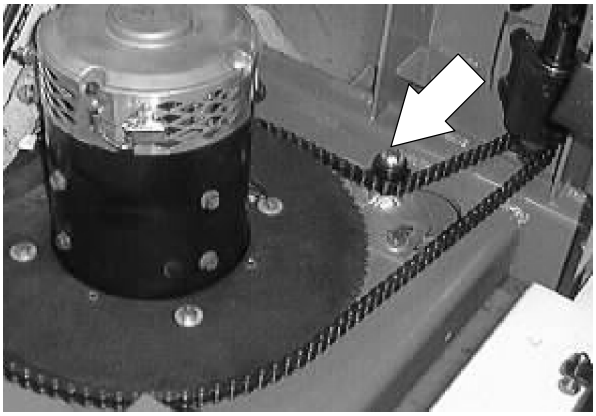


MANUAL STEERING CHAIN ADJUSTMENT

1. Loosen the two hex screws on the chain idler mounting plate. Slide the plate forward to gain slack in the steering chain.



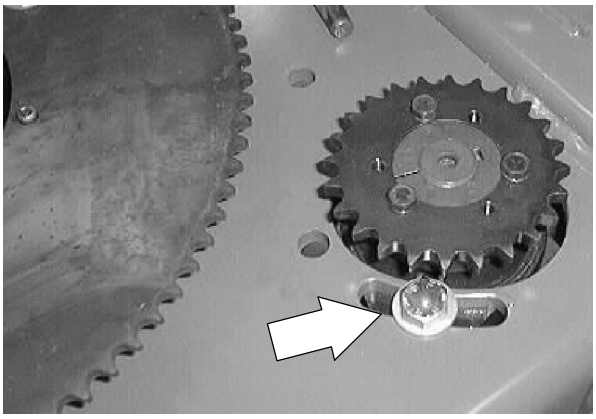
2. Move the idler sprocket and mounting bracket in until the proper deflection is measured. Tighten the motor mounting hardware to 18 – 24 Nm (15 – 20 ft lb).



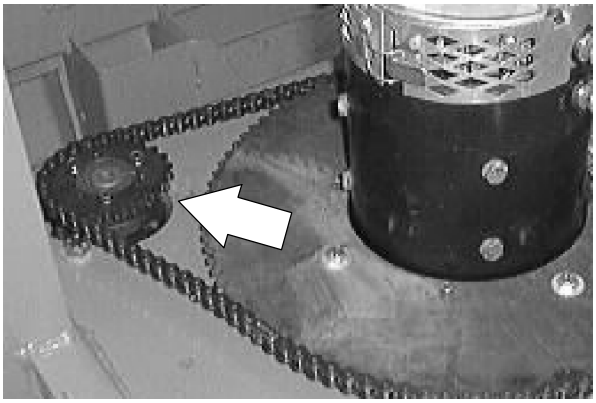
NOTE: The tension of the chain should be checked after the first 50 hours of operation and every 200 hours there after. The deflection should be 0.12 to 0.25 in (3 to 6 mm) between the steering sprocket and the idler sprocket when the steering wheel is turned the tightest position either direction.

POWER STEERING CHAIN ADJUSTMENT

1. Loosen the hardware holding the hydraulic steering motor to the machine frame.

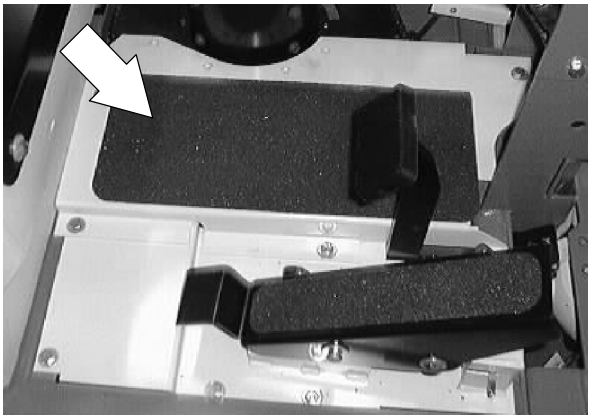


2. Use a pry bar to move the hydraulic steering motor away from the large sprocket until the chain is tight. Tighten the motor mounting hardware to 37 – 48 Nm (26 – 34 ft lb).

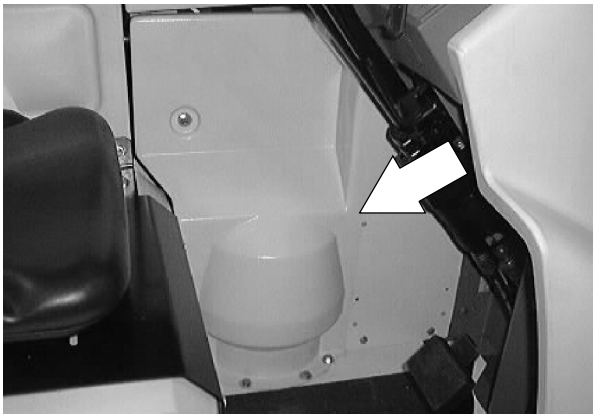


NOTE: The tension of the chain should be checked after the first 50 hours of operation and every 200 hours there after. The deflection should be 0.12 to 0.25 in (3 to 6 mm) between the steering sprocket and the idler sprocket when the steering wheel is turned the tightest position either direction.

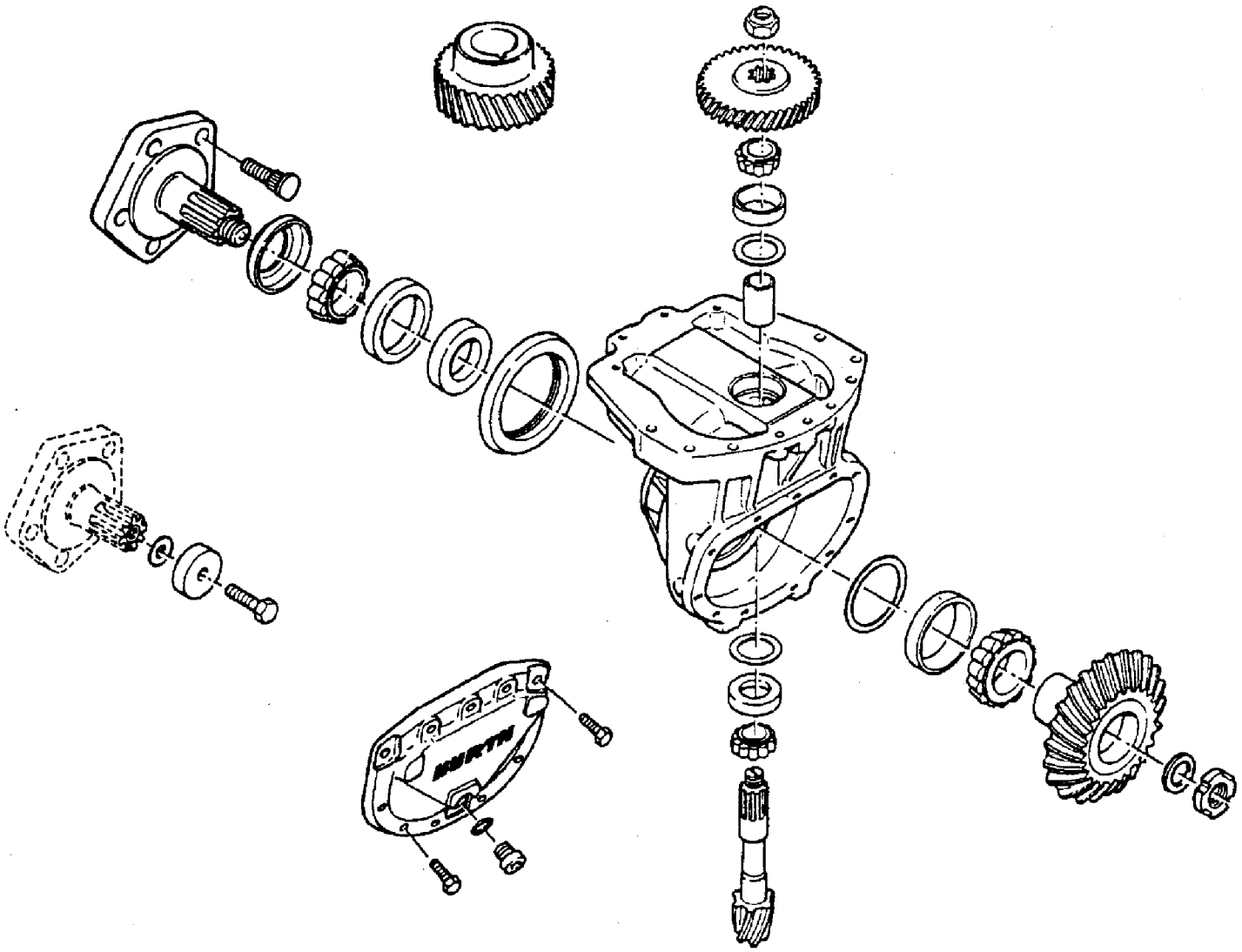
3. Reinstall the inside floor plate.



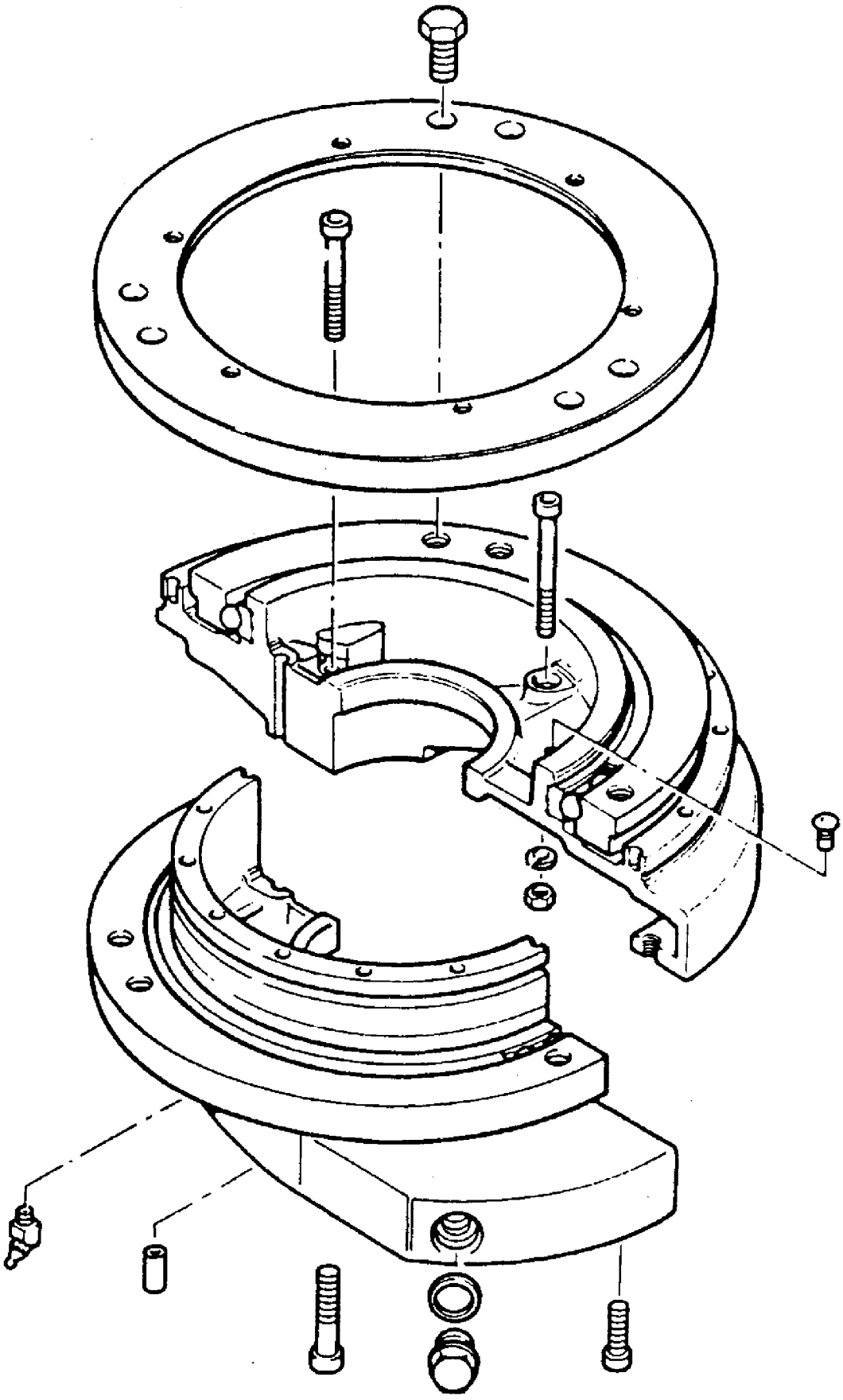
4. Reinstall the plastic drive motor cover.



5. Lower the machine to the ground and check the steering for proper operation.



HURTH GEARBOX EXPLODED VIEW (LOWER SECTION)



HURTH GEARBOX EXPLODED VIEW (UPPER SECTION)

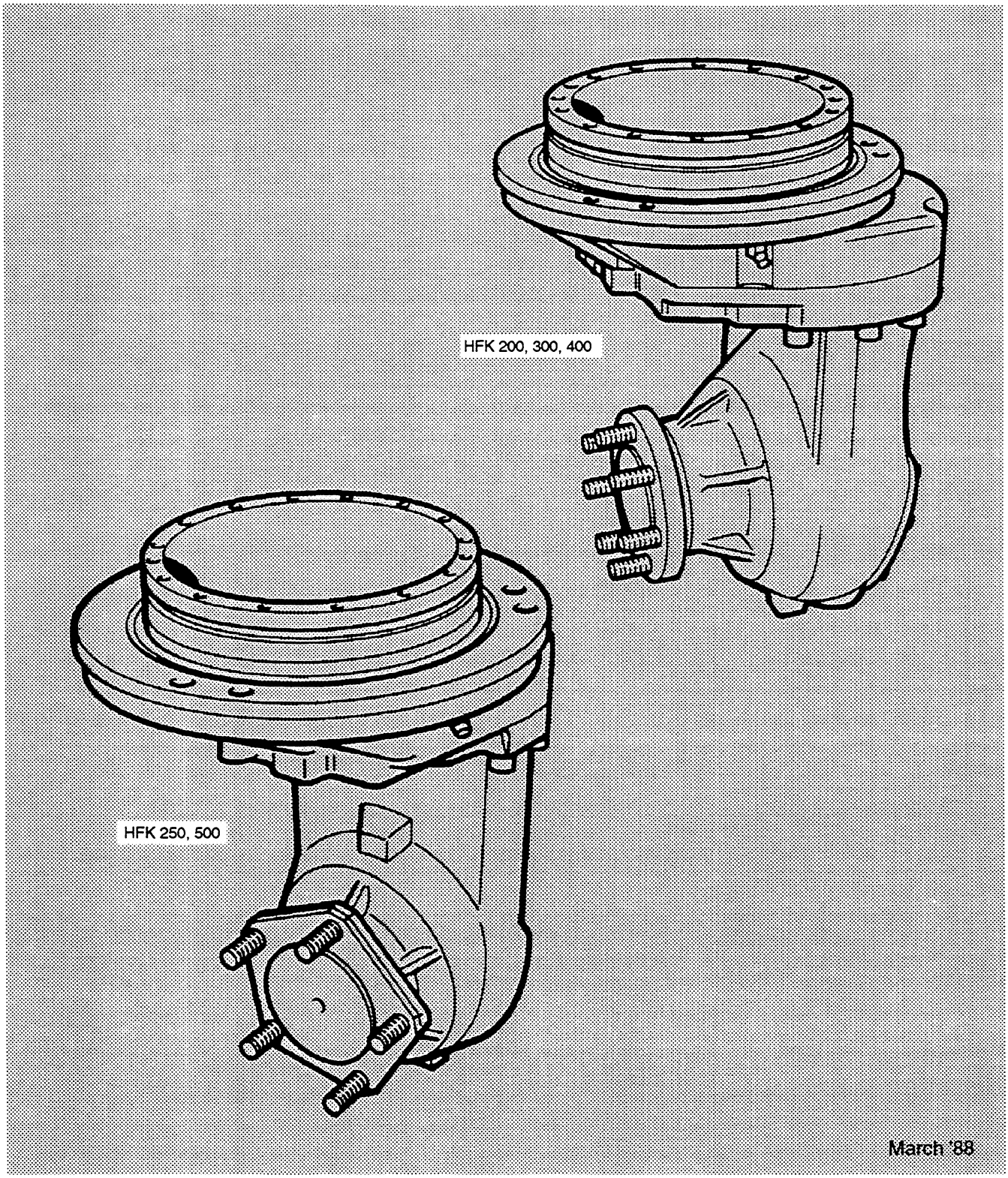
HURTH GETRIEBE UND ZAHNRÄDER

Repair Manual

HFK 200, 250, 500

HFK 300 to serial no. 5999

HFK 400 to serial no. 815



March '88

Table of Contents 4

4. Instructions for repair

General

Repair of drive assembly accessories will not be covered here since they may differ by quantity and design. Attention is drawn to section Z.

The following remarks refer to the disassembly/assembly of the gear unit and the dismounting/mounting of the accessories which are directly connected to the gear unit.

4.1 Dismantling the drive assembly

Before disassembling the gear unit, drain the transmission oil and dismount the drive wheel.

Drive wheel

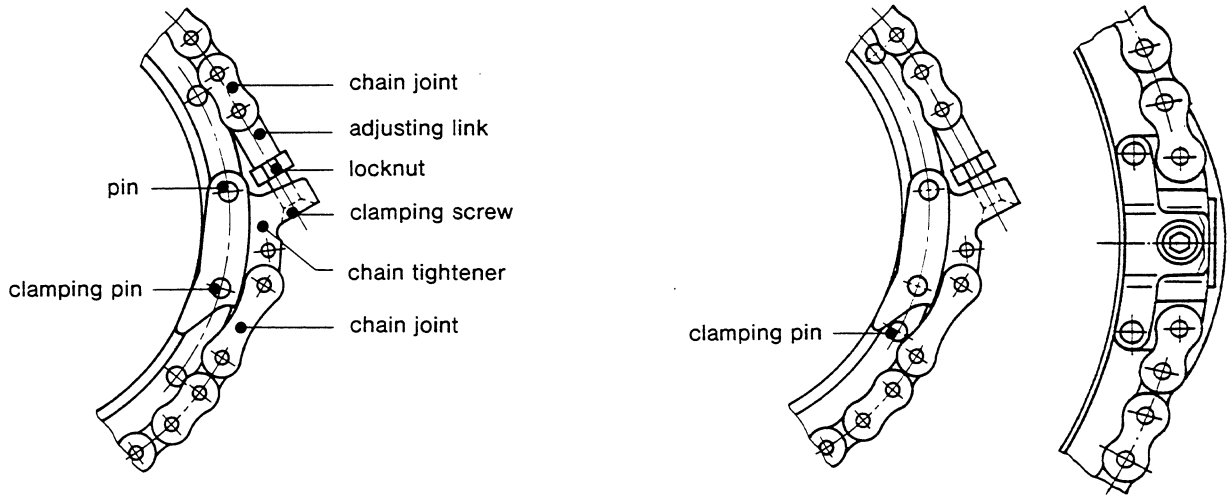
Remove wheel nuts and take off drive wheel.

Steering chain

Open lock nut and slacken the steering chain by screwing out the clamping screw.

a) Chain tightener
   Open the chain joint at the chain tightener and remove the steering chain.

Version S/B — **Chain connection** — Version SF/SU/BF/BU



b) Chain support
   Open the chain joint at the chain support and remove the steering chain.

Dismantling the drive assembly

Remove screws fastening the trunnion bearing to the vehicle frame.

Electric motor

The electric motor can be dismantled without dismounting the complete drive assembly. Remove the screws and lift the motor out of the assembly.

If only the electric motor is dismantled, the opening to the gear unit must be closed to prevent dirt from entering the gear unit.

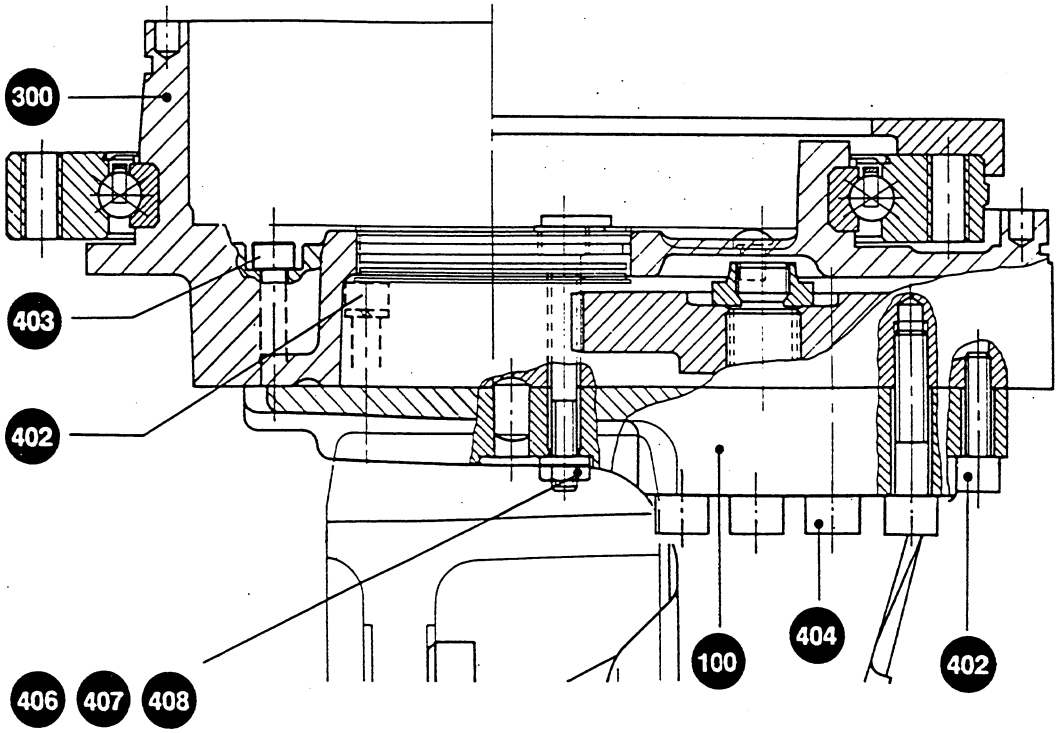
Dismantling the drive pinion (202)

Hold the motor shaft tight and loosen the shaft nut, then extract the drive pinion using the extractor. Remove the O-ring from the motor centering recess.

4.2 Dismantling the gear unit

4.2.1 Removing the top of the gear unit (300) from the basic gear unit (100)

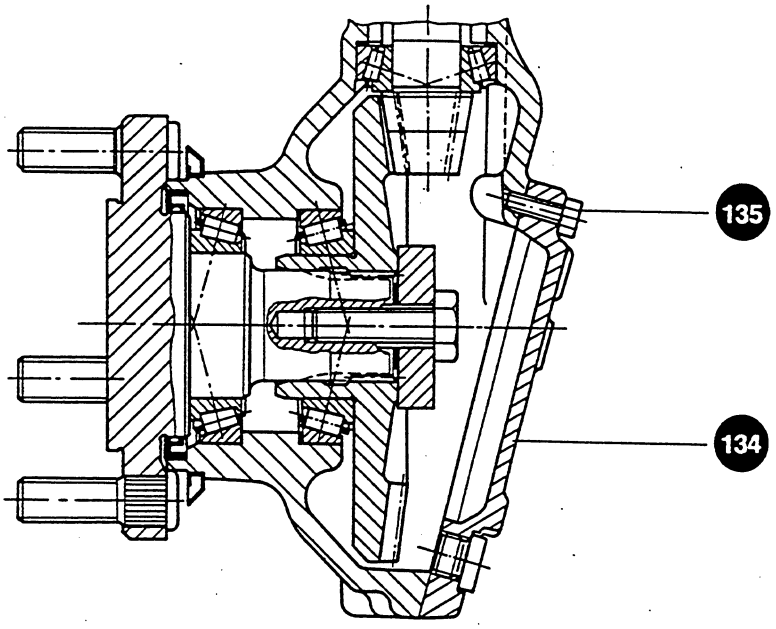
Remove the screws (402/404/406). Loosen the top of the gear unit by knocking lightly (e.g., with a plastic hammer) and lift it off.



4.2.2 Dismantling the basic gear unit (100)

4.2.2.1 Disassembling the housing lid (134)

Remove the screws (135), loosen the lid by knocking lightly, and lift off.



4.2.2.2 Dismantling the crown gear (104) and wheel shaft (119)

Fasten auxiliary unit "A" with screws (135) to housing. If the conical pinion shaft (104) is dismantled as well, it is recommended to loosen the hexagon nut (118) on the conical pinion shaft at the same time (refer to 4.2.2.5).

Hold the wheel shaft tight and remove the screw (129). Remove washer (128) with shims (130-133) and bind them together with a wire or the like.

Attention: The plane surface X of the wheel shaft is required for setting the wheel shaft bearing and must not be damaged.

Insert the 9-mm dia. striking pin into the threaded borehole of the wheel shaft and knock to dismantle the wheel shaft.

The wheel bolts (120) can be dismounted by pushing them out when the wheel shaft is dismantled.

Take the crown gear out of the gear unit.

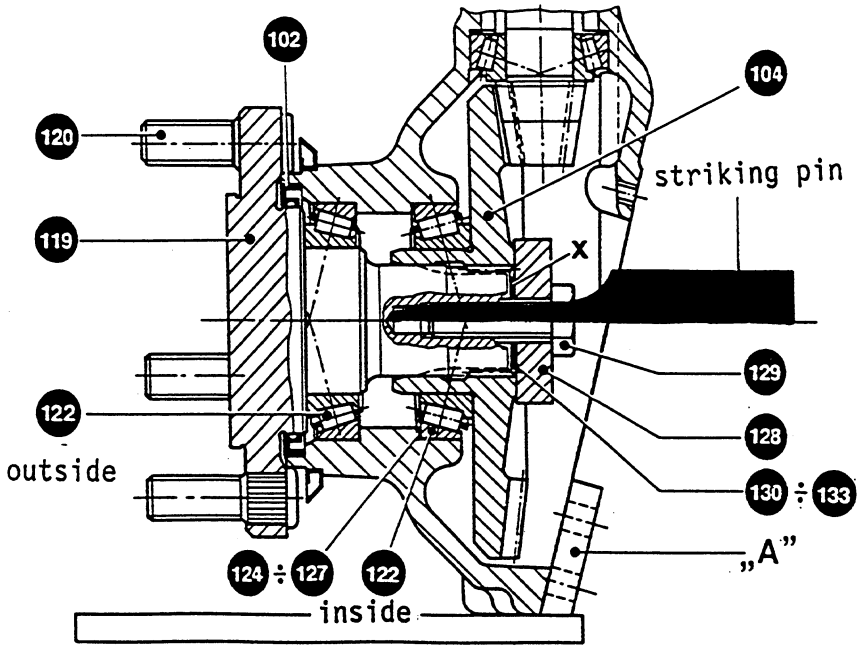
4.2.2.3 Dismounting the outer race (122), shims (124-127), radial sealing ring (102)

Dismount the outer race (122 inside) by lightly knocking with a copper pin or the like. Make sure not to damage the shims. Bind the outer race and the shims together with a wire or the like and place them with the crown gear.
Lever out the sealing ring, dismount the outer race (122 outside) by lightly knocking with a copper pin or the like, and place the outer race with the wheel shaft.

4.2.2.4 Dismantling the inner race

The inner race should be dismantled only if the bearings are damaged and have to be replaced. If a new wheel shaft or a new set of bevel gears is mounted, new bearings must be fitted.

To dismantle the inner race, cut open the bearing cage and extract the inner race via the small bearing collar using the extractor.

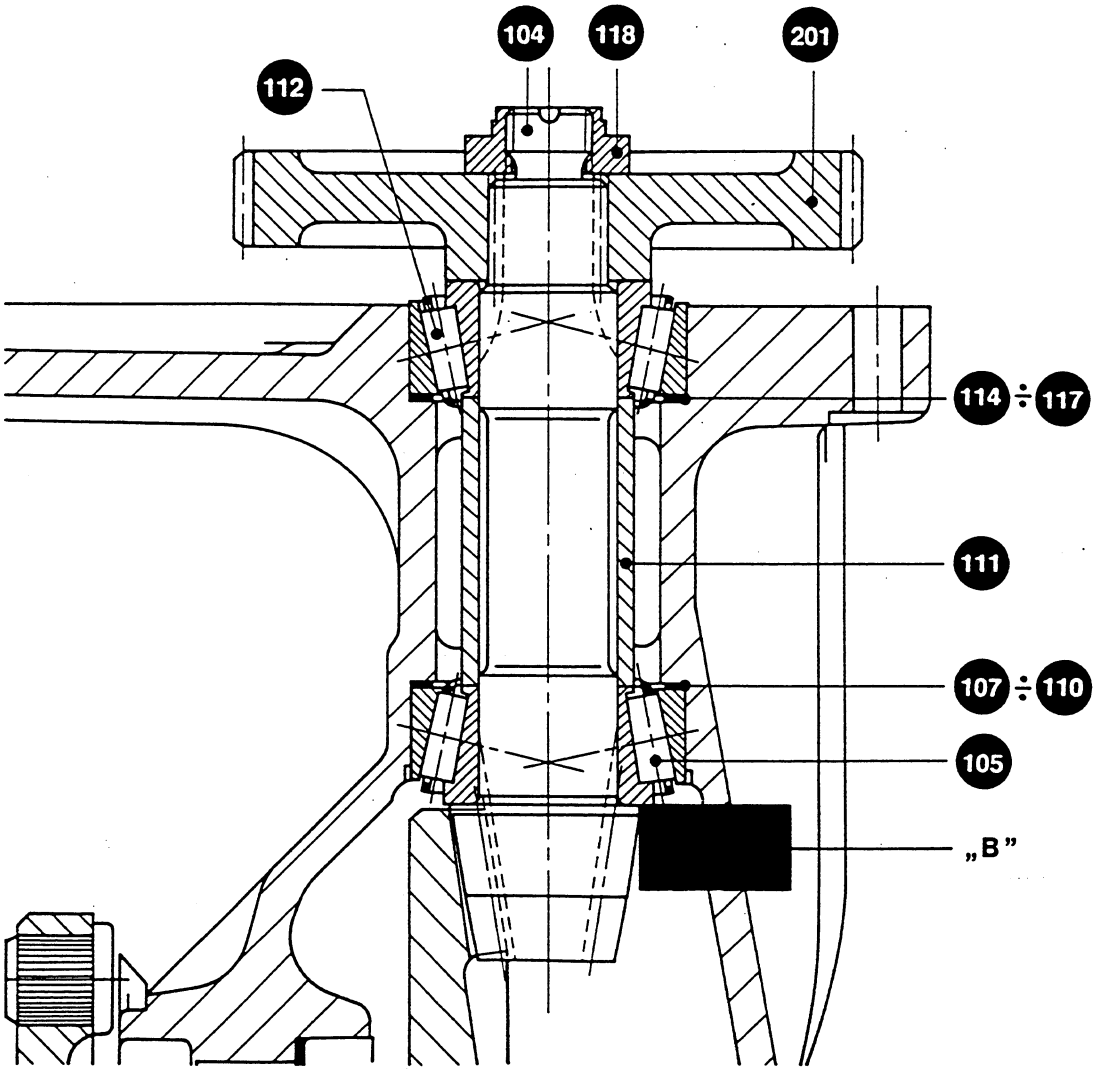


4.2.2.5 Dismounting the helical spur gear (201) and the conical pinion shaft (104)

Unscrew the hexagon nut, dismount the helical spur gear using the extractor, and knock out the conical pinion shaft (e.g., using a copper pin).
Remove the top inner race (112) and place it with the helical spur gear. Push the lower inner race (105) with spacer bushing (111) off the conical pinion shaft using the auxiliary unit "B" and place them with the conical pinion shaft.

Dismount the top outer race (112) by lightly knocking with a copper pin or the like. Make sure not to damage the shims (114-117). Bind the outer race and the shims together with a wire or the like and place them with the inner race or the helical spur gear.
Dismount the bottom outer race (105) by lightly knocking with a copper pin or the like. Again make sure not to damage the shims (107-110). Bind the outer race and the shims together and place them with the inner race or the conical pinion shaft and the spacer bushing.

With the HFK 400 there is no spacer bushing (111) as from gear unit No. 816; it is replaced by a conical pinion shaft with a different form.



4.3 Mounting the gear unit

4.3.1 General remarks

Before mounting the gear unit, the following points should be noted:

- Clean all parts carefully and remove all traces of sealing compound.
- Check all parts for wear, damage and fissures and replace them if necessary.
- Hone the sealing surfaces with an oil stone or a smooth-cut file.
- Wheel set components such as helical spur gears **should** be replaced in pairs, helical gears **must** be replaced in pairs.
- It is recommended to always replace seals and radial seal rings whenever repairs are made.
- Cleaned anti-friction bearings should be lubricated before being mounted.
- For sealing, use only elastic non-hardening sealing compound (e.g., Loctite 574).

4.3.2 Mounting the basic gear unit (100)

4.3.2.1 Measuring the assembly dimension of the conical pinion shaft (104)

Insert measuring bush "D" into the bearing borehole of the housing and measure dimension F.

The housing dimension E is determined according to the following formula:

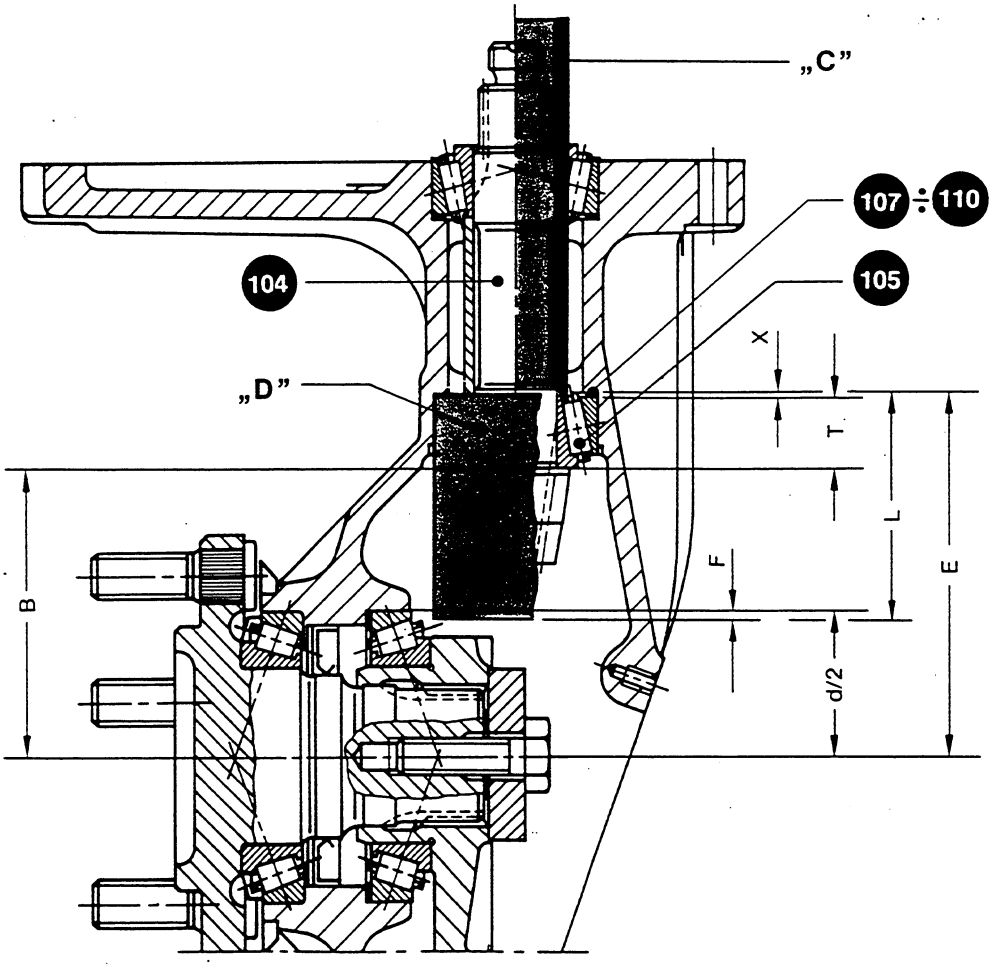
$$E = L - F + d/2$$

Type	Housing of borehole d/2
HFK 200	37.50
HFK 250/300	44.45
HFK 400/500	45.00

The thickness X of the shims (107-110) is calculated according to the following formula:

$$X = E - B - T$$

E = housing dimension
B = assembly dimension of conical pinion shaft (marked)
T = bearing width (105)



4.3.2.2 Pre-assembly of the conical pinion shaft (104)

Press the inner race (105) carefully with auxiliary unit "C" up to the limit stop.

4.3.2.3 Mounting the conical pinion shaft (104), helical gear (201) and setting the bearing clearance

Position the shims (107-110) according to instructions of section 4.3.2.1 and insert the outer race (105) into the housing (101).

Insert the previously mounted conical pinion shaft and mount the bushing (111).

With the HFK 400 there is no longer a bushing as from gear unit No. 816.

Using auxiliary unit "F", apply a light pre-stress to the conical pinion shaft via the housing towards the top.

Adjustment of bearing clearance

The thickness of the top shims (114-117) to be fitted can now be determined on the basis of the following dimensions:

C = distance between spacer bushing/conical pinion shaft (HFK 400) and contact of outer race.
S = distance between plane surface of outer race and plane surface of inner race.

Attention! If the outer race is higher than the inner race (dimension S as shown in detail "Z"), dimension X is determined as follows:

Shim thickness X = C - S - 0.02

If the outer race is lower than the inner race, dimension X is determined as follows:

Shim thickness X = C + S - 0.02

Insert the shims and the top outer race. Fit the inner race by knocking onto the pinion shaft using auxiliary unit "G". Place the helical spur gear (201) onto the conical pinion shaft and screw on the hex nut (118). Hold the helical spur gear tight using the auxiliary unit (see fig. 1) and tighten the nut with 60 +/- 5 Nm (44 +/- 3.7 ft-lb.). After checking the tooth pattern (refer to item 4.3.2.6), the shaft nut is locked by caulking.

Checking the bearing clearance of the pinion shaft

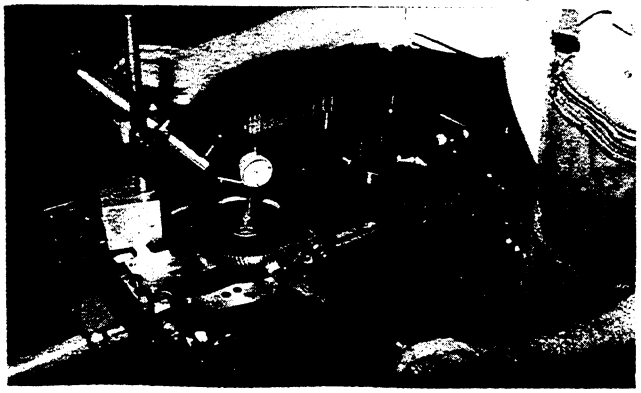
For the arrangement of the dial gauge refer to figure 2. Mark the measuring point on the helical spur gear (e.g., with a tallow pencil).

Press the conical pinion shaft downwards by hand, simultaneously turning it several times through approx. 180°. Adjust the dial gauge to zero at the measuring point.

Pull the conical pinion shaft upwards via the helical spur gear, turning it as described above, and hold it steady at the measuring point.

Read the bearing clearance off the dial gauge (admissible: 0-0.05 mm) (0-0.002").

Attention: When taking this measurement it is vital to turn the shaft several times so as to align the rollers in the taper roller bearing.



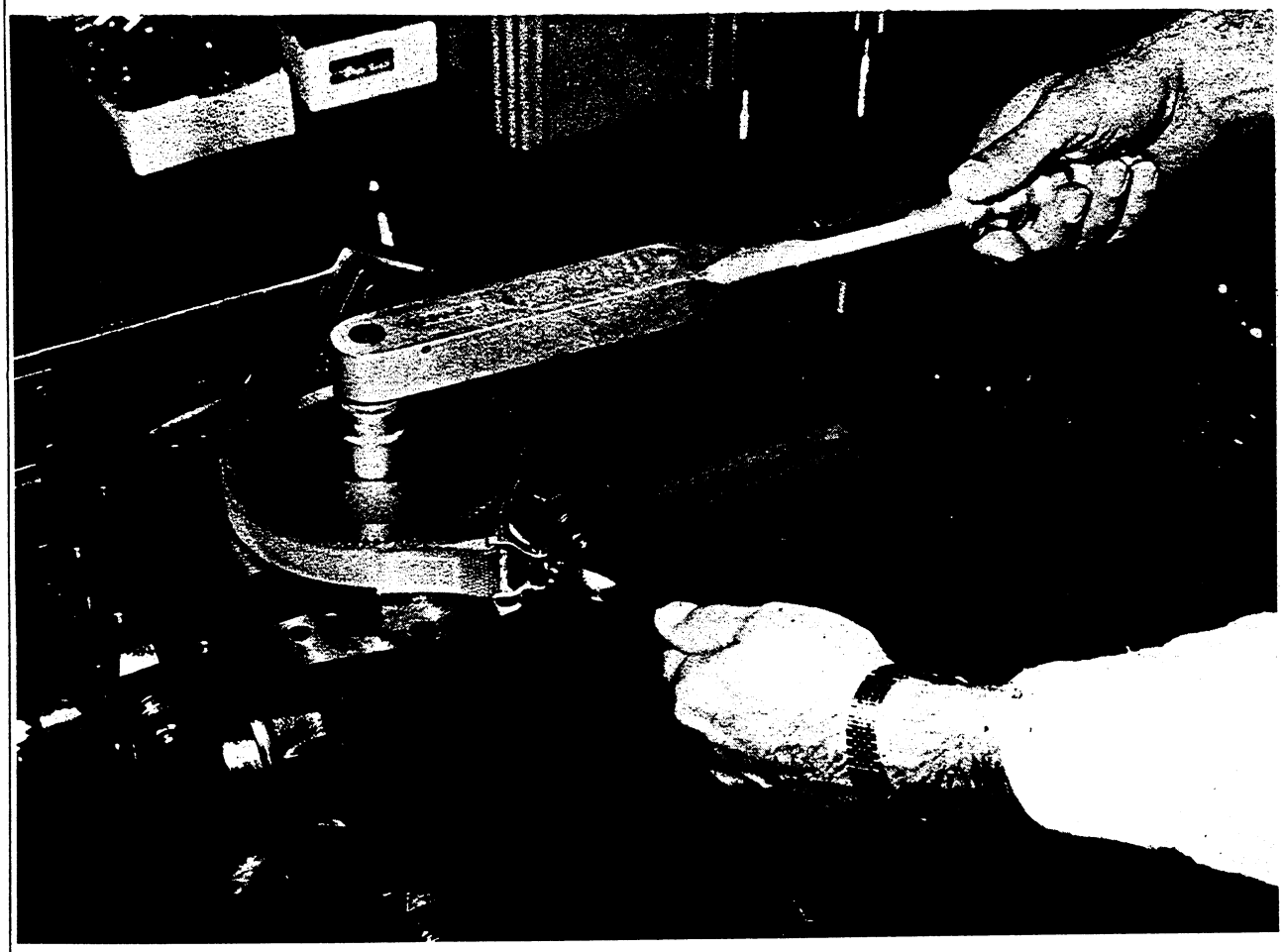
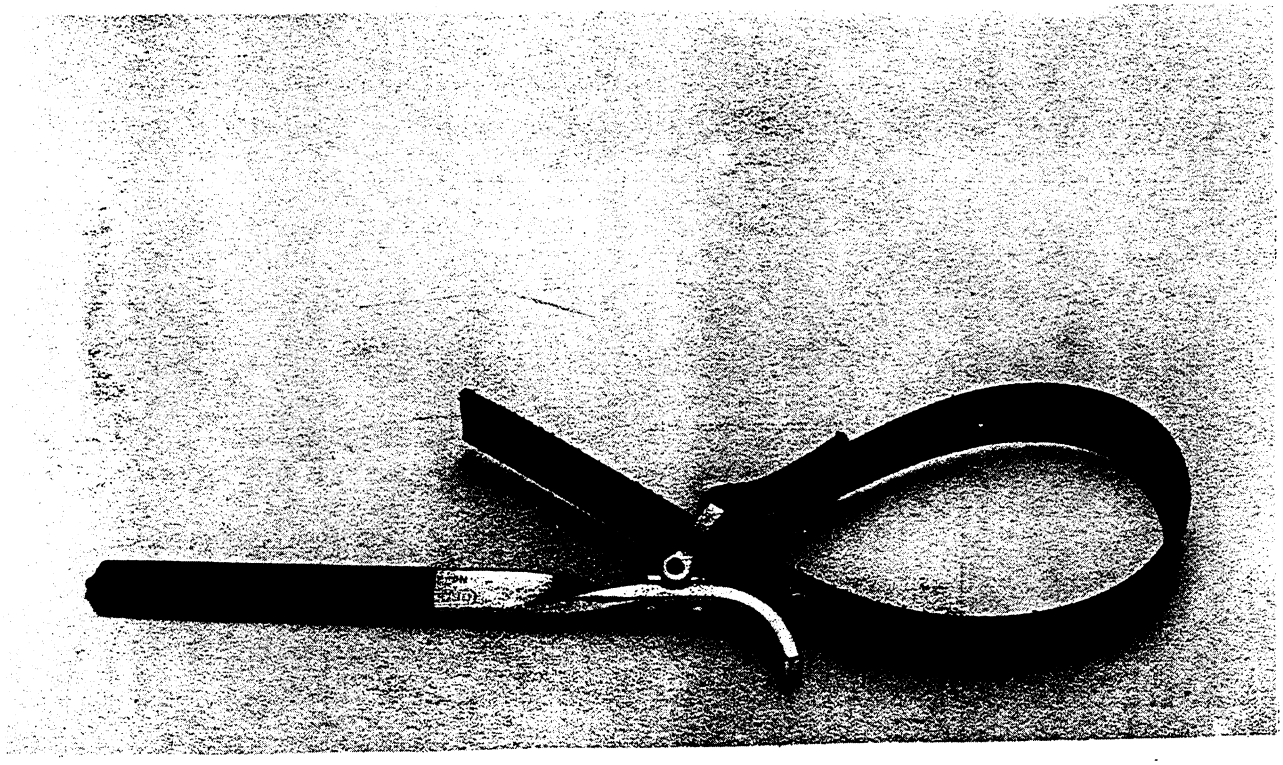
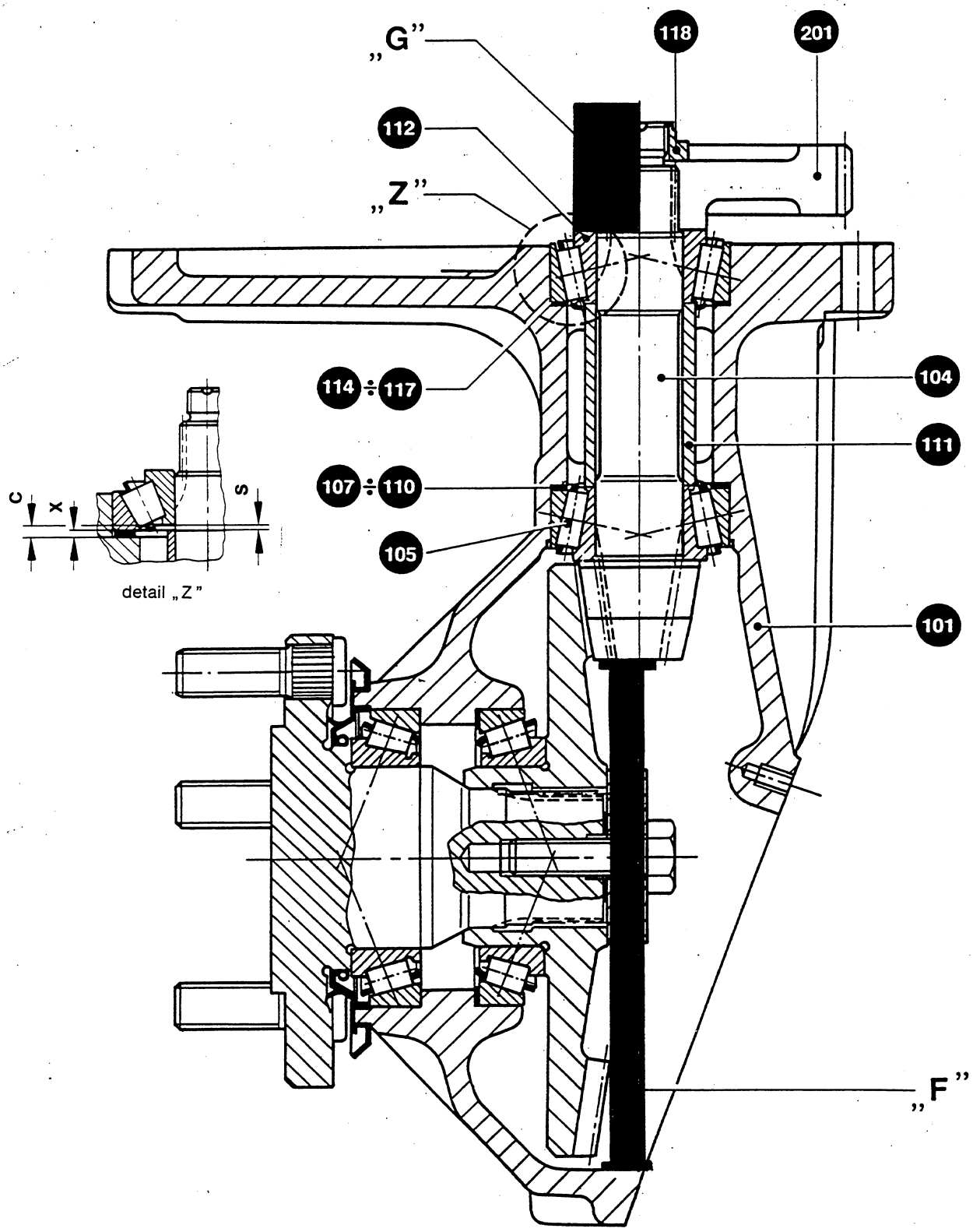


Fig. 1

Tools available on the market, such as, Gedore special tool 36/2



Mounting of wheel shaft



4.3.2.4 Pre-assembly of the wheel shaft (119)

Wet the wheel bolt (120) at its knurling with Loctite 242 and press into the boreholes provided on the flange of the wheel shaft.

Push the Nilos ring (121) onto the wheel shaft up to its stop at the flange.

Using auxiliary unit "H", press inner race (122) onto the wheel shaft up to the stop.

Grease the inner race of the taper roller bearing on the wheel shaft (cavities between rollers and cage and between cage and Nilos ring; use Shell Alvania R3 or a grease of identical composition and specification).

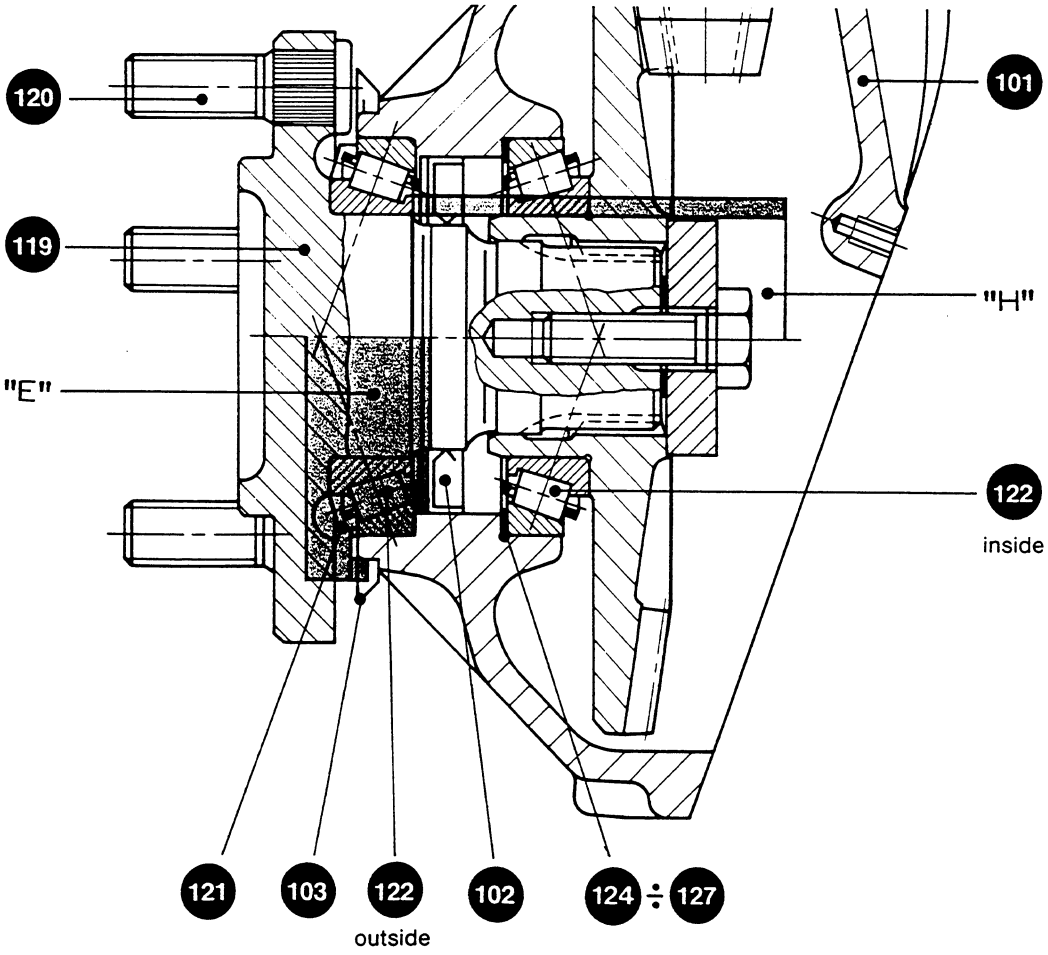
4.3.2.5 Pre-assembly of wheel shaft bearing in the housing (101)

Wet the sealing ring (102) at its outside diameter with Loctite 574 and mount it using auxiliary unit "E"; the open side of the ring must point to the inside of the gear unit.

Wet the Gamma ring (103) with Loctite 242 and press it onto the housing using auxiliary unit "E".

Insert the outer race (122 outside) into the housing.

As for dismantling, insert the outer race (122 inside) with shims (124-127) for the preliminary setting.



4.3.2.4 Pre-assembly of the wheel shaft (119)

Wet the wheel bolt (120) at its knurling with Loctite 242 and press into the boreholes provided on the flange of the wheel shaft.

Grease radial shaft seal (102) between dust and sealing lip and mount in such a way that the dust lip rests against the wheel shaft flange.

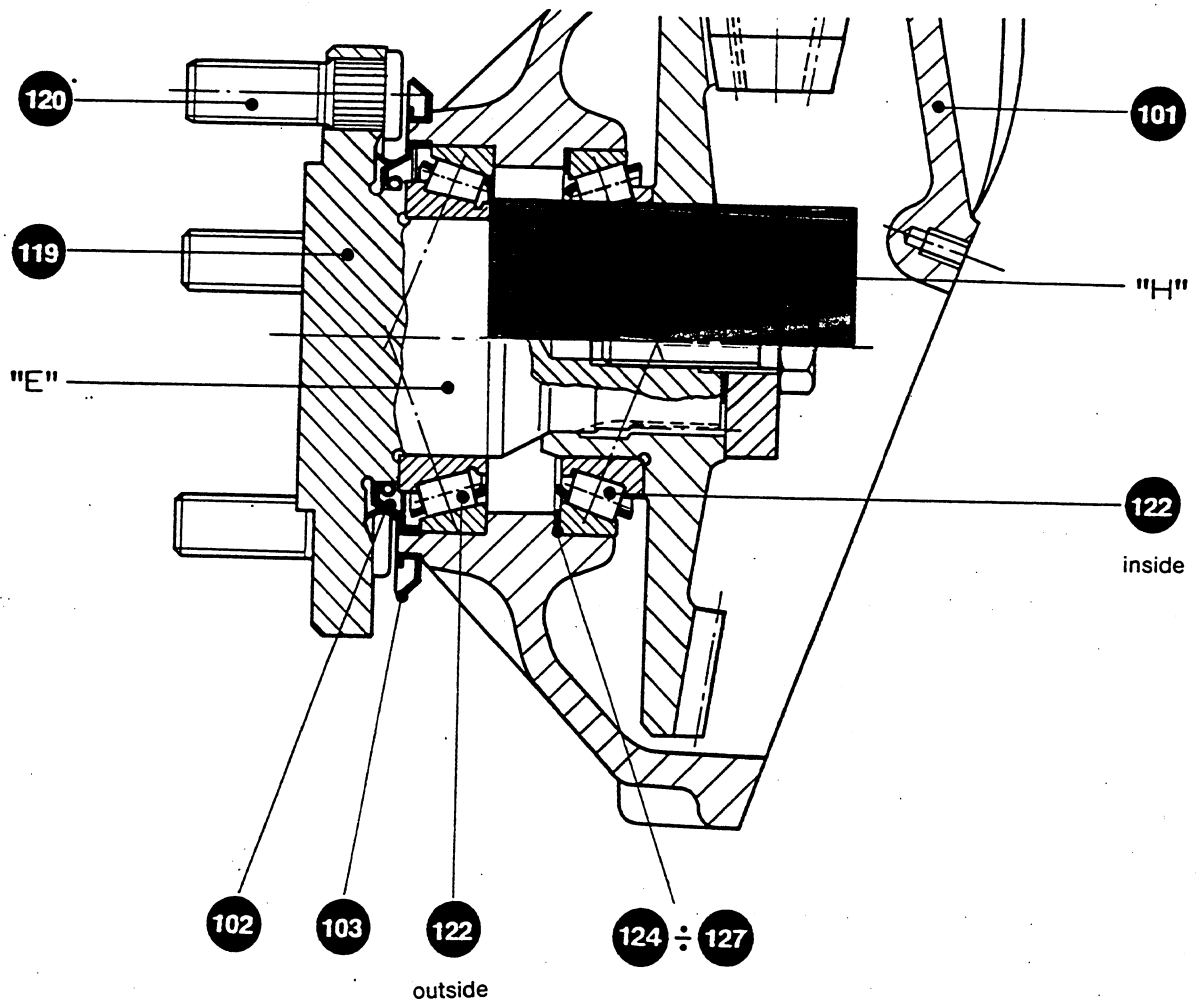
Using auxiliary unit "H", press inner race (122) onto the wheel shaft up to the stop.

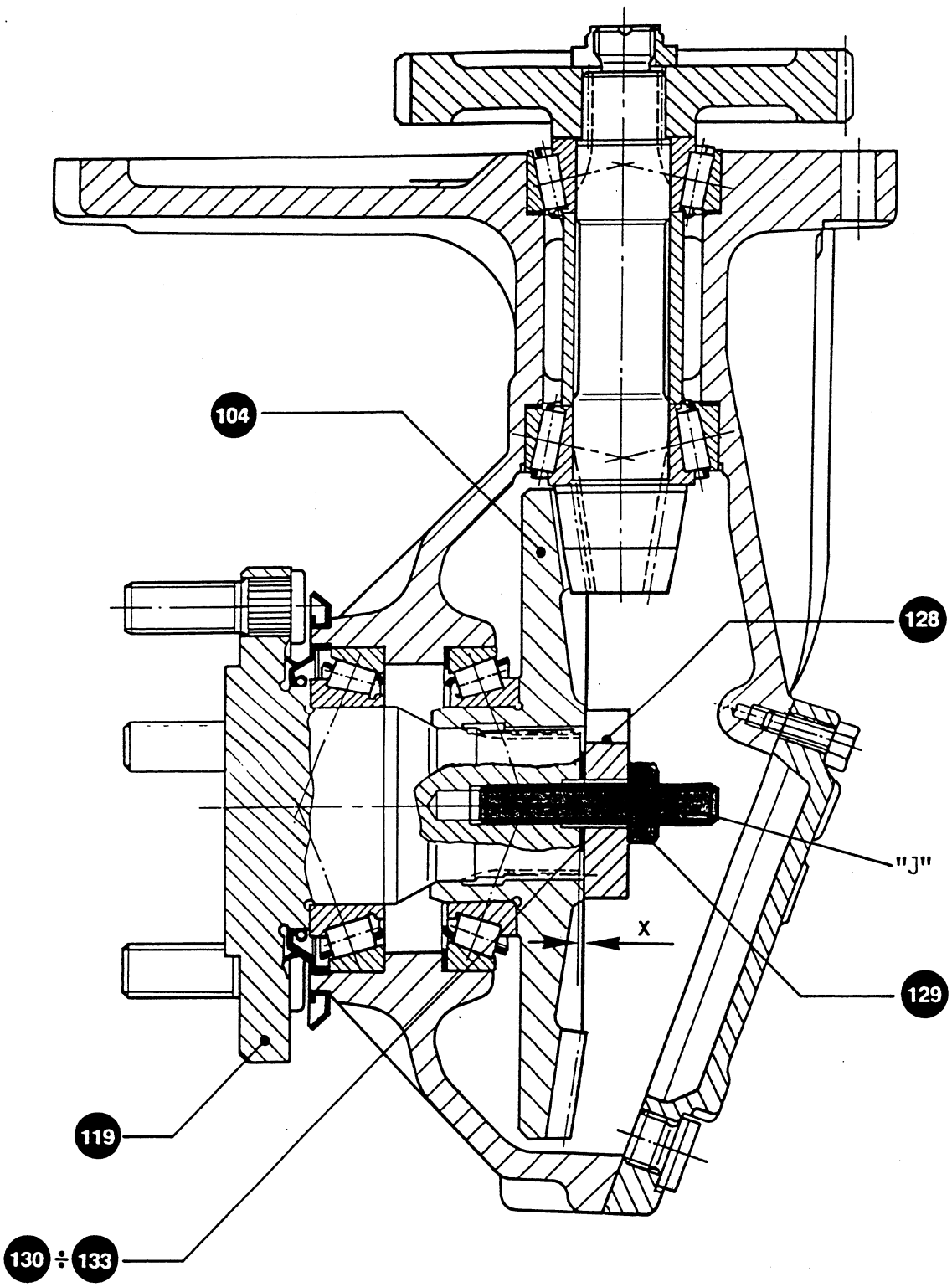
4.3.2.5 Pre-assembly of wheel shaft bearing in the housing (101)

Wet the Gamma ring (103) with Loctite 242 and press it onto the housing using auxiliary unit "E".

Insert the outer race (122 outside) into the housing.

As for dismantling, insert the outer race (122 inside) with shims (124-127) for the preliminary setting.




104
128
"J"
X
129
119
130 ÷ 133

4.3.2.6 Setting the circumferential backlash on the crown gear (104) and checking the tooth pattern

Press the inner race (122) onto the crown gear using the auxiliary unit "H".

Insert the crown gear (101) into the housing.

Push in the pre-assembled wheel shaft (used here simply as an auxiliary unit) and use auxiliary unit "J" to pull together the crown gear and the washer (128) until the bearing clearance is approx. zero.

For measuring the circumferential backlash at the crown gear, secure the conical pinion shaft against turning, e.g., with a wooden wedge.

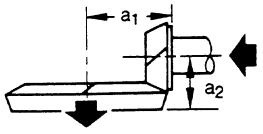
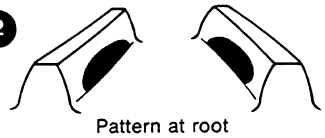
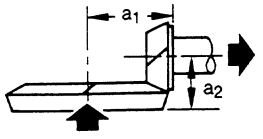
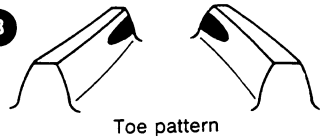
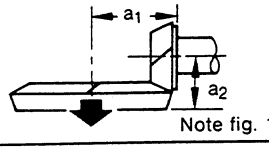
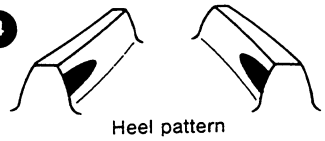
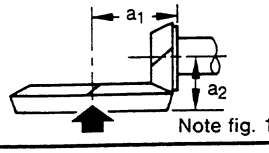
The circumferential backlash is corrected by adjusting with shims (124-127).

Admissible circumferential backlash 0.1-0.15 mm (0.004 - 0.006").

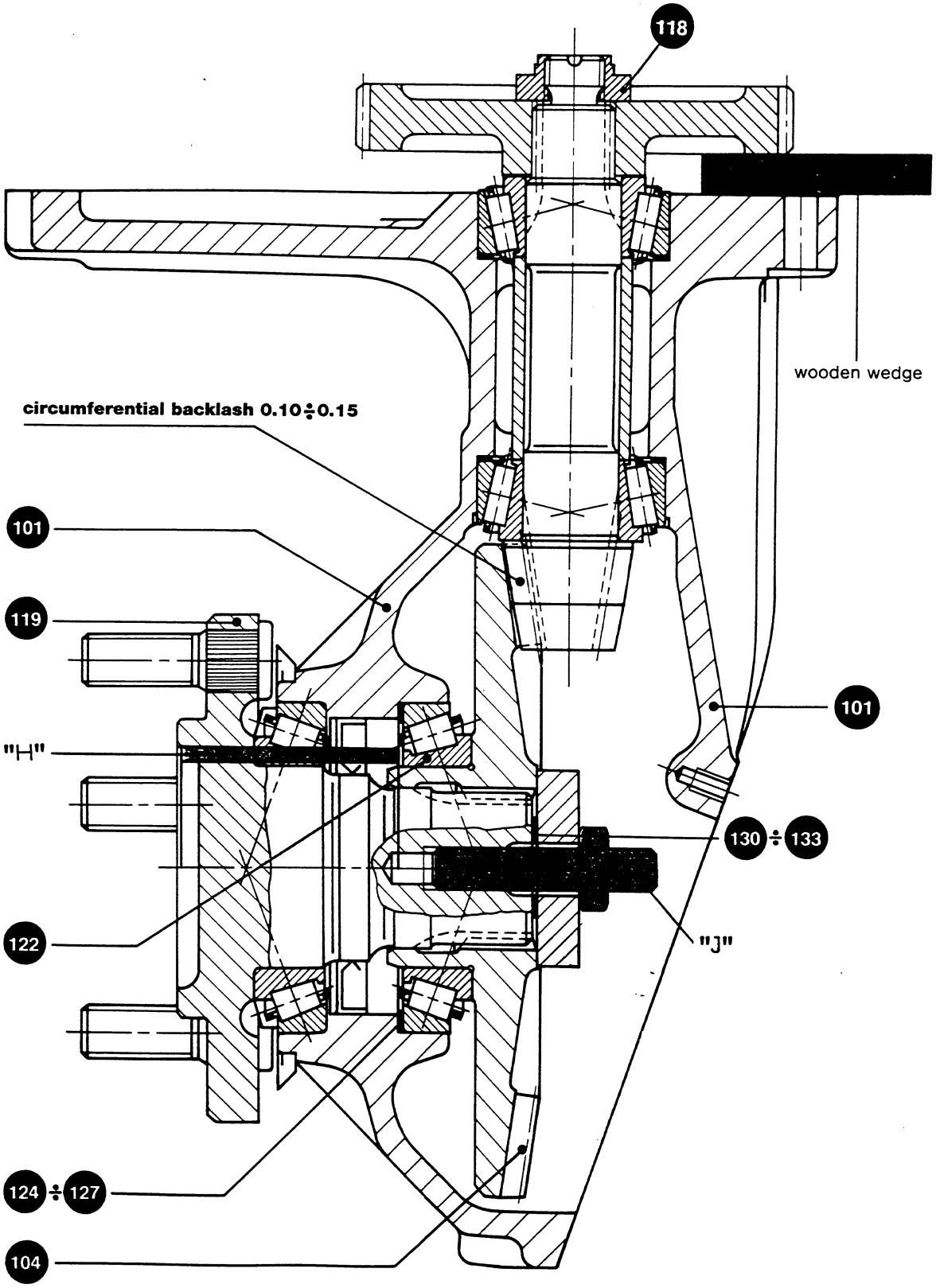
Checking the tooth pattern

For checking the tooth pattern it is necessary to apply a thin coat of marking ink to 3-4 tooth flanks of the crown gear.
Mesh the coated tooth flanks several times with the conical pinion. The pattern will show better if the conical pinion is slightly braked while in mesh. Compare the pattern obtained with the "Mounting guideline" below.
If a correction is necessary, its direction is indicated by the "Mounting guideline".
Secure the hex nut (118) by caulking.

Table of tooth patterns

Tooth pattern on the ring gear Defective patterns Concave flank | Convex flank	Correct pattern adjustment by changing the mounting dimensions in direction of arrow	Setting instructions
1  Pattern at tip		Mount every wheel set on principle according to the marked mounting dimensions a_1 and a_2 or the backlash S_d) or to deviations from the mounting dimensions $\pm\Delta$ a_1 and ($\pm\Delta_a$ or backlash S_d). The mounting dimensions may only be changed for incorrect patterns. The size of the change depends on the position of the patterns on the teeth.
2  Pattern at root		
3  Toe pattern	 Note fig. 1 & 2	
4  Heel pattern	 Note fig. 1 & 2	

Setting the circumferential backlash



4.3.2.7 Mounting the wheel shaft (119), crown gear (104), and setting the bearing clearance

Use auxiliary unit "J" to pull together the mounted wheel shaft and crown via washer (128):

- HFK 200 with M_A = 7 Nm (5.2 ft-lb.) = approx. 3500 N bearing pre-stress
- HFK 250-500 with M_A = 10 Nm (7.4 ft-lb.) = approx. 5000 N bearing pre-stress

When doing so, turn the wheel shaft several times in both directions to enable the bearing rollers to align themselves.

Measure dimension "Y" via the borehole of auxiliary unit "J".

Shim thickness "X" = Y - washer thickness of auxiliary unit.

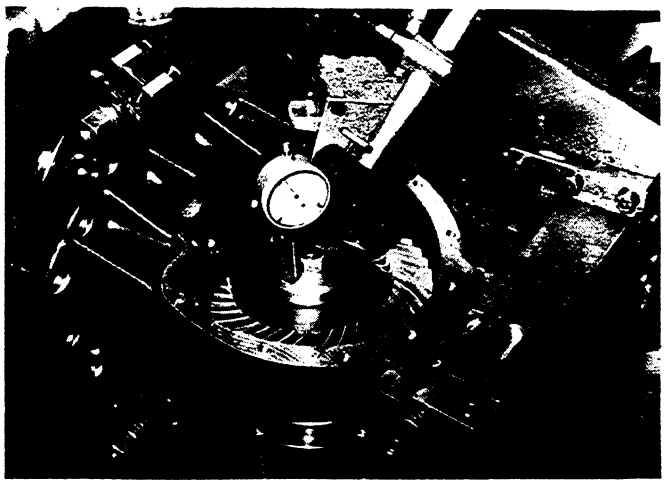
Unscrew auxiliary unit "J" and remove.

Insert shims (2, see fig. 4.5) in accordance with dimension "X".

Wet screw (129) with Loctite 242 and pull together the previously mounted wheel shaft and crown gear via the washer (128).

Tightening torque M_A = 110 Nm (81 ft-lb.) +/- 10 %

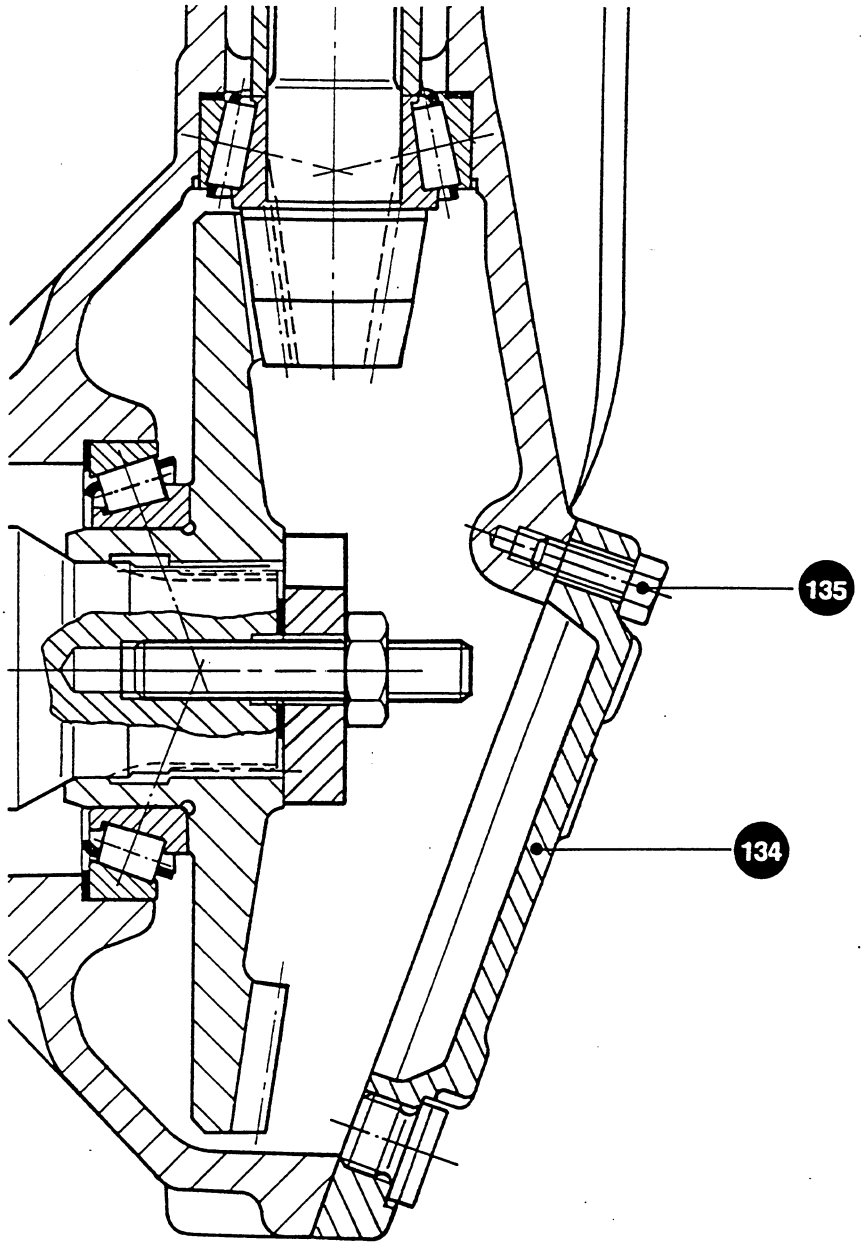
Remarks: A direct check of the bearing pre-stress as now set is hardly possible. When checking according to the measuring method described above, there should be no measurable bearing clearance. Nevertheless, it should still be possible to rotate the wheel shaft easily by hand.



4.3.2.8 **Mounting the housing lid (134)**

Coat the housing lid with Loctite 574 and fit in position. Wet screws (135) with Loctite 242 and fasten.

Tightening torque M_A = 9.5 Nm (7 ft-lb.)



Remarks

If the basic gear unit is stored as an assembly group, e.g., for standby purposes, it should be suitably protected against corrosion and be packaged accordingly.

Conservation can be carried out, e.g., by filling the unit with oil and draining it afterwards.

A closed plastic cover is sufficient to package the unit for storage.

4.3.3 Mounting the top of the gear unit (300)

4.3.3.1 Fitting the top of the gear unit to the basic gear unit (100)

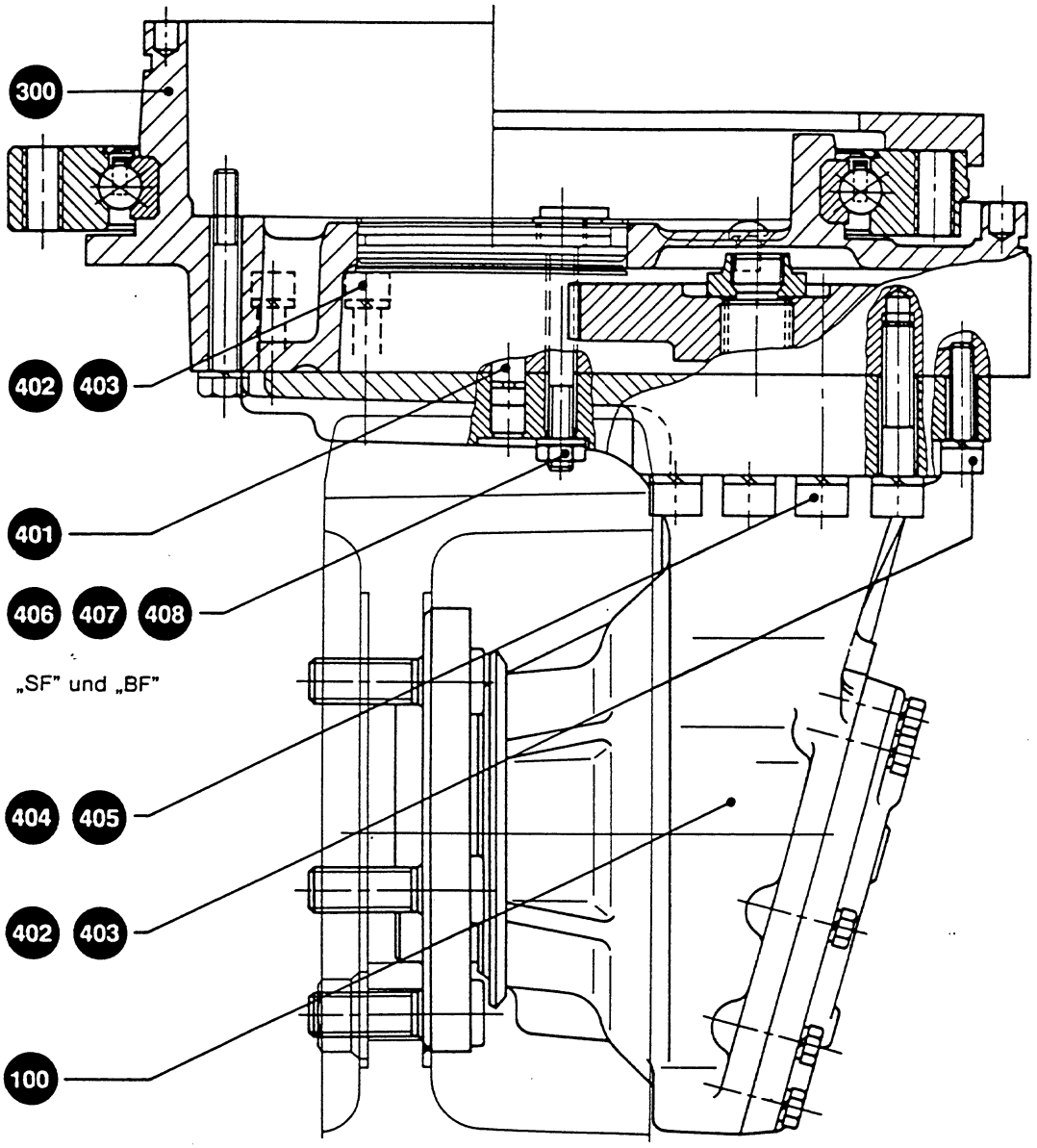
Insert dowel pins (401) into the basic gear unit in such a way (internal thread pointing downward) that they still project by approx. 1 mm (0.04") over the sealing surface.

Coat the sealing surface of the top of the gear unit with Loctite 574 and place it onto the basic gear unit.

Screw in bolts (402 and 404) with spring washers (403 and 405) and knock the dowel pin (401) with a 9 mm (11/32") dia. drift punch into the top of the gear unit up to the stop.

Tighten bolts (402/405) with tightening torque of M_A = 23 Nm (17 ft-lb.).

Tighten bolts (404) with tightening torque of M_A = 46 Nm. (34 ft-lb.).



4.3.3 Mounting the top of the gear unit (300)

4.3.3.1 Fitting the top of the gear unit to the basic gear unit (100)

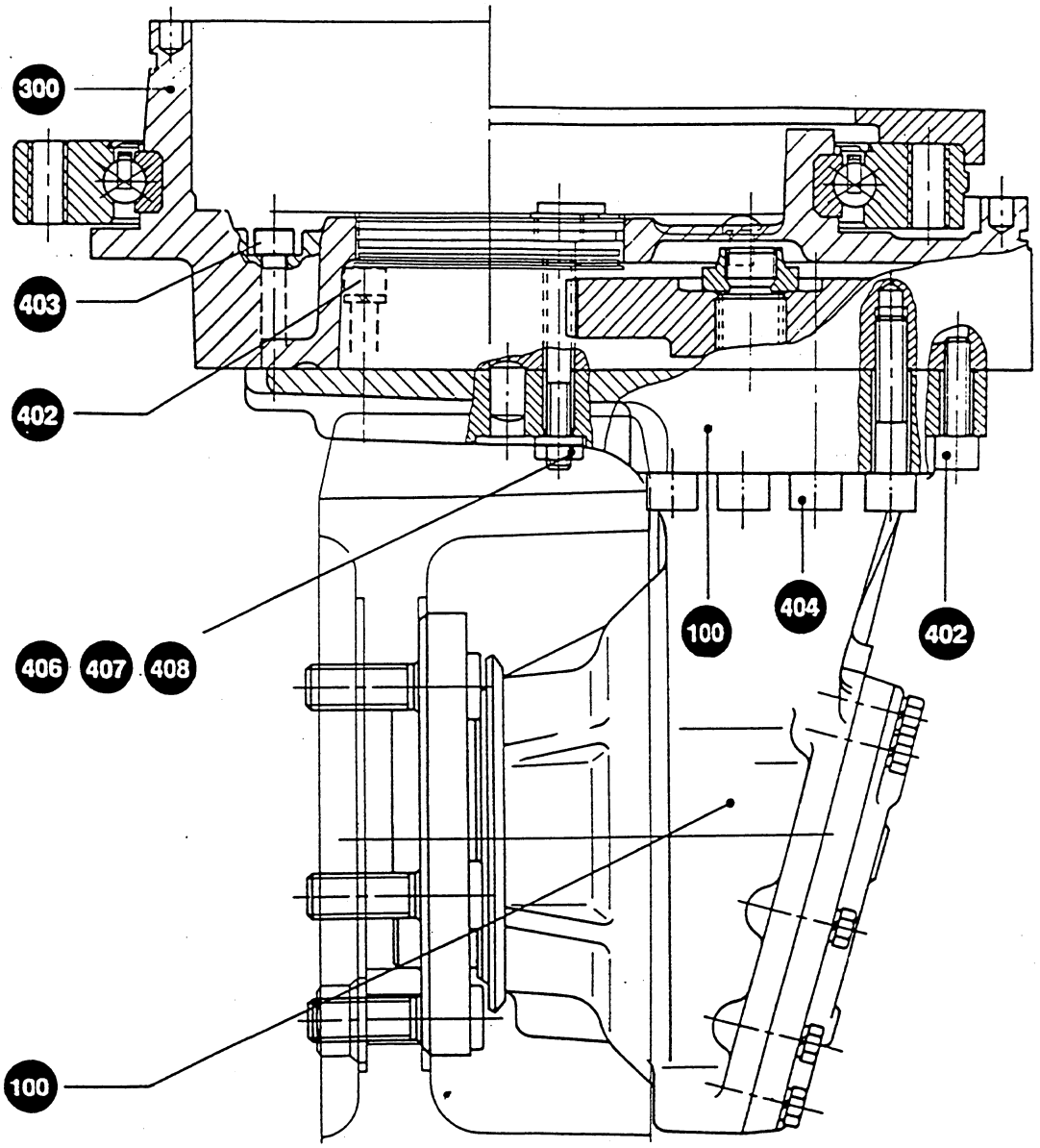
Dowel pins (401) to be driven up to the stop into the basic gear unit. (Dowel pins should then jut out of the sealing surface by abt. 3 mm - 1/8").

Coat the sealing surface of the top of the gear unit with Loctite 574 and place it onto the basic gear unit.

Screw in bolts (402 and 404).

Tighten bolts (402/406) with tightening torque of M_A = 23 Nm (17 ft-lb.).

Tighten bolts (404) with tightening torque of M_A = 46 Nm (34 ft-lb.).



4.3.3.2 General remarks

If the gear unit is stored, e.g., for standby purposes, it should be suitably protected against corrosion and packaged accordingly. Close the opening of the gear unit (for taking up the motor).

Protection against corrosion is possible, e.g., by filling the unit with oil and draining it afterwards. A closed plastic cover is sufficient to package the unit for storage.

4.4 Mounting the drive assembly

The part dealing with "Mounting the drive assembly" is included in the "Mounting Instructions", items 2.3 through 2.6 (refer also to item 1.2.6).

702 7.87 1

CONTENTS

INTRODUCTION

In the scrubbing mode the water flows from the solution tank, through the solution valve, and down to the scrub brushes. The brushes scrub the floor. As the machine moves forward the rear squeegee wipes the dirty solution off the floor, which is then picked up and drawn into the recovery tank by the vacuum fans.

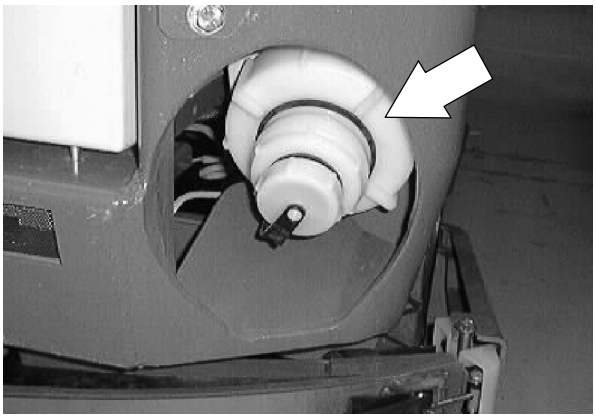
SOLUTION TANK

The solution tank is located on the right side of the machine. Water from the solution tank flows from the bottom of the tank to the water valve located on the scrub head. Filtered water from the recovery tank is pumped to the top of the solution tank when the ES™ option is in use.

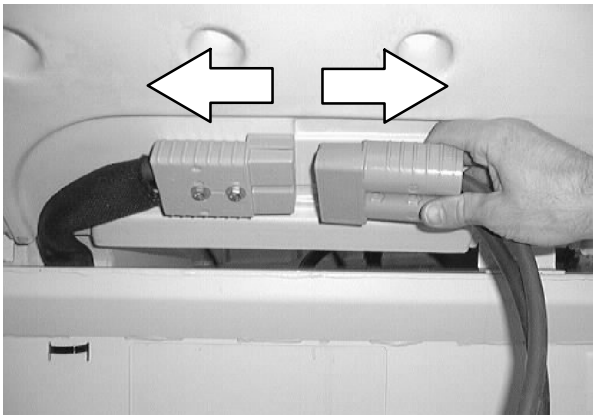
TO REMOVE SOLUTION TANK

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

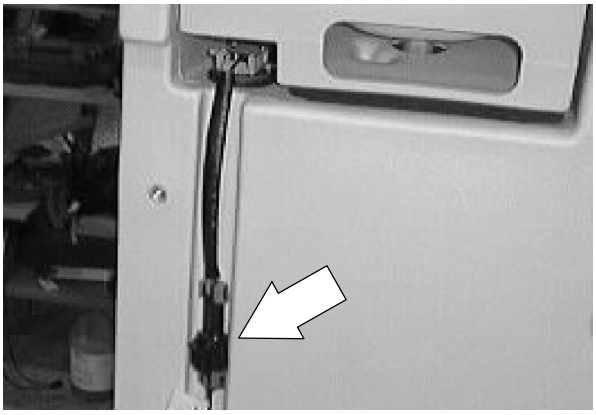
1. Make sure the solution tank (right side of machine) has been drained.



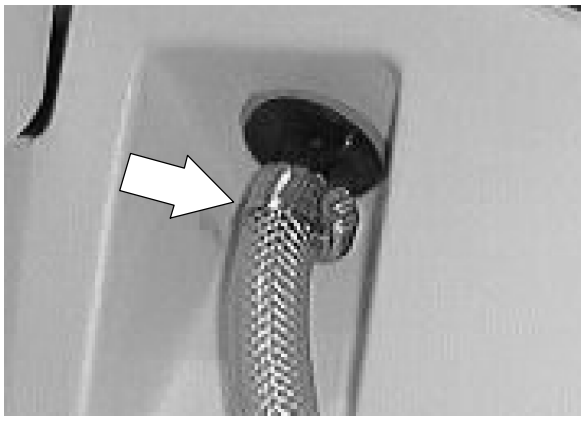
2. Raise the battery cover. Unplug the battery connector.



3. Disconnect the float switch from the main harness. *(ES™ option only)*

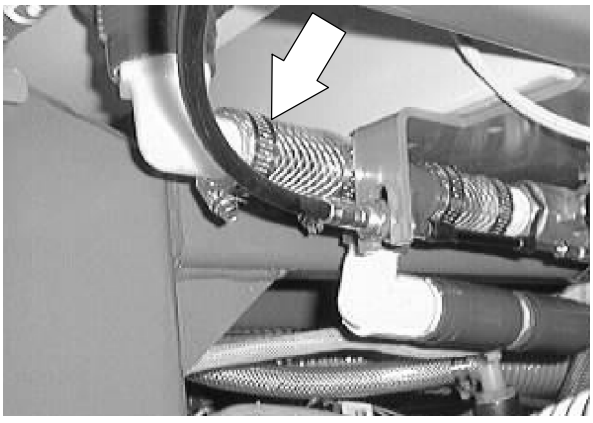


4. Disconnect the ES™ water line from the top of the solution tank. *(ES™ option only)*

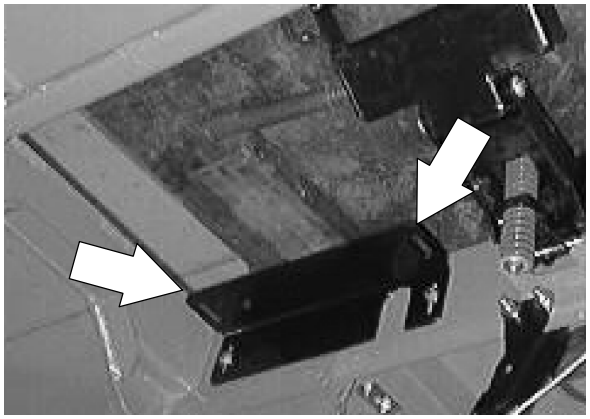


5. Remove the six hex screws holding the operator seat mount plate to the solution tank. Remove the seat assembly.

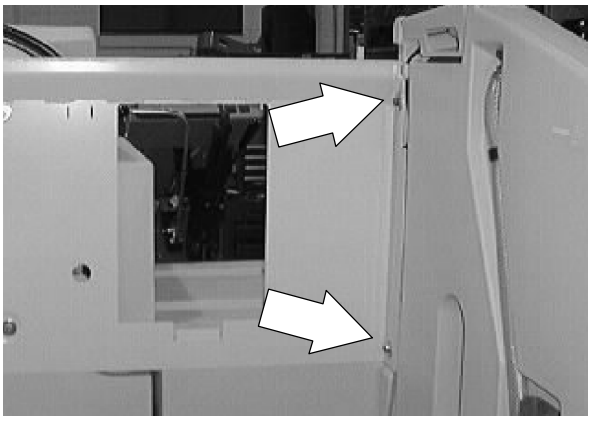
6. Go under the solution tank. Disconnect the main drain line from the bottom of the solution tank.



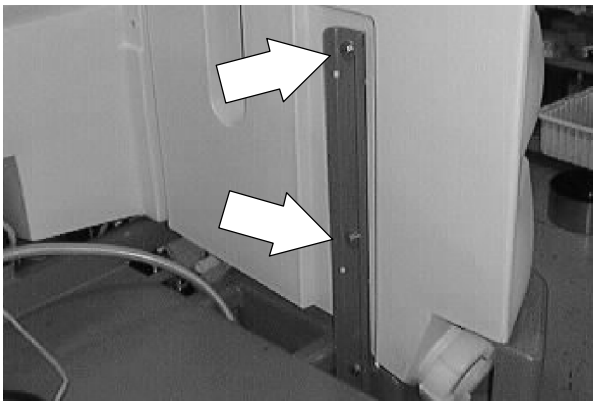
7. Go under the solution tank in the area under the rear of the operator floor plate. Remove the two hex screws holding the front of solution tank to the frame bracket.



8. Remove the two hex screws holding battery cover mount plate to the inside of the solution tank.

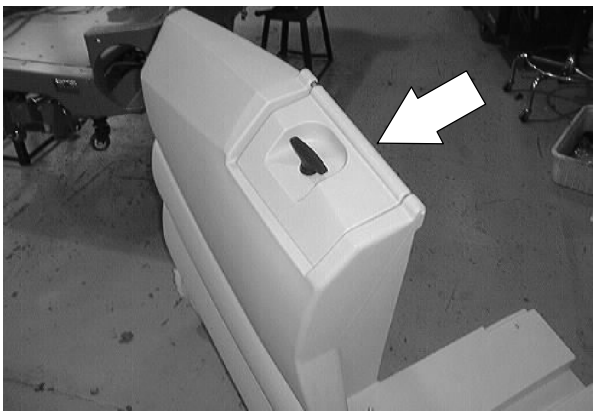


9. Remove the two hex screws holding the solution tank to the vertical mount channel at the right side of the battery.



10. The solution tank can now be carefully be lifted out of the machine frame.

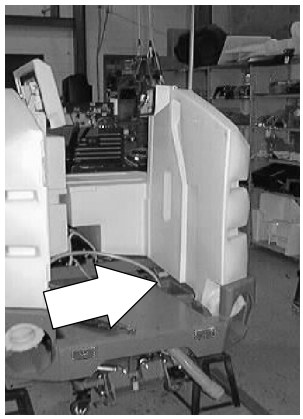
NOTE: Remove the solution level switch assembly from the mount hole in the tank. Use this hole to attach a lifting strap. The tank will lift fairly level using this procedure.



TO INSTALL SOLUTION TANK

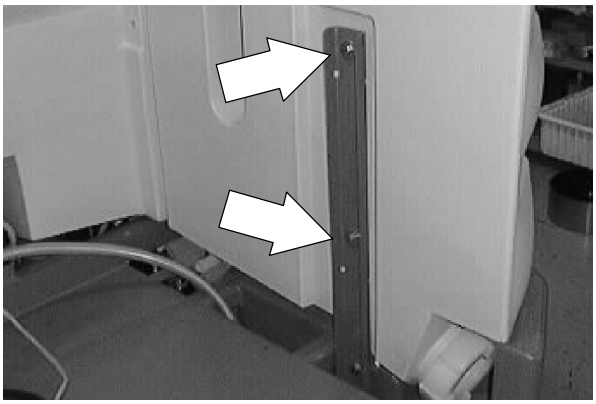
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

1. Carefully position the solution tank into the machine frame.

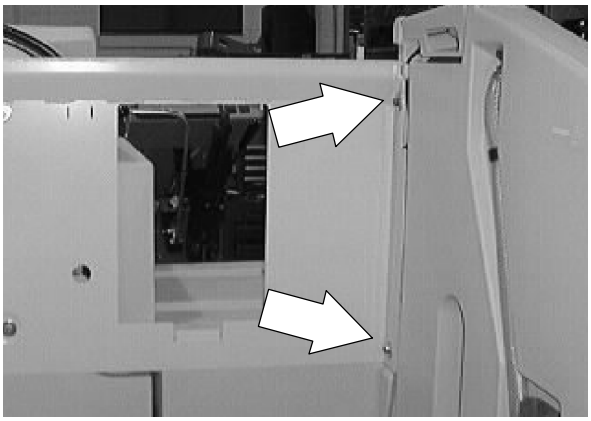


NOTE: Remove the solution level switch assembly from the mount hole in the tank. Use this hole to attach a lifting strap. The tank will lift fairly level using this procedure.

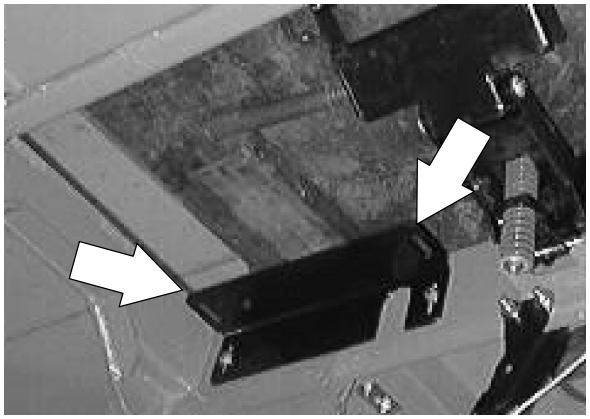
2. Loosely install the two hex screws holding the solution tank to the vertical mount channel at the right side of the battery.



3. Loosely install the two hex screws holding battery cover mount plate to the inside of the solution tank.

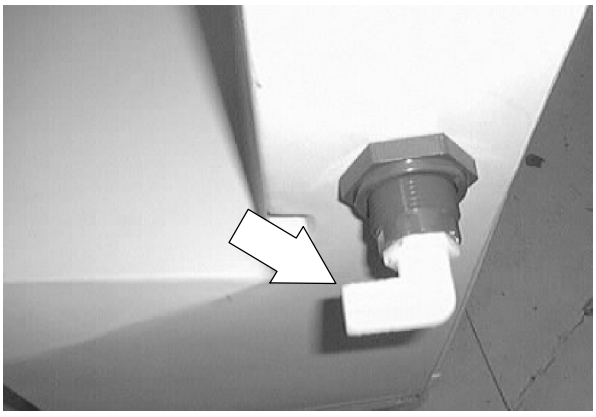


4. Go under the solution tank in the area under the rear of the operator floor plate. Loosely install the two hex screws holding the front of solution tank to the frame bracket. Go back and tighten all six mounting screws to 18 – 24 Nm (15 – 20 ft lb).

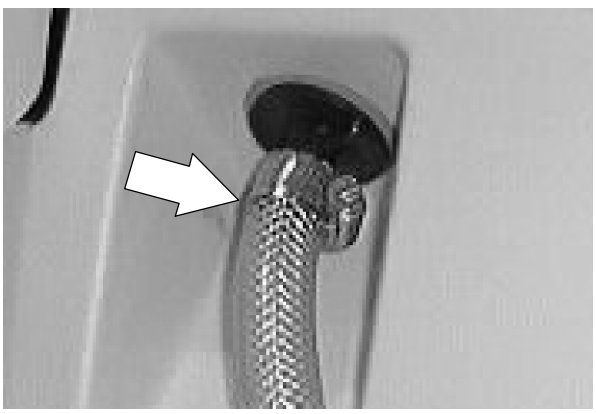


5. Reinstall the seat assembly. Reinstall the six hex screws holding the operator seat mount plate to the solution tank. Tighten screws to 18 – 24 Nm (15 – 20 ft lb).

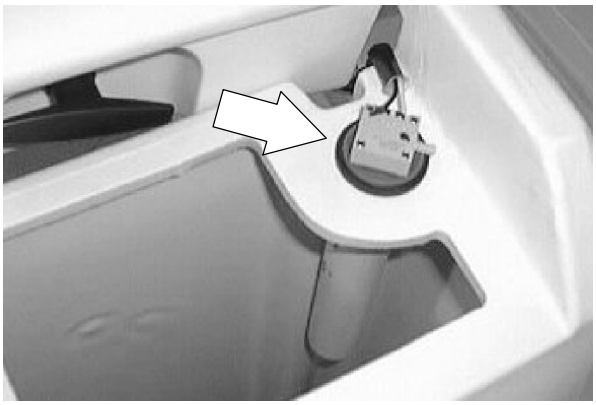
6. Reconnect the main solution line to the bottom of the tank.



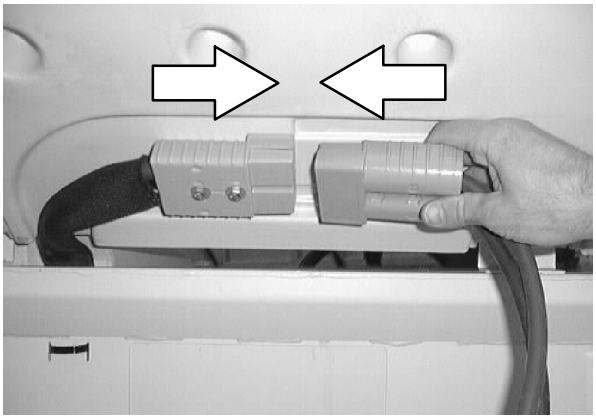
7. Reconnect the ES™ water line to the top of the solution tank. *(ES™ option only)*



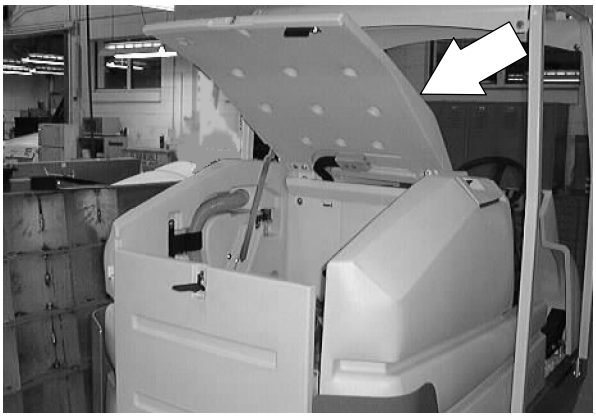
8. Reconnect the float switch to the main harness. *(ES™ option only)*



9. Plug the battery connector into the main connector.



10. Close the battery cover and front cover.



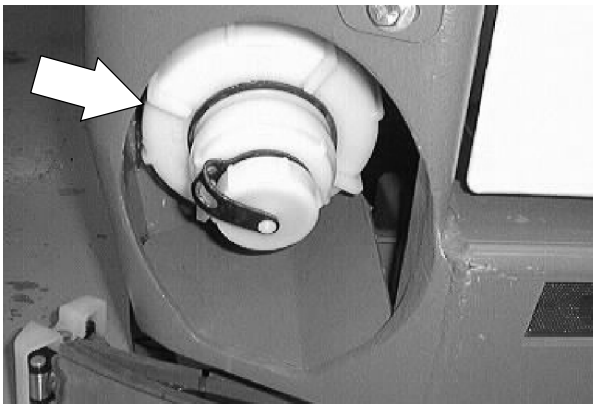
RECOVERY TANK

The recovery tank is located on the left side of the machine. The scrubber vacuum fans located on the front of the recovery tank pull dirty water from the rear squeegee and deposit it into the recovery tank.

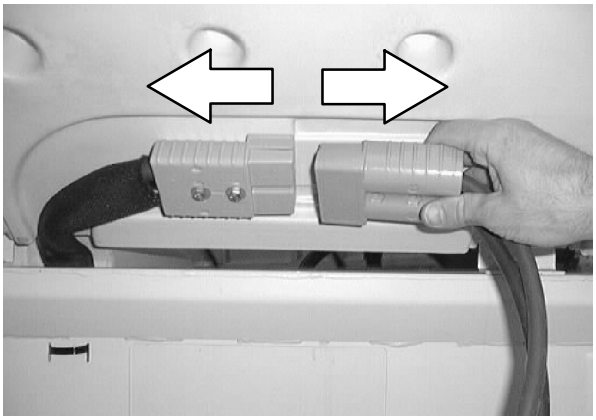
TO REMOVE RECOVERY TANK

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

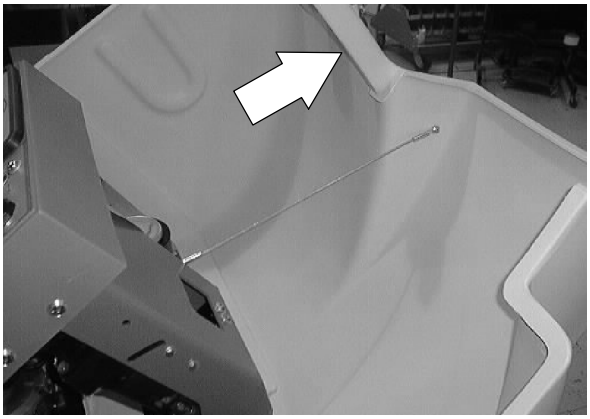
1. Make sure the recovery tank (left side of machine) has been drained.



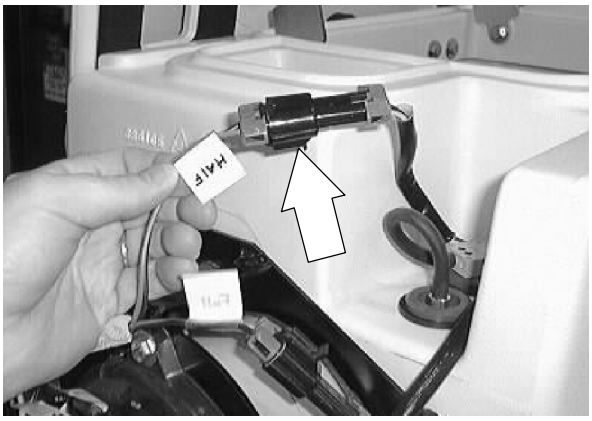
2. Raise the battery cover. Unplug the battery connector.



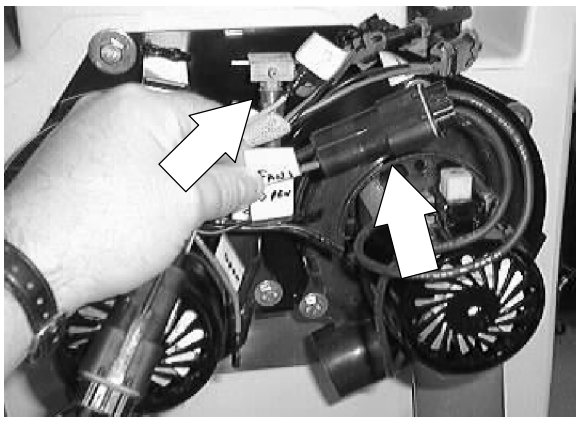
3. Open the front cover.



4. Disconnect the float switches from the main harness.

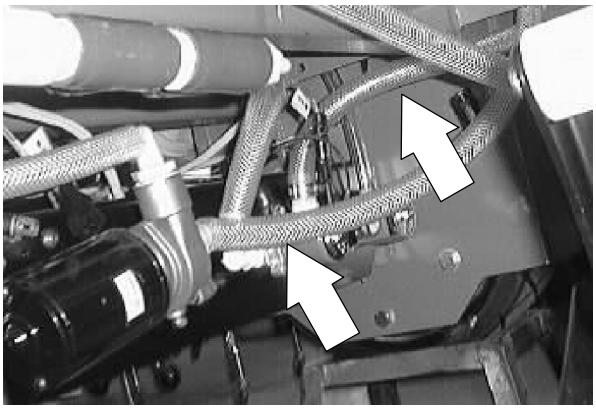


5. Disconnect the scrubbing vacuum fans and vacuum switch from the main harness.

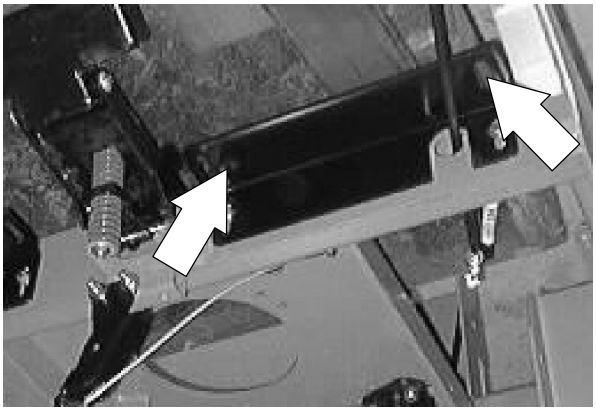


6. Remove the two hex screws holding the side of the operator seat mount plate to the side of the recovery tank.

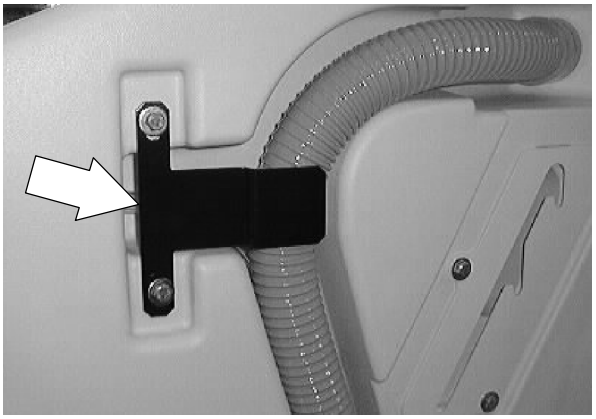
7. Go under the recovery tank. Disconnect the ES™ water line and autofill line from the bottom of the recovery tank.



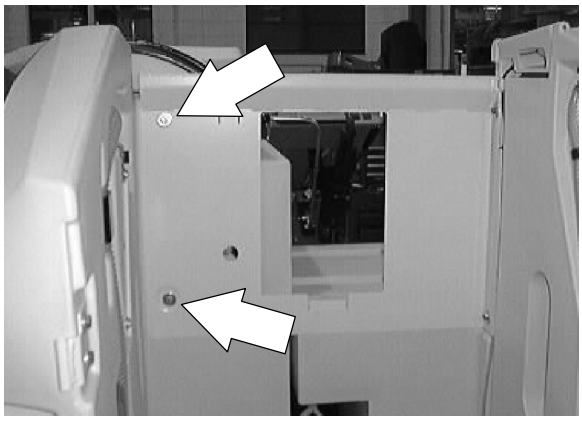
8. Go under the recovery tank in the area under the scrubbing vacuum fans. Remove the two hex screws holding the front of recovery tank to the frame bracket.



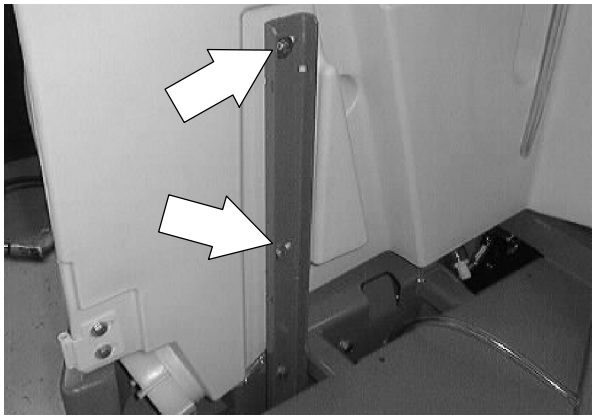
9. Remove the bracket holding the rear squeegee vacuum hose to the side of the recovery tank. Remove the vacuum hose from the recovery tank.



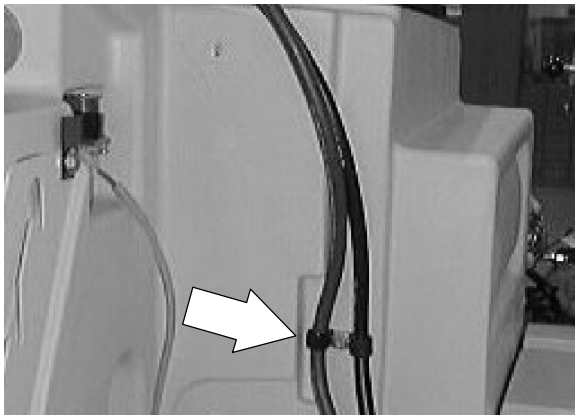
10. Remove the two hex screws holding battery cover mount plate to the inside of the recovery tank.



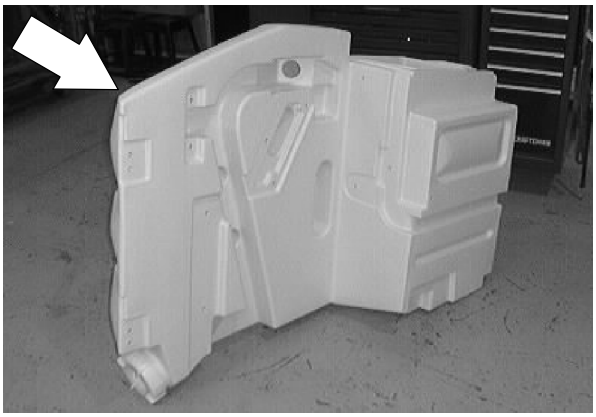
11. Remove the two hex screws holding the recovery tank to the vertical mount channel at the left side of the battery.



12. Remove the clamp holding the battery cables to the back of the recovery tank.



13. The recovery tank can now be carefully be lifted out of the machine frame.

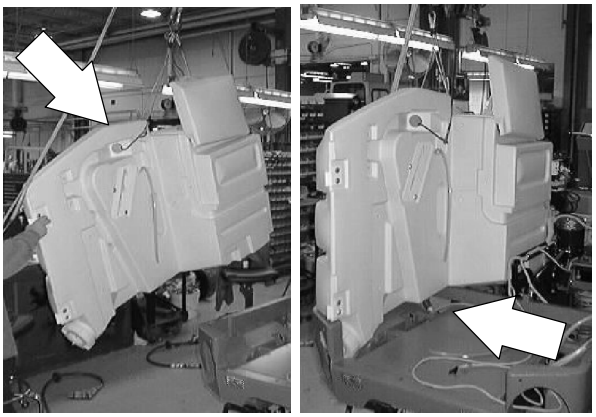


NOTE: Remove the solution level switch assembly from the mount hole in the tank. Use this hole to attach a lifting strap. The tank will lift fairly level using this procedure.

TO INSTALL RECOVERY TANK

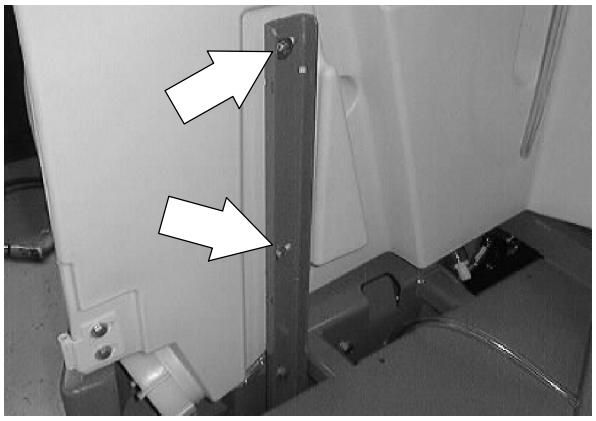
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

1. Carefully position the recovery tank into the machine frame.

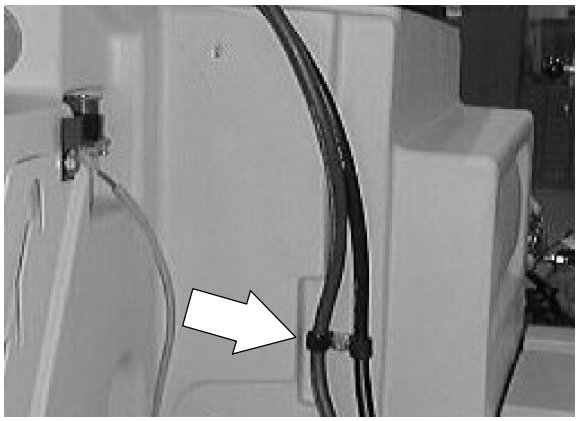


NOTE: Remove the solution level switch assembly from the mount hole in the tank. Use this hole to attach a lifting strap. The tank will lift fairly level using this procedure.

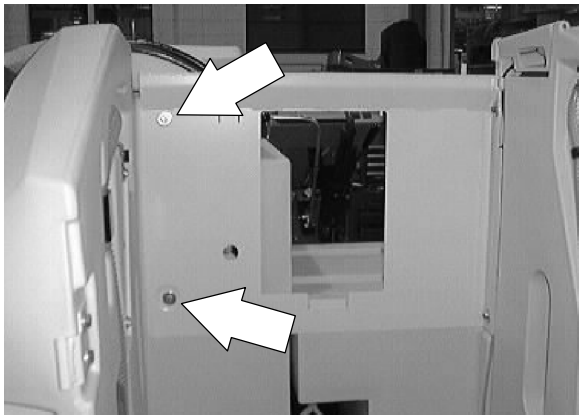
2. Loosely install the two hex screws holding the recovery tank to the vertical mount channel at the right side of the battery.



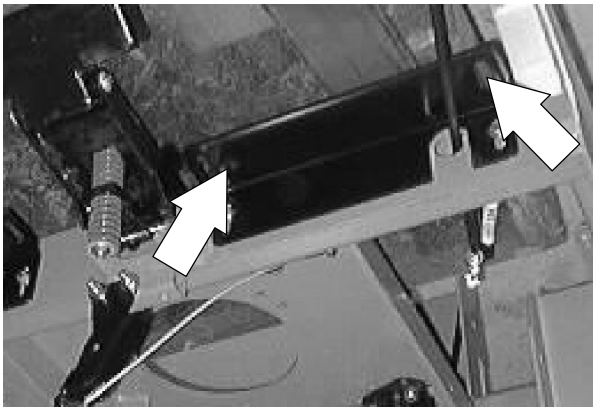
3. Reinstall the clamp holding the battery cables to the back of the recovery tank.



4. Loosely install the two hex screws holding battery cover mount plate to the inside of the recovery tank.

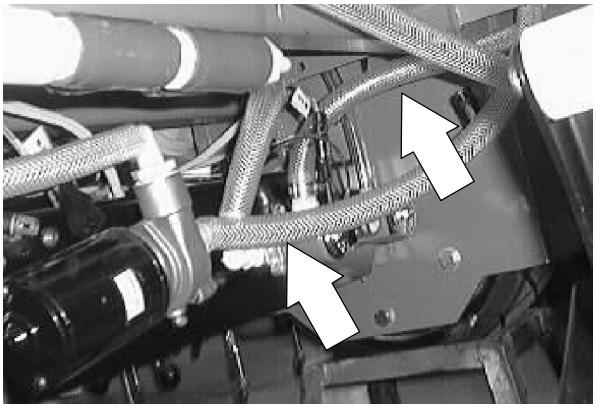


5. Go under the recovery tank in the area under the scrubbing vacuum fans. Loosely install the two hex screws holding the front of recovery tank to the frame bracket. Go back and tighten all six mounting screws to 18 – 24 Nm (15 – 20 ft lb).

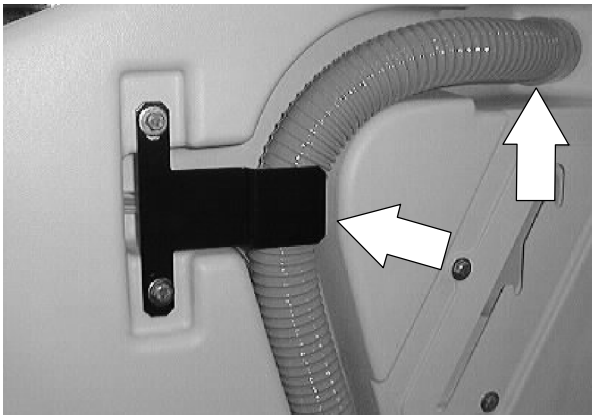


6. Reinstall the two hex screws holding the side of the operator seat mount plate to the side of the recovery tank. Tighten to 18 – 24 Nm (15 – 20 ft lb).

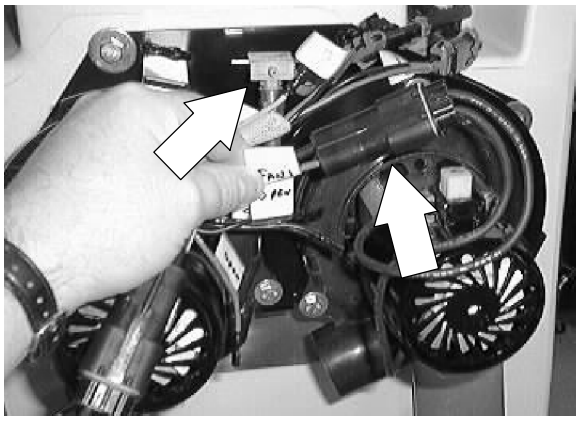
7. Reconnect the ES™ water line and autofill solution line to the bottom of the tank.



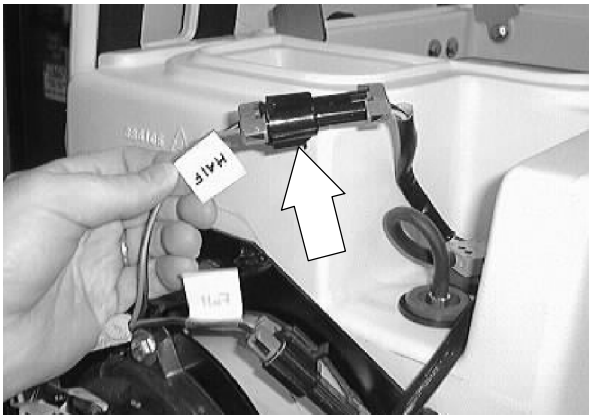
8. Reinstall the vacuum hose into the vacuum hole in the recovery tank. Reinstall the bracket holding the rear squeegee vacuum hose to the side of the recovery tank.



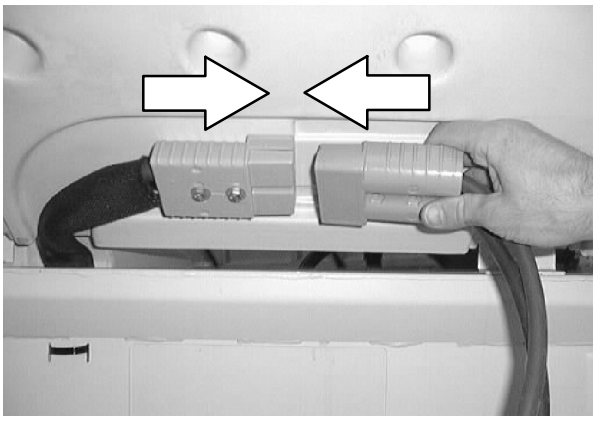
9. Reconnect the scrubbing vacuum fans and vacuum switch to the main harness.



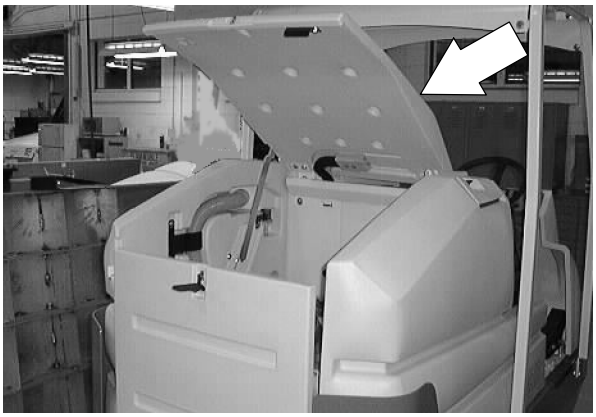
10. Reconnect the float switch to the main harness.



11. Plug the battery connector into the main connector.



12. Close the battery cover and front cover.



SCRUB HEAD

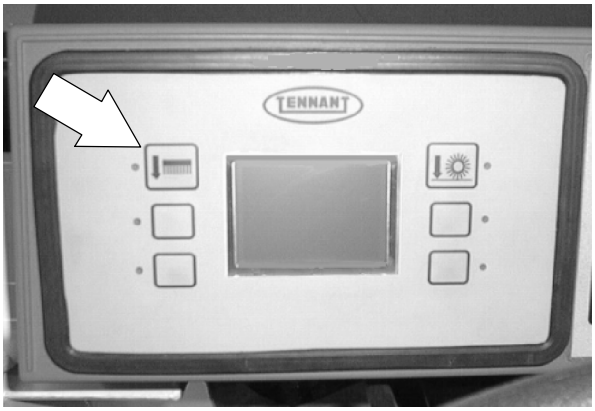
The 7300 can be equipped with five different scrub heads;
MAXPRO™ 1000, MAXPRO 1000 HD motors,
MAXPRO™ 1200 disc scrub heads.
MAXPRO™ 1000 and 1200 cylindrical scrub heads.

TO REMOVE TWO MOTOR DISC SCRUB HEAD (MAXPRO™ 1000)

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

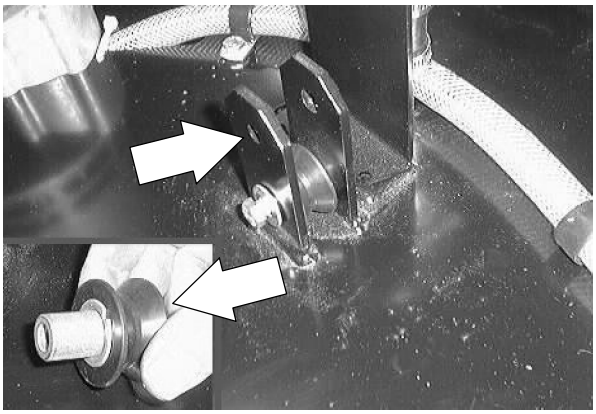
NOTE: Latch the side squeegees in the double scrub position. Leave the scrub brushes on the scrub head.

1. Turn on the machine and *lower* the scrub head. Shut off the key.

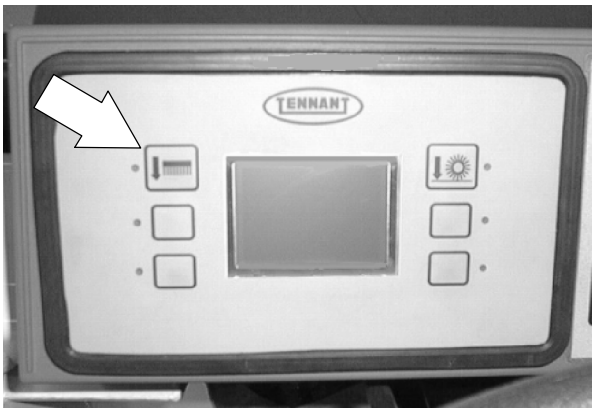


NOTE: Use down pressure setting #3 on cylindrical head and down pressure setting #2 on all disc heads.

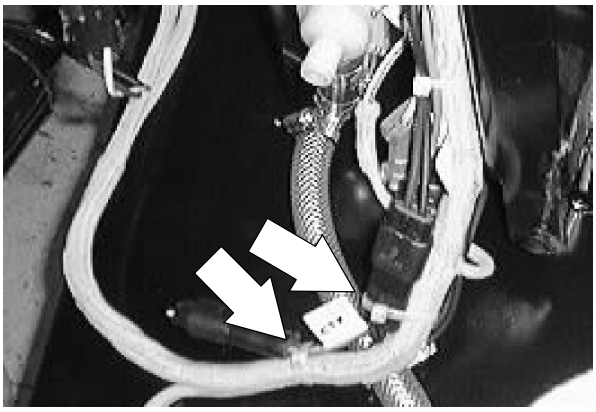
2. Go under the machine in the area of the center of the scrub head. Remove the hex screw holding the **UPPER** head lift roller to the mount bracket. Remove the roller from the scrub head frame.



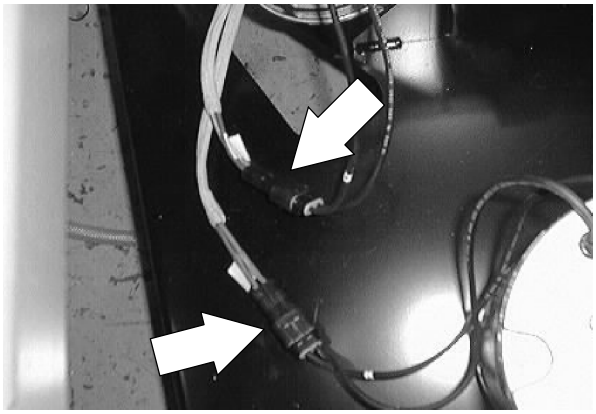
3. Turn on the machine and *raise* the scrub head. Turn off the key.



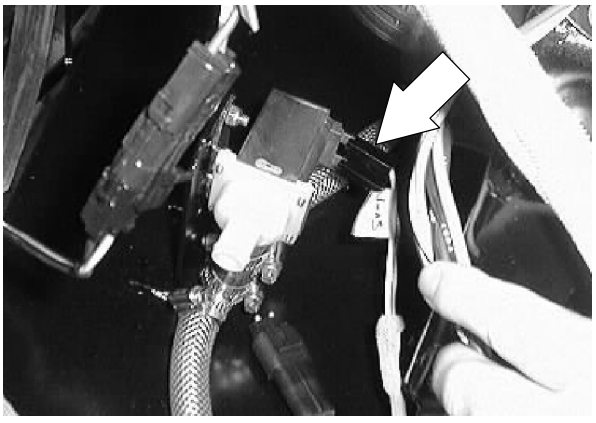
4. Remove any plastic ties holding the wires to the scrub head.



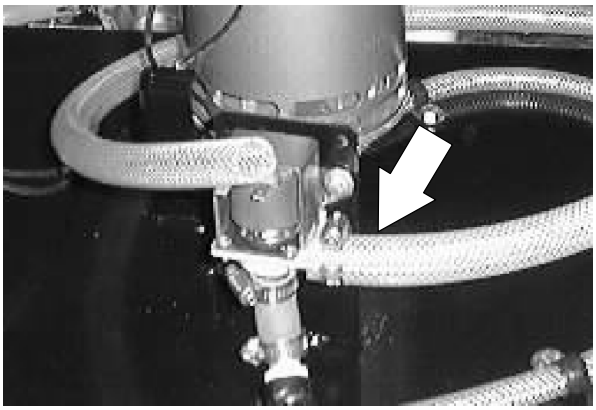
5. Disconnect the two scrub brush motors from the main harness.



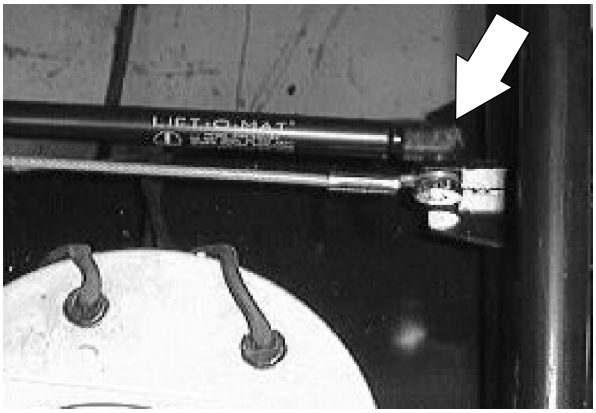
6. Disconnect the main harness from the water flow solenoid.



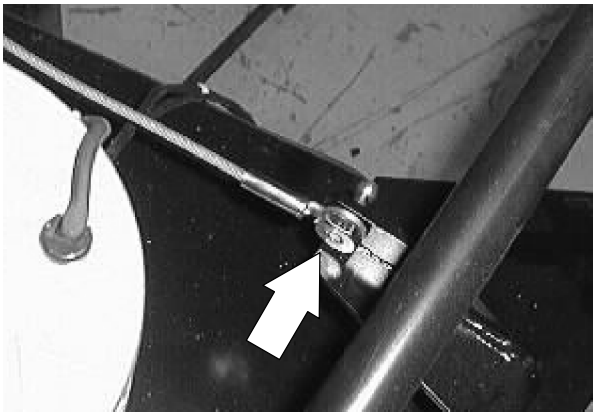
7. Disconnect the solution line from the water flow solenoid.



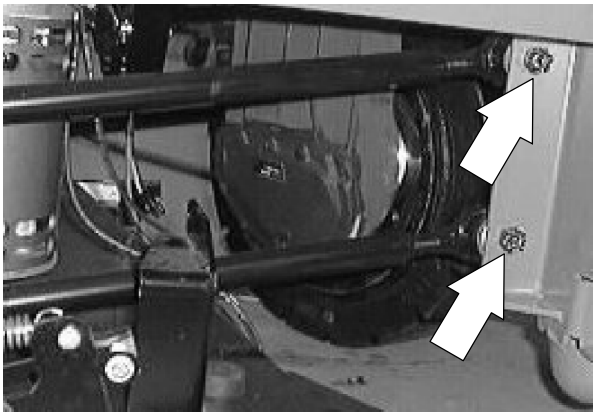
8. Disconnect the end of the side shift gas spring where it attaches to the scrub head.



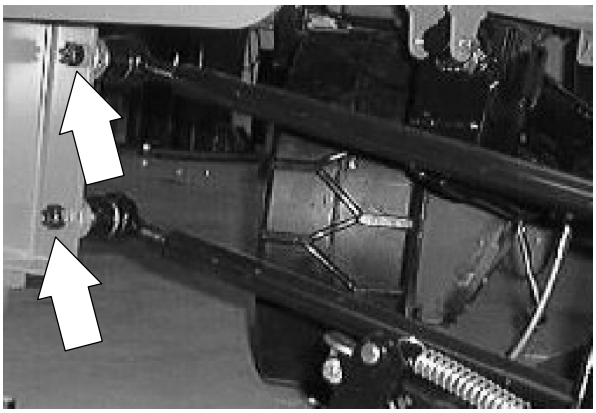
9. Disconnect the end of the side shift cable where it attaches to the scrub head.



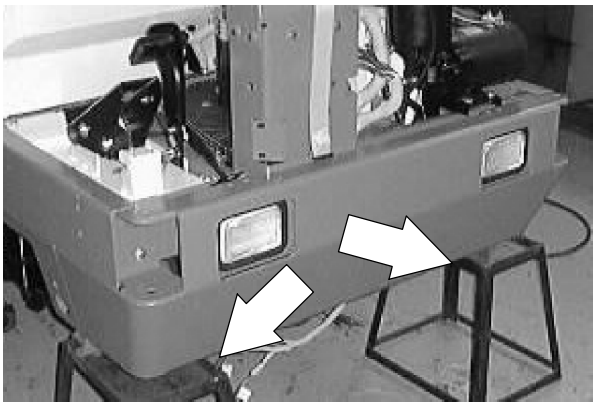
10. Remove the cotter pins and castle nuts from the end of the scrub head drag links where they attach to the machine frame.



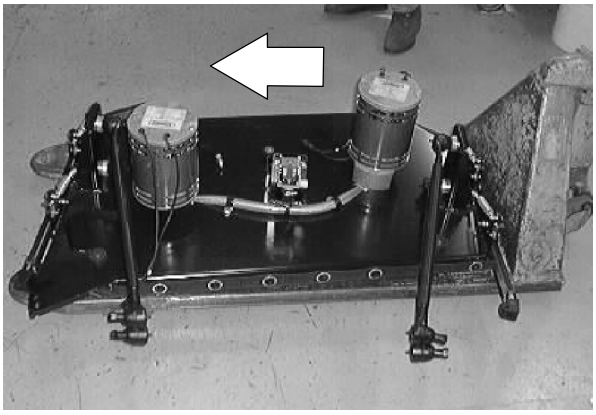
11. Pull the drag links out of the frame mount holes. Disconnect the kick-in guard from the front, right corner of the scrub head.



12. **If a hoist is available--**raise the front of the machine and place jackstands under the corners of the machine frame.



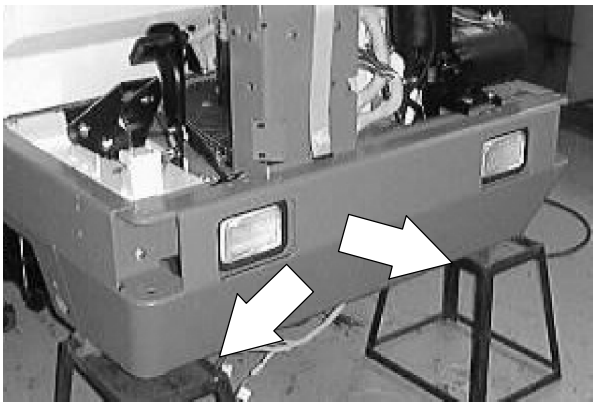
13. Push or pull the scrub head out the right side (operators compartment side) of the machine. The scrub head can now be removed from the machine.



TO INSTALL TWO MOTOR DISC SCRUB HEAD (MAXPRO™ 1000)

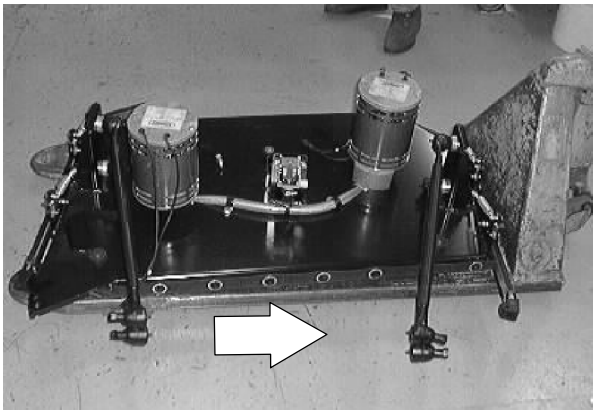
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

1. **If a hoist is available--**raise the front of the machine and place jackstands under the corners of the machine frame.



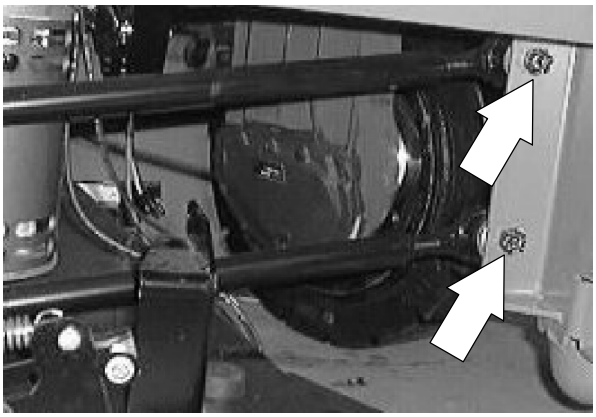
NOTE: Make sure the side squeegees are latched up and the scrub brushes are installed.

2. Push or pull the scrub head into the right side (operators compartment side) of the machine. Push the head in until it is centered in the frame.

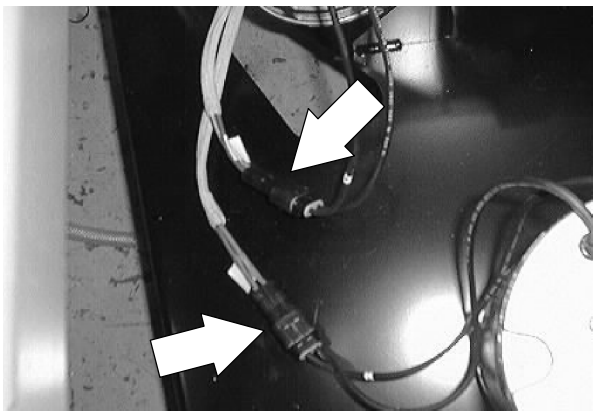


3. Position the four scrub head drag links into the frame mount holes.

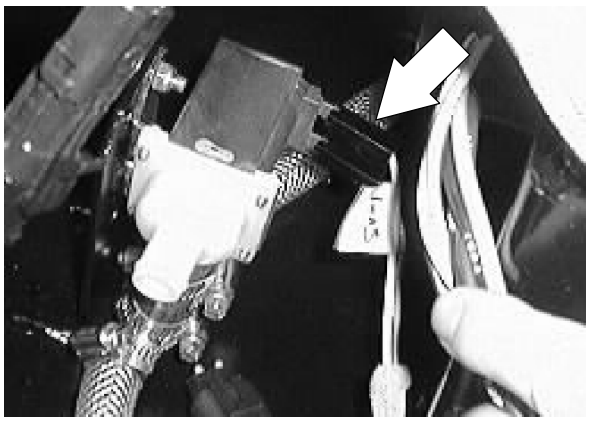
4. Reinstall the castle nuts onto the end of the scrub head drag links where they attach to the machine frame. Tighten the castle nuts tight. Reinstall the cotter pins.



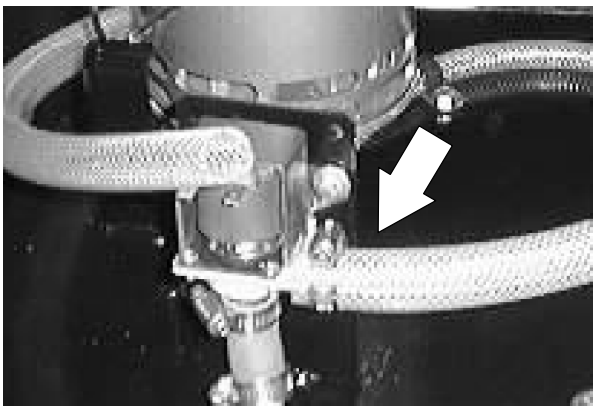
5. Reconnect the two scrub brush motors to the main harness.



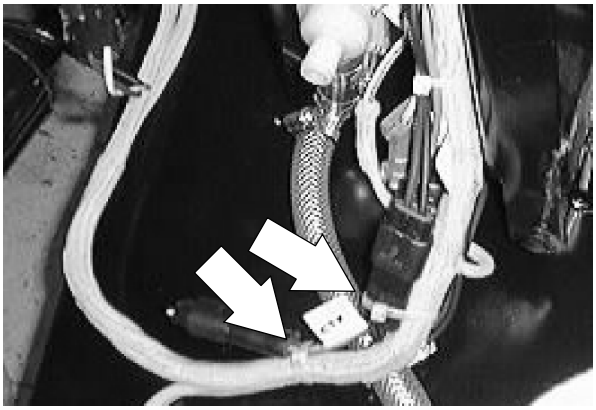
6. Reconnect the water flow solenoid to the main harness.



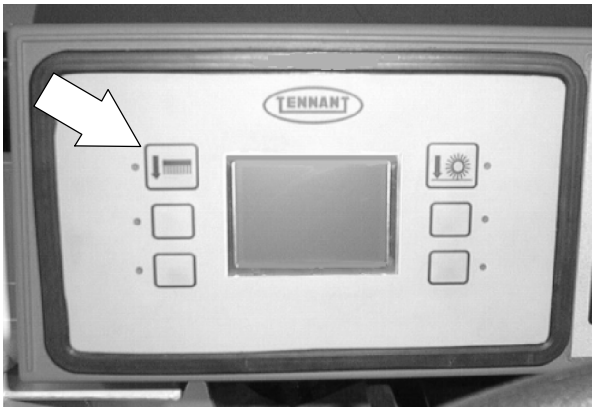
7. Reconnect the solution line to the water flow solenoid.



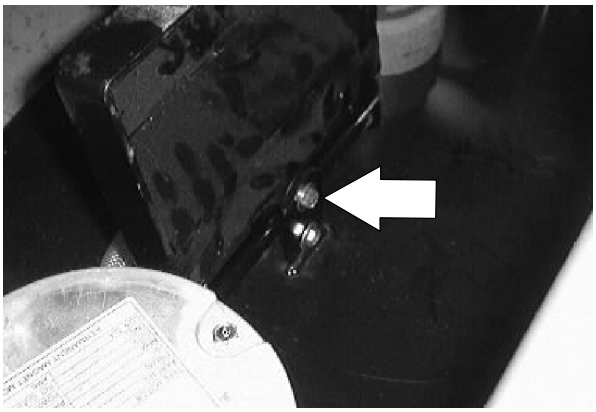
8. Use plastic ties to secure electrical wires and solution lines.



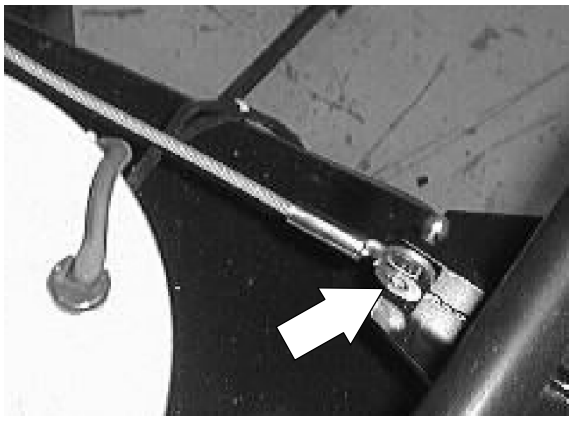
9. Turn on the machine and *lower* the scrub head. Shut off the key.



10. Go under the machine in the area of the center of the scrub head. Reinstall the **UPPER** head lift roller into the mount bracket. Reinstall the roller mount screw and tighten to 18 – 24 Nm (15 – 20 ft lb).

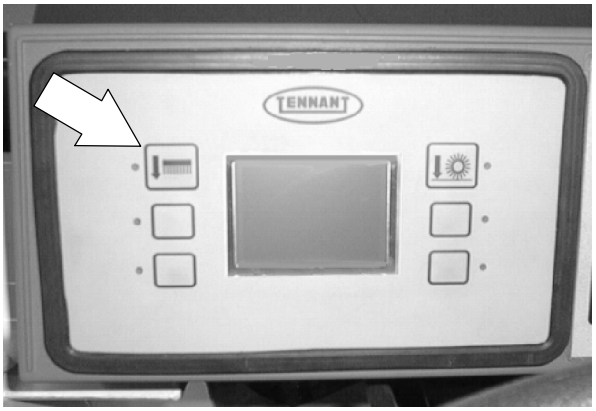


11. Reconnect the end of the side shift cable where it attaches to the scrub head.



12. Reconnect the end of the side shift gas spring where it attaches to the scrub head. Reconnect the kick-in guard to the front, right corner of the scrub head.

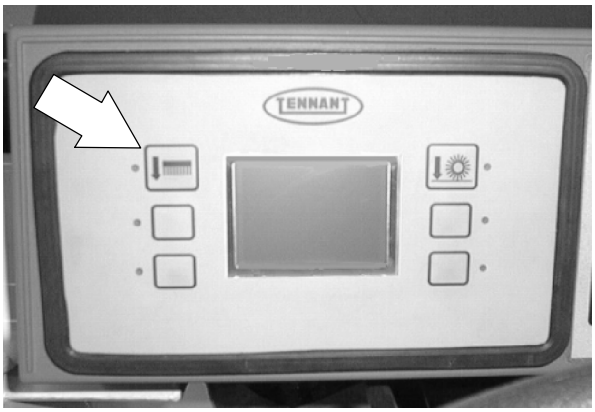
13. Turn on the machine and *raise* the scrub head. Check the scrub head for proper operation.



TO REMOVE THREE MOTOR DISC SCRUB HEAD (MAXPRO™ 1200)

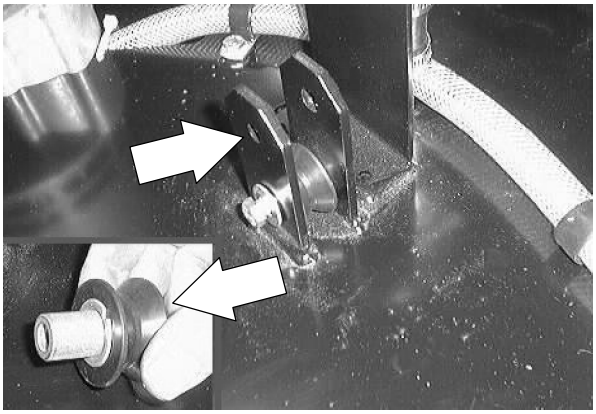
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

1. Turn on the machine and *lower* the scrub head. Shut off the key.

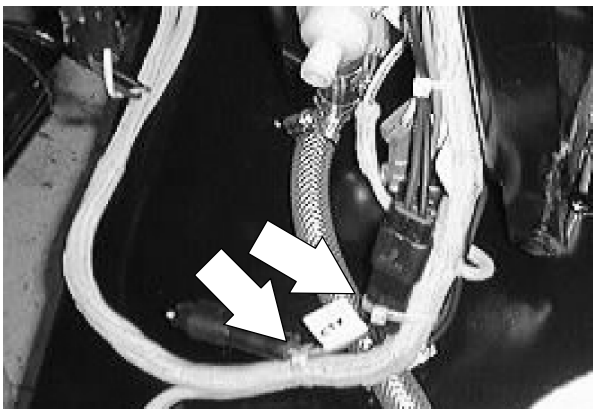


2. Go under the machine in the area of the center of the scrub head. Remove the hex screw holding the **UPPER** head lift roller to the mount bracket. Remove the roller from the scrub head frame.

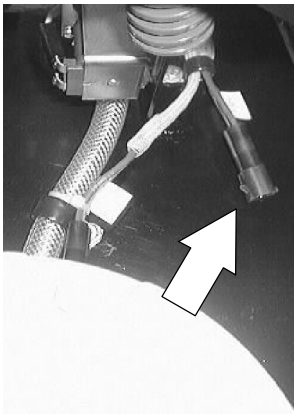
3. Turn on the machine and *raise* the scrub head. Turn off the key.



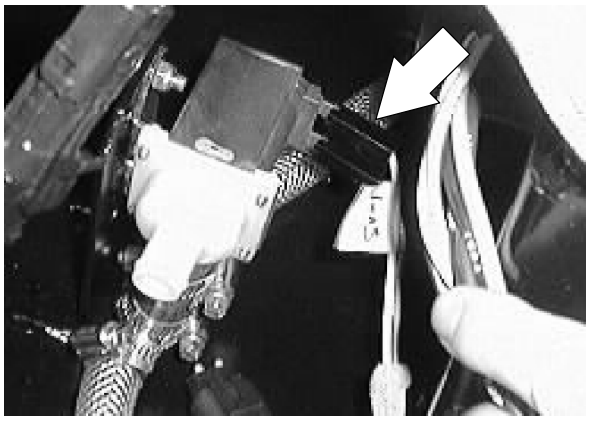
4. Remove any plastic ties holding the wires and solution lines to the scrub head.



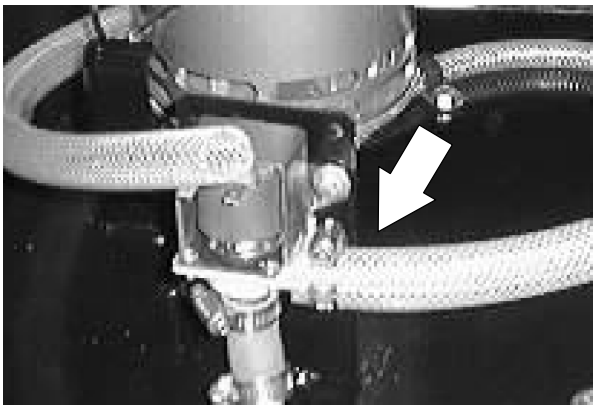
5. Disconnect the three scrub brush motors from the main harness.



6. Disconnect the water flow solenoid from the main harness.

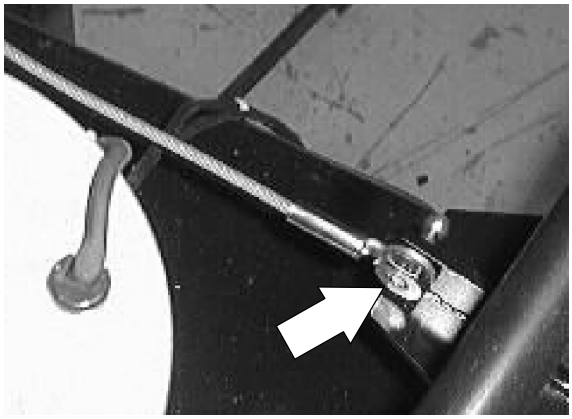


7. Disconnect the solution line from the water flow solenoid.

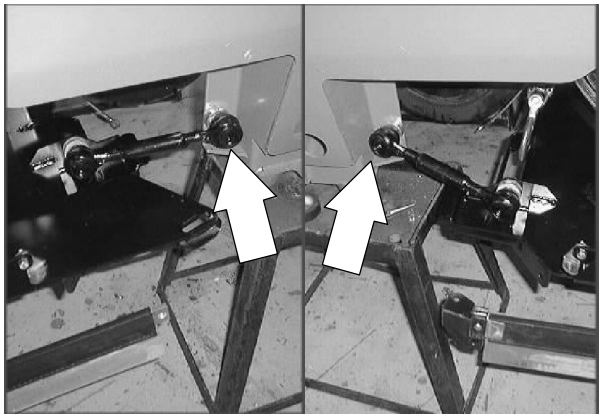


8. Disconnect the end of the side shift gas spring where it attaches to the scrub head.

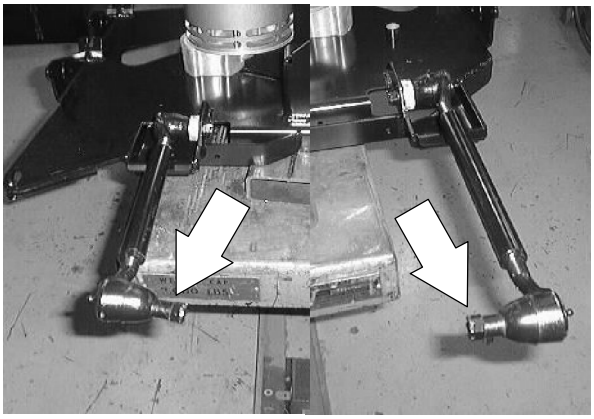
9. Disconnect the end of the side shift cable where it attaches to the scrub head.



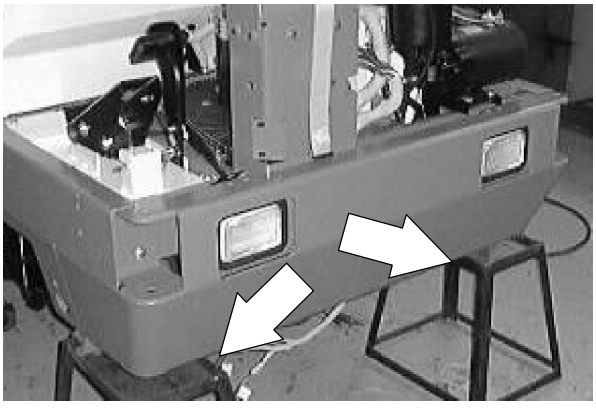
10. Remove the cotter pins and castle nuts from the end of the scrub head drag links where they attach to the machine frame.



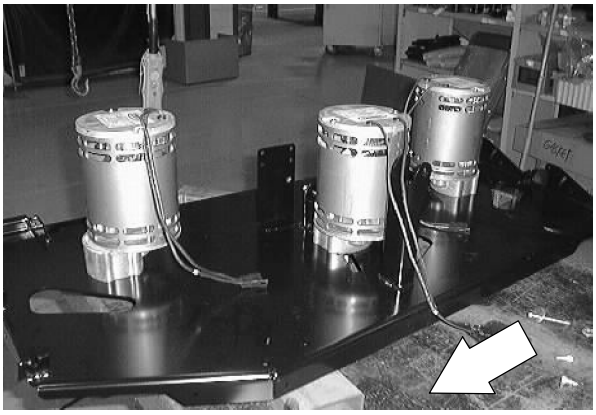
11. Pull the drag links out of the frame mount holes. Disconnect the kick-in guard from the front, right corner of the scrub head.



12. **If a hoist is available--**raise the front of the machine and place jackstands under the corners of the machine frame.



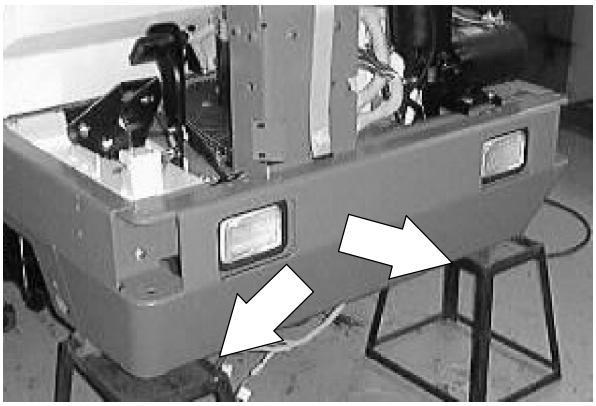
13. Push or pull the scrub head out the right side (operators compartment side) of the machine. The scrub head can now be removed from the machine.



TO INSTALL THREE MOTOR DISC SCRUB HEAD (MAXPRO™ 1200)

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

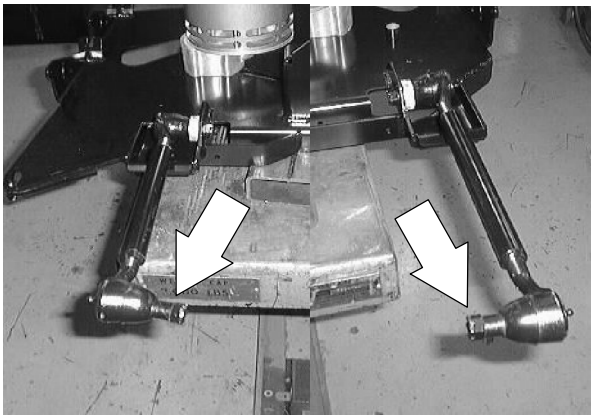
1. **If a hoist is available--**raise the front of the machine and place jackstands under the corners of the machine frame.



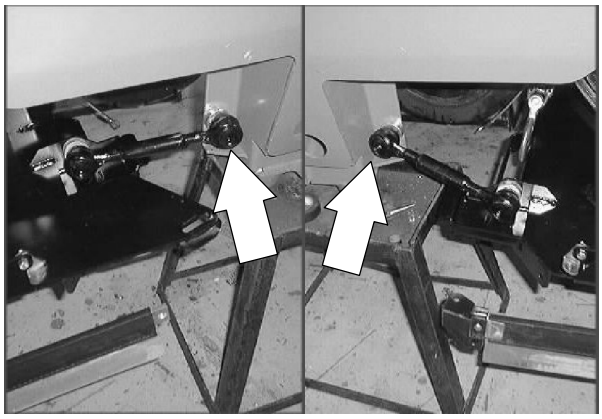
NOTE: Latch the side squeegees in the double scrub position. Leave the scrub brushes on the scrub head.

2. Push or pull the scrub head into the right side (operators compartment side) of the machine. Push the head in until it is centered in the frame.

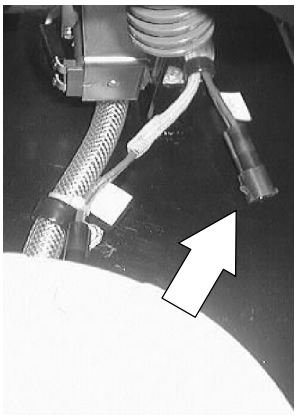
3. Position the two scrub head drag links into the frame mount holes.



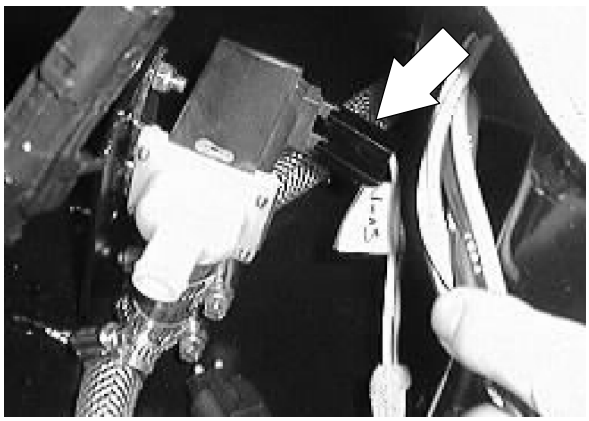
4. Reinstall the castle nuts onto the end of the scrub head drag links where they attach to the machine frame. Tighten the castle nuts tight. Reinstall the cotter pins.



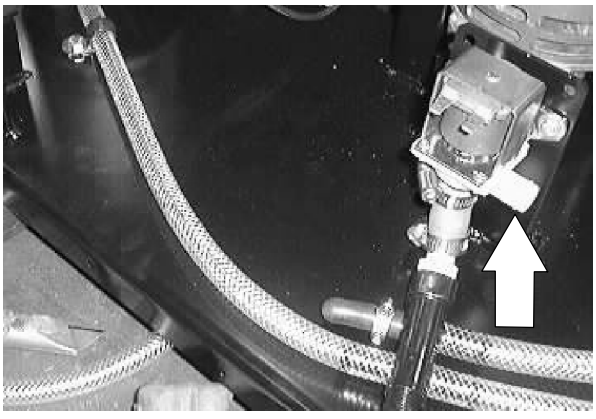
5. Reconnect the three scrub brush motors to the main harness.



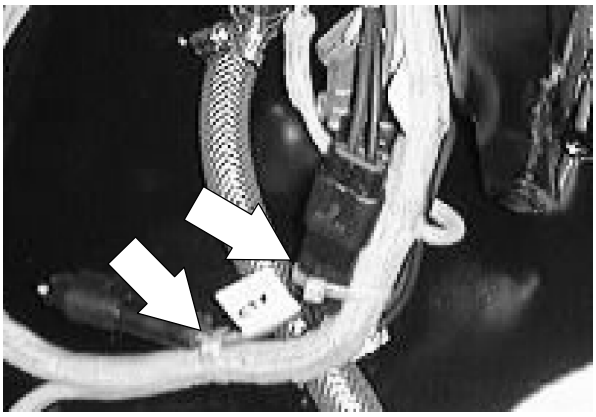
6. Reconnect the water flow solenoid to the main harness.



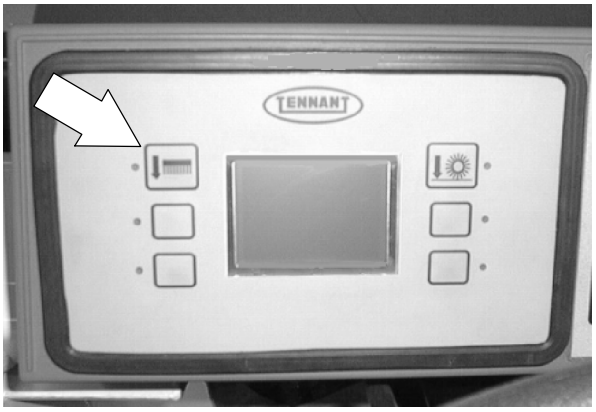
7. Reconnect the solution line to the water flow solenoid.



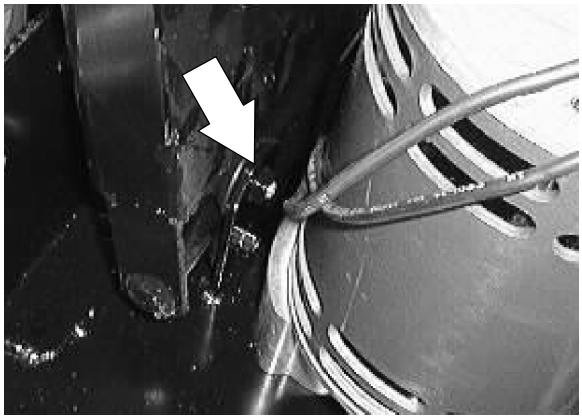
8. Use plastic ties to secure electrical wires and solution lines.



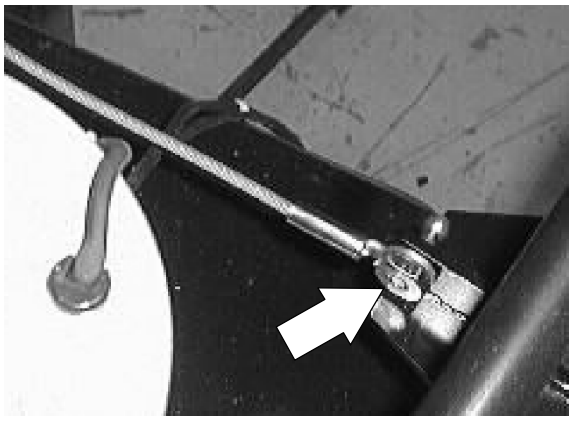
9. Turn on the machine and *lower* the scrub head. Shut off the key.



10. Go under the machine in the area of the center of the scrub head. Reinstall the **UPPER** head lift roller into the mount bracket. Reinstall the roller mount screw and tighten to 18 – 24 Nm (15 – 20 ft lb).

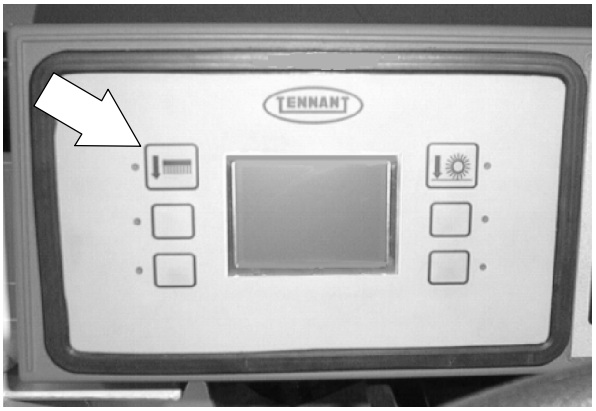


11. Reconnect the end of the side shift cable where it attaches to the scrub head.



12. Reconnect the end of the side shift gas spring where it attaches to the scrub head. Reconnect the kick-in guard to the front, right corner of the scrub head.

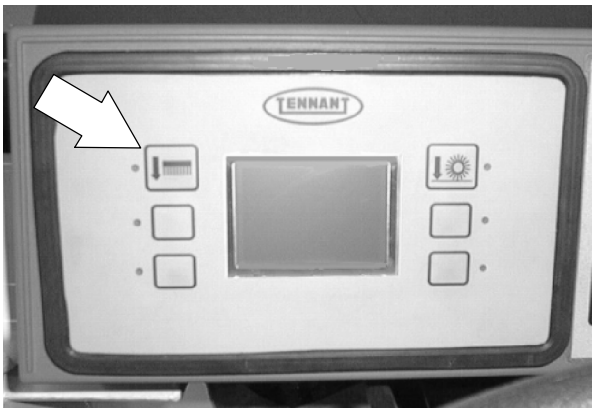
13. Turn on the machine and *raise* the scrub head. Check the scrub head for proper operation.



TO REMOVE CYLINDRICAL SCRUB HEAD (MAXPRO™ 1000 AND 1200)

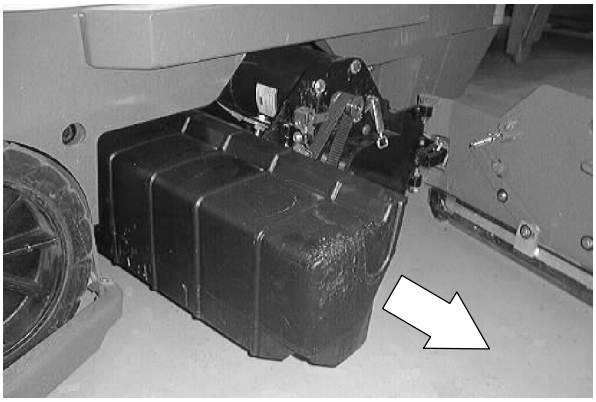
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

1. Turn on the machine and *lower* the scrub head. Shut off the key.

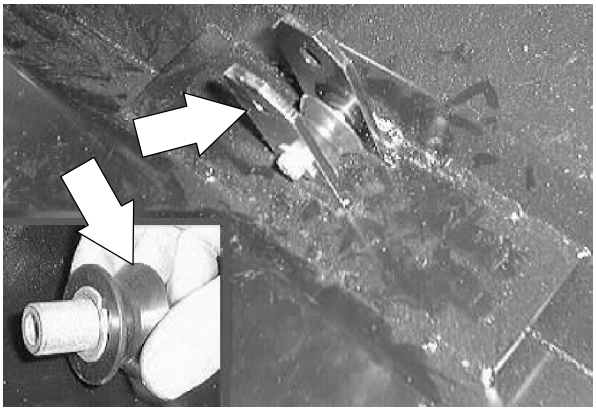


NOTE: Latch the side squeegees in the double scrub position. Leave the scrub brushes on the scrub head.

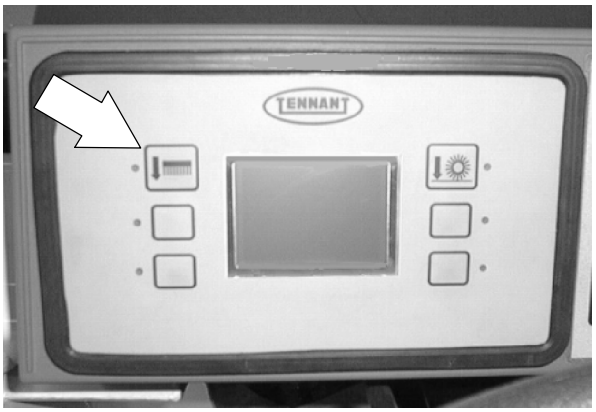
2. Remove the debris tray from the right side of the machine.



3. Go under the machine in the area of the center of the scrub head. Remove the hex screw holding the **UPPER** head lift roller to the mount bracket. Remove the roller from the scrub head frame.

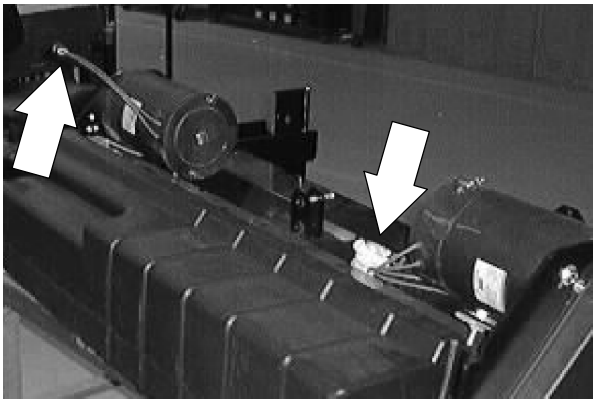


4. Turn on the machine and *raise* the scrub head. Turn off the key.

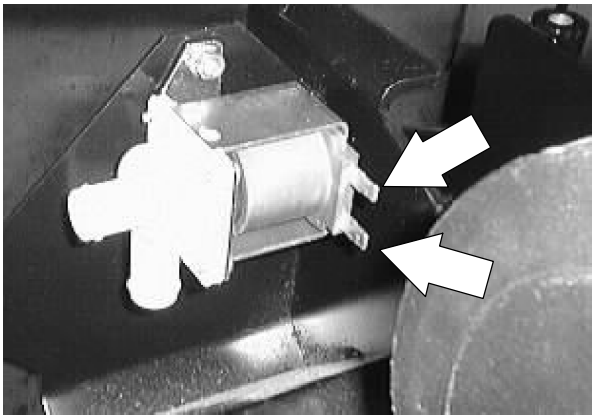


5. Remove any plastic ties holding the wires to the scrub head.

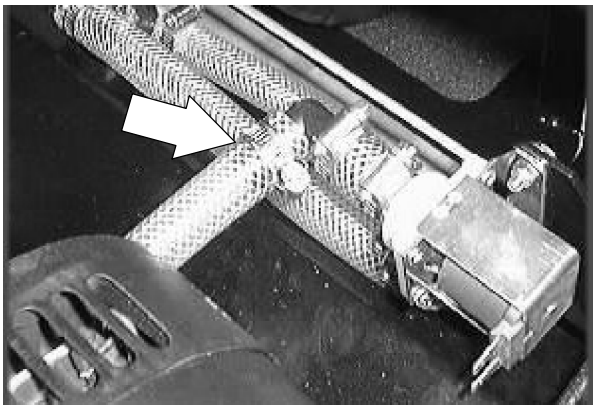
6. Disconnect the two scrub brush motors from the main harness.



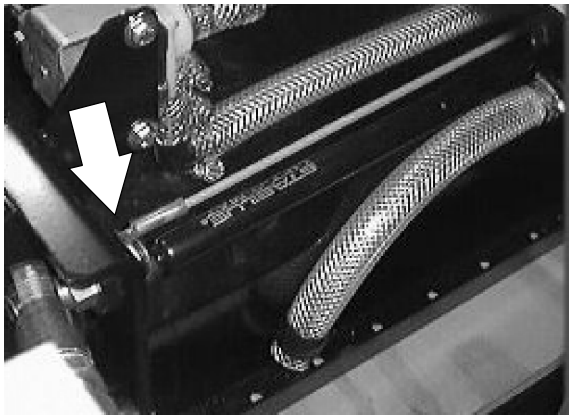
7. Disconnect the water flow solenoid from the main harness.



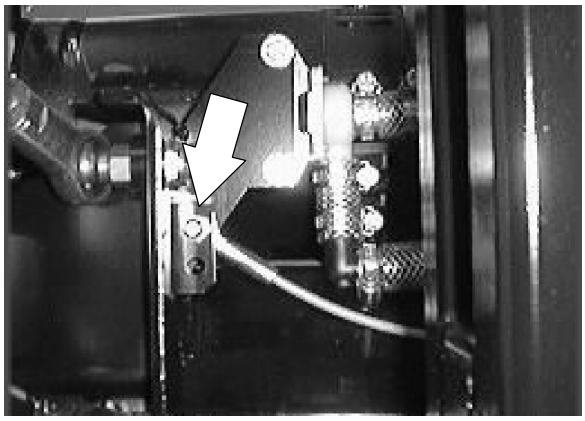
8. Disconnect the solution line from the water flow solenoid.



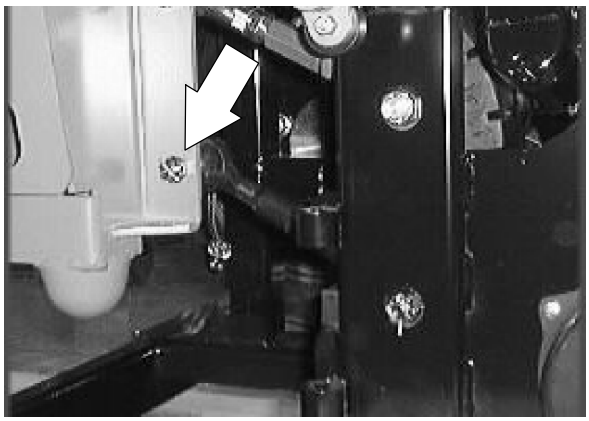
9. Disconnect the end of the side shift gas spring where it attaches to the scrub head.



10. Disconnect the end of the side shift cable where it attaches to the scrub head.

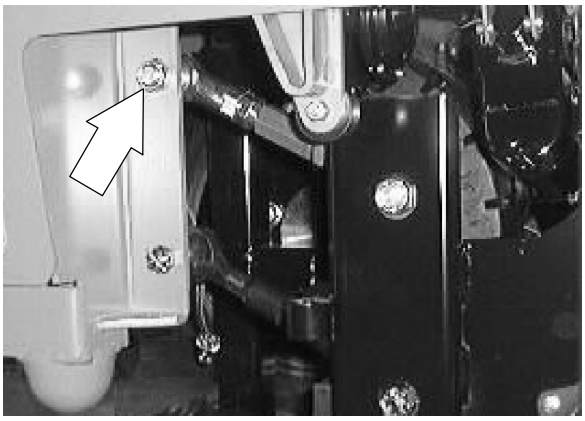


11. Remove the cotter pins and castle nuts from the end of the **LOWER** scrub head drag links where they attach to the machine frame.

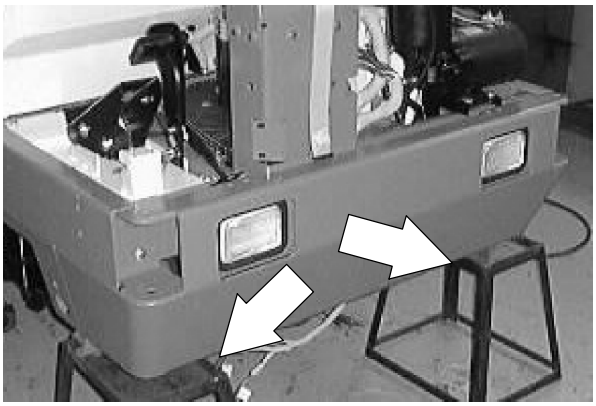


12. Remove the larger nyloc nut from the **UPPER** scrub head drag links where they attach to the machine frame.

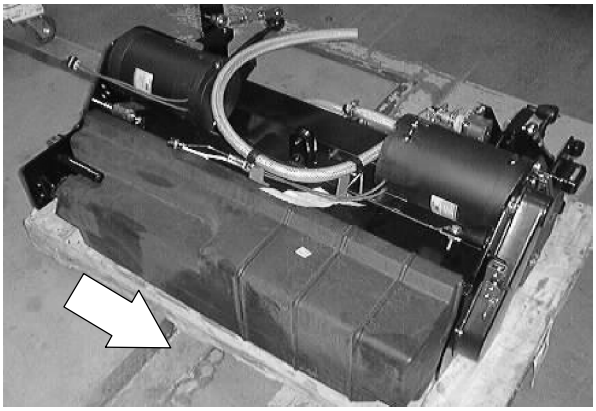
13. Pull the drag links out of the frame mount holes. Disconnect the kick-in guard from the front, right corner of the scrub head.



14. **If a hoist is available--**raise the front of the machine and place jackstands under the corners of the machine frame.



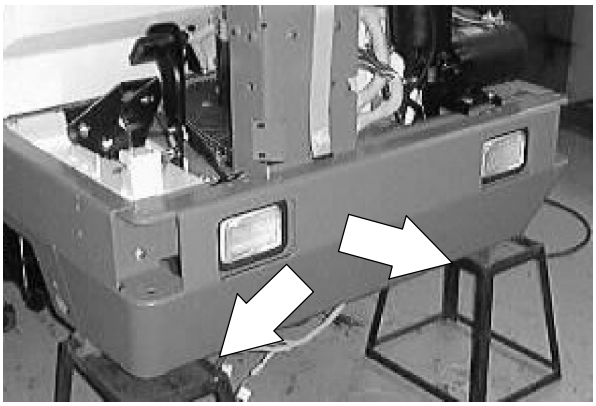
15. Push or pull the scrub head out the right side (operators compartment side) of the machine. The scrub head can now be removed from the machine.



TO INSTALL CYLINDRICAL SCRUB HEAD (MAXPRO™ 1000 AND 1200)

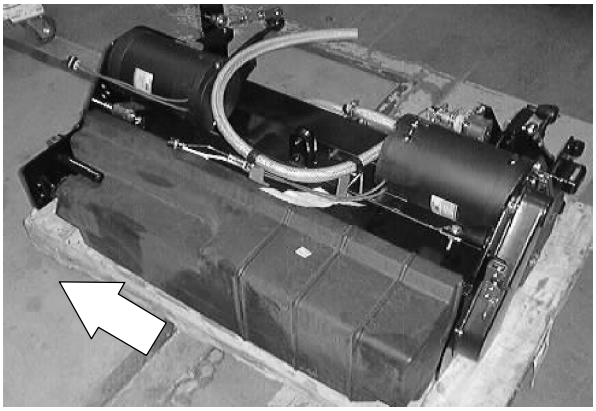
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

1. **If a hoist is available--**raise the front of the machine and place jackstands under the corners of the machine frame.

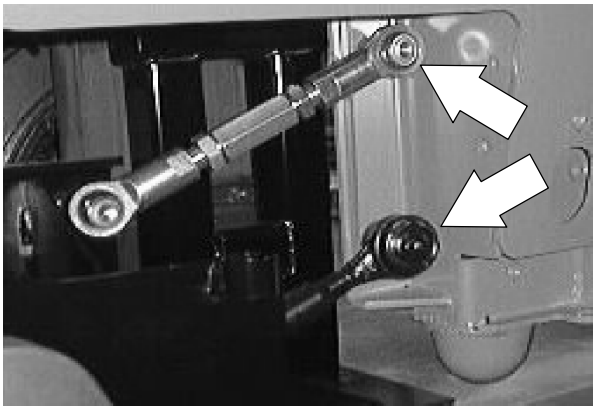


NOTE: Latch the side squeegees in the double scrub position. Leave the scrub brushes on the scrub head.

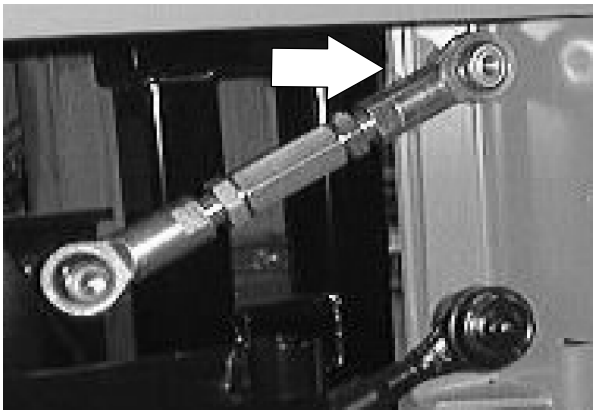
2. Push or pull the scrub head into the right side (operators compartment side) of the machine. Push the head in until it is centered in the frame.



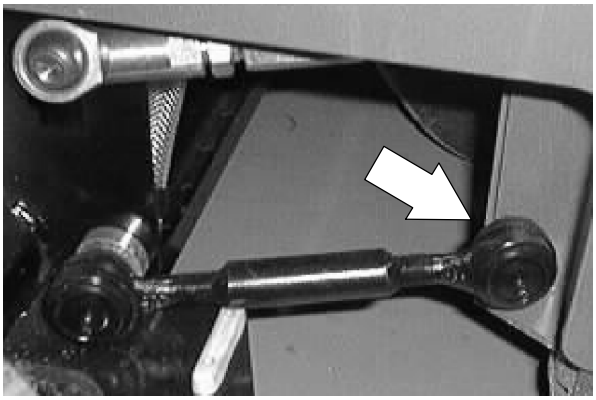
3. Position the four scrub head drag links into the frame mount holes.



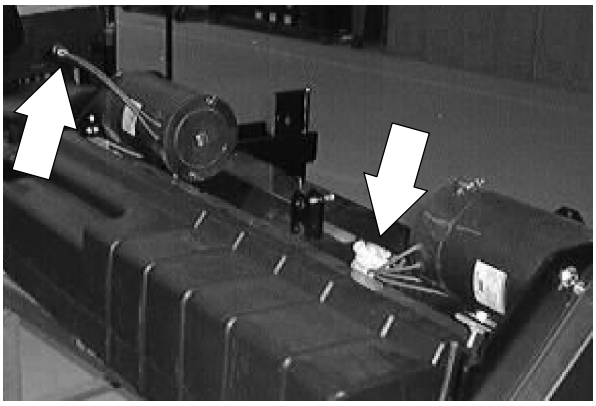
4. Reinstall the larger nyloc nut onto the **UPPER** scrub head drag links where they attach to the machine frame. Tighten to 64 – 83 Nm (47 – 61 ft lb).



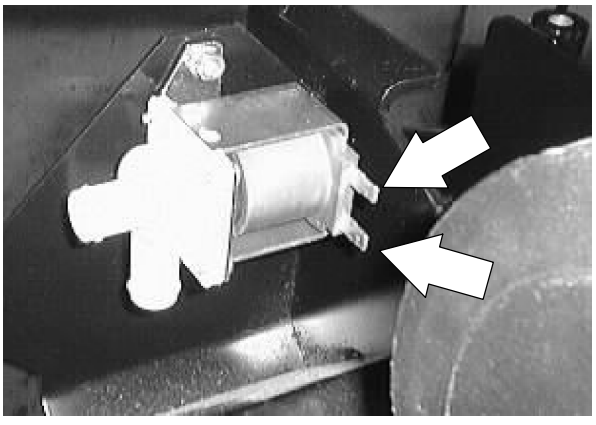
5. Reinstall the castle nuts onto the end of the **LOWER** scrub head drag links where they attach to the machine frame. Tighten the castle nuts tight. Reinstall the cotter pins.



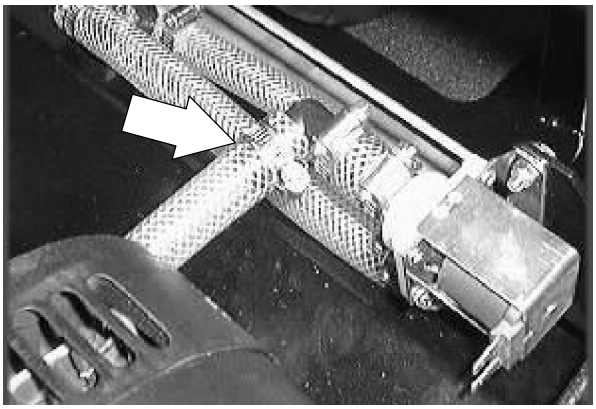
6. Reconnect the two scrub brush motors to the main harness.



7. Reconnect the water flow solenoid to the main harness.

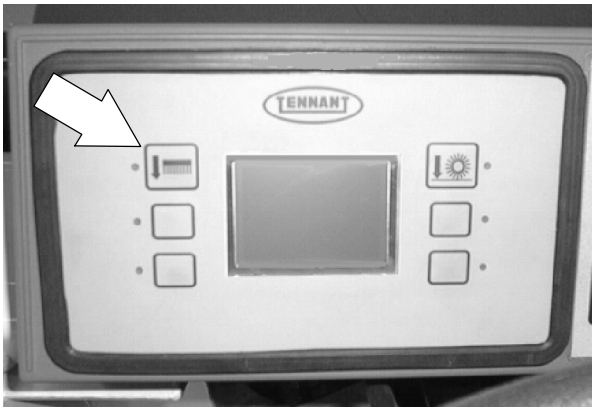


8. Reconnect the solution line to the water flow solenoid.

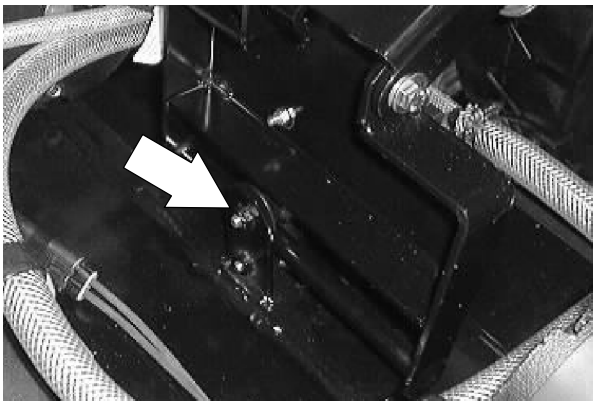


9. Use plastic ties to secure electrical wires and solution lines.

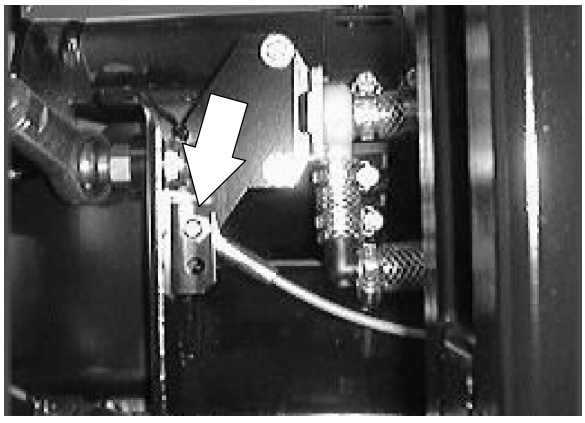
10. Turn on the machine and *lower* the scrub head. Shut off the key.



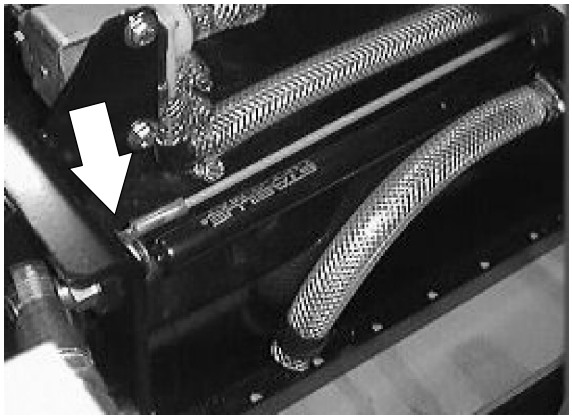
11. Go under the machine in the area of the center of the scrub head. Reinstall the **UPPER** head lift roller into the mount bracket. Reinstall the roller mount screw and tighten to 18 – 24 Nm (15 – 20 ft lb).



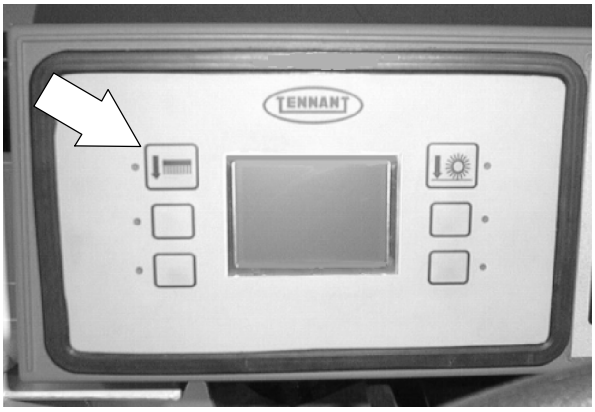
12. Reconnect the end of the side shift cable where it attaches to the scrub head.



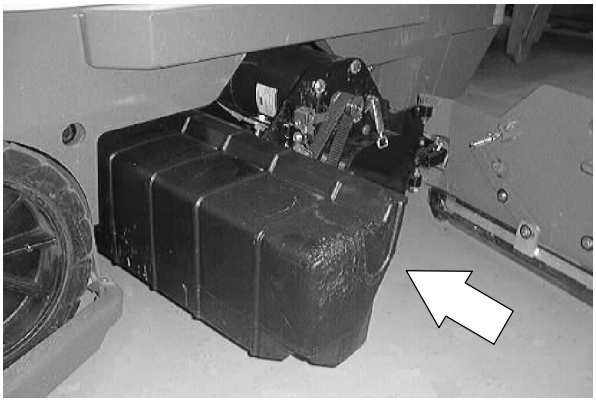
13. Reconnect the end of the side shift gas spring where it attaches to the scrub head. Reconnect the kick-in guard to the front, right corner of the scrub head.



14. Turn on the machine and *raise* the scrub head. Check the scrub head for proper operation.



15. Reinstall the debris tray into the right side of the machine.

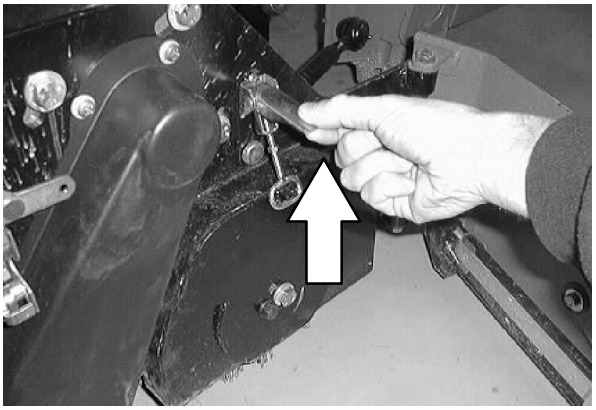


16. Operate the machine and check the scrub head for proper operation.

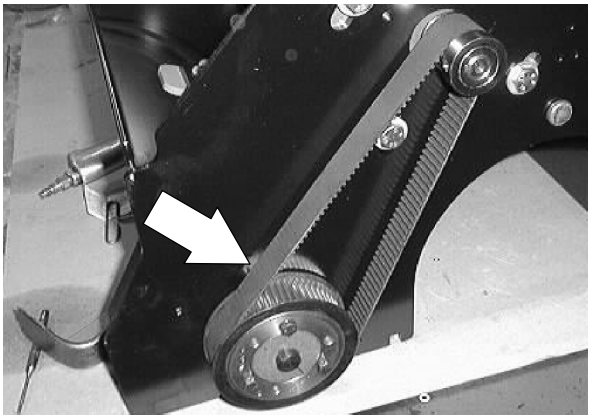
TO REPLACE CYLINDRICAL SCRUB HEAD DRIVE PLUG SHAFT BEARINGS

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

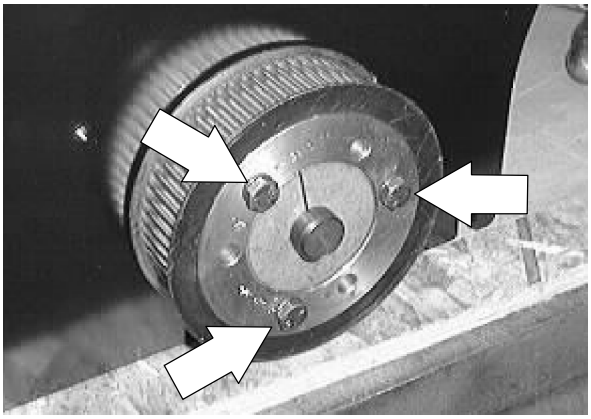
1. Remove the scrub brush from the drive plug. See TO REPLACE CYLINDRICAL SCRUB BRUSH instructions in this section.



2. Remove the cogged drive belt from the scrub brush drive sheave. See TO REPLACE CYLINDRICAL SCRUB HEAD BRUSH MOTOR instructions in the ELECTRICAL section.

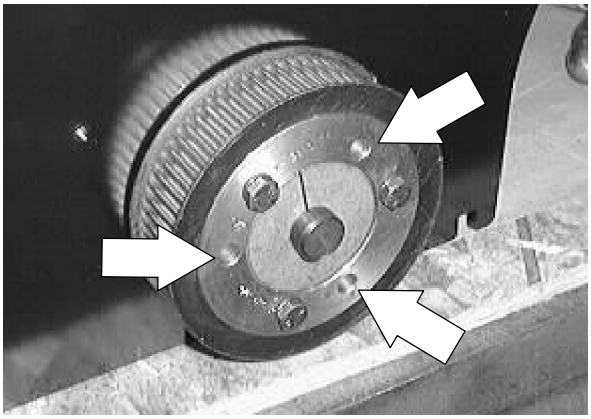


3. Remove the three hex screws holding the cogged drive sheave to the shaft hub.



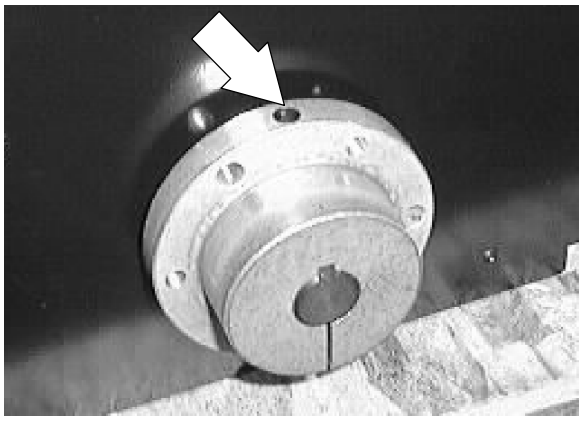
4. Screw the three hex screws into the open holes on the cogged sheave and tighten. This will push the cogged sheave off the shaft hub

NOTE: Make sure to note the location of the sheave on the shaft.

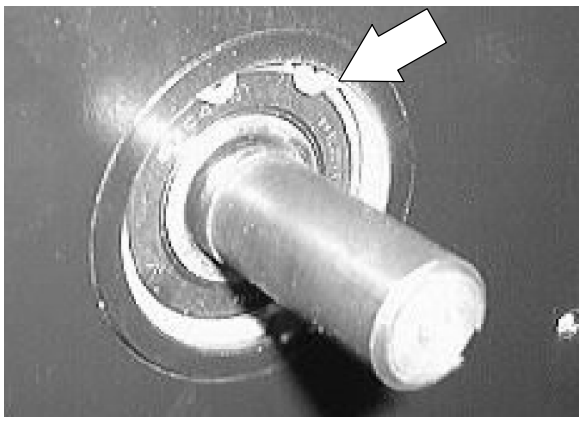


5. Loosen the set screw holding the shaft hub to the square key and shaft.

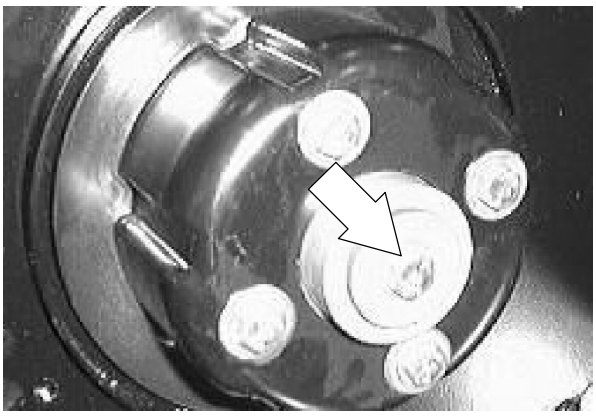
NOTE: Use a pry bar to remove the shaft hub from the shaft.



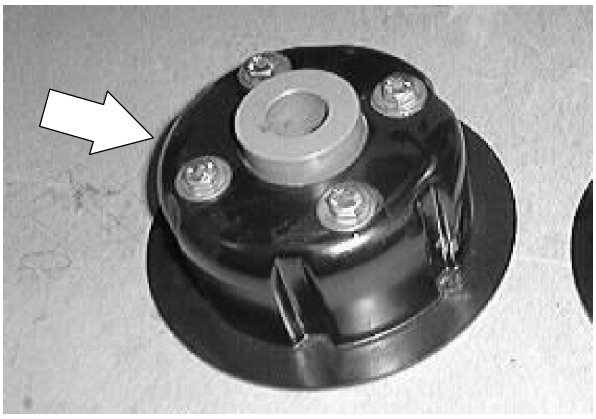
6. Remove the snap ring from the end of the *outside* shaft bearing.



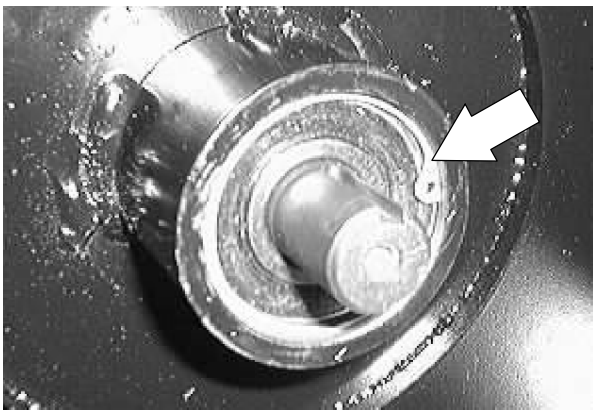
7. Remove the screw and washer holding the scrub brush drive plug to the shaft.



8. Remove the drive plug from the shaft.

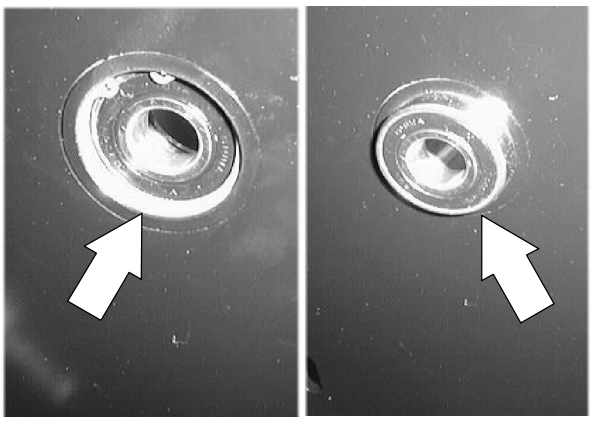


9. Remove the snap ring from the end of the *inside* shaft bearing.

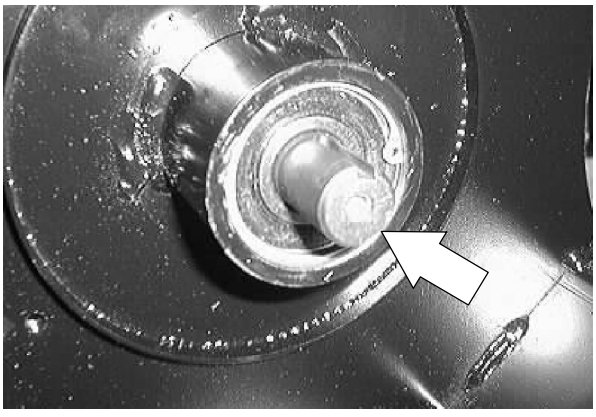


10. Use a rubber hammer to tap the shaft and bearing assembly out of the bearing housing *(tap the assembly into the center of the scrub head).* **Note the orientation of the shaft in the housing.**

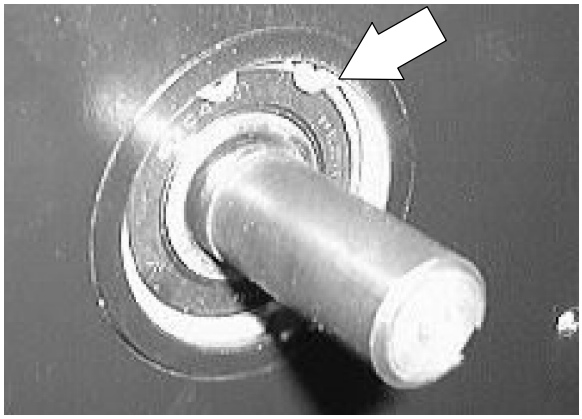
11. Use a press to remove the bearings from the shaft assembly.



12. Install the new bearings and shaft assembly into the bearing housing *(tap the assembly into the housing from the center of the scrub head to the outside of the scrub head).* **The longer shaft end goes to the outside of flange.**

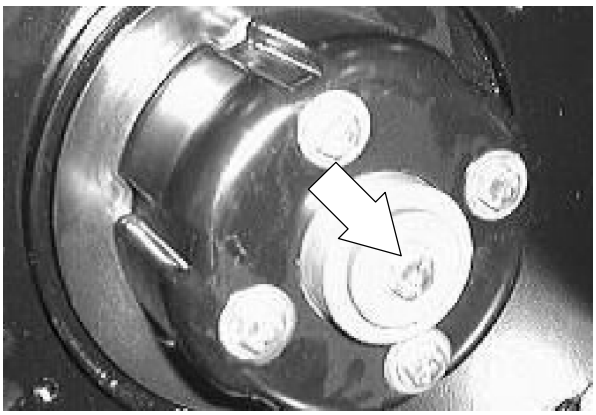


13. Reinstall both bearing snap rings.



14. Reinstall the scrub brush drive hub onto the shaft on the inside of the shaft. Reinstall the hex screw and tighten to 8 – 10 Nm (5 – 7 ft lb).

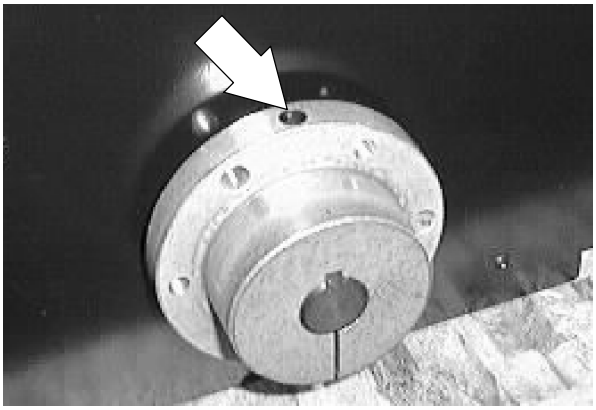
NOTE: Make sure the square key is in place on the shaft.



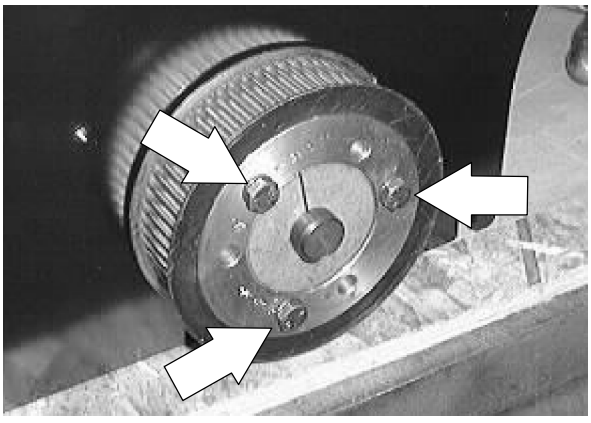
15. Reinstall the cogged sheave shaft hub onto the outside of the shaft and bearing assembly.

NOTE: Make sure the square key is in place on the shaft.

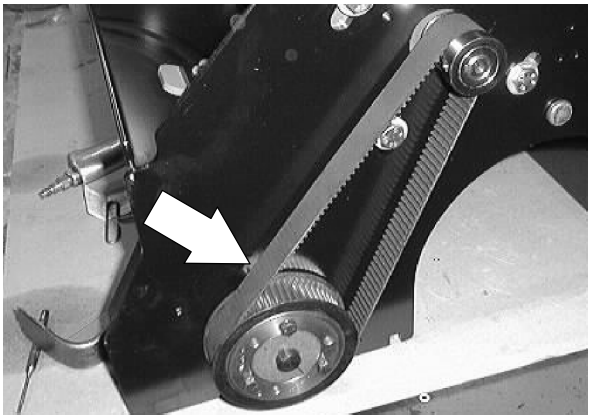
Position the hub flush with the end of the shaft. *Hand tighten the set screw tight.*



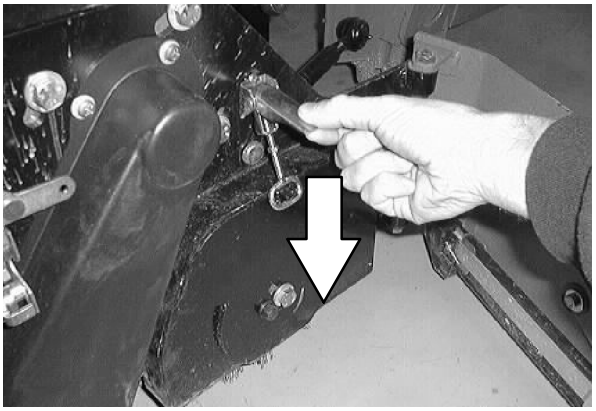
16. Position the cogged sheave onto the shaft hub. Reinstall the three hex screws. Tighten to 8 – 10 Nm (5 – 7 ft lb).



17. Reinstall the cogged drive belt onto the scrub brush drive sheave. See TO REPLACE CYLINDRICAL SCRUB HEAD BRUSH MOTOR instructions in the ELECTRICAL section.



18. Reinstall the scrub brush onto the drive plug. See TO REPLACE CYLINDRICAL SCRUB BRUSH instructions in this section.

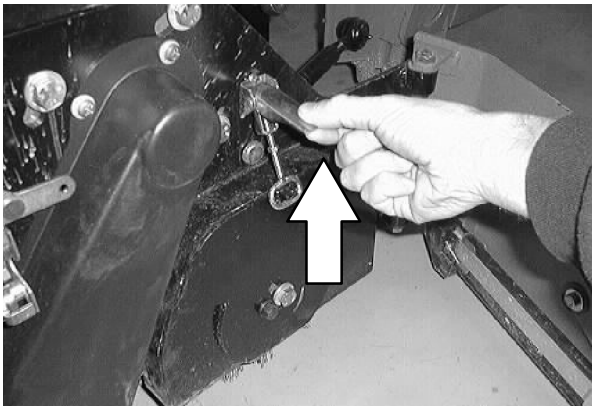


19. Operate the machine and check the scrub head for proper operation.

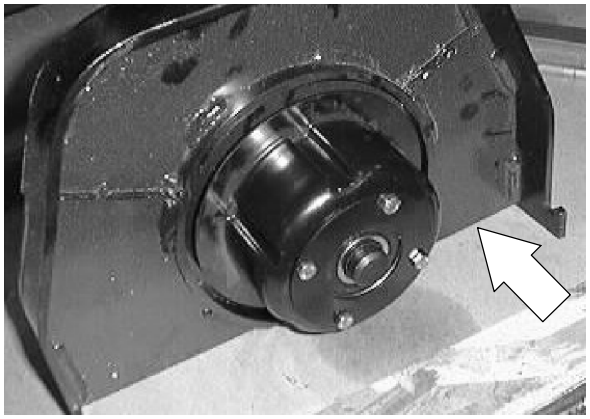
TO REPLACE CYLINDRICAL SCRUB HEAD IDLER PLUG SHAFT BEARING

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

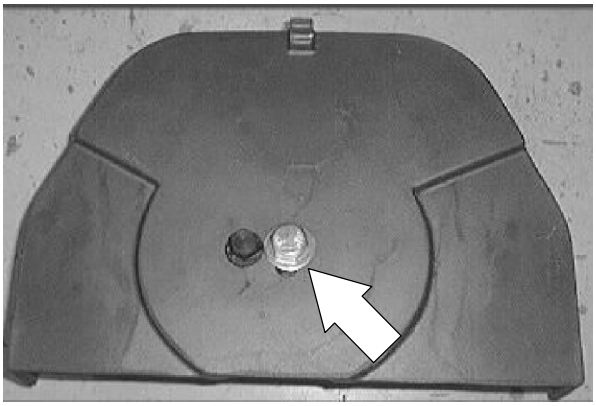
1. Unlatch the brush idler plate latch. See TO REPLACE CYLINDRICAL SCRUB BRUSH instructions in this section.



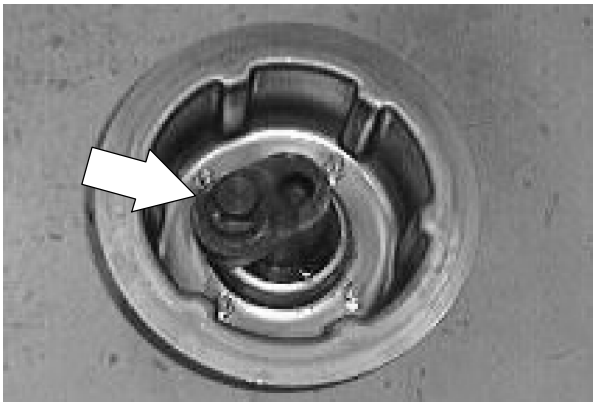
2. Remove the scrub brush idler plate from the scrub head.



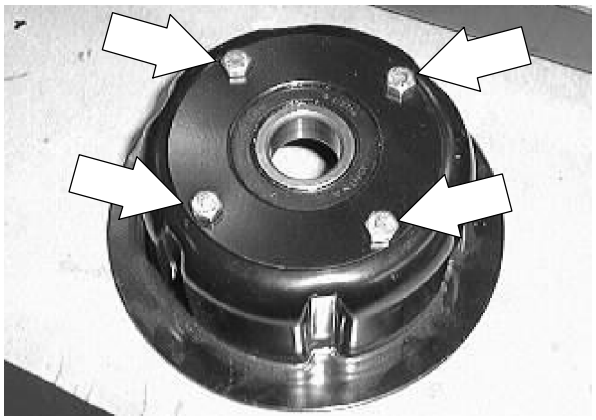
3. Remove the hex screw holding the brush idler plug and cam assembly to the mount plate.



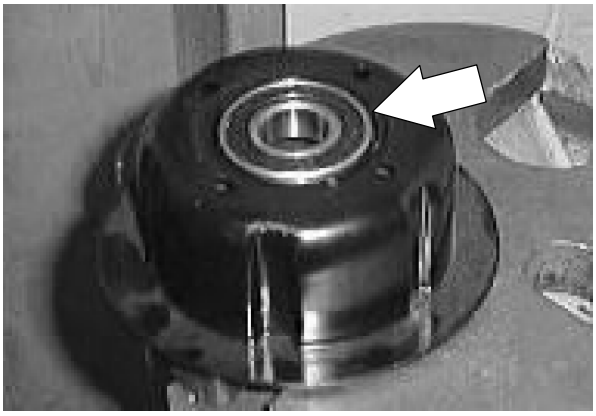
4. Use a mechanical press to remove the cam from the idler bearing.



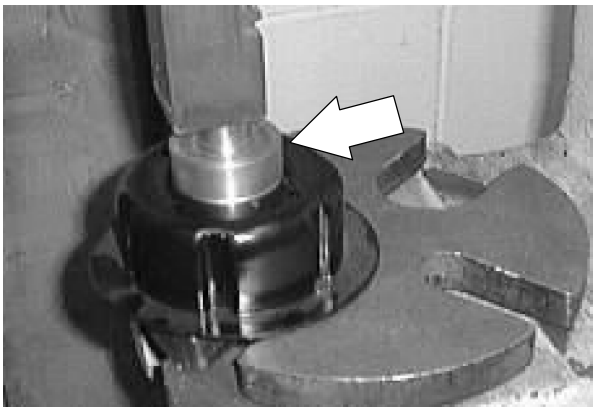
5. Remove the four screws holding the bearing retainer plate to the idler hub.



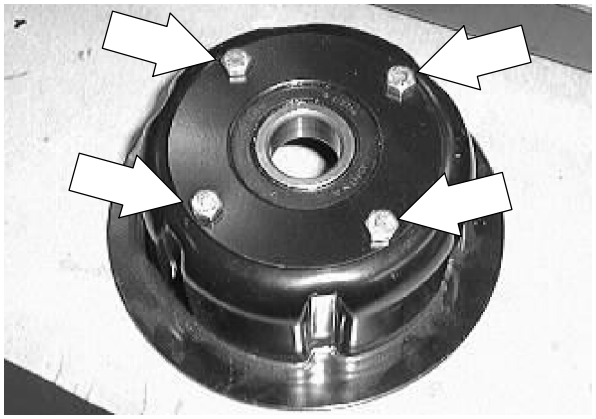
6. Remove the retainer plate to expose the idler bearing.



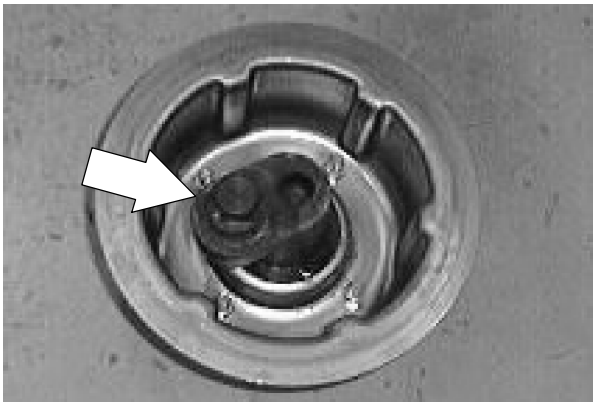
7. Use a mechanical arbor press to remove the existing bearing and to install the new bearing.



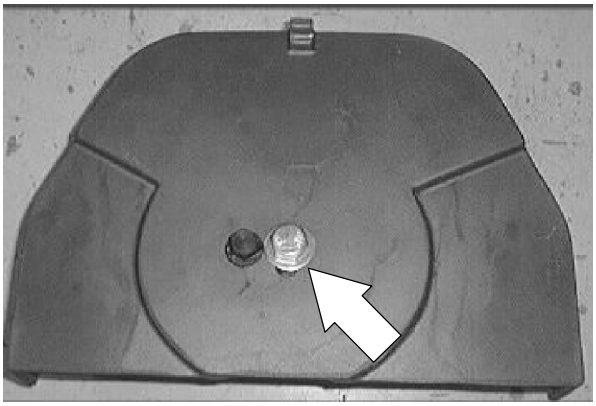
8. Reinstall the retainer plate and four screws. Tighten to 443 – 575 Ncm (4 – 6 ft lb).



9. Use a mechanical arbor press to reinstall the adjustment cam into the new bearing.

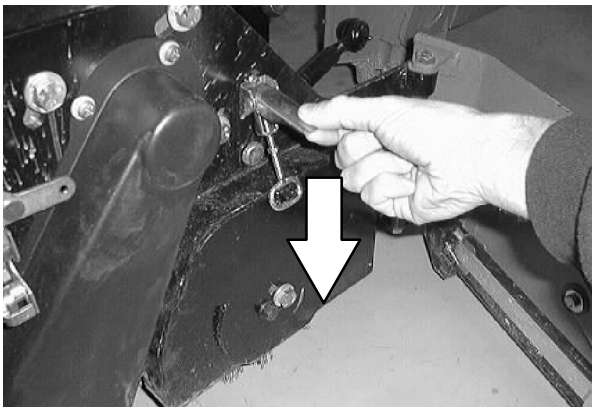


10. Reinstall the idler plug assembly onto the mount plate. Leave the hardware loose for now.



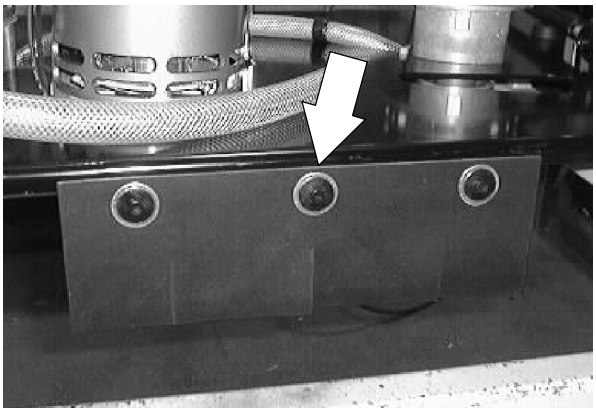
11. Reinstall the scrub brush and idler plate onto the scrub head. See TO REPLACE CYLINDRICAL SCRUB BRUSH instructions in this section.

12. Operate the machine and check the cylindrical scrub brush patterns. See CHECKING AND ADJUSTING CYLINDRICAL BRUSH PATTERN instructions in this section.



DISC SCRUB HEAD SKIRTS

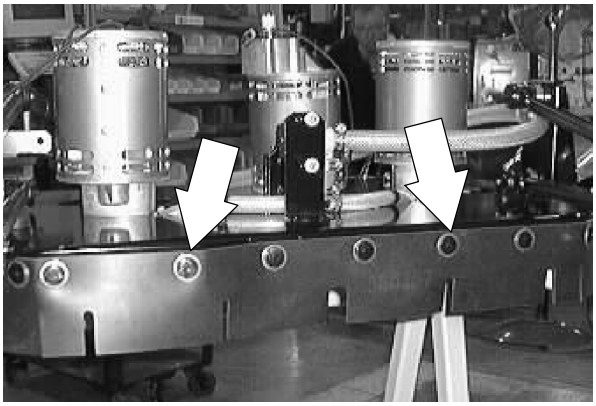
The 7300 disc scrub heads are equipped with rubber skirts front and rear. These skirts control water spray during the scrubbing operation.

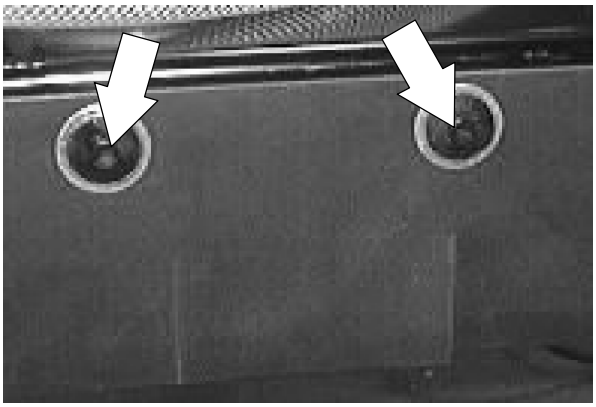


TO REPLACE DISC SCRUB HEAD SKIRTS

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

1. The disc scrub head skirts are held in place with plastic rivets (10 for the front, 5 for the back).
2. Use a screw driver or pliers to remove the plastic pin from the center of the rivet body.
3. Pull the rivet body out of the mount hole.
4. After all of the plastic rivets have been removed--remove the rubber skirt.
5. Install the new rubber skirt onto the scrub head (note the orientation).
6. Reinstall the plastic rivet bodies.
7. Push the pin into the center of the rivet body. Push the pin all the way in.
8. Repeat this procedure for the front or rear skirt.





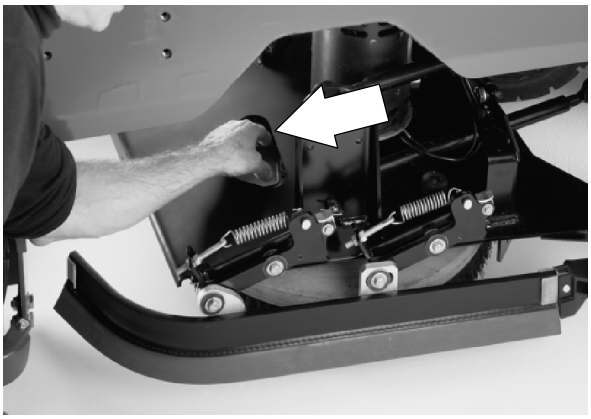
TO ADJUST DISC SCRUB HEAD SKIRTS

The front and rear scrub head skirts on the MAXPRO™ 1000 and 1200 are not adjustable.

SCRUB BRUSHES

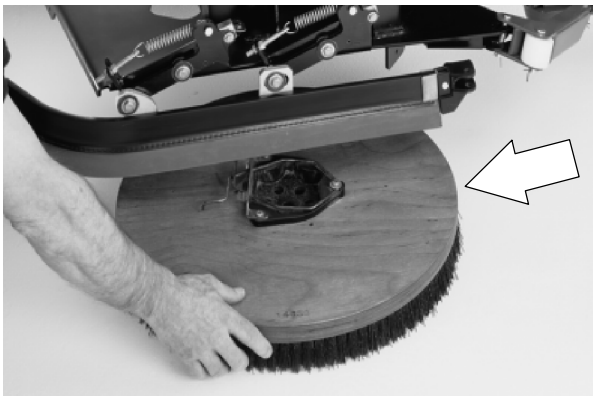
DISC SCRUB BRUSHES

Disc-type scrub brushes scrub the floor. Each scrub brush is driven by its own electric motor to a brush drive hub. A spring lock clip holds the scrub brush onto the drive hub.



There are many variations of brushes and cleaning pads to choose from. There is a brush or cleaning pad available for almost any application. Scrub brushes are ready for use when they are equipped with a brush drive plate and a spring clip.

The scrub brushes should be checked daily for tangled wire or string wear damage. The scrub brushes should be replaced if large portions of the brush bristles are missing or if the remaining brush bristle measure 0.38 in (10 mm) or less in length.

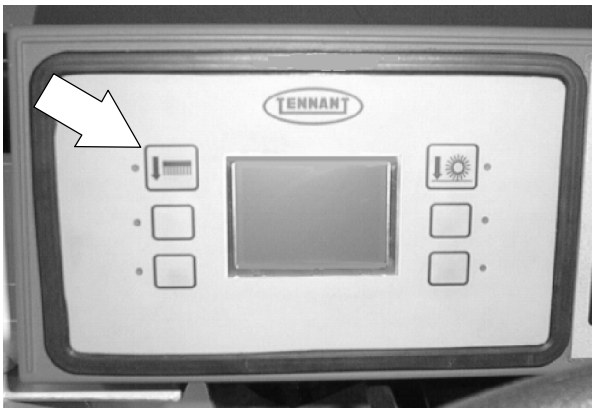


NOTE: Be sure to replace the scrub brushes in sets. Otherwise one scrub brush will be more aggressive than the other.

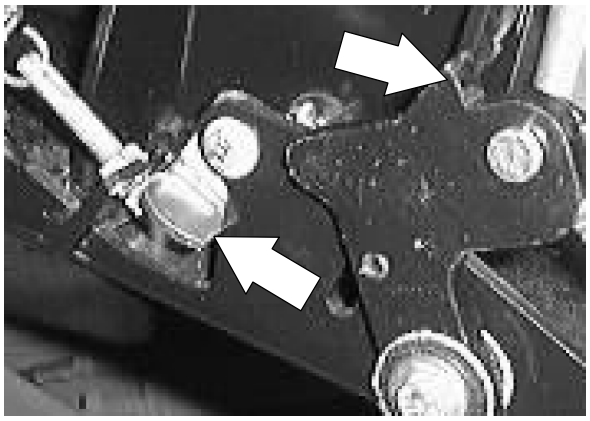
TO REPLACE DISC SCRUB BRUSH

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

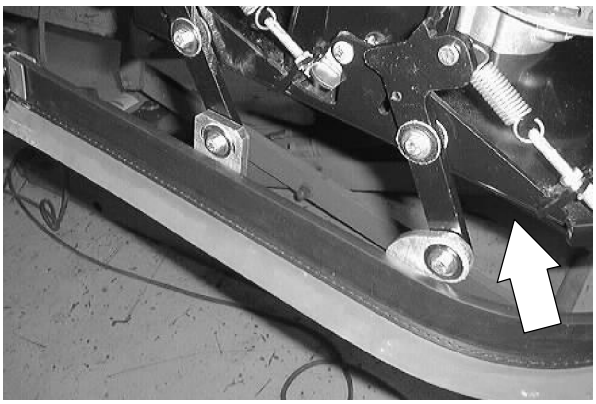
1. Turn on the machine and *raise* the scrub head. Turn the machine off.



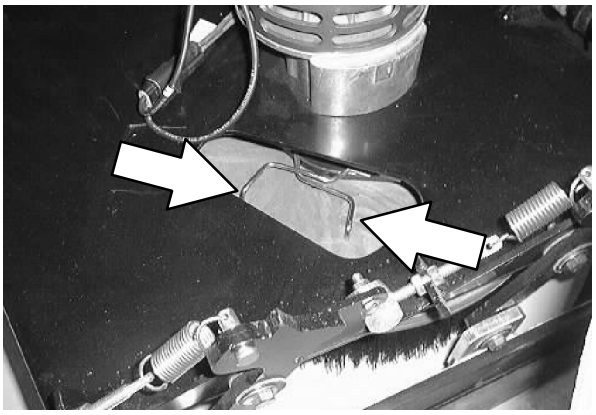
2. Lift the side squeegee up and engage the double scrub clips.



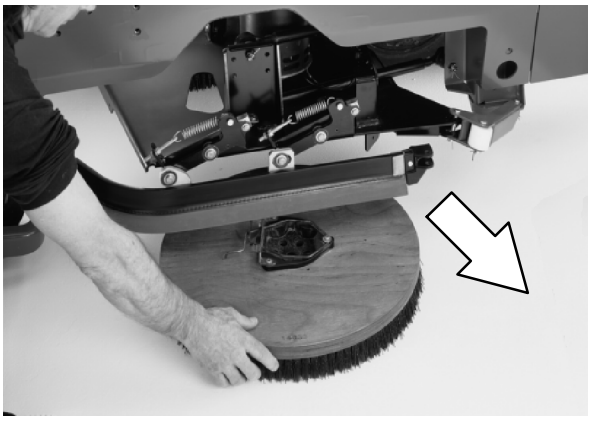
3. Reach into the scrub brush area and spin the scrub brush until the spring clips are visible.



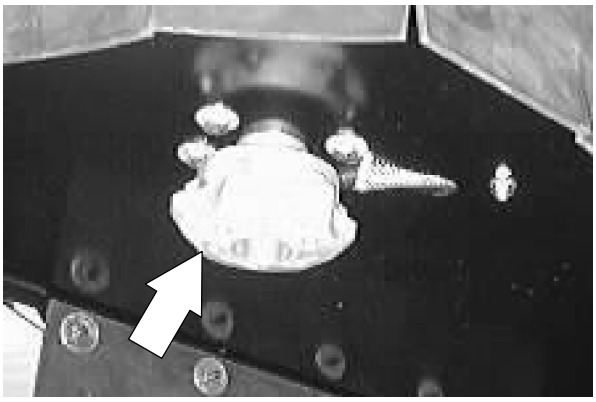
4. Pinch the spring clip together.



5. Remove the scrub brush from the machine.



6. Position the new scrub brush under the scrub head. Line up the motor drive plug with the brush drive insert.



7. Push the scrub brush up until the spring clips lock onto the drive hub.

CYLINDRICAL SCRUB BRUSHES

Check the brush taper and rotate the brushes from front-to-rear every 50 hours of machine operation for maximum brush life and best scrubbing performance.

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

NOTE: Replace worn brushes in pairs. Scrubbing with brushes of unequal bristle length will result in diminished scrubbing performance.

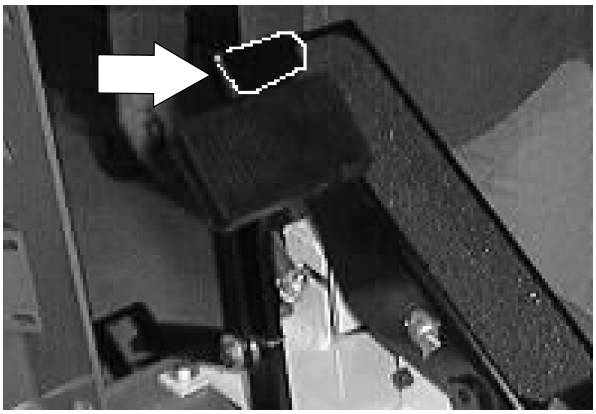
NOTE: Fill the solution tank before checking or adjusting the brush pattern.

TO REPLACE CYLINDRICAL SCRUB BRUSH

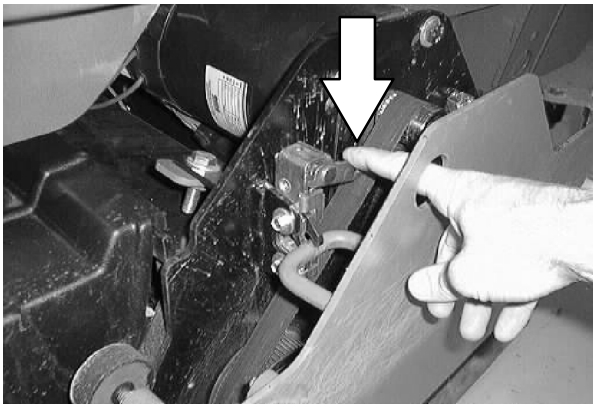
1. Press the scrubbing switch. When the scrub head is approximately 25 mm (1 in) from the floor, turn the machine power off.

2. Set the parking brake.

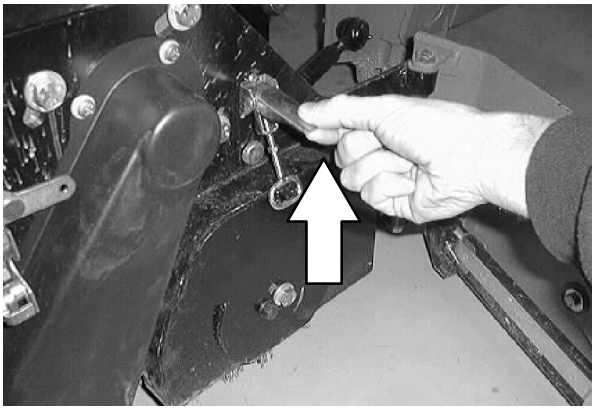
   FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.



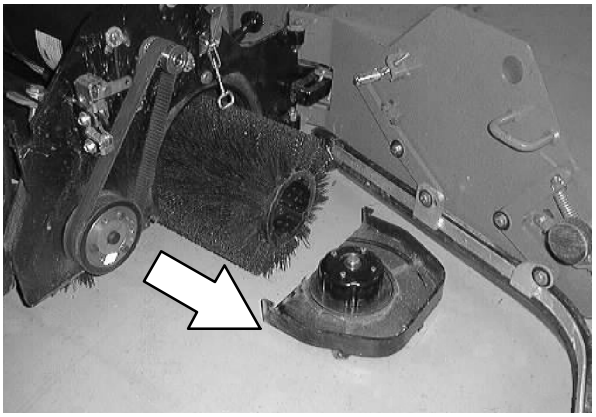
3. Open the side squeegee support guard with the latch. Swing the support guard outward to access the idler support casting.



4. Lift up on the idler support latch to release the idler support casting.

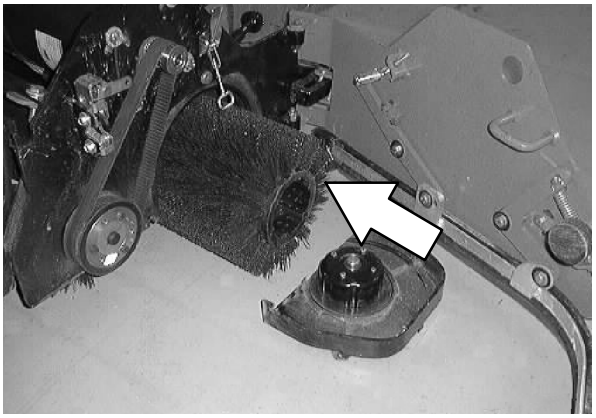


5. Pull the idler plug off the brush, and pull the old brush out of the scrub head.

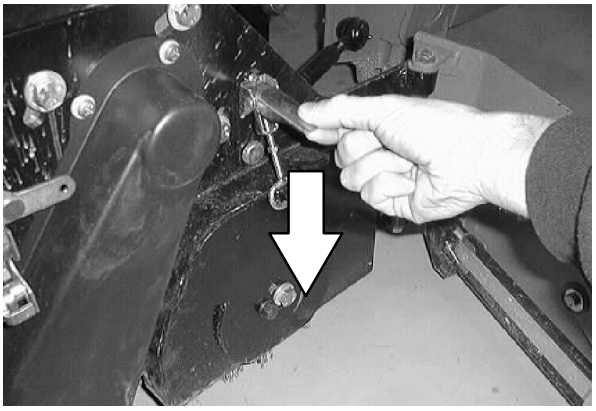


6. Position the brush with the *double row end towards you.* Guide the new brush onto the drive hub.

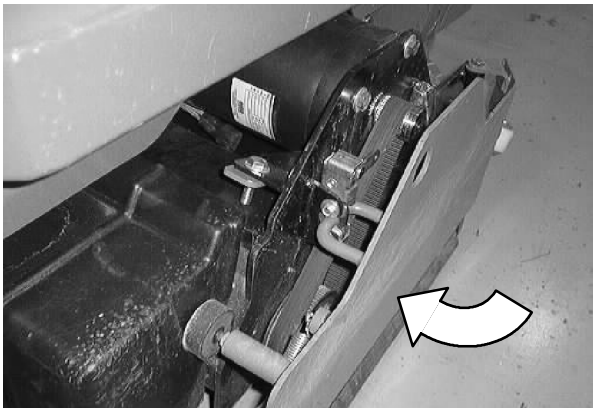
7. Insert the Idler plug (on the inside of the idler door), into the brush.



8. Secure the idler support casting with the idler support latch.



9. Firmly close the side squeegee support guard.

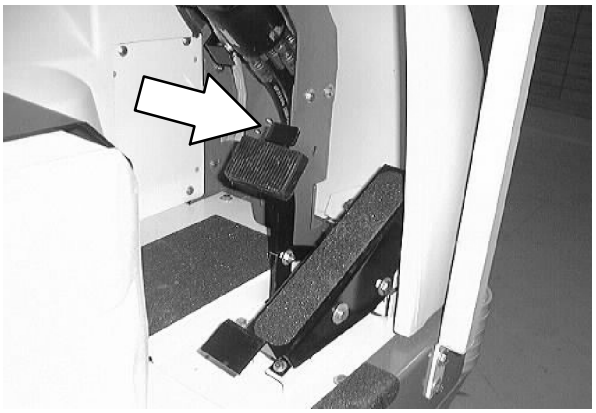


10. Repeat for the other brush on the other side of the scrub head.

CHECKING AND ADJUSTING CYLINDRICAL BRUSH PATTERN

1. Apply chalk (or another material that will not easily blow away), to a smooth, level section of the floor.

2. Set the parking brake.



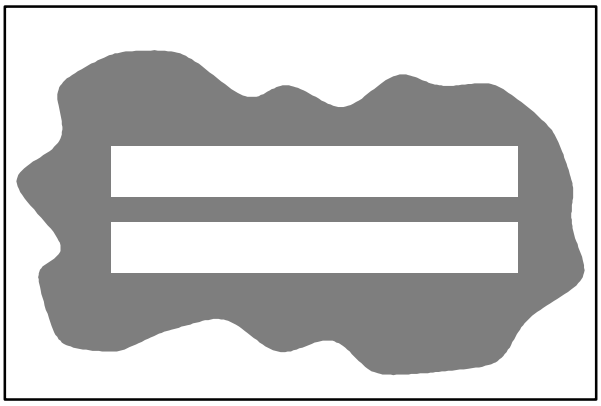
NOTE: Use down pressure setting #3 on cylindrical head and down pressure setting #2 on all disc heads.

3. Lower the scrub head in the chalked area. Allow the machine to scrub in the same place for 15 to 20 seconds.

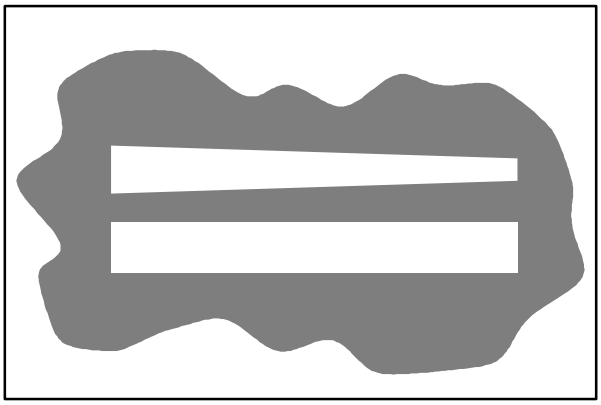
NOTE: If chalk or other material is not available, allow the brushes to spin on the floor for two minutes. A polish mark will remain on the floor.

4. Raise the scrub head and move the machine away from the chalked area. Turn the machine power off.

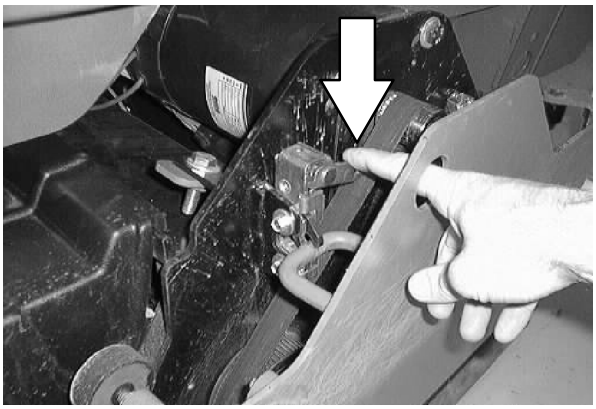
5. Observe the shape of the brush patterns. If the brush patterns have parallel sides, the brushes do not need adjustment.



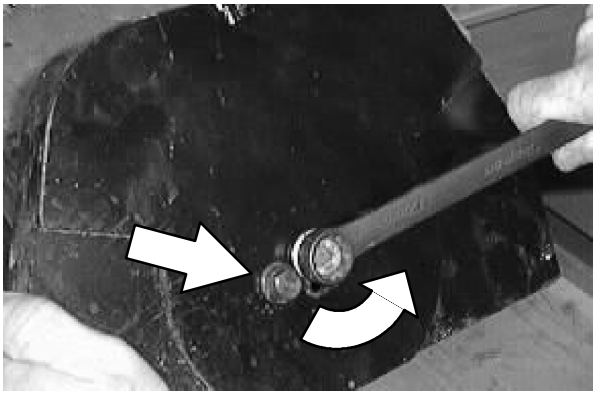
If one, or both of the brush patterns are tapered, the brushes need adjustment to straighten the brush pattern.



6. Open the side squeegee support guard with the latch. Swing the support guard outward to access the idler support casting.

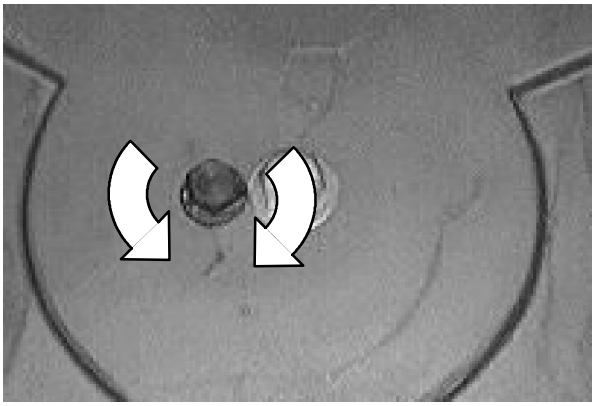


7. While holding the smaller hex, loosen the larger mounting screw on the outside of the idler door.

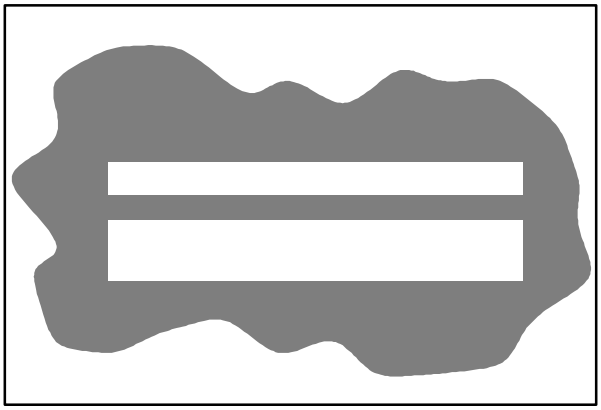


8. Using the smaller hex head – raise or lower the end of the brush as needed to straighten the brush pattern. Tighten the larger mounting screw.

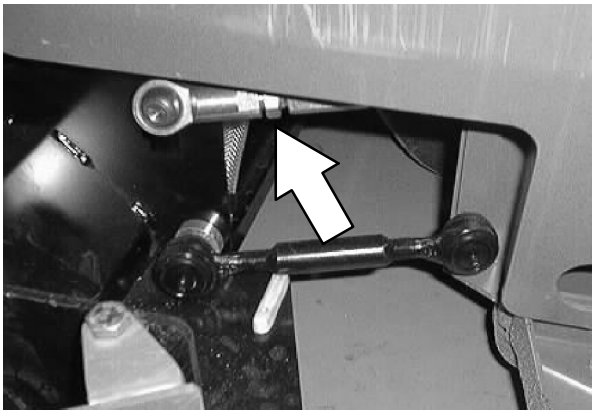
9. Check the brush patterns again and readjust as necessary until both patterns are the same.



10. If one brush pattern is wider than the other, the scrub head needs to be leveled.



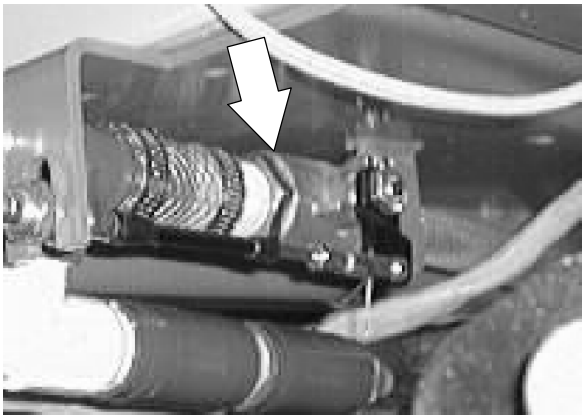
11. Level the scrub head by turning the scrub head links. Both scrub head links should be adjusted equally.



12. Check the brush patterns again and readjust as necessary until both patterns are the same.

MANUAL SOLUTION VALVE

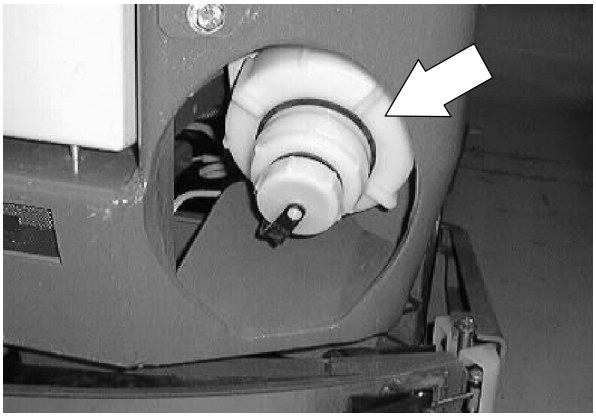
The 7300 manual solution valve is located under the front of the solution/recovery tanks. The manual valve is controlled with the solution lever on the left side of the steering column. The manual valve controls the amount of water going to the electric solution solenoid (located on the scrub head).



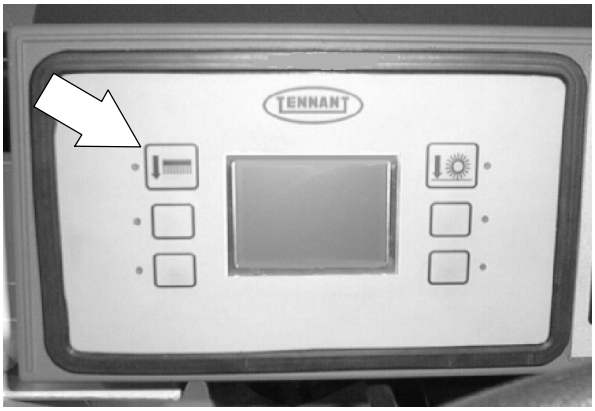
TO REPLACE MANUAL SOLUTION VALVE

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

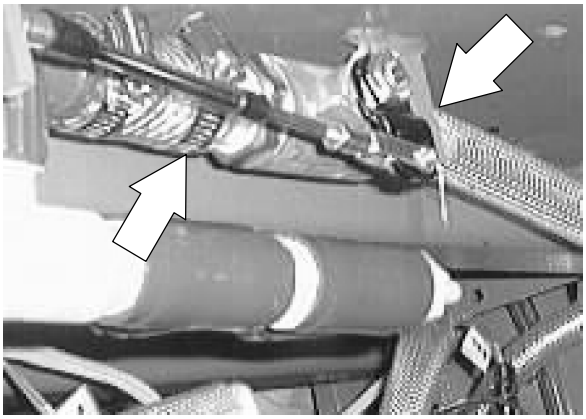
1. Make sure the solution tank has been drained.



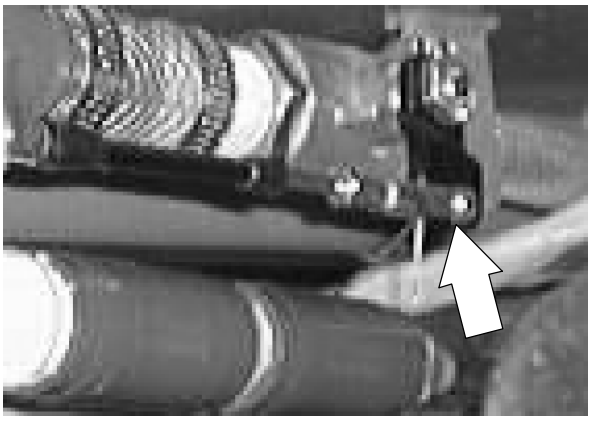
2. Turn on the machine and lower the scrub head. Shut off the key.



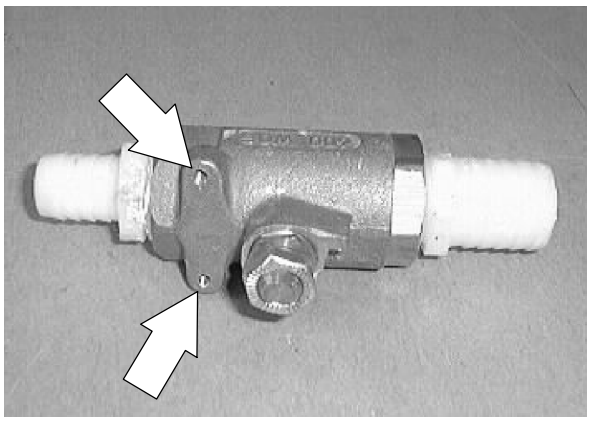
3. Loosen the worm drive clamps holding the solution hoses to the manual valve fittings. Pull the hoses off the fittings.



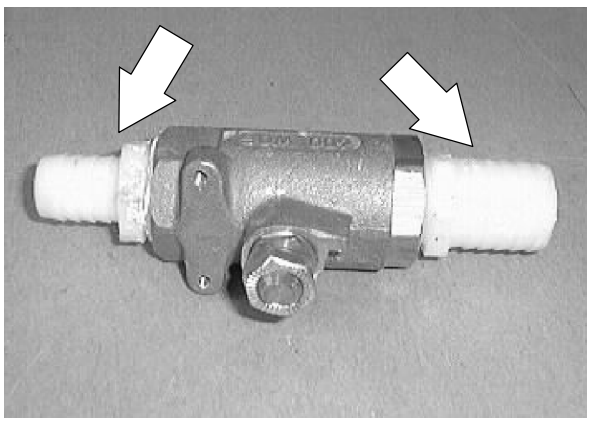
4. Remove the cotter pin and clevis pin holding the push/pull cable clevis to the manual valve lever.



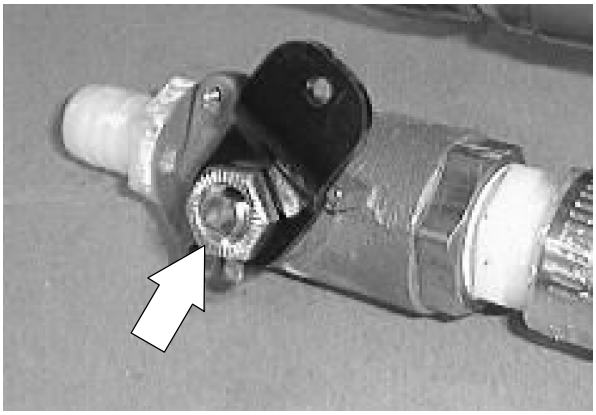
5. Remove the two screws holding the valve to the mount bracket. Remove the valve from the machine.



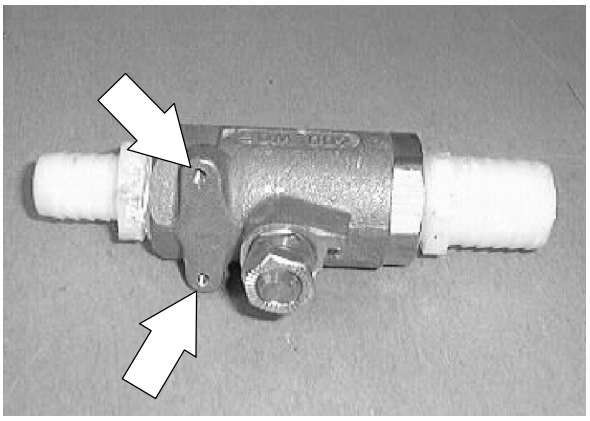
6. Remove the two fittings and install into the new valve.



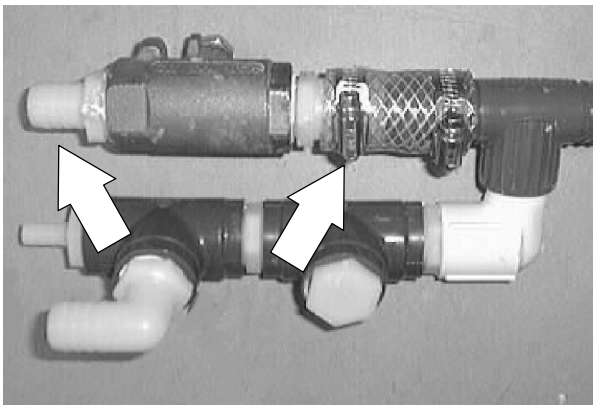
7. Remove the nut holding the valve lever to the valve body. Remove the lever and install on the new valve in the same orientation.



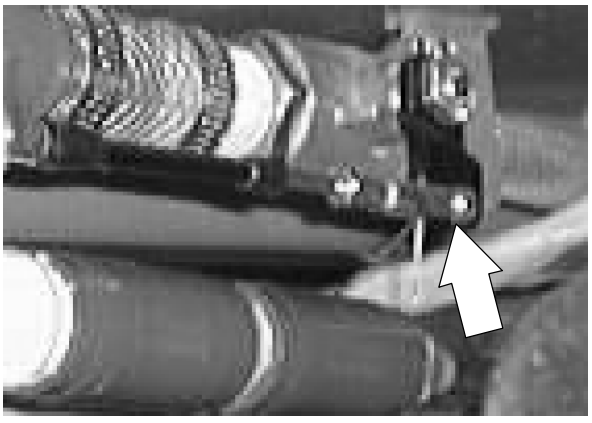
8. Install the new valve assembly onto the mount bracket. Reinstall the hardware and tighten hand tight.



9. Reconnect the two solution hoses to the new valve.



10. Reconnect the push/pull cable to the valve lever. Reinstall the clevis pin and cotter pin.

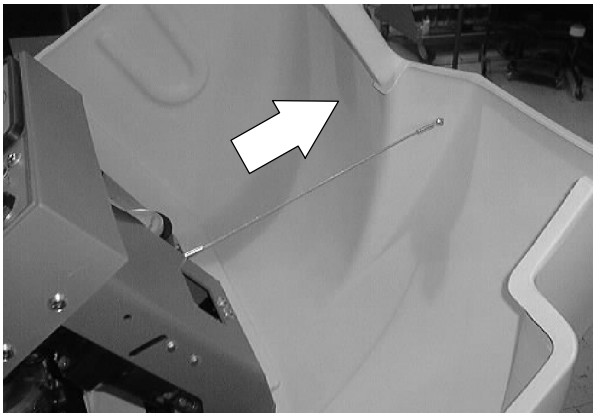


11. Fill the solution tank and check the new valve for proper operation. See TO ADJUST MANUAL WATER VALVE instructions.

TO ADJUST MANUAL SOLUTION VALVE

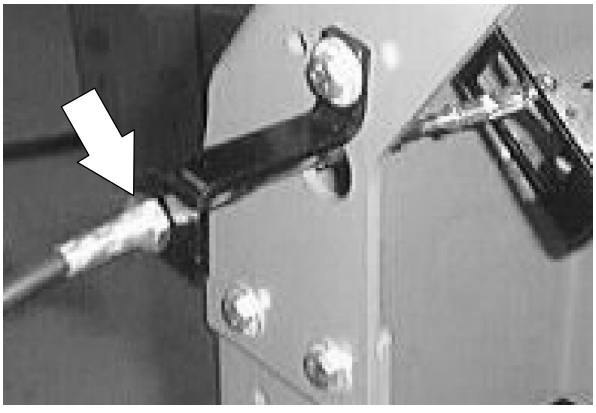
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

1. If the manual solution valve needs to be adjusted (to gain more water flow or if valve fails to shut water off completely) open the machine front cover.



2. Locate the manual solution valve push/pull cable on the left side of the steering column.

3. Loosen the large jam nuts holding the cable to the mount bracket. Move the cable in or out. Retighten the jam nuts.

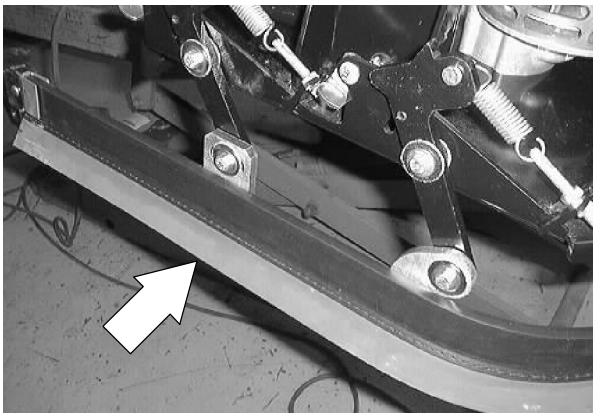


SQUEEGEES

The 7300 is equipped with two side squeegees and one rear squeegee. The rear squeegee comes in two different widths (Maxpro 1000 and 1200). The squeegee assemblies have replaceable rubber blades.

SIDE SQUEEGEES

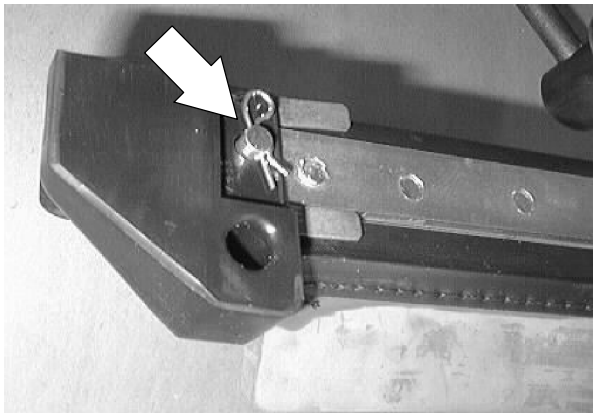
The side squeegees control water spray and channel water into the path of the rear squeegee. Check the side squeegees for damage and wear daily. Replace the side squeegee blades whenever they become damaged or lose their shape or resiliency. Replace the squeegee deflectors whenever they become worn.



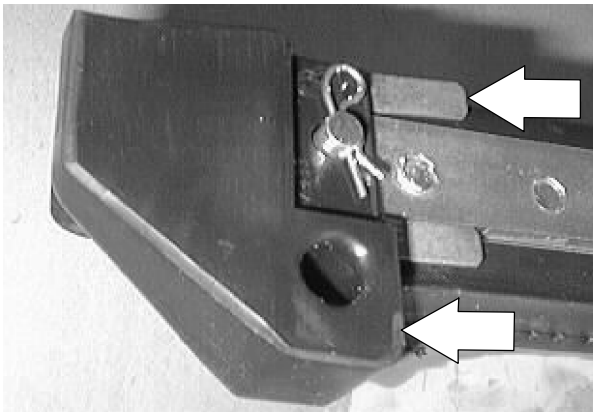
TO REPLACE SIDE SQUEEGEES

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

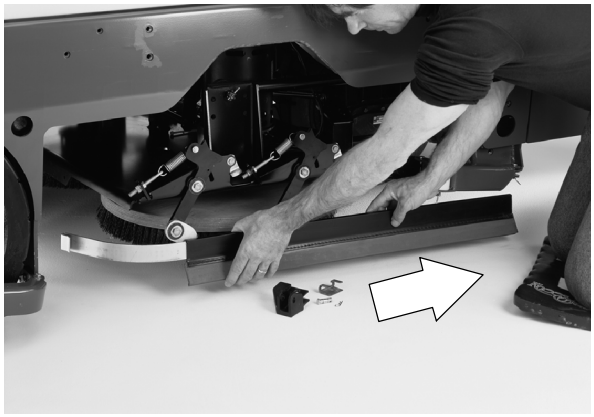
1. Remove the hair pin and clevis pin from the side squeegee protection tip.



2. Remove the plastic tip and metal retainer.

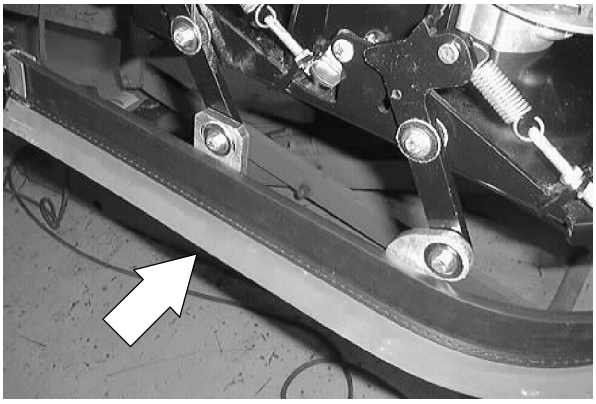


3. Remove the squeegee blade from the squeegee frame.

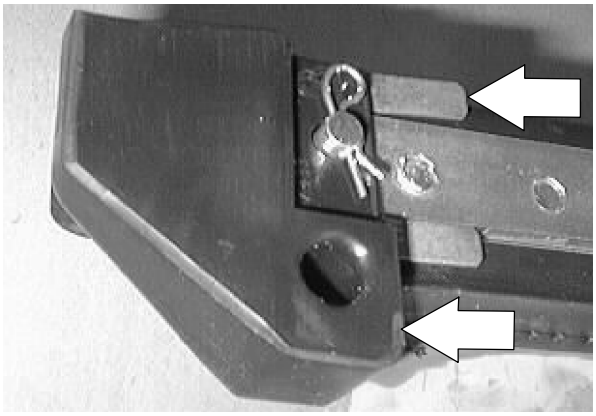


4. Install a new side squeegee blade onto the frame.

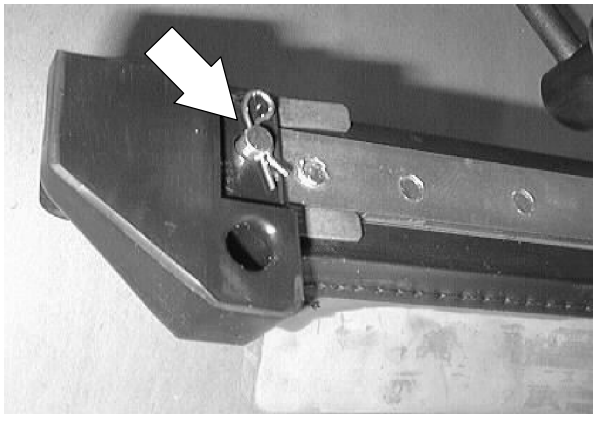
NOTE: Place a few drops of oil on the edge of the squeegee frame before installing the new blade. The new blade will slip on with less resistance.



5. Reinstall the metal retainer and plastic tip.



6. Reinstall the clevis pin and hair pin.

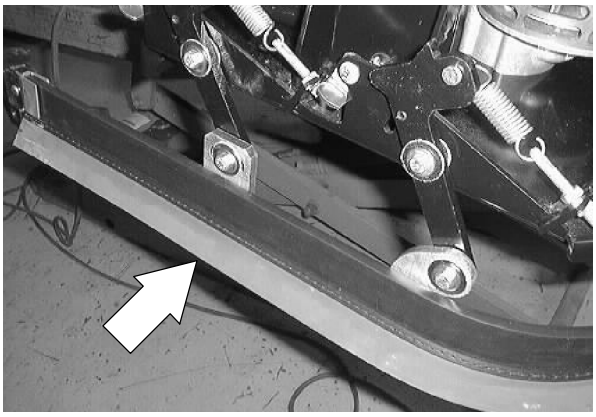


7. Operate the machine and check the side squeegee for proper operation.

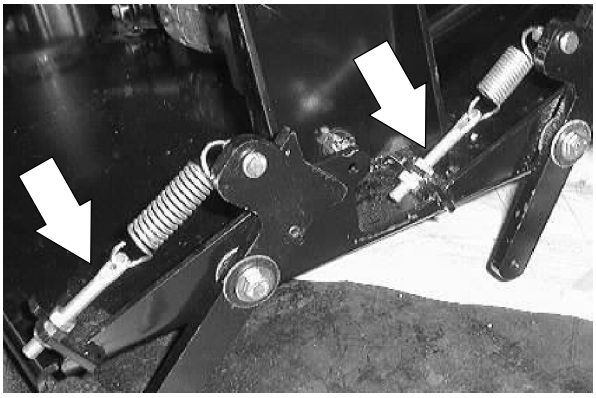
TO ADJUST SIDE SQUEEGEES

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

1. The side squeegees are adjusted at the factory and **should not need** further adjusting.



2. If the side squeegees need to have the down pressure adjusted--loosen the jam nuts on the tension spring threaded rod. Move the threaded rod down to increase tension on the spring. Retighten the jam nuts.



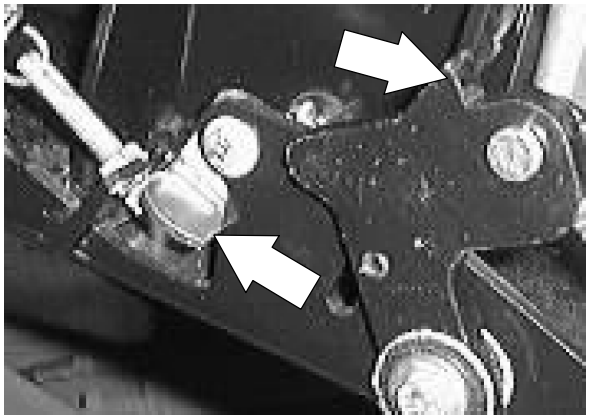
SIDE SQUEEGEE DOUBLE SCRUB CLIPS

The side squeegees can be raised and held in place for double scrubbing a dirty floor.

TO ENGAGE DOUBLE SCRUB CLIPS

1. Pull the side squeegee up front and back. Flip the double scrub clip over so it engages the notch in the squeegee arm. The squeegee will stay in the up position until the clips are moved back.

NOTE: The clips can also be used when changing the scrub brushes.



REAR SQUEEGEE

The rear squeegee assembly channels water into the vacuum fan suction. The front squeegee blade channels the water, and rear blade wipes the floor. Check the rear squeegee assembly for damage, wear, and adjustment daily.

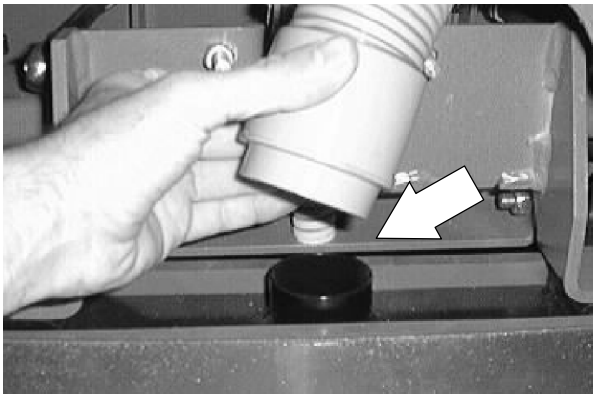
Rotate or replace either squeegee blade if its leading edge is torn or worn half-way through the thickness of the blade.

Each blade has four wiping edges. To use them all, start with one wiping edge. To use the next wiping edge, rotate the squeegee end-for-end. To use the next wiping edge, rotate the top edges down, bottom edges up. To use the last edge, rotate the squeegee end-for-end.

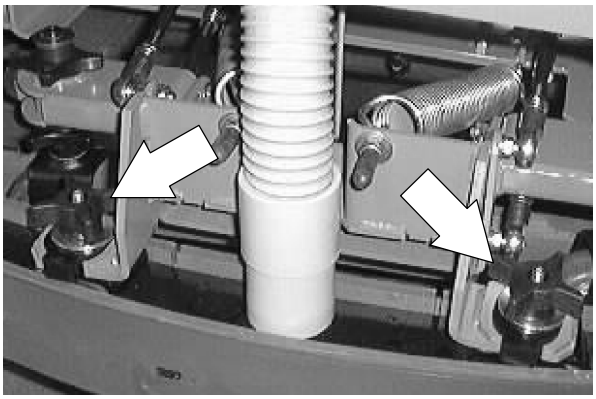
TO REPLACE OR ROTATE REAR SQUEEGEE BLADES

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

1. Make sure the rear squeegee is in the raised position. Pull the vacuum hose out of the squeegee frame.



2. Loosen the hardware holding the squeegee frame to the lift assembly. Pull the squeegee frame and blade assembly off the machine.

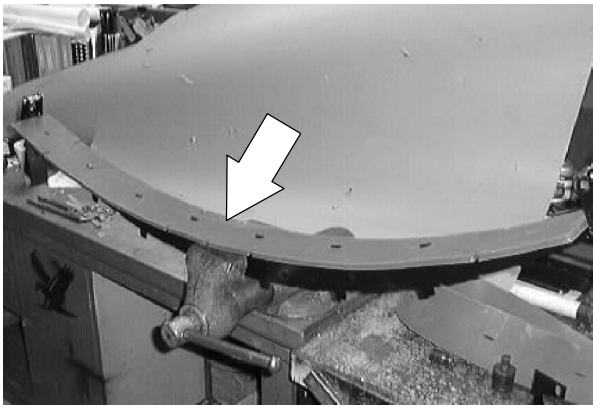


3. Flip the squeegee band lock open. Remove the band from the squeegee frame.

4. Pull the rubber squeegee blade off the frame. Rotate the blade to one of the four edges or discard blade.

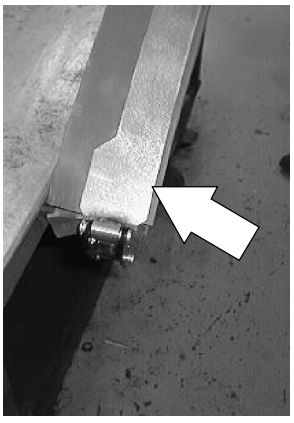
5. Install the new or rotated blade onto the squeegee frame.

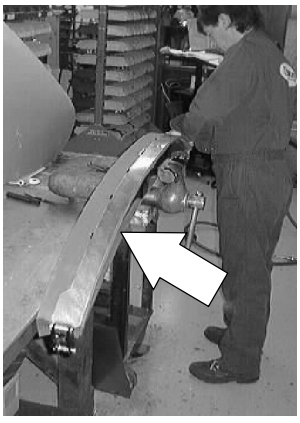
NOTE: Make sure the slots in the blade match up with the tangs on the frame.



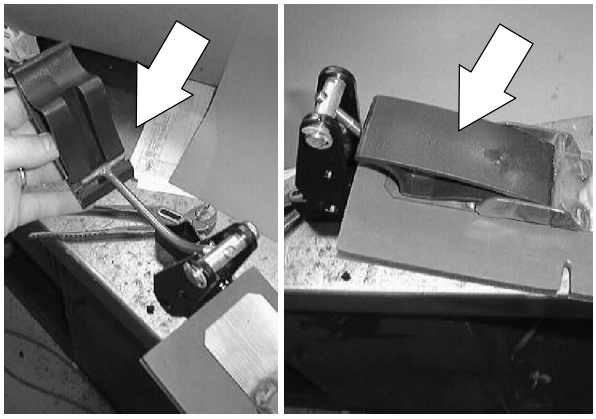
6. Reinstall the squeegee band.

NOTE: Make sure the slots in the band match up with the tangs on the frame.





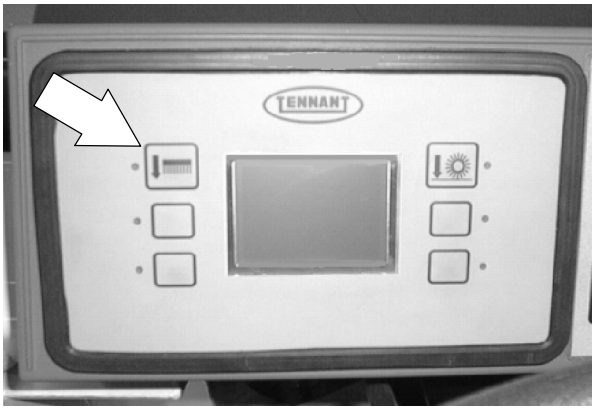
7. Flip the squeegee band lock into place and snap down to lock.



8. Repeat this procedure for the front and rear blades.

TO ADJUST REAR SQUEEGEE DEFLECTION

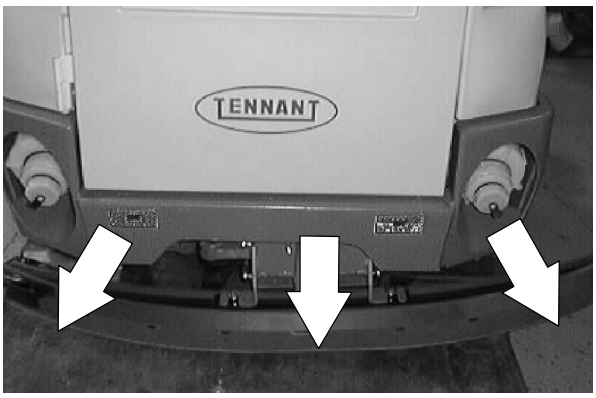
1. Start the machine and lower the squeegee while driving forward. Shut off the machine with the squeegee in the lowered position.



NOTE: Make sure the floor is flat and level.

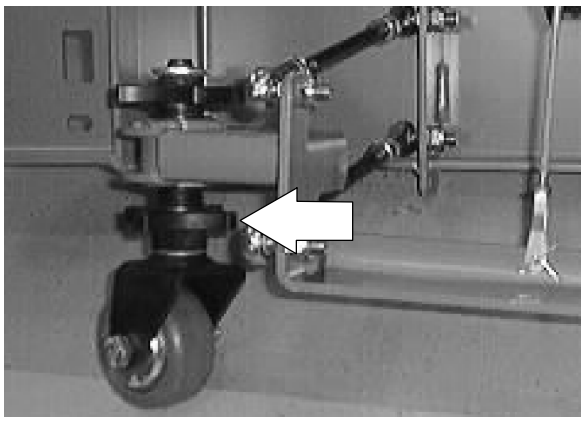
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

2. Check the squeegee for even deflection *(curl of squeegee blade on floor)* across the entire length of the blades. **The rear blade should deflect .50 to .75 in (13 - 20mm).**

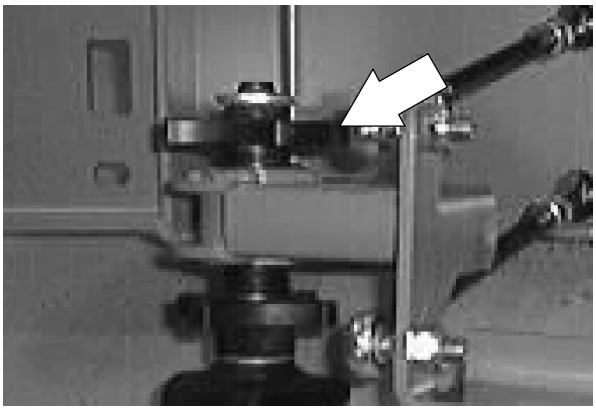


3. If the squeegee deflection is not even side to side--go to the next step.

4. Loosen the large plastic jam nut located just above the squeegee caster on the side of the squeegee that needs adjusting.



5. Turn the top of the squeegee caster assembly *(clockwise-raise squeegee counterclockwise-lower squeegee)*

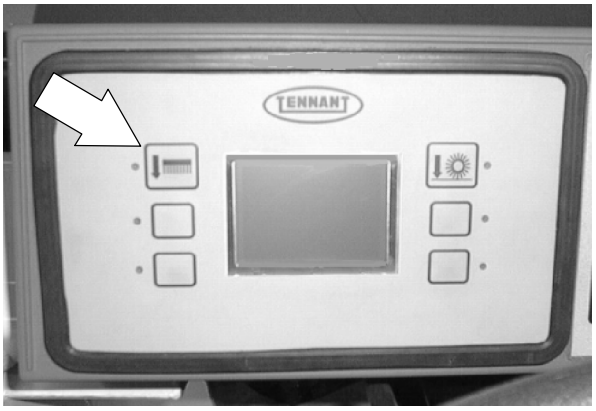


6. Recheck the deflection of the squeegee. If squeegee deflection is even across the entire length of the blades--tighten the jam nut. If needed--repeat the previous step.

7. Operate the machine and check the rear squeegee for proper operation.

TO LEVEL REAR SQUEEGEE

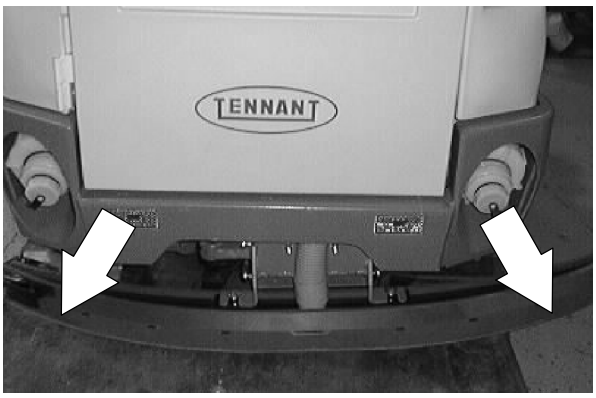
1. Start the machine and lower the squeegee while driving forward. Shut off the machine with the squeegee in the lowered position.



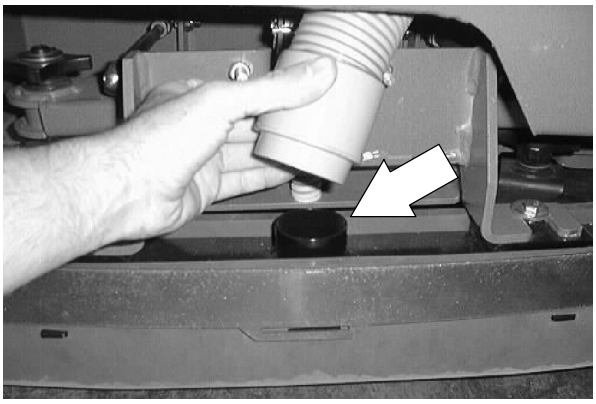
NOTE: Make sure the floor is flat and level.

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

2. Check the squeegee for levelness at each end of the blades. The front and back blades should touch the floor evenly. If either the squeegee tips are pointing up or the center of the squeegee is up slightly--go to the next step.



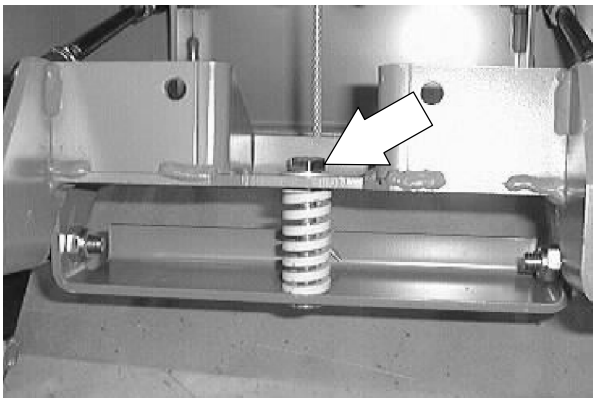
3. Pull the squeegee vacuum hose out of the squeegee frame. Move the hose to the side.



4. Turn the hex screw in the center of the squeegee mount bracket to adjust the tips up or down.

5. Recheck the levelness of the squeegee. If the squeegee blade is even across the entire length--tighten the jam nut. If needed--repeat the previous step.

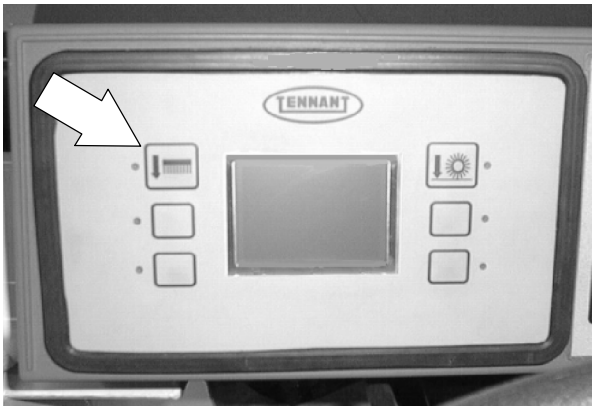
6. Operate the machine and check the rear squeegee for proper operation.



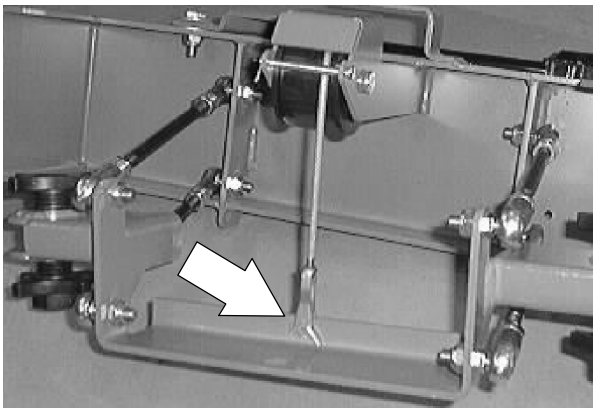
TO REPLACE REAR SQUEEGEE LIFT CABLE

1. Start the machine and lower the squeegee. Shut off the machine with the squeegee in the lowered position.

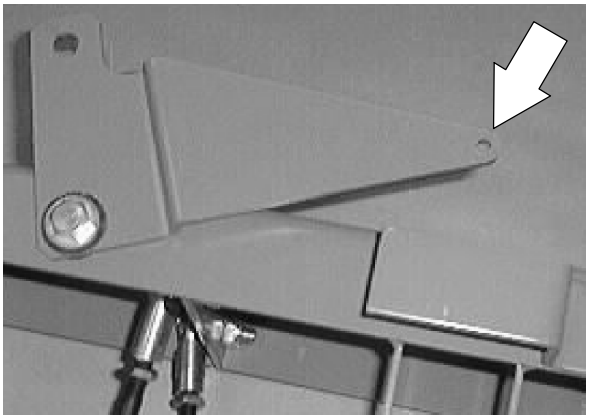
   FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.



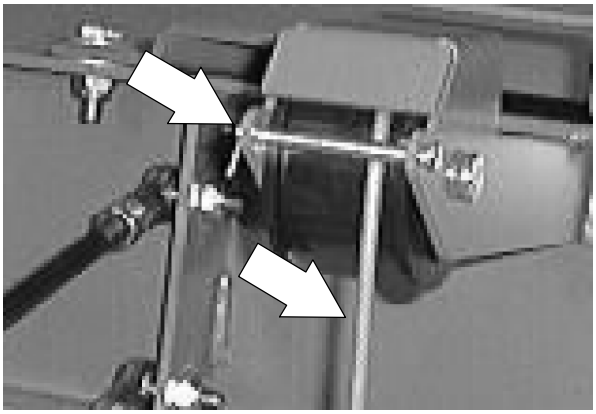
2. Remove the cotter pin and clevis pin from the squeegee lift cable where it attaches to the squeegee frame.



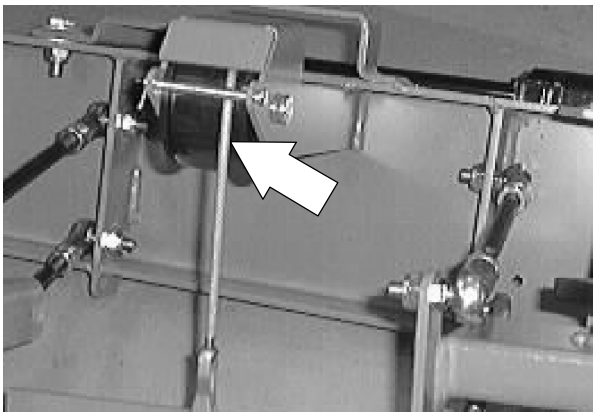
3. Remove the cotter pin and clevis pin from the squeegee lift cable where it attaches to the actuator lift pivot bracket.



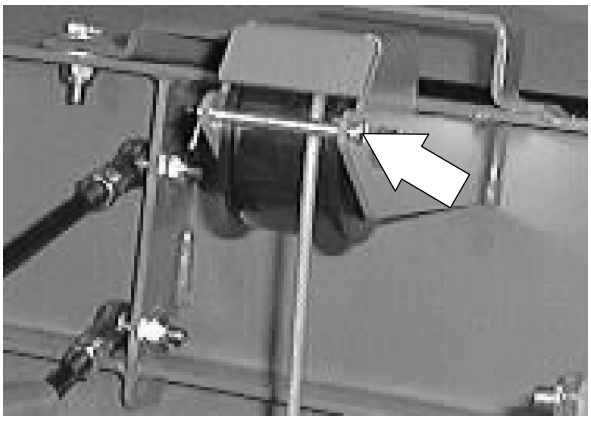
4. Remove the cotter pin from the long clevis pin in front of the squeegee lift cable roller. Remove the clevis pin and the lift cable from the machine.



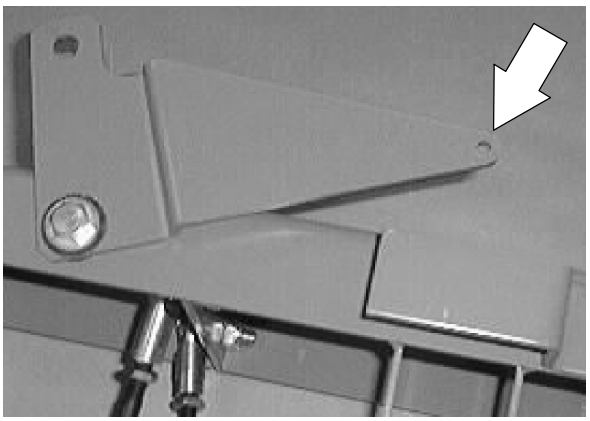
5. Position the new squeegee lift cable over the cable roller.



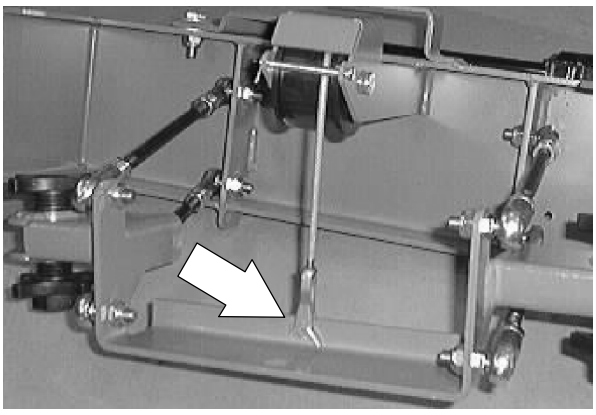
6. Reinstall the clevis pin and cotter pin in front of the lift roller.



7. Reattach the squeegee lift cable to the actuator pivot bracket using the clevis pin and cotter pin.



8. Reattach the squeegee lift cable to the actuator squeegee lift bracket using the clevis pin and cotter pin.

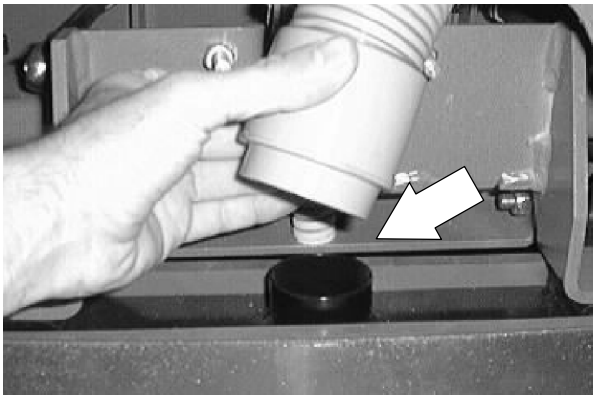


9. Operate the machine. Check the rear squeegee for proper operation.

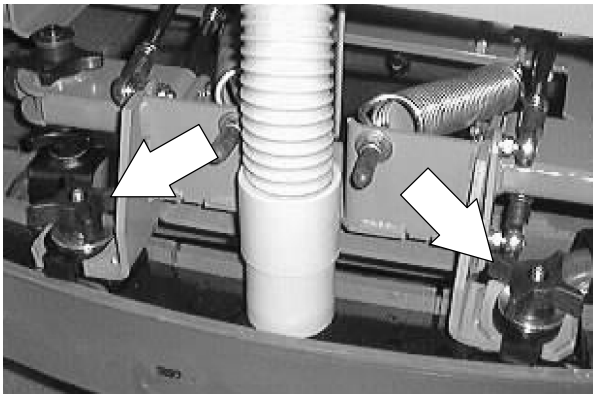
TO REMOVE REAR SQUEEGEE ASSEMBLY

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

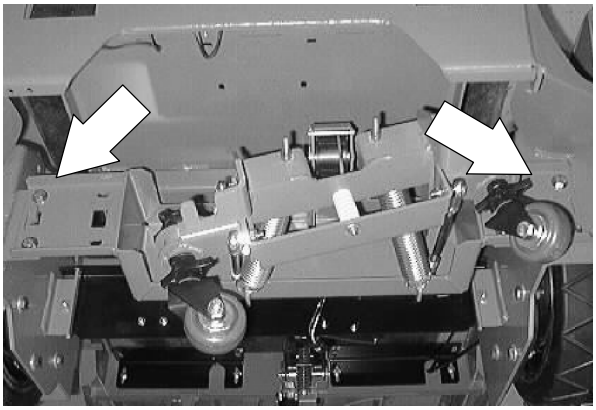
1. Make sure the rear squeegee is in the raised position. Pull the vacuum hose out of the squeegee frame.



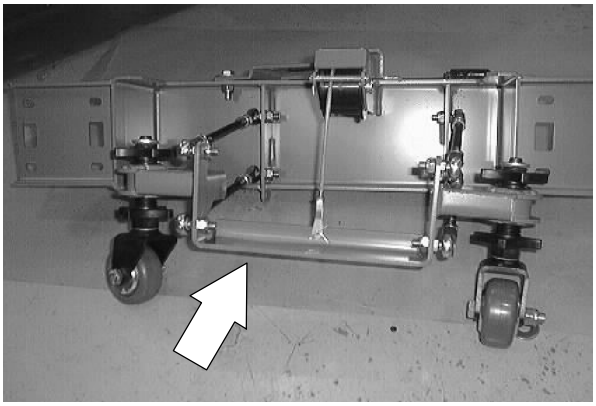
2. Loosen the hardware holding the squeegee frame to the lift assembly. Pull the squeegee frame and blade assembly off the machine.



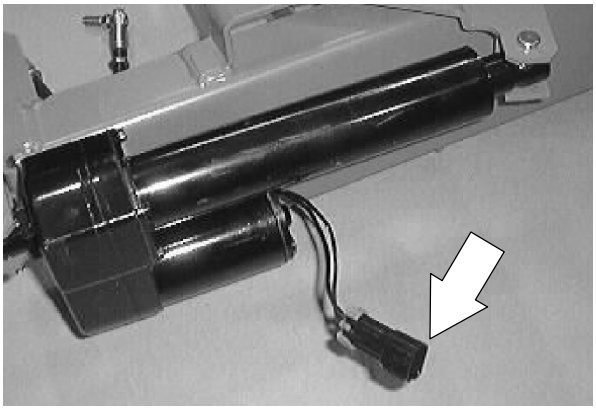
3. Remove the four hex screws holding the rear squeegee assembly to the machine frame.



4. Pull the squeegee assembly away from the rear of the machine.

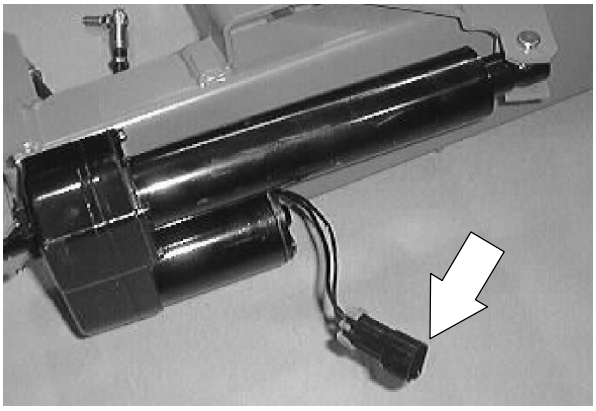


5. Disconnect the squeegee lift actuator from the main harness. The squeegee assembly can now be removed from the machine.



TO INSTALL REAR SQUEEGEE ASSEMBLY

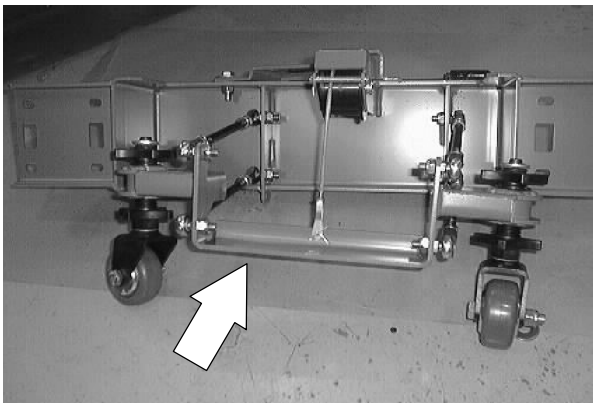
1. Position the squeegee assembly at the back of the machine. Reconnect the squeegee lift actuator to the main harness.



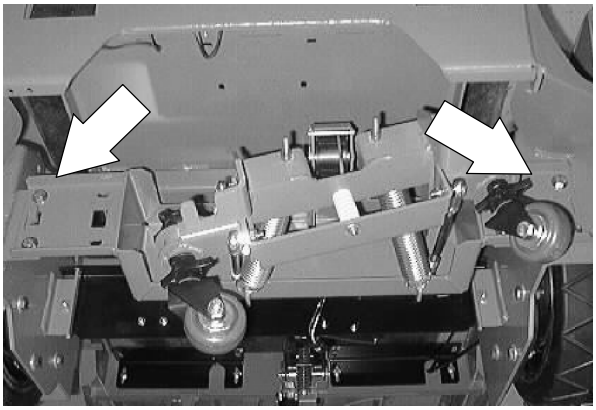
2. Position the squeegee assembly onto the back of the machine frame.

   MAXPRO 1000: Use the left hand bolt pattern.

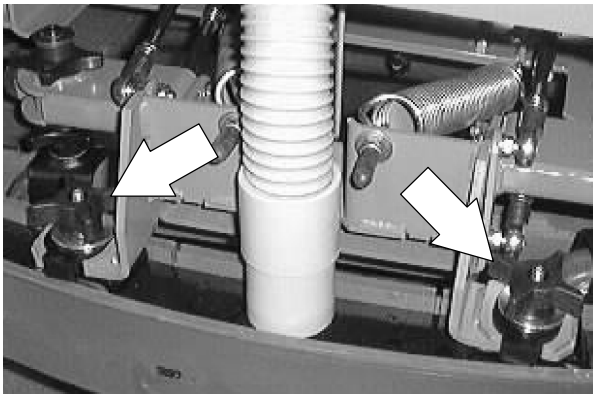
   MAXPRO 1200: Use the right hand bolt pattern.



3. Reinstall the hardware. Tighten to 37 – 48 Nm (26 – 34 ft lb).



4. Reinstall the squeegee blade assembly frame onto the lift bracket. Position the vacuum hose into the hole in the squeegee frame.



5. Operate the machine and check the squeegee assembly for proper operation.

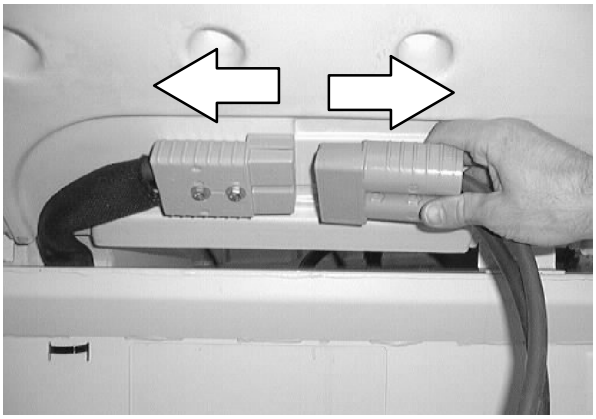
VACUUM FANS

The scrub vacuum fans, when activated, create a vacuum in the recovery tank. The recovery tank is sealed to the demister tank cover when it is the down position. Water is pulled from the rear squeegee to the demister tank through a vacuum hose.

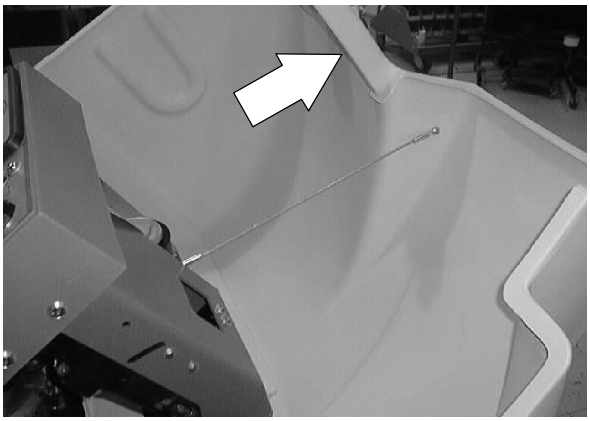
TO REMOVE VACUUM FAN ASSEMBLY

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

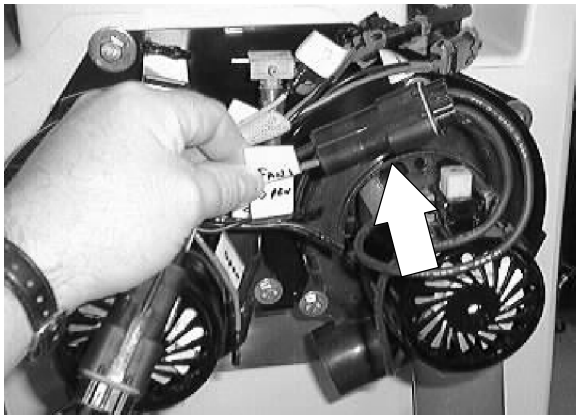
1. Raise the battery cover. Unplug the battery connector.



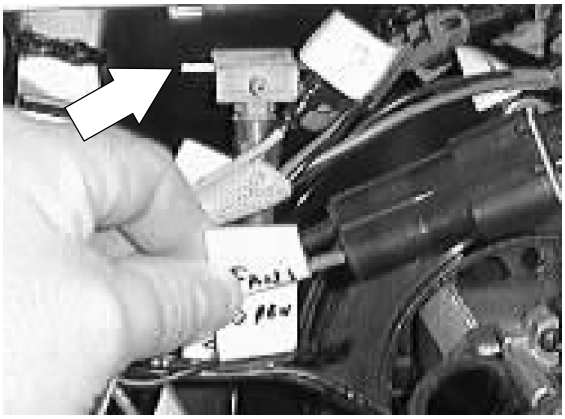
2. Open the front cover.



3. Disconnect the vacuum fans from the main harness.

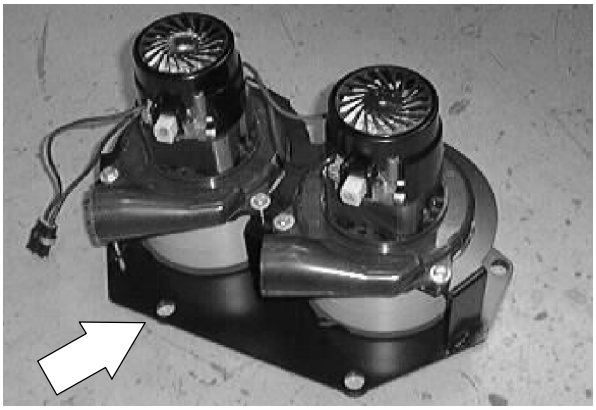


4. Disconnect the vacuum switch from the main harness.

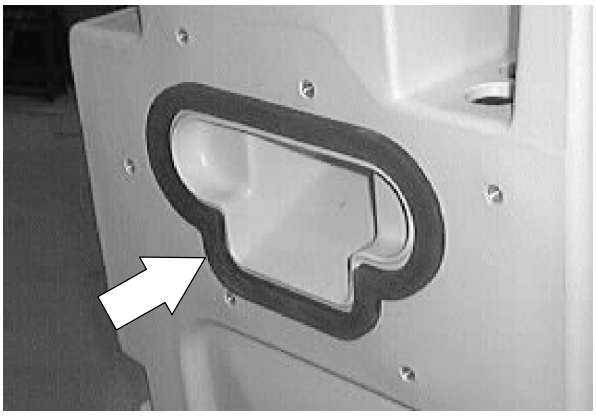


5. Remove the six M8 hex screws holding the scrub vacuum fan assembly to the front of recovery tank.

6. Remove the vacuum fan assembly from the machine.



7. Check the tank gasket for rips or tears. Replace if needed.



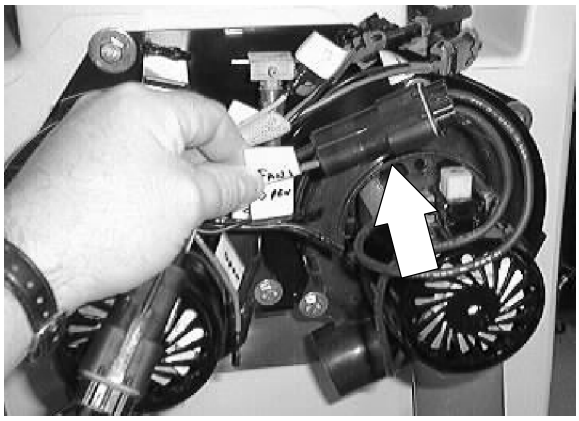
TO INSTALL VACUUM FAN ASSEMBLY

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

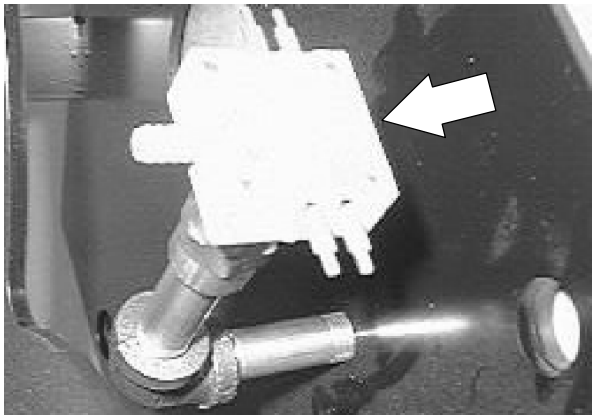
1. Position the scrubbing vacuum fan assembly onto the front of the recovery tank. Reinstall the six M8 hex screws. Tighten to 18 – 24 Nm (15 – 20 ft lb).

NOTE: If machine is equipped with the ES/AUTO FILL option--adjust the mount bracket to the middle of the slots.

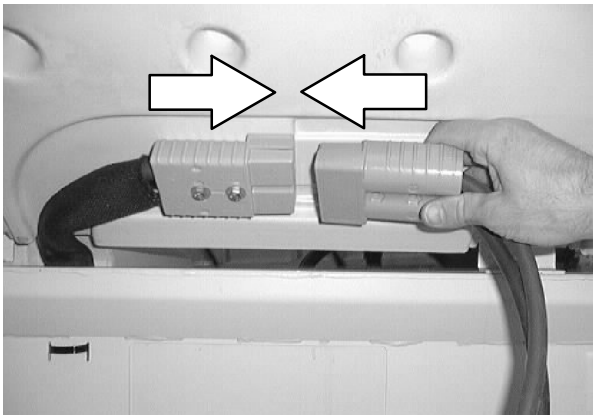
2. Reconnect the vacuum fan motors to the main harness.



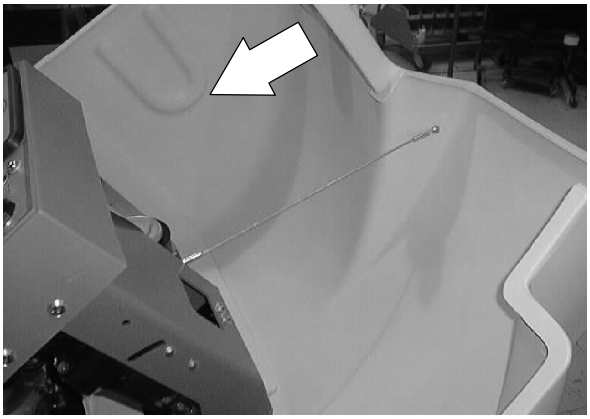
3. Reconnect the vacuum switch to the main harness.



4. Plug the battery into the connector.



5. Close the front cover.

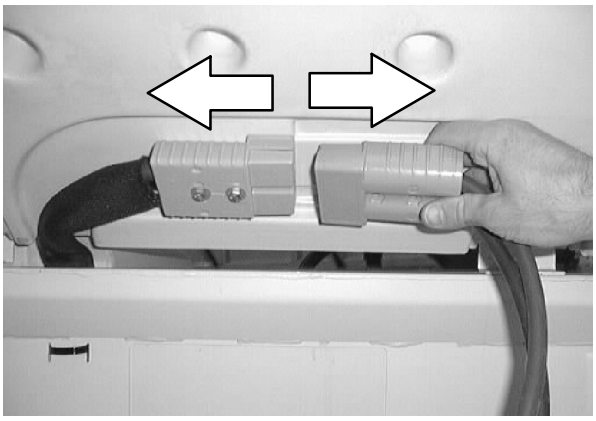


6. Operate the machine. Check the scrubbing vacuum fans for proper operation.

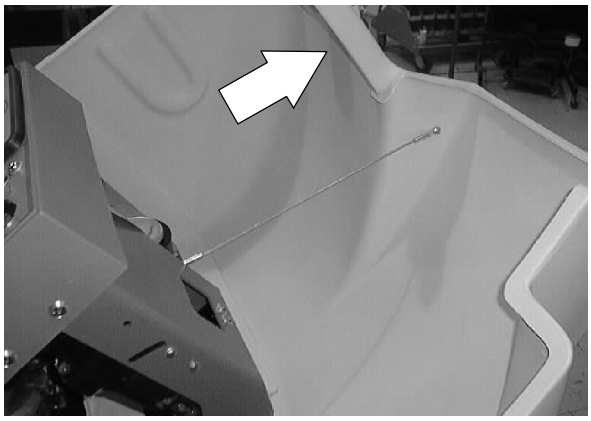
TO REPLACE INDIVIDUAL VACUUM FAN

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

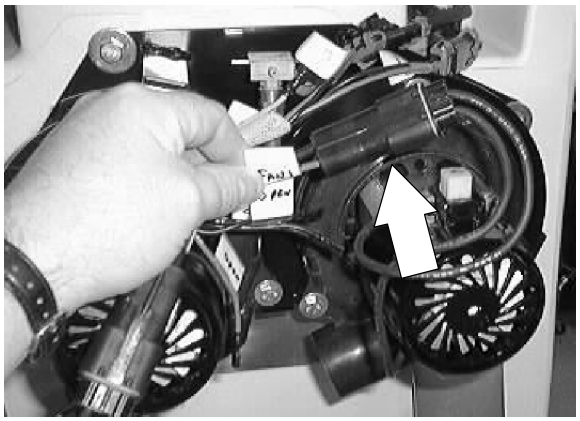
1. Raise the battery cover. Unplug the battery connector.



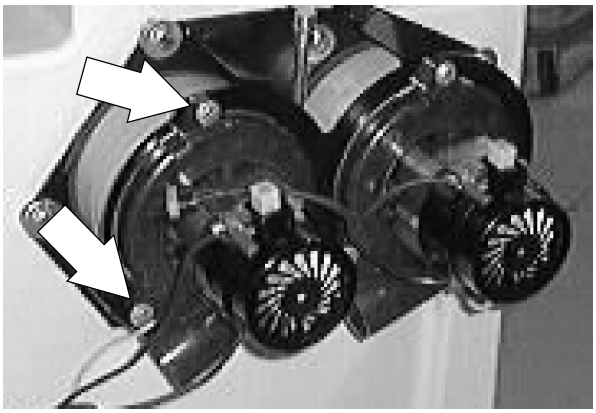
2. Open the front cover.



3. Disconnect the vacuum fans from the main harness.

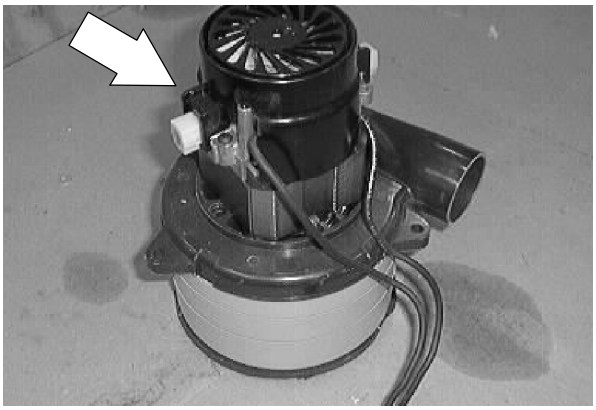


4. Remove the three M6 hex screws holding the individual vacuum fan to the mount bracket.

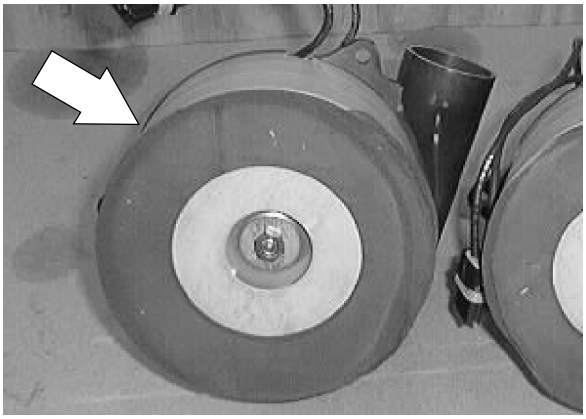


5. Remove the vacuum fan from the bracket.

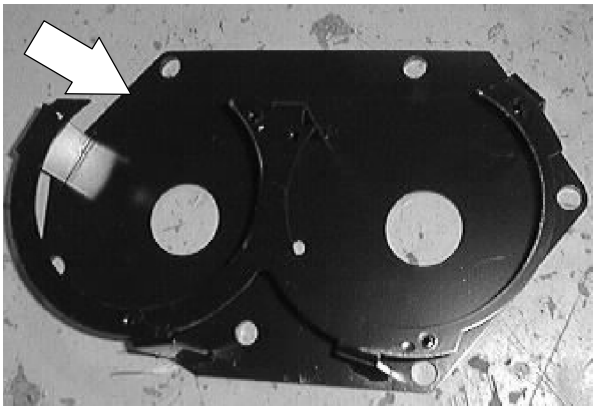
NOTE: Note orientation of exhaust port.



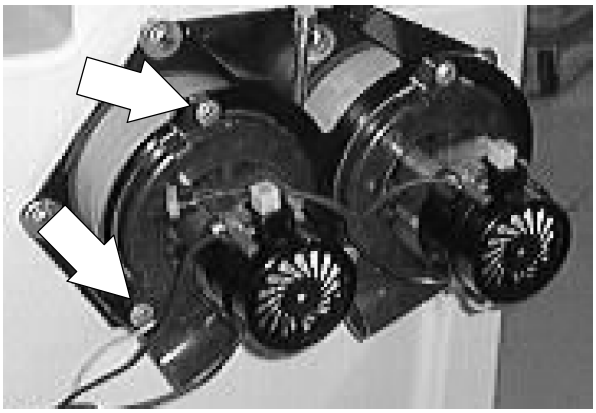
6. Check the gasket on the back of the vacuum fan for rips or tears before installing on the mount bracket.



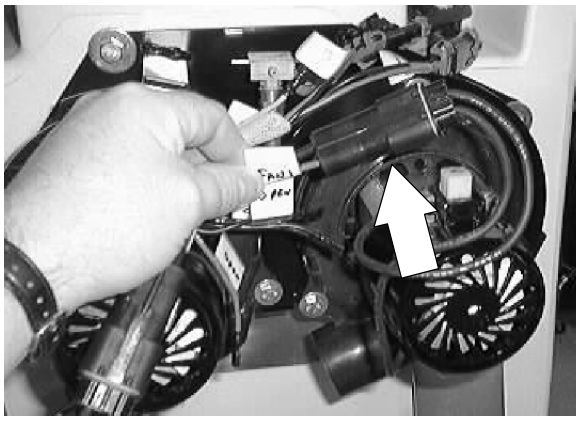
7. Position the new vacuum fan onto the fan mount bracket.



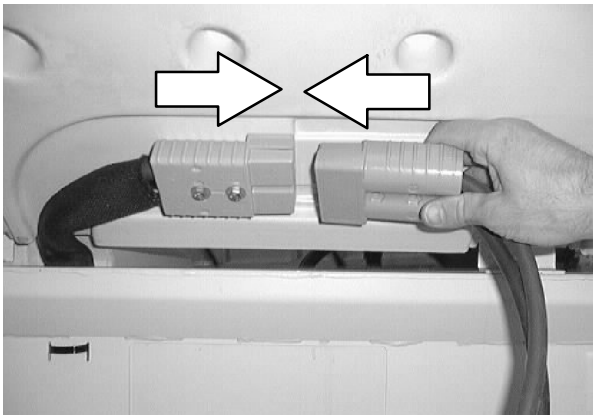
8. Reinstall the three M6 hex screws and tighten to 8 – 10 Nm (5 – 6 ft lb).
Note orientation of exhaust port.



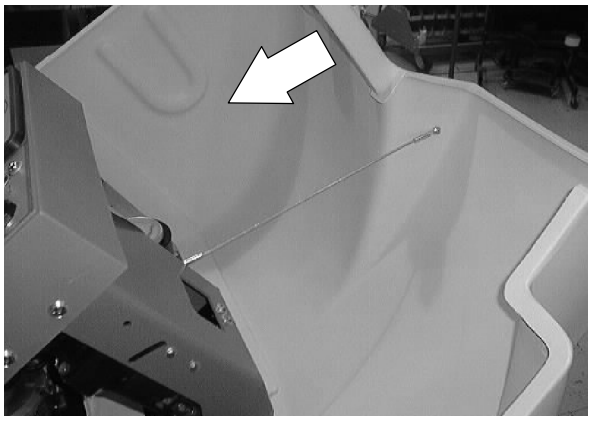
9. Reconnect the vacuum fan to the main electrical harness.



10. Plug the battery into the connector.



11. Close the front cover.



12. Operate the machine. Check the scrubbing vacuum fans for proper operation.

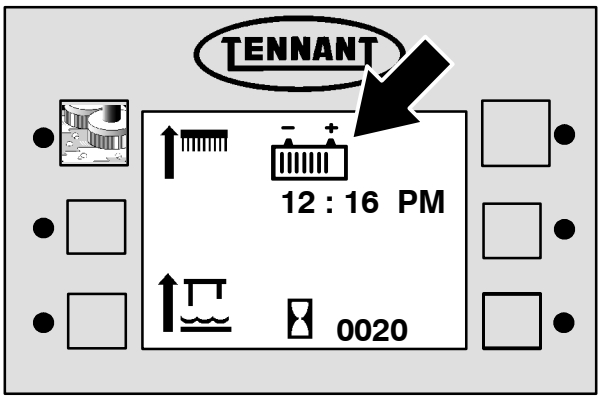
CONTENTS

INTRODUCTION

The 7300 electrical system consists of the batteries, instrument panel, control panels, traction motor, actuators, pumps, switches, relays, circuit board, and circuit breakers.

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 all the battery discharge indicator segments shut off (20% charge left). Use an automatic charger with the proper rating for the batteries.



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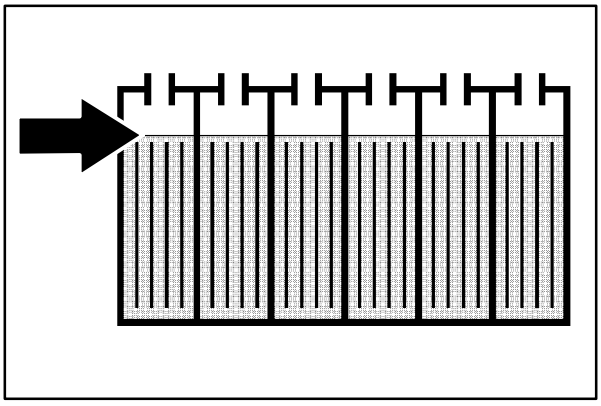
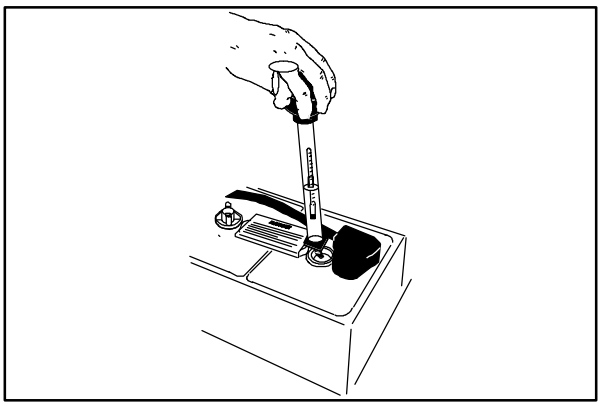
Periodically clean the top surface of the batteries and terminals with a strong solution of baking soda and water. Brush the solution sparingly over the battery tops, terminals, and cable clamps. Do not allow any baking soda solution to enter the batteries. Use a wire brush to clean the terminal posts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



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 test lower than the other battery cells (0.050 or more), the cell is damaged, shorted, or is about to fail.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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
1.290	100% Charged
1.252	75% Charged
1.200	50% Charged
1.177	25% Charged
1.140	Discharged

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).

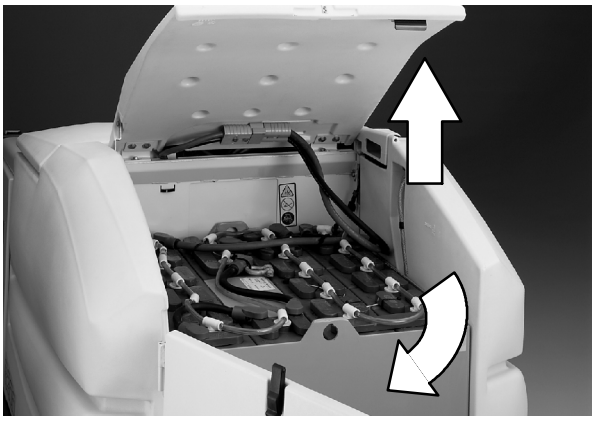
CHARGING THE BATTERIES

1. Drive the machine to a flat, dry surface in a well-ventilated area.

2. Turn the machine power off and set the parking brake.

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

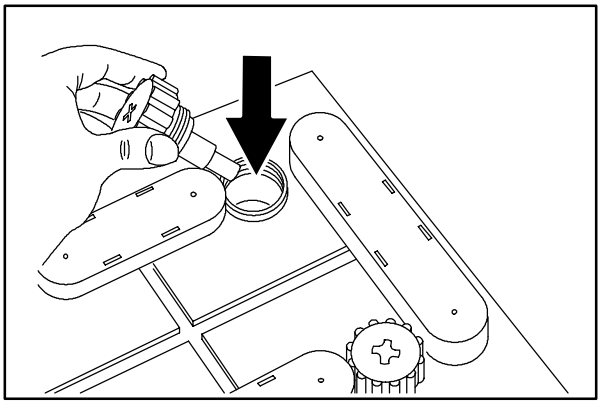
3. Open the top battery compartment cover. The support arm will engage when the cover is lifted all the way up.



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

4. Open the rear battery compartment door.

5. Check the electrolyte level in all the battery cells.



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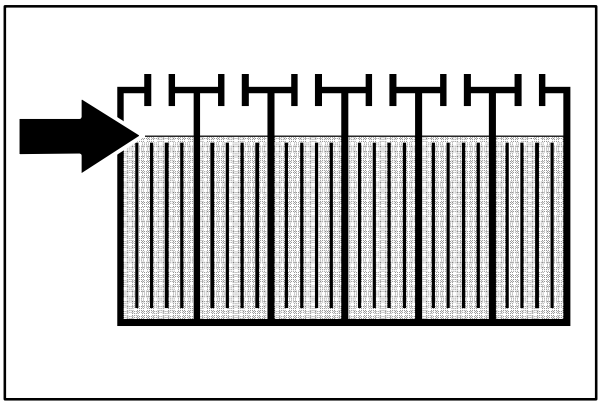
6. If the level is low, add just enough distilled water to cover the plates. DO NOT OVERFILL. The batteries can overflow during charging due to expansion.

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

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

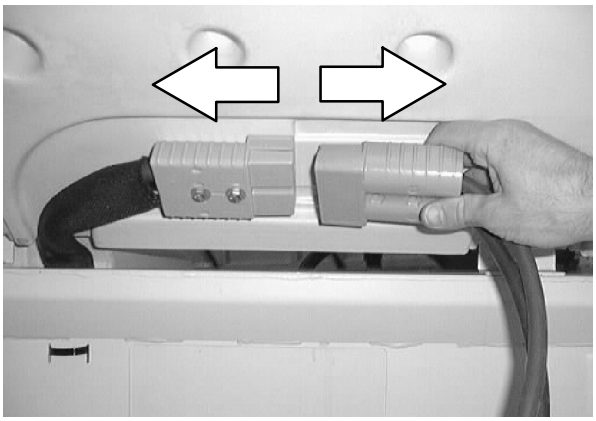


7. Unplug the battery connector from the machine connector.

8. Plug the charger connector into the battery connector.

9. Plug the battery charger into the wall outlet.

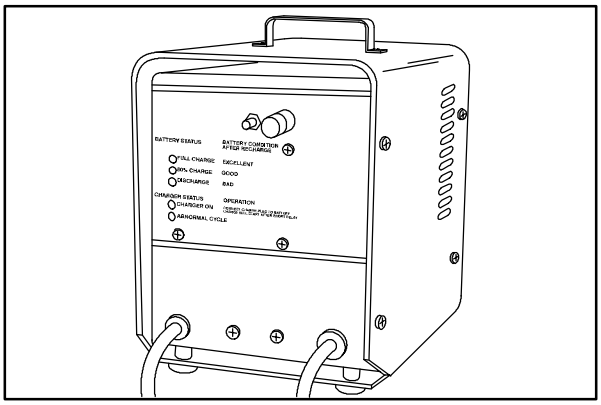
NOTE: If the red "ABNORMAL CYCLE" lamp lights when the TENNANT charger is plugged into a wall outlet, the charger can not charge the battery and there is something wrong with the battery.



10. The Tennant charger will start automatically. When the batteries are fully charged, the Tennant charger will automatically turn off.

NOTE: Use a charger with the proper rating for the batteries to prevent damage to the batteries or reduce the battery life.

NOTE: If the charger needs to be disconnected from the machine before the batteries are fully charged and the charger has not automatically shut off, turn off the charger before disconnecting it.



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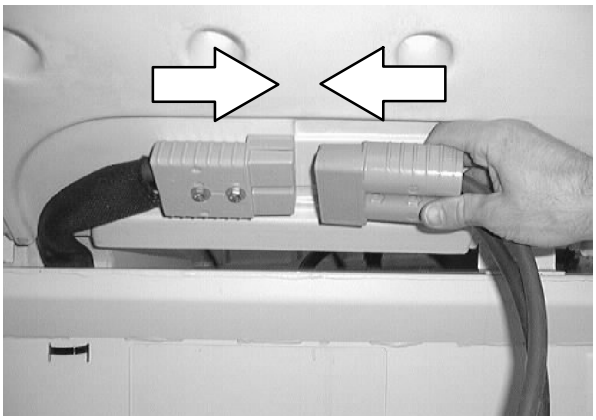
11. After the charger has turned off, unplug the charger from the wall outlet.

12. Unplug the charger connector from the battery connector on the machine.

13. Reconnect the battery connector to the machine connector.



14. Check the electrolyte level in each battery cell after charging. If needed, add distilled water to raise the electrolyte level to about 12mm (0.4 in) below the bottom of the sight tubes.

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

15. Close the rear battery compartment door. Disengage the support arm, and close the top battery compartment cover.

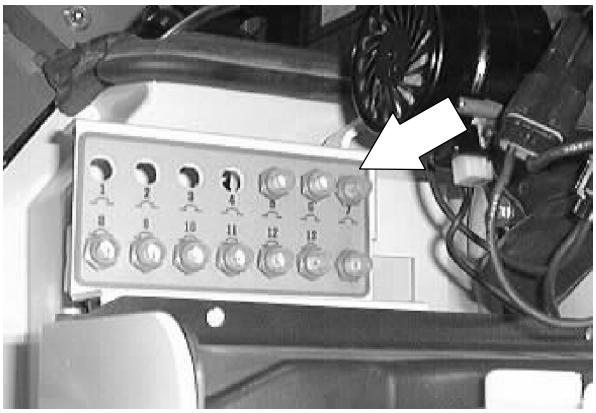
CIRCUIT BREAKERS

The circuit breakers are resetable electrical circuit protection devices. They stop the flow of current in the event of a circuit overload. Once a circuit breaker is tripped, reset it manually by pressing the reset button after the breaker has cooled down.

If the overload that caused the circuit breaker to trip is still there, the circuit breaker will continue to stop current flow until the problem is corrected.

The fuse is a one-time circuit protection device designed to stop the flow of current in the event of a circuit overload. Never substitute higher value fuses then those specified in this manual.

The circuit breakers are located to the left of the operator's compartment and in the control box. The fuses are also located in the control box.



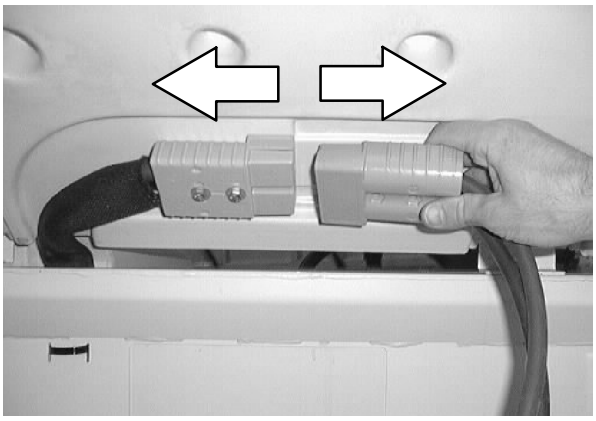
The chart below shows the circuit breakers and fuses, and the electrical components they protect.

Circuit Breaker	Rating	Circuit Protected
CB1		Open on 7300 model
CB2		Open on 7300 model
CB3		Open on 7300 model
CB4		Open on 7300 model
CB5	10 A	Key Switch
CB6	40/50 A	Right Scrub Motor
CB7	40/50 A	Left Scrub Motor
CB8	15 A	Lights
CB9	15 A	Horn
CB10	20 A	Vac Fan #1
CB11	20 A	Vac Fan #2
CB12	25 A	Control Board
CB13	40 A	Center Scrub Motor
CB14	30 A	Power Steering Pump

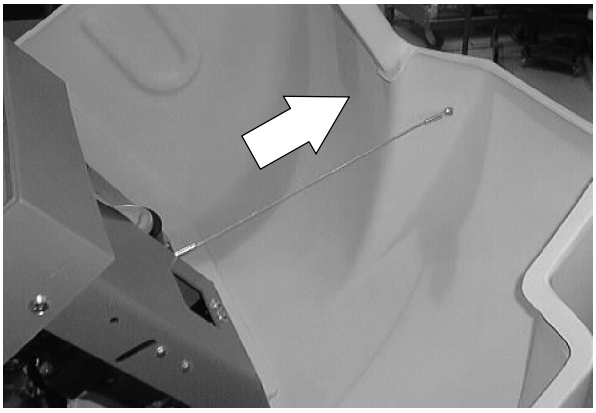
TO REPLACE CIRCUIT BREAKER

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

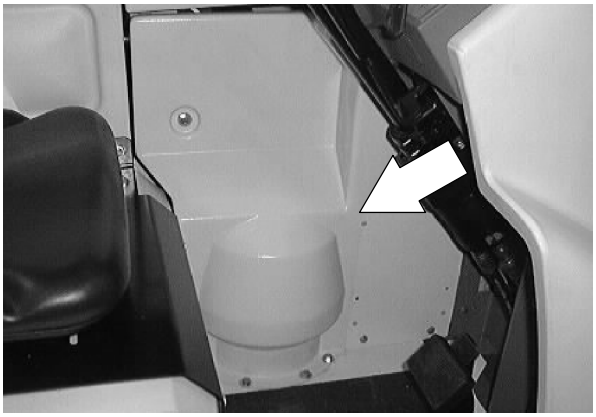
1. Raise the rear cover and unplug the battery connector.



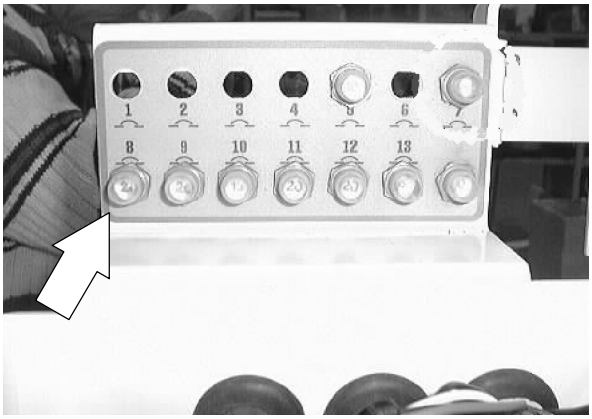
2. Open the front cover.



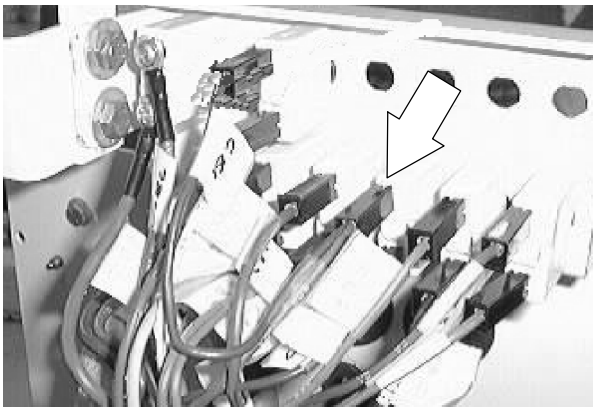
3. Remove the plastic traction motor cover.



4. Locate the circuit breaker panel on the left side of the operators compartment, in front of the scrub vacuum fans.

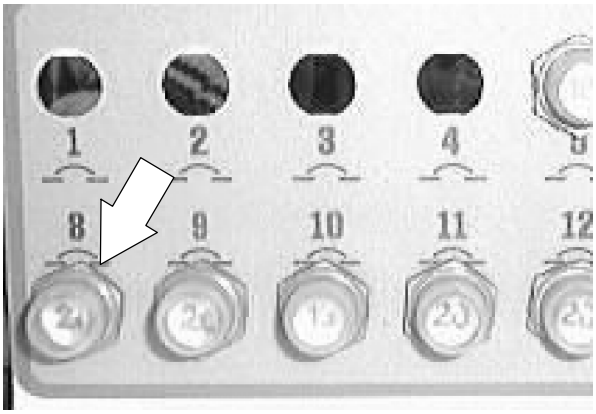


5. Mark and disconnect the wire leading to the circuit breaker that needs to be changed.

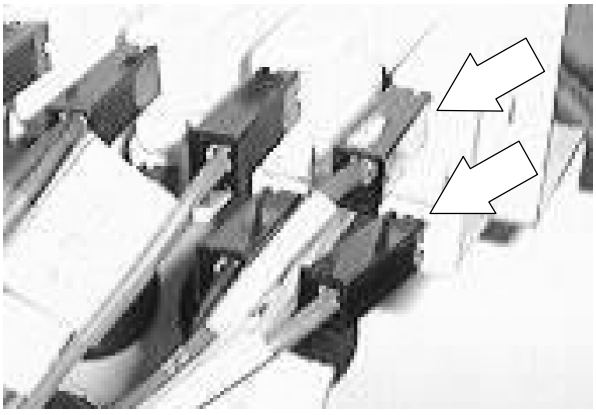


6. Remove the rubber boot from the outside of the circuit breaker. Remove the circuit breaker from the machine.

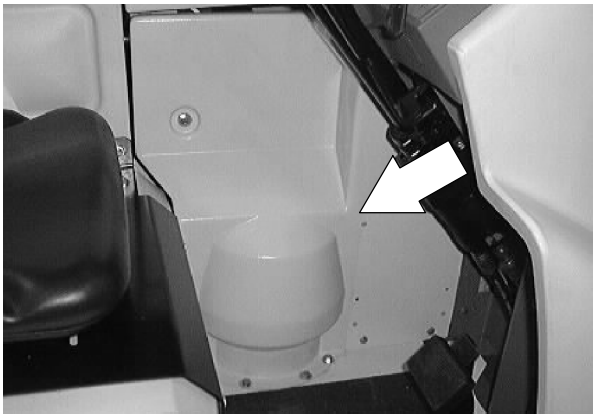
7. Install the new circuit breaker *(with the same amp rating)* into the mount hole. Reinstall the rubber boot and hand tighten.



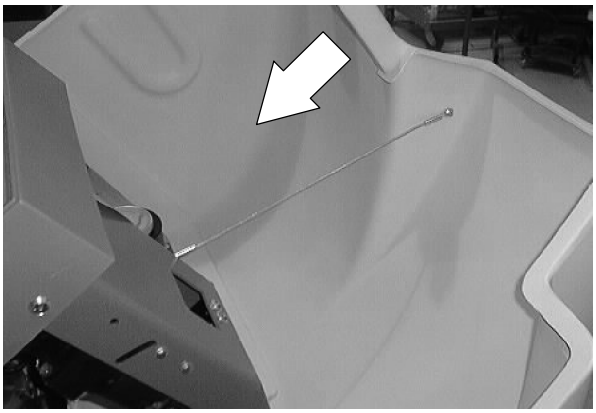
8. Reconnect the wires to the back of the new circuit breaker.



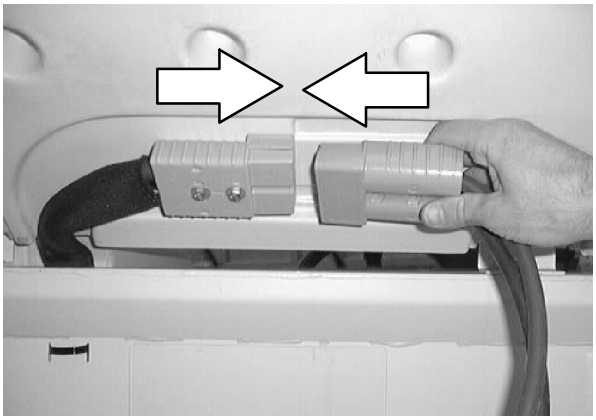
9. Reinstall the plastic traction motor cover.



10. Close the front cover.



11. Plug the battery connector into the machine. Close the rear cover.

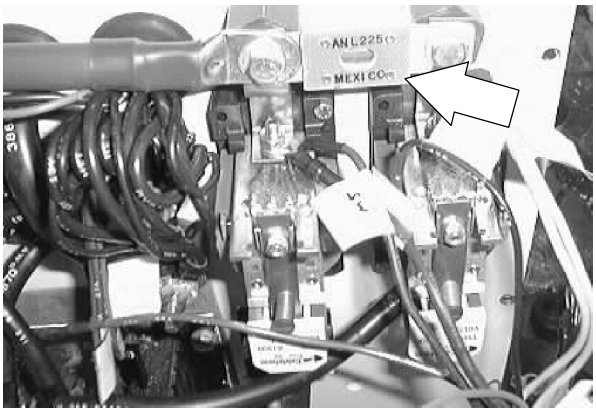


12. Operate the machine. Check the new circuit breaker for proper operation.

FUSE

Fuses are a one-time protection device designed to stop the flow of current in the event of a circuit overload. Never substitute higher value fuses than specified.

The fuses are located near the main control box.

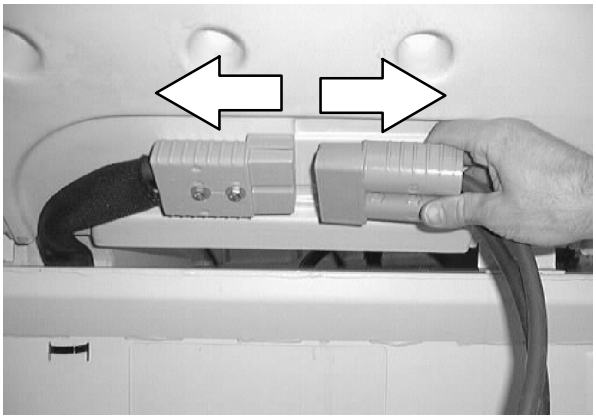


Fuse	Rating	Circuit Protected
FU 1	150 A	Propelling
FU 2	10 A	Electronic Actuator
FU 3	10 A	Electronic Actuator

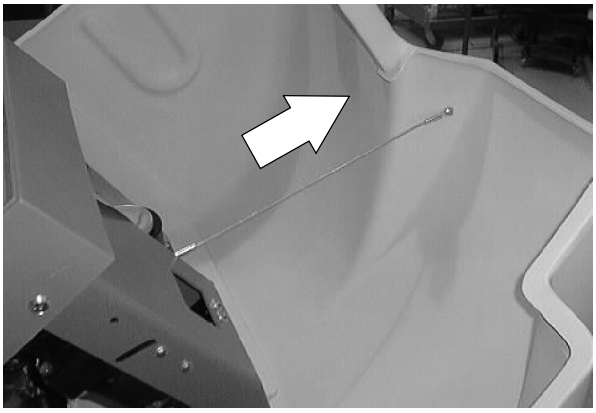
TO REPLACE PROPELLING FUSE

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

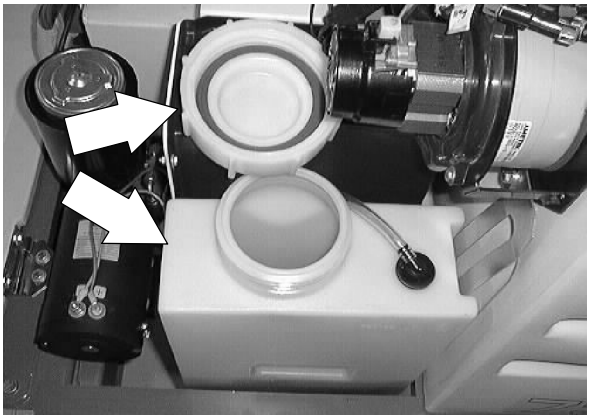
1. Raise the rear cover and unplug the battery connector.



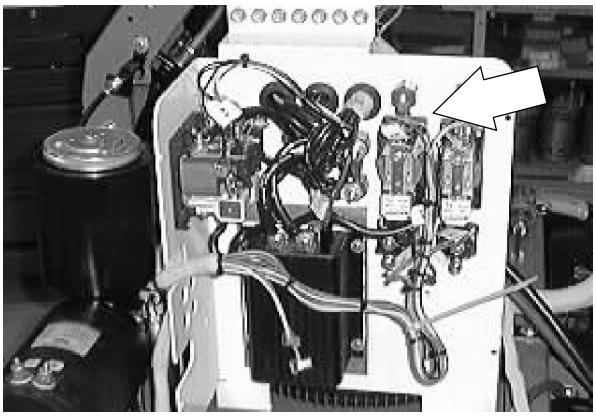
2. Open the front cover.



3. Remove the detergent tank and control panel cover from the machine.



4. Locate the propelling fuse in the control box.

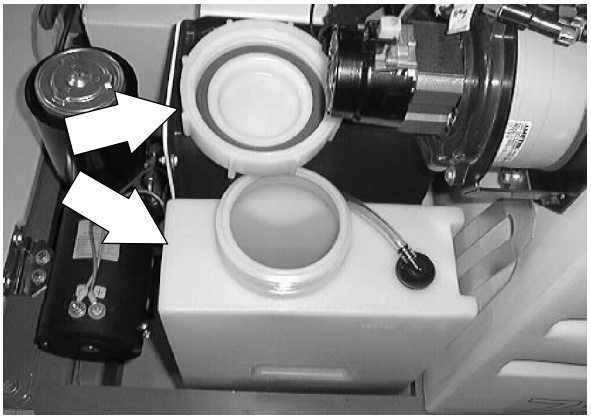


5. Loosen the two hex screws holding the propelling fuse to the cable standoffs.

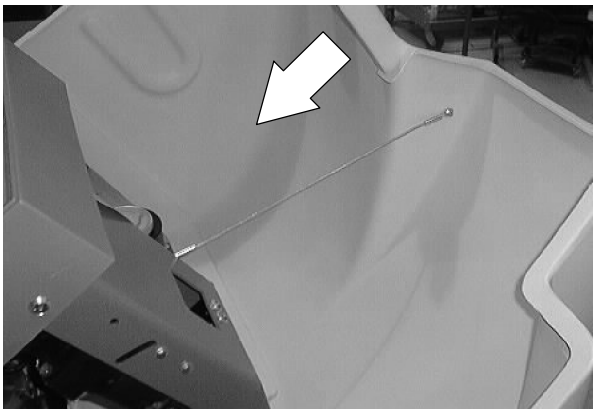
6. Pull one end of the fuse up, then remove the fuse from the standoff.

7. Install the new propelling fuse in the same orientation. Hand tighten the two hex screws tight.

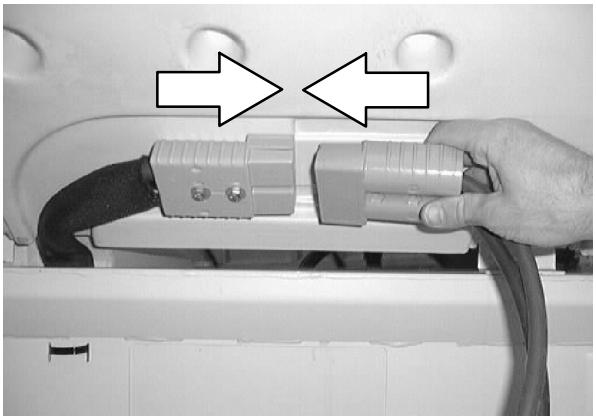
8. Reinstall the control panel cover and detergent tank onto the machine.



9. Close the front cover.



10. Plug the battery connector into the machine. Close the rear cover.



11. Operate the machine. Check the propelling circuit for proper operation.

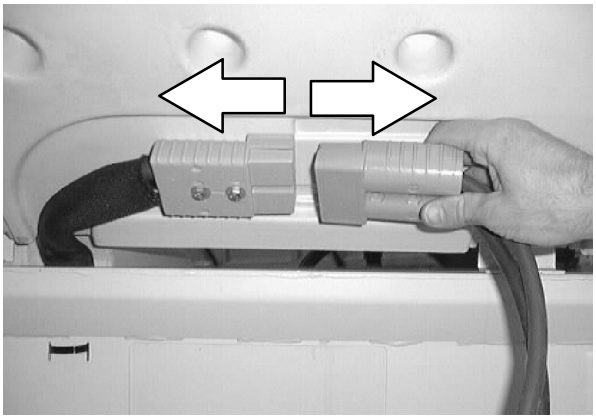
INSTRUMENT PANEL

The 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 machine performance.

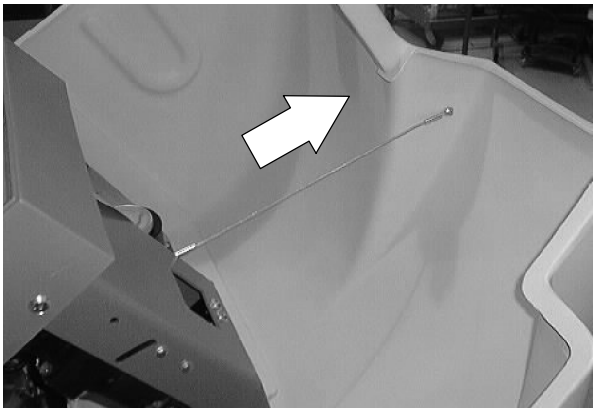
TO REPLACE TOUCH PANEL

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

1. Raise the rear cover and unplug the battery connector.

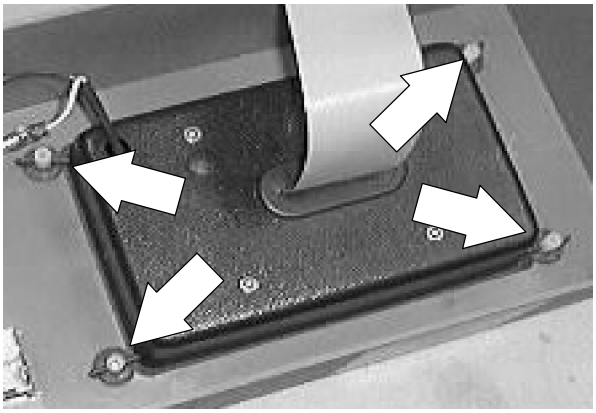


2. Open the front cover.

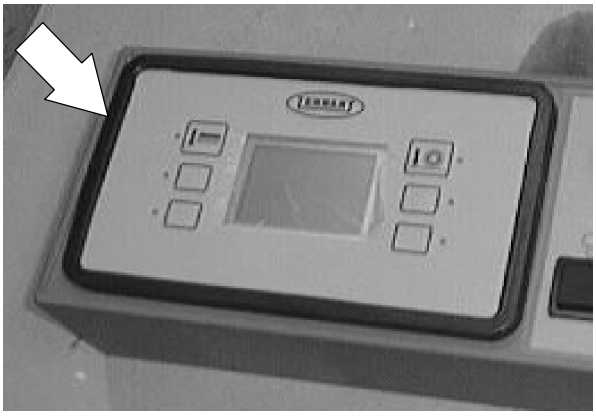


3. Remove the four screws and washers holding the instrument panel to the steering support frame.

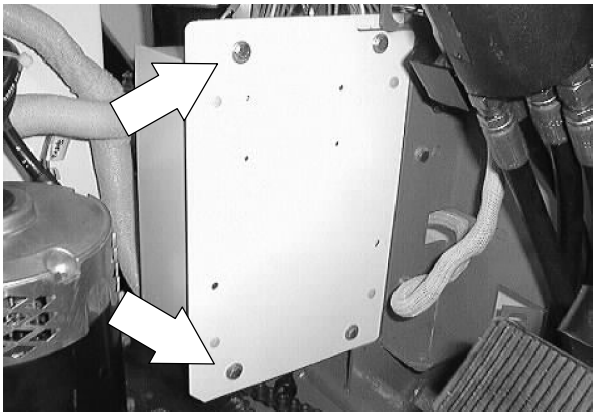
4. Remove the four wing nuts from the studs of the touch panel bezel.



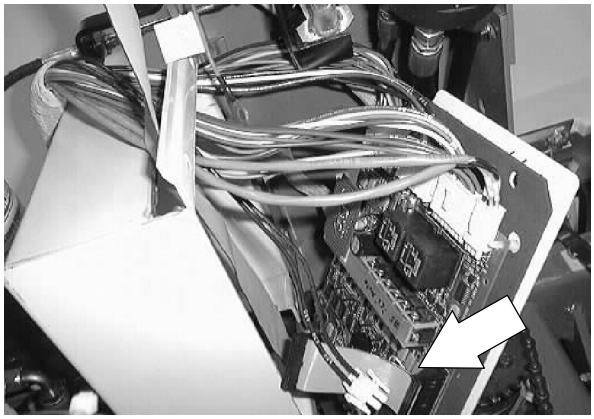
5. Pull the bezel off the touch panel.



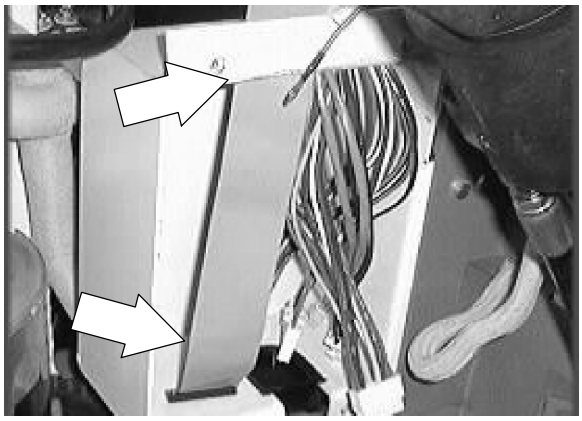
6. Remove the four screws holding the cover on the small control panel.



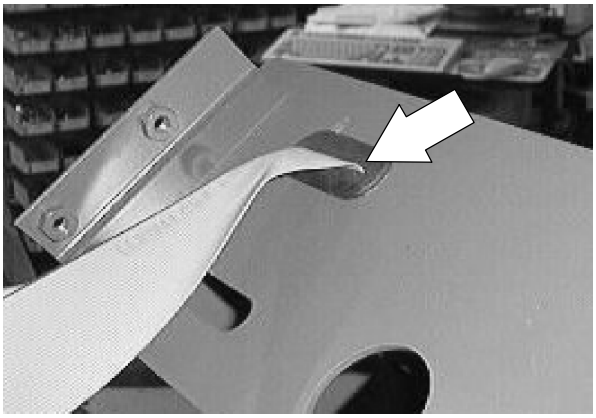
7. Unplug the touch panel ribbon cable from the circuit board.



8. Route the ribbon cable out of the small control panel.

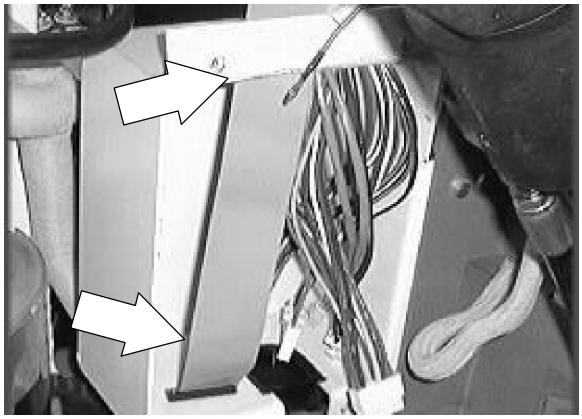


9. Pull the touch panel assembly back. Route the ribbon cable out of the grommet on the dash mount plate. Remove the touch panel and ribbon cable from the machine.

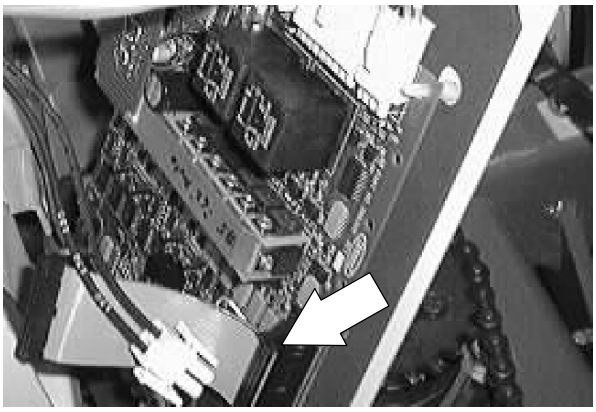


10. Install the new touch panel and ribbon assembly on the dash mount plate. Route the ribbon cable through the grommet and dash slot.

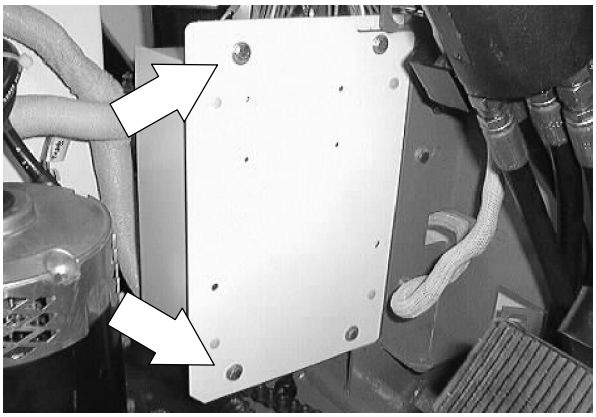
11. Route the ribbon cable down to the small control panel, through the grommet, and into the box.



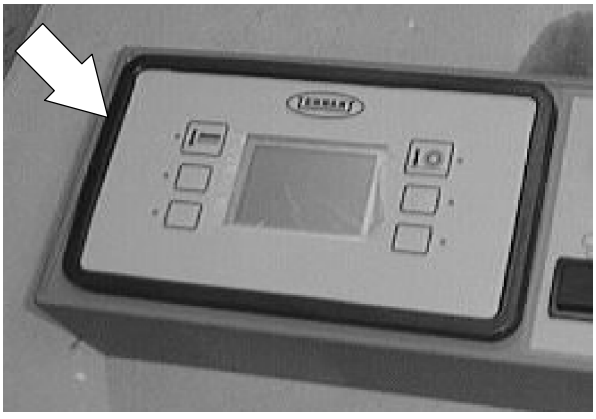
12. Plug the ribbon cable into the circuit board.



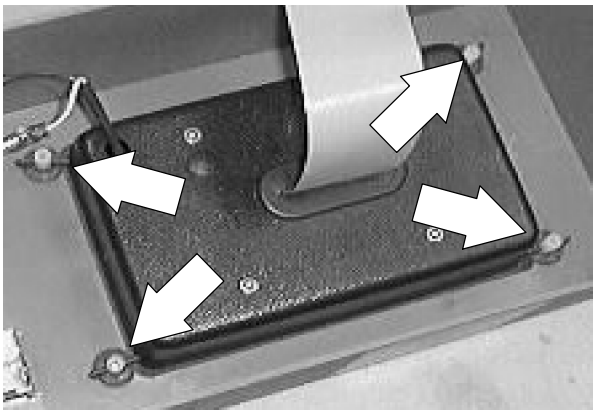
13. Reinstall the small control panel cover. Tighten the screws to 11 – 14 Nm (7 – 10 ft lb).



14. Position the touch panel and bezel onto the dash plate.

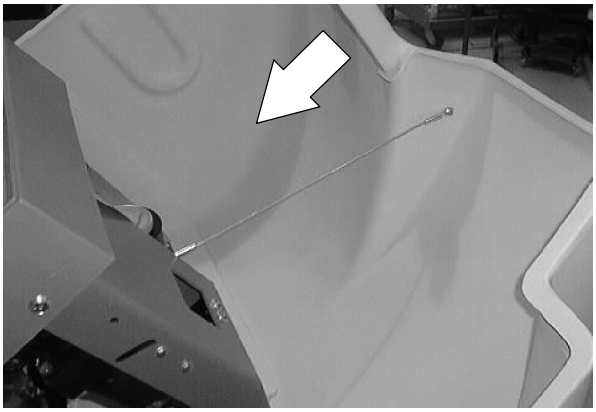


15. Reinstall the four wing nuts onto the four screws from the bezel.

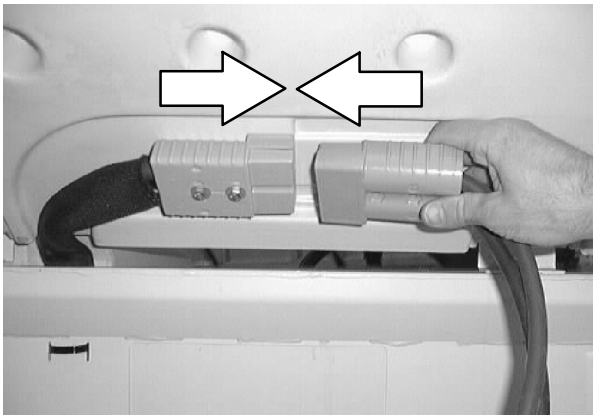


16. Position the instrument panel back onto the dash plate. Reinstall the four screws and special washers. Tighten the screws to 11 – 14 Nm (7 – 10 ft lb).

17. Close the front cover.



18. Plug the battery connector into the machine. Close the rear cover.

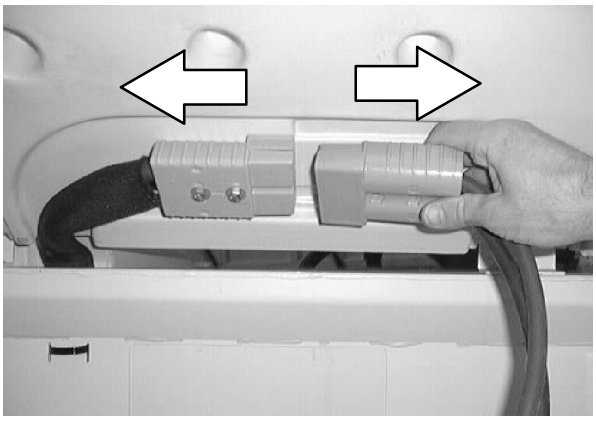


19. Operate the machine. Check the touch panel for proper operation.

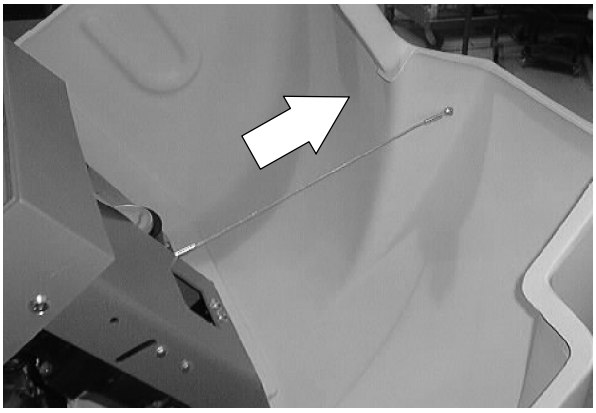
TO REPLACE CIRCUIT BOARD

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

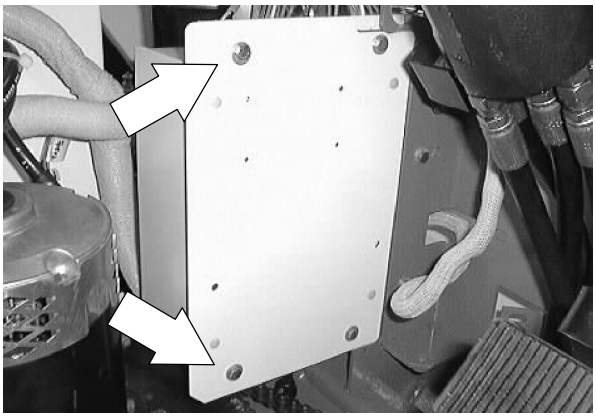
1. Raise the rear cover and unplug the battery connector.



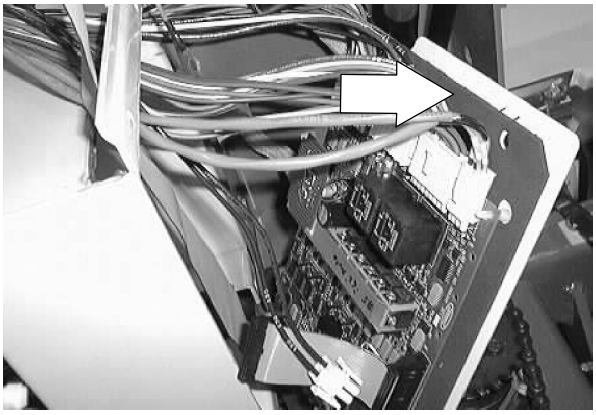
2. Open the front cover.



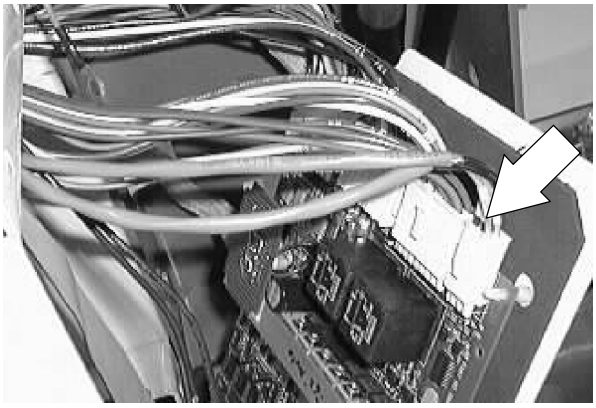
3. Remove the four screws holding the cover on the small control panel.



4. Pull the small control panel cover back to access the circuit board (s).



5. Unplug the wire connectors on top of the circuit board.



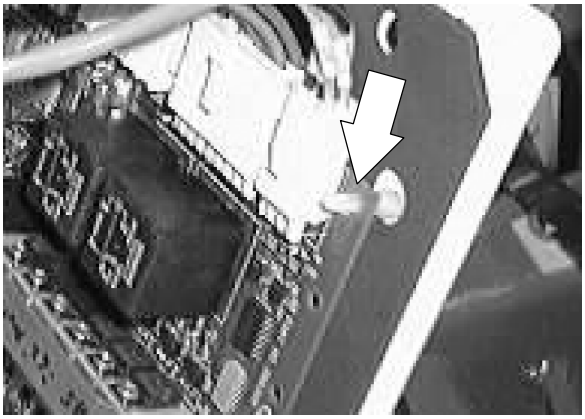
6. Unplug the ribbon cable from the circuit board.

7. Snap the circuit board off the plastic stand-offs holding the board to the cover. Remove the board from the machine.

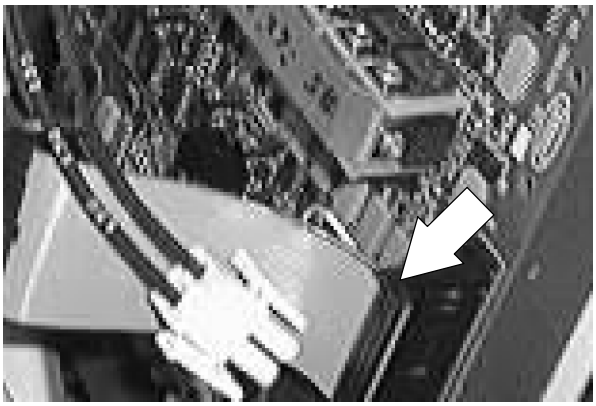
NOTE: Note orientation of the board.

8. Position the new circuit board onto the panel cover in the same orientation as the old one was removed.

9. Snap the new circuit board down onto the plastic stand-offs.

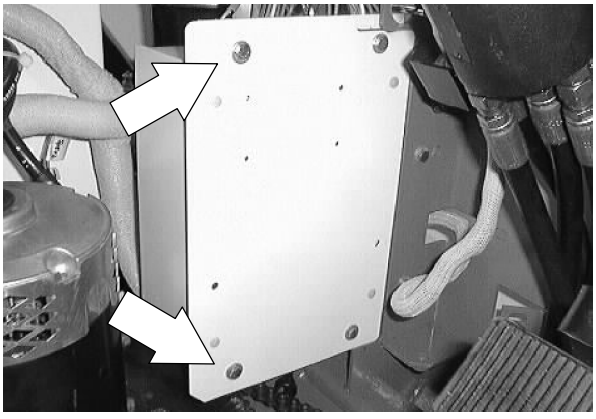


10. Reconnect the ribbon cable.

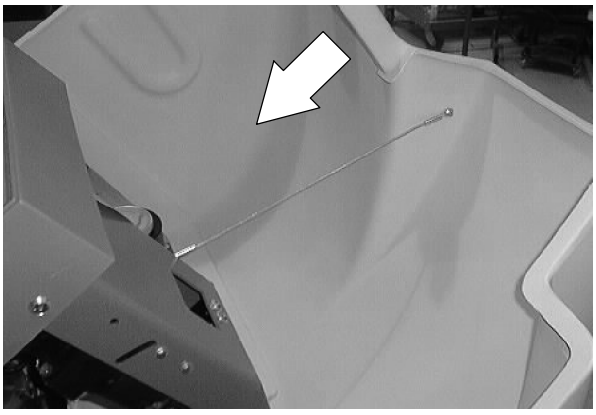


11. Reconnect the wire connectors on top of the circuit board.

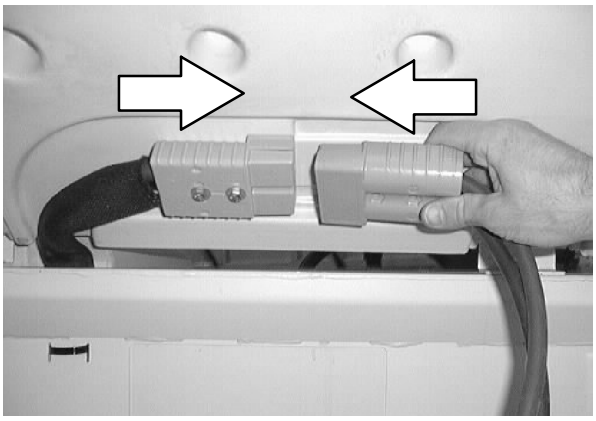
12. Position the panel cover back on the control box. Reinstall the hardware and tighten to 11 – 14 Nm (7 – 10 ft lb).



13. Close the front cover.



14. Plug the battery connector into the machine. Close the rear cover.

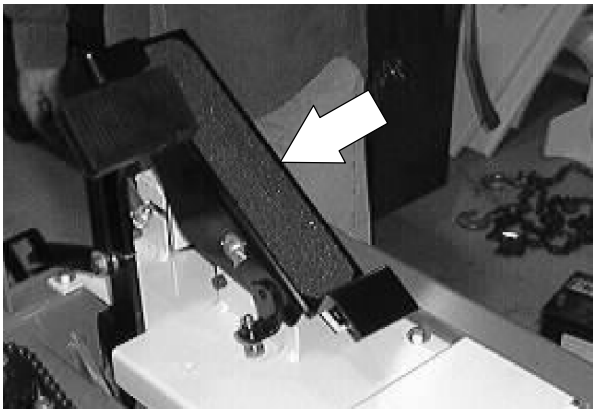


15. Operate the machine. Check the circuit board for proper operation.

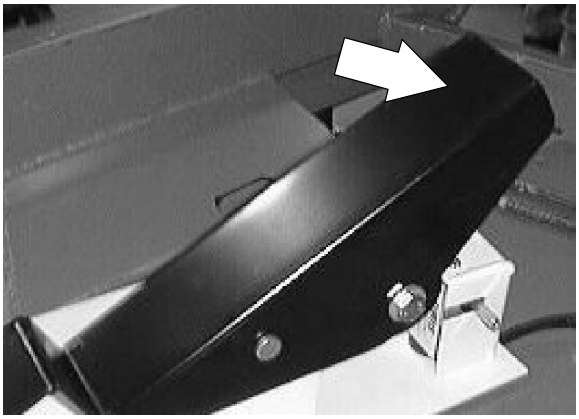
DIRECTIONAL PEDAL

The directional pedal controls direction of travel and the propelling speed of the machine. You change the speed of the machine with the pressure of your foot; the harder you press the faster the machine travels.

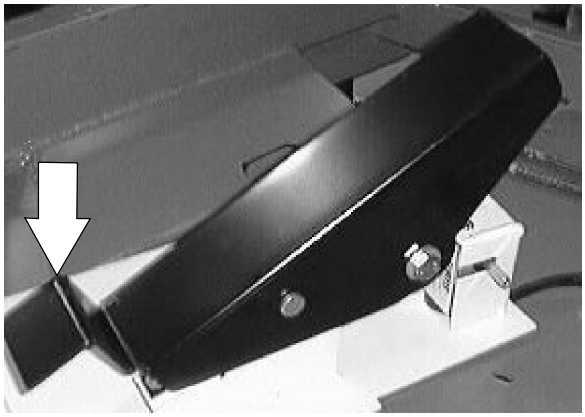
The machine will coast for a short distance before changing direction when it is moving, and the direction is reversed with the directional pedal. Use the brake pedal to stop the machine.



Forward: Press the top of the directional pedal with the toe of your foot.



Reverse: Press the bottom of the directional pedal with the heel of your foot.

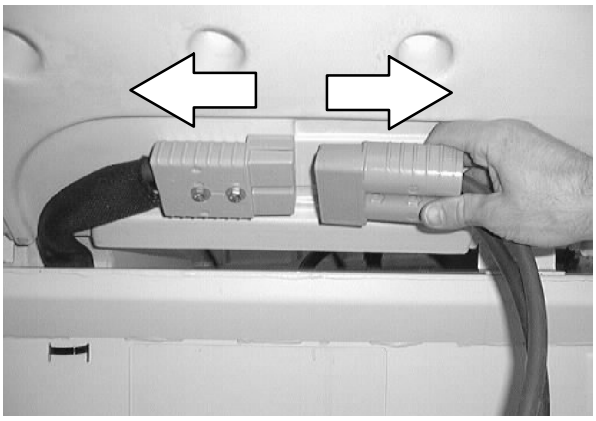


Neutral: Take your foot off the directional pedal and it will return to the neutral position.

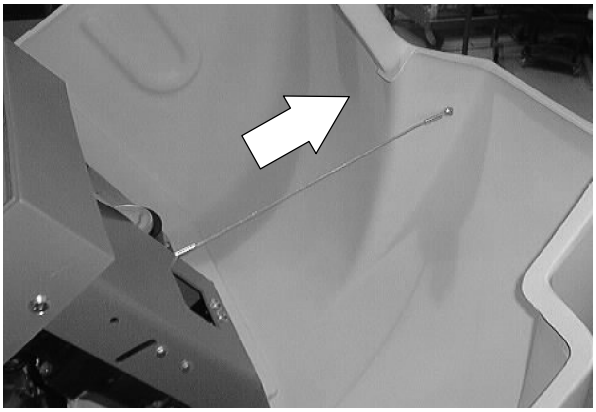
TO REPLACE CURTIS DIRECTIONAL CONTROL UNIT

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

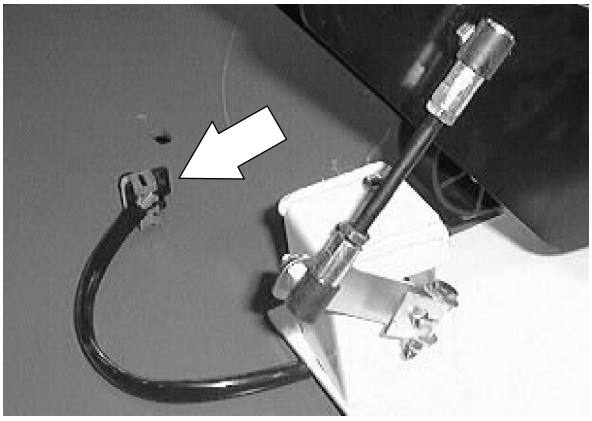
1. Raise the rear cover and unplug the battery connector.



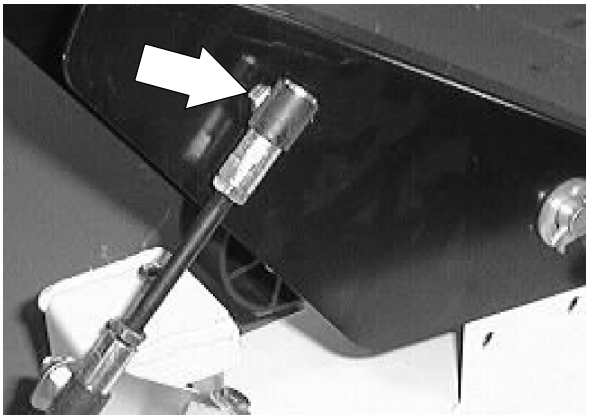
2. Open the front cover.



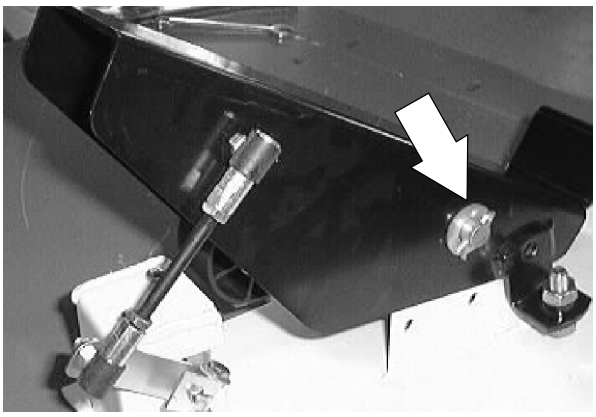
3. Unplug the directional control unit from the main harness.



4. Remove the M6 nyloc nut holding the upper balljoint to the pedal of the directional control unit.



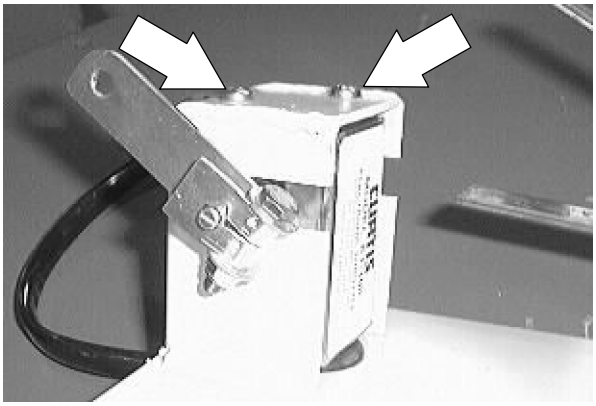
5. Remove the cotter pin from the large clevis pin holding the pedal to the directional control unit. Remove the pedal from the machine.



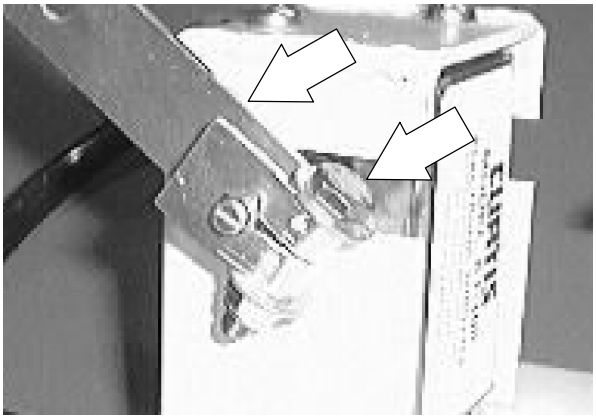
6. Remove the two pan screws holding the directional control unit to the mount bracket. Remove the unit from the mount bracket.

NOTE: Push the rubber grommet out of the hole in the floor plate to let wire connector pass through.

NOTE: Make sure to note the orientation of the accelerator lever on the shaft of the Curtis unit when it is in the neutral position.

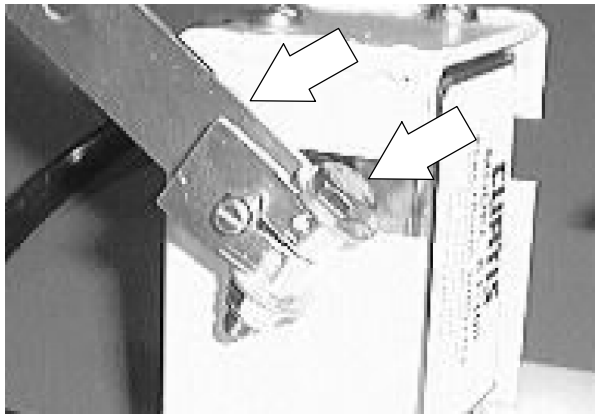


7. Loosen the hex screw and nut holding the lever and rod to the Curtis accelerator unit. Remove the lever and rod assembly from the unit.

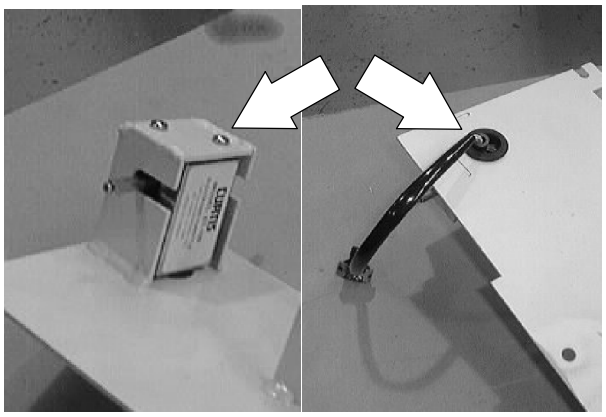


8. Place the arm assembly in the same orientation on the new Curtis accelerator unit. Hand tighten the hex screw tight.

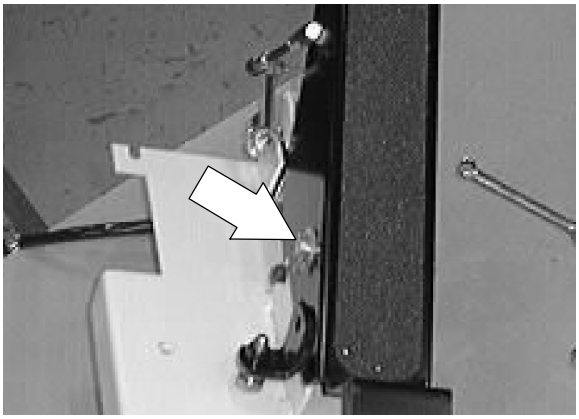
NOTE: Make sure to position the accelerator lever on the shaft of the Curtis unit in the same orientation as it was removed.



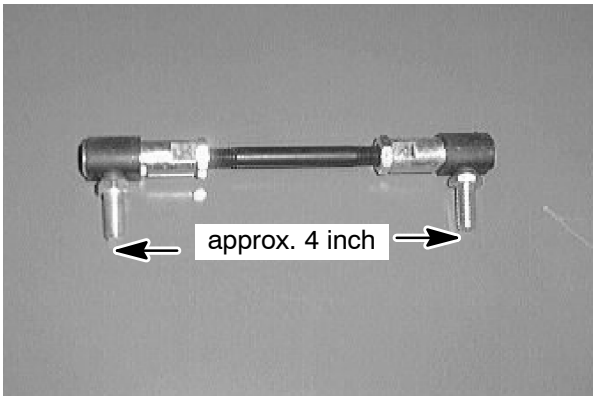
9. Position the new Curtis accelerator unit on the mount bracket. Reinstall the two pan screws and tighten to 7.6 – 9.9 Nm (5 – 6 ft lb). *Make sure the wire harness is placed through the grommet and the grommet is installed in the hole of the floor plate.*



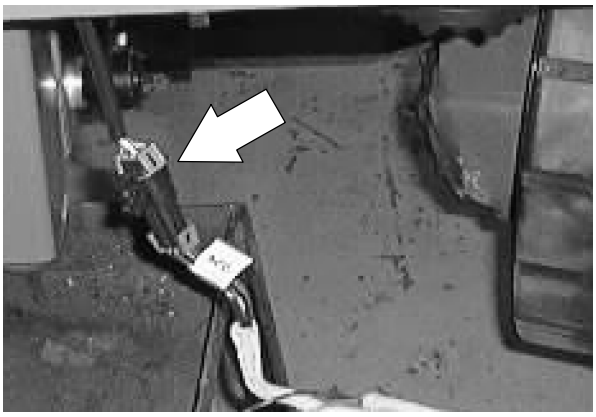
10. Position the pedal, clevis pin, and cotter pin onto the pedal mount brackets.



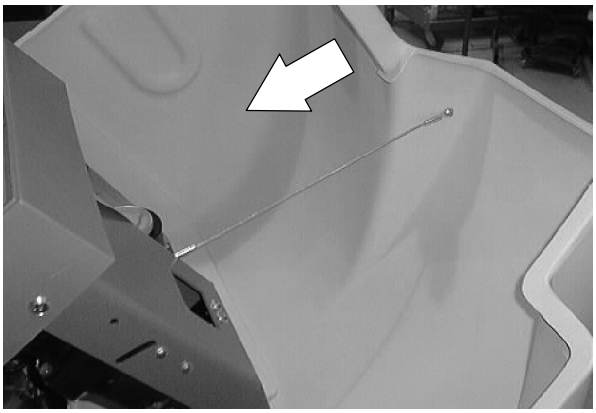
11. The pedal and accelerator arm should now be in their neutral position. Adjust the threaded rod and balljoint so it lines up with the hole in the pedal assembly. Reinstall the M6 nyloc nut and tighten to 7.6 – 9.9 Nm (5 – 6 ft lb).



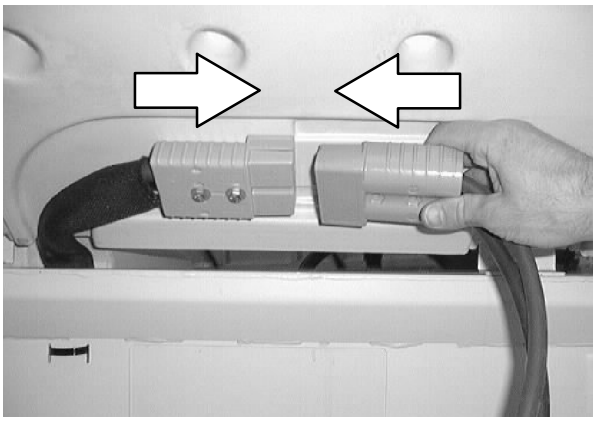
12. Plug the new unit into the main harness connector.



13. Close the front cover.



14. Plug the battery connector into the machine. Close the rear cover.

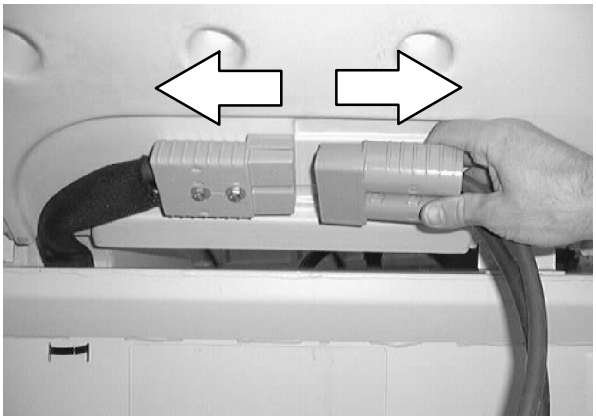


15. Start the machine. Move the accelerator into the forward and reverse positions checking for proper operation.

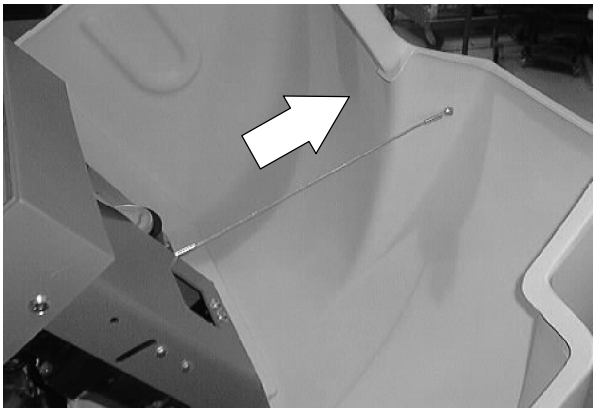
TO REPLACE TRACTION MOTOR CONTROLLER

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

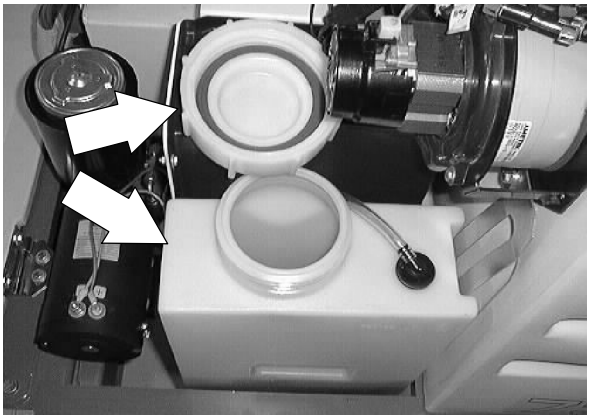
1. Raise the rear cover and unplug the battery connector.



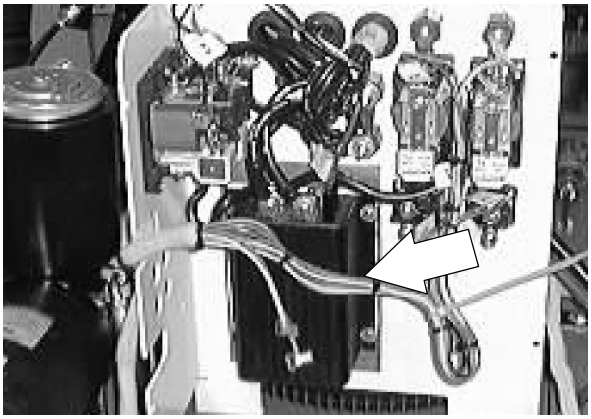
2. Open the front cover.



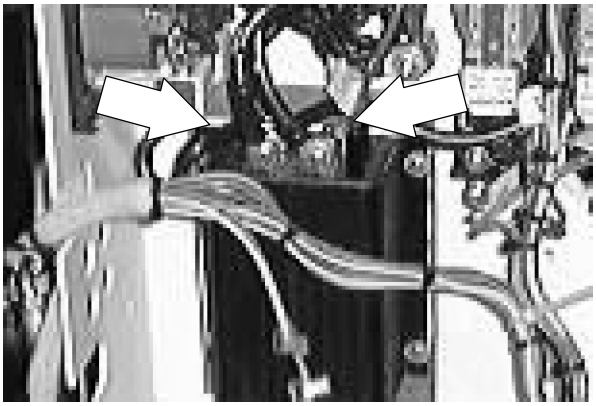
3. Remove the detergent tank and main control panel cover from the machine.



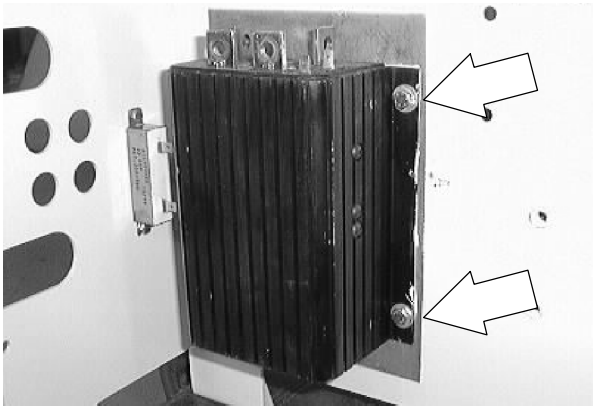
4. Locate the traction motor controller in the control box.



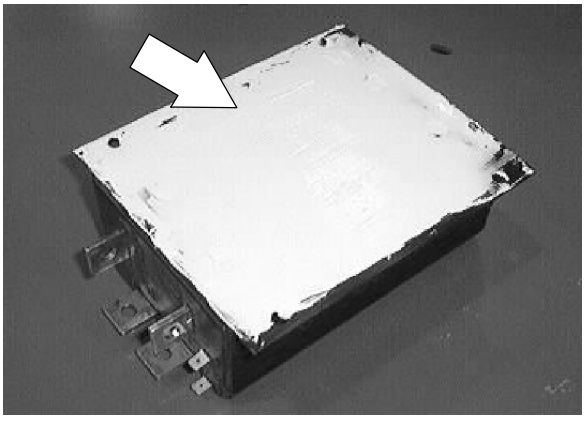
5. Mark and disconnect the electrical cables and smaller wires leading to the top of the controller.



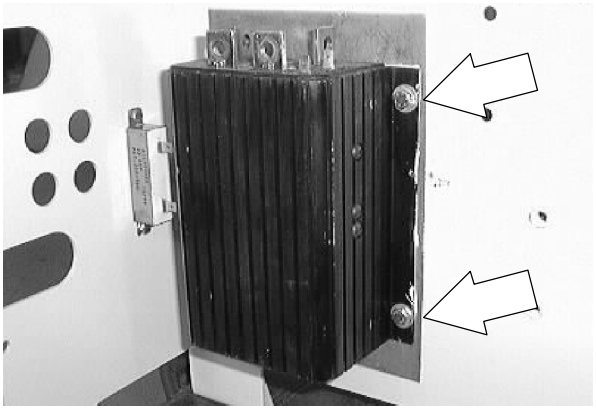
6. Remove the four hex screws holding the controller to the control panel. Remove the controller from the machine.



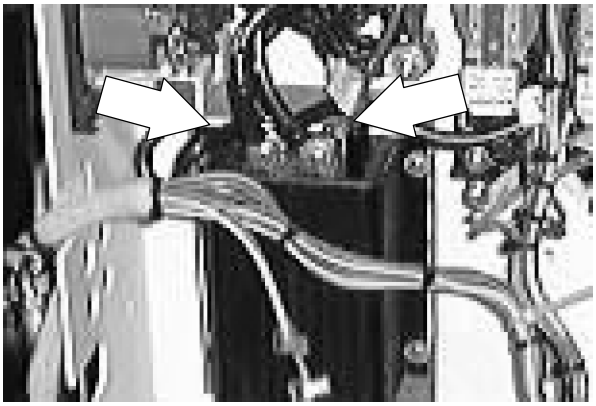
7. Cover the back side of the new controller with electrical thermal grease.



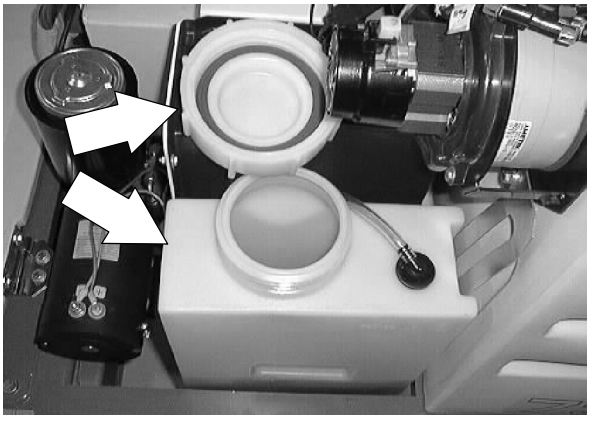
8. Install the new controller onto the control panel. Reinstall the four hex screws. Tighten to 7.6 – 9.9 Nm (5 – 6 ft lb).



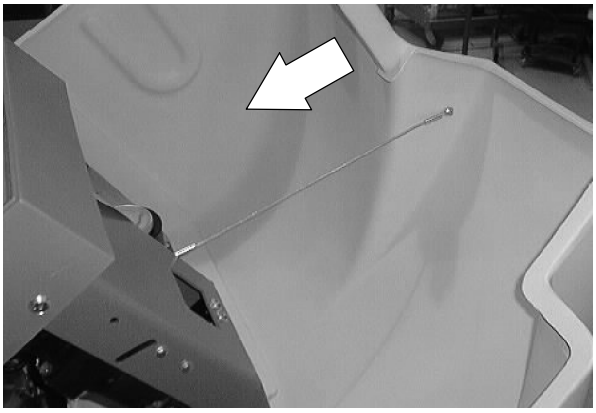
9. Reconnect the electrical cables and smaller wires leading to the top of the controller.



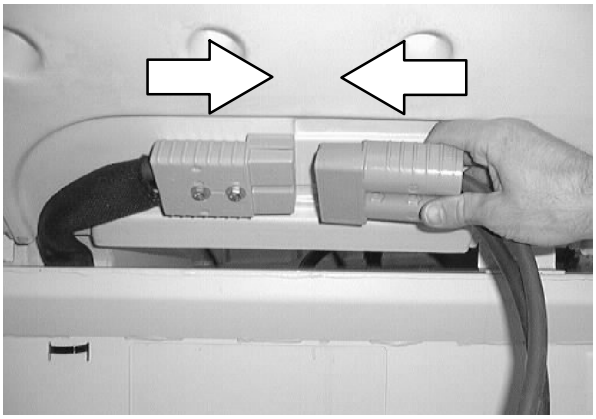
10. Reinstall the detergent tank and main control panel cover onto the machine.



11. Close the front cover.



12. Plug the battery connector into the machine. Close the rear cover.

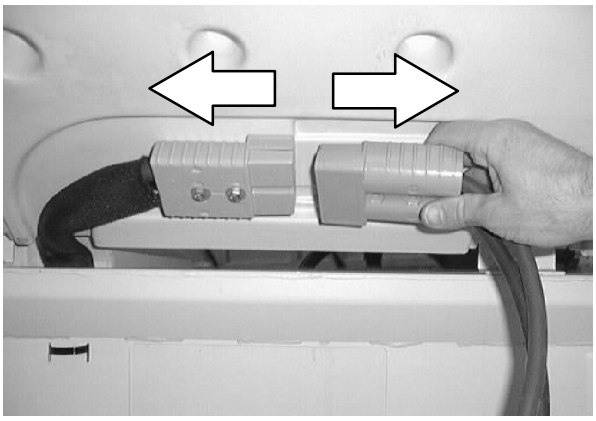


13. Start the machine. Check the new traction motor controller for proper operation.

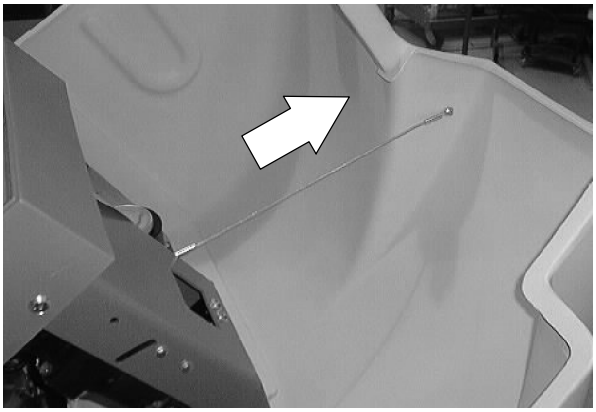
TO REPLACE 36V RELAY

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

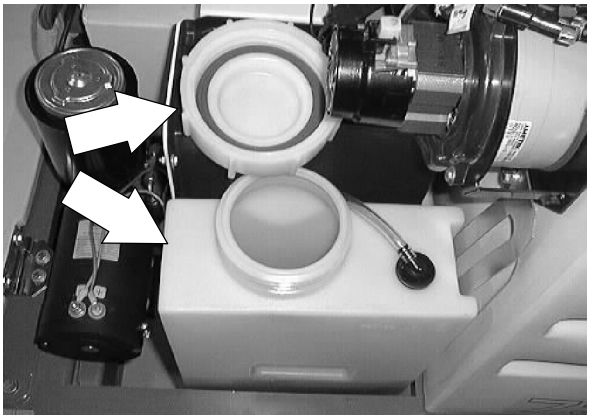
1. Raise the rear cover and unplug the battery connector.



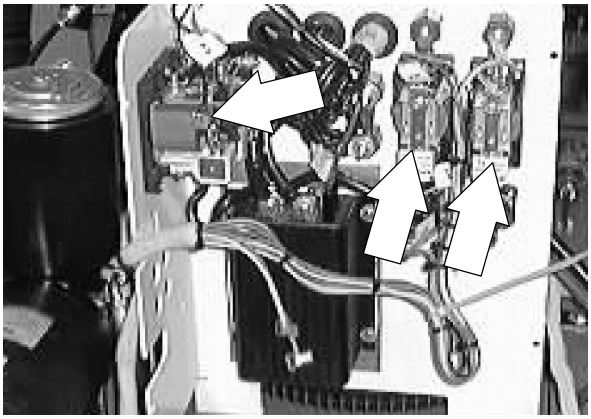
2. Open the front cover.



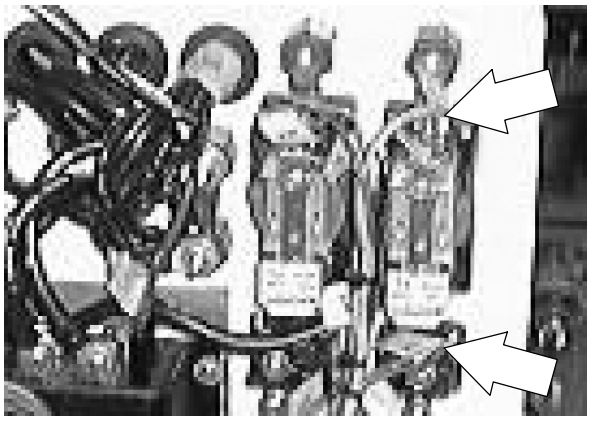
3. Remove the detergent tank and main control panel cover from the machine.



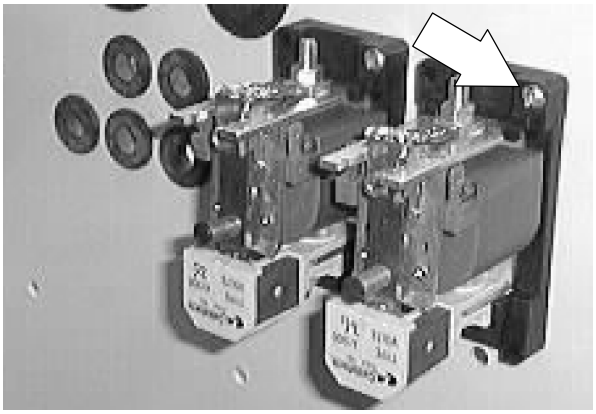
4. Locate the 36V relays in the control box.



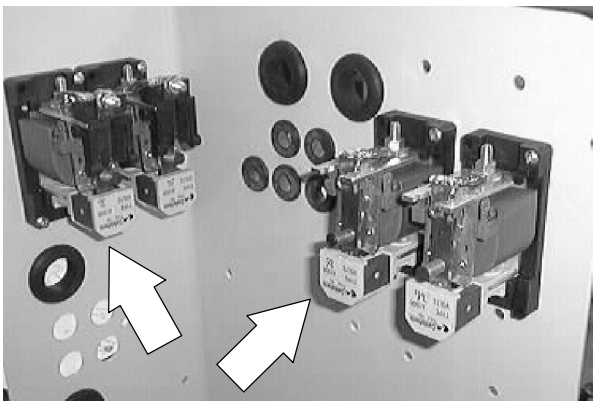
5. Mark and disconnect the electrical cables and smaller wires leading to the 36V relay.



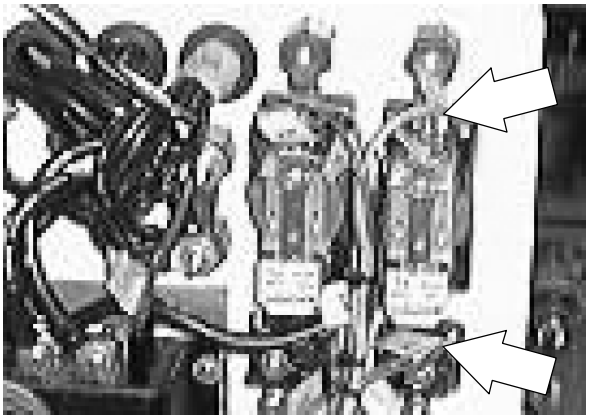
6. Remove the two hex screws holding the 36V relay to the control panel. Remove the relay from the machine.



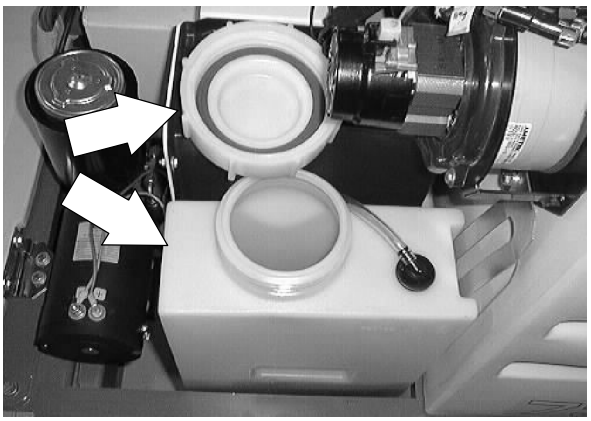
7. Install the new 36V relay onto the control panel. Reinstall the two hex screws. Hand tighten lightly--do not over tighten.



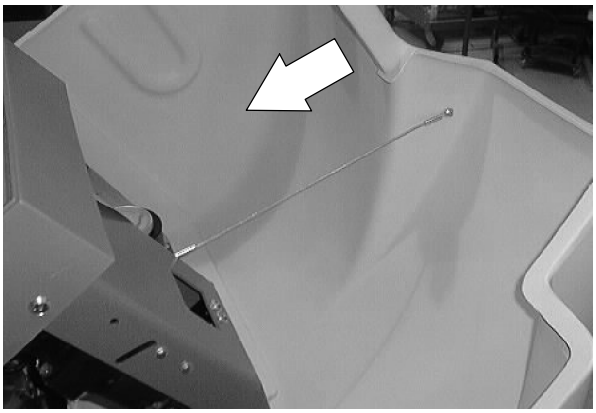
8. Reconnect the electrical cables and smaller wires leading to the top of the 36V relay.



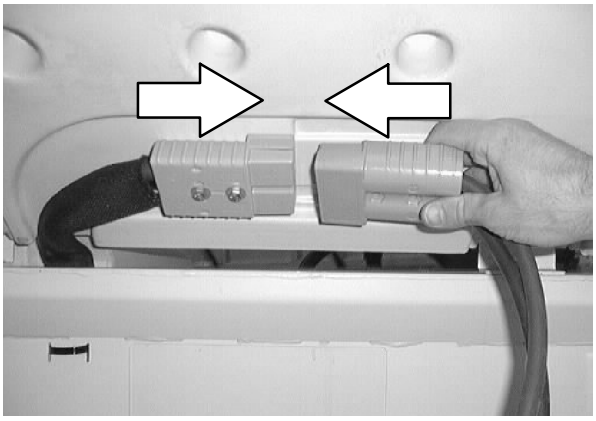
9. Reinstall the detergent tank and main control panel cover onto the machine.



10. Close the front cover.



11. Plug the battery connector into the machine. Close the rear cover.

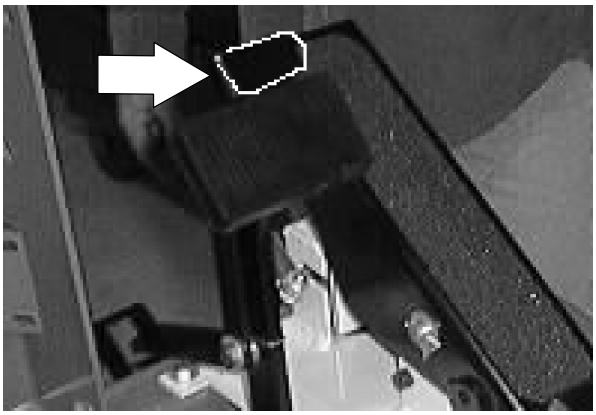


12. Start the machine. Check the new traction motor controller for proper operation.

TO REPLACE TRACTION MOTOR

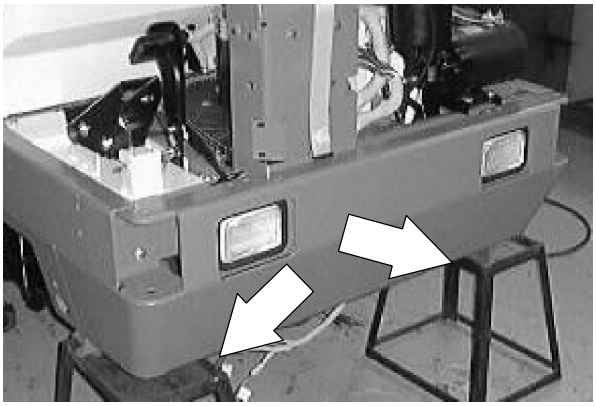
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

1. Engage the parking brake, block the rear tires.

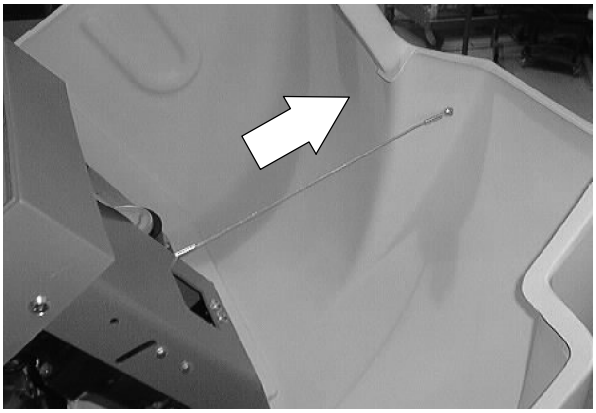


2. Jack up the front of the machine. Use jack stands to support the machine.

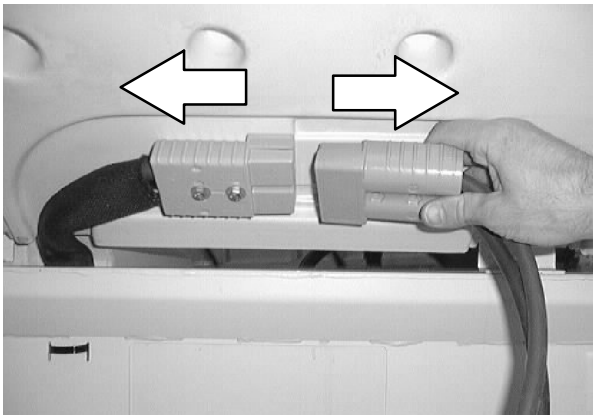
FOR SAFETY: Block machine tires before jacking machine up. Jack machine up at designated locations only. Block machine up with jack stands.



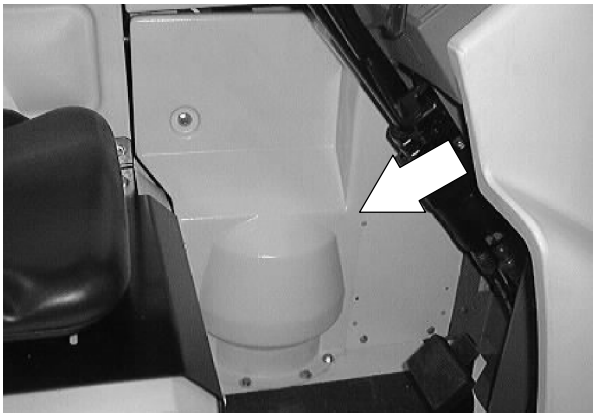
3. Open the front cover.



4. Open the battery cover and un-plug the battery connector from the machine.

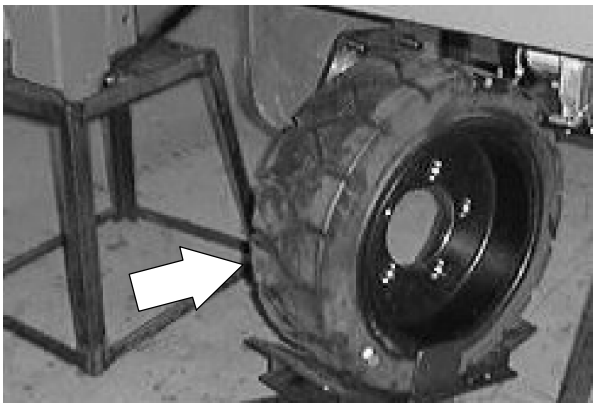


5. Remove the plastic traction motor cover.

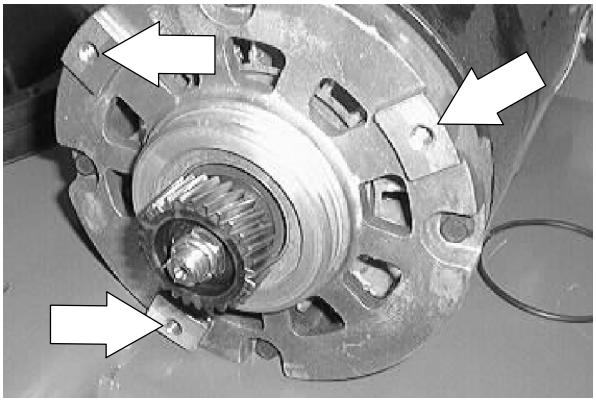


6. Mark and disconnect the four electrical cables leading to the traction motor.

7. Remove the front tire and wheel assembly from the traction motor hub.

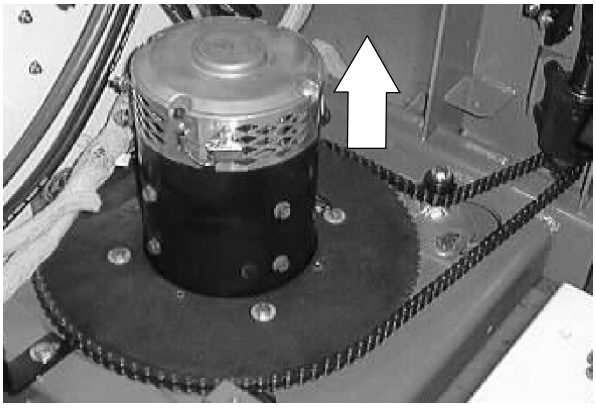


8. Remove the three M8 socket head cap screws holding the traction motor to the drive gear box.



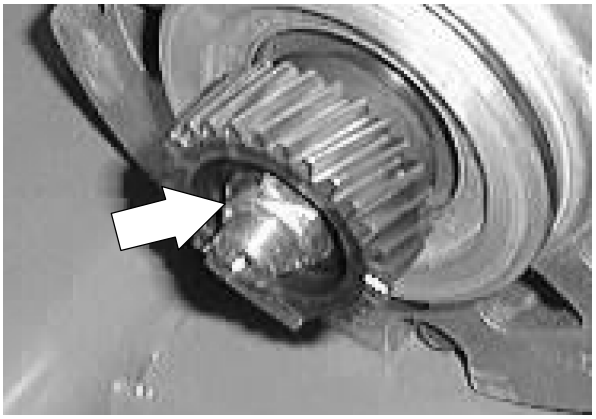
9. Pull the traction motor straight up and out of the drive gear box. Remove it from the machine.

NOTE: Be careful not to loose the rubber o-ring that is on the bottom of the motor.



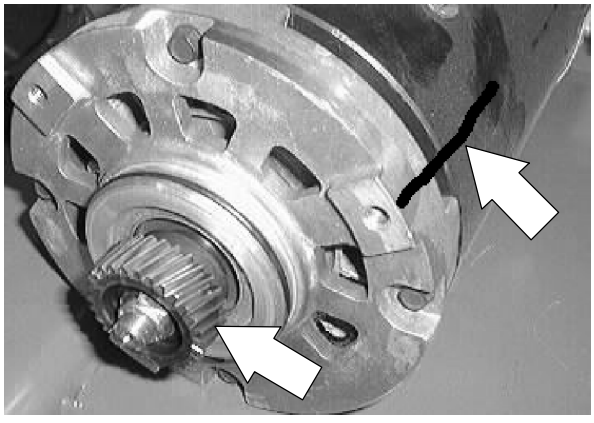
10. Remove the 0.50 in x 20 thin nyloc holding the drive gear to the motor shaft.

NOTE: A puller must be used to remove the gear from the shaft.



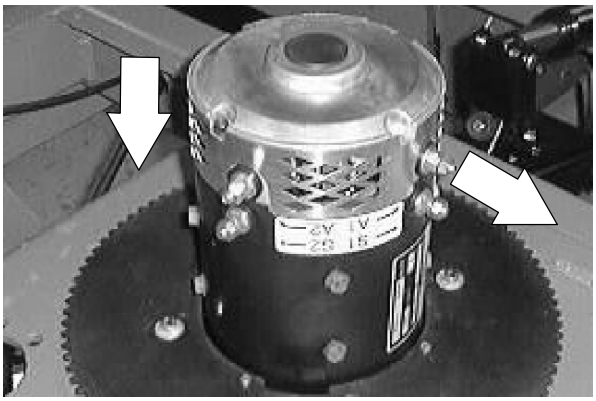
11. Place the gear and key on the new motor shaft. Tighten to 14 – 18 Nm (10 – 13 ft lb).

NOTE: Before the motor is reinstalled, mark the position of the threaded mounting holes in the bottom of the motor. Go far enough up the side of the motor so the mark can be seen when the motor is in its position in the drive gear box.

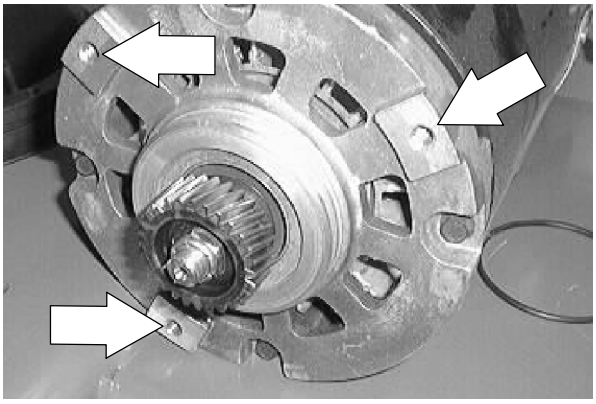


12. Position the traction motor back on the gear box housing. Make sure the electric cable studs are pointing towards the LH side of the machine.

NOTE: Make sure the O-ring in installed on the bottom of the motor.



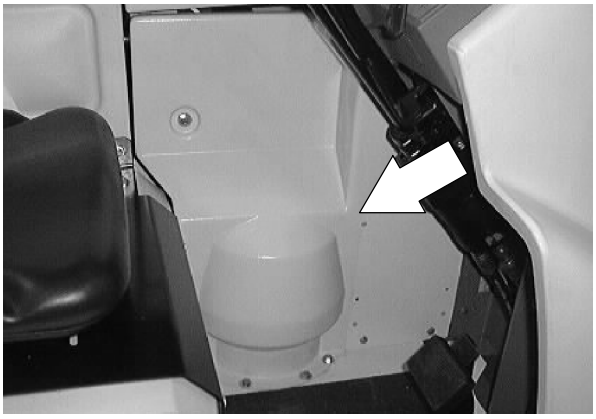
13. Reinstall the three M8 socket head cap screws holding the traction motor to the drive gear box. Tighten to 26 - 34 Nm (20 - 26 ft lb).



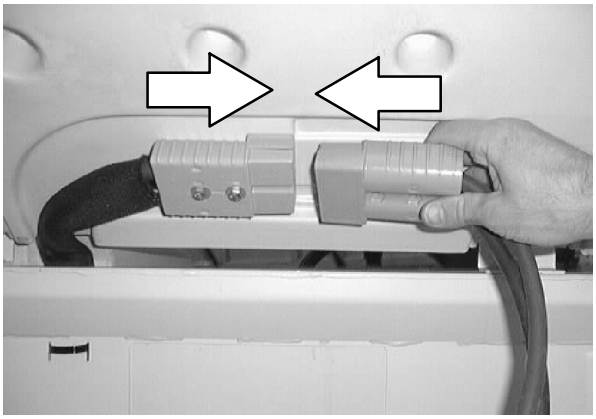
14. Install front tire. Tighten nuts to 122-150 Nm (90-110 ft lb).

15. Reconnect the four electrical cables going to the traction motor. See the schematic in this section.

16. Reinstall the plastic traction motor cover.



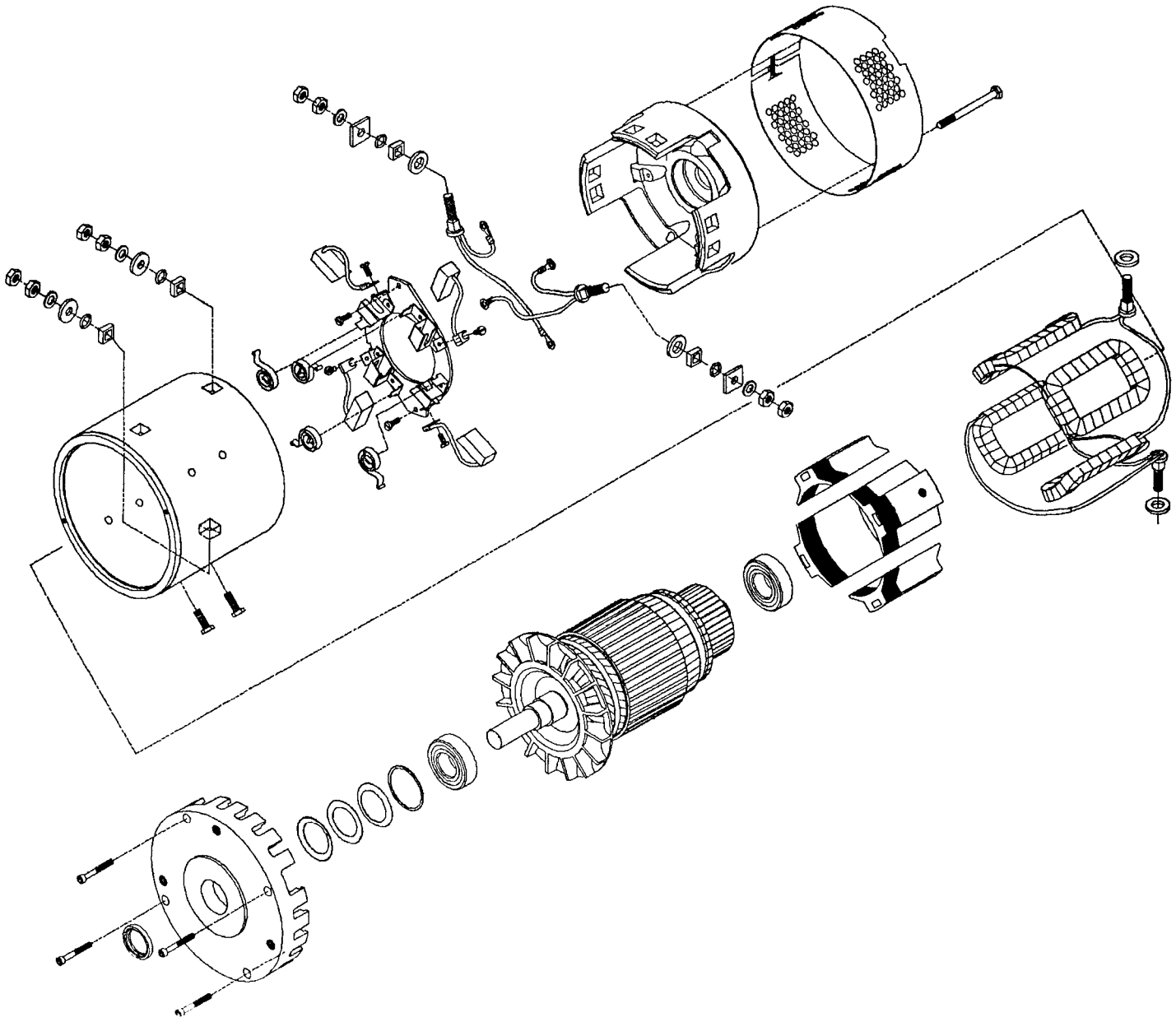
17. Plug in the battery connector. Close the battery cover.



18. Close the front cover.

19. Lower the machine to the ground and check the new traction motor for proper operation.

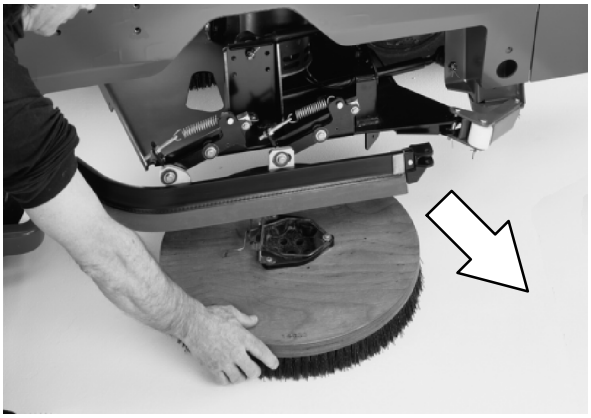
PROPEL MOTOR BREAKDOWN



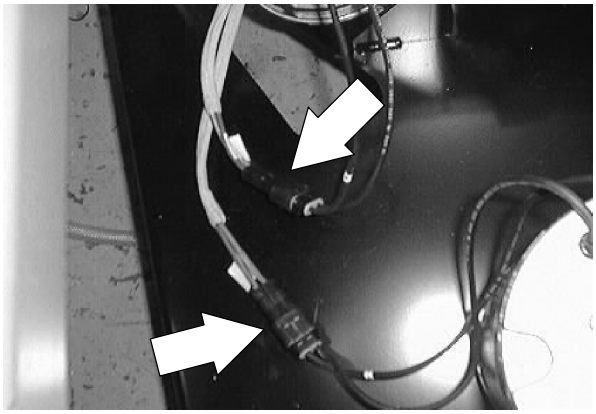
TO REPLACE DISC SCRUB HEAD BRUSH MOTOR

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

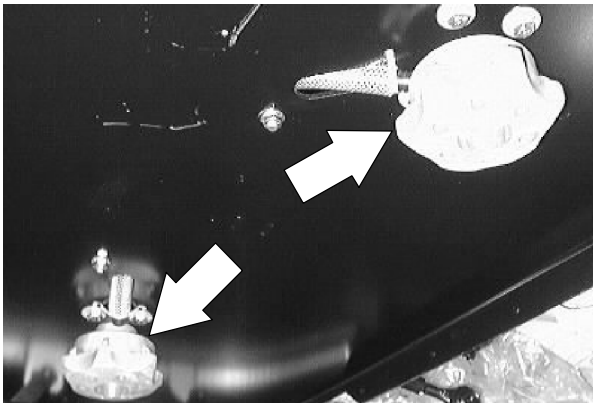
1. Remove both scrub brushes. See TO REPLACE DISC SCRUB BRUSH instructions in SCRUBBING section.



2. Disconnect the motor from the main harness.

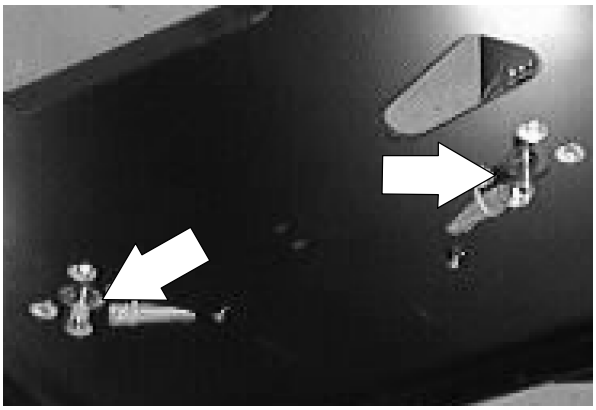


3. Go under the scrub head and remove the hex screw holding the scrub brush drive plug to the brush motor.

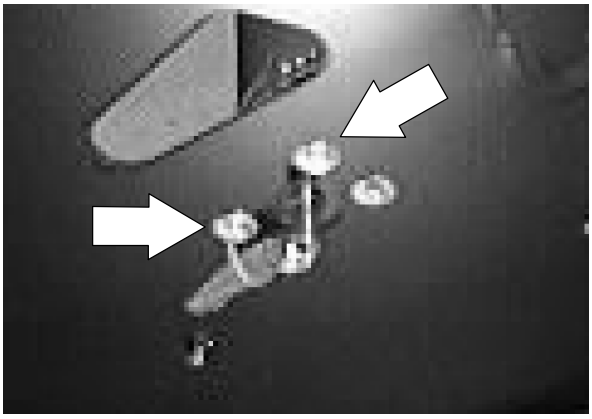


4. Pull the drive plug off the motor shaft.

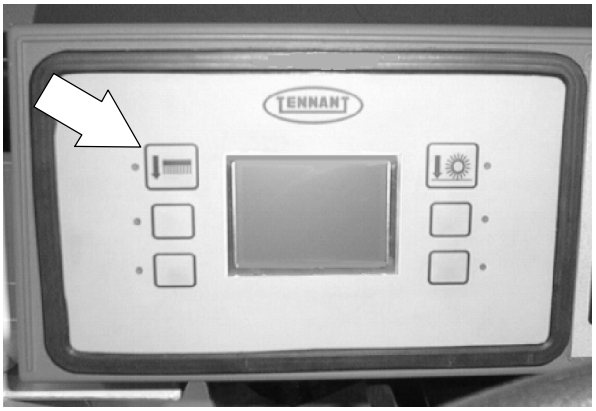
NOTE: Make sure to retain the two washers.



5. Remove the four hex screws holding the motor to the scrub head.

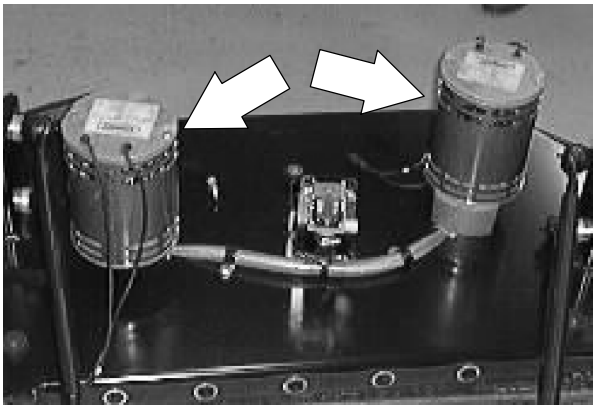


6. Start the machine and lower the scrub head. Shut off the machine.



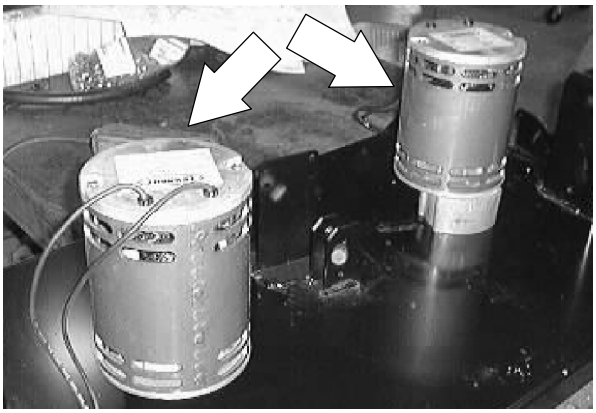
7. Remove the motor from the machine.

NOTE: Note the orientation of the motor on the top of the scrub head.

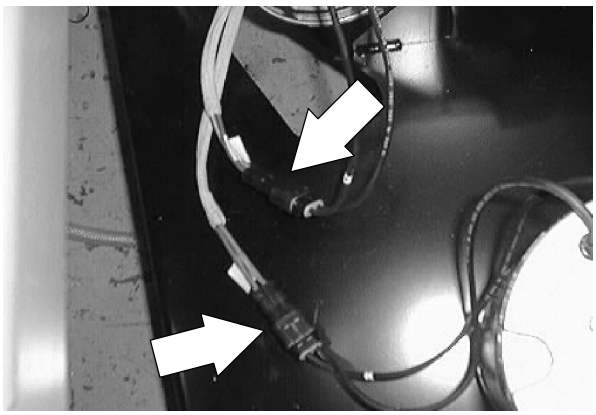


8. Position the new motor onto the top of the scrub head frame.

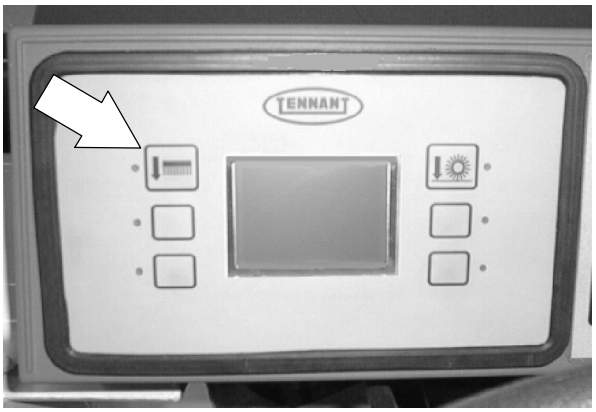
NOTE: Note the orientation of the motor on the top of the scrub head.



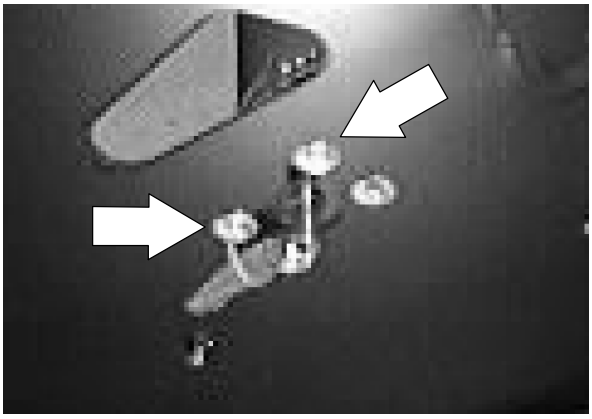
9. Reconnect the new motor to the main harness.



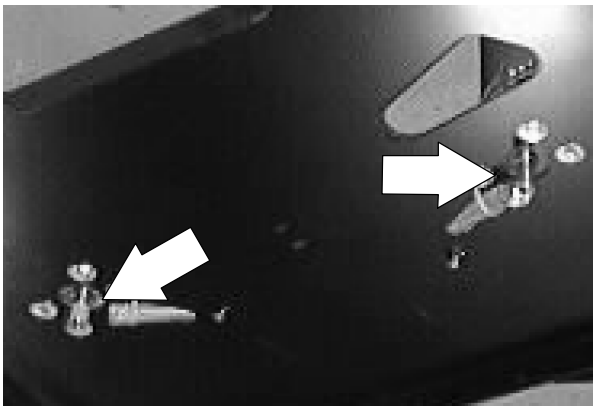
10. Start the machine and raise the scrub head. Shut off the machine.



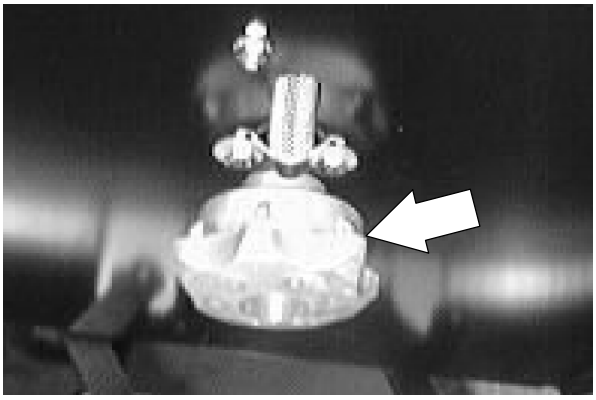
11. Reinstall the four hex screws holding the motor to the scrub head. Tighten to 18 – 24 Nm (15 – 20 ft lb).



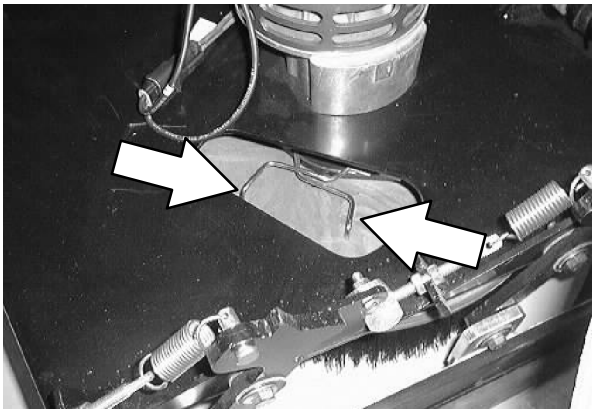
12. Place a small amount of white lithium grease on the shaft of the new brush motor.



13. Reinstall the brush drive hub onto the motor shaft. Reinstall the two washers and one hex screw. Tighten to 18 – 24 Nm (15 – 20 ft lb).



14. Reinstall the scrub brushes. See TO REPLACE DISC SCRUB BRUSH instructions in SCRUBBING section.

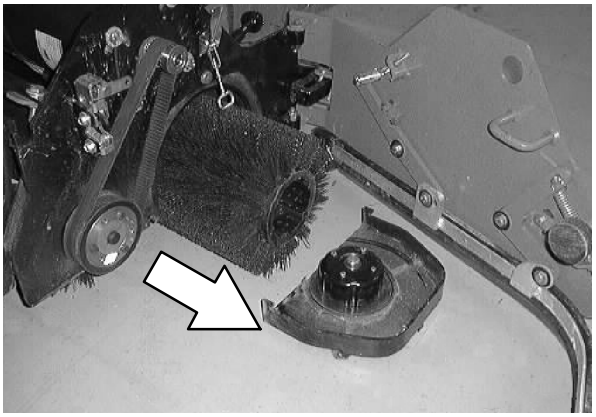


15. Operate the machine. Check the new scrub brush motor for proper operation.

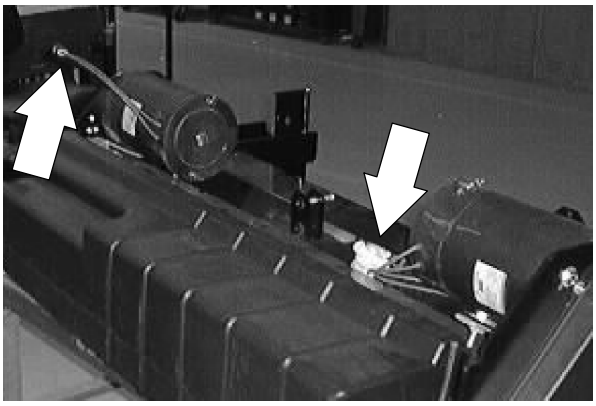
TO REPLACE CYLINDRICAL SCRUB HEAD BRUSH MOTOR

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

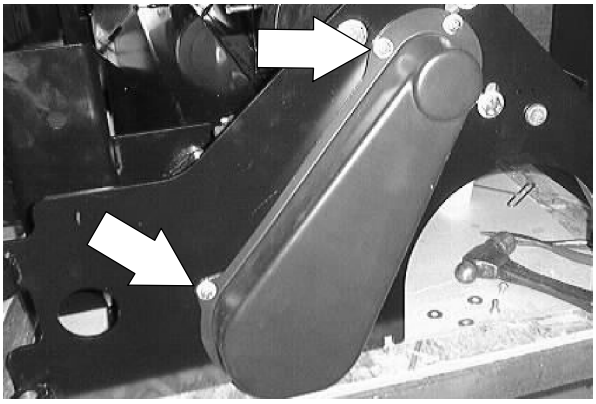
1. Remove both scrub brushes. See TO REPLACE CYLINDRICAL SCRUB BRUSH instructions in SCRUBBING section. Lower the scrub head to the floor and shut off the machine.



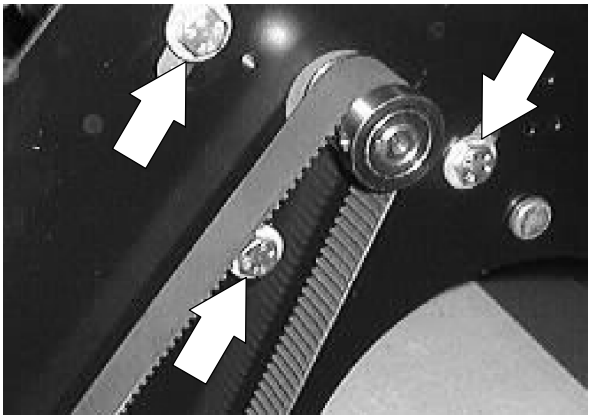
2. Disconnect the motor from the main harness.



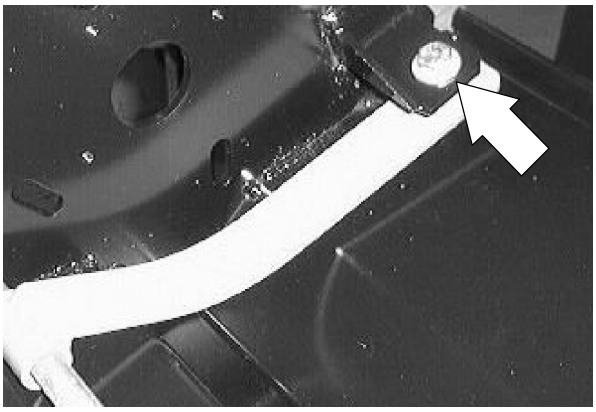
3. Remove the screws holding the plastic belt cover to the side of the scrub head. Remove the cover.



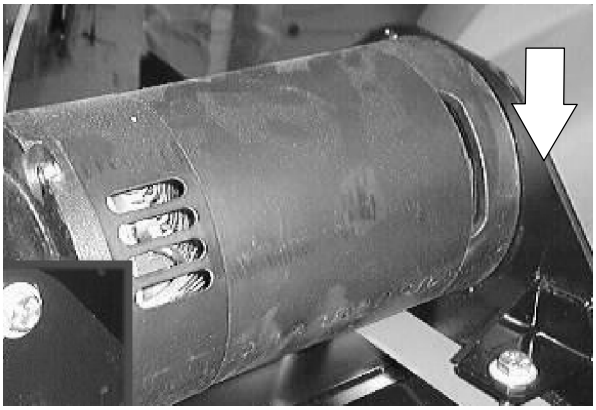
4. Loosen the four hex screws holding the scrub brush motor to the scrub head.



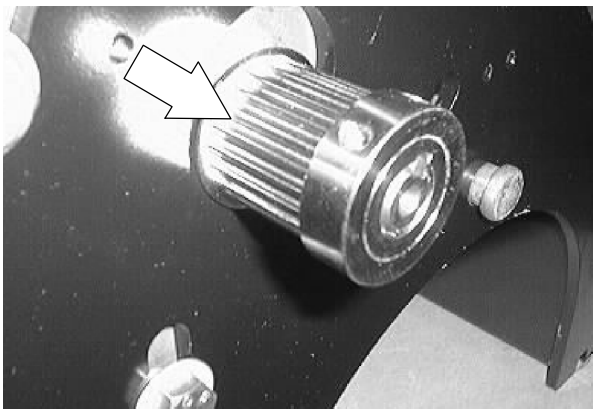
5. Loosen the hex screws holding the brush motor support strap to the mount bracket.



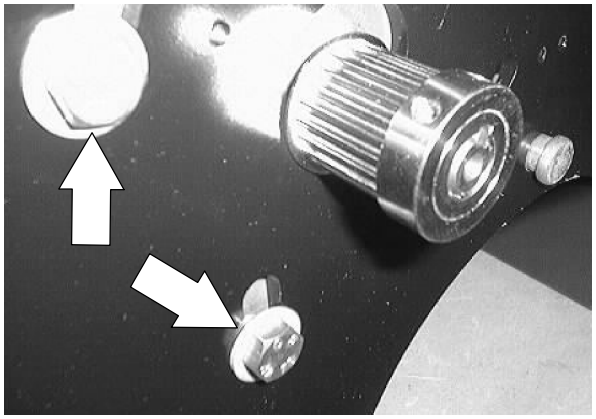
6. Let the scrub brush motor drop down in the slots.



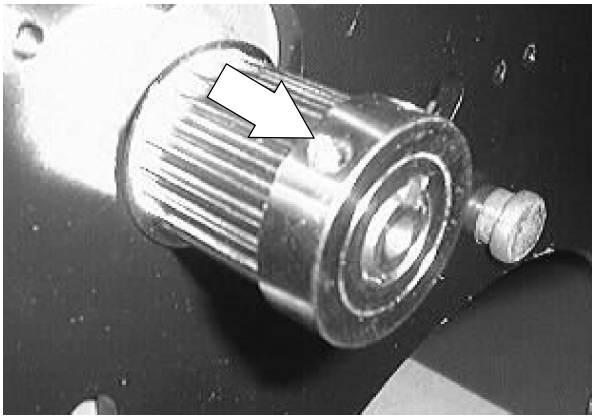
7. Remove the cogged drive belt from the grooved pulley on the brush motor.



8. Finish removing the four hex screws holding the scrub brush motor to the scrub head. Remove the motor from the machine.



9. Loosen the allen screws holding the grooved pulley to the shaft of the scrub motor. Pull the pulley off the motor shaft. *Note the location of the pulley on the shaft.*

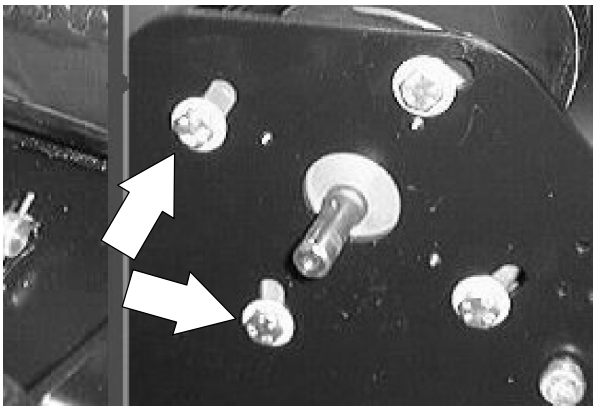


10. Install the grooved pulley onto the new scrub brush motor.

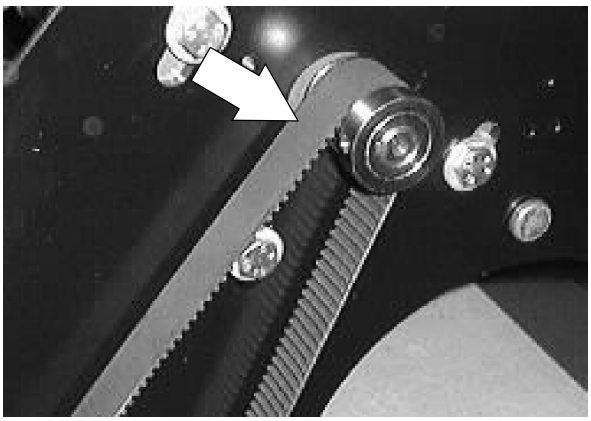
NOTE: Position the pulley on the shaft in the same location as it was removed from the old motor.

Hand tighten the allen screws tight.

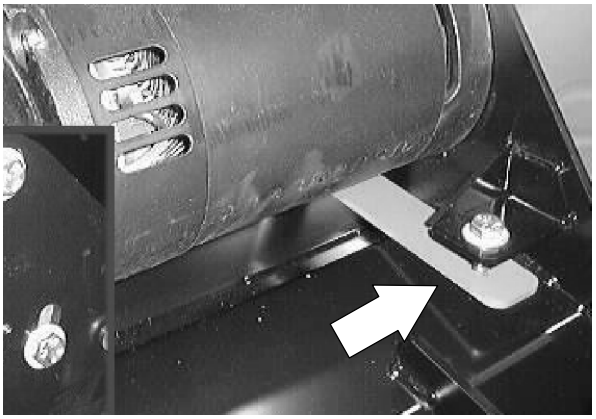
11. Position the new motor onto the scrub head. Reinstall the four hex screws. Leave loose for now.



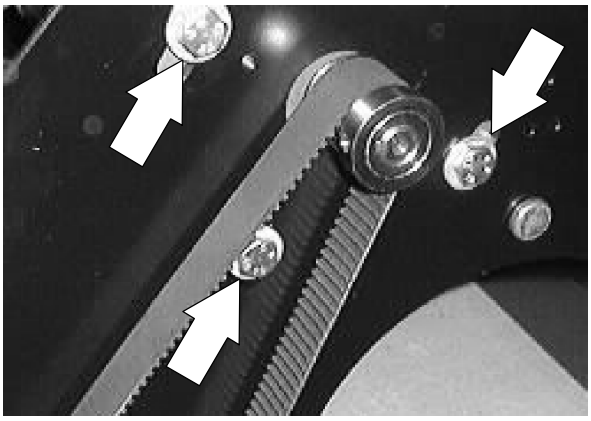
12. Position the cogged brush drive belt over the motor pulley.



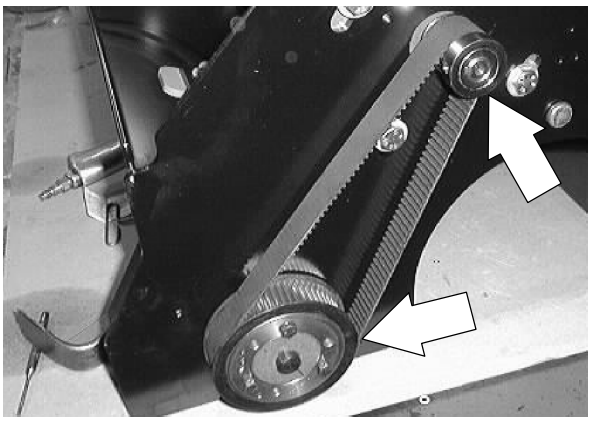
13. Use the brush motor support strap to move the brush motor up to tighten the cogged belt. Tighten the strap hex screw to 18 – 24 Nm (15 – 20 ft lb).
Check the belt tension. Use 4.2 to 4.6 lbs of force in the center span of the belt. Belt deflection should not exceed .10 inch (7/64 inch).



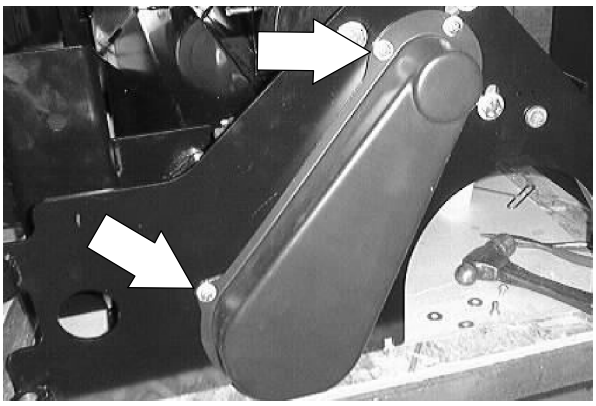
14. Go back and tighten the four brush motor screws to 37 – 48 Nm (26 – 34 ft lb).



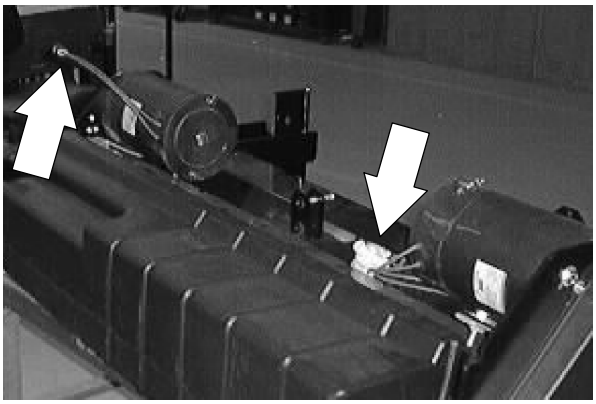
15. Check the alignment of the upper motor pulley with the lower drive pulley. Move the upper pulley in or out if needed.



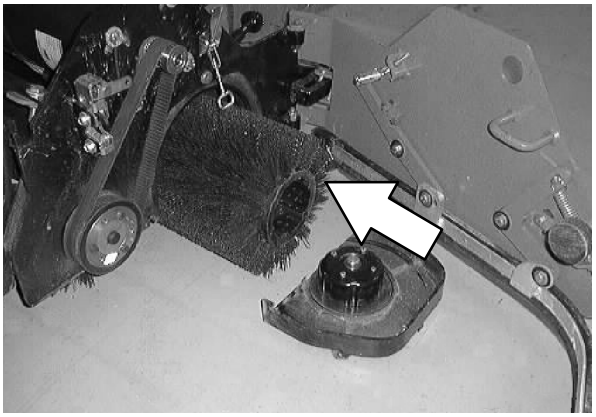
16. Reinstall the plastic belt cover. Reinstall the five pan screws holding the plastic cover to the scrub head. Hand tighten the screws tight.



17. Connect the new motor to the main electrical harness.



18. Reinstall the scrub brushes. See TO REPLACE CYLINDRICAL SCRUB BRUSH instructions in SCRUBBING section.



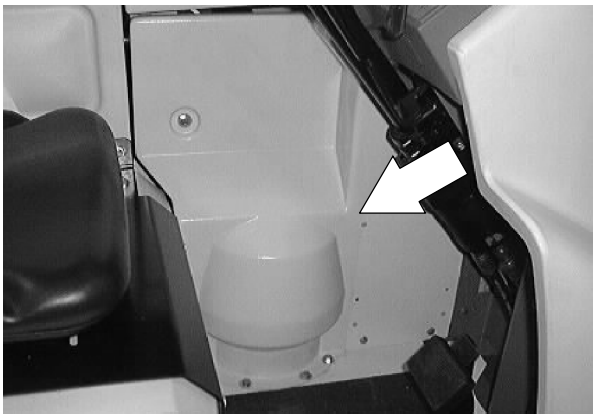
19. Operate the machine. Check the scrub brush motor for proper operation.

TO REPLACE SCRUB HEAD LIFT ACTUATOR

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

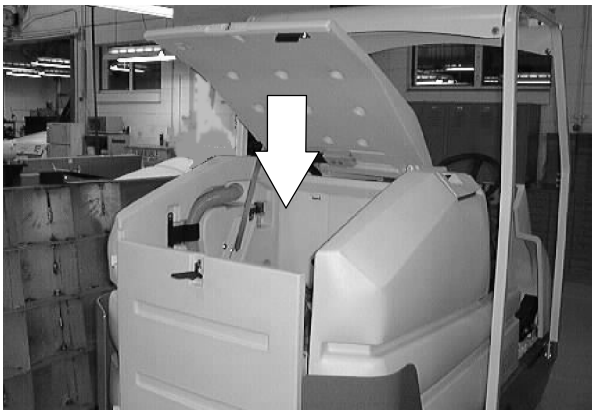
NOTE: See instructions on page 4-54 if scrub head lift actuator has failed completely.

1. Remove the traction motor plastic cover.

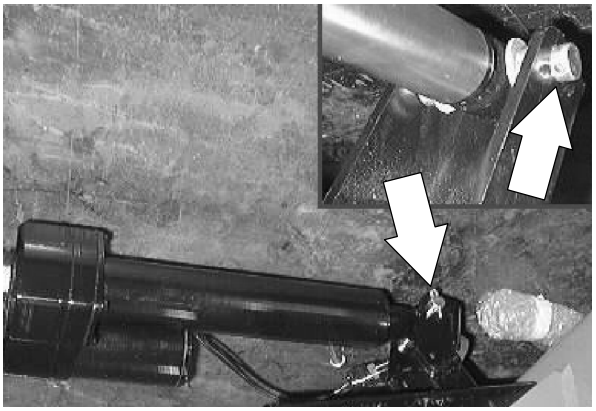


NOTE: Lower the scrub head until it just touches the floor--shut off the key before the actuator produces any DOWN PRESSURE.

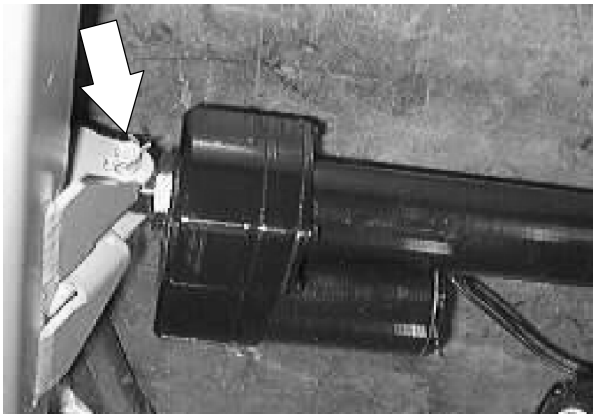
2. Disconnect and remove the battery from the rear of the machine. This will allow access to the rear mount clevis on the scrub head lift actuator.



3. Go to the operators compartment and remove the cotter pin and clevis pin from the actuator where it attaches to the scrub head lift pivot bracket.

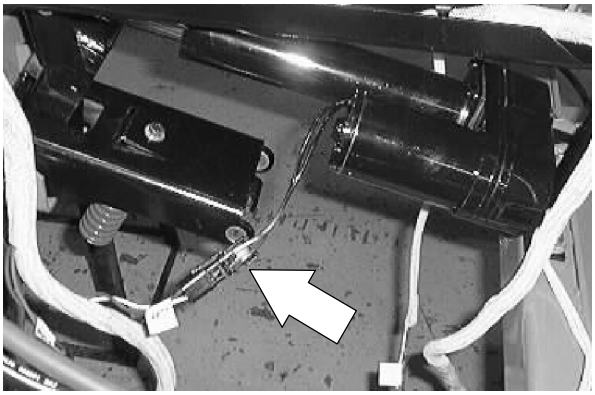


4. Go to the battery compartment and remove the cotter pin and clevis pin from the actuator where it attaches to the machine frame.



5. Go in to the center of the scrub head. Disconnect the scrub head lift actuator from the main harness.

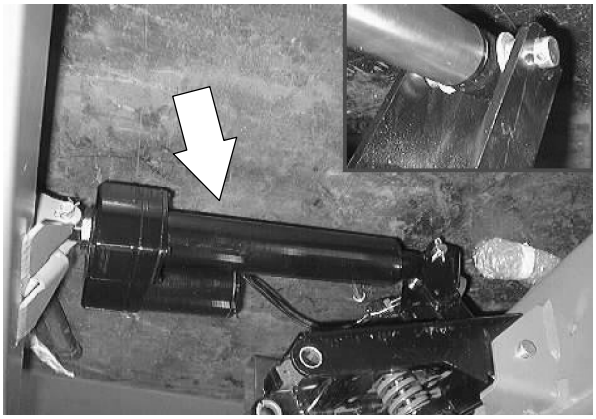
6. Remove the existing actuator out the side of the machine.



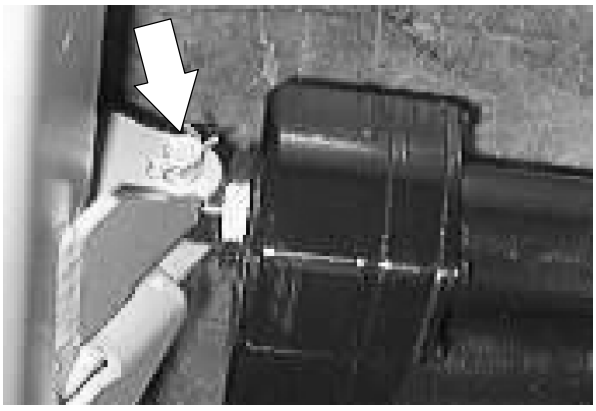
NOTE: Use the "Manual Mode" to extend/retract the new actuator for installation.

7. Position the new lift actuator in the machine.

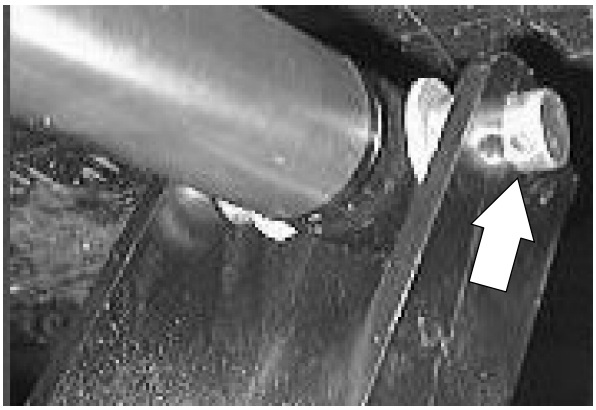
NOTE: The actuator motor should be pointing to the left side of the machine.



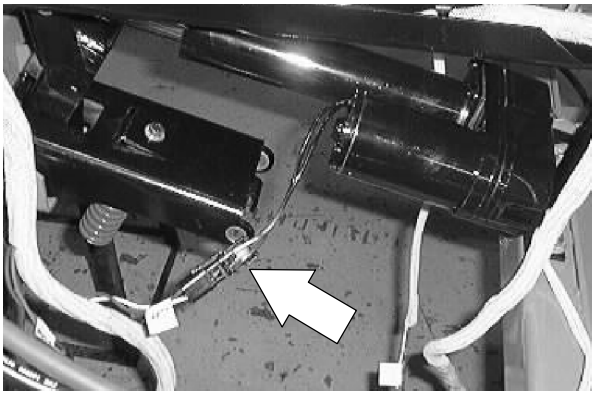
8. Reinstall the clevis pin and cotter pin into the actuator where it attaches to the machine frame *(battery compartment)*.



9. Reinstall the clevis pin and cotter pin into the end of the actuator where it attaches to the scrub head lift pivot bracket *(operators compartment).*



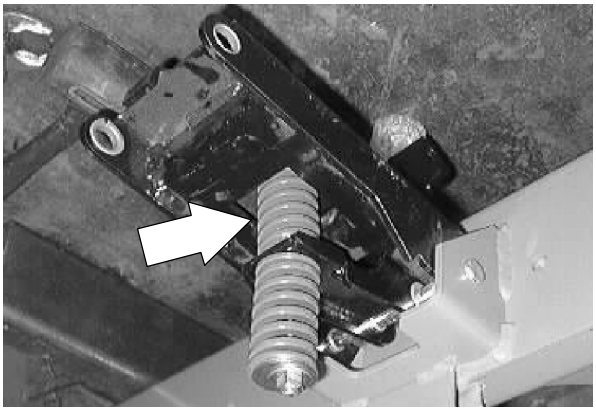
10. Reconnect the scrub head lift actuator to the main harness.



11. Operate the machine. Check the scrub head lift actuator for proper operation.

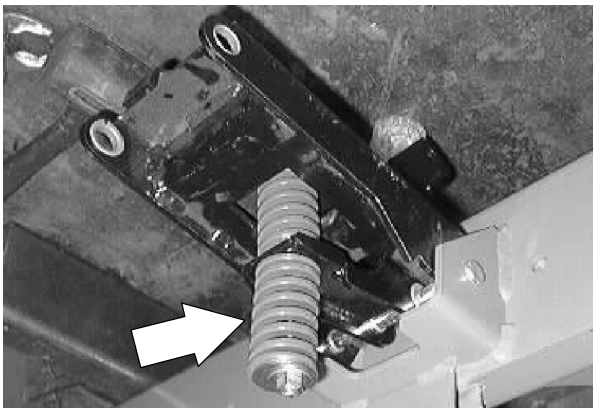
TO REPLACE "FAILED" SCRUB HEAD LIFT ACTUATOR

IF ACTUATOR FAILED WITH SCRUB HEAD IN THE RAISED POSITION: *(Top die spring compressed and actuator is extended)*



1. Disconnect and remove the battery from the rear of the machine. This will allow access to the rear mount clevis on the scrub head lift actuator. Use a pry bar between the rear of the actuator and frame to release pressure on clevis pin. Remove the rear clevis pin. *(See TO REPLACE SCRUB HEAD LIFT ACTUATOR instructions and photos).*
2. Use a floor jack to lift the scrub head until both die springs on the lift assembly have minimal compression.
3. Remove the top roller between the lift tabs on the scrub head. *NOTE: The roller is under high forces. (See TO REPLACE SCRUB HEAD LIFT ACTUATOR instructions and photos).*

IF ACTUATOR FAILED WITH SCRUB HEAD IN THE LOWERED POSITION: *(Bottom die spring compressed and actuator is retracted).*

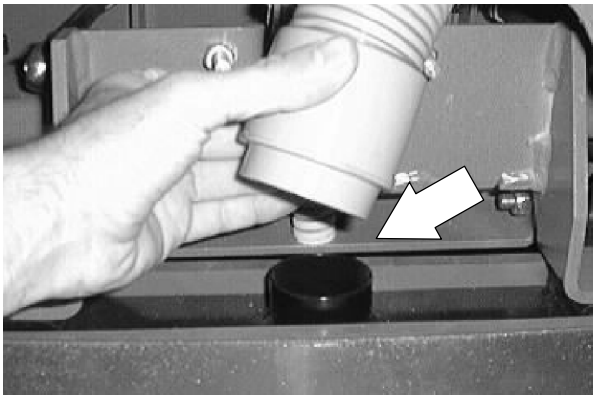


1. Jack up the front of the machine until the scrub and brushes are off the floor and the pressure on the bottom die spring has been eliminated.
2. Go to step 3 in the TO REPLACE SCRUB HEAD LIFT ACTUATOR instructions.

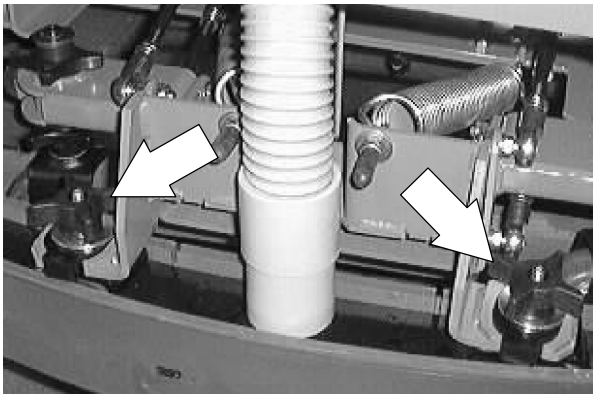
TO REPLACE REAR SQUEEGEE LIFT ACTUATOR

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

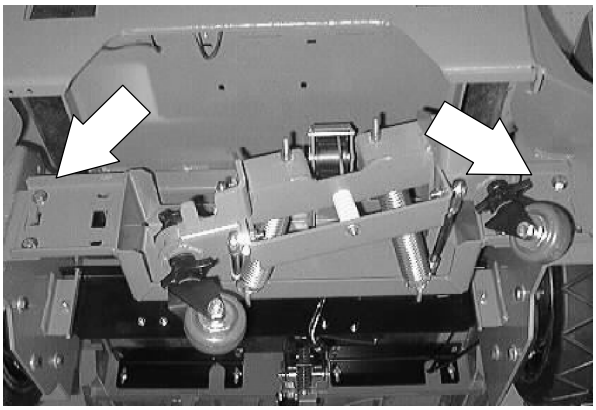
1. Make sure the rear squeegee is in the raised position. Pull the vacuum hose out of the squeegee frame.



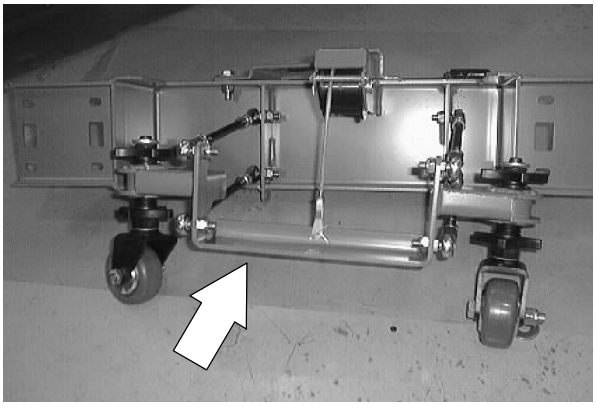
2. Loosen the hardware holding the squeegee frame to the lift assembly. Pull the squeegee frame and blade assembly off the machine.



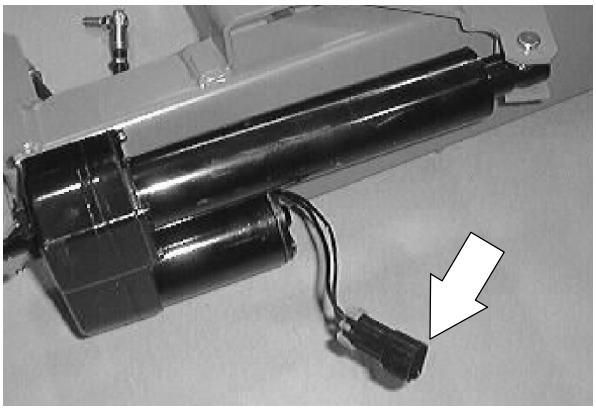
3. Remove the four hex screws holding the rear squeegee assembly to the machine frame.



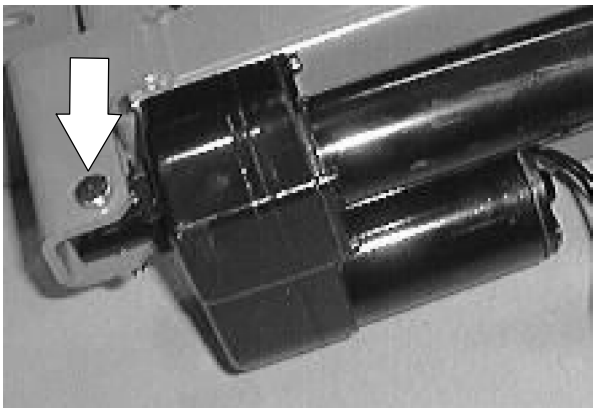
4. Pull the squeegee assembly away from the rear of the machine.



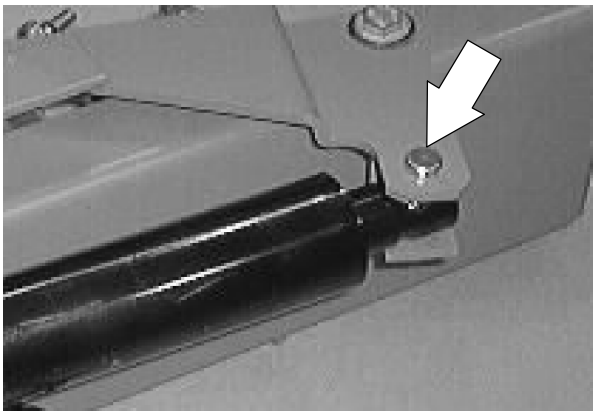
5. Disconnect the squeegee lift actuator from the main harness.



6. Remove the cotter pin and clevis pin from the motor end of the actuator where it attaches to the squeegee mount frame.

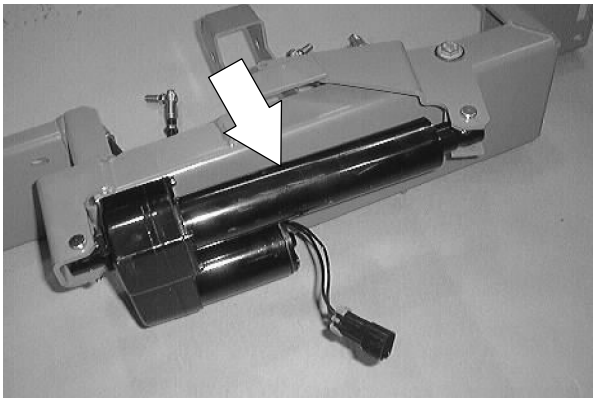


7. Remove the cotter pin and clevis pin from the rod end of the actuator where it attaches to the squeegee lift cable pivot bracket. Remove the actuator from the machine.

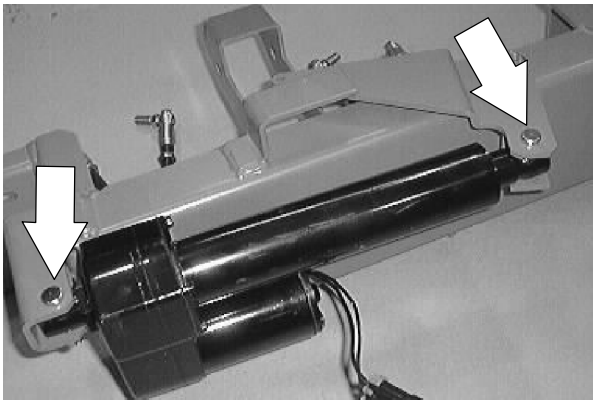


8. Position the new rear squeegee lift actuator onto the front of the squeegee mount frame.

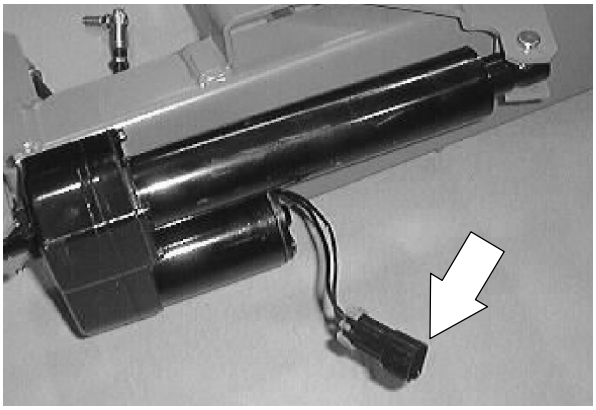
NOTE: The motor faces down and to the right side of the machine.



9. Reinstall the clevis pins and cotter pins into each end of the new actuator.



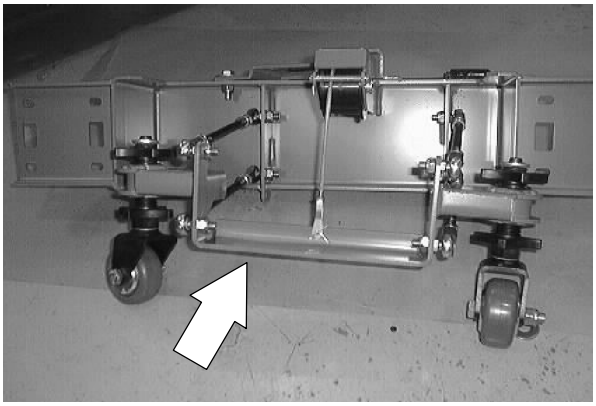
10. Position the squeegee assembly at the back of the machine. Reconnect the squeegee lift actuator to the main harness.



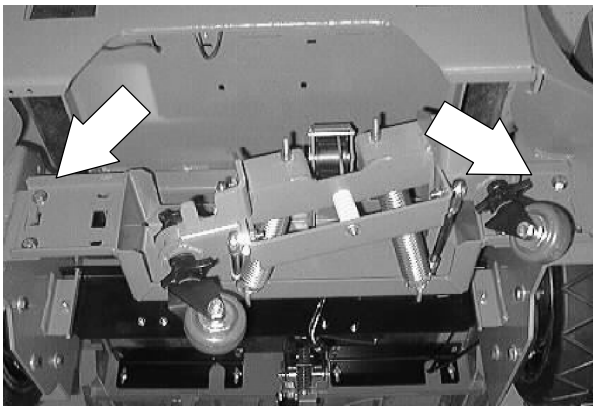
11. Position the squeegee assembly onto the back of the machine frame.

    MAXPRO 1000: Use the left hand bolt pattern.

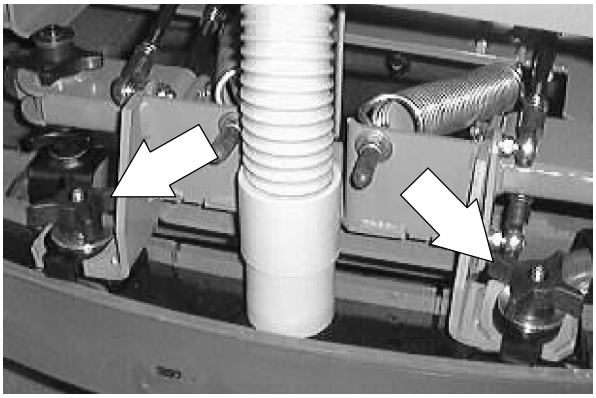
    MAXPRO 1200: Use the right hand bolt pattern.



12. Reinstall the hardware. Tighten to 37 – 48 Nm (26 – 34 ft lb).



13. Reinstall the squeegee blade assembly frame onto the lift bracket. Position the vacuum hose into the hole in the squeegee frame.



14. Operate the machine and check the squeegee assembly for proper operation.

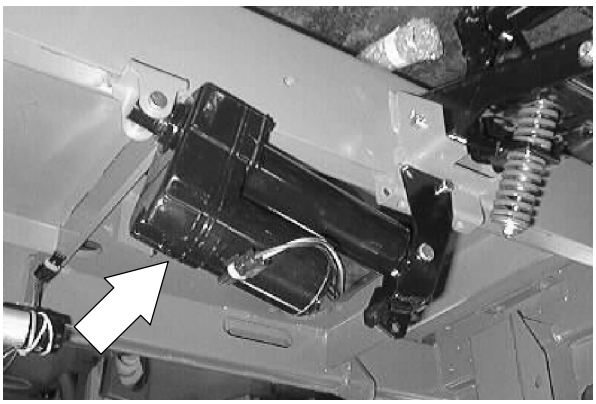
TO REPLACE SIDE SHIFT ACTUATOR

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

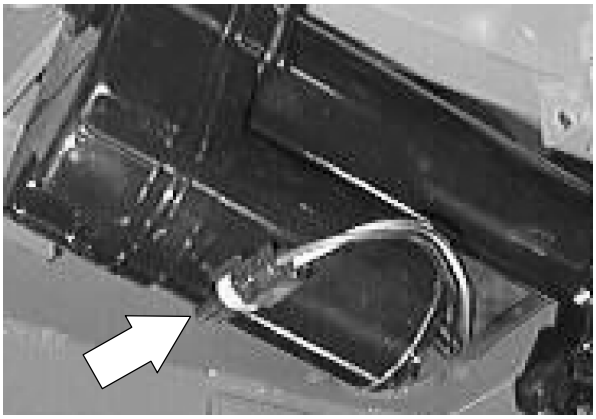
1. Make sure the scrub head is retracted in under the machine.

2. Go under the machine on the left side, under the recovery tank.

3. Locate the scrub head side shift actuator above the front of the scrub head.



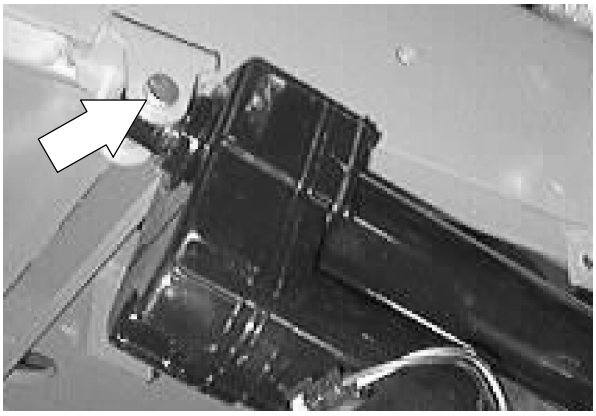
4. Disconnect the side shift actuator from the main harness.



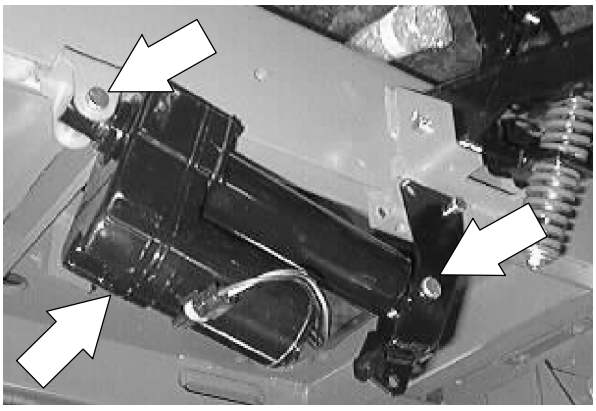
5. Remove the cotter pin and clevis pin from the end of the actuator where it attaches to the pivot bracket.

NOTE: Disconnect one end of the gas spring to release pressure on clevis pin.

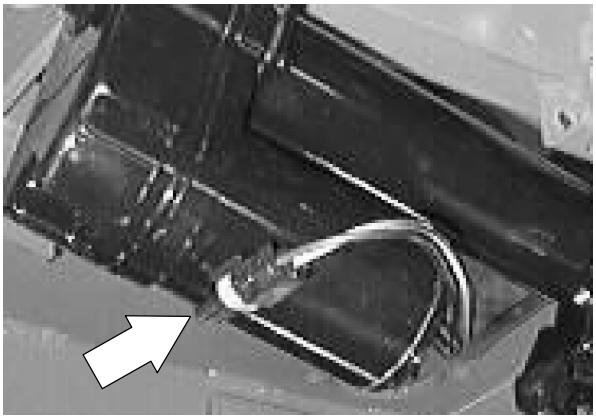
6. Remove the cotter pin and clevis pin from the end of the actuator where it attaches to the machine frame. Remove the actuator from the machine.



7. Position the new actuator in the machine. Reinstall the two clevis pins and cotter pins.



8. Reconnect the side shift actuator to the main harness.



9. Operate the machine and check the side shift actuator for proper operation.

ES™ PUMP

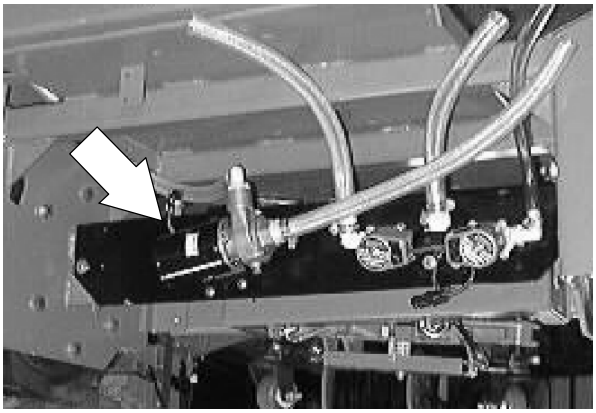
The ES™ pump is used to pump filtered solution from the recovery tank to the solution tank.

TO REPLACE ES™ PUMP

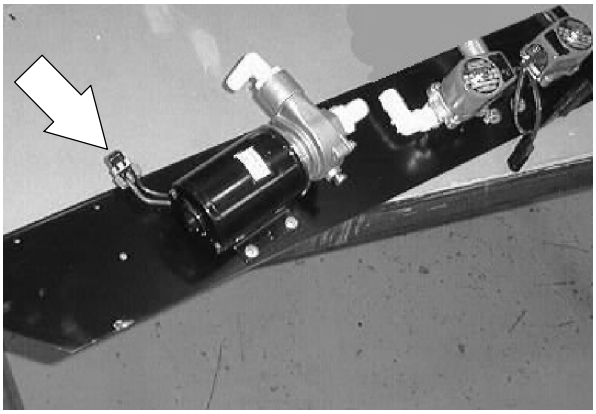
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

1. Drain the recovery tank and lower the scrub head. Shut off the machine.

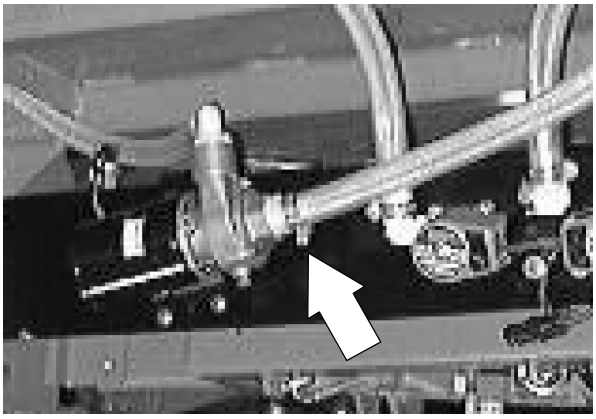
2. Go under the machine on the right side and locate the ES™ pump on the mount bracket between the back wheels.



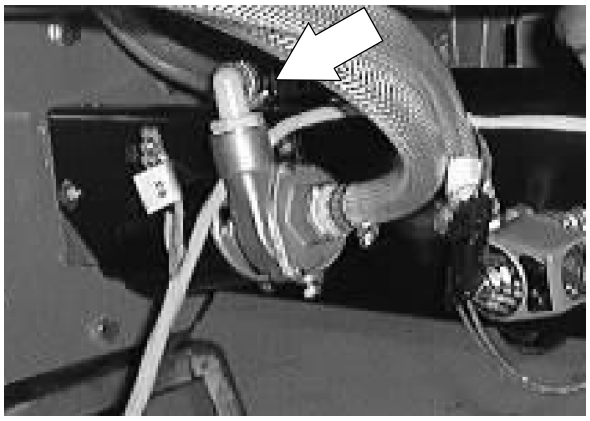
3. Disconnect the ES™ pump from the main harness.



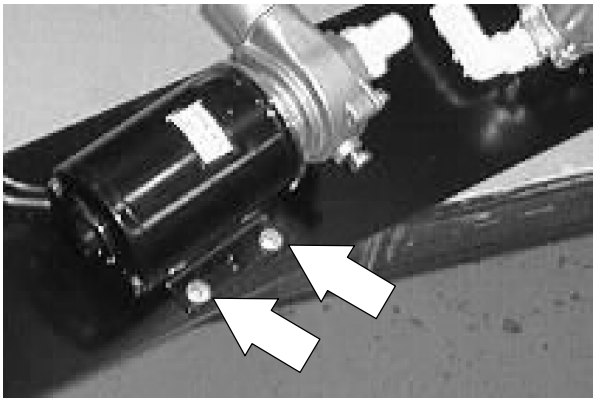
4. Loosen the wormdrive clamp holding the recovery tank hose to the ES™ pump center fitting. Pull the hose off the fitting.



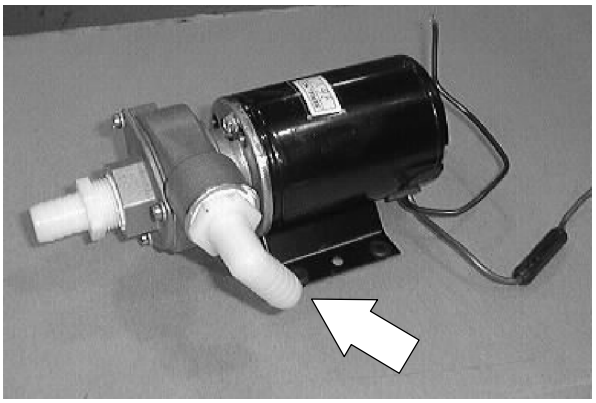
5. Loosen the wormdrive clamp holding the solution tank hose to the ES™ pump top fitting. Pull the hose off the fitting.



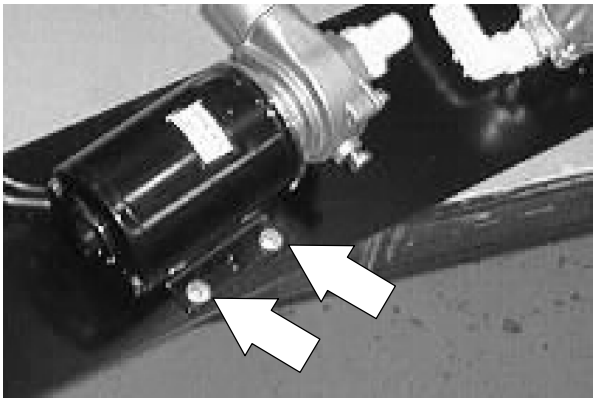
6. Remove the four hex screws holding the ES™ pump to the mount bracket. Remove the ES™ pump from the machine.



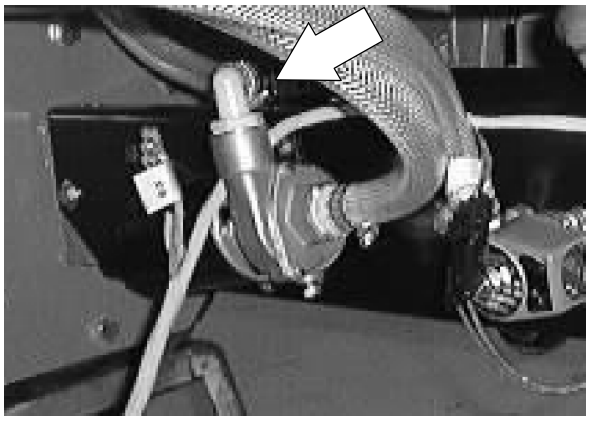
7. Remove the fittings from the existing ES™ pump. Install fittings in the new pump in the same orientation as they were removed.



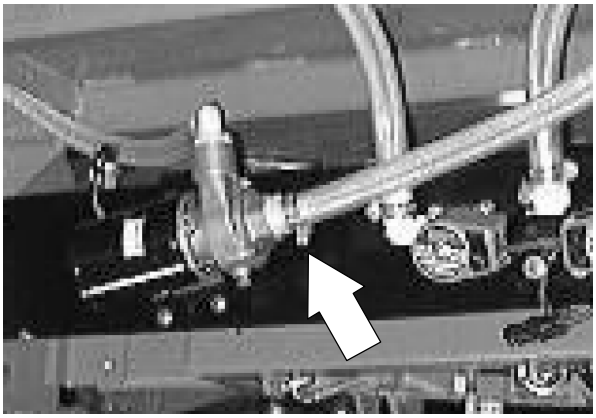
8. Reinstall the four hex screws holding the ES™ pump to the mount bracket. Hand tighten tight.



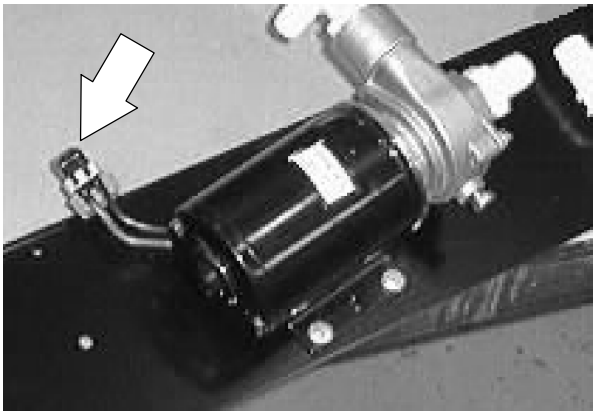
9. Reinstall the solution tank hose onto the upper fitting on the ES™ pump. Tighten the wormdrive clamp.



10. Reinstall the recovery tank hose onto the lower fitting on the ES™ pump. Tighten the wormdrive clamp.



11. Reconnect the ES™ pump to the main harness.



12. Operate the machine and check the new ES™ pump for proper operation.

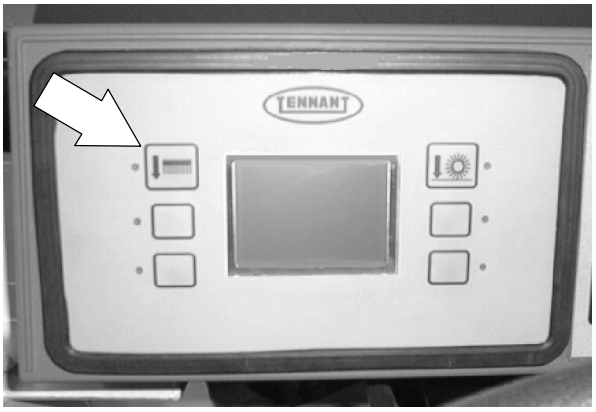
DETERGENT PUMP

The detergent pump is used to pump detergent to the scrub head during the scrubbing operation.

TO REPLACE DETERGENT PUMP

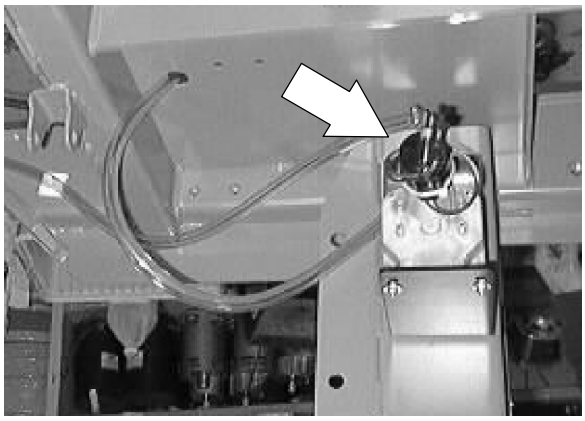
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake.

1. Start the machine and lower the scrub head. Shut off the machine.

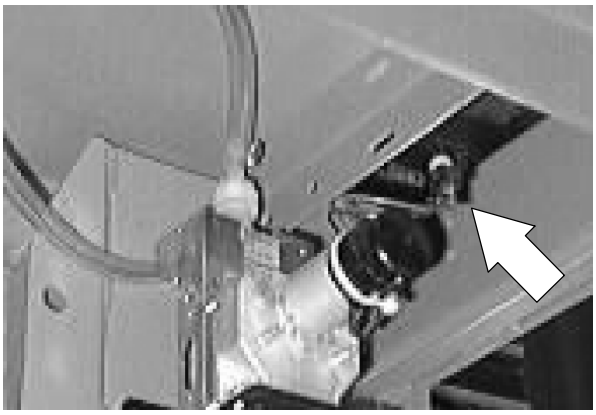


2. Go under the machine on the left side, under the recovery tank.

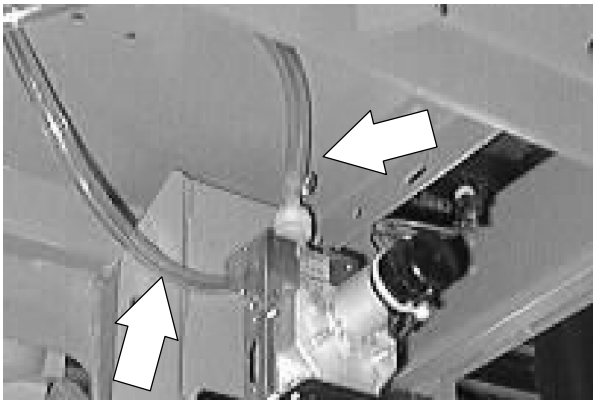
3. Locate the detergent pump on the left hand frame leg.



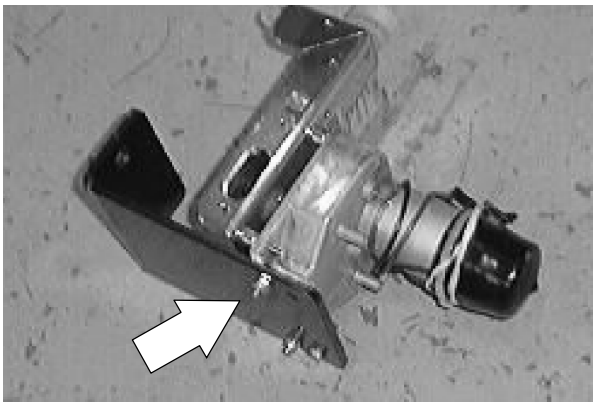
4. Disconnect the detergent pump from the main harness.



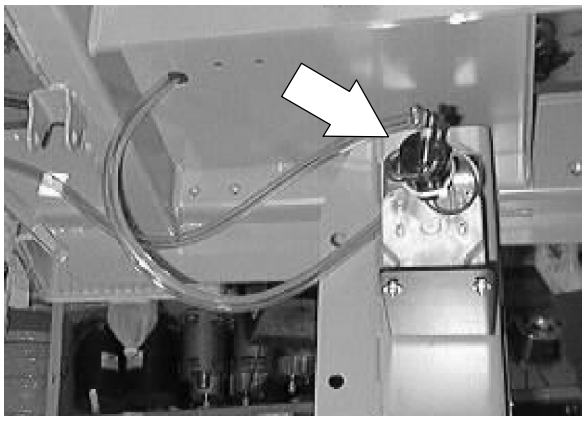
5. Mark and disconnect the two hoses leading to the top of the detergent pump.



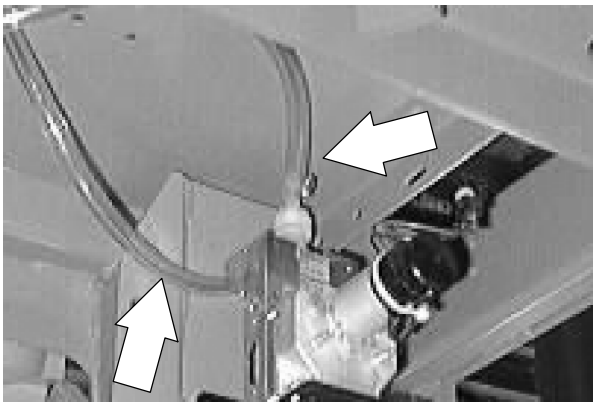
6. Remove the two hex screws holding the detergent pump to the mount bracket. Remove the pump from the machine.



7. Position the new detergent pump on the mount bracket. Reinstall the two screws and tighten.



8. Reconnect the two hoses leading to the top of the detergent pump.



NOTE: Make sure the hose leading from the detergent tank is attached to the top fitting.

9. Reconnect the detergent pump to the main harness.

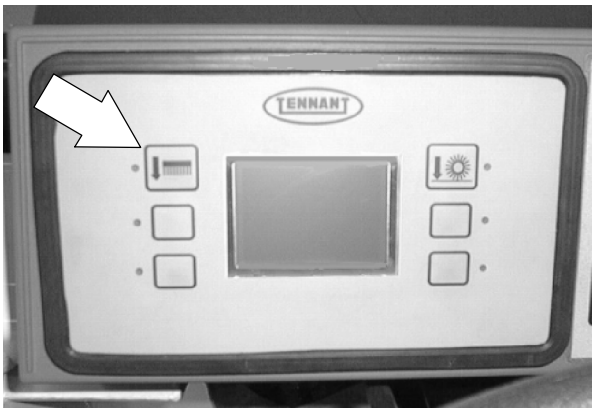
10. Operate the machine and check the new detergent pump for proper operation.

TO REPLACE AUTO FILL VALVES

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

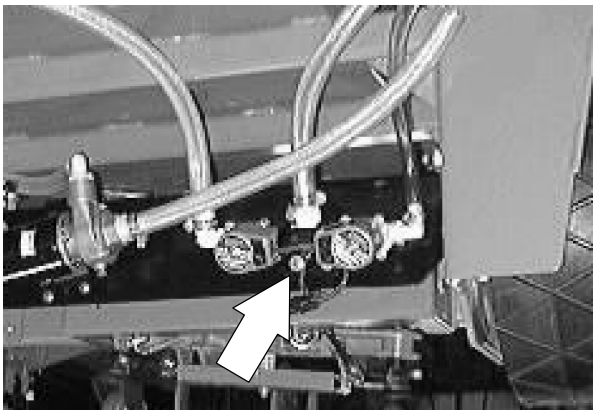
1. Drain the solution and recovery tanks.

2. Start the machine and lower the scrub head. Shut off the machine.

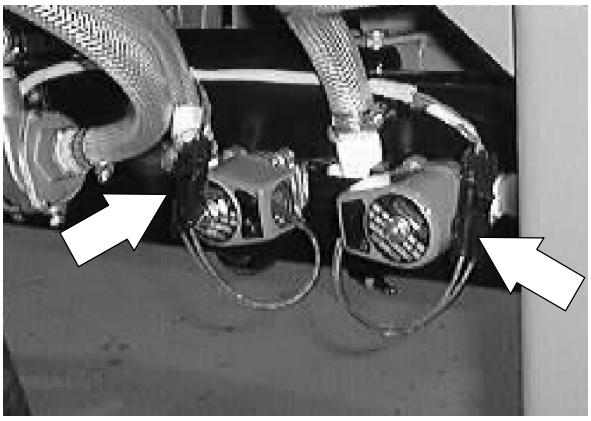


3. Go under the machine on the left side, under the recovery tank, ahead of the left, rear wheel.

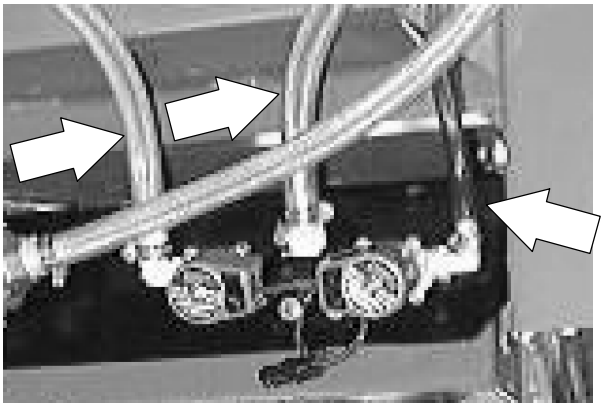
4. Locate the autofill valves on the mount bracket between the rear wheels.



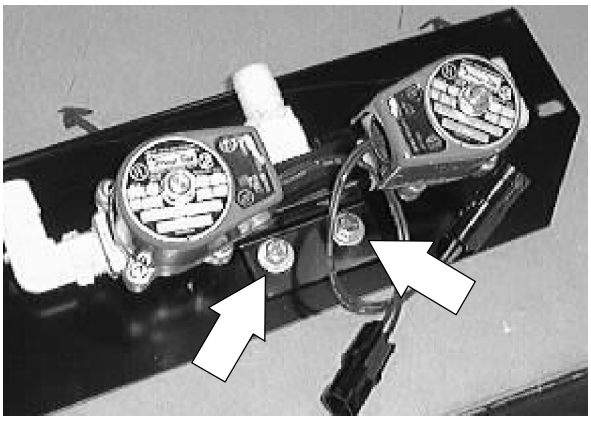
5. Disconnect the valve solenoids from the main harness.



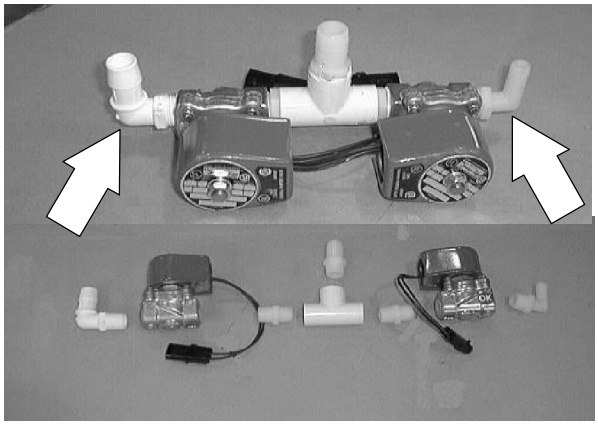
6. Mark and disconnect the three hoses leading to the autofill valve assembly.



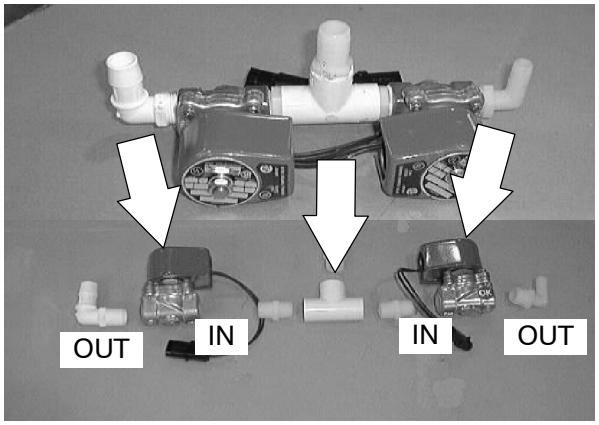
7. Remove the three screws holding the autofill valve assembly retainer bracket to the pump mount bracket. Remove the assembly from the machine.



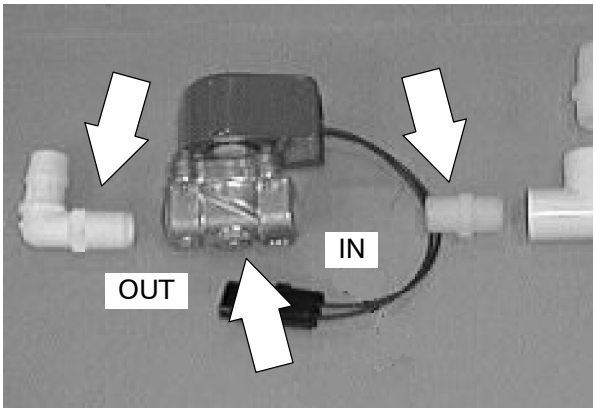
8. Remove the fitting from the autofill valve.



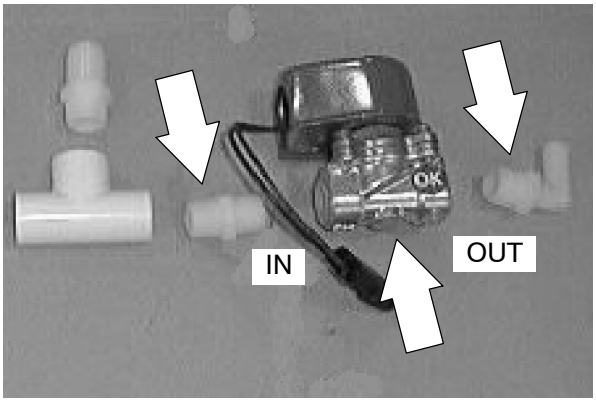
9. Remove the autofill valve from the plastic tee fitting.



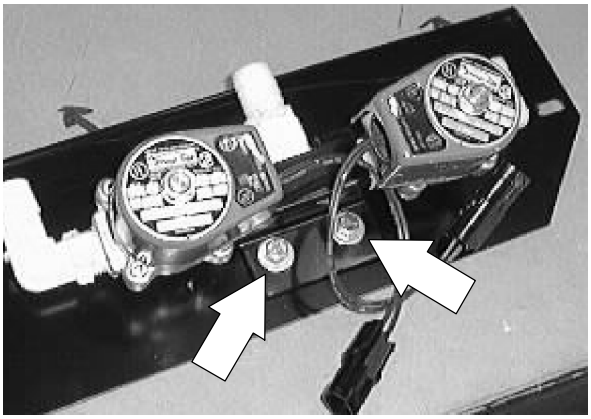
10. If replacing left hand autofill valve--note orientation of valve and fittings.



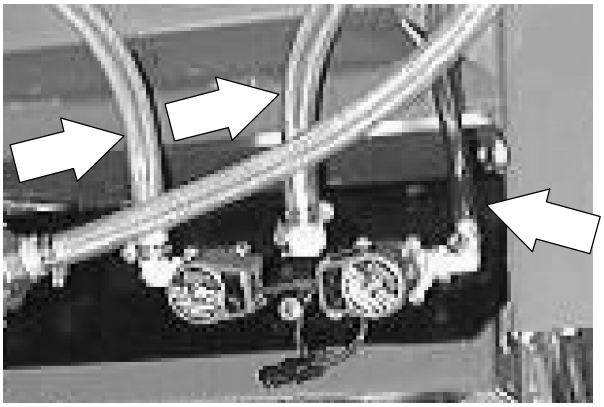
11. If replacing right hand autofill valve--note orientation of valve and fittings.



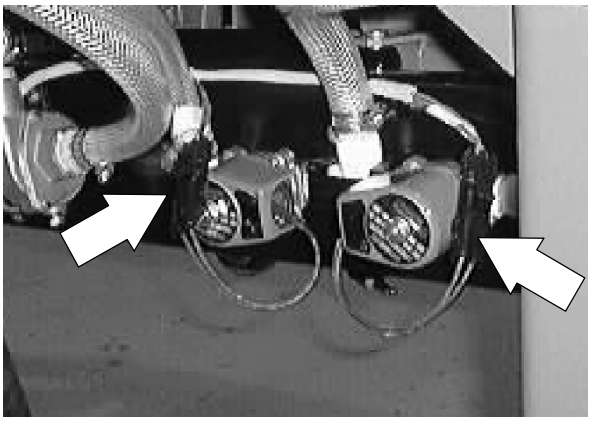
12. Reinstall the autofill valve assembly and retainer bracket onto the pump mount bracket. Reinstall the three hex screws and tighten to 11 – 14 Nm (7 – 10 ft lb).



13. Reconnect the three hoses to the autofill valve assembly.



14. Reconnect the valve solenoids to the main harness.



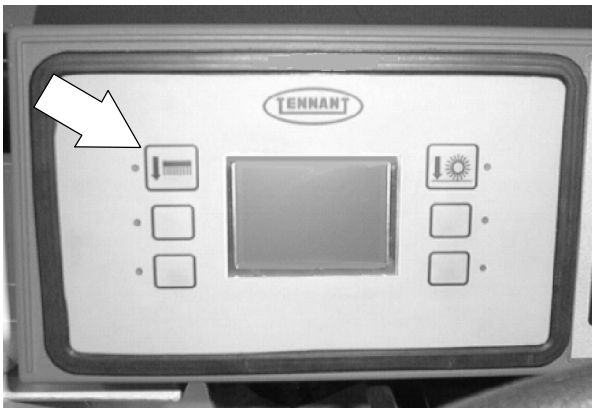
15. Operate the machine and check the new autofill valve for proper operation.

TO REPLACE SOLUTION SOLENOID VALVE

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

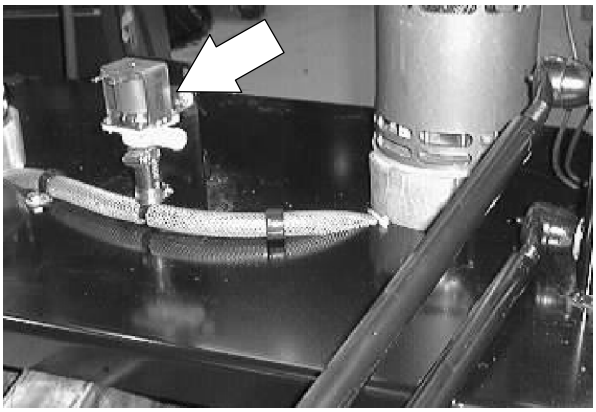
1. Drain the solution and recovery tanks.

2. Start the machine and lower the scrub head. Shut off the machine.

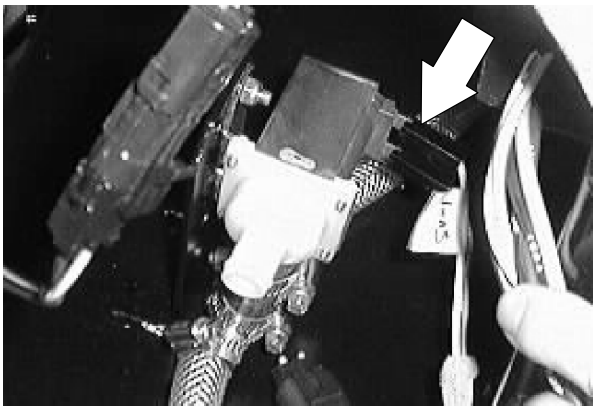


3. Go under the machine on the left side, under the recovery tank, ahead of the left, rear wheel.

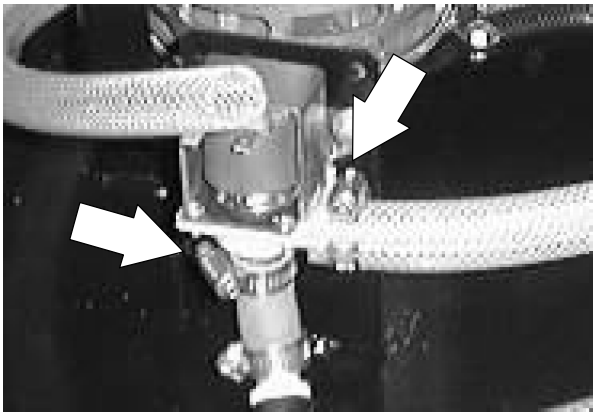
4. Locate the solution solenoid valve in the center, front area of the scrub head.



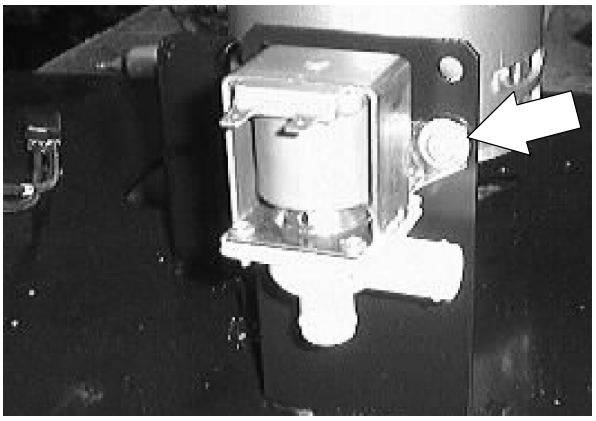
5. Disconnect the solenoid valve from the main harness.



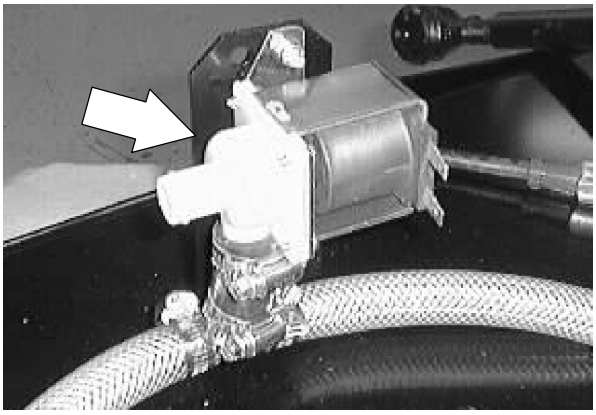
6. Loosen the worm drive clamps and remove the water lines leading to the solenoid valve.



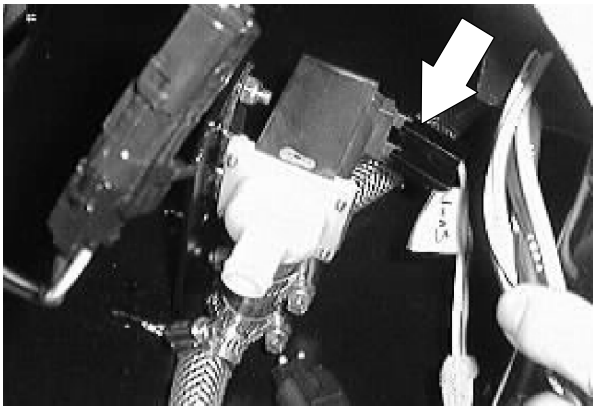
7. Remove the two screws holding the solenoid valve to the mount bracket. Remove the solenoid valve from the machine.



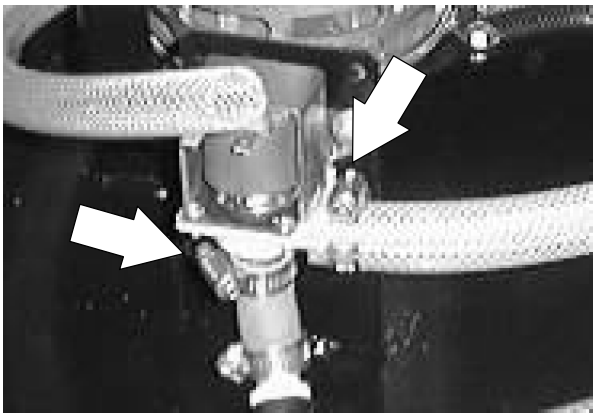
8. Install the new solenoid valve on the scrub head. Reinstall the two hex screws and tighten to 11 – 14 Nm (7 – 10 ft lb).



9. Connect the new valve to the main harness.

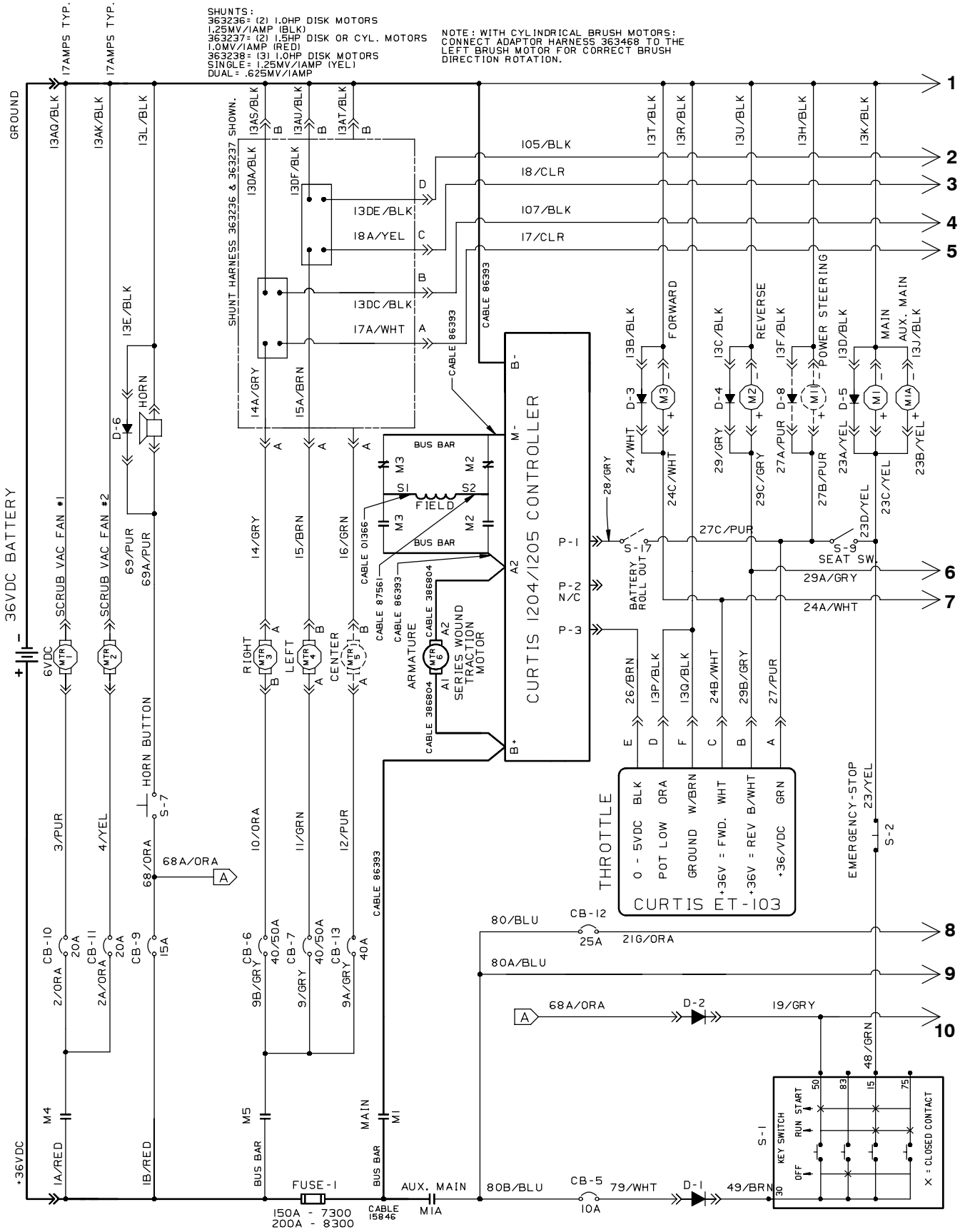


10. Position the two water lines onto the new solenoid valve. Tighten the wormdrive clamps.



11. Operate the machine and check the new solution solenoid valve for proper operation.

ELECTRICAL SCHEMATIC



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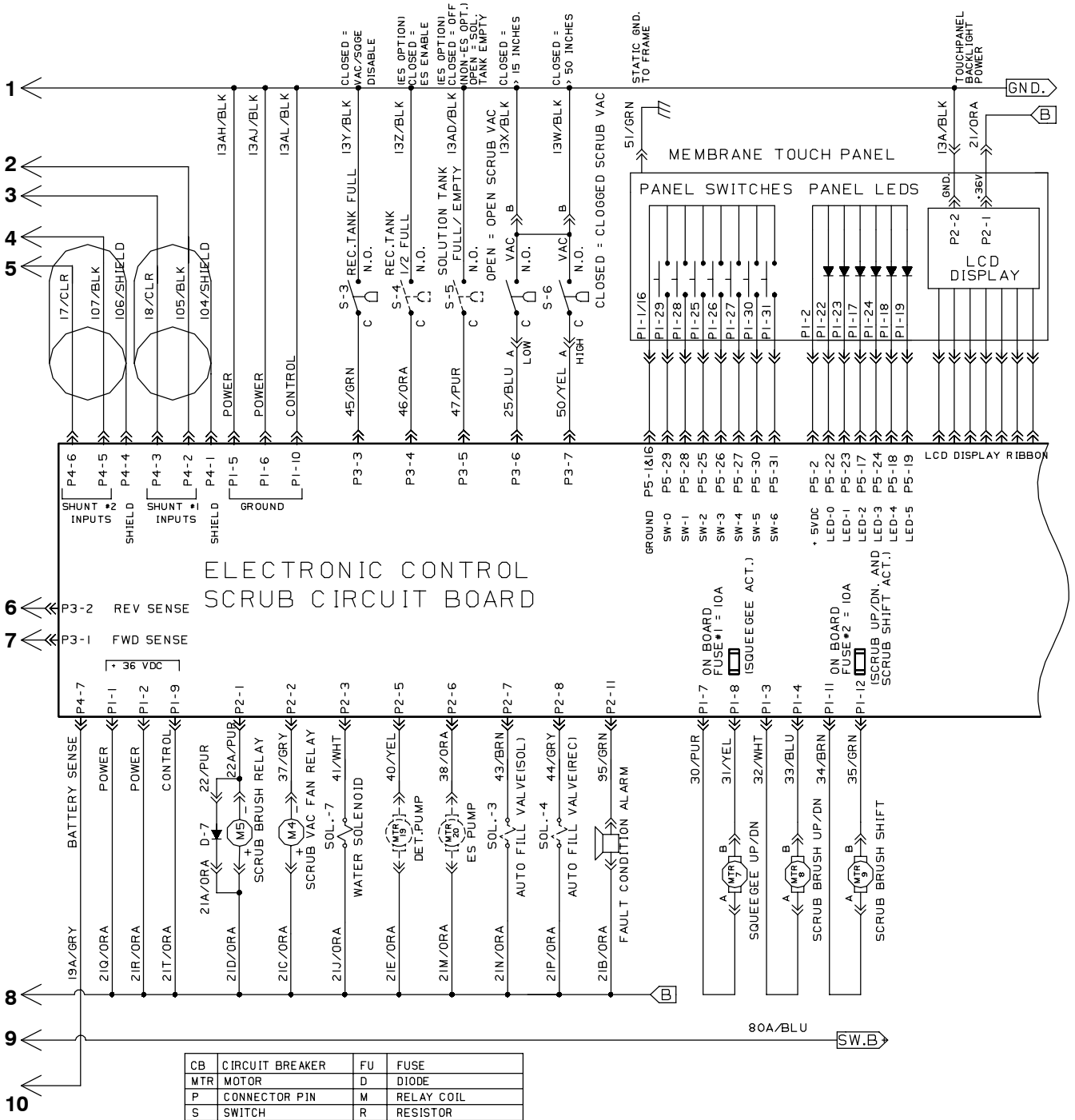
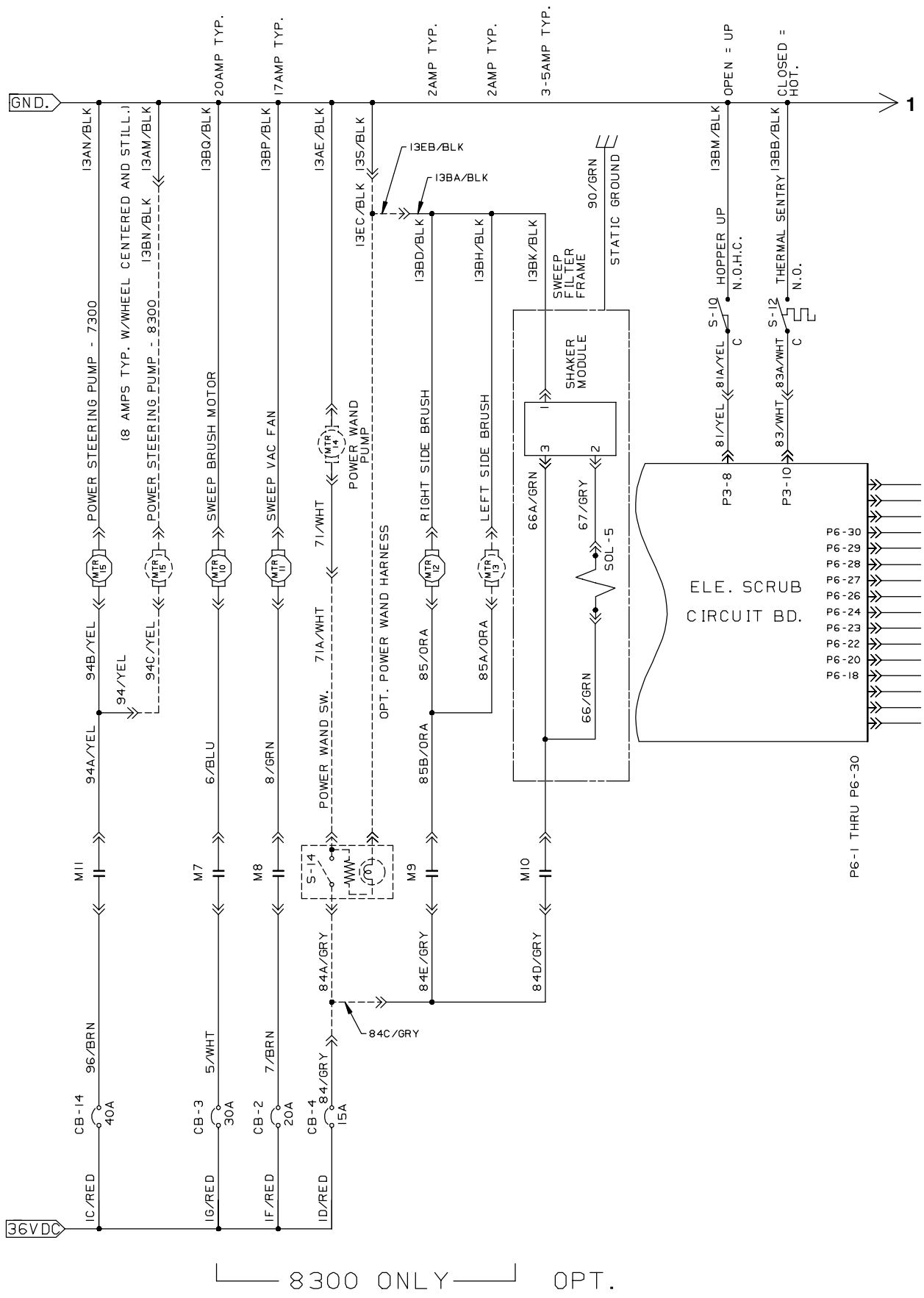
ELECTRICAL SCHEMATIC



CB	CIRCUIT BREAKER	FU	FUSE
MTR	MOTOR	D	DIODE
P	CONNECTOR PIN	M	RELAY COIL
S	SWITCH	R	RESISTOR
ARM	ARMATURE	HM	HOURMETER
N.O.	NORM.OPEN CONTACT	C	COMMON CONTACT
SV	HYD.SOLENOID VALVE	SOL.	ELE. MECH. VALVE

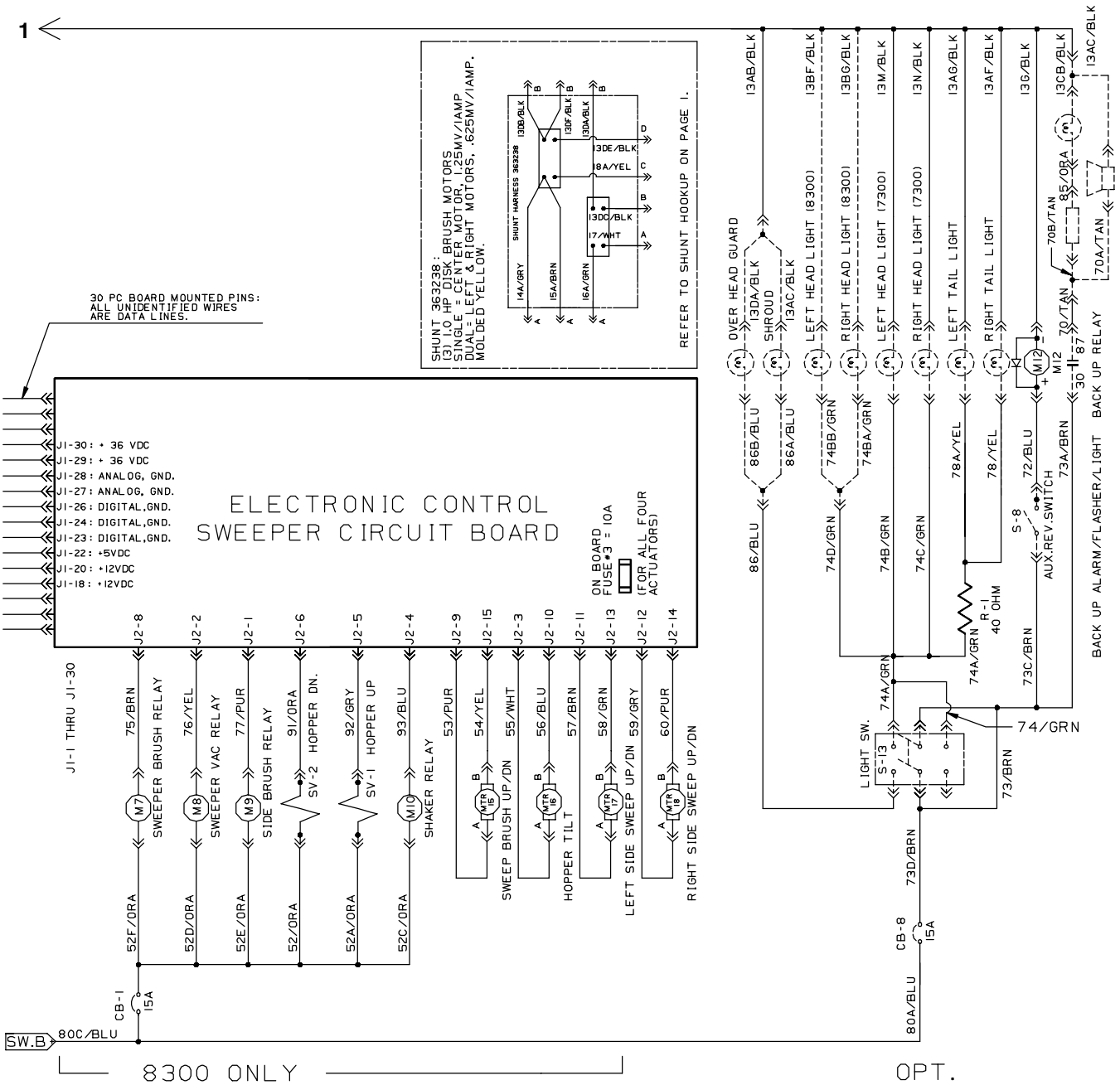
353346

ELECTRICAL SCHEMATIC



353346

ELECTRICAL SCHEMATIC

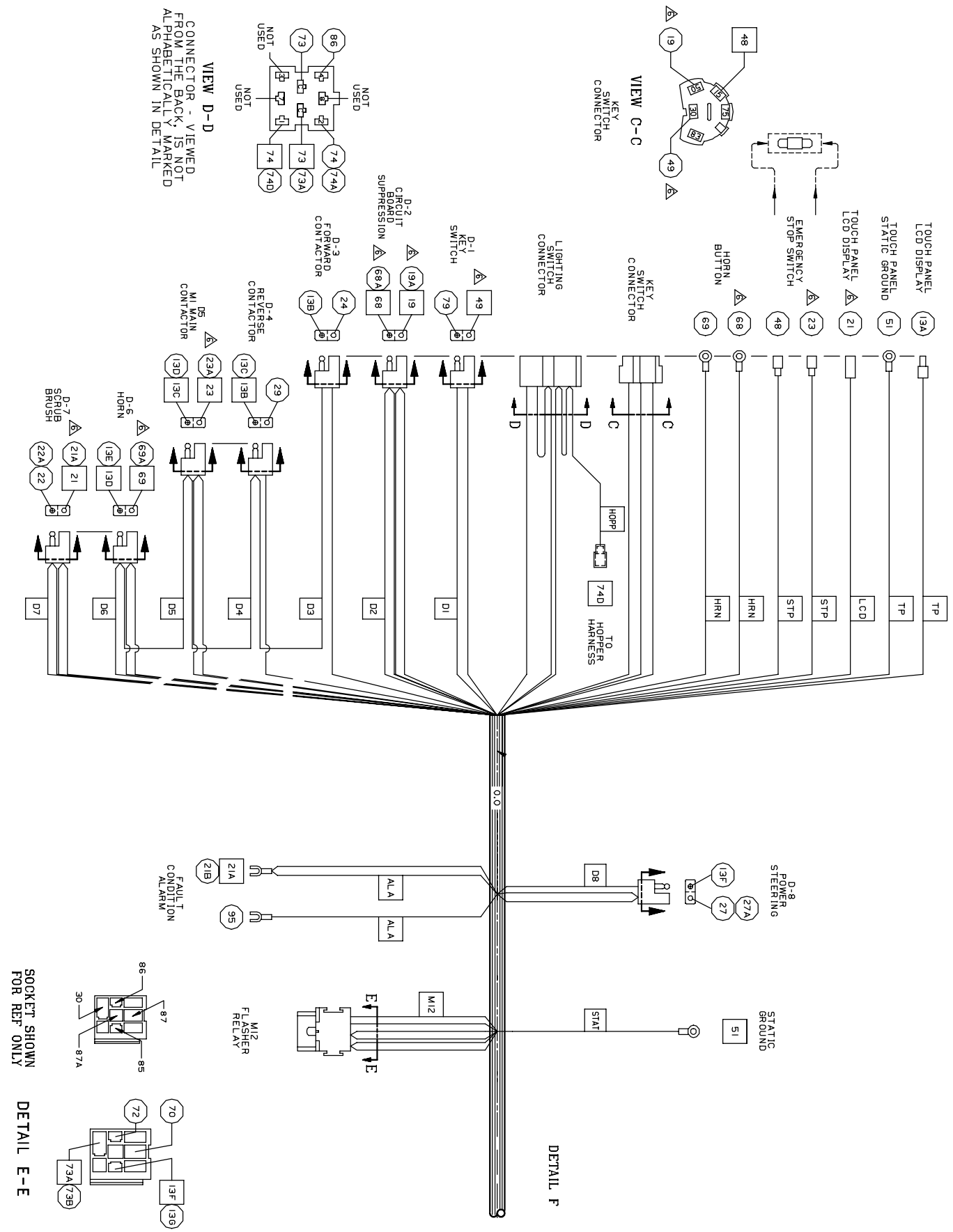


LEGEND

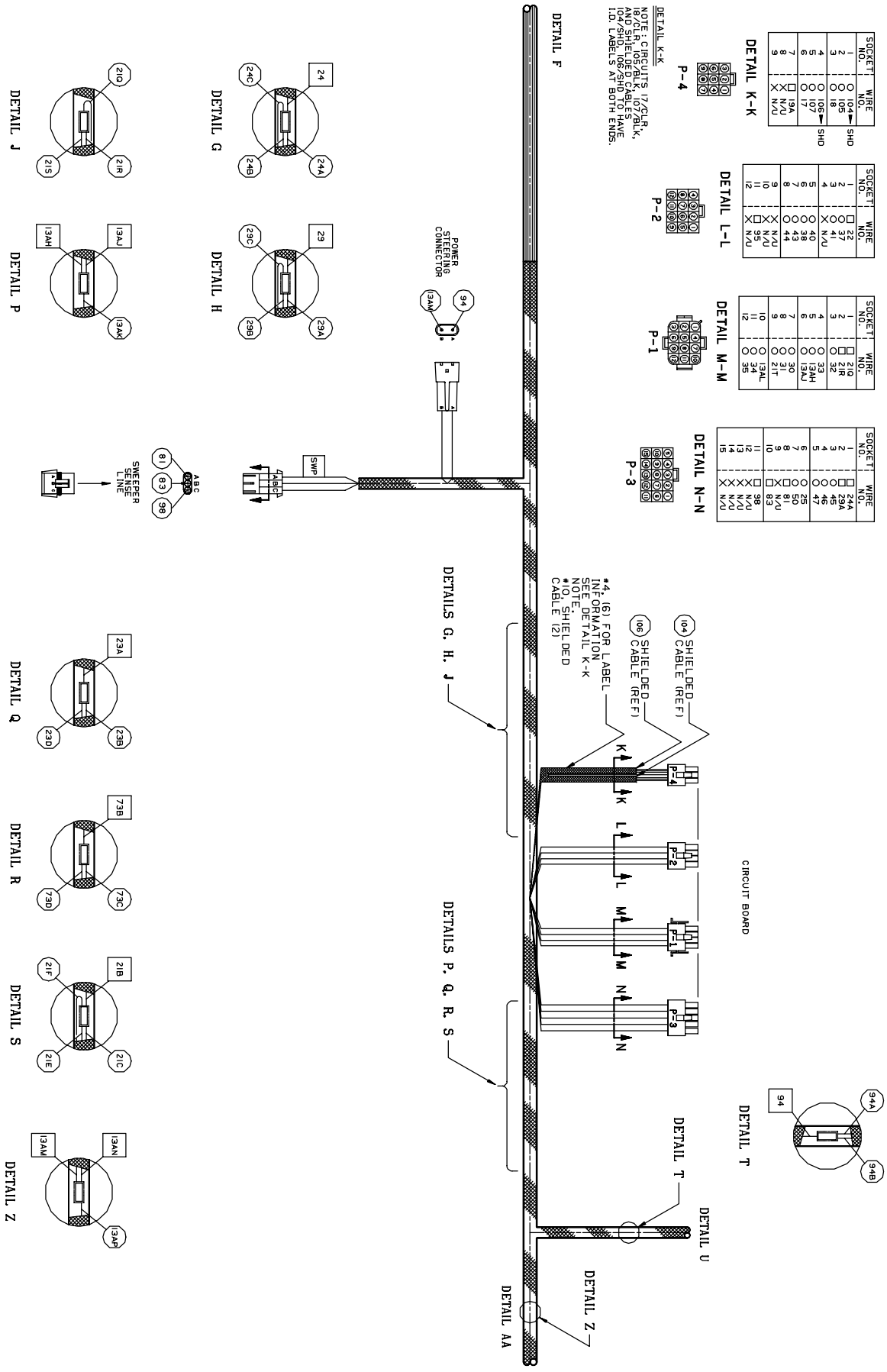
CB	CIRCUIT BREAKER	FU	FUSE
MTR	MOTOR	D	DIODE
P	CONNECTOR PIN	M	RELAY COIL
S	SWITCH	R	RESISTOR
ARM	ARMATURE	HM	HOURMETER
N.O.	NORM.OPEN CONTACT	C	COMMON CONTACT

353346

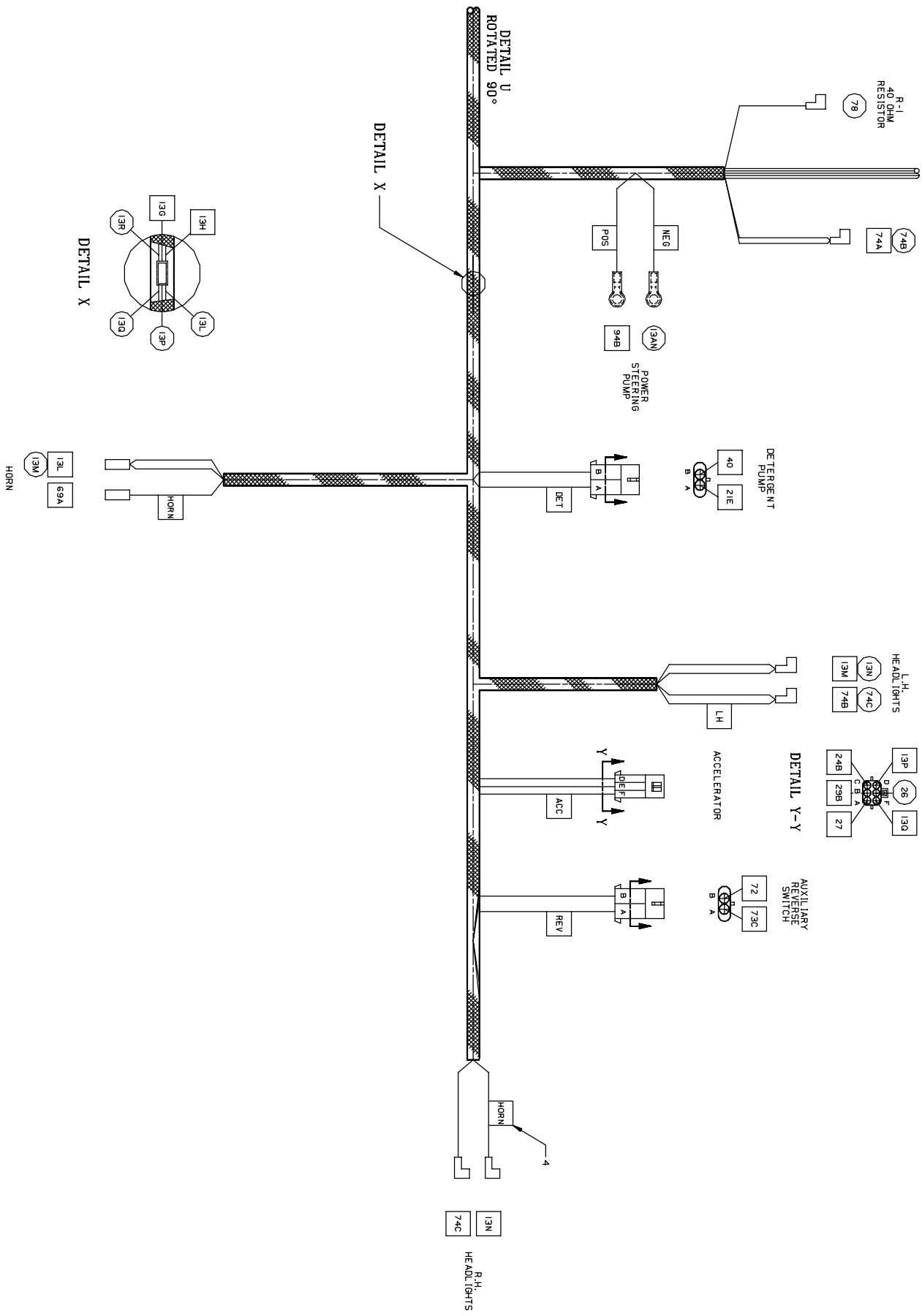
WIRE HARNESS



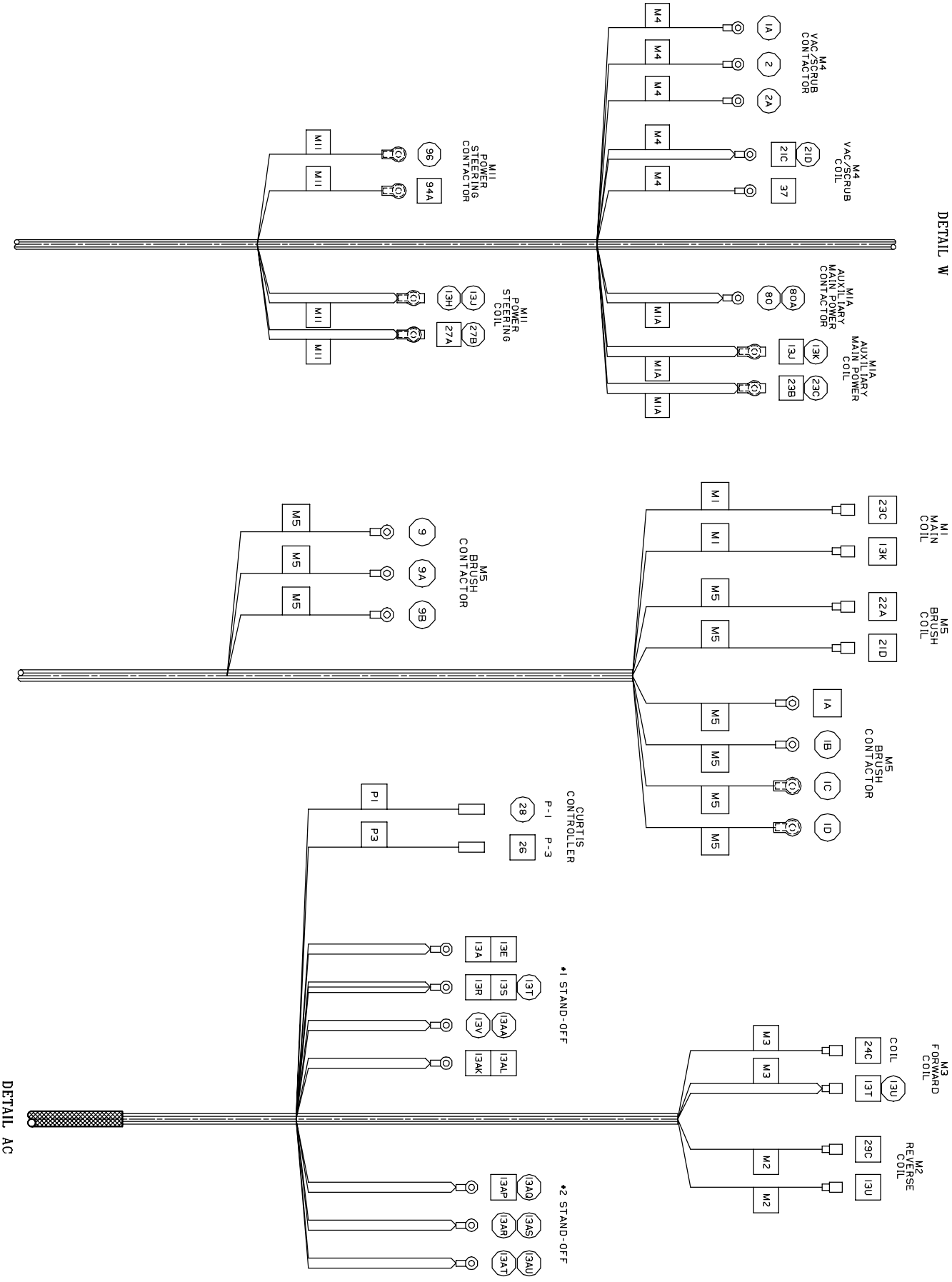
WIRE HARNESS



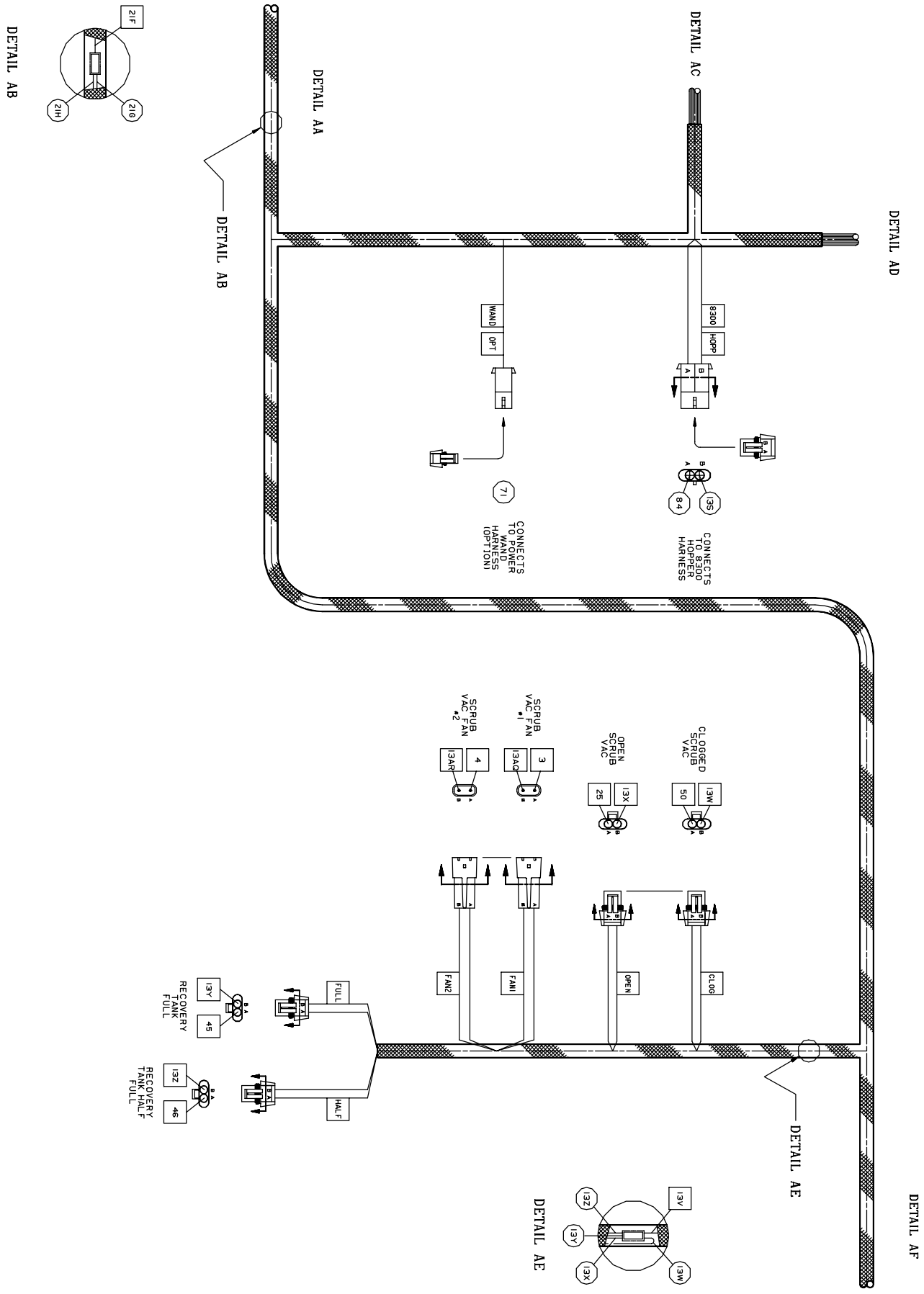
WIRE HARNESS



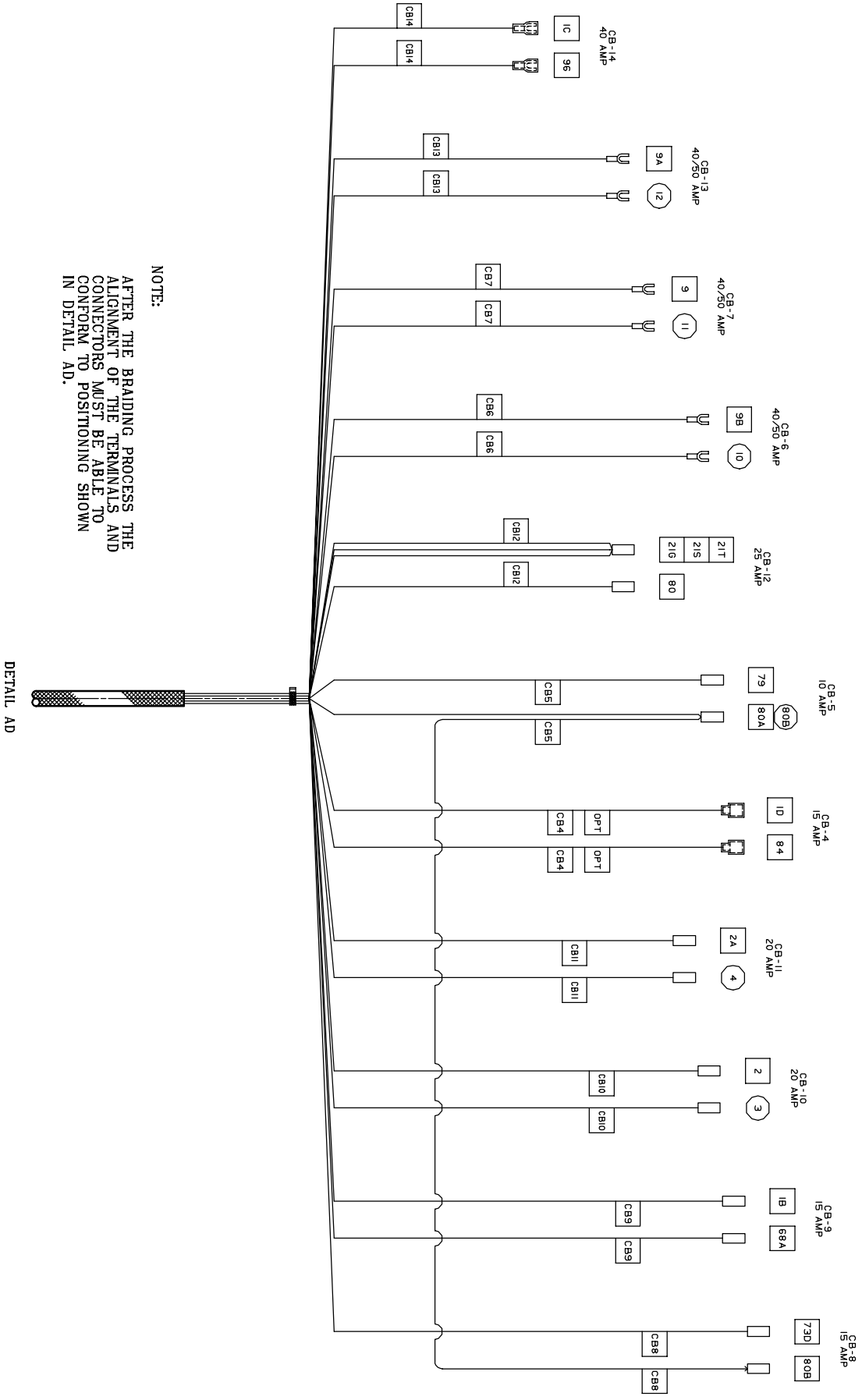
WIRE HARNESS



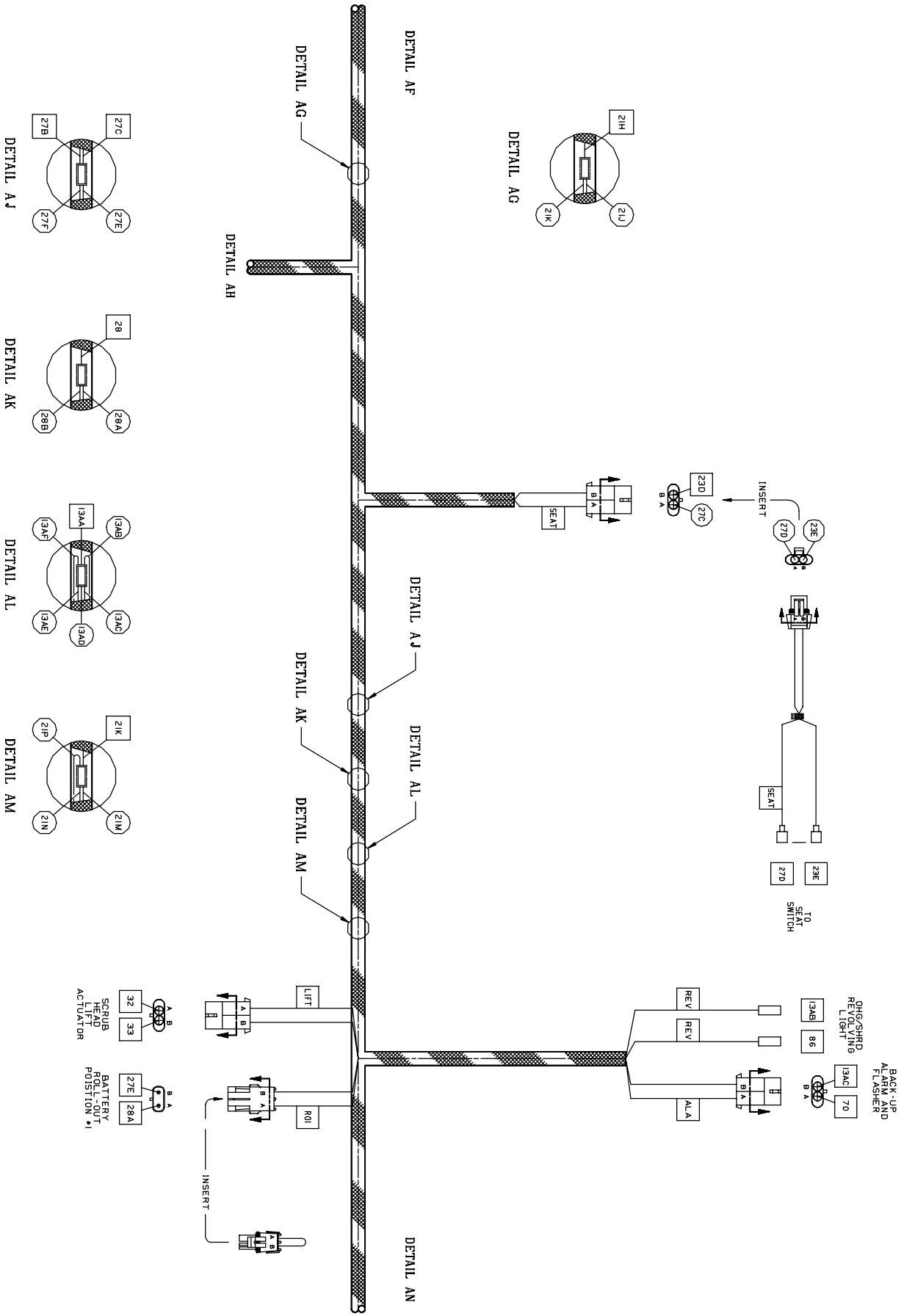
WIRE HARNESS



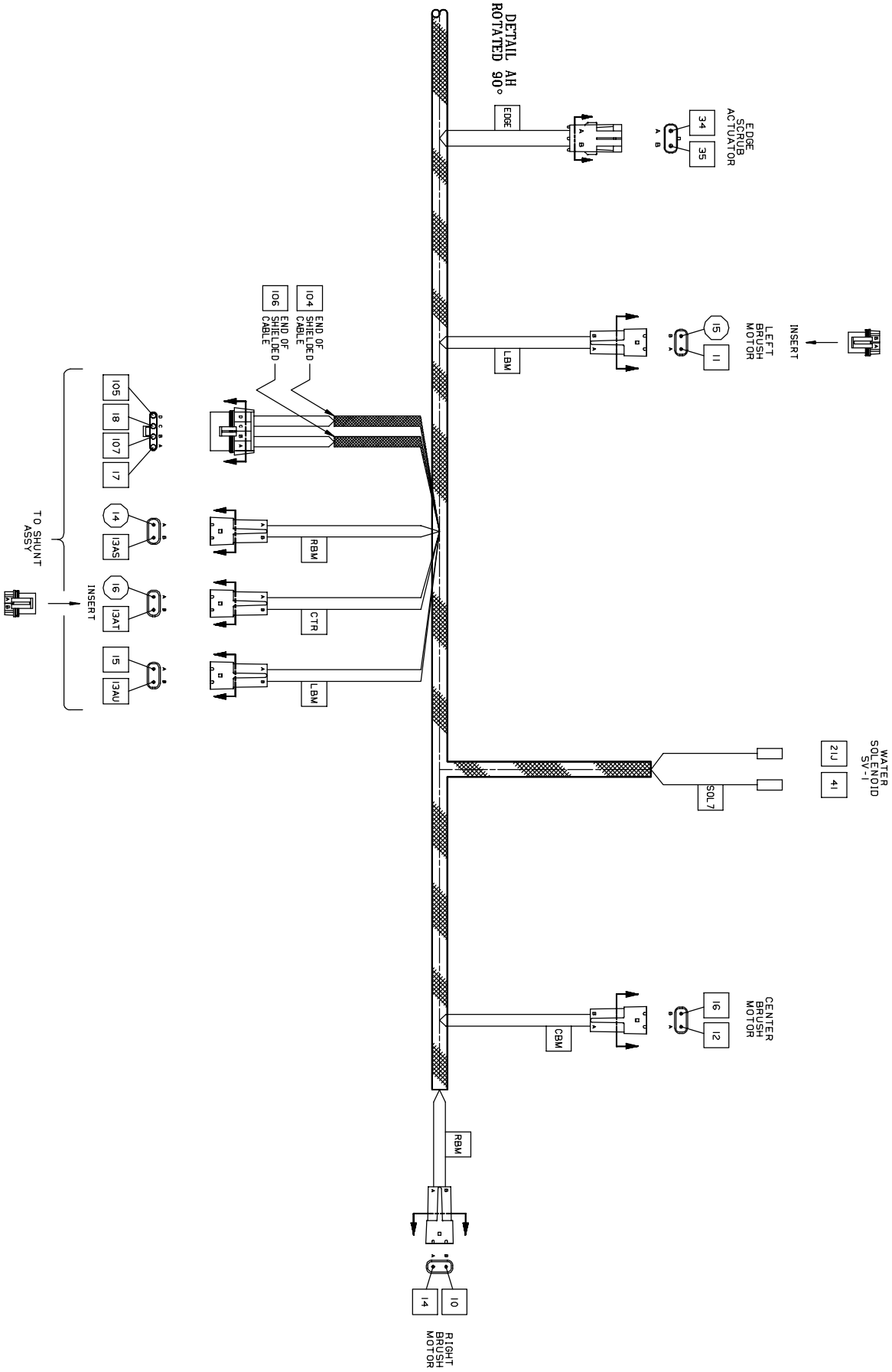
WIRE HARNESS



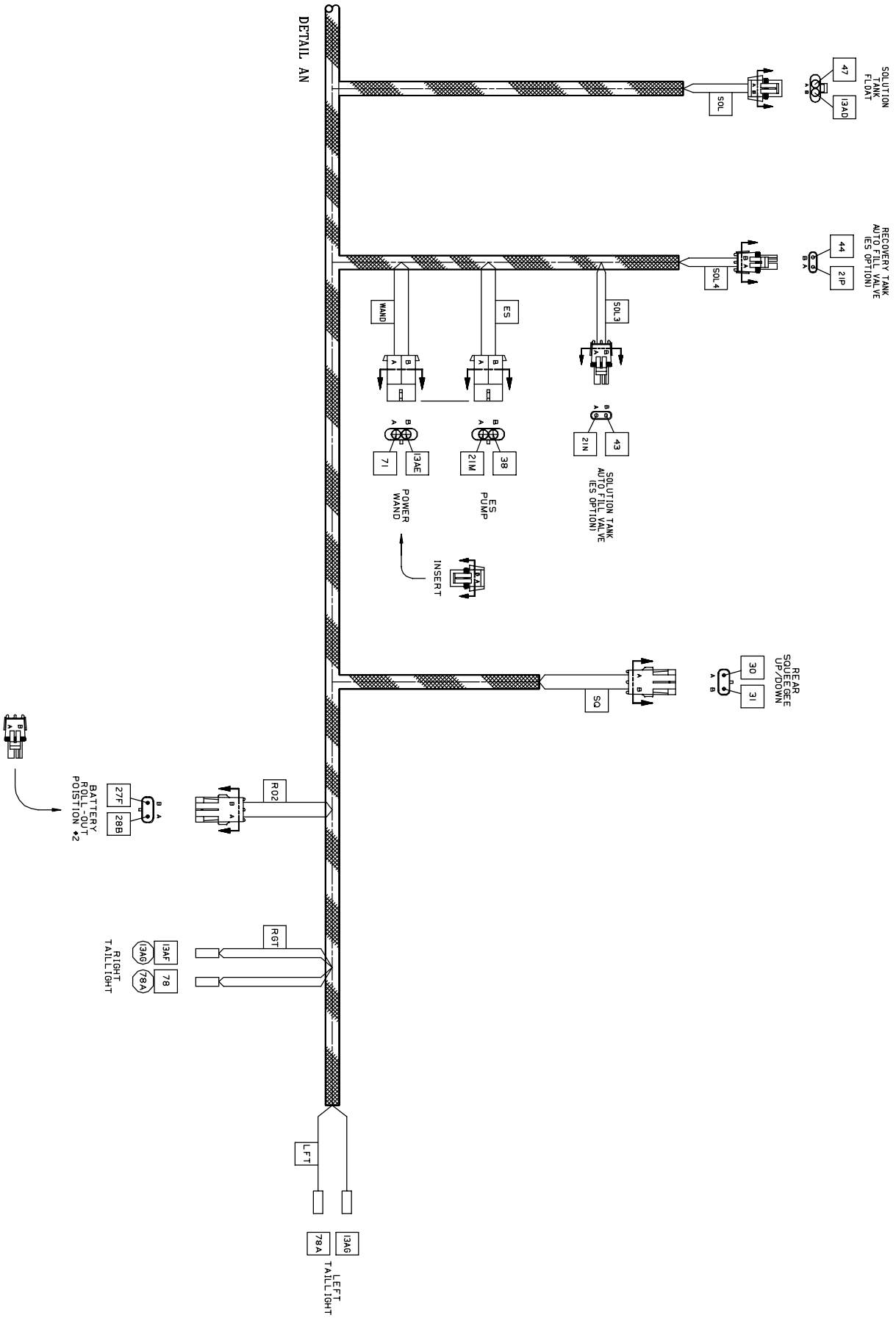
WIRE HARNESS



WIRE HARNESS



WIRE HARNESS



DIAGNOSTICS–7300

The Model 7300 has an on–board diagnostic system.

The first part of the diagnostics section describes the different operating modes that can be activated by using an entry sequence on the dash panel. There is also a chart describing the normal mode messages that may appear on the dash panel.

OPERATING MODES

The scrub functions of the 7300 are controlled using a touch panel with two dedicated buttons, and 6 multi-function buttons. The multi-function buttons surround a graphics display panel. Images on the display panel identify the current function of the six buttons.

The intent of the system is to offer one button scrubbing, while reducing the number of controls confronting the operator. This is accomplished by using multi-function buttons. This system is designed to offer the operator control of the functions which are appropriate for the current task.

The 7300 has 2 operating, and 7 maintenance modes. The operating modes are engaged using the 6 multi-function buttons. The button which is inside the Tennant logo (logo button) will scroll the machine through the various operating modes without engaging any functions. The maintenance modes are enabled buy pressing the logo button, turning on the machine, waiting 15 seconds, and releasing the logo button. Maintenance modes can then be chosen using the multi-function buttons.

7300 OPERATING MODES

OPERATING MODE	ENTRY SEQUENCE	FUNCTIONS AVAILABLE	DESCRIPTION
● IDLE MODE	1. This is the mode in which the panel will normally power up.	1. Scrub 2. No function 3. Squeegee	This mode gives the operator the basic, scrub, and water pickup modes.
● SCRUB MODE	1. Pressing the scrub button from the idle mode. 2. Pressing the logo button from the idle mode.	1. Scrub 2. Edge scrub 3. Squeegee 4. Detergent metering 5. ES function	This mode gives the operator control of all scrub functions.

7300 MAINTENANCE MODES

MAINTENANCE MODE	ENTRY SEQUENCE	FUNCTIONS AVAILABLE	DESCRIPTION
● MAINTENANCE 1 MODE	1. Hold logo key 2. Turn machine on 3. Hold logo key for 15 seconds 4. Release logo key	1. Enable left side brush 2. Display current 3. Manual mode 4. No function 5. No function 6. No function	This mode allows the operator to choose from the first three maintenance modes.
● MAINTENANCE 2 MODE	1. Hold logo key 2. Turn machine on 3. Hold logo key for 15 seconds 4. Release logo key 5. Press and release logo key 2 times.	1. Input display mode 2. Enable Edge Scrub mode 3. Time adjust mode 4. No function 5. No function 6. No function	This mode allows the operator to choose from the second three maintenance modes.
● MAINTENANCE 3 MODE	1. Hold logo key 2. Turn machine on 3. Hold logo key for 15 seconds 4. Release logo key 5. Press and release logo key 3 times.	1. Self Test mode 2. Display maint. mode 3. Enable maint. mode 4. No function 5. No function 6. No function	This mode allows the operator to choose from the last two maintenance modes, or exiting to the idle mode.
● MAINTENANCE 4 MODE	1. Hold logo key 2. Turn machine on 3. Hold logo key for 15 seconds 4. Release logo key 5. Press and release logo key 4 times.	1. Language select 2. Enable sweep 3. Restrict pressure 4. No function 5. No function 6. No function	Pressing button 1 will cause the machine to scroll through the different language options.
● MAINTENANCE 5 MODE	1. Hold logo key 2. Turn machine on 3. Hold logo key for 15 seconds 4. Release logo key 5. Press and release logo key 5 times.	1. Software rev level 2. No function 3. No function 4. No function 5. No function 6. Exit to normal mode	The software rev level is displayed near switch 2.
● MANUAL MODE ”MAN” INDICATED ON GRAPHIC DISPLAY	Select Manual Mode from Maintenance 1 screen	Operator can use the logo button to scroll through the various operating modes and select individual functions.	Manually operate discrete functions without interlocks.

Continued on next page.

7300 MAINTENANCE MODES (continued)

MAINTENANCE MODE	ENTRY SEQUENCE	FUNCTIONS AVAILABLE	DESCRIPTION
• INPUT DISPLAY MODE	Select the Input Display mode from the Maintenance 2 screen		Display the state of floats, limit switches, and sensors. This mode enables a special display that indicates the various float and input switch levels. The operator can operate the machine in input display mode by scrolling to the operating modes, engaging the desired functions, and scrolling back to the input display mode.
• SELF TEST MODE	Select the Self Test mode from the maintenance 3 screen		This function tests the output portion of the controller board.
• ADJUST TIME MODE	Select Adjust Time from the maintenance 2 screen	1. Increment segment 2. Decrement segment 3. Select 24/12 hour clock 4. Move cursor right 5. Move cursor left 6. No function	Set the on board clock and calendar.
• DISPLAY MAINTENANCE MODE	Select Check maintenance from the maintenance 2 screen	1. No function 2. No function 3. No function 4. Clear maint. timer 5. No function 6. No function LOGO – select next maint. item	Check various maintenance timers.
• RESTRICT PRESSURE MODE	Select the Restrict Pressure mode from the maintenance 4 screen	1. Toggles on/off	Allows restriction of brush down pressure settings to the lightest two.
• LANGUAGE SELECT MODE	Select the Language Select from the maintenance 4 screen	1. Toggles on/off	Allows technician to scroll thru 12 languages.

INTERLOCKS:

The operator can start and stop the various functions of the 7300 using a variety of switch closures and interlocks. What follows are two tables for each of the basic functions. One table lists the action that are required for the basic function to be running. The other table lists the actions that would prevent the operation from running. *If the operator satisfies all of the requirements from the first table, and none of the situations of the second table exist, the operator could expect the function to operate.*

SCRUB BRUSH AND SOLUTION FLOW VALVE OPERATION ENABLED

Scrub brush operation enabled by:	Indicator
• Scrub button	• Scrub icon visible with LED illuminated
• Forward propel	• Forward sensed

SCRUB BRUSH AND SOLUTION FLOW VALVE OPERATION INHIBITED

Scrub brush operation inhibited by:	Indicator
• Scrub button	• Scrub icon visible with LED extinguished
• Neutral or Reverse	• Forward/reverse not sensed
• Full recovery tank	• Recovery tank full icon visible
• Low battery	• Blinking inverted battery icon
• No brush current sensed	• Blinking circuit breaker icon

SQUEEGEE AND VACUUM FAN OPERATION ENABLED

Squeegee operation enabled by:	Indicator
• Scrub button or Squeegee button	• Squeegee icon visible with LED illuminated
• Forward or Neutral	• Reverse not sensed

SQUEEGEE AND VACUUM FAN OPERATION INHIBITED

Squeegee operation inhibited by:	Indicator
• Scrub button or Squeegee button	• Squeegee icon visible with LED extinguished
• Reverse	• Reverse sensed
• Full recovery tank	• Recovery Tank full icon visible
• Low battery	• Blinking inverted battery icon

ES™ PUMP OPERATION ENABLED

ES™ pump operation enabled by:	Indicator
• ES™ button	• ES™ icon visible with LED illuminated
• Recovery tank full	• Float is covered for 5–8 seconds *NOTE: ES™ pump will operate until full float is uncovered for 30 seconds, or until solution tank full float is covered*

ES™ PUMP OPERATION INHIBITED

ES™ pump operation inhibited by:	Indicator
• ES™ button	• ES™ icon visible with LED extinguished
• More than 30 seconds has passed since the ES™ float has become uncovered	• None
• Solution Tank Full float covered for more than 5 seconds	• None
• Recovery tank low	• Icon blinks

SOLUTION TANK AUTOFILL VALVE ENABLED

Solution tank autofill valve enabled by:	Indicator
• Solution tank full float is inactive	• None
• Machine in neutral	• None
• Key switch is on	• None

SOLUTION TANK AUTOFILL VALVE DISABLED

Solution tank autofill valve disabled by:	Indicator
• Solution tank full float is active	• None
• Machine in forward or reverse	• Forward or reverse sensed
• Key switch is off	• None

RECOVERY TANK AUTOFILL VALVE ENABLED

Recovery tank autofill valve enabled by:	Indicator
• Recovery tank full float is inactive	• None
• Machine in neutral	• None
• Key switch is on	• None

RECOVERY TANK AUTOFILL VALVE DISABLED

Recovery tank autofill valve disabled by:	Indicator
• Recovery tank full float is active	• None
• Machine in forward or reverse	• Forward or reverse sensed
• Key switch is off	• None

DETERGENT PUMP ENABLED

Detergent pump enabled by:	Indicator
• Scrub button	• Scrub icon active on screen
• Detergent button	• 1 or 2 arrows present on detergent icon
• Forward or reverse propel sensed	• None

DETERGENT PUMP DISABLED

Detergent pump disabled by:	Indicator
• Scrub button	• Scrub icon inactive on screen
• Detergent button	• X present below detergent icon
• Neutral	• Forward/reverse not sensed

ALARM CONDITIONS

Alarm condition:	Indicator
• Clogged scrub vacuum fan	• Blinking squeegee/vacuum icon no alarm
• Low battery	• Blinking inverted battery icon and 5 second audible alarm
• Tanks full (15 second)	• Autofill/blinking recovery tank full icon and 5 second audible alarm
• Open scrub vacuum fan	• Blinking inverted squeegee/ vacuum icon and 5 second audible alarm
• Maintenance interval (15 second)	• Maintenance icon and 5 second audible alarm
• Solution tank low (7300 with no ES option only)	• Blinking solution tank icon and 5 second audible alarm.

BASIC 7300 OPERATION

○ Each time the panel is turned on the following actions will occur:

1. The main brushes will raise.

2. The scrub vacuum fan will be turned off, and the squeegee will raise.

- EDGE SCRUB (SCRUB MODE):

○ Pressing the Edge scrub button will toggle the Edge scrub LED.

If the machine is propelling forward in the scrub mode and the Edge scrub LED is on, the scrub head will shift into the edge scrub position. If the Edge scrub LED is off, the scrub head will return to the retracted position.

- SQUEEGEE (SCRUB MODE):

○ If the squeegee LED is off, pressing the squeegee button will drop the squeegee and turn on the vacuum fan. If the squeegee LED is on, pressing the squeegee button will raise the squeegee, initiate a delay, and turn off the vacuum fan. Squeegee operation is inhibited in reverse.

- SCRUB (SCRUB MODE):

○ I f the machine is currently in the idle mode, pressing the scrub button will initiate the following actions:

1. If the machine is propelling forward, the main brushes will turn on and go down. The down pressure setting will be the same used during the last scrub cycle. The solution will flow at the rate determined by the water position lever.

2. If the machine is in reverse, the brushes will stay up and off.

3. If the machine goes into neutral, the brushes will stay on for a short delay, then shut off and retract.

4. If the Edge Scrub LED is on and the machine is propelling forward, the scrub head will go into the edge scrub position.

5. The scrub vacuum fan will turn on.

Continued on next page...

- SCRUB (SCRUB MODE): continued

6. If the machine is not in reverse, the squeegee will go down.

7. If the machine is in reverse, the squeegee will stay up until reverse is no longer sensed.

8. If the detergent LED is illuminated, and the machine is in forward, the detergent pump will run. The detergent pump will run at its slow rate if one arrow is present on the detergent icon. The detergent pump will run at its fast rate if two arrows are present on the detergent icon.

   ☞ If the operator pushes and holds the scrub button, the pressure settings will begin to scroll. The pressure setting displayed after releasing the scrub button will become the new default down pressure setting. If the scrub function is active and one of the following occurs:
   A. Operator pushes, then releases the scrub button.
   B. Low battery condition sensed.
   C. Overflow condition sensed.

      ○ The following actions will occur:

1. The main brushes will turn off and rise.

2. The edge scrub will turn off and retract.

3. The solution flow will turn off.

4. The detergent pump will turn off.

5. A 7 second delay will pass, and the squeegee will rise.

6. Another 4 second delay will pass and the vacuum fan will turn off.

   ○ *Note: If neutral is sensed for several seconds, the brushes turn off.*

- DETERGENT (SCRUB MODE):

  ○ Pressing the detergent button will toggle the function on and off. Holding the detergent button will cause the display to scroll through its two speeds. The detergent pump will run only if the main scrub brushes are active and the machine is propelling forward.

  1. OFF (No arrows present on detergent icon)
     ☞ **Detergent pump off**

  2. LOW (One arrow present on detergent icon)
     ☞ **Detergent pump low**

  3. HIGH (Two arrows present on detergent icon)
     ☞ **Detergent pump high**

- ES™ (SCRUB MODE):

  ○ Pressing the ES™ button will enable or disable the ES™ function. In order for the ES™ float to become active, it must be consistently in the up position for at least 10 seconds. If the ES™ function is enabled and the ES™ float becomes active, the following actions will occur.

  1. The ES™ pump will begin to run.

  2. The ES™ pump will continue to run for 30 seconds after the ES™ float becomes uncovered, or until the solution tank full float becomes covered.

- OVERFLOW (SCRUB MODE):

  ○ In order for the recovery tank float to become active, it must be consistently in the up position for at least 10 seconds. If the scrub or vacuum fan are active and the tank full float becomes active the overflow icon will appear, the audible alarm will sound for 5 seconds, and the scrub and squeegee functions will be canceled. The overflow icon will not turn off by simply emptying the recovery tank. The scrub or squeegee buttons must be pressed, or the key switch must be cycled.

MAINTENANCE MODES

The 7300 front panel has a total of eight maintenance modes. The operator can access the maintenance modes by turning the machine off, pressing and holding the button inside the Tennant logo, turning the machine on, holding the button for about 15 seconds, and releasing it. At that point, the panel will display the maintenance modes (three at a time). The operator can scroll through the maintenance modes using the logo button.

Operating Modes	Entry Sequence (how to activate)
Manual Mode; *Manually operate discrete functions without interlocks.* More info pages 4-89 and 4-90	1. Turn off the machine 2. Press and hold the logo button 3. Turn on the machine 4. Hold the logo button for 15 seconds 5. Release the logo button 6. Select Manual mode
Input Display Mode; *Display the state of floats, limit switches, and sensors.* More info page 4-91	1. Turn off the machine 2. Press and hold the logo button 3. Turn on the machine 4. Hold the logo button for 15 seconds 5. Release the logo button 6. Press and release the logo button 7. Select Input mode
Self Test Mode; *Checks normal operation.* More info page 4-92	1. Turn off the machine 2. Press and hold the logo button 3. Turn on the machine 4. Hold the logo button for 15 seconds 5. Release the logo button 6. Press and release the logo button twice 7. Select Self Test mode
Time Adjust Mode; *This mode is used to set the internal clock.* More info page 4-93	1. Turn off the machine 2. Press and hold the logo button 3. Turn on the machine 4. Hold the logo button for 15 seconds 5. Release the logo button 6. Press and release the logo button 7. Press the Set Clock button

Operating Mode	Entry Sequence (how to activate)
Manual Mode; *Manually operate discrete functions without interlocks.*	1. Turn off the machine 2. Press and hold the logo button 3. Turn on the machine 4. Hold the logo button for 15 seconds 5. Release the logo button 6. Select Manual mode

MANUAL MODE

In this mode, the operator can turn on and off accessories individually and manually. In the manual mode, the operator can turn on accessories without regard to inputs or interlocks. If, for instance, the operator enables the ES™ pump in the manual mode, it will run regardless of whether or not the ES™ float is in the water.

- TO INITIATE:

1. Turn off the machine.
2. Press and hold the logo button.
3. Turn on the machine.
4. Hold the logo button for 15 seconds.
5. Release the logo button.
6. Select Manual mode.

■ **OPERATION:**

☞ All of the following operations are accessed by scrolling to the appropriate screen using the logo button.

□ ES™ (scrub mode):
Pressing the ES™ button in the manual mode turns on and off the ES™ pump.

□ EDGE SCRUB BUTTON (scrub mode):
Pressing the Edge Scrub button will extend or retract the scrub head.

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- **OPERATION:**

  - SQUEEGEE BUTTON (scrub mode):

    Pressing the Squeegee button will turn on the vacuum fan and lower the squeegee. Reverse is ignored.

  - SCRUB BUTTON (idle, scrub mode):

    Pressing the Scrub button will turn on and lower the main scrub head. The brush head actuator will continue to lower until the scrub button is released. Reactivating the scrub button will turn off the scrub brushes and raise the head.

NOTE: DO NOT hold the button long enough to drive the brush into the ground. The actuator could be damaged.

  - DETERGENT BUTTON (scrub mode):

    Pressing the Detergent button will cause the detergent LED's to scroll. If no LED's are on, the detergent pump will be off. If one LED is illuminated, the detergent pump will run in low speed If both LED's are on, the detergent pump will run in high speed. The water valve will also turn on whenever the detergent pump is running.

Operating Mode	Entry Sequence (how to activate)
Input Display Mode; *Display the state of floats, limit switches, and sensors.*	1. Turn off the machine 2. Press and hold the logo button 3. Turn on the machine 4. Hold the logo button for 15 seconds 5. Release the logo button 6. Press and release the logo button 7. Select Input mode

INPUT DISPLAY MODE

In this mode, the operator can observe whether or not inputs to the panel are operating as intended. In the Input display mode, the LED's on the instrument panel, and and the graphics screen, display the state if each input to the controller board.

- TO INITIATE:

1. Turn off the machine.
2. Press and hold the logo button.
3. Turn on the machine.
4. Hold the logo button for 15 seconds.
5. Release the logo button.
6. Press and release the logo button.
7. Select Input mode.

PANEL LED	INPUT SIGNAL
ES ICON AND LED	ES FLOAT
OVERFLOW ICON AND LED	FULL RECOVERY TANK
LEFT ARROW	REVERSE LIMIT SWITCH
RIGHT ARROW	FORWARD LIMIT SWITCH
SOLUTION FULL ICON AND LED	SOLUTION FULL FLOAT

Operating Mode	Entry Sequence (how to activate)
Self Test Mode; *Checks normal operation.*	1. Turn off the machine 2. Press and hold the logo button 3. Turn on the machine 4. Hold the logo button for 15 seconds 5. Release the logo button 6. Press and release the logo button twice 7. Select Self Test mode

SELF TEST MODE

If the operator selects the Self test mode, the panel will run a self test on each output. If the panel passes the diagnostics, the OK indicator is illuminated on the graphics display. If the panel fails, the pin number of the controller connector for the failing output will be printed on the screen. The technician can use this information, in combination with the machine schematic, to determine which devices are on failing outputs. The technician should then unplug the offending device, and re-run the self test. If the OK icon now comes on, the controller board is probably good, and the device that was unplugged was probably shorted.

- TO INITIATE:

1. Turn off the machine.
2. Press and hold the logo button.
3. Turn on the machine.
4. Hold the logo button for 15 seconds.
5. Release the logo button.
6. Press and release the logo button twice.
7. Select Self Test mode.

Operating Mode	Entry Sequence (how to activate)
Time Adjust Mode; *This mode is used to set the internal clock.*	1. Turn off the machine 2. Press and hold the logo button 3. Turn on the machine 4. Hold the logo button for 15 seconds 5. Release the logo button 6. Press and release the logo button 7. Press the Set Clock button

SET CLOCK

This mode is used to set the internal clock.

- TO INITIATE:

1. Turn off the machine.
2. Press and hold the logo button.
3. Turn on the machine.
4. Hold the logo button for 15 seconds.
5. Release the logo button.
6. Press and release the logo button.
7. Press the set clock button.

○ **In the Set clock mode, the touch panel functions as follows:**

+ BUTTON	INCREMENT UNDERLINED SEGMENT
- BUTTON	DECREMENT UNDERLINED SEGMENT
RIGHT ARROW	SHIFT UNDERLINE TO NEXT SEGMENT ON RIGHT
LEFT ARROW	SHIFT UNDERLINE TO NEXT SEGMENT ON LEFT
12/24	SELECT 12 OR 24 HOUR CLOCK

CHECK MAINTENANCE MODE:

The check maintenance mode allows the operator to store and monitor the elapsed time between 6 different required maintenance items. Each maintenance items is represented by an icon with the recommended elapsed time interval (in hours) printed below it. The lower left corner of the screen displays the number of hours that have elapsed since this maintenance timer was last reset. The button at the upper right corner of the screen will reset the hour counter for this maintenance item. The operator can scroll through the various maintenance items by pressing the logo button.

If the operator presses the reset button each time one of these maintenance items is performed, this feature will act as an accurate maintenance log, and the reminder for the machine.

- **If the Enable maintenance button from maintenance screen 3 is activated:**

The operator will get a 10 second alert each time the machine is started, if one or more of the maintenance hour counters goes beyond the recommended interval.

SCRUB CIRCUIT BOARD PIN FUNCTIONS

PIN NUMBER	FUNCTION	ACTIVE VOLTAGE	INACTIVE VOLTAGE
P1–1, P1–2	Input, Power	B+	0 VDC
P1–9	Input, logic power	B+	0 VDC
P2–1, 2, 3, 4, 5, 6, 7, and 8	Outputs	0 VDC	B+
P2–5	Detergent pump output	High speed – ???? (measured across the pump) Low speed – ???? volts (measured across the pump)	0 VDC across the motor.
P1–5, 6 and 10	Grounds	B–	B–
P4–7	Battery Disconnect sensed	B+ = Connected	B– = Disconnected
P3–1 and 2	Forward/Reverse sensed	B+	0 VDC
P3–3, 4, 5, 6, 7, 8, and 10	Inputs	B–	5 VDC
P4–6 and P4–3	Shunt High inputs	0 – 62.5mV (Depends on brush current level and shunt selection)	0 VDC
P4–1, 2, 4 and 5	Shunt low and shields	Ground	Ground
P1–3 and 4	Scrub Brush up/dn act	0 to approx. B+. (Depends on act. Position.)	0 VDC across the motor
P1–7 and 8	Squeegee up/dn act.	0 to approx. B+. (Depends on act. Position.)	0 VDC across the motor
P1–11 and 12	Edge scrub in/out act.	0 to approx. B+. (Depends on act. Position.)	0 VDC across the motor

POWER UP TESTING:

OPERATION:

1) Keyswitch in the start position–

Current flows into the keyswitch terminal 50.
Current flows out of the keyswitch terminal 15, turning on M1A contactor.

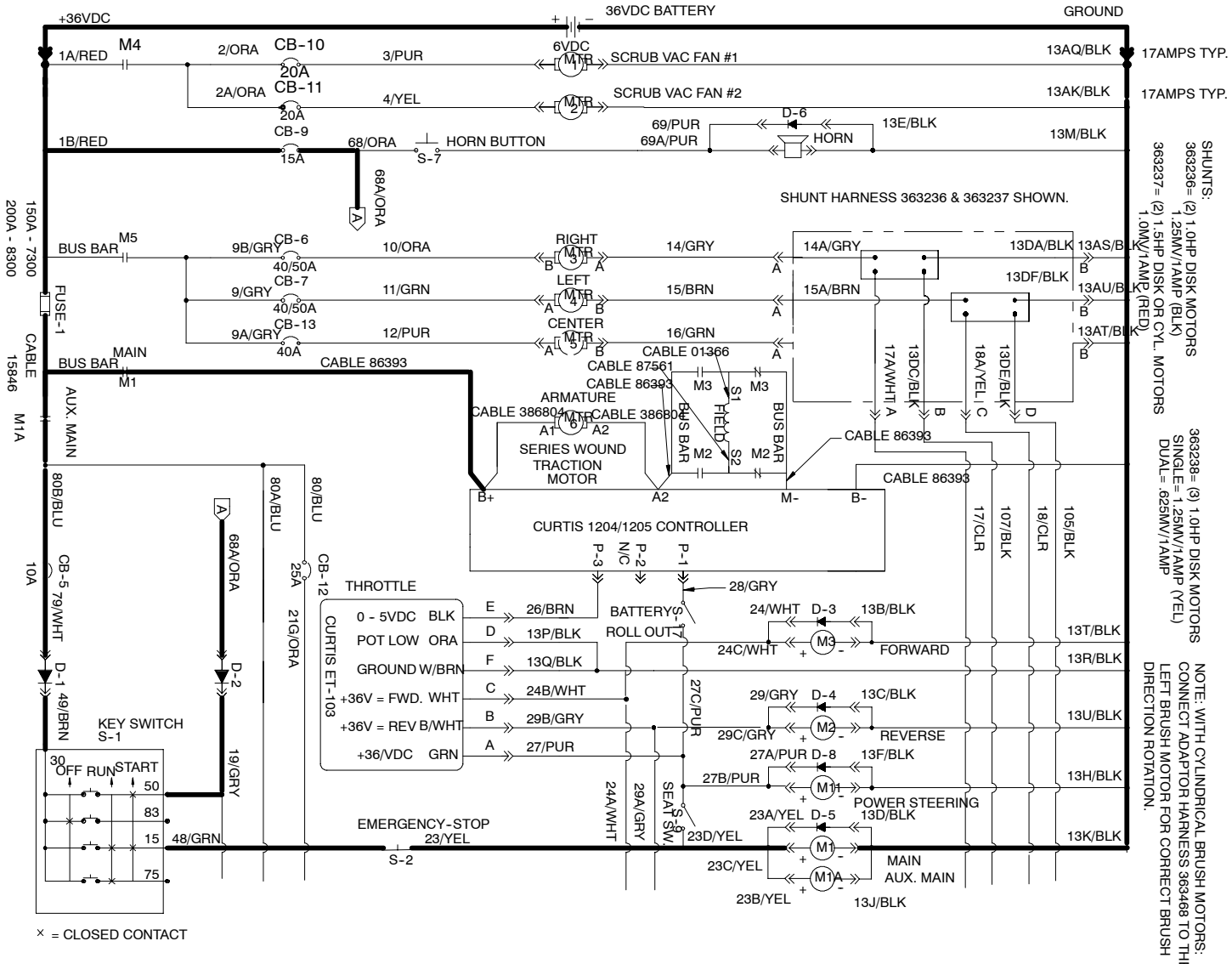
2) Release keyswitch to the run position–

Current flows through M1A contacts, into keyswitch pin 30.
Current flows out of keyswitch terminal 15, holding M1A contactor on, keeping the machine powered up.

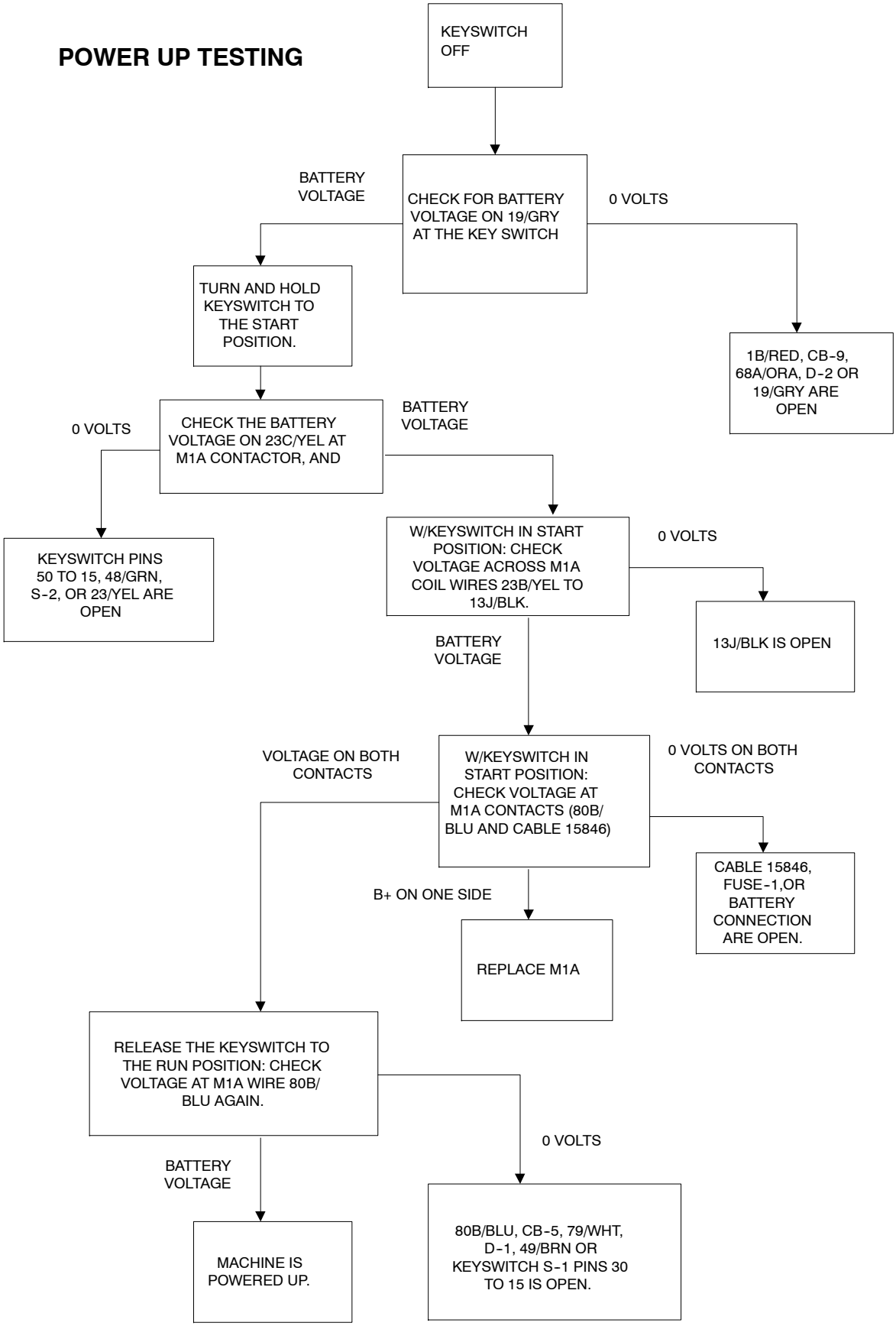
3) Keyswitch to the off position–

M1 is turned off by the keyswitch or emergency switch. Machine turns off.

POWER UP TESTING



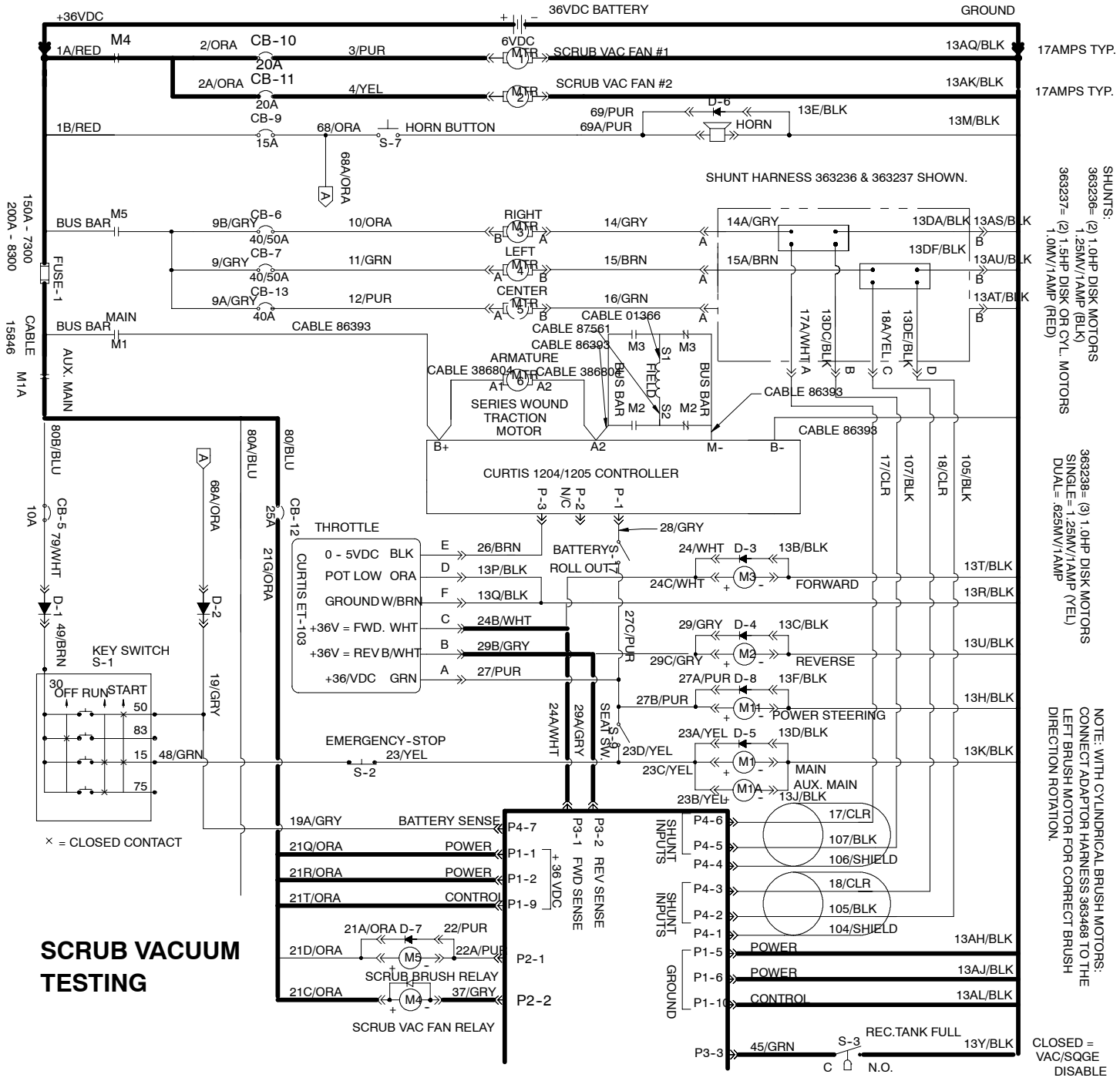
POWER UP TESTING



SCRUB VACUUM FAN TESTING:

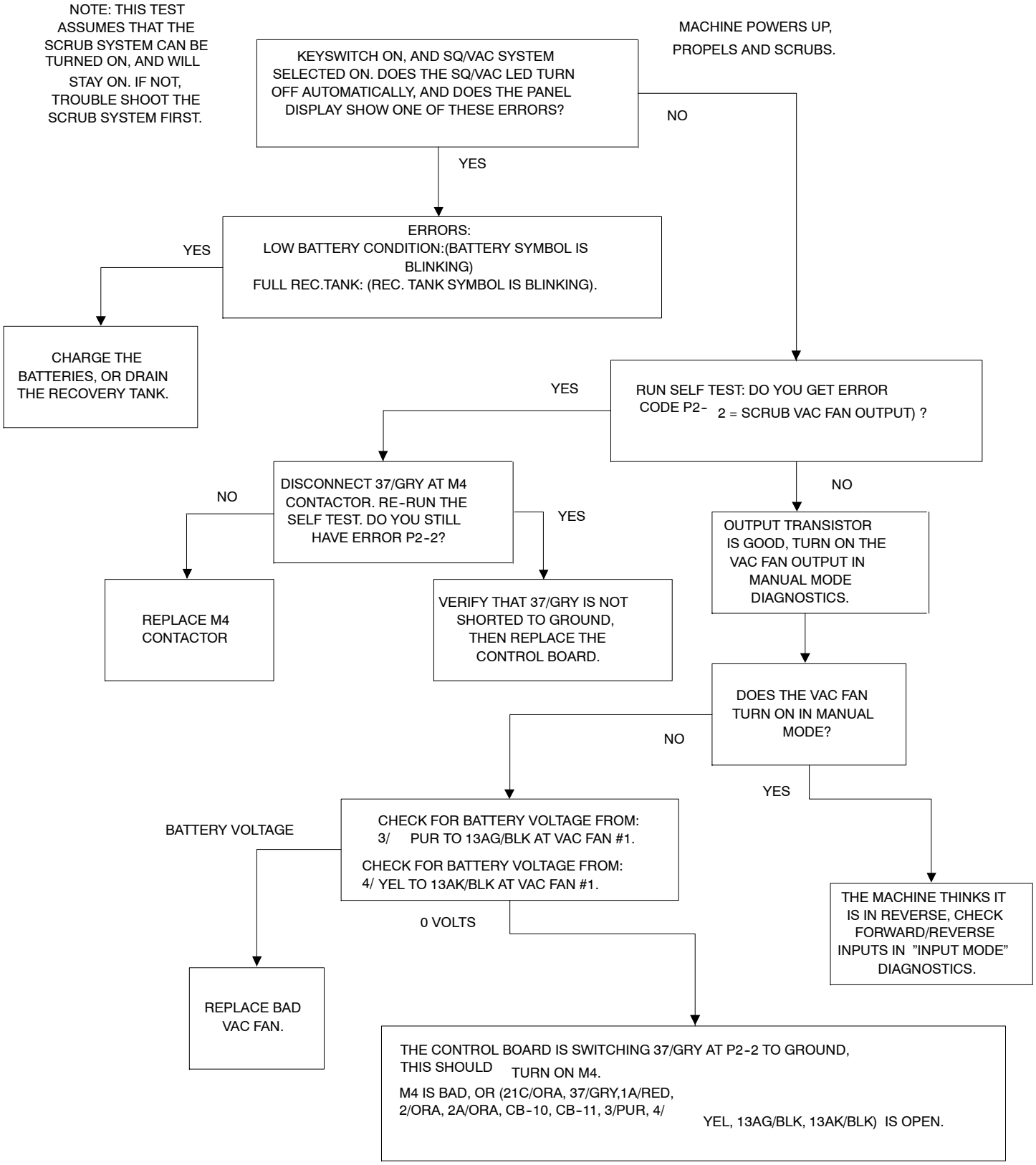
OPERATION: To enable the scrub vacuum fan the following conditions must occur:
Squeegee/Scrub Vacuum system must be selected on the touch panel. (associated LED will be on.)
Machine in neutral or forward position.
No "low battery condition" sensed.
No "full recovery condition" sensed.

VACUUM MOTOR TURNS ON:
37/GRY is switched to ground at the control board P2-2.
M4 contactor turns on, supplying power to the vacuum fans, through CB-10 and CB-11.
Note: This testing assumes that the machine powers up and propels.



SCRUB VACUUM TESTING

SCRUB VACUUM TESTING



TOUCH PANEL AND RIBBON CABLE TESTING:

This test assumes that machine powers up and propels.

OPERATION OF TOUCH PANEL LED□S (LIGHTS):

P5–2 = Supplies +5VDC to each LED.

P5_25 through P5–31 will light an LED if they are pulled to ground by the control board.

OPERATION OF SWITCHES:

P5–1 and P5–16 = Supplies ground to each switch.

P5–25 = Pulled to ground by lower left switch.

P5–26 = Pulled to ground by upper right switch.

P5–27 = Pulled to ground by center right switch.

P5–28 = Pulled to ground by center left switch.

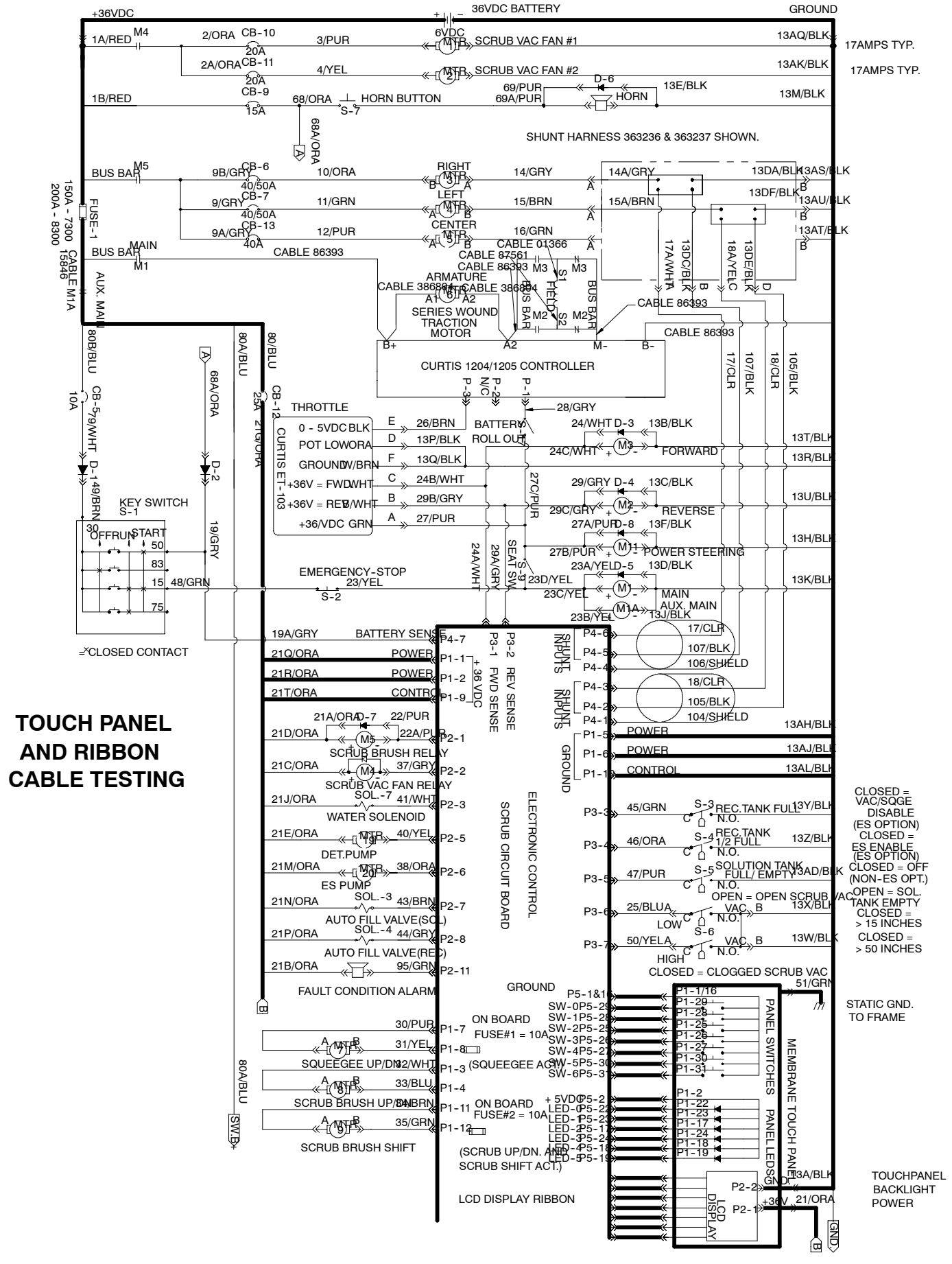
P5–29 = Pulled to ground by upper left switch.

P5–30 = Pulled to ground by lower right switch.

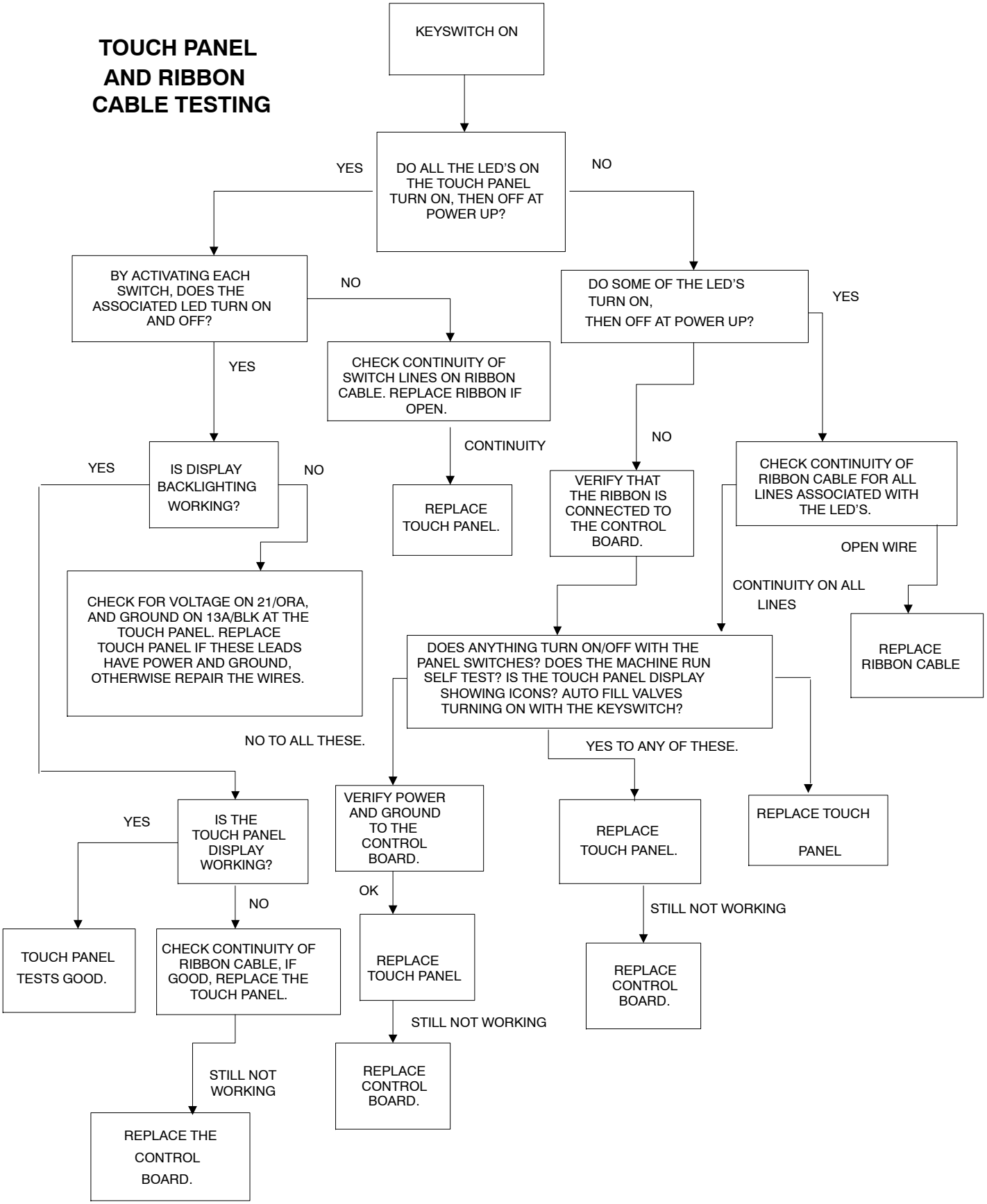
P5–31 = Pulled to ground by Tennant Logo switch.

See schematic on following page.

TOUCH PANEL AND RIBBON CABLE TESTING



TOUCH PANEL AND RIBBON CABLE TESTING



PROPEL TESTING

OPERATION:

Note: This test assumes that machine has passed power up testing.

M1 contactor supplies battery voltage to the Curtis motor controller, and the propel motor at power up.

M1A (aux. Main contactor) supplies battery voltage to the electronic throttle, and the logic input of the Curtis motor controller (P1).

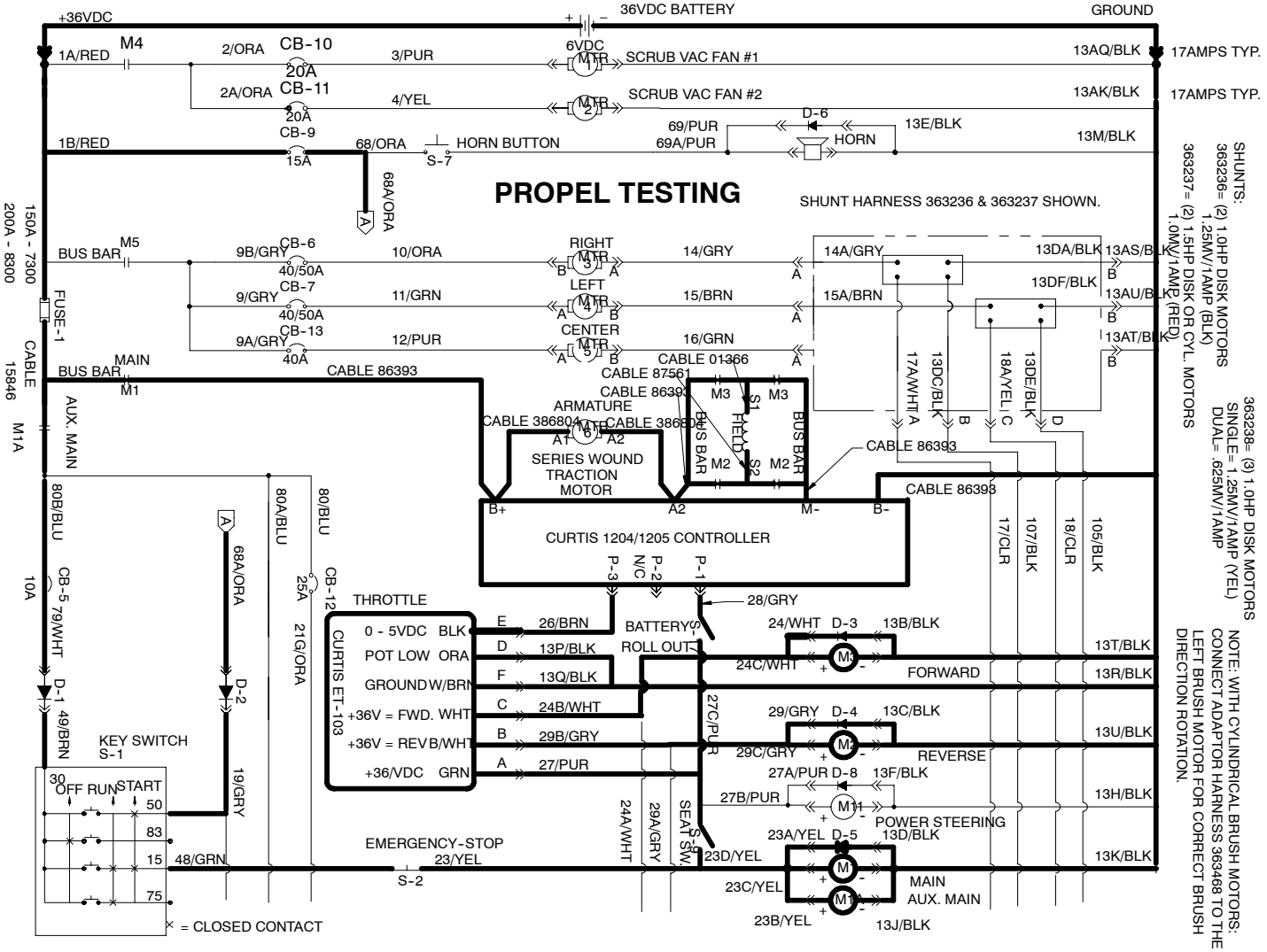
Electronic throttle supplies voltage to the forward or reverse contactor when the pedal is activated. This will connect the motor field winding to the motor controllers output in the proper direction.

Electronic throttle will supply a variable voltage to the P3 input of the motor controller. This voltage represents the throttle positioning. (0 volts = neutral, +5VDC = full throttle)

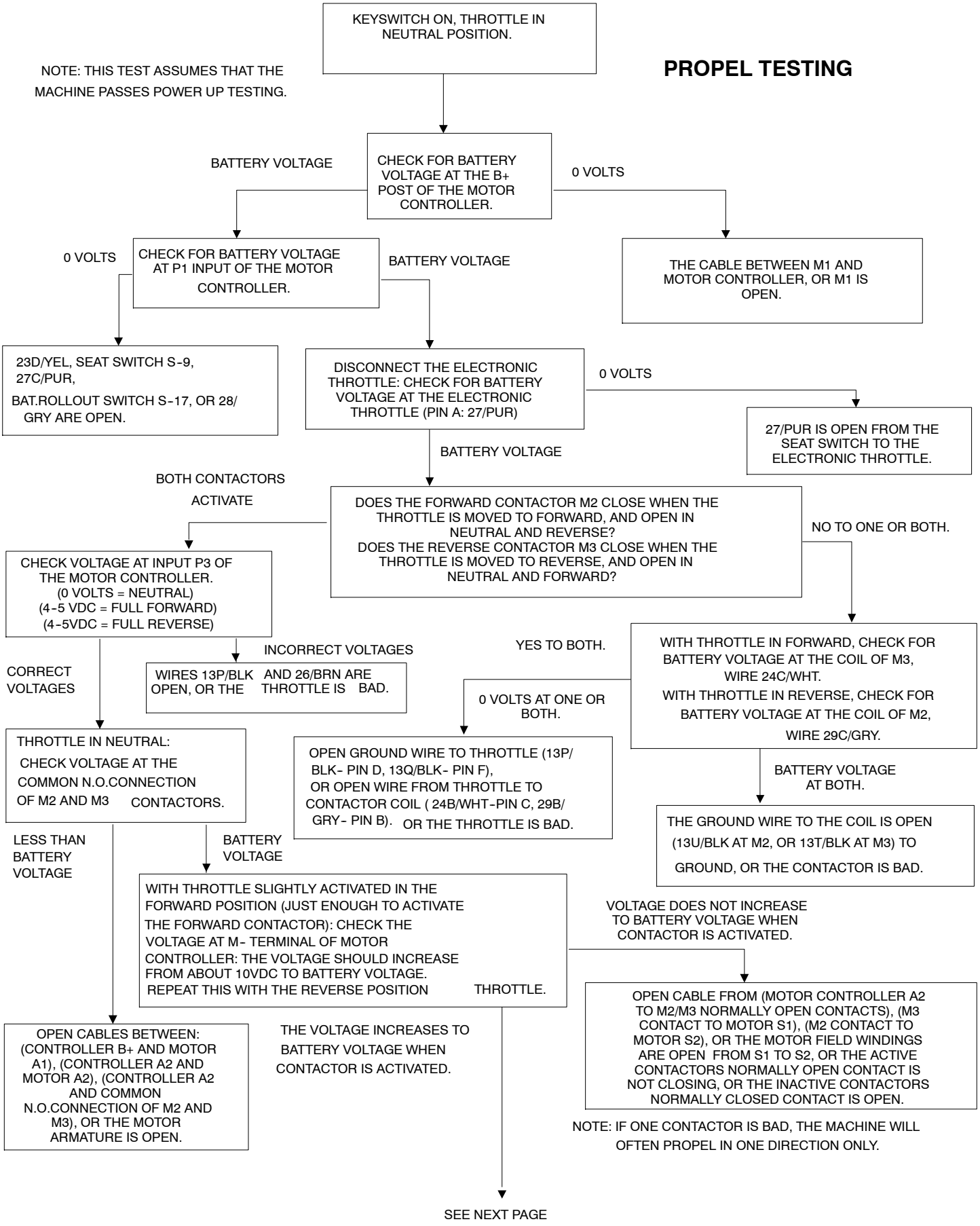
The Curtis Motor controller power output (M-) is pulsed to ground at a high frequency(PWM controlled output). The duty cycle of this output pulsing is directly related to the throttle position. When the duty cycle of the output pulsing in increased, the propel motor turns faster and the machine speed increases.

Removing power (open: keyswitch, emergency stop switch, seat switch, battery roll out switch, CB5 , fuse-1) to the motor controller logic input (P1) will turn off the PWM output.

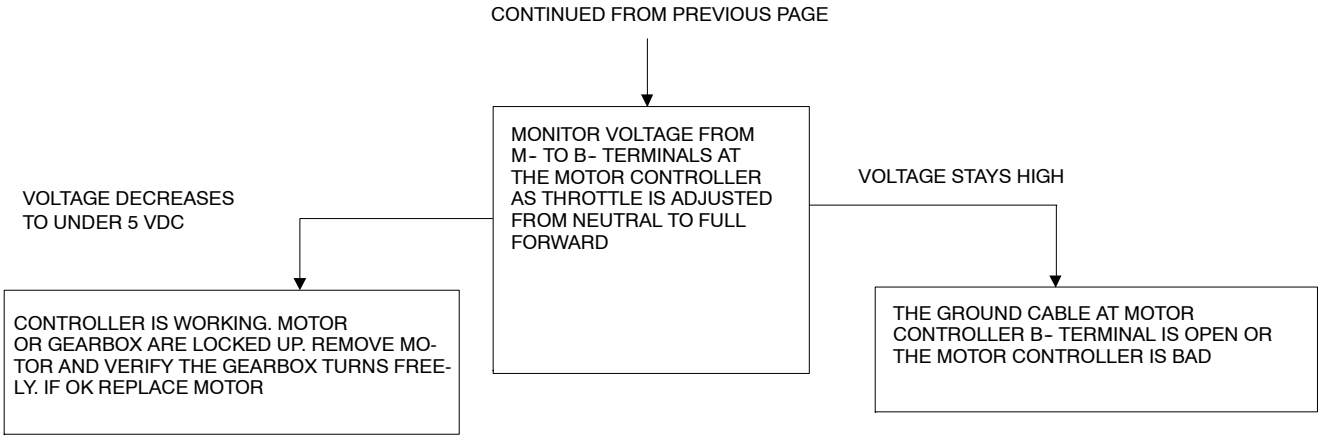
NOTE:
For safety reasons: Before maintenance work is done on the propel system, the machine should be jacked up with the front propel wheel off the ground.



PROPEL TESTING



PROPEL TESTING
CONTINUED



SCRUB TESTING:

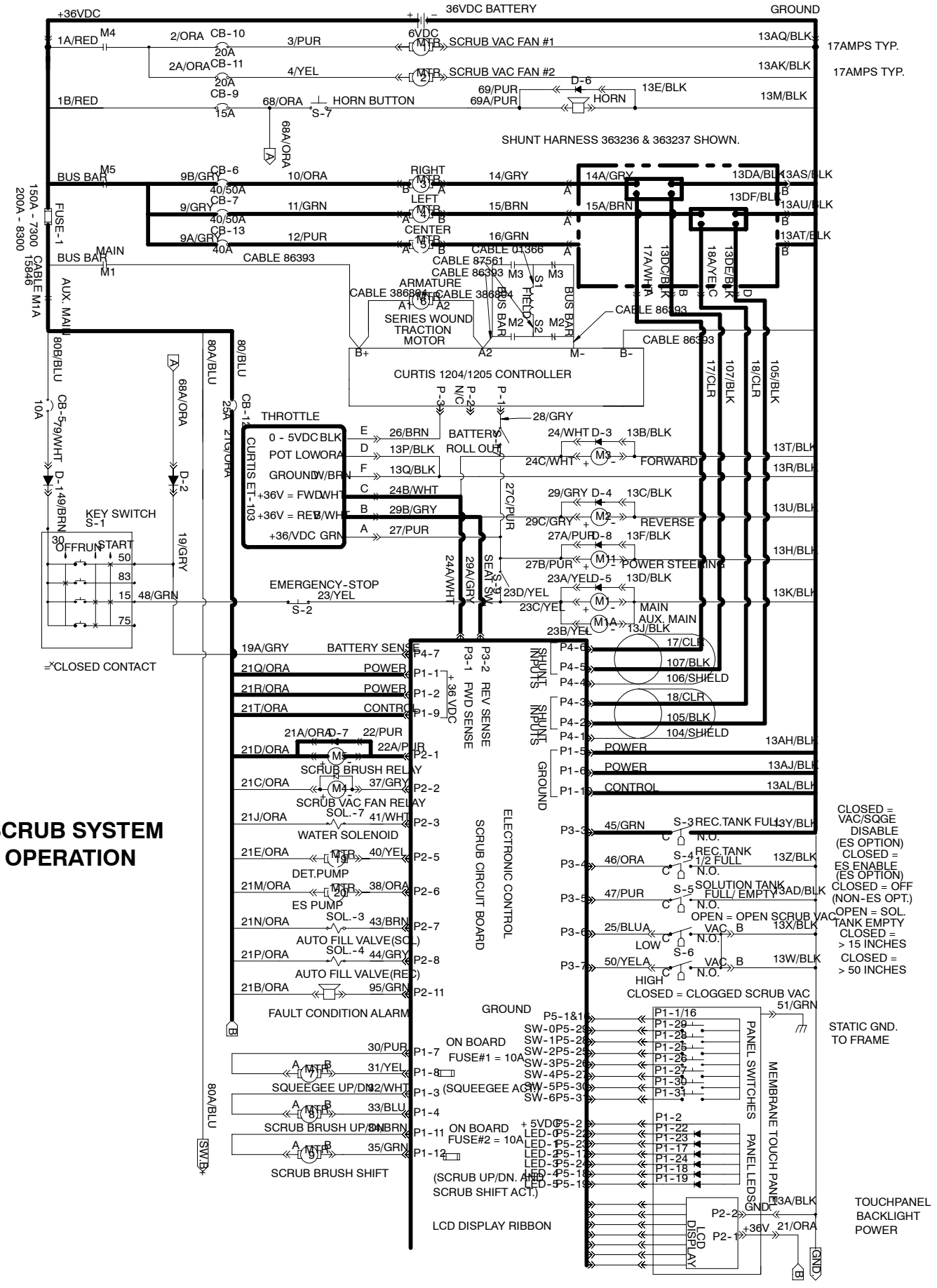
OPERATION: Scrub system is selected on the touchpanel, the associated LED will turn on.
When forward propel is sensed, the system is activated.
The control board pulls 22A/PUR to ground at P2–1, turning on M5 contactor (scrub brush).
M5 contactor closes, supplying power to the (2 or 3) brush motors through CB–6,7 and 13. The brush motors turn on.
The brush motor current flows through the brush motor shunt. This shunt produces 1.25mV (1.00mV for heavy duty motors) per amp of brush current.
The control board reads the shunt signal, and lowers the brush head actuator until the desired brush current is obtained. The control board will continue to lift and lower the brush head actuator to keep the brush current in the proper amperage range.
If the machine has edge scrub option, and it has been selected, the brush head shift actuator will extend, extending the brush head out.

SYSTEM INHIBITS:
Neutral or reverse will turn off the brushes/vac and lift the head after a delay.
Full recovery tank will automatically turn off the scrub system, and flash the rec. tank icon.
Low battery will automatically turn off the scrub system, and flash the battery icon.
Sensing no current from one of the shunts will automatically turn off the scrub system, and flash a circuit breaker icon.

Note: This testing assumes that the machine powers up and propels.

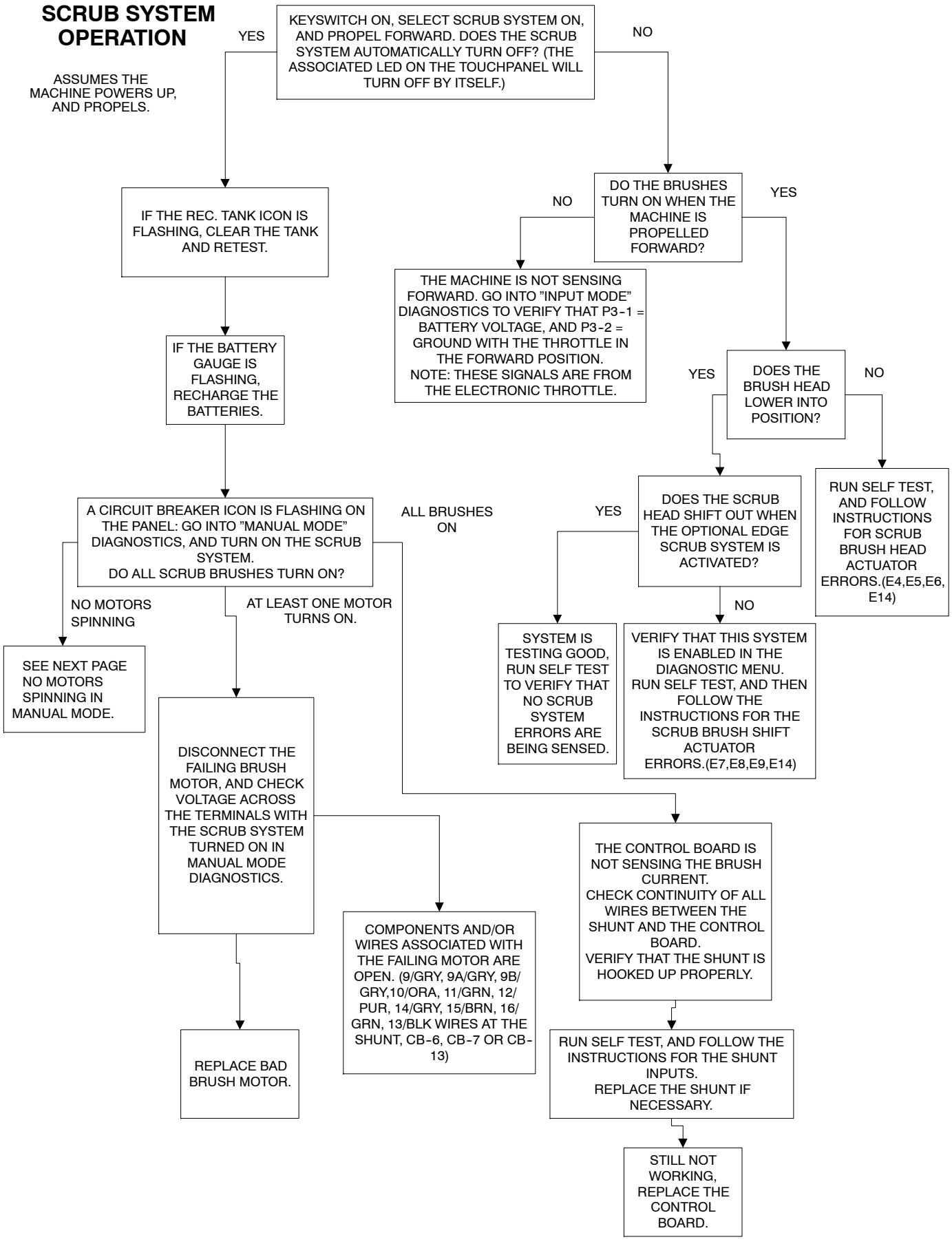
See schematic on following page.

SCRUB SYSTEM OPERATION



SCRUB SYSTEM OPERATION

ASSUMES THE MACHINE POWERS UP, AND PROPELS.



TOUCH PANEL ERROR CODES

E-4 = THE CIRCUIT BOARD IS SENSING SCRUB HEAD ACTUATOR CURRENT WITH THE ACTUATOR TURNED OFF. REPLACE THE CONTROL BOARD.

E-5 = STALLED OR JAMMED SCRUB HEAD ACTUATOR. VERIFY THAT 32/WHT AND 33/BLU ARE NOT SHORTED TOGETHER, THEN REPLACE THE SCRUB HEAD UP DOWN ACTUATOR.

E-6 = OPEN SCRUB HEAD ACTUATOR. VERIFY THAT 32/WHT AND 33/BLU ARE NOT OPEN, THEN REPLACE THE SCRUB HEAD ACTUATOR.

E-7 = THE CIRCUIT BOARD IS SENSING SCRUB SHIFT ACTUATOR CURRENT WITH THE ACTUATOR TURNED OFF. REPLACE THE CONTROL BOARD.

E-8 = STALLED OR JAMMED SCRUB SHIFT ACTUATOR. VERIFY THAT 34/BRN AND 35/GRN ARE NOT SHORTED TOGETHER, THEN REPLACE THE SCRUB SHIFT ACTUATOR.

E-9 = OPEN SCRUB SHIFT ACTUATOR. VERIFY THAT 34/BRN AND 35/GRN ARE NOT OPEN, THEN REPLACE THE SCRUB SHIFT ACTUATOR.

E-14 = OPEN FUSE 2 ON CONTROL BOARD. BRUSH HEAD OR EDGE SHIFT ACTUATOR IS DRAWING EXCESSIVE CURRENT, OR THE CONTROL BOARD OUTPUT IS BAD. GO TO MANUAL MODE, THEN PUT IN A NEW FUSE. LOWER AND EXTEND THE THE BRUSH HEAD, AND REPLACE WHICHEVER ACTUATOR CAUSES THE FUSE TO BLOW AGAIN. IF IT STILL BLOWS A FUSE, REPLACE THE CONTROL BOARD.

NOTE: FUSE 1 AND FUSE 2 ARE LOCATED ON THE SCRUBBING CIRCUIT BOARD. THE CIRCUIT BOARD IS LOCATED IN THE SMALL CONTROL PANEL AT THE LEFT OF THE STEERING COLUMN

CONTINUED ON NEXT PAGE

TOUCH PANEL ERROR CODES

E-1 = THE CIRCUIT BOARD IS SENSING SQUEEGEE ACTUATOR CURRENT WITH THE ACTUATOR TURNED OFF. REPLACE THE CONTROL BOARD.

E-2 = STALLED OR JAMMED ACTUATOR. VERIFY THAT 30/PUR AND 31/YEL ARE NOT SHORTED TOGETHER, THEN REPLACE THE SQUEEGEE ACTUATOR.

E-3 = OPEN ACTUATOR. VERIFY THAT 30/PUR AND 31/YEL ARE NOT OPEN, THEN REPLACE THE SQUEEGEE ACTUATOR.

E-13 = OPEN FUSE 1 ON CONTROL BOARD. SQUEEGEE ACTUATOR IS DRAWING EXCESSIVE CURRENT, OR THE CONTROL BOARD OUTPUT IS BAD. GO TO MANUAL MODE, THEN PUT IN A NEW FUSE. LOWER THE SQUEEGEE. REPLACE THE ACTUATOR IF THE FUSE BLOWS AGAIN. IF IT STILL BLOWS A FUSE, REPLACE THE CONTROL BOARD.

NOTE: FUSE 1 AND FUSE 2 ARE LOCATED ON THE SCRUBBING CIRCUIT BOARD. THE CIRCUIT BOARD IS LOCATED IN THE SMALL CONTROL PANEL AT THE LEFT OF THE STEERING COLUMN

E16 = P4-6 SHUNT SIGNAL IS LOW = LOW CURRENT SENSED FROM RIGHT BRUSH MOTOR SHUNT. VERIFY BRUSH MOTOR IS ON, AND AMPERAGE IS WITHIN SPECIFICATIONS, AND SHUNT IS HOOKED UP PROPERLY. THEN REPLACE THE SHUNT.

E17 = P4-6 SHUNT SIGNAL IS HIGH = EXCESSIVE CURRENT SENSED FROM RIGHT BRUSH MOTOR SHUNT. VERIFY BRUSH MOTOR IS SPINNING FREELY, AND AMPERAGE IS WITHIN SPECIFICATIONS, AND SHUNT IS HOOKED UP PROPERLY.
(KEYSWITCH OFF) DISCONNECT P4 FROM THE CONTROL BOARD, AND CHECK CONTINUITY BETWEEN (P4-6 AND P4-5) AND (P4-3 AND P4-2). IF AN OPEN EXISTS: SHUNT WIRES OR SHUNT ARE OPEN. IF CONTINUITY EXISTS: REPLACE THE SHUNT, THEN REPLACE THE CONTROL BOARD.

E18 = P4-3 SHUNT SIGNAL IS LOW = LOW CURRENT SENSED FROM LEFT (OR LEFT AND CENTER) BRUSH MOTOR SHUNT. VERIFY BRUSH MOTOR(S) IS ON, AND AMPERAGE IS WITHIN SPECIFICATIONS, AND SHUNT IS HOOKED UP PROPERLY. THEN REPLACE THE SHUNT.

E19 = P4-3 SHUNT SIGNAL IS EXCESSIVE = EXCESSIVE CURRENT SENSED FROM LEFT (OR LEFT AND CENTER) BRUSH MOTOR SHUNT. VERIFY BRUSH MOTOR(S) IS SPINNING FREELY, AND AMPERAGE IS WITHIN SPECIFICATIONS, AND SHUNT IS HOOKED UP PROPERLY.
(KEYSWITCH OFF) DISCONNECT P4 FROM THE CONTROL BOARD, AND CHECK CONTINUITY BETWEEN (P4-6 AND P4-5) AND (P4-3 AND P4-2). IF AN OPEN EXISTS: SHUNT WIRES OR SHUNT ARE OPEN. IF CONTINUITY EXISTS: REPLACE THE SHUNT, THEN REPLACE THE CONTROL BOARD.

NOTE: THE SHUNT SIGNAL, REPRESENTING BRUSH MOTOR CURRENT, BEING READ BY THE CONTROL BOARD, CAN BE MONITORED IN "CURRENT DISPLAY" DIAGNOSTIC MODE.

SQUEEGEE TESTING:

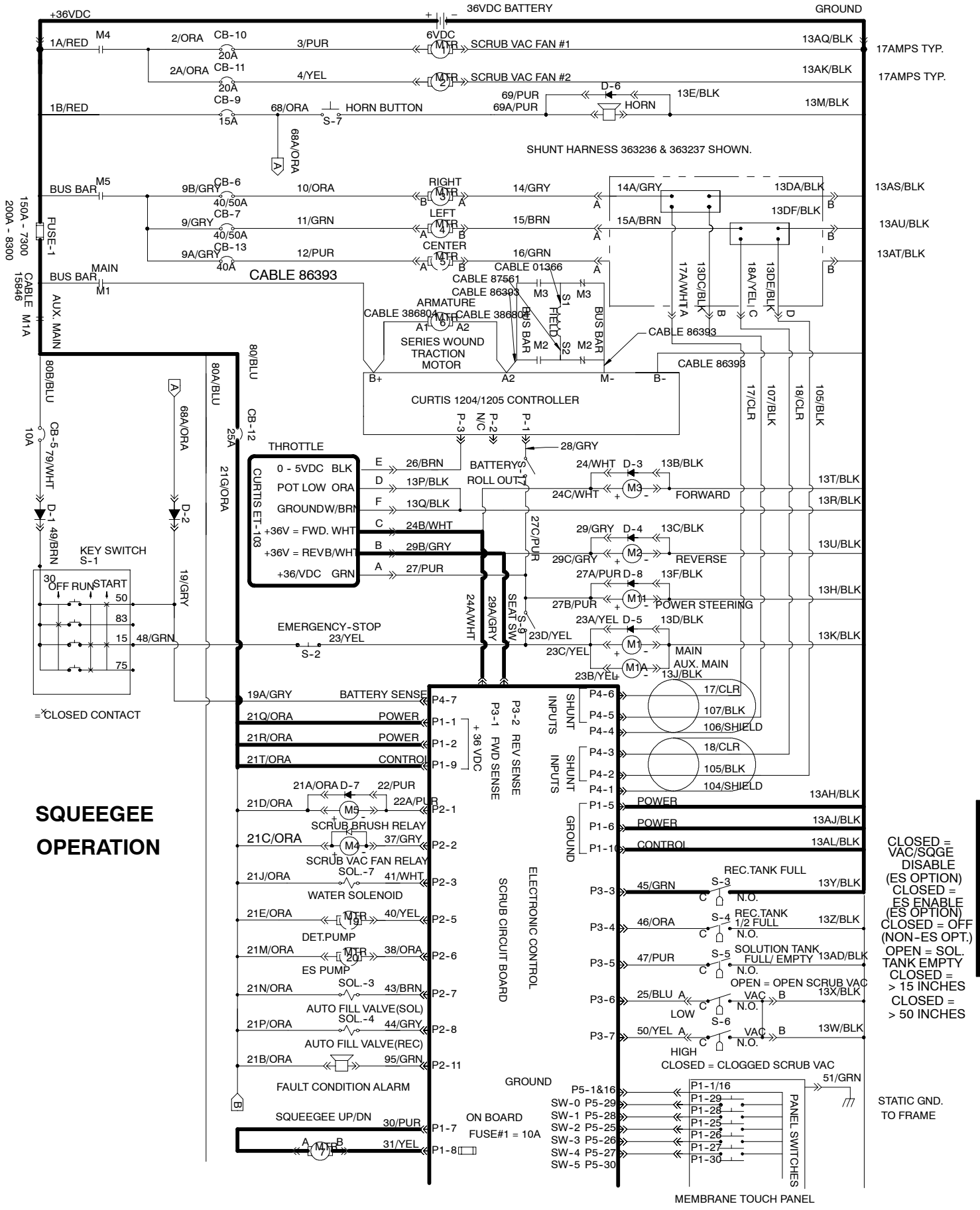
OPERATION: To lower the squeegee, the following conditions must occur:
Squeegee/Vacuum system must be selected on the touchpanel. (associated LED will be on.)
Machine in neutral or forward position.
No low battery condition sensed.
No full recovery condition sensed.

SQUEEGEE ACTUATOR EXTEND/LOWER:
30/PUR is switched to battery voltage at the control board P1-7.
31/YEL is pulsed to ground. This lowers the squeegee.
Once the squeegee actuator reaches the end of stroke, the stall current is sensed by the control board, and the output is turned off.
If no stall is sensed, the actuator will lower for a set time. (approx. 5-8 seconds.)

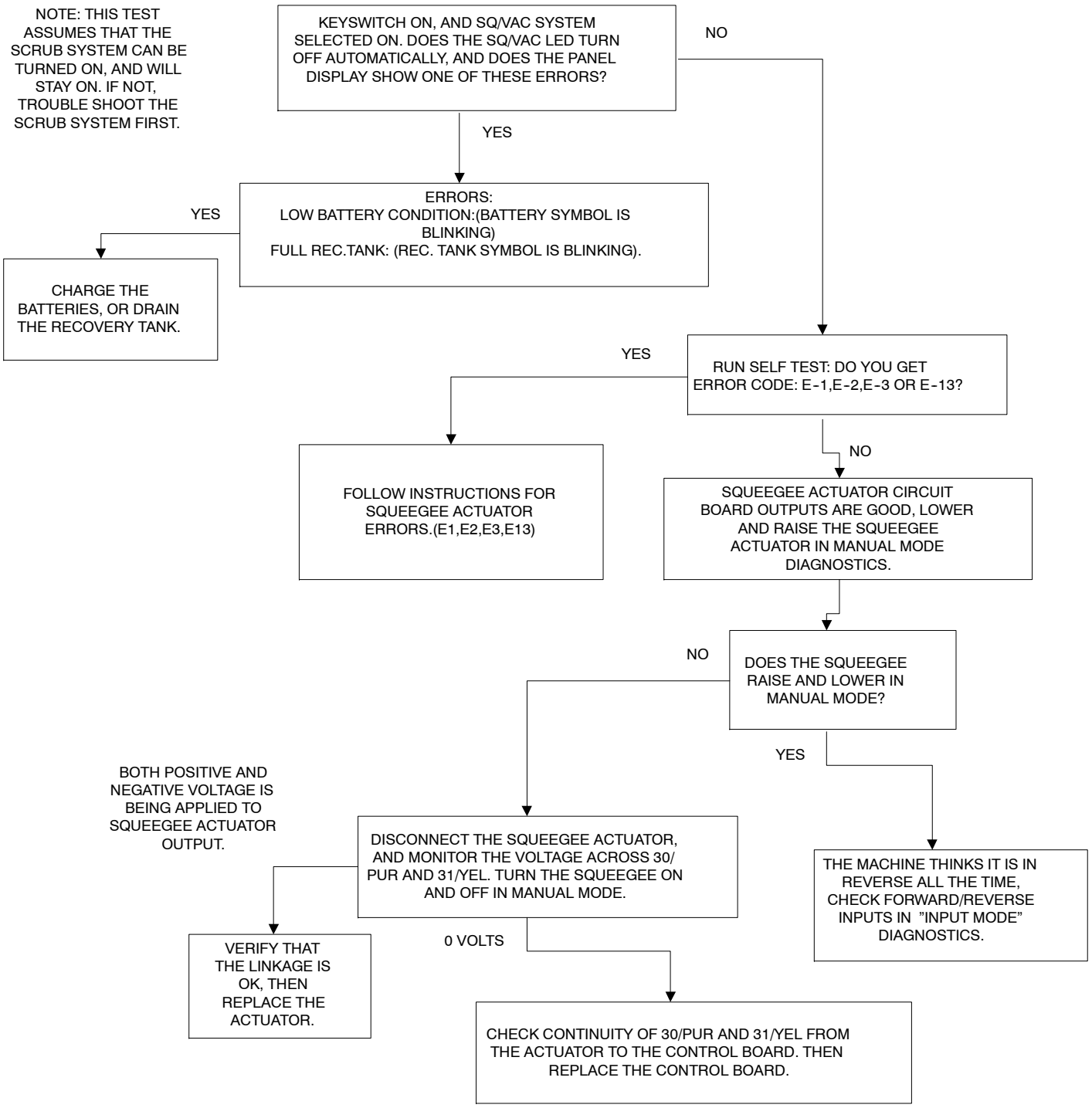
SQUEEGEE ACTUATOR RETRACT/LIFT:
31/YEL is switched to battery voltage at the control board P1-7.
30/PUR is pulsed to ground. This lowers the squeegee.
Once the squeegee actuator reaches the end of stroke, the stall current is sensed by the control board, and the output is turned off.
If no stall is sensed, the actuator will lower for a set time. (approx. 5-8 seconds.)

Note: This testing assumes that the machine powers up and propels.

See schematic on following page.


+36VDC
36VDC BATTERY
GROUND
SCRUB VAC FAN #1
SCRUB VAC FAN #2
HORN BUTTON
HORN
SHUNT HARNESS 363236 & 363237 SHOWN.
CABLE 86393
CABLE 01366
CABLE 87561
CABLE 86393
CABLE 38680A
CABLE 38680B
ARMATURE
SERIES WOUND TRACTION MOTOR
CURTIS 1204/1205 CONTROLLER
THROTTLE
0 - 5VDC BLK
POT LOW ORA
GROUNDW/BRN
+36V = FWD. WHT
+36V = REVB/WHT
+36VDC GRN
CURTIS ET-103
KEY SWITCH S-1
OFF RUN START
EMERGENCY-STOP
BATTERY ROLL OUT
FORWARD
REVERSE
POWER STEERING
MAIN
AUX. MAIN
= CLOSED CONTACT
SQUEEGEE OPERATION
BATTERY SENSE
POWER
CONTROL
SCRUB BRUSH RELAY
SCRUB VAC FAN RELAY
WATER SOLENOID
DET.PUMP
ES PUMP
AUTO FILL VALVE(SOL)
AUTO FILL VALVE(REC)
FAULT CONDITION ALARM
SQUEEGEE UP/DN
ON BOARD FUSE#1 = 10A
ELECTRONIC CONTROL
SCRUB CIRCUIT BOARD
SHUNT INPUTS
REC.TANK FULL
REC.TANK 1/2 FULL
SOLUTION TANK FULL/ EMPTY
OPEN = OPEN SCRUB VAC
LOW
HIGH
CLOSED = CLOGGED SCRUB VAC
PANEL SWITCHES
MEMBRANE TOUCH PANEL
CLOSED = VAC/SQGE DISABLE (ES OPTION)
CLOSED = ES ENABLE (ES OPTION)
CLOSED = OFF (NON-ES OPT.)
OPEN = SOL. TANK EMPTY
CLOSED = > 15 INCHES
CLOSED = > 50 INCHES
STATIC GND. TO FRAME
17AMPS TYP.
17AMPS TYP.

SQUEEGEE OPERATION



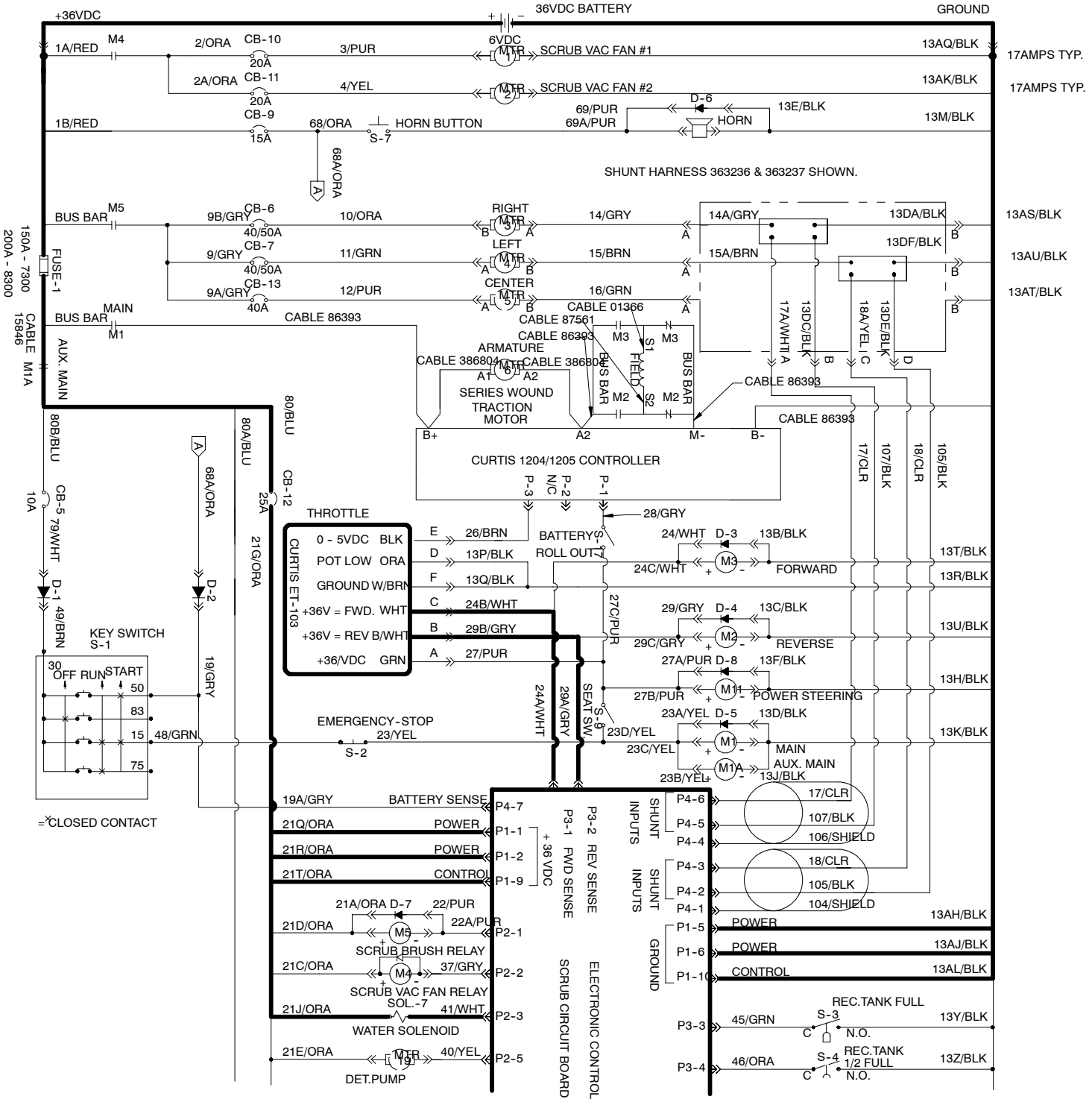
WATER VALVE TESTING:

DESCRIPTION: The water valve is activated whenever the scrub system is operating, and the machine is propelling forward.
Note: a mechanically operated valve controls the flow rate once the valve is turned on.

OPERATION:
The SCRUB system is turned on, and running.
The machine is propelled forward.
41/WHT (P2–3) is pulled to ground by the control board, turning on the water valve (sol.–7)
Note: A mechanically operated valve controls the flow rate once the valve is turned on.
Note: This testing assumes that the machine powers up and propels.

See schematic on following page.

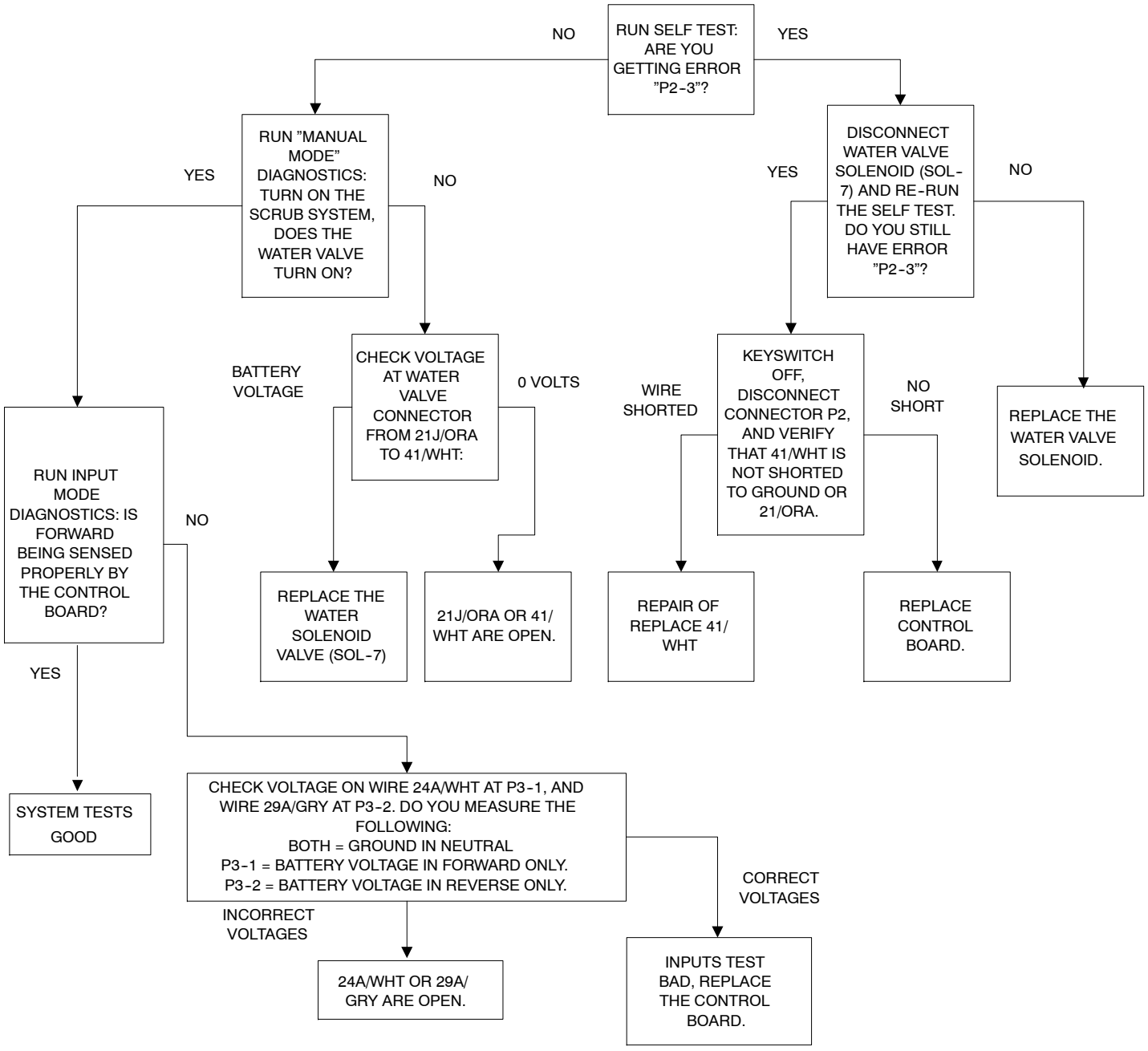
WATER VALVE TESTING



WATER VALVE TESTING

MACHINE POWERS UP AND PROPELS.

NOTE: THIS TEST ASSUMES THAT THE SCRUB SYSTEM CAN BE TURNED ON, AND WILL STAY ON. IF NOT, TROUBLE SHOOT THE SCRUB SYSTEM FIRST.



OPEN/CLOGGED SCRUB VAC SWITCH TESTING:

DESCRIPTION: With scrub system active: If the scrub vacuum pressure drops below 15 inches, the low side of S-6 opens, and an open vac icon appears on the touchpanel. If the scrub vacuum pressure exceeds 50 inches, the high side of S-6 closes, and a clogged vac icon appears.

OPERATION:

Scrub system is activated and running.

Under normal operating conditions the scrub vacuum pressure is between 15 and 50 inches, and the low side of S-6 is closed, and the high side of S-6 is open.

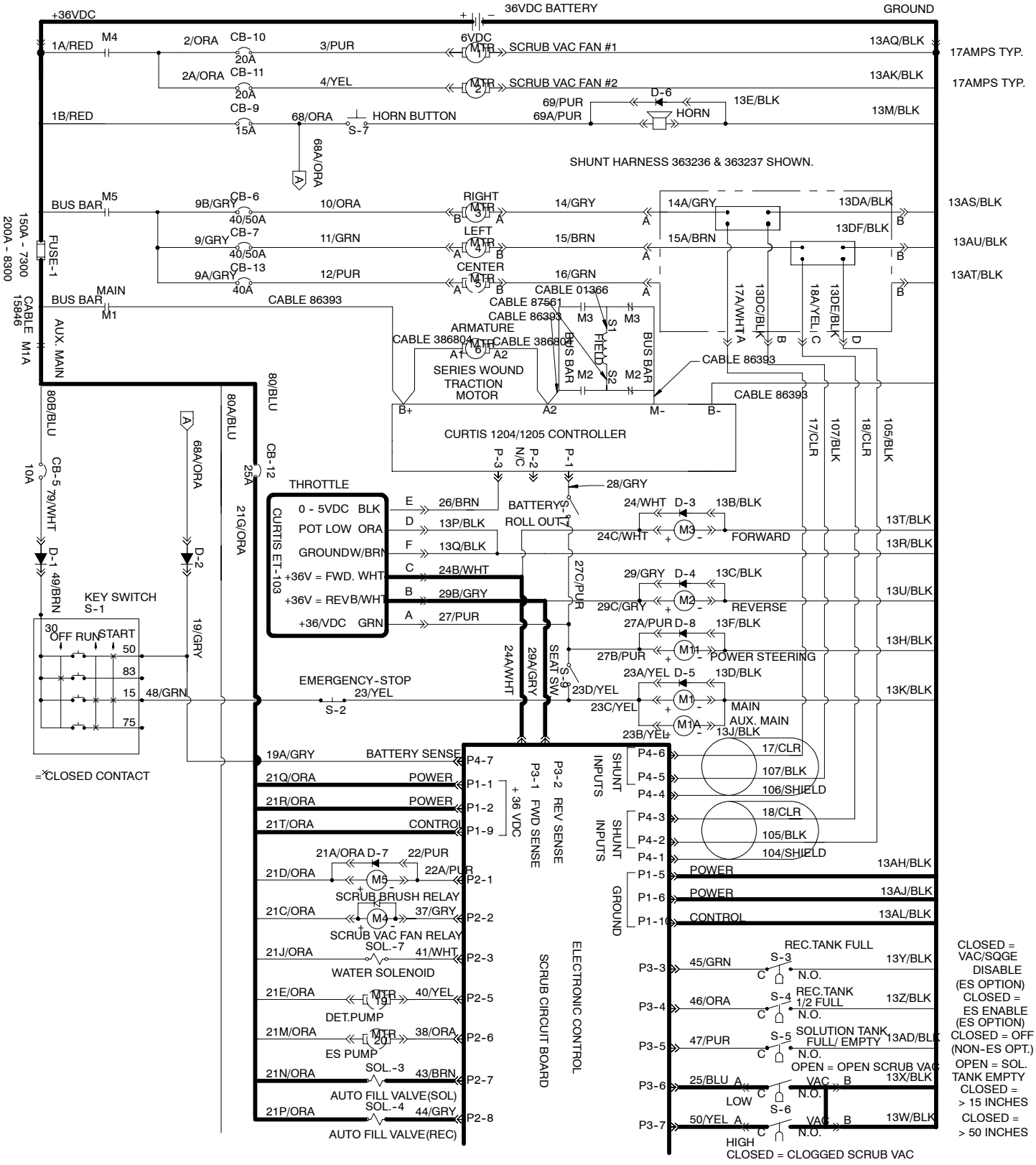
If vacuum pressure drops below 15 inches (open vac condition) the low side of S-6 opens, and an open vacuum icon is shown on the touchpanel display.

If vacuum pressure exceeds 50 inches (clogged vac condition) the high side of S-6 closes, and a clogged vacuum icon is shown on the touchpanel display.

Displays warning icons only - No flow chart needed

See schematic on following page.

OPEN/CLOGGED SCRUB VAC SWITCH TESTING



ES™ SYSTEM OPERATION AND TESTING:

DESCRIPTION: The ES system pumps used water from the recovery tank, through a filter, and into the solution tank.

OPERATION:

The ES system is selected on the touch panel.

The recover tank full float is activated.

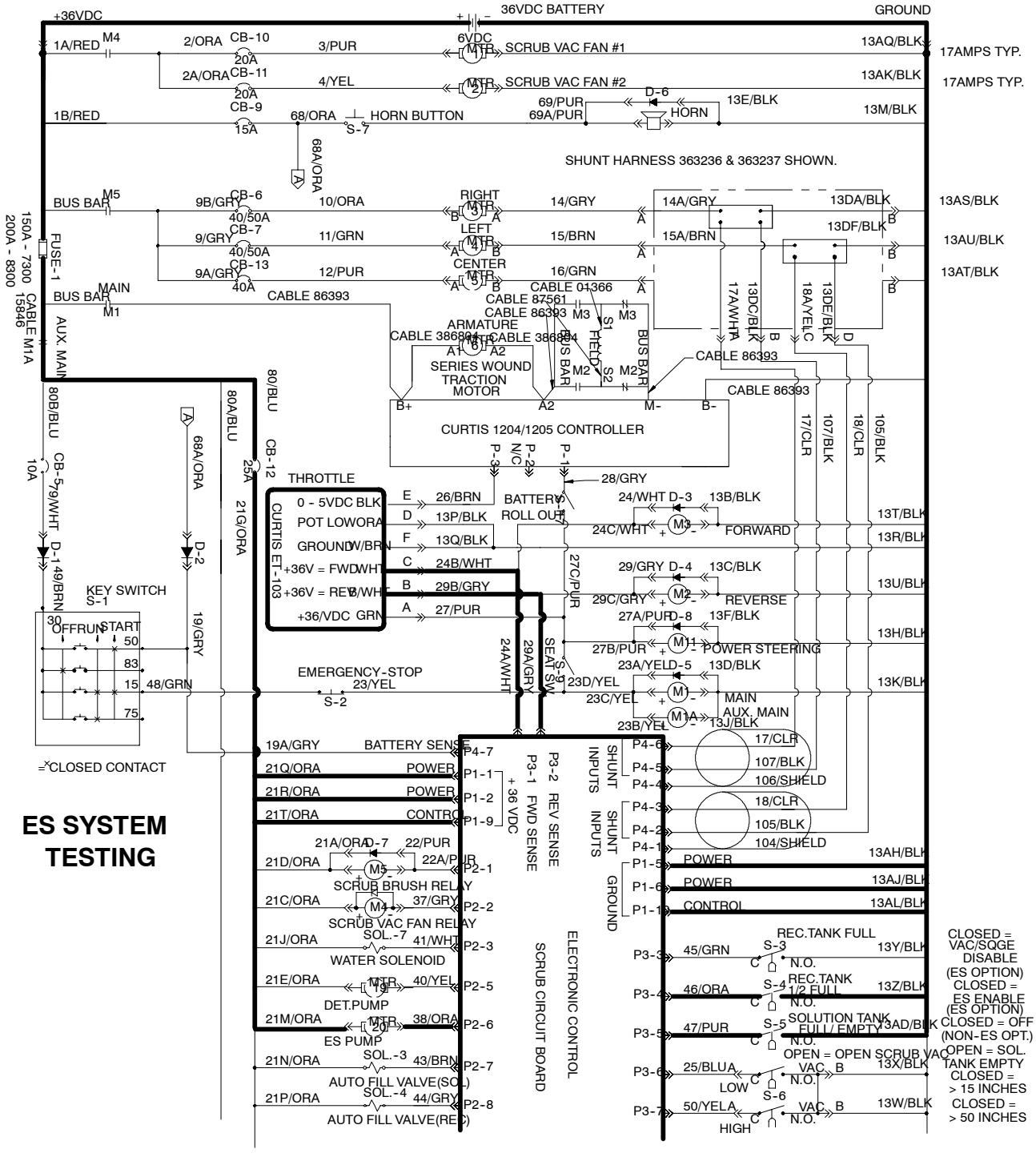
The ES pump is turned on until a or b:

a) The recovery tank float is deactivated for 30 seconds.

b) The solution tank full float is activated.

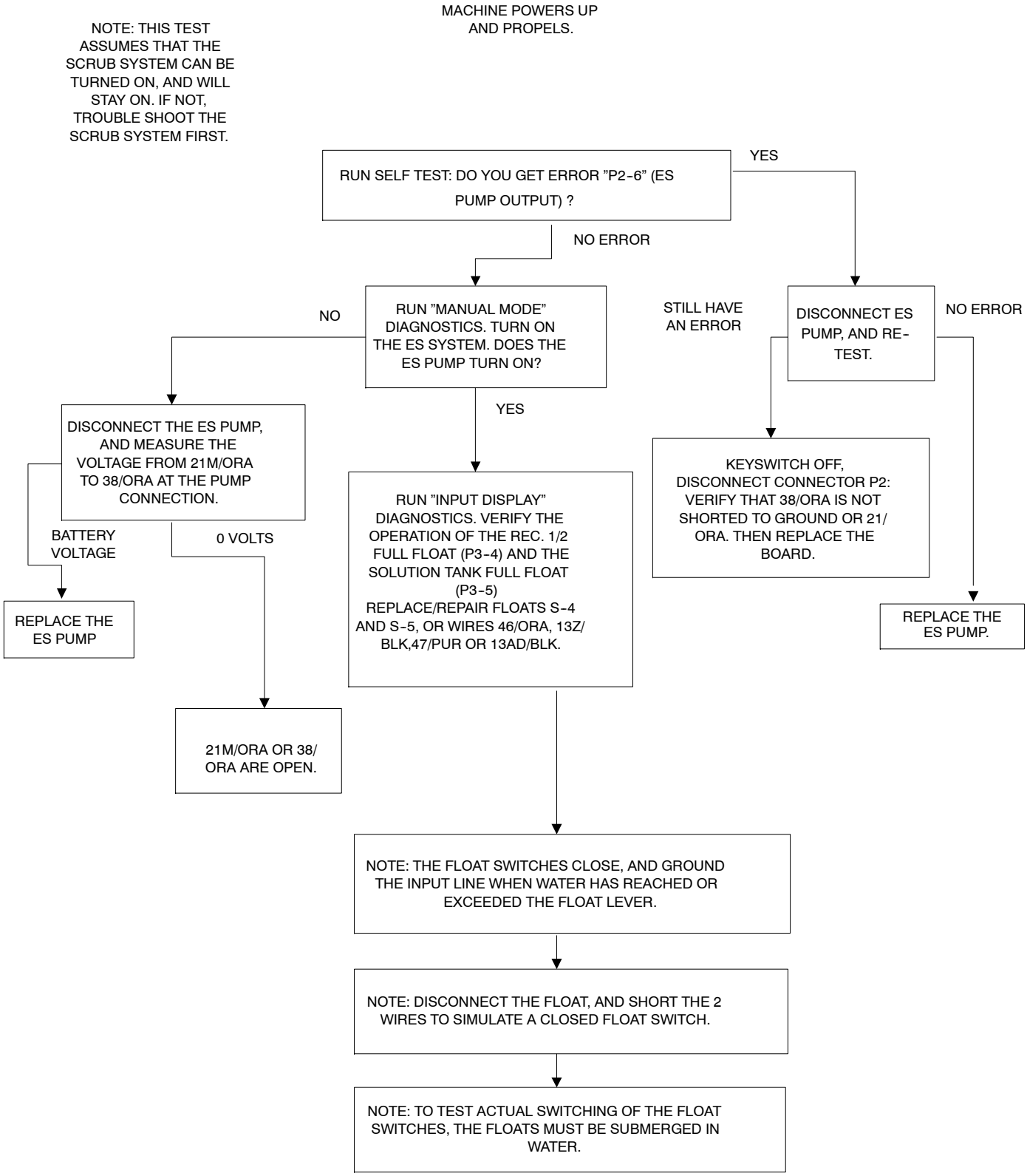
c) ES system is selected off at the touchpanel.

Note: This testing assumes that the machine powers up and propels.



ES SYSTEM TESTING

ES™ SYSTEM TESTING



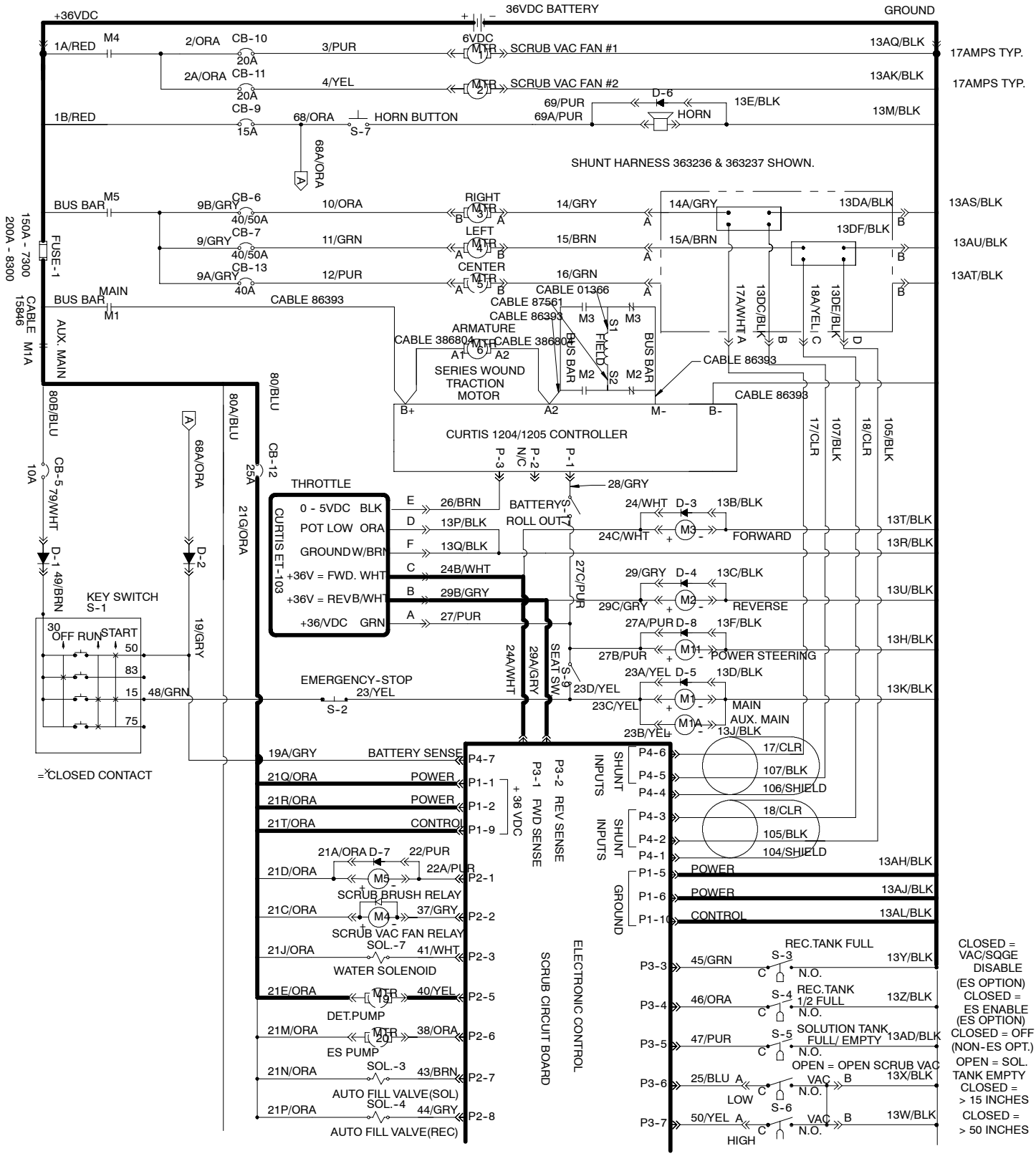
DETERGENT METERING SYSTEM TESTING:

DESCRIPTION: The detergent metering pump is activated whenever the scrub system is operating, the machine is propelling forward, and the detergent metering system is selected on. The pump runs at low and high speed.

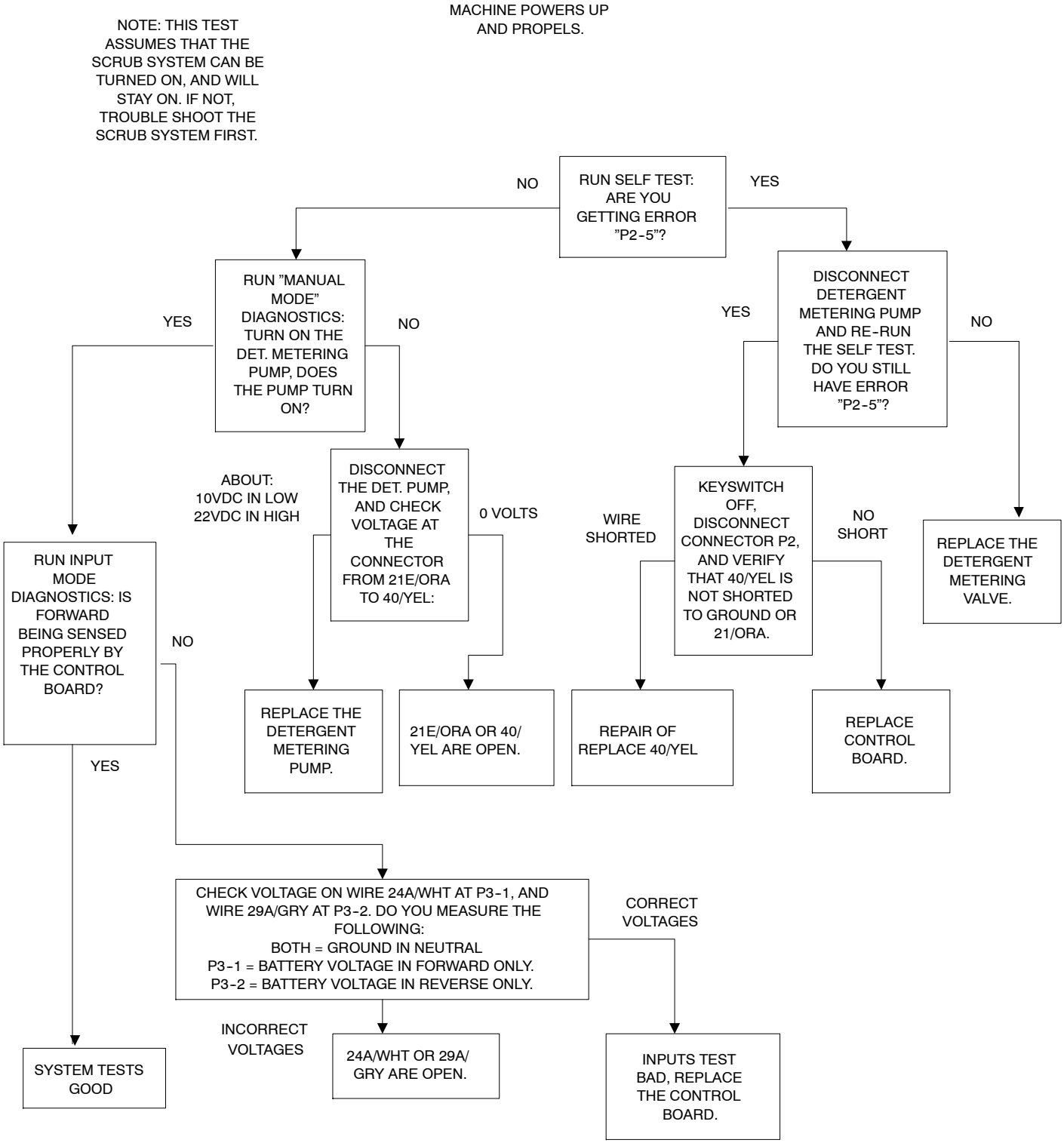
OPERATION:
The SCRUB system is turned on, and running.
The machine is propelled forward.
The detergent metering system is selected on. (low or high speed)
40/YEL (P2–5) is pulsed to ground by the control board, turning on the detergent pump.
Note: Low speed = 35% duty cycle = about 12.5VDC at the pump.
Note: High speed = 62.5% duty cycle = about 22.5VDC at the pump.

See schematic on following page.

DETERGENT METERING
TESTING



DETERGENT METERING TESTING



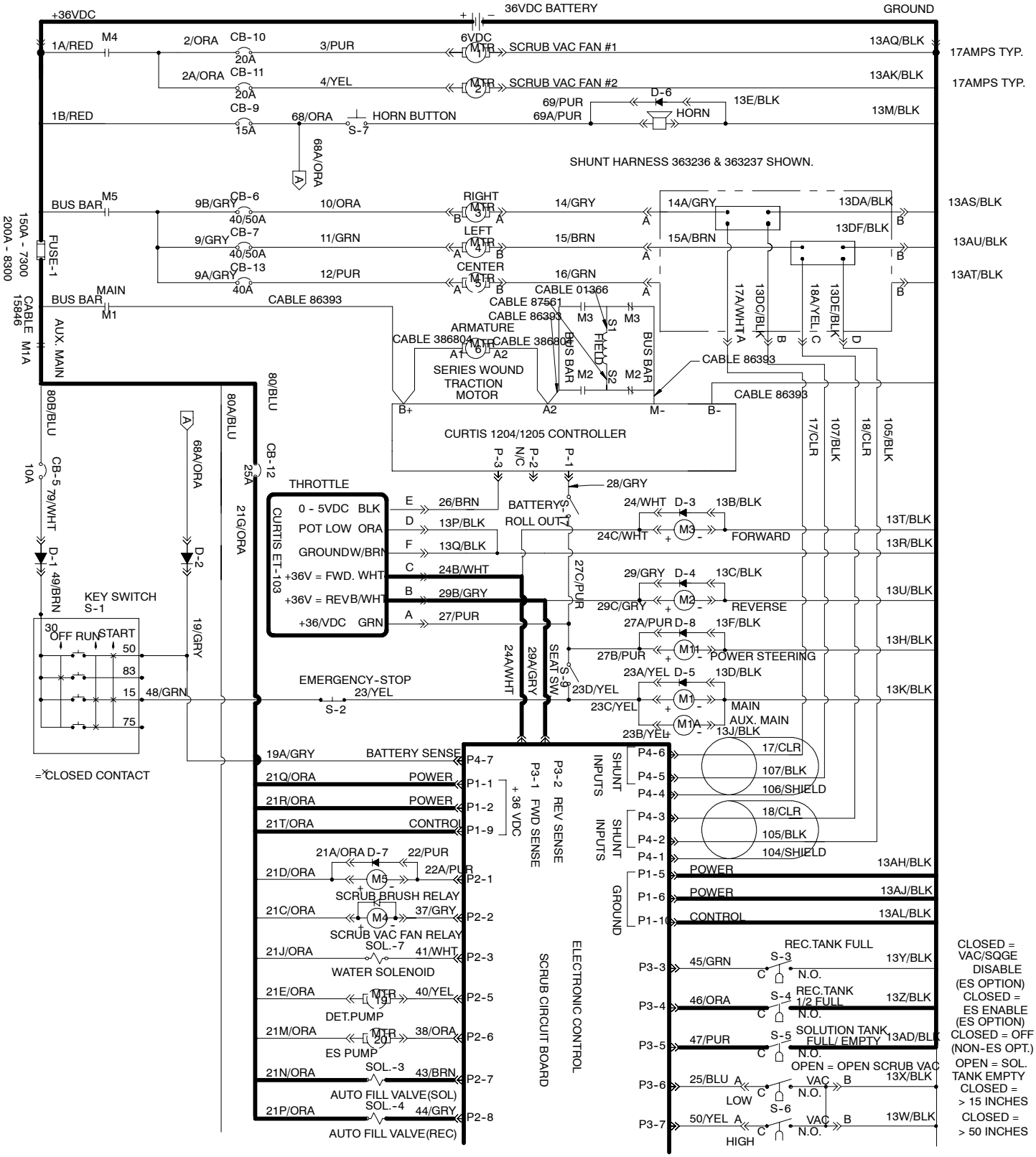
AUTO FILL SYSTEM TESTING:

DESCRIPTION: With keyswitch on, propel in neutral: the solution auto fill valve will open until the solution full float closes. The recovery auto fill valve will open until the recovery full float closes.

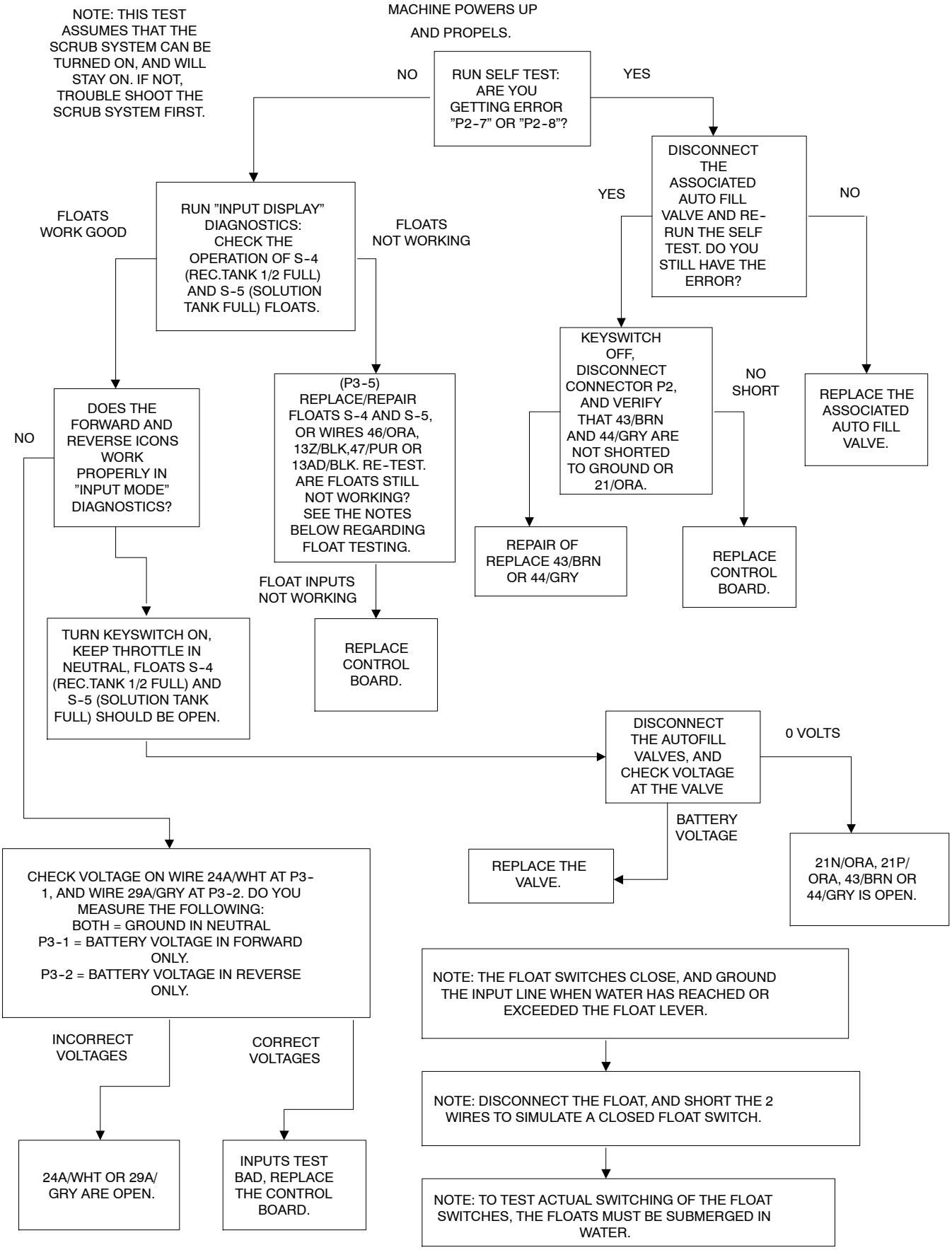
OPERATION:
1) Turn the keyswitch on, and leave the machine in neutral.
2) Hook water line up to outside valve, and turn on.
3) 43/BRN is pulled to ground at pin P2-7, turning on the solution auto fill valve (sol-3). This valve stays on until the solution full float (s-5) closes.
4) 44/GRY is pulled to ground at pin P2-8, turning on the recovery auto fill valve (sol-4). This valve stays on until the recovery 1/2 full float (s-4) closes.

See schematic on following page.

AUTO FILL TESTING



AUTO FILL TESTING



POWER STEERING TESTING: (OPTIONAL)

POWER STEERING ACTIVATION:

1) M11 is activated when the keyswitch is activated.

2) M11 contactor closes, supplying power to the power steering pump through CB-14. The power steering pump turns on.

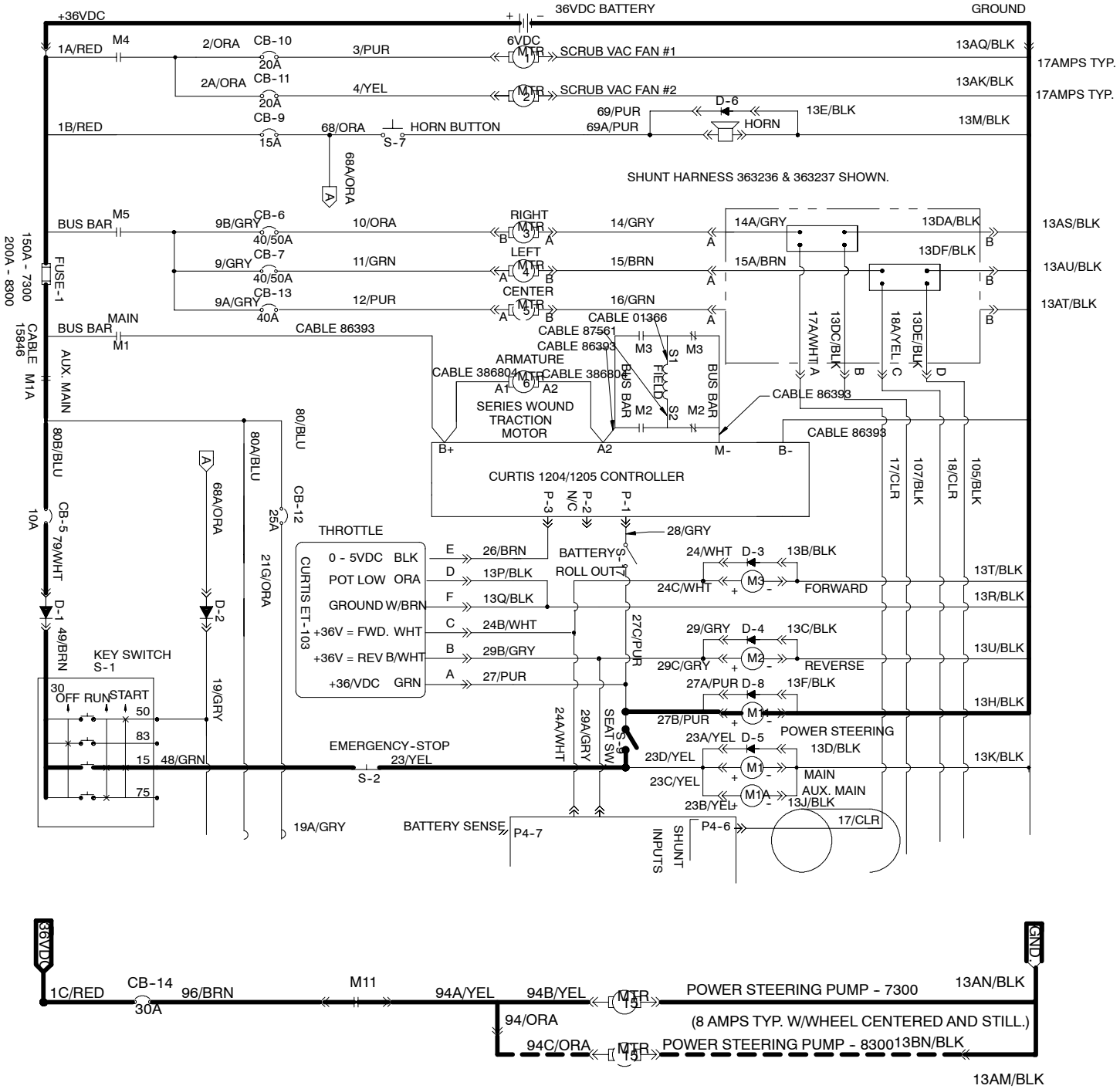
Note: The pump draws about 8 amps with the steering wheel centered, and not moving.

POWER STEERING INHIBITS:

1) The power steering pump is on whenever the machine is powered up.

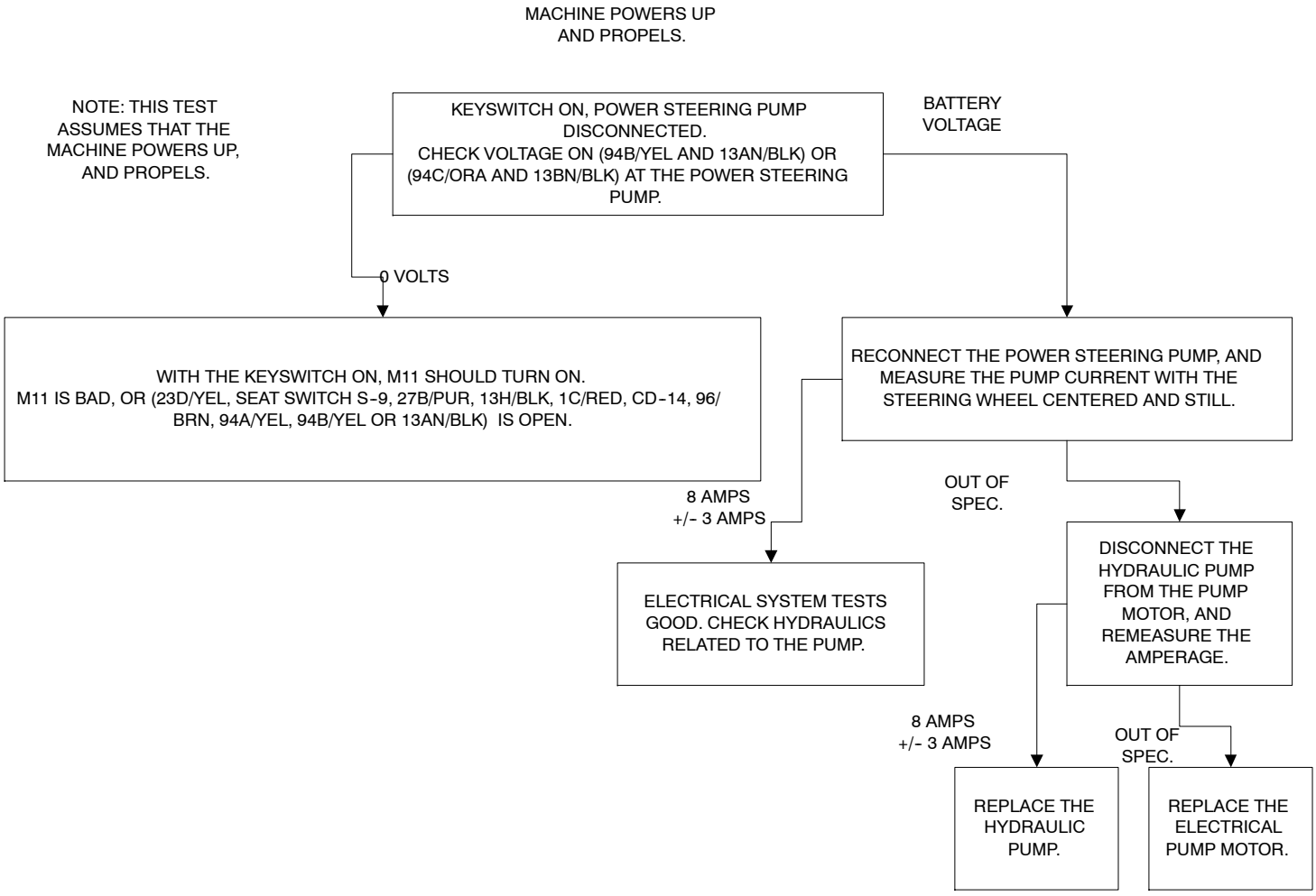
Note: This testing assumes that the machine powers up.

POWER STEERING TESTING



POWER STEERING TESTING

(OPTIONAL)



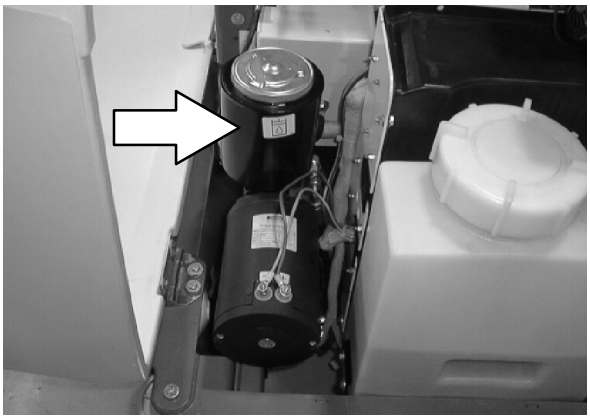
CONTENTS

INTRODUCTION

The 7300 hydraulic system consists of a electro/hydraulic power unit, steering wheel motor, drive unit turning motor, and hydraulic hoses.

HYDRAULICS (OPTION)

HYDRAULIC FLUID RESERVOIR



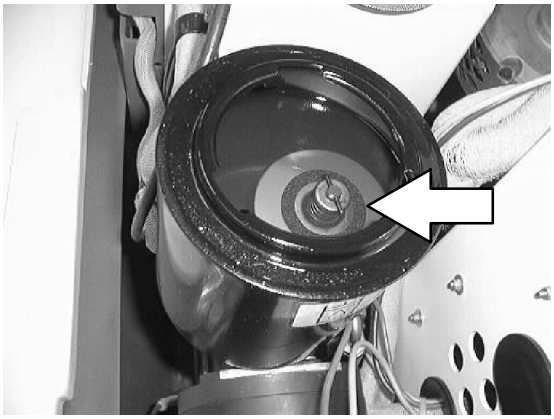
The hydraulic reservoir holds the hydraulic fluid for the power steering option. It is located underneath the front cover of the machine. A filler cap is mounted on top of the reservoir.

Check the hydraulic fluid level at operating temperature after every 100 hours of operation.

Lubricate the filler cap gasket with a film of hydraulic fluid before putting the cap back on the reservoir.

Drain and refill the hydraulic fluid reservoir with new hydraulic fluid after every 800 hours of operation.

ATTENTION! Do not overfill the hydraulic fluid reservoir or operate the machine with a low level of hydraulic fluid in the reservoir. Damage to the machine hydraulic system may result.



The reservoir has a built–in filter outlet that filters hydraulic fluid before it enters the system. Replace the filter every 800 hours of operation.

HYDRAULIC FLUID

The quality and condition of the hydraulic fluid play a very important role in how well the machine operates. Tennant's hydraulic fluid is specially selected to meet the needs of Tennant machines.

Tennant's hydraulic fluids provide a longer life for the hydraulic components.

Tennant hydraulic fluid	
Part number	Fluid weight
65870	SHP 5/20

If another hydraulic fluid is used, make sure the specifications match Tennant hydraulic fluid specifications. Using substitute fluids can cause premature failure of hydraulic components.

ATTENTION! Hydraulic components depend on system hydraulic fluid for internal lubrication. Malfunctions, accelerated wear, and damage will result if dirt or other contaminants enter the hydraulic system.

HYDRAULIC HOSES

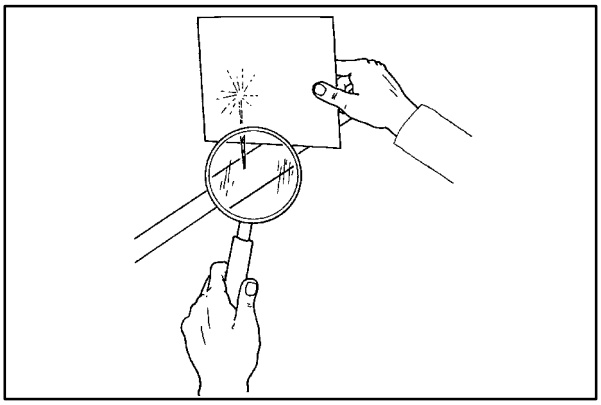
Check the hydraulic hoses after every 800 hours of operation for wear or damage.

Fluid escaping at high pressure from a very small hole can be almost invisible, and can cause serious injuries.

See a doctor at once if injury results from escaping hydraulic fluid. Serious infection or reaction can develop if proper medical treatment is not given immediately.

FOR SAFETY: When servicing machine, use cardboard to locate leaking hydraulic fluid under pressure.

If you discover a fluid leak, contact your mechanic or supervisor.



00002

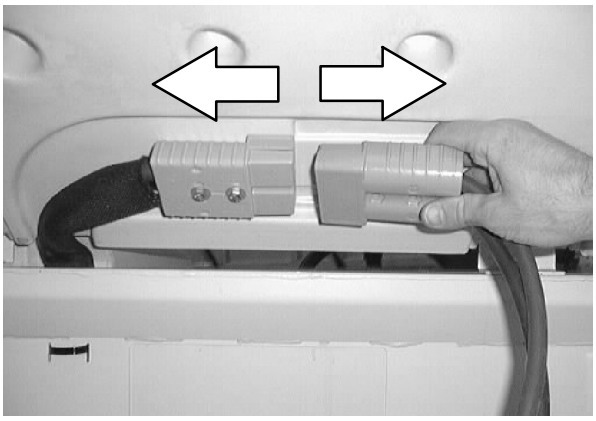
ELECTRO/HYDRAULIC POWER UNIT

The electro/hydraulic power unit uses power from the batteries to turn an electric motor, which turns a hydraulic pump. Hydraulic fluid flows to the steering hydraulic motor and is then directed to the turning hydraulic motor. The unit is self contained including fluid reservoir.

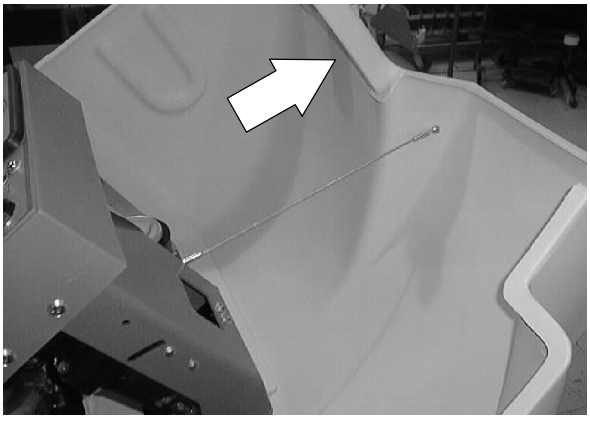
TO REPLACE ELECTRO/HYDRAULIC POWER UNIT

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

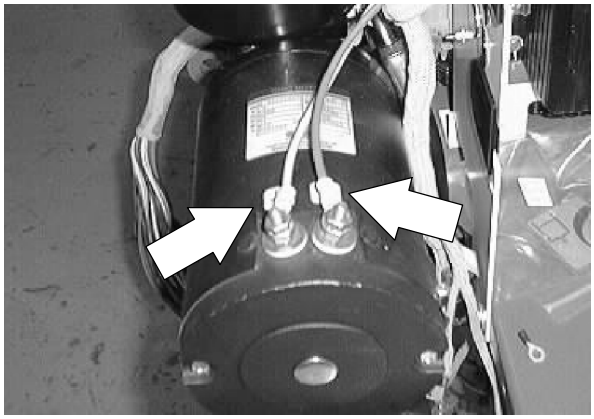
1. Raise the battery cover. Unplug the battery connector.



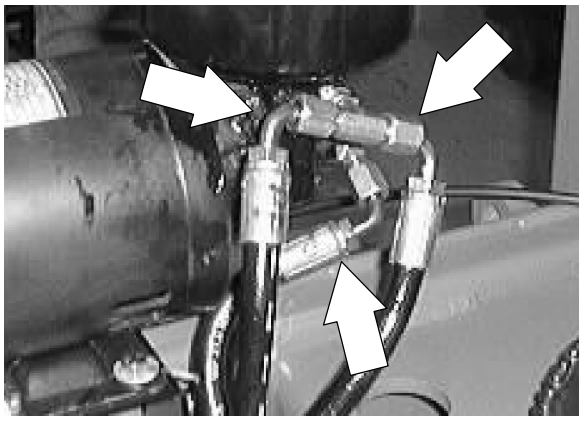
2. Open the front cover.



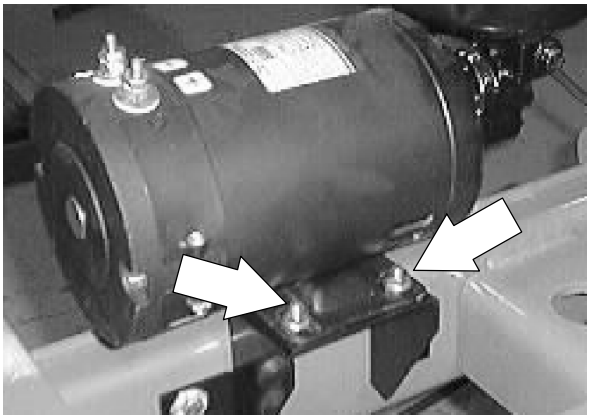
3. Disconnect the two wires leading to the electro/hydraulic motor.



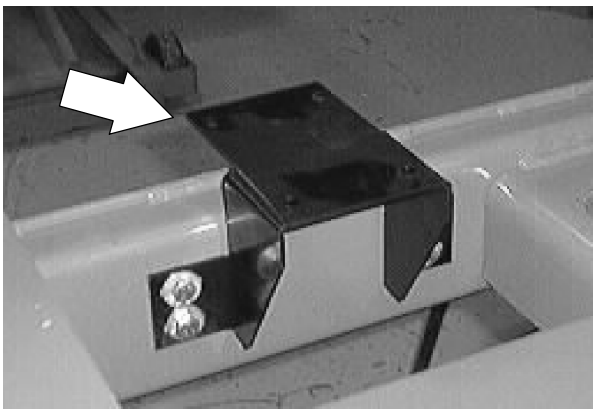
4. Mark, disconnect, and plug the three hydraulic hoses leading to the electro/hydraulic pump.



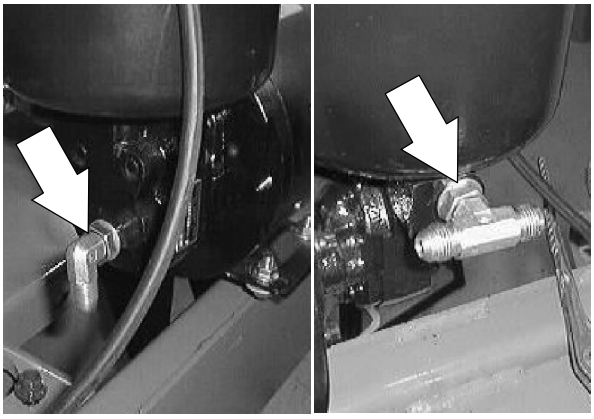
5. Remove the four M8 hex screws holding the electro/hydraulic unit to the machine frame.



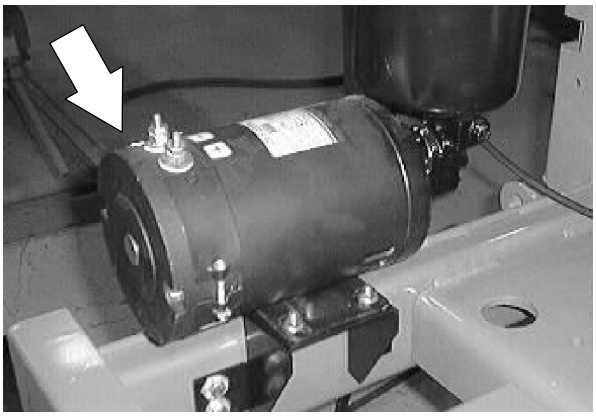
6. Remove the electro/hydraulic unit from the mount bracket.



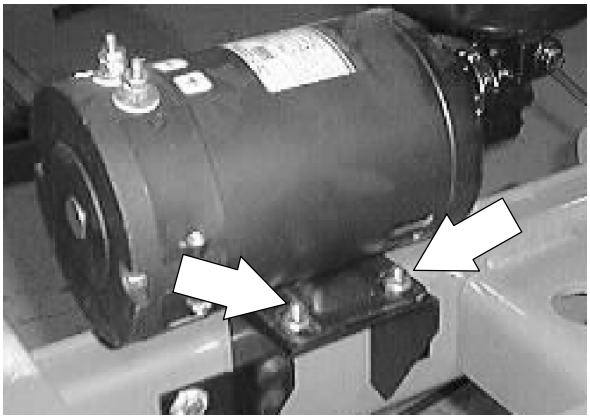
7. Remove the hydraulic fittings from the existing pump. Install into the new unit.



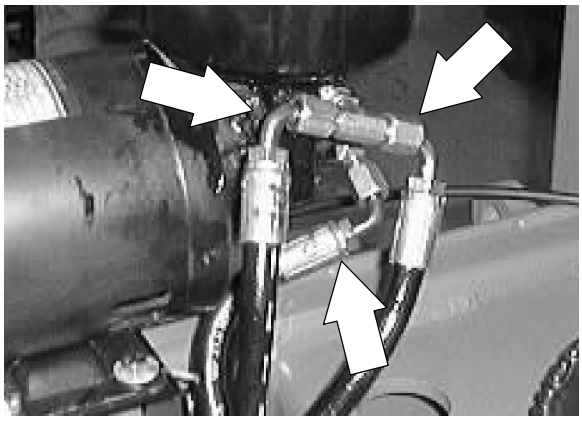
8. Position the new power unit onto the mount bracket.



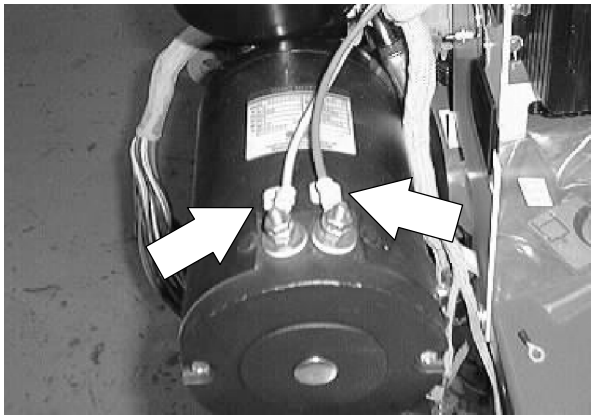
9. Reinstall the four M8 hex screws. Tighten to 18 – 24 Nm (15 – 20 ft lb).



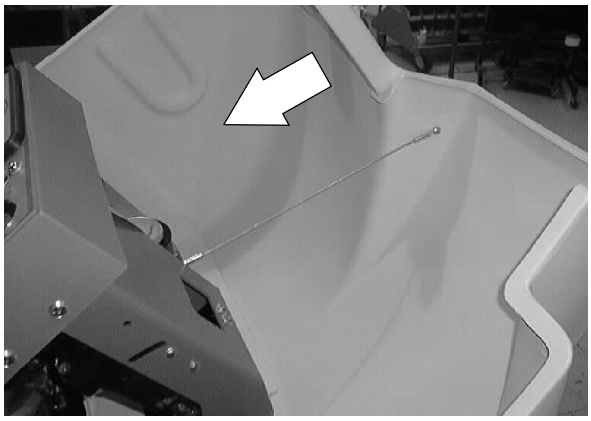
10. Reconnect the three hydraulic hoses onto the electro/hydraulic pump.



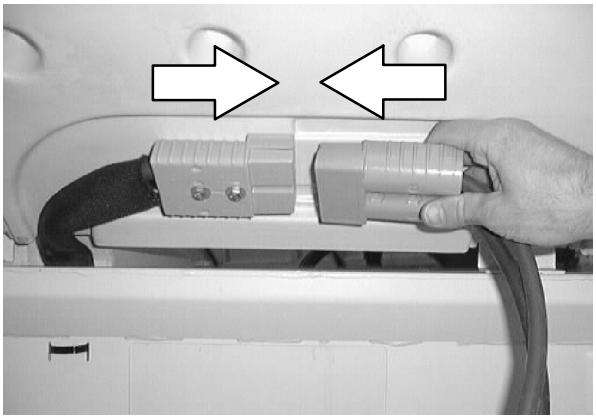
11. Reconnect the two wires leading to the electro/hydraulic motor.



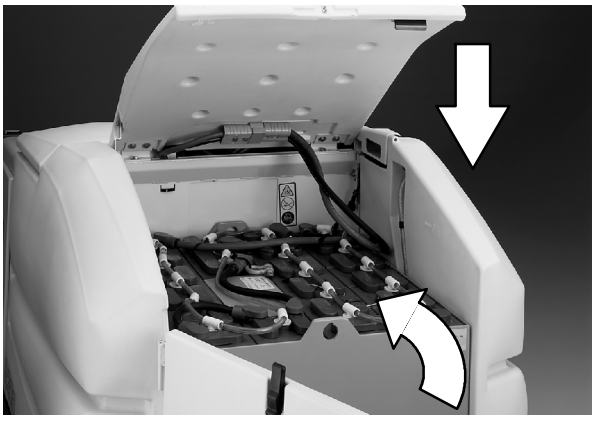
12. Close the front cover.



13. Plug the battery connector into the main connector.



14. Close the battery cover.

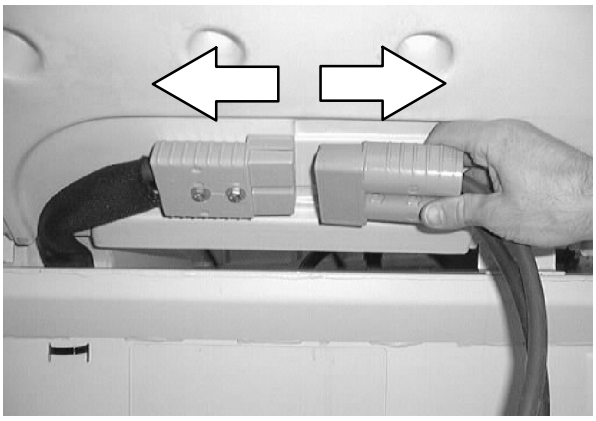


15. Start the machine. Check the power steering for proper operation.

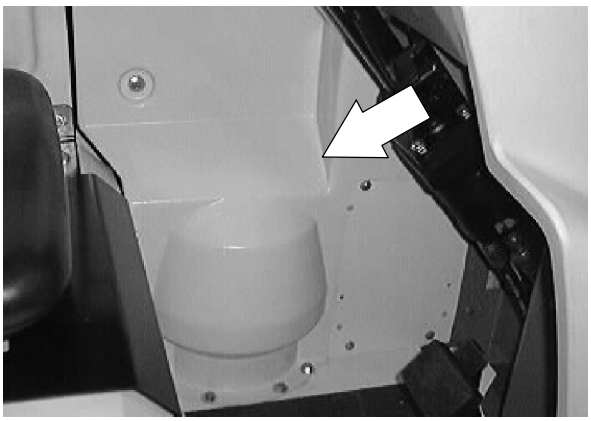
TO REPLACE HYDRAULIC TURNING MOTOR

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

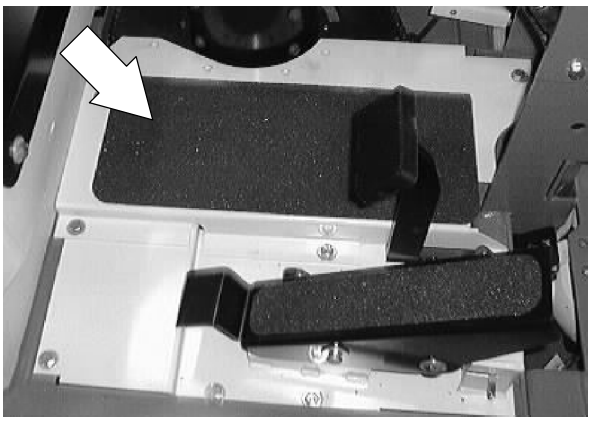
1. Raise the battery cover. Unplug the battery connector.



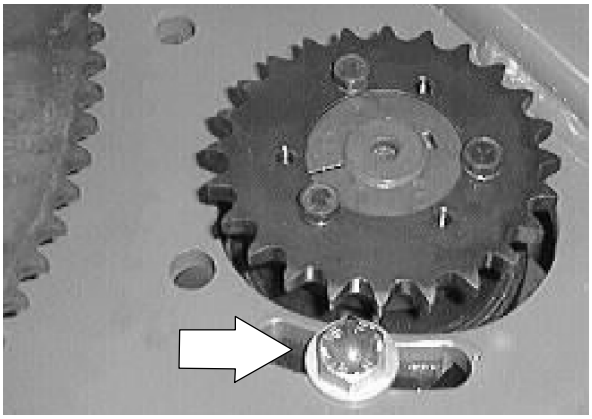
2. Open the front cover and remove the plastic drive motor cover.



3. Remove the inside floor plate.

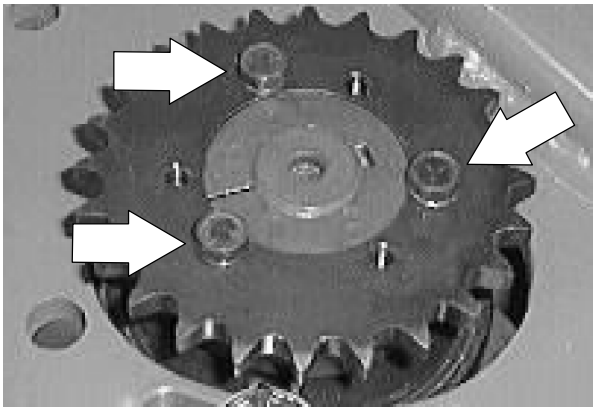


4. Loosen the hardware holding the hydraulic steering motor to the machine frame. *Push the motor and sprocket in toward the large sprocket.*

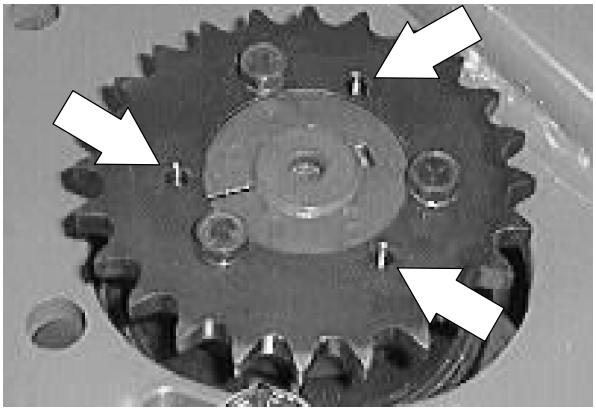


5. Remove the steering chain from the steering motor sprocket.

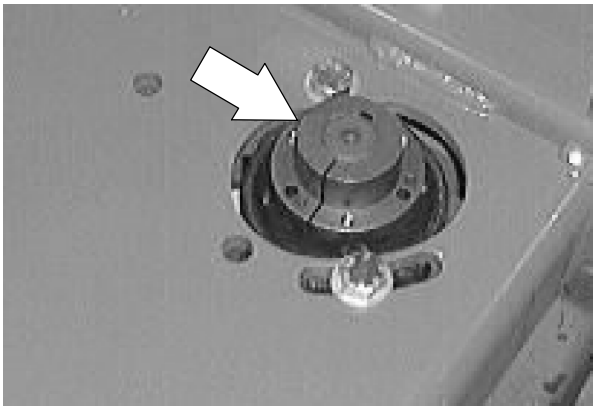
6. Remove the three hex screws holding the steering motor sprocket to the motor hub.



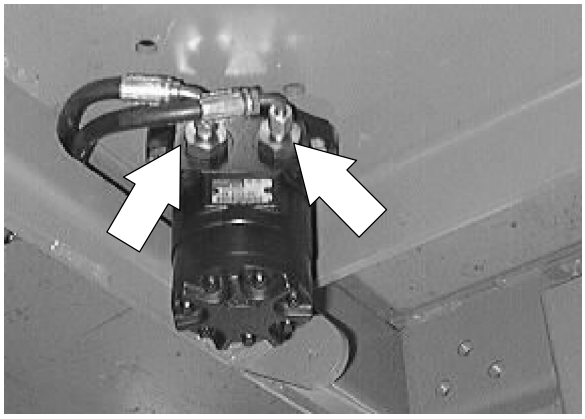
7. Thread the three screws into the open holes on top of the steering sprocket.



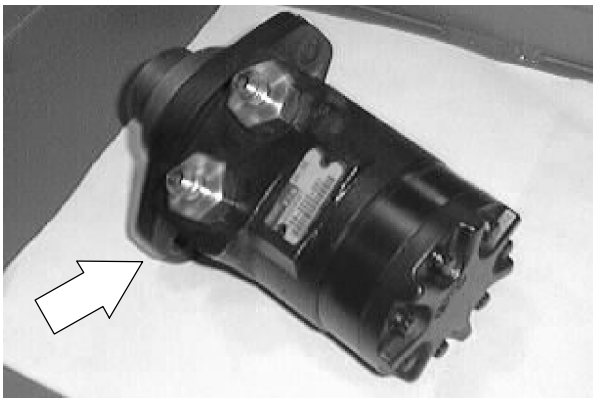
8. Tighten the screws to push the sprocket off the motor hub.



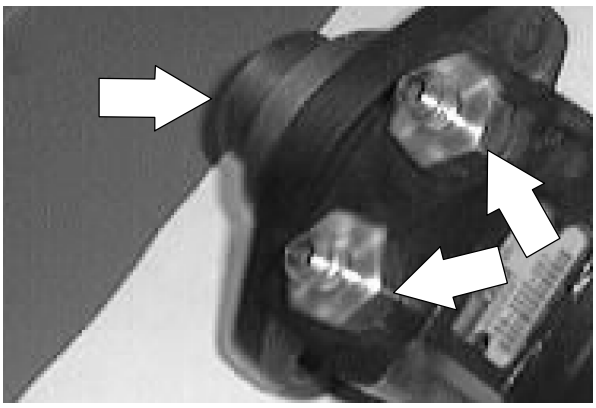
9. Mark, disconnect, and plug the two hydraulic hoses leading to the steering motor. *Note routing of hoses into frame.*



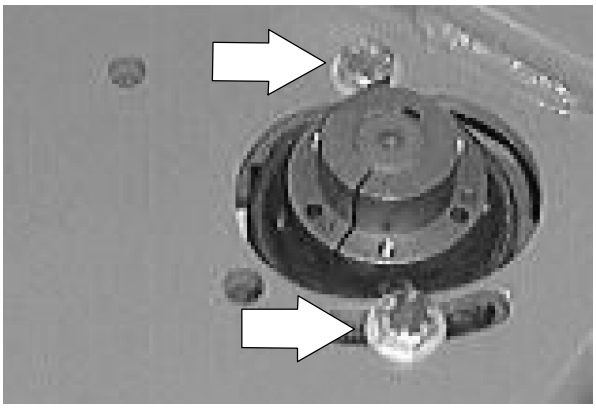
10. Remove steering motor hardware. Remove the motor from the machine.



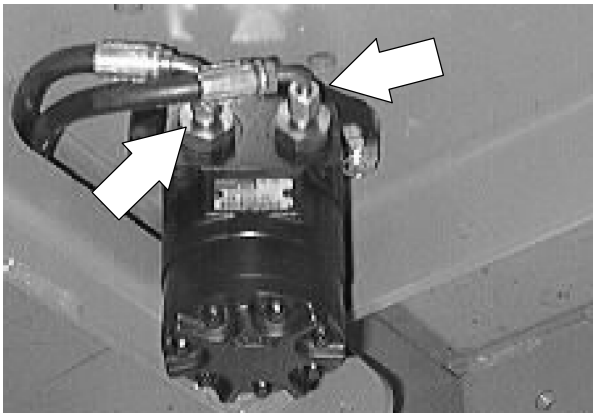
11. Remove the hydraulic fittings and taper lock hub from the existing motor. Install the fittings and hub on the new motor. *Position the top of hub even with the top of the motor shaft. Make sure the key is installed on the motor shaft.*



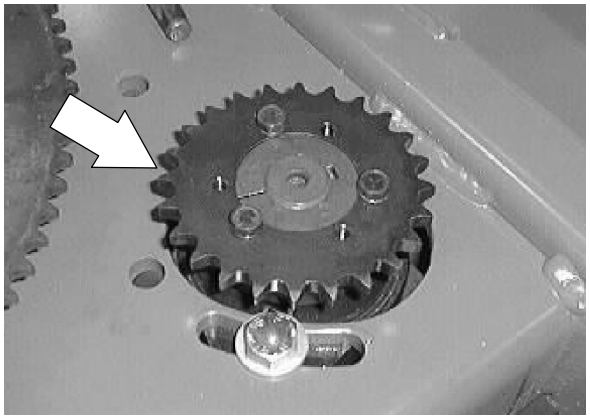
12. Install the new motor in the machine. Leave the hardware loose for now.



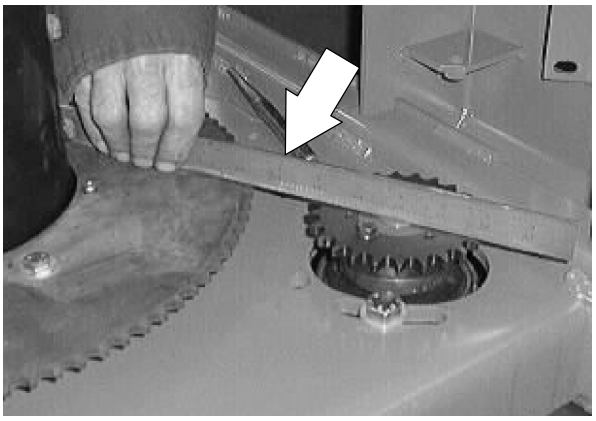
13. Reconnect the two hydraulic hoses to the new motor. *Note routing of hoses into frame.*



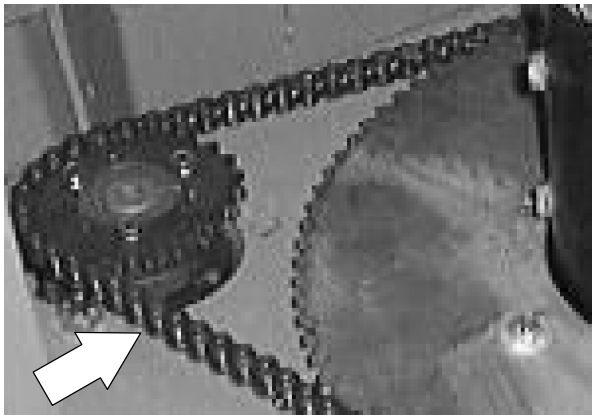
14. Reinstall the small steering chain sprocket onto the motor hub. Install the three hex screws. Leave loose for now. *Use loctite blue 242 on the threads.*



15. Use a straight edge to align the small sprocket with the large sprocket. Tighten the three hex screws to 11 – 14 Nm (7 – 10 ft lb). *Use loctite blue 242 on the threads.*

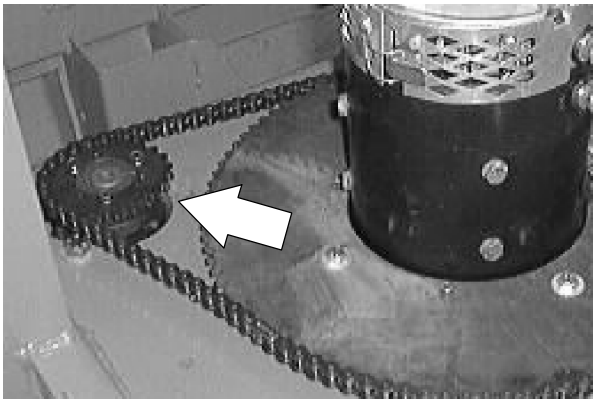


16. Reinstall the steering chain onto the small sprocket.

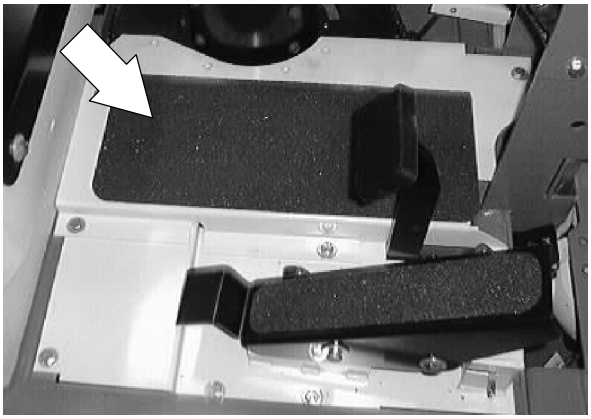


17. Use a pry bar to move the hydraulic steering motor away from the large sprocket until the chain is tight. Tighten the motor mounting hardware to 37 – 48 Nm (26 – 34 ft lb).

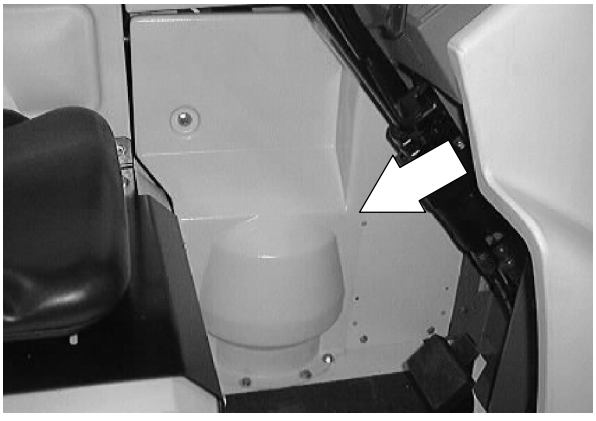
NOTE: The tension of the chain should be checked after the first 50 hours of operation and every 200 hours there after. The deflection should be 0.12 to 0.25 in (3 to 6 mm) between the steering sprocket and the idler sprocket when the steering wheel is turned the tightest position either direction.



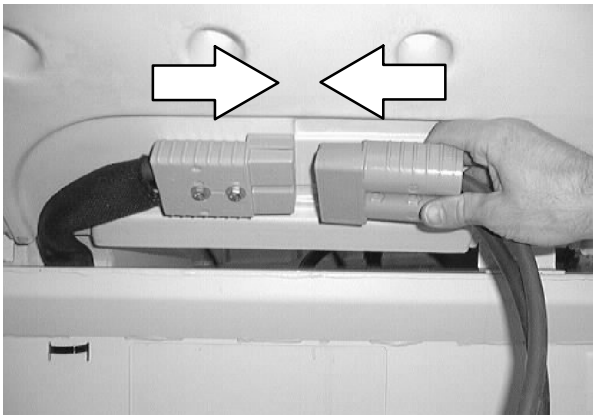
18. Reinstall the inside floor plate.



19. Reinstall the plastic drive motor cover.



20. Plug in the battery connector. Close the battery cover.



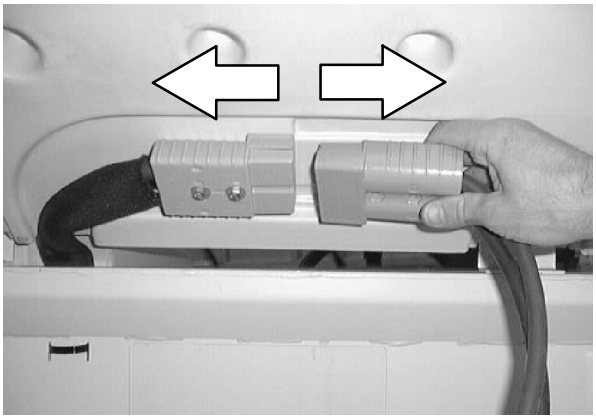
21. Close the front cover.

22. Start and operate the machine. Check the steering for proper operation.

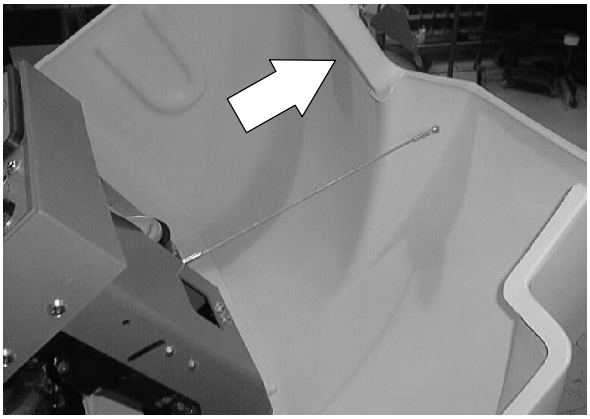
TO REPLACE HYDRAULIC STEERING WHEEL MOTOR

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

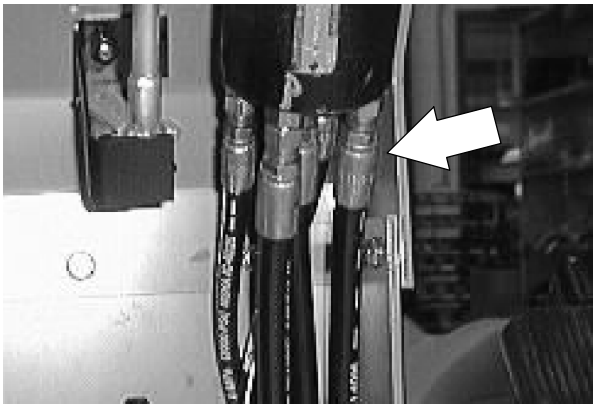
1. Raise the battery cover. Unplug the battery connector.



2. Open the front cover.

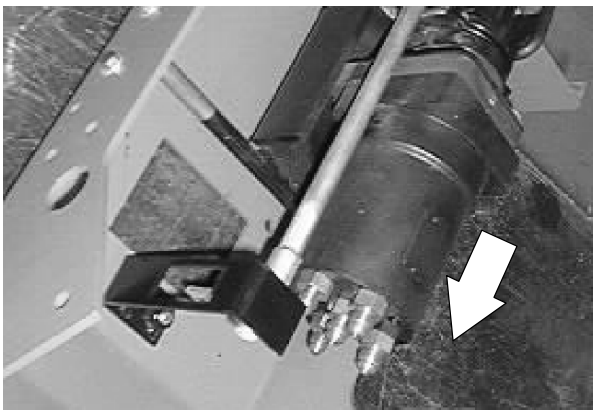


3. Mark, disconnect, and plug the five hydraulic hoses leading to the steering wheel motor. *Note routing of hoses through frame.*

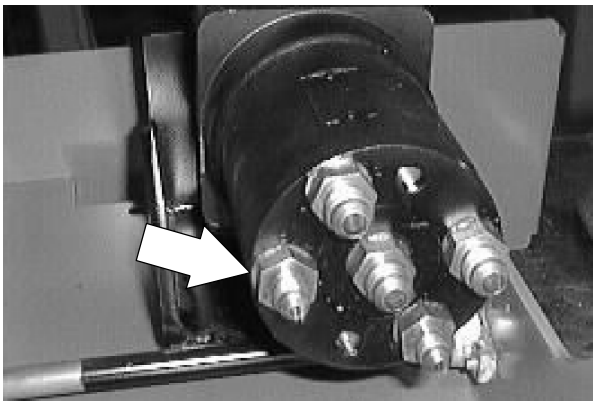


4. Remove the three screws holding the steering wheel motor to the steering column.

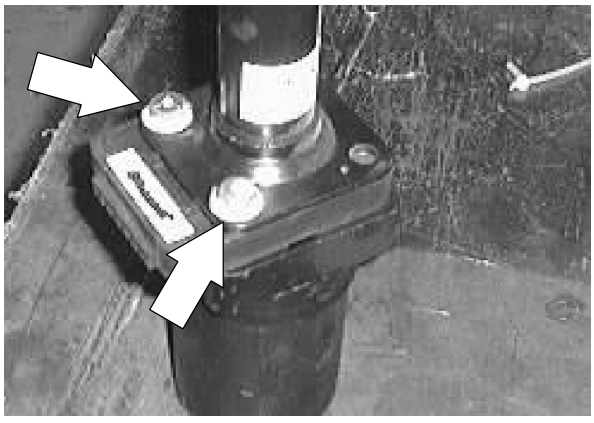
5. Pull the steering motor down off the bottom of the steering column. Remove the motor from the machine. *Note the orientation of the spacer between the motor and the column.*



6. Remove the hydraulic fittings from the existing motor and install in the new motor.

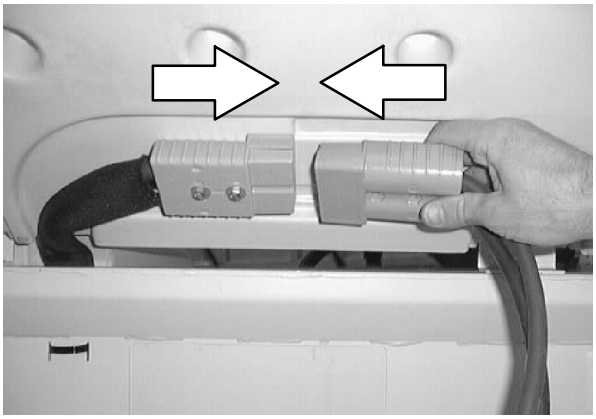


7. Position the new motor into the bottom of the steering column. *The splines on the motor shaft must line up with the splines in the steering column. Note the orientation of the spacer between the motor and the column.* Hand tighten the hardware tight.



8. Reconnect the hydraulic hoses to the steering motor. *Start at the back hose and work your way forward.*

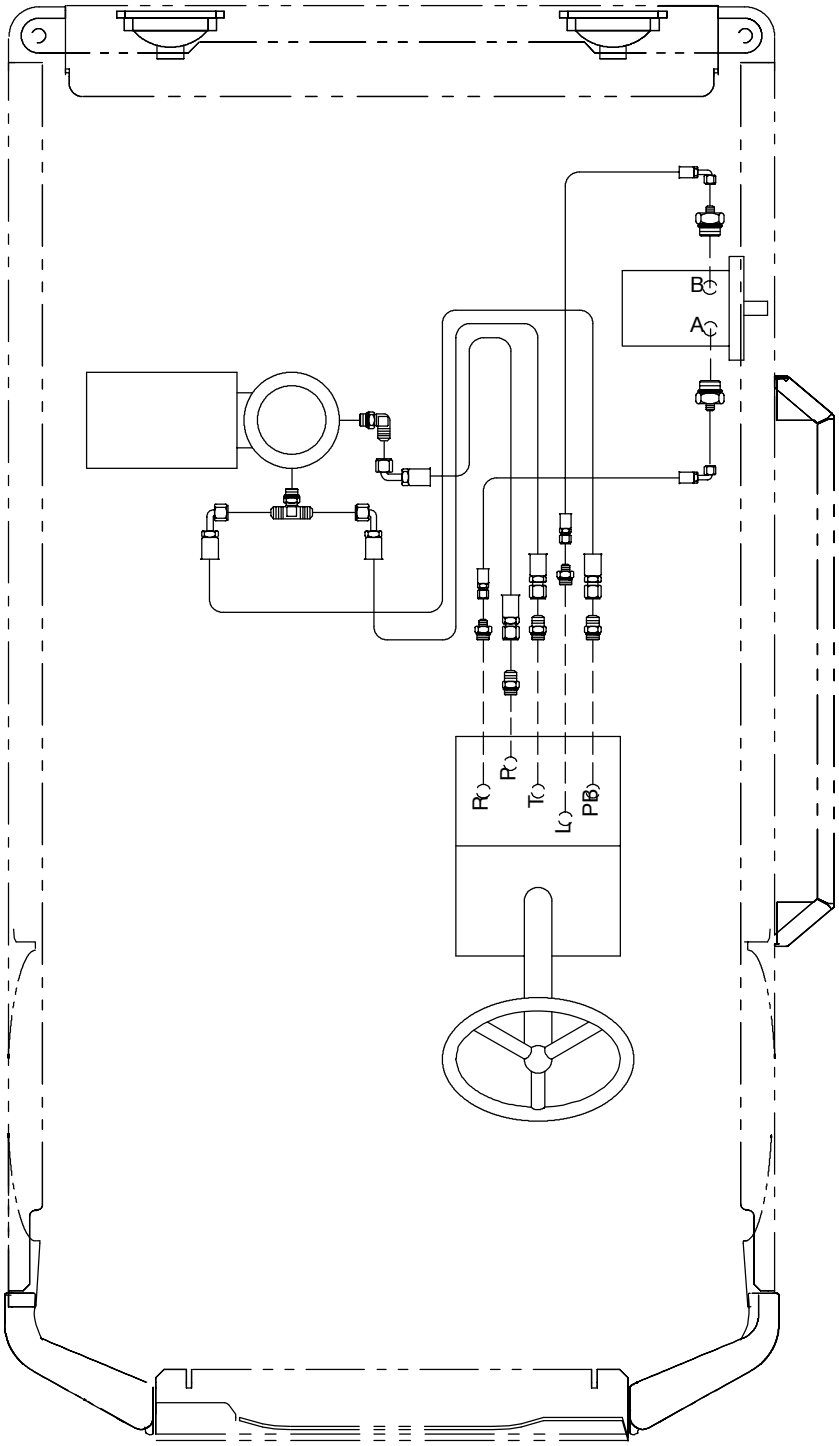
9. Plug in the battery connector. Close the battery cover.



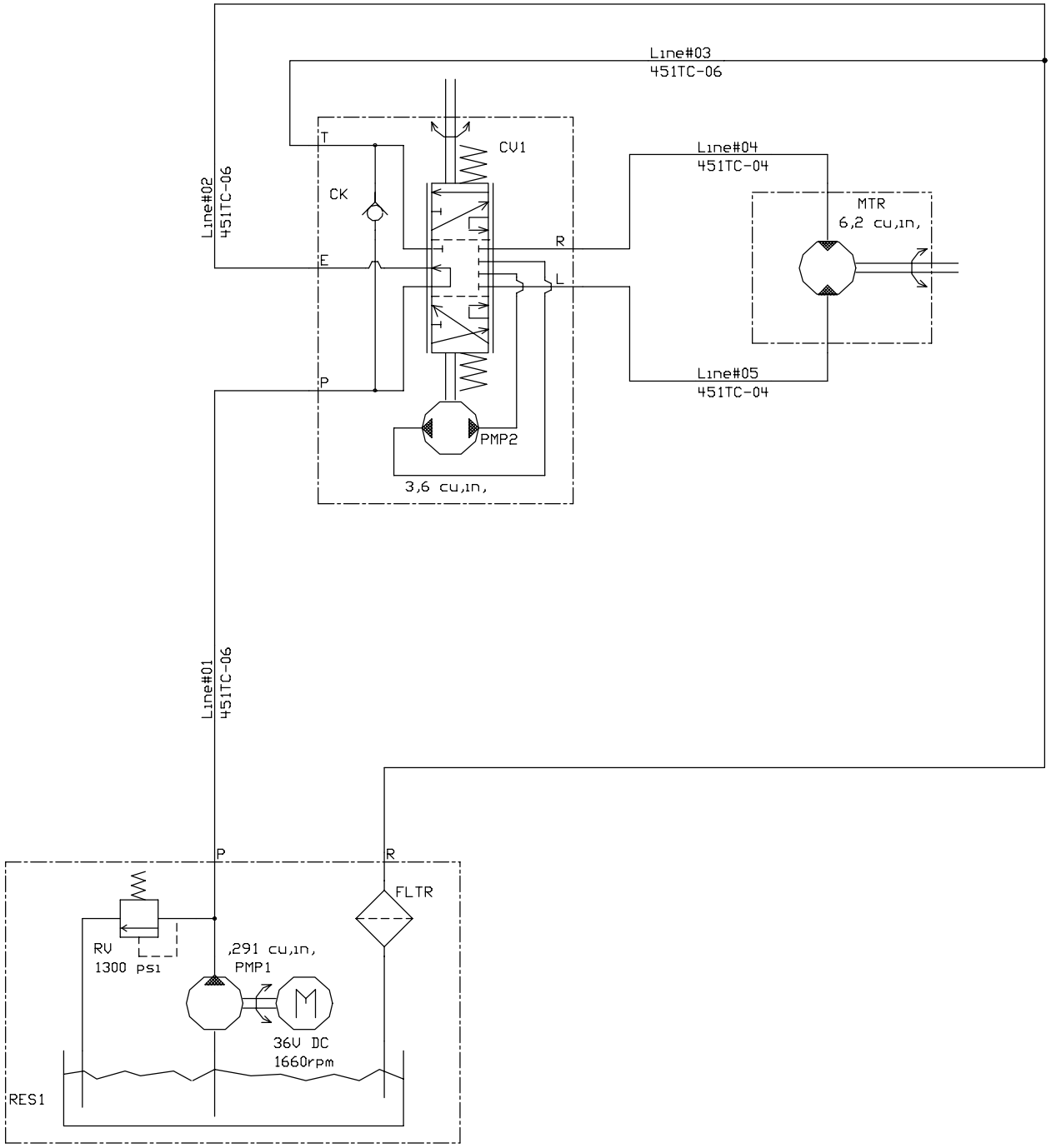
10. Close the front cover.

11. Start and operate the machine. Check the steering for proper operation.

HYDRAULIC DIAGRAM



HYDRAULIC SCHEMATIC



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