

# Section 1

## GENERAL INFORMATION

Briggs & Stratton engines are of the same basic 4 stroke cycle design used in automobiles, aircraft trucks and tractors. As the name indicates, there are four strokes to one complete power cycle:

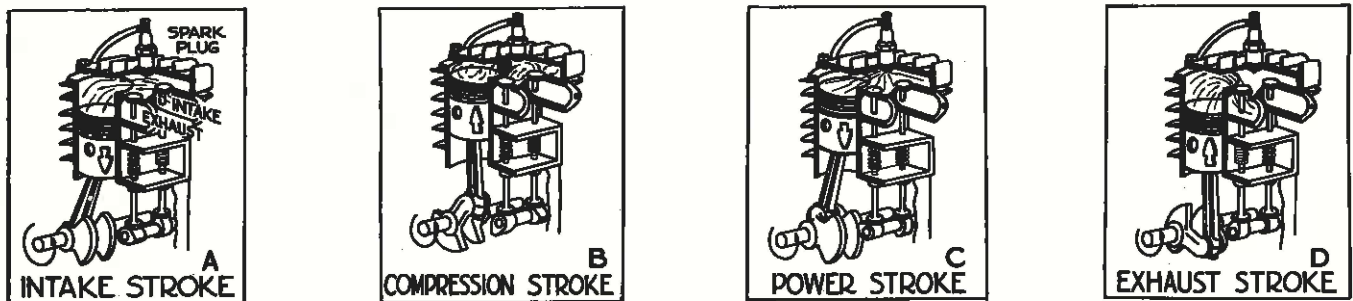


Fig. 1 - The 4-Stroke Cycle

- a. **INTAKE STROKE:** The piston goes down, creating a vacuum in the cylinder which draws gas through open intake valve into the space above piston.
- b. **COMPRESSION STROKE:** The piston comes up with both valves closed, highly compressing the gas into the space left between the top of the piston and cylinder head.
- c. **POWER STROKE:** At this point the magneto sends high tension current to the spark plug, firing or exploding the compressed gas and driving the piston down.
- d. **EXHAUST STROKE:** Exhaust valve opens and the upward stroke of the piston forces out all of the burnt gases, thus completing the power cycle.

### CAUTION

Exhaust gases contain carbon monoxide which is odorless and a deadly poison. Proper care must be taken to provide efficient ventilation when running an engine indoors.

Fill the crankcase and air cleaner with proper oil before starting engine. See that oil level is maintained.

Do not fill the gasoline tank while the engine is running. Avoid spilling gasoline on a hot engine — This may cause an explosion and serious injury.

### USE CLEAN GASOLINE

We recommend “regular” grade gasoline for all Briggs & Stratton engines. However, the use of lead-free, or low lead, gasolines will result in reduced combustion deposits and normally will improve engine life. Therefore, lead-free, or low lead, gasoline may be used, where available.

We also recommend that gasoline be purchased in small quantities, not more than a 30-day supply. FRESH gasoline minimizes gum deposits, and also insures a fuel with volatility tailored for the season.

# GENERAL INFORMATION

## CORRECT LUBRICATION IS IMPORTANT

1

Any high quality detergent oil having the American Petroleum Institute classification "For Service SC, SD, SE or MS" can be used in Briggs & Stratton engines. Detergent oils keep the engine cleaner and retard the formation of gum and varnish deposits.

### SUMMER

(Above 40° F.)

Use SAE 30

If not available,

Use SAE 10W-30

or

SAE 10W-40

### WINTER

(Under 40° F.)

Use SAE 5W-20 or SAE 5W-30

If not available,

Use SAE 10W or SAE 10W-30

Below 0° F,

Use SAE 10W or SAE 10W-30

Diluted 10% with Kerosene

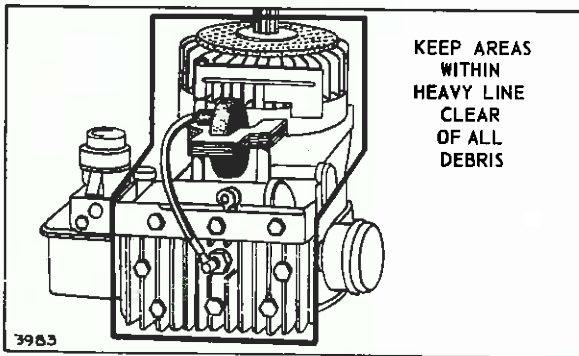
The oil recommendations are the result of extensive testing. No special additives should be used.

OIL SHOULD BE CHANGED AFTER EACH 25 HOURS OF ENGINE OPERATION. (More often under dirty operating conditions). In normal running of any engine, small particles of metal from the cylinder walls, pistons and bearings will gradually work into the oil. Dust particles from the air also get into the oil. If the oil is not changed regularly, these foreign particles cause increased friction and a grinding action which shorten the life of the engine. Fresh oil also assists in cooling, for old oil gradually becomes thick and loses its cooling effect as well as its lubricating qualities.

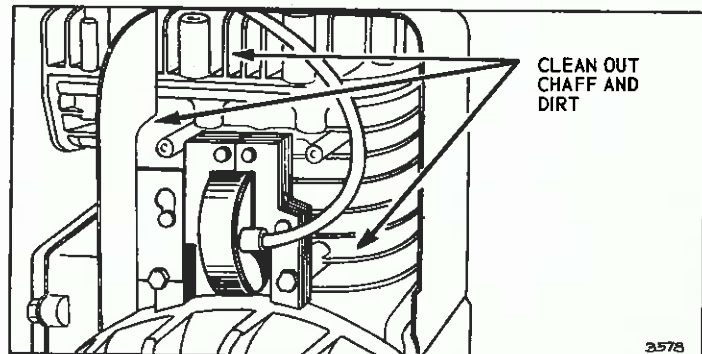
The air cleaner should be serviced every 25 hours of engine operation. Dirty operating conditions require more frequent servicing.

## CLEAN COOLING SYSTEM

Grass particles, chaff or dirt may clog the air cooling system, especially after prolonged service in cutting dry grasses. Continued operation with a clogged cooling system may cause severe overheating and possible engine damage. The figures below show the blower housing removed and area to be cleaned. This should be a regular maintenance operation.



Vertical Crankshaft



Horizontal Crankshaft

### TUNE-UP PROCEDURE

A "Tune-Up", see the steps listed below, would normally be performed on relatively new engines brought in for minor difficulties. By performing these steps you will either be sure that the engine is functioning properly or will know what major repairs should be made.

The steps are also covered in the Overhaul Procedure and will normally be performed as a part of the complete overhaul.

**STEP NO.**

|    |  |
|----|--|
| 1. | Remove air cleaner, check for proper servicing.  |
| 2. | Check oil level and drain. (Clean fuel tank and lines if separate from carburetor).  |
| 3. | Remove blower housing, inspect rope and rewind assembly and starter clutch.  |
| 4. | Clean cooling fins and entire engine. Rock flywheel to check compression.  |
| 5. | Remove carburetor, disassemble and inspect for wear or damage. Wash in solvent, replace parts as necessary and assemble. Set initial adjustment. |
| 6. | Inspect crossover tube or intake elbow for damaged gaskets.  |
| 7. | Check governor blade, linkage and spring for damage or wear, if mechanical also check adjustment.  |
| 8. | Remove flywheel, check for seal leakage, both flywheel and PTO sides. Check flywheel key.  |
| 9. | Remove breaker cover and check for proper sealing.   |

**STEP NO.**

|     |   |
|-----|---|
| 10. | Inspect breaker points and condenser. Replace or clean and adjust. Check plunger.   |
| 11. | Check coil, inspect all wires for breaks, damaged insulation. Be sure lead wires do not touch flywheel. Check stop switch and lead. |
| 12. | Replace breaker cover, use sealer where wires enter.  |
| 13. | Install flywheel, time engine if necessary. Set air gap. Check for spark with #19051 tester.  |
| 14. | Remove cylinder head, check gasket, remove spark plug, and clean carbon, inspect valves for seating.                                |
| 15. | Replace cylinder head, torque to specified torque, set spark plug gap or replace plug if necessary.                                 |
| 16. | Replace oil and fuel, check muffler for restrictions or damage.   |
| 17. | Adjust remote control linkage and cable if used, for correct operation.   |
| 18. | Service air cleaner, check gaskets and element for damage.  |
| 19. | Run and adjust mixture and top speed.   |

# GENERAL INFORMATION

## Overhaul Procedure

### OVERHAUL PROCEDURE

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The Overhaul Procedure which follows is intended to help you to become accustomed to a systematic method of repairing Briggs & Stratton engines. Naturally these steps could be rearranged in different order but efficiency is obtained when the repair operations are performed in the same sequence every time. The exact procedure will vary according to the engine model being repaired.

The Overhaul Procedure can also be used as an index. For information on how to perform most operations listed, refer to the page number or operation. Be careful to locate the instructions covering the specific model being repaired.

#### SECTION PAGE NO. DISASSEMBLY

|   |         |   |
|---|---------|---|
| 8 | 1       | Drain oil   |
| 3 | 1       | Air cleaner and stud  |
|   |         | Fuel pipe and tank assembly   |
|   |         | Air cleaner elbow or pipe   |
|   |         | Carburetor and linkage  |
|   |         | Carburetor intake elbow   |
|   |         | Muffler   |
| 3 | 18 & 5  | Check space between upper and lower carburetor body or carburetor to tank fit |
| 3 | 18      | Check throttle shaft and bushings for wear                                    |
|   |         | Disassemble carburetor  |
| 7 | 8 to 40 | Electric starter (110 V) (12 V)   |
|   |         | Blower housing  |
| 6 | 1       | Spin flywheel to check compression  |
| 2 | 1       | Spark plug - adjust gap (.030") and clean and wash                            |
|   |         | Fuel tank and bracket assembly or carburetor                                  |
| 2 | 3       | Rope starter pulley   |
|   |         | Blower housing  |
| 2 | 6       | Check air gap - armature to flywheel  |
| 5 | 1       | Governor blade  |
| 8 | 3       | Breather or valve cover   |
| 6 | 1       | Cylinder head and shield  |
| 6 | 3       | Check tappet clearance  |
| 6 | 2 & 3   | Valve and springs   |
| 2 | 3       | Rope starter pulley or recoil starter clutch                                  |
| 2 | 3 & 8   | Flywheel  |
| 2 | 6       | Breaker point cover   |
| 2 | 2 & 5   | Check breaker point gap   |
| 2 | 4       | Check breaker point plunger hole  |
| 2 | 4 & 7   | Test condenser and remove if necessary  |

#### SECTION PAGE NO. DISASSEMBLY (Continued)

|    |               |  |
|----|---------------|--|
| 2  | 6             | Test coil and remove if necessary  |
| 2  | 5             | Breaker arm assembly and condenser   |
| 2  | 8 & 13        | Breaker box  |
| 2  | 13            | Breaker shaft  |
| 10 | 4 & 5         | Check end play   |
| 10 | 1             | Remove burrs from crankshaft extension                                     |
| 10 | 1             | Crankcase cover, base or sump  |
| 10 | 7             | Auxiliary drive  |
| 11 | 6             | Damage seals   |
| 5  | 1 to 7        | Mechanical governor parts  |
| 8  | 4             | Inspect oil slinger  |
| 10 | 2             | Cam gear   |
|    |               | Tappets  |
| 9  | 1             | Connecting rod and piston  |
| 10 | 2             | Crankshaft - inspect and check   |
| 2  | 12            | Armature assembly and back plate   |
| 2  | 11 & 12       | Rotor  |
| 2  | 6, 8, 12 & 13 | Test coil or armature - check leads  |
| 11 | 3             | Crankcase cover or sump  |
| 10 | 2             | Crankshaft - inspect & check   |
| 10 | 2             | Cam shaft and gear   |
| 10 | 2             | Check automatic spark advance  |
|    |               | Tappets  |
| 11 | 1             | Cylinder - check bore, main bearing, valve guides and seats, cylinder bore |
| 9  | 1             | Disassemble connecting rod and piston                                      |
| 9  | 2 & 3         | Check piston, rings, connecting rod, piston pin                            |

# GENERAL INFORMATION

## Overhaul Procedure

1

| SECTION | PAGE NO.     | REPAIRS   |
|---------|--------------|---|
|         |              | Clean parts   |
| 11      | 1 & 2        | Resize cylinder bore to next oversize   |
| 6       | 3 & 4        | Replace valve guide - intake or exhaust   |
| 6       | 2            | Reface valves and seats and lap   |
| 6       | 4 to 6       | Replace valve seat insert   |
| 11      | 3 to 5       | Replace main bearings   |
| 11      | 6            | Replace oil seal  |
| 2       | 4            | Install breaker point plunger, bushing and plunger in cylinder (Internal breaker) |
| 2       | 9 & 10       | Install breaker point plunger bushing and plunger in cylinder (External breaker)  |
| 2       | 6 & 8        | Replace armature and governor blade   |
| 2       | 12 & 13      | Replace coil or armature or both  |
| 10      | 3            | Replace automatic spark advance, weight and spring                                |
| 3       | 17 & 18      | Replace throttle shaft bushing  |
| 3       | 3 to 26      | Repair carburetor   |
| 7       | 1, 2, 5 to 7 | Replace rewind starter spring and rope  |
| 7       | 3            | Starter clutch  |
| 11      | 3            | Remove ball bearing and re-assemble to crankshaft                                 |

| SECTION | PAGE NO. | REASSEMBLE   |
|---------|----------|--|
| 10      | 3 & 4    | Tappets, cam gear, camshaft                            |
|         | 5        | Crankshaft and bearing support                         |
|         | 5        | Crankshaft, bearing plate - adjust crankshaft end play |
| 9       | 3 & 4    | Piston, piston pin, connecting rod, rings              |
| 8       | 4        | Oil Slinger  |
| 5       | 1 to 7   | Mechanical governor                                    |
| 10      | 4        | Sump or crankcase cover - adjust crankshaft end play   |
| 6       | 3        | Adjust valve tappet clearance                          |
| 6       | 2 & 3    | Valves, springs, retainer                              |

| SECTION | PAGE NO.  | REASSEMBLE (Continued)  |
|---------|-----------|---|
| 2       | 6 & 8     | Coil, armature, governor blade                                |
| 2       | 5         | Breaker points (Internal system)                              |
| 2       | 5         | Condenser (Internal system)                                   |
| 2       | 13        | Breaker shaft - Magna-Matic                                   |
| 2       | 13        | Primary wire - Magna-Matic                                    |
| 2       | 8, 9 & 12 | Adjust Armature timing  |
| 2       | 7 & 14    | Condenser   |
| 2       | 7 & 14    | Adjust and clean breaker points (External)                    |
| 2       | 6 & 8     | Breaker point cover   |
| 2       | 12        | Coil and armature assembly                                    |
| 2       | 11 & 2    | Adjust rotor timing   |
| 2       | 7 & 14    | Breaker box cover   |
| 2       | 3         | Flywheel and starter pulley or clutch                         |
| 7       | 8 to 40   | Electric starter (110 V) (12 V)                               |
| 2       | 6, 8 & 9  | Adjust air gap - armature to flywheel                         |
| 2       | 1         | Check spark   |
| 8       | 3 & 4     | Breather or valve cover                                       |
| 6       | 1         | Cylinder head and shield                                      |
| 2       | 1         | Spark plug  |
|         |           | Muffler   |
|         |           | Intake elbow or carburetor and tank                           |
| 4       | 1 to 12   | Carburetor and linkage and governor controls                  |
| 5       | 1         | Check air vane governor                                       |
| 5       | 2 to 7    | Check and adjust mechanical governor                          |
|         |           | Blower housing  |
|         |           | Fuel filter parts, tank & line                                |
|         |           | Air cleaner elbow or pipe                                     |
| 8       | 1         | Fill crankcase with oil                                       |
|         |           | Start engine (fill with gas)                                  |
| 2       | 1         | Check spark   |
| 6       | 1         | Retighten cylinder head screws                                |
| 3       | 7 to 27   | Adjust carburetor   |
| 5       | 2, 3 & 6  | Set governor to obtain correct engine speed (Remote controls) |
| 3       | 1         | Clean, fill, assembly air cleaner                             |
|         |           | Spray engine and apply decals                                 |



# GENERAL INFORMATION

## Check-up

1

### CHECK - UP

Most complaints concerning engine operation can be classified as one or a combination of the following:

1. Will not start
2. Hard starting
3. Kicks back when starting
4. Lack of power
5. Vibration
6. Erratic operation
7. Overheating
8. High oil consumption

When the cause of malfunction is not readily apparent, perform a check of the Compression, Ignition and Carburetion Systems. This check-up, performed in a systematic manner, can usually be done in a matter of minutes. It is the quickest and surest method of determining the cause of failure. This check-up will point up possible cause of future failures, which can be corrected at the time. The basic check-up procedure is the same for all engine models, while any variation, by model will be shown under the subject heading.

**NOTE:** What appears to be an engine malfunction may be a fault of the powered equipment rather than the engine. If equipment is suspect, see Equipment, affecting engine operation.

#### Check Compression

Spin flywheel in reverse rotation (counterclockwise) to obtain accurate compression check. The flywheel should rebound sharply, indicating satisfactory compression.

If compression is poor, look for –

1. Loose spark plug
2. Loose cylinder head bolts
3. Blown head gasket
4. Burnt valves and/or seats
5. Insufficient tappet clearance
6. Warped cylinder head
7. Warped valve stems
8. Worn bore and/or rings
9. Broken connecting rod

#### Check Ignition

Remove the spark plug. Spin the flywheel rapidly with one end of the ignition cable clipped to the 19051 tester and with the other end of the tester grounded on the cylinder head. If spark jumps the .166" tester gap, you may assume the ignition system is functioning satisfactorily. Try a new spark plug.

If spark does not occur look for –

1. Incorrect armature air gap
2. Worn bearings and/or shaft on flywheel side
3. Sheared flywheel key
4. Incorrect breaker point gap
5. Dirty or burned breaker points
6. Breaker plunger stuck or worn
7. Shorted ground wire (when so equipped)
8. Shorted stop switch (when so equipped)
9. Condenser failure
10. Armature failure
11. Improperly operating interlock system

**NOTE:** If engine runs but misses during operation, a quick check to determine if ignition is or is not at fault can be made by inserting the 19051 tester between the ignition cable and the spark plug. A spark miss will be readily apparent. While conducting this test on Magna-Matic equipped engines, Models 9, 14, 19 and 23, set the tester gap at .060".

### Check Carburetion

Before making a carburetion check, be sure the fuel tank has an ample supply of fresh, clean gasoline. On gravity feed (Flo-Jet) models, see that the shut-off valve is open and fuel flows freely through the fuel line. On all models, inspect and adjust the needle valves. Check to see that the choke closes completely. If engine will not start, remove and inspect the spark plug. If plug is wet, look for —

1. Overchoking
2. Excessively rich fuel mixture
3. Water in fuel
4. Inlet valve stuck open (Flo-Jet carburetor)

If plug is dry, look for —

1. Leaking carburetor mounting gaskets
2. Gummy or dirty screen or check valve (Pulsa-Jet and Vacu-Jet carburetors)
3. Inlet valve stuck shut (Flo-Jet carburetors)
4. Inoperative pump (Pulsa-Jet carburetors)

A simple check to determine if the fuel is getting to the combustion chamber through the carburetor is to remove the spark plug and pour a small quantity of gasoline through the spark plug hole. Replace the plug. If the engine fires a few times and then quits, look for the same condition as for a dry plug.

### Equipment - Effecting Engine Operation

Frequently, what appears to be a problem with engine operations, such as hard starting, vibration, etc., may be the fault of the equipment powered rather than the engine itself. Since many varied types of equipment are powered by Briggs and Stratton engines, it is not possible to list all of the various conditions that may exist. Listed are the most common effects of equipment problems, and what to look for as the most common cause.

### Hard Starting, Kickback, or Will Not Start

1. Loose blade — Blade must be tight to shaft or adaptor.
2. Loose belt — a loose belt like a loose blade can cause a back-lash effect, which will counteract engine cranking effort.
3. Starting under load — See if the unit is disengaged when engine is started; or if engaged, does not have a heavy starting load.
4. Check remote Choke-A-Matic control assembly for proper adjustment.
5. Check interlock system for shorted wires, loose or corroded connections, or defective modules or switches.

### Vibration

1. Cutter blade bent or out of balance — Remove and balance
2. Crankshaft bent — Replace
3. Worn blade coupling — Replace if coupling allows blade to shift, causing unbalance.
4. Mounting bolts loose — Tighten
5. Mounting deck or plate cracked — Repair or replace.

### Power Loss

1. Bind or drag in unit — If possible, disengage engine and operate unit manually to feel for any binding action.
2. Grass cuttings build-up under deck.
3. No lubrication in transmission or gear box.
4. Excessive drive belt tension may cause seizure.

### Noise

1. Cutter blade coupling or pulley — an over-size or worn coupling can result in knocking, usually under acceleration. Check for fit, or tightness.
2. No lubricant in transmission or gear box.

# GENERAL INFORMATION

## BRIGGS & STRATTON NUMERICAL MODEL NUMBER SYSTEM

This handy chart explains the unique Briggs & Stratton numerical model designation system. It is possible to determine most of the important mechanical features of the engine by merely knowing the model number. Here is how it works:

- A. The first one or two digits indicate the CUBIC INCH DISPLACEMENT.
- B. The first digit after the displacement indicates BASIC DESIGN SERIES, relating to cylinder construction, ignition, general configuration, etc.
- C. The second digit after the displacement indicates POSITION OF CRANK-SHAFT AND TYPE OF CARBURETOR.
- D. The third digit after the displacement indicates TYPE OF BEARINGS and whether or not the engine is equipped with REDUCTION GEAR or AUXILIARY DRIVE.
- E. The last digit indicates the TYPE OF STARTER

| <u>CUBIC INCH DISPLACEMENT</u> | <u>FIRST DIGIT AFTER DISPLACEMENT</u><br>BASIC DESIGN SERIES | <u>SECOND DIGIT AFTER DISPLACEMENT</u><br>CRANKSHAFT, CARBURETOR GOVERNOR | <u>THIRD DIGIT AFTER DISPLACEMENT</u><br>BEARINGS, REDUCTION GEARS & AUXILIARY DRIVES | <u>FOURTH DIGIT AFTER DISPLACEMENT</u><br>TYPE OF STARTER                               |
|--------------------------------|--|---|---|---|
| 6                              | 0  | 0 -   | 0 - Plain Bearing   | 0 - Without Starter   |
| 8                              | 1  | 1 - Horizontal<br>Vacu-Jet  | 1 - Flange Mounting<br>Plain Bearing  | 1 - Rope Starter  |
| 9                              | 2  | 2 - Horizontal<br>Pulsa-Jet   | 2 - Ball Bearing  | 2 - Rewind Starter  |
| 10                             | 3  | 3 - Horizontal (Pneumatic)<br>Flo-Jet Governor                            | 3 - Flange Mounting<br>Ball Bearing   | 3 - Electric - 110 Volt,<br>Gear Drive  |
| 11                             | 4  | 4 - Horizontal (Mechanical)<br>Flo-Jet Governor                           | 4 -   | 4 - Elec. Starter-<br>Generator - 12 Volt,<br>Belt Drive                                |
| 13                             | 5  | 5 - Vertical<br>Vacu-Jet  | 5 - Gear Reduction<br>(6 to 1)  | 5 - Electric Starter<br>Only - 12 Volt,<br>Gear Drive                                   |
| 14                             | 6  | 6 -   | 6 - Gear Reduction<br>(6 to 1)<br>Reverse Rotation                                    | 6 - Alternator Only *   |
| 17                             | 7  | 7 - Vertical<br>Flo-Jet   | 7 -   | 7 - Electric Starter,<br>12 Volt Gear Drive,<br>with Alternator                         |
| 19                             | 8  | 8 -   | 8 - Auxiliary Drive<br>Perpendicular to<br>Crankshaft                                 | 8 - Vertical-pull Starter   |
| 20                             | 9  | 9 - Vertical<br>Pulsa-Jet   | 9 - Auxiliary Drive<br>Parallel to<br>Crankshaft                                      | * Digit 6 formerly used<br>for "Wind-Up" Starter<br>on 60000, 80000 and<br>92000 Series |
| 23                             |  |   |   |   |
| 24                             |  |   |   |   |
| 25                             |  |   |   |   |
| 30                             |  |   |   |   |
| 32                             |  |   |   |   |

### EXAMPLES

To identify Model 100202:

|               |                 |   |               |                |
|---------------|-----------------|---|---------------|----------------|
| <u>10</u>     | <u>0</u>        | <u>2</u>                                  | <u>0</u>      | <u>2</u>       |
| 10 Cubic Inch | Design Series 0 | Horizontal Shaft-<br>Pulsa-Jet Carburetor | Plain Bearing | Rewind Starter |

Similarly, a Model 92998 is described as follows:

|              |                 |   |   |                       |
|--------------|-----------------|---|---|-----------------------|
| <u>9</u>     | <u>2</u>        | <u>9</u>                                | <u>9</u>                                  | <u>8</u>              |
| 9 Cubic Inch | Design Series 2 | Vertical Shaft-<br>Pulsa-Jet Carburetor | Auxiliary Drive<br>Parallel to Crankshaft | Vertical Pull Starter |