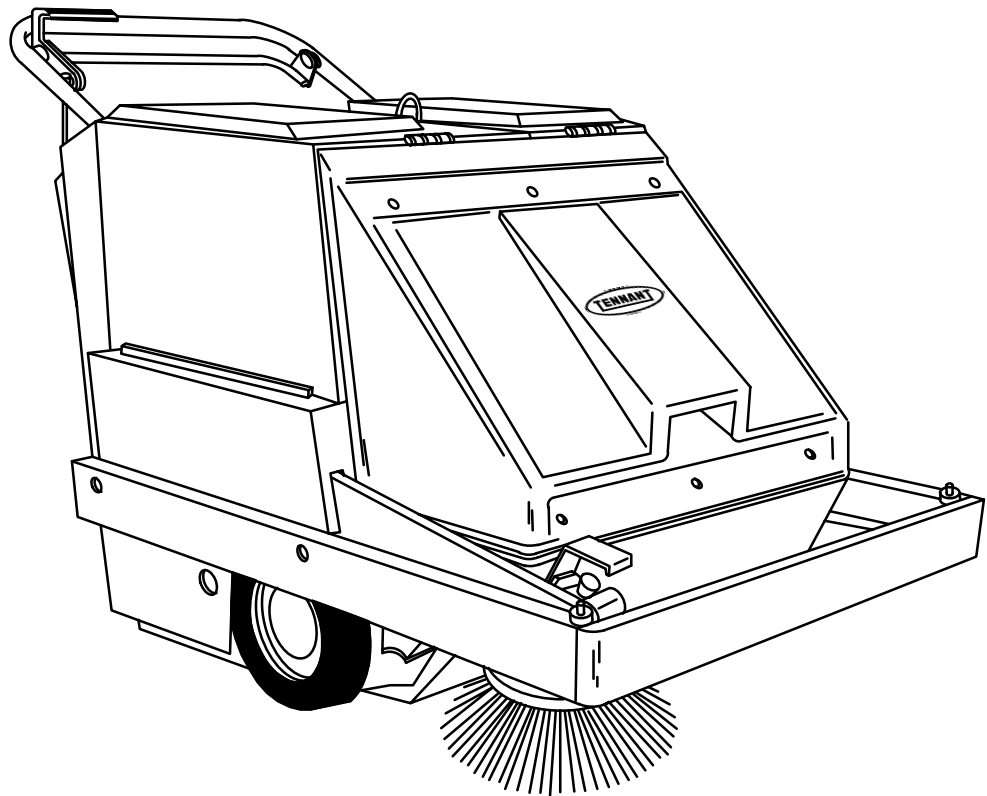




186

(Operator Manual)



MM159
Rev. 05 (12-95)



This manual is furnished with each new TENNANT Model 186. It provides necessary operating and preventive maintenance instructions. Read this manual completely and understand the machine before operating or servicing it.

This manual covers all machine variations and standard options. The instruction portion of the manual consists of the Specification, Operation, Maintenance, and Appendix sections. The parts portion consists of the Standard Parts; Options; Electrical Components; and Cross Reference; sections.

All right side and left side references to the machine are determined by facing the direction of forward travel. All hardware considered to be of a common nature or locally available has been omitted from the parts sections. Be aware that this machine may contain metric hardware. Make sure you use equivalent hardware when replacement becomes necessary.

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 maintenance instructions provided.
- The machine is maintained with TENNANT supplied or equivalent parts.

Parts and supplies may be ordered by phone or mail from any TENNANT parts and service center, distributor, or from any of the TENNANT subsidiaries. Before ordering parts or supplies, be sure to have your machine model number and serial number handy. Fill out the data block below for future reference.


MACHINE DATA <i>Please fill out at time of installation.</i>
Machine Serial Number – _____
Engine Serial Number – _____
Sales Representative – _____
Customer Number – _____
Date of Installation – _____
Manual Number – MM159
Revision: 05
Published: 12-95

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SAFETY PRECAUTIONS

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

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


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

The following information signals potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Locate all safety devices on the machine. Then, take necessary steps to train machine operating personnel. Report machine damage or faulty operation immediately. Do not use the machine if it is not in proper operating condition.

FOR SAFETY:

1. **Do Not Operate Machine:**
 - Unless Trained And Authorized.
 - Unless Operation Manual Is Read And Understood.
 - In Flammable Or Explosive Areas Unless Designed For Use In Those Areas.
2. **Before Starting Machine:**
 - Check For Fuel Leaks.
 - Keep Sparks And Open Flame Away From Refueling Area.
 - Make Sure All Safety Devices Are In Place And Operate Properly.
 - Check Brakes And Steering For Proper Operation.
3. **When Using Machine:**
 - Go Slow On Grades And Slippery Surfaces.
 - Use Care When Backing Machine.
4. **Before Leaving Or Servicing Machine:**
 - Stop On Level Surface.
 - Set Parking Brake.
 - Turn Off Machine And Remove Key.

5. **When Servicing Machine:**
 - Avoid Moving Parts. Do Not Wear Loose Jackets, Shirts, Or Sleeves When Working On Machine.
 - Use Hoist Or Jack Of Adequate Capacity To Lift Machine.
 - Wear Eye And Ear Protection When Using Pressurized Air Or Water.
 - Disconnect Battery Connections Before Working On Machine.
 - Avoid Contact With Battery Acid.
 - Use TENNANT Supplied Or Equivalent Replacement Parts.

 **WARNING:** Engine Emits Toxic Gases. Severe Respiratory Damage Or Asphyxiation Can Result. Provide Adequate Ventilation. Consult With Your Regulatory Agency For Exposure Limits. Keep Engine Properly Tuned.

 **WARNING:** Heavy Hopper. Get Help To Handle.

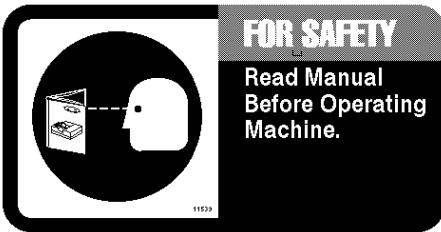
 **WARNING:** Flammable Materials Can Cause An Explosion Or Fire. Do Not Use Flammable Materials In Tank(s).

 **WARNING:** Flammable Materials Or Reactive Metals Can Cause Explosion Or Fire. Do Not Pick Up.

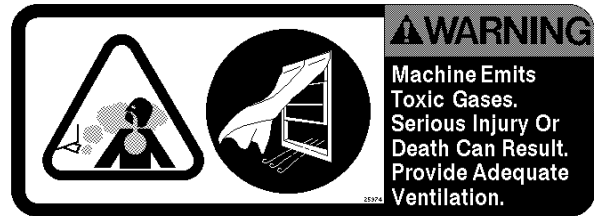
GENERAL INFORMATION

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

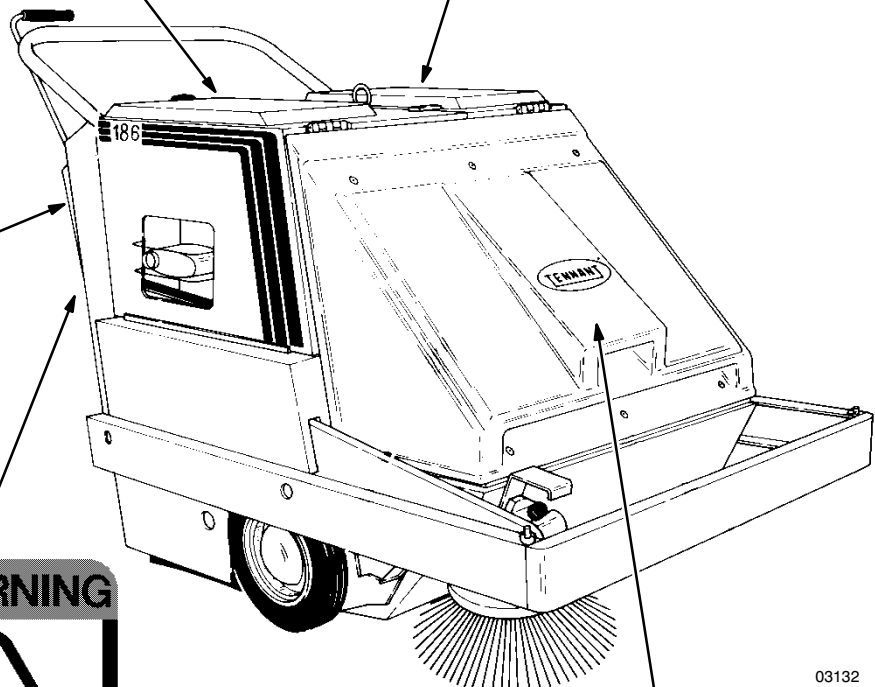
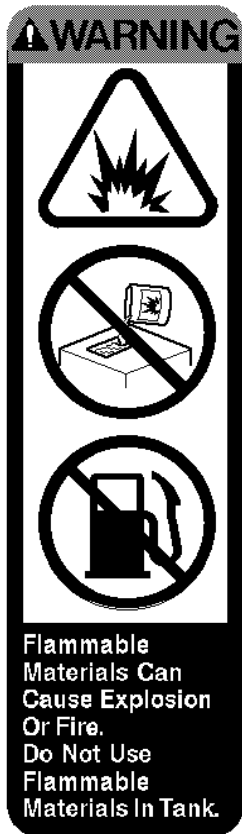
FOR SAFETY LABEL – LOCATED ON THE TOP OF THE SOLUTION TANK.



TOXIC GASES LABEL – LOCATED ON THE LEFT SIDE PANEL.



FLAMMABLE MATERIALS LABEL – LOCATED ON RIGHT SIDE PANEL.



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FLAMMABLE MATERIALS LABEL – LOCATED ON RIGHT SIDE PANEL.

BACK STRAIN LABEL – LOCATED ON THE UNDERSIDE OF THE FILTER ASSEMBLY.



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MACHINE SPECIFICATIONS**POWER TYPE**

Engine type – piston
Ignition – breakerless type spark
Cycle – 4
Aspiration – natural
Cylinders – 1
Bore – 2.94 in (75 mm)
Stroke – 2.75 in (70 mm)
Displacement – 18.6 cu in (305 cc)
Net power governed – 5.1 hp (3.8 kw)
@ 2000 rpm
Net power maximum – 8 hp (6 kw) @ 3600 rpm
Fuel – gasoline, unleaded, 87 octane or LPG
Cooling system – air
Electrical system – 12 V nominal, 15 A alternator

POWER TRAIN

Propelling – belt driven
Differential – belt driven
Drive axle (2) – chain driven
Main brush – belt driven
Side brush – belt driven
Vacuum fan – belt driven
Scrub attachment/vacuum fan water pick-up –
belt driven

SUSPENSION SYSTEM

Front – 10 x 2.00 zero pressure tires (2)
Rear – 5 x 1.5 caster (1)

SYSTEM FLUID CAPACITIES

Engine lubricating oil – 1 qt (0.95 L)
Fuel tank – 1.25 gal (4.75 L) gasoline
20 lb (9 kg) LPG
Scrub attachment solution tank – 14.5 gal (55 L)
Scrub attachment recovery tank – 13 gal (50 L)

**GENERAL MACHINE DIMENSIONS –
CAPACITIES**

Length – 58 in (1475 mm)
Width – 36 in (915 mm) less side brush
Height – 38 in (965 mm)
Track – front 31 in (790 mm)
Wheel base – 23.5 in (595 mm)
Main brush – width 26 in (660 mm)
Main brush – diameter 10 in (255 mm)
Side brush – diameter 17 in (430 mm)
Sweeping path width (total) – 33 in (840 mm)
Hopper capacity – 2.8 cu ft (0.08 m³)
150 lb (68 kg)
Dust filter – 49 sq ft (4.55 m²), pleated panel
filter element

MACHINE WEIGHTS

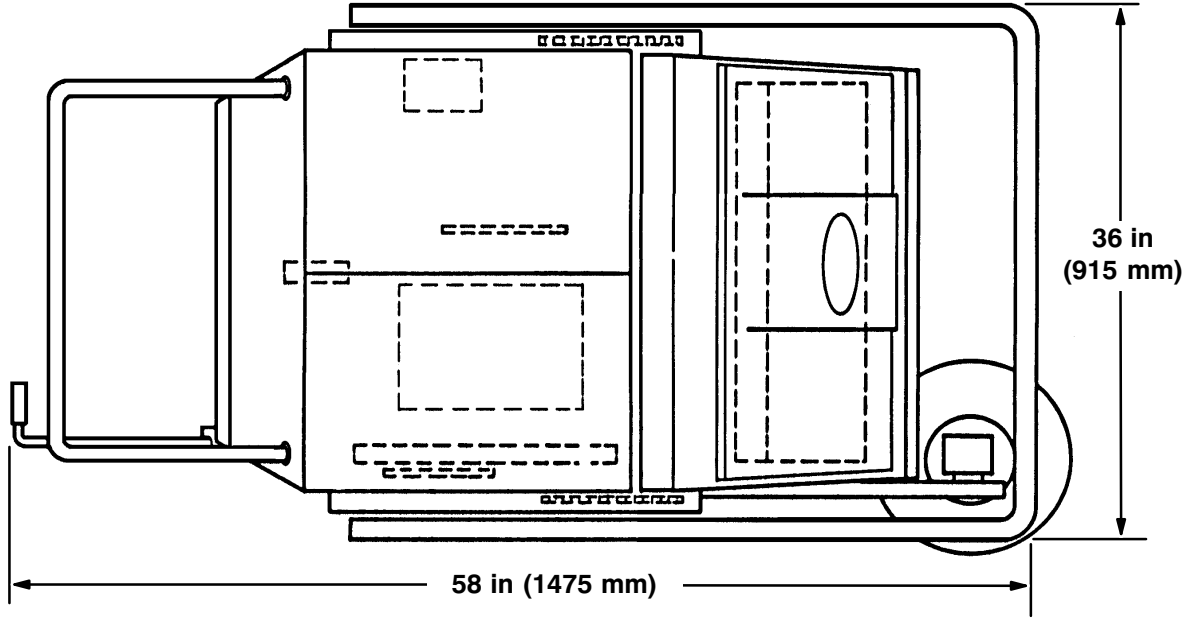
GVWR – 650 lb (295 kg)

GENERAL MACHINE PERFORMANCE

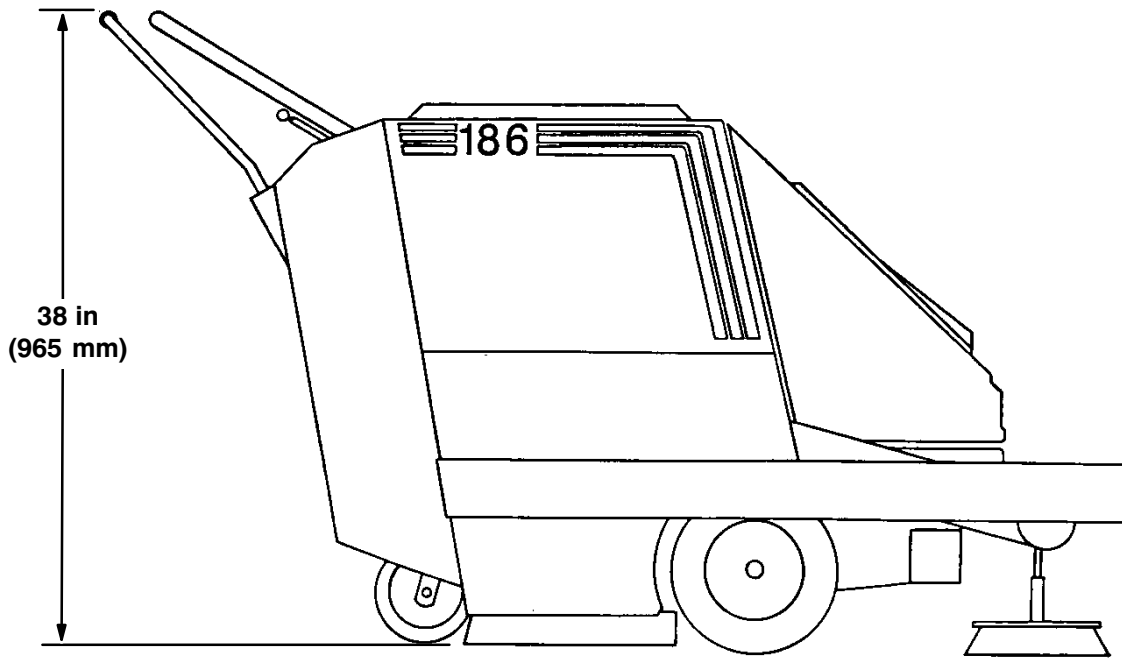
Maximum forward speed – 3.2 mph (5.2 km/h)
Maximum reverse speed – 3 mph (4.8 km/h)
Turning radius – 65 in (1650 mm)

SPECIFICATIONS

MACHINE DIMENSIONS



TOP VIEW



SIDE VIEW

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PREPARATION FOR OPERATION

AFTER UNCRATING AND BEFORE
OPERATING MACHINE:

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

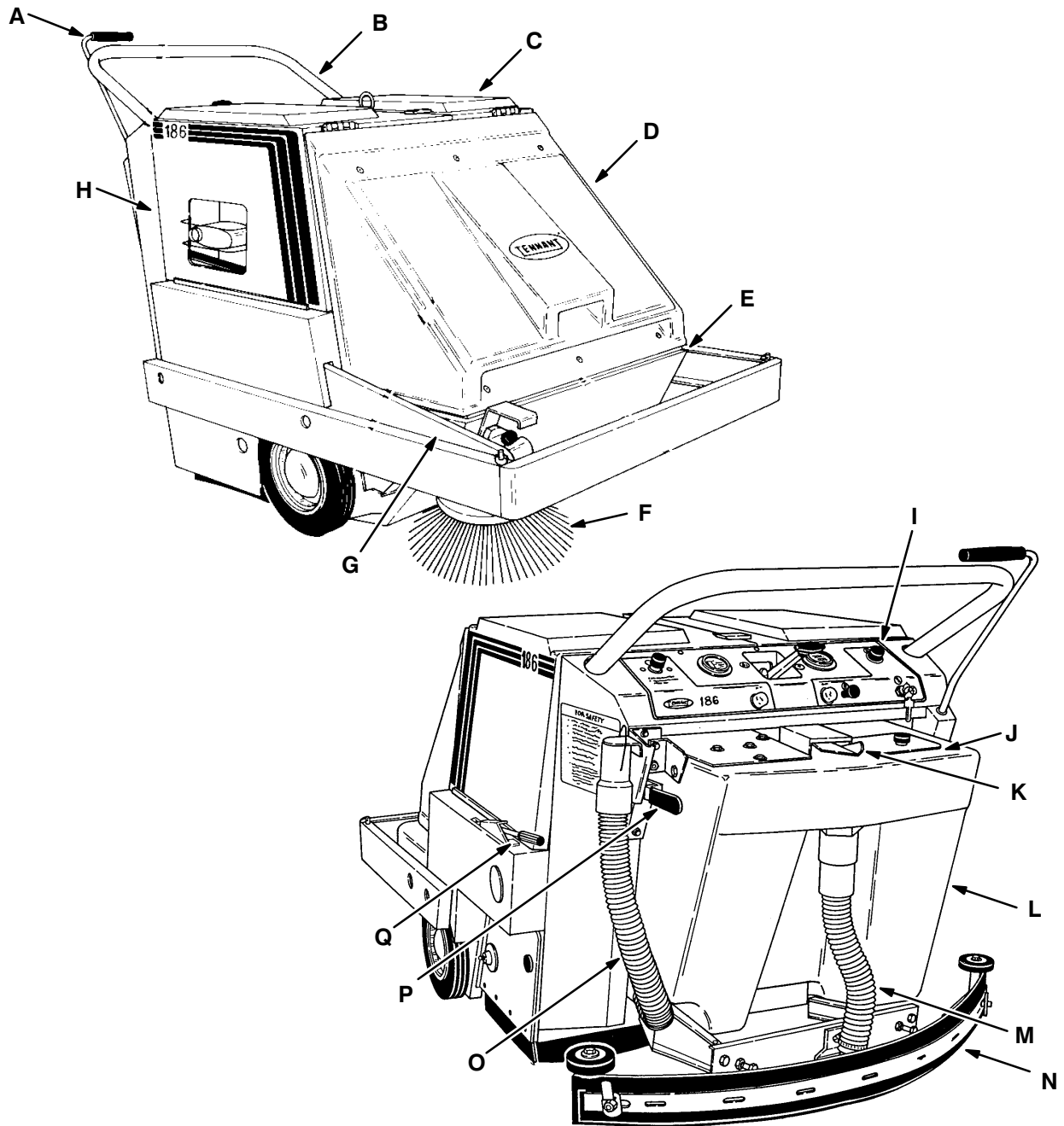
**FOR SAFETY: Do Not Operate Machine Unless
Operation Manual Is Read And Understood.**

3. Check the engine oil level. See *ENGINE* in the *MAINTENANCE* section.

4. Check the main brush adjustment. See *BRUSHES* in the *MAINTENANCE* section.
5. Fill the fuel tank, or install an LPG fuel tank on the machine.

**FOR SAFETY: When Servicing Machine, Keep
Flames And Sparks Away From Fuel System
Service Area. Keep Area Well Ventilated.**

OPERATION OF CONTROLS



MACHINE COMPONENTS

- | | |
|-------------------------|--------------------------|
| A. Clutch Handle | J. Inspection Door |
| B. Stationary Handle | K. Solution Lever |
| C. Battery Access Cover | L. Recovery Tank |
| D. Filter Cover | M. Squeegee Suction Hose |
| E. Hopper | N. Squeegee |
| F. Side Brush | O. Drain Hose |
| G. Side Brush Arm | P. Squeegee Lift Lever |
| H. Engine Access Cover | Q. Parking Brake Lever |
| I. Instrument Panel | |

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INSTRUMENT PANEL SYMBOLS

The symbols are used to identify controls and displays on the machine:



Filter Shaker



Main Brush Free-Float



Main Brush Down



Main Brush Up



Vacuum Shut-Off



Circuit Breaker No. 1



Circuit Breaker No. 2



Choke



Engine Start



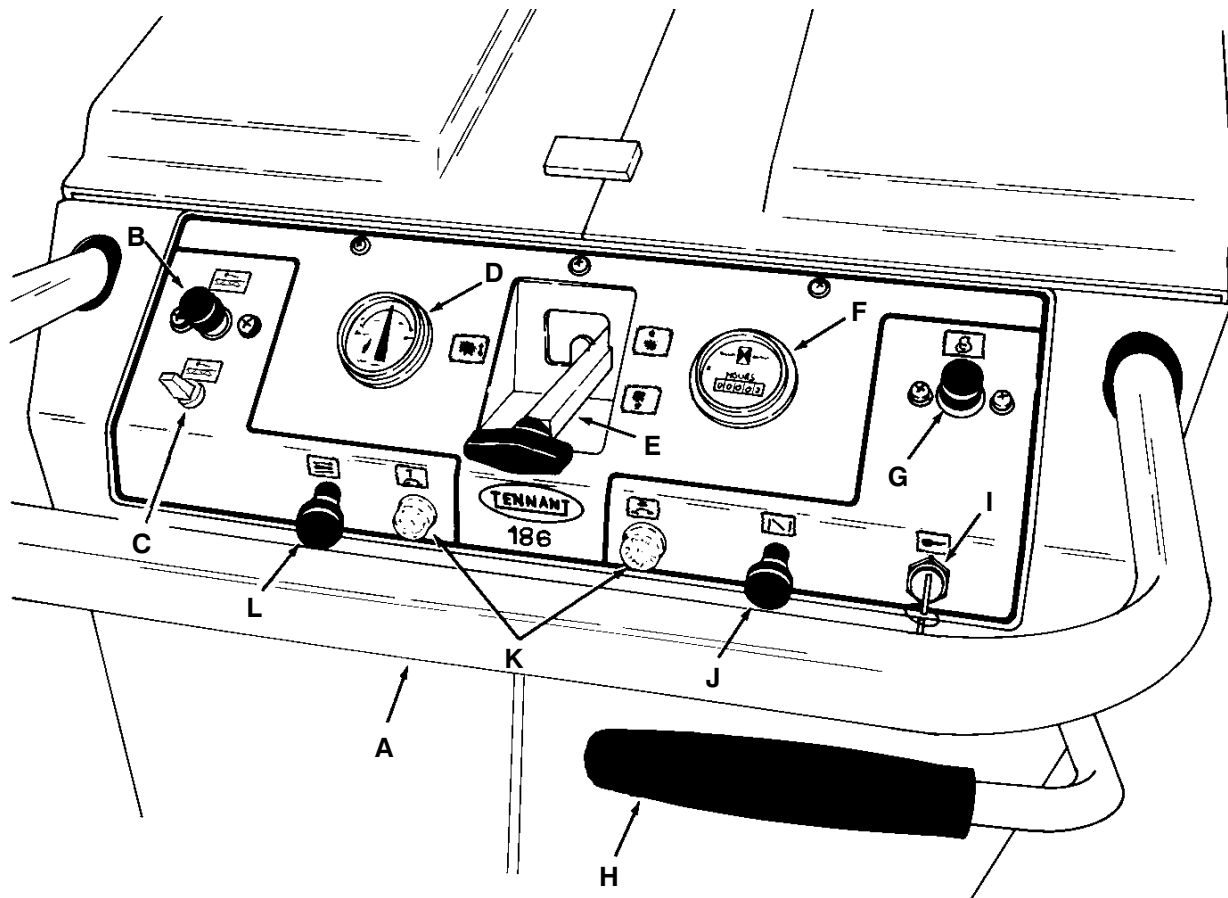
Key Switch



Parking Brake



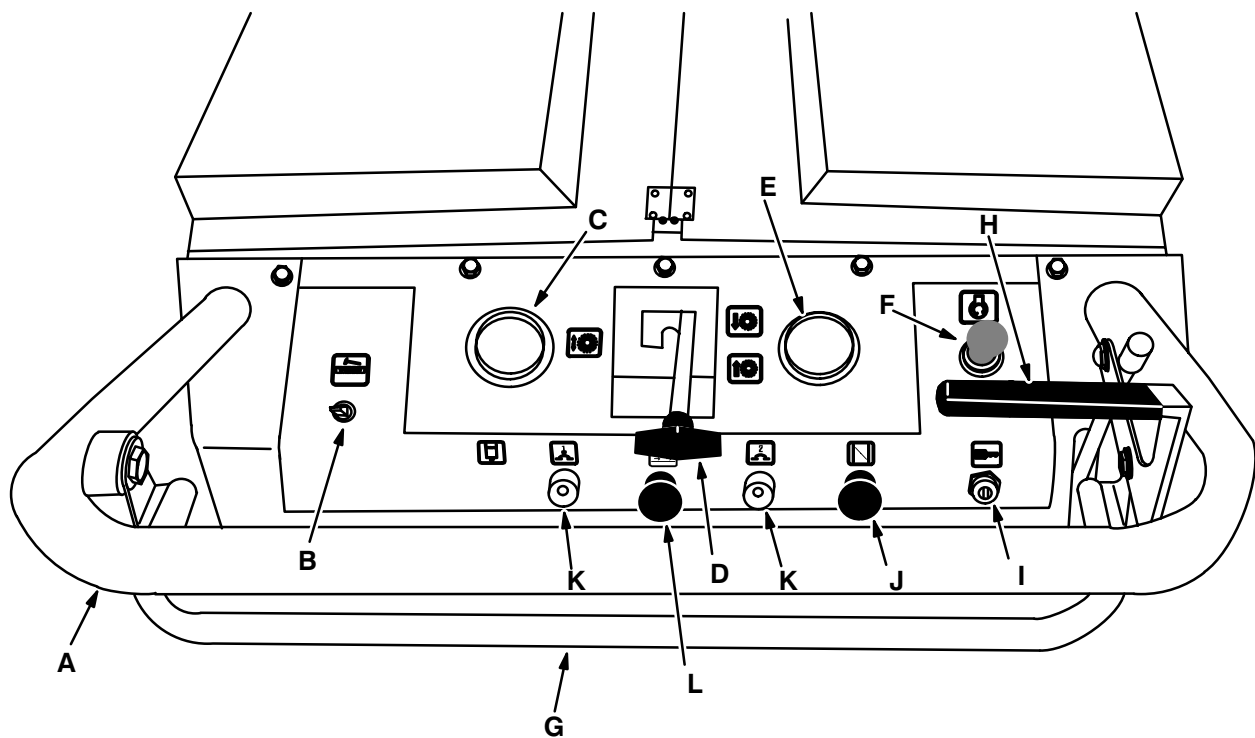
Side Brush



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CONTROLS AND INSTRUMENTS
(For machines below serial number 006000)

- | | |
|---------------------------------|-------------------------------|
| A. Stationary Handle | G. Start Switch |
| B. Filter Shaker Switch | H. Clutch Handle |
| C. Filter Shaker By-pass Switch | I. Key-Operated On-Off Switch |
| D. Ammeter | J. Engine Choke Knob |
| E. Main Brush Lever | K. Circuit Breakers |
| F. Hour Meter | L. Vacuum Shut-Off Knob |



CONTROLS AND INSTRUMENTS
 (For machines serial number 006000 and above)

06439

- | | |
|---------------------------------|-------------------------------|
| A. Stationary Handle | G. Clutch Handle |
| B. Filter Shaker By-Pass Switch | H. Clutch Reverse Handle |
| C. Ammeter | I. Key-Operated On-Off Switch |
| D. Main Brush Lever | J. Engine Choke Knob |
| E. Hour Meter | K. Circuit Breakers |
| F. Start Switch | L. Vacuum Shut-Off Knob |

OPERATION

STATIONARY AND CLUTCH HANDLES

The stationary and clutch handles control the wheel drive clutch.

To move the machine forward for machines below serial number 006000, press the clutch handle until the desired speed is reached. To stop the machine, release the handle.

To move the machine forward for machines serial number 006000 and above, pull the clutch handle until the desired speed is reached. To stop the machine, release the handle.


To move the machine backward for machines below serial number 006000, pull the clutch handle. To stop the machine, release the handle.

To move the machine backward for machines serial number 006000 and above, press the clutch reverse handle. To stop the machine, release the handle.

FILTER SHAKER SWITCH

The filter shaker switch, for machines before serial number 004369, operates the dust filter shaker motor. The shaker motor shakes the dust out of the dust filter. To shake the filter, press the switch for 15 seconds. Release the switch to stop the filter shaker.




FILTER SHAKER BY-PASS SWITCH

The filter shaker by-pass switch  , for machines serial number 004369 and above, controls the automatic filter shaker. When the switch is in the "on" position, the filter shaker motor will shake the dust from the filter for 20 seconds when the machine is turned off. When the switch is in the "off" position, the filter shaker motor will not shake the dust from the filter when the machine is turned off. The switch should be in the "off" position when servicing the machine or when using the scrubber attachment.

AMMETER

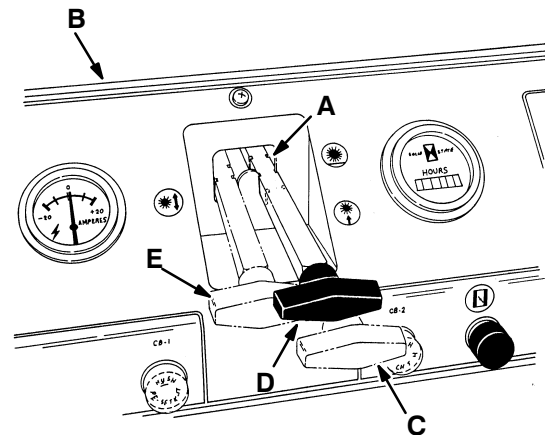
The ammeter registers the charging current which is being passed to the battery by the alternator. It also registers a discharge of current being used by the machine when the alternator is not charging.

MAIN BRUSH LEVER

The main brush lever controls the position of the main brush. To raise the main brush, pull the lever up, to the right and back into the  (Main Brush Up) position (lower groove). To lower the main brush on smooth surfaces, push the lever forward and pull it back into the  (Main Brush Down) position (top groove). To lower the main brush on uneven surfaces, push the lever forward, to the left, and release it into the  (Main Brush Free-Float) position.

When parking the machine, always raise the brush to prevent the bristles from taking a set.

To increase main brush contact with the floor, turn the main brush lever to the left. To decrease main brush contact with the floor, turn the lever to the right.



MAIN BRUSH LEVER


03134

- A. Main Brush Lever
- B. Instrument Panel
- C. (Main Brush Up) Position
- D. (Main Brush Down) Position
- E. (Main Brush Free-Float) Position

HOUR METER


The hour meter records the number of hours the machine has operated. This information is useful in determining when to service the machine.

START SWITCH

The start switch  controls the engine starter motor. To start the engine, turn the on-off switch to the right and push the start switch.

NOTE: Do not engage the starter for more than ten seconds at a time, or after the engine has started, as the starter may be damaged.

KEY-OPERATED ON-OFF SWITCH

The key-operated on-off switch  has two positions: off and on. To start the engine, turn the key fully to the right to the on position. To stop the engine, turn the key to the left to the off position.

ENGINE CHOKE KNOB

The engine choke knob controls the engine choke which helps start cold engines. To engage the choke, pull the knob out. To disengage the choke, push the knob in. Do not choke a warm engine.

CIRCUIT BREAKERS AND FUSES


Circuit breakers are resettable circuit protection devices designed to stop the flow of current in the event of a circuit overload. Once tripped, circuit breakers must be manually reset by pressing the circuit breaker button in. If the overload which caused the circuit breaker to trip is still present in the circuit, the circuit breaker will continue to stop current flow until the overload is corrected.

The circuit breakers are located on the instrument panel.


The following chart shows the various circuit breakers and the electrical components they protect.

PROTECTIVE DEVICE	RATING	CIRCUIT PROTECTED
CB-1	15 A	Shaker Motor
CB-2	15 A	Hour Meter, Thermo-Sentry™, Alternator

VACUUM SHUT-OFF KNOB

The vacuum shut-off knob  is present on machines with the filter bypass option, vacuum wand option, or the water pick-up option. The knob controls the vacuum to the dust filter. To stop vacuum to the dust filter, pull the knob out. To vacuumize the dust filter, push the knob in.

PARKING BRAKE LEVER

The parking brake lever  controls the brake on the front wheel.

To set the parking brake for machines below serial number 002316, pull the handle back. To release the parking brake, pull the quick-release notch.

To set the parking brake for machines serial number 002316 to 005999, pull the handle up and over the latch bracket. To release the parking brake, pull the handle up, over and away from the latch bracket.

To set the parking brake for machines serial number 006000 and above, step on the lever and release it into the long notch on the left. To release the parking brake, step on the lever and release it into the short notch on the right.

Always park on a level surface, stop the engine, and engage the parking brake before leaving the machine unattended and before working on the machine.

OPERATION

SQUEEGEE LEVER

The squeegee lever is present on machines with the scrub attachment option. It controls the position of the rear squeegee.


To raise the squeegee, lift the lever into the “up” position. To lower the squeegee, lower the lever into the “down” position.

SOLUTION LEVER

The solution lever is present on machines with the scrub attachment option. It controls the flow of solution to the floor.

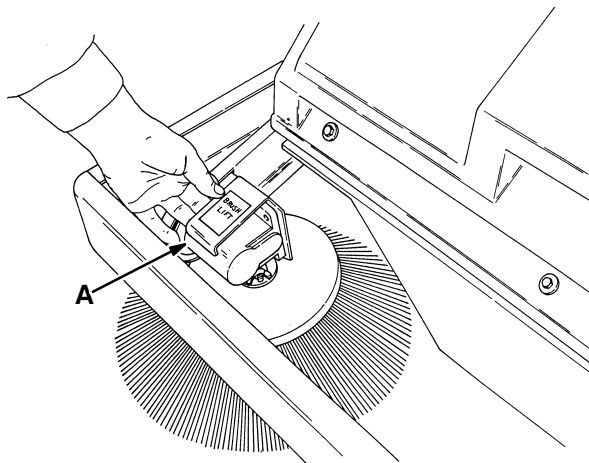
To start solution flow, push the lever to the right near the “on” position. Solution flow increases as the lever is pushed to the right. To stop solution flow, push the lever to the left into the “off” position.

SIDE BRUSH ARM

The side brush arm  controls the position of the side brush.

To raise the side brush, pull the lift arm up and push it back into the raised position. To lower the side brush, pull the arm forward and release it into the down position.

When parking the machine, always raise the brush to prevent the brush bristles from taking a set.



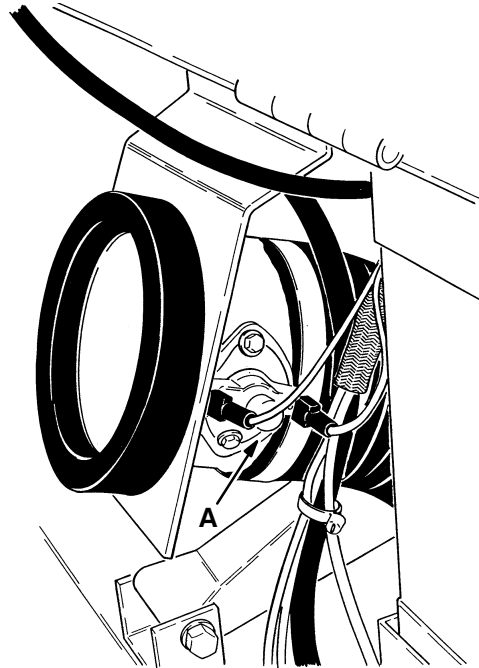
03135

RAISING SIDE BRUSH ARM

A. Side Brush Arm

THERMO-SENTRY™

The Thermo-Sentry™ is a thermostat that senses the temperature of the air drawn into the vacuum fan from the hopper. The thermostat controls an engine shut off switch. In the event of a fire in the hopper, the high air temperature would cause the thermostat to trip, stopping the engine cutting off air flow to the fire. After the thermostat has tripped, it will automatically reset after cooling.



03152

THERMO-SENTRY™

A. Thermo-Sentry™

MACHINE OPERATION

NORMAL SWEEPING OPERATION

A normal sweeping operation consists of seven typical operations: pre-start checklist, starting machine, sweeping, dumping hopper, post operation checklist – engine operating, stopping machine, and post operation checklist – engine stopped.

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

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

TO SWEEP lists things to keep in mind before and during the sweeping operation.

TO DUMP HOPPER lists the steps required to dump the hopper.

POST OPERATION CHECKLIST – ENGINE OPERATING lists things to check before stopping the machine engine.

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

POST OPERATION CHECKLIST – ENGINE STOPPED lists things to check after stopping the machine engine.

PRE-START CHECKLIST

Check under machine for leak spots.

Check engine lubricating oil level.

Check fuel level.

Check for LPG odor or frosting on hoses or components indicating a leak.

Check controls for proper operation.

Check service records to determine service requirements.

TO START MACHINE

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

1. LPG powered machines: Slowly open the liquid service valve.

NOTE: Opening the service valve too quickly may cause the service valve check valve to stop the flow of LPG fuel. If the check valve stops the flow of fuel, close the valve, wait a few seconds, and slowly open the valve once again.

2. Gasoline powered machines: When the engine is cold, pull the choke knob out. Push choke in after the engine has started and is running smoothly.

LPG powered machines: When the engine is cold and exposed to cold temperatures, press the primer button on the LPG vaporizer through the hole in the battery access cover.

3. Turn the on-off switch key to the right.
4. Push the start switch until the engine starts. Do not operate the starter for more than 10 seconds at a time or after the engine has started.

NOTE: Do not operate the starter motor for more than 10 seconds at a time or after the engine has started. Allow the starter to cool between starting attempts. The starter motor may be damaged if it is operated incorrectly.

5. Release the machine parking brake.
6. Drive the machine to the area to be swept.

OPERATION

TO SWEEP

Plan the sweeping in advance. Try to arrange long runs with minimum stopping and starting. Sweep debris from very narrow aisles into main aisles ahead of time. Do an entire floor or section at one time.

Pick up oversize debris before sweeping. Flatten or remove bulky cartons from aisles before sweeping. Pick up pieces of wire, twine, string, etc., which could become entangled in brush or brush plugs. Overlap brush paths.

Sweep as straight a path as possible. Avoid bumping into posts or scraping the sides of the sweeper.

1. Move the main brush lever into the (Main Brush Down) or (Main Brush Free-Float) position.
2. Move the side brush arm into the down position.
3. Sweep as required.

TO DUMP HOPPER

1. Pull the main brush lever into the (Main Brush Up) position.
2. Pull the side brush arm into the raised position.
3. For machines below serial number 004369: Push the filter shaker switch for 15 seconds to shake the dust filter.

NOTE: For machines serial number 004369 and above, the filter shaker by-pass switch must be in the "on" position to shake the dust filter when the engine is turned off.

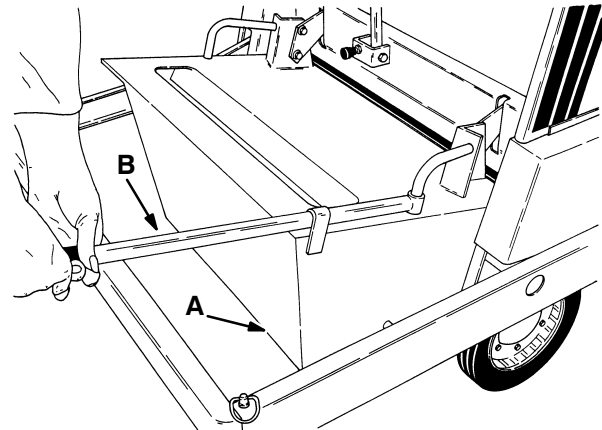
4. Slowly drive the machine up to the dump site or dumpster. Stop the engine.
5. Park on level surface.

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

6. Lift the filter cover.

7. Swing the dump lever under the hook; Lift the dump lever to dump the hopper.

! WARNING: Heavy Hopper. Get Help To Handle.



03142

DUMPING HOPPER

- A. Hopper**
B. Dump Lever

8. Engage the lever hook to keep the hopper in the dump position.
9. Slowly back the machine away from the dump site or dumpster.
10. Release the lever hook, lower the hopper, and return the dump lever to its storage location.

POST OPERATION CHECKLIST – ENGINE OPERATING

Check brush pattern for width and evenness.

TO STOP MACHINE

1. Raise the main brush and side brush.
2. Turn the on-off switch key to the left. Remove the key from the on-off switch.

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

3. LPG powered machines: Close the LPG tank liquid service valve.

POST OPERATION CHECKLIST – ENGINE STOPPED

Check skirts for damage, wear, and adjustment.

Check for wire or string tangled on brushes.

Check to make sure LPG tank service valve is closed.

Check for LPG odor or frost on LPG hoses and components, indicating a leak.

Check for leaks.

NORMAL SCRUBBING OPERATION

A normal scrubbing operation consists of seven typical operations: pre-start checklist, starting machine, scrubbing, draining recovery tank and emptying debris tray, post operation checklist – engine operating, stopping machine, and post operation checklist – engine stopped.

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

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

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

TO DRAIN RECOVERY TANK AND EMPTY DEBRIS TRAY lists the steps required to empty the debris tray and the recovery tank.

POST OPERATION CHECKLIST – ENGINE OPERATING lists things to check before stopping the machine engine.

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

POST OPERATION CHECKLIST – ENGINE STOPPED lists things to check after stopping the machine engine.

PRE-START CHECKLIST

Check under machine for leak spots.

Check engine lubricating oil level.

Check fuel level.

Check for LPG odor or frosting on hoses or components indicating LPG fuel leak.

Check brakes and controls for proper operation.

Check service records to determine service requirements.

TO START MACHINE

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

1. LPG powered machines: Slowly open the liquid service valve.

NOTE: Opening the service valve too quickly may cause the service valve check valve to stop the flow of LPG fuel. If the check valve stops the flow of fuel, close the valve, wait a few seconds, and slowly open the valve once again.

2. Gasoline powered machines: When the engine is cold, pull the choke knob out. Push choke in after the engine has started and is running smoothly.

LPG powered machines: When the engine is cold and exposed to cold temperatures, press the primer button on the LPG vaporizer through the hole in the left engine compartment cover.

3. Turn the on-off switch key to the right.
4. Push the start switch until the engine starts. Do not operate the starter for more than 10 seconds at a time or after the engine has started.

NOTE: Do not operate the starter motor for more than 10 seconds at a time or after the engine has started. Allow the starter to cool between starting attempts. The starter motor may be damaged if it is operated incorrectly.

5. Release the machine parking brake.
6. Drive the machine to the area to be scrubbed.

OPERATION

TO SCRUB

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

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

Allow a few inches overlap of brush paths.

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

Floor conditions, amount of soilage, type of soilage, brush action, and squeegee action all play an important role in determining the type and concentration of detergent to be used. For specific recommendations, consult the local Tennant Company Representative.

⚠ WARNING: Flammable Materials Can Cause An Explosion Or Fire. Do Not Use Flammable Materials In Tank(s).

The recovery tank should be drained after the solution tank is empty and whenever the float rises and stops water vacuum. The recovery tank may fill before the solution tank empties if standing water is picked up in addition to the solution put down by the machine.

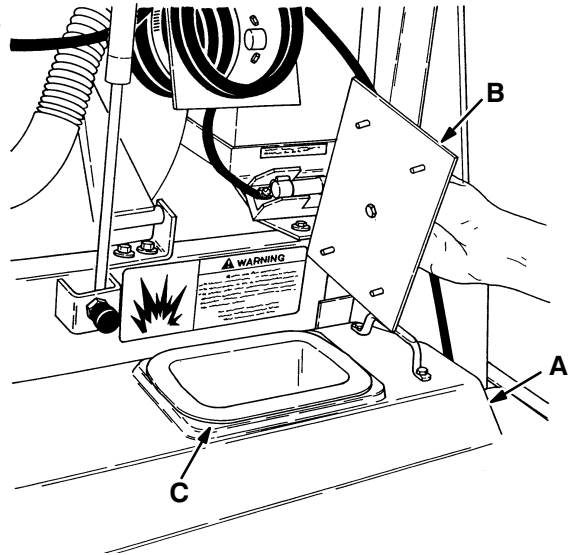
For best scrubbing results, reduce speed to one-half maximum machine speed. Shut off solution flow to floor 5 ft (1.5 m) before making turns. Always raise the rear squeegee before backing machine. Adjust solution flow to floor with solution flow control lever to match floor conditions.

1. Stop the engine before filling solution tanks.

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

NOTE: For machines serial number 004369 and above, the filter shaker by-pass switch should be in the "off" position to prevent the filter shaker from shaking.

2. Open the solution tank cover.



SOLUTION TANK COVER

03150

- A. Solution Tank
- B. Cover
- C. Soap Basket

3. Pour the required amount of detergent into the soap basket. Fill the tank with water to 1 in (25 mm) above the top of the screened portion of the soap basket.

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

4. Start and drive the machine to the area to be scrubbed.
5. Move the main brush lever into the (Main Brush Down) or (Main Brush Free-Float) position.
6. Move the side brush arm into the down position.
7. Place the solution spreader tube in the down position.
8. Move the solution lever into the on position.
9. Lower the squeegee lever into the down position.

10. Scrub as required. Adjust the solution flow to match floor conditions. When the recovery tank float stops vacuum, return to the solution dump/filling site. Drain the recovery tank, empty the debris tray, and refill the solution tank.

! WARNING: Flammable Materials Or Reactive Metals Can Cause Explosion Or Fire. Do Not Pick Up.

TO DRAIN RECOVERY TANK AND EMPTY DEBRIS TRAY

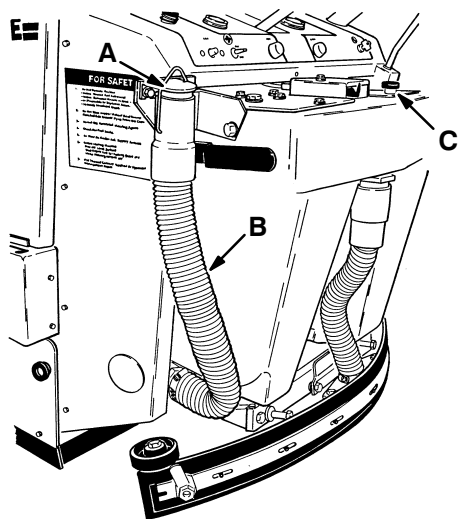
1. Park the machine next to a floor drain. Stop the engine and set the machine parking brake.

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

NOTE: For machines serial number 004369 and above, the filter shaker by-pass switch should be in the "off" position to prevent the filter shaker from shaking.

2. Remove the recovery tank drain hose from its retention plug. Lower the hose to the floor drain to drain the tank.

NOTE: The tank will not empty with the vacuum fan operating.

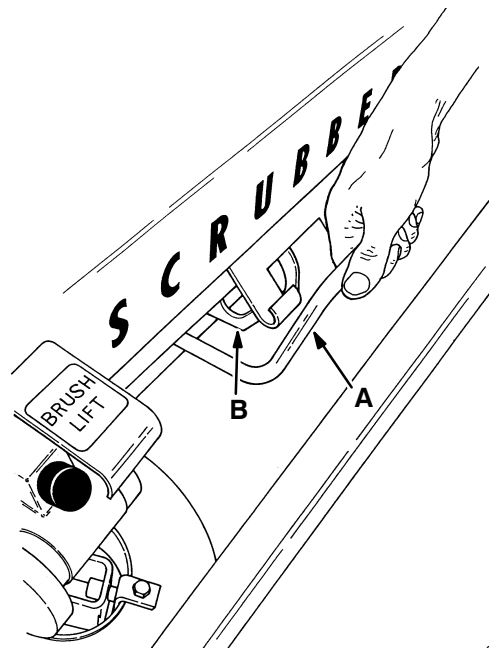


RECOVERY TANK DRAIN HOSE

- A. Plug**
- B. Drain Hose**
- C. Access Door**

03148

3. Replace the hose on the retention plug after the tank is empty.
4. Lift the debris tray handle off its hanger and pull the tray out from under the solution tank. Empty and replace it.



REMOVING DEBRIS TRAY

- A. Handle**
- B. Debris Tray**

03149

POST OPERATION CHECKLIST – ENGINE OPERATING

Check scrub brush pattern for width and evenness.

Check squeegees for proper deflection.

TO STOP MACHINE

1. Move the solution lever into the off position and place the main brush lever into the (Main Brush Up) position 10 ft (3 mm) before stopping the machine.
2. Lift the squeegee lever into the up position.
3. Place the solution spreader tube in the up position.
4. Pull the side brush arm into the raised position.

OPERATION

5. Turn the on-off switch key to the left.
Remove the key from the on-off switch.

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

NOTE: For machines serial number 004369 and above, the filter shaker by-pass switch should be in the "off" position to prevent the filter shaker from shaking.

6. LPG powered machines: Close the LPG tank liquid service valve.

POST OPERATION CHECKLIST – ENGINE STOPPED

Check skirts for damage, wear, and adjustment.

Check for wire or string tangled on brushes.

Drain and clean recovery tank.

Check vacuum hoses for debris or obstructions.

Check to make sure LPG tank service valve is closed.

Check for LPG odor or frost on LPG hoses and components, indicating a leak.

Check for leaks.

DOUBLE SCRUBBING OPERATION

Double scrubbing is a method of removing heavy accumulations of soilage, dirt, wax, or spills. It involves making two passes over the area to be cleaned. To double scrub, make a single pass over the surface being cleaned with the rear squeegee raised. Allow the solution to soak on the floor for 15 to 20 minutes. Then make a second scrubbing pass in the normal manner with the rear squeegee lowered.

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

OPERATION ON GRADES

Drive the machine slowly on grades. The maximum rated climb angle is 8 degrees. The maximum rated descent angle is 6 degrees.

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

VACUUM WAND OPTION

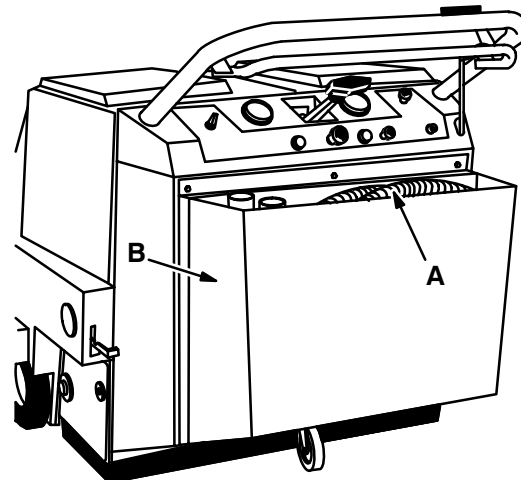
The vacuum wand option gives the machine the added flexibility of picking up debris not accessible to the machine. An 84 in (2135 mm) hose utilizes the machine vacuum system.

TO OPERATE VACUUM WAND

1. Stop the machine close to the area to be cleaned.
2. Raise the main brush and side brush
3. Stop the engine.

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

4. Remove the vacuum wand and hose from its storage location.
5. Assemble the vacuum wand to the vacuum hose.



VACUUM WAND

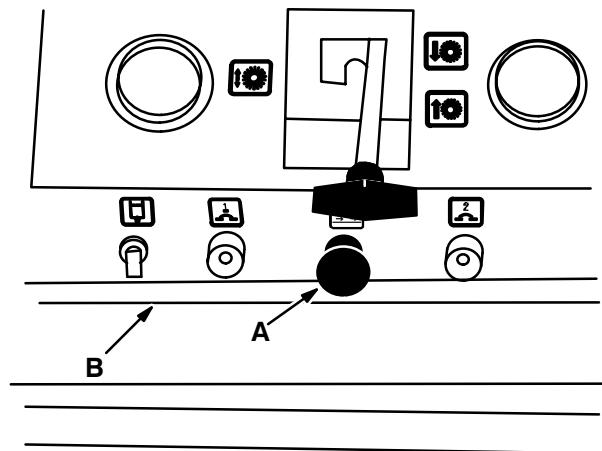
- A. Vacuum Hose
- B. Storage Bin

07127

6. Pull the vacuum shut-off knob to divert vacuum to the wand.
7. Start the engine.
8. Vacuum the area as required.
9. When finished, stop the engine and push the vacuum shut-off knob in to divert vacuum to the main brush compartment.
10. Disassemble the vacuum wand and hose. Place them in their storage locations.

FILTER BY-PASS OPTION

The filter by-pass option allows the machine to sweep wet debris without soaking and damaging the dust filter. To operate the filter bypass, pull the vacuum shut-off knob out. To stop the filter bypass, push the vacuum shut-off knob in.



VACUUM SHUT-OFF KNOB

- A. Vacuum Shut-Off Knob
- B. Instrument Panel

07126

WATER PICKUP OPTION

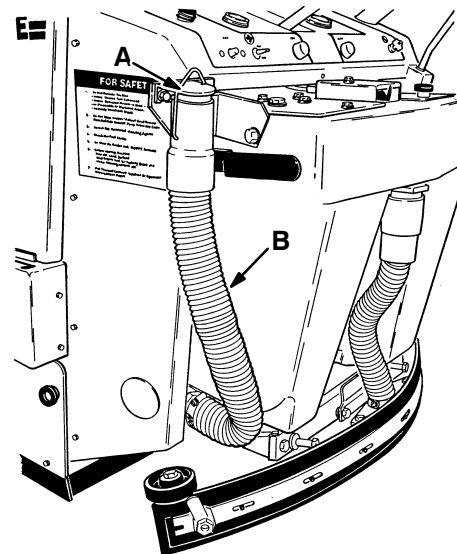
The water pickup option allows a machine without the scrub attachment to pick up water from the floor. The kit includes a filter by-pass, a squeegee, and a recovery tank.

TO OPERATE THE WATER PICKUP OPTION

1. Pull out the vacuum shut-off knob.
2. Raise the main brush and side brush.
3. Lower the squeegee lever into the down position.
4. Drive the machine over to the wet areas.

When the recovery tank float stops vacuum, go to the dump/filling site. Stop the machine. Lower the drain hose to empty the recovery tank. Rinse the recovery tank clean. Replace the hose on the retention plug after the tank is empty.

NOTE: The tank will not empty with the vacuum fan operating.



RECOVERY TANK DRAIN HOSE

- A. Retention Plug
- B. Drain Hose

03148

OPERATION

SCRUB ATTACHMENT

The scrub attachment option gives the machine the added flexibility to scrub floors. It consists of four groups of parts—the solution tank and debris tray, the side and main scrub brushes, the recovery tank, and the rear squeegee.

The solution tank, debris tray, and side and main scrub brushes are to be removed when sweeping. The recovery tank and rear squeegee may be left on the machine. The rear squeegee must be kept in the “up” position to prevent being damaged however. The solution tank and debris tray takes the place of the sweeping hopper. The side scrub brush takes the place of the side sweep brush. The main sweeping brush is also exchanged for a scrubbing brush in the conversion.

Rear squeegee and recovery tank installation are covered in an instruction bulletin. Side scrub brush installation is the same as side sweep brush installation as covered in *BRUSHES* in the *MAINTENANCE* section. Here we will only cover routine solution tank and debris tray installation and removal.

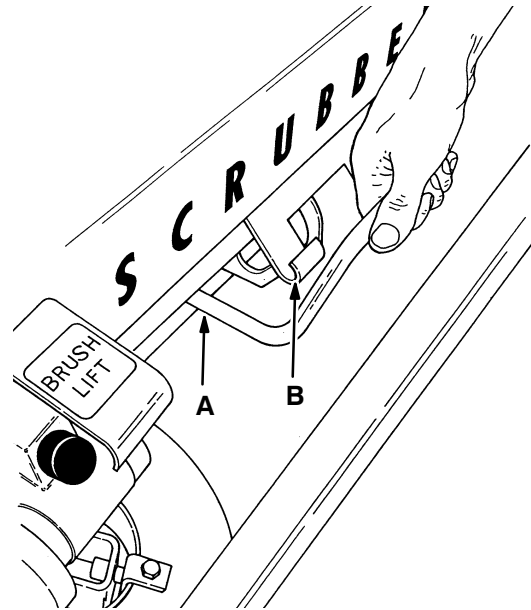
TO MOUNT SOLUTION TANK AND DEBRIS TRAY

1. Stop the engine.

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

2. Raise the filter assembly.
3. Remove the debris hopper.

4. Slide the solution tank into place on the machine. Be sure the tank hanger brackets engage the mounting pins.
5. Slide the debris tray under the solution tank.



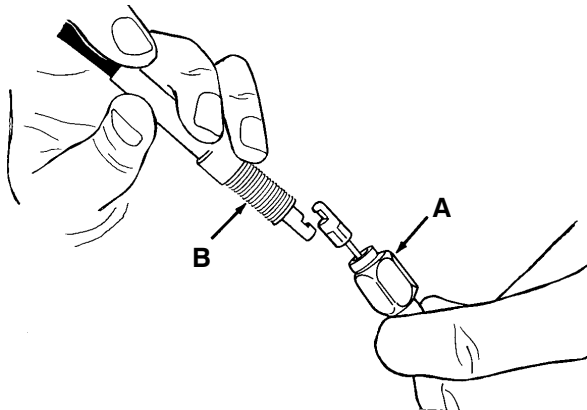
DEBRIS TRAY

- A. Debris Tray**
B. Handle Hanger

6. Place the tray handle on its hanger.

03149

7. Connect the solution cable on the tank to the cable on the machine. Do not twist the cable.

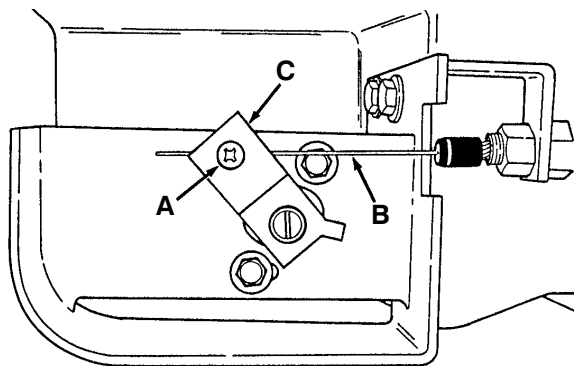


CONNECTING SOLUTION CABLE

03137

- A. Tank Cable
- B. Machine Cable

NOTE: If twisting is required to connect the cables, loosen the valve swivel screw and allow the cable to relax. Connect the cables and tighten the swivel screw. Be sure the valve lever does not move when loosening or tightening the swivel screw.

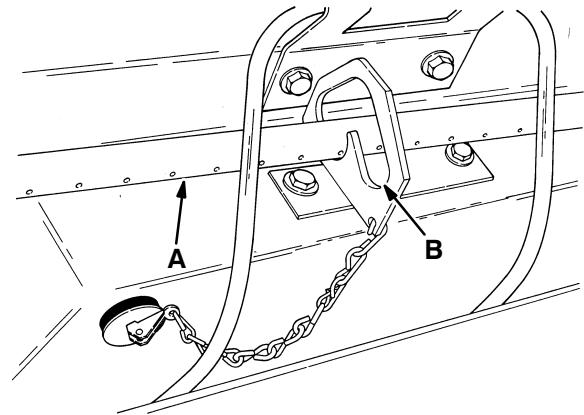


CABLE SWIVEL SCREW

03725

- A. Swivel Screw
- B. Cable
- C. Solution Valve Lever

8. Position the spreader tube in the "lowered" position.



SPREADER TUBE

03160

- A. Spreader Tube
- B. Lowered Position Slot

9. Lower the filter assembly.

TO REMOVE SOLUTION TANK AND DEBRIS TRAY

1. Park the machine next to a floor drain. Stop the engine and set the machine parking brake.

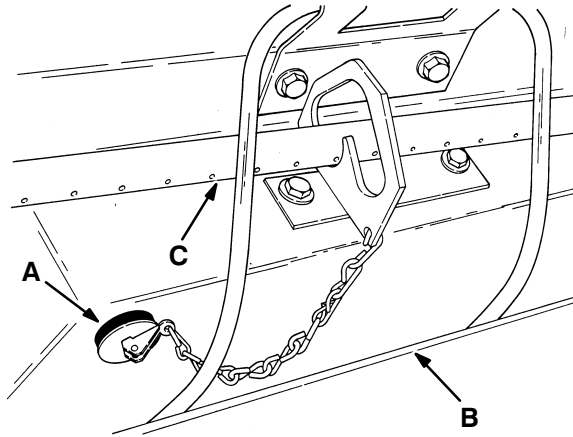
FOR SAFETY: Before Leaving Or Servicing Machine; Stop On Level Surface, Set Parking Brake, And Turn Off Machine.

NOTE: For machines serial number 004369 and above, the filter shaker by-pass switch should be in the "off" position to prevent the filter shaker from shaking.

2. Raise the filter assembly.
3. Position the spreader tube in the "raised" position.

OPERATION

4. Remove the plug on the bottom of the solution tank to drain the solution tank.



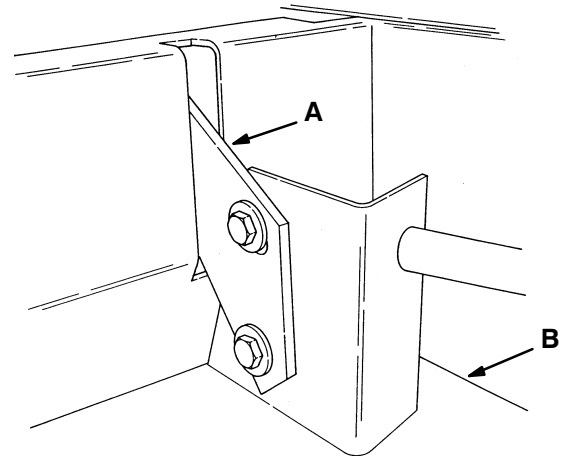
DRAIN PLUG

03160

- A. Drain Plug
- B. Solution Tank
- C. Raised Spreader Tube

5. Disconnect the solution cable on the machine from the from the solution tank cable.
6. Slide the debris tray out from under the solution tank.

7. Remove the solution tank.
8. Slide the debris hopper into place on the machine. Be sure the debris hopper hangers engage the mounting pins.



HOPPER HANGERS

03159

- A. Hanger
- B. Hopper

9. Replace the tank drain plug.

MACHINE TROUBLESHOOTING

Problem	Cause	Remedy
Excessive dusting	Dust skirts and seals worn, damaged, not adjusted properly	Replace or adjust skirts or seals
	Dust filter clogged	Shake and/or clean or replace filter
	Vacuum Hose damaged	Replace vacuum hose
	Vacuum belt slipping or broken	Adjust or replace belt
Poor sweeping performance	Brush bristles worn	Replace brushes
	Brushes not adjusted properly	Adjust brushes
	Debris caught in brush drive mechanism	Free mechanism of debris
	Hopper not adjusted properly	Adjust hopper floor clearance
	Hopper full	Empty hopper
	Hopper floor skirts worn, damaged	Replace skirts
Trailing water – poor or no water pickup	Worn rear squeegee	Rotate or replace rear squeegee blade
	Rear squeegee out of adjustment	Adjust rear squeegee
	Recovery tank inspection cover seal broken	Adjust cover or replace seal
	Vacuum hose clogged	Flush vacuum hoses
	Recovery tank full	Drain tank
	Float stuck shutting off vacuum	Clean float and float guide
	Debris caught on squeegee	Remove debris
	Debris tray full	Empty tray
	Foam filling recovery tank	Empty recovery tank; change detergent
	Vacuum hose to squeegee disconnected or damaged	Reconnect or replace vacuum hose
	Vacuum fan to recovery tank hose damaged	Replace hose
	Vacuum fan belt slipping or broken	Adjust or replace belt
	Little or no solution flow to floor	Solution tank empty
Solution control cable broken or out of adjustment		Replace and/or adjust cable
Solution supply lines and spreader tube clogged		Flush solution supply lines, spreader tube
Solution tube in “up” position		Place tube in “down” position

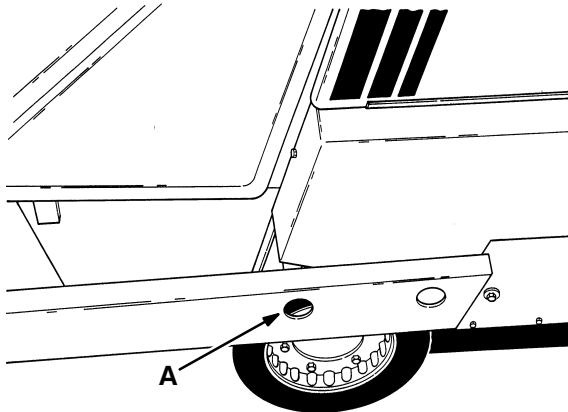
MACHINE TROUBLESHOOTING

Problem	Cause	Remedy
Poor scrubbing performance	Debris caught on scrub brushes	Remove debris
	Improper detergent or brushes used	Check with TENNANT® representative for advice
	Worn scrub brushes	Replace scrub brushes
	Scrub brushes out of adjustment	Adjust scrub brushes
	Debris tray full	Empty tray

TRANSPORTING MACHINE**MACHINE TIE-DOWNS**

The machine may be tied down at each of the attachment bolts on the wrap around bumper.

To tie the machine down, strap around the bumper at the attachment bolts.



03136

LEFT SIDE TIE-DOWN LOCATION**A. Tie-Down**

When transporting the machine on a trailer or in a truck, be sure to engage the machine parking brake if so equipped, and block the machine tires to prevent the machine from rolling.

MACHINE STORAGE**STORING MACHINE**

When storing the machine for extended periods of time, the following procedures must be followed to lessen the chance of rust, sludge, or other undesirable deposits from forming.

1. Empty debris hopper.
2. Change engine oil.
3. Raise the main brush and side brush.
4. Park the machine in a cool, dry area.
5. Stop the engine.
6. Drain the fuel tank.
7. Start the engine and let it run out of fuel.
8. Remove the spark plug and pour 1 oz (30 cc) of new engine oil into the cylinder.
9. Crank the engine to distribute the oil, then replace the spark plug.
10. Clean the engine cooling fins.

SECTION 3

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MAINTENANCE

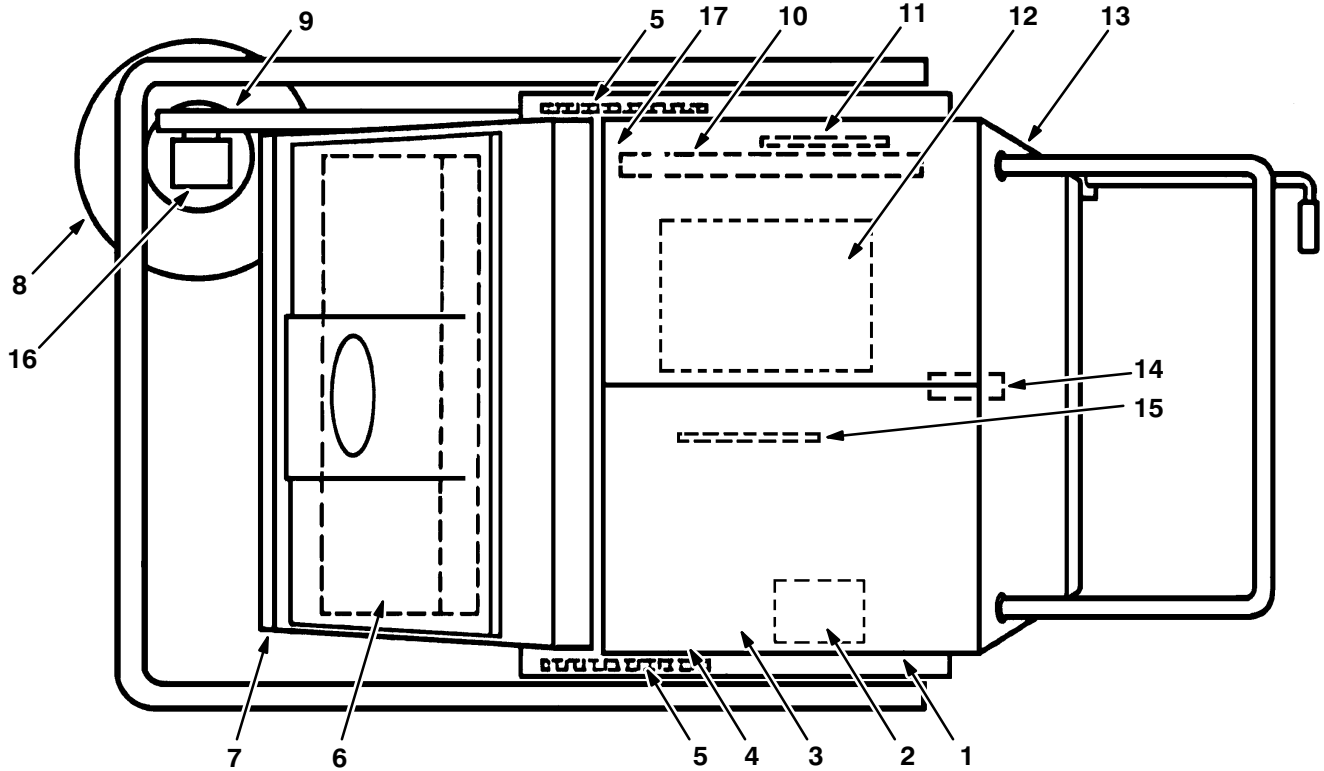
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RECOMMENDED FIRST 25-HOUR MACHINE INSPECTION

After the first 25 hours of operation, the following procedures are recommended:

1. Check the brush pattern for correct brush adjustment.
2. Check the floor skirts to floor clearance.
3. Check the side brush and main brush patterns.
4. Check the drive chain tension.

MAINTENANCE CHART



03138

Interval	Key	Description	Procedure	Lubricant	No. of Service Points
Daily	12	Engine	Check oil level	EO	1
	6	Dust filter	Shake	-	1
	1	Brush skirts	Check for damage, wear, and floor clearance	-	5
	3	Main brush	Check for damage, wear, and floor clearance	-	1
	8	Side brush	Check for damage and wear	-	1
	7	Hopper	Check for hopper door seal damage and wear	-	3
	13	Scrub attachment	Check scrub brushes for damage and wear	-	2
			Check rear squeegee for damage, wear, and adjustment	-	1
25 Hours	12	Engine	Change oil	EO	1
			Clean cooling fins	-	1
			Clean and oil air filter pre-cleaner element	-	1
	13	Scrub attachment	Clean recovery tank	-	1
			Check squeegee for damage, wear, and adjustment	-	1

MAINTENANCE

Interval	Key	Description	Procedure	Lubricant	No. of Service Points
50 Hours	15	Vacuum fan belt	Check tension and wear	–	1
	10	Propelling belts	Check tension and wear	–	2
	10	Main brush belts	Check for wear	–	2
	9	Side brush belt	Check tension and wear	–	2
	2	Battery	Check electrolyte level	DW	1
	8	Side brush	Check floor pattern	–	1
	3	Main brush	Check floor pattern	–	1
			Rotate end-for-end	–	1
	4	Brush arm pivot	Lubricate	SPL	2
	14	Rear caster	Lubricate	SPL	2
	13	Scrub attachment	Lubricate squeegee pivot	SPL	1
			Check debris tray floor clearance	–	1
			Check scrub brushes pattern	–	2
	7	Hopper	Check floor clearance	–	1
100 Hours	12	Engine	Clean or replace and gap spark plug	–	1
			Clean or replace filter element	–	1
	5	Drive chains	Check and adjust tension	–	2
			Lubricate	SO	2
	7	Hopper	Clean inside	–	1
			Check floor clearance	–	1
	11	Self adjusting sheave	Lubricate	EO	1
	6	Dust filter	Clean or replace	–	1
17	Differential	Lubricate	SPL	1	
400 Hours	12	Engine	Check valve clearance	–	1
			Check breather reed valve and gaskets	–	1
			Clean cylinder head carbon deposits	–	1
			Check starter motor brushes	–	1
	16	Side brush gear box	Check lubricant level	GL	1

EO – Engine oil

DW – Distilled water

SPL – Special lubricant, Lubriplate EMB grease, TENNANT Part No. 01433-1

SO – Spray lubricant

GL – SAE 90 weight gear lubricant

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

LUBRICATION

ENGINE

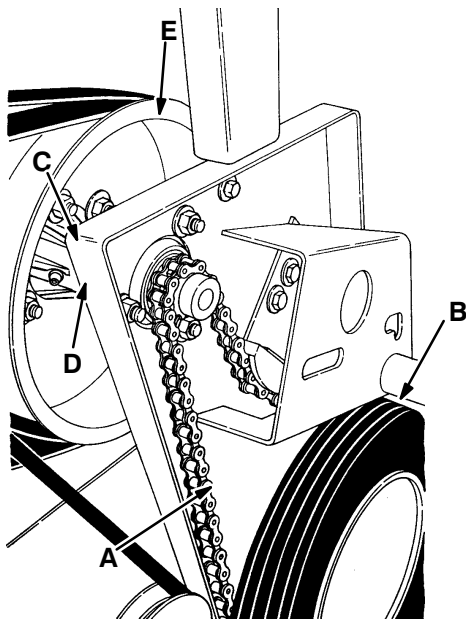
Check the engine oil level daily. Change the engine oil after every 25 hours of operation. Use a straight SAE 30-weight, API class SF engine oil. If multiviscosity oil is used, oil consumption and combustion deposits will increase.

Using other than service class SF oil or extending oil change intervals could cause engine damage not covered by the engine warranty.

The engine oil capacity is 1 qt (0.95 L).

DRIVE CHAINS

The two wheel drive chains propel the machine. They should be lubricated with a penetrating-type spray lubricant after every 100 hours of operation.



WHEEL DRIVE CHAIN

03139

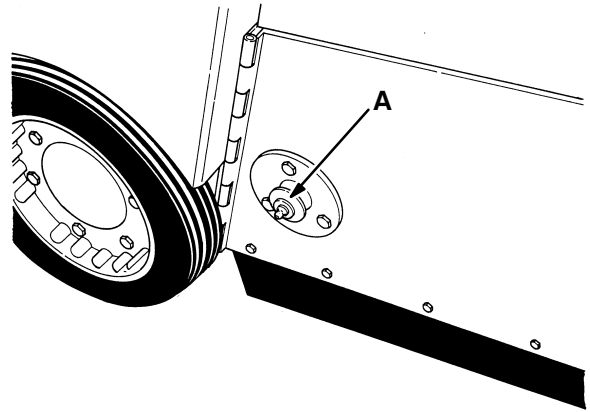
- A. Drive Chain
- B. Tire
- C. Differential
- D. Grease Fitting
- E. Drive Sheave

DIFFERENTIAL

The differential drives the front wheels. The differential has one grease fitting located on the drive shaft inside the drive sheave. Lubricate the differential every 100 hours of operation with Lubriplate EMB grease (TENNANT Part No. 01433-1).

BRUSH ARM PIVOTS

The brush arm pivots on a stub shaft on each side of the machine. Each of the stub shafts are fitted with a grease fitting. Apply Lubriplate EMB grease (TENNANT Part No. 01433-1) to the grease fittings after every 50 hours of operation.



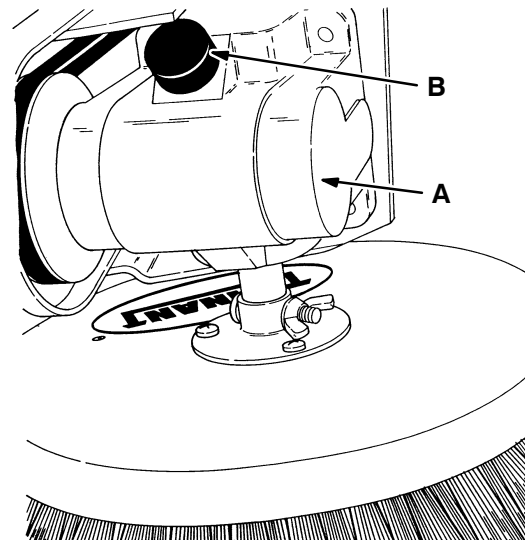
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LEFT SIDE BRUSH ARM PIVOT GREASE FITTING

- A. Grease Fitting

SIDE BRUSH GEAR BOX

The side brush gear box drives the side brush. It is lubricated with SAE 90 weight gear lubricant. Check the fluid level after every 400 hours of operation. Remove the breather and fill the gear box to within 0.25 in (6 mm) of the top if needed.



03144

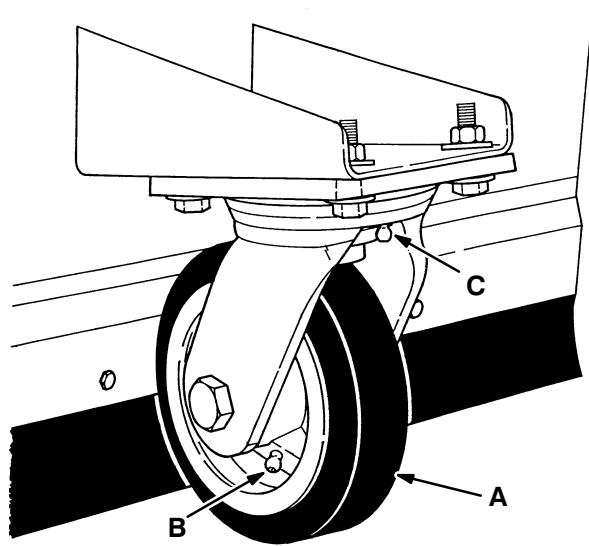
SIDE BRUSH GEAR BOX

- A. Side Brush Gear Box
- B. Breather

REAR CASTER

The rear caster which supports the weight of the rear of the machine. There are two grease fittings on the caster for lubrication purposes. One grease fitting is located on the swivel position of the caster. The other grease fitting, located on the hub portion of the caster, is for lubricating the caster axle.

Apply Lubriplate EMB grease (TENNANT Part No. 01433-1) to each of the grease fittings after every 50 hours of operation. The caster axle is full when grease appears between the caster hub and the caster fork. The caster swivel is full when grease appears through the swivel o-ring.



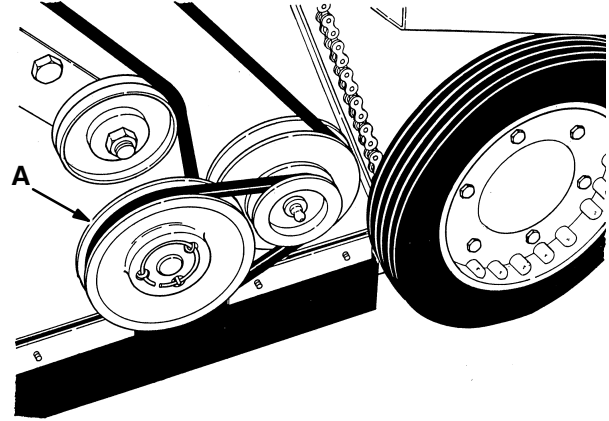
REAR CASTER

03143

- A. Rear Caster
- B. Axle Grease Fitting
- C. Swivel Grease Fitting

SELF ADJUSTING SHEAVE

The self adjusting sheave transfers power from the short main brush belt to the main brush. Lubricate the sheave shaft with SAE 30-weight engine oil after every 100 hours of operation. Avoid getting oil in the belt or sheave belt surfaces.



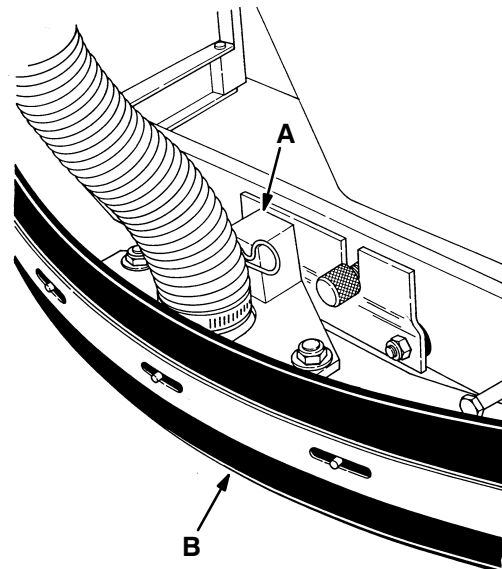
SELF ADJUSTING SHEAVE

03141

- A. Sheave

SQUEEGEE PIVOT

The squeegee pivot allows the rear squeegee to pivot over uneven floor surfaces. Apply Lubriplate EMB grease (TENNANT Part No. 01433-1) to the pivot shaft after every 50 hours of operation.



SQUEEGEE PIVOT

03166

- A. Squeegee Pivot
- B. Squeegee

ENGINE

ENGINE LUBRICATION

Check the engine oil level daily. Change the engine oil after every 25 hours of operation. Use a straight SAE 30-weight, API class SF engine oil. If multiviscosity oil is used, oil consumption and combustion deposits will increase.

Using other than service class SF oil or extending oil change intervals could cause engine damage not covered by the engine warranty.

The engine oil capacity is 1 qt (0.95 L).

COOLING SYSTEM

Maintaining cooling system efficiency is important. Engine temperatures must be brought up to and maintained within the satisfactory range for efficient operation. However, the engine must be kept from overheating in order to prevent damage to the valves, pistons, and bearings.

Clean the engine cooling fins after every 25 hours of operation.

FOR SAFETY: When Servicing Machine, Wear Eye And Ear Protection When Using Pressurized Air Or Water.

AIR INTAKE SYSTEM

The importance of maintaining an air filter in proper condition cannot be overemphasized. Dirt induced through improperly installed, improperly serviced, or inadequate air filter elements wears out more engines than long hours of operation. Even a small amount of dirt will wear out a set of piston rings in just a few hours. Operating with a clogged air filter element also causes the fuel mixture to be richer, which can lead to formation of harmful sludge deposits in the engine. Always cover the air intake when the air cleaner is removed for servicing. Do not neglect servicing the air cleaner. Use only correct parts for replacement. Keep all other air intake components such as hoses, clamps, etc., secure and in good condition to prevent entrance of unfiltered air.

AIR FILTER

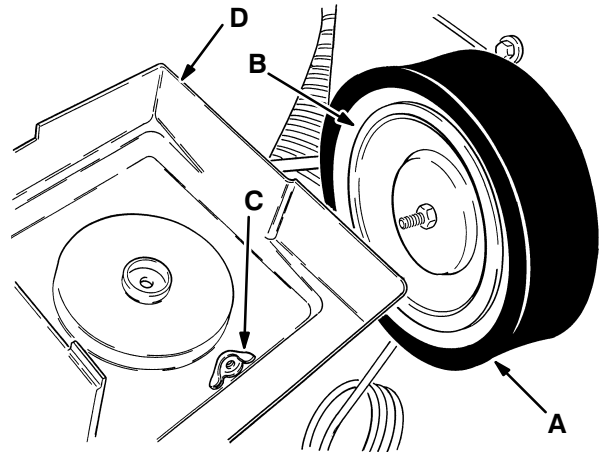
The engine air filter is made up of two parts, a foam pre-cleaner and a dry cartridge type filter. The foam pre-cleaner must be cleaned and re-oiled after every 25 hours of operation. The dry cartridge type filter should be cleaned or replaced after every 100 hours of operation. The filter element must be replaced if it is damaged or has been cleaned three times.

TO CLEAN OR REPLACE AIR FILTER ELEMENT

1. Stop the engine and set the machine parking brake.

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

2. Open the filter cover to gain access to the engine.
3. Remove the air filter cover wing nut.
4. Remove the air filter cover.



ENGINE AIR FILTER

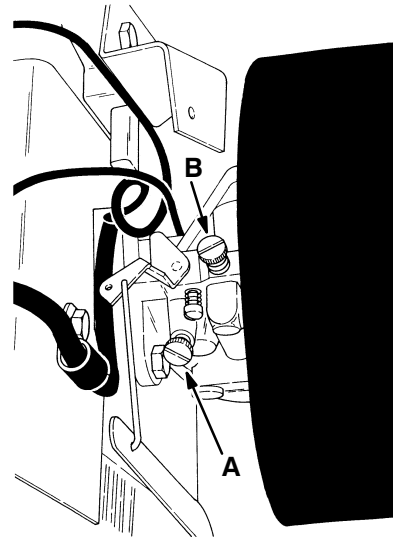
03074

- A. Foam pre-cleaner**
- B. Dry Cartridge Air Filter**
- C. Wing Nut**
- D. Air Filter Cover**

5. Remove the foam pre-cleaner.
6. Wash the foam pre-cleaner in liquid detergent and water.

7. Squeeze it dry in a cloth.
8. Remove the dry cartridge-type filter nut and cup.
9. Gently remove the dry cartridge-type air filter.
10. Clean or discard the dry cartridge-type air filter.
11. Clean the interior of the air cleaner housing with a damp cloth. Clean the element sealing surfaces.
12. Position the cleaned or new, dry cartridge-type air filter on the engine.
13. Slide the air filter cup over the air filter stud.
14. Thread and tighten the nut on the air filter stud.
15. Oil the foam pre-cleaner with 1 oz (30 cc) of clean engine oil. Squeeze the pre-cleaner to distribute the oil evenly throughout the foam.
16. Slide the foam pre-cleaner over the dry cartridge-type filter.
17. Position the air filter cover over the air filter assembly. Tighten the wing nut on the air filter stud.

The carburetor should be adjusted with the fuel tank approximately one-half full and with the engine running at approximately 800 RPM. Turn the main fuel adjusting needle valve out until the engine begins to lose speed (rich). Note the position of the needle. Then turn the needle in. The engine speed may increase, then it will decrease as the needle is turned in (lean). Note the position of the needle. Set the needle half way between the rich and lean positions.



CARBURETOR ADJUSTMENTS

- A. Idle Needle Valve**
- B. Main Fuel Needle Valve**

03075

FUEL SYSTEM – GASOLINE

FUEL FILTER

The fuel filter traps fuel impurities. It is located below the air filter. Replace the filter when diminished fuel flow indicates a dirty filter.

CARBURETOR

The carburetor needs no regular maintenance. It is set so there is no idle speed—only the normal operating speed. The initial setting of the idle and main fuel needle valves is made by turning them all the way in. Turn the idle fuel adjusting needle counterclockwise to a minimum of one and one-quarter turns to a maximum of one and one-half turns. Turn the main fuel adjusting needle out counterclockwise to a minimum of one and three-quarters turns to a maximum of two turns open. Final adjustment is made with the engine running and warm.

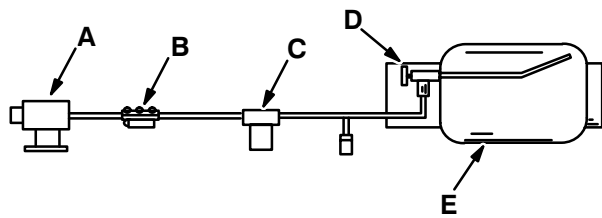
FUEL SYSTEM – LPG

LPG FUEL SYSTEM

The vapor withdrawal LPG fuel system is made up of four components which are: the LPG fuel tank, fuel filter lock, the regulator, and the carburetor.

LPG fuel flows from the LPG tank, under its own pressure, to the fuel filter lock. The fuel filter lock filters unwanted tank scale and deposits out of the LPG fuel. The fuel filter lock also stops the flow of LPG fuel when the engine is not operating. The LPG module controls the fuel filter lock. When the charging system produces sufficient energy, it permits an electrical current to open the fuel filter lock which allows LPG fuel to flow on to the regulator.

The regulator reduces the pressure of the LPG fuel to the level required by the carburetor. From the regulator, the LPG fuel is sent to the carburetor where it is finally metered into the combustion chamber air flow.



LPG FUEL SYSTEM

06800

- A. Carburetor**
- B. Regulator**
- C. Fuel Filter Lock**
- D. Tank Service Valve**
- E. LPG Fuel Tank**

Never operate an LPG powered machine if the LPG fuel system is leaking, or if any component in the fuel system is malfunctioning. Operating the machine under either of these conditions may cause a fire or explosion.

Check for frosting. If frosting occurs on or near any LPG component, there is a possibility of an LPG fuel leak or a malfunctioning component. To locate the leak, apply a soapy water solution to the suspected area. Watch for bubbles forming in a suspected area indicating an LPG fuel leak. Repair or replace the part. Use Loctite brand Stainless Steel PST thread sealant when reassembling. This epoxy-type sealant is not affected by aging or high humidity. Be sure to follow application directions and apply proper torque when reconnecting fittings. Never bypass safety components except to test. If the safety components are defective, replace them before operating the machine.

Check routings of all LPG hoses. Keep them away from sharp edges, exhaust manifolds, or other hot surfaces. Check for signs of abrasion or deterioration. Replace hoses found to be worn or damaged.

FUEL TANKS

The LPG fuel tanks should be inspected for sharp dents, gouges, leaks, and broken protecting rings whenever the tanks are refilled. All tank valves must be inspected for leaks using a soap solution. Valves must also be checked for dirt, paint, or other debris in the valve openings. The following specific checks must also be made:

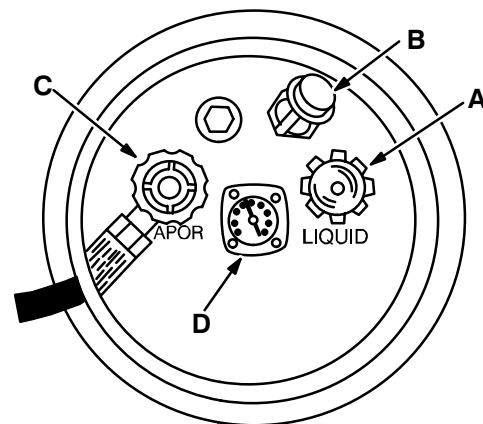
Filler Valve – Check for proper functioning and the presence of the handwheel. Valve must be closed except during filling.

Vapor and Liquid Service Valves – Check for proper functioning and presence of the handwheel. The valve must be closed except when in service.

Tank Service Valve Coupling – Check for proper functioning, thread condition, and damaged or missing washers or o-rings.

Safety Relief Valve – Check for damage. Check for the presence of the relief valve elbow and the proper direction of the elbow. If the rain cap is missing, check for foreign matter and replace the rain cap. Do not tamper with the relief valve setting.

Magnetic Liquid Level Gauge – Check operation against the maximum filling point as determined by weight.



TYPICAL LPG VAPOR WITHDRAWAL FUEL TANK

00115

- A. Filler Valve**
- B. Safety Relief Valve**
- C. Vapor Service Valve**
- D. Liquid Level Gauge**

An LPG fuel tank with any of the stated defects must be removed from service and be repaired or destroyed accordingly.

If an LPG fuel tank is damaged or leaking, it should be removed to a designated safe area, and the proper personnel should be notified. Do not attempt to make repairs to the tank, regardless of condition. Repairs or disposal must only be made by qualified personnel.

The care an LPG fuel tank receives has a direct bearing on how long that tank can be used safely. LPG fuel tanks must not be dropped or dragged across any surface. To move LPG fuel tanks, use a hand truck or roll the tank on its foot ring while it is being held in a position slightly off vertical.

Whether the storage is inside or outside, fuel tanks should not be stored in the vicinity of combustible materials or high temperature sources such as ovens and furnaces, since the heat may raise the pressure of the fuel to a point where the safety relief valves would function. Take care to insure that the tanks are stored in such a way that if the safety relief valves do function, they will relieve vapor, rather than liquid.

Valves on empty tanks must be closed during storage and transportation.

Similar precautions should be taken in storing machines fitted with LPG fuel tanks. The machines may be stored or serviced inside buildings, provided there are no leaks in the fuel system and the tanks are not overfilled. While machines are being repaired inside a building, the shut-off valve on the tank must be closed, except when the engine must be operated.

Changing the tanks is a chance for the machine operator to carefully observe the tank, fittings, and the fuel lines and fittings. If abnormal wear is detected, the operator should notify the appropriate personnel for appropriate action.

TO CHANGE AN LPG FUEL TANK

1. Park the machine in a designated safe area.

FOR SAFETY: When Servicing Machine, Keep Flames And Sparks Away From Fuel System Service Area. Keep Area Well Ventilated.

2. Close the tank service valve.
3. Operate the engine until it stops from lack of fuel.

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

4. Put on gloves and remove the quick-disconnect tank coupling.
5. Inspect the LPG fuel lines for wear or damage.
6. Remove the empty LPG fuel tank from the machine.
7. Check the tank for damage or wear.
8. Store the tank in a designated safe area.
9. Select a filled LPG fuel tank and inspect it for damage or leaks.

NOTE: Make sure the LPG fuel tank matches the fuel system (vapor tank with vapor system).

10. Carefully place the LPG tank in the machine so that the tank centering pin enters the aligning hole in the tank collar.

NOTE: If the pin cannot be engaged, make sure you have the correct LPG fuel tank and then adjust the pin locator in or out.

11. Fasten the tank hold-down clamp to lock the tank in position.
12. Connect the LPG fuel line to the tank service coupling. Make sure the service coupling is clean and free of damage. Also make sure it matches the machine service coupling.
13. Open the tank service valve slowly and check for leaks. If an LPG leak is found, close the service valve immediately and notify the appropriate personnel.
14. If no leaks are found, the engine is ready to start.

MAINTENANCE

FUEL FILTER LOCK

The fuel filter lock filters the LPG fuel. The fuel filter lock also stops the flow of LPG fuel to the engine when the engine is not operating.

Replace the fuel filter lock filter pack with the filter pack replacement kit if diminished gas flow indicates the filter is clogged. A drain plug is provided for purging the filter bowl on the older style fuel filter lock. Clean out the bowl when replacing the filter pack.

REGULATOR

The regulator regulates the flow of LPG fuel to the carburetor. If any malfunction is noted, completely disassemble the regulator. Clean all of the parts in alcohol. Inspect all of the parts and replace where needed. Carefully reassemble the regulator with the seal repair kit. Check for proper operation.

CARBURETOR

The carburetor meters fuel to the engine. If any malfunction is noted, completely disassemble the carburetor. Clean all of the parts in alcohol.

Inspect all of the parts and replace when needed. Carefully reassemble the carburetor with the seal repair kit.

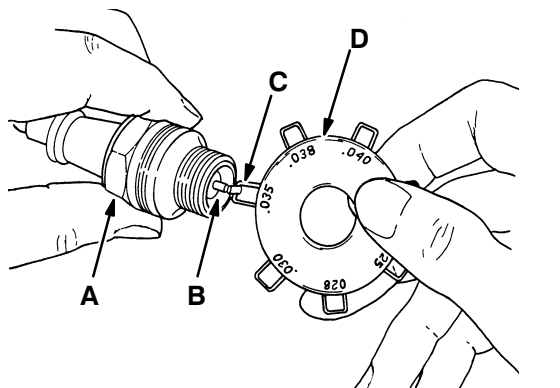
LPG FUEL TROUBLESHOOTING

Problem	Cause	Remedy
Engine will not start	Out of fuel	Replace fuel tank with full one
	Service valve opened too quickly – engaging safety valve	Close valve and reopen slowly
	Plugged fuel filter	Replace filter
	Kinked or restricted fuel line	Straighten or replace fuel line
	Engine out of tune	Replace spark plug
	LPG module failure	Replace module
	Fuel lock valve failure	Repair or replace fuel filter lock
	Regulator failure	Repair or replace regulator
Engine runs unevenly or lacks power	Wrong type of fuel tank – liquid withdrawal tank	Replace vapor withdrawal tank with vapor withdrawal tank
	Plugged fuel filter	Replace filter
	Kinked or restricted fuel line	Straighten or replace fuel line
	Engine out of tune	Replace spark plug
	Restricted air filter	Clean or replace air filter element
	Regulator maladjusted	Adjust regulator

ELECTRICAL SYSTEM

SPARK PLUG

Clean or replace and adjust spark plugs after every 100 hours of operation. A wire gauge is best for checking the spark plug gap. A flat gauge should not be used unless the electrode surfaces have been dressed with a small file to get parallel surfaces between the center and side electrodes. Set the spark plug gap by bending the side electrode. All spark plugs, new or used, should have the gaps checked and reset if necessary.



GAPPING THE SPARK PLUG

- A. Spark Plug**
- B. Center Electrode**
- C. Side Electrode**
- D. Gapping Tool**

The proper spark plug gap is 0.023 to 0.028 in (0.58 to 0.71 mm) for gasoline, and 0.016 to 0.020 in (0.41 to 0.51 mm) for LPG engines.

To get good performance from the spark plugs, follow these steps when installing the plugs.

1. Clean the spark plug seat in the cylinder head.
2. Use a new seat gasket and screw the plug in by hand.
3. Tighten the spark plugs to 22 to 28 ft lb (30 to 38 Nm) with a socket wrench of the correct size.

IGNITION SYSTEM

The engine ignition system is the breakerless type. The ignition system needs no regular maintenance. The magnet-to-ignition module gap is 0.012 to 0.016 in (0.30 to 0.41 mm). When adjusting, tighten module screws to 32 in lb (3.5 Nm).

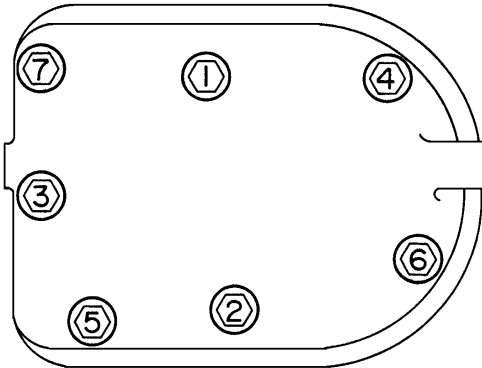
STARTER

The starter motor brushes must be inspected after every 400 hours of operation.

MAINTENANCE

CYLINDER HEAD

The cylinder head may develop carbon deposits. After every 400 hours of operation, remove the cylinder head and clean it of any accumulated deposits. Replace the cylinder head, making sure the cylinder head screws are lubricated with graphite grease and are returned to the same hole. Alternately snug the screws; tighten them to one-half of the specified value, then torque the screws to 15 to 20 ft lb (20 to 25 Nm).



CYLINDER HEAD SCREW TIGHTENING SEQUENCE

03076

VALVE TAPPET CLEARANCE

The valve tappet clearance must be inspected after every 400 hours of operation. The intake valve clearance should be 0.006 to 0.008 in (0.15 to 0.20 mm) cold. The exhaust valve clearance should be 0.017 to 0.019 in (0.43 to 0.48 mm) cold. Grind off the end of the valve stem to obtain the proper clearance.

PCV SYSTEM

The pcv system including the reed valve and gaskets must be inspected after every 400 hours of operation.

TUNE-UP CHART	
Maximum governed speed	2000 rpm
Spark plug gap	0.023 to 0.028 in (0.58 to 0.71 mm) gasoline 0.016 to 0.020 in (0.41 to 0.51 mm) LPG
Valve clearances, cold	0.006 to 0.008 in (0.15 to 0.20 mm) intake 0.017 to 0.019 in (0.43 to 0.48 mm) exhaust

ELECTRICAL SYSTEM

BATTERY

The battery provides the engine with starting power. It requires regular maintenance to operate at its best.

The battery is a 12 V, 40 A/h at a 20-hour rate. It is located in the engine compartment. When removing battery cables, remove the negative (–) cable before the positive (+) cable.

Do not allow the battery to remain in discharged condition for any length of time. Do not operate the machine if the battery is in poor condition or discharged beyond 75%, specific gravity below 1.170.

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

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

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

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

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

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

SPECIFIC GRAVITY AT 80° F (27° C)	BATTERY CONDITION
1.265	100% charged
1.225	75% charged
1.190	50% charged
1.155	25% charged
1.120	Discharged

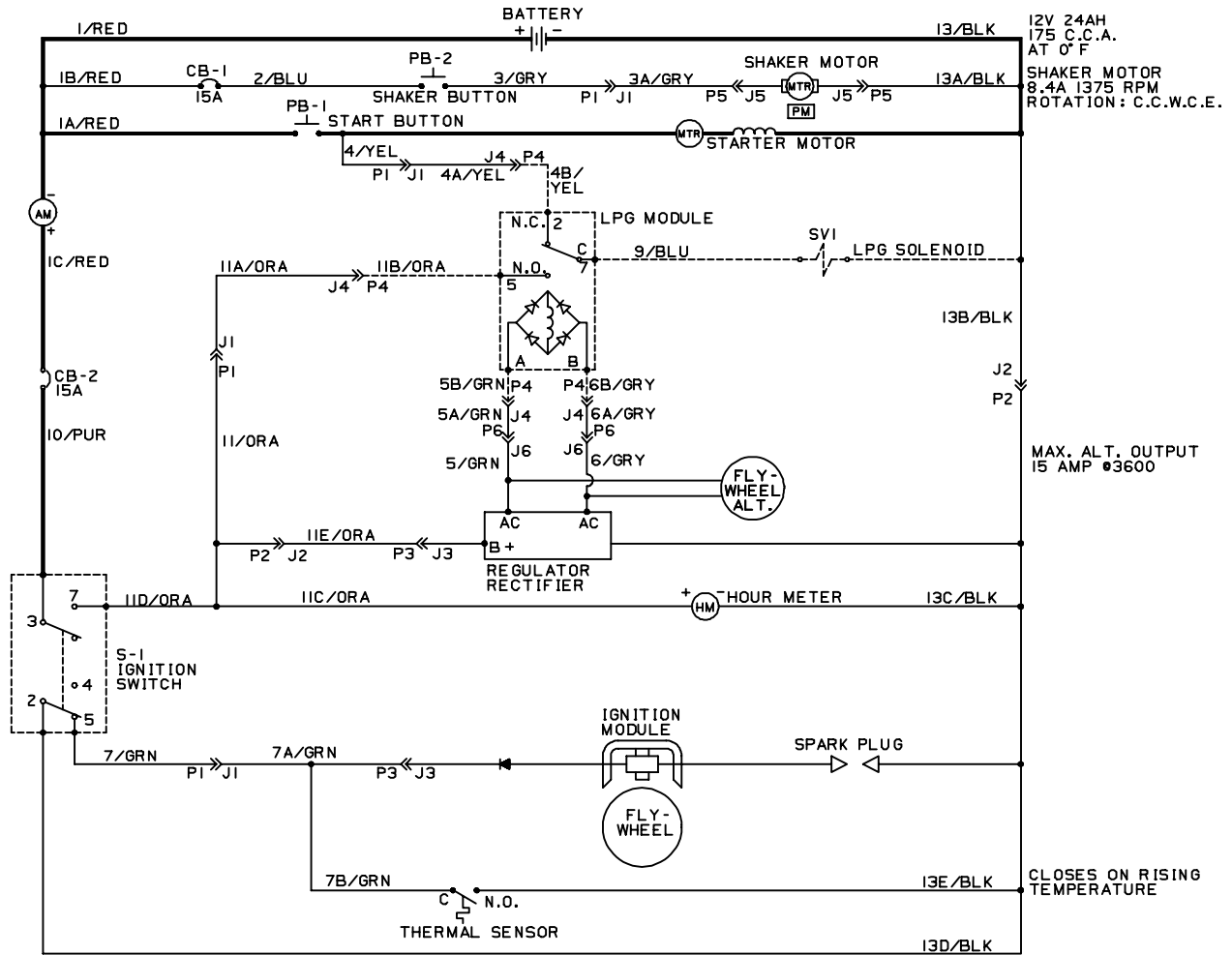
NOTE: If the readings are taken when the battery electrolyte is any temperature other than 80° F (27° C), the reading must be temperature corrected.

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

Add to the specific gravity reading 0.004 (4 points) for each 10° F (6° C) above 80° F (27° C).

Subtract from the specific gravity reading 0.004 (4 points) for each 10° F (6° C) below 80° F (27° C).

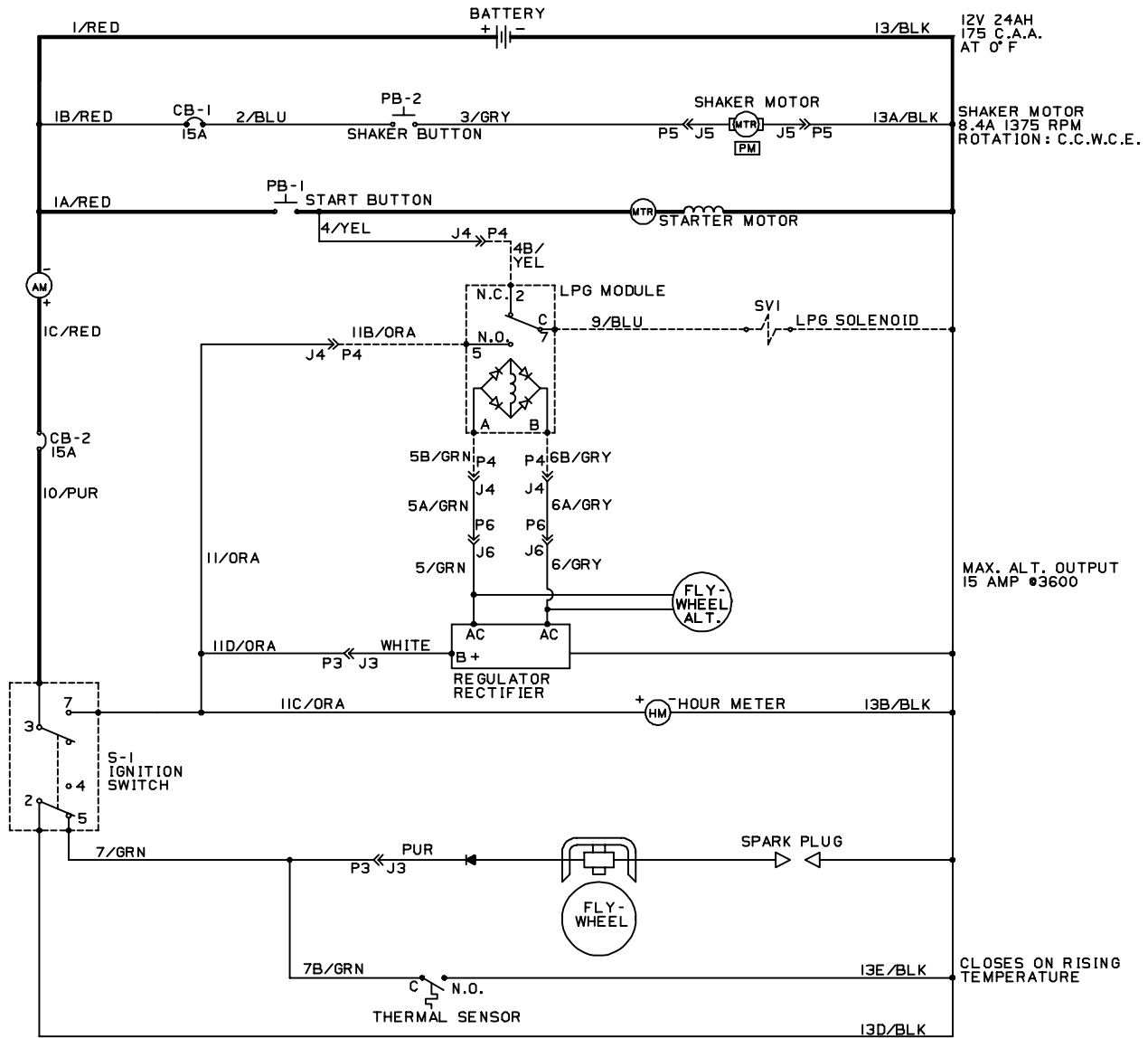
ELECTRICAL SCHEMATIC (For machines below serial number 003181)



LEGEND			
M	POWER RELAY	HM	HOURLMETER
MTR	MOTOR	SV	SOLENOID VALVE
CB	CIRCUIT BREAKER	S	SWITCH
PM	PERMANENT MAGNET	ACC	ACCESSORY
J	JACK-FEM. SOCKET	GND	GROUND CHASSIS
P	PLUG-MALE PIN	C	COMMON
PB	PUSHBUTTON	N.O.	NORMALLY OPEN
VM	VOLTMETER	N.C.	NORMALLY CLOSED
FU	FUSE		

03145

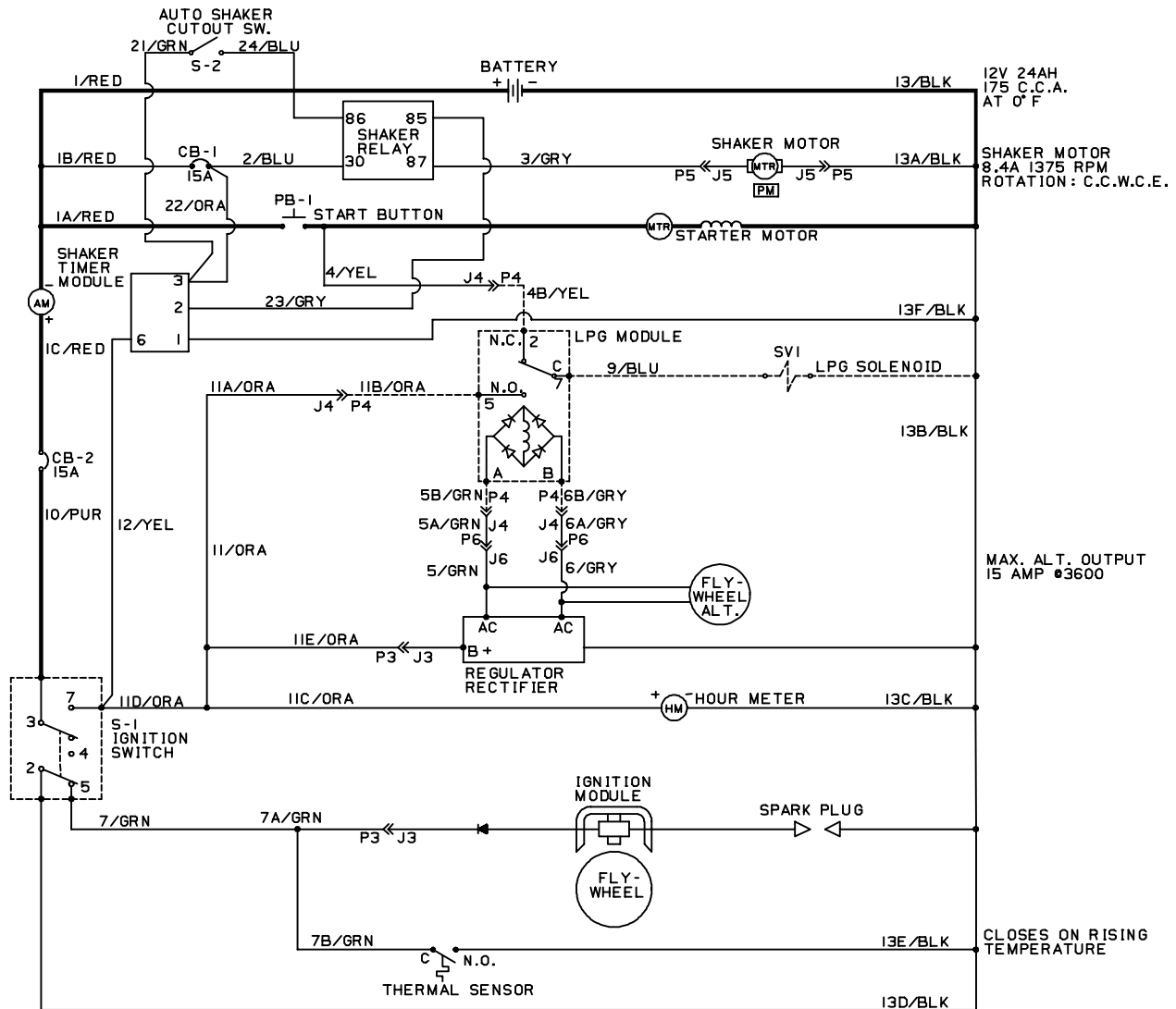
ELECTRICAL SCHEMATIC
(For machines serial number 003181 to 004368)



LEGEND			
C	COMMON	HM	HOURLMETER
MTR	MOTOR	SV	SOLENOID VALVE
CB	CIRCUIT BREAKER	S	SWITCH
PM	PERMANENT MAGNET	ALT	ALTERNATOR
J	JACK	AM	AMMETER
P	PLUG	N.C.	NORMALLY CLOSED
PB	PUSHBUTTON	N.O.	NORMALLY OPEN

03145

ELECTRICAL SCHEMATIC (For machines serial number 004369 and above)



LEGEND			
M	POWER RELAY	HM	HOURLMETER
MTR	MOTOR	SV	SOLENOID VALVE
CB	CIRCUIT BREAKER	S	SWITCH
PM	PERMANENT MAGNET	STM	SHAKER TIMER MODULE
J	JACK-FEM. SOCKET	GND	GROUND CHASSIS
P	PLUG-MALE PIN	C	COMMON
PB	PUSHBUTTON	N.O.	NORMALLY OPEN
AM	AMMETER	N.C.	NORMALLY CLOSED
ALT	ALTERNATOR	SR	SHAKER RELAY

03145

BELTS AND CHAINS

PROPELLING BELTS

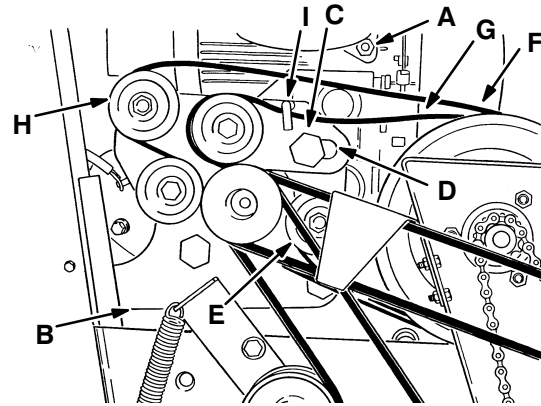
The propelling belts transfer power from the engine to the machine differential. Check the belts for wear and tension after every 50 hours of operation.

TO CHECK AND ADJUST PROPELLING BELTS TENSION

1. Park on level surface. Stop the engine and set the machine parking brake.

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

2. Remove the engine access cover, right side bumper and cover.
3. Observe the position of the clutch plate bolt with no pressure on the clutch handle. It should be approximately in the center of the slot.
4. Press the clutch handle to tighten the forward propelling belt. The clutch handle should be at least 0.75 in (20 mm) from the stationary handle for machines below serial number 006000. The clutch handle should be 0.25 to 0.50 in (7 to 13 mm) from the stationary handle for machines serial number 006000 and above. Observe the position of the clutch plate bolt. It should not touch the end of the slot. If the handle and bolt are in the proper position, skip to step 8; if not, continue with step 5 to readjust forward belt tension.



PROPELLING BELTS

03151

- A. Engine**
- B. Clutch Plate**
- C. Clutch Plate Bolt**
- D. Bolt Slot**
- E. Forward Belt Idler Sheave**
- F. Reverse Propelling Belt**
- G. Forward Propelling Belt**
- H. Reverse Belt Idler Sheave**
- I. Belt Guide**

5. Loosen the forward idler sheave bolt and slide the idler sheave down to tighten the belt (this also increases distance between clutch handle and stationary handle); slide the sheave up to loosen the belt (this also reduces distance between clutch handle and stationary handle).
6. Tighten the idler sheave bolt.
7. Recheck handle and bolt positions. Repeat as necessary to adjust belt tension.

NOTE: After adjusting the forward belt, it may contact the belt guide when engaged causing a whining noise. To stop the noise, bend the guide up out of the belt's way.

8. Pull the clutch handle to tighten the reverse propelling belt. Observe the position of the clutch plate bolt. It should not touch the end of the slot. If the bolt is in the proper position, skip to step 12; if not, continue with step 9 to readjust reverse belt tension.

NOTE: If the reverse belt is too tight, it will require excessive clutch handle pressure to propel machine in the forward direction. It may also cause the machine to creep backward when the handle is released.

MAINTENANCE

9. Loosen the reverse idler sheave bolt and slide the idler sheave to the rear to tighten the belt; slide the sheave forward to loosen the belt.

NOTE: The belts should be loose enough so that when the machine is pushed forward while in neutral, the large sheave on the differential will turn, but the belts remain stationary. This will make the machine easier to push and will reduce current draw.

10. Tighten the idler sheave bolt.
11. Pull the clutch handle to recheck the position of the clutch plate bolt. Repeat as necessary to adjust belt tension.
12. Check steering effort. After repairing or replacing drive system parts, effort may increase due to poor alignment. To correct, do the following:
 - A. Loosen the bearing flanges as well as the split coupling bolts.
 - B. Snug one split coupling bolt.
 - C. Align the propelling belts. Check for clearance between the differential and the locking collar.

NOTE: Minimum clearance between differential and sheave is 0.010 in (0.3 mm).

- D. While holding belt alignment, pull the shaft away from the differential.
- E. Tighten the center (early style only) and left bearing flanges. Check for hard rotation of shaft.
- F. Tighten the center (early style only) and left bearing collars.
- G. Pull the short differential shaft away from differential to spread the differential gears.
- H. Tighten the right side bearing flange. Rap on bearing before tightening.
- I. Tighten the right bearing collar.

- J. Check for free spinning of differential. Loosen the center and right bearing flanges if it is not spinning freely. Rap and retighten.

- K. Align and tighten sprockets. Chains must be slack to minimize steering effort.

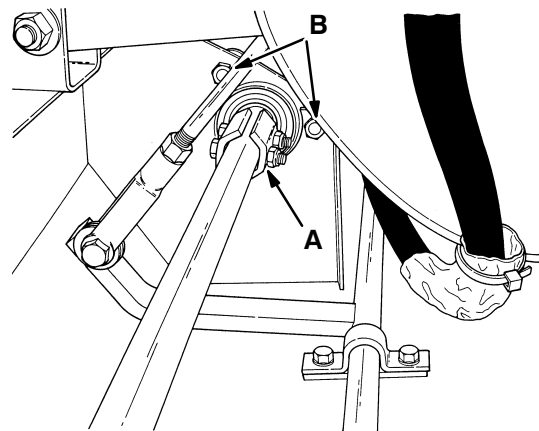
13. Replace the right side panel and bumper, and engine access cover.

TO REPLACE PROPELLING BELTS

1. Stop the engine and set the machine parking brake.

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

2. Remove the right side bumper and cover, debris hopper, and engine access cover.
3. Loosen the belt idler sheave bolts.
4. Slip the propelling belts off the idler sheaves.
5. Lift the filter cover.
6. Remove the differential coupling.



COUPLING (EARLY STYLE SHOWN)

03147

- A. Coupling**
B. Flange Bolts

7. Slide the old belt out through the coupling opening.
8. Slide the new belt through the coupling opening.

9. Reconnect the coupling to the differential shafts.
10. Slip the belt over the idler and engine sheaves.
11. Adjust the belt as described in *TO CHECK AND ADJUST PROPELLING BELT TENSION*.
12. Replace the right side cover and bumper, and the engine access cover.
13. Replace the debris hopper.
14. Lower the filter cover.

SIDE BRUSH BELT

The side brush belt transfers power from the engine to the side brush gear reducer. Check the belt for wear and tension after every 50 hours of operation.

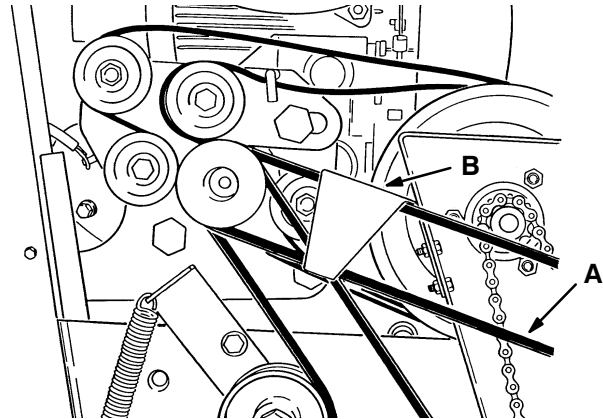
TO CHECK AND ADJUST SIDE BRUSH BELT TENSION

1. Stop the engine and set the machine parking brake.

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

2. Remove the debris hopper.
3. Remove the engine access cover, right side bumper and cover.
4. Place the side brush arm in the down position.

5. Check the belt tension at a point 9 in (230 mm) from the engine shaft. The belt should deflect 0.75 in (20 mm) from a force of 6 lb (3 kg).



SIDE BRUSH BELT

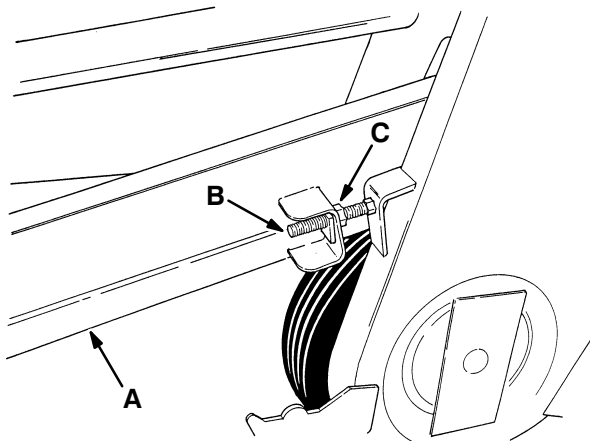
03151

- A. Side Brush Belt**
- B. Belt Guard**

6. To adjust belt tension, loosen the button head screw through the side cover.
7. Pull the side brush arm out to tighten the belt.

MAINTENANCE

8. Tighten the button head screw when the correct tension is reached.



STOP BOLT

03153

- A. Side Brush Arm
- B. Stop Bolt
- C. Lock Nut

9. Adjust the stop bolt so it clears the stop by 0.06 in (5 mm).

10. Replace the debris hopper.

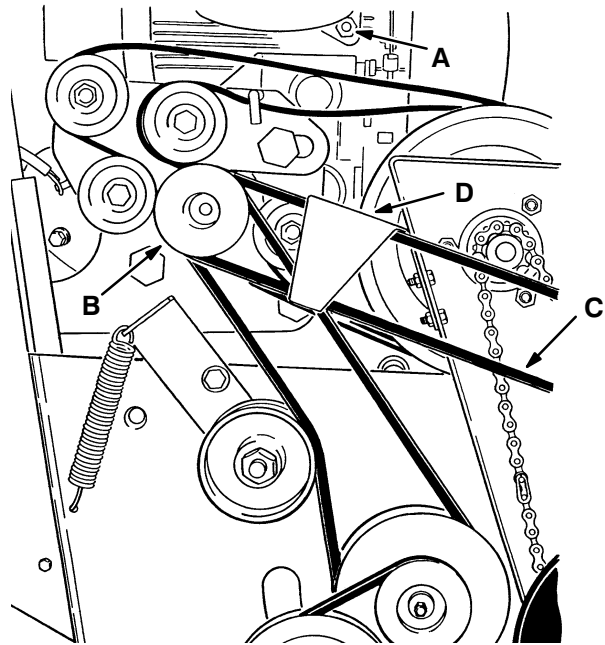
TO REPLACE SIDE BRUSH BELT

1. Stop the engine and set the machine parking brake.

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

2. Remove the debris hopper.
3. Remove the right side bumper and cover, and engine access cover.
4. Place the side brush arm in the raised position.

5. Remove the four speed reducer mounting bolts and the speed reducer from the side brush arm.
6. Slide the belt off the engine sheave and out of the machine.



SIDE BRUSH BELT

03151

- A. Engine
- B. Engine Sheave
- C. Side Brush Belt
- D. Belt Guide

7. Position the new belt over the engine sheave, under the belt guide, and through the side brush arm.
8. Loop the belt over the speed reducer sheave and bolt the speed reducer back onto the side brush arm.
9. Adjust the belt tension as described in *TO CHECK AND ADJUST SIDE BRUSH BELT TENSION*.
10. Replace the right side bumper and cover, and engine access cover.
11. Replace the debris hopper.

SHORT MAIN BRUSH BELT

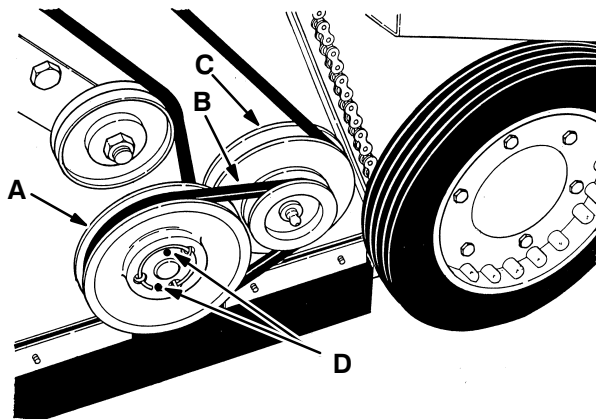
The short main brush belt transfers power from the main brush two-step sheave to the main brush. Check the belt for wear after every 50 hours of operation. A self-adjusting sheave is provided to control belt tension; it is not adjustable.

TO REPLACE SHORT MAIN BRUSH BELT

1. Stop the engine and set the machine parking brake.

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

2. Remove the debris hopper.
3. Remove the right side bumper and cover, and engine access cover.
4. Thread two 10-24 screws into the two threaded holes in the face of the self-adjusting sheave.



SHORT MAIN BRUSH BELT

03141

- A. Self-Adjusting Sheave
- B. Short Main Brush Belt
- C. Two-Step Sheave
- D. Threaded Holes

5. Evenly tighten the two screws to expand the self-adjusting sheave.
6. Slip the belt off the sheaves.

7. Slide the new belt over the sheaves.
8. Unthread the two screws.
9. Replace the right side bumper and cover, and engine access cover.

LONG MAIN BRUSH BELT

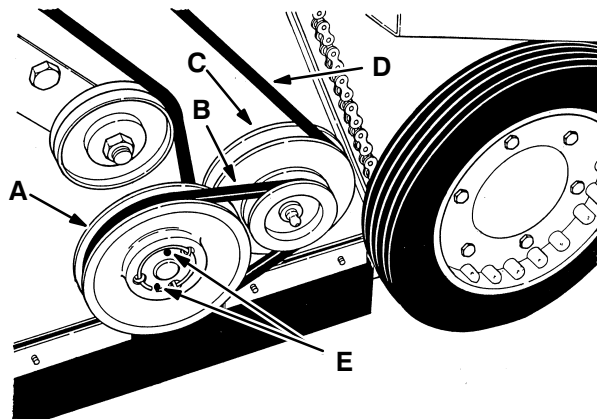
The long main brush belt transfers power from the engine to the main brush two-step sheave. Check the belt for wear after every 50 hours of operation. A belt idler is provided to control belt tension and is not adjustable.

TO REPLACE LONG MAIN BRUSH BELT

1. Stop the engine and set the machine parking brake.

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

2. Remove the debris hopper.
3. Remove the right side bumper and cover, and engine access cover.
4. Thread two 10-24 screws into the two threaded holes in the face of the self-adjusting sheave.



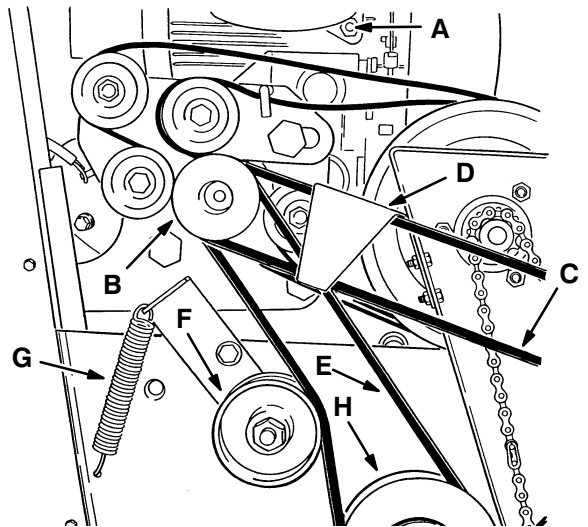
SELF-ADJUSTING SHEAVE

03141

- A. Self-Adjusting Sheave
- B. Short Main Brush Belt
- C. Two-Step Sheave
- D. Long Main Brush Belt
- E. Threaded Holes

MAINTENANCE

5. Evenly tighten the two screws to expand the self-adjusting sheave.
6. Slip the short main brush belt off the sheaves.
7. Place the side brush arm in the raised position.
8. Slide the side brush belt off the engine sheave.
13. Reinstall the two-step sheave and reconnect the idler sheave spring.
14. Position the side brush belt over the engine sheave and under the belt guide.
15. Slide the short main brush belt over the self-adjusting sheave and the two-step sheave.
16. Unthread the two screws separating the self-adjusting sheave.
17. Adjust the belt tension as described in *TO CHECK AND ADJUST SIDE BRUSH BELT TENSION*.



SIDE BRUSH BELT

- A. Engine**
- B. Engine Sheave**
- C. Side Brush Belt**
- D. Belt Guide**
- E. Long Main Brush Belt**
- F. Belt Idler**
- G. Idler Sheave Spring**
- H. Two-Step Sheave**

9. Disconnect the idler sheave spring.
10. Remove the snap ring from the two-step sheave and slide the sheave off the shaft.
11. Pull belt idler back and slide the long main brush belt out of the machine.
12. Position the new long main brush belt in the machine.

VACUUM FAN BELT

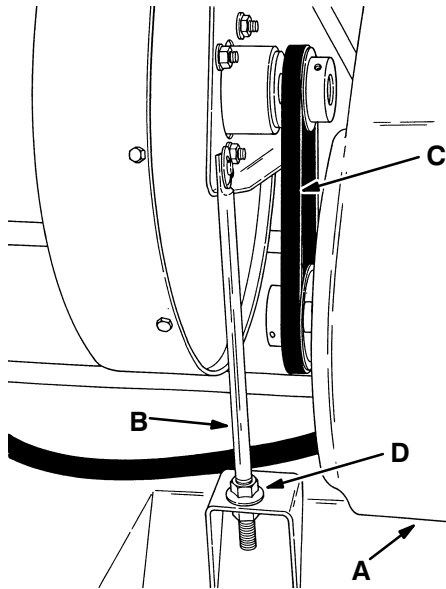
The vacuum fan belt transfers power from the engine to the vacuum fan impeller. Check the belt for wear and tension after every 50 hours of operation.

TO CHECK AND ADJUST VACUUM FAN BELT TENSION

1. Stop the engine and set the machine parking brake.

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

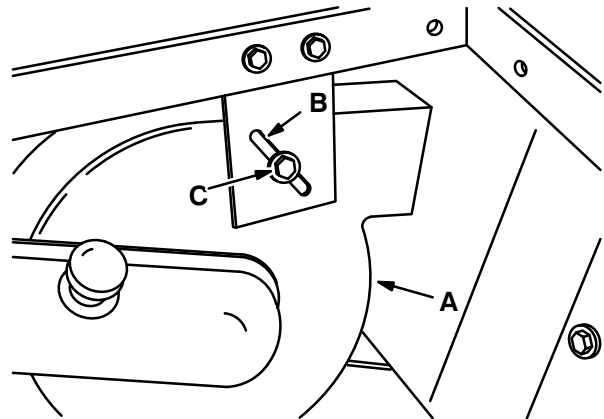
2. Remove the rear panel.
3. Check belt deflection by applying a force of 2 lb (1 kg) to the midpoint of the belt span. The belt should deflect 0.09 in (5 mm).
4. To adjust belt tension for machines below serial number 002253, loosen the belt adjusting stud jam nut. Tighten the top nut to tighten the drive belt. Loosen the top nut to loosen the belt.



VACUUM FAN BELT (OLD STYLE)

- A. Engine
- B. Adjustment Stud
- C. Vacuum Fan Belt
- D. Jam Nut

To adjust belt tension for machines serial number 02253 and above, loosen the belt adjusting stud nut. Pull the vacuum fan assembly back to tighten the belt and tighten the stud nut.



VACUUM FAN (NEW STYLE)

- A. Vacuum Fan
- B. Adjustment Slot
- C. Stud Nut

5. Tighten all nuts and recheck belt tension.
6. Replace the rear panel.

TO REPLACE VACUUM FAN BELT

1. Stop the engine.

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

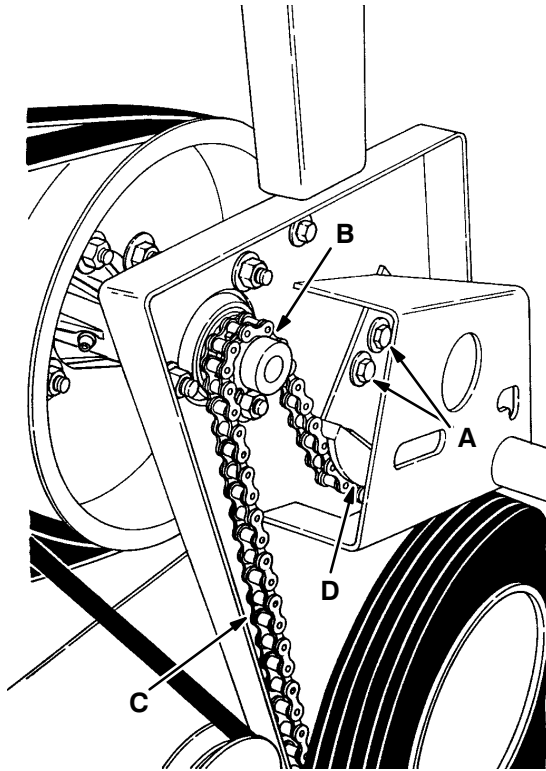
2. Remove the rear panel.
3. Loosen the vacuum fan belt.
4. Slide the belt off the sheaves.
5. Position the new belt on the engine sheave and the vacuum fan sheave.
6. Adjust belt tension as described in *TO CHECK AND ADJUST VACUUM FAN BELT TENSION*.
7. Replace the rear panel.

MAINTENANCE

WHEEL DRIVE CHAINS

The two wheel drive chains transfer power from the differential to the drive wheels. Lubricate the chains with a penetrating-type spray lubricant after every 100 hours of operation.

Check the chains for wear or damage and tension after the first 50 hours of operation and then after every 100 hours of operation. The wheel drive chains should have 0.5 in (15 mm) slack measured midway between the sprockets.



03139

WHEEL DRIVE CHAIN

- A. Adjustment Bolts
- B. Sprocket
- C. Chain
- D. Adjustment Block

STATIC DRAG CHAIN

A static drag chain is provided to prevent the buildup of static electricity in the machine. The chain is attached to the machine by a rear brush skirt mounting bolt.

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

BRUSHES

MAIN BRUSH

The main brush sweeps debris into the debris hopper. Inspect the main brush daily for wear or damage. Remove any string or wire found tangled on the main brush, the main brush drive hub, or the main brush idler hub.

Rotate the main brush end-for-end after every 50 hours of operation to obtain maximum brush life. The main brush should be replaced when the remaining bristle measures 0.5 in (15 mm).

The main brush pattern should be checked after every 50 hours of operation. The main brush pattern should be 1.25 in (30 mm) wide. Main brush pattern adjustments are made by turning the main brush lift handle.

TO REMOVE MAIN BRUSH

1. Stop the engine and set the machine parking brake.

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

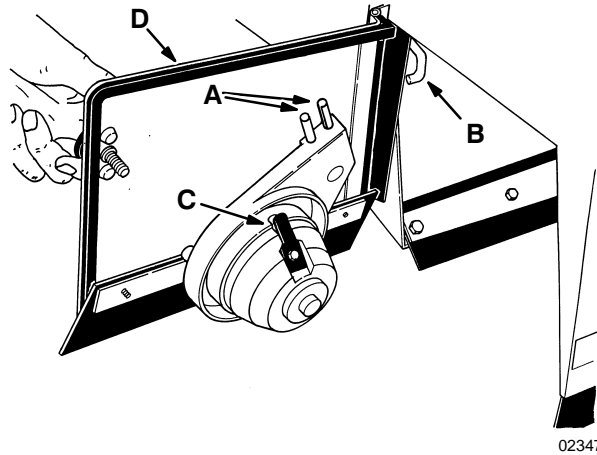
2. Place the main brush lift handle in the (Main Brush Free-Float) position.
3. Open the main brush access door.
4. Pull the main brush out of the brush compartment.

TO INSTALL MAIN BRUSH

1. Slide the main brush through the main brush access door into the brush compartment.
2. Rotate the main brush until the slots on the ends of the main brush engage the keys on the main brush drive hub.

NOTE: Do not force the main brush onto the drive hub. When the main brush slots and drive hub keys are properly aligned, the main brush will easily slip on the drive hub.

3. Close and secure the main brush access door, making sure the lift arm engages the idler arm lift pins.



CLOSING MAIN BRUSH ACCESS DOOR

- A. Lift Arm Pin**
- B. Lift Arm**
- C. Idler Key**
- D. Access Door**

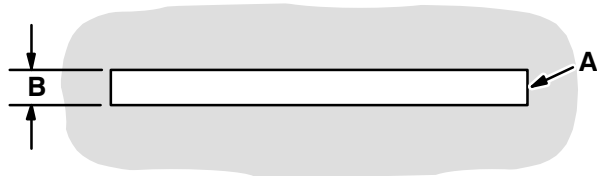
4. Check and adjust main brush pattern as described in *TO CHECK AND ADJUST MAIN BRUSH PATTERN*.

TO CHECK AND ADJUST MAIN BRUSH PATTERN

1. Apply chalk or some material that will not blow away easily, to a smooth, level surface.
2. Start the engine.
3. With side brush and main brush raised, position main brush over the chalked area.
4. Place the main brush lift handle in the (Main Brush Free-Float) position to lower the main brush to the floor for 15 to 20 seconds, while holding the machine in place.
5. Place the main brush lift handle in the (Main Brush Up) position.

MAINTENANCE

6. Move the machine from the main brush polish mark.
7. Stop the engine.
8. Observe the width of the polish mark. The proper polish width is 1.5 in (40 mm).



MAIN BRUSH PATTERN

00582

- A. Main Brush Pattern
- B. Polish Width

To reduce the polish width, turn the main brush lift handle to the right.

To widen the polish width, turn the main brush lift handle to the left.

If any adjustments are made, recheck the main brush pattern before continuing sweeping with the machine.

SIDE BRUSH

The side brush deflects debris into the path of the main brush. The side brush should be inspected daily for wear or damage.

Remove any string or wire found tangled on the side brush, side brush drive hub, or shaft.

The side brush should be replaced when the remaining bristle length measures 1 in (25 mm) in length.

The side brush pattern should be checked after every 50 hours of operation. The side brush is properly adjusted when, with the side brush arm in the raised position, there is approximately 1 in (25 mm) of space between the floor and the side brush bristles.

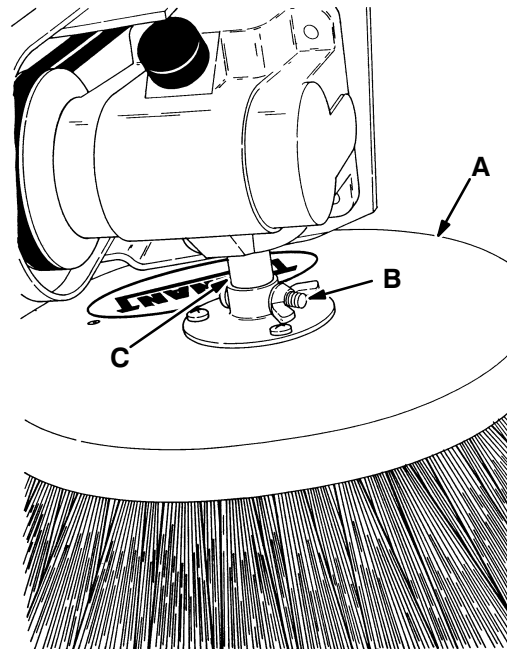
The side brush is adjusted by changing the mounting location on the drive shaft.

TO REMOVE SIDE BRUSH

1. Stop the engine and set the machine parking brake.

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

2. Pull the side brush arm up into the raised position.
3. Remove the side brush retaining bolt or clevis pin.



SIDE BRUSH

03144

- A. Side Brush
- B. Retaining Bolt
- C. Drive Shaft

4. Slide the side brush off its drive shaft.

TO INSTALL SIDE BRUSH

1. Slide the side brush onto its drive shaft.
2. Push the side brush retaining bolt or clevis pin through the side brush and the drive shaft.
3. Tighten the retaining bolt or secure clevis pin with cotter pin.
4. Check the side brush adjustment as described in *TO ADJUST SIDE BRUSH PATTERN*.

TO ADJUST SIDE BRUSH PATTERN

1. Stop the engine and set the machine parking brake.

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

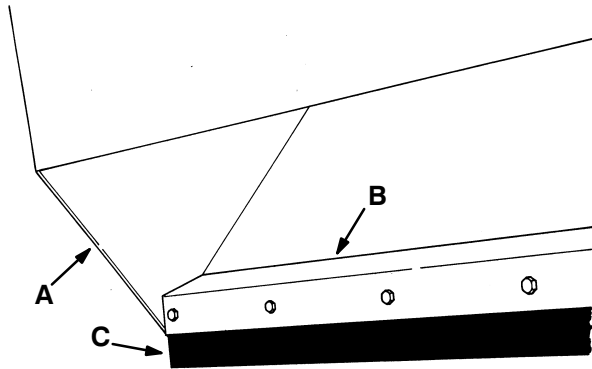
2. Pull the side brush arm up into the raised position.
3. Remove the side brush retaining bolt or clevis pin.
4. Slide the side brush up or down on the shaft until there is approximately 1 in (25 mm) of space between the floor and the brush bristles.
5. Line up the side brush and drive shaft holes.
6. Secure the side brush to the drive shaft with the retaining bolt or clevis pin.

NOTE: It may be necessary to readjust the side brush drive belt tension after adjusting the side brush height.

SKIRTS AND SEALS

HOPPER LIP SKIRT

The hopper lip skirt is located on the lower rear of the hopper. It floats over debris and helps deflect that debris into the hopper. The hopper lip skirt should be inspected for wear or damage daily.



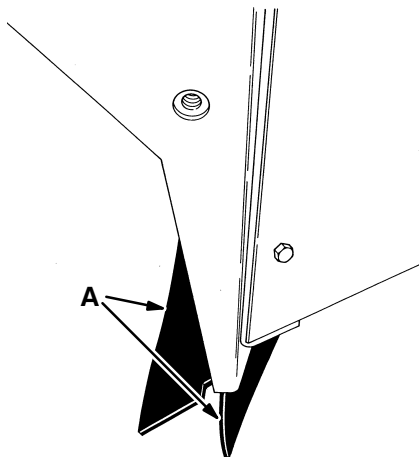
HOPPER LIP SKIRT

02348

- A. Hopper
- B. Retaining Strip
- C. Hopper Lip Skirt

REAR BRUSH SKIRTS

The rear brush skirts are located on the bottom rear of the brush compartment. The skirts seal the rear of the brush compartment. The rear brush skirts have slotted mounting holes and should be adjusted to clear the floor by 0.06 in (2 mm). Inspect the skirt for wear or damage and proper floor clearance daily.



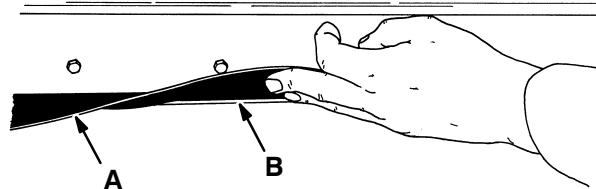
REAR BRUSH SKIRTS

03157

- A. Rear Brush Skirts

HOPPER TOP SEAL

The hopper top seal is located on the front edge of the machine frame. It seals the area between the top of the hopper and the brush compartment. Inspect the seal for wear or damage daily.



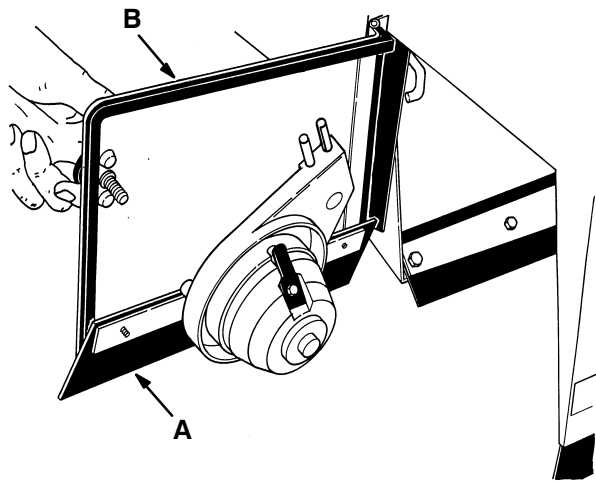
02349

HOPPER TOP SEAL

- A. Seal
- B. Frame

MAIN BRUSH COMPARTMENT SKIRTS

Two main brush compartment skirts seal the lower sides of the brush compartment. The right side seal is mounted to the machine frame. The left side seal is mounted to the main brush access door. The skirts have slotted mounting holes and should be adjusted to clear the floor by 0.06 in (2 mm). Inspect the skirts for wear or damage and proper floor clearance daily.



02347

BRUSH DOOR SKIRT

- A. Skirt
- B. Door

DEBRIS HOPPER AND DUST FILTER

DEBRIS HOPPER

The debris hopper collects debris swept up by the machine. It should be emptied after every work shift. The debris hopper floor clearance should be checked after every 50 hours of operation. The filter assembly to hopper seal can also be adjusted to correct dusting when shaking the dust filter.

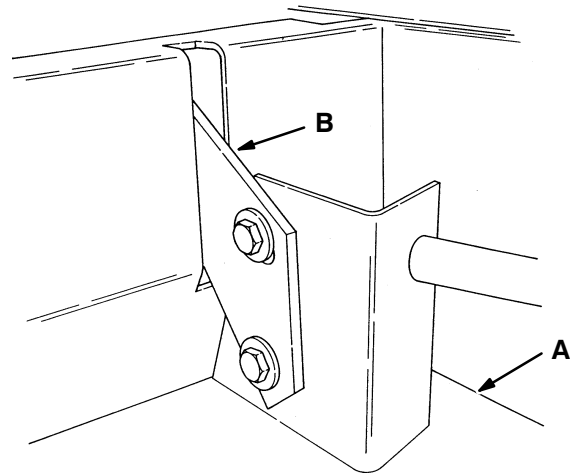
TO CHECK AND ADJUST HOPPER FLOOR CLEARANCE

1. Park the machine on a smooth, level surface and set the machine parking brake.
2. Stop the engine.

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

3. Empty the debris hopper and replace it on the machine.
4. The bottom rear metal edge of the hopper should clear the floor by 0.5 in (15 mm). Also, be sure the hopper is level side to side.

5. To adjust the hopper, loosen the hanger bracket bolts, reposition the hanger bracket, and retighten the hanger bracket bolts. Be sure the hopper brackets do not rub against the pivot pins preventing the hopper from floating.



03159

HOPPER HANGER BRACKET

- A. Hopper**
- B. Hanger Bracket**

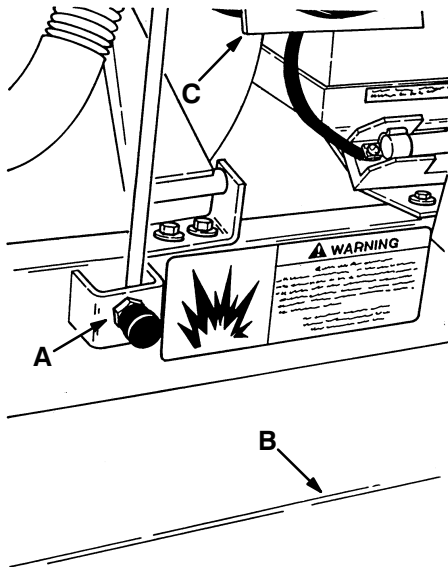
MAINTENANCE

TO ADJUST DUST FILTER TO HOPPER SEALING

1. Park the machine on a smooth, level surface and set the machine parking brake.
2. Stop the engine.

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

3. Lift the filter assembly.
4. Make sure stop bolt is making contact with the filter assembly. If it is, continue with step 5. If it is not, press the round vacuum fan seal bracket back to allow the assembly to contact the stop bolt.



STOP BOLT

- A. Stop Bolt
- B. Hopper
- C. Vacuum Fan Seal Bracket

5. Turn the filter stop bolt to the right one-half turn.
6. Close the filter assembly and check the clearance between the filter cover and the hopper. This can be done by placing a 1 in (25 mm) wide strip of paper between the filter cover and the hopper. When correctly adjusted, the paper will be difficult to pull out. The seal pressure should not be so great that the hopper will not float. Push the hopper down to check – it should be able to go down and return to its original position.

DUST FILTER

The dust filter filters the air which is drawn up from the main brush compartment by the vacuum fan. It is located inside the dust filter compartment. Shake the excess dust from the filter daily and before emptying hopper. Inspect and clean or replace the dust filter after every 100 hours of operation.

To clean the dust filter use one of the following methods:

- TAPPING – Tap the filter gently on a flat surface with the dirty side down. Do not damage the edges of the filter element or the filter will not seat properly in the filter frame.
- AIR – Blow compressed air, 35 psi (240 kPa) maximum, through the dust filter opposite the direction of the arrows. This may be done with the filter in the machine. Always wear eye protection when using compressed air.
- WATER – Soak the dust filter in a water and mild detergent solution. Rinse the dust filter until it is clean. The maximum water pressure allowable is 40 psi (275 kPa). Air dry the wet dust filter; do not use compressed air.

NOTE: Be sure the dust filter is dry before reinstalling it in the machine.

Machines equipped with the fine particle filter option should vacuum the extra filter clean whenever the standard filter is serviced.

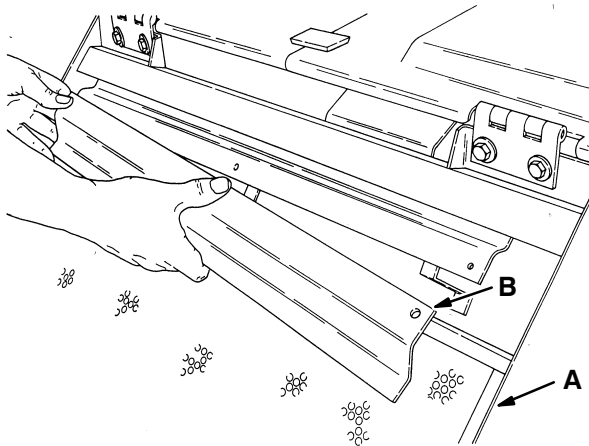
TO REMOVE DUST FILTER

1. Stop the engine and set the machine parking brake.

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

2. Remove the six front filter cover screws and the front filter cover.
3. Remove the filter hold-down bar. Remove the dust filter.

4. Inspect and clean or replace the dust filter.
5. Position the dust filter in the filter frame with the arrows pointing away from the machine.
6. Position the filter hold-down bar on the filter.
7. Secure the front filter cover on the filter frame with the six bolts.

**REMOVING HOLD-DOWN BAR**

03158

- A. Dust Filter**
- B. Hold-Down Bar**

VACUUM WAND OPTION

VACUUM WAND OPTION

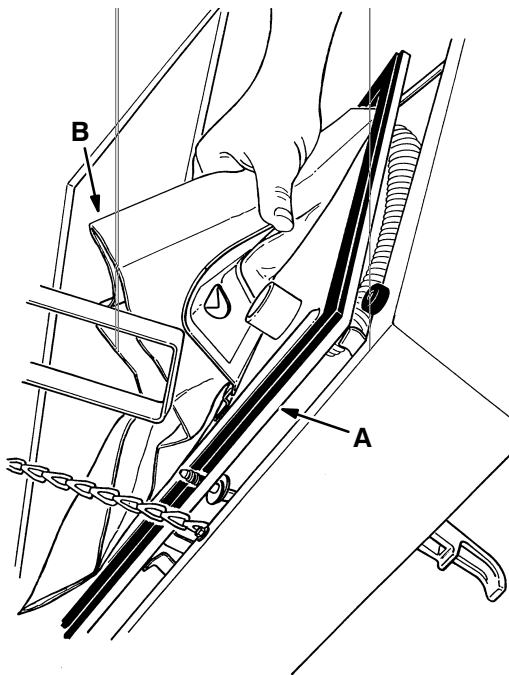
The vacuum wand option gives the machine the added flexibility of picking up debris not accessible by the machine. A 84 in (2135 mm) hose utilizes the machine vacuum system. A vacuum bag collects the debris vacuumed up by the wand. Replace it when it becomes full.

TO REPLACE VACUUM WAND BAG

1. Stop the engine and set the machine parking brake.

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

2. Open the rear access panel.
3. Unthread the two vacuum panel thumbscrews. Open the panel.
4. Pull the bag off the panel connection.



03156

VACUUM BAG

- A. Vacuum Panel
- B. Bag

5. Position the new bag on the panel. Be sure the bag is not pinched when closing the door.

6. Close and secure the panel with the thumbscrews.
7. Close the rear access panel.

WATER PICKUP OPTION

WATER PICKUP OPTION

The water pickup option allows machines without the scrub attachment to pick up water from the floor. The kit includes a filter bypass, a recovery tank, and a squeegee.

RECOVERY TANK

The recovery tank stores the water solution picked up by the machine squeegee and vacuum fan. The recovery tank is located at the rear of the machine.

The recovery tank should be drained after the solution tank is empty or whenever the float rises and stops the water vacuum.

Clean the recovery tank after every work shift. An inspection door has been provided to make the tank cleaning job easier. It is located on the top of the recovery tank.

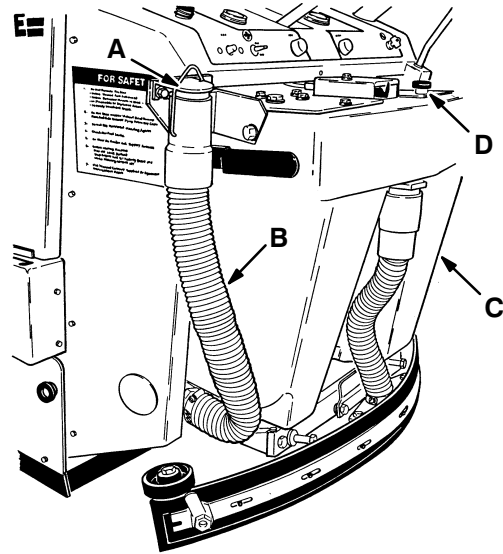
Keep vacuum hoses clean. Clogged hoses are a common cause of poor water pickup.

TO DRAIN RECOVERY TANK

1. Stop the engine and set the machine parking brake.

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

2. Remove the drain hose from its retention plug.



RECOVERY TANK DRAIN HOSE

03148

- A. Retention Plug**
- B. Drain Hose**
- C. Recovery Tank**
- D. Inspection Door**

3. Lower the hose to a floor drain to drain the tank.

NOTE: The tank will not empty with the vacuum fan operating.

4. Spray the inside of the tank with clean water. Remove all sludge and debris from the bottom of the tank.

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

5. Return the drain hose to its retention plug.

MAINTENANCE

REAR SQUEEGEE

The rear squeegee channels water into the vacuum fan suction. The front squeegee blade channels the water; the rear blade wipes the floor. Check the rear squeegee assembly for damage, wear, and adjustment daily.

Rotate or replace the rear blade of the rear squeegee if its leading edge is worn one-half of the way through the thickness of the blade.

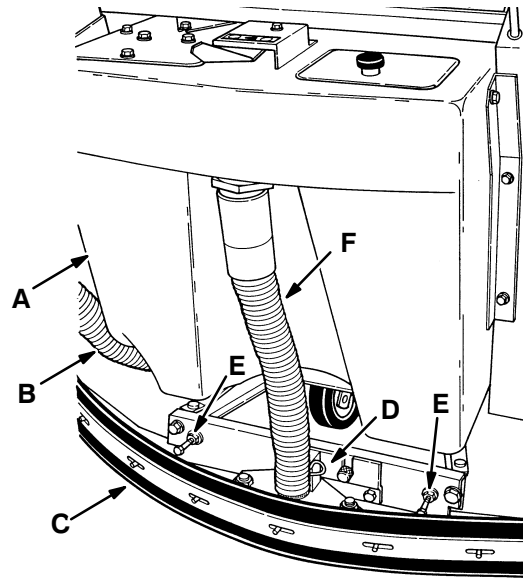
The rear blade has four wiping edges. To use them all, start with one wiping edge. To use the next wiping edge, swap the squeegee end-for-end. To use the next wiping edge, rotate the top edges down, bottom edges up. To use the last edge, swap the squeegee end-for-end. Replace the back-up strips if they become damaged, or if they lose their resiliency.

TO REMOVE SQUEEGEE ASSEMBLY

1. Place the squeegee lever in the up position.
2. Stop the engine and set the machine parking brake.

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

3. Pull the squeegee suction hose off the recovery tank connector.



03162

SQUEEGEE ASSEMBLY

- A. Recovery Tank
- B. Drain Hose
- C. Squeegee Assembly
- D. Retaining Pin
- E. Side Bolts
- F. Squeegee Suction Hose

4. Pull the squeegee assembly retaining pin out of the squeegee pivot pin.
5. Pull the squeegee assembly off the squeegee mounting block.

TO INSTALL SQUEEGEE ASSEMBLY

1. Place the squeegee lever in the up position.
2. Stop the engine and set the machine parking brake.

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

3. Slide the squeegee assembly onto the squeegee mounting block. Be sure the side bolts are above the squeegee frame.
4. Slide the squeegee assembly retaining pin through the squeegee pivot pin.
5. Push the squeegee suction hose onto the recovery tank connector.

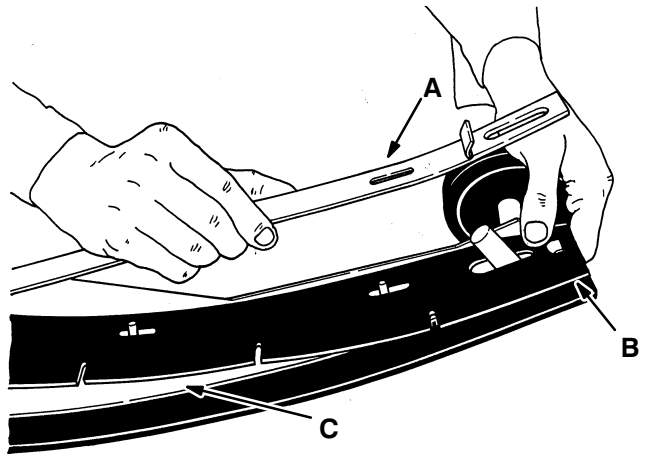
TO REPLACE FRONT SQUEEGEE BLADE

1. Place the squeegee lever in the up position.
2. Stop the engine and set the machine parking brake.

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

3. Remove the squeegee assembly from the machine.
4. Turn the front squeegee levered cam to the right to relieve tension on the squeegee retention band.
5. Remove the stationary cam and levered cam.
6. Remove the squeegee retention band.
7. Remove the front squeegee from the squeegee frame.

8. Position the new front squeegee blade on the squeegee frame pins.

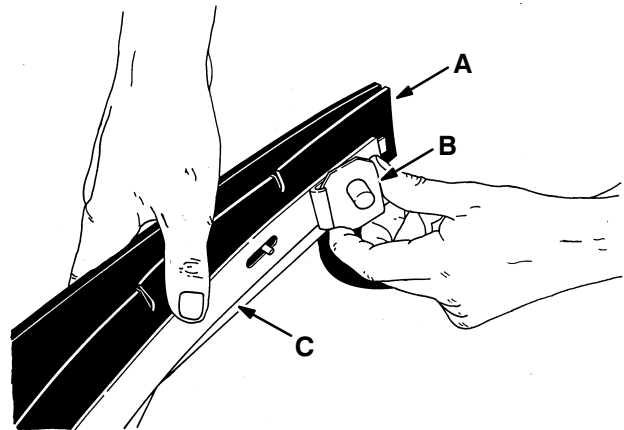


00927

INSTALLING FRONT SQUEEGEE BLADE AND BAND

- A. Retention Band
- B. Front Squeegee Blade
- C. Squeegee Frame

9. Position the stationary squeegee cam and retention band over the squeegee blade.



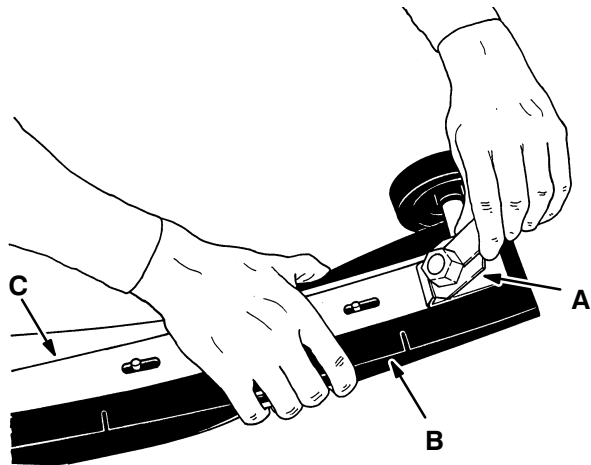
00928

INSTALLING STATIONARY CAM

- A. Front Squeegee Blade
- B. Stationary Cam
- C. Retention Band

MAINTENANCE

10. Position the levered cam on the squeegee retention band with the lever down.



INSTALLING LEVERED CAM

- A. Levered Cam
- B. Front Squeegee Blade
- C. Retention Band

00929

11. Pull the levered cam lever up to tighten the front squeegee in place.

NOTE: If the levered cam is too loose to clamp the squeegee blade, rotate the stationary cam to the next flat edge and retighten the levered cam. Overtightening the levered cam may damage the squeegee frame and retention band.

12. Reinstall the squeegee assembly on the machine.

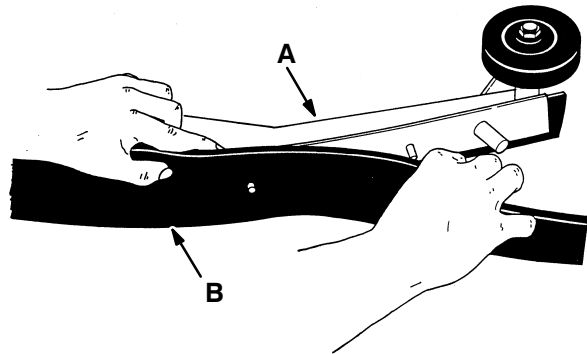
TO REPLACE REAR SQUEEGEE BLADE

1. Lift the squeegee lever into the up position.
2. Stop the engine and set the machine parking brake.

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

3. Remove the squeegee assembly from the machine.
4. Turn the rear squeegee levered cam to the right to relieve tension on the squeegee retention band.

5. Remove the squeegee retention band, stationary cam, and levered cam.
6. Remove the backup strip and rear squeegee from the squeegee frame.
7. Rotate end-for-end or flip the rear squeegee blade to use an unused edge of the squeegee blade, or discard the old squeegee and replace it with a new squeegee blade.
8. Position the rear squeegee blade on the squeegee frame pins.

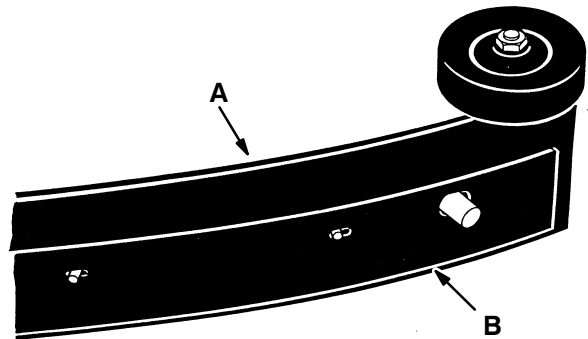


INSTALLING SQUEEGEE BLADE

- A. Squeegee Frame
- B. Rear Squeegee Blade

03163

9. Position the squeegee backup strip over the rear squeegee with the long side down.

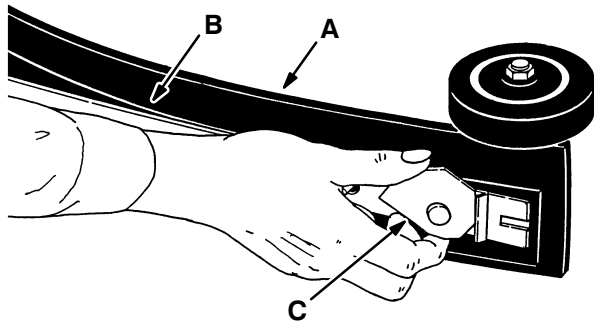


INSTALLING BACKUP STRIP

- A. Rear Squeegee Blade
- B. Backup Strip

03164

- Position the stationary cam and the retention band over the backup strip.

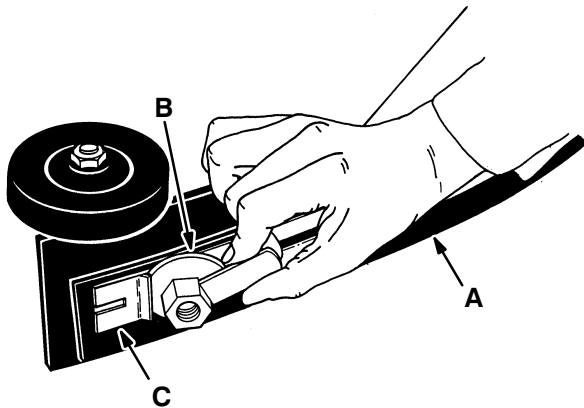


03165

POSITIONING STATIONARY CAM

- A. Rear Squeegee Blade**
- B. Retention Band**
- C. Stationary Cam**

- Position the levered cam on the squeegee retention band with the lever down.



00933

INSTALLING LEVERED CAM

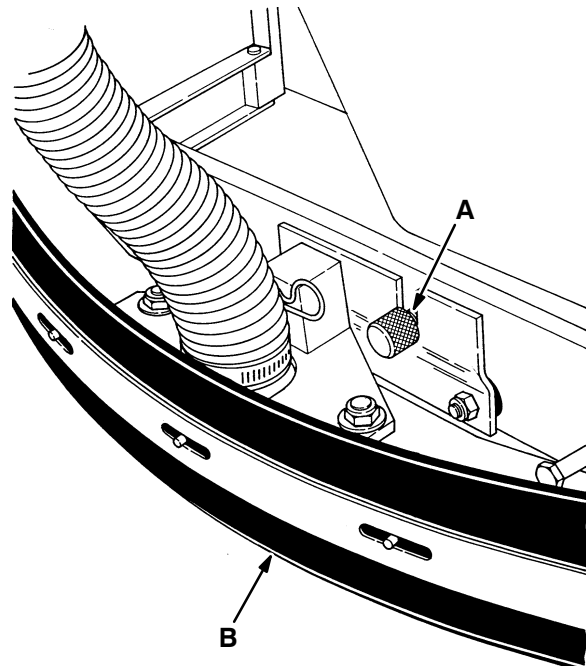
- A. Rear Squeegee Blade**
- B. Levered Cam**
- C. Retention Band**

- Pull the levered cam lever up to tighten the rear squeegee in place.

NOTE: The cam lever should be above the horizontal axis to keep from possibly scratching the floor. If the levered cam is too loose to clamp the squeegee blade, rotate the stationary cam to the next flat edge and retighten the levered cam. Overtightening the levered cam may damage the squeegee frame and retention band.

TO ADJUST SQUEEGEE

- Start the engine.
- Place the squeegee lever in the down position.
- Operate the machine in a forward direction to deflect the squeegee blade.
- Observe the squeegee blade deflection. The squeegee blade should be evenly deflected from one end to the other. If the squeegee tips are deflecting less than the middle of the squeegee, turn the squeegee tips adjusting knob to the right. If the squeegee tips are deflecting more than the middle of the squeegee, turn the squeegee tips adjusting knob to the left. Raise and lower the squeegee, operate the machine, and recheck the squeegee tips deflection if an adjustment was made.



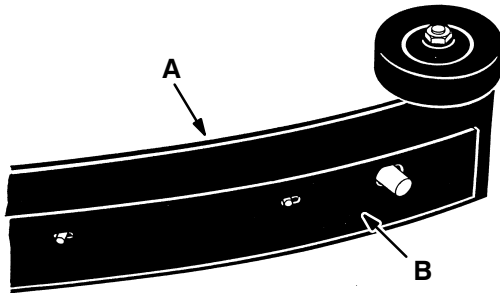
03166

SQUEEGEE TIPS ADJUSTMENT KNOB

- A. Squeegee Tips Adjustment Knob**
- B. Squeegee Assembly**

MAINTENANCE

5. Operate the machine in a forward direction with the squeegee down to deflect the squeegee blades once again.
6. Check the rear squeegee blade deflection. The backup strip controls the squeegee blade deflection. Flip the backup strip to increase or decrease the squeegee blade deflection.



03164

BACKUP STRIP

- A. Rear Squeegee Blade**
- B. Backup Strip (This position has the smallest deflection)**

SCRUB ATTACHMENT

SCRUB ATTACHMENT

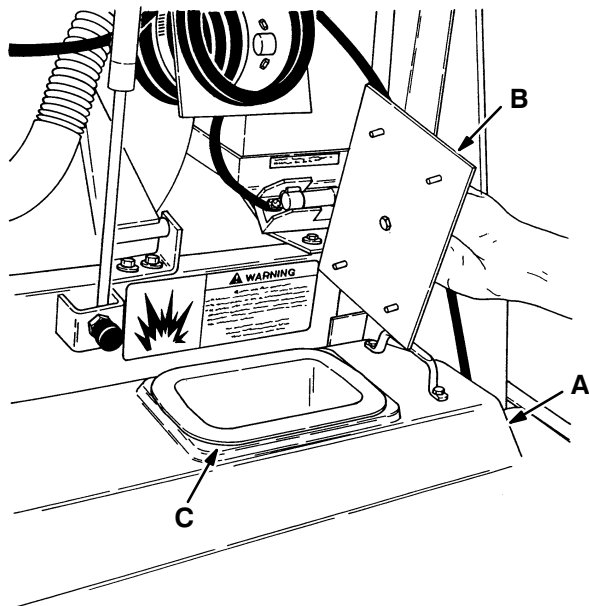
The scrub attachment option gives the machine the added flexibility to scrub floors. It consists of four groups of parts—the solution tank and debris tray, the side and main scrub brushes, the recovery tank, and the rear squeegee.

The solution tank, debris tray, and side and main scrub brushes are to be removed when sweeping. The recovery tank and rear squeegee may be left on the machine. The rear squeegee must be kept in the “up” position to prevent being damaged however. The solution tank and debris tray takes the place of the sweeping hopper. The side scrub brush takes the place of the side sweep brush. The main sweeping brush is also exchanged for a scrubbing brush in the conversion.

SOLUTION TANK

The solution tank supplies the scrub brush with a water and detergent solution. It is mounted in place of the hopper.

The solution tank requires no regular maintenance. If detergent cakes on the bottom of the tank, remove the deposits with a strong blast of water.



SOLUTION TANK

03150

- A. Solution Tank
- B. Tank Cover
- C. Soap Basket

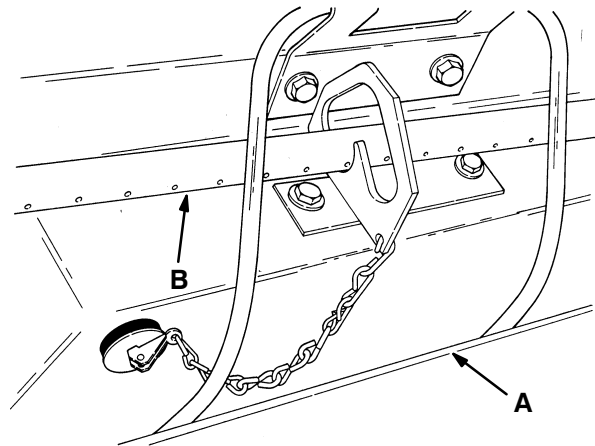
SOLUTION DISTRIBUTION SYSTEM

The solution distribution system consists of a feed line from the solution tank to a cable controlled flow-rate valve, then to the solution spreader tube.

The solution spreader tube distributes scrub solution to the scrub brush. It must be positioned so the solution runs down toward the side brush to work effectively. The spreader tube may be flushed out if it becomes clogged with soap or other debris. A drain plug is located on the end of the spreader tube.

Before cleaning the solution spreader tube, make sure that the cable controlled flow-rate valve is opening fully.

A brush and hot water may be needed to remove stubborn clogs. A sharp instrument may be used to clear the small distribution holes in the spreader tube.



SPREADER TUBE

03160

- A. Solution Tank
- B. Spreader Tube

MAINTENANCE

DEBRIS TRAY

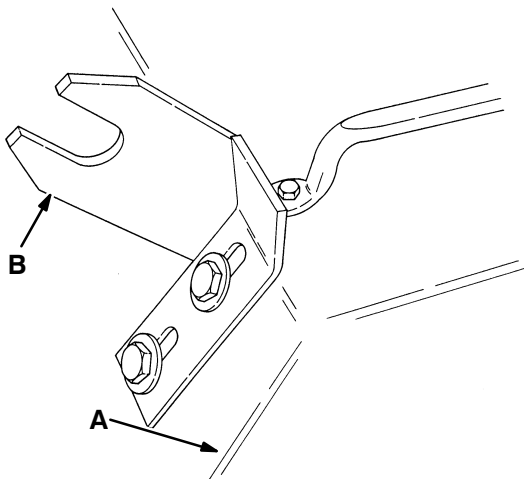
The debris tray collects debris swept up by the machine when using the scrub attachment. It should be emptied after every work shift. The debris tray floor clearance should be checked after every 50 hours of operation.

TO CHECK AND ADJUST DEBRIS TRAY FLOOR CLEARANCE

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

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

2. Empty the debris tray and replace it on the machine.
3. Measure the distance between the floor and the bottom of the of the debris tray handle. It should be 1 in (25 mm) from the floor. Adjust the solution tank hangers if needed.



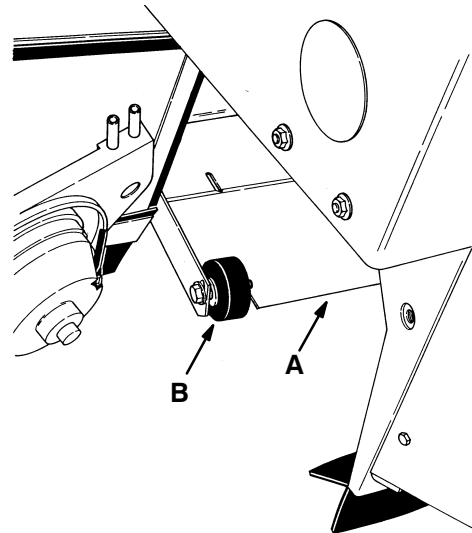
SOLUTION TANK HANGER

03170

- A. Solution Tank
- B. Hanger

4. The bottom rear metal edge of the tray should clear the floor by 0.18 in (5 mm). Also, be sure the tray is level side to side.

5. To adjust the tray for old style, loosen the caster bracket bolts, reposition the caster bracket, and retighten the bolts. For new style, loosen caster bolts, reposition the caster, and retighten the bolts.



03161

DEBRIS TRAY CASTER

- A. Debris Tray
- B. Caster

SCRUB BRUSHES

Scrub brushes are used instead of sweeping brushes when the scrub attachment is set up. The side brush scrubs and deflects debris into the path of the scrub brush. The main brush scrubs and deflects debris into the debris tray.

The brushes should be inspected daily for damage or wear. Remove any string or wire found tangled on the brushes, brush drives, or idler hubs.

The scrub brush patterns should be checked after every 50 hours of operation. Replace the scrub brushes when the brush bristle is 0.5 in (15 mm) or less in length.

RECOVERY TANK

The recovery tank stores the water solution picked up by the machine squeegee and vacuum fan. The recovery tank is located at the rear of the machine.

The recovery tank should be drained after the solution tank is empty and whenever the float rises and stops the water vacuum.

Clean the recovery tank after every work shift. An inspection door has been provided to make the tank cleaning job easier. It is located on the top of the recovery tank.

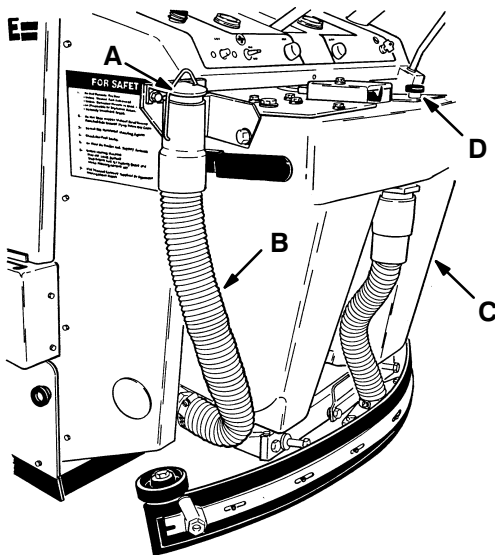
Keep vacuum hoses clean. Clogged hoses are a common cause of poor water pickup.

TO DRAIN RECOVERY TANK

1. Stop the engine and set the machine parking brake.

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

2. Remove the drain hose from its retention plug.



RECOVERY TANK DRAIN HOSE

03148

- A. Retention Plug**
- B. Drain Hose**
- C. Recovery Tank**
- D. Inspection Door**

3. Lower the hose to a floor drain to drain the tank.

NOTE: The tank will not empty with the vacuum fan operating.

4. Spray the inside of the tank with clean water. Remove all sludge and debris from the bottom of the tank.

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

5. Return the drain hose to its retention plug.

REAR SQUEEGEE

The rear squeegee channels water into the vacuum fan suction. The front squeegee blade channels the water; the rear blade wipes the floor. Check the rear squeegee assembly for damage, wear, and adjustment daily.

Rotate or replace the rear blade of the rear squeegee if its leading edge is worn one-half of the way through the thickness of the blade.

The rear blade has four wiping edges. To use them all, start with one wiping edge. To use the next wiping edge, swap the squeegee end-for-end. To use the next wiping edge, rotate the top edges down, bottom edges up. To use the last edge, swap the squeegee end-for-end. Replace the back-up strips if they become damaged, or if they lose their resiliency.

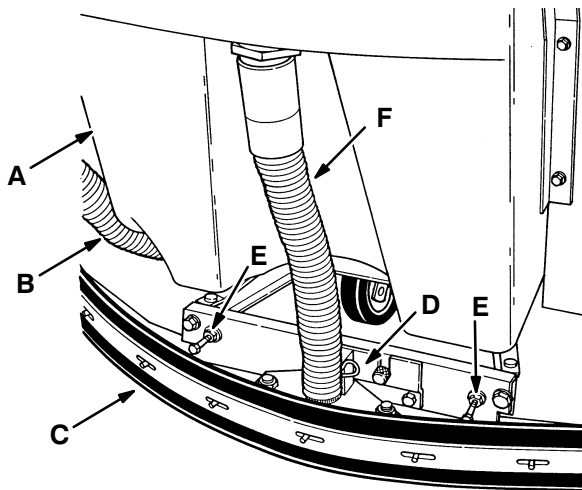
TO REMOVE SQUEEGEE ASSEMBLY

1. Place the squeegee lever in the up position.
2. Stop the engine and set the machine parking brake.

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

MAINTENANCE

3. Pull the squeegee suction hose off the recovery tank connector.



03162

SQUEEGEE ASSEMBLY

- A. Recovery Tank
- B. Drain Hose
- C. Squeegee Assembly
- D. Retaining Pin
- E. Side Bolts
- F. Squeegee Suction Hose

4. Pull the squeegee assembly retaining pin out of the squeegee pivot pin.
5. Pull the squeegee assembly off the squeegee mounting block.

TO INSTALL SQUEEGEE ASSEMBLY

1. Place the squeegee lever in the up position.
2. Stop the engine and set the machine parking brake.

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

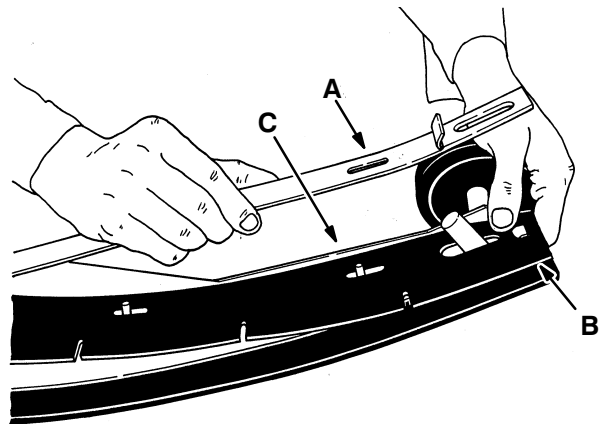
3. Slide the squeegee assembly onto the squeegee mounting block. Be sure the side bolts are above the squeegee frame.
4. Slide the squeegee assembly retaining pin through the squeegee pivot pin.
5. Push the squeegee suction hose onto the recovery tank connector.

TO REPLACE FRONT SQUEEGEE BLADE

1. Place the squeegee lever in the up position.
2. Stop the engine and set the machine parking brake.

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

3. Remove the squeegee assembly from the machine.
4. Turn the front squeegee levered cam to the right to relieve tension on the squeegee retention band.
5. Remove the stationary cam and levered cam.
6. Remove the squeegee retention band.
7. Remove the front squeegee from the squeegee frame.
8. Position the new front squeegee blade on the squeegee frame pins.

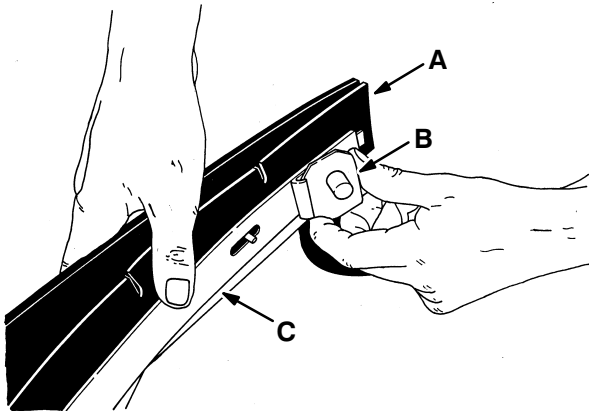


00927

INSTALLING FRONT SQUEEGEE BLADE AND BAND

- A. Retention Band
- B. Front Squeegee Blade
- C. Squeegee Frame

- Position the stationary squeegee cam and retention band over the squeegee blade.

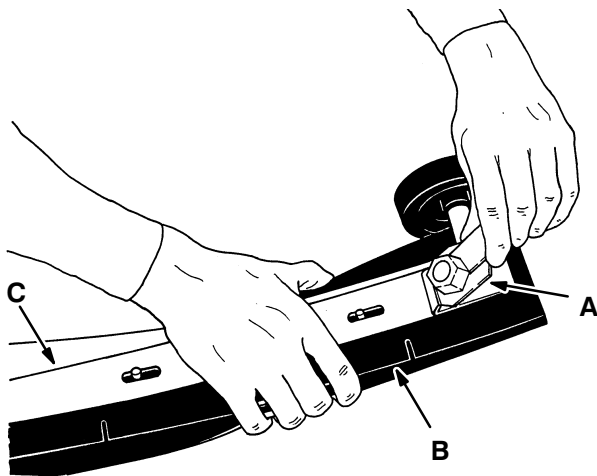


00928

INSTALLING STATIONARY CAM

- A. Front Squeegee Blade**
- B. Stationary Cam**
- C. Retention Band**

- Position the levered cam on the squeegee retention band with the lever down.



00929

INSTALLING LEVERED CAM

- A. Levered Cam**
- B. Front Squeegee Blade**
- C. Retention Band**

- Pull the levered cam lever up to tighten the front squeegee in place.

NOTE: If the levered cam is too loose to clamp the squeegee blade, rotate the stationary cam to the next flat edge and retighten the levered cam. Overtightening the levered cam may damage the squeegee frame and retention band.

- Reinstall the squeegee assembly on the machine.

TO REPLACE REAR SQUEEGEE BLADE

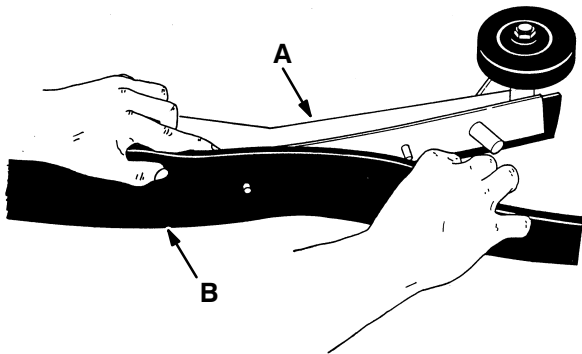
- Place the squeegee lever into the up position.
- Stop the engine and set the machine parking brake.

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

- Remove the squeegee assembly from the machine.
- Turn the rear squeegee levered cam to the right to relieve tension on the squeegee retention band.
- Remove the squeegee retention band, stationary cam, and levered cam.
- Remove the backup strip and rear squeegee from the squeegee frame.
- Rotate end-for-end or flip the rear squeegee blade to use an unused edge of the squeegee blade, or discard the old squeegee and replace it with a new squeegee blade.

MAINTENANCE

8. Position the rear squeegee blade on the squeegee frame pins.

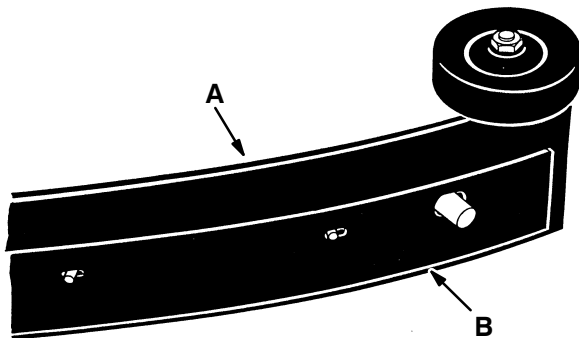


INSTALLING SQUEEGEE BLADE

03163

- A. Squeegee Frame
- B. Rear Squeegee Blade

9. Position the squeegee backup strip over the rear squeegee with the long side down.

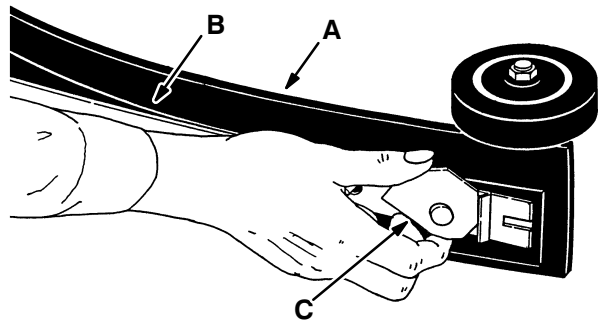


INSTALLING BACKUP STRIP

03164

- A. Rear Squeegee Blade
- B. Backup Strip

10. Position the stationary cam and the retention band over the backup strip.

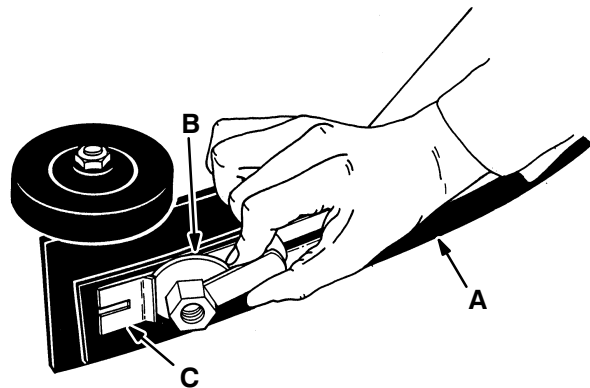


POSITIONING STATIONARY CAM

03165

- A. Rear Squeegee Blade
- B. Retention Band
- C. Stationary Cam

11. Position the levered cam on the squeegee retention band with the lever down.



INSTALLING LEVERED CAM

00933

- A. Rear Squeegee Blade
- B. Levered Cam
- C. Retention Band

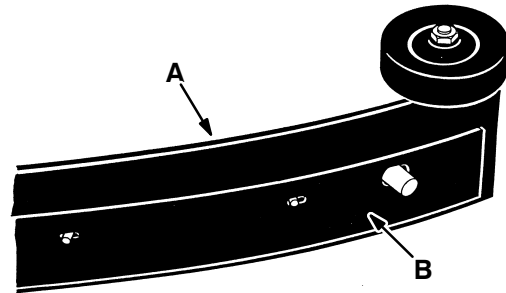
12. Pull the levered cam lever up to tighten the rear squeegee in place.

NOTE: The cam lever should be above the horizontal axis to keep from possibly scratching the floor. If the levered cam is too loose to clamp the squeegee blade, rotate the stationary cam to the next flat edge and retighten the levered cam. Overtightening the levered cam may damage the squeegee frame and retention band.

TO ADJUST SQUEEGEE

1. Start the engine.
2. Place the squeegee lever in the down position.
3. Operate the machine in a forward direction to deflect the squeegee blade.
4. Observe the squeegee blade deflection. The squeegee blade should be evenly deflected from one end to the other. If the squeegee tips are deflecting less than the middle of the squeegee, turn the squeegee tips adjusting knob to the right. If the squeegee tips are deflecting more than the middle of the squeegee, turn the squeegee tips adjusting knob to the left. Raise and lower the squeegee, operate the machine, and recheck the squeegee tips deflection if an adjustment was made.

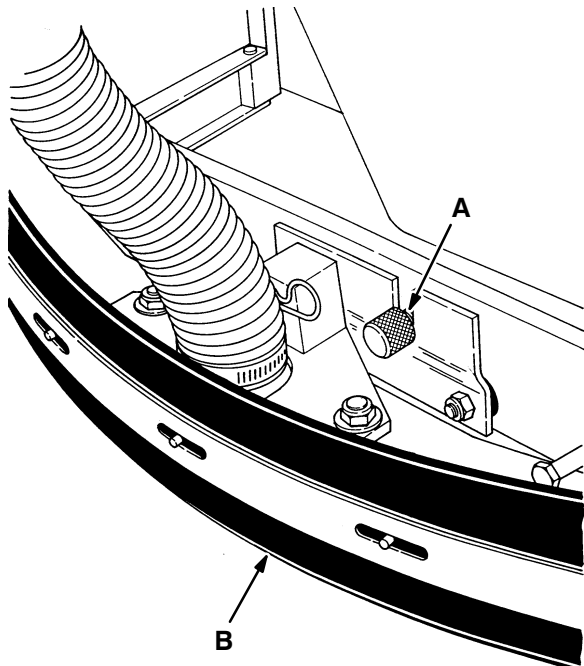
5. Operate the machine in a forward direction with the squeegee down to deflect the squeegee blades once again.
6. Check the rear squeegee blade deflection. The backup strip controls the squeegee blade deflection. Flip the backup strip to increase or decrease the squeegee blade deflection.



BACKUP STRIP

03164

- A. Rear Squeegee Blade
- B. Backup Strip (This position has the smallest deflection)



SQUEEGEE TIPS ADJUSTMENT KNOB

03166

- A. Squeegee Tips Adjustment Knob
- B. Squeegee Assembly

SECTION 4**CONTENTS**

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HARDWARE INFORMATION

The following charts state standard plated hardware tightening ranges for normal assembly applications. Decrease the specified torque by 20% when using a thread lubricant. Do not substitute lower grade hardware for higher grade hardware. If higher grade hardware than specified is substituted, tighten only to the specified hardware torque value to avoid damaging the threads of the part being threaded into, as when threading into speed nuts or weldments.

STANDARD BOLT TORQUE CHART

Thread Size	SAE Grade 5 Torque ft lb (Nm)	SAE Grade 8 Torque ft lb (Nm)
0.25 in	7–10 (9–14)	10–13 (14–38)
0.31 in	15–20 (20–27)	20–26 (27–35)
0.38 in	27–35 (37–47)	36–47 (49–64)
0.44 in	43–56 (58–76)	53–76 (72–103)
0.50 in	65–85 (88–115)	89–116 (121–157)
0.62 in	130–170 (176–231)	117–265 (159–359)
0.75 in	215–280 (291–380)	313–407 (424–552)
1.00 in	500–650 (678–881)	757–984 (1026–1334)





NOTE: Decrease torque by 20% when using a thread lubricant.

METRIC BOLT TORQUE CHART

Thread Size	Class 8.8 Torque ft lb (Nm)	Class 10.9 Torque ft lb (Nm)
M4	2 (3)	3 (4)
M5	4 (5)	6 (8)
M6	7 (9)	10 (14)
M8	18 (24)	25 (34)
M10	32 (43)	47 (64)
M12	58 (79)	83 (112)
M14	94 (127)	133 (180)
M16	144 (195)	196 (265)
M20	260 (352)	336 (455)
M24	470 (637)	664 (900)

NOTE: Decrease torque by 20% when using a thread lubricant.

BOLT IDENTIFICATION

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

01395

THREAD SEALANT AND LOCKING COMPOUNDS

Thread sealants and locking compounds may be used on this machine. They include the following:

Loctite 515 sealant – gasket forming material. TENNANT® Part No. 75567, 15 oz (440 ml) cartridge.

Loctite 242 blue – medium strength thread locking compound. TENNANT® Part No. 32676, 0.5 ml tube.

Loctite 271 red – high strength thread locking compound. TENNANT® Part No. 19857, 0.5 ml tube.

