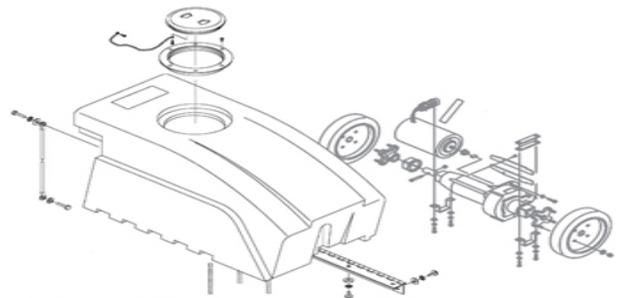
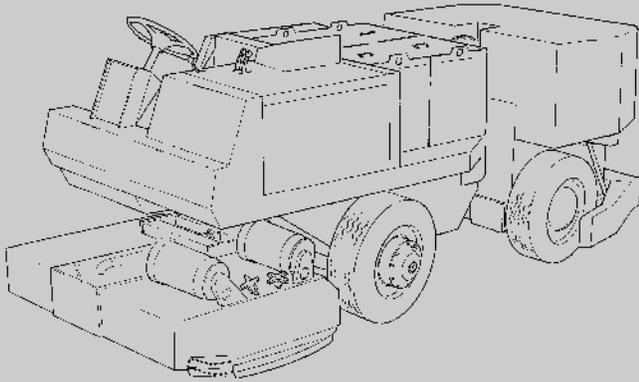




550E

Manual
(Operator Manual)



FLOOR EQUIPMENT PARTS.COM



This manual is furnished with each new model. It provides necessary operation and maintenance instructions.

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

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

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



PROTECT THE ENVIRONMENT

Please dispose of packaging materials, old machine components such as batteries, hazardous fluids such as antifreeze and oil, in a safe environmentally way according to your local waste disposal regulations.



Always remember to recycle.

MACHINE DATA

Please fill out at time of installation for future reference.

Model No.- **550E**

Serial No.- _____

Machine Options - _____

Sales Rep. - _____

Sales Rep. phone no. - _____

Customer Number - _____

Installation Date - _____

Tennant Company

PO Box 1452

Minneapolis, MN 55440

Phone: (800) 553-8033 or (763) 523-2850

SRS is a United States registered trademark of the Tennant Company.

Specifications and parts are subject to change without notice.

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SAFETY PRECAUTIONS

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



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

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

The following information signals potentially dangerous conditions to the operator 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 Solution Tank.



WARNING: Flammable materials or reactive metals can cause explosion or fire. Do not pick up.



WARNING: Moving Belt. Keep Away.



WARNING: Falling Scrub Head. Block Scrub Head Up Before Working Under It.



WARNING: Crush Hazard Between Front And Rear Halves Of Machine. Put Locking Pin In Pivot Lock Before Going Between Machine Halves.



WARNING: Hazardous Voltage. Shock Or Electrocutation Can Result. Disconnect Batteries Before Working On Machine. Only Qualified Personnel Should Work Inside Panel.



WARNING: Strong Vacuum. Keep Away From Fan Inlet When Fan Is Running.

FOR SAFETY:

1. **Do Not Operate Machine:**
 - Unless Trained And Authorized.
 - Unless Operation Manual Is Read And Understood.
 - In Flammable Or Explosive Areas Unless Modified 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 Grades And Slippery Surfaces.
 - Use Care When Reversing Machine.
 - Do Not Carry Riders On Machine.
 - Always Follow Safety And Traffic Rules.
 - Report Machine Damage or Faulty Operation Immediately.
 - Follow mixing and handling instructions on chemical containers.
5. **Before Leaving Or Servicing Machine:**
 - Stop On Level Surface.
 - Set Parking Brake.
 - Turn Off Machine And Remove Key.

GENERAL INFORMATION

6. When Servicing Machine:

- Avoid Moving Parts. Do Not Wear Loose Jackets, Shirts, Or Sleeves.
- Block Machine Tires Before Jacking Machine Up.
- Jack Machine Up At Designated Locations Only. Block Machine Up With Jack Stands.
- Use A Hoist Or Jack That Will Support The Weight Of The Machine
- Disconnect Battery Connections Before Working On Machine.
- Wear Eye And Ear Protection When Using Pressurized Air Or Water.
- Avoid Contact With Battery Acid.
- Use Cardboard To Locate Leaking Hydraulic Fluid Under Pressure.
- Use TENNANT Supplied Or Approved Replacement Parts.

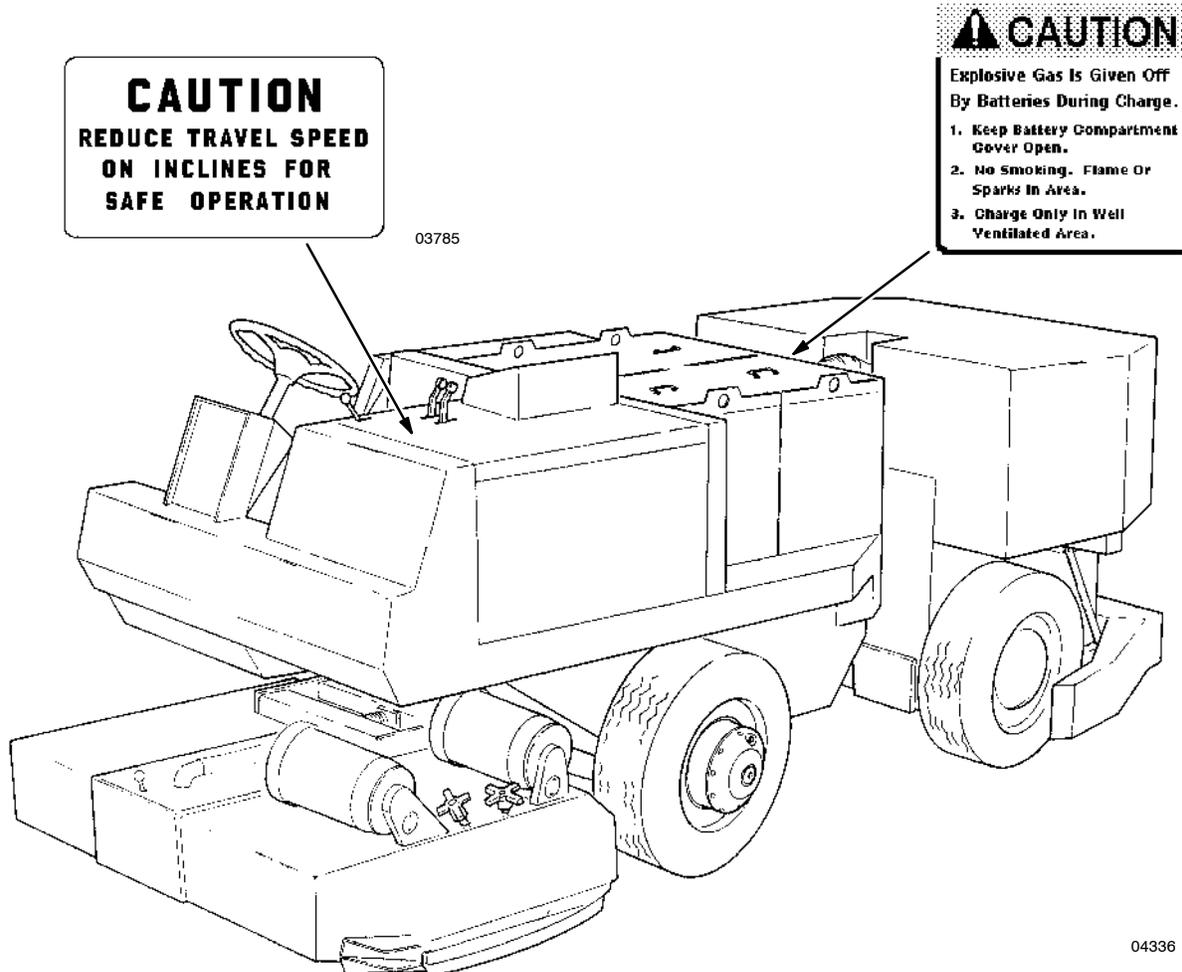
**TRAVEL SPEED CAUTION LABEL -
LOCATED ON THE SIDE OPERATOR
PANEL**

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 following safety decals are mounted on the machine in the locations indicated. If these, or any decal becomes damaged or illegible, install a new decal in its place.

**BATTERY CHARGING CAUTION LABEL -
LOCATED ON REAR OF BATTERY
COMPARTMENT.**

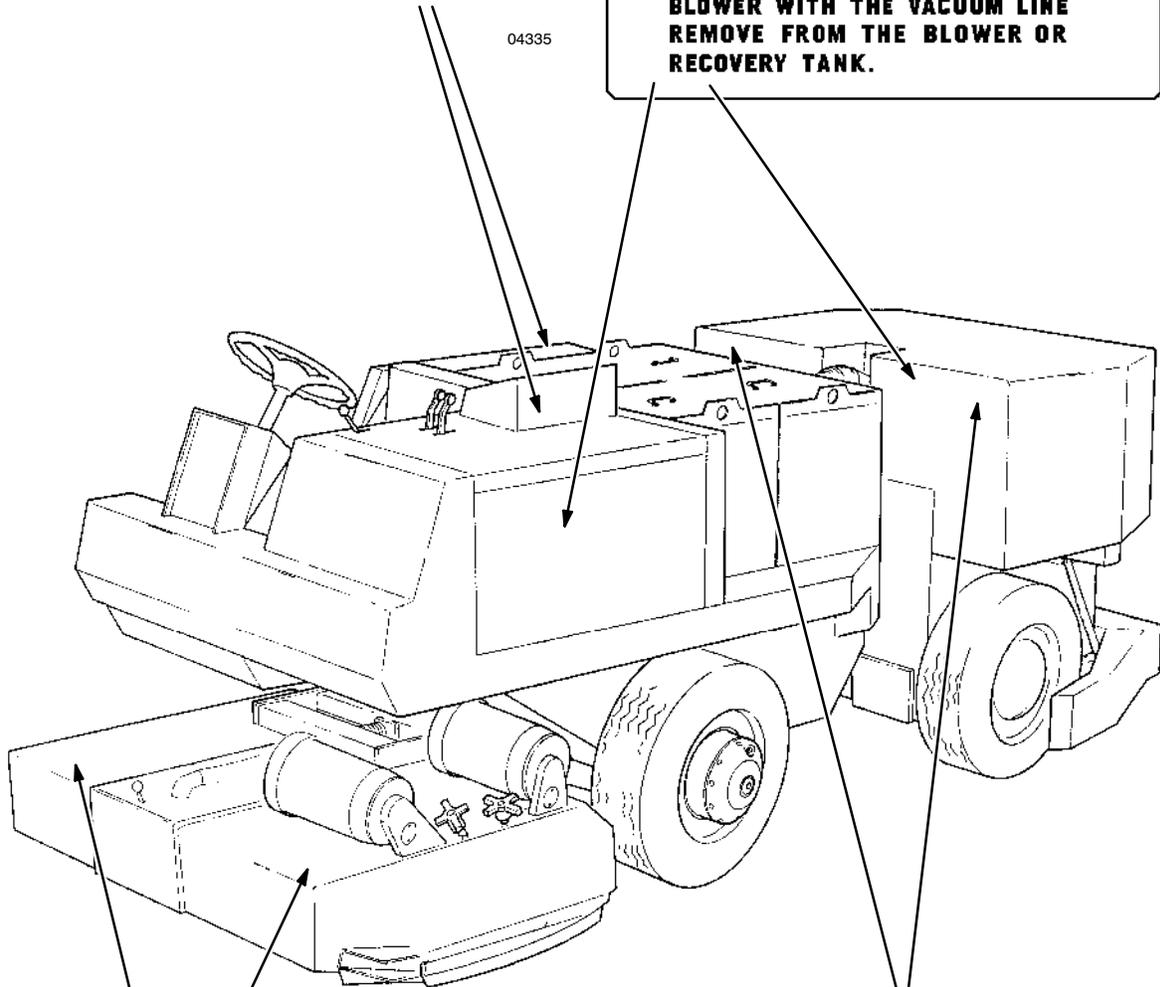


**HIGH VOLTAGE WARNING LABEL -
LOCATED ON CONTROL PANEL AND
UNDER THE INSTRUMENT PANEL**

**FAN SUCTION DANGER LABEL -
LOCATED ON THE SOLUTION TANK
AND VACUUM FAN HOUSING**

**WARNING
HAZARDOUS
VOLTAGE** DISCONNECT BATTERY.
BEFORE REMOVING PANEL
DOOR

DANGER
**FAN SUCTION IS VERY STRONG.
NEVER RUN THE ENGINE AND
BLOWER WITH THE VACUUM LINE
REMOVE FROM THE BLOWER OR
RECOVERY TANK.**



04335

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04336

WARNING
**USE SCRUBBER HEAD
LOCK (FOUND IN
OPERATOR'S COMPART-
MENT) WHEN WORKING
ON SCRUBBER HEAD.**

DANGER
**KEEP OUT OF PINCH SPACE
UNTIL JOINT IS LOCKED OR
ENGINE IS STOPPED.**

03787

03788

**SCRUB HEAD LOCK WARNING LABEL
- LOCATED ON THE SCRUB HEAD**

**PINCH SPACE DANGER LABEL -
LOCATED ON THE SOLUTION TANK**

CONTENTS

	Page		Page
GENERAL INFORMATION	i	LEVEL PUSH BUTTON	2-7
SAFETY PRECAUTIONS	i	DRAIN TANK LAMP (OPTION)	2-8
SPECIFICATIONS	1-1	SQUEEGEE POSITION LAMP	2-8
MACHINE SPECIFICATIONS	1-3	HOUR METER	2-8
POWER TYPE	1-3	SCRUB BRUSH PRESSURE GAUGE	2-8
POWER TRAIN	1-3	BATTERY CONDITION GAUGE	2-8
STEERING	1-3	PANEL LAMP (OPTION)	2-8
HYDRAULIC SYSTEM	1-3	SCRUB BRUSH SWITCH	2-8
BRAKING SYSTEM	1-4	SQUEEGEE SWITCH	2-8
SUSPENSION SYSTEM	1-4	SCRUB HEAD POSITION CONTROL	
SYSTEM FLUID CAPACITIES	1-4	LEVER	2-8
GENERAL MACHINE		SOLUTION CONTROL LEVER	2-9
DIMENSIONS/CAPACITIES	1-4	STEERING WHEEL	2-9
MACHINE WEIGHTS	1-4	SRS LIQUID LOW LEVEL LAMPS	
GENERAL MACHINE		(OPTION)	2-9
PERFORMANCE	1-4	SRS CLEANING SOLUTION FLOW	
UL BATTERY REQUIREMENTS	1-5	CONTROL KNOB (OPTION)	2-9
UL BATTERY REQUIREMENT FOR		FUSES AND CIRCUIT BREAKERS ...	2-9
THE TYPE "E" MACHINE	1-5	MACHINE OPERATION	2-10
BATTERY ENCLOSURE	1-5	NORMAL SCRUBBING OPERATION	2-10
BATTERY	1-5	PRE-START CHECKLIST	2-10
MACHINE DIMENSIONS	1-6	TO START MACHINE	2-10
OPERATION	2-1	TO FILL SOLUTION TANK	2-10
PREPARATION FOR OPERATION	2-3	TO SCRUB	2-11
AFTER UNLOADING AND BEFORE		TO DRAIN AND CLEAN RECOVERY	
OPERATING THE MACHINE:	2-3	TANK AND EMPTY	
OPERATION OF CONTROLS	2-4	HOPPER	2-12
MACHINE COMPONENTS	2-4	POST OPERATION CHECKLIST -	
INSTRUMENTS AND CONTROLS ...	2-5	MOTOR OPERATING	2-13
BRAKE PEDAL	2-6	TO STOP MACHINE	2-13
DIRECTIONAL PEDAL	2-6	POST OPERATION CHECKLIST -	
PARKING BRAKE LEVERS	2-6	MOTOR STOPPED	2-13
SCRUB HEAD LOCK LEVER	2-6	DOUBLE SCRUBBING OPERATION	2-13
PIVOT LOCK PIN	2-7	OPERATION ON GRADES	2-13
OPERATOR SEAT	2-7	MACHINE TROUBLESHOOTING ...	2-14
HAZARD LIGHT SWITCH (OPTION) ..	2-7	OPTION OPERATION	2-15
ROTATING LIGHT SWITCH		VACUUM WAND	2-15
(OPTION)	2-7	TO OPERATE VACUUM WAND: ..	2-15
OPERATING LIGHTS SWITCH		TOWING AND TRANSPORTING THE	
(OPTION)	2-7	MACHINE	2-16
MASTER POWER SWITCH	2-7	TOWING THE MACHINE	2-16
MOTOR START PUSH BUTTON	2-7	TRANSPORTING THE MACHINE ...	2-16
CLIMB PUSH BUTTON	2-7	MACHINE JACKING LOCATIONS ...	2-18
		MACHINE STORAGE	2-19
		STORING MACHINE	2-19

	Page		Page
MAINTENANCE	3-1	SOLUTION SYSTEM	3-20
RECOMMENDED FIRST 50-HOUR		RECOVERY TANK	3-20
MACHINE INSPECTION	3-3	WATER SPRAY DEFLECTOR	3-20
MAINTENANCE CHART	3-4	SRS WATER SPRAY DEFLECTOR ..	3-21
LUBRICATION	3-6	SRS SOLUTION TANK	3-22
VACUUM FAN SHAFT	3-6	SOLUTION DISPENSING TUBE	3-23
MACHINE PIVOT	3-6	SRS CLEANING SOLUTION	
SCRUB HEAD PIVOT	3-7	FILTER	3-23
SCRUB HEAD HINGES	3-7	SRS METERING SOLUTION PUMP .	3-23
REAR SQUEEGEE CASTERS	3-7	TROUBLESHOOTING	3-23
SCRUB BRUSH IDLER PLUGS	3-8	SQUEEGEES	3-24
REAR WHEELS	3-8	SIDE SQUEEGEES	3-24
SCRUB BRUSH DRIVE CHAINS	3-8	REAR SQUEEGEE	3-24
POWER WHEEL	3-8	TO REPLACE REAR	
HYDRAULICS	3-9	SQUEEGEE BLADES	3-25
HYDRAULIC FLUID	3-9	TO FACTORY ADJUST	
HYDRAULIC FLUID RESERVOIR	3-9	REAR SQUEEGEE	3-25
HYDRAULIC FLUID FILTER	3-10	TO ADJUST REAR SQUEEGEE	3-28
TO REPLACE HYDRAULIC FLUID		BRAKES AND TIRES	3-30
FILTER ELEMENT	3-10	SERVICE BRAKES	3-30
HYDRAULIC FLUID LEAKS	3-10	PARKING BRAKES	3-30
ELECTRICAL SYSTEM	3-11	TIRES	3-31
BATTERIES	3-11	POWER WHEEL	3-31
BATTERY REPLACEMENT	3-12	APPENDIX	4-1
BATTERY CHARGING	3-12	HARDWARE INFORMATION	4-3
TO CHARGE BATTERIES	3-13	STANDARD BOLT TORQUE CHART	4-3
ELECTRIC MOTORS	3-13	METRIC BOLT TORQUE CHART ..	4-3
CONTROL PANEL	3-13	BOLT IDENTIFICATION	4-3
DIRECTIONAL PEDAL	3-14	THREAD SEALANT AND LOCKING	
BELTS AND CHAINS	3-15	COMPOUNDS	4-3
VACUUM FAN DRIVE BELT	3-15	HYDRAULIC FITTING INFORMATION .	4-4
PUMP DRIVE BELT	3-15	HYDRAULIC TAPERED PIPE FITTING	
STATIC DRAG CHAIN	3-15	(NPT) TORQUE CHART	4-4
SCRUB BRUSH DRIVE CHAINS	3-15	HYDRAULIC TAPERED SEAT FITTING	
SCRUB HEAD	3-16	(JIC) TORQUE CHART	4-4
SCRUB HEAD	3-16	HYDRAULIC O-RING FITTING	
TO ADJUST SCRUB HEAD		TORQUE CHART	4-4
HEIGHT	3-16		
TO ADJUST SCRUB			
BRUSH PATTERN	3-17		
SCRUB BRUSHES	3-19		
TO REPLACE SCRUB BRUSHES	3-19		

GENERAL INFORMATION

	Page		Page
HOW TO USE THIS MANUAL	5-1	Fig. 37 - Solution and Recovery Tanks	
IMPORTANT INFORMATION	5-1	Group, Front Side	6-56
FINDING A TENNANT PART NUMBER	5-2	Fig. 38 - Solution and Recovery Tanks	
PLACING AN ORDER	5-3	Group, Rear Side	6-58
 		Fig. 39 - Rear Wheel Group	6-60
Fig. 1 - Recommended General Maintenance		Fig. 40 - Rear Wheel Parking Brake	
Items	6-2	Handle Group	6-61
Fig. 2 - Replacement Brushes	6-4	Fig. 41 - Rear Wheel Parking Brake	
Fig. 3 - Main Frame Group	6-6	Group	6-62
Fig. 4 - Seat Group	6-8	Fig. 42 - Rear Bumper Group	6-63
Fig. 5 - Main Frame Noise Insulation		Fig. 43 - Rear Squeegee Assembly	6-64
Group	6-9		
Fig. 6 - Speed And Directional Pedal		SRS PARTS ..	7-1
Group	6-10	Fig. 1 - SRS Solution Supply and Control	
Fig. 7 - Scrub Head Hopper Group	6-11	Group	7-2
Fig. 8 - Scrub Head Right Side Squeegee		Fig. 2 - SRS Control Panel Assembly ..	7-5
Assembly	6-12	Fig. 3 - SRS Front Side of Solution Tank	
Fig. 9 - Scrub Head Left Side Squeegee		Group, (001330-004933)	7-6
Assembly	6-13	Fig. 4 - SRS Front Side of Solution Tank	
Fig. 10 - Scrub Head Lift Group	6-14	Group, (004934-)	7-8
Fig. 11 - Scrub Head Solution Supply		Fig. 5 - SRS Rear Side of Solution Tank	
and Control Group	6-16	Group, (001330-004933) .	7-10
Fig. 12 - Scrub Head Front Brush Drive		Fig. 6 - SRS Rear Side of Solution Tank	
Components Group	6-18	Group, (004934-) ..	7-12
Fig. 13 - Scrub Head Front Brush Idler		Fig. 7 - SRS Wire Harnesses	7-14
Assembly	6-20		
Fig. 14 - Scrub Head Rear Brush Idler		OPTIONS	8-1
Assembly	6-21	Fig. 1 - Overhead Guard Kit	8-2
Fig. 15 - Scrub Head Rear Brush Drive		Fig. 2 - Revolving Light Kit	8-3
Components Group	6-22	Fig. 3 - Heavy Duty Bumper Kit	8-4
Fig. 16 - Vacuum Fan Assembly	6-24	Fig. 4 - SRS Heavy Duty Bumper Kit ...	8-5
Fig. 17 - Electric Motor Group	6-26	Fig. 5 - SRS Sludge Removal Tool	8-6
Fig. 18 - Steering Column Group	6-28	Fig. 6 - Solution Tank Drain Kit	8-7
Fig. 19 - Instrument Panel Group	6-30	Fig. 7 - Fire Extinguisher Kit	8-7
Fig. 20 - Instrument Panel Components		Fig. 8 - Operating Light Kit	8-8
Group	6-31	Fig. 9 - SRS Operating Light Kit	
Fig. 21 - Control Panel Components		(001330-004933)	8-8
Group	6-32	Fig. 10 - SRS Operating Light Kit	
Fig. 22 - MFR Control Assembly	6-34	(004934-)	8-9
Fig. 23 - Electrical Schematic	6-35	Fig. 11 - Squeegee Wand Kit	8-10
Fig. 24 - Power Wheel Group	6-38	Fig. 12 - SRS Squeegee Wand Kit	8-12
Fig. 25 - Electrical Wire Harness Group		Fig. 13 - Mirror Kit	8-14
Fig. 26 - Front Wheel Assembly	6-42	Fig. 14 - Tire and Wheel Kit, Foam Filled	8-14
Fig. 27 - Front Wheel Brakes Group ...	6-43	Fig. 15 - Dust Shield Kit	8-15
Fig. 28 - Front Wheel Parking Brake		Fig. 16 - Battery Chargers	8-15
Group	6-44	Fig. 17 - Batteries	8-15
Fig. 29 - Hydraulic Pump Group	6-45	Fig. 18 - Batteries (International)	8-15
Fig. 30 - Hydraulic Control Valve		Fig. 19 - Side Squeegee Extension Kit .	8-16
Group	6-46	Fig. 20 - Documentation Group	8-17
Fig. 31 - Hydraulic Schematic			
(001330-005607)	6-47	BREAKDOWNS	9-1
Fig. 32 - Hydraulic Schematic		Fig. 1 - SRS Metering Solution Pump	
(005608-)	6-48	Breakdown, 16485	9-2
Fig. 33 - Hydraulic Filter Group	6-49	Fig. 2 - SRS Solution Pump Breakdown,	
Fig. 34 - Hydraulic Hoses Group		79326-1	9-3
(001330-005607)	6-50	Fig. 3 - Power Wheel Breakdown, 75274	9-4
Fig. 35 - Hydraulic Hoses Group		Fig. 4 - Pump Breakdown, 76043	9-5
(005608-)	6-52	Fig. 5 - Hydraulic Steering Valve	
Fig. 36 - Trunnion Group	6-54	Breakdown, 57982	9-6

	Page
Fig. 6 - Hydraulic Steering Valve Breakdown, 74176	9-7
Fig. 7 - Hydraulic Steering Valve Breakdown, 65242	9-8
Fig. 8 - Solenoid Control Valve Breakdown, 31574	9-9
Fig. 9 - Steering Cylinder Breakdown, 04431	9-10
Fig. 10 - Control Valve Breakdown, 48108A	9-11
Fig. 11 - Front Brush Drive Motor Breakdown, 76213	9-12
Fig. 12 - Rear Brush Drive Motor Breakdown, 76214	9-12
Fig. 13 - Electric Motor Breakdown, 16450	9-12
Fig. 14 - Electric Motor Breakdown, 03462	9-12
Fig. 15 - Propelling Motor Breakdown, 76017	9-13
Fig. 16 - Electric Relay Breakdown, 76095	9-13
Fig. 17 - Electric Relay Breakdown, 76096	9-13
Fig. 18 - Electric Relay Breakdown, 76092	9-14
CROSS REFERENCE	10-1
PART NUMBER TO PAGE NUMBER CROSS REFERENCE LIST	10-2
PART DESCRIPTION TO PAGE NUMBER CROSS REFERENCE LIST	10-8

SECTION 1

CONTENTS

	Page
MACHINE SPECIFICATIONS	1-3
POWER TYPE	1-3
POWER TRAIN	1-3
STEERING	1-3
HYDRAULIC SYSTEM	1-3
BRAKING SYSTEM	1-4
SUSPENSION SYSTEM	1-4
SYSTEM FLUID CAPACITIES	1-4
GENERAL MACHINE	
DIMENSIONS/CAPACITIES	1-4
MACHINE WEIGHTS	1-4
GENERAL MACHINE PERFORMANCE	1-4
UL BATTERY REQUIREMENTS	1-5
UL BATTERY REQUIREMENT FOR	
THE TYPE "E" MACHINE	1-5
BATTERY ENCLOSURE	1-5
BATTERY	1-5
MACHINE DIMENSIONS	1-6

MACHINE SPECIFICATIONS**POWER TYPE**

Propelling electric motor (2) - nominal voltage
72 V.D.C.
3.2 hp (2.4 kW) @ 2400-2600 rpm, 40 A totally
enclosed, EE rated, meets U.L. 583
Brush Drive Motor (2) - nominal voltage
72 V.D.C. 2 hp (1.5 kW) @ 1600 rpm, 30 A
totally enclosed, EE rated, meets U.L. 583
Fan and hydraulic pump drive motor - nominal
voltage, 72 V.D.C. 8 hp (6 kW) @ 3200 rpm,
98 A totally enclosed, EE rated, meets
U.L. 583

POWER TRAIN

Propelling - gear reduction unit (2) 28 to 1
gear reduction
Scrub brushes (2) - chain driven
Vacuum fan - belt driven
Hydraulic pump - belt driven

STEERING

Type - Articulated frame double acting hydraulic
cylinder powered
Emergency steering - manual

HYDRAULIC SYSTEM

Function - operates steering, head lift,
squeegee lift
Control valve, steering - open center, rotary type
Control valve, head and squeegee lift -
open center type, 2-spool
Pump - vane type, 3.6 gpm (13.6 L/m) @
220 rpm, 1500 psi (10,340 kPa) delivery
pressure
System relief valve rated pressure-1500 psi
(10,340 kPa) @ 3.6 gpm (13.6 L/m)
Steering cylinder - double acting type 2 in
(50 mm) bore x 11 in (230 mm) stroke
1 in (25 mm) rod dia
Head and squeegee lift cylinders-single acting
type 2 in (50 mm) bore x 9 in (230 mm)
stroke 1 in (25 mm) rod dia
Head and squeegee lift cylinders-single acting
type 2 in (50 mm) bore x 9 in (230 mm)
stroke 1 in (25 mm) rod dia

SPECIFICATIONS

BRAKING SYSTEM

Service brakes - hydraulic caliper disc brakes (4)
(2 per front wheel) foot brake master
cylinderactuated.

Parking brakes - mechanical caliper disc brakes
(2) (1 per front wheel), cable actuated

SUSPENSION SYSTEM

Front (2) - 8.75 x 16.5 8-ply rating tubeless tires
Rear (2) - 8.75 x 16.5 8-ply rating tubeless tires

SYSTEM FLUID CAPACITIES

Power wheel - 30 oz (90 cc) SAE 90
mild/extreme pressure lubricant

Hydraulic system - reservoir 2 qt (1.9 L) total
system 6.5 qt (6.2 L)

Standard solution tank - 140 gal (530 L)

Standard recovery tank - 120 gal (455 L)

SRS solution tank - 240 gal (905 L)

SRS cleaning solution tank - 10 gal (40 L)

GENERAL MACHINE DIMENSIONS/CAPACITIES

Length - 156.5 in (3975 mm)

Width - 61.35 in (1555 mm)

Height without overhead guard - 60.9 in
(1545 mm)

Height with overhead guard - 84 in (2135 mm)

Track - front - 46.7 in (1185 mm)
rear - 45.3 in (1150 mm)

Wheelbase - 59.59 in (1510 mm)

Scrub brush (2) - path width 50 in (1270 mm)
diameter 11 in (280 mm)

Rear squeegee path width - 56.5 in (1435 mm)

Debris hopper capacity - 2.6 cu ft (0.073 m³)

MACHINE WEIGHTS

Net, less solutions, brushes and batteries -
4300 lb (1950 kg)

Net, with solutions, brushes, and standard
batteries-8680 lb (3935 kg)

Net, with solutions, brushes, and heavy duty
batteries-10,570 lb (4795 kg)

GENERAL MACHINE PERFORMANCE

Maximum travel speed - 6 mph (9.7 km/h)

Cleaning speed - 3 mph (4.8 km/h)

Turning Radius - right 196 in (4980 mm) left
191 in (4850 mm)

Maximum rated climb and descent angle with
empty tanks - 8°

Maximum rated climb and descent angle with full
tanks - 6°

UL BATTERY REQUIREMENTS

NOTE: If batteries are obtained from a supplier other than those listed in this manual, the batteries must meet these specifications.

UL BATTERY REQUIREMENT FOR THE TYPE "E" MACHINE

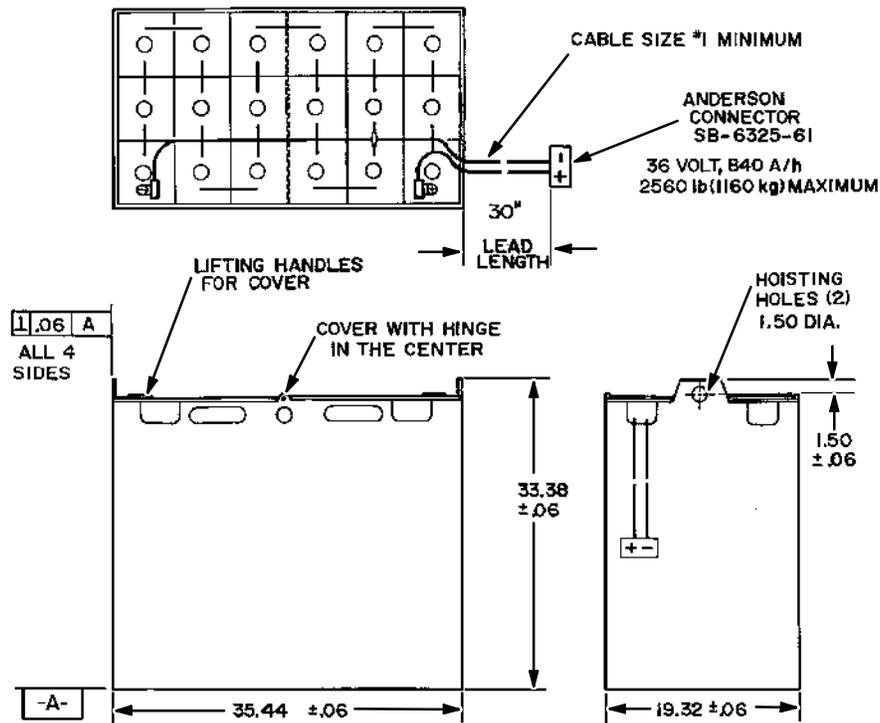
BATTERY ENCLOSURE

1. The battery shall be provided with support and protection by means of a noncombustible enclosure which, if of metal, shall be no less than 0.053 in (1.3 mm) thick (No. 16MSG) and either shall be flanged not less than 0.50 in (13 mm) on all sides or shall be provided with a construction that gives equivalent strength. A cover shall remain closed by the force of gravity or shall be provided with a fastener.
2. Battery should have flush covers.

BATTERY

3. A battery furnished with a noncombustible tray and cover, intended to form the ultimate enclosure for the battery, shall comply with the requirements in step 1.

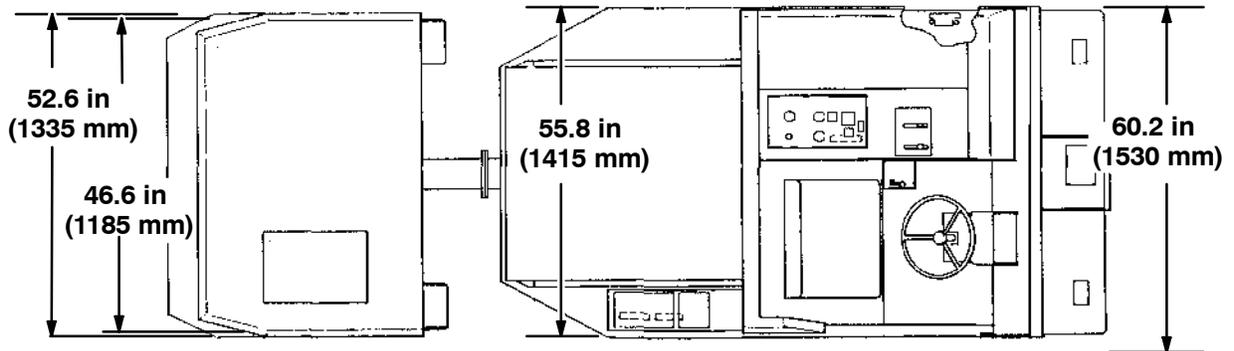
4. The battery enclosure shall be ventilated so as to minimize the possibility of accumulation of explosive hydrogen-air mixture above the battery.
5. Cells employing metal containers (such as alkaline batteries) shall be insulated from one another and from a metal tray or metal battery compartment. Insulation of wood or other material shall be: (1) treated or painted to minimize deterioration by the battery electrolyte, and (2) constructed to minimize the risk of damage to the insulation in the normal operation and maintenance of the cleaning machine.
6. The connections shall be such that the potential between any two adjacent cells cannot be more than 2.4 volts (nominal).
7. Means shall be provided as a part of the cleaning machine to restrain the battery from moving more than a total of 0.50 in (13 mm) in a horizontal direction.
8. A battery for use with a Type E cleaning machine shall be marked with the battery nominal voltage, ampere-hour capacity, battery manufacturer's name, and the catalog designation or equivalent identification.



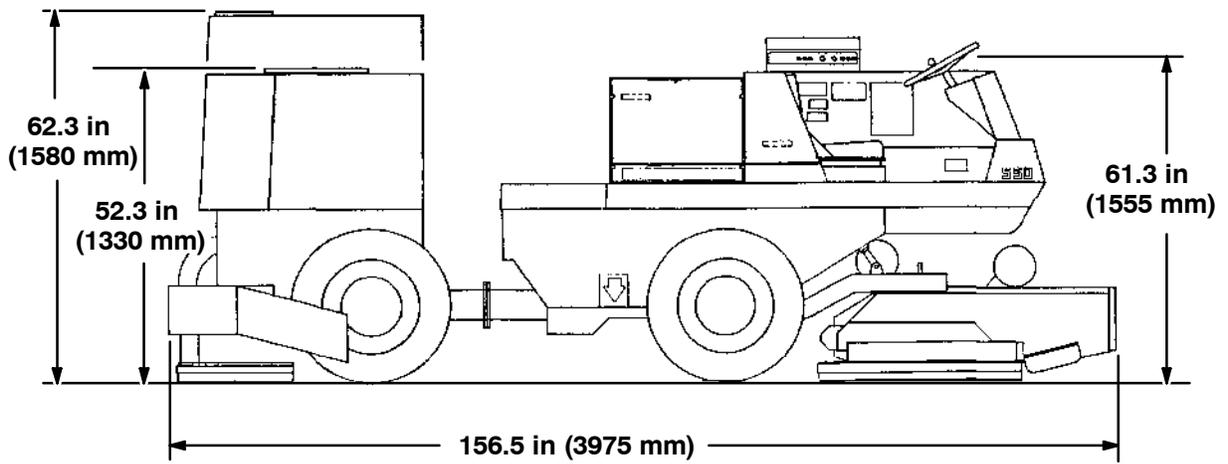
MAXIMUM BATTERY SIZE AND CONFIGURATION

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MACHINE DIMENSIONS



TOP VIEW



SIDE VIEW

00438

SECTION 2

CONTENTS

	Page		Page
PREPARATION FOR OPERATION	2-3	MACHINE OPERATION	2-10
AFTER UNLOADING AND BEFORE		NORMAL SCRUBBING OPERATION ...	2-10
OPERATING THE MACHINE:	2-3	PRE-START CHECKLIST	2-10
OPERATION OF CONTROLS	2-4	TO START MACHINE	2-10
MACHINE COMPONENTS	2-4	TO FILL SOLUTION TANK	2-10
INSTRUMENTS AND CONTROLS	2-5	TO SCRUB	2-11
BRAKE PEDAL	2-6	TO DRAIN AND CLEAN RECOVERY	
DIRECTIONAL PEDAL	2-6	TANK AND EMPTY HOPPER	2-12
PARKING BRAKE LEVERS	2-6	POST OPERATION CHECKLIST -	
SCRUB HEAD LOCK LEVER	2-6	MOTOR OPERATING	2-13
PIVOT LOCK PIN	2-7	TO STOP MACHINE	2-13
OPERATOR SEAT	2-7	POST OPERATION CHECKLIST -	
HAZARD LIGHT SWITCH (OPTION)	2-7	MOTOR STOPPED	2-13
ROTATING LIGHT SWITCH (OPTION) ..	2-7	DOUBLE SCRUBBING OPERATION ...	2-13
OPERATING LIGHTS SWITCH (OPTION) ..	2-7	OPERATION ON GRADES	2-13
MASTER POWER SWITCH	2-7	MACHINE TROUBLESHOOTING	2-14
MOTOR START PUSH BUTTON	2-7	OPTION OPERATION	2-15
CLIMB PUSH BUTTON	2-7	VACUUM WAND	2-15
LEVEL PUSH BUTTON	2-7	TO OPERATE VACUUM WAND:	2-15
DRAIN TANK LAMP (OPTION)	2-8	TOWING AND TRANSPORTING THE	
SQUEEGEE POSITION LAMP	2-8	MACHINE	2-16
HOUR METER	2-8	TOWING THE MACHINE	2-16
SCRUB BRUSH PRESSURE GAUGE ...	2-8	TRANSPORTING THE MACHINE	2-16
BATTERY CONDITION GAUGE	2-8	MACHINE JACKING LOCATIONS	2-18
PANEL LAMP (OPTION)	2-8	MACHINE STORAGE	2-19
SCRUB BRUSH SWITCH	2-8	STORING MACHINE	2-19
SQUEEGEE SWITCH	2-8		
SCRUB HEAD POSITION CONTROL			
LEVER	2-8		
SOLUTION CONTROL LEVER	2-9		
STEERING WHEEL	2-9		
SRS LIQUID LOW LEVEL			
LAMPS (OPTION)	2-9		
SRS CLEANING SOLUTION FLOW			
CONTROL KNOB (OPTION)	2-9		
FUSES AND CIRCUIT BREAKERS	2-9		

PREPARATION FOR OPERATION

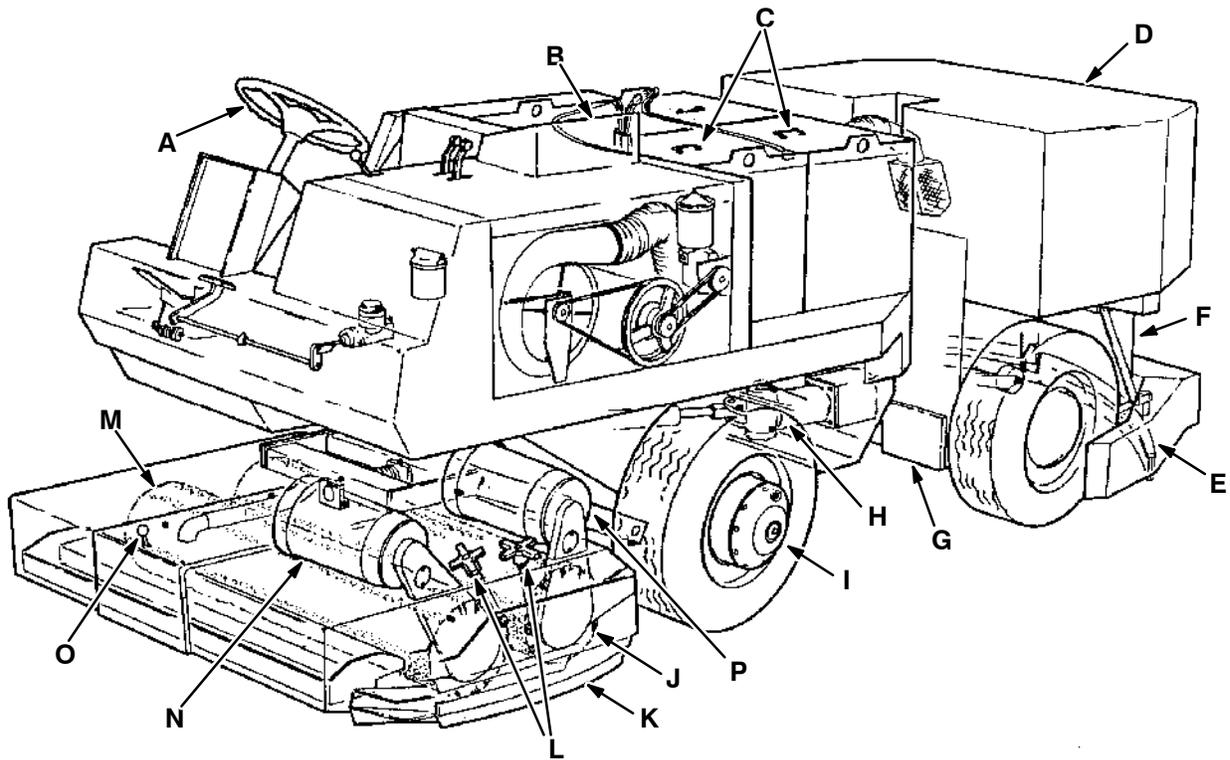
AFTER UNLOADING AND BEFORE OPERATING THE MACHINE:

1. Check the machine for shipping damage.
2. Read this manual carefully before operating or servicing the machine.

FOR SAFETY: Do Not Operate Machine Unless Operation Manual Is Read And Understood.

3. Check the hydraulic fluid level in the hydraulic fluid reservoir. TENNANT hydraulic fluid is recommended. If TENNANT hydraulic fluid is not available, use only new, approved hydraulic oil. See *HYDRAULICS* in the *MAINTENANCE* section.
4. Check the battery charge. Charge if needed. See *BATTERIES* in the *MAINTENANCE* section.
5. Check the brush adjustment, as described in *BRUSHES* in the *MAINTENANCE* section.
6. Check the air pressure of the tires. See *BRAKES AND TIRES* in the *MAINTENANCE* section.

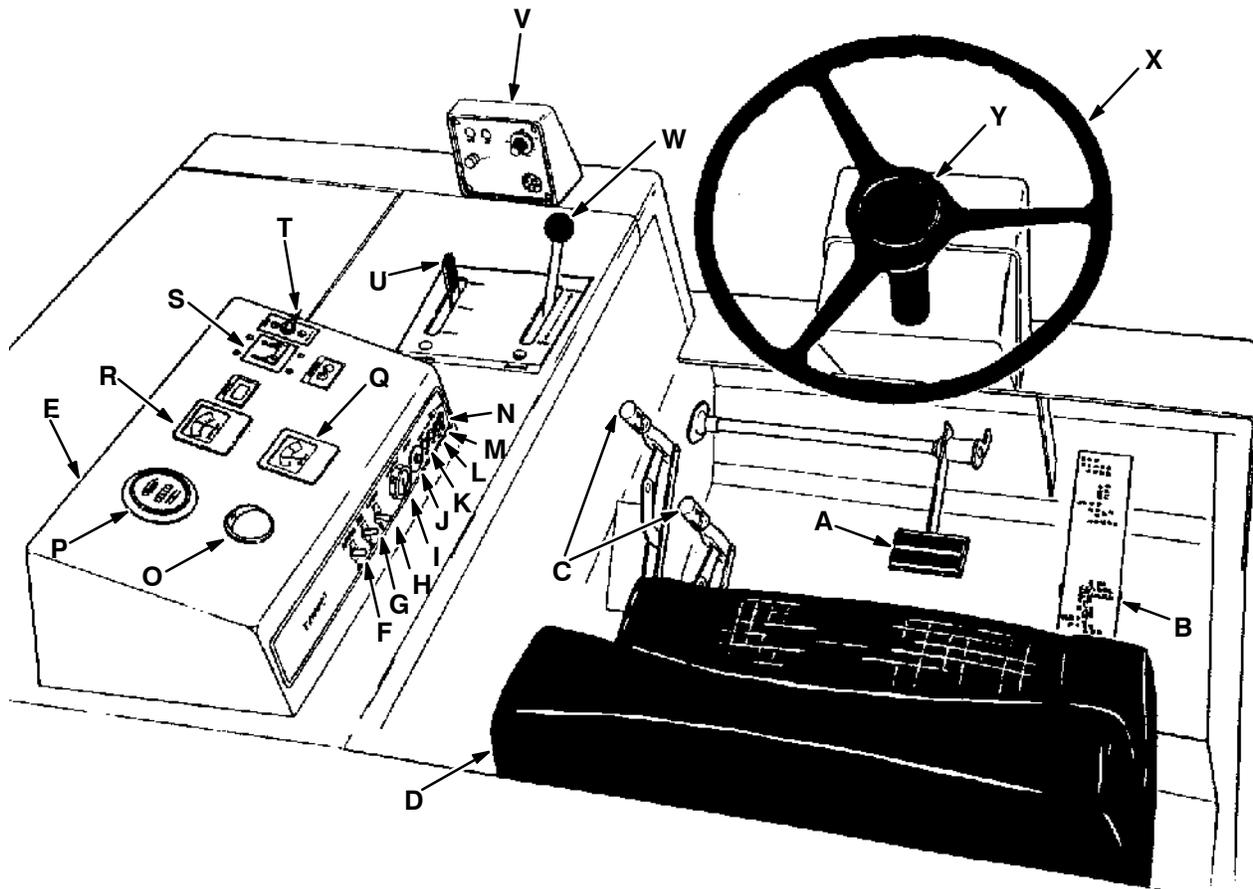
OPERATION OF CONTROLS



MACHINE COMPONENTS

01145

- | | |
|-----------------------------|---|
| A. Steering Wheel | I. Power Wheel |
| B. Instrument Panel | J. Rear Scrub Brush |
| C. Batteries | K. Side Squeegee |
| D. Solution Tank | L. Scrub Brush Adjustment Knobs |
| E. Rear Squeegee | M. Front Scrub Brush |
| F. Recovery Tank | N. Front Scrub Brush Drive Motor |
| G. Clean-Out Door | O. Debris Trough Release Lever |
| H. Articulated Joint | P. Rear Scrub Brush Drive Motor |



02360

INSTRUMENTS AND CONTROLS

- | | |
|-------------------------------------|--------------------------------------|
| A. Brake Pedal | O. Panel Lamp (Option) |
| B. Directional Pedal | P. Hour Meter |
| C. Parking Brake Levers | Q. Scrub Brush Pressure Gauge |
| D. Operator Seat | R. Battery Condition Gauge |
| E. Instrument Panel | S. Scrub Brush Switch |
| F. Hazard Light Switch (Option) | T. Squeegee Switch |
| G. Rotating Light Switch (Option) | U. Scrub Head Position Control Lever |
| H. Operating Lights Switch (Option) | V. SRS Control Panel (Option) |
| I. Master Power Switch | W. Solution Control Lever |
| J. Motor Start Push Button | X. Steering Wheel |
| K. Climb Push Button | Y. Horn Button |
| L. Level Push Button | |
| M. Drain Tank Lamp | |
| N. Squeegee Position Lamp | |

OPERATION

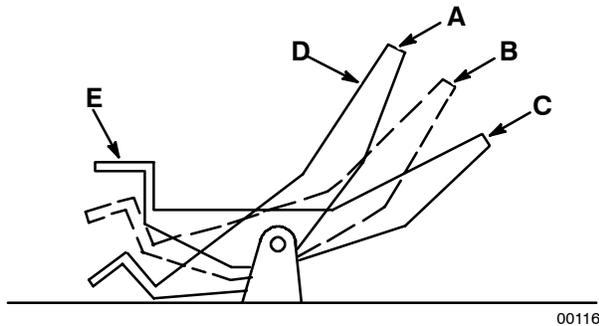
BRAKE PEDAL

The foot brake pedal operates the hydraulic disc brakes on the two front wheels.

To stop the machine, return the directional pedal to neutral; then apply pressure to the brake pedal.

DIRECTIONAL PEDAL

The machine is propelled by two electric motors which drive the two front wheels. Traveling speed of the machine is varied by means of a foot pedal which is also used to select the direction of travel.



DIRECTIONAL PEDAL

00116

- A. "Reverse" Position
- B. "Neutral" Position
- C. "Forward" Position
- D. "Toe" Portion
- E. "Heel" Portion

Gently press the "toe" portion of the pedal for forward travel. Press the "heel" portion for reverse travel. Regulate machine speed by varying the pressure on the pedal.

There are six forward speeds; three level or normal speeds and three climb speeds. There are also three reverse speeds. As the directional control pedal is pressed, the faster speed ranges will engage—much like an automatic transmission. There will be a three-second delay between the time the speed switches are engaged and the time the motor speeds up. This delay is present to insure a smooth acceleration.

NOTE: For normal stopping, return the directional pedal to neutral and use the foot brake to stop the machine.

PARKING BRAKE LEVERS

The parking brake levers control brakes on all four wheels. Pulling the brake handles up sets the parking brakes. Pushing the brake handles down releases the parking brakes. Always set the parking brakes before leaving the machine unattended and before working on the machine. The parking brakes must be released in order to start the machine motors.

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

SCRUB HEAD LOCK LEVER

The scrub head lock lever controls the scrub head lock mechanism. This locks the scrub head, preventing it from lowering.

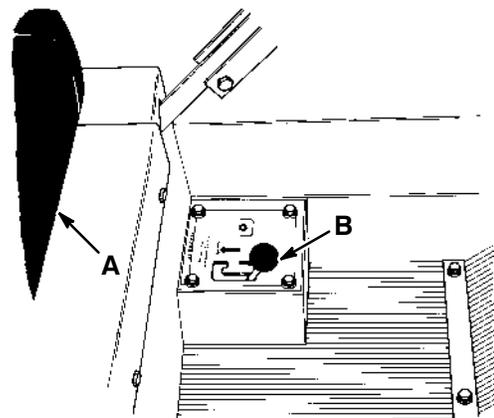
To set the scrub head lock, fully raise the scrub head. Then push the scrub head lock lever into the "LOCK" position.

To release the scrub head lock, fully raise the scrub head. Then pull the scrub head lock lever into the "UNLOCK" position.

Always set the scrub head lock before working under the scrub head. The scrub head lock must also be set whenever the machine will not be used for an extended period of time, overnight for example. Flat spots on the brushes will appear if the scrub head is left down for an extended period of time.



WARNING: Falling Scrub Head. Block Scrub Head Up Before Working Under It.



SCRUB HEAD LOCK LEVER

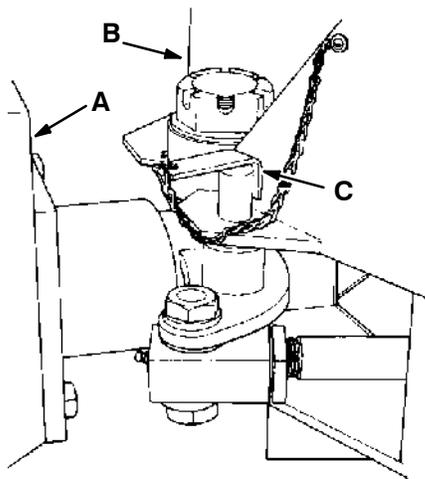
01816

- A. Operator Seat
- B. Scrub Head Lock Lever

PIVOT LOCK PIN

A pivot lock pin is provided to lock the pivot joint located between the front and rear machine sections. The pin is hung on the front section of the machine adjacent to the machine pivot. To lock the sections, turn the machine so the pivot lock holes line up, then insert the pin through the holes. The pin will prevent the machine from pivoting and creating a pinch area.

⚠ WARNING: Crush Hazard Between Front And Rear Halves Of Machine. Put Locking Pin In Pivot Lock Before Going Between Machine Halves.



PIVOT LOCK PIN IN USE

00251

- A. Machine Trailer Section**
- B. Machine Tractor Section**
- C. Pivot Lock Pin**

OPERATOR SEAT

The operator seat is of a fixed back style with a forward-backward adjustment. To adjust the seat, loosen the seat mounting bolts, slide the seat to the position desired, and tighten the bolts.

HAZARD LIGHT SWITCH (OPTION)

The hazard light switch is present on machines with the hazard light option. Flip the switch toggle up to turn the light on. Flip the switch toggle down to turn the light off.

ROTATING LIGHT SWITCH (OPTION)

The rotating light switch is present on machines with the rotating light switch option. Flip the switch toggle up to turn the light on. Flip the switch toggle down to turn light off.

OPERATING LIGHTS SWITCH (OPTION)

The operating lights switch is present on machines with the operating lights option. It controls the headlights, taillights, and the brush spot light. Flip the switch toggle up to turn the lights on. Flip the switch toggle down to turn the lights off.

MASTER POWER SWITCH

The key-operated master power switch controls the machine power. Turning the switch key clockwise to the “on” position allows power to flow. Turning the switch key counterclockwise to the “off” position stops all power flow.

Always remove the key from the switch when the machine is left unattended.

MOTOR START PUSH BUTTON

The motor start push button controls the motor starting circuit of the main electric motor. Press the push button switch momentarily to start the motor.

NOTE: The operator must be on the seat when starting the motor so that the safety switch, located under seat, will be closed. The parking brake must also be released in order to start the machine.

CLIMB PUSH BUTTON

The red climb push button, when pressed, energizes a special circuit which allows extra voltage to be applied to the drive motors, giving the machine more power to climb ramps. Press the push button switch to engage the climb circuit. To disengage the climb circuit, press the level push button. Pressing the directional pedal into the “reverse” position will also disengage the climb circuit.

LEVEL PUSH BUTTON

The level push button, when pressed, stops the climb circuit operation. The push button is used when the machine is still moving and when the climb circuit is no longer needed. The level or normal speed range is recommended for optimum scrubbing performance.

DRAIN TANK LAMP (OPTION)

The drain tank lamp is present on machines equipped with the drain tank option. The lamp lights when the recovery tank is nearly full. The machine operator can then plan to return to a dumping station.

SQUEEGEE POSITION LAMP

The squeegee position lamp lights when the rear squeegee is either fully raised or lowered. This can be helpful to the operator when the squeegee is not visible.

HOUR METER

The hour meter is located on the control panel. The meter records the number of hours the machine is operated and is useful in determining when to perform periodic maintenance procedures which are listed in the maintenance chart.

SCRUB BRUSH PRESSURE GAUGE

The scrub brush pressure gauge indicates the electrical current flow to the rear scrub brush motor. The gauge needle should be in the green zone when scrubbing. If the needle stays in the red zone continuously, the scrub brush pattern or floor contact area is excessive and should be decreased.

BATTERY CONDITION GAUGE

The battery condition gauge indicates the battery state of charge. When the gauge needle is in the red zone, the batteries should be recharged.

NOTE: If machine stalls due to low battery charge, disconnect the vacuum fan belt and wait approximately 5 to 10 minutes. The batteries should then have recovered enough to be able to power the machine to a charger station.

PANEL LAMP (OPTION)

The panel lamp is present on machines with the operating lights option. The lamp lights whenever the operating lights switch toggle is flipped up to turn on the operating lights.

SCRUB BRUSH SWITCH

The scrub brush switch controls the power to the scrub brush motors. Place the scrub brush switch in the “on” position to start the scrub brushes rotating. Place the switch in the “off” position to stop scrub brush rotation.

The switch also provides the circuit electrical overload protection with a 30 A circuit breaker.

In the event of a circuit overload, the switch will return to the “off” position. The switch must then be returned to the “on” position to restart the scrub brush rotation. If the overload which caused the switch to trip is still present, the switch circuit breaker will continue to stop electrical current flow until the overload is corrected.

NOTE: To prolong the life of the scrub brush motors and chains, always raise the scrub head before turning on brush drive motors.

SQUEEGEE SWITCH

The squeegee switch, in conjunction with a hydraulic flow sensing device, controls the position of the rear squeegee.

Flipping the switch toggle up places the rear squeegee in the “Squeegee Up” position. This position cannot be overridden by the hydraulic flow sensing device.

Flipping the switch toggle down places the rear squeegee in the “Down” position when traveling in the forward direction. When traveling in the reverse direction, the hydraulic flow sensing device overrides the squeegee switch and raises the rear squeegee. This prevents the rear squeegees from being damaged when traveling in reverse. The squeegee switch should always be in the “Down” position when scrubbing.

SCRUB HEAD POSITION CONTROL LEVER

The scrub head position control lever controls the position of the scrub head lift cylinder. Pulling the control lever into the “RAISE” position raises the scrub head. The middle “HOLD” position stops scrub head movement. Pushing the control lever into the “LOWER” position lowers the scrub head.

SOLUTION CONTROL LEVER

The solution control lever controls the solution flow. Pushing the lever into the “CLOSED” position stops solution flow to the floor. Pulling the lever into the “OPEN” position allows solution to flow.

STEERING WHEEL

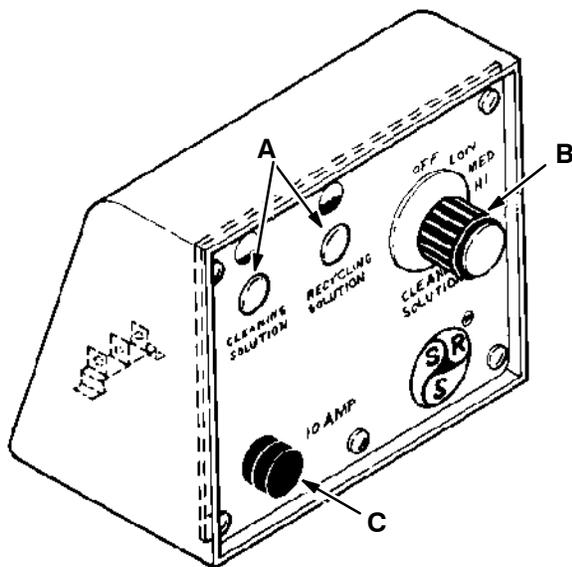
The steering wheel controls a steering cylinder which is mounted between the two halves of the machine.

Do not turn the steering wheel excessively when the motor is not running. An articulated trunnion connects the front and rear sections of the machine so that the rear section always follows the path of the front section.

A horn button is located in the center of the steering wheel.

SRS LIQUID LOW LEVEL LAMPS (OPTION)

The SRS liquid low level lamps option includes two indicating lamps. The cleaning solution lamp lights when the cleaning solution is low. The recycling solution lamp lights when the recycling solution is low.



SRS CONTROL PANEL

00351

- A. Liquid Low Level Indicator Lamps**
- B. Cleaning Solution Flow Control Knob**
- C. SRS Pump System Fuse**

SRS CLEANING SOLUTION FLOW CONTROL KNOB (OPTION)

The SRS cleaning solution flow control knob controls the cleaning solution pump which pumps cleaning solution into the solution flow to the floor. The “LOW,” “MED,” and “HI” levels indicate the rate of cleaning solution flow. The “LOW” level causes the pump to deliver one-fourth capacity, “MED” level one-half capacity, and “HI” level full pump capacity of cleaning solution into the solution flow to the floor.

The “OFF” position shuts off the cleaning solution flow.

FUSES AND CIRCUIT BREAKERS

Fuses are 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 than those specified in this manual. The fuses are located in the control panel.

Circuit breakers are resettable circuit protection devices designed to stop the flow of current in the event of a circuit overload. Once tripped, circuit breakers must be manually reset. The scrub brush drive circuit is located in the instrument panel.

If the overload which caused the circuit breaker to trip is still present in the circuit, the circuit breaker will continue to stop current flow until the overload is corrected. The chart below shows the various fuses and circuit breakers and the electrical components they protect.

PROTECTIVE DEVICE PROTECTED	RATING	CIRCUIT
Fuse	200 A	Complete machine
Fuse	15 A	Horn
Fuse	15 A	Operating lights
Fuse	15 A	Hazard light
Fuse	15 A	Auto-squeegee
Fuse	1 A	Level sensing
Fuse	50 A	MFR control, drive motors
Fuse	120 A	Motor
Fuse	5 A	SRS pumps
Circuit	30 A	Scrub brush drive
CB-6	15 A	Lights

MACHINE OPERATION

NORMAL SCRUBBING OPERATION

A normal scrubbing operation consists of eight typical operations: pre-start checklist, starting machine, filling solution tank, scrubbing, draining recovery tank and emptying hopper, post operation checklist - motor operating, stopping machine, and post operation checklist - motor stopped.

PRE-START CHECKLIST lists things to check before starting the machine.

TO START MACHINE lists the steps required to start the machine.

TO FILL SOLUTION TANK lists the steps required to fill the solution tank.

TO SCRUB lists things to keep in mind before and during the scrubbing operation.

TO DRAIN AND CLEAN RECOVERY TANK AND EMPTY HOPPER lists the steps required to empty the debris hopper and the recovery tank.

POST OPERATION CHECKLIST - MOTOR OPERATING lists things to check before stopping the machine motor.

TO STOP MACHINE lists the steps required to stop the machine.

POST OPERATION CHECKLIST - MOTOR STOPPED lists things to check after stopping the machine motor.

PRE-START CHECKLIST

Check under the machine for leak spots.

Check the brakes and controls for proper operation.

Check the service records to determine service requirements.

TO START MACHINE

NOTE: Before starting machine, perform the pre-start checks.

1. The machine operator must be in the operator's seat with the directional pedal in the "neutral" position and with a foot on the brake pedal.

FOR SAFETY: Before Starting Machine, Make Sure All Safety Devices Are In Place And Operate Properly.

2. Release the parking brake..
3. Turn the master power key switch to the "ON" position.
4. Press the start push button to start the motor.
5. Drive the machine to the solution filling site.

TO FILL SOLUTION TANK

1. Stop the motor and set the parking brake.

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

2. Open the solution tank fill door or cap.
3. Pour the required amount of detergent into the tank. Fill the tank with water to 1 in (25 mm) below the tank opening. The water must not be hotter than 130°F (54°C) or tank damage may occur.

FOR SAFETY: When using machine, follow mixing and handling instructions on chemical containers.

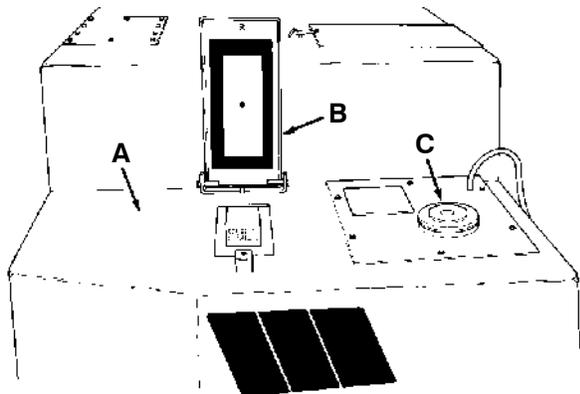
NOTE: If standing water is to be picked up in addition to the solution put down by machine, do not fill tank all of the way. This will allow more water to be picked up before the ball float shutoff is actuated.

! WARNING: Flammable Materials Can Cause An Explosion Or Fire. Do Not Use Flammable Materials In Solution Tank.

SRS machines: Pour liquid detergent into the cleaning solution tank - not the solution tank. Do not use powdered detergent or any other detergent not designed for the SRS application. Replace the cleaning solution tank fill cap.

FOR SAFETY: When using machine, follow mixing and handling instructions on chemical containers.

NOTE: Floor conditions, water condition, amount of soilage, type of soilage, brush action, and squeegee action all play an important role in determining the type and the concentration of detergent to be used. For specific recommendations, contact the local TENNANT representative.



SRS TANK

- A. Solution Tank**
- B. Solution Fill Door**
- C. Cleaning Solution Fill Cap**

4. Close the solution fill door.

TO SCRUB

Plan the scrubbing in advance. Try to arrange long runs with minimum stopping and starting. Do an entire floor or section at one time.

Pick up oversize debris before scrubbing. Remove bulky debris from aisles before scrubbing. Pick up pieces of wire, twine, string, etc., which could become entangled in brush or brush plugs.

Allow a few inches overlap of brush paths.

Do not turn steering wheel too sharply when the machine is in motion. It is very responsive to the movement of the steering wheel. Avoid sudden turns, except in emergencies.

Try to scrub as straight a path as possible. Avoid bumping into posts or scraping the sides of the machine.

1. Drive the machine to the area to be scrubbed.
 2. Move the scrub head position lever to the "RAISE" position to release the scrub head lock.
 3. Move the scrub head lock lever to the "UNLOCK" position.
 4. Place the squeegee switch in the "DOWN" position.
 5. Move the solution lever back to start the solution flow.
- For SRS machines: Turn the cleaning solution knob to the desired cleaning solution flow.
6. Move the scrub brush switch to the "ON" position.
 7. Scrub as required.

! WARNING: Flammable materials or reactive metals can cause explosion or fire. Do not pick up.

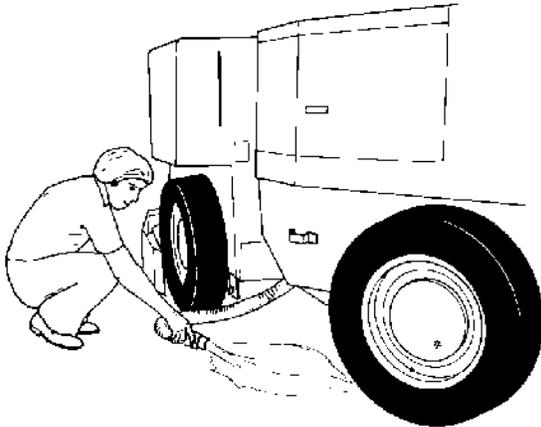
OPERATION

TO DRAIN AND CLEAN RECOVERY TANK AND EMPTY HOPPER

1. Stop the motor and set the parking brake.

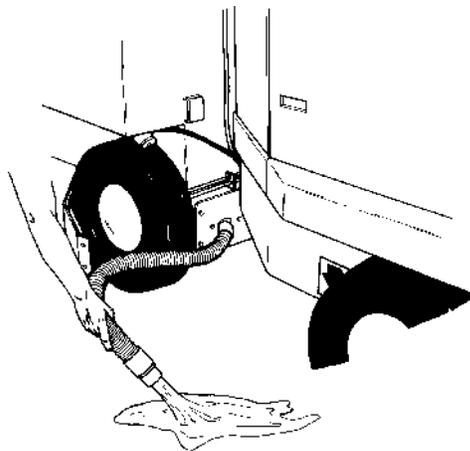
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

2. Remove and unplug the tank drain hose next to a floor drain.



DRAINING RECOVERY TANK

00288

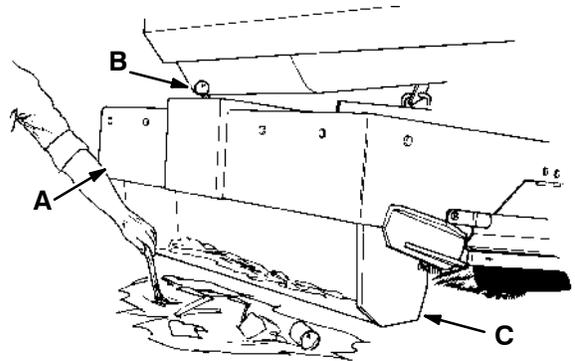


DRAINING SRS TANK

00343

3. Pull the debris trough lever to dump the debris trough.

NOTE: If a more gentle dumping action is desired, the trough can be dumped with the scrub head lowered; then the head can be raised hydraulically to slowly tip the trough.



DUMPING DEBRIS TROUGH

00283

- A. Scrub Head**
- B. Debris Trough Lever**
- C. Debris Trough**

4. Clean the trough screen.
5. Clean the channel above the debris trough. If debris builds up in this area, the trough will not swing all the way up and latch properly. Remove any debris which has accumulated on top of the rail.
6. Close the debris trough.
7. Plug and secure the drain hose to the machine after tank is drained.
8. SRS machines: Partially fill the solution tank with clean water. Run the SRS pump for a few minutes to flush the solution hoses.

POST OPERATION CHECKLIST - MOTOR OPERATING

Check the scrub brush pattern for width and evenness.

Check the squeegees for proper deflection.

TO STOP MACHINE

1. Return the directional pedal to the "neutral" position. Apply the brake.
2. Move the solution lever to the "OFF" position.
3. Move the scrub head position lever to the "RAISE" position to set the scrub head lock.
4. Move the scrub head lock lever to the "LOCK" position.
5. Move the scrub brush lever to the "OFF" position.
6. Place the squeegee switch in the "Squeegee Up" position.
7. Turn off the operating lights if used.
8. Turn the master power key switch to the "OFF" position.
9. Set the machine parking brake.

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

POST OPERATION CHECKLIST - MOTOR STOPPED

Check for wire or string tangled on the scrub brushes.

Check the squeegees for wear or damage.

Empty and clean the debris hopper.

Drain and clean the recovery tank.

Check the vacuum hoses for debris or obstructions.

Check for leaks.

DOUBLE SCRUBBING OPERATION

Double pass scrubbing should be necessary only for heavy soilage and build-up of dirt, wax, etc. Operate the machine as desired for normal scrubbing but keep the rear squeegee up while making the first scrubbing pass. Allow the solution to soak on the floor for 15 to 20 minutes. Then make a second pass in the normal manner with the rear squeegee down.

FOR SAFETY: When Using Machine: Go Slow On Grades And Slippery Surfaces.

OPERATION ON GRADES

Drive the machine slowly on grades. Some loss of rear wheel steering traction could occur when braking with empty solution tanks.

The maximum rated ramp climb angle is 8° with empty tanks, and 6° with full tanks.

FOR SAFETY: When Using Machine: Go Slow On Grades And Slippery Surfaces.

OPERATION

MACHINE TROUBLESHOOTING

Problem	Cause	Remedy
Trailing water - poor or no water pickup	Worn rear squeegee	Rotate or replace rear squeegee blade
	Rear squeegee out of adjustment	Adjust rear squeegee
	Worn side squeegee	Replace side squeegee blade
	Side squeegee out of adjustment	Adjust side squeegee
	Vacuum hose clogged	Flush vacuum hoses
	Recovery tank full	Drain tank
	Float stuck shutting off vacuum	Clean float
	Vacuum fan drive belt loose or broken	Adjust, or replace and adjust belt
	Debris caught on 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 to recovery tank hose damaged	Replace hose
Little or no solution flow to floor	Solution tank empty	Fill solution tank
	Solution control linkage broken or out of adjustment	Replace and/or adjust linkage
	Solution supply lines plugged	Flush solution supply lines
	Solution spreader holes plugged	Flush spreader holes
Poor scrubbing performance	Debris caught on scrub brushes	Remove debris
	Improper detergent or brushes used	Check with TENNANT representative for advice
	Worn scrub brushes	Replace scrub brushes
	Scrub brushes out of adjustment	Adjust scrub brushes
	Debris hopper full	Empty hopper
	Brushes have rotation set	Rotate brushes end-for-end
	Scrub brush drive failure	Check scrub brush drive circuit breaker

OPTION OPERATION

VACUUM WAND

The vacuum wand option gives the machine the added flexibility of picking up spills not accessible by the machine. A 20 ft (6095 mm) hose and wand utilizes the machine vacuum system.

TO OPERATE VACUUM WAND:

1. Set the machine parking brake.

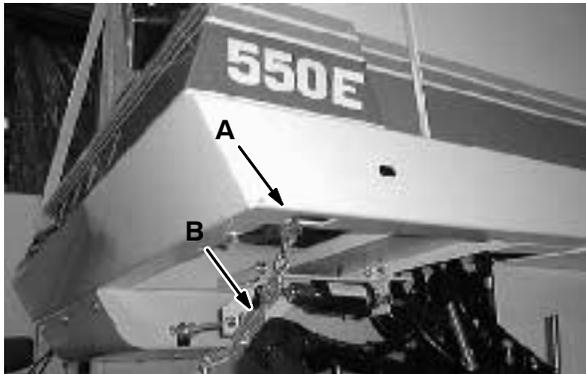
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, Turn Off Machine And Remove Key.

2. Remove the vacuum wand and hose from storage on the machine.
3. Remove the rear squeegee vacuum hose plate from the rear of the tank.
4. Attach the vacuum hose plate to the rear of the tank, using the toggle clamps provided.
5. Place the master power switch in the "on" position.
6. Place the wand switch in the "on" position.
7. Operate the squeegee wand as required.
8. When finished, shut off the wand switch, shut off the master power switch, and remove the vacuum hose plate from the rear of the tank.
9. Reconnect the rear squeegee vacuum hose plate to the rear of the tank, using the toggle clamps provided.
10. Clean and rinse off squeegee wand and related equipment as required.
11. Store the squeegee wand equipment in the proper locations.

TOWING AND TRANSPORTING THE MACHINE

TOWING THE MACHINE

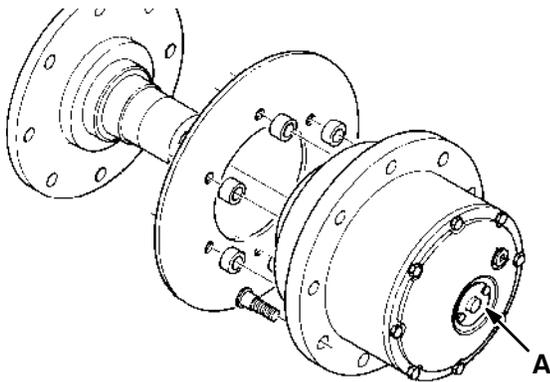
If the machine becomes disabled, it can be towed from the front tie down holes or from the rear bumper mounts.



FRONT TOWING LOCATION

- A. Front Tie Down Holes**
- B. Towing Chain**

This machine is not designed to be pushed. The propelling system can be disengaged to prevent damage to the propelling system when the machine is being towed. Remove the cover plates from the front drive wheels before towing the machine. This will disengage the electric propelling motors.



DISENGAGING PROPELLING MOTORS

- A. Cover Plate**

Only tow the machine for a short distance and do not exceed 3.2 kp/h (2 mph). It is NOT intended to be towed for a long distance or at a high speed.

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

TRANSPORTING THE MACHINE

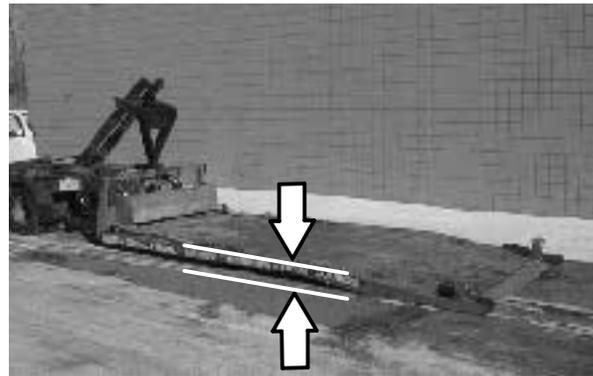
1. Position the machine at the loading edge of the truck or trailer.

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

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

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

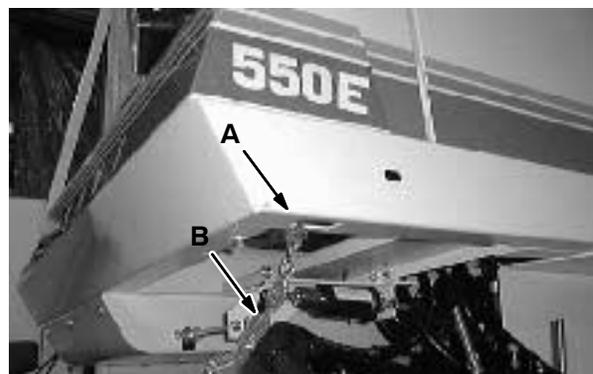
If the loading surface is horizontal AND is 380 mm (15 in) or less from the ground, the machine may be driven onto the truck or trailer.



LOADING SURFACE

- A. Loading Surface Height**

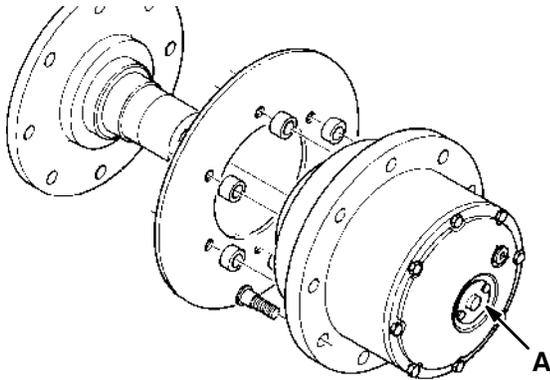
3. To winch the machine onto the truck or trailer, attach the winching chains to the machine.



ATTACHING WINCHING CHAINS

- A. Front Tie Down Holes**
- B. Winching Chain**

- Remove the cover plates from the front drive wheels to disengage the electric propelling motors.



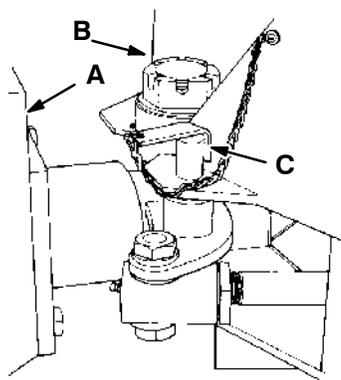
DISENGAGING PROPELLING MOTORS

A. Cover Plate

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 (15 in) or less from the ground.

- Turn the machine so the pivot lock holes line up, then insert the pin in the lined up holes. The pin will prevent the machine from pivoting and creating a pinch area. See *PIVOT LOCK PIN* section of this manual.

WARNING: Crush Hazard Between Front And Rear Halves Of Machine. Engage Pivot Lock.

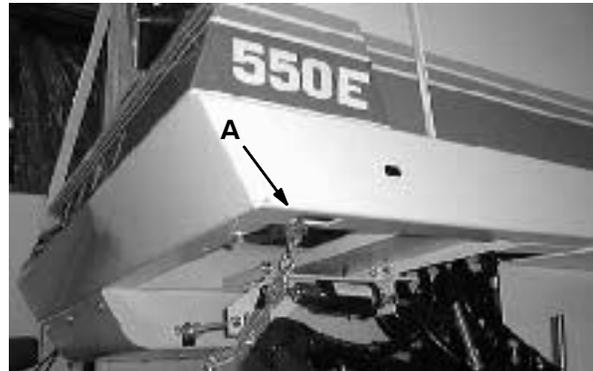


PIVOT LOCK PIN IN USE

00251

- A. Machine Trailer Section**
- B. Machine Tractor Section**
- C. Pivot Lock Pin**

- 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.
- Set the parking brake, lower the scrub head and block the machine tires. Tie down the machine to the truck or trailer at the six tie down locations before transporting.
- Tie the front of the machine at the two corners of the front frame.



FRONT TIE DOWN LOCATION

A. Front Tie Down Holes

- Tie the middle of the machine on the tie down bracket on the rear of the tractor frame.



MIDDLE TIE DOWN LOCATION

A. Middle Tie Down Bracket

OPERATION

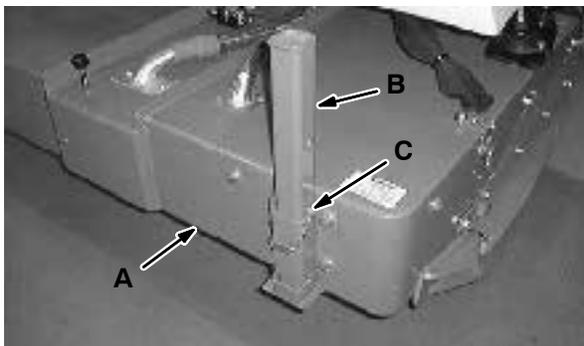
10. Tie the rear of the machine under the rear bumper at the two bumper mounts.



REAR TIE DOWN LOCATION

A. Rear Bumper Mounts

11. If the machine is equipped with the optional scrub head support legs, pull the pins to lower the legs. Lock them into position again by replacing the pins.



OPTIONAL SCRUB HEAD SUPPORT LEG

- A. Scrub Head
- B. Support Leg
- C. Pin

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

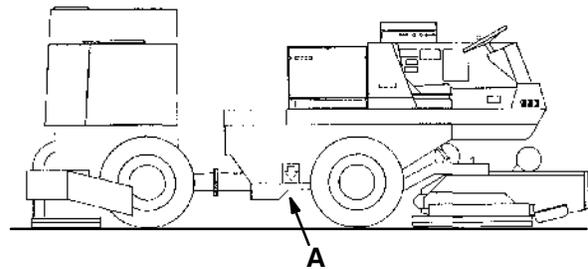
If the loading surface is horizontal AND is 380 mm (15 in) or less from the ground, the machine may be driven off the truck or trailer.

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 (15 in) or less from the ground.

MACHINE JACKING LOCATIONS

Empty the recovery and solution tanks before jacking the machine. The machine jacking locations are labeled with a label. The tractor jacking locations are behind each of the front wheels, and the tank jacking locations are in the front of the rear wheels.

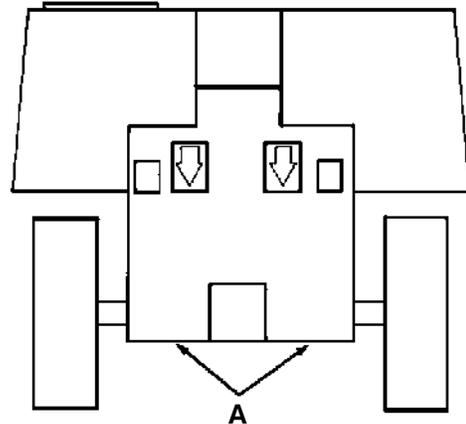
FOR SAFETY: When Servicing Machine, Block Machine Tires Before Jacking Machine Up. Jack Machine Up At Designated Locations Only. Block Machine Up With Jack Stands. Use A Hoist Or Jack That Will Support The Weight Of The Machine.



TRACTOR JACKING LOCATION

00438

A. Jacking Location



TANK JACKING LOCATION

01820

A. Jacking Location

MACHINE STORAGE

STORING MACHINE

When storing the machine for extended periods of time, the following procedures must be followed to lessen the chance of rust, sludge, and other undesirable deposits to form:

1. Drain and clean out the solution recovery and cleaning solution tanks.
2. Park the machine in a cool and dry area.
3. Raise and lock the scrub head in the raised position.
4. Fill the hydraulic reservoir with hydraulic fluid to 0.5 to 1 in (15 to 25 mm) from the top of the reservoir. To prevent excessive condensation from forming in the reservoir.

SECTION 3

CONTENTS

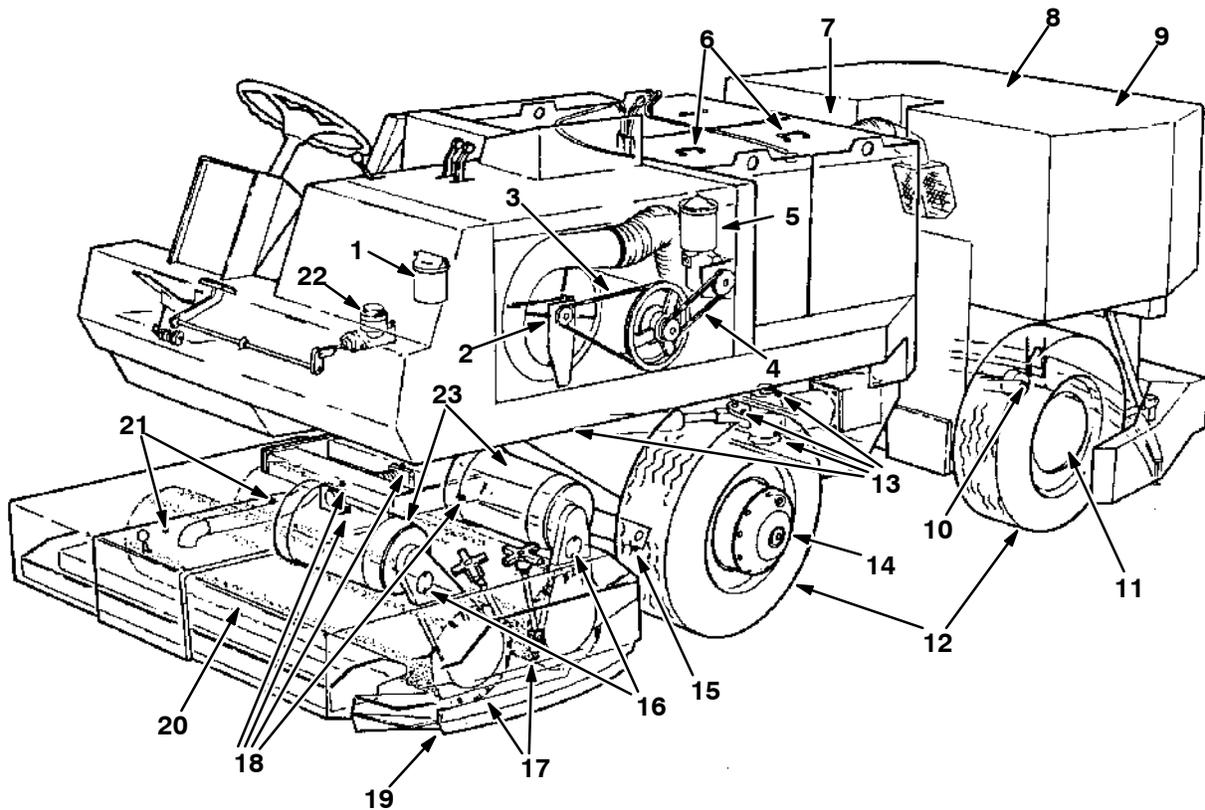
	Page		Page
RECOMMENDED FIRST 50-HOUR		SCRUB HEAD	3-16
MACHINE INSPECTION	3-3	SCRUB HEAD	3-16
MAINTENANCE CHART	3-4	TO ADJUST SCRUB HEAD HEIGHT ...	3-16
LUBRICATION	3-6	TO ADJUST SCRUB BRUSH PATTERN	3-17
VACUUM FAN SHAFT	3-6	SCRUB BRUSHES	3-19
MACHINE PIVOT	3-6	TO REPLACE SCRUB BRUSHES	3-19
SCRUB HEAD PIVOT	3-7	SOLUTION SYSTEM	3-20
SCRUB HEAD HINGES	3-7	RECOVERY TANK	3-20
REAR SQUEEGEE CASTERS	3-7	WATER SPRAY DEFLECTOR	3-20
SCRUB BRUSH IDLER PLUGS	3-8	SRS WATER SPRAY DEFLECTOR	3-21
REAR WHEELS	3-8	SRS SOLUTION TANK	3-22
SCRUB BRUSH DRIVE CHAINS	3-8	SOLUTION DISPENSING TUBE	3-23
POWER WHEEL	3-8	SRS CLEANING SOLUTION FILTER ...	3-23
HYDRAULICS	3-9	SRS METERING SOLUTION PUMP	3-23
HYDRAULIC FLUID	3-9	TROUBLESHOOTING	3-23
HYDRAULIC FLUID RESERVOIR	3-9	SQUEEGEES	3-24
HYDRAULIC FLUID FILTER	3-10	SIDE SQUEEGEES	3-24
TO REPLACE HYDRAULIC FLUID		REAR SQUEEGEE	3-24
FILTER ELEMENT	3-10	TO REPLACE REAR	
HYDRAULIC FLUID LEAKS	3-10	SQUEEGEE BLADES	3-25
ELECTRICAL SYSTEM	3-11	TO FACTORY ADJUST	
BATTERIES	3-11	REAR SQUEEGEE	3-25
BATTERY REPLACEMENT	3-12	TO ADJUST REAR SQUEEGEE	3-28
BATTERY CHARGING	3-12	BRAKES AND TIRES	3-30
TO CHARGE BATTERIES	3-13	SERVICE BRAKES	3-30
ELECTRIC MOTORS	3-13	PARKING BRAKES	3-30
CONTROL PANEL	3-13	TIRES	3-31
DIRECTIONAL PEDAL	3-14	POWER WHEEL	3-31
BELTS AND CHAINS	3-15		
VACUUM FAN DRIVE BELT	3-15		
PUMP DRIVE BELT	3-15		
STATIC DRAG CHAIN	3-15		
SCRUB BRUSH DRIVE CHAINS	3-15		

RECOMMENDED FIRST 50-HOUR MACHINE INSPECTION

AFTER THE FIRST 50 hours of operation, the following procedures are recommended:

1. Check brushes for even wear and rotate brushes end-for-end.
2. Check scrub brush pattern.
3. Check scrub head side squeegee blades for wear or damage.
4. Check rear squeegee for worn or damaged blades, or for incorrect adjustment.
5. Check vacuum fan and pump drive belts for correct tension adjustment.
6. Check tires for correct inflation.
7. Check brush drive chains for correct tension and oil level.
8. Check vacuum hoses for damage or loose connections.
9. Check tightness of nut attaching each front wheel hub to front axle.
10. Check tightness of front and rear wheel mounting nuts.
11. Perform all remaining 50-hour lubrication and maintenance procedures listed in *MAINTENANCE CHART*.

MAINTENANCE CHART



01145

Interval	Key	Description	Procedure	Lubricant/ Fluid	No. of Service Points
Daily	17	Scrub brushes	Check for damage, wear, and adjustment	-	2
	9	Recovery tank	Empty and clean	-	1
			Clean ball float screen	-	1
	9	SRS Solution tank and Metering pump	Empty and clean	-	1
			Flush laminar tubes	-	1
	10	Rear squeegee	Check for damage, wear, and adjustment	-	1
	19	Side squeegees	Check for damage, wear, and adjustment	-	2
12	Tires	Check air pressure	-	4	

Interval	Key	Description	Procedure	Lubricant/ Fluid	No. of Service Points
50 Hours	17	Scrub brushes	Rotate front-to-back	-	2
	4	Pump drive belt	Check tension	-	1
	3	Vacuum fan drive belt	Check tension	-	1
	2	Vacuum fan shaft	Lubricate	SPC	1
	13	Machine pivot	Lubricate	SPC	4
	18	Scrub head pivot	Lubricate	SPC	4
	15	Scrub head hinges	Lubricate	SPC	2
	10	Rear squeegee casters	Lubricate	SPC	3
	21	Scrub brush idler plugs	Lubricate	SPC	2
	16	Scrub brush drive chains	Check lubrication level	EO	2
	5	Hydraulic fluid reservoir	Check fluid level	HYDO	1
	6	Batteries	Clean tops	-	2
			Check electrolyte level	-	2
			Check specific gravity	-	2
	20	Solution dispensing tube	Flush	-	1
7	SRS Cleaning solution Filter	Clean	-	1	
22	Brake master cylinder	Check fluid level	BF	1	
100 Hours	16	Scrub brush drive chains	Check tension	-	2
	22	Parking brake	Check adjustment	-	2
200 Hours	14	Power wheel	Check lubricant level	MPL	2
	8	Spray deflectors	Check for wear	-	2
	11	Wheel lug nuts	Check torque	-	26
	23	Electric motors	Inspect brushes	-	3
	12	Tires	Tighten lug nuts	-	4
400 Hours	1	Hydraulic fluid filter	Change filter element	-	1
	5	Hydraulic fluid reservoir	Change hydraulic fluid	HYDO	1
2000 Hours	11	Rear wheel bearings	Repack with lubricant	WBG	2

BF - Brake fluid

EO - Engine oil, SAE 30

HYDO - TENNANT or approved hydraulic fluid

MPL - Multipurpose gear lubricant, SAE 90

SPC - Special lubricant, Lubriplate EMB grease, (TENNANT Part No. 01433-1)

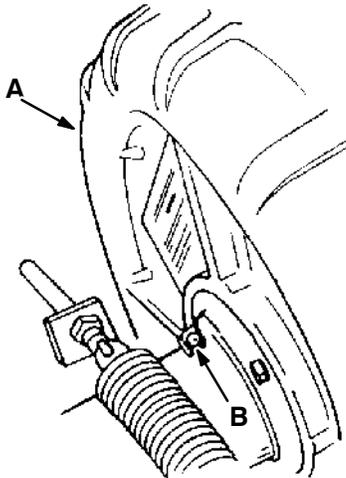
WBG - Wheel bearing grease

LUBRICATION

VACUUM FAN SHAFT

There is one grease fitting which is used to lubricate the vacuum fan shaft. Grease the vacuum fan bearings after every 50 hours of operation. The vacuum fan grease fitting is covered with a plastic cap. Snap the cap open and apply Lubriplate EMB grease (TENNANT Part No. 01433-1) to the vacuum fan grease fitting. Wipe off all excess grease and replace the grease fitting cap.

⚠ WARNING: Strong Vacuum. Keep Away From Fan Inlet When Fan Is Running.



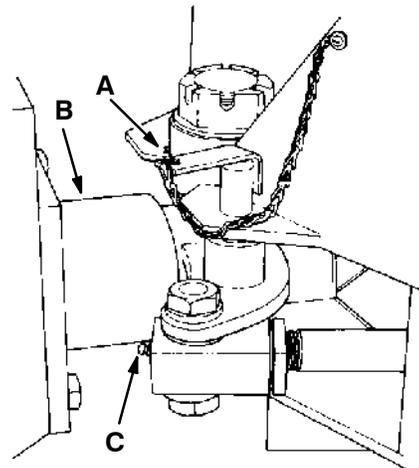
VACUUM FAN

- A. Vacuum Fan
- B. Grease Fitting

MACHINE PIVOT

There are four grease fittings which are used to lubricate the machine pivot assembly. There is an upper bearing grease fitting, a lower bearing grease fitting, and a grease fitting on each rod end of the steering cylinder. Apply grease to these fittings after every 50 hours of operation. Use lubriplate EMB grease (TENNANT Part No. 01433-1).

⚠ WARNING: Crush Hazard Between Front And Rear Halves Of Machine. Put Locking Pin In Pivot Lock Before Going Between Machine Halves.



MACHINE PIVOT

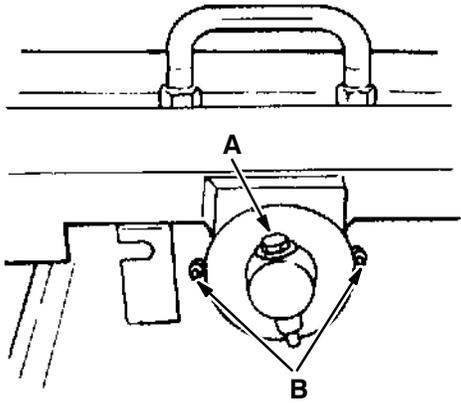
- A. Upper Bearing Grease Fitting
- B. Machine Pivot
- C. Steering Cylinder Rod End Grease Fitting

03789

00251

SCRUB HEAD PIVOT

There are four grease fittings which are used to lubricate the scrub head pivot assembly—one on each of the four scrub head pivot blocks. Apply grease to these fittings after every 50 hours of operation. Use Lubriplate EMB grease (TENNANT Part No. 01433-1).



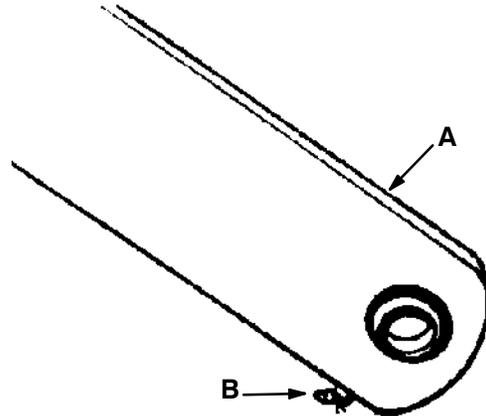
SCRUB HEAD PIVOT

03790

- A. Pivot
- B. Grease Fitting

SCRUB HEAD HINGES

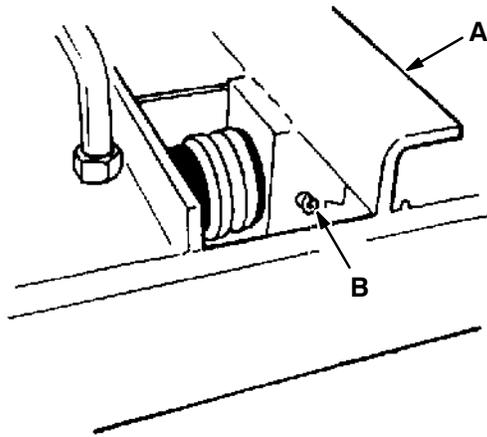
There are two grease fitting which are used to lubricate the scrub head hinges. One grease fitting is located on the underside of each of the hinges. Apply grease to these fittings after every 50 hours of operation. Use Lubriplate EMB grease (TENNANT Part No. 01433-1).



SCRUB HEAD HINGE

03792

- A. Scrub Head
- B. Grease Fitting



SCRUB HEAD PIVOT

03791

- A. Scrub Head
- B. Grease Fitting

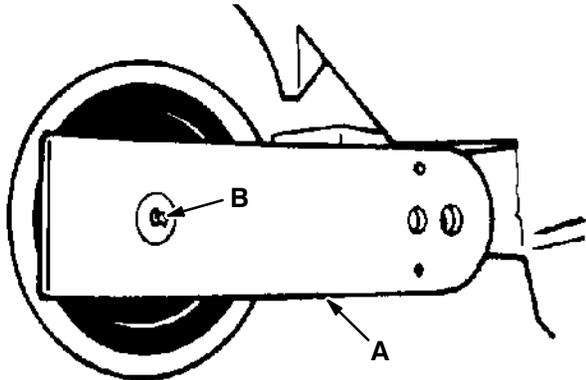
REAR SQUEEGEE CASTERS

Lubricate the rear squeegee casters after every 50 hours of operation. Use Lubriplate EMB grease (TENNANT Part No. 01433-1).

MAINTENANCE

SCRUB BRUSH IDLER PLUGS

There are two grease fittings which are used to lubricate the scrub brush idler plugs. The grease fittings are located in the center of each idler plug and are covered with plastic caps. Snap the caps open to apply grease to the fittings. Use Lubriplate EMB grease (TENNANT Part No. 01433-1). Wipe off all excess grease and replace the plastic cap. Apply grease to the fittings after every 50 hours of operation.



BRUSH IDLER PLUG

03793

- A. Idler Arm
- B. Grease Fitting

REAR WHEELS

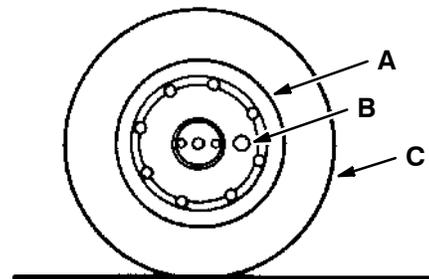
The rear wheels have automotive-type bearings. Repack the bearings with automotive type wheel bearing grease after every 2000 hours of operation.

SCRUB BRUSH DRIVE CHAINS

Each scrub brush is driven by a chain assembly. Each chain case should be filled with SAE 30 engine oil to the oil level plug. Add oil through the round cover at the top of the case. Check the oil level after every 50 hours of operation.

POWER WHEEL

The power wheel is a gear reduction unit used to drive the machine. Each front wheel is equipped with its own power wheel that is driven by an electric motor. The power wheels are lubricated with SAE 90 mild to extreme pressure lubricant. When the fill plug is in the three o'clock position, add lubricant until it seeps out of the fill hole. Check the lubricant level after every 200 hours of operation.



POWER WHEEL

01149

- A. Power Wheel
- B. Fill Plug
- C. Tire

HYDRAULICS

HYDRAULIC FLUID

The quality and condition of the hydraulic fluid plays a very important role in how well the machine operates. TENNANT's hydraulic fluid is designed to meet the special needs of its machines.

TENNANT's hydraulic fluids provide longer life of the hydraulic components. There are two fluids available for two different temperature ranges:

TENNANT part no.	Ambient Temperatures
65869	above 45° F (7° C)
65870	below 45° F (7° C)

The higher temperature fluid is designed with a higher viscosity and should not be used at the lower temperatures. Possible damage to the hydraulic pumps may occur because of improper lubrication.

The lower temperature fluid is a thinner fluid designed for colder temperatures.

If a locally-available hydraulic fluid is preferred, or if products of only one oil company are used, contact TENNANT Technical Customer Service to check the specifications of the substitute fluid. Using substitute fluids can cause premature failure of hydraulic components.

ATTENTION! Hydraulic components depend on system hydraulic fluid for internal lubrication. If dirt or other contaminants are allowed to enter the hydraulic system, malfunctions, accelerated wear, and damage will result.

HYDRAULIC FLUID RESERVOIR

Hydraulic fluid is stored in the hydraulic fluid reservoir. The reservoir holds up to 2 qt (1.9 L) of hydraulic fluid. The reservoir is mounted on top of the hydraulic pump.

Check the hydraulic fluid level after every 50 hours of operation. The fluid level should be 0.5 to 1 in (15 to 25 mm) from the top of the reservoir.

Do not overfill the hydraulic reservoir. The hydraulic fluid expands as it heats to its normal operating temperature. Always allow for expansion when filling the reservoir.

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.

Drain, flush, and refill the hydraulic fluid reservoir with hydraulic fluid after every 400 hours of operation.

NOTE: Always change the hydraulic fluid filter when draining the hydraulic fluid reservoir.

MAINTENANCE

HYDRAULIC FLUID FILTER

The hydraulic system is kept clean to a level of 10 microns by a hydraulic fluid filter. The hydraulic fluid filter should be changed after every 400 hours of operation.

TO REPLACE HYDRAULIC FLUID FILTER ELEMENT

1. Park the machine on a smooth, level surface, stop the motor, and set the machine parking brake.

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

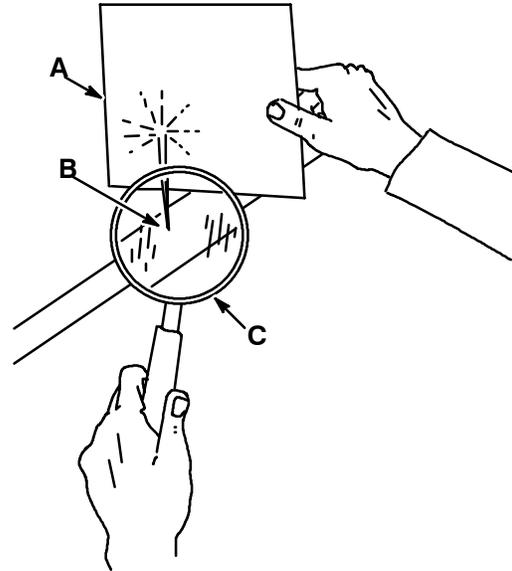
2. Raise the access cover and side door.
3. Unthread and discard the hydraulic fluid filter elements.

NOTE: Discard all hydraulic fluid drained from the system. Drained hydraulic fluid may contain foreign material harmful to the hydraulic system.

4. Apply a thin coat of hydraulic fluid to the seal of the new hydraulic fluid filter element.
5. Thread and hand tighten the new hydraulic fluid filter elements on the filter heads.
6. Operate the machine and check for leaks. Correct any leaks found.
7. Check the hydraulic fluid reservoir level and fill as required.
8. Close the access cover and side door.

HYDRAULIC FLUID LEAKS

Hydraulic fluid escaping at high pressure from a very small hole can be almost invisible, and can cause serious injuries. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks.



HYDRAULIC PIN HOLE LEAK

00002

- A. Cardboard**
- B. Pin Hole Leak**
- C. Magnifying Glass**

If injured by escaping hydraulic fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.

FOR SAFETY: When Servicing Machine; Use Cardboard To Locate Leaking Hydraulic Fluid Under Pressure.

ELECTRICAL SYSTEM

BATTERIES

The machine batteries provide all of the energy used by the machine. The batteries require regular maintenance to keep them operating their best.

Do not allow the batteries to remain in discharged condition for any length of time.

Do not operate machine if batteries are in poor condition or with only 25% of the charge left, specific gravity below 1.160.

Check the battery cables daily for loose connections on the battery terminals. Inspect the cables for corrosion or damage.

Clean the top surface and the terminals of the batteries after every 50 hours of operation, using a strong solution of baking soda and water. Brush the solution sparingly over the battery top, terminals, and cable clamps. Do not allow any baking soda solution to enter the battery. Use a wire brush to clean the terminal posts and the cable connectors. After cleaning, apply a coating of clear petroleum jelly to the terminals and the cable connectors. Keep the tops of the batteries clean and dry.

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

Check the electrolyte level of each battery cell after every 50 hours of operation. The electrolyte level must always be above the battery plates. Add distilled water to maintain solution at the correct level above the plates, but do not overfill. Never add acid to batteries, only water. Keep vent plugs firmly in place at all times, except when adding water or taking hydrometer readings.

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

Use a hydrometer to check the electrolyte specific gravity after every 50 hours of operation.

If one or more battery cell tests lower than the other battery cells, (0.050 or more) the cell is damaged, shorted, or is about to fail.

NOTE: Do not take readings immediately after adding water-if the water and acid are not thoroughly mixed, the readings may not be accurate. Check the hydrometer readings against this chart:

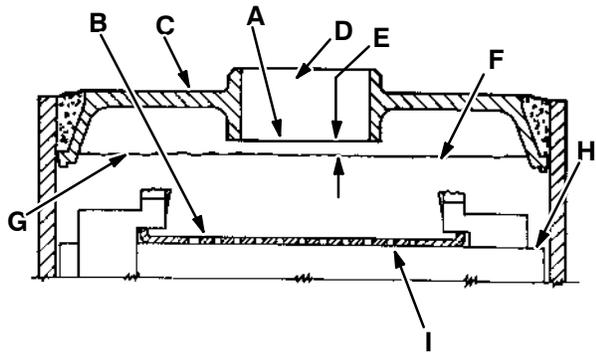
SPECIFIC GRAVITY at 80° F (27° C)	BATTERY CONDITION
1.315	100% charged
1.265	75% charged
1.210	50% charged
1.160	25% charged
1.110	Discharged

NOTE: If the readings are taken when the battery electrolyte is any temperature other than 80° F (27° C), the reading must be temperature corrected.

To determine the corrected specific gravity reading when the temperature of the battery electrolyte is other than 80° F (27° C):

Add to the specific gravity reading 0.004, 4 points, for each 10° F (5.5° C) above 80° F (27° C).

Subtract from the specific gravity reading 0.004, 4 points, for each 10° F (5.5° C) below 80° F (27° C).



BATTERY CROSS-SECTION VIEW

01148

- A. Bottom of Filling Hole**
- B. Low Level**
- C. Cover**
- D. Filling Hole**
- E. 0.375 in (10 mm) Space**
- F. Electrolyte Level**
- G. High Level**
- H. Top of Separators**
- I. Splash Cover**

Always keep electrolyte level above the splash plate, but avoid over-filling.

When adding water, it is necessary to visually gauge when to stop. Keep the top level of the electrolyte no less than approximately 0.38 in (10 mm) below bottom of filling hole as shown in the sketch. All the cells of a battery should require about the same amount of water.

BATTERY REPLACEMENT

NOTE: Maximum total allowable battery weight is 5,300 lb (2405 kg) with two identical batteries.

Each battery is enclosed in a steel case provided with a special hinged cover and lifting holes located near the top of the case. See *SPECIFICATIONS* section.

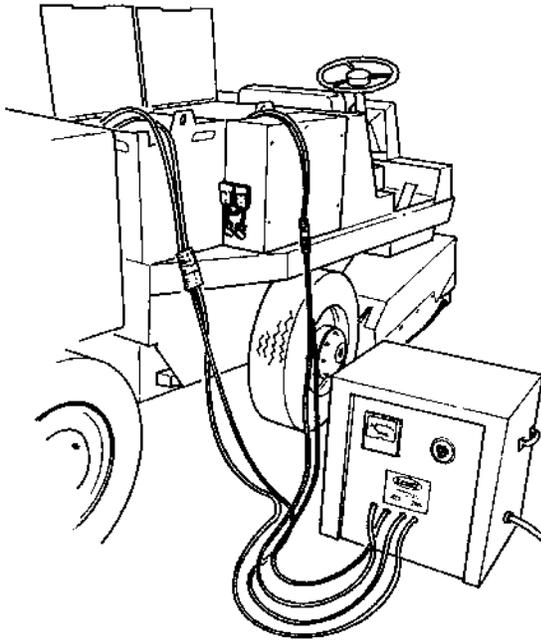
BATTERY CHARGING

The machine batteries are specially made for this machine application. They are unique in that they hold their power for long periods of time, but they can only be recharged a certain number of times. To get the most life from the batteries, charge them when 25% of the battery power is left.

Do not expose the battery charger to water. Do not touch uninsulated battery terminals or unnecessarily expose any portion of your body to the batteries when making electrical connections.

TO CHARGE BATTERIES

1. Turn charger timer to "off" position before disconnecting or connecting batteries receptacles to charger, and before inserting or removing the "A.C." plug from the wall outlet.
2. Check water level in battery. Water should cover plates completely. If water is low, add distilled water, but do not over-fill.
3. Connect battery connectors to charger connector.



01146

CHARGING MACHINE BATTERIES

4. Battery covers should be braced open, so that the gases can escape. Otherwise, the top of the battery eventually develops a conductive leak between cells and battery tray.

⚠ WARNING: Batteries Emit Hydrogen Gas. Explosion Or Fire Can Result. Keep Sparks And Open Flame Away. Keep Covers Open When Charging.

5. Begin charge by turning timer to recommended hours. Pilot light and ammeter indicate charger is on.
6. Batteries are charged when timer reads "off" or the electrolyte specific gravity indicates 100% charged.

NOTE: The charger may remain connected to the batteries for occasional extended periods without harm to the charger or batteries. The charging rate gradually tapers down as the batteries are recharged.

ELECTRIC MOTORS

The electric motor brushes should be inspected and the brush dust should be blown out of the motor after every 200 hours of operation. If the brushes have been worn to less than 0.75 in (20 mm) in length, they should be replaced. If the commutator is worn or rough, the armature should be removed. The commutator should be turned in a lathe, the mica recut, and commutator polished. Reassemble, and seat the new brushes, using a brush seating stone. Be sure the rocker arm is set on the neutral mark.

CONTROL PANEL

The control panel houses the forward and reverse relays and controls. The components are not user serviceable - only trained personnel should be allowed to work on it.

⚠ WARNING: Hazardous Voltage. Shock Or Electrocutation Can Result. Disconnect Batteries Before Working On Machine. Only Qualified Personnel Should Work Inside Panel.

MAINTENANCE

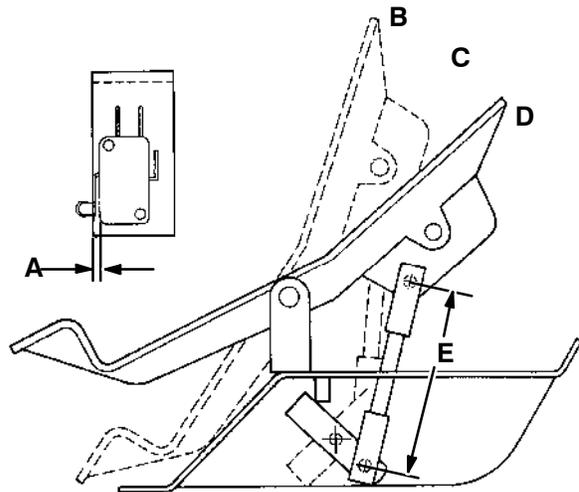
DIRECTIONAL PEDAL

The directional pedal should be readjusted after replacing one of the control components and whenever the machine creeps when it is in the "neutral" position.

Adjust the pedal, using the following illustration as a guide. "Neutral" position should be set first. The pedal overtravel in "forward" and "reverse" should be about equal. The micro switches should have 0.005 to 0.015 in (0.13 to 0.38 mm) travel left after the switches are energized. Use feeler gauge to measure.

The "neutral" position of the pedal is set by adjusting the stud between the two ball joints on the control linkage and the centering springs under the floor pan. After the pedal is centered, apply Loctite 290 to the spring mounting bracket to keep the spring position stationary.

NOTE: On a smooth level floor, the machine should not "creep" in either direction when the pedal is at rest (in neutral).



DIRECTIONAL PEDAL POSITIONS

01150

- A. 0.005 to 0.015 in (0.13 to 0.38 mm)**
- B. "Reverse" Position**
- C. "Neutral" Position**
- D. "Forward" Position**
- E. 4.75 in (120 mm)**

BELTS AND CHAINS

VACUUM FAN DRIVE BELT

The vacuum fan drive belt is driven by the main electric motor. Belt tension is maintained by a tension spring. The belt is properly tensioned when the spring is extended 1.25 in (32 mm) beyond it's collapsed length, approximately 6.88 in (175 mm). Thread the spring eye bolt in or out of the fan mounting bracket to change the spring length. Check belt condition and tension after every 50 hours of operation.

⚠ WARNING: Strong Vacuum. Keep Away From Fan Inlet When Fan Is Running.

⚠ WARNING: Moving Belt. Keep Away.

PUMP DRIVE BELT

The pump drive belt is driven by the main electric motor. Belt tension is maintained by an adjustment bolt that pivots the pump assembly away from the electric motor. The belt is properly tensioned when it deflects 0.12 in (3 mm) from a force of 1.5 to 2 lb (0.7 to 0.9 kg) applied at belt midpoint. Check belt tension after every 50 hours of operation.

⚠ WARNING: Moving Belt. Keep Away.

STATIC DRAG CHAIN

A static drag chain is provided to prevent the build-up of static electricity in the machine. This chain is attached below the machine frame, and drags on the floor.

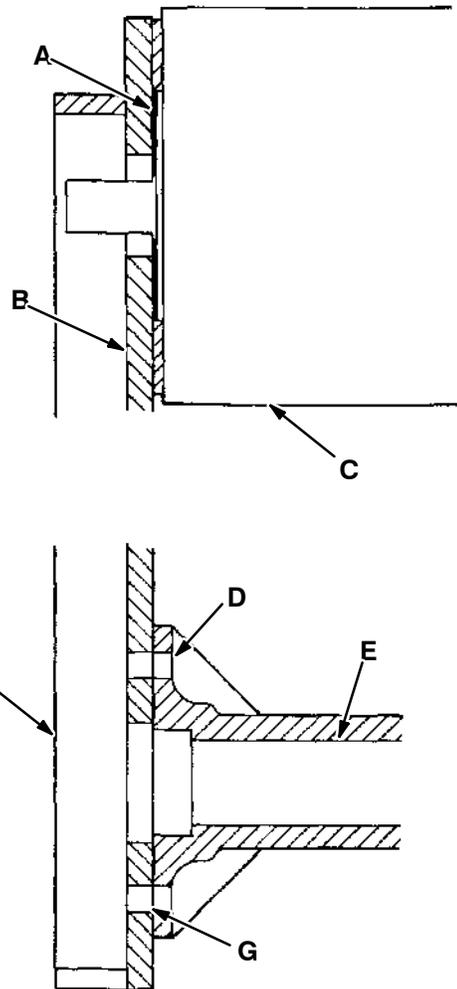
Check the chain periodically for wear. Make sure that it is making contact with the floor at all times.

SCRUB BRUSH DRIVE CHAINS

Each of the two scrub brush drive chains are driven by an electric motor. The chains are covered by a chain case and are partially immersed in SAE 30 engine oil. Check the oil level after every 50 hours of operation.

Chain tension is adjusted by moving the mounting location of the electric motors. The motor mounting holes are slotted. The chains are properly tensioned when there is 0.12 in (3 mm) slack midway between the sprockets. Check the chain tension after every 100 hours of operation.

When replacing drive chains, be sure to use new gaskets and RTV sealant where they were originally used. Also, use Loctite on the four motor mounting bolts.



SCRUB BRUSH DRIVE CROSS-SECTION 01151

- A. Gasket
- B. RTV Sealant in Slot after the Bolt is in Place
- C. Electric Motor
- D. Loctited Mounting Bolts (4)
- E. Bearing Housing
- F. Brush Drive Arm
- G. Sealant Around the Diameter

SCRUB HEAD

SCRUB HEAD

The scrub head houses the two scrub brushes and the brush drive mechanisms. The scrub head has two adjustments; scrub head height, and scrub brush pattern.

The scrub head height adjustment sets the minimum scrub head height. The height adjustment should not be changed unless, due to a major parts replacement or collision, the head adjustment may have been altered. If the head height is too low, excessive brush wear, engine overheating, brush bounce, or excessive brush drive plug and bearing wear may occur.

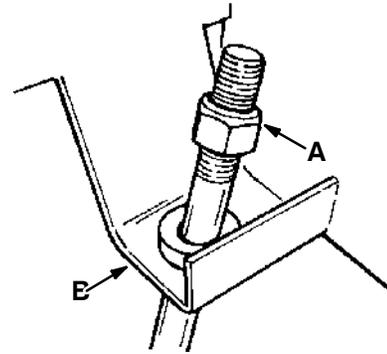
The scrub brush pattern adjustment determines the amount of contact the brush has with the floor. The brush pattern should be checked daily.

TO ADJUST SCRUB HEAD HEIGHT

1. The head height adjustment must be made with a full solution tank and tires correctly inflated: 85 psi (585 kPa) front for machines below serial number 004506; 65 psi (450 kPa) front for machines serial number 004507 and above; and 35 psi (240 kPa) for rear tires on all machines.

NOTE: Using a different sized tire on the machine, other than standard, will affect the head height adjustment.

2. The head height adjusting nut is located under the operator's seat. The nut is accessible by lifting up the seat. Hold the seat up by attaching its chain to the steering wheel.

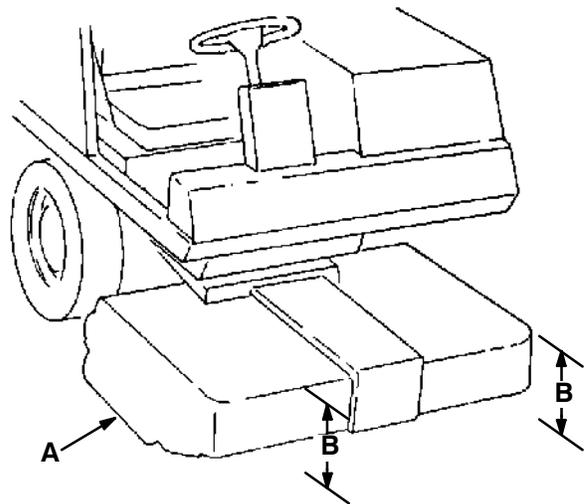


ADJUSTMENT NUT

03734

- A. Nut
- B. Scrub Head Link

3. Adjust the nut so that the top front of the head is 13.62 in to 13.75 in (345 to 350 mm) from the floor.



SCRUB HEAD ADJUSTMENT

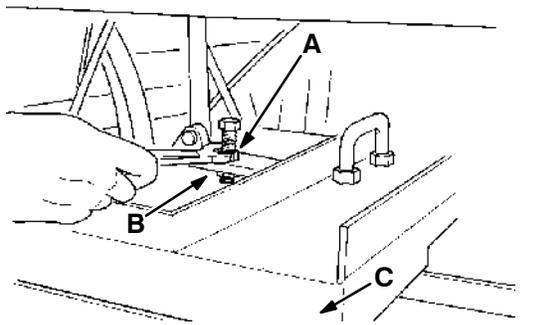
01822

- A. Scrub Head
- B. 13.62 to 13.75 in (345 to 350 mm)

4. If the scrub head is lower than 13.62 in (345 mm), washers should be added below the adjusting nut.

TO ADJUST SCRUB BRUSH PATTERN

1. The machine must have correct tire pressures, full solution tank, and correct scrub head height adjustment.
2. On a smooth, level surface, apply chalk or some other material that won't blow away easily.
3. With the scrubber head raised, move the machine over the test area. Start the brush rotation, apply the foot brakes, and lower the scrubber head, allowing the brushes to spin in one spot for 15 to 20 seconds. With no chalk or other material on the floor, allow the brushes to spin approximately two minutes.
4. Polish marks made by both brushes should be visible. They should be about 1.5 in (40 mm) wide the full length of the brush. With a soft brush, the polish mark should not exceed 2 in (50 mm) wide, evenly, the full length of the brush.
5. The rear brush polish mark is the most critical and should be adjusted first. If the polish mark is uneven or cone shaped from one end to the other, the brush leveling spring, located at the operator side of the head lift, should be adjusted. The spring compensates for the weight of the brush drive motors. Loosen the top nut first to make the adjustment.

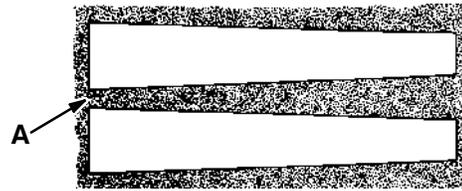


LEVELING BRUSH

00285

- A. Top Nut**
- B. Brush Levelling Adjusting Nut**
- C. Operator Side of Scrub Head**

Lower the brush leveling adjustment nut if the polish mark is too wide on the operator's side.

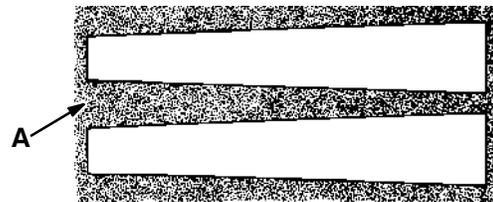


00082

TAPERED BRUSH PATTERN

A. Operator Side

Raise the brush leveling adjustment nut if the polish mark is too narrow on the operator's side. Retighten the top nut after making adjustments.

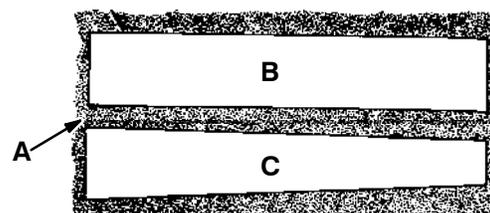


00082

TAPERED BRUSH PATTERN

A. Operator Side

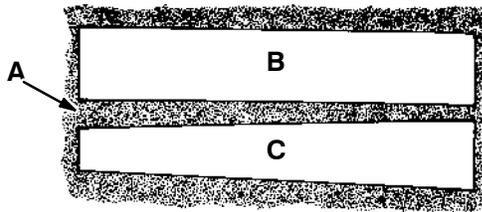
6. The polish mark of the front brush should match the polish mark of the rear brush. If the front brush polish mark is uneven, the narrow side should be shimmed. Add shims to the shaft bearing mount located on the underside of the scrub head. Remove the debris trough, loosen the bolts holding the bearing protector, and loosen the flat socket head bolts that hold the bearing mounting bracket before installing shims. One 0.12 in (3 mm) thick shim will add about 0.50 in (13 mm) width to the polish mark.



00082

TAPERED BRUSH PATTERN

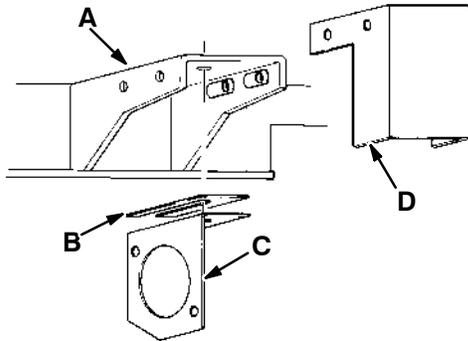
- A. Operator Side**
- B. Rear Brush Marks**
- C. Front Brush Marks**



00082

TAPERED BRUSH PATTERN

- A. Operator Side
- B. Rear Brush Marks
- C. Front Brush Marks



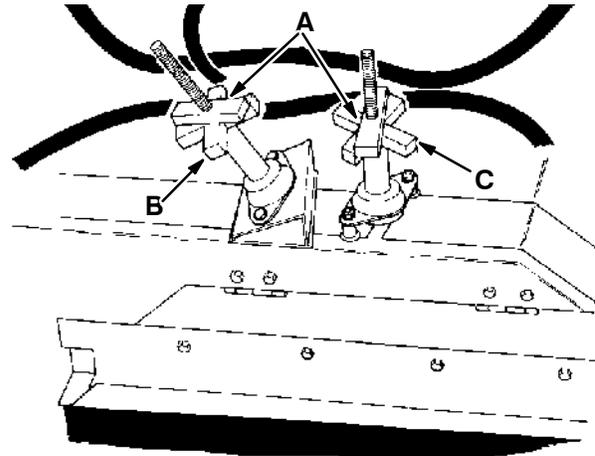
00284

BRUSH SHAFT MOUNTING

- A. Scrub Head
- B. Shim
- C. Bearing Mounting Bracket
- D. Bearing Protector

7. Recheck the brush polish marks to see if the front and rear match, and are even across the full length of the brush.

8. The width of the rear brush polish mark can vary more than the desired 1.5 to 2 in (40 to 50 mm). There are adjusting knobs located on the drive side of the scrub head. Turn the knob clockwise to decrease the width of the polish mark and counterclockwise to increase the width of the polish mark. The polish mark should not exceed 2 in (50 mm). Use the locking strips to keep the adjusting knobs in place.



00286

BRUSH ADJUSTMENT KNOBS

- A. Locking Strips
- B. Front Brush Adjusting Knob
- C. Rear Brush Adjusting Knob

9. For maximum brush life, rotate the brushes from front-to-rear after every 50 hours of operation.

10. While scrubbing, refer to the brush pressure gauge on the instrument panel. The pointer should read in the "green" area. If the gauge reads in the "red" area continuously, the width of both brush patterns should be narrowed.

SCRUB BRUSHES

The scrub brushes are tubular and run the width of the scrub head, sweeping debris into the debris trough while they scrub the floor. The brushes should be inspected daily for damage or wear. Remove any string or wire found tangled on the scrub brushes, drive, or idler hubs.

Rotate the scrub brushes from front-to-rear after every 50 hours of operation for maximum brush life and best scrubbing performance.

The scrub brush patterns should be checked daily. The scrub brush pattern is adjusted by turning the adjustment knobs on top of the scrub head. See *TO ADJUST SCRUB BRUSH PATTERN*. The width of the patterns should be 1.5 to 2 in (40 to 50 mm).

TO REPLACE SCRUB BRUSHES

1. Raise scrub head and set scrub head lock.

⚠ WARNING: Falling Scrub Head. Block Scrub Head Up Before Working Under It.

2. Stop motor and set parking brake.

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

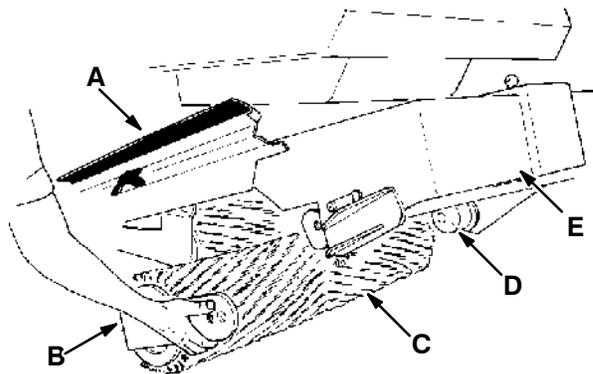
3. Open right side door on scrub head and use the chain to hold the door in the raised position.
4. Use wrench to remove hex head bolt attaching the brush arm.

NOTE: If arm does not come off easily, insert bolt in the adjacent threaded hole and screw in until arm comes off.

5. The brush arm and brush can then be pulled out.
6. Repeat step 4 and 5 to remove other brush.
7. Insert one end of brush through access door and push the brush in until it touches the drive plug.

It is helpful to have a second person guide the other brush end onto the drive plug while you are pushing and turning the brush until it engages the drive keyway on the plug.

8. Install the brush arm with the hex head bolt.



00287

REPLACING BRUSH

- A. Door
- B. Brush Arm
- C. Brush
- D. Brush Drive Plug
- E. Raised Scrubber Head

9. Repeat steps 7 and 8 for the other brush.
10. Unhook the chain and lower the access door.
11. Release the scrub head lock before lowering scrub head.

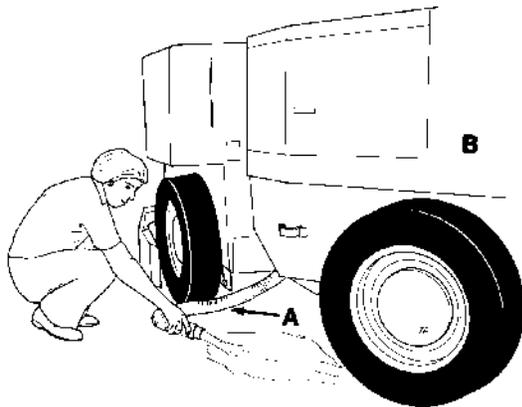
SOLUTION SYSTEM**RECOVERY TANK**

The recovery tank has a capacity of 120 gal (455 L). When the tank is full, a ball float will rise and shut off the vacuum to the tank. A 48 in (220 mm) long drain hose for the recovery tank is located on the front of the tank.

You can determine the water level in the recovery tank by lowering the hose end until water appears - this will then be the water level in the tank, (motor must be off; this stops vacuum).

To drain the tank, lower the hose and place it near a suitable floor drain.

NOTE: The hose will not drain until the motor is off, stopping vacuum.



00288

DRAINING RECOVERY TANK**A. Drain hose****B. Operator Side of Machine**

Three clean-out doors are provided for the recovery tank: two at the front and one at the rear of the tank.

Flush all sand, sludge, debris, etc., out of the tank. Also, check the return hoses and connections for clogging or damage.

NOTE: The cleanout door seal will leak if small particles of debris are caught between the door edge and rubber seal.

Empty and clean the recovery tank daily. The ball float screen retainer at the top of the tank should also be cleaned daily.

NOTE: The water must not be hotter than 130°F (54°C) or tank damage may occur.

WATER SPRAY DEFLECTOR

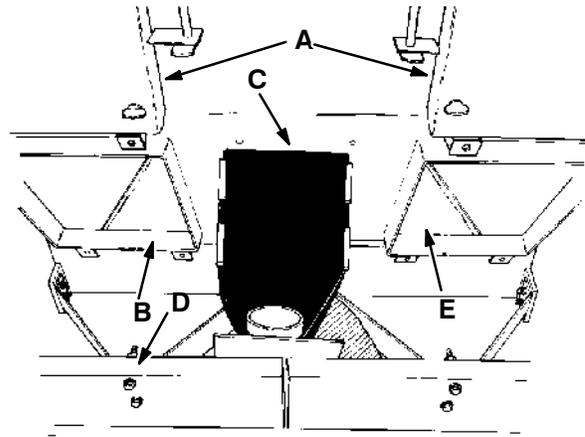
The water spray deflector is located on the rear squeegee discharge tube inside of the recovery tank. The spray deflector deflects the spray of water and small debris picked up by the rear squeegee away from the walls of the recovery tank. The deflector should be checked for wear after every 200 hours of operation.

To check the water spray deflector for wear, the rear squeegee discharge tube must be removed. Be sure to save and reuse the rubber-backed washers which are located on the inside of the recovery tank. Inspect or replace the spray deflector. Reinstall discharge tube, using a new gasket if the existing one was damaged.

SRS WATER SPRAY DEFLECTOR

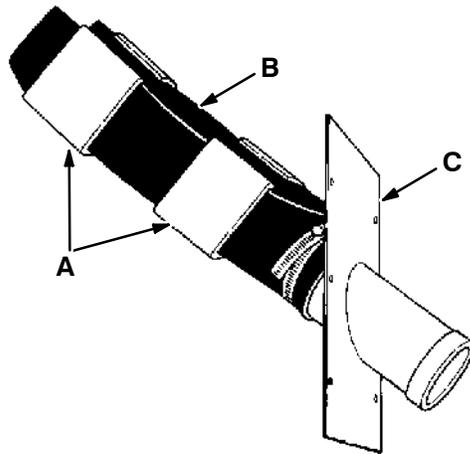
The SRS solution tank has two spray deflectors; a lower spray deflector located on the rear squeegee discharge tube inside the tank, and a top spray deflector located in the top rear of the tank. The spray deflectors deflect the spray of water and small debris away from the walls of the solution tank. The deflectors should be checked for wear after every 200 hours of operations.

To check the lower spray deflector for wear, the rear squeegee discharge tube must be removed from the rear of the tank. Be sure to save the rubber seal washers which are located on the inside of the tank. Inspect the spray deflector for wear. If replacement is necessary, install a new deflector into the spray deflector frames, and mount the deflector to the rear squeegee discharge tube. Reinstall the discharge tube into the rear of the tank. Use a new discharge tube gasket if the existing one is damaged.



INSTALLING LOWER SPRAY DEFLECTOR

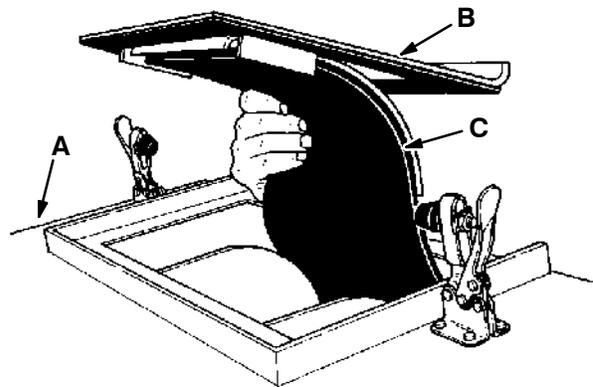
- A. Top Rear Clean-Out Doors**
- B. Bottom Clean-Out Door**
- C. Spray Deflector**
- D. Rear Bumper**
- E. Bottom Clean-Out Door**



CORRECT POSITIONING OF LOWER SPRAY DEFLECTOR

- A. Spray Deflector Frames**
- B. Spray Deflector**
- C. Rear Squeegee Discharge Tube**

To check the top spray deflector for wear, remove the top access cover at the top rear of the solution tank. Inspect the deflector for wear. Remove the deflector if replacement is necessary. Replace the top access cover gasket if the gasket is damaged. To install the spray deflector back into the tank, slide the bottom of the deflector down the back of the tank. Then, with the top cover gasket in place on the solution tank, position the deflector to follow the curvature of the bottom of the access cover. Clamp the top access cover in place.



INSTALLING TOP SPRAY DEFLECTOR

- A. Solution Tank**
- B. Top Access Cover**
- C. Spray Deflector**

MAINTENANCE

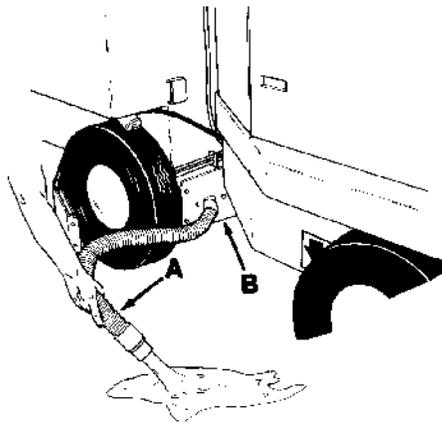
SRS SOLUTION TANK

The tank has a capacity of 265 gal (1000 L). When the tank is full, a ball float will rise and shut off the vacuum to the tank. A 72 in (1830 mm) long drain hose for the recovery tank is located on the front of the tank. You can determine the water level in the tank by lowering the hose end until water appears—this will then be the water level in the tank (motor must be off; this stops vacuum). To drain the tank, lower the hose and place near a suitable floor drain.

Empty and clean the solution tank and flush the laminar tubes daily.

Partially fill the solution tank with clean water. Run the SRS pump for a few minutes to flush the solution hoses.

NOTE: The water must not be hotter than 130°F (54°C) or tank damage may occur.

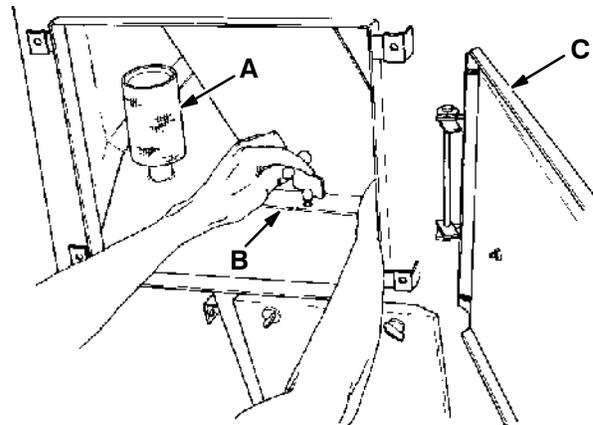


DRAINING SOLUTION TANK

- A. Drain Hose
- B. Clean out Door

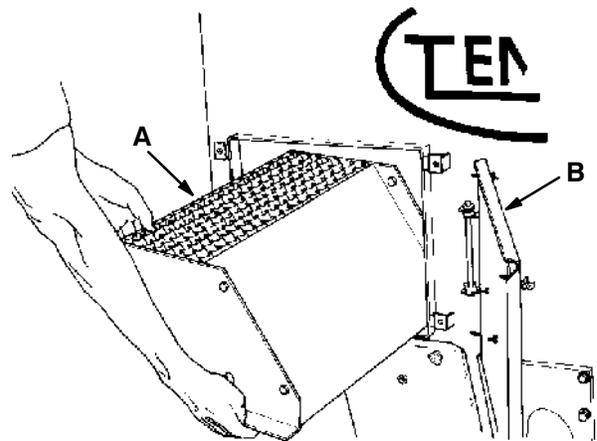
Six clean-out doors are provided on the tank, two at the front, two at the upper rear, and two at the lower rear of the tank. Using the sludge removal tool, remove all sand, sludge, debris, etc., from the tank. Remove the two large plugs above the tank tires near the upper front of the tank. Flush the sediment from all compartments of the tank, and the wire mesh filters. Check for dirt buildup in the laminar flow tubes. To clean tubes, remove and flush. Also, check the return hoses and connections for clogging or damage.

NOTE: For machines below serial number 004934, when replacing the clean-out doors, the thumbscrews should be tightened to 20 - 50 in lb (2.26 - 5.65 Nm). Do not over-tighten. Too much torque on the thumbscrews will cause the clean-out doors to bow and cut the door seals.



REMOVING LAMINAR TUBES

- A. Solution Outlet Filter
- B. Laminar Tube Set Fastener
- C. Upper Rear Clean-Out Door



REMOVING LAMINAR TUBES

- A. Laminar Tube Set
- B. Upper Rear Clean-Out Door

NOTE: Keep laminar tube sections facing the outside of the machine.

SOLUTION DISPENSING TUBE

The solution dispensing tube has a flushing connection built in. The flushing connection is the tee fitting next to the solution control valve. This allows a garden hose to be threaded into the dispensing system to flush the system. Flush the system after every 50 hours of operation.

SRS CLEANING SOLUTION FILTER

The cleaning solution filter has been provided to filter cleaning solution before it enters the main supply hoses or pump. It is mounted on the top front right side of the solution tank. Clean the filter after every 50 hours of operation on machines before serial number 001439.

SRS METERING SOLUTION PUMP

A bellows pump meters cleaning solution into the recycling solution at rates of one-quarter, one-half and one percent. The cleaning solution is introduced to the recycling solution at a point just before the spray nozzle. Clean the metering pump daily when cleaning the solution tank.

TROUBLESHOOTING**Low Flow**

1. Poppet valves dirty, dried cleaning solution residue on valves.
2. Restriction in cleaning solution lines.
3. Air leak at pump intake.
4. Defective wiring or motor.

Motor Fails to Turn On

1. Loose wiring connection.
2. Defective motor.

Motor Operates, But No Pump Discharge

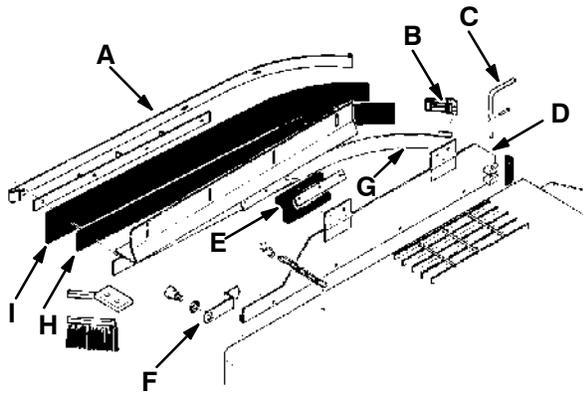
1. Damaged bellows.
2. Restriction in cleaning solution lines.
3. Air leak in intake line.
4. Unprimed pump.
 - a. Remove pump inlet hose.
 - b. Fill pump chamber with approximately one ounce SRS solution.
 - c. Reinstall pump inlet hose.
 - d. Pump should start metering tank solution after 3 to 4 minutes run time.

SQUEEGEES

SIDE SQUEEGEES

The side squeegees control scrub brush water spray. They consist of a squeegee blade, backup strip, band, and clamp. Check the side squeegee blades for damage or wear daily. Replace squeegee blade by opening the quick-release latch and removing the band. Remove the bracket, old blade, and backup strip. Replace the squeegee blade and backup strip, if it is worn.

Adjust the squeegee clamp so that there is adequate pressure to hold the squeegee blade in place. The squeegee blade should be held so that it cannot be pulled from between the locating pins.



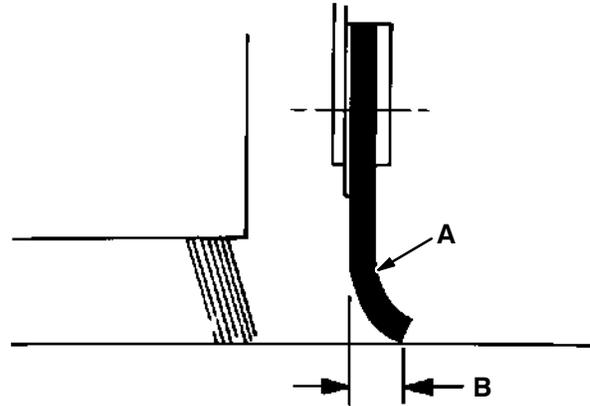
SIDE SQUEEGEE ASSEMBLY

00302

- A. Retaining Band**
- B. Latch**
- C. Door Locking Pin**
- D. Door**
- E. Flap**
- F. Door Latch**
- G. Squeegee Frame**
- H. Backup Strip**
- I. Squeegee Blade**

The side squeegee frame is attached to the squeegee door with four screws. The screw mounting holes are slotted, allowing vertical adjustment of the squeegee blade by simply loosening the screws and moving the squeegee up or down. Check the side squeegee blades adjustment daily.

Lower the head and adjust the squeegee so that the blade deflects 0.50 in (13 mm). The squeegee should deflect evenly across its entire length.



SIDE SQUEEGEE BLADE DEFLECTION

00289

- A. Side Squeegee Blade**
- B. 0.50 in (13 mm) Deflection**

REAR SQUEEGEE

The rear squeegee assembly channels water into the vacuum fan suction. When properly maintained, the squeegee should leave floors nearly dry. The assembly consists of a front and rear blade held in place by bands and clamps. Two back-up strips are used with the rear blade. Check the rear squeegee for damage or wear and adjustment daily.

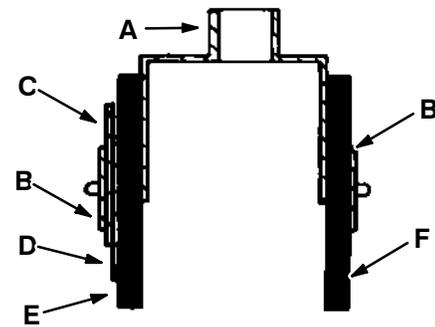
The rear squeegee has been factory adjusted. The factory adjustments need to be done only after replacing a major component of the rear squeegee assembly. Regular squeegee adjustments are covered in *TO ADJUST REAR SQUEEGEE*.

TO REPLACE REAR SQUEEGEE BLADES

1. Stop the motor and set the parking brake.

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

2. Open the band clamp and remove all parts.
3. Place the new squeegee blade over the pins on the frame.
4. Next, fit the two back-up strips on the pins, inner strip down, outer strip up.
5. Position the retaining band in place and engage the clamp.
6. The front blade is replaced in the same manner, except that backup strips are not used.
7. Adjust the squeegee clamp so that there is adequate pressure to hold the squeegees in place. The squeegee blades should be held so they cannot be pulled from between the locating pins. After proper adjustment is made, lock each adjusting screw with a jam nut.



REAR SQUEEGEE CROSS-SECTION

00151

- A. Squeegee Frame**
- B. Band**
- C. Outer Back-Up Strip**
- D. Inner Back-Up Strip**
- E. Rear Blade**
- F. Front Blade**

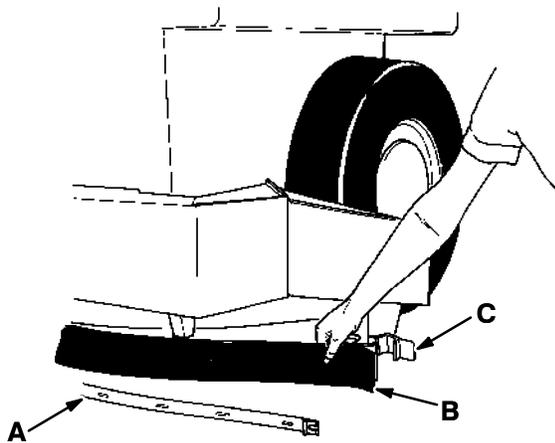
NOTE: Install back-up strips with outer strip up, inner strip down.

TO FACTORY ADJUST REAR SQUEEGEE

NOTE: The solution tank must be full, and the tires must be correctly inflated to properly adjust the rear squeegee.

1. LINKAGE PIVOTS

Check the squeegee linkage pivot points and, if necessary, tighten the locknuts on each bearing joint in the linkage. Tighten each locknut until the joint is just short of locking up. The linkage must be snug, but still free enough to rotate the linkage by hand.



REAR SQUEEGEE

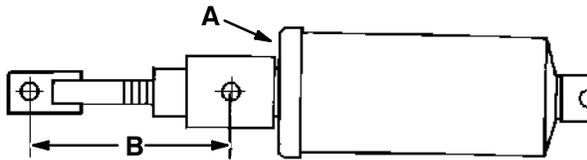
00290

- A. Band**
- B. Blade and Back-Up Strips on Pins**
- C. Clamp**

MAINTENANCE

2. SQUEEGEE LIFT CYLINDER

The squeegee lift cylinder rod end should be adjusted so there is 5.50 ± 0.12 in (140 ± 3 mm) between the cylinder rod hole and the rod end hole for machines below serial number 004506. For machines serial number 004507 and above, the adjustment should be 6.00 ± 0.12 in (150 ± 3 mm).



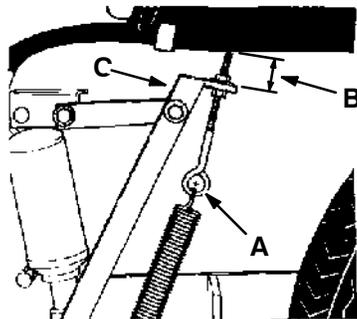
01725

SQUEEGEE LIFT CYLINDER

- A. Cylinder
- B. Adjustment Length

3. EYEBOLTS

The eyebolts should be adjusted so there is 1.38 ± 0.12 in (35 ± 3 mm) between the end of the eyebolt and the top of the arm on each side of squeegee.



01726

EYEBOLT

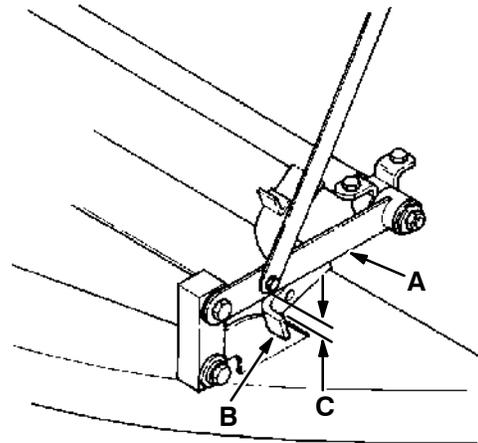
- A. Eyebolt
- B. 1.38 ± 0.12 in (35 ± 3 mm)
- C. Arm

4. CASTERS

The casters should be in good condition and be free to spin. The center caster should be 0.25 ± 0.06 in (6 ± 2 mm) off the floor with the squeegee blade perpendicular to the floor. The tip casters should touch the floor with the squeegee blade perpendicular to the floor.

5. ARM CLEARANCE

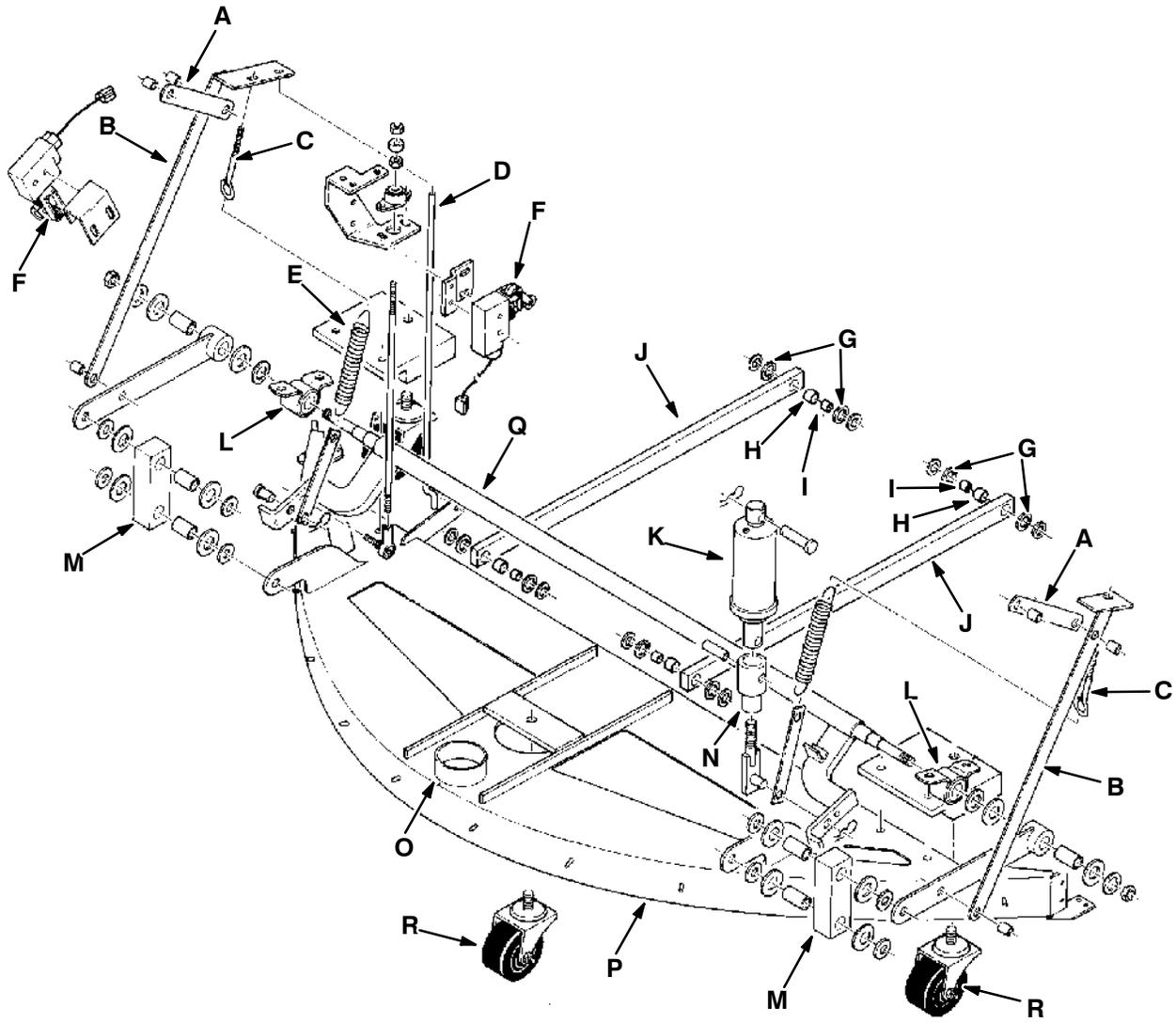
The distance between the arm assembly and the squeegee lift shaft arm should be 1 to 1.25 in (25 to 30 mm) with the squeegee blade down and perpendicular to the floor.



01728

ARM CLEARANCE

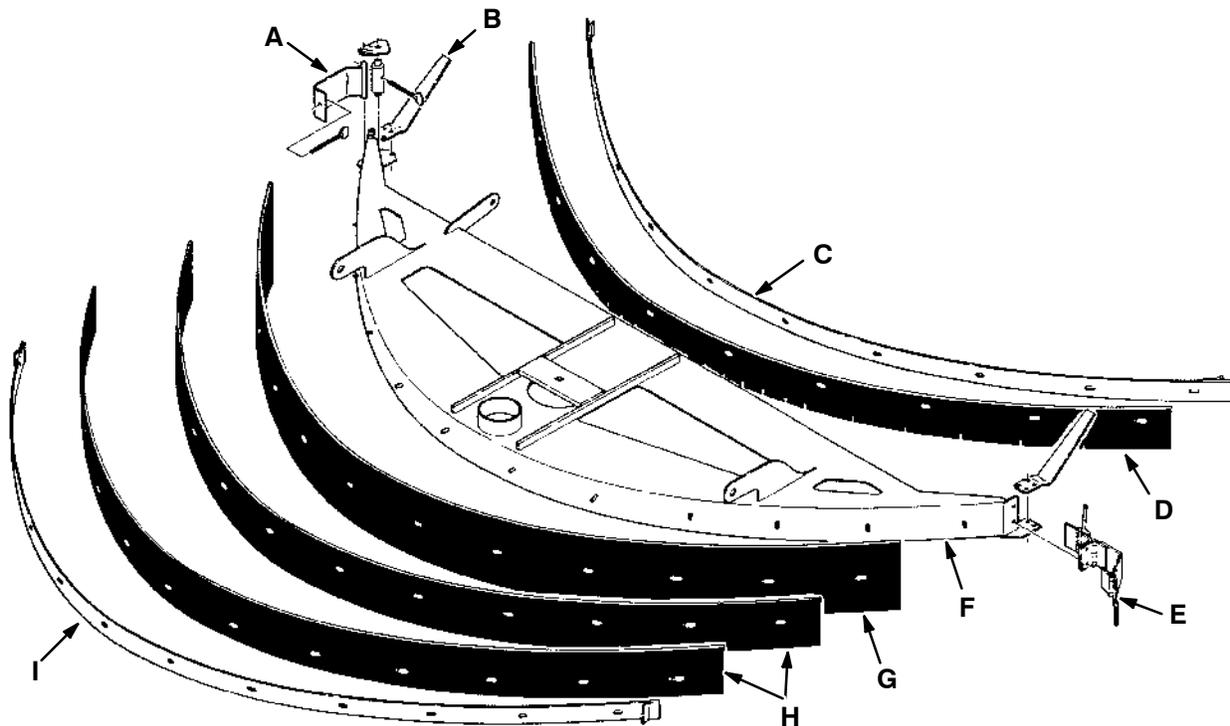
- A. Arm Assembly
- B. Squeegee Lift Shaft Arm
- C. 1 to 1.25 in (25 to 30 mm)



REAR SQUEEGEE LINKAGE

00191

- | | |
|---------------------------------|----------------------------------|
| A. Link | J. Drag Link |
| B. Arm | K. Squeegee Lift Cylinder |
| C. Eyebolt | L. Bearing |
| D. Squeegee Tip Lift Rod | M. Block Link |
| E. Down Pressure Spring | N. Cylinder Rod End |
| F. Roller Switch | O. Vacuum Hose Connection |
| G. Fiberglide Washer | P. Squeegee Frame |
| H. Bearing | Q. Lift Shaft |
| I. Sleeve | R. Caster |



REAR SQUEEGEE

00196

- | | |
|------------------------|-------------------------|
| A. Adjuster | F. Frame |
| B. Spring Guide | G. Rear Blade |
| C. Front Band | H. Back-Up Strip |
| D. Front Blade | I. Band |
| E. Band Clamp | |

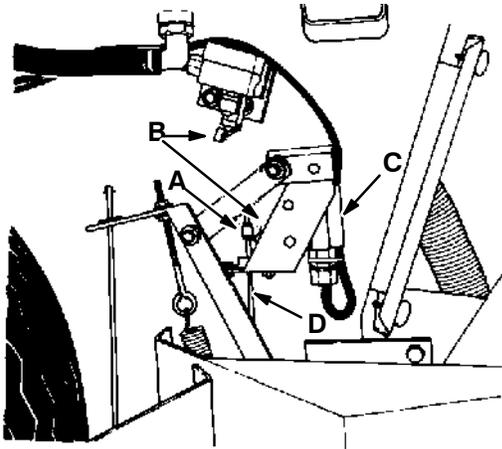
TO ADJUST REAR SQUEEGEE

1. Lower the rear squeegee and drive the machine slowly forward to observe the squeegee rollout. Adjust the squeegee roller height adjustment stud or add or remove washers from the casters to get an even rollout. The top nut acts as a locknut. The nut just under the squeegee frame is the adjusting nut. Loosen the locking nut and turn the adjusting nut clockwise to increase down pressure, or counterclockwise to decrease pressure. Tighten the locknut after adjusting the adjusting nut.
2. Lower the rear squeegee and drive the machine slowly forward to observe the tips of the squeegee.
 - a. If both tips are too low, tighten both eyebolts which increases the down pressure on the back side of the squeegee frame to lift both tips.

- b. If both tips are too high, loosen both eyebolts which decreases the down pressure on the back side of the squeegee frame to lower both tips.
- c. If just one tip is too low, loosen the eyebolt on the side that is too low. If the tip is still too low, tighten the eyebolt on the opposite side.
- d. If just one tip is too high, tighten the eyebolt on the side that is too high. If the tip is still too high, loosen the eyebolt on the opposite side.

NOTE: The number of washers on the squeegee tip casters may need to be changed to properly adjust the squeegee tips.

3. After the tips are adjusted, make sure the eyebolt adjustments are locked in place. The center of the squeegee may have to be readjusted to get an even rollout across the squeegee. If the squeegee rollout is set too small, the squeegee will skip when traveling on a uneven floor.
4. Lower the rear squeegee. The lower squeegee switch roller should be in line and tripped by the top of the trip barrel. Adjust the trip barrel position on the threaded rod to adjust.

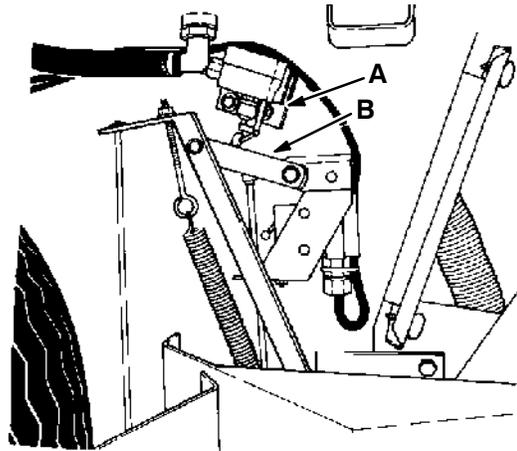


LOWERED SQUEEGEE

02357

- A. Trip Barrel**
- B. Switch Roller**
- C. Lower Switch**
- D. Threaded Rod**

Raise the rear squeegee. The upper squeegee switch roller should be tripped by the squeegee link. The lower squeegee switch roller should be free standing.



RAISED SQUEEGEE

02358

- A. Upper Switch**
- B. Link**

After both switches are properly adjusted with the motor operating, put the instrument panel squeegee switch in the “down” position. Press the directional control pedal into the “forward” position. The squeegee should lower. Press the directional control pedal into the “reverse” direction. The squeegee should rise. Press the directional control pedal into the “forward” direction. The squeegee should lower.

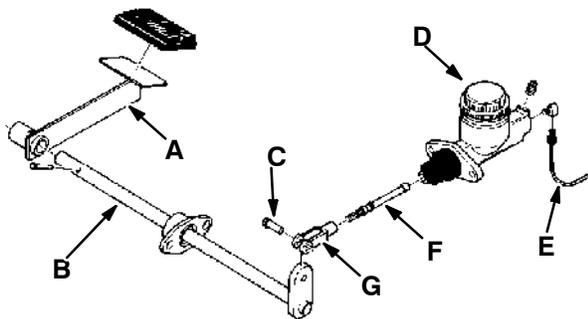
BRAKES AND TIRES

SERVICE BRAKES

The service brakes are hydraulically activated by a master brake cylinder.

Check the master brake cylinder fluid level after every 50 hours of operation and add brake fluid as needed. The master brake cylinder is located at the front of the machine. Open the side access door for access to the master cylinder.

If necessary, adjust brake linkage as follows: adjust clevis on master cylinder push rod so that brake pedal is in a horizontal position when the cylinder push rod starts to engage the cylinder piston.



00105

BRAKE SYSTEM COMPONENTS

- A. Brake Pedal
- B. Shaft
- C. Pin
- D. Master Brake Cylinder
- E. Brake Line
- F. Push Rod
- G. Clevis

Brakes require bleeding whenever air enters the system, lowering the effective braking pressure. Air can enter when the master cylinder or wheel cylinders are serviced or if the fluid in the reservoir runs dry. Air can also enter through a leaky brake line or hose. Find the leaking line and replace it before bleeding the brakes.

Whenever handling brake fluid, do not get any on the brake pads, brake discs, calipers, or body paint. Brake pads will be permanently damaged, requiring replacement. Body paint can be damaged also unless you wipe the area with a clean cloth and wash it with a soapy solution immediately.

1. Make sure that the brake fluid reservoir is full and that the vent in the cap is open.
2. Connect a plastic or rubber tube to the bleeder valve on the left front wheel. Suspend the other end of the tube in a jar or bottle filled with a few inches of brake fluid. During the remaining steps, keep this end submerged at all times and never let the level in the brake fluid reservoir drop below one half full.
3. Open the bleeder valve and plug on the left front wheel about one turn. Have an assistant press the brake pedal slowly to the floor. As soon as the pedal is all the way down, close the bleeder valve and let the pedal up. Repeat this step as many times as necessary, until fluid with no air bubbles exits from the tube.
4. Bleed the right front wheel in the same manner as described in the steps above. Keep checking the brake fluid reservoir to be sure it doesn't run out of fluid.
5. When all wheels are bled, discard the brake fluid in the jar or bottle; never reuse such fluid.
6. Top up the brake fluid reservoir with clean fluid.

PARKING BRAKES

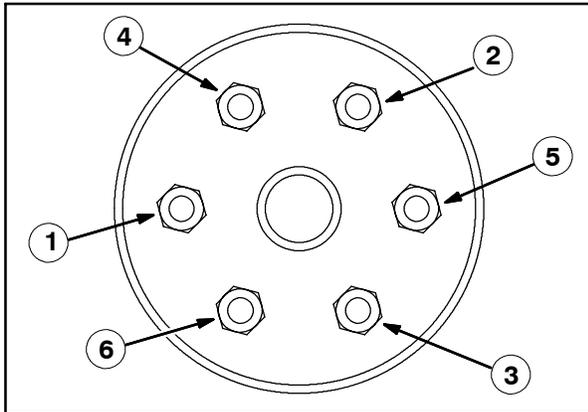
The parking brakes are mechanically activated by the parking brake lever and two cables. The machine is equipped with parking brakes on all four wheels and utilize two parking brake levers.

The parking brake cables should be adjusted after every 100 hours of operation or whenever the machine rolls after setting the parking brake or when it becomes very easy to set the parking brake. To adjust the brake cables, turn the knurled knob on the end of the parking brake clockwise. Tighten the brake cable enough to make the parking brake slightly resist being set.

TIRES

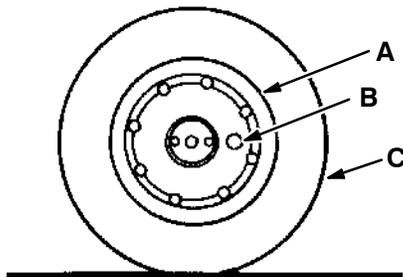
The machine is equipped with four pneumatic tires. The air pressure in these tires is critical to machine performance. Check the tire pressure daily. The correct tire pressures are: 85 psi (585 kPa) front for machines below serial number 004506; 65 psi (450 kPa) for machines serial number 004507 and above; and 35 psi (240 kPa) for rear tires on all machines.

Tighten the wheel lug nuts in the pattern shown, after every 200 hours of operation. Tighten lug nuts 85 to 95 ft lb (115 to 130 Nm).



POWER WHEEL

The power wheel is a gear reduction unit used to drive the machine. Each front wheel is equipped with its own power wheel and is driven by an electric motor. The power wheels are lubricated with SAE 90 mild-extreme pressure lubricant. When the fill plug is in the three o'clock position, add lubricant until it seeps out of the fill hole. Check the lubricant level after every 200 hours of operation.

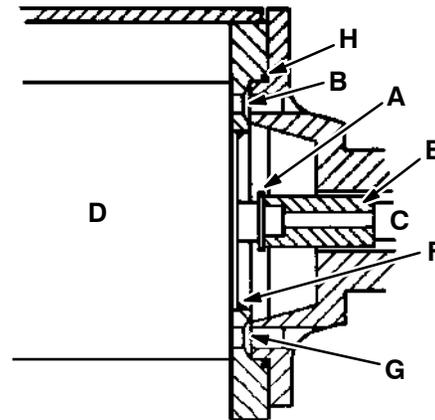


POWER WHEEL

01149

- A. Power Wheel**
- B. Fill Plug**
- C. Tire**

When reassembling a power wheel, be sure to apply RTV sealant on the electric motor pilot face and loctite the mounting bolts. Also, be sure the motor coupling is installed with the shoulder mounted toward the electric motor.



POWER WHEEL CROSS-SECTION

01149

- A. Retaining Ring**
- B. Loctited Mounting Bolt**
- C. Power Wheel**
- D. Electric Motor**
- E. Coupling With Shoulder Toward Electric Motor**
- F. Silastic Location**
- G. Set Screw (2)**
- H. O-Ring**

SECTION 4

CONTENTS

	Page
HARDWARE INFORMATION	4-3
STANDARD BOLT TORQUE CHART ..	4-3
METRIC BOLT TORQUE CHART	4-3
BOLT IDENTIFICATION	4-3
THREAD SEALANT AND LOCKING COMPOUNDS	4-3
HYDRAULIC FITTING INFORMATION	4-4
HYDRAULIC TAPERED PIPE FITTING (NPT) TORQUE CHART	4-4
HYDRAULIC TAPERED SEAT FITTING (JIC) TORQUE CHART	4-4
HYDRAULIC O-RING FITTING TORQUE CHART	4-4

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.

Front wheel nut – 10 to 12 ft lb (14 to 16 Nm) while turning wheel, tighten to spec, then backoff, retighten by hand till snug, then turn to next slot.

Damper solenoid nut – 20 to 23 in lb (2.5 to 3 Nm).

Pitman arm to steering column nut – 160 ft lb (215 Nm).

Propelling motor shaft thin nylon lock nut – 7 to 10 ft lb (9 to 14 Nm).

Propelling motor adapter bolts – 16 to 21 ft lb (21 to 28 Nm) with Locktite 242 blue on threads. Use locktite 515 sealant on the pilot fillet of the motor and the adapter.

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.

BOLT IDENTIFICATION

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

01395

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:

Main brush drive plug nut – 30 ft lb (40 Nm) then tighten to next slot.

Brake unit to hub sockethead screw – 9 to 12 ft lb (12 to 16 Nm) with Locktite 242 blue.

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

