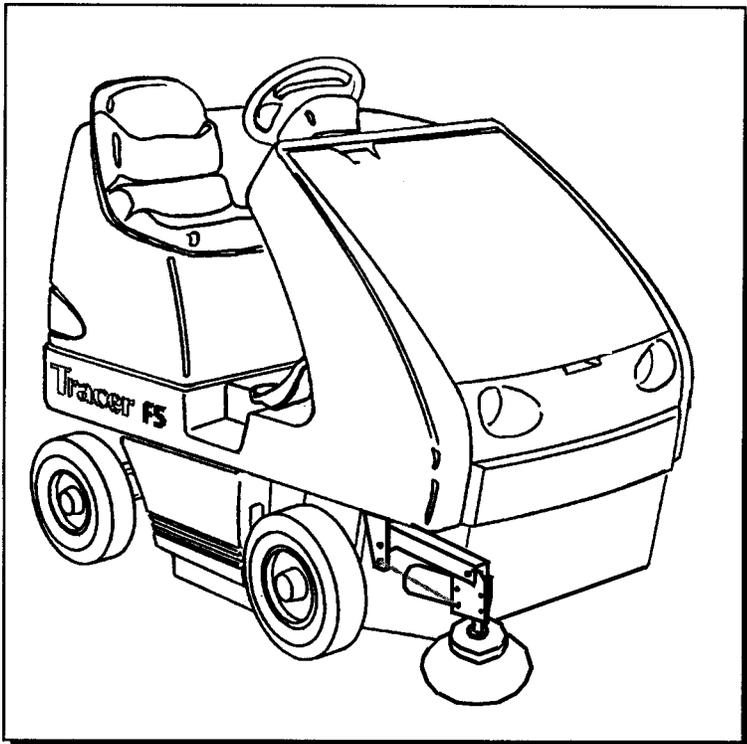


# Tracer FS



## **FLOOR SWEEPER**

Operating Instructions



**MODEL:** TRACER FS  
QTFSD (Diesel Version)  
QTFSG (Gas Version)



*Read these instructions before using the machine*



## MACHINE DATA LOG

MODEL \_\_\_\_\_

DATE OF PURCHASE \_\_\_\_\_

SERIAL NUMBER \_\_\_\_\_

SALES REPRESENTATIVE # \_\_\_\_\_

DEALER NAME \_\_\_\_\_

OPERATIONS GUIDE NUMBER \_\_\_\_\_

PUBLISHED \_\_\_\_\_

Copyright 1995 Windsor Industries, Printed in USA

### YOUR DEALER

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone Number: \_\_\_\_\_

### OVERVIEW

The Tracer Floor Sweeper is a gas or diesel powered, ride-on floor sweeper intended for industrial use. The appliance sweeps the floor while vacuuming the dirt into a holding tank.

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# HOW TO USE THIS MANUAL

This manual contains the following sections:

- HOW TO USE THIS MANUAL
- SAFETY
- OPERATIONS
- MAINTENANCE
- PARTS LIST

The HOW TO USE THIS MANUAL section will tell you how to find important information for ordering correct repair parts.

Parts may be ordered from authorized Windsor dealers. When placing an order for parts, the machine model and machine serial number are important. Refer to the MACHINE DATA box which is filled out during the installation of your machine. The MACHINE DATA box is located on the inside of the front cover of this manual.

MODEL _____
DATE OF PURCHASE _____
SERIAL NUMBER _____
SALES REPRESENTATIVE # _____
DEALER NAME _____
OPERATIONS GUIDE NUMBER _____
PUBLISHED _____
<small>Copyright 1995 Windsor Industries, Printed in USA</small>

The model and serial number of your machine is on the bottom back-end of the machine.

The SAFETY section contains important information regarding hazard or unsafe practices of the machine. Levels of hazards is identified that could result in product or personal injury, or severe injury resulting in death.

The OPERATIONS section is to familiarize the operator with the operation and function of the machine.

The MAINTENANCE section contains preventive maintenance to keep the machine and its components in good working condition. They are listed in this general order:

- Hydraulics
- Directional Control System
- Throttle Neutral Position
- Main Broom
- Side Broom
- Belts
- Differential Drive
- Skirts
- Hopper
- Brakes/Tires
- Battery Information
- Hydraulic Schematic
- Hydraulic Troubleshooting
- Propelling Troubleshooting
- Machine Troubleshooting
- Service Schedule

The PARTS LIST section contains assembled parts illustrations and corresponding parts list. The parts lists include a number of columns of information:

- **REF** – column refers to the reference number on the parts illustration.
- **PART NO.** – column lists the part number for the part.
- **QTY** – column lists the quantity of the part used in that area of the machine.
- **DESCRIPTION** – column is a brief description of the part.
- **SERIAL NO. FROM** – column indicates the first machine the part number is applicable to. When the machine design has changed, this column will indicate serial number of applicable machine. The main illustration shows the most current design of the machine. The boxed illustrations show older designs. If column has an asterisk (\*), call manufacturer for serial number.
- **NOTES** – column for information not noted by the other columns.

*NOTE: If a service or option kit is installed on your machine, be sure to keep the KIT INSTRUCTIONS which came with the kit. It contains replacement parts numbers needed for ordering future parts.*

*NOTE: The 98# on the lower left corner of the front cover is the part number for this manual.*

# IMPORTANT SAFETY INSTRUCTIONS

When using a gas or diesel powered appliance, basic precaution must always be followed, including the following:

READ ALL INSTRUCTIONS BEFORE USING THIS MACHINE.



## **WARNING:**

To reduce the risk of fire, electric shock, or injury:

**This machine is for dry use only** and shall not be used or stored outdoors in wet conditions.

**Use only** as described in this manual. Use only manufacturer's recommended brushes and attachments.

If the machine is **not working properly**, has been dropped, damaged, left outdoors, or dropped into water, return it to an authorized service center.

**Do not** operate the machine with any openings blocked. Keep openings free of debris that may reduce airflow.

**Machine can cause a fire** when operating near flammable vapors or materials. Do not operate this machine near flammable fluids, dust or vapors.

**This machine is suitable for commercial use, for example in hotels, schools, hospitals, factories, shops and offices for more than normal housekeeping purposes.**

Maintenance and repairs **must be done** by qualified personnel.

**During operation**, attention shall be paid to other persons, especially children.

**When leaving unattended**, secure against unintentional movement.

**The machine shall only** be operated by instructed and authorized persons.

**When leaving unattended**, switch off or lock the main power switch to prevent unauthorized use.

The **exhaust system gets very hot**, keep hands, clothing and any items that can burn away from the engine while hot.

This machine emits **lethal exhaust gas**. Ensure the working area is well ventilated.

**Keep** hands, feet, strings and ties away from all moving parts while the machine is in operation.

**Keep** hair, loose clothing, fingers and all parts of the body away from openings.

**Disconnect battery before cleaning or servicing machine.**

**This machine not suitable for picking up hazardous dust.**

Before use, all covers and doors shall be put in the positions specified in the instructions.

## SAVE THESE INSTRUCTIONS

## **HAZARD INTENSITY LEVEL**

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

### **HAZARD INTENSITY LEVEL**

There are three levels of hazard intensity identified by signal words -**WARNING** and **CAUTION** and **FOR SAFETY**. The level of hazard intensity is determined by the following definitions:

#### **! WARNING**

**WARNING** - Hazards or unsafe practices which COULD result in severe personal injury or death.

#### **! CAUTION**

**CAUTION** - Hazards or unsafe practices which could result in minor personal injury or product or property damage.

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

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

#### **FOR SAFETY**

**DO NOT OPERATE MACHINE:**

Unless Trained and Authorized.

Unless Operation Guide is Read and understood.

In Flammable or Explosive areas.

In areas with possible falling objects.

#### **WHEN SERVICING MACHINE:**

Avoid moving parts. Do not wear loose clothing; jackets, shirts, or sleeves when working on the machine. Use Windsor approved replacement parts.

#### **! WARNING**

Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep sparks and flames away from the battery. Do not smoke around battery.

#### **! WARNING**

Hazardous voltage. Shock can result. Disconnect battery before working on machine. Only qualified personnel should work inside machine. Always wear eye protection and protective clothing when working on or near battery. Avoid skin contact with the acid contained in the battery.

#### **! WARNING**

Never allow metal to lie across battery tops.

#### **! WARNING**

Flammable materials or reactive metals can cause explosion or fire. Do not sweep these materials.

#### **! 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**

Machine can emit excessive noise. Consult with your regulatory agency for exposure limits. Hearing loss can result. Wear hearing protection.

#### **! WARNING**

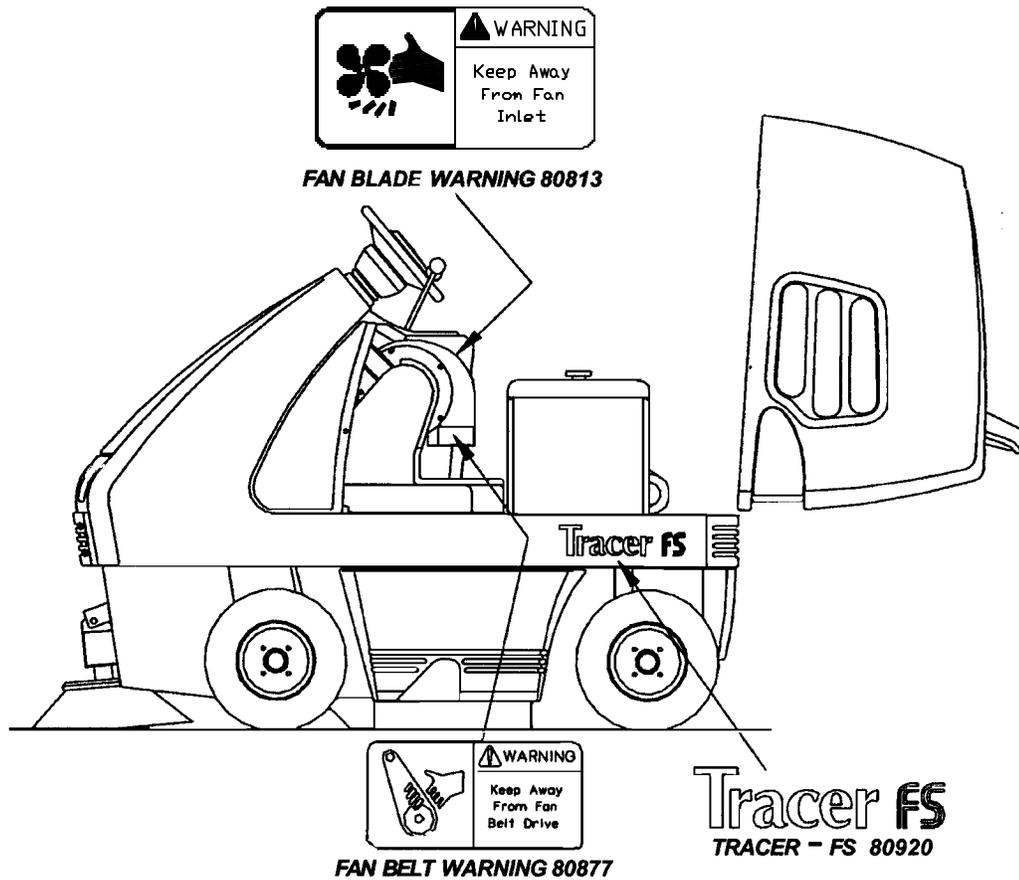
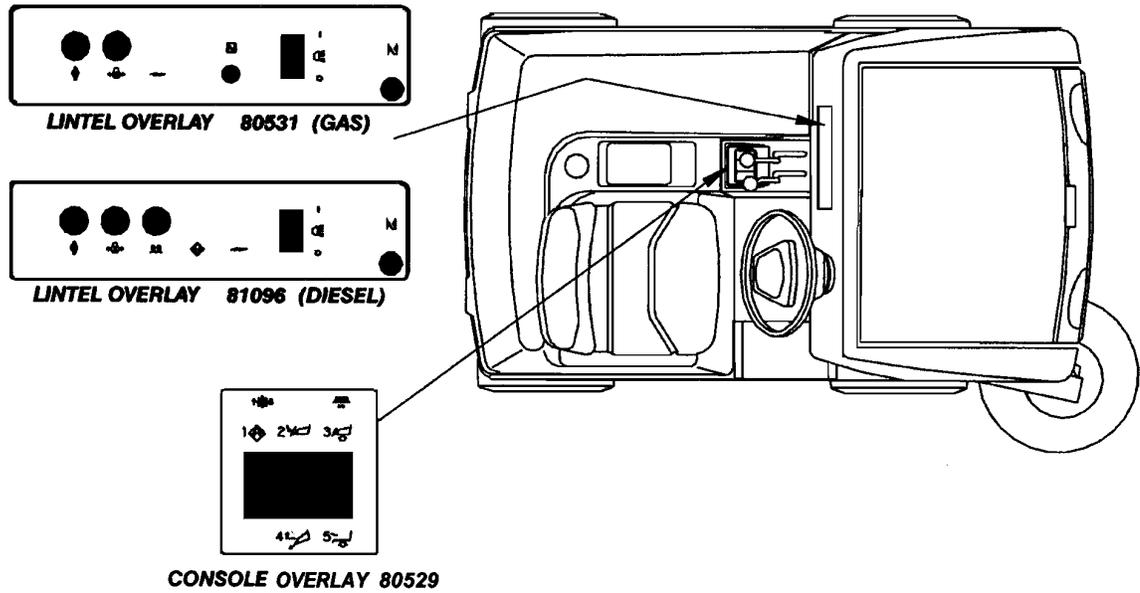
Lift arm pinch points. Keep clear of hopper lift arm. Raised hopper may fall. Engage hopper safety arm.

#### **! WARNING**

Moving belts. Keep away.

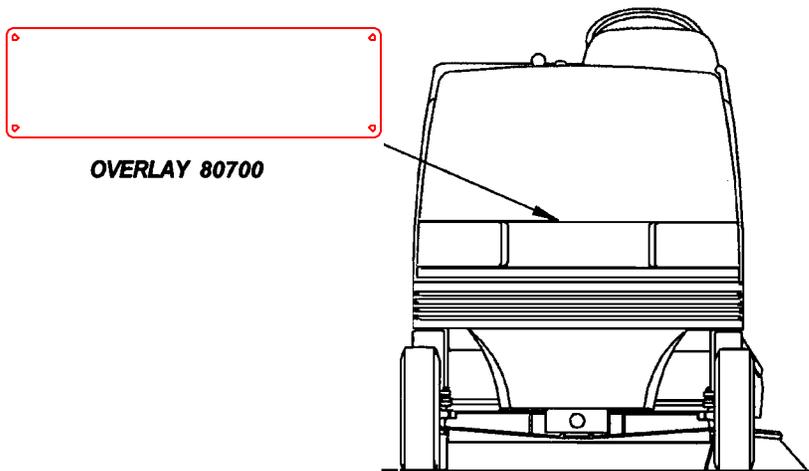
# SAFETY LABEL LOCATION

NOTE: These drawings indicate the location of safety labels on the Tracer FS. If, at any time, the labels become illegible contact your Windsor representative for prompt replacement.



# SAFETY LABEL LOCATION

NOTE: These drawings indicate the location of safety labels on the Tracer FS. If, at any time, the labels become illegible contact your Windsor representative for prompt replacement.



OVERLAY 80700

- FOR SAFETY**
- Do Not Operate Machine:
    - Unless Trained And Authorized
    - Unless Permission Granted To Operate And Understand
    - In Flammable Or Explosive Areas
    - In Poorly Ventilated Areas
  - Do Not Raise Hopper:
    - Unless Machine Is On A Level Surface
    - Unless Main And Side Brooms Are Turned Off
  - Do Not Use Flammable Cleaning Agents
  - Check For Fuel Leaks
  - Do Not Stop On Grades And Slippery Surfaces
  - Before Leaving Machine:
    - Stop On Level Surface
    - Turn Off Key And Set Parking Brake
    - When Parking Remove Key

SAFETY DECAL 80814



**HOPPER LIFT ARM  
WARNING 80812**  
2-REQ D. SAME LOCATION  
ON BOTH SIDES



**SAFETY ARM  
INSTRUCTIONS 80883**



**HOPPER WARNING 80884**  
LOCATED ON FACE OF LINTEL



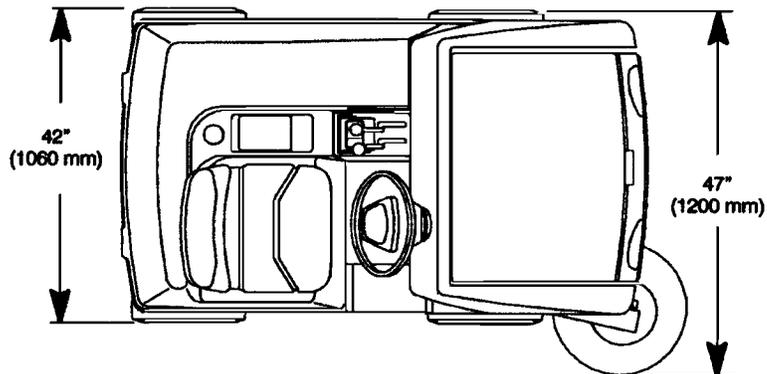
**FAN BLADE WARNING  
80813**  
(Located on guard)

**Tracer FS**  
TRACER - FS 80920

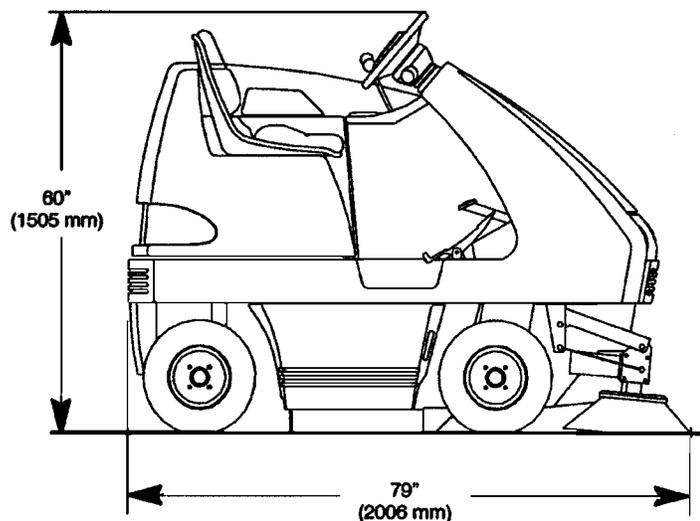
## TECHNICAL SPECIFICATIONS

ITEM	DIMENSION/CAPACITY
Power Source: Gas	20hp, 2 Cylinder, Liquid-Cooled
Diesel	14hp, 2 Cylinder, Liquid-Cooled
Suspension	Floating I-Beam
Maximum Speed	10k/hour
Sweep Path	1200mm
Main Broom	812mm
Main Broom Diameter	355mm
Side Broom	510mm
Hopper Capacity	180 liters
Hopper Dump	1520mm
Dust Control	54ft <sup>2</sup> (5m <sup>2</sup> ) pleated filter with exclusive cyclonic pre-filter
Brakes	Dual mechanical disc with parking brake
Steering	Rear wheel, rack & pinion
Tires	405mm dia. Pneumatic
Dimensions: Height	1505mm
Weight	1060 lbs.
Length	2006mm
Coverage	12,000m <sup>2</sup> /hr

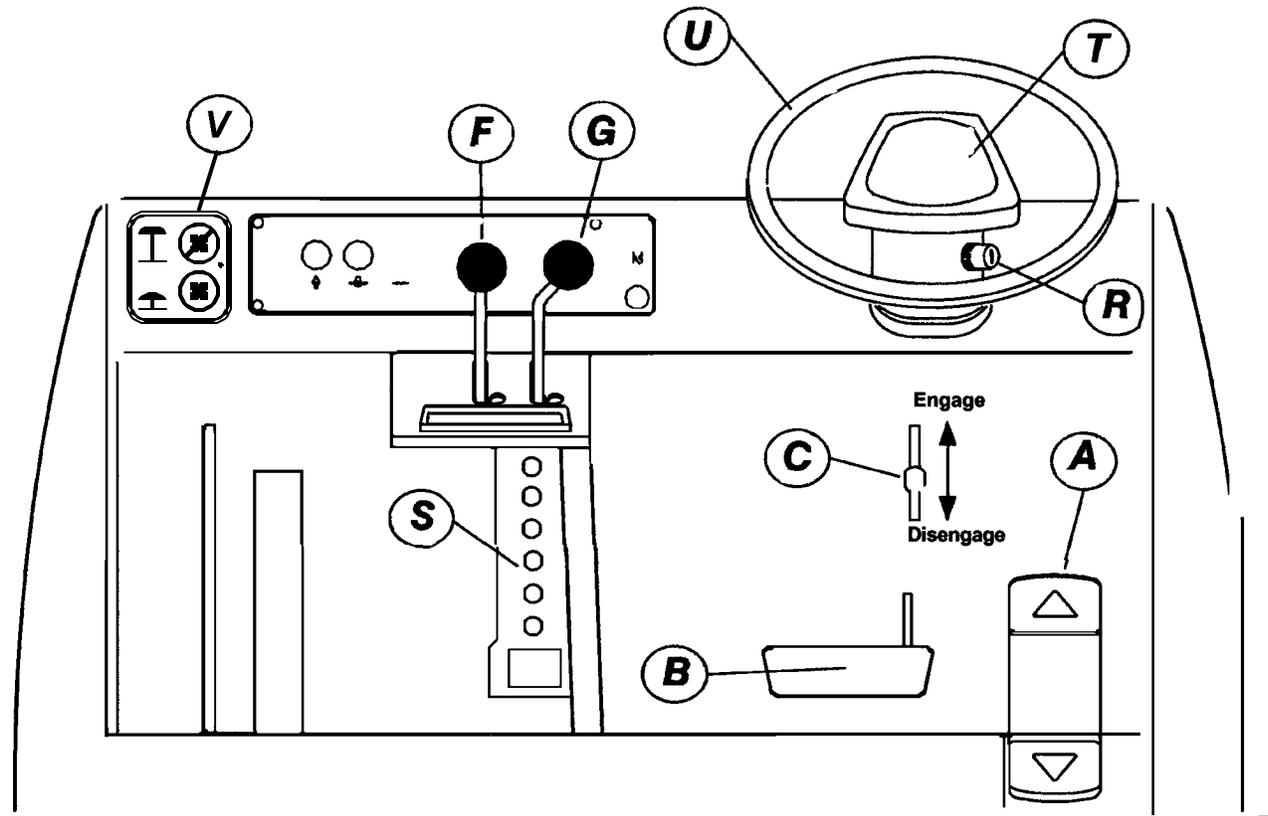
**TOP VIEW**



**SIDE VIEW**



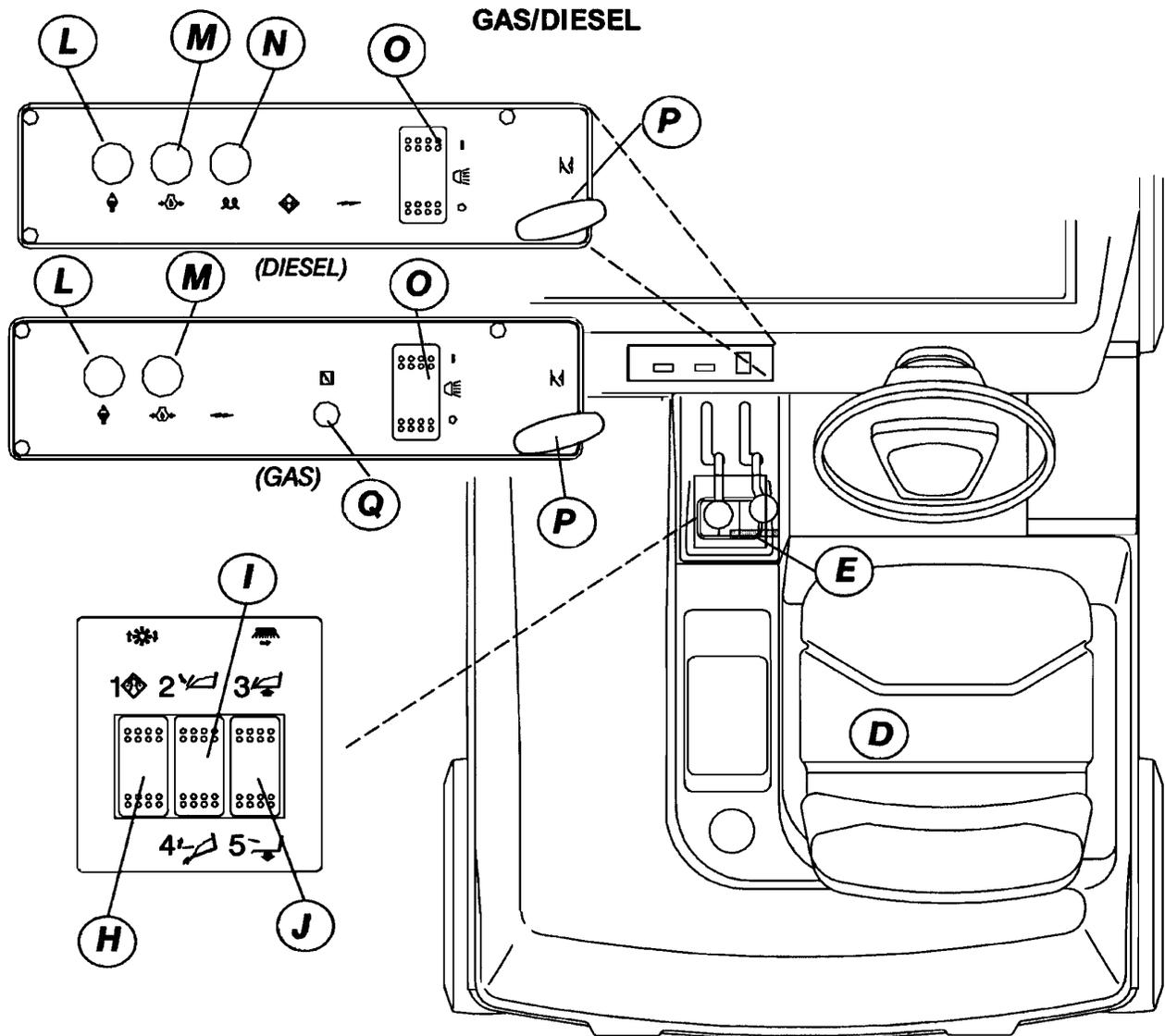
## CONTROLS



### SPECIAL NOTES:

The sound pressure level at the operator's ear was measured to be 78 dBA for the QTFSG and 83 dBA for the QTFSD. This was a nearfield, broad-band measurement made during normal operation on a composite tile floor with a white pad. This appliance contains no possible source of impact noise. The instantaneous sound pressure level is below 63 Pa.

The weighted root mean square acceleration at the operator's arms was measured to be below  $2.5\text{m/s}^2$  for the QTFSG and below  $3.2\text{m/s}^2$  for the QTFSD. The weighted root mean square acceleration at the operator's posterior was measured to be below  $0.5\text{m/s}^2$  for the QTFSG and below  $1.3\text{m/s}^2$  for the QTFSD. This was a tri-axial, third-octave-band measurement made during normal operation on a composite tile floor. The measurement and related calculations were made in accordance with ANSI S3.34-1986.

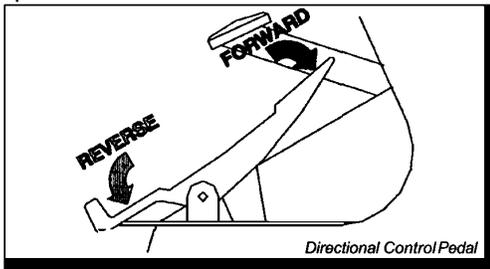


- |                              |   |
|------------------------------|---|
| A. Directional Control Pedal | L. Engine Temperature Light             |
| B. Brake Pedal               | M. Oil Pressure Light                   |
| C. Parking Brake             | N. Engine Glow Plug Light (Diesel Only) |
| D. Operator Seat             | O. Light Switch                         |
| E. Rear Cover Latch          | P. Engine Throttle Handle               |
| F. Main Broom Lever          | Q. Choke Cable                          |
| G. Side Broom Lever          | R. Key Switch                           |
| H. Filter Shaker Switch      | S. Circuit Breakers                     |
| I. Hopper Door Switch        | T. Horn Pad                             |
| J. Hopper Lift Switch        | U. Steering Wheel                       |
| K. Hopper Safety Arm         | V. Wet Sweep Bypass                     |

## CONTROLS

### A - DIRECTIONAL CONTROL PEDAL

This pedal controls the direction of travel and the speed of the machine.



Slowly pressing the front of the pedal causes the machine to travel forward. Pressing the rear of the pedal causes the vehicle to travel in reverse. The machine speed can be controlled by varying the pressure on the front or rear of the pedal.

**FOR SAFETY:** The machine can coast for a short distance after releasing the directional pedal. Use the brake pedal to slow or stop the machine.

### B – BRAKE PEDAL

This brake operates the disc brakes on the two front tires. To slow or stop the machine, apply pressure to the brake pedal.

### C – PARKING BRAKE LEVER

The knob located above the brake pedal is the parking brake knob. To set the parking brake, slide the parking brake knob up to the top of its slot, then depress the brake pedal. To release the parking brake, slide the parking brake knob to the bottom of its slot. The brake pedal will return to its raised position.

**FOR SAFETY:** Always park on a level surface, turn the machine off, and set the parking brake before leaving the machine, and before servicing the machine.

### D – OPERATOR SEAT

The operators seat position is adjustable. To change positions loosen the four lower mounting bolts and slide the seat to the desired position. Tighten the four mounting bolts.

### E – REAR COVER LATCH

The rear cover latch locks the rear cover in the closed position. To open the rear cover, push the latch in and pull the rear cover back. To close the rear cover, lower it slowly until the latch engages the floor slot. Do not let the rear cover drop, or damage to the latch or cover may occur.

**FOR SAFETY:** When the rear cover is open a safety switch prevents the operation of the main broom and vacuum impeller.

### F – MAIN BROOM LEVER

**FOR SAFETY:** The main broom and the vacuum impeller automatically begin to operate when the main broom lever is positioned in the forward end of its slot.

The main broom lever controls the position and the drive of the main broom. To start the main broom and lower it to the floor, release the main broom lever and let it drop to the front end of its slot. To shut off and raise the main broom, pull the main broom lever back into its locked position.

### G – SIDE BROOM LEVER

**FOR SAFETY:** The side broom automatically begins to operate when the side broom lever is positioned in the forward end of its slot.

The side broom lever controls the position and the drive of the side broom. To start the side broom and lower it to the floor, release the side broom lever and let it drop to the front end of its slot. To shut off and raise the side broom, pull the side broom lever back into its locked position.

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

### H – FILTER SHAKER SWITCH

The filter shaker switch operates the dust filter cleaning system.

For efficient sweeping the filter must be cleaned on a regular basis. To clean the filters, pull the Wet Sweep Bypass knob, then push and hold the filter shaker switch for 10-20 seconds. Clean the filters just before dumping the hopper. In very dusty conditions the filter may need to be cleaned more frequently.

## I – HOPPER DOOR SWITCH

The hopper door switch opens and closes the hopper dump door. Pushing the front half of the hopper door switch closes the hopper dump door. Pushing the rear half of the switch opens the hopper dump door. A beeper sounds when the door is in the closed position. Sweeping should not be attempted when the hopper door is closed.

## J – HOPPER LIFT SWITCH

The hopper lift switch is used to raise and lower the hopper during dumping operations. To raise the hopper, press and hold the front half of the hopper lift switch until the hopper has raised to the desired height. Then release the switch. To lower the hopper, press and hold the rear half of the hopper lift switch until the hopper lowers to the normal sweeping position.

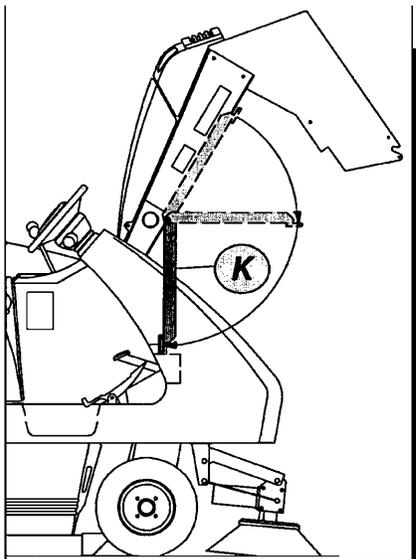
**FOR SAFETY:** The hopper lift switch will not raise or lower the hopper if the key switch is in the off position.

## K – HOPPER SAFETY ARM

The hopper safety arm is used to support the hopper in the raised position. The safety arm should be used whenever inspection or service is performed under the hopper. Do not rely on the hydraulic cylinder to keep the hopper raised.



**Raised hopper may fall. Engage hopper safety arm before working under hopper.**



## L – ENGINE TEMPERATURE LIGHT

The engine temperature light indicates when the engine is overheating. If the light comes on, stop the engine immediately and determine the cause. Failure to stop the engine will result in engine damage. Some causes of engine overheating are a clogged radiator, clogged cooling fins in the radiator, loose fan belt or other engine malfunction. Consult your Engine Owners guide to help determine the problem.

## M – OIL PRESSURE LIGHT

The engine oil pressure light indicates inadequate engine oil pressure. If the light comes on, stop the engine immediately and determine the cause. Failure to stop the engine will result in engine damage.

## N – ENGINE GLOW PLUG LIGHT (DIESEL ONLY)

The glow plug light is a time-controlled light that allows the glow plugs to heat up sufficiently before cranking the engine. When the ignition switch is turned clockwise to the "RUN" position, the light will come on. After 5-30 seconds, depending on temperature, the light will go off. Then the engine can be cranked with the ignition switch.

## O – LIGHT SWITCH

The light switch operates the headlights and taillights.

## P – THROTTLE

The throttle is an adjustable, lockable tee-handle. The handle is unlocked by turning counter-clockwise, and locked by turning clockwise. Start the engine with the throttle pushed all the way in. When the engine has adequately warmed up, unlock and pull the throttle all the way out and lock. This will set the engine at the maximum governed speed. The throttle may be adjusted and locked anywhere between idle and max. if desired. Consult engine service guide.

## CONTROLS

### Q – CHOKE (GAS ONLY)

By pulling this knob out, the choke is engaged for cold starting. To release choke, push the knob in.

### R – KEY SWITCH

The key switch controls starting and electrical power for most machine functions. To start the machine, turn the key clockwise past the "RUN" position to the crank position. After engine has started release key. (For starting diesel engines, see "Glow Plug Light"). To stop engine, turn key counter-clockwise.

### S – CIRCUIT BREAKERS

The circuit breakers are circuit protection devices designed to interrupt the flow of current in the event of an electrical overload. When tripped, the circuit breakers must be reset by pressing the exposed button on the face of the affected circuit breaker. If the circuit breaker continues to trip, the cause of the electrical overload should be found and corrected.

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

#### GAS:

DEVICE	RATING	COMPONENT PROTECTED
CB-1	30A	Voltage Regulator
CB-2	15A	Igniter, Fuel Pump, Oil Pressure Lamp, Water Temp. Lamp
CB-3	15A	Side Broom Valve, Head Lamps, Tail Lamps, Horn
CB-4	15A	Options
CB-5	15A	Hopper Dump Door, Shaker Motor, Hour Meter, Hopper Raise/Lower Valves

#### DIESEL:

DEVICE	RATING	COMPONENT PROTECTED
CB-1	30A	Glow Plugs
CB-2	30A	Starter Relay, Oil Pressure Lamp, Water Temp. Lamp, Glow Plug Lamp, Optional Charge Light, Optional Air Registration Light
CB-3	15A	Side Broom Valve, Head Lamps, Tail Lamps, Horn,
CB-4	15A	Options
CB-5	15A	Hopper Dump Door, Shaker Motor, Hour Meter, Hopper Raise/Lower Valves

### T – HORN PAD

The horn pad is located on the steering wheel. The horn is activated by pressing on any area of the horn pad.

### U – STEERING WHEEL

The steering wheel controls the two rear wheels. The machine is highly receptive to the movement of the wheel. Operators should use care until they become experienced in driving the machine.

### V – WET SWEEP BYPASS

By pulling this knob out, vacuum is cut off from filter and hopper. To prevent damage to filter caused by moisture, pull knob out when sweeping through puddles. To maximize filter cleaning, pull knob out before pressing filter shaker switch.

## BEFORE OPERATING THE FS:

1. Complete the machine data sheet on page 2.
2. Read this manual carefully before operating or servicing the machine.

### CAUTION:

**Do not operate machine unless Operation manual is read and understood.**

3. Carefully read the Owner's Manual that is supplied for your gas or diesel machine.  
REFERENCE FOR GAS ENGINE:  
Kawasaki FD620D – Owners Manual  
REFERENCE FOR DIESEL ENGINE:  
Lombardini LDW series – Use, Maintenance
4. Check oil and engine fuel in the machine. See engine Owner's manual for complete filling instructions.
5. Check the hydraulic fluid level in the hydraulic power unit. See hydraulics in the maintenance section.
6. Check the main and side broom for correct adjustment. See brooms in the maintenance section.

## STARTING THE MACHINE

**FOR SAFETY:** use caution when backing machine. Do not carry riders on the machine. Always follow basic safety and traffic rules. Go slow on slippery surfaces and grades.

1. The operator should be sitting on the seat with a foot on the brake pedal or with the parking brake on. The directional pedal should be in neutral.

**FOR SAFETY:** Before starting machine, make sure that all safety devices are in place and operating properly.

2. Turn the key switch clockwise to the "ON" position.
3. Drive the machine to the area where sweeping is to begin.

## TO SWEEP

Plan the sweeping pattern in advance. For efficient operation, the sweeping runs should be long with as little stopping and starting as possible. Overlap the brush paths and complete an entire section at one time.

Use the side broom to pull debris from areas near walls or obstructions. The side broom is also useful for extending the sweeping paths on long runs. If the area to be swept is very dusty, the side broom should be raised to prevent dust clouds.

Oversized debris that can inhibit sweeping operations should be picked up by hand. This includes large cartons and items that could become tangled in the brooms, such as wire or banding material.

The machine is very responsive. Avoid turning the steering wheel too sharply when the machine is in motion. Avoid sudden turns except in an emergency.

1. Put the main broom lever in the forward position to lower the main broom.
2. Put the side broom lever in the forward position to lower the side broom.

NOTE: The main broom and side broom lever indicators are color-coded green.

3. Make sure that the hopper door is open. A beeper will sound if the hopper door is not open.
4. Sweep as required.

## OPERATING ON GRADES

Operate the machine slowly on grades. Use the brake pedal to control the machine speed.

NOTE: When operating machine, go slowly on grades and slippery surfaces.

# OPERATIONS

## STOPPING THE MACHINE

1. Remove foot from the directional pedal and apply the brake.
2. Raise and turn off the brooms by pulling the main and side broom levers back to the rear locked position.
3. Set the parking brake.
4. Turn the key switch counterclockwise to the off position. Remove the key.

## STORING THE MACHINE

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

1. Empty the hopper.
2. Raise the main broom and the side broom.
3. Park the machine in a cool, dry area.
4. Remove or change the batteries for 4 hours, once every three months.

## DUMPING THE HOPPER

NOTE: The hopper dump switches are numbered and color-coded. The filter shaker is shown in yellow and hopper functions are shown in red.

1. Drive the machine to the dump site or dumpster.
2. The correct sequence for dumping the hopper is shown by following the numbers on the switch panel.
  1. Clean the filter by pressing the filter shaker switch for 10-20 seconds.
  2. Close the hopper door by pushing and releasing the front half of the hopper door switch. The beeper will sound.
  3. Press and hold the front half of the hopper lift switch and raise the hopper to a height that will clear the dumpster, then release the switch. Drive forward slowly until the hopper is positioned above the dumpster.
  4. Dump the hopper by pressing and then releasing the rear half of the hopper door switch. After dumping, back the machine slowly away from the dumpster.
  5. Lower the hopper by pressing and holding the rear half of the hopper lift switch.

## TO ENGAGE THE HOPPER SAFETY ARM

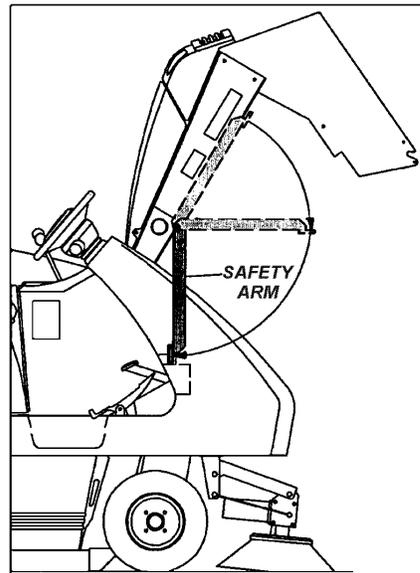
### **▲ WARNING:**

**Raised hopper may fail. Engage hopper safety arm before working under hopper.**

1. Set the machine parking brake.

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

2. Raise the hopper.
3. Unhook the safety arm and swing it down into position over the safety arm retainer. Do not let the safety arm drop into position.
4. Slowly lower the hopper until the safety arm is secure.

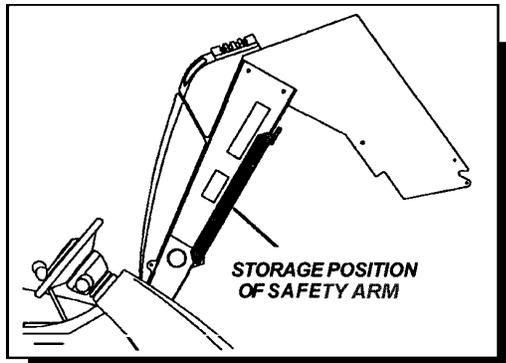


### **▲ CAUTION:**

**Make sure that the lower end of the safety arm is correctly held in the retainer on the machine frame.**

## TO DISENGAGE THE HOPPER SAFETY ARM

1. Raise the hopper.
2. Place the safety arm in its storage position on the inside of the hopper lift arm.
3. Lower the hopper.



## TOWING OR PUSHING MACHINE

Gas and diesel powered machines may be pushed or towed easily by bypassing the transmission. To do this raise the rear cover and remove the belt guard. Locate the transmission. On the rear of the transmission is a plunger valve. Push the valve in as far as possible and pivot up the tow bar valve just next to the valve. This bar is supplied to lock the valve in the "IN" position. The machine can now be easily pushed or towed up to 4 mph (7 kilometers/hr).

### **▲ WARNING:**

**Do not exceed 4 mph (7 kilometers/hr) as damage to the transmission may result.**

When towing is complete, slide tow valve bar out of the way to release valve.

## MACHINE JACKING

The machine may be jacked up for service or inspection by using the specified jack locations. Always block the tires when jacking up the machine.

The right front jack location is the base of the side broom, just ahead of the right tire.

The left front jack location is the lower front frame channel just ahead of the left front tire.

The rear jack location is the steel beam mount located at the rear of the machine, centered under the plastic bumper.

## TO JACK UP MACHINE

1. Empty and lower the hopper.
2. Turn the key switch off and set the parking brake.

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

3. Block the tires that are not being raised to prevent the machine from rolling.

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

4. Use a jack of adequate capacity, raise the machine using the designated jack locations.

**FOR SAFETY:** When servicing machine, use hoist or jack of adequate capacity, jack machine at designated jack locations only. Block machine with jack stands when raised.

5. When the machine is raised, use jack at the designated jack locations.

**FOR SAFETY:** Block machine at designated jack locations with jack stands when raised.

6. Slowly lower the machine onto the jack stands.
7. Be sure that the machine is secure.
8. Service or inspect the machine as required.
9. When finished working on the machine, raise the machine off the jack stands.
10. Remove the jack stands.
11. Lower the machine to the floor. Remove the blocks from the tires.

## MACHINE TIE-DOWNS

There is a tie-down location at each corner of the machine. The front attach points are the frame cutouts located directly above each front tire. The rear attach points are the right and left lower flange of the frame channels, where they join the rear bumper. An alternate single rear attach point is around the pivot of the rear axle beam, located at the center of the machine behind the rear jack point.

**NOTE:** When transporting the machine on a trailer or in a truck, in addition to tie-downs, be sure to set the machine parking brake, and block the tires to prevent the machine from rolling.

# MAINTENANCE

## HYDRAULIC FLUID

Hydraulic fluid is used with the hydraulic pump to operate the hopper lift system and the side broom motor. The condition of the hydraulic fluid plays a large part in determining the life of the hydraulic system.

The hydraulic fluid used in the Tracer Gas/Diesel powered Floor Sweeper is Chevron 400 15W40. If a different hydraulic fluid is used, it must closely match the viscosity specification below.

SUS @ 100" (38° C) 404-445

SUS @ 210" (38° C) 78-84

This specification has a flat viscosity curve (high viscosity index). This means the thickness of the oil stays relatively constant over a wide temperature range. DO NOT use Automatic Transmission Fluid.

NOTE: The hydraulic components in the machine rely on system hydraulic fluid for lubrication. Dirty or contaminated fluid accelerates wear and malfunctions, and reduced component life.

## HYDRAULIC FLUID RESERVOIR

The hydraulic fluid reservoir is located below the broom levers inside the machine. To check the fluid level remove the fill cap to read the dipstick attached to the cap.

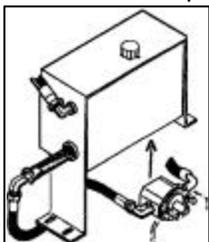
NOTE: Do not overfill reservoir. Expansion of the hydraulic fluid when heated to the normal operating temperature can cause fluid to spill from the reservoir, or cause damage to the component.

The oil in the reservoir should be replaced every 500 hours of use. To drain hydraulic reservoir:

1. Turn off machine and set parking brake.

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

2. Raise rear cover.
3. Disconnect batteries from machine.
4. Remove impeller.



A – Hydraulic Pump

5. Remove bolts (4) in feet of reservoir.
6. Shift reservoir forward so that short leg of reservoir drops down and rests on lower frame.
7. Remove upper hydraulic hose from reservoir.
8. Lift reservoir out of frame and rest on outer frame with open port above oil level.
9. Tilt reservoir back and remove last hose.
10. Reservoir may be emptied by pouring fluid out of ports.
11. The fluid strainer may be removed for inspection and to speed fluid drainage.

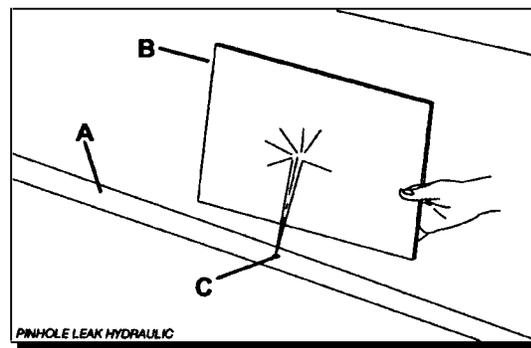
NOTE: Do not overfill the reservoir. Expansion of the hydraulic fluid when heated to the normal operating temperature can cause fluid to spill from the reservoir, or cause damage to the component.

If the reservoir is overfilled, use a suction type device to draw the excess hydraulic fluid from the reservoir.

## HYDRAULIC FLUID LEAKS

Pressurized hydraulic fluid spraying from a very small hole can be very hard to see. Do not use hands to locate the leak. Use a piece of cardboard as shown below to find leaks.

**When servicing machine, use a sheet of cardboard to locate leaking hydraulic fluid under pressure. Keep eyes and hands clear of leaks. Escaping hydraulic fluid under pressure can cause severe injury.**



- A – Hydraulic Line  
B – Cardboard  
C – Pinhole Leak

## HYDRAULIC FILTER

The hydraulic filter keeps the machines hydraulic system clean to a level of 10 microns. The hydraulic fluid filter is located just inside the left rear frame. The filter should be changed every 500 hours.

### TO REPLACE FILTER ELEMENT:

1. Stop the engine and set the parking brake.
2. Open the seat support.
3. Unthread and discard the hydraulic fluid filter element.
4. Apply a thin coat of hydraulic fluid to the seal of the new hydraulic fluid filter element.
5. Thread and hand tighten the new hydraulic fluid filter element on the filter head.
6. Close the seat support.
7. Operate the machine and check for leaks. Correct any leaks found.
8. Check the hydraulic fluid reservoir level and fill as required.

## DIRECTIONAL CONTROL SYSTEM

(Refer to the Electrical Control Group in the Parts section)

The directional control system controls the direction and speed of the machine. The system is made up of the directional pedal, the throttle box, the transistorized controller and contactors. The controller, located in the electrical drive compartment, is sealed and can only be serviced by trained service personnel.

**Do not use a pressure washer to clean the inside of the electrical drive compartment.**

**When servicing machine, disconnect battery connections before working on machine.**

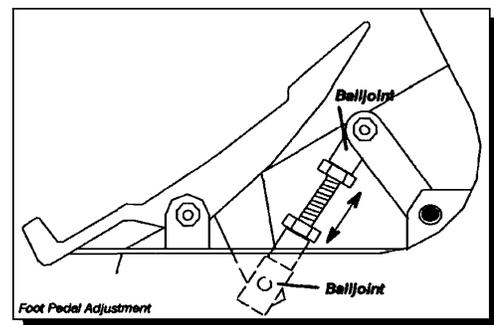
## DIRECTIONAL CONTROL PEDAL ADJUSTMENT

(Refer to the Console Group in the Parts section)

The directional control pedal is designed to prevent driver fatigue. However if a different pedal angle is preferred, these directions should be followed.

1. Raise rear cover.
2. Disconnect batteries from machine.
3. Locate and remove the directional control pedal stop bolt.
4. Locate the linkage rod beneath the directional control pedal.
5. Adjusting the length of the linkage rod controls the pedal angle. Shortening the linkage rod causes the pedal to have a flatter angle with the floor. Lengthening the linkage rod causes the pedal to have a steeper angle.
6. To change the length of the linkage rod, disconnect the upper end of the linkage rod from the forward/reverse arm.

7. Loosen the locking nuts on both ends of the threaded portion of the linkage rod.
8. Turning the balljoint changes the length of the linkage rod, be sure that there is a minimum of 5/16" of threaded rod engaged in each of the balljoints.
9. When the new length is established, reconnect the upper balljoint to the forward/reverse arm.
10. Tighten the two locking nuts on the threaded portion of the linkage rod.
11. Reposition the directional foot pedal stop bolt.
12. The stop bolt must be adjusted so that the directional foot pedal comes in contact with the stop while there is still a small amount of travel remaining in the throttle arm. This is done to prevent heavy foot pressure from damaging the throttle unit.



## THROTTLE "NEUTRAL POSITION" ADJUSTMENT

(Refer to the Console Group in the Parts section)

The throttle is automatically returned to its neutral position by a spring centering system. If the machine tends to creep forward or reverse when the operators foot is removed from the directional foot pedal, the throttle "neutral position" may require adjustment as described below:

1. Turn off machine and set parking brake.
2. Raise the rear cover.
3. Disconnect the batteries from the machine.
4. Remove the drive motor dust cover.
5. Locate the throttle and spring centering assembly.
6. Disconnect the linkage rod from the throttle arm.
7. With the throttle arm free, the throttle will return to its neutral position using its internal centering spring.
8. Position the linkage rod balljoint over the hole in the throttle arm. The balljoint should slide into the hole without repositioning the throttle arm.
9. If required, shorten or lengthen the linkage rod until proper engagement occurs.
10. Reattach linkage rod to the throttle arm.
11. Install the drive motor dust cover.
12. Connect batteries.
13. Lower hopper.

# MAINTENANCE

## MAIN BROOM (Refer to the Main Broom Group and Main Broom Lift Group in the Parts section)

**FOR SAFETY:** The main broom and the vacuum impeller automatically begin to operate when the main broom lever is positioned in the forward end of its slot.

The main broom spans the width of the machine, and sweeps debris into the hopper. Inspect the main broom daily for wear or damage. Remove any obstructions found in the main broom chamber, main broom drive hub or idler hub.

The main broom should be replaced when the remaining bristles measure 5/8 " (16mm) or less in length.

**NOTE:** All original equipment brooms are equipped with "Perform Alert™". This feature tells the operator when it is time to replace the main broom. "Perform Alert™" brooms have bright yellow tufts located on each end of the broom. These tufts are pre-trimmed to indicate the length of a worn out broom. When the main body of the broom wears to a length that matches the yellow tufts, the broom should be replaced.

Always check the main broom pattern when installing a new broom.

### TO REMOVE THE MAIN BROOM

1. Turn off machine and set parking brake.

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

2. Raise rear cover.
3. Disconnect batteries from machine.
4. Lower the main broom lever.
5. Open the right side broom door.
6. Remove the idler arm D-ring retainer.
7. Remove the main broom idler arm.
8. Grasp the broom by the core and remove.

### TO INSTALL THE MAIN BROOM

1. Turn off machine and set parking brake.

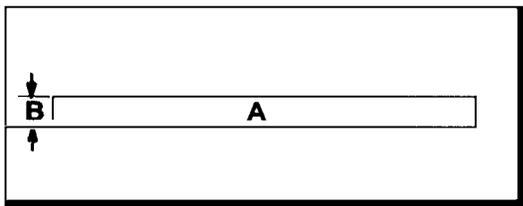
**FOR SAFETY:** Before leaving or servicing the machine, stop on level surface, apply parking brake, turn off machine and remove key.

2. Raise rear cover.
3. Disconnect batteries from machine.
4. Lower the main broom lever.
5. Open right side broom door.
6. If replacing a worn broom, turn the main broom adjustment knob so that the broom drive hub is raised to a position that will allow a new broom to easily slide onto the broom drive hub.
7. Slide the new brush into the broom chamber.
8. Hold the broom by the core and rotate the broom counter-clockwise while pushing the broom onto the drive hub. Make sure that the broom is fully seated onto the drive hub before attempting to install the idler arm.
9. Locate the idler arm. Align the tabs on the idler hub with the slots on the main broom core. Slide the idler into the main broom core, the position the upper right end of the idler arm onto the two locator pins.
10. Replace and tighten the D-ring retainer.
11. Close the broom door.
12. Check the main broom floor pattern and adjust as necessary.

## CHECKING AND ADJUSTING THE MAIN BROOM PATTERN

1. Using chalk, or similar material, coat and area of the floor that is flat and smooth. If a suitable material is not available, run the broom for two minutes during the following test.
2. With the main broom raised, position the machine so that the main broom is directly over the chalked area.
3. Apply the parking brake to prevent the machine from moving.
4. Lower the main broom to the floor for 10-15 seconds.
5. Raise the main broom, release the parking brake, and back the machine away from the test area.
6. Observe the pattern that the main broom left on the floor. The pattern should be 1 to 1-1/2 inches (25.4 to 38.1mm) wide. The pattern should not be tapered (wider at one end than the other).
7. To adjust the width of the pattern, locate the main broom adjustment knob, and loosen the locking wing nut.
8. If the pattern is too wide, rotate the adjustment knob clockwise to raise the broom. If the pattern is too thin, rotate the adjustment knob, counterclockwise to lower the broom. Tighten the locking wing nut.
9. Check the broom pattern again. Repeat the procedure until the pattern is correct.

### NORMAL MAIN BROOM PATTERN

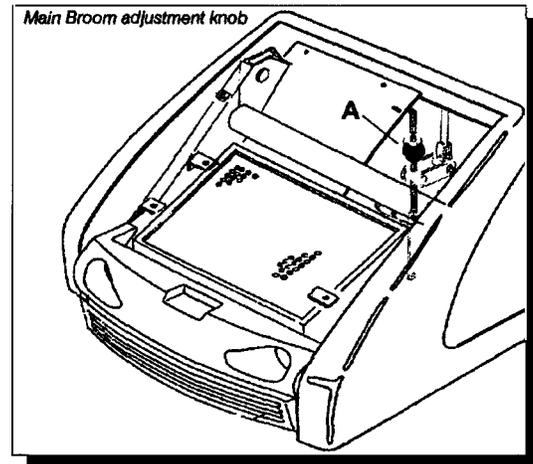
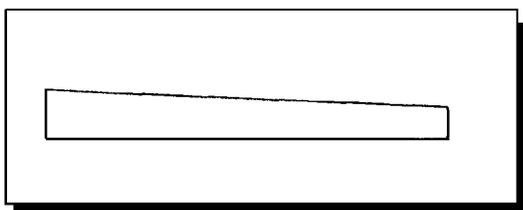


**A – Main Broom Pattern**

**B – 1 to 1-1/2" (25.4 to 38.1mm)**

NOTE: If one end of the main broom pattern is more than 1/2" (12.7mm) wider than the other end, perform the following leveling procedure.

### TAPERED MAIN BROOM PATTERN



**A – Main Broom Adjustment Knob**

The adjustable bearing block used to correct a tapered broom pattern is located just inside the right broom door. Only the right side of the broom can be raised or lowered to correct the pattern. Before attempting the following adjustment, determine if the right side of the broom needs to be raised or lowered to correct the tapered pattern.

1. Turn off machine and set parking brake.

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

2. Raise rear cover.
3. Disconnect batteries from machine.
4. Open the right side broom door.
5. Remove the main broom.
6. Locate the plastic main broom bearing block just inside the right broom door. Loosen the bearing block retainer bolts.
7. Slide the bearing block up or down to correct the tapered pattern condition.
8. Tighten the bearing block retaining bolts.
9. Replace the main broom, and repeat the pattern test procedure. Readjust if necessary to eliminate the tapered pattern condition.

## MAINTENANCE

### SIDE BROOM (Refer to the Side Broom Group in the Parts section)

**FOR SAFETY:** The side broom automatically begins to operate when the side broom lever is positioned in the forward end of its slot.

The side broom is used to clean debris away from curbs and walls, and sweep it into the path of the main broom. Inspect the side broom daily for wear or damage. Remove any string, wire or banding found wrapped around the side broom, side broom hub, or shaft.

The side broom should be replaced when the remaining bristles measure 2-1/2 inches (65 mm) or less in length.

**NOTE:** All original equipment brooms are equipped with "Perform Alert™". This feature tells the operator when it is time to replace the side broom. "Perform Alert™" brooms have bright yellow tufts located around the outside edge of the broom. These tufts are pre-trimmed to indicate the length of a worn out broom. When the main body of the broom wears to a length that matches the yellow tufts, the broom should be replaced.

#### TO REMOVE THE SIDE BROOM

1. Turn off machine and set parking brake.

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

2. Raise rear cover.
3. Disconnect batteries from machine.
4. Raise the side broom lever.
5. Remove the locking clip from the side broom retaining pin.
6. Push up on the base of the side broom to relieve the tension on the retaining pin, then remove the retaining pin.
7. Slide the side broom off the side broom motor shaft.

#### TO INSTALL THE SIDE BROOM

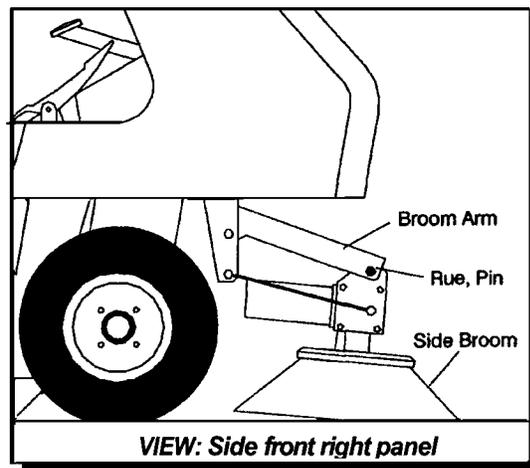
1. Turn off machine and set parking brake.

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

2. Raise rear cover.
3. Disconnect batteries from machine.
4. Raise the side broom lever.

5. Slide the side broom onto the side broom motor shaft.
6. Install the side broom retaining pin and the retaining pin locking clip.
7. Adjust the side broom if necessary

The side broom should contact the floor in an area as shown below. One third to one half of the side broom bristles should contact the floor when the broom is down.



#### ADJUSTING THE SIDE BROOM

1. Raise the hopper.
2. Engage safety arm.



**Raised hopper may fall. Engage hopper safety arm.**

3. Turn off machine and set parking brake.

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

4. Raise rear cover.
5. Disconnect batteries from machine.
6. Lower the side broom lever.
7. Place a block or similar support under the side broom to relieve the tension in the lift cable.
8. Locate the side broom adjustments links located just above the side broom, and remove the retaining pin passing through both adjustment links.
9. Reposition the two adjustment links to move the side broom up or down as required, and replace the retaining pin.

## TRANSMISSION JACKSHAFT BELT

The transmission belt transfers power from the engine to the transmission jackshaft on the gasoline machines and from the engine jackshaft to the transmission jackshaft on the diesel powered machines.

### TO REPLACE BELT

1. Turn off machine and set parking brake.

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

2. Raise rear cover.
3. Disconnect batteries from machine.
4. Remove the belt guard cover.
5. Remove the tension spring for the idler on the transmission drive belt. Loosen tension on impeller belt.
6. Loosen, but do not remove the four bolts in the base of the shaft mounting bracket.
7. Slide mounting bracket toward engine to create slack in the belt.
8. Loosen, but do not remove 4 bolts in the bases of the rear jackshaft mount and pump mount bracket.
9. Loosen tensioning nut and bolt on the rear of rear jackshaft mount. Slide rear jackshaft mount away from engine.
10. Remove the bolts retaining the bearings on transmission jackshaft.
11. Lift the jackshaft and bearings from the mount and remove the transmission drive belt, then the transmission jackshaft belt.
12. Remove the bolts retaining the bearing on the rear jackshaft. Remove the belt controller rod.
13. Loosen bearing collars on rear jackshaft bearings.
14. Remove first the main broom belt, then the pump drive belt.
15. Slide the rear jackshaft outward to disengage the pump coupling, then lift the shaft up to remove drive belt in reverse order.
16. Reinstall belt in reverse order.

## ADJUSTING THE JACKSHAFT BELT

**Proper alignment is important for all belts on Tracer machines. To properly align the transmission jackshaft belt:**

**Repeat Steps 1-8 from above then:**

9. Move the transmission jackshaft belt off its pulley and loosen the setscrew in the pulley.
10. Using a straightedge between the pulleys to be aligned, move the pulley left or right on it's shaft until proper alignment is established.
11. After this adjustment, check the transmission belt alignment.
12. Reverse steps 1-8.
13. If jackshaft belt idler pulley does not center on belt, adjust by adding or removing washers behind the idler pulley.

## TRANSMISSION BELT

The transmission belt transfers power from the transmission jackshaft to the transmission.

### TO REPLACE BELT

1. Repeat steps 1-10.
11. Lift the jackshaft and bearings from the mount and remove the transmission belt off the end of shaft.

## REAR JACKSHAFT (PUMP DRIVE) BELT

The rear jackshaft belt transfers power from transmission jackshaft to rear jackshaft.

### TO REPLACE BELT

1. Turn off machine and set parking brake.

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

2. Raise rear cover.
3. Disconnect battery from machine.
4. Remove the belt guard cover.
5. Remove belt controller rod from rear jackshaft mount and take main broom drive belt off double pulley located on rear jackshaft.
6. Loosen, but don't remove 4 bolts in base of rear jackshaft mount and pump mount.
7. Loosen tensioning nut and bolt at rear jackshaft mount, and slide mount away from engine.
8. Remove rear jackshaft belt.

# MAINTENANCE

## TO ALIGN BELT

1. Repeat steps 1-7
8. Loosen tension on impeller drive pulley on end of transmission jackshaft.
9. Slide pulley side to side on shaft to make proper alignment.
10. Retighten setscrews in pulley.
11. Reverse Steps 1 –7.

## MAIN BROOM BELT (Refer to Main Broom Group in the Parts section)

The main broom belt transfers power from the rear jackshaft to the main broom pulley. Check the belt condition and tension every 200 hours of operation.

### **CAUTION:**

The main broom and vacuum impeller automatically begin to operate when the main broom lever is positioned in the forward end of its slot.

## REPLACING AND ADJUSTING MAIN BROOM BELT

1. Turn off machine and set parking brake.

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

2. Raise rear cover.
3. Disconnect batteries from machine.
4. Remove the belt guard.
5. Be sure main broom lift lever is in the raised position. Remove the belt controlling rod from rear jackshaft mount.
6. Remove belt from pulleys.
7. Install new belt and reinstall belt controlling rod.

## TO ALIGN BELT

Repeat steps 1-7 under rear jackshaft (Pump Drive) belt.

8. Loosen set screws in double pulley located on the rear jackshaft.
9. Slide pulley side to side to align with main broom drive pulley below.
10. Retighten setscrews in pulley.
11. Reverse Steps 1 –7.

NOTE: This adjustment may require realignment of the rear jackshaft belt.

## VACUUM IMPELLER BELT (Refer to the Impeller Group in the Parts section)

The impeller belt transfers power from the auxiliary motor to the impeller. Check the belt condition and tension every 200 hours of operation.

### **CAUTION:**

The main broom and vacuum impeller automatically begin to operate when the main broom lever is positioned in the forward end of its slot.

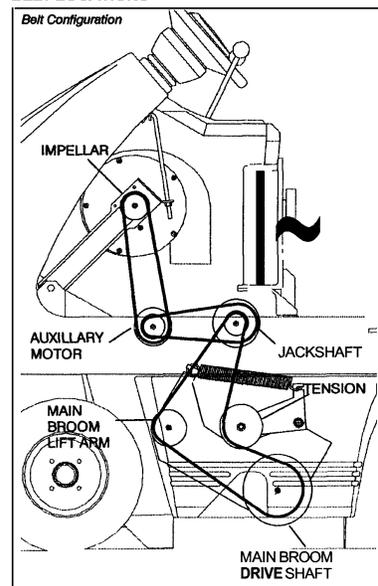
## REPLACING AND ADJUSTING THE VACUUM IMPELLER BELT

1. Turn off machine and set parking brake.

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

2. Raise rear cover.
3. Disconnect batteries from machine.
4. Remove the belt guard and the side filler panel.
5. Loosen the auxiliary motor base mounting bolts.
6. Slide the auxiliary motor back and remove the jackshaft belt.
7. Pull the auxiliary motor forward to tension the jackshaft belt. The belt has proper tension when the belt deflects 1/4 inch (6 mm) from a force of 6 lbs (3 kg) applied at the midpoint of the belt.
8. While keeping the motor and jackshaft pulleys aligned, tighten the auxiliary motor base mounting bolts.
9. Replace the main broom belt.
10. Replace the side filler panel and the belt guard.

### BELT LOCATIONS



## IMPELLER BELT

The impeller belt transfers power from transmission jackshaft to impeller.

### CAUTION:

1. Turn off machine and set parking brake.

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

2. Raise rear cover.
3. Disconnect batteries from machine.
4. Remove the belt guard cover.
5. Release tension on impeller belt using tension bolt under impeller arm.
6. Repeat Steps 5 and 6 under Rear Jackshaft (Pump Drive) Belt.
7. Remove rear jackshaft belt from front pulley.
8. Remove impeller belt.
9. Replace belt and reverse Steps 1 –6.

## TO ALIGN BELT

1. Loosen impeller belt, using the tensioning bolt under the impeller arm.
2. Loosen set screws in the impeller pulley.
3. Slide the pulley side to side to make proper alignment.
4. Tighten set screws in pulley.
5. Retighten impeller belt.

## DIFFERENTIAL DRIVE CHAIN (Refer to the Differential Group in the Parts section)

The differential drive chain transfers power from the output sprocket of transmission to differential sprocket. Check the chain condition and tension every 200 hours of operation.

## REPLACING AND ADJUSTING DIFFERENTIAL DRIVE CHAIN

1. Raise the hopper and engage the hopper safety arm.

### WARNING:

2. Turn off machine and set parking brake.

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

3. Raise rear cover.
4. Disconnect batteries from machine.
5. Remove the drive motor dust cover.

6. Loosen 4 bolts holding transmission case to mount.
7. Locate tensioning bolt at top of transmission mount. Tighten or loosen bolt as needed to properly tension chain.
8. Tighten 4 mounting bolts in transmission body.

If alignment of the chain and sprockets becomes necessary, the alignment is accomplished by moving the entire differential assembly side to side.

## TO REALIGN

1. Raise the hopper and engage the hopper safety arm.

### WARNING:

**Raised hopper may fall. Engage hopper safety arm.**

2. Turn off machine and set parking brake.

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

3. Remove rear cover.
4. Disconnect battery from machine.
5. Remove the drive motor dust cover.
6. Loosen all four locking on bearings supporting the differential.
7. Loosen the set screws in the two brake disks.
8. Loosen but don't remove the hardware attaching the bearing flanges to the frame.
9. Make sure there is little tension on the drive chain. Gently slide the differential in it's bearing to restore proper alignment.

**NOTE:** The brake disks must remain stationary while the differential shafts move in them.

10. Reverse Steps 1-8. Follow tensioning instructions above.

**NOTE:** After aligning the differential the small sprockets at each end of the differential may need to be realigned with the wheel sprockets. If so, loosen setscrews in small sprockets and slide on differential shaft until aligned. Retighten setscrews.

## MAINTENANCE

### DRIVE WHEEL CHAIN (Refer to the Front Wheel Group in the Parts section)

The drive wheel chain transfers power from the differential shaft to the drive wheels. Check the chain condition and tension every 200 hours of operation.

### REPLACING AND ADJUSTING THE DRIVE WHEEL CHAINS

1. Turn off machine and set parking brake.

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

2. Raise rear cover.
3. Disconnect batteries from machine.
4. Chock the rear wheels. Jack up and remove the front tire.
5. Remove the chain guard and tensioner disk.
6. Check the drive wheel chain for excessive wear. Replace if necessary.
7. Check the drive wheel and differential shaft sprockets to proper alignment. If they are not lined up, loosen the setscrews on the differential shaft sprocket, align the sprockets, and tighten the setscrews.
8. Replace the chain guard and tensioner disk.
9. Check the chain tension. There should be 1/2 inch (12.5 mm) slack measured midway between the sprockets. To adjust the tension, loosen the chain guard mounting bolt and rotate the disk. Tighten the chain guard mounting bolt.
10. Replace the tire and slowly lower the machine to the floor.
11. Repeat the procedure for the other drive tire.

### SKIRTS AND SEALS (Refer to the Frame Group and the Main Broom Group in the Parts section)

The main broom skirts prevent dust from exiting the main broom chamber. The skirts should be inspected for wear or damage daily. When correctly adjusted, they should clear the floor by 0 to 1/8 inch (0 to 3mm).

**NOTE:** Original equipment skirts are provided with "Perform Alert™" wear indicators. The wear indicator is a raised horizontal line near the lower edge of the skirts. When a skirt is worn to this line it should be replaced. A skirt can be adjusted many times before it wears to the "Perform Alert™" strip. During daily inspections the "Perform Alert™" indicators are useful in determining when skirts are close to requiring replacement.

### REPLACING THE RIGHT BROOM DOOR SKIRT

1. Turn off machine and set parking brake.

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

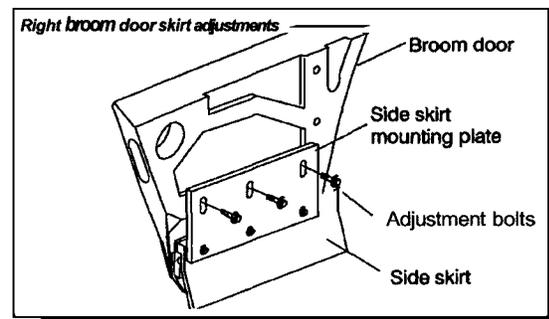
2. Open the right broom door.
3. Loosen the lower three retaining bolts on the side skirt mounting plate.
4. Slide the worn side skirt out of the skirt retainer.
5. Slide a new skirt into place. Tighten the three retaining bolts.
6. Adjust the side skirt.

### ADJUSTING THE RIGHT BROOM DOOR SKIRT

1. Turn off machine and set parking brake.

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

2. Open the right broom door.
3. Loosen the three upper adjustment bolts on the side skirt mounting plate.
4. Adjust the side skirt for correct floor clearance, then tighten the three adjustment bolts.



## REPLACING THE LEFT BROOM SKIRT

1. Turn off machine and set parking brake.

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

2. Raise rear cover and disconnect the batteries from the machine.
3. Open the left broom door.

NOTE: The left skirt is mounted to the frame. This skirt does not have a wear indicator strip.

4. Remove the five adjustment nuts and the retaining bars.
5. Replace the worn side skirt with a new skirt.
6. Install the retaining bars and adjustment nuts.
7. Adjust the side skirt.

## ADJUSTING THE LEFT BROOM SKIRT

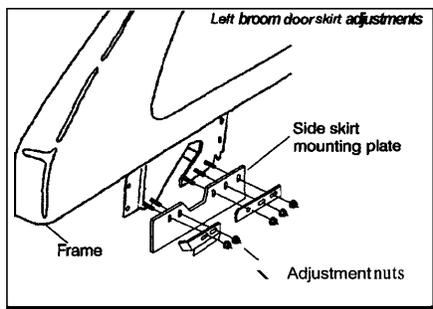
1. Turn off machine and set parking brake.

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

2. Raise rear cover and disconnect the batteries from the machine.
3. Open the left broom door.

NOTE: The left skirt is mounted to the frame. This skirt does not have a wear indicator strip.

4. Loosen the five adjustment nuts.
5. Adjust the side skirt for correct floor clearance, then tighten the adjustment nuts.
6. Tighten the five broom skirt.
7. Adjust the rear skirt.



## ADJUSTING THE REAR BROOM SKIRT

1. Turn off machine and set parking brake.

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

2. Loosen the five upper adjustment nuts on the rear skirt mounting plate.
3. Adjust the rear skirt for correct floor clearance, then tighten the adjustment nuts.

## RECIRCULATION SKIRT

The recirculation skirt helps to channel debris that has been carried over the main broom, back into the sweeping area. The recirculation skirt should be checked daily for wear or damage.

## REPLACING THE RECIRCULATION SKIRT

1. Turn off machine and set parking brake.

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

2. Raise the rear cover and disconnect the batteries from the machine.
3. Remove the main broom.
4. Open the left broom door.
5. Remove the three retaining nuts and retaining strip on the left side broom skirt.
6. Loosen the five retaining nuts on the recirculating skirt retaining plate.
7. Slide the worn skirt out of the skirt retainer and replace with a new skirt.
8. Hold the skirt firmly in place and tighten the five retaining bolts. No adjustment is required.

# MAINTENANCE

## HOPPER SEALS

The hopper seals prevent dust from exiting around the hopper where it meets the broom chamber. There are two side hopper seals and one upper hopper seal. These seals should be inspected for wear or damage daily. When correctly adjusted, the two hopper side seals should clear the floor by 0 to 1/8 inch (0 to 3mm).

## REPLACING THE HOPPER SEALS

1. Park the machine on a smooth, level floor.
2. Raise the hopper and engage the hopper safety arm.

### **⚠ WARNING:**

**Raised hopper may fall. Engage hopper safety arm.**

3. Turn off machine and set parking brake.

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

4. Remove the retaining bolts and retaining bar.
5. Replace the worn hopper seal with a new seal.
6. Install the retaining bar and bolts.
7. Adjust the hopper side seals.

## ADJUSTING THE HOPPER SIDE SEALS

1. Park the machine on a smooth, level floor.
2. Raise the hopper and engage the hopper safety arm.

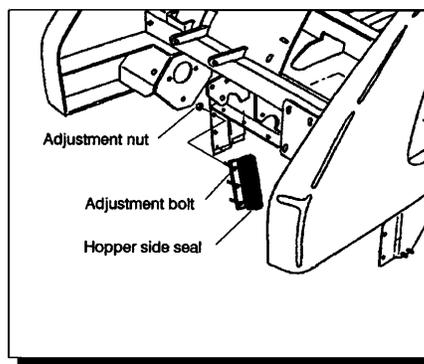
### **⚠ WARNING:**

**Raised hopper may fall. Engage hopper safety arm.**

3. Turn off machine and set parking brake.

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

4. Loosen the three adjustment bolts.
5. Adjust the hopper side seals for correct floor clearance, then tighten the adjustment bolts.
6. Connect the batteries and lower the hopper.



## HOPPER LIP SKIRTS

The hopper lip skirts seal the area between the lip of the hopper and the floor. They also help deflect debris into the hopper. The lip skirts should be inspected for wear or damage daily. The lip skirts do not require adjustment. They should be replaced when the lower edge is worn down to the "Perform Alert™" wear indicator line.

## REPLACING THE HOPPER LIP SKIRTS

1. Empty the debris hopper.
2. Park the machine on a smooth, level floor.
3. Raise the hopper and engage the hopper safety arm.

### **⚠ WARNING:**

**Raised hopper may fall. Engage hopper safety arm.**

4. Turn off machine and set parking brake.

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

5. Remove the retainer plate on the right side of the hopper.
6. Loosen the four lip skirt retaining bolts.
7. Slide the four hopper lip skirts out of the retainer plate.
8. Slide the new hopper lip skirts into place.
9. Tighten the retaining bolts and replace lip skirt retainer.

## HOPPER DOOR SEALS

The hopper door seals prevent debris from spilling out of the hopper before dumping. There are two hopper door side seals, one hopper door lower seal and one hopper door upper seal. The upper seal can only be replaced by removing the hopper door from the hopper. The hopper door seals should be inspected for wear or damage daily. They do not require adjustment.

## REPLACING DOOR SEALS

1. Empty the debris hopper.
2. Park the machine on a smooth, level floor.
3. Raise the hopper and engage the hopper safety arm.



**WARNING:**  
Raised hopper may fall. Engage hopper safety arm.

4. Partially open the hopper dump door so that both sides of the hopper door can be accessed.
5. Turn off machine and set parking brake.

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

6. Remove the retainer bar from the worn or damaged seal.
7. Remove the old seal and place the new seal in position.

**NOTE:** When replacing the lower door seal, a new seal cord must be used.

8. Replace the seal retaining bar. Replace and tighten the screws.

## HOPPER

The hopper holds debris swept by the main broom. The hopper should be dumped after each day of operation and cleaned every 200 hours of operation. For efficient sweeping, the correct hopper floor clearance must be maintained.

1. Empty the hopper.
2. Park the machine on a smooth, level floor.
3. Turn off machine and set parking brake.

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

4. Check the distance from the lower rear edge of the hopper to the floor. The correct clearance is 2 inches (51 mm). The clearance should be equal from side to side. A good method for checking this clearance is to slide a 2 inch (51mm) high bar under the hopper.
5. If necessary, loosen the two rear hopper attachment bolts, raise or lower the rear of the hopper to obtain the correct floor clearance, and tighten bolts.

## HOPPER DUST FILTER

The hopper dust filter cleans the dust laden air that is drawn up from the hopper by the vacuum impeller. The filter is located above the hopper and is accessed by raising the filter cover. The filter should be cleaned daily by pressing the filter shaker button for 10-20 seconds. The filter should be removed, cleaned and inspected after every 100 hours of operation. Replace if damaged.

## TO REMOVE AND REPLACE HOPPER DUST FILTER

1. Turn off machine and set parking brake.

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

2. Raise the filter cover.
3. Loosen the four filter retaining bolts.
4. Rotate the lower two filter retaining tabs down.
5. Lift the left side of the upper filter retaining bar to clear the retaining bolt and swing the bar down to clear the right side of the filter panel.
6. Remove the filter.
7. After inspection or cleaning, install the dust filter with the air flow arrow pointing up.
8. Replace the filter retaining bar, and the two lower retaining tabs. Tighten the bolts.

## MAINTENANCE

To clean the filter after removal, use one of the following methods:

- 1. TAPPING** Tap the filter frame gently on the dirty side of the filter down. Be careful not to dent the filter frame.
- 2. AIR** Blow compressed air through the filter opposite the direction of the arrow on the side of the filter. This may be done with filter in the machine. Wear eye and dust inhalation protection when using compressed air.
- 3. WATER** The filter can be soaked in water and mild detergent. Rinse the filter until it is clean. Air dry the filter.

NOTE: Do not install the filter until it is completely dry.

### **BRAKES (Refer to the Brake Group in the Parts section)**

The brake pedal and the parking brake operate the two front tire disc brakes. The disc brakes should be checked every 200 hours of operation, and adjusted if necessary. The disc brakes should be adjusted so that the disc pads are as close to the brake disc as possible, without causing the brakes to drag.

### **TO ADJUST THE BRAKES**

1. Raise the hopper.
2. Engage the hopper safety arm.

#### **⚠ WARNING:**

**Raised hopper arm may fall. Engage hopper safety arm.**

3. Turn off machine. Do not set parking brake.

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

4. Raise rear cover.
5. Disconnect batteries from machine.
6. Locate the brake adjustment screw on each brake caliper.
7. Loosen the locknut and turn the adjusting screw to adjust each brake. Tighten the locknut.
8. Lower the hopper.
9. Test brakes before beginning normal operations.

## TIRES

Tires should be inspected after every 100 hours of operation. Pneumatic tires should be inflated to 90 PSI.

## BATTERY

The battery provides the power to start the machine. The battery requires regular maintenance to keep them operating at peak efficiency.

To get the greatest life from the battery charge it when their charge level reaches 25% of a full charge. Use a hydrometer to check the charge level.

Do not allow the battery to remain in a discharged condition for any length of time. Never expose a discharged battery to temperatures below freezing. Discharged batteries will freeze causing cracked case. Do not operate the machine if the battery is in poor condition or if they have a charge level below 25%, specific gravity below 1.177.

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

Check the electrolyte level in each battery cell before and after charging the battery. Never add acid to the battery, use water. Do not allow water level to fall below the battery plates. Portions of plates exposed to air will be destroyed. Do not overfill. Keep plugs firmly in place at all times.

The battery in this machine is rated at 12V, 550cca. It is located under the engine, center of frame.

When removing the battery cables, remove the negative (-) cable before removing the positive (+) cable.

### **! WARNING**

When servicing machine, avoid contact with acid.

### **! WARNING**

Batteries emit hydrogen gas. Explosion or fire can result. Keep sparks and open flame away. Keep covers open when charging.

### **! WARNING**

Wear eye protection and protective clothing when working with batteries.

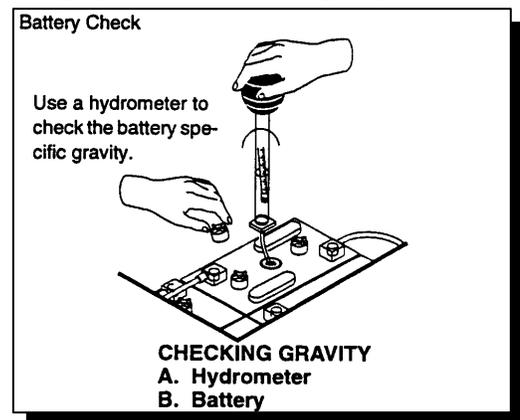
### **! WARNING**

Charge batteries in a well-ventilated area.

## BATTERY MAINTENANCE

1. When cleaning the battery, use a solution of baking soda and water. Do not allow the cleaning fluid to enter the battery cells. Electrolyte will be neutralized.
2. Maintain the proper electrolyte level in each battery cell. If a cell should accidentally overflow, clean immediately.
3. Do not add water until the battery is fully charged.
4. Wipe off the top of the batteries at least once a week.
5. Test battery condition with a hydrometer at least once a week.
6. Ensure that all connections are tight and all corrosion removed.
7. Every 4 to 6 months, remove the batteries from the machine and clean the battery cases and battery compartment.

NOTE: Do not take readings immediately after adding water. If the water and acid are not thoroughly mixed, the reading may not be accurate.

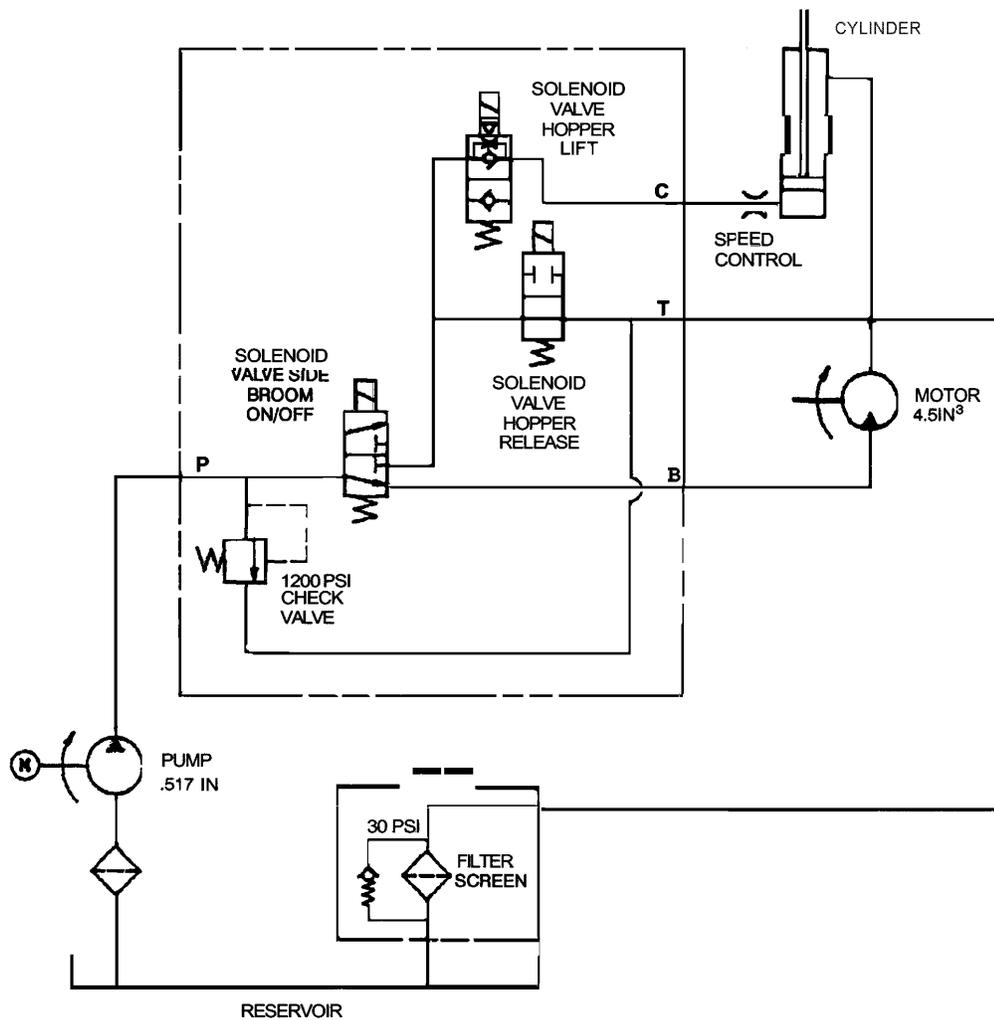


To find the correct specific gravity reading when the temperature of the battery electrolyte is other than 80° F (27° C).

SPECIFIC GRAVITY	BATTERY CONDITION
1.265	100% CHARGED
1.225	75% CHARGED
1.190	50% CHARGED
1.155	25% CHARGED
1.120	DISCHARGED

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).

# HYDRAULIC SCHEMATIC



# HYDRAULIC TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
<b>Hopper will not lift</b>	Loss of power to rocker switch	Key switch must be on check circuit breaker
	Low hydraulic fluid	Add hydraulic fluid
	Hopper overloaded	Empty hopper
	Rocker switch failure	Test – replace switch
	Speed control orifice plugged	Clean or replace orifice (located behind the lower cylinder fitting)
	Pump solenoid failure	Replace pump solenoid
	Check valve failure	Replace check valve or solenoid
	Lift cylinder failure	Replace cylinder seals
<b>Hopper will not lower</b>	Gear pump failure	Replace pump or pump motor
	Loss of power to rocker switch	Key switch must be on, check circuit breaker
	Rocker switch failure	Test – replace switch
	Speed control orifice plugged	Clean or replace orifice (located behind the lower cylinder fitting)
	Check valve failure	Replace check valve or solenoid

## PROPEL SYSTEM TROUBLESHOOTING

PROBLEM.	CAUSE	SOLUTION
<b>No propelling</b>	Low battery charge	Charge battery.
	Controller overheated	Thermal switch tripped. Allow cool down period.
	Loose or broken wires or motor failure	Located, then fix or replace wire(s). Check motor for binding. Check motor for failure.
	Blown fuse (120A)	Replace fuse.
	Main contactor failure	Replace main contactor.
	Key operated on/off switch failure	Replace on/off switch.
	Chain failure	Repair chain.
<b>Machine moves without pressing foot pedal</b>	Throttle not set at "neutral" position	Adjust linkage.
<b>Full speed only</b>	Pedal linkage frozen	Repair or adjust linkage.
<b>Machine will not reach full speed</b>	Transmission belt slipping or linkage needs adjustment	Charge battery.
<b>Forward speed only</b>	Transmission failure	Inspect, repair or replace.
<b>Reverse speed only</b>	Transmission failure	Inspect, repair or replace.
<b>Sporadic operation</b>	Transmission failure	Inspect, repair or replace.

## MACHINE TROUBLESHOOTING

PROBLEM.	CAUSE	SOLUTION
<b>Excessive dusting</b>	Dust skirts and seals worn, damaged, not adjusted properly	Replace or adjust skirts or seals.
	Dust filter clogged or damaged	Shake and clean or replace filter.
	Vacuum hose damaged	Replace vacuum hose.
<b>Poor sweeping performance</b>	Vacuum fan not operated	Belt loose, broken or off pulley.
	Broom bristles worn	Replace brooms.
	Brooms not adjusted properly.	Adjust brooms.
	Debris caught in broom drive mechanism.	Free mechanism of debris.
	Main broom drive failure	Belt loose, broken or off pulley.
	Side broom drive failure	Check circuit breaker. Check side broom motor circuit.
	Hopper dump door closed	Open dump door.
	Hopper full	Empty hopper.
	Hopper floor skirts worn, damaged	Replace skirts.
	<b>Machine travels slowly or not at all</b>	Parking brake set
Towing valve activated.		Release towing valve.
Linkage broken or not properly adjusted		Inspect and adjust or repair.
Transmission drive belt slipping or broken		Inspect and repair.
Main engine drive belt failure		Inspect and repair.
Differential drive chain failure.		Inspect and repair.

**SERVICE SCHEDULE**

<b>MAINTENANCE</b>	<b>DAILY</b>	<b>WEEKLY</b>	<b>50HRS</b>
Check and add fuel (see Engine's Owner's Manual supplied)	*		
Check and add engine oil (see Engine's Owner's Manual supplied)	*		
Check for fuel, oil and coolant leakage (see Engine's Owner's Manual supplied)	*		
Check radiator for dust and insects (see Engine's Owner's Manual supplied)	*		
Check water level of batteries after charging	*		
Check main broom & side broom adjustment, remove string, etc – check for damage	*		
Check main broom skirts and seals	*		
Check hopper lip skirts for damage and wear	*		
Visually check tires for damage and proper inflation	*		
Check for leaks under hydraulic power unit and at cylinder	*		
Check hopper side seals for adjustment and wear		*	
Check hopper top seals for wear		*	
Check air pressure in pneumatic tires (90PSI)		*	
Check air cleaner foam element (see Engine's Owner's Manual supplied)		*	
Rotate main broom end-for-end			*
Check skirt floor clearance			*
Tighten wheel nuts			*
Check carburetor adjustment			*

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