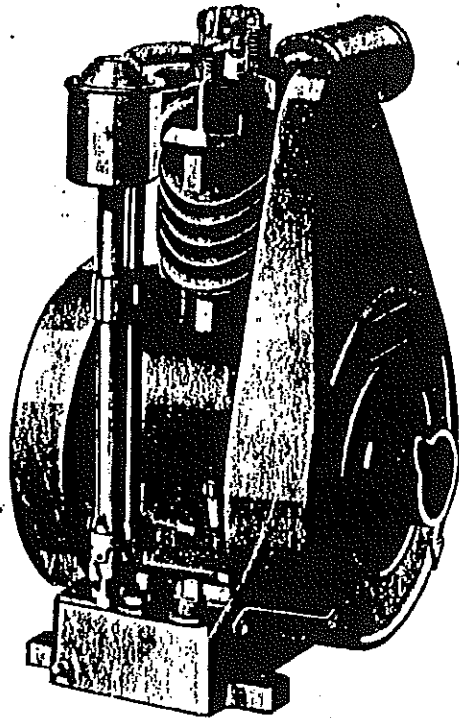


# INSTRUCTIONS Type FE

## Full Power Briggs-Stratton Engine



### BRIGGS & STRATTON CORP.

MILWAUKEE



WISCONSIN

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## IMPORTANT—PLEASE READ THIS CAREFULLY

It is important that the instructions in this booklet be read and followed in order to insure satisfactory operation of the engine.

Our Sales and Service departments are separate. It is, therefore, advisable not to combine service subjects in the same letter with sales subjects.

When desiring additional information, returning material or placing parts orders, address your letter to the attention of the Service Department. In replying to a letter from the company please mention the name of the individual and date of the letter but address the letter to the company and not to an individual.

When ordering parts or writing to us about this engine always be sure to give the number and type letter preceding the number. This number will be found stamped on the crank case on the rear side of the engine above and slightly to the left of the breather tube.

Above all be sure to follow the instructions contained on the following pages, especially those concerning keeping the engine clean and replenishing of the oil supply.

## GUARANTEE

The "Fullpower" 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.

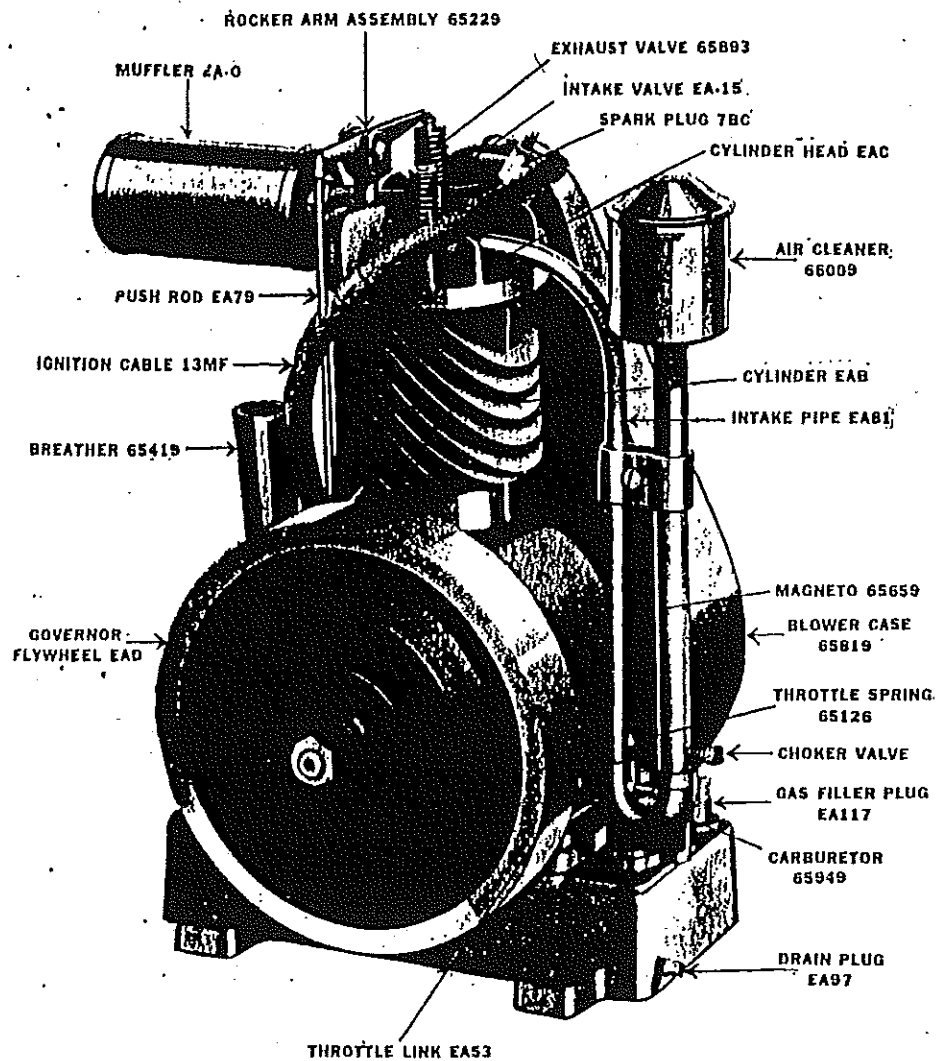


FIGURE 1—Model FE Engine

## INSTRUCTIONS FOR USE OF FULLPOWER ENGINE TYPE FE

This engine has been carefully inspected and given a thorough running test before being shipped. It should, therefore, run satisfactorily ~~now~~ unless something has happened to it since it left the factory, provided it is properly supplied with gasoline and oil. It ~~should be expected that~~ it may still be slightly stiff the first few hours' running and the operation ~~may be expected to~~ improve after a few hours' use. ~~It would undoubtedly be a good idea to~~ allow the engine to run without a load or with a light load for an hour or two before the full load is applied.

This little engine, although very simple and requiring very little care, nevertheless requires some attention and will give much better satisfaction if the instructions in this book are followed.

It is necessary to keep this engine as clean as possible. Wipe off any dirt or oil that accumulates on the engine and keep the engine covered when not in use.

We have developed for use outdoors or wherever there is much dirt or dust an air cleaner, which we recommend to anyone who is interested in keeping down future repair bills. This slips into the carburetor air opening and filters all the air used, preventing any particles of grit reaching the cylinder. This cleaner is not supplied with the engine unless ordered at an extra cost. You can easily determine by comparing your engine with the illustration in this booklet whether your engine is so equipped. This air cleaner can be purchased separately any time. Order 1-66009 Air Cleaner and 1-66159 Clamp Assembly for holding in place.

Proper care in keeping the engine clean and following the instructions on the following pages will do much toward keeping down repair bills. We will try on the following pages to give sufficient information so that you should be able to take care of any simple troubles which may arise.

The Fullpower Engine operates on what is known as the four cycle or four-stroke principle, the same as practically all automobile and stationary engines. The four cycles can be explained as follows: It requires four strokes of the piston to produce one power stroke.

**First Cycle or Suction Stroke:** The piston moves down in the cylinder when exhaust valve is closed. The suction thus produced opens the intake valve and a charge of gasoline mixed with a proper proportion of air is drawn into the cylinder. This mixture quickly forms a gas when the engine is hot. When the piston reaches the bottom of the cylinder and there is no more suction the spring on the intake valve closes it.

**Second Cycle or Compression Stroke:** The piston now makes the up or compression stroke. Both valves being closed, you will readily see that the charge of gas must be compressed into the small space in upper end of cylinder when the piston reaches the upper end of its stroke.

**Third Cycle or Power Stroke:** An instant before the piston reaches the end of its second stroke the timer breaks a contact in the ignition circuit, and this causes a spark to leap across the points of the spark plug. This ignites the compressed gas, which in burning expands so rapidly as to cause the term "explosion" to be used when describing this operation. It takes an instant for all the gas to ignite, and the spark is so timed that by the time all the gas is burning the piston has passed the upper end of the stroke and started down again. The rapid expansion of the burning gas pushes the piston down, forming the power stroke.

**Fourth Cycle or Exhaust Stroke:** When the piston reaches the bottom of the power stroke the exhaust valve is opened by the push rod and the piston in moving up forces all the burnt gases out of the cylinder. At the top of the exhaust stroke the exhaust valve closes and the first cycle or suction stroke takes place again, followed by the other strokes as described.

All the cycles or strokes take place more rapidly than they can be described, but we believe that this explanation of the operation of the engine will help you understand it better and thus enable you to keep it in perfect running order.

### INSPECTION

Examine spark plug to see that it is screwed in place and is not cracked or broken. See that ignition cable terminal is securely fastened to spark plug.

Depress intake valve several times. It should snap up freely when released.

Revolve flywheel several times and watch exhaust valve stem, rocker arm and pushrod. These should work freely once every second revolution of flywheel. When exhaust valve is seated, or up, there should be a space between the exhaust valve stem and rocker arm of about double the thickness of a piece of newspaper.

If the space between the exhaust valve stem and rocker arm is not as outlined above, the adjustment is made on the rocker arm fork or "yoke". Revolve flywheel until valve push rod and end of rocker arm are in lowest position. Loosen set screw holding rocker arm fork in place, raise rocker arm and fork and insert two thicknesses of newspaper between the valve stem and rocker arm. Lower rocker arm and fork gently until one end of rocker arm rests on paper on valve stem and other end of rocker arm is seated on valve push rod. Then securely tighten set screw holding rocker arm fork in place and your valve adjustment is properly made.

#### FILLING

Gasoline tank is in the base of the engine and is filled through opening in top of base after removing gasoline tank filler plug. Examine filler plug to see that small vent hole is clear and fill tank with a good grade of gasoline. Replace plug.

The oil filler opening is on the side of the engine opposite the carburetor. With the engine setting level pour oil in this opening until it overflows. This is the maximum oil level. Replace filler plug. We recommend the use of Mobiloil A, which we have found by test to be of the proper characteristics for all conditions except outdoor use in winter weather when we recommend Mobiloil Arctic. These oils may be obtained almost anywhere.

#### LUBRICATING SYSTEM

Lubrication of the Type FE Fullpower Engine is accomplished through the splash system. Oil is automatically maintained at a proper level in a specially constructed oil trough into which a splasher on the lower end of the connecting rod dips, distributing the oil in the form of a fine spray throughout the cylinder and crankcase. By this method all moving parts are thoroughly lubricated at all times and under all conditions.

After filling the oil reservoir through the oil filler opening as directed under paragraph headed "Filling" no further attention is necessary except to examine the oil level as indicated by the height of the oil in the filler pipe every five running hours. The first few times running a new engine it is advisable to check the oil level every two hours. The oil reservoir should be as nearly full as possible at all times.

ONCE EVERY FIFTY RUNNING HOURS DRAIN THE OLD OIL OUT OF THE ENGINE BY TIPPING IT AND POURING THE OIL OUT OF THE OIL FILLER OPENING. THE OIL SHOULD THEN BE REPLACED BY FRESH OIL.

#### STARTING

First make sure that the oil level is correct as described above and also make sure that the gasoline tank is supplied with plenty of gasoline. Depress intake valve once or twice. (This need only be done on a cold engine.)

Then choke the carburetor by closing the valve at the lower end of the air cleaner (handle at right angle to pipe) if the engine is equipped with an air cleaner. If engine is not equipped with air cleaner, a choker disc is fastened to the gas pipe which can be swung around to partially close air opening in the top of the carburetor. Choking the carburetor shuts off considerable of the air supply, giving a richer mixture, needed when starting a cold engine. When the engine is hot it is generally not necessary to choke the carburetor.

Slip the knot of the starter rope into the "V" of the starter pulley and wind all the cord on the pulley snugly, winding in a clockwise direction when facing the engine from the starter pulley side. Grasp the cord and give it a fast hard pull so as to spin the engine. The cord will become disengaged from the pulley at the end of the pull. If the engine is cold it may be necessary to repeat this operation two or three times.

As soon as engine starts to turn over, open choke valve in air cleaner, or in case no air cleaner is used remove choker disc. If engine is cold it may slow down or sputter immediately after starting. In this case choke the carburetor again for a few seconds.

## IF ENGINE FAILS TO START PROPERLY

If the engine fails to start properly the following suggestions may be of value and should be followed one by one until trouble is found:

### Causes

1. Intake valve may be stuck.
2. No gasoline in tank.
3. Water in gasoline.
4. No spark or poor spark.
5. Governor arm improperly adjusted.
6. Carburetor gas pipe plugged up.

### Remedies

1. Depress valve several times, making sure same works freely: (Always do this when starting a cold engine.)

2. Fill tank with gasoline.
3. Drain tank (remove small plug near bottom of base) and re-fill.
4. Inspect and test spark plug and if not in good condition replace plug. Be sure cable is tight and breaker points are properly set. Refer to paragraph headed "Ignition" for detail ignition tests.
5. Loosen set screw, move governor arm to the right and tighten in place. See paragraph headed "Speed Regulation".
6. Loosen nut holding gas pipe to lower end of carburetor and unscrew gas pipe. Then unscrew jet at the top of the gas pipe and blow out any obstructions in the small opening through the jet. Do not clean out with pin or tool.

## TROUBLES AND REMEDIES

### Engine Lacks Power or Does Not Operate Smoothly

1. Leaky valves and engine badly carboned.
2. Compression leaks at other points.
3. Weak valve springs.
4. Clearance too great between exhaust valve and rocker arm.
5. Muffler clogged.
6. Dirty or cracked spark plug.
7. Engine overheating.

8. Worn piston rings.
9. Equipment operated by engine may be binding or otherwise working improperly.
10. Carburetor clogged up.

### Remedies

1. Head should be removed (see paragraph on "Lack of Compression"). Carbon should be thoroughly cleaned out and exhaust valve ground to a seat.

2. Spark plug must be securely screwed into head. Be sure gasket is in place. Cylinder head gasket may leak. Test for air leak and replace if necessary. Use only copper and asbestos gasket as supplied with engine.

3. Weak valve springs may be tested by inserting the point of a screwdriver into the coils and placing tension on the spring. If engine speeds up to normal, spring should be replaced. Head should be removed and valves removed as described in paragraph headed "Lack of Compression". Only valve springs as supplied by the factory for this purpose are to be used.

4. See third paragraph under "Inspection".
5. Make sure that small holes in muffler are not clogged.
6. Clean spark plug thoroughly and set points at scant  $\frac{1}{32}$ " clearance. Replace plug if defective in any way. See paragraph headed "Ignition".
7. Caused by poor grade of oil or lack of oil or overload.
8. This condition will not occur until engine has had a great deal of use or has been run with poor or an insufficient quantity of oil. Replacement should be made by a reliable repair man or by the factory.

9. Disconnect engine and test equipment for freedom of movement or amount of friction. Be sure the equipment is kept well oiled and greased.

10. Same as No. 6 under "Engine fails to start properly".

### Engine Knocks

1. Engine badly carboned.
2. Loose connecting rod.
3. Loose crankshaft bearing.
4. Loose flywheel.
5. Lack of oil.

### Remedies

1. Proceed to clean out. See paragraph "Lack of Compression".
- 2 and 3. Have repairs effected by a reliable repair man or return to factory. This condition is caused only by poor oiling or long service.
4. Be sure flywheel nuts and pulleys are properly tightened. Replace key on crankshaft if necessary.
5. Replenish oil supply.

### CARBURETOR

The carburetor is adjusted properly at the factory for all conditions and no further adjustments are necessary or possible. Be sure that there is always sufficient gas supply in the tank and the vent hole in the gasoline filler plug is not clogged up, preventing the gas to flow freely.

Occasionally it may be advisable to take off gas pipe, which unscrews from the carburetor, after first loosening the nut holding it in place, and blow out the gas jet which screws into the upper end of the gas pipe.

For use outdoors or where there is much dirt or dust we have developed an air cleaner which slips into the carburetor air opening. This is supplied only at an extra cost when ordered and is not standard equipment on the engine. We recommend its use, however, to keep the dust and dirt out of the cylinder, thus reducing wear. The air cleaner is self-cleaning and does not need any cleaning unless it becomes oil or water soaked, in which event it should be removed and shaken into a tank or basin of gasoline and then allowed to dry.

### IGNITION

If engine fails to start, remove ignition cable from spark plug and remove spark plug. See that points are clean and about  $\frac{1}{32}$ " apart. This will be about the thickness of a thin dime. 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 nut 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 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 been used.) If found to be dirty, clean well with a piece of fine sand paper. 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.

## LACK OF COMPRESSION

The mixture of gasoline from the carburetor must be compressed on the up stroke of the piston and in this condition fired by the spark jumping across the gap in the spark plug. If this compression is faulty there will be either no explosion or insufficient explosion to develop full power by the engine. To determine if you have compression revolve flywheel at a moderate speed by hand. If compression is correct, there will be a point during every second revolution where resistance will be felt. It will feel as if pull were against a spring and if the flywheel is revolved, fairly fast, up to this point of resistance and let go, it will rebound rapidly in the opposite direction. If this action does not take place there is no compression and the cause must be looked for. There are four causes of poor compression which you can easily determine and remedy.

1. Cylinder head loose. Can be detected by air coming through between cylinder and cylinder head and by oil oozing out at same place. Turn screws down tightly and if this does not remedy condition, use a new copper and asbestos gasket.

2. Spark plug loose. Screw down and if necessary replace gasket.

3. Exhaust valve not seating properly. First examine the exhaust valve spring and make sure it is not broken. If not broken insert the point of a screwdriver between the coils and place tension on the spring. If this makes the engine run normally the spring is weak and should be replaced. If spring is not at fault the valve may be badly carboned and need regrinding. (The latter can only occur in engines which have been running for some time and will never happen on new engines.) To replace spring or regrind valves see paragraph on "Cylinder Head and Valves" for method of removal from engine.

4. Intake valve not seating properly. Depress the valve by hand several times. It should snap up freely. Test the spring as outlined above for exhaust valve spring. It should very seldom be necessary to replace intake valves. See paragraph "Cylinder Head and Valves".

If none of the causes mentioned above seem to be responsible for the lack of compression see paragraph headed "Worn Rings and Scored Cylinders" for further suggestions.

## CYLINDER HEAD AND VALVES

To remove cylinder head, first remove ignition cable, from spark plug, and the upper blower case clamp. Then remove the four cylinder head screws. Cylinder head can now be lifted straight up, bringing tube from carburetor to cylinder head with it. Tube can then be pulled out of cylinder head.

To regrind the exhaust valve it should not be necessary to remove the valve from the cylinder, unless the valve is in very bad condition. It should very seldom be necessary to regrind the intake valve. Secure a small amount of valve grinding compound from any garage, auto supply or motorcycle supply store and cover the seat of the exhaust valve thinly with this compound, oscillating the valve rapidly in the seat. When clean metal shows all around on both the valve and seat, and there are no pits or black spots showing, the valve is properly ground. Wash valve and seat thoroughly with gasoline before assembling.

When necessary to remove exhaust valve to regrind or to replace exhaust valve spring, the following suggestions will be found helpful. The head should be laid on a bench with some means of supporting the exhaust valve from beneath, as a block of wood, etc. Using a tube, pipe or anything else that will bear down on the collar at the upper end of the exhaust valve stem without touching the split sleeve next to the stem, drive the collar or sleeve retainer down by several taps with a hammer. The split sleeve will then drop out, enabling the valve parts to be disassembled. If no other tool is available, the flywheel nut may be used to drive down the sleeve retainer or collar as described above. Always grind in, as described above, a new valve before assembling.

The intake valve is spun in place on the cylinder head and we do not recommend replacement except by a competent repair shop or the factory. There should be very little occasion to replace intake valves. In many cases when necessary to replace intake valves it may be advisable to replace entire cylinder head. If necessary to replace intake valve spring, the entire cylinder head may be returned to the factory to have spring replaced and valve seats reground at a cost of \$2.00 net. This does not include new valves which will be charged for extra if required. In all cases when the cylinder is sent in leave the exhaust valve in the head so that it may be properly seated.

All Model FE Fullpower Engines are equipped with a cylinder head gasket composed of copper and asbestos. While it is possible to use this part a second time it is advisable to use a new gasket when available. Place intake tube in head and put head in proper position on cylinder, making sure that other end of tube is properly inserted in the carburetor. Insert screws, attaching magneto cable clip and upper blower clamp and draw to seat. Tighten all screws a half turn at a time so as to bring head down evenly on the cylinder.

#### WORN PISTON RINGS OR SCORED CYLINDERS

This condition can be identified by the sound of air rushing down into the crank case when point of compression is reached. This would only occur after long use of the engine unless the engine were run without sufficient oil, or with a poor grade or dirty oil or continuously overloaded.

In this condition, or whenever the engine does not perform satisfactorily and you have proper gasoline, ignition and compression at other points, we recommend that either a competent gas engine expert repair the engine, or it be returned to the factory for repairs. If you are located far from our factory we may be able to recommend a competent repair shop closer to you if you will write us.

If the engine is torn down, in no event use any gasket, except the copper and asbestos cylinder head gasket, a second time. Always use a new gasket.

#### SPEED REGULATION

The speed of the engine is set properly when leaving the factory, and there should be no need of adjustment unless the governing mechanism has been disarranged in transit. If it is necessary to change speed, proceed as follows:

Immediately in rear of carburetor will be found a double arm lever attached to a small stem entering carburetor. From one of these arms a wire extends to the governor in the flywheel. From the other arm a coil spring extends to a small bracket fastened to the crankcase by a screw. Loosen this screw and move bracket to the left to decrease speed, and to the right to increase the speed.

There is nothing to get out of order in the governor mechanism unless the governor spool is tight on the crank shaft. It should slide easily. If it does not do so, it should be removed and the bore increased slightly.

#### TIMING

If the connecting rod has not been disassembled from the crank shaft, even though the engine has been otherwise disassembled, the timing gears will not be disengaged and the engine will not have to be retimed.

If the connecting rod has been disassembled from the crank shaft, the timing gears will have been disengaged, and when reassembling the engine the gears must be properly engaged, or "meshed", or the engine will not run.

After the connecting rod has been properly assembled to the piston by means of the piston pin, this pin being locked by the piston pin lock, the piston and connecting rod is inserted into the cylinder from the top, the cylinder head being removed. Insert the crank shaft through the large opening in the crank case, from which the magneto was removed, meshing the pinion (small gear) on the crank shaft with the cam gear. This cam gear should be on its stud with the cam part of the gear toward the wall of the crank case. The cam follower should be on its stud, secured in place by a cotter pin, with the free end of the cam follower riding on the cam of the cam gear. Insert valve push rod through small hole in top of crank case, lower end of rod resting on cam follower. Revolve crank shaft to the left or anti-clockwise, at the same time holding push rod down on cam follower until the push rod just begins to rise. It will be best to do this several times so the exact spot may be determined. You will readily feel when the cam begins to push the cam follower and push rod up. If you have the timing gears properly meshed, the crank pin of the crank shaft, or, in other words, the part of the crank shaft to which the connecting rod will be fastened, will be nearly in its topmost position. It will be to the right of its topmost position about 10° and will be pointing, nearly directly, towards the top one of the three screw holes in the crank case, in which the screws fit that fasten the magneto to the crank case.

If, when the push rod is just beginning to rise, the crank shaft is not in the correct position, pull it straight out toward you, disengaging the timing gears. Revolve it until it assumes the correct position described above, then push it straight in, engaging the timing gears. During this operation be sure that the cam gear has not



moved. If you should engage the gears incorrectly, even so little as one tooth, the position of the crank shaft, when the push rod begins to rise, will be so far wrong that it will be readily apparent.

After the gears have been meshed properly, assemble the connecting rod to the crank shaft, being sure that the screws holding the connecting rod cap in place are drawn down tightly and have lock-washers under each head.

Always use new gaskets when reassembling the engine.

### TO STOP ENGINE

Engine can be stopped in several ways. Intake valve can be held down, governor throttle can be moved to extreme left and when engine is equipped with a short circuiting switch the switch should be closed and held closed until the engine stops. It is very poor practice to stop any gasoline engine by choking the carburetor.

### OPERATION AND CARE

Always use a good grade of gasoline and be sure there is a sufficient amount in the tank. Use the very best grade of cylinder oil of medium weight. Be sure oil is up to proper level.

Inspect spark plug frequently and keep points free from carbon and at proper distance from each other.

**KEEP YOUR ENGINE CLEAN. IT CANNOT TAKE CARE OF ITSELF.**

### REPAIRS

We have attempted to describe in this booklet only those repair operations which might well be undertaken by the average man with a slight mechanical skill. If it is necessary to undertake any serious repairs to the magneto, replace piston, piston rings, bearings, or re-grind cylinders, we recommend that the engine either be sent to a competent repair shop or to the factory for repairs. This should not be necessary until the engine has seen considerable service. If you are located far away from our factory we may be able to recommend a repair shop nearer to you.

We have established the following flat rate repair charges so that users who send engines to us may know the cost of the repairs.

Complete overhauling and replacement of small parts but no major parts, \$6.75 net.

Testing and repairing engines not requiring tearing down but including adjustment and repair of magneto, \$3.50 net.

The above prices do not include replacement of any of the following parts which will be charged for extra if required: Cylinder, Cylinder Head, Flywheel, Crankshaft, Connecting Rod, Piston, Carburetor, Crank Case Cover, Magneto, Muffler, Pulley, Armature, Condenser, Base, Blower Case, Air Cleaner.

Replacement of a bearing is \$1.00 net added to the above charges.

Repairs to Magneto sent in separately, not including replacement of Armature or Condenser, \$2.25 net.

If necessary to replace Armature add \$6.00 to above price for repairing magneto.

When cylinder head is shipped in separately for replacement of springs and regrinding of valve seats a charge of \$2.00 will be made, not including valves, which will be charged extra if replacement is required.

### ORDERING PARTS

We are listing below a list of parts of the Type FE Fullpower Engine for your convenience in ordering parts.

In order to avoid delay and unnecessary correspondence, the INSTRUCTIONS BELOW MUST BE CAREFULLY OBSERVED IN ORDERING PARTS. Do not order parts in the same letter you write on any other subject. Be sure to write plainly and legibly.

### DESCRIPTION OF PARTS

Select the part numbers by referring to both the list of parts and the illustrations of parts. Always refer to both the description and the illustration to make sure the proper part number is selected. If unable to determine the proper number of the part wanted describe it as fully as possible. Do not depend on the numbers cast on parts as being correct as they may only cover part of what you want if it is an assembly.

**ALWAYS USE BOTH PART NUMBER AND DESCRIPTION OF PARTS ORDERED, IF POSSIBLE. ALWAYS**

**GIVE THE NUMBER OF THE ENGINE ON YOUR ORDER.**  
 This number will be found on the crank case and is preceded by the type letter which should always be shown on the order.

**SHIPPING INSTRUCTIONS**

Always specify on the order whether shipment is desired by parcel post, express or freight. In absence of any instructions we will always ship the cheapest way.

**REMITTANCE**

**REMITTANCE SHOULD ACCOMPANY EACH ORDER.**  
 We will not ship any parts C. O. D. unless a deposit of more than twice the transportation charge has been made. Remittance must include sufficient to cover postage charge if to be shipped by mail as well as ten cents (\$0.10) to cover insurance. Any excess remittance will be refunded. **MINIMUM CHARGE FOR PARTS IS 25 CENTS PLUS POSTAGE AND INSURANCE.**

Remit either postoffice or express money order. Postage stamps will be accepted in amounts of less than one dollar (\$1.00) only.

**PRICES**

All prices in this book are subject to change without notice. In case of changes in price, orders will be filled at current prices. All prices shown are F. O. B. our factory in Milwaukee, Wis.

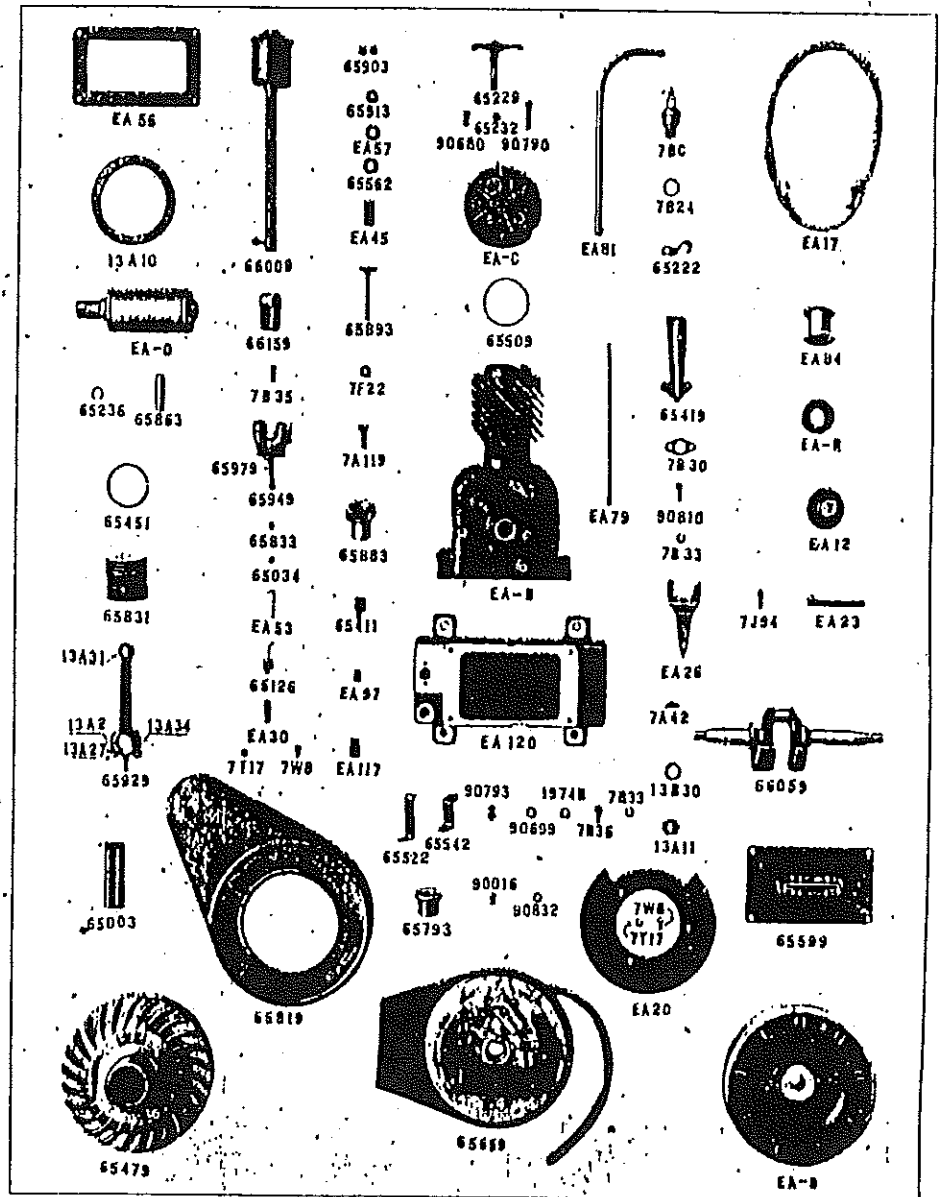
**INSTRUCTIONS ON RETURN MATERIAL**

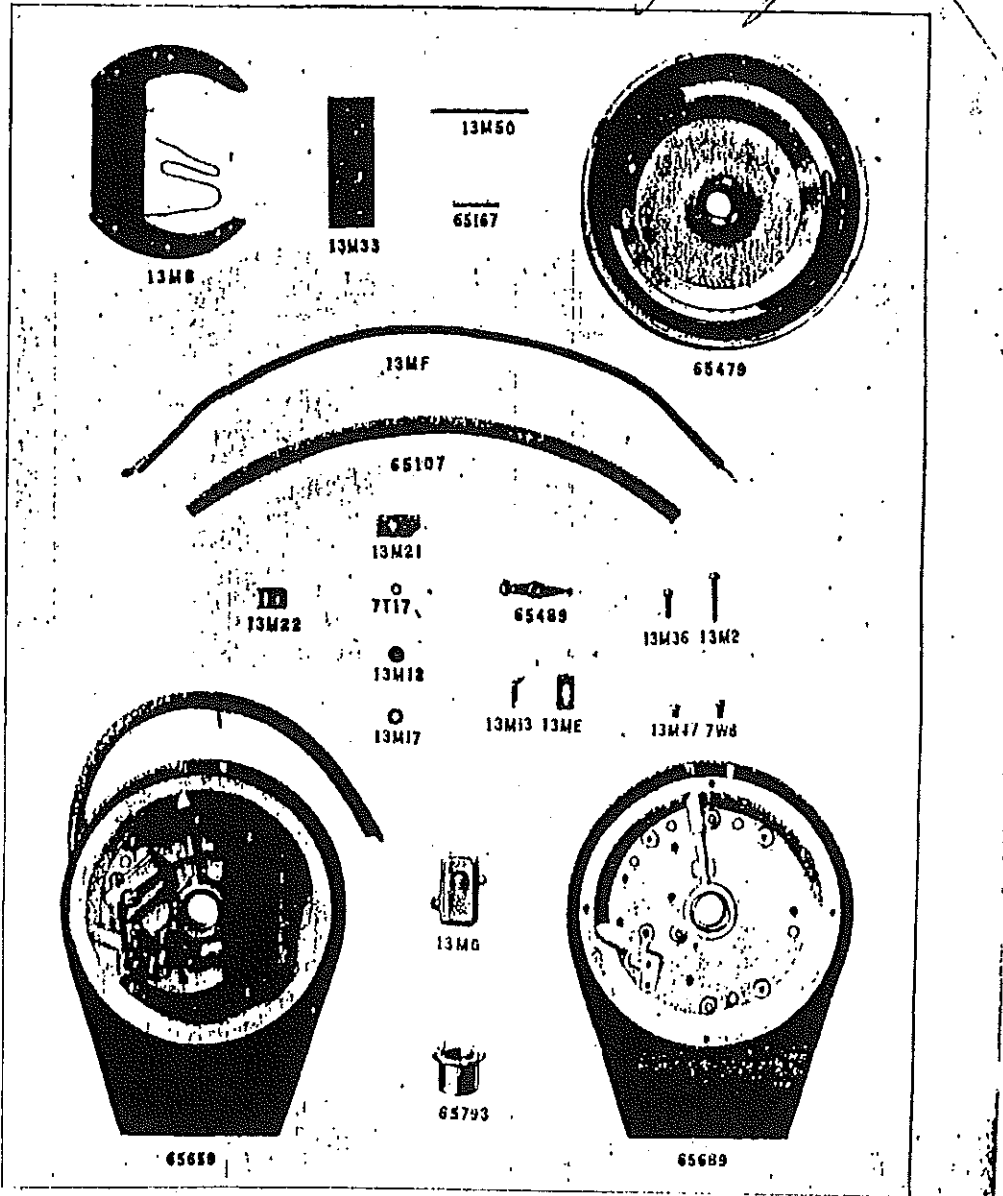
Never return material to us without writing us a letter explaining what parts are being returned, the engine number and the reason or return. Mark the shipment both outside and by tag on the parts with your name and address. Do not include any instructions in package, however. All instructions must be sent by mail to secure prompt attention. No return shipments will be accepted unless return transportation charges are prepaid.

Never return any material to the factory without first receiving permission from us to do so, except incorrect shipment of parts, defective material returned for replacement or material returned for repairs at your expense.

**PARTS PRICE LIST**

This list includes only parts used on standard Type FE Full-power Engines and should not be used to order parts for other





Models. Always refer to the illustrations as well as this list.

Part No.	Description	Price
EA-B	Cylinder Assembly consisting of EA1 Cylinder, 65883 Bushing, EA63 Cam Gear Stud, EA62 Cam Follower Stud, EA118 Taper Pin.....	\$20.00
EA-AB	Cylinder Head Assembly consisting of EA-C Cylinder Head, EA45 Exhaust Valve Spring, EA57 Valve Spring Gasket, 65893 Exhaust Valve, 65562 Valve Spring Washers, 65903 Exhaust Valve Sleeve, 65913 Exhaust Valve Sleeve Retainer .....	10.00
<del>EA-C</del>	*Cylinder Head Assembly consisting of EA2 Cylinder Head, EA15 Intake Valve, EA46 Intake Valve Spring, EA86 Intake Valve Collar, EA57 Valve Spring Gasket, 65562 Valve Spring Washer.....	9.00
65299	Cylinder Head Assembly consisting of EA-AB Cylinder Head, 65229 Rocker Arm, 90680 Set Screw, 65232 Slug.....	12.50
65379	*Cylinder Head Assembly consisting of EA-C Cylinder Head, 65229 Rocker Arm, 90680 Set Screw, 65232 Slug.....	11.50
EA-D	Governor Flywheel Assembly consisting of EA4 Governor Flywheel, EA25 Governor Weights, EA27 Washer, EA111 Escutcheon Pins .....	6.00
EA-O	Muffler Assembly .....	2.50
EA-R	Governor Spool Assembly.....	.70
EA120	Gasoline Base 1/2-gal. (Standard).....	6.00
EA12	Cam Gear.....	2.00
EA17	Starter Rope.....	.20
EA20	Air Deflector.....	.20
EA23	Cam Follower .....	.16
EA26	Governor Arm .....	.12
EA30	Throttle Spring Clip.....	.10
EA45	Exhaust Valve Spring.....	.15
EA53	Throttle Link.....	.10
EA56	Diaphragm Gasket.....	.04

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Part No.	Description	Price
13M33	Coil Insulator.....	.10
13M36	Fill. Head Screw No. 10—32 U. S. F. Th'd x 5/8-in. lg. for 13ME .....	.02
13M47	Condenser Screw.....	.03
13M50	Armature Lead Insulator 3-in. lg.....	.05
7T17	Lockwasher 3/8-in. for Air Deflector and Throttle Spring Clip .....	.01
7W8	Fill. Head Cap Screw No. 10—32 U. S. F. Th'd x 3/8-in. lg. for Air Deflector and Throttle Spring Clip.....	.03
65003	Socket Wrench.....	.30
65034	Carburetor Jet Washer.....	.10
65107	Ignition Cable Sleeve.....	.10
65126	Throttle Spring.....	.15
65167	Condenser Lead Insulator 1 3/4-in. lg.....	.05
65222	Ignition Cable Clamp.....	.15
65229	Rocker Arm Assembly consisting of 65861 Rocker Arm, 65281 Rocker Arm Fork, 65303 Rocker Arm Pin.....	2.50
65232	Slug for 90680 Set Screw.....	.02
65236	Piston Pin Lock.....	.05
65281	Rocker Arm Fork.....	1.50
65299	Cylinder Head Assembly consisting of EA-AB Cylinder Head, 65229 Rocker Arm, 90680 Set Screw, 65232 Slug.....	12.50
65303	Rocker Arm Pin.....	.10
65379	*Cylinder Head Assembly consisting of EA-C Cylinder Head, 65229 Rocker Arm, 90680 Set Screw, 65232 Slug.....	11.50
65393	Hex. Brass Nut 3/8-in.—27 Th'd. x 1/2-in. for Gasoline Pipe....	.10
65411	Oil Filler Pipe Plug 3/4-in.....	.10
65419	Breather Tube Assembly.....	1.90
65451	Piston Ring.....	.55
65479	Flywheel Assembly .....	13.00
65489	Breaker Arm Assembly with Point and Fibre Bushing.....	1.50
65509	Cylinder Head Gasket.....	.08
65522	Large Blower Case Clamp (Side).....	.15
65542	Small Blower Case Clamp (Upper).....	.15
65562	Valve Washer.....	.05

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Part No.	Description	Price
EA57	Valve Spring Gasket.....	.05
EA79	Push Rod.....	.10
EA81	Intake Pipe.....	.75
EA84	Drive Pulley (furnished only when specified).....	1.60
EA97	Drain Pipe Plug 1/8-in.....	.06
EA117	Gasoline Filler Pipe Plug 3/8-in.....	.10
EA120	Gasoline Base 1/2-gal. (Standard).....	6.00
7A42	Woodruff Key for Crank Shaft.....	.10
7A119	Cylinder Screw 5/8-in.—18 U. S. F. Th'd. x 1-in. lg. Hex. Head .....	.05
13A2	Connecting Rod Lockwasher.....	.01
13A10	Crank Case, Cover Gasket.....	.12
13A11	Flywheel Nut 3/8-in.—18 Th'd.....	.21
13A27	Connecting Rod Screw.....	.05
13A34	Connecting Rod Shim.....	.10
13A31	Connecting Rod Bushing (Upper).....	.36
7BC	Spark Plug with 7B24 Gasket.....	1.25
7B24	Spark Plug Gasket.....	.03
7B30	Breather Tube Gasket.....	.10
7B33	Lockwasher for 90810 Breather Tube Screw.....	.01
7B35	Fill. Head Cap Screw No. 10—32 U. S. F. Th'd. x 1/2-in. lg. for Carburetor.....	.01
7B36	Fill. Head Machine Screw No. 14—20 x 1/2-in. lg. for Blower Case Clamp.....	.05
13B30	Lockwasher 3/8-in. for Flywheel Nut.....	.03
1974B	Washer for 7B36 Screw.....	.01
7F22	Cylinder Lockwasher 3/8-in.....	.01
7J94	Cam Follower Cotter Pin.....	.01
13MB	Armature .....	9.80
13ME	Contact Bracket with Point.....	.52
13MF	Ignition Cable .....	.50
13MG	Condenser Assembly.....	2.50
13M2	Armature Core Screw.....	.05
13M12	Bracket Bushing .....	.06
13M13	Breaker Arm Spring.....	.05
13M17	Bracket Washer .....	.06
13M21	Bracket Shim .....	.05
13M22	Ignition Cable Clamp.....	.07

Part No.	Description	Price
65599	Oil Trough and Diaphragm Assembly.....	1.25
65659	Magneto Assembly complete with Air Guide.....	22.50
65689	Crank Case Cover with Air Guide.....	6.00
65772	Choker Disc (used when air cleaner is not furnished).....	.10
65793	Magneto Crank Case Bushing.....	1.00
65819	Blower Case Assembly.....	1.00
65831	Piston Only.....	2.75
65833	Carburetor Jet.....	.25
65861	Rocker Arm.....	1.00
65863	Piston Pin.....	.60
65883	Bushing for Cylinder.....	1.25
65893	*Exhaust Valve.....	1.00
65903	Exhaust Valve Sleeve.....	.10
65913	Exhaust Valve Sleeve Retainer.....	.15
65929	Connecting Rod Assembly consisting of 13A31 Upper Bushing, 13A34 Shim, 13A2 Lockwasher, 13A27 Screw.....	5.00
65949	Carburetor for use with standard EA120 Base, including 65979 Gasoline Pipe, 65393 Nut.....	6.00
65979	Gasoline Pipe for 65949 Carburetor, including 65833 Carburetor Jet, 65034 Carburetor Jet Washer.....	1.00
66009	Air Cleaner Assembly (furnished only when specified).....	2.00
66059	Crank Shaft Assembly.....	12.00
66069	Piston Assembly consisting of 65831 Piston, 65451 Piston Rings.....	3.85
66159	Air Cleaner Clamp and Bolt Assembly (used only when Air Cleaner is used).....	.20
90016	Rd. Head Machine Screw No. 14—20 x 1/2-in. lg. for Crank Case Cover.....	.05
90680	Rocker Arm Adjusting Screw.....	.05
90699	Blower Case Clamp Lockwasher.....	.01
90790	Cylinder Head Screw 3/8-in.—18 U. S. F. Th'd. x 1 1/4-in. lg. Fill. Head.....	.05
90793	Stove Bolt with Nut for 65542 Blower Case Clamp.....	.03
90810	Fill. Head Machine Screw 1/4-in.—20 x 3/4-in. lg for Breather Tube 65419.....	.05
90832	Lockwasher for Magneto Crank Case Cover Plate.....	.01

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