WISCONSIN

Air Cooled

HEAVY DUTY ENGINES

INSTRUCTION BOOK AND PARTS LIST

Models T E
T F

ISSUE MM-249-C

WORLD'S LARGEST BUILDERS OF HEAVY DUTY AIR COOLED ENGINES

IMPORTANT

STARTING AND OPERATING OF NEW ENGINES

Careful breaking in of a new engine will greatly increase its life and result in trouble-free operation. A factory test is not sufficient to establish the polished bearing surfaces, which are so necessary to the proper performance and long life of an engine. Neither is there a quick way to force the establishment of good bearing surfaces. These can only be obtained by running a new engine carefully and under reduced speeds and loads for a short time, as follows:

First, be sure the engine is filled to the proper level with a good quality of engine oil, see "Grade of Oil" chart.

Before a new engine is put to its regular work, the engine should be operated at low idle speed (1000 to 1200 R.P.M.) for one half hour, without load. The R.P.M. should then be increased to engine operating speed, still without load, for an additional two hours.

If at all possible, operate the engine at light loads for a period totaling about eight hours, before maximum load is applied. This will greatly increase engine life.

The various bearing surfaces in a new engine have not been glazed, as they will be with continued operation, and it is in this period of "running in," that special care must be exercised, otherwise the highly desired glaze will never be obtained. A new bearing surface that has once been damaged by carelessness will be ruined forever.

READ INSTRUCTIONS CAREFULLY

A copy of this manual is sent out with each engine. All points of operation and maintenance have been covered as carefully as possible but if further information is required, inquiries sent to the factory will receive prompt attention.

When writing the factory ALWAYS GIVE THE MODEL AND SERIAL NUMBER of engine referred to.

Manual Price $1.50

WISCONSIN MOTOR CORPORATION
MILWAUKEE, WISCONSIN 53246

BOOK OF INSTRUCTIONS

WISCONSIN *Air-Cooled*

TWO CYLINDER ENGINES

READ THE *STARTING AND OPERATING INSTRUCTIONS* THOROUGHLY BEFORE STARTING A NEW ENGINE. BECOME ACQUAINTED WITH THE ENGINE COMPONENTS; THEIR LOCATION, MAINTENANCE AND ADJUSTMENT REQUIREMENTS.

MODEL TE

3" Bore
3¼" Stroke
45.9 cu. in. Disp.

MODEL TF

3¼" Bore
3¼" Stroke
53.9 cu. in. Disp.

Models T E
T F

ISSUE MM-249-C

NOTE: Engines having Stellite Exhaust Valves and Inserts are designated as Models TED and TFD.

INDEX

PAGE

3–4
17
7
6
10
10
12
10
8
20
23
17
27
21
25
15
14
8
15
16
15
25
17
16
22
23
15

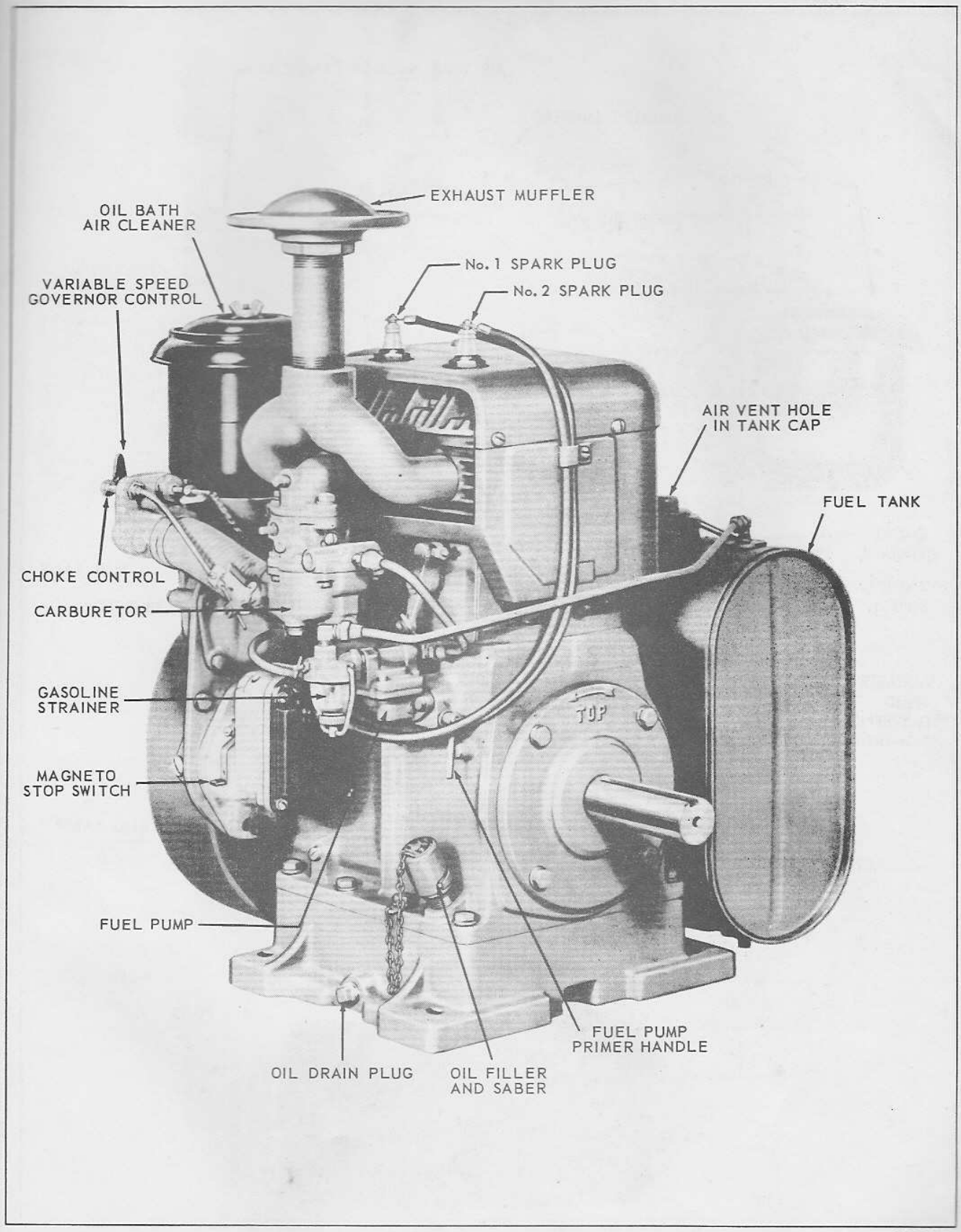

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Fig. 1

TAKE-OFF (Side Mount Tank) VIEW OF ENGINE

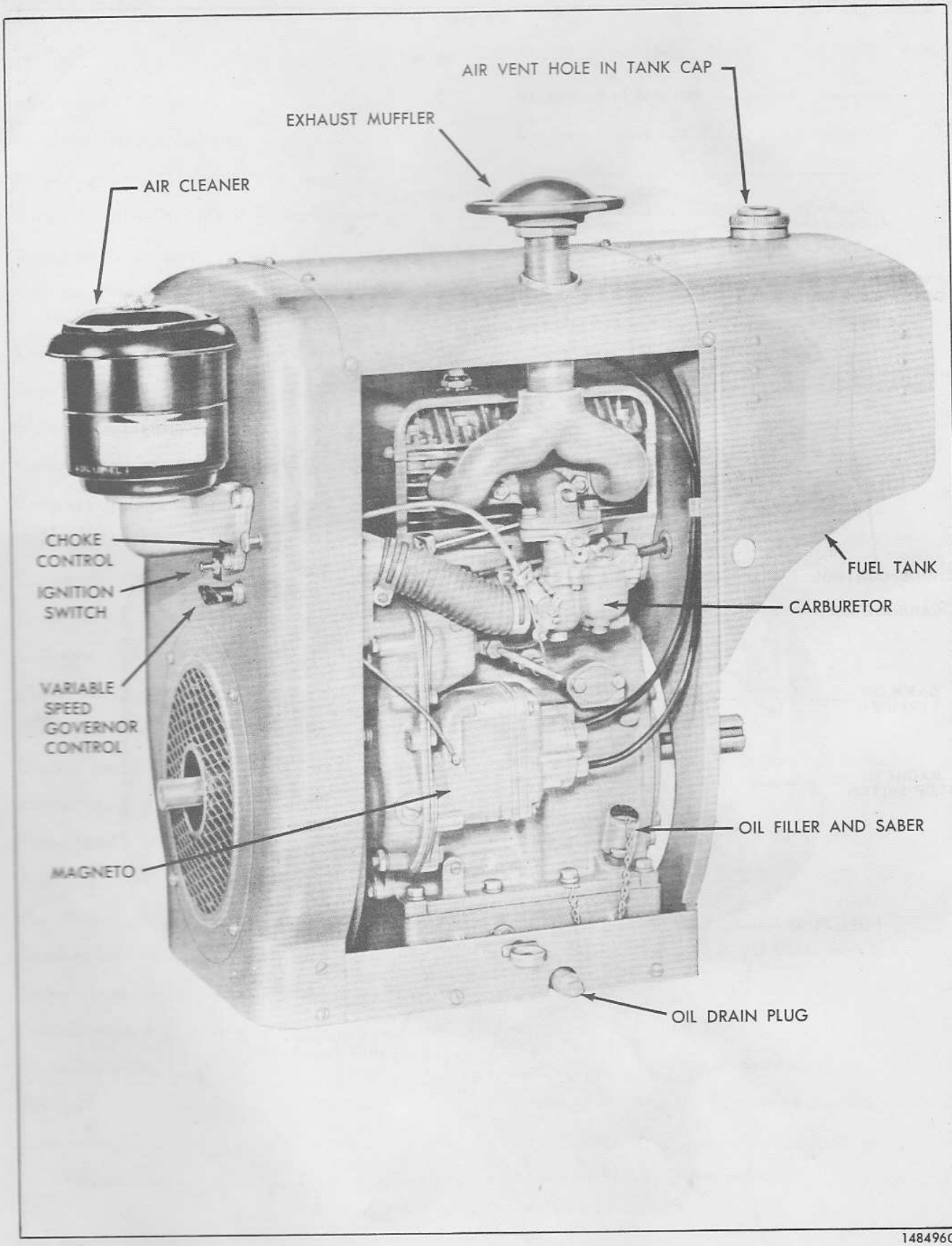

Fig. 2

POWER UNIT FAN END VIEW OF ENGINE

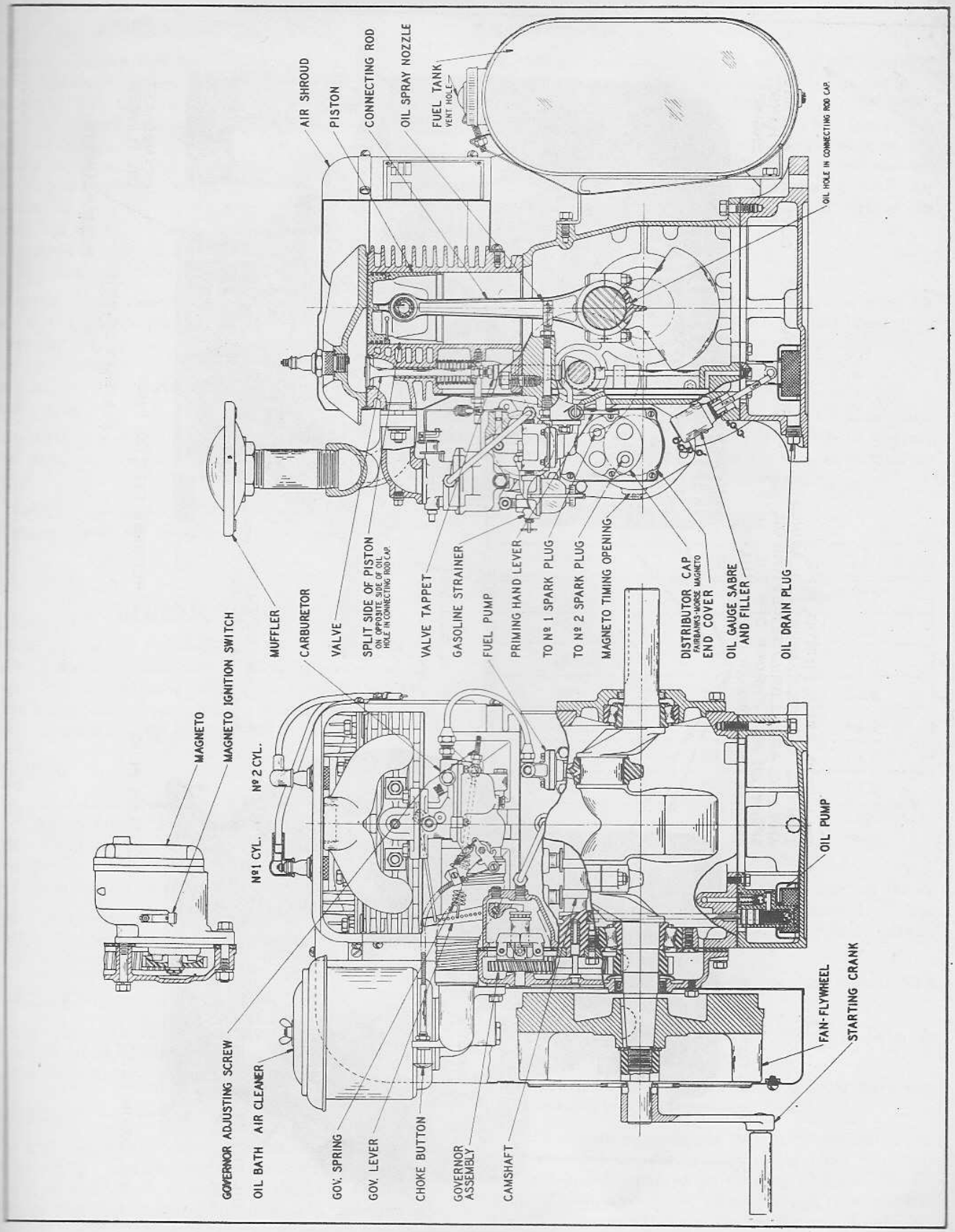

Fig. 3

CROSS SECTION OF ENGINE

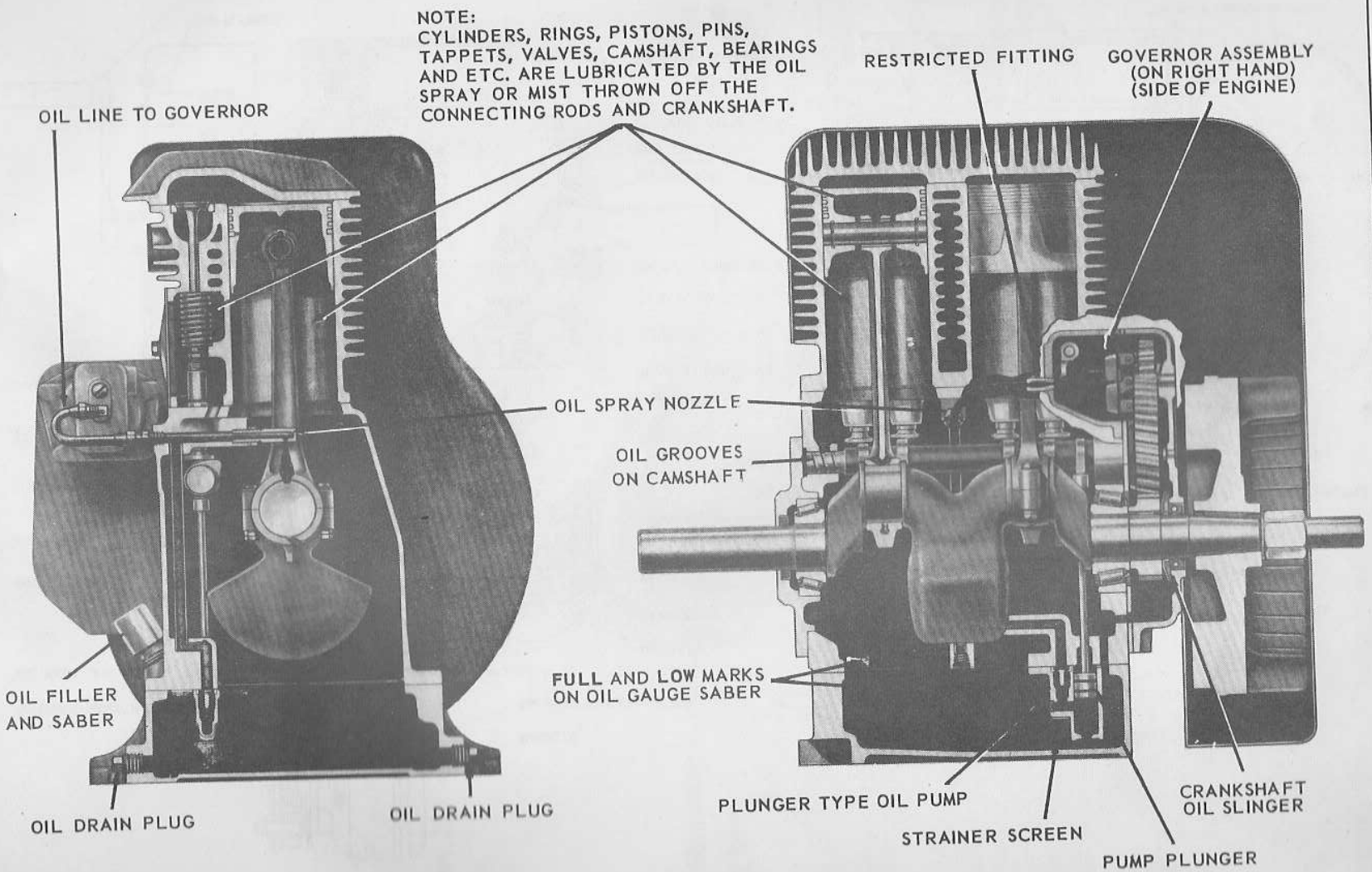

Fig. 4

LUBRICATION SYSTEM

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148943C-1

GENERAL INFORMATION

Wisconsin heavy duty air cooled engines are of the most approved design, built in a modern factory, equipped with the latest machinery available. Only the best materials, most suitable for the particular part, are used. During production every part is subjected to the most rigid inspection, as are also the completely assembled engines. After assembly every engine is operated on its own power, for several hours, on a dynamometer. All adjustments are carefully made so that each engine will be in perfect operating condition when it leaves the factory.

Back of the Wisconsin Motor Corporation is fifty years of engineering experience in the design of gasoline engines for every conceivable type of service. The performance of these engines is proof of the long satisfactory service you too can expect from your engine.

Like all fine machinery an engine must be given regular care and operated in accordance with instructions.

Keep this book handy at all times, familiarize yourself with the operating instructions.

GENERAL DESIGN

Wisconsin engines are of the four cycle type, in which each of the four operations of suction, compression, expansion and exhaust requires a complete stroke. This gives one power stroke per cylinder for each two revolutions of the crankshaft.

COOLING

Cooling is accomplished by a flow of air, circulated over the cylinders and heads of the engine, by a combination fan-flywheel encased in a sheet metal shroud. The air is divided and directed by ducts and baffle plates to insure uniform cooling of all parts.

Never operate an engine with any part of the shrouding removed, because this will retard the air cooling.

CARBURETOR

The proper combustible mixture of gasoline and air is furnished by a balanced carburetor, giving correct fuel to air ratios for all speeds and loads.

IGNITION

The spark for ignition of the fuel mixture is furnished by a high tension magneto driven off the timing gears at crankshaft speed. The magneto is fitted with an impulse coupling, which makes possible a powerful spark for easy starting. Also, the impulse coupling automatically retards the timing of the spark for starting, thus eliminating danger of a kick back from the engine when starting. When electric starter and generator are furnished, battery ignition is used. *See Page 11.*

LUBRICATION

A plunger type pump supplies oil to a spray nozzle which directs oil streams against holes in the connecting rods, and to an oil header line, connected to the governor housing, which lubricates the timing gear train. Part of the oil from the oil spray nozzle enters the rod bearings thru holes in the rods and the balance of the oil forms a spray or mist which lubricates the cylinders and all other internal parts of the engine. *See Fig. 4.*

GOVERNOR

A governor of the centrifugal flyball type controls the engine speed by varying the throttle opening to suit the load imposed upon the engine.

ROTATION

The rotation of the crankshaft is clockwise when viewing the flywheel or starting end of the engine. This gives counter-clockwise rotation when viewing the power take-off end of the crankshaft.

HORSE POWER

R.P.M.	TE	TF
1400	7.2	8.7
1600	8.3	10.1
1800	9.3	11.4
2000	10.0	12.4
2200	10.6	13.2
2400	10.9	14.0
2600	11.2	14.6

HORSE POWER

The horse power given in the above chart is for an atmospheric temperature of 60° Fahrenheit, at sea level, and at a Barometric pressure of 29.92 inches of mercury.

For each inch lower Barometer reading deduct 3½% from above horsepower.

For each 10° higher temperature there will be a reduction in horsepower of 1%.

For each 1000 ft. altitude above sea level there will be a reduction in horsepower of 3½%.

The friction in new engines cannot be reduced to the ultimate minimum during the regular block test, but engines are guaranteed to develop at least 85 per cent of maximum power when shipped from the factory. The power will increase, as friction is reduced, during a few days of operation. The engine will develop at least 95% of power shown on chart when friction is reduced to a minimum.

For continuous operation allow 20% of horse power shown, as a safety factor.

INSTRUCTIONS FOR STARTING AND OPERATING

Some of these engines are furnished with a house, as shown in *Fig. 2*, and are called power units. Others are furnished without a house, as shown in *Fig. 1*, and are called open engines.

On engines with a house the side doors should always be removed when operating.

This is to give better circulation of air for cooling the engine.

LUBRICATION

Before starting the engine, fill the oil base with good gasoline engine oil ***up to FULL line on oil gauge sabre***, *see Fig. 4*. The combination oil gauge sabre and filler is on the magneto side of the standard engine.

On engines with generator and distributor ignition, the oil level gauge plug is a separate unit mounted directly beneath the distributor. The oil filler cap is mounted along side of the generator.

Too much emphasis cannot be given to the matter of oil selection. High grade oil of the body suited to the requirements of your engine is the most important single item in the economical operation of the unit, yet it is the cheapest item of operating cost. Select your oil solely on quality and suitability—never on price—for no one thing is so sure to bring about unsatisfactory performance and unnecessary expense as incorrect lubrication.

High-grade, highly refined oils corresponding in body to the S.A.E. (Society of Automotive Engineers) Viscosity Numbers listed in the following chart will prove economical and assure long engine life.

GRADE OF OIL

SEASON OR TEMPERATURE	GRADE OF OIL	EXAMPLE
Spring, Summer or Autumn +120°F to +40°F	SAE 30	Mobiloil A
Winter +40°F to +5°F	SAE 20-20W	Mobiloil Arctic
Winter +5°F to −20°F	SAE 10W	Mobiloil 10W
Crankcase Capacity		3½ Qts.

Important: S.A.E. Viscosity Numbers classify oils in terms of body only, without consideration of quality or character, therefore we list certain grades of ***Mobil oil*** as typical examples of lubricants possessing the qualities we believe desirable in oils for ***Wisconsin*** engines. We plainly state that these grades of ***Mobil-oils*** are listed because of their recognized quality and world-wide distribution. ***There are other high quality oils on the market that are equally satisfactory for Wisconsin engines.***

GRADE OF OIL

Follow summer recommendations in winter if engine is housed in warm building.

Check oil level every 8 hours of operation.

The old oil should be drained and fresh oil added after every 50 hours of operation.

To drain oil remove drain plug. *See Fig. 4*. Oil should be drained while engine is hot, as it will then flow more freely.

AIR CLEANER

The air cleaner is an essential accessory, filtering the air entering the carburetor, and thereby prolonging the life of the engine.

Fig. 5 148487C-1

Remove the cover and filtering element from the air cleaner. *See Fig. 5*. Fill bowl to oil level line with the same grade of oil as used in the crankcase. The filtering element should be washed in solvent if it shows signs of collected dust. Detailed instructions are printed on the Air Cleaner.

The air cleaners must be serviced frequently, depending on the dust conditions where the engines are operated. When the oil in the bowl becomes dirty it should be removed and replaced with new oil. This servicing will vary from a few days of operation in comparatively clean conditions to twice a day in dusty conditions.

Operating the engine under dusty conditions without oil in the air cleaner or with dirty oil, may wear out cylinders, pistons, rings and bearings in a few days time, and result in costly repairs.

Daily attention to the air cleaner is one of the most important considerations in prolonging engine life.

The gear cover breather is mounted underneath the air cleaner bracket. *See Fig. 5* which shows the breather removed. This breather should be removed periodically and thoroughly cleaned to be sure that the check ball is free. If the breather becomes dirty so that the check ball is not free to function properly, a pressure will be built up in the gear cover causing oil leakage at seal and poor oil economy.

FUEL

These engines are furnished either with gravity feed tanks mounted above the level of the carburetor, or with side mount tanks, or tanks mounted below the engine. In the latter two cases, fuel pumps are furnished on the engines, to pump the fuel up to the carburetor.

The fuel tank should be filled with a good quality of gasoline free from dirt and water. Some of the poorer grades of gasoline contain gum which will deposit on valve stems, piston rings, and in various small passages in the carburetor and thus cause serious trouble in operating, and this might prevent the engine from operating at all.

Use only reputable, well known brands of ***Regular*** gasoline. Fuels with the lowest possible lead content, but not below octane rating 74 (Research Method), are best. Fuel with a lower octane rating will cause detonation, and if operation is continued under this condition, severe damage will result to the engine. The cylinders and pistons will be scored, head gaskets blown out, bearings will be damaged, etc.

Be sure to open the shut off valve in the gasoline strainer before starting. Also, be sure air vent hole in fuel tank cap is open, otherwise gas cannot flow to carburetor.

GASOLINE STRAINER

The gasoline strainer is very necessary to prevent sediment, dirt and water from entering the carburetor and causing trouble or even complete stoppage of the engine. This strainer has a glass bowl and should be inspected frequently, and cleaned if dirt or water are present. To remove bowl, first shut off fuel valve, then loosen the knurled nut below bowl and swing the wire bail to one side. After cleaning bowl and screen replace the parts, being sure the gasket is in good condition; otherwise use a new gasket. *See Fig. 6* which shows the gasoline strainer mounted to the fuel tank of a power unit. On open engines the strainer is mounted to the inlet of the fuel pump.

FUEL PUMP

On engines equipped with fuel pumps, when starting

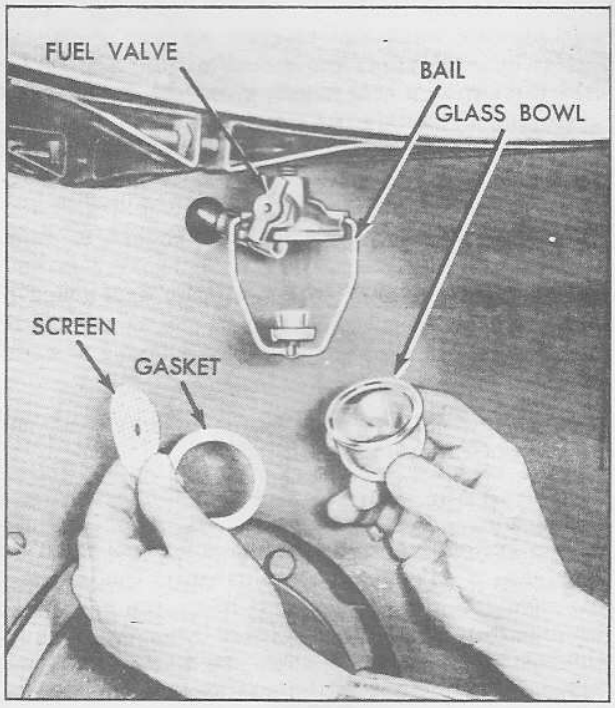

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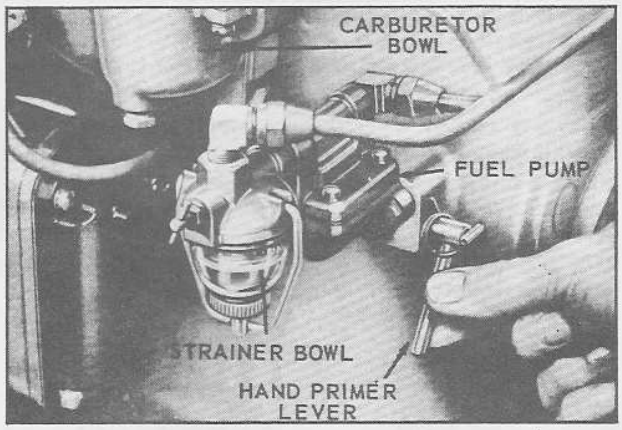
Fig. 6

the first time, or when engines have been out of operation for a while, the hand primer lever on the fuel pump should be used before attempting to start, so that fuel may be pumped into the dry carburetor, otherwise starting would be very difficult. When priming by hand lever, a distinct resistance of the fuel pump diaphragm should be felt. If this is not the case the engine should be turned over a revolution so that the fuel pump cam will be rotated from its upper position which would prevent hand priming.



189166C

Fig. 7

Assuming the gasoline strainer is empty, approximately 25 strokes of the primer lever are required to fill the bowl. *See Fig. 7.* After strainer bowl is full, an additional 5 to 10 strokes are required to fill the carburetor bowl. When the carburetor is full the hand primer lever will move more easily. Instructions for fuel pump maintenance and repair are located in the back of this manual.

CHOKE

Before starting a cold engine close the choke on the carburetor by pulling out the choke button at the flywheel end of the engine. *See Fig. 1 and 2.* When the engine is started the choke should be opened gradually as the engine warms up. More choking is necessary when starting in cold weather than in warm. If the engine is warm, very little choking is necessary. The operator will soon gain experience in how much choking is necessary. The choke button should always be pushed in after the engine is warmed up.

The choke is closed when button is pulled out, and open when button is pushed in.

CARBURETOR ADJUSTMENT

The main metering jet in the carburetor is of the fixed type, that is, it requires no adjustment. The idle needle should be adjusted for best low speed operation, while carburetor throttle is closed by hand. For illustrations and more information see Carburetor Manufacturer's Instruction Bulletin in back of this manual.

IGNITION SWITCH

Magneto ignition is standard on these engines, with a lever type switch, on the side of the magneto, which is always in the **on** or running position, except when depressed for stopping the engine. *See Fig. 1.*

On engines with a house, the ignition switch is on the outside of the house at the flywheel end. *See Fig. 2.* To run engine with magneto ignition, this switch is pushed in; with battery ignition, it is pulled out.

MAGNETO BREAKER POINT ADJUSTMENT

Magnetos are properly adjusted before leaving factory. The breaker point gap on the Fairbanks-Morse magneto and the Wico magneto should be .015" at full separation. If the spark becomes weak after continued operation it may be necessary to readjust these points. To do this first remove the end cover on the magneto. *See Fig. 8* and *Fig. 9* which show the end

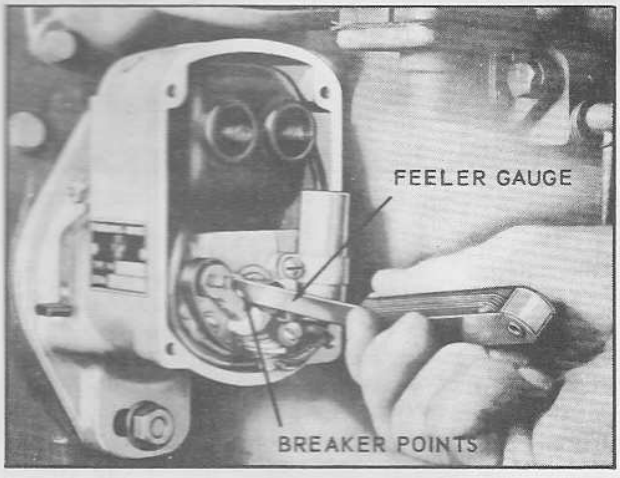
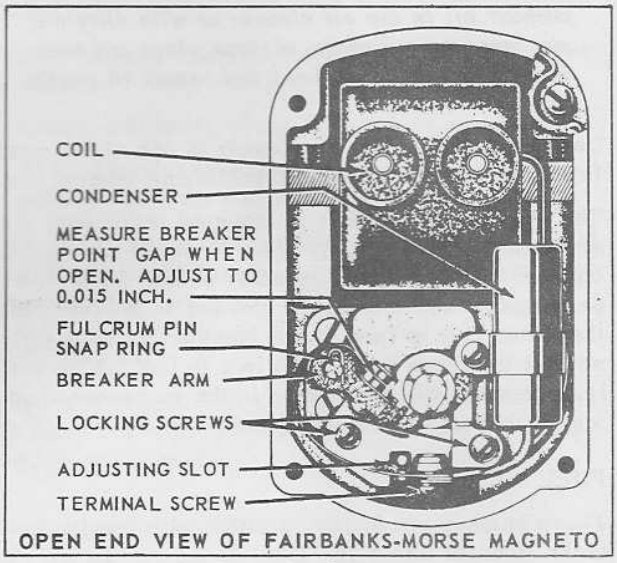


Fig. 8 189167C



OPEN END VIEW OF FAIRBANKS-MORSE MAGNETO

Fig. 9

cover of the Fairbanks-Morse magneto removed. The crankshaft should then be rotated with the starting crank, (this also rotates the magneto), until the breaker points are wide open. The opening or gap should then be measured with a feeler gauge and if necessary reset as shown in *Fig. 9.* To readjust points first loosen the lock-screw on the breaker point plate, then insert the end of a small screwdriver into the adjusting slot and open or close breaker points until proper gap is attained, then be sure to retighten lock-screw. All of these parts are shown in *Fig. 9.* After tightening lock-screw, recheck breaker point gap, to make sure it has not changed. If it is found that the breaker points have become rough, they should be smoothed with a breaker point file before the above adjustments are made. Then replace magneto end cover carefully so that it will seal properly. Do not force cover screws too tightly otherwise cover may crack. For further information see Fairbanks-Morse or Wico Magneto Maintenance Instructions in back of this manual.

MAGNETO IGNITION SPARK

If difficulty is experienced in starting the engine or if engine misses firing, the strength of the ignition spark may be tested by removing the ignition cable from No. 1 spark plug and holding the terminal 1/8 inch away from the cylinder head shroud, as shown in *Fig. 10.* Turn the engine over slowly by the starting crank as shown.

When the impulse coupling on the magneto snaps there should be a good spark at the ignition cable terminal. If there is a weak spark, or none at all, first check breaker point opening as mentioned in preceding paragraph under 'Magneto'. If this does not remedy the trouble, it may be necessary to install a new condenser. See Magneto Manufacturer's Maintenance Instructions in back of this manual.

MAGNETO TIMING

The magneto is properly timed at the factory, but if

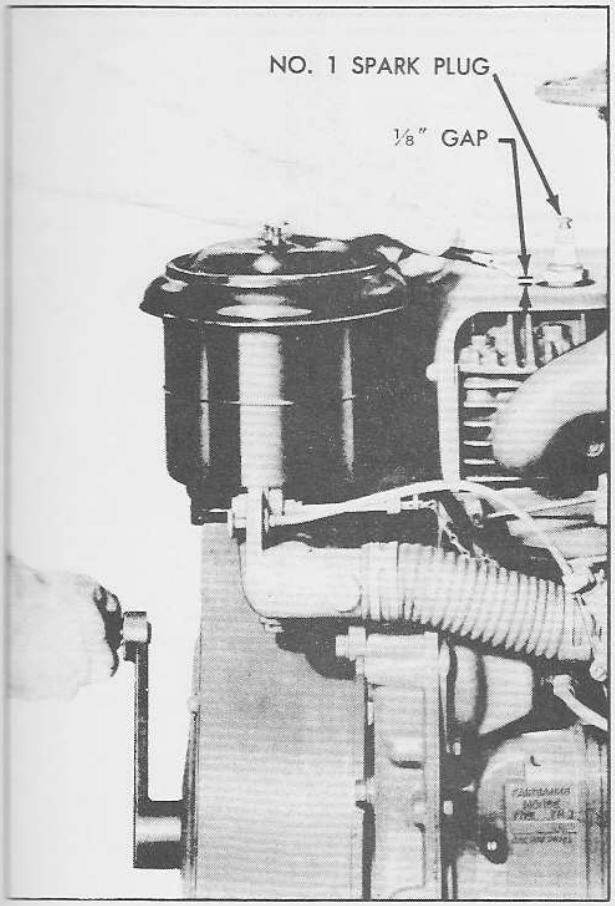


Fig. 10 148498C

for any reason it is necessary to retime the magneto, the following instructions will be helpful.

First remove the screen over the flywheel air intake opening by taking out the screws holding the screen in place. This will expose the timing marks on flywheel shroud for timing magneto. See Timing Diagram, *Fig. 11.*

Next, remove the spark plug that is closest to the flywheel end of the engine. This is the No. 1 cylinder spark plug. Then, hold the thumb over the spark plug hole and turn the engine over slowly with the starting crank until a definite pressure can be felt, tending to push the thumb away from the spark plug hole. When this occurs, the No. 1 piston is coming up on compression stroke.

The flywheel is marked with the letters 'DC' near one of the air circulating vanes. This vane is further identified by an 'X' mark, cast on the end. See Magneto Timing Diagram, *Fig. 11.* With the No. 1 piston coming up on the compression stroke, continue turning the starting crank until the edge of the 'X' marked vane on the flywheel is in line with the vertical centerline mark on the shroud as shown on Timing Diagram, *Fig. 11.* Then leave flywheel in this position, as the No. 1 piston is now on top dead center.

Next, remove the inspection hole plug from the magneto timing opening in the engine gear cover as shown in *Fig. 11.*

Assuming that the magneto has been removed from the engine, the following proceedure should be followed before replacing magneto:

Turn the magneto gear in a clockwise rotation until the impulse snaps. Then, hold the gear in this position and mount the magneto to the engine, meshing the gears so that the 'X' marked tooth on the magneto gear is centrally located in the inspection hole of the gear cover as shown on magneto Timing Diagram, *Fig. 11.* Tighten the two magneto mounting screws and be sure the magneto flange gasket is in place.

The split-coil magneto furnished on these engines, has no distributor or internal timing gears, and provides two sparks simultaneously (one for each terminal) every 360° of rotation. One spark is used for ignition, the other is wasted in the exhaust. Therefore, either tower can be used to connect the ignition wires to the spark plugs, but for convenience in assembly the tower on the magneto nearest the engine is used as the No. 1 spark plug tower.

Early model engines had a distributor type magneto in which alternate firing of the spark plugs occured and each plug fired every 720° of rotation. Thus the firing of No. 1 spark plug terminal had to be determined before mounting magneto to engine.

The proper spark advance is 27°. For checking timing with a neon light, the advance mark is located on the flywheel shroud, 27° or about 2½" to the left of the vertical centerline, as shown on *Fig. 11.* With the engine operating at normal speed, the ignition spark takes place when the 'X' marked vane on the flywheel lines up with the running spark advance mark on the shroud.

The magneto rotates at crankshaft speed in a clockwise direction when viewing driving gear end of magneto.

BATTERY IGNITION DISTRIBUTOR

When these engines are furnished with electric starters and generators, battery ignition is used, instead of magneto ignition. The ignition timer and distributor are mounted on the end of the generator.

The distributor is of the automatic advance type and it is driven off an engine speed shaft through a pair of two to one ratio helical gears, thus giving the distributor one half engine speed in a counter-clockwise direction when viewed from above.

The proper spark advance for normal speeds is 27°, the same as for magneto ignition.

The distributor is of course properly timed at the factory, but the following instructions are given as a help in retiming if this becomes necessary for any reason.

First remove the screen over the flywheel air intake opening by taking out the screws holding the screen in place. This will expose the timing marks on the flywheel shroud, also the vane on flywheel, marked by an 'X' and the letters DC. *See Fig. 12.* Then re-

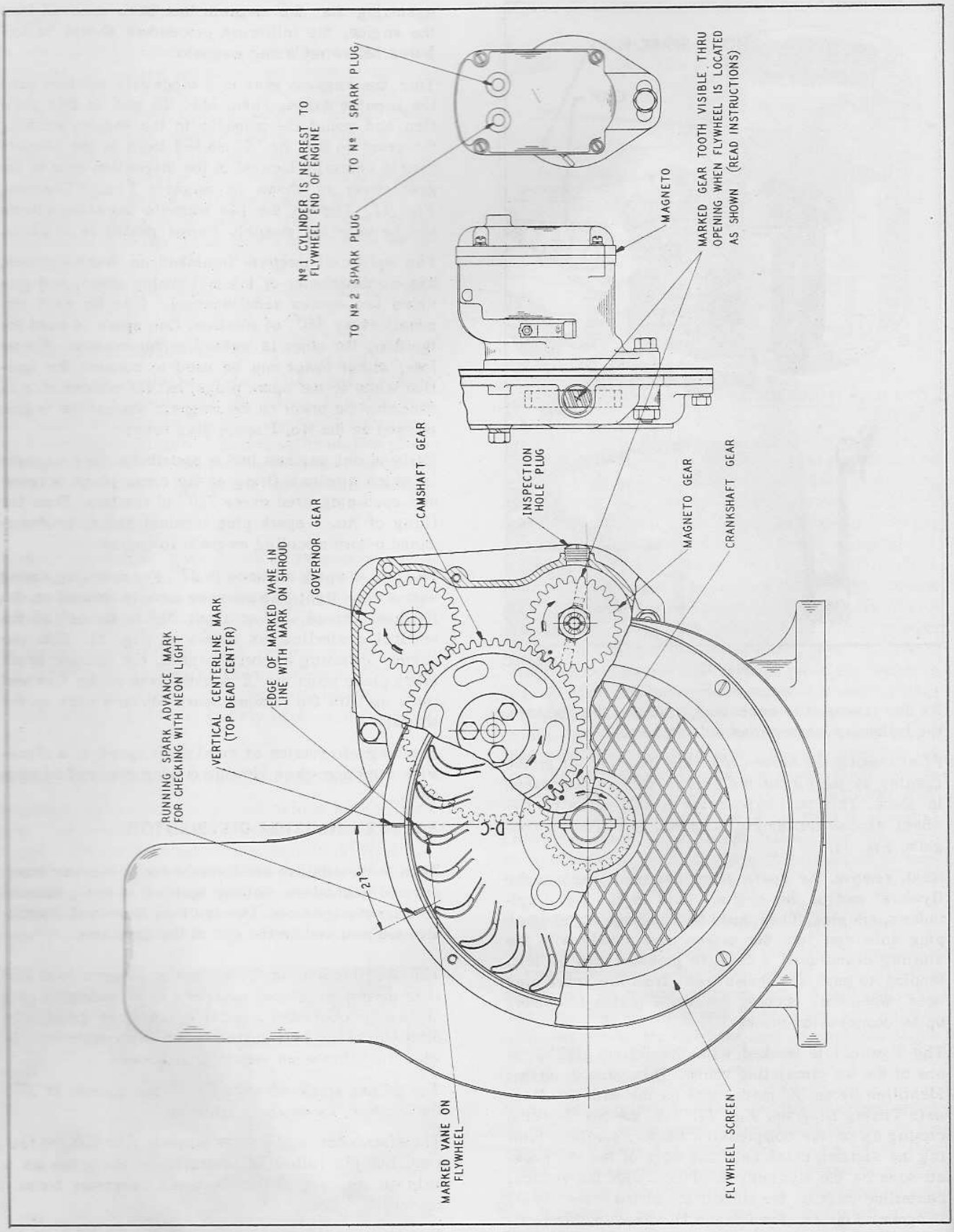


Fig. 11

MAGNETO TIMING DIAGRAM

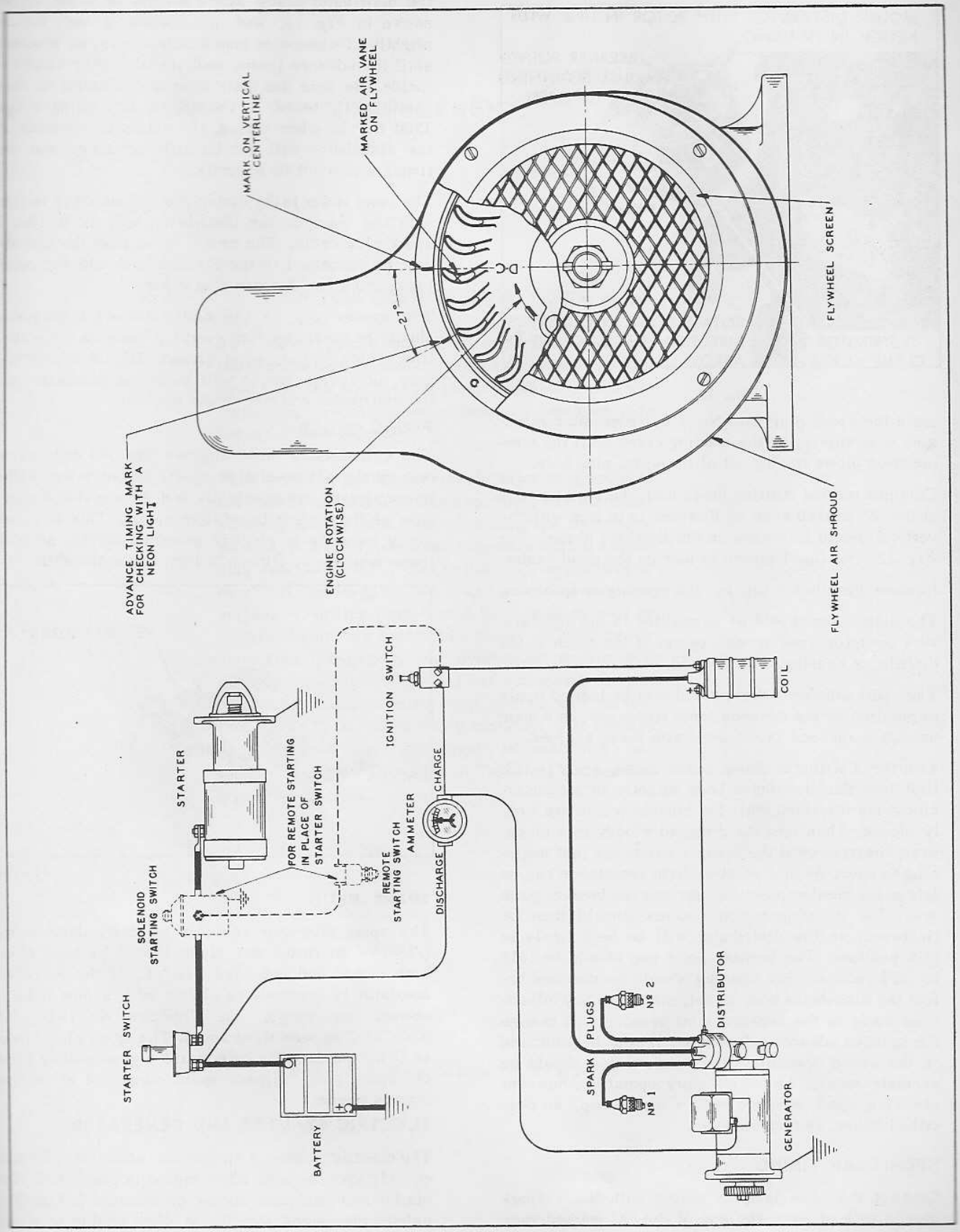


Fig. 12

BATTERY IGNITION – WIRING AND TIMING DIAGRAM

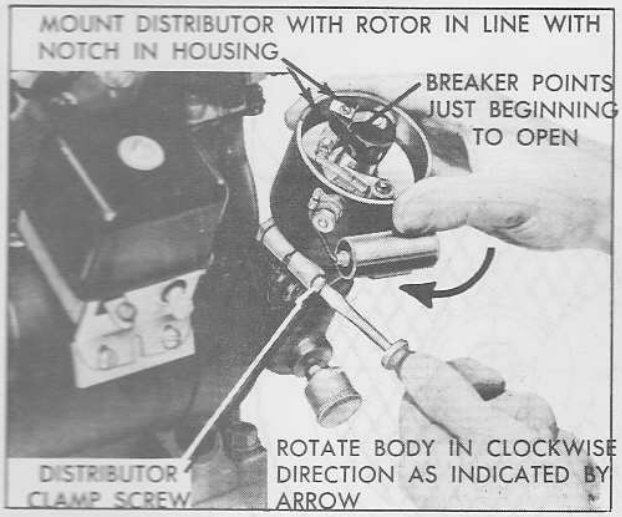


Fig. 13 148493C

move the spark plug from No. 1 cylinder and turn engine over slowly, by the starting crank until the compression blows the air out of the spark plug hole.

Continue turning starting crank until the leading edge of the 'X' marked vane on flywheel is in line with the vertical center line mark on the flywheel shroud. *See Fig. 12.* The No. 1 piston is now on top dead center.

Remove distributor cap by disengaging snap hooks.

The distributor should be assembled to the generator with the rotor lined up with center of the notch in the distributor housing. *See Fig. 13.*

The spark advance lever should now be locked firmly in position by the advance lever lockscrew, as a manual spark advance is not used with these engines.

With the distributor clamp screw loose, *see Fig. 13,* first turn the distributor body slightly in a counter-clockwise direction until the breaker points are firmly closed. Then turn the distributor body in a clockwise direction until the breaker points are just beginning to open. At this point a slight resistance can be felt as the breaker point cam strikes the breaker point arm. The distributor clamp screw should then be tightened, so the distributor will be held firmly in this position. The breaker point gap should be .018 to .022 inches. This opening should be checked before the distributor body is set, otherwise any adjustment made to the breaker point opening will change the ignition advance adjustment. If care is exercised in the above operations the spark timing should be accurate enough for satisfactory operation, however checking spark advance with a neon lamp, as described below, is recommended.

NEON LAMP TIMING

Connect the neon lamp in series with No. 1 spark plug. Chalk or paint the end of the 'X' marked vane on the flywheel, white. Then with the engine operating at 1800 R.P.M. or over, allow the flash from the neon lamp to illuminate the whitened vane. At the time of the flash, the leading edge of the vane should line up with the running spark advance timing mark on the flywheel shroud. *See Fig. 12.* If it does not, the distributor clamp screw should be loosened as shown in *Fig. 13,* and the distributor body turned slightly clockwise or counter-clockwise, as required, until the advance timing mark and the white vane coincide. Be sure the distributor clamp screw is then carefully tightened. If the engine is running below 1800 R.P.M. when timing, the automatic advance in the distributor will not be fully advanced and the timing would not be accurate.

The inner tower in the distributor cap which is in line with the notch in the distributor body is for No. 1 spark plug cable. The center tower from the distributor is connected to the ignition coil and the outer tower is for No. 2 spark plug cable.

The grease cup on the distributor and generator should be given one turn every 50 hours of operation. Use a high melting point grease. Do not over lubricate, otherwise grease will enter the generator and the distributor and may cause trouble.

FIRING ORDER

The cylinders in these engines fire 360 degrees or one crankshaft revolution apart. In other words the power strokes are evenly divided, thus giving a minimum of fluctuation in rotative speed. This is especially valuable in electric generator drives, as with these engines no flicker in lights is noticeable.

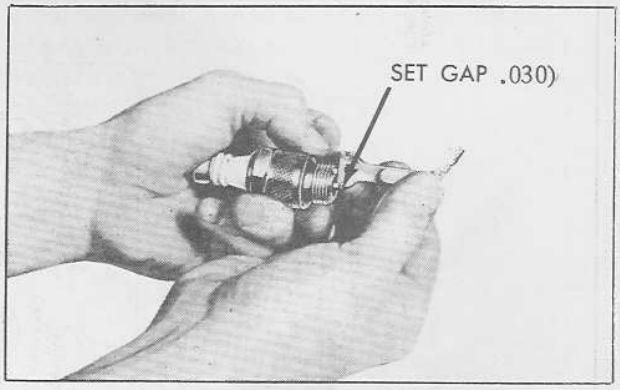


Fig. 14 104713C

SPARK PLUG

The spark plug gap should be thirty thousandths (.030) of an inch, and plugs should be kept clean both inside and out. *See Fig. 14.* If the porcelain insulator is cracked, replace with a new plug of correct heat range, like Champion No. D-16, AC No. C86 Commercial, or equal. The spark plug thread is 18 millimeter. Be sure to use a good gasket under the spark plug. Tighten spark plugs, 24 to 26 foot pounds torque.

ELECTRIC STARTER AND GENERATOR

The electric starter is an optional accessory, furnished only upon request when engine is purchased. The starter and generator cannot be mounted in the field unless provisions were made when engine was purchased. The starter and generator are products of the Electric Auto-Lite Company, Toledo, Ohio, and it is recommended that all repairs for this accessory be done through their authorized Service Stations. For wiring diagram, *see Fig. 12.* Battery is not furnished by engine manufacturer.

SUPPLEMENT

HIGH TEMPERATURE SAFETY SWITCH

As a safety precaution, some engines have a high temperature safety switch mounted on the cylinder head near the No. 2 spark plug, which will automatically stop the engine when head temperatures rise beyond a safe degree.

This switch is set by the manufacturer to operate at the correct temperature. Consequently, the adjusting screw on the top of the switch should not be tampered with. If the cylinder head temperature at the spark plug reaches 550°F., the switch will automatically short out the magneto, or distributor, and stop the engine. A waiting period of 3 to 5 minutes will be required before the switch has cooled off sufficiently to re-start the engine. An overheated engine will score the cylinder walls, burn out connecting rod and crankshaft bearings, also warp pistons and valves. The cause of the overheating condition will have to be remedied before the engine is re-started. *See* Engine Overheats *paragraph in Troubles, Causes and Remedies section.*

(On next revision, include in TE, TF manual)

STARTING

The engine, less electric starter, is started by applying the crank as shown in *Fig. 3* and pulling up briskly on the crank in a clockwise direction. ***Do not*** attempt to spin the engine with the starting crank. If the engine does not start on the first pull up of the crank re-engage the crank and repeat the operation.

WARM-UP PERIOD

When starting a gasoline engine for its days work, the engine should be allowed to warm up to operating temperature, before the load is applied. This requires only a few minutes of running of the engine at moderate speed.

Racing an engine or gunning it, to hurry the warm-up period, ***is very destructive*** to the polished wearing surfaces on pistons, rings, cylinders, bearings, etc., as the proper oil film on these various surfaces cannot be established until the oil has warmed up and become sufficiently fluid. This is especially important on new engines and in cool weather.

Racing an engine by disconnecting the governor, or by doing anything to interfere with the governor control of the speed of the engine, ***is extremely dangerous.*** Quite naturally the operator of the engine desires to get all possible power out of an engine, and the engine manufacturer does his best to supply this want, but if all of this power is used merely to speed up the engine, without any load being imposed upon it, dangerously high speeds will result.

The governor is provided as a means for controlling the engine speed to suit the load applied, and also as a safety measure to guard against excessive speeds, which not only overstrain all working parts, but which might cause wrecking of the engine, and possible injury to bystanders.

All parts of the engine are designed to safely withstand any speeds which might normally be required, but it must be remembered that the stresses set up in rotating parts, increase with the square of the speed. That means that if the speed is doubled the stresses will be quadrupled, and if the speeds are trebled the stresses will be nine times as great.

Strict adherence to the above instructions cannot be too strongly urged, and greatly increased engine life will result as a reward for these easily applied recommendations.

RESTORING COMPRESSION

On a new engine or on one which has been out of operation for some time, the oil may have drained off the cylinder so that compression will be weak. This may cause difficulty in starting. To remedy this condition, remove the spark plugs and pour about a fluid ounce of crankcase oil through the spark plug hole into each cylinder.

Turn the engine over several times with the starting crank to distribute the oil over the cylinder wall. Then replace the spark plugs and compression should be satisfactory.

TO STOP ENGINE

Engines, less house, have a lever type stop switch on the side of the magneto. On these, to stop engine, depress lever and hold down until engine stops. *See Fig. 1.* Others with house have an ignition switch on front panel of house as shown in *Fig. 2.* On these, to stop engine with magneto ignition, pull out the switch; with battery ignition, push in the switch.

If the engine has been running hard and is hot, do not stop it abruptly from full load, but remove the load and allow engine to run idle at 1000 to 1200 R.P.M. for three to five minutes, depending on how hot the engine has been. This will reduce the internal temperature of the engine much faster than stopping the engine, and of course the external temperature, including the manifold and carburetor will also reduce faster, due to the air circulation from the flywheel.

Two main troubles resulting from abrupt shutting off a hot engine are vapor lock and dieseling. Vapor lock will prevent the flow of fuel in the fuel lines and carburetor passages, which will result in hard starting of the engine. This can be overcome by choking the engine when cranking or waiting until the engine has cooled off sufficiently to overcome the vapor lock.

Dieseling, is caused by the carbon and lead deposits in the cylinder head being heated up to such an extent that they continue to fire the engine and keep it running after the ignition has been shut off. By idling the engine, as previously mentioned, the carbon and lead deposits cool off, break up and will blow out thru the exhaust. Have the carburetor throttle partially open when engine is shut off.

SAFETY PRECAUTIONS

Never fill fuel tank while engine is in operation or hot, as danger from fire would be incurred.

Never operate engine in a closed building unless the exhaust is piped outside. This exhaust contains carbon monoxide, a poisonous, odorless and invisible gas, which if breathed into the lungs would cause serious illness and possible death.

Never make adjustments on machinery while it is connected to the engine, without first removing the ignition cables from the spark plug. Turning over the machinery by hand during adjusting or cleaning might start the engine, and machinery with it, causing serious injury to the operator.

Always keep all parts of the engine clean. This will prolong engine life, and give more satisfactory operation.

Every 4 to 8 hours depending on dust conditions, check air cleaner and change oil. *See Page 8.*

Every 8 hours check crankcase oil level. Keep filled to ***full*** mark on oil gauge sabre, but no more. *See Fig. 4.*

Every 50 hours drain crankcase and refill with fresh oil. *See Lubrication, Pages 6 and 8.*

TROUBLES
CAUSES AND REMEDIES

Three prime requisites are essential to starting and maintaining satisfactory operation of gasoline engines. They are:

1. ***A proper fuel mixture*** in the cylinder.
2. ***Good compression*** in the cylinder.
3. ***Good spark, properly timed,*** to ignite the mixture.

If all three of these conditions do not exist the engine cannot be started. There are other factors which will contribute to hard starting; such as, too heavy a load for the engine to turn over at a low starting speed, a long exhaust pipe with high back pressure, etc. These conditions may affect the starting, but do not necessarily mean that the engine is improperly adjusted.

As a guide to locating any difficulties which might arise the following causes are listed under the three headings: ***Fuel Mixture, Compression,*** and ***Ignition.***

In each case the causes of trouble are given in the order in which they are most apt to occur. In many cases the remedy is apparent, and in such cases no further remedies are suggested.

STARTING DIFFICULTIES

FUEL MIXTURE

No fuel in tank or fuel shut-off valve closed.

Fuel pump diaphragm worn out, so pump does not supply carburetor with fuel.

Carburetor not choked sufficiently, especially if engine is cold. *See 'Choke', Page 10.*

Water, dirt, or gum in gasoline interfering with free flow of fuel to carburetor.

Poor grade or stale gasoline that will not vaporize sufficiently to form the proper fuel mixture.

Carburetor flooded, caused by too much choking especially if engine is hot. *See 'Choke', Page 10.*

Dirt or gum holding float needle valve in carburetor open. This condition would be indicated if fuel continues to drip from carburetor with engine standing idle. Often tapping the float chamber of the carburetor very lightly with the wood handle of a screw driver or similar instrument will remedy this trouble. Do not strike carburetor with any metal tools, it may be damaged. Also if the mixture in the cylinder, due to flooding, is not too rich to start the engine, starting should be tried, as it will usually correct the trouble. In this case the choke should be left open.

If, due to flooding, too much fuel should have entered the cylinder in attempting to start the engine, the mixture will most likely be too rich to burn. In that case the spark plugs should be removed from the cylinders and the engine then turned over several times with the starting crank, so the rich mixture will be blown out through the spark plug holes. The choke on the carburetor should of course be left open during this procedure. The plugs should then be replaced and starting tried again.

To test for clogged fuel line, loosen fuel line nut at carburetor slightly. If line is open, fuel should drip out at loosened nut.

COMPRESSION

If the engine has proper compression, considerable resistance will be encountered in the pull on the starting crank on compression strokes. If this resistance is not encountered, compression is faulty. Following are some reasons for poor compression:

Cylinder dry due to engine having been out of use for some time. *See 'Restoring Compression', Page 15.*

Loose or broken spark plug. In this case a hissing noise will be heard in cranking engine, due to escaping gas mixture on compression stroke.

Damaged cylinder head gasket or loose cylinder head. This will likewise cause hissing noise on compression stroke.

Valve stuck open due to carbon or gum on valve stem. To clean valve stems, *see 'Valves', Page 22.*

Valve tappets adjusted with insufficient clearance under valve stems. *See 'Valve Tappet Adjustment', Page 23.*

Piston rings stuck in piston due to carbon accumulation. If rings are stuck very tight this will necessitate removing piston and connecting rod assembly and cleaning parts. *See 'Piston and Connecting Rod' Page 20.*

Scored cylinders. This will require reboring of the cylinders and fitting with new pistons and rings. If scored too severely an entirely new cylinder block may be necessary,

IGNITION

See 'Magneto Ignition Spark' Page 10 or 'Distributor-Battery Ignition' Page 11. No spark may also be attributed to the following:

Ignition cable disconnected from magneto or spark plugs.

Broken ignition cables, causing short circuits.

Ignition cables wet or oil soaked.

Spark plug insulators broken.

Spark plugs wet or dirty.

Spark plug point gap wrong. *See Page 14.*

Condensation on spark plug electrodes.

Magneto or Distributor breaker points pitted or fused.

Magneto or Distributor breaker arm sticking.

Magneto or Distributor condenser leaking or grounded.

Spark timing wrong. *See 'Magneto Timing', Page 10,* or *'Distributor-Battery Ignition', Page 11.*

ENGINE MISSES

Spark plug gap incorrect. *See Page 14.*

Worn and leaking ignition cables.

Weak spark. *See 'Magneto Ignition Spark', Page 10,* or *'Distributor-Battery Ignition', Page 11.*

Loose connections at ignition cable.

Magneto or Distributor breaker points pitted or worn.

Water in gasoline.

Poor compression. *See 'Compression', Page 16.*

ENGINE SURGES OR GALLOPS

Carburetor flooding.

Governor spring hooked into wrong hole in lever. *See 'Governor', Page 23.* Governor rod incorrectly adjusted. *See 'Governor', Page 23.*

ENGINE STOPS

Fuel tank empty.

Water, dirt or gum in gasoline.

Gasoline vaporized in fuel lines due to excessive heat around engine (Vapor Lock).

Vapor lock in fuel lines or carburetor due to using winter gas (too volatile) in hot weather.

Air vent hole in fuel tank cap plugged.

Engine scored or stuck due to lack of oil.

Ignition troubles. *See 'Ignition', Page 16.*

ENGINE OVERHEATS

Crankcase oil supply low. Replenish immediately.

Ignition spark timed wrong. *See 'Magneto Timing', Page 10,* or *'Distributor-Battery Ignition,' Page 11.*

Low grade of gasoline.

Engine overloaded.

Restricted cooling air circulation.

Part of air shroud removed from engine.

Dirt between cooling fins on cylinder head.

Engine operated in confined space where cooling air is continually recirculated, consequently becoming too hot.

Carbon in engine.

Dirty or incorrect grade of crankcase oil.

Restricted exhaust.

Engine operated while detonating due to low octane gasoline or heavy load at low speed.

ENGINE KNOCKS

Poor grade of gasoline or of low octane rating. *See 'Fuel', Page 9.*

Engine operating under heavy load at low speed.

Carbon or lead deposits in cylinder head.

Spark advanced too far. *See 'Magneto Timing' Page 10* or *'Battery Ignition Distributor', Page 11.*

Loose or burnt out connecting rod bearing.

Engine overheated due to causes under previous heading.

Worn or loose piston pin.

ENGINE BACKFIRES THROUGH CARBURETOR

Water or dirt in gasoline.

Engine cold.

Poor grade of gasoline.

Sticky inlet valves. *See 'Valves', Page 22.*

Overheated valves.

Spark plugs too hot. *See 'Spark Plug', Page 14.*

Hot carbon particles in engine.

DISASSEMBLING AND REASSEMBLING ENGINES

Engine repairs should be made only by a mechanic who has had experience in such work. When disassembling the engine it is advisable to have several boxes available so that parts belonging to certain groups can be kept together, such as, the cylinder head screws and etc. Capscrews of various lengths are used in the engine, therefore great care must be exercised in reassembly so that right screws will be used in the various places, otherwise damage may result.

Tighten the capscrews and nuts of the manifold, cylinder head, gear cover, engine base, connecting rods, cylinder block, main bearing plate and the spark plugs to the specified torque readings indicated in the following paragraphs of reassembly.

With the disassembling operations, instructions on reassembling are also given, as often, it will not be necessary to disassemble the entire engine. If it is desired to disassemble the entire engine the reassembly instructions can be looked up later under the headings of the various parts.

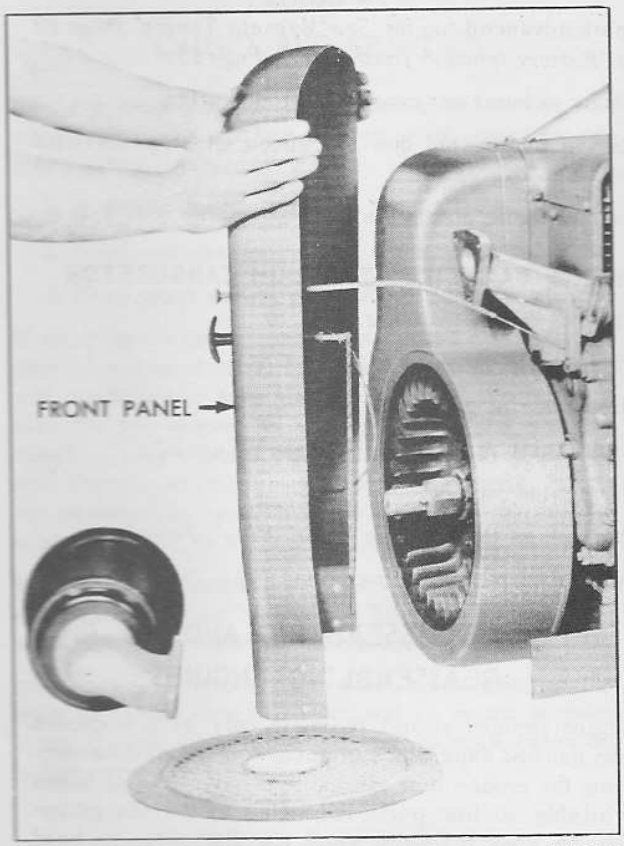
While the engine is partly or fully dismantled, all of the parts should be thoroughly cleaned. Remove all accumulated dirt between the fins on cylinder and head.

ACCESSORIES

Remove the muffler and disconnect the governor control, choke control, ignition switch, fuel lines and if an electric starter and generator are used, these should also be removed.

SHEET METAL HOUSE

With engines enclosed in a sheet metal house, the top or canopy should be removed by taking out the screws holding it to the end panels.



148478C

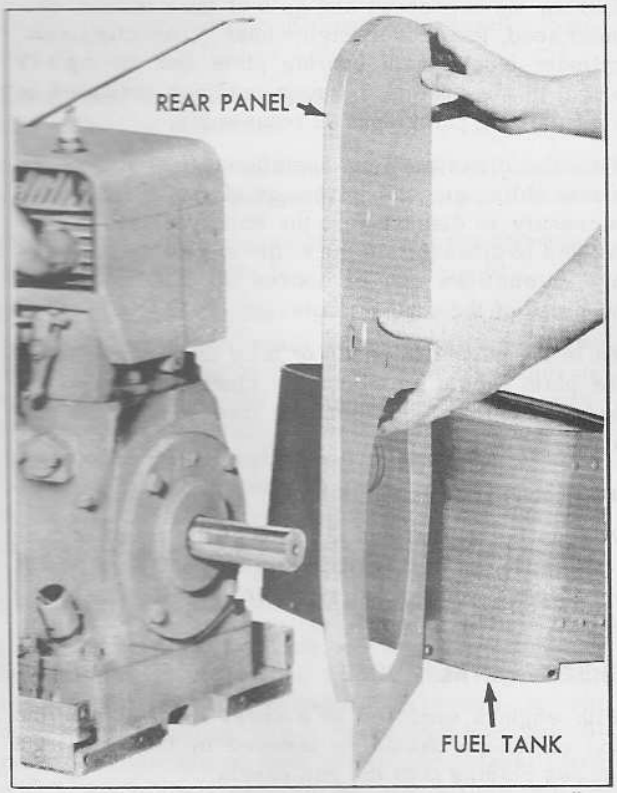
Fig. 15

FRONT PANEL

Remove the air cleaner and bracket, the flywheel screen and the four round head screws which support the panel to the side rails. The front house panel can then be removed as shown in *Fig. 15.*

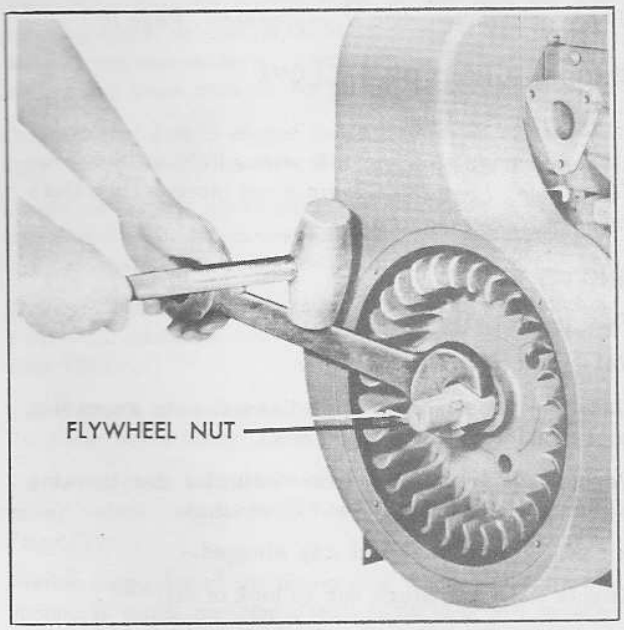
REAR PANEL AND FUEL TANK

The fuel tank assembly is removed by taking out the six screws which hold it to the rear panel. The rear house panel can then be removed by taking out the screw holding it to the cylinder block, engine base and side rails. *See Fig. 16.*



148477C

Fig. 16



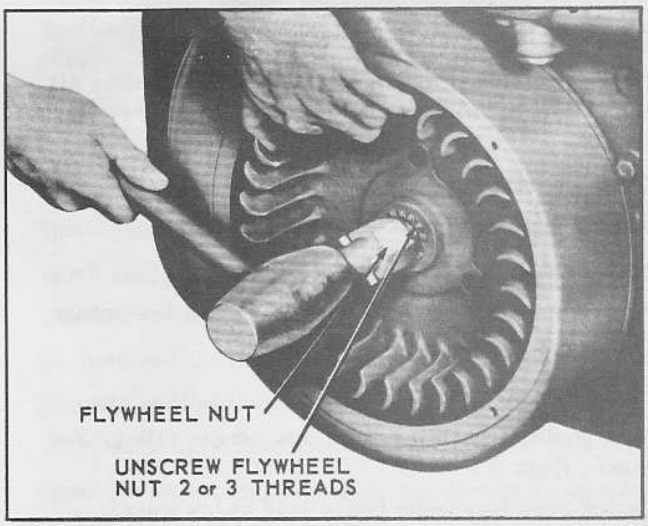
148497C

Fig. 17

FLYWHEEL

Loosen the flywheel nut with a monkey wrench or 1-3/8" open end wrench as shown in *Fig. 17.* Do not remove the flywheel nut, but unscrew it about two or three turns.

The flywheel is mounted to a taper on the crankshaft. Take a firm hold on the flywheel fins, pull outward and at the same time strike the end of the flywheel



189165C

Fig. 18

nut with a babbitt hammer. *See Fig. 18.* The flywheel will slide off the taper of the crankshaft and can be removed after the flywheel nut is removed. Striking the end of the flywheel nut instead of directly on the crankshaft will prevent serious damage to the threads at the end of the shaft. Also, do not use a hard hammer as it may ruin the crankshaft and bearings. When reassembling the flywheel, be sure the Woodruff key is in position on the shaft and that the keyway in the flywheel is lined up accurately with the key.

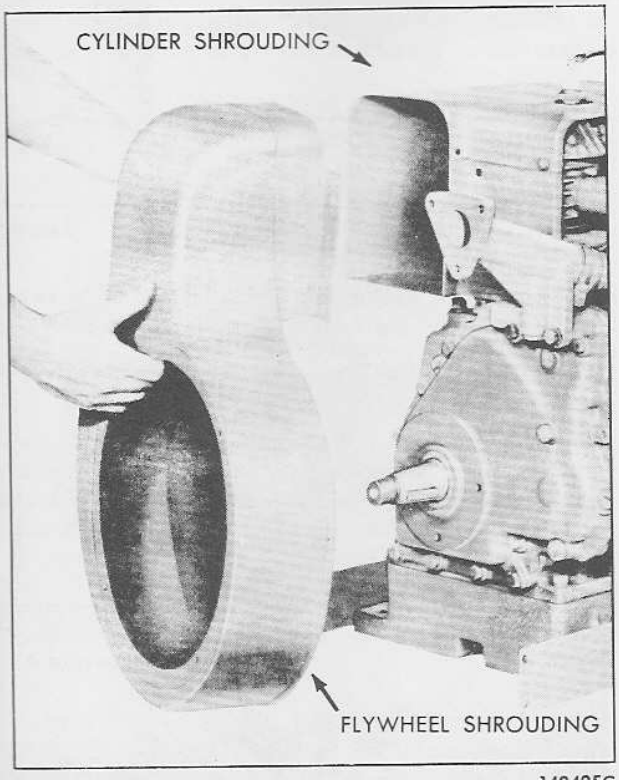


Fig. 19 148495C

FLYWHEEL SHROUD

The three capscrews which mount the flywheel shroud to the gear cover and the six screws to the cylinder shrouding must be removed to disassemble flywheel shroud from engine. *See Fig. 19.*

SIDE MOUNT FUEL TANK

If it is necessary the side mount fuel tank and bracket be disassembled, loosen the tank strap screws and remove the tank. This will make the four screws for mounting the tank bracket to the crankcase and engine base accessible. Otherwise, just remove the two screws holding the bracket to the crankcase and remove the tank and bracket assembly along with the engine base when it is removed.

CARBURETOR AND MANIFOLD

Remove the cotter pin from the governor control rod and pull the rod from the control lever. Take out the two capscrews which hold the air cleaner connection bracket to the gear cover and remove the two nuts and square washers from the manifold studs. The complete carburetor, manifold and air cleaner connection

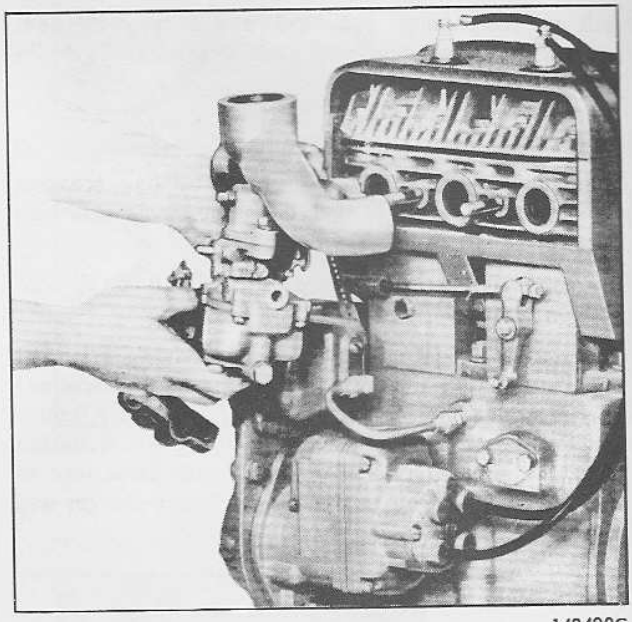


Fig. 20 148490C

bracket can be removed as a complete unit, shown in *Fig. 20.*

In reassembly, tighten the nuts for mounting the manifold to 26 foot pounds torque. Tightening beyond specification may cause the square washers to crack.

CYLINDER HEAD

Remove the cylinder head cover, heat deflector and side shroud. If it is necessary to regrind valves or do work on the piston rings or connecting rods, the cylinder head will have to be removed. All the cylinder head screws are plainly in view and can be easily removed. Screws of different lengths are used but these can be properly reassembled according to the various lengths of cylinder head bosses. Before reassembling the cylinder head, all carbon and lead deposits must be removed. It is recommended that a new cylinder head gasket be used in reassembly as the old gasket

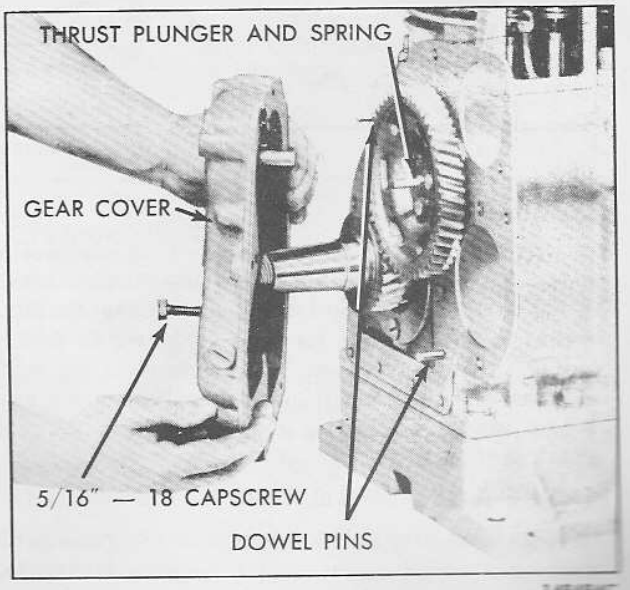


Fig. 21

will be compressed and hard, and it may not seal properly. Tighten cylinder head screws to 22 to 24 foot pounds torque.

GEAR COVER

Disconnect the governor linkage and oil line. Remove the governor, magneto and the gear cover mounting screws.

In reassembly, tighten capscrews to 16 to 18 foot pounds torque.

Screw a 5/16"-18 thread capscrew, having a 1-3/4" minimum length of thread, into one of the flywheel shroud mounting holes, *see Fig. 21*. Then, by lightly tapping the gear cover through the magneto mounting hole, the gear cover will come off without damage to the dowel pins. Pull out camshaft thrust plunger and spring to prevent losing them.

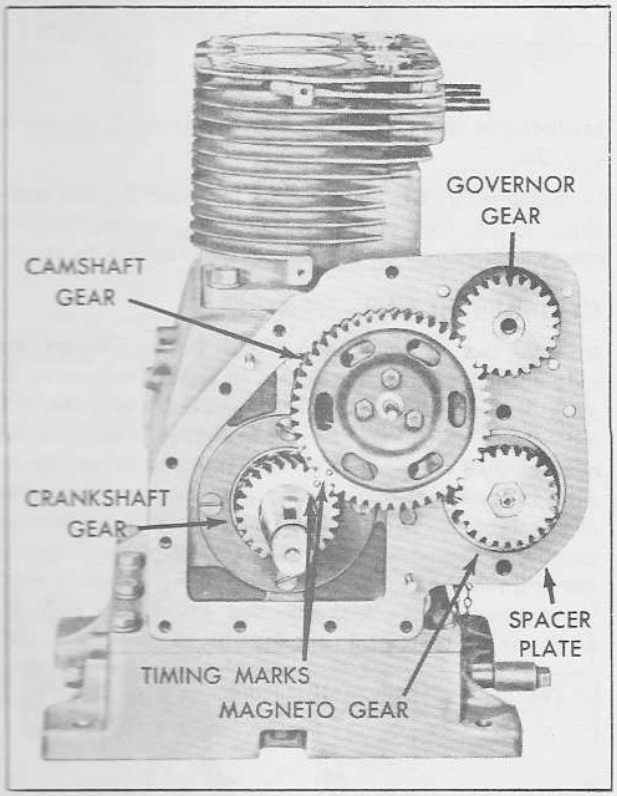


Fig. 22 148489C

CAMSHAFT GEAR

Remove the three capscrews which hold the gear to the end of the camshaft and pry it off with a screw driver or similar wedge tool. Note that the mounting holes in the camshaft gear are staggered in such a manner that the gear can be assembled to the shaft only one way which will automatically time the gear to the shaft. *See Timing Gear Train, Fig. 22.* The gear cover spacer plate can now be removed.

ENGINE BASE AND OIL PUMP

Be sure and drain oil from engine base. Take out 8 capscrews which mount engine base to crankcase, then turn engine on its side and take out the two cap

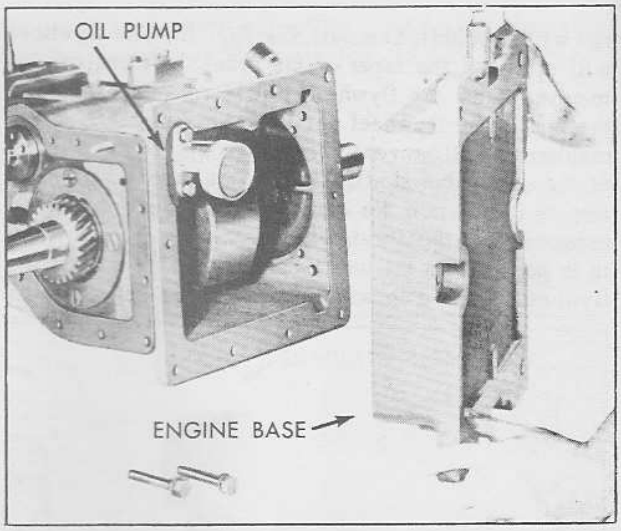


Fig. 23 148479C

screws from the bottom that hold the base to the case. Remove engine base as shown in *Fig. 23.*

In reassembly, tighten capscrews to 22 to 24 foot pounds torque.

Dismantle the oil pump by taking out the three capscrews which hold it to the crankcase. *See Fig. 23.* When servicing oil pump, be sure all ball checks and other parts are reassembled in same position as when taken apart. *See Fig. 3.*

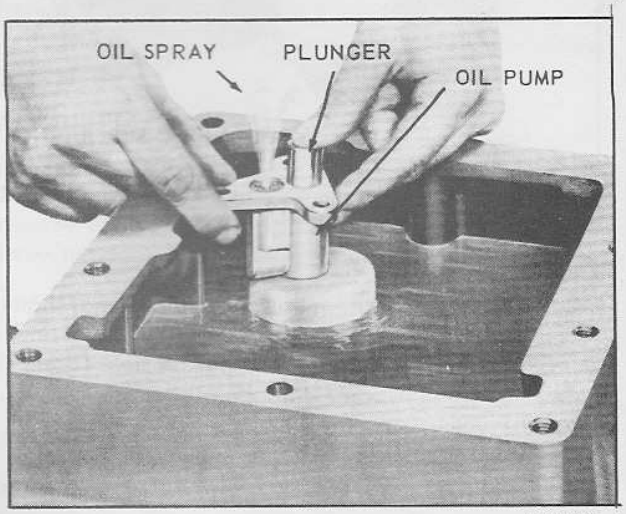


Fig. 24 148485C-1

Before assembling oil pump to crankcase, fill base partially with engine oil and work pump plunger up and down, *see Fig. 24*, to test if pump is operating properly.

When assembling pump to crankcase, be sure that the plunger rod is in position. Install the oil pump cup, washer and strainer screen over the pump inlet before the engine base is mounted to the crankcase.

PISTONS AND CONNECTING RODS

After removal of engine base and oil pump, the connecting rods will be accessible. Remove the palnuts

and hexagon nuts, then by tapping the ends of the bolts lightly, being careful not to mar the threads, the connecting rod cap can be freed from the bolts. The rod with the piston can now be pushed up through the cylinder. Be careful not to score the crankshaft journals, by allowing the rod bolts to strike or scrape across them, when removing the connecting rod and piston assemblies. Replace the caps on the rods immediately so that they are in the correct position for reassembly, being sure that the shims are in place before the cap is put on. A number is stamped on the side of the rod and cap to match each connecting rod with its corresponding cap. These numbers must be on the same side of the connecting rod in reassembly. *See Fig. 25.*

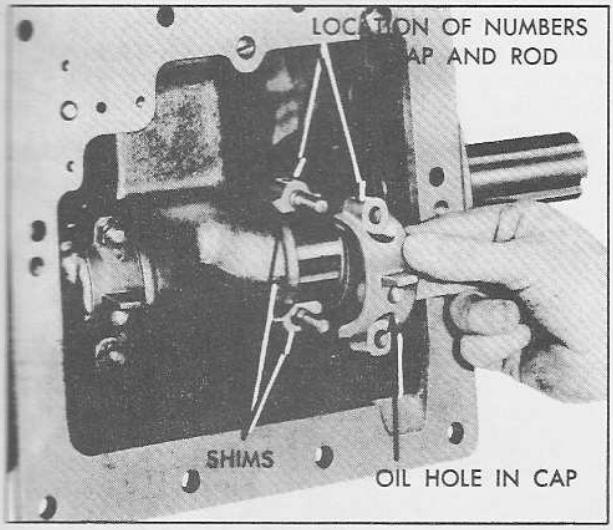


Fig. 25 148483C

When assembling piston to connecting rod, the split side of the piston should be on the opposite side of the rod to the oil hole in connecting rod cap. *See Fig. 3.* The connecting rods are assembled into the engine with the oil hole in the cap pointing away from the camshaft side of the engine. *See Fig. 25.*

Be sure piston and connecting rod assemblies are put back into the same bore from which they were removed. Use a suitable ring compressor in reassembly and stagger the piston ring gaps 90° apart around the piston. Oil the pistons, rings, wrist pins, rod bearings and cylinder walls before assembly.

Tighten connecting rod nuts to 22 to 24 foot pounds torque, then install 'Pal' lock-nuts and tighten with wrench ¼ turn beyond 'finger-tight' position.

PISTON RINGS

Install rings by placing the open end of the ring on piston first, as shown in *Fig. 26.* Spread ring only far enough to slip over piston and into correct groove, being careful not to distort ring.

The scraper ring and oil ring must be installed on the piston with the scraper edge down, otherwise oil pumping and excessive oil consumption will result. *See Fig. 27.*

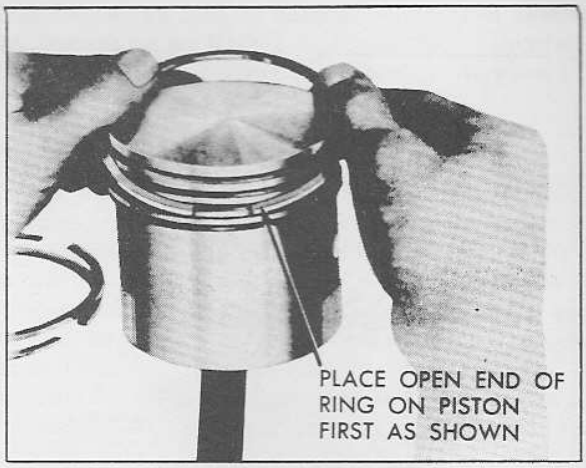


Fig. 26 71152C

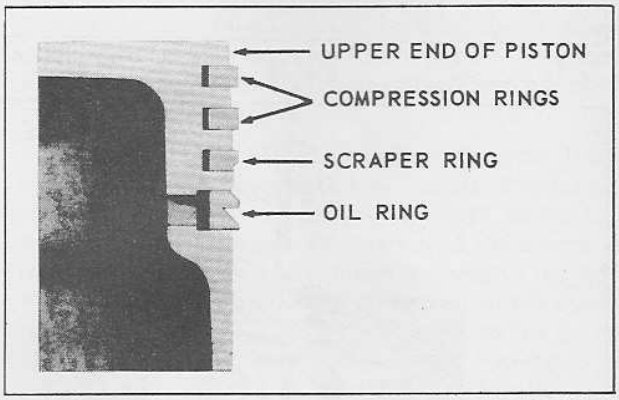


Fig. 27 92200C-1

PISTON, RING AND ROD CLEARANCES CHART

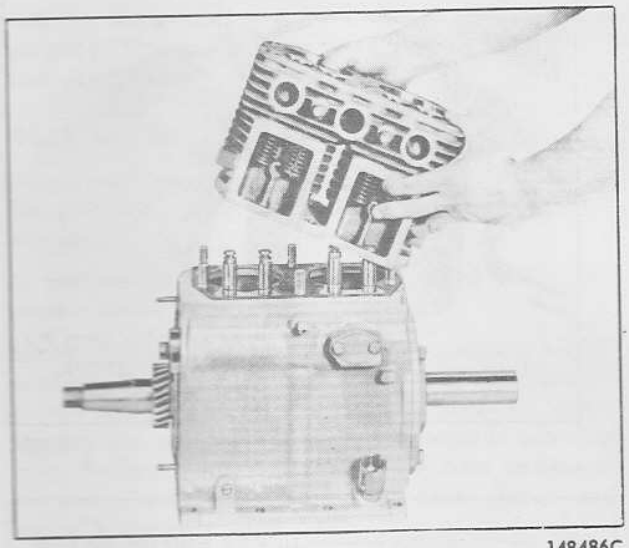
Piston to Cylinder at Piston Skirt		.004 to .0045"
Piston Ring Gap		.014 to .024"
Piston Ring Side Clearance in Grooves	Top Ring	.002 to .0035"
	2nd Ring	.001 to .0025"
	Scraper Ring	.001 to .0025"
	Oil Ring	.0025 to .004"
Connecting Rod to Crank Pin	Diameter	.0007 to .002"
	Side	.004 to .010"
Piston Pin to Connecting Rod Bushing		.0005 to .001"

CYLINDER BLOCK

The cylinder block assembly can be removed by taking off the six nuts which hold the block to the crank case studs. *See Fig. 28.*

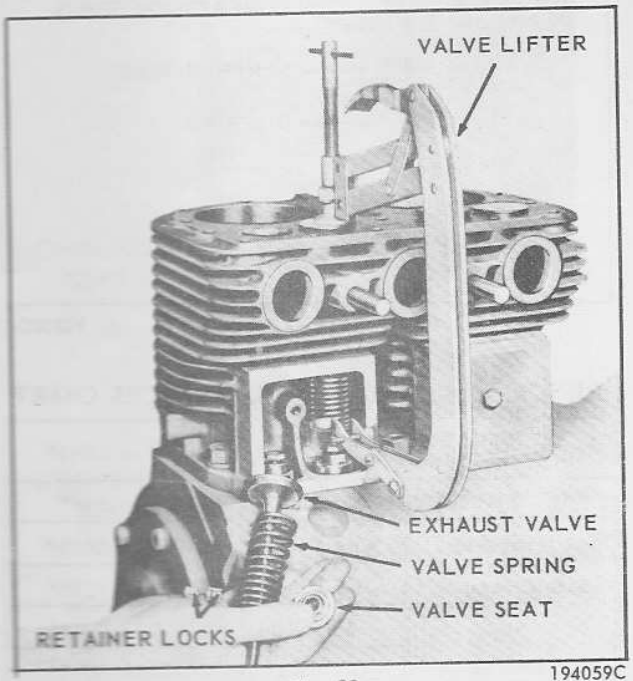
In reassembly, clean all dirt and other deposits from fins. If the cylinders are worn more than .005 inch oversize, they should be reground and fitted with oversize pistons and rings. This work should be done at an authorized service station.

Tighten cylinder block mounting nuts to 32 to 34 foot pounds torque.



148486C

Fig. 28



194059C

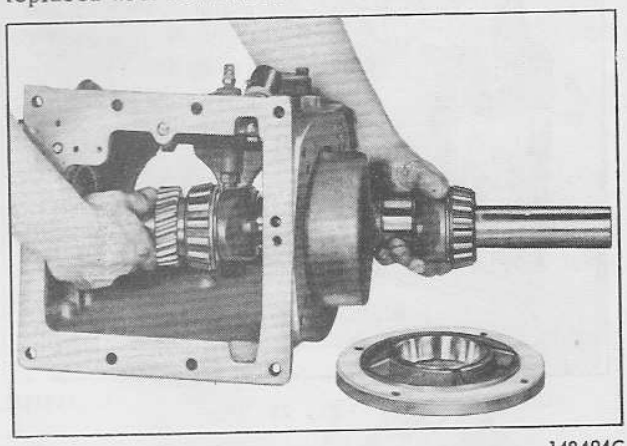
Fig. 29

VALVES

Remove the valve tappet inspection plate. Compress the valve springs with a standard automotive type valve lifter. We recommend a No. 358 valve lifter manufactured by KD Tools of Lancaster, Penn., or equivalent. *See Fig. 29.* Insert a rag in the opening at the bottom of the valve chamber so the valvespring seat retaining locks do not fall into the engine crankcase. Remove the valve spring seat retaining locks, seats, springs, valves and clean these, as well as the ports and guides, of all carbon and gum deposits. Tag each valve so that in reassembly they will be mounted in the same guide they were removed from.

The valve face is ground at 45° to the vertical center line of the valve stem and the valve seat insert should also be ground at a 45° angle. After grinding, valves and inserts should be lapped with a suitable lapping compound or they will leak due to improper seating within the first few hours of operation. After valve seats have been cleaned, apply lapping compound to the valve face and put the valves back into their guides. Lap the valves by rotating them back and forth with a reciprocating advancing valve tool. Occasionally lift the valves and reseat them in a different position to insure a uniform seat which will show entirely around the valves. After valves have been lapped in evenly, remove them from the block and wash the valves and block thoroughly with gasoline or kerosene.

The valve stems should have a clearance of .003" to .005" in the guides. When the clearance becomes .007", the guides should be reamed and fitted with valves that have a .004" oversize valve stem. *Later Model Engines* have replaceable valve guides thus eliminating the necessity of using valves with oversize stems, as the worn guides can be driven out and replaced with new ones.



148494C

Fig. 30

CRANKSHAFT

To remove the crankshaft, first remove the oil slinger from the flywheel end of the shaft and take out the four capscrews holding the main bearing plate in place at the take-off end of the crankshaft. The main bearing plate can then be pried off and the crankshaft removed from that end of the crankcase as shown in *Fig. 30.*

Be sure to keep the gaskets on the main bearing plate in place, since they are necessary to give the proper end play to the Timken main bearings on the crankshaft. This end play should be .001 to .004 inch when engine is cold. There is practically no wear in the Timken roller bearings so that no readjustment is necessary after proper assembly.

When reassembling crankshaft, the timing marks on the crankshaft gear and the camshaft gear must match up, as shown in *Fig. 22,* otherwise engine will not operate properly or if timing is off considerably, engine will not run at all.

Mount main bearing plate in the correct position in reassembly. The word **'TOP'** is cast on the outside of the plate, and should be mounted in this position. Tighten main bearing plate capscrews to 24 to 26 foot pounds torque.

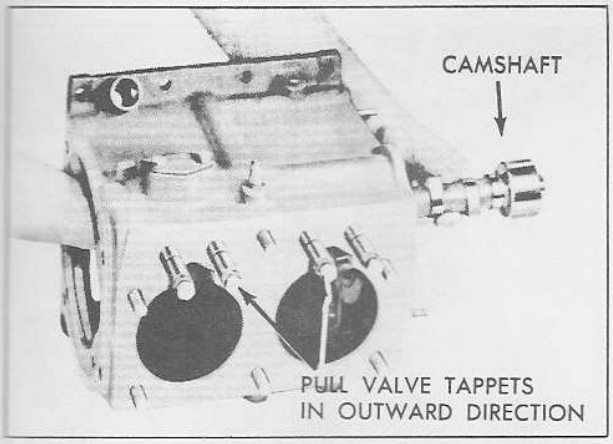


Fig. 31 148492C

CAMSHAFT

Pull the valve tappets outward so as to clear the cams of the camshaft as it is removed from the crank case, shown in *Fig. 31*. When replacing, be sure the spring and thrust plunger, *see Fig. 21*, are in place in the end of the camshaft, as these hold the camshaft in position endwise.

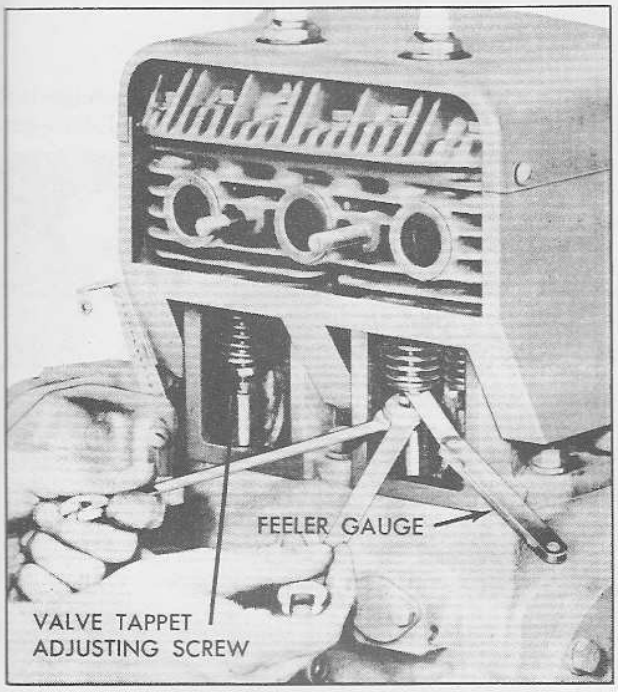


Fig. 32 148488C

VALVE TAPPETS

The valve tappets are taken out after the camshaft is removed. In reassembly, the tappets must of course be inserted in proper position in crankcase, before the camshaft is assembled.

After the cylinder block assembly has been mounted to the crankcase, the tappets should be adjusted. *See Fig. 32*. With the tappets in their lowest positions, engine cold, the clearance should be:

Inlet and Exhaust Valves, .011" to .013", including Stellite Exhaust Valves.

Engines having Stellite exhaust valves and inserts are designated as Models TED and TFD. Carefully check the model designation on name plate when adjusting valve tappet clearance.

OIL SPRAY NOZZLE

The oil spray nozzle is installed so that both metered holes can be seen when looking into the bottom of the crankcase. When positioned correctly, the flats on the hex body of the nozzle will be parallel with the top and bottom machined surfaces of the crankcase. The end of the spray nozzle should extend about 1½ inches from the boss it is screwed into, or so that the restricted discharge holes line up with the crankshaft centerline when it is installed. *See* oil spray nozzle, *Fig. 3* and *Fig. 4*.

GOVERNOR

The centrifugal flyball governor rotates on a stationary pin driven into the upper part of the timing gear cover, and the governor is driven off the camshaft gear at crankshaft speed.

The flyweights are hinged to lugs on the gear. Hardened pins on the flyweights bear against the flanged sliding sleeve, moving it back and forth as the flyweights move in or out. The motion of the sleeve is transmitted through a ball thrust bearing to the governor lever, which in turn is connected to the carburetor throttle lever. A spring connected to the governor lever tends to hold the governor flyweights to their inner position, also to hold the carburetor throttle open. As the engine speed increases, the centrifugal force in the flyweights acts against the spring and closes the throttle to a point where the engine speed will be maintained practically constant under varying load conditions. This speed can be varied to suit conditions by adjusting the governor spring to suit.

The control rod from the governor to carburetor must be adjusted to the proper length otherwise the governor action will be faulty. With the engine at rest the governor spring will hold the flyweights ***'in'***, and the control rod must be of such length as to hold the carburetor throttle wide open at that point. The ac-

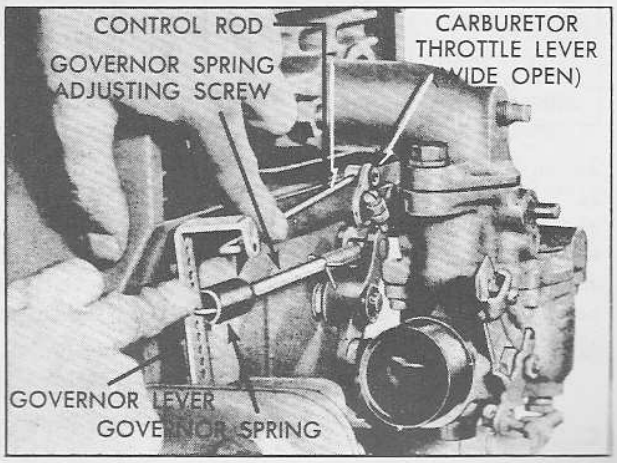


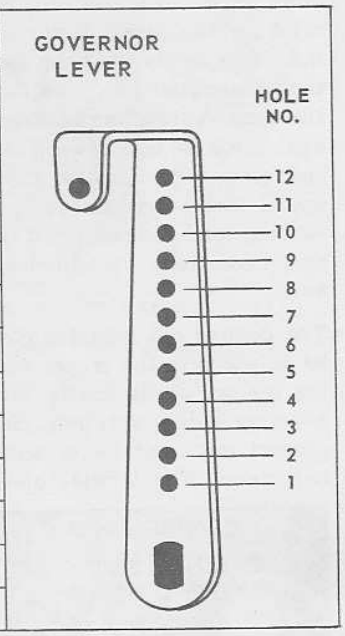
Fig. 33 148481C

curacy of this adjustment can be tested by disconnecting the rod from the governor lever, and then pushing the rod toward the carburetor as far as it will go. This will open the throttle wide. The bent end of the rod should then exactly register with the hole in the governor lever. *See Fig. 33.* If it does not, the rod should be screwed into or out of the swivel block on the carburetor lever, until the above mentioned registry is attained. The rod should then be again connected to the governor lever. If this adjustment is not made accurately the governor may cause the engine speed to surge or otherwise be unsatisfactory.

The governor can be disassembled from the engine by first removing the governor housing, after which the entire governor can be withdrawn from the stationary pin. The construction of the governor can be best seen from the sectional drawing of the engine, *Fig. 3.*

The governor lever is furnished with 12 holes, as shown in the following table, for attaching the governor spring. It is very important that the spring is hooked into the proper hole to suit the speed at which the engine is operated. A table is given herewith showing the full load and no load speeds of the engine and the hole corresponding thereto. The full load speed will be from 150 to 125 revolutions less than the no load speed.

LOAD R.P.M.	NO LOAD R.P.M.	HOLE NO.
1400	1550	2
1500	1650	3
1600	1725	3
1700	1850	4
1800	1925	4
1900	2025	5
2000	2150	6
2100	2225	6
2200	2350	7
2300	2425	7
2400	2550	8
2500	2650	9
2600	2725	9



As an example, if the engine is to be operated at 2150 revolutions per minute without load, the spring should be hooked into the 6th hole in the governor lever and the spring tension adjusted by means of the adjusting screw on the spring to run 2150 revolutions per minute. The speed at full load will then be approximately 2000 revolutions per minute.

CLUTCH AND REDUCTION GEARS

CLUTCH

The clutch furnished with these models of engines is of the disc type running in oil. Use the same grade

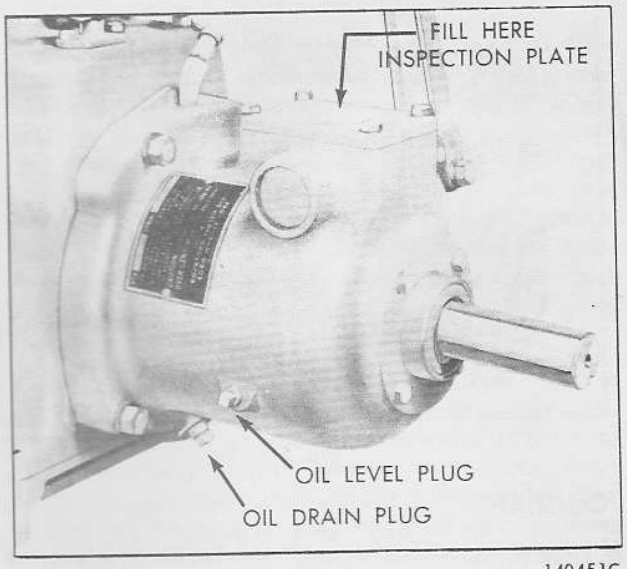
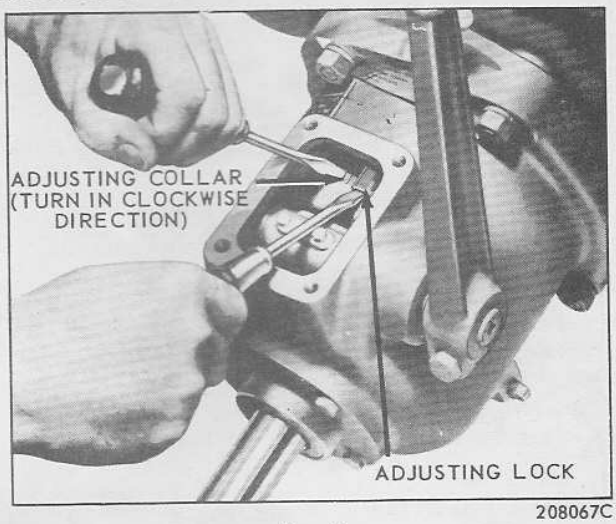


Fig. 34 140451C

of oil in the clutch as is used in the crankcase of the engine. The oil should be filled through the inspection plate opening, to the height of the oil level plug. Approximately a pint of oil is required. *See Fig. 34.*

CLUTCH ADJUSTMENT

If the clutch begins to slip it should be readjusted, otherwise it would become overheated and damaged.



208067C

Fig. 35

First remove the clutch inspection plate. This will expose the notched adjusting collar. Release clutch engaging lever. Turn adjusting collar in clockwise direction with a screw driver or similar instrument. *See Fig. 35.* The collar should be turned one notch at a time until a definite pressure is felt on the clutch lever when clutch is being engaged. Then replace inspection plate, being careful that the gasket fits properly and is not broken.

On the clutch reduction gears, there is a no inspection plate directly over the clutch. A pipe plug is furnished, however, and the clutch adjustment is made through the pipe plug hole. *See Fig. 36.*

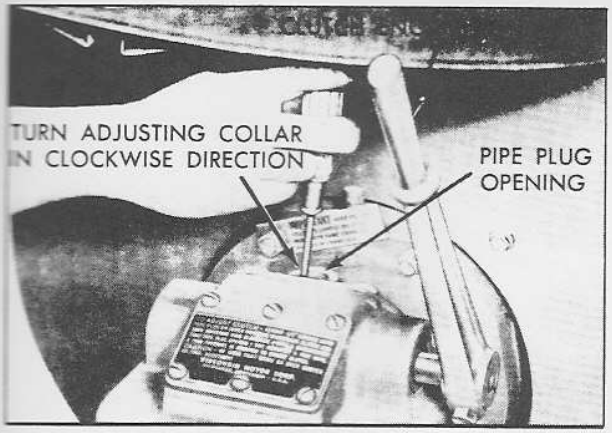


Fig. 36 104575C

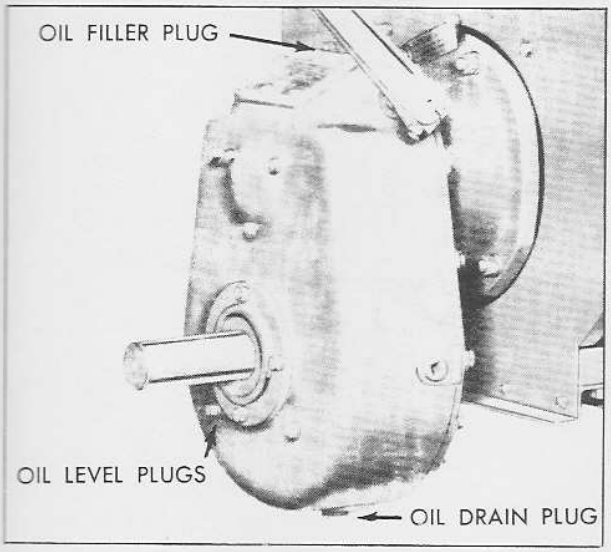


Fig. 37 76090C

REDUCTION GEARS

Reduction gears are furnished with several different ratios, some with spur gears, others with chains. All are of the same general design, except that some are furnished with clutches, others without. These reduction gears require the same grade of oil as is used in the crankcase of the engine. For various installations these gears are assembled to the engines in various positions. Several plugs are furnished on these reduction gears so that the lubrication may be properly taken care of regardless of the position of the installation. For instance, there will always be one plug on top to be used for filling oil. There will always be one plug below for draining oil, and there will be one plug on the side slightly above the bottom, to be used as an oil level plug. *See Fig. 37.*

The oil should always be filled when the engine is at rest. When the oil becomes dirty it should be drained, while the engine is hot, and fresh oil added. The frequency at which these oil changes should be made depends entirely on the kind of service in which these gears are used, but ever with light service the change should be made at least once every five hundred hours of operation, adding sufficient oil between changes to keep the oil up to the oil level plug.

STORAGE OF ENGINE FOR WINTER

When the season's work is completed, the following instructions should be carried out very carefully to protect the engine over winter.

The outside of the engine, including the cooling fins on the cylinders and heads, should be thoroughly cleaned of all dirt and other deposits.

The air cleaner at the carburetor intake should be thoroughly cleaned of all oil and accumulated dust and sediment removed from the oil cup at the bottom of the cleaner.

To protect the cylinders, pistons, rings and valves and keep them from rusting and sticking, a half and half mixture of kerosene and good gas engine oil, (the same kind of oil as used in the crankcase of the engine), should be injected into the pipe tap opening on the intake manifold while the engine is warm and running at moderate speed. About a quarter of a pint is necessary, or enough so that a heavy bluish smoke will appear at the exhaust. The ignition switch should then be shut off and the engine stopped. This operation will give a coating of oil on the above mentioned parts, protecting them from the atmosphere.

All old used oil should be drained from the crankcase while the engine is warm, as the oil will then flow more freely than when cold.

Drain fuel system, including gasoline lines, carburetor, fuel pump and tank of all gasoline to prevent lead and gum sediment interfering with future operation.

All exposed unpainted metal parts should be coated with grease or heavy oil.

Before starting the engine again the next season, the crankcase drain plug should again be removed, so that any condensation, which may have collected during the winter, may be drained before new crankcase oil is added.

A good plan, and one that is recommended is to remove the crankcase oil base in the spring before starting the engine for the new season, and scrubbing off all sediment which may have collected there.

When replacing the engine base, a new gasket should be used.

Be sure to fill the crankcase with a good quality of crankcase oil to the high level point, before starting the engine. Do not use any oil heavier than SAE No. 30. Also be sure to put oil to the proper level in the air cleaner.

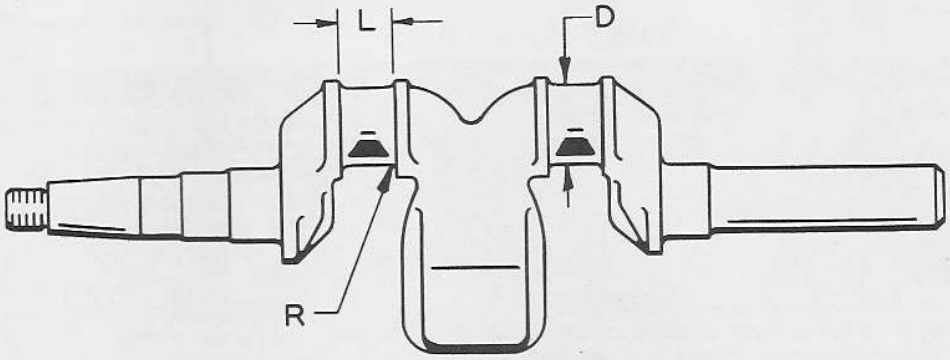
It is also recommended to use new spark plugs at the beginning of the next season, especially if the engine has given considerable service.

Refuel engine and follow the starting instructions as shown on preceding pages of this manual.

It is highly recommended that machines be stored inside a building through the winter. If this is not possible, the engine should be protected from snow and ice by a proper covering.

CA-62-Etc. CRANKSHAFT JOURNAL DIMENSIONS

For Engine Models TE, TF and TH



Diameter – $\begin{matrix}1.751\\1.750\end{matrix}$ inch

Length – $\begin{matrix}1.130\\1.125\end{matrix}$ inch

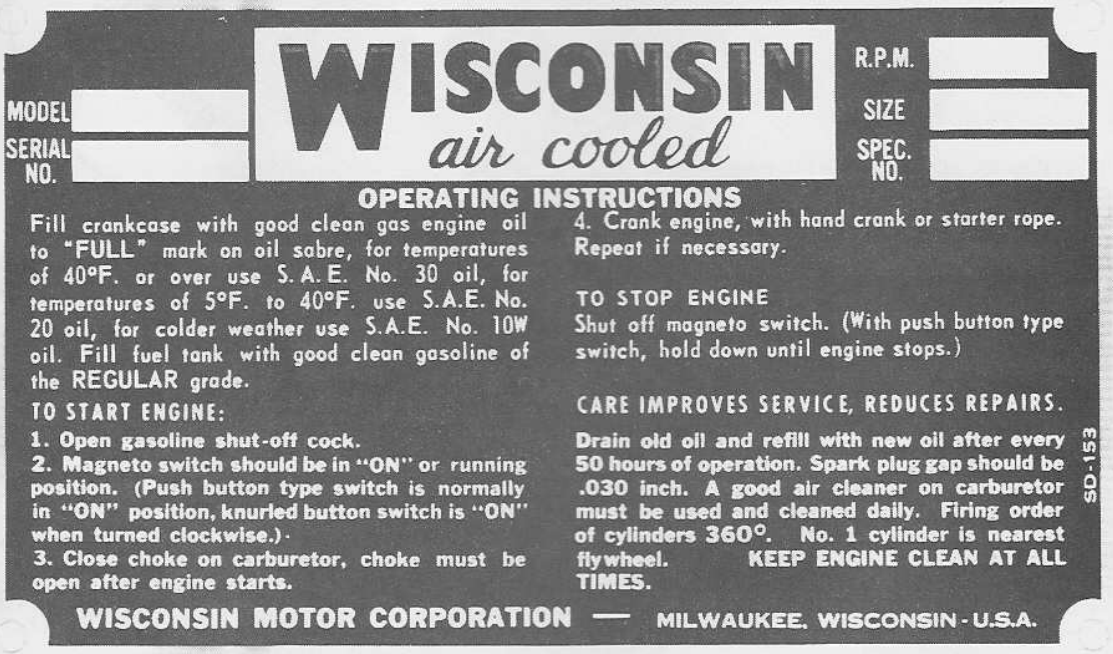
Radius – 1/8 inch

REPAIR PARTS LIST

READ THESE INSTRUCTIONS BEFORE ORDERING PARTS

THE MODEL, SPEC AND SERIAL NUMBER OF YOUR ENGINE, SHOWN ON THE NAME PLATE ATTACHED TO THE AIR SHROUD, MUST BE GIVEN WHEN ORDERING PARTS.

FILL IN THE ABOVE INFORMATION ON THE PHOTO OF THE NAME AND INSTRUCTION PLATE SO THAT IT WILL BE AVAILABLE TO YOU WHEN ORDERING PARTS.



193683C-2

TO INSURE PROMPT AND ACCURATE SERVICE, THE FOLLOWING INFORMATION MUST ALSO BE GIVEN.

1. State exactly, quantity of each part and part number.

2. State definitely, whether parts are to be shipped by express, freight or parcel post.

SERVICE FACILITIES

Approved engine service stations, located throughout the U.S. and foreign countries, have been carefully selected by the WISCONSIN MOTOR CORPORATION in order to assure complete and efficient repair and inspection service to owners of Wisconsin Air Cooled Engines. These service stations, equipped and trained for complete engine repair, also stock parts to facilitate immediate delivery for all Wisconsin Air Cooled Engines.

A DIRECTORY OF SERVICE STATIONS CAN BE FOUND IN THE BACK OF THIS MANUAL.

PARTS RETURNED FOR CREDIT

Before returning any parts, write a letter to the company from whom the parts were purchased, giving an exact list and description of the materials, why you wish to return them, whether for repairs, credit, or replacement, and also the model, specification and serial numbers of the engine from which the parts were taken. If authority is granted for their return, transportation charges must be prepaid and sender's name marked on the outside of the box or package.

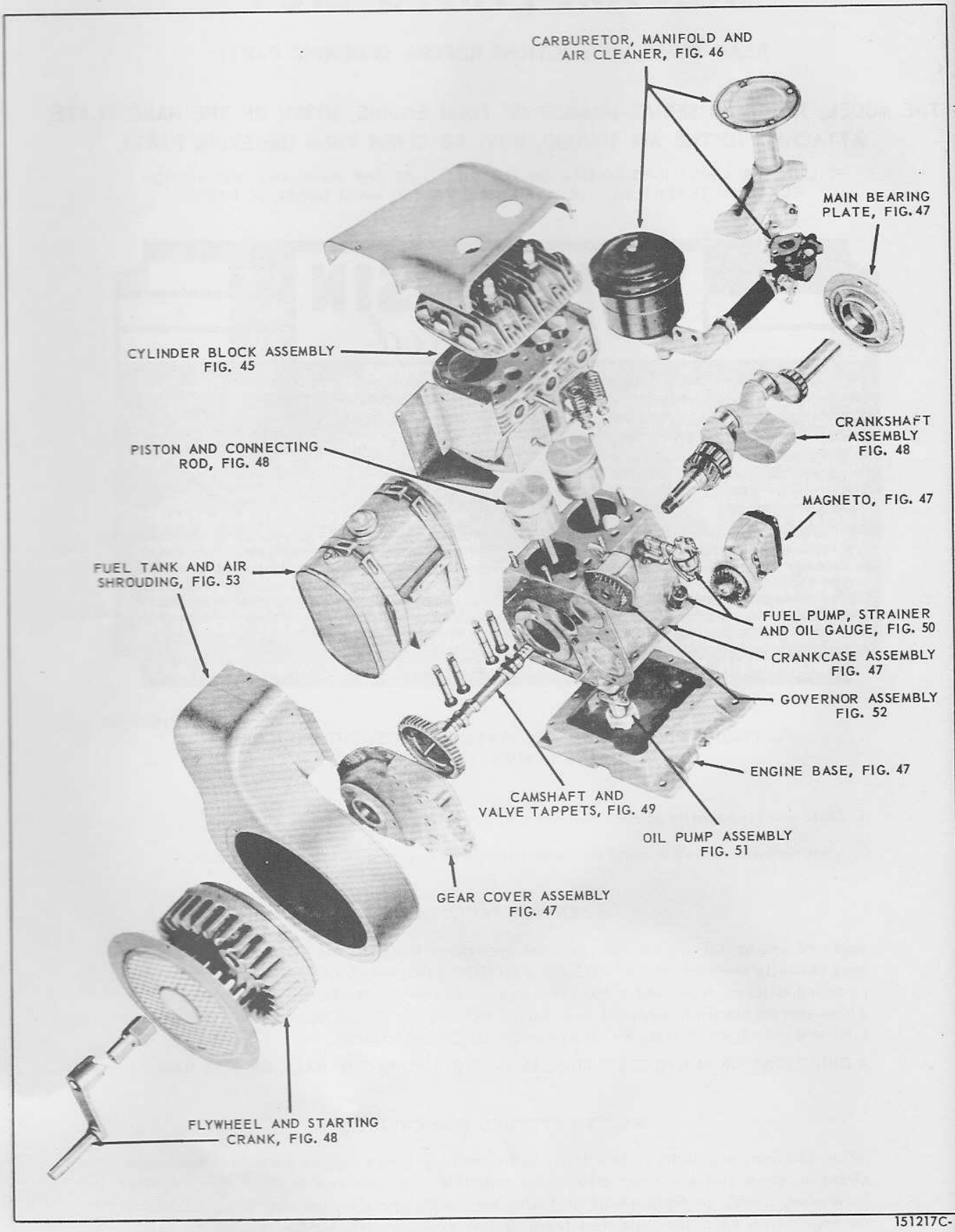


Fig. 44, EXPLODED VIEW OF ENGINE

Refer to figure numbers for break down of parts.

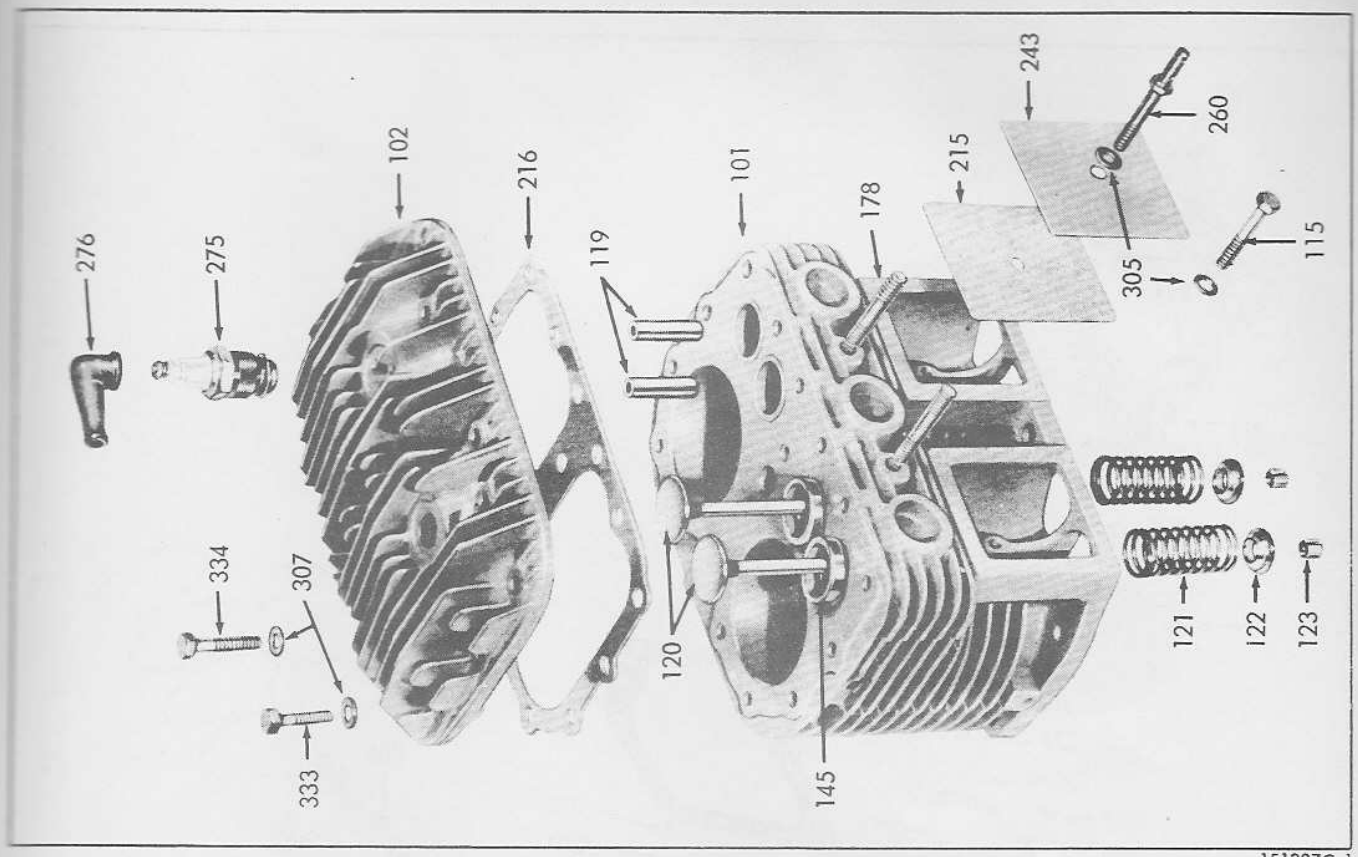


Fig. 45, CYLINDER BLOCK ASSEMBLY

151297C-1

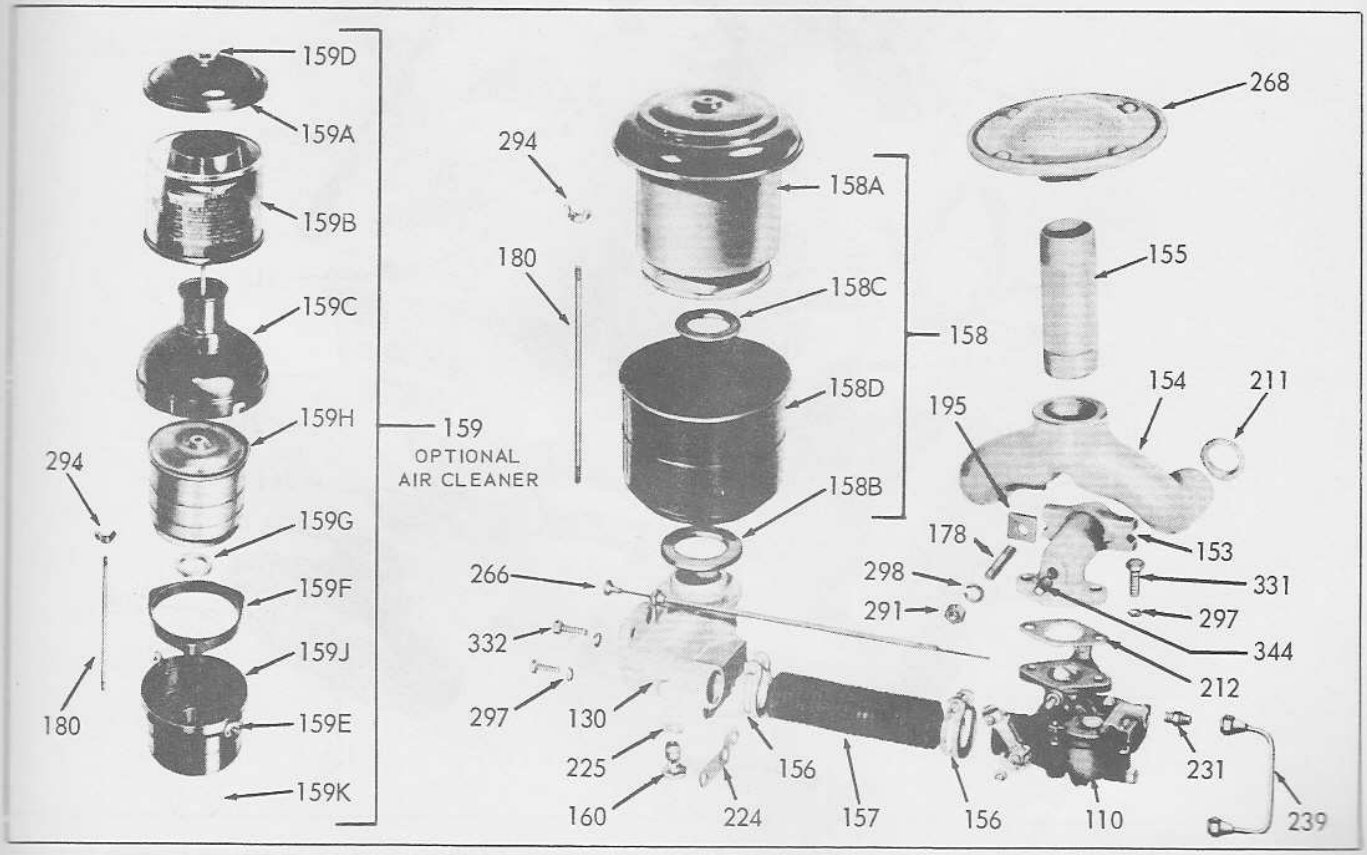


Fig. 46, CARBURETOR, MANIFOLD AND AIR CLEANER GROUP

151299C-3

Parts are identified by reference number. See parts list for correct part number.

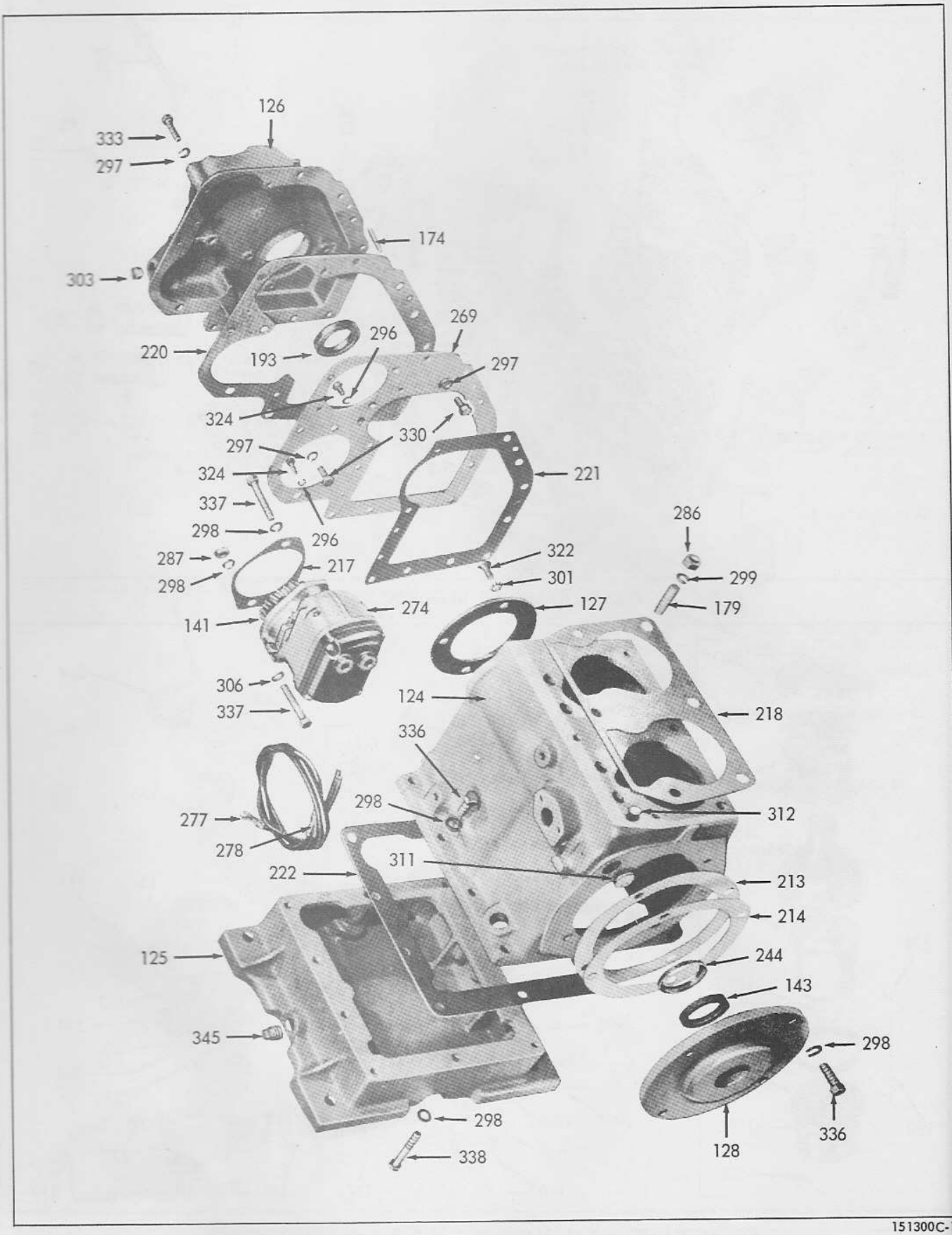
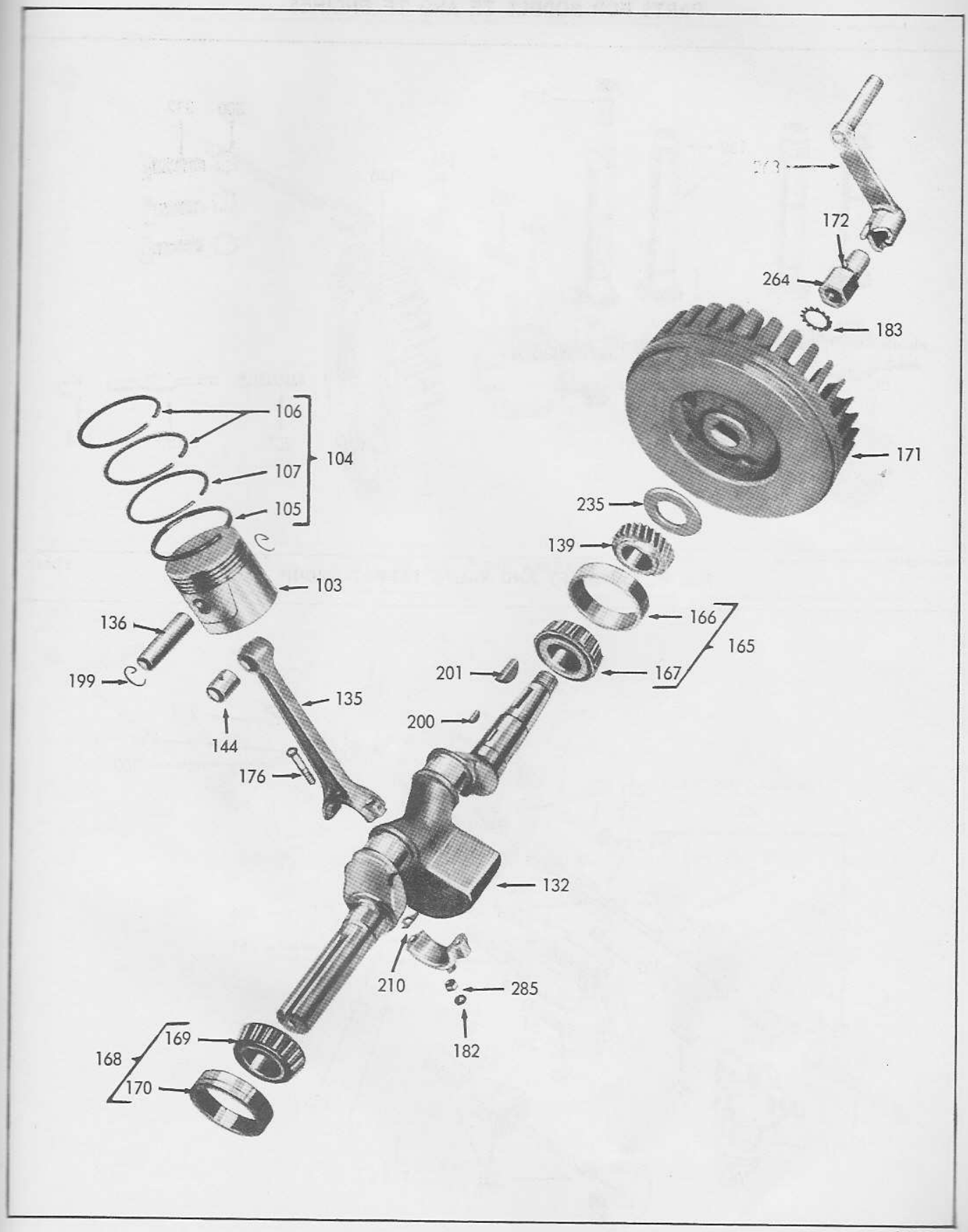


Fig. 47, CRANKCASE, GEAR COVER, BASE AND MAGNETO GROUP

Parts are identified by reference number. See parts list for correct part number.



151295C

Fig. 48, CRANKSHAFT, PISTON AND CONNECTING ROD GROUP

Parts are identified by reference number. See parts list for correct part number.

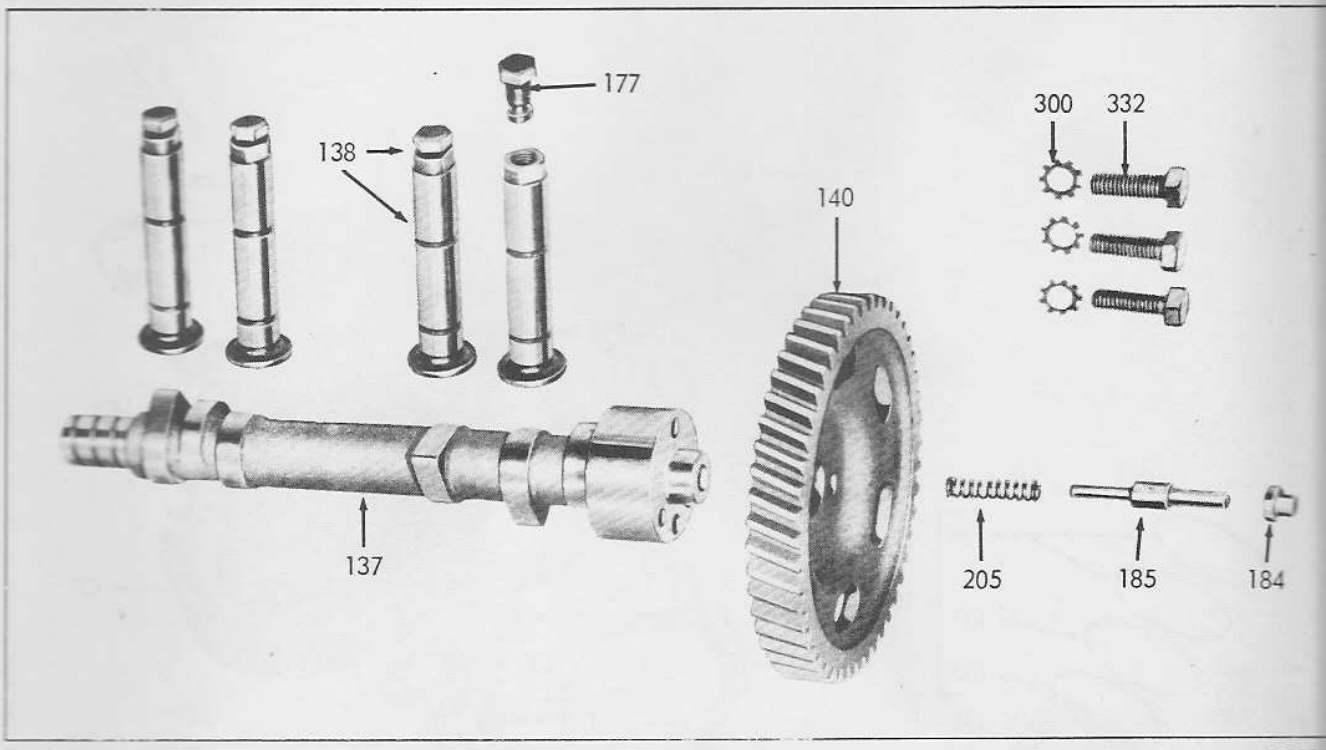


Fig. 49, CAMSHAFT AND VALVE TAPPET GROUP

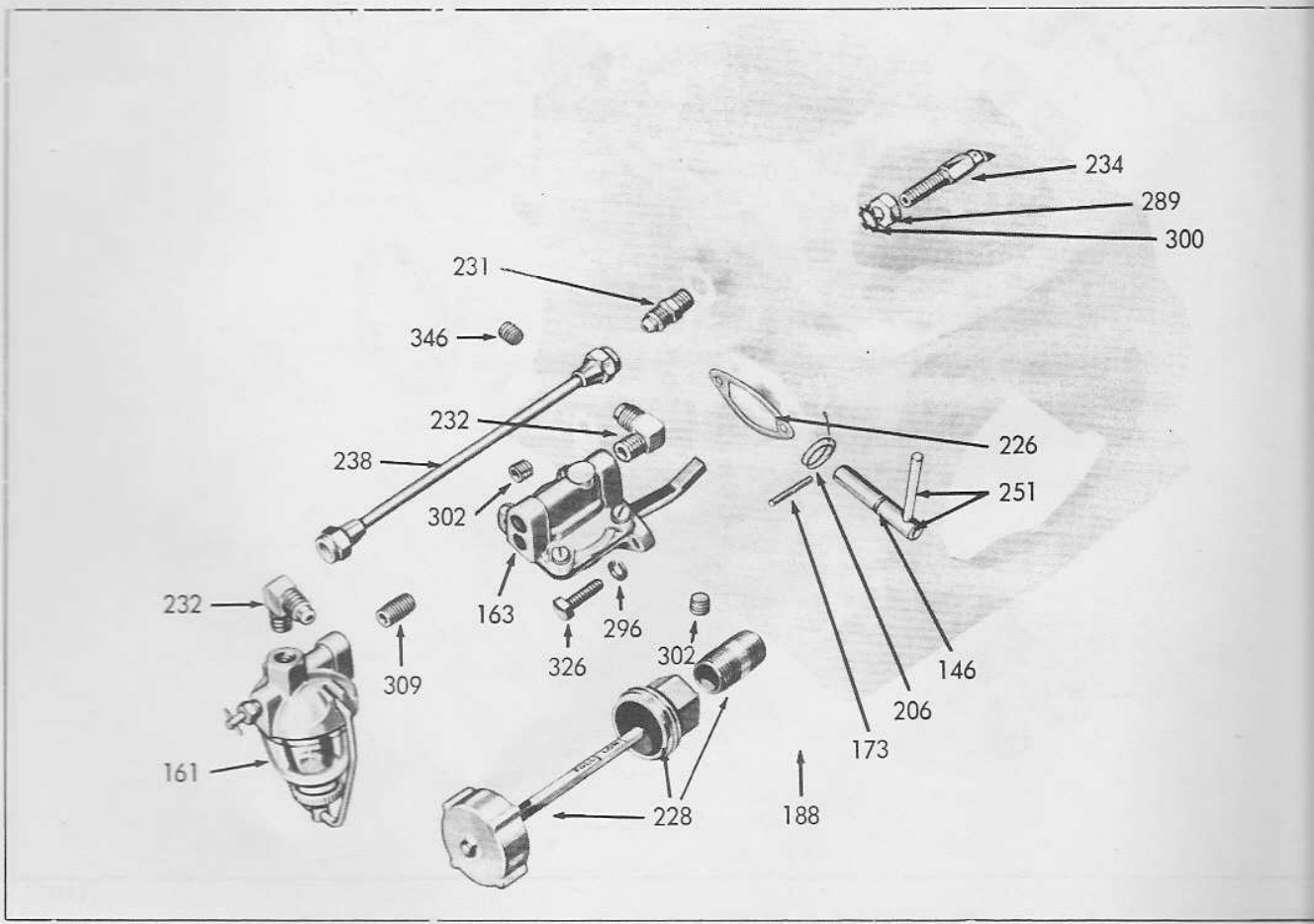


Fig. 50, FUEL PUMP, OIL GAUGE AND OIL SPRAY NOZZLE GROUP

Parts are identified by reference number. See parts list for correct part number.

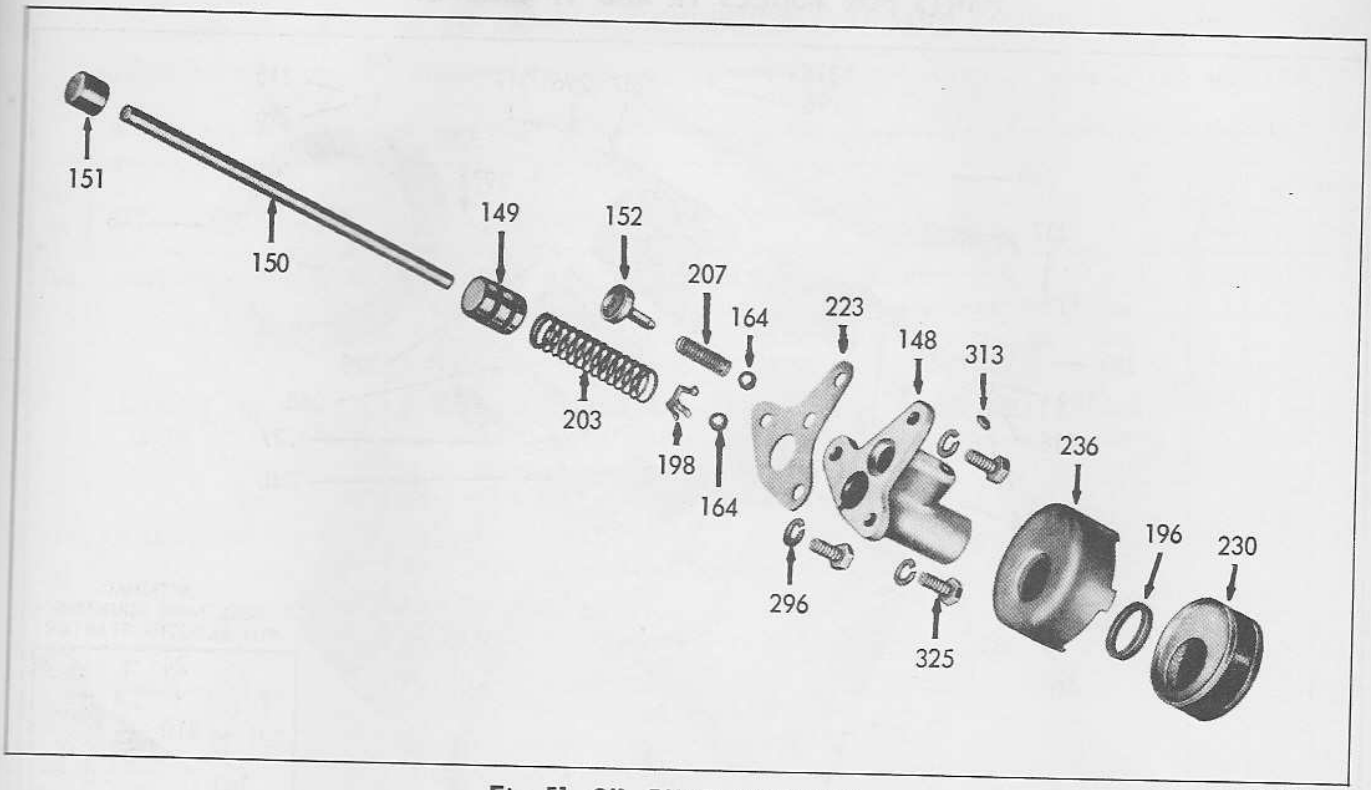
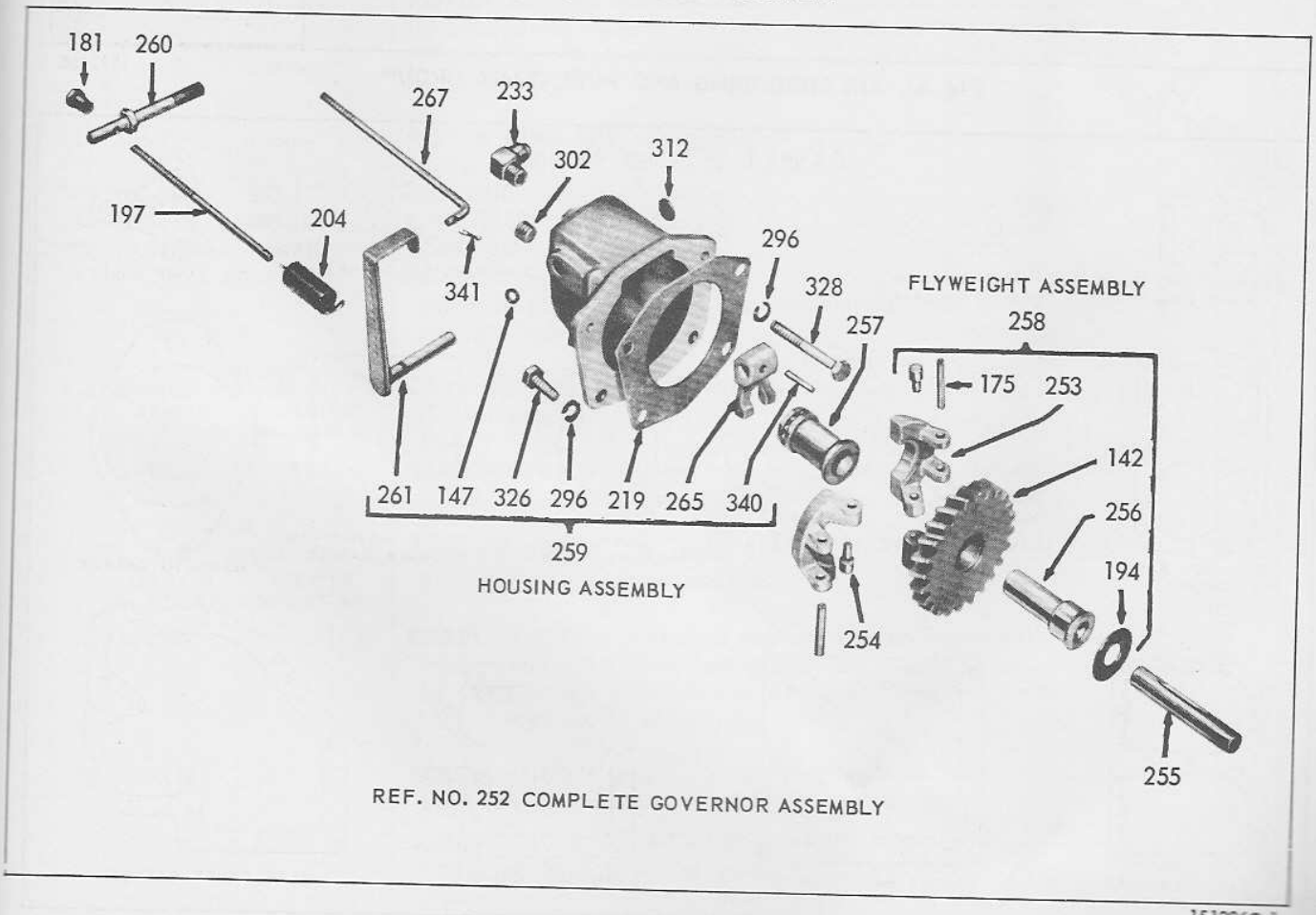


Fig. 51, OIL PUMP ASSEMBLY 151292C-1



151296C-1

Fig. 52, GOVERNOR ASSEMBLY

Parts are identified by reference number. See parts list for correct part number.

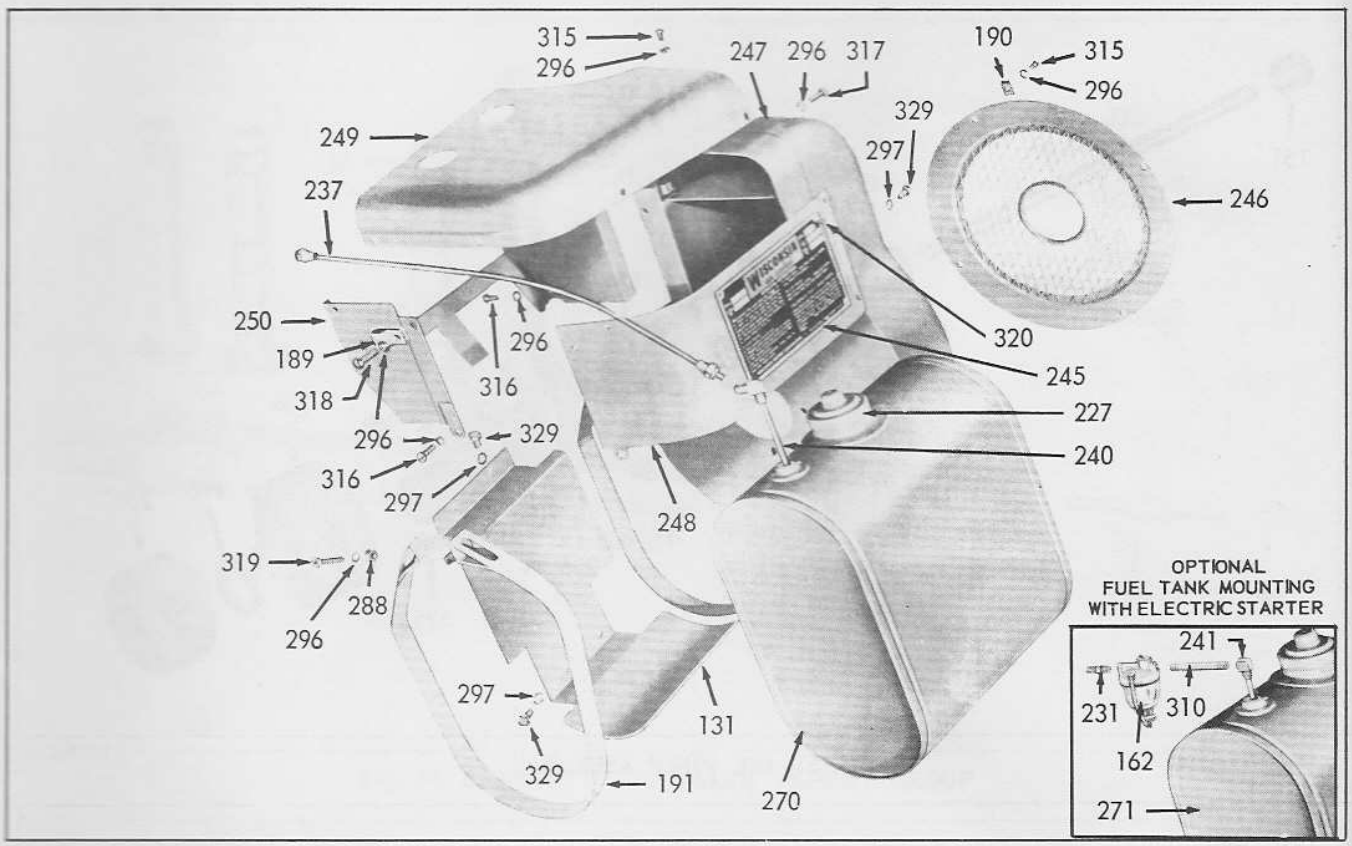


Fig. 53, AIR SHROUDING AND FUEL TANK GROUP

151216C-1

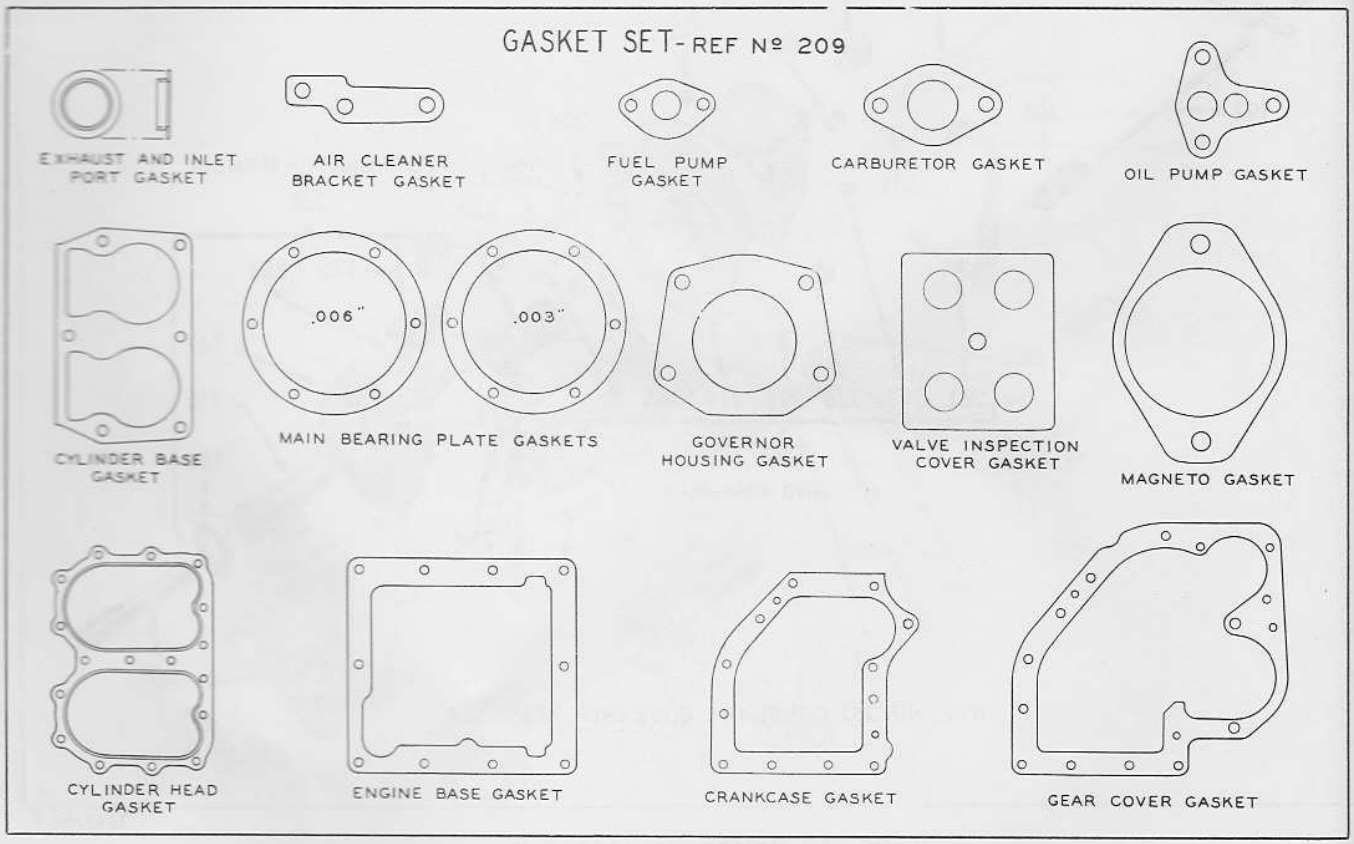


Fig. 54, GASKET SET

Parts are identified by reference number. See parts list for correct part number.

PARTS LIST

MODELS TE and TF – 2 CYLINDER STANDARD ENGINE

ENGINES HAVING STELLITE EXHAUST VALVES AND INSERTS ARE DESIGNATED AS MODELS TED AND TFD.

The following parts are for a standard engine without house. If power unit house parts are required, refer to Page 42.

Ref. No.	Part Number TE	Part Number TF	Description	No. Req.	Net Weight Lbs.	Net Weight Oz.
101	AA-85-S22	AA-86A-S22	**CYLINDER BLOCK ASSEMBLY,** standard Complete with valves, guides, springs, seats, locks and inserts. PC-110 Studs for mounting manifold must be ordered separately. AA-86-S22, replaced by AA-86A-S22.	1	30	
	AA-85-S19 (TED)	AA-86A-S19 (TFD)	**CYLINDER BLOCK ASSEMBLY,** complete with **STELLITE** exhaust valves and inserts, guides, springs, seats, locks, studs, inspection plate, gasket, screw and pin. AA-86-S19, replaced by AA-86A-S19.			
102	AB-100-B		**CYLINDER HEAD** AB-80-E Cylinder Head, replaced by AB-100-B.	1	2	13
		AB-100	**CYLINDER HEAD** AB-86 Cylinder Head, replaced by AB-100.	1	4	
103	DB-209		**PISTON,** standard size DB-187B-1 Piston, replaced by DB-209. DB-208 Piston, replaced by DB-209. **NOTE:** These pistons are interchangeable only in sets.	2		8
		DB-210	**PISTON,** standard size DB-190 Piston, replaced by DB-210, interchangeable only in sets. Pistons are also furnished .005", .010", .020", .030" oversize and semi-finished.	2		9
104	DR-19	DR-20	**PISTON RING SET,** standard size Consisting of:	1		5
105	DC-109	DC-112-A	**OIL RING**	2		1
106	DC-163	DC-125-2	**COMPRESSION RING**	4		1
107	DC-163-1	DC-210	**SCRAPER RING** DC-125-3, replaced by DC-210. Piston rings and ring sets are also furnished .005", .010", .020" and .030" oversize.	2		1
110	L-48-L (ZENITH No. 10627-B)	L-48-J (ZENITH No. 10595-C)	**CARBURETOR,** Zenith Model 161-7 For engines with fuel pump.	1	2	15
	L-48L-1	L-48J-1 (ZENITH No. 11774)	**CARBURETOR** for engines with fuel pump and generator-distributor ignition			
	L-48-D (ZENITH No. S-1548-B)	L-48-C (ZENITH No. S-1329-C)	**CARBURETOR,** Zenith Model 161-7 For power unit engines with gravity feed fuel system.	1	2	15
	L-48D-1	L-48C-1	**CARBURETOR** for power unit engines with generator-distributor ignition and gravity feed fuel system **NOTE:** See carburetor bulletin in back of manual for service replacement parts list.			
115	XD-148		**SCREW,** 5/16"-18 thread x 1-5/8" long, hexagon head For valve inspection cover plate, No. 1 cylinder.	1		2
		XD-21	**SCREW,** 5/16"-18 thread x 1-1/2" long, hexagon head For valve inspection cover plate, No. 1 cylinder.	1		2

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

PARTS INTERCHANGEABLE ON MODELS TE AND TF

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
119	AD-41	**VALVE STEM GUIDE** for engines beginning with Serial No. 2247771	4		2
120	AE-75-B	**VALVE,** inlet and exhaust, standard	4		3
	AE-75-D	**STELLITE EXHAUST VALVE** For TED and TFD engines. Valves are also furnished with .004" oversize stem.	2		3
121	AF-49-A	**VALVE SPRING,** standard (2-5/16" approx. free length).	4		2
	AF-51	**VALVE SPRING,** (1-31/32" approx. free length) for TED and TFD engines with Stellite exhaust valves	2		2
122	AG-26	**SEAT** for valve spring	4		1
123	AH-9	**LOCK** for valve spring seat	4pr		1
124		**CRANKCASE ASSEMBLY** Consisting of:	1	30	
		1 Crankcase			
		1 JK-50 Primer packing			
		1 PA-332 Primer stop pin			
		6 PC-337 Studs			
		1 PD-78 Nut			
		2 PE-3 Lockwashers			
		1 PE-46 Lockwasher			
		2 PF-18 Plugs			
		1 PM-163 Primer spring			
		1 QD-670 Gasket			
		1 RF-270 Elbow			
		1 RF-1196 Spray nozzle			
		1 RF-1199 Header tube			
		1 SA-10 Plug			
		1 SA-52 Plug			
		1 SA-92 Cover			
		1 TA-124 Primer shaft			
		1 TA-125 Primer handle			
		2 XD-6 Screws			
		1 XK-121 Plug			
		NOTE: The part number of the crankcase is stamped on the case in the location shown in **Fig. 1. ORDER BY THIS NUMBER** and by giving the Model, Specification and Serial Number of the engine.			

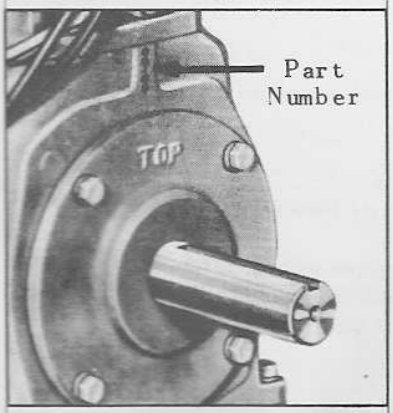


Fig. 1 152521C

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
125	BB-126-A	**OIL PAN** and **ENGINE BASE** For open engine.	1	21	
	BB-126A-1	**ENGINE BASE,** for engine covered with sheet metal house (Has tapped holes for mounting house panels)		21	
126	BD-103B-S1	**GEAR COVER ASSEMBLY** Consisting of:	1	8	
		1 BD-103-B Gear cover			
		1 PF-25 Pipe plug			
		1 PF-52 Button			
		1 PH-299 Oil seal			
		1 SA-26 Plug			
		1 TC-388-2 Governor shaft			
		BD-103-S1 Cover, replaced by BD-103B-S1.			
127	BG-209	**BEARING RETAINER PLATE** Flywheel end.	1		10
128	BG-224-S1	**MAIN BEARING PLATE ASSEMBLY** take-off end. Consisting of:	1	4	8
		1 BG-224 Bearing plate			
		1 HF-261 Cork seal			
		1 SD-43 Cork retainer			
	BG-224-S2	**MAIN BEARING PLATE ASSEMBLY** Consisting of:		5	
		1 BG-224 Bearing plate			
		1 HF-261 Cork seal			
		1 ME-130-2 Main bearing cup			
		1 SD-43 Cork retainer			
130	BI-286-S1	**AIR CLEANER BRACKET ASSEMBLY** Consisting of:	1	1	10
		1 BI-286 Bracket			
		1 LO-84 Breather assembly			
		1 PC-447 Stud			
131	BK-79-A	**BRACKET** for fuel tank	1	3	12
	BK-80	**FUEL TANK BRACKET** For engine with electric starter.		5	
132		**CRANKSHAFT ASSEMBLY** Consisting of:	1	26	8
		1 Crankshaft			
		1 GA-36A-1 Gear			
		1 ME-71 Bearing, flywheel end			
		1 ME-130 Bearing, take-off end			
		1 PL-53 Key			
		NOTE: The part number of the crankshaft will be found stamped on the counterweight as illustrated in **Fig. 2. ORDER BY THIS NUMBER** and by giving Model Specification and Serial Number of the engine.			

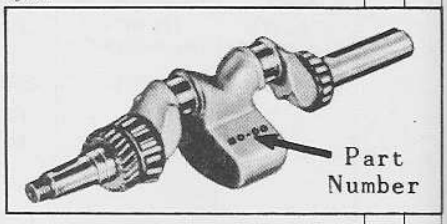


Fig. 2 152520C

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

PARTS INTERCHANGEABLE ON MODELS TE AND TF

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
1225	DA-51B-S1	**CONNECTING ROD ASSEMBLY** ..... Consisting of: 1 DA-51-B Connecting rod (not furnished separately). 1 HG-157A Bushing 2 PB-148 Bolts 2 PD-10 Nuts 2 PD-181 Palnuts 2 QA-114 Shims Connecting rods are also furnished .010", .020" and .030" undersize.	2	1	7
1226	DE-65	**PISTON PIN,** standard size ..... Piston pins are also furnished .010", .020" and .030" oversize.	2		3
1227	EA-106	**CAMSHAFT**	1	3	6
1228	F-61	**VALVE TAPPET** with lockscrew ..... FA-40-B Tappet—replaced by F-61.	4		4
1229	GA-36A-1	**CRANKSHAFT GEAR**	1		14
1440	GB-45A-2	**CAMSHAFT GEAR** ..... GB-45A-1 Gear—replaced by GB-45A-2.	1	2	2
1441	GD-93C-1	**MAGNETO GEAR**	1		9
1442	GD-100A-1	**GOVERNOR GEAR** ..... GD-100-A Gear—replaced by GD-100A-1.	1		7
1443	HF-261	**CORK OIL SEAL** ..... For main bearing, take-off end.	1		1
1444	HG-157A-1	**PISTON PIN BUSHING**	2		1
1445	HG-201	**VALVE SEAT INSERT,** standard	4		1
	HG-201-D	**STELLITE EXHAUST VALVE SEAT INSERT,** for TED and TFD engines	2		1
1446	JK-50	**'O' RING OIL SEAL** ..... For fuel pump primer shaft.	1		1
1447	JK-52	**'O' RING OIL SEAL** for governor cross shaft, beginning with engine Serial No. 1604246-replaces PH-318A Oil Seal and PF-118 Retainer—for engines to and including Serial No. 1604245. Not interchangeable unless complete TC-428-C Governor Cross Shaft and Lever Assembly, which includes JK-52 'O' Ring, is ordered.	1		1
1448	KA-63B-1-S1	**OIL PUMP BODY ASSEMBLY** ..... Beginning with engine Serial 1139705. Consisting of: 1 KA-63B-1 Body 1 KF-28 Retainer 1 KF-30 Insert 1 ME-38 Ball 1 PM-165-1 Spring 1 SA-93 Plug KA-63A-S1 and KA-63B-S1 Oil Pump Assembly—replaced by KA-63B-1-S1, Interchangeable. KA-63-S1 Oil Pump Assembly (for engines to and including Serial 1139704)	1		6
1449	KF-23-1	**OIL PUMP PLUNGER** ..... KF-23 Plunger—replaced by KF-23-1.	1		2
1450	KF-24	**OIL PUMP PUSH ROD**	1		2
1451	KF-25	**PUSH ROD CAP**	1		1
1452	KF-28	**RETAINER** for oil pump outlet ball ..... SA-26-1—replaced by KF-28.	1		1
1453	LC-266-A	**INLET MANIFOLD**	1	1	4
1454	LD-242	**EXHAUST MANIFOLD**	1	3	8
1455	LJ-192	**PIPE NIPPLE** for muffler, 1¼" x 4½" long, for open engine	1		10
	LJ-188	**PIPE NIPPLE** for muffler, 1¼" x 6" long, for engine covered with sheet metal house	1		12
1456	LK-5	**HOSE CLAMP** for air cleaner connection 1-5/8" I.D.	2		1
1457	LL-92	**HOSE CONNECTION** for air cleaner	1		3

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
158	LO-83	**OIL BATH AIR CLEANER,** United Specialties No. T-12B12 ..... Service parts: United Specialties Part No	1	2	8
158A		179B4 Cap and filter assembly	1		
158B		A-7419 Mounting gasket	1		1
158C		615A1 Filter gasket	1		
158D		176B8 Oil cup assembly	1		
		LO-83, United Specialties No. B-13845—replaced by LO-83, United Specialties No. T-12B12, Interchangeable as a unit only. The old LO-83, United Specialties No. B-13825 consists of: 10792 Cap B-13829 Filter unit B-13831 Oil cup A-7419 Base gasket			
	OPTIONAL				
159	LO-98	**OIL BATH AIR CLEANER** with precleaner, U.S. No. 12C2 ..... Service parts: U.S. Part Numbers.	1	5	2
159A		A-16380 Pre-cleaner cap assembly	1		
159B		B-16382 Pre-cleaner body assembly	1	1	2
159C		180B2 Air cleaner cap assembly	1	1	
159D		A-11812 Wing nut for top	1		1
159E		990A1 Wing nut on side	2		1
159F		615B2 Rubber spacer gasket	1		4
159G		A-7421 Gasket for filter unit	1		1
159H		A-17936 Filter unit	1	1	8
159J		A-17752 Body assembly	1	1	4
159K		A-7419 Mounting gasket	1		1
160	LO-84-C	**BREATHER ASSEMBLY** ..... Mounted in air cleaner bracket. LO-84—replaced by LO-84-C.	1		2
161	LP-43	**FUEL STRAINER** (small) Tillotson No. OW-480-T ..... Mounted to fuel pump inlet, beginning with engine Serial No. 1893058. LP-19-B Strainer (large) mounted to carburetor, for engines to and including Serial No. 1893057—replaced by LP-43, interchangeable if fuel line to carburetor is also changed.	1		3
162	LP-19-B	**FUEL STRAINER** (large) Tillotson No. OW-444 ..... Mounted to fuel tank, for engines with electric starter. **NOTE:** See illustration in back of manual for service parts list of fuel strainers	1		9
163	LP-42-A	**FUEL PUMP,** Blackstone No. GI-205	1		10
	LQ-28	**REPAIR KIT** for fuel pump ..... **NOTE:** Refer to fuel pump instruction sheet in back of manual for maintenance and repair.	1		2
164	ME-38	**CHECK BALL,** for oil pump, 5/16" dia. steel	2		1
165	ME-71	**MAIN BEARING ASSEMBLY** ..... Flywheel end. Consisting of:	1	1	14
166		1 ME-69-1 Bearing cup—Timken 414			12
167		1 ME-71-1 Bearing cone—Timken 420		1	2
168	ME-130	**MAIN BEARING ASSEMBLY** ..... Take-off end. Consisting of:	1	1	4
169		1 ME-130-1 Bearing cone—Timken 26881			13
170		1 ME-130-2 Bearing cup—Timken 26822A			7
171	NC-145-G	**FLYWHEEL** ..... NC-145-B—replaced by NC-145-G.	1	33	

(Continued)

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

PARTS INTERCHANGEABLE ON MODELS TE AND TF

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
	NC-145G-1-S1	**FLYWHEEL** for engines with electric starter. Includes: 1 GH-46 Ring gear 3 XE-17 Set screws NC-145B-1-S1—replaced by NC-145G-1-S1		34	
172	PA-333	**PIN** for starting crank nut ..... PA-239 Pin—replaced by PA-333.	1		1
173	PA-332	**PIN** for fuel pump primer stop..... PA-281 Groov-pin—replaced by PA-332.	1		1
174	PA-291	**DOWEL PIN** for gear cover to crankcase	2		1
175	PA-340	**ROLL PIN** for governor flyweights ..... XJ-47 Rivet—replaced by PA-340 roll pin	2		1
176	PB-148-S1	**CONNECTING ROD BOLT ASSEMBLY** .. Consisting of: 1 PB-148 Bolt 1 PD-10 Nut 1 PD-181 Palnut	4		1
177	PB-169-A	**VALVE TAPPET ADJUSTING SCREW**.. For F-61 Tappet. PB-169 Adj. screw—replaced by PB-169A PB-147 Screw with PD-141 nut for obsolete FA-40-B tappet.	4		1
178	PC-110	**STUD** for manifold to cylinder block mounting	2		1
179	PC-337	**STUD** for cylinder block to crankcase mounting	6		1
180	PC-447	**STUD** for air cleaner to bracket mounting	1		1
181	PD-173-A	**NUT** for governor adjusting screw.....	1		1
182	PD-181	**PALNUT** for connecting rod bolt, 5/16-24	4		1
183	PE-59	**WASHER** for starting cranknut, 1" external Everlock.....	1		1
184	PF-52	**BUTTON** for camshaft thrust plunger	1		1
185	PF-101	**CAMSHAFT THRUST PLUNGER**.....	1		1
189	PG-314	**CLIP** for spark plug cables	1		1
190	PG-315	**CLIP** for mounting flywheel screen to shroud	4		1
191	PG-488	**FUEL TANK STRAP**..... **NOTE:** Early model engines had fuel tank mounted with steel binder strapping which is not serviceable. For replacement, order 2 each of PG-488 straps, XA-52 screws, PD-77 nut and PE-3 lockwashers.	2		8
193	PH-299	**CRANKSHAFT OIL SEAL** in gear cover	1		2
194	PH-313-A	**SHIM** for governor bushing.....	1		1
195	PH-356	**CLAMP WASHER** for manifold mounting..	2		1
196	PH-387	**SPACING WASHER** for oil strainer	1		1
197	PI-115F-1	**SCREW** for adjusting governor spring	1		2
198	PK-50-A	**RETAINER** for oil pump check ball..... PK-50 Retainer—replaced by PK-50-A.	1		1
199	PK-52	**RETAINING RING** for piston pin.....	4		1
200	PL-53	**KEY** for crankshaft gear, No. 8 Woodruff..	1		1
201	PL-83	**KEY** for flywheel, No. 23 Woodruff	1		
203	PM-58	**SPRING** for oil pump plunger	1		
204	PM-75	**SPRING** for governor	1		
205	PM-108	**SPRING** for camshaft thrust plunger.....	1		
206	PM-163-A	**SPRING** for fuel pump primer handle ..... PM-163 Spring—replaced by PM-163-A.	1		
207	PM-165-1	**SPRING** for oil pump outlet..... PM-162 and PM-165 Springs—replaced by PM-165-1.	1		
209	Q-21	**GASKET SET** (Fig. 54)..... Consisting of: 3 QB-75 1 QD-613-C 1 QD-661-A 1 QC-58-A 1 QD-616 1 QD-662-A 9 QD-487-A 1 QD-617 1 QD-663-A 1 QD-487-B 1 QD-638-A 1 QD-667 2 QD-612-A 1 QD-660 1 QD-670 Q-20 Gasket set for TE engine—replaced by Q-21.	1		
210	QA-114	**CONNECTING ROD SHIM**.....	4		
211	QB-75	**GASKET** for manifold mounting	3		
212	QC-58-A	**GASKET** for carburetor mounting	1		
213	QD-487-A	**GASKET** for main bearing plate, .006" thick	9		
214	QD-487-B	**GASKET** for main bearing plate, .003" thick	1		
215	QD-612-A	**GASKET** for valve inspection cover	2		
216	QD-613-C	**GASKET** for cylinder head ..... QD-613-B for TE engine—replaced by QD-613-C.	1		
217	QD-616	**GASKET** for magneto mounting.....	1		
218	QD-617	**GASKET** for cylinder block to crankcase	1		
219	QD-638-A	**GASKET** for governor housing ..... QD-638 Gasket—replaced by QD-638-A.	1		
220	QD-660	**GASKET** for gear cover to spacer	1		
221	QD-661-A	**GASKET** for gear cover spacer to crankcase ..... QD-661 Gasket—replaced by QD-661-A.	1		
222	QD-662-A	**GASKET** for engine base to crankcase ..	1		
223	QD-663-A	**GASKET** for oil pump to crankcase ..... QD-663 Gasket—replaced by QD-663-A.	1		
224	QD-667	**GASKET** for air cleaner bracket to gear cover.....	1		
225	QD-669	**GASKET** for breather (Part of LO-84 assembly).....	1		
226	QD-670	**GASKET** for fuel pump or pad cover mtg.	1		
227	RC-77-5	**CAP** for fuel tank	1		
228	R-123	**OIL FILLER** and **GAUGE ASSEMBLY**.. Consisting of: 1 LJ-310 ½" Pipe Nipple, 1½" long .. 1 RB-86 Body ..... 1 RC-106-S1 Cap and Gauge Assembly .. R-114-9—replaced by R-123.	1		
230	RD-107-A	**OIL STRAINER** ..... RD-107 Strainer—replaced by RD-107-A.	1		

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PARTS INTERCHANGEABLE ON MODELS TE AND TF

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
[illegible]	RF-269	**STRAIGHT FITTING** ..... 1-for oil line to governor housing. 1-in carburetor for fuel line. 1-in fuel strainer (when mounted to fuel tank).	3		1
[illegible]	RF-270	**ELBOW** for 1/4" tubing nut ..... 1-in fuel strainer. 1-in fuel pump outlet.	2		1
[illegible]	RF-270-4	**RESTRICTED ELBOW FITTING** ..... 1 [illegible] housing for oil line. RF-269-2 Straight fitting—replaced by RF-270-4 Elbow fitting.	1		1
[illegible]	RF-1196	**OIL SPRAY NOZZLE**	1		1
[illegible]	RK-170	**[illegible] SLING** for crankshaft	1		2
[illegible]	RK-178	**CUP** for oil strainer	1		1
[illegible]	RM-477	**FUEL LINE,** tank to strainer, 18" long .. Tubing with nuts. RM-450 Fuel line, 20" long—replaced by RM-477.	1		4
[illegible]	RM-849	**OIL LINE,** governor to crankcase, 6" long Tubing with nuts. RM-776 Oil line, 9½" long—replaced by RM-849 but mount in upper tap of oil header tube in crankcase.	1		2
[illegible]	RM-1122	**FUEL LINE,** pump to carburetor, 6½" long. Tubing with nuts ..... RM-546 Fuel line, 5½" long—replaced by RM-1122. RM-849 Fuel line, 6" long—replaced by RM-1122.	1		2
240	RM-1206	**SUCTION TUBE** and **ELBOW** ..... For fuel tank (standard).	1		3
241	RM-1211	**SUCTION TUBE** for engines with electric starter (fuel strainer mounted to fuel tank)	1		3
243	SA-68	**COVER PLATE** for valve tappet inspection	2		2
244	SD-43	**RETAINER** for main bearing cork oil seal, take-off end	1		1
245	SD-153	**ENGINE INSTRUCTION** and **NAME PLATE** ..... When ordering name plate, give Model, Specification Number and Serial Number for correct stamping.	1		1
246	SE-3	**FLYWHEEL SCREEN**	1		12
247	SE-135	**FLYWHEEL AIR SHROUD** ..... For standard engine and power unit.	1	7	
	SE-135-J	**SHROUD** with pad for mounting electric starter ..... SE-135-A Shroud—replaced by SE-135-J.		8	
248	SE-136-B	**CYLINDER SHROUD** for engines beginning with Serial No. 1873091 ..... SE-136 Shroud for engines to and including Serial No. 1873090, interchangeable with SE-136B if SE-138B deflector is used.	1	1	6
249	SE-137-B	**AIR SHROUD COVER** ..... SE-137 Cover—replaced by SE-137-B.	1	1	6
250	SE-138-B	**AIR SHROUD HEAT DEFLECTOR** for engines beginning with Serial 1873091 .. SE-138 Deflector for engines to and including Serial 1873090, interchangeable with SE-138-B if SE-136-B cylinder shroud is used.	1		12
251	TA-126	**FUEL PUMP PRIMER SHAFT** and **HANDLE ASSEMBLY** ..... With JK-50 'O' ring oil seal.	1		1
252	T-96-S1	**GOVERNOR ASSEMBLY** ..... Consisting of: 1 TC-391-A Thrust sleeve & bearing. 1 TC-422B-S1 Housing assembly. 1 TC-405-A Flyweight assembly.	1	2	12
253	TC-322-A	**GOVERNOR FLYWEIGHT**	2		3
254	TC-328	**GOVERNOR FLYWEIGHT THRUST PIN**	2		1
255	TC-388-2	**GOVERNOR SHAFT**	1		2
256	TC-389-1	**GOVERNOR GEAR BUSHING**	1		2
257	TC-391-B	**GOVERNOR THRUST SLEEVE** and **BEARING** ..... TC-391 and TC-391-A Sleeve and bearing—replaced by TC-391-B.	1		2
258	TC-405-A	**GOVERNOR FLYWEIGHT ASSEMBLY** .. Consisting of: 1 GD-100A-1 Gear 2 PA-340 Roll pin 1 PH-313-A Shim 2 TC-322-A Flyweights 2 TC-328 Pins 1 TC-389-1 Bushing TC-405 Flyweight assembly—replaced by TC-405-A.	1	1	
259	TC-422B-S1	**GOVERNOR HOUSING ASSEMBLY** ..... (Aluminum) Consisting of: 1 JK-52 'O' ring 1 PF-18 Plug 1 QD-638A Gasket 1 RF-270-4 Fitting 1 SA-52 Plug 1 TC-422-B Housing 1 TC-428-C Shaft and lever 1 VB-166 Yoke 1 XH-1 Pin TC-422-1-S1 and TC-422-2-S1 (cast iron) Housing assemblies—replaced by TC-422B-S1.	1	1	
260	TC-427-B	**SUPPORT PIN** for governor adjusting screw ..... TC-427—replaced by TC-427-B, but invert the Valve Tappet Inspection Plate.	1		2
261	TC-428-C	**GOVERNOR CROSS SHAFT & LEVER.** With JK-52 'O' ring—beginning with engine Serial No. 1249047. TC-428-A Shaft and lever—for engines to and including Serial No. 1249046.	1		2
263	U-212	**STARTING CRANK**	1	1	7
264	UC-75-S1	**STARTING CRANK NUT ASSEMBLY** .... Consisting of: 1 PA-333 Pin 1 UC-75 Nut	1	1	
265	VB-166	**GOVERNOR YOKE**	1		2

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PARTS INTERCHANGEABLE ON MODELS TE AND TF

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
266	VE-693	**CHOKE CONTROL** ..... VE-575-A replaced by VE-693.	1		4
267	VE-555-A	**GOVERNOR CONTROL ROD** to carburetor	1		1
268	WD-26-A	**MUFFLER**	1	2	1
269	WE-293-1	**GEAR COVER SPACER** for engines beginning with Serial No. 1964973..... WE-293 Spacer— To and including Serial No. 1964972.	1	1	6
270	WE-302-S1	**FUEL TANK ASSEMBLY** ..... Consisting of: 1 RM-1206 Suction tube assembly 1 WE-302 Fuel tank with cap	1	5	12
271	WE-302-S2	**TANK ASSEMBLY** with RM-1211 Suction tube for engines with electric starter .... (Fuel strainer mounted to tank). **NOTE:** Fuel tanks were mounted to the tank bracket with steel binder strapping which is not serviceable in the field. When replacing fuel tank, order correct replacement straps.			
274	Y-80-S1	**MAGNETO,** with gear, Fairbanks-Morse No. FM4X1-2B7	1	7	
	Optional	Y-52-S1 and Y-75-S1—replaced by Y-80-S1.			
	Y-67A-S1	**MAGNETO,** with gear, Wico XH-2531 .... Y-55-S1 and Y-67-S1—replaced by Y-67A-S1.		6	
		NOTE: These engines are equipped with either a 'Fairbanks-Morse' or 'Wico' magneto as shown above. See magneto bulletins in back of manual for service replacement parts list.			
275	YD-6-S1	**SPARK PLUG,** 18mm, Champion No. D-16 or AC No. C86 Com.....	2		2
276	YD-12	**SPARK PLUG SAFETY NIPPLE**.....	2		1
277	YL-79	**MAGNETO IGNITION CABLE** to No. 1 cylinder, 24¾" long	1		2
278	YL-120	**MAGNETO IGNITION CABLE** to No. 2 cylinder, 21¾" long	1		2
		STANDARD HARDWARE			
		NOTE: The following nuts, washers, capscrews and etc., are of a common hardware variety and can be purchased from local plumbing or hardware stores.			
285	PD-10	**NUT,** 5/16"-24 thread, hexagon steel.... For connecting rod bolts.	4		1
286	PD-12	**NUT,** 7/16"-20 thread, hexagon steel .... For mounting cylinder block to crankcase.	6		1
287	PD-79	**NUT,** 3/8"-16 thread, hexagon steel..... For magneto mounting screw, lower hole	1		1
288	PD-77	**NUT,** 1/4"-20 thread, hexagon steel..... For fuel tank straps.	2		1

Ref. No.	Part Number	Description	No. Req
289	PD-78	**NUT,** 5/16"-18 thread, hexagon steel .... For oil spray nozzle.	1
291	PD-109	**NUT,** 3/8"-24 thread, hexagon brass..... For manifold to cylinder block studs.	2
294	PD-147	**WING NUT,** 1/4"-20 thread ..... For mounting air cleaner.	1
296	PE-3	**LOCKWASHER,** 1/4" Positive ..... 2-for fuel tank straps. 3-for mounting oil pump to crankcase. 13-for mounting air shrouding. 4-for mounting governor housing. 4-for gear cover spacer to crankcase. 2-for mounting fuel pump.	28
297	PE-4	**LOCKWASHER,** 5/16" Positive ..... 2-for carburetor mounting. 3-for flywheel shroud to gear cover. 10-for gear cover and spacer to crankcase. 4-for mounting fuel tank bracket. 2-for mounting air cleaner bracket.	21
298	PE-5	**LOCKWASHER,** 3/8" Positive..... 2-for mounting manifold. 4-for main bearing plate—take-off end. 2-for mounting magneto. 10-for mounting engine base.	18
299	PE-6	**LOCKWASHER,** 7/16" Positive..... For mounting cylinder block to crankcase.	6
300	PE-46	**LOCKWASHER,** 5/16" external Everlock 3-for mounting camshaft gear. 1-for oil spray nozzle.	4
301	PE-49	**LOCKWASHER,** 5/16" countersunk Everlock, for bearing retainer plate—flywheel end	4
302	PF-18	**PIPE PLUG,** 1/8" slotted..... 1-for governor housing. 2-for oil holes in crankcase.	3
303	PF-25	**PIPE PLUG,** 3/8" slotted..... For gear cover timing hole.	1
305	PH-14	**PLAIN WASHER,** 5/16" copper ..... For valve inspection cover plate.	2
306	PH-22-A	**PLAIN WASHER,** 3/8" steel..... For magneto mounting screw—lower hole.	1
307	PH-77-A	**PLAIN WASHER,** 5/16" steel..... For mounting cylinder head.	17
309	RF-794-A	**PIPE NIPPLE,** 1/8" x 3/4" long, brass.. For mounting fuel strainer to fuel pump.	1
310	RF-948	**PIPE NIPPLE,** 1/8" x 3" long..... For mounting fuel strainer to fuel tank.	1
311	SA-10	**PLUG,** 7/8" Expansion ..... For camshaft end hole.	1
312	SA-52	**PLUG,** 1/2" Expansion ..... 1-for camshaft oil hole. 1-for governor cross shaft.	2
313	SA-93	**PLUG,** 5/16" Expansion ..... For oil pump.	1

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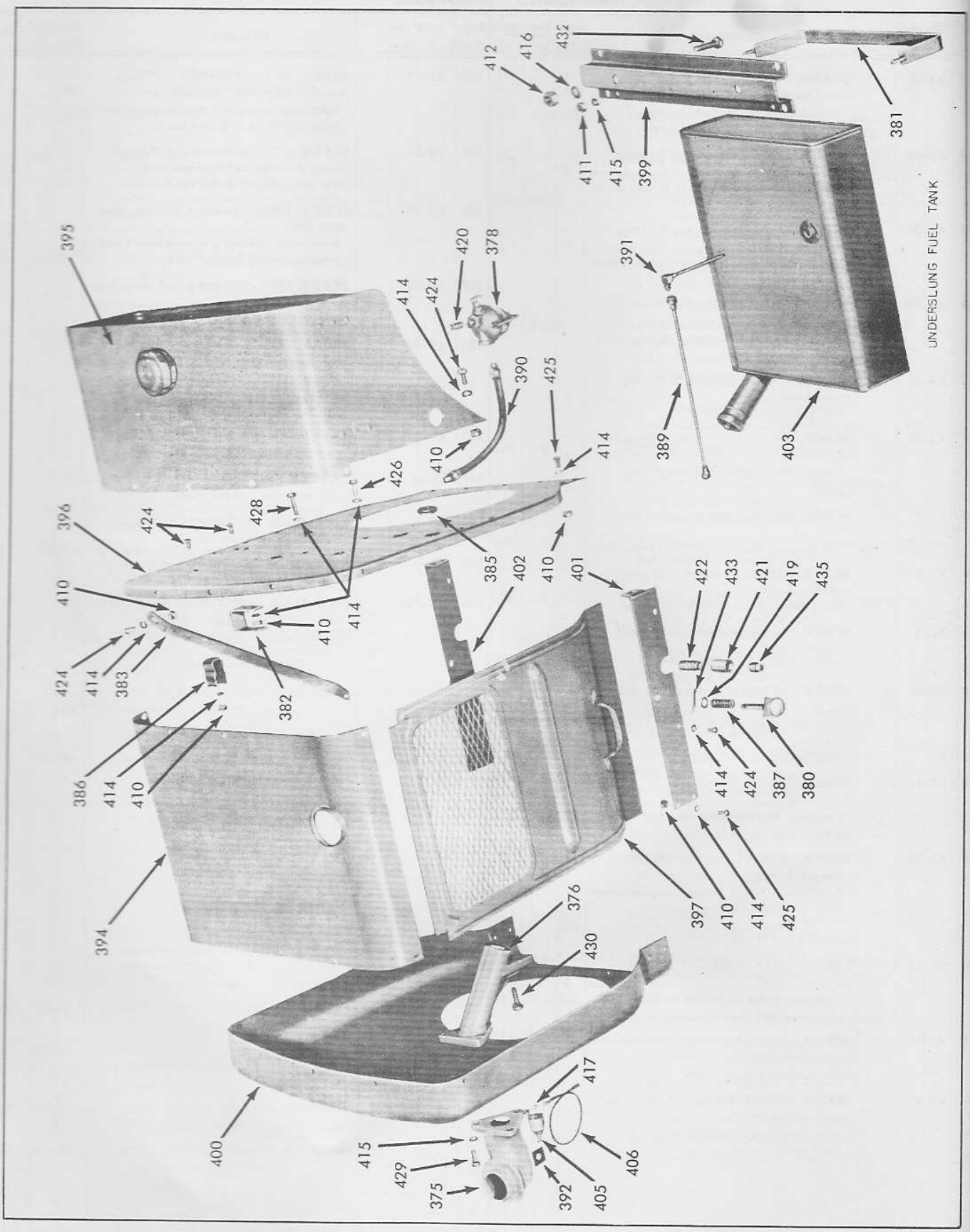
PARTS INTERCHANGEABLE ON MODELS TE AND TF
STANDARD HARDWARE

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
315	XA-33	**SCREW**, 1/4"-20 thread x 3/8" long, round head 4-for mounting flywheel screen. 6-for mounting air shroud cover.	10		1
316	XA-34	**SCREW**, 1/4"-20 thread x 1/2" long, round head For air shroud to cylinder block, lower holes.	4		1
317	XA-36	**SCREW**, 1/4"-20 thread x 3/4" long, round head For air shroud to cylinder block, upper hole, fan end.	1		1
318	XA-38	**SCREW**, 1/4"-20 thread x 1" long, round head For air shroud to cylinder block, upper hole, take-off end.	1		1
319	XA-52	**SCREW**, 1/4"-20 thread x 1½" long, round head For fuel tank straps.	2		1
320	XA-67	**SCREW**, No. 4 x 1/4" long, self-tapping sheet metal For mounting name and instruction plate.	4		1
322	XC-17	**SCREW**, 5/16"-18 thread x 3/4" long, flat head For bearing retainer plate—flywheel end	4		1
324	XD-4	**SCREW**, 1/4"-20 thread x 1/2" long, hexagon head For mounting spacer plate to crankcase	4		1
325	XD-5	**SCREW**, 1/4"-20 thread x 5/8" long, hexagon head For mounting oil pump.	3		1
326	XD-6	**SCREW**, 1/4"-20 thread x 3/4" long, hexagon head 2-for mounting governor housing—lower holes. 2-for mounting fuel pump.	4		1
328	XD-11	**SCREW**, 1/4"-20 thread x 2" long, hexagon head For mounting governor housing—upper holes.	2		1
329	XD-13	**SCREW**, 5/16"-18 thread x 1/2" long, hexagon head 3-for mounting air shroud to gear cover. 4-for mounting fuel tank bracket. PC-396 Studs for mounting fuel tank—replaced by XD-13.	7		1
330	XD-14	**SCREW**, 5/16"-18 thread x 5/8" long, hexagon head For gear cover to spacer plate—magneto side and upper hole.	2		1
331	XD-16	**SCREW**, 5/16"-18 thread x 7/8" long, hexagon head For mounting carburetor.	2		1
332	XD-17	**SCREW**, 5/16-18 thread x 1" long, hexagon head 3-for mounting camshaft gear. 2-for mounting air cleaner bracket.	5		1
333	XD-19	**SCREW**, 5/16"-18 thread x 1¼" long, (special hardness) hexagon head 8-for gear cover and spacer mounting. 15-for mounting cylinder head.	23		2
334	XD-21	**SCREW**, 5/16"-18 thread x 1½" long, (special hardness) hexagon head For mounting cylinder head.	2		2
336	XD-27	**SCREW**, 3/8"-16 thread x 1" long, hexagon head 4-for main bearing plate—take-off end. 8-for mounting engine base.	12		2
337	XD-33	**SCREW**, 3/8"-16 thread x 2¼" long, hexagon head For mounting magne	2		2
338	XD-34	**SCREW**, 3/8"-16 thread x 2½" long, hexagon head For mounting engine base—from bottom. XD-113 Screw, 2¾" long—replaced by XD-34.	2		2
340	XH-1	**TAPER PIN**, No.0 x 3/4" long For governor yoke.	1		1
341	XI-32	**COTTER PIN**, 3/64" x 3/8" long For governor control rod.	1		1
344	XK-1	**PIPE PLUG**, 1/8" square head For tap in inlet manifold.	1		1
345	XK-3	**PIPE PLUG**, 3/8" square head For oil drain.	2		1
346	XK-121	**PIPE PLUG**, 1/8" Allen socket head For oil header tube—from face of crankcase.	1		1

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

TE AND TF POWER UNIT WITH FUEL TANK AT TAKE-OFF END OR UNDERSLUNG FUEL TANK



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ENGINE HOUSE AND FUEL TANK GROUP

Parts are identified by reference number. See parts list for correct part number.

TE AND TF POWER UNIT WITH FUEL TANK AT TAKE-OFF END OR UNDERSLUNG FUEL TANK

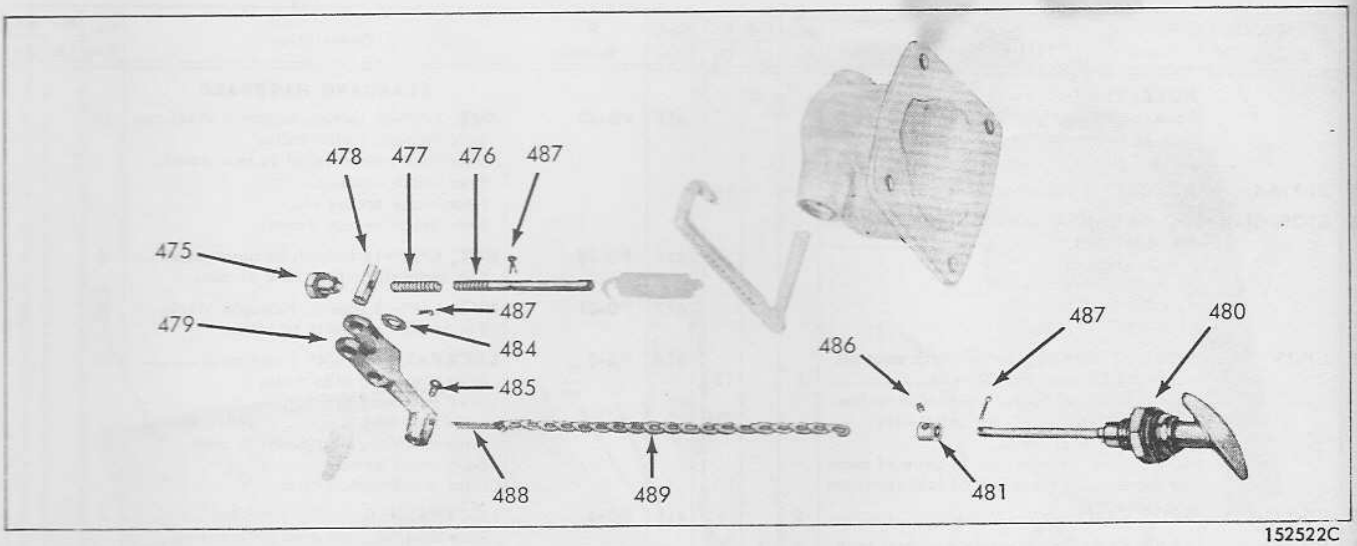
Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
		NOTE: The following are power unit house parts which replace or are in addition to those in the standard engine parts list.			
375	BI-176-5	**BRACKET** for mounting air cleaner	1		14
376	BI-292-S1	**AIR CLEANER CONNECTION BRACKET ASSEMBLY** Consisting of: 1 BI-292 Bracket 1 LO-84-C Breather 1 SA-52 Plug	1	1	
378	LP-19	**FUEL STRAINER,** (large), with shut-off valve, Tillotson No. OW-418 LP-43 Strainer, (small), mounted to fuel pump, No. OW-480-T, for units with underslung fuel tank. **NOTE:** See illustration in back of manual for service parts list of fuel strainers	1		12
380	PG-323-1	**DOOR CLIP**	2		3
381	PG-452	**TANK STRAP** for underslung fuel tank	2	1	
382	PG-491	**BRACKET** for holding starting crank	1		2
383	PG-528	**BRACE** for rear panel	1		5
385	PH-198	**GROMMET** in rear panel for fuel line	1		1
386	PK-87	**CLIP** for holding starting crank	1		1
387	PM-137-1	**SPRING** for door clip	2		1
389	RM-391	**FUEL LINE** tubing with nuts, 15" long Underslung fuel tank to strainer. RM-772, RM-197—replaced by RM-391.	1		3
390	RM-1203-A	**FLEX-O-TUBE FUEL LINE,** 10½" long Tank at take-off end to carburetor.	1		3
391	RM-1206-D	**SUCTION TUBE ASSEMBLY** For underslung fuel tank.	1		3
392	SD-108	**TAG** for ignition switch	1		1
394	WE-257-A	**CANOPY**	1	3	3
395	WE-260-A	**FUEL TANK ASSEMBLY**—take-off end Consisting of: RC-77 Cap WE-260A-1 Tank with cap WE-260A-2 Support and straps WE-260 Tank assembly—replaced by WE-260-A.	1 1 1 1	13 5 7	 3 13
396	WE-261-A	**REAR PANEL** WE-261A-3 Rear panel—replaced by WE-261-A.	1	5	8
397	WE-262	**HOUSE DOOR**	2	3	
399	WE-273-A	**ENGINE SUPPORT** for unit with underslung fuel tank	2	3	
400	WE-299	**FRONT PANEL** (standard)	1	6	8
	WE-299-1	**PANEL** (with holes for switch and ammeter) For unit with electrical equipment			
401	WE-300	**SIDE RAIL,** R.H. side	1	1	
402	WE-301	**SIDE RAIL,** L.H. side (magneto side)	1	1	
403	WE-304-S1	**UNDERSLUNG FUEL TANK ASSEMBLY** Consisting of: 1 RC-87 Cap 1 RM-1206-D Suction tube 1 WE-304 Tank with cap	1	7	
405	YC-9-C	**IGNITION SWITCH** YC-9-A Switch—replaced by YC-9-C.	1	2	
406	YL-151	**MAGNETO GROUND WIRE** YL-156, replaced by YL-151.	1	2	

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
		STANDARD HARDWARE			
410	PD-77	**NUT,** 1/4"-20 thread, hexagon steel 6-for mounting side rails. 6-for fuel tank support to rear panel. 2-for crank bracket. 1-for crank spring clip. 1-for brace to rear panel.	16		1
411	PD-78	**NUT,** 5/16"-18 thread, hexagon steel For underslung fuel tank straps.	4		1
412	PD-81	**NUT,** 1/2"-13 thread, hexagon steel For engine supports to base.	4		1
414	PE-3	**LOCKWASHER,** 1/4" Positive 10-for mounting side rails. 10-for mounting canopy. 6-for fuel tank support to rear panel. 6-for mounting rear panel to base. 2-for crank bracket. 1-for crank spring clip.	35		1
415	PE-4	**LOCKWASHER,** 5/16" Positive 3-for mounting air cleaner bracket. 4-for underslung fuel tank straps.	7		1
416	PE-7	**LOCKWASHER,** 1/2" Positive For mounting engine supports to base.	4		1
417	PE-72	**LOCKWASHER** for ground switch terminal	1		1
419	PH-2	**WASHER,** 7/16" I.D. x 13/16" O.D., plain steel. For door clips	2		1
420	RF-794	**PIPE NIPPLE,** 1/8" x 3/4" long For fuel strainer mounting.	1		1
421	RF-937	**PIPE COUPLING,** 3/8", for oil drain	1		2
422	RF-1186	**PIPE NIPPLE,** 3/8" x 1/2" long For oil drain.	1		2
424	XA-34	**SCREW,** 1/4"-20 thread x 3/8" long, round head 6-for mounting fuel tank support to rear panel. 10-for mounting canopy. 8-for rear and side panels to eng. base. 2-for crank bracket. 1-for crank spring clip.	27		1
425	XA-35	**SCREW,** 1/4"-20 thread x 5/8" long, round head For side rails to front and rear panels.	6		1
426	XD-5	**SCREW,** 1/4"-20 thread x 5/8" long, hexagon head For rear panel to cylinder block, lower hole.	1		1
428	XD-7	**SCREW,** 1/4"-20 thread x 1" long, hexagon head For rear panel to cylinder block, upper hole.	1		1
429	XD-17	**SCREW,** 5/16"-18 thread x 1" long, hexagon head For mounting air cleaner bracket.	3		1
430	XD-19	**SCREW,** 5/16"-18 thread x 1¼" long, hexagon head For mounting air cleaner connection bracket.	1		1
432	XD-44	**SCREW,** 1/2"-13 thread x 1-3/4" long, hexagon head For mounting engine supports to base.	4		2
433	XI-23	**COTTER PIN,** 1/8" x 3/4" long For door clips.	2		1
435	XK-3	**PIPE PLUG,** 3/8" square head For oil drain.	2		1

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

TT-66 VARIABLE SPEED GOVERNOR CONTROL ASSEMBLY FOR TE AND TF ENGINES



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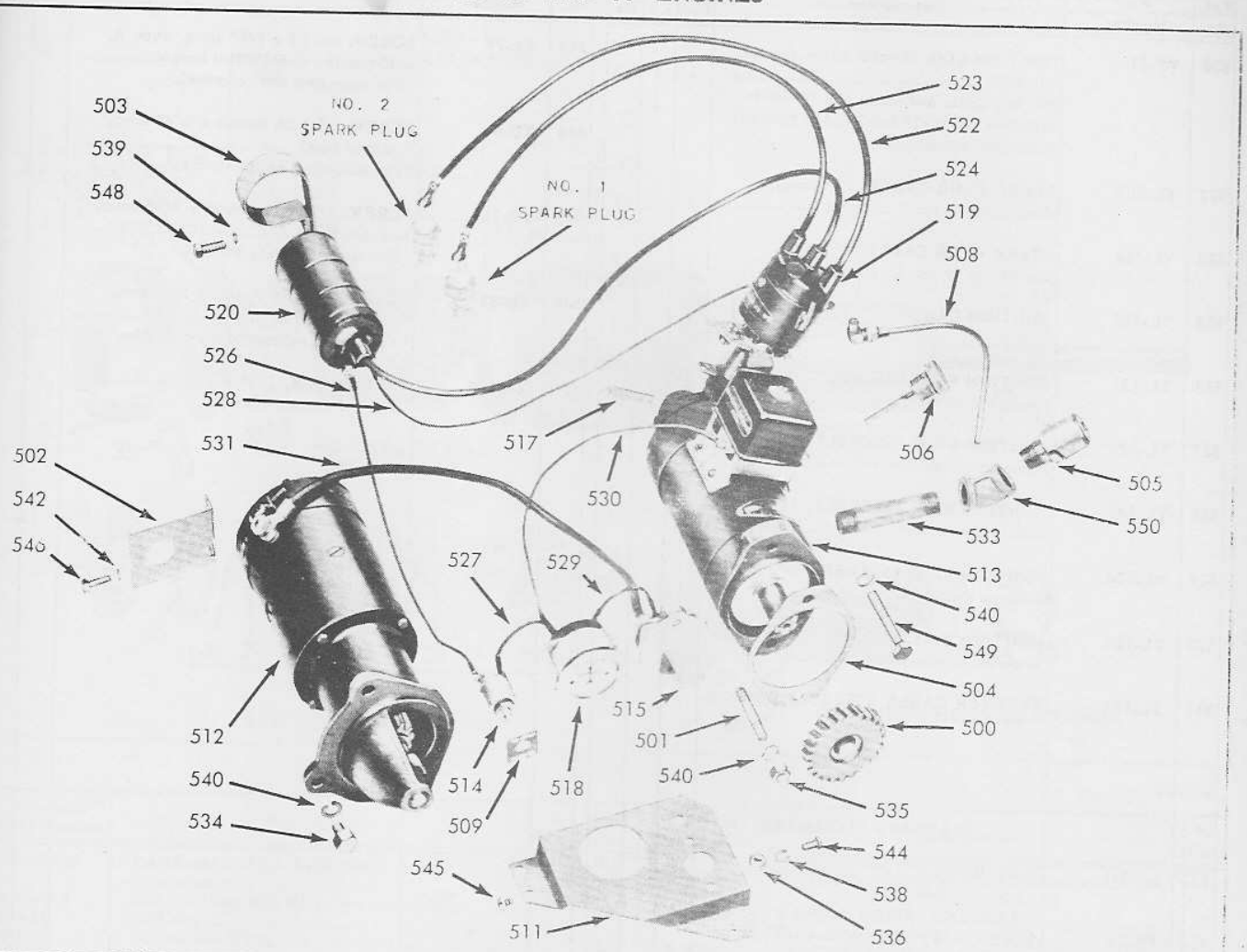
REF. NO.	PART NUMBER	DESCRIPTION	NO. REQ.	NET WEIGHT LB	NET WEIGHT OZ
	TT-66	**GOVERNOR CONTROL ASSEMBLY** – Complete	1	1	
475	PD-173-A	**ADJUSTING SCREW LOCKNUT** (Standard engine part)	1		1
476	PI-115-E	**ADJUSTING SCREW**	1		2
477	PM-111-1	**SPRING** for adjusting screw	1		1
478	TC-368-A	**SWIVEL PIN** for adjusting screw	1		1
479	VB-134-C	**LEVER**	1		4
480	VE-527-W	**CONTROL** VE-527 with 3/16" shaft, replaced by VE-527-W with 1/4" shaft. Also order VE-542-B Stop Block.	1		6
481	VE-542-B	**STOP COLLAR** for control VE-542 for VE-527 Control with 3/16" shaft. VE-542-B for VE-527-W control with 1/4" shaft.	1		1
		STANDARD HARDWARE			
484	PH-77	**PLAIN WASHER,** 5/16" I.D. x 5/8" O.D. x 1/16" thick steel For lever mounting.	1		1
485	XA-62	**SCREW,** No. 8-32 thread x 1/4' long, round head For cotter pin in lever.	1		1
486	XE-61	**SET SCREW,** No. 10-32 thread x 3/16" long, headless For stop collar.	1		1
487	XI-1	**COTTER PIN,** 1/16" x 1/2" long 1-for lever pin. 1-for adjusting screw pin. 1-for chain at control.	3		1
488	XI-11	**COTTER PIN,** 3/32" x 1¼" long For chain at lever.	1		1
489		**No. 1/0 GALVANIZED SAFETY CHAIN,** 9" long For control to lever.	1 pc		1

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

ELECTRIC STARTER, GENERATOR AND DISTRIBUTOR IGNITION FOR TE AND TF ENGINES



151218C

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
500	GD-97-A	**DRIVE GEAR** for generator	1		7
501	PC-110	**STUD** for mounting generator, lower hole	1		1
502	PG-516-A	**BRACKET** for starter support. PG-516—replaced by PG-516-A.	1		4
503	PG-556	**BRACKET** for mounting coil	1		4
504	QD-616	**GASKET** for mounting generator	1		1
505	R-123-8	**OIL FILLER ASSEMBLY** Consisting of: 1 LJ-310 Pipe 1 RB-86 Body 1 RC-106-1-S1 Cap R-114-8, replaced by R-123-8.	1		6
506	RJ-148	**OIL LEVEL GAUGE**	1		3
508	RP-911	**DRIP TUBE ASSEMBLY** for carburetor. Consisting of: 1 RF-270-4 Elbow 1 RF-808 Nut 1 RF-731 Tube	1		2
509	SD-109	**TAG** for ignition switch	1		1
511	VE-566	**CONTROL PANEL**	1		10

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
512	YA-19	**ELECTRIC STARTER** (6 volt), Auto-Lite No. MZ-4184. YA-10 Auto-Lite No. MZ-4118 and MZ-4175 replaced by YA-19. **NOTE:** See Electric Auto-Lite illustration and parts list for starter service parts.	1	17	
513	YB-26-A	**GENERATOR** (6 volt) Auto-Lite No. GAS-4305. YB-26-A replaced YB-26 Auto-Lite No. GAS-4302. **NOTE:** See Electric Auto-Lite illustration and parts list for generator service parts.	1	15	
514	YC-9-B	**IGNITION SWITCH** YC-9 Switch replaced by YC-9-B.	1		2
515	YC-10	**STARTING SWITCH**	1		4
517	YD-165	**JUMPER STRIP** for regulator	1		1
518	YE-2	**AMMETER**	1		6
519	YF-6-E	**DISTRIBUTOR,** Auto-Lite IGW-4199A. YF-6-E replaced YF-6-D Auto-Lite No. IGW-4168-B. **NOTE:** See Electric Auto-Lite illustration and parts list for distributor service parts.	1	2	6

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial numbers as shown on name plate.

ELECTRIC STARTER, GENERATOR AND DISTRIBUTOR IGNITION FOR TE AND TF ENGINES

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
520	YF-11	**IGNITION COIL** (6 volt) Auto-Lite No. CR-6005 ..... YF-4-A Coil, Auto-Lite No. IG-6001—replaced by YF-11 but PG-556 Bracket must also be ordered.	1	1	12
522	YL-105	**SPARK PLUG CABLE,** 22" long, distributor to No. 2 cylinder.....	1		2
523	YL-164	**SPARK PLUG CABLE,** 25" long, distributor to No. 1 cylinder.....	1		2
524	YL-165	**IGNITION CABLE,** 27" long, distributor to coil.....	1		2
526	YL-151	**IGNITION WIRE ASSEMBLY,** 14" long, ignition switch to coil	1		1
527	YL-179	**IGNITION WIRE ASSEMBLY,** 3" long, ammeter to ignition switch	1		1
528	YL-181	**IGNITION WIRE ASSEMBLY,** 20" long, coil to distributor	1		1
529	YL-184	**IGNITION WIRE ASSEMBLY,** 3" long, starting switch to ammeter	1		1
530	YL-185	**IGNITION WIRE ASSEMBLY,** 15" long, ammeter to regulator.....	1		1
531	YL-186	**STARTER CABLE ASSEMBLY,** 19" long	1		4
		STANDARD HARDWARE			
533	LJ-331	**PIPE NIPPLE,** 1/2" x 3½" long ..... For oil filler.	1		4
534	PB-24	**SCREW,** 3/8"-24 thread x 1-1/8" long, hexagon head..... For mounting starter.	3		2
535	PD-11	**NUT,** 3/8"-24 thread, hexagon steel ..... For generator stud, lower hole.	1		1
536	PD-77	**NUT,** 1/4"-20 thread, hexagon steel ..... For starter switch mounting.	2		1
538	PE-3	**LOCKWASHER,** 1/4" Positive ..... For starter switch mounting.	2		1
539	PE-4	**LOCKWASHER,** 5/16" Positive ..... For mounting coil bracket.	1		1
540	PE-5	**LOCKWASHER,** 3/8" Positive ..... 3-for mounting starter. 2-for mounting generator.	5		1
542	PH-30	**WASHER,** 1/4" plain copper ..... For mounting starter bracket.	2		1
544	XA-34	**SCREW,** 1/4"-20 thread x 1/2" long, round head ..... For starter switch mounting.	2		1
545	XA-79	**SCREW,** No. 14 x 1/2" long, Type A, self-tapping sheet metal screw ..... For mounting control panel.	2		1
546	XD-6	**SCREW,** 1/4"-20 thread x 3/4" long, hexagon head..... For mounting starter bracket.	2		1
548	XD-16	**SCREW,** 5/16"-18 thread x 7/8" long, hexagon head..... For mounting coil bracket.	1		1
549	XD-33	**SCREW,** 3/8"-16 thread x 2½" long, hexagon head..... For mounting generator, top hole.	1		2
550	XK-105	**PIPE ELBOW,** 1/2" x 45° ..... For oil filler mounting.	1		3

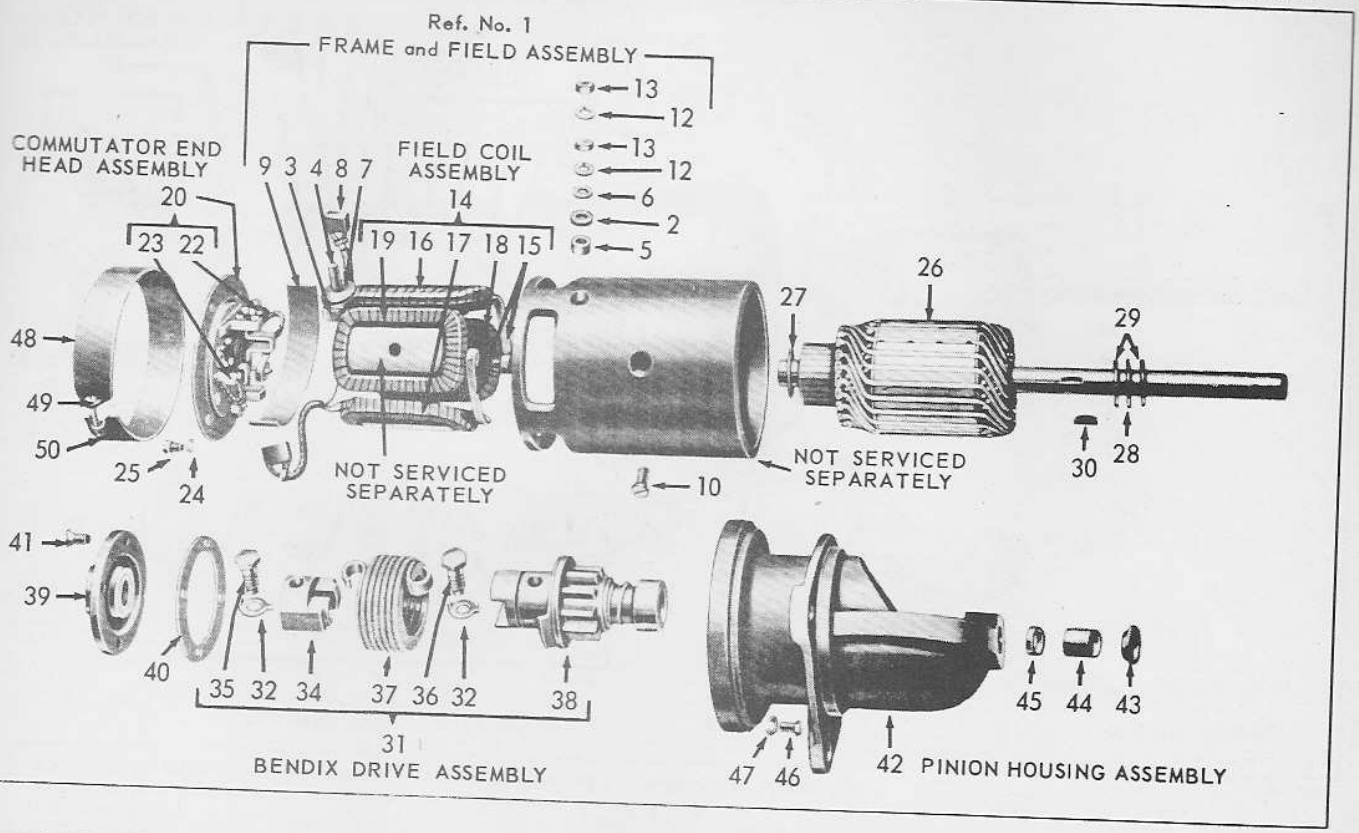
Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

ELECTRIC AUTO-LITE No. MZ-4184 STARTING MOTOR PARTS LIST

WISCONSIN MOTOR PART NUMBER YA-19

NOTE: MZ-4184 (YA-19) is a completely dust sealed starting motor, which replaces MZ-4175 (YA-10), and is interchangeable as a complete unit.



209102

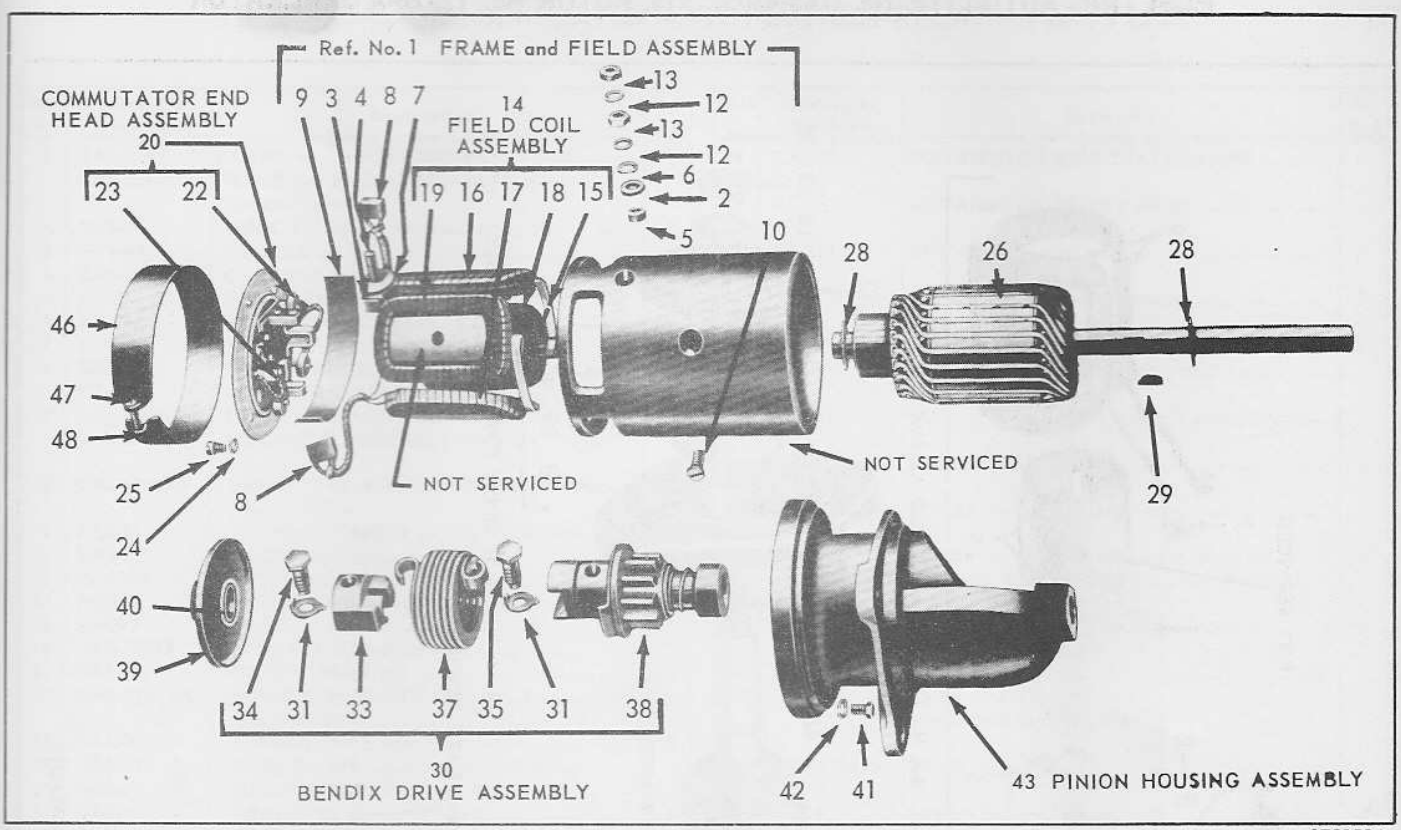
Ref No	Auto-Lite Part Number	Description	No Req
1	MZ-2001M	**FRAME and FIELD ASSEMBLY** ..... Consisting of:	1
2	MAB-31A	INSULATING WASHER for terminal stud.....	1
3	MU-14	TERMINAL	1
4	MU-28	TERMINAL STUD.....	1
5	MU-31	INSULATING BUSHING for terminal stud	1
6	MU-37	PLAIN WASHER, 5/16", for terminal stud	1
7	MU-39A	INSULATING WASHER for terminal stud	1
8	MZ-12 *	INSULATED BRUSH	2
9	MZ-30A	INSULATION for field coils	1
10	MZ-38A	SCREW for pole shoe	4
11	MZ-74	EQUALIZER (not illustrated).....	1
12	12X-1014	LOCKWASHER, 5/16", for terminal stud.....	2
13	8X-1376	NUT for terminal stud, 5/16"-24 thread, hex....	2
14	MZ-3005S	FIELD COIL ASSEMBLY ..... Consisting of:	1
15	MZ-32	CONNECTOR for field coil.....	2
16	MZ-1007	FIELD COIL, U.L.....	1
17	MZ-1008	FIELD COIL, L.R.....	1
18	MZ-1009	FIELD COIL, L.L.....	1
19	MZ-1010	FIELD COIL, U.R.....	1
20	MZ-2002B	**COMMUTATOR END HEAD ASSEMBLY** ..... Includes:	1
21	MAD-110	FELT (not illustrated)	1
22	MZ-19	BRUSH SPRING	4
23	MZ-1034S *	GROUNDED BRUSH	2
24	12X-196	**LOCKWASHER** for head screw, No. 10.....	4
25	8X-902	**SCREW** for head mounting ..... No. 10-32 thread x 3/8" long, fillister head.	4
26	MZ-2366	**ARMATURE ASSEMBLY**	1
27	MU-54	**THRUST WASHER** for Armature, C.E.	1
28	MZ-365	**SPRING WASHER** for Armature	1
29	MZ-357	**THRUST WASHER** for Armature, Int.	2

Ref No	Auto-Lite Part Number	Description	No Req
30	X-261	**KEY** for mounting Bendix, No. 6 Woodruff	1
31	EBB-45A	**BENDIX DRIVE ASSEMBLY** ..... Consisting of:	1
32	EB-108A	LOCKWASHER	2
33	EB-7819SA	COMPRESSION SLEEVE (not illustrated)	1
34	EB-8503A	DRIVE HEAD.....	1
35	EB-8506A	SCREW for spring head.....	1
36	EB-8507A	SCREW for spring shaft	1
37	EBA-405A	DRIVE SPRING	1
38	EBB-4511A	SHAFT and PINION.....	1
39	MZ-1360	**BEARING PLATE ASSEMBLY,** intermediate	1
40	MZ-359	**GASKET** for bearing plate	1
41	8X-63	**SCREW** for mounting bearing plate ..... No. 8-32 thread x 3/8" long, flat head.	4
42	PS-1330	**PINION HOUSING ASSEMBLY**..... Includes:	1
43	MZ-358	BEARING CAP	1
44	MZ-364	BRONZE BEARING	1
45	XA-832	OIL SEAL	1
46	MZ-52	**SCREW** for pinion housing mounting ..... No. 10-32 thread x 31/32" long, hexagon head.	4
47	12X-196	**LOCKWASHER** for housing screw, No. 10	4
48	MZ-1024U	**COVER BAND**	1
49	8X-714	**SCREW** for cover band..... No. 10-32 thread x 1-1/2" long, round head.	1
50	8X-794	**NUT** for cover band ..... No. 10-32 thread, square.	1

* **BRUSH SET for SERVICE, MZ-2012AS**

ELECTRIC AUTO-LITE †MZ-4175 STARTING MOTOR PARTS LIST

WISCONSIN MOTOR PART NUMBER YA-10



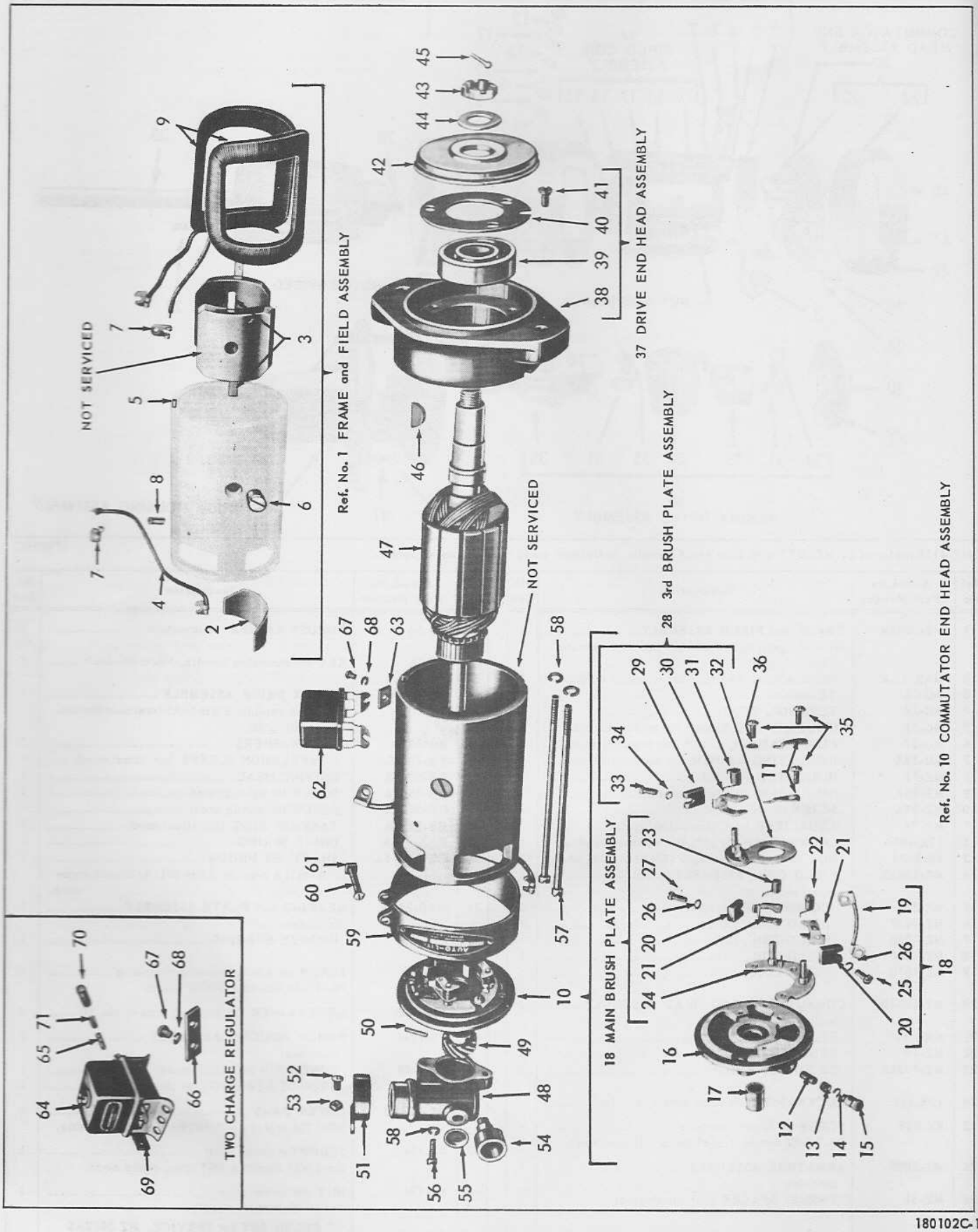
†MZ-4118 replaced by MZ-4175 with dust proof Bendix. Individual parts changes noted below.

179859C

Ref No	Auto-Lite Part Number	Description	No Req
1	MZ-2001M	**FRAME** and **FIELD ASSEMBLY** ..... MZ-2001 repl. by MZ-2001M: Interchangeable. Consisting of:	1
2	MAB-31-A	INSULATING WASHER for terminal stud.....	1
3	MU-14	TERMINAL.....	1
4	MU-28	TERMINAL STUD.....	1
5	MU-31	INSULATING BUSHING for terminal stud.....	1
6	MU-37	PLAIN WASHER, 5/16", for terminal stud	1
7	MU-39A	INSULATING WASHER for terminal stud.....	1
8	MZ-12 *	INSULATED BRUSH	2
9	MZ-30A	INSULATION for field coils	1
10	MZ-38A	SCREW for pole shoe	4
11	MZ-74	EQUALIZER (not illustrated).....	1
12	12X-1014	LOCKWASHER, 5/16", for terminal stud.....	2
13	8X-1376	NUT for terminal stud, 5/16"-24 thread, hex. ..	2
14	MZ-3005S	FIELD COIL ASSEMBLY ..... Consisting of:	1
15	MZ-32	CONNECTOR for field coil.....	2
16	MZ-1007	FIELD COIL, U.L.....	1
17	MZ-1008	FIELD COIL, L.R.....	1
18	MZ-1009	FIELD COIL, L.L.....	1
19	MZ-1010	FIELD COIL, U.R.....	1
20	MZ-2002B	**COMMUTATOR END HEAD ASSEMBLY** ..... Includes:	1
21	MAD-110	FELT (not illustrated)	1
22	MZ-19	BRUSH SPRING	4
23	MZ-1034S *	GROUNDED BRUSH.....	2
24	12X-196	**LOCKWASHER** for head screw, No. 10.....	4
25	8X-902	**SCREW** for head mounting ..... No. 10-32 thread x 3/8" long, fillister head.	4
26	MZ-2089	**ARMATURE ASSEMBLY** ..... Includes:	1
27	MZ-51	THRUST SPACER (not illustrated)	1
28	MU-54	**THRUST WASHER** for armature	2
29	X-261	**KEY** for mounting Bendix, No. 6 Woodruff	1
30	EBB-36A	**BENDIX DRIVE ASSEMBLY** ..... EBA-36A repl. by EBB-36A: Interchangeable. Consisting of:	1
31	EB-108A	LOCKWASHERS	2
32	EB-7819SA	COMPRESSION SLEEVE (not illustrated)	1
33	EB-8503A	DRIVING HEAD	1
34	EB-8506A	SCREW for spring head	1
35	EB-8507A	SCREW for spring shaft	1
36	EB-8734A	TAKE-UP RING (not illustrated)	1
37	EBA-405A	DRIVE SPRING	1
38	EBB-3611A	SHAFT and PINION ..... EBA-3611A repl. by EBB-3611A: Interchangeable.	1
39	MAB-2040	**BEARING** and **PLATE ASSEMBLY** ..... Includes:	1
40	MG-77A	BRONZE BEARING.....	1
41	MZ-52	**SCREW** for pinion housing mounting ..... No. 10-32 thread x 31/32" long.	4
42	12X-196	**LOCKWASHER** for housing screw, No. 10	4
43	PS-1214	**PINION HOUSING ASSEMBLY** ..... Includes:	1
44	MAB-88	DOWEL PIN (not illustrated)	1
45	MP-41A	BRONZE BEARING (not illustrated)	1
46	MZ-1024U	**COVER BAND** ..... MZ-1024 repl. by MZ-1024U: Interchangeable.	1
47	8X-714	**SCREW** for cover band ..... No. 10-32 thread x 1½" long, round head.	1
48	8X-794	**NUT** for cover band ..... No. 10-32 thread, square.	1

* **BRUSH SET for SERVICE, MZ-2012AS**

ELECTRIC AUTO-LITE No. GAS-4302, WIS. MOTOR No. YB-26 GENERATOR
ELECTRIC AUTO-LITE No. GAS-4305, WIS. MOTOR No. YB-26-A GENERATOR



180102C-1

Parts are identified by reference number. See parts list for correct part number.

YB-26 (GAS-4302) GENERATOR – WITH REGULATOR – PARTS LIST
YB-26-A (GAS-4305) GENERATOR – WITH CUT-OUT RELAY – PARTS LIST

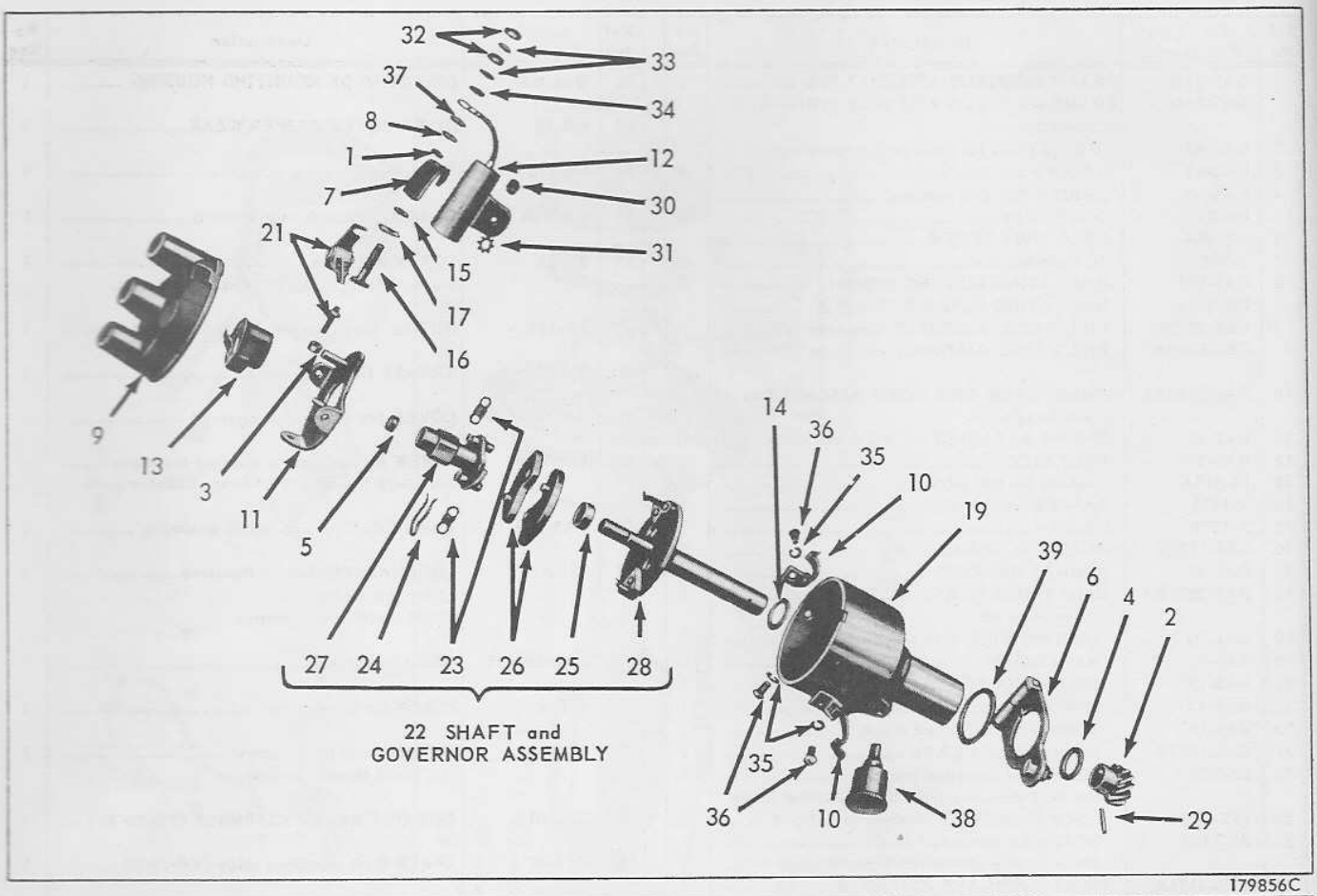
Ref No	Auto-Lite Part Number	Description	No Req
1	GAS-2167	**FRAME** and **FIELD ASSEMBLY** (YB-26)	1
	GAS-2364	**FRAME** and **FIELD ASSEMBLY** (YB-26-A)	
		Consisting of:	
2	GAS-44	**INSULATION** for field coil connection	1
3	GAS-45	**HOLDER** for field coil	4
4	GAS-86	**LEAD WIRE** with terminal	1
5	MN-21	**DOWEL PIN**	2
6	MZ-38A	**POLE SHOE SCREW**	2
7	X-755	**TERMINAL**	2
8	GAS-121	**INSULATING BUSHING** (YB-26)	1
	GT-7	**INSULATING BUSHING** (YB-26-A)	
9	GAS-2005D	**FIELD COIL ASSEMBLY** complete (YB-26)	1
	GAS-2005A	**FIELD COIL ASSEMBLY** complete (YB-26A)	
10	GAS-2132AS	**COMMUTATOR END HEAD ASSEMBLY**	1
		Consisting of:	
11	GAS-51	**SPRING RETAINER** for 3rd brush plate	2
12	GAS-281	**FELT WICK**	1
13	IG-515A	**SPRING** for felt wick	1
14	X-1275	**WASHER** for felt wick	1
15	X-1573	**OILER**	1
16	GAS-11325	**HEAD** with GAS-49 bearing	1
17	GAS-49	**BRONZE BEARING**	1
18	GAS-2021RA	**MAIN BRUSH PLATE ASSEMBLY**	1
		Consisting of:	
19	GAL-31	**GROUND WIRE** with terminals	1
20	GAS-12 *	**MAIN BRUSH**	2
21	GAS-15	**BRUSH HOLDER**	2
22	GAS-17	**SPRING** for grounded brush	1
23	GAS-18	**SPRING** for insulated brush	1
24	GAS-1021R	**MAIN BRUSH PLATE**	1
25	8X-122	**SCREW** for grounded brush	1
		No. 8-32 thread x 1/2" long, fillister head.	
26	12X-195	**LOCKWASHER** for brush screw, No. 8	2
27	8X-1496	**SCREW** for insulated brush	1
		No. 8-32 thread x 7/16" long, binding head.	
28	GAS-2126A	**3rd BRUSH PLATE ASSEMBLY**	1
		Consisting of:	
29	GAS-13 *	**THIRD BRUSH**	1
30	GAS-15	**BRUSH HOLDER**	1
31	GAS-17	**BRUSH SPRING**	1
32	GAS-1126	**3rd BRUSH PLATE**	1
33	8X-878	**SCREW** for third brush	1
		No. 8-32 thread x 7/16" long, fillister head.	
34	12X-195	**LOCKWASHER** for 3rd brush screw, No. 8	1
35	8X-55	**SCREW** for plate mounting	3
		No. 8-32 thread x 3/8" long, round head.	
36	12X-195	**LOCKWASHER** for plate mounting, No. 8	1
37	GAS-1232AS	**DRIVE END HEAD ASSEMBLY**	1
		Consisting of:	
38	GAS-232AS	**HEAD**	1
39	X-3003	**BALL BEARING**, shielded, S.A.E. No. 204	1
40	GAS-177	**BEARING RETAINER**	1
41	8X-63	**SCREW** for retainer	3
		No. 8-32 thread x 3/8" long, flat head.	
42	GAS-1176	**OIL THROWER**	1
43	X-835	**NUT** for armature shaft, 1/2"-20 thread, slotted	1
44	GK-174A	**WASHER** for armature shaft nut, 1/2" plain	1
45	X-404	**COTTER PIN** for nut, 3/32" x 1" long	1
46	X-263	**KEY** for drive gear, No. 8 Woodruff	1
47	GAS-2175	**ARMATURE**	1

Ref No	Auto-Lite Part Number	Description	No Req
48	GAL-98	**DISTRIBUTOR MOUNTING HOUSING**	1
49	GE-58	**DISTRIBUTOR DRIVER GEAR**	1
50	SW-213	**PIN** for driver gear	1
51	GAG-58	**CLAMP** for distributor housing	1
52	8X-53	**SCREW** for clamp	1
		No. 8-32 thread x 5/8" long, round head.	
53	8X-141	**NUT** for clamp screw, No. 8-32 thread, hex.	1
54	X-382	**GREASE CUP**	1
55	GW-19-A	**COVER** for distributor housing	1
56	8X-900	**SCREW** for distributor housing mounting	3
		No. 10-32 thread x 7/8" long, fillister head.	
57	GAS-20A	**THRU BOLT** for end heads mounting	2
58	12X-196	**LOCKWASHER**, No. 10 Positive	5
		2-for thru bolts.	
		3-for distributor housing.	
59	GAS-1024JS	**BAND** for cover	1
60	X-714	**SCREW** for band cover	1
61	8X-794	**NUT** for band cover screw	1
		No. 10-32 thread, square.	
62	CB-4014	**CUT-OUT RELAY ASSEMBLY** (YB-26-A)	1
63	GAS-87	**SPACER** for mounting relay (YB-26-A)	2
64	TC-4329C	**TWO CHARGE REGULATOR** (YB-26)	1
65	X-842	**FUSE** for regulator, 5 Amp (YB-26)	1
66	GAS-168	**SPACER** for mounting regulator (YB-26)	2
67	8X-311	**SCREW** for mounting regulator or relay	4
		No. 10-32 thread x 3/8" long, round head.	
68	12X-196	**LOCKWASHER** for mounting regulator or relay, No. 10	4
69	TC-51E	**CARBON RESISTOR** for regulator (YB-26)	1
70	TC-1050	**FUSE HOLDER** (YB-26)	1
71	TC-48	**FUSE INSULATOR** (YB-26)	1

* **BRUSH SET** for **SERVICE, GAS-2012.**

YF-6-F AUTO-LITE IGW-4199B DISTRIBUTOR
YF-6-E AUTO-LITE IGW-4199A DISTRIBUTOR
YF-6-D AUTO-LITE IGW-4168B DISTRIBUTOR

(YF-6-E Replaced YF-6-D, Interchangeable)



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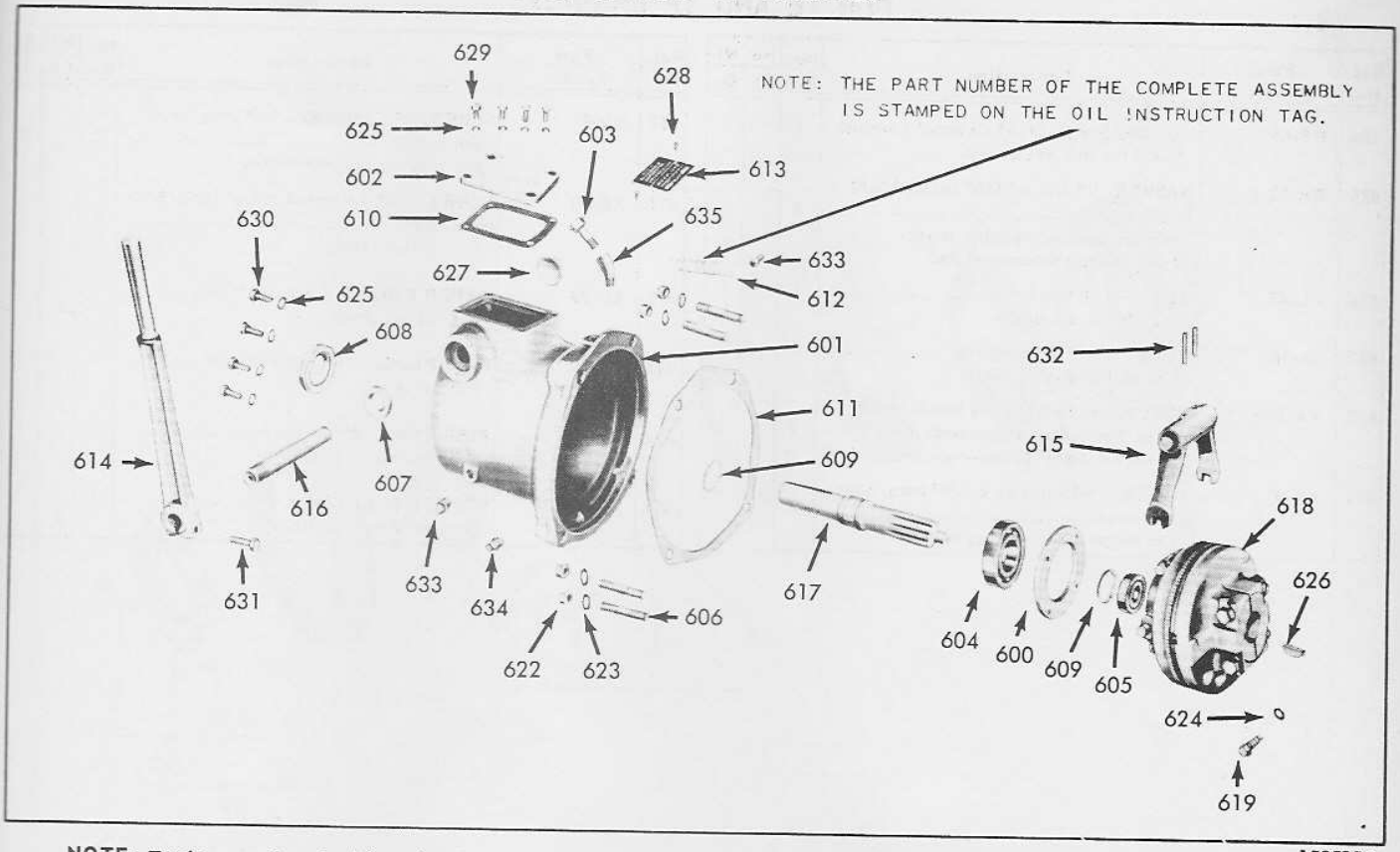
Ref No	Auto-Lite Part Number	Description	No Req
1	CB-140	**INSULATING BUSHING** for terminal stud	1
2	GK-36	**FOLLOWER GEAR**	1
3	IB-23	**LOCKNUT** for contact screw	1
4	IG-90	**THRUST WASHER** for drive shaft, lower	1
5	IG-495	**FELT WICK** for cam sleeve	1
6	IG-2860A-3	**ADVANCE ARM**	1
7	IGB-21	**INSULATION** for terminal stud	1
8	IGB-22	**INSULATING WASHER** for terminal stud	1
9	IGB-1065-C	**DISTRIBUTOR CAP** for YF-6E & YF-6F	1
	IGB-1065	For YF-6-D Auto-Lite IGW-4168-B	1
10	IGB-1007	**CLAMP SPRING** and **HINGE** for cap	2
11	IGB-1010	**BREAKER PLATE**	1
12	IGB-1025E	**CONDENSER**	1
13	IGB-1002	**ROTOR**	1
14	IGS-104	**THRUST WASHER** for drive shaft, upper	1
15	IGW-38	**INSULATING WASHER** for terminal stud	1
16	IGW-39	**TERMINAL STUD**	1
17	IGW-54	**WASHER** for terminal stud	1
19	IGW-2163A	**BASE ASSEMBLY** for YF-6E & YF-6F	1
		Includes:	
		IG-579A Bronze Bearings (not illustrated)	2
		VRP-26 Felt (not illustrated)	1
		XA-880 Felt Retainer (not illustrated)	1
	IGW-2163	For YF-6-D Auto-Lite IGW-4168B	1
		Includes:	
		IG-579A Bronze Bearings (not illustrated)	2

Ref No	Auto-Lite Part Number	Description	No Req
21	IGW-3028S	**BREAKER CONTACT SET**	1
22	IGW-3143LA	**SHAFT** and **GOVERNOR ASSEMBLY** for YF-6D & YF-6E	1
	IGW-3143LB	For YF-6F.	1
		Consisting of:	
23	IGB-327S	**SPRING SET** for governor weights	1
24	IGW-37	**CAM RETAINING SPRING**	1
25	IGW-92	**CAM SPACER**	1
26	IGW-1063L	**GOVERNOR WEIGHT**	2
27	IGW-2100LAB	**CAM** and **STOP PLATE** for YF-6D & YF-6E	1
	IGW-2100LAF	For YF-6F	1
28	IGW-2143L	**DRIVE SHAFT**	1
29	SW-213	**RIVET** for gear	1
30	8X-59	**SCREW** for condenser mounting No. 8-32 thread x 3/16" long, round head.	1
31	X-1276	**WASHER** for condenser mounting Shakeproof No. 8, External.	1
32	8X-173	**NUT** for terminal stud No. 10-32 thread, hexagon.	2
33	12X-196	**LOCKWASHER** for terminal stud, No. 10	2
34	8X-183A	**WASHER** for terminal stud, No. 10 plain	1
35	12X-195	**LOCKWASHER** for breaker plate, No. 8	3
36	8X-304	**SCREW** for breaker plate mounting No. 8-32 thread x 5/16" long, round head.	3
37	X-1270	**WASHER** for terminal stud Shakeproof No. 10.	1
38	X-1601	**GREASE CUP**	1
39	IG-816	**THRUST WASHER** for advance arm For YF-6D Auto-Lite IGW-4168B only.	1

WW-74-A CLUTCH AND POWER TAKE-OFF ASSEMBLY FOR TE AND TF ENGINES



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NOTE: Engines equipped with a clutch and power take-off assembly, require a special main bearing plate assembly, crankshaft and crankcase as follows:

BG-224-B-S2 **MAIN BEARING PLATE ASSEMBLY** (not illustrated) consisting of:
1 BG-224-B Bearing Plate — 1 ME-130-2 Bearing Cup — 1 PH-364 Oil Seal

CA-62-2-S1 **CRANKSHAFT ASSEMBLY** (not illustrated) consisting of:
1 CA-62-2 Crankshaft — 1 ME-71 Bearing — 1 PL-53 Key
1 GA-36A-1 Gear — 1 ME-130 Bearing

THE PART NUMBER OF THE CRANKCASE IS STAMPED ON THE FACE OF THE CASE ABOVE THE BEARING PLATE AT THE TAKE-OFF END

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
	WW-74-A	**CLUTCH** and **POWER TAKE-OFF ASSEMBLY.** Consisting of:	1	30	
600	BG-156	**RETAINER PLATE** for bearing	1		8
601	BG-230-2	**CLUTCH HOUSING**	1	6	
602	BH-115	**COVER** for inspection opening	1		8
603	LO-44	**BREATHER ASSEMBLY**	1		1
604	ME-79-A	**BEARING** for take-off shaft, N. D. 7507	1		10
605	ME-131-A	**BALL BEARING** for clutch shaft pilot. New Departure No. 77503.	1		6
606	PC-392	**STUD** for mounting clutch housing	4		2
607	PH-234-A	**OIL SEAL** for shifter lever shaft	1		2
608	PH-280	**OIL SEAL** for take-off shaft	1		3
609	PK-56	**RETAINING RING** for bearing	2		1
610	QD-551	**GASKET** for inspection cover	1		1
611	QD-650-1	**GASKET** for housing mounting	1		1
612	SD-79	**TAG** for oil instructions	1		1
613	SD-132	**INSTRUCTION PLATE** For clutch adjustment.	1		1
614	VB-55-1	**SHIFTER LEVER**	1	2	
615	VB-64-A	**SHIFTER YOKE**	1	1	4
616	WA-61	**SHAFT** for shifter yoke	1	1	
617	WA-94	**TAKE-OFF SHAFT**	1	3	
618	WC-280-A	**CLUTCH ASSEMBLY** Rockford Drilling Model 4½ L.O.C. No. CLA-1721-1. **NOTE:** See Rockford illustration and parts list for clutch parts.	1	12	
619	XD-14-2	**SET SCREW** for clutch drive hub	1		1
		STANDARD HARDWARE			
622	PD-12	**NUT,** 7/16"-20 thread, hexagon steel. For clutch housing studs.	4		1
623	PE-6	**LOCKWASHER,** 7/16" Positive. For clutch housing stud nuts.	4		1

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

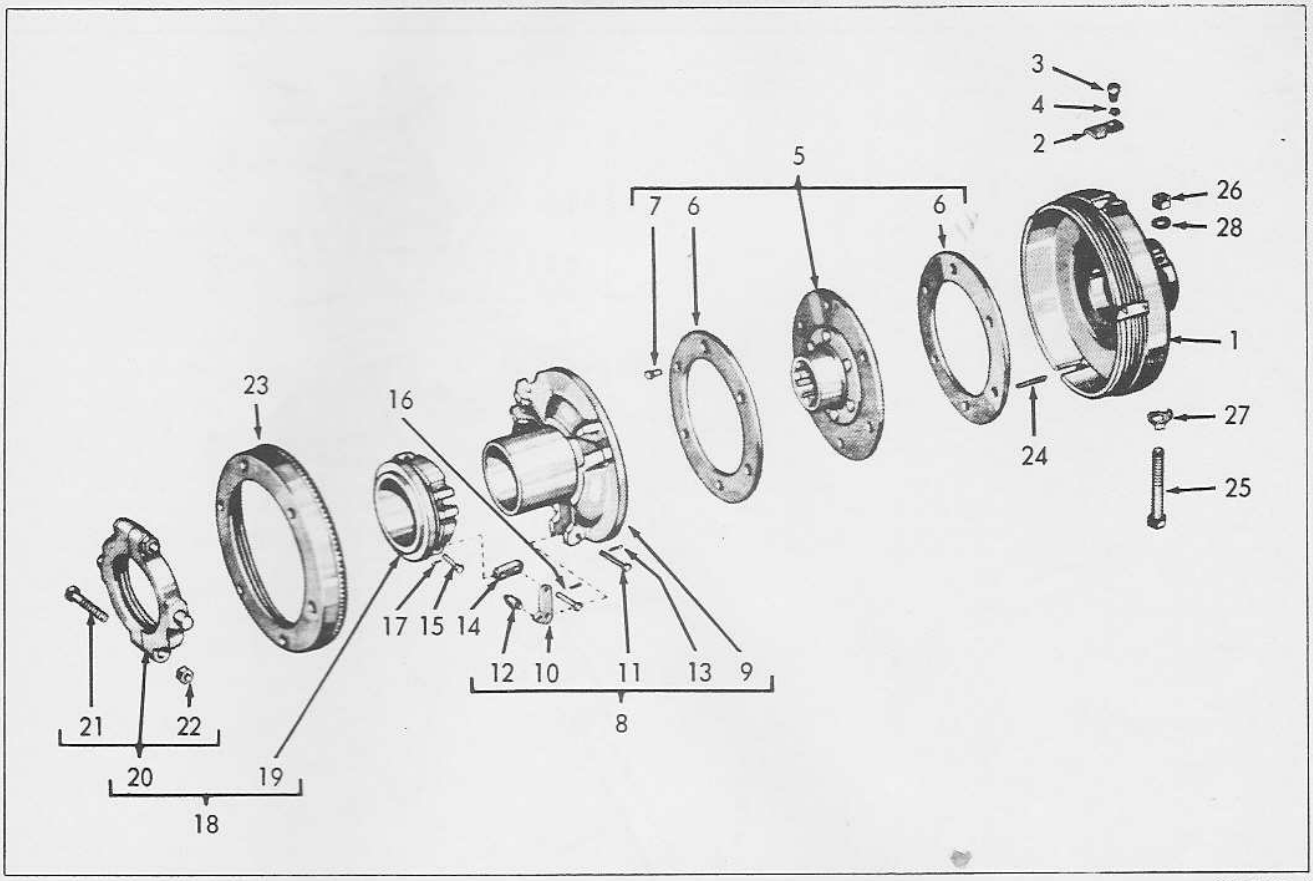
WW-74-A CLUTCH AND POWER TAKE-OFF ASSEMBLY FOR TE AND TF ENGINES

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
624	PE-46	**LOCKWASHER,** 5/16" External Everlock For drive hub set screw.	1		1
625	PH-30	**WASHER,** ¼" I.D. x 7/16" O.D. x 1/16" thick, copper 4-for inspection opening cover. 4-for bearing retainer plate.	8		1
626	PL-47	**KEY,** No. 18 Woodruff For clutch drive hub.	1		1
627	SA-58	**PLUG,** 1-3/8" Expansion For shifter shaft hole.	1		1
628	XA-100	**SCREW,** No. 4 x ¼" round head, metalic drive. For clutch adjustment plate XA-68, No. 2 x ¼" Screw—repl. by XA-100.	2		1
629	XD-5	**SCREW,** ¼"-20 thread x 5/8" long, hexagon head For inspection opening cover.	4		1
630	XD-8	**SCREW,** ¼"-20 thread x 1¼" long, hexagon head For bearing retainer plate.	4		1
631	XD-30	**SCREW,** 3/8"-16 thread x 1½" long, hexagon head For shifter lever.	1		1
632	XH-26	**TAPER PIN,** No. 4 x 1-3/8" long For shifter lever.	1		1
633	XK-1	**PIPE PLUG,** 1/8" square head For oil level.	2		1
634	XK-2	**PIPE PLUG,** ¼" square head For oil drain.	1		1
635	XK-77	**STREET ELL,** 1/8" x 45° For breather mounting.	1		1

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

ROCKFORD No. CLA-1721-1 CLUTCH ASSEMBLY
WISCONSIN MOTOR PART No. WC-280-A



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Ref. No.	Rockford Part Number	Description	No Req
1	CL-7248	**CLUTCH HOUSING**	1
2	CL-7012	**ADJUSTMENT LOCK**	1
3	CL-3917-1	**SCREW** for adjustment lock, 1/4"-20 thread x 3/8" long, fillister head	1
4	CL-3468	**WASHER** for adjustment lock, 1/4" Shakeproof	1
5	UCL-5230	**DRIVE MEMBER ASSEMBLY**	1
		Consisting of:	
	*	Splined center and plate assembly	1
6		CL-4096-1 Facing (Raybestos No. 500B)	2
7		CL-1011 Brass rivet	6
8	UCL-1-5228-A	**PRESSURE PLATE and LEVER ASSEMBLY**	1
		Consisting of:	
9		UCL-5228 Pressure plate assembly	1
10		CL-5543 Lever	6
11		CL-5156 Lever pin	3
12		LM-408 Roller	3
		CL-4775 Roller and CL-4971 Pin replaced by LM-408.	
13		CL-5092 Cotter pin, 1/16" x 3/8" long	3
14	CL-4776	**CONNECTING LINK**	6
15	CL-5153	**LINK PIN** (long)	3
16	CL-5152	**LINK PIN** (short)	3

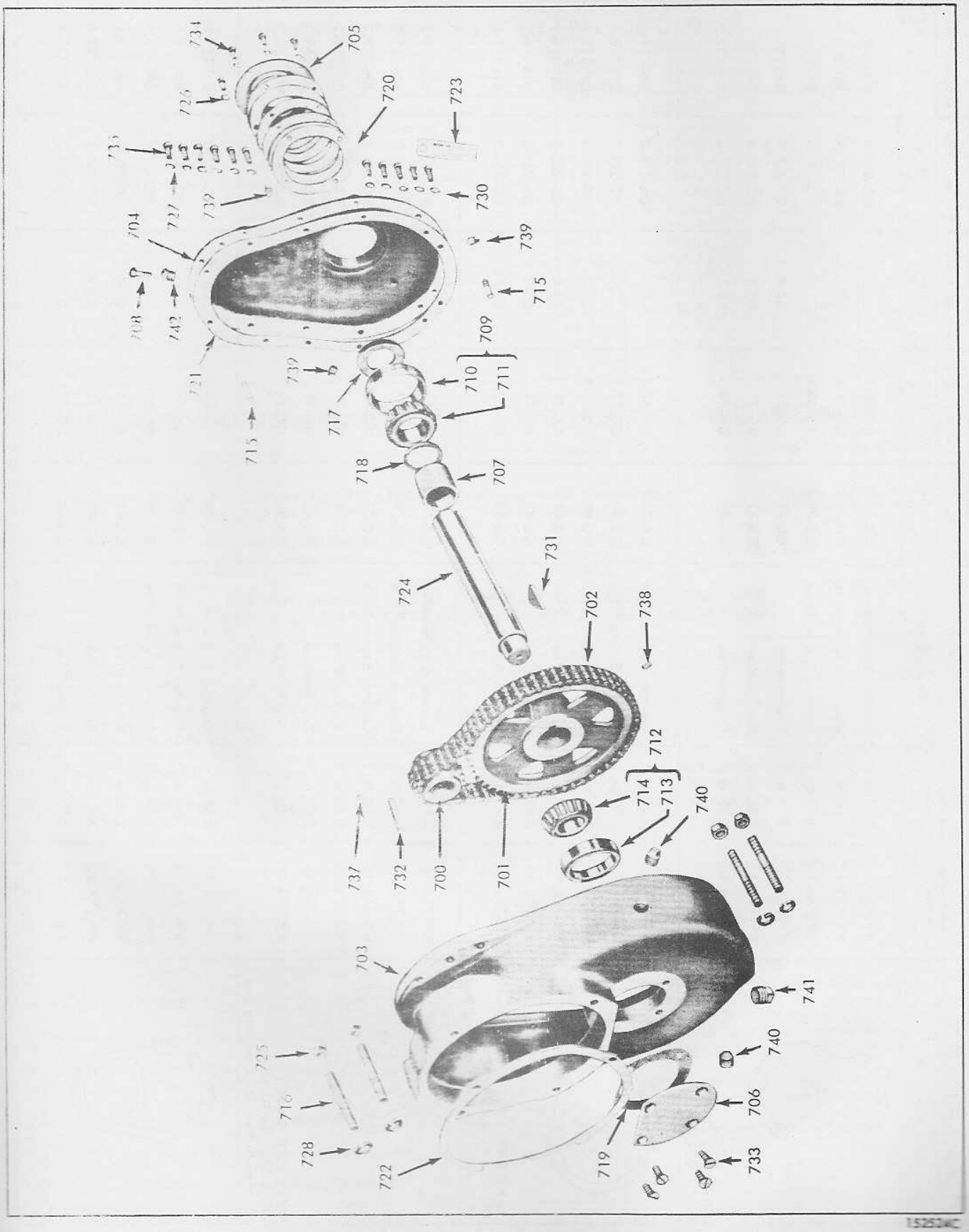
Ref. No.	Rockford Part Number	Description	No Req
17	CL-5092	**COTTER PIN** for link pins, 1/16" x 3/8" long.	6
18	UCL-5229-L	**RELEASE SLEEVE ASSEMBLY**	1
		Consisting of:	
19		CL-5229 Release sleeve	1
20		UCL-7-4966 Release bearing assembly	1
		Consisting of:	
	*	Release bearing (2 halves)	
21		CL-3335-1 Hexagon head screw, 5/16"-24 thread x 1-3/4" long	2
22		CL-7356 Elastic stop nut, 5/16"-24 thread	2
23	CL-4964	**ADJUSTING RING**	1
24	CL-5087	**SPRING**	3
25	CL-5318	**CLAMP SCREW**, 3/8"-24 thread x 2-1/2" long, hexagon head	2
26	CL-5319	**NUT**, 3/8"-24 thread, light hexagon	2
27	CL-5211	**SCREW LOCK**	2
28	PT-353	**LOCKWASHER**, 3/8" Positive	2

(*) Not serviced separately from sub-assembly it is included in.

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

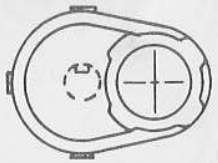
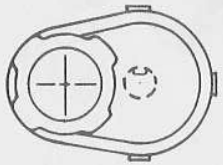
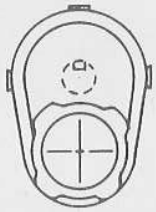
WW-77-A ETC. REDUCTION GEAR ASSEMBLIES FOR TE AND TF ENGINES



15252AC

Parts are identified by reference number. See parts list for correct part number.

WW-77-A ETC. REDUCTION GEAR ASSEMBLIES FOR TE AND TF ENGINES

Position of Take-off Shaft Viewing From Cranking End of Engine	Assembly Number	Reduction Ratio	Rotation of Take-off Shaft	Ref. No. 700 Driver Gear Part No.	Ref. No. 701 Driven Gear Part No.	Ref. No. 702 Chain Part No.	Ref. No. 703 Housing Part No.	Ref. No. 704 Housing Cover Part No.
 TAKE-OFF SHAFT BELOW	WW-77-A	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	.....	BG-231-4	BH-119
	WW-77A-1	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	.....	BG-231-4	BH-119
	WW-77A-2	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	.....	BG-231-4	BH-119
	WW-77A-3	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-231-4	BH-119
	WW-77A-4	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-231-4	BH-119
	WW-77A-5	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-231-4	BH-119
 TAKE-OFF SHAFT ON LEFT HAND SIDE as Viewed from the Cranking End	WW-77A-6	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	.....	BG-231-5	BH-119-1
	WW-77A-7	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	.....	BG-231-5	BH-119-1
	WW-77A-8	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	.....	BG-231-5	BH-119-1
	WW-77A-9	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-231-5	BH-119-1
	WW-77A-10	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-231-5	BH-119-1
	WW-77A-11	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-231-5	BH-119-1
 TAKE-OFF SHAFT ON RIGHT HAND SIDE as Viewed from the Cranking End	WW-77A-12	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	.....	BG-231-6	BH-119-2
	WW-77A-13	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	.....	BG-231-6	BH-119-2
	WW-77A-14	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	.....	BG-231-6	BH-119-2
	WW-77A-15	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-231-6	BH-119-2
	WW-77A-16	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-231-6	BH-119-2
	WW-77A-17	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-231-6	BH-119-2
 TAKE-OFF SHAFT ON TOP	WW-77A-18	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	.....	BG-231-7	BH-119-6
	WW-77A-19	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	.....	BG-231-7	BH-119-6
	WW-77A-20	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	.....	BG-231-7	BH-119-6
	WW-77A-21	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-231-7	BH-119-6
	WW-77A-22	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-231-7	BH-119-6
	WW-77A-23	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-231-7	BH-119-6

See following page for weights and description.

WW-77-A ETC. REDUCTION GEAR ASSEMBLIES FOR TE AND TF ENGINES

WEIGHTS OF PARTS SHOWN ON PRECEDING PAGE

Part Number	Net Wt. Lb	Net Wt. Oz	Part Number	Net Wt. Lb	Net Wt. Oz	Part Number	Net Wt. Lb	Net Wt. Oz
BG-231-4	19		GG-81 (20 teeth)	2		WW-77A-9	59	
BG-231-5	19		GG-82 (15 teeth)	1	1	WW-77A-10	58	
BG-231-6	19		GG-83 (14 teeth)		15	WW-77A-11	60	
BG-231-7	19		GJ-8 (27" long)	1	13	WW-77A-12	63	
BH-119	14		GJ-9 (26" long)	1	12	WW-77A-13	65	
BH-119-1	14		GJ-10 (30" long)	2		WW-77A-14	64	
BH-119-2	14		WW-77-A	63		WW-77A-15	59	
BH-119-6	14		WW-77A-1	65		WW-77A-16	58	
GG-66-3 (30 teeth)	2	12	WW-77A-2	64		WW-77A-17	60	
GG-67-1 (62 teeth)	8	11	WW-77A-3	59		WW-77A-18	63	
GG-69-1 (73 teeth)	10	15	WW-77A-4	58		WW-77A-19	65	
GG-71 (40 teeth)	5	4	WW-77A-5	60		WW-77A-20	64	
GG-73 (53 teeth)	7	10	WW-77A-6	63		WW-77A-21	59	
GG-77-1 (69 teeth)	10	4	WW-77A-7	65		WW-77A-22	58	
GG-79-1 (23 teeth)	2		WW-77A-8	64		WW-77A-23	60	
GG-80-1 (19 teeth)	1	4						

INTERCHANGEABLE PARTS OF WW-77-A ETC. REDUCTION GEAR ASSEMBLIES

NOTE: Engines equipped with a reduction gear assembly, require a special main bearing plate, crankshaft and crankcase as follows:

BG-224-B-S2 **MAIN BEARING PLATE ASSEMBLY** (not illustrated) consisting of:
1 BG-224-B Bearing Plate — 1 ME-130-2 Bearing Cup — 1 PH-364 Oil Seal

CA-62-3-S1 **CRANKSHAFT ASSEMBLY** (not illustrated) consisting of:
1 CA-62-3 Crankshaft — 1 ME-71 Bearing — 1 PL-53 Key
1 GA-36A-1 Gear — 1 ME-130 Bearing

THE PART NUMBER OF THE CRANKCASE IS STAMPED ON THE FACE OF THE CASE ABOVE THE BEARING PLATE AT THE TAKE-OFF END

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
705	BG-150	**PLATE** for retaining bearing (outer)	1	1	
706	BG-151	**PLATE** for retaining bearing (inner)	1		6
707	HF-265	**SPACER** for take-off shaft	1		3
708	LO-44	**BREATHER**	1		1
709	ME-76	**BEARING ASSEMBLY** (outer)	1	1	7
		Consisting of:			
710		ME-76-1 Cup, Timken No. 3525	1		10
711		ME-76-2 Cone, Timken No. 3578	1	1	1
712	ME-77	**BEARING ASSEMBLY** (inner)	1		15
		Consisting of:			
713		ME-77-1 Cup, Timken No. 02820	1		6
714		ME-77-2 Cone, Timken No. 02877	1		9
715	PA-279	**DOWEL PIN** for cover to housing	2		1
716	PC-392	**STUD** for housing to crankcase	6		1
717	PH-202	**OIL SEAL** for take-off shaft Kickhaefer Mfg. Co. No. A-31-106.	1		4
718	PH-206	**COLLAR** for take-off shaft spacer	1		2
719	QD-543-A	**GASKET** for bearing retainer plate—inner	1		1
720	QD-544	**GASKET** for bearing retainer plate—outer	6		1

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
721	QD-545	**GASKET** for cover to housing	1		1
722	QD-650-1	**GASKET** for housing to crankcase	1		1
723	SD-79	**OIL INSTRUCTION TAG**	1		1
724	WA-55	**TAKE-OFF SHAFT**	1	6	14
		STANDARD HARDWARE			
725	PD-12	**NUT**, 7/16"-20 thread, hexagon steel For housing to crankcase mounting studs.	4		1
726	PE-4	**LOCKWASHER**, 5/16" Positive For outer bearing retainer plate.	4		1
727	PE-5	**LOCKWASHER**, 3/8" Positive For cover to housing mounting above oil level.	6		1
728	PE-6	**LOCKWASHER**, 7/16" Positive For housing to crankcase mounting.	4		1
730	PH-22	**PLAIN WASHER**, 3/8" I.D. x 1/16" thick steel For cover to housing mounting, below oil level.	5		1

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

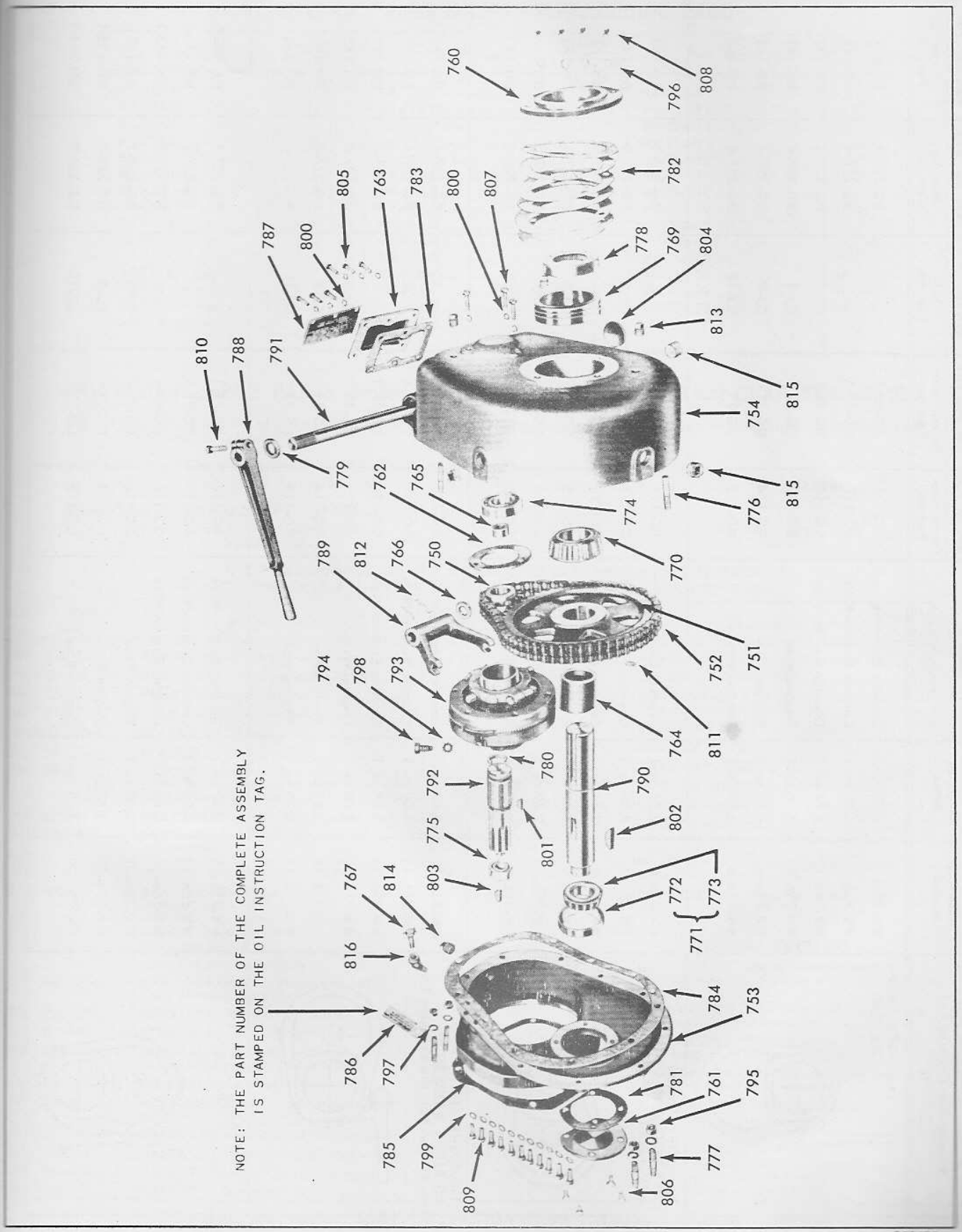
INTERCHANGEABLE PARTS OF WW-77-A ETC. REDUCTION GEAR ASSEMBLIES FOR TE AND TF ENGINES

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
731	PL-24	**KEY,** No. 29 Woodruff ..... For driven gear mounting.	1		1
732	PL-88	**KEY,** 1/4" square x 2" long ..... For driver gear mounting.	1		1
733	XC-17	**SCREW,** 5/16"-18 thread x 3/4" long, flat head ..... For inner bearing retainer plate.	4		1
734	XD-15	**SCREW,** 5/16"-18 thread x 3/4" long, hexagon head ..... For outer bearing retainer plate.	4		1
735	XD-27	**SCREW,** 3/8"-16 thread x 1" long, hexagon head ..... For cover to housing mounting.	11		1
737	XE-17	**SET SCREW,** 1/4"-20 thread x 3/8" long headless ..... For driver gear mounting.	1		1
738	XE-44	**SET SCREW,** 5/16"-18 thread x 5/8" long, headless ..... For driven gear mounting.	1		1
739	XK-2	**PIPE PLUG,** 1/4" square head ..... For oil level.	3		1
740	XK-3	**PIPE PLUG,** 3/8" square head ..... For oil level—when take-off shaft is in horizontal position.	2		2
741	XK-4	**PIPE PLUG,** 1/2" square head ..... For oil drain.	1		2
742	XK-88	**REDUCER BUSHING,** 3/8" to 1/8" pipe.. For mounting breather.	1		1

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

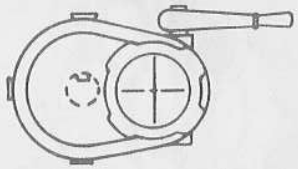
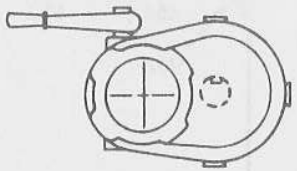
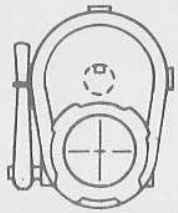
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

WW-75-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR TE AND TF ENGINES



Parts are identified by reference number. See parts list for correct part number.

WW-75-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR TE AND TF ENGINES

Position of Take-Off Shaft Viewing from Cranking End of Engine	Assembly Number	Reduction Ratio	Rotation of Take-off Shaft	Ref. No. 750 Driver Gear Part No.	Ref. No. 751 Driven Gear Part No.	Ref. No. 752 Chain Part No.	Ref. No. 753 Housing Part No.	Ref. No. 754 Cover Part No.
TAKE-OFF SHAFT BELOW 	WW-75-A	2.07 to 1	Counter Engine-Wise	GG-116	GG-67-1	.....	BG-227-4	BH-143
	WW-75A-1	3.00 to 1	Counter Engine-Wise	GG-117	GG-77-1	.....	BG-227-4	BH-143
	WW-75A-2	3.84 to 1	Counter Engine-Wise	GG-118	GG-69-1	.....	BG-227-4	BH-143
	WW-75A-3	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-227-4	BH-143
	WW-75A-4	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-227-4	BH-143
	WW-75A-5	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-227-4	BH-143
TAKE-OFF SHAFT ON LEFT HAND SIDE as Viewed from the Cranking End 	WW-75A-6	2.07 to 1	Counter Engine-Wise	GG-116	GG-67-1	.....	BG-227-5	BH-143
	WW-75A-7	3.00 to 1	Counter Engine-Wise	GG-117	GG-77-1	.....	BG-227-5	BH-143
	WW-75A-8	3.84 to 1	Counter Engine-Wise	GG-118	GG-69-1	.....	BG-227-5	BH-143
	WW-75A-9	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-227-5	BH-143
	WW-75A-10	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-227-5	BH-143
	WW-75A-11	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-227-5	BH-143
TAKE-OFF SHAFT ON RIGHT HAND SIDE as Viewed from the Cranking End 	WW-75A-12	2.07 to 1	Counter Engine-Wise	GG-116	GG-67-1	.....	BG-227-6	BH-143
	WW-75A-13	3.00 to 1	Counter Engine-Wise	GG-117	GG-77-1	.....	BG-227-6	BH-143
	WW-75A-14	3.84 to 1	Counter Engine-Wise	GG-118	GG-69-1	.....	BG-227-6	BH-143
	WW-75A-15	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-227-6	BH-143
	WW-75A-16	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-227-6	BH-143
	WW-75A-17	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-227-6	BH-143
TAKE-OFF SHAFT ON TOP 	WW-75A-18	2.07 to 1	Counter Engine-Wise	GG-116	GG-67-1	.....	BG-227-7	BH-143-1
	WW-75A-19	3.00 to 1	Counter Engine-Wise	GG-117	GG-77-1	.....	BG-227-7	BH-143-1
	WW-75A-20	3.84 to 1	Counter Engine-Wise	GG-118	GG-69-1	.....	BG-227-7	BH-143-1
	WW-75A-21	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-227-7	BH-143-1
	WW-75A-22	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-227-7	BH-143-1
	WW-75A-23	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-227-7	BH-143-1

See following page for weights and description.

WW-75-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR TE AND TF ENGINES

WEIGHTS OF PARTS SHOWN ON PRECEDING PAGE

Part Number	Net Wt. Lb	Net Wt. Oz	Part Number	Net Wt. Lb	Net Wt. Oz	Part Number	Net Wt. Lb	Net Wt. Oz
BG-227-4	19	8	GG-117 (23 teeth)	2	1	WW-75A-10	85	
BG-227-5	19	8	GG-118 (19 teeth)	1	12	WW-75A-11	87	
BG-227-6	19	8	GJ-8 (27" long)	1	13	WW-75A-12	89	
BG-227-7	19	8	GJ-9 (26" long)	1	12	WW-75A-13	89	8
BH-143	20		GJ-10 (30" long)	2		WW-75A-14	89	
BH-143-1	20		WW-75-A	89		WW-75A-15	86	
GG-67-1 (62 teeth)	8	11	WW-75A-1	89	8	WW-75A-16	85	
GG-69-1 (73 teeth)	10	15	WW-75A-2	89		WW-75A-17	87	
GG-71 (40 teeth)	5	4	WW-75A-3	86		WW-75A-18	89	
GG-73 (53 teeth)	7	10	WW-75A-4	85		WW-75A-19	89	8
GG-77-1 (69 teeth)	10	4	WW-75A-5	87		WW-75A-20	89	
GG-113 (20 teeth)	1	14	WW-75A-6	89		WW-75A-21	86	
GG-114 (15 teeth)		14	WW-75A-7	89	8	WW-75A-22	85	
GG-115 (14 teeth)		11	WW-75A-8	89		WW-75A-23	87	
GG-116 (30 teeth)	2	10	WW-75A-9	86				

INTERCHANGEABLE PARTS OF WW-75-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES

NOTE: Engines equipped with a clutch reduction gear assembly, require a special main bearing plate, crankshaft and crankcase as follows:

BG-224B-S2 **MAIN BEARING PLATE ASSEMBLY** (not illustrated) consisting of:
1 BG-224-B Bearing Plate — 1 ME-130-2 Bearing Cup — 1 PH-364 Oil Seal

CA-62-2-S1 **CRANKSHAFT ASSEMBLY** (not illustrated) consisting of:
1 CA-62-2 Crankshaft — 1 ME-71 Bearing — 1 PL-53 Key
1 GA-36-A-1 Gear — 1 ME-130 Bearing

THE PART NUMBER OF THE CRANKCASE IS STAMPED ON THE FACE OF THE CASE ABOVE THE BEARING PLATE AT THE TAKE-OFF END

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
760	BG-150	**PLATE** for retaining bearing (outer)	1	1	
761	BG-151	**PLATE** for retaining bearing (inner)	1		6
762	BG-216	**PLATE** for clutch bearing	1		8
763	BH-127	**COVER** for inspection opening	1		12
764	HF-265-A	**SPACER** for take-off shaft	1		6
765	HF-372-A	**SPACER** for ball bearing	1		3
766	HF-392	**SPACER** for shifter yoke (Used only when take-off shaft is on the right or left hand side.)	4		2
767	LO-44	**BREATHER**	1		1
768	ME-76	**BEARING ASSEMBLY** (outer) Consisting of:	1	1	11
769		ME-76-1 Cup, Timken No. 3525	1		10
770		ME-76-2 Cone, Timken No. 3578	1	1	1
771	ME-77	**BEARING ASSEMBLY** (inner) Consisting of:	1		15
772		ME-77-1 Cup, Timken No. 02820	1		6
773		ME-77-2 Cone, Timken No. 02877	1		9
774	ME-119	**BALL BEARING** for clutch shaft. New Departure No. 3206.	1		8
775	ME-131-A	**BALL BEARING** for clutch shaft pilot. New Departure No. 77503.	1		6
776	PA-279	**DOWEL PIN** for cover to housing	2		1
777	PC-392	**STUD** for housing to crankcase	4		1
778	PH-202	**OIL SEAL** for take-off shaft. Kickhaefer Mfg. Co. No. A-31-106.	1		4
779	PH-234-A	**OIL SEAL** for shifter shaft	1		3
780	PK-82	**RETAINING RING** for clutch shaft bearing	2		1
781	QD-543-A	**GASKET** for bearing retainer plate—inner	1		1
782	QD-544	**GASKET** for bearing retainer plate—outer	6		1
783	QD-592	**GASKET** for inspection hole cover	1		1
784	QD-619	**GASKET** for cover to housing	1		1

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
785	QD-650-1	**GASKET** for housing to crankcase	1		1
786	SD-79	**OIL INSTRUCTION TAG**	1		1
787	SD-125	**INSTRUCTION PLATE** For clutch adjustment.	1		1
788	VB-55-1	**SHIFTER LEVER**	1	2	
789	VB-64-A	**SHIFTER YOKE**	1	1	8
790	WA-55-H	**TAKE-OFF SHAFT**	1	6	10
791	WA-61-D	**SHIFTER SHAFT**	1	1	12
792	WA-93	**CLUTCH SHAFT**	1	2	
793	WC-280-A	**CLUTCH ASSEMBLY** Rockford Drilling Model 4½ L.O.C. No. CLA-1721-1. **NOTE:** See Rockford illustration and parts list for clutch parts.	1	12	
794	XD-14-2	**SET SCREW** for clutch drive hub	1		1
		STANDARD HARDWARE			
795	PD-12	**NUT,** 7/16"-20 thread, hexagon steel. For housing to crankcase mounting studs.	4		1
796	PE-4	**LOCKWASHER,** 5/16" Positive. For outer bearing retainer plate.	4		1
797	PE-6	**LOCKWASHER,** 7/16" Positive. For housing to crankcase mounting.	4		1
798	PE-46	**LOCKWASHER,** 5/16" External Everlock. For clutch drive hub set screw.	1		1
799	PH-22	**PLAIN WASHER,** 3/8" I.D. x 1/16" thick, steel. For cover to housing mounting.	11		1
800	PH-30	**PLAIN WASHER,** 1/4" I.D. x 1/16" thick, copper. 6-for inspection hole cover plate. 3-for bearing retainer plate.	9		1

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

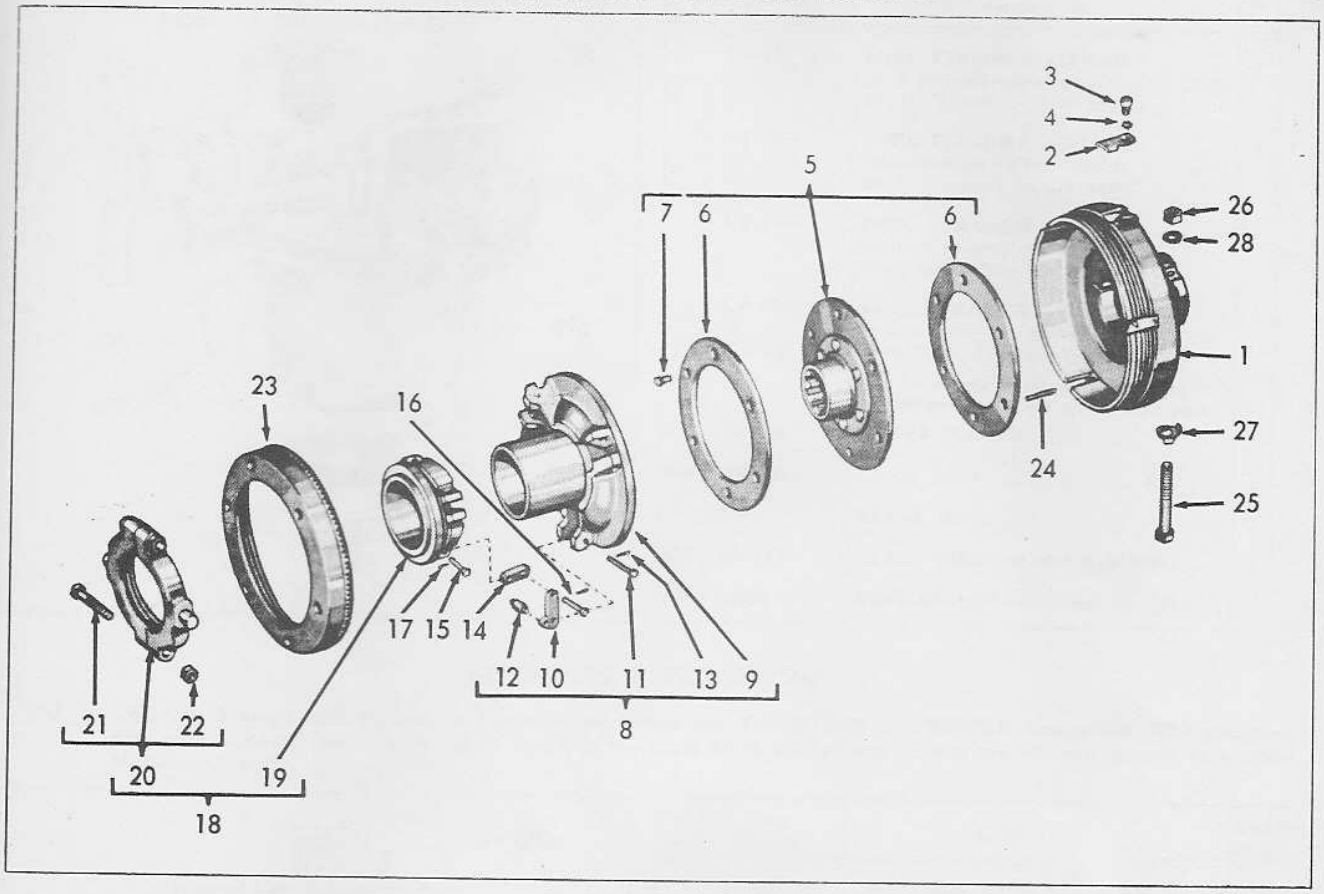
INTERCHANGEABLE PARTS OF WW-75-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR TE AND TF ENGINES

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
801	PL-17	**KEY,** No. 13 Woodruff ..... For drive gear.	1		1
802	PL-24	**KEY,** No. 29 Woodruff ..... For driven gear.	1		1
803	PL-47	**KEY,** No. 18 Woodruff ..... For clutch drive hub.	1		1
804	SA-58	**PLUG,** 1-3/8" expansion..... For shifter shaft hole.	1		1
805	XA-36	**SCREW,** 1/4"-20 thread x 3/4" long, round head..... For inspection hole cover.	6		1
806	XC-17	**SCREW,** 5/16"-18 thread x 3/4" long, flat head ..... For inner bearing retainer plate.	4		1
807	XD-7	**SCREW,** 1/4"-20 thread x 1" long, hexagon head ..... For clutch bearing retainer plate.	3		1
808	XD-15	**SCREW,** 5/16"-18 thread x 3/4" long, hexagon head ..... For outer bearing retainer plate.	4		1
809	XD-27	**SCREW,** 3/8"-16 thread x 1" long, hexagon head ..... For cover to housing mounting.	11		1
810	XD-30	**SCREW,** 3/8"-16 thread x 1-1/2" long, hexagon head..... For shifter lever clamp.	1		2
811	XE-44	**SET SCREW,** 5/16"-18 thread x 5/8" long, headless ..... For driven gear mounting.	1		1
812	XH-26	**TAPER PIN,** No. 4 x 1-3/8" long ..... For shifter yoke.	2		1
813	XK-2	**PIPE PLUG,** 1/4" square head ..... For oil level.	3		1
814	XK-4	**PIPE PLUG,** 1/2" square head ..... For oil filler.	1		2
815	XK-6	**PIPE PLUG,** 1/2" Countersunk head .... For oil drain.	3		2
816	XK-77	**STREET ELL,** 1/8" pipe x 45° ..... For breather mounting.	1		1

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

ROCKFORD No. CLA-1721-1 CLUTCH ASSEMBLY
WISCONSIN MOTOR PART No. WC-280-A



206584C-A

Ref. No.	Rockford Part Number	Description	No Req
1	CL-7248-	**CLUTCH HOUSING**	1
2	CL-7012	**ADJUSTMENT LOCK**	1
3	CL-3917-1	**SCREW** for adjustment lock, 1/4"-20 thread x 3/8" long, fillister head	1
4	CL-3468	**WASHER** for adjustment lock, 1/4" Shakeproof	1
5	UCL-5230	**DRIVE MEMBER ASSEMBLY**	1
	*	Consisting of:	
		Splined center and plate assembly	1
6		CL-4096-1 Facing (Raybestos No. 500B)	2
7		CL-1011 Brass rivet	6
8	UCL-1-5228-A	**PRESSURE PLATE** and **LEVER ASSEMBLY**	1
		Consisting of:	
9		UCL-5228 Pressure plate assembly	1
10		CL-5543 Lever	6
11		CL-5156 Lever pin	3
12		LM-408 Roller	3
		CL-4775 Roller and CL-4971 Pin replaced by LM-408.	
13		CL-5092 Cotter pin, 1/16" x 3/8" long	3
14	CL-4776	**CONNECTING LINK**	6
15	CL-5153	**LINK PIN** (long)	3
16	CL-5152	**LINK PIN** (short)	3

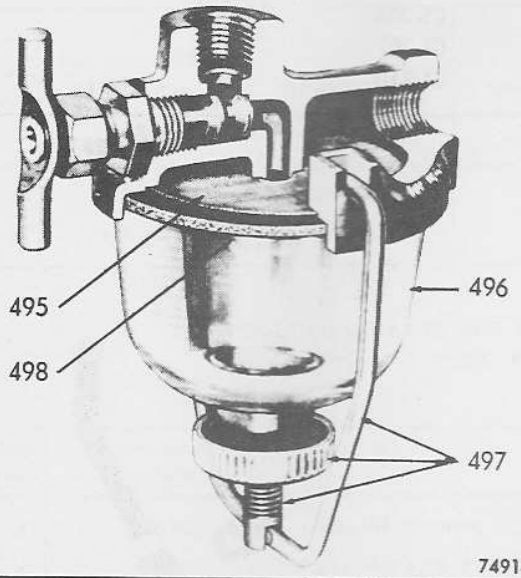
Ref. No.	Rockford Part Number	Description	No Req
17	CL-5092	**COTTER PIN** for link pins, 1/16" x 3/8" long.	6
18	UCL-5229-L	**RELEASE SLEEVE ASSEMBLY**	1
		Consisting of:	
19		CL-5229 Release sleeve	1
20		UCL-7-4966 Release bearing assembly	1
	*	Consisting of:	
		Release bearing (2 halves)	
21		CL-3335-1 Hexagon head screw, 5/16"-24 thread x 1-3/4" long	2
22		CL-7356 Elastic stop nut, 5/16"-24 thread	2
23	CL-4964	**ADJUSTING RING**	1
24	CL-5087	**SPRING**	3
25	CL-5318	**CLAMP SCREW**, 3/8"-24 thread x 2-1/2" long, hexagon head	2
26	CL-5319	**NUT**, 3/8"-24 thread, light hexagon	2
27	CL-5211	**SCREW LOCK**	2
28	PT-353	**LOCKWASHER**, 3/8" Positive	2

(*) Not serviced separately from sub-assembly it is included in.

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

FUEL STRAINER ASSEMBLIES

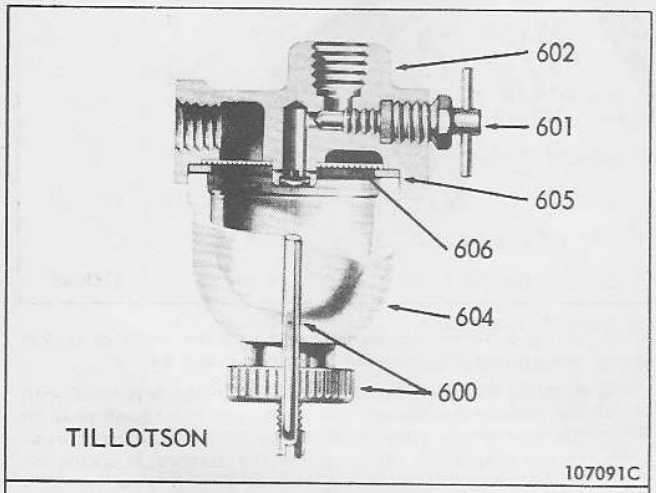
LP-19, LP-19-A, LP-19-B, LP-19-C
FUEL STRAINER (LARGE)

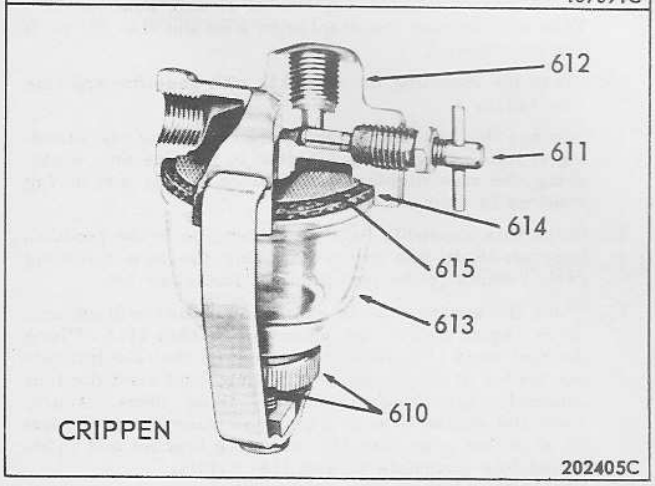


Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
	LP-19	**FUEL STRAINER ASSEMBLY** ..... (With Shut-off valve in cover, and glass bowl) Tillotson No. OW-418-T.	1		8
	LP-19-A	**FUEL STRAINER ASSEMBLY** ..... (With Shut-off valve in cover, and metal bowl) Tillotson No. OW-449-T.	1		7
	LP-19-B	**FUEL STRAINER ASSEMBLY** ..... (Without Shut-off valve in cover, and glass bowl) Tillotson No. OW-444.	1		6
	LP-19-C	**FUEL STRAINER ASSEMBLY** ..... (Without Shut-off valve in cover, and metal bowl) Tillotson No. OW-476-T.	1		5
		The following serviceable parts are interchangeable for the above strainers.			
495	OW-352	**FILTER SCREEN**	1		1
496	OW-363	**GLASS BOWL**	1		2
	06137	**METAL BOWL**	1		1
497	OW-447	**CLAMP WIRE** and **NUT ASSEMBLY**	1		1
498	06096	**BOWL GASKET** (Wisconsin No. QD-653)	1		5

LP-43 FUEL STRAINER (SMALL)

NOTE: The **LP-43** small fuel strainer is furnished by either the **TILLOTSON** or **CRIPPEN** Companies. The strainers are interchangeable as complete units, but only the glass bowl, gasket and screen are interchangeable as service replacement parts.





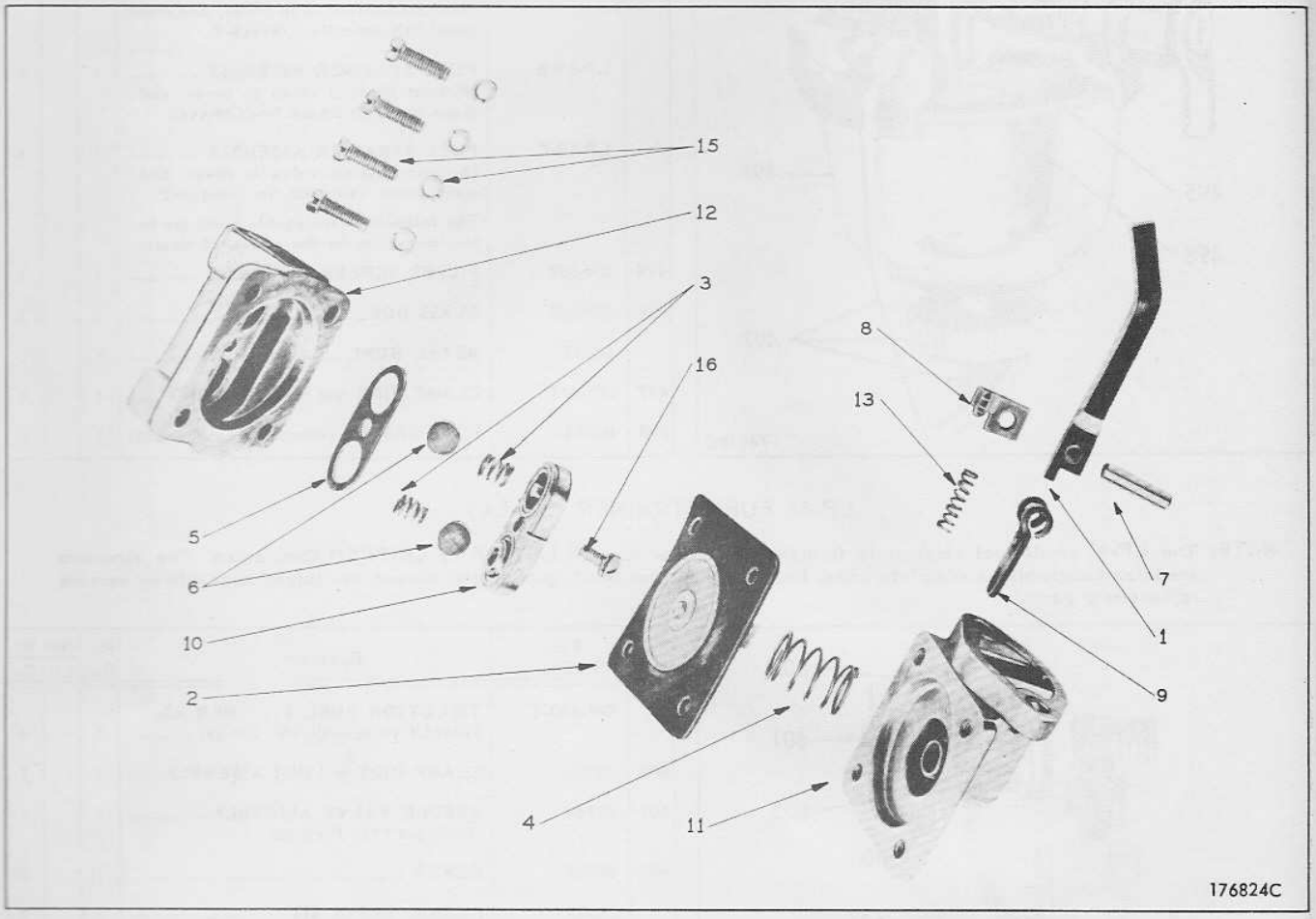
Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
	OW-480-T	**TILLOTSON FUEL STRAINER ASSEMBLY** (Wisconsin No. LP-43)	1		6
600	07766	**CLAMP WIRE** and **NUT ASSEMBLY**	1		1
601	07769	**NEEDLE VALVE ASSEMBLY** ..... Includes 0705 Packing.	1		1
602	07770	**COVER**	1		2
	08322	**REPAIR PARTS KIT** ..... Consisting of:	1		3
601		07769 Needle Valve Assembly	1		1
604		07759 Glass Bowl	1		1
605		08227 Thiokol Gasket	1		1
606		07762 Screen	1		1
		– OPTIONAL –			
	830	**CRIPPEN FUEL STRAINER ASSEMBLY** (Wisconsin No. LP-43)	1		6
610	100-A	**BAIL ASSEMBLY**	1		2
611	100-6-7-8-9	**NEEDLE VALVE ASSEMBLY** ..... Includes 100-9 Packing.	1		1
612	100-1	**COVER**	1		2
	100-19	**REPAIR PARTS KIT** ..... Consisting of:	1		3
611		100-6-7-8-9 Needle Valve Assembly	1		1
613		100-2 Glass Bowl	1		1
614		100-10N Neoprene Gasket	1		1
615		100-11 Screen	1		1

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

INSTRUCTIONS AND PARTS LIST FOR FUEL PUMP

WISCONSIN MOTOR No.	BLACKSTONE No.
LP-42-A	GI-205
LP-42-B	GI-206
LP-42-C	GI-207
LP-42-F	GI-210



The fuel pump, like all other parts of the engine, is subject to wear and you will find that any time after 500 hours of use, its efficiency will gradually decrease. This is indicated by the engines faltering at high speeds or when heavy loads are suddenly applied. The pump can easily be restored to its normal efficiency by the installation of a **Wisconsin Motor No. LQ-28** diaphragm kit (standard) or **LQ-28-A** diaphragm kit (Government – cold weather).

1. Remove the fuel lines and the two mounting bolts which hold the pump to the engine. Take the pump to a work bench or suitable place.
2. With file, make an indicating mark across a point at the union of castings (11 and 12). This is a positive location of the fuel line positions when reassembling. Remove four assembly screws (15) and remove fuel head.
3. Turn head (12) over and remove one screw (16). Remove (10, 3, 6 and 5) valve assemblies, noting their positions. Discard the above parts (3, 6 and 5).
4. Clean fuel head thoroughly with gasoline and a fine wire brush.
5. Holding fuel head, (12) with diaphragm surface (containing four clearance holes) up, reassemble the valve spring (3) and valve (6) into the cavity from which they were removed. Now place new gasket (5) in position and reassemble the valve retainer (10) into position and lock it by inserting and tightening the fuel pump valve retainer screw (16).
6. Place this fuel head assembly in a clean place and we are ready to rebuild the lower diaphragm section.
7. Using a screw driver, inserted into the coils of rocker arm spring (13), remove this spring and save.
8. Holding the mounting bracket (11) in the left hand with the rocker arm toward the body and the thumb nail on the end of the link (9) with the heel of the right hand on the diaphragm (2) compress the diaphragm spring (4) at the same time, turning in a clockwise position 90°. This will unhook the diaphragm from the link (9) so it can be removed.
9. Clean the mounting bracket (11) with gasoline and fine wire brush.
10. Replace the new diaphragm operating spring (4), standing it into casting (11). Repeat in reverse step eight, using the new diaphragm. Replace rocker arm spring removed in step seven.
11. Mount this assembly back on the engine in the position from which it was removed, using the new mounting gasket which is the last piece of the repair kit.
12. Crank the engine over to a position where the diaphragm (2) is laying flat on the mounting bracket (11). Place the fuel head (12) back in position so that the indicating marks of step one are in line, and start the four assembly screws approximately three turns. Again, crank the engine over to a position where the diaphragm (2) is pulled down into (11) mounting bracket and tighten the four assembly screws (15) tightly.
13. Connect the fuel lines and you have a completely rebuilt fuel pump.

FUEL PUMP PARTS LIST

(Blackstone Part Numbers Shown)

Ref. No.	Part Number MODELS TE, TF LP-42-A Pump Blackstone GI-205 (Standard)	Part Number MODELS TE, TF LP-42-C Pump Blackstone GI-207 (Cold Weather)	Part Number MODELS AEN LP-42-B Pump Blackstone GI-206 (Standard)	Part Number MODELS AEN LP-42-F Pump Blackstone GI-210 (Cold Weather)	Description	Qty.
1	FP-918	FP-918	FP-916	FP-916	ROCKER ARM	1
** 2	LQ-28	LQ-28-A	LQ-28	LQ-28-A	DIAPHRAGM KIT	1

THE FOLLOWING PARTS ARE INTERCHANGEABLE ON ALL THE ABOVE FUEL PUMP ASSEMBLIES

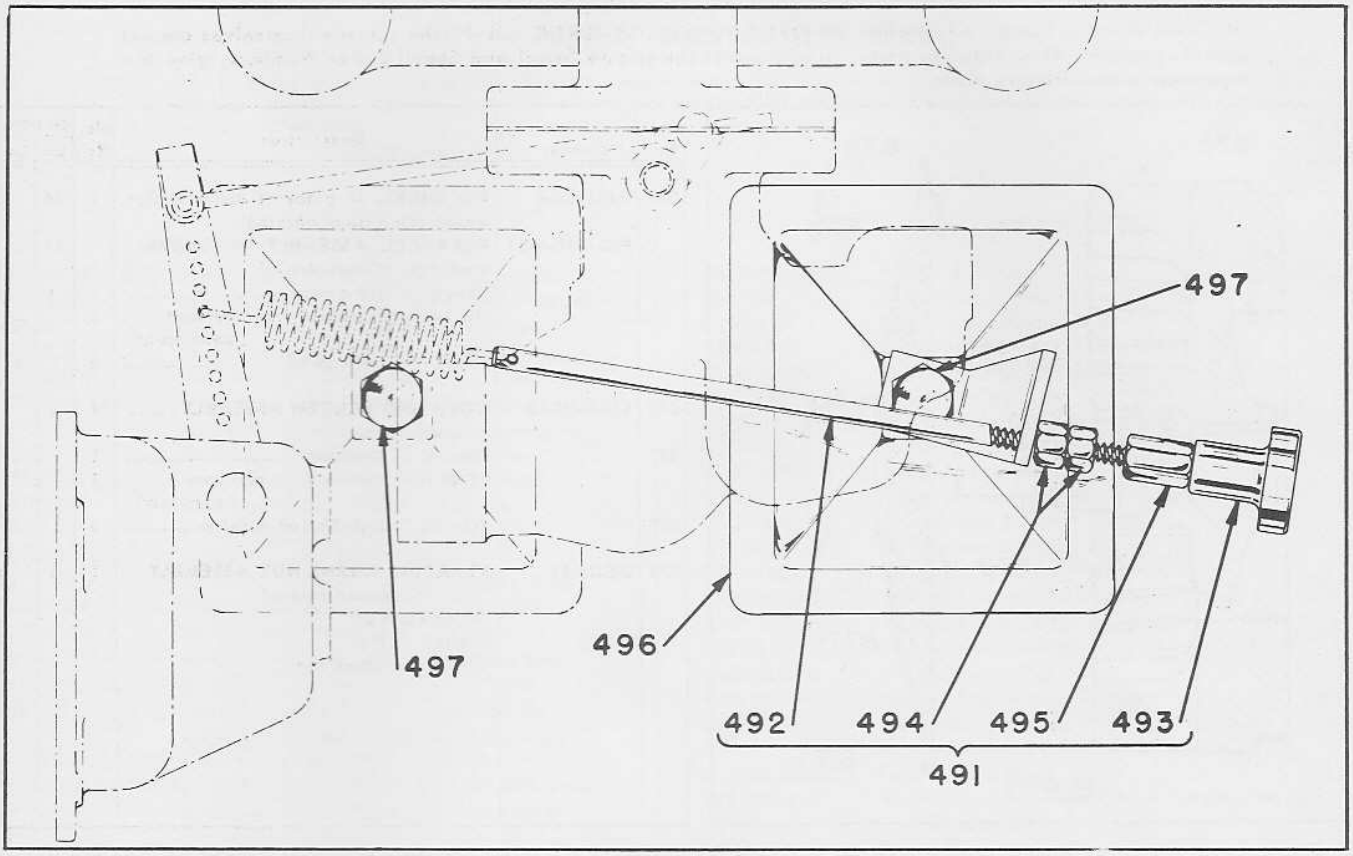
Ref. No.	Blackstone Part Number	Description	Qty.
* 3	FP-900	VALVE SPRING	2
* 4	FP-901	DIAPHRAGM SPRING	1
* 5	FP-903	VALVE GASKET	1
* 6	FP-904	VALVE	2
7	FP-905	ROCKER ARM PIN	1
8	FP-906	SPRING CLIP for rocker arm	1
9	FP-910	LINKAGE	1
10	FP-911 and FP-907	VALVE PLATE and SEATS NOTE: FP-911 Plate and 2 FP-907 Seats must be ordered together.	1
11	FP-912	MOUNTING BRACKET	1
12	FP-913	HEAD	1
13	FP-914	ROCKER ARM SPRING	1
* 14	FP-917	MOUNTING FLANGE GASKET (Not illustrated)	1
15	FP-920	ASSEMBLY SCREW and LOCKWASHER	4
16	FP-927	VALVE PLATE SCREW and LOCKWASHER No. 6-32 thread x 3/8" long, binder head screw. No. 6 shakeproof external lockwasher.	1

** Parts marked with an asterisk (*) are included in the LQ-28 (Standard) and LQ-28-A (Cold Weather) diaphragm kits.

WISCONSIN MOTOR CORPORATION
Milwaukee 46, Wisconsin

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

TT-66-F GOVERNOR IDLE CONTROL ASSEMBLY FOR TE AND TF ENGINES

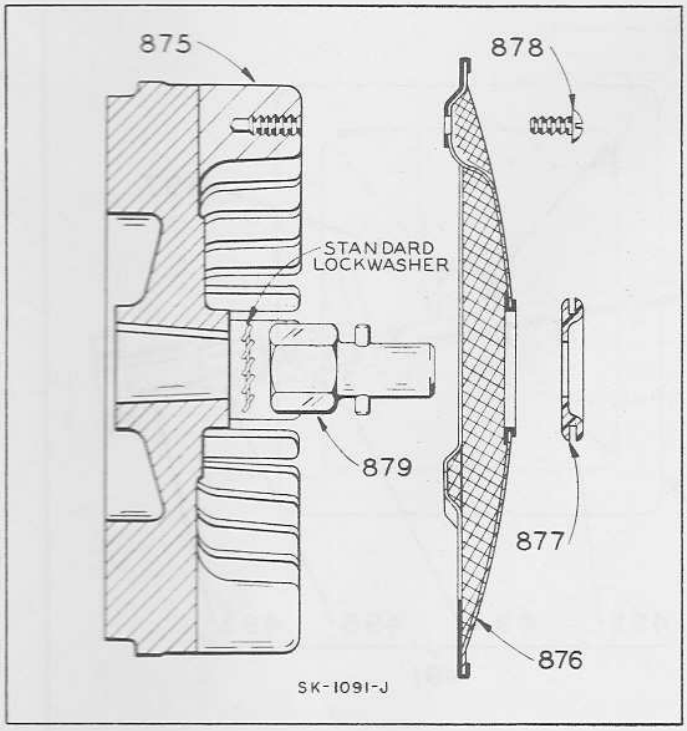


REF. NO.	PART NUMBER	DESCRIPTION	NO. REQ.	NET WEIGHT Lb	NET WEIGHT Oz
	TT-66-F	**GOVERNOR CONTROL ASSEMBLY** – Complete	1		
491	PI-171-A-S1	**CONTROL ROD ASSEMBLY**	1		5
		Consisting of:			
492		1 PI-171-A Control Rod			2
493		1 VE-452-A Control Knob			2
494		2 VE-657 Lock Nuts, short			1
495		1 VE-657-A Lock Nut, long			1
496	SA-68-A	**VALVE TAPPET INSPECTION COVER**	1		3
497	XD-21	**SCREW,** 5/16"–18 thread x 1½" long, hexagon head	2		1
		For mounting inspection covers.			

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

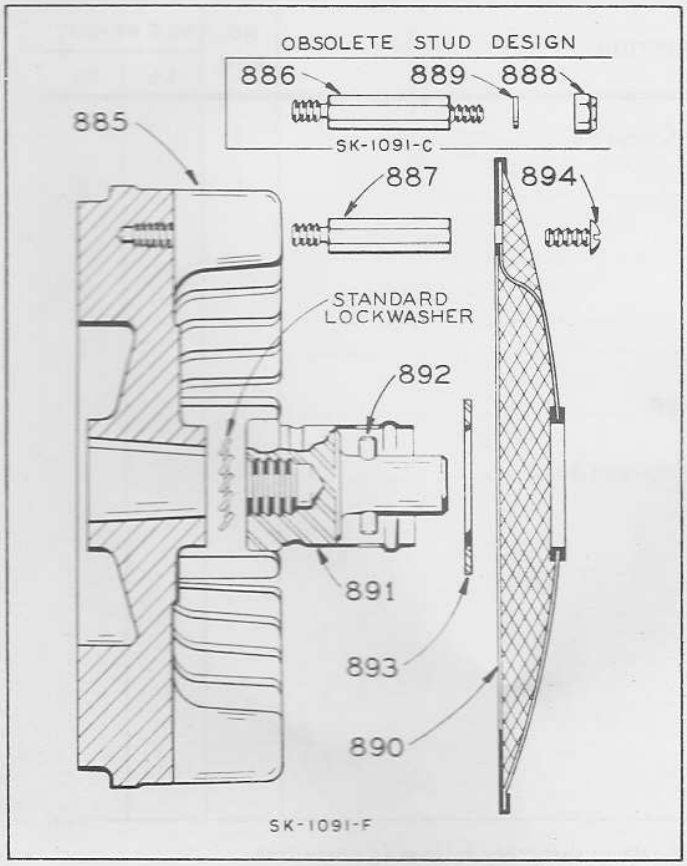
SK-1091-C, SK-1091-F and SK-1091-J FLYWHEEL ROTATING SCREENS FOR ENGINE MODELS TE, TF and TFD

Flywheel Rotating Screen, Illustration SK-1091-J, replaced SK-1091-C and -F, the screens themselves are not interchangeable. When ordering parts, in addition to the engine Serial and Specification Numbers, give the equipment manufacturers name.



Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
875	NC-145G-8	**FLYWHEEL,** in place of standard flywheel (for manual starting).	1	34	
	NC-145G-9-S1	**FLYWHEEL ASSEMBLY** (for electric starting) Consisting of:		35	
	GH-46	Ring gear	1	1	
	NC-145G-9	Flywheel (not serviced separately)	1		
	XE-17	Set screws	3		1
876	SE-201D-S2	**ROTATING SCREEN ASSEMBLY** Consisting of:	1	2	
877	PH-426	Grommet	1		1
	SE-201-D	Screen (not serviced separately)	1		
878	XA-104	Lok-Thread screws	3		1
879	UC-75-S1	**STARTING CRANK NUT ASSEMBLY** (Part of standard engine) Consisting of:	1	1	
	PA-333	Pin			
	UC-75	Crank nut			

(OBSOLETE) FLYWHEEL ROTATING SCREEN



Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
885	NC-145B-8	**FLYWHEEL** (for manual starting) Replaced by **NC-145G-8,** but **SE-201D-S3** Rotating Screen Kit must also be ordered.	1		
	NC-145B-9-S1	**FLYWHEEL ASSEMBLY** (for electric starting) replaced by **NC-145G-9-S1,** but **SE-201D-S3** Rotating Screen Kit must also be ordered. **NOTE:** The new style flywheel with the SE-201D-S3 Kit, makes the Rotating Screen set-up identical to the Rotating Screen as shown above in Illustration SK-1091-J.	1		
886	PC-475	**STUD,** replaced by **PC-475D-S1** (Ref. No. 887) includes XA-104 Screw	3		
887	PC-475D-S1	**STUD ASSEMBLY** Consisting of: PC-475D Stud XA-104 Screw	3		3
888	PD-198	**LOCKNUT,** 1/4"-20 thread For obsolete PC-475 stud.	3		1
889	PH-84	**WASHER** for locknut, 1/4" I.D. x 1/2" O.D x 1/16" thick, plain steel	3		1
890	SE-201-C	**ROTATING SCREEN**	1	1	
891	UC-156-A	**STARTING CRANK NUT ASSEMBLY** Consisting of:	1	1	4
892	PA-333	Crank pin	1		1
893	PH-410	Washer	1		2
	LJ-370-1	Tube (not serviced separately)	1		
	UC-156	Nut (not serviced separately)	1		
894	XA-104	**LOK-THREAD SCREW** for mounting screen mounting	3		1

Order parts from nearest ***SERVICE STATION*** shown in directory following parts list.
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

INDEX

ZENITH 161 SERIES CARBURETORS

FOR WISCONSIN MOTOR CORPORATION

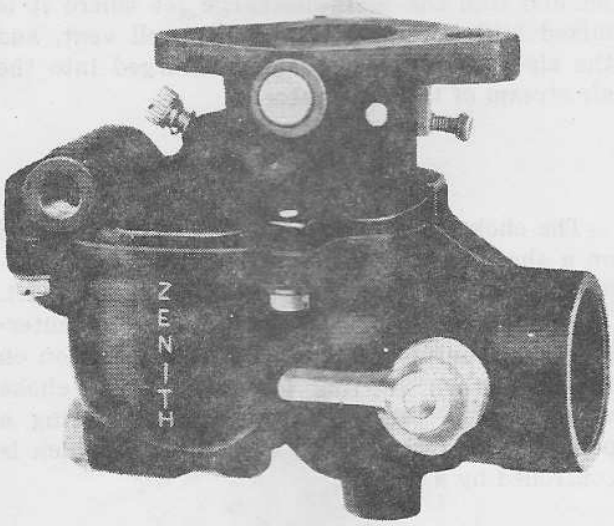


Figure 1

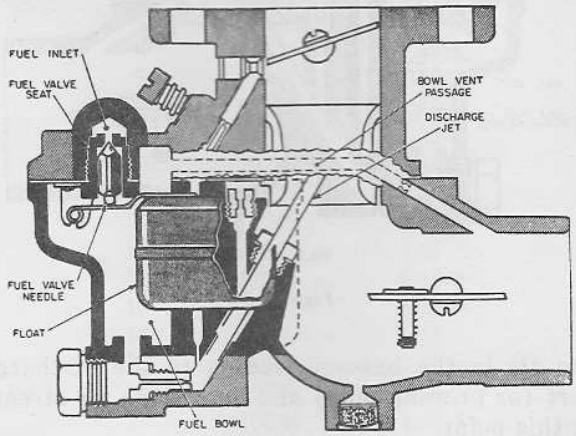
The Zenith 61 and 161 Series carburetors are of updraft single venturi design. They are made in 5/8" and 7/8" S.A.E. barrel sizes; with 5/8", 7/8", 1" and 1¼" S.A.E. flange sizes available. They are made with selective fuel inlet, with or without a back suction economizer and a main jet adjustment.

They are "balanced" and "sealed", and the semi-concentric fuel bowl allows operation to quite extreme angles without flooding or starving. This design makes them particularly adaptable to smaller farm tractors and a great variety of agricultural machines and industrial units.

FUEL SUPPLY SYSTEM

The fuel supply system is made up of the threaded fuel inlet, the fuel valve seat, fuel valve, float and fuel bowl.

The fuel supply line is connected to the threaded inlet. The fuel travels through the fuel valve seat and passes around the fuel valve and into the fuel bowl. The level of the fuel in the fuel chamber is regulated by the float through its control of the fuel valve. The fuel valve does not open and close alternately but assumes an opening, regulated by the float, sufficient to maintain



FUEL SUPPLY SYSTEM

Figure 2

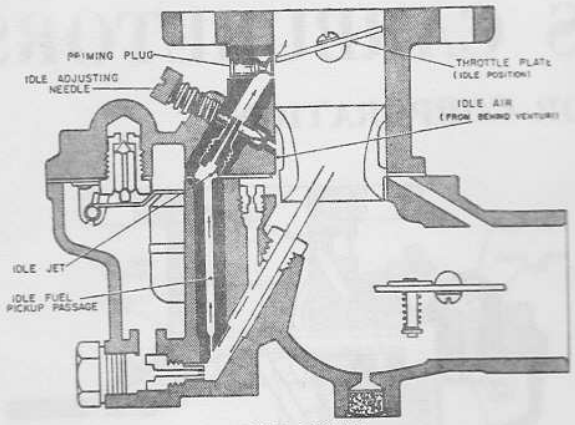
a proper level in the fuel chamber equal to the demand of the engine according to its speed and load.

The inside bowl vent as illustrated by the passage originating in the air intake and continuing through to the fuel bowl, is a method of venting the fuel bowl to maintain proper air fuel mixtures even though the air cleaner may become restricted. This balancing is frequently referred to as an "inside bowl vent."

IDLE SYSTEM

The idle system consists of the idle discharge port, idle air passage, idle adjusting needle, idle jet, and fuel passage.

The fuel for idle is supplied through the main jet to a well directly below the main discharge jet. The pick-up passage is connected to this well by a restricted drilling at the bottom of this passage. The fuel travels through this channel to the idle jet calibration. The air for the idle mixture originates back of (or from behind) the main venturi. The position of the idle adjusting needle in this passage controls the suction on the idle jet and thereby the idle mixture. Turning the needle in closer to its seat results in a greater suction with a smaller amount of air and therefore a richer mixture. Turning the needle out away from its seat increases the amount of air and reduces the suction, and a leaner mixture is delivered. The fuel is atomized and mixed with



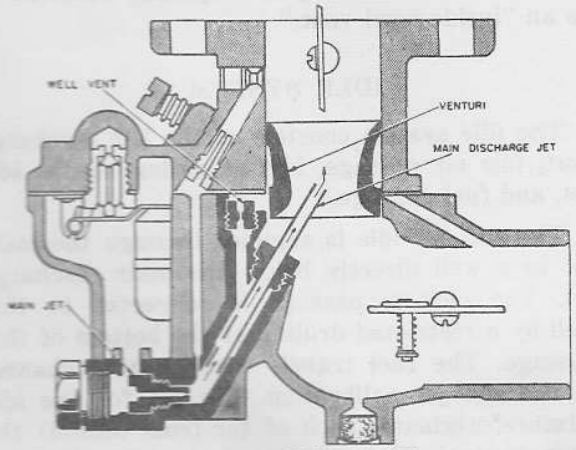
IDLE SYSTEM

Figure 3

the air in the passage leading to the discharge port (or priming plug) and enters the air stream at this point.

HIGH SPEED SYSTEM

The high speed system controls the fuel mixture at part throttle speeds and at wide open throttle. This system consists of a **venturi,** controlling the maximum volume of air admitted into the engine; the **main jet,** which regulates the flow of fuel from the float chamber to the main discharge jet; the **well vent,** which maintains uniform mixture ratio under changing suction



HIGH SPEED SYSTEM

Figure 4

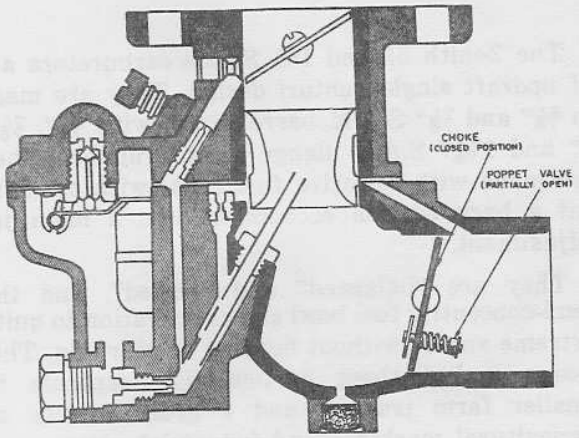
and engine speeds; and a **main discharge jet,** which delivers the fuel into the air stream.

The main jet controls the fuel delivery during the part throttle range from about one-quarter to full throttle opening. To maintain a proper mixture ratio a small amount of air is admitted through the well vent into the discharge jet through the air bleed holes in the discharge jet at a point below the level of fuel in the metering well.

The passage of fuel through the high speed system is not a complicated process. The fuel flows from the fuel chamber through the main jet and into the main discharge jet where it is mixed with air admitted by the well vent, and the air-fuel mixture is then discharged into the air stream of the carburetor.

CHOKE SYSTEM

The choke system consists of a valve mounted on a shaft located in the air entrance and operated externally by a lever mounted on the shaft. The choke valve is used to restrict the air entering the carburetor. This increases the suction on the jets when starting the engine. The choke valve is of a "semi-automatic" type, having a poppet valve incorporated in its design, which is controlled by a spring.

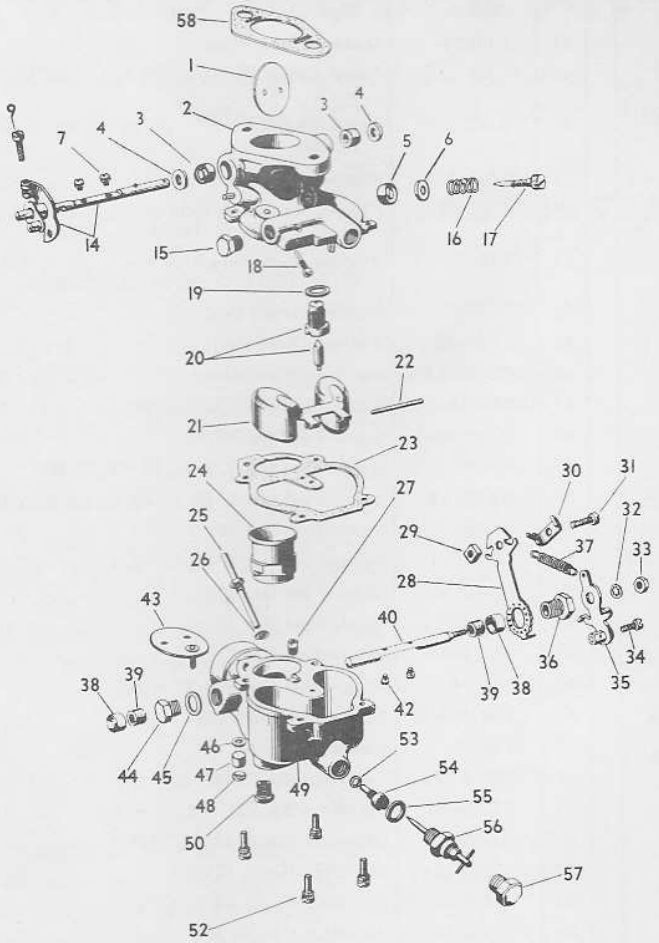


CHOKE SYSTEM

Figure 5

The poppet valve opens automatically when the engine starts and admits air to avoid **over-choking** or **flooding** of the engine. The mixture required for starting is considerably richer than that needed to develop power at normal temperatures. As the engine fires and speed and suction are increased, the mixture ratio must be rapidly reduced. This change is accomplished through adjustment of the choke valve and the automatic opening of the poppet valve to admit more air when the engine fires.

Parts List for Zenith Model 161-7 Carburetors



CARB. REF. NO.	ZENITH ASS'Y. NO.	WISCONSIN PART NO.
1	10034E	L48
2	S717	L48-1
3	S632B	L48-2
4	S732	L48-3
5	S1164	L48-B
6	S1329	L48-C
7	S1548	L48-D
8	10741	L48-E
9	10457	L48-F
10	10748	L48-G
11	10535	L48-H
12	10595	L48-J
13	10610	L48-K
14	10627	L48-L
15	10788	L48-M
16	10737	L48-N
17	10816	L48-P
18	10926	L48-Q
19	10858	L48-U
20	10907	L48-V
21	10932	L48-Y
22	10955	L48-Z
23	11003	L48-AA
24	11206	L48-AB
25	11372	L48-AC
26	11595	L48-AD
27	11494	L48-AE
28	11593	L48-AL
29	12095	L48-BF & -1

Ref No	Zenith Part Number	Description
1	C21-88	Plate–Throttle (for 1,2,3,4,5,7,8,9,10,11,13,14, 15,16,17,18,20,21,22,23)
1	C21-176	Plate–Throttle (for 6,12,19,24,25,26,27,28,29)
2		Body–Throttle (Not serviceable. Purchase complete carburetor.)
3	†CT48-9	Seal–Shaft Packing
4	†CT52-57	Retainer–Shaft Seal
5	CT48-8	Seal–Idle Needle (for 27)
6	CT52-1	Retainer–Needle Seal (for 27)
7	T315B5-3	Screw–Throttle Plate
9	T8S8-10	Screw–Throttle Stop (for all except 19, 24, 26, 27, 28)
9	T8S8-12	Screw–Throttle Stop (for 24, 26, 27, 28, 29)
9	T8B10-15	Screw–Throttle Stop (for 19)
	C111-19	Spring–Throttle Stop Screw (for 19)
14	C29-491	Shaft and Lever–Throttle (for 1,2,3,4,5,6,7,8, 12, 14, 15, 17, 18, 24, 27, 29)
14	C29-858	Shaft and Lever–Throttle (for 9, 16, 21)
14	C29-875	Shaft and Lever–Throttle (for 11, 13)
14	C29-926	Shaft and Lever–Throttle (for 10,22,23,25, 26, 28)
14	C29-172-1	Shaft and Lever–Throttle (for 19)
14	C29-963	Shaft and Lever–Throttle (for 20)
15	CT91-3	Plug–Fuel Inlet (1/8" Pipe)
16	C111-9	Spring–Adjusting Needle (for all except 6, 12, 19, 24, 27, 29)
16	C111-17	Spring–Adjusting Needle (for 6, 12, 24, 27)

Ref No	Zenith Part Number	Description
16	C111-63	Spring–Adjusting Needle (for 19)
17	†C46-25	Needle–Idle Adjusting (for all except 6, 12, 19, 24, 27)
17	C46-6	Needle–Idle Adjusting (for 6, 12, 24)
17	C46-32	Needle–Idle Adjusting (for 27)
17	C46-48	Needle–Idle Adjusting (for 19)
18	†C55-6-12	Jet–Idle (for all except 6, 12, 19, 24, 27, 29)
18	†C55-22-13	Jet–Idle (for 6, 12, 19, 24, 27)
19	†T56-20	Washer–Fuel Valve Seat
20	†C81-17-35	Valve and Seat–Fuel (for 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 16, 17, 20, 21, 22, 23, 29)
20	†C81-50-35	Valve and Seat–Fuel (for 12, 14, 15, 18, 19, 24, 25, 26, 27, 28)
21	C85-28	Float
22	†C120-4	Axle–Float
23	†C142-16	Gasket–Bowl to Body
24	C38-51-16	Venturi (for 7, 9, 10, 14, 16, 17, 18, 23, 25, 28)
24	C38-51-19	Venturi (for 1, 2, 3, 4, 5, 11, 20, 29)
24	C38-51-17	Venturi (for 21, 22, 26)
24	C38-51-18	Venturi (for 6, 8, 12, 13, 15, 19, 24, 27)
25	C66-47-40	Jet–Discharge (for 7, 8, 14, 15, 17, 18)
25	C66-47-45	Jet–Discharge (for 11)
25	C66-47-50	Jet–Discharge (for 3, 4, 5, 29)
25	C66-47-60	Jet–Discharge (for 1, 2, 20)
25	C66-47-6-40	Jet–Discharge (for 6, 12, 19, 24, 27)
25	C66-50-40	Jet–Discharge (for 9, 10, 16, 21, 22, 23, 25, 26, 28)

Ref No	Zenith Part Number	Description
25	C66-50-45	Jet–Discharge (for 13)
26	†T56-52	Washer–Discharge Jet
27	C77-18-13	Jet–Well Vent (for 2, 20)
27	C77-18-14	Jet–Well Vent (for 6, 12, 19, 24, 27)
27	C77-18-17	Jet–Well Vent (for 8, 9, 10, 11, 13, 15, 16, 21, 22, 23, 25, 26, 28)
27	C77-18-15	Jet–Well Vent (for 1, 7, 14, 17, 18)
27	C77-18-22	Jet–Well Vent (for 3, 4, 5, 29)
28	C109-2	Bracket–Choke (for 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 20, 24, 27)
28	C109-2-1	Bracket–Choke (for 29)
28	C109-31	Bracket–Choke (for 9, 10, 11, 13, 16, 21)
28	C109-13	Bracket–Choke (for 19)
28	C109-63	Bracket–Choke (for 22, 23, 25, 26)
28	C109-46	Bracket–Choke (for 28)
29	T21S8	Nut–Tube Clamp Screw (for 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 20, 24, 28, 29)
29	T22B8	Nut–Tube Clamp Screw (for 19)
30	C110-1	Clamp–Bracket Tube (for 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 19, 20, 24, 26, 27, 28, 29)
31	T1S8-10	Screw–Tube Clamp (for 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 20, 24, 26, 27, 28)
31	T1B8-10	Screw–Tube Clamp (for 19)
31	T8S8-10	Screw–Tube Clamp (for 29)
32	T45-8	Lockwasher–Shaft Nut (for 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 19, 20, 24, 27, 28, 29)
32	T41-10	Lockwasher–Shaft Nut (for 9, 10, 11, 13, 16, 21, 22, 23, 25, 26)
33	T22S8	Nut–Choke Shaft (for 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 20, 24, 27, 28, 29)
33	T22S10	Nut–Choke Shaft (for 9, 10, 11, 13, 16, 21, 22, 23, 25, 26)
33	T22B8	Nut–Choke Shaft (for 19)
34	T8S8-8	Screw–Lever Swivel (for 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 15, 17, 18, 20, 24, 26, 27, 29)
34	T1S8-6	Screw–Lever Swivel (for 28)
34	T1B8-6	Screw–Lever Swivel (for 19)
35	C106-104	Lever–Choke (for 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 20, 24)
35	CR106-157	Lever–Choke (for 9, 10, 11, 13, 16, 21, 22, 23, 25, 26)
35	C106-57	Lever–Choke (for 19)
35	C106-127	Lever–Choke (for 28)
35	C106-186	Lever–Choke (for 27)
35	C106-2	Lever–Choke (for 29)
36	C140-2	Screw–Bracket (for all except 19, 28, 29)
36	C140-20	Screw–Bracket (for 19)
36	C140-7	Screw–Bracket (for 28)
37	C112-6	Spring–Lever Return (for 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 19, 20, 24, 28, 29)
37	C112-11	Spring–Lever Return (for 9, 10, 11, 13, 16, 21, 22, 23, 25, 26)
37	C117-68	Spring Lever Return (for 27)
38	CT48-7	Seal–Choke Shaft (for 27)
39	CT52-13	Retainer–Choke Shaft (for 27)
40	C105-60	Shaft–Choke (for 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 19, 20, 24, 28, 29)
40	C105-298	Shaft–Choke (for 27)

Ref No	Zenith Part Number	Description
40	C108-107	Shaft and Lever–Choke (for 9, 10, 11, 13, 16, 21, 22, 23, 25, 26)
42	T315B5-3	Screw–Choke Plate
43	C101-17	Plate–Choke (for 1, 2, 3, 4, 5, 7, 9, 10, 11, 13, 14, 16, 20, 21)
43	C101-60	Plate–Choke (for 6, 8, 12, 15, 17, 18, 22, 23, 25, 26, 28)
43	C102-110	Plate–Choke (for 24, 27, 29)
44	C138-24	Plug–Choke Shaft Hole (for 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 19, 20, 24, 27, 28, 29)
45	†T56-23	Washer–Shaft Hole Plug (for 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 19, 20, 24, 27, 28, 29)
46	CT52-7	Washer–Intake Drain
47	†CT57-12	Washer–Drain Felt
48	CT93S-51	Retainer–Felt Washer
49	B3-85A	Bowl–Fuel (for 1, 2, 3, 4, 5)
49	B3-85AB-1	Bowl–Fuel (for 29)
49	B3-85L	Bowl–Fuel (for 7, 8, 10, 14, 15, 17, 18)
49	B3-85L-1	Bowl–Fuel (for 6, 12, 19, 22, 23, 25, 26)
49	B3-85L-5	Bowl–Fuel (for 28)
49	B3-85R-1	Bowl–Fuel (for 9, 11, 13, 16, 21)
49	B3-85H-2	Bowl–Fuel (for 20)
49	B3-112-1	Bowl–Fuel (for 24)
49	B3-112B-2	Bowl–Fuel (for 27)
50	CT91-3	Plug–Bowl Drain (1/8" Pipe)
52	T301S10-10	Screw–Bowl to Body
53	†T56-24	Washer–Main Jet
54	C52-6-18	Jet–Main (for 7, 14, 16)
54	C52-6-19	Jet–Main (for 23)
54	C52-6-21	Jet–Main (for 6, 12, 19, 24, 27)
54	C52-6-23	Jet–Main (for 1, 13)
54	C52-6-24	Jet–Main (for 2, 20)
54	C52-6-25	Jet–Main (for 17, 18)
54	C52-6-26	Jet–Main (for 3, 8, 15, 29)
54	C52-6-28	Jet–Main (for 4, 5)
54	C52-6-30	Jet–Main (for 9, 10, 21, 22, 25, 26, 28)
54	C52-6-33	Jet–Main (for 11)
55	†T56-23	Washer–Passage Plug (or adjustment)
56	C71-21	Adjustment–Main Jet (for 2, 4, 5, 8, 9, 10, 11, 13, 15, 17, 18, 20, 21, 22, 25, 26, 28)
57	C138-23	Plug–Main Jet Passage (for 1, 3, 6, 7, 12, 14, 16, 23, 24, 27)
57	C138-52	Plug–Main Jet Passage (for 19)
57	C138-24	Plug–Main Jet Passage (for 29)
58	†C141-4-5	Gasket–Flange (not in C181-66 gasket set)
	C24-54Px2	Lever and Swivel–Throttle Clamp (for 19)
	C63-168	Tube–Idle Channel Filler (for 26, 27, 28)
	C181-66	Gasket Set
	LQ-36	Repair Kit (for 12, 14, 15, 18, 19, 24, 25, 26, 27, 28)
	LQ-38	Repair Kit (for 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 16, 17, 20, 21, 22, 23, 29)
		†Note: Items Included in Repair Kit.

ZENITH CARBURETOR DIVISION

696 HART AVENUE — DETROIT 14, MICHIGAN

Bendix AVIATION CORPORATION

Manufacturers of Zenith Carburetors and Filters

Printed by Wis. Motor Corp.

WICO MODEL XH-2D MAGNETO

WICO No. XH-1961C (Replaces XH-1961), WIS. No. Y-67, For MODELS TE and TF ENGINE
WICO No. XH-2531C (Replaces XH-2531 and XH-1961C), WIS. No. Y-67-A, For MODELS TE, TF, TH ENGINE

INSTRUCTIONS

TIMING

The magneto is properly timed to the engine at the factory. If it becomes necessary to retime the magneto to the engine, refer to the diagram and instructions in the engine instruction book.

LUBRICATION

The only lubricating point in the magneto is the cam wiper felt *(Ref. No. 17)*. This felt, which lubricates the breaker arm at point of contact with the cam, should be replaced whenever it is necessary to replace the breaker contacts.

IMPORTANT

Incorrectly adjusted spark plug gaps cause magneto failure more frequently than any other condition.

Spark plugs should be inspected at frequent intervals, the size of the gap should be carefully checked and adjusted and the plugs thoroughly cleaned.

All oil, grease, and dirt should frequently be wiped off the magneto, lead wires, and spark plug insulators. Keeping these parts clean and the spark plugs properly adjusted will improve the engine performance and at the same time will prolong the life of the magneto.

MAGNETO COVER

The magneto cover *(Ref. No. 53)* can be removed by loosening the four screws *(Ref. No. 33)* which hold it in place. When replacing the cover be sure that the cover gasket *(Ref. No. 32)* is in its proper place.

BREAKER CONTACTS – REPLACEMENT AND ADJUSTMENT

The breaker contacts should be adjusted to .015" when fully opened. To adjust the contacts, loosen the two clamp screws *(Ref. No. 37)* enough so that the contact plate can be moved.

Insert the end of a small screw driver in the adjusting slot and open or close the contacts by moving the plate until the opening is .015", measuring with a feeler gauge of that thickness, tighten the two clamp screws.

To replace the contacts, remove the breaker spring clamp screw *(Ref. No. 40)*, the breaker arm lock *(Ref. No. 16)* and washer *(Ref. No. 12)*. Then lift the breaker arm from its pivot. Remove the aligning washer, 5717, and the two fixed contact clamp screws *(Ref. No. 37)*. The breaker plate can then be removed.

If the contacts need replacing it is recommended that both the fixed contact and the breaker arm be replaced at the same time, using replacement breaker set X5996 *(Ref. No. 39)*.

After assembly, the contacts should be adjusted as described above. The contacts should be kept clean at all times. Lacquer thinner is an ideal cleaner for this purpose. Use **WICO** tool S-5449, to adjust the alignment of the contacts so that both surfaces meet squarely.

CONDENSER

To remove the condenser *(Ref. No. 31)*, first disconnect the condenser lead by removing the breaker arm spring screw *(Ref. No. 40)*, then remove the two condenser clamp screws *(Ref. No. 19)* and the condenser clamp *(Ref. No. 28)*. When replacing the condenser make sure it is properly placed and that the clamp screws are securely tightened.

COIL AND COIL CORE

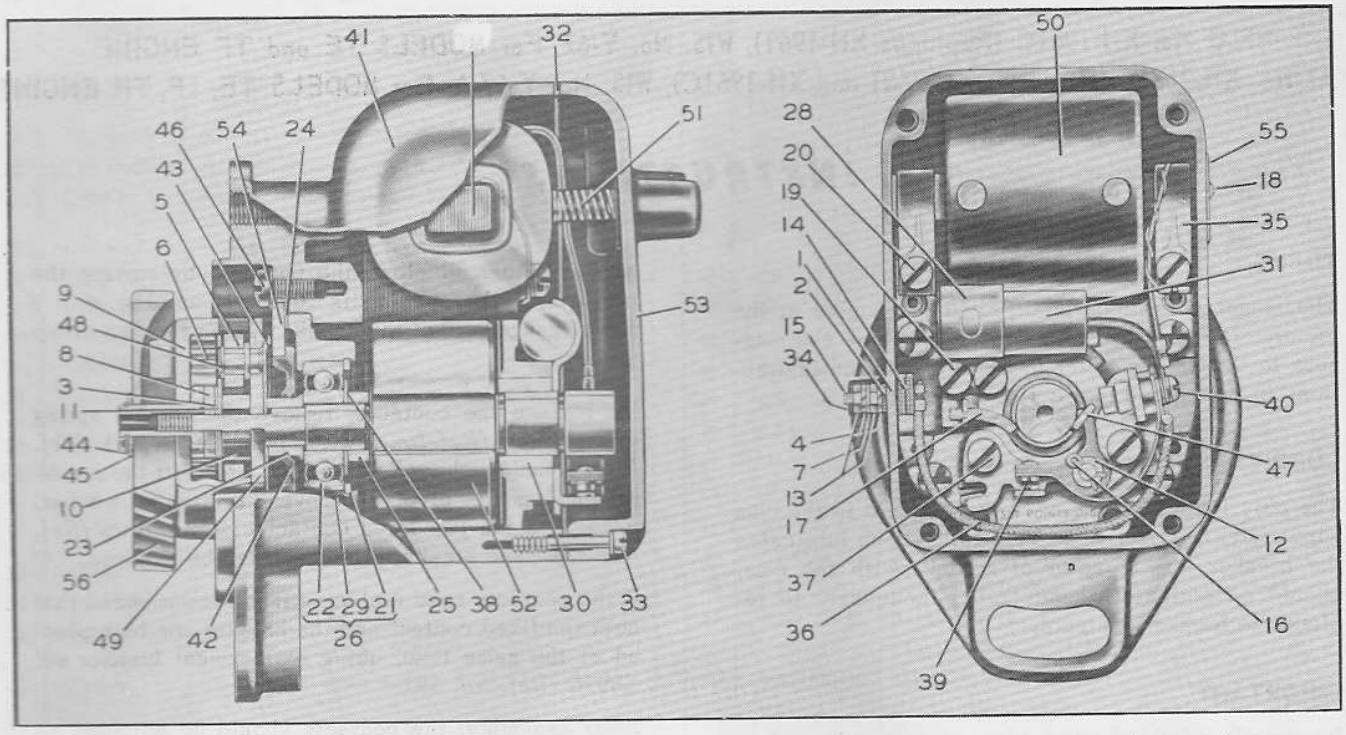
The coil and coil core must be removed from the magneto housing as a unit. Disconnect the primary wire from the breaker arm spring terminal by removing screw *(Ref. No. 40)*, take out the two coil core clamp screws *(Ref. No. 20)* and remove the clamps *(Ref. No. 35)*. The coil and core can then be pulled from the housing. When replacing this group make sure that the bare primary wire is connected under the core clamp screw and that the insulated wire is connected to the breaker arm spring terminal.

WICO ELECTRIC COMPANY WEST SPRINGFIELD, MASSACHUSETTS, U.S.A.

MY-21-5 (2 Pages)

WICO MODEL XH-2D MAGNETO

WICO SPEC. No. XH-1961C (Replaces XH-1961), WISCONSIN MOTOR No. Y-67
WICO SPEC. No. XH-2531C (Replaces XH-2531 and XH-1961C), WISCONSIN MOTOR No. Y-07-A



The service parts for Spec. Nos. XH-2531, XH-2531C, XH-1961C and XH-1961 are interchangeable except where noted.

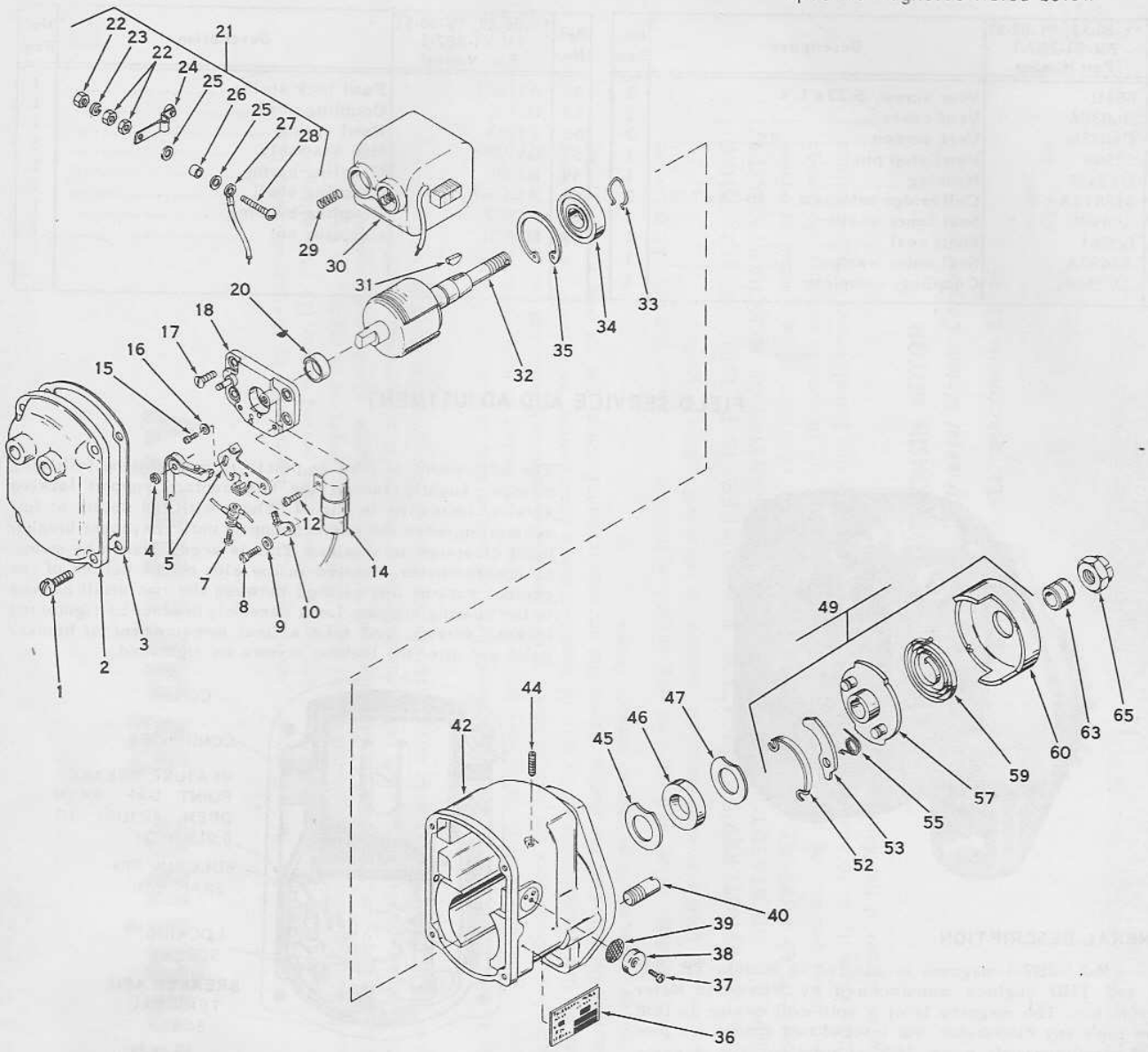
Ref. No.	Wico Part No.	Description	No Req
1	11874	INSULATING WASHER for ground stud	2
2	11874	INSULATING WASHER for ground stud	1
3	X-42XA	SPACING WASHER for driven flange	1
4	M-55XA	LOCKWASHER for ground stud	2
5	A-179X	TRIP ARM	1
6	15-186	DRIVE SPRING	1
7	IXA-256	WASHER for ground stud (steel)	1
8	IVA-583	SPACING WASHER for drive cup	1
9	2061A	DRIVE CUP	1
10	2122	DRIVEN FLANGE SPACER	1
11	2288	DRIVE SPRING RETAINER	1
12	3219	PIVOT WASHER for breaker arm	1
13	3230	NUT for ground stud	2
14	9820	INSULATING LOCK for ground stud	2
15	3945	GROUND STUD	1
16	4210	BREAKER ARM LOCK	1
*	4589	NUT for impulse set screw (XH-1961 & C, XH-2531)	1
17	5077	CAM WIPER FELT	1
18	5250	NAME PLATE SCREW	2
19	5411	CLAMP SCREW for condenser (Sems)	2
20	5411	CLAMP SCREW for coil core (Sems)	2
21	5516	RETAINING RING for rotor bearing	1
22	5517	ROTOR BEARING	1
23	5518	IMPULSE SPACER	1
24	5519	GASKET for impulse stop	1
25	5520	SPACER for bearing cage group	1
26	X5521	BEARING CAGE GROUP (Incl. Ref. # 21, 22, 29)	1
28	6924	CONDENSER CLAMP (XH-1961C and XH-2531 & C)	1
	5532	CONDENSER CLAMP (XH-1961)	1
29	5567	BEARING CAGE	1
30	5610	BUSHING for breaker plate	1
31	X6916	CONDENSER ASSEMBLY (XH-1961C & XH-2531 & C)	1
	X5614	CONDENSER ASSEMBLY (XH-1961)	1
32	5618	COVER GASKET	1
33	5622	COVER SCREW	4
34	X5632	STOP BUTTON GROUP	1

Ref. No.	Wico Part No.	Description	No Req
35	5633	COIL CORE CLAMP	2
*	5717	ALIGNING WASHER for breaker point	1
*	X5750	GROUND CONNECTION UNIT (includes Ref. Nos. 1; 2, 4, 7, 13, 14, 15 & 36)	1
36	X5757	GROUND LEAD GROUP	1
37	5900	CLAMP SCREW for fixed contact (Sems)	2
38	5926	BALL BEARING SHIELD	1
39	X5996	BREAKER CONTACT SET	1
40	5431	CLAMP SCREW for breaker spring	1
41	X7262	MAIN HOUSING REPLACEMENT ASSEMBLY, (XH-2531C)	1
	X8553	MAIN HOUSING REPLACEMENT ASSEMBLY, (XH-1961, & C, and XH-2531)	1
42	6199	OIL SEAL	1
43	6204	OIL SLINGER	1
44	6424	IMPULSE LOCK RING	1
45	6425	THRUST WASHER	1
*	6412	IMPULSE LOCK NUT	1
46	6465	CLAMP SCREW for impulse stop (Sems)	4
47	7644	BREAKER ARM FELT	1
48	6585	TRIP ARM SPRING	1
49	X6586	DRIVEN FLANGE GROUP	1
50	X12810	COIL GROUP	1
51	6882	COIL CONTACT SPRING	1
52	Y7569	ROTOR (XH-1961C, XH-2531 & C)	1
†	Y7054	ROTOR (XH-1961)	1
53	X7123	COVER UNIT (Includes Ref. # 32, 33, 51)	1
*	X7412	IMPULSE COUPLING UNIT (Includes Ref. Nos. 3, 5, 6, 8, 9, 10, 11, 44, 45, 48 & 49)	1
*	8511	IMPULSE SET SCREW (XH-1961 & C, XH-2531)	1
54	X8555	IMPULSE STOP GROUP (XH-1961 & C, XH-2531)	1
	X5549	IMPULSE STOP GROUP (XH-2531C)	1
55	8792	NAME PLATE	1
*	10407	ALIGNING WASHER for breaker point (thin)	1
56		DRIVE GEAR (Wis.Motor No. GD-93C-1) for TE, TF	1
		DRIVE GEAR (Wis.Motor No. GD-93C-3) for TH	1
		* Not illustrated.	

† Y7569 Rotor can be used in place of Y7054, but new Condenser X6916 and Clamp 6924 must also be used.

FAIRBANKS, MORSE MAGNETO PARTS LIST

WISCONSIN MOTOR Y-80-Series
TYPE FM-X1-2B7-1
Specific magnetos listed below



* Y-80-S2 Includes A GD-93C-3 Drive Gear For TH, THD Engines.
* Y-80-S1 Includes A GD-93C-1 Drive Gear For TE, TF Engines.
NOTE: Refer To Engine Parts List For Part Number of Repair Kits.

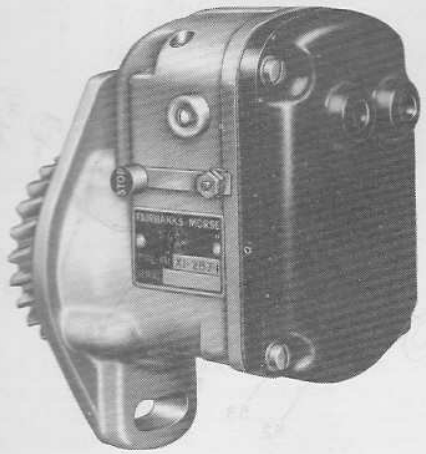
Ref. No.	*Y-80-S2, *Y-80-S1 FM-X1-2B7-1 Part Number	Description	No. Req.
1	10S12D	End cap screw, 10-24 x 3/4	4
2	BY2430	End cap	1
3	H2498	End cap gasket	1
4	C1498G	Fulcrum pin snap ring	1
5	A2437A	Point set, cw	1
7	6S6Z	Terminal screw, 6-32 x 3/8	1
8	8S6U	Support screw, 8-32 x 3/8	1
9	B5969	Support screw washer	1
10	G2788	Cam wick, cw	1
12	8S4U	Condenser screw, 8-32 x 1/4	1
14	SXY2433	Condenser	1
15	6S6U	Support screw, 6-32 x 3/8	1
16	D2458	Support screw washer, #6	1
17	8S6G	Support screw, 8-32 x 3/8	4
18	V4631	Bearing support	1
20	A5950A	Cam end bearing	1

Ref. No.	*Y-80-S2, *Y-80-S1 FM-X1-2B7-1 Part Number	Description	No. Req.
21	L2514C	Switch assembly	1
22	8N1	Screw nut	3
23	8LW5	Screw lockwasher	1
24	M2514	Insulated lever	1
25	C6018	Insulating washer	2
26	K2457A	Switch bushing	1
27	J2499A	Wire assembly	1
28	8S14N	Switch screw, 8-32 x 7/8	1
29	B3967	Coil lead spring	2
30	Q2477C	Coil	1
31	3K1	Key	1
32	FV2480	Rotor	1
33	B1498D	Shaft snap ring	1
34	C5949	Drive end bearing	1
35	B1498B	Bearing snap ring	1
36	A195	Name plate	1

Ref. No.	*Y-80-S2, *Y-80-S1 FM-X1-2B7-1 Part Number	Description	No. Req.
37	6S4U	Vent screw, 6-32 x 1/4	2
38	B6030A	Vent cover	2
39	C6032B	Vent screen	2
40	S2568	Pawl stop pin	1
42	DY2425	Housing	1
44	31SS14A	Coil bridge setscrew, 5/16-24 x 7/8	2
45	A2492C	Seal inner washer	1
46	G3861	Shaft seal	1
47	A2492A	Seal outer washer	1
49	ZV2563C	Coupling, complete	1

Ref. No.	*Y-80-S2, *Y-80-S1 FM-X1-2B7-1 Part Number	Description	No. Req.
52	A1498J	Pawl lock spring	1
53	Q2566	Coupling pawl	1
55	T5963	Pawl spring	1
57	GY2563	Hub assembly	1
59	D2565	Coupling spring	1
60	AZ5957	Coupling shell	1
63	F2572	Coupling bushing	1
65	M2570	Coupling nut	1

FIELD SERVICE AND ADJUSTMENT



GENERAL DESCRIPTION

Type FM-X1-2B7-1 magneto is adapted to Models TE, TF TH and THD engines manufactured by Wisconsin Motor Corporation. The magneto is of a split-coil design in that there isn't any distributor, but instead two sparks are provided simultaneously every 360° of rotation. The magneto is flange mounted, clockwise in rotation, and has a lag angle of 20° provided by a special impulse coupling.

SERVICE PROCEDURE

Improper functioning of the magneto is often believed to be the cause of engine difficulty arising from other sources, such as a flooded carburetor, insufficient fuel or air, loose ignition connections, or a defective spark plug. A brief engine inspection will often locate the trouble before the magneto is reached, and prevent maladjustment of parts in good condition. The magneto should be opened only when it is certain that the ignition spark produced is unsatisfactory. This condition may be determined by an ignition spark test, as explained in engine INSTRUCTION MANUAL.

SERVICING BREAKER POINTS

Remove the magneto end cap and inspect the breaker points for evidence of pitting or pyramiding. A small tungsten file or fine stone should be used to resurface the points. Badly worn or pitted points should be replaced. If it is necessary to resurface or replace the breaker points, it will also be necessary to adjust them to their proper clearance which is 0.015 inch at full separation.

The adjustment of breaker points is made in the following manner: Lightly loosen the two contact support **locking screws**, identified in Fig. 1. Then, with the points at full separation, move the contact support until the proper breaker point clearance is obtained. This is accomplished by means of a screwdriver inserted in the slot at the bottom of the contact support and pivoted between the two small bosses on the bearing support. Lock assembly in place by tightening locking screws, and take a final measurement of breaker point gap after the locking screws are tightened.

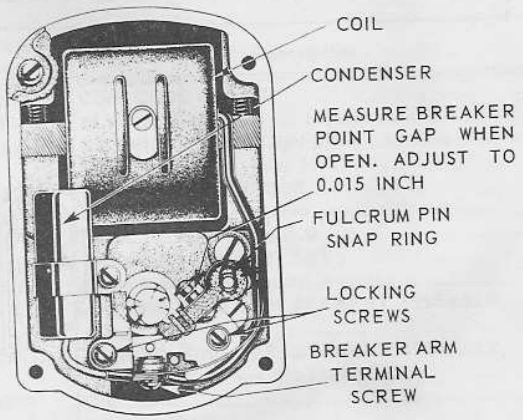


Fig. 1 END VIEW OF MAGNETO.

SEALING MAGNETO

Before replacing end cap on the magneto frame, clean the contact surfaces between cap and frame. Then coat the end cap contact surface with Fairbanks-Morse FMCO2 Gasket Varnish, place a new cork gasket in the joint, mount the end cap on the frame, and tighten the four screws securely.

FURTHER FIELD SERVICE NOT RECOMMENDED

The cam felt wick, if dry or hard, should be replaced by a new factory-impregnated wick. Other than this, magneto does not require field lubrication and any attempt to oil or grease the bearings is inadvisable. The lubricants should be renewed only during a complete overhaul of the magneto by a Factory-Authorized Magneto Service Center. Coil and condenser replacements, while simple, are not recommended unless test equipment is available.

TIMING MAGNETO TO ENGINE

Ignition timing is accomplished by correctly mounting magneto to the crankcase. Refer to **'MAGNETO TIMING'** in engine INSTRUCTION MANUAL for assembly procedure.

Engine Warranty

WISCONSIN MOTOR, hereinafter referred to as "Manufacturer", warrants each new engine sold by the Manufacturer to be free from defects in material and workmanship, under normal use and service, for a period of one (1) year after the date of delivery to the original retail purchaser, and Manufacturer will, at its option, replace or repair, at one of the Manufacturer's factories, or at a point designated by the Manufacturer, any part or parts which shall appear to the satisfaction of the Manufacturer upon inspection at such point, to have been defective in material or workmanship. This Warranty does not obligate the Manufacturer to bear any transportation charges in connection with the replacement or repair of defective parts.

This Warranty shall not apply to any engine which shall have been installed or operated in a manner not recommended by the Manufacturer; nor to any engine which shall have been repaired, altered, neglected or used in any way which, in the Manufacturer's opinion, adversely affects its performance; nor to any engine in which parts not manufactured by the Manufacturer, or supplied by the Manufacturer or by one of Manufacturer's Distributors or Service Centers, have been used; nor to any accessories installed on the engine where the accessory manufacturer has its own warranty; nor to normal maintenance services or replacement of normal service items.

Manufacturer reserves the right to modify, alter, and improve any engine or parts without incurring any obligation to replace any engine or parts previously sold with such modified, altered, or improved engine or part.

THIS WARRANTY, AND THE MANUFACTURER'S OBLIGATION THEREUNDER, IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, and all other obligations or liabilities, including special or consequential damages or contingent liabilities arising out of the failure of any engine or part to operate properly. No person is authorized to give any other warranty or to assume any additional obligation on the Manufacturer's behalf unless made in writing and signed by an officer of the Manufacturer.

WISCONSIN MOTOR
DIVISION OF *Continental Motors Corporation*
MILWAUKEE, WISCONSIN 53246

MS-83-5
FEB., 1969

WISCONSIN

HEAVY DUTY

Air-Cooled ENGINES

REG. U.S. PAT. OFF.

3 to 60.5 H.P.

WISCONSIN MOTOR CORPORATION
MILWAUKEE, WISCONSIN 53246

PRINTED IN U.S.A.