AMERICAN-LINCOLN
TECHNOLOGY

OPERATOR'S MANUAL & PARTS LIST

3366XP POWER SWEEPER

Beginning with Serial No. 586039

READ THIS BOOK

This book has important information for the use and safe operation of this machine. Failure to read this book prior to operating or attempting any service or maintenance procedure to your machine could result in injury to you or to other personnel; damage to the machine or to other property could occur as well. you must have training in the operation of this machine before using it. If you or your operator (s) cannot read English, have this manual explained fully before attempting to operate this machine.

ISO 9001

FILE A2287

All directions given in this book are as seen from the operator's position at the rear of the machine.

Part No. 2004 American-Lincoln Printed in the U.S.A.

TABLE OF CONTENTS

TABLE OF CONTENTS

CHAPTER 3 OPTIONS

MACHINE SPECIFICATIONS

DIMENSIONS

Length	97.0 inches (246.4 cm.)
Width	70.5 inches (179.1 cm.)
Wheel Base	45.2 inches (114.8 cm.)
Height	59.5 inches (151.1 cm.)

DRIVES

Propelling	Variable Displacement Pump Hydraulic Drive Motor
Sweeping	(2) Hydraulic Motors
Vacuum	(1) Hydraulic Motor
Multi Level Dump	(4) Hydraulic Cylinders

HYDRAULIC CONTROLS

Single foot pedal controls forward, neutral, reverse and dynamic braking.
Switch controlled broom and vacuum fan on/off.
Steering wheel controls maneuverability to the right and left. Power steering system translates steering wheel rotation to rear wheel angle.

MECHANICAL SYSTEMS

Brakes	Foot-operated with hand-operated locking drum brakes
Brooms	
Main	Lift and height adjustment
Side	Lift

SWEEPING SYSTEM

Type	Direct throw
Hopper	27 cubic feet 1500 lbs. (680 Kg.)
Filter Area	170 square feet

Main Broom

Length	50 inches (127 cm.)
Diameter	16 inches (40.6 cm.)
Bristle length	4.25 inches (10.8 cm.)

Features broom lift and adjustable broom height for wear compensation, standard proex and wire broom and quick change system.

Side Broom

Diameter	23 inches (58.5 cm.)

Features side broom lift, independent broom angle and height adjustment for wear compensation and nylon fiber broom.

Dust Control System

Twin quick change treated pleated paper type panel air filters (85 square feet or 7.9 square meters) with a 9 inch (22.9 cm.) hydraulically driven vacuum impeller.

SYSTEM FLUID CAPACITIES

Engine Cooling System

Radiator and Hoses	4.0 quarts (3.8 liters)
Gas/LP System total	8.0 Quarts (7.6 l.)
Diesel system total	8.0 Quarts (7.6 l.)

Fuel Tank

Gas, Diesel Fuel	9.2 gallons (34.8 liters)
LP Fuel	33 lbs. (15 kg.)

Hydraulic System	7 gallons (26.5 liters)

SPECIFICATIONS

GENERAL MACHINE PERFORMANCE

Sweeping Width	66 inches (167.6 cm.)
Speed	
Maximum Travel	8.0 MPH (12.9 Km/Hr)
Recommended Sweeping Speed	3.0 MPH(4.8 Km/Hr)
Turning Radius	
Left	68 inches (172.5 cm.)
Right	110 inches (279.4 cm.)
Minimum aisle width for 180° turn	120 inches (304.8 cm.)

WEIGHT

3366 Gas Variable Dump	3700 lbs. (1678 Kg.)
3366 Gas Variable Dump w/Crate	4200 lbs. (1905 Kg.)

ENGINE DATA

Ford LRG425 EFI

Bore and Stroke	3.78” x 3.40” (96.0 mm x 86.3 mm)
Oil Capacity	4.5 quarts (4.3 liters) (including filter)
Displacement	4 cylinders (2.5 liters) (153 CID)
Fuel	87 A.K.I. (Standard Unleaded Gasoline) HD-5 for LP versions

Mitsubishi S4Q2 Diesel

Bore and Stroke	3.46" x 4.06” (88 mm x 103 mm)
Oil Capacity	7.2 quarts (7 liters) -Oil pan / 8.4 quarts (8 liters) - Complete system
Displacement	4 cylinders (2.5 Liters) (153 cu. in.) (122 CID)
Fuel	ASTM No. 2-D

High temperature/low pressure sensors with engine shutdown are standard on both the Ford 425EFI and Mitsubishi S4Q2.

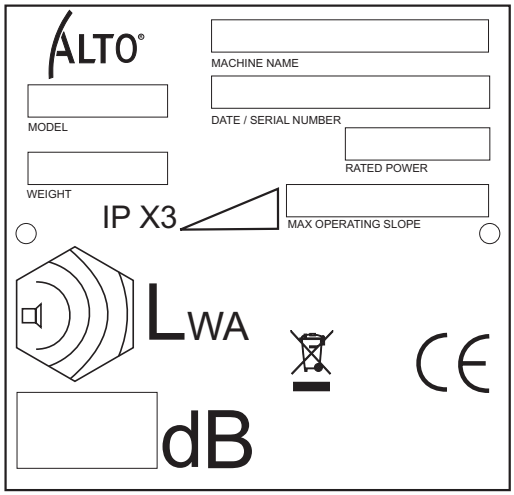
WHEELS

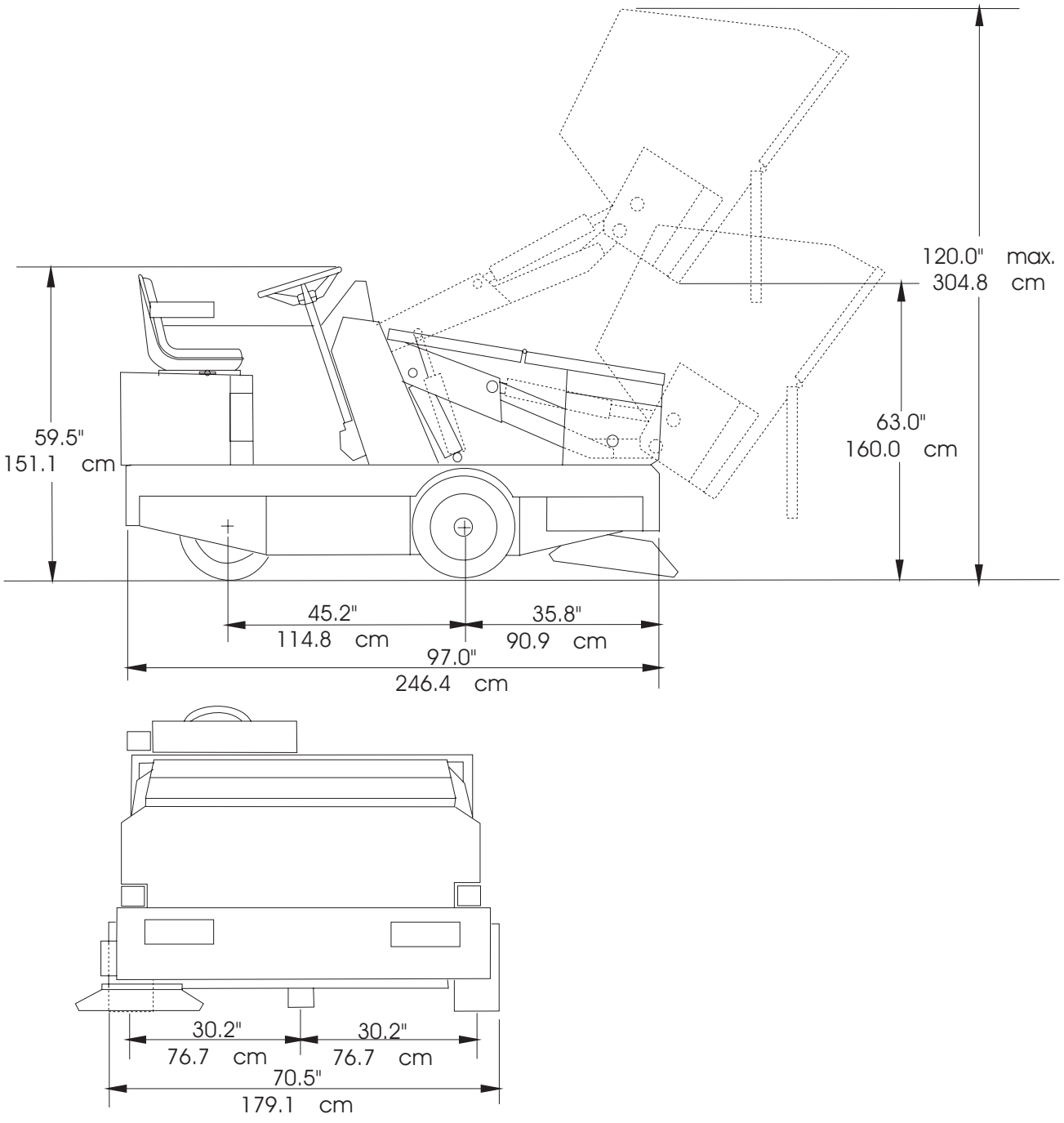
Diameter	21 inches
Tire	Pneumatic (6.90/6.00 x 9)
Rim	9 in. (22.86 cm), 5 bolts

WARRANTY

Our general conditions of business are applicable with regard to the guarantee. Subject to change as a result of technical advances. The guarantee is invalidated if the machine is not operated in accordance with these instructions or otherwise abused. The guarantee is invalidated if the machine is not serviced as described.

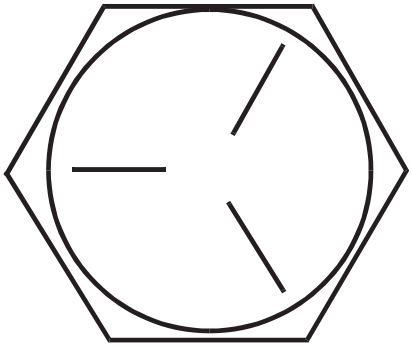
MACHINE DATA



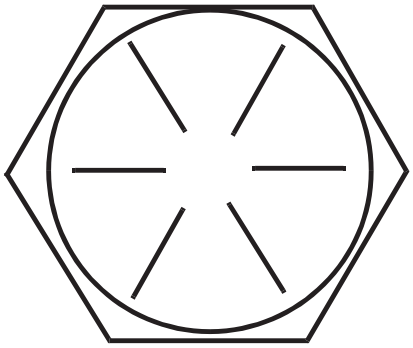

120.0" max.
304.8 cm
63.0"
160.0 cm
59.5"
151.1 cm
45.2"
114.8 cm
35.8"
90.9 cm
97.0"
246.4 cm
30.2"
76.7 cm
30.2"
76.7 cm
70.5"
179.1 cm

C-0100

BOLT IDENTIFICATION



SAE - Grade 5



SAE - Grade 8

Screw Size	Grade 5 Plated		Grade 8 Plated		410H Stainless		Brass	Type F & T & BT		Type B, AB
	C	F	C	F	C	F		C	F	
*6	14	15	-	-	18	20	5	20	23	21
*8	27	28	-	-	33	35	9	37	41	34
*10	39	43	-	-	47	54	13	49	64	49
*1/4	86	108	130	151	114	132	32	120	156	120
5/16	15	17	22	24	19	22	6	-	-	-
3/8	28	31	40	44	34	39	10	-	-	-
7/16	44	49	63	70	55	62	16	-	-	-
1/2	68	76	95	108	85	95	-	-	-	-
9/16	98	110	138	155	-	-	-	-	-	-
5/8	135	153	191	216	-	-	-	-	-	-
3/4	239	267	338	378	-	-	-	-	-	-
7/8	387	-	545	-	-	-	-	-	-	-
1	579	-	818	-	-	-	-	-	-	-

C = Coarse Thread
F = Fine Thread
* = Torque values for #6 through 1/4 are lb./in. All others are lb./ft.

NOTE

Decrease the torque by 20% when using thread lubricant
The torque tolerance is ± on torque values.

C2000/9905

+

HYDRAULIC TORQUE REQUIREMENTS

Nominal SAE Dash Size	O-ring Face Seal End		SAE O-ringBoss End	
	Thread Size Inch	Swivel Nut Torque LB-FT	Thread Size Inch	Str. Fitting or Locknut Torque LB-FT
-3	*	*	3/8-24	8-10
-4	9/16-18	10-12	7-16-20	14-16
-5	*	*	1/2-20	18-20
-6	11/16-16	18-20	9/16-18	24-25
-8	13/16-16	32-35	3/4-16	50-60
-10	1-14	46-50	7/8-14	72-80
-12	1 3/16-12	65-70	1 1/16-12	125-135
-14	1 3/16-12	65-70	1 3/16-12	160-180
-16	1 7-16-12	92-100	1 5/16-12	200-220
-20	1 11/16-12	125-140	1 5/8-12	210-280
-24	2-12	150-165	1 7/8-12	270-360

* O-Ring Face Seal Not Defined for this tube size.

NOTE
Parts must be lightly oiled with hydraulic fluid.

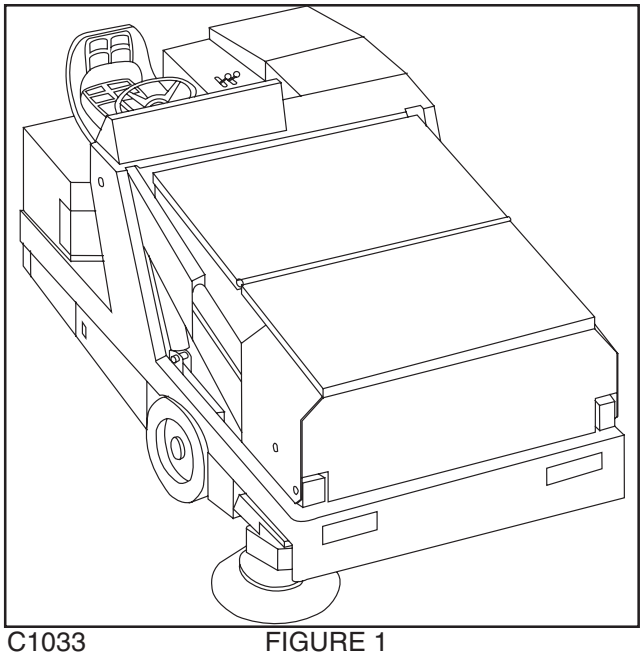
O-RING SIZE CHART

Part Number	O.D.	I.D.	Width	Description
2-00-04962	0.441	0.301+0.005	0.07	O-ring Seal Tube Size 4
2-00-04963	0.629	0.489+0.005	0.07	O-ring Seal Tube Size 8
2-00-04964	0.879	0.739+0.005	0.07	O-ring Seal Tube Size 12

DECIMAL-METRIC CONVERSION TABLE

Fraction	Decimal	Millimeter	Fraction	Decimal	Millimeter
1/64	0.015625	0.3969	33/64	0.515625	13.0969
1/32	0.03125	0.7938	17/32	0.53125	13.4938
3/64	0.046875	1.1906	35/64	0.546875	13.8906
1/16	0.0625	1.5875	9/16	0.5625	14.2875
5/64	0.078125	1.9844	37/64	0.578125	14.6844
3/32	0.09375	2.3813	19/32	0.59375	15.0813
7/64	0.109375	2.7781	39/64	0.609375	15.4781
1/8	0.125	3.1750	5/8	0.625	15.8750
9/64	0.140625	3.5719	41/64	0.640625	16.2719
5/32	0.15625	3.9688	21/32	0.65625	16.6688
11/64	0.171875	4.3656	43/64	0.671875	17.0656
3/16	0.1875	4.7625	11/16	0.6875	17.4625
13/64	0.203125	5.1594	45/64	0.703125	17.8594
7/32	0.21875	5.5563	23/32	0.71875	18.2563
15/64	0.234375	5.9531	47/64	0.734375	18.6531
1/4	0.25	6.3500	3/4	0.75	19.0500
17/64	0.265625	6.7469	49/64	0.765625	19.4469
9/32	0.28125	7.1438	25/32	0.78125	19.8438
19/64	0.296875	7.5406	51/64	0.796875	20.2406
5/16	0.3125	7.9375	13/16	0.8125	20.6375
21/64	0.328125	8.3344	53/64	0.828125	21.0344
11/32	0.34375	8.7313	27/32	0.84375	21.4313
23/64	0.359375	9.1281	55/64	0.859375	21.8281
3/8	0.375	9.5250	7/8	0.875	22.2250
25/64	0.390625	9.9219	57/64	0.890625	22.6219
13/32	0.40625	10.3188	29/32	0.90625	23.0188
27/64	0.421875	10.7156	59/64	0.921875	23.4156
7/16	0.4375	11.1125	15/16	0.9375	23.8125
29/64	0.453125	11.5094	61/64	0.953125	24.2094
15/32	0.46875	11.9063	31/32	0.96875	24.6063
31/64	0.484375	12.3031	63/64	0.984375	25.0031
1/2	0.5	12.7000	1	1.0000	25.4000

C-2001



C1033 FIGURE 1

Unpacking and Preparing the Machine for Operation

YOUR MODEL 3366XP POWER SWEEPER HAS BEEN SHIPPED COMPLETE, BUT DO NOT ATTEMPT TO OPERATE WITHOUT READING THE FOLLOWING INSTRUCTIONS.

1. Uncrate the machine and carefully remove from skid to prevent damage.
2. Connect and tighten battery cables.
3. Fill tank with UNLEADED gasoline or Diesel Fuel.

WARNING

Never fill fuel tank while the engine is running. Always be sure gasoline container and sweeper are electrically connected before pouring gas. This can be easily done by providing an insulated wire (permanently attached to the container) with battery clip on the other end.

4. Check engine crankcase oil level. Although properly lubricated at factory, check before starting engine. No special break-in oil is used and recommended number of operating hours before the initial oil change is the same as normal. See Maintenance chart.
5. Check radiator coolant level. Permanent type antifreeze is added at the factory to provide protection to approximately -35° F (-37° C). To retain this protection level, always add 1/2 part water to 1/2 part antifreeze.
6. Check oil level in the hydraulic reservoir located at center of machine beside the engine. The hydraulic reservoir is full, if oil can be seen in the sight glass with the hopper in “DOWN” position. If oil is required, add HYDRAULIC FLUID ONLY, automatic transmission fluid FORD type “F” ATF.

NOTE

After the first 50 operating hours, service must be performed on your engine to insure future high performance and trouble free operation. See Maintenance.

WARNING

FOR SAFETY, OBSERVE THE FOLLOWING WARNINGS. FAILURE TO COMPLY MAY CREATE A SERIOUS RISK OF INJURY TO YOURSELF AND OTHERS. THIS MACHINE SHOULD NOT BE USED IN HAZARDOUS LOCATIONS INCLUDING AREAS OF VOLATILE DUST OR VAPOR CONCENTRATIONS.

1. To avoid possible injury or property damage, read the operator's manual before using the machine.
2. Fire hazard. Fine dust, fuels solvents and thinner can explode and cause severe burns.
3. Do not use with/ or near flammable materials or vapors. Use only with good ventilation.
4. Heavy machinery, Improper use can cause personal injury.
5. Operate only from the designated operators position. Keep inside the body of the machine. Keep hands and feet on the designated controls. Always operate in well lighted areas.
6. Do not leave the machine on a ramp or dock. After stopping the machine, turn all the switches off.
7. Do not dump the hopper over an open pit or dock. Do not dump the hopper when positioned on a grade (ramp). The machine must be level (horizontal).
8. Operate only when lids, doors, and access panels are securely closed.
9. Never travel with the hopper in the raised position.
10. The operator must exhibit extreme caution when negotiating, turning and traveling across grades or ramps.
11. Start, stop, change direction, travel and brake smoothly. Slow down when turning. Avoid uneven surfaces and loose materials.
12. Watch out for obstructions, especially overhead.
13. Carry no passengers on the machine.
14. Set parking brake when leaving the machine. Chock (block) the wheels if the machine is to be parked on a grade (ramp), or is to be worked on.
15. Never leave the operator's seat with the engine running.
16. Report damage or faulty operation immediately. Do not operate the machine until repairs have been completed.
17. Maintenance and repairs must be done by authorized personnel only.
18. Never manually depress the electrical switch on the left lift arm when the hopper is raised.

WARNING

TO MAINTAIN THE STABILITY OF THIS SWEEPER IN NORMAL OPERATION, THE COUNTER-WEIGHTS, OVER-HEAD GUARD, REAR BUMPER GUARD, OR ANY SIMILAR EQUIPMENT, INSTALLED BY THE MANUFACTURER AS ORIGINAL EQUIPMENT, SHOULD NEVER BE REMOVED. IF IT BECOMES NECESSARY TO REMOVE SUCH EQUIPMENT FOR REPAIR OR MAINTENANCE. THIS EQUIPMENT MUST BE REINSTALLED BEFORE THE SWEEPER IS PLACED BACK IN OPERATION.

WARNING

WHEEL ASSEMBLY MAY EXPLODE CAUSING SERIOUS PERSONAL INJURY OR DEATH. WHEEL ASSEMBLY MUST BE SERVICED BY PROPERLY TRAINED AND QUALIFIED PERSONNEL IN ACCORDANCE WITH FEDERAL OSHA STANDARD 29 CFR PART 1910.177.<D>

WARNING

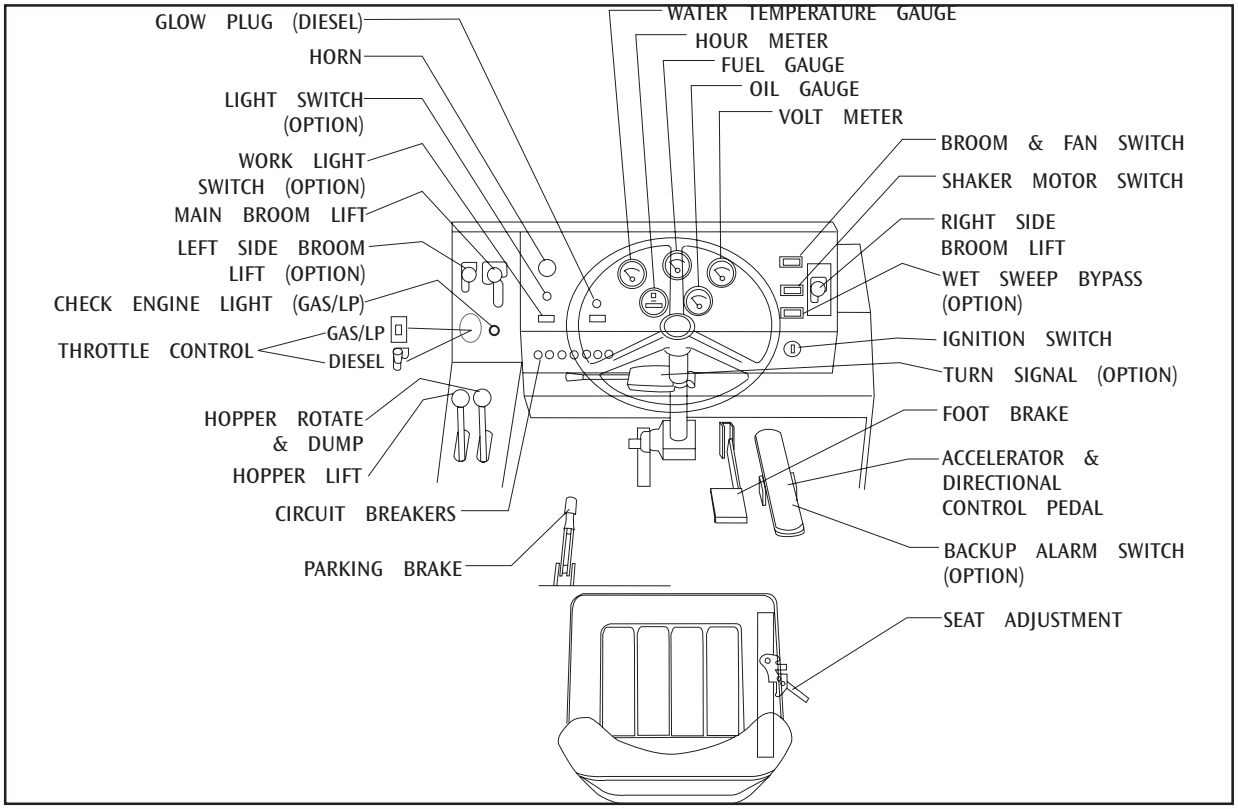
DO NOT ADD AIR TO TIRE AND RIM ASSEMBLIES THAT HAVE BEEN OPERATED IN A SERIOUS UNDERINFLATED OR FLAT CONDITION.
THE TIRE AND RIM COMPONENTS CAN EXPLODE CAUSING SERIOUS OR FATAL INJURIES.

-Always deflate a tire and wheel assembly completely before removing it from the vehicle for servicing.
-An underinflated tire is one inflated to 80% or less of recommended air pressure.
-Never use mismatched tire/rim components.

WEEE Symbol Information

ENGLISH **Correct Disposal of This Product (Waste Electrical & Electronic Equipment) (Applicable in the European Union and other European countries with separate collection systems)**

This marking, shown on the product or its literature, indicates that it should not be disposed with other household wastes at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take this item for environmentally safe recycling. Business users should contact their supplier and check the terms and conditions of the purchase contract. This product should not be mixed with other commercial wastes for disposal.



P4586ecp FIGURE 2

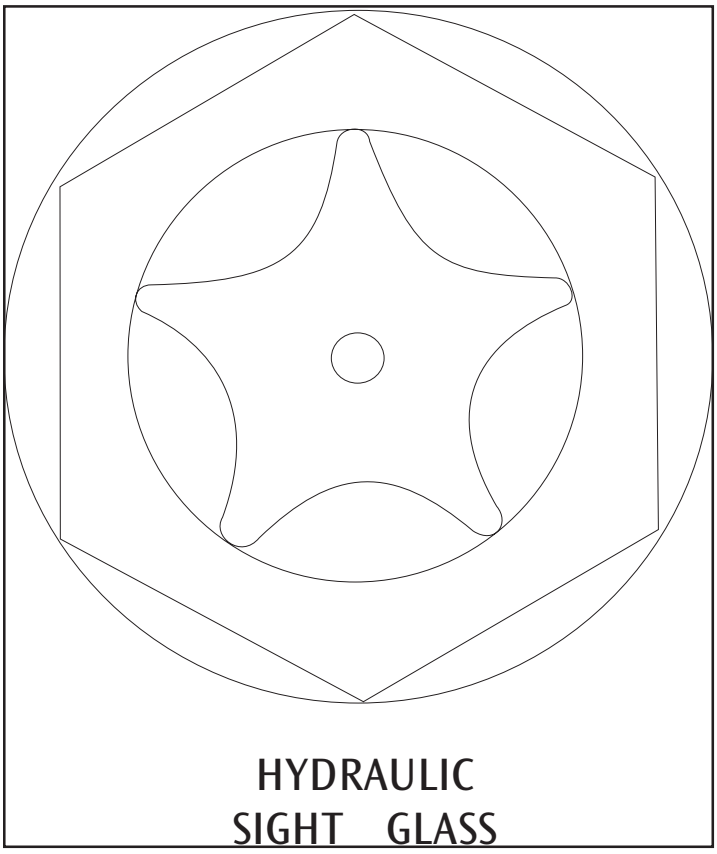
WATER TEMPERATURE GAUGE (See Figure 2)
The water temperature gauge is located on the instrument panel to the left of the fuel gauge. The gauge is activated by a sender in the engine. It displays the engine water temperature in °F.

HOUR METER (See Figure 2)
This meter is located to the left of the oil pressure gauge on the instrument console. This meter is activated when the engine begins running. The meter indicates actual “run” time of the machine. The meter can be used to indicate when maintenance should be done to the machine.

FUEL GAUGE (See Figure 2)
The fuel gauge is located between the water temperature gauge and the volt meter on the instrument panel, and indicates the level of fuel contained in the fuel tank.

OIL PRESSURE GAUGE (See Figure 2)
The oil pressure gauge is located on the instrument panel to the right of the hour meter. The gauge is mechanical and activated by a sender in the engine. It displays the engine oil pressure in PSI.

VOLT METER (See Figure 2)
The volt meter is located on the control panel to the left of the fuel gauge. The meter indicates the charging or discharging of the battery. When the key is in the accessory position the gauge will register approx. 12 volts. The meter will indicate approx. 13 to 14.5 volts when the engine is running. This indicates that the alternator is working correctly.



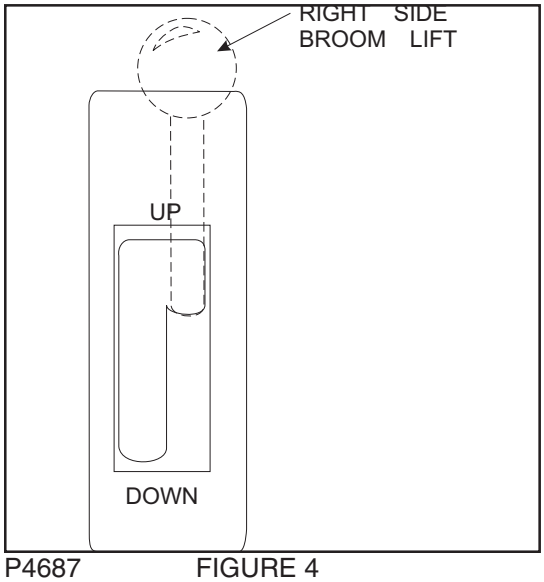
P4696a FIGURE 3

HYDRAULIC FLUID SIGHT GLASS (See Figure 3)
The sight glass is located on the side of the hydraulic oil reservoir.
The sight glass indicates the level of the hydraulic oil in the reservoir.
Fluid level must be visible in the sight glass when the hopper is in the down position. If the sight glass is completely full, then there is too much fluid in the reservoir.

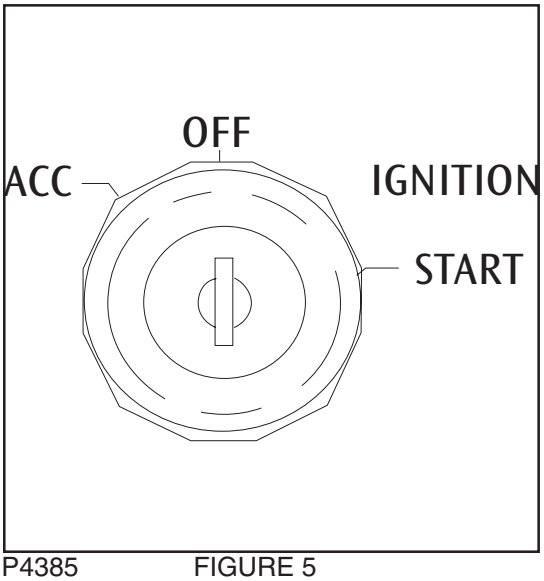
BROOM & FAN SWITCH (See Figure 2)
The broom and fan switch is located to the left of the right side broom lever. This switch “powers” the brooms and the vacuum fan system. It has on-off positioning.

SHAKER MOTOR SWITCH (See Figure 2)
The shaker motor switch is located below the broom and fan switch. This is a momentary switch that will activate the filter shaker motors. Hold the switch for 20 to 30 seconds to activate the shaker motors. When the shaker motors have been activated, the brooms and impeller fan will stop. The shaker motors will only operate with the hopper in the “SWEEP” position. The switch is not on the control panel if the machine is equipped with the CDC Dust Control Filter Option.

TIMED SHAKER MOTOR SWITCH (OPTION) (See Figure 2)
The shaker motor switch is located below the broom and fan switch. This is a momentary switch that will activate the filter shaker motors for 20 to 30 seconds after it has been pushed. When the shaker motors have been activated, the brooms and impeller fan will stop. The shaker motors will only operate with the hopper in the “SWEEP” position.



P4687 FIGURE 4



P4385 FIGURE 5

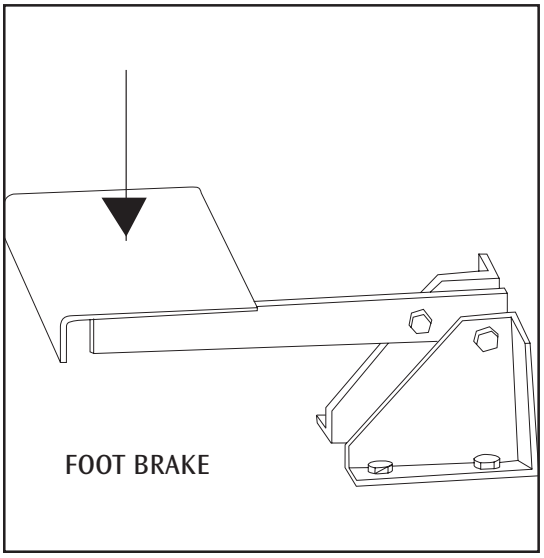
RIGHT SIDE BROOM LIFT AND POWER CONTROL (See Figure 4)
The right side broom lift and power control is located on the right side of the instrument panel. To raise and stop the side broom, grasp the lever and push the lever to the locking notch, marked “UP”. To lower the side broom, grasp the lever, push it up and to the left, away from the locking notch. Let the lever lower -until it rests by the “DOWN” mark. The broom will automatically begin rotating as it is lowered. To turn “ON” the side brooms, move the Hopper Lift/Side Broom Lever forward to the “ON” position (See Figure 9).

IGNITION SWITCH (See Figure 5)
The keyed ignition switch is located to the right of the steering column on the instrument panel. It has four positions.

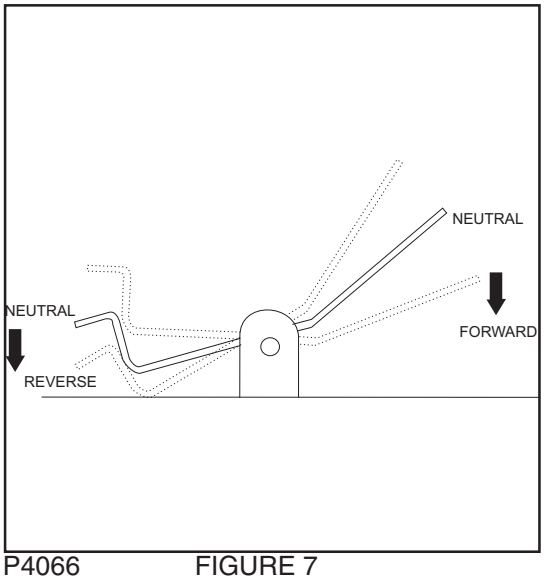
1. The key turned to the center “OFF” position will shut of the engine. The following items can be activated in the “OFF” position.
   a. Horn
   b. Filter Shaker Motors
   c. Light Options
2. The key turned to the left “ACCESSORY” position will allow the following additional items to be activated:
   a. Turn Signals
   b. Instrument Gauges
3. The key turned to the right “IGN/ON” position will allow all the items listed above to be activated. This position will not start the engine.
4. The key turned to the far right “START” position will start the engine. This position is a momentary position. The key will revert to the “IGN/ON” position when it is released.

WET-SWEEP BYPASS SWITCH (OPTION) (See Figure 2)
The wet-sweep bypass switch is located to the right of the steering wheel under the shaker motor switch. The switch activated will shut off the vacuum motor. This will keep the dust filters from being ruined by the water pickup from sweeping water.

4-WAY TURN SIGNALS (OPTION) (See Figure 2)
The turn signal option is located on the steering column and works as automotive turn signals work, forward on the lever for right and back on the lever for left. The 4 way flasher will activate when the turn signal lever is pulled out.



P4689 FIGURE 6



P4066 FIGURE 7

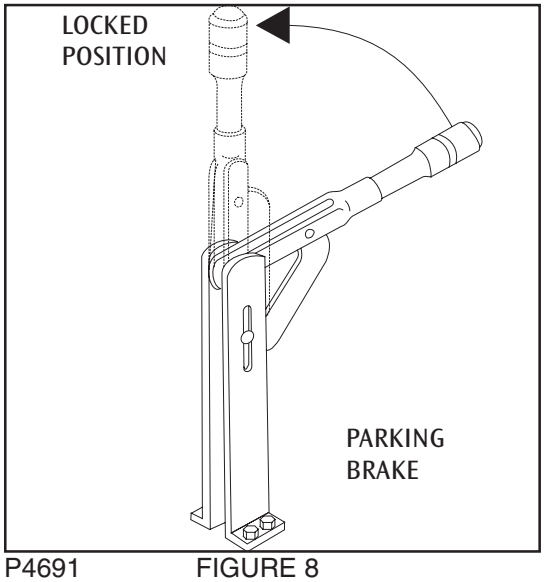
FOOT BRAKE **(See Figure 6)**
The foot brake pedal is located to the right of the steering column on the floor of the driver compartment. The foot brake on front wheels is a mechanical system actuated by the brake pedal.

ACCELERATOR & DIRECTIONAL CONTROL PEDAL (See Figure 7)
The accelerator and directional control pedal is located on the floor of the operator's area, to the right of the brake pedal. The accelerator and directional control pedal controls the machine direction and travel speed.

1. Put foot pressure on the upper portion of the pedal. The machine will move forward.
2. Increase the foot pressure on the upper portion of the pedal to increase the forward speed.
3. Put foot pressure on the lower portion of the pedal. The machine will move in reverse.
4. Increase the foot pressure on the lower portion of the pedal to increase the reverse speed.
5. To stop the machine, put light foot pressure on the opposite end of the accelerator and directional control pedal. If the machine is moving forward, put light foot pressure on the lower portion of the pedal. If the machine is moving in reverse, put light foot pressure on the upper portion of the pedal.

BACK UP ALARM (OPTION) (See Figure 2)
The back up alarm is operated by a switch that is located under the lower section of the Accelerator and directional control pedal. The alarm makes a loud audible noise when the machine is being driven in reverse.

SEAT ADJUSTMENT (See Figure 2)
This lever is located on the right of the seat. This lever allows the seat to be adjusted forward or back when the lever is moved.



P4691 FIGURE 8

PARKING BRAKE (See Figure 8)
The parking brake lever is located in the left side of the driver compartment floor. This lever when raised to the upright position will "lock" the foot brake pedal in the down position.

CIRCUIT BREAKERS (See Figure 2)
The circuit breakers are located to the left of the steering wheel. When a circuit breaker "pops" out, this is an indication of an electrical problem that must be corrected before the breaker can be reset.

There can be up to seven circuit breakers in the row. They control the following circuits, beginning with number 1 on the left:

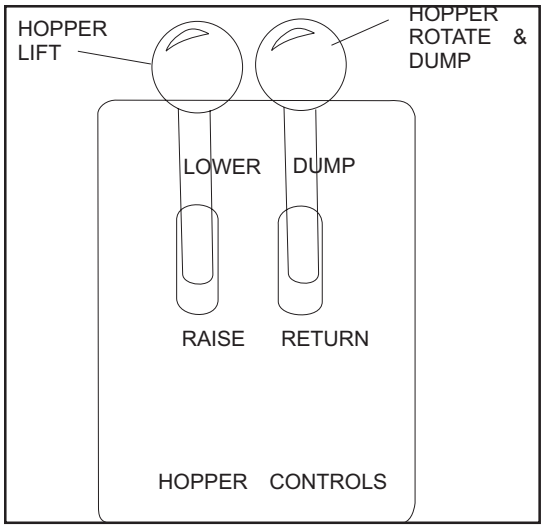
CB-1 = Filter shaker motors
CB-2 = Horn
CB-3 = Starter relay
CB-4 = Ignition
CB-5 = Accessory
CB-6 = Options
CB-7 = Cab Options

GLOW PLUG (DIESEL)

WARNING

It is advised that in no circumstances should either or any other unauthorized starting aids be used at the same time as the Glow Plugs.

To operate the glow plugs, the following procedure should be adopted.
1. Before operating he starter motor, press the "GLOW PLUG" button for approximately 20 to 30 seconds.
2. With the "GLOW PLUG" button still depressed, engage the starter motor until the engine starts.
3. Continue to press the "GLOW PLUG" button for a few seconds after the engine has started until even running has been obtained.
4. If the engine does not start, disengage the starter motor but keep the "GLOW PLUG" button depressed for a further 10 to 15 seconds. When a further attempt is made to start the engine, keep the glow plugs energized while starting and for a few seconds after the engine has fired until it is running smoothly.



P4686 FIGURE 9

HOPPER LIFT / SIDE BROOM LEVER (See Figure 9)

The Hopper Lift/Side Broom lever is located to the left side of the drive compartment. The lever is a three position control that operates the hopper lift, side broom and optional left side broom.

NOTE

The Hopper Lift lever will not function until the hopper has been rotated to clear the body of the sweeper.

The lever is spring centered from the rear position. The center position turns OFF the side broom (or brooms) and is the HOLD position when dumping the hopper. The lever is detonated in the forward position. Move the lever forward to turn ON the side broom when sweeping or to LOWER the hopper when dumping the hopper. Move the lever back to RAISE the hopper when dumping. Release the lever when the hopper has reached the desired height. The lever will return to the center HOLD position.

HOPPER DUMP/RETURN CONTROL LEVER (See Figure 9)

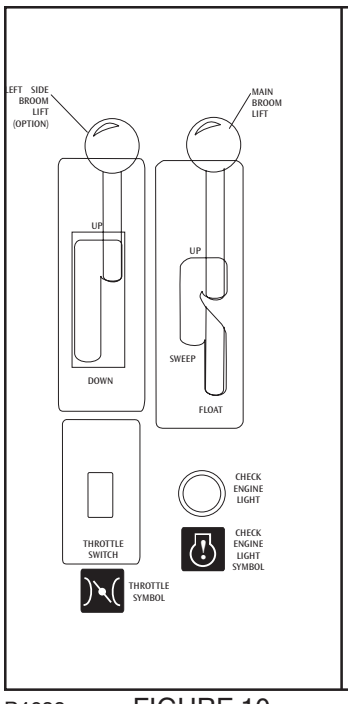
The Hopper Dump/Return lever is located to the left of the drive compartment. The lever is a two position control that operates the hopper dump system. The lever is spring loaded to the center position which "STOPS" rotation of the hopper. To rotate the hopper, move the lever forward to the dump position and hold. Release the lever when the hopper reaches the desired position. The return the hopper after dumping, move the lever back to the RETURN position. The hopper will rotate back and the hopper will lower to the seated position. Release the lever once the hopper has been seated in the body of the sweeper.

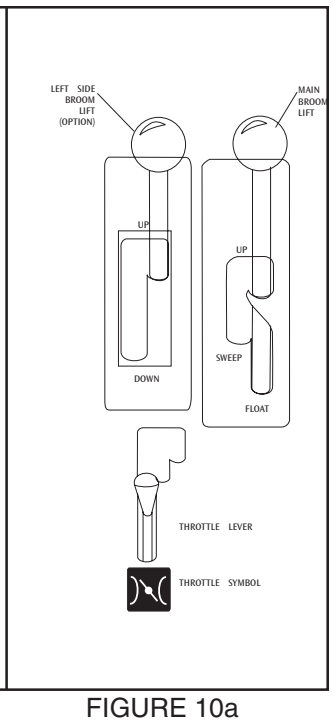
WARNING

Never turn off the engine with the hopper in the lifted position.

THROTTLE CONTROL (Figures 10 & 10a)

The throttle control is located on the left side console. Gas and LP equipment have a throttle switch. Diesel versions have a lever. Both have 3 throttle speed positions - IDLE, 1, and 2. To operate the diesel, grasp the lever and push up and right to desired locking notch. To reduce to idle, grasp the lever and push up and to the left (away from both locking notches). Let the lever lower until it rests at the bottom of the slot. For the Gas/LP switch, the bottom position is idle, the top position is top RPMs (2450 "no load"), and the middle is lower speed (2050 "no load" RPMs). "Load" (brooms and/or brushes and/or dust control operating) and "No Load" (brooms, brushes & dust control off) RPMs are the same for gas and LP equipment; there will be a slight drop between "Load" and "No Load" RPMs with diesels. Always return the throttle lever to the idle position before turning off the key to stop the engine.





P4688ecp FIGURE 10 FIGURE 10a

MACHINE			RPMs	
			IDLE	"NO LOAD"
SWEEPER/ SCRUBBER (1 speed level)	Gas/LP		950	2050
	Diesel		950	2150
SWEEPER (2 speed levels)	Gas/LP	1st	950	2050
		2nd	950	2450
	Diesel	1st	950	2150
		2nd	950	2550

CHECK ENGINE LIGHT (Gas, LP Only) (See Figure 10a)
The check engine light is located on the left side console. If the light comes on, it indicates a problem with the engine. Flip the switch located on/near the air cleaner bracket in the engine compartment and count the number of times the panel light flashes, then go to the "Check Engine Light Codes" page at the end of this chapter to determine the problem.

LEFT SIDE BROOM LIFT AND POWER CONTROL (OPTION) (See Figure 10)
The left side broom lift control is located on the left side of the instrument panel. To raise and stop the side broom, grasp the lever and push the lever to the locking notch marked "UP". To lower the side broom, grasp the lever and push it up to the right away from the locking notch. Let the lever lower until it rests by the "DOWN" mark. To turn "ON" the side brooms, move the Hopper Lift/Side Broom Lever forward to the "ON" position.

MAIN BROOM LIFT (See Figure 10)
The main broom lift control is located to the left of the driver's seat. To lower the main broom, grasp the lever and push up and to the left to clear the locking notch. Move the lever down to the first or second notch in the elongated slot. The first notch, "SWEEP", is for normal sweeper (2 to 3 in. or 5 to 8 cm. broom pattern).
The second notch, "FLOAT", is for heavy sweeping (4 to 5 in. or 10 to 13 cm. broom pattern), To raise the main broom, push the lever up and slide into the locking notch in the "UP" position. You may operate the main broom in either the "SWEEP" or "FLOAT" position. However, the "SWEEP" position should be used for normal sweeping and will result in increased broom life. The "FLOAT" position should be used only when sweeping in extremely uneven areas.

WORK LIGHT SWITCH (OPTION)
The work light switch is located under the light switch to the left side of the steering wheel. It allows the operator to work the rear work light option when the headlights are on.

LIGHT SWITCH (OPTION)
The light switch is located under the horn to the left side of the steering wheel. It will work various light options that are available for this machine, such as:

* Head Lights
* Tail Lights
* Side Broom Lights
* Instrument Lights

All gauges with the exception of the hour meter can have an option internal instrument light.

HORN BUTTON
The horn button is located to the left of the steering column. The horn button is always active. Push the horn button to sound the horn.

CAB (OPTION)
The all weather cab is available for this machine along with several "cab only" options:

* Heater
* Windshield Wipers
* Defroster Fan
* Interior Light
  Pressurizer

These options have their controls located on the cab.

LOW OIL SHUTDOWN
This engine is equipped with a low oil pressure shutdown. If the engine oil pressure drops too low, the engine will shut down. Add engine oil until the oil is brought up to the correct level.

NOTE

Before starting the engine, perform these pre-start checks.

PRE-START CHECK LIST

1. Check engine air filter element indicator.
2. Check engine oil level.
3. Check radiator coolant level.
4. Check hydraulic fluid level.
5. Check fuel level.
6. Check all systems for leaks.
7. Check brakes and controls for proper operation.
8. Check broom patterns

BEFORE STARTING ENGINE

1. Set Parking Brake.
2. Make sure all controls are in the “Off” position.

TO START ENGINE

1. Be sure accelerator and directional control pedal is in neutral.
2. Turn key to “On” position & release.
3. If engine fails to start after following the above procedures, refer to Engine Manual Section.

NOTE

When machine has been stored in below-freezing temperatures, run engine at not over 1/2 throttle with machine standing still for 5 to 10 minutes to warm engine and hydraulic oil.

TO OPERATE SWEEPER

1. Make sure parking brake is released.
2. Lower the side and main broom to the floor. (The main broom control may be placed in either the “FLOAT” or “SWEEP” position.)
3. Turn Broom Fan Switch on.
4. Pull engine throttle to “UP” position. (Engine must always be operated at full governed speed while sweeping to obtain recommended brush speed and dust control).
5. Push forward on directional control pedal to place machine in motion.
6. Vary your foot pressure on the directional control pedal to obtain desired travel speed.

TO STOP SWEEPER

1. Allow directional control pedal to return to neutral (centered) position. (Pedal will automatically return to neutral when foot pressure is released.) FOR NORMAL OPERATION, DEPRESS DIRECTIONAL CONTROL PEDAL WITH HEEL INTO NEUTRAL.
2. Depress the foot brake.
3. Turn Broom Fan Switch off.
4. Put the broom controls (Side and Main) in the “UP” position.
5. Push engine throttle down. Turn key to “OFF.”
6. Set parking brake.

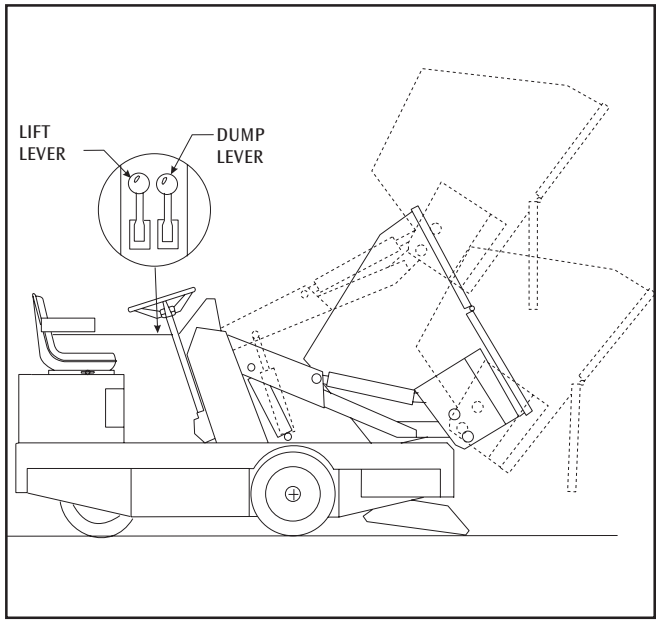
NOTE
After stopping the engine, perform these post operation checks.

POST OPERATION CHECK LIST

1. Clean debris hopper.
2. Check sweeping brooms for wear or damage.
3. Check all flaps for wear, damage and adjustment.
4. Fill the fuel tank.

WARNING
The gasoline tank access is located behind the drivers seat.
DO NOT mistake the *hydraulic reservoir* for the gasoline tank.

5. Check all systems for leaks.

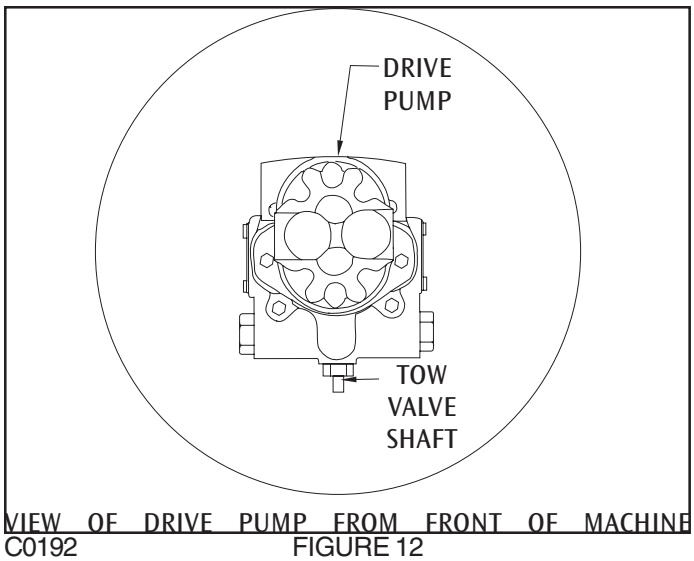


P4585 FIGURE 11

TO EMPTY DEBRIS HOPPER

1. Set engine throttle to full throttle position.
2. Push the hopper rotate and dump lever to the “DUMP” position. The hopper will begin to rotate.
3. Once the hopper rotation speed doubles, the hopper lift lever will work. Raise the hopper to the desired level (MINIMUM OF 8" or 20 cm OF LIFT REQUIRED) by pulling back the hopper lift lever to the “RAISE” position.
4. Drive forward 12 to 18 inches slowly with the hopper up before completing the dump cycle.
5. Push the hopper rotation and dump lever to the “DUMP” position to complete dump cycle.
6. Drive in reverse 12 to 18 inches or 30 to 46 cm. slowly with the hopper up to clear the dumpster before lowering the hopper.
7. Pull the hopper rotation and dump lever to the “RETURN” position and the hopper will automatically rotate and lower to its proper position.

WARNING
Never turn off the engine with the hopper in the lifted position.



C0192 FIGURE 12

TOWING INSTRUCTIONS

1. Locate tow control shaft extension as shown in Figure 12. The tow control shaft is located underneath the pump.
2. To open hydraulic circuit to wheel drive motor turn shaft 90°.
3. After towing, turn shaft 90° to its original position.

DUST FILTERS

The Filter Panel can be periodically removed from the hopper and blown off with compressed air (not to exceed 100 P.S.I.) or cleaned with soap and water. (Do not attempt to use Filter Panels that have not dried completely.)

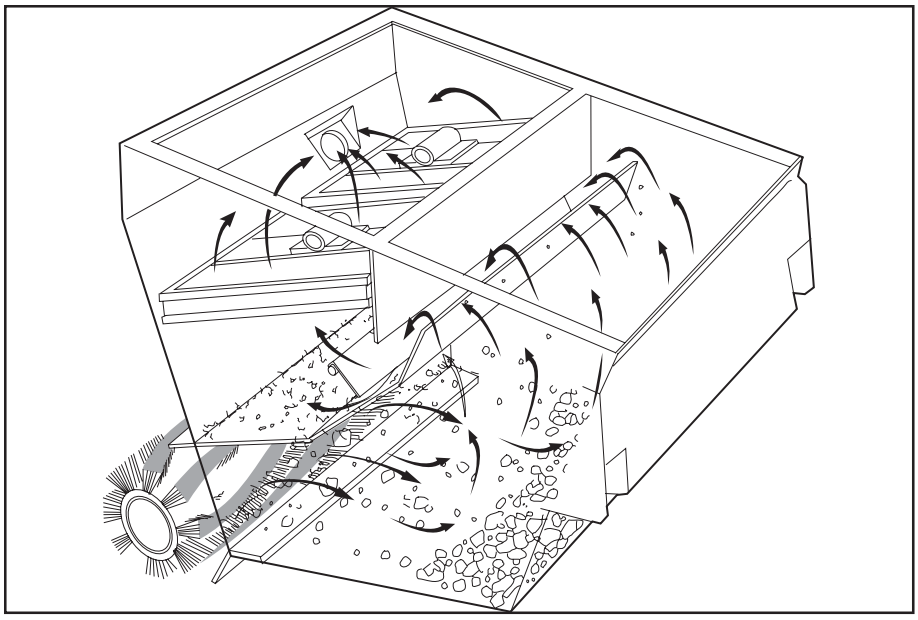
THE DUST CONTROL SYSTEM

The baffle system that is built into the debris hopper is designed minimize dust in the air while the machine is sweeping.

The debris from sweeping is thrown into the hopper. The impeller vacuum fan pulls the lighter dust up and through a baffle system. The Pre-Clean Flap separates the heavier dust particles to an area below the filter. The lighter dust particles are captured by the dust filter. This allows the dust filter to remain cleaner and need less shaking to remove dust. When the dust filter becomes clogged the filter shaker switch should be pushed to start the dust shaker cycle. This will extend the life of the filter.

NOTE

The main broom and impeller fan will shut off automatically when the shaker motor is cycling.



P4695 FIGURE 13

SAFETY REQUIREMENTS

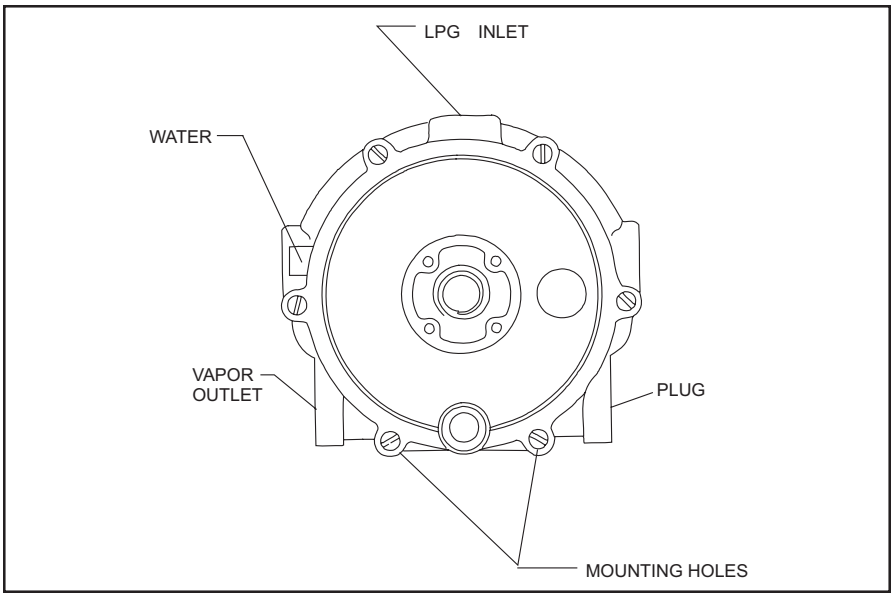
1. Keep cigarettes, sparks, and open flame away when working on LP equipment, when inspecting for gas leaks or when LP tanks are present.
2. Check all components for proper operation. Replace LP components when needed. Never by-pass defective safety components.
3. Check routing of all LP hoses. Keep them away from sharp edges, exhaust manifolds, or other hot surfaces. Check for signs of abrasion or deterioration.
4. Check for gas odor before and during starting operations. If gas odor is noticed, stop and check for leaks or component malfunction.
5. Make sure LP tank is free of dents or gouges.
6. Make sure service coupling is clean and free of damage. Make sure service coupling of tank matches machine service coupling.
7. Keep the engine properly tuned.
8. Make sure the LP tank matches the fuel system.
9. Make sure LP tank is securely mounted on the machine with the retainer bracket clamping the tank, and with the locating pin in position.
10. Park the machine in a shaded, cool area when not in use.
11. Keep the LP tank service valve closed when the tank is not in use.
12. Never overfill LP tank. Fill the LP tank to the recommended weight stamped on the tank.
13. Use care in handling LP tanks. Never drop or drag them.
14. Always store and transport LP fuel tanks with the safety relief valve in the “UP” position.
15. Avoid contact with the LP fuel to avoid frostbite.

When the machine is to stand unused for a period of time, overnight for example, park the machine in a designated area, shut off the service valve at the tank and operate the engine until the remaining fuel is consumed. Then, turn off the ignition switch.

LP CHECKLIST

This checklist can be made quickly. Be sure to make all of the checks listed on the maintenance chart.

1. Check connections for leaks.
2. Open the LP storage tank valve.
3. Check the regulator. See Figure 15.
4. Start the engine.



P4563ecp FIGURE 15

LP-POWERED MACHINES

LP FUEL SYSTEM

The LP fuel system consists of several components not found on the gasoline system. The LP fuel system also contains the associated mounting hardware and plumbing for the LP components. The major LP components are as follows (these components are factory set, adjustments to these components should only be made by authorized service personnel):

1. Throttle plate & mixer
2. Combination water-heated vaporizer & regulator
3. LP fuel tank, valves & fittings

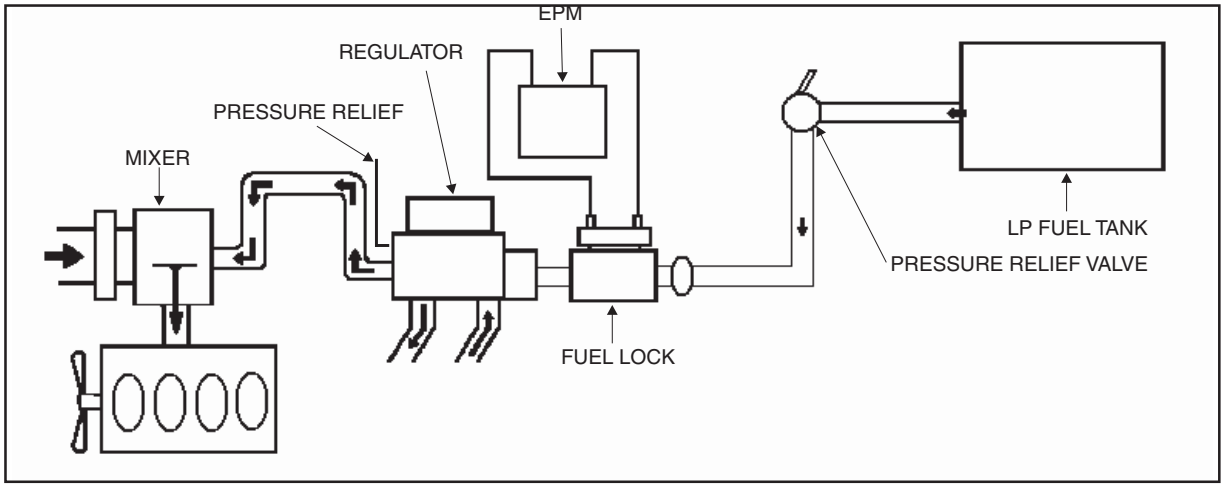


FIGURE 16 lpexport

LP VAPOR WITHDRAWAL SYSTEM

The liquid fuel flows from the tank under its own pressure to the pressure relief valve. This valve is normally closed, which prevents fuel from escaping into the atmosphere. When the engine is running, LP then flows through the open fuel lock (lock automatically closes when engine is shut down) and into the vaporizer/regulator where it is converted to a gaseous state. (The regulator reduces the tank pressure and makes the flow more constant.) The LP is then piped into the mixer where it is introduced into the air flow and sent to the combustion chamber.

LP VAPORIZER-REGULATOR QUICK CHECK

Turn on the ignition switch and open the radiator cap. Check the coolant for bubbles. If bubbles are present, the vaporizer may have a leaking gasket or may have developed a pinhole leak, allowing the LP fuel to enter the cooling system.

LP FUEL TANKS

Standard D.O.T. LP fuel tank sizes have 14, 20, 33.5, and 43.5 lb. capacities. The liquid volume permitted in these containers is less than the total volume of the cylinder, to provide for expansion of the LP fuel should the temperature increase a normal amount. Excessive heat may cause the fuel to expand too much, causing the safety relief valve to vent some LP fuel, relieving internal tank pressure.

Each tank is marked showing the type of construction (liquid or vapor), the manufacturer, the date of manufacture, the capacity, the weight, and the date of requalification. D.O.T. LP fuel tanks must be requalified (checked) periodically. This requalification must be recorded and maintained for the life of the container.

USE & CARE OF LP TANKS

If an LP 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 cylinder, regardless of conditions. Repairs must be made by qualified personnel.

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

CHANGING MACHINE LP TANKS

Refueling machines with LP tanks is an important function. Refueling is accomplished by replacing the empty LP tank with a full one.

The tank changing operation presents an opportunity for the machine operator to observe, carefully, the tank, tank fittings, and the fuel lines and the fittings for his own satisfaction. If abnormal wear is detected, the operator should report his findings to his supervisor for appropriate action.

To begin the tank changing operation, park the machine in a designated safe area and stop the machine. Next, close the tank valve, then remove the quick-disconnect coupling from the tank valve. Observe the machine fuel lines and the quick-disconnect for damage or abnormal wear.

Remove the empty tank from the holding device and observe the tank and tank fittings for damage or abnormal wear. Handle the tank carefully; it must not be dropped or mishandled.

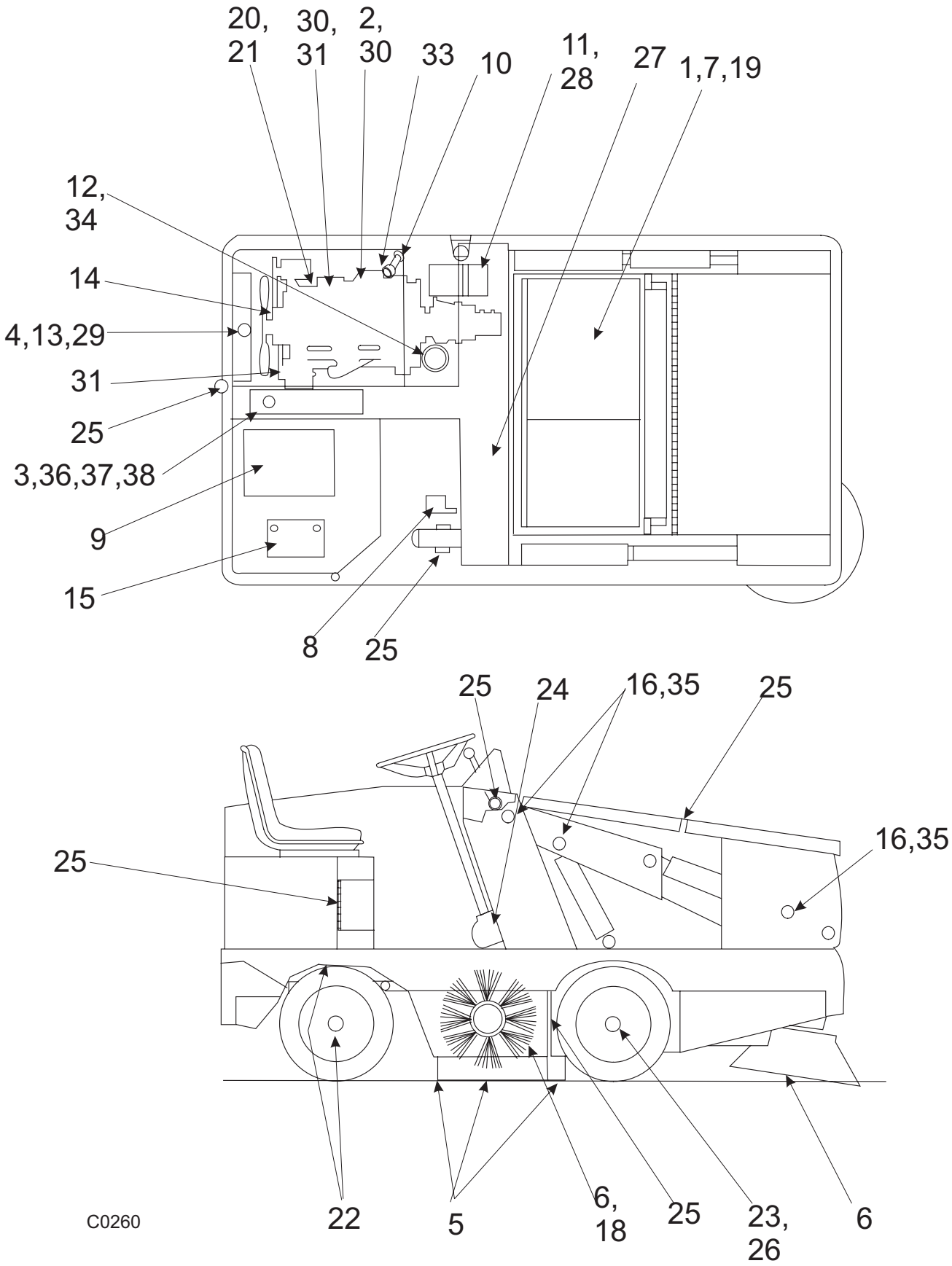
Store the LP tank in a designated safe area. Select a filled LP tank and observe it for damage or leaks. Carefully install the filled tank in the machine so that the tank centering pin enters the aligning hole in the tank collar. This assures that the tank is positioned properly, so that the safety relief valve, liquid level gauge, and service valves will operate properly. Fasten the tank retaining bracket so that the tank is locked into position. Reconnect the fuel line to the tank servicing coupling. Open the service valve slowly and check for leaks. If a leak is found, close the valve immediately and notify the appropriate personnel. If no leaks are found, the engine is ready to start. Do not start the engine unless the operator is in the operator's position, with the directional control pedal in the neutral position.

STORAGE OF LP FUEL TANK

Whether the storage is inside or outside, it should not be in the vicinity of combustible materials or high temperature sources such as ovens or furnaces, since the heat may raise the pressure of the fuel to a point where the safety relief valves would function. Care should be taken to insure that the cylinders are stored in such a manner 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 LP fuel tanks. They 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 tanks must be closed, except when the engine must be operated.


20, 21
30, 31
2, 30
33
10
11, 28
27
1,7,19
12, 34
14
4,13,29
31
25
3,36,37,38
9
15
8
25
25
24
16,35
25
16,35
25
C0260
22
5
6, 18
25
23, 26
6

For service assistance, consult the yellow pages under power sweepers and scrubbers. For best performance, replace worn parts with genuine Alto parts.

EVERY 8 HOURS or DAILY **operation check and clean/adjust if necessary:**

1. Inspect panel filter for damage and clean.
2. Check engine oil level
3. Check hydraulic fluid level
4. Check radiator core for blockage
5. Check all flaps for wear or damage
6. Check brooms for wear or damage, adjust as required
7. Check panel filter (clean side) for leakage
8. Check brake pedal and parking brake
9. Check for LP/Diesel odor at connections
10. Check water separator (Diesel)
11. Clean engine air filter dust cap and check filter
12. Check hydraulic return filter
13. Check coolant level

EVERY 50 HOURS

14. Check tension on all belts
15. Check battery electrolyte level (If battery is not maintenance free)
16. Lubricate dump system
17. Check all hydraulic hoses for wear or cuts
18. Rotate main brush (end-to-end)
19. Clean or replace panel filter

Perform recommended engine maintenance (See engine manual)

EVERY 100 HOURS

20. Change crankcase oil
21. Change engine oil filter
22. Lubricate drive wheel swivel bearing
23. Lubricate front wheel bearings
24. Lubricate steering gear box
25. Lubricate all moving joints
26. Check brake pads for wear and adjust accordingly
27. Lubricate clamp ends of the throttle cable with NAPA #765-1363 or equivalent anti-seize lubricant.

Perform recommended engine maintenance (See engine manual)

EVERY 250 HOURS

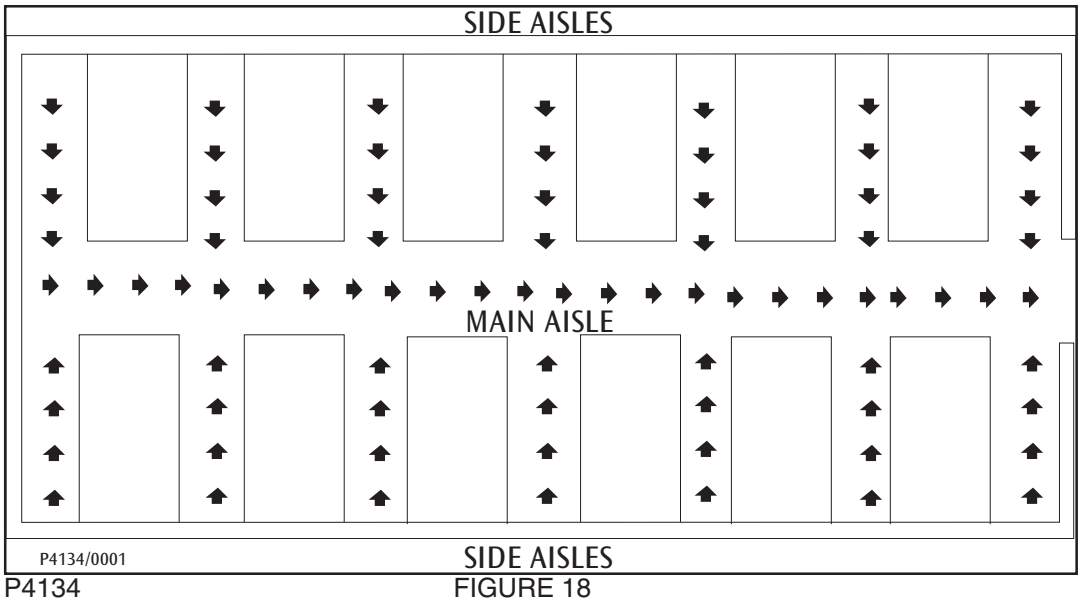
29. Flush radiator coolant system
30. Remove spark plugs - clean or replace (Gas, LP)
31. Check distributor - service or replace (Gas, LP)
32. Clean and lubricate governor linkage (Diesel)
33. Replace fuel filter
34. Replace hydraulic return filter element
35. Check brass bushings & pins on hopper & lift arms

Perform recommended engine maintenance (See engine manual)

EVERY 500 HOURS

36. Clean hydraulic reservoir
37. Clean hydraulic intake strainer
38. Change hydraulic fluid

Perform recommended engine maintenance (See engine manual)



P4134 FIGURE 18

WARNING

Do not turn the steering wheel sharply when the machine is in motion. The sweeper is very responsive to movement of the steering wheel. Do not make sudden turns.

WARNING

Sweep in straight paths. Do not bump posts. Do not scrape the sides of the machine.

WARNING

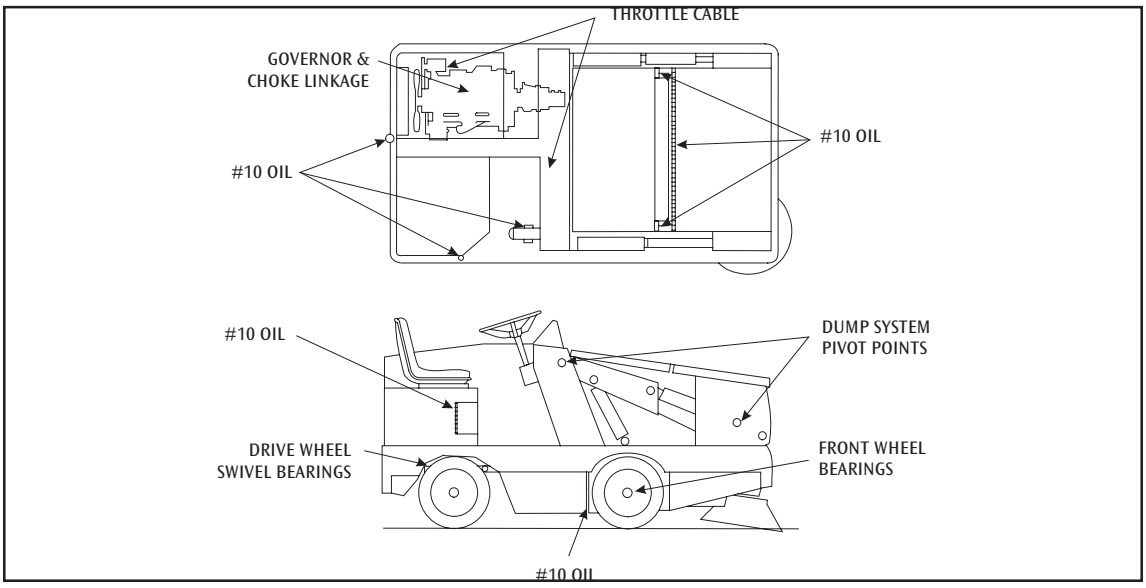
When the machine is in motion, do not push the directional / speed control pedal all the way forward. This is the same as starting in "High" and will put a strain on the motor and drive system.

1. Pick up large debris before sweeping with machine. Flatten and remove bulky cartons from aisle before sweeping large debris.
2. Use the machine to sweep debris from narrow aisles into main aisle. See Figure 17.
3. After the machine has made a sweeping run.
4. Push and hold the filter shaker control button for 20 to 30 seconds, the filter shakers will shake to unload accumulated dust. The main broom and fan will turn off automatically. The filter shakers only work when the hopper is in the sweep position.
5. Sweep debris from main aisle. See Figure 17.
6. Overlap of broom paths when sweeping. This will eliminate leaving dirty patches.
7. The machine will leave debris, while sweeping, when the hopper is full. Follow the hopper unloading cycle outlined on page 18.

NOTE

Replace main broom when bristles are reduced to 2-inch length. To order replacement brooms, see MAIN BROOM. Replace side broom when bristles are reduced to 3-inch length. To order replacement brooms see SIDE BROOM.

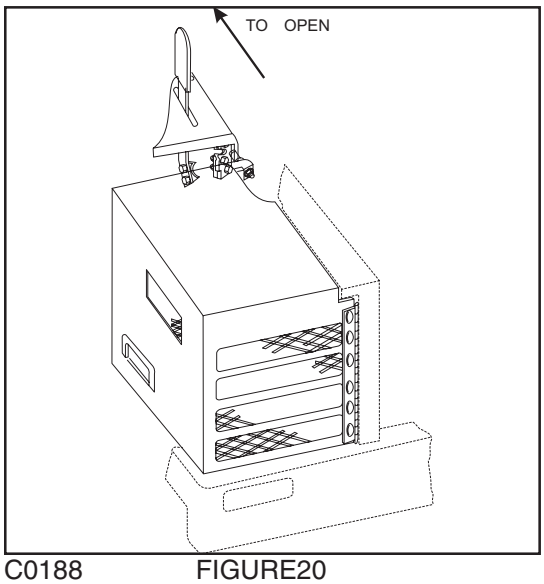
LUBRICATION



C0135 FIGURE 19

Perform the following lubrication procedures after every 50 hours of machine use:

1. Lubricate dump system pivot points, with a good grade multipurpose grease. Do the following lubrication procedures after every 100 hours of machine use.
2. Lubricate drive wheel swivel bearing, and the front wheel bearings with a good multi-purpose grease.
3. The steering gear assembly has a grease fitting, located on the front section of the steering gear housing. Use E.P. Lithium grease to lubricate the steering gear through the grease fitting.
4. Lubricate all other moving joints of the machine with #10 oil.
5. Lubricate the clamp ends of the throttle cable with NAPA #765-1363 or equivalent anti-seize lubricant.

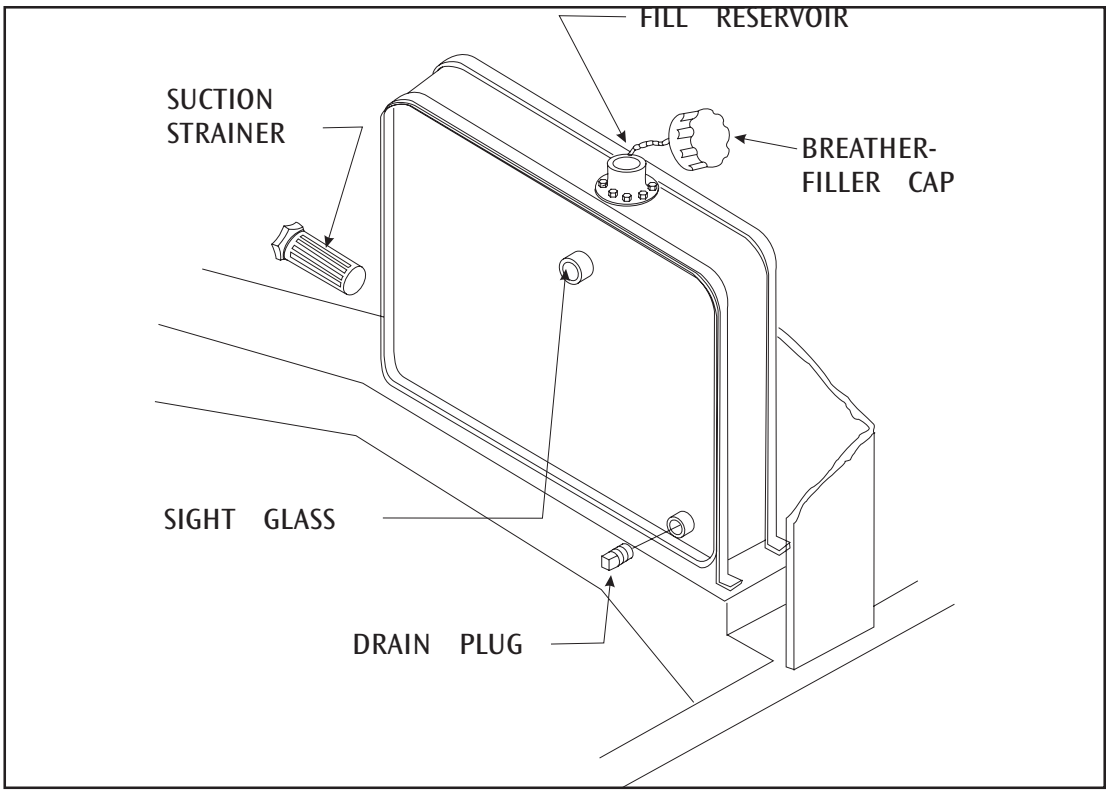


C0188 FIGURE20

HOW TO OPEN THE ENGINE COVER

The engine cover encloses the entire engine, radiator and hydraulic reservoir assembly. The cover can be swung open to completely clear the assembly and allow easy access to the engine.

1. To open the cover, push the engine cover latch lever toward the front of the machine.
2. Swing the cover over.



P4705b FIGURE 21

HYDRAULICS

The Hydraulics system controls the brooms, hopper lift and rotation, the machine drive motor and vacuum fan.

HOW TO FILL THE HYDRAULIC RESERVOIR

1. Open the engine cover.
2. Open the hydraulic reservoir breather filler cap.
3. Remove any debris that is in the breather filler cap screen.
4. Fill the reservoir until fluid is visible in the sight glass that is located on the side of the reservoir. DO NOT OVERFILL.
5. Close the hydraulic reservoir breather filler cap.
6. Close the engine cover.

HYDRAULIC OIL COOLER

The hydraulic oil cooler is located next to the radiator. The cooler can be accessed by opening the engine cover. The oil cooler core must be kept clear of debris and dust.

HOW TO CLEAN THE HYDRAULIC SYSTEM

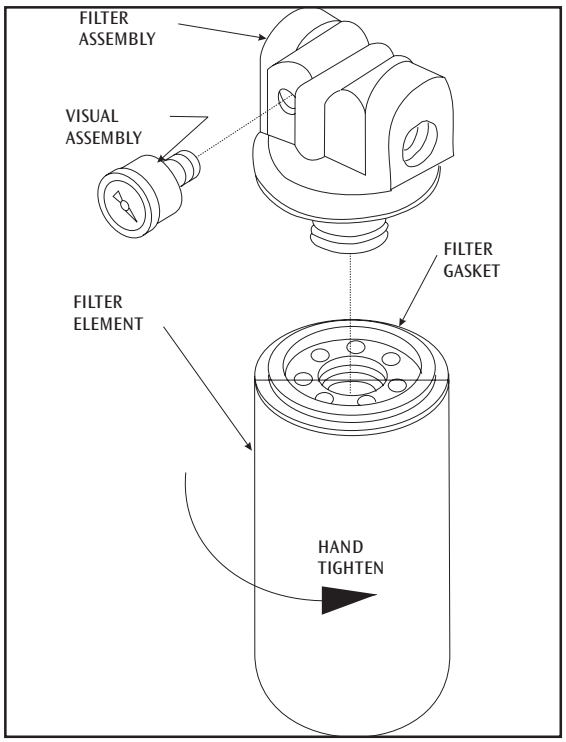
1. Put a drop cloth on the floor.
2. Drive the machine on to the drop cloth.
3. Set the parking brake.
4. Open the engine cover.
5. Put a container under the reservoir drain to catch the reservoir fluid.
6. Remove the drain plug. The reservoir fluid will drain. Do not use the drained reservoir fluid to refill the hydraulic reservoir. Dispose of the used fluid.

HOW TO CLEAN THE HYDRAULIC SUCTION STRAINER

The suction strainer is the filter assembly located in the bottom of the hydraulic reservoir and can be removed from the outside of the reservoir.

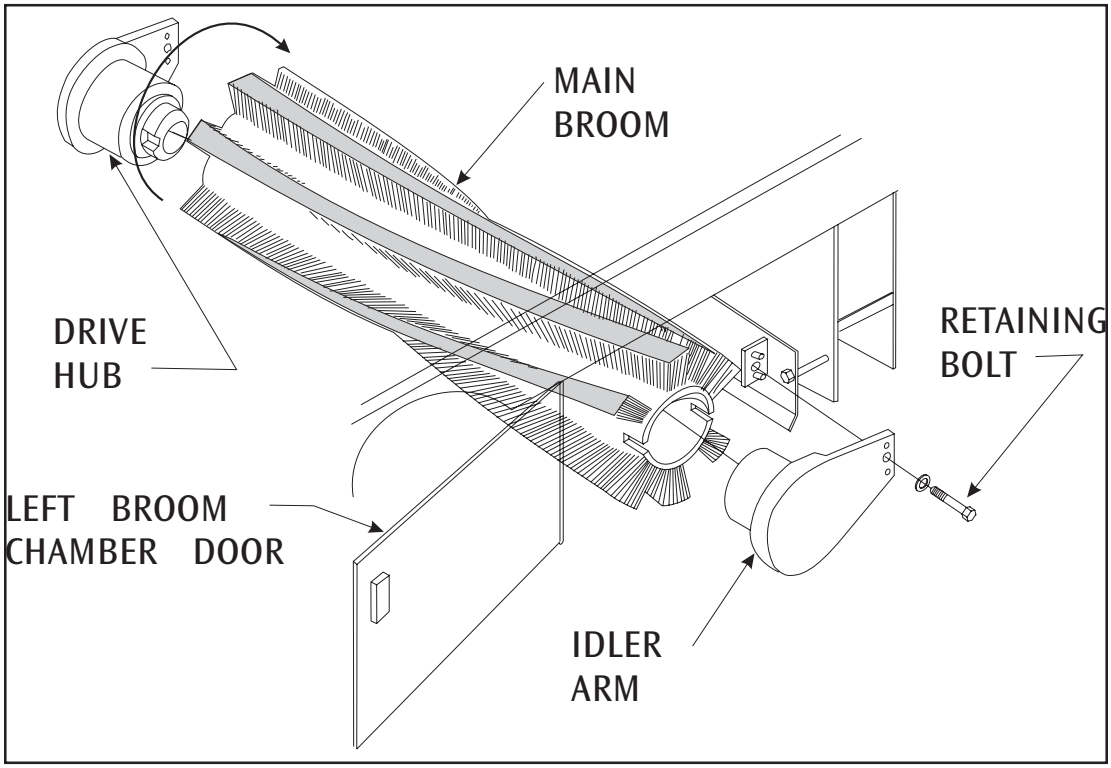
7. Turn the suction strainer counterclockwise by hand.
8. Remove the suction strainer from the reservoir.
9. Use a compressed air line on the inside of the strainer to blow impurities out of the filter media. If a com pressed air line is unavailable, use new FORD type "F" Automotive Transmission Fluid to flush the impurities out of the filter media.
10. Flush the interior of the hydraulic reservoir with clean fluid.
11. Put the cleaned strainer in the hydraulic reservoir.
12. Rotate the strainer clockwise into the bottom of the hydraulic reservoir. Stop rotating the strainer when it is hand tight.
13. Put the reservoir plug, removed in step six, back in the hydraulic tank drain and tighten.
14. Open the breather filler cap.
15 Fill the reservoir with new FORD type "F" automotive transmission fluid. The capacity of the tank is 6 gallons or 22.8 liters.
16. Close the breather filler cap.
17. Close the engine cover.

HOW TO REPLACE THE RETURN FILTER ELEMENT



P4506b FIGURE 22

1. Check the visual indicator on the top of the filter assembly daily. When the indicator reads 40 PSI replace the return filter element immediately. This should be after 250 hours of machine run time.
2. Unscrew the filter element from the filter assembly and discard.
3. Moisten the filter gasket of a new filter element with hydraulic fluid.
4. Put the filter element on threaded nipple of the filter assembly. Turn the filter clockwise, until it is hand tight.
5. Wipe clean any hydraulic reservoir fluid spills.



P4388a FIGURE 23

HOW TO REPLACE THE MAIN BROOM

Replace the main broom when the bristles are worn to 2 inches in length.

1. Open the left broom chamber door.
2. Put the main broom control in the “SWEEP” position.
3. Remove the retaining bolt. (See Figure 23)
4. Remove the idler arm assembly.
5. Remove the main broom and discard.
6. Put a new main broom in the broom chamber.
7. Rotate the new broom to the right on the drive hub until it engages the drive hub broom tabs.
8. Put the idler arm assembly in place.
9. Put the retaining bolt in place and tighten.
10. Close the broom chamber door.
11. Start the engine.
12. Put the broom lever in the “SWEEP” position.
13. Let the broom sweep in place for 30 seconds.
14. Put the broom lever in the “UP” position.
15 Back the machine off the test spot.
16. Inspect the polished area where the broom swept, for broom bristle contact with the floor. The area of broom bristle contact with the floor should be 2 to 3 inches or 5 to 8 cm. wide.

MAIN BROOM LEVEL ADJUSTMENT

The main broom level is factory set and should not need adjustment, if the level gets out of adjustment and the broom bristle contact pattern is not an even 2" to 3" wide, the broom arm lift frame will have to be adjusted. The frame is supported by two flange bearings. These bearings are located inside the broom doors. The carriage bolts on the two end flanges will have to be loosened. The frame can then be leveled and the bolts tightened.

HOW TO ADJUST MAIN BROOM WEAR PATTERN

When the bristles of the broom begin to wear out the following adjustments may be made to keep a 2 inch (5 cm) broom pattern.

1. Loosen the wing nut located in the engine compartment.
2. Set the broom lever to the “Sweep” position and adjust the torque knob to obtain a 2 inch (5 cm) broom pattern. The torque knob will move the linkage rod that adjusts the sweeping pattern of the broom for wear.
3. Tighten the wing nut against the torque knob.

SIDE BROOM LEVEL ADJUSTMENT

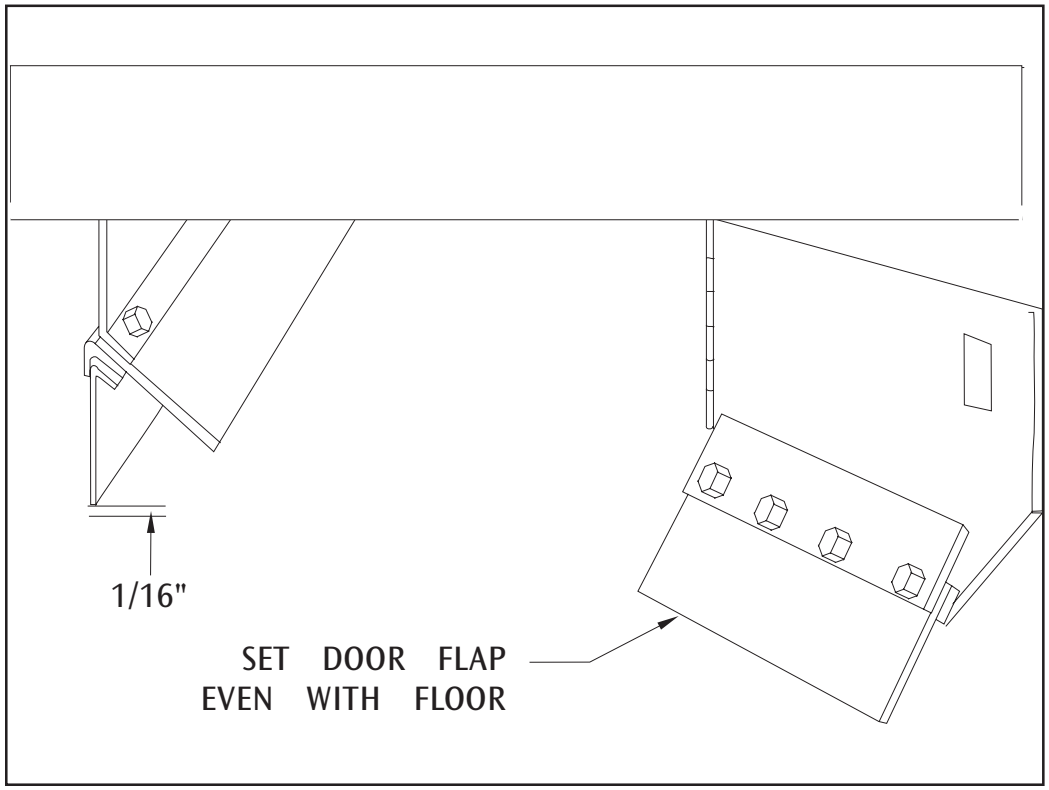
As the side broom wears, simply loosen the two wear adjusting bolts and slide the broom-motor assembly into a position so that the broom contacts the floor at a 3 degree angle when lowered.

SIDE BROOM REPLACEMENT

Put the side broom lift control in the “UP” position. Remove the retaining screw in the bottom middle of the side broom. Remove the side broom. Transfer the side broom flange, spacer, screws, washers, and nuts to the replacement side broom. Put the replacement side broom on the shaft. Put the retaining screw and washer in position and tighten.

BROOM FLAPS

The Urethane Flaps are susceptible to damage and should be inspected regularly and maintained in good condition. The side and hopper flaps are adjustable and should be maintained even with the floor. The rear flap must be maintained 1/16" (16 cm.) above the floor. All flaps should be replaced when worn or damaged to such an extent that they cannot perform their normal function.



P4488a FIGURE 24

ENGINE AIR INTAKE SYSTEM

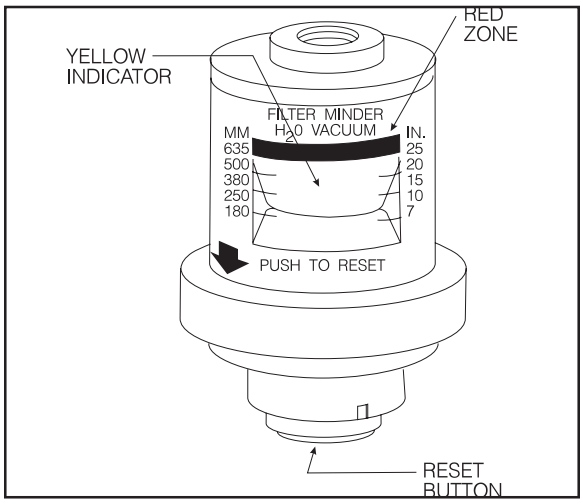
NOTE
Monitor the air filter indicator daily

The importance of maintaining an air filter cannot be overemphasized. Dirt ingested 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 filter is removed for servicing. Do not neglect servicing the air filter. Use only approved replacement parts. Keep all other air intake components such as hoses and clamps secure and in good condition to prevent entrance of unfiltered air.

Over maintenance can cause more damage than good. Removing the air filter element more often than is needed allows contaminants to enter the engine unnecessarily.

AIR FILTER

The engine air filter housing includes a dust cap and a dry cartridge type air filter element. The dust cap must be emptied of dirt daily. The air filter element must be replaced every 75 to 100 hours. The filter element must be replaced if it is damaged or has been cleaned three times. Replace the engine air filter only when the Yellow Filter Service Indicator reaches the red band at the top of the indicator. The yellow indicator will stay at the red band when the engine is off. Reset the indicator by depressing the black button at the bottom of the indicator.



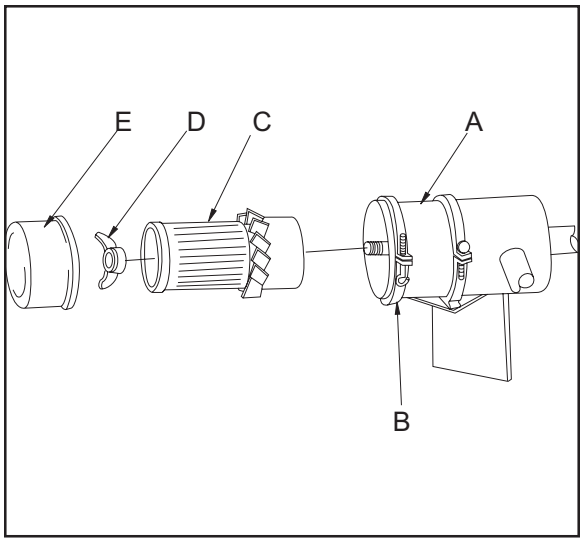
P4713 FIGURE 26

TO REPLACE AIR FILTER ELEMENT

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

WARNING
Always park on a level surface, stop the engine, and engage parking brake before working on the machine to keep it from creeping or rolling.

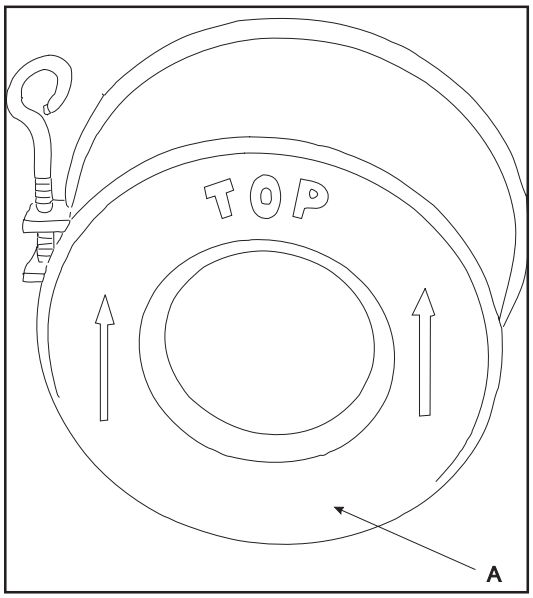
2. Tilt the hopper forward until it is over the bumper.
3. Unscrew the clamp ring on the filter.
4. Remove the dust cap.
5. Empty the dust cap.
6. Remove the filter wing nut.
7. Gently pull the filter element out of the filter housing.



P4599a FIGURE 27

REMOVING AIR FILTER ELEMENT

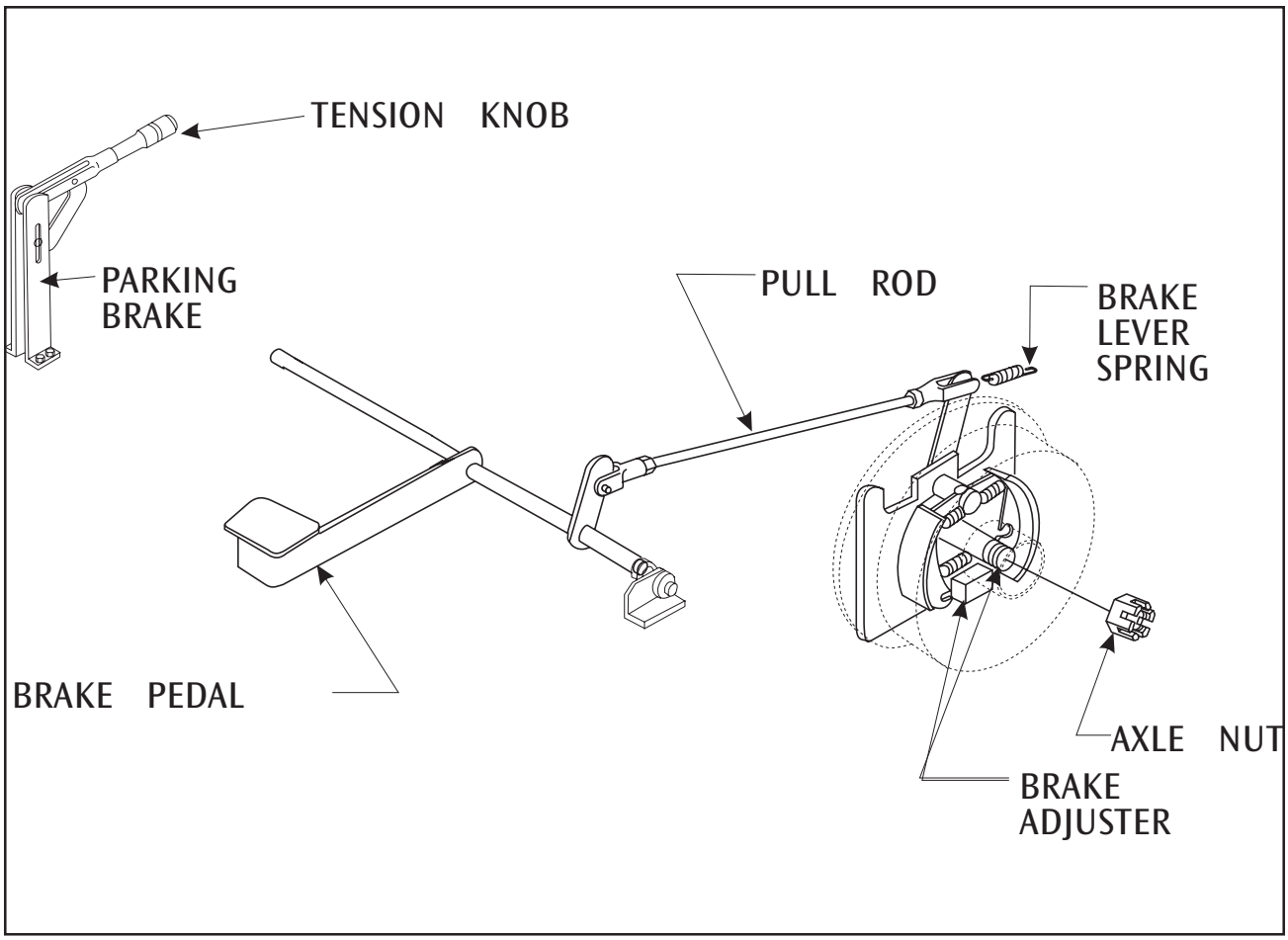
A. Filter Housing
B. Clamp Ring
C. Filter Element
D. Wing Nut
E. Dust Cap



P4505 FIGURE 30

DUST CAP

8. Install the new filter element so that fins on the element are at the intake end of the air cleaner. Use care so the fins are not damaged. Tighten the wing nut attaching the element.
9. Install the dust cap with the arrows pointing up. Tighten the clamp ring to hold it in place. Check all intake hose connections for leaks or abrasion.
10. Reset filter monitor after any filter service.
11. Retract the hopper.



P4718 FIGURE 31

BRAKE ADJUSTMENT

1. Connect pull rod to brake lever then adjust to fit with brake pedal full up and the spring not attached.
2. Adjust tension knob on parking brake lever to hold machine on a 8 degree incline.
3. Attach the brake lever spring.

BRAKE DRUM ADJUSTMENT

1. Tighten the axle nut so that the wheel hub spins freely.
2. Set the brake adjusters so that brakes drag then back them off two (2) notches.PNEUMATIC WHEELS

PNEUMATIC WHEELS

The pneumatic wheels should be maintained at an inflation pressure of 100 PSI. Since the wheel rims are of a split rim construction, the outer bolt circle maintains the wheel assembly in one piece when the wheels are demounted from the machine.

WARNING

Fully deflate tires before removing the rim bolts.

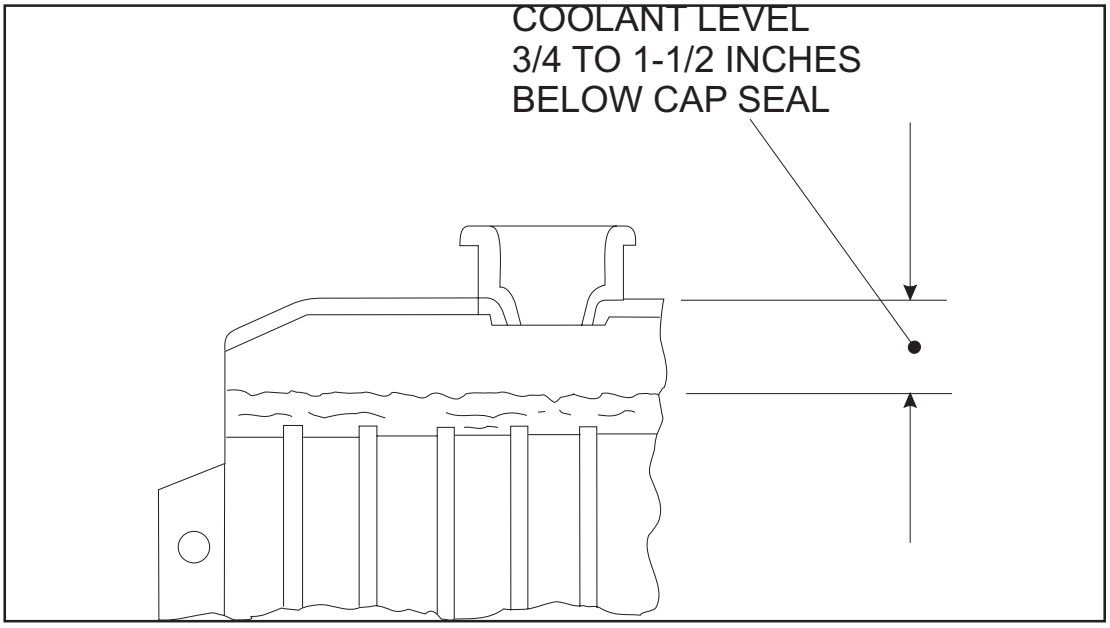
COOLING SYSTEM

COOLANT LEVEL

Check the coolant level in the radiator daily, only when the engine is cool.

Maintain the coolant level at approximately 3/4 inches (1.9 cm.) below the filler neck seat on the radiator when the coolant is cold. See Figure 32

Whenever coolant level checks are made, check condition of radiator cap rubber seal. Make sure it is clean and free of any dirt particles. Rinse off with clean water if necessary. When replacing cap on radiator, also make sure radiator filler neck is clean.



P4404 FIGURE 32

WARNING

Never remove the radiator cap under any conditions while the engine is operating. Failure to follow these instructions could result in damage to the cooling system or engine and/or personal injury. To avoid having scalding hot coolant or steam blow out of the radiator, use extreme care when removing the cap from a hot radiator, if possible, wait until the engine has cooled, then wrap a thick cloth around the radiator cap and turn it slowly to the first stop. Step back while the pressure is released from the cooling system. When you are sure all the pressure has been released, press down on the cap (still with a cloth), turn and remove it.

Do not add coolant to an engine that has become overheated until the engine cools. Adding coolant to an extremely hot engine can result in a cracked block or cylinder head. Use only a permanent type coolant that meets FORD specification ESE-M97B44-A such as FORD Cooling System Fluid. Refer to the coolant chart on the container for additional antifreeze protection information. Do not use alcohol or methanol antifreeze, or mix them with the specified coolant.

Plain water may be used in an emergency, but replace it with the specified coolant as quickly as possible to avoid damage to the system. With only water in the system, do not let engine run hot.

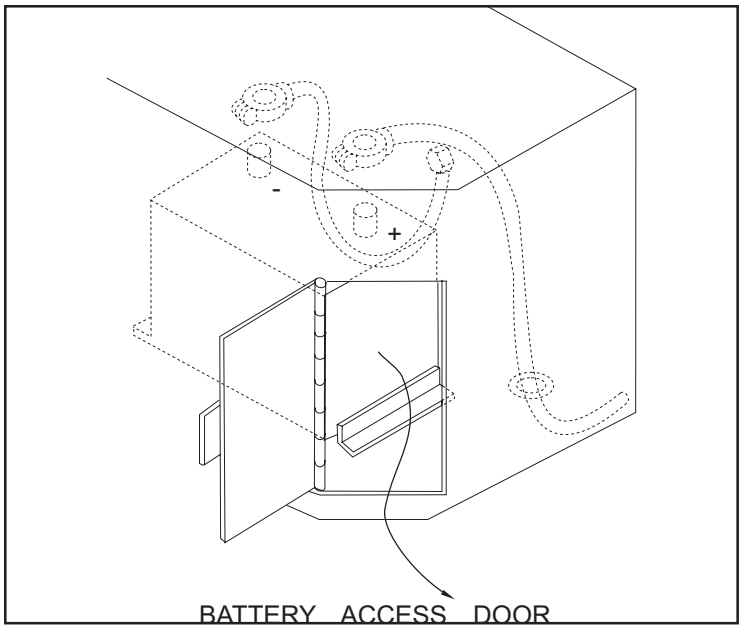
RADIATOR

Inspect the exterior of the radiator for obstructions. Remove all bugs, dirt or foreign material with a soft brush or cloth. Use care to avoid damaging the fins. If available, use compressed air or a stream of water in the opposite direction to normal airflow. Open door for access.

Check all hoses and connections for leaks. If any of the hoses are cracked, frayed, or feel spongy, they should be replaced.

DRIVE BELTS

The drive belt(s) should be properly adjusted at all times. A loose drive belt causes improper alternator, fan and water pump operation, and overheating. Overtightening the belt may result in excessive wear on the alternator and water pump bearings, as well as premature wear on the belt itself. Therefore, it is recommended that proper belt tension be maintained.



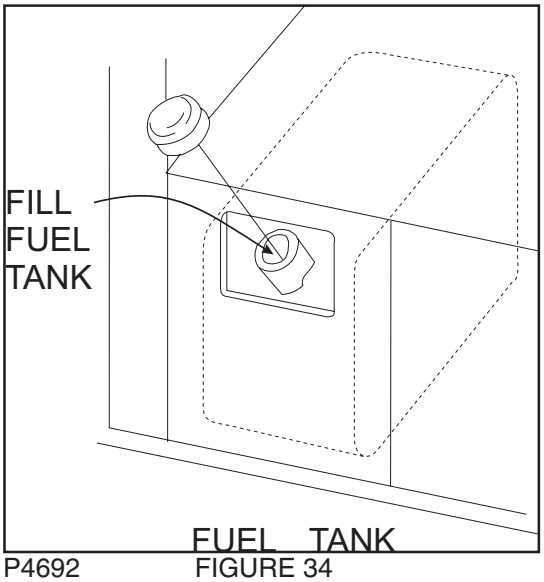
P4694 FIGURE 33

BATTERY

1.Access to the battery is through the door located beneath the driver's seat.
2.Keep the top of the battery clean and dry. Keep the terminals and connectors clean. To clean the tops of the batteries, use a damp cloth with a weak solution of ammonia or bicarbonate of soda solution. To clean the terminals and connectors, use a terminal and connector cleaning tool.

WARNING

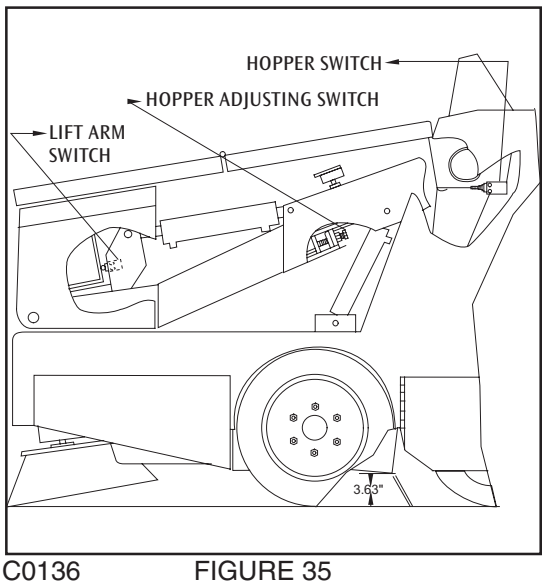
NEVER allow the soda solution to enter the cells. This will permanently discharge the battery.



P4692 FIGURE 34

FUEL TANK

The gas tank is located under the drivers seat. It may be filed from the rear of the machine.

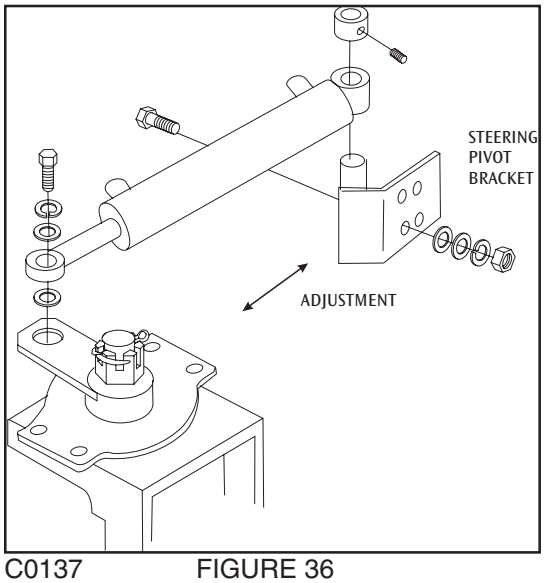


C0136 FIGURE 35

HOPPER ADJUSTMENT

The following adjustments are made to the hopper at the factory. Once adjusted, no further attention should be required.

1. Install hopper stops loosely.
2. Adjust stops to give 3 5/8 (9.2 cm.) inches clearance under rear bottom edge of hopper, then secure.
3. Using the adjusting screw, set the hopper square in the machine with equal clearance between the wheel wells and the outer edges of the hopper on both sides. Set the jam nut.



C0137 FIGURE 36

STEERING ADJUSTMENT

1. Loosen the mounting hardware at the steering pivot bracket.
2. Rotate the rear wheel yoke to a 90° full left turn position. Be sure the cylinder is fully extended.
3. Tighten the mounting hardware.

CHECK ENGINE LIGHT CODES

CATEGORY	DESCRIPTION	CODE NUMBER
MAP	MAP high pressure	231
	MAP low voltage	232
TIP	TIP high voltage	1111
	TIP low voltage	1111
FP	FP high voltage	1111
	FP low voltage	1111
ECT/CHT	ECT/CHT high voltage	221
	ECT/CHT low voltage	222
	ECT higher than expected 1	223
	ECT higher than expected 2	224
	CHT higher than expected 1	223
	CHT higher than expected 2	224
IAT	IAT high voltage	211
	IAT low voltage	212
	IAT higher than expected 1	213
	IAT higher than expected 2	214
BP	BP high pressure	234
	BP low pressure	235
Knock	Knock sensor open	253
	Excessive knock signal	254
Battery Voltage	Voltage high	162
	Voltage low	161
5V External	5VE high voltage	632
	5VE low voltage	631
TPS	TPS1 high voltage	531
	TPS1 low voltage	532
	TPS2 high voltage	533
	TPS2 low voltage	534
	TPS1 higher than TPS2	535
	TPS1 lower than TPS2	536
	Unable to reach higher TPS	537
	Unable to reach lower TPS	538
FPP	FPP1 high voltage	511
	FPP1 low voltage	512
	FPP2 high voltage	521
	FPP2 low voltage	522
	FPP1 higher than IVS limit	513
	FPP1 lower than IVS limit	514
	FPP2 higher than IVS limit	523
	FPP2 lower than IVS limit	524
	FPP1 higher than FPP2	515
	FPP1 lower than FPP2	516
Governor Interlock	IVS/Brake interlock failure	545

CATEGORY	DESCRIPTION	DESCRIPTION	CODE NUMBER
Auxiliary Analog Inputs	AUX analog PD1 high		163
	AUX analog PD1 low		164
	AUX analog PU1 high		541
	AUX analog PU1 low		542
	AUX analog PU2 high		543
	AUX analog PU2 low		544
Engine Speed	Max govern speed override		551
	Fuel rev limit		552
	Spark rev limit		553
Oil Pressure	Oil pressure low		215
Adaptive Learn	AL high gasoline bank1		141
	AL high gasoline bank2		151
	AL low gasoline bank1		142
	AL low gasoline bank2		152
	AL high LPG		143
	AL low LPG		144
	AL high NG		145
	AL low NG		146
Closed Loop	CL high gasoline bank1		121
	CL high gasoline bank2		131
	CL low gasoline bank1		122
	CL low gasoline bank2		132
	CL high LPG		111
	CL low LPG		124
	CL high NG		125
	CL low NG		126
Catalyst Monitor	Gasoline cat monitor		133
	LPG cat monitor		134
	NG cat monitor		135
EGO Sensors	EGO open/lazy bank1		112
	EGO open/lazy bank2/post-cat		113
	EGO open/lazy post-cat		114
Injectors	Injector Loop Open or	Injector 1	311
	Low-Side Short to Ground	Injector 2	313
		Injector 3	315
		Injector 4	321
	Injector Coil Shorted	Injector 1	312
		Injector 2	314
		Injector 3	316
		Injector 4	322

CHECK ENGINE LIGHT CODES

CATEGORY	DESCRIPTION	DESCRIPTION	CODE NUMBER
Spark Coil Primary	Primary Loop Open or Low-Side Short to Ground	Coil 1	411
		Coil 2	413
		Coil 3	415
		Coil 4	421
	Primary Coil Shorted	Coil 1	412
		Coil 2	414
		Coil 3	416
		Coil 4	422
Fuel Pump Feedback	F Pump Loop Open or High-Side Short to Ground		351
	F Pump High-Side Shorted to Power		352
MegaJector Diagnostics	MegaJector delivery pressure higher than expected		353
	MegaJector delivery pressure lower than expected		354
	MegaJector comm lost		355
	MegaJector voltage supply high		361
	MegaJector voltage supply low		362
	MegaJector internal actuator fault detection		363
	MegaJector internal circuitry fault detection		364
	MegaJector internal comm fault detection		365
Crank/Cam Sensors	Cam loss		244
	Cam sync noise		245
	Crank sync noise		242
	Never crank synced at start		243
Internal Processor Diagnostics	COP failure		611
	RTI 1 loss		614
	RTI 2 loss		655
	RTI 3 loss		656
	A/D loss		613
	Invalid interrupt		612
	Flash checksum invalid		615
	RAM failure		616
RS-485 Network	Rx Inactive		641
	Rx Noise		642
	Invalid Packet Format		643
	Shutdown Request		644

ABBREVIATIONS - SCREWS

ADJ	=	Adjusting Screw
ADJ.SP	=	Adjusting Plunger Screw
BHM	=	Binding Head Machine Screw
BHS	=	Button Head Socket Screw
CAPT.SL	=	Captivated Slotted Screw
CAPT.WG	=	Captivated Wing Screw
FHM	=	Flat Head Machine Screw
FIL.HM	=	Filister Head Machine Screw
HHC	=	Hexagon Head Cap Screw
HHM	=	Hexagon Head Machine Screw
HIHD	=	1/2 High Head Screw
HSHC	=	Hexagonal Socket Head Cap Screw
HSFHC	=	Hexagonal Socket Flat Head Cap Screw
KNH	=	Knurled Head Screw
MHHC	=	Metric Hexagon Head Cap Screw
PHM	=	Pan Head Machine Screw
RHD	=	Round Head Drive Screw
RHM	=	Round Head Machine Screw
RHW	=	Round Head Wood Screw
SHC	=	Shiny Crown Cap Screw
SHTB	=	Shoulder Thumb Screw
SQ	=	Square Head Screw
TB	=	Thumb Screw
THM	=	Truss Head Machine Screw
WELD	=	Weld Stud
WG	=	Wing Screw

ABBREVIATIONS - SETSCREWS

HS	=	Hexagonal Socket Setscrew
S	=	Slotted Setscrew
SH	=	Square Head Setscrew
-KCP	=	Knurled Cup Point Setscrew
-CP	=	Cup Point Setscrew
-OP	=	Oval Point Setscrew
-FDP	=	Full Dog Point Setscrew
-HDP	=	Half Dog Point Setscrew
-FP	=	Flat Point Setscrew
-COP	=	Cone Point Setscrew

ORDERING PARTS

INTERNET
http://www.alto-online.com

ALTO HEADQUARTERS
Incentive International A/S
Kongens Nytorv 28
P.O. Box 2064
1013 Copenhagen K
Tel.: +45 72 18 10 00
Fax: +45 72 18 11 64
E-mail: incentive@incentive-dk.com

SUBSIDIARIES

AUSTRALIA
ALTO Overseas Inc.
1B/8 Resolution Drive
P.O. Box 797
Caringbah, N.S.W.2229
Tel.: +61 2 95 24 61 22
Fax: +61 2 95 24 52 56

AUSTRIA
ALTO Österreich GmbH
Metzgerstr. 68
5101 Bergheim/Salzburg
Tel.: +43 6624 5 64 00-14
Fax: +43 6624 5 64 00-55
E-mail: wap@salzburg.co.at

BRAZIL
Wap do Brasil Ltda.
Rua 25 de Agosto, 608
83323-260 Pinhais/Paraná
Tel.: +55 4 12 10 67 40 0
Fax: +55 4 12 10 67 40 3
E-mail: wap@wapdobrazil.com.br

CANADA
ALTO Canada
24 Constellation Road
Rexdale, Ontario M9W 1K1
Tel.: +1 416 6 75 58 30
Fax: +1 416 6 75 69 89

CROATIA
Wap ALTO Strojevi za čišćenje, d.o.o.
Siget 18a
10020 Zagreb
Tel.: +385 1 65 54 144
Fax: +385 1 65 54 112
E-mail: admin.wap@wap-sistemi.hr

CZECH REPUBLIC
ALTO Ceská Republika s.r.o.
Zateckych 9
14000 Praha 4
Tel.: +420 2 41 40 84 19
Fax: +420 2 41 40 84 39
E-mail: wap_p@mbox.vol.cz
Web: www.wap-alto.cz

DENMARK
ALTO Danmark A/S
Industrikvarteret
9560 Hadsund
Tel.: +45 7218 21 00
Fax: +45 7218 21 05
E-mail: salg@alto-dk.com

FRANCE
ALTO France S.A.
B.P. 44, 4 Place d'Ostwald
67036 Strasbourg Cedex 2
Tel.: +33 3 88 28 84 00
Fax: +33 3 88 30 05 00
E-mail: info@alto-fr.com

GERMANY
ALTO Deutschland GmbH
Guido-Oberdorfer-StraBe 2-8
89287 Bellenberg
Tel.: +49 0180 5 37 37 37
Fax: +49 0180 5 37 37 38
E-mail: info@wap-online.de

GREAT BRITAIN
ALTO Cleaning Systems
(UK) Ltd.
Bowerbank Way
Gilwilly Industrial Estate, Penrith
Cumbria CA11 9BN
Tel.: +44 1 7 68 86 89 95
Fax: +44 1 7 68 86 47 13
E-mail: sales@alto-uk.com

NETHERLANDS
ALTO Nederland B.V.
Postbus 65
3370 AB Hardinxveld-Giessendam
Tel.: +31 18 46 77 20 0
Fax: +31 18 46 77 20 1
E-mail: info@alto-nl.com

NORWAY
ALTO Norge A/S
Bjørnerudveien 24
1266 Oslo
Tel.: +47 22 75 17 70
Fax: +47 22 75 17 71
E-mail: info@alto-no.com

SINGAPORE
ALTO DEN-SIN Singapore Pte Ltd.
No. 17 Link Road
Singapore 619034
Tel.: +65 62 68 10 06
Fax: +65 62 68 49 16
E-mail: densin@singnet.com.sg
Web: www.densin.com

SLOVENIA
Wap ALTO čistilni sistemi, d.o.o.
Letališka 33
SLO-1110 Ljubljana
Tel.: +368 15 20 62 00
Fax: +368 15 20 62 10
E-mail: wap@siol.net

SLOWAKIA
Wap ALTO čistiace systémy s.r.o.
Remeselnicka 42
83106 Bratslavia-Rača
Tel.: +421 2 44 881 402
Fax: +421 2 44 881 395
E-mail: wap@gtinet.sk
Web: www.wap-alto.sk

SPAIN
ALTO Iberica S.L.
Calle de la Majada No. 4
28760 Tres Cantos - Madrid
Tel.: +34 91 8 04 62 56
Fax: +34 91 8 04 64 63
E-mail: info@alto-es.com

SWEDEN
ALTO Sverige AB
Aminogatan 18
431 04 Mölndal
Tel.: +46 3 17 06 73 00
Fax: +46 3 17 06 73 41
E-mail: info@alto-se.com

USA
ALTO Cleaning Systems Inc.
12249 Nations Ford Road
Pineville, NC 28134
Tel.: +1 704 971 1240
Fax: +1 704 971 1241
E-mail: info@altocsi.com

1. **Use the model number, catalog number, and serial number when ordering.**
2. **Give the part number, description, and quantity of parts needed.**
3. **Give shipping instructions for either freight, UPS, or parcel post.**

MACHINE CATALOG NUMBERS

579-540CE	Gas Variable Dump (Export w/CE Kit)	579-543CE	Gas Low Dump (Export w/CE Kit)
579-541CE	LP Variable Dump (Export w/CE Kit)	579-544CE	LP Low Dump (Export w/CE Kit)
579-542CE	Diesel Variable Dump (Export w/CE Kit)	579-545CE	Diesel Low Dump (Export w/CE Kit)