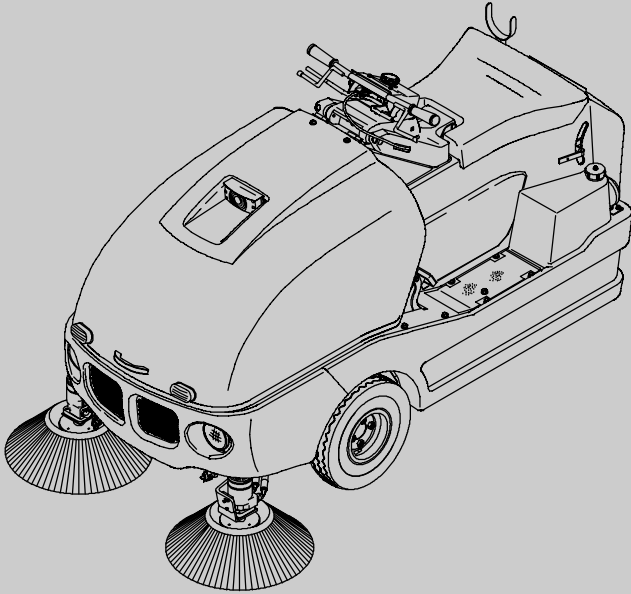




# Litter Hawk™

## Operator Manual




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

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


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

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



**PROTECT THE ENVIRONMENT**

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



Always remember to recycle.

---

## MACHINE DATA

---

Please fill out at time of installation for future reference.

Model No.- **Litter Hawk**

Serial No.- \_\_\_\_\_

Machine Options - \_\_\_\_\_

Sales Rep. - \_\_\_\_\_

Sales Rep. phone no. - \_\_\_\_\_

Customer Number - \_\_\_\_\_

Installation Date - \_\_\_\_\_

### Tennant Company

PO Box 1452

Minneapolis, MN 55440

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



### CALIFORNIA PROPOSITION 65 WARNING:

**Engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

Litter Hawk and Thermo Sentry are United States trademarks of Tennant Company.

Specifications and parts are subject to change without notice.

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**CONTENTS**

	Page		Page
SAFETY PRECAUTIONS .....	2	LUBRICATION .....	56
OPERATION .....	4	ENGINE .....	56
OPERATOR RESPONSIBILITY .....	4	REAR WHEEL SUPPORT BEARINGS ..	56
MACHINE COMPONENTS .....	5	HYDRAULICS .....	57
SYMBOL DEFINITIONS .....	6	HYDRAULIC FLUID RESERVOIR .....	57
CONTROLS AND INSTRUMENTS .....	7	HYDRAULIC FLUID .....	58
OPERATION OF CONTROLS .....	9	HYDRAULIC HOSES .....	58
DIRECTIONAL LEVER .....	9	ENGINE .....	59
IGNITION SWITCH .....	10	COOLING SYSTEM .....	59
STEERING HANDLE .....	10	AIR FILTER .....	60
FUEL LEVEL GAUGE .....	10	FUEL FILTER .....	60
HOURMETER .....	11	FUEL LINES .....	61
HORN BUTTON .....	11	BATTERY .....	61
POWER KILL SWITCH .....	11	BELTS AND CHAINS .....	62
STEERING ASSEMBLY KNOB .....	12	ENGINE BELT .....	62
OPERATING/HAZARD LIGHTS		DEBRIS HOPPER .....	63
SWITCH (000000-001579) .....	12	HOPPER DUST FILTER	
OPERATING LIGHTS (001580- ) ..	12	INFORMATION .....	63
VOICE BOX SWITCH (OPTION) .....	13	THERMO SENTRY .....	64
VACUUM FAN/SIDE BRUSHES		DIFFUSER SCREENS .....	64
SWITCH .....	13	BRUSHES .....	65
WATER PUMP SWITCH .....	14	SIDE BRUSHES .....	65
TURN SIGNAL SWITCH .....	15	REPLACING SIDE BRUSH .....	66
ENGINE TEMPERATURE LIGHT .....	15	DUST CONTROL SYSTEM .....	67
ENGINE OIL PRESSURE LIGHT .....	15	SPRAY NOZZLES .....	67
CHARGING SYSTEM LIGHT .....	16	CLEANING AND ADJUSTING	
THERMO SENTRY LIGHT .....	16	SPRAY NOZZLES .....	67
HAZARD LIGHT SWITCH (001580- ) ..	16	WATER TANK .....	69
BRAKE PEDAL .....	17	DRAINING THE WATER TANK .....	69
PARKING BRAKE PEDAL .....	17	SKIRTS AND SEALS .....	71
FUSES .....	18	HOPPER COVER SEAL .....	71
CIRCUIT BREAKERS .....	18	HOPPER SEAL .....	71
VACUUM FAN DAMPER HANDLE .....	19	FILTER SEALS .....	71
THROTTLE LEVER .....	19	FILTER HOUSING COVER SEALS .....	72
VACUUM HEAD CONTROL LEVER .....	19	VACUUM HEAD SKIRT .....	72
OPERATOR SEAT .....	20	VACUUM SYSTEM .....	73
HOPPER .....	20	VACUUM FAN SCREEN .....	73
HOPPER SECURING BAR .....	20	VACUUM HOSES .....	73
HOW THE MACHINE WORKS .....	21	VACUUM WAND DAMPER .....	73
PRE-OPERATION CHECKLIST .....	21	BRAKES AND TIRES .....	74
POSITIONING STEERING ASSEMBLY .....	25	BRAKES .....	74
STARTING THE MACHINE .....	27	TIRES .....	75
OPERATION ON INCLINES .....	30	PUSHING, TOWING, AND	
CLEANING AND BRUSH INFORMATION ..	31	TRANSPORTING THE MACHINE .....	76
FILLING WATER TANK .....	33	PUSHING OR TOWING THE	
CLEANING .....	34	MACHINE .....	76
VACUUM WAND OPERATION .....	36	TRANSPORTING THE MACHINE .....	76
STOP CLEANING .....	39	MACHINE JACKING .....	79
STOPPING THE MACHINE .....	40	STORING MACHINE .....	79
EMPTYING THE DEBRIS HOPPER .....	42	SPECIFICATIONS .....	80
REMOVING HOPPER DUST FILTERS .....	47	GENERAL MACHINE PERFORMANCE ..	80
POST-OPERATION CHECKLIST .....	50	POWER TYPE .....	81
OPTIONS .....	51	STEERING .....	81
VOICE BOX .....	51	HYDRAULIC SYSTEM .....	81
MACHINE TROUBLESHOOTING .....	52	BRAKING SYSTEM .....	81
MAINTENANCE .....	54	TIRES .....	81
MAINTENANCE CHART .....	54	MACHINE DIMENSIONS .....	82

## SAFETY PRECAUTIONS

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



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

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

The machine is suited to sweep disposable debris. Do not use the machine other than described in this Operator Manual.

The following information signals potentially dangerous conditions to the operator or equipment:



**WARNING: Machine emits toxic gases. Serious injury or death can result. Provide adequate ventilation.**



**WARNING: Moving fan blades. Keep away.**



**WARNING: Sharp objects in debris canister. Wear gloves.**



**WARNING: Heavy hopper. Do not remove without help.**

### FOR SAFETY:

- 1. Do not operate machine:**
  - Unless trained and authorized.
  - Unless operation manual is read and understood.
  - In flammable or explosive areas unless designed for use in those areas.
  - In areas with possible falling objects unless equipped with overhead guard.
- 2. Before starting machine:**
  - Make sure all safety devices are in place and operate properly.
  - Check brakes and steering for proper operation.
- 3. When starting machine:**
  - Keep foot on brake and directional lever in neutral.

- 4. When using machine:**
  - Use brakes to stop machine.
  - Go slowly on inclines and slippery surfaces.
  - Use care when reversing machine.
  - Do not carry riders on machine.
  - Always follow safety and traffic rules.
  - Report machine damage or faulty operation immediately.
- 5. Before leaving or servicing machine:**
  - Stop on level surface.
  - Set parking brake.
  - Turn off machine and remove key.
- 6. When servicing machine:**
  - Avoid moving parts. Do not wear loose jackets, shirts, or sleeves when working on machine.
  - Block machine tires before jacking up machine.
  - Jack up machine at designated locations only. Block machine up with jack stands.
  - Use hoist or jack that will support the weight of the machine.
  - Wear eye and ear protection if using pressurized air or water.
  - Disconnect battery connections before working on machine.
  - Avoid contact with battery acid.
  - Use cardboard to locate leaking hydraulic fluid under pressure.
  - Use Tennant supplied or equivalent replacement parts.
- 7. When loading/unloading machine onto/off truck or trailer:**
  - Turn off machine.
  - Use truck or trailer that will support the weight of the machine.
  - Use winch. Do not drive the machine onto/off the truck or trailer unless the load height is 380 mm (15 in) or less from the ground.
  - Set parking brake after machine is loaded.
  - Block machine tires.
  - Tie machine down to truck or trailer.

**SAFETY PRECAUTIONS**

The following safety labels are mounted on the machine in the locations indicated. If these or any labels become damaged or illegible, install a new label in its place.

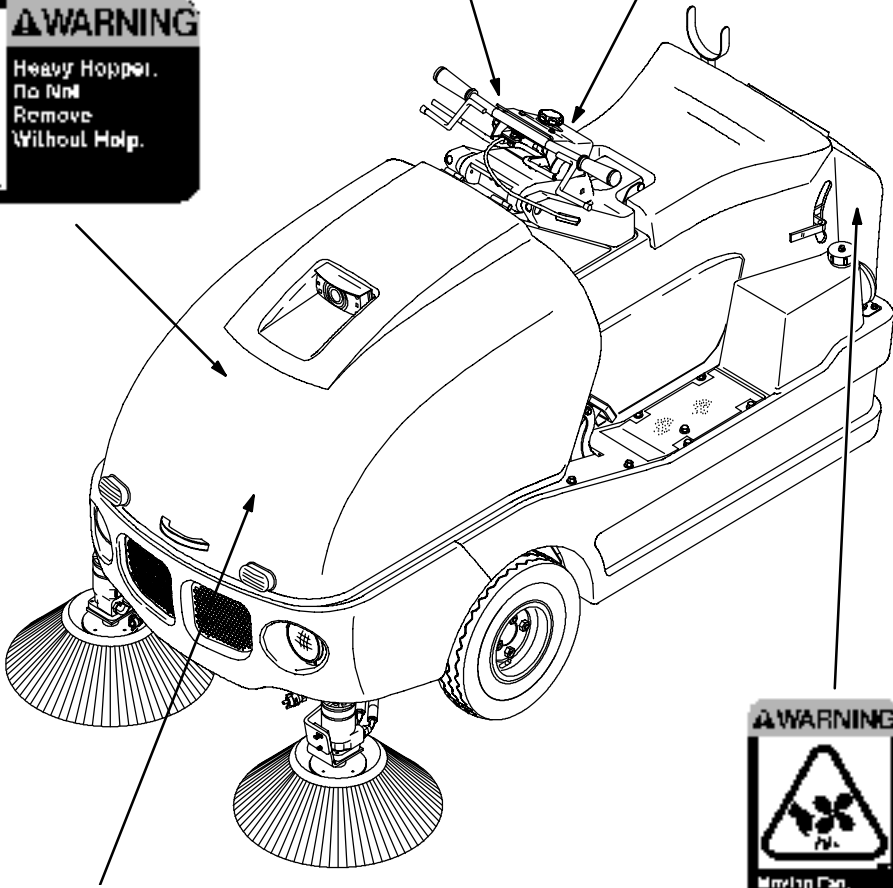
**FOR SAFETY LABEL - Located on the top of the steering assembly.**



**EMISSIONS LABEL - Located on the side of the steering assembly.**



**HEAVY HOPPER LABEL - Located on top of the fan housing.**



**SHARP OBJECTS HAZARD LABEL - Located on top of the fan housing.**



**FAN WARNING LABEL - Located on both sides of the radiator.**

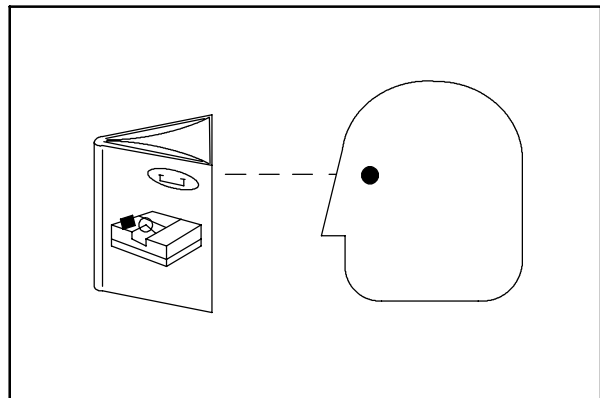
### OPERATOR RESPONSIBILITY

- The operator's responsibility is to take care of the daily maintenance and checkups of the machine to keep it in good working condition. The operator must inform the service mechanic or supervisor when the maintenance intervals are required as stated in the *MAINTENANCE* section of this manual.

- Read this manual carefully before operating the machine. View the operation video supplied with the machine.

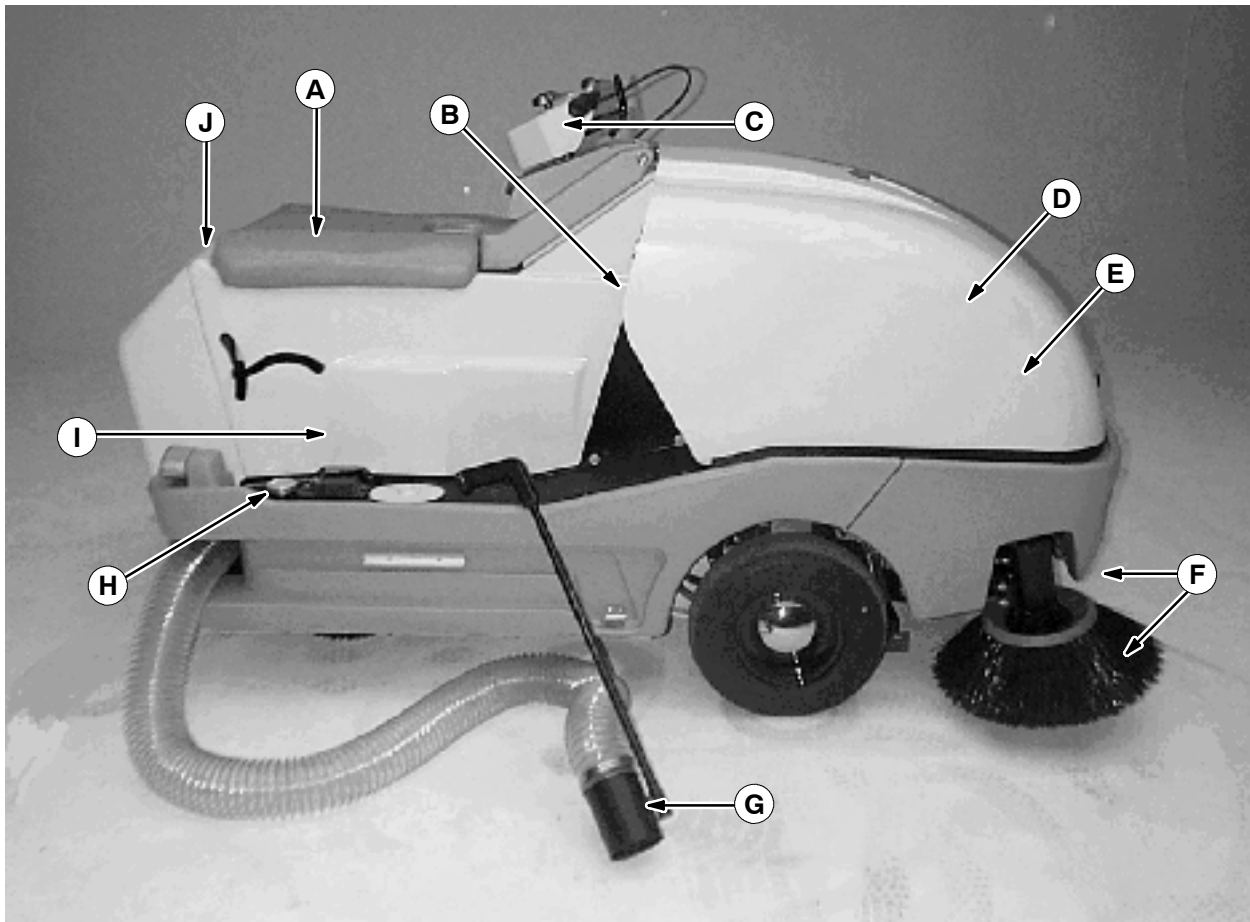
**FOR SAFETY: Do not operate machine, unless operation manual is read and understood.**

- Check the machine for shipping damage. Check to make sure the machine is complete per shipping instructions.
- Keep your machine regularly maintained by following the maintenance information in this manual. We recommend taking advantage of a regularly scheduled service contract from your Tennant representative.
- Order parts and supplies directly from your authorized Tennant representative. Use the parts manual provided when ordering parts.
- After operation, follow the recommended daily and hourly procedures stated in the *MAINTENANCE CHART*.



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## MACHINE COMPONENTS





























- A. Operator seat
- B. Instrument panel
- C. Steering assembly
- D. Hopper cover
- E. Hopper dust filters
- F. Side brushes
- G. Vacuum wand
- H. Fuel tank
- I. Engine cover
- J. Water tank

# OPERATION

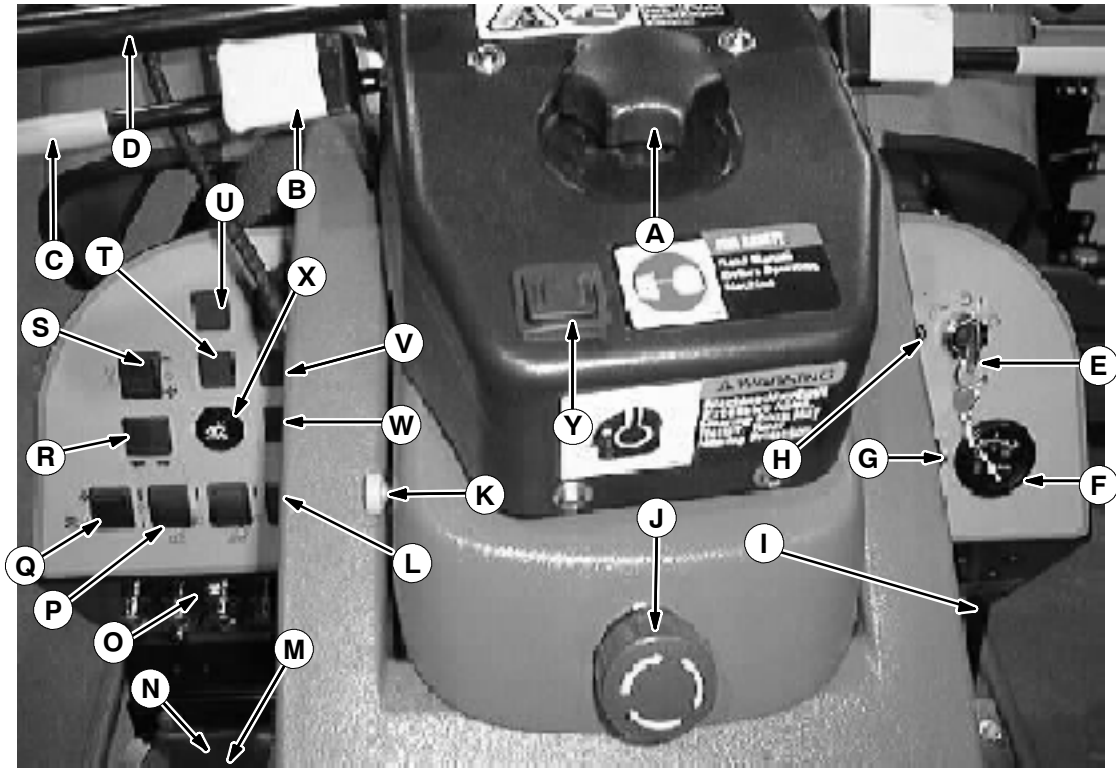
## SYMBOL DEFINITIONS

These symbols identify controls, displays, and features on the machine:

	On		Engine Oil Pressure
	Off		Engine Water Temperature
	Glow Plug (Preheat)		Thermo Sentry™
	Voltmeter		Operating lights
	Start		Hazard light
	Horn		Turn signal light (Option)
	Vacuum Fan and Side brushes		Voice box (option)
	Circuit breaker #1		Idle Engine Speed
	Circuit breaker #2		Medium Vacuum Fan / Engine Speed
	Circuit breaker #3		Fast Vacuum Fan / Engine Speed
	Circuit breaker #4		Spray nozzles
	Circuit breaker #5		Vacuum head lift
	Circuit breaker #6		Vacuum head lowered

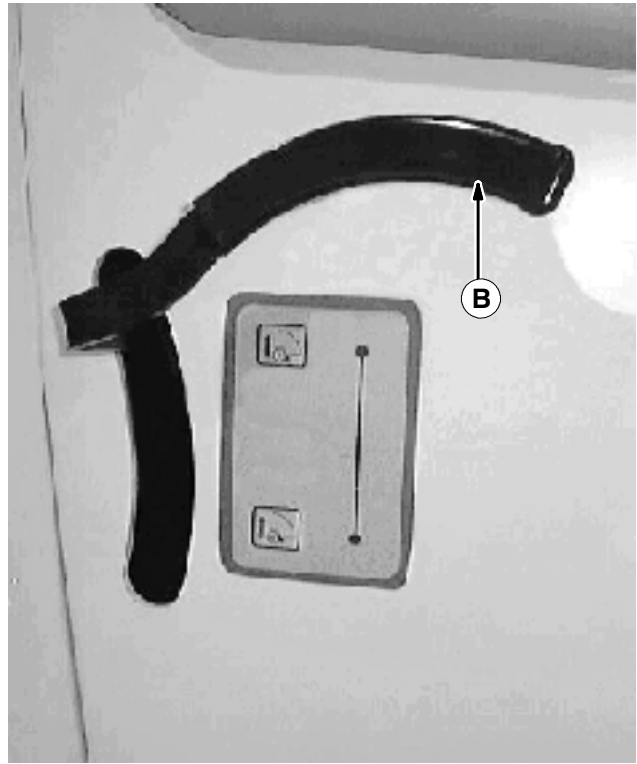
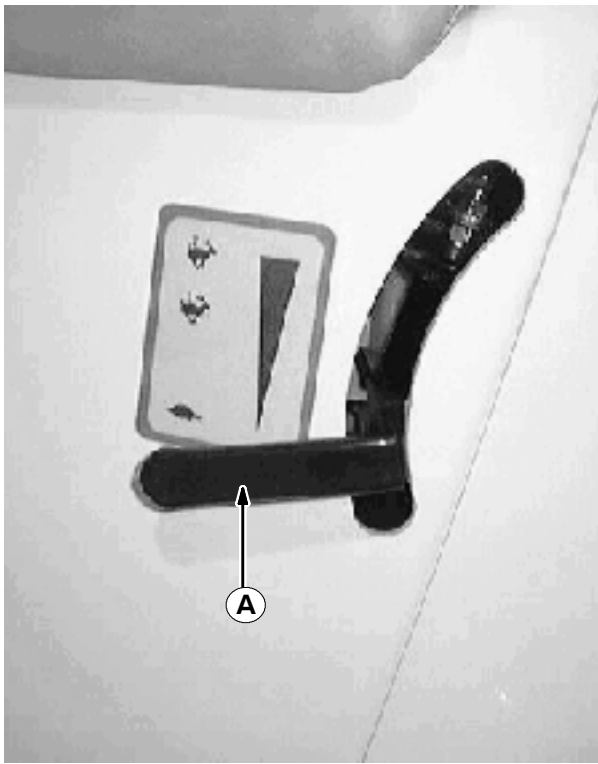


## CONTROLS AND INSTRUMENTS



- A. Steering assembly knob
- B. Directional lever (reverse)
- C. Directional lever (forward)
- D. Steering handle
- E. Ignition switch
- F. Fuel gauge
- G. Hourmeter
- H. Glow plug light
- I. Vacuum fan damper handle
- J. Power kill switch
- K. Horn button
- L. Operating/hazard lights switch (000000-001579)
- L. Operating switch (001580- )
- M. Brake pedal
- N. Parking brake pedal
- O. Circuit breakers
- P. Voice box switch (option)
- Q. Vacuum fan/side brushes switch
- R. Turn signal switch (000000-001579)
- S. Water pump switch
- T. Engine temperature light
- U. Engine oil pressure light
- V. Charging system light
- W. Thermo sentry light
- X. Hazard Light (000000- )
- Y. Turn signal switch (001580- )

## OPERATION



- A. Throttle lever
- B. Vacuum head control lever

---

**OPERATION OF CONTROLS**

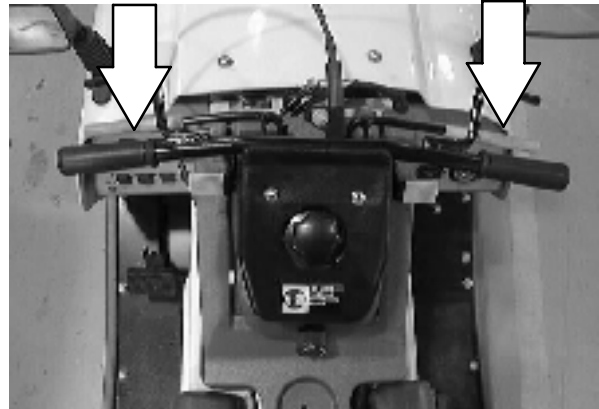
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**DIRECTIONAL LEVER**

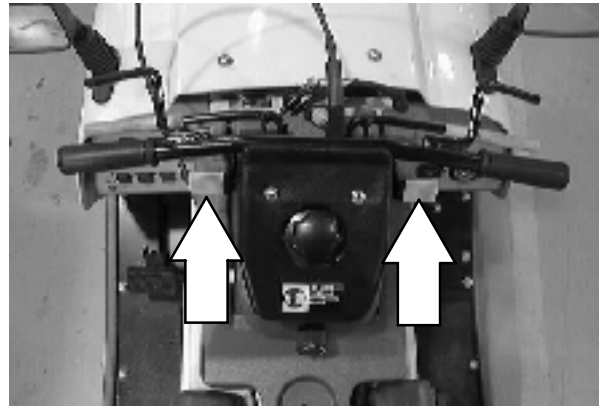
The *directional lever* controls the direction of travel of the machine. Change the direction of the machine with the pressure of your hands on the directional lever. The machine is very responsive to the directional lever. Squeeze and release the directional lever gently.

Use the brake pedal to stop the machine.

**Forward:** Gently squeeze the directional lever with your fingers, pulling the lever back towards the steering handle. Keep your hands on the steering handle.



**Reverse:** Push the directional lever away from the steering handle by pressing the lower lever tabs with the operator's thumbs. Keep your hands on the steering handle.



**Neutral:** Gently remove your hands from the directional lever and it will return to the **Neutral** position.



## OPERATION

### IGNITION SWITCH

The *ignition switch* controls machine power with a key.

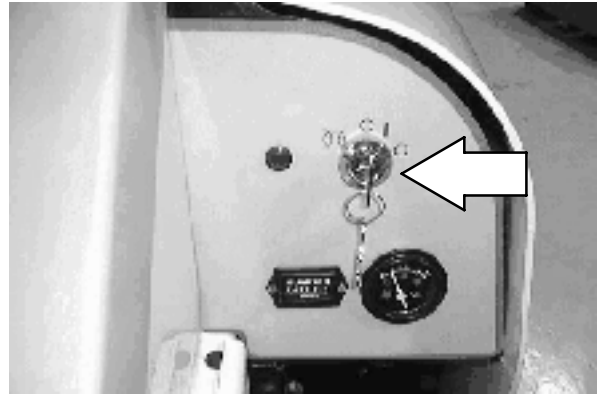
**FOR SAFETY: When starting machine, keep foot on brake and directional lever in neutral.**

**Preheat:** Turn and hold the key counterclockwise. The glow plug light will come on. When the glow plug light goes out, usually in 5 to 30 seconds depending on weather conditions, the engine is ready to start.

**Start:** Turn the key all the way clockwise, and release the key as soon as the engine starts.

**Stop:** Turn the key counterclockwise.

**Accessory power:** Turn the key clockwise to the next position from the off position.

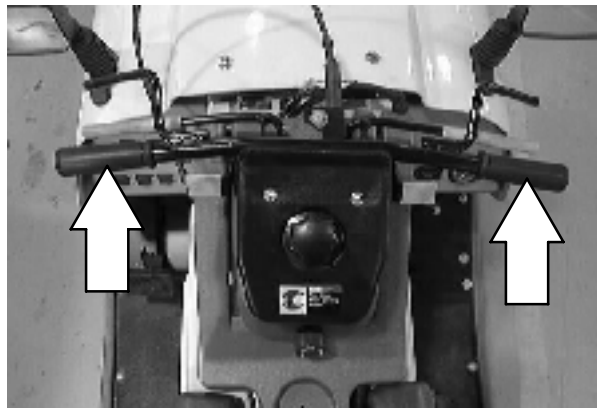


### STEERING HANDLE

The *steering handle* controls the machine's direction. The machine is very responsive to the steering wheel movements.

**Left:** Turn the steering handle to the left.

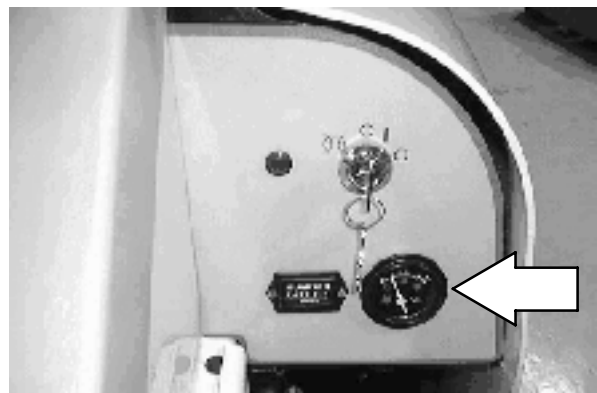
**Right:** Turn the steering handle to the right.



### FUEL LEVEL GAUGE

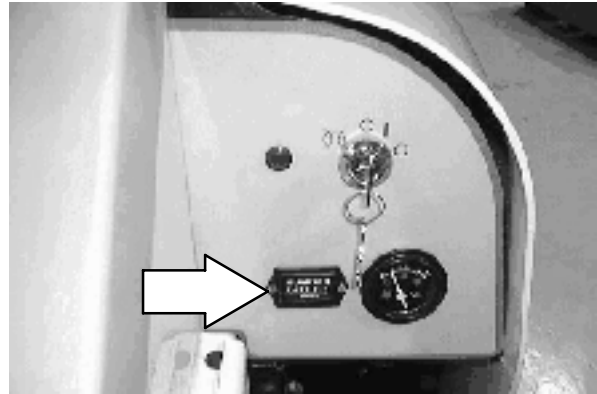
The *fuel level gauge* indicates how much fuel is in the fuel tank.

**NOTE:** Do not allow the fuel tank to empty completely. Air can enter the fuel system, and it may need bleeding before the next engine start.



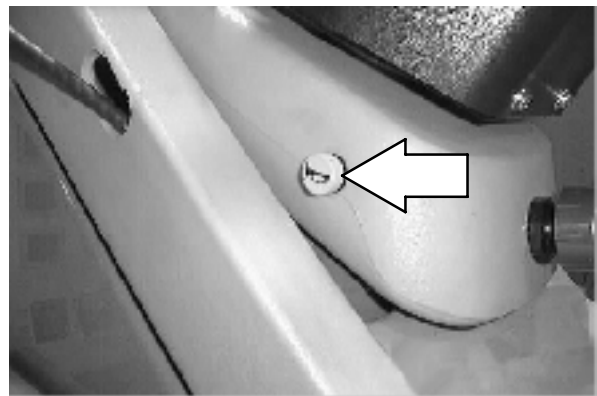
**HOURMETER**

The *hourmeter* records the number of hours the machine has been operated. The hourmeter displays the number of hours in tenths of an hour. Use this information to determine machine maintenance intervals.

**HORN BUTTON**

The *horn button* controls the horn.

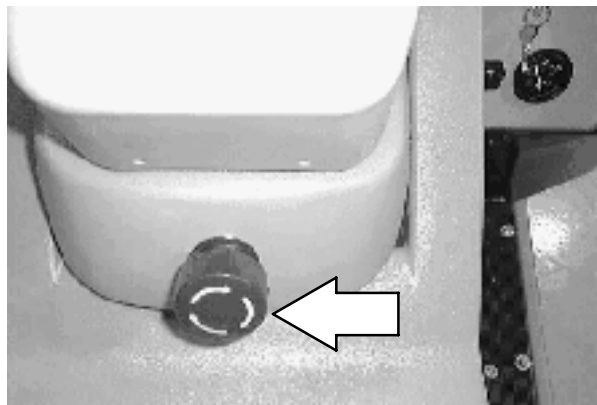
Sound: Push button

**POWER KILL SWITCH**

The *power kill switch* halts all power to the machine.

Halt: Push the power kill switch in.

Restart: Turn off the machine with the ignition switch. Turn the power kill switch to the right to release the switch. Restart the machine with the ignition switch.



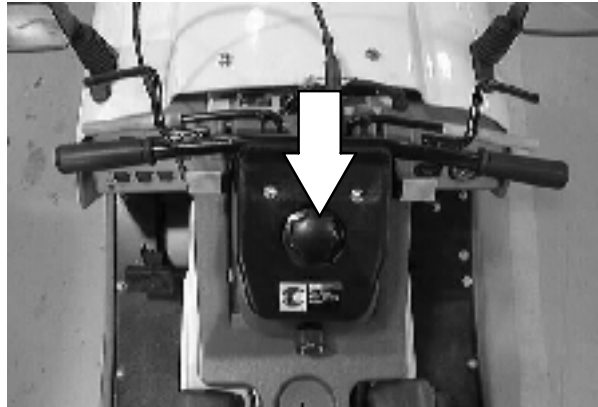
## OPERATION

### STEERING ASSEMBLY KNOB

The *steering assembly knob* secures the steering assembly to the front riding or rear walking steering locations for the steering handle. See the POSITIONING STEERING ASSEMBLY section of this manual.

Tighten: Turn the knob clockwise.

Loosen: Turn the knob counterclockwise.



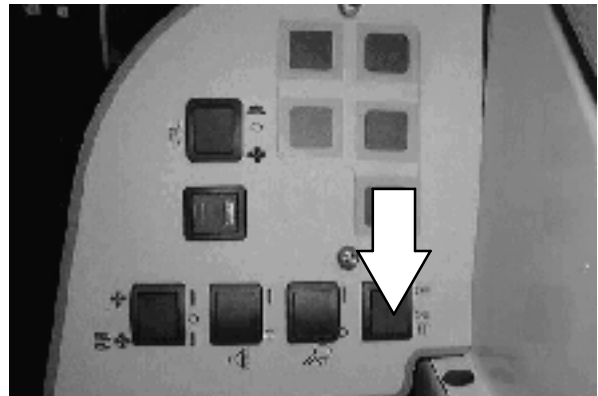
### OPERATING/HAZARD LIGHTS SWITCH (000000-001579)

The *operating/hazard light switch* controls the headlights, taillights and hazard light.

Operating lights: Press the top of the operating/hazard light switch.

Operating/hazard lights: Press the bottom of the operating/hazard light switch.

Off: Press the switch to the middle off position.

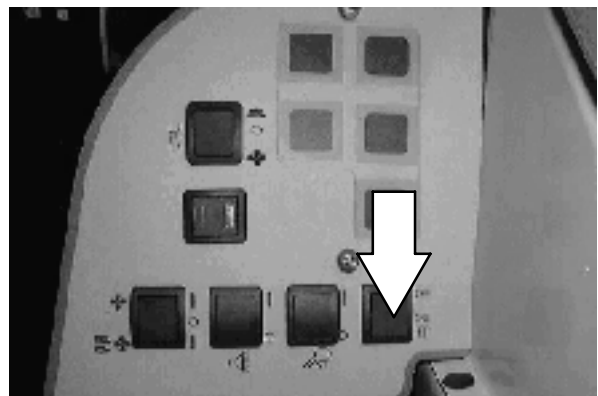


### OPERATING LIGHTS SWITCH (001580- )

The *operating light switch* controls the headlights and taillights.

Operating lights: Press the top of the operating/hazard light switch.

Off: Press the switch to the middle off position.

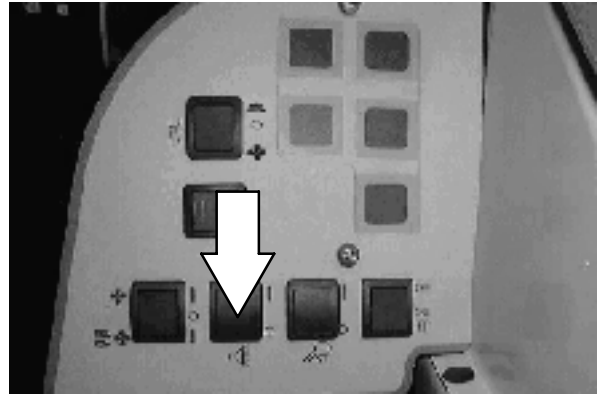


**VOICE BOX SWITCH (OPTION)**

The *voice box switch* controls the pre-recorded voice message. See the VOICE BOX section of this manual.

Replaying message on : Press and release the top of the voice box switch.

Message off: Press the bottom of the voice box switch.

**VACUUM FAN/SIDE BRUSHES SWITCH**

The *vacuum fan/side brushes switch* controls the vacuum fan and side brushes.

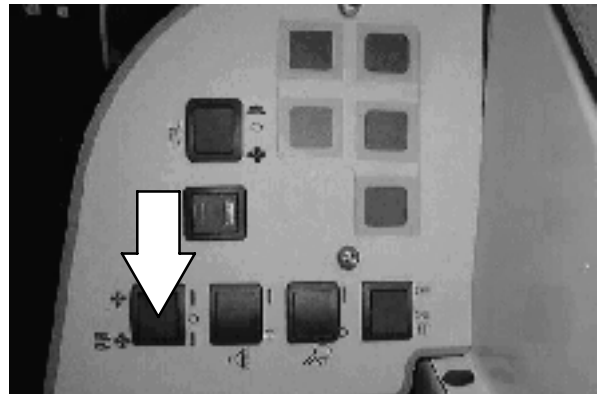
Vacuum fan on: Press the top of the vacuum fan/side brush switch. The vacuum fan will turn on. The side brushes will also turn on, but will remain in the raised position.

Vacuum fan on/side brushes down and on: Press the bottom of the vacuum fan/side brushes switch. The vacuum fan will turn on. The side brushes will also turn on and lower to the cleaning position.

Vacuum fan off/side brushes up and off: Press the switch to the middle off position. The vacuum fan will turn off. The side brushes will also turn off, and will raise to the off position.

*Note: Excessive heat in the hopper will cause the Thermo Sentry™ to shut off the vacuum fan.*

*If this happens, stop the machine, eliminate the source of heat. Turn the switch to the off position and back on to reset.*

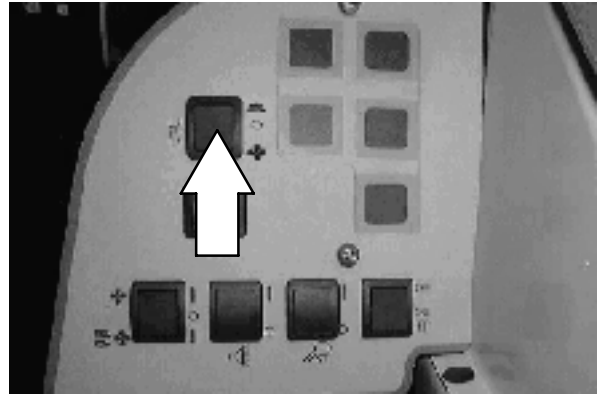


## OPERATION

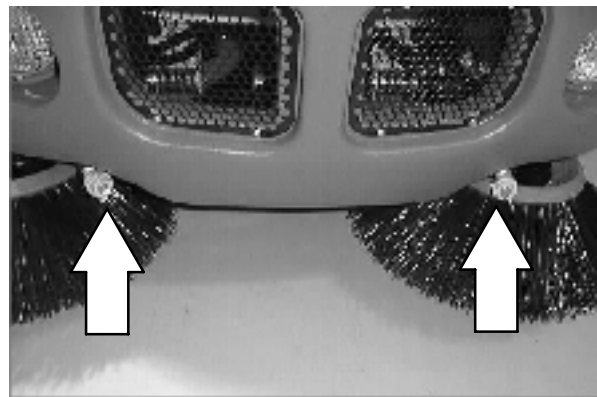
### WATER PUMP SWITCH

The *water pump switch* controls the two water pumps for the dust control system. The water pumps and the lights on the switch will shut off when the water tank is empty. See the DUST CONTROL SYSTEM in the MAINTENANCE section of this manual.

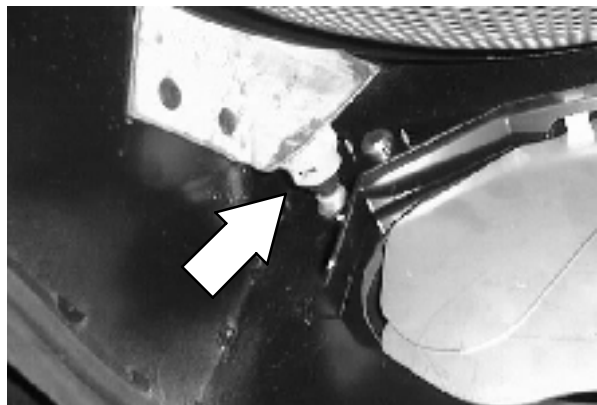
Off: Press the switch to the middle off position to stop the water pumps.



Side brush pump on: Press the top of the water pump switch to activate the steady spray dust control nozzles in front of each side brush. The light on the switch will come on while the pump is on.



Debris hopper pump on: Press the bottom of the water pump switch to activate the pulsating dust control spray above the debris hopper. The light on the switch will come on while the pump is on.





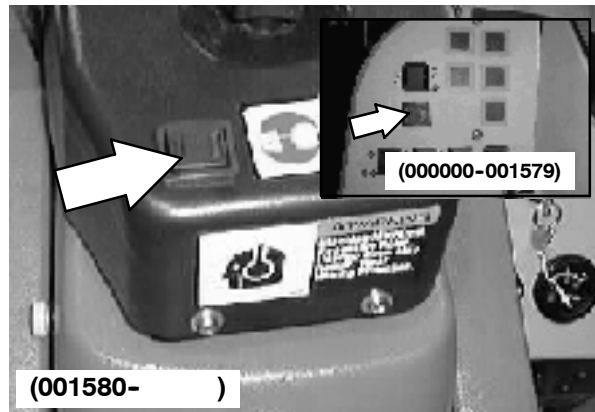
**TURN SIGNAL SWITCH**

The *turn signal switch* powers on and off the directional signals. A light in the switch will come on when the turn signals are activated.

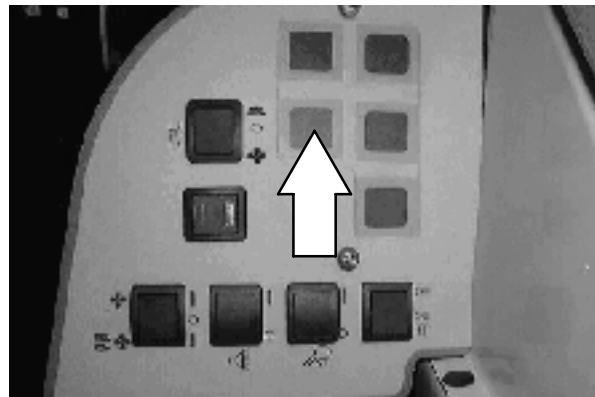
Right signal on: Press the right side of the switch

Left signal on: Press the left side of the switch

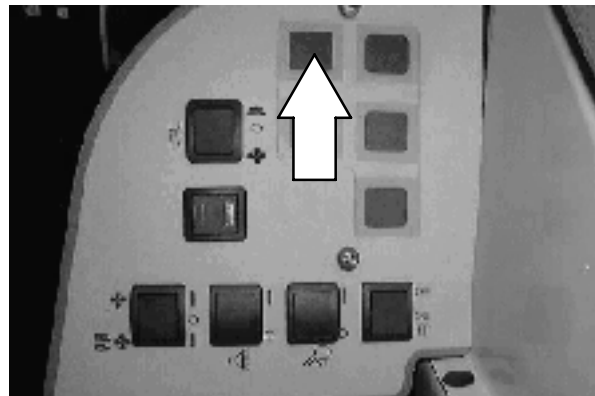
Signal off: Return the switch to the middle off position.

**ENGINE TEMPERATURE LIGHT**

The *engine temperature light* comes on when the temperature of the engine coolant is more than 113° C (235° F). If the light comes on, stop operating the machine. Locate the problem and have it corrected. See the COOLING SYSTEM in the MAINTENANCE section of this manual.

**ENGINE OIL PRESSURE LIGHT**

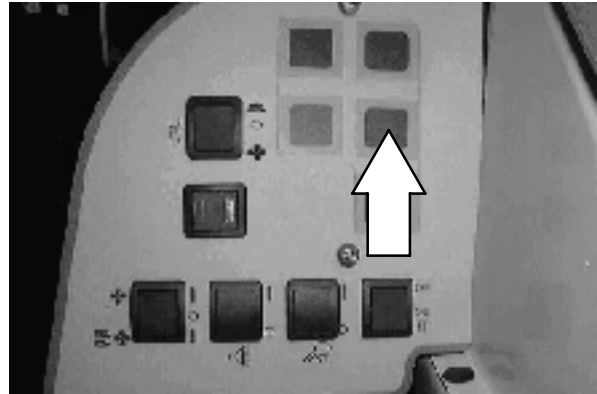
The *engine oil pressure light* comes on when the engine oil pressure falls below 40kPa (5psi). If the light comes on, stop operating the machine. Locate the problem, and have it corrected.



## OPERATION

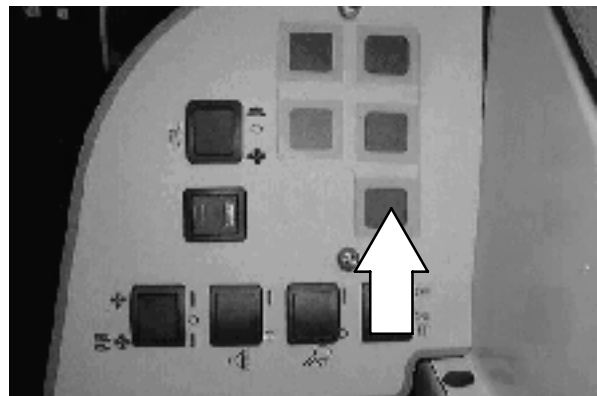
### CHARGING SYSTEM LIGHT

The *charging system light* comes on when the alternator is not operating within normal range; 13.5 to 15.5V. If the light comes on, stop operating the machine. Locate the problem, and have it corrected.



### THERMO SENTRY LIGHT

The *Thermo Sentry light* comes on when the Thermo Sentry senses excessive heat in the hopper, possibly from a fire. The Thermo Sentry will also shut off the vacuum fan. If this happens, stop the machine and eliminate the source of heat. Allow the sensor to cool, and it will reset automatically.

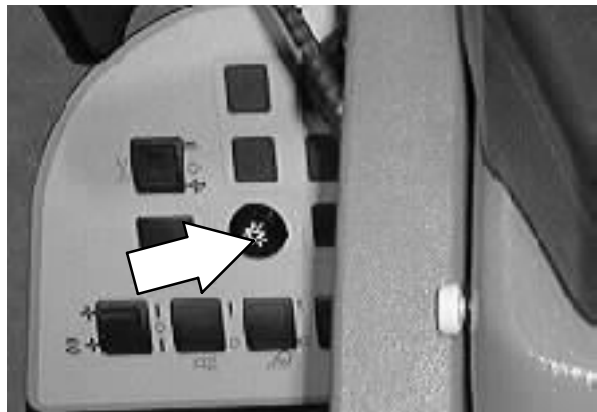


### HAZARD LIGHT SWITCH (001580- )

The *hazard light switch* controls the hazard lights.

On: Press the center of the hazard light switch.

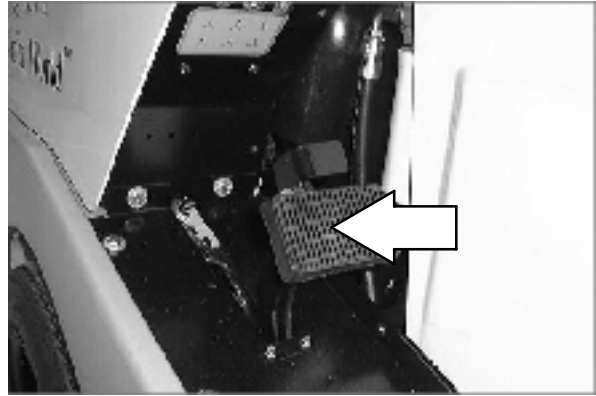
Off: Press the center of the hazard light switch again.



**BRAKE PEDAL**

The *brake pedal* stops the machine.

Stop: Release the directional lever and allow it to return to the neutral position. Step on the brake pedal.

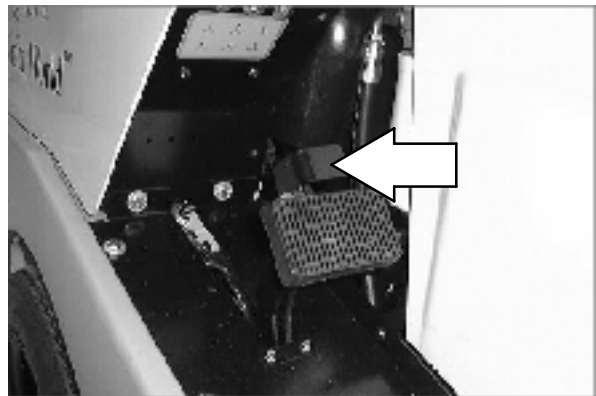
**PARKING BRAKE PEDAL**

The *parking brake pedal* sets and releases the front wheel brakes of the machine.

Set: Press on the brake pedal as far as possible, then press on the parking brake pedal with the toe portion of your foot to lock the parking brake pedal in place.

**FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake, turn off machine, and remove key.**

Release: Press on the brake pedal to unlock the parking brake pedal.



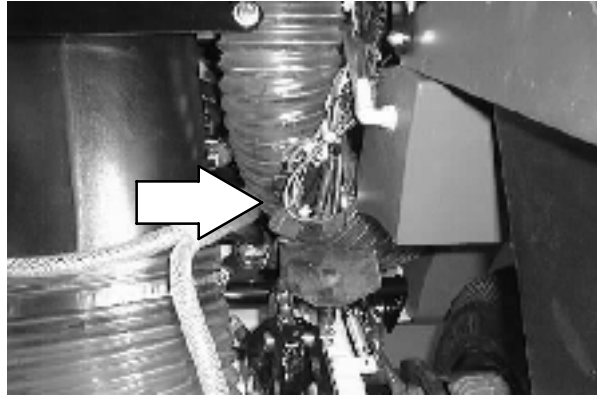
## OPERATION

### FUSES

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

The fuses are located behind the debris hopper when viewed from the front of the machine.

Fuse	Rating	Circuit Protected
FU-1	30 A	Glow plug
FU-2	20 A	Main



### CIRCUIT BREAKERS

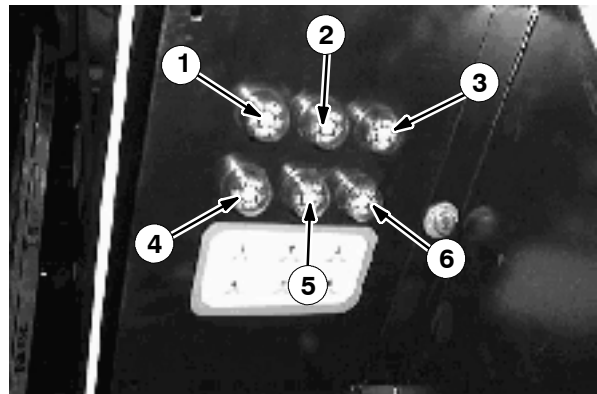
The *circuit breakers* are resettable electrical circuit protection devices. Their design stops the flow of current in the event of a circuit overload. Once a circuit breaker is tripped, it must be reset manually. Press the reset button after the breaker has cooled down. The circuit breakers will not reset until they have had a chance to cool down.

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

The circuit breakers are located on the left side of the machine, above the brake pedals.

The chart lists the circuit breakers and the electrical components they protect.

Circuit Breaker	Rating	Circuit Protected
CB-1	15 A	Main Power
CB-2	15 A	Horn
CB-3	15 A	Aux lights
CB-4	15 A	Headlights / fuel
CB-5	15 A	Taillights / turn sig. Backup alm option
CB-6	15 A	Voice box option

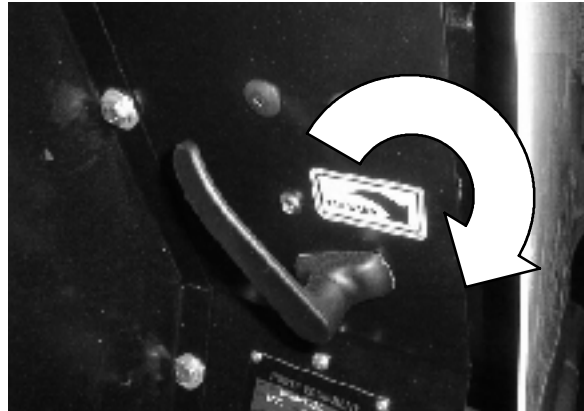


### VACUUM FAN DAMPER HANDLE

The *vacuum fan damper handle* moves the damper, directing vacuum power to the main vacuum head or the vacuum wand. The handle can be positioned with the operator's hand if walking behind the machine or by the operator's foot if riding the machine.

Vacuum wand: Turn the handle clockwise.

Main vacuum head: Turn the handle counterclockwise.



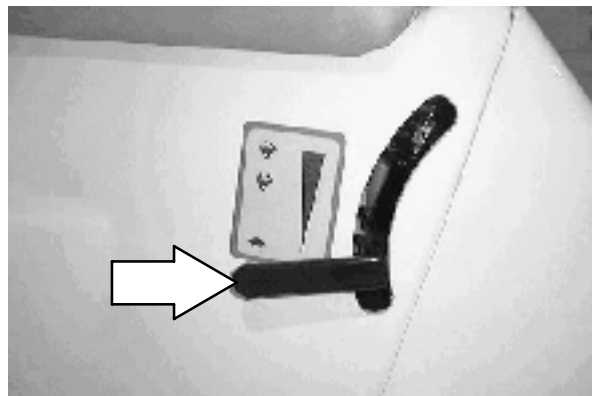
### THROTTLE LEVER

The *throttle lever* is located on the left rear side of the machine. It controls the engine speed and vacuum fan power. Raise the throttle lever until desired engine speed/vacuum power is reached.

Idle: Push the lever all the way down to the idle position.

Normal operating speed/vacuum power: Raise the lever to the middle speed1 position. This position works well for light debris or dusty conditions.

Maximum operating speed/vacuum power: Raise the lever all the way up to the speed2 position. This position works well for heavier debris or wet conditions.

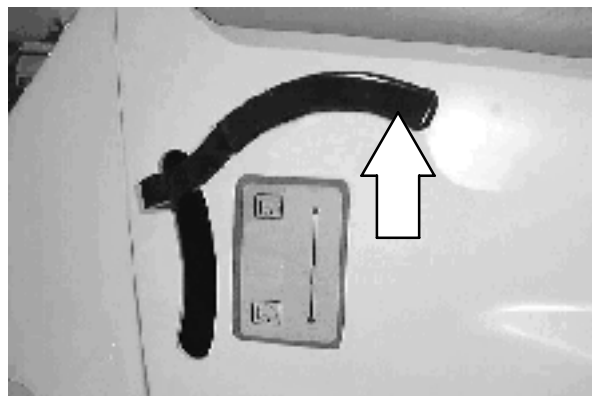


### VACUUM HEAD CONTROL LEVER

The *vacuum head control lever* is located on the right rear side of the machine. It raises and lowers the vacuum head. Raise or lower the lever until the desired vacuum head position is reached.

Raised position: Lift the lever all the way up.

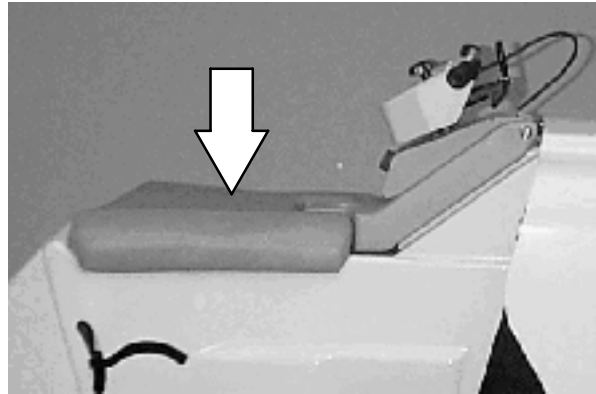
Lowered position: Push the lever all the way down to the lowered position.



## OPERATION

### OPERATOR SEAT

The *operator seat* is a stationary fixed bench style.



### HOPPER

The *hopper* is located in the front of the machine under the hood. If the hopper is heavy, get help to remove it.

 **WARNING: Sharp objects in debris canister. Wear gloves.**

 **WARNING: Heavy hopper. Do not remove without help.**



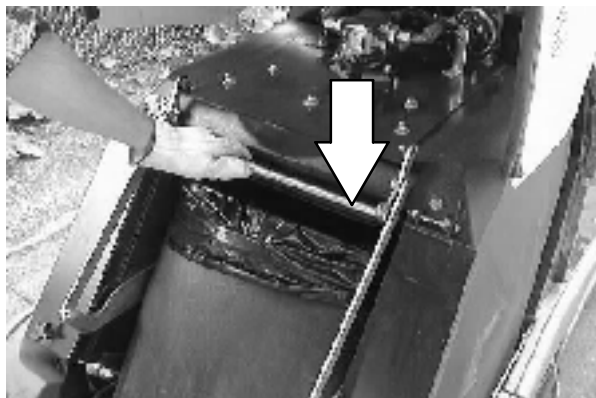
### HOPPER SECURING BAR

The hopper is held in place with a securing bar.

Hopper removing position: Pull the bar down into the lowered position.

Hopper securing position: Hold the hopper in place and raise the bar up into the locked position.

*NOTE: Check that the hopper securing bar is up in the locked position before operating machine.*



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**HOW THE MACHINE WORKS**

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The steering handle controls the direction of machine travel. The directional lever controls the speed and forward/reverse direction. The brake pedal slows and stops the machine.

The side brushes sweep debris into the path of the vacuum. The vacuum takes debris from the sidewalk or other surfaces into the hopper.

When cleaning is finished, clean the filters and empty the hopper.

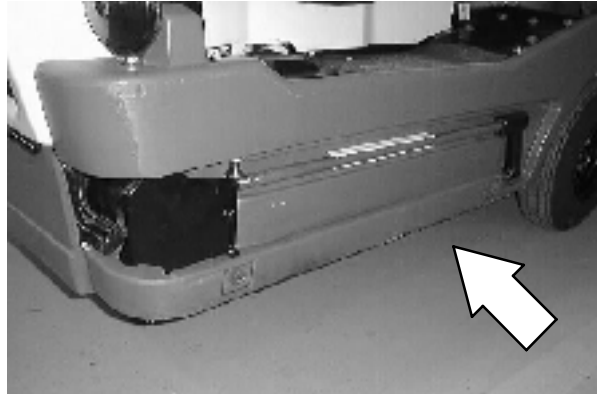


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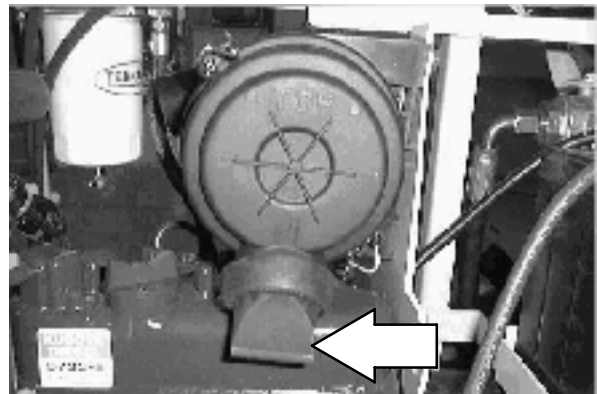
**PRE-OPERATION CHECKLIST**

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- Check under the machine for leaks (fuel, oil, coolant, water).

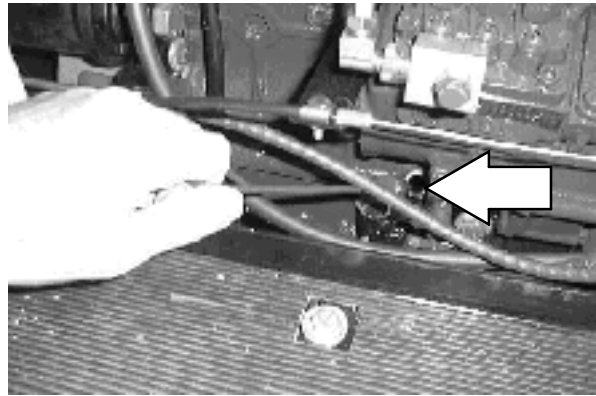


- Check the engine air filter dust cap.

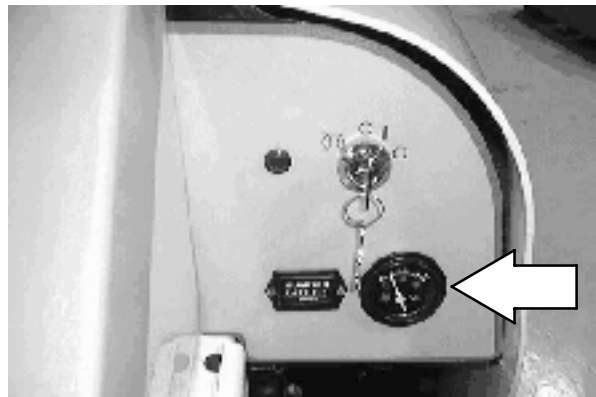


## OPERATION

- Check the engine oil level.

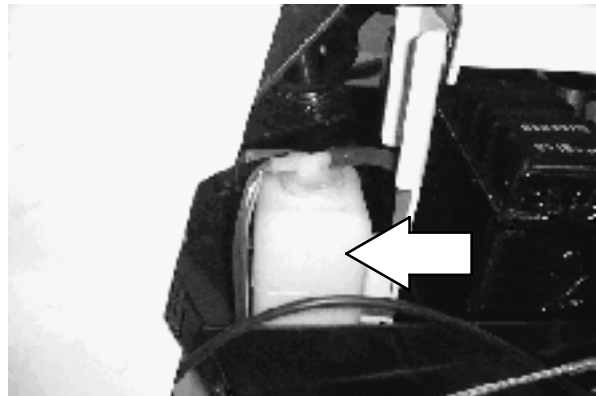


- Check the fuel level gauge.



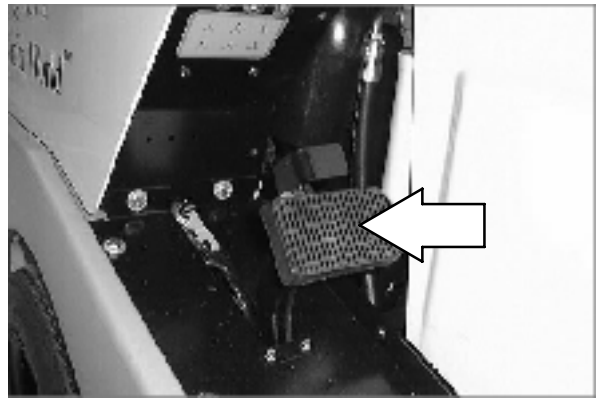
- Check the coolant in overflow reservoir.

 **WARNING: Moving fan blades. Keep away.**

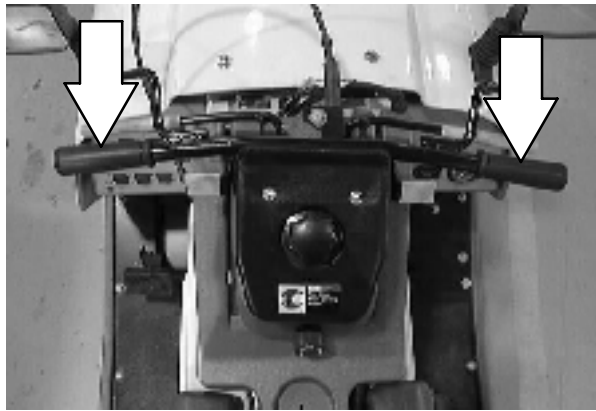




- Check the brakes for proper operation.



- Check the steering for proper operation.



- Check the inside of the hopper compartment and vacuum screen for debris. Clean if required.

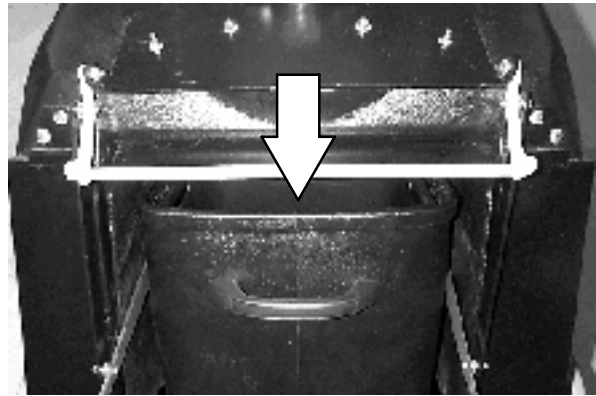


## OPERATION

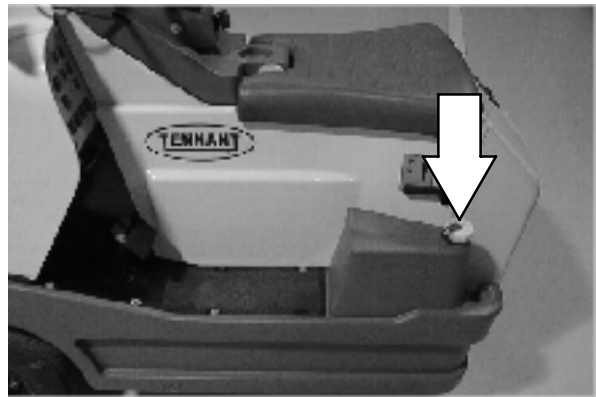
Check hopper, empty if required.

**!** **WARNING: Sharp objects in debris canister. Wear gloves.**

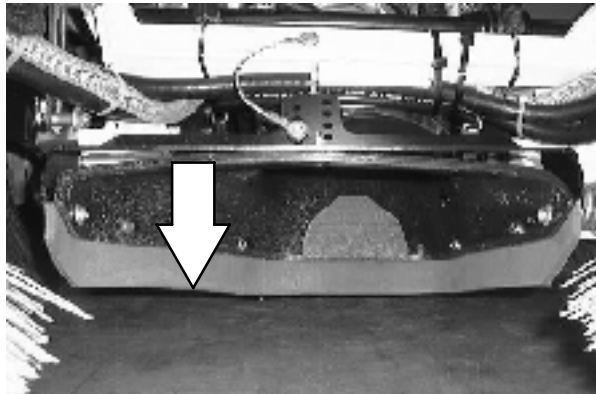
**!** **WARNING: Heavy hopper. Do not remove without help.**



Check water tank, fill if required.



Check vacuum hoses and vacuum head skirts for wear.



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**POSITIONING STEERING ASSEMBLY**

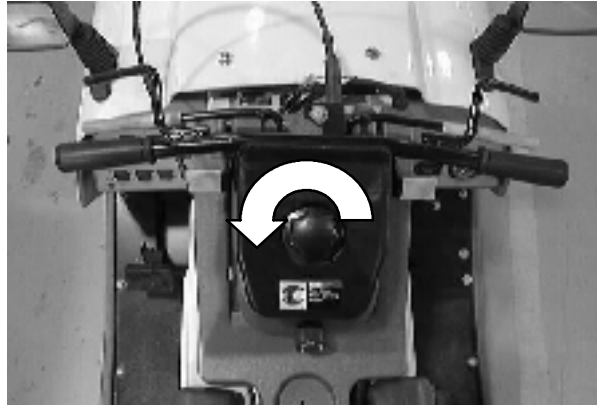
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The Litter Hawk™ may be operated from two different positions. The operator may sit on the machine and steer from the front, or walk behind the machine and steer from the rear.

To move the steering assembly from the front or the rear of the machine:

1. Turn ignition key counterclockwise to stop the engine. Apply the machine parking brake.
2. Turn steering assembly knob counterclockwise until the steering assembly may be lifted off the front notched steering plate.

*NOTE: The machine will not operate unless the steering assembly is held securely in place with the steering assembly knob.*



3. Raise the rear notched steering plate cover, and fold it over onto the seat.

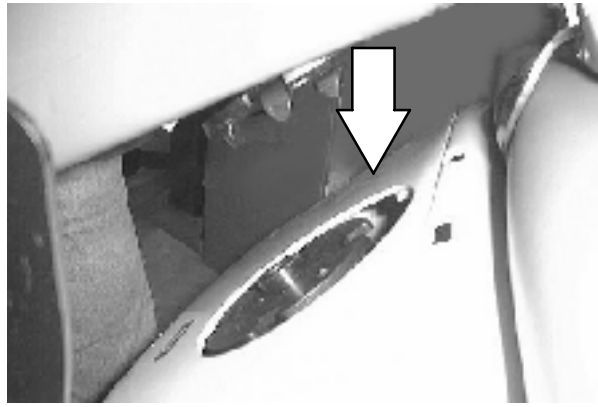


4. Lift the steering assembly off the front notched steering plate. Unfold the steering assembly back over the machine seat.

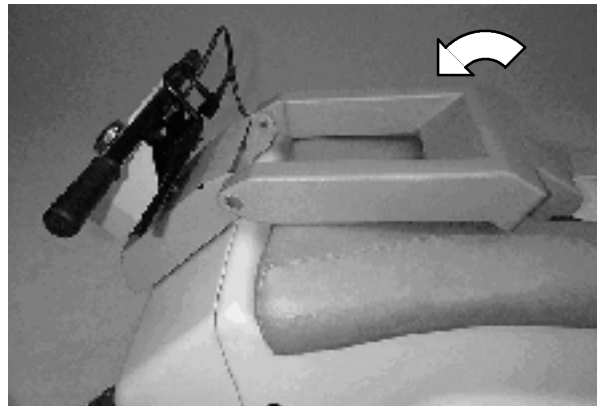


## OPERATION

5. Position the steering assembly plate over the rear notched steering plate.



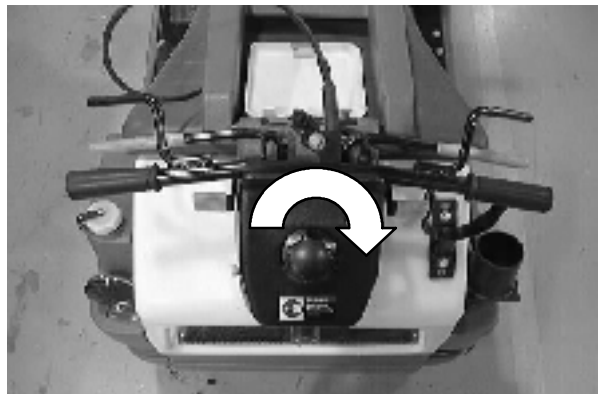
6. Fit the steering assembly plate into the rear notched steering plate.



7. Turn the steering assembly knob clockwise until steering assembly is secure.

*NOTE: The machine will not operate unless the steering assembly is held securely in place with the steering assembly knob.*

8. Reverse the order of positioning to move the steering assembly from the rear to the front notched steering plate.



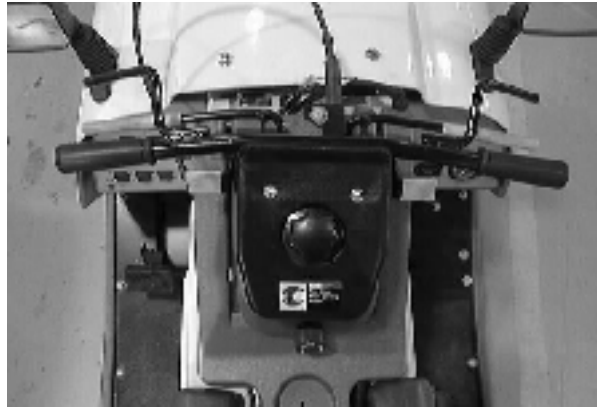
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**STARTING THE MACHINE**

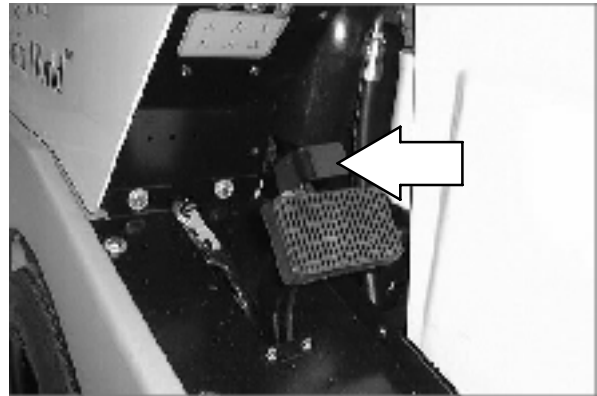
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1. Place the directional lever in neutral.

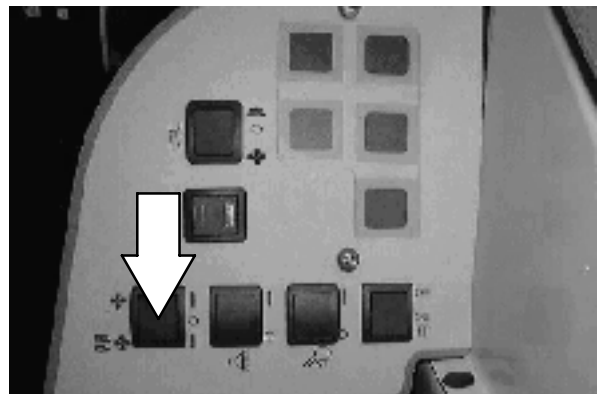
**FOR SAFETY: When starting machine, keep foot on brake and directional lever in neutral.**



2. Set the machine parking brake.

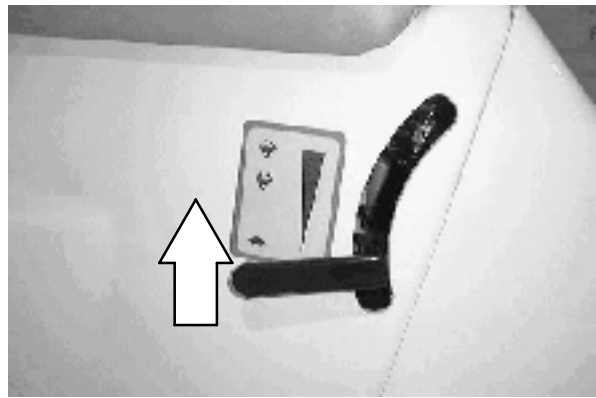


3. Check that the vacuum fan/side brushes switch is in the middle off position.

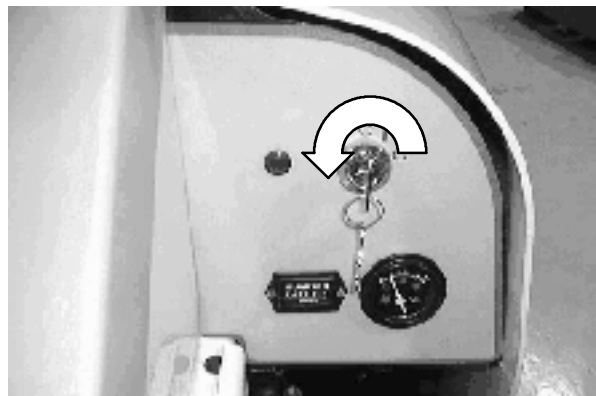


## OPERATION

4. Move the throttle lever to the middle engine throttle position.



5. Turn and hold the ignition key counterclockwise. The glow plug light will come on. Hold the key in this position until the light goes out. The engine is now ready to start.



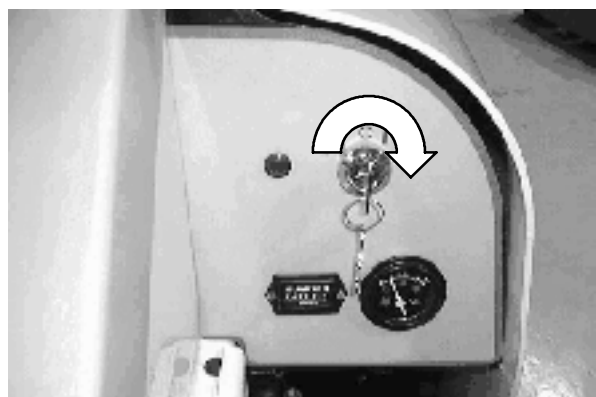
6. Turn the ignition key clockwise until the engine starts.

*NOTE: Do not operate the starter motor for more than 10 seconds at a time or after the engine has started. Allow the starter to cool between starting attempts or damage to the starter motor may occur.*

7. Allow the engine to warm up two to three minutes.



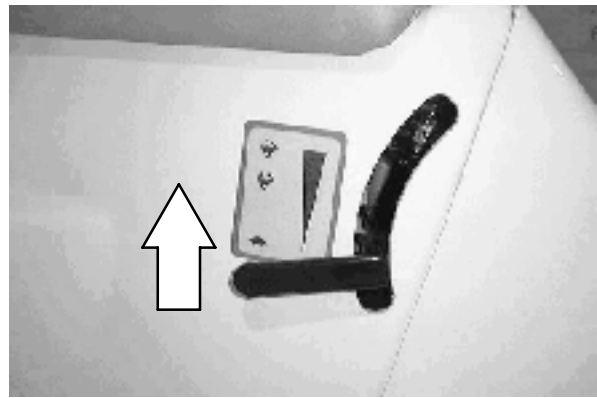
**WARNING: Engine emits toxic gases. Severe respiratory damage or asphyxiation can result. Provide adequate ventilation. Consult with your regulatory authorities for exposure limits. Keep engine properly tuned.**



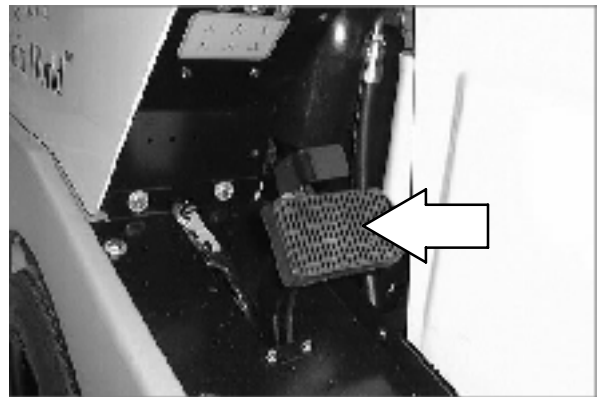
8. Set the throttle at the desired engine speed.

Normal operating speed/vacuum power:  
Raise the lever to the middle speed1  
position. This position works well for light  
debris or dusty conditions.

Maximum operating speed/vacuum power:  
Raise the lever all the way up to the speed2  
position. This position works well for heavier  
debris or wet conditions.



9. Release the machine parking brake.



10. Drive the machine to the area to be cleaned.

### OPERATION ON INCLINES

---

Drive the machine slowly on inclines. Use the brake pedal to control machine speed when riding and descending inclines.

The maximum rated incline when riding is 8° with a full hopper and 8° with an empty hopper. Use care when walking behind the machine on inclines of 7° or more.

**FOR SAFETY: When using machine, go slowly on inclines and slippery surfaces.**

Keep all movement on any slope or incline slow and gradual. Do not make any sudden changes in speed or direction.

Operate the machine up and down inclines. Do not operate the machine across inclines.

Do not turn on inclines unless necessary, and then turn gradually down hill.



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**CLEANING AND BRUSH INFORMATION**

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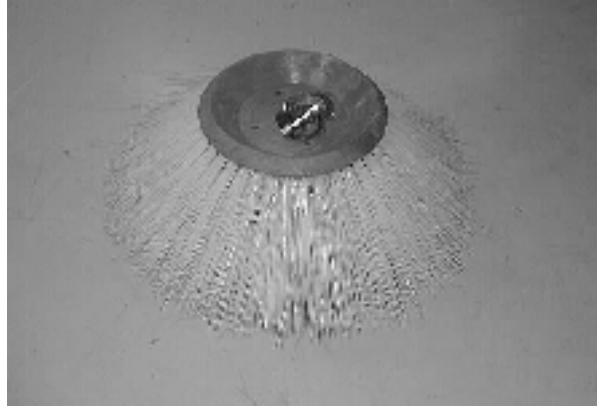
Pick up oversized debris before cleaning. Pick up pieces of wire, twine, string, etc., which could become entangled in the brushes. There is only one set of side brushes recommended for use with the Litter Hawk™.

**Polypropylene side brush** – A good general purpose brush for sweeping light to medium debris in outdoor applications. This brush is recommended for dry or wet conditions.

Plan the cleaning in advance. Try to arrange long runs with minimum stopping and starting. Drive the straightest path possible. Avoid bumping into posts or scraping the sides of the machine.

When operating the machine, turn the steering handle with a smooth, even motion. Avoid sudden turns, except in emergencies.

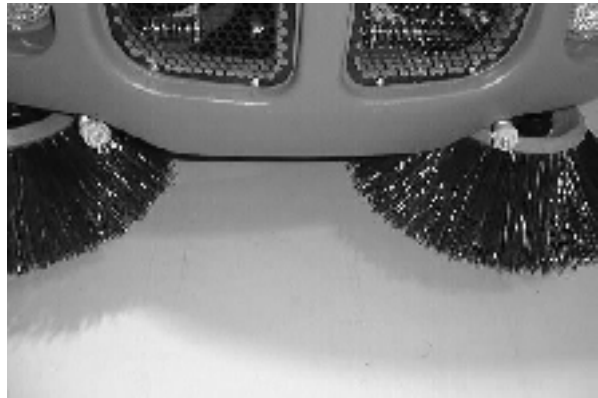
The dust control system is useful in dry conditions to control the dust stirred up by the side brushes and vacuum fan. The system consists of a water pump switch, water tank, two water pumps and three spray nozzles.



## OPERATION

The water pump switch allows the operator to choose between two dust control methods.

The side brushes pump sends a steady spray of water out of each nozzle located in front of each side brush. A full water tank will last approximately 86 minutes with the front dust control nozzles on.



The hopper vacuum fan pump sends a pulsating spray of water out of the nozzle located in the vacuum fan chamber. A full water tank will last seven hours with the vacuum chamber spray on.

Do not use the water spray dust control system on wet roads or surfaces. Reduce vacuum power when working through standing water or puddles to minimize water pick up.



Dust filters will not be harmed by wet sweeping. The filters will remain dry, and will continue to work effectively while wet sweeping.

The debris hopper can be used with or without standard 114 L (30 gallon) size garbage bags as bag liners. Extra bags can be stored in the debris hopper under the working bag, or in the side saddlebag.

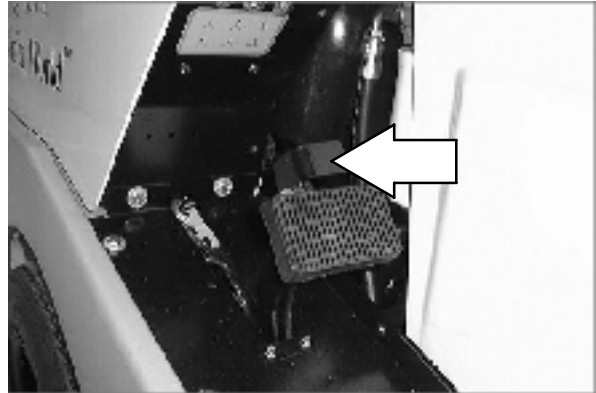


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**FILLING WATER TANK**

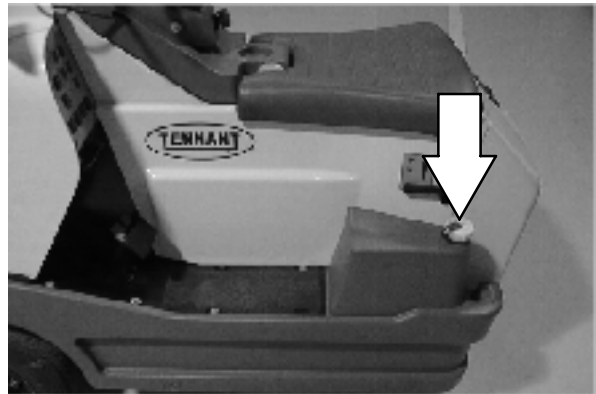
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1. Drive the machine to an accessible water supply hose. Stop the machine and apply the parking brake. See the STOPPING THE MACHINE section of the manual.

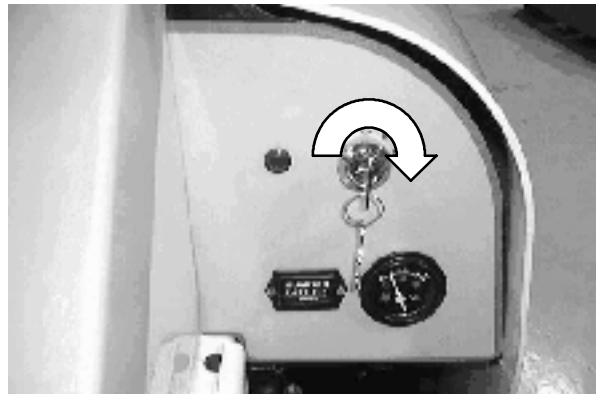


2. Fill the water tank. The fill cap is located on top of the tank on the left hand side of the machine.

*NOTE: The dust control system will stop, and the water pump switch light will turn off if the water tank runs dry during operation. If this happens, return to water supply and refill the tank. Turn the water pump switch off and back on again to reset the switch.*



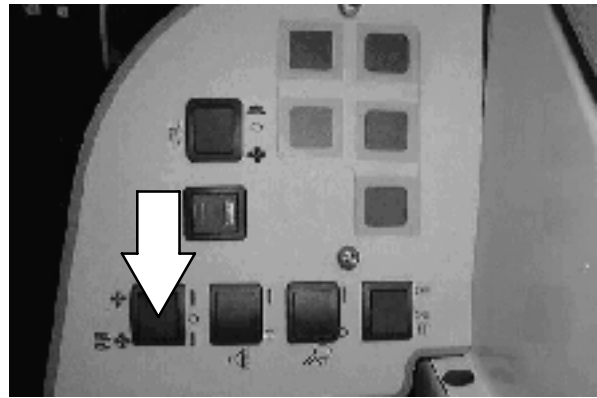
3. Start the machine, release the parking brake and begin cleaning. See the CLEANING section of the manual.



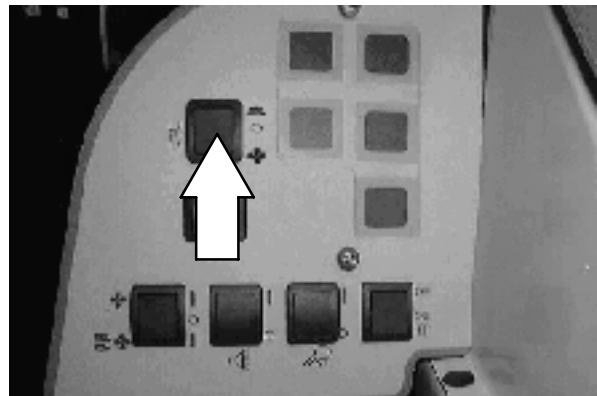
# OPERATION

## CLEANING

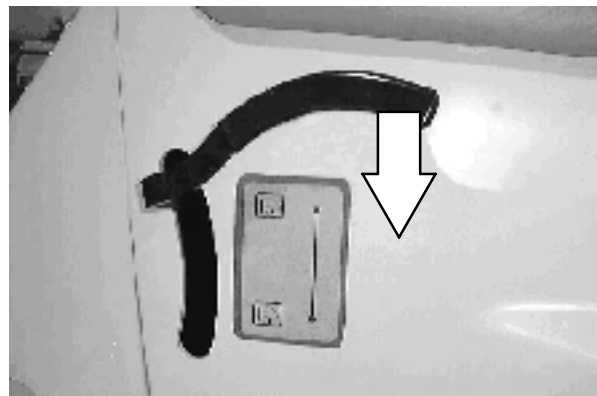
1. Press the top of the vacuum fan/side brushes switch for cleaning without the side brushes.
2. Press the bottom of the vacuum fan/side brushes switch for cleaning with the side brushes.



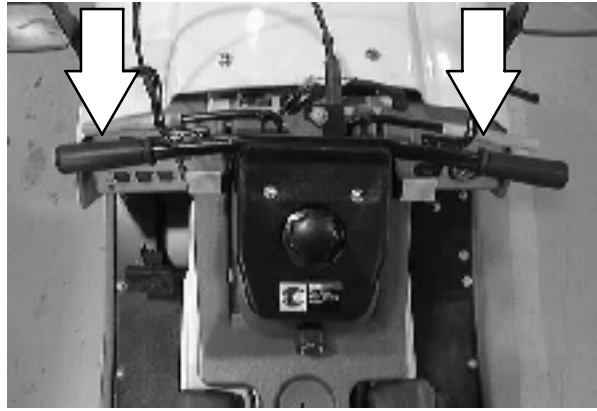
3. Press the top of the water pump switch to start the continuous spray dust control systems for the side brushes.
4. Press the bottom of the water pump switch to start the pulsating spray dust control systems for the debris hopper.



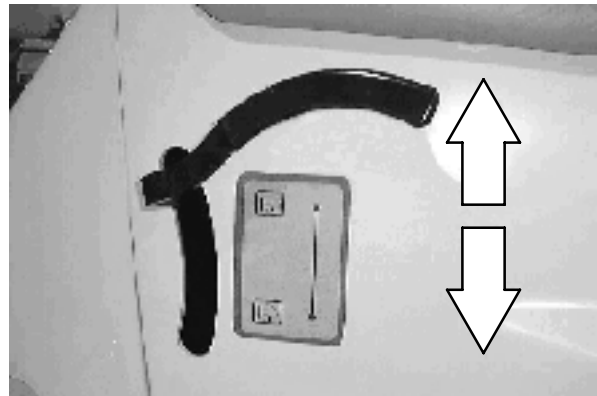
5. Lower the vacuum head with the vacuum head control lever.
6. Adjust the throttle lever for operator preference and/or operating conditions.



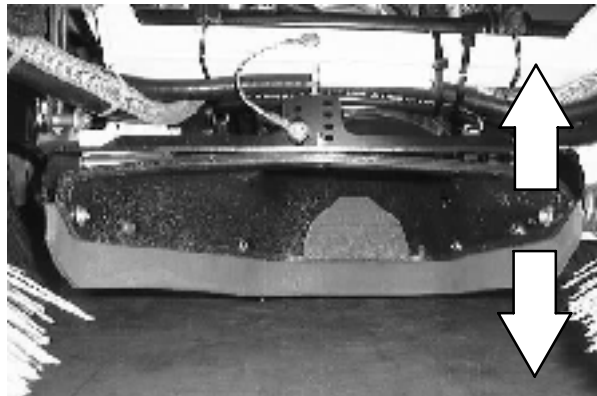
7. Squeeze the directional lever and begin cleaning.



8. Quickly raise the vacuum head control lever when vacuuming large debris, and lower it again.



The vacuum head will allow larger debris under the front lip of the vacuum head when it is raised, and will vacuum up the debris when it is lowered.

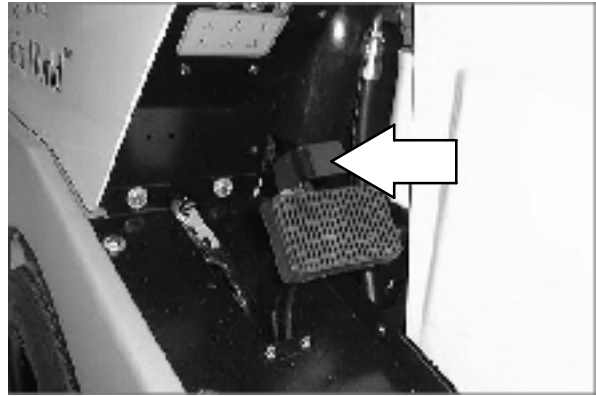


# OPERATION

## VACUUM WAND OPERATION

1. Stop machine and apply parking brake. See the STOPPING THE MACHINE section of the manual.

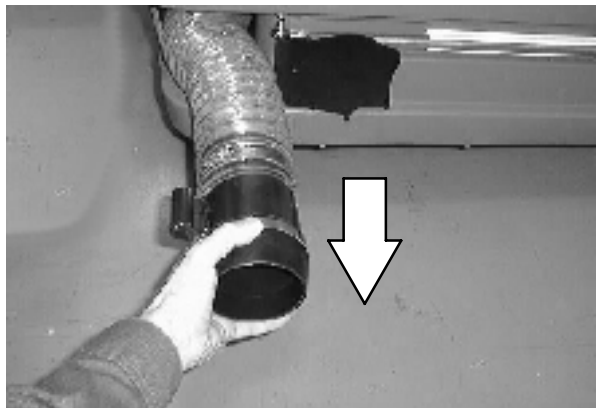
**FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake and remove key.**



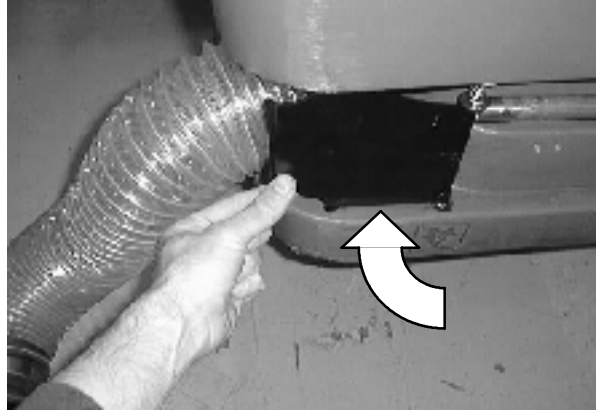
2. Lift and open the vacuum wand door.



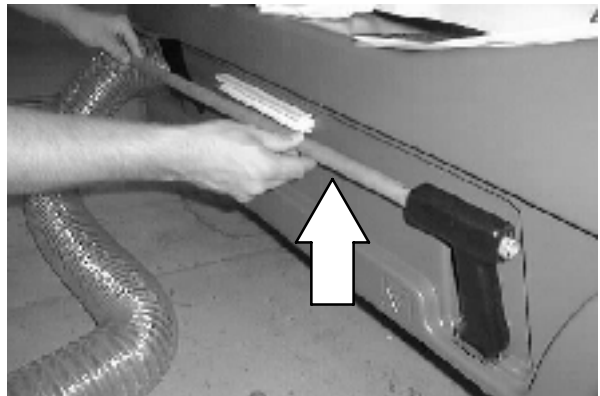
3. Extend as much vacuum hose from machine as required.



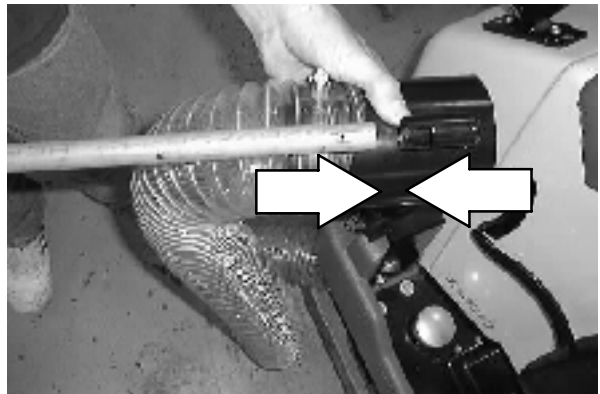
4. Close the vacuum wand door to secure the length of extended hose.



5. Remove vacuum hose handle from right side bumper.



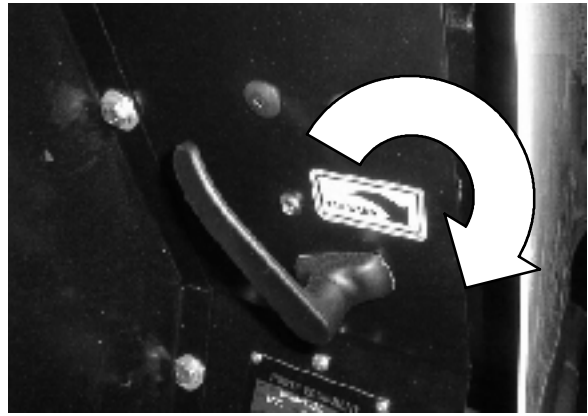
6. Connect vacuum hose handle to vacuum hose end.



## OPERATION

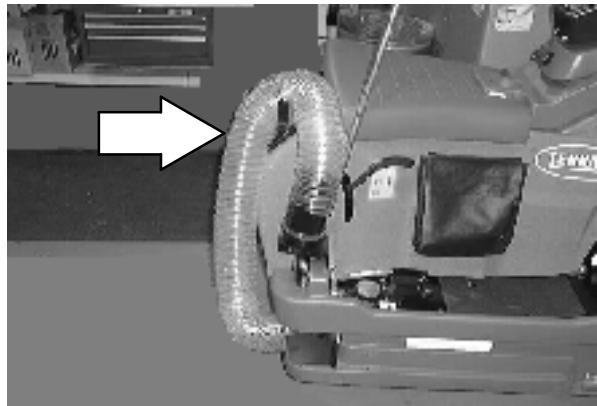
7. Turn the vacuum fan damper handle clockwise to transfer the vacuum power from the main vacuum to the vacuum wand. Turn the handle counterclockwise to transfer vacuum power back to the main vacuum.

*NOTE: The machine will not operate the main vacuum and the vacuum wand at the same time.*

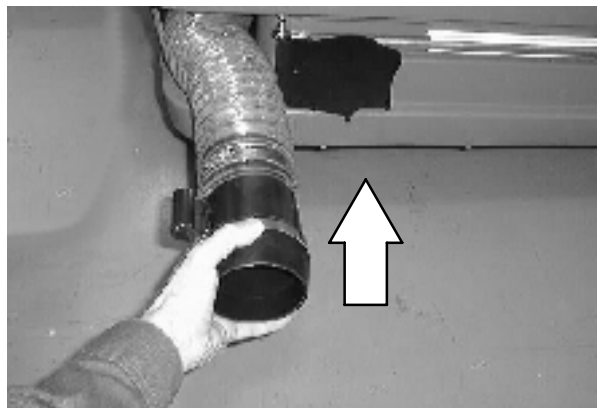


8. Start the machine, release the machine parking brake, and begin vacuuming. Store the vacuum hose on the rear hose retainer when not in use.

**FOR SAFETY: When starting machine, keep foot on brake and directional lever in neutral.**



9. Place the vacuum hose and handle back in their storage positions when not using the machine.



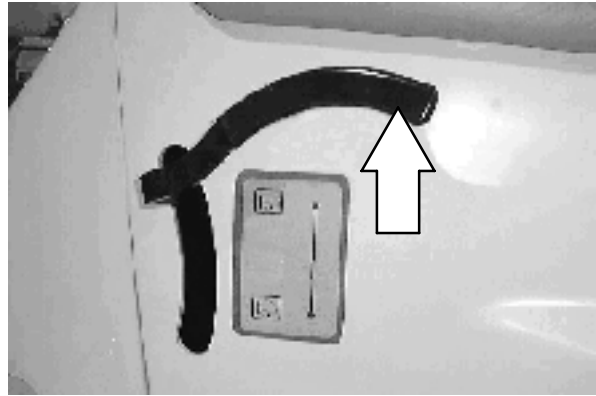


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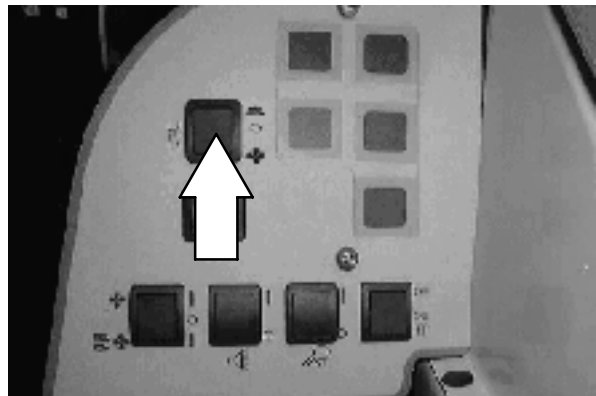
**STOP CLEANING**

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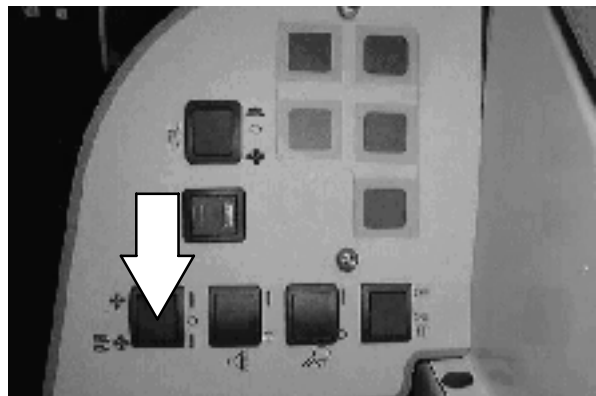
1. Raise the vacuum head with the vacuum head control lever.



2. Press the water pump switch to the middle off position.



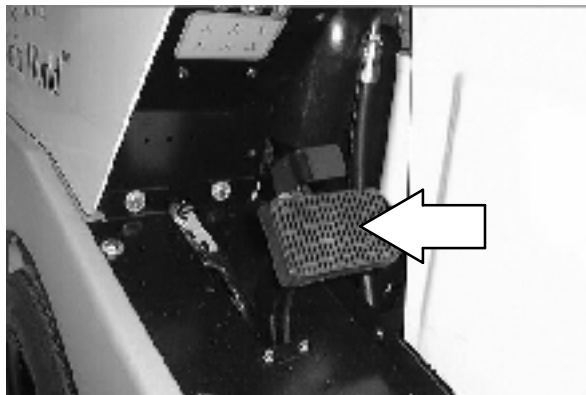
3. Press the vacuum fan/side brushes switch to the middle off position.



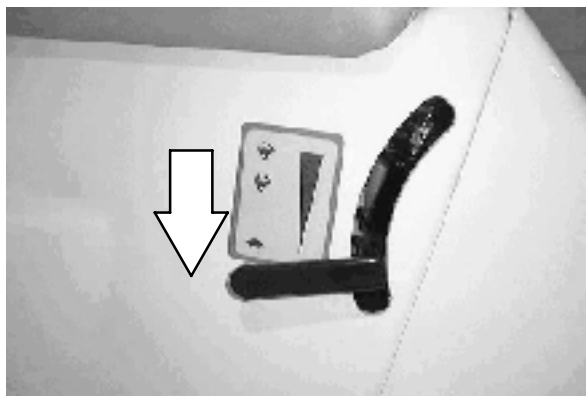
## STOPPING THE MACHINE

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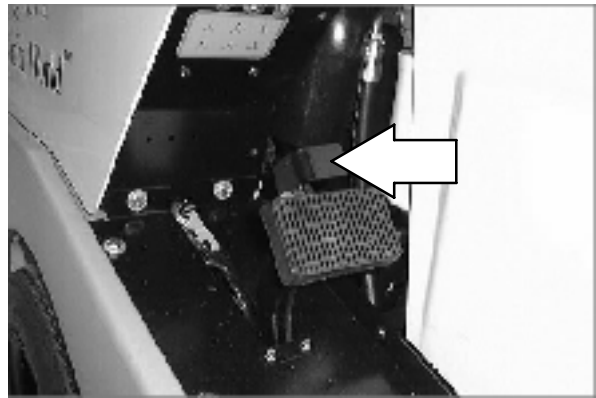
1. Stop cleaning. See the STOP CLEANING section of the manual.
2. Release the directional lever. Step on the brake pedal.



3. Move the throttle lever back into the Idle engine speed position.

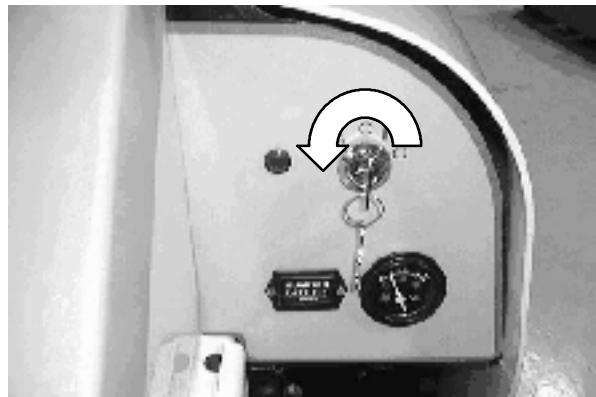


4. Set the machine parking brake.



5. Turn the machine power off. Remove the switch key.

**FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake, turn off machine, and remove key.**

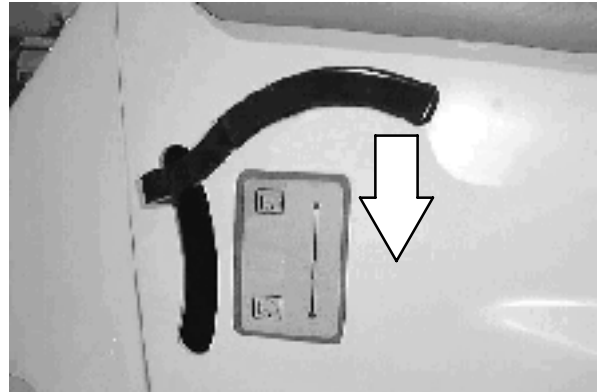


## EMPTYING THE DEBRIS HOPPER

The debris hopper can be used by itself or with 114 L (30 gallon) trash bag liners.

1. Stop cleaning. See the STOP CLEANING section of the manual.
2. Drive the machine to the debris site or debris container.
3. Lower the vacuum head.
4. Stop the machine. See the STOP THE MACHINE section of the manual.

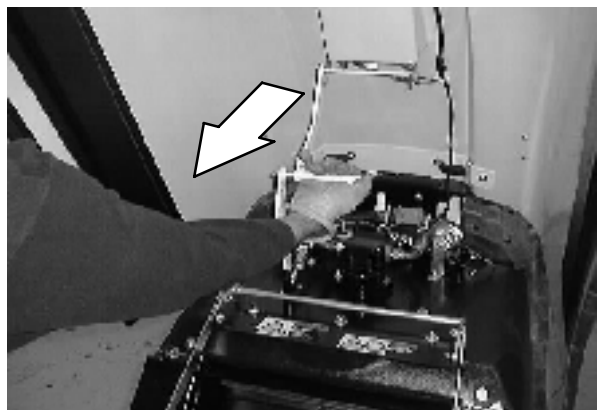
**FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake, turn off machine, and remove key.**



5. Lift and hold up the hopper cover.



6. Pull on the cover prop rod to lock cover in open position.



- Firmly lower the hopper securing bar to lower and release the debris hopper.

**⚠ WARNING: Sharp objects in debris canister. Wear gloves.**



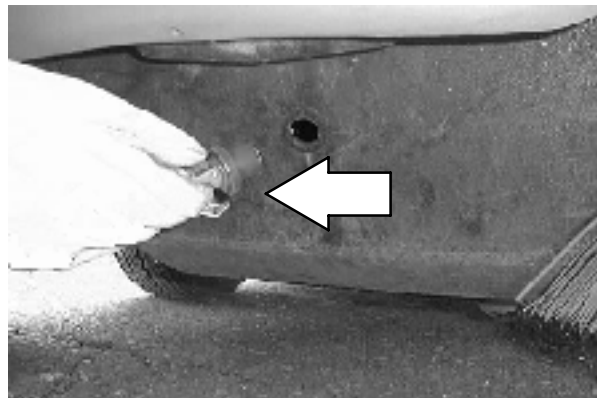
- Pull hopper down towards front of machine and remove bag liner.

*Note: If the operator is not using trash bag liners, simply remove and empty the entire hopper after draining any excess water out of hopper.*

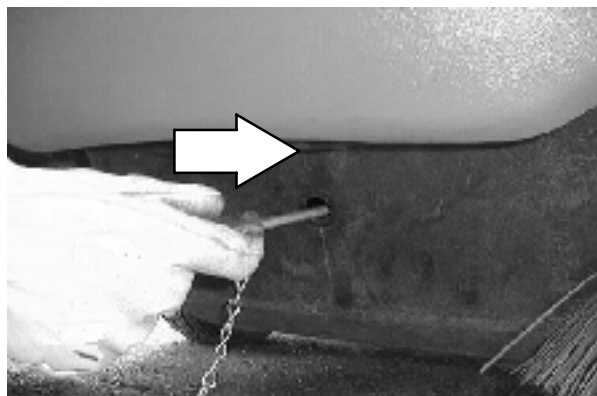
**⚠ WARNING: Sharp objects in debris canister. Wear gloves.**



- Unplug hopper drain plug to remove any excess water from the hopper.



- Poke a drain hole in the garbage bag liner (if used) with a screwdriver to allow any excess water to drain out. Reinsert the screwdriver every few minutes to clear the opening of any debris. Replace the drain plug when water is finished draining.



## OPERATION

11. Tie off bag and dispose of waste. Wet debris can be heavy. If the hopper bag liner is heavy, get help to lift and dispose of the debris.

 **WARNING: Sharp objects in debris canister. Wear gloves.**

 **WARNING: Heavy hopper. Do not remove without help.**



12. Remove and empty the debris hopper if bag liners are not being used. Wet debris can be heavy. If the hopper is heavy, get help to lift it and dispose of the debris.

 **WARNING: Sharp objects in debris canister. Wear gloves.**

 **WARNING: Heavy hopper. Do not remove without help.**



13. Clean the inside of the hopper compartment by scraping any compacted debris with a scraper. Use a stiff broom or brush to clean the vacuum screen.

The inner top part of the hopper compartment can be sprayed with water as well. Do not spray water on the inside walls of the hopper compartment or anywhere on the outside of the hopper compartment. If this is done, water can seep into the electrical components and damage them.

**FOR SAFETY: When servicing machine wear eye and ear protection if using pressurized air or water.**



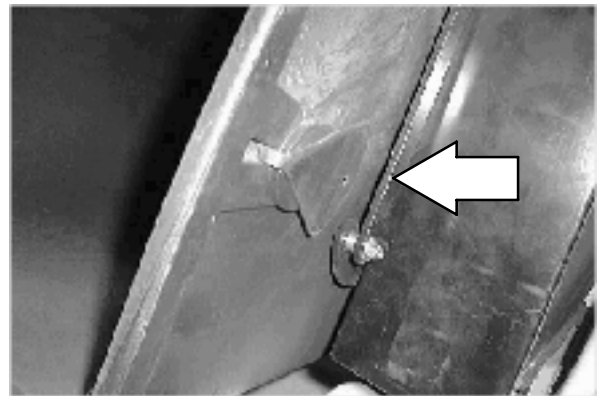
14. Place a new trash bag over the bag liner if using trash bags.



15. Insert new bag and liner, or debris hopper if not using bags, back in the machine.

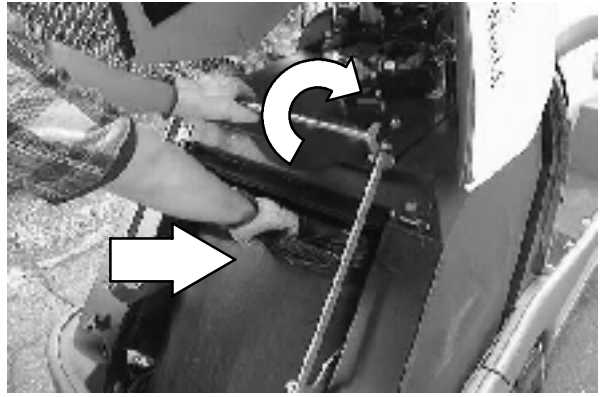


16. Check that the hopper track guides are resting properly on the hopper tracks on both sides of the debris hopper.

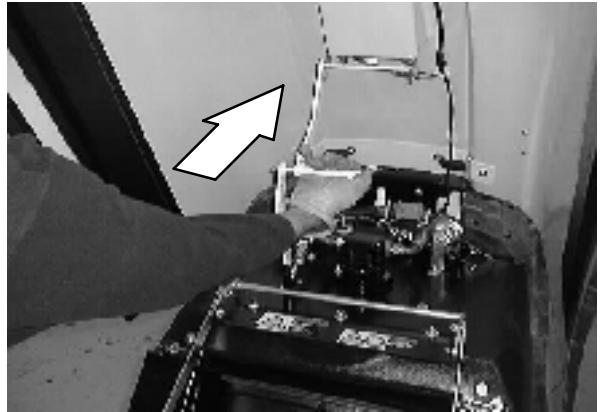


## OPERATION

17. Push and hold hopper back into place.  
Secure the hopper with hopper secure lever.



18. Hold up the hopper cover while pushing the prop rod in.



19. Close the hopper cover.





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**REMOVING HOPPER DUST FILTERS**

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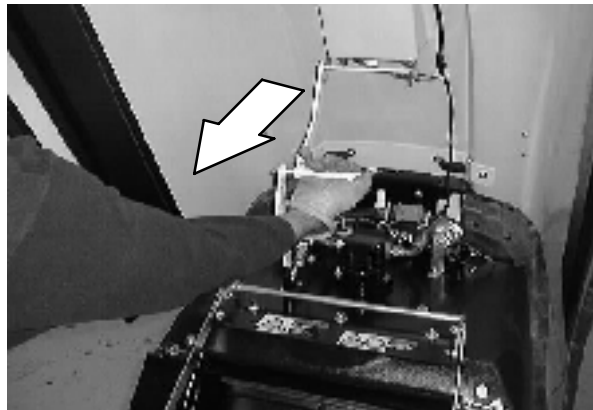
1. Stop the machine, set the parking brake and turn the machine power off.

**FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake, turn off machine, and remove key.**

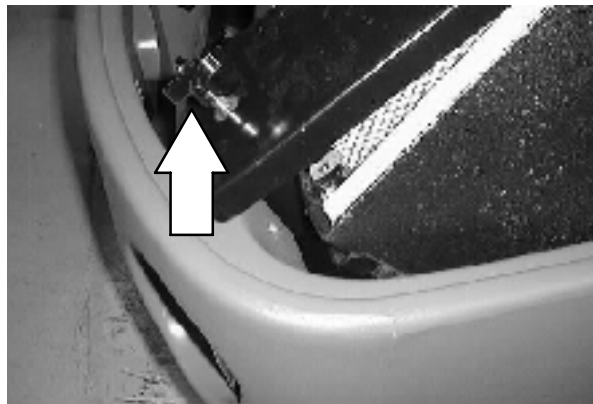
2. Lift and hold up the hopper cover.



3. Pull on the cover prop rod to lock cover in open position.

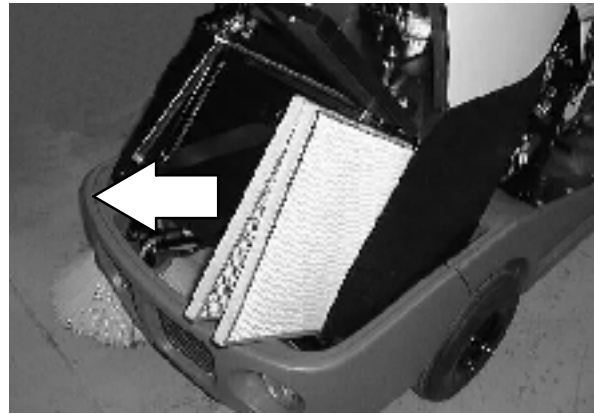


4. Unscrew the dust filter housing cover bolts, and open the dust filter housing covers.



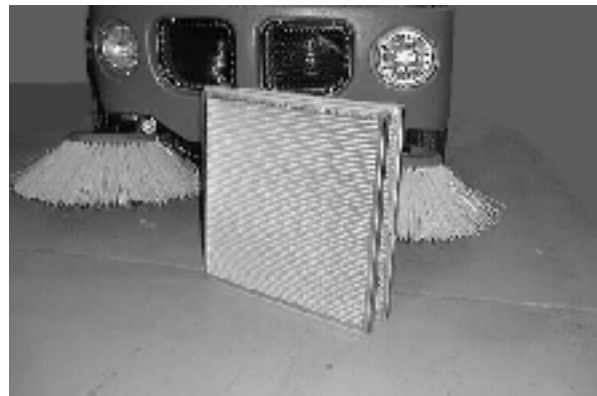
## OPERATION

5. Remove the hopper dust filters from the machine.

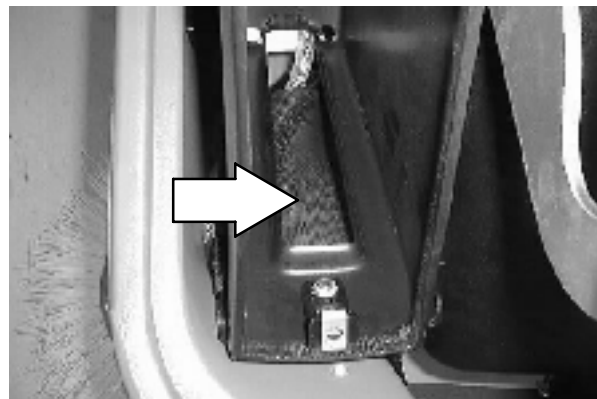


6. Clean the dust filters as required. See the DEBRIS HOPPER section in the MAINTENANCE section of the manual.

*NOTE: If taken care of properly, the filters can provide up to two years of service.*

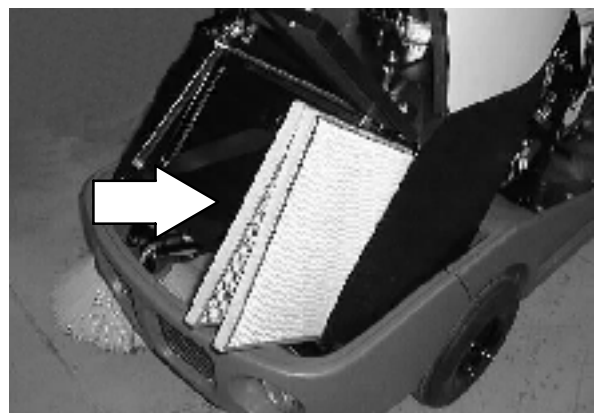


7. Clean the diffuser screens in the bottom of the filter housings and check for damage.

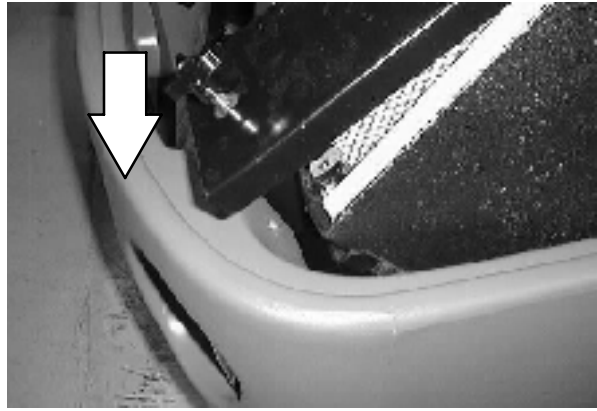


8. Replace the new or cleaned filters back in the hopper filter housings.

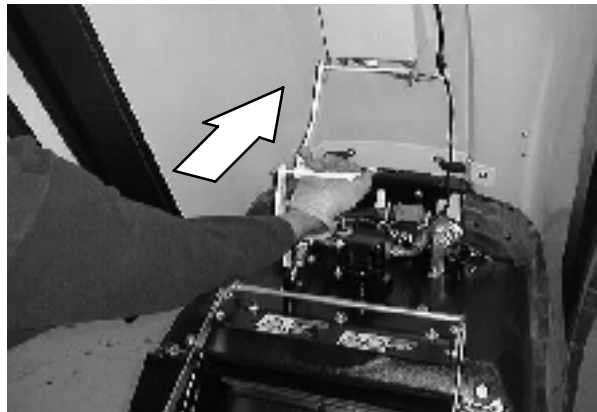
**NOTE: Check that the filters are inserted in an upside down "V" formation with the taped edges on top and the filter reinforcing screen on the inside of the filters.**



9. Close the dust filter housing covers and secure with the housing cover bolts.



10. Hold up the hopper cover while pushing the prop rod in.



11. Close the hopper cover.



## POST-OPERATION CHECKLIST

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Check this list of items after you have finished sweeping:

- Check the vacuum hoses for cracks or wear.
- Check the vacuum fan screen for debris.
- Check the hopper and seals for debris or damage.
- Check the vacuum head skirts for damage and wear.
- Check for large debris lodged in the vacuum hoses.
- Check for fuel odor that indicates a fuel leak.
- Check under the machine for leak spots (fuel, oil, coolant).
- Check the service records to determine maintenance requirements.

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**OPTIONS**

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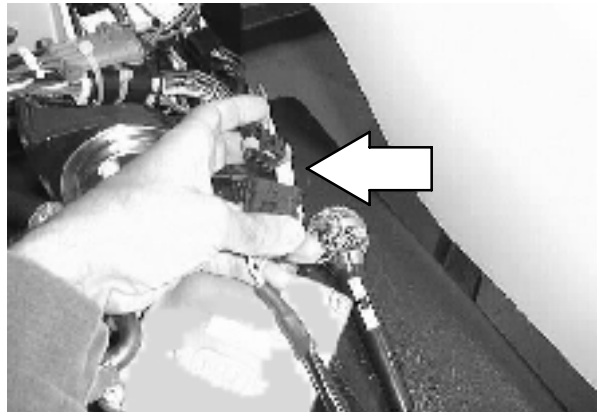
**VOICE BOX**

The voice box holds an 18 second pre-recorded message from the operator that warns pedestrians and other traffic of machine operation.

1. Stop the machine. See the STOPPING THE MACHINE section of the manual.

**FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake, turn off machine, and remove key.**

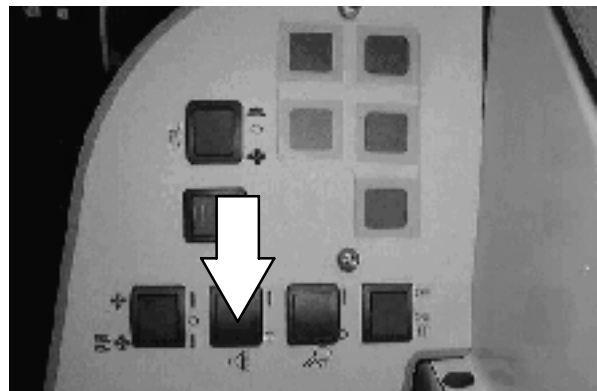
2. Turn the machine accessory power on.
3. Lift the hopper cover and connect the microphone/recording switch to the wire harness on top of the hopper, next the horn.



4. Press and hold the microphone recording button. Record a message up to 18 seconds long into the microphone. Release the microphone recording button when finished. Disconnect the microphone, and close hopper.



5. Press the top of the voice box switch to play the recorded message back continuously. Press the bottom of the voice box switch to stop the message from playing.



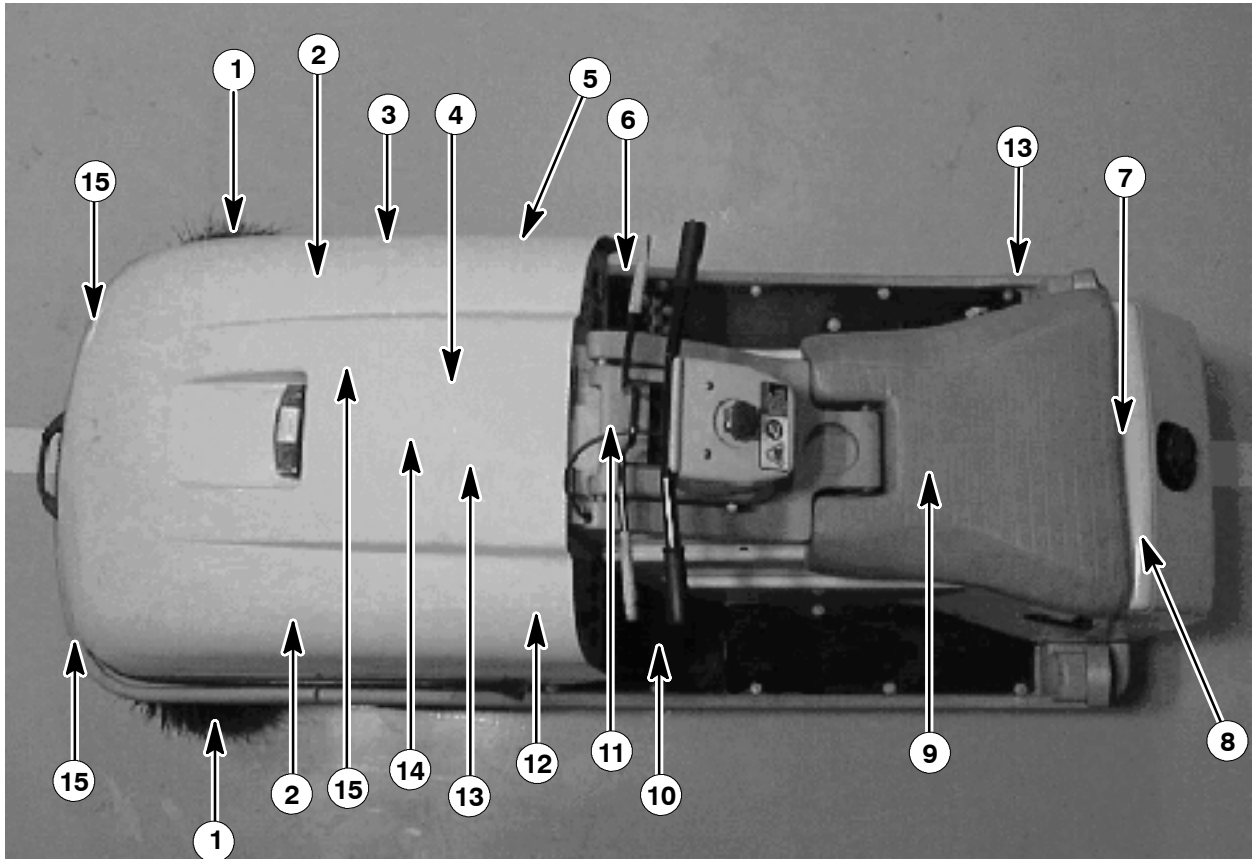
# OPERATION

## MACHINE TROUBLESHOOTING

Problem	Cause	Remedy
Machine does not start	Glow plug not warmed up properly	Turn key to warm up glow plug
	Power kill switch on	Turn kill switch clockwise until it pops up. Turn machine off and on
	Steering assembly safety switch on	Tighten steering assembly knob
	Fuel filter plugged	Replace fuel filter
	Fuel pump damaged	Replace fuel pump
	Main fuse blown	Check fuses
Machine does not propel	Parking brake on	Release parking brake
	Towing valve open	Turn valve to vertical position
Poor cleaning performance	Vacuum head or hose clogged	Remove clog
	Hopper dust filters clogged	Clean or replace dust filter
	Hopper vacuum fan clogged	Clean vacuum fan screen
	Side brush bristles worn	Replace side brushes
	Side brush drive failure	Contact Tennant service personnel
	Vacuum head not lowered	Lower vacuum head
	Vacuum head skirt damaged	Replace worn vacuum skirt
	Debris hopper full	Empty debris hopper
	Driving too fast for conditions	Decrease operating speed
	Engine throttle too low	Increase engine throttle
	Hopper seals worn or damaged	Replace hopper seals
	Vacuum damper in the wrong position	Turn damper lever to change vacuum damper position
	Vacuum fan failure	Contact Tennant service personnel
Vacuum fan failure	Thermo Sentry™ activated	Allow Thermo Sentry to cool and reset
	Hopper cover safety switch on	Lower hopper cover
Low vacuum fan speed	Soft start not functioning	Contact Tennant service personnel

Excessive dusting	Dust control nozzles clogged	Clean nozzles
	Wet dust control system not on	Press water pump switch to activate one of the water pumps
	Water tank empty	Fill water tank
	Water hose damaged	Replace water hose
	Water pump failure	Contact Tennant service personnel
	Dust control spray nozzles not properly aligned	Realign dust control spray nozzles
	Filter outlet diffusers clogged	Clean diffusers
	Filter damaged	Replace damaged filter

**MAINTENANCE**



**MAINTENANCE CHART**

*NOTE: Check procedures indicated (■) after the first 50 hours of operation.*

Interval	Key	Description	Procedure	Lubricant/ Fluid	No. of Service Points
Daily	1	Side brushes	Check for damage, wear and adjustment	-	2
			Check brush pattern	-	2
	2	Hopper dust filters	Clean and check for damage	-	2
	2	Diffuser screens	Clean and check for damage	-	2
	4	Vacuum fan screen	Check for debris and clean	-	1
	4	Vacuum fan damper	Check for debris and clean	-	1
	9	Engine air filter	Check dust cap	-	1
			Replace element as necessary	-	1
	9	Engine crankcase	Check oil level	EO	1
	13	Vacuum hoses	Check for damage, wear and blockage	-	2
	14	Vacuum head and skirt	Check for damage and wear	-	1
15	Spray nozzles	Check for damage, wear and adjustment	-	3	



Interval	Key	Description	Procedure	Lubricant/ Fluid	No. of Service Points
100 Hours	2	Filter seals	Check for damage or wear	-	8
	2	Filter housing cover seals	Check for damage or wear	-	2
	4	Hopper seal	Check for damage or wear	-	1
	3	Hopper cover seal	Check for damage or wear	-	1
	5,7	Tires	Check for correct pressure, damage or wear	-	4
	6	Hydraulic fluid reservoir	Check fluid level	HYDO	1
	8	Radiator	Clean core exterior	-	1
			Check coolant level	-	1
	9	Engine	Replace air filter element	-	1
	9	Engine crankcase	Change oil and filter element	EO	1
	9	Engine belt	Check belt tension	-	1
	9	Fuel lines	Check for damage and wear	-	-
200 Hours	8	Radiator hoses and clamps	Check for tightness and wear	-	2
	10	Brake pedal	Check travel adjustment	-	1
400 Hours	9	Engine	Change fuel filter	-	1
	7	Rear wheel support bearings	Check and lubricate	SPL	2
800 Hours	6	Hydraulic fluid reservoir	Change hydraulic fluid	HYDO	1
			Replace suction strainer	-	1
			Replace hydraulic breather cap	-	1
	12	Hydraulic fluid filter	Change filter element	-	1
	-	Hydraulic hoses	Check for wear and damage	-	All
	-	Water lines and clamps	Check for damage, tension and wear	-	11/20
	8	Cooling system	Flush and change engine coolant	WG	1
	5,7	Wheel nuts	■Torque wheel nuts	-	4
11	Battery	■Clean and tighten battery cable connections	-	1	

**LUBRICANT/FLUID**

EO . . . . Engine oil, diesel rating *above* CD grade only

HYDO... Tennant or approved hydraulic fluid

SPL..... Special lubricant, Lubriplate EMB grease (TENNANT part no. 01433-1)

WG..... Water and permanent-type ethylene glycol anti-freeze, -34° C (-30° F)

*NOTE: More frequent intervals may be required in extremely dusty conditions.*

## LUBRICATION

### ENGINE

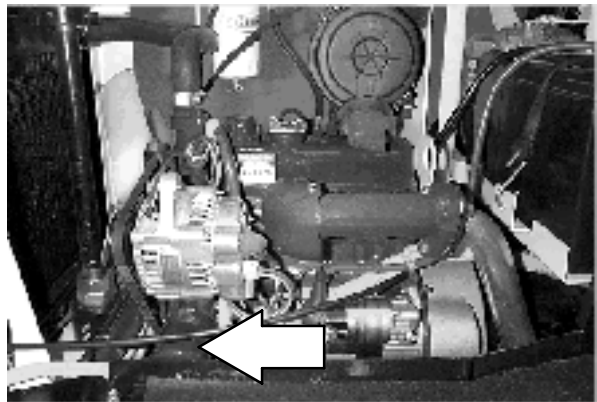
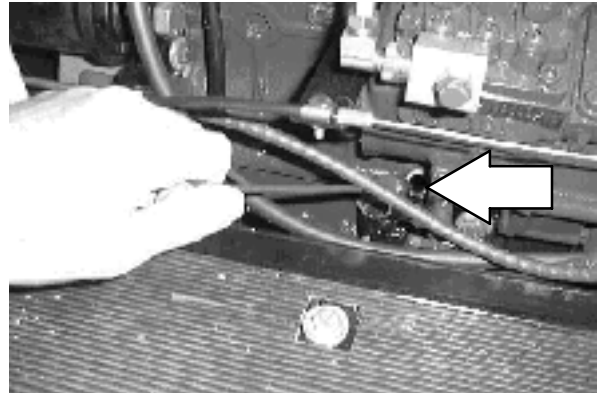
Check the engine oil level daily. Change the engine oil and oil filter after every 100 hours of operation. Use engine oil with a diesel rating *above* CD grade.

Fill the engine with oil to the level indicated on the oil dipstick. Low oil level is indicated by the mark closest to the end of the dipstick. Full level is indicated by the mark closest to the top of the dipstick. The engine oil capacity is 3.25 L (3.4 qt) without the oil filter.

The engine oil drain plug is located underneath the machine on the bottom of the oil pan.

The engine oil filter is mounted on the right side of the machine, under the engine alternator.

 **WARNING: Moving fan blades. Keep away.**



### REAR WHEEL SUPPORT BEARINGS

The rear wheel support bearings have two grease fittings on the collar between the bearings. They are located at the base of the rear wheel support shaft, in front of the radiator.

Lubricate with Lubriplate EMB grease (Tennant part number 01433-1) after every 400 hours of machine operation.



**HYDRAULICS**

**HYDRAULIC FLUID RESERVOIR**

The reservoir is located on the right side of the machine under the right side foot rest.

Remove the two mounting screws and the protective cover plate to access the hydraulic tank and filler cap.

The filler cap is mounted on top of the reservoir. It has a built-in breather and fluid level dipstick. Replace the cap after every 800 hours of operation.

Lubricate the filler cap gasket with a film of hydraulic fluid before putting the cap back on the reservoir.

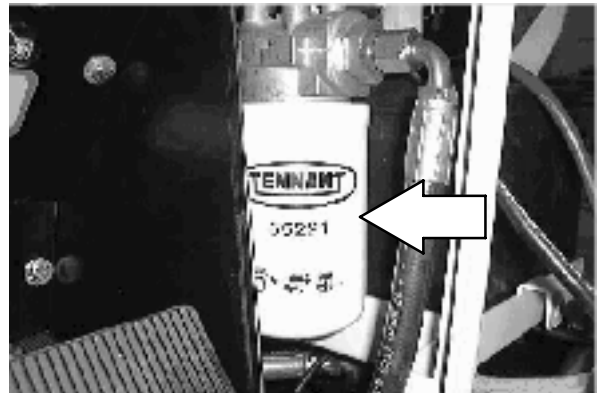
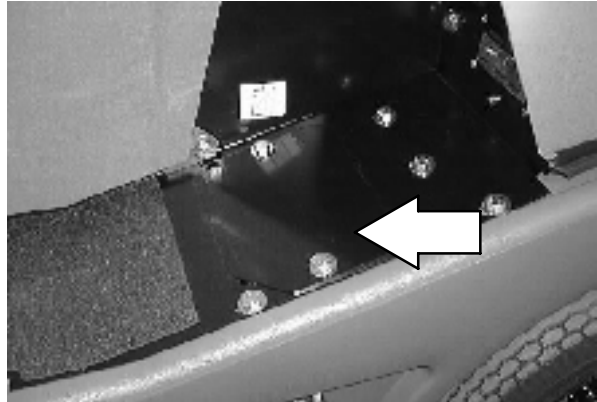
The reservoir has a built-in strainer outlet that filters hydraulic fluid before it enters the system. Replace the strainer after every 800 hours of operation.

Check the hydraulic fluid level at operating temperature after every 100 hours of operation. The end of the dipstick is marked with FULL and ADD levels to indicate the level of hydraulic fluid in the reservoir.

**ATTENTION! Do not overfill the hydraulic fluid reservoir or operate the machine with a low level of hydraulic fluid in the reservoir. Damage to the machine hydraulic system may result.**

Drain and refill the hydraulic fluid reservoir with new hydraulic fluid after every 800 hours of operation.

The hydraulic fluid filter is located on the left side of the engine compartment, close to the brake pedal on the left side of the machine. Replace the filter element after every 800 hours of operation.



## HYDRAULIC FLUID

The quality and condition of the hydraulic fluid play a very important role in how well the machine operates. Tennant's hydraulic fluid is specially selected to meet the needs of Tennant machines.

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

Tennant hydraulic fluid	
Part number	Ambient temperature
65869	above 7° C (45° F)
65870	below 7° C (45° F)

The higher temperature fluid has a higher viscosity and should not be used at the lower temperatures. Damage to the hydraulic pumps may occur because of improper lubrication.

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

If a locally available hydraulic fluid is used, make sure the specifications match Tennant hydraulic fluid specifications. Using substitute fluids can cause premature failure of hydraulic components.

**ATTENTION! Hydraulic components depend on system hydraulic fluid for internal lubrication. Malfunctions, accelerated wear, and damage will result if dirt or other contaminants enter the hydraulic system.**

## HYDRAULIC HOSES

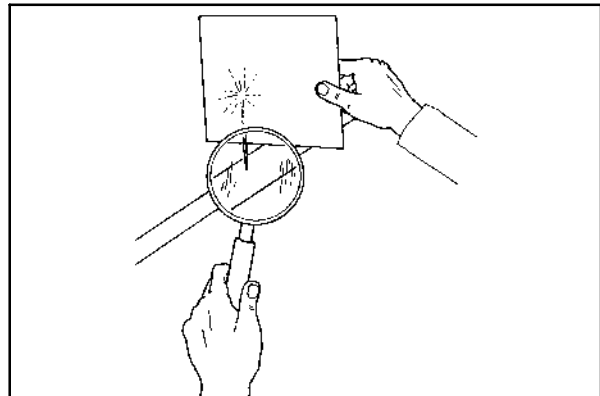
Check the hydraulic hoses after every 800 hours of operation for wear or damage.

Fluid escaping at high pressure from a very small hole can be almost invisible, and can cause serious injuries.

See a doctor at once if injury results from escaping hydraulic fluid. Serious infection or reaction can develop if proper medical treatment is not given immediately.

**FOR SAFETY: When servicing machine, use cardboard to locate leaking hydraulic fluid under pressure.**

If you discover a fluid leak, contact your mechanic or supervisor.



00002

**ENGINE**

**COOLING SYSTEM**

Check the radiator coolant level every 100 hours of operation. Use clean water mixed with a permanent-type, ethylene glycol antifreeze to a -34° C (-30° F) rating.

**FOR SAFETY: When servicing machine, avoid contact with hot engine coolant.**

 **WARNING: Moving fan blades. Keep away.**

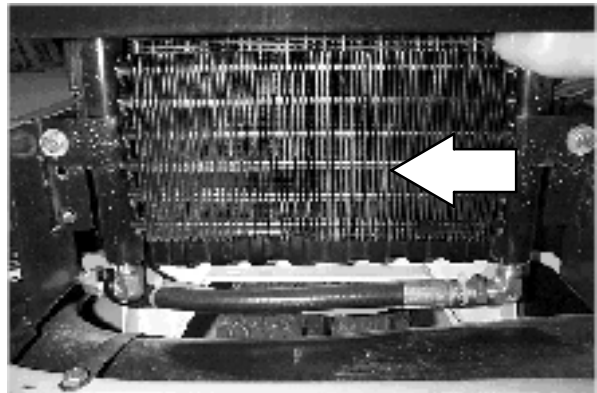
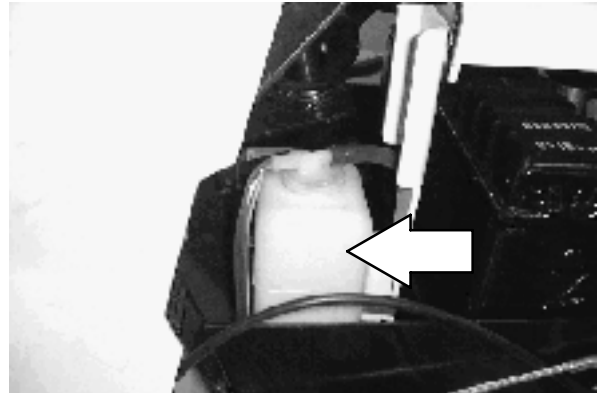
Check the radiator hoses and clamps every 200 hours of operation. Tighten the clamps if they are loose. Replace the hoses and clamps if the hoses are cracked, hardened or swollen.

Check the radiator core exterior and hydraulic cooler fins for debris every 100 hours of operation. Blow or rinse all dust, which may have collected on the radiator, in through the grill and radiator fins, opposite the direction of normal air flow. Be careful not to bend the cooling fins when cleaning. Clean thoroughly to prevent the fins becoming encrusted with dust. Clean the radiator and cooler only after the radiator has cooled to avoid cracking.

**FOR SAFETY: When servicing machine, wear eye and ear protection if using pressurized air or water.**

 **WARNING: Moving fan blades. Keep away.**

Flush the radiator and cooling system every 800 hours of operation, using a dependable cleaning compound.

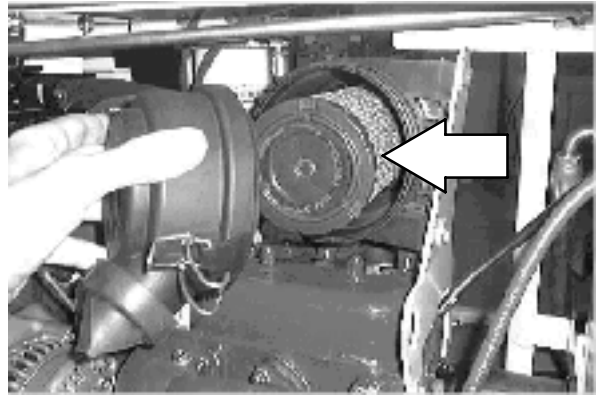


## MAINTENANCE

### AIR FILTER

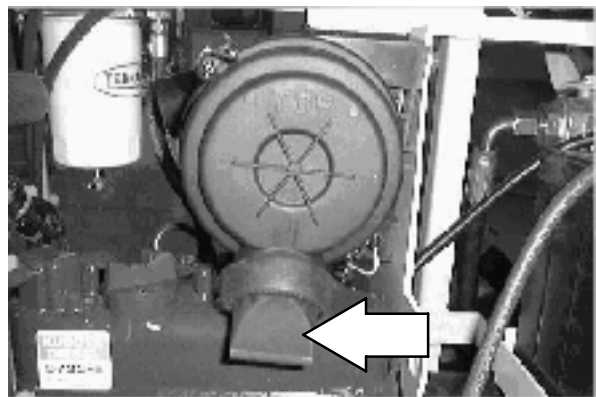
The engine air filter housing has an end cap, a rubber dust cap and a dry cartridge-type air filter element. Check the dust cap daily to make sure it is expelling dust. Replace the dust cap if the rubber is worn.

The air filter must be replaced every 100 hours or if it becomes damaged. The air filter cannot be cleaned.



Before placing new filter in housing, carefully clean interior of filter housing and end cap with damp cloth.

Install the filter end cap on the air filter housing with the arrows pointing up and the rubber dust cap on the bottom.

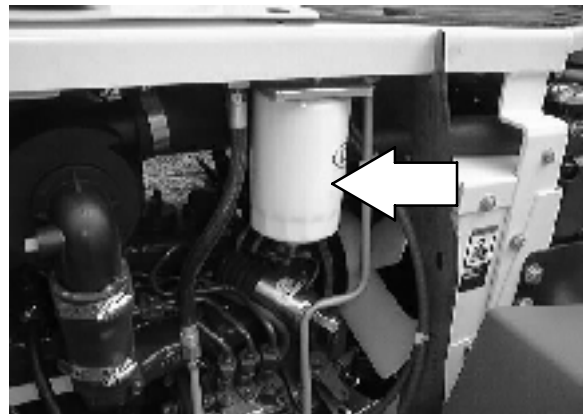


### FUEL FILTER

The fuel filter has an element that filters impurities from the diesel fuel. It is located on the left side of the engine in the engine compartment.

Replace the fuel filter after every 400 hours of operation.

**FOR SAFETY: When servicing machine, keep flames and sparks away from fuel system service area. Keep area well ventilated.**

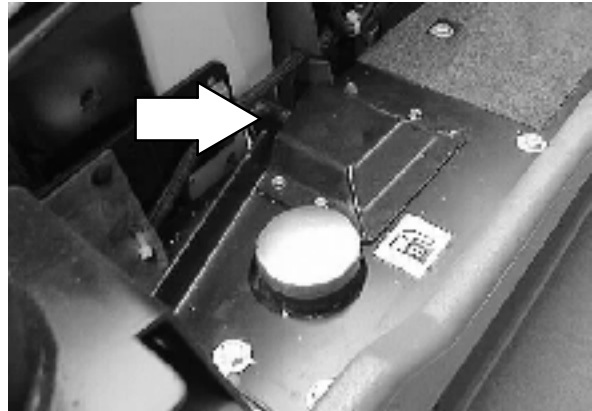


**FUEL LINES**

Check the fuel lines every 100 hours of operation. If a band clamp becomes loose, apply oil to the screw on the band, and securely tighten the band.

Made of rubber, the fuel lines may become worn out whether the engine has been used much or not. Replace the fuel lines and hose clamps every two years.

**FOR SAFETY: When servicing machine, keep flames and sparks away from fuel system service area. Keep area well ventilated.**



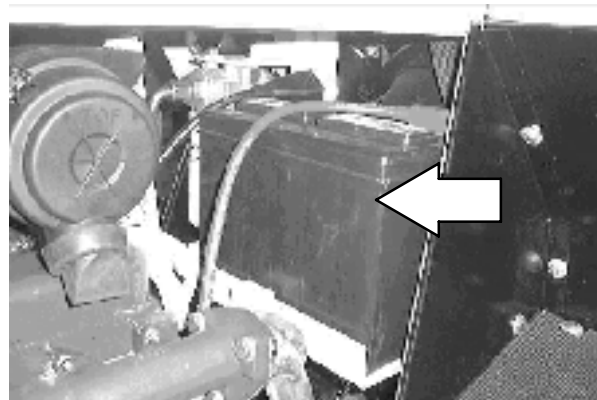
**BATTERY**

The battery for the machine is a low maintenance battery. Do not add water to the battery, or remove the battery vent plugs.

The battery is located in the front of the engine compartment.

After the first 50 hours of operation, and after every 800 hours after that, clean and tighten the battery connections.

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



## BELTS AND CHAINS

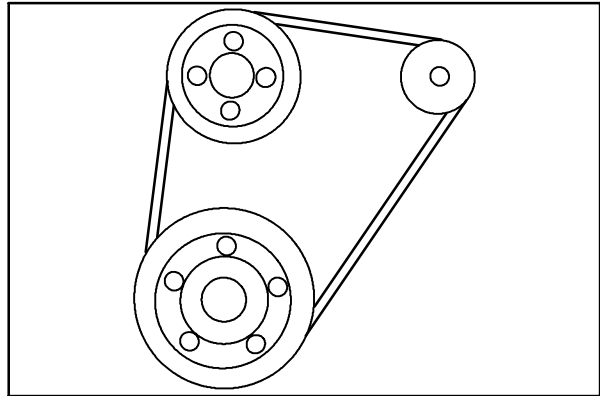
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### ENGINE BELT

The engine fan belt is driven by the engine crankshaft pulley and drives the alternator pulley. Proper belt tension is 10 mm (0.40 in) from a force of 10 kg (22 lb) applied at the mid-point of the longest span.

Check and adjust the belt tension every 100 hours of operation.

 **WARNING: Moving Belt And Fan Blades. Keep Away.**





**DEBRIS HOPPER**

**HOPPER DUST FILTER INFORMATION**

The hopper dust filters filter the air pulled up from the hopper. The filters need to be removed and cleaned to remove debris and dust particles.

Clean the filters daily after emptying the hopper.

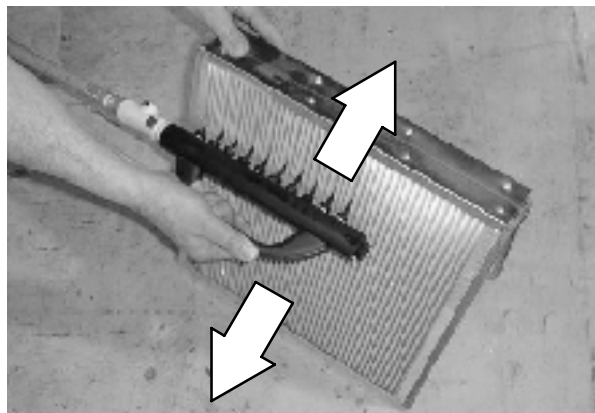
If taken care of properly, the filters can provide up to two years of service.

The filter panel media is a synthetic material, and can be either gently shaken or tapped to clean when dry or washed clean with a garden hose or the filter cleaning tool (option):

**FOR SAFETY: When servicing machine, wear eye and ear protection if using pressurized air or water.**

- Dry - Remove the filters and gently tap them on a hard surface or over a wastebasket to clean. The filters can be placed inside a garbage bag before tapping to help contain dust.
- WATER - Rinse the dust filters with a garden hose or the filter cleaning tool (option) until they are clean. The filters should be left out to dry overnight. If the filters are still damp when reinstalled, allow the machine to run stationary with the fan on for 5-10 minutes. The fan airflow will dry out the filters. If the machine is not going to be used after the filters are washed, it is recommended that the filters be left out to dry to prevent mold from developing.

**NOTE: Check that the filters are inserted in an upside down "V" formation with the taped edges on top.**

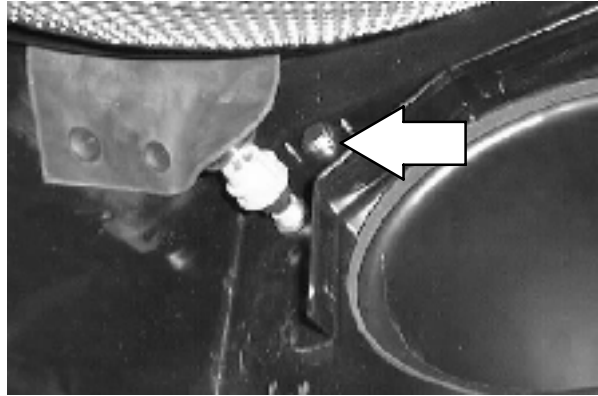


## MAINTENANCE

### THERMO SENTRY™

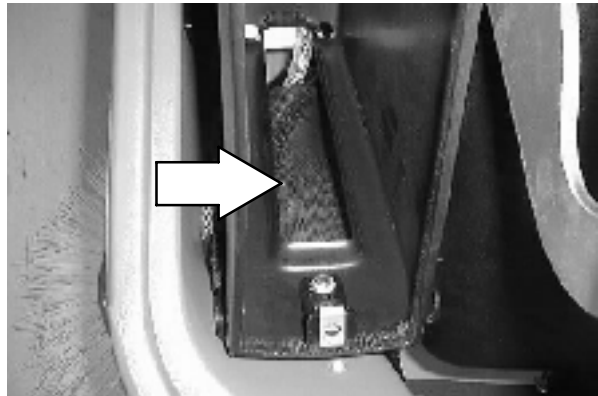
The Thermo Sentry™ is located in the vacuum fan compartment, above the debris hopper.

If a fire ignites in the hopper, the Thermo Sentry™ light will come on, and the Thermo Sentry™ will shut off the vacuum fan. If this occurs, drive the machine to a safe location and eliminate the source of heat. Turn the vacuum fan switch off and back on to reset the vacuum fan.



### DIFFUSER SCREENS

The diffuser screens are located on the bottom of the filter housings. Clean and check the screens for damage daily.



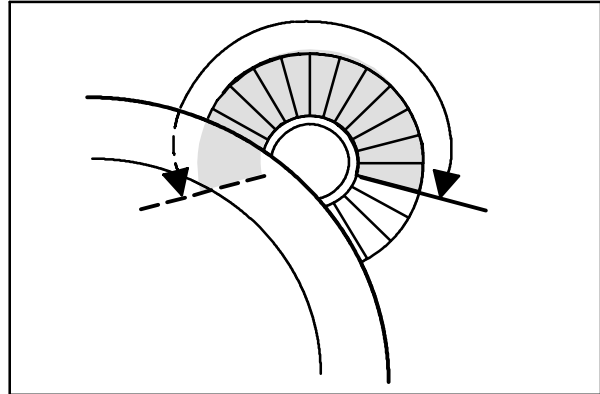
**BRUSHES**

**SIDE BRUSHES**

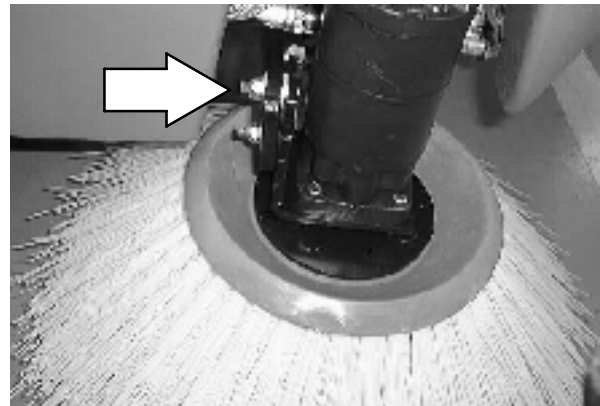
The side brushes sweep debris from the outer edges of the machine into the path of the main vacuum head.

Check the brushes daily for wear or damage. Remove any string or wire found tangled on the side brushes or side brush drive hubs.

Check the side brush pattern daily. The side brush bristles should contact the floor in an 8 o'clock to 4 o'clock pattern when the brush is in motion.



Adjust the side to side position of the brushes with the side brush bracket weldments in the front of the side brush arms. A spacer can be added to the top bolt of the right side mounting bracket, and lower bolt on the left side mounting bracket, to help give the brushes proper tilt.



Adjust the vertical tension of the brushes with the tension spring bolt eyes. Turn the bolt eyes counterclockwise to increase the brush contact with the sweeping surface, and clockwise to decrease the brush contact with the sweeping surface.



## MAINTENANCE

The side brush should be replaced when it no longer sweeps effectively for your application. A guideline length is when the remaining bristles measure 75 mm (3 in) in length. You may need to replace the side brush sooner if you are sweeping light litter or use a brush with shorter bristles if you are sweeping heavy debris.



### REPLACING SIDE BRUSH

1. Stop the machine, set the parking brake and turn the machine power off.

**FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake, turn off machine, and remove key.**

2. Remove the side brush retaining pin from the side brush drive shaft by pulling the pin keeper off over the end of the pin.
3. Slide the side brush and washer off the side brush drive shaft.
4. Slide the washer and new side brush onto the side brush drive shaft.
5. Insert the side brush retaining pin through the side brush hub and shaft.
6. Secure the pin by clipping the pin keeper over the end of the pin.



**DUST CONTROL SYSTEM**

**SPRAY NOZZLES**

Check the spray nozzles daily for debris and adjustment. Spray the vacuum fan housing out with a garden hose daily to keep the debris hopper nozzle clean.

**FOR SAFETY: Wear eye and ear protection if using pressurized air or water.**

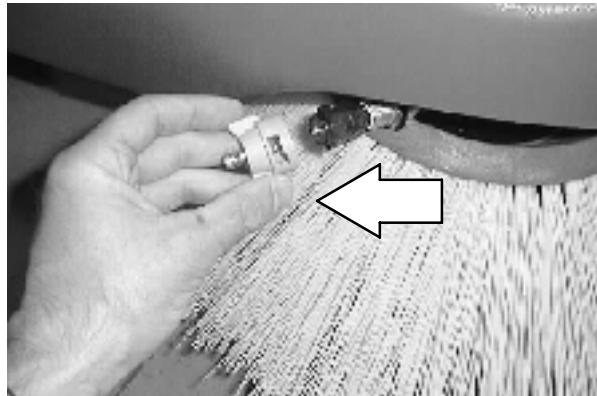
If any of the spray nozzles become blocked or clogged, they will have to be removed and cleaned.

**CLEANING AND ADJUSTING SPRAY NOZZLES**

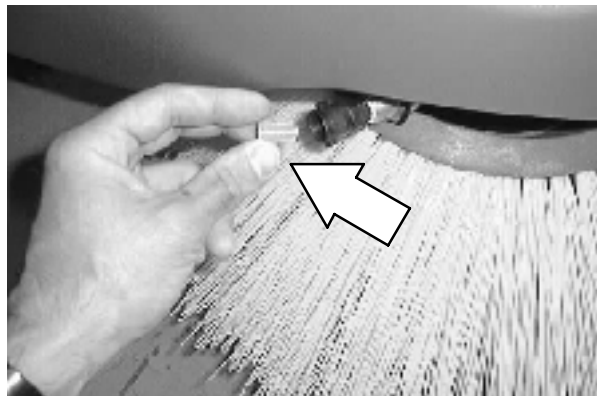
1. Stop the machine, set the parking brake and turn the machine power off.

**FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake, turn off machine, and remove key.**

2. Turn the plastic nozzle heads 1/4 turn counterclockwise and pull straight out to remove them.

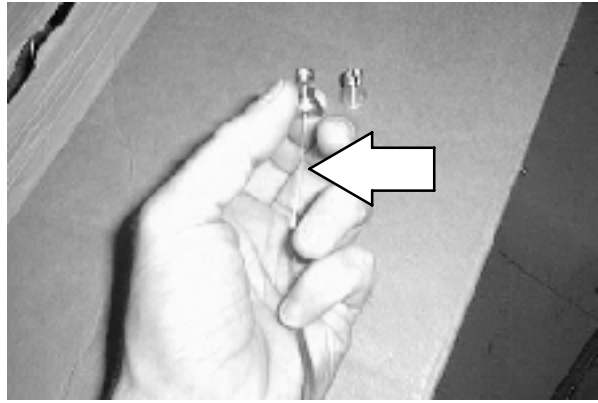


3. Remove and clean the spray nozzle filter screen.

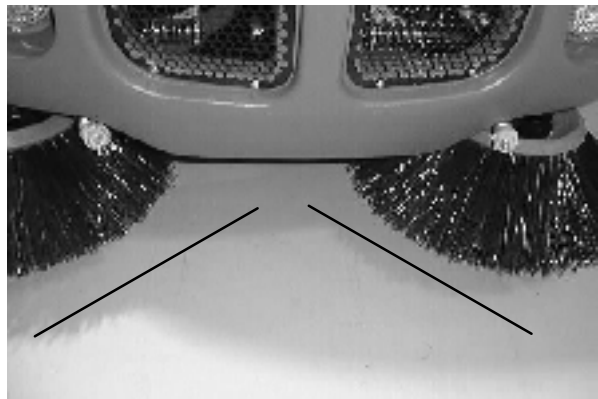


## MAINTENANCE

4. Use a piece of fine stripped electrical wire to remove any blockage from the spray nozzle.
5. Replace the filter screen and reassemble the spray nozzle. Press the spray nozzle head back into position, and secure with a 1/4 clockwise turn.
6. Turn the machine power on. Do not start the machine. Press the *vacuum fan switch* on.
7. Press the top of the *water pump switch* to turn the side brush spray nozzles on.
8. Use a standard screwdriver to turn the spray nozzle heads and adjust the spray pattern while the nozzles are spraying.



9. The adjusted side brush spray pattern should form a wide "V" pattern in front of the machine, intersecting in between the brushes.
10. Press the bottom of the *water pump switch* to turn the debris hopper spray nozzle on.
11. Use a standard screwdriver to turn the spray nozzle head and adjust the spray pattern while the nozzle is spraying.



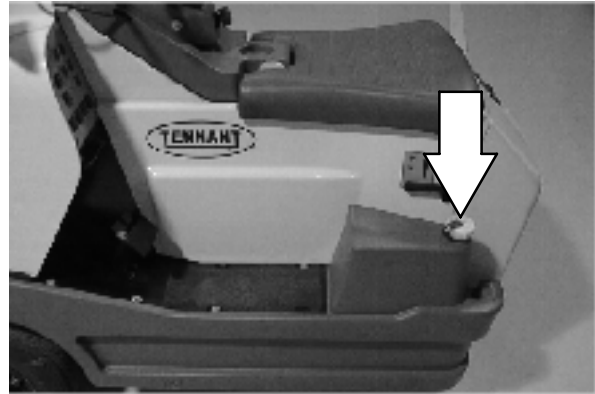
12. The adjusted debris hopper spray nozzle should spray over the main vacuum hose opening.



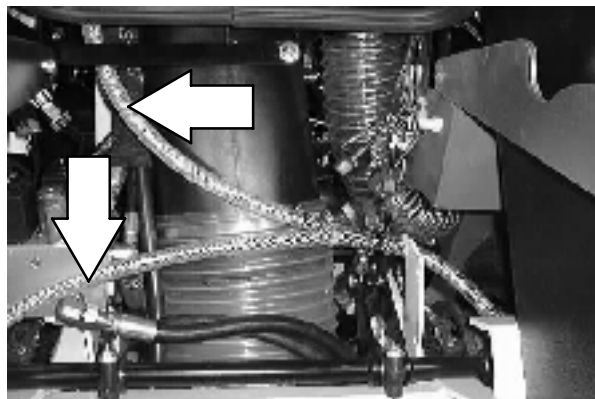
**WATER TANK**

The *water tank* holds up to 45.5 L (12 gallons) of water for the dust control system.

The tank should be drained before storing the machine for an extended period of time.



Check the water lines and clamps for damage, tension and wear every 800 hours.

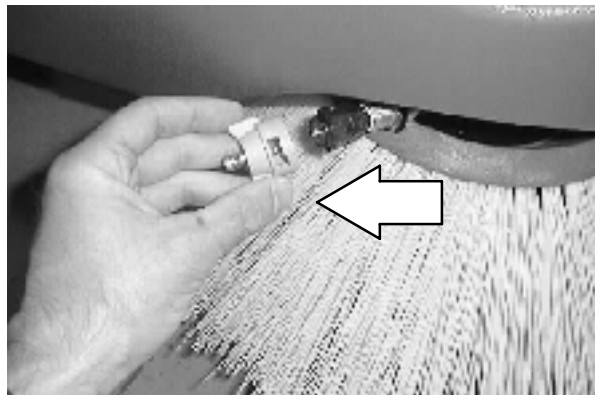


**DRAINING THE WATER TANK**

1. Stop the machine, set the parking brake and turn the machine power off.

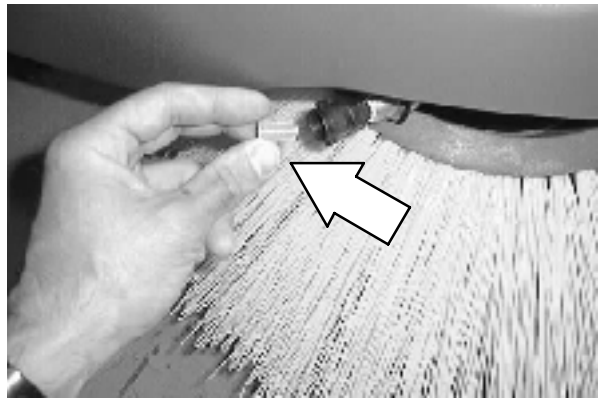
**FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake, turn off machine, and remove key.**

2. Turn one of the plastic nozzle heads 1/4 turn counterclockwise and pull the nozzle straight out to remove it.

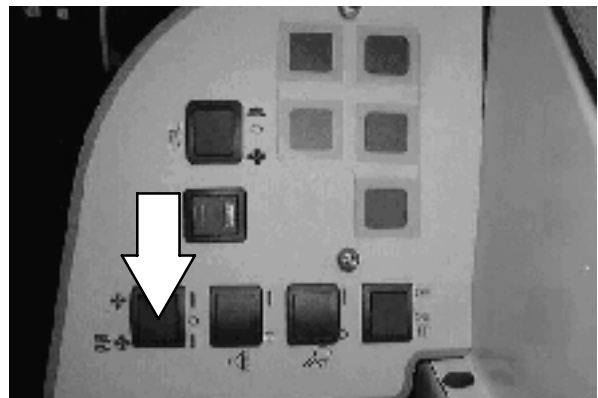


## MAINTENANCE

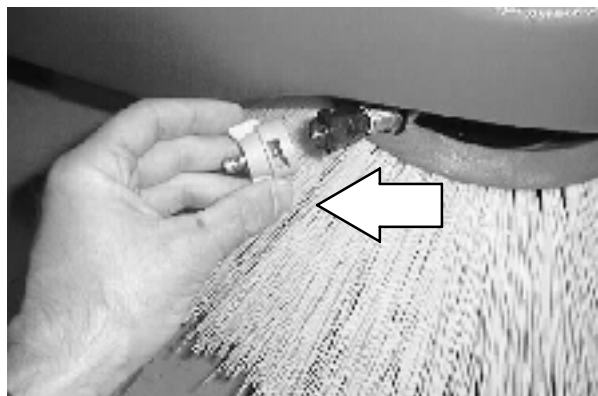
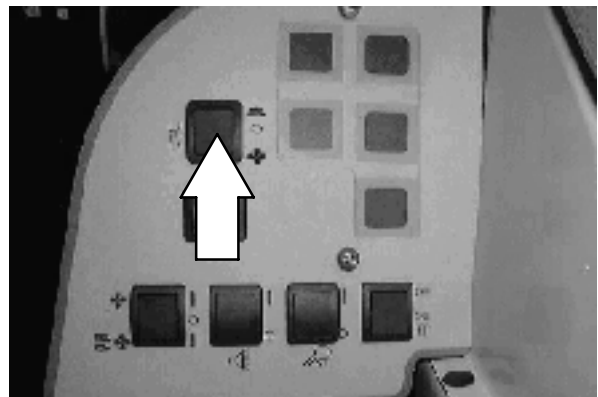
3. Remove the spray nozzle filter screen.



4. Turn the machine power on. Press the vacuum fan switch on.



5. Press the bottom of the water pump switch to turn the side brush spray nozzles on.
6. Allow the pump to operate until all the water drains out of the water reservoir.
7. Press the water pump switch to the middle off position.
8. Press the vacuum fan switch to the middle off position.
9. Turn the machine power off.
10. Replace the filter screen and spray nozzle head on the machine.





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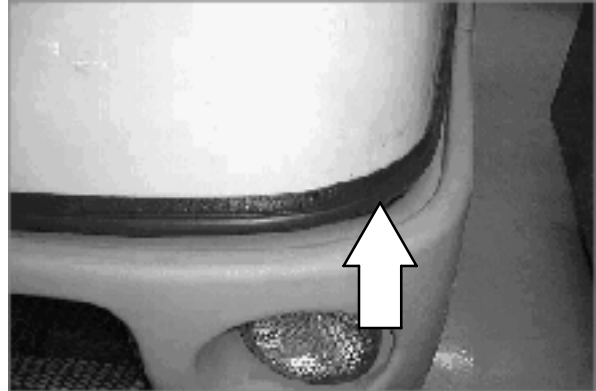
**SKIRTS AND SEALS**

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**HOPPER COVER SEAL**

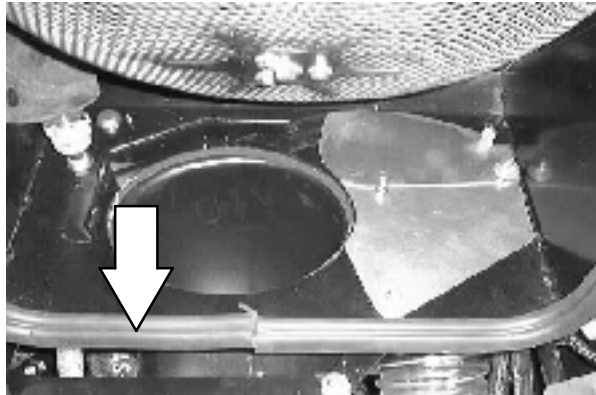
The hopper cover seal is located along the bottom edge of the hopper cover. The hopper cover rests on this seal when it is setting in the proper closed cleaning position.

Check the seal for wear or damage after every 100 hours of operation.

**HOPPER SEAL**

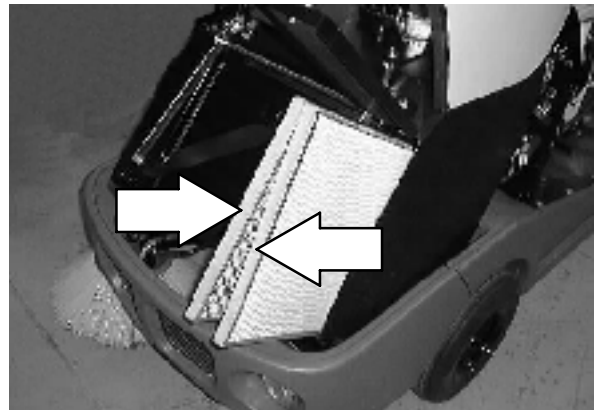
The hopper seal is located around the edges of the vacuum fan compartment. The lip of the hopper is secured against this seal when the hopper is locked in the proper cleaning position.

Check the seal for wear or damage after every 100 hours of operation.

**FILTER SEALS**

The filter seals are located on each end of the hopper filters. The filters are kept in place with the filter housing covers.

Check the filter seals for wear or damage after every 100 hours of operation.

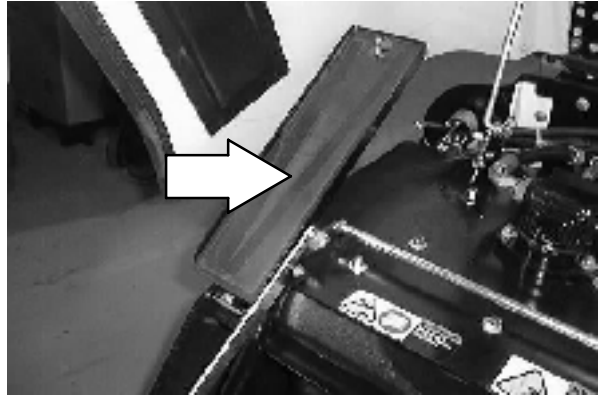


## MAINTENANCE

### FILTER HOUSING COVER SEALS

The filter housing cover seals are located on the inside of each filter housing cover. The filter housing covers provide access to the filters and keep the filters in place while the machine is operating.

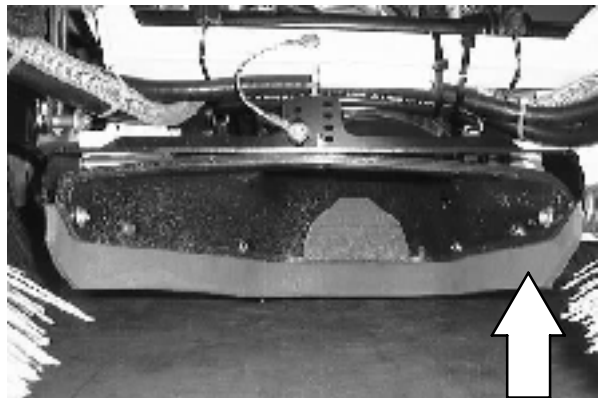
Check the filter housing cover seals for wear or damage after every 100 hours of operation.



### VACUUM HEAD SKIRT

The vacuum head skirt is located on the bottom of the vacuum head. When the vacuum head is lowered, the skirt should just rest on the cleaning surface along its entire length.

Check the skirts for wear or damage and adjustment daily.



**VACUUM SYSTEM**

**VACUUM FAN SCREEN**

The vacuum fan screen is located inside the hopper compartment. Check the vacuum fan screen for debris daily. Clean with a stiff broom if required.

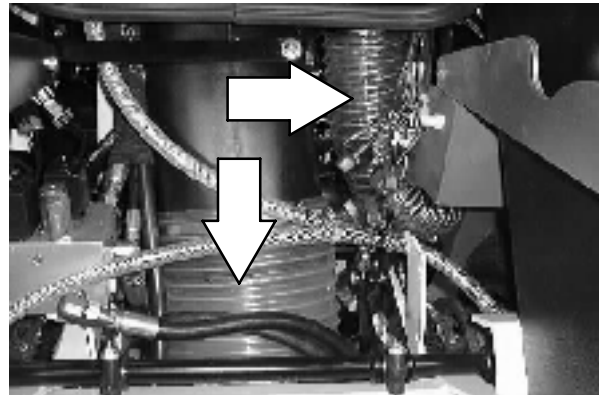
The inner top part of the hopper compartment can be sprayed with water as well. Do not spray water on the inside walls of the hopper compartment or anywhere on the outside of the hopper compartment. If this is done, water can seep into the electrical components and damage them.

**FOR SAFETY: When servicing machine, wear eye and ear protection if using pressurized air or water.**



**VACUUM HOSES**

check the vacuum hoses for blockage and damage daily.

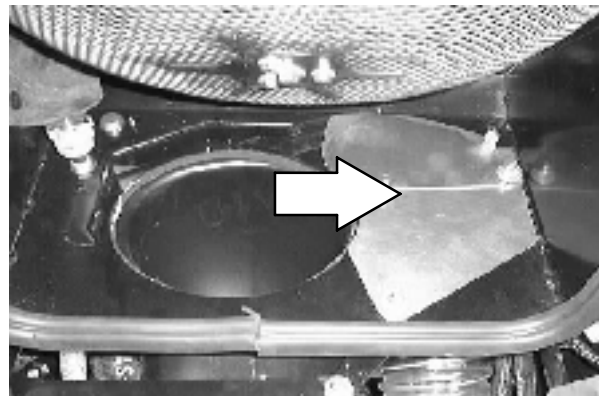


**VACUUM WAND DAMPER**

The vacuum wand damper is located behind the vacuum fan above the debris hopper. The damper is operated with the vacuum wand damper handle and controls the vacuum fan air flow between the main vacuum head and the vacuum wand. If the surface surrounding the vacuum hose openings is dirty, the damper will not seal properly.

Check the vacuum damper for proper operation and debris daily. Wash the around the vacuum fan damper with a garden hose daily after using the machine.

**FOR SAFETY: When servicing machine, wear eye and ear protection if using pressurized air or water.**



## BRAKES AND TIRES

---

### BRAKES

The brakes on the machine are front wheel disk brakes. The brakes are operated by the brake pedal and connecting rods.

Check the brake adjustment after every 200 hours of operation. If the brake does not respond well to pressure on the brake pedal, you may need to adjust the brake.

The foot pedal should not travel more than 25.4 mm (1 in) to engage the brake.

To Adjust Brakes:

Park the machine on a level surface. Turn the machine off and block the tires.

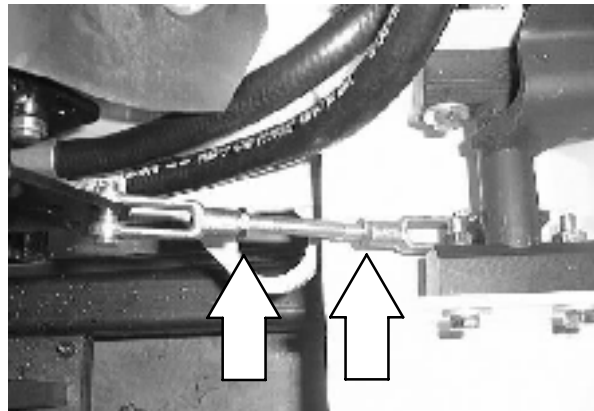
**FOR SAFETY: Before leaving or servicing machine, stop on level surface turn off machine and remove key.**

Jack up the machine, and remove the left front tire to access the brake adjustment rod.

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

Loosen the brake adjustment nuts. Rotate the brake extension arm and draw the ends inward to tighten. Secure with adjustment nuts.

Adjust the brake connecting rods so the brake pedal travels no more than 25.4 mm (1 in) to engage the brakes. Readjust the brakes if necessary.



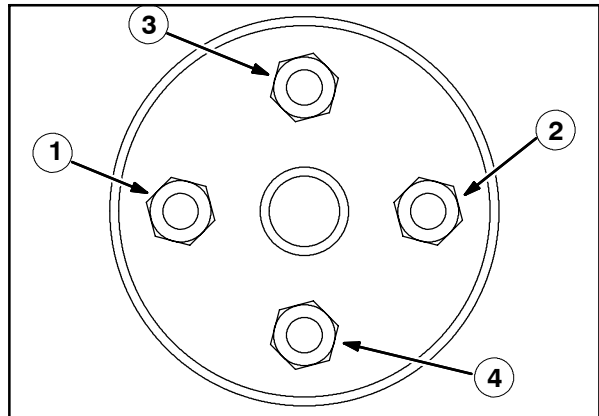
**TIRES**

The tires on the machine are pneumatic. Check the tires after every 100 hours of operation for damage and air pressure.

The proper front tire air pressure is 414 kpa (60 psi).

The proper rear tire air pressure is 345 kpa (50 psi).

Torque the front wheel nuts twice in the pattern shown to 122-155 Nm (90-110 ft. lbs) after the first 50 hours of operation, and every 800 hours of operation.



Torque the rear wheel nuts twice to 126-154 Nm (90-110 ft. lbs) after the first 50 hours of operation, and every 800 hours of operation.

## PUSHING, TOWING, AND TRANSPORTING THE MACHINE

### PUSHING OR TOWING THE MACHINE

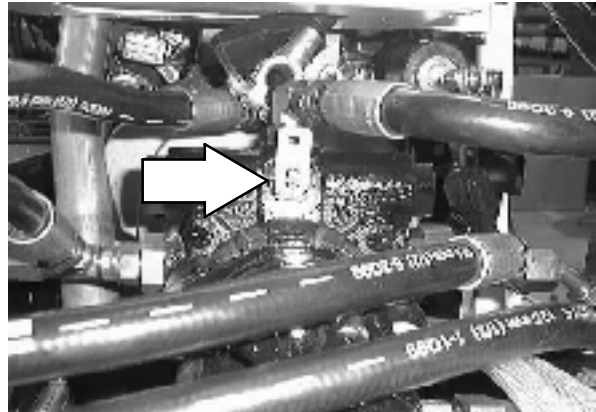
If the machine becomes disabled, it can be pushed from the front or rear, but towed only from the rear. It is easier and more stable to tow the machine from the rear.

The propelling pump has a bypass valve to prevent damage to the hydraulic system when the machine is being pushed or towed. This valve allows a disabled machine to be moved for a *very short distance* and at a speed to not exceed 1.6 kp/h (1 mph). The machine is NOT intended to be pushed or towed a long distance or at a high speed.

**ATTENTION! Do not push or tow machine for a long distance and without using the bypass valve, or the machine hydraulic system may be damaged.**

Remove the debris hopper, and reach behind the main vacuum hose to access the bypass valve.

Turn the bypass valve to the horizontal position before pushing or towing the machine.



### TRANSPORTING THE MACHINE

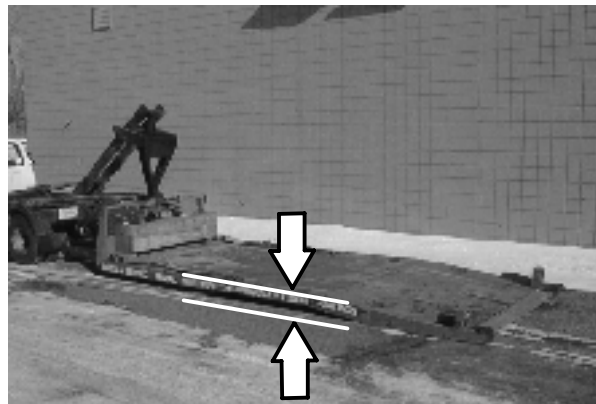
1. Position the rear of the machine at the loading edge of the truck or trailer.

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

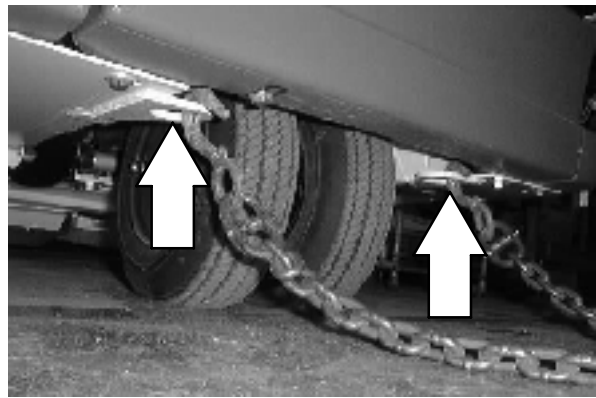
*NOTE: Empty the hopper before transporting the machine.*

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

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

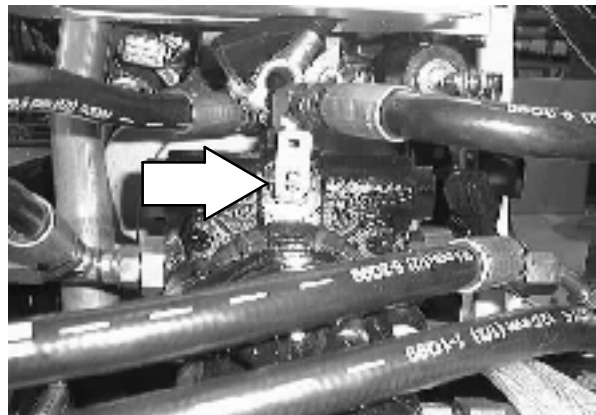


3. To winch the machine onto the truck or trailer, attach the winching chains to the rear tie down locations. The rear tie-down locations are located near the rear of the machine, on opposite sides of the rear wheels.



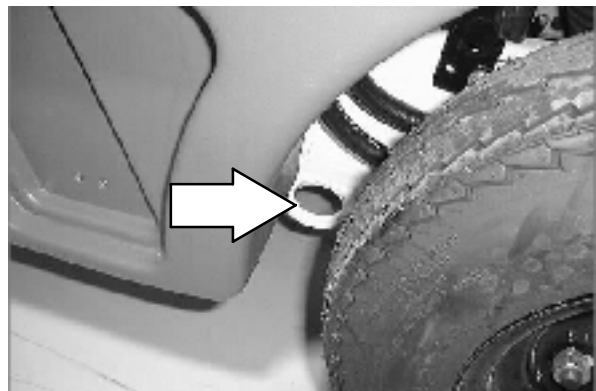
4. Turn the bypass valve 90° from the normal position before winching the machine onto the truck or trailer. See *PUSHING OR TOWING THE MACHINE* section of this manual. Make sure the machine is centered.

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



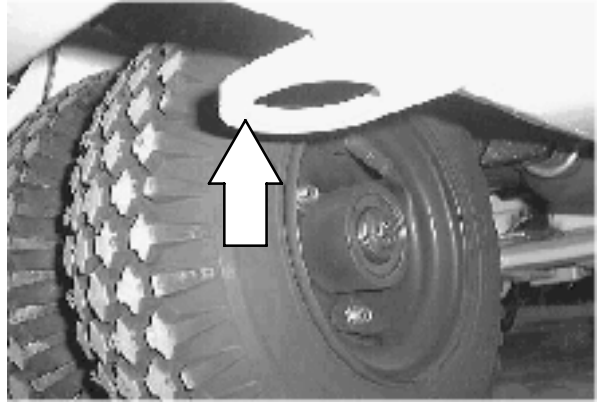
5. Position the machine onto the truck or trailer as far as possible. If the machine starts to veer off the centerline of the truck or trailer, stop and turn the steering wheel to center the machine.
6. Set the parking brake and block the machine tires. Tie down the machine to the truck or trailer before transporting.

The front tie-down locations are located behind the front tires.



## MAINTENANCE

The rear tie-down locations are the bottom lips at each corner of the rear bumper.



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

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

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



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**MACHINE JACKING**

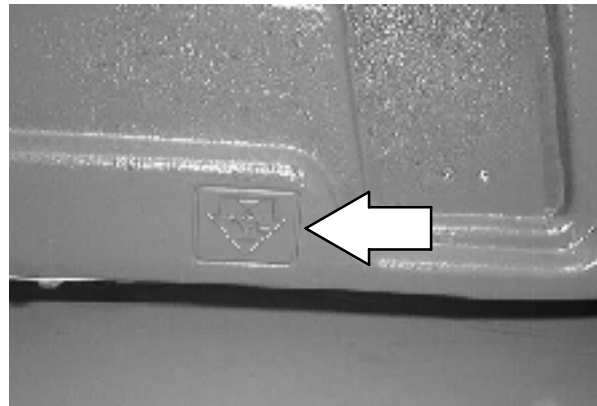
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Empty the hopper before jacking machine. You can jack up the machine for service at the designated locations. Use a jack or hoist that will support the weight of the machine. Always stop the machine on a flat, level surface and block the tires before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

**FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake, turn off machine, and remove key.**

The front jacking locations are on the flat bottom edge of the front of the machine frame.

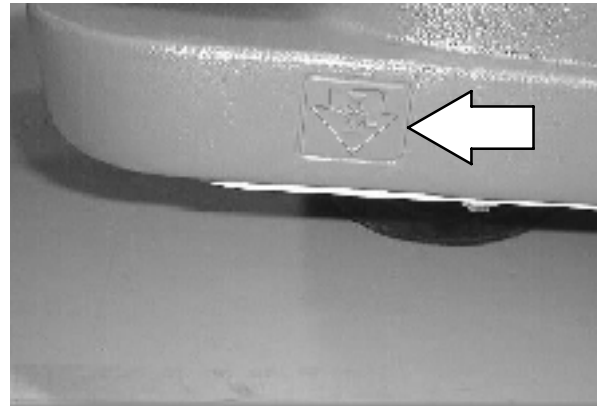
**FOR SAFETY: When servicing machine, block machine tires before jacking up machine.**



The rear jacking locations are on the corners of the rear frame.

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

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




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**STORING MACHINE**

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Before storing the machine for an extended time, the machine needs to be serviced to lessen the chance of rust, sludge, and other undesirable deposits from forming.

Drain the dust control system water tank before storing the machine to prevent water from freezing. See the DRAINING THE WATER TANK section in the MAINTENANCE section of the manual.

# SPECIFICATIONS

## SPECIFICATIONS

### GENERAL MACHINE DIMENSIONS/CAPACITIES

Item	Dimension/capacity	
Length (Riding)	2135 mm	(84 in)
Length (Walk behind)	2235 mm	(88 in)
Height (Riding)	1320 mm	(52 in)
Height (Walk behind)	1168 mm	(46 in)
Width	915 mm	(36 in)
Track	775 mm	(30.5 in)
Wheelbase	1010 mm	(39.75 in)
Side brush diameter	508 mm	(20 in)
Sweeping path width	1270 mm	(50 in)
Hopper weight capacity	45 kg	(100 lb)
Hopper volume capacity	114 L	(30 gal)
Water reservoir volume capacity	45.5 L	(12 gal)
Dust filter area	2.8 sq m	(30.6 sq ft)
GVWR	727 kg	(1600 lb)

### GENERAL MACHINE PERFORMANCE

Item	Measure	
Maximum forward speed	8.0 km/h	(5 mph)
Maximum reverse speed	2.4 km/h	(1.5 mph)
Minimum turning radius, left	1365 mm	(53.75 in)
Minimum turning radius, right	1270 mm	(50 in)
Minimum isle turn width, left	3162 mm	(124.5 in)
Minimum isle turn width, right	2902 mm	(114.25 in)
Maximum rated incline with empty hopper	8°	
Maximum rated incline with full hopper	8°	

**POWER TYPE**

Engine	Type	Ignition	Cycle	Aspiration	Cylinders	Bore	Stroke
Kubota D722	Piston	Diesel	4	Natural	3	67 mm	68 mm
	Displacement		Net power, governed			Net power, maximum	
	719 cc (43.88 cid)		12.2 kw @ 2400 rpm (14.3 hp)			15.6 kw@ 3600 rpm (20.9 hp)	
	Fuel		Cooling system			Electrical system	
	Diesel Fuel tank: 13.6L (3.6 gal)		Water/ethylene glycol antifreeze			12 V nominal	
			Total: 4.8 L (1.25 gal)			40 A alternator	
			Radiator: 2.8 L (.75 gal)				
	Idle speed, no load		(Fast) governed speed, under load			Engine lubricating oil with filter	
900 ± 100 rpm		2400 ± 100 rpm			3.25 L (3.4 qt) diesel rating <i>above</i> CD grade only		

**STEERING**

Type	Power source	Emergency steering
Rear wheel, manual controlled	Manual steering	Manual

**HYDRAULIC SYSTEM**

System	Capacity	Fluid Type
Hydraulic reservoir capacity	15.20 L (4 gal) Fill to FULL line only	TENNANT part no. 65869 - above 7° C (45° F) TENNANT part no. 65870 - below 7° C (45° F)
Hydraulic total (all components, plumbing)	19 L (5 gal)	

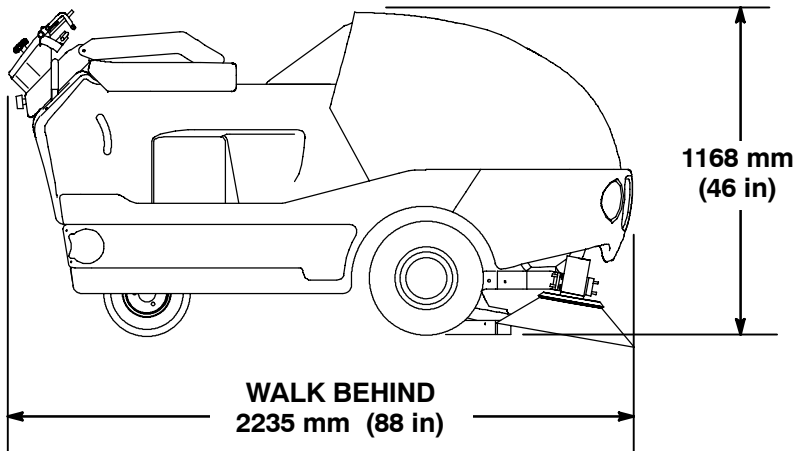
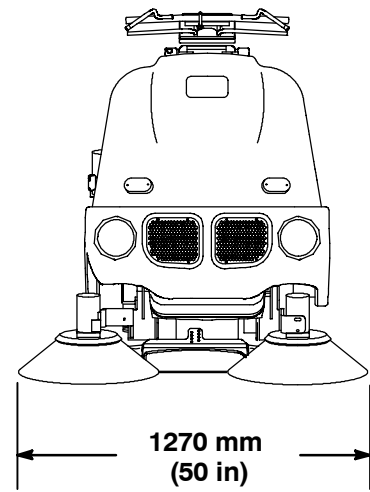
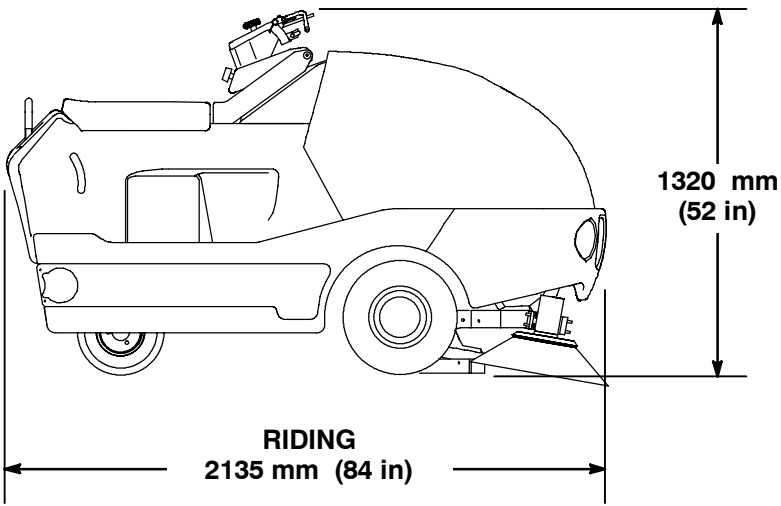
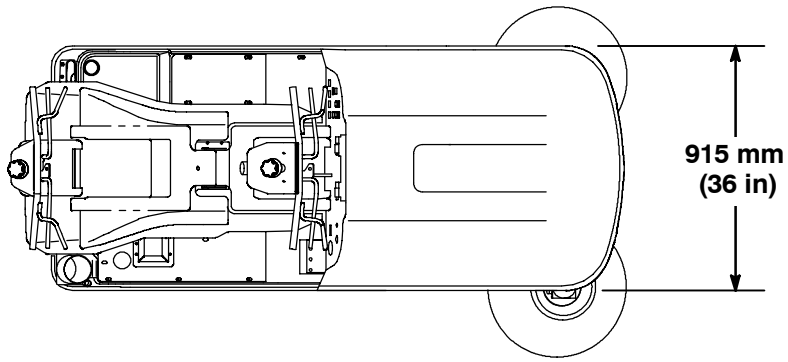
**BRAKING SYSTEM**

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

**TIRES**

Location	Type	Size
Front (2)	Pneumatic	117 x 406 mm (4.6 in x16 in OD)
Rear (2)	Pneumatic	102 x 305 mm (4 in x 12 in OD)

# SPECIFICATIONS



## MACHINE DIMENSIONS

353209

**A**

Air filter, 21, 60  
Aisle turn, 80

**B**

Batteries  
  Charger specifications, 81  
  Specifications, 81  
Belts, 62  
  Engine fan belt, 62  
Brake pedal, 17  
Brakes, 23, 74  
  System specifications, 81  
Brushes, 31–34, 50, 65–70  
  Checking side brush pattern, 65  
  Replacing side brush, 66  
  Side brush, 65–67  
  Side brush bristle length, 66  
Bypass valve, 76

**C**

Capacities, 80  
Chains, 62  
Charging system light, 16  
Circuit breakers, 18  
Cleaning, 34  
Cleaning and brush information, 31–34  
Cleaning hopper dust filters, 47  
Cleaning spray nozzles, 67  
Controls, 7  
  Brake pedal, 17  
  Charging system light, 16  
  Circuit breakers, 18  
  Directional pedal, 9  
  Engine oil pressure light, 15  
  Engine temperature light, 15  
  Fuel level gauge, 10  
  Fuse, 18  
  Hazard Light Switch (001580-     ), 16  
  Horn button, 11  
  Hourmeter, 11  
  On-off key switch, 10  
  Operation, 9  
  Parking brake pedal, 17  
  Power kill switch, 11  
  Steering assembly knob, 12  
  Steering handle, 10  
  Symbols, 6–8  
  Thermo Sentry light, 16  
  Throttle lever, 19

Vacuum fan damper handle, 19  
Vacuum fan/side brush switch, 13  
Vacuum head control lever, 19  
Voice box switch, 13  
Water pump switch, 14

Coolant level, 22  
Cooling system, 59

**D**

Debris hopper, 63  
Diffuser screens, 64  
Dimensions, 80  
Directional pedal, 9  
Draining the water tank, 69  
Dust control system, 32, 67  
Dust filter, Cleaning, 63

**E**

Electric motors, 81  
Electrical  
  Circuit breakers, 18  
  Fuse, 18  
  On-off key switch, 10  
Emptying the hopper, 42–45  
Engine  
  Air filter, 60  
  Battery, 61  
  Cooling system, 59  
  Fan belt, 62  
  Fuel filter, 60  
  Fuel lines, 61  
Engine lubrication, 56  
Engine oil pressure light, 15  
Engine temperature light, 15

**F**

Filter cleaning tool (option), 63  
Filter housing cover seals, 72  
Filter seals, 71  
Fuel, 21  
Fuel filter, 60  
Fuel level, 22  
Fuel level gauge, 10  
Fuses, 18

**G**

Gauge, Fuel level, 10

**H**

Handle, Steering, 10

Hazard Light Switch (001580- ), 16

Hopper, 24

    Cleaning dust filter, 63

    Emptying the hopper, 42–45

Hopper , 20

Hopper cover seal, 71

Hopper dust filter information, 63

Hopper dust filters, Removing, 47

Hopper dust filters, cleaning, Filter cleaning tool (option), 63

Hopper seal, 71

Hopper securing bar, 20

Horn button, 11

Hourmeter, 11

How the machine works, 21

Hydraulic fluid, 58

Hydraulic fluid reservoir, 57

Hydraulic hoses, 58

Hydraulics, 57–61

    Fluid, 58–60

    Fluid filter, 57

    Fluid level, 57

    Hoses, 58

    Reservoir, 57

    system specifications, 81

**J**

Jack points, 79

Jacking up the machine, 79

**K**

Knob, Steering assembly, 12

**L**

Leaks, 21

Lever

    Throttle, 19

    Vacuum head control, 19

Light

    Charging system, 16

    Engine oil pressure, 15

    Engine temperature, 15

Lights

    Hazard, 16

    Operating/hazard (000000–001579), 12

    Operating/hazard (001580- ), 12

    Thermo Sentry , 16

Lubrication, 56–58

    Engine, 56

Lubrication , Rear wheel support bearings, 56

**M**

Machine, Troubleshooting, 52

Machine components, 5

Machine dimensions, 82

Machine jacking, 79

Machine tie down location, 77

Maintenance, 54

    Debris Hopper, 63

    Draining the water tank, 69

    Dust control system, 67

    Filter housing cover seals, 72

    Filter seals, 71

    Hopper cover seal, 71

    Hopper dust filters, 63

    Hopper seal, 71

    Intervals, 54–56

    Recommended, 4

    Spray nozzles, 67

    Vacuum fan screen, Vacuum fan screen, 73–76

    Vacuum head skirt, 72

    Vacuum system, 73–76

        Vacuum hoses, 73–76

        Vacuum wand damper, 73–76

    Water tank, 69

Maintenance chart, 54–56

Motors, Electric, 81

**O**

Oil level, 22  
 On-off key switch, 10  
 Operating/hazard lights switch (000000-001579), 12  
 Operating/hazard lights switch (001580- ), 12  
 Operation, 4  
   Filling water tank, 33  
   Hopper , 20  
   Vacuum wand, 36  
 Operation on inclines, 30  
 Operator Responsibility, 4  
 Operator Seat, 20  
 Options  
   Filter cleaning tool, 63  
   Voice box, 51-54  
   Voice box switch, 13

**P**

Parking brake pedal, 17  
 Pedal, Directional, 9  
 Pedals  
   Brake, 17  
   Parking brake, 17  
 Positioning steering assembly, 25  
 Post-operation checklist, 50  
 Power kill switch, 11  
 Pre-operation checklist, 21  
 Pushing machine, 76  
 Pushing or towing the machine, 76  
 Pushing, towing, and transporting machine, 76

**R**

Rear wheel support bearings, 56

**S**

Safety  
   Labels, 3  
   Precautions, 2-4

Seals, 71-74  
 Seat, Operator, 20  
 Securing bar, 20  
 Service records, 50  
 Side brush, 65-67  
   Bristle length, 66  
   Checking brush pattern, 65  
   Replacing, 66  
 Skirts, 50, 71-74  
 Skirts and seals  
   Filter housing cover, 72  
   Filter seals, 71  
   Hopper cover seal, 71  
   Hopper seal, 71  
   Vacuum head skirt, 72  
 Specifications, 80-83  
   Braking system, 81  
   Chargers, 81  
   Electric motors, 81  
   hydraulic system, 81  
   Machine capacities, 80  
   Machine dimensions, 80  
   Machine performance, 80  
   Power type, 81  
   Steering, 81  
   Tires, 81  
 Spray nozzles, 67  
 Starting the machine, 27  
 Steering, 23  
   Specifications, 81  
 Steering assembly, Positioning, 25  
 Steering assembly knob, 12  
 Steering handle, 10  
 Stop cleaning, 39  
 Stopping the machine, 40  
 Storing machine, 79  
 Switch  
   Turn signal, 15  
   Vacuum fan/side brush, 13  
   Voice box, 13  
 Switches  
   On-off key, 10  
   Operating/hazard lights (000000-001579), 12  
   Operating/hazard lights (001580- ), 12  
   Power kill , 11  
   Water pump, 14

**T**

Thermo Sentry, 64  
Thermo Sentry light, 16  
Throttle lever, 19  
Tie down location, 77  
Tires, 74, 75  
    Specifications, 81  
Towing machine, 76  
Transporting machine, 76  
Transporting the machine, 76  
Travel speed, 80  
Troubleshooting, 52  
Turn signal switch, 15

**V**

Vacuum fan, Screen, 23  
Vacuum fan , Damper, 19  
Vacuum fan damper handle, 19  
Vacuum fan/side brush switch, 13  
Vacuum head control lever, 19  
Vacuum head skirt, 72  
Vacuum head skirts, 24  
Vacuum hoses, 24  
Vacuum screen, 23  
Vacuum system, 73–76  
Vacuum wand operation, 36  
Voice box option, 51–54  
Voice box switch, 13

**W**

Water pump switch, 14  
Water reservoir, 24  
Water tank, 69  
    Filling , 33  
Wheel nuts, Torque, 75