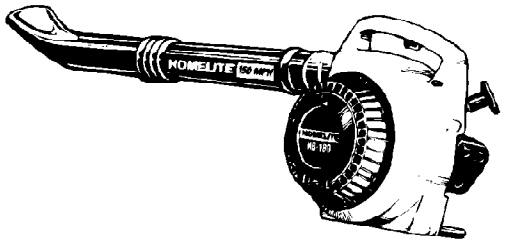
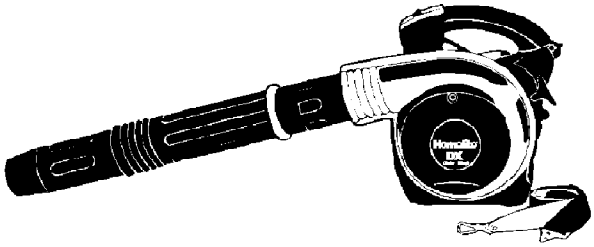
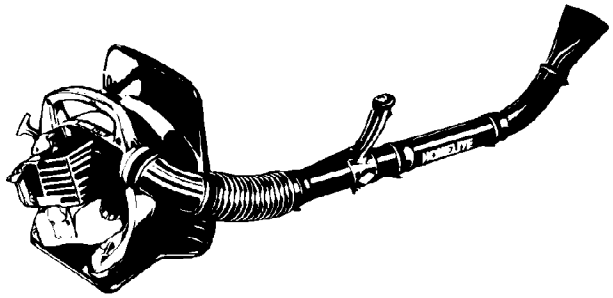
Homelite®

Dealer Service Guide







Blowers

ST01372

MODEL	UT NUMBER
BP-250	UT08017, 1, A, B, C, D, E, F, G, H, I, J
BP-250I	UT08045
BP-300	UT08025
BP-30185	UT08036-R
BVM-160	UT08069, A
BX-90	UT08026, A, B, C, D, E, F, G, H
BX-90 CANADA	UT08032, A, B
BX-90I	UT08042
d25b	UT08079
d25mha	UT08080
d25mhv	UT08067, A
d30mha	UT08066, A
d30mhv	UT08057, A
HB-100	UT08011, 1, A, B, C, D, E, F, G, H, R, UT08018, A, B
HB-100 CANADA	UT08029, A, B
HB-180	UT08007, R, UT08009, A, B, C, D, E, F, R, U, UT08019, A, B
HB-180I	UT08044
HB-180V	UT08008, R, U, UT08010, 1, A, B, C, D, E, F, U
HB-180V CANADA	UT08030, 1, A, B, C
HB-180V INT L.	UT08016, 1, A, B, C, D, E, F, G
HB-180VGK	UT08038, A, B, C
HB-25150	UT08034-R, UT08071-R
HB-25150V	UT08035-R
HB-290	UT08037, A, B
HB-290V	UT08041, 1, A
HB-30160	UT08070-R
HB-390	UT08023, 1, A, B, C, D
HB-390V	UT08024, 1, 2, A, B, C, D
HB-390V CANADA	UT08031, A, B, C
HB-390V INT L.	UT08027, 1, A, B, C, D
i25ehv	UT08060
i25mhv	UT08059, A
i30mhv	UT08058, A
PBP-3000	UT08033, A, B, C, R
PHB-3000	UT08028, A, B, C, R
PHB-3000I	UT08046, UT08047
YARDBROOM	UT08026, G, H, J, K
YARDVARK	UT08074, A, B, UT08077, UT08078R
z25ehv	UT0805, UT08051, UT08053
z25mha	UT08050
z25mhv	UT08052, A, UT08076

Unit Groups

Throughout this service guide are references to Group 1 and Group 2 Units. Use the list below to identify the group to which the unit you are servicing belongs. Additionally, there are special instructions for Backpack blowers and for blowers equipped with outboard starters. If no group is specified for a particular operation or instruction, that instruction applies to all unit groups.

Group 1 Units*

HB-100
BX-90
YARDBROOM
YARDVARK
HB-180
HB-180V
HB-290
HB-290V
HB-390
HB-390V
BP-250
BACKPACKER
PBP-3000
PHB-3000

Group 2 Units*

D25mha
D25mhv
D30mha
D30mhv
VAC ATTACK
Z25mhv
Bvb160
HB25250
HB30160

*Groups include but are not limited to these models

Service Notes:

Before repairs begin, select a clean work surface.

Clean all tools and equipment to be used during assembly.

Clean all parts with solvent, compressed air and shop towels.

Any dirt or other contaminants left in the engine or any other assemblies can significantly reduce engine or component life.

Always refer to this Service Guide for reference to the proper torque specifications for fasteners and other components. Use a torque wrench to tighten all fasteners to these specifications.

Note also: all fasteners that thread into plastic should be rotated counter clockwise until the screw drops in place in the existing threads. Then turn the screw clockwise to tighten. This should always be done when reinstalling fasteners into plastic components. This insures that the original threads are used and new threads are not cut into the plastic, thereby shorting the life of the component.

Contents

SAFETY

DO NOT ALLOW UNTRAINED INDIVIDUALS TO USE THIS UNIT.

Never start or run this blower inside a closed area; breathing exhaust fumes can kill.

Never operate unit without a spark arrestor screen (located on the muffler).

Make sure unit is properly assembled and in good operating condition. Do not operate without blower tubes in place.

Do not attempt to install or remove attachments, make repairs or remove obstruction from the fan housing while engine is running.

Do not operate vacuum without vacuum bag installed; flying debris could cause serious injury. Always close vacuum bag completely before operating.

FOLLOW THESE INSTRUCTIONS TO REDUCE THE RISK OF INJURY:

Wear full eye and hearing protection while operating this blower.

Wear heavy long pants, shoes, and gloves.

Do not wear loose clothing or jewelry.

Secure long hair above the shoulder.

Keep all bystanders at least 50 feet (15m) away.

Do not operate this blower when tired, ill, or under the influence of alcohol, drugs, or medication.

Do not operate in poor lighting.

Do not point blower in direction of people.

Keep a firm footing and balance. Do not overreach.

Keep all parts of your body away from hot surfaces.

Wear a face mask in dusty conditions to reduce the risk of injury associated with the inhalation of dust.

To avoid injury to the operator or unit, do not pick up rocks, broken glass, bottles, or other similar objects when using the vacuum attachment.

Hold engine higher than the inlet end of the vacuum tube.

Always point vacuum tube downhill when working on a hillside.

ALWAYS STOP ENGINE AND REMOVE SPARK PLUG WIRE BEFORE MAKING ANY ADJUSTMENTS OR REPAIRS EXCEPT CARBURETOR ADJUSTMENTS.

MAINTENANCE & REPAIR

Use manufacturer s replacement parts. Failure to do so may cause poor performance and possible injury.

Inspect unit for loose fasteners, fuel leaks, etc. Replace damaged parts.

Before storing, allow the engine to cool.

Empty fuel tank and restrain the unit from moving before transporting the blower in a vehicle.

REFUELING (DO NOT SMOKE!)

Mix and store fuel in a container approved for gasoline.

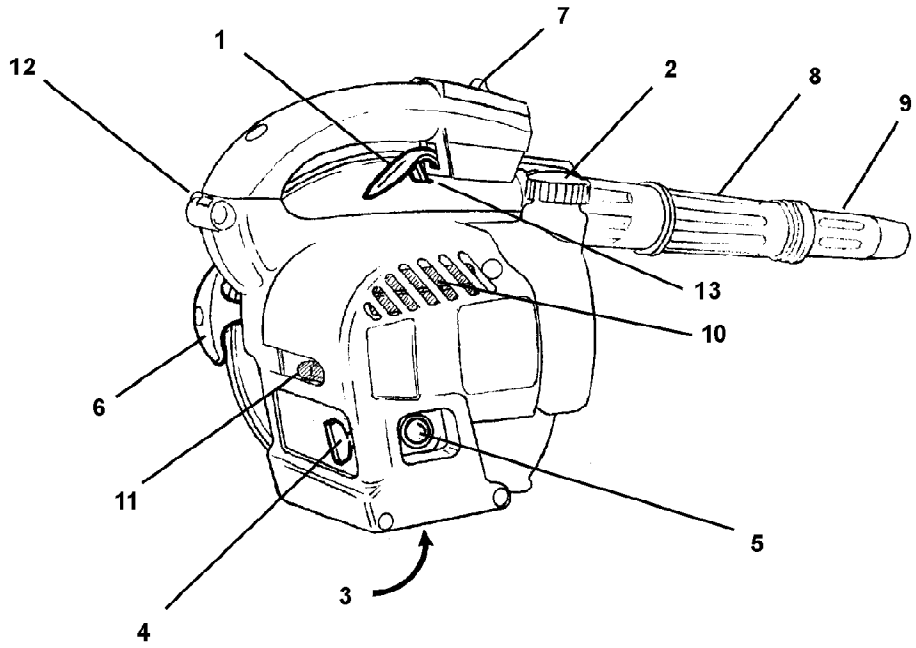
Mix fuel where there are no sparks or flames.

Stop engine, and allow to cool before refueling.

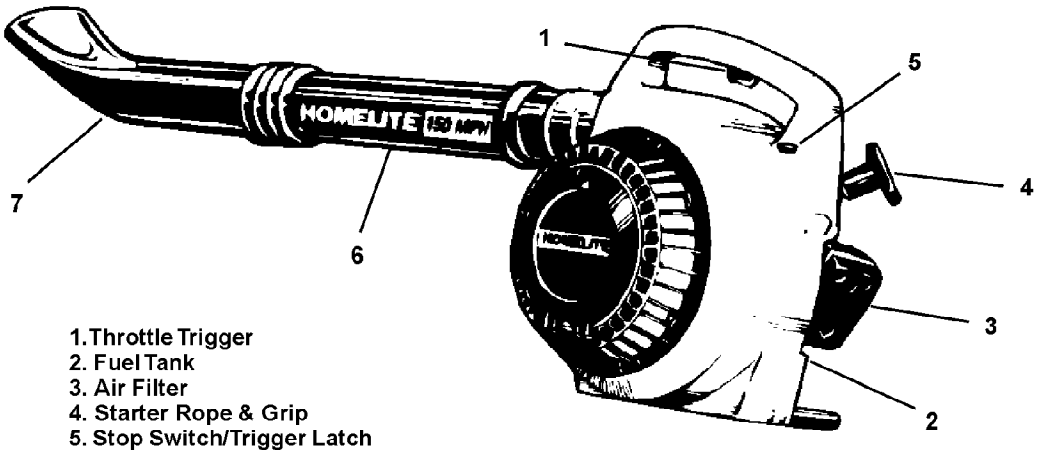
Loosen fuel cap slowly to release pressure and to keep fuel from escaping around the cap.

Wipe spilled fuel from the unit. Move 10 feet (3m) away from the refueling site before starting the engine.

UNIT FEATURES

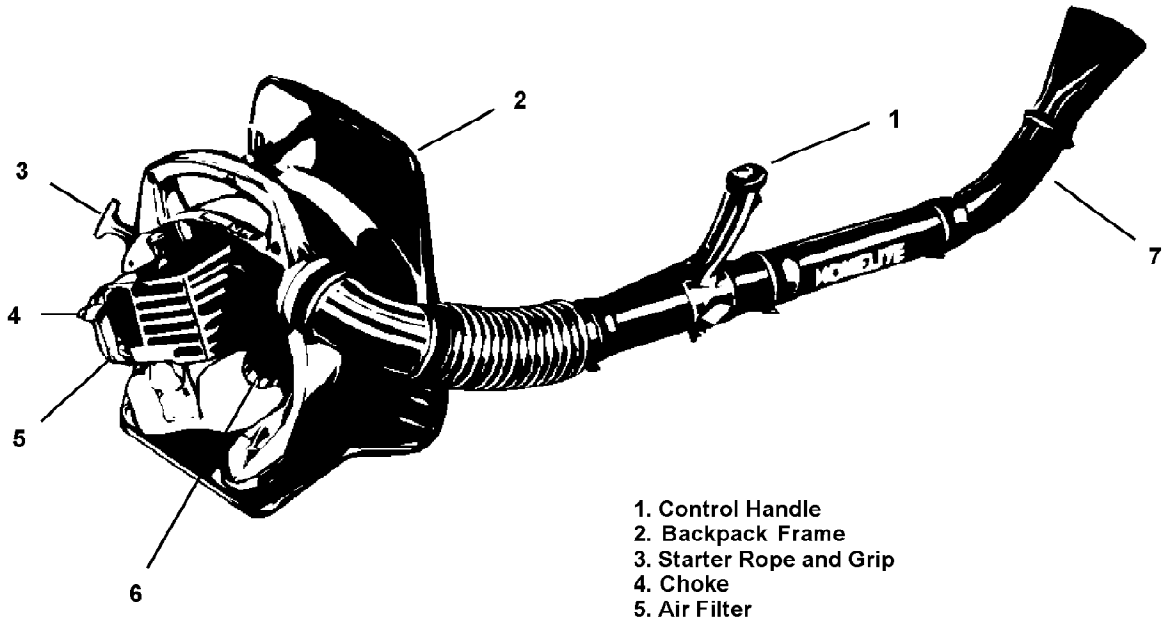


1. Throttle Trigger / Fast Idle
2. Fuel Tank And Cap
3. Air Filter
4. Choke
5. Carburetor And Primer Bulb
6. Starter Rope And Grip
7. Stop Switch
8. Blower Tube
9. Blower Nozzle
10. Muffler / Spark Arrestor
11. Spark Plug
12. Strap Hook
13. Trigger Lock



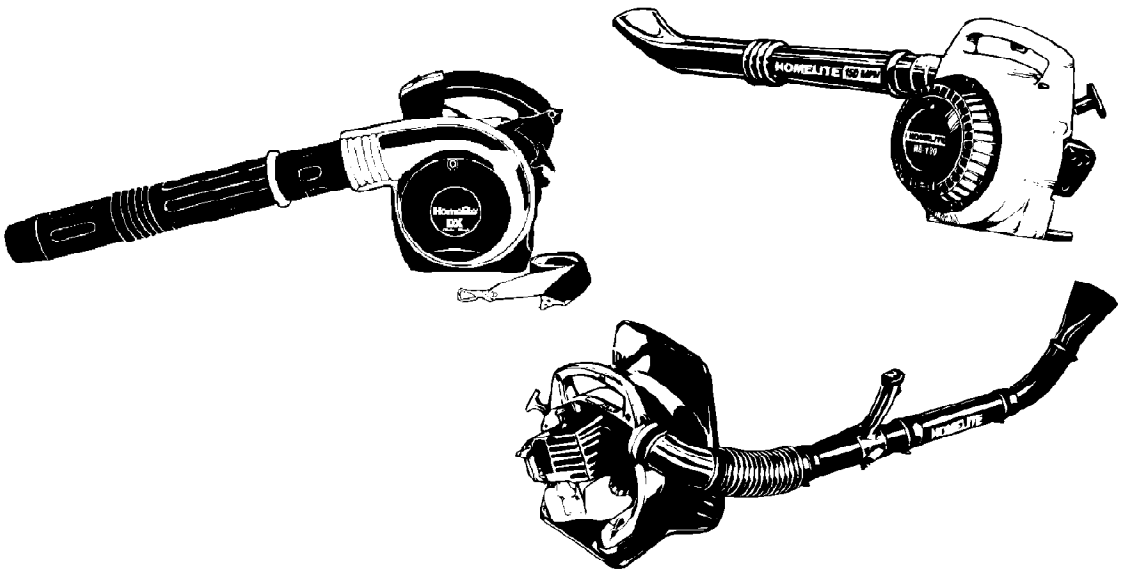
1. Throttle Trigger
2. Fuel Tank
3. Air Filter
4. Starter Rope & Grip
5. Stop Switch/Trigger Latch
6. Blower Tubes
7. Blower Nozzle

UNIT FEATURES



1. Control Handle
2. Backpack Frame
3. Starter Rope and Grip
4. Choke
5. Air Filter
6. Fuel Tank and Cap
7. Blower Nozzle

UNIT SPECIFICATONS



Engine

Type	2-cycle, Single Cylinder, Air Cooled			
Engine Displacement	25 cc (1.5 cu.in.)			
	30 cc (1.9 cu.in.)			
Ignition	One Piece Capacitor Discharge			
Ignition Timing	27° BDTC (Non Adjustable)			
Muffler	Dual Chamber Soft Tone			
Sound Level	68 dBa @ 50 Feet (25 cc)	70 dBa @ 50 Feet (30 cc)		
Engine Speeds**	**Group 1 except PHB300 & PBP3000**	2800	3800 Idle	6800 Min, No load
	PHB3000 & PBP3000	2800	3800 Idle	7200 Min, No load
	Group 2 Units	3800 Max, Idle		Optimum, No-Load, then richen to lower by 200 RPM.

Fuel System

Carburetor	All Position Diaphragm Type With Primer Bulb
Intake Piston	Piston Port Induction
Air Filter	Foam (Dry)
Throttle Control	Trigger Type Plus Throttle Lock
Fuel Mix Ratio	Exact Mix 50:1 (2.6 oz.to One Gallon)

General

Maximum Velocity	155 mph (249 km / h)	25 cc	170 mph (274 km / h)	30 cc
Maximum Volume	360 cfm (612 m^3 / h)	25 cc	370 cfm, (629 m^3 / h)	30 cc
Vac Capable	Yes (Optional except Backpack, HB100, BX90, Yard Broom andYardvark)			
Reduction With Vac	Up To 12:1			
Gutter Kit Capable	Yes (Optional)			

*Specifications subject to change without notice.

**Engine speeds are with all blower tubes mounted.

TORQUE SPECIFICATIONS

NOTE:TORQUE SPECIFICATIONS ARE GIVEN IN INCH POUNDS AND NEWTON METERS (N·m)

SIZE & TYPE	QTY	APPLICATION	TORQUE LIMITS (IN. LBS)	TORQUE LIMITS (N·M)
FUEL SYSTEM				
10-24 X 2.188 T-25 TORX TRUSS HEAD	2	MUFFLER TO CYLINDER	50-60	5,6-6,8
8-32 X .375 TORX TRUSS HEAD	2	MUFFLER COVER TO MUFFLER	30-40	3.4-4.5
10-32 X 1.00 T-25 TORX TRUSS HEAD	2	HEAT DAM TO CYLINDER	50-60	5,6-6,8*
10-24 LOCK NUT	2	A/F BOX TO HEAT DAM	30-40	3,4-4,5
#10-14 X .875 T-25 TORX PLASTITE	3	FUEL TANK TO HOUSING	30-40	3,4-4,5
#8-16 X .625 PHILLIPS HEAD PLASTITE	4	AIR FILTER COVER TO A/F BODY	30-40	3,4-4,5
(10-24 x 2 ½) SEMS HEAD SCREW	2	MUFFLER TO CYLINDER (Group 1)	40-50	5.6 - 6.8
IGNITION SYSTEM				
8-32 X 1.00 TAPTITE T-25 TORX & SLOT	2	MODULE TO C/CASE	30-40	3,4-4,5*
MISCELLANEOUS				
(¼) HEX NUTS	3	BACKPACK FRAME ISOLATORS	40-50	5.6 - 6.8
SHROUD				
#10-14 X .875 T-25 TORX TRUSS HEAD PLASTITE	5	SHROUD TO STARTER HSG	30-40	3.4-4.5
VOLUTE, STARTER, HANDLE				
10-24 X .750 MACHINE, TORX TRUSS HEAD	1	DOOR TO VOLUTE	15-20	1.7-2.6
#10-14 X .500 T-25 TORX TRUSS HEAD PLASTITE	2	STARTER PULLEY TO STARTER HSG	30-40	3.4-4.5

* ***Use thread locking compound***

TORQUE SPECIFICATIONS

NOTE:TORQUE SPECIFICATIONS ARE GIVEN IN INCH POUNDS AND NEWTON METERS (N·m)

SIZE & TYPE	QTY	APPLICATION	TORQUE LIMITS (IN. LBS)	TORQUE LIMITS (N·M)
MISCELLANEOUS				
#10-14 x .875 T-25 Torx Plastite	5	VOLUTE TO STARTER HSG	55-65	6.2-7.3
3/8-24 HEX NUT	1	FAN TO SHAFT	130-150	14.7-16.9
#10-14 x .500 T-25 Torx Plastite	1	DOOR HINGE TO VOLUTE	30-40	3.4-4.5
10-24 x .750 T-25 TORX TRUSS HEAD	4	C/CASE TO STARTER HSG	55-60	6.2-6.8
#8-16 x .500 T-25 TORX PLASTITE	2	HANDLE COVER TO HANDLE	10-25	1.1-2.8
#10-14 x .875 T-25 TORX PLASTITE	1	HANDLE TO STARTER HSG	30-45	3.4-5.1
ENGINE				
14MM TAPERED SEAT SPARK PLUG	1	TO CYLINDER	120-180	13,6-20,0
12-24 X .750 T-27 TORX TRUSS HEAD	3	C/CASE TO CYLINDER	65-75	7,3-8,5*
10-24 X .500 T-25 TORX TRUSS HEAD	4	C/CASE COVER TO C/CASE	30-40	3,4-4,5*

**** Use thread locking compound***

FUELING SPECIFICATIONS

FUEL AND OIL REQUIREMENTS

This engine is certified to operate on unleaded gasoline intended for automotive use.

This is a 2-cycle engine product and requires premixing gasoline and 2-cycle oil. For normal use, we recommend mixing fuel in a 1 or 2 gallon container approved for gasoline.

Mix HOMELITE® **Premium Exact Mix** Oil with gasoline according to the instructions on the package. If **Premium Exact Mix** oil is not available, use a high quality 2-cycle engine oil, mixed at 2.6 oz. per gallon (US).

DO NOT USE AUTOMOTIVE OIL OR 2-CYCLE OUTBOARD OIL.

NOTE: Premium Exact Mix fuel mix will stay fresh up to 30 days.

DO NOT mix quantities larger than usable in a 30 day period.

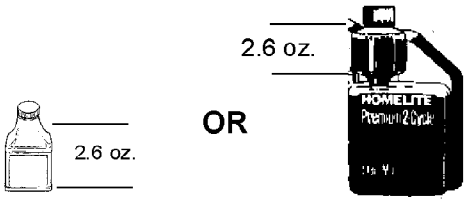
1. Loosen fuel cap slowly. Rest the cap on a clean surface.
2. Carefully pour fuel into the tank. Avoid spillage.
3. Immediately replace fuel cap and hand tighten. Wipe up any fuel spillage.
4. It is normal for smoke to be emitted from a new engine after first use.

   NOTE: Always shut off engine before fueling. Never add fuel to a machine with a running or hot engine. Move at least 10 feet (3m) from refueling site before starting engine. **DO NOT SMOKE!**

FUEL MIXTURE CHART

PREMIUM EXACT MIX™ (50:1)

Gasoline	Oil
1 gallon	2.6 (fl. oz.)
1 Liter	20 (ml)



WARNING

Experience indicates that alcohol blended fuels (called gasohol or using ethanol or methanol) can attract moisture which leads to separation and formation of acids during storage. Acidic gas can damage the fuel system of an engine while in storage.

ENGINE STORAGE

It is important to prevent gum deposits from forming in essential fuel system parts such as the carburetor, fuel filter, fuel hose or tank during storage.To avoid engine problems, the fuel system should be emptied before storage of 30 days or longer. Follow these instructions:

To remove gasoline, run the engine until the tank is empty and the engine stops.

If you do not want to remove gasoline, a fuel stabilizer (such as Sta-Bil fuel stabilizer p/n JA54715-6) may be added to any gasoline left in the tank to minimize gum deposits and acids. If the tank is almost empty, mix stabilizer with fresh gasoline/oil mixture in a separate container and add some to the tank.

Always follow instructions on stabilizer container. Run engine at least 10 minutes after stabilizer is added to allow mixture to reach carburetor. Store trimmer in a safe place. See warning above.

FUEL STORAGE

Keep fuel in a clean container approved for fuel storage. Keep all dirt, water or other foreign material out of the container.

TROUBLESHOOTING

TESTING IGNITION OUTPUT

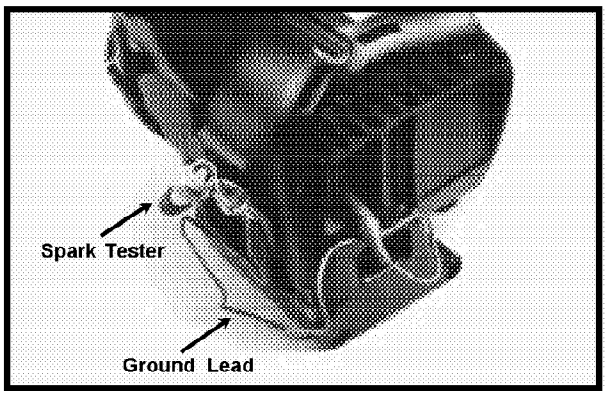


Figure 1

Remove the spark plug terminal (boot) from the spark plug. Insert the spark tester between the spark plug terminal and the tip of the spark plug. Pull the starter grip rapidly (at least 800 R.P.M.). A spark should jump the 3/16 - 1/4 gap between the tester electrodes.

WARNING: If all components in the ignition system are working, the engine on the unit may start while making this test. Always make this test in a safe and proper area.

If a spark occurs, the ignition module and spark plug are performing properly. If no sparking occurs, connect the tester to the base of the plug. This may require an extra grounding lead in order to make the connection.

Pull the starter grip again to produce the cranking speed of 800 RPM. If a spark now jumps the gap, this indicates spark plug failure under compression. Replace the spark plug and retest.

If no spark occurs with either of the previous tests, the failure is with the other ignition components.

IGNITION SYSTEM

Test the Stop Switch and Wiring Harness - Group 2 and Backpack Units

Refer to Shroud and Heat Shield Section for information on removal and installation of the shroud.

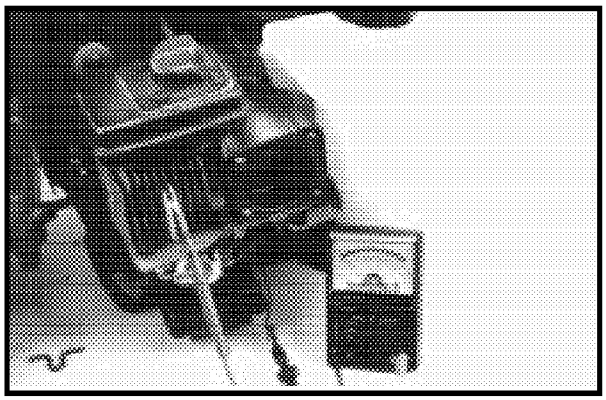


Figure 2

1) Remove the ground lead from the crankcase cover. Use a Volt-Ohm-Milli-amp Meter or VOM Meter, set on the R times scale or; set for testing continuity. Connect one lead from the meter to the ground wire. Connect the other lead from the meter to the cylinder or a surface on the engine that will provide a path to ground. The meter should indicate no continuity.
2) If there is continuity indicated in the previous step, remove the two handle cover screws. Turn the cover over and remove one switch lead from the switch. Use the VOM meter to test the switch. There should be no continuity between the two switch terminals with the switch lever not depressed.

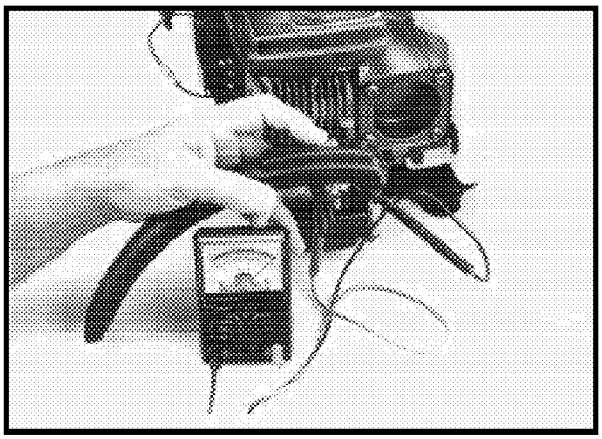


Figure 3

3) Now, depress the switch lever. There should be continuity with the switch lever depressed. Attach the VOM meter s leads to each of the two switch terminals. Depress the switch again. If the VOM Meter now shows continuity, replace the wiring harness. If the VOM Meter now shows no continuity, replace the switch.

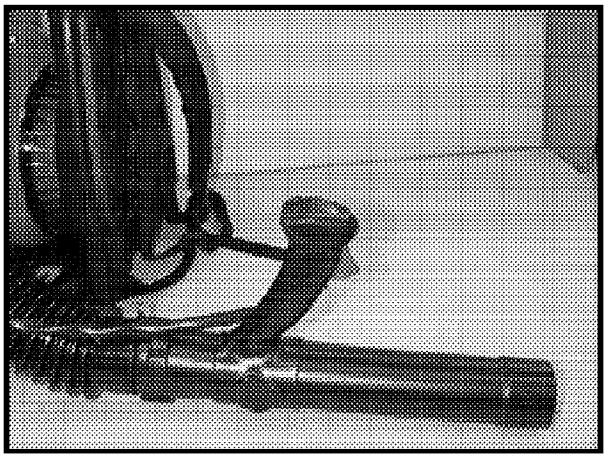


Figure 4

Switch Access Backpack Models

Backpack models have the switch located in the control handle on the tube assembly.

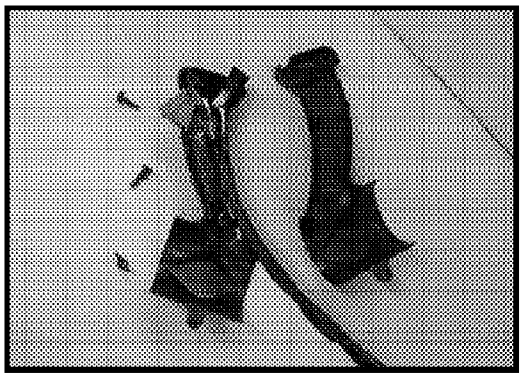


Figure 5

Use a 1/4" nut driver or flat blade screwdriver to remove the 2 (10-14 x 3/4") Plastite screws. Remove the wing nut from the (10-24 X 7/8") Rib Neck Bolt at the bottom of the handle assembly. Separate the two halves of the handle assembly to gain access to the ignition switch.

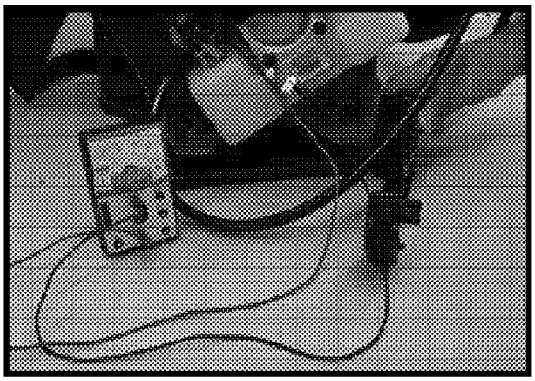


Figure 6

Once the access to the switch is gained, refer to procedures for testing the ignition switch and wiring harness for the Group 2 Units. Note however, that Backpack blowers use a positive-contact type switch instead of the push-and-hold type switch used on Group 2 Units.

TEST THE ENGINE COMPRESSION

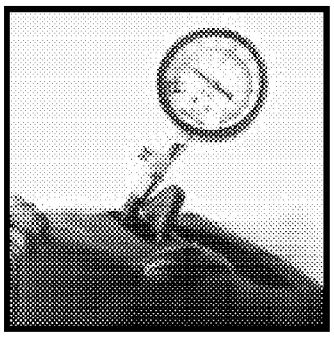


Figure 7

Low compression will cause hard starting, erratic idling, loss of power under load, and hard starting when hot.

Remove the spark plug. Place the choke lever in the OFF or OPEN position. With the throttle wide open, pull the starter grip rapidly several times to purge any excess fuel in the crankcase and cylinder.

Insert a compression gauge p/n 94194 into the spark plug hole. Pull the starter grip rapidly 12 to 15 times or until the compression gauge reaches its peak.

Engine compression should be:
Hot Engine 90 PSIG (6.2 bars) - minimum
Cold Engine 100 PSIG (6.9 bars) - minimum

TEST THE FUEL SYSTEM

If your testing has indicated that the fuel system may be the cause of the problem, perform the following tests to narrow the area of inspection.

Remove the fuel cap and drain all the fuel from the fuel tank.

CHECK THE FUEL TANK VENTING SYSTEM

These units are designed to run in virtually any position. For that reason the fuel tank venting system is designed so that, no matter how the unit is positioned, no fuel can escape and spill on the operator or ground. The venting system will allow air to enter in order to compensate for a vacuum, but will not allow fuel or pressure to escape. The fuel systems are designed with this pressure accounted for. It is perfectly normal for pressure to build within the fuel tank when the unit is operated.

If, however this vent is plugged and will not allow air to enter the tank, a vacuum could form in the tank. The engine would starve for fuel and stop running after a short time. A good indication of this would be that the unit could be restarted after the fuel cap was opened slightly to relieve the vacuum.

The fuel tank vent consists of a non-replaceable filter and check valve in the top of the fuel cap. Replace the cap if the blower is starving for fuel as described above, or, if the cap leaks and will not hold fuel and pressure within the tank.

TROUBLESHOOTING

CHECK THE FUEL LINES AND FILTER

Use a hook to pull the flexible fuel pickup line and fuel filter from inside the tank.

Inspect the fuel filter for buildup of dirt and debris. If the filter is discolored, appears yellow in color; or if dirt streaks are visible, replace the filter. A fuel filter that is loaded with dirt will cause hard starting and loss of power.

Examine the fuel line for kinks, tears or pinhole leaks. The line should be flexible and should spring back to its original shape if compressed.

Replace the line if it is hard or stiff to the touch. A hard or stiff fuel line cannot flex to follow the fuel in the tank when the unit is run in varying operating positions.

Inspect the fuel line, overflow line and fuel pick up line for signs of abrasion or pinhole leaks. Use a pressure tester (P/N 94197) and vacuum tester (P/N 08279) if the unit indicates lean running or will only start on choke even after the engine is warm.

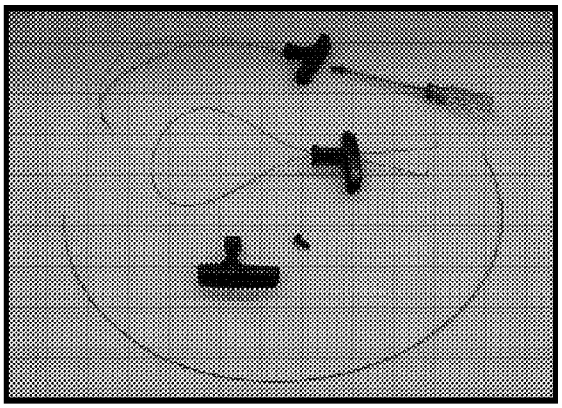


FIGURE 8

A fuel line installation tool can be made using #15 AWG wire; #10 - 1/2" screw, P/N 82541; and a starter grip, P/N 02264.

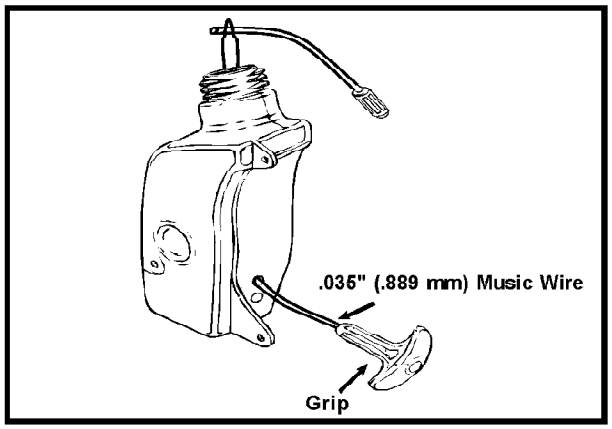


Figure 9

To replace the fuel pickup line or overflow line, pull out and discard the old line. Slide the loop of the fuel line installation tool through the tank and out the fuel filler hole. Insert the new line into the installation tool loop as shown. Squeeze the loop against the line to hold the line in place. Pull the line and installation tool back through the tank until contact with the tank wall is made. Give a sharp pull on the tool, pulling the line part way through the tank. Remove the tool and continue pulling the line until the proper length outside the tank is met.

CARBURETOR ADJUSTMENTS

Engines manufactured since 1995 must comply with EPA (Environmental Protection Agency) and CARB (California Air Resource Board) regulations that require exhaust emission control. As a result, the carburetor adjustment needles are equipped with plastic caps that prevent rotation from the original factory adjustment.

NEVER REMOVE THESE CAPS!

If you are unable to adjust the factory-installed carburetor to a satisfactory performance level, replace the carburetor.

For Idle speed adjustment on Group 2 Units, turn the idle speed screw out until it no longer touches the carburetor throttle linkage. Then, turn the idle adjustment screw in, until it just touches the throttle linkage. Next, turn the idle adjustment screw an additional 3 to 4 turns. Turning the idle screw in or clockwise will raise the idle speed. Turning the screw out, or counterclockwise will lower idle speed.

When starting and running the engine, let the engine warm up for at least five minutes before making any adjustments.

Refer to the Specifications Section for proper idle and full load speeds. Note that all engine speed specifications are with all blower tubes installed.

Use a tachometer to check the idle speed. Adjust the idle speed so it does not exceed the maximum as indicated in the specifications.

If unit runs lean and cannot be adjusted rich enough to compensate, within the range of the factory installed limiter caps; check other systems before replacing the carburetor.

When a carburetor is replaced; it may require some preliminary adjustments. New replacement carburetors are shipped with the plastic limiter caps not permanently seated. For replacement carburetors, only after the final adjustments are made to the carburetor should the limiter caps be pushed down over the serrated part of the adjustment needle.

IDLE SPEED ADJUSTMENT (GROUP 1 UNITS)

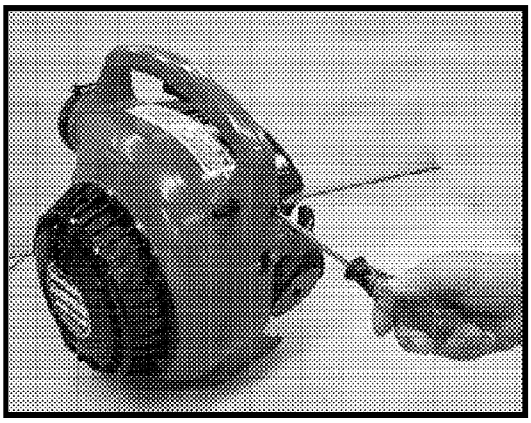


Figure 10

The idle adjustment screw on Group 1 Units is located at the top rear of the upper handle. Turning the idle screw clockwise will raise the idle speed, turning the needle counterclockwise will lower idle speed.

STATIC TEST - FUEL PUMP

The fuel pump is operated by vacuum and pressure form the crankcase, also referred to as pulse . A small hole in the heat dam connects the fuel pump with crankcase so it can receive its pulse.

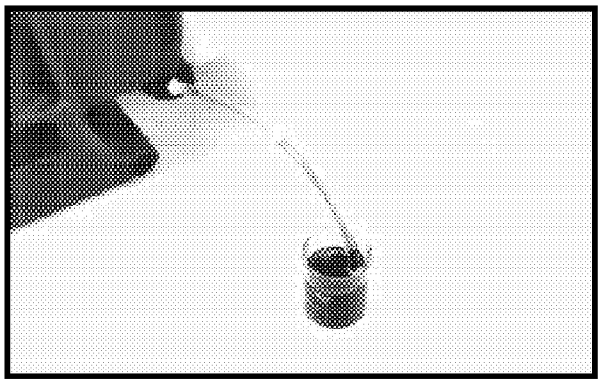


Figure 11

Separate the inlet fuel lines at the inlet fitting. Connect a length of clear plastic tubing to the inlet fitting (and fuel line attached to the carburetor). Add colored liquid (colored water, coffee, soda, etc.) to an open container. Place the end of the clear plastic tubing into the colored liquid. Close the choke on the carburetor. With the throttle wide open, pull the starter grip briskly. Look for the colored liquid to begin to travel up the clear tubing toward the carburetor. When the colored liquid is drawn (at least half way) up the clear tubing, stop pulling the starter grip.

This test concludes that the crankcase is delivering the needed pulse/vacuum to the carburetor and that the fuel pump side of the carburetor is working. If the colored liquid is not drawn up the clear tubing, a problem may exist in the carburetor fuel pump, fuel inlet screen, inlet needle and seat, or pulse passageways. Inspect and/or pressure test the carburetor and/or carburetor components to find the fault.

TEST THE CARBURETOR

Access can be gained to the carburetor, fuel inlet elbow and fuel overflow lines without removing the shroud and other components, these illustrations show these components removed in order to provide better viewing.

TROUBLESHOOTING

PRESSURE TESTING THE CARBURETOR

Pressure testing the carburetor will test gasket integrity, fuel inlet screen, inlet needle valve, welch plugs (expansion plugs), high-speed and low-speed circuits.

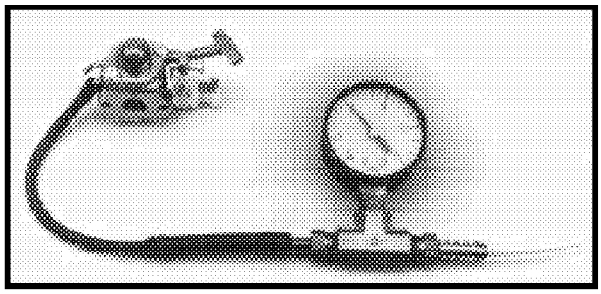


Figure 12

Install a pressure tester on the carburetor fuel inlet fitting. Pressurize the carburetor to 5-6 PSIG (0,34-0-41 bars). The carburetor should hold this pressure. Carburetor replacement is recommended if the carburetor fails to pass either of these tests.

TESTING FOR PULSE

Refer to Air Filter, Carburetor and Heat Dam Section for information on removal, and installation of the air filter, carburetor and heat dam.

To test for pulse through the heat dam, place one or two drops of oil in the carburetor heat dam pulse-hole.

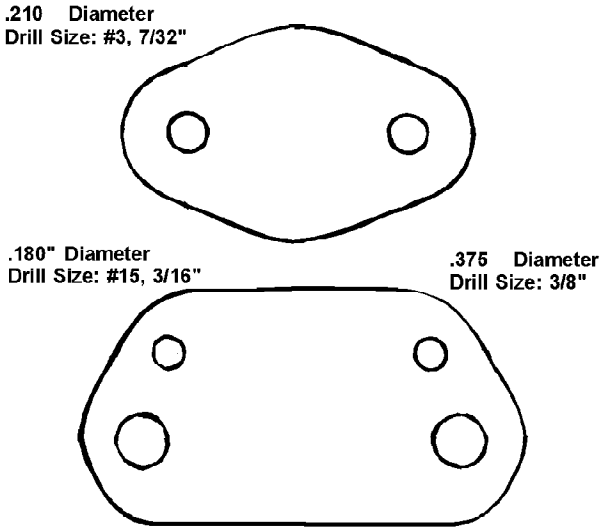
Pull rapidly on the starter grip. The oil should be pushed out of the pulse hole, indicating that the passageway is clear.

If no pulse is indicated, remove the heat dam, the two carburetor-retaining studs, and the heat dam gasket.

Examine these parts, paying attention to the pulse passageway, in order to find the fault.

PRESSURE AND VACUUM TESTING THE CRANKCASE/CYLINDER

Pressure and vacuum testing of the crankcase/cylinder are important procedures that are often overlooked. All air going into the engine must pass through the carburetor. Air bypassing the carburetor because of leaking seals gaskets or porous castings will cause hard starting, erratic idling, poor acceleration and deceleration. Pressure and vacuum testing the crankcase and cylinder is the best way to determine where a leak is occurring.



SEALING PLATE TEMPLATES

Figure 13

Note that the intake sealing plate has been drilled and tapped. A barbed fitting has been installed in the intake plate. Use the templates above as patterns that can be used for making these sealing plates. They are typically cut from aluminum or Plexiglas, using a band saw or jigsaw. They can be drilled with an electric drill or drill press.

TROUBLESHOOTING

PRESSURE TESTING

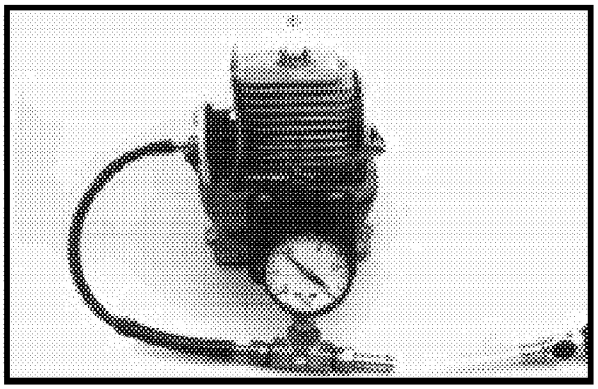


Figure 14

Pressure Test the Crankcase/ Cylinder

Begin pressure testing the crankcase by closing off both the intake and exhaust ports with sealing plates and rubber gaskets.

Connect a pressure tester (P/N 94197) to the barbed fitting on the intake sealing plate.

Use the pressure tester to introduce 5 to 6 PSI or 0.3 to 0.4 bars of pressure into the crankcase and cylinder. The crankcase and cylinder should hold this pressure.

A drop in pressure indicates an air leak. To find the exact location of the air leak, spray or paint a soap and water solution on suspected areas such as gaskets, seals, and castings.

VACUUM TESTING

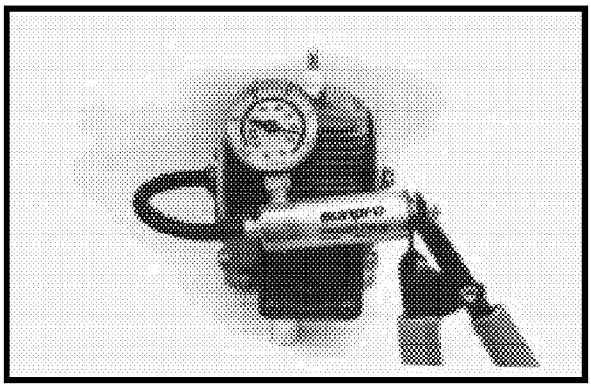


Figure 15

Vacuum Test the Crankcase/Cylinder

Vacuum testing of the crankcase and cylinder is an important part of troubleshooting, as the crankshaft seals must seal tight against both vacuum and pressure.

With the intake and exhaust sealing plates in place, install a vacuum tester (P/N A08279). Actuate the vacuum tester until the gauge needle reaches 5-6 inches of mercury (5"-6" Hg or 12,7 - 15,2 cm Hg). This is generally the point of maximum negative pressure reached during wide-open throttle operation. Vacuum loss should not exceed 4 inches of mercury (4" Hg or 10 cm Hg) in one minute. Vacuum testing of the Garlock type crankshaft seals is more reliable than pressure testing. These seals are designed primarily to keep air from leaking into the crankcase.

CAUTION

Do not submerge the engine in water or paint it with liquid during vacuum testing.

SHROUD AND HEAT SHIELD

REMOVAL AND INSTALLATION OF THE SHROUD AND HEAT SHIELD

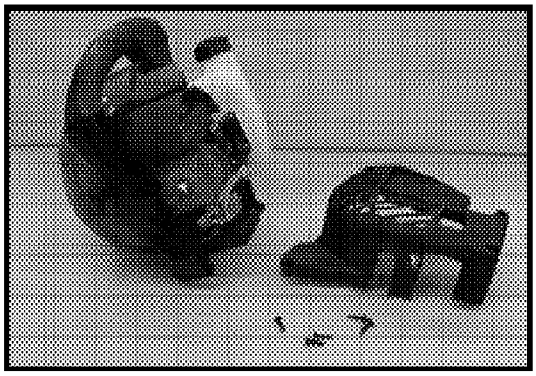


Figure 16

Remove the Shroud

Group 2 Units: Remove the shroud and five #10-14 x 7/8" Torx head screws with a T-25 Torx bit or screwdriver.

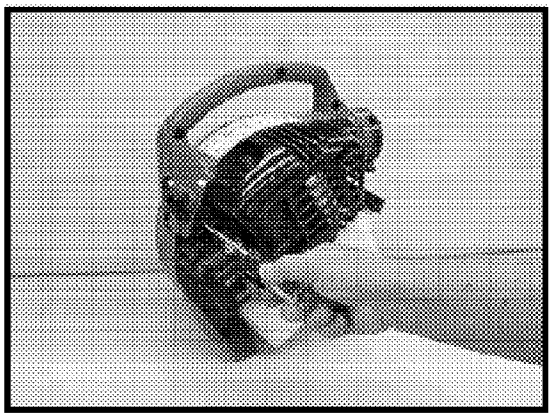


Figure 17

Group 1 Units: Use a #2 Phillips Screwdriver or a nut driver to remove the 3 (#8 X 1/2") thread-forming screws. Use a T25 torx bit, screwdriver or 5/16" nut-driver to remove the (#10 X 3/4") thread-forming screw.

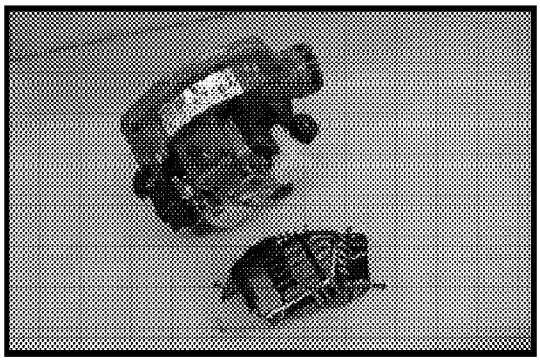


Figure 18

Lift the shroud from the unit.

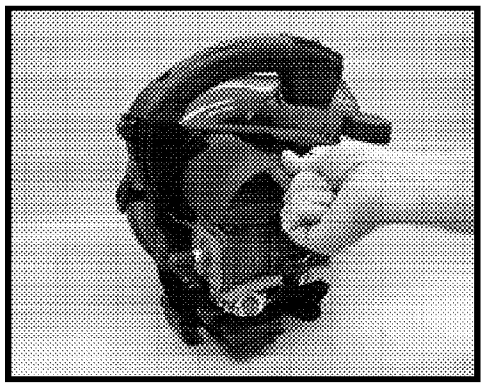


Figure 19

Remove the heat shield

Group 2 Units: slide out the heat shield.

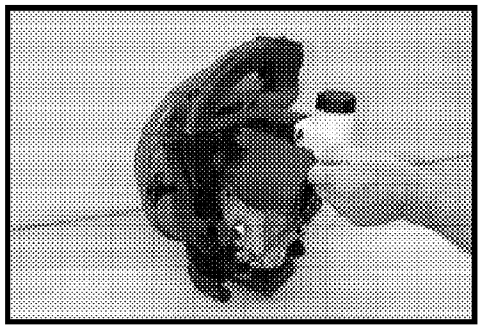


Figure 20

Assemble the heat shield

Group 2 Units: Assemble the heat shield with the cutouts in the shield facing towards the starter housing.

SHROUD AND HEAT SHIELD

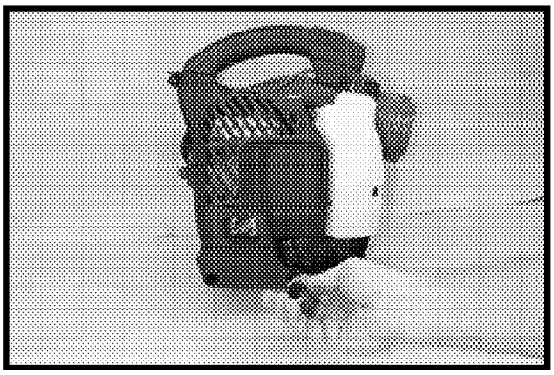


Figure 21

Group 2 Units: Mount the shroud over the engine and against the starter housing. Install the 5 (10-14 x 7/8") thread forming screws. Tighten the screws to 30-40 In/Lbs.; 3.4-4.6 Nm

Service Note:

On Group 2 Units: Take care to assure that the shroud at the top goes over the starter housing and not under it, otherwise a mismatch can easily occur.

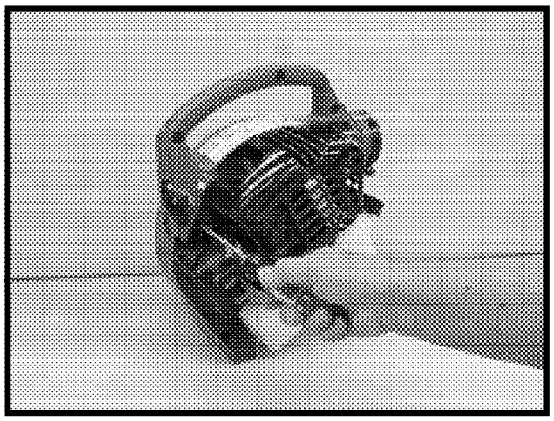


Figure 22

Group 1 Units: Place the shroud on the unit.

Install the (#10 X 3/4") thread-forming screw and tighten to 20-30 In/Lbs.; 2.3-3.4 Nm

Install the 3 (#8X 1/2") thread-forming screws and tighten to 8-12 In/Lbs.; .9-1.4 Nm.

AIR FILTER, CARBURETOR AND HEAT DAM

DISASSEMBLY AND INSPECTION OFTHE AIR FILTER, CARBURETOR AND HEAT DAM

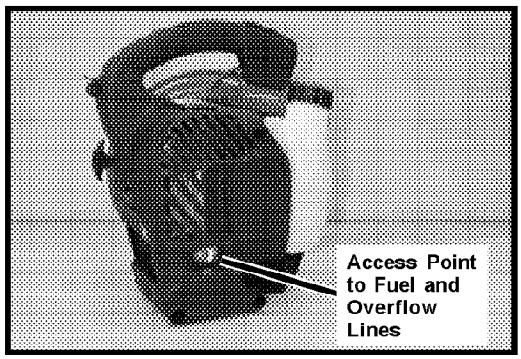


Figure 23

Use a small flat blade screwdriver to push the fuel and over-flow lines off the carburetor fittings.

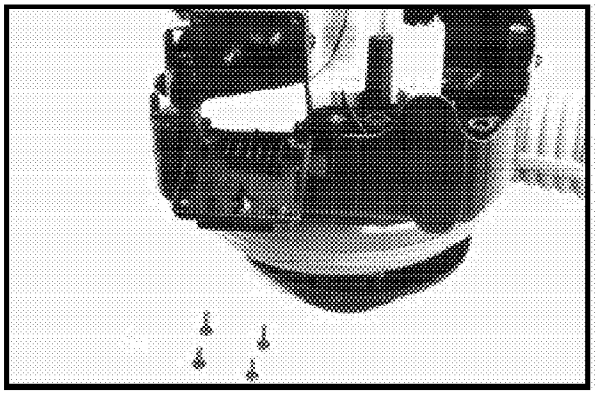


Figure 24

On Group 2 Units, remove the air filter cover by using a #2 Phillips head screwdriver to loosen and remove the four (8-16 x 1/2") screws.

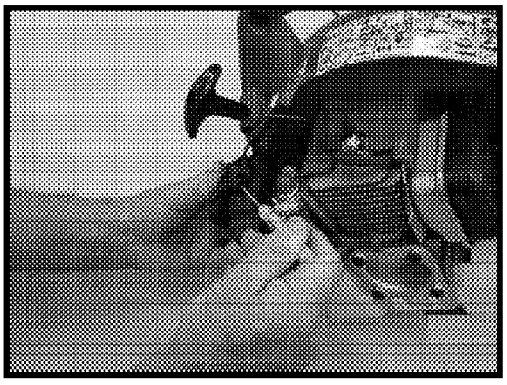


Figure 25

Air filter Removal (Group 1 Units)

On Group 1 Units, remove the air filter cover by gently pulling on the cover while carefully prying up on the latches with a screwdriver.

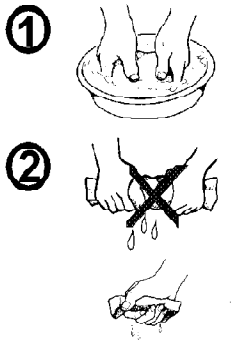


Figure 26

1) Clean the filter in a soap and water solution.

2) Do not *wring* the filter dry, but squeeze the excess water and soap out of the foam. Let the filter dry completely before installing it back on the unit.

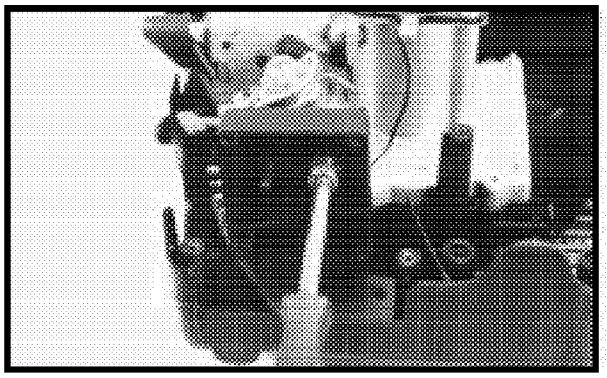


Figure 27

Use 3/8" socket to remove two 10-24-lock nuts. Slide the air filter body off the studs.

AIR FILTER, CARBURETOR AND HEAT DAM

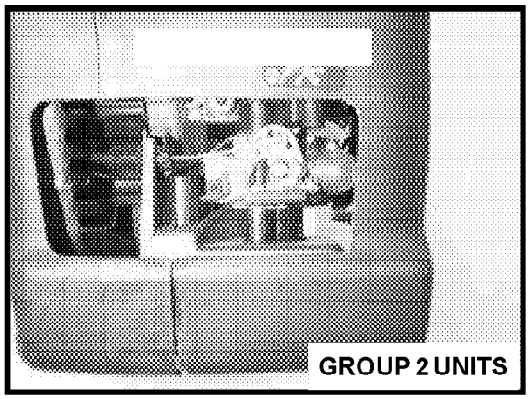


Figure 28

Group 2 Units: Use needle nose pliers to unhook the Z fitting from the carburetor. Then squeeze the cable housing with needle nose pliers to free it from the air cleaner body.

Service Note Group 2 Units: On Units with Zama carburetors, the cable Z fitting goes into second hole from the top. (11 o clock position).

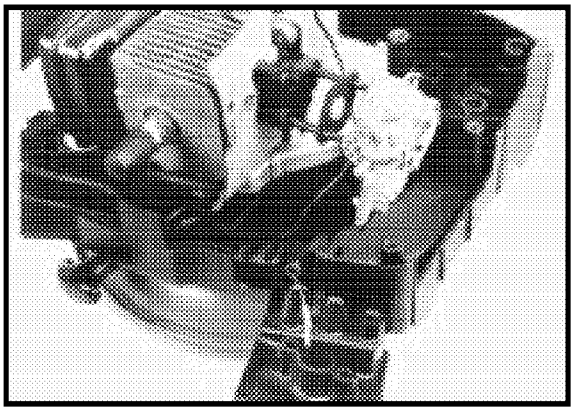


Figure 29

Pull the carburetor and carburetor gasket off the two 10-24 x 2 3/4" mounting studs.

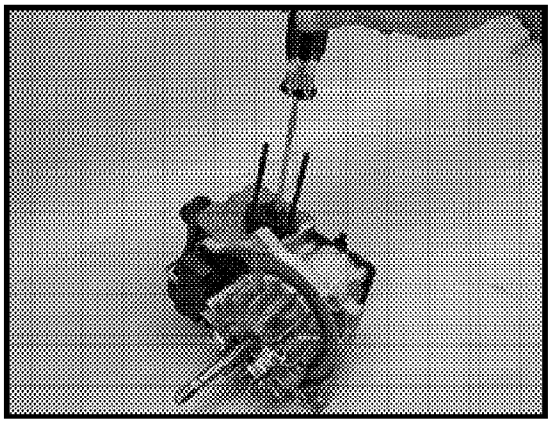


Figure 30

Use a T-25 Torx bit or screwdriver to remove the two (10-32 x 1") Torx screws securing the heat dam, or carburetor spacer, the studs and the heat dam gasket to the cylinder. Pull the heat dam off the cylinder and remove the studs.

The studs fit into pockets in the backside of the heat dam. The studs should drop into the pockets and be properly seated when re-assembling the studs to the heat dam.

Assemble the Heat Dam to the Crankcase

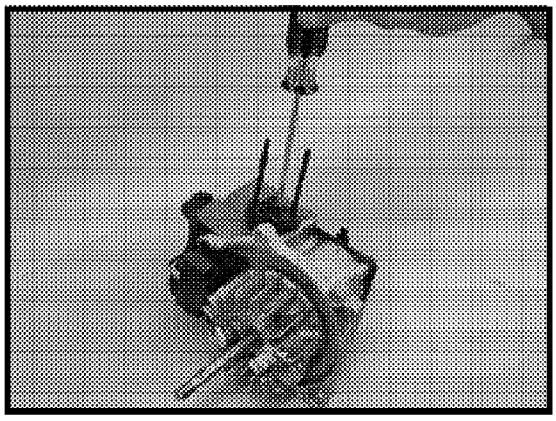


Figure 31

Note: Illustrations here show the short block removed from the housings. Depending on the components being serviced, it may not be necessary to completely remove the short block from the housings to service the heat dam.

Place a new heat dam gasket on the cylinder. Use caution to assure that the gasket is placed on the cylinder with the two cutouts of the gasket facing down and the shape of the gasket matches the screw holes and pulse holes on the cylinder around the intake port.

AIR FILTER, CARBURETOR AND HEAT DAM

SERVICE NOTE: Insert the two carburetor studs into the pockets in the backside of the heat dam. The studs should drop into the pockets and be properly seated when re-assembling the studs to the heat dam.
Assure that the heads on the studs are flush with the surface of the heat dam. Set the heat dam on the cylinder.

Apply thread locking compound on the first few threads of the 2 (10-32 x 1") pan head Torx screws. Insert the screws into the heat dam and cylinder. Tighten the screws by hand until snug. Use a torque wrench to tighten the two screws to 50 - 60 in. lbs. (5.6 - 6.8 Nm).

Slide the carburetor gasket on the studs and push it on until the gasket is flat on the heat dam. Make sure the pulse hole in the gasket is lined up with the pulse hole in the heat dam.

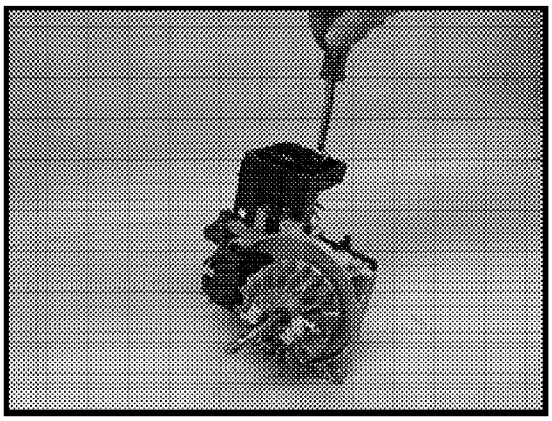


Figure 32

Place the side of the carburetor opposite the choke mechanism, towards the heat dam. Mount the carburetor on the two studs. Move the carburetor in place against the gasket. Slide the fuel pick-up line and the overflow line onto the proper fittings on the carburetor. Assemble the air filter body and two, (10-24) hex, lock nuts. Adjust the air filter body until it is properly squared.
Use a torque wrench to tighten the 2 (10-24) hex, lock nuts to 34-40 in. lbs. (3.4 4.5 Nm.). Insert the air filter element into the cavity in the air filter body. Place the air filter cover on the air filter body.
On Group 1 Units, snap the cover in place.
On Group 2 Units, insert the four Phillips head screws into the air filter cover and body and tighten the four screws to 34-40 in. lbs. (3.4 4.5 Nm.).

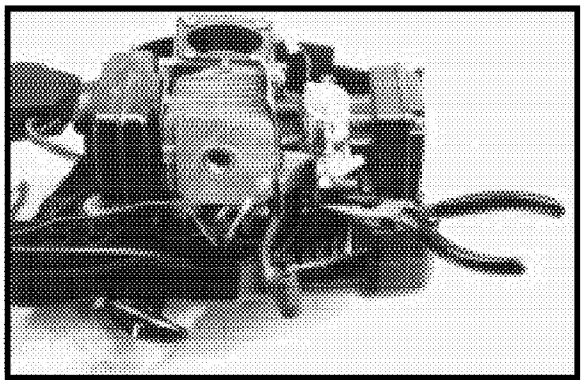


Figure 33

On Group 2 Units, reconnect the ground wire at the crankcase cover s grounding tab. Use needle nose pliers to connect the throttle cable Z fitting to the carburetor.
Service Note
On units with Zama carburetors, the cable Z fitting goes into second hole from the top. (11 o clock position).
Squeeze the cable housing with needle nose pliers to connect it to the air cleaner body.

FUEL TANK

FUEL TANK REMOVAL GROUP 2 UNITS

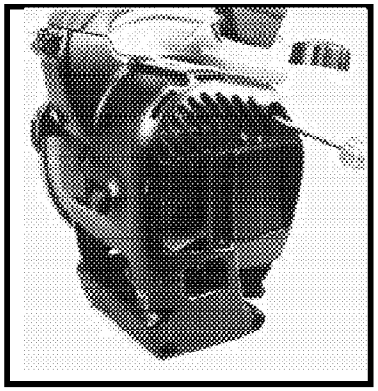


Figure 34

Remove the Shroud.

Refer to Shroud and Heat Shield Section for instructions on removal of the shroud.

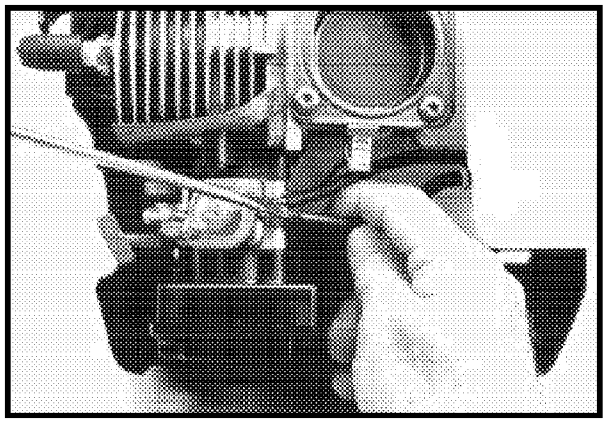


Figure 35

Disconnect the fuel lines.

Use a flat blade screwdriver to push the over flow and fuel pickup lines off the carburetor.

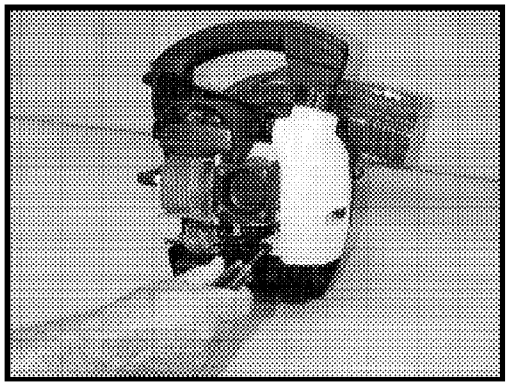


Figure 36

Group 2 Units: Use T-25 Torx to remove the three (10-14 x 7/8") Torx- head, Plastite screws and the flat washers from the fuel tank.

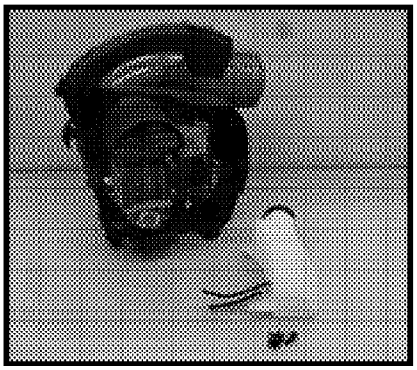


Figure 37

Lift the fuel tank off the unit.

FUEL TANK INSTALLATION - GROUP 2 UNITS

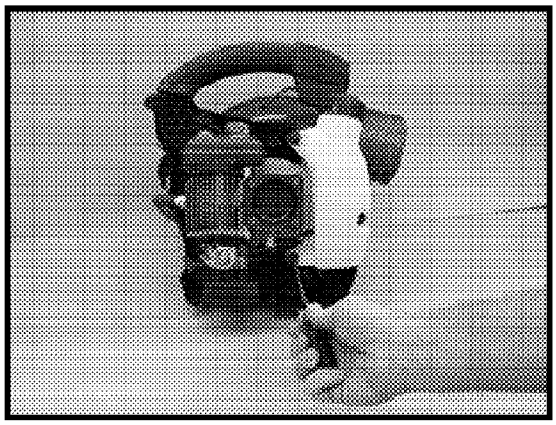


Figure 38

Group 2 Units: Push the single, one-piece overflow line, from the fuel tank onto the primer overflow fitting of the carburetor. Slide the two piece fuel pickup line, from the fuel tank, onto the fuel pump inlet fitting on the carburetor. Position the fuel tank on the starter housing. Use a T-25 Torx bit or screwdriver to start the three Torx screws and washers into the bosses on the starter housing. Use a torque wrench to tighten the three screws to 30 - 40 in. lbs. (3.0 - 4.0 Nm).

FUEL TANK

FUEL TANK REMOVAL (GROUP 1 UNITS)

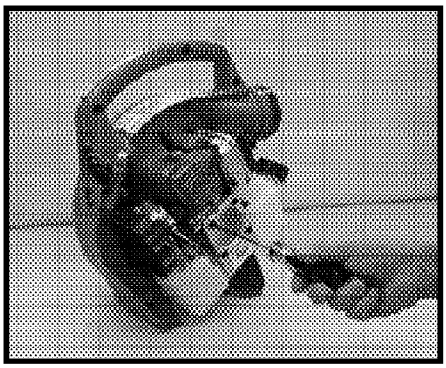


Figure 39

Remove the Crankcase Cover

Use a T-25 Torx bit or screwdriver to remove the four 10-24 x 3/4" screws, that secure the crankcase cover to the crankcase.

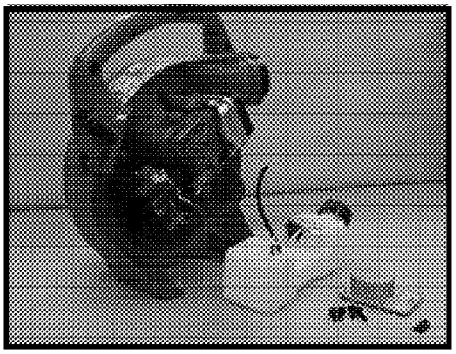


Figure 40

Lift off the crankcase cover, and then remove the fuel tank assembly from the unit.

FUEL TANK INSTALLATION - GROUP 1 UNITS

Push the overflow line (line that does not connect to the fuel filter), from the fuel tank onto the primer overflow fitting of the carburetor. Slide the fuel pickup line (line with the fuel filter attached), from the fuel tank onto the fuel pump inlet fitting on the carburetor. Position the fuel tank on the crankcase. Take care to assure that the 3 rubber bumpers are properly positioned on bosses located on the crankcase cover and the crankcase

Place a new crankcase cover gasket on the crankcase. Insert the crankcase cover into the crankcase. For outboard starter equipped units, upon reassembling the cover to the crankcase, take care to properly align the yoke of the starter shaft with the crank pin. Refer to Starter Section for outboard starter instructions.

On Group 1 Units, the grounding tab is a separate component that fits under the crankcase cover screw in the lower left-hand corner of the cover, as viewed with the cylinder pointing upward.

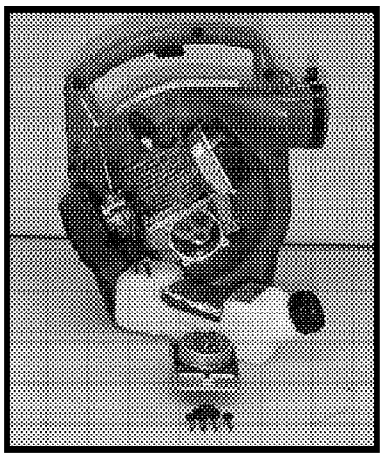


Figure 41

Assemble the four 10-24 x 1/2" Torx screws by hand. Use a torque wrench to tighten the screws to 30 - 40 in. lbs. (3.4 - 4.5 Nm.).

VOLUTE AND FAN REMOVAL AND INSTALLATION

Remove the Shroud

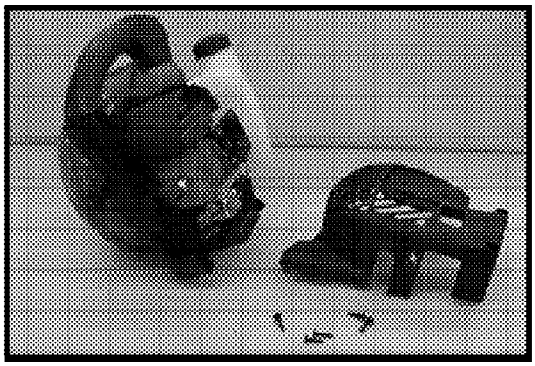


Figure 42

Refer to Shroud and Heat Shield Section for instruction on shroud and heat shield removal.

Remove the Fuel Tank (Group 2 Units)

On Group 2 Units, Refer to Fuel Tank Section for information and instructions on removal of the fuel tank.

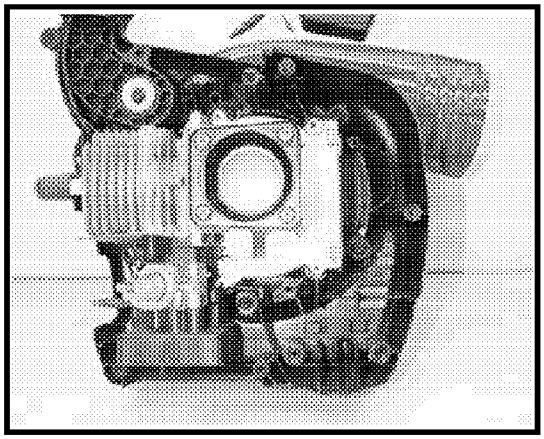


FIGURE 43

For Group 2 Units, use a T-25 Torx bit to remove the five 10-14 x 7/8 securing the volute assembly to the fan /starter housing. Then separate the volute assembly from the fan / starter housing. On Group 2 Units If the muffler grommet has come out of the volute housing with the muffler pipe, pull it off the muffler and push it back into the housing.

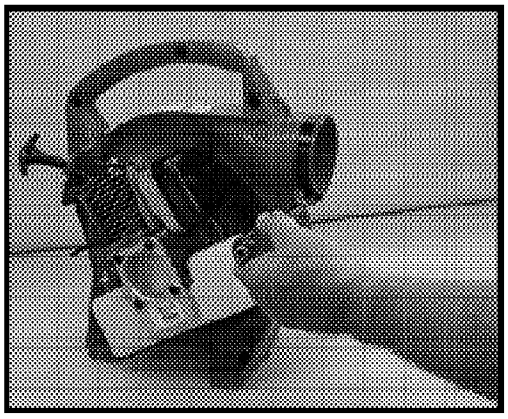


FIGURE 44

For Group 1 Units, remove the tubing clamp from the volute housing

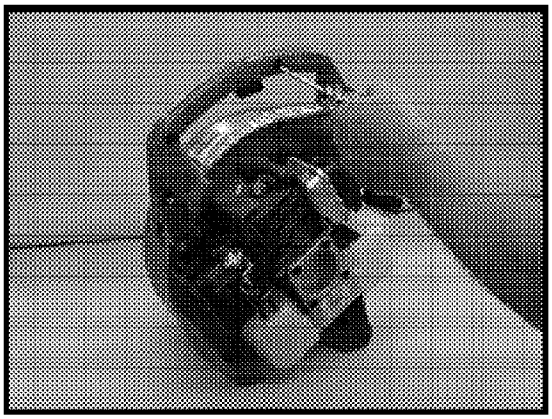


FIGURE 45

For Group 1 Units, remove the 6 SCREW- (10-24 X 3/4") Thread Forming screws and the 1 (#10 X 1 5/8") Thread forming screw securing the volute to the starter housing.

VOLUTE AND FAN

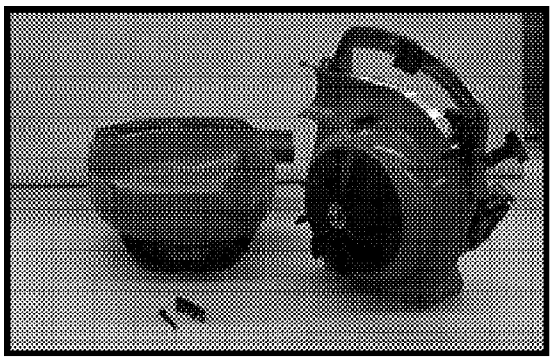


Figure 46

Then separate the volute from the starter housing.

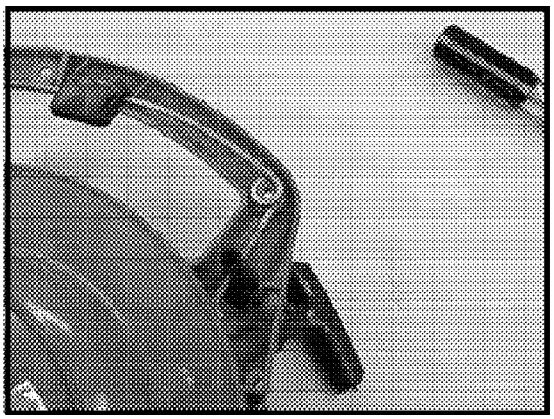


Figure 47

On Group 1 Units, the throttle lever, throttle trigger, trigger latch and trigger latch spring may be lifted from the housing.

Remove the Fan Assembly

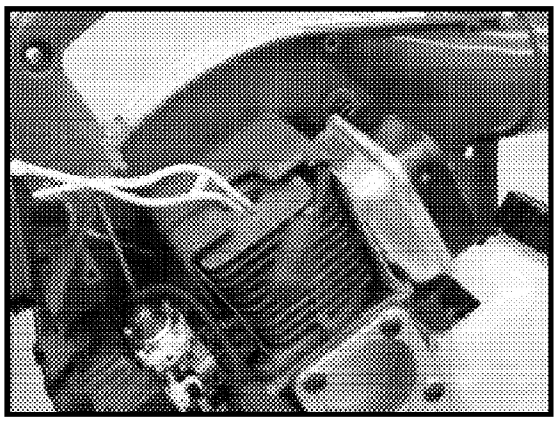


Figure 48

Move the piston to the bottom dead center position. Insert a looped length of starter rope into the cylinder to act as a piston stop.

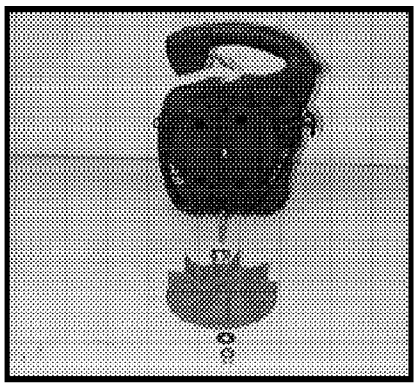


Figure 49

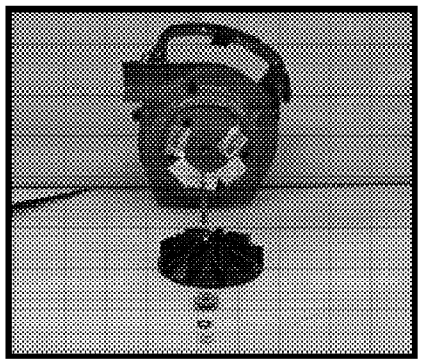


Figure 50

Use a 9/16 (14 mm) socket to remove the fan retaining nut, Belleville washer and flat washer.

The fan and fan adapter can now be removed from the crankshaft. After these parts are removed slide the spacer off the crankshaft so it will not be lost.

Assemble Fan to Crankshaft

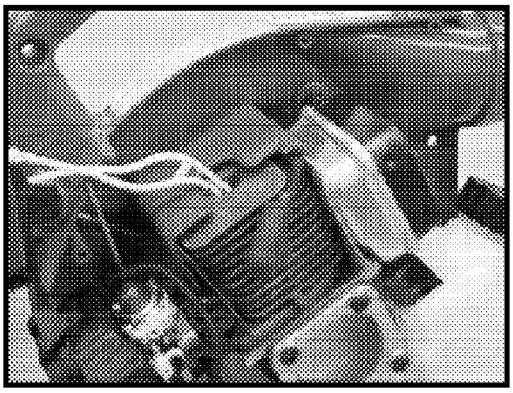


Figure 51

Move the piston to the bottom dead center position. Insert a looped length of starter rope into the cylinder to act as a piston stop.

VOLUTE AND FAN

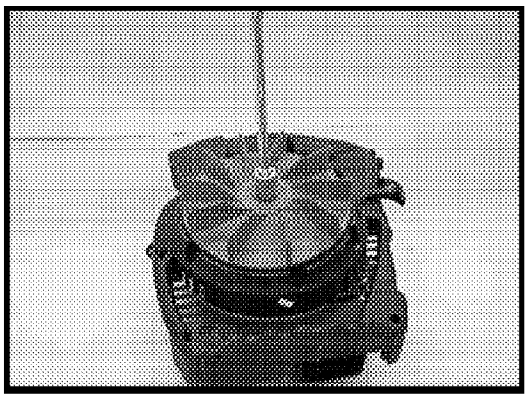


Figure 52

Press the fan adapter into the back of the fan and slide the fan on the crankshaft. Place the Large 3/8" flat washer and the Belleville washer onto the crankshaft. Thread the 3/8"-24 fan-retaining nut onto the crankshaft. Use a torque wrench to tighten the fan-retaining nut to 130 - 150 in. lbs. (14.7 - 16.9 Nm).

BLOWERS WITH ROUND FAN SHAFTS

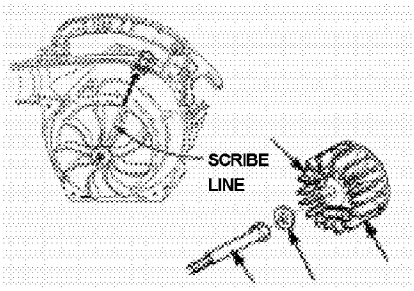


FIGURE 53

Certain older vintage blowers, equipped with fan adapter shafts that thread onto the crankshaft, require special procedures for fan assembly and alignment. These units can be identified as having a round shaft for mounting the fan instead of the D shaped shaft previously detailed.

These **SPECIAL PROCEDURES** are detailed as follows:

1. Remove starter rope from the spark plug hole. Position the piston at top-dead-center.
2. Assemble the fan with the molded scribe line on the fan, in line with the spark plug (see Figure 53)
3. Install the fan adapter and Belleville washer, with the concave side of the Belleville washer towards the fan.
4. Hold the fan, install the fan-retaining nut and torque the nut 150 - 200 in. lbs. (17.0 22.5 Nm.).
5. Recheck the fan alignment with the piston at top-dead-center. Adjust as necessary.

NOTE:

Do not use an impact wrench to tighten the fan-retaining nut.

WARNING:

The blower will vibrate excessively if fan is improperly installed.

Assemble Volute to Starter Housing

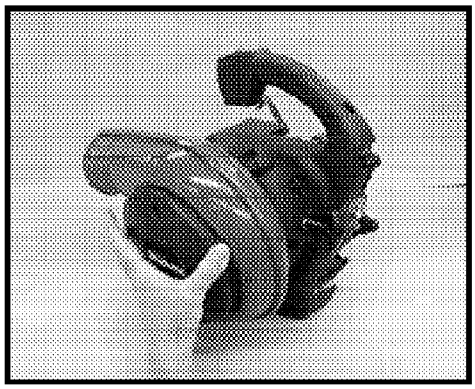


FIGURE 54

On Group 2 Units, push the volute in place until it presses against the starter housing.

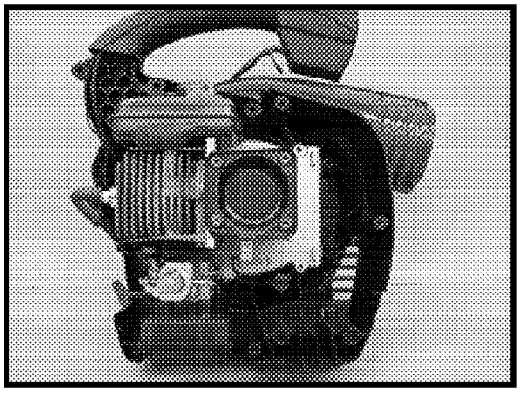


Figure 55

Insert the five #10-14 x 7/8" Torx head screws through the housing and into the volute.

Use a torque wrench to tighten the screws to 35 - 45 in. lbs. (4.0 -5.0 Nm.).

VOLUTE AND FAN

Caution: Group 1 Units - Use care when assembling the throttle lever and the throttle latch assembly. Take note of proper assembly of these components to assure proper installation. Verify their proper operation. If improperly assembled, the trigger latch will malfunction. By allowing the throttle to close completely and stop the engine, when the latch is pushed straight in; the trigger latch also acts as the stop switch for the unit.

Test the assembly by rotating the latch clockwise. This should move the throttle lever in the same direction as it normally moves when the trigger is depressed.

Next, use your finger to depress the trigger. The latch should then release and allow the throttle lever to return to the idle position.

Pushing straight in on the trigger latch should allow the lever to move, even further, toward the closed-throttle position.

These checks will verify proper assembly of these components.

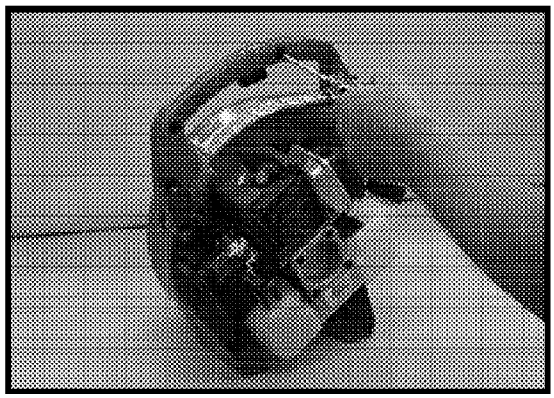


Figure 56

For Group 1 Units, Place the volute housing back onto the starter housing. Use care to assure that the throttle lever and the latch assembly has been properly installed and verify their proper operation, per the previous instructions. Install the 1 (#10 X 1 5/8") Thread forming screw. Use a torque wrench to tighten the screw to 20-30 In/Lbs.; 2.3-3.4 Nm. Install the 6 (10-24 X 3/4") Thread Forming screws. Use a torque wrench to tighten the screws to (20-30 In/Lbs.; 2.3-3.4 Nm).

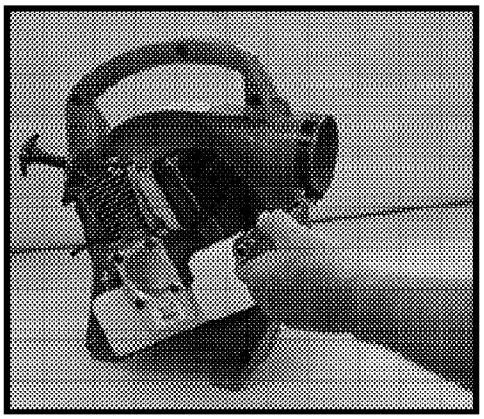


Figure 57

For Group 1 Units, install the tubing clamp on the volute housing.

Install the shroud and heat shield.

Refer to Shroud and Heat Shield Section for information and instructions on the shroud and heat shield.

MUFFLER

MUFFLER REMOVAL, INSTALLATION AND SERVICE

Remove the shroud and heat shield

Refer to Shroud and Heat Shield Section for information on removal of the shroud and heat shield.

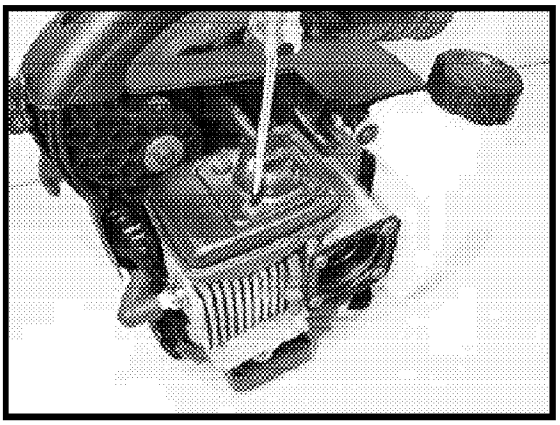


Figure 58

Group 2 Units: use a T-25 Torx bit to remove the two 10-24 x 2 1/8 screws and #10 flat washers, retaining the muffler to the cylinder. Then, use a T-20 Torx bit to remove the two (8-32 x 3/8") screws and the muffler cap. The spark arrestor screen can be re-placed or serviced at this time. The muffler consists of the following parts: cap, gasket, spark arrestor, and body.

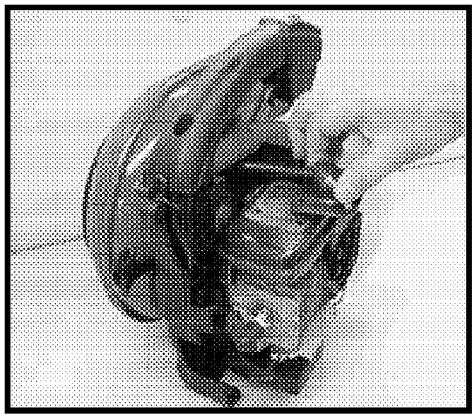


Figure 59

Group 2 Units: To remove the muffler: partially lift the muffler cap off the muffler body and slide the muffler discharge tube and muffler cap out of the muffler grommet in the volute assembly. Lift the muffler and muffler gasket off the cylinder.

SERVICE NOTE: Group 2 Units: The spark screen assembly must be placed on the muffler body with the gasket side of the spark screen facing down. Replace the spark screen if the gasket is damaged or old. A leaking gasket may cause heat damage to the surrounding housings or may produce vapor lock symptoms.

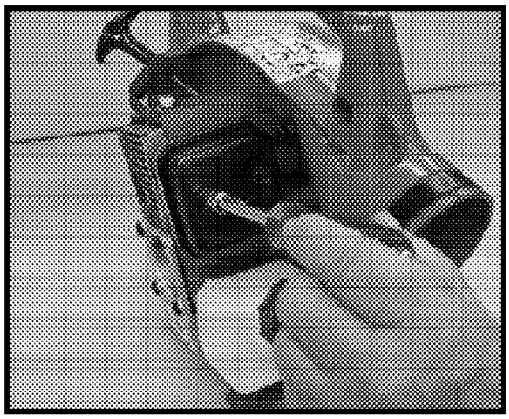


Figure 60

Group 1 Units: Remove the muffler by using a 5/16" nut driver to remove the 2 (10-24 x 2 1/2") Sems Hex Head screws.

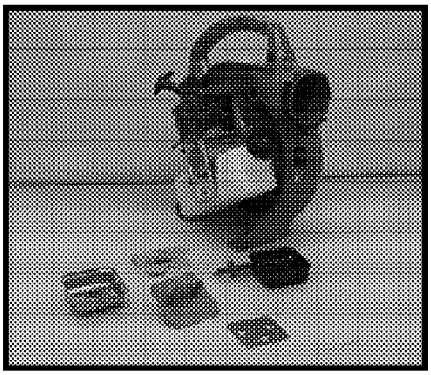


Figure 61

On Group 1 Units, the muffler consists of the cover, spark arrestor screen, deflector, 3 spacers, body, and gasket.

SERVICE NOTE: For All Groups: inspect the spark arrestor screen for carbon build-up. A carbon filled screen will cause hard starting, low power, poor high-speed operation or no high-speed operation at all. Replace the screen if it is clogged with carbon.

Do not operate the blower without a spark arrestor screen installed.

MUFFLER

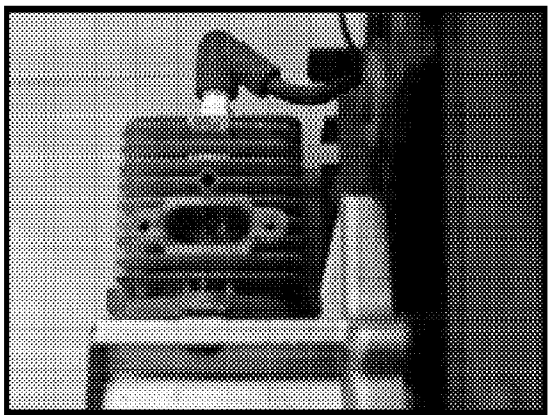


Figure 62

Examine the cylinder exhaust port, piston, and piston ring for carbon build up. If the exhaust port is clogged, rotate the piston until it fully covers the exhaust port. Carefully remove the carbon with a plastic or wooden scraper. Do not scratch the piston or damage the edges of the exhaust port.

The compression relief hole, on units so equipped, should be cleaned periodically with a three sixty-fourths inch or, Number 56, twist drill. Move the piston to the bottom dead center position. Insert the twist drill into the compression relief hole and turn the drill, by hand, to clean the hole

Use compressed air to blow the carbon particles out of the cylinder.

Muffler Assembly to Cylinder

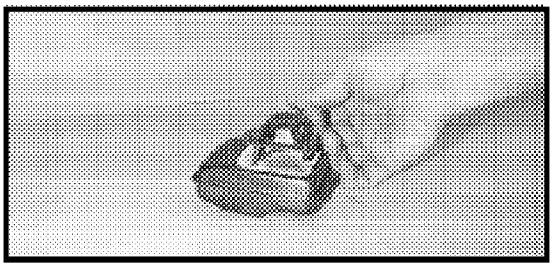


Figure 63

Group 2 Units: Place the spark arrestor screen and gasket assembly on the muffler. The side of the spark arrestor screen with the gasket must go towards the muffler body.

Install the muffler cap and 2 (8-32 x 3/8") Torx screws. Use a T-25 Torx bit or screwdriver to tighten the two screws hand tight.

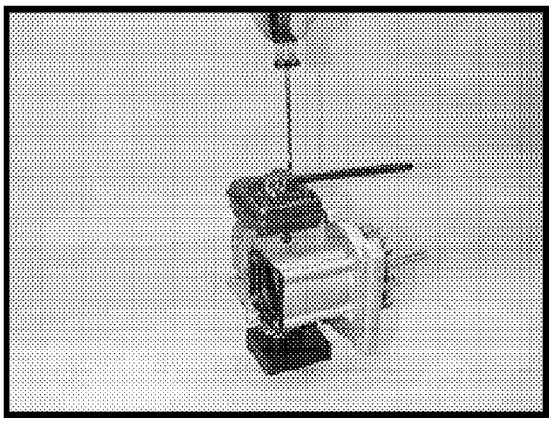


Figure 64

Note: Illustrations here show the short block removed from the housings. Depending on the components being serviced, it may not be necessary to completely remove the short block from the housings to service the muffler. Place the muffler gasket on the cylinder with the round hole in the gasket lined up with the compression relief hole in the cylinder.

Group 2 Units: Assemble the muffler, two (10-24 x 2 1/8") Torx head screws and flat washers to the muffler. Use a Torque wrench to tighten the two screws to 50 - 60 in. lbs. (5.6 - 6.8 Nm).

Group 1 Units: Assemble the muffler cover, deflector, spacers, spark-arrestor screen, two (10-24 x 2 1/2") Sems head screws and gasket. Mount the muffler to the cylinder. Use a Torque wrench to tighten the two screws to 40 50 in. lbs. (5.6 - 6.8 Nm).

ROTOR AND MODULE REMOVAL, INSTALLATION AND INSPECTION

Remove the shroud and heat shield
Refer to Shroud and Heat Shield Section for information on removal and installation of the shroud and heat shield.

Remove the volute
Refer to Volute and Fan Section for information on removal of the volute assembly.

Remove the fan assembly
Refer to Volute and Fan Section for information on removal of the fan.

Remove the starter
Refer to Starter Section for information on removal of the starter assembly.

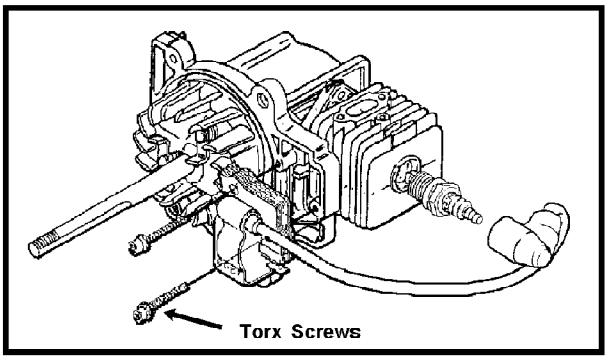


Figure 65

The module can be removed by using a T-25 Torx bit to loosen the two 8-32 x 1" mounting screws. Lift the module off the crankcase. On Group 2 Units and backpack models, The stop switch lead on the module may be removed at this time.

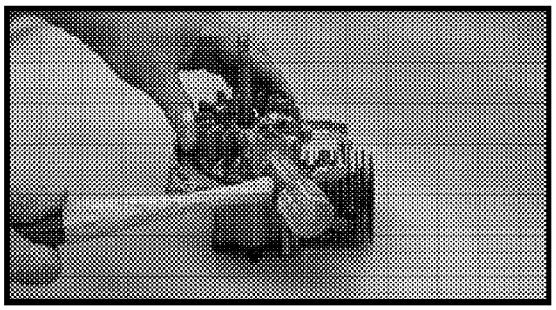


Figure 66

To remove the rotor, hold the rotor with one hand and strike the non-magnetized side of the rotor with a plastic, dead weight or rawhide mallet. This will free the rotor from the crankshaft taper.
Inspect the Rotor: The rotor contains a ceramic magnet, which under normal operating conditions should not require any maintenance except for occasional cleaning. The rotor may affect the operation of the ignition system if the woodruff key has been sheared, the rotor-to-module air gap is too wide, or if permanent magnetism has been reduced or removed. The later could result from striking the rotor magnets with a mallet.
A sheared rotor key will allow the spark plug to fire properly, even under compression, however, the unit will not start. If this condition exists, pull the rotor and check the key and keyway area of the rotor.
Test the rotor magnets by placing a large socket on the rotor magnets. Shake the rotor. The magnets should hold onto the socket unless the magnetic field strength is weak.
Missing fins or damage to the rotor is not acceptable. Always replace the rotor if rotor fins are missing or if there is visible damage to the rotor. The starter pawls on the rotor are not replaceable. If the starter pawls are damaged, the rotor should be replaced.
CAUTION!
Operating the unit with a damaged rotor could result in a rotor explosion and possible injury.

Rotor to module air gap must be correct if the ignition system is to work properly. If the air gap is too wide, the voltage output will be too low causing no output under compression, loss of spark after a short period of time, or, repeated changing of the spark plug. If the air gap is set too close, the rotor and module will suffer mechanical damage. The ignition module air gap should be set to .008 (.02mm) to .012 (.03mm.).

Ignition Module, Rotor and Spark Plug Assembly

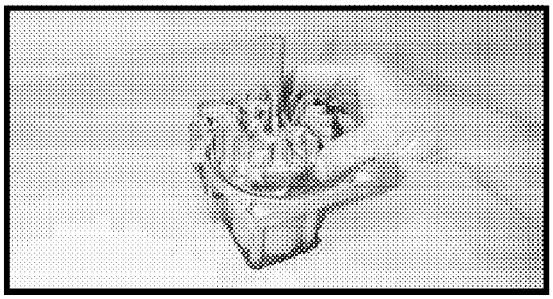


Figure 67

Install the Rotor on the Crankshaft
The rotor has a blind key-way. A mark on the face of the rotor corresponds to the key-way. Carefully align the mark with the woodruff key when installing the rotor on the crankshaft.

ROTOR AND MODULE

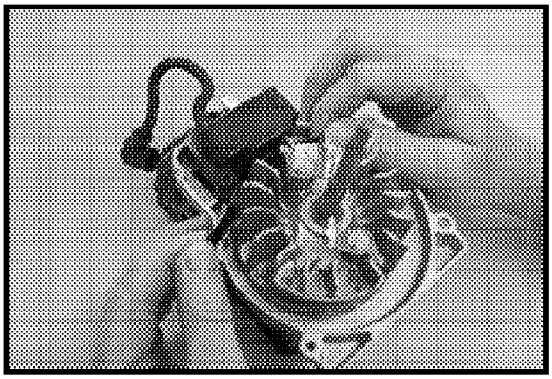


Figure 68

Install the ignition module and adjust the air gap
To install the module: Mount the module on the two module-mounting bosses on the cylinder. Insert the two 8-32 x 1" pan head Torx screws. Place a shim, P/N PS24306, between the rotor and module. Rotate the rotor until the magnets are parallel with the module core legs. The module will draw tight against the rotor. Tighten the module mounting screws to 30 - 40 in. lbs.(3.4 - 4.5 Nm). Rotate the rotor and remove the shim.

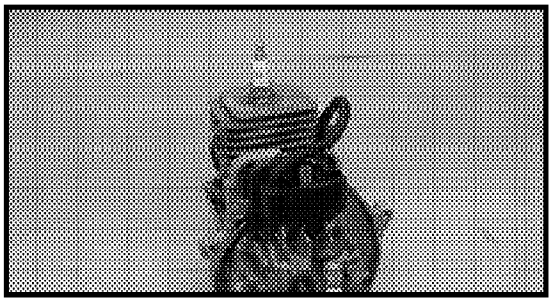


Figure 69

Install the spark plug
Thread the spark plug into the cylinder. Use a torque wrench to tighten the spark plug to 120 - 180 in. lbs. (13.6 - 20.3 Nm.).

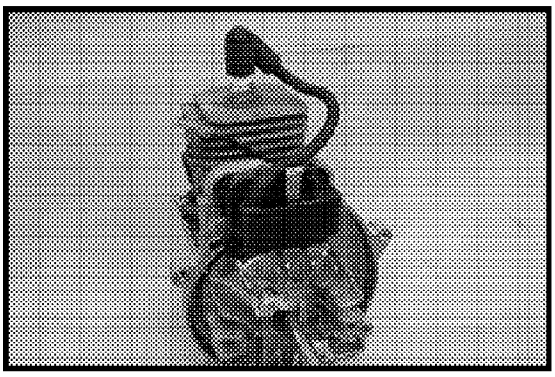


Figure 70

Route the ignition lead
On Group 2 Units and on Backpack units, the ignition lead must now be routed as shown in Figure 70 above. Push the spade terminal on the grounding tab then route the lead under the high tension lead, behind the module core and through the opening in the crankcase.

HANDLE DISASSEMBLY

Remove the shroud and heat shield
Refer to Shroud and Heat Shield Section for shroud and heat shield removal instructions.

Disconnect the wiring harness and throttle cable

Refer to Air Filter, Carburetor and Heat Dam Section for instructions on disconnecting the throttle cable and ignition leads.

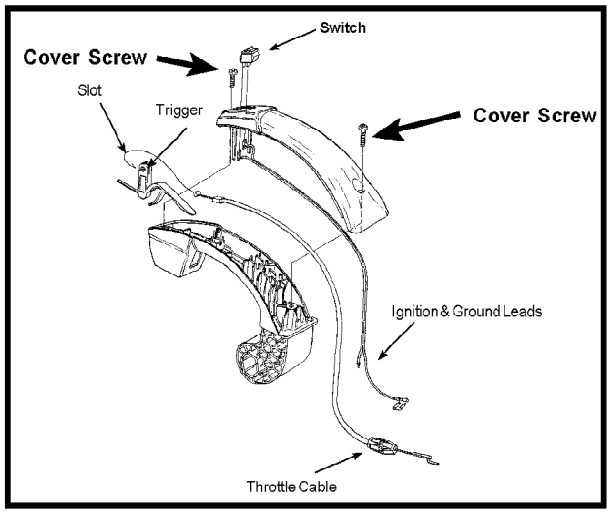


Figure 71

Use a T-25 Torx bit to remove the two 8-16 x 5/8" screws from the cover. Once the cover is removed, the electrical leads or harness and the throttle cable are exposed. These two components are nested in the honeycombed part of the handle. Pull the harness and throttle cable out of the handle. Pull up on the throttle cable so the trigger and throttle cable end will come free from the handle. Rotate the end of the throttle cable until the cable is aligned with the slot in the trigger. The cable can now be disconnected from the trigger.

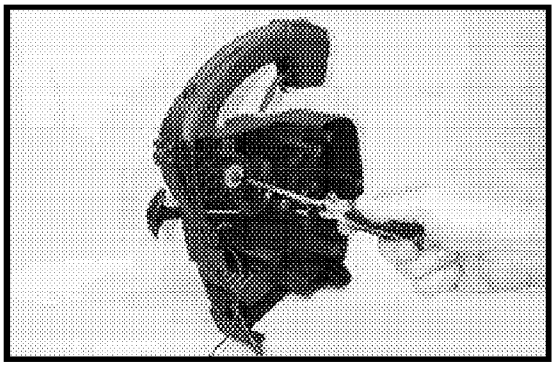


Figure 72

Use a T-25 Torx bit to remove the 10-14 x 3/4" Torx screw and flat washer retaining the handle. If the starter housing is still attached to the engine, it will be necessary to remove the muffler. Refer to Muffler Section for instructions on muffler removal. Remove the handle from the starter assembly.

Assemble Handle to Starter

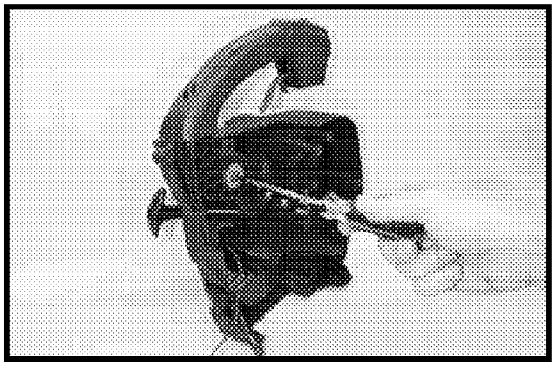


Figure 73

Slide the handle assembly into the slot in the starter housing. Place the large #10 flat washer on the #10-14 x 7/8" Torx screw and thread the screw into the housing. Use a torque wrench to tighten the screw to 30 - 45 in. lbs. (3.4 - 5.1 Nm). If the starter housing is still attached to the engine, reinstall the muffler. Refer to Muffler Section for instructions on muffler installation.

SERVICE NOTE

Take care to route the electrical wiring and throttle cable in front of the handle assembly before insertion into the housing.

Handle Disassembly: Group 1 Units

Group 1 Units: Refer to Volute and Fan Section for instruction on removal of the volute. The handle is part of the volute and starter housings and not a separate component. Volute and Fan Section includes information on servicing the throttle lever and other internal handle components on Group 1 Units.

STARTER REPAIR

Remove the shroud and heat shield

Refer to Shroud and Heat Shield Section for instruction on removal of the shroud

Remove the fuel tank

Refer to Fuel Tank Section for instructions on fuel tank removal

Remove the volute

Refer to Volute and Fan Section for instructions on removal of the Volute Assembly

Remove the fan assembly

Refer to Volute and Fan Section for instructions on removal of the Fan Assembly

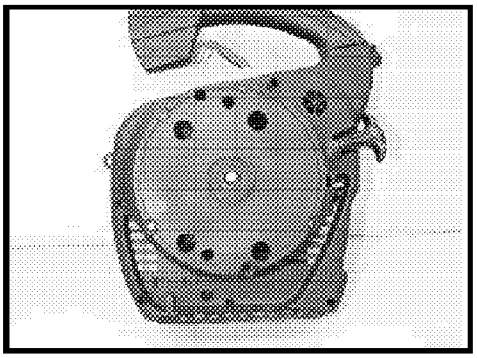


Figure 74

For Group 2 Units Use a T-25 Torx bit to remove the four 10-24 x 3/4" engine mounting screws. Once this is done pull the engine from the starter housing. Remove the flat washer from the crankshaft.

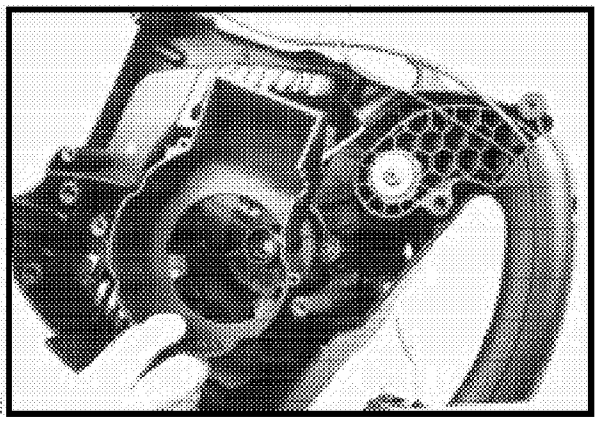


Figure 75

On Group 2 Units, the scroll fits into the starter housing as a slip fit on the two posts, which are molded into the housing. During disassembly, the scroll may come out with the starter housing or it may stay with the engine assembly.

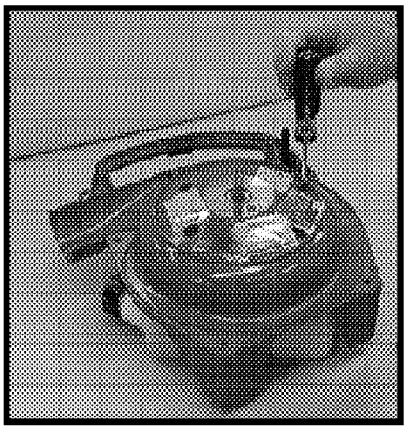


Figure 76

For Group 1 Units, use a T-25 Torx bit or screwdriver to remove the 4 (10-24 x 3/4") screws securing the starter to the engine.

CAUTION

Eye protection should be worn when removing the pulley from the starter housing. The spring coils remain under tension within the container and can fly out with great force if disturbed. Be careful not to dislodge or pull up the starter spring coils. The spring could fly out of the container suddenly and violently. If it does fly out, it can inflict injuries. Do not let starter springs lie about where they can be handled by unwary persons. Do not remove the replacement spring from its retainer. Before discarding the old spring, remove it one coil at a time from the retainer.

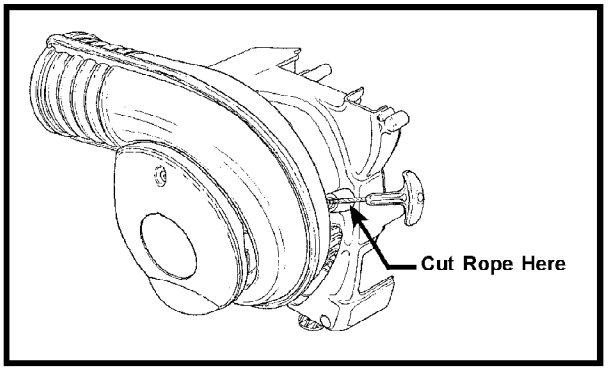


Figure 77

Relieve the spring tension

If the rope is to be replaced cut the rope just below the grip. This will relieve spring tension.

STARTER

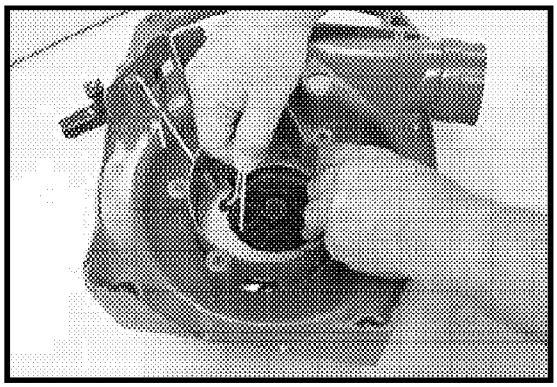


Figure 78

If the rope is not to be replaced, pull approximately 10" (25 cm) of rope out of the starter housing until the notch in the pulley flange is aligned with the rope exit hole. Place your thumb on the pulley flange to keep the pulley from turning.

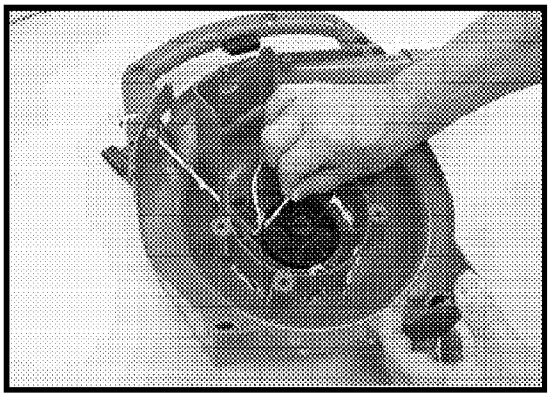


Figure 79

Apply pressure on the rope in the notch while SLOWLY unwinding the pulley until all of the spring tension is relieved.

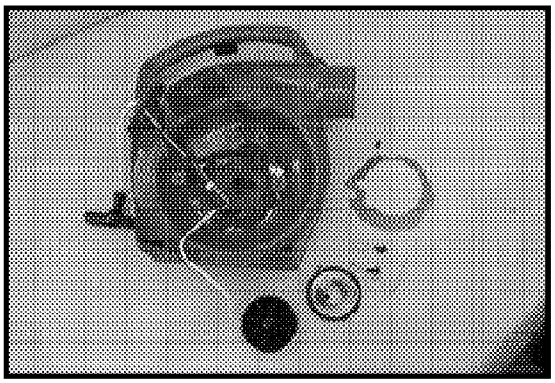


Figure 80

Remove and inspect the starter components

Remove the two #10-14 x 1/2" screws and retainers holding the pulley in place. Gently, rotate the pulley back and forth to free it from the spring hook. If resistance is felt when lifting the pulley off the spring, carefully lift up the pulley just far enough to expose the spring hook. Then use a flat blade screwdriver to push the spring hook off the pulley.

SERVICE NOTE

If the spring jumps out of the container, it can be rewound within the container With the spring coils facing up, wind the spring in a counter-clockwise direction.

Replace the rope if it is frayed or too short. The proper rope length is 46" or 117 cm. On Group 1 Units. The proper rope length is 42" or 107 cm. on Group 2 Units.

Replace the spring and container if the spring is bent or broken.

If the inner spring hook will not engage the pulley, carefully reshape the spring hook by bending it with needle nose pliers until it, once again, engages the pulley.

STARTER

Starter Assembly

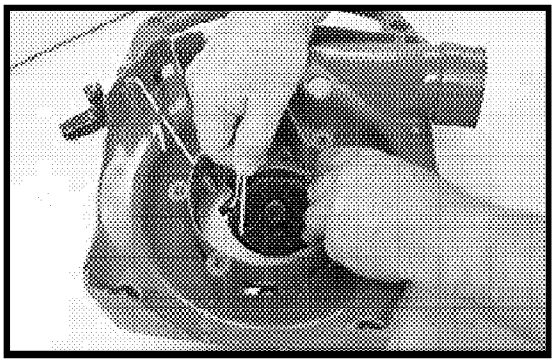


Figure 81

Install the Pulley and Rope

With the ratchet side of the pulley facing up, wind all but 10" (25 cm) of rope on the pulley in a clock-wise direction before placing the pulley in the starter housing. If the rope is being replaced, pass the rope through the eyelet in the starter housing. Slide the grip to the end of the rope.

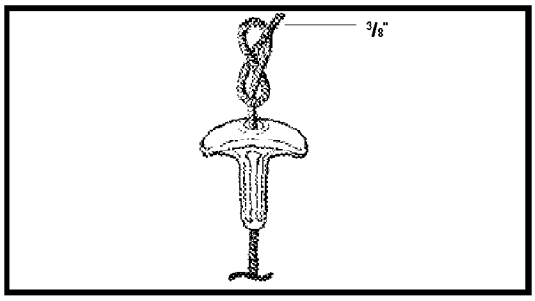


Figure 82

Once the rope is through the grip, tie a figure eight knot (as shown above) leaving approximately 3/8" above the knot after the knot has been set or pulled tight. Curl the pigtail, or length of rope above the knot, around the knot. Pull the knot into the grip.

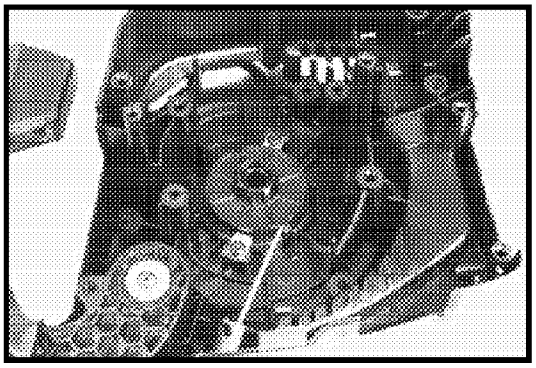


Figure 83

Lightly grease the starter housing pulley post with multi-purpose grease prior to assembly. Place the pulley in the housing. Press down on the pulley while turning the pulley back and forth to engage the recoil spring hook.

Add pre-winds to the starter spring

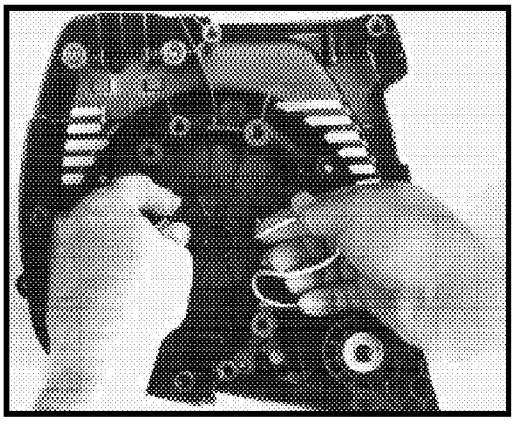


Figure 84

Reinstall the flat retainers and Torx screws. For proper recoil operation, two pre-winds on the rewind spring are required. Pull 10" (25 cm) of slack rope back into the housing to form a loop. Put the loop in the pulley notch, as shown. Wind the pulley, in a clockwise direction, two complete revolutions. Use your thumb to hold the pulley from rewinding. Use the grip to pull the loop back out of the starter housing. When the grip is released all the rope should rewind back into the starter housing.

Test the rewind spring tension

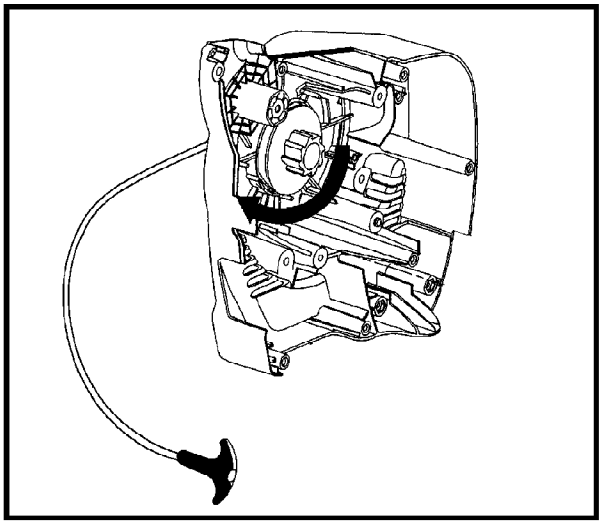


Figure 85

Proper spring coil tension must now be tested.

With the starter fully assembled, pull the starter rope as far as possible out of the housing.

Hold the pulley from turning and recoiling with your thumb while switching your other hand from the starter grip to the rope, as close to the rope eyelet as possible.

Continue to hold the rope fully extended, grasp the pulley and turn it clockwise.

If the pulley will not rotate, the spring is bottoming out. Release one pre-wind and repeat this check.

If the spring does not bottom out and you can turn the pulley more than one turn, the spring is not tight enough. Add one turn clockwise, then, repeat the check.

This check of recoil spring tension will assure that the repairs that you make to the starter will be lasting ones. It will maximize the life of the rope, spring and other components.

Special Starter Repair Instructions, For Group 1 Units, Equipped With Outboard Starters.

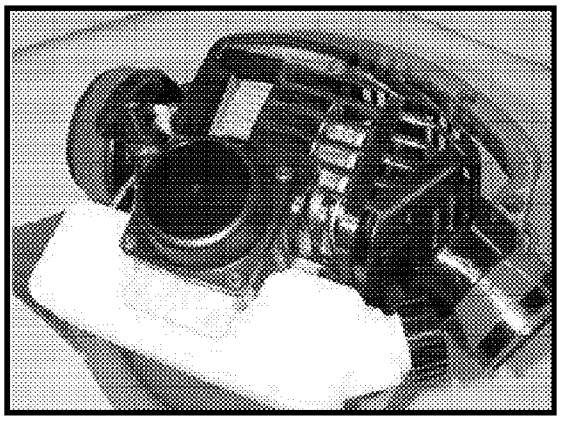


Figure 86

Certain Group 1 Units are equipped with outboard starters.

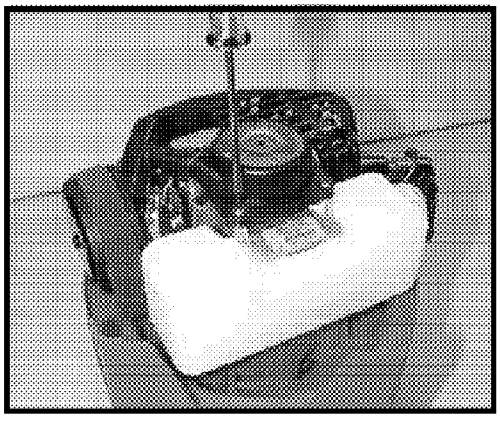


Figure 87

Remove the Starter Assembly from the crankcase Use a T-25 Torx bit to remove the 4 (10-24 x 3/4") starter retaining screws.

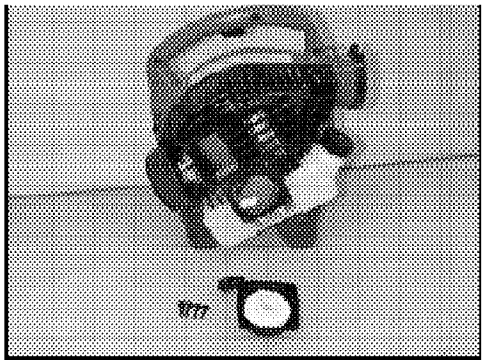


Figure 88

Lift the starter assembly from the crankcase.

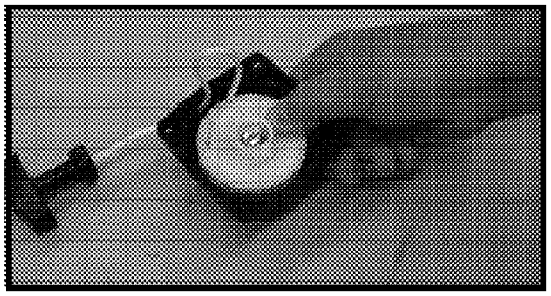


Figure 89

Relieve the spring tension

If the rope is to be replaced cut the rope just below the grip. This will relieve spring tension.

If the rope is not to be replaced, pull approximately 10" (25 cm) of rope out of the starter housing until the notch in the pulley flange is aligned with the rope exit hole. Place your thumb on the pulley flange to keep the pulley from turning. Apply pressure on the rope in the notch while SLOWLY unwinding the pulley until all of the spring tension is relieved.

STARTER

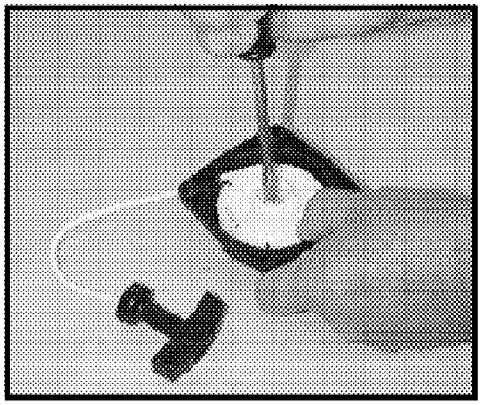


Figure 90

Remove and inspect the components

Remove the set-screw and washer holding the pulley in place.

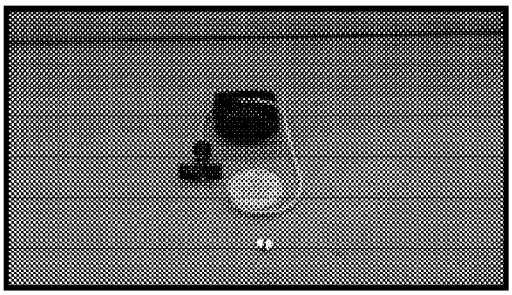


Figure 91

Gently, rotate the pulley back and forth to free it from the spring hook. If resistance is felt when lifting the pulley off the spring, carefully lift up the pulley just far enough to expose the spring hook. Then use a flat blade screwdriver to push the spring hook off the pulley.

SERVICE NOTE

If the spring jumps out of the container, it can be rewound within the container. With the spring coils facing up, wind the spring in a clockwise direction.

Replace the rope if it is frayed or too short.

Replace the spring and container if the spring is bent or broken.

If the inner spring hook will not engage the pulley, carefully reshape the spring hook by bending it with needle nose pliers until it, once again, engages the pulley.

Starter Assembly for Outboard Starter Equipped Units

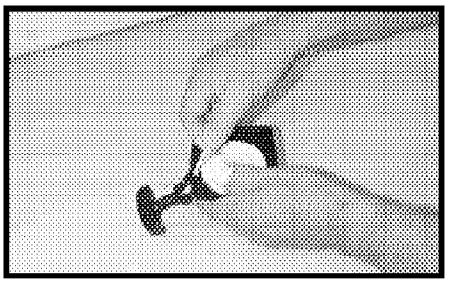


Figure 92

Install the pulley and rope assembly

With the ratchet side of the pulley facing up, wind all but 10" (25 cm) of rope on the pulley in a counterclockwise direction before placing the pulley in the starter housing. If the rope has been cut or replaced, pass the rope through the eyelet in the starter housing. Slide the grip to the end of the rope.

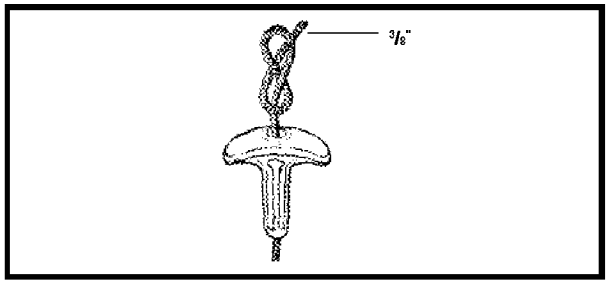


Figure 93

Once the rope is through the grip, tie a figure eight knot (as shown above) leaving approximately 3/8" above the knot after the knot has been set or pulled tight. Curl the pigtail, or length of rope above the knot, around the knot. Pull the knot into the grip.

Lightly grease the starter housing pulley post with multi-purpose grease prior to assembly. Place the pulley in the housing. Press down on the pulley while turning the pulley back and forth to engage the recoil spring hook.

Add Pre-winds

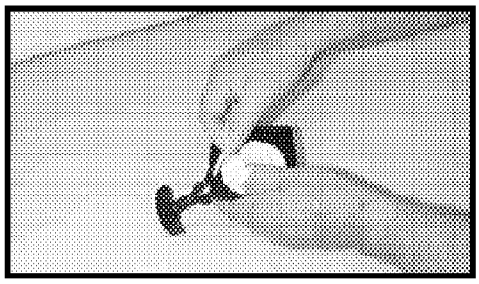


Figure 94

Reinstall the pulley retaining set-screw and washer. For proper recoil operation, two pre-winds on the rewind spring are required. Pull 10" (25 cm) of slack rope back into the housing to form a loop. Put the loop in the pulley notch, as shown. Wind the pulley, in a counterclockwise direction, two complete revolutions. Use your thumb to hold the pulley from rewinding. Use the grip to pull the loop back out of the starter housing. When the grip is released all the rope should rewind back into the starter housing.

Test the rewind spring tension

Proper spring coil tension must now be tested.

With the starter fully assembled, pull the starter rope as far as possible out of the housing.

Hold the pulley from turning and recoiling with your thumb while switching your other hand from the starter grip to the rope, as close to the rope eyelet as possible.

Continue to hold the rope fully extended, grasp the pulley and turn it counterclockwise.

If the pulley will not rotate, the spring is bottoming out. Release one pre-wind, then, repeat this check.

If the spring does not bottom out and you can turn the pulley more than one turn, the spring is not tight enough. Add one turn counterclockwise, then repeat the check.

This check of recoil spring tension will assure that the repairs that you make to the starter will be lasting ones. It will maximize the life of the rope, spring and other components.

Repairs to the Starter Cup and Shaft Assembly - Outboard Starter Equipped Units

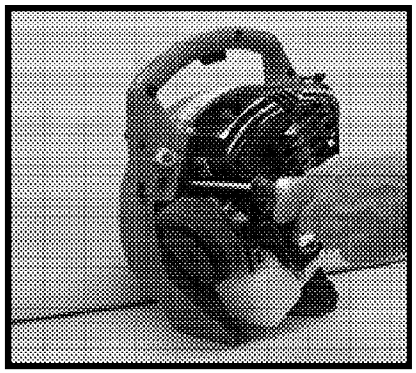


Figure 95

Remove the shroud

Refer to Shroud and Heat Shield Section for instructions on removing the shroud.

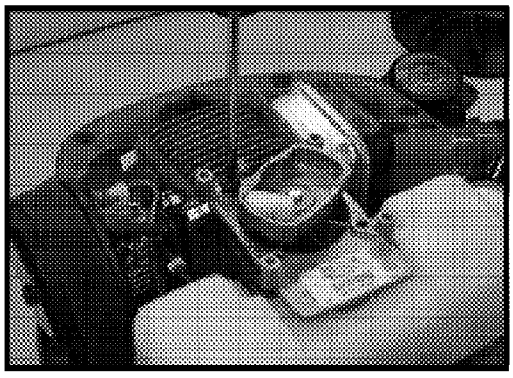


Figure 96

Remove the crankcase cover

Use a T-25 Torx bit or screwdriver to remove the 4 (10-24 x 3/4") screws retaining the starter cup and shaft assembly to the crankcase.

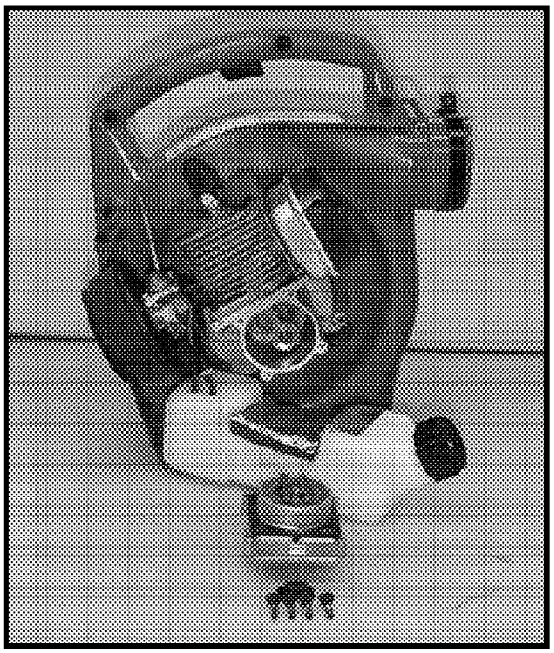


Figure 97

Carefully remove the crankcase cover, shaft and cup assembly from the crankcase.

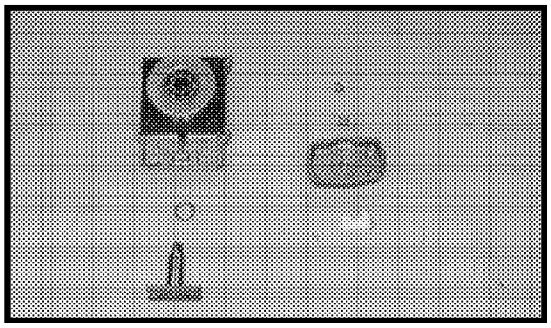


Figure 98

Inspect the components

On outboard starter equipped units, the components of the crankcase cover assembly may be serviced individually or as a complete assembly.

Service Notes: Upon reassembling the cover to the crankcase, take care to properly align the yoke of the starter shaft with the crank-pin.

Always install a new crankcase cover gasket when reassembling the crankcase cover assembly to the crankcase.

Tighten the crankcase cover retaining screws to the proper torque specs of 40-50 In/Lbs., 4.5-5.6 Nm.

REMOVAL OF BACKPACK FRAME (BACK-PACK UNITS)

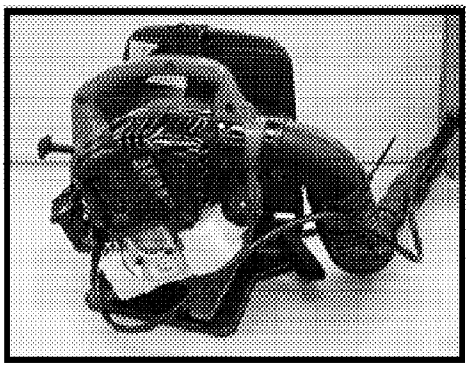


Figure 99

On backpack blowers, the backpack frame must be removed in order to facilitate repairs to the starter, volute housings, fan and internal engine components.

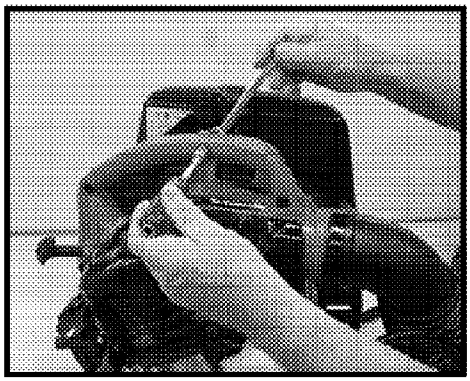


Figure 100

Remove the upper isolator screw
Use a 3/8" combination wrench and a 3/8" nut-driver or socket wrench to remove the (1/4-20 x 1 1/4") screw, nut and washer at the top of the frame.

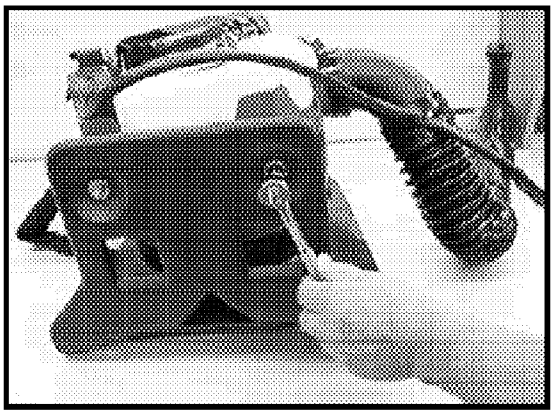


Figure 101

Remove the lower isolator screws
Use a 7/16" socket to remove the 2 1/4" hex nuts and flat washers at the lower vibration isolators.

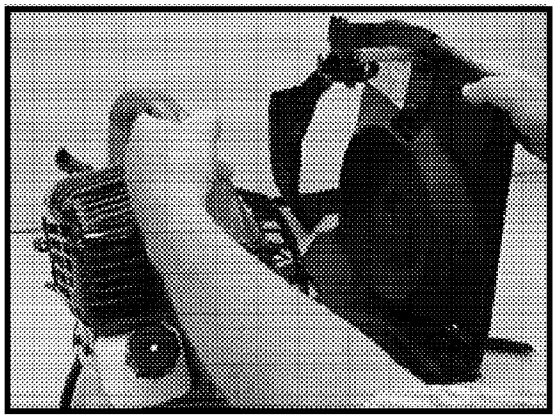


Figure 102

Separate the upper isolator from the housing
Carefully push the power head free from the backpack frame.

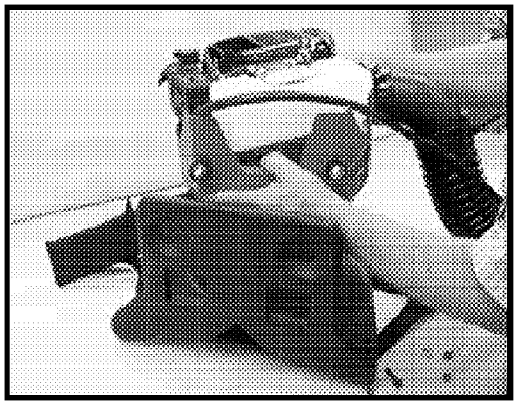


Figure 103

Separate the lower isolators from the backpack frame
Lift the power head to free the studs of the lower isolators from the backpack frame.

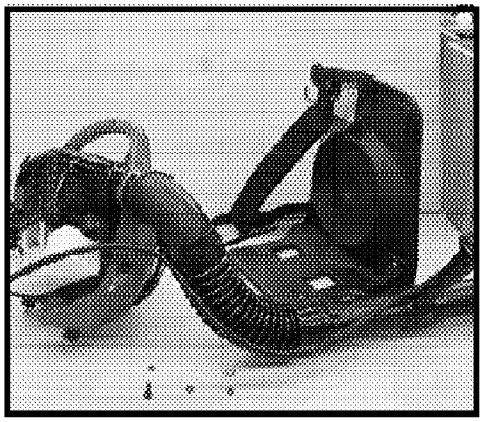


Figure 104

Disconnect the throttle cable and wiring harness

Assembling the Power Head to the Backpack Frame
Carefully insert the studs of the lower isolators back through the holes in the lower portion of the backpack frame. Install the 2 (1/4") hex nuts and flat washers at the lower vibration isolators. Use a torque wrench to tighten the nuts to 40-50 In/Lbs., 4.5-5.6 Nm.
Reconnect the throttle cable and wiring harness.

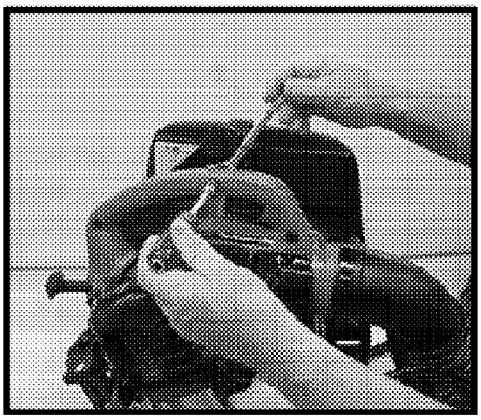


Figure 105

Install the upper isolator screw, nut and washer
Use a 3/8" combination wrench and a 3/8" nut-driver or socket wrench to install and hand tighten the (1/4-20 x 1 1/4") screw, nut and washer at the top of the frame. Use a torque wrench to tighten the nut to 40-50 In/Lbs., 4.5-5.6 Nm.

INTERNAL ENGINE DISASSEMBLY, SERVICING AND RE-ASSEMBLY

Remove the Shroud
Refer to Shroud and Heat Shield Section for instructions on removal of the shroud and heat shield.

Remove the fuel tank
Refer to Fuel Tank Section for fuel tank removal instructions.

Remove the volute housing
Refer to Volute and Fan Section for volute housing removal instructions.

Remove the fan assembly
Refer to Volute and Fan Section for fan removal instructions.

Disconnect the throttle cable and wiring harness (Group 2 Units)
Refer to Air Filter, Carburetor and Heat Dam Section for instructions on disconnecting the throttle cable and wiring harness.

Remove the starter assembly
Refer to Starter Section for starter removal instructions. Pull the engine from the starter housing.

Remove the muffler
Refer to Muffler Section for instructions on muffler removal

Remove the air filter assembly, carburetor and heat dam
Remove Carburetor and Air Filter Refer to Air Filter, Carburetor and Heat Dam Section for instructions on air filter and carburetor and heat dam removal.

Remove the module and rotor
Refer to Rotor and Module Section for instruction on module, rotor and spark plug removal.

Remove the Crankcase Cover

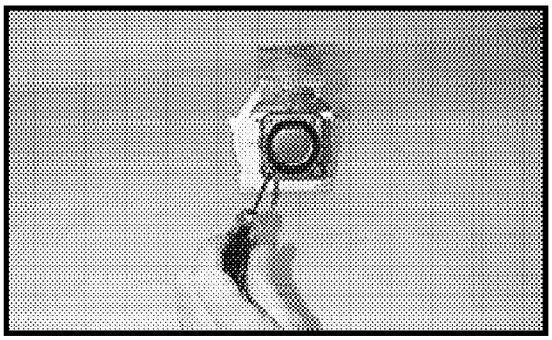


Figure 106

On Group 1 Units, the crankcase cover will already be removed as part of the fuel tank disassembly.
On Group 2 Units, use a T-25 Torx bit or screwdriver to remove the four (10-24 x 1/2") Torx screws securing the crankcase cover to the crankcase.

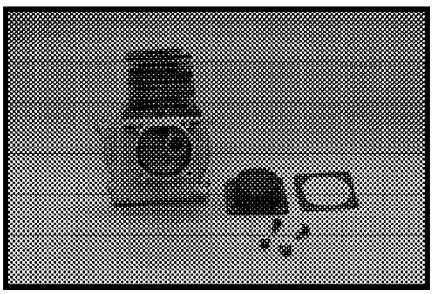


Figure 107

Lift off the crankcase cover and gasket.

Remove the Cylinder and Piston / Rod Assembly

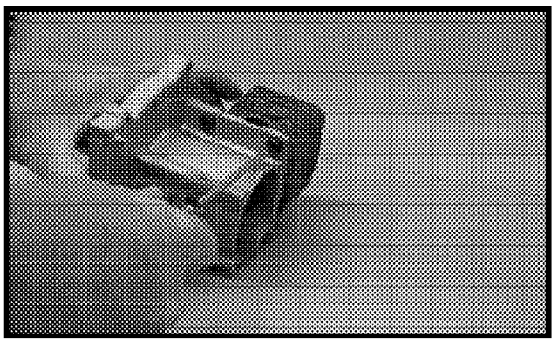


Figure 108

Use a T-27 Torx bit or screwdriver to remove the three 10-24 x 3/4" Torx screws holding the cylinder to the crankcase.

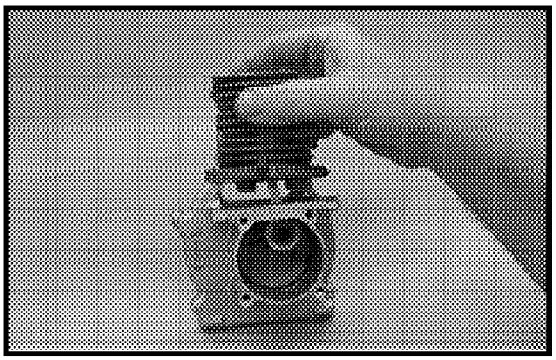


Figure 109

Lift the cylinder off the crankcase. It may be necessary to use a back and forth rocking motion to free the cylinder from the crankcase and gasket. Slowly, lift the cylinder just far enough to expose the connecting rod. Do not pull the cylinder off the piston at this time. Instead, grasp the connecting rod and push it off the crankshaft crank pin. Then, pull the cylinder and piston/rod assemblies free of the crankcase.

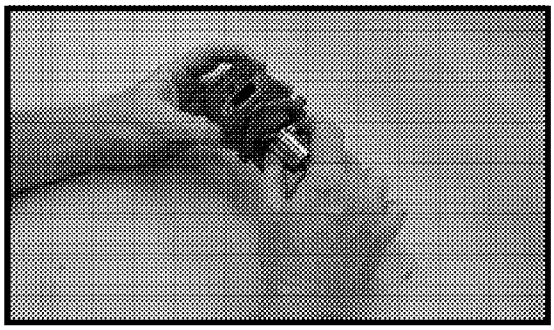


Figure 110

The piston and rod assembly may now be safely pulled out of the cylinder.

Remove the Piston Ring from Piston

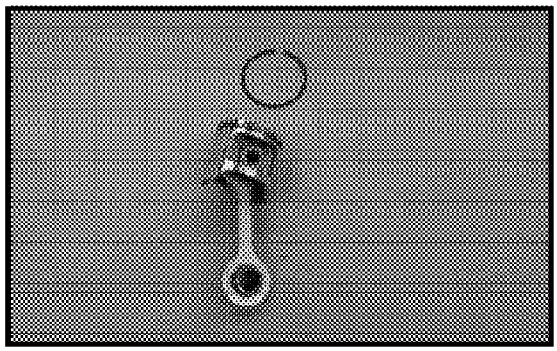


Figure 111

Place your thumbs at the back of the piston ring(s) opposite the piston ring opening or end gap. Use your two index fingers to pry the two ends of the piston ring just far enough to clear the piston.

Inspection of the internal engine components
Examine the piston ring groove in the piston for carbon build up.

Inspect the piston ring for thin spots or other signs of wear.

Carefully remove any carbon build-up from the piston and piston ring groove.

If the piston ring is to be reused, mark the piston ring end gap so that it can be replaced back in the piston in the same position as when first removed.

The piston and rod are supplied as an assembly only. Replace the entire assembly if problems exist with the rod bearings, connecting rod or piston.

De-glaze the piston with crocus cloth.

The cylinder must also be de-glazed if it is to be re-used.

A 50/50 mixture of kerosene and engine oil along with a silicon carbide, Christmas tree or ball type hone may be used to de-glaze the cylinder.

Spin the crankshaft slowly in order to check the main bearings.

Take note if roughness or binding is felt while rotating the crankshaft.

Inspect the connecting rod and crankshaft for signs of overheating such as bluing, discoloration or scoring.

Repairs to the crankshaft, main bearings or crankcase are accomplished by using a replacement short block.

ASSEMBLY

Assemble the Piston Ring to the Piston

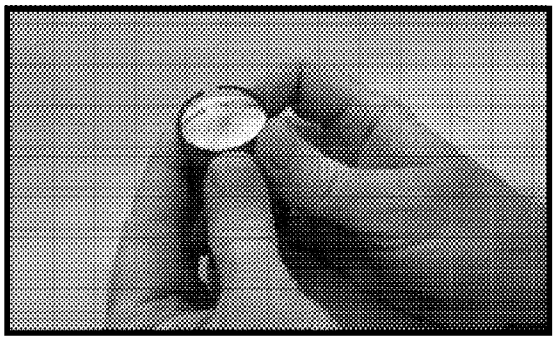


Figure 112

Lubricate the piston ring with Homelite 2-cycle engine oil prior to assembly. Place the piston ring on top of the piston. Gently pry apart the open end of the piston ring just far enough to start the closed end of the piston ring over the piston. Push the closed portion of the piston ring until it seats in the piston ring groove. Slide the open ends of the piston ring until they slip into place. Care must be taken so not to scratch the skirt of the piston with the edge of the piston ring.

Assembly of the Piston / Rod To Cylinder

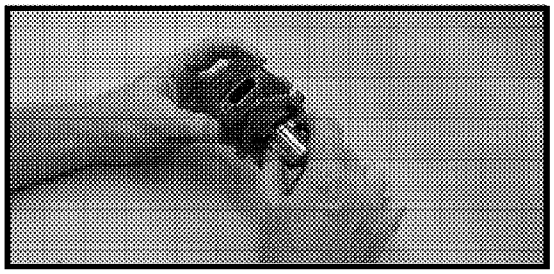


Figure 113

Lightly oil the piston with Homelite 2-Cycle engine oil. Put multi-purpose grease to the needles of the connecting rod s caged bearing. Apply engine oil to a clean rag and swab the inside diameter of the cylinder to clean and lubricate the cylinder bore. Compress the piston ring with your fingers and push the piston slowly into the cylinder. It may be necessary to rock the piston back and forth gently to start it into the cylinder bore.

Assemble Cylinder to Crankcase

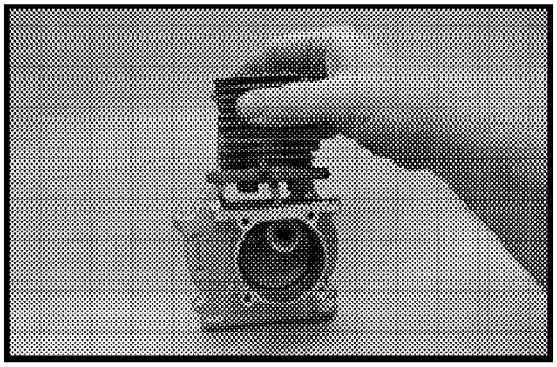


Figure 114

Make sure the crankcase is clean and free of debris and old oil. Place a new cylinder gasket on the crankcase. Be sure the gasket is installed properly so that the shape of the gasket matches the transfer ports and pulse holes. Pull the rod and piston assembly downward in the cylinder so the skirt of the piston is flush with the bottom of the cylinder. Rotate the crankshaft until the crank pin is in the top dead center position. Insert the rod, piston and cylinder assembly into the crankcase. Carefully engage the crank pin with the connecting rod and bearing. Once this is done, push the cylinder down over the piston and rod until it mates with the crankcase and gasket.

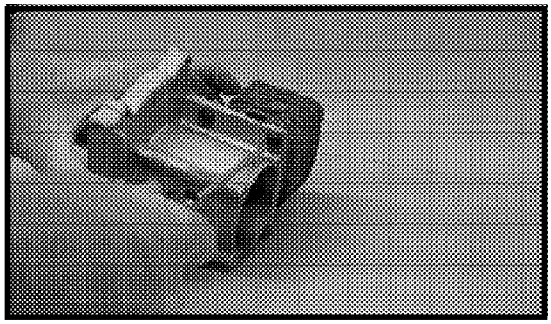


Figure 115

Apply thread-locking compound to the first few threads of each of the cylinder retaining screws. Thread the three 10-24 x 3/4" Torx screws from the bottom of the crankcase to the cylinder by hand.
Use a torque wrench to tighten these screws to 65 - 70 in. lbs. (7.3 - 7.9 Nm.).

Assemble the Crankcase Cover to the Crankcase

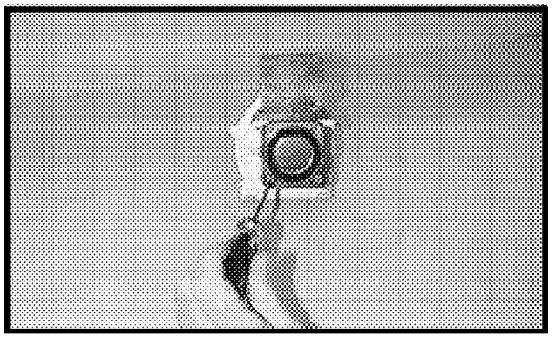


Figure 116

Group 2 Units: Place a new crankcase cover gasket on the crankcase. Insert the crankcase cover into the crankcase.
On Group 2 Units the grounding tab is part of the crankcase cover and should point in the direction of the intake or carburetor side of the cylinder.
Assemble the four 10-24 x 1/2" Torx screws by hand. Use a torque wrench to tighten the screws to 30 - 40 in. lbs. (3.4 - 4.5 Nm.).
Group 1 Units: The crankcase cover will not be installed at this time. Installation of the crankcase cover will take place when the fuel tank is installed.

Assemble the Engine to the Starter Assembly
Refer to Starter Section for information on installing the starter assembly to the engine.

Assemble the Fan to the Crankshaft
Refer to Volute and Fan Section for information on installation of the fan.

Assemble Volute to Starter Housing
Refer to Volute and Fan Section for information on installation of the volute housing.

Assemble Fuel Tank to Starter Housing
Refer to Fuel Tank Section for information on installation of the Fuel tank assembly.

Assemble the Heat Shield and Shroud
Refer to Shroud and Heat Shield Section for information on installation of the heat shield and shroud.

NOTES

John Deere Consumer Products, Inc.

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