

Service Manual

**ARMADILLO 6X**



# SERVICE INSTRUCTIONS

## ENGINE

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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.

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***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 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 inside 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 and tighten it.
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.
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 BREAKERS

If a circuit breaker trips, it can be reset by pressing the reset button in the center of the breaker. (The circuit breakers are located beside the ignition key switch)

### FUSES

The Fuses are located on a trap door underneath the dash panel. If a fuse blows out, re place it by:

- \* Turn the latch ¼ turn and drop down the door.
- \* Pull out the old fuse and install a new fuse.

# 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 operation 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 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 shops, 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.

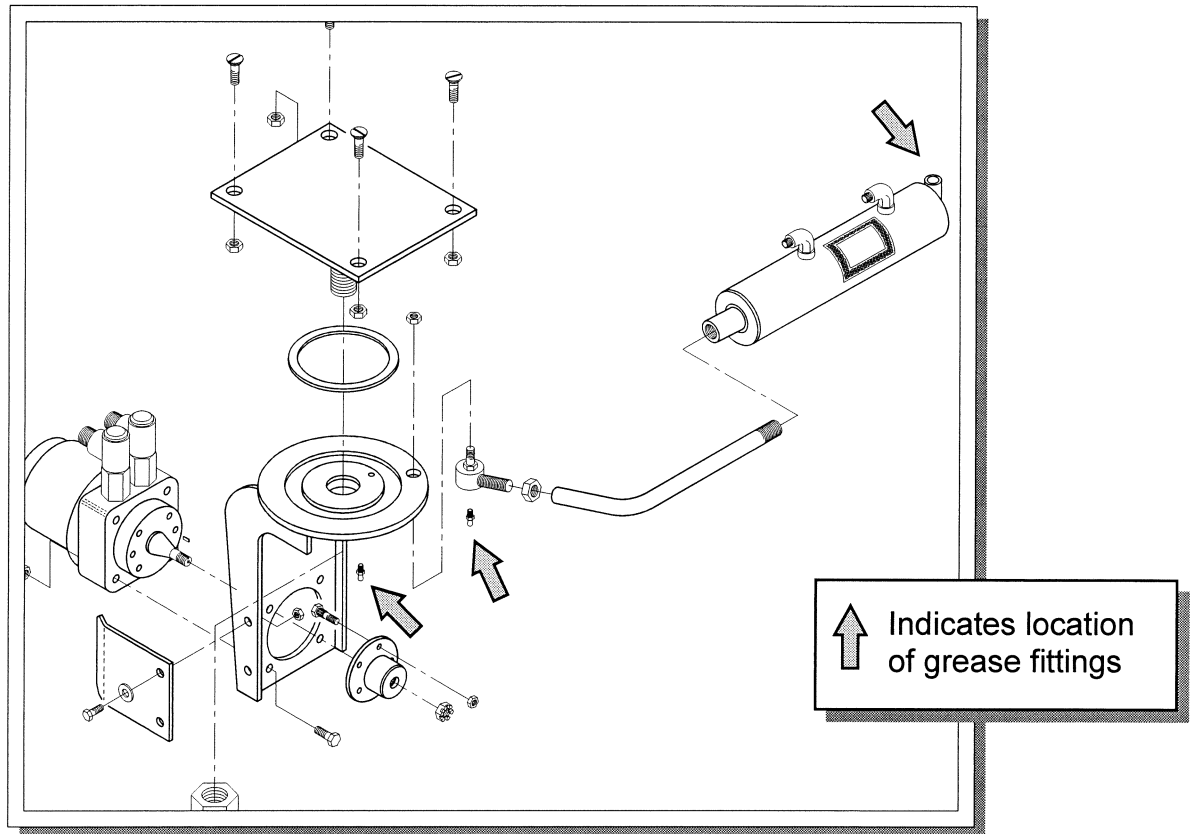
### **CHANGING ENGINE OIL**

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.

# SERVICE INSTRUCTIONS (CONTINUED)

## LUBRICATION POINTS

Lubrication	Type of Lubrication	Frequency (In Hours)
Steering Link Assembly	Grease	500
Steering Cylinder	Grease	500
Steering Fork Assembly	Grease	500
Hood Latches & Hinges	Oil	500



**Steering Lubrication Points**



# SERVICE INSTRUCTIONS (CONTINUED)

## HYDRAULICS SYSTEM

### FILLING THE FLUID RESERVOIR

**NOTE**

The reservoir is located inside the machine and is accessible by tilting the rear cover or clip backward.

1. When the machine is cool and the hopper is in the lowered position, remove the dipstick. Fluid level should be about 1 inch from the top.

***DO NOT OVERFILL! DO NOT USE TRANSMISSION FLUID***

**CAUTION**

***INSTEAD OF HYDRAULIC FLUID.*** Minuteman PowerBoss, Inc. recommends Exxon Nuto H-32.

2. If the fluid level is not acceptable, add hydraulic fluid.

### 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 drain plug 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 retighten the drain plug.
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. Install the filler cap assembly.
7. Check the drain plug for leakage.

# SERVICE INSTRUCTIONS (CONTINUED)

## HYDRAULICS SYSTEM (CONTINUED)

### CHANGING THE HYDRAULIC FLUID FILTER

1. Turn off the engine and engage the parking brake.
2. Remove the filler cap on the reservoir.
3. Remove and properly discard the filter.

**NOTE**

**Do not over tighten.**

4. 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 a so an indicator that the directional control return spring needs adjusting. If this occurs, perform the procedure which follows:

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 half throttle.
7. Turn the adjusting bolts while watching the rear wheel. Continue to adjust until the rear wheel does not turn in either direction.

## **SERVICE INSTRUCTIONS (CONTINUED)**

### **HYDRAULICS SYSTEM (CONTINUED)**

8. Fully open the throttle. 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 off.
2. Set the parking brake.
3. Push the broom control switch to the **ON** position to activate the broom motor and lower the broom. Open the throttle to full RPM.
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.

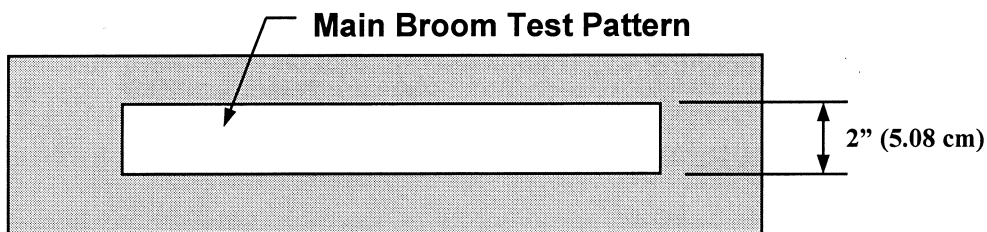
5. Drive the machine clear of the test site.

## SERVICE INSTRUCTIONS (CONTINUED) SWEEP COMPONENTS (CONTINUED)

6. Examine the polished pattern made by the broom on the test area.

### 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 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. Engage the parking brake.
2. Turn on the Brooms by depressing the **Broom Button**.

### NOTE

**The adjustment knob is located behind the hopper.**

3. Turn the broom adjusting knob clockwise one-eighth turn to free the wingnut.
4. Turn the wingnut counter-clockwise to allow space for adjustment.
5. Make a lower or higher adjustment with the knob as required for the 2" pattern.
6. Retighten the wingnut.
7. Repeat the main broom adjustment test to see that the broom is properly adjusted.

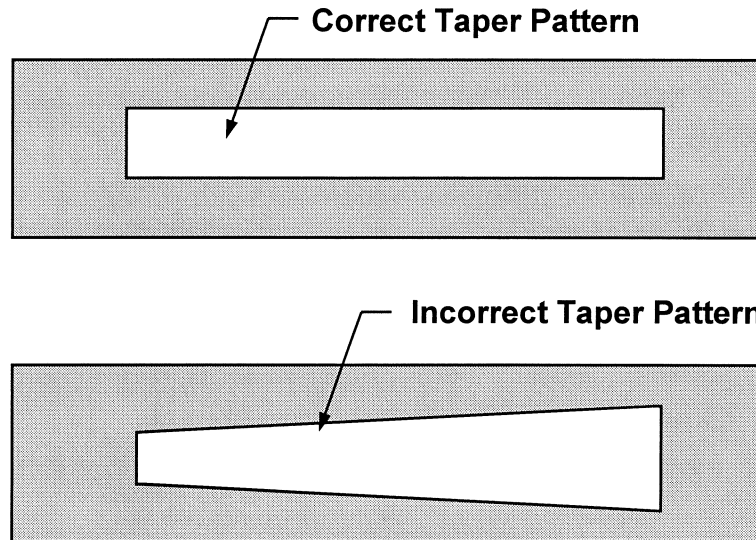
# SERVICE INSTRUCTIONS (CONTINUED)

## 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 adjusting screws directly beneath the floor pan.
2. Loosen the retaining bolt on the outside of the mounting bracket.
3. Raise or lower the ends of the main broom.
4. After adjustment, tighten the retainer 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 **FLOAT** position
3. Open the right side door (on side with 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.
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 bolt into position and tighten firmly.
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 stop bolt. This stop bolt is located at the top front of the side broom arm (under the spring). To increase the angle of the side broom, loosen the jam nut and turn the stop bolt counter-clockwise. Be sure to retighten the jam nut back down once the adjustment is made.

### SIDE BROOM HEIGHT (WEAR) ADJUSTMENT

The height of the side broom is adjusted with the use of a stop bolt located at the lower rear of the curb broom arm. As the side broom wears, it will be necessary to lower the arm. To lower the side broom, loosen the jam nut on the stop bolt. Turn the stop bolt in a counter-clockwise direction, check the side broom for proper contact and re-tighten the jam nut.

### SIDE BROOM LIMIT SWITCH ADJUSTMENT

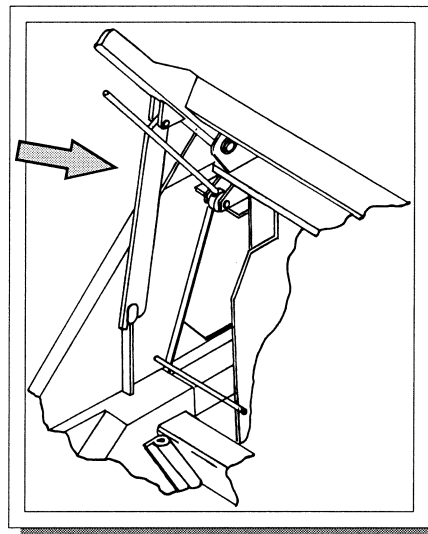
This adjustment is made on the actuator mounting bracket attached to the side of the frame. It controls the starting and stopping of the curb broom. This adjustment must be made with the hopper fully raised.



**WARNING**

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

**SAFETY ARM  
ENGAGED**





# SERVICE INSTRUCTIONS (CONTINUED)

## SWEEP COMPONENTS (CONTINUED)

### SIDE BROOM LIMIT SWITCH ADJUSTMENT (Continued)

1. Retract the actuator until it is approximately ¼" from the full UP position.
2. Loosen the screws on the actuator mounting bracket holding the limit switches.
3. Rotate the limit switches counterclockwise until the broom circuit is interrupted (the switches will click).
4. Tighten the screws.
5. Cycle the curb broom with the engine running to verify operation.

### 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.

# SERVICE INSTRUCTIONS (CONTINUED)

## HOPPER

### HOPPER REMOVAL

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

### 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.

# SERVICE INSTRUCTIONS (CONTINUED)

## HOPPER (CONTINUED)

### FILTER REMOVAL

1. Release the latch on the hopper cover and raise the cover.
2. Disconnect the wire harness leading to the filter shaker motor.
3. Unscrew the two screws securing the filter retainer bars to the hopper.
4. Remove the shaker motor assembly and filter retainer bars.
5. Lift out the panel filter.

### FILTER CLEANING

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

1. If washed with soap and water, use 40 psi water pressure or less.

<b>NOTE</b>
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**Make sure the filter is thoroughly dried while standing on its side before installing in the hopper. Do NOT install a wet filter.**

### FILTER REPLACEMENT

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

### FLOOR CLEARANCE AND DUMP ADJUSTMENTS

In order to perform properly, the hopper 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)

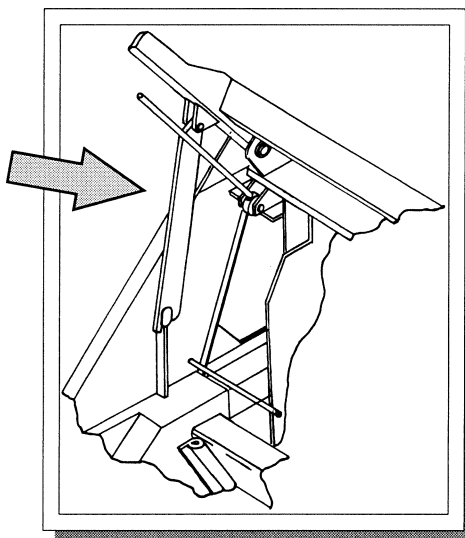
### ADJUSTING MAXIMUM HOPPER DUMP ANGLE

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



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

# SERVICE INSTRUCTIONS (CONTINUED)

## HOPPER (CONTINUED)

### 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.

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.

### CAUTION

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

# SERVICE INSTRUCTIONS (CONTINUED)

## HOPPER (CONTINUED)

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

### 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.
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.



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

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

# SERVICE INSTRUCTIONS (CONTINUED)

## TIRES & MISCELLANEOUS

### CHANGING SOLID TIRES

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

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

### CHANGING PNEUMATIC TIRES



*Since procedures for changing pneumatic tires must be performed in a safety cage and require special tools, Minuteman PowerBoss, Inc. recommends that you have these tires changed by a professional tire dealer.*

### 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.

#### LATCHED AND HINGE MAINTENANCE

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





## 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><b>NOTE:</b> 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.
	Tires skidding from contact with oil or grease.	Clean tires or drive through a solvent absorbing substance.
	Wheels jammed.	Clear jam.
	Low hydraulic fluid level.	Add hydraulic fluid.

## TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
<p>PowerBoss® moves slowly or does not move (continued).</p>	<p>Hydraulic fluid temperature too high and too thin caused by excessive load, climbing, high environment temperatures, worn pump, or improper fluid.</p> <p>Damaged or worn pump drive coupling.</p> <p>Other problems with the hydraulics system: pump failure, motor failure, relief valve leaking or stuck open.</p>	<p>Use the proper weight oil for the operation conditions; check pump.</p> <p>Replace damaged item.</p> <p>See Hydraulics System Problems in this section.</p>
<p>PowerBoss® creeps in neutral.</p>	<p>Directional control pedal return spring is out of adjustment.</p>	<p>Perform the adjustment procedures.</p>
<p>Brushed do not turn or turn very slowly.</p>	<p>Hydraulic system problem:</p>	<p>See Hydraulics System Problems in this section.</p>

## TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Little or no vacuum in brush compartment.	Filters clogged.	Clean filters.
	Leak or clog in hose from impeller.	Repair leaks; clear obstructions or replace hose.
	Impeller failure.	Check and repair.
Loss of dust control.	Debris in hose or impeller inlet.	Clean.
	Broom skirts or seal worn.	Replace.
	Skirt clearance from floor exceeds $\frac{1}{8}$ ".	Adjust clearance.
	Dust control filters clogged.	Clean filters.
	Filter seals worn or missing.	Replace.
	Poor seal with vacuum gasket.	Visually check and adjust, if necessary.
Sweeper unit leaving debris.	Hopper full.	Dump hopper.
	Broom(s) out of adjustment.	Adjust.

## TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Sweeper unit leaving debris (continued).	<p>Hopper flaps damaged or missing.</p> <p>Hopper out of adjustment.</p> <p>Dust control filters clogged.</p>	<p>Replace or adjust clearance.</p> <p>Check hopper clearance.</p> <p>Clean filters.</p>
Hopper does not raise or lower.	<p>Hydraulics system problem:</p> <ul style="list-style-type: none"> <li>• control valve</li> <li>• gear pump</li> <li>• lift cylinder</li> <li>• relief valve</li> </ul> <p>Hopper arms binding.</p> <p>Hopper load too heavy.</p>	<p>See Hydraulics Systems Problems in this section.</p> <p>Lubricate or adjust arm linkage.</p> <p>Dump more frequently.</p>
Hopper does not rotate or rotates slowly.	<p>Hydraulics system problem:</p> <ul style="list-style-type: none"> <li>• control valve</li> <li>• gear pump</li> <li>• lift cylinder</li> <li>• relief valve</li> </ul>	<p>See Hydraulics System Problems in this section.</p>

## TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Hopper lift cylinder failure.	Line to cylinder leaking.	Tighten fittings or replace hose.
	Piston seals leaking.	Replace seals.
	Bent piston rod.	Replace rod.
Hydraulic motor failure.	Motor leaking.	Replace seals.
	Drive malfunction.	Replace drive belt.
	Drive link malfunction.	Replace drive link.
	Output shaft malfunction.	Replace output shaft and bearings.
Hydraulic gear pump failure.	Pump leaking.	Replace seals.
	Gears worn or scored.	Rebuild pump.
	Relief valve stuck.	Clean or replace (at control valve).
	Oil supply low.	Check and fill.

## TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
<p>Hydraulic gear pump failure (Continued).</p>	<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>
<p>Hydraulic variable displacement pump failure.</p>	<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.	<p>Air in system.</p> <p>Relief valve dirty or damaged.</p> <p>Loose suction line.</p> <p>Clogged section filter or pump inlet line.</p> <p>Internal pump or motor damage.</p>	<p>Check fluid level in reservoir; check for loose connections or leaks.</p> <p>Clean or replace.</p> <p>Tighten fittings.</p> <p>Replace filter, clear line; change fluid in reservoir if dirty and flush system.</p> <p>Inspect and repair.</p>
Curb broom comes on when other functions are summoned.	<p>Mechanical: #3 solenoid is stuck open.</p> <p>Electrical: #3 solenoid is energized all of the time.</p>	<p>Mechanical: Replace #3 cartridge.</p> <p>Electrical: Adjust curb broom limit switches or replace.</p>
Hopper will not lift.	<p>Mechanical:</p> <ol style="list-style-type: none"> <li>1. #4 solenoid stuck closed.</li> <li>2. Others are stuck open.</li> <li>3. Plugged #4 orifice.</li> </ol>	<p>Mechanical:</p> <ol style="list-style-type: none"> <li>1. Replace.</li> <li>2. Replace.</li> <li>3. Replace.</li> </ol>



## TROUBLESHOOTING (CONTINUED)

PROBLEM	CAUSE	SOLUTION
Hopper will not lift (continued).	Electrical:  Solenoids are not energized.	<ol style="list-style-type: none"> <li>1. Replace coil.</li> <li>2. Trace wires.</li> <li>3. Replace blown wires.</li> </ol>
Hopper comes down by itself.	Mechanical: <ol style="list-style-type: none"> <li>1. #2 solenoid stuck open.</li> <li>2. Wrong cartridge in #4 position..</li> </ol> Electrical: Solenoids are energized incorrectly .	<ol style="list-style-type: none"> <li>1. Replace.</li> <li>2. Replace.</li> </ol> Trace wires and inspect fuses.
Hopper responds too slowly or too fast.	Mechanical: Incorrect orifice size.	<ol style="list-style-type: none"> <li>1. Use .052 for lowering.</li> <li>2. Use .035 for raising.</li> </ol>
Engine stalls when lifting or rotating.	Mechanical: <ol style="list-style-type: none"> <li>1. Engine RPM too low.</li> <li>2. Hydraulic fluid too cold.</li> <li>3. Lo-flow relief valve set too high.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reset speed.</li> <li>2. Warm up system.</li> <li>3. Adjust to 900 psi.</li> </ol>

## TROUBLESHOOTING (CONTINUED)

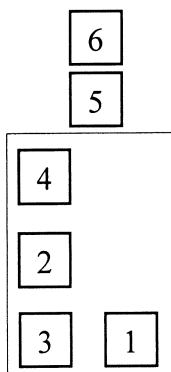
PROBLEM	CAUSE	SOLUTION
Engine stalls when lifting or rotating (continued).	Electrical: Improper logic.	Logic check.
Nothing works or engine starts under load.	Mechanical: 1. #1 solenoid stuck closed.  Electrical: 1. Blown fuses. 2. Improper logic. 3. Tripped breaker.	Replace  1. Inspect fuses. 2. Logic check. 3. Inspect breaker.
Blown fuses.	Electrical: 1. Shorted wire.	1. Trace wires.
Tripped breaker.	Electrical: 1. Current overload.	1. Trace wires.
Hopper goes up by itself.	Mechanical: Stuck solenoids.  Electrical: Improper logic.	Replace.  Logic check.

# TROUBLESHOOTING (CONTINUED)

## SOLENOID LOGIC OVERVIEW

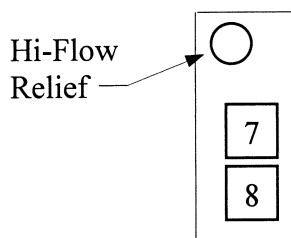
The curb broom, hopper lift, hopper rotate, main broom and dust control are activated when certain solenoids are energized. Solenoids are remotely signaled by pushing the desired button on the gauge panel. For each of the above sweeper functions, the correct combinations of solenoids (solenoid logic) must be open or closed. The logic shown here describes which solenoids must be energized to perform the various sweeper functions. Solenoid #1 is normally open and allows fluid flow to circulate back to the reservoir when all functions are off. When any of the sweeper functions are required, the #1 solenoid is closed. At the same time, another is opened, allowing flow to operate a particular function. When troubleshooting the electro-hydraulic system, it is important to determine if the problem is electrical or mechanical. The electrical side should be eliminated first. When a function is summoned, the corresponding solenoids (logic table) are energized and emit a magnetic field. A small steel washer will stick to an energized coil (except #1). Using the logic table, determine if the proper solenoids are energized for each sweeper function. Be sure that only the required units are energized. If all solenoid logic is correct, the problem is mechanical.

FUNCTION	#1	#2	#3	#4	#5	#6	#7	#8
CURB BROOM ON	ENERG.		ENERG.					
LIFT HOPPER	ENERG.			ENERG.				
LOWER HOPPER		ENERG.						
DUMP HOPPER	ENERG.				ENERG.			
RETRACT HOPPER	ENERG.					ENERG.		
MAIN BROOM & DUST CONTROL—ON							ENERG.	
MAIN BROOM & DUST CONTROL—OFF								ENERG.



### SOLENOID POSITIONS

Lo-Flow Block



Hi-Flow Block

## Your Page

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