400 Series

CE

Global

YM036
Rev. 05 (12-2015)

www.greenmachines.com

INTRODUCTION

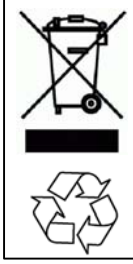
This manual is furnished with each new model. It provides necessary operation and maintenance instructions.

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

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 and fluids in an environmentally safe way according to local waste disposal regulations.

Always remember to recycle.

MACHINE DATA

Please fill out at time of installation for future reference.

Model No. − _____

Serial No. − _____

Installation Date − _____

The following publications are included with this machine:

Operators Manual
Service Schedule
Parts Catalog
Kubota Engine Manual

The following optional publications can be purchased separately:

Kubota Engine Workshop Manual
Kubota Engine Parts Catalog

Please contact a local Green Machines distributor to order additional publications.

INTENDED USE

The 414S2D, 414RS, 424TR, 424HS machines are designed to sweep disposable debris from surfaces typically found in outdoor urban areas (city streets, pedestrian malls, sidewalks, parking lots, etc…). Do not use this machine on soil, grass, artificial turf, or outdoor carpet surfaces. Do not use the machine other than described in this Operator Manual.

Green Machines Sweepers U.K. Ltd.
Bankside, Falkirk FK2 7XE
Scotland, United Kingdom
Phone: (+44) 1324−611666
www.greenmachines.com

Specifications and parts are subject to change without notice.

CE

Green Machines Sweepers U.K. Ltd

Bankside, Falkirk FK2 7XE
Scotland, United Kingdom
21−05−2010

EN

DECLARATION OF CONFORMITY FOR MACHINERY
(according to Annex II A of the Machinery Directive)

Herewith declares, on our own responsibility, that the machinery

414S2D, 414RS, 424TR, 424HS
- is in conformity with the provisions of the Machinery Directive (2006/42/EC), as amended and with national implementing legislation
- is in conformity with the provisions of the Electro Magnetic Compatibility Directive 2004/108/EC
- is in conformity with the provisions concerning noise emission for outdoor use (Directive 2000/14/CE) and with national implementing legislation

and that
- the following harmonized standards or parts of these standards have been applied: EN ISO 14121−1, EN 1037, EN 60335−1, EN 60204−1, EN ISO 13849−1, EN ISO 13849−2, EN 60529, EN ISO 4413, EN 349, EN 55012, EN 61000−6−2, EN ISO 11201, EN ISO 4871, EN ISO 3744*, EN ISO 13059*, EN ISO 3450, EN 60335−2−72.
- the following national standards or parts of these standards have been used:

CONTENTS

CONTENTS

IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

The following precautions 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.

CAUTION: To warn of unsafe practices that could result in minor or moderate personal injury.

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

The following information signals potentially dangerous conditions to the operator. Know when these conditions can exist. Locate all safety devices on the machine. Report machine damage or faulty operation immediately.

WARNING: Moving belt and fan. Keep away.

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

WARNING: Flammable materials can cause explosion or fire. Do not use flammable materials in tank. Only use water.

WARNING:Allow engine to cool. Do not remove cap from radiator when engine is hot. Avoid contact with hot engine coolant.

FOR SAFETY:

1. **Do not operate machine:**
   - **Unless trained and authorized.**
   - **Unless operator manual is read and understood.**
   - **Under the influence of alcohol or drugs.**
   - **While using a cell phone or other types of electronic devices.**
   - **Unless mentally and physically capable of following machine instructions.**
   - **If it is not in proper operating condition.**
   - **In areas where flammable vapors/liquids or combustible dusts are present.**
   - **In areas that are too dark to safely see the controls or operate the machine unless operating / headlights are turned on.**
   - **In areas with possible falling objects.**

2. **Before starting machine:**
   - **Check for fuel, oil, and liquid leaks.**
   - **Keep sparks and open flame away from refueling area.**
   - **Make sure all safety devices are in place and operate properly.**

3. **When starting machine:**
   - **Keep directional lever in neutral.**

4. When using machine:
   - Use only as described in this manual.
   - Do not pick up burning or smoking debris, such as cigarettes, matches or hot ashes
   - Do not sit on seat when manuevering machine over curbs.
   - Go slowly on inclines and slippery surfaces.
   - Do not sweep on ramp inclines that exceed 20% grade or transport (GVWR) on ramp inclines that exceed 20% grade.
   - Reduce speed when turning.
   - Keep all parts of body inside operator station while machine is moving.
   - Always be aware of surroundings while operating machine.
   - Use care when reversing machine.
   - Keep children and unauthorized persons away from machine.
   - Do not carry passengers on any part of the machine.
   - Always follow safety and traffic rules.
   - Report machine damage or faulty operation immediately.

5. Before leaving or servicing machine:
   - Do not park near combustible materials, dusts, gases, or liquids.
   - Stop on level surface.
   - Ensure drive lever is in neutral.
   - Set parking brake (if equipped).
   - Turn off machine and remove key.

6. When servicing machine:
   - All work must be done with sufficient lighting and visibility.
   - Keep work area well ventilated.
   - Avoid moving parts. Do not wear loose clothing, jewelry and secure long hair.
   - Block machine tires before jacking machine up.
   - Jack machine up at designated locations only. Support machine with jack stands.
   - Use hoist or jack that will support the weight of the machine.
   - Do not power spray or hose off machine near electrical components.
   - Disconnect battery connections before working on machine.
   - Avoid contact with battery acid.
   - Avoid contact with hot engine coolant.
   - Do not remove cap from radiator when engine is hot.
   - Allow engine to cool.
   - Keep flames and sparks away from fuel system service area. Keep area well ventilated.
   - Use cardboard to locate leaking hydraulic fluid under pressure.
   - All repairs must be performed by a trained service mechanic.
   - Do not modify the machine from its original design.
   - Use Green Machines supplied or approved replacement parts.
   - Wear personal protective equipment as needed and where recommended in this manual.


For Safety: Wear hearing protection.


For Safety: Wear protective gloves.


For Safety: Wear eye protection.


For Safety: Wear protective dust mask.

7. When loading/unloading machine onto/off truck or trailer:
   - Drain water tank before loading machine.
   - Use ramp, truck or trailer that will support the weight of the machine and operator.
   - Do not load/unload on ramp inclines that exceed 20% grade.
   - Use winch. Do not drive the machine onto/off the truck or trailer. Do not push 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 (if equipped).
   - Turn off machine and remove key.
   - Block machine tires.
   - Tie machine down to truck or trailer.

The safety labels appear in the locations indicated. Replace damaged labels.

Moving Fan. Keep Away. Read Operator Manual. Remove Key From Machine. Refer To Workshop Manual − Located on back duct.

Do not open when engine is running . Refer To Workshop Manual − Located on back duct.

Read Manual Before Operating Machine − Located on top cover.

Allow engine to cool. Do not remove cap from radiator when engine is hot. Avoid contact with hot engine coolant − Located on coolant tank cap

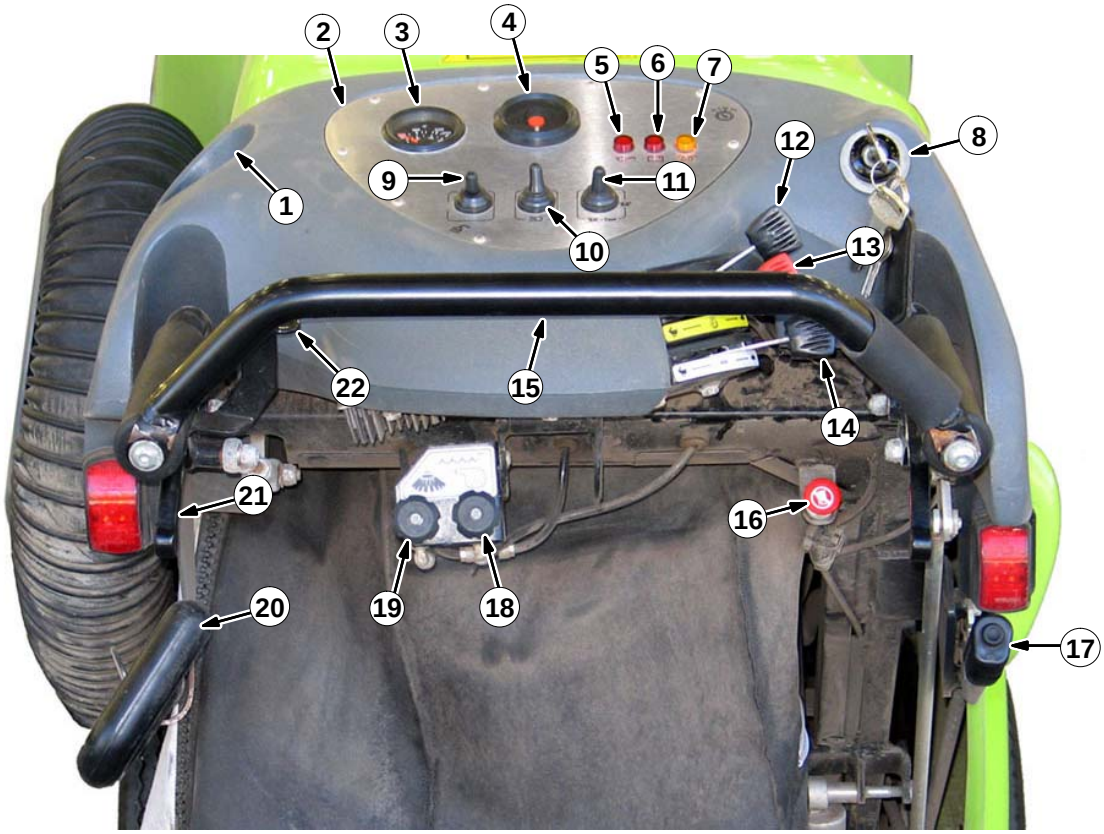
Moving Fan. Keep Away. Read Operator Manual. Remove Key From Machine. Refer To Workshop Manual − Located on vacuum fan housing.

OPERATION

MACHINE COMPONENTS

1. Front box assembly
2. Water tank
3. Top cover
4. Wander hose (Option)
5. Operator console / controls
6. Operator seat (414RS only)
7. Debris bag
8. Rear tire
9. Main tires (2)
10. Front castor wheels (2)
11. Rear mirrors
12. Warning beacon
13. Side access panel
14. Headlights
15. Spray jets (dust suppression)
16. Sweeping brushes
17. Suction nozzle

CONTROLS AND INSTRUMENTS

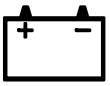


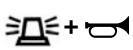
1. Cup holder
2. Control panel
3. Engine temperature gauge
4. Hour meter
5. Engine oil pressure indicator
6. Charging system indicator
7. Glow plug indicator
8. Ignition switch (ON / OFF)
9. Water ON / OFF switch (Option) / Clean and Safe Attachment (CSA) / Dog Excrement Attachment (DEA) switch (Option)
10. Headlight / taillight switch
11. Warning beacon / audible warning switch
12. Vacuum flap lever
13. Throttle lever
14. Brush speed lever
15. Handlebar
16. Emergency shutoff knob
17. Parking brake (414RS / 424TR / 424HS only)
18. Inner bag spray jet (414S2D / 414RS only)
19. Brush spray jets (414S2D / 414RS only)
20. Wander hose handle (Option)
21. Forward drive lever
22. Reverse drive lever

SYMBOL DEFINITIONS

These symbols are used on the machine to identify controls, displays, and features.


Glow Plug (Preheat)


Battery Charge


Warning Beacon / Audible Warning


Warning Beacon


Low Speed (Throttle / Brush)


Vacuum Nozzle Up


Brush Dust Suppression


Dust Suppression Control


Emergency Shutoff


Oil Pressure


Brush Speed


Headlights / Taillights


High Speed (Throttle / Brush)


Throttle Lever


Vacuum Nozzle Down


Debris Bag Dust Suppression


Dust Suppression Switch

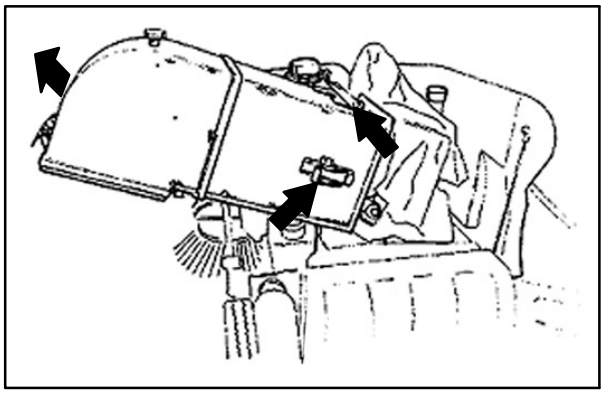
0 Off (Warning Beacon / Audible Warning, Headlights / Taillights, and Dust Suppression Switches)

REMOVING THE PROTECTIVE PLASTIC SHEET

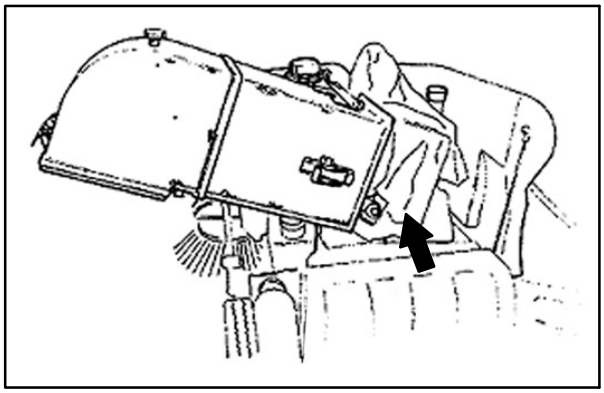
This machine is often shipped with a protective plastic sheet fitted inside the back duct. This protective plastic sheet must be removed prior to the machine being operated.

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (414S2D / 414RS only), turn off machine, and remove key.

1. Loosen both toggle clamps and open the back duct.



2. Remove the protective plastic sheet.



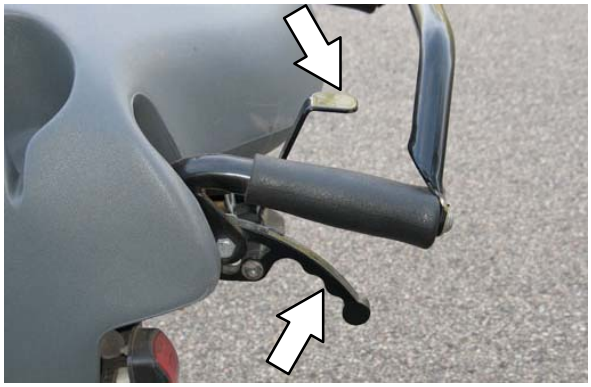
3. Lift the hinge lock pin and close the back duct.
4. Refasten the toggle clamps.

OPERATION OF CONTROLS

DRIVE LEVER (FORWARD / NEUTRAL / REVERSE)

Forward: Squeeze the *Drive lever*.

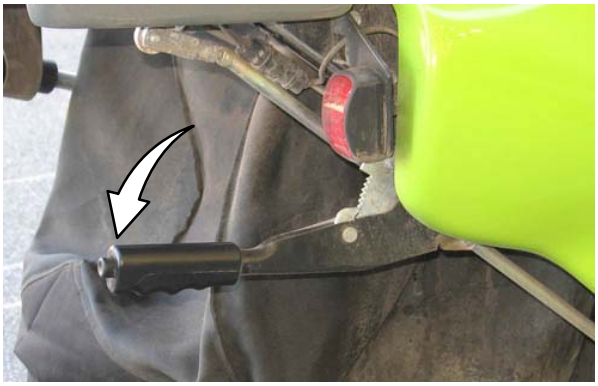
Neutral: Release the *Drive lever* into the middle position.



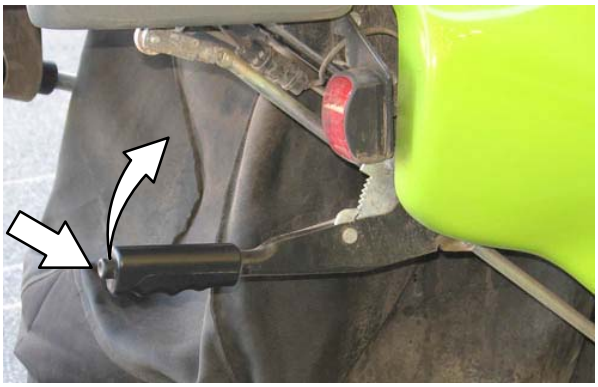
Reverse: Press the *Drive lever*.

PARKING BRAKE LEVER (414RS / 424TR / 424HS only)

Push the *Parking brake lever* down to engage the parking brake.



Slightly push the *Parking brake lever* down and press the button to release the parking brake.



ENGINE TEMPERATURE GAUGE

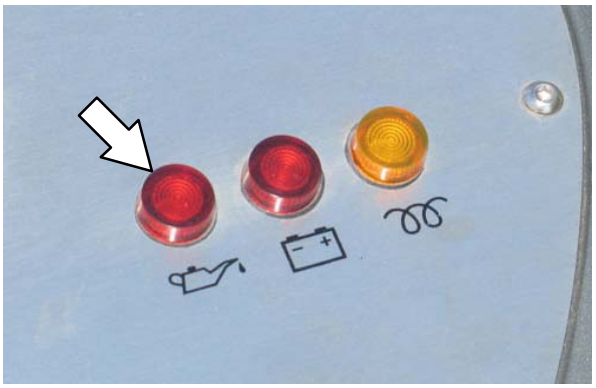
The *Engine temperature gauge* indicates the engine temperature.

HOUR METER

The *Hour meter* displays the hours the machine was operated. Use this information to determine machine service intervals.

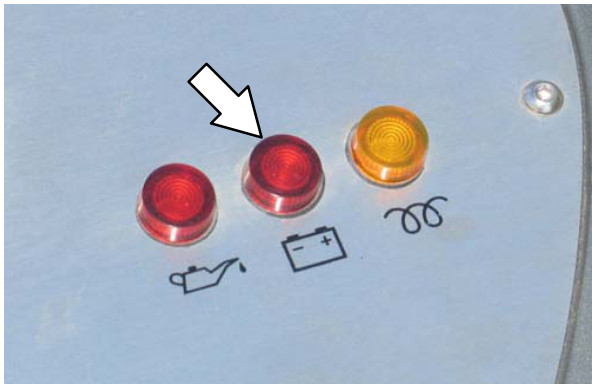
ENGINE OIL PRESSURE INDICATOR

The *Engine oil pressure indicator* illuminates when the oil pressure is low.



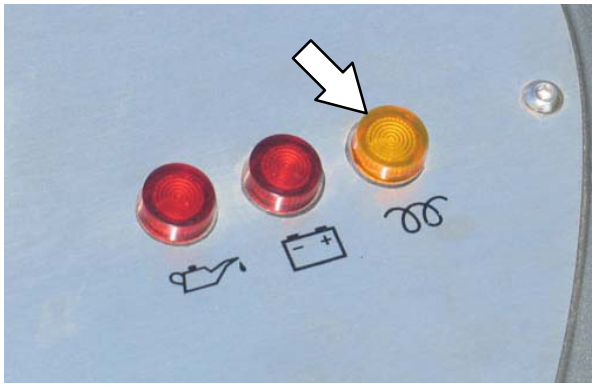
CHARGING SYSTEM MALFUNCTION INDICATOR

The *Charging system malfunction indicator* illuminates when the alternator is not charging the battery.



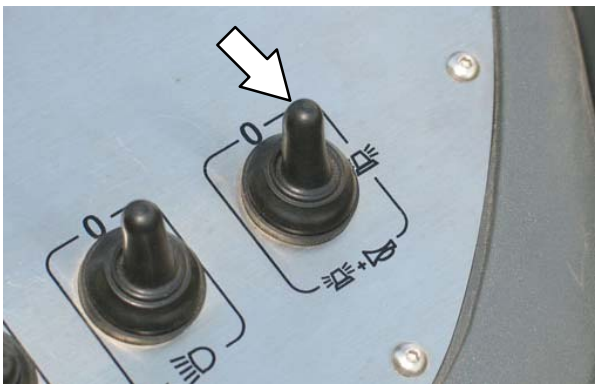
GLOW PLUG INDICATOR

The *Glow plug indicator* illuminates when the ignition switch is turned clockwise far enough to activate the glow plugs, but not far enough to start the engine.



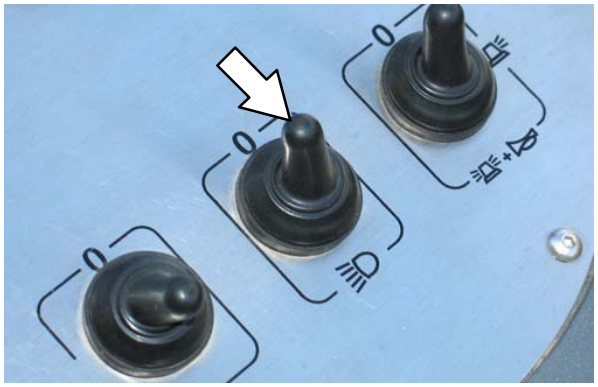
WARNING BEACON / AUDIBLE ALARM SWITCH

Use the 3−position *Warning beacon / audible alarm switch* to activate the warning beacon and audible alarm. Push the switch to the second (middle) position to operate only the warning beacon and the third position to operate the warning beacon and audible alarm. Push the switch back to the first position to turn off the warning beacon and audible alarm.



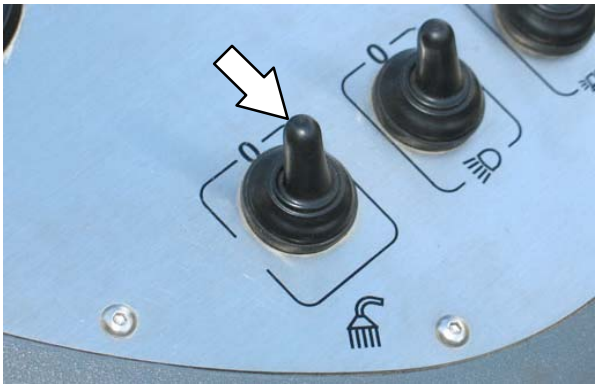
OPERATING LIGHT SWITCH

Use the *Operating light switch* to operate the rear tail lights and headlights.



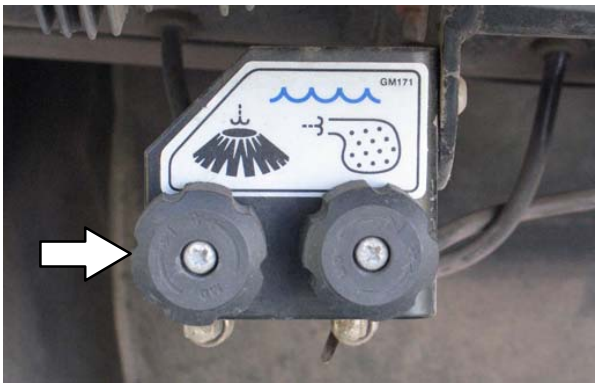
WATER SWITCH (DUST SUPPRESSION) (414RS)

Use the *Water switch* to turn on the dust control system for the brushes and the filter bag.

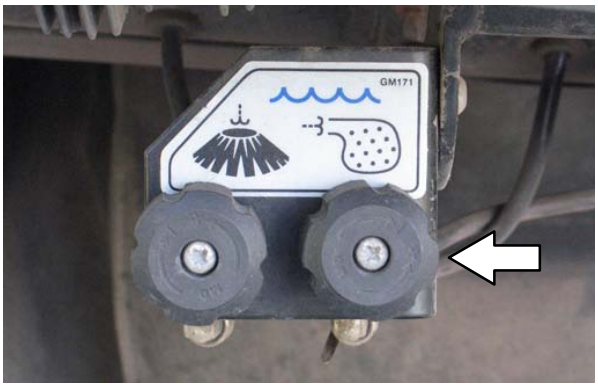


BRUSH WATER CONTROL KNOB / FILTER BAG WATER CONTROL KNOB (DUST SUPPRESSION) (414RS)

Use the *Brush water control knob* to adjust the amount of water dispensed to the brushes for dust suppression.

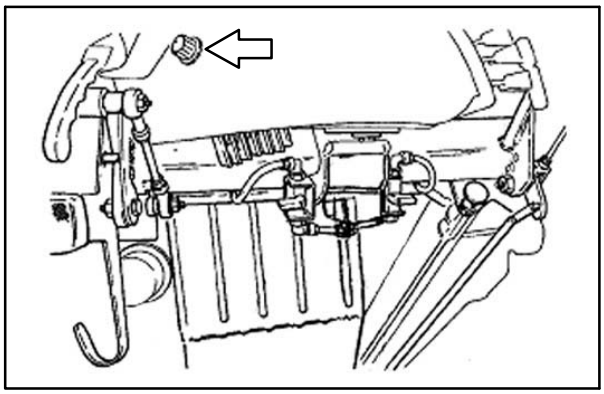


Use the *Filter bag water control knob* to adjust the amount of water dispensed inside the filter bag for dust suppression.

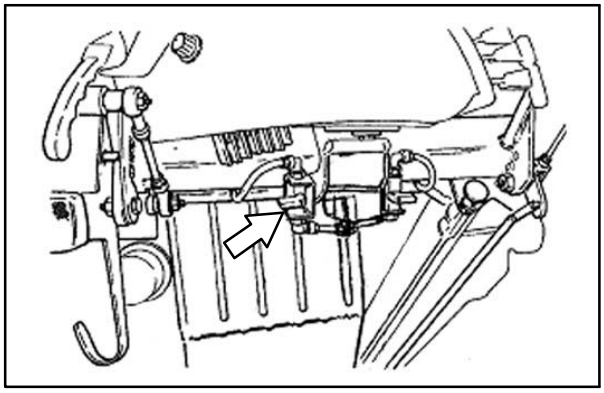


VARIABLE SPEED WATER PUMP (DUST SUPPRESSION) (424TR / 424HS)

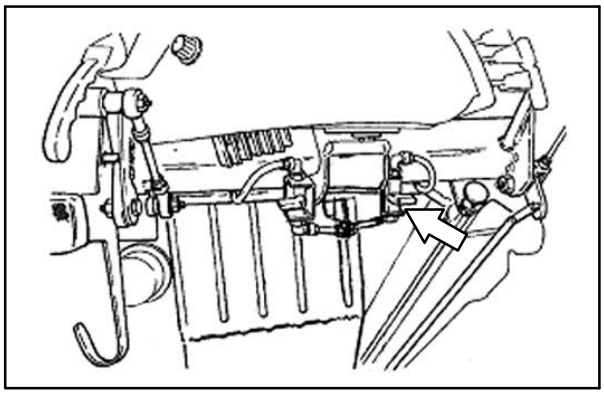
Use the *Water pump speed control knob* to adjust the amount of water that is sprayed.



Use the *Brush spray valve* located below the console to turn the brush sprays on or off.



Use the *Inside filter bag spray valve* located below the console to turn the filter bag spray on or off.



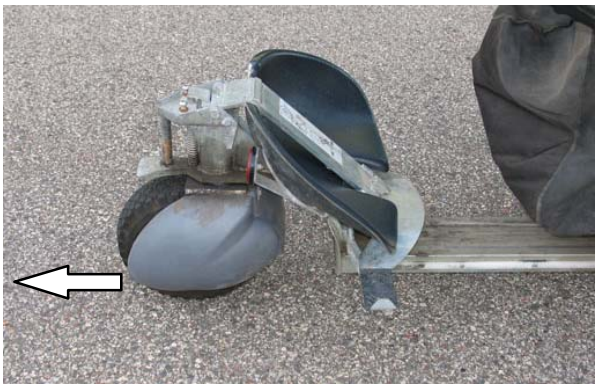
OPERATOR SEAT (414RS)

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

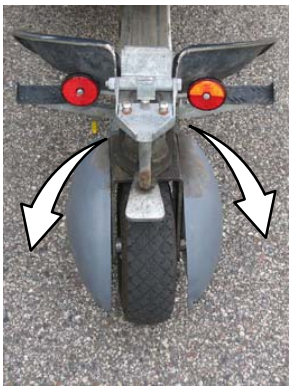
EXTENDING THE OPERATOR SEAT

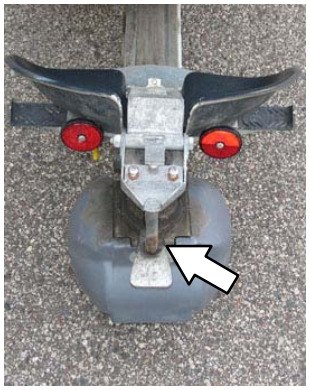
1. Push locking lever in to release the seat.

2. Pull the seat assembly out from the machine until the seat locks into the fully extended position.



3. Rotate the rear wheel until the hole in the rear wheel cover is aligned with the rear seat locking pin.





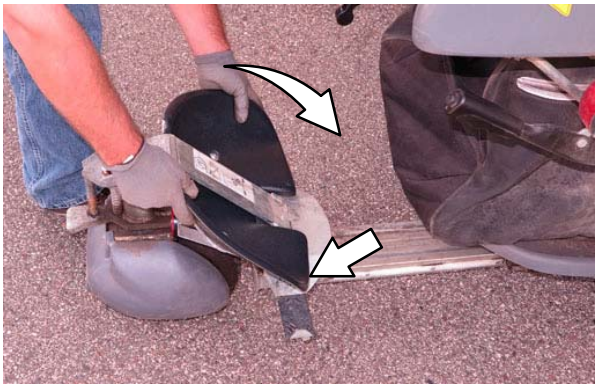
4. Raise the seat stem. The locking pin will got through the hole in the rear wheel cover to lock the rear wheel into place when the seat stem is raised.

5. Rotate the seat into position.

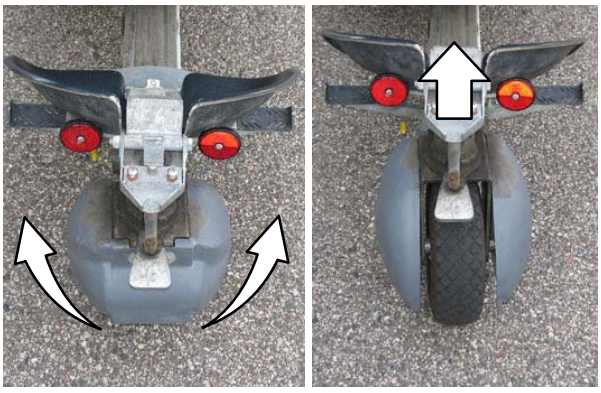
STOWING THE OPERATOR SEAT

1. Fold the front of the seat down back against the seat stem.

2. Hold seat against the seat stem and fold the seat stem down.

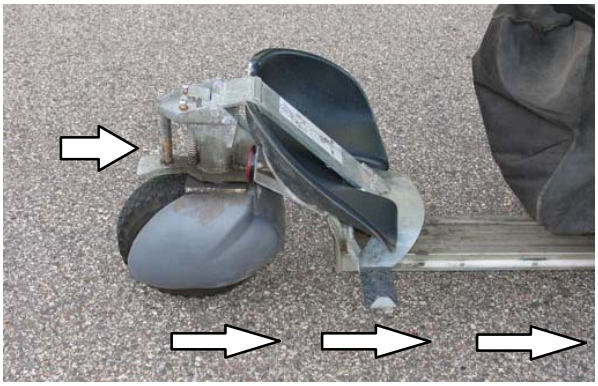


3. Rotate the rear wheel until the hole in the rear wheel cover is oriented to the front of the machine and the rear wheel is pointed straight to the front of the machine.



4. Ensure the seat slide is aligned straight with the rest of the machine and pull the locking lever out.

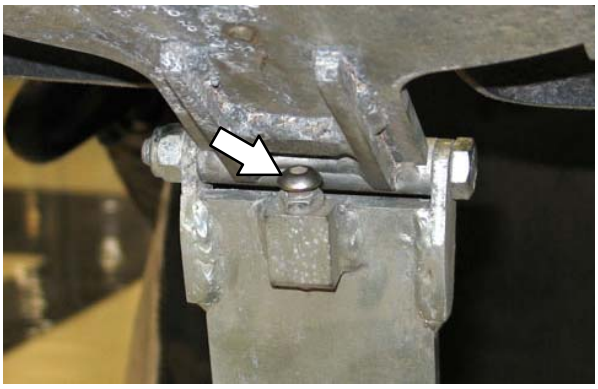
5. Use pedal or handle to push the operator seat in until it locks into the stowed position.



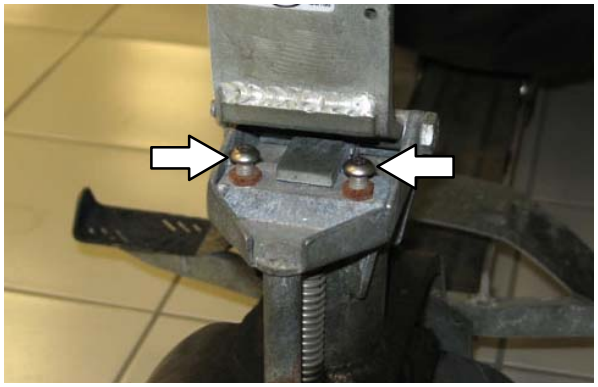
ADJUSTING THE OPERATOR SEAT

Adjust the operator seat before operating the machine. Adjust the operator seat so that when seated, most of the body weight is supported by the legs and not the seat and so that there is adequate vision over the top of the machine.

Use the top button screw to adjust the seat angle.



Use the two bottom button screws to move the seat stem forward or backwards.

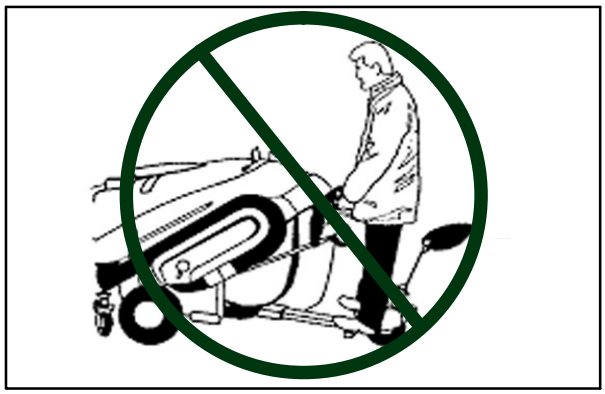


USING THE OPERATOR SEAT

Before using the operator seat be sure the seat is properly adjusted. See *ADJUSTING THE OPERATOR SEAT.* Also be sure the wing mirrors are adjusted for good vision to the rear of the machine.

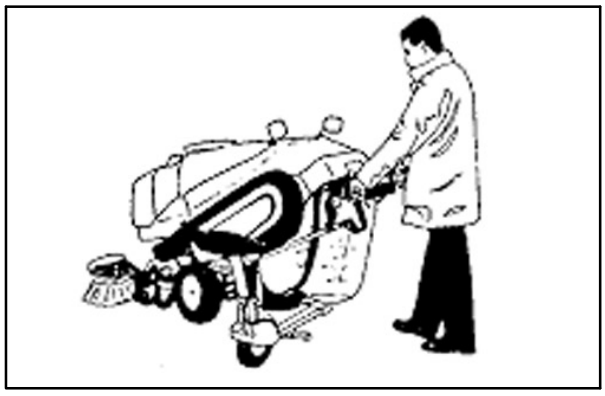
When using the operator seat, always have both feet firmly on the foot plates and both hands on the handle bars. For comfort keep elbows slightly bent and legs bent to support most body weight. Also ensure there is adequate sight lines to the front of the machine.

Always remain seated while the machine is in motion **Do Not** stand on the foot plates when the machine is moving.



Do not use the operator seat in confined areas, when the area being swept is crowded with pedestrians, or on streets where there is heavy vehicular traffic.

Also do not use the operator seat if making a sharp turn. To make a such turns, first stop the machine, get off the operator seat, step to the side of the machine opposite of the direction of the turn, and squeeze the drive lever, and turn handle bars in the direction of the turn.

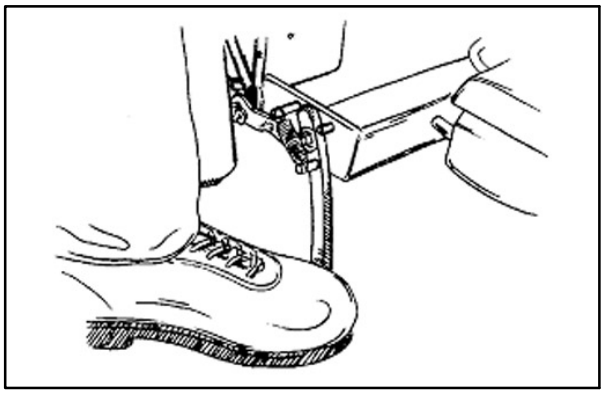


OPERATOR SEAT (424TR / 424HS)

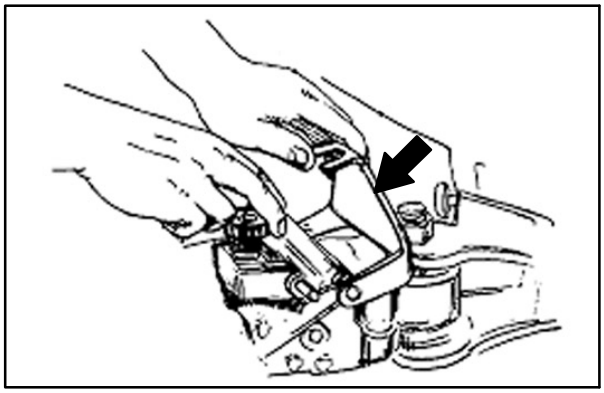
ATTACHING THE SEAT (424TR / 424HS)

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

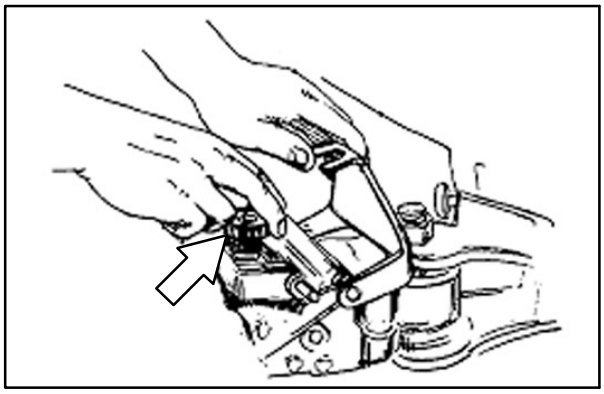
1. Engage the kickstand to support the back of the machine into position for installing the seat.



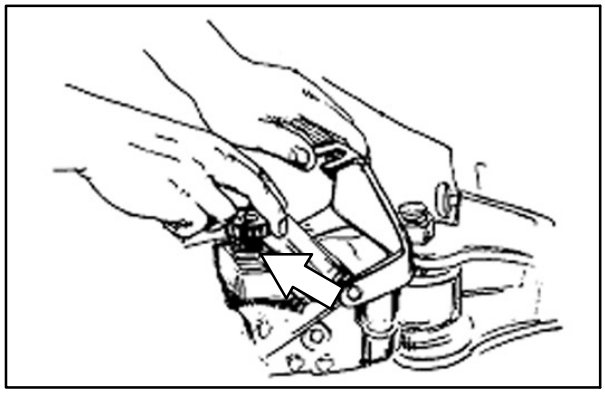
2. Lift the yellow cover located at the back of the machine.



3. Turn the lock screw counterclockwise to loosen.

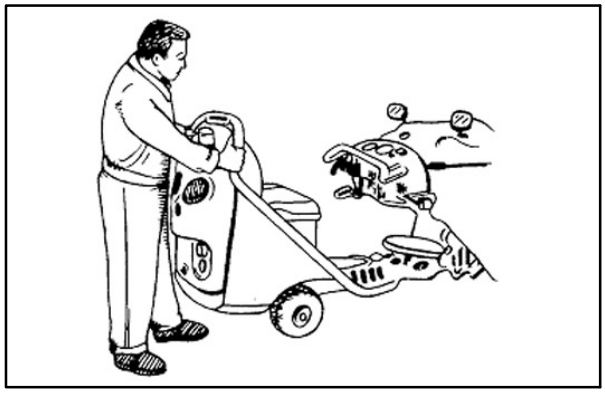


4. Swing the lock screw to the rear to clear the locking plate.

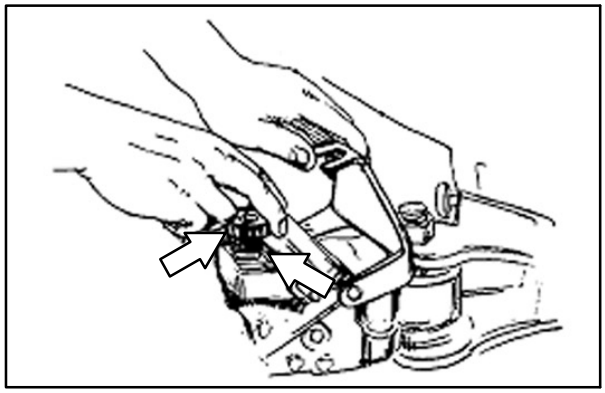


5. Lift the locking plate and remove the dolly wheel.

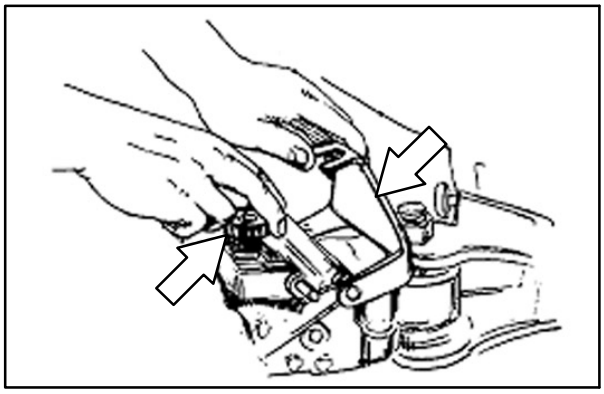
6. With the dolly wheel removed, hold the seat unit and guide the seat forwards onto the guides on the machine.



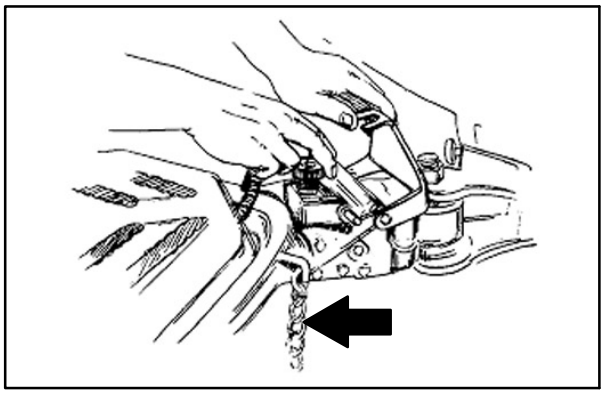
7. Push down on the locking plate, slide the lock screw into position, and hand tighten the screw clockwise.



8. Align the yellow cover with the locking screw and close the cover.



9. Reattach the safety chain.



10. Connect the rear lighting electric cable to the socket.

NOTE: The kickstand should spring back to the closed position when the machine is driven forward.

NOTE: Remove the seat in the reverse order in which it was installed.

ADJUSTING THE SEAT (424TR / 424HS)

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

Slide the lever at the front of the seat to move the seat forward and backward.

Use the hand wheel located on the right side to adjust the recline.

There are three weight settings on the spring suspension unit under the seat. Push the segment button at the top right side of the seat to adjust the weight setting.

ADJUSTING THE FOOT PLATE AND HANDLE HEIGHT (424TR / 424HS)

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

To raise the footplate, first unclasp the two toggle clamps. Lift the footplate to new position, and clamp the toggles.

To adjust the handle height, turn the large adjustment screw located under the control console.

BRUSH INFORMATION

For best results, use the correct brush type for the cleaning application.

NOTE: *The amount and type of debris play an important role in determining the type of brushes to use. Contact an authorized service representative for specific recommendations.*

Polypropylene Brush − Best overall general cleaning brush. The bristles fan out and dig into cracks to remove debris.

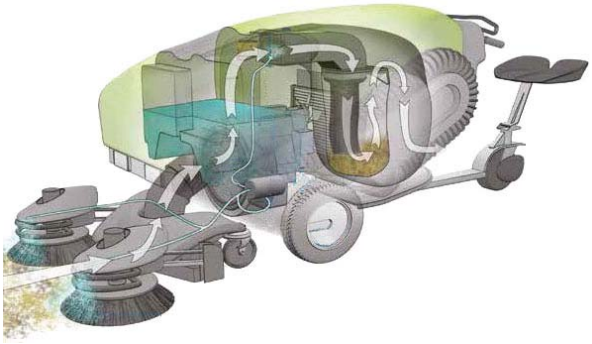
Polypropylene and Wire Brush − Recommended for moving heavy debris. Best bristle mix for moving large quantities of sand and heavier debris. The bristles fan out similar to the polypropylene brush. The wire bristles provide the ability to move heavier material.

PET (Polyethylene Terephthalate) Heavy Duty Brush − Recommended for areas where there is a heavy build up of debris. The stiffer / thicker bristles provide more aggressive digging action to remove compacted debris from along buildings, curbs, and in corners.

HOW THE MACHINE WORKS

This machine works by airflow. As long as airflow is maintained through the machine it should effectively sweep and pickup debris.

The two front brushes move debris to the center of the machine and the vacuum created by the impeller pulls the debris through the impeller fan, where the debris (leaves, glass bottles, paper, metallic cans, etc...) is mulched into fine particles. The debris is then blown through the back duct and down through a filter screen that separates the debris from the air. The debris drops into the plastic trash bag located inside the debris bag. The air escapes through the filter bag that prevents remaining dust from escaping. Airflow must be maintained through the debris bag to keep the machine functioning properly.



PRE−OPERATION CHECKLIST

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

- ❑ Check the engine oil level.
- ❑ Check the hydraulic fluid level.
- ❑ Check the engine coolant level.
- ❑ Check the fuel level.
- ❑ Check the air filter indicator.
- ❑ Check the water tank level.
- ❑ Check the condition of the brushes. Remove any string, banding, plastic wrap, or other debris from the brushes. Adjust brush height as necessary.
- ❑ Ensure water pump and and spray jets are operational.
- ❑ Check inner bag, nylon sock, and outer bag for damage and cleanliness.
- ❑ Check operating lights (headlights / taillights).
- ❑ Check safety equipment (rotating beacon / audible alarm / reflectors).
- ❑ Ensure all controls, gauges, and indicators function properly.
- ❑ Check tire pressure and condition of tires.
- ❑ Ensure side panel is secured in place.
- ❑ Machines with optional snow plow only: Check snow plow for damage.

POST OPERATION CLEANING

Clean the machine after every use. See *CLEANING THE MACHINE* section of this manual.

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

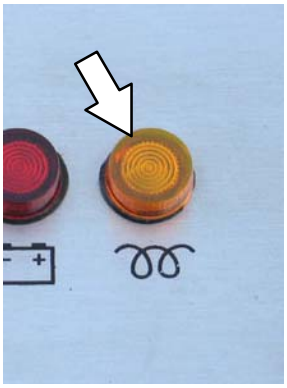
- ❑ Clean the back duct and the impeller housing area.
- ❑ Clean the interior and exterior of the outer filter bag.
- ❑ Clean the engine compartment and around the hydraulic components.
- ❑ Clean the radiator and area around the radiator.
- ❑ Clean the air filter cap, filter housing, and filter.
- ❑ Clean the brushes and vacuum head area.
- ❑ Clean the exterior of the machine.

STARTING THE MACHINE

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

1. Engage the parking brake (if equipped).
2. Adjust the *Throttle lever* to the lowest setting.

3. Ensure the drive lever is in neutral position.
4. Turn the key clockwise until the *glow plug indicator* comes on, but not far enough to start the engine. Hold the key in this position for 5 seconds, depending on temperature. Colder temperatures require longer time.



5. Turn the key further clockwise to start the engine.
6. Allow the engine and hydraulic system to warm up for three to five minutes.

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 15−20 seconds between starting attempts or damage to the starter motor may occur.

WARNING: Machine 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.

7. Turn on lights.

TURNING OFF THE MACHINE

1. Stop the machine, turn off all sweeping functions, and release the drive lever into the neutral position.
2. Turn the ignition switch key counter clockwise to turn off the machine. Remain in the operator seat or at the controls of the machine until the engine is off.

FOR SAFETY: Before leaving or servicing machine, do not park near combustible materials, dust, gases, or liquids. Stop on level surface, set parking brake (if equipped), turn off machine, and remove key.

WHILE OPERATING THE MACHINE

Perform the Pre−Operation Procedures before each use (see *MACHINE MAINTENANCE* section of this manual).

Avoid straps, twine, rope, large plastic bags, etc..., since these items could become entangled in the brushes, brush motors, and vacuum fan. Avoid heavy debris such as bricks and rocks since the vacuum will not pick up such items and they will be drug underneath the vacuum nozzle. Also avoid wood debris since such items can become lodged in the vacuum fan and possibly damage the impeller.

Avoid oil absorbent granules or other oil soaked debris, since such debris can be broken down by the vacuum fan blade and become stuck to the interior of the filter bag, preventing air from moving through bag and significantly diminishing vacuum performance. The filter bag will need to be cleaned if it is clogged with this type debris.

Do Not pickup aerosol cans or other flammable items since such items could create a fire hazard in the filter bag.

Plan the sweeping in advance. Try to arrange long runs with minimum stopping and starting. Sweep as straight a path as possible. Overlap the brush paths. For maximum sweeping performance, operate the machine at lowest speed possible to allow time for the heavier debris to be picked up. Use dust suppression in dusty conditions. Also remember to use the minimum engine speed possible to avoid blowing dust from the plastic collection bag and onto the filter bag surfaces.

Use dust suppression in dusty conditions to prevent the bag from getting dusty. Excessive dust can adversely affect sweeping performance.

Always drive in the general direction of traffic when sweeping along curb lines and areas where there is motor vehicle traffic. Use the lights, beacon, and audible warning to alert pedestrians and motorist that the machine is in use. Always wear reflective safety clothing when operating the machine.

Avoid turning too sharply when the machine is in motion. The machine is very responsive to sudden turns. Avoid sudden turns, except in emergencies.

If poor sweeping performance is observed, stop cleaning and refer to *MACHINE TROUBLESHOOTING* section of this manual.

Drive the machine slowly on inclines. Use the drive lever and throttle to control machine speed on descending inclines. Sweep with the machine up inclines rather than down inclines.

Never maneuver over curbs with the brushes. Always raise the brushes prior to moving over curbs. Never drive over curbs at a high speed or at a 90° angle. Approach curbs at approximately a 45° angle. Never operate machine over curbs greater than 100 mm (4 in.) in height.

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

Do not operate machine in areas where the ambient temperature is above 51° C (124° F). Do not operate sweeping functions in areas where the ambient temperature is below −20° C (−4° F).

FOR SAFETY: When using machine, do not sweep / scrub on ramp inclines that exceed 20% grade or transport (GVWR) on ramp inclines that exceed 20% grade.

The Green Machine is not designed as a full sized street sweeper, however it is capable of maintaining moderately dirty curb lines.

Most dirt is concentrated along edges, either between the sidewalk and buildings (building line) or between the street and the curb (curb line). Since approximately 90% of dirt is generally within 457 mm (18 in) of the building line or curb line, the best way to sweep the area is to start by positioning the machine approximately 305 mm (12 in) from the curb line or building line.

The next time the area is swept, sweep slightly closer to the edge, until finally on the third or fourth pass the brushes can sweep right up against the line.

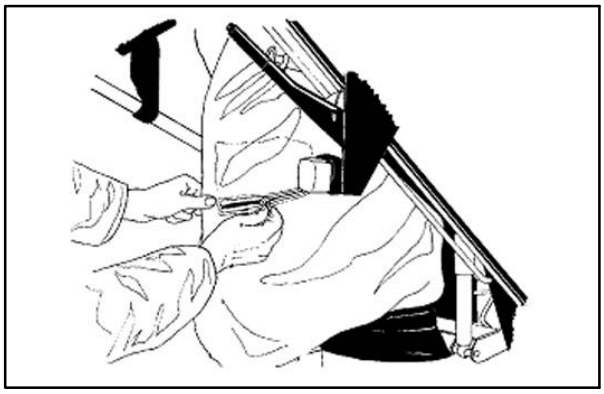
SWEEPING

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

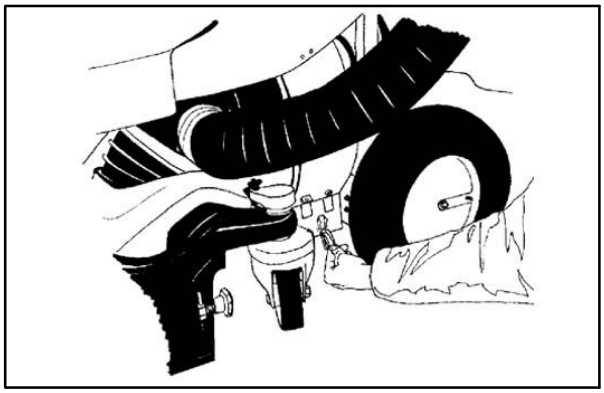
1. Unhook both brushes and lower the brushes to the ground.

2. Start the machine.

3. If sweeping in wet weather or in areas with standing water, open the side zipper to allow the bag to vent.

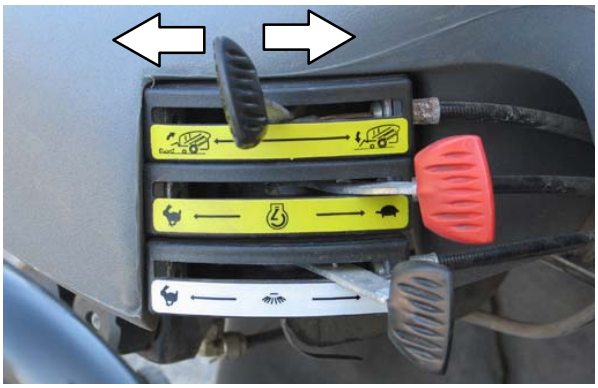


4. If sweeping in wet weather or in areas with standing water, open sludge door to allow excess water to drain from the machine. Close sludge door when sweeping in dry conditions.



5. If necessary, turn on the *Water switch* for dust suppression and adjust the *Water control knobs* to the appropriate settings for sweeping conditions.

6. Use the *Flap lever* to raise or lower the front flap for sweeping conditions. Raise the front flap for larger litter and debris (plastic bottles, leaves, and paper cups). Lower the front flap for finer / smaller debris.

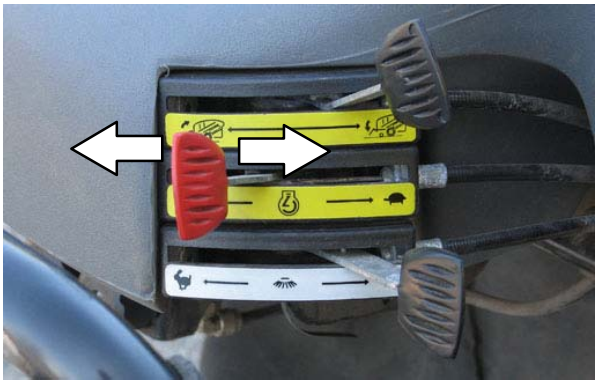


7. Release the parking brake (if equipped).

8. Squeeze the drive lever to begin sweeping.

9. Use the *Brush speed lever* to adjust the brush speed for sweeping conditions.

10. Use the *Throttle lever* to adjust the speed of the fan for sweeping conditions.



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

11. To stop sweeping, release the *Drive lever t*o stop the machine.

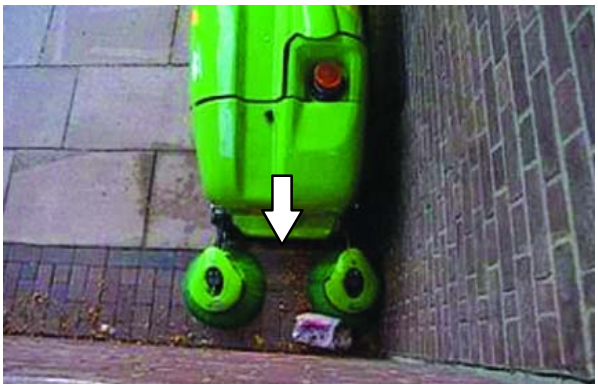
12. Turn off all sweeping functions.

13. Turn off the machine.

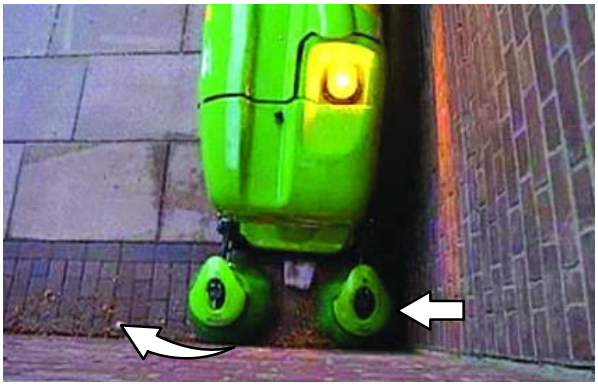
14. Replace the debris bag at the end of each shift or as needed. See *REPLACING THE PLASTIC TRASH BAG* section of this manual.

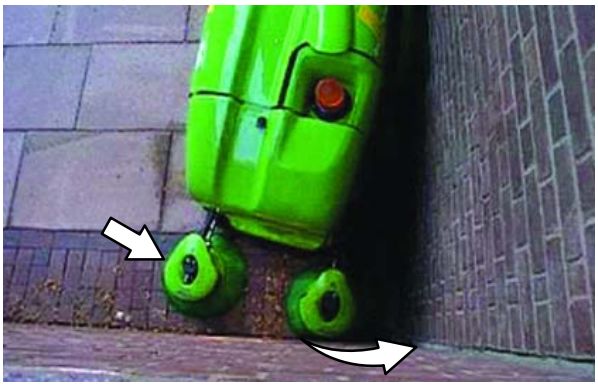
SWEEPING INTO CORNERS

To clean out corners, drive the machine into the corner approximately 450 mm (18 in) away from the adjacent wall. Stop when the brushes touch the opposing wall.

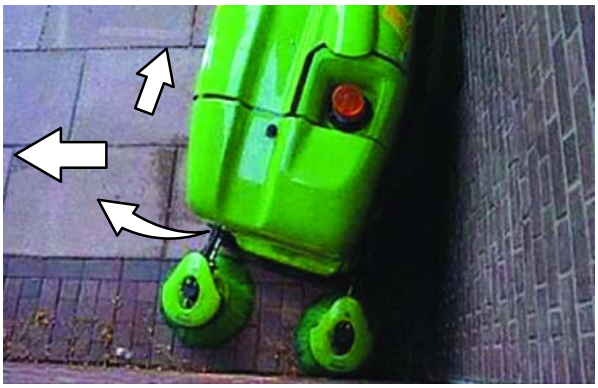


Maneuver the handlebars to the left and to the right to gather the debris under the vacuum nozzle.





Reverse the machine approximately 600 mm (24 in), turn away form the corner, and drive past the opposing wall. Ensure neither the handle bars nor the brush arms touch the walls.



SELECTING HIGH SPEED MODE (424HS)

NOTE: The high speed mode is not recommended for normal sweeping due to the risk of damaging the vacuum nozzle and / or sweeping gear on elevated objects such as drain covers when travelling at higher speeds.

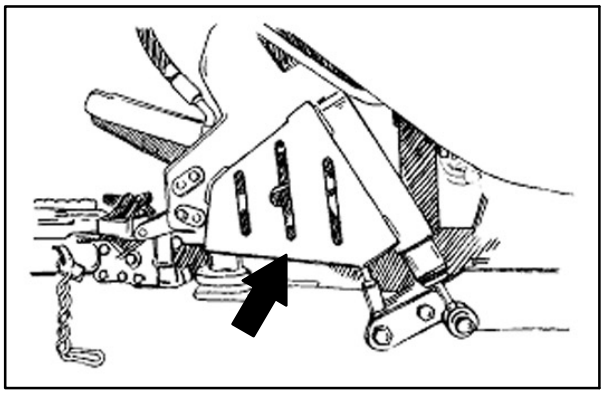
1. Bring the machine to a complete stop.
2. Use the switch on the control panel to raise the vacuum nozzle.
3. Adjust the throttle lever to the lowest setting.
4. Pull and adjust the switch on the control panel from the tortoise position (slow speed) to the hare position (high speed).

NOTE: The acceleration in high speed mode is less than when the machine is in low speed mode.

RAISING / LOWERING THE VACUUM NOZZLE (424HS)

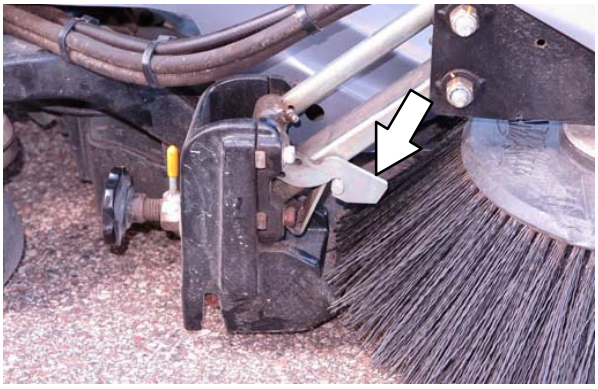
1. Bring the machine to a complete stop.
2. Use throttle to lower the engine idle.
3. Use the vacuum switch on operator console to raise the vacuum nozzle.

NOTE: As well as raising the front nozzle, the vacuum switch controls the pitch lock mechanism. The pitch lock automatically engages when the front vacuum nozzle is raised. The pitch lock limits the range of movement of the handlebars when the front vacuum nozzle is raised. This prevents the handlebars from hitting the operator's knees when moving over uneven surfaces and gives a more stable and secure ride at high speeds.



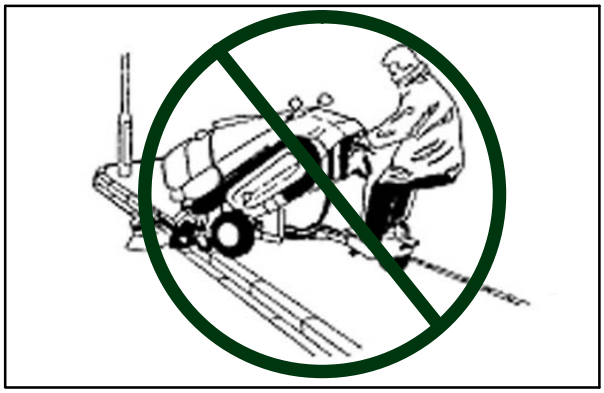
DRIVING OVER CURBS

1. Stop and turn off the machine.
2. Lock the brushes into the raised position.

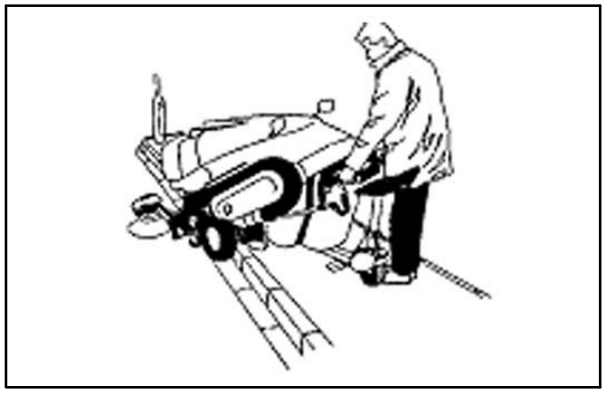


3. Start the machine.

FOR SAFETY: When using machine, do not sit on seat when maneuvering machine over curbs.



4. Approach the curb at approximately a 45° angle and slowly drive over the curb. Never operate machine over curbs greater than 100 mm (4 in.) in height.



When descending the curb, move slowly forward until one wheel drops down from the curb. The handlebars will move up as the front of the machine descends. Hold the handles firmly so the machine stays on course and does not swing to the side.

When descending the curb, move slowly forward, push down firmly on the handles before mounting the curb, and keep them down until the front brushes and castor wheels clear the curb as the machine moves forward.

CLEARING BLOCKAGES FROM THE VACUUM NOZZLE

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

1. Tilt the machine back.
2. Reach in under the suction nozzle and remove the debris / blockages from the vacuum nozzle.

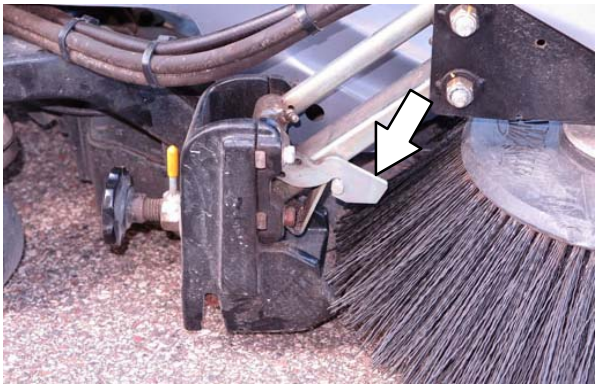
If still unable to reach / clear the blockage, proceed to the following steps to clear any blockages.

3. Loosen the six knobs securing the front vacuum fan cover to the machine and the single knob at the base of the vacuum hose and first pull the bottom of the assembly and then the top from the machine.

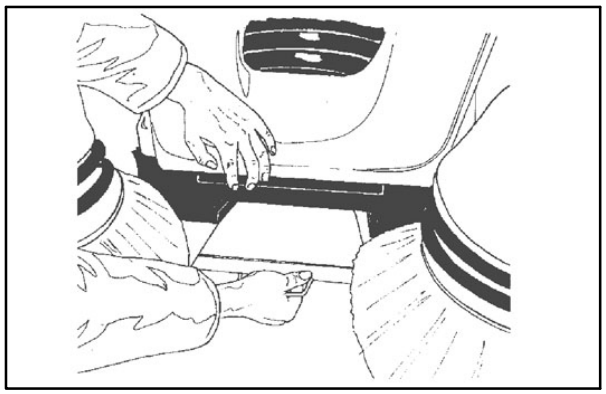
4. Remove debris / blockages from the vacuum vacuum assembly
5. Reinstall the front vacuum fan cover onto the machine

TRANSPORTING THE MACHINE

1. Stop and turn off the machine.
2. Lock the brushes into the raised position.



3. To prevent the vacuum from picking up debris while moving to another location, lift the flap at the vacuum nozzle, insert blanking plate into the vacuum nozzle, and lower the flap to block the vacuum.



4. Start the machine and drive to new location.

SWEEPING LEAVES

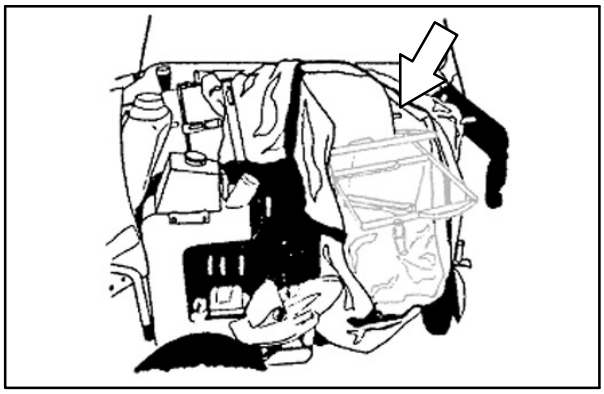
Leaf bags provide several advantages versus the standard plastic trash bags. Leaf bags have a much larger capacity and are capable of collecting approximately 10 times the amount of leaves over the standard trash bag. The leaf bags are also very easy to change out when they are full.

The open burlap weave allows much greater airflow and therefore improved vacuum performance, allowing the machine to operate faster when picking up large quantities of leaves. The improved airflow also reduces the likelihood of blockages.

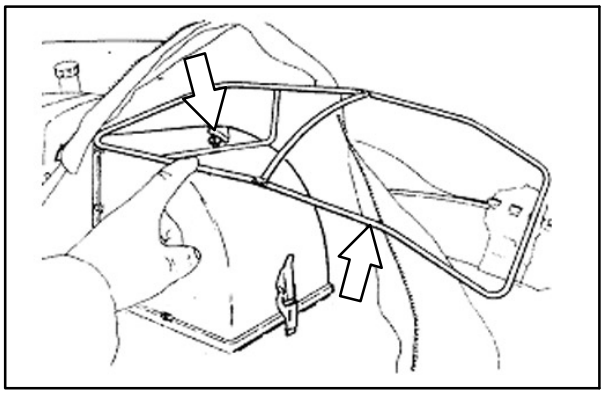
*NOTE: **Do** **Not** use the leaf bags for everyday sweeping. Since the open weave does not provide a final filter stage, dust output through the leaf bag is much higher.*

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

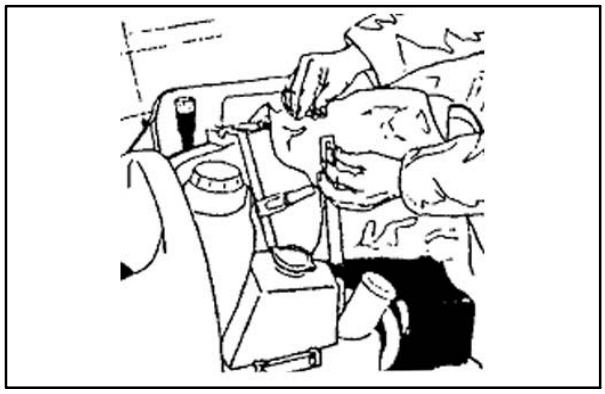
1. Open the machine top cover.
2. Open the toggle clamp and remove the sliding frame, filter screen, and holder.



3. Loosen the panel knob and remove the bag support frame.



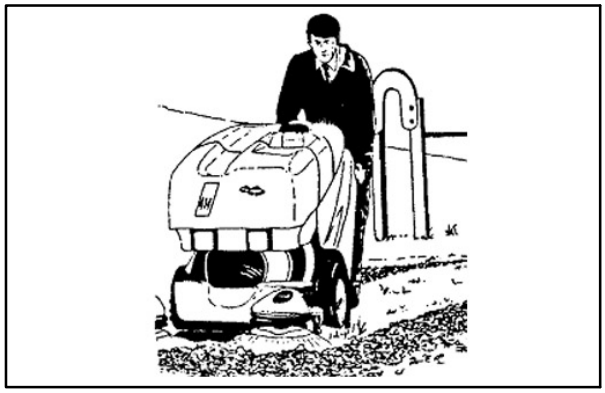
4. Remove the outer filter bag.



5. Refit the bag support frame.
6. Use the bag strap to fit the leaf bag as the outer filter bag had previously been fitted.
7. Hook the right side hole in the apron over the hydraulic tank filler to install the protective apron.
8. Remove the water tank filler cap and hook the left side hole in the apron over the water tank filler. Reinstall the water tank filler cap.
9. Close the machine top cover.
10. If sweeping grass areas, adjust the brush height so the brushes just touch the grass. Excessive brush pressure damage the grass.
11. If necessary, adjust the vacuum nozzle height and open the front flap as necessary for the sweeping conditions.

NOTE: Blockages may be encountered when sweeping piles of leaves containing many twigs and small branches longer than 200 mm (8 in.). See CLEARING BLOCKAGES FROM THE VACUUM NOZZLE for instructions how to clear blockages from the vacuum fan.

12. Start machine and use the machine to clear leaves from hard surface and grass areas.

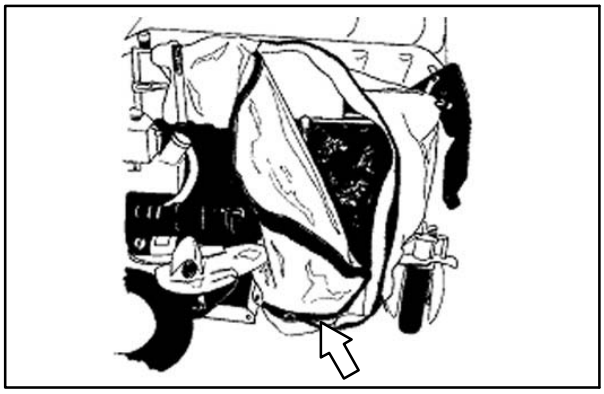


REPLACING THE PLASTIC TRASH BAG

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

1. Remove the wander hose from the holster and move the wander hose out of the way. Open the top cover.

2. Open the filter bag zipper to access the plastic trash bag.



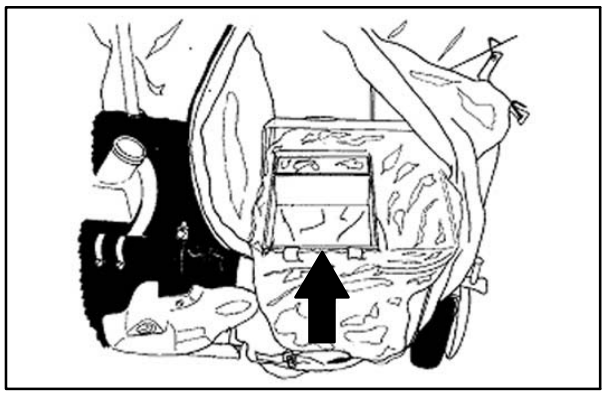
3. Loosen the toggle clamp and pull the sliding frame out towards body.

4. Remove the trash bag, plastic screen, and holder from inside the filter bag.

5. Remove the plastic screen and holder from the trash bag. Discard the plastic trash bag.

6. Install a new plastic trash bag onto the plastic screen and holder. Fold the edges of the bag around the outer sliding frame, Do not fold the edges around the inside screen holder.

7. Install the plastic bag, plastic screen, and holder into the sliding frame.



8. Close the sliding frame and secure the toggle clamp.

9. Close the filter bag zipper.

10. Close the top cover and reinstall the wander hose onto the machine.

CLEANING THE MACHINE

DAILY AFTER USE CLEANING

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

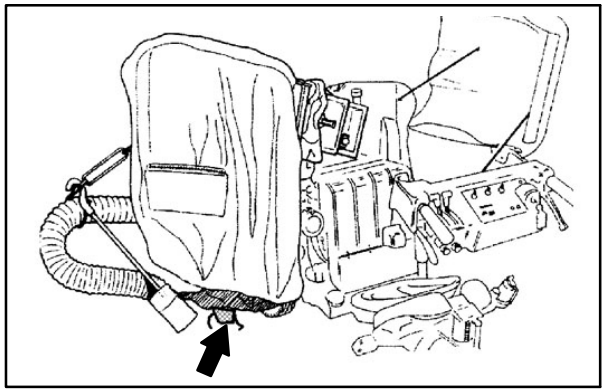
1. Remove the wander hose from from the holster and move the wander hose out of the way and open the top cover.

2. Unzip the outer filter bag and remove the inner plastic bag and filter screen from the machine.

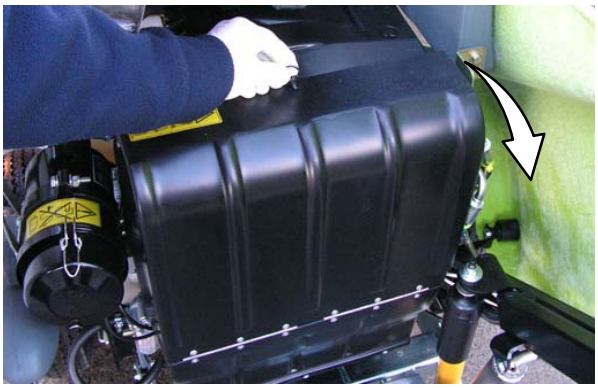
3. Loosen both toggle clamps to release the back trucking from the machine.

4. Swing the back duct open until it locks into the open position.

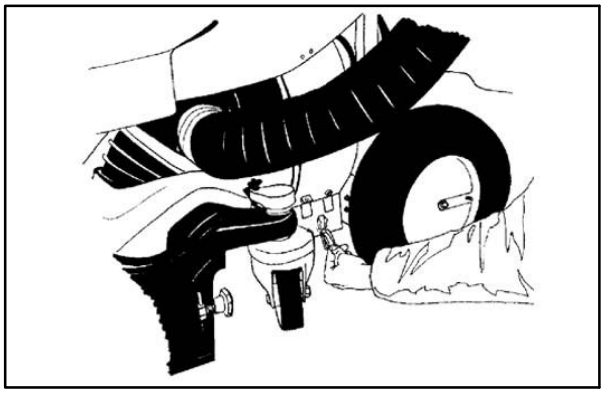
5. Loosen the drain tube located on the bottom of the filter bag and gently shake the filter bag to allow dust and sand to escape.



6. Open the radiator cover door.



7. Open the sludge door located at the bottom of the fan casing to drain water from the casing.



8. Clean the back duct and the impeller housing area.

9. **Machines with wander hose only:** Spray water into the wander hose.

10. **Machines with wander hose only:** Hold wander hose up and to drain the water from the wander hose and out the sludge door.

11. **Machines with wander hose only:** Repeat previous two steps as necessary until all dirt and debris is cleared from the wander hose.

12. Clean the interior and then the exterior of the outer filter bag.

13. Thoroughly clean the radiator and area around the radiator.

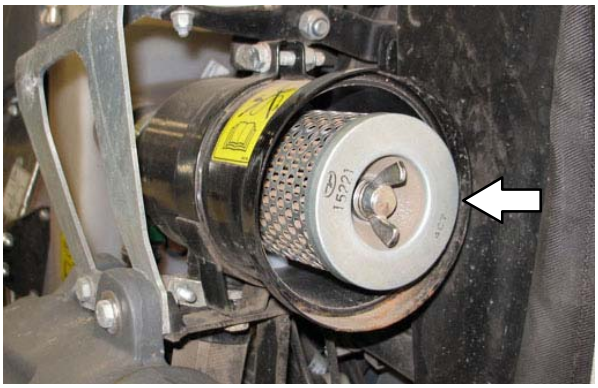
NOTE: Do not use excessive water pressure when cleaning the radiator and areas around the radiator. Excessive water pressure could damage the radiator.

14. **414RS machines only:** Rinse the operator seat swivel box.

NOTE: Leave the operator seat fully extended for cleaning.

15. Remove the air filter cap from the air filter housing.

16. Remove the filter from the filter housing and tap dust and debris from the filter. Wipe the interior of the filter housing. Reinstall the filter.



17. Wipe dust and debris from the interior of the air filter cap and reinstall the cap onto the air filter housing.

18. Close the radiator cover door and the back duct.

19. Close the top cover.

20. Place the wander hose back into storage location.

21. Clean the exterior of the machine (brushes, front nozzle, covers, etc...).

WEEKLY CLEANING

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

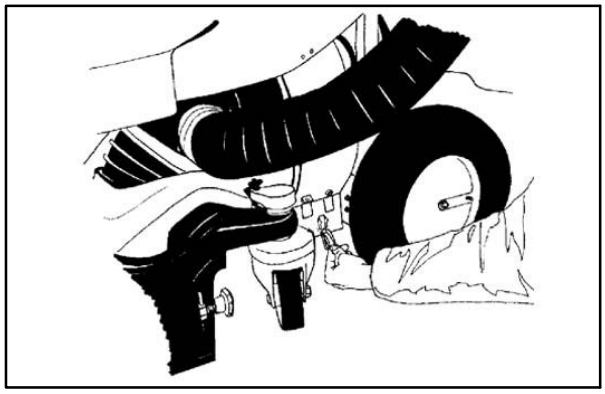
NOTE: Also complete daily cleaning procedure when conducting weekly cleaning.

1. Remove the front box (CSA/DEA, if equipped) from the machine.

2. Loosen the six knobs securing the front vacuum fan cover to the machine and the single knob at the base of the vacuum hose and first pull the bottom of the assembly and then the top from the machine.

3. Inspect the impeller fan. Ensure the impeller fan turns freely and that there are no obstructions to damage impeller / prevent the impeller from moving freely.

4. Open the sludge door located at the bottom of the fan casing to drain water from the casing.



5. Clean the interior of the vacuum fan housing.

6. Reinstall the front vacuum fan cover / vacuum hose onto the machine.

7. Remove the side access panel from the machine.

8. Remove the engine top cover from the engine.

9. Clean all dirt and debris buildup from areas around the engine and the hydraulic block.

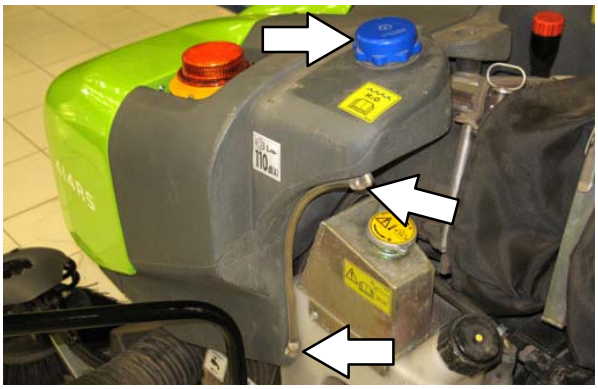
10. Reinstall the engine top cover and the side access panel

WATER TANK

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

CHECKING / FILLING THE WATER TANK

1. Check the water tank level at the water tank level tube. If necessary, fill the water tank.



DRAINING THE WATER TANK

1. Push the metal tab on the quick release coupling to disconnect the water tube
2. Remove the drain cap from the water tank and allow the water tank to drain.
3. Start the machine, turn on the *Water switch*, and allow the pump to operate a few seconds to drain remaining water.
4. Turn off the machine.
5. Reinstall the drain cap onto the water tank and reconnect the water tube to the water tank.

FILLING THE WATER TANK WITH DEICER

1. Drain all remaining water / detergent from the water tank. See *DRAINING THE WATER TANK.*

NOTE: Use liquid Magnesium Acetate, liquid Calcium Chloride, liquid Calcium Magnesium Acetate or approved deicers only. ***Do*** ***Not*** *use glycol−based or methanol−based deicers since these products could damage the water pump sprayer.*

2. Fill the water tank with an approved deicer.

NOTE: Thoroughly clean machine after using deicers. Many deicing chemicals are corrosive and can possibly damage the machine.

USING DISINFECTANTS / CHEMICALS

A disinfectant and/or mild degreaser can be added to the water system to improve hygiene and sweeping performance (quaternary ammonium halide based products are recommended). Add the manufacture recommended amount before filling the water tank with water. Follow the dilution instructions on the product container.

Do **Not** use products containing methanol. These products can damage the water pump seals.
Do **Not** use products containing colloidal deposits. These products turn a milky color when mixed with water. These products can leave a sticky residue on the water pump seals.
Never use herbicides or products containing poisonous or harmful chemicals. There is a strong risk of inhaling such products when they are vacuumed up by the machine.

OPTIONS

WANDER HOSE (OPTION)

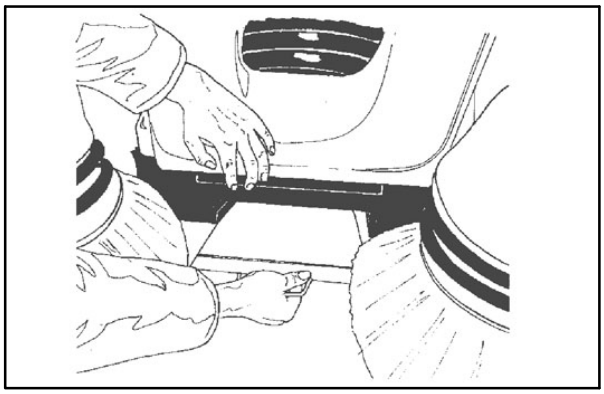
Use the wander hose to clean areas that are out of reach of the machine.

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, and set parking brake (if equipped).

1. Adjust the throttle for for the type area and debris to be cleaned.

2. Grasp the wander hose handle and remove the wander hose from the holster.

3. To increase the vacuum at the wander hose and block the vacuum at the vacuum nozzle, turn off the machine, retrieve the blanking plate from the front box assembly, lift the flap at the vacuum nozzle, insert the blanking plate into the vacuum nozzle, and lower the flap.



4. Use the wander hose for cleaning.

5. Return the wander hose to the holster when finished using the wander hose.

6. If the blanking plate was used, turn off the machine, remove the blanking plate from the vacuum nozzle, and return the blanking plate to the front box assembly.

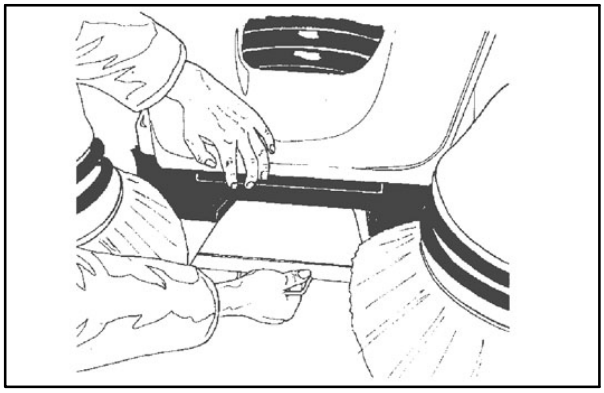
CLEARING A BLOCKAGE FROM THE WANDER HOSE

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, and set parking brake (if equipped).

1. Turn off the the machine

1. Retrieve the blanking plate from the front box assembly.

2. Lift the flap at the vacuum nozzle, insert blanking plate into the vacuum nozzle, and lower the flap to block the vacuum at the vacuum nozzle.

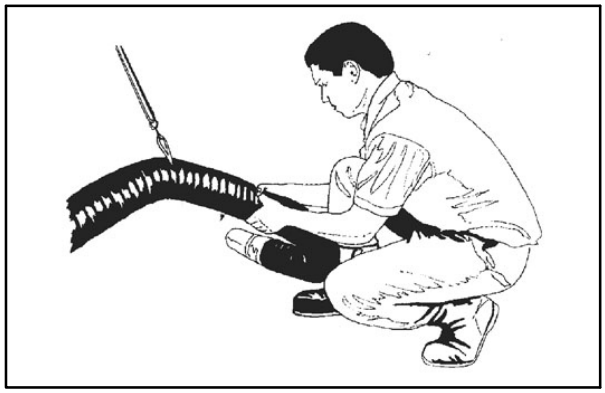


3. Stretch the wander hose out to its full length.

4. Turn on the machine and set the throttle to approximately 1/3 power.

5. Grasp the wander hose handle and pull sharply to straighten the hose and clear the blockage.

6. If the blockage still remains, squeeze along the wander hose to dislodge the blockage.



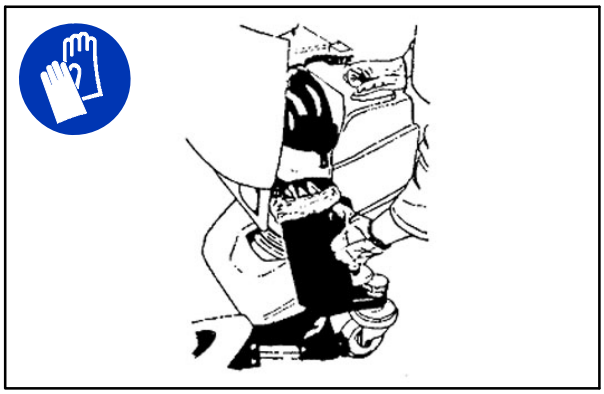
CLEAN AND SAFE ATTACHMENT (CSA) / DOG EXCREMENT ATTACHMENT (DEA) (OPTION)

Use the CSA / DEA hose to clean dog excrement from public areas.

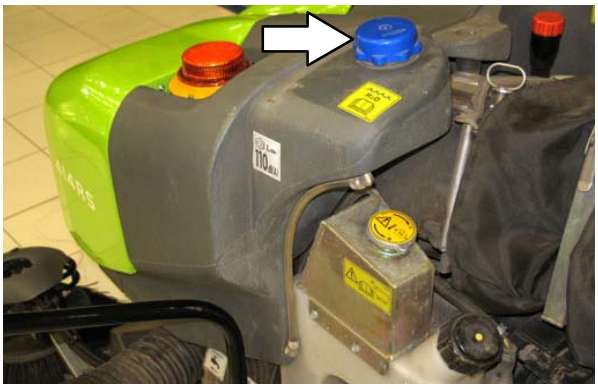
FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, and set parking brake (if equipped).

PREPARING THE CSA / DEA SYSTEM FOR USE

1. Remove the CSA / DEA container from the machine.
2. Insert the CSA / DEA plastic sack and cardboard tube into the CSA / DEA container.



3. Reinstall container onto machine.
4. Add 1 L (1 qt) of disinfectant into the water tank.



5. Add water to water tank as necessary.

USING THE CSA / DEA SYSTEM

NOTE: Always wear appropriate protective gear when using the CSA / DEA system.

1. Set the engine speed to idle.

NOTE: Starting CSA / DEA with engine idle too high could damage the engine. Always set the engine to a low idle before turning on the CSA / DEA system.

2. Turn on the CSA / DEA system.

3. Increase the engine speed to approximately 2/3rd power.

4. Remove the CSA / DEA lance and hose from the storage holster.

5. Open the CSA / DEA lance water valve and lightly spray the excrement with the water / disinfectant mixture.

6. Close the CSA / DEA lance water valve.

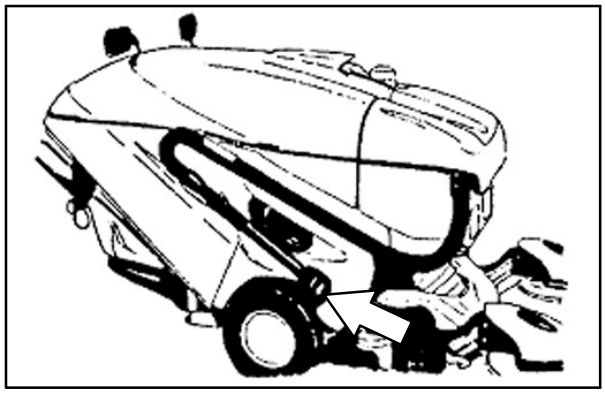
7. Place the CSA / DEA lance hose end over the soiled area and then draw the hose toward body. Continue until all excrement is removed.

8. Open the CSA / DEA lance water valve again and spray the area with the water / disinfectant solution.

9. Close the CSA / DEA lance water valve.

10. Place the CSA / DEA lance hose end over the soiled area and clean any remaining residue.

11. Return the CSA / DEA lance to the storage holster.



12. Set the engine speed to idle and turn off the CSA / DEA system.

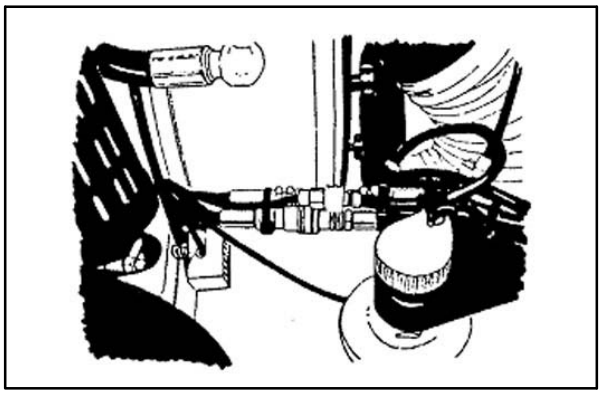
13. When finished using the machine, replace the CSA / DEA plastic sack and cardboard tube in the CSA / DEA container.

SNOW PLOW (OPTION)

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

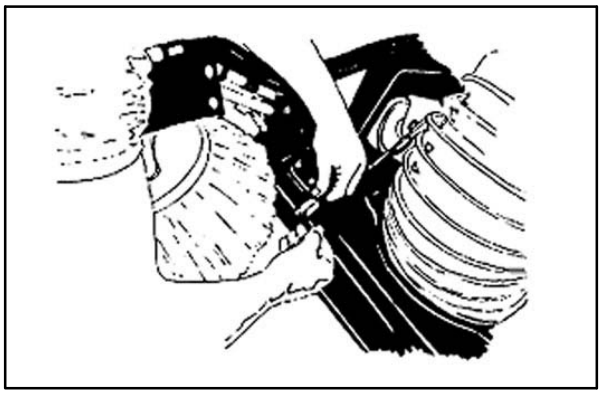
INSTALLING THE SNOW PLOW

1. Disconnect the three hydraulic couplings located on the right side of the machine.

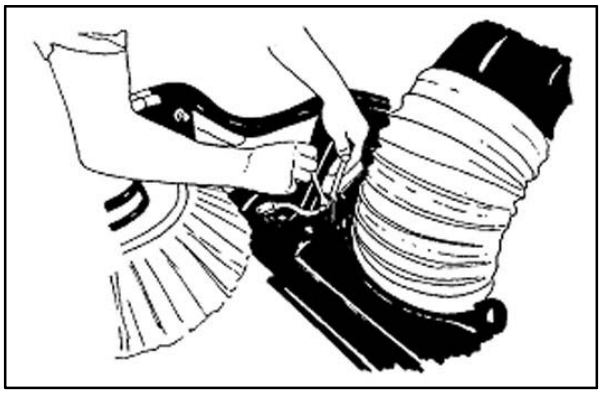


2. Disconnect the water hose located on the right side of the machine.

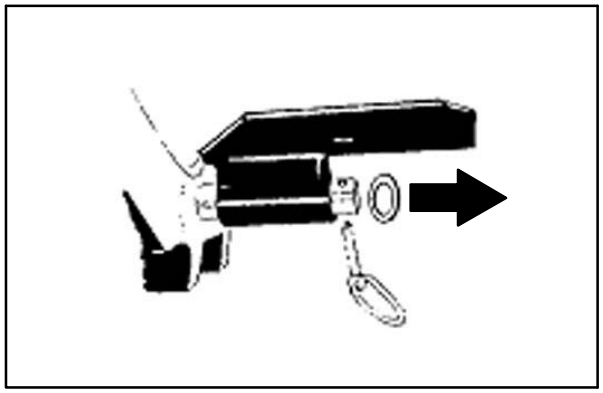
3. Remove the flap cable split pin and clevis pin.



4. Use a wrench to loosen the nut and release the threaded adjuster from its anchorage.



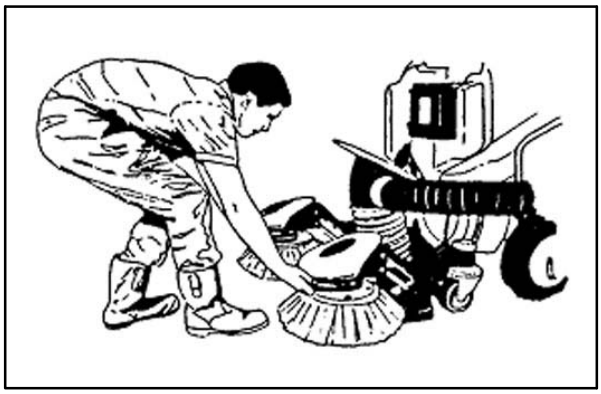
5. Remove the pin and washer from the vacuum spigot.



6. Remove the front box assembly from the machine.

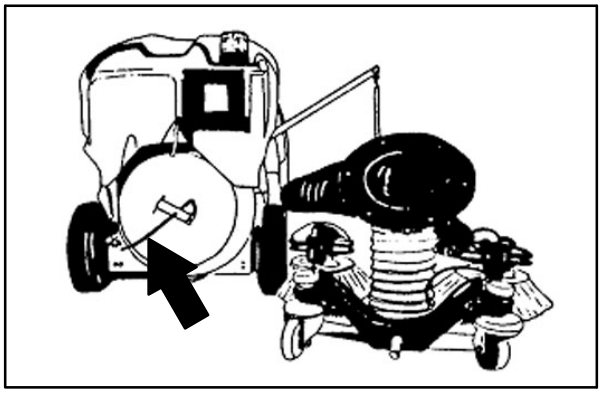
7. Remove the six knobs from the fan casing access cover and the knob at the base of the vacuum hose and remove the front vacuum hose assembly from the machine.

8. With another person holding the machine handlebar, pull the vacuum nozzle assembly away from the machine.



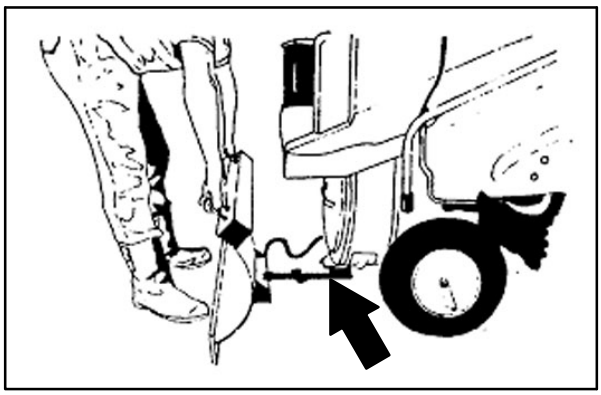
9. Place the casing blanking plate included with the snowplow over the fan casing and secure it with six of the panel knobs that were removed earlier.

10. Secure the flap cable to the casing blanking plate handle so that the cable does not drag on the ground.

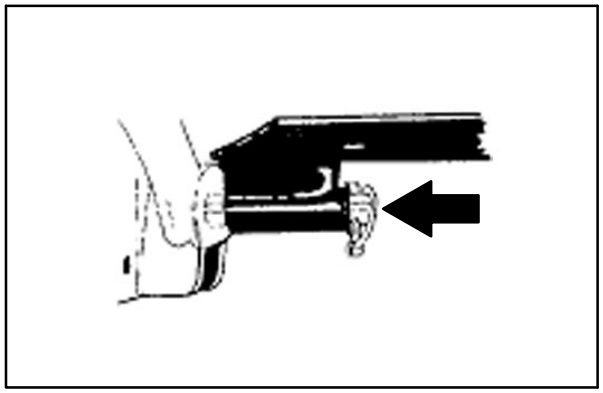


11. Unclip the wander hose from the boom and remove the wander hose nozzle assembly from the machine.

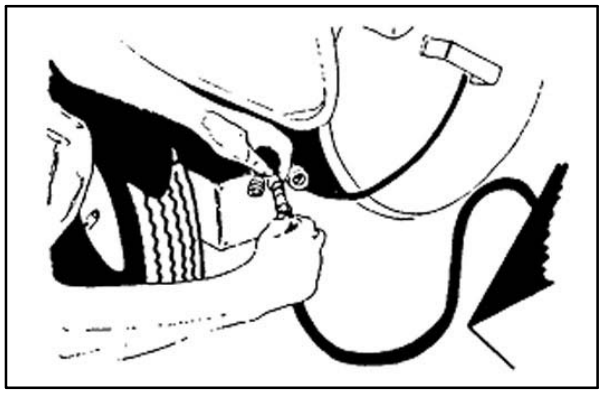
12. Slide the snowplow pivot pin into the front head pivot tube.



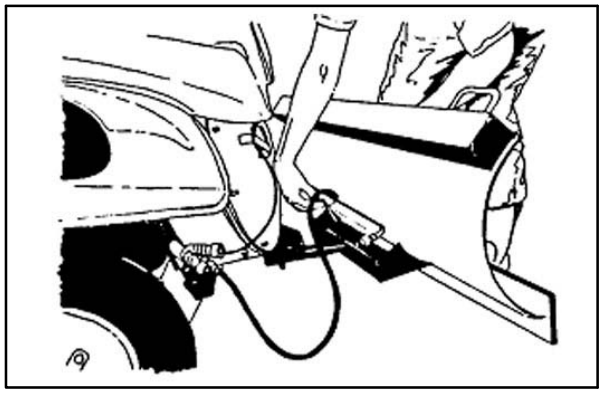
13. Reinstall the pin and washer into the vacuum spigot.



14. Connect the snowplow spray bar hose to the water system



15. Position the snowplow to either the left or right as required and install the locking pin.

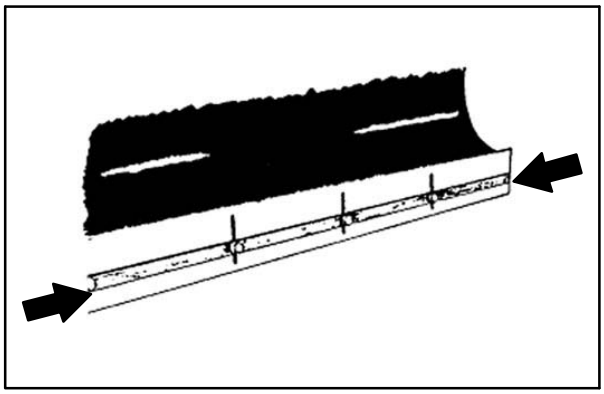


16. Reinstall the front box assembly.

17. Fill the water tank with an approved deicer. See *FILLING THE WATER TANK WITH DEICER*.

18. Inspect the sprays on the spray bar for correct operation.

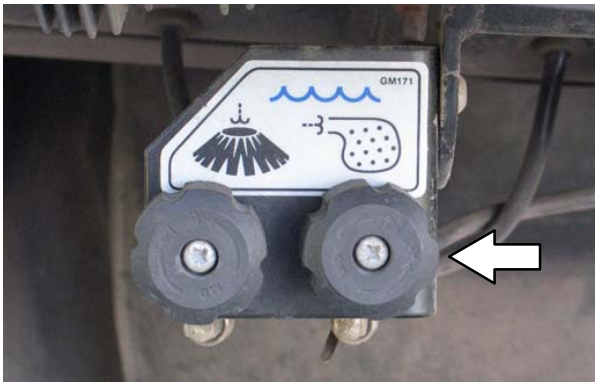
19. Ensure that the snow plow rubber is set with no more than 18mm (0.75 in) protruding below the snow plow blade.



USING THE SNOW PLOW

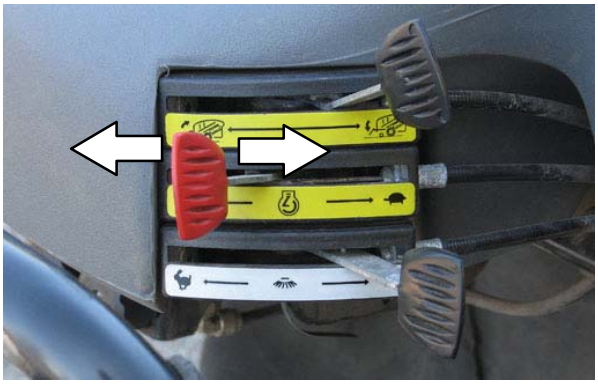
FOR SAFETY: Do not operate machine, unless operator manual is read and understood.

1. Start the machine.
2. Turn off the water supply to the debris bag spray jet.



NOTE: Due to the machine being only 14 horsepower, the maximum depth of dry powder snow the machine can plow is approximately 100 mm (4 in). The machine can not effectively plow deeper snow accumulations or wet / heavy snow.

3. Squeeze the drive lever to begin plowing snow.
4. Use the *Throttle lever* to adjust the speed of the machine for snow conditions.



5. To stop plowing snow, release the *Drive lever t*o stop the machine.
6. Set the engine speed to idle.

7. Turn off the machine.

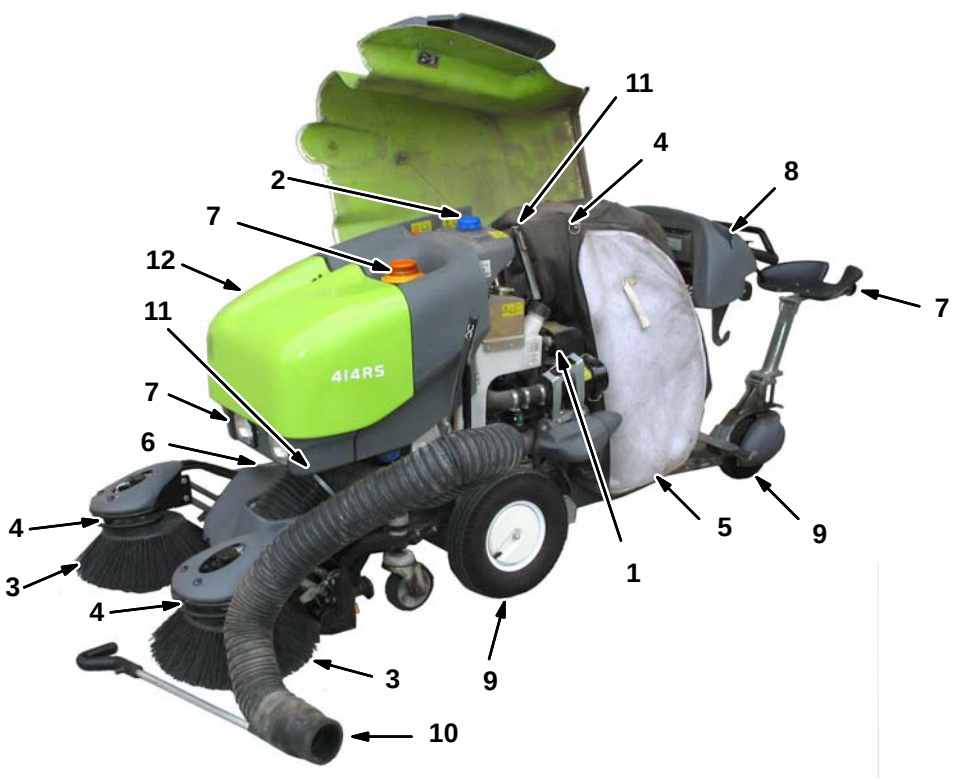
MACHINE TROUBLESHOOTING

Problem	Cause	Remedy
Poor sweeping performance (not picking up debris / leaving a trail).	Engine speed too low for conditions.	Increase engine speed.
	Operating machine too fast for conditions.	Operate machine at a slower speed.
	Inner plastic sack is full.	Empty / replace inner plastic sack.
	Filter bag is clogged (feels inflated like a balloon).	Shake sides of filter bag to knock dust from interior surface. Rinse out filter bag if it is clogged after shaking. Wash filter bag if it remains clogged after shaking and rinsing.
	Filter bag is wet.	Open filter bag side zipper to allow filter bag to vent. Open sludge door to allow water to drain from the system. Pierce one or two small holes into inner plastic bag to allow water to drain.
	Vacuum hose is blocked.	Remove blockage from vacuum hose.
	Front flap is open.	Close the front flap.
	Vacuum nozzle is adjusted to far from the ground.	Adjust vacuum nozzle to lower height.
	Back duct / filter screen are blocked.	Remove debris from filter screen. Remove debris from back duct.
Machine pulls to one side or feels too heavy to operate.	Parking brake is engaged.	Release parking brake.
	Front tires and / or rear tire are under inflated.	Inflate tire(s) to correct pressure.
	Front castor wheels are not rolling freely.	Remove obstruction(s) from castor wheels. Grease caster wheel assemblies.
	Rear tire not rolling freely.	Remove obstruction(s) from rear tire. Grease rear tire assembly
	Seat assembly may not be operating correctly (414RS Only).	If seat is in stowed (in) position, ensure rear tire rotates freely in both directions. If seat is in extended (out) position, ensure castor is correctly locked into place.
Brushes bounce when sweeping.	Brush speed too low for travel speed.	Increase brush speed
	Excessive brush pressure.	Decrease brush pressure
	Brush arm assemblies need grease / bushings need to be replaced.	Grease brush arm assemblies. Replace bushings if problem persists.

Problem	Cause	Remedy
Machine will not move forward or moves forward very slowly.	Parking brake is engaged.	Release parking brake.
	Brush speed is too high.	Lower brush speed.
	Debris wrapped in impeller (vacuum fan assembly).	Remove obstruction(s) from impeller.
	Emergency brake release valve not closed or is damaged.	Close emergency brake release valve. Replace emergency brake release valve if problem persists.
	CSA / DEA are on (Machines with CSA / DEA option only).	Turn off CSA / DEA system.
	Hydraulic system overheating / hydraulic filter needs to be replaced.	Check hydraulic fluid level. Add fluid as necessary. Check hydraulic filter. Replace if necessary.
	Hydraulic system excessively worn.	Call authorized service representative.
	Problem with gearbox / axle.	Call authorized service representative.
	Machines with snow plow installed.	Adjust *Brush speed lever* to lowest setting. Check / reconnect quick connect fittings.
Engine overheating.	Radiator / coolant system blocked.	Clear blockage.
	Radiator fins damaged.	Call authorized service representative.
	Engine coolant level is low.	Add coolant to reservoir.
	Incorrect coolant / wrong coolant mixture is being used.	Drain coolant and replace with correct coolant / coolant mix.
	Debris wrapped in impeller (vacuum fan assembly).	Remove obstruction(s) from impeller.
	Bad / contaminated diesel fuel.	Drain bad fuel and refill machine with fuel from another source.
Engine will not turn over.	Battery is not fully charged / connected properly.	Charge battery. Ensure battery posts are free or corrosion and cables are not loose
	In−line starter fuse is blown	Replace blown fuse.
	Debris wrapped in impeller (vacuum fan assembly).	Remove obstruction(s) from impeller.
	Starter motor / starter switch are faulty.	Replace starter motor / starter switch.
	Back duct not completely closed (safety switches not making contact).	Completely close / secure rear duct.
Engine turns over, but will not start.	Engine preheater not allowed enough time to warm (cold weather).	Hold key in preheat position for longer duration before attempting to start engine.
	Battery is not fully charged / connected properly.	Charge battery. Ensure battery posts are free or corrosion and cables are not loose.
	Emergency shutoff is engaged.	Disengage the Emergency shutoff.
	Debris wrapped in impeller (vacuum fan assembly).	Remove obstruction(s) from impeller.
	Bad / contaminated diesel fuel.	Drain bad / contaminated fuel. Refuel machine from another fuel source.

Problem	Cause	Remedy
Charging system malfunction indicator remains illuminated after engine is started.	Engine fan belt is loose.	Tighten engine fan belt.
	Alternator / charging regulator are faulty.	Replace alternator / charging regulator.
Engine smoking.	Black smoke − Dirty air filter.	Replace air filter. Clean air inlet screen.
	Black smoke − Bad / contaminated fuel.	Drain bad fuel and refill machine with fuel from another source.
	Black smoke − Worn / damaged fuel injectors.	Call authorized service representative.
	Blue smoke − Burning oil.	Call authorized service representative.
	White smoke / mist / steam − Leaking head gasket.	Call authorized service representative.
	White smoke − Worn / damaged fuel injectors.	Call authorized service representative.
Hydraulic system overheating.	Hydraulic fluid level is low.	Add hydraulic fluid to the system.
	Worn / damaged hydraulic filter.	Replace hydraulic filter.
	Radiator blocked with debris (air flow restriction).	Clean radiator.
	Radiator fins damaged.	Call authorized service representative.
Water system (dust suppression) is not functioning.	Water tank is empty.	Fill water tank.
	Spray jets are blocked.	Clear dust / debris from spray jets.
	Water outlet hose disconnected or blocked.	Reconnect water outlet hose. Clear blockage from water outlet hose.
Fold and stow seat will not pull out / stow.	Locking mechanism is not released	Release locking mechanism.
	Slide and roller mechanism filled with debris.	Clear debris from slide and roller mechanism.
Electrical problems.	Fuse(s) is / are blown.	Replace blown fuse(s).

MAINTENANCE



MAINTENANCE CHART

The table below indicates the *Person Responsible* for each procedure.
O = Operator.
T = Trained Personnel.

Interval	Person Resp.	Key	Description	Procedure	Lubricant/ Fluid	No. of Service Points
Daily	O	1	Engine	Check oil level	EO	1
				Check hydraulic fluid level	EO	1
				Check coolant level	WG	1
				Check radiator for damage	–	1
				Check fuel level	–	1
				Check air filter indicator	–	1
				Check fuel lines for wear and damage.	–	All
	O	2	Water tank	Check water tank level	–	1
	O	3	Brushes	Check for wear	–	2
	O	4	Dust suppression	Ensure spray jets are operational (spray jet at each brush / spray jet at debris bag)	–	3
				Ensure water pump is operational	–	1
	O	5	Debris bag assembly	Check outer bag, nylon sock, and inner bag for cleanliness and damage.	–	1
	O	6	Vacuum nozzle	Check the vacuum nozzle height.	–	1
	O	7	Operating lights	Check operation and for damage.	–	All

Interval	Person Resp.	Key	Description	Procedure	Lubricant/ Fluid	No. of Service Points
Daily	O	−	Safety equipment (rotating beacon / audible alarm / reflectors)	Check operation and for wear and damage.	−	All
	O	8	Control panel / operator compartment	Ensure all controls, gauges, and indicators function properly.	−	All
	O	9	Tires	Check pressure and for damage	−	3
	O	−	Side panel (not shown)	Ensure side panel is secured	−	1
	O	−	Snow plow (Optional) (not shown)	Check snow plow for damage	−	1
	O	10	Wander hose (Optional)	Check wander hose for damage	−	1
	O	11	Safety interlock switches	Ensure safety interlock switches function	−	2
250 Hours	T	9	Tires	Torque lug nuts (4 each wheel)	−	All
	T	12	Battery	Check electrolyte level (non−sealed batteries only)	−	1
				Clean, grease, and tighten battery cable connections **(after initial 250 hours only)**	−	1
750 Hours	T	12	Battery	Clean, grease, and tighten battery cable connections	−	1

LUBRICANT/FLUID

EO . . . . . Turbo Diesel Engine Oil, 15W40. to APISG/CD or better.
HYDO . . . . . Turbo Diesel Engine Oil, 15W40. to APISG/CD or better
WG . . . . . 50/50 mix of water and ethylene glycol permanent, −34° C (−30° F).

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

NOTE: Refer to the Green Machine 414 Workshop Manual for additional service requirements.

HYDRAULICS

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

Check the hydraulic fluid level daily. The machine must be at operating temperature before checking the hydraulic fluid level. Fill the hydraulic system with hydraulic fluid until the oil is between the indicator marks on the dipstick. DO NOT fill past the top indicator mark. The hydraulic system capacity is 7.2 L (7.6 qt) for standard machines and 7.6 L (8 qt) for machines equipped with optional Dog Excrement Attachment (DEA).

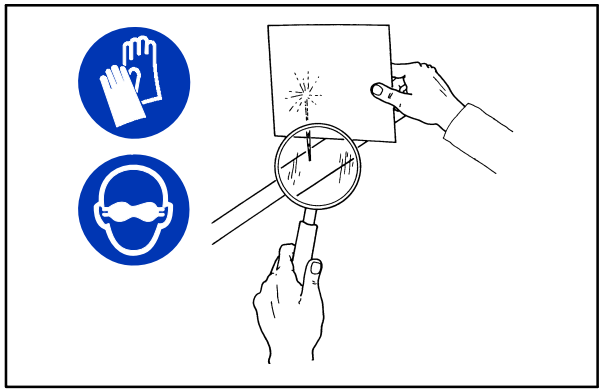
ATTENTION! Do not overfill the hydraulic fluid reservoir or operate the machine with a low level of hydraulic fluid in the reservoir. Damage to the machine hydraulic system may result.

HYDRAULIC HOSES

Check the hydraulic hoses after every 250 hours of operation for wear, damage, and leaks.

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

High pressure fluid escaping from a very small hole can almost be invisible, and can cause injury.



Contact appropriate personnel if a leak is discovered.

ATTENTION: Only use TENNANT supplied hydraulic hoses or equivalent rated hydraulic hoses.

HYDRAULIC FLUID

Use Turbo Diesel Engine Oil, 15W40. to APISG/CD or better.

If using a locally−available hydraulic fluid, be sure the specifications match manufacturer hydraulic fluid specifications. 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.

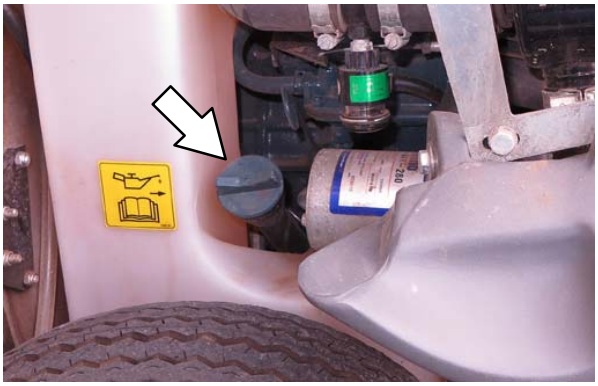
ENGINE

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

ENGINE OIL

Check the engine oil level daily.

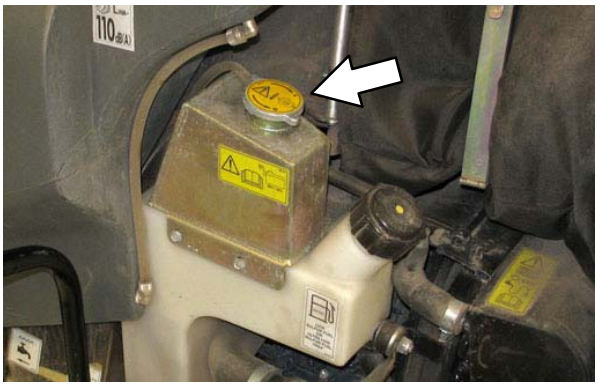
Fill the engine with oil until the oil is between the indicator marks on the dipstick. DO NOT fill past the top indicator mark. The engine oil capacity is 2.2 L (2.3 qt) with oil filter. Oil filler cap is located below the dip stick.



COOLING SYSTEM

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

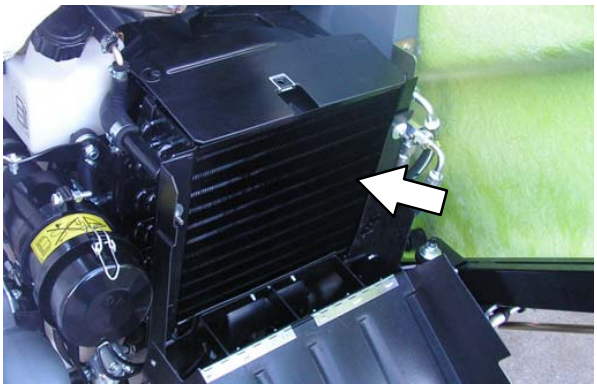
Check the coolant level daily. Remove the cap to check the coolant level. The coolant level must be 50 mm (2 in.) below the top of the tank when the engine is cold.



FOR SAFETY: When servicing machine, do not remove cap from radiator when engine is hot. Allow engine to cool.

Do not overfill the coolant tank. Coolant will escape from the tank when the engine heats up if the coolant tank is overfilled.

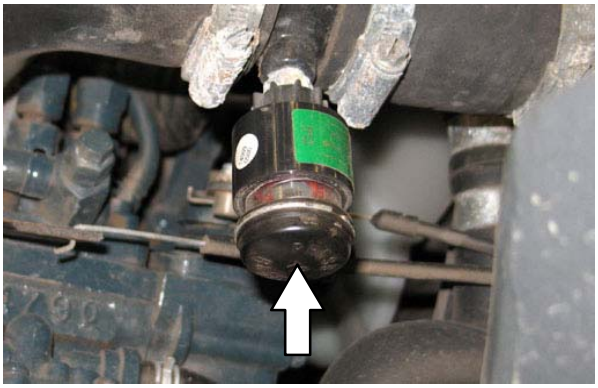
Check the radiator for damage daily.



AIR FILTER

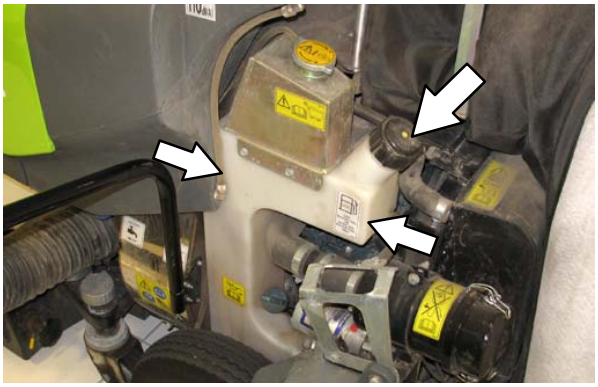
Check the air filter indicator daily.

Press the reset button to reset the air filter indicator after replacing the air filter.



FUEL LEVEL

Check fuel level in the fuel tank daily. Fill fuel tank as necessary.



Be careful to not spill fuel when filling the fuel tank. Wipe up any spilled fuel with a dry rag. Avoid spilling fuel on the air intake screen located beneath the air filter housing. If fuel is spilled on the air intake screen, dirt will stick to the screen, causing the engine to start smoking. (See *TROUBLESHOOTING* section).

FUEL LINES

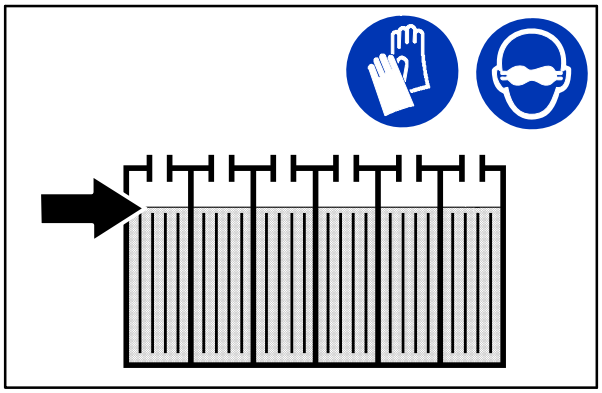
Check the fuel lines daily. The rubber fuel lines can become worn out whether the engine has been used much or not. If the fuel lines and clamp bands are worn or damaged; replace or repair them at once.

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

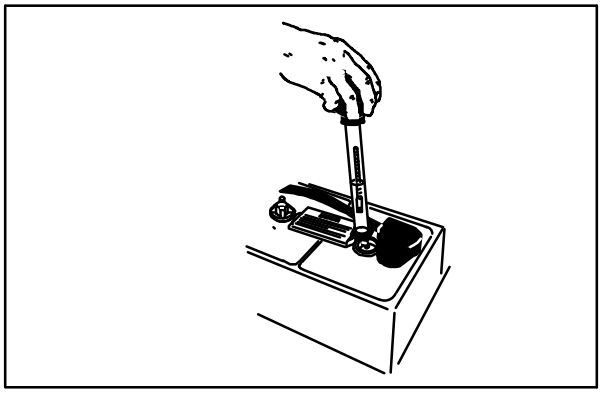
BATTERY

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

Check the electrolyte level in non−sealed batteries after every 250 hours of operation. Never add acid to the batteries. Add distilled water *only*. Always keep the battery caps on, except when adding water or taking hydrometer readings.



Using a hydrometer, measure the specific gravity to determine the charge level and condition of the batteries. If one or more of the battery cells test lower than the other battery cells, the cell is damaged, shorted, or is near failure. Replace the battery if it is damaged.



Clean the battery terminals after every 750 hours of operation. Apply a light coat of dielectric grease onto the terminals after they have been cleaned.

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

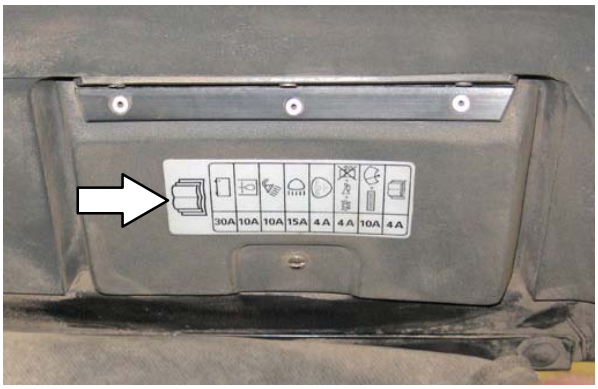
If the machine is equipped with a maintenance free battery, clean and tighten the battery connections after the first 250 hours of operation and after every 750 hours after that. Apply a light coat of dielectric grease onto the terminals after they have been cleaned. Do not remove the vent plugs from the battery or add water to the battery.

FUSES

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

REPLACING THE FUSES

Open the fuse box cover to access the fuses.



Refer to the diagram on the fuse box cover for locations of the *fuses* in the fuse box and the circuits protected. Always replace a fuse with a fuse of the same type and amperage rating.

Refer to the table below for the *fuses* and circuits protected.

Fuse Box	
Rating	**Circuit Protected**
30 A	Main Power To Panel
10 A	CSA / DEA (Optional)
10 A	Water Pump
15 A	Headlights / Rear Lights
4 A	Control Instruments / Indicator Lights
4 A	Beacon / Audible Warning / Fuel Cutoff Solenoid
10 A	Radio / Wiper Motor (414 TR / 424 HS machines equipped with cabs only)
4 A	Spare (Various Options)

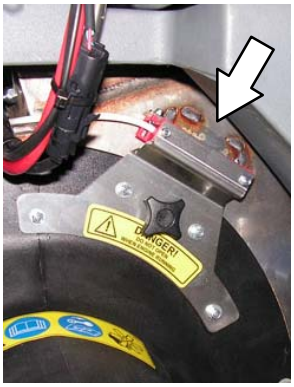
NOTE: Always replace a fuse with a fuse of the same type and amperage rating.

SAFETY INTERLOCK SWITCHES

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

Check the safety interlock switches daily. The engine should not crank if either safety interlock switch is open or removed.

There is a safety interlock switch is located on the front vacuum cover and the rear duct.



1. Remove the wander hose from from the holster and move the wander hose out of the way and open the top cover.
2. Loosen both toggle clamps to release the back trucking from the machine.
3. Swing the back duct open until it locks into the open position.
4. Position body away from the open back duct.
5. Attempt to start the machine. The engine **Should Not Crank**. Immediately report to supervisor / service personnel if the machine cranks. If the engine does not crank with the rear duct open, the safety interlock switch is operating correctly
6. Close the rear duct and secure the toggle clamps.
7. Remove the front box (CSA/DEA, if equipped) from the machine.
8. Remove the front vacuum fan cover from the machine.
9. Attempt to start the machine. The engine **Should Not Crank**. Immediately report to supervisor / service personnel if the machine cranks. If the engine does not crank with the front vacuum fan cover open, the safety interlock switch is operating correctly
10. Reinstall the front vacuum fan cover onto the machine.
11. Reinstall the front box (CSA/DEA, if equipped) onto the machine.

BRUSHES

Check the brushes for wear daily. Remove tangled debris from the brushes and brush drive motors.

REPLACING THE BRUSHES

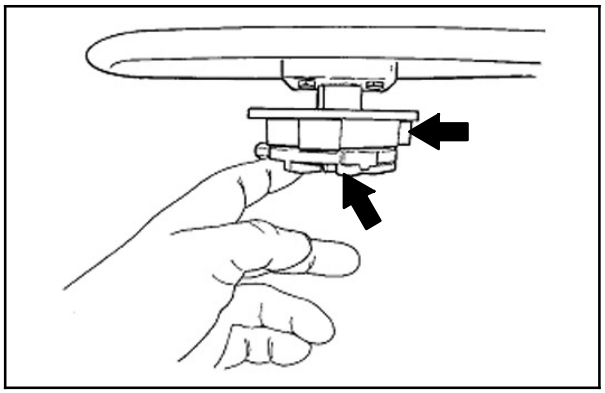
FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake (if equipped), turn off machine, and remove key.

Replace the brushes when they no longer adequately sweep.

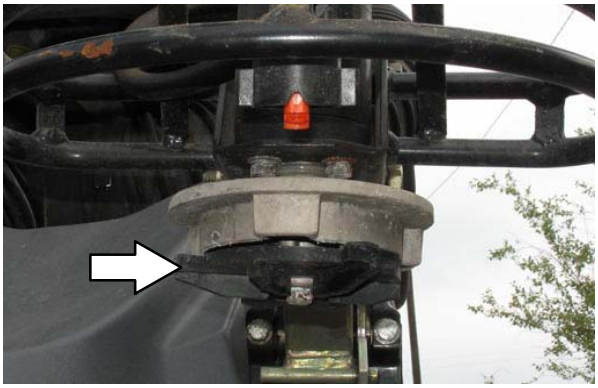
1. Remove the brush assembly cover.

2. Rotate the brush from the brush drive.

3. Align the plastic locking cam lugs with the lugs on the metal drive hub.



4. Place the new brush onto the brush drive and turn the plastic locking cam until a solid click is felt. The solid click means the brush is locked fully locked onto the brush drive.



NOTE: The plastic locking cam on the left side of the machine locks in the opposite direction of the plastic locking cam on the right side. Both plastic locking cams self tighten when the brushes are operating.

5. Reinstall the brush assembly cover.

6. Adjust the brush angle. See *ADJUSTING THE BRUSH PRESSURE* section of this manual.

CHECKING / ADJUSTING THE BRUSH PRESSURE

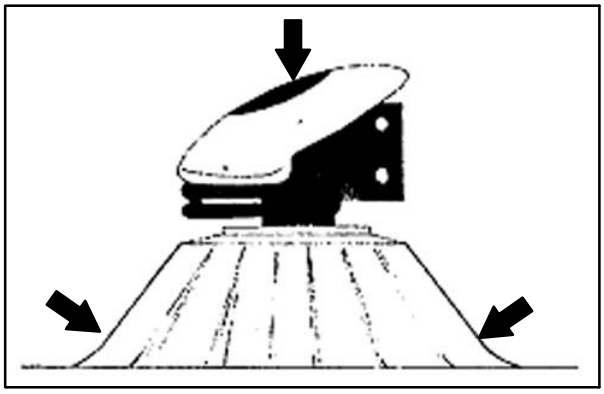
Check brushes daily for wire or string tangled around the brush or brush drive hub. Also check brushes for damage and wear. Check the brush pressure for each brush daily.

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

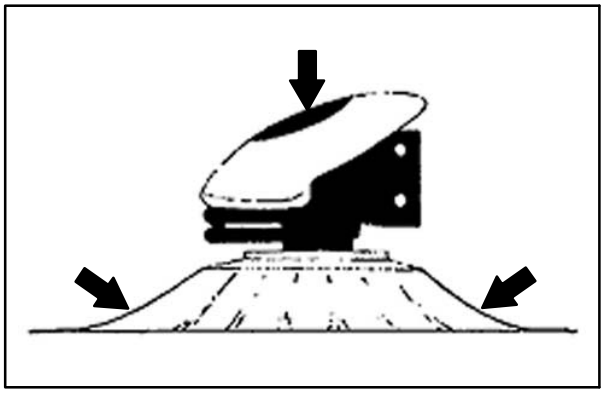
CHECKING THE BRUSH PRESSURE

1. Unhook the brush and lower the brush to the ground.

2. Push down on the top of the brush assembly until it feels like the brush can no longer move further down. The brush pressure is correct if the tips of the brush bend slightly.



The brush pressure is incorrect if the tips of the brush spread out too far.

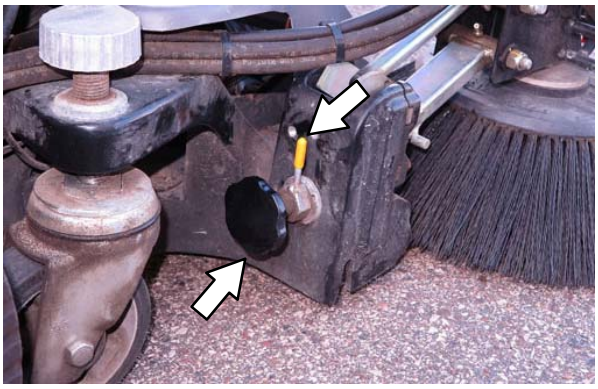


ADJUSTING THE BRUSH PRESSURE

NOTE: The vacuum nozzle height must be adjusted before the brush pressure is adjusted. See ADJUSTING THE NOZZLE HEIGHT.

1. Remove the brush assembly cover.

2. Adjust the brush pressure. Loosen the lock. Turn the brush adjustment knob counterclockwise to increase the brush pressure and clockwise to decrease the brush pressure. Tighten the lock.

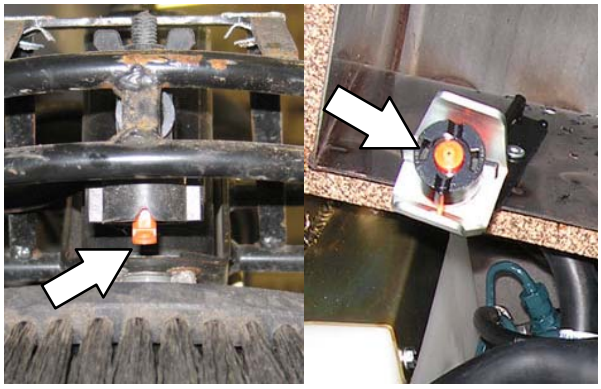


3. Reinstall the brush assembly cover.
4. Recheck the brush pressure. Adjust brush pressure as necessary.

DUST SUPPRESSION / VACUUM

CHECKING / CLEANING THE SPRAY JETS

Check the spray jets daily to ensure they are not damaged and are functioning properly. Clean the spray jet filters as necessary. A spray jet is located above each brush and inside the vacuum tube.

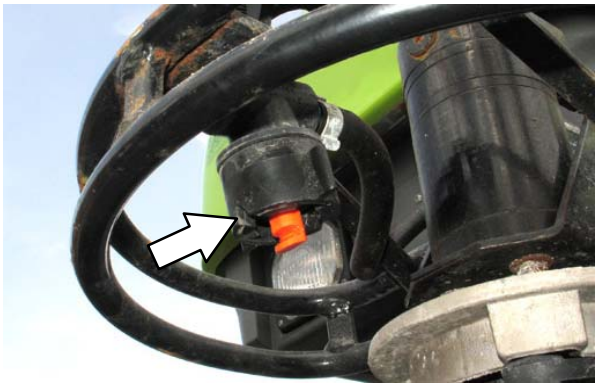


*NOTE: **Do** **Not** use wire or other sharp objects to clear / clean spray nozzle openings. Such items could damage the spray jet assemblies.*

1. Remove the brush assembly cover.

2. Rotate the brush from the brush drive.

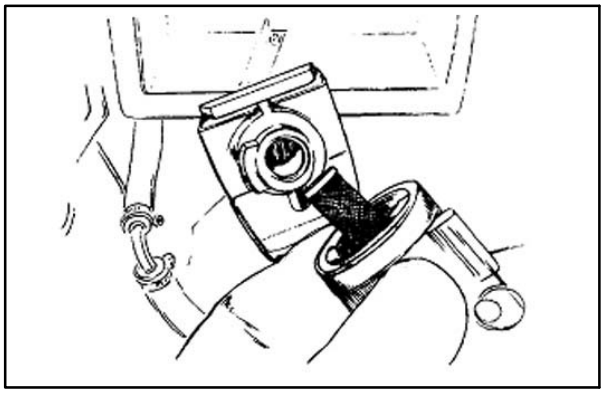
3. Twist the bayonet fitting from the brush spray jet assembly to access the spray jet filter.



4. Clean the brush spray jet parts with either compressed air or hot water.

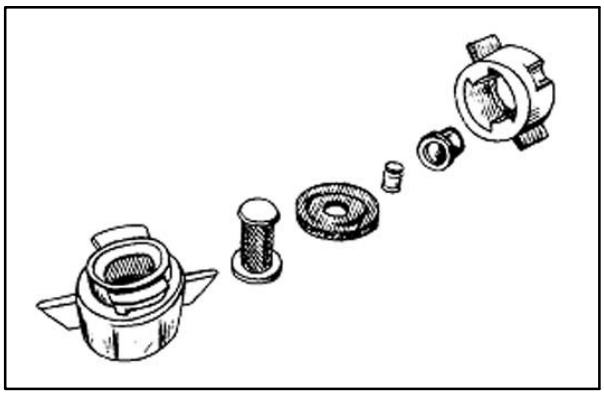
5. Reassemble the brush spray jet assembly..
6. Reinstall the brush and brush assembly cover onto the machine..
7. Swing the back duct open until it locks into the open position.

8. Twist the bayonet fitting from the bag spray jet assembly to access the spray jet filter.



9. Use a flat tip screwdriver or thumbnail to disassemble the inner dark blue center core from the outer light blue colored spray jet body.

10. Clean the brush spray jet parts with either compressed air or hot water.



11. Reassemble the bag spray jet assembly..

12. Close the back duct..

ADJUSTING THE VACUUM NOZZLE HEIGHT

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

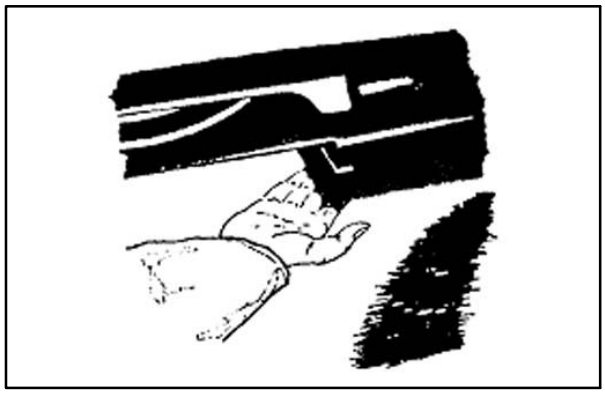
Check the vacuum nozzle height daily. Adjust the vacuum nozzle height as necessary for the surface being swept.

1. Remove the castor locking pins (one located on each side of the machine).

NOTE: Machines with wander hose: If necessary, move the wander hose to allow access to the locking pin on the left side of machine.

2. Turn the adjustment knob clockwise to raise the vacuum nozzle and counterclockwise to lower the vacuum nozzle.

3. Check the nozzle height. Both sides of the skid should be approximately 10 mm (0.40 in) from the ground. There should be just enough room to place fingers between the bottom edge of the skid and the ground.



*NOTE: **Do** **Not** set the vacuum nozzle height too low. The vacuum nozzle will make contact with uneven surfaces, causing the skid underneath the vacuum nozzle to prematurely wear down. Adjust the nozzle higher if surface being swept is extremely uneven.*

4. Reinstall the castor locking pins

FILTER BAG

CLEANING THE FILTER BAG

Thoroughly clean both the interior and exterior of the filter bag daily. Vacuum performance will suffer if the filter bag is not kept clean.

Difficult to see oils and particulates eventually build up onto the filter bag. While the machine is running, press on the sides of the filter bag. If the filter bag feels tight it is not functioning properly, requiring the filter bag to be washed in a washing machine.

Machine wash the filter bag with regular laundry detergent in warm water only. **Do Not** wash the filter bag in hot water since it will shrink. Shrinkage will diminish vacuum performance. **Do Not** wash the filter bag with fabric softener since fabric softener can also diminish vacuum performance.

*NOTE: If necessary, for smoother operation, apply candle wax to the filter bag zippers. **Do Not** apply grease or oil to the zippers since such lubricants will cause dust and dirt to stick to the zippers, eventually making the zippers more difficult to use.*

WATER TANK

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

DRAIN CAP FILTER

Check the drain cap filter for damage daily.

BRAKES AND TIRES

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

PARKING BRAKES (414RS / 424TR / 424HS ONLY)

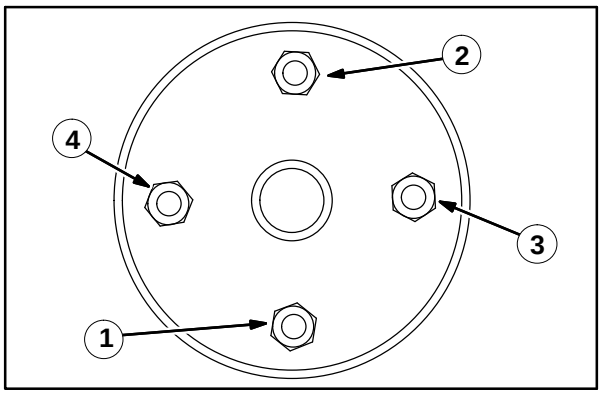
Check the parking brake adjustment after every 250 hours of operation.

TIRES

Check the tires for damage and the tire pressure daily. The proper air pressure for the front tires is 3.2 bar (47 psi) and 3.5 bar (51 psi) for the rear tire.

WHEEL TORQUE

Torque wheel nuts twice in the pattern shown to 55 Nm (40 ft lb) after every 250 hours of operation.



WANDER HOSE (OPTION)

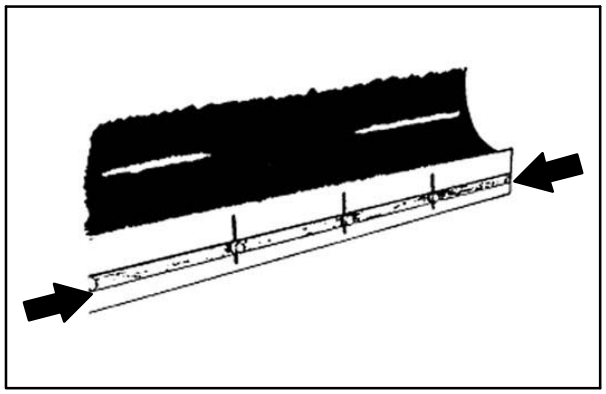
FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake (if equipped), turn off machine, and remove key.

Check the wander hose and wander hose nozzle for wear and damage daily.

SNOW PLOW (OPTION)

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

Check the snow plow for wear and damage daily.



PUSHING / TRANSPORTING THE MACHINE

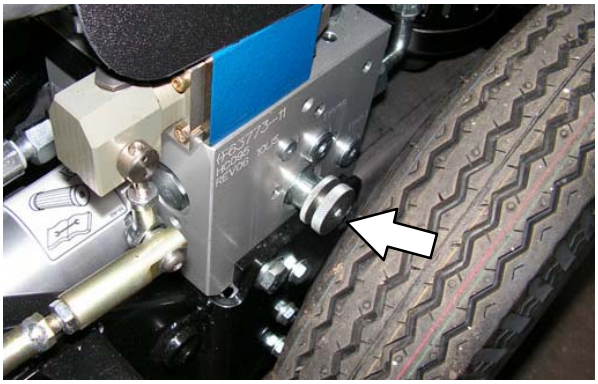
PUSHING THE MACHINE

If the machine becomes disabled, it can be only pushed from the back of the machine. Do Not tow this machine.

Use the *emergency tow valve* located on the right side of the machine to prevent damaging the hydraulic system when pushing the machine. 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 a long distance or at a high speed.

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

Turn the *emergency brake release* counter−clockwise to open the valve before pushing the machine. Close the *emergency brake release* when finished pushing the machine. Use hand only to close the *emergency brake release.* **Do Not** use a wrench since doing so could damage the *emergency brake release.* **Do Not** open the *emergency brake release* during normal machine operation.



ATTENTION! Do not open the emergency brake release if the machine is on a gradient unless the road wheels are chocked or the parking brake is applied.

TRANSPORTING THE MACHINE

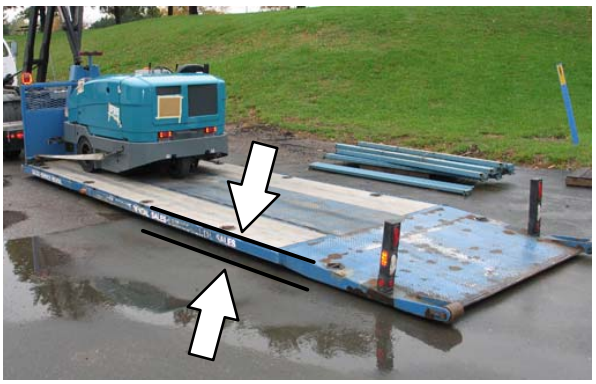
1. Raise the brushes.
2. **414RS machines:** Stow the operator seat under the machine. See *STOWING OPERATOR SEAT*.

FOR SAFETY: When loading machine onto truck or trailer, drain water tank and empty hopper before loading machine.

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

FOR SAFETY: When unloading machine off truck or trailer, use winch. Do not drive the machine onto/off the truck or trailer. Do not push the machine onto/off the truck or trailer unless the load height is 380 mm (15 in) or less from the ground.

4. If the loading surface is horizontal and 380 mm (15 in) or less from the ground, push the machine up onto the truck or trailer.



5. To winch the machine onto the truck or trailer, attach the winching chains to front caster wheel brackets located on both sides of the front head. **Do Not** attach the winching chains to the caster wheel assemblies.

6. Position the machine as close to the front of the trailer or truck as possible.

7. Set the parking brake and place a block behind each wheel to prevent the machine from rolling.

8. Connect tie−down straps to the tie down points located behind both drive wheels.

9. Route a tie−down strap over the vacuum nozzle Assembly and the front caster wheel brackets located on both sides of the vacuum nozzle assembly.

10. Route the tie−down straps to the opposite ends of the machine and hook them to the brackets on the floor of the trailer or truck. Tighten the tie−down straps.

NOTE: It may be necessary to install tie-down brackets to the floor of the trailer or truck.

FOR SAFETY: When unloading machine off truck or trailer, use winch. Do not drive the machine onto/off the truck or trailer. Do not push the machine onto/off the truck or trailer unless the load height is 380 mm (15 in) or less from the ground.

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

MACHINE JACKING

Remove the plastic trash bag from the filter bag and empty the water tank before jacking up the machine. Jack up the machine at the designated locations. Use a hoist or jack capable of supporting the weight of the machine. Use appropriately rated jack stands to support the machine.

FOR SAFETY: Before leaving or servicing machine, stop on level surface, ensure drive lever is in neutral, set parking brake (if equipped), turn off machine, and remove key.

FOR SAFETY: When servicing machine, block machine tires before jacking machine up. Use a hoist or jack that will support the weight of the machine. Jack machine up at designated locations only. Support machine with jack stands.

Jacking locations are located directly behind each rear tire.

STORAGE AND FREEZE PROTECTION

Before storing the machine for an extended period, the machine must be prepped to lessen the chances of being damaged. It is recommend that a full service be carried out before storing the machine. Contact an authorized service representative.

STORING THE MACHINE

The following steps should be taken prior to storing the machine for extended periods.

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

1. Empty and clean the water tank.
2. Remove the drain cap and completely drain the water tank. Reinstall the drain cap when the water tank is empty.

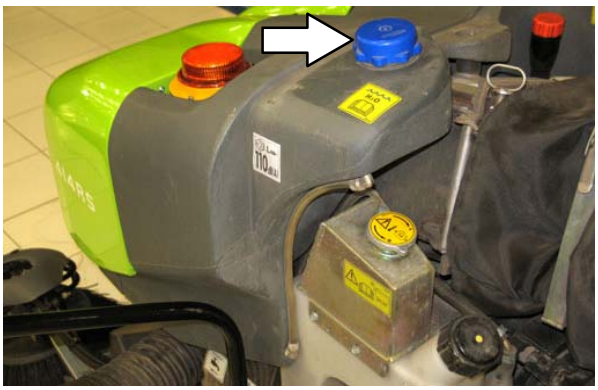
3. Park the machine in a cool, dry area. Do not expose the machine to rain. Store indoors.

FREEZE PROTECTION

FOR SAFETY: Before leaving or servicing machine, stop on level surface, set parking brake (if equipped), and turn off machine.

1. Empty and clean the hopper.
2. Remove the drain cap and completely drain both water tanks. Reinstall the drain cap when the water tank is empty.

3. Pour 3.8 liters (1 gallon) of full strength Propylene Glycol Based / Screen Wash into the water tank. Do not dilute.



4. Start the machine and operate the dust control system until screen wash is discharging from both brush spray jets and the vacuum tube spray jet.

SPECIFICATIONS

GENERAL MACHINE DIMENSIONS/CAPACITIES

Item	Dimension/capacity
Length (walk behind − All)	2515 mm (99 in)
Length (ride behind − 414RS)	2997 mm (118 in)
Length (ride behind − 424TR / 424HS)	3530 mm (139 in)
Height (414S2D / 414RS)	1143 mm (45 in)
Height (424TR / 424HS − No cab)	1397 mm (55 in)
Height (424TR / 424HS − With cab)	1854 mm (73 in)
Width/frame	920 mm (36.2 in)
Ground clearance	111 mm (4.4 in)
Cleaning path width	1140 mm (44.9 in)
Brush diameter	500 mm (19.7 in)
Water tank capacity	55 L (14.5 gal)
Debris bag volume capacity	60 L (15.8 gal)
Debris bag weight capacity	25 kg (55 lbs)
Weight 414S2D − empty	400 Kg (882 lbs)
Weight 414RS − empty	440 Kg (970 lbs)
Weight 424TR − empty	520 Kg (1146 lbs)
Weight 424HS − empty	545 Kg (1200 lbs)
Protection Grade	IPX3

Values determined as per EN 60335−2−72	Measure
Sound pressure level L_{pA} at operator ear	79 dB(A)
Sound power level L_{WA} + Uncertainty K_{WA}	110 dB(A)
Vibration − Hand−arm	>2.5 m/s^2
Vibration − Whole body	>0.5 m/s^2

GENERAL MACHINE PERFORMANCE

Item	Measure
Turning dimension (wall to wall) − 414S2D, 414RS, 424TR, 424HS (seat stowed)	1350 mm (53 in)
Turning dimension (wall to wall) − 414RS, 424TR, 424HS (seat installed / extended)	2400 mm (94in)
Travel speed forward (maximum) − 414S2D, 414RS, 424TR	8.8 Km/h (5.5 mph)
Travel speed forward (maximum) − 424HS	16 Km/h (10 mph)
Travel speed reverse (maximum)	5.6 Km/h (3.5 mph)
Vacuum Speed−standard	800−2800 rpm
Maximum ramp incline for loading − Empty	20%
Maximum ramp incline for sweeping − including operator @ 110 Kg (242.4 lbs)	20%
Maximum ramp incline for transporting (GVWR)	20%
Maximum ambient operating temperature	51° C (124° F)
Minimum ambient operating temperature	−20° C (−4° F)

HYDRAULIC SYSTEM

System	Capacity	Fluid Type
Hydraulic reservoir	7.2 L (1.9 gal)	10W40 API CF (or better)

POWER TYPE

<table>
<tr><th>Engine</th><th>Type</th><th>Compression</th><th>Cycle</th><th>Aspiration</th><th>Cylinders</th><th>Bore</th><th>Stroke</th></tr>
<tr><td rowspan="7">Kubota Z482E Twin cylinder, liquid cooled diesel</td><td>Piston</td><td>Diesel</td><td>4</td><td>Nat</td><td>2</td><td>67 mm (2.60 in)</td><td>68 mm (2.28 in)</td></tr>
<tr><td colspan="3">Displacement</td><td colspan="3"></td><td>Net power, maximum</td></tr>
<tr><td colspan="3">479 cc (29.23 cu in)</td><td colspan="3"></td><td>9 kw (12 hp) @ 2800 rpm</td></tr>
<tr><td colspan="3">Fuel</td><td colspan="3">Cooling system</td><td>Electrical system</td></tr>
<tr><td colspan="3" rowspan="2">Diesel, ASTMd975 cetane no4 (min)
Fuel tank: 9.4 L (2.5 gal)</td><td colspan="3">50/50 water/ethylene glycol antifreeze</td><td>12 V nominal</td></tr>
<tr><td colspan="3">Total: 4 L (1.05 gal)</td><td>16 A alternator</td></tr>
<tr><td colspan="3">Idle speed, no load</td><td colspan="3">Valve clearance, cold</td><td>Engine lubricating oil with filter</td></tr>
<tr><td colspan="3">800 ± 50 rpm</td><td colspan="3">0.145 mm to 0.185 mm (0.0057 in to 0.0073 in)</td><td>2.9 L (3 qt) 10W40 API CF (or better)</td></tr>
</table>

BRAKING SYSTEM

Type	Operation
Parking brake (414RS, 424TR, 424HS)	Mechanical

TIRES

Location	Type	Size
Main axle (414S2D, 424RS, 424TR)	Pneumatic	4.80 / 4.00 x 8, 6 ply
Main axle (414HS)	Pneumatic	5.00 x 8, 6 ply
Rear (414S2D, 414RS)	Pneumatic	3.00 x 4, 6 ply
Rear (424TR, 414HS)	Pneumatic	4.00 x 4, 4 ply

MACHINE DIMENSIONS