



Electronic Service Manuals

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American-Lincoln®

OPERATOR'S MANUAL & PARTS LIST



91WS WALK-BEHIND SWEEPER

Beginning with
Serial No. 307335

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.

Si Ud. o sus operadores no pueden leer el Inglés, se hacen explicar este manual completamente antes de tratar el manejo o servicio de esta máquina.

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



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SWEEPING PATH 36 inches (91.44 cm) with single side broom
45 inches (114.30 cm) with dual side broom

TRAVEL SPEED 0-3 m.p.h.

DIMENSIONS

Length	60.00 inches (152.40 cm)
Width	34.00 inches (86.36 cm)
Height	39.00 inches (99.06 cm)
Wheel Base	22.65 inches (57.79 cm)
Track	32.00 inches (81.28 cm)

WEIGHT (SHIPPING)

Gas Machine	460 lbs. (171.58 kg)
LP Machine	460 lbs. (171.58 kg)
LP Tank	20 lbs. (7.46 kg)
24 VDC Machine	385 lbs. (143.61 kg)
Batteries	275 lbs. (102.58 kg)
Charger	30 lbs. (11.19 kg)

WHEELS

Rear Cater (1)	2.0 wide x 5.00 dia. Molded Non-marking Urethane
Front Drive (2)	2.0 wide x 10.00 dia. (5.08 cm wide x 25.4 cm dia) Solid grey Non-marking Rubber Standard or 3.0 wide x 10.00 dia (5.08 cm wide x 25.4 cm dia) Foam Filled Grey Non-marking Rubber (Optional)

POWER SOURCES

24 VDC Battery

24 volt system, 1.3 HP (.97 kw) Electric Motor, (2) 12 volt batteries in series, 185 A.H. @ 20 hour discharge rating

Gas/LP

Briggs & Stratton 8 HP I/C Engine with electric and backup recoil start, Dual Element Air Filter, 1.5 gal Fuel Tank, Low Oil Shutdown

Briggs & Stratton I/C Series

Model	1 cylinder, 8 HP (6 kw)
Bore	3 inches (7.62 cm)
Stroke	2.75 inches (6.98 cm)
Displacement	19.44 cu. inches (319.0 cc)
RPM	2200 Max.

DRIVE SYSTEM

Unit is self-propelled in forward and reverse, controlled by a full width handle bar, dual flat belt drive to automotive type differential, chain drive wheels, belt driven main and side brooms.

CONTROLS AND INSTRUMENTATION

Key Switch (with push button STAR for Gas/LP machines)

Forward/Reverse Handle

Hour Meter

Ammeter (Gas/LP Models)

Fuel Gauge (Gas/LP Models)

Condition Meter (Gas/LP Models)

Single Lever Raises and Lowers Main Broom

Single Lever Raises, Lowers, and Activates Side Broom

SPECIFICATIONS

SWEEPING SYSTEM

Type Direct Throw

Main Broom

One place plastic core disposable type. No tool charge. Position can be set to "Restricted Down" or "Free Float".

Length 27 inches (68.6 cm)
Diameter 11 inches (27.90 cm)
Bristle Length 3 inches (7.62 cm) long, usable to 1.00 inch
Option Bristle Types Proes, Nylon, High Density Nylon

Side Broom

Rotary disposable type with 1.25 inches (3.17 cm) thick marine grade varnished hardwood disk. Floats over uneven surfaces and is adjustable for wear. Retracts up to impact. No tool charge.

Diameter 16.00 inches (40.60 cm)
Bristle Type Polypropylene

Hopper

Molded polypropylene construction with handle to dump and levers to remove (no tool).

Volumetric Capacity 3 cu. ft. (85.00 lt)
Weight Capacity 220 lbs. (82.06 kg)
Ground Clearance 3 inches (7.62 cm)

Dust Control

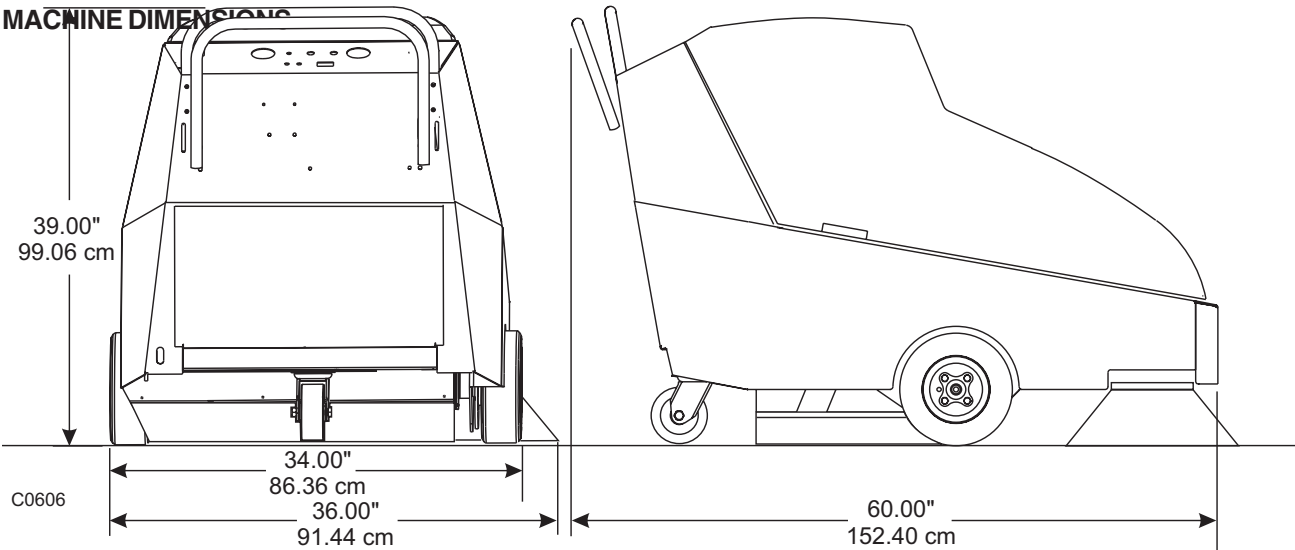
One pleated water resistant fibre type panel filter with automatic timed (20 seconds) filter shaker. Patented shaker system. No tool quick change filter.

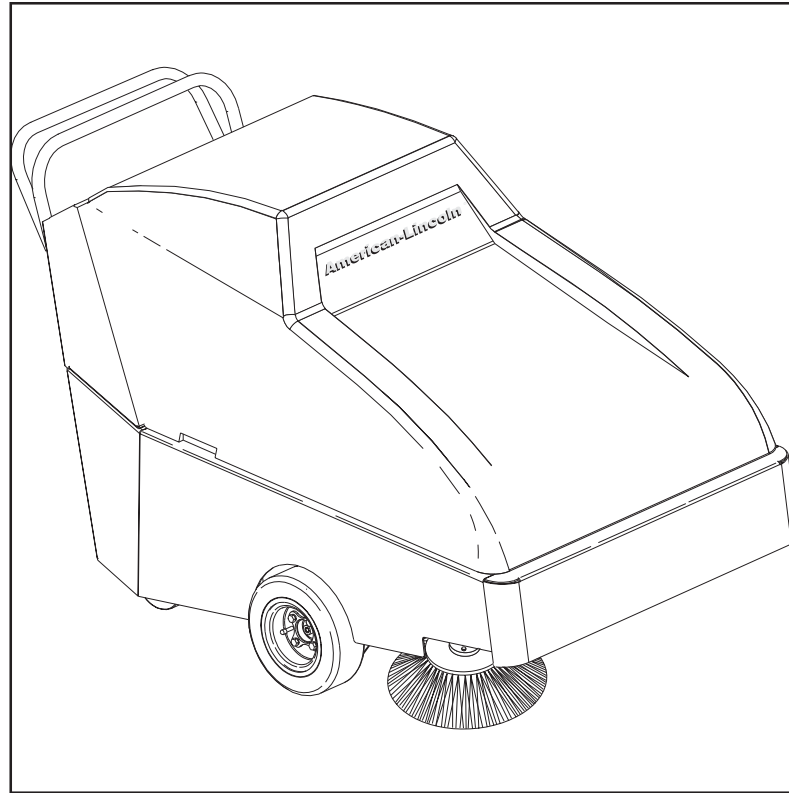
Filter Area 40 sq. ft. (3.70 m²)
Impeller 9 inches dia.

OPTIONAL EQUIPMENT

Left Hand Side Broom Low Oil Light
Shaker Switch Foam Filled Tires in Lieu of Solid Tires

MACHINE DIMENSIONS





C1199

FIGURE 1

MACHINE PREPARATION

Your American-Lincoln Technology sweeper has been shipped complete, but do not attempt to operate before reading and following the preparation instructions for your type of machine.

GAS/LP POWERED MACHINES

1. Uncrate the machine and carefully remove it from the skid to prevent damage.
2. Inspect the machine for obvious damage and check the controls for proper operation.
3. Connect and tighten battery cables.
4. Fill fuel tank with regular grade unleaded gasoline.
 - *Install filled LP tank and connect fuel line to the tank.
 - *Turn on service valve, check all LP connections for leaks.
 - *Turn off service valve after inspection has been completed.
5. Check engine crankcase oil level. Although properly lubricated at the factory, check before starting engine. The engine uses no special break in oil. The recommended number of hours before the initial oil change is 5 hours (see maintenance chart).
6. For safety, do not operate until you have read the safety precautions and operation instructions in the manual.

*=LP Powered machines only



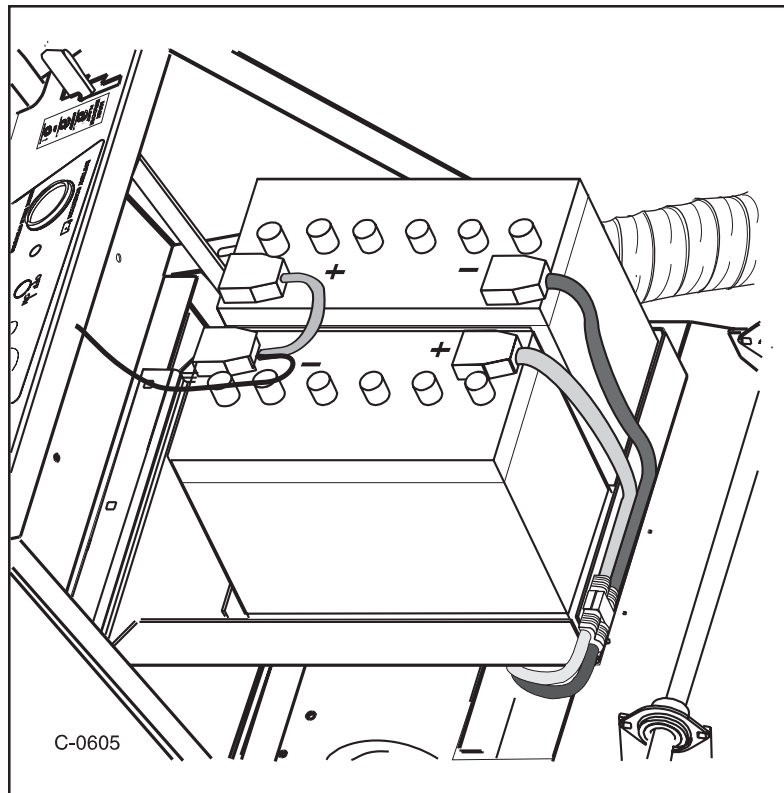
WARNING

To prevent possible fire, never fill fuel tank while the engine is running. Always be sure gasoline container and sweeper are electrically grounded before dispensing gasoline. This can be done by permanently attaching an insulated wire with a battery clip on the end to the gasoline container.



WARNING

Keep cigarettes, sparks, and open flame away from LP equipment.
Use extreme caution when inspecting for gas leaks.



C0605

FIGURE 2

BATTERY POWERED MACHINES

The battery powered machines may be shipped with the batteries and charger in separate containers. The batteries will need to be filled with electrolyte if batteries were shipped dry.

1. Uncrate the machine and carefully remove it from the skid to prevent damage.
2. Inspect the machine for obvious damage and check the controls for proper operation.
3. Connect and tighten battery cables. (See Figure 2)
4. Connect battery cables. Be sure to observe polarity. (See Figure 2)
5. Charge batteries using the quick disconnect provided. Leave the top cover open while charging to prevent build up of explosive gases generated during the charging process. Refer to the charging instructions provided in the manual and on the charging unit being used.
6. For safety, do not operate until you have read the safety precautions and operation instructions in the manual.



WARNING

Lead acid batteries generate gases which can cause an explosion. Make sure the switch on the charger is in the "OFF" position before connecting or disconnecting the charger. If no switch is provided, unplug the charger before making connections to the batteries. Keep sparks and flame away from batteries. NO SMOKING. Charge the batteries only in an area with good ventilation and leave the top cover open while charging.



WARNING

Batteries contain sulfuric acid which can cause burns to exposed skin or eyes. To prevent injury, wear protective clothing and safety glasses when working on batteries. In the event that acid comes in contact with skin or eyes, flush affected area with fresh water for a minimum of 5 minutes and get medical attention immediately.

SAFETY PRECAUTIONS

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



DANGER

To warn of immediate hazards which will result in severe personal injury or death.



WARNING

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



CAUTION

To warn of hazards or unsafe practices which could result in minor personal injury.

ATTENTION

To warn of unsafe practices which could result in extensive equipment damage.

NOTE

To give important information or to warn of unsafe practices which could result in equipment damage.

THE FOLLOWING INFORMATION SIGNALS POTENTIALLY DANGEROUS CONDITIONS TO THE OPERATOR OR EQUIPMENT. READ THIS MANUAL CAREFULLY. KNOW WHEN THESE CONDITIONS CAN EXIST. THEN, TAKE NECESSARY STEPS TO TRAIN MACHINE OPERATING PERSONNEL.

FOR THE SAFE OPERATION OF THIS MACHINE, READ AND UNDERSTAND ALL WARNINGS, CAUTIONS AND NOTES.



WARNING

Machines can ignite flammable materials and vapors. Do not use with or near flammables such as: gasoline, grain dust, solvents and thinners.



WARNING

Heavy machinery. Improper use can cause personal injury.



WARNING

Operate only when lids, doors, and access panels are securely closed.



WARNING

Use care when reversing machine in confined area.



WARNING

When servicing the machine disconnect the batteries first to prevent possible injury.



WARNING

When working on the machine, empty hopper, remove batteries, clear area of people and obstructions, use additional people and proper procedures when lifting the machine.



WARNING

Always empty the Hopper and Disconnect Battery before doing maintenance.



WARNING

You must have training in the operation of this machine before using it. **READ THE INSTRUCTION BOOK.**



WARNING

Do not operate this machine unless it is completely assembled.

SAFETY PRECAUTIONS



WARNING

Do not use this machine as a step or furniture.



WARNING

Be careful when operating the machine on a ramp or incline. Always move slowly on a ramp. Do not turn this machine on a ramp. Do not stop and leave this machine on a ramp.



WARNING

Stop and leave this machine on a level surface. When you stop the machine, put the key switch in the "OFF" position.



WARNING

To prevent injury, and damage to the machine, do not lift the machine or move it to an edge of a stair or loading dock.



WARNING

Lead acid batteries generate gases which can cause an explosion. Keep sparks and flames away from batteries. **NO SMOKING.** Charge batteries only in area with good ventilation and always leave the top cover open while charging batteries. Do not disconnect the charger from the batteries before disconnecting the AC power cord. Disconnecting the battery cable with the charger plugged in could cause an explosion.



WARNING

Always wear eye protection and protective clothing when working near batteries. Remove all jewelry. Do not put tools or other metal objects across the battery terminals, or the tops of batteries.



WARNING

Maintenance and repairs must be done by authorized personnel only. Tighten all fasteners. Keep adjustments according to the specifications given in the service manual for the machine. Keep the electrical parts of the machine dry. For storage, keep the machine in a building.



WARNING

Make sure that all labels, decals, warnings, cautions and instructions are fastened to the machine. Get new labels and decals from American-Lincoln.

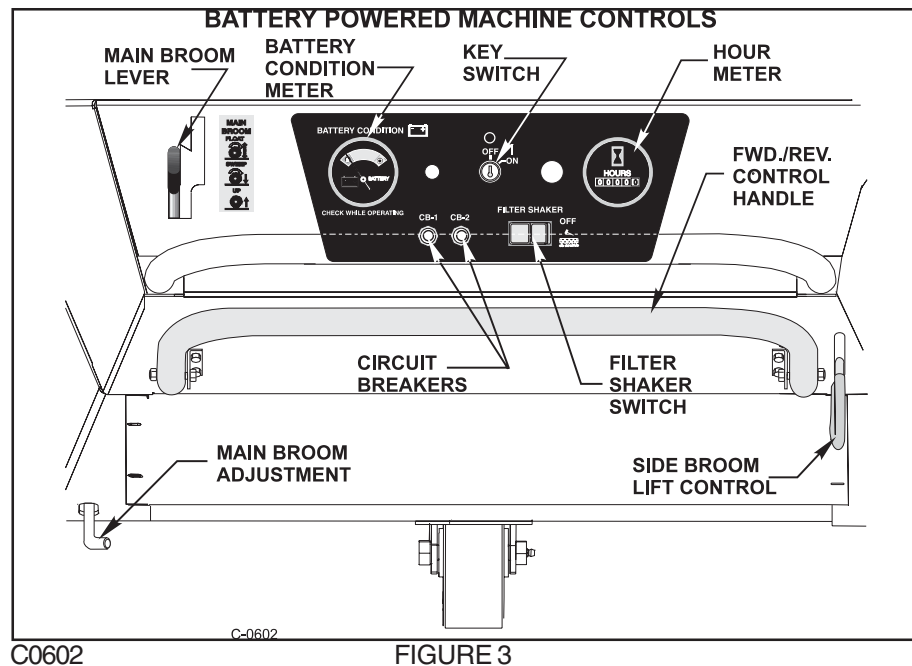


FIGURE 3

MACHINE CONTROLS

KEY SWITCH

The key switch is a two position rotary ON/OFF switch that is located on the control panel.

The filter shaker will activate for 20 seconds after the key switch is turned to the "OFF" position unless equipped with the optional filter shaker switch.

Gas/LP Powered Machines

The key switch must be turned "ON" before using the electric starter button or the pull start.

- Turn the key switch to the "ON" position before using the start button.
- Turn the key switch to the "OFF" position to turn off the sweeper.

Battery Powered Machines

To conserve battery power turn the key switch "OFF" when leaving the machine unattended even if only for a minute. Run time for the battery powered machine can vary with operating conditions and machine maintenance practices.

- Turn the key switch to the "ON" position to turn on the sweeper.
- Turn the key switch to the "OFF" position to turn off the sweeper.

BATTERY CONDITION METER (Battery Powered Machines)

The battery condition meter is located on the left side of the console. The condition meter indicates the level of charge in the batteries. The batteries are sufficiently charged when the needle stays in the green area on the gauge while the machine is being operated. Charge the batteries when the needle drops into the red zone while operating the machine.



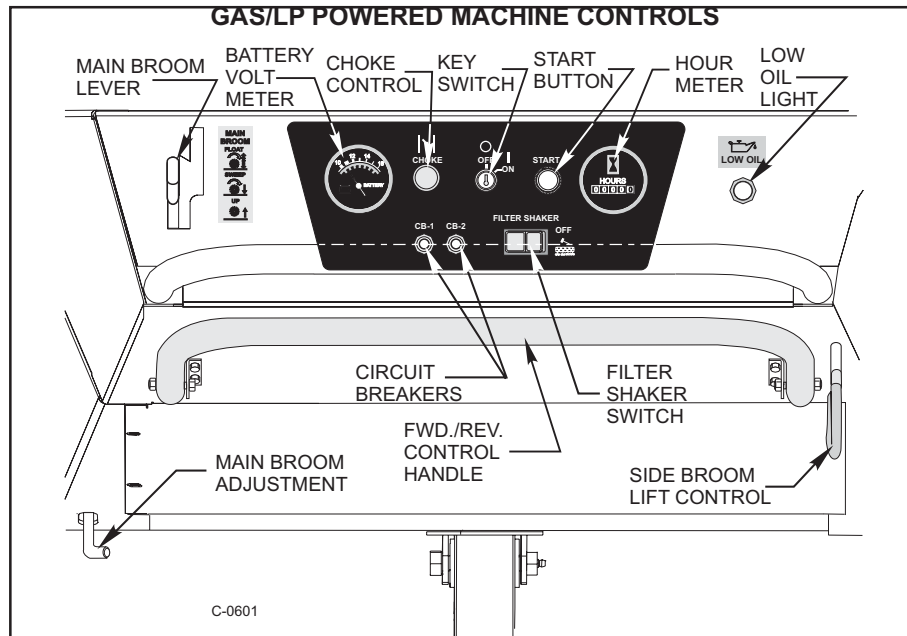
WARNING

Do not operate the machine if the needle stays in the red zone. Operating the sweeper with discharged batteries will degrade battery life.

HOUR METER

The Hour Meter is located on right side of the console. The meter is activated when the key switch is on. The meter indicates actual run time of the sweeper. The meter is used to determine when maintenance should be performed.

MACHINE CONTROLS



C0601

FIGURE 4

START BUTTON (Gas/LP Only)

The start button is located on the right side of the console next to the key switch. The start button is a momentary push button switch that energizes the electric starter motor when pushed. The key switch must be turned on before using the start button to start the engine.



WARNING

Do not hold the start button for more than 15 seconds at a time. Allowing the starter motor to run for more than 15 seconds at a time may cause permanent damage to the starter motor.

To start the engine, push and hold the switch until the engine starts.

BATTERY VOLT METER (Gas/LP Only)

The battery volt meter is used to monitor the charging system on GAS/LP Powered machines.

The meter indicates the voltage of the battery. A properly charged battery will indicate approximately 13.8 volts. A reading of less than 12 volts could be an indication of a charging system fault.

CHOKE CONTROL (Gas/LP Only)

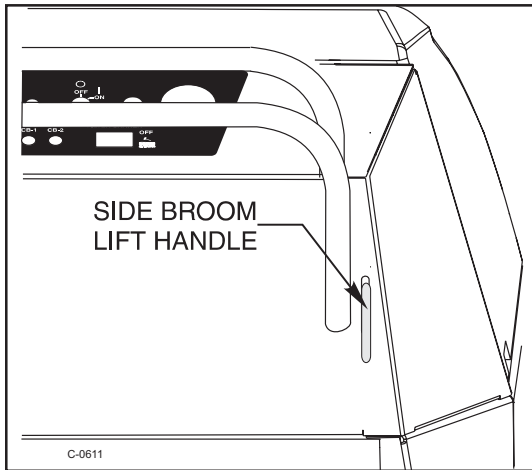
The choke control is located on the console. The choke governs the air/fuel mixture during the combustion cycle of the engine operation. The choke should be pulled out while starting the engine and then gradually pushed back in after the engine warms up.

LOW OIL LIGHT (Gas/LP Only)

The low oil light is located on the console. The low oil light is part of a protection feature for the engine. When the oil level drops below a safe level the engine shuts off and illuminates the light to advise the operator of the low oil level. When this occurs check the oil level in the engine and add oil as necessary. The oil level must be full before the engine will start.

FILTER SHAKER SWITCH

The filter shaker switch is a two position rocker switch that is located on the console. When the filter shaker switch is set to the "ON" position the filter shaker will operate automatically for approximately 20 seconds after the key switch is turned off. The "OFF" position disables the automatic shake cycle which would normally occur after turning the key switch off.



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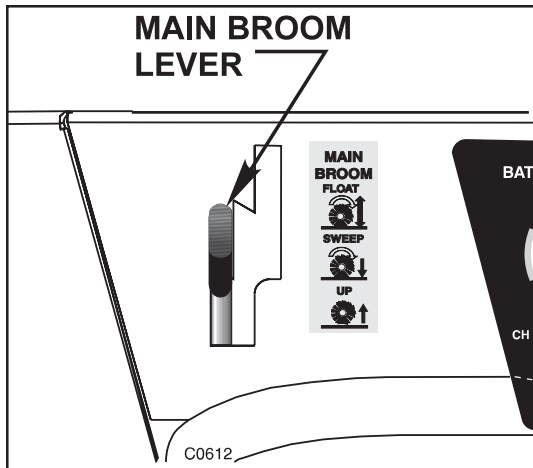
FIGURE 5

SIDE BROOM LIFT HANDLE

The Side Broom lift handle is located at the rear of the sweeper on the right side. The lift handle raises and lowers the side broom. Broom rotation stops when the side broom is raised.

-To raise the side broom, pull the handle out and down to lock the broom in the raised position.

-To lower the side broom, move handle up and forward into the slot.



C0612

FIGURE 6

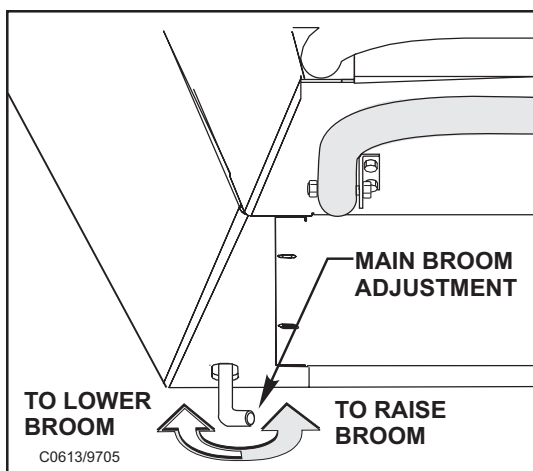
MAIN BROOM LEVER

The main broom lever is located on the left side of the console. The main broom lever has three positions that control the main broom sweep height.

To lower the main broom, grasp the lever and move it to the right out of the "UP" position and place the lever in the "SWEEP" or "FLOAT" position.

The "SWEEP" position is for normal sweeping and should be used for most sweeping conditions.

The "FLOAT" position is used for sweeping very uneven surfaces only. Using the float position will cause premature wear on the main broom if used under normal operating conditions for extended periods of time.

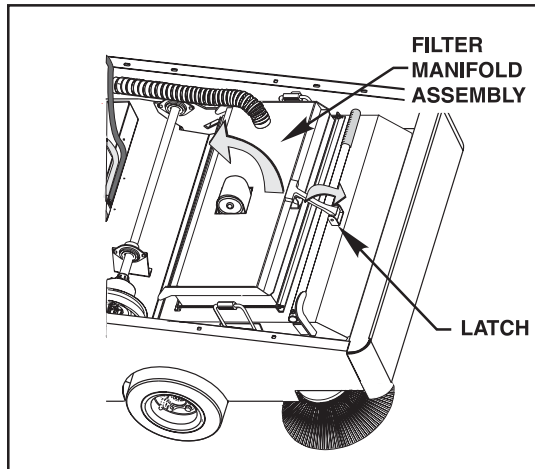


C0613

FIGURE 7

MAIN BROOM ADJUSTMENT

The main broom adjustment is located at the rear of the machine. Adjust the main broom sweep height to compensate for wear of the broom bristles. Check the main broom sweep height regularly and adjust as necessary. (See "Main Broom Service" in this manual)



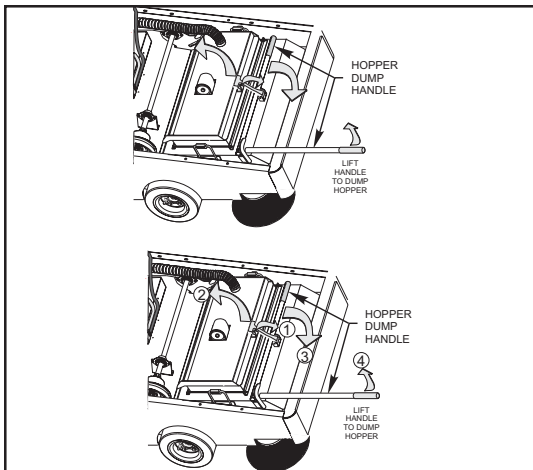
C0609

FIGURE 8

FILTER MANIFOLD LATCH

The filter manifold latch is located on the hinged filter manifold assembly. The latch must be disengaged before dumping the hopper or removing the dust filter. Apply slight down pressure on the edge of the manifold assembly to ease removal.

To disengage the filter manifold latches, apply slight down pressure to the manifold assembly and lift the latch off the catch.



C0608

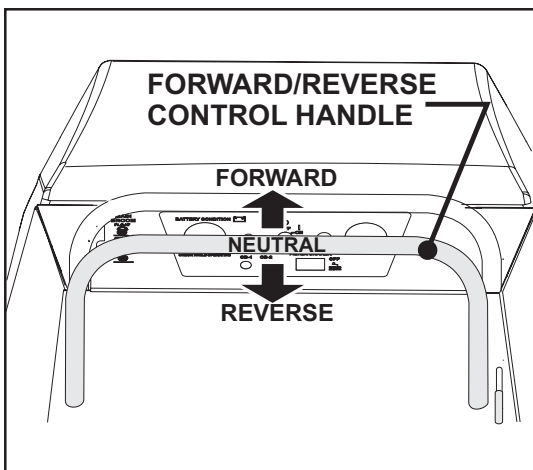
FIGURE 9

HOPPER DUMP HANDLE

The hopper dump handle is located on the hopper and is used for dumping debris. A mechanical interlock prevents the handle from being moved out of the stowed position before the filter manifold assembly has been lifted away from the hopper.

To dump the hopper, disengage the filter latch, lift the manifold assembly then rotate the dump handle out of the stowed position and lift.

To stow the handle, replace the handle to the stowed position, lower the filter manifold assembly and engage the filter latch.



C0614

FIGURE 10

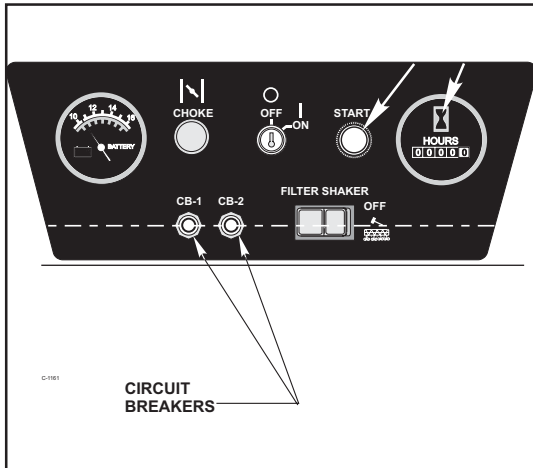
FORWARD/REVERSE CONTROL HANDLE

The forward/reverse control handle is located at the rear of the machine. The control handle extending across the rear of the machine activates the belt driven dead-man clutch in the drive system.

To drive the machine forward, move the control handle forward.

To drive the machine backward, move the control handle back.

The handle returns to neutral automatically when released.



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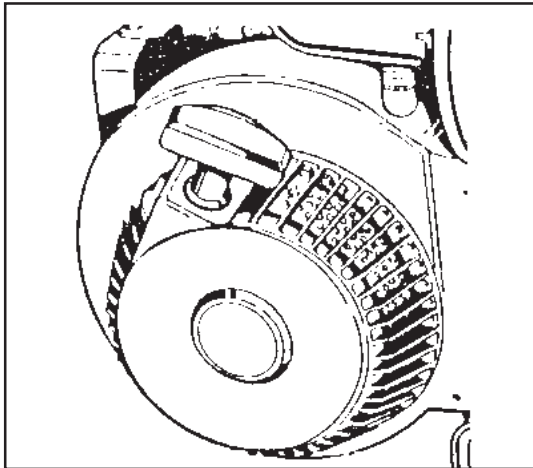
FIGURE 11

CIRCUIT BREAKERS

The circuit breakers provide protection for the electrical system and are located on the console. The circuit breaker “POPS” out when an overcurrent condition exists.

When a circuit breaker pops out, the machine must be taken out of service and repaired before the circuit breaker will reset. The circuit breaker may be reset when the overcurrent condition has been corrected.

Push the button in to reset a popped circuit breaker.



P4550

FIGURE 12

REWIND STARTER

The Gas/LP engine is equipped with a rewind starter. If the battery is dead, it may be possible to start the engine with the rewind starter.

Open the top cover to gain access to the rewind starter.

To use the rewind starter:

- Turn key switch to “On” position.
- Grasp the starter, and pull it slowly until the starter engages.
- Pull the cord rapidly enough to overcome compression, prevent kickback and start engine.

OPERATING INSTRUCTIONS

BATTERY MACHINE OPERATION

Charge the batteries after operating the machine. See the battery charging instructions in this manual. Use the pre-start checklist and follow the service chart for daily check points. Read and follow the safety precautions to assure safe, trouble free operation.



WARNING

Lead acid batteries generate gases which can cause an explosion. Keep sparks and flames away from batteries.

NO SMOKING. Charge batteries only in area with good ventilation and always leave the top cover open while charging batteries. Do not disconnect the charger from the batteries before disconnecting the AC power cord.

Disconnecting the battery cable with the charger plugged in could cause an explosion.



WARNING

Always wear eye protection and protective clothing when working near batteries. Remove all jewelry. Do not put tools or other metal objects across the battery terminals, or the tops of batteries.

GAS/LP MACHINE OPERATION

See the LP instructions in this manual for fueling and service instructions on the LP fuel system and replacement of tanks. Use the pre-start checklist and follow the service chart for daily check points. Read and follow the safety precautions to assure safe, trouble free operation. Gasoline powered machines use regular grade unleaded gasoline. Turn the engine off before dispensing fuel into the gasoline powered machine.



WARNING

To prevent possible fire. Never fill fuel tank while the engine is running. Always be sure gasoline container and sweeper are electrically grounded before dispensing gas. This can be done by permanently attaching an insulated wire with a battery clip on the end to the gasoline container.



WARNING

All internal combustion engines give off harmful fumes and gases while running. Do not start or run the engine in an enclosed area where the exhaust gases can accumulate. Avoid breathing these gases as they contain poisonous carbon monoxide which can endanger your health or life if inhaled steadily for even a few minutes.



WARNING

Check for gas odor before and during starting operations. If gas odor is noticed, stop and check for leaks or component malfunctions in the fuel system. Check fuel supply hoses for proper connection and signs of abrasion. Do not start engine when gas odor is present.



WARNING

Keep cigarettes, sparks and open flame away when working on LP equipment, use caution when inspecting for gas leaks or when LP tanks are present.



WARNING

Do not run engine in an enclosed area. exhaust gases contain carbon monoxide, an odorless and deadly poison. Do not operate the engine without adequate ventilation.

STARTING INSTRUCTIONS

PRE-START CHECKLIST

Before starting the machine, do these pre-start checks.

1. Check all controls for proper operation.
2. Check for loose battery connections.
3. Make sure all controls are "OFF".
4. Check to be certain that the forward /reverse control handle is centered in the neutral position.

TO START THE BATTERY POWERED SWEEPER

Perform the pre-start checklist before starting the sweeper.

1. Turn the key switch to the "ON" position.
2. Check the battery condition meter after the machine is on to determine if battery is sufficiently charged.
Charge the batteries when the needle stays in the red zone while the machine is being operated

TO START GAS POWERED SWEEPER

Follow these instructions for starting a cold engine. If the engine is warm reduce the initial choke setting in step 1 to halfway out position.

1. Set the choke to the full out position.
2. Turn the key switch to the "ON" position.
3. Push the start button until the engine starts. Do not hold the start button for more than 15 seconds at a time.
4. After engine starts, gradually push in the choke until the engine runs smoothly.
5. If the engine starts then stalls push in the choke halfway and restart the engine.
6. At temperatures below 50° F (10° C), a one or two minute warm-up may be required.
7. Push the choke control all the way in when the engine reaches normal operating temperature.

TO START LP POWERED SWEEPER

Follow these instructions for starting a cold engine. If the engine is warm reduce the initial choke setting in step 4 to halfway out position.

1. Open the LP storage tank valve.
2. Check all propane components for leaks and physical security. Be sure the tank is securely fastened.
3. Check the regulator. Momentarily press fuel primer on the regulator cover to bleed air out of the system.
4. Set the choke to the full out position.
5. Push the start button until the engine starts. Do not hold the start button for more than 15 seconds at a time.
6. If the engine starts then stalls, push in the choke halfway and restart the engine.
7. At temperatures below 50° F (10° C), a one or two minute warm-up may be required.
8. Push the choke control all the way in when the engine reaches normal operating temperature.

TO START ENGINE USING THE REWIND STARTER

The Gas/LP engine is equipped with a rewind starter. If the battery is dead, it may be possible to start the engine with the rewind starter. Grasp the starter, and pull it slowly until the starter engages. Pull the cord rapidly enough to overcome compression, prevent kickback and start engine. Repeat if necessary with the choke opened slightly. When the engine starts open the choke gradually to position that allows the engine to run smoothly.

OPERATING INSTRUCTIONS

TO DRIVE MACHINE FOR TRANSPORT

Use these instructions to drive the machine for transport to the sweeping site.



WARNING

Be careful when operating the machine on a ramp or incline. Always move slowly on a ramp. Do not turn this machine on a ramp. Do not stop and leave this machine on a ramp.

1. Push the Forward/Reverse control Handle forward to start machine moving.
2. Vary your hand pressure on the control handle to obtain the desired travel speed.

TO SWEEP WITH MACHINE

Follow these steps to sweep with the machine.



WARNING

Machines can ignite flammable materials and vapors. Do not use with or near flammables such as: gasoline, grain dust, solvents and thinners.

1. Lower the side broom.
2. Move the main broom lever to the sweep position.
3. Vary your hand pressure on the forward reverse control handle to obtain desired travel speed.
4. Empty the hopper when full. The sweeper will start to leave debris on the floor when the hopper fills to capacity.

TO EMPTY HOPPER

Empty the hopper when full. The sweeper may begin to leave a trail of debris while sweeping when the hopper is full. Use the hopper dump handle to empty the hopper. The hopper may be removed for cleaning. Do not attempt to remove the hopper when full. Empty the hopper before removing. Follow these instructions to dump the hopper.



WARNING

To prevent possible back injury. Do not attempt to dump the hopper if it is too heavy to be lifted by one person. Get help if needed. Know how to lift safely. Use your legs to do the work while keeping your back straight in an upright position. Do not bend over and use your back to lift heavy objects.

1. Drive to dump site and position machine on hard level surface. Turn key switch to the "OFF" position.
2. Open the hinged top cover.
3. Disengage the filter manifold latch located on the filter shaker assembly. Apply light down pressure on the corner of the shaker assembly to ease removal of the latches.
4. Lift the hinged shaker assembly away from the hopper.
5. Swing the hopper dump handle to the dump position.
6. Lift the hopper dump handle to empty the hopper.
7. Use the hopper dump handle to return the hopper to the sweep position.
8. Swing the hopper dump handle to the stowed position.
9. Lower the hinged shaker assembly and engage the filter manifold latch. Apply slight down pressure on the corner of the shaker assembly to ease engagement.
10. Close the hinged top cover.

TO STOP SWEEPER

1. Allow the directional control handle to return to the center (neutral) position.
2. Use the side broom lift handle to raise the side broom. Pull out and down to lock the side broom in the raised position.
3. Use the main broom lever to raise the main broom. Move the main broom lever back to the "UP" position and move the lever into the slot provided to hold the main broom in the "UP" position.
4. Turn the key switch to the "OFF" position.
5. Perform the post operation checklist.

POST OPERATION CHECKLIST

After stopping the machine perform these post operation checks.

1. Check sweeping brooms for wear or damage.
2. Check all flaps for wear, damage or adjustment.
3. Close the supply valve on the LP cylinder. Check the fuel level and install a filled cylinder if needed.
- ~3. Fill the fuel tank.
- *3. Charge the batteries.
4. Perform the scheduled maintenance according to the service chart.

- = LP powered machines only.

~ = Gasoline powered machines only.

* = Battery powered machines only.

BATTERY CHARGING INSTRUCTIONS

Charge the batteries at the end of each day or when the battery condition meter indicates low battery voltage. The batteries need to be charged when the needle stays in the "red" zone while the machine is being operated. When charging batteries, only use the quick disconnect provided. Use the quick disconnect to insure correct polarity.

Check the liquid level in the batteries a least once a week and add water when low. Use only distilled water. Fill the batteries after charging the batteries to prevent electrolyte from spilling over on to the tops of the batteries during the charging process.



WARNING

The use of an extension cord with the charger should be avoided. Risk of fire and electrical shock is possible if the wrong type or size extension cord is used. If an extension cord must be used, only use a three conductor number 12 AWG cord with ground, properly wired, in good electrical condition and keep it as short as possible. Locate all cords so that they cannot be stepped on, tripped over, or otherwise subjected to damage or stress.



WARNING

Verify that the AC power source to which the charger is to be connected is capable of supplying the current specified on the charger nameplate.



WARNING

Keep all charger ventilation holes at least 2 inches away from walls or other objects. Do not allow vent holes to become obstructed.



WARNING

Do not operate charger that has been damaged or shows physical signs of damage. Have charger serviced by a qualified professional repair person.



WARNING

Lead acid batteries generate gases which can cause an explosion. Keep sparks and flames away from batteries. **NO SMOKING.** Charge batteries only in area with good ventilation and always leave the top cover open while charging batteries. Do not disconnect the charger from the batteries before disconnecting the AC power cord. Disconnecting the battery cable with the charger plugged in could cause an explosion.

OPERATING INSTRUCTIONS

TO CHARGE THE MOTIVE POWER BATTERIES (Battery powered machines only)

1. Read the detailed instructions provided on the charger.
2. Be sure all controls are "OFF" and machine is located in an area with good ventilation.
3. Open the top cover. The top cover must remain open during the charging process.
4. Disconnect the machine power supply cable from the battery using the quick disconnect provided.
5. Connect the charger cable to the battery connector.
6. Plug the charger into properly grounded AC outlet. Be sure to verify the operating voltage of your charger. The chargers supplied with machine operate at 115 VAC @ 60 HZ or 230 VAC @ 50 HZ.
7. The charger will begin charging the batteries after a short period of time. The charger will shut off automatically when the charging process is complete.
8. Unplug the charger from the grounded AC outlet before disconnecting the charger from the battery.
9. Disconnect the charger cable from the battery.
10. Check the electrolyte level in the battery after charging. Add distilled water if needed.
11. Reconnect the machine power supply cable to the battery cable.
12. Lower the top cover and perform the pre-start checks before operating the machine.

GASOLINE POWERED MACHINE FUELING INSTRUCTIONS

The fuel tank for gasoline powered machines is located on the engine. The top cover must be opened to access the fuel tank. After opening the top cover, observe the combination fuel cap/gas gauge and check the fuel level to determine if the fuel tank needs to be filled.

TO FILL THE GASOLINE POWERED MACHINE FUEL TANK



WARNING

To prevent possible fire. Never fill fuel tank while the engine is running. Always be sure gasoline container and sweeper are electrically grounded before dispensing gas. This can be done by permanently attaching an insulated wire with a battery clip on the end to the gasoline container.

1. Turn the key switch to the "OFF" position.
2. Open the top cover.
3. Observe the level indicated by the gas gauge on the fuel tank cap.
4. Remove the fuel tank cap from the fuel tank and add gasoline as needed.
5. Install the gas cap and lower the hinged top cover.

LP POWERED MACHINE FUELING INSTRUCTIONS

Fueling the LP powered machine is accomplished by removing the empty LP cylinder and replacing it with a full replacement cylinder. Some cylinders are equipped with a fuel level gauge. Check the gauge and change the cylinder when the gauge reads "EMPTY". See the LP Instructions in this manual for additional information.



WARNING

Improper filling procedures could cause an explosion. Have your LP cylinders filled by qualified personnel.



WARNING

Park the machine in a safe area designated for changing LP fuel tanks. The designated safe area must have adequate ventilation, must be free from sparks or other sources of ignition.



WARNING

NO SMOKING signs should be posted and enforced. The area must not be in the vicinity of flammables, combustible materials or high temperature sources such as furnaces or ovens.



WARNING

Always store and transport LP fuel tanks with the safety relief valve in the up position. This will prevent the tank from venting liquid propane in the event the safety relief valve opens due to overpressure in the tank. A properly stored tank will only vent gaseous propane which dissipates much faster than liquid propane.

TO CHANGE LP TANK

The tank changing operation presents an opportunity for the operator to inspect the tank, tank fittings and the fuel lines for damage or wear that could cause leaks in the LP fuel system. Follow these steps to change the LP tank.

1. Park the machine in a designated safe area.
2. Turn key switch to "OFF" position.
3. Close the tank supply valve.
4. Remove the machine fuel supply hose quick disconnect coupling from the tank.
5. Inspect the fuel system components for damage and abnormal wear.
6. Remove the tank from the cradle holding device. Handle the tank carefully. It must not be dropped or mishandled.
7. Store the empty tank in the designated storage area.
8. Select a filled LP tank and inspect for damage and abnormal wear.
9. Carefully install the tank so the centering pin aligns with the hole in the tank collar.
10. Fasten the tank hold down clamp so that the tank locks into position.
11. Reconnect the machine fuel supply hose to the tank supply coupling.
12. Open the tank supply valve and inspect for leaks. If leaks are present close the supply valve immediately. Investigate the source of the leak and have it repaired before using the machine. If no leaks are found, the machine is ready to start.
13. Close the top cover.
14. Close the tank supply valve if the machine is to be stored.

MACHINE STORAGE

GASOLINE POWERED MACHINES

Machines to be stored over 30 days should be completely drained of fuel to prevent gum deposits forming on essential carburetor parts, fuel filter and tank.

The use of a fuel additive, such as STA-BIL, or an equivalent, will minimize the formation of fuel gum deposits during storage. Such an additive may be added to the gasoline in the fuel tank of the engine.

The following procedure should be used to prepare the machine for storage:

1. All fuel should be removed from the tank. Run the engine until it stops from lack of fuel.
2. While engine is still warm, drain oil from the crankcase. Refill with fresh oil.
3. Remove spark plug, pour approximately 1/2 ounce (15 grams) of engine oil into cylinder and crank slowly to distribute oil. Replace spark plug.
4. Store in a clean and dry area.

BATTERY POWERED MACHINES

All wet batteries will slowly discharge on standing and will discharge much faster when warm than when cold. At normal temperature of 80°F (26°C) loss of capacity by self-discharge, starting with a fully charged battery, may amount to an average of .001 specific gravity per day over a 30 day period. The battery should be given a booster charge when the specific gravity falls .040.

Do not discharge the batteries excessively. Excessive discharge can cause polarity reversal of the individual cells in the battery which will lead to complete failure of the batteries.

Use a hydrometer to monitor the specific gravity of the individual cells in the batteries. When checking the specific gravity of the batteries, you should not see a large difference between the individual cells. The batteries may need to be replaced if the battery shows a significant difference of specific gravity between the cells.

The specific gravity of the electrolyte should measure 1.285 when fully charged.

SERVICE CHART

SERVICE CHART

The following is a guide for servicing and maintaining your 91WS Walkbehind Sweeper. For best machine performance, the following operation checks should be made at these intervals. For service assistance, consult your Clarke/American-Lincoln distributor. For best results, replace worn or damaged parts with genuine Clarke/American-Lincoln parts.

EVERY 8 HOURS or DAILY:

- | | |
|--|-------|
| 1. Recharge batteries and check electrolyte level. | B |
| 2. Check fuel level. | G, LP |
| 3. Check engine oil level (at 5 hours). | G, LP |
| 4. Clean cooling fins and entire engine. | G, LP |
| 5. Check all flaps and gaskets for wear or damage. | |
| 6. Check sweeping brooms for wear or damage. | |
| 7. Check panel filter (clean side) for dust leak. | |
| 8. Check for LPG odor at connections. | LP |

EVERY 25 HOURS:

- | | |
|--|-------|
| 9. Change crankcase oil (heavy use). | G, LP |
| 10. Clean and re-oil foam pre-cleaner air filter (Dual Element). | G, LP |
| 11. Check all belts and chains for wear and alignment. | |

EVERY 50 HOURS:

- | | |
|--|-------|
| 12. Change crankcase oil (normal use). | G, LP |
| 13. Check battery electrolyte level. | G, LP |
| 14. Lubricate the caster wheel bearings. | |
| 15. Lubricate the drive chains. | |

EVERY 100 HOURS:

- | | |
|--|-------|
| 16. Lubricate all moving joints. | |
| 17. Clean or replace the spark plug and reset the gap. | G, LP |
| 18. Replace fuel filter. | G |
| 19. Clean and/or replace engine air filter paper cartridge (dual element). | G, LP |
| 20. Remove, clean, inspect, and reinstall battery cable connections. | |
| 21. Inspect side broom gear box and repack if necessary. | |
| 22. Check all fasteners for tightness. | |

EVERY 250 HOURS:

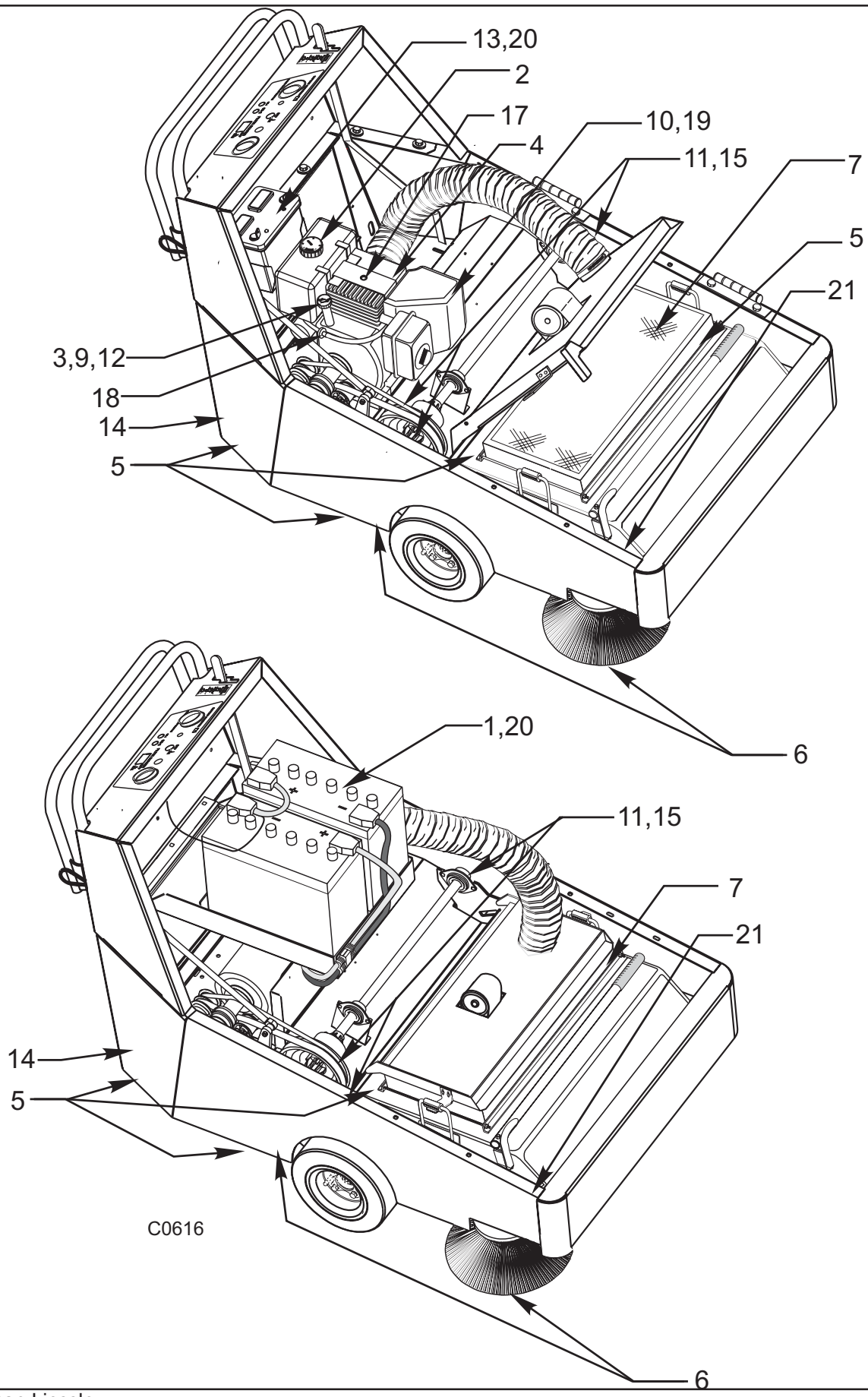
- | | |
|--|-------|
| 23. Remove combustion deposits. | G, LP |
| 24. Inspect LP fuel filter and change if needed. | LP |

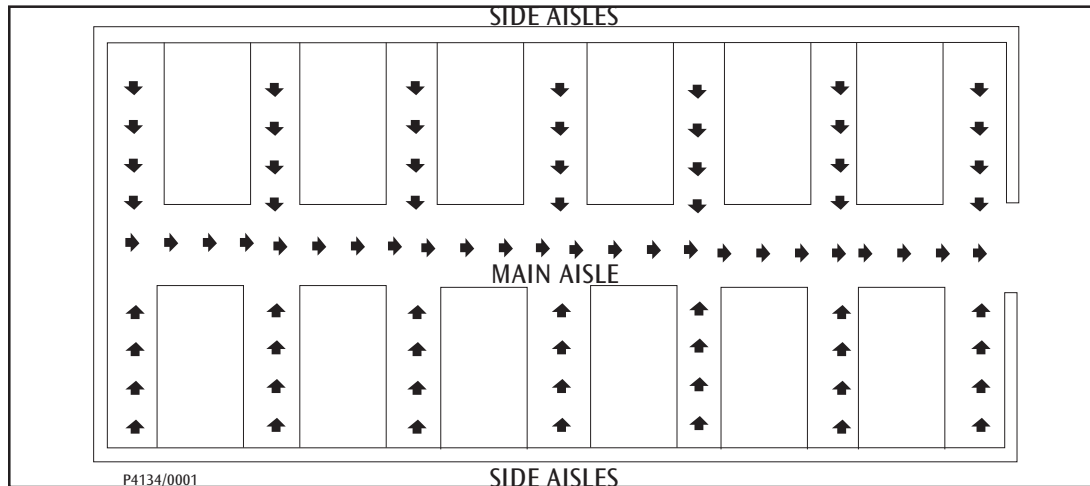
Note: Complete service information for the Briggs and Stratton engine is provided in the "Engine Owners' Manual" which is supplied as part of this manual. Briggs & Stratton Form No. 272848-1/94

G = GAS

LP = LPG

B = BATTERY





P4134

FIGURE 13

HOW TO SWEEP

The sweeper is intended for use on hard relatively flat surfaces such as cement, asphalt and wood block floors. Exercise care when maneuvering to keep wheels from dropping off curbs or into pot holes. Do not sweep over obstructions.

The sweeper is designed for dry sweeping conditions. Wet clay and muddy type material will adhere to surface of sweeping chamber and hopper. Sweeping performance will degrade if these surfaces are not kept clean. Large heavy objects such as bricks, large stone and iron parts should not be swept. Damage to the main broom or other sweeping system components is possible. String, rope, wire or metal strapping longer than 18 inches should not be swept. These items have a tendency to wrap around moving parts. This can cause damage or degrade sweeping performance.

SWEEPING GUIDELINES

In actual sweeping, there is no single pattern that can be set forth in the manual. Each installation has its own conditions, and the operator can readily set his own pattern using these guidelines.

1. Pick up large debris and remove bulky cartons from aisles before sweeping.
2. Use the machine to sweep debris from the narrow aisles into the main aisle.
3. After the machine has made a sweeping run, move the main broom lever to the "UP" position and turn the key switch to the "OFF" position. The filter shaker will operate for a short period of time. After the shaker stops, turn the key switch to the "ON" position, lower the main broom to the "SWEEP" position and continue sweeping.

NOTE

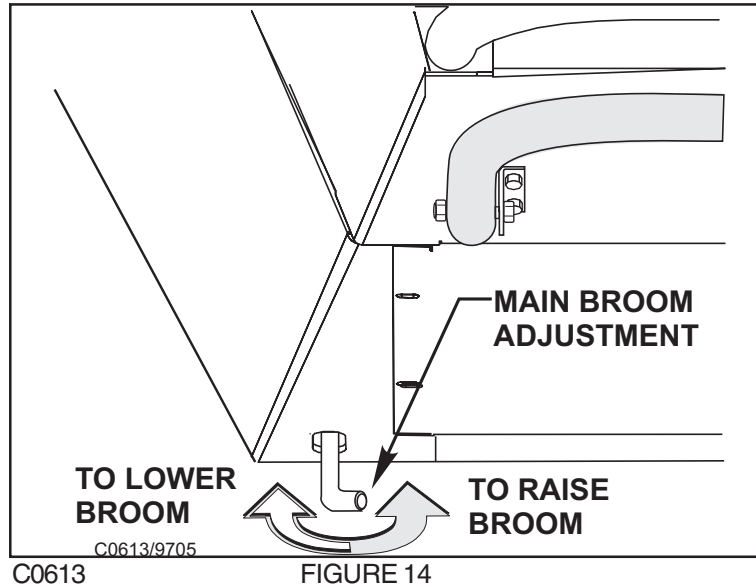
Replace main broom when bristles are reduced to 3.75 inch (9.5 cm) length. To order replacement brooms, see MAIN BROOM section of this manual. Replace side broom when bristles fail to sweep debris into the path of the main broom. To order replacement brooms see SIDE BROOM section of this manual.

SWEEPING VARIOUS TYPES OF DEBRIS

For heavy sand, dirt or excessive scattered debris, travel slowly with machine to allow main broom to deliver best results. Do not expect a completely clean surface on the first pass under these conditions.

Sometimes it is necessary to have extra broom pressure where debris is excessively heavy. See "Main Broom Adjustment" for information on adjusting broom to a "heavy" sweeping pattern. Material that adheres to the sweeping surface: This type of wet or sticky material will require more broom pressure, as in the above paragraph.

MAIN BROOM SERVICE INSTRUCTIONS



MAIN BROOM

To prevent the main broom from setting in one direction and to provide maximum life of the broom. It is recommended that the broom be turned end for end periodically.

TO CHECK THE MAIN BROOM SWEEP PATTERN

Check the main broom sweep pattern after changing the broom or when poor sweeping performance is encountered while sweeping.

1. While the machine is not moving, lower the main broom to the "SWEEP" position. Allow the machine to sweep in one spot for a short period of time.
2. Before moving machine, move main broom lever to the "UP" position and move the sweeper forward until you can see the pattern left by the main broom bristles on the floor.
3. Check the width of the pattern on the floor to determine if the main broom requires adjustment.

The recommended sweep pattern left on the floor will be between 1 and 2 inches wide.

- A pattern that is more than 2 inches wide indicates the broom linkage needs to be adjusted "UP".
- A pattern that is less than 1 inch wide indicates the broom linkage needs to be adjusted "DOWN".

TO ADJUST THE MAIN BROOM SWEEP HEIGHT

When changing the sweep height adjustment it is recommended that the bolt be adjusted 1 turn at a time. After adjustment, recheck the sweep pattern to determine if further adjustment is necessary. Locate the Main Broom Height Adjustment which is located at the rear bottom of machine. Turn the adjustment screw as described below.

- Turn the adjustment bolt counterclockwise to INCREASE the sweep pattern width.
- Turn the adjustment screw clockwise to DECREASE the sweep pattern width..

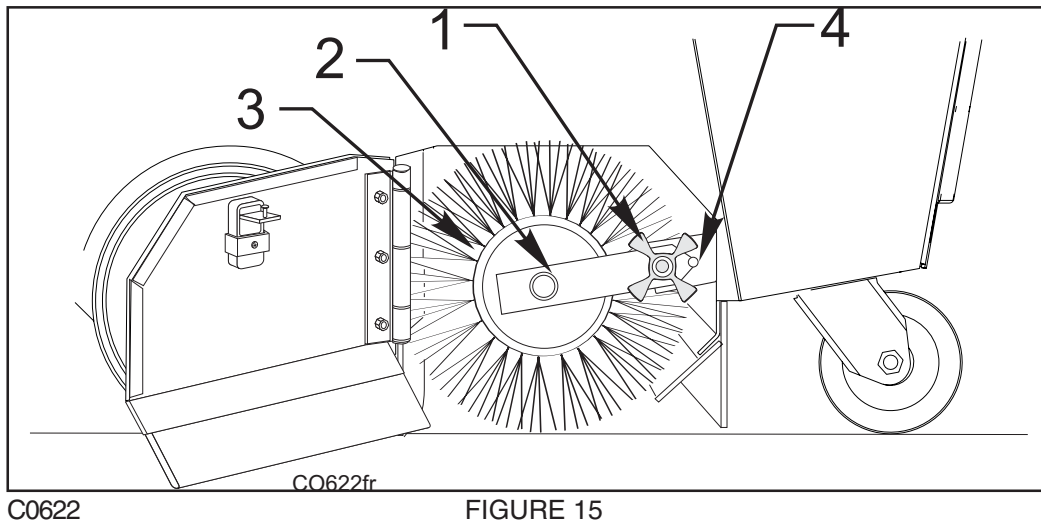


WARNING

To prevent unexpected movement always park on a hard, level surface and turn key switch off before working on the machine.

SERVICE INSTRUCTIONS

MAIN BROOM SERVICE INSTRUCTIONS-CONT.



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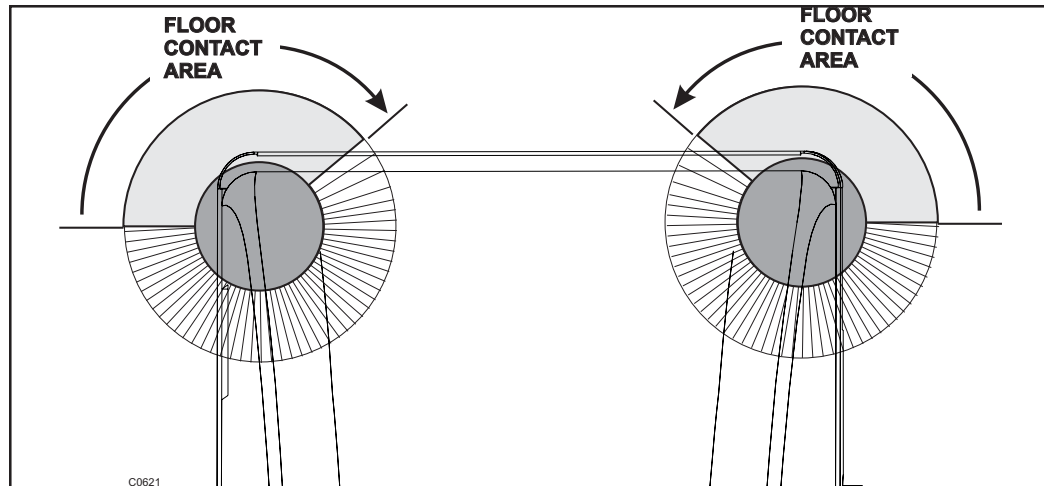
FIGURE 15

TO REPLACE THE MAIN BROOM

The main broom should be replaced when the bristles become worn to less than 2". The main broom is held in place by a single threaded knob. This feature provides for easy removal and installation of the main broom without the need for special tools or equipment. Follow the instructions below for main broom removal and replacement.

1. Park the sweeper on a smooth level surface. Turn the key switch "OFF". Place the main broom lever in the "SWEEP" position.
2. Gain access to the main broom by opening the broom compartment door located on the left side of the machine.
3. Remove the main broom idler hub [Item 2] by loosening the threaded knob [Item 1].
4. Grasp the main broom [Item 3] and remove it from the drive hub [Item 2].
5. Insert replacement broom [Item 3] into the broom compartment. Pay special attention to the slots on the broom. It may be necessary to rotate the broom so the tabs on the drive hub align with the slots on the broom.
6. Reinstall the idler hub [Item 2] to the broom and over the locator stud [Item 4] and screw provided for the threaded knob [Item 1].
7. Install the threaded knob and close the broom door and engage the door latch.
8. Re-Check main broom sweep pattern.

SIDE BROOMS SERVICE INSTRUCTIONS



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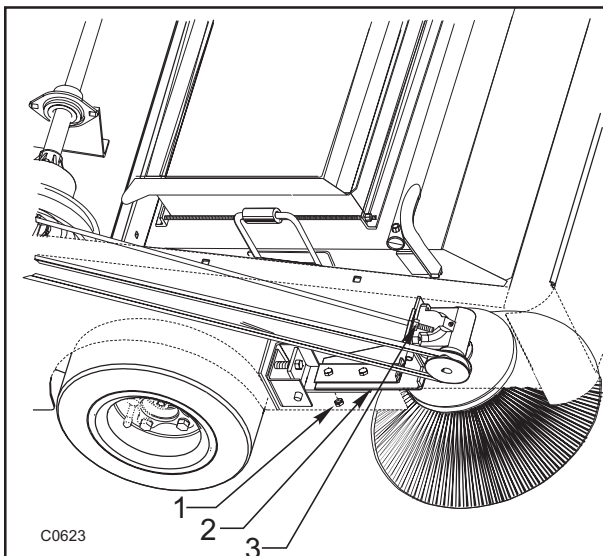
FIGURE 16

SIDE BROOMS

The side broom's sweeping angle is not adjustable, however the height of the side brooms can be adjusted to compensate for wear as the brooms become worn from use. Open the top cover and turn the adjustment nut to vary the side broom sweep height.

TO CHECK THE SIDE BROOM SWEEP PATTERN

1. Position the machine on a smooth level surface.
2. Place the side broom lift lever in the "DOWN" position.
3. While staying in place allow the side brooms to sweep for a short period of time. (Allow enough time for the side brooms to leave a clean footprint on the floor).
4. Place the side broom lift lever in the "UP" position.
5. Back the sweeper away from the area where the pattern was left.
6. Turn Key Switch to the "OFF" position.
7. Check the pattern to determine the floor contact area.
8. Determine if sweep height adjustment of the side brooms is necessary by comparing the floor contact area to the diagram in Figure 16.



C0623A

FIGURE 17

TO CHANGE THE SIDE BROOMS HEIGHT ADJUSTMENT

Adjust the side broom height to compensate for normal wear of the side brooms or when installing a new replacement broom.

1. Park machine on a smooth level surface, turn keyswitch to "OFF" position.
2. Place the side broom lift lever in the "DOWN" position.
3. Open the top cover and locate the adjustment nut on the end of the lift rod. (See Figure 17)
4. Adjust the nut so the broom contacts the floor as shown. (See Figure 16)

SERVICE INSTRUCTIONS

TO CHANGE THE SIDE BROOMS

Change the side brooms when the bristles become worn to less than 3 inches length.

1. Park machine on a smooth level surface, turn key switch to "OFF" position.
2. Place the side brooms lever in the "DOWN" position.
3. Remove the pin that passes through the flange and motor shaft. Remove the broom.
4. Remove the three (3) 1/4 inch bolts and nuts that hold the broom to the motor flange.
5. Assemble the flange to the replacement broom and fasten using the hardware removed in step 4.
6. Install broom to motor shaft with the pin removed in step 3.
7. Check sweep pattern and perform height adjustment so the broom contacts the floor as shown (See Figure 16).

DUST CONTROL SERVICE INSTRUCTIONS

The dust control system consists of the filter baffle and a panel filter. The filter baffle is built in to the hopper and should be checked/cleaned when the hopper is being emptied. The panel filter is located on top of the hopper under the hinged manifold. The panel filter must be replaced if the filter media tears. Inspect the top of the panel for signs of dirt that may be escaping through tears in the filter media.

TO CLEAN THE FILTER BAFFLE

The filter baffle should be cleaned as a first step when the dust control system fails to effectively control dusting while sweeping.

1. Park the sweeper on a smooth level surface, Turn the key switch to the "OFF" position.
2. Open the top cover and disengage the filter manifold latch.
3. Lift the hinged manifold to gain access to the panel filter.
4. Remove the panel filter and inspect for debris lodged in the baffle passages.
5. Dislodge all debris from the baffle manually or with compressed air not to exceed 100 PSI.
6. Install the panel filter. Lower the manifold over the filter and engage the latch.
7. Close the top cover .

TO CLEAN THE PANEL FILTER

Clean the panel filter when the shaker fails to adequately clear the filter pleats.

1. Park the sweeper on a smooth level surface, Turn the key switch to the "OFF" position.
2. Open the top cover and disengage the vacuum manifold latch.
3. Lift the hinged vacuum manifold to gain access to the panel filter.
4. Remove the panel filter and inspect for damage. Replace if not in serviceable condition.
5. Apply compressed air not to exceed 100 PSI to the top side of the panel to backflush lodged dirt from the filter media. The filter may also be cleaned with a solution of soap and water. If this method is used, do not use the panel filter until it has completely dried.
6. Reinstall the cleaned filter and lower the hinged manifold assembly over the filter.
7. Engage the manifold latch and close the top cover.

TO CHANGE THE PANEL FILTER

Change the filter when obvious damage is evident. Inspect for leakage or a heavily loaded filter to the point that cleaning and shaking of the filter has no effect on clearing the pleats.

1. Park the sweeper on a smooth level surface, Turn the key switch to the "OFF" position.
2. Open the top cover and disengage the vacuum manifold latch.
3. Lift the hinged vacuum manifold to gain access to the panel filter.
4. Remove the panel filter and install a new replacement panel.
5. Lower the hinged manifold assembly over the filter.
6. Engage the manifold latch and close the top cover.

FLAP SERVICE INSTRUCTIONS

The flaps are very important to the sweeping process. Inspect the flaps daily and replace any flap that shows signs of wear or deterioration. The side flaps are adjustable and should be adjusted so there is a recommended 1/16" to 1/8" gap between the floor and the bottom edge of the flaps. The adjustable flaps have slotted mounting holes to facilitate adjustment. The recycling flap is also adjustable and should be adjusted so the flap touches the broom. All other flaps require no adjustment and should be replaced when worn or damaged.

TO ADJUST THE SIDE FLAPS

1. Park machine on a smooth level surface. Turn the key switch to the "OFF" position.
2. Loosen the flap retaining screws and adjust the flap to clear the floor and leave a 1/16" to 1/8" gap.
3. Tighten flap retaining screws while holding flap in position.

HOPPER SERVICE INSTRUCTIONS

The hopper houses the debris compartment, the dust control filter and the removable dust baffle. For maximum performance and service life, keep the hopper clean and inspect the seals and flaps daily. Clean the hopper prior to parking the sweeper at the end of the day. A clean hopper will make inspecting the flaps and seals much easier and will prevent premature deterioration of hopper components. Do not leave the hopper full of debris while in storage or when parked for extended periods of time.

TO CLEAN HOPPER

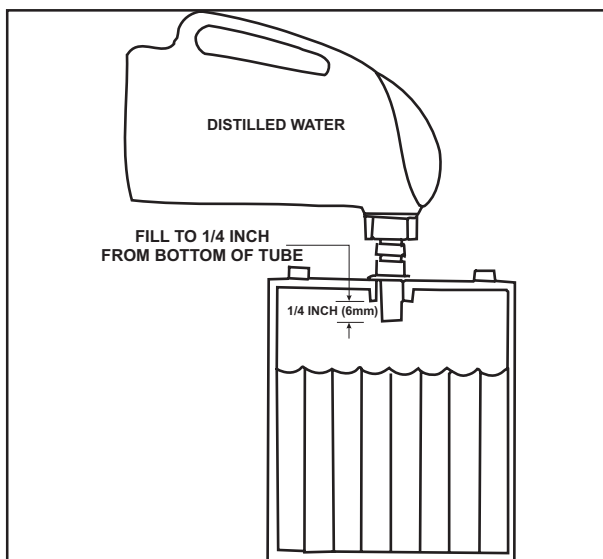
Once the hopper has been emptied, the insides of the hopper should be rinsed out with water and allowed to dry completely.

TO CHECK HOPPER SEALS

The hopper seals are important to positive dust control while sweeping. Damaged seals will reduce vacuum pressure at the broom. Inspect for cuts, tears and proper positioning of the seal material. Replace all seals that become damaged.

BATTERY SERVICE INSTRUCTIONS (Battery powered machine only)

Install the batteries as shown on page 7 and make sure all connections are wrench tight. A film of Vaseline will help prevent corrosion at the battery connection. Do not replace the electrolyte in the batteries if they have been in service for more than a week.



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FIGURE 18

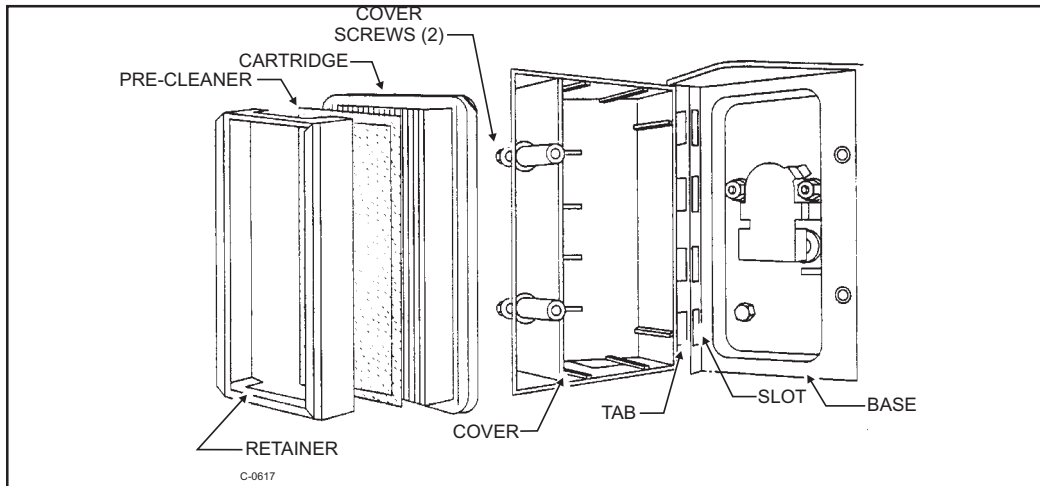
Charge the batteries when the battery condition meter stays in the red zone while the machine is being operated.

Read the safety precautions and follow the instructions for charging the batteries on page 18.

Check the liquid level in the batteries weekly. The liquid level must be checked after the batteries have been charged since the level may rise during the charging cycle. Add distilled water to bring the level up to a 1/4" below the fill tube as shown in Figure 18.

SERVICE INSTRUCTIONS

ENGINE SERVICE INSTRUCTIONS



C0617

FIGURE 19



WARNING

To prevent accidental starting, remove spark plug wire when servicing engine or equipment. Disconnect the battery at the negative terminal if the engine has an electric starting system.

NOTE

Check the oil level regularly. Be sure correct oil level is maintained. Check every five (5) hours or daily before starting the engine.

NOTE

Check the oil per the Service Chart Instructions previously listed. Change the oil after the five (5) hours of operation. Change the oil while the engine is warm. Refill with new oil of a recommended grade.

ENGINE AIR INTAKE SERVICE

1. Loosen the cover screws. Remove the cover and air cleaner assembly from the base.
2. Remove the air cleaner assembly from the inside of the cover and disassemble.
3. To service the pre-cleaner, wash in a liquid detergent and water. Squeegee dry in a clean cloth. Saturate the pre-cleaner in engine oil and use a clean, absorbent cloth to remove ALL EXCESS oil. If the pre-cleaner is very dirty or damaged, replace it.



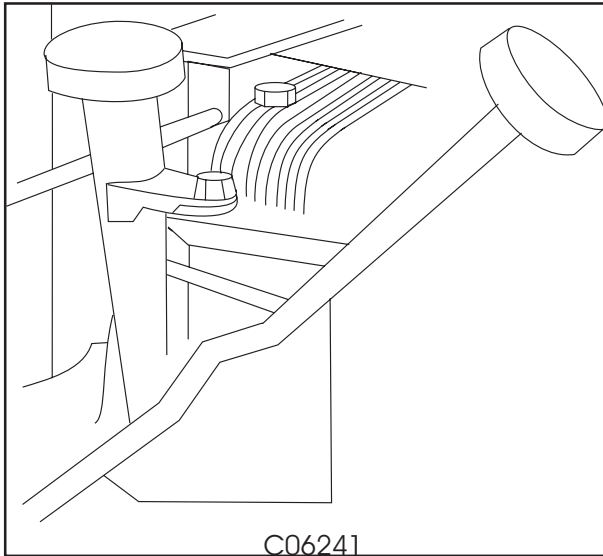
WARNING

Do not use petroleum solvents, e.g. kerosene, nor pressurized air, to clean the cartridge. Solvents will cause the cartridge to deteriorate. Pressurized air can damage the cartridge.

4. Reassemble the retainer on the pre-cleaner and cartridge (screen side of pre-cleaner toward cartridge pleats). Install this assembly in cover.
5. Insert tabs on cover into slots in base. Tighten cover screws securely.

FUEL FILTER SERVICE

The engine is equipped with an in-line fuel filter. As the in-line fuel filter is disposable, the only service required is replacement every 100 hours. For more information regarding the fuel filter system, refer to the Briggs & Stratton Owner's Manual included with this Operator's Manual.



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FIGURE 20

TO CHECK THE ENGINE OIL LEVEL

Be sure the correct engine oil level is maintained by checking the oil level daily. Use the dipstick to verify the correct oil level and add oil as indicated on the dipstick. When changing the oil you must first remove the drain plug which is located on the rear of the engine. Refer to the Briggs & Stratton Engine Owners' Manual for more information on recommended type and grade of oil to be used.

DRIVE SYSTEM SERVICE INSTRUCTIONS TO ADJUST THE NEUTRAL SETTING

The only item that should have to be moved is the linkage rod itself. By adjusting the clevis in or out, one should be able to achieve neutral when you install the new belt or if the machine begins to creep.

TO REPLACE THE FORWARD DRIVE BELT

1. Remove the two (2) inspection plugs on the right hand side of the machine which allows access to the bearing plate on the end of the differential.
2. Reach in through the inspection holes and remove the two (2) bolts that hold the differential bearing plate in. Remove and retain hardware.
3. Loosen the chain idler pulley and move it to the top of the slot to relax all tension on the chain. Retighten the idler.
4. Remove the drive wheel chain by walking it off the differential. With the idler out of the way, it should all you plenty of clearance to come off the end of the differential.
5. Move the bearing plate in an upward position to give you clearance for installing the new belt.
6. Begin by working the forward drive belt around the bearing plate. Once this is around the bearing plate, the reverse belt off the differential shieve and leave it lay off to the left hand side of the shieve.
7. Take the main forward belt and work it back around the forward idler underneath the main drive shieve and around the rear of the forward and reverse idler pulley and up over the forward and reverse idler pulley.
8. When installing the forward drive belt, one side of the belt is printed and says "This Side Out". On the forward drive belt, you want to have that so you cannot read it when it is installed. It will be riding against the shieve itself on the differential because the machine is driven off the backside of that belt.
9. Once that main forward drive belt is installed and routed correctly, reattach the reverse belt the same way it was routed before.
10. At the front of the machine, refasten the bearing plate on the end of the differential to the frame.
11. Start you chain back around the differential and readjust the idler for the drive chain.
12. Any fine adjustments for neutral that need to be done should be done with the linkage rod only.

SERVICE INSTRUCTIONS

DRIVE SYSTEM SERVICE INSTRUCTIONS - Cont.

TO REPLACE THE REVERSE BELT

1. Remove the two (2) inspection plugs on the right hand side of the machine which allows access to the bearing plate on the differential shaft. Loosen and remove both bolts holding the bearing plate to the machine.
2. Loosen the drive wheel chain idler and pull it to the top of the slot. Retighten it to keep it out of the way. This allows you freedom to walk the chain off the differential.
3. At the rear of the machine, follow the main broom belt down to the idler. Disconnect the spring to release the tension on that belt and remove the right hand side broom belt.
4. Remove the main broom belt.
5. At the front of the machine, place the differential plate with the bearing in it to the "UP" position. This allows you clearance to feed the new belt in.
6. If the forward belt is still in good condition, you will need to start by removing it off the main drive shieve off the differential.
7. Get both the forward and reverse belt off the differential shieve laying them to the left hand side.
8. Work the reverse belt over the differential shieve once you are on the front and off to the left hand side of the shieve with both belts hanging loose around the differential.
9. Take the top portion of the belt and pick it up and the bottom portion of the belt and bring it to the "UP" position. That will need to be worked around the main shieve coming off the motor in between the shieve and the fixed bracket that holds the forward idler pulley. This clearance is very tight and you must be careful not to cut the belt while you are working around that.
10. Work the belt around the forward and reverse main idler by putting it back over top of it.
11. Come back to the front of the machine and lower the differential bearing plate.
12. Reinstall the 2 bolts in that and reset the chain idler back to its position and retighten.
13. Move to the rear of the machine again and reinstall the main drive broom belt and the spring that was taken off the right hand side broom belt.
14. Any fine adjustments should be able to be done with the linkage rod itself.



WARNING

Keep cigarettes, sparks, and open flame away when working on LP equipment when inspecting for gas leaks or when LP tanks are present.



WARNING

Check all components for proper operation when needed. Replace LP components when needed. Never bypass defective safety components.



WARNING

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.



WARNING

Check for gas odor before and during starting operations. If gas odor is noticed, stop and check for leaks or component malfunction.



WARNING

Make sure LP tank is free of dents and gouges.



WARNING

Make sure service coupling is clean and free of damage. Make sure service coupling of tank matches machine service coupling.



WARNING

Keep engine properly tuned.



WARNING

Make sure the LP tank matches the fuel system.



WARNING

Make sure the LP tank is securely mounted on the machine with the retainer bracket clamping the tank with the locating pin in position.



WARNING

Park the machine in a shaded, cool area when not in use.



WARNING

Keep the LP tank service valve closed when the tank is not in use.



WARNING

Never overfill the LP tank. Fill the LP tank to the recommended weight stamped on the tank.



WARNING

Use care in handling LP tanks. Never drag or drop them.



WARNING

Always store and transport LP fuel tanks with the safety relief valve in the “UP” position.



WARNING

Avoid contact with the LP fuel to avoid frostbite.



WARNING

When the machine is to stand unused for a period of time (overnight), 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. Turn off the ignition switch.

LP GAS COMPONENTS

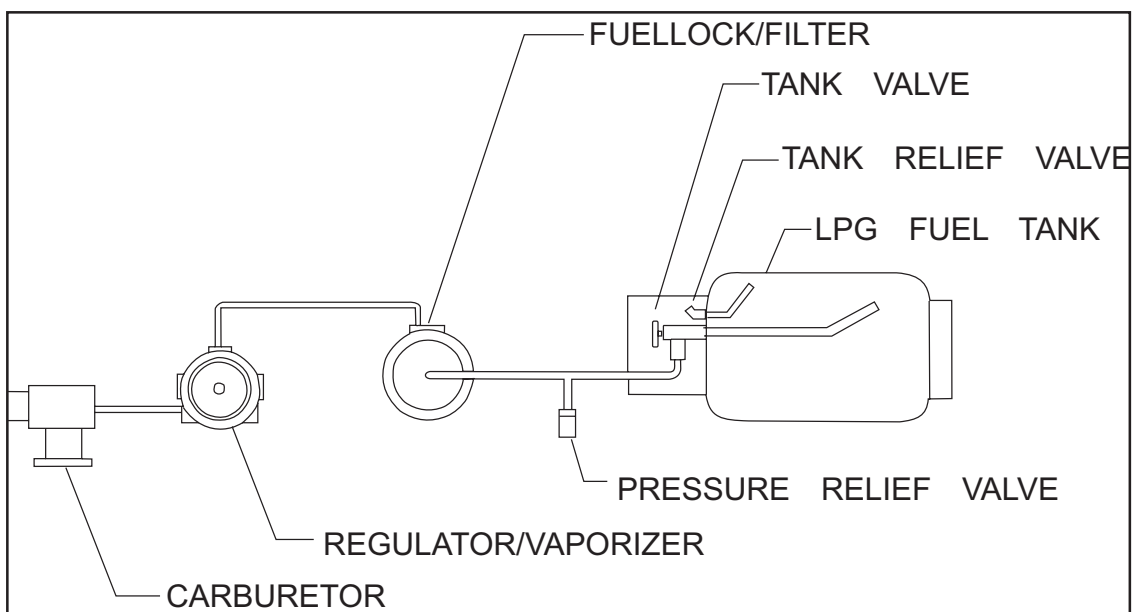
LP GAS SYSTEM

The propane powered Model 91WS fuel system has been modified to operate on LP vapor fuel instead of gas.

The LP fuel system consists of several components not found in a regular gasoline system. The LP fuel system also contains the associated mounting hardware and plumbing for the LP components. The major components are as follows:

- An LP carburetor
- A combination water-heated vaporizer and regulator
- A combination LP fuel line filter and lock-off valve
- An LP fuel tank, fittings, and relief valves

These components are factory set. Attempts at adjusting these components should only be made by authorized service personnel.

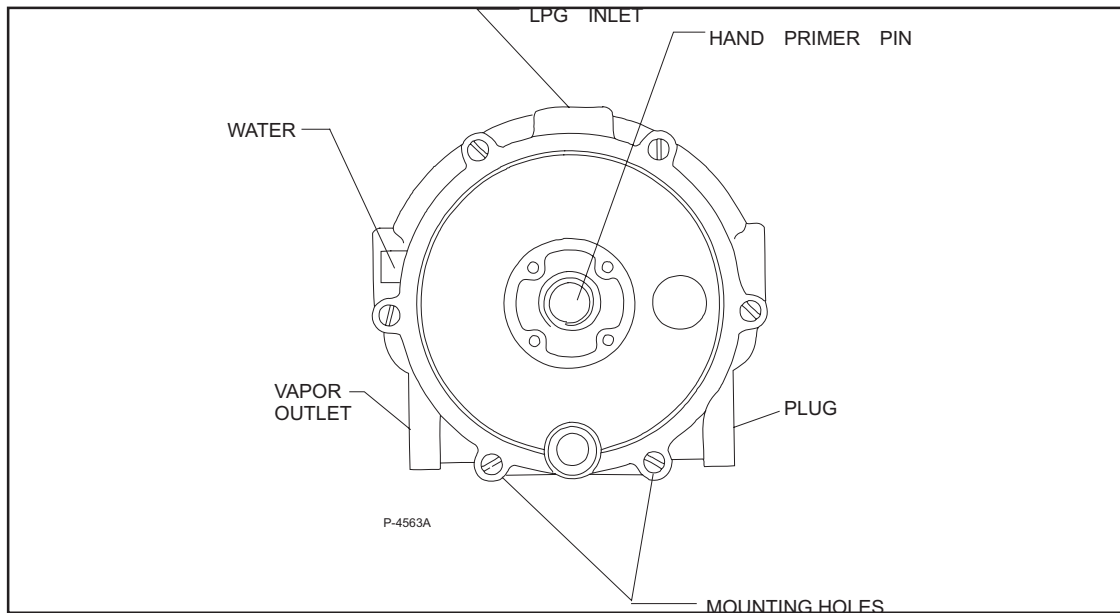


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FIGURE 21

LP VAPOR WITHDRAWAL SYSTEM

The liquid LP fuel flows from the LP tank under its own pressure to the pressure relief valve. This valve is normally closed, which prevents LP fuel from escaping into the atmosphere. This LP gas is then piped to the LP fuel filter lock. The fuel filter lock removes unwanted tank scale and deposits from the LP gas. This gaseous LP fuel is sent to the primary regulator. The primary regulator reduces the pressure of the LP fuel tank and makes the flow more constant. The secondary regulator reduces LP gas pressure to the level required by the carburetor. From the secondary regulator, the LP fuel is piped to the carburetor where it is finally metered into the air flow which is sent to the combustion chamber.



P4563

FIGURE 22

LP CHECKLIST

This checklist can be preformed quickly and should be done before every use. Be sure to make all necessary checks as listed on the Maintenance Chart as discussed earlier.

1. Check for connections for leaks.
2. Open the LP storage tank valve.
3. Check the regulator. Momentarily press the fuel primer on the regulator cover to bleed air out of the system.
4. Start the machine's engine.

LP FUEL TANKS

Standard D.O.T. LP fuel tank sizes have 14, 20, 33.5, and 43.5 pounds capacities. The liquid volume permitted in these containers is less than the total volume of the cylinder. This provides for expansion of the LP fuel should the temperature increase above the normal amounts. 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. fuel tanks must be requalified (checked) periodically. This requalification must be recorded and maintained for the life of the container.

LP fuel tanks are equipped with the following approved valves and fittings:

Safety Relief Valve - This is a spring loaded valve that relieves excessive pressures which may develop in the tank due to unusual condition.

Liquid Service Valve - Liquid is withdrawn from the tank through this valve. The LP tank may be filled through this valve if the tank is not equipped with a filter valve.

Excessive Flow Valve - This valve is part of the Liquid Service Valve. It is mounted inside the tank and prevents LP fuel from leaving the LP tank in the event of accidental breakage of external fittings or hoses. It permits flow in either direction but stops outward flow if that flow becomes excessive.

Filter Valve - This valve is optional. If this valve is not present, the tank is filled through the service valve.

Liquid Level Gauge - This gauge is optional.

LP TANK CARE

USE AND CARE OF LP TANKS

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

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

CHANGING LP TANKS

Refueling machines with LP tanks is an important process. 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 carefully inspect the tank, tank fittings, the fuel lines, and fuel line fittings. If abnormal wear is detected, the operator should report these findings to the appropriate personnel for immediate action.

TO BEGIN CHANGING THE LP TANK

1. Park the machine in a designated safe area and set the parking brake.
2. Close the tank valve.
3. Remove the quick disconnect coupling from the tank valve.
4. Inspect the machine's fuel lines and the quick disconnect coupling for damaged or abnormal wear.
5. Remove the empty tank from the holding device.
6. Inspect the tank and tank fittings for damage and abnormal wear. Handle the tank carefully. It must not be dropped or mishandled.
7. Store the LP tank in a designated safe area.
8. Select a filled LP tank and observe for damage or leaks.
9. Carefully install the filled tank in the machine so that the tank centering pin enters the aligning hole (closest to the tank) in the tank collar. This assures that the tank is positioned properly and allows for proper operation of the safety relief valve, liquid level gauge, and service valves.
10. Fasten the tank retaining bracket so that the tank is locked into position.
11. Reconnect the fuel line to the tank servicing coupling.
12. Open the service valve slowly and check for leaks. If a leak is found, close the valve immediately and notify the appropriate personnel.
13. If no leaks are detected, the engine is ready to start. Do not start the engine unless the operator is in position with the directional control pedal in the neutral position.

STORAGE OF LP FUEL TANKS

Whether the storage is inside or outside, the LP tanks should not be in the vicinity of combustible materials or high temperature sources such as ovens or furnaces. This may cause the heat to raise the pressure of the fuel to a point where the safety valves would begin to operate. Care should be taken to ensure that the cylinders are stored in such a manner that if the safety relief valves are triggered, the vapor will be relieved rather than any liquid.

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

Similar precautions should be taken in storing machines fitted with LP tanks. They may be stored or serviced inside buildings provided there are no leaks in the fuel system and the tanks have not been overfilled. If machines are being repaired inside a building, the shutoff valve on the tanks must be closed except when the engine must be on during servicing.

STANDARD HARDWARE & TORQUE VALUES

STANDARD METRIC TORQUE VALUES

When tightening torques are not specified, tighten the bolts and nuts according to the table below.

GRADE		No-Grade or 4T			7T			9T		
		SS41, S20C			S43C, S48C			SCR435, SCM435		
Nom. Dia.	Unit	N.m	kgf.m	ft-lbs	N.m	kgf.m	ft-lbs	N.m	kgf.m	ft-lbs
M6 (6mm, 0.24 in.)		7.85	0.80	5.79	9.81	1.00	7.23	12.26	1.25	9.04
		to 9.32	to 0.95	to 6.87	to 11.28	to 1.15	to 8.32	to 14.22	to 1.45	to 10.49
M8 (8mm, 0.31 in.)		17.7	1.8	13.0	23.5	2.4	17.4	29.4	3.9	21.7
		to 20.6	to 2.1	to 15.2	to 27.5	to 2.8	to 20.3	to 34.3	to 3.5	to 25.3
M10 (10mm, 0.39 in.)		39.2	4.0	28.9	48.1	4.9	35.4	60.8	6.2	44.8
		to 45.1	to 4.6	to 33.3	to 55.9	to 5.7	to 41.2	to 70.6	to 7.2	to 52.1
M12 (12mm, 0.47 in.)		62.8	6.4	46.3	77.5	7.9	57.1	103.0	10.5	75.9
		to 72.6	to 7.4	to 53.5	to 90.2	to 9.2	to 66.5	to 117.7	to 12.0	to 86.8

ENGINE TORQUE VALUES

Screws, bolts and nuts must be tightened to the specified torque using a torque wrench. Several screws, bolts, and nuts such as those used on the cylinder head must be tightened in proper sequence and at the proper torque.

ITEM	Size & Pitch	N.m	kgf.m	ft-lbs
*Head Cover Cap Nuts	M6 x 1.0	3.9 to 5.9	0.4 to 0.6	2.9 to 4.3
*Head Bolts	M8 x 1.25	37.2 to 42.1	3.8 to 4.3	28.9 to 32.5
*Bearing Case Bolts 1	M6 x 1.0	12.7 to 15.7	1.3 to 1.6	9.4 to 11.6
*Bearing Case Bolts 2	M7 x 1.0	26.5 to 30.4	2.7 to 3.1	19.6 to 22.5
*Flywheel Bolts	M10 x 1.25	53.9 to 58.8	5.5 to 6.0	39.8 to 43.4
*Connecting Rod Bolts	M6 x 0.75	26.5 to 30.4	2.7 to 3.1	10.8 to 13.7
*Rocker Arm Bracket Bolts	M6 x 1.0	9.81 to 11.28	1.00 to 1.15	7.23 to 8.32
*Idle Gear Shaft Bolts	M6 x 1.0	9.81 to 11.28	1.00 to 1.15	7.23 to 8.32
Spark Plugs	M14 x 1.25	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
Drain Plugs	M12 x 1.25	32.4 to 37.3	3.3 to 3.8	23.9 to 27.5
Oil Switch Taper Bolt	PT 1/8	14.7 to 19.6	1.5 to 2.0	10.8 to 14.5
*Crankshaft Bolt	M12 x 1.5	98.1 to 107.9	10.0 to 11.0	72.3 to 79.6

For "*" marked bolts and nuts in the table, apply engine oil to their threads and seats before tightening.

Screw and bolt material grades are shown by numbers punched on the screw and bolt heads.

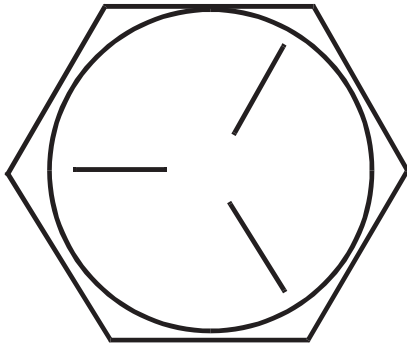
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DECIMAL METRIC & CONVERSION TABLE

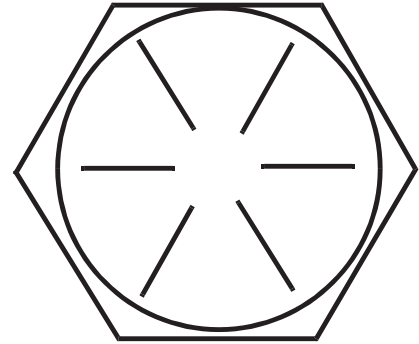
FRACTION	DECIMAL	MILLIMETER	FRACTION	DECIMAL	MILLIMETER
$\frac{1}{64}$	0.015625	0.3969	$\frac{33}{64}$	0.515625	13.0969
$\frac{1}{32}$	0.03125	0.7938	$\frac{17}{32}$	0.53125	13.4938
$\frac{3}{64}$	0.046875	1.1906	$\frac{35}{64}$	0.546875	13.8906
$\frac{1}{16}$	0.0625	1.5875	$\frac{9}{16}$	0.5625	14.2875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

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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 $\pm$ on torque values.

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C2000/9905

LEGEND - SCREWS/ SETSCREWS

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

HARDWARE LEGEND

<u>Key No.</u>	<u>Part Number</u>	<u>Description</u>
H1	2-00-05060	Screw, #6-32 x 1.250 RHM
H2	2-00-00455	Flat Washer, .375 x .156 x .047
H3	2-00-01499	Lock Washer, #6 Med. Helical Spring
H4	2-00-00624	Nut, #6-32 Hex
H5	2-00-00645	Nut, Hex Fiber Insert #6-32
H6	2-00-00049	Screw, # 10-24 x .500 RHM
H7	2-00-00056	Screw, # 10-24 x .750 RHM
H8	2-00-00039	Screw, 10-24 x 1.000 RHM
H9	2-00-00426	Flat Washer, .500 x .219 x .063
H10	2-00-00519	Lock Washer, # 10 Med HS
H11	2-00-00605	Nut, Hex MS # 10-24 x .375 x .125
H12	2-00-01246	Nut, Hex Fiber Insert #10-24
H13	2-00-00054	Screw, 1/4-20 x .500 RHM
H14	2-00-00219	Screw, 1/4-20 x .500 HHC
H15	2-00-00221	Screw, 1/4-20 x .750 HHC
H16	2-00-03051	Screw, 1/4-20 x .750 HSHC
H17	2-00-00205	Screw, 1/4-20 x 1.000 HHC
H18	2-00-00060	Screw, 1/4-20 x 1.250 RHM
H19	2-00-02587	Screw, 1/4-20 x 1.250 HHC
H20	2-00-00203	Screw, 1/4-20 x 1.500 HHC
H21	2-00-01769	Screw, 1/4-20 x 1.750 HHC
H22	2-00-02589	Screw, 1/4-20 x 2.000 HHC
H23	2-00-01980	Screw, 1/4-20 x 2.500 HHC
H24	2-00-00220	Screw, 1/4-20 x .625 HHC
H25	2-00-00594	Nut, Hex 1/4-20 x .437 x .218
H26	2-00-00641	Nut, 1/4-20 Insert Fiber
H27	2-00-03702	Washer, .625 x .281 x .063
H28	2-00-04685	Screw, 1/4-20 x .750 HHC
H29	2-00-04966	Screw, 1/4-20 x 1.500 HHM
H30	2-00-04687	Lock Washer, Hel. Spring 1/4 Med.
H31	2-00-04695	Screw, # 10-32 x .630 RHM
H32	2-00-04688	Nut, 1/4-20 Hex.
H33	2-00-00224	Screw, 5/16-18 x .500 HHC
H34	2-00-00208	Screw, 5/16-18 x .750 HHC
H35	2-00-02708	Screw, 5/16-18 x 1.000 HHM
H36	2-00-00196	Carriage Bolt, 5/16-18 x 1.000
H37	2-00-00207	Screw, 5/16-18 x 1.250 HHC
H38	2-00-00225	Screw, 5/16-18 x 1.500 HHC
H39	2-00-00218	Screw, 5/16-18 x 2.000 HHC
H40	2-00-01770	Screw, 5/16-18 x 2.750 HHC
H41	2-00-02597	Screw, 5/16-18 x 3.250 HHC
H42	2-00-02655	Screw, 5/16-18 x 4.500 HHC
H43	2-00-00409	Flat Washer, .687 x .344 x .062
H44	2-00-00530	Lock Washer, 5/16 HS Med.
H45	2-00-00585	Nut, Hex. 5/16-18 x .500 x .265
H46	2-00-00644	Nut, 5/16-18, Insert Fiber
H47	2-00-00232	Screw, 3/8-16 x .750 HHC
H48	2-00-00233	Screw, 3/8-16 x 1.000 HHC
H49	2-00-00209	Screw, 3/8-16 x 1.250 HHC
H50	2-00-00234	Screw, 3/8-16 x 1.500 HHC
H51	2-00-00216	Screw, 3/8-16 x 2.000 HHC
H52	2-00-00402	Flat Washer, .750 x .390 x .094
H53	2-00-02310	Lock Washer, Helical Spring 3/8
H54	2-00-02360	Nut, 3/8-16 Hex.
H55	2-00-00643	Nut, 3/8-16 Stop
H56	2-00-00239	Screw, 1/2-13 x 1.000 HHC
H57	2-00-00240	Screw, 1/2-13 x 1.250 HHC
H58	2-00-00241	Screw, 1/2-13 x 1.750 HHC
H59	2-00-00242	Screw, 1/2-13 x 2.250 HHC
H60	2-00-02682	Screw, 1/2-13 x 2.750 HHC
H61	2-00-02616	Screw, 1/2-13 x 3.000 HHC
H62	2-00-00405	Flat Washer, 1.063 x .531 x .094

HARDWARE LEGEND

<u>Key No.</u>	<u>Part Number</u>	<u>Description</u>
H63	2-00-02312	Lock Washer, 1/2 HS Med.
H64	2-00-00596	Nut, Hex. 1/2-13 x .750 x .437
H65	2-00-04936	Nut, 1/2-13 Fibre Lock
H66	2-00-02689	Screw, 1/2-20 x 1.000 HHC
H67	2-00-00614	Nut, Hex 1/2-20
H68	2-00-00640	Nut, Hex Fiber Insert 1/2-20
H69	2-00-01255	Screw, 5/16-18 x .875 HHC
H70	2-00-05254	Screw, 3/4-10 x 2.250 HHC
H71	2-00-05255	Nut, 3/4-10 Nylon Lock
H72	2-00-00518	Lock Washer, Helical Spring
H73	2-00-00247	Screw, 1/2-13 x 2.500 HHC
H74	2-00-03170	Flat Washer, 1.500 x .750 x .125
H75	2-00-00618	Nut, Hex Jam 3/8-16
H76	2-00-00632	Nut, Fiber Insert 3/8-24 Steel
H77	2-00-00484	Flat Washer, .625 x .375 x .046
H78	2-00-05187	Carriage Bolt, 3/8-16 x 1.250
H79	2-00-01676	Flat Washer, 1.062 x .265 x .062'
H80	2-00-02196	Carriage Bolt, 1/4-20 x 1.000 RHM
H81	2-00-05276	Screw, 3/8-16 x 5.500
H82	2-00-00505	Lock Washer, 3/8 Int. Tooth
H83	2-00-04877	Screw, 1/4-20 x 1.000 BHS
H84	2-00-00228	Screw, 5/16-18 x 2.250 HHC
H85	2-00-00650	Nut, Cap 3/8-16 Low Crown
H86	2-00-03575	Carriage Bolt, 1/4-20 x .750
H87	2-00-00263	Set Screw, 1/4-20 x .250 HSKCP
H88	2-00-05258	Screw, #8-325 x .750 BHS
H89	2-00-01372	Nut, Fiber Insert #8-32 Steel
H90	2-00-03569	Carriage Bolt, 5/16-18 x .750
H91	2-00-05279	Screw, M6 x 1.0 x 20 mm MHHC
H92	2-00-04801	Flat Washer, .875 x .375 x .125
H93	2-00-00222	Screw, 1/4-20 x 1.250 HHM
H94	2-00-00410	Flat Washer, .875 x .375 x .060
H95	2-00-03382	Spring Washer, .875 x .500 x .015
H96	2-00-02605	Screw, 3/8-16 x 4.500 HHC
H97	2-00-04677	Screw, 1/4-20 x .750 HSC
H98	2-00-05277	Screw, 1/2-13 x .750 HSHC
H99	2-00-02810	Screw, 1/4-20 x 1.000 FHM
H100	2-00-03062	Screw, #10-24 x .625 THM
H101	2-00-04897	Screw, #10-24 x 1.250 THM
H102	2-00-04795	Screw, #10-24 x .750 BHS
H103	2-00-00089	Screw, 10-24 x 1.500 RHM
H104	2-00-03541	Screw, 1/4-20 x 1.500 FHSCH
H105	2-00-05260	Nut, Jam #8-32
H106	2-00-04886	Screw, 3/8-16 x .500 HSHC
H107	2-00-04887	Screw, Main Broom Control
H108	2-00-04888	Washer, Main Broom Control
H109	2-00-00522	Lock Washer, 3/4 Helical Spring
H110	2-00-03039	Screw, 1/4-20 x .625 HSHC
H111	2-00-03296	Screw, 3/8-16 x 4.000 HHC
H112	2-00-02603	Screw, 3/8-16 x 3.500 HHC
H113	2-00-03333	Screw, 3/8-16 x 3.750 HHC
H114	2-00-00633	Nut, Fiber 1/4-28
H115	2-00-03063	Screw, #10-24 x .750 THM
H116	2-00-01951	Carriage Bolt, 1/4-20 x 1.250
H117	2-00-05067	Flat Washer, 1.750 x .531 x .100
H118	2-00-02618	Screw, 1/2-13 x 3.500 HHC
H119	2-00-05005	Screw, M10 x 1.500 30 mm MHHC
H120	2-00-03829	Lock Washer, 3/8 Bolt
H121	2-00-00090	Screw, #8-32 x 1.500 RHM
H122	2-00-05216	Screw, 1/4-20 x 5.000 HHC
H123	2-00-00204	Screw, 1/4-20 x 1.500 HHC
H124	2-00-02296	Lock Washer, #10 Ext. Shakeproof

HARDWARE LEGEND

<u>Key No.</u>	<u>Part Number</u>	<u>Description</u>
H125	2-00-00418	Flat Washer, .984 x .627 x .063
H126	2-00-03466	Screw, #10-16 x .500
H127	2-00-03522	Washer, 5/16 x 1.250 x .050
H128	2-00-04681	Carriage Bolt, 5/16-18 x 1.250
H129	2-00-02311	Lock Washer, 4.38 Split
H130	2-00-03334	Screw, .44-20 x 1.000 HHC
H131	2-00-03855	Carriage Bolt, 3/8-16 x 1.000
H132	2-00-00503	Lock Washer, 1/4 Ext.
H133	2-00-00006	Screw, #10-24 x .675 FHM
H134	2-00-03032	Screw, 3/8-16 x .750 FHS
H135	2-00-05298	Flat Washer, .344 x 2.000 x .062
H136	2-00-03940	Screw, #10-24 x .500 T/C HH
H137	2-00-05299	Screw, #10-24 x 1.250 HSHC
H138	2-00-00504	Lock Washer, Int.
H139	2-00-00611	Nut, Hex Jam, 3/8-24
H140	2-00-00447	Flat Washer, 1.250 x .280 x .090
H141	2-00-00501	Lock Washer, Int.
H142	2-00-05244	Carriage Bolt, 1/2-13 x 2.000
H143	2-00-00432	Flat Washer, 1.13 x .770 x .063
H144	2-00-02303	Lock Washer, Int.
H145	2-00-04180	Setscrew, 1/4-20 x .500
H146	2-00-00420	Flat Washer, 1.000 x .516 x .063
H147	2-00-00642	Nut, Fibre Insert 5/18-18
H148	2-00-01778	Screw, 1/2-13 x 2.000 HHC
H149	2-00-01803	Washer, 1.063 x .031 x .063
H150	2-00-00211	Screw, 5/16-18 x 1.750 HHC
H151	2-00-00213	Screw, 5/16-18 x .625 HHC
H152	2-00-01562	Carriage Bolt, 5/16-18 x 2.250
H153	2-00-03266	Washer
H154	2-00-04363	Screw, M8-1.250 x .750
H155	2-00-05044	Lock Washer, M14 Split
H156	2-00-05079	Screw, M14 x 1.500 x 25 mm HHC
H157	2-00-00217	Screw, 5/16-18 x 2.000 HHC
H158	2-00-05306	Screw, M14 x 35 mm HHC
H159	2-00-00512	Lock Washer
H160	2-00-00441	Flat Washer, .438 x .200 x .036
H161	2-00-00153	Screw, #8-24 x .875 OHM
H162	2-00-03961	Screw, 5/16-24 x 1.000 HHC
H163	2-00-03570	Carriage Bolt, 3/8-16 x .750
H164	2-00-00107	Screw, 10-24 x 4.50 RD. HD.
H165	2-00-00589	Nut, Hex Jam, .25-20
H166	2-00-00066	Screw, 6-32 x .50 RHM
H167	2-00-04312	Screw, 10-24 x .625 T/C Hex HD.
H168	2-00-05261	Insert, 1/4-20
H169	2-00-02637	Screw, 1/4-20 x 2.750 HHC
H170	2-00-03061	Screw, # 10-24 x .500 THM
H171	2-00-02371	Nut, Hex Jam .50-13 STL.
H172	2-00-04986	Screw, 1/4-20 x 4.500
H173	2-00-02709	Screw, 5/16-18 x 1.500
H174	2-00-00183	Screw, 1/4-20 x .750 THM
H175	2-00-01252	Screw, 10-24 x 2.750 RDH
H176	2-00-05337	Screw, #8-32 x .750 BHS SS
H177	2-00-05324	Threaded Insert, #8-32
H178	2-00-00206	Screw, 5/16-18 x 1.000 HHC
H179	2-00-04948	Screw, 25mm - M8 x 1.250
H180	2-00-04378	Clip, Water Line
H181	2-00-05078	Screw, M6 x 1.000 x 10mm HHC
H182	2-00-00236	Screw, 5/8-16 x 2.500 HHC
H183	2-00-05042	Lock Washer, M10
H184	2-00-04366	Screw, M10 x 1.500 x 25mm
H185	2-00-02588	Screw, 1/4-20 x 1.125 HHC Cad. Pl.
H186	2-00-03041	Screw, 1/4 x 1.250 HSC-SS

HARDWARE LEGEND

<u>Key No.</u>	<u>Part Number</u>	<u>Description</u>
H187	2-00-00071	Screw, #10-24 x 1.250 RHM
H188	2-00-01987	Flat Washer, .438 x .200 x .036 sst
H189	2-00-00460	Flat Washer, .437 x .192 x .031-s
H190	2-00-00529	Lock Washer - helical sps, 8 MDM
H191	2-00-00602	Nut, MSCR - Hex, 8-32
H192	2-00-04841	Nut 3/4 - 16 Slotted Hex head
H193	2-00-03412	Lock Nut, .375 - 24, sps 21 FK
H194	2-00-03537	Screw - 1/4 - 20 x2.000
H195	2-00-04210	Clamp
H196	2-00-05350	Screw 1/4 - 28 x .63 HHC
H197	2-00-03979	Washer 1.00 x .391 x .06
H198	2-00-03808	Wahser 1.50 x .750 x .06
H199	2-00-04603	Clamp
H200	2-00-00626	Nut, Hex MS #10 - 32 x .375 x .125
H201	2-00-02011	Plastic Plug, .440 Dia (Diesel)
H202	2-00-04514	Plastic Plug, .562 Dia (LP & Gas)
H203	2-00-04794	Screw, #10 - 24 x .625 BHS
H204	2-00-04873	Clamp
H205	2-00-04721	Grommet, 1.750 x1.125 x .500 x.125
H206	2-00-00407	Washer, Flat .562 x.265
H207	2-00-02227	Key, .125 x .750 SQ
H208	2-00-00772	Cotterpin .093 x 1.000
H209	2-00-00586	Nut Hex Jam 5/16 - 18x .500 x .187
H210	2-00-00776	Cotterpin .125x1.500
H211	2-00-02728	Screw 10 - 32 x .375 BHM
H212	2-00-00566	Fitting-Grease
H213	2-00-01254	Screw - 1/2 - 13 x 1.500 HHCS
H214	2-00-00462	Flat Washer, .562 x .250 x .031
H215	2-00-02558	Grease Zerk
H216	2-00-04378	Harness Clamp
H217	2-00-00511	Internal Washer, #6
H218	2-00-05345	Screw, Hex Head Cap
H219	2-00-05359	Nut, Serrated Flange 5/16-18
H220	2-00-02617	Screw, 50-13 x 3.25 HHC
H221	2-00-03335	Screw, Hex SOC Cap, .312 -18 x .50
H222	2-00-02848	Screw, 10-32 x .50 Cad PL,STL RHM
H223	2-00-00631	Nut, .31 - 24 Fiber Insert
H218	2-00-05345	Screw, Hex Head Cap
H219	2-00-05359	Nut, Serrated Flange 5/16-18
H220	2-00-02617	Screw, 50-13 x 3.25 HHC
H221	2-00-03335	Screw, Hex SOC Cap, .312 -18 x .50
H222	2-00-02848	Screw, 10-32 x .50 Cad PL,STL RHM
H223	2-00-00631	Nut, .31 - 24 Fiber Insert
H224	2-00-04686	Lock Washer-helical#10Scr.Med. SS
H225	2-00-04851	Washer, Engine Mount
H226	2-00-04689	Washer, 11/16 OD x .260 ID x .050
H227	2-00-04596	Screw, Hex Head 1/4 - 20 x 3.5
H228	2-00-02606	Screw, .375 - 24 x 1.00, STL HHC
H229	2-00-01490	Screw, .25 - 20 x .875 HHC STL
H230	2-00-00466	Flat Washer, .625 x .203 x .031
H231	2-00-02933	Screw, Mach 10 - 24 x 3.50
H232	2-00-04909	Yoke, Pin Assy.
H233	2-00-02638	Screw, HHC .25-20 x 3.00
H234	2-00-00064	Screw- RHM #10-24 x .88
H235	2-00-00197	Carriage Bolt, .38-16 x 2.75
H236	2-00-02369	Nut, Hex Jam, .38-16
H237	2-00-05356	Screw, 5/16 - 18 X 1.25 Grade 8
H238	2-00-03750	Carriage Bolt, .38-16 x 1.50
H239	2-00-02814	Screw-FHM .25-20x1.75
H240	2-00-05398	Screw, HSHC 3/8-16 x .50
H241	2-00-05395	Screw, RHM .25-20 x 4.00 Zinc
H242	2-00-05370	Screw, M12 - 16 x 1.75 x 40mm HHC

HARDWARE LEGEND

<u>Key No.</u>	<u>Part Number</u>	<u>Description</u>
H243	2-00-00591	Nut, Hex-Jam .50-20
H244	2-00-05297	Nut, Insert Fiber, .38-16 Heavy Nut
H245	2-00-05401	Shoulder Screw, 1/2-3/4
H246	2-00-05122	Screw-HHC, .25-20 x 2.00
H247	2-00-04590	Washer
H248	2-00-05236	Flat Washer, 2.000 x .281 x .063
H249	2-00-00004	Screw-FHM #10-24 x 1.25
H250	2-00-04968	Screw-T/FRH #14-10 x 1.00 Type A
H251	2-00-02602	Screw, 3/8-16 x 2.750 HHC Cad. Pl
H252	2-00-00600	Nut, Hex Heavy 3/8-16
H253	2-00-05120	Nut, .75-Hex Nyloc Jam
H254	2-00-04625	Screw-HHM .375-24 x .75
H255	2-00-00227	Screw-HHC .313-18 x 2.25
H256	2-00-02354	Nut-Hex-Jam .50-20
H257	2-00-00093	Screw-RHM 6-32 x .75
H258	2-00-04062	Screw-T/FFH #6-20 x .50
H259	2-00-05343	Bolt Carriage, .38-16 x 3.50 sstl
H260	2-00-00615	Nut, Hex Fin .63 - 22
H261	2-00-05344	Screw - HHM .313 - 18 x 1.75 Stl
H262	2-00-00617	Nut, Hex, Finish .75-16
H263	2-00-02313	Lock Washer, HS .63 Scr. Med.
H264	2-00-02622	Screw, 5/16 - 18 x 1.000 HHM
H265	2-00-00506	Lock Washer, Int Tooth #8 Dia Screw
H266	2-00-05371	Screw-RHM #8-32 x 2.38
H267	2-00-00068	Screw-RHM #8-32 x .63
H268	2-00-00051	Screw-RH, .25 - 20 x .75
H269	2-00-00118	Screw - RHM #10 - 24 x .625
H270	2-00-05341	Screw-HHC .75-10 x 2.00
H271	2-00-03293	Nut-Hex-Fin .75-10
H272	2-00-04563	Screw, Shoulder #10-24
H273	2-00-03214	Screw, .31-18 x .75 Zinc PL HSHC
H274	2-00-02676	Screw, .50 - 13 x .75 HHM
H275	2-00-00237	Screw, HHC .375 - 16 x 3.00
H276	2-00-00223	Screw, HHC .25-20 x 1.25 nickel
H277	2-00-05164	Screw, HHM 5/16 - 18 x 3.50
H278	2-00-03044	Screw, .38 - 16 .75 HSHC
H279	2-00-04914	Screw, .50 - 13 x 4.50 HHC
H280	2-00-00187	Bolt Carriage, .38 - 16 x 2.50
H281	2-00-00415	Flat Washer, .9375 x .468 x .0625SS
H282	2-00-02562	Fitting
H283	2-00-03842	Roll Pin, 1/4 x 1.00
H284	2-00-04845	Screw, 3/8-16 x 1.00 FHSC
H285	2-00-05153	Screw, 1/4 x 20 1.50 HHC
H286	2-00-05383	Washer, Special
H287	2-00-00264	Set Screw, 1/4-20 x .313 HSKCP
H288	2-00-00668	Wing Nut, 5/16-18
H289	2-00-00532	Snap Ring
H290	2-00-02049	Bearing - Double Seal
H291	2-00-02243	Square Key, .188 - .187 x 1.250
H292	2-00-02293	Lockwasher, 5/8 Int.
H293	2-00-03151	Spacer, 1/2 ID 3/4 .625 Lg.
H294	2-00-03158	Spacer, 1/2 ID 3/4 .3/8 Lg.
H295	2-00-03306	Bearing
H296	2-00-03413	Flat Washer, 1.125 x .765 x .062
H297	2-00-04345	Tye - Wrap
H298	2-00-04708	Terminal
H299	2-00-05183	Terminal, 1/4 x .03 12-10
H300	2-00-00767	Cotter Pin, .063 x.500
H301	2-00-04159	Flat Washer, 1.375 x .563 x .109 SS
H302	2-00-00490	Washer, Spring, Shakeproof
H303	2-00-05103	Flat Washer, .750 x .343 x .050 SS
H304	2-00-00246	Screw, .25 - 20 x 2.25 HHC

HARDWARE LEGEND

<u>Key No.</u>	<u>Part Number</u>	<u>Description</u>
H305	2-00-00809	Screw, HSHC .31 - 18 x 1.00
H306	2-00-05405	Nut, 3/8 - 32 NEF 2A
H307	2-00-02963	Screw, RHM #10-32 1/4 PL. (Steel)
H308	2-00-05388	Sealing Washer 46/53 ESP OPT
H309	2-00-01081	Screw - T/C RH #8-32x.50type 2
H311	2-00-05024	Washer Flat, 2 x 1.06
H312	2-00-05227	Screw, HHC M14 x 1.50 x 45mmgr10
H313	2-00-04652	Screw, HHC .438 - 20 x 1.50
H314	2-00-03836	Bolt Carriage, .31 - 18 x 1.75
H315	2-00-00593	Nut, .38-16 Hex heavy Jam
H316	2-00-00044	Screw, RHM #8-32 x .50
H317	2-00-00252	Screw, .313-18 x 4.00 HHC
H318	2-00-04750	Screw, BTN HD SKT
H319	2-00-02352	Nut, Hex Hvy, .50-13 stl-zn.
H320	2-00-05424	Screw, Shoulder 1/2-1/2
H321	2-00-04699	Screw, HHC, .375-16 x 2.75
H322	2-00-03993	Screw, HHM 3/4-16 x 3.000
H323	2-00-00244	Screw, HHC .25-20 x 1.000
H324	2-00-05329	Screw, HHC M10 x 1.50 x 40MM SS
H325	2-00-00092	Screw, Ph. RHM #8-32 x 1.75 Zn.
H326	2-00-00235	Screw HHC .375-16 x 1.75
H327	2-00-05444	#10-24 BHCS 1.00 Black Oxide
H328	2-00-03994	Carriage Bolt, .31-18 x 1.50
H329	2-00-00036	Screw, RHM #10-24 x .25** NLS
H330	2-00-00397	Flatwasher .875 x .516 x .031 ss
H331	2-00-02779	Fhms #10-32 x .312
H332	2-00-05433	M16 x 1.50 Hex Nut (Metric) Gr 10.9
H333	2-00-00451	Flatwasher .750 x .312 x .065 ss-zn
H334	2-00-05450	Shoulder Screw, 5/16-18 x 3/8
H335	2-00-03404	Clamp - Witteck - C24P
H336	2-00-04620	O-Ring
H337	2-00-03042	Screw - JSJC, .25-20 X 1.50
H338	2-00-04880	Screw - 1/4-20 x .75 BHS GR 8 Zn.
H339	2-00-04876	Screw - 1/4-20 x .50 BHS GR 8 Zn.
H340	2-00-05463	#8-32 x 1.25 FHS Phillips
H341	2-00-05385	Screw - HHM .375-16 x 1.75
H342	2-00-04857	Bulkhead - Union Elbow
H343	2-00-00250	Screw - HHM, #10-24 x 1/2
H344	2-00-04576	Terminal Insulated Bullet Plu
H345	2-00-00249	Screw - HHM 8-32 x .375 Brass/Chr
H346	2-00-05237	Flatwasher, 1.063 x .265 x .063
H347	2-00-00231	Screw - HHC .375-16 x .63**NLS
H348	2-00-04446	Terminal
H349	2-00-05454	#8-32 x 2.5 FHM Screw
H350	2-00-05354	Fitting 90° Elbow
H351	2-00-05455	5/16-18 x 1/2 Shldr. Screw Stl.
H352	2-00-00427	Flatwasher, .875 x .516 x .063 stl.
H353	2-00-02336	Nut, Hex Hvy Semi Fin, .25-20
H354	2-00-02694	Screw HHC - .50-20 x 2.25
H355	2-00-04182	Bushing
H356	2-00-00011	Screw, #10-24 x .500 FHS, Zn.
H357	2-00-00081	Screw, Ph. RHM .25-20 x 1.00 Zn.

Parts may be ordered from American-Lincoln authorized distributors. Record the information from the American-Lincoln serial number plate to avoid delays in filling your order.

MODEL NO. 	SERIAL NO.
Manufactured By  AMERICAN LINCOLN TECHNOLOGY BOWLING GREEN, OHIO	

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- 2. Give the part number, description, and quality of parts needed.
- 3. Give shipping instructions for either freight, UPS, or parcel post.

Parts and supplies listed in this manual can be ordered from the following address:

American-Lincoln	American Lincoln Distributor
1100 Haskins Road Bowling Green, Ohio 4302 1-800-331-7692	

MACHINE CATALOG NUMBERS
400-041 91WS Battery with Proex Main Broom

