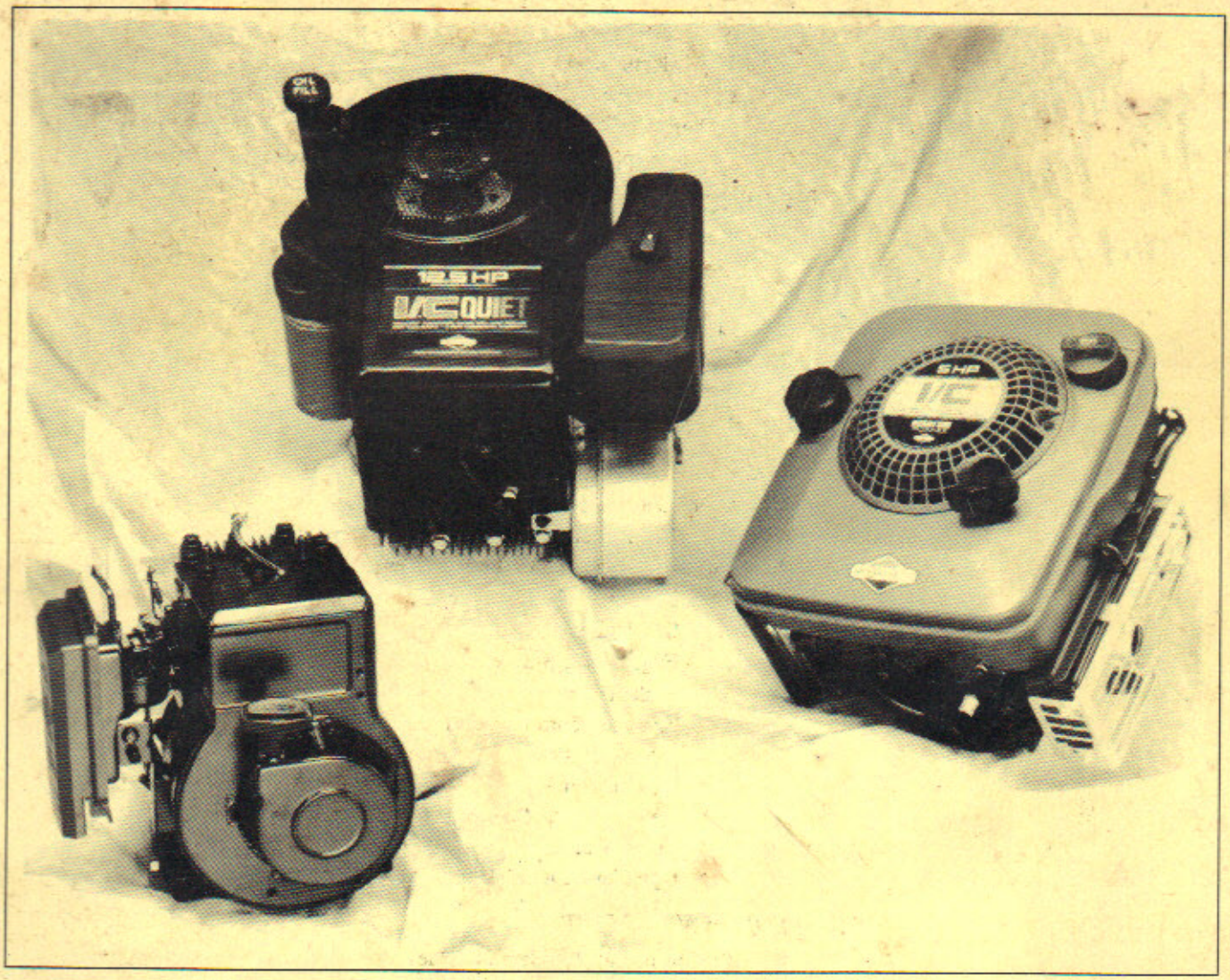
1991
Update Seminar



Briggs & Stratton Corporation

BRIGGS & STRATTON

Briggs & Stratton Corporation
Form 2285 - 10/90

MILWAUKEE, WI 53201
PRINTED IN U.S.A.

1991 UPDATE SEMINAR

I. *NEW ENGINE MODELS*
- A. 12.5 HP, I/C Quiet, Model Series 286700
- B. 5.0 HP, Quantum Power I/C, Model Series 126700
- C. 3.0 HP, Model Series 83400

II. *DISCOVERING GROWTH OPPORTUNITIES*

III. *SERVICE INFORMATION*
- A. Alternator Systems
  - 1. Identification
  - 2. Test Specifications
- B. Carburetors
  - 1. A Simple Approach to a Complex Component

IV. *SERVICE TIPS & TOOLS - '91*
- A. Crankshaft End Play
- B. Quantum Power Rewind Starter
- C. Synchro-Balance® Timing for Horizontal Shaft Engines
- D. Electric Starter Removal on Opposed Twin-Cylinder Engines
- E. Carburetor Bushing Replacement
- F. Carburetor Bushing Installation
- G. Throttle Shaft Bushing Alignment

V. *FOLLOW-UP*
- A. Major Engine Failure Analysis
  - 1. Lubrication
- B. Quantum Power Design Improvements
  - 1. Service Replacement Engines
  - 2. Special Parts
  - 3. Engine Flag Bracket
  - 4. Brake Bypass
  - 5. Throttle Control Bracket
  - 6. Rewind Position
  - 7. Dry Bulb Primer
  - 8. Rewind Starter Servicing
  - 9. Finger Guard
  - 10. Cylinder Heat Shield

VI. *TOP TEN HIT LIST*
- A. Review of Top Ten Service Issues
  - 1. Identify
  - 2. Cause
  - 3. Cure

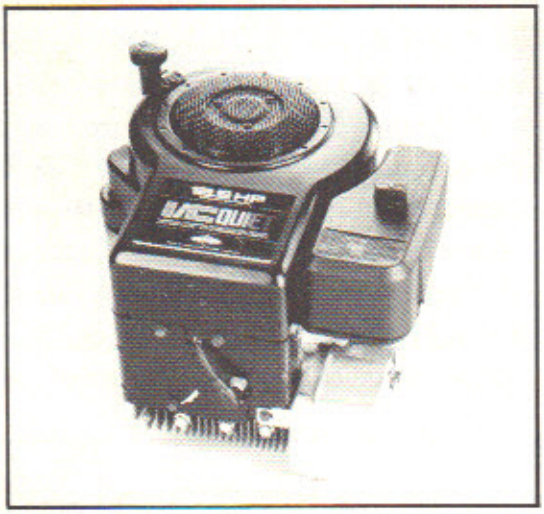
VII. *MISCELLANEOUS*
- A. Pulsa-Prime Carburetor, Engine Model 93900 Sprint
- B. Service Bulletin

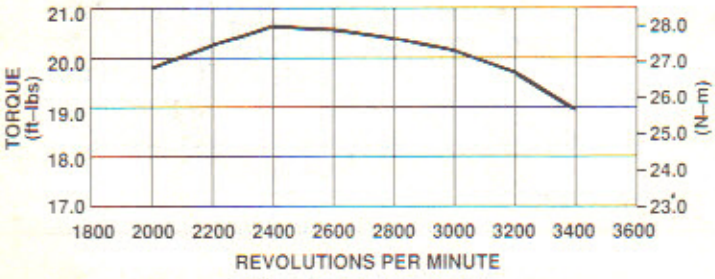
New Engine Models

12.5 HP, I/C QUIET, MODEL SERIES 286700

Briggs & Stratton 12 hp and 12 hp I/C model series, 280700 and 281700, have become the most popular lawn tractor engines within their markets. The acceptance and performance of these engines are unsurpassed.

This year Briggs & Stratton has added another 1/2 horsepower to the durable features of the 12 hp I/C model series, 281700. With reliable I/C features and a variety of options available, these new 12.5 hp I/C Quiet engines are built for both professional and home owner use.





Bore 3.44" (87.3 mm)
Stroke 3.06" (77.7 mm)
Displacement 28.4 cu. in. (465 cc)
Weight 55.75 lbs (25.28 kg)

Durability

- Cast Iron Cylinder Sleeve
- Dual Element Air Cleaner
- Cobalite Exhaust Valve and Seat

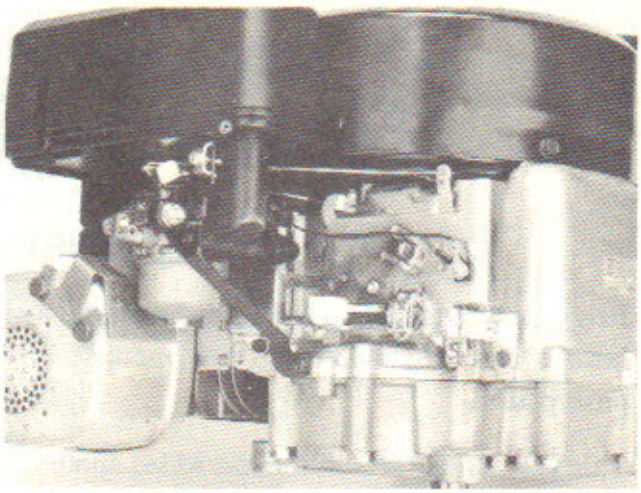
Quiet

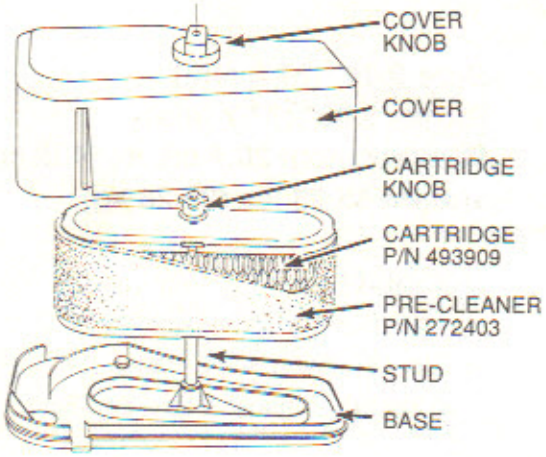
- Laminated Blower Housing Absorbs Noise
- Ground Cam Gear Reduces Mechanical Noise
- Available with Super Lo-Tone Muffler

Under heavy load conditions, it is torque that is the crucial measure of the work an engine can perform. This new 12.5 hp engine provides greater torque for those really tough jobs.

Air Cleaner/Carburetor/Engine Controls

This new 12.5 I/C Quiet engine model series 286700 incorporates a new Air Cleaner, one piece Flo-Jet Carburetor, and governor control package. The additional 1/2 horsepower is achieved primarily through the precisely calibrated world class carburetor and air cleaner assembly.



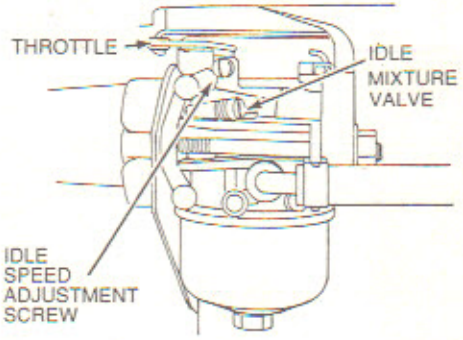


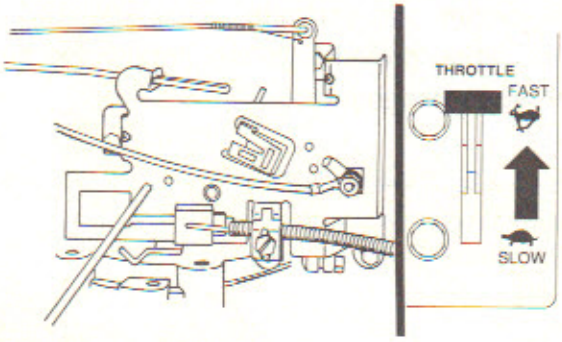
Dual Element Air Cleaner

A dual element air cleaner package, which includes a large capacity pleated paper cartridge with foam pre-cleaner, ensures maximum protection for long engine life. This new air cleaner cover is designed to eject large particles of debris thus extending the service life of the air cleaner. However, when the air cleaner assembly does require service, it can be performed quickly without the use of tools.

One-Piece Flo-Jet World Class Carburetor

A new One Piece Flo-Jet Carburetor incorporates a fixed high-speed jet and an adjustable idle mixture screw. The adjustment procedure varies from that of the 12 hp model series.





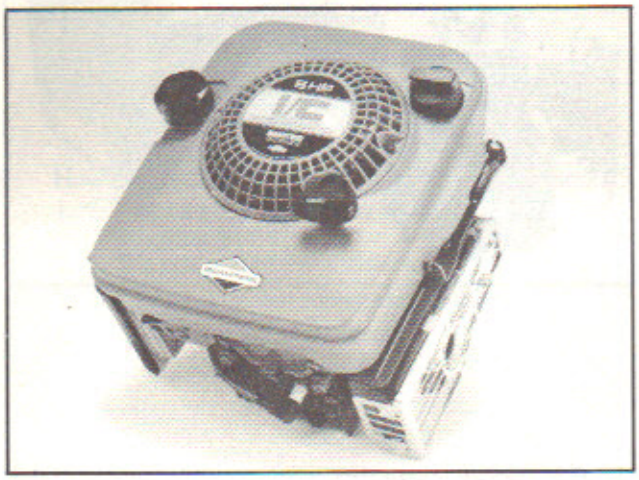
Engine Throttle/Governor Controls (Remote and Manual Friction)

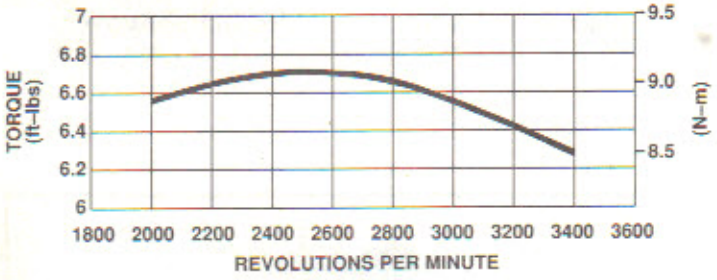
Both remote and manual friction controls are available on the new 12.5 hp I/C Quiet engine models. Engine throttle, choke, and governor adjustment procedures are the same as model series 280700 and 281700.

5 HP, QUANTUM POWER I/C, MODEL SERIES 126700

A new 5 hp Quantum Power engine is now available with long-life I/C features. The combination of sure, effortless starting characteristics of Quantum Power engines and durable I/C features translate into reliable power and customer satisfaction.

Engine model series, 126700, is well suited for use as a service replacement engine to upgrade your customers' equipment as an additional service repair option. There is no better value built for professional rotary lawn mower power than Quantum Power I/C.





Bore 2.69" (68.0 mm)
Stroke 2.04" (51.8 mm)
Displacement 11.57 cu. in. (190 cc)
Weight 24.25 lbs (11.0 kg)

Durability

- Cast Iron Cylinder Sleeve
- Extra Large Dual Element Air Cleaner

Power and Torque

- 190 cc Displacement
- Excellent Torque Throughout Operating Range

Startability

- Ignition Spark at 200 RPM
- Advancing Magnetron® Ignition System
- Float Carburetor with Positive Action Choke
- Mechanical Compression Release
- Large Diameter Starter Rope Pulley

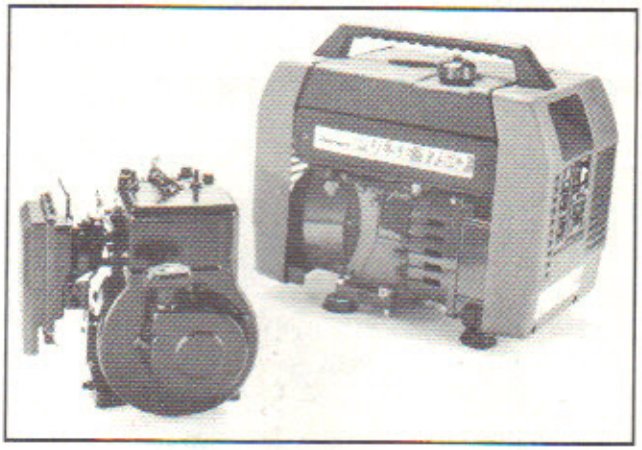
Warranty

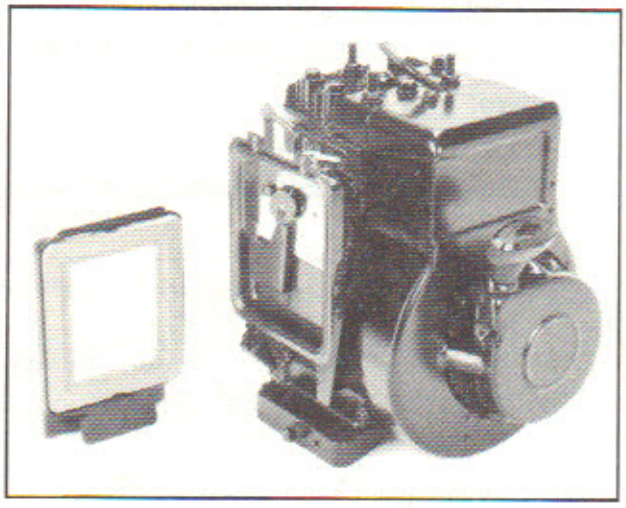
- 2 Years on the Engine
- Lifetime on the Ignition System

3 HP, MODEL SERIES 83400

A new 3 hp engine, model series 83400, has been developed for use as a power source for 1750 watt generators. This new engine combines a One-Piece Flo-Jet Carburetor and a mechanical governor to achieve easy starts and closely held governing, essential for generator operation.

Shown is the engine applied to a 1750 watt generator manufactured by Coleman Power-Mate. The generator's specifications, envelope package, and performance influenced the engine's design. Designing engines for specialized applications is becoming more commonplace as user expectations demand more market differentiation from OEMs.

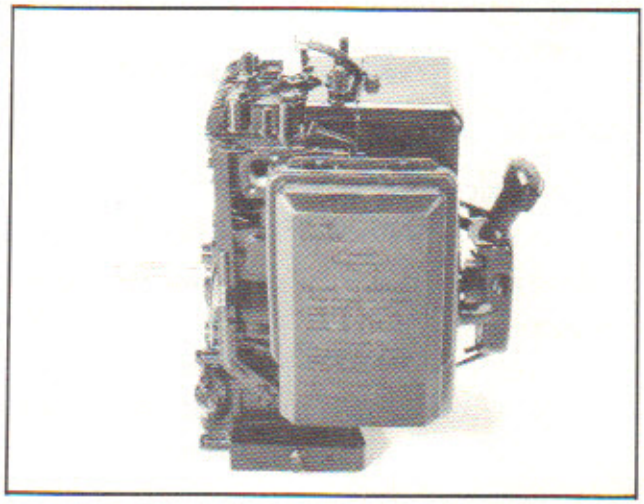




A flat paper cartridge air cleaner ensures the delivery of clean air to the one-piece Flo-Jet Carburetor. Design and location make air cleaner servicing a snap. The air cleaner cover is held in place by a plastic clip molded into the cover.

Mechanical governor adjustments for engine model series 83400 are the same as all other Briggs & Stratton mechanical governor-equipped engines.

For initial/static adjustment, rotate the throttle from idle to high speed. This motion translates governor shaft to a clockwise rotation.



Are You Overlooking Growth Opportunities?

Bob was until the Genie showed him what he was missing. How about you? Take this short quiz and rate your performance at the bottom of the page.

A. How do you feel about arguments with customers?
1. I like a good fight. You wanna make something of it?
2. It's just part of the business.
3. Unfortunate, but sometimes justified.
4. To be avoided at all costs.

B. If your customers do not complain, are they happy with your service?
1. They had better be happy.
2. They must be happy or they would tell me.
3. No news is good news.
4. Not necessarily; 90% of unhappy customers don't complain.

C. Do discount stores represent a growth opportunity?
1. I don't need their kind of business.
2. They don't buy from me, so I'm not interested.
3. They represent 75% of annual sales, so I can't ignore them.
4. Yes, I actively go after that business.

D. Are you open-minded about changes in the industry?
1. I'm selling what I want to sell—period!
2. We've done okay in the past, I'm not changing anything.
3. I'll go after new business if I'm certain it is a sure thing.
4. I try to anticipate new business trends and take advantage of them.

E. What does it mean to "actively" listen to your customers?
1. To not waste time with idle chatter.
2. To sell your customers things they do not need.
3. To listen carefully to your customers.
4. To be alert to sales opportunities based on customer needs.

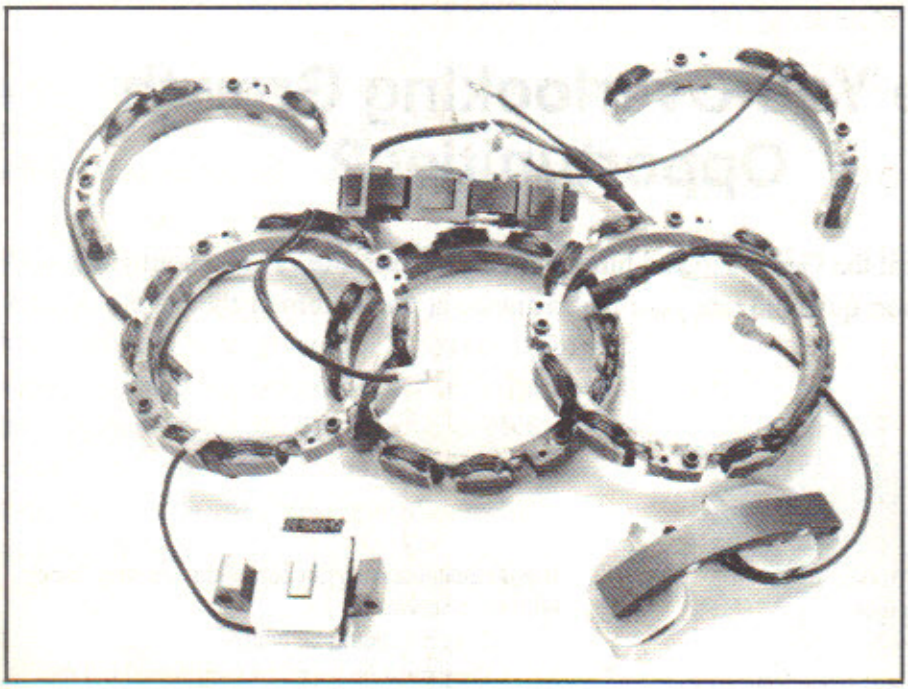
Rate Your Performance

Add up your answers and see if you are ready for the '90s

15-20 points = You're on your way!

10-15 points = Careful, you might be missing some opportunities.

5-10 points = Better consult the Genie.



Alterations to Alternators

Briggs & Stratton has always taken pride in the fact that its alternator systems are easy to identify and simple to test and to troubleshoot. In the past two years, Briggs & Stratton has added a number of new alternator systems to its lineup. These new systems allow Briggs & Stratton to better meet the needs of its customers, without creating new service and repair procedures. The same standard for color coding and testing the existing systems is used with the new alternator systems.

The following page is a chart covering all Briggs & Stratton systems. Use this chart to:

- identify the system by the color code of the wires and the connectors.
- identify minimum output of the alternator and the type of output (AC volts and DC amps).
- identify the engine models on which the system is used.
- obtain the part number for stators, wiring harnesses, or regulator rectifiers.
- obtain additional information that may be helpful when working with alternator systems.

ALTERNATOR SPECIFICATIONS

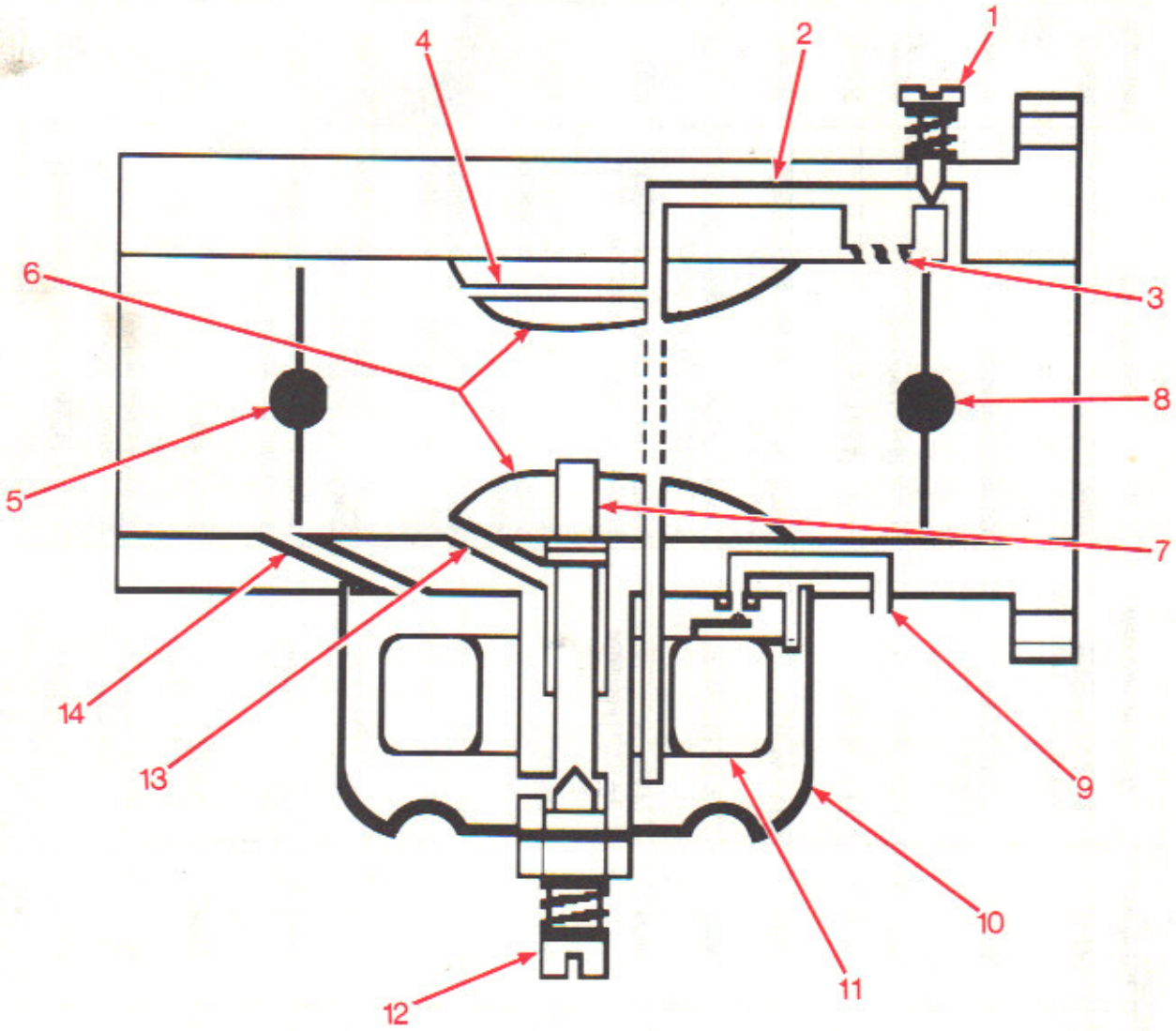
NOTE: All tests should be made with the engine running at 3600 RPM unless otherwise noted. Values given are minimum output values. If output values are less than stated, further checking of the alternator is necessary.

Alternator Identification	Color Code		Output at 3600 RPM	Engine Model	Stator P/N	Harness or Regulator/Rectifier	Remarks
	Wire	Connector					
System 3® System 4®	Black	White	.5 A, DC Unregulated Note: Output at 2800 RPM	90000, 110000	397880		Production Since 1981 Alternator Mounted Outside Flywheel
DC Only Alternator	Black	White	.5 A, DC Unregulated Note: Output at 2800 RPM	120000 (Quantum Power)	492841		Production Since 1989 Alternator Mounted Outside Flywheel
DC Only Alternator	Black	Red	1.2 A, DC Unregulated	104700 (5 HP Vanguard)	491469		Production Since 1988
DC Only Alternator	Red (2) Black	Red	1.5 A, DC Unregulated	130000 (5 HP L-Head)	394173		Production Since 1969
AC Only Alternator	Black	White	14 Volts AC	160000, 170000, 190000, 220000, 250000, 280000, 320000, 400000, 420000	391595		Production Since 1974 Small Magnets in Flywheel
DC Only Alternator	Red	Red	3 A, DC Unregulated	170000, 190000, 220000, 250000, 260000, 280000, 320000, 400000, 420000	391529	393814	Production Since 1973 Small Magnets in Flywheel
Dual Circuit Alternator	Red & Black	White	14 Volts AC 3 A, DC Unregulated	160000, 170000, 190000, 220000, 250000, 260000, 280000, 290000, 320000, 400000, 420000	393474	393456	Production Since 1971 Small Magnets in Flywheel
Tri-Circuit Alternator	Black	Green	28 Volts AC	160000, 170000, 190000, 220000, 250000, 260000, 280000, 290000, 303000, 320000, 400000, 420000	392595	392606	Production Since 1976 Small Magnets in Flywheel
5 Amp Alternator	Black	Green	5 A, DC Regulated* (28 Volts AC at Stator)	160000, 170000, 190000, 220000, 250000, 260000, 280000, 290000, 303000, 400000, 420000	392595	491546	Production Since 1988 Small Magnets in Flywheel
9 Amp Alternator	Black	Green	9 A, DC Regulated* (40 Volts AC at Stator)	160000, 220000, 250000, 260000, 280000, 290000, 303000, 400000, 420000	392595	491546	Production Since 1988 Large Magnets in Flywheel
10 Amp Alternator	Black (2)	Yellow	10 A, DC Regulated* (20 Volts AC at Stator)	160000, 220000, 250000, 280000, 290000, 303000, 320000, 400000, 420000	393295	394890	Production Since 1978 Small Magnets in Flywheel (Replaces Starter–Generator)
13 Amp Alternator	Black (2)	Yellow	13 A, DC Regulated* (20 Volts AC at Stator)	400000, 420000	393295	394890	Produced from 1979-1982 Medium Magnets in Flywheel
16 Amp Alternator	Black (2)	Yellow	16 A, DC Regulated* (30 Volts AC at Stator)	220000, 250000, 280000, 290000, 303000, 320000, 400000, 420000	393295	394890	Production Since 1983 Large Magnets in Flywheel
Quad Circuit Alternator	Black (2)	Yellow	8 A, DC Regulated* (30 Volts AC at Stator)	170000, 190000, 220000, 250000, 280000	393295	397809	Production from 1984-1987

* Alternator Output Is Determined by Size of Magnets Underneath Flywheel

Magnet Dimensions: Small 7/8 x 11/16 (12 x 18 mm)
Medium 1-1/16 x 11/16 (27 x 18 mm)
Large 1-1/16 x 15/16 (27 x 24 mm)

A Simple Approach to a Complex Component



1. Idle Passage Needle Adjustment Used to meter the precise amount of fuel for engine at idle.

2. Idle Passage Connects the carburetor's bowl to the engine side of the throttle plate. Fuel is forced through this passage when the throttle plate moves to the idle position.

3. Transitional Fuel Passages Provide a temporary fuel supply to the engine during the transition from idle to high-speed operation.

4. Idle Air Bleed This opening allows air to atomize the fuel before entering the air stream while the engine is idling. This premixing of the fuel and air increases the efficiency of engine combustion.

5. Choke Through the use of a plate, the choke blocks off air flow. This creates low pressure throughout the carburetor to provide a rich fuel mixture for cold starting.

6. Venturi A narrowing in the air-stream tube to increase the velocity of the air to lower its pressure.

7. High-Speed Pick-Up Tube This is the part through which the fuel travels from the Fuel Bowl to the air stream during high-speed operation.

8. Throttle Plate Controls the air flow through the Venturi, thereby controlling the fuel flow to the engine.

9. Fuel Supply Inlet This is where fuel enters the Fuel Bowl from the engine's fuel tank.

10. Fuel Bowl Provides constant fuel lift distance to the Venturi.

11. Carburetor Bowl Float and Inlet Needle Used to control the level of fuel in the Bowl.

12. High-Speed Needle Adjustment Used to control the amount of fuel entering the air stream at high speed.

13. High-Speed Air Bleed This opening serves the same function as the Idle Air Bleed, except that it premixes fuel and air in the High-Speed Pick-Up Tube.

14. Bowl Vent Allows ambient air pressure to enter the carburetor system. This high pressure pushes the fuel from the Bowl into the Venturi.

Carburetor Problem Solving Chart

PROBLEM	CAUSE	SOLUTION
Flo-Jet Carburetor leaking after being transported.	Float bounce	Use the fuel shut-off valve
Flo-Jet Carburetor leaks during operation.	Fuel tank too far above carburetor causing excessive pressure at the needle valve	Lower the tank to a maximum of 45 inches (114.3 cm) above the carburetor
	Loose, missing, incorrectly assembled/adjusted, or damaged parts	Correct parts problem
	Contaminated fuel	Replace the fuel
Flo-Jet Carburetor leaks shortly after engine is turned off.	Long coast-down period	Lower engine speed to idle before shutting down.
	Fuel leaking past main nozzle	See #7 in Top 10 Hit List
	Loose, missing, incorrectly assembled/adjusted or damaged parts	Correct parts problem
Engine dies at idle, runs normal at high speed-full load, but surges when running at high speed-no load.	Idle Passage is blocked	Clean the passage
Engine runs normal at high speed with or without load but at idle it runs rough with a rhythmic idle.	Idle Air Bleed is blocked	Clean air bleed
Engine runs normal at high speed and idle with no load but at high speed under load there is a severe loss of power and the engine dies.	High Speed Pick-Up Tube partially blocked	Clean obstruction
At idle, engine is running slightly fast. At high speed under load it is very rich, blowing black smoke, and top speed does not exceed 2200 RPM. At top speed with no load it is also slightly rich.	High-Speed Air Bleed is blocked	Clean obstruction

Service Tips & Tools

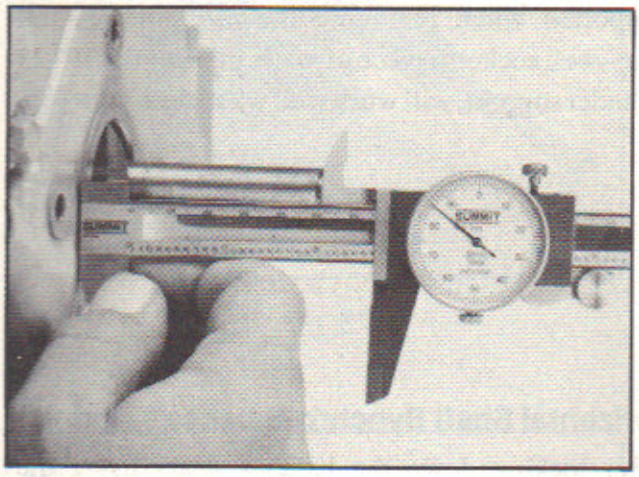


Fig. 1

Crankshaft End Play

Crankshaft end play is an important specification that is commonly overlooked. By spending just a few seconds measuring crankshaft end play before repairing an engine, you can get a good indication of how much internal engine wear may exist. It is also a must to measure crankshaft end play any time a crankshaft, crankcase cover, or sump is replaced on an engine. *Important note: crankshaft end play specifications will vary depending on the engine's model. Be sure to check the specification before making any adjustment.*

CRANKSHAFT END PLAY SPECIFICATIONS	
Model 100700, 120000 90000	.002 - .030
All Other Models	.002 - .008

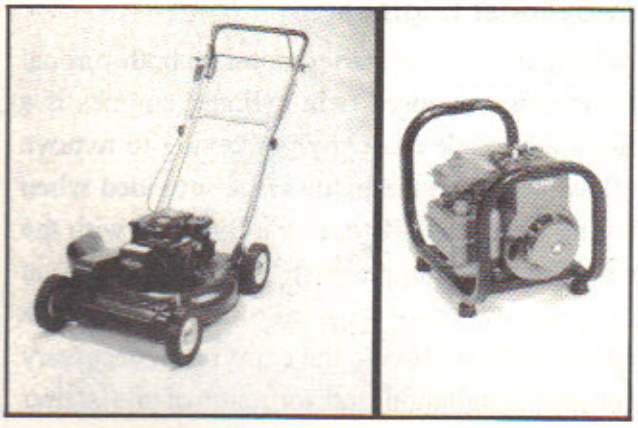


Fig. 2

The reason for the difference in crankshaft end play can depend a lot on the type of application. For example, on newer vertical shaft engines used in rotary lawn mower applications, the tolerance can be much greater than a horizontal engine used on a generator.

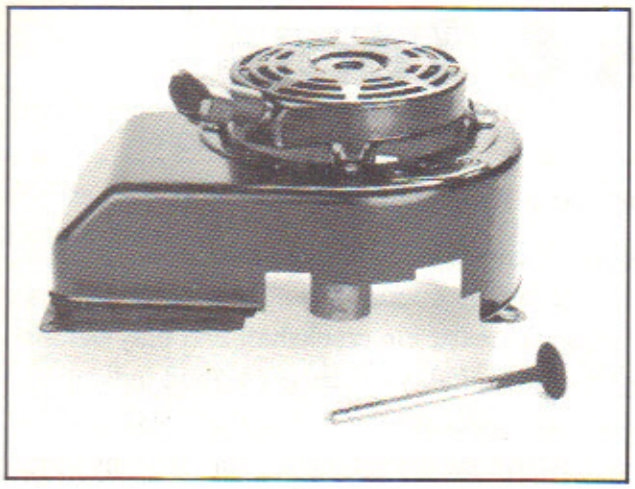


Fig. 3

Quantum Power Rewind Starter

A 5/16" valve will work well for removing the roll pin that holds the Quantum Power starter together. Remember, the underside of the starter must be supported when removing the roll pin. A tall deep-well socket, a piece of water pipe, or the 19123 cylinder support, will work well when doing this job.

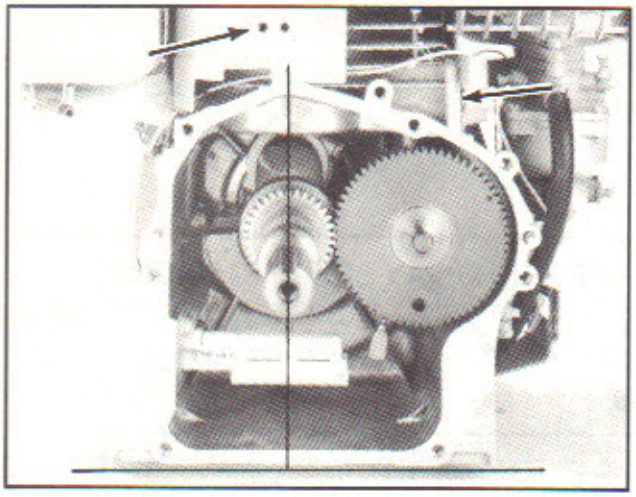


Fig. 4

Horizontal Shaft Synchro-Balance® Timing

After locking down the balance gears using the screws from the dipstick tube and the breather, the most important thing to remember about timing of the Synchro-Balance® system on a horizontal shaft engine is to put the piston at top dead center. You can easily do this by rotating the crankshaft counterclockwise until the connecting rod is at the top of its travel and the parting line on the crankshaft casting is perpendicular to the base of the engine. At this point, you can proceed by installing the cover.

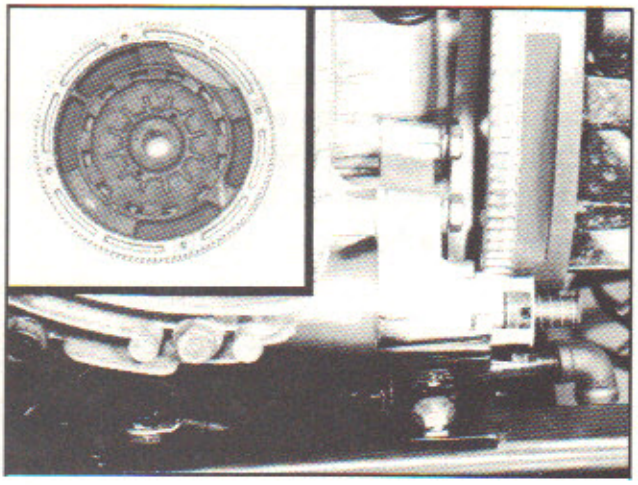


Fig. 5

Electric Starter Removal on Opposed Twin-Cylinder Engines

Removing the electric starter motor on both vertical and horizontal opposed twin-cylinder engines is a difficult job, made easier by not having to remove the flywheel. Use the extra space provided when lining up the deep valleys in the flywheel with the starter bolt that is underneath the flywheel. That extra space will make removal of the starter much easier, as well as provide the extra room necessary for proper installation and torquing of the starter bolts to 160 in. lbs.

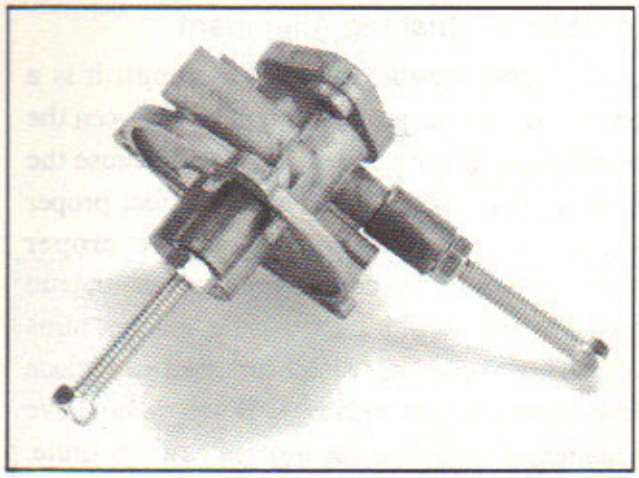


Fig. 6

Carburetor Bushing Replacement

Removal and replacement of carburetor bushings is made easy by using some existing engine parts that are probably lying around the shop. Start by placing a gas tank bushing from a 9 or 11 cu. in. engine, part no. 94038 or 94047, over the bushing to be replaced. This could be the throttle shaft bushing or a fuel inlet bushing. Thread a self-tapping screw (*fig. 6*), part no. 93029 or screw from 19069, or 19165 flywheel puller, into the bushing until secure. Then tighten the nut on the screw down against the spacer until the bushing is pulled from the carburetor.

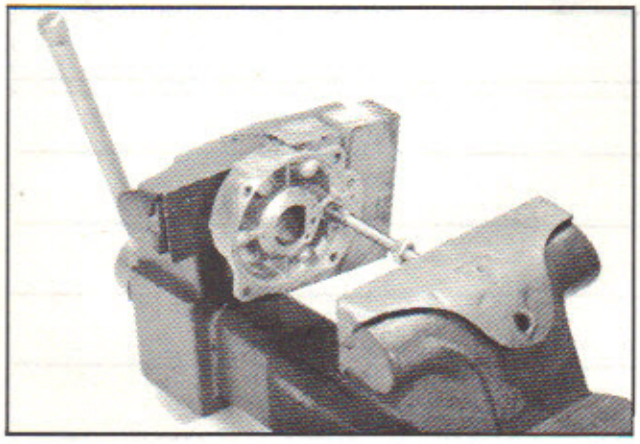


Fig. 7

Carburetor Bushing Installation

There are two methods of installing the replacement bushings, depending on which bushing it is. If you are replacing the fuel inlet bushing, leave the old bushing on the end of the puller screw and use it as a driver to push a replacement bushing into place. Push the bushing into the carburetor until it is flush with the carburetor body.

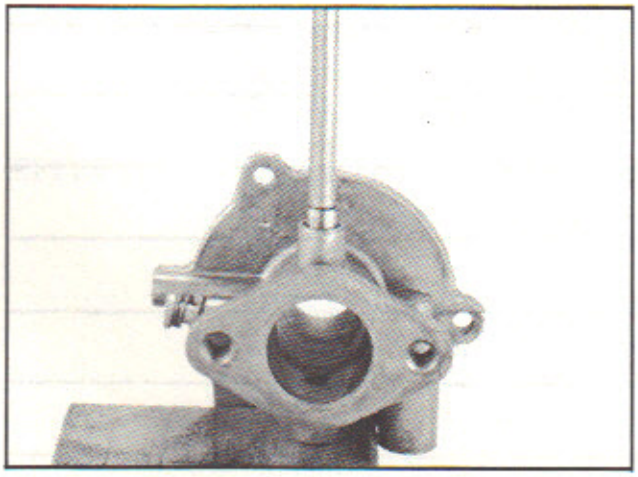


Fig. 8

If the throttle shaft bushing is being replaced, use a 19057, bushing driver, to push the throttle bushing into place until it seats into the body of the carburetor. The 19057, bushing driver, is the old bushing driver used in the days of replacing breaker point plunger bushings.

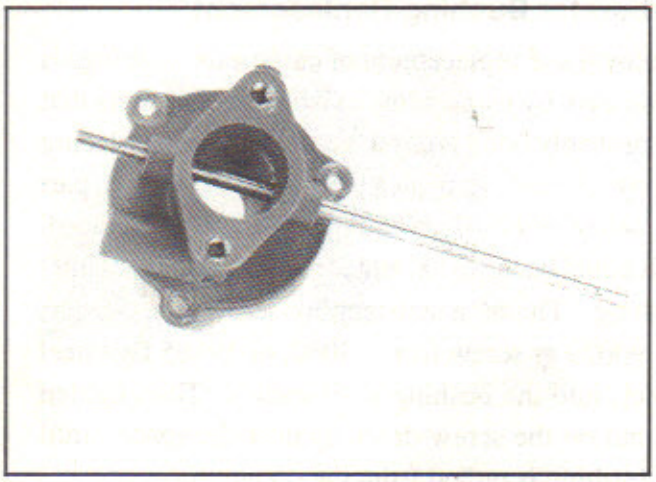


Fig. 9

Throttle Shaft Bushing Alignment

After replacing the throttle shaft bushings, it is a good idea to ensure proper alignment between the two bushings. If not aligned, they could cause the throttle shaft to hang up and would affect proper governing on the engine. To ensure proper alignment, use a 19056, counterbore reamer, and run it through both bushings until the reamer turns freely. This reamer has also been used to replace breaker point plunger bushings. If you do not have this reamer, a 7/32" drill can be used as a substitute.

Notes

Major Engine Failure Analysis–Lubrication

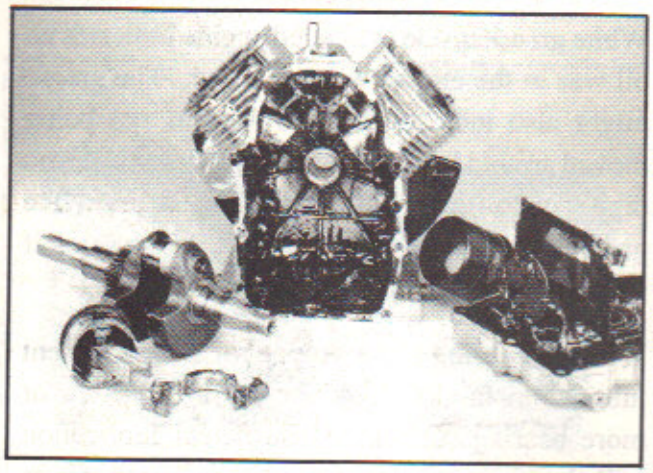


Fig. 1

In a continuing process to keep current information available to service technicians, this follow-up is to provide additional support to the service network when evaluating lubrication failures.

One question that has come up with recent changes in engine design is, "How does a pressurized lubrication system change the effects of insufficient lubrication?" The answer is, "Very little." Whether the engine is designed with pressure or splash lubrication, the oil in the engine has the same responsibility—that is, to cool, lubricate, clean, and seal. To reduce the amount of lubrication in a pressure lube system means to reduce the oil's ability to perform these four functions. The cause and effect relationships for lubrication failure are the same for both types of lubrication systems.

CAUSE:

— Insufficient amount of lubrication (Low Oil).
— Use of other than recommended lubricants.
— Crankcase oil dilution with gasoline.
— Operating on excessive angles.
— Overfilling the engine crankcase with oil.

EFFECT:

— Seizure – locking between a bearing and a journal.
— Breakage – the locking between bearings and journals can cause enough stress to break internal engine parts.
— Scoring – metal transfer from a bearing to a journal.
— Overheating or Discoloration – oil burning onto internal engine parts due to the lack of oil to provide cooling.

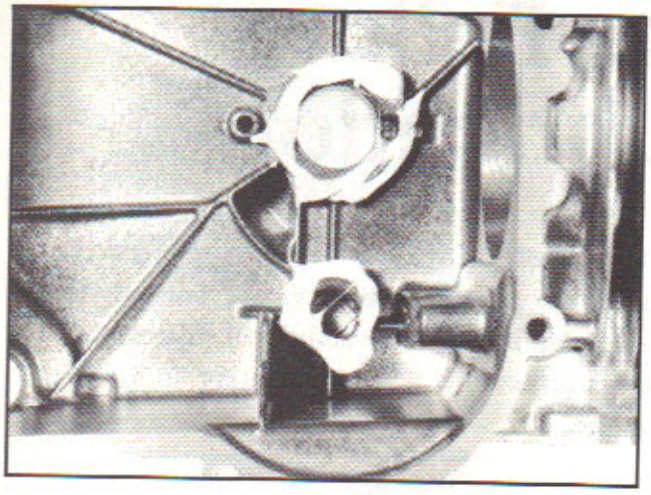


Fig. 2

White grease is no longer used during the assembly of most Briggs & Stratton engines. This recent change may influence your analysis of certain engine failures related to insufficient lubrication.

White grease inside of a failed engine indicates no oil was in the engine when it failed. The grease might also indicate that the oil was not being moved around by the internal components (ie., no dipper on the connecting rod). The lack of white grease can no longer be a factor in determining if an engine has been run without oil.

When inspecting a new engine for an insufficient lubrication failure, look for scoring on two or more bearing surfaces. Insufficient lubrication will also cause seizure or breakage. These effects will help you determine if warranty consideration should be given.

Quantum Power Design Improvements

Quantum Power engines were introduced in the summer of 1989 . This follow-up information will help bring information up-to-date, showing the latest changes and additions to the Quantum Power line.

Fig. 1

Service Replacement Engines

Quantum Power service replacement engines will be used to replace 11 cubic inch engines. In most applications, a 5 hp Quantum Power engine will replace a 4 hp, 11 cubic inch engine. For the limited number of applications that Quantum Power engines will not replace, Briggs & Stratton will, in some cases, provide a suitable 11 cubic inch service engine.

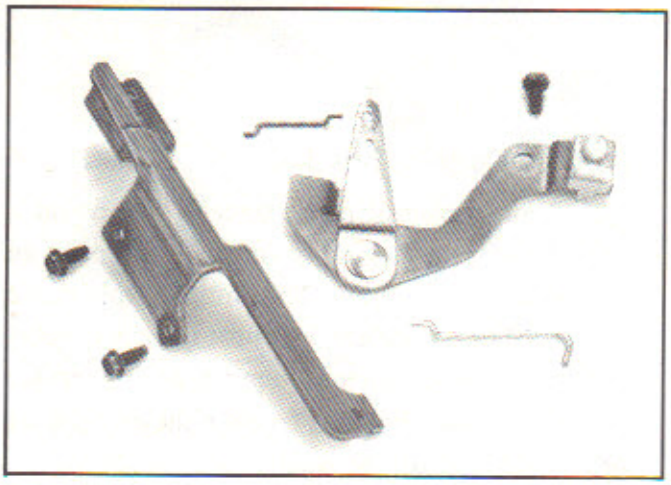


Fig. 2

Special Conversion Parts

To increase the interchangeability between the 11 cubic inch and Quantum Power engines, special parts have been developed (*fig. 2*). These parts and instructions for their installation are included with the service engine. Simply choose the parts that will be needed and install accordingly.

- Engine Flag Bracket
- Brake Bypass
- Throttle Control Bracket

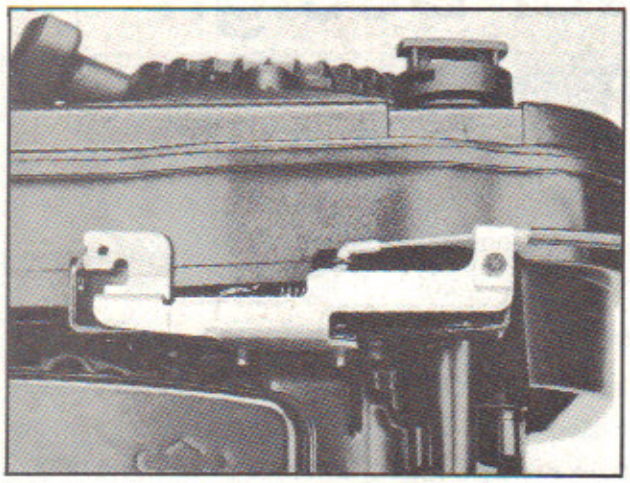


Fig. 3

Engine Flag Bracket

Quantum Power engines are equipped with a brake control cable anchor that is different from the 11 cubic inch engine. In order to use the equipment's existing brake control cable, install the flag bracket on the Quantum Power engine and brake controls are instantly compatible.

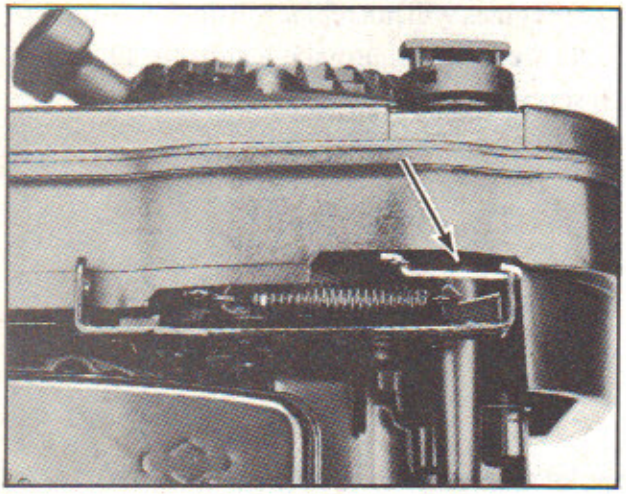


Fig. 4

Brake Bypass

Quantum Power service replacement engines may also be used in place of engines that do not have a brake system. Included with the engine will be a brake bypass link. Do not use the link if the original engine came equipped with a brake system.

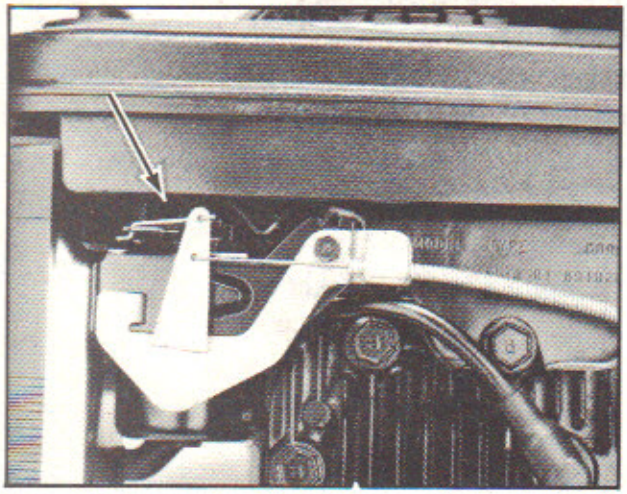


Fig. 5

Throttle Control Bracket

The throttle control cable travel distance on a Quantum Power engine is longer than that of an 11 cubic inch engine. To eliminate this cable travel distance problem, a throttle control bracket will be included with the Quantum Power service engine. By installing this bracket, the original set of controls can still be used.

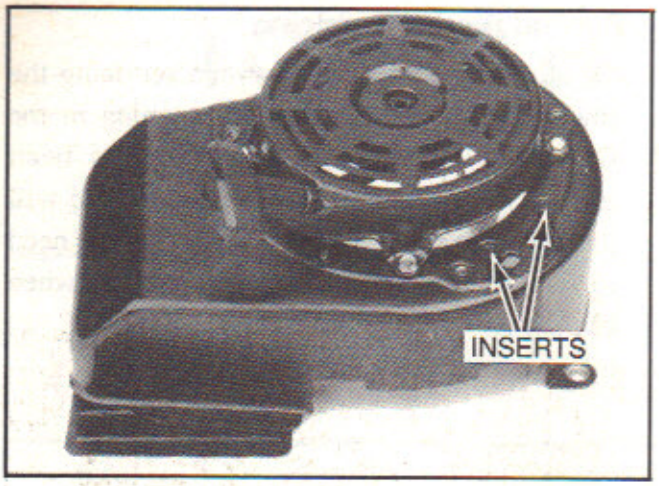


Fig. 6

Rewind Position

On an 11 cubic inch service replacement engine, if the o'clock position of the rewind starter had to be changed, the blower housing had to be changed. On a Quantum Power service replacement engine, all o'clock positions are possible without replacing parts. To change the o'clock position of the starter, remove the two screws that hold down the debris guard. Then, remove the four screws that hold the rewind in place, rotate the rewind to the desired position, and install the screws.

Other Quantum Power Changes To Be Aware Of

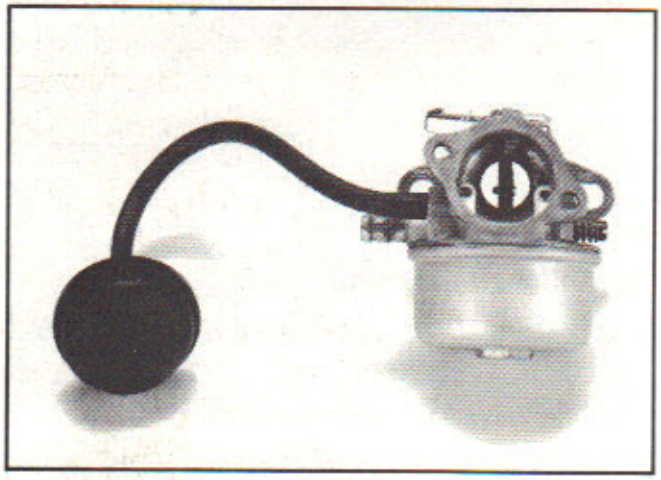


Fig. 7

Dry Bulb Primer

Some Quantum Power engines may be equipped with a dry bulb primer. This primer will eliminate the choke plate in the carburetor. When the primer bulb is depressed, the air pressure on the fuel in the bowl of the carburetor is increased. This air pressure pushes fuel up the main nozzle and into the engine to provide for easier starting when the engine is cold.

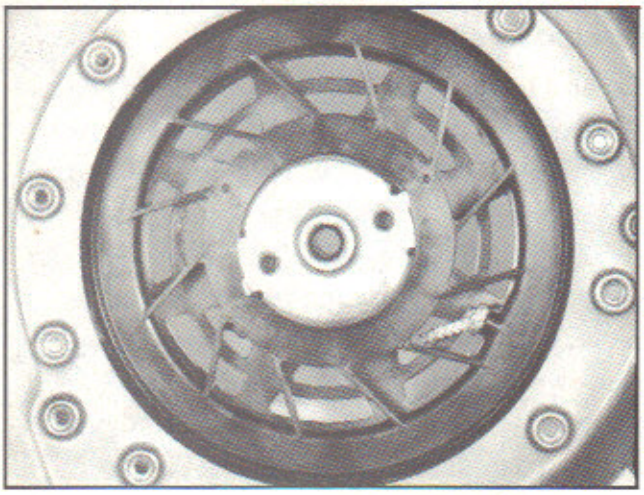


Fig. 8

Rewind Starter Servicing

To allow for easier access when servicing the rewind starter, the size of the opening in the Quantum Power blower housing has been increased. All components of the rewind will pass through the opening, eliminating the need to remove the starter from the housing when servicing.

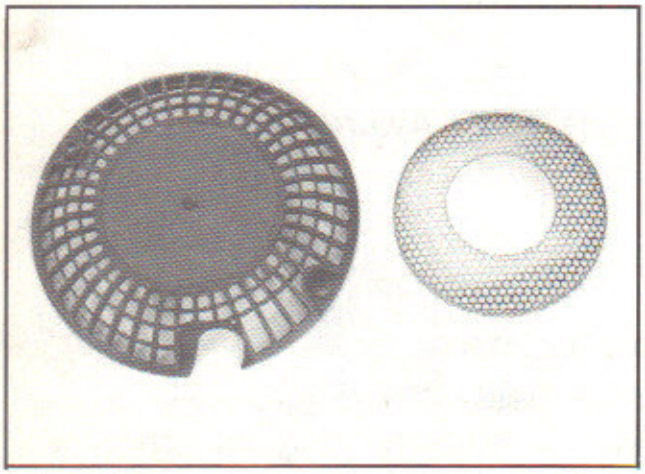


Fig. 9

Finger Guard

As of December 1, 1989 (date coded 89120100), ALL Quantum Power engines equipped with a static finger guard will not have a rotating grass screen on the flywheel.

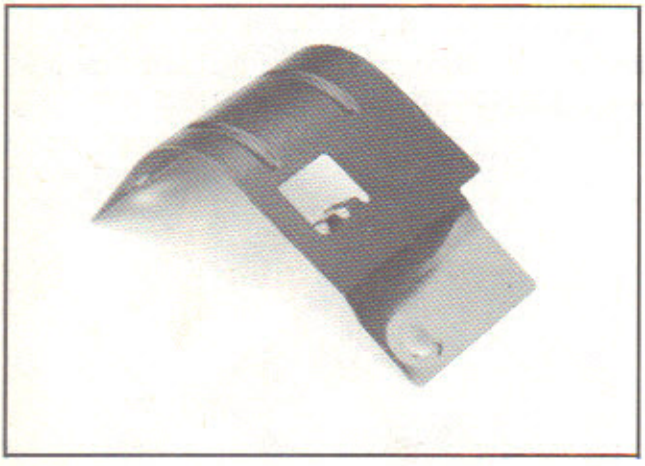


Fig. 10

Cylinder Heat Shield

As of December 1, 1989 (date coded 89120100), all 3.5 hp (121700) and 4 hp (122700) engines will not have a cylinder heat shield.

TOP 10 HIT LIST — #1

Quantum Power Fuel Tank Leakage

TO PREVENT POSSIBLE FUEL LEAKAGE, GIVE THIS MATTER IMMEDIATE ATTENTION.

I. ALL ENGINES RETURNED FOR FUEL TANK LEAKAGE

Replace fuel tanks on **ALL** Quantum Power engines returned with leaking tanks. DO NOT attempt to repair fuel shut-off valves in leaking fuel tanks.

Place an emergency order with your source of supply if you do not have the correct fuel tank in your inventory. Most Quantum Power fuel tanks listed on page 26 are readily available from your source of supply.

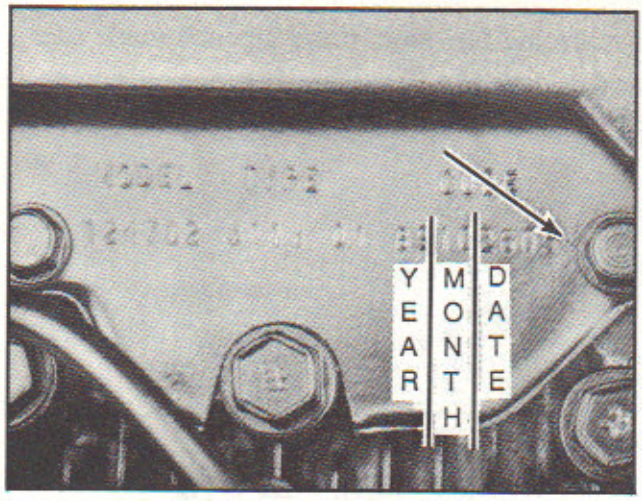


Fig. 1

After replacing the fuel tank, place a punch mark after engine date code (*fig. 1*) to identify a repaired engine. DO NOT return original fuel tank to the factory. The fuel tank should be punctured, then scrapped after receiving warranty reimbursement.

This repair should be completed under warranty with the word "Leaks SB #593-Tank Leaks" on claim (*fig. 2*). Typically this repair and preparation of a warranty claim can be completed in 30 minutes or less.

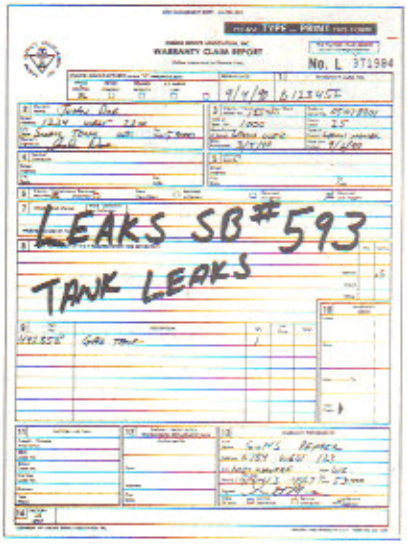


Fig. 2

II. ALL ENGINES RETURNED FOR SERVICE OR MAINTENANCE

Replace **ALL** fuel tanks on Quantum Power engines date coded 90072200 or before, which HAVE CONTAINED GASOLINE. This applies to all engines returned for ANY type of service or maintenance, including those on equipment.

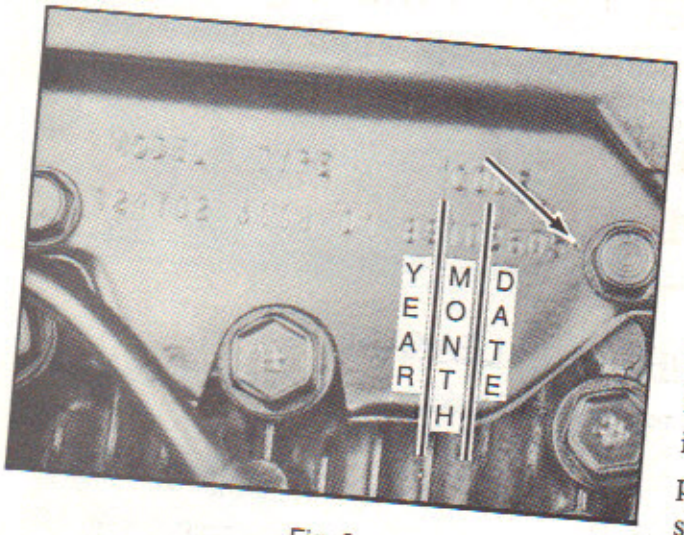


Fig. 3

NOTE: Engines with a punch mark after the date code (*fig. 3*) have been repaired and no further service is necessary.

Place an emergency order with your source of supply if you do not have the correct fuel tank in your inventory. Most Quantum Power fuel tanks listed on page 26 are readily available from your source of supply.

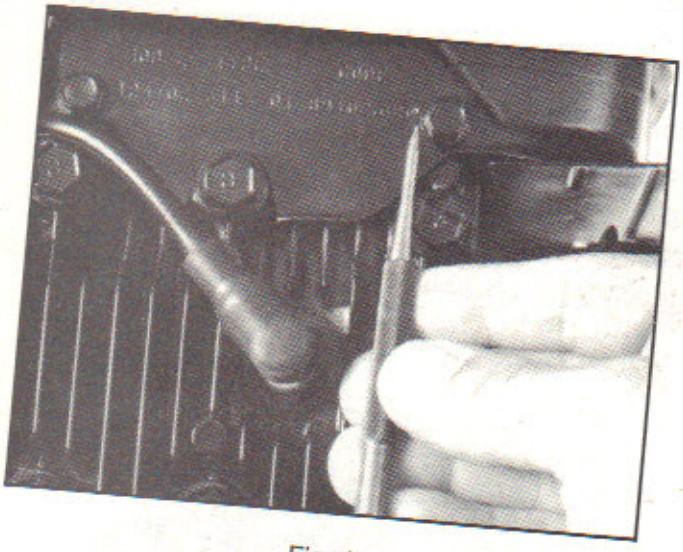


Fig. 4

After replacing fuel tank, place a punch mark after engine date code (*fig. 4*) to identify a repaired engine. DO NOT return original fuel tank to the factory. The fuel tank should be punctured, then scrapped after receiving warranty reimbursement.

This repair should be completed under warranty with the words "Replace SB #593—Returned For Service" on claim (*fig. 5*). Typically this repair and preparation of a warranty claim can be completed in 30 minutes or less.

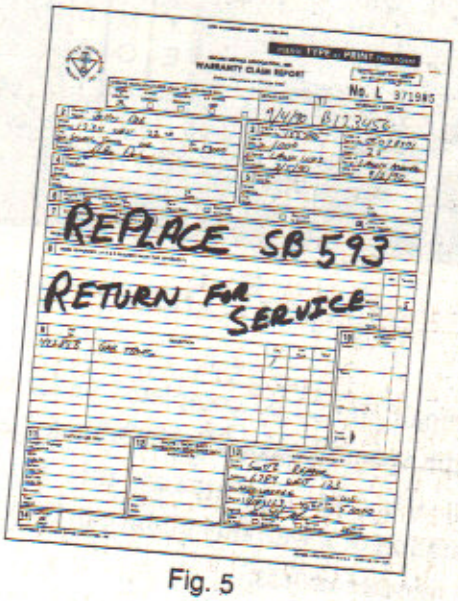


Fig. 5

III. ALL NEW FUEL TANKS ON ENGINES AND IN EQUIPMENT

Replace fuel shut-off valves in **ALL** new fuel tanks (*fig. 6*) which have NEVER CONTAINED GASOLINE with a new part no. 494235 fuel shut-off valve kit. This applies to all fuel tanks on engines date coded 90072200 or before, including those in equipment. Engines with a punch mark after the date code (*fig. 7*) have been repaired and no further service is necessary.

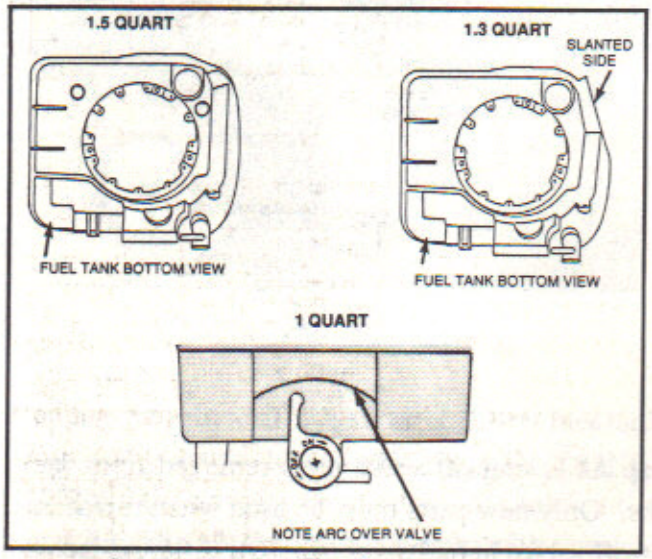


Fig. 6

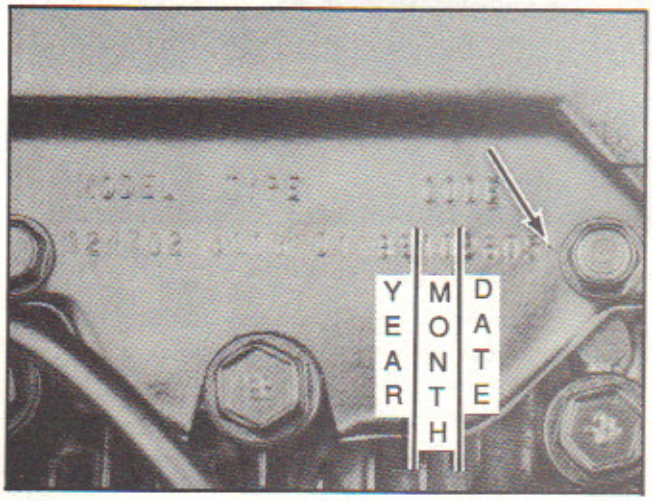


Fig. 7

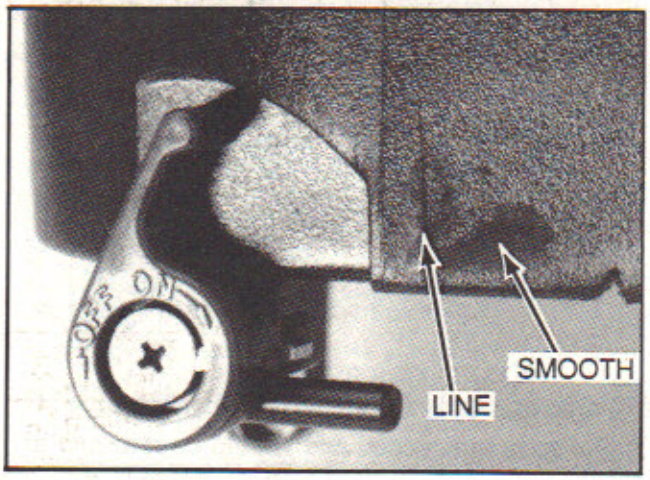


Fig. 8

NOTE: Replace **ALL** fuel tanks found with a smooth spot and line shown in figure 8, date coded 90072200 or before, as described in Section II, on ALL ENGINES.

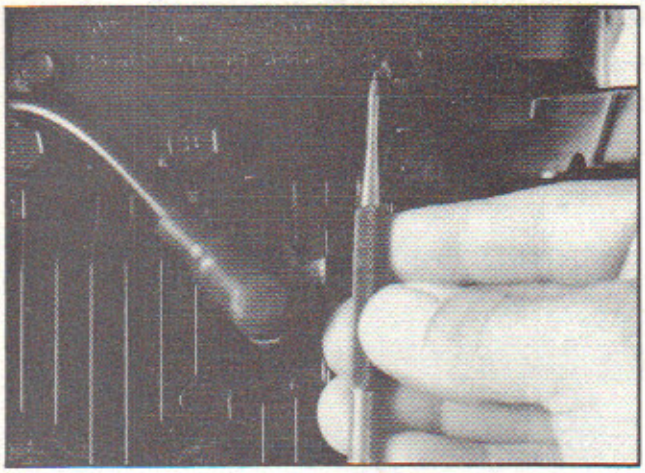


Fig. 9

After replacing fuel tank, place a punch mark after engine date code (*fig. 9*) to identify a repaired engine. DO NOT return original fuel tank to the factory. The fuel tank should be punctured, then scrapped after receiving warranty reimbursement.

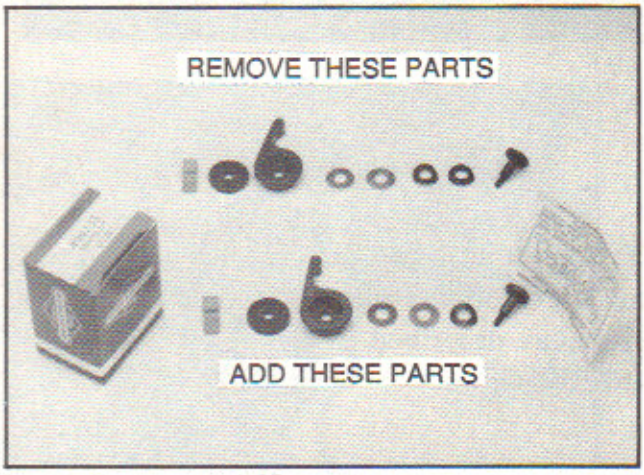


Fig. 10

Scrap **ALL** shut-off valve parts removed from fuel tanks. Only new parts must be used when replacing shut-off valves in fuel tanks (*fig. 10*). After replacing fuel shut-off valve kits, place a punch mark after the engine date code (*fig. 9*).

We recommend you place an emergency order with your source of supply for all part no. 494235 shut-off valve kits you require. **DO NOT** use part no. 493277. It has been superseded and should be returned to your source of supply for credit.

This repair should be completed under warranty with the words "Repair SB #593—Fuel Shut-Off Valve" on claim. Typically the fuel tank shut-off valve replacement and preparation of a warranty claim can be completed in 20 minutes or less.

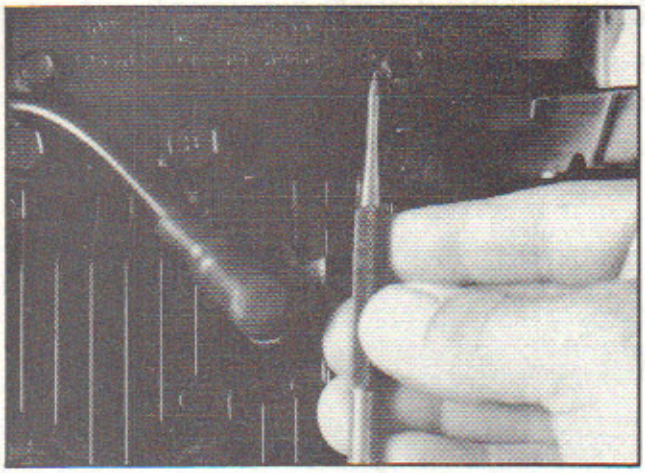


Fig. 9

After replacing fuel tank, place a punch mark after engine date code (*fig. 9*) to identify a repaired engine. DO NOT return original fuel tank to the factory. The fuel tank should be punctured, then scrapped after receiving warranty reimbursement.

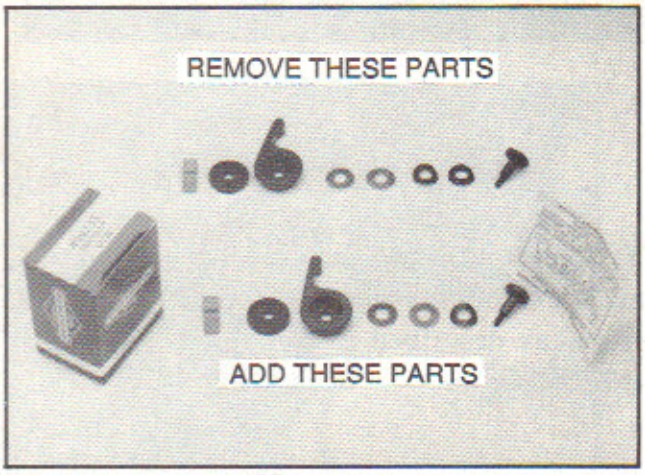


Fig. 10

Scrap **ALL** shut-off valve parts removed from fuel tanks. Only new parts must be used when replacing shut-off valves in fuel tanks (*fig. 10*). After replacing fuel shut-off valve kits, place a punch mark after the engine date code (*fig. 9*).

We recommend you place an emergency order with your source of supply for all part no. 494235 shut-off valve kits you require. **DO NOT** use part no. 493277. It has been superseded and should be returned to your source of supply for credit.

This repair should be completed under warranty with the words "Repair SB #593—Fuel Shut-Off Valve" on claim. Typically the fuel tank shut-off valve replacement and preparation of a warranty claim can be completed in 20 minutes or less.

IV. ALL NEW FUEL TANKS IN INVENTORY

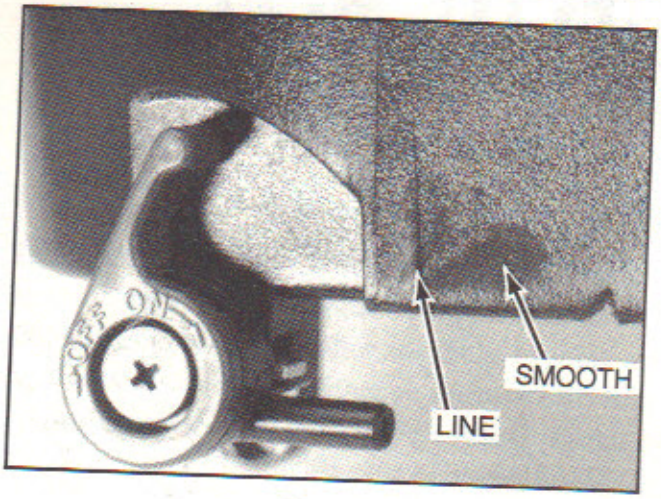


Fig. 11

Replace fuel shut-off valves in **ALL** new fuel tanks (*fig. 12*) which have NEVER CONTAINED GASOLINE with a new part no. 494235 fuel shut-off valve kit. This applies to all fuel tanks with a package date code of 9029 or before.

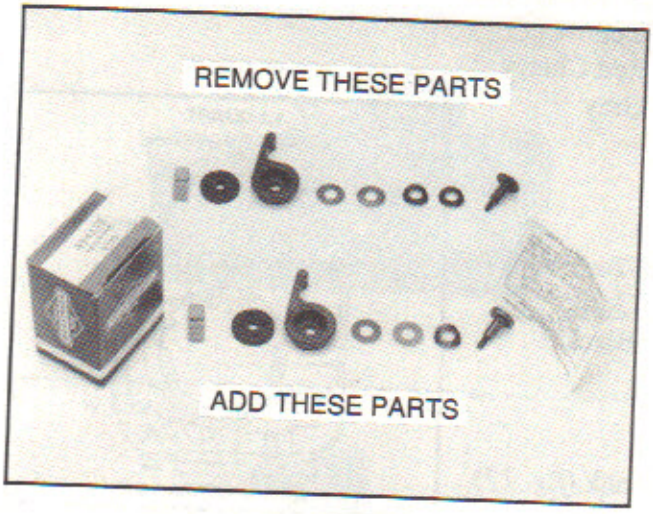


Fig. 13

Replace **ALL** fuel tanks found with a smooth spot and line shown in figure 11, date coded 9020 or before.

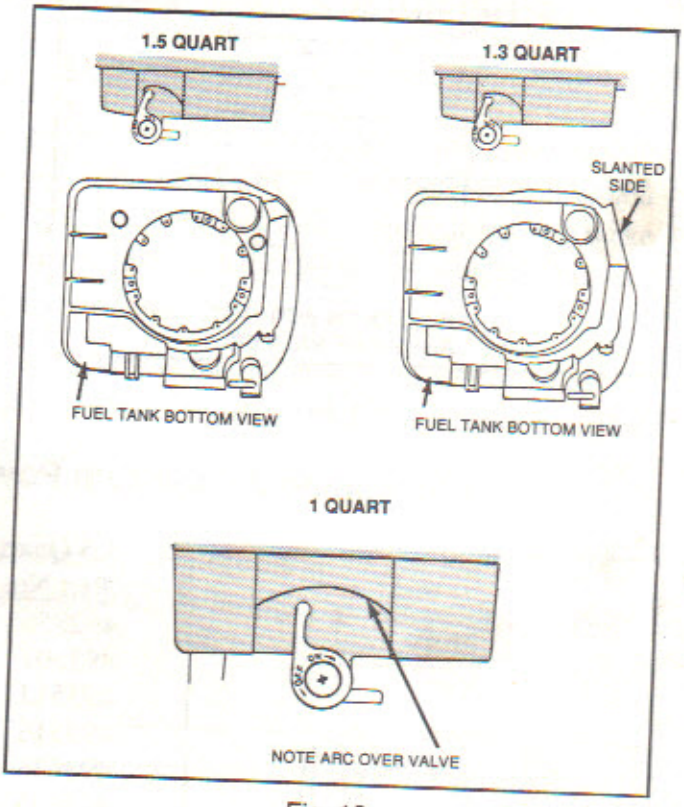


Fig. 12

Scrap **ALL** shut-off valve parts removed from fuel tanks. Only new parts must be used when replacing shut-off valves in fuel tanks (*fig 13*).

We recommend you place an emergency order with your source of supply for all part no. 494235 shut-off valve kits you require. Do not use part no. 493277. It has been superseded and should be returned to your source of supply for credit. This repair should be completed under warranty with the words "Repair SB #593—Fuel Shut-Off Valve" on claim. Typically the fuel tank shut-off valve replacement and preparation of a warranty claim can be completed in 20 minutes or less.

V. FUEL TANKS NOT AFFECTED BY THIS BULLETIN

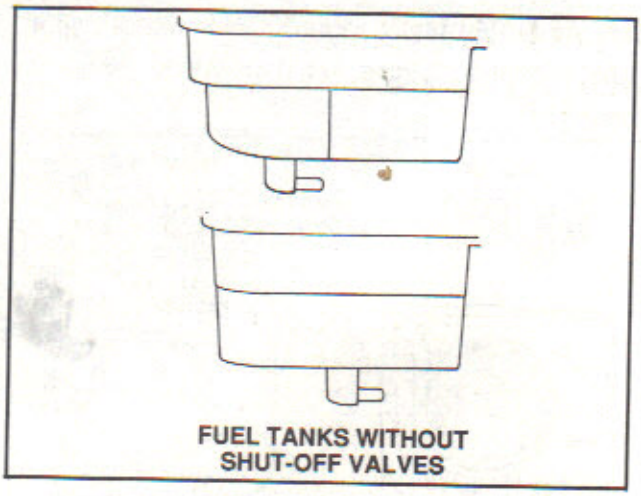


Fig. 14

Fuel tanks without shut-off valves, as shown in figure 14, are not affected by this bulletin.

Replacement Quantum Power Fuel Tank Part Numbers

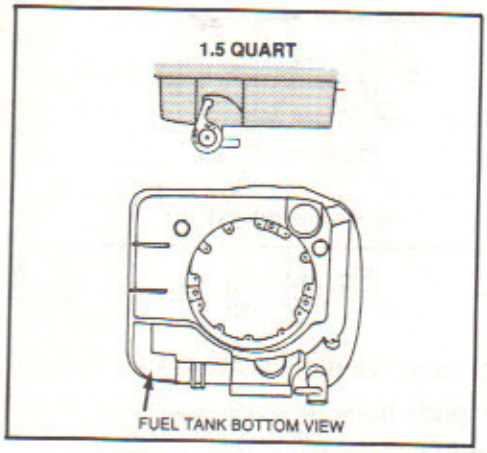


Fig. 15

1.5 Quart Fuel Tank (*fig. 15*)

Part No.	Color
492858	Black
493507	Fawn
493513	American Red
493516	Yellow
493636	Red Cherry
493645	Gray

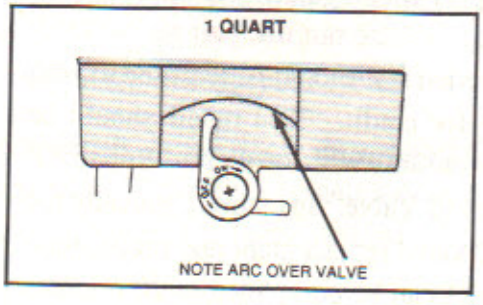


Fig. 17

1 Quart Fuel Tank (*fig. 17*)

Part No.	Color
492859	Black
493872	Yellow
493992	Red
493995	Gray

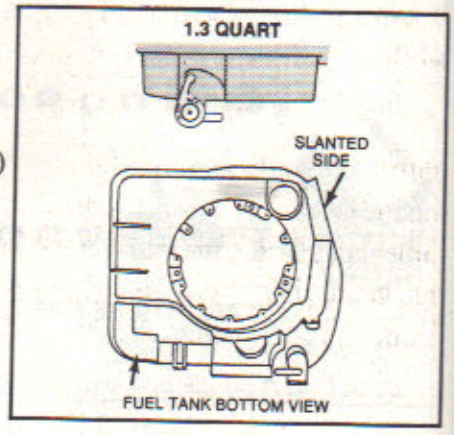


Fig. 16

1.3 Quart Fuel Tank (*fig. 16*)

Part No.	Color
493231	Black

TOP 10 HIT LIST — #2

Dirt Ingestion on Model 28 Air Cleaners

Improper servicing procedures or impact damage to an engine have contributed to a possible problem with the air cleaner base on model 28 engines. If the air cleaner fasteners have been over-tightened or if a solid object has struck the air filter assembly, bending can occur between the two welded components that make up the air cleaner base. Either occurrence will create an opening between the two pieces of metal, allowing unfiltered air to enter the engine, causing premature engine failure.

A quick fix to prevent this from occurring is to apply a sealant to both the inside and outside of the air cleaner base to prevent dirt from entering if the air cleaner base should be damaged. Make sure that whatever type of sealant is used, it is a flexible sealant, such as silicone, so that it will maintain a proper seal.

One other option, which is also the correction for the problem, is to replace the air cleaner base with a new one-piece base (*fig.* 19). This new filter base made of a single solid piece has been in production since 1989 and it is not susceptible to this type of damage.

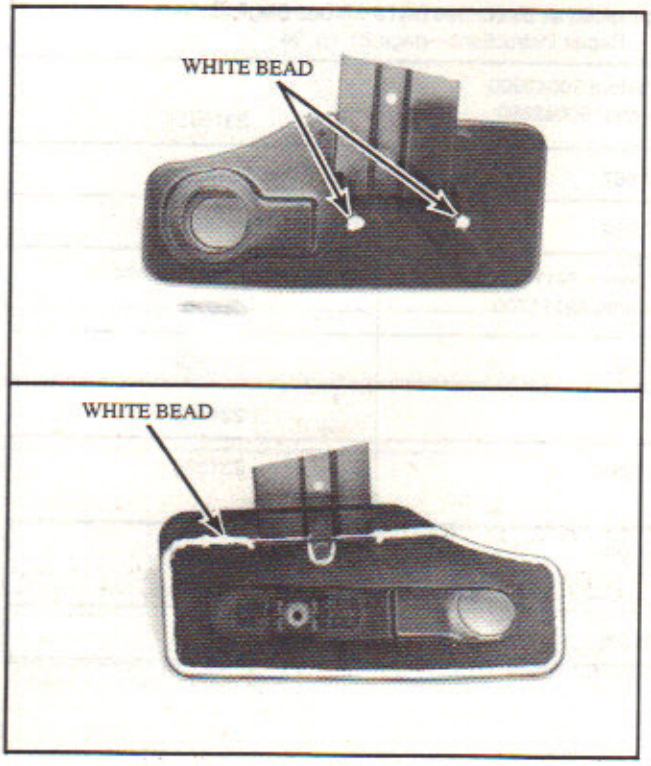


Fig. 18

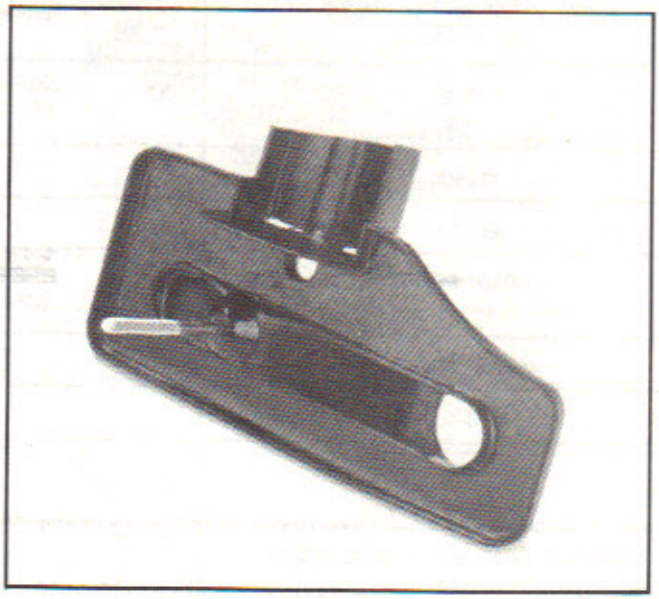


Fig. 19
p/n 491877

TOP 10 HIT LIST — #3

High-Altitude Jet

Some of these Top 10 problems are regional and they will have a greater effect on people in one part of the country and a lesser affect on others. An example of this type of problem is power loss due to high-altitude operation. All engines, large or small, will suffer this power loss because of a decrease of air density that comes with an increase in altitude. This power loss can be calculated by subtracting 3.5% of an engine's rated horsepower for every 1000 feet (304.8 meters) above sea level. The problem will also be compounded if the carburetor is not readjusted (leaned out) as the air density decreases. On a fully adjustable carburetor, this adjustment can be made easily by adjusting the high-speed fuel mixture screw to a leaner mixture. As the altitude is increased, the engine will still suffer a power loss because of the decrease in air density, but the adjustment will compensate for the loss caused by an engine running too rich. If the carburetor has a fixed high-speed jet, it must be replaced to compensate for this loss. Here is a list of all the high-altitude jets for fixed jet carburetors.

Fixed Jet Carburetors — High-Altitude Jets

Engine Model	High-Altitude Jet	STD Jet
83400, 90700, 100700, 110700, 120700, 130700	Remove high speed air bleed. See part # 270962 Single Cylinder Repair Instructions—page 26, fig. 94	
104700	231668 — before 90042900 231739 — after 90042800	231645
161400	231667	231654*
261700	231669	231660*
290400-[redacted] 294400	805537 [redacted] —before 89111800 805625 — after 89111700	[redacted] 805548 [redacted] 805634
400400-400700	231337	231339
404400-404700	231337	231339
402400-422400 402700-422700	231333	231338
402400—Type No.'s 0106, 0712, 0721, 1218	231339	231338
422400—Type No.'s 1217, 1220, 1230	231339	231338

* Available in kit only

805537 805548

TOP 10 HIT LIST — #4

Replacement Mufflers

A common request made of the Distribution Sales and Service Division is to identify replacement mufflers for specific engine models, as well as optional, hardware-like guard assemblies, deflector assemblies, and spark arresters. Briggs & Stratton has recently put out a new publication (form MS-3880) that covers all of this information and much, much more.

The Engine Accessories and Products Catalog has identifying photographs and service part numbers for things like:

- optional air intake systems
- optional controls
- exhaust systems
- fuel systems
- ignition and starting systems
- lubrication systems
- and other related engine products.

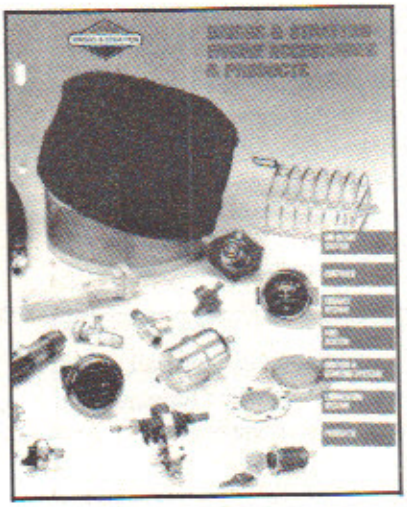


Fig. 20

Notes

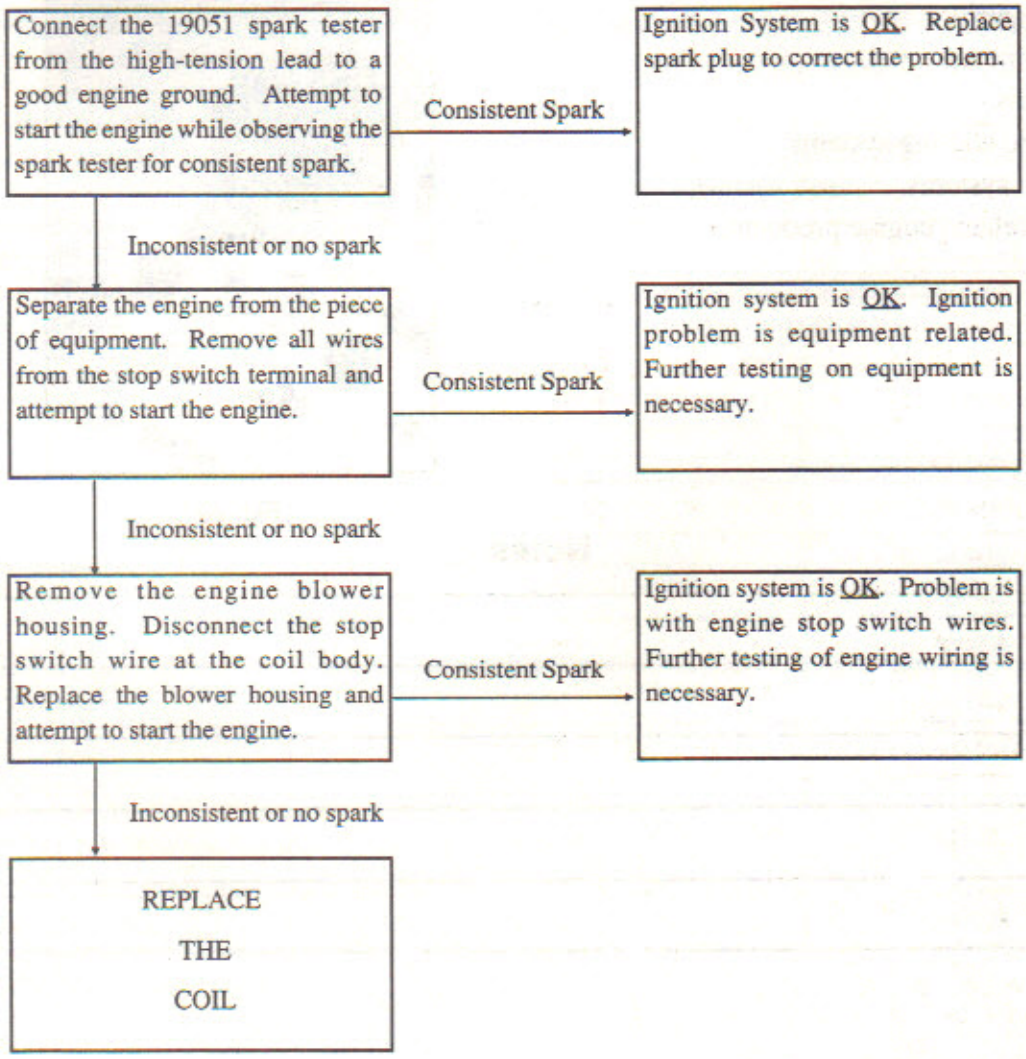
TOP 10 HIT LIST — #5

Ignition Coil Failure

There are two areas of concern when it comes to ignition coils:

- the proper systematic approach for testing coils is not being used.
- many coils are being replaced that do not need to be.

When you have a problem you believe is related to the ignition coil, use the systematic testing procedure below. You should not even consider replacing the coil unless you do not have a consistent spark in the last step of this procedure. By following this chart, you will be less likely to replace a perfectly good coil.



TOP 10 HIT LIST — #6

Piston Ring Identification

Twenty years ago, installing piston rings was not much of a problem. Most ring sets were of the same design and, in almost all cases, they were installed on a piston the same way. This, however, does not apply to today's ring sets. Technology has lead to many changes in piston ring design because of the increased demand for higher engine output combined with lower oil consumption. Unfortunately, the instructions for installing the rings did not keep up with the changes. So, to bring this information up-to-date, Briggs & Stratton has published a list of the most common ring sets with diagrams of how they are installed.

NOTE: For some ring sets, there is more than one figure listed. This indicates that the ring design has changed. Simply identify which of the drawings applies to the ring set, and install accordingly.

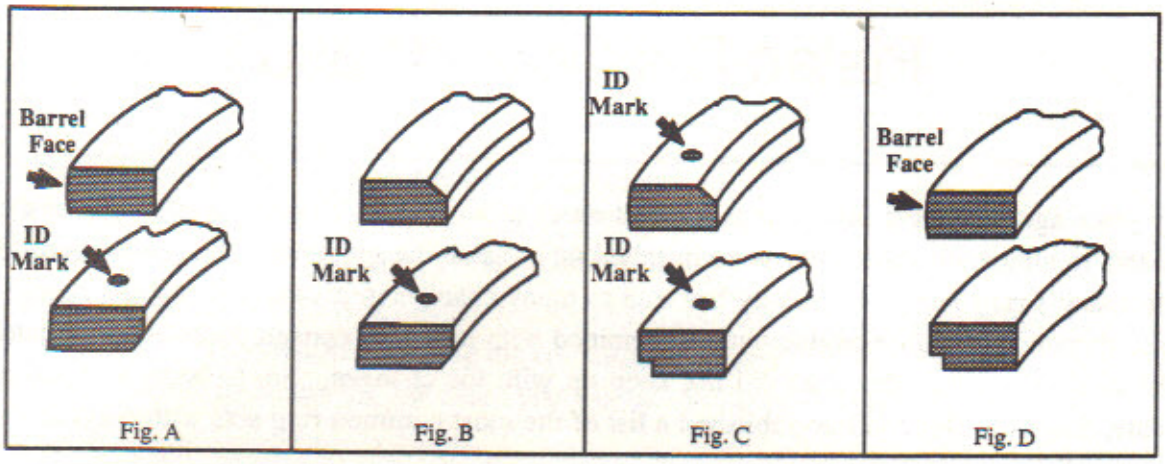
PISTON RING SPECIFICATIONS

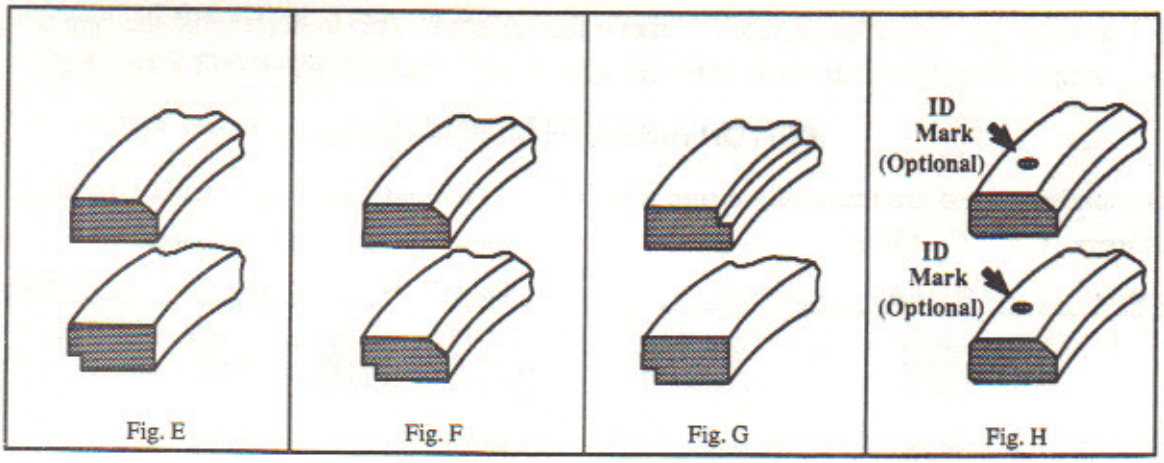
The part numbers listed are for standard ring sets. Refer to the illustrated parts list for oversize ring set part numbers. C.I. = Cast Iron

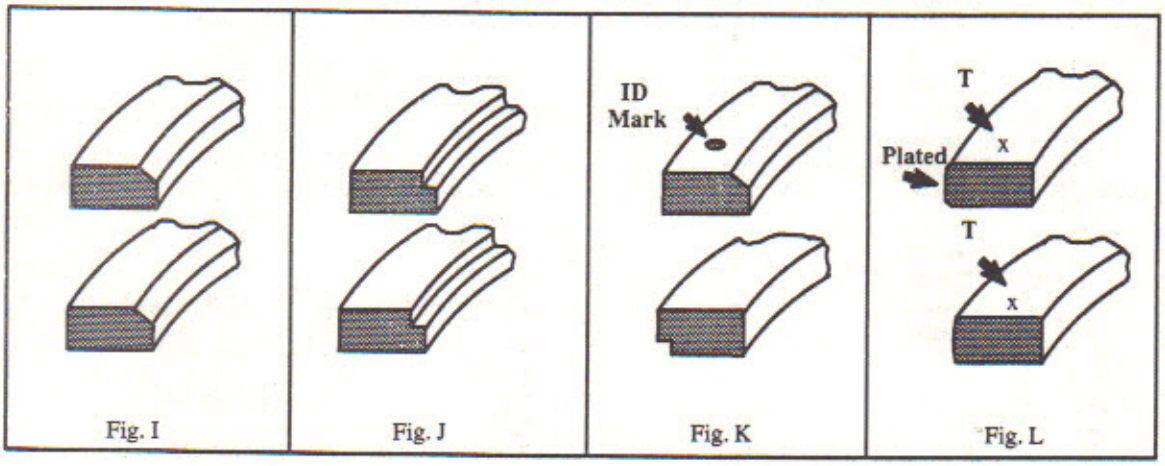
Engine Model	Ring Set	Figure
N	290290	E
Z	290630	G
B	290696	G
A, 9 C.I.	290820	E
14 C.I.	292096	I, J
23 C.I.	292100	J
6BH	293506	E, G
60100, 8BH	294232	E, F
61000	295649	E, G
80200	294232	E, F
81000	295657	E, F
92000	298982	D
97770	493782	D
100200-100900	298174	E, F, G
100700	490565	D
104700	492766	D
110900	391654	E, F
114900	396459	F
120700	493261	D

Engine Model	Ring Set	Figure
130000	298982	D
131000-After 85042100	399067	A
131000-Before 85042200	393835	E, F
140000-142000	297815	E, F
141000	295852	I, J
161400	491905	A
170000	391669	E, F, G
190000	391669	E, F, G
195000	393881	A, K
221400	394665	E, F
251000	391780	E, F
243400	299089	H
261700	492111	C
290000 - 303000	807620	L
300400	299690	H
320400	390484	H
401000	393277	B
400000 - 422000	394959	B

Note: In each figure shown the upper drawing represents the top compression ring. The lower drawing represents the center ring. Drawings are the same for both standard and oversize rings.







Note: Oil ring packages do not require a special installation procedure other than locating the bottom land on the piston.

TOP 10 HIT LIST — #7

Fuel Leakage Past Main Nozzle on Two-Piece Flo-Jet Carburetors

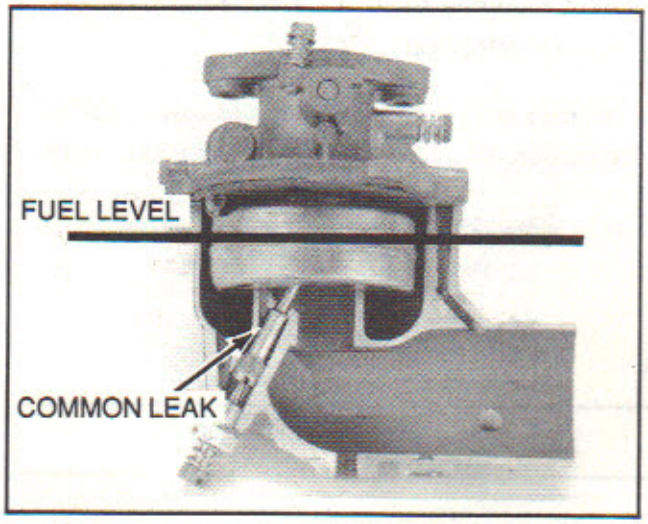


Fig. 21

One of the most common causes of fuel leakage in a two-piece flo-jet carburetor is an improper seal between the main nozzle and the lower half of the carburetor. It is a problem that is also hard to detect because the leak is inside the carburetor.

However, troubleshooting and correcting the problem does not have to be an expensive endeavor.

When disassembling the carburetor, check the needle and seat for dirt or damage. Next, check the float for proper level setting. If both appear to be in order, it is most likely that the leak is at the main nozzle.

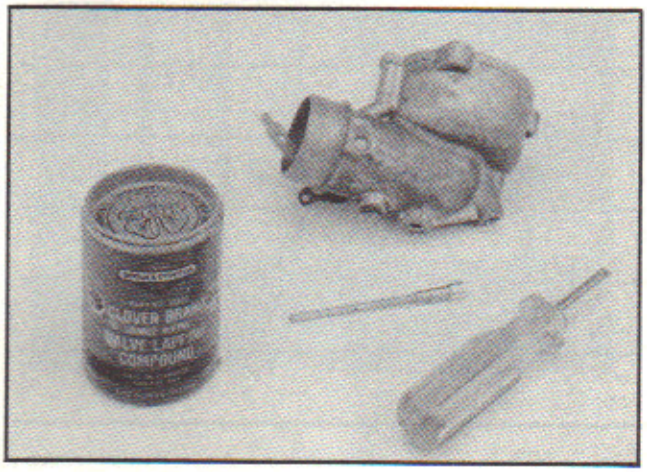


Fig. 22

There are three ways in which to correct this problem. First, take an old nozzle and grind all the threads off the outside. Do not leave any sharp edges that could damage the threads inside the carburetor. Next, put a small amount of white aluminum oxide or fine lapping compound on the shoulder of the nozzle. Using a screwdriver as a lapping tool, lap the nozzle into the carburetor. This will remove corrosion and restore a sealing surface. **NOTE:** *Be sure to thoroughly clean the carburetor before reassembly.*

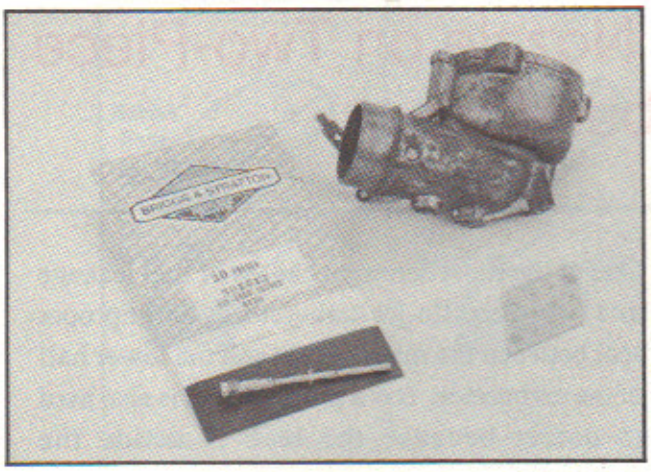


Fig. 23

Another way to correct this problem is to use a part from the 391413 carburetor repair kit for servicing a pulsa-jet carburetor. Using a Teflon washer from the kit, force the washer over the end of the nozzle. The washer will act as a gasket, stopping any leakage between the nozzle and carburetor body.

The third option is to replace the lower half of the carburetor or the entire carburetor assembly.

Notes

TOP 10 HIT LIST — #8

Finding Replacement Engines, Short Blocks, and Parts in Part Manuals

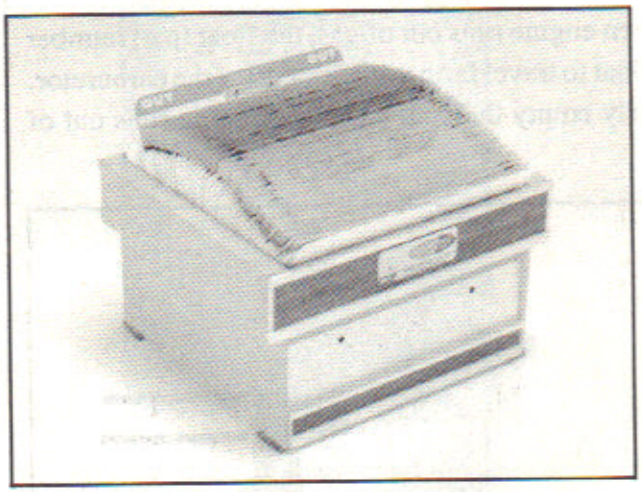


Fig. 24

The most up-to-date information available is contained in the white and yellow barred microfiche cards. Recently, Briggs & Stratton has made some internal changes to ensure that this information will be updated at least twice a year. As a result, up-to-date information will be available for 99% of the engines out in the field.

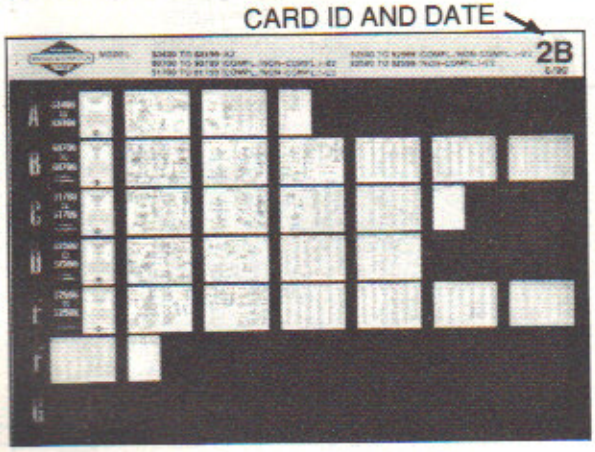


Fig. 25

During October, 1990, a microfiche mailing went out to all servicing dealers. With this mailing was a postcard that listed the most current date for each microfiche card. Check each microfiche card and its issue date against this postcard. If any microfiche cards are not up-to-date, damaged, soiled, etc., circle the card number on the postcard and return it to Briggs & Stratton. Briggs & Stratton will send you the current fiche card to update your information.

TOP 10 HIT LIST — #9

Using All the Gasoline in a Gas Tank

A problem still being reported is that some horizontal crankshaft (12, 19, 23 cubic inch) engine models are not consuming all the fuel in certain tanks.

To reduce the amount of gasoline left in the tank when then engine runs out of gas, the float (part number 99333) has been redesigned. This change will allow the float to travel farther in the bowl of the carburetor. This creates more draw on the tank gas line to completely empty the tank when the engine runs out of gas.

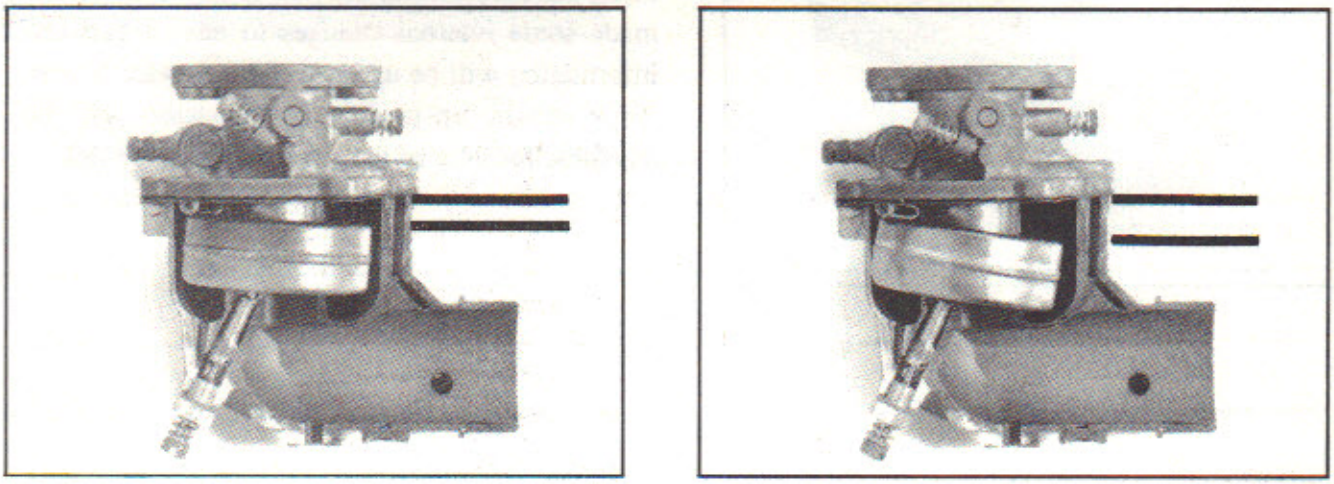


Fig. 26

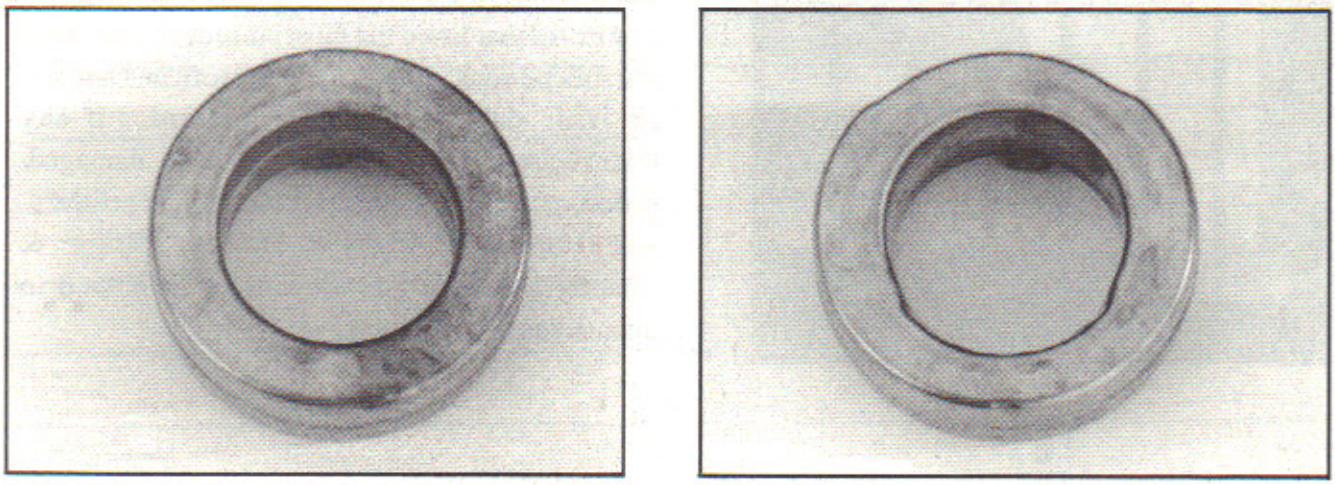


Fig. 27

TOP 10 HIT LIST — #10

Servicing 120 Volt, 1000 Watt Electric Motors

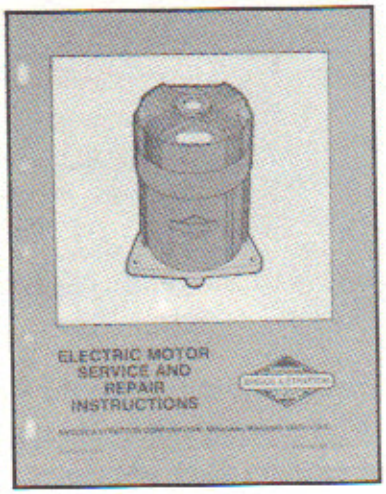


Fig. 28

Briggs & Stratton has received many inquiries from customers about providing service for the 120 volt, 1000 watt electric motor. Analysis of these inquiries shows two areas which contribute to the reluctance to service these motors. The first is insufficient service knowledge of the 1000 watt electric motor. Briggs & Stratton publication (Form MS-8247) Electric Motor Service and Repair Instructions should be used as a guide for servicing these motors.

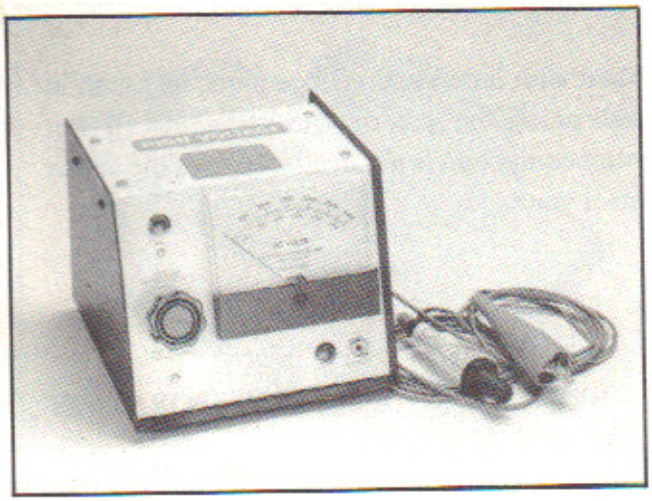


Fig. 29

The second problem is the lack of a particular specialized service tool for testing the 1000 watt electric motor. Whenever a 120 volt, 1000 watt electric motor has been serviced with individual parts, it must be high-pot tested to ensure safe operation. However, most Briggs & Stratton service shops do not have a high-pot tester. Rely on a local electric motor service shop to high-pot test the motor when required.

One way to overcome both of these problems is to follow the recommendations in Service Bulletin #580 (see next page). Whenever a 120 volt, 1000 watt electric motor fails because of a defect in parts or workmanship during the warranty period, replace the motor. Because of the high cost of service parts this same approach can be used after the warranty period. It may be more economical to replace the motor then it would be to repair it.

SERVICE BULLETIN

TO ALL AUTHORIZED SERVICE ACCOUNTS

No. 580
DATE 7/24/89
FILE IN Bulletin Binder

SUBJECT **120 Volt, 1000 Watt Electric Motors – Warranty Replacement**

The Briggs & Stratton 120 volt, 1000 watt electric motors used to power lawn and garden equipment are covered by a limited one-year warranty.

If any 120 volt, 1000 watt motor fails because of defects in parts or workmanship during the warranty period, the complete motor should be REPLACED — not repaired. Replacement motors are stocked by Central Sales and Service Distributors and are available through your regular source of supply.

When a 120 volt, 1000 watt motor is replaced under warranty, return the original motor with a warranty claim form in the same carton in which the new motor was received to your Central Sales and Service Distributor.

Briggs & Stratton 120 volt, 1000 watt motor may be repaired with individual service parts, as found in the Illustrated Parts List. However, no repair should be made unless the motor is checked with a Hi–Pot tester before placing the motor back into service. If proper test equipment is not available, take the motor to a qualified electric motor repair shop for resting, or contact your source of supply.

BRIGGS & STRATTON CORPORATION

Service Division

Engine Model 93900, 3.5 HP Sprint

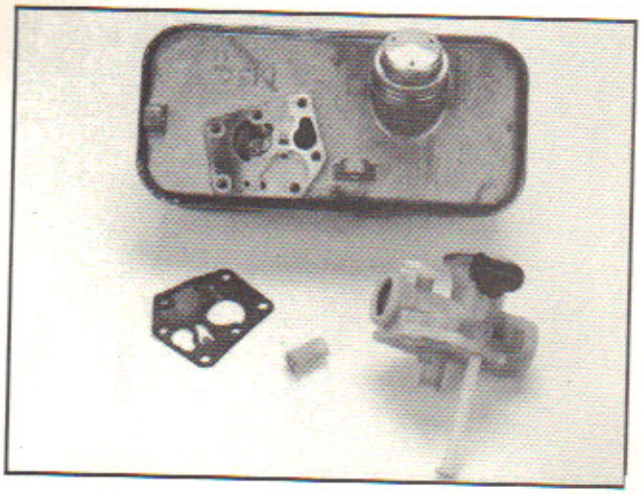


Fig. 1

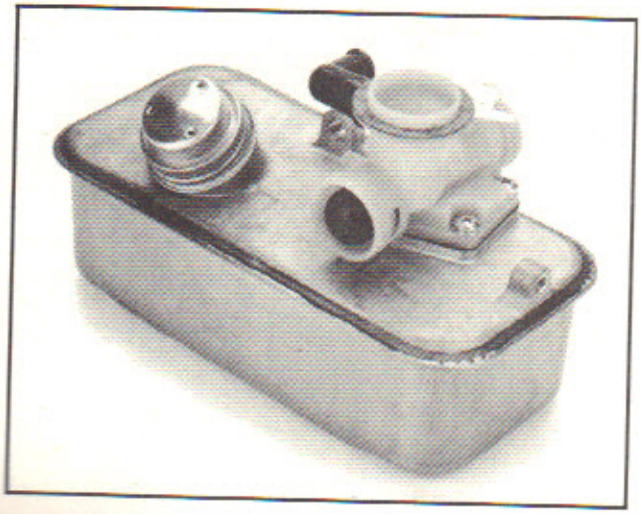


Fig. 2

Pulsa-Prime Carburetor

Engine model series 93900 may come equipped with a rather unique option next year—a pulsa-prime carburetor. The pulsa-jet carburetor has been redesigned and has undergone two major changes. First, the body of the carburetor is now injection molded glass reinforced nylon polymers. By using plastic, no machining is required.

Second, a wet bulb primer has been added to the carburetor. This eliminates the need for the automatic choke. The wet bulb primer will inject fuel directly into the throat of the carburetor for quick start with a cold engine. The primer bulb will also assist when starting an engine after refueling.

Other unique features designed into the new pulsa-prime carburetor are no idle system and no air or fuel adjustments. The governor system will allow for a 600 RPM decrease in speed from top no-load speed, but the engine will never reach a true idle speed.

The carburetor has a fixed high-speed jet that will provide fuel throughout the operating speed range of the engine.