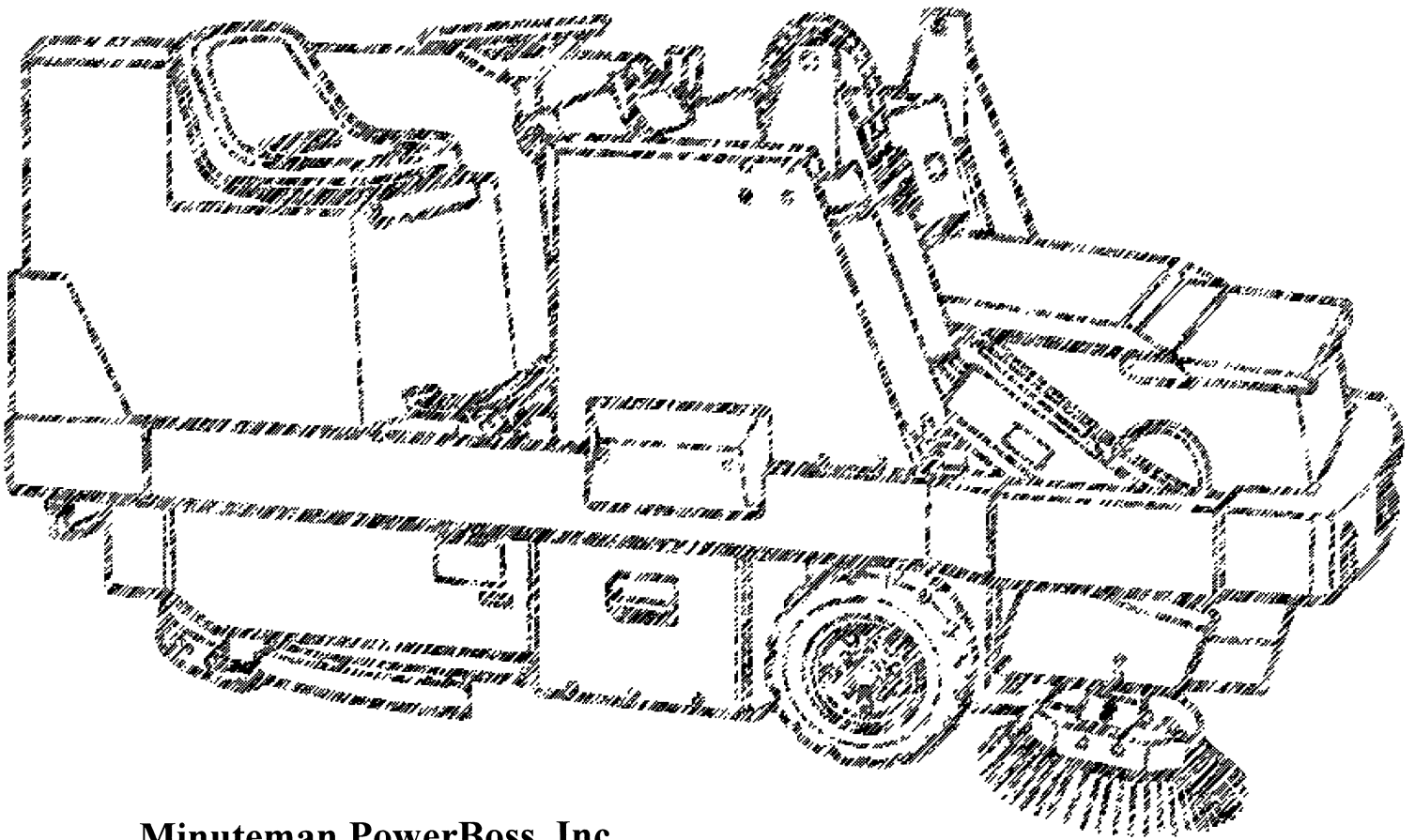


Minuteman® **PowerBoss**®

OPERATION, MAINTENANCE,
TROUBLESHOOTING MANUAL
AND PARTS MANUAL
TSS/82, ISS/82, CSS/82



Minuteman PowerBoss, Inc.

175 Anderson Street

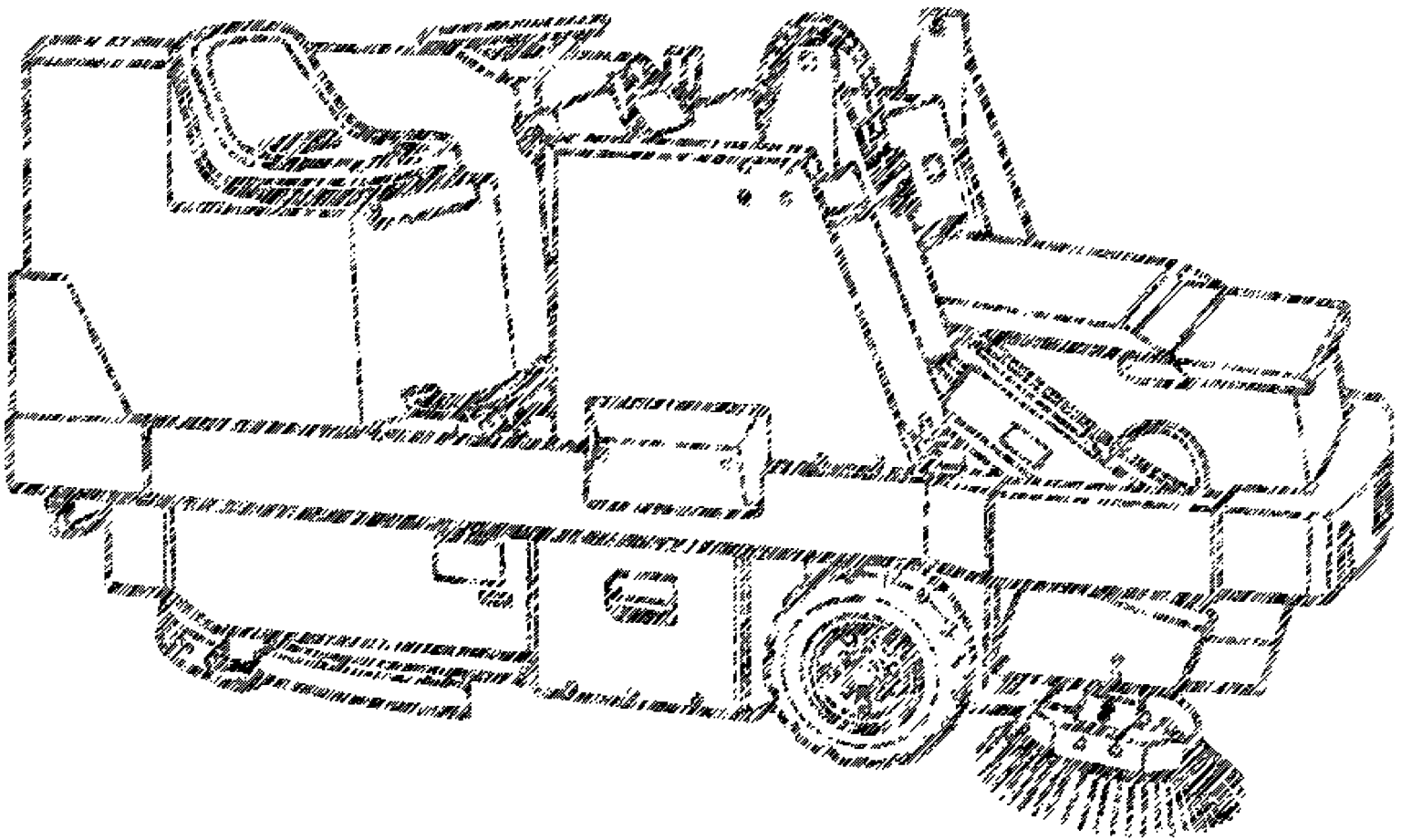
Aberdeen, North Carolina 28315 USA

(910) 944-2167 / FAX (910) 944-7409

Minuteman® **PowerBoss**®

OPERATION, MAINTENANCE
& TROUBLESHOOTING

TSS/82, ISS/82, CSS/82



Minuteman PowerBoss, Inc.
175 Anderson Street
Aberdeen, North Carolina 28315 USA
(910) 944-2167 / FAX (910) 944-7409

The Model and Serial Numbers of your machine are shown on the nameplate mounted on the machine. This information is needed when contacting Technical Support or ordering parts. For your convenience, use the space below to record the Model and Serial Numbers of your machine and the date it was placed into service.

MODEL NUMBER: _____

SERIAL NUMBER: _____

DATE PLACED INTO SERVICE: _____

All information contained in this manual is current at the time of printing. However, due to constant updates and improvements, we reserve the right to make changes at any time without notice.

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Minuteman® **PowerBoss**®

OPERATION, MAINTENANCE &
TROUBLESHOOTING

TSS/82, ISS/82, CSS/82



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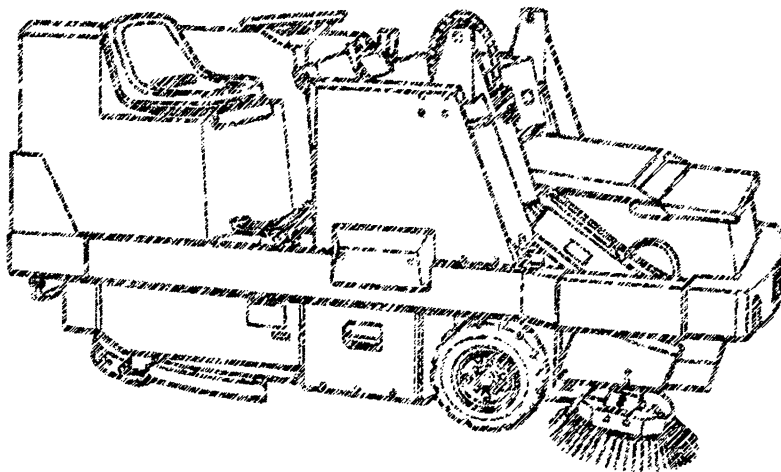
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TSS/82, ISS/82, CSS/82 **(LIMITED) PRODUCT WARRANTY**

Minuteman PowerBoss, Inc. (hereafter known as PowerBoss) warrants that these PowerBoss machines will be free from defects in material and workmanship for a period of 24 months or 2,000 operating hours from date of installation, whichever comes first. Poly components are warranted for five (5) years unless used with a cleaning solution in excess of 130°F (54°C), which would void the solution and recovery tank warranty. Written notice of any claimed defect must be given to PowerBoss within the warranty period and within thirty (30) days after such defect is discovered. Liability under this warranty is limited to either replacing or repairing, at PowerBoss's election, any part or parts deemed defective after examination by PowerBoss or an Authorized Service Representative.

For one hundred eighty (180) days from date of installation, PowerBoss will provide repair labor, at no charge, solely through an Authorized Service Representative. Thereafter, labor will be charged. Labor coverage is extended only to those items on which service was performed, and which failed as a result of defects in materials or workmanship. Normal preventative maintenance or adjustments, wearable parts, such as but not limited to flaps, filters, seals, points, plugs or similar items are not eligible for warranty coverage; parts or labor. Brushes are prorated against defects in materials or workmanship for twelve (12) months; hoses are warranted for six (6) months.

Travel is eligible for warranty consideration the first thirty (30) days after installation. The same provisions and exclusions apply to travel coverage as to labor and part eligibility.

This warranty does not extend to the PowerBoss machine, or its parts, that have been subject to misuse, accident or improper handling, installation, maintenance or application, nor does it extend to PowerBoss machine and/or parts which have been repaired or altered outside PowerBoss's plant or the facility of Authorized Service Representative.

Only authorized PowerBoss replacement parts purchased from PowerBoss are eligible for warranty consideration and are warranted against defects in materials and workmanship for the duration of the unit's warranty or thirty (30) days, whichever is longer. (Exception being wearable parts, such as but not limited to flaps, filters, seals, points, plugs or similar items. These items are to be free of defects in materials and workmanship when received and are not eligible for additional warranty consideration.) Damage to the unit, or that incurred as a result of utilization of parts not authorized by or purchased from PowerBoss, is not eligible for warranty reimbursement; parts or labor.

THE WARRANTY SET FORTH HEREIN IS IN LIEU OF AND EXCLUDES ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND CUSTOMER WAIVES ANY OBLIGATION OR LIABILITY OR POWERBOSS ARISING IN TORT OR STRICT LIABILITY IN TORT, OR FOR LOSS OR USE, REVENUE OR PROFIT WITH RESPECT TO POWERBOSS MACHINE AND/OR PARTS FOR ANY LIABILITY OF CUSTOMER TO ANY THIRD PARTY, OR FOR OTHER DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

SAFETY SYMBOLS

Five symbols are used throughout this manual to emphasize various levels of safety information. These symbols and the meaning of each are listed below.



DANGER: To warn of immediate hazards which will result in severe personal injury or death



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



CAUTION: To warn of hazards or unsafe practices which could result in minor personal injury.



ATTENTION!: To warn of practices which could result in extensive equipment damage.

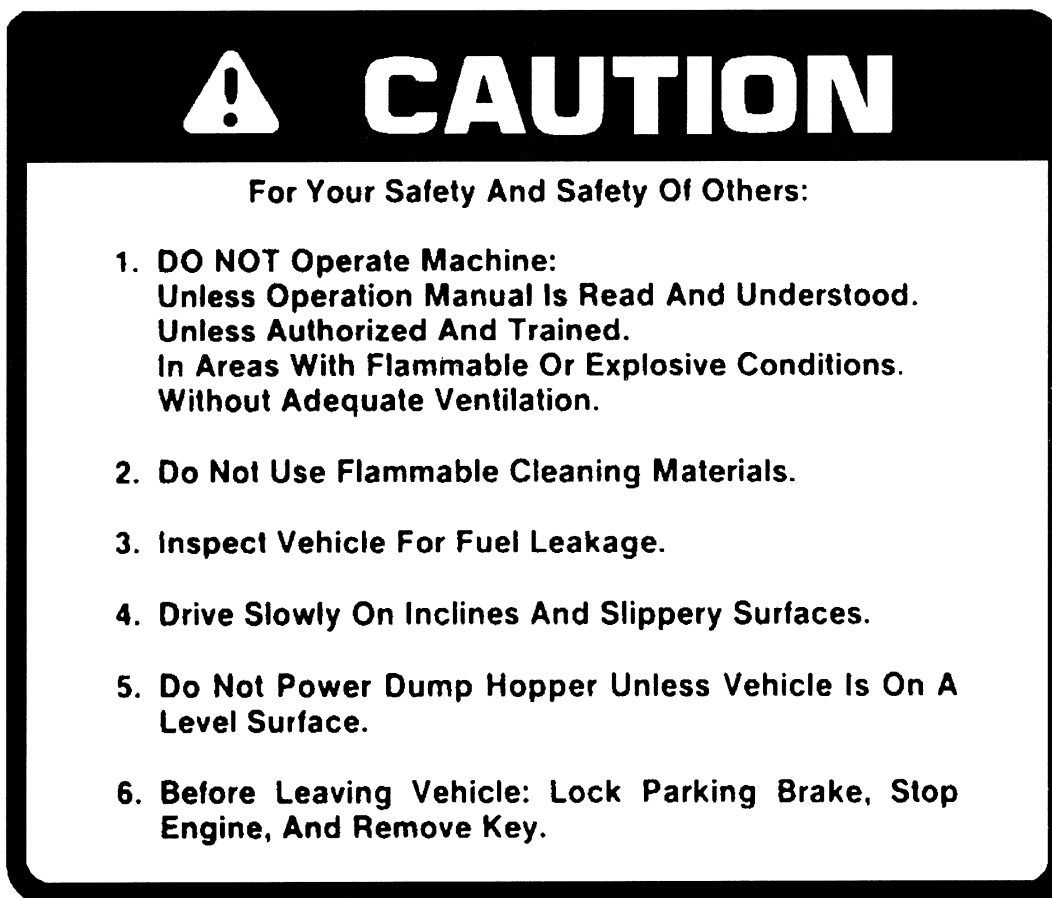


NOTE: To direct your attention to important equipment information or special instructions for preventing damage to equipment

Symbols at the top of the list are the strongest warnings. However, all symbols represent important information which should be observed to protect you and others from harm and injury, and to prevent damage to the equipment.

SAFETY DECALS

Decals directly attached to various parts of the sweeper are highly visible safety reminders which should be read and observed. Make sure the decals are replaced if they become illegible or damaged. The decal below is located in the drive compartment. Other safety decals on you machine appear on the next page.



Part Number 301854

Follow manufacturers recommendations for safe handling of cleaning materials.

SAFETY DECALS (Continued)

Shroud of Radiator

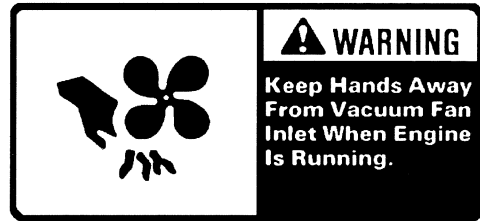


Part Number 301729

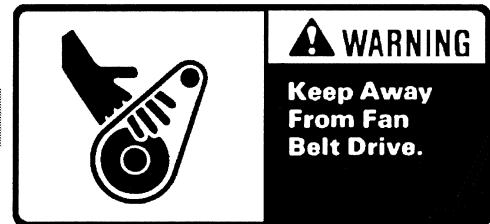
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Part Number 301730

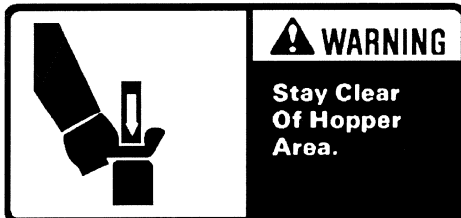
Impeller



Impeller

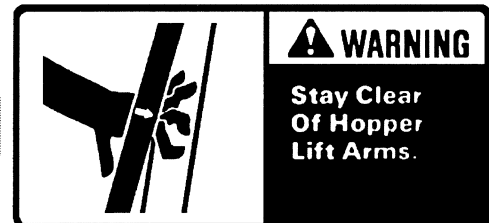


High Dump & Low Dump Hopper



Part Number 301731

High Dump Hopper



Part Number 301732

Shroud of Radiator



Part Number 301728

BASIC PowerBoss[®] SAFETY

PowerBoss[®] sweepers should never be operated unless: 1. The operator is trained and authorized to operate the equipment and, 2. The equipment is free of malfunctions. Malfunctioning equipment should be removed from service.



1. Keep cigarettes, matches and all other flame sources away from the sweeper. Gasoline, LP gas and diesel fuel are highly flammable. Lead acid batteries are equally dangerous due to the highly explosive hydrogen gas they emit.



1. Before starting the engine, make sure that:

- * You have read and understand the operation manual.**
- * You are securely seated in the operator's seat.**
- * The parking brake is locked.**
- * The directional control pedal is in neutral.**
- * The throttle is in idle.**
- * Hydraulic controls are in the OFF position.**

2. During operation:

- * Keep your hands and body clear of moving parts, especially when the hopper or lift arms are partially or fully raised.**
- * Make sure others in the area stay clear of the equipment and moving parts.**
- * Never attempt to dump debris from a dock or mezzanine. Dump from ground level only.**

3. When leaving the sweeper unattended:

- * Place the controls in the OFF position.**
- * Set the parking brake.**
- * Shut off the engine.**

BASIC PowerBoss[®] SAFETY (Continued)**4. During cleaning and maintenance:**

- * Always stop the engine and set the parking brake before servicing.*
- * Never use detergents or cleansers that are flammable or combustible.*
- * Never inflate a pneumatic tire without using a safety cage.*
- * Do not attempt any impeller adjustment unless you have shut off the engine. Never place your hands near the intake hoses or inlet when the engine is running.*
- * Always engage the safety arm before servicing the hopper. Do not rely on the hydraulic cylinder to keep the hopper raised.*

5. When servicing or repairing the fuel system:

- * Work in a properly ventilated area, do not smoke or allow an open flame near the fuel system.*
- * Never bypass safety components unless you are testing them.*
- * Never bypass the fuel filter lock, except when testing them (and always reconnect them after testing).*
- * Wear gloves to disconnect the LPG tank coupling.*

6. Do not operate an LPG powered sweeper when any component in the fuel system is malfunctioning or leaking.**7. Replace any defective safety components before operating the sweeper.**

- 1. Do not drive with the hopper in the raised position except the few feet necessary to position the hopper over the dumpster or receptacle. Driving with the hopper raised reduces visibility and creates conditions for striking over-head objects, throwing the machine off-balance and other hazards.**

BASIC PowerBoss[®] SAFETY (Continued)

- 2. Travel slowly on grades.*
- 3. Place a block or chock behind the wheels when parking on inclines.*
- 4. Use special care when traveling on wet surfaces.*
- 5. Observe all proper procedures for operation and maintenance of the sweeper, as outlined in this manual.*
- 6. Remain alert at all times to people and equipment in and around your area of operation.*

ATTENTION!

- 1. Do not operate the #2 RTR lever before the #1 light illuminates.*
- 2. Turn the tow valve before pushing or towing. Never push or tow a machine faster than specified.*

BASIC OPERATION CONTROLS

IGNITION SWITCH	The four position keyswitch is used to turn the machine's power on and off .
STARTER	To start gasoline powered machines, turn the key to the START position. When the engine starts, release the key. To stop the engine, turn the key to the OFF position.
HORN	The horn is activated by pressing the horn button located on the right side of the instrument panel.
FUEL LEVEL GAUGE	The fuel gauge indicates the amount of fuel remaining in the tank.
AMMETER	The ammeter indicates the charging current which is being sent to the battery by the alternator. It also indicates a discharge of current being used by the sweeper / scrubber when the alternator is not charging.
HOUR METER	The hour meter records the number of hours the machine has been operated, providing a helpful guide for performing routine maintenance tasks.
ENGINE CHOKE	Gasoline engines have electric choke for aid in cold starting.
ENGINE OIL PRESSURE	The engine oil pressure gauge ranges from 0 psi to 60 psi. A reading below 6 psi indicates problems which may result in damage to the engine.
ENGINE COOLANT TEMPERATURE GAUGE	The engine coolant temperature gauge registers the temperature of the engine coolant. Temperatures above 210°F indicate an overheating engine.
STARTING DIESEL	The diesel engine is equipped with glow plugs to aid in cold starting. To start a cold engine: <ul style="list-style-type: none">* Turn the ignition key counter-clockwise and hold for 10 - 20 seconds to warm the glow plugs.* Turn the key to START position until the engine starts.* When the engine starts, release the key.

NOTE

If the engine does not start after 10 seconds, release the key, wait 1 minute and repeat the procedure.

BASIC OPERATING CONTROLS (Continued)

THROTTLE

The throttle adjusts the engine speed from idle to the operating speed.

- * The throttle should be in the **IDLE** position when starting the engine and immediately before shutdown.
- * The throttle should be in the **RUN** position during normal operation to ensure proper broom speed and dust control.

DIRECTIONAL CONTROL PEDAL

The directional control pedal controls the speed and direction of the machine. It is also used for slowing the machine or stopping.

- * To propel the machine forward, apply pressure to the front of the pedal, increasing pressure to increase speed.
- * To propel the machine backward, apply pressure to the rear of the pedal.
- * To slow or stop the machine, move the foot pedal into neutral.
- * For emergency stops move the foot pedal past neutral and into the opposite position.

NOTE

Use for emergency stops only! Constant use of this braking method may result in damage to the drive components.

PARKING BRAKE

The parking brake operates the mechanical drum brakes on the front two wheels and is engaged by the brake pedal. On Optional and Deluxe models, the hand brake is engaged by lifting up on the lever.

- * Diesel units equipped with a handbrake is standard.
- * Hydraulic brakes are optional with a handbrake.

SWEEPING CONTROLS

BROOM CONTROL

The broom control lever activates the brooms and scrub brushes. Side broom **OFF** position activates the main broom and scrub brushes. When the side broom is **OFF** the main broom and scrub brushes are **ON**.

NOTE

The main broom and side broom may be lowered independently.

NOTE

The “OFF” position is achieved by placing the broom control lever in the center of the slot. Both broom motors (main and side) are deactivated.

MAIN BROOM

The main broom handle to the left of the instrument panel raises and lowers the main broom into three positions: (1) **RAISE**, (2) **NORMAL** and (3) **FLOAT**. The **NORMAL** position is recommended for most applications.

- * For extremely uneven floors, position the handle to the **FLOAT** position.

NOTE

Extensive use of the FLOAT position reduces broom life.

- * When not sweeping, position and lock the handle to the **RAISE** position.

SIDE BROOM HANDLE

The side broom handle to the right of the instrument panel raises and lowers the side broom.

- * When not sweeping, the side broom should remain in the **RAISE** position.
- * To lower the side broom position the handle to the **LOWER** position.

SCRUBBING CONTROLS

FILLING THE SOLUTION TANK

To fill the solution tank follow these steps:

1. Make sure the air control knob is pushed in (TSS and ISS models).
2. Park the machine on a level area and lock the parking brake.
3. Make sure the solution delivery valve is closed.
4. Open the top door of the machine and connect a garden hose to the AutoFill Assembly. The water will shut off when the proper level is achieved. **OR**

NOTE

Unscrew the smallest (6 inch) cap located on the top of the solution tank. Fill the tank with cleaning water solution.

5. When the tank is full, remove the hose, close the door and replace the cap.

CAUTION

Never use detergents or cleaners that are flammable or combustible. Always wear safety glasses and protective clothing when using chemicals of any kind.

MAIN SCRUB BRUSHES

To operate the scrub brushes, follow these steps:

1. Activate the scrub brushes by putting the broom and brush control lever in the **ON** position. Stop the brushes by returning the lever to the center **OFF** position.
2. Locate the scrubhead switch in the console to the left of the operator.
3. Lower the scrubhead to the floor with the scrubhead switch. The scrubhead gauge is a visual indication of the scrub deck position and not the amount of pressure on the floor. The scrubhead is raised with the same switch.

NOTE

For normal scrubbing, the main broom and side broom remain in the RAISED position.

To scrub and sweep at the same time, lower the brooms. Even though the brooms and brushes are both rotating, each is lowered independently of each other.

SCRUBBING CONTROLS (Continued)

MAIN SCRUB BRUSHES (Continued)

3. Lower the squeegee with the squeegee switch in the **LOWER** position.
4. Start the flow of solution to the floor. To dispense solution, push the solution delivery lever forward. To stop the flow of solution, pull the lever back to the **OFF** position. The amount of solution dispensed increases as the lever is moved forward, increasing the flow rate to up to 3 gallons per minute.
5. Drive forward slowly.



Use care when driving on wet surfaces. Always travel slowly on grades.

DOUBLE SCRUBBING

For double scrubbing, proceed as follows:

1. Follow the procedures for scrubbing *without* lowering the squeegee to the floor.
2. Make multiple passes over the same area of the floor as conditions indicate.
3. Lower the squeegee and turn **ON** the vacuum for the final pass.

DRAINING THE RECOVERY TANK

Follow these steps to drain the recovery tank:

1. Park the machine on a level surface at an approved drainage site with the left rear of the machine beside the drain access.
2. Engage the parking brake.
3. Turn the machine **OFF**.
4. Open the left scrubhead access door.
5. Remove the flexible drain hose from its storage hook. Pull out the drain hose for the required reach to the access.
6. Place the end of the drain hose on or in the approved drain access.
7. Loosen and remove the drain plug.
8. Drain the tank completely and reinstall the plug.
9. Reposition the drain hose on its storage hook.

SCRUBBING CONTROLS (Continued)

CLEANING THE RECOVERY TANK

To clean the recovery tank, proceed as follows:

NOTE

The recovery tank should be cleaned after every shift.

1. Position the machine at an approved drain area.
2. Engage the parking brake.
3. Shut off the machine.
4. Remove the two 9" access caps at the rear of the unit.
5. Remove the drain hose and position it over the approved drain opening.
6. Loosen and remove the drain plug.
7. Spray the tank with clean water, flushing all sludge out of the access ports.
8. Remove the ball and float. Rinse and reinstall.
9. Drain the tank completely and reinstall the drain plug.
10. Return the drain hose to the storage hook at the left side scrub door area beneath the floor pan.
11. Replace the 9" access caps removed in step four.

SQUEEGEE WAND

This attachment allows the operator to vacuum spills and standing water in areas which the machine cannot maneuver. To operate the squeegee wand, follow these steps:

1. Remove the hose from the squeegee tool.
2. Attach the adapter to the hose.
3. Connect the squeegee wand to the adapter.
4. Set the engine at a high idle and vacuum the spills or standing water.

DEBRIS HOPPER DUMP CONTROLS

HOPPER FILTER SHAKER BUTTON

This button is used to activate the filter shakers prior to dumping or as needed during sweeping operation. It is located to the left side of the instrument panel.

To shake the filter:

1. Bring the machine to a complete stop.
2. Place the broom control lever in the **OFF** position.
3. Interrupt the airflow to the hopper by:
 - * shutting the impeller off or
 - * slightly raising the hopper to break the seal at the gasket mount
4. Press and hold the filter shaker button for 20 to 30 seconds.
5. Place the broom switch in the **ON** position and resume sweeping.



Do not leave the hopper in the RAISE position for an extended period of time.

HIGH DUMP MODELS

The two far left levers on the front control panel are used to raise the hopper to a height up to 60" (1.52 m) and dump it.

- To raise the hopper, pull back Lever 1 to the **RAISE** position and hold until the hopper raises to the proper height for the dumpster or container.
- To empty debris, pull back Lever 2 to the **DUMP** position to rotate the hopper forward and empty the debris.
- To rotate the hopper back, push Lever 2 forward to the **RETURN** position until the hopper rotates and stops.
- To lower the hopper, push Lever 1 forward to the **LOWER** position until the hopper stops.



(TSS model only) Never rotate the hopper until the #1 RTR™ light is ON.

ROTARY TRASH RELOCATOR (RTR™)

Rotary Trash Relocator (RTR™) is a standard feature on high dump models. Its purpose is to relocate the debris in the hopper to make dumping the hopper necessary less frequently. This also aids in keeping the unit sweeping effectively.

OPERATING PROCEDURES

PRE-OPERATION CHECKS

Prior to starting the engine, check the following:

1. Engine oil level
2. Engine coolant level
3. Fuel level
4. Hydraulic fluid level
5. Brakes, steering and directional controls
6. The floor beneath the machine for signs of fluid leaks

Fluid levels should be correct. Brakes, steering and directional controls should be functioning properly. Hoses, lines and tanks should be free of damage and leaks.

STARTING



Before starting the engine, sit in the operator's seat and make sure the parking brake is locked.

1. Make sure the directional control pedal is in the neutral position.
2. Make sure the throttle is in the idle position.
3. ***Gasoline-powered:*** To start gasoline powered machines, turn the key to the **START** position. When the engine starts, release the key. To stop the engine, turn the key to the **OFF** position.
Diesel-powered: The diesel engine is equipped with glow plugs to aid in cold starting.
 - * Turn the ignition key counter-clockwise and hold for 10 to 20 seconds to warm the glow plugs.
 - * Turn the key to the **START** position until the engine starts.

NOTE

If the engine fails to start after 10 seconds, release the key, wait one (1) minute and repeat the procedure.

4. Allow the engine to warm for approximately two minutes.

SLOWING AND STOPPING

1. Allow the directional control pedal to move into the neutral position. The machine will slow and coast to a stop.

**OPERATING ON
GRADES**

1. Always travel slowly.
2. Exercise extreme caution when traveling across or turning on grades

SWEEPING

1. Lower the Brooms
 - * When sweeping extremely uneven floors, position the main broom handle to the **FLOAT** position on the handle slot.
 - * Lower the side broom by positioning the side broom handle at the **LOWER** position in the handle slot.
 - * Lower the main broom by positioning the main broom handle to the **LOWER** position on the handle slot.
2. Activate the broom motors.
 - * Activate both main and side broom motors by pushing the broom and brush control lever to the **ON** position.
 - * Activate the main broom and scrub motors by pulling the broom and brush control lever to the **SIDE BROOM OFF** position.
3. Drive the machine over the area to be swept

NOTE

The main broom motor cannot be turned on without scrub brushes.

**VACUUM
ATTACHMENT
(TSS MODEL ONLY)**

To operate the vacuum, open the hopper lid, close the vacuum door (at the front of the dust filter housing) and attach the vacuum hose. With the parking brake locked, move the throttle to the RUN position. The vacuum is now ready for use.

**EMPTYING THE
HOPPER
(TSS MODEL ONLY)**

1. Drive the machine to an approved dumping area.
2. Position the machine so that the space between the machine and the container or dumpster is adequate to raise the hopper. The broom control lever must be in the center **OFF** position.
3. Reduce the engine speed.
4. Pull back Lever 1 to the **RAISE** position and hold until the bottom of the hopper is high enough to clear the top of the container.

CAUTION

Never place your hands or other body parts near the lift arms when the hopper is operating.

**EMPTYING THE
HOPPER
(Continued)**

5. Use the directional control pedal to slowly and carefully move the machine forward until the hopper is properly positioned to dump the debris into the container.

⚠ WARNING

It is unsafe to travel an extended distance with the hopper raised. Travel only the distance necessary to position the hopper.

6. Shake the filters for 20-30 seconds. Pull back Lever 2 to the **DUMP** position to rotate the hopper forward and empty the debris.
7. After the hopper empties, push Lever 2 forward to the **RETURN** position until the hopper rotates and stops.
8. Slowly back the machine away from the dumpster approximately 5 feet.
9. Push Lever 1 forward to the **LOWER** position until the hopper stops.

**USING THE
ROTARY TRASH
RELOCATOR
(RTR™)**

1. Use the directional control pedal to stop the machine on a level surface.
2. Move the throttle to the **IDLE** position.
3. Turn the brushes and vacuum fan **OFF**.

NOTE

As you complete Steps Two and Three, observe the two red lights labeled 1 and 2 in the upper left corner of the control panel.

- Light 1 illuminates when the hopper reaches the minimum height required to use the RTR™ feature.
 - Light 2 illuminates when the hopper reaches the rotation stop point.
4. Pull back Lever 1 to the **RAISE** position and hold until Light 1 illuminates, then release.

⚠ WARNING

Make sure no one is in the area under or around the hopper.

**USING THE
ROTARY TRASH
RELOCATOR
(RTR™)
(Continued)**

NOTE

5. Pull back Lever 2 to the **DUMP** position and hold until Light 2 illuminates, then release.

This rotates the hopper, causing debris to move from the rear entrance to the front wall of the hopper. Rotating beyond this point will cause debris to be dumped from the hopper.

6. Push Lever 2 forward to the **RETURN** position until the hopper rotates back and stops.
7. Push Lever 1 forward to the **LOWER** position until the hopper returns to the normal operating position.
8. Turn the brushes and vacuum fan to the **ON** position.
9. Move the throttle back to the **RUN** position and resume sweeping.

**LOW DUMP MODEL
(ISS)**

NOTE

1. Push the throttle to the **IDLE** position.

The broom control lever must be in the center or OFF position. Never attempt to dump debris off of a dock or mezzanine. Dump onto ground surface only.

2. Pull back the lever marked **DUMP** from its center **OFF** position until the hopper raises and locks in the dump position. Debris will empty onto the floor.
3. With the hopper in the raised position, press the filter shaker button for 20 to 30 seconds to shake the dust from the hopper filter(s).
4. Use the directional control pedal to slowly back the machine a distance of about five feet (15.24 cm).

CAUTION

It is unsafe to travel an extended distance with the hopper raised. Travel only the distance necessary to clear the debris.

WARNING

Never place your hands or other body parts under a raised or partially raised hopper unless the safety arm is in place.

5. Use the directional control pedal to stop the machine, then release the **DUMP** lever to return it to its center **OFF** position.
6. Pull the throttle back to the **RUN** position and resume sweeping.

**MANUAL LIFT-OUT
MODELS
(CSS)**

CAUTION

Turn the machine OFF and set the parking brake.

1. Grasp the handles on top of the hopper.
2. Lift the hopper straight up, about 3 inches (76.2 mm) until the support brackets clear the frame.
3. Move the hopper back and dump.
4. Replace the hopper.

NOTE

If the debris in the hopper is too heavy, the hopper can be rotated and partially dumped to make it lighter.

BLOWER

The blower blows debris from hard-to-reach areas into the path of the sweeper. To operate, take the wand and pull the blower control knob.

**TRANSPORTING
THE MACHINE
Loading**

1. Position the machine on the transport vehicle or trailer and apply the parking brake.
2. Chain the machine down using the tie-down holes in the frame in front of both front wheels and in the rear of the frame.

NOTE

Attach the tie downs to the frame only.

ATTENTION!

On 1993 and later models a tow valve is equipped located on the top of the propulsion pump. To operate the tow valve:

1. Turn the flat-sided shaft at the top of the pump 90°.
2. Before operating the machine, return the valve to its original position.

Pushing

1. Push the machine from the rear using bumpers only.

Do not tow or push the machine a distance of more than .5 miles (.80 kilometers) or faster than one mile per hour (1.61 km). Exceeding these restrictions may cause damage to the hydraulic system. If towing will exceed the above restrictions, the rear wheel must be raised or supported by a dolly.

PLANNED MAINTENANCE CHART INTRODUCTION

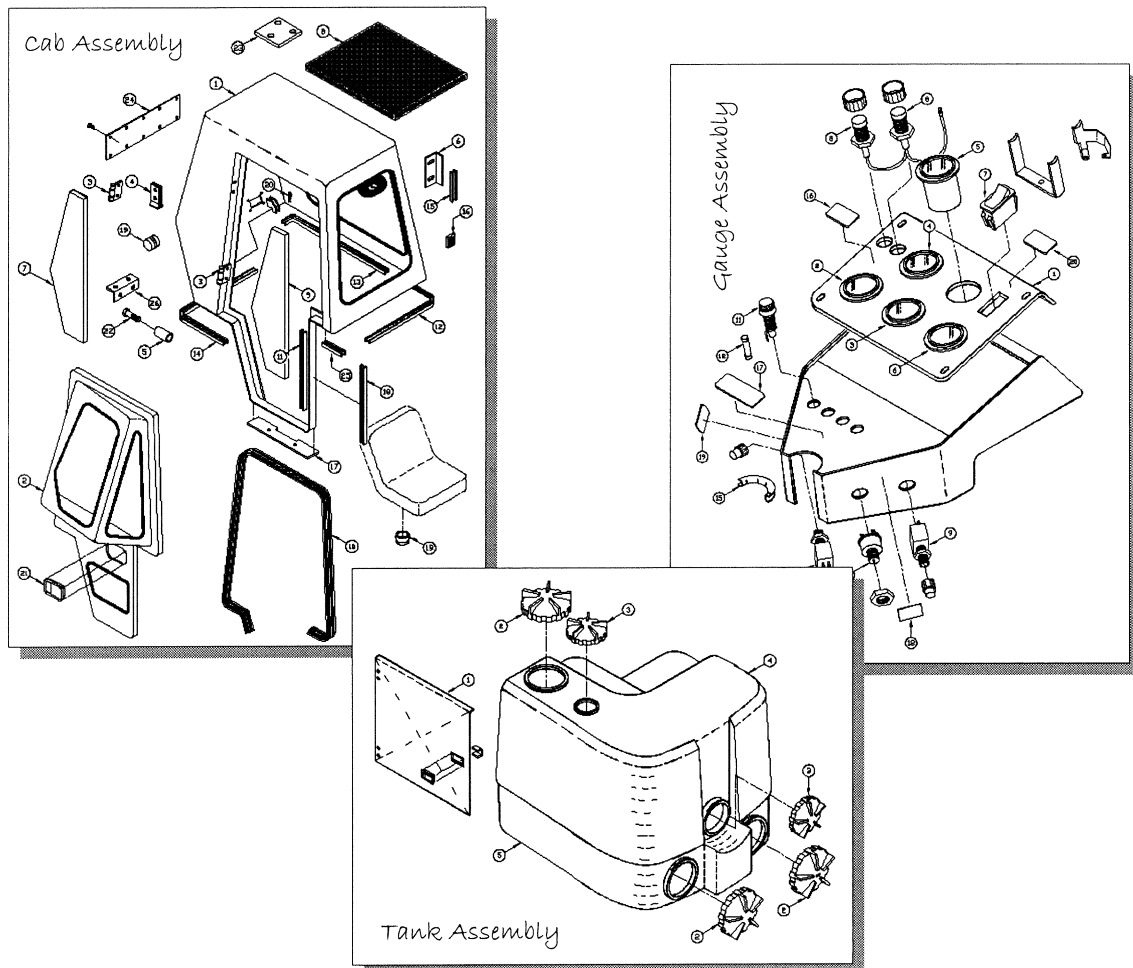
Regular maintenance on your sweeper results in better cleaning, faster cleaning and a prolonged service life for the equipment and components. This section contains the following information to help you give your sweeper the maintenance attention it requires:

- A Planned Maintenance Chart
- Service Instructions for Required Maintenance Tasks

Because it is extremely important to your safety, you will see the following **WARNING** repeated throughout this section:



Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.



PLANNED MAINTENANCE CHART (Ford[®] Engine)

100 Hrs.	200 Hrs.	300 Hrs.	400 Hrs.	500 Hrs.	600 Hrs.	700 Hrs.	800 Hrs.	900 Hrs.	1000 Hrs.	Operation
Daily										Oil, Engine, Check Level
Daily										Coolant, Check Level ⁷
Daily										Fuel, Oil and Coolant Leaks
X	X	X	X	X	X	X	X	X	X	Oil, Engine, Change ¹
X	X	X	X	X	X	X	X	X	X	Oil Filter, Change ¹
			X				X			Air Cleaner, Replace Element ¹
X	X	X	X	X	X	X	X	X	X	Battery, Check Charge and Level
X	X	X	X	X	X	X	X	X	X	Crankcase Vent System Breather Cap, Clean ⁴
	X		X		X		X		X	Radiator, Inspect and Clean Exterior ¹
	X		X		X		X		X	Battery Cables, Clean
	X		X		X		X		X	Fan, Alternator Belts, Check and Adjust Tension ^{5,6}
	X		X		X		X		X	Throttle, Governor and Choke Linkage, Lubricate
			X				X			Fuel Filter, Replace ^{1,4}
			X				X			Cooling System, Check or Refill ^{3,7}
			X				X			Idle Speed, Check and Adjust
			X				X			Idle Mixture, Check and adjust
			X				X			Spark Plugs, Clean, Adjust and Test or Replace
							X			PCV Valve, Replace
				X						Coolant—Replace 24 Months or
							X			Intake Manifold Bolts, Torque ³
										All Bolts and Nuts, Check for Tightness ³
			X							Valve Clearance, Check and Adjust ³

- 1 More frequent intervals may be required in dusty areas—50 hours for oil and filter.
- 2 Mechanical governor (belt driven).
- 3 Seasonal or as required.
- 4 If so equipped.
- 5 Replace worn, frayed, cracked or damaged belts.
- 6 Replace governor belts every 24 months.
- 7 Check engine coolant condition and protection, hoses and clamps annually—prior to cold weather

NOTE: Scheduled Maintenance beyond 1000 hours should be continued at the same intervals as before.

PLANNED MAINTENANCE CHART

FREQUENCY (IN HOURS)					SERVICE (BY MAINTENANCE AREA)
DAILY	50	100	200	500	
		X			ENGINE
		X			Pressure wash engine
		X			Oil Change
					<i>For additional maintenance requirements, refer to the engine manual furnished with this manual.</i>
					AIR INTAKE SYSTEM
X					Empty rubber dust cup of air filter element.
		X			Clean air filter. <i>NOTE: Clean more often in dusty conditions.</i>
			X		Replace air filter.
					ELECTRICAL SYSTEM
		X			Check electrolyte level in battery cells and fill as needed.
			X		Clean battery top.
					COOLANT SYSTEM
X					Check coolant level and fill as needed.
	X				Inspect radiator fins and clean as needed.
		X			Blow out radiator fins.
				X	Drain and flush the coolant system

PLANNED MAINTENANCE CHART (Continued)

FREQUENCY (IN HOURS)					SERVICE (BY MAINTENANCE AREA)
DAILY	50	100	200	500	
					HYDRAULIC SYSTEM
X					Check hydraulic reservoir gauge and fill as needed.
				X	Replace breather cap filter element.
				X	Replace hydraulic fluid and filter
X					Check functioning of directional control pedal and adjust as needed.
				X	Clean hydraulic fluid strainer in reservoir.
	X				Inspect hydraulic oil cooler fins and clean as needed (if so equipped).
		X			Blow out hydraulic oil cooler fins with compressed air (if so equipped).
					SWEEPING COMPONENTS
X					Inspect brooms for wear and remove strings and debris from bristles and drive assembly.
	X				Inspect broom skirts for wear and adjust or replace as needed.
	X				Rotate main broom end-to-end.
	X				Perform main broom adjustment test and adjust as needed.
X					Inspect the side broom for wear and adjust as needed.
					<i>Replace main and side brooms as needed. Main Broom—Bristles are 1" in length. Side Broom—Bristles are 3" in length.</i>

PLANNED MAINTENANCE CHART (Continued)

FREQUENCY (IN HOURS)					SERVICE (BY MAINTENANCE AREA)
DAILY	50	100	200	500	
X					HOPPER Check hopper filters and clean or replace as needed.
	X				Check hopper clearance from floor and adjust as needed.
X					Inspect the hopper flaps for wear or damage and replace as needed.
		X			Inspect hopper side and frame seals for wear or damage. Adjust or replace as needed.
				X	Lubricate the pillow blocks supporting the dump mechanism.
					STEERING
				X	Lubricate steering cylinder rod ends.
				X	Lubricate steering fork assembly.
	X				Check for leaks.
					PARKING BRAKE
			X		Check for proper functioning and adjust as needed.
					TANKS
X					Check squeegee tool and vacuum hose for clogs.

PLANNED MAINTENANCE CHART (Continued)

FREQUENCY (IN HOURS)					SERVICE (BY MAINTENANCE AREA)
DAILY	50	100	200	500	
X					<p>TIRES</p> <p>Visually inspect for wear and damage. Repair or replace as needed.</p>
		X			<p>MISCELLANEOUS</p> <p>Inspect latches and hinges. Tighten and lubricate as needed.</p>
			X		<p>Check anti-static drag chain on rear wall of broom chamber for damage or excessive wear. Replace as needed.</p>
				X	<p>Check side broom lift cable and brake cable for wear.</p>
X					<p>IMPELLER</p> <p>Check for hydraulic fluid leaks.</p>
	X				<p>SCRUB AND WATER PICK-UP COMPONENTS</p> <p>Inspect scrub brushes and replace as needed. Maximum wear = 1/2"</p>
X					<p>Inspect squeegee flare and adjust as needed.</p>
	X				<p>Check the main squeegee for wear. (Turn or replace as needed.)</p>

SERVICE INSTRUCTIONS INTRODUCTION

Maintenance requirements and service instructions for your sweeper engine are outlined in the following parts of this Maintenance Section:

- * Air Intake System
- * Electrical System
- * Fuel System
- * Coolant System
- * Lubrication System

All basic maintenance tasks are listed with their recommended frequencies on the Planned Maintenance Chart in this manual. Important additional maintenance requirements and instructions are explained in the engine manual which comes with your machine.



Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

SERVICE INSTRUCTIONS (CONTINUED)

AIR INTAKE SYSTEM

AIR FILTER REMOVAL

1. Turn off the engine and set the parking brake.
2. Lift the engine cover.
3. Locate the air filter and unclamp the retaining clamps or the ring clamp.
4. Remove the dust cup.
5. Pull the rubber plug out of the dust cup and empty the contents.
6. Pull the air filter out of its housing.

AIR FILTER CLEANING

1. Once you have removed the air filter, empty the dust cup and clean the interior of the air filter housing.
2. Use an air hose to blow out the air filter. Air pressure should be 100 psi or less.

AIR FILTER INSPECTION

1. After you clean the air filter, check it for holes by passing a light bulb in side it.

AIR FILTER INSTALLATION

1. Wipe out the air cleaner housing with a damp cloth. Be sure all dirt is removed.
2. Install the cleaned replacement filter so that the fins are at the far end of the housing. Be careful not to damage the fins.
3. Replace the wing nut with the rubber gasket and tighten (if so equipped).
Be sure the Radial Seal Element seats properly.
4. Replace the rubber plug in the dust cup.
5. Replace dust cup, being sure embossed word "top" on cup is positioned correctly (up).
6. Tighten the ring clamp or retaining clamps.
7. Check the condition of intake hoses and clamps. Close engine cover.

SERVICE INSTRUCTIONS (CONTINUED) ELECTRICAL SYSTEM

BATTERY CLEANING

1. Combine baking soda and water in a strong solution.
2. Brush the solution over the battery top, including terminals and cable clamps. Make sure the solution does not enter the battery.
3. Using a wire brush, clean the terminal posts and cable clamps.
4. Apply a thin coating of petroleum jelly to the terminals and cable clamps.

BATTERY REPLACEMENT



Remove the negative battery cable before you remove the positive battery cable. This is done to prevent accidental electrical shorting which can result in personal injury.

1. Disconnect the negative (-) cable and then the positive (+) cable.
2. Remove the battery.
3. Install the new battery.
4. Connect the positive (+) battery cable first, then the negative (-) cable.

CIRCUIT BREAKER / FUSES

If the circuit breaker trips, it can be reset by pressing the reset button in the center of the breaker. (The circuit breaker is located on the instrument panel below the steering wheel. There are three (3) replaceable fuses located next to the circuit breaker.)

Circuit Breaker 45 Amp.

1. Filter Shaker Motors, Horn, Fuel Gauge, Option Connector
2. Oil Pressure Gauge, Temperature Gauge, Hour Meter
3. Head Lights, Tail Lights, Gauge Lights

An auxiliary fuse panel (for the scrubhead lift, squeegee and options) is located inside the engine compartment to the right of the battery.

SERVICE INSTRUCTIONS (CONTINUED)

FUEL SYSTEM



1. ***Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.***
2. ***Never operate an LPG powered sweeper when any component in the fuel system is malfunctioning or leaking.***
3. ***Never bypass safety components unless you are testing them.***
4. ***Replace any defective safety components before operating the sweeper.***
5. ***During repair or servicing of the fuel system, work in a properly ventilated area and do not smoke or allow an open flame near the fuel system.***
6. ***When disconnecting the LPG tank coupling, always wear gloves. LPG fuel can freeze bare hands.***
7. ***Under no circumstances should the fuel filter lock be bypassed, except when testing. After testing, always reconnect lock. Bypassing the fuel filter lock after testing creates a potential fire hazard.***

CHECKING THE LPG FUEL FILTER LOCK

1. Start the engine. Then remove the vacuum hose going to the fuel filter lock. The solenoid should close, shutting off the fuel supply and stopping the engine.
 - If the engine continues to operate, the fuel filter lock should be replaced.
 - If the engine stops, the fuel filter lock is operating properly.
2. With the engine stopped, let the machine stand while the LPG tank valve is open (the hose is removed from the fuel filter lock). After 10 minutes, try the starter motor.
 - If the engine starts or fires, this indicates a fuel leak has occurred. Replace the fuel filter lock immediately.
 - If the engine simply turns over, this indicates the fuel filter lock is operating correctly.

SERVICE INSTRUCTIONS (CONTINUED) COOLANT SYSTEM

BLOWING OUT RADIATOR FINS

NOTE

Make sure radiator is cool before blowing out the radiator fins with compressed air.

REVERSE FLOW FLUSHING

1. At the engine, disconnect the hoses.
2. Make sure the radiator cap is on tight.
3. Using a hose clamp, clamp a flushing gun onto the lower hose.
4. Turn on the water and fill the radiator.
5. To keep from damaging the radiator, apply air pressure slowly and carefully.
6. Shut off the air pressure, refill the radiator with water, and reapply the air pressure. You will need to repeat these steps until water flushed from the radiator runs out clear.
7. Inspect and clean the radiator cap.
8. Inspect and reconnect the hoses.
9. Refill the radiator with coolant.

NOTE

Use a 50/50 mixture of water and an anti-freeze with an ethylene glycol base.

SERVICE INSTRUCTIONS (CONTINUED) LUBRICATION

Gasoline and LPG Engines:

Refer to the Engine Manufacturer's Operator Manual for these specifications.

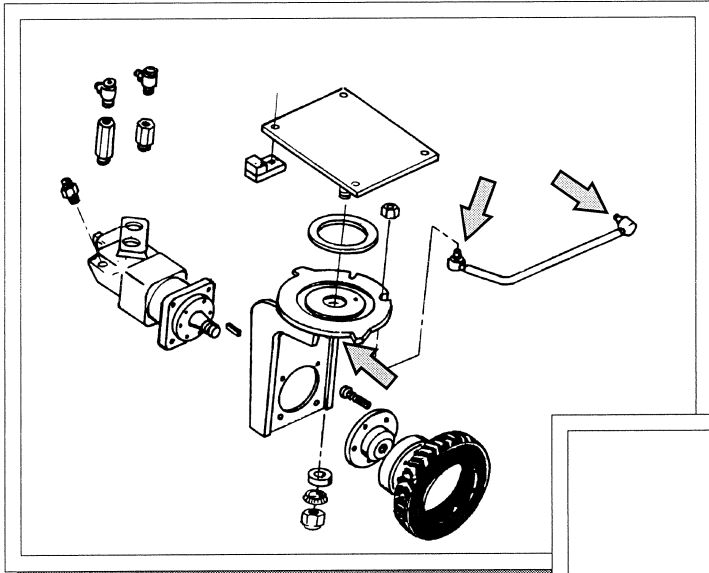
CHANGING ENGINE OIL

1. Place a drain pan under the engine.
2. Remove the drain plug and allow the oil to drain into the pan.
3. Remove the used oil filter and replace with a new one.
4. Dispose of the oil and oil filter in an approved manner.
5. Remove the engine oil cap, add oil in the amounts listed in the engine manual, then secure the cap.

LUBRICATION POINTS

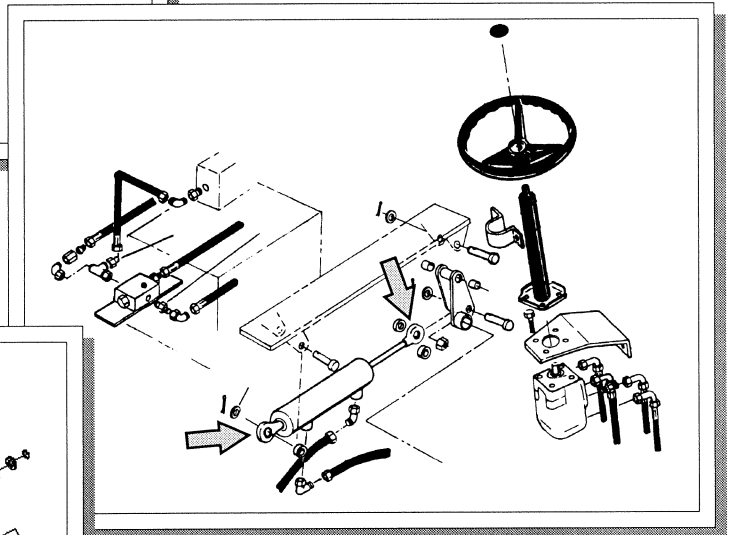
Lubrication	Type of Lubrication	Frequency (In Hours)
Steering Cylinder (2 fittings)	Grease	500
Steering Fork Assembly	Grease	500
Dump Arm Mounts	Grease	100

SERVICE INSTRUCTIONS (CONTINUED)
LUBRICATION POINTS (Continued)

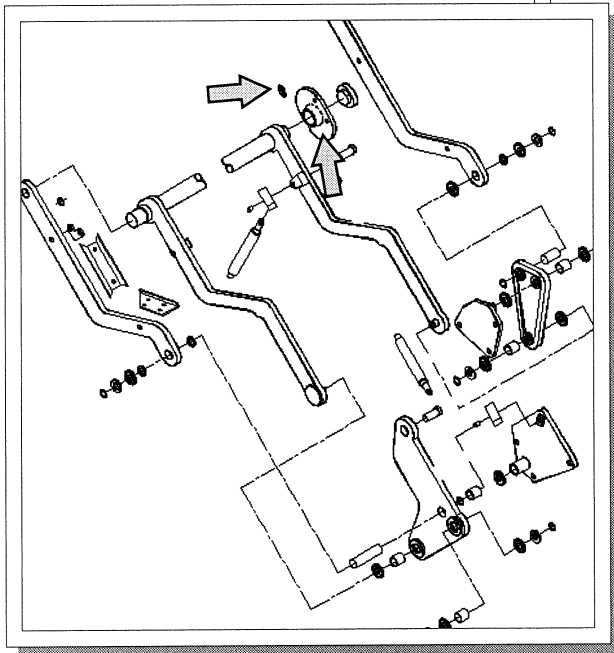


Steering Fork & Drive Tire

↑ Indicates location of grease fittings



Power Steering



Dump Arm Mounts

SERVICE INSTRUCTIONS (CONTINUED) HYDRAULICS SYSTEM

FILLING THE FLUID RESERVOIR

NOTE

The reservoir is located inside the machine and is accessible through the top side door.

1. When the machine is cool and the hopper is in the lowered position, check the dipstick attached to the fill cap. The hydraulic fluid should be at the notch on the dipstick.
2. If the fluid level is not acceptable, add hydraulic fluid.

CAUTION

DO NOT OVERFILL! DO NOT USE TRANSMISSION FLUID INSTEAD OF HYDRAULIC FLUID. HYDRAULIC OIL MUST MEET THE SPECIFICATIONS LISTED TO ENSURE PROPER PERFORMANCE.

HYDRAULIC FLUID VISCOSITY SPECIFICATIONS

SUS @100° F 510-560
SUS @ 210° F 78-84
Exxon® XD-3™ 15W-40 or equal.

CHANGING THE HYDRAULIC FLUID

1. Turn off the engine and engage the parking brake.
2. Place a drain pan on the floor below the reservoir.
3. Remove the hose and fitting located on the bottom rear of the reservoir and allow the fluid to drain.
4. Discard the fluid in an approved manner, then replace and reinstall the hose and fitting.
5. Remove the filler / breather cap located on top of the reservoir and fill the reservoir with approved hydraulic fluid.

NOTE

Ten (10) gallons (US) of fluid are required.

6. Check the dipstick to ensure the proper level is achieved.
7. Install a new filler / breather cap assembly.
8. Check for leakage.

SERVICE INSTRUCTIONS (CONTINUED) HYDRAULICS SYSTEM (CONTINUED)

CHANGING THE HYDRAULIC FLUID FILTER

1. Turn off the engine and engage the parking brake.
2. Unscrew the oil filter cartridge from the mount and discard in an approved manner.
3. Apply a thin coating of fluid to the seal of a new filter element.
4. Thread onto the mount and hand tighten.
5. Tighten an additional one-half turn beyond hand tight.

NOTE Do not over tighten.

6. Start the machine, shut it off, then check for leakage.

ADJUSTING THE DIRECTIONAL CONTROL RETURN SPRING

You may encounter “creeping” problems from time to time. Creeping means the machine moves backward or forward when the forward/reverse pedal is in neutral. A grinding noise when the engine is shut down is also an indicator that the directional control return spring needs adjusting. If this occurs, perform the procedure which follows:

NOTE On low dump models, remove the hopper. On high dump models, raise and engage the safety arm.

1. Turn off the engine, engage the parking brake and chock both wheels.

WARNING *DO NOT USE A JACK ALONE TO HOLD THE MACHINE!!!*

2. Jack the rear of the machine so that the rear tire just clears the floor. Use two jack stands to support the machine.
3. Locate the forward / reverse adjustment bracket mounted beneath the pump on the pump mounting plate.
4. Slightly loosen the bolt on the center of the bracket.
5. Loosen the locking nut on each of the adjusting bolts on the side of the bracket closest to the pump mounting plate.
6. From the operator's seat, start the engine and run at the “rabbit” position.
7. Turn the adjusting bolts while watching the rear wheel. Continue to adjust until the rear wheel does not turn in either direction.
8. Open the throttle to the “tornado” position. Push the directional control pedal forward and backward to be sure the pump stays in neutral.
9. Retighten all the locking nuts and bolts.
10. Turn the engine off and lower the machine to the floor.

SERVICE INSTRUCTIONS (CONTINUED) SWEEP COMPONENTS

BROOM DOOR FLAP INSPECTION

NOTE

Perform this inspection when the machine is parked on a level surface.

1. Turn the machine off and lock the parking brake.
2. Inspect broom door flaps for wear and damage. Flap clearance should be $\frac{1}{8}$ " (3.18 mm) above the floor.
3. Worn and damaged flaps should be replaced immediately to maintain proper dust control.

BROOM DOOR FLAP REPLACEMENT AND ADJUSTMENT

The flaps are attached to the broom doors by a retainer bar, hex bolts and nuts. To remove the flaps, remove the nuts, bolts and retainer bar. To adjust the flaps, loosen the nuts and bolts, slide the flap up or down as needed. Retighten the nuts and bolts.

MAIN BROOM ADJUSTMENT

NOTE

Perform this adjustment on a flat, smooth test surface.

1. Drive the machine onto the test surface with the main broom in the **RAISED** position.
2. Set the parking brake and position the main broom handle in the **NORMAL** position.
3. Push the broom control switch to the **ON** position to activate the broom motor and open the throttle to the "rabbit" or "tornado" position.
4. Allow about 45 seconds for the broom to operate, then deactivate the broom motor and raise the broom.

NOTE

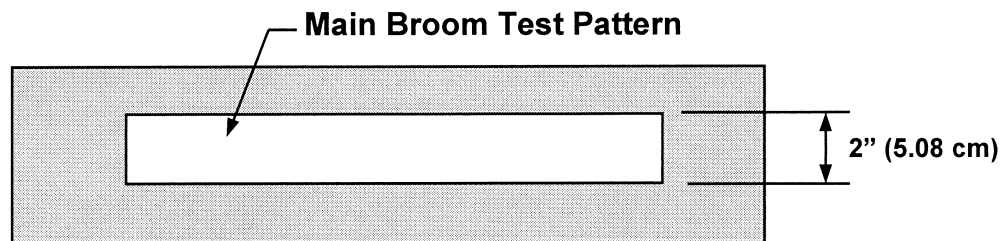
Test time will vary according to the test surface used.

5. Drive the machine clear of the test site.
6. Examine the polished pattern made by the broom on the test area.

SERVICE INSTRUCTIONS (CONTINUED) SWEEP COMPONENTS (CONTINUED)

NOTE

A rectangular shape the length of the main broom, 2" (5.08 cm) wide, indicates the main broom is properly adjusted. A pattern smaller than 2" (5.08 cm) indicates need for lower adjustment. A pattern wider than 2" (5.08 cm) indicates a need for higher adjustment. If pattern is tapered from end to end instead of rectangular, see Taper Adjustment on the next page.



MAIN BROOM HEIGHT ADJUSTMENT

1. Turn the machine off and lock the parking brake.
2. Position the main broom lever in the **NORMAL** position.

NOTE

The adjustment knob is located in the engine compartment on the broom control handle pivot.

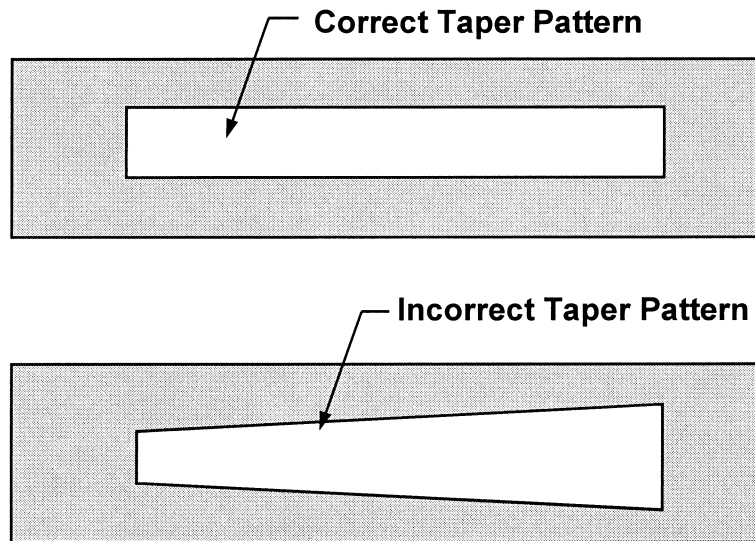
3. Turn the broom adjusting knob clockwise one-eighth turn to free the wing nut.
4. Turn the wingnut counter-clockwise to allow space for adjustment.
5. Make a lower or higher adjustment with the knob as required.
6. Retighten the wingnut.
7. Repeat the main broom adjustment test to see that the broom is properly adjusted.

SERVICE INSTRUCTIONS (CONTINUED) SWEEP COMPONENTS (CONTINUED)

MAIN BROOM TAPER ADJUSTMENT

NOTE

It is not usually necessary to perform this adjustment. However, if the main broom adjustment test shows a pattern that is tapered in length (one end is wider than the other), perform the procedures which follow.



Main Broom Taper Patterns

1. Locate the hex-shaped adjustment bar on the left rear wall of the broom chamber underneath the machine.
2. Loosen the retaining bolt on the right side of the hex bar.
3. Grasp the hex bar with a wrench and rotate it to raise or lower the left end of the main broom. (The right end of the broom remains fixed. All adjustments affect the left end of the broom.)
4. After adjustment, re-tighten the bolt.
5. Repeat the main broom adjustment test to see that the broom is properly adjusted.

SERVICE INSTRUCTIONS (CONTINUED) SWEEP COMPONENTS (CONTINUED)

MAIN BROOM REPLACEMENT (Bristles worn to a length of 1 inch; 2.54 cm or less)

1. Turn the engine off and lock the parking brake.
2. Push the main broom control lever to the **NORMAL** position
3. Open the left broom chamber door (the door opposite the driver's seat).
4. Remove the knob on the main broom idler mount.
5. Pull the main broom idler mount straight out to remove.
6. Grasp the main broom by the plastic drive hub, pull the main broom straight out and clear of the broom chamber.
7. Depending on broom condition, you can either rotate the old broom end-to-end and re-install it or you can install a new broom. Slide the main broom into the broom chamber and align the broom with the metal drive hub located at the far side of the broom chamber. If a worn broom is being replaced, install the new broom by first adjusting the broom arms up to better match the position of the drive hub with the hub on the new broom.
8. Once the broom is started onto the drive hubs, rotate the broom counter-clockwise while pushing lightly against the broom.
9. Once the broom is fully engaged, replace the idler hub while aligning the seats in the idler hub with the broom's drive hub ears.
10. Install the retaining knob and tighten into position.
11. Perform a main broom adjustment test and adjust as needed.

SERVICE INSTRUCTIONS (CONTINUED)

SWEEP COMPONENTS (CONTINUED)

SIDE BROOM ANGLE ADJUSTMENT

The angle adjustment is controlled with a bolt located on the inside of side broom arm assembly. By turning this bolt, the angle at which the bristles contact the floor can be changed. The optimum angle is 6 degrees.

SIDE BROOM HEIGHT (WEAR) ADJUSTMENT

The height of the side broom can be adjusted as follows. By positioning the side broom handle in the **LOWER** position. Loosen the side broom adjusting nuts located on the exterior of the side broom arm assembly. Adjust the side broom height by sliding the broom assembly up or down until proper floor contact is made in the "10 to 3 o'clock" position. After the adjustment, tighten the adjusting nut.

SIDE BROOM LIFT CABLE ADJUSTMENT

This adjustment is made at the hex-shaped adjustment bar attached to the side broom lift lever in the engine compartment. It controls the height of the side broom in the **RAISED** position. On high dump models this adjustment must be made with the hopper full lowered.

1. Pull the side broom lever into the **RAISED** position.
2. Loosen the locknut on the hex bar.
3. Turn the cable in or out of the hex bar as necessary to set the side broom in the maximum raised position.
4. Secure the cable adjustment by tightening the locknut against the hex bar.

SERVICE INSTRUCTIONS (CONTINUED)

SWEEP COMPONENTS (CONTINUED)

SIDE BROOM REPLACEMENT (Bristles worn to a length of 3 inches; 7.62 cm or less)

NOTE

The side broom features a quick release mechanism which enables the operator to remove the brush in seconds.

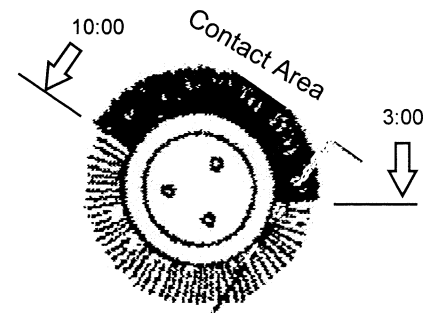
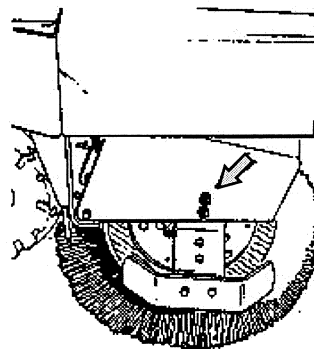
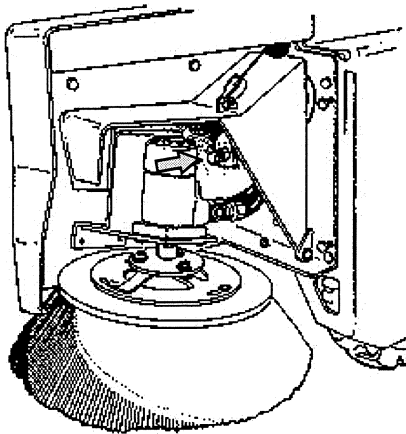
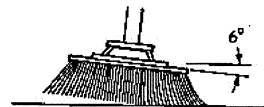
1. Turn the side broom by hand until the brush retainer bar is accessible.
2. Lift the bar and turn the broom clockwise (about one eighth of a turn) until the lock pins in the broom disengage from the drive plate.
3. Install the new broom by positioning the three drive pins into the pilot holes of the drive plate.
4. Lift and rotate the broom until the broom retainer bar springs into the locked position.
5. Check to make sure all three drive pins are properly engaged.

NOTE:

This adjustment is controlled by a bolt located on the inside of the side broom arm assembly. By turning this bolt, the angle at which the bristles contact the floor can be changed. The optimum angle is 6°.

Side Broom Height (Wear) Adjustment

1. Stop the engine and lock the parking brake.
2. Position the side broom handle in LOWER position.
3. Loosen the side broom adjusting nuts located on the exterior of the side broom arm assembly.
4. Adjust the side broom height by sliding the broom assembly up or down until proper floor contact is made.
5. After adjustment, tighten the adjusting nut.



**SERVICE INSTRUCTIONS (CONTINUED)
SCRUB & WATER PICK-UP COMPONENTS****⚠ WARNING**

Never attempt to perform any service on the equipment or components until the machine is OFF, the parking brake is LOCKED and the wheels are CHOCKED.

SCRUB BRUSH REPLACEMENT

The scrub brush features a quick release mechanism which enables the operator to remove the brush in seconds.

NOTE

Brushes should be replaced when the bristles are less than ½” (12.77 mm) long.

1. Raise the scrubhead.
2. Turn the scrub brush by hand until the brush retainer bar is accessible.
3. Lift the bar and turn the brush clockwise (about one-eighth of a turn) until the lock pins in the brush disengage from the drive plate.
4. Install the new brush by positioning the three drive pins into the pilot holes of the drive plate.
5. Lift and rotate the brush until the brush retainer bar springs into the locked position.
6. Check to make sure that all three drive lugs are properly engaged.

NOTE

Machines built from 1995 to the present have Power Drive hubs.

To replace the Power Drive scrub brushes:

1. Raise the scrubhead.
2. Turn the brush by hand until the ends of the lock spring is accessible.
3. Squeeze the ends together to release the brush.
4. To install: Align the socket in the brush with the drive hub and push the brush on.

SERVICE INSTRUCTIONS (CONTINUED) SCRUB & WATER PICK-UP COMPONENTS

SCRUBHEAD GAUGE ADJUSTMENT

1. Raise the scrubheads to the full **UP** position.
2. Locate the linkage attached to the frame above the scrubheads.
3. Loosen the set screw (the bolt running through the arm).
4. Turn the potentiometer shaft until the gauge needle points to the white dot at the left of the gauge.
5. Re-tighten the set screw.

NOTE

A gauge that is nonfunctional does not indicate that the scrubhead is nonfunctional. The scrubhead will continue to operate.

SERVICE INSTRUCTIONS (CONTINUED) MAIN SQUEEGEE COMPONENTS

CHECKING AND ADJUSTING THE MAIN SQUEEGEE FLARE

1. Park the machine on a flat surface. Lower the squeegee.
2. Turn the machine off and engage the parking brake.
3. Open the rear lower access doors.
4. Remove the pull pins and remove the side squeegees.
5. Lower the squeegee.
6. Release the quick-disconnect at the back of the rear squeegee.
7. Loosen the locking nut on the squeegee caster and screw the caster up until it clears the floor.
8. Locate the squeegee arms on each side of the machine.
9. Loosen the bolt which attaches the upper squeegee arm to the squeegee mount plate on each side.
10. Locate and loosen both nuts on each squeegee adjustment link and back them away from the gussets. The rear squeegee is now free to be aligned with the floor.
11. Check the squeegee rubber to make sure the squeegee makes contact with the floor all the way around. It should stand straight on the floor with **no flare**.
12. At each squeegee mount, turn the two nuts on the adjusting link until they both make contact with the mount plate on each side.
13. Tighten the nuts on each mount plate. Then tighten the bolt on top of each of the two upper squeegee arms.
14. With the squeegee straight up on the floor (no flare), adjust the caster until it clears the floor by ½" (12.7 mm).
15. Use a ½" (12.7 mm) shim spacer of metal or wood as a feeler gauge for this procedure.
16. Tighten the nut on the caster and move the shim.
17. Reattach the squeegee lift linkage.
18. With the squeegee in the down position, drive the machine forward approximately two feet (.61 meters). Examine the flare in the squeegee rubber to see that it is uniform around the entire parabola. If not, go through Steps 7 to 15 again.

SERVICE INSTRUCTIONS (CONTINUED)

MAIN SQUEEGEE COMPONENTS (Continued)

TURNING OR REPLACING THE MAIN SQUEEGEE RUBBER

The primary rubber on the main squeegee frame has four different edges that may be used: the front and back lower edge and the front and back upper edge. When the edge in use becomes worn to the midpoint of thickness, turn the rubber to an unused edge in the order indicated: 1. Front Lower Edge, 2. Opposite Lower Edge, 3. Front upper Edge and 4. Opposite Upper Edge. Removal and replacement instructions follow. This procedure can be performed with the squeegee tool on or off the machine.

NOTE Removal and replacement of the main squeegee elements is easier if the squeegee frame is removed from the machine.

1. Unlatch the clamping strap at the center of the squeegee frame and remove the 2 outer knobs.
2. Remove the metal strap, the two back-up strips and the outer squeegee rubber.
3. Turn the side ends of the squeegee rubber 180°, or turn the rubber upside down to expose an unused edge. Reposition the rubber on the pins of the squeegee frame.
4. Reposition the first back-up strip using the top holes.
5. Reposition the second back-up strip using the bottom holes.
6. Reposition the metal strap and reattach the two outer knobs.
7. Relatch the straps at the center being careful not to bunch the rubber.

NOTE Replace the back-up strips only if they lose their elasticity.

MAIN SQUEEGEE TOOL REMOVAL

All machines are equipped with auto-squeegee lift. To remove the squeegee tool, proceed as follows:

1. Engage the parking brake and chock the wheels.
2. Pull the pin at the rear of the squeegee tool.
3. Remove the knobs at the square lift arms supports.
4. Disconnect the vacuum hose from the squeegee.
5. Lift the supports up off the pins on the squeegee frames and slide the squeegee tool toward the rear of the machine.
6. Go to the back of the machine and pull the squeegee straight back and out.

SERVICE INSTRUCTIONS (CONTINUED)

MAIN SQUEEGEE COMPONENTS (Continued)

MAIN SQUEEGEE TOOL INSTALLATION

1. At the back of the machine, push the squeegee forward under the machine.
2. Lift the supports up onto the pins on the squeegee frames.
3. On each side of the squeegee, attach the hand knobs (one on each side) to the squeegee frame supports.
4. Connect the quick-release pin to the squeegee.
5. Connect the vacuum hose to the squeegee.

INNER SQUEEGEE REPLACEMENT

The inner squeegee is a component of the rear squeegee assembly. When the squeegee is down, locked and the rear squeegee rubber is flared, check to see if the inner squeegee has become too worn to make proper contact with the floor.

1. Remove the main squeegee tool (see removal instructions).
2. Remove the nuts on the front of the inner squeegee frame.
3. Remove the strap and the inner squeegee rubber.
4. Install the new inner squeegee rubber.
5. Position the strap and secure with the nuts.

AUTO SQUEEGEE LIFT MECHANISM

Bearing Replacement: If any binding occurs in the lift apparatus, replace the bushings, spacers and dry bearings located on the squeegee lift assembly as necessary.

NOTE

Bent components may cause binding.

SERVICE INSTRUCTIONS (CONTINUED) HOPPER

It is not usually necessary to remove or replace the hopper on high dump models. However, if it becomes necessary for maintenance or to install an option, use the following procedure to remove:

HIGH DUMP HOPPER REMOVAL

1. Park the machine on a level surface and engage the parking brake.
2. Raise the hopper and position the high dump hopper dolly, a platform truck or similar four wheeled cart under the hopper.
3. Set the hopper down on the truck and turn the engine off.
4. Cycle the rotation control handle (#2) in both positions to relieve any residual hydraulic pressure.
5. Remove three bolts, washers, nuts and backing plate.
6. Disconnect the wire connections at the right side of the hopper.
7. While spreading the dump arms slightly, roll the hopper away from the machine.

HIGH DUMP HOPPER REPLACEMENT

1. Position the hopper on the dolly so as to align the mounting holes in the sides of the hopper with the rotation mounts on the arms. Lift arms should be positioned about $\frac{1}{3}$ of the way up.
2. Engage the lift arm rotation plates with the mounting bolts on each side of the hopper.
3. Start the machine and lift the hopper.
4. Drive away from the hopper dolly or cart.
5. Lower the hopper.
6. Engage the wire connections at the right side of the hopper.
7. Be sure to tighten all bolts

FILTER REMOVAL

1. Release the latch on the hopper hood and raise the hood.
2. Disconnect the wire harness leading to the filter shaker motor.
3. Remove the four bolts securing the shaker motor assembly to the hopper.
4. Remove the shaker motor assembly.
5. Lift out the panel filters.

SERVICE INSTRUCTIONS (CONTINUED) HOPPER (CONTINUED)

FILTER CLEANING

The dust control filter is a permanent type paper element filter. It may be vacuumed, blown out with compressed air, tapped against the floor or washed with soap and water.

1. If blown out with compressed air, use 100 psi or less.
2. If washed with soap and water, use 40 psi water pressure or less.

NOTE

Make sure the filter is thoroughly dried while standing on its side before installing in the hopper. Do not install or use a wet filter. Drying time is approximately 72 hours if air dried.

FILTER REPLACEMENT

1. Insert the panel filter.
2. Install the shaker motor assemblies.
3. Install and tighten the four filter retaining bolts and isolators.
4. Hook the wire harness to the filter shaker motors.
5. Close the hopper cover and secure the latches.

LOW DUMP HOPPER REMOVAL

The hopper must be removed on low dump models for service and maintenance. A low dump hopper dolly is needed for this procedure.

1. Park the machine on a level surface and engage the parking brake.
2. Raise the hopper to full dump height and lock it into the raised position.
3. Turn the engine off.
4. Insert the hook on top of the dolly into the opening between the bottom of the sweeper / scrubber's bumper and the hopper. Position it near the center of the bumper.

NOTE

The dolly should stay attached in this position when released.

SERVICE INSTRUCTIONS (CONTINUED) HOPPER (CONTINUED)

LOW DUMP HOPPER REMOVAL (Continued)

5. Return the dump lever to its center **OFF** position to lower the hopper.
6. Loosen the bolts on the inside of the hopper on the left and right side securing the hopper.
7. Push down on the dump arms until the ends of the dump arms are lower than the hopper lift brackets.
8. Disconnect the wire connection at the rear of the hopper.
9. Grab the bumper and pull the hopper straight out and away from the machine.

LOW DUMP HOPPER REPLACEMENT

1. Make sure the ends of the dump arms are lower than the hopper lift brackets.
2. Roll the hopper between the lift arms.
3. Be sure the hopper stop bars are positioned immediately above the dump arm flanges located at the rear of the dump arms.
4. Align the hopper lift brackets with the hook openings located at the front of the lift arms.
5. Start the engine and lift the dump arms slowly. When the lift arms engage the hopper lift brackets, lift the hopper all of the way up.
6. Pull the dump lever back to lock the hopper in the raised position. Remove the dolly.
7. Lower the hopper, tighten the bolts inside the hopper on the left and right side.

FLOOR CLEARANCE AND DUMP ADJUSTMENTS

In order to perform properly, the hopper (on both the low and high dump models) must maintain a distance of 3½" (8.89 cm) from the floor to the rear hopper entrance lip. The front of the hopper should be adjusted so that the front bumper aligns with the hopper frame where the two meet. When properly adjusted, the front edge of the hopper will be 5" (12.7 cm) to 6" (15.24 cm) from the floor.

SERVICE INSTRUCTIONS (CONTINUED) HOPPER (CONTINUED)

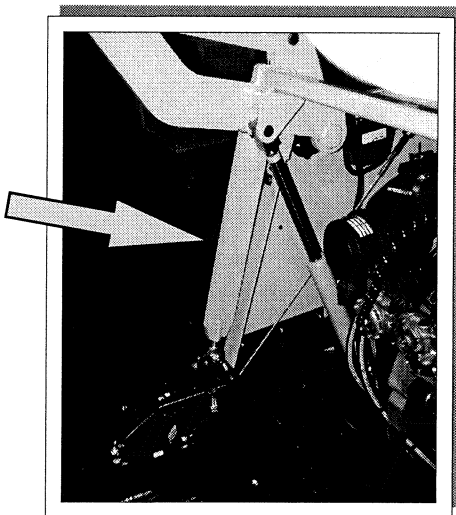
ADJUSTING MAXIMUM HOPPER DUMP ANGLE

1. Park the machine on a level surface, shut off the engine and engage the parking brake.

WARNING

Do not rely upon the hydraulic cylinders to keep the hopper raised for maintenance. Always engage the safety arm before servicing the hopper or near the hopper.

SAFETY ARM
ENGAGED



2. Adjust the lift arm stop bolts located on top of the wheel wells as low as possible while still allowing the side broom assembly to clear the lift arms when the hopper is in the **NORMAL** position. Be sure that both lift arms contact the stop bolts at the same time.

NOTE

This may involve raising and lowering the hopper several times.

3. After adjustment, with the hopper down, use the two adjustable stops located on the rotation plates on both sides of the hopper to establish 3½" (8.89 cm) clearance between the rear hopper entrance lip and the floor.

NOTE

The stop on the driver's side is located immediately below the cylinder rod end and is threaded into the cylinder mount arm. The stop on the left side is located directly above the arm rotation plate.

SERVICE INSTRUCTIONS (CONTINUED) HOPPER (CONTINUED)

ADJUSTING MAXIMUM HOPPER DUMP ANGLE (Continued)

4. After the 3½" (8.89 cm) clearance is established, make sure both stops make contact simultaneously. The lower front edge of the hopper should be 5" (12.7 cm) to 6" (15.24 cm) from the floor. A balanced adjustment of both sets of adjustment bolts is required to correctly adjust the hopper in the lower position. If the bumper is lower than the frame, after the hopper is correctly adjusted, loosen the bumper attachment bolts and reposition the front bumper.
5. Raise the hopper and rotate fully.
6. Turn the engine off.



Do not rely upon the hydraulic cylinders to keep the hopper raised for maintenance. Always engage the safety arm before servicing the hopper or near the hopper.

7. Adjust the stops on the hopper mounts on each side of the hopper so that clearance between the lift arms and the cut-outs in the bumper is ¼" (6.35 mm) maximum.
8. Loosen the locking set screw in the bottom side of the rotation cylinder rod end.
9. Using the hole in the cylinder rod, turn the rod to adjust the cylinder extended length to match the hopper rotation stops.
10. Tighten the set screw.
11. Rotate the hopper back, remove the safety arm and lower the hopper.

VACUUM GASKET MOUNT ADJUSTMENT

1. With the hopper in the normal position, observe contact between the back of the hopper and gasket. If complete seal is not maintained, raise the high dump hopper.



Do not rely upon the hydraulic cylinders to keep the hopper raised for maintenance. Always engage the safety arm before servicing the hopper or near the hopper.

2. Loosen the mounting bolts in the gasket mount. Move the assembly toward the hopper. Tighten the bolts. Test and repeat if necessary.

SERVICE INSTRUCTIONS (CONTINUED) HOPPER (CONTINUED)

ADJUSTING MAXIMUM HOPPER DUMP (LOW DUMP) ANGLE

1. With the hopper lowered and with correct floor clearance, note the amount of unpainted cylinder that does not return into the cylinder bodies.
2. If more than $\frac{1}{8}$ " (3.18 mm) of unpainted cylinder rod is exposed on both cylinders, then the hopper dump angle can be increased by the following:
3. Start the engine, raise the hopper and lock the lever in the full **RAISE** position.
4. Turn off the engine.
5. Loosen the set screw on each of the cylinder clevises and adjust each side alternately. With a tapered punch, rotate the cylinder rod to thread it out of the clevis a distance equal to the length of the exposed rod on the cylinder observed when the hopper was down.
6. Tighten the set screws.
7. Lower the hopper.
8. Check to see that both of the cylinders reach their extended positions at the same time. If not, screw in the clevis on the longer cylinder to match the other's extended length.

FLAP REPLACEMENT

Flaps located at the entrance lip of the hopper must be replaced when worn or damaged. The flap panels may be replaced separately.

1. Park the machine on a level surface and engage the parking brake.
2. Raise the hopper.

**WARNING**

Do not rely upon the hydraulic cylinders to keep the hopper raised for maintenance. Always engage the safety arm before servicing the hopper or near the hopper.

3. Turn off the engine
4. Remove the flap retaining angle and worn or damaged flaps.
5. Install new flaps.
6. Replace the retaining angle.

**SERVICE INSTRUCTIONS (CONTINUED)
HOPPER (CONTINUED)****FRAME SEAL REPLACEMENT****FRONT FRAME SEAL**

The hopper frame seal bolts to the front edge of the engine pan. Install a new seal by folding it in half to align the holes. Doubled edge with holes goes on the bottom. Support the seal straight up while bolting the retainer bar in place. The seal should fall over the retainer bar after installation. Be certain that the seal edges are aligned to prevent twisting of the seal.

SIDE FRAME SEAL

The side frame seals should clear the floor by at least $\frac{1}{8}$ " (3.18 cm). If the bottom of a side seal measures $\frac{1}{2}$ " (1.27 cm) or more above the floor, readjust it or replace it by removing the bolts on the inside of the wheel wells, installing a new seal, and securing it with the bolts. The double edge with the holes goes toward the front.

SERVICE INSTRUCTIONS (CONTINUED)

PARKING BRAKE

Normal adjustment of the optional hand parking brake can be accomplished from the operator compartment. Locate the knurled handle on the parking brake lever. Turn the handle clockwise to increase brake tension.

NOTE

Two or three turns is usually adequate. DO NOT OVERTIGHTEN.

If this adjustment becomes ineffective, it will be necessary to adjust the cable length.

CAUTION

Do not rely upon the hydraulic cylinders to keep the hopper raised for maintenance. Always engage the safety arm before conducting maintenance in the hopper area.

ADJUSTING THE PARKING BRAKE* CABLE LENGTH

1. Park the machine on a level surface and chock the wheels.
2. Place the parking brake lever in the OFF position.
3. Turn the knurled handle counter-clockwise to loosen the tension as far as possible.
4. Raise the hopper and engage the safety arm.
5. Locate the cable clevis ends for the parking brake cables in the left front wheel well.
6. Disconnect the clevis ends from the bar.
7. Loosen the jam nuts at the base of the clevis.
8. Turn the clevis clockwise three or four complete turns.
9. Tighten the jam nuts and re-install the clevis ends onto the bar.
10. Adjust the knurled handle on the parking brake lever.

CABLE ADJUSTMENT FOR STANDARD BRAKE

1. Locate the parking brake cable in the top of the left wheel well opening.
2. Loosen the locking nut located against the hex bar.
3. Thread the cable end into the hex bar.
4. If threads are not sufficient for adjustment, disconnect the springs, move the cable bars to the next adjusting hole on the hex bar and reconnect the springs.
5. Retighten the locking nut against the hex bar. This adjusts both sets of brake shoes.
6. Test the brakes. Readjust if necessary.

* If so equipped.

SERVICE INSTRUCTIONS (CONTINUED)

TIRES & MISCELLANEOUS

CHANGING SOLID TIRES

NOTE The procedures which follow apply to **SOLID TIRES ONLY**.

Front Tires

1. Remove the tire from the vehicle by removing the five lug nuts.
2. Remove the ten hex head bolts and nuts.
3. Press the tire from the rim.
4. Press the large rim half into the new tire.
5. Mount the small rim half and secure with hex head bolts.
6. Reinstall the tire on the machine.

Rear Tire

The rear tire is a special rubber compound press-on type tire.

MISCELLANEOUS ADJUSTMENTS

ANTI-STATIC CHAIN ADJUSTMENT

Each machine is equipped with an anti-static chain bolted to the back wall of the broom chamber. This should remain in contact with the floor at all times. Inspect the chain every 200 operating hours. Replace if at least one link does not drag the surface of the floor.

LATCHES AND HINGE MAINTENANCE

Latches and hinges should be inspected after every 500 hours of use. Retighten and oil if necessary.

CABLES

Inspect the cables for wear every 500 hours.

NOTES:

TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Engine overheats.	Low coolant level.	Supply coolant.
	Clogged radiator.	Flush radiator.
	Loose fan belt.	Tighten belt.
	Defective thermostat.	Replace thermostat.
<p>NOTE: If coolant loss has not occurred, check for malfunction of the temperature sending unit.</p>		
PowerBoss [®] moves slowly or does not move.	Parking brake is on.	Release brake.
	Directional control pedal jammed, damaged, or not adjusted properly.	Clear jam or adjust linkage.
	Low hydraulic fluid level.	Add hydraulic fluid.
	Hydraulic fluid temperature too high and too thin caused by excessive load, climbing, high environment temperatures, worn pump, or improper fluid.	Use the proper weight oil for the operation conditions; check pump.
Damaged or worn pump drive coupling.	Replace damaged item.	

TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
PowerBoss [®] moves slowly or does not move (continued).	<p>Other problems with the hydraulics system: pump failure, motor failure, relief valve leaking or stuck open.</p> <p>Tow Valve improperly set.</p>	<p>See Hydraulics System Problems in this section.</p> <p>Turn to correct position.</p>
PowerBoss [®] creeps in neutral.	Directional control pedal return spring is out of adjustment.	Perform the adjustment procedures.
Brushes do not turn or turn very slowly.	<p>Hydraulic system problem:</p> <ul style="list-style-type: none"> • Motor • Control Valve • Gear Pump • Relief Valve 	See Hydraulics System Problems in this section.
Little or no vacuum in brush compartment.	<p>Filters clogged.</p> <p>Leak or clog in hose from impeller</p> <p>Impeller failure.</p>	<p>Clean filters.</p> <p>Repair leaks; clear obstructions or replace hose.</p> <p>Check and repair.</p>

TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Loss of dust control.	Debris in hose or impeller inlet.	Clean.
	Broom skirts or seal worn.	Replace.
	Skirt clearance from floor exceeds 1/8".	Adjust clearance.
	Dust control filters clogged.	Clean filters.
	Filter seals worn or missing.	Replace.
Sweeper unit leaving debris.	Poor seal with vacuum gasket.	Visually check and adjust, if necessary.
	Hopper full.	Dump hopper.
	Broom(s) out of adjustment.	Adjust.
	Hopper flaps damaged or missing.	Replace or adjust clearance.
	Hopper out of adjustment.	Check hopper clearance.
Dust control filters clogged.	Clean filters.	

TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Hopper does not raise or lower.	Hydraulics system problem: <ul style="list-style-type: none"> • Motor • Control Valve • Gear Pump • Relief Valve Hopper arms binding.	See Hydraulics Systems Problems in this section. Lubricate or adjust arm linkage.
Hopper does not rotate or rotates slowly.	Hopper load too heavy. Hydraulics system problem: <ul style="list-style-type: none"> • Motor • Control Valve • Gear Pump • Relief Valve 	Dump more frequently. See Hydraulics Systems Problems in this section.
Scrubhead will not lower.	Fuse blown. Loose scrubhead switch wires. Loose connection of plug at actuator. Defective actuator.	Replace fuse. Connect wires. Connect. Replace actuator.

TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Scrubhead will not lower. (Continued)	Defective scrubhead switch.	Replace switch.
Brushes do not turn or turn very slowly.	Hydraulics system problem: <ul style="list-style-type: none"> • Motor • Control Valve • Gear Pump • Relief Valve 	See Hydraulics Systems Problems in this section.
Poor water pick-up	<p>Recovery tank is full.</p> <p>Squeegee worn.</p> <p>Debris caught in squeegee or pick-up tube.</p> <p>Leak or clog in hose from impeller.</p> <p>Squeegee out of adjustment.</p> <p>Engine not operating at governed speed.</p> <p>Impeller failure.</p>	<p>Empty the tank; if foaming badly, change detergent.</p> <p>Replace squeegee.</p> <p>Remove debris.</p> <p>Repair leak, clear obstruction or replace hose.</p> <p>Adjust squeegee.</p> <p>Re-adjust governor.</p> <p>Check and repair.</p>

TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Detergent solution not being delivered.	<p>Solution tank is empty.</p> <p>Solution tank outlet screen clogged.</p> <p>Delivery lines clogged.</p> <p>Solution valve out of adjustment.</p>	<p>Fill tank.</p> <p>Clean screen.</p> <p>Clear lines.</p> <p>Adjust.</p>
Scrubber unit not cleaning the floor.	<p>Brushes worn.</p> <p>Need different type of brush or detergent.</p> <p>Debris caught in brush drive mechanism.</p> <p>Brushes out of adjustment.</p> <p>Brush motor failure.</p>	<p>Replace.</p> <p>Use manufacturer's recommended brushes / detergent.</p> <p>Clear obstruction.</p> <p>Adjust.</p> <p>See Hydraulics System Problems.</p>

TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Squeegee will not lower.	Fuse blown.	Replace the fuse.
	Loose or defective squeegee switch (on console).	Reconnect wiring or replace switch.
	Loose wire(s) at foot pedal.	Connect.
	Foot pedal switches need adjustment.	Re-adjust cams.
Squeegee will not raise in reverse or by console switch.	Foot pedal switches need adjustment.	Re-adjust cams.
	Lift springs worn out or missing.	Replace springs.
	Bad ground at valve.	Check ground.
	No power at valve.	Test for power.
Hopper lift cylinder failure.	Line to cylinder leaking.	Tighten fittings or replace hose.
	Piston seals leaking.	Replace seals.
	Bent piston rod.	Replace rod.

TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Hydraulic control valve failure.	Misaligned control linkage. Foreign matter in spool bore. Valve seals leaking. O-rings leaking. Relief valve stuck open.	Align. Remove spool and clean bore. Replace seals. Replace O-rings. Clean or replace relief valve.
Hydraulic motor failure.	Motor leaking. Drive link malfunction. Output shaft malfunction.	Replace seals. Replace drive link. Replace output shaft and bearings.
Hydraulic gear pump failure.	Pump leaking. Gears worn or scored. Relief valve stuck. Oil supply low.	Replace seals. Rebuild pump. Clean or replace (at control valve). Check and fill.

TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Hydraulic gear pump failure (Continued).	<p>Oil strainer clogged.</p> <p>Incorrect oil.</p> <p>Damage due to entry of air into hydraulic system.</p>	<p>Replace strainer (inside reservoir).</p> <p>Use recommended viscosity oil.</p> <p>Maintain correct hydraulic fluid level in reservoir. Keep suction hose fittings tight.</p>
Hydraulic variable displacement pump failure.	<p>Pump leaking.</p> <p>Relief valve(s) stuck.</p> <p>Drive coupling malfunction.</p> <p>Control linkage out of adjustment</p> <p>Charge pump gears worn or scored</p> <p>Damage due to entry of air into hydraulic system.</p>	<p>Replace seals.</p> <p>Clean or replace relief valve(s) at the pump.</p> <p>Replace defective gears.</p> <p>Check to see if linkage is binding unfastened.</p> <p>Replace defective gears.</p> <p>Maintain correct hydraulic fluid level in reservoir. Keep suction hose fittings tight.</p>

TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Hydraulic system noisy.	Air in system.	Check fluid level in reservoir; check for loose connections or leaks.
	Relief valve dirty or damaged.	Clean or replace.
	Loose suction line.	Tighten fittings.
	Clogged section filter or pump inlet line.	Replace filter, clear line; change fluid in reservoir if dirty and flush system.
	Internal pump or motor damage	Inspect and repair.

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