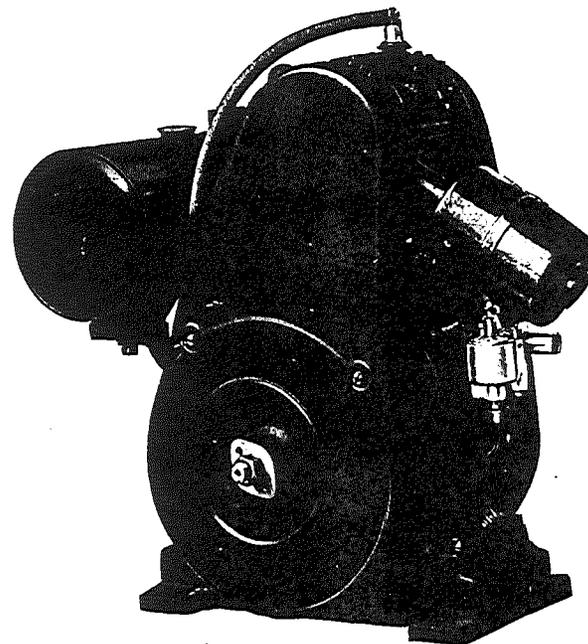




INSTRUCTIONS  
TYPE Q  
Briggs & Stratton Engine



**BRIGGS & STRATTON CORP.**

MILWAUKEE



WISCONSIN

# IMPORTANT SAFETY INFORMATION AND INSTRUCTIONS FOR ENGINE SELECTION ENGINE INSTALLATION ENGINE OPERATION

In the USA and Canada,  
our 24 hour hotline is:

18002333723

Briggs & Stratton Corporation  
Milwaukee, Wisconsin 53201

[www.briggsandstratton.com](http://www.briggsandstratton.com)

Keep these instructions for future reference.



**Before installing and operating this engine read and observe all warnings, cautions and instructions on both sides of this sheet, on the engine, and in the operating & maintenance instructions.**

**NOTE:** This sheet of instructions and safety information is not meant to cover all possible conditions and situations that may occur. Read entire Operating & Maintenance Instructions for this engine AND the instructions for the equipment this engine powers. Failure to follow instructions and safety information could result in serious injury or death.

The safety alert symbol () is used to identify safety information about hazards that can result in personal injury.

A signal word (DANGER, WARNING, or CAUTION) is used with the alert symbol to indicate the likelihood and the potential severity of injury. In addition, a hazard symbol may be used to represent the type of hazard.

 **DANGER** indicates a hazard which, if not avoided, will result in death or serious injury.

 **WARNING** indicates a hazard which, if not avoided, could result in death or serious injury.

 **CAUTION** indicates a hazard which, if not avoided, might result in minor or moderate injury.

**CAUTION**, when used **without** the alert symbol, indicates a situation that **could result in damage to the engine.**

## HAZARD SYMBOLS AND MEANINGS



Fire



Explosion



Moving Parts



Toxic Fumes



Hot Surface



Shock



Kickback

(OVER)

FORM MS-6445-01/03

# ENGINE SELECTION

 <b>WARNING</b>

<b>Failure to select the correct engine could result in fire or explosion.</b>

- Some engines are unique and designed for specific applications or types of equipment. If this engine will be used to build new equipment, contact Briggs & Stratton to ensure that the engine is appropriate for the intended use.  
**Note: For all Go-karts use only a model 136200 series engine, which offers improved safety and performance.**
- Replacement engines should be the same model as the original engine, or be the Briggs & Stratton designated replacement engine. Refer to the Operation & Maintenance Instructions for engine identification information.  
**Note: For all Go-karts use only a model 136200 series engine, which offers improved safety and performance.**
- Do not use Briggs & Stratton engines on 3-wheel All-Terrain Vehicles (ATVs), motor bikes, air craft products, or vehicles intended for use in competitive events. Briggs & Stratton does not approve of or authorize such uses.

# ENGINE INSTALLATION

- [1] Do not attempt to install this engine if you do not have the appropriate tools and knowledge of small engine installation procedures. Use only Briggs & Stratton parts. Contact your Authorized Service Dealer for assistance.
- [2] Do not modify the engine in any way without Briggs & Stratton factory approval. Any such modification is at the owner's sole risk.
- [3] If the exhaust system on the old engine was supplied by the equipment manufacturer, you must transfer the exhaust system and related components (original muffler and related pipes, brackets, clamps, and shields) to the new engine. All components must be in good condition.
- [4] 

 <b>WARNING</b>	Install muffler (and muffler deflector if used) so outlet points away from operator, fuel tank, and equipment, and so muffler heat will not damage or deform engine and components.
	
- [5] 

 <b>WARNING</b>	Ensure all fuel lines and fittings are properly assembled and do not leak. Replacement parts must be the same model as the original.
	
- [6] 

 <b>WARNING</b>	Ensure all wiring, including safety switches and engine shut-off components are completely installed and functioning properly.
	
- [7] Set engine speed to equipment manufacturer's specification. Refer to equipment manufacturer's manual. Do not tamper with governor springs, or other parts that will increase engine speed above specification.

- [8] 

 <b>WARNING</b>	All engine parts, including fuel cap, spark plug, muffler, air cleaner, and covers and guards for drive components (gears, belts, shafts, couplings, etc.) must be in place before attempting to start engine.
	
- [9] 

 <b>WARNING</b>	If engine is installed on walk behind lawn mower, all mower components, including cutting blade, must be correctly installed before attempting to start engine.
	
- [10] 

 <b>WARNING</b>	When working on the engine or equipment, remove spark plug wire from spark plug. For electric start, remove negative wire from battery.
	
- [11] 

 <b>WARNING</b>	Do not check for spark with spark plug removed. Use Briggs & Stratton spark tester #19368.
	

# ENGINE OPERATION

	 <b>WARNING</b>
<b>When adding fuel:</b>	
Turn engine off and let engine cool at least 2 minutes before removing gas cap. Fill fuel tank outdoors or in well-ventilated area. Fill tank to about 1 inch below lowest portion of neck to allow for fuel expansion. Keep gasoline away from sparks, open flames, pilot lights, heat, and other ignition sources.	
	 <b>WARNING</b>
<b>When starting engine:</b>	
Remove all external equipment/engine loads. Wait until spilled fuel is evaporated. Start engine outdoors. Pull cord slowly until resistance is felt, then pull rapidly. If engine floods, set choke to OPEN/RUN, place throttle in FAST and crank until engine starts.	
	 <b>WARNING</b>
<b>When operating equipment:</b>	
Do not tip engine or equipment at angle which causes gasoline to spill. Run engine outdoors. Do not run in enclosed area, even if doors or windows are open. Do not choke carburetor to stop engine.	

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### **Important—Please Read This Carefully**

In order that you may have the best service out of the Briggs & Stratton Type Q Engine, we ask that you read this booklet carefully and follow its suggestions. **BEFORE STARTING THE ENGINE BE SURE TO READ THE PARAGRAPHS ON "GAS," LUBRICATION," "STARTING" AND "STOPPING" ON PAGES 5, 6 AND 7.**

Whenever you find it necessary to write us with reference to this engine or to order parts **ALWAYS GIVE THE SERIAL NUMBER OF THE ENGINE AND THE TYPE LETTER IN YOUR LETTER.** This serial number and type letter will be found on the name plate riveted to the blower case.

### **Guarantee**

The Briggs & Stratton Type "Q" Engine is guaranteed for one year against defects in material and workmanship. If within this time any part is found defective it should be returned to us, carrier charges prepaid, and if after our inspection, the part is found to be defective, no-charge replacement will be made at once. Our guarantee is limited to replacement of parts and does not include any labor charges except in cases of new engines which are found not to operate satisfactorily from the start. In such cases write us, after having attempted to locate the trouble as outlined in this booklet and explain the difficulty as fully as possible. We will then advise you whether it will be necessary to return the entire engine to the factory for repairs.

### **Instructions for Use of Type Q Engine**

This engine has been carefully inspected and tested in our factory, after having been run for a considerable period, to insure it reaching you in first class condition, and unless something has happened to it since it left our factory, it should be ready to run when you get it. Be sure to read and follow the instructions in the following paragraphs before attempting to start the engine.

Even though the engine has been run in, it may still be slightly stiff to start with, and it is advisable, if possible, to start the engine for the first time without any load, or with as light a load as possible. If it seems a trifle stiff, a few hours running under light load will loosen it up.

It is important to keep the engine clean both inside and outside. Keep it clean on the outside by wiping off any dirt or spilled oil. Keep it clean within by seeing that no dirt enters when filling with either gas or oil. Al-

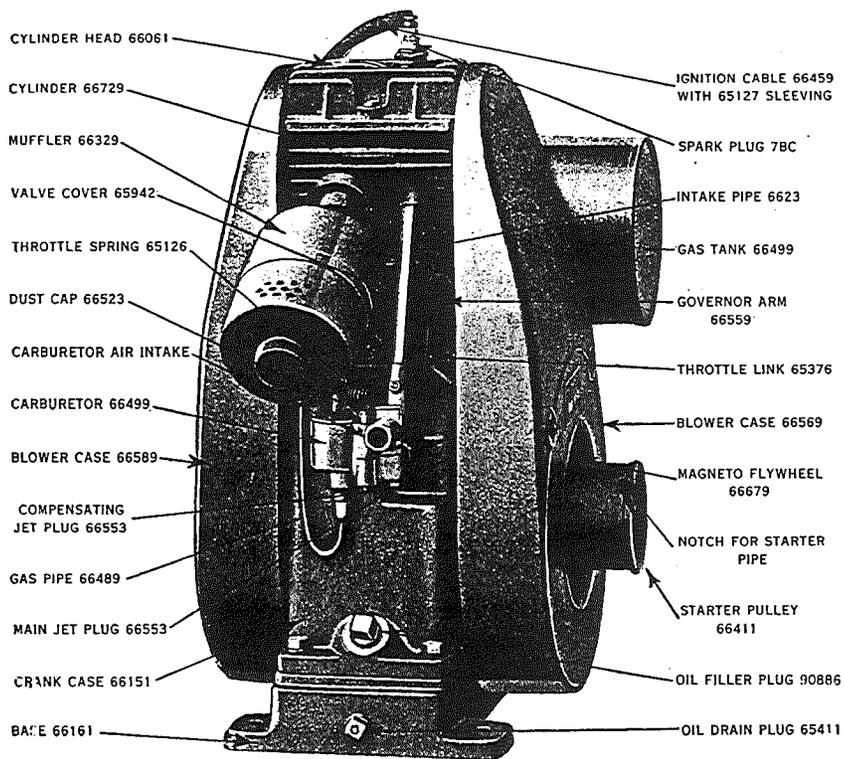


Figure One—Type Q Engine.

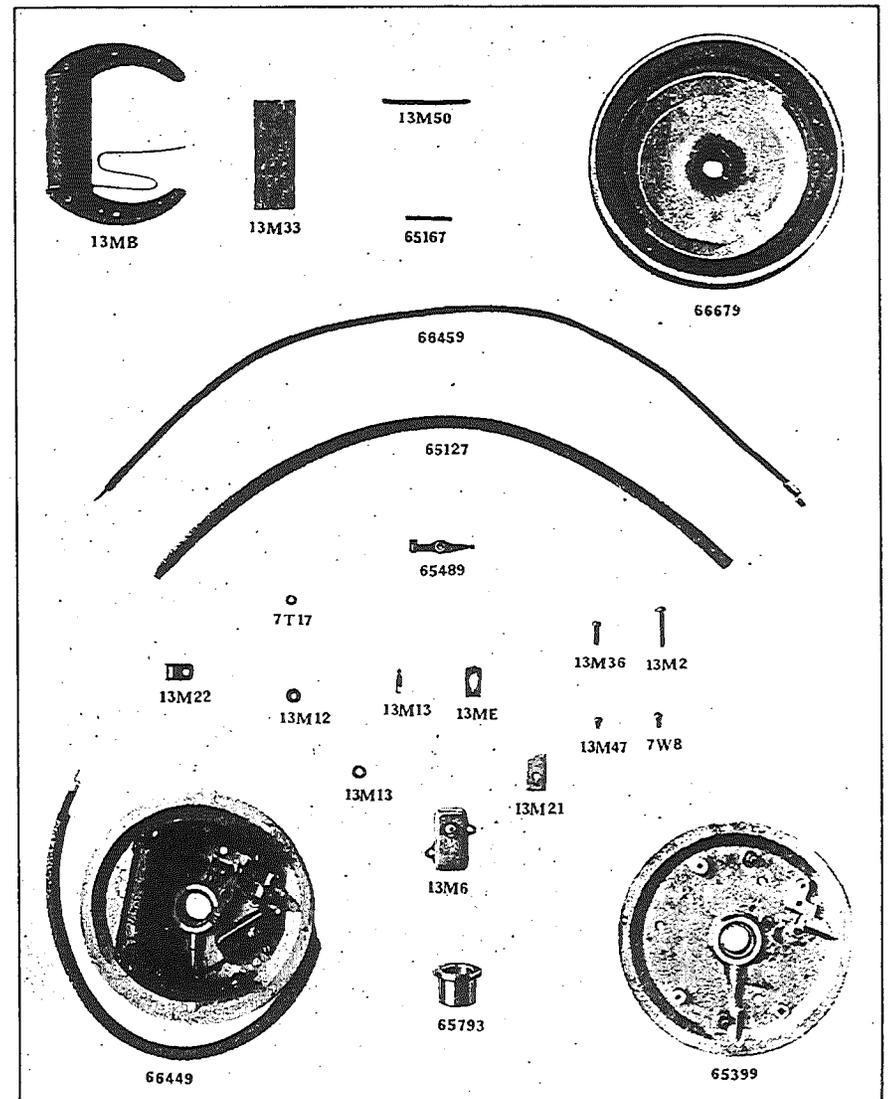


Plate 6—Parts of Magneto.

- 13M17 Bracket Washer (Shown on Plate as 13M13)
- 13M21 Bracket Shim
- 13M22 Ignition Cable Clamp
- 13M33 Coil Insulator
- 13M36 Fil. Head Screw No. 10-32 U. S. S. Thd. x  $\frac{5}{8}$ " lg. for Contact Bracket
- 13M47 Fil. Head Machine Screw No. 10-32x $\frac{1}{4}$ " lg. for Condenser
- 13M50 Armature Lead Insulator 3" lg.
- 7T17 Lock Washer 3/16"
- 7W8 Fil. Head Machine Screw No. 10-32 U. S. S. Thd. x  $\frac{3}{8}$ " lg. for Cable Clamp

ways wipe off the oil plug and pipe before removing the plug to replenish oil supply. Take care to see that no dirt enters your oil or gas can. Always keep your oil or gas in closed containers. We recommend the use of an air cleaner whenever the engine is used outdoors or wherever there is much dust or dirt in the air. Most dust is of a very abrasive nature and will cause more damage to the cylinders, pistons and bearings than any amount of running without the presence of grit in the engine. We do not furnish an air cleaner but have arranged the carburetor for the installation of an air cleaner.

The engine is shipped completely assembled with the exception of the spark plug, which, to keep in better condition, is packed separately in the crate. The cork should be removed from the spark plug opening in the cylinder head and the spark plug screwed in place tightly, using the gasket furnished with the plug to get a good seal preventing a compression leak. Examine the plug before inserting it to make sure it is not cracked and that the points are separated by about .020 inches. This is about the thickness of a thin dime or a little more than 1/64 inch. Unless the spark gap is right the engine will not run satisfactorily. Attach the ignition cable firmly to the spark plug.

### Gasoline

None but good grades of gasoline should be used. In cold weather, high test is recommended on account of the easier starting. Always be sure your gasoline is clean, as dirt in the gasoline may clog the carburetor.

The gas tank is filled by removing the filler plug and pouring in the gas until full. Under full load conditions this gas will last a half day continuous running.

The first time you fill the gas tank open the pet cock under the tank and remove the dust cap from the top of the carburetor and see if the carburetor float pin projects up out of the carburetor body. If it does, you can be sure gas is reaching the carburetor. If this pin does not project up in the air, the gas is not coming down through the gas pipe, probably due to air being trapped in the pipe. Blowing into the tank filler opening will usually force the gas down, pushing the float pin up. Then hold the pin down and continue blowing until gas flows freely out of the pin hole. The vent hole in gas tank filler plug must be kept open, clean it out occasionally.

Never allow gasoline to stand in uncovered pans or pails or leave the cap off the gasoline tank, as any water or dirt entering the carburetor may

stop the engine and much time be lost before the cause of the trouble is located. One drop of water in the carburetor jet will usually prevent the flow of gasoline.

### Oil

We recommend the use of Mobiloil "A" under ordinary conditions and for exposed use in cold weather, we recommend Mobiloil Arctic, or high grade oil of equivalent grade and quality. It is very important not to use cheap or unknown oils in an air cooled engine. There is an oil filler opening on either side of the engine. Use whichever one is most convenient. See Figure 1, for location of this opening and drain plug. Remove the plug, first wiping off the dirt around the opening, and on the plug, and fill until the oil overflows. Then the oil reservoir is full, provided engine is setting level, otherwise allowance must be made accordingly. This oil supply should last a full working day. It is advisable to replenish the oil supply every day that the engine is used.

Every 50 running hours the drain plug on either side should be removed, and the oil drained out and an entirely new oil supply added. In case the engine is not setting level, the lower of the two drain plugs should be used. It is advisable to drain the engine while it is hot.

When the engine is new the oil consumption may be a little greater than usual and the first few days the oil supply should be watched carefully and it will probably be advisable to add oil twice a day the first few days if the engine is run all day.

Read the paragraph headed "Lubrication" for additional information on this subject, which is most important for satisfactory performance.

### Starting

After having filled the gas tank and filled the oil reservoir, open the pet cock under the gas tank and the first time, at least, remove the carburetor dust cap to make sure the float pin rises through the top of the carburetor. In cold weather it is advisable to push down this float pin to flood the carburetor. This should not be necessary except when the engine is quite cold.

Slip the knot of the starter rope into the notch on the starter pulley and wind all the rope on the pulley snugly, winding in a clockwise direction when facing the engine from the starter pulley side. Put one finger over the end of the carburetor air intake pipe partially closing the opening to

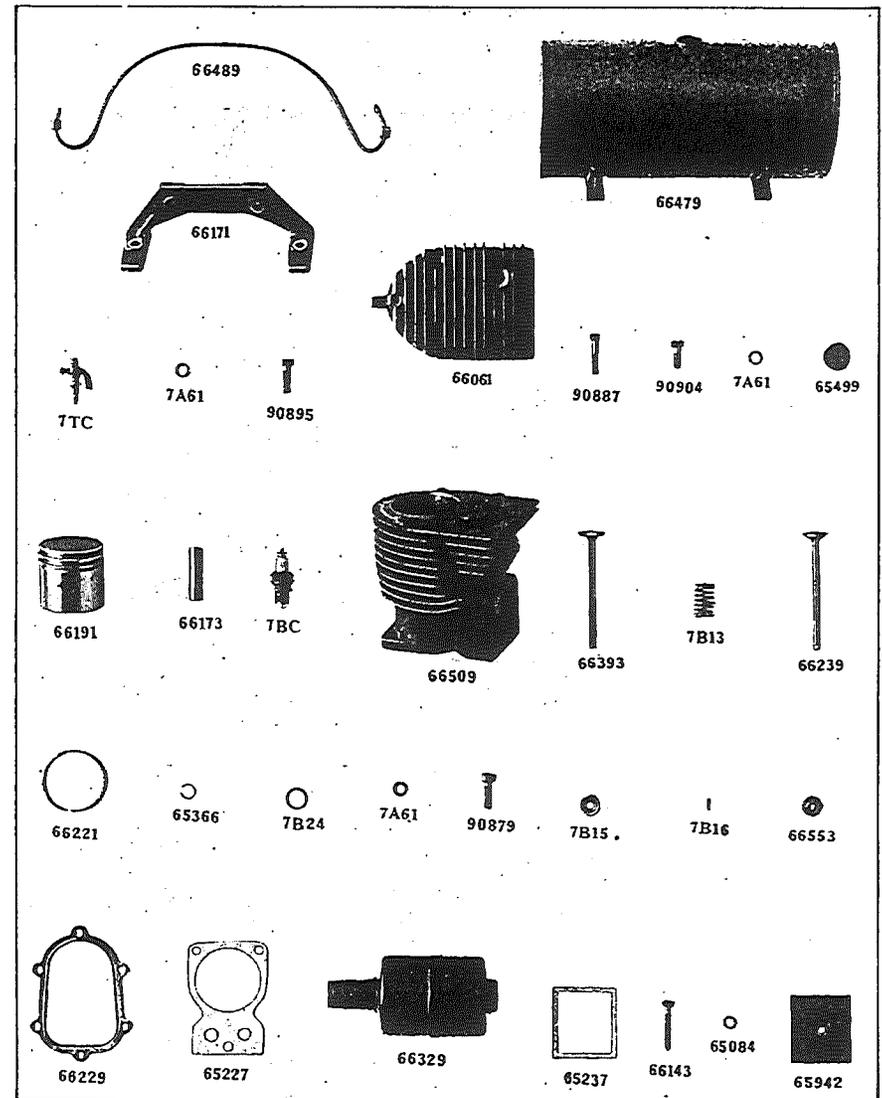


Plate 5—Parts of Cylinder and Gas Tank Division.

- \*66539 Piston Assem. .020" Over Size, consisting of 66321 Piston, 66351 Piston Ring, 65366 Piston Pin Lock
- \*66549 Piston Assem. .030" Over Size consisting of 66331 Piston, 66361 Piston Ring, 65366 Piston Pin Lock
- 66553 Valve Spring Support
- 66729 Cylinder Assem. consisting of Cylinder, 66239 Intake Valve, 66393 Exhaust Valve
- 90879 Fil. Head Cap Screw 5/16"-18 U. S. S. Thd. x 1½" lg. for Cylinder Head
- 90887 Hex. Head Cap Screw ⅜"-16 U. S. S. Thd. x 1¼" lg. for Cylinder
- 7A61 Lock Washer ⅜"x½"x3/32" for Cylinder
- 7BC Spark Plug with 7B24 Gasket
- 7B13 Valve Spring
- 7B15 Valve Spring Collar
- 7B16 Valve Pin
- 7B24 Spark Plug Gasket

Note: \*Pistons and Rings can be furnished over sized. See Assemblies 66529—.010" O. S., 66539—.020" O. S., 66549—.030" O. S.

#### GASOLINE TANK DIVISION (PLATE 5)

Part No.	Description
65499	Tank Cap
66171	Tank Support
66499	Gasoline Tank
66489	Gasoline Pipe
90895	Hex. Head Cap Screw ⅜"-16 U. S. S. Thd. x 1" lg. for Gasoline Tank
90904	Hex. Head Cap Screw ⅜"-16 U. S. S. Thd. x 1¼" lg. for Tank Bracket
7A61	Lock Washer ⅜"x½"x3/32" for Tank and Tank Bracket
7TC	Shut-Off Valve

#### MAGNETO DIVISION (PLATE 6)

Part No.	Description
65127	Ignition Cable Sleaving
65167	Condenser Lead Insulator 1¾" lg.
65399	Magneto Crank Case Cover
65489	Breaker Arm with Point and Fibre Bushing
65793	Bushing for Magneto Crankcase Cover
66449	Magneto Assembly
66459	Ignition Cable
66679	Magneto Fly Wheel
13MB	Armature
13ME	Contact Bracket & Point
13MC	Condenser
13M2	Fil. Head Machine Screw No. 10-32x1¼" lg. for Armature
13M12	Bracket Bushing
13M13	Breaker Arm Spring

choke the engine. If an air cleaner is used it will have to be removed to do this.

Grasp the cord firmly and give it a fast, hard pull so as to spin the engine. The rope will disengage at the end of the pull. It may be necessary to repeat this once or twice if the engine is cold. As soon as the engine begins to turn over, remove finger gradually from the air intake pipe. If the engine slows down or sputters immediately, choke it a little more.

When the engine is hot it is not necessary to choke the carburetor at all. Merely spin the engine over with the rope.

If the engine fails to start and you are sure you have followed all instructions, read the paragraph headed "If the Engine Fails to Start" on page 14.

When starting the engine it is advisable to have the engine disconnected from the load as much as is possible, as this will enable you to spin it more swiftly with the rope. After a little practice you will acquire the knack of spinning the engine quite fast with the rope.

#### Stopping

To stop the engine depress the large end of the governor arm and hold it down until the engine stops.

#### Lubrication

It is an accepted fact in the automotive industry that over 50% of all repair bills are directly traceable to damage resulting from the improper use of lubricants.

The dangers of incorrect lubrication are many. It results in overheating, fouling of spark plugs, damage to bearings, scoring of piston and cylinder surfaces. It means loss of both time and money—delays, tie-ups and repairs.

Correct lubrication avoids all these troubles and annoyances. Therefore use a quality oil of the correct grade for the Briggs and Stratton Engine; use it properly and you will obtain most satisfactory results.

The Briggs and Stratton Type Q is a single-cylinder, 4-cycle, air-cooled engine. Bore of 2¾, stroke 3¼ inches. Careful workmanship and good materials make this engine a dependable unit. With proper care it should give long and satisfactory service.

## Determining the Correct Lubricant

The selection of the correct body and character of oil for an automotive engine is a problem requiring careful study by competent engineers, familiar with the design and construction of automotive units, as well as with the performance of lubricants under the various conditions of service encountered.

It is based upon many different features of design, construction and operation of the engine, all of which may be classified generally under four basic lubrication factors, namely, operating temperatures, oil distribution, piston seal and carbon formation.

Engine operating temperatures are affected principally by the service the engine performs, the type of cooling system, kind of fuel employed, the engine speed and the size of the cylinder bore.

As the proper functioning of the lubricating system depends almost entirely upon the use of the correct oil, this must be of such body and character as will be reliably circulated and distributed to all the working parts under all temperature conditions encountered in service. Some lubricating systems are adapted for the perfect circulation of all oils, from the heaviest to the lightest bodied. Others require oils of special fluidity. To make sure that the oil, which satisfactorily meets the temperature conditions, will be properly distributed, the characteristics of the lubricating system must be analyzed.

Again, the lubricant which is correct for both operating temperatures and the lubricating system must also be of such character as to minimize carbon formation and at the same time seal the piston rings against the highly compressed gases on the compression and power strokes.

## Lubricating System

Lubrication of the engine is accomplished by means of the splash circulating system. A positive action plunger pump, actuated by the cam shaft, pumps the oil from the bottom of the crankcase, which serves as the reservoir, into a trough or dam, maintaining a constant level of oil in this trough, irrespective of the amount of oil in the reservoir below. Into this trough

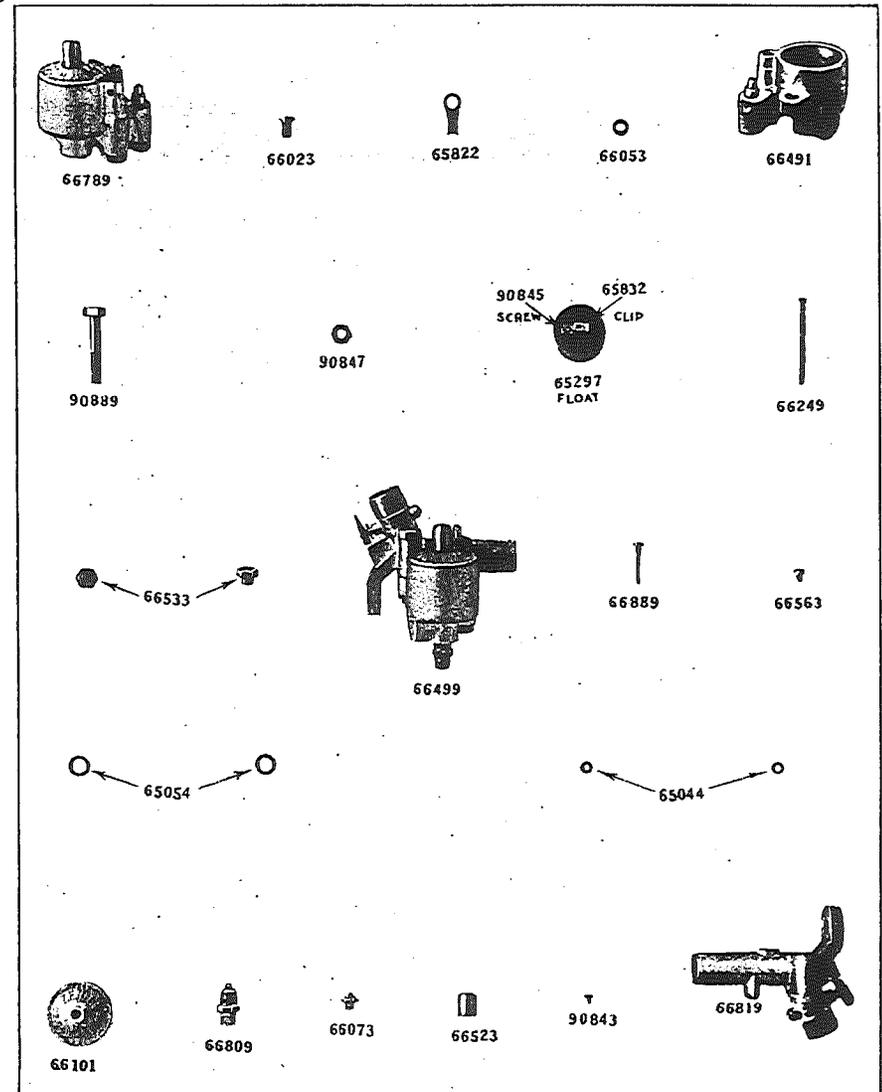


Plate 4—Parts of Carburetor Division

65054 Lower Plug Washer  
 65297 Float  
 65822 Bowl Cover Spring  
 65832 Float Clip  
 66023 Bowl Cover Spring Screw  
 66053 Bowl Cover Spring Screw Spacer  
 66073 Dust Cover  
 66101 Bowl Cover  
 66249 Needle Valve  
 66491 Bowl  
 66523 Dust Cap  
 66533 Lower Plug  
 66563 Compensating Jet No. 10  
 66889 Main Jet Assembly No. 10  
 90843 Channel Screw  
 90845 Float Clip Screw

#### CYLINDER DIVISION (PLATE 5)

Part No.	Description
65084	Fibre Washer for Valve Cover Screw
65227	Cylinder Gasket
65237	Valve Cover Gasket
65366	Piston Pin Lock
65942	Valve Cover
66061	Cylinder Head
66143	Hex. Head Cap Screw 5/16"-18x2" lg. for Valve Cover
66173	Piston Pin
*66191	Piston Standard Size
*66221	Piston Ring—Standard Size
66229	Cylinder Head Gasket
66239	Intake Valve
66311	Piston .010" Over Size
66321	Piston .020" Over Size
66329	Muffler
66331	Piston .030" Over Size
66341	Piston Ring .010" Over Size
66351	Piston Ring .020" Over Size
66361	Piston Ring .030" Over Size
66393	Exhaust Valve
66509	Cylinder Assem. consisting of 66729 Cylinder with valves, 7B15 Valve Spring Collar, 7B13 Valve Spring, 66553 Valve Spring Support, 7B16 Valve Pin
*66519	Piston Assem. Standard Size, consisting of 66191 Piston, 66221 Piston Ring, 65366 Piston Pin Lock
*66529	Piston Assem. .010" Over Size, consisting of 66311 Piston, 66341 Piston Ring, 65366 Piston Pin Lock

the splasher on the lower end of the connecting rod dips, distributing the oil in the form of a fine spray throughout the whole interior of the engine. By this means all moving parts are kept lubricated at all times. All surplus oil returns to the reservoir for recirculation.

#### Draining Crankcase Oil

To reduce wear and maintain the efficiency of the engine, the lubricant must be kept in serviceable condition. This can only be done by draining the crankcase at regular intervals and filling with fresh oil.

Oil does not break down or undergo any permanent thinning when it is heated. When diluted with a certain amount of fuel, however, its body may be reduced so that it will not properly separate the friction surfaces. Dilution is especially troublesome in cold weather.

The crankcase oil also becomes contaminated with dust, drawn through the air intake of the carburetor into the combustion chamber, which works past the rings, and by dust entering through the crankcase breather. Particles of worn metal or carbon which flakes off the underside of the piston heads also contribute to this contamination. The accumulation of worn metal particles is greatest in a new engine, while the friction surfaces are being "worn-in" to a permanent finish.

Therefore, to prolong the life of the engine, the crankcase should be drained of used oil after every 50 hours of operation, and refilled with fresh oil of the recommended grade. In case the engine is not setting level, the lower of the two drain plugs, shown in Figure 1, should be used.

Drain the reservoir after a run when the engine is hot. The oil is then more fluid and thoroughly mixed and will carry off sediment more readily.

Do not flush with kerosene because quantities of it will be trapped in the engine and will remain to dilute the fresh oil.

#### Carburetor

This engine is equipped with a Zenith Carburetor of the fixed adjustment type. There is therefore no adjustment possible or necessary. It is practically fool proof. The carburetor should be left alone except for cleaning.

EVERY FEW WEEKS IT IS ADVISABLE TO CLEAN THE CARBURETOR JETS IF THE ENGINE IS USED STEADILY. First shut off the gasoline stop cock under the gas tank. Then unscrew the two jet plugs in the bottom of the carburetor and also the two jets found one under each plug. Under each plug and also under each jet will be found a small washer which may or may not drop out as the plug or jet is removed. It is very important that these washers be kept and replaced when replacing the plugs and jets.

Clean out the jets with air or gasoline. Usually any dirt can be blown out. Under no circumstances use a wire to clean them out, as this may enlarge the hole, which is made with great accuracy to exact size required.

If no gas seems to be supplied to the engine, first make sure that there is gas in the tank, that the pet cock is open and that the vent hole in filler cap of gas tank is not plugged up. Then take off the dust cap from the top of the carburetor and make sure that the float pin rises. Push down the float pin; gas should now come out of the hole in the top. If it does not and pin does not rise out of the hole while there is gas in the tank, and the pet cock is open, the gas pipe is clogged up. Blowing into the gas tank may help. If not, remove gas pipe and pet cock and clean out. There is a screen in the pet cock and also in the fitting in the bottom of the carburetor, either of which may be clogged. If there is gas in the bowl of the carburetor as indicated above, and still no gas reaches engine, clean out the jets as described in preceding paragraphs.

### Speed Regulation

The speed is regulated by a pneumatic governor operating the throttle of the carburetor. This adjustment is set at the factory to run the engine at the proper speed under full load and there should ordinarily be no occasion to change it.

If the speed is not right, however, adjustment can easily be made. Immediately in the rear of carburetor will be found a double arm lever attached to a small stem entering the carburetor. From one arm extends a wire to the governor arm, and from the other a coil spring to a small bracket fastened to the crankcase by a screw. Loosen this screw and move the bracket to the right to decrease speed and to the left to increase speed.

There is a spring (governor stop) fastening to the center of the large governor arm which should be set so that the movement of the arm will not quite shut off all of the gas. If this spring is too strong the engine

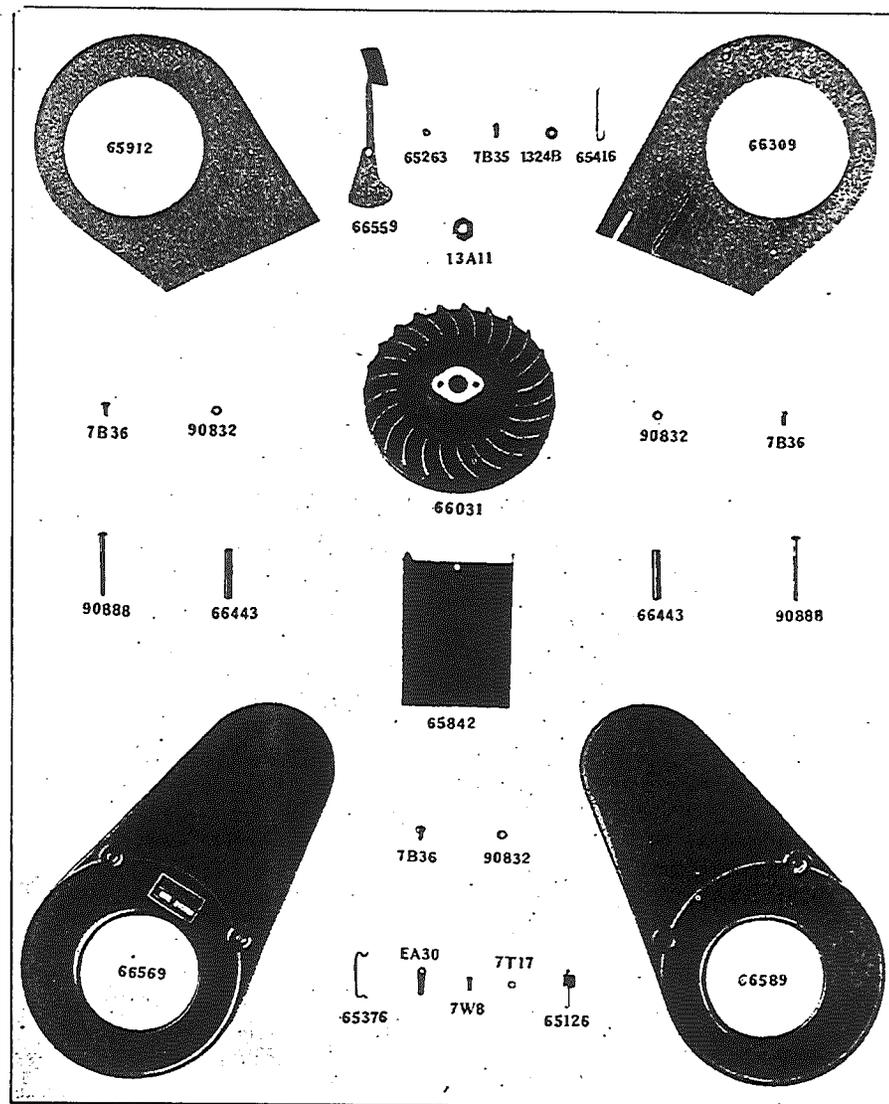


Plate 3—Governor and Throttle Division.

- 90902 Fil. Head Machine Screw  $\frac{1}{4}$ "-20 U. S. S. Thd. x  $\frac{5}{8}$ " lg. for Crank Case Cover and Magneto Plate
- EA17 Starter Rope
- EA101 Hex. Head Cap Screw  $\frac{5}{16}$ "-18 U. S. S. Thd. x  $\frac{3}{4}$ " lg. for Carburetor
- 7A39 Lock Washer  $\frac{17}{64}$ "x $\frac{5}{64}$ "x $\frac{1}{16}$ " for Oil Trough
- 7A61 Lock Washer  $\frac{3}{8}$ "x $\frac{1}{8}$ "x $\frac{3}{32}$ " for Crank Case
- 13AJ Pump Plunger
- 13A10 Gasket for Magneto Crank Case Cover
- 13A40 Pump Plunger Spring
- 7F22 Lock Washer  $\frac{5}{16}$ " for Carburetor

#### BLOWER-GOVERNOR-THROTTLE DIVISION (PLATE 3)

Part No.	Description
65126	Throttle Spring
65263	Governor Arm Bushing
65376	Throttle Link
65416	Governor Stop
65842	Cylinder Shield
65912	Blower Back Plate Magneto Side
66031	Governor Fly Wheel
66309	Blower Back Plate—Governor Side
66443	Blower Case Spacer
66559	Governor Arm
66569	Blower Case—Magneto Side
66589	Blower Case—Governor Side
90832	Lock Washer $\frac{1}{4}$ " for Cylinder Shield and Governor Back Plate
90888	Round Head Machine Screw $\frac{1}{4}$ "-20 U. S. S. Thd. x $2\frac{3}{4}$ " lg. for Blower Case
EA30	Throttle Spring Clip
13A11	Hex. Nut $\frac{9}{16}$ "-18 S. A. E. Thd. for Crank Shaft
1324B	Governor Arm Washer
7B35	Fil. Head Machine Screw No. 10-32x $\frac{1}{2}$ " lg. for Governor Arm
7B36	Fil. Head Machine Screw $\frac{1}{4}$ "-20 U. S. S. Thd. x $\frac{1}{2}$ " lg. for Cylinder Shield and Blower Back Plate
7T17	Lock Washer $\frac{13}{64}$ "x $\frac{1}{16}$ "x $\frac{3}{64}$ " for Throttle Clip
7W8	Fil. Head Machine Screw No. 10-32x $\frac{3}{8}$ " lg. for Throttle Clip

#### CARBURETOR DIVISION (PLATE 4)

Part No.	Description
66499	Zenith Carburetor, including the following parts:
66809	Carburetor Connection
66819	Carburetor Body Assembly
90847	Hex. Nut $\frac{1}{4}$ "-28 S. A. E. Thd. x $\frac{7}{32}$ "x $\frac{3}{8}$ "
90839	Hex. Head Cap Screw $\frac{1}{4}$ "-28 S. A. E. Thd. x $1\frac{1}{2}$ " lg.
66789	Carburetor Bowl Assembly, consisting of:
65044	Main Jet Washer

will run too fast when idling, and if too weak the engine will gallop at times.

#### Ignition

If engine fails to start, and you are sure gas is being supplied to cylinder, remove ignition cable from spark plug and remove spark plug. See that points are clean and about .020" apart. This will be a trifle greater than  $\frac{1}{64}$ ". Attach ignition cable firmly to spark plug and lay spark plug on top of engine so that steel part of plug is touching engine. Grasp ignition cable by the insulation and keep plug in place as above. Revolve flywheel smartly by hand several times. At a point during each revolution a spark should jump across the gap in the spark plug providing spark plug is laid so that steel part is touching engine. If there is no spark the probabilities are that the spark plug is cracked or porous. Replace with a plug of reputable manufacture that you know has been tested and is O. K.

**CAUTION:** Never in any case try to test for spark by removing ignition cable from spark plug, trying to hold terminal of cable close to cylinder, revolving flywheel and watching for spark between ignition cable terminal and cylinder. You run an excellent chance of completely ruining your magneto if you test in this manner.

If there is still no spark, remove pulley from end of crankshaft that holds magneto flywheel in place. Pulling outward on the flywheel, tap the end of the crankshaft gently with a piece of wood, brass or lead. Do not strike end of crankshaft with hammer or other hard substance as you will ruin the thread. This gentle tapping will loosen flywheel from its taper seat and it will come off of the crankshaft. You will then have exposed to view the breaker arm 65489. You will note that the breaker-arm is pivoted in the center, with one end riding on the crankshaft. On the other end is located a tungsten point with another located opposite to make contact with it. You may find that there is oil or foreign substance between these points or they may be burned. (NOTE: The latter only after an engine has seen considerable service.) If found to be dirty, clean well with a piece of fine sandpaper. If the points are rough, scrape them with a sharp knife, but under no condition use emery cloth. When the points are separated the greatest, the gap should be about .020 of an inch.

Another important matter to watch is the proper fastening of the magneto cable which reaches from the connection on the coil to the spark plug. This cable should be securely fastened at both the coil and the spark plug.

Fasten the cable to the coil connection with a pair of pliers. Under no circumstances is the cable to be soldered to the coil. Any heat will damage the winding. To insure the cable not coming loose at the coil, secure with the clamp just to the left of the points. This will insure a good connection even though the cable is jerked. The insulation of the coil and cable must not be cracked or oil soaked.

Replace flywheel carefully and try as before. If still no spark develops there is something wrong that you cannot remedy and the engine should be returned to the factory or to a competent ignition expert for further repairs.

When replacing flywheel be sure that the taper end of the crankshaft and the taper hole in flywheel are absolutely clean to insure proper fit of flywheel to the shaft. Insert a bar or rod through the two holes in the starter pulley (which acts as a nut to hold the flywheel in place) and tighten securely by hitting bar with hammer. PULLEY MUST BE DRAWN UP TIGHT.

The key, which holds the flywheel in place, is made of aluminum so that it will shear off if the pulley becomes loose, thereby not allowing any damage to be done to the keyways in the flywheel or crankshaft.

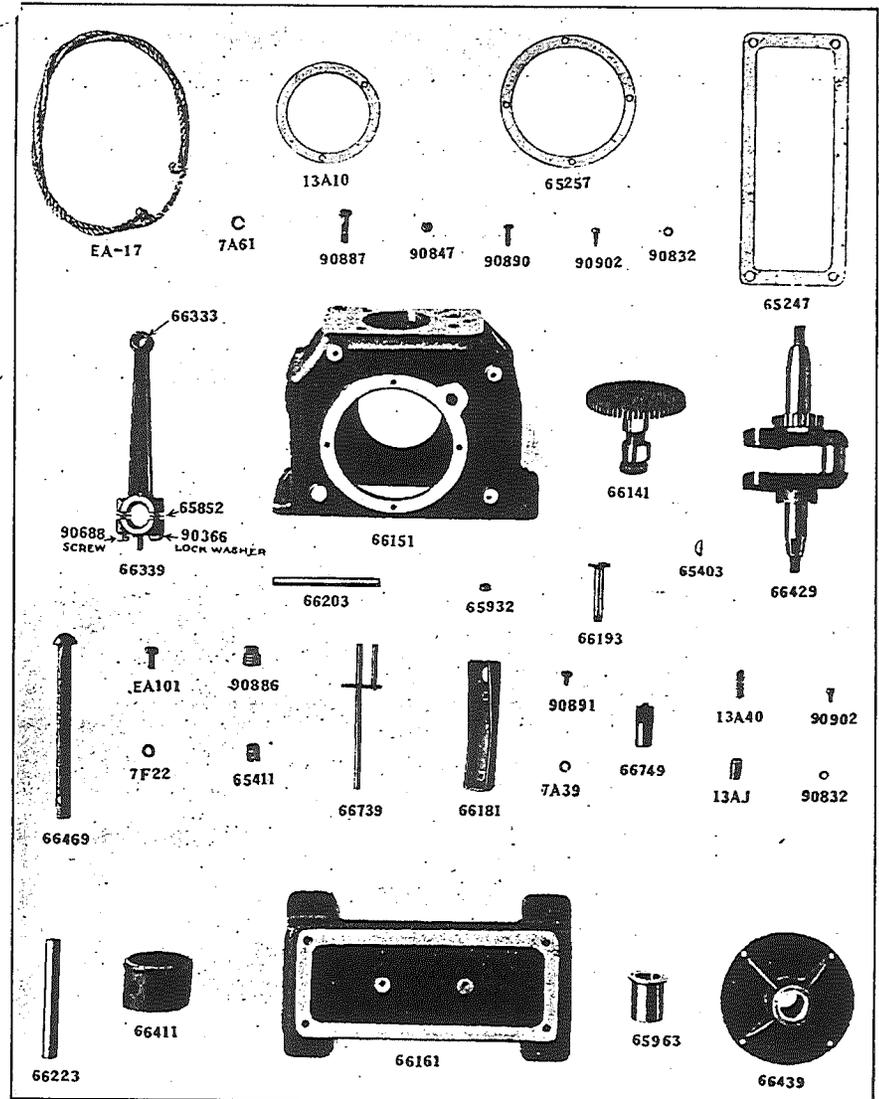


Plate 2—Parts of Crank Case Division.

### Instructions on Returning Material

Never return any material to us without writing us a letter explaining what parts are being forwarded, the engine number and the reason for return. Tag each piece with your name and address and number of engine. Transportation charges must be prepaid on all return shipments as otherwise they will not be accepted.

### Repair Parts List of Type Q Engine

This list includes all of the parts used in Type Q Engine, all of which are illustrated on the accompanying plates.

#### CRANK CASE DIVISION (PLATE 2)

Part No.	Description
65247	Base Gasket
65257	Gasket for Crankcase Cover
65411	Oil Drain Pipe Plug
65852	Connecting Rod Shim
65932	Cam Shaft Plug
65963	Bushing for Governor Crank Case Cover
66141	Cam Gear
66151	Crank Case
66161	Base
66181	Oil Trough
66193	Cam Follower
66203	Cam Shaft
66223	Intake Pipe
66333	Connecting Rod Bushing—Upper
66339	Connecting Rod Assem., including 66333 Upper Bushing, 65852 Shim, 90688 Cap Screw, 90366 Lock Washer
66403	Woodruff Key No. 9
66429	Crank Shaft
66439	Governor Crank Case Cover Assem., including 66573 Bushing
66451	Starter Pulley
66469	Breather Tube
66739	Pump Rod Assembly
66749	Pump Body Assembly
90366	Lock Washer 5/16"x1/8"x1/16" S. A. E. for Connecting Rod
90688	Hex. Head Cap Screw 5/16"-24 S. A. E. Thd. x 1 1/4" lg. for Connecting Rod
90832	Lock Washer 3/4" for Crank Case Cover and Magneto Plate
90847	Hex. Nut 1/4"-28 S. A. E. for Cam Follower
90386	Oil Filler Pipe Plug 1/2"
90887	Hex. Head Cap Screw 3/8"-16 U. S. S. Thd. x 1 1/4" lg. for Crankcase
90890	Hex. Head Cap Screw 1/4"-28 S. A. E. Thd. x 3/4" lg. for Valve Tappet
90891	Hex. Head Cap Screw 1/4"-20 U. S. S. Thd. x 1/2" lg. for Oil Trough

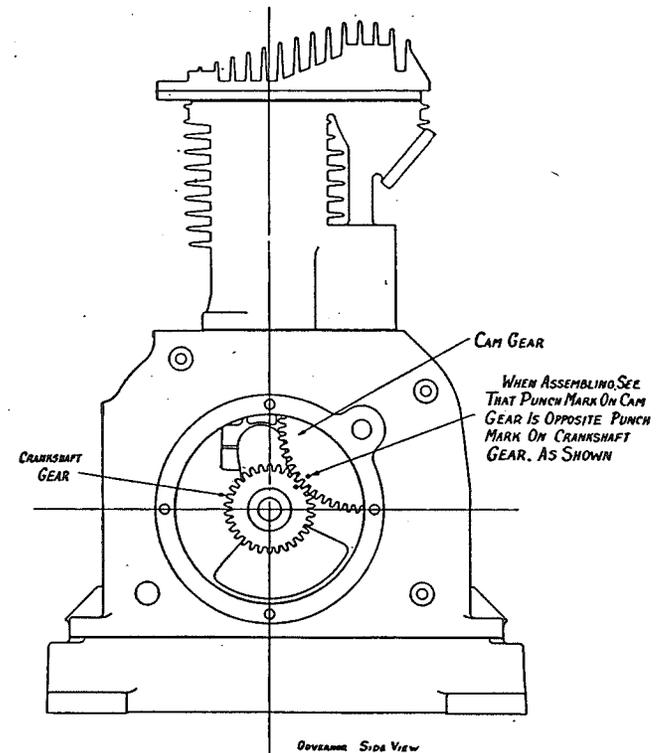


Figure Two—Timing Diagram

### Valve Adjustment

Valve adjustment should very seldom be required until the engine has run for a very long period, and probably in most cases will never be required, except when replacing or regrinding valves due to long service.

Valve tappets are located behind the valve cover (Plate 1). To adjust valves, or remove valves it is necessary to remove this plate. First remove the small screw holding the governor arm in place. Be sure not to lose any of the governor parts. Then remove the large screw in the center of the plate, and the plate can be removed exposing the valve tappets.

The adjustment is made between the end of the valve stems, and the screws entering into the top of the tappets. The clearance when the valves are closed and stems are down should be .006 inch (approximately two thicknesses of newspaper) in the case of the exhaust valve, and .003 inch (approximately one thickness of newspaper) in the case of the intake valve. Be sure that the exhaust valve is not set any closer than this.

To make adjustment, if necessary, three wrenches really should be used, although it is possible to do it with two wrenches. First hold the tappet itself with one wrench and loosen the hexagon lock nut, right under the hexagon screw head. The adjusting screw can then be turned to give necessary adjustment with one wrench while holding the tappet with the other. Very little turning will be necessary as turning the equivalent of one hexagonal side of the screw head will produce a movement up or down of .006 inch. After the adjustment is correct hold the screw with one wrench, the tappet with another and tighten the lock nut with the third wrench.

As very frequently the adjustment will change when tightening the lock nut, the adjustment should be checked again to make sure it is correct. It may be necessary to do this several times before correct adjustment is obtained. When reassembling be sure that governor arm does not rub on the baffle plate and also make sure that the speed regulation has not been disturbed, thus changing the speed of the engine.

### If Engine Fails to Start

In cases of difficulty in starting engines, the following suggestions of possible troubles may be of assistance.

#### CAUSES

1. No Gas.
  - A—Tank empty.
  - B—Gas does not reach carburetor.
  - C—Carburetor jets clogged.
  - D—Carburetor or gas pipe frozen (in extreme cold only).
  - E—Water in gasoline

still loose, remove flywheel, examine the key and replace if found faulty. The key is aluminum to shear off if the flywheel is loose, in order to protect the flywheel and crankshaft.

5. Replenish oil supply.

### Ordering Parts

This parts list is issued for your convenience in ordering parts. All parts are illustrated in the various plates and also listed in the list of parts.

In order to save delay and correspondence INSTRUCTIONS GIVEN BELOW MUST BE CAREFULLY OBSERVED IN ORDERING PARTS.

### How to Order

Be sure to write plainly and legibly. Do not write on any other subject in the same letter. Select the parts numbers by referring to both the plates and the list of parts, comparing parts with illustrations. ALWAYS ORDER BY PART NUMBER AND GIVE AT THE SAME TIME DESCRIPTION OF PARTS. Do not depend on numbers cast on parts as being correct. ALWAYS GIVE ENGINE NUMBER AND ENGINE TYPE IN ORDERING PARTS. This will be found stamped on the Blower Case.

### Shipping Instructions

Always state on the order whether shipment is desired by express, freight or parcel post.

### Remittance

Remittance in full must accompany each order. We will not ship C. O. D. unless a deposit of more than twice the transportation charge has been made. Remit by post office or express money order. Stamps will be accepted for parts orders less than One Dollar (\$1.00) only. Remittance must include postage charge if to be shipped by mail and also include ten cents (\$0.10) to cover insurance. Any excess remittance or postage will be returned. MINIMUM CHARGE IS 25 CENTS.

### Prices

Prices quoted herein are subject to change without notice. In case of change orders will be filled at current prices. All parts are sold F.O.B. factory.

## Engine Stops Suddenly

### CAUSES

1. Gas supply shut off.
2. Failure of spark.
3. Overheated.

### REMEDIES

1. Refer to No. 1 under "Engine Fails to Start." Any of the troubles mentioned thereunder may have happened while running, causing same condition.
2. Spark plug may have fouled and magneto points become dirty or pitted. Refer to paragraph headed "Ignition."
3. Refer to heading "Engine Overheated," to determine cause of overheating and remedy.

## Engine Knocks

### CAUSES

1. Carbon in cylinder or cylinder head.
2. Loose connecting rod.
3. Worn bearings.
4. Loose flywheel.
5. Lack of oil.

### REMEDIES

1. Remove cylinder head and clean out. This should only be done by experienced mechanic.
2. Have repairs made by experienced engine repair man.
3. Have repairs made by experienced engine repair man.
4. Both flywheels must be kept tight. These flywheels are either held in place by nuts or by pulleys, gears, etc., which take the place of and act as nuts, depending on the service the engine is put to. Tightening by hand does not tighten enough. As a general rule the driving of the load acts to tighten the pulley, etc., used on the drive end of the engine. In case of the starter pulley, it is provided with holes through it for the insertion of a bar. After it has been tightened as far as possible by hand, hit it several blows with a hammer to tighten further.

If, after tightening the flywheel as much as possible it is

2. No Spark.

A—Spark plug not functioning properly.  
B—Ignition cable grounded.  
C—Magneto not delivering proper spark.

3. Valves Not Working Properly.

### REMEDIES

- 1.

A—Refill tank.

B—Make sure pet cock under gas tank is open. Remove dust cap on top of carburetor. If gas is reaching the carburetor the float pin in the top of carburetor will rise up out of the carburetor top and gas will flow out of the hole when pin is depressed. If gas does not reach carburetor first try blowing into gas tank to force through, continuing to blow depressing float pin until gas flows out freely through pin hole, and if this does not remedy trouble, take off pipe and clean it out. Clean out the gasoline screens, one in the pet cock under the gas tank, and the other at the fitting at the bottom of the carburetor.

C—Clean out jets. See paragraph headed "Carburetor."

D—Caused by water in carburetor, or in the low point of the gas pipe. Thaw out with hot water applications, disconnect gas pipe and drain out both gas and carburetor.

E—Occasionally water will get in the gasoline. One drop is often sufficient to stop the engine, as it will usually stop in the jet of the carburetor and entirely stop the flow of gasoline. It can usually be blown out. If such is the case, however, the carburetor, gas pipe, and gas tank must be drained by removing the gas pipe and opening the pet cock under the tank. If this is not done the same trouble will undoubtedly be experienced again. Gasoline should never be allowed to stand in uncovered pans anywhere.

- 2.

A—Examine spark plugs and make sure that porcelain is not cracked. If so, replace plug. Clean points and set at .020 inches, which is a little more than 1/64", about the

thickness of a thin dime. If not positive that the spark plug is in good condition try another plug which you know is in good condition before looking for trouble elsewhere in the ignition system.

B—Make sure that the cable is firmly attached to the spark-plug. If oil or water is spilled on the cable often, it may become oil or water soaked and ground on the engine frame, in which case the ignition cable must be replaced.

C—Refer to paragraph headed "Ignition."

3.

Refer to paragraph headed "Valve Adjustment."

## UNSATISFACTORY ENGINE OPERATION

### Lack of Power

#### CAUSES

1. Poor Compression. (When the flywheel is turned over by hand there should be a point every second revolution where considerable resistance is felt and from which point the flywheel will rebound in the opposite direction if let go. If such is not the case, the compression is poor.
2. Poor spark.
3. Insufficient gas.
4. Exhaust pipe or muffler clogged.
5. Valves improperly adjusted.
6. Air cleaner clogged (if one is used).

#### REMEDIES

1. Poor compression may either be caused by leaks at the spark plug, cylinder head or valves, or by worn or scored piston, piston rings or cylinder. A leak can usually be detected by air and oil oozing out at the point of leak. See that the spark plug is screwed down tight and that the screws holding down cylinder head are tight. If there is still a leak at either of these points replace gasket. It is never advisable to use a gasket again after disassembling any part of the engine, except the spark plug gasket.

If the valves do not seat properly they will leak. In such

cases they should be reground. This should only be undertaken by an experienced mechanic.

If the compression is poor and no leaks can be discovered, undoubtedly the piston, piston rings or cylinder is worn or scored and the engine will have to be overhauled by an experienced mechanic. Use of an air cleaner will keep out dirt and grit, reducing cylinder and piston wear and valve trouble which cause loss of compression.

2. See No. 2, under "Engine Fails to Start." Poor spark may be due to defective or fouled spark plug or magneto trouble. Refer to paragraph headed "Ignition."
3. Probably caused by partially clogged carburetor jet. Clean out as directed in paragraph headed "Carburetor."
4. See that holes in muffler are not clogged. If clogged, clean out with any sharp pointed tool.
5. See paragraph headed "Valve Adjustment."
6. Clean out air cleaner.

### Engine Overheats

#### CAUSES

1. Oil supply insufficient.
2. Poor oil.
3. Carbon in cylinder and head.
4. Overload.

#### REMEDIES

1. Supply more oil. If not corrected, trouble must be in oil pump. Remove base and examine pump parts. Work pump arm with fingers to see if it works properly. Screen at bottom of pump may be clogged with dirt.
2. Use only Mobiloil or some other equally high grade oil. Do not use cheap grades of oil.
3. To remove carbon requires disassembly of engine and should only be undertaken by an experienced repair man.
4. Be sure the load is not increased beyond the capacity of the engine. Sometimes the load of an engine is increased without the knowledge of the operator due to increase of friction or some defect in the machine which the engine drives.