



# **WISCONSIN ENGINES**

**INSTRUCTION BOOK AND PARTS LIST**

**Models  
VE4D, VF4D**

BASIC ISSUE MM-265

# IMPORTANT

## READ THESE INSTRUCTIONS CAREFULLY

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, SPECIFICATION AND SERIAL NUMBER of engine referred to.

## 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.

Our engine warranty is printed on the inside back cover of this manual. Read it carefully.

For Your Own Record

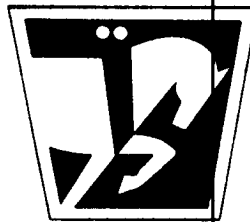
THIS MANUAL IS FOR MY WISCONSIN MODEL ..... ENGINE

SPEC. No. .... SERIAL No. ....

THE ABOVE INFORMATION, WHICH WILL BE FOUND ON THE INSTRUCTION PLATE ATTACHED TO THE AIR SHROUD OF THE ENGINE, SHOULD BE FILLED IN. YOUR PROMPT ATTENTION TO THIS MATTER WILL MAKE IT CONVENIENT FOR YOU IN THE FUTURE, AS THIS INFORMATION MUST BE GIVEN WHEN ORDERING ENGINE REPAIR PARTS.

## BOOK OF INSTRUCTIONS

# WISCONSIN *Air-Cooled* Four 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.

## Models

**VE4D**  
**VF4D**

3" Bore – 3-1/4" Stroke  
91.9 cu. in. Displacement

3-1/4" Bore – 3-1/4" Stroke  
107.7 cu. in. Displacement

ISSUE MM-265-1  
REV 1-85

## INTRODUCTION

This manual has been compiled to suit the service requirements of the basic engine and accessories most commonly supplied with engines.

Teledyne Wisconsin adapts its engines to suit individual customer requirements whenever practical. It evidently would become too involved to include all variations in one manual; therefore, should any problems arise concerning engine servicing, we advise that a Wisconsin distributor or authorized service station be contacted as they are capable of identifying all parts by the specification number stamped on the name plate of engine.

Wisconsin heavy duty air cooled engines are of the most advanced design and are 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, and all adjustments are carefully made so that each engine will be in perfect operating condition when it leaves the factory.

Back of Teledyne Wisconsin Motors is seventy 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, the engine must be given regular care and operated in accordance with the instructions.

## SAFETY PRECAUTIONS

Precaution is the best insurance against an accident.

Never fill fuel tank while engine is in operation or hot, to avoid the possibility of spilled fuel causing a fire.

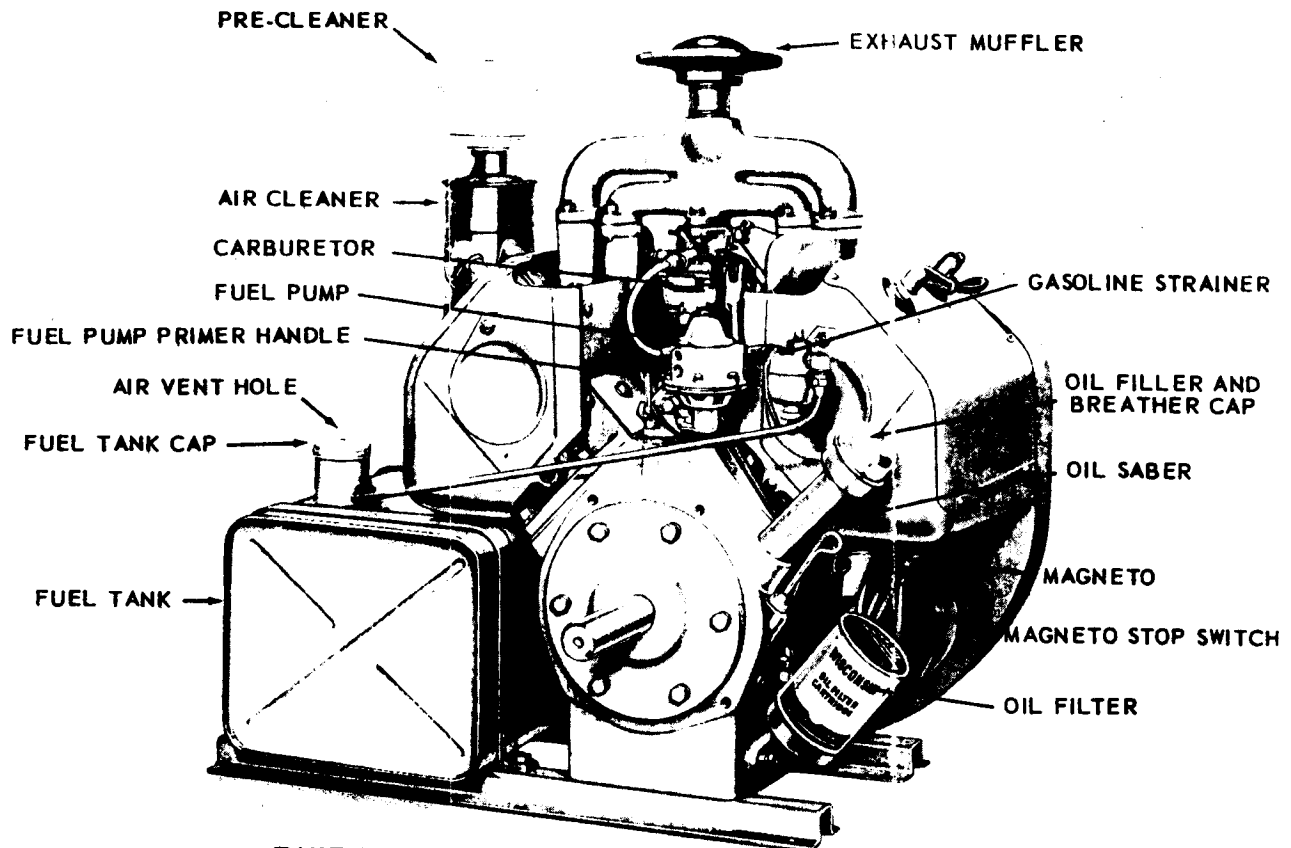
Never operate engine in a closed building unless the exhaust is piped outside. This exhaust contains carbon monoxide, a poisonous, odorless and invisible gas, which if breathed causes serious illness and possible death.

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.

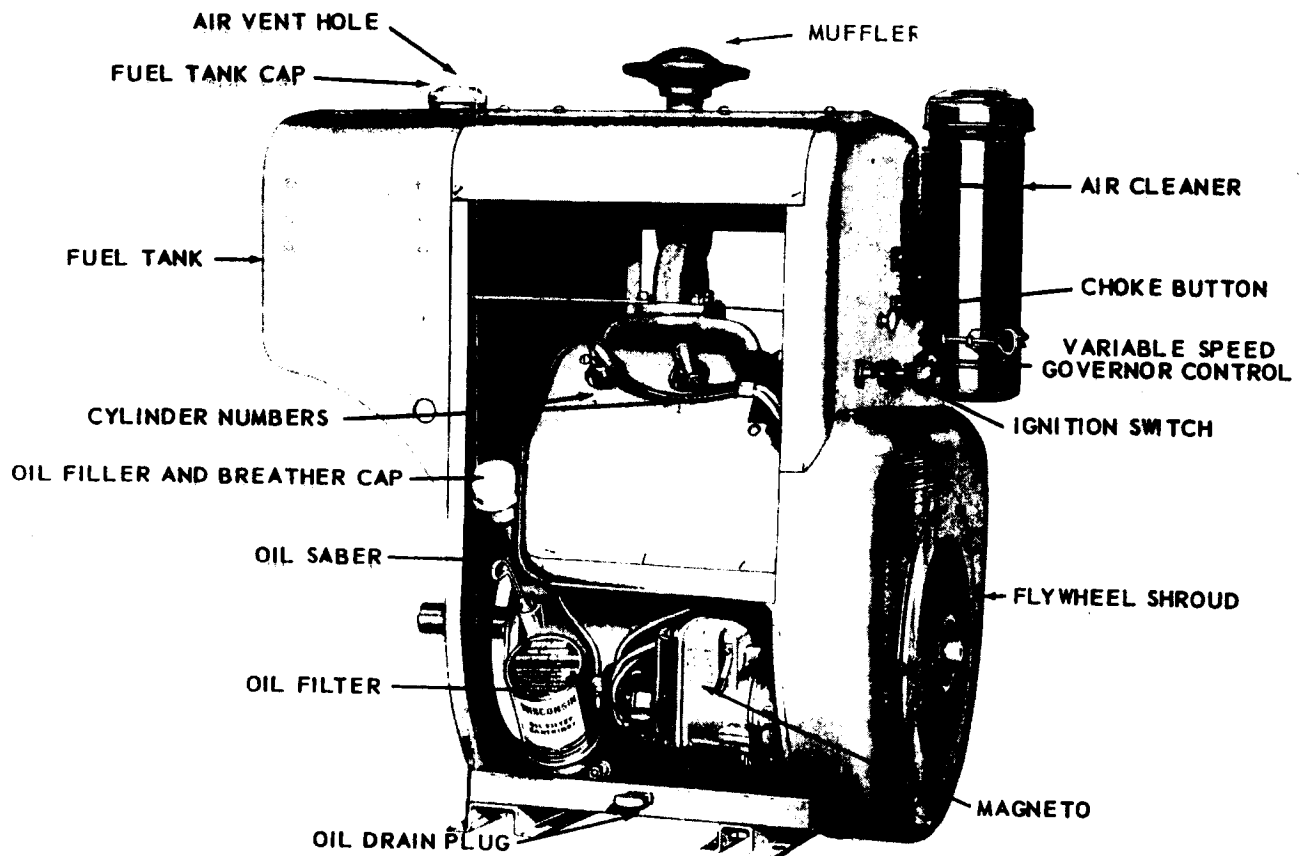
***Keep this book handy at all times, familiarize yourself with the operating instructions.***

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**TAKE-OFF (Side Mount Tank) VIEW OF OPEN ENGINE**



**POWER UNIT FAN END VIEW OF ENGINE**

**Fig. 1  
MODELS VE4 AND VF4 OPEN ENGINE AND POWER UNIT**

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104720C-2

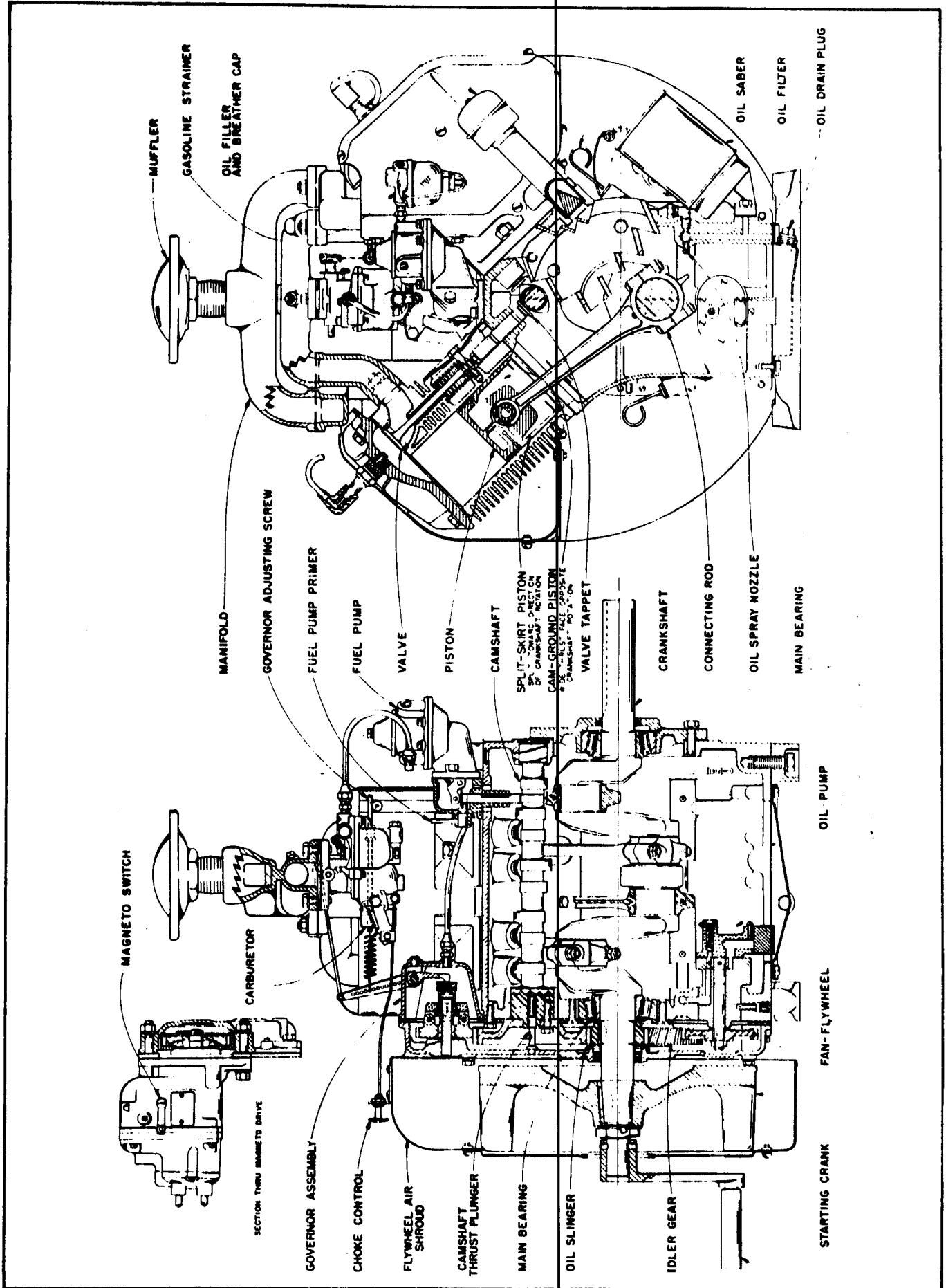
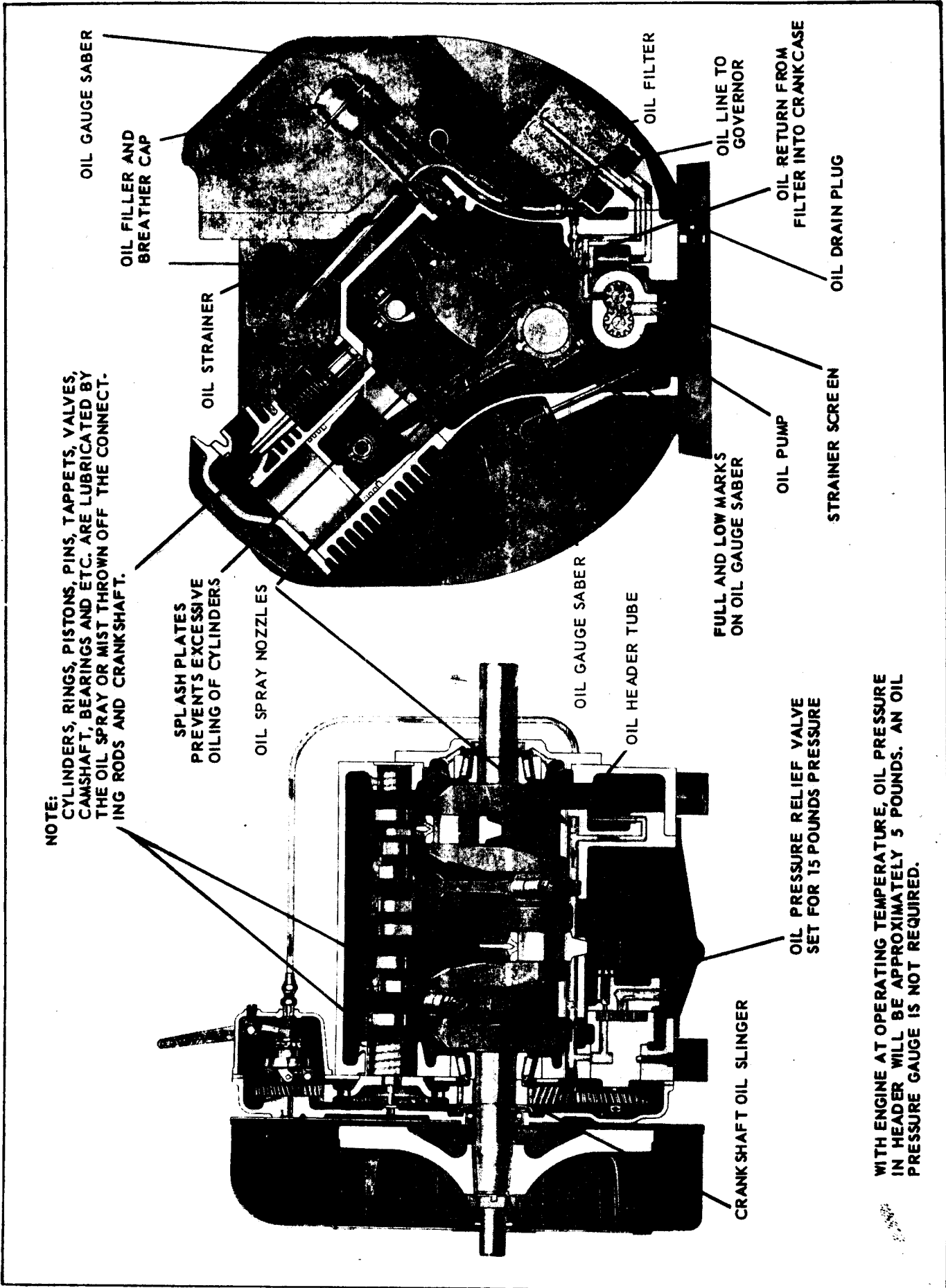


Fig. 2

CROSS SECTION OF ENGINE MODELS VE4 AND VF4



**NOTE:**

CYLINDERS, RINGS, PISTONS, PINS, TAPPETS, VALVES, CAMSHAFT, BEARINGS AND ETC. ARE LUBRICATED BY THE OIL SPRAY OR MIST THROWN OFF THE CONNECTING RODS AND CRANKSHAFT.

SPLASH PLATES PREVENTS EXCESSIVE OILING OF CYLINDERS

OIL SPRAY NOZZLES

OIL GAUGE SABER

OIL HEADER TUBE

CRANK SHAFT OIL SLINGER

OIL PRESSURE RELIEF VALVE SET FOR 15 POUNDS PRESSURE

OIL GAUGE SABER

OIL FILLER AND BREATHER CAP

OIL STRAINER

OIL FILTER

OIL LINE TO GOVERNOR

OIL RETURN FROM FILTER INTO CRANKCASE

OIL DRAIN PLUG

STRAINER SCREEN

OIL PUMP

FULL AND LOW MARKS ON OIL GAUGE SABER

WITH ENGINE AT OPERATING TEMPERATURE, OIL PRESSURE IN HEADER WILL BE APPROXIMATELY 5 POUNDS. AN OIL PRESSURE GAUGE IS NOT REQUIRED.

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166738C-1

Fig. 3  
LUBRICATION SYSTEM



## GENERAL INFORMATION AND 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 while cranking. When electric starter and generator is furnished, battery ignition is used. See Page 13.

### LUBRICATION SYSTEM

A gear type pump supplies oil to four nozzles which direct oil streams against fins on the connecting rod caps. Part of the oil enters the rod bearing through holes in the rods, and the balance of the oil forms a spray or mist which lubricates the cylinders and all other parts of the engine. An external oil line from the oil header tube in the crankcase lubricates the governor and gear train, see Fig. 3.

### 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. A variable speed regulator, to control the governed speed of the engine, or an idle control, is furnished upon request.

### 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. The flywheel end of the engine is designated the *front end*, and the power take-off end, the *rear end* of the engine.

## HORSEPOWER

R.P.M.	MODEL VE4	MODEL VF4
1400	13.0	15.0
1600	15.0	17.5
1800	17.0	19.5
2000	18.7	21.0
2200	20.5	23.0
2400	21.5	25.0

The horsepower 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 horsepower shown, as a safety factor.

## INSTRUCTIONS FOR STARTING AND OPERATING

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

*On engines with a house, the side doors must always be removed when operating.*

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

### LUBRICATION

Before starting a new engine, fill the oil base with good "gasoline engine" oil, as specified in the "Grade of Oil" chart. Fill through the breather tube shown in Fig. 3, with 4 quarts of oil.

After the engine has been run for a short time, the oil lines and oil filter will have been filled with oil. Shut off the engine and check the oil level by means of the *oil gauge saber*. If necessary, add enough oil to bring the level up to the *full mark*. An oil saber is located on the left hand side of the engine below the

oil filler and breather tube, as well as on the opposite side, see Fig. 3.

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.

**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 **Mobiloil** as typical examples of lubricants possessing the qualities we believe desirable in oils for **Wisconsin** engines. We plainly state that these grades of **Mobiloils** 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

SEASON OR TEMPERATURE	GRADE OF OIL	EXAMPLE
Spring, Summer or Fall + 120 °F to + 40 °F	SAE 30	Mobiloil A
Winter + 40 °F to + 15 °F + 15 °F to 0 °F Below Zero	SAE 20-20W SAE 10W SAE 5W-20W	Mobiloil Arctic Mobiloil 10W Mobiloil 5W-20W
Use oils classified as Service MS		
Crankcase Capacity	New engine	4 Qts.
	Oil and filter change	4 Qts.
	Less — filter or filter change	3½ Qts.

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 illustrated in Fig. 3. Oil should be drained while engine is hot, as it will then flow more freely.

#### OIL PRESSURE

At engine operating temperature, the oil pressure will be about 4 to 5 pounds per square inch. Due to this low pressure system, an oil pressure gauge is not required. When the engine is cold, the pressure will be higher and a relief valve is fitted to the oil pump so that under these conditions the maximum pressure will be limited to 15 pounds.

#### FUEL

These engines are furnished either with a gravity feed

tank mounted above the level of the carburetor, or with side mount tank or tank mounted below the engine. In the latter two cases a fuel pump is furnished on the engine, to pump the fuel up to the carburetor.

The fuel tank should be filled with a **good quality** gasoline free from dirt and water. The capacity of the tank is approximately 6 gallons. Some of the poorer grades of gasoline contain gum which will deposit on valve stems, piston rings, and in the various small passages in the carburetor, causing serious trouble in operating, and in fact might prevent the engine from operating at all.

**Use only reputable, well known brands of gasoline of the REGULAR GRADE.**

Gasoline engines should not be operated on fuel with an octane rating below 74 (Research Method). 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 and etc.

Be sure to open the gasoline shut off valve below the power unit fuel tank illustrated in Fig. 1. Also be sure that air vent hole in fuel tank cap is not plugged with dirt, as this would prevent fuel from flowing to the carburetor.

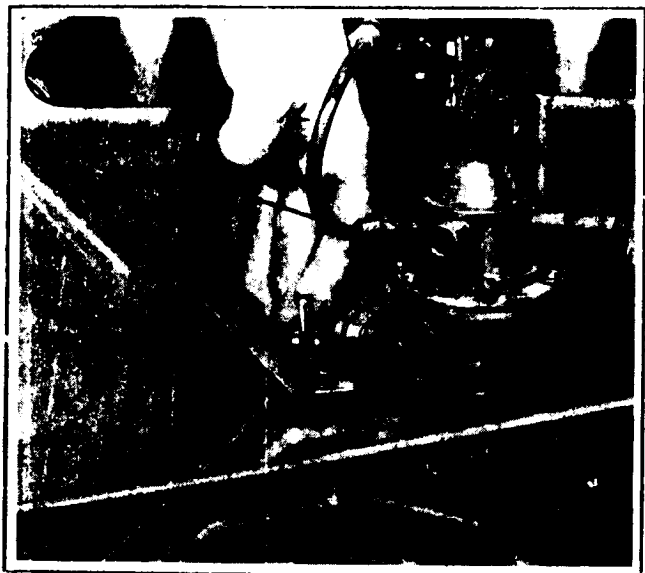


Fig. 4

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#### FUEL PUMP

On engines equipped with a fuel pump, when starting 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, so that fuel may be pumped into the dry carburetor, and thus prevent hard starting. 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. This hand lever should be given about 20 to 30 strokes, depending on how much fuel, if any, there is in the carburetor float chamber, see Fig. 4. When the

carburetor is full, the hand primer lever will move more easily.

## CHOKE

Before starting a cold engine, close the choke on the carburetor by pulling out the choke button located at the flywheel end of the engine as shown in *Fig. 1*. After the engine starts, 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.

If after several unsuccessful attempts to start engine, gasoline begins to drip from carburetor, the choke should be opened fully, otherwise the fuel mixture may become too rich to burn. The regular starting procedure should then continue as in paragraphs on "Starting", but with the choke open.

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

## 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 top view of *Fig. 1*.

On engines with a house, the ignition switch is on the outside of the house at the flywheel end. See bottom view of *Fig. 1*. To start engine with magneto ignition, this switch is pushed in; with battery ignition, it is pulled out.

## STARTING

### HAND CRANK

With the engine base filled with the correct grade of oil, fuel shut-off valve open and magneto switch in the *on* position, close the carburetor choke valve by pulling out the choke button. If engine is equipped with a variable speed governor control, set throttle about 1/3 open. Apply the crank at the flywheel end of the engine and pull 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. When engine starts, push choke button in gradually, as engine warms up.

After starting a new engine for the first time, the engine should be "run-in" gradually, to insure trouble-free service and long engine life. Refer to "Starting and Operation of New Engine" instructions, on the inside of the front cover of this manual, for correct "running-in" procedure.

### ELECTRIC STARTER AND GENERATOR

Engines equipped with electric starter and distributor ignition are started by pulling out the ignition switch

button, closing the carburetor choke and then depressing the starter switch.

The electric starter, generator and distributor are optional accessories, furnished only upon request when engine is purchased, and cannot be mounted in the field, unless provisions were made when engine was ordered. The starter, generator and distributor 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. 13*. Battery is not furnished by engine manufacturer.

## 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 piston, rings, cylinder, 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.*

## STOPPING 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. Others with house have an ignition switch on front

panel of house. 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. If engine should continue to diesel, by suddenly opening up the throttle wide open and at the same time shutting off the ignition, the engine will stop.

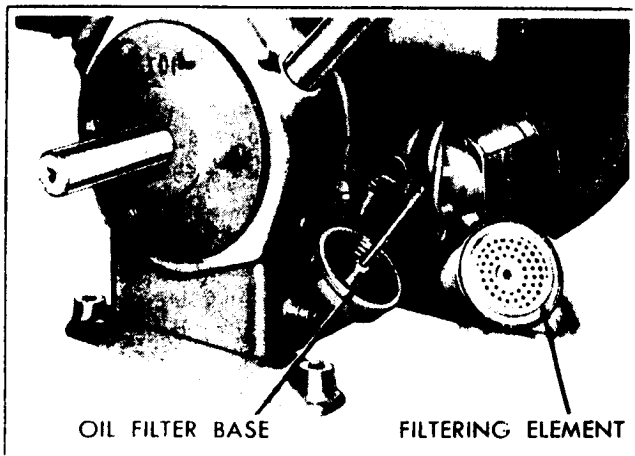


Fig. 5

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### OIL FILTER

A *by-pass* type oil filter is furnished on these engines, as shown in *Fig. 3*, except in a few cases where the use of other accessories prevents the mounting of an oil filter. The oil filtering cartridge should be replaced after every other oil change. If operating conditions are extremely dusty, replace cartridge, illustrated in *Fig. 5*, after every oil change. Refer to Engine Parts List in the back of this manual, for part number of replaceable cartridge.

### AIR CLEANER

The air cleaner is an essential accessory, filtering the air entering the carburetor, and thereby prolong-

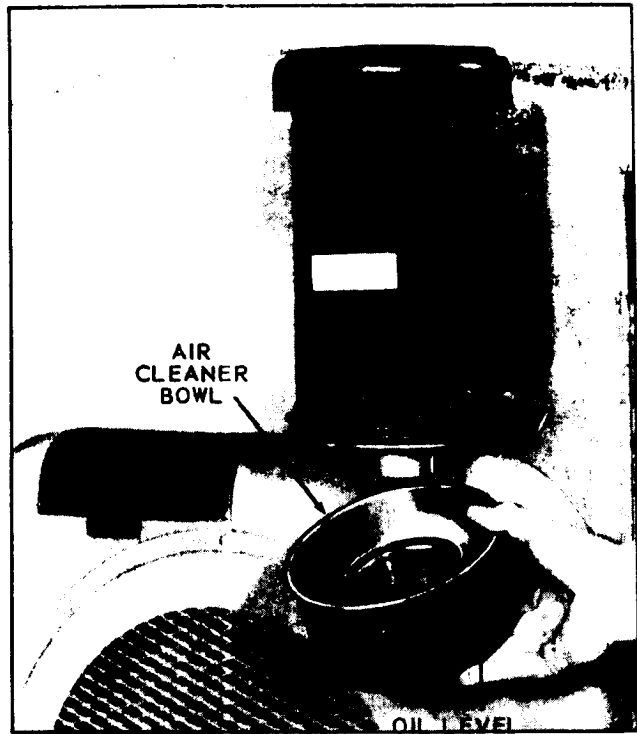


Fig. 6

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ing the life of the engine.

Remove the bowl from the air cleaner, as illustrated in *Fig. 6*, and fill to the oil level line with the same grade of oil as used in the crankcase. Detailed instructions are printed on the air cleaner.

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.*

At least once a year, the air cleaner should be removed from the engine and the element, which is not removable, should be washed in a solvent to clean out the accumulated dust and dirt.

A collector type pre-cleaner, mounted to the top of the air cleaner as shown in *Fig. 7*, should be emptied of accumulated dirt frequently, depending on dust conditions. *Do not use oil or water in pre-cleaner, this must be kept dry.*

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

### GASOLINE STRAINER

The gasoline strainer is very necessary to prevent sediment, dirt and water from entering the carburetor

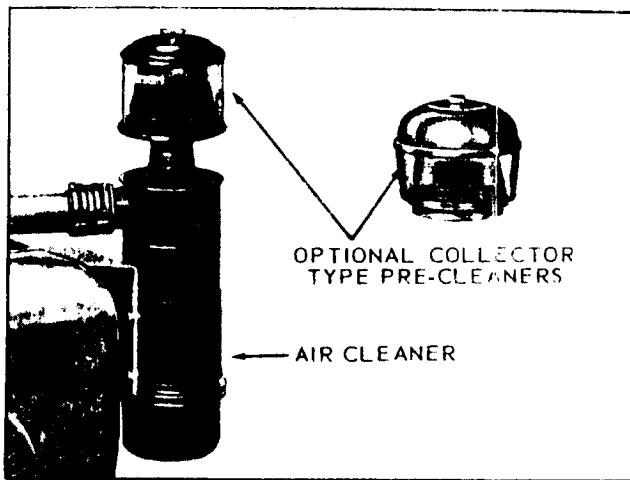


Fig. 7

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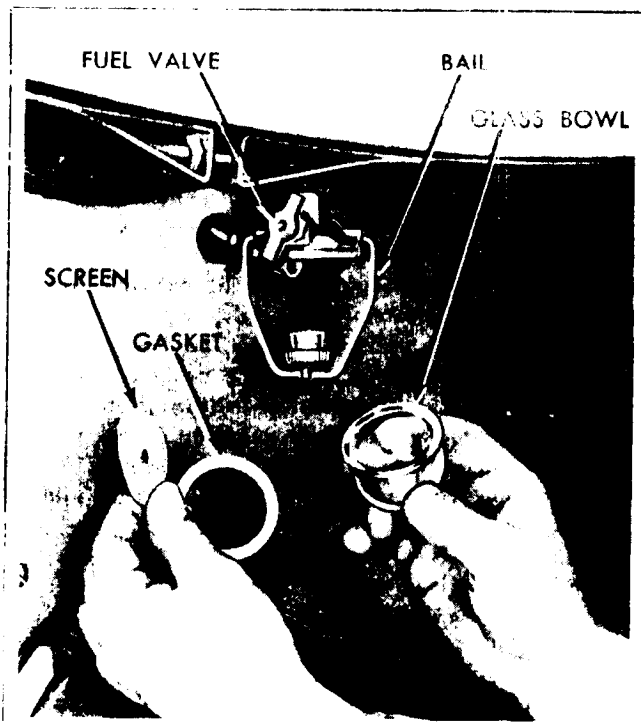


Fig. 8

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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, reassemble the parts, being sure the gasket is in good condition; otherwise use a new gasket. See Fig. 8, 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.

### 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 the back of this manual.

### MAGNETO BREAKER POINT ADJUSTMENT

Magnetos are properly adjusted before leaving factory. The *breaker points* on the Fairbanks-Morse magneto and on 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. 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 as shown in Fig. 9 and if necessary reset. To readjust points, first loosen the *locking screws* on the *contact plate* enough so that the plate can be moved. Insert the end of a small screw driver into the *adjusting slot* at the bottom of the *contact plate* and open or close the contacts by moving the plate until the proper opening is obtained. See Fig. 10. After tightening the locking screws, 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

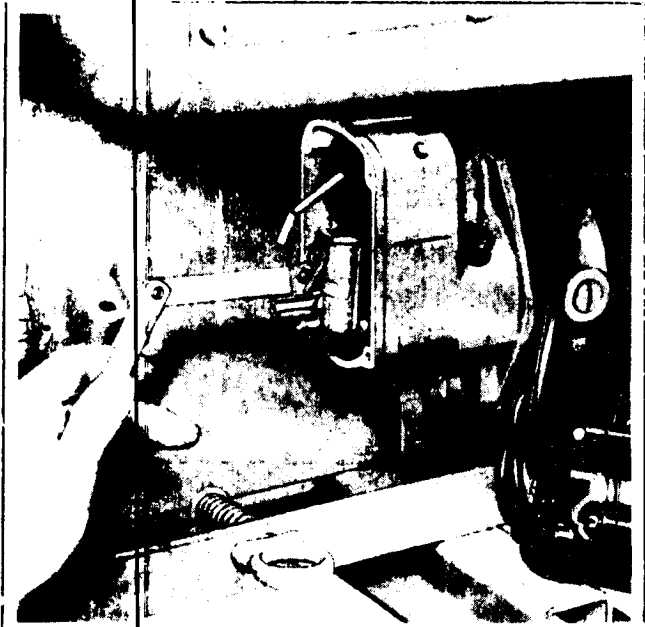
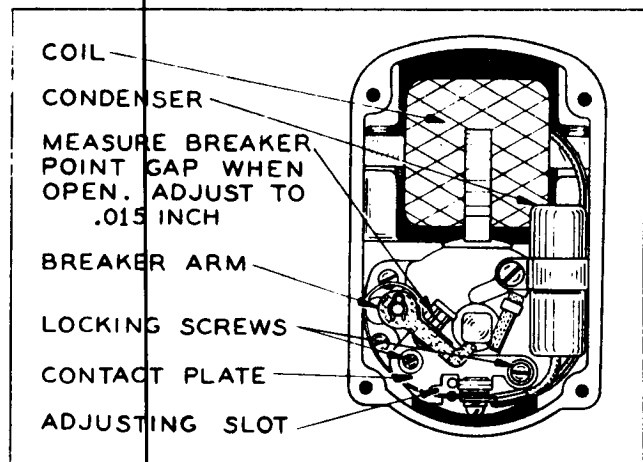


Fig. 9

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OPEN END VIEW OF FAIRBANKS-MORSE MAGNETO

Fig. 10

the above adjustments are made. 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 Manual in the 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 disconnecting the No. 1 ignition cable from the spark plug and holding the terminal 1/8 inch away from the air shroud or any other metal part of the engine, as shown in Fig. 11; if the

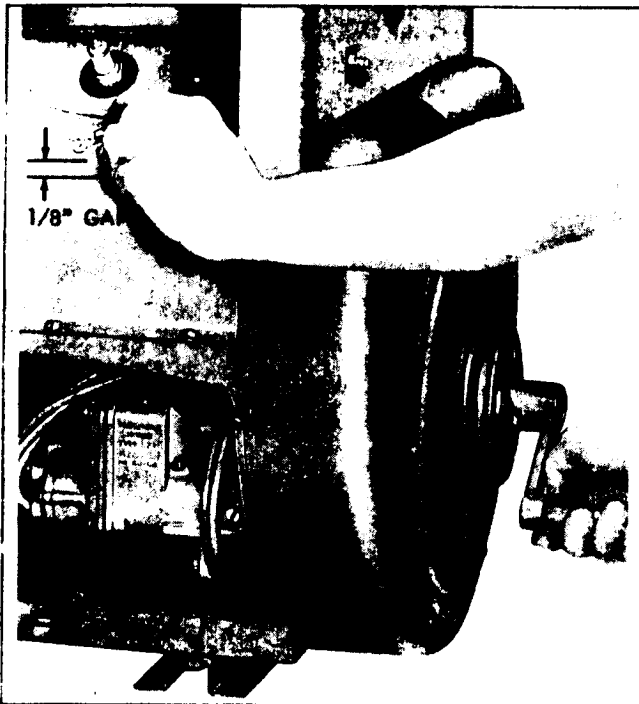


Fig. 11

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ignition cable has a molded rubber insulated spark plug terminal at the end, wedge a piece of bare wire up into the terminal, and let one end of the wire extend out. Turn the engine over slowly by the starting crank two complete revolutions and watch for the spark discharge which should occur during the cycle, at the instant the impulse coupling on the magneto snaps. Repeat this check with each of the other ignition cables. If there is a weak spark, or none at all, check breaker point opening as mentioned in preceding paragraph under "Magneto Breaker Point Adjustment". 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.

## FIRING ORDER

The firing order of the cylinder is 1-3-4-2. Number 1 cylinder is the one nearest to the flywheel in the left bank of cylinders, when viewed from the flywheel end of the engine. Number 3 cylinder is the other cylinder in this bank. Number 2 cylinder is the one nearest to the flywheel in the right bank of cylinders and Num-

ber 4 is the other cylinder in this bank. The cylinders are numbered from 1 to 4 on the air shroud near the spark plugs. The flywheel end of the engine is designated the *front end*, and the power take-off end, the *rear end* of the engine.

Although the firing order of these V-type engines is 1-3-4-2, the interval between the firing strokes is *not the same* as 'in line' engines, also the magneto rotates at crankshaft speed. Therefore, since the interval between No. 1 and No. 3 cylinders is 180°, terminal No. 3 on the magneto end cap should also follow terminal No. 1 by 180°, or it should be directly opposite. No. 4 cylinder follows No. 3 cylinder by 270°, therefore No. 4 terminal should follow No. 3 terminal by 270°, or three quarters of a full revolution. No. 2 cylinder follows No. 4 cylinder by 180°, therefore No. 2 terminal should also follow No. 4 terminal by 180°, or it should be directly opposite. Then finally No. 1 cylinder follows No. 2 cylinder by 90°, therefore No. 1 terminal should follow No. 2 terminal by 90°, or one quarter revolution.

The magnetos for these engines, will fire once for every revolution from each terminal, so that there will be a spark in each cylinder for every revolution. Of course only the spark at the beginning of the power stroke is used, the other spark in the same cylinder occurs at the beginning of the exhaust stroke, and this spark performs no useful purpose, but it is present in these engines, due to the design of the magneto. It is on account of the presence of this second spark in each cylinder, following 360° after the original spark, that some juggling of spark plug connections has been made in the field, but it is imperative, however, that spark plugs be connected to the magneto as indicated in this instruction book.

## MAGNETO TIMING

The magneto is properly timed to the engine at the factory. If for any reason it is necessary to retime the magneto, it can be done in the following manner:

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 and shroud for timing magneto. See Fig. 12.

The flywheel is marked with the letters 'DC' near one of the air circulating vanes and this vane is further identified by an 'X' mark cast on the end. Turn the engine over by means of the starting crank until the edge of the *marked vane* on flywheel is on line with the *mark* on the *vertical centerline* of the *shroud* as shown on Fig. 12. Then, leave flywheel in this position. At this point the *keyway* for mounting the flywheel is also on top.

The magneto should then be fitted to the engine so that the 'X' marked tooth on the magneto gear is visible through the *lower half* of the *inspection hole* in timing gear housing as shown in Fig. 12. The distributor cap on the magneto is numbered from 1 to 4. The leads from the magneto should be connected to spark plug of like numbers.

LOCATION OF NO. 1 TERMINAL ON END CAP OF RADIO SHIELDED MAGNETO. OTHER TERMINALS FOLLOW IN A CLOCKWISE DIRECTION.

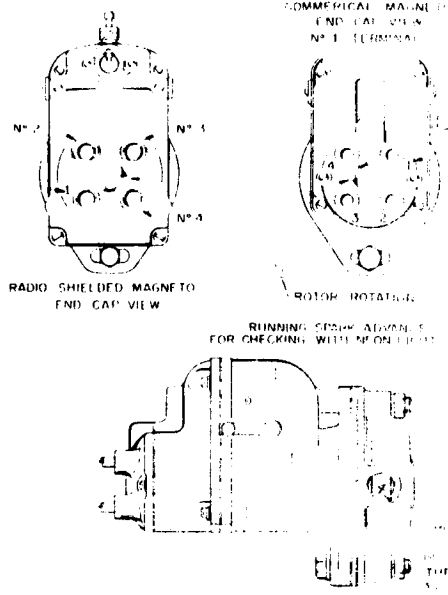


Fig. 12, MAGNETO TIMING DIAGRAM

When the magneto is properly timed, the impulse coupling will snap when the 'DC' - 'X' marked vane, lines up with the *centerline*, of the No. 1 and 3 cylinders, on the flywheel shroud. This can be checked by turning the crankshaft over slowly by hand. The impulse will snap every 90° of flywheel rotation thereafter.

The spark advance is 27°. To check timing with a neon light, the running spark advance is indicated by a mark on the flywheel shroud, 27° before *vertical centerline* of the No. 1 and 3 cylinders. See Fig. 12. The end of the 'X' marked vane should be whitened with chalk or paint for this operation.

### ELECTRICAL WIRING CIRCUITS

Note: Beginning with engine serial No. 3987113, the

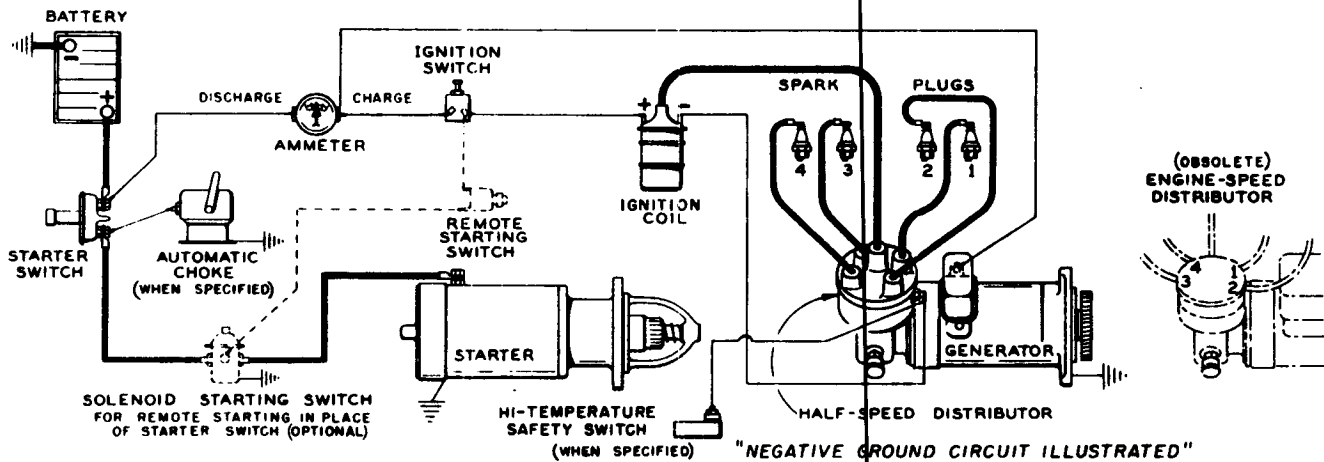
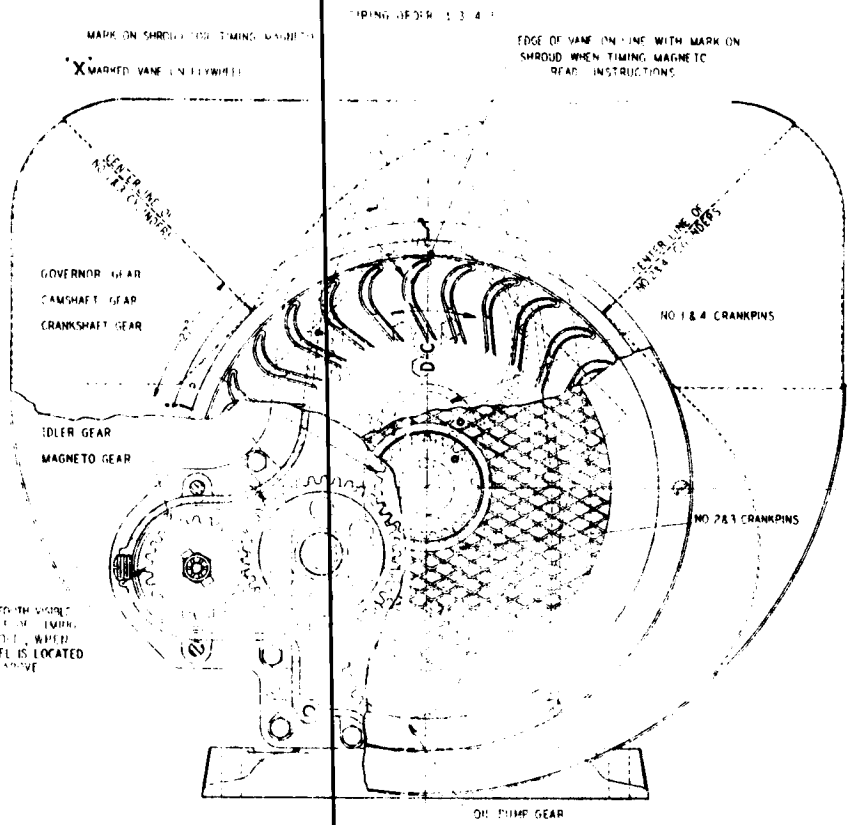


Fig. 13, BATTERY IGNITION - WIRING AND TIMING DIAGRAM



standard wiring circuits for all 12 volt electrical equipment is *negative ground polarity*, in place of the previously furnished positive ground. All 6 volt systems remain positive ground.

The wiring diagram, Fig. 13, illustrates a *negative ground* circuit. If polarity of generator is for a positive ground circuit (engines built previous to serial No. 3987113), terminal connections at ammeter, igni-coil and battery are just reversed from those illustrated.

### DISTRIBUTOR - BATTERY IGNITION

When these engines are furnished with electric starter and direct mounted generator, battery ignition is used instead of magneto ignition. The distributor is mounted to the end of the generator.

## HALF-SPEED DISTRIBUTOR TIMING PHOTOS

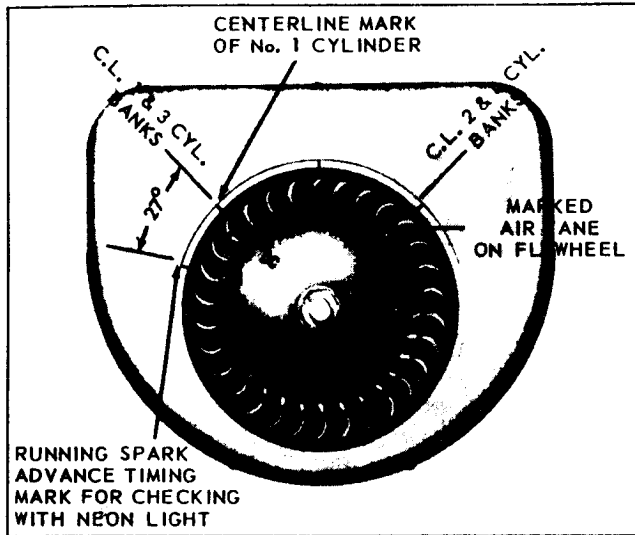


Fig. 14

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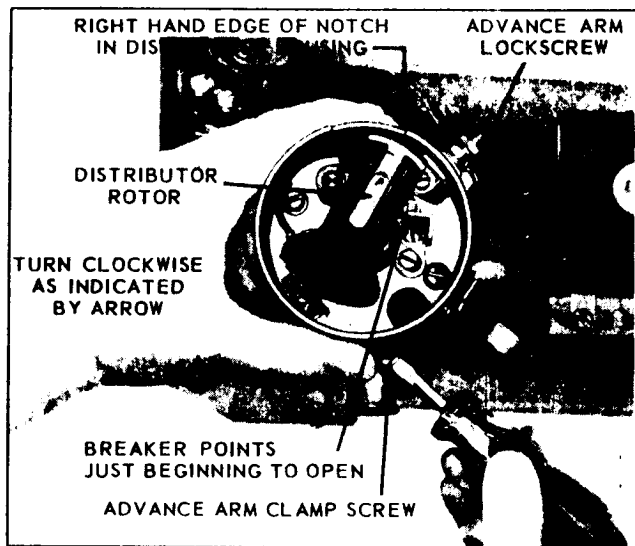


Fig. 15

195132C

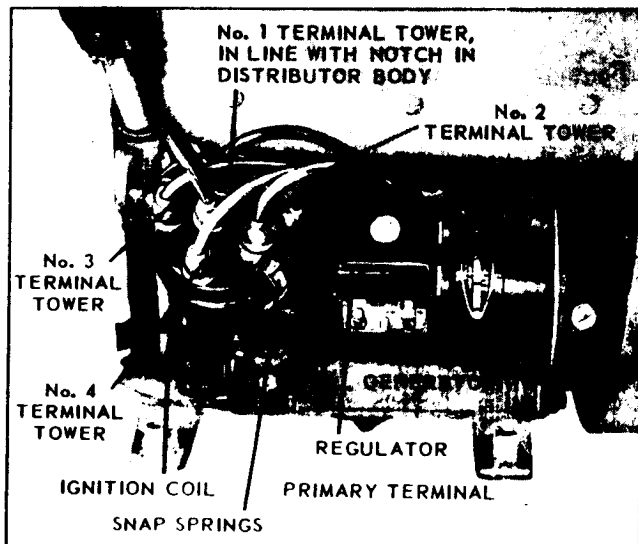


Fig. 16

195133C

Two types of distributors, either the *Engine Speed* as illustrated in *Fig. 20*, or the *Half-Speed* distributor, *Fig. 16*, have been furnished. The *Half-Speed* distributor, which offers greater breaker point life, replaces the *Engine Speed* distributor on engines that are currently being built.

These engines are properly timed at the factory, but the following instructions are given as a help in re-timing, if this becomes necessary. The generator drive gear does not have to be timed to the gear train as timing is set by means of the distributor gear.

The *spark advance* for *normal speeds* (2000 R.P.M.) is  $27^\circ$ , the same as for magneto ignition. *Engine must be running at 2000 R.P.M. or over when adjusting spark advance.*

### TIMING MARKS

Remove the screen over the flywheel air intake opening by taking out the screws holding the screen in place. This will expose the *Vane* timing marks on the flywheel shroud, also the *Vane* on flywheel, marked by an 'X' and the letters 'DC'. See *Fig's. 14 or 17*. Next, remove the spark plug from No. 1 cylinder and turn the engine over slowly by the starting crank, at the same time holding a finger over the spark plug hole, so that the compression stroke can be determined by the air blowing out of the hole. *Continue with instructions for Half-Speed Distributor Timing or Engine Speed Distributor Timing whichever is applicable.*

### HALF-SPEED DISTRIBUTOR TIMING

The *Half-Speed Distributor*, illustrated in *Fig. 16*, 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 automatic advance is  $14^\circ$  in the distributor, equal to  $28^\circ$  on the crankshaft which is the full amount of spark advance required. The distributor is fully advanced at 2000 R.P.M. of the engine.

Upon reaching the compression stroke, as determined in 'Timing Marks' paragraph, continue turning the starting crank until the leading edge of the *Marked Vane* on the flywheel is in line with the *Centerline Mark* on the flywheel shroud of the No. 1 cylinder. The No. 1 piston is on top dead center in this position. See *Fig. 14*.

Remove the upper half of the distributor body by disengaging snap springs. The *centerline* of the *distributor rotor* should be in line with the *right hand edge* of the *notch* in the distributor housing. No. 1 cylinder is ready to fire, in the retarded timing position, when the distributor rotor is in this position, as shown in *Fig. 15*. If the distributor rotor is not in the above mentioned position, withdraw the entire distributor from the generator. Remove the distributor rotor in order to take off the dust cover from the distributor body, which will expose the breaker



points. Mount rotor back on distributor shaft. Assemble distributor to generator with the **centerline** of the **distributor rotor** in line with the **right hand edge** of the **notch** in the distributor housing as shown in *Fig. 15*, and the **primary terminal** pointing toward the top edge of the generator **regulator**. See *Fig. 16*. Be sure that the **advance arm lock screw**, *Fig. 15*, which is mounted to the **distributor clamp** is tight, as a manual spark advance is not used with these engines.

With the **advance arm clamp screw** loose, turn the distributor body slightly in a counter-clockwise rotation so that the breaker points are firmly closed. Then turn the distributor body in a **clockwise** rotation until the **breaker points** are just **beginning to open**, see *Fig. 15*. At this point a slight resistance can be felt as the breaker point cam strikes the breaker point arm. Tighten **advance arm clamp screw**. The No. 1 cylinder is now ready to fire in the retarded position, with the centerline of the **distributor rotor** in line with the **right hand edge** of the **notch** in the distributor body as shown in *Fig. 15*.

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. Replace distributor dust cover. If care is exercised in the above operations, the spark timing should be accurate enough for satisfactory starting, however, **checking spark advance** with a **neon lamp**, as described in '*Neon Lamp Timing is necessary*'.

The four ignition cables from the distributor should be connected to the proper spark plugs. The cylinder shroud covers are marked for identification. The No. 1 terminal tower on the distributor is in line with the notch in the distributor body. The terminal sequence is 1-3-4-2 in a counter-clockwise rotation. See *Fig. 16*.

### ENGINE SPEED DISTRIBUTOR TIMING

The **Engine Speed Distributor** illustrated in *Fig. 20*, has an automatic advance of 15°, and is mounted to the engine with an additional advance of 12°, to give a total of 27°, which is the running spark advance of the engine.

After determining the compression stroke of No. 1 cylinder as described in '*Timing Marks*' paragraph, continue turning starting crank until the leading edge of the **Marked Vane** on the flywheel is in line with the **Center Punch Mark** on the flywheel shroud. See *Fig. 17*. This will leave the No. 1 piston, 12° before top dead center, which is the amount of spark advance at low speeds (below 300 R.P.M.) before the distributor automatic advance begins to take hold.

Remove upper half of distributor body by disengaging snap springs,

The **distributor rotor** should line up with **center** of the **two notches** in the distributor housing. See *Fig. 18*.

If the rotor is not in this position, withdraw entire distributor from the generator, and re-engage the

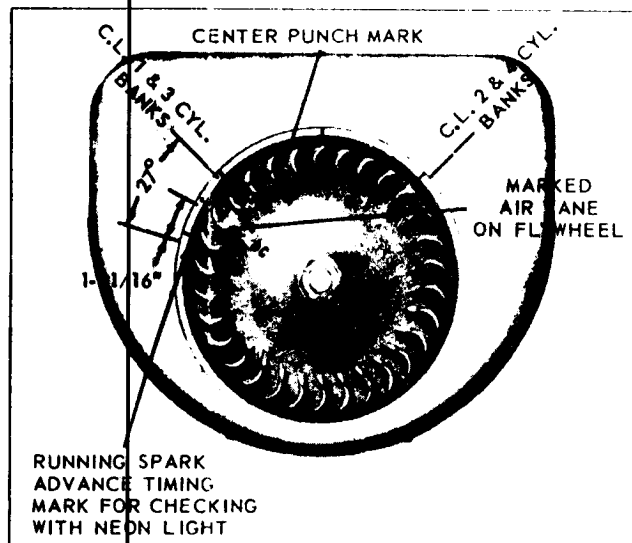


Fig. 17

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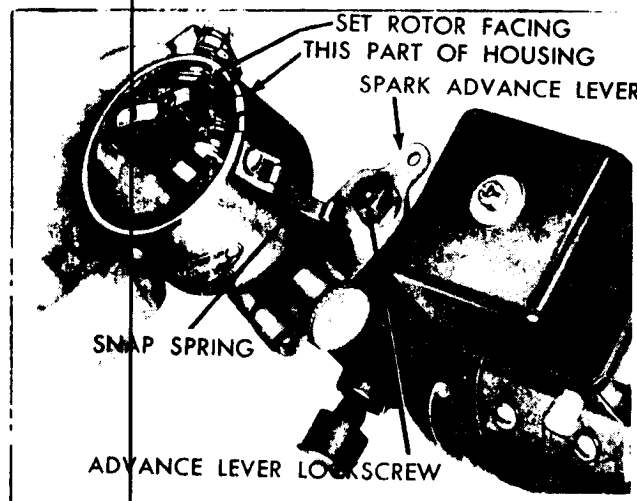


Fig. 18

77930C

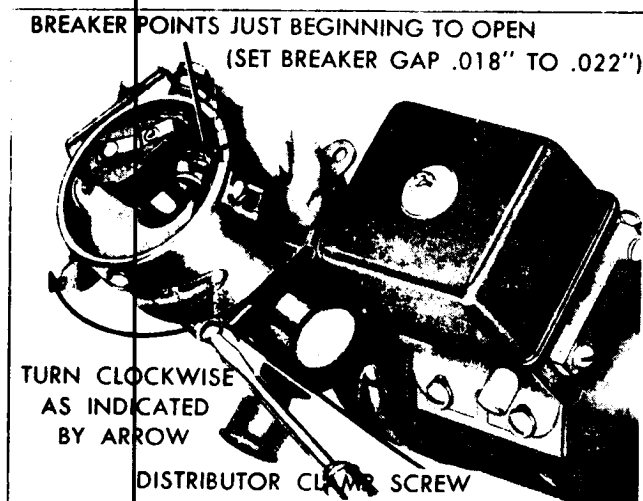


Fig. 19

77931C

gears at the bottom of the distributor in a new position so rotor will be located properly. Be sure that the **advance lever lock screw**, *Fig. 18*, which is mounted to the **distributor clamp**, is tight; as a manual spark advance is not used with these engines.

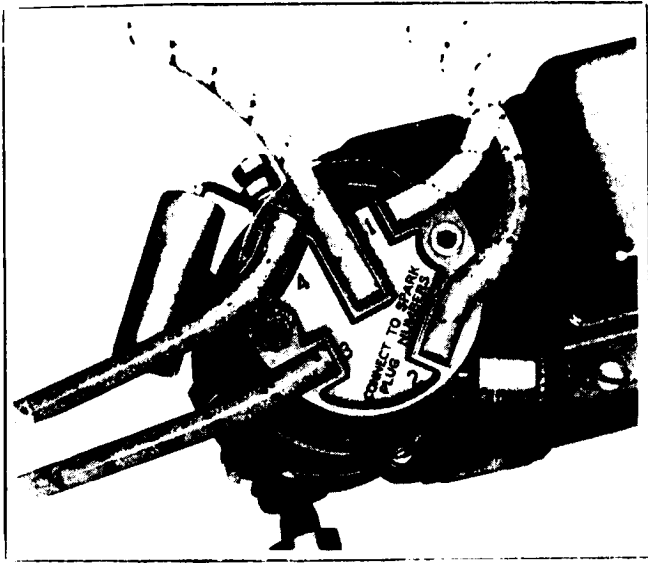


Fig. 20

77932C

With the *distributor clamp screw* loose, 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*, see Fig. 19. 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 starting, however, checking spark advance with a neon lamp, as described in 'Neon Lamp Timing', is necessary.

The four ignition cables are numbered in the distributor cap, see Fig. 20. Connect to spark plugs of the same number. The center cable is for ignition coil.

### NEON LAMP TIMING

The engine should be timed to the 27° advanced position at not less than 2000 R.P.M.

The timing should be checked with a neon lamp connected 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 2000 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. 14 or Fig. 17. If it does not, the *advance arm clamp screw* should be loosened as shown in Fig. 15 for the *Half-Speed Distributor*, or Fig. 19 for the *Engine Speed Distributor*, and the distributor body turned slightly clockwise or counter-clockwise, as required, until the *advance timing mark* and the *white vane* coincide. Be sure *advance arm clamp screw* is then carefully tightened. If the en-

gine is running below 2000 R.P.M. when timing, the automatic advance in the distributor will not be fully advanced and damage to the engine could result when the engine is operated at higher speeds. Mount flywheel screen if removed — use *slotted opening* without removing screen for running spark advance check only.

### DISTRIBUTOR AND GENERATOR MAINTENANCE

The distributor breaker point gap should be .018 to .022 inches. To readjust breaker point gap, turn engine over by means of the starting crank until the distributor breaker arm *rubbing block* is on a high point of the *cam*. Loosen the *stationary contact locknut* and screw *fixed contact*, in or out, until correct gap is obtained. Tighten locknut and recheck gap.

The generator and distributor should be periodically lubricated and inspected for external conditions which would affect their operation.

It is recommended that the generator oiler, located below the primary terminal of the distributor, be given 3 to 5 drops of medium engine oil every 50 hours.

Every 50 hours of operation, the oiler on the side of the distributor base should have 3 to 5 drops of medium engine oil added, and the grease cup given one complete turn. Use a high melting point grease. Every 100 hours, apply 3 to 5 drops of medium engine oil to the felt in the top of the cam sleeve. *Do not over-lubricate.*

### FLYWHEEL ALTERNATOR

12 volt — 10 or 25 amp flywheel alternator furnished in place of gear driven generator. Instructions and parts bulletin is located in the rear of this manual.

### SPARK PLUGS, Fig. 21

Incorrect gap, fouled or worn spark plug electrodes, will have an adverse affect on engine operation. Remove spark plugs periodically, clean, regap or replace if necessary. Thread size is 18 mm.

*Spark plug gap — 0.030 of an inch.*

Replacement plugs must be of the correct heat range, like Champion No. D-16J, AC No. C86 commercial. Tighten spark plugs, 25 to 30 foot pounds torque.

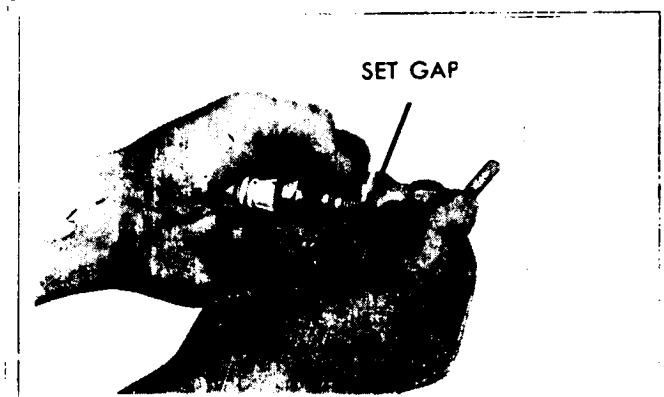


Fig. 21

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## RESTORING COMPRESSION

In a new engine or one which has been out of operation for some time, oil may have drained off the cylinders so that compression will be weak, causing difficulty in starting. To remedy this condition, remove the sparkplugs and pour about a fluid ounce of crankcase oil through the spark plug hole into each cylinder. Turn engine over several times with the hand crank to distribute oil over the cylinder walls. Assemble spark plugs and compression should be satisfactory.

## HIGH TEMPERATURE SAFETY SWITCH

As a safety precaution against overheating, engines can be equipped with a high temperature switch mounted to the cylinder head at the No. 4 spark plug.

When cylinder head temperature becomes critically high, the safety switch will automatically stop the engine by shorting out the ignition system. A waiting period of about *10 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.*

## KEEP ENGINE CLEAN - PREVENT OVERHEATING (Agricultural and Industrial Engines)

This engine is cooled by blasts of air which must be allowed to circulate all around the cylinders and cylinder heads to properly cool the engine and thereby keep it in good running condition. If *dust, dirt or chaff is allowed to collect in the cylinder shrouding or in the V between the cylinders*, it will retard the flow of air and cause the engine to overheat. Keep *flywheel screen and rotating screen clean*, so as not to restrict the intake of cooling air.

With reference to *Fig. 22*; follow the cleaning and maintenance instructions pointed out, to obtain trouble free and satisfactory engine performance.

1. Remove these covers frequently and clean out all dust, dirt and chaff. Be sure to secure covers in place.
2. Open these covers or complete rear shroud covers frequently and clean out all dust, dirt and chaff. Be sure to close covers.
3. Keep this space between cylinders free of dust, dirt and chaff.
4. Read instructions on this air cleaner regarding its care. This is important. The entire air cleaner should be taken off the engine at least once a year and washed in a cleaning fluid to remove dust and dirt from the non-removable filter element.
5. The collector type pre-cleaner must be emptied of accumulated dirt frequently, depending on dust conditions. Do not use oil or water in pre-cleaner, this must be kept dry.

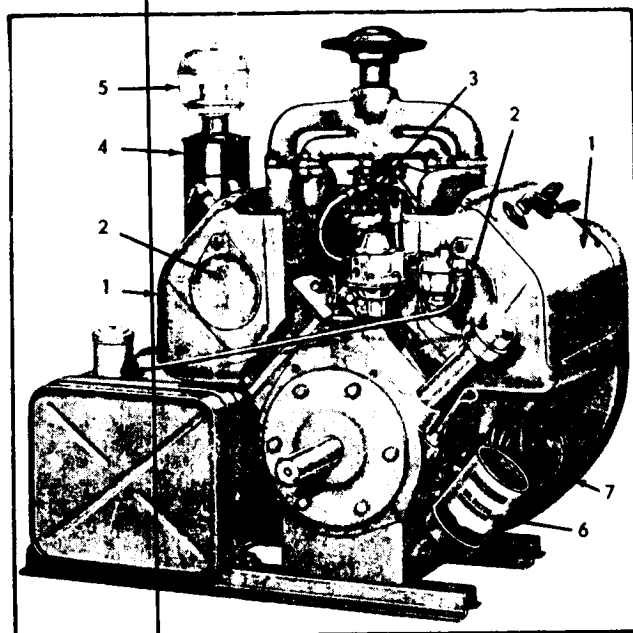


Fig. 22

104725C-3

6. Replace this oil filter cartridge every other oil change. If operating conditions are extremely dusty replace cartridge every oil change. Be sure that your replacement is a Wisconsin Micro-Fine filter.
7. Do not allow shrouding to become damaged or badly dented as this will retard air flow.

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

**Never operate engine with air shrouding removed. This will retard the air cooling.**

**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 10.*

**Every 8 hours** check crankcase oil level. Keep filled to *full mark* on oil gauge saber, but no more. See *Fig. 3.*

**Every 50 hours** drain crankcase and refill with fresh oil. See *Lubrication, Page 6 and 7.*

## TROUBLES CAUSES AND REMEDIES

Three prime requisites are essential to starting and maintaining satisfactory operation of internal combustion 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.

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 9.

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 9.

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 cause serious damage. Also if the mixture in the cylinder, due to flooding, is too rich, starting may be accomplished by continued cranking, with the carburetor choke 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. 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 16.

Loose spark plugs 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 24.

Valve tappets adjusted with insufficient clearance under valve stems. See *'Valve Tappets'*, Page 25.

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 22.

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 12 or *'Distributor-Battery Ignition'*, Page 13. 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 soaked.

Spark plug insulators broken.

Spark plugs wet or dirty.

Spark plug point gap wrong. See Page 16.

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 12, or *'Distributor-Battery Ignition'*, Page 13.

### ENGINE MISSES

Spark plug gap incorrect. See Page 16.

Worn and leaking ignition cables.

Weak spark. See *'Magneto Ignition Spark'*, Page 12, or *'Distributor-Battery Ignition'*, Page 13.

Loose connections at ignition cable.

Magneto or distributor breaker points pitted or worn.

Water in gasoline.

Poor compression. See *'Compression'*, Page 18.

### ENGINE SURGES OR GALLOPS

Carburetor flooding.

Governor spring hooked into wrong hole in lever. See *'Governor Adjustment'*, Page 25. Governor rod incorrectly adjusted. See *'Governor Adjustment'*, Page 25.

## ENGINE STOPS

Fuel tank empty.

Water, dirt or gum in gasoline.

Gasoline vaporized in fuel lines due to excessive heat around engine (Vapor Lock). See 'Stopping Engine', Page 9.

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 18.

## ENGINE OVERHEATS

Crankcase oil supply low. Replenish immediately.

Ignition spark timed wrong. See 'Magneto Timing', Page 12, or 'Distributor-Battery Ignition', Page 13.

Low grade of gasoline.

Engine overloaded.

Restricted cooling air circulation.

Part of air shroud removed from engine.

Dirt between cooling fins on cylinder or 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 8.

Engine operating under heavy load at low speed.

Carbon or lead deposits in cylinder head.

Spark advanced too far. See 'Magneto Timing', Page 12, or 'Distributor-Battery Ignition', Page 13.

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 24.

Overheated valves.

Spark plugs too hot. See 'Spark Plug', Page 16.

Hot carbon particles in engine.

## DISASSEMBLY AND REASSEMBLY OF VE4 AND VF4 ENGINE

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, for instance, the cylinder head screws, etc. Capscrews of various lengths are used in the engine, therefore great care must be exercised in reassembly so the right screw will be used in the various places, otherwise damage may result.

Tighten the cap screws and nuts of the manifolds, cylinder heads, gear cover, oil pan, connecting rods, cylinder blocks, main bearing plate and the spark plugs to the specified torque readings indicated in the following paragraphs of reassembly.

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

If it is desired to disassemble the engine, the following order should be substantially adhered to. As disassembly progresses, the order may be altered somewhat if desired, as will be self-evident to the mechanic. Reassembly of the engine should be made in the reverse order.

## TESTING REBUILT ENGINE

An engine that has been completely overhauled, such as having the cylinders rebored and fitted with new pistons, rings and valves, should go through a thorough "run-in" period, before any amount of load is applied to the engine.

The engine should be started and allowed to run for about one-half hour, at about 1200 to 1400 R.P.M. without load. The R.P.M. should then be increased to engine operating speed, still without load, for an additional three and one-half to four hours.

The proper "running-in" of the engine will help to establish polished bearing surfaces and proper clearances between the various operating parts and thus add years of trouble free service to the life of your engine.

## ACCESSORIES

The air cleaner, oil filter, magneto, and if an electric starter and generator are used, these should be removed first.

Remove clutch or clutch reduction unit if engine is equipped with either of these accessories.

## SHEET METAL HOUSE

On power units, engines which are enclosed in a sheet metal house, remove the muffler and canopy first. Disconnect air cleaner, choke, governor control and instrument wires at the front house panel. The front panel can be removed as part of the flywheel shroud, as explained in the following paragraphs of disassembly.

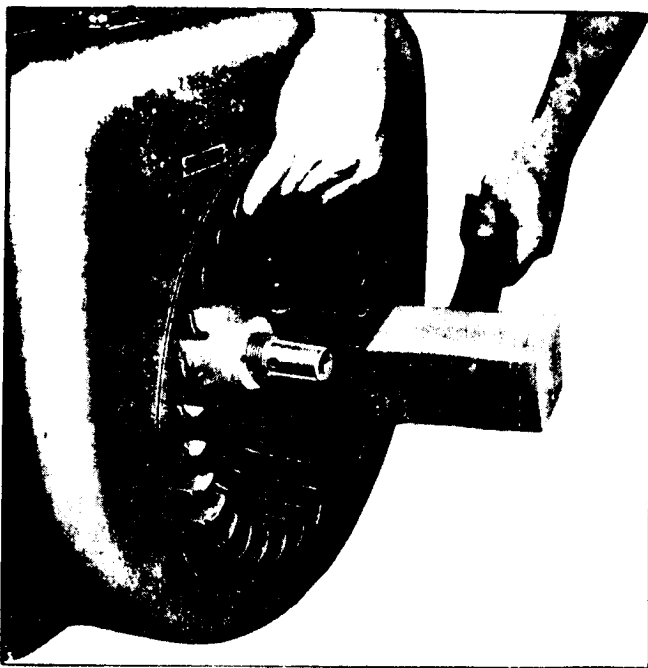


Fig. 23

76696C

### FLYWHEEL

After the flywheel screen has been removed, drive out the starting crank pin in the crankshaft and remove the flywheel nut and washer.

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 crankshaft with a babbitt hammer. See Fig. 23. The flywheel will slide off the taper of the crankshaft. 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.

### AIR SHROUDING

To disassemble air shrouding, refer to Fig. 24. First remove cylinder head covers and the screws mounting the flywheel shroud to the lower cylinder shrouds

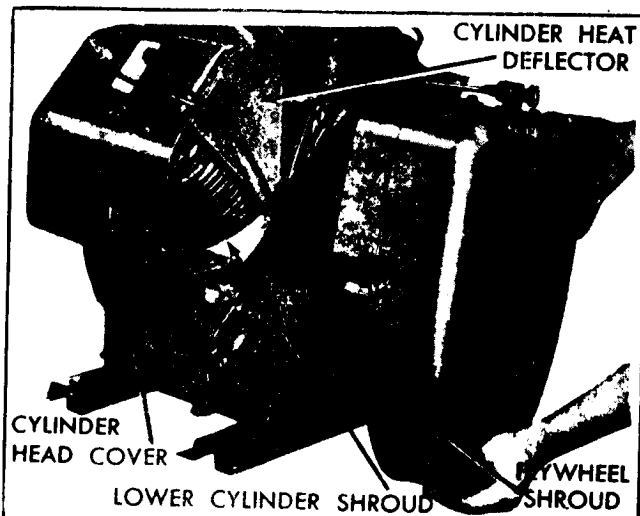


Fig. 24

104811C

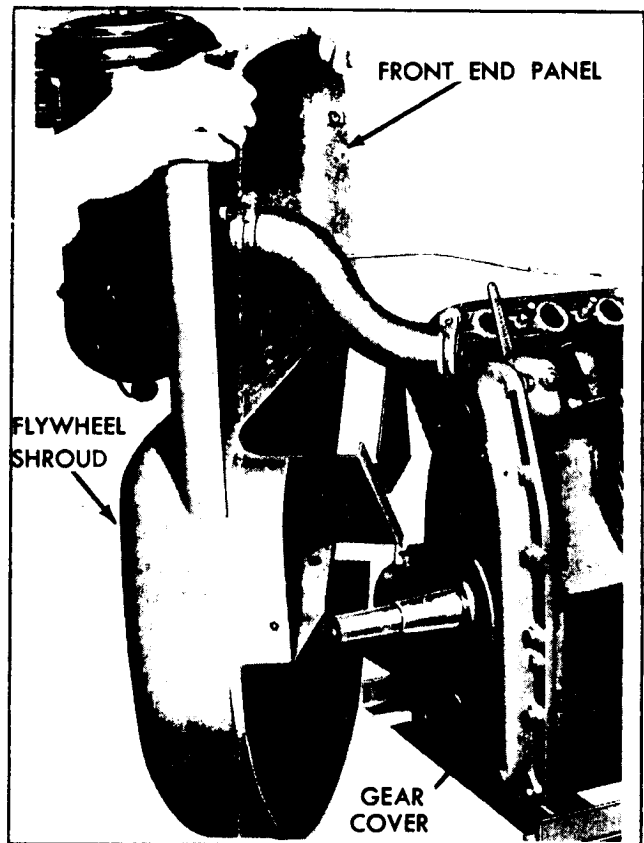


Fig. 25

104719C

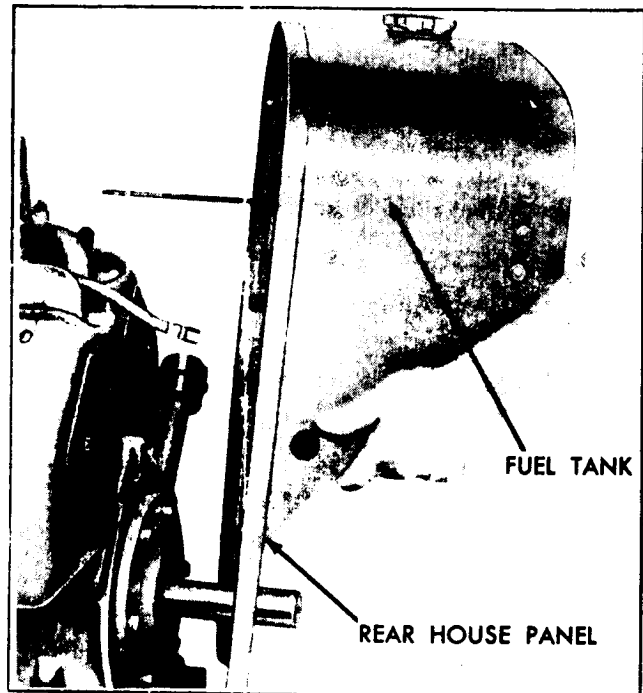


Fig. 26

71050C

and cylinder heat deflectors, then remove the screws holding the flywheel shroud to gear cover.

On power units, remove the front end panel as shown in Fig. 25, together with flywheel shroud, and the rear end panel, see Fig. 26, complete with fuel tank. Balance of shrouding can now be readily removed.

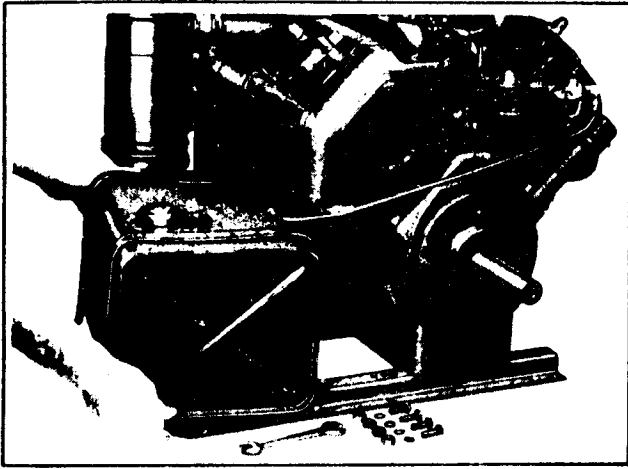


Fig. 27

83608C



Fig. 28

83620C

### FUEL TANK

If a side mount gasoline tank is used, this should be removed next. See Fig. 27.

### CARBURETOR AND MANIFOLDS

The carburetor and manifolds can be removed in sections as shown in Fig. 28.

In reassembly tighten the nuts for mounting the manifolds, 14 to 18 foot pounds torque. Tightening beyond specification may cause the flanges to break.

### CYLINDER HEAD

The cylinder head must be removed if it is necessary to regrind valves, or to do work on the piston, rings or connecting rods. All of 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 heads, remove all carbon and lead deposits. It is recommended that new cylinder head gaskets be used on reassembly,

as the old gaskets will be compressed and hard so that they may not seal properly. Use a mixture of graphite and oil on the cylinder head screws to prevent them from rusting tight against the cylinder block. Tighten cylinder head screws 22 to 24 foot pounds torque, and after complete assembly and engine is run in, retorque head screws.

### GEAR COVER

Disconnect the governor linkage before removing gear cover, since the same mounting screws for governor housing and gear cover are used. Remove gear cover screws and drive out two dowel pins as shown in Fig. 29. The cover can then be removed exposing the timing gears as shown in Fig. 30. In reassembly,

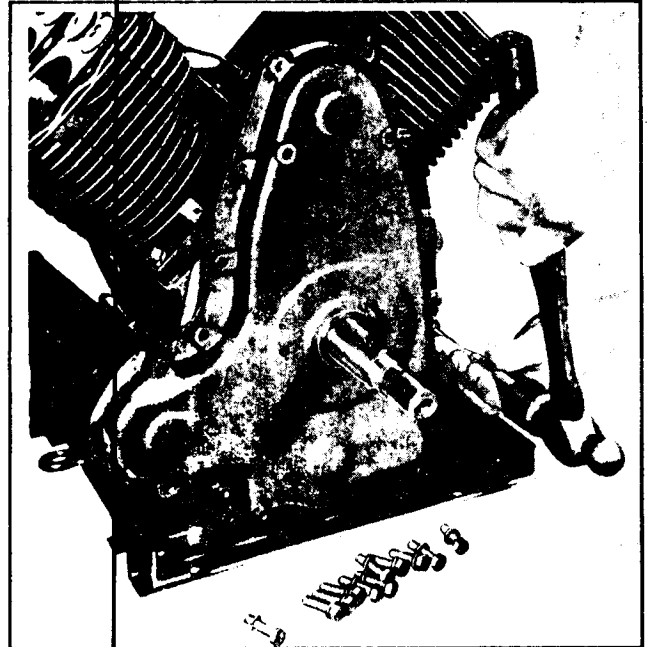


Fig. 29

71056C

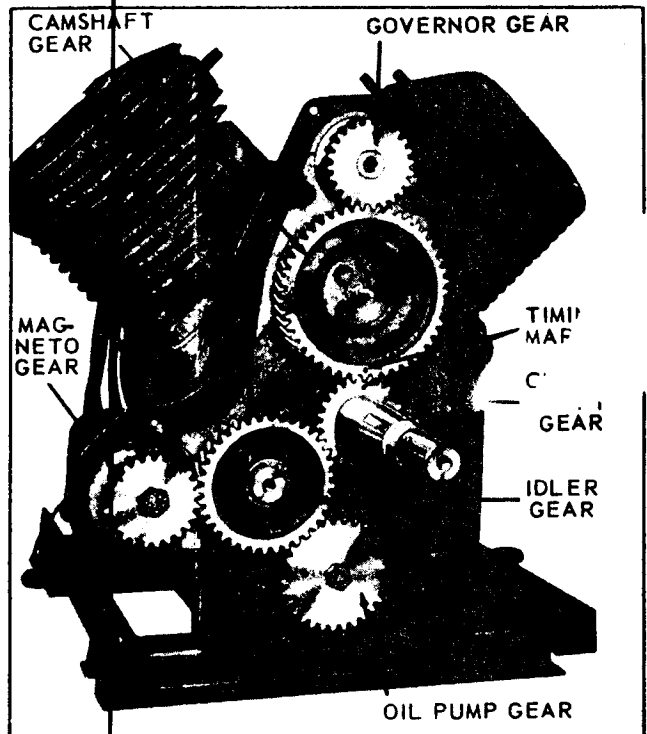


Fig. 30

104716C-1

tighten cap screws, 14 to 18 foot pounds torque.

### CAMSHAFT GEAR (Fig. 30)

Remove the three cap screws and lockwashers which hold the gear to the end of the camshaft. Note that the *camshaft gear* has offset mounting holes to provide accurate assembly for valve timing. Refer to *Gear Train, Fig. 30*.

### IDLER GEAR AND SHAFT (Fig. 31)

Take out the Allen-head setscrew that locks idler shaft in place. Screw is located in side of crankcase behind magneto or distributor mounting flange. Remove idler gear and shaft by means of a gear puller.

*In reassembly*; be sure oil groove in shaft is facing up. Drive shaft into crankcase with soft metal hammer and maintain a .003 to .004 inch clearance between idler gear and shoulder of shaft.

### OIL PAN (Fig. 32)

The engine can now be inverted so that the supports and oil pan can be removed. *In reassembly*; tighten oil pan mounting screws, 6 to 9 foot pounds torque.

### OIL PUMP (Fig. 33)

Remove locknut and driver gear from shaft. If gear is too tight to remove by hand, use a puller; hammering on end of shaft to loosen gear will damage pump.

Take out slotted pipe plug from bottom of crankcase. By means of a 5/32 inch Allen wrench, remove lock-screw from pipe plug hole. Withdraw oil pump from inside crankcase. If pump fits too tight to remove by hand, tap front of pump housing (not shaft), with hammer and brass rod.



Fig. 33

180178C

*In reassembly*; be sure lock-screw seat in pump housing lines up with lock-screw hole in crankcase.

### PISTONS AND CONNECTING RODS (Figs. 34, 35, 38)

By means of a 1/2" socket wrench, loosen and remove the hex locknuts from connecting rod bolts. Then, by tapping the ends of the bolts lightly, the connecting rod cap will break free from the bolts.

Scrape off all carbon deposits that might interfere with removal of pistons from upper end of cylinder. Turn crankshaft until piston is at top, then push connecting rod and piston assembly upward and out thru top of cylinder. Be careful not to mar the crank pin by allowing the rod bolts to strike or scrape across it. Place caps on rods immediately so that they will not be mismatched in reassembly. Be sure that shims (used in babbitt bearing rods), are in place before cap is put on.

**NOTE:** These models of engines were originally furnished with *babbitt cast* connecting rod bearings. *Shell bearing* rods are now being used for current production engines, and are interchangeable with babbitt bearing rods for service replacement. Care should be taken *in reassembly* to mount bearings properly. The cap should be assembled to the rod so that the *locat-*

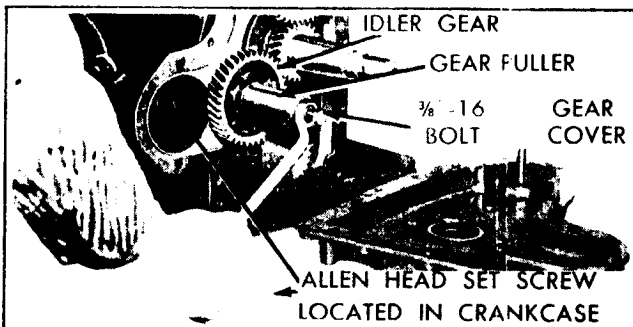


Fig. 31

71066C

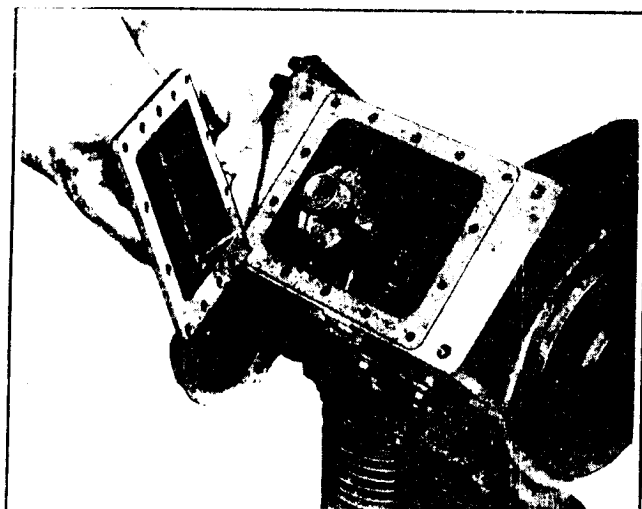


Fig. 32

104721C

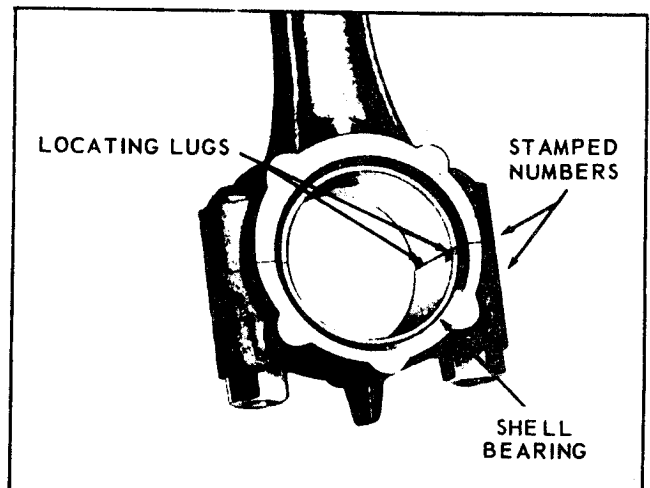


Fig. 34

316307C



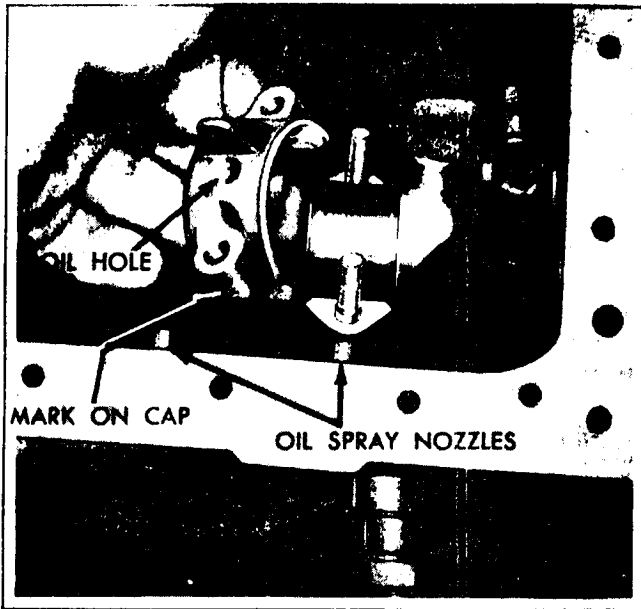


Fig. 35 104819C

ing lug of both bearing halves are on the same side as illustrated in Fig. 34. Refer to chart, Fig. 38, for clearance between bearing and crank pin.

When reassembling the *split-skirt* piston to the engine, the split should be toward the direction of crankshaft rotation (clockwise facing cranking end). The thrust faces on the skirt of the *cam-ground* piston are 90° from the axis of the piston pin hole, with the wide section of the piston skirt toward the maximum thrust side, or opposite the crankshaft rotation, see *Engine Sectional, Fig. 2*. The clearance between the piston skirt and cylinder must be measured in the center of the thrust face at the bottom of the piston skirt. Refer to Chart, Fig. 38, for proper skirt clearance for both *split-skirt* and *cam-ground* pistons.

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

**CAUTION:** Identical numbers are stamped on the side of the rod with its corresponding cap. These numbers must be on the same side of the connecting rod when

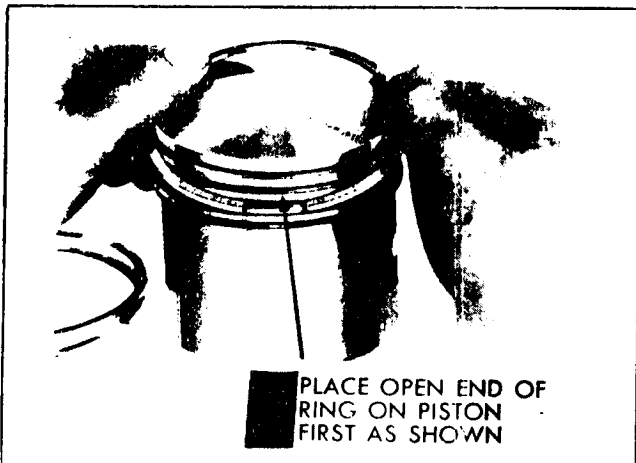


Fig. 36 71152C

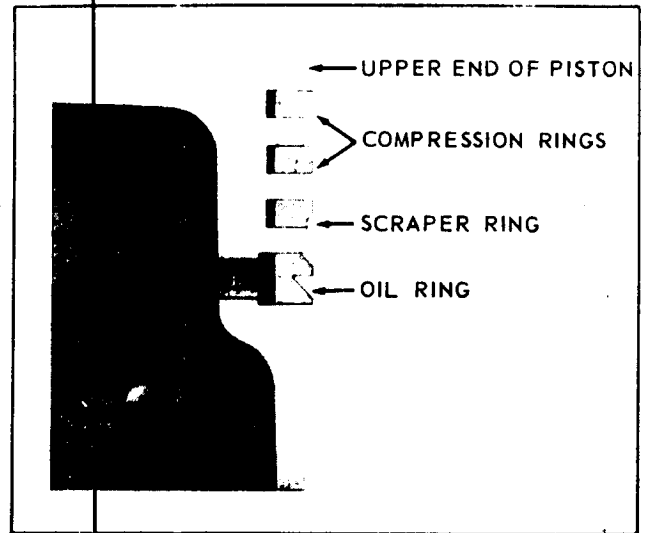


Fig. 37 92200C-1

mounted in engine. Be sure that *oil hole* in connecting rod cap is facing toward the oil spray nozzle, as illustrated in Fig. 35. Install new nuts on connecting rod bolts and torque 22 to 28 foot pounds.

### PISTON RINGS (Fig's. 36, 37, 38)

If a ring expander tool is not available, install rings by placing the open end of ring on piston first, as shown in Fig. 36. Spread ring only far enough to slip

PISTON TO CYLINDER AT PISTON SKIRT (THRUST FACE)	CAM-GROUND .0035 to .004"	SPLIT-SKIRT .004 to .0045"
PISTON RING GAP		.010 to .020"
PISTON RING SIDE CLEARANCE IN GROOVES	TOP RING	.002 to .0035"
	2nd, 3rd RING	.001 to .0025"
	OIL RING	.0025 to .004"
PISTON PIN TO CONNECTING ROD BUSHING		.0005 to .0011"
PISTON PIN TO PISTON		.0000 to .0008" tight
CONNECTING ROD TO CRANK PIN - SIDE CLEARANCE		.009 to .018"
CONNECTING ROD SHELL BEARING TO CRANK PIN DIA. (VERTICAL)		.0012 to .0034"
CONNECTING ROD BABBIT BEARING TO CRANK PIN		.0007 to .0020"

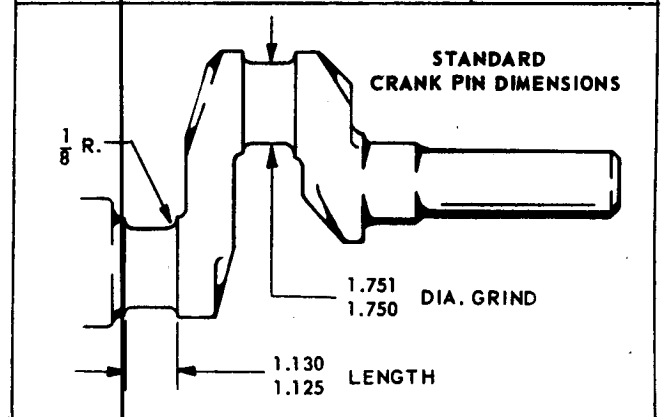


Fig. 38

### PISTON, RING AND ROD CLEARANCES CHART

over piston and into correct groove, being careful not to distort ring. Install bottom ring first and work toward the head of the piston, installing top ring last.

Each piston has two compression rings, a scraper ring, and an oil control ring. The outer diameter of the top compression ring is *chrome plated*. Mount scraper ring with scraper edge down, otherwise oil pumping and excessive oil consumption will result. Refer to *Fig. 37* for the correct placement of piston rings.

### CYLINDER BLOCKS

Clean all dirt and foreign deposits from between the cylinder fins and manifold ports.

The cylinder blocks do not have to be removed unless the cylinder bore is scored, out-of-round, or worn over-size more than 0.005 inch. In this event, the blocks will have to be removed, rebored and fitted with over-size pistons and rings. This work should be done by an authorized Service Center.

If in the opinion of the service center attendant, a chrome re-ring is feasible, use *Wisconsin TriCrome* piston ring set, indicated in Parts List Section.

*In reassembly*; tighten the four cylinder block mounting nuts, 40 to 50 foot pounds torque.

### VALVES and SEAT INSERTS (Fig. 39)

Remove valve tappet inspection plate and compress valve springs with a standard automotive type valve lifter as illustrated. Insert a rag in the opening at the bottom of valve chamber so the retaining locks do not fall into engine crankcase. Remove 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. Replace valves that are burned or pitted.

The *exhaust valve face* and replaceable exhaust *seat inserts* are of *stellite* material. A positive type *valve*

*rotator* is furnished as standard equipment on the exhaust valves. Clean and inspect operation of rotor.

The inlet and exhaust valve *seat inserts* can be removed, when replacement becomes necessary, by means of *Wisconsin Motor DF-66-A* insert puller.

*Before grinding valves*, inspect valve guides for possible replacement. Refer to *Valve Guide* paragraph. 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*, lap valves in place until a uniform ring will show entirely around the face of the valve. Clean valves, and wash block thoroughly with a hot solution of soap and water. Wipe cylinder walls with clean lint free rags and light engine oil, especially if cylinders were rebored and honed.

*Valve guides* in the cylinder block are replaceable. The valve stem has a clearance of .003 to .005" in the guide. When the clearance becomes .007", the guide should be driven out and a new guide pressed in place. Use *Wisconsin Motor DF-72* driver.

### CRANKSHAFT (Fig. 40)

To remove crankshaft, take out the six capscrews in main bearing plate at the take-off end. The plate can then be pried off and the crankshaft removed from that end of crankcase. *In reassembly*; use same quantity and thickness of bearing plate gaskets and shims as were removed, since these are necessary to give proper end play for the tapered roller crankshaft bearings. *End play* should be .002 to .004 inch when engine is cold. There is practically no wear in these bearings so that readjustment is seldom necessary after proper assembly.

*CAUTION:* In reassembly, the *timing marks* on the crankshaft gear and camshaft gear must be aligned as shown in *Fig. 30*, otherwise engine will not operate properly, or if timing is off considerably, engine will not run at all.

The mounting holes in main bearing plate are off-set so that the plate will be correctly mounted for main bearing lubrication. Tighten main bearing plate capscrews, 25 to 30 foot pounds torque.

### CAMSHAFT (Fig. 41)

The camshaft must be withdrawn from the flywheel

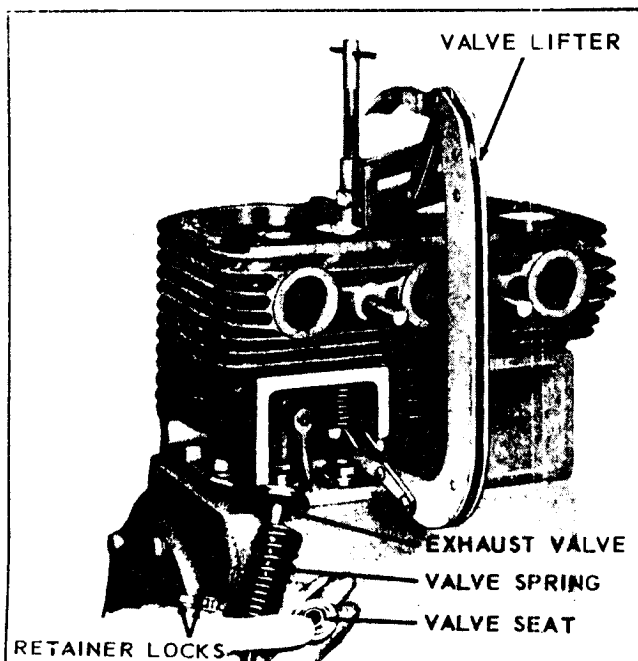


Fig. 39

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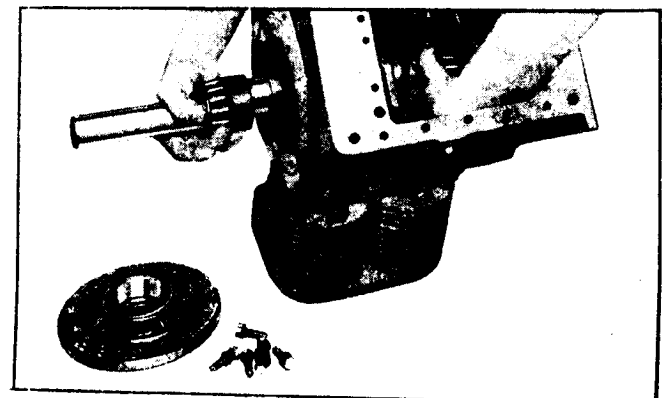


Fig. 40

71075C

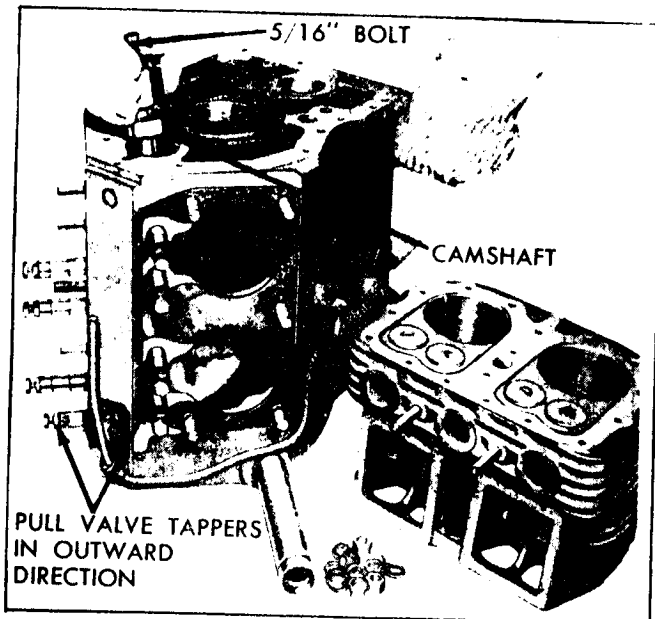


Fig. 41

104726C

end of the engine as shown in *Fig. 41*. When replacing, be sure the spring and plunger are in place in the end of the camshaft, as they hold the camshaft in position endwise. These parts are shown in the sectional view of the engine, *Fig. 2*.

### 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 blocks have been assembled to the crankcase, adjust the valve tappets as shown in *Fig. 42*. With the tappets in their lowest positions, engine cold, the clearance should be *.008 inch* for the *inlet* and *.016 inch* for the *exhaust*, with or without Stellite valves.

### GOVERNOR - OPERATION

The centrifugal flyball governor rotates on a station-

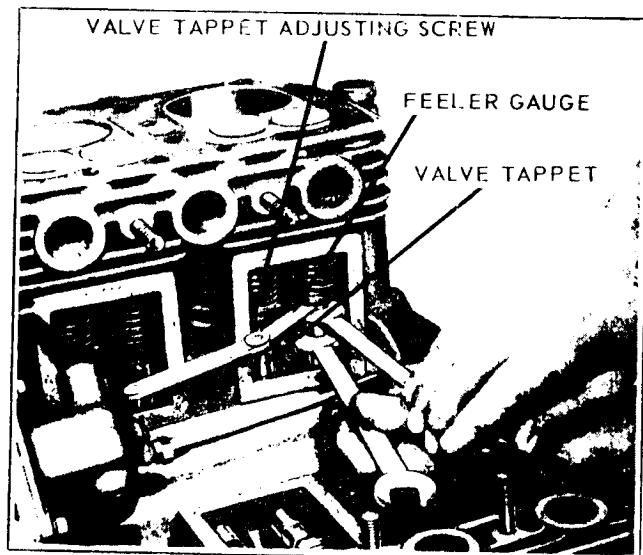


Fig. 42

71059C

ary 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 tension to suit.

### GOVERNOR ADJUSTMENT

The control rod between the governor and 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 accuracy of this adjustment can be tested by disconnecting the control 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 governor lever should then be moved as far as possible in the same direction, all of this being done with the rod disconnected from the lever. Holding both parts in the above position, the rod should be screwed into the swivel block on the carburetor, until the bent end of the rod will register with the hole in the lever, then, screw the rod in two more turns. Insert the rod into the hole in the governor lever and assemble cotter pin. With the governor lever pushed toward the carburetor as far as it will go, there should be about a *1/16 inch* clearance between the throttle lever and the stop pin on the carburetor. The clearance will cause the lever to bounce back from the stop pin, rather than jam against the pin, when a load is suddenly applied to an idling engine. This will eliminate excessive wear on the threads in the carburetor throttle swivel block.

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. 2*.

The governor lever is furnished with 12 holes, as shown in *Fig. 43*, 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. The Governor Lever Chart, *Fig. 43*, shows the *full load* and *no load* speeds of the engine and the hole corresponding thereto. The full load speed will be less than the no

LOAD R.P.M.	NO LOAD R.P.M.	HOLE NO.
1400	1570	3
1500	1660	3
1600	1730	4
1700	1820	4
1800	1925	5
1900	2015	5
2000	2100	6
2100	2195	6
2200	2300	7
2300	2420	7
2400	2495	8

Fig. 43

load speed. As an example; if the engine is to be operated at 2000 revolutions per minute under *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 to run 2100 revolutions per minute at *no load*. The speed at full load will then be approximately 2000 revolutions per minute. A tachometer or revolution counter should be used against the crankshaft to check speed while adjusting the governor spring tension.

## 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 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. 44.

### CLUTCH ADJUSTMENT

If the clutch begins to slip, it should be readjusted, otherwise it will become overheated and damaged. First remove the inspection plate which will expose the notched *adjusting ring*. Release the *clutch*, by pushing the *engaging lever* forward. Turn engine over until the *clutch adjustment lock* is visible thru the inspection opening. Loosen *adjustment lock screw*, one full turn. Keep the crankshaft from turning, then, by means of a screw driver as shown in Fig. 45, turn the *adjusting ring*, one notch at a time in a clockwise direction, until a very firm pressure is required to engage the clutch with the lever. Be sure that the clutch cams snap over-center on final adjustment. Securely tighten adjustment lock screw. Assemble inspection plate, being sure that the gasket fits properly and is not broken.

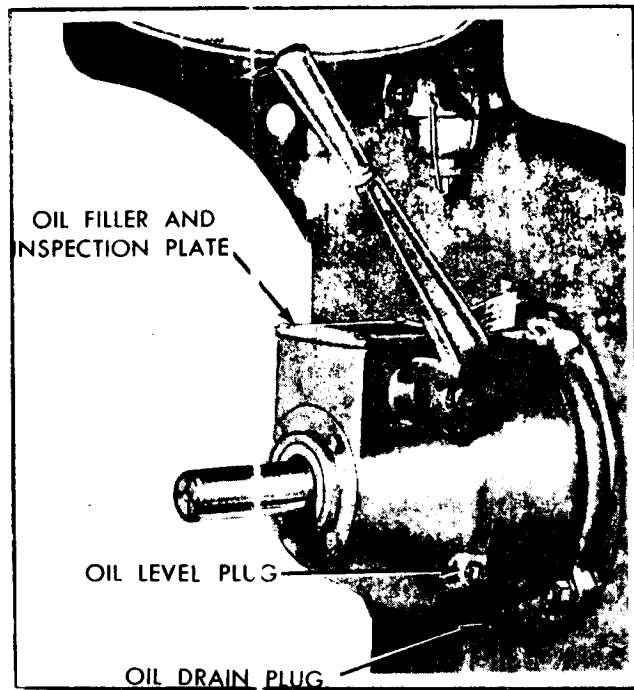


Fig. 44

84066C

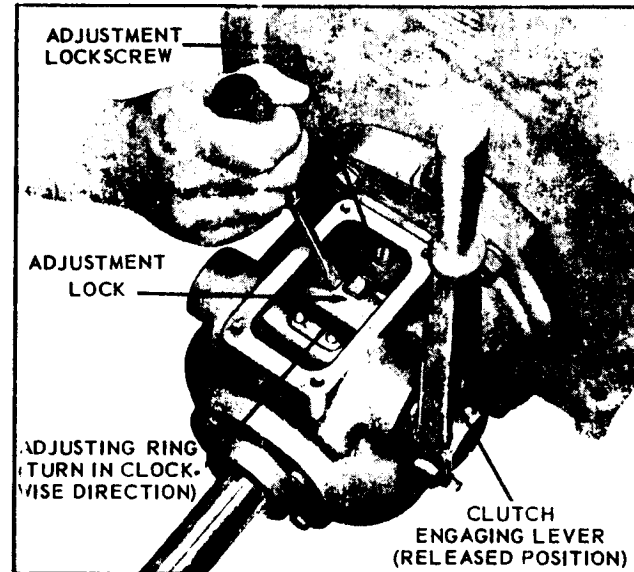


Fig. 45

244949C-A

## CLUTCH REDUCTION UNIT

### ADJUSTMENT

The clutch in the clutch reduction unit is the same as used in the clutch take-off assembly. The clutch adjustment is made thru two pipe tap openings; one for the *adjustment lock screw* and the other for turning the *adjusting ring*, as illustrated in Fig. 46. There are four 1/2 inch square head pipe plugs in the housing, to provide a means of adjusting the clutch regardless of what position the unit is mounted in.

Remove the two pipe plugs on the side of the housing (if not accessible, use the two optional taps). Disengage the clutch and turn engine over slowly with the starting crank until the *adjustment lock screw* is visible thru the pipe plug opening nearest to the

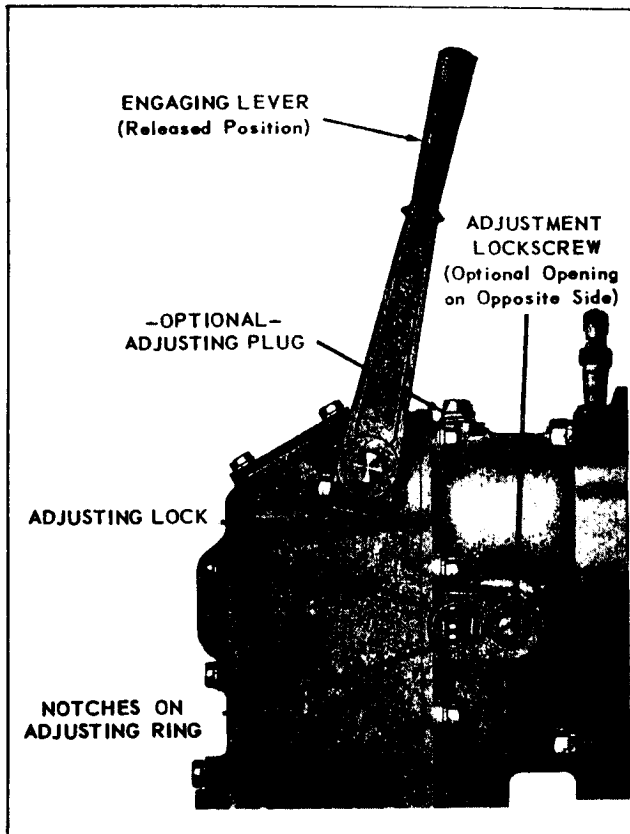


Fig. 46

275568C

engine. Loosen *lockscrew* one full turn, or enough to relieve the tension of the lock against the notches on the *adjusting ring*. Then, turn engine over slightly to expose the *notches* on *adjusting ring*. Keep engine crankshaft from turning, while thru the adjacent pipe plug opening, turn the *adjusting ring* with a screw driver, one notch at a time in a clockwise direction (viewing from take-off end), until a very firm pressure is required to engage the clutch with the lever.

Tighten adjustment lockscrew and mount pipe plugs, when adjustment is completed.

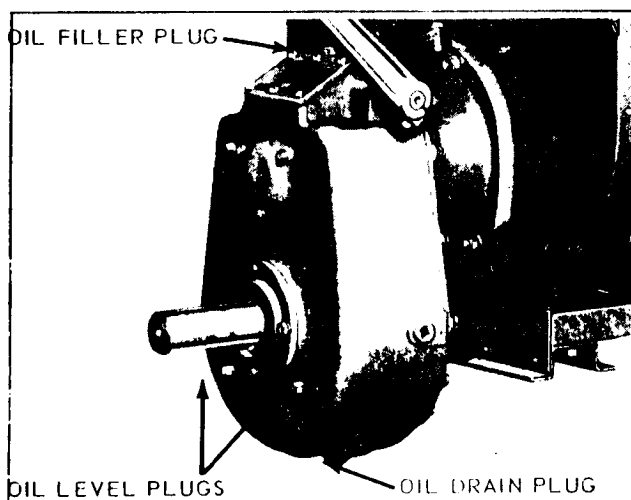


Fig. 47

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 the units are assembled to the engines in various positions. Several plugs are furnished 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. 47.

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 even with light service the *oil 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 the 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 "gasoline 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 fogging operation will give a coating of oil on the above mentioned parts, protecting them from the atmosphere.

On engines where the pipe tap opening on the intake manifold is inaccessible, the rust preventative may be injected into the air intake on the carburetor while the engine is running, so the mixture will be drawn into the engine. The air cleaner connection will of course have to be disconnected from the carburetor to do this.

All the 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. Gasoline fumes from gradual evaporation is a dangerous *fire hazard*.

The air cleaner or carburetor intake, as well as the exhaust manifold and breather openings, should be taped or otherwise sealed off, for the duration of the storage period.

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

*Before starting the engine*, after the storage period, remove crankcase drain plug so that any condensation which may have collected may be drained, before new crankcase oil is added. It is highly recommended that the crankcase bottom cover be removed, and scrubbed of all sediment which may have collected there. When reassembling the bottom cover, a new gasket should be used.

*Be sure to fill crankcase with the correct grade of oil to the full mark on the saber. Do not use any oil heavier than SAE No. 30. Also be sure to put oil to the proper level in the air cleaner. (Refer to Lubrication and Air Cleaner.)*

It is advisable to use new spark plugs at the beginning of the operating interval, 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 suggested that machines be stored inside a building. If this is not possible, the engine should be protected from the weather by a proper covering.*

# REPAIR PARTS LIST

READ THESE INSTRUCTIONS BEFORE ORDERING PARTS

THE MODEL, SPECIFICATION AND SERIAL NUMBERS 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.

**WISCONSIN**  
HEAVY-DUTY  
*Air-Cooled* **ENGINE**®

MODEL  SERIAL NO.

SIZE  R.P.M.  SPEC. NO.

WISCONSIN MOTOR CORPORATION  
MILWAUKEE, WISC. U.S.A.

278228C

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 centers, 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 centers, equipped and trained for complete engine repair, also stock parts to facilitate immediate delivery for all Wisconsin Air Cooled Engines.

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

PARTS FOR MODELS VE4 AND VF4 ENGINES

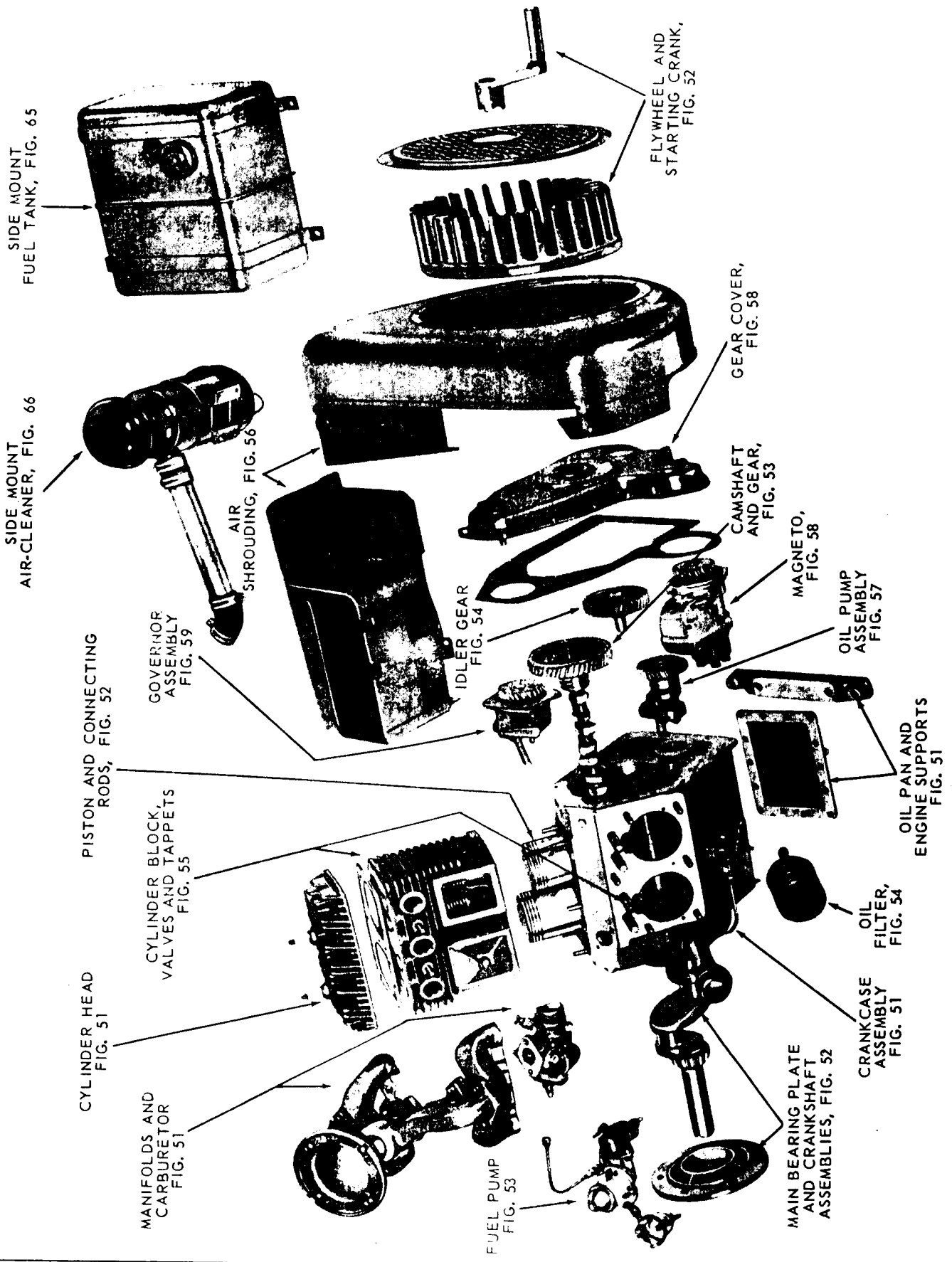


Fig. 50, EXPLODED VIEW OF ENGINE

Refer to figure numbers for break down of parts.

164956C



PARTS FOR MODELS VE4 AND VF4 ENGINES

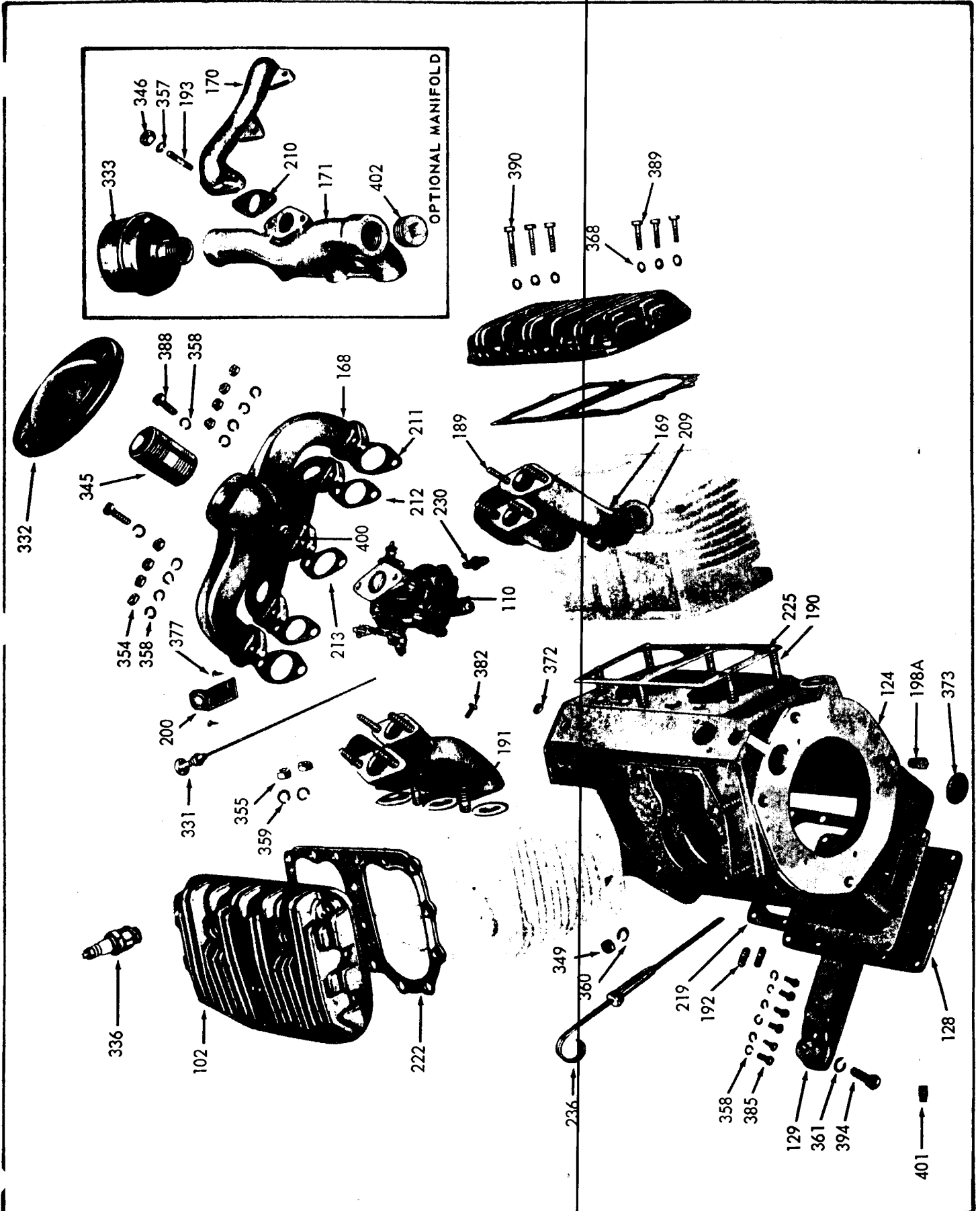


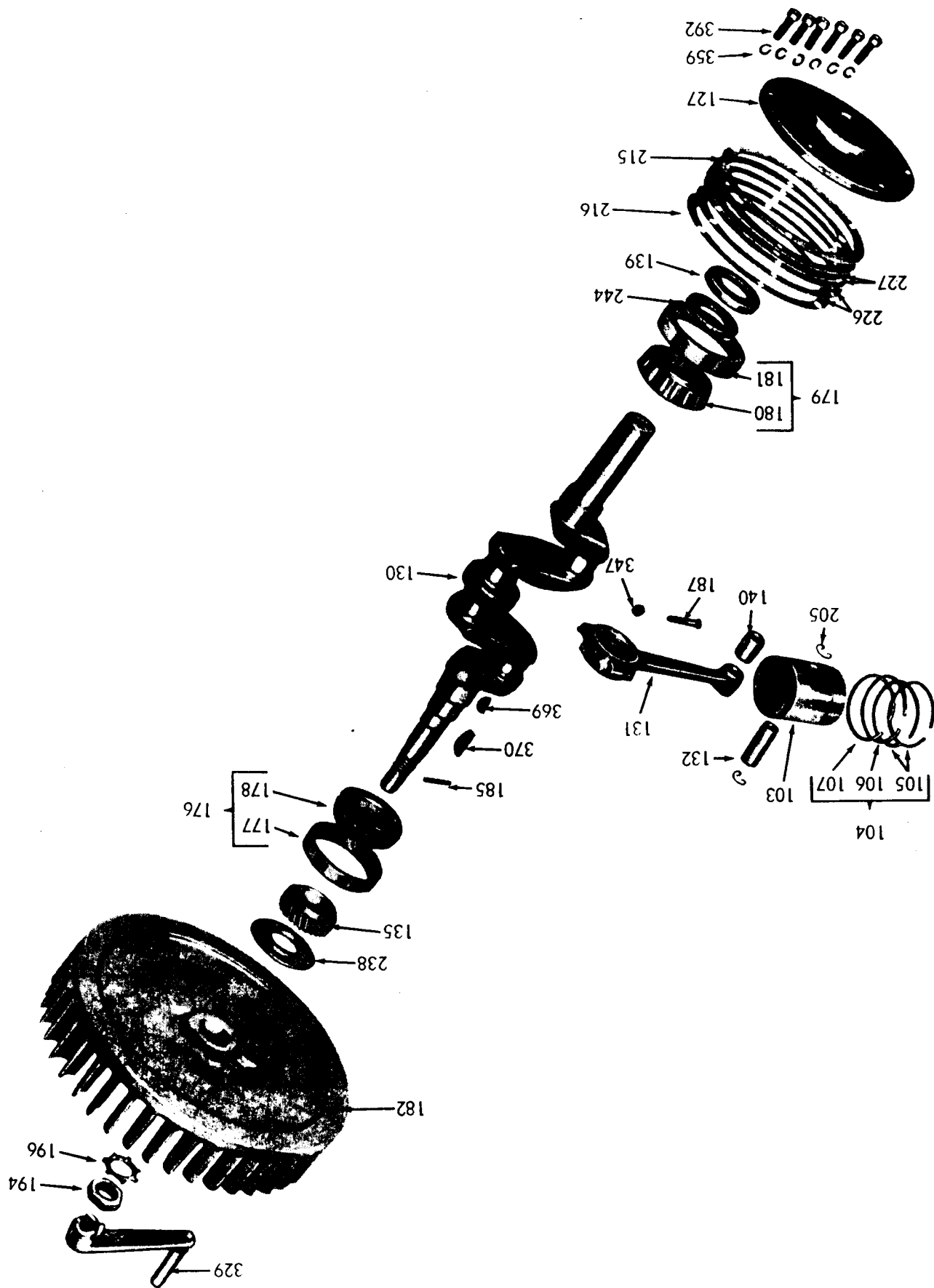
Fig. 51, MANIFOLD AND CRANKCASE GROUP

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

104809C-3

Fig. 52, CRANKSHAFT, PISTON AND CONNECTING ROD GROUP  
Parts are identified by reference number. See parts list for correct part number.

203937C-A



PARTS FOR MODELS VE4 AND VF4 ENGINES

PARTS FOR MODELS VE4 AND VF4 ENGINES

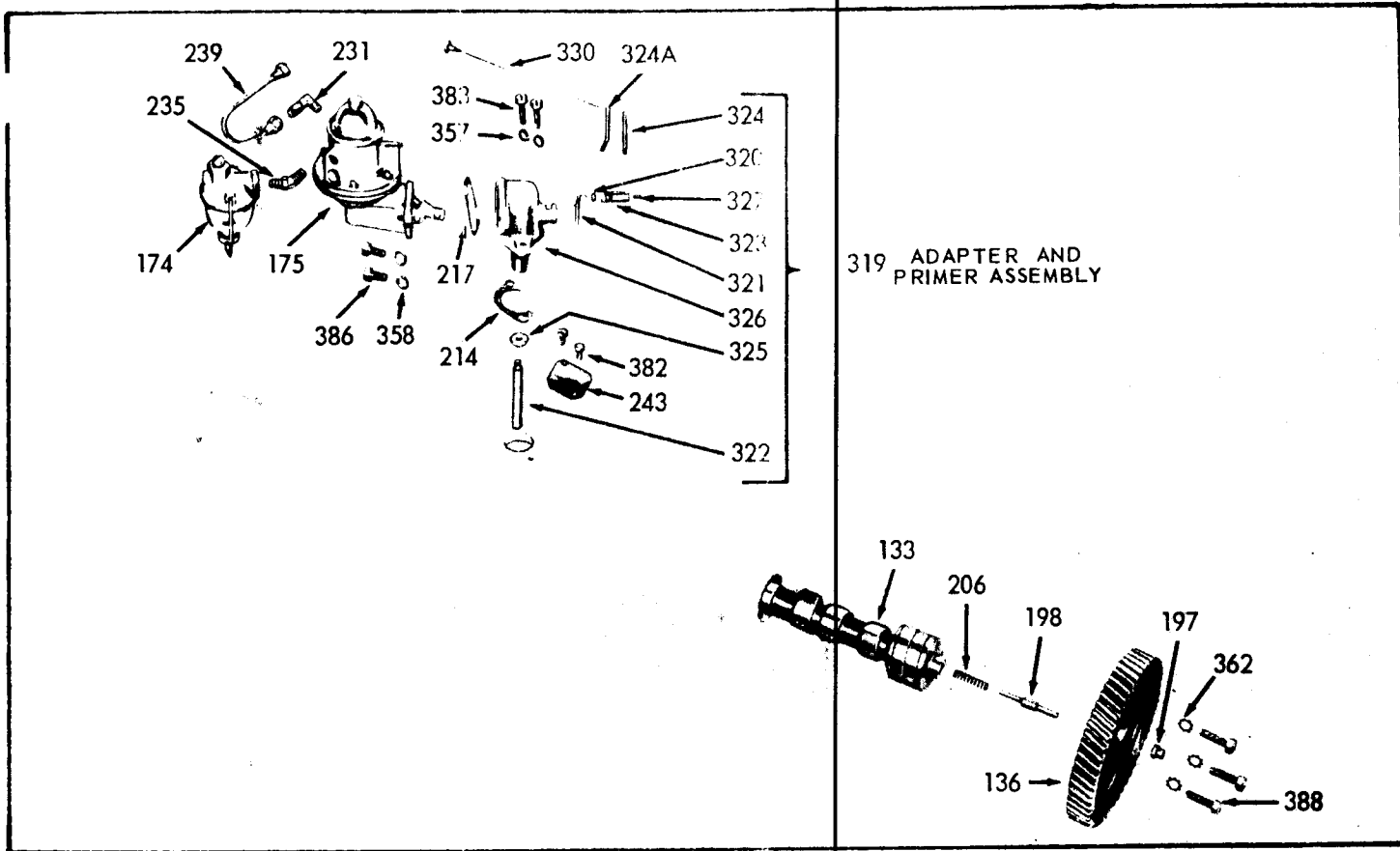


Fig. 53, CAMSHAFT AND FUEL PUMP MOUNTING GROUP

180193C-B1

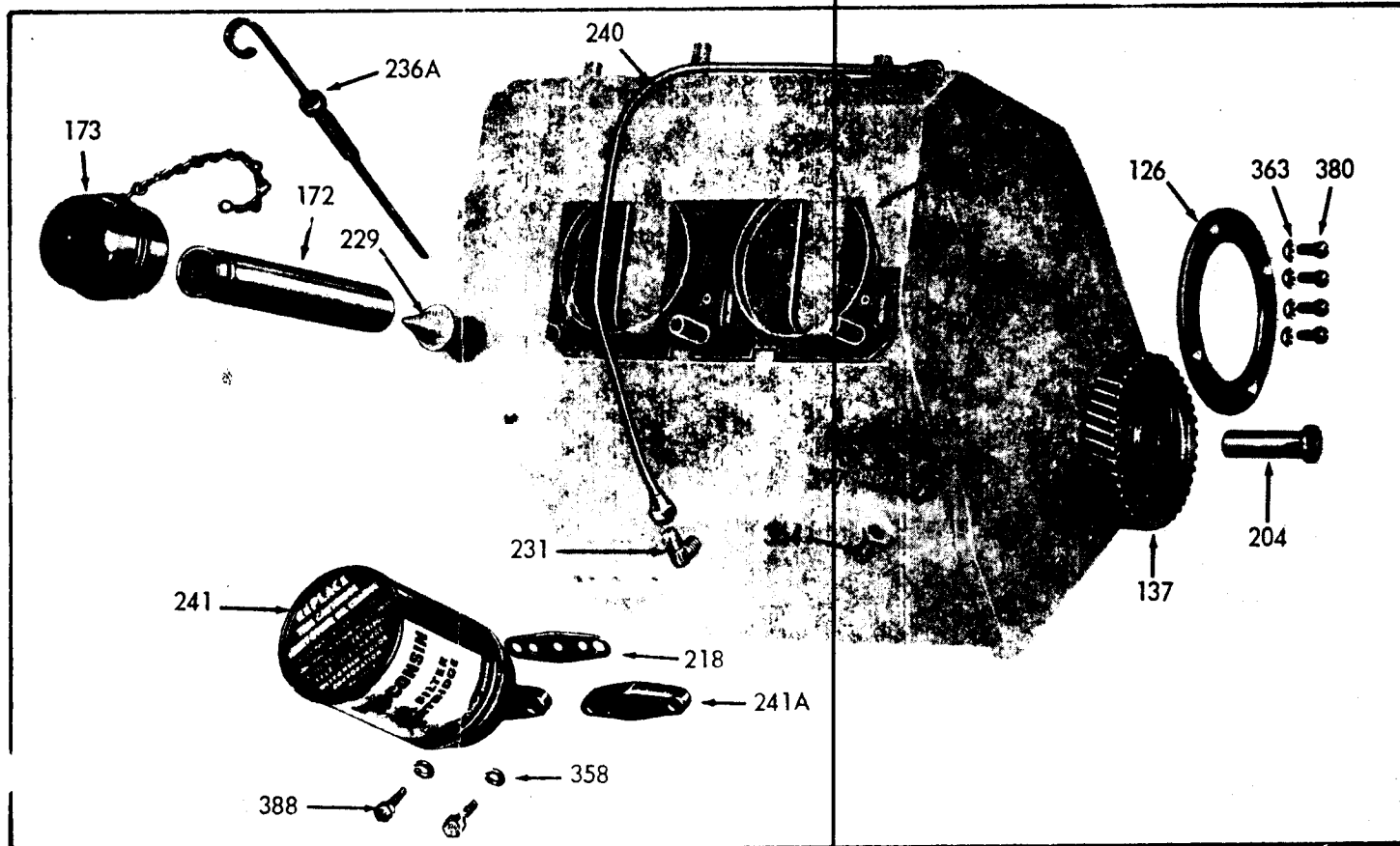


Fig. 54, OIL FILTER AND OIL FILLER MOUNTING GROUP

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

180190C-1

# PARTS FOR MODELS VE4 AND VF4 ENGINES

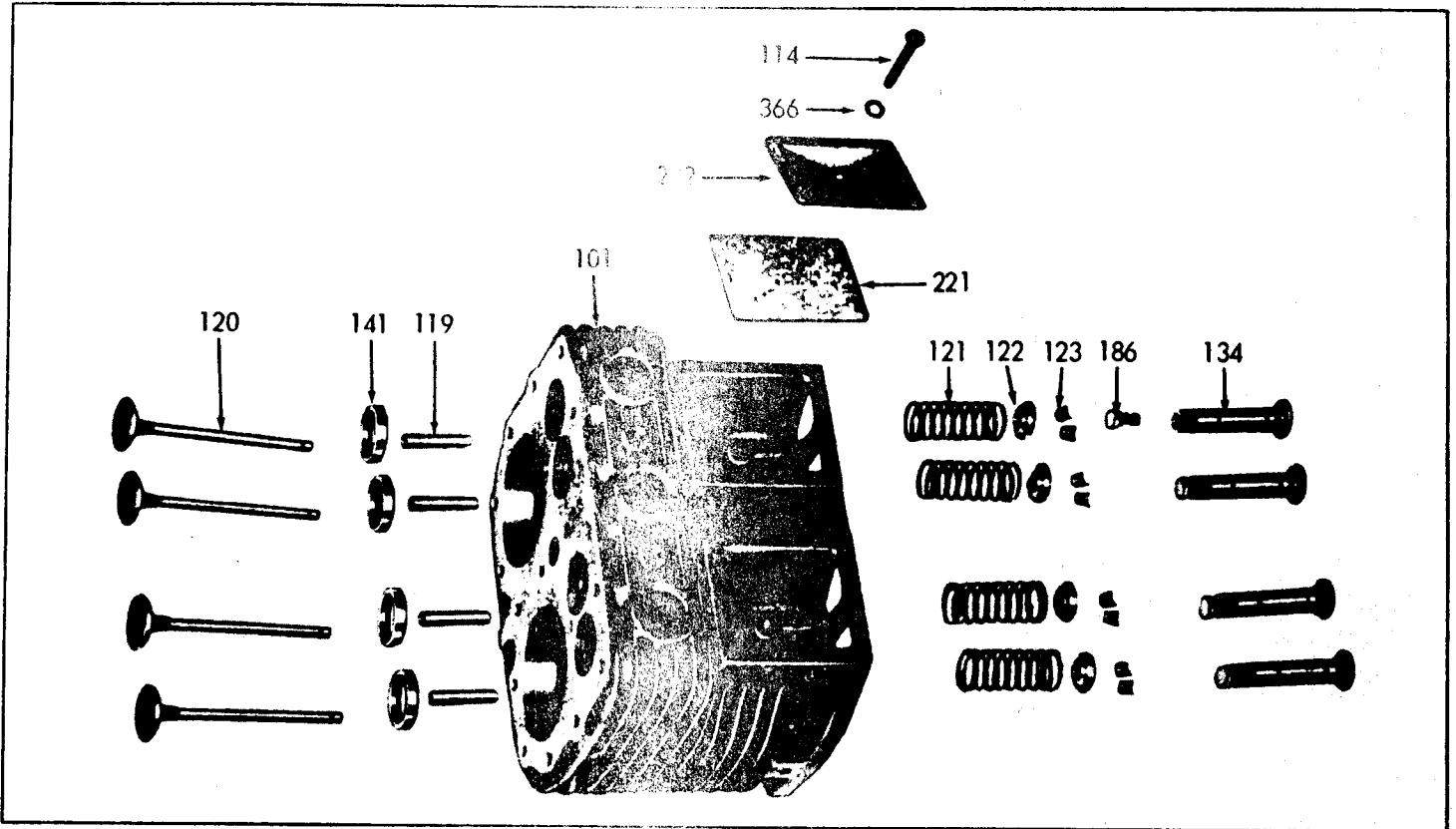


Fig. 55, CYLINDER BLOCK ASSEMBLY

70506C-2

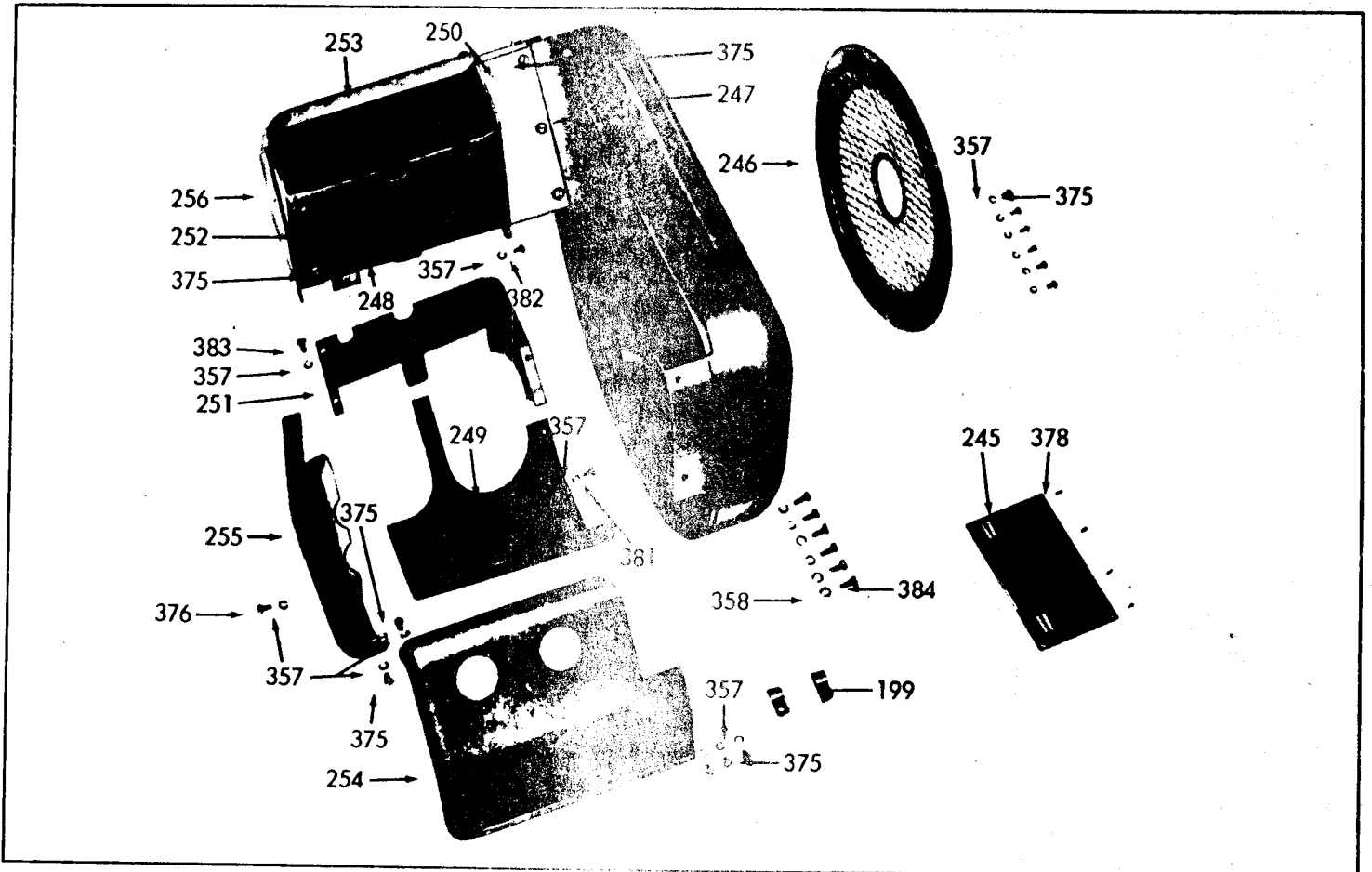


Fig. 56, AIR SHROUDING

219076C

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

PARTS FOR MODELS VE4 AND VE4 ENGINES

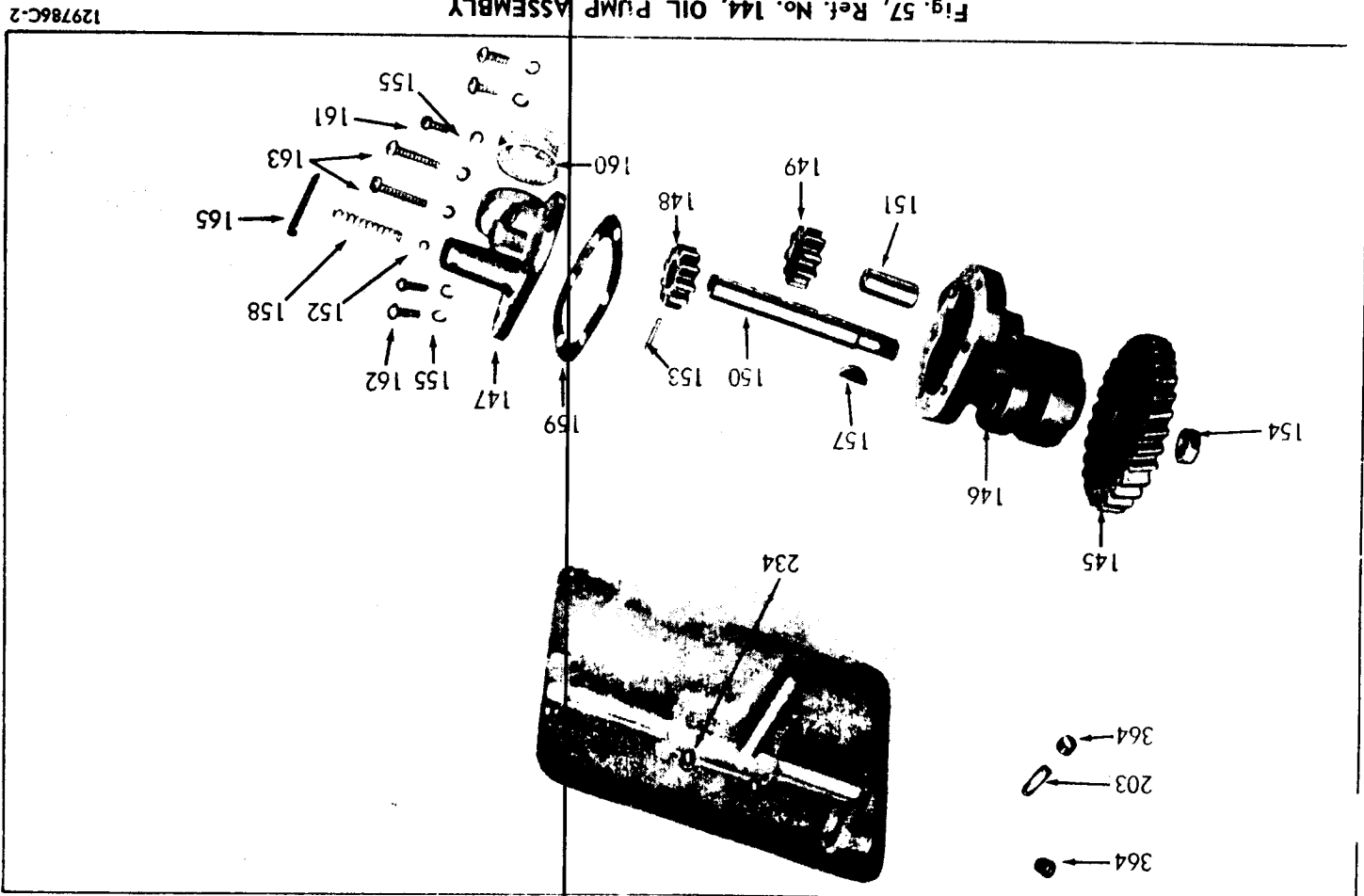


Fig. 57, Ref. No. 144, OIL PUMP ASSEMBLY

129786C-2

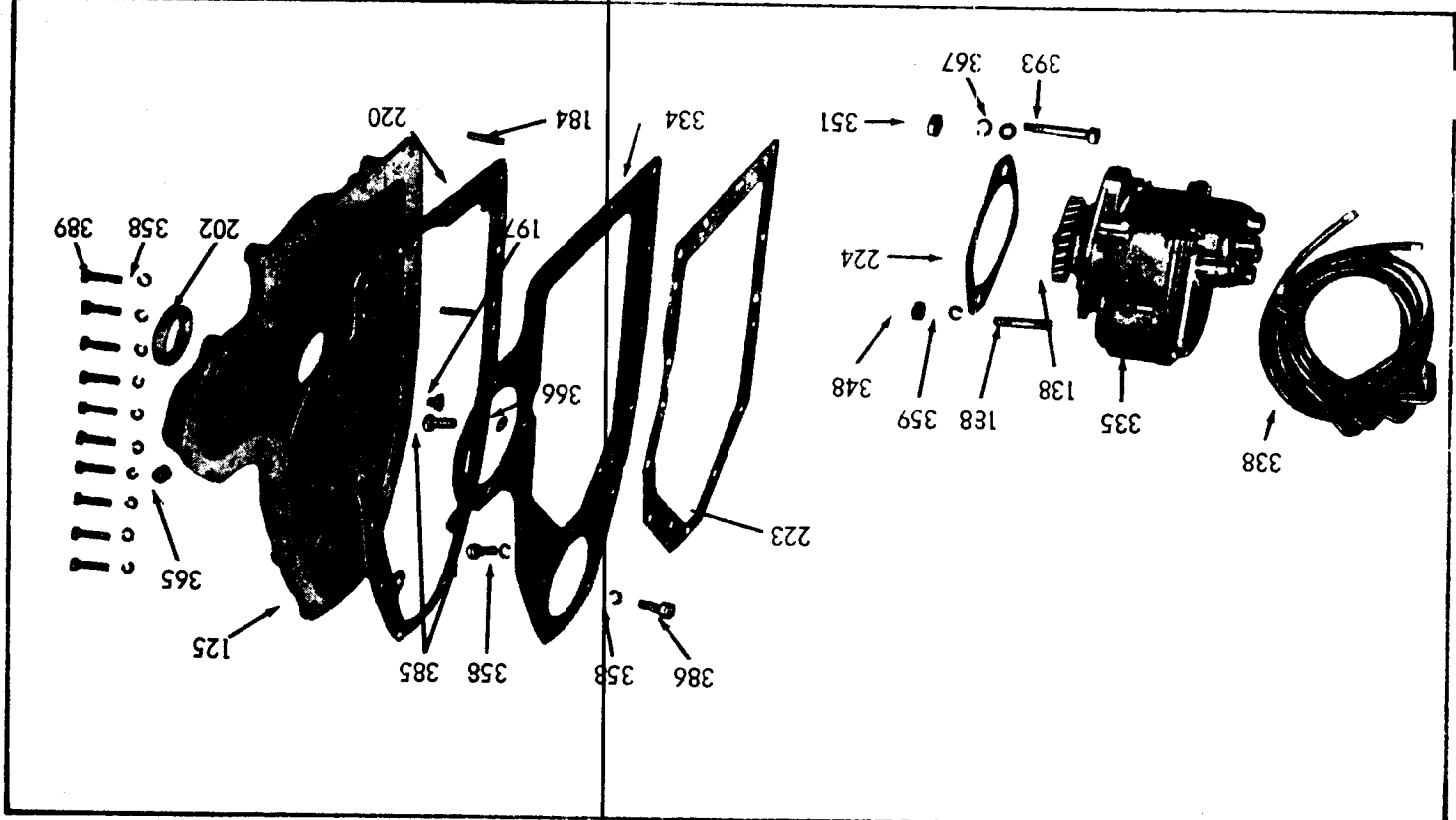
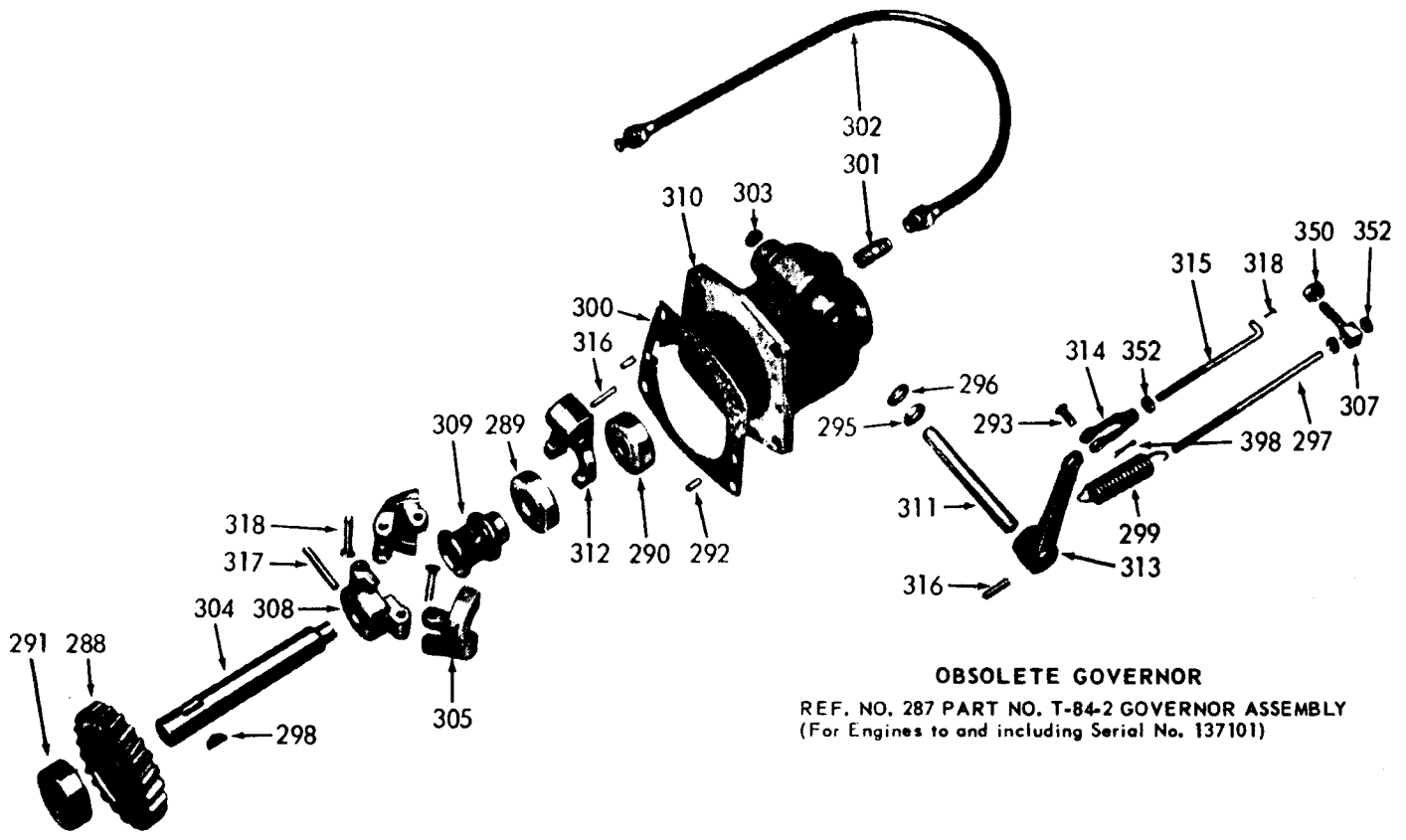


Fig. 58, MAGNETO AND GEAR COVER GROUP

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

85759C-1

PARTS FOR MODELS VE4 AND VF4 ENGINES



79486C

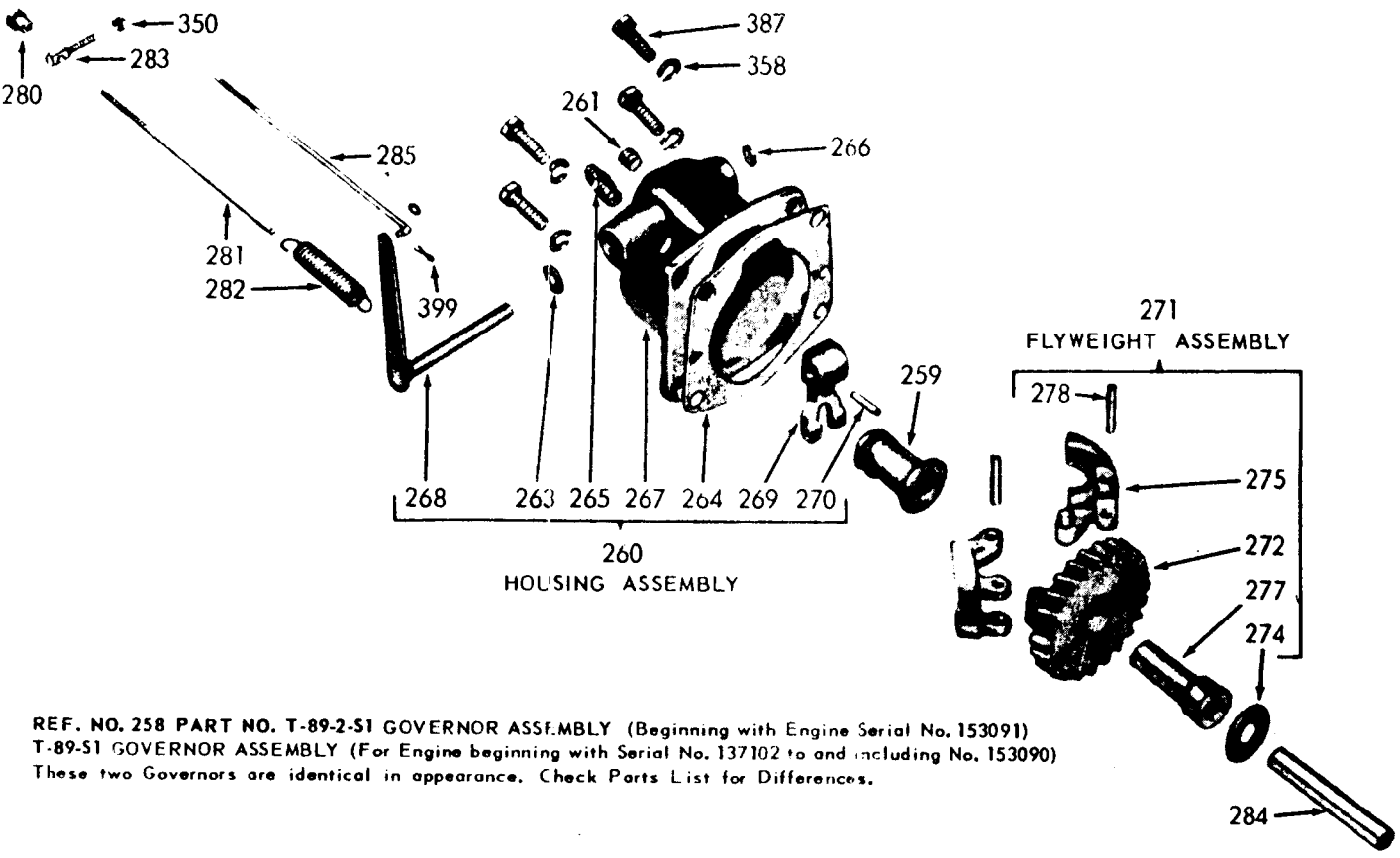


Fig. 59, GOVERNOR ASSEMBLY

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

129792C-1

PARTS FOR MODELS VE4 AND VF4 ENGINES

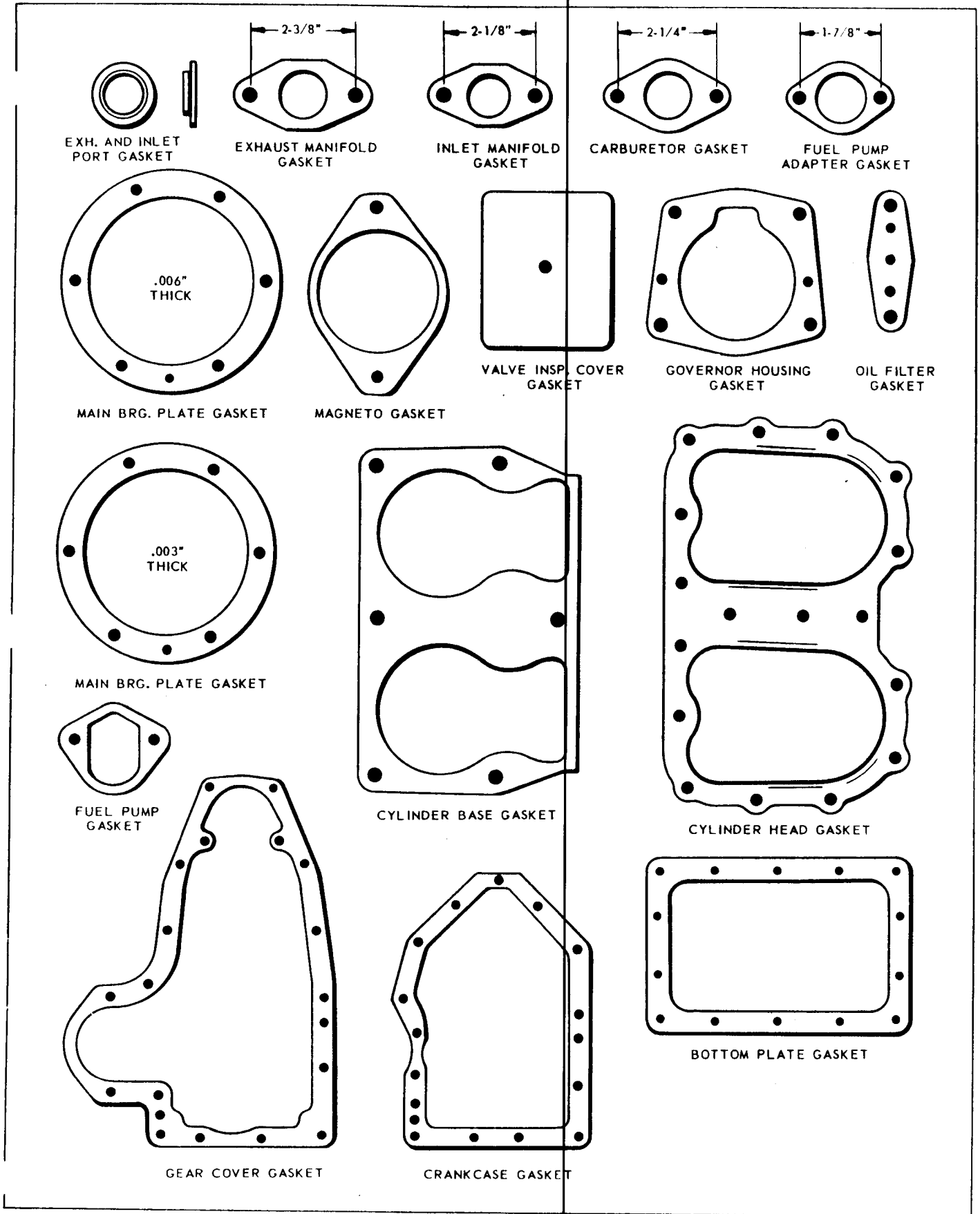


Fig. 60, Ref. No. 207, GASKET SET

# PARTS LIST

## MODELS VE4D and VF4D - 4 CYLINDER STANDARD ENGINE

This list is for a standard engine without house. If power unit house parts are required, refer to Page 47.

**THE FOLLOWING PARTS ARE NOT INTERCHANGEABLE BETWEEN MODELS VE4D AND VF4D**

**ENGINES WITHOUT STELLITE EXHAUST VALVES, STELLITE SEAT INSERTS, AND POSITIVE TYPE EXHAUST VALVE ROTATORS, WERE DESIGNATED AS MODELS VE4 AND VF4.**

### PARTS LIST MODEL VE4D

### PARTS LIST MODEL VF4D

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
101	AA-85-S23	<b>CYLINDER BLOCK ASSEMBLY</b> ..... Complete, but with <b>STELLITE</b> exhaust valves and seat inserts, and with exhaust <b>VALVE ROTATORS</b> . AA-85-S2, AA-85-S6, AA-85-S22, replaced by AA-85-S23.	2	31		101	AA-86A-S30	<b>CYLINDER BLOCK ASSEMBLY</b> ..... Complete, but with <b>STELLITE</b> exhaust valves and seat inserts, and with exhaust <b>VALVE ROTATORS</b> . AA-86-S5, AA-86A-S5, AA-86A-S6, AA-86A-24, replaced by AA-86A-S30.	2	30	
102	AB-100-B	<b>CYLINDER HEAD</b> ..... AB-80, AB-80-A, AB-80-E, AB-80-G, replaced by AB-100-B.	2	3	13	102	AB-100-A	<b>CYLINDER HEAD</b> ..... AB-86, AB-86A, replaced by AB-100-A.	2	4	1
103	DB-208	<b>PISTON</b> , split skirt, std. size, aluminum DB-187B-2 and (DB-199 cast iron) replaced by DB-208.  Pistons are also furnished .010", .020", .030" oversize.	4		12	103	DB-190A-1	<b>PISTON</b> , can ground, standard size .... DB-190, DB-190A, split skirt piston and (DB-203 cast iron), replaced by DB-190A-1.  Pistons are also furnished .010", .020", .030" oversize.	4		13
104	DR-12	<b>PISTON RING SET</b> , standard size ..... Consisting of:	1		10	104	DR-31-C	<b>PISTON RING SET</b> , Standard size ..... Consisting of:	1		10
105	DC-163	<b>COMPRESSION RING</b> 1st and 2nd groove	8		1	105	DC-209	<b>COMPRESSION RING</b> 2nd groove ..... <b>COMPRESSION RING</b> chrome faced,	4		1
106	DC-163-1	<b>SCRAPER RING</b> 3rd groove	4		1		DC-209-B	top groove ..... <b>SCRAPER RING</b> 3rd groove	4		1
107	DC-109	<b>OIL RING</b> 4th groove	4		1	106	DC-210	<b>OIL RING</b> 4th groove	4		1
	DR-39	<b>TRI-CROME RE-RING SET</b> , std. size ..  <b>NOTE:</b> Ring sets are also furnished .010", .020" and .030" oversize.	1			107	DC-211	DB-31, replaced by DR-31-C.	4		1
							DR-42	<b>TRI-CROME RE-RING SET</b> , Std. size ..  <b>NOTE:</b> Ring sets are also furnished .010", .020" and .030" oversize.	1		8
110	L-63-S1	<b>CARBURETOR</b> with gasket, Zenith Model 68-7, No. 12098. <b>LQ-39</b> Carburetor Repair Kit ..... L-48 Zenith No. 10034-E and L-45-11, Stromberg No. 4260260, replaced by L-63-S1.  <b>NOTE:</b> The above is a standard carburetor. Special carburetors are identified by Part Number stamped on carburetor name plate. Refer to this number for service replacement carburetor or parts. See carburetor bulletins in back of manual for service replacement parts list.	1	1	12	110	L-63-S1	<b>CARBURETOR</b> with gasket ..... Zenith Model 68-7, No. 12098. <b>LQ-39</b> Carburetor Repair Kit ..... L-48-2 Zenith No. 5-632-B, and L-45-20 Stromberg No. 426041, replaced by L-63-S1.  <b>NOTE:</b> The above is a standard carburetor. Special carburetors are identified by Part Number stamped on carburetor name plate. Refer to this number for service replacement carburetor or parts. See carburetor bulletins in back of manual for service replacement parts list.	1	1	12
											8
114	XD-148	<b>SCREW</b> , 5/16"-18 thread x 1-5/8" long, hexagon head ..... For valve inspection cover plate. XD-24, 2" long - replaced by XD-148 (cover plate inverted).	4		2	114	XD-21	<b>SCREW</b> , 5/16"-18 thread x 1-1/2" long, hexagon head ..... For valve inspection cover plate. XD-22, 1-3/4" long, replaced by XD-21 (cover plate inverted).	4		2

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.



## PARTS INTERCHANGEABLE ON MODELS VE4D AND VF4D

Ref. No.	Part Number	Description	No. Net Wt.		
			Req	Lb	Oz
19	AD-41	<b>VALVE STEM GUIDE</b> for engines beginning with Serial No. 2322869 for VE4 engines and No. 2247771 for VF4 eng.	8		2
120	AE-75-B	<b>VALVE</b> , inlet ..... (For inlet and exh. in Models VE4, VF4)	4		3
	AE-75-D	<b>STELLITE EXHAUST VALVE</b> ..... Valves are also furnished with .004" oversize stem.	4		3
121	AF-49-A	<b>VALVE SPRING</b> , inlet ..... 2-5/16" free length. Spring rated at 49 pounds when compressed to approx. 1-3/8" height. (For inlet and exh. in Models VE4, VF4)	4		2
	AF-54	<b>VALVE SPRING</b> , exhaust, for <b>STELLITE</b> valves and <b>VALVE ROTATORS</b> 1-13/16" free length, rated at 85 pounds, when compressed to approx. 1-1/8".	4		2
	AF-51	<b>VALVE SPRING</b> , exhaust, with <b>STELLITE</b> valves, less valve rotators ..... 1-31/32" free length, rated at 85 pounds, when compressed to approximately 1-9/32" height.	4		2
122	AG-26	<b>SEAT</b> for valve spring, inlet ..... (For inlet and exh. in Models VE4, VF4)	4		1
	AG-31	<b>VALVE ROTATOR</b> and spring <b>SEAT</b> (exhaust) used with Stellite valves .....	4		1
123	AH-9	<b>LOCK</b> for valve spring seat .....	8 pr		1
124	See Fig. A	<b>CRANKCASE ASSEMBLY</b> ..... Consisting of: 1 Crankcase 1 LJ-300A Tube 4 RF-1143 Nozzles 12 PC-337 Studs 2 PC-396 Studs 1 RJ-173A Saber 7 PF-18 Plugs 2 SA-26 Plugs 4 PF-144 Plugs 1 SA-58 Plug 1 RC-91 Screen 2 XD-17 Screws	1	60	

**NOTE:** Beginning with engine Serial No. 3,106,939, the basic standard crankcase part number became **BA-48-C**. (With a 5-7/8" dia. bore for main bearing plate pilot.) Any special machining is indicated by a number stamped on the crankcase in the location shown in **Fig. A**. Add this number to **BA-48-C**. The further addition of **-S1A** to the Part No. (**BA-48C-dash #-S1A**) specifies a complete crankcase assembly for **VE4D** and **VF4D** engines. Order by complete number, or by engine Model, Spec and Serial Numbers.

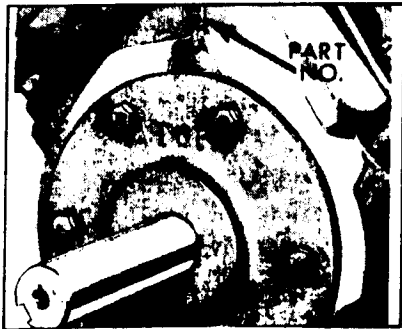


Fig. A      76638C

Ref. No.	Part Number	Description	No. Net Wt.		
			Req	Lb	Oz
		Engines previous to Serial No. 3,106,939, used a basic <b>BA-48-A</b> crankcase (with a 5 1/2" dia. bore for main bearing plate pilot), which is no longer available. For replacement, it is necessary to order a corresponding <b>BA-48-C-etc.</b> crankcase, plus a new <b>main bearing plate assembly</b> . Therefore, it is absolutely necessary that <b>Model, Specification and Serial No.</b> of engine be given when ordering new crankcase.			
125	BD-100K-S1	<b>GEAR COVER ASSEMBLY</b> , std. (Beginning with engine Serial No. 4238373 (has rough flange for flywheel alternator). Consisting of: 1 PH-299 Seal 1 BD-100K Gear cover 1 TC-388-1 Shaft 1 PF-52 Button 1 XK-3 Plug BD-100H-1-S1, replaced by BD-100K-S1.  <b>BD-100C-2-S1</b> for engine Serial No. 153091 to and incl. No. 4238372 (without flywheel alternator flange).  BD-100C-S1 Gear Cover Assembly ..... (Beginning with engine Serial 137102 to and including 153090.)  BD-100C-4-S1 Gear Cover Assembly ..... (For engines to and including Serial 137101.)	1	12	
	BD-100K-4-S1	For engine with flywheel alternator ..... BD-100K-S1, replaced by BD-100K-4-S1.	1	12	
126	BG-209	<b>BEARING RETAINER PLATE</b> ..... Flywheel end.	1		10
127	BG-210-C-52	<b>MAIN BEARING PLATE ASSEMBLY</b> , std. take-off end. (Beginning with engine Serial No. 3,106,939 and used with BA-48-C-etc. crankcase.) Consisting of: 1 BG-210C Plate 1 ME-114-2 Cup 1 HF-261 Seal 1 SD-43 Retainer  <b>BG-210-52</b> Assembly (For engines to and including Serial No. 3,106,938 and used with BA-48-A-etc. crankcase.)	1	6	
		<b>NOTE:</b> Engines equipped with a clutch, reduction or clutch reduction unit, require a special main bearing plate as specified in the rear section of this manual where these accessories are located.			
128	BH-141-A	<b>CRANKCASE BOTTOM COVER PLATE</b> <b>BH-141-A</b> , with underslung fuel tank.	1	1	8
129	BK-65	<b>ENGINE SUPPORT</b> (cast iron) .....	2	1	13
130	See Fig. B	<b>CRANKSHAFT ASSEMBLY</b> Includes: 1 GA-36A Gear 1 ME-114 Bearing 1 ME-71 Bearing 1 PL-53 Key	1	27	

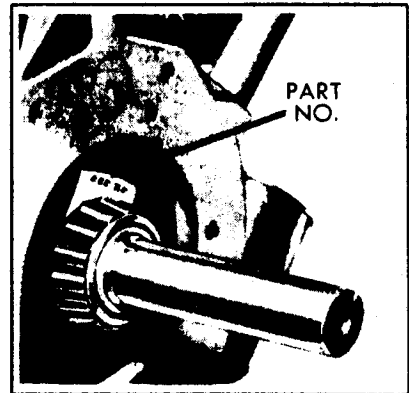


Fig. B      71057C

**Order parts from nearest WISCONSIN DISTRIBUTOR or SERVICE CENTER.**  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

## PARTS INTERCHANGEABLE ON MODELS VE4D AND VF4D

Ref. No.	Part Number	Description	No. Net Wt.		
			Req	Lb	Oz
		<p><b>NOTE:</b> The basic crankshaft part number (raised letters on side counterweight), is <b>CA-55</b>. Dash numbers are added to the basic part number to identify special machining at the take-off end. The dash (-) number will be found stamped on the cheek facing the take-off end of the shaft, as illustrated in <b>Fig. B</b>. Order by <b>complete part number</b>, (dash number added to basic number) and by giving the <b>model, specification and serial numbers</b> of the engine.</p>			
131	DA-51-C-51	<p><b>CONNECTING ROD - shell bearing type</b> 4 1 6</p> <p>Assembly includes:                      1 HC-157A Bushing                      2 PF-148 Bolts                      2 PD-246 Locknuts</p>			
		<p><b>NOTE:</b> The connecting rod is furnished <b>LESS</b> shell bearings. Refer to following <b>HA-133</b> part number for standard and undersize shell bearings available.</p>			
		DA-51B-S1 Babbitt Lined connecting rod, repl'd by DA-51-C-51 and shell bearings.			
	HA-133-5	<p><b>SHELL BEARING</b> (2 halves) ..... 4 2</p> <p>For connecting rod, standard size.</p> <p><b>NOTE:</b> The following undersize shell bearings are also available.                      HA-133-S1 ..... (.001" undersize)                      HA-133-S2 ..... (.002" undersize)                      HA-133-S10 ..... (.010" undersize)                      HA-133-S20 ..... (.020" undersize)</p>			
132	DE-65	<p><b>PISTON PIN</b>, standard size ..... 4 3</p> <p>Piston pins are also furnished .005" and .010" oversize.</p>			
133	EA-102	<b>CAMSHAFT</b> ..... 1 3 8			
134	F-61	<p><b>VALVE TAPPET</b> with lock screw ..... 8 4</p> <p>FA-40-B Tappet, replaced by F-61.</p>			
135	GA-36-A	<b>CRANKSHAFT GEAR</b> ..... 1 14			
136	GB-45-A	<b>CAMSHAFT GEAR</b> ..... 1 2 2			
137	GC-27-B-1	<b>IDLER GEAR</b> ..... 1 1 6			
138	GD-93-C-5	<p><b>MAGNETO GEAR</b> ..... 1 9</p> <p>GD-93-C, replaced by GD-93-C-5.</p>			
139	HF-261	<p><b>CORK OIL SEAL</b>, standard ..... 1 1</p> <p>For main bearing, take-off end.                      PH-364 Oil seal for engines with clutch, reduction or clutch reduction unit.</p>			
140	HG-157-A	<p><b>PISTON PIN BUSHING</b> ..... 4 1</p> <p>HC-157-A-1, replaced by HG-157-A.</p>			
141	HG-201	<p><b>VALVE SEAT INSERT</b>, inlet ..... 4 2</p> <p>(For inlet and exhaust in Models VE4 and VF4.)</p>			
	HG-201-D	<b>VALVE SEAT INSERT</b> , stellite exhaust 4 2			
144	K-95-L	<p><b>OIL PUMP ASSEMBLY</b>, complete ..... 1 3 13</p> <p>E-95-D, E-95-A and K-95 replaced by E-95-E (interchangeable as a unit).</p>			

Ref. No.	Part Number	Description	No. Net Wt.		
			Req	Lb	Oz
		<p><b>NOTE:</b> Beginning with Serial No. 3810396 the K-95-L oil pump replaces K-95-D and utilizes the same internal gears for both the drive and driven gears. Therefore, driven gear and stub shaft for old pumps are not interchangeable since gear bore diameters are not the same.</p>			
145		Pump assembly consists of:			
146	GD-94-C	Oil Pump Drive Gear (exhaust) 1 11			
	KA-61-C-51	Body -- includes: KC-56A Gear KD-122A Shaft KA-61A-1-S1, replaced by KA-61C-S1.			
147	KB-42-52	Cover Assembly, includes relief valve and screen ..... 1 11			
148	KC-56-A	Driver Gear ..... 1 1			
		KC-54-1 and KC-56-1, replaced by KC-56-A. KC-54 to and including Serial 80146, replaced by KC-59-1.			
149	KC-56-A	Driven Gear, .499-.498 I.D. beginning with Serial No. 3810396 ..... 1 1			
		KC-55-1, KC-56-2 (K-95D pump) .5015-.5005 I.D. previous to Serial 3810396. For replacement use KC-56A-1. KC-55 to and including Serial 80146. For replacement use KC-59-2.			
150	KD-121-S1	Drive Shaft with KC-56-A gear 1 4			
151	KD-122-A	Stub Shaft, for engines beginning with Serial No. 3810396 ..... 1 2			
		KD-122 (K-95D pump) previous to engine No. 3810396, no longer available, order KA-61C-S1 Body Assembly.			
152	ME-60	Check Ball, 1/4" dia. steel ..... 1 1			
153	PA-64	Pin, 1/8" dia. x 3/4" long steel straight, for driver gear ..... 1 1			
154	PD-195	Jam Lock-Nut, 7/16"-20 thread for gear mounting. 1 1			
155	PE-14	Lockwasher, No. 10 Positive ... 7 1			
		6-for cover 1-for screen			
157	PL-137	Key, No. 1 Woodruff ..... 1 1			
		For drive gear.			
158	PM-111	Spring for relief valve ..... 1 1			
159	QD-535-A	Gasket for oil pump cover (not included in gasket set) -.003" thick, for engines beginning with Serial #3795557. QD-535, .012" thick jute tag paper. For engines to and including #3795556. Not interchangeable with QD-535-A. 1 1			
160	RD-112	Screen ..... 1 1			
161	XA-7	Screw for screen, No. 10-32 thread x 3/8" long steel round head ..... 1 1			
162	XA-8	Screw for cover, No. 10-32 thread x 1/2" long steel round head ..... 4 1			
163	XA-56	Screw for cover, No. 10-32 thread x 1-1/4" long steel round head ..... 2 1			
165	XI-16	Cotter Pin for valve, 1/8" x 1" ..... 1 1			
168	LD-227-D	MANIFOLD, upper branch ..... 1 6 1			
		LD-227, replaced by LD-227-D.			
169	LD-228-S1	MANIFOLD ASSEMBLY, Lower branch Consisting of: 1 LD-228 Manifold 4 PC-171 Studs 1 XD-4 Screw for plugging top Optional manifold with double exhaust outlet. (Furnished as standard equipment on engines to & including Serial 85815). 2 3 12			

**Order parts from nearest WISCONSIN DISTRIBUTOR or SERVICE CENTER.**  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

**PARTS INTERCHANGEABLE ON MODELS VE4D AND VF4D**

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
70		LC-261-A INLET MANIFOLD .....	1	2		186	PB-169-A	VALVE TAPPET ADJUSTING SCREW ..	8		1
171		LD-226 EXHAUST MANIFOLD .....	2	4	8			For F-61 tappet. PB-147 Screw with PD-141 nut for ob- solete FA-40-B tappet.			
172	LJ-300-A	OIL FILLER TUBE .....	1		6						
173	LO-60-3	CAP for oil filler and breather .....	1		6	187	PB-148-S1	CONNECTING ROD BOLT ASSEMBLY	8		1
		LC-261, replaced by LD-226.						Consisting of: 1 PB-148 Bolt                      1 PD-246 Nut			
174	LP-19-B	FUEL STRAINER, Tillotson OW-444 ....	1		6	188	PC-110	STUD for magneto mounting .....	1		1
		NOTE: See illustration on Page 54 for service parts list of fuel strainer.				189	PC-171	STUD for lower to upper manifold .....	8		1
175	LP-38E-S1	FUEL PUMP for open engine (low dome)	1	1	8	190	PC-337	STUD for cylinder block to crankcase ....	12		2
		For replacement, LP-38H-S1 can be used.				191	PC-369	STUD for manifold to cylinder block .....	4		1
		LQ-46 Repair kit for LP-38E-S1 .....	1		2	192	PC-356	STUD for starter bracket .....	2		1
	LP-38H-S1	FUEL PUMP for power units (with rotat- ing dome and inlet connection) .....	1	12		193	PC-405	STUD for inlet to exhaust manifold .....	4		1
		LQ-47 Repair kit for LP-38H-S1 .....	1		2			For engines with LC-261A and LD-226 manifolds.			
		LP-38-S1 (high dome style pump) .....	1	11		194	PD-123	NUTS for flywheel mounting .....	1		2
		Replaced by LP-38E-S1 but for service replacement, LP-38H-S1 can be used for both LP-38-S1 and LP-38E-S1.				196	PE-66	LOCKWASHER for flywheel nut .....	1		1
		LQ-30 Repair kit for obsolete LP-38-S1	1		2	197	PF-52	BUTTON for camshaft thrust plunger ....	1		1
176	ME-71	MAIN BEARING ASSEMBLY, flywheel				198	PF-101	THRUST PLUNGER for camshaft .....	1		1
		end. Consisting of: .....	1	1	14	198A	PF-144	PLUG for 7/16"-14 taps in face of case	4		1
77		ME-69-1 Bearing cup - Timken 414 .....	1		12	199	PG-314	CLIP for spark plug ignition cables .....	2		1
178		ME-71-1 Bearing cone - Timken 420 .....	1	1	2	200	PG-475	BRACKET for choke control .....	1		2
179	ME-114	MAIN BEARING ASSEMBLY, take-off end	1	3				PG-319-A, replaced by PG-475.			
		Consisting of:				202	PH-299	OIL SEAL for crankshaft, flywheel end	1		2
180		ME-114-1 Bearing cone - Timken 3382 ..	1	2	4	203	PI-143-B	LOCKSCREW for oil pump. Beginning			
181		ME-114-2 Bearing cup - Timken 3328 ....	1		12			with engine Serial 145636 .....	1		1
182	NC-140-G	FLYWHEEL, standard .....	1	33	8			PI-143-A, replaced by PI-143-B. PI-143 Lockscrew, to and including en- gine Serial 145635 .....	1		1
		NC-140 and NC-140-D, replaced by NC-140-G.				204	PJ-105	STUD for idler gear .....	1		5
		NC-140G-1-S1 for engines with electric starter .....	1	34	8	205	PK-52	RETAINING RING for piston pin .....	8		1
		Includes:				206	PM-108	SPRING for camshaft thrust plunger .....	1		1
		GH-44 Ring Gear .....	1		13	207	Q-12-J	GASKET SET (Fig. 60) Consisting of:	1		8
		NC-140-1-S1 and NC-140D-1-S1, replaced by NC-140G-1-S1.						6 QB-75      3 QD-527-C    4 QD-612-A 2 QB-78      3 QD-527-D    2 QD-613-C 2 QB-79      1 QD-538-A    1 QD-614 3 QC-71-A    1 QD-595-A    2 QD-615-A 1 QD-67      1 QD-610-A    1 QD-616 2 QD-527-A   1 QD-611      2 QD-617 1 QD-527-B Q-10-B and Q-12-B, replaced by Q-12-J.			
		FLYWHEELS for Flywheel Alternator, refer to electrical equipment section of parts list.									
		NOTE: Because of the numerous variations in flywheels; for mounting rotating screens, stub shafts, alternators, etc., only the standard and ring gear flywheels are listed. Therefore, give Model, Specification and Serial Numbers of engine when ordering new flywheel.									
184	PA-291	DOWEL PIN for gear cover .....	2		1	-	Q-29	VALVE GRINDING GASKET SET .....	1		2
185	PA-333	PIN for starting crank .....	1		1			Consisting of:    6 QB-75 2 QB-78            4 QD-612-A 2 QB-79            2 QD-613-C			

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## PARTS INTERCHANGEABLE ON MODELS VE4D AND VF4D

Ref. No.	Part Number	Description	No. Net Wt.			Ref. No.	Part Number	Description	No. Net Wt.		
			Req	Lb	Oz				Req	Lb	Oz
209	QB-75	GASKET for manifold to cylinder block	6		1	229	RC-91	SCREEN for oil filler .....	1		1
210	QB-77	GASKET upper to lower branch manifold For engines with I.C. 201A and I.D. 220 manifolds.	2		1	230	RF-269	STRAIGHT FITTING in carburetor .....	1		2
211	QB-78	GASKET for exhaust manifold, upper to lower branch .....	2		1	231	RF-1225	ELBOW for fuel line .....	2		2
212	QB-79	GASKET for inlet manifold, upper to lower branch .....	2		1			1-for fuel pump. 1-for oil line to governor, in crankcase.			
213	QC-71-A	GASKET for carburetor flange .....	3		1	234	RF-1143	OIL SPRAY NOZZLE, short. Beginning with engine Serial No. 615486 .....	4		1
214	QD-67	GASKET for fuel pump adapter .....	1		1			Previous to engine 615486 use: RF-1121 (long), for #1 and #3 rods .....	2		1
215	QD-527-C	GASKET for bearing plate, .007" thick 5-29/32" I.D. (For engines beginning with Serial No. 3,106,939). QI-527-A, 5-17/32" I.D. (To and including Serial No. 3,106,938) .....	3		1			RF-1143 (short), for #2 and #4 rods .....	2		1
216	QD-527-D	GASKET for bearing plate, .003" thick 5-29/32" I.D. (For engines beginning with Serial No. 3,106,939). QI-527-B, 5-17/32" I.D. (To and including Serial No. 3,106,938) .....	3		1	235	RF-1397	ELBOW, 45° male, for fuel strainer mt'g.	1		1
217	QD-538-A	GASKET for fuel pump mounting .....	1		1			<b>NOTE:</b> Oil dip stick, used in conjunction with an adapter tube, replaces dip stick mounted directly into crankcase, but is not interchangeable for service. <b>Order by part number</b> indicated on blade of dip stick.			
218	QD-595-A	GASKET for oil filter mounting .....	1		1	236	RJ-173-A	DIP STICK 6-1/4" long) starter side ....	1		3
219	QD-610-A	GASKET for crankcase bottom cover ....	1		1			RJ-159 (obsolete), 3-5/8" long blade ..	2		2
220	QD-611	GASKET for gear cover .....	1		1	236A	RJ-173	DIP STICK (10" long) below oil filler ..	1		5
221	QD-612-A	GASKET for valve inspection cover plate	4		1			RJ-159C (obsolete), 7-1/8" long blade	3		3
222	QD-613-C	GASKET for cylinder head .....	2		4	237	RK-182 (Obsolete)	SPLASH PLATE for crankcase .....	2		3
223	QD-614	GASKET for gear cover spacer to case	1		1			Discontinued as of Serial No. 4479692.			
224	QD-616	GASKET for magneto flange .....	1		1	238	RK-170	OIL SLING .....	1		2
225	QD-617	GASKET for cylinder base .....	2		1	239	RM-1122	FUEL LINE, pump to carburetor .....	1		2
226	QF-33-B	SHIM for main bearing plate, .006" thick 5-57/64" I.D. (For engines beginning with Serial No. 3,106,939). * Obsolete - 2 were used - replaced by 1 QI-527-C and 2 QD-527-D. QI-33, 5-33/64" I.D. (To and including Serial No. 3,106,938) .....	2		1	240	RM-675	OIL LINE, crankcase to governor .....	1		3
227	QF-33-C	SHIM for main bearing plate, .013" thick 5-57/64" I.D. (For engines beginning with Serial No. 3,106,939). <b>NOTE:</b> 2 were required - use same quantity of shims and gaskets as were removed, to give .002" to .004" end play. QI-33-A, 5-33/64" I.D. (To and including Serial No. 3,106,938) .....	2		1	241	-----	OIL FILTER, consisting of: RV-40-S4 CARTRIDGES (4 pack) .....	1	3	4
								RV-40A-1 BASE ASSEMBLY .....	1	1	1
								<b>NOTE:</b> Beginning with engine Serial No. 3408750, the RV-29-A oil filter is replaced by a <b>BASE ASSEMBLY</b> and <b>CARTRIDGE</b> listed above. Replacement cartridges are not interchangeable, therefore RV-29-S4 cartridges must be used for obsolete RV-29-A oil filter. Part number is located on top of cartridge for identification.			
						241A	SA-65-C	PAD COVER, for engine less oil filter	1		4
						242	SA-68	COVER PLATE for valve inspection ..	4		9
						243	SA-69	COVER for engine without fuel pump. ..	1		2
						244	SD-43	RETAINER for main bearing oil seal cork, take-off end .....	1		1
						245	SD-248	INSTRUCTION AND NAME PLATE .... When ordering name plate, give Model, Specification Number and Serial Number for correct stamping. SD-115-N, replaced by SD-248.	1		1
						246	SE-20-B-3	SCREEN for flywheel shroud .....	1	1	2

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**PARTS INTERCHANGEABLE ON MODELS VE4D AND VF4D**

Ref. No.	Part Number	Description	No.		Net Wt.		Ref. No.	Part Number	Description	No.		Net Wt.	
			Req	Lb	Oz	Req				Lb	Oz		
		<b>NOTE:</b> Beginning with engine Serial No. 4238373, the SE-74-Y series of flywheel shrouds replaces the SE-74-V series, because of a gear cover alteration for mounting flywheel alternator. The new shrouds are interchangeable if gear cover is replaced, or by omitting use of the two center screws for attaching flywheel shroud to gear cover.											
247	SE-74-Y	<b>FLYWHEEL SHROUD</b> , for std. engine and power unit. (No pad for air cleaner) SE-74, SE-74-V, replaced by SE-74Y (See note).	1	11			264	QD-615A	Housing gasket	1	1		
		SE-74-YA With pad for mounting starter SE-74-A, SE-74-VA, repl'd by SE-74-YA.	11	8			265	RF-269-2	Straight fitting	1	1		
		SE-74-YC with pads for air cleaner and starter mounting	12				266	SA-52	Plug-1/2" expansion	1	1		
		SE-74-V, SE-74-VG, repl'd by SE-74-YC.					267	TC-395	Housing	1	1	14	
248	SE-75-B	<b>LOWER CYLINDER SHROUD</b> , R. H. side	1	14			268	TC-398	Cross shaft and lever	1	2		
249	SE-76-B	<b>LOWER CYLINDER SHROUD</b> , L. H. side	1	12			269	VB-151	Yoke	1	3		
250	SE-80	<b>SIDE COVER</b> , flywheel shroud	1	4			270	XH-1	Pin for yoke--#0 x 3/4" taper	1	1		
		<b>NOTE:</b> The remaining shroud parts, Ref. 251, 252, 253, 254, 255, 256, have been redesigned and are used on engines beginning with Serial No. 2,631,413. The old style shrouding is available for service as these are not interchangeable unless all 3 matching parts for either bank of cylinders is ordered.					271	TC-405	<b>FLYWEIGHT ASSEMBLY</b>	1	1		
251	SE-77-C	<b>CYLINDER HEAT DEFLECTOR</b> , Left hand side, beginning with Serial 2631413. SE-77-A, to and including Serial 2631412.	1	11			272		Includes:				
252	SE-77-D	<b>CYLINDER HEAT DEFLECTOR</b> , Right hand side, beginning with Serial 2631413. SE-77-B, to and including Serial 2631412.	1	14			273	GD-100A	Gear	1	7		
253	SE-78-C	<b>CYLINDER HEAD SHROUD</b> , Right hand side, beginning with Serial 2631413 SE-78-A, to and including Serial 2631412.	1	14			274	PH-313A	Bushing washer	1	1		
254	SE-79-C	<b>CYLINDER HEAD SHROUD</b> , Left hand side, beginning with Serial 2631413 SE-79-A, to and including Serial 2631412.	1	1			275	TC-322D-S1	Flyweight assembly	2	3		
255	SE-82-C	<b>REAR SHROUD COVER</b> , Left hand side Beginning with Serial 2631413. SE-82-B, to and including Serial 2631412.	1	15					Includes TC-328D Thrust pin.				
256	SE-83-C	<b>REAR SHROUD COVER</b> , Right hand side Beginning with Serial 2631413. SE-83-B, to and including Serial 2631412.	1	15			277	TC-322-A	replaced by TC-322-D-S1.				
258	T-89-2-S1	<b>GOVERNOR ASSEMBLY</b> , Beginning with engine Serial 153091 (Fig. 59) consisting of:	1	3	3		278	TC-389A-1	Gear bushing	1	2		
259		TC-391-B Thrust sleeve and bearing .. TC-391 & TC-391A, repl'd by TC-391B.	1	2			280	PA-340	Flyweight roll pin	2	1		
260		TC-395-S1 Housing assembly	1	2	2		281	XJ-47	Rivet or PA-265 Pin with 2 XI-33 Cotter Pins replaced by PA-340, but drill out holes in governor gear to .196 (No. 9 drill).				
261		PF-18 Pipe plug-1/8" slotted	1	1			282		<b>NOTE:</b> The following governor linkage parts are not included in the T-89-2-S1 governor assembly.				
263		PH-571 Oil seal for cross shaft (Niprene) Mount with lips in. IFE-118-A cork seal & PF-118 retainer replaced by PH-571.	1	1			283	PD-173A	Governor adjusting screw nut	1	1		
							284	PI-115F	Governor adjusting screw	1	3		
							285	PM-76	Governor spring	1	1		
								TC-367	Adjusting screw pin	1	1		
								TC-388-1	Governor drive shaft	1	3		
								VE-464	Governor control rod	1	1		
									<b>GOVERNOR ASSEMBLY</b> , Beginning with engine Serial 137102 to and including 153090	1	3	3	
									This governor is the same as T-89-2-S1 with the following exceptions:				
									TC-405-1 Flyweight assembly in place of TC-405	1			
									TC-389 Gear bushing in place of TC-389A-1			2	
									TC-388 Governor drive shaft in place of TC-388-1			3	
									<b>GOVERNOR ASSEMBLY</b> , To and including engine Serial 137101	1	6		
									Consisting of:				
									GD-95A Governor gear	1	9		
									ME-100 Thrust bearing, Nice 5774 or ME-138 (Nice 607), Use TC-340-S1 Assembly	1	6		
									ME-111 Housing bearing	1	6		
									ME-112 Shaft bearing	1	6		
									PA-294 Housing dowel pin	2	1		
									PA-251 Yoke pin	1	1		
									PF-118 Cross shaft seal retainer	1	1		
									PH-318 Cross shaft seal	1	1		
									PT-115B Adjusting screw	1	2		
									PL-21 Gear key--Woodruff No. 3	1	1		
									PM-76 Governor spring	1	1		
									QD-615A Housing gasket	1	1		
									RF-269-2 Straight fitting	1	1		
									RM 980 Oil line to crankcase	1	4		
									SA-52 Plug-1/2" expansion	1	1		
									TA-112 Drive shaft	1	6		
									TC-322D-S1 Flyweight assembly	2	3		
									Includes TC-328D Thrust pin. TC-322A, replaced by TC-322D-S1.				

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**PARTS INTERCHANGEABLE ON MODELS VE4D AND VF4D**

Ref. No.	Part Number	Description	No.			Ref. No.	Part Number	Description	No.		
			Req	Lb	Oz				Req	Lb	Oz
307		TC-330 Adjusting screw pin .....	1			335	Y-106-S1	MAGNETO, with gear, FAIRBANKS-MORSE No. FMZV4B7 .....	1	5	8
308		TC-346B Flyweight hub .....	1					Y-74-S1 (FMXV4137) and Y-41-S1 (FMXV4137) replaced by Y-106-S1.			
309		TC-348-S1 Thrust sleeve and bearing .....	1					YQ-6 Points and Condenser Kit .....			2
		TC-348A-S1, replaced by TC-348-S1.						YQ-3 Overhaul Kit .....			6
310		TC-363 Housing .....	1	2			OPTIONAL				
311		TC-364 Cross shaft .....	1				Y-54-S1	WICO No. XH-1343B magneto with gear Y-37C (J-1343), replaced by Y-54-S1.	5		10
312		VB-98A-2 Yoke .....	1					YQ-5 Points and Condenser Kit .....			2
313		VB-132 Lever (Give engine Serial Number when ordering) .....	1					YQ-2 Overhaul Kit .....			6
314		VF-158-1 Control rod yoke .....	1								
315		VE-273B-1 Control rod .....	1								
316		XH-1 Pin, No. 0 x 1/4" long, taper XH-2, replaced by XH-1.	2								
317		XH-9 Pin, No. 2 x 1/4" long, taper	1								
318		PA-340 Flyweight roll pin .....	2								
		XJ-47 Rivet or PA-265 fulcrumpin with 2 XI-33 cotter pins, replaced by PA-340, but drill out holes in flyweight hub to .196 (No. 9).									
319	TF-96	<b>FUEL PUMP ADAPTER and PRIMER ASSEMBLY</b> (with straight handle, for open engine).	1	1		336	YD-6-S1	<b>SPARK PLUG, 18mm, CHAMPION</b> No. [J-16-J] .....	4		2
	TF-96-6	<b>ADAPTER and PRIMER ASSEMBLY</b> .... (with bent handle for power units with fuel pump). Both assemblies consist of the following parts, except where noted.	1	1			YD-6-S2	<b>AC</b> No. C86 Commercial .....			
							YD-20	<b>RUBBER NIPPLE</b> for magneto towers .. (Not illustrated)	4		1
320		JK-50 Packing ring .....	1	1		338	YL-100-A	Set of Magneto Ignition Cables with integral molded spark plug boot .....	1		12
321		PM-145 Spring .....	1	1				Consisting of:			
322		TA-111-1 Plunger (TA-116 must also be ordered) .....	1	1				YL-339-26 Cable for No. 1 cylinder ....	1		3
323		TA-114-S1 Shaft with JK-50 packing For TF-96 assembly.	1	1				YL-339-34 Cable for No. 2 cylinder ....	1		3
		TA-114C-S1 For TF-96-6 assembly .....	1	1				YL-339-32 Cable for No. 3 cylinder ....	1		3
324		TA-115 Handle (straight) .....	1	1				YL-339-38 Cable for No. 4 cylinder ....	1		3
		For TF-96 assembly.						YL-12 Terminal boots and YL-100 Cable Set, (which consisted of YL-79, YL-80, YL-81 and YL-82) is replaced by YL-100A Cable Set, but YD-294 Spark plug post terminal nut must be ordered for use with the integral molded boot.			
324A		TA-115-4 Handle (bent) .....	1	1							
		For TF-96-6 assembly.									
325		TA-116 Cap .....	1	1		345	LJ-184	<b>NIPPLE, 1/4" x 2 1/2" long, W.I. pipe</b> .... For muffler mounting.	1		5
326		Adapter, not serviced separately, order complete Adapter assembly.	1			346	PD-9	<b>NUT, 1/4"-28 thread, hexagon steel</b> .... For mounting LD-226 manifold.	4		1
327		XE-65 Set screw, for shaft in TF-96-6 assembly .....	1	1		347	PD-246	<b>LOCKNUT, 5/16"-24 thread, (special)</b> .. For connecting rod bolts. PD-10, replaced by PD-246.	8		1
329	U-212	<b>STARTING CRANK</b> .....	1	1	7	348	PD-11	<b>NUT, 3/8"-24 thread, hexagon steel</b> .... For magneto stud.	1		1
330	VE-471-4	<b>PRIMER CONTROL</b> .....	1	1		349	PD-12	<b>NUT, 7/16"-20 thread, hexagon steel</b> ... For mounting cylinder block.	12		1
		For power units with fuel pump.				350	PD-77	<b>NUT, 1/4"-20 thread, hexagon steel</b> .... For governor adjusting screw pin.	1		1
331	VE-693	<b>CHOKE CONTROL</b> .....	1	2		351	PD-79	<b>NUT, 3/8"-16 thread, hexagon steel</b> .... For magneto mounting screw.	1		1
		VE-435 and VE-575, repl'd by VE-693.				352	PD-115	<b>NUT, No. 10-32 thread, hexagon steel</b> .. 2-for governor adjusting screw. 1-for governor control rod (T-84-2 (Rev.)).	3		1
332	WD-98	<b>MUFFLER, standard, for 1 1/4" pipe tap</b> .. WI-26-A, replaced by WD-98.	1	2	1						
333	WD-66A-S2	<b>MUFFLER, for 1" pipe tap, used on engine with LD-226 manifolds</b> .....	2	1							
		WI-15, replaced by WD-66A-S2.									
334	WE-182-A	<b>SPACER</b> for gear cover .....	1	2							
		WE-182A-1, replaced by WE-182-A.									

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**PARTS INTERCHANGEABLE ON MODELS VE4D AND VF4D**

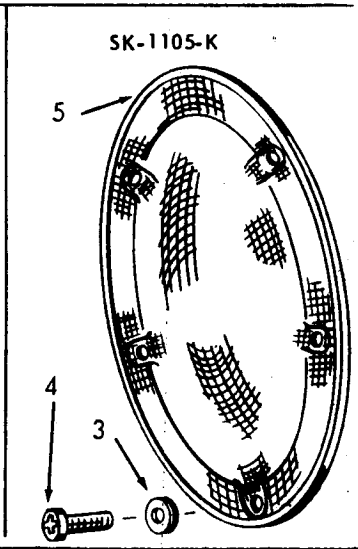
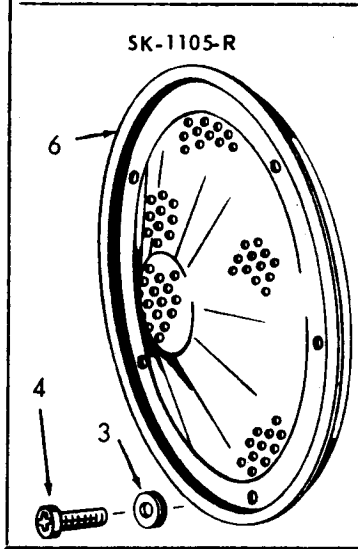
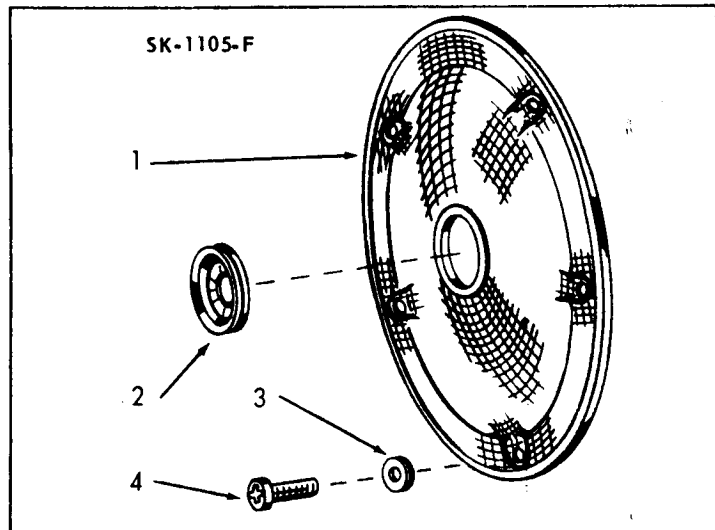
Ref. No.	Part Number	Description	No.			Ref. No.	Part Number	Description	No.		
			Req	Lb	Oz				Req	Lb	Oz
54	PD-205	<b>NUT</b> , 5/16"-24 thread (Seize proof), hexagon steel ..... For exhaust and inlet manifold studs. PD-10A, brass nut, replaced by PD-205.	8		1	369	PL-53	<b>KEY</b> , No. 8 Woodruff ..... For crankshaft gear.	1		1
355	PD-206	<b>NUT</b> , 3/8"-24 thread (Seize proof), hexagon steel ..... For manifold to cylinder block studs. PD-109, brass nut, replaced by PD-206.	4		1	370	PL-83	<b>KEY</b> , No. 23 Woodruff ..... For mounting flywheel.	1		2
357	PE-3	<b>LOCKWASHER</b> , 1/4" spring lock ..... 2-for mounting fuel pump adaptor. 6-for splash plates (obsolete). 6-for flywheel screen. 4-for LD-226 exhaust manifold. 33-for air shrouding.	51		1	372	SA-26	<b>PLUG</b> , 5/8" expansion ..... For camshaft bearing oil hole.	2		1
358	PE-4	<b>LOCKWASHER</b> , 5/16" spring lock ..... 14-for crankcase bottom cover plate. 6-for flywheel shroud to gear cover. 15-for gear cover and spacer. 4-for governor housing. 2-for fuel pump. 2-for carburetor. 2-for oil filter. 8-for lower to upper manifold.	53		1	373	SA-58	<b>PLUG</b> , 1-3/8" expansion ..... For camshaft end hole.	1		1
359	PE-5	<b>LOCKWASHER</b> , 3/8" spring lock ..... 4-for mounting manifold to cylinder. 6-for main bearing plate—take-off end. 2-for magneto.	12		1	375	XA-33	<b>SCREW</b> , 1/4"-20 thread x 3/8" long, round or indented hexagon head ..... 6-for flywheel screen. 8-for lower cylinder shroud, L & R sides. 2-for cylinder heat deflector, R.H. side. 12-for cylinder head shrouds. 3-for air shroud side cover. 2-for rear shroud cover, lower holes.	33		1
360	PE-6	<b>LOCKWASHER</b> , 7/16" spring lock ..... For cylinder block to crankcase.	12		1	376	XA-36	<b>SCREW</b> , 1/4"-20 thread x 3/4" long, round or indented hexagon head ..... 2-for rear shroud cover, top holes. 2-for cylinder heat deflector R & L.	4		1
361	PE-7	<b>LOCKWASHER</b> , 1/2" spring lock ..... For engine supports to crankcase.	4		1	377	XA-65	<b>SCREW</b> , No. 8 x 1/2" long, self-tapping, sheet metal ..... For mounting choke bracket.	2		1
362	PE-46	<b>LOCKWASHER</b> , 5/16" external 'Everlock' ..... For mounting camshaft gear.	3		1	378	XA-67	<b>SCREW</b> , No. 4 x 1/4" long, self-tapping, sheet metal ..... For mounting name and instruction plate.	4		1
363	PE-49	<b>LOCKWASHER</b> , 5/16" countersunk 'Everlock', for bearing retainer plate—flywheel end .....	4		1	OPTIONAL	<b>XJ-46-A</b>	<b>RIVET</b> , 9/64" dia. x 3/16" long, tubular steel ..... For mounting name and instruction plate to cylinder head cover.			
364	PF-18	<b>PIPE PLUG</b> , 1/8" slotted ..... 1-for oil hole to pump. 4-for oil spray nozzles. 1-for oil pump lockscrew hole. 1-for oil header.	7		1	380	XC-17	<b>SCREW</b> , 5/16"-18 thread x 1/4" long, flat head ..... For bearing retainer plate—flywheel end	4		1
365	XK-3	<b>PIPE PLUG</b> , 3/8" square head ..... For timing hole in gear cover. PI-25, slotted, replaced by XK-3.	1		2	381	XA-33	<b>SCREW</b> , 1/4"-20 thread x 3/8" long, indented hexagon head ..... For lower cylinder shrouds. XD-3, replaced by XA-33.	4		1
366	PH-14	<b>PLAIN WASHER</b> , 5/16" copper ..... 4-for valve inspection cover plate. 2-for spacer plate to crankcase (at idler gear).	6		1	382	XD-4	<b>SCREW</b> , 1/4"-20 thread x 1/2" long, hexagon head ..... 2-for fuel pump pad cover. 1-for exhaust manifold, R.H. side.	3		1
367	PH-22-A	<b>PLAIN WASHER</b> , 3/8" steel ..... For magneto mounting screw.	1		1	382	XA-34	<b>SCREW</b> , 1/4"-20 x 1/2", indented hex. hd. .... 4-for cylinder heat deflector. 6-for splash plates. Obsolete—discontinued as of serial No. 4479692.	10		
368	PH-77-A	<b>PLAIN WASHER</b> , 5/16" steel ..... For mounting cylinder heads.	34		1	383	XD-6	<b>SCREW</b> , 1/4"-20 thread x 3/4" long, hexagon head ..... 2-for cylinder heat deflector, L.H. side. 2-for fuel pump adapter. XB-75 (Allen capscrew), replaced by XD-6.	4		1
						384	XD-13	<b>SCREW</b> , 5/16"-18 thread x 1/2" long, hexagon head ..... For flywheel shroud mounting.	4		1

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# PARTS INTERCHANGEABLE ON MODELS VE4D AND VF4D

## ROTATING SCREENS

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
384	XD-172	SCREW, 5/16"-18 x 1 1/2" long, 1/8" thick hexagon head For center holes in flywheel shroud.	2	1	
385	XD-14	SCREW, 5/16"-18 thread x 5/8" long, hexagon head 14-for crankcase bottom cover plate. 5-for mounting spacer to crankcase.	19	1	
386	XD-15	SCREW, 5/16"-18 thread x 3/4" long, hexagon head 2-for mounting spacer to gear cover. 2-for mounting fuel pump.	4	1	
387	XD-16	SCREW, 5/16"-18 thread x 7/8" long, hexagon head For mounting governor housing.	4	1	
388	XD-17	SCREW, 5/16"-18 thread x 1" long, hexagon head 3-for mounting camshaft gear. 2-for mounting carburetor. 2-for oil filter mounting. PC-112 Studs for oil filter, replaced by XD-17.	7	2	
389	XD-19	SCREW, 5/16"-18 thread x 1 1/4" long, hexagon head (Special hardness) 10-for mounting gear cover. 30-for mounting cylinder heads.	40	2	
390	XD-20	SCREW, 5/16"-18 thread x 1-3/8" long, hexagon head (Special hardness) For mounting cylinder heads. XD-21 (1 1/2" long), replaced by XD-20.	4	2	
392	XD-29	SCREW, 3/8"-16 thread x 1 1/4" long, hexagon head For main bearing plate-take-off end.	6	2	
393	XD-33	SCREW, 3/8"-16 thread x 2 1/4" long, hexagon head For mounting magnets (lower hole).	1	2	
394	XD-43	SCREW, 1/2"-13 thread x 1 1/2" long, hexagon head For mounting engine supports.	4	2	
397	XE-55	SCREW, 5/16"-18 thread x 3/8" long, Allen head set For roller stud.	1	1	
398	XI-1	COTTER PIN, 1/16" x 1/2" long For governor yoke pin (T-84-2 Gov.).	1	1	
399	XI-32	COTTER PIN, 3/64" x 3/8" long For governor control rod.	1	1	
400	XK-1	PLUG, 1/8" pipe, square head For inlet manifold.	2	1	
401	XK-3	PLUG, 3/8" pipe, square head For oil drain.	1	1	
402	XK-12	PLUG, 1" pipe, countersunk head For LL-229 exhaust manifold.	2	2	



Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
<b>THE FOLLOWING REPLACE STANDARD PARTS</b>					
	NC-140G-3-S1	FLYWHEEL - Includes GH-43 Ring Gear and tapped holes for mt'g rotating screen	1	35	
	N-101-7	FLYWHEEL - for 10 amp alternator, ring gear and rotating screen	1		
	N-101-11	FLYWHEEL - for 30 amp alternator, ring gear and rotating screen	1		
	U-212-A	HAND CRANK	1	2	
<b>PER SK-1105-F</b>					
1	SE-204C-S1	ROTATING SCREEN ASSEMBLY (Consisting of:	1	2	
2	PH-426	Grommet	1	1	
3	PH-442	Washers	5	1	
-	SE-204-C	Screen	1	1	8
4	XA-104	Lok-Thread screws	5	1	1
<b>PER SK-1105-K</b>					
5	SE-204-D	ROTATING SCREEN	1	1	
<b>PER SK-1105-R</b>					
6	SE-321	ROTATING SCREEN	1	2	8

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.



# REPAIR PARTS LIST

FOR

ACCESSORIES COMMONLY SUPPLIED

ON THIS MODEL ENGINE

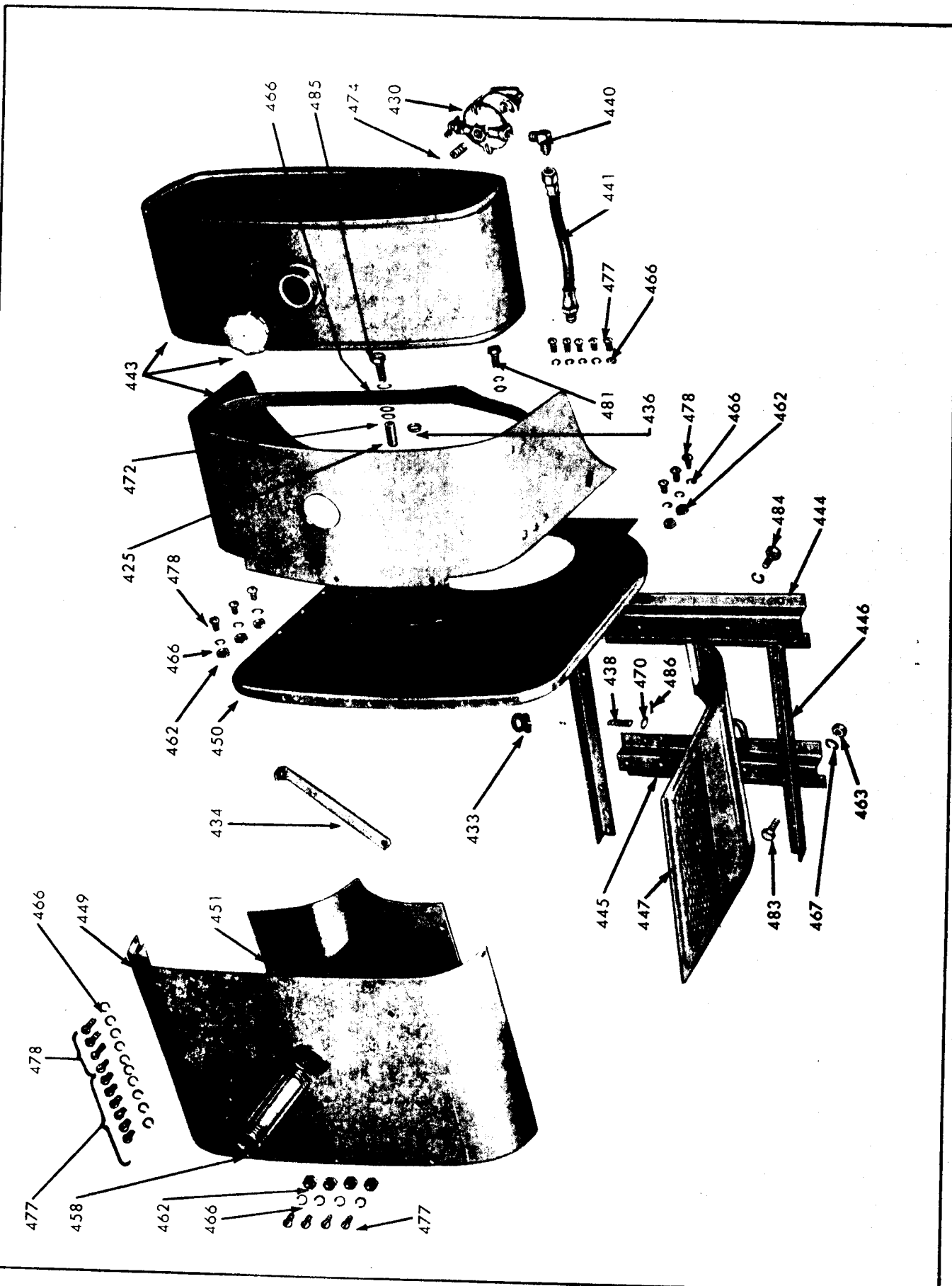


## IMPORTANT

THE FOLLOWING SECTION IS INTENDED TO BE AN AID IN SELECTING SERVICE PARTS ONLY IF THEY HAD ORIGINALLY BEEN SUPPLIED WITH THE ENGINE.

SHOULD IT BE DESIRED TO CONVERT AN ENGINE TO USE ANY ACCESSORIES, CONTACT AN AUTHORIZED DEALER OR DISTRIBUTOR BEFORE ORDERING PARTS. IN MOST CASES, A CONVERSION CAN ONLY BE MADE IF MAJOR ENGINE PARTS ARE ALSO CHANGED.

# HOUSE PARTS FOR MODELS VE4 AND VF4 ENGINES



**Fig. 60, ENGINE HOUSE WITH FUEL TANK AT TAKE-OFF END**  
 Parts are identified by reference number. See parts list for correct part number.

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HOUSE PARTS FOR MODELS VE4 AND VF4 ENGINES

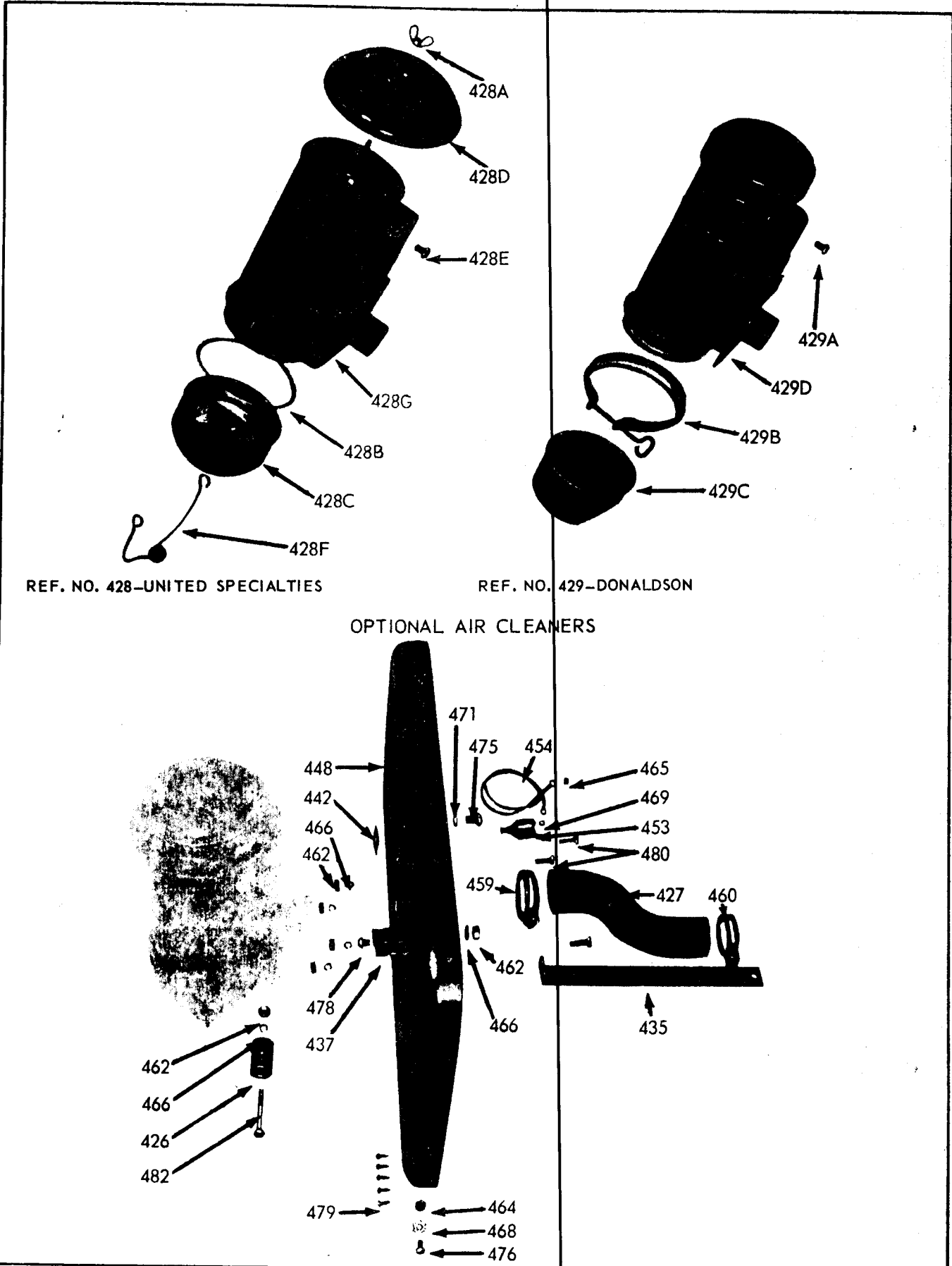


Fig. 61, END PANEL AND AIR CLEANER FOR ENGINE HOUSE WITH FUEL TANK AT TAKE-OFF END

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

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## VE4D AND VF4D ENGINE HOUSE WITH FUEL TANK AT TAKE-OFF END

Ref. No.	Part Number	Description	No.		Net Wt.		Ref. No.	Part Number	Description	No.		Net Wt.	
			Req		Lb	Oz				Req		Lb	Oz
425	HF-380	SPACER for rear panel to cylinder block	1		1		444	WE-193-A	ENGINE SUPPORT, take-off end	1	3	1	
426	HF-387	SPACER for crank mounting (Used only with LO-66 air cleaner).	1		3		445	WE-194-A	ENGINE SUPPORT, flywheel end	1	2	9	
427	LL-64	RUBBER ELBOW for air cleaner to carburetor	1		8		446	WE-195	SIDE RAILS	2	1	8	
428	LO-66-51 (Obsolete)	AIR CLEANER, United Specialties No. CT50-10505. For complete replacement use LO-158-S2. Service parts: United Specialties Part Numbers.	1		6		447	WE-196	HOUSE DOORS (Standard) WE-196-F (Bumped out to clear distributor) For units with generator and distributor on left hand side of engine. WE-196-A, replaced by WE-196-F.	2	4	8	
428A		A-1317 Wing nut	1		1		448	WE-197	FRONT PANEL (Standard) WE-197-2 (With additional holes for switch and ammeter) For units with electric starting.	1	4	4	
428B		A-9986 Gasket	1		1								
428C		A-10141 Oil cup and baffle assembly	1		8								
428D		A-10713 Top cap and screw assembly	1		6								
428E		A-10962 Screw	1		1								
428F		B-9982 Roller and ball assembly	1		3		449	WE-198-A-1	CANOPY (Beginning with engine Serial 84249) WE-198 Canopy (To and including engine Serial 84248) Not available, use WE-198-A-2 with WE-218-1 Partition plate.	1	4	5	
428G		C-10724 Body assembly (Less fittings)	1		5								
429	LO-158-S2	AIR CLEANER 4-3/8" dia. Donaldson No. FGA04-2512 Service parts: Donaldson Part Numbers.	1		4		450	WE-199-A	REAR PANEL	1	7	9	
429A		5/16-18 x 1/2" round head support screw	1		1		451	WE-218	PARTITION PLATE (Beginning with engine Serial 84249) WE-200 Plate (To and including engine Serial 84248)	1	1	14	
429B		P-9595 Clamp assembly	1		3								
429C		P-15463 Inner oil cup	1		4		453	YC-9-F-S1	GROUND SWITCH ASSEMBLY Includes: SD-109 Tag, PE-72 Lock-washer. YC-9-A, YC-9-C, repl'd. by YC-9-F-S1.	1		2	
429D		P-14889 Outer oil cup	1		6		454	YL-352-21	IGNITION WIRE, switch to magneto YL-181 replaced by YL-352-21.	1		1	
		BODY ASSEMBLY—not serviced, order complete air filter. LO-97, Donaldson No. A-4542, replaced by LO-158-S2 (Interchangeable). P-10498 Oil cup assembly must be used on LO-97 for service	1		6								
430	LP-19	FUEL STRAINER, Tillotson OW-418-T NOTE: See illustration in rear of manual for service parts list of fuel strainers.	1		12								
433	PG-323	DOOR CLIP	2		3								
434	PG-401	HOUSE BRACE, take-off end	1		6								
435	PG-402	HOUSE BRACE, flywheel end	1		7								
436	PH-198	GROMMET for fuel line	1		1								
437	PK-87	SPRING CLIP for crank mounting	1		1		458	LJ-188	NIPPLE, 1/4" x 6" long, W.I. pipe For muffler mounting.	1		12	
438	PM-137	SPRING for door clip	2		1		459	LK-8	HOSE CLAMP, 2-1/8" I.D. For air cleaner connection, cleaner end	1		1	
440	RF-1225	ELBOW for fuel strainer outlet RF-270 replaced by RF-1225.	1		1		460	LK-11	HOSE CLAMP, 1-7/8" I.D. For air cleaner connection, carburetor end.	1		1	
441	RM-1049-A	FUEL LINE, tank to carburetor	1		2		462	PD-77	NUT, 1/2"-20 thread, hexagon steel 5-for tank support to rear panel. 4-for air cleaner mounting. 4-for partition plate. 1-for crank spacer (Used with LO-66). 1-for crank spring clip.	15		1	
442	SD-109	TAG for ignition switch "To Stop Push In."	1		1		463	PD-79	NUT, 3/8"-16 thread, hexagon steel For side rails to engine supports.	4		1	
443	WE-192	FUEL TANK ASSEMBLY Consisting of: WE-192-9 Support and straps RC-77 Cap, Easy-on RC-92 and RC-92-1 Brass cap used for old style tanks with screw type flange. WE-192-4 Tank (Furnished with cap)	1	17	2								
			1	10									
			1	2									
			1	8									
			1	7									

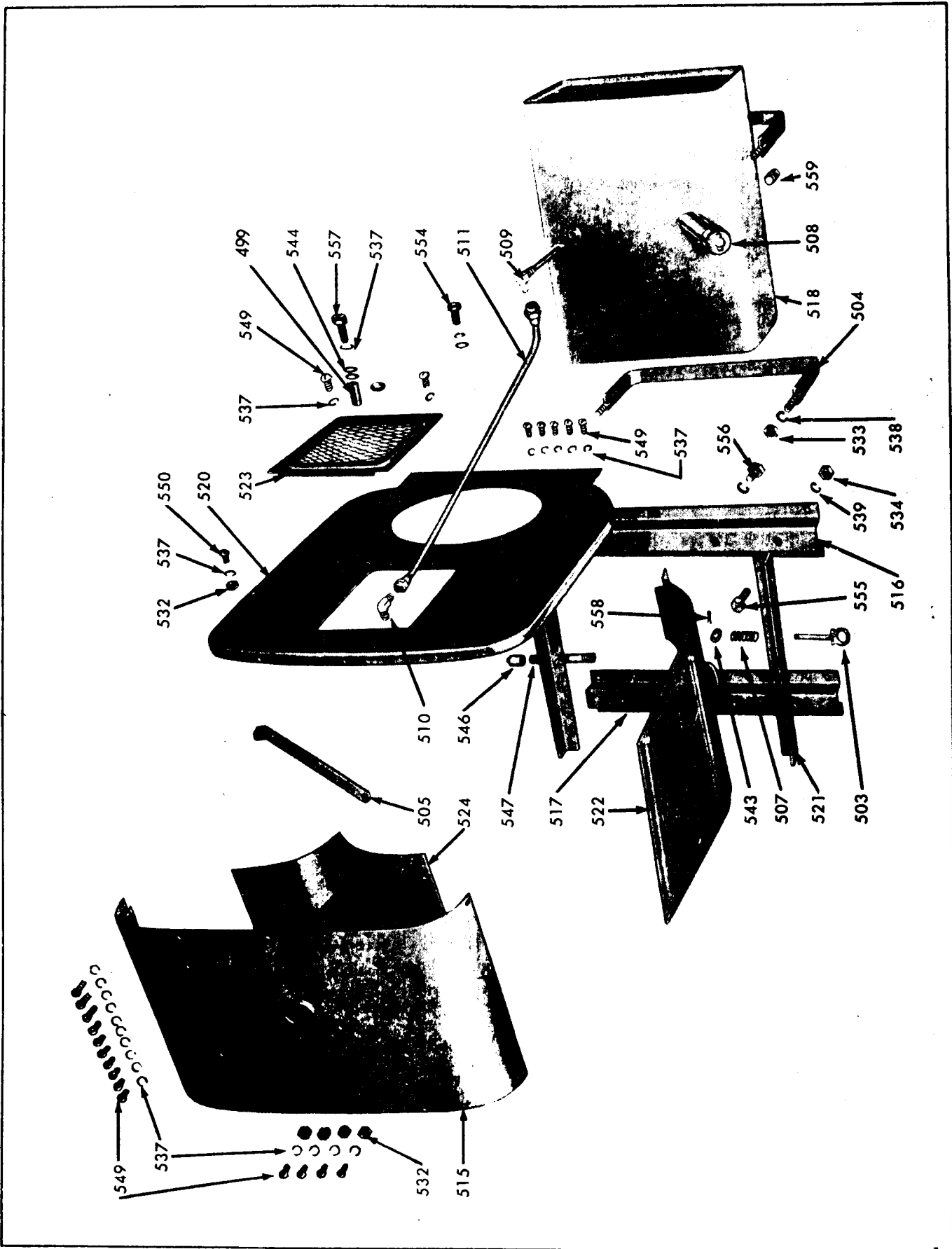
Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

## VE4D AND VF4D ENGINE HOUSE WITH FUEL TANK AT TAKE-OFF END

Ref. No.	Part Number	Description	No.			Net Wt.			Ref. No.	Part Number	Description	No.			Net Wt.		
			Req	Lb	Oz	Req	Lb	Oz				Req	Lb	Oz	Req	Lb	Oz
464	PD-115	<b>NUT</b> , No. 10-32 thread, hexagon steel .. 1-for front panel to side of shroud.	2		1				481	XD-7	<b>SCREW</b> , ¼"-20 thread x 1" long, hexagon head, for rear panel to cylinder block, R.H. side .....	1		1			
465	PD-152	<b>NUT</b> , No. 6-32 thread, hexagon steel .... 1-for magneto ignition wire.	1		1				482	XD-11	<b>SCREW</b> , ¼"-20 thread x 2" long, hexagon head, for mounting crank spacer to LO-66 air cleaner .....	1		1			
466	PE-3	<b>LOCKWASHER</b> , ¼" spring lock .....	31		1				483	XD-25	<b>SCREW</b> , 3/8"-16 thread x ¾" long, hexagon head .....	4		1			
		10-for canopy. 5-for rear panel to engine support. 6-for fuel tank support. 4-for air cleaner mounting. 4-for partition plate. 1-for crank spacer. (Used with LO-66). 1-for crank spring cup.							484	XD-41	<b>SCREW</b> , ½"-13 thread x 1" long, hexagon head .....	4		1			
467	PE-5	<b>LOCKWASHER</b> , 3/8" spring lock .....	4		1				485	XD-120	<b>SCREW</b> , ¼"-20 thread x 3¼" long, hexagon head .....	1		2			
		For side rails to engine support.									For rear panel to cylinder block, L.H. side.						
468	PE-45	<b>LOCKWASHER</b> , No. 10 external 'Everlock' for front panel to side of shroud ..	2		1				486	XI-23	<b>COTTER PIN</b> , 1/8" x 3/4" long .....	2		1			
469	PE-72	<b>LOCKWASHER</b> , ignition switch terminal	1		1						For door clip.						
470	PH-2	<b>PLAIN WASHER</b> , 7/16" I.D. x 1/16" thick steel, for door clip .....	2		1												
471	PH-77-A	<b>PLAIN WASHER</b> , 5/16" I.D. x 1/16" thick steel .....	1		1												
		For air cleaner support screw.															
472	PH-196	<b>PLAIN WASHER</b> , ¼" I.D. x 1/16" thick steel .....	3		1												
		For rear panel to cylinder block mounting.															
474	RF-794	<b>NIPPLE</b> , 1/8" x ¼" long, close pipe ..	1		1												
		For fuel strainer mounting.															
475		<b>SCREW</b> , 5/16"-18 thread x ½" long, round head .....	1		1												
		Furnished with air cleaner.															
476	XA-8	<b>SCREW</b> , No. 10-32 thread x ½" long, round head .....	2		1												
		For front panel to side of shroud.															
477	XA-33	<b>SCREW</b> , ¼"-20 thread x 3/8" long, round or indented hexagon head .....	16		1												
		7-for canopy mounting. 5-for rear panel to engine support. 4-for partition plate.															
478	XA-34	<b>SCREW</b> , ¼"-20 thread x ½" long, round or indented hexagon head .....	9		1												
		5-for fuel tank support. 3-for canopy and tank support. 1-for crank spring clip.															
478	XA-35	<b>SCREW</b> , ¼"-20 x 5/8" indented hex. hd.	1		1												
		For tank support to brace.															
479	XA-65	<b>SCREW</b> , No. 8 x ½" long, self-tapping, sheet metal .....	5		1												
		For front panel to shroud.															
480	XD-6	<b>SCREW</b> , ¼"-20 thread x ¾" long, hexagon head .....	4		1												
		For mounting air cleaner.															

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

# HOUSE PARTS FOR MODELS VE4 AND VF4 ENGINES

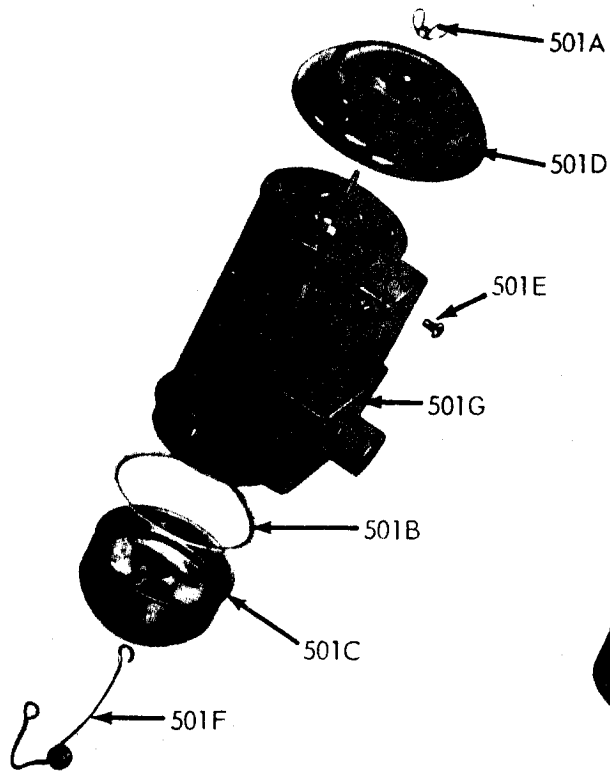


**Fig. 62, ENGINE HOUSE WITH UNDERSLUNG FUEL TANK**

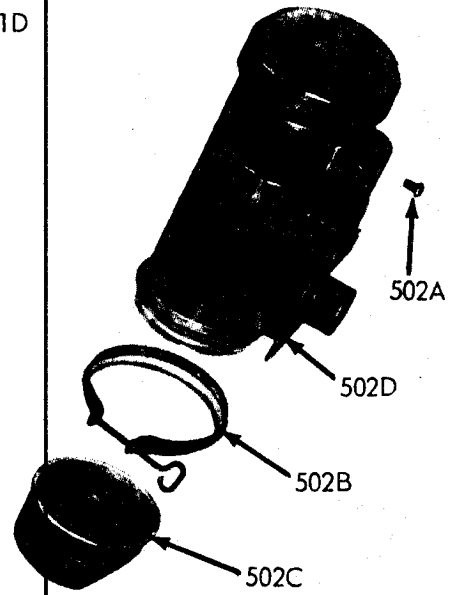
Parts are identified by reference number. See parts list for correct part number.

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HOUSE PARTS FOR MODELS VE4 AND VF4 ENGINES



REF. NO. 501-UNITED SPECIALTIES



REF. NO. 502-DONALDSON

OPTIONAL AIR CLEANERS

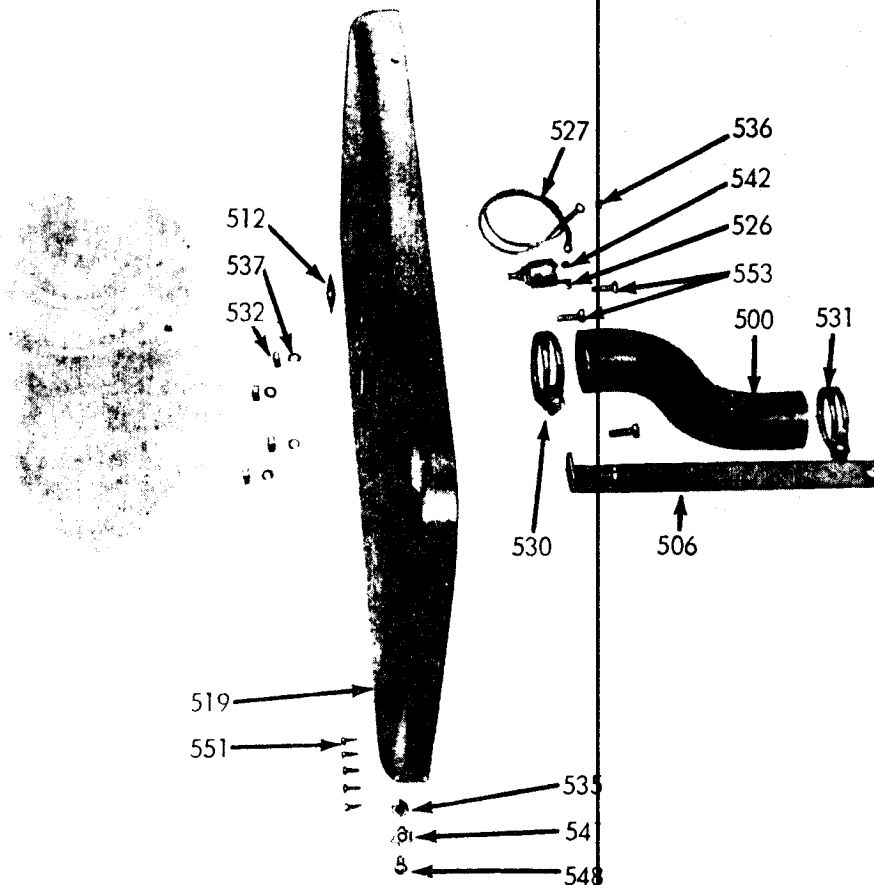


Fig. 63, END PANEL AND AIR CLEANER FOR ENGINE HOUSE WITH UNDERSLUNG FUEL TANK

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

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## VE4D AND VF4D ENGINE HOUSE WITH UNDERSLUNG FUEL TANK

Ref. No.	Part Number	Description	No.		Net Wt.		Ref. No.	Part Number	Description	No.		Net Wt.	
			Req		Lb	Oz				Req		Lb	Oz
499	HF-380	SPACER for rear panel to cylinder block	1		1		518	WE-204-S1	FUEL TANK with RC-87 cap and RM-1206C suction tube	1		9	
500	LL-64	RUBBER ELBOW for air cleaner to carburetor	1		8				WE-204A-S1 (Filler neck relocated) for units with electric starter and generator	1		9	
501	LO-66-S1 (Obsolete)	AIR CLEANER, United Specialties No. 1150-10505. For complete replacement use LO-158-S2	1		6		519	WE-206	FRONT PANEL (Standard)	1		3	10
		Service parts: United Specialties Part Numbers.							WE-206-6 (With additional holes for switch and ammeter)	1		3	10
501A		A-1317 Wing nut	1		1				For units with electric starting.				
501B		A-9986 Gasket	1		1		520	WE-207-A	REAR PANEL	1		5	10
501C		A-10141 Oil cup and baffle assembly	1		8								
501D		A-10713 Top cap and screw assembly	1		6		521	WE-208	SIDE RAIL	2		1	8
501E		A-10962 Screw	1		1								
501F		B-9982 Roller and bail assembly	1		3		522	WE-209	HOUSE DOOR	2		3	11
501G		C-10724 Body assembly (Less fittings)	1		5				WE-209-E (Bumped out to clear distributor) For units with generator and distributor on left hand side of engine.	1		3	11
502	LO-158-S2	AIR CLEANER (4-3/8" dia.) Donaldson No. FGA04-2512	1		4				WE-209-A, replaced by WE-209-E.				
		Service parts: Donaldson Part Numbers.					523	WE-211	COVER for rear panel	1			12
502A		5/16-18 x 1/4" round head support screw	1		1								
502B		P-9595 Clamp assembly	1		3		524	WE-218	PARTITION PLATE	1		1	14
		P-15463 Inner oil cup	1		4								
502C		P-14889 Outer oil cup	1		6		526	YC-9-F-S1	GROUND SWITCH ASSEMBLY	1			2
502D		BODY ASSEMBLY—not serviced, order complete air filter.							Includes: SD-109 Tag, PE-72 Lockwasher.				
		LC-97, Donaldson No. A-4542, replaced by LO-158-S2 (Interchangeable).							YC-9-A, YC-9-C, repl'd. by YC-9-F-S1.				
		P-10498 Oil cup assembly must be used on LC-97 for service	1		6		527	YL-352-21	GROUND WIRE, switch to magneto	1			1
									YL-181, replaced by YL-352-21.				
503	PG-323	DOOR CLIP	2		3				<b>STANDARD HARDWARE</b>				
504	PG-329-B	STRAP for fuel tank with 2" corner radius	2		1	3	530	LK-8	HOSE CLAMP, 2-1/8" I.D.	1			1
		PG-329-A for tank with 1-1/8" corner radius.							For air cleaner connection, cleaner end.				
505	PG-401	HOUSE BRACE, take-off end	1		6		531	LK-11	HOSE CLAMP, 1-7/8" I.D.	1			1
506	PG-402	HOUSE BRACE, flywheel end	1		7				For air cleaner connection, carburetor end.				
507	PM-137	SPRING for door clip	2		1		532	PD-77	NUT, 1/4"-20 thread, hexagon steel	9			1
508	RC-87	CAP for fuel tank	1		2				4-for air cleaner mounting.				
509	RM-1206-C	SUCTION TUBE ASSEMBLY in fuel tank	1		3				4-for partition plate.				
		RF-270 Elbow for fuel tanks with built-in suction tube	1		1		533	PD-78	NUT, 5/16"-18 thread, hexagon steel	4			1
									For tank straps to engine supports.				
510	RF-1225	ELBOW for fuel pump inlet	1		2		534	PD-79	NUT, 3/8"-16 thread, hexagon steel	4			1
		RF-320-3, replaced by RF-1225.							For side rails to engine supports.				
511	RM-900	FUEL LINE, tank to pump	1		6		535	PD-115	NUT, No. 10-32 thread, hexagon steel	2			1
									For front panel to side of shroud.				
512	SD-109	TAG for ignition switch	1		1		536	PD-152	NUT, No. 6-32 thread, hexagon steel	1			1
		"Push In"							For magneto ignition wire.				
515	WE-198A-1	CANOPY (Beginning with engine Serial 84249)	1		4	5	537	PE-3	LOCKWASHER, 1/4" spring lock	26			1
		WE-198C canopy (To and including engine Serial 84248)	1		4	5			10-for canopy.				
									4-for partition plate.				
516	WE-202-A	ENGINE SUPPORT, take-off end	1		4	10			5-for rear panel to engine support.				
									2-for cover to rear panel.				
517	WE-203	ENGINE SUPPORT, flywheel end	1		3	9			4-for air cleaner mounting.				
							538	PE-4	LOCKWASHER, 5/16" spring lock	4			1
									For tank straps to engine supports.				

**Order parts from nearest WISCONSIN DISTRIBUTOR or SERVICE CENTER.**  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.



## VE4D AND VF4D ENGINE HOUSE WITH UNDERSLUNG FUEL TANK

Ref. No.	Part Number	Description	No.		Net Wt.		Ref. No.	Part Number	Description	No.		Net Wt.	
			Req	Lb	Oz	Req				Lb	Oz		
	PE-5	LOCKWASHER, 3/8" spring lock ..... For side rails to engine supports.	4		1		550	XA-34	SCREW, 1/4"-20 thread x 1/2" long, round, or indented hexagon head ..... For house brace to panel, take-off end.	1		1	
541	PE-45	LOCKWASHER, No. 10 external 'Ever- lock', for front panel to side of shroud	2		1		551	XA-65	SCREW, No. 8 x 1/2" long, self-tapping, sheet metal, for front panel to shroud ..	5		1	
542	PE-72	LOCKWASHER, ignition switch terminal	1		1		553	XD-6	SCREW, 1/4"-20 thread x 3/4" long, hex- agon head, for air cleaner mounting .....	4		1	
543	PH-2	PLAIN WASHER, 7/16" I.D. x 1/16" thick steel for door clip .....	2		1		554	XD-7	SCREW, 1/4"-20 thread x 1" long, hex- agon head ..... For rear panel to cylinder block, R.H. side.	1		1	
544	PH-196	PLAIN WASHER, 1/4" I.D. x 1/16" thick steel ..... For rear panel to cylinder block mt'g.	3		1		555	XD-25	SCREW, 3/8"-16 thread x 3/4" long, hexagon head ..... For side rails to engine supports.	4		1	
546	RF-937	COUPLING, 3/8" W.I. pipe ..... For oil drain pipe.	1		2		556	XD-41	SCREW, 1/2"-13 thread x 1" long, hex- agon head ..... For engine supports to crankcase.	4		2	
547	RF-1086-A	NIPPLE, W.I. pipe, for oil drain ..... RF-1086 Nipple, replaced by RF-1086-A.	1		4		557	XD-120	SCREW, 1/4"-20 thread x 3/4" long, hex- agon head ..... For rear panel to cylinder block, L.H. side.	1		2	
548	XA-8	SCREW, No. 10-32 thread x 1/2" long, round, or indented hexagon head ..... For front panel to side of shroud.	2		1		558	XI-23	COTTER PIN, 1/8" x 3/4" long ..... For door clip.	2		1	
549	XA-33	SCREW, 1/4"-20 thread x 3/8" long, round, or indented hexagon head ..... 10-for canopy. 4-for partition plate. 5-for rear panel to engine support. 2-for cover to rear panel.	21		1		559	XK-1	PLUG, 1/8" square head pipe ..... For fuel tank drain.	1		1	

## YC-66-D-51 HIGH TEMPERATURE SAFETY SWITCH KIT

Ref. No.	Part Number	Description	No.		Net Wt.	
			Req	Lb	Oz	
	YC-66-D-51	HIGH TEMPERATURE SAFETY SWITCH KIT - Complete (Replaces YC-66-59) ..... Consisting of:			8	
563	PH-77	WASHER, 5/16" I.D., plain steel ..... For switch to cylinder head mounting.	1		1	
564	SD-233	INSTRUCTION DECAL .....	1		1	
565	XD-22	CAPSCREW, 5/16"-18 thread x 1 1/4" long, hexagon head (special hardness) For switch to cylinder head mounting.	1		1	
566	YC-66-D	HIGH TEMPERATURE SAFETY SWITCH ..... For replacement, order YC-66-D-51 Kit.	1		3	
567	YL-357-42	WIRE ASSEMBLY, 42" long, with termi- nals. (Wire coiled to suit all models.)	1		1	

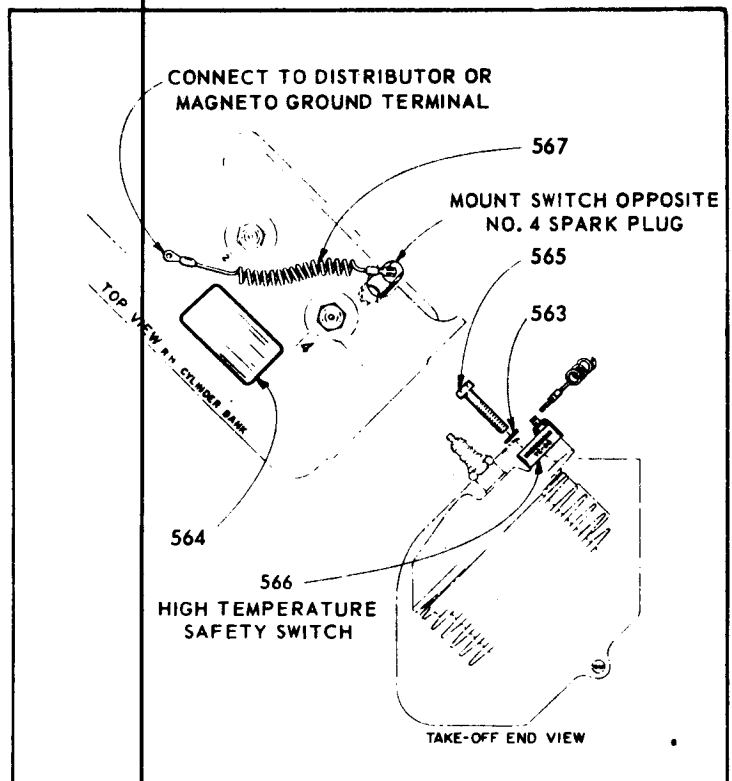


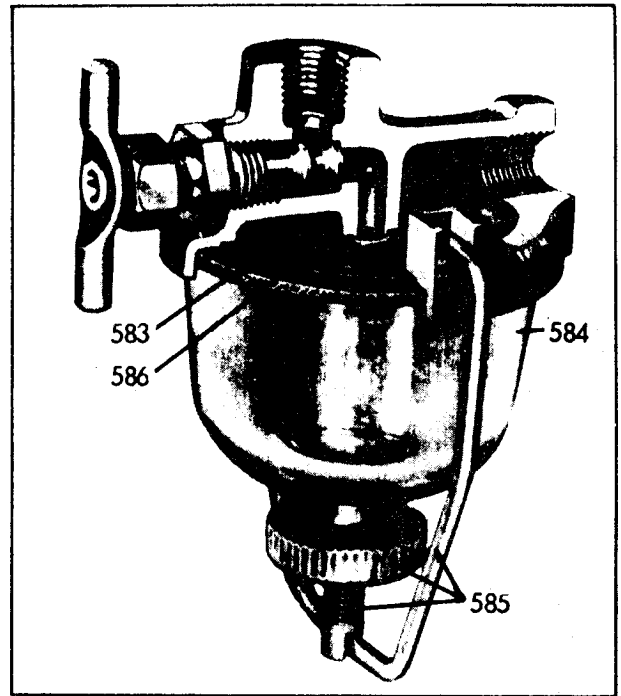
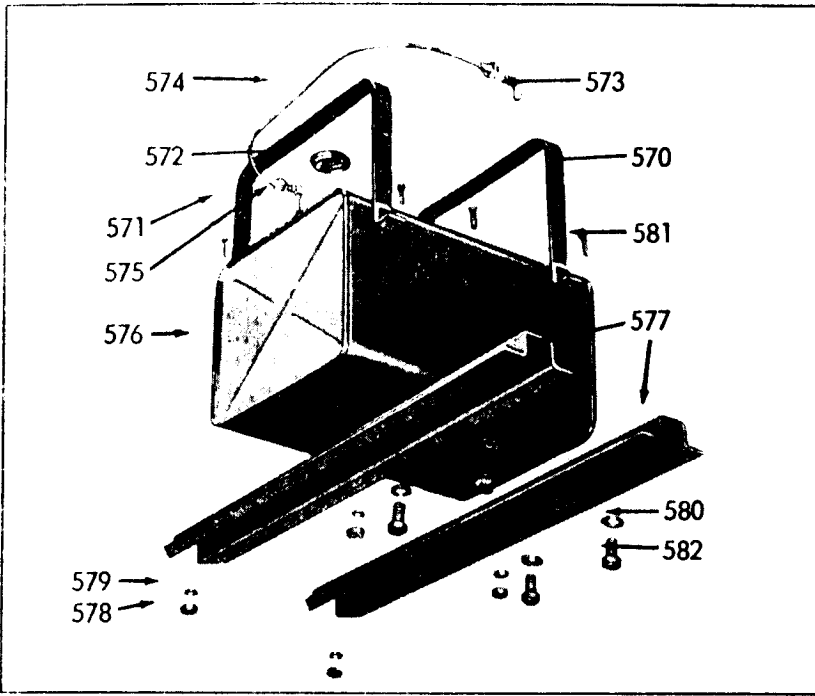
Fig. 64

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

**SIDE MOUNT FUEL TANK**

**FOR VE4 AND VF4 ENGINES**

**FUEL STRAINER ASSEMBLIES**



**Fig. 65**

104724C

74918C

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.		
				Lb	Oz					Lb	Oz	
570	PG-321	STRAP for fuel tank	2	1			LP-19	FUEL STRAINER ASSEMBLY (With Shut-off valve in cover, and glass bowl) Tillotson No. OW-418-T.	1		8	
571	PH-244-A	FELT for fuel tank strap	2		2		LP-19-A	FUEL STRAINER ASSEMBLY (With Shut-off valve in cover, and metal bowl) Tillotson No. OW-449-T.	1		7	
572	RC-77	CAP for fuel tank	1		3		LP-19-B	FUEL STRAINER ASSEMBLY (Without Shut-off valve in cover, and glass bowl) Tillotson No. OW-444.	1		6	
573	RF-1225	ELBOW for fuel line, in fuel strainer	1		1		LP-19-C	FUEL STRAINER ASSEMBLY (Without Shut-off valve in cover, and metal bowl) Tillotson No. OW-476-T.	1		5	
574	RM-1161	FUEL LINE from tank to fuel strainer (22 1/2" long)	1		4							
		RM-822 for engines with electric starter (21 1/2" long)	1		5							
575	RM-1206-B	SUCTION TUBE ASSEMBLY for fuel tank	1		3							
576	WE-187-S1 WE-187E-S1 (OPTIONAL)	FUEL TANK, 6 gal. capacity With RC-77 cap and RM-1206-B section tube.	1		7							
577	WE-188	ENGINE SUPPORT WE-188D for engines with electric starter	2	4	11							
		<b>STANDARD HARDWARE</b>										
578	PD-79	NUT, 3/8"-16 thread, hexagon steel For fuel tank straps to supports.	4		1		583	OW-352	FILTER SCREEN	1		1
579	PE-5	LOCKWASHER, 3/8" Positive For fuel tank straps to supports.	4		1		584	OW-363	GLASS BOWL	1		2
580	PE-7	LOCKWASHER, 1/2" Positive For engine supports to crankcase.	4		1		06137	METAL BOWL	1		1	
581	XD-27	SCREW, 3/8"-16 thread x 1" long, hexagon head For fuel tank straps to supports.	4		1		585	OW-447	CLAMP WIRE and THUMB NUT ASSEMBLY	1		1
582	XD-41	SCREW, 1/2"-13 thread x 1" long, hexagon head For engine supports to crankcase.	4		2		586	06096	BOWL GASKET (Wisconsin No. QD-653)	1		5

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

# SIDE MOUNT AIR CLEANER FOR VE4D AND VF4D ENGINES

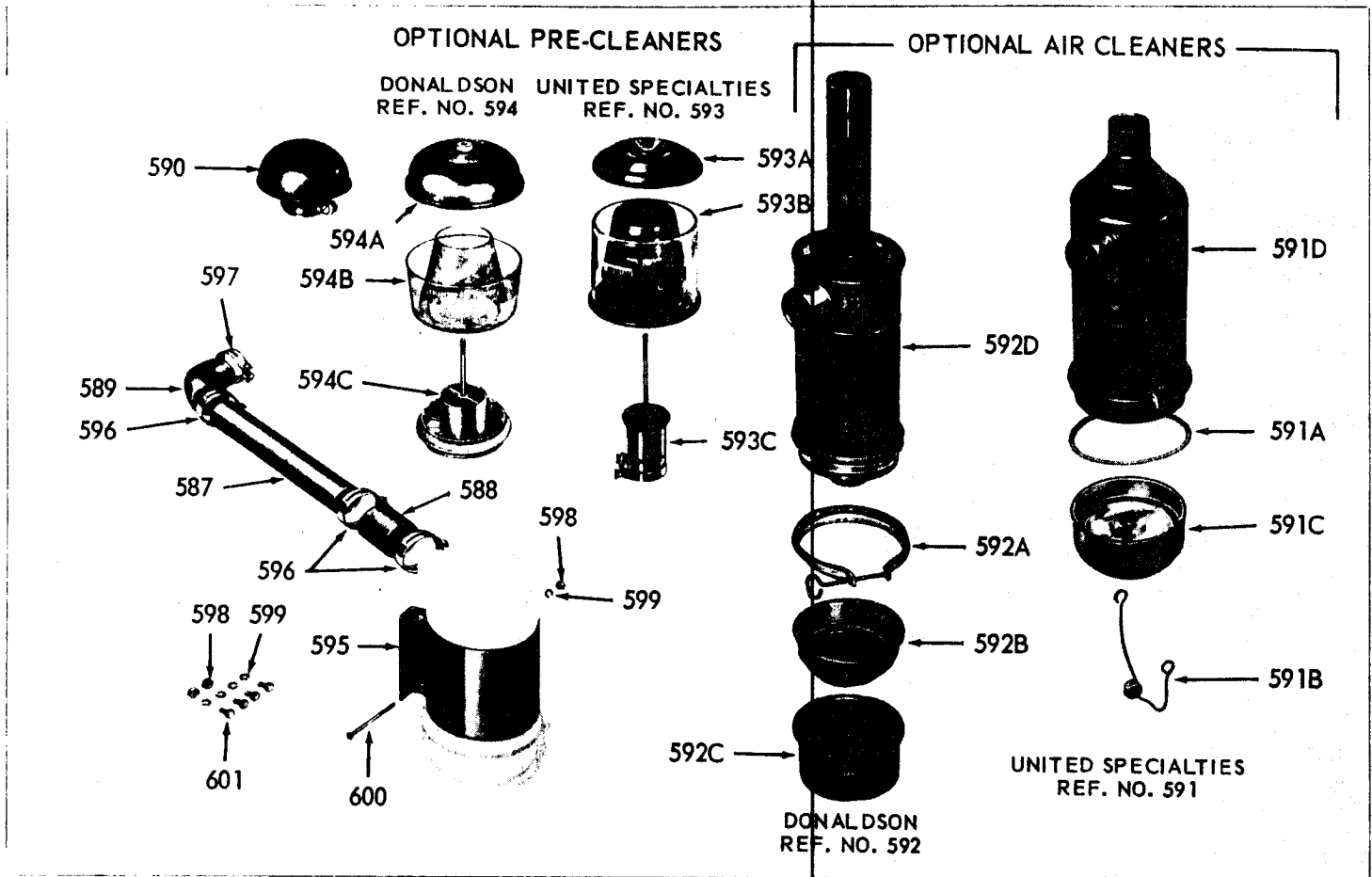


Fig. 66

104565C-3

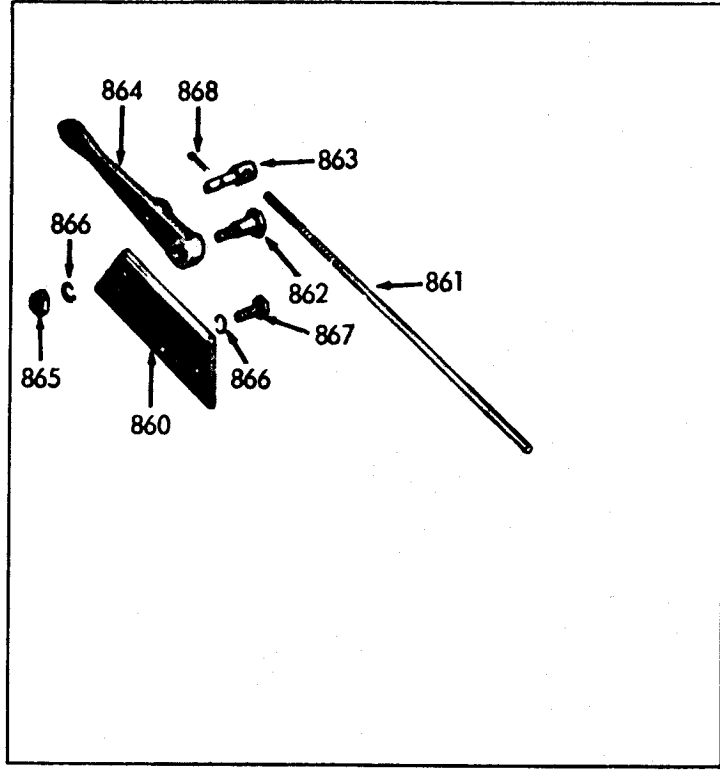
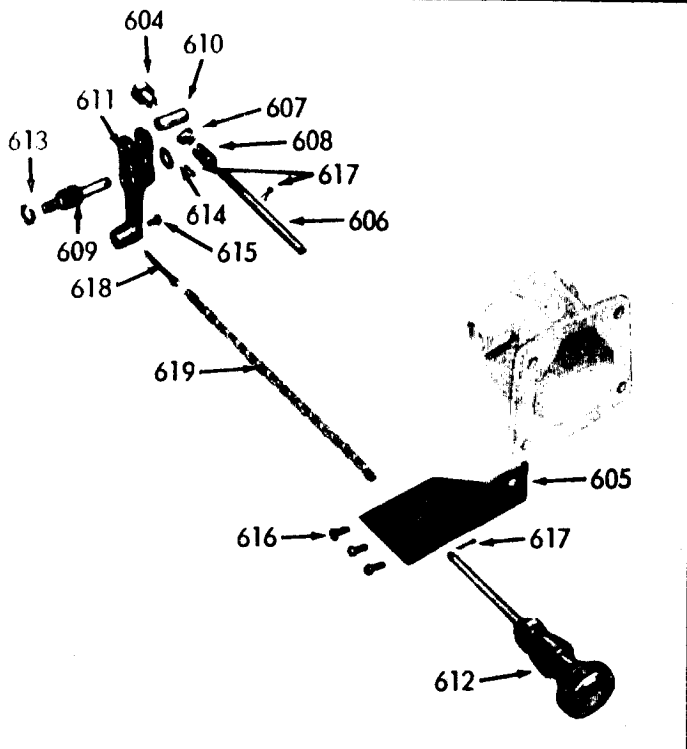
Ref. No.	Part Number	Description	No.			Net Wt.		
			Req.	Lb	Oz.	Req.	Lb	Oz.
587	LJ-120	TUBE for air cleaner to carburetor elbow	1	1	1			
588	LL-27	RUBBER HOSE for air cleaner tube	1		2			
589	LL-67	RUBBER ELBOW for air cleaner tube	1		4			
590	LO-96	STACK CAP for United Spec. air cleaner	1		12			
	LO-86	STACK CAP for Donaldson air cleaner			10			
591	LO-64-S1 (OBSOLETE)	AIR CLEANER, United Specialties No. CT-50-14920. For complete replacement order LO-157-1-S1. Service parts: United Specialties Part Numbers.	1	4	7			
591A		A-9986 Gasket	1		1			
591B		B-9982 Roller and bail assembly	1					
591C		B-10141 Oil cup and baffle assembly	1					
591D		15114 Body assembly (Less fittings)	1					
592	LO-157-1-S1 (2 1/2" stack)	Donaldson Co. No. FGA04-2511 Service Parts: Donaldson Part No's.	1	3	12			
592A		P-2846 Clamp assembly	1		3			
592B		P-15463 Inner oil cup	1		4			
592C		P-14889 Outer oil cup	1		6			
592D		BODY (Order complete air cleaner). LO-85-1, replaced by LO-157-1-S1. P-3507 Oil cup assembly - Must be used for service on LO-85 and LO-85-1.	1		6			
	LO-147-A	PERFORATED BODY for pre-cleaner 4" dia. x 2-11/16" high (not illust.).	1		2			
593	LO-109	PRE-CLEANER, collector type United Specialties No. S-5C-B16420. Service parts: United Part Numbers.	1	1	12			
593A		A-16380 Cap assembly	1		4			
593B		B-16382 Body assembly	1		1			
593C		A-16370 Sleeve assembly	1		8			
594	LO-114	PRE-CLEANER, Collector type Donaldson Co. No. PBH00-0215 (was No. H-215). Service parts: Donaldson Part Numbers P-20116 Cover assembly P-20115 Body P-20120 Sleeve assembly	1	1	8			
595	PG-328 PG-291	STRAP (5" Inside Diameter) for United Specialties air cleaner. STRAP (4-3/8" Inside Diameter) For Donaldson air cleaner.	1	1	2			15
<b>STANDARD HARDWARE</b>								
596	LK-8	HOSE CLAMP, 2-1/8" I.D. For air cleaner connections.	3		2			
597	LK-11	HOSE CLAMP, 1-7/8" I.D. For air cleaner elbow, carburetor end.	1		2			
598	PD-77	NUT, 1/4"-20 thread, hexagon steel For air cleaner strap mounting.	4		1			
599	PE-3	LOCKWASHER, 1/4" spring lock For air cleaner strap mounting.	6		1			
600	XA-74	SCREW, 1/4"-20 thread x 2 1/4" long, round or indented hexagon head For air cleaner strap clamping.	2		1			
601	XD-4	SCREW, 1/4"-20 thread x 1/2" long, hexagon head, for strap to shroud	4		1			

**Order parts from nearest WISCONSIN DISTRIBUTOR or SERVICE CENTER.**  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

**TT-45-L AND TT-45L-1  
GOVERNOR CONTROL ASSEMBLIES**

**FOR VE4 AND VF4 ENGINES**

**TT-45-D  
IDLE CONTROL ASSEMBLY**



104568C-1

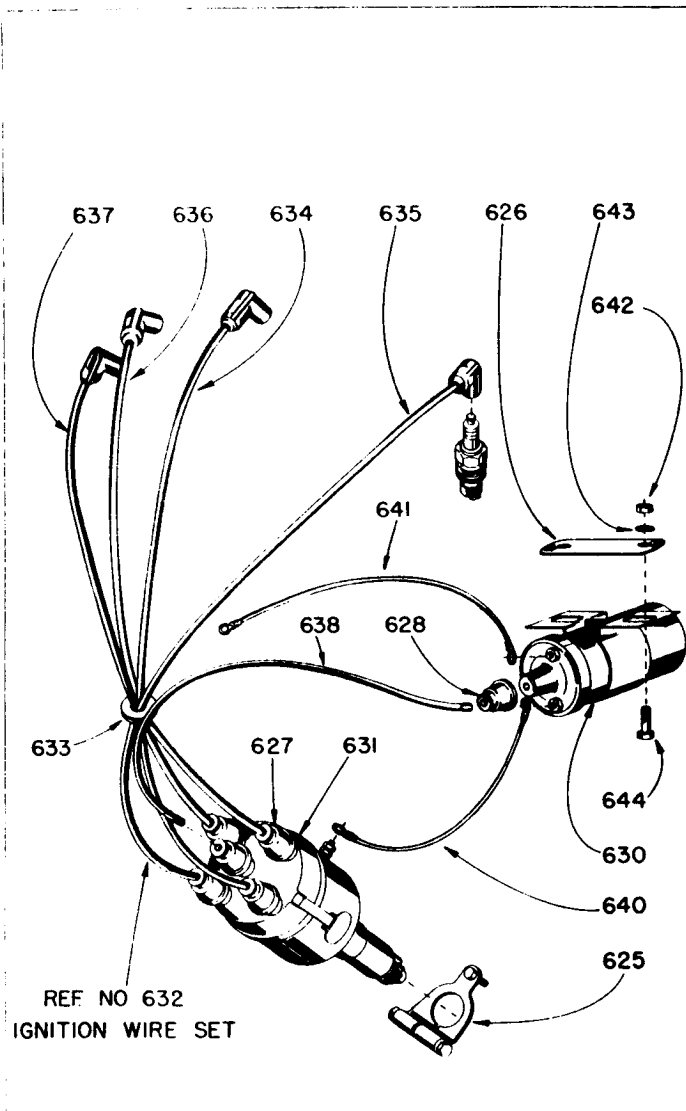
135517C

Ref. No.	Part Number	Description	No.		Net Wt.	
			Req		Lb	Oz
	TT-45-L	<b>GOVERNOR CONTROL ASSEMBLY</b> - for open engine .....	1		1	
	TT-45-L-1	<b>GOVERNOR CONTROL ASSEMBLY</b> - for power unit .....	1		1	
		<b>NOTE:</b> The following parts are identical on both the above assemblies, except PG-342 bracket is not furnished on TT-45L-1 assembly.				
04	PD-173-A	<b>LOCKNUT</b> for adjusting screw .....	1		1	
05	PG-342	<b>BRACKET</b> for governor and choke control .....	1		4	
06	PI-115-E	<b>ADJUSTING SCREW</b> .....	1		2	
07	PK-121	<b>RETAINER</b> for adjusting screw spring ..	1		1	
08	PM-111-1	<b>SPRING</b> for adjusting screw .....	1		1	
09	TC-365	<b>PIN</b> for variable speed lever support ....	1		1	
10	TC-368-A	<b>PIN</b> for adjusting screw swivel .....	1		1	
11	VB-134-A	<b>VARIABLE SPEED LEVER</b> .....	1		4	
12	VE-527-W	<b>CONTROL</b> .....	1		8	
		VE-527, replaced by VE-527-W.				
		<b>STANDARD HARDWARE</b>				
13	PE-3	<b>LOCKWASHER</b> , 1/4" positive .....	1		1	
		For support pin.				
14	PH-77	<b>PLAIN WASHER</b> , 5/16" I.D. x 5/8" O.D. x 1/16" thick steel .....	1		1	
		For variable speed lever.				
15	XA-62	<b>SCREW</b> , 8-32 thread x 1/4" long, round head .....	1		1	
		For cotter pin in lever.				
16	XA-65	<b>SCREW</b> , 8 x 1/2" long, self-tapping, sheet metal. For control bracket .....	3		1	
17	XI-1	<b>COTTER PIN</b> , 1/16" x 1/2" long .....	3		1	
		1-for variable speed lever pin.				
		1-for adjusting screw spring.				
		1-for chain at control.				
18	XI-11	<b>COTTER PIN</b> , 3/32" x 1 1/4" long .....	1		1	
		For chain at lever.				
19		<b>No. 1/0 GALVANIZED SAFETY CHAIN</b> 1 pc	1		1	
		8 1/4" long. For control to lever. (Was No. 9100G furnace chain 10" long)				

Ref. No.	Part Number	Description	No.		Net Wt.	
			Req		Lb	Oz
860	PG-348	<b>BRACKET</b> for control lever .....	1		2	
861	PI-145-B	<b>ADJUSTING SCREW</b> .....	1		2	
862	TC-380	<b>FULCRUM PIN</b> for control lever .....	1		1	
863	TC-381	<b>PIN</b> for adjusting screw .....	1		1	
864	VB-142	<b>IDLE CONTROL LEVER</b> .....	1		4	
		<b>STANDARD HARDWARE</b>				
865	PD-77	<b>NUT</b> , 1/4"-20 thread, hexagon steel .....	1		1	
		For fulcrum pin.				
866	PE-3	<b>LOCKWASHER</b> , 1/4" positive .....	2		1	
		1-for fulcrum pin.				
		1-for bracket mounting.				
867	XD-4	<b>SCREW</b> , 1/4"-20 thread x 1/4" long, hexagon head .....	1		1	
		For bracket mounting.				
868	XI-1	<b>COTTER PIN</b> , 1/16" x 1/2" long .....	1		1	
		For adjusting screw pin.				

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

## ELECTRICAL EQUIPMENT FOR VE4D and VF4D ENGINES IGNITION COIL and DISTRIBUTOR



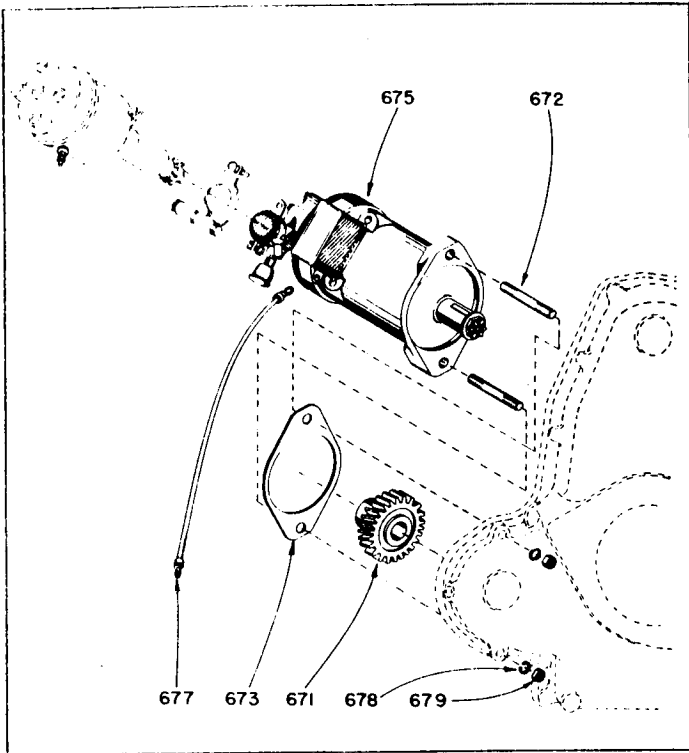
Ref. No.	Part Number	Description	No. Net Wt.		
			Req	Lb	Oz
631	YF-10-S1	<b>DISTRIBUTOR, HALF SPEED</b> , Prestolite No. IAD-4036A ..... Includes PG-543A Adv. Arm Assembly. For engines beginning with Serial No. 2264163. <b>YF-6 Prestolite No. IGW-4159A, ENGINE SPEED DISTRIBUTOR</b> , for engines to and including Serial No. 2264162.  <b>NOTE:</b> For distributor service parts, refer to illustration immediately following this parts list.	1	3	3
632	YL-285-F	<b>DISTRIBUTOR IGNITION CABLE SET</b> With integral molded spark plug boot. For <b>YF-10 HALF SPEED DISTRIBUTOR</b> Consisting of: <b>PH-198 GROMMET</b> .....	1	2	7
633			1		1
634		<b>YL-339-28 CABLE</b> to No. 1 spark plug	1		2
635		<b>YL-339-36 CABLE</b> to No. 2 spark plug	1		3
636		<b>YL-339-32 CABLE</b> to No. 3 spark plug	1		2
637		<b>YL-339-42 CABLE</b> to No. 4 spark plug	1		3
638		<b>YL-358-8 CABLE</b> to ignition coil.....  YD-12 Terminal boots and YL-285 Cable Set (which consisted of YL-42-2, YL-14-6, YL-173, YL-251 and YL-284), is replaced by YL-285-F Cable Set, but YD-294 Spark Plug Post Terminal Nuts must be ordered for use with the integral molded boot.  <b>NOTE:</b> When servicing ignition cable set for YF-6 Engine Speed Distributor, use YL-285-F, but cut off terminals at distributor end.	1		1
640	YL-352-8	<b>IGNITION WIRE ASSEMBLY</b> ..... 8" long, coil to distributor. No. 14 GA. cable with terminals.	1		1
641	YL-352-30	<b>IGNITION WIRE ASSEMBLY</b> ..... 30" long, coil to ignition switch. No. 14 GA. cable with terminals. For open engines. <b>YL-352-26 WIRE ASSEMBLY</b> , 26" long For power unit engines.	1		1
<b>STANDARD HARDWARE</b>					
642	PD-78	<b>NUT</b> , 5/16" - 18 thread, hexagon steel. For ignition coil mounting.	2		1
643	PE-4	<b>LOCKWASHER</b> , 5/16" spring lock ..... For ignition coil mounting.	2		1
644	XD-15	<b>SCREW</b> , 5/16" - 18 thread x 3/4" long, hexagon head ..... For ignition coil mounting.	2		1

Ref. No.	Part Number	Description	No. Net Wt.		
			Req	Lb	Oz
625	PG-543-A-1	<b>CLAMP</b> for mounting distributor.....	1		3
626	PG-791	<b>SUPPORT PLATE</b> for ignition coil .....	1		1
627	YD-20	<b>TERMINAL CAP</b> for ignition wires .....	5		1
628	YD-20-A	<b>TERMINAL CAP</b> at coil wire .....	1		1
630	YF-4-A Optional YF-5-A	<b>IGNITION COIL</b> (6 volt).....  Mounted to lower cylinder shroud. Left Hand Side.  YF-4 (Prestolite No. 200604) mounted to PG-345 Bracket at oil filter pad, replaced by YF-4-A, but order SA-65-C Oil Filter Pad Cover.	1	1	14

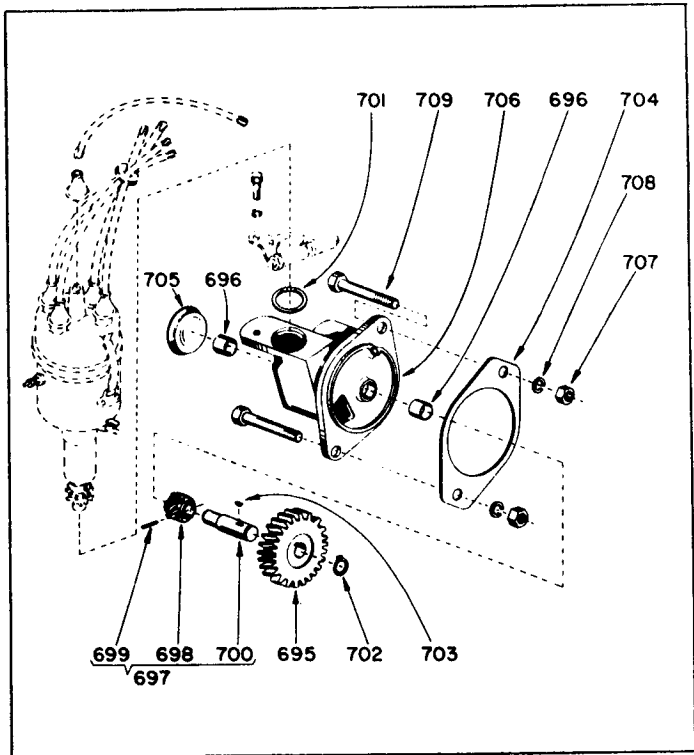
Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

# ELECTRICAL EQUIPMENT FOR VE4D and VF4D ENGINES

## GENERATOR MOUNTING (Gear Driven)



## TF-128 DISTRIBUTOR DRIVE ASSEMBLY



Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz.
671	GD-97-C	DRIVE GEAR for generator..... GD-97-A, replaced by GD-97-C.	1		8
672	FC-110	STUD, for generator mounting.....	2		1
673	QD-616	GASKET, for mounting generator.....	1		1
675	YB-16-G (12 volt)	GENERATOR, Prestolite No..... GDY-4115-N, with cut-out relay..... YB-16-G negative ground replaced. YB-16-F positive ground.	1	15	6
	YB-16-E (6 Volt)	GENERATOR Prestolite No. .... GAS-4306, used with YF-10 Half Speed Distributor. For engines beginning with Serial No. 2264163. YB-16-C Prestolite No. GAS-4303 with two charge regulator, repl'd. by YB-16-E. YB-16-A Prestolite No. GAS-4301, used with YF-6 Engine Speed Distributor. For engines to and including Serial No. 2264162. <b>NOTE:</b> For generator service parts, refer to illustration immediately follow- ing this parts list.	1	15	6
	YD-165	JUMPER STRIP, for YB-16-C generator with two charge regulator (not illust.)..	1		1
677	YL-352-26	IGNITION WIRE ASSEMBLY..... 26" long, ammeter to generator.	1		1
<b>STANDARD HARDWARE</b>					
678	PE-5	LOCKWASHER, 3/8" spring lock..... For mounting generator to gear cover.	2		1
679	PD-11	NUT, 3/8" - 24 thread, hexagon steel .. For mounting generator to gear cover.	2		1

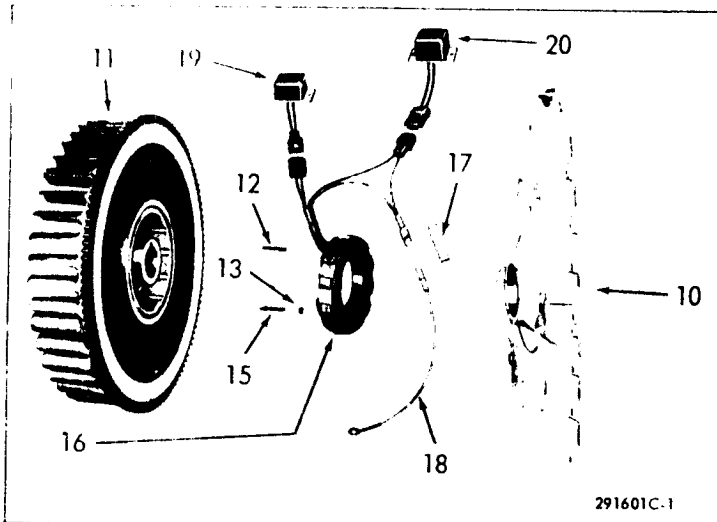
Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz.
<b>NOTE:</b> The TF-128 distributor drive assembly includes the YF-10-S1 distributor and ignition cable set illus- trated on Page 59					
695	GD-140	DRIVE GEAR.....	1		8
696	HG-182	BUSHING, for drive shaft.....	2		2
697	JJ-324	DRIVE SHAFT and GEAR ASSEMBLY Consisting of:	1		
	698	GF-88 gear for distributor .....	1		2
	699	PA-367 pin for distributor gear, .....	1		1
	700	TA-132 drive shaft .....	1		2
701	JK-59	PACKING RING, for distributor mt'g. ..	1		1
702	PK-109	LOCK RING for drive gear.....	1		1
703	PL-161	KEY, No. 213 Woodruff, for drive gear..	1		1
704	QD-616	GASKET for housing (std. engine part)	1		1
705	SA-143	CUP PLUG for housing .....	1		2
706	TB-146-S1	HOUSING ASSEMBLY includes: bushings and cup plug .....	1		12
<b>STANDARD HARDWARE</b>					
707	PD-79	NUT, 3/8" - 16 thread, hexagon steel... For mounting housing.	2		1
708	PE-5	LOCKWASHER, 3/8" spring lock .....	2		1
		For mounting housing.			
709	XD-32	SCREW, 3/8" - 16 thread x 2" long, hex- agon head .....	2		1
		For mounting accessory drive housing.			

**Order parts from nearest WISCONSIN DISTRIBUTOR or SERVICE CENTER.**  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

# ELECTRICAL EQUIPMENT FOR VE4D and VF4D ENGINES

## 12 VOLT FLYWHEEL ALTERNATORS

Assembly No. ENA-100 (30 amp circuit) and ENA-101 (10 amp circuit)

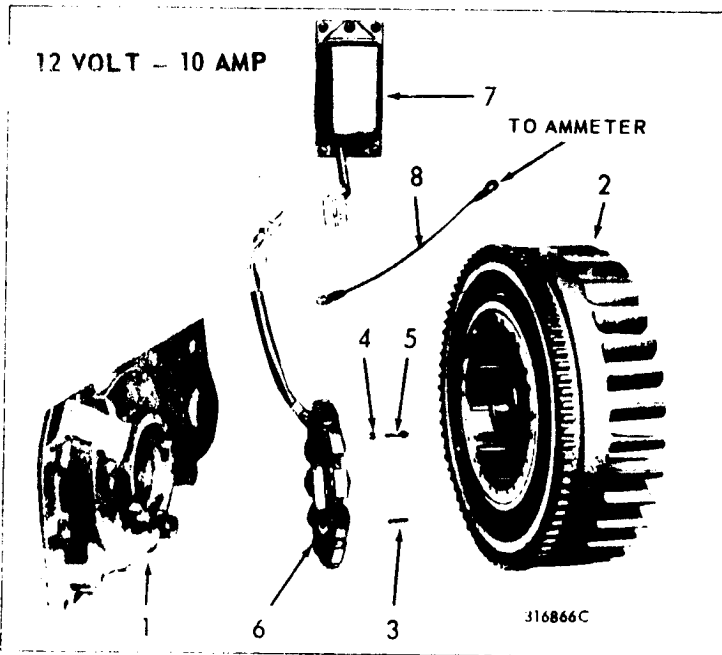


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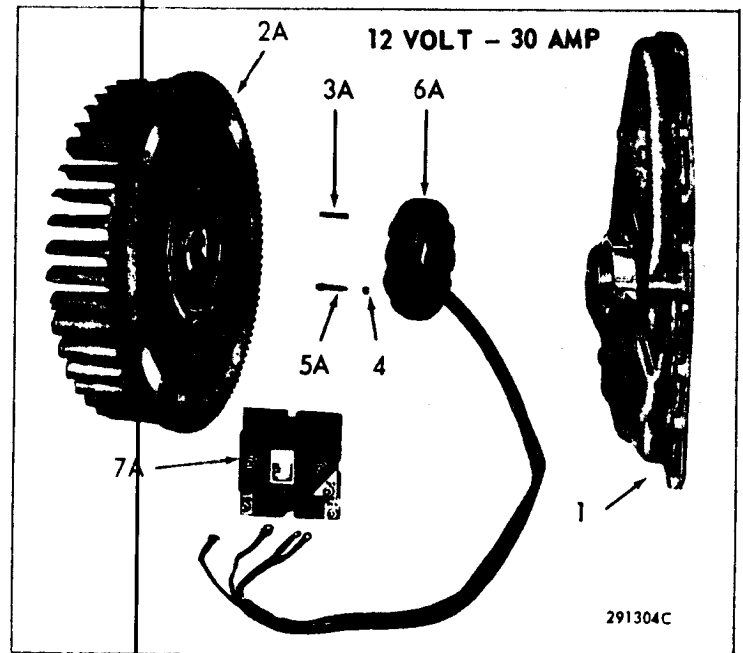
Ref. No.	Description	Part Number	No. Req.
12	ROLL PIN - For 10 amp stator	PA-368	2
	For 30 amp stator	PA-340	2
13	LOCKWASHER, No. 10, for stator mounting	PE-14	4
15	SCREW - For 10 amp stator mounting	XB-113	4
	For 30 amp stator mounting	XB-106	4
16	STATOR ASSEMBLY - For 10 amp circuit	YB-75	1
	For 30 amp circuit	YB-76	1
17	INSULATOR - ammeter wire connector	YD-350	1
18	WIRE ASSEMBLY - stator plug to ammeter		
	For 10 amp stator	YL-381-14	1
For 30 amp stator	YL-380-14	1	
19	RECTIFIER MODULE - 10 and 30 amp	YJ-58	1
20	REGULATOR MODULE - For 10 amp circuit	YJ-59 use YJ-60	
	For 30 amp circuit	YJ-60	
Not illust.	NUT, #10-32, for mounting modules	PD-115	4
	LOCKWASHER, #10 I.E.T., for modules	PE-78-A	4
	SCREW, #10-32, for mounting modules	XA-8	4

Ref. No.	Description	Part Number	No. Req.
10	GEAR COVER ASSEMBLY - replaces std.	BD-100K-4-S1	1
11	FLYWHEEL with rotor and ring gear - repl. std.		
	For 10 amp alternator	N-101-6	1
	For 30 amp alternator	N-101-10	1

### (obsolete) FLYWHEEL ALTERNATORS



316866C



291304C

Ref. No.	Description	Part Number	No. Req.
1	GEAR COVER ASSEMBLY	BD-100K-4-S1	1
2	FLYWHEEL with rotor and ring gear		
	For 10 amp alternator circuit	N-101-6	1
2A	For 30 amp alternator circuit	N-101	1
3	ROLL PIN for 10 amp stator mounting	PA-368	2
3A	ROLL PIN for 30 amp stator mounting	PA-340	2
4	LOCKWASHER, No. 10, for stator	PE-14	4

5	SCREW, for 10 amp stator mounting	XB-113	4
5A	SCREW, for 30 amp stator mounting	XB-106	4
6	STATOR ASSEMBLY, for 10 amp circuit	YB-72	1
6A	STATOR ASSEMBLY, for 30 amp circuit	YB-67	1
7	RECTIFIER-REGULATOR MODULE		
	For 10 amp alternator circuit	YJ-56	1
7A	For 30 amp alternator circuit	YJ-49-S1	1
8	WIRE ASSEMBLY for 10 amp circuit		
	Stator receptacle to ammeter	YL-379-14	1

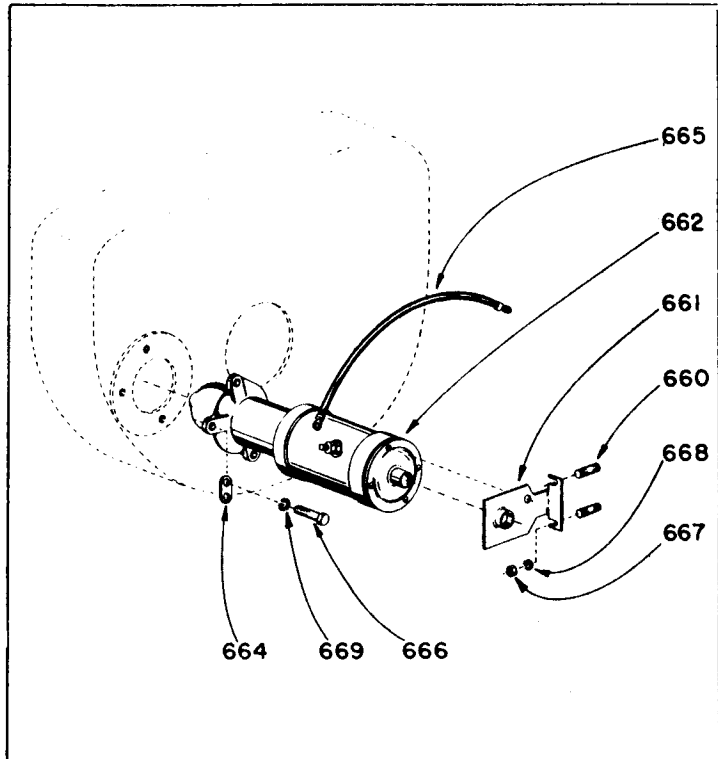
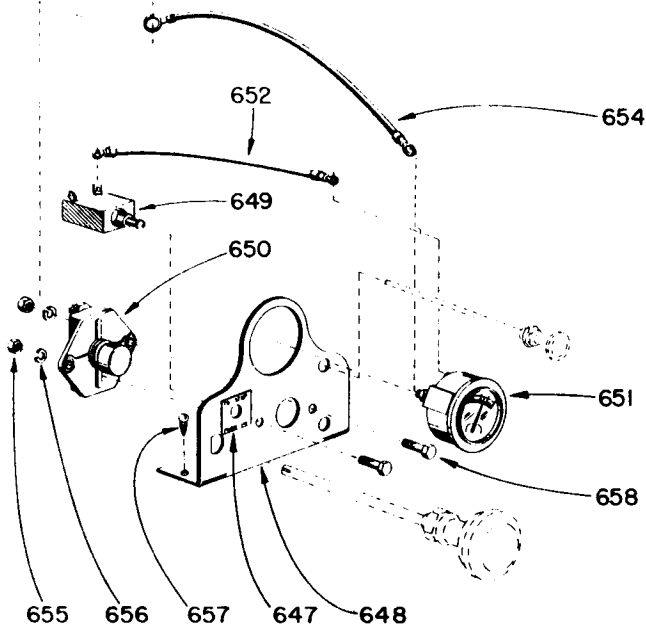
\* NOTE: Because of the available variations in Flywheels, for mounting rotating screen, stub shaft, etc. - give Engine Model, Specification and Serial Numbers when ordering.

# ELECTRICAL EQUIPMENT FOR VE4D and VF4D ENGINES

## CONTROL PANEL GROUP

## EEA-101 STARTING MOTOR ASSEMBLY (12 Volt)

(Obsolete 6 Volt Starting Motor)



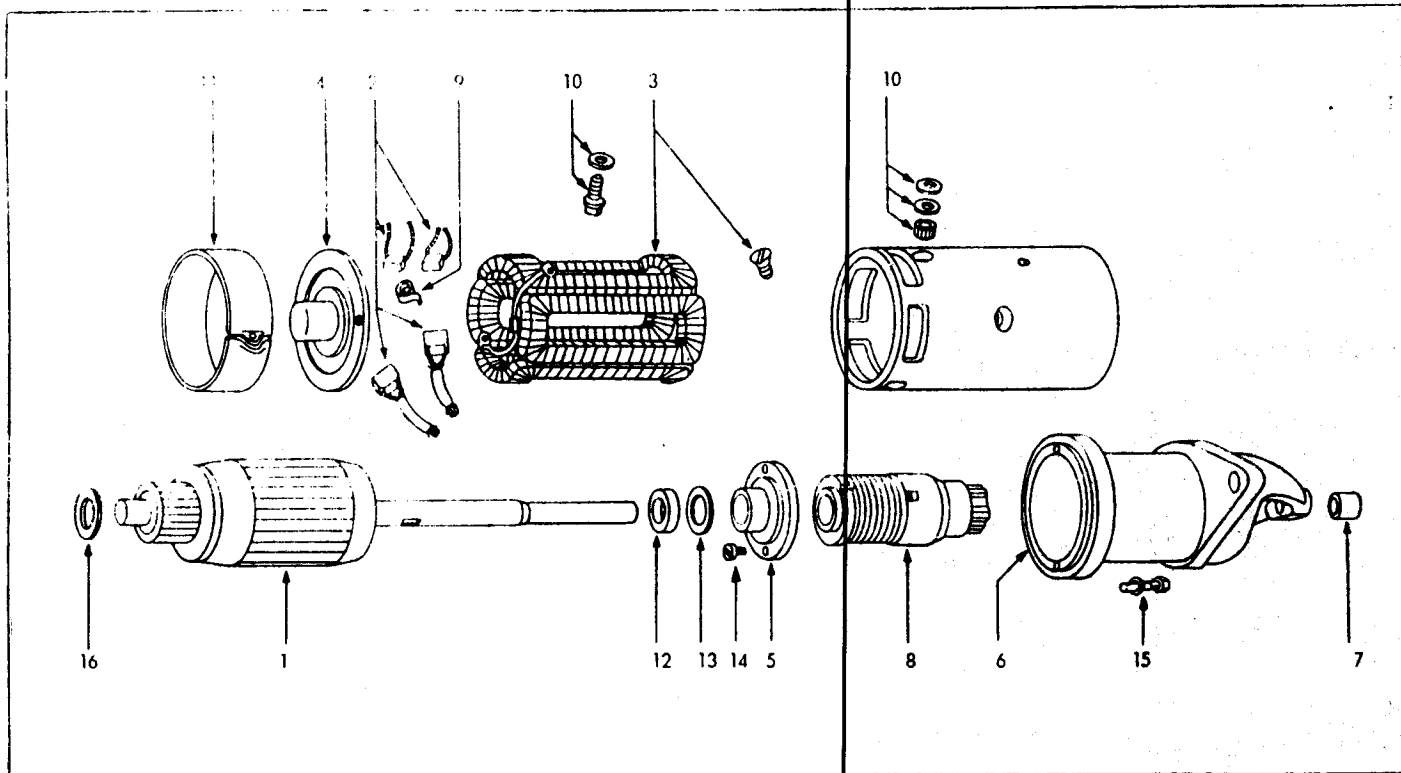
Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
647	SD-109	TAG, for ignition switch..... "To Stop Push In"	1	1	
648	VE-439-D	CONTROL PANEL ..... VE-439, replaced by VE-439-D.	1	8	
649	YC-9-B-51	IGNITION SWITCH ASSEMBLY .....	1	2	
650	YC-10-C	STARTING SWITCH.....	1	4	
651	YE-2	AMMETER (0 - 30 amps).....	1	6	
652	YL-352-4	IGNITION WIRE ASSEMBLY .....	1	1	
		4" long, ammeter to ignition switch. For open engines.			
		YL-352-8 WIRE ASSEMBLY, 8" long ...	1	1	
		For power unit engines.			
654	YL-353-6	IGNITION WIRE ASSEMBLY .....	1	1	
		6" long, starter switch to ammeter.			
<b>STANDARD HARDWARE</b>					
655	PD-77	NUT, 1/4" - 20 thread, hexagon steel..... For starter switch mounting.	2	1	
656	PE-3	LOCKWASHER, 1/4" spring lock..... For starter switch mounting.	2	1	
657	XA-65	SCREW, No. 8 x 1/2" long, self-tapping, sheet metal.....	4	1	
		For mounting control panel.			
658	XD-6	SCREW, 1/4" - 20 thread x 3/4" long, hex- agon head .....	2	1	
		For starter switch mounting.			

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
660	PC-396	STUD, for starter bracket.....	2	1	
661	PG-514-A-1	BRACKET, for starter support .....	1	6	
		PG-331 Bracket for YA-4-B starter .....		4	
662	YA-54-A (12 Volt)	STARTING MOTOR Prestolite MBG-4141 YA-18-3 (MBG-4109) was MBG-4024, replaced by YA-54-A.	1	17	8
	YA-55-A (6 Volt)	STARTING MOTOR Prestolite MZ-4212 YA-19-3 (MZ-4192 and MZ-4184), and YA-10-3 (MZ-4175 and MZ-4118), re- placed by YA-55-A. YA-4-B (Prestolite No. MAK-4002), re- placed by YA-55-A but PG-514-A-1 sup- port bracket must also be ordered. <b>NOTE:</b> For electric starter service parts, refer to illustration immediately following this parts list.	1	17	8
664	YD-296	TERMINAL CONNECTOR for ground....	1	1	
665	YL-356-20	STARTER CABLE ASSEMBLY .....	1	4	
		20" long, for open engines.			
		YL-356-26 CABLE ASSEMBLY, 26" long For power unit engines.	1	6	
<b>STANDARD HARDWARE</b>					
666	PB-187	SCREW, 3/8" - 24 thread x 1" long, hex- agon head .....	3	2	
		For mounting electric starter. PB-24, replaced by PB-187.			
667	PD-10	NUT, 5/16" - 24 thread, hexagon steel.. For mounting starter bracket.	2	1	
668	PE-4	LOCKWASHER, 5/16" spring lock..... For mounting starter bracket.	2	1	
669	PE-5	LOCKWASHER, 3/8" spring lock .....	3	1	
		For mounting electric starter.			

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.



**12 VOLT PRESTOLITE STARTING MOTOR WITH FOLE-THRU BENDIX  
YA-54-A (MBG-4141) FOR FOUR CYLINDER ENGINE MODELS**



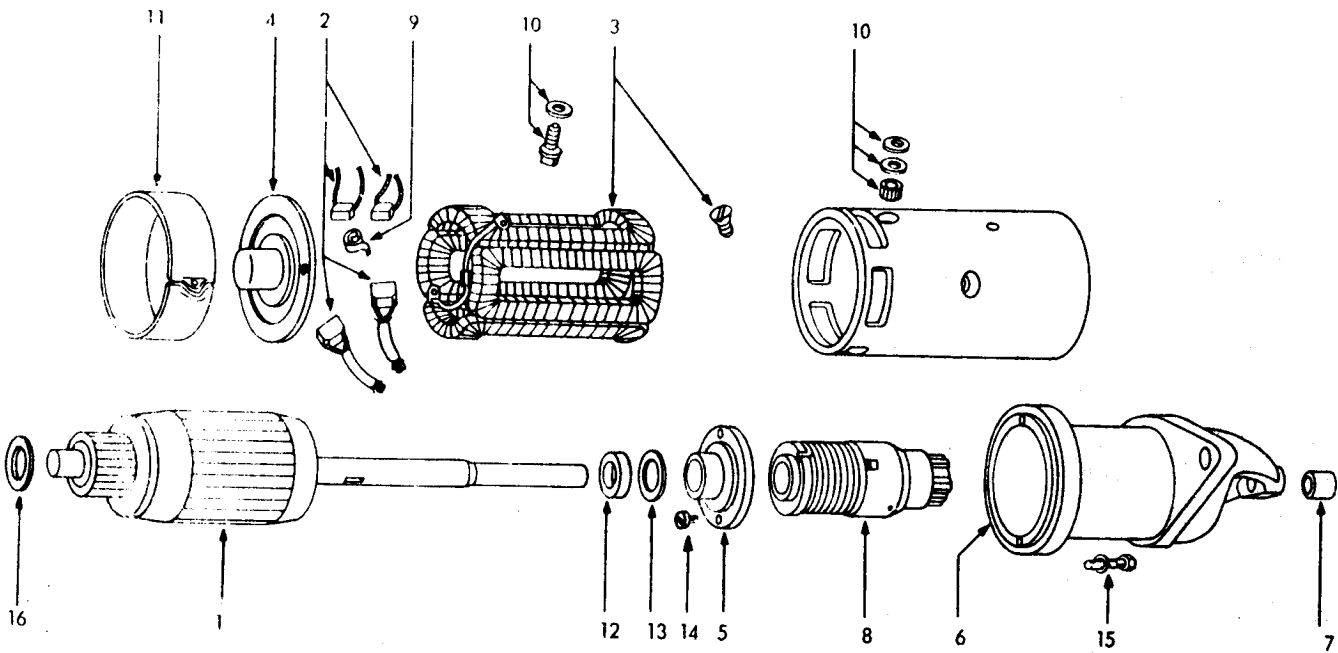
NOTE: Code number 28, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.
1	28-MBG-2411	ARMATURE .....	1
2	28-MBG-2012S	BRUSH SET * .....	1
3	28-MBG-3005AS	FIELD COIL PACKAGE .....	1
		Includes:	
		MZ-38C SCREW, for pole shoe .....	4
4	28-MZ-2002Q	COMMUTATOR END HEAD ASSEMBLY .....	1
		Includes:	
		MBG-1021S BRUSH, grounded .....	2
		MAD-110 FELT .....	1
		MZ-19S BRUSH SPRING SET .....	1
5	28-MZ-134C	BEARING PLATE ASSEMBLY, Intermediate .....	1
6	28-P9-1330B	PINION HOUSING ASSEMBLY .....	1
		Includes:	
		MZ-364 BRONZE BEARING .....	1
		MZ-358 BEARING CAP .....	1
		XA-832 OIL SEAL .....	1
7	28-MZ-364	BRONZE BEARING abs. ....	1
8	28-EBB-117A	BENDIX DRIVE .....	1
		Order Eclipse No. 28-480187.	
9	28-MZ-19S	BRUSH SPRING SET .....	1
10	28-P90-743	TERMINAL STUD PACKAGE .....	1
		Includes:	
		MU-31 INSULATING BUSHING for term. stud .....	1
		MBG-28 TERMINAL STUD .....	1
		MAK-80 INS. WASHER, term. stud, inner ..	1
		MAB-31A INS. WASHER, term. stud, outer ..	1
		MU-37 PLAIN WASHER, term. stud .....	1

Ref. No.	Part Number	Description	No. Req.
11	28-MZ-1024U	COVER BAND .....	1
12	28-XA-832	OIL SEAL .....	1
13	28-MZ-359	GASKET, for Intermediate bearing .....	1
14	28-P90-822	MOUNTING SCREW PACKAGE .....	1
		Includes:	
		8X-3649 SCREW, Intermediate bearing, Flat Head #8-32 x 3/8 .....	4
15	28-MZ-52	SCREW, pinion housing, hexagon head #10-32 x 31/32 .....	4
16	28-P90-448	THRUST WASHER PACKAGE ** .....	1
		* Brush Set for Service (Ref. 2)	
		** Contains additional parts to service other applications.	
		Note: <b>BOLD TYPE ITEMS</b> indicate recommended service parts.	

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

**6 VOLT PRESTOLITE STARTING MOTORS WITH FOLD-THRU BENDIX  
YA-55-A (MZ-4212) FOR FOUR CYLINDER ENGINE MODELS**



NOTE: Code number 28, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.	Ref. No.	Part Number	Description	No. Req.
1	28-MZ-2411	<b>ARMATURE</b> .....	1	11	28-MZ-1024U	<b>COVER BAND</b> .....	1
2	28-MZ-2012AS *	<b>BRUSH SET</b> .....	1	12	28-XA-832	<b>OIL SEAL</b> .....	1
3	28-MZ-3005ES	<b>FIELD COIL PACKAGE</b> .....	1	13	28-MZ-359	<b>GASKET</b> , for intermediate bearing .....	1
		Includes:		14	28-P90-822	<b>MOUNTING SCREW PACKAGE</b> .....	1
		MZ-38C SCREW, for pole shoe .....	4			Includes:	
4	28-MZ-2002F	<b>COMMUTATOR END HEAD ASSEMBLY</b> .....	1			8X-3649 SCREW, intermediate bearing, Flat Head #8-32 x 3/8 .....	4
		Includes:		15	28-MZ-52	<b>SCREW</b> , pinion housing, hexagon head #10-32 x 31/32 .....	4
		MRC-1021S BRUSH, ground side .....	2	16	28-P90-448 **	<b>THRUST WASHER PACKAGE</b> .....	1
		MAD-110 FELT .....	1				
		MZ-19S BRUSH SPRING SET .....	1				
5	28-MZ-1360	<b>BEARING PLATE ASSEMBLY</b> , Intermediate	1				
6	28-PS-1330B	<b>PINION HOUSING ASSEMBLY</b> .....	1				
		Includes:					
		M7-364 BRONZE BEARING .....	1				
		MZ-358 BEARING CAP .....	1				
		XA-832 OIL SEAL .....	1				
7	28-MZ-364	<b>BRONZE BEARING</b> abs. ....	1				
8	28-EBB-137A	<b>BENDIX DRIVE</b> .....	1				
		Order Eclipse No. 28-480187.					
9	28-MZ-19S	<b>BRUSH SPRING SET</b> .....	1				
10	28-P90-716	<b>TERMINAL STUD PACKAGE</b> .....	1				
		Includes:					
		MU-14 TERMINAL .....	1				
		MU-31 INSULATING BUSHING for term. stud .....	1				
		MU-28 TERMINAL STUD .....	1				
		MU-39A INS. WASHER, term. stud, inner .....	1				
		MAB-31A INS. WASHER, term. stud, outer .....	1				
		MU-37 PLAIN WASHER, term. stud .....	1				

\* Brush Set for Service (Ref. 2)

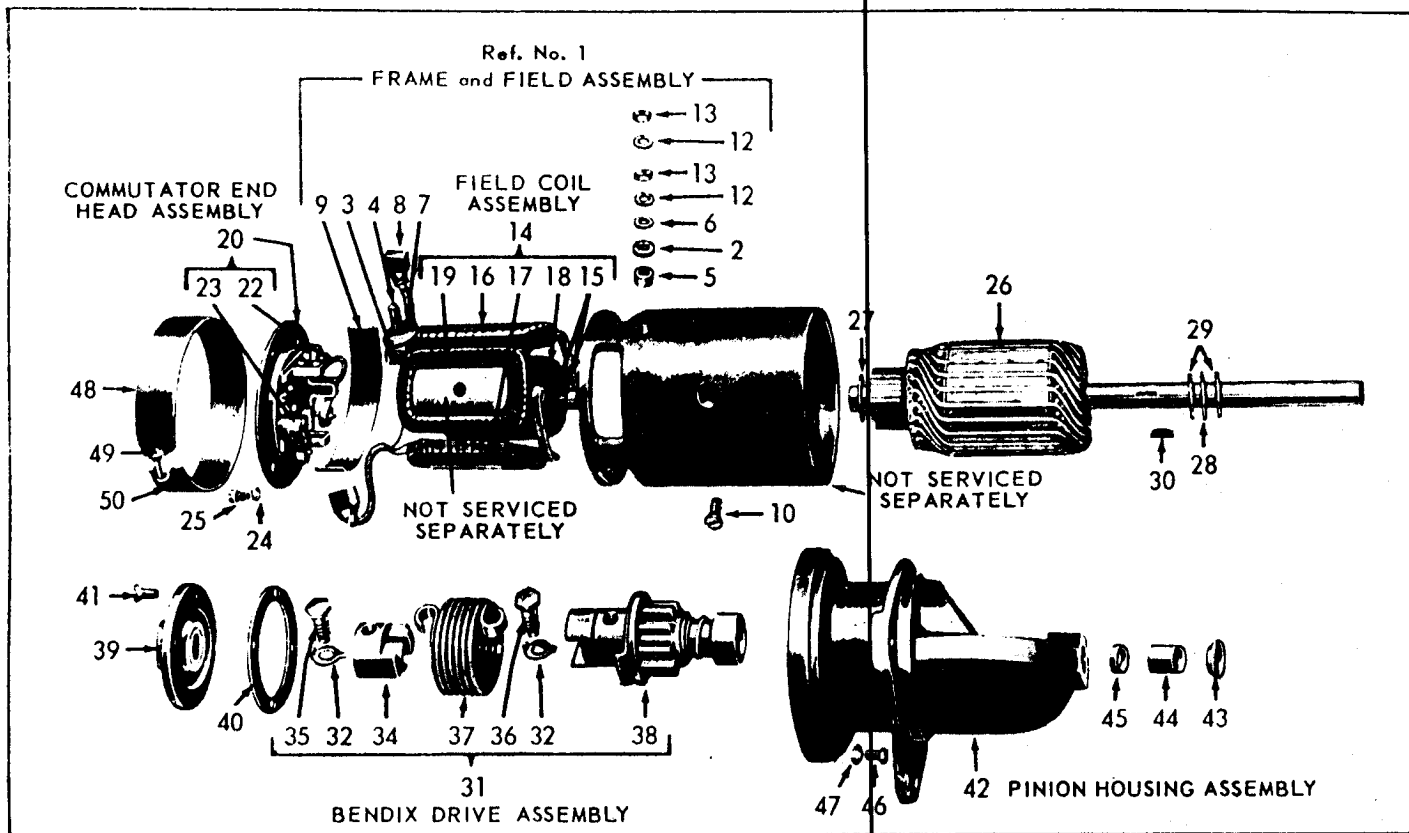
\*\* Contains additional parts to service other applications.

Note: **BOLD TYPE ITEMS** indicate recommended service parts.

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

YA-19-3-S1 ( 6 Volt) STARTING MOTOR – PRESTOLITE No. MZ-4192  
YA-18-3-S1 (12 Volt) STARTING MOTOR – PRESTOLITE No. MBG-4109

NOTE: YA-19-3 (MZ-4192) was Prestolite No. MZ-4184. YA-18-3 (MBG-4109) was Prestolite No. MBG-4024.  
Addition of clear-out hole in pinion housing by vender necessitated their Part No. change.



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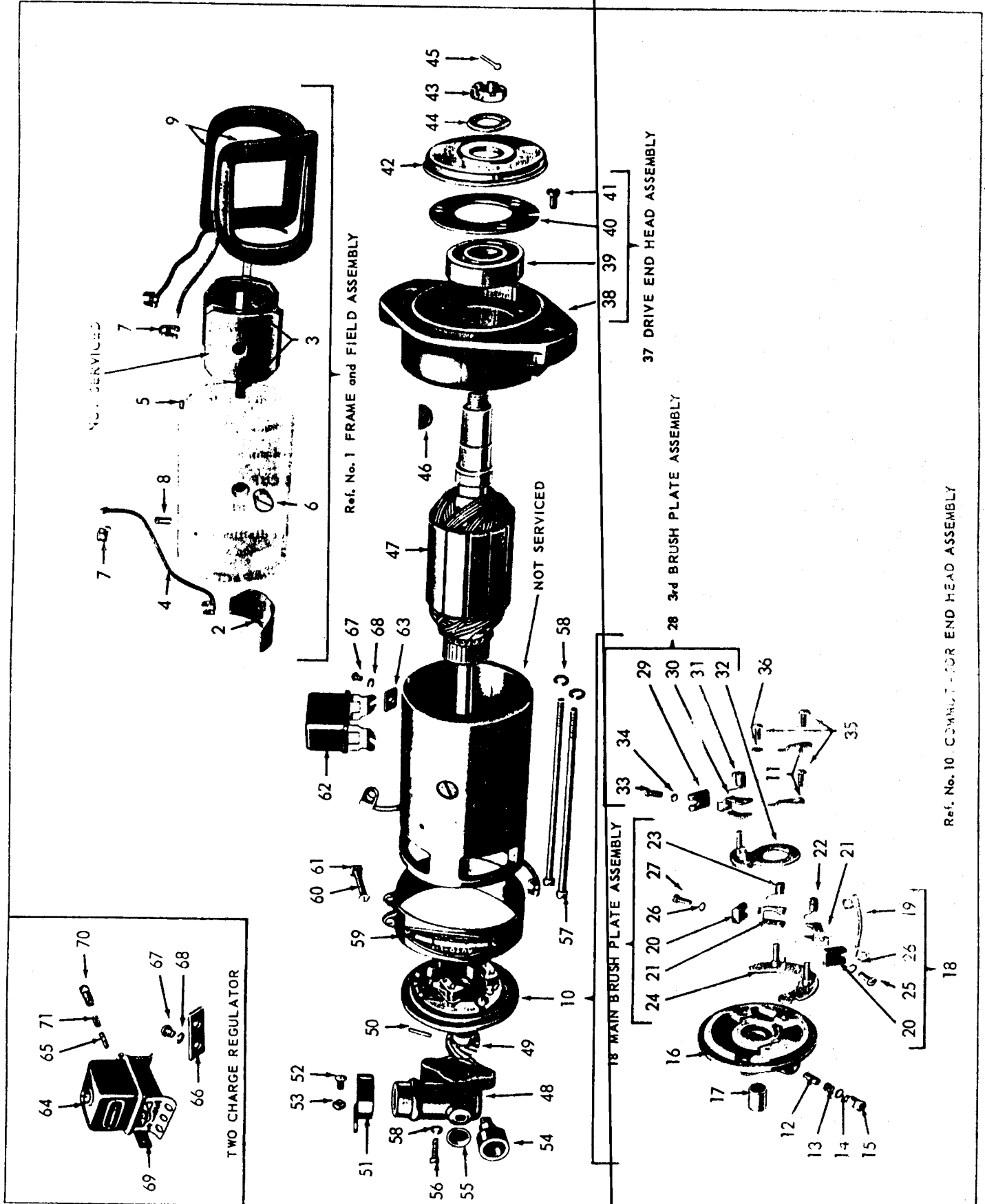
All parts are interchangeable for both starting motors, except where noted.

NOTE: Code number 28, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.	Ref. No.	Part Number	Description	No. Req.
1		FRAME and FIELD ASSEMBLY, includes: ..	1	26	28-MZ-2366	ARMATURE ASSEMBLY for YA-19-3-S1 .....	1
2	**	INSULATING WASHER, terminal stud .....	1	28-MBG-2866	ARMATURE ASSEMBLY for YA-18-3-S1 .....	1	1
3	**	TERMINAL .....	1	27	***	THRUST WASHER for Armature, C.E. ....	2
4	**	TERMINAL STUD .....	1	28	***	SPRING WASHER for Armature .....	1
5	**	INSULATING BUSHING for terminal stud ..	1	29	***	THRUST WASHER for Armature, Int. ....	2
6	**	PLAIN WASHER, 5/16" for terminal stud ..	1	30		KEY for mounting Bendix, No. 6 Woodruff ..	1
7	**	INSULATING WASHER, terminal stud .....	1	31	28-EBB-48B	BENDIX DRIVE ASSEMBLY, order Eclipse No. 28-480029.	1
8	*	INSULATED BRUSH .....	2	39	28-MZ-1360	BEARING PLATE ASSEMBLY, intermediate	1
9		INSULATION, field connection .....	1	40	28-MZ-359	GASKET for bearing plate .....	1
10		SCREW for pole shoe .....	4	41		SCREW, bearing plate, #8-32 x 3/8", flat hd.	4
12		LOCKWASHER, 5/16", for terminal stud ....	2	42	28-PS-2330BS	PINION HOUSING ASSEMBLY, includes ....	1
13		NUT, for terminal stud, 5/16"-24 hex .....	2	43		BEARING CAP .....	1
14	28-MZ-3005ES 28-MBG-3005AS	FIELD COIL ASSEMBLY for YA-19-3-S1 .. FIELD COIL ASSEMBLY for YA-18-3-S1 ..	1	44	28-MZ-364	BRONZE BEARING .....	1
15		Consisting of:		45	28-XA-832	OIL SEAL .....	1
16		CONNECTOR for field coil .....	2	46		SCREW for pinion housing mounting .....	4
17		FIELD COIL, U.L. ....	1	47		No. 10-32 x 31/32" long, hexagon head.	4
18		FIELD COIL, L.R. ....	1	48	28-MZ-1024U	COVER BAND .....	1
19		FIELD COIL, L.L. ....	1	49		SCREW, cover band, 10-32 x 1-1/2", round hd.	1
20	28-MZ-2002F 28-MZ-2002Q	COMMUTATOR END HEAD for YA-19-3-S1 COMMUTATOR END HEAD for YA-18-3-S1	1	50		NUT, cover band, No. 10-32 thread, square	1
21		Includes:					
22	28-MZ-195	FELT (not illustrated) .....	1		28-MZ-2012AS	BRUSH SET for YA-19-3-S1.	1
23	*	BRUSH SPRING SET .....	1		28-MBG-2012S	BRUSH SET for YA-18-3-S1.	1
24		GROUNDING BRUSH .....	2		28-P90-368	Terminal Stud Pkg. for YA-19-3-S1.	1
25		LOCKWASHER for head screw, No. 10 .....	4		28-P90-333	Terminal Stud Pkg. for YA-18-3-S1.	1
		SCREW, head, 10-32 x 3/8", fillister head..	4		28-P90-448	Armature Thrust Washer Package.	1



PRESTOLITE No. GAS-4301, WIS. MOTOR No. YB-14-A GENERATOR  
 PRESTOLITE No. GAS-4303, WIS. MOTOR No. YB-14-C GENERATOR  
 PRESTOLITE No. GAS-4306, WIS. MOTOR No. YB-14-E GENERATOR  
 PRESTOLITE No. GDY-4115, WIS. MOTOR No. YB-16-F GENERATOR  
 PRESTOLITE No. GDY-4115N, WIS. MOTOR No. YB-16-G GENERATOR



Ref. No. 10. CONTACT FOR END HEAD ASSEMBLY

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

180102C-1

MP-443-5

- YB-16-A (GAS-4301) 6 Volt Generator - With Regulator - Used with YF-6 Engine Speed Distributor
- YB-16-C (GAS-4303) 6 Volt Generator - With Regulator - Used with YF-10 Half Speed Distributor
- YB-16-E (GAS-4306) 6 Volt Generator - With Cut-Out Relay - Used with YF-10 Half Speed Distributor
- YB-16-F (GDY-4115) 12 Volt Generator - With Cut-Out Relay - Used with YF-10 Half Speed Distributor
- YB-16-G (GDY-4115N) 12 Volt Generator - With Cut-Out Relay - Used with YF-10 Half Speed Dist. (Neg. Grd.)

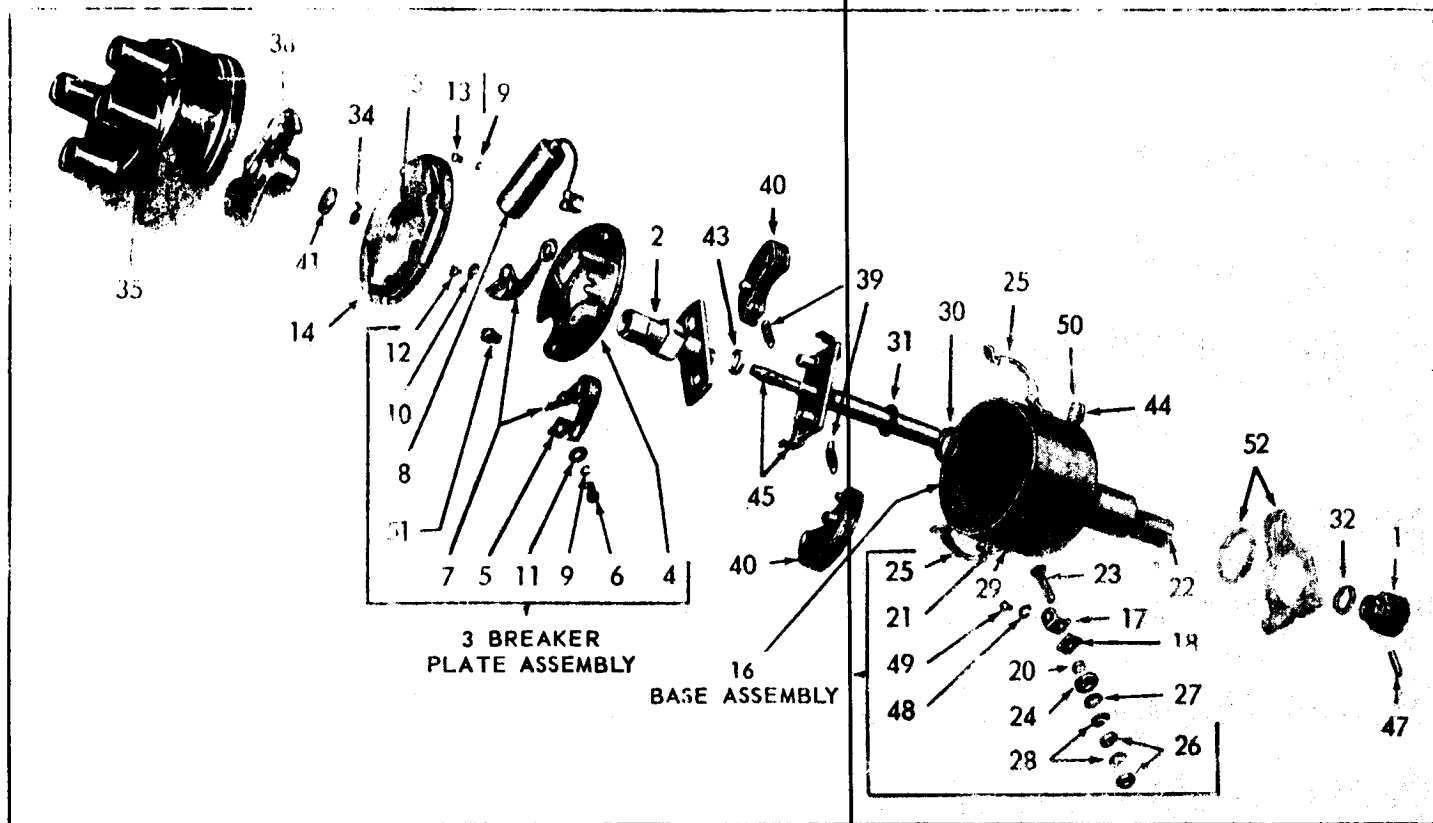
Parts are interchangeable for the above generators except where noted.

NOTE: Code number 28, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.	Ref. No.	Part Number	Description	No. Req.
1		FRAME and FIELD ASSEMBLY .....	1	44	****	WASHER for amature shaft nut, 1/2" plain .....	1
		Consisting of:		45		COTTER PIN for nut, 3/32" x 1" long .....	1
2		INSULATION for field coil connection .....	1	46		KEY for drive gear, No. 8 Woodruff .....	1
3	**	HOLDER for field coil .....	4	47	28-GAS-2175	ARMATURE (YB-16-A, YB-16-C, YB-16-E) ..	1
4		LEAD WIRE with terminal .....	1		28-GDY-2175	ARMATURE (YB-16-F, YB-16-G) .....	1
5		DOWEL PIN .....	2	48	28-GT-121B	DISTRIBUTOR MOUNTING HOUSING .....	1
6		POLE SHOE SCREW .....	2	49	28-P90-629	DISTRIBUTOR DRIVER GEAR & PKG.,	
7		TERMINAL .....	2		28-P90-628	11 teeth, (YB-16-A) .....	1
8	**	INSULATING BUSHING .....	1			7 teeth (YB-16C, YB-16E, YB-16F, YB-16G)	
9	28-GAS-2005D	FIELD COIL ASSEMBLY (YB-16-A, -C) .....	1	50		PIN for driver gear .....	1
	28-GAS-2005A	FIELD COIL ASSEMBLY (YB-16-E) .....	1	51	28-GAG-58A	CLAMP for distributor housing .....	1
	28-GDY-1005	FIELD COIL ASSEMBLY (YB-16-F, -G) .....	1	52		SCREW, clamp, No. 8-32 x 5/8" round hd. ....	1
10	28-GAS-2174A	COMMUTATOR END HEAD ASSY. (YB-16-A) .....	1	53		NUT for clamp screw, No. 8-32 thread, hex.	1
	28-GAS-2174B	COMMUTATOR END HEAD ASSY. (YB-16-C, YB-16-F, YB-16-G) .....	1	54	28-X-382	GREASE CUP .....	1
		Consisting of:		55	28-GW-19-A	COVER for distributor housing .....	1
11		SPRING RETAINER for 3rd brush plate .....	2	56		SCREW for distributor housing mounting .....	3
12		FELT WICK .....	1			No. 10-32 thread x 7/8" long, fillister head.	
13		SPRING for felt wick .....	1	57	28-GAS-20AS	THRU BOLT PACKAGE .....	2
14		WASHER for felt wick .....	1	58		LOCKWASHER, No. 10 Positive .....	5
15	28-X-3172	OILER (elbow type) .....	1			2-for thru bolts.	
	28-X-1573	OILER (straight) .....	1			3-for distributor housing.	
16		HEAD .....	1	59	28-GAS-1024JS	COVER BAND .....	1
17	28-GAS-49	BRONZE BEARING .....	1	60		SCREW for cover band .....	1
18	28-GAS-2021RA	MAIN BRUSH PLATE ASSEMBLY .....	1			No. 10-32 thread x 1 1/2" long, round head.	
		Consisting of:		61		NUT for cover band screw .....	1
19		GROUND WIRE with terminals .....	1			No. 10-32 thread, square.	
20	*	MAIN BRUSH .....	2	62	28-CB-4014	CUT-OUT RELAY ASSEMBLY (YB-16-E) ....	1
21	***	BRUSH HOLDER .....	2		28-RA-4002	CUT-OUT RELAY ASSEMBLY (YB-16-F, -G)	
22	***	SPRING for grounded brush .....	1	63		SPACER for mounting relay (YB-16-E, -F)....	2
23	***	SPRING for insulated brush .....	1	64	28-TC-4329C	TWO CHARGE REGULATOR (YB-16-A, -C)	1
24		MAIN BRUSH PLATE .....	1	65		FUSE for regulator, 5 Amp (YB-16-A, -C) .....	1
25		SCREW for grounded brush .....	1	66		SPACER for mounting regulator (YB-16-A, -C)	2
		No. 8-32 x 1/2" long, fillister head.		67		SCREW for mounting regulator or relay .....	4
26		LOCKWASHER for brush screw, No. 8 .....	2	68		No. 10-32 thread x 3/8" long, round head.	
27		SCREW for insulated brush .....	1	69		LOCKWASHER for mtg. regulator or relay,	
		No. 8-32 x 7/16" long, binding head.				No. 10 .....	4
28	28-GAS-2126A	3rd BRUSH PLATE ASSEMBLY .....	1	70		CARBON RESISTOR for regulator (YB-16-A, YB-16-C) .....	1
		Consisting of:				FUSE HOLDER (YB-16-A, YB-16-C) .....	1
29	*	THIRD BRUSH .....	1				
30	***	BRUSH HOLDER .....	1				
31	***	BRUSH SPRING .....	1				
32		3rd BRUSH PLATE .....	1				
33		SCREW for 3rd brush .....	1				
		No. 8-32 x 7/16" long, fillister head.					
34		LOCKWASHER for 3rd brush screw, No. 8 .....	1				
35		SCREW for plate mounting .....	3				
		No. 8-32 thread x 3/8" long, round head.					
36		LOCKWASHER for plate mounting, No. 8 .....	1				
37	28-GAS-1232	DRIVE END HEAD ASSEMBLY (YB-16-A) .....	1				
	28-GAS-1232B	DRIVE END HEAD ASSEMBLY .....	1				
		(YB-16-C, YB-16-E, YB-16-F, YB-16-G)					
		Consisting of:					
38		HEAD .....	1				
39	28-X-3003	BALL BEARING, shielded, S.A.I., No. 204 .....	1				
40		BEARING RETAINER .....	1				
41		SCREW for retainer .....	3				
		No. 8-32 thread x 3/8" long, flat head.					
42	28-GAS-1176	OIL THROWER .....	1				
43	****	NUT for amature shaft, 1/2"-20 thrd., slotted .....	1				

28-GAS-2012 Brush Set  
 28-P90-370 Lead Assembly Package  
 28-P90-438 Brush Holder & Spring Package  
 28-P90-630 Arm. Shaft Nut & Washer Package  
 NOTE: Items less part number are not serviced separately.

28-1036A HALF SPEED DISTRIBUTOR PARTS LIST  
 MOTOR PART NUMBER YF-10-51

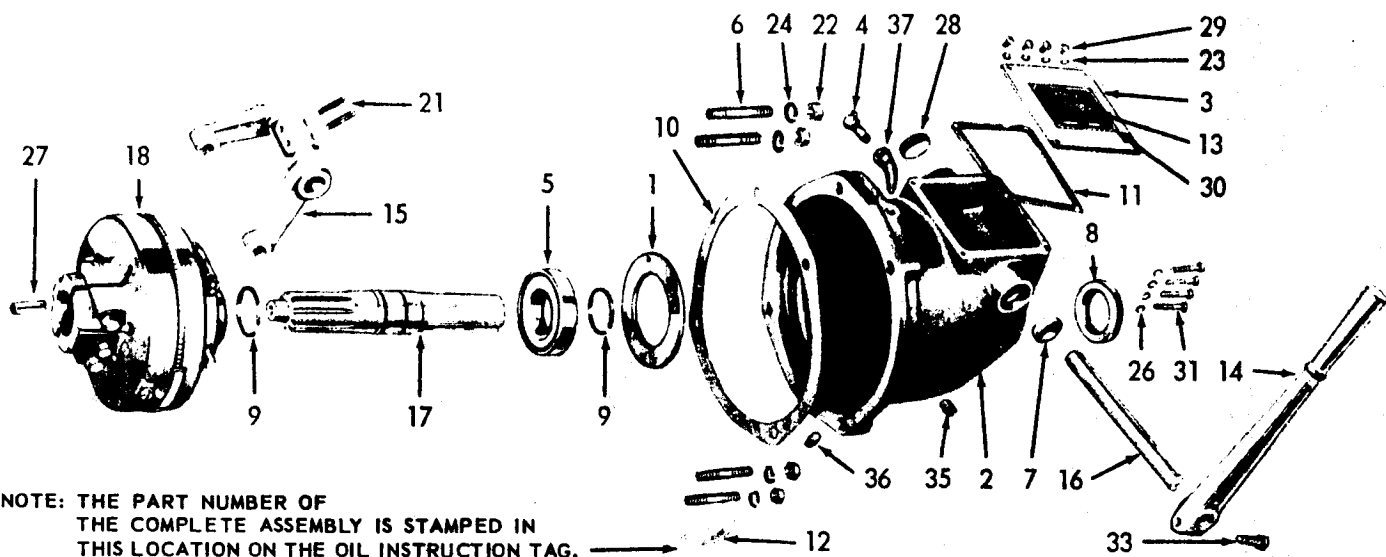


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NOTE: Code number 28, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.	Ref. No.	Part Number	Description	No. Req.
1	****	FOLLOWER GEAR.....	1	30	*	THRUST WASHER (inner) for drive shaft	1
2	28-1AD-1100LH-1	CAM and STOP PLATE, 4 cyl., L.H. ....	1	31	*	THRUST WASHER (outlet) for drive shaft	1
3	28-1AD-2004	BREAKER PLATE ASSEMBLY.....	1	32	* ****	THRUST WASHER for drive shaft (lower)	1
4		Consisting of:		34	*	SNAP RING for cam.....	1
4		BREAKER PLATE.....	1	35	28-1G-1324D	DISTRIBUTOR CAP ASSEMBLY, including:	1
5		SPRING CLIP for contact arm.....	1			PLUNGER CONTACT (not illustrated)	1
6		SCREW for spring clip.....	1			CONTACT SPRING (not illustrated).....	1
7	28-1B-1124LB	BREAKER CONTACT SET.....	1	38	28-1G-1657RA	ROTOR.....	1
8	28-1BB-2042SS-1	CONDENSER PACKAGE.....	1	39	28-1GC-2115	SPRING SET for governor weights.....	1
9		LOCKWASHER, #6.....	3	40	28-1GC-2168LS	GOVERNOR WEIGHT SET.....	2
		2-for condenser mtg. 1-for spring clip.		41	28-1GH-28	FELT WICK for cam sleeve.....	1
10		PLAIN WASHER, contact lockscrew, #8.....	1	43	*	CAM SPACER.....	1
11		PLAIN WASHER, spring clip screw, #6.....	1	44	28-1GS-117	FELT WICK.....	1
12		LOCKSCREW for breaker contact.....	1	45	28-1GS-1180L	DRIVE SHAFT.....	1
13		#8-32 x 3/16" long, fillister head		47	* ****	PIN for gear.....	1
		SCREW for condenser mounting.....	1	48		LOCKWASHER, connector screw, #6.....	1
		#6-32 x 5/32" long, fillister head		49		SCREW for connector.....	1
14	28-1AD-2015	DUST COVER ASSEMBLY, includes:.....	1			#6-32 x 3/16" long, round head	
15		FELT WASHER.....	1	50	28-X-1590	OILER.....	1
16		BASE ASSEMBLY, includes:.....	1	51		SCREW for breaker plate mounting.....	2
17	**	CONNECTOR for terminal stud.....	1			#10-32 x 5/16" long, fillister head	
18	**	INSULATOR for terminal stud.....	1	52	PG-543-A	ADVANCE ARM ASSEMBLY.....	1
19	***	BRACKET, breaker plate (Not ill.).....	2		*	28-P90-390 Distr. Shaft Bearing & Parts Pkg.	
20	**	INSULATING BUSHING for terminal stud.....	1		**	28-P90-337 Terminal Stud & Parts Pkg.	
21	***	BRACKET for cap spring.....	2		***	28-P90-429 Cap Clamp Spring Pkg.	
22	*	BRONZE BEARING.....	2		****	28-P90-427 Dist. Shaft Gear & Parts Pkg.	
23	**	TERMINAL STUD.....	1			NOTE: Parts less part number are not	
24	**	INSULATING WASHER, terminal stud.....	1			serviced separately.	
25	***	CLAMP SPRING for cap.....	2				
26		NUT for terminal stud, #10-32 thread.....	2				
27		PLAIN WASHER, terminal stud, #10.....	1				
28		LOCKWASHER, terminal stud, #10.....	2				
29	***	RIVET for clamp spring.....	4				

## WW-61-E CLUTCH TAKE-OFF ASSEMBLY FOR VE4 AND VF4 ENGINES



84069C-A

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

**BG-210C-1-S2 MAIN BEARING PLATE ASSEMBLY** (Not illustrated) For engines beginning with Serial No. 3106939.  
**BG-210B-S2 ASSEMBLY**, for engines to and including Serial No. 3106938.

**CRANKCASE ASSEMBLY** (Not illustrated) Order by giving the **MODEL, SPECIFICATION and SERIAL NUMBERS** of the engine.

**CA-55-23-S1 CRANKSHAFT ASSEMBLY** (Not illustrated) consisting of:  
1 CA-55-23 Crankshaft      1 ME-71 Bearing      1 PL-53 Key  
1 GA-36-A Gear              1 ME-114 Bearing

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
	<b>WW-61-E</b>	<b>CLUTCH TAKE-OFF ASSEMBLY -</b>			
		Complete .....	1	40	
1	BG-225-A	BEARING RETAINER PLATE .....	1	8	
2	BG-234	HOUSING .....	1	15	
3	BH-158	COVER for housing .....	1	10	
4	LO-44	BREATHER .....	1	1	
5	ME-36-A	BEARING, N.D. No. 7208, at T.O. end .. ME-36 (7508), replaced by ME- 36-A.	1	1	
6	PC-392	STUDS for mounting housg to crankcase	4	2	
7	PH-234-A	OIL SEAL, Trotsel No. BR-124484 .....	1	1	
		For yoke shaft.			
8	PH-344-A	OIL SEAL, Victor No. 60534 .....	1	3	
		For T.O. shaft.			
9	PK-148	SNAP RING, bearing retainer, take-off shaft. Beginning with engine Serial No. 3205301. PK-136 Snap Ring for engines to and in- cluding Serial No. 3205300.	2	1	
10	QD-618	GASKET for housing to crankcase .....	1	1	
11	QD-652	GASKET for cover .....	1	1	
12	SD-79	OIL INSTRUCTION TAG .....	1	1	
13	SD-132	INSTRUCTION PLATE .....	1	2	
14	VB-55-1	SHIFTING LEVER .....	1	2	
15	VB-64-A	CLUTCH YOKE .....	1	1	3
16	WA-61	YOKE SHAFT, order 2 PK-148 Snap rings	1	14	
17	WA-96-B	CLUTCH T.O. SHAFT .....	1	3	12
18	WC-288-A	CLUTCH ASSEMBLY .....	1	12	
		Rockford Drilling Model 5½ L.O.C. No. CLA-1467-AF. See Rockford illustration and parts list of clutch.			
		<b>STANDARD HARDWARE</b>			
21	PA-341	ROLL PIN, 1/4" x 1-1/8" long .....	2	1	
		For clutch yoke.			
22	PD-12	NUT, 7/16"-20 thread, hexagon steel..	4	1	
		For mounting clutch housing.			
23	PE-3	LOCKWASHER, ¼" Positive, cover to housing.....	4	1	
24	PE-6	LOCKWASHER, 7/16" Positive .....	4	1	
		For mounting clutch housing.			
26	PH-30-A	WASHER, 1/4" plain .....	4	1	
		For bearing retainer plate to housing.			
27	PL-140	KEY, 5/16" square x 1-1/8" long, steel	1	1	
		For mounting clutch to crankshaft.			
28	SA-58	WELCH PLUG, 1-3/8" .....	1	1	
29	XA-35	ROUND HEAD SCREW, ¼"-20 x 5/8" ..	4	1	
		Cover to housing.			
30	XA-106	DRIVE SCREW for instruction plate .... XA-64 Self-tapping screw, replaced by XA-106.	2	1	
31	XD-8	HEXAGON HEAD SCREW, ¼"-20 x 1¼" Bearing retainer plate to housing.	4	1	
33	XD-30	HEX. HEAD SCREW, 3/8"-16 x 1½" ....	1	1	
		For shifter lever clamp.			
35	XK-1	PIPE PLUG, 1/8" square head .....	2	1	
		For oil level hole.			
36	XK-2	PIPE PLUG, 1/4" square head .....	1	1	
		For oil drain hole.			
37	XK-77	ST. ELL, 1/8" - 45°, for breather .....	1	1	

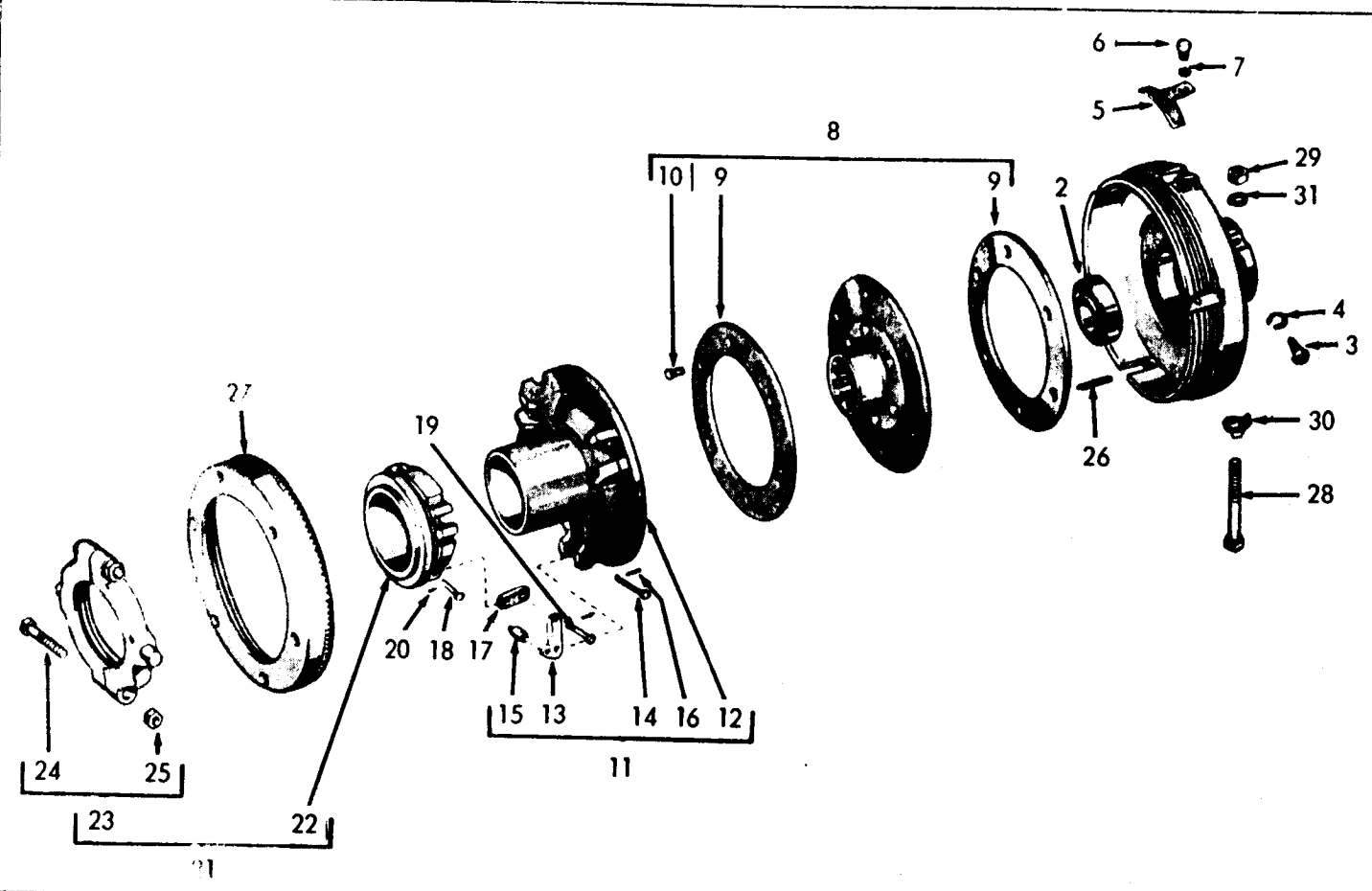
Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.

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





ROCKFORD No. CLA-1467-AF CLUTCH ASSEMBLY  
 WISCONSIN MOTOR PART No. WC-288-A



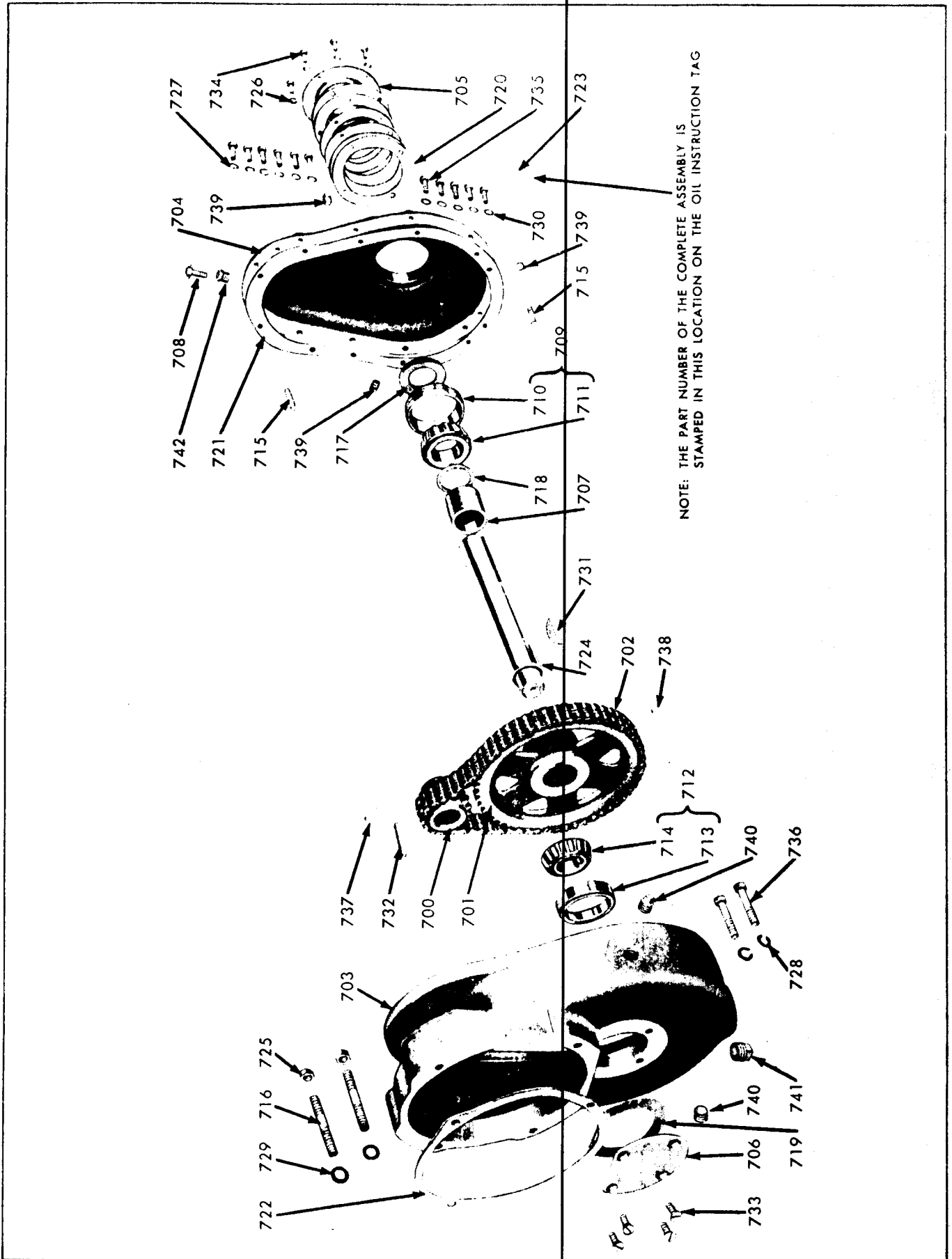
206587C-A

NOTE: Code number 63, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.	Ref. No.	Part Number	Description	No. Req.
1	63-CL-5210-1	CLUTCH HOUSING .....	1	18	63-CL-5153	LINK PIN, long .....	3
2	ME-189	PILOT BEARING .....	1	19	63-CL-5152	LINK PIN, short .....	3
3	XD-14-2	SCREW, 5/16"-18 x 5/8" Dog point hex. hd. ....	1	20	63-CL-5092	COTTER PIN, 1/16" x 3/8" .....	6
4	PE-46	LOCKWASHER, 5/16" external tooth .....	1	21	63-UCL-4-5145	RELEASE SLLEEVE ASSEMBLY .....	1
5	63-CL-4973	ADJUSTING LOCK .....	1	Consisting of:			
6	63-CL-8807-1	SCREW, 1/4"-20 x 3/8" hexagon head ....	1	22	63-CL-5145	Release sleeve .....	1
7	63-CL-3468	LOCKWASHER, 1/4" Shakeproof .....	1	23	63-UCL-6-5144	Release bearing assem. ....	1
8	63-UCL-1-1244-10	DRIVEN MEMBER ASSEMBLY .....	1	Consisting of:			
9	Splined center and plate assembly			24	63-CL-3335-1	Screw, 5/16"-24 x 1-3/4" hexagon head .....	2
10	63-CL-5321-40 Facing (Thermoid DK) ....			25	63-CL-7356	Nut, 5/16"-24 elastic stop .....	2
	63-CL-1011 Tubular rivets (brass) ....			26	63-CL-5087	RETURN SPRING .....	3
11	63-UCL-5146-1A	PRESSURE PLATE and LEVER ASSEM. ....	1	27	63-CL-5147	ADJUSTING RING .....	1
12	Consisting of:			28	63-CL-5318	SCREW, 3/8"-24 x 2-1/2" hexagon head .....	2
13	63-UCL-5146-1	Pressure plate assembly .....	1	29	63-CL-5319	NUT, 3/8"-24 hexagon .....	2
14	63-CL-5544	Lever .....	6	30	63-CL-5211	SCREW LOCK .....	1
15	63-CL-5156	Lever pin .....	3	31	63-PT-353	LOCKWASHER, 3/8" Positive .....	1
16	63-1M-408	Roller .....	3				
17	63-CL-4776	CONNECTING LINK .....	6				

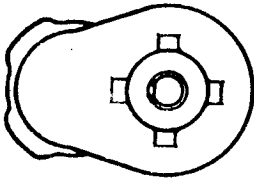
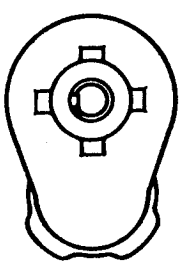
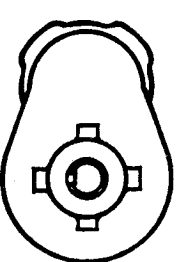
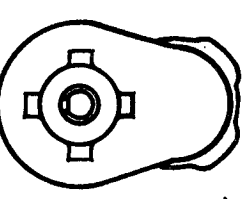
Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

WW-27-J ETC. REDUCTION GEAR ASSEMBLIES  
FOR VE4 AND VF4 ENGINES



Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

**WW-27-J ETC. REDUCTION GEAR ASSEMBLIES  
FOR VE4 AND YE4 ENGINES**

Determine position of take-off shaft when viewing from cranking end of engine. (Views showing take-off end are shown)	Assemble Number	Reduction Ratio	Rotation of Take-off Shaft	Ref. No. 700	Ref. No. 701	Ref. No. 702	Ref. No. 703	Ref. No. 704
				Driver Gear Part No.	Driven Gear Part No.	Chain Part No.	Housing Part No.	Housing Cover Part No.
 <b>TAKE-OFF SHAFT BELOW</b>	WW-27-J	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1		BG-149-B-6	BH-119-6
	WW-27-J-1	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1		BG-149-B-6	BH-119-6
	WW-27-J-2	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1		BG-149-B-6	BH-119-6
	WW-27-J-3	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B-6	BH-119-6
	WW-27-J-4	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B-6	BH-119-6
	WW-27-J-5	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-6	BH-119-6
 <b>TAKE-OFF SHAFT ON LEFT HAND SIDE (as Viewed from the Cranking End)</b>	WW-27-J-6	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1		BG-149-B-7	BH-119-6
	WW-27-J-7	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1		BG-149-B-7	BH-119-6
	WW-27-J-8	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1		BG-149-B-7	BH-119-6
	WW-27-J-9	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B-7	BH-119-6
	WW-27-J-10	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B-7	BH-119-6
	WW-27-J-11	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-7	BH-119-6
 <b>TAKE-OFF SHAFT ON RIGHT HAND SIDE (as Viewed from the Cranking End)</b>	WW-27-J-12	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1		BG-149-B-8	BH-119-2
	WW-27-J-13	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1		BG-149-B-8	BH-119-2
	WW-27-J-14	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1		BG-149-B-8	BH-119-2
	WW-27-J-15	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B-8	BH-119-2
	WW-27-J-16	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B-8	BH-119-2
	WW-27-J-17	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-8	BH-119-2
 <b>TAKE-OFF SHAFT ON TOP</b>	WW-27-J-18	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1		BG-149-B-9	BH-119-6
	WW-27-J-19	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1		BG-149-B-9	BH-119-6
	WW-27-J-20	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1		BG-149-B-9	BH-119-6
	WW-27-J-21	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B-9	BH-119-6
	WW-27-J-22	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B-9	BH-119-6
	WW-27-J-23	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-9	BH-119-6

See following page for weights and description.

## WEIGHTS OF PARTS SHOWN ON PRECEDING PAGE

Part Number	Net Wt.		Part Number	Net Wt.		Part Number	Net Wt.	
	Lb	Oz		Lb	Oz		Lb	Oz
BG-149-B-6	22		GG-81 (20 teeth)	2		WW-27-J-9	62	
BG-149-B-7	22		GG-82 (15 teeth)		1	WW-27-J-10	61	
BG-149-B-8	22		GG-83 (14 teeth)		15	WW-27-J-11	63	
BG-149-B-9	22		GJ-8 (27" long)		13	WW-27-J-12	66	
BH-119	14		GJ-9 (26" long)		12	WW-27-J-13	68	
BH-119-1	14		GJ-10 (30" long)		2	WW-27-J-14	67	
BH-119-2	14		WW-27-J		66	WW-27-J-15	62	
BH-119-6	14		WW-27-J-1		68	WW-27-J-16	61	
GG-66-3 (30 teeth)	2	12	WW-27-J-2		67	WW-27-J-17	63	
GG-67-1 (62 teeth)	8	11	WW-27-J-3		62	WW-27-J-18	66	
GG-69-1 (73 teeth)	10	15	WW-27-J-4		68	WW-27-J-19	66	
GG-71 (40 teeth)	5	4	WW-27-J-5		63	WW-27-J-20	67	
GG-73 (53 teeth)	7	10	WW-27-J-6		66	WW-27-J-21	62	
GG-77-1 (69 teeth)	10	4	WW-27-J-7		68	WW-27-J-22	61	
GG-79-1 (23 teeth)	2		WW-27-J-8		67	WW-27-J-23	63	
GG-80-1 (19 teeth)	1	4						

### INTERCHANGEABLE PARTS FOR WW-27-J ETC. REDUCTION GEAR ASSEMBLIES FOR VE4 AND VF4 ENGINES

**NOTE:** Engines equipped with a Reduction Gear Assembly require a special Main Bearing Plate Assembly, Crankshaft and Crankcase as follows:

**BG-210C-1-52 MAIN BEARING PLATE ASSEMBLY** (Not illustrated) For engines beginning with Serial No. 3106939.

Consisting of:

1 BG-210C-1 Plate                      1 PH-364 Oil Seal                      1 ME-114-2 Bearing Cup

**BG-210B-S2 ASSEMBLY**, for engines to and including Serial No. 3106938.

**CA-55-11-51 CRANKSHAFT ASSEMBLY** (Not illustrated) consisting of:

1 CA-55-11 Crankshaft                      1 ME-71 Bearing                      1 PL-53 Key  
1 GA-36-A Gear                      1 ME-114 Bearing

**CRANKCASE ASSEMBLY** (Not illustrated) **ORDER** by giving the **MODEL, SPECIFICATION** and **SERIAL NUMBERS** of the engine.

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.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
705	BG-150	PLATE for retaining bearing (outer)	1	1		719	QD-543-A	GASKET for bearing retainer plate-inner	1		1
706	BG-151	PLATE for retaining bearing (inner)	1		6	720	QD-544	GASKET for bearing retainer plate-outer	6		1
707	HF-265	SPACER for take-off shaft	1		3	721	QD-545	GASKET for cover to housing	1		1
708	LO-44	BREATHER	1		1	722	QD-618	GASKET for housing to crankcase	1		1
709	ME-76	BEARING ASSEMBLY (outer)	1	1	11	723	SD-79	OIL INSTRUCTION TAG	1		1
710		Consisting of:				724	WA-55	TAKE-OFF SHAFT	1	6	14
711		1 ME-76-1 Cup, Tinker 3528			10						
712	ME-77	BEARING ASSEMBLY (inner)	1		15			<b>STANDARD HARDWARE</b>			
713		Consisting of:				725	PD-12	NUT, 7/16"-20 thread, hexagon steel	2		1
714		1 ME-77-1 Cup, Tinker 028, 0			6			For housing to crankcase mounting studs.			
715	PA-279	DOWEL PIN for cover to housing	2		1	726	PE-4	LOCKWASHER, 5/16" positive	4		1
716	PC-425	STUD for housing to crankcase (outer holes)	2		2			For outer bearing retainer plate.			
717	PH-202	OIL SEAL for take-off shaft Fickhaefer Mfg. Co. A-31-106.	1		4	727	PE-5	LOCKWASHER, 3/8" positive	6		1
718	PH-206	COLLAR for take-off shaft spacer	1		1			For cover to housing mounting, above oil level.			

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

**INTERCHANGEABLE PARTS FOR WW-27-J ETC. REDUCTION GEAR ASSEMBLIES  
FOR VE4 AND VF4 ENGINES**

Ref. No.	Part Number	Description	No. Req	Net Wt.	
				Lb	Oz
728	PE-6	<b>LOCKWASHER, 7/16" positive</b> ..... For housing to crankcase mounting, inner holes.	2		1
729	PH-2	<b>PLAIN WASHER, 7/16" I.D. x 1/16"</b> thick steel..... For housing to crankcase mounting, outer holes.	2		1
730	PH-22	<b>PLAIN WASHER, 3/8" I.D. x 1/16"</b> thick steel..... For cover to housing mounting, below oil level.	5		1
731	PL-24	<b>KEY, No. 29 Woodruff</b> ..... For driven gear mounting.	1		1
732	PL-88	<b>KEY, 1/4" square x 2" long</b> ..... For driver gear mounting.	1		1
733	XC-17	<b>SCREW, 5/16"-18 thread x 3/4" long,</b> flat head ..... For inner bearing retainer plate.	4		1
734	XD-15	<b>SCREW, 5/16"-18 thread x 3/4" long,</b> hexagon head ..... For outer bearing retainer plate.	4		1
735	XD-27	<b>SCREW, 3/8"-16 thread x 1" long,</b> hexagon head..... For cover to housing mounting.	11		1
736	XD-130	<b>SCREW, 7/16"-14 thread x 2 1/4" long,</b> hexagon head..... For housing to crankcase, inner holes.	2		2
737	XE-17	<b>SCREW, 1/4"-20 thread x 3/8" long,</b> headless set ..... For driver gear mounting.	1		1
738	XE-44	<b>SCREW, 5/16"-18 thread x 5/8" long,</b> headless set ..... For driven gear mounting.	1		1
739	XK-2	<b>PLUG, 1/4" pipe, square head</b> ..... For oil level.	3		1
740	XK-3	<b>PLUG, 3/8" pipe, square head</b> ..... For oil level—when take-off shaft is in horizontal position.	2		2
741	XK-4	<b>PLUG, 1/2" pipe, square head</b> ..... For oil drain.	1		2
742	XK-88	<b>REDUCER BUSHING, 3/8" to 1/8" pipe</b> For mounting breather.	1		1

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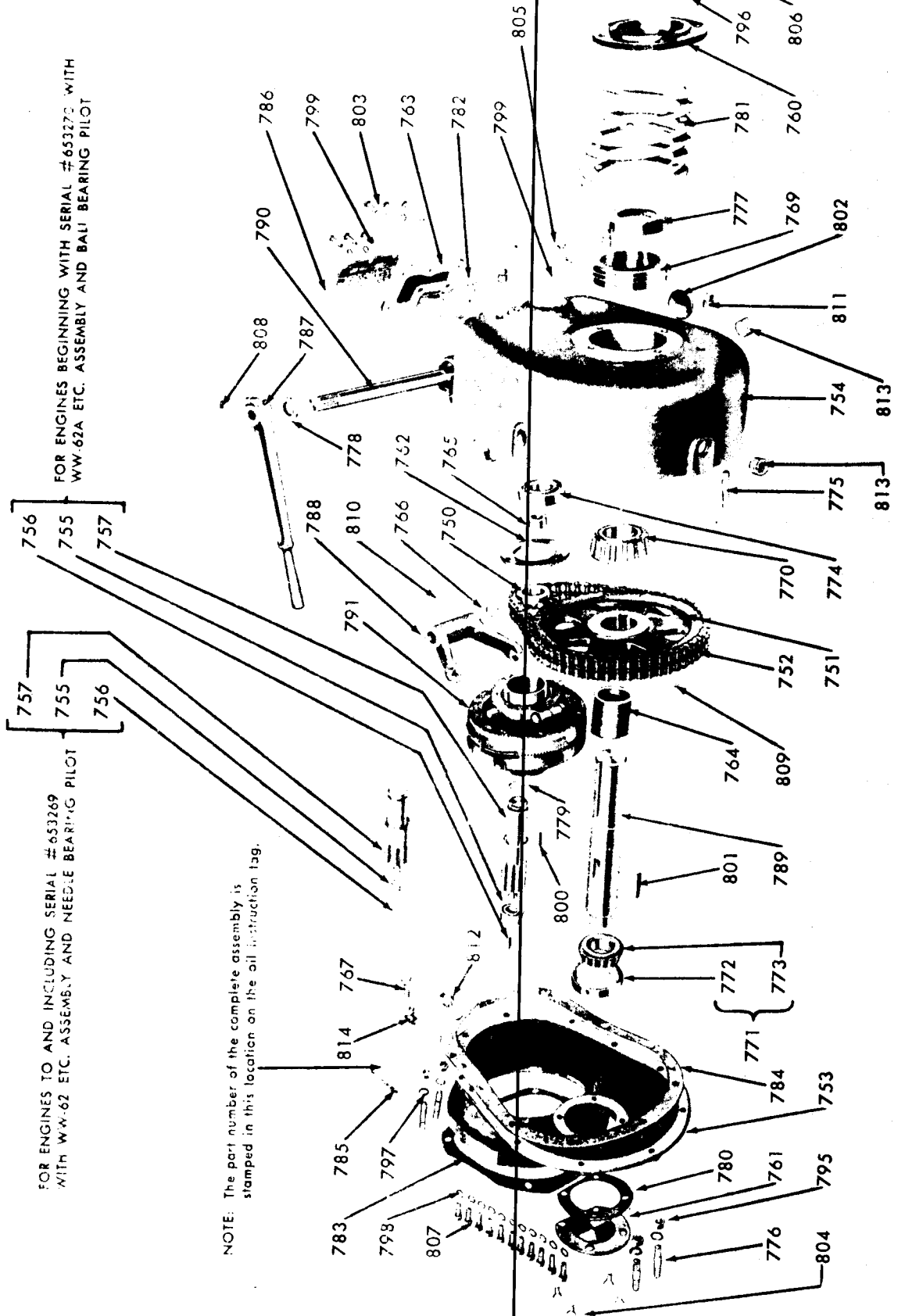
# WW-62 ETC. AND WW-62-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR MODELS VE4 AND VF4 ENGINES

**NOTE:** Beginning with engine Serial No. 653270, WW-62 A etc. Clutch Reduction Gear Assemblies (with ball bearing pilot) replace corresponding WW-62 etc. units (with needle bearing pilot). These units are interchangeable if the engine crankshaft CA-55-1 for WW-62 etc. units is cut off 19.32" from end, for clearance of the ball bearing pilot.

**FOR ENGINES TO AND INCLUDING SERIAL #653269 WITH WW-62 ETC. ASSEMBLY AND NEEDLE BEARING PILOT**

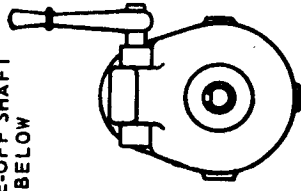
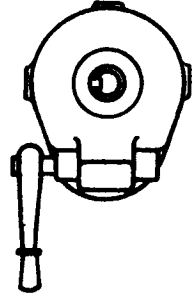
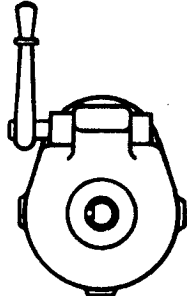
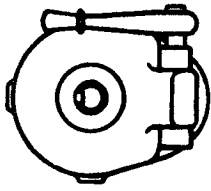
**FOR ENGINES BEGINNING WITH SERIAL #653270 WITH WW-62A ETC. ASSEMBLY AND BALL BEARING PILOT**

**NOTE:** The part number of the complete assembly is stamped in this location on the oil instruction tag.



Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

# WW-62 ETC. AND WW-62-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR VE4 AND VF4 ENGINES

Determine position of take-off shaft when viewing from cranking end of engine. (View facing take-off end are shown.)	Assembly Number	Reduction Ratio	Rotation of Take-off Shaft	Ref. No. 750	Ref. No. 751	Ref. No. 752	Ref. No. 753	Ref. No. 754	Ref. No. 755	Ref. No. 756	Ref. No. 757
				Driver Gear Part No.	Driven Gear Part No.	Chain Part No.	Housing Part No.	Cover Part No.	Pilot Bearing	Key	Drive Shaft
<b>TAKE-OFF SHAFT BELOW</b> 	WW-62	2.07 to 1	Ctr. Engine-Wise	GG-116	GG-67-1	.....	BG-215	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-A	3.00 to 1	Ctr. Engine-Wise	GG-117	GG-77-1	.....	BG-215	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-1	3.84 to 1	Ctr. Engine-Wise	GG-118	GG-69-1	.....	BG-215	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-2	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-215	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-3	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-215	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
<b>TAKE-OFF SHAFT ON LEFT HAND SIDE</b> as viewed from the cranking end. 	WW-62-4	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-215	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-6	2.07 to 1	Ctr. Engine-Wise	GG-116	GG-67-1	.....	BG-215-1	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-7	3.00 to 1	Ctr. Engine-Wise	GG-117	GG-77-1	.....	BG-215-1	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-8	3.84 to 1	Ctr. Engine-Wise	GG-118	GG-69-1	.....	BG-215-1	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-9	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-215-1	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
<b>TAKE-OFF SHAFT ON RIGHT HAND SIDE</b> as viewed from the cranking end. 	WW-62-10	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-215-1	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-11	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-215-1	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-12	2.07 to 1	Ctr. Engine-Wise	GG-116	GG-67-1	.....	BG-215-2	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-13	3.00 to 1	Ctr. Engine-Wise	GG-117	GG-77-1	.....	BG-215-2	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-14	3.84 to 1	Ctr. Engine-Wise	GG-118	GG-69-1	.....	BG-215-2	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
<b>TAKE-OFF SHAFT ON TOP</b> 	WW-62-15	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-215-2	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-16	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-215-2	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-17	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-215-2	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-18	2.07 to 1	Ctr. Engine-Wise	GG-116	GG-67-1	.....	BG-215-3	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
	WW-62-19	3.00 to 1	Ctr. Engine-Wise	GG-117	GG-77-1	.....	BG-215-3	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A
WW-62-20	3.84 to 1	Ctr. Engine-Wise	GG-118	GG-69-1	.....	BG-215-3	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A	
WW-62-21	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-215-3	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A	
WW-62-22	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-215-3	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A	
WW-62-23	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-215-3	BH-143	ME-115 ME-15	PL-103 PL-140	WA-87 WA-87-A	

\* BH-143—replaces BH-143-1. Order PF-127 plug for fuel strainer clearance on power units.

See following page for weights and description.



**WEIGHTS OF PARTS SHOWN ON PRECEDING PAGE**

Part Number	Net Weight		Part Number	Net Weight		
	Lb	Oz		Lb	Oz	
1G-215	19	8	<b>Complete Clutch Reduction Gear Assemblies for engines beginning with Serial No. 653270 (with ball bearing pilot).</b>  For engines to and including Serial No. 653269, WW-62-etc. units (with needle bearing pilot) were used. These are replaced by corresponding WW-62-A-etc. assemblies by cutting off 19/32" from end of engine crankshaft for clearance of the ball bearing pilot.			
BG-215-1	19	8				
BG-215-2	19	8				
BG-215-3	19	8				
BH-143	20					
GG-67-1 (62 teeth)	8	11		WW-62A	89	
GG-67-A (65 teeth)	9			WW-62A-1	89	8
GG-69-1 (73 teeth)	10	15		WW-62A-2	89	
GG-71 (40 teeth)	5	4		WW-62A-3	86	
GG-73 (53 teeth)	7	10		WW-62A-4	85	
GG-77-1 (69 teeth)	10	4		WW-62A-5	87	
GG-113 (20 teeth)	1	14		WW-62A-6	89	
GG-114 (15 teeth)		14		WW-62A-7	89	8
GG-115 (14 teeth)		11		WW-62A-8	89	
GG-116 (30 teeth)	2	10		WW-62A-9	86	
GG-117 (23 teeth)	2	1		WW-62A-10	85	
GG-118 (19 teeth)	1	12		WW-62A-11	87	
GG-131 (28 teeth)	3			WW-62A-12	89	
GJ-8 (27" long)	1	13		WW-62A-13	89	8
GJ-9 (26" long)	1	12		WW-62A-14	89	
GJ-10 (30" long)	2			WW-62A-15	86	
ME-15-B Ball (pilot) bearing For engines beginning with Serial 653270 (furnished by Hockford with clutch, their No. CL-5616).		8		WW-62A-16	85	
ME-115 Needle (pilot) bearing For engines to and including Serial 653269.	3			WW-62A-17	87	
PL-103, 5/16" x 1-5/8" long	1			WW-62A-18	89	
SQUARE KEY (For engines to and including Serial 653269).				WW-62A-19	89	8
PL-140, 5/16" x 1-1/8" long	1			WW-62A-20	89	
SQUARE KEY (For engines beginning with Serial 653270).				WW-62A-21	86	
WA-87 DRIVE SHAFT For engines to and including Serial 653269.	2	8	WW-62A-22	85		
WA-87-A DRIVE SHAFT For engines beginning with Serial 653270.	2	8	WW-62A-23	87		
			WW-62A-24	89		
			WW-62A-25	89		
			WW-62A-26	89		
			WW-62A-27	89		

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

# INTERCHANGEABLE PARTS FOR WW-62 ETC. AND WW-62-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR VE4 AND VF4 ENGINES

**NOTE** Engines equipped with a Clutch Reduction Gear Assembly require a special Main Bearing Plate Assembly, Crankshaft and Crankcase as follows:

**BG-210C-1-S2 MAIN BEARING PLATE ASSEMBLY** (Not illustrated) For engines beginning with Serial No. 3106939 -  
Consisting of:  
1 BG-210C-1 Plate                      1 PH-364 Oil seal                      1 ME-114-2 Bearing cup  
**BG-210B-S2 ASSEMBLY**, for engines to and including Serial No. 3106938.

**CA-55-23-S1 CRANKSHAFT ASSEMBLY** (Not illustrated) For engines with WW-62-A-etc. units beginning with  
Serial No. 653270 (with ball bearing pilot).  
Consisting of:  
1 CA-55-23 Crankshaft              1 ME-71 Bearing                      1 PL-53 Key  
1 GA-36-A Gear                      1 ME-114 Bearing

**CA-55-1-S1 CRANKSHAFT ASSEMBLY**, for engines with WW-62-etc. units, to and including engine Serial No.  
653269 (with needle bearing pilot).

**CRANKCASE ASSEMBLY** (Not illustrated) **ORDER** by giving the **MODEL, SPECIFICATION** and **SERIAL NUMBERS** of the engine.

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
760	BG-150	PLATE for retaining bearing (outer) .....	1	1		781	QD-544	GASKET for bearing retainer plate (outer)	6		1
761	BG-151	PLATE for retaining bearing (inner) .....	1		6	782	QD-592	GASKET for inspection hole plate .....	1		1
762	BG-216	PLATE for clutch bearing .....	1		8	783	QD-618	GASKET for housing to crankcase .....	1		1
763	BH-127-B	COVER for inspection opening .....	1		8	784	QD-619	GASKET for cover to housing .....	1		1
		BH-127, replaced by BH-127-B.				785	SD-79	OIL INSTRUCTION TAG .....	1		1
764	HF-265-A	SPACER for take-off shaft .....	1		6	786	SD-125	INSTRUCTION PLATE .....	1		1
765	HF-372	SPACER for ball bearing .....	1		3			For clutch adjustment.			
766	HF-392	SPACER for shifter yoke .....	4		2	787	VB-55-1	SHIFTER LEVER .....	1	2	
		(Used only when take-off shaft is on the right or left hand side).				788	VB-64-A	SHIFTER YOKE .....	1	1	8
767	LO-44	BREATHER .....	1		1	789	WA-55-H	TAKE-OFF SHAFT .....	1	6	10
768	ME-76	BEARING ASSEMBLY (outer) .....	1	1	11	790	WA-61-D	SHIFTER SHAFT .....	1	1	12
		Consisting of:				791	WC-288-A	CLUTCH ASSEMBLY .....	1	12	
769	ME-76-1	Cup, Timken 3525 .....	1		10			Rockford Drilling Model 5 1/2 L.O.C. No. CLA-1467-AF.			
770	ME-76-2	Cone, Timken 3578 .....	1	1	1			<b>NOTE:</b> For engines to and including Serial No. 653269 with needle bearing pilot in crankshaft, use WC-288A clutch but remove ball bearing pilot in clutch drive hub.			
771	ME-77	BEARING ASSEMBLY (inner) .....	1		15			See Rockford illustration and parts list of clutch.			
		Consisting of:						<b>STANDARD HARDWARE</b>			
772	ME-77-1	Cup, Timken 02820 .....	1		6	795	PD-12	NUT, 7/16"-20 thread, hexagon steel....	4		1
773	ME-77-2	Cone, Timken 02877 .....	1		9			For housing to crankcase mounting studs.			
774	ME-119	BALL BEARING for clutch shaft.....	1		6	796	PE-4	LOCKWASHER, 5/16" Positive .....	4		1
		New Departure No. 3206.						For outer bearing retainer plate.			
775	PA-279	DOWEL PIN for cover to housing.....	2		1						
776	PC-419	STUD for housing to crankcase .....	4		2						
777	PH-202	OIL SEAL for take-off shaft .....	1		4						
778	PH-234-A	OIL SEAL for shifter lever shaft .....	1		3						
779	PK-82	RETAINING RING .....	1		1						
		For clutch shaft bearing.									
780	QD-543-A	GASKET for bearing retainer plate (inner)	1		1						

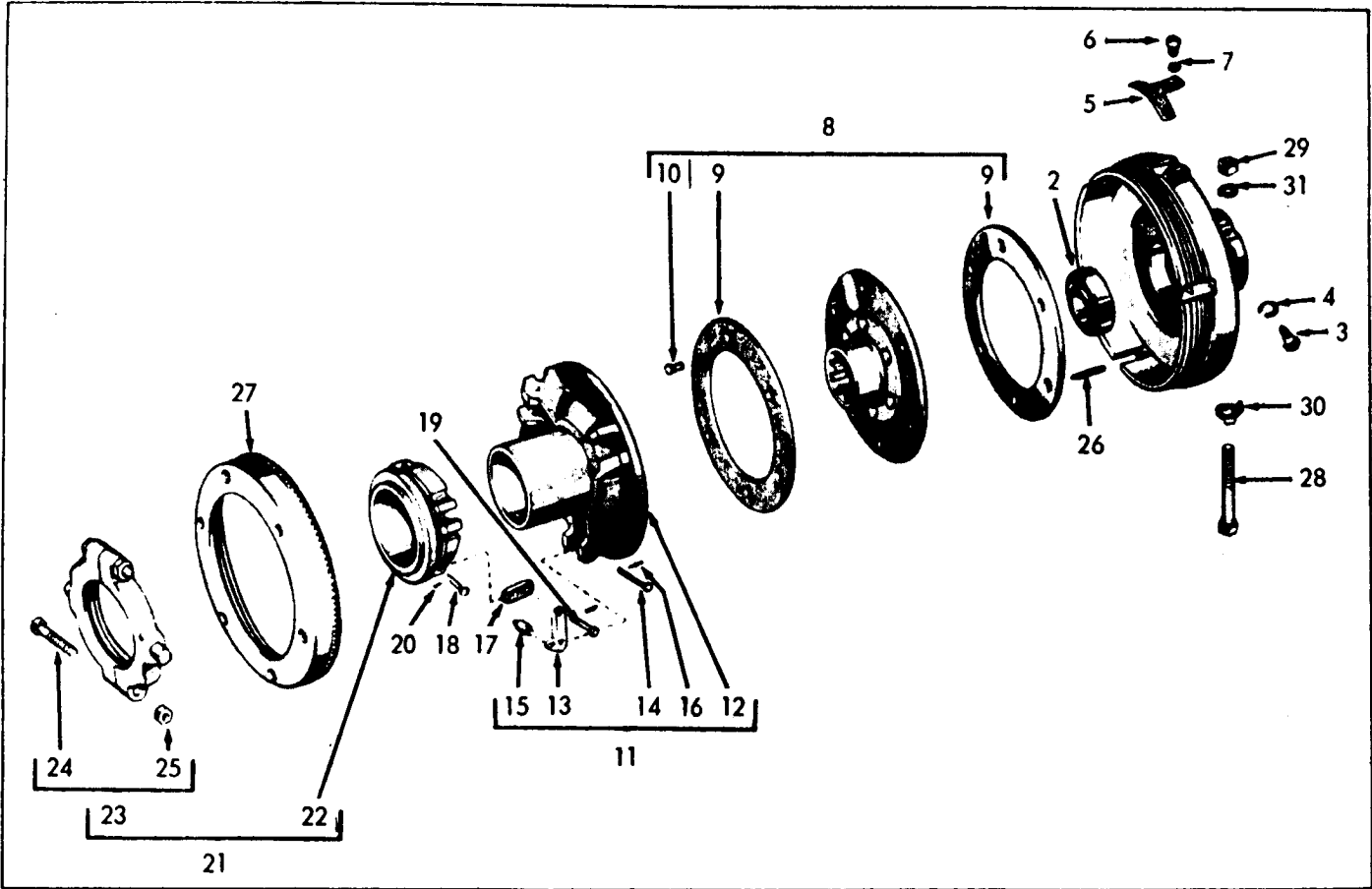
**Order parts from nearest WISCONSIN DISTRIBUTOR or SERVICE CENTER.**  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

**INTERCHANGEABLE PARTS FOR WW-62 ETC. AND WW-62-A ETC. CLUTCH  
REDUCTION GEAR ASSEMBLIES FOR VE4 AND VF4 ENGINES**

Ref. No.	Part Number	Description	No. Net Wt.		
			Req	Lb	Oz
97	PE-6	<b>LOCKWASHER</b> , 7/16" Positive For housing to crankcase mounting.	4		1
798	PH-22	<b>PLAIN WASHER</b> , 3/8" I.D. x 1/16" thick steel For cover to housing mounting.	11		1
799	PH-30	<b>PLAIN WASHER</b> , 1/2" I.D. x 1/16" thick copper 6-for inspection hole cover. 3-for bearing retainer plate.	9		1
800	PL-17	<b>KEY</b> , No. 13 Woodruff For drive gear.	1		1
801	PL-24	<b>KEY</b> , No. 29 Woodruff For driven gear.	1		1
802	SA-58	<b>PLUG</b> , 1-3/8" expansion For shifter shaft hole.	1		1
803	XA-34	<b>SCREW</b> , 1/4"-20 thread x 1/2" long, round head 1 for BH-127B inspection hole cover. XA-36 (1/4" long) for BH-127 cover.	6		1
804	XC-17	<b>SCREW</b> , 5/16"-18 thread x 3/4" long, flat head For inner bearing retainer plate.	4		1
805	XD-7	<b>SCREW</b> , 1/4"-20 thread x 1" long, hex- agon head For clutch bearing retainer plate.	3		1
806	XD-15	<b>SCREW</b> , 5/16"-18 thread x 3/4" long, hexagon head For outer bearing retainer plate.	4		1
807	XD-27	<b>SCREW</b> , 3/8"-16 thread x 1" long, hex- agon head For cover to housing mounting.	11		1
808	XD-30	<b>SCREW</b> , 3/8"-16 thread x 1 1/2" long, hexagon head For shifter lever clamp.	1		2
809	XE-44	<b>SCREW</b> , 5/16"-18 thread x 5/8" long, headless set For driven gear mounting.	1		1
810	PA-341	<b>ROLL PIN</b> , 1/4" dia. x 1-1/8" long For shifter yoke to shaft. XH-26, No. 4 x 1-3/8" long, taper pin, replaced by PA-341.	2		1
811	XK-2	<b>PLUG</b> , 1/4" pipe, square head For oil level.	3		1
812	XK-4	<b>PLUG</b> , 1/2" pipe, square head For oil filler.	1		2
813	XK-6	<b>PLUG</b> , 1/2" pipe, countersunk head For oil drain.	3		2
814	XK-77-A	<b>STREET ELL</b> , 1/8" pipe x 45°, brass For breather mounting. XE-77, replaced by XK-77-A.	1		1

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

**ROCKFORD No. CLA-1467-AF CLUTCH ASSEMBLY  
WISCONSIN MOTOR PART No. WC-288-A**



206587C-A

NOTE: Code number 63, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.	Ref. No.	Part Number	Description	No. Req.
1	63-CL-5210-1	CLUTCH HOUSING .....	1	18	63-CL-5153	LINK PIN, long .....	3
2	ME-189	PILOT BEARING .....	1	19	63-CL-5152	LINK PIN, short .....	3
3	XD-14-2	SCREW, 5/16"-18 x 5/8" Dog point hex. hd. ....	1	20	63-CL-5092	COTTER PIN, 1/16" x 3/8" .....	6
4	PE-46	LOCKWASHER, 5/16" external tooth .....	1	21	63-UCL-4-5145	RELEASE SLLEEVE ASSEMBLY .....	1
5	63-CL-4973	ADJUSTING LOCK .....	1	Consisting of:			
6	63-CL-8807-1	SCREW, 1/4"-20 x 3/8" hexagon head ....	1	22	63-CL-5145	Release sleeve .....	1
7	63-CL-3468	LOCKWASHER, 1/4" Shakeproof .....	1	23	63-UCL-6-5144	Release bearing assem. ....	1
8	63-UCL-1-1244-10	DRIVEN MEMBER ASSEMBLY .....	1	Consisting of:			
9	Splined center and plate assembly			24	63-CL-3335-1	Screw, 5/16"-24 x 1-3/4" .....	2
10	63-CL-5321-40	Facing (Thermoid DK) ....	2	25	63-CL-7356	Nut, 5/16"-24 elastic stop .....	2
10	63-CL-1011	Tubular rivets (brass) .....	6				
11	63-UCL-5146-1A	PRESSURE PLATE and LEVER ASSEM. ....	1	26	63-CL-5087	RETURN SPRING .....	3
12	Consisting of:			27	63-CL-5147	ADJUSTING RING .....	1
13	63-UCL-5146-1	Pressure plate assembly .....	1	28	63-CL-5318	SCREW, 3/8"-24 x 2-1/2" hexagon head .....	2
14	63-CL-5544	Lever .....	6	29	63-CL-5319	NUT, 3/8"-24 hexagon .....	2
15	63-CL-5156	Lever pin .....	3	30	63-CL-5211	SCREW LOCK .....	1
16	63-LM-408	Roller .....	3	31	63-PT-353	LOCKWASHER, 3/8" Positive .....	1
17	63-CL-4776	CONNECTING LINK .....	6				

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

# WICO MODEL XH-4 MAGNETOS

FOR WISCONSIN MODELS VE4, VF4 and VP4D ENGINES

Y-54 Series

## 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. 18*). 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

Improperly 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.

### DISTRIBUTOR CAP AND ARM

The distributor cap (*Ref. No. 42*) may be removed by loosening the three screws (*Ref. No. 38*) which hold it in place. The distributor arm (*Ref. No. 29*) can then be removed from the shaft. When replacing the distributor arm be sure that the flat inside of the arm is lined up with the flat on the cam.

### 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. 44*) 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. 48*), the breaker arm lock (*Ref.*

*No. 17*) and washer (*Ref. No. 13*). Then lift the breaker arm from its pivot. Remove the spacing washer, 5717, and the two breaker plate clamp screws (*Ref. No. 44*). 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. 46*).

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. 36*) first disconnect the condenser lead by removing the breaker arm spring screw (*Ref. No. 48*), then remove the two condenser clamp screws (*Ref. No. 20*) and the condenser clamp (*Ref. No. 30*). When replacing the condenser make sure it is properly placed between the two locating bosses 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. After the distributor cap, distributor arm, and breaker shield have been removed and the primary wire disconnected from the breaker arm spring terminal by removing screw (*Ref. No. 48*), take out the two coil core clamp screws (*Ref. No. 21*) and remove the clamps (*Ref. No. 40*). 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.

### REMOVAL OF COIL FROM CORE

The coil (*Ref. No. 43*) is held tight on the core (*Ref. No. 28*) by two wedges, 10383. It will be necessary to press against the coil core with considerable force to remove it from the coil. The coil should be supported in such a way that there is no danger of the primary of the coil being pushed out of the secondary.

When replacing the coil on the coil core, slide it on then press in the two coil wedges, one on each end, until they are flush with the primary of the coil.

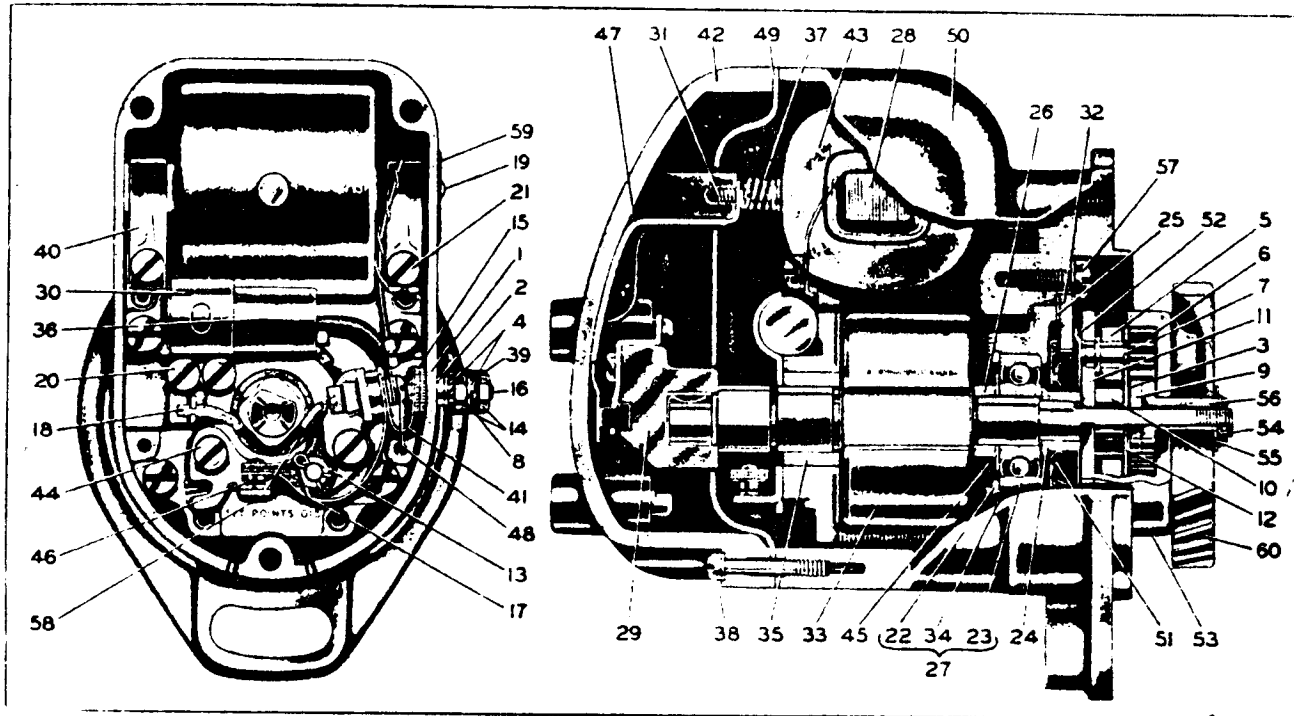
**WICO ELECTRIC COMPANY**

WEST SPRINGFIELD, MASSACHUSETTS, U. S. A.

# MAGNETO PARTS LIST

TELEDYNE WISCONSIN MOTOR No. Y-54

WICO Model XH-4, No. XH-1343B



NOTE: Code number 90, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

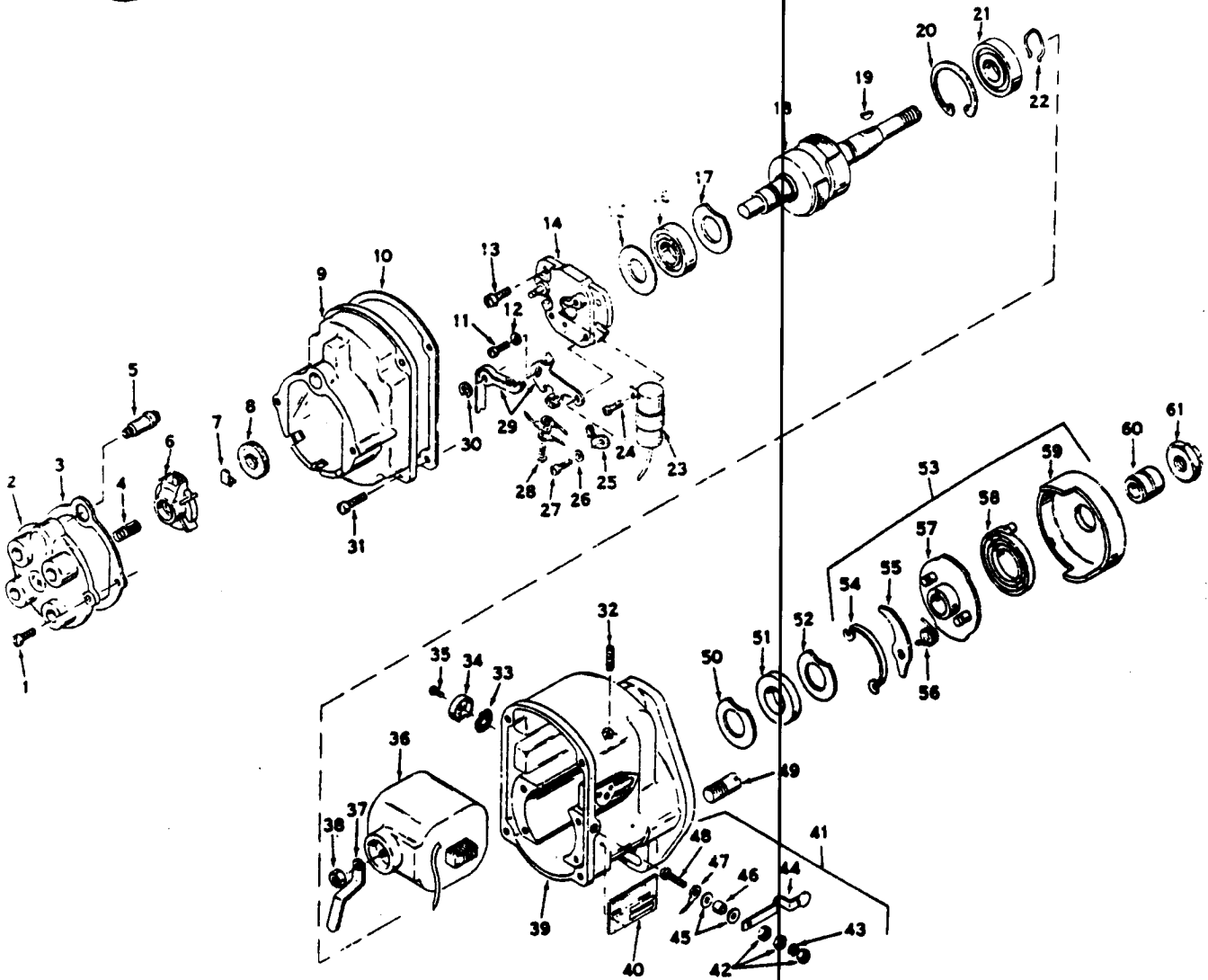
Ref. No.	Part Number	Description	No. Req.
1	90-M-34X	SPACING WASHER for ground stud	2
2	90-M-35X	GROUND STUD WASHER	1
3	90-M-42XA	SPACING WASHER for driven flange	1
4	90-M-55XA	LOCKWASHER for ground stud	2
5	90-A-179X	TRIP ARM	2
6	90-15-186	DRIVE SPRING	1
7	90-A-243X	SNAP RING	2
8	90-1XA-256	WASHER for ground stud (steel)	1
9	90-IVA-583	SPACING WASHER for drive cup	1
10	90-2122	SPACER for drive flange	1
11	90-X2286	DRIVEN FLANGE GROUP	1
12	90-2288	DRIVE SPRING RETAINER	1
13	90-3219	PIVOT WASHER for breaker arm	1
14	90-3230	GROUND STUD NUT	2
15	90-11874	INSULATING LOCK for ground stud	1
16	90-3945	GROUND STUD	1
17	90-4210	BREAKER ARM LOCK	1
18	90-5077	CAM WIPER FELT	1
19	90-5250	SCREW for name plate	2
20	90-5411	CLAMP SCREW for condenser (Sems)	2
21	90-5411	CLAMP SCREW for coil core (Sems)	2
22	90-5516	RETAINING RING for rotor bearing	1
23	90-5517	ROTOR BEARING	1
24	90-5518	IMPULSE SPACER	1
25	90-5519	GASKET for impulse stop	1
26	90-5520	SPACER for bearing cage group	1
27	90-X5521	BEARING CAGE GROUP	1
28	90-X5524	COIL CORE	1
29	90-X5531	DISTRIBUTOR ARM GROUP	1
30	90-6924	CONDENSER CLAMP	1
31	90-5536	COIL CONTACT SCREW	1
32	90-X5550	IMPULSE STOP GROUP	1
33	90-Y 5560	ROTOR	1
34	90-5567	BEARING CAGE	1

Ref. No.	Part Number	Description	No. Req.
35	90-5610	BUSHING for breaker plate	1
36	90-X6916	CONDENSER ASSEMBLY	1
37	90-5620	COIL CONTACT SPRING	1
38	90-5622	SCREW for distributor cap	3
39	90-X5632	STOP BUTTON GROUP	1
40	90-5633	COIL CORE CLAMP	2
41	90-5635	GROUND CONNECTOR	1
42	90-X5653	DISTRIBUTOR CAP UNIT	1
	90-X5654	GROUND CONNECTION UNIT (includes Ref. Nos. 1, 2, 4, 8, 14, 15, 16, and 41) Not ill.	1
43	90-X5700B	COIL GROUP	1
	90-5717	ALIGNING WASHER, breaker point (Not ill.)	1
44	90-5900	SCREW for fixed contact (Sems)	2
45	90-5926	BALL BEARING SHIELD	1
46	90-X5996	BREAKER CONTACT SET	1
47	90-X6000	SECONDARY INTERLEAD GROUP	1
48	90-6017	CLAMP SCREW for breaker spring	1
49	90-6081	GASKET for distributor cap	1
50	90-X6150	MAIN HOUSING REPL. GROUP	1
51	90-6199	OIL SEAL (repl. A-33X used on early models)	1
52	90-6204	OIL SLINGER	1
53	90-6310	DRIVE CUP (repl. 3870 used on early models)	1
54	90-6424	SNAP RING for impulse lock nut	1
55	90-6425	THRUST WASHER for impulse lock nut	1
56		IMPULSE LOCK NUT KIT	1
	90-K6444	Replaces 6009 below serial No. 15431	1
	90-K6445	Replaces 6227 above serial No. 15430	1
	90-X6455	IMPULSE COUPLING UNIT incl. Ref. Nos. 3, 5, 6, 7, 9, 10, 11, 12, 53, 56 (K6445) Not ill.	1
57	90-6465	CLAMP SCREWS for impulse stop (Sems)	4
58	90-6468	BREAKER ARM FELT	1
59	90-8792	NAME PLATE	1
	90-10383	COIL WEDGE (Not illustrated)	1
	90-10407	ALIGNING WASHER, breaker pt. (thin) Not ill.	1
60	GD-93C-5	DRIVE GEAR (24 teeth) for VE4D and VF4D	1
	GD-103	DRIVE GEAR (27 teeth) for model VP4D	1



# FAIRBANKS, MORSE MAGNETO PARTS LIST

TELEDYNE  
WISCONSIN MOTOR Y-106 Series  
TYPE FM-ZV4B7



NOTE: Code number 31, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Y-106-S1 For VE4D with GD-93C-5 Gear  
Y-106-1-S1 For VP4D with GD-103  
Refer To Engine Parts List For Repair Kits.

Ref. No.	Part Number	Description	No. Req.
1	31-859D	SCREW, cover, 8-32 x 9/16	2
2	31-G800	COVER, end cap	1
3	31-B682	GASKET, cover	1
4	31-E2460B	BRUSH and SPRING	1
5	31-DX983A	LEAD ROD	1
6	31-Y2765	DISTRIBUTOR ROTOR	1
7	31-A2766	SPRING CLIP, rotor	1
8	31-G2501	SEAL, distributor shaft	1
9	31-TY2430	END CAP	1
10	31-H2498	GASKET, end cap	1
11	31-656U	SUPPORT SCREW, 6-32 x 3/8	1
12	31-D2458	WASHER, support screw #6	1
13	31-856D	SUPPORT SCREW, 8-32 x 3/8	4
14	31-SX4631	BEARING SUPPORT	1
15	31-E2493	WASHER, grease retaining (inner)	1
16	31-D5949A	BEARING, cam end	1
17	31-A2492C	WASHER, grease retaining (outer)	1
18	31-RT2480	ROTOR	1
19	31-3K1	KEY	1
20	31-B1498B	SNAP RING, bearing	1
21	31-C5949	BEARING, drive end	1

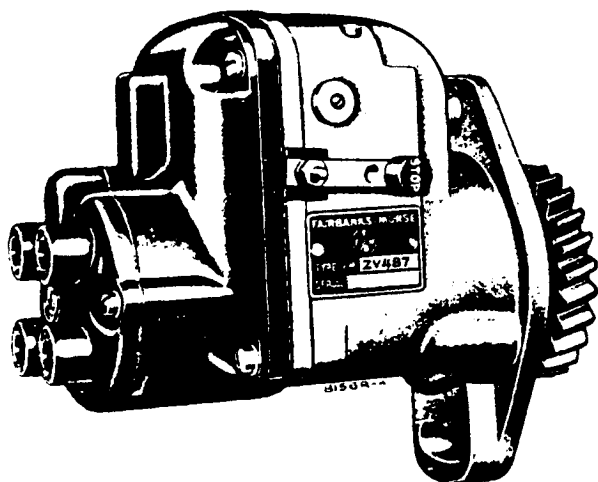
Ref. No.	Part Number	Description	No. Req.
22	31-B1498D	SNAP RING, shaft	1
23	31-SXY2433	CONDENSER	1
24	31-856U	CONDENSER SCREW, 8-32 x 3/8	1
25	31-G2788	CAM WICK	1
26	31-B5969	WASHER, support screw #8	1
27	31-856U	SUPPORT SCREW, 8-32 x 3/8	1
28	31-656Z	TERMINAL SCREW, 6-32 x 3/8	1
29	31-A2437A	POINT SET	1
30	31-C1498G	SNAP RING, fulcrum pin	1
31	31-10512D	SCREW, end cap 10-24 x 3/4	4
32	31-315514A	COIL SETSCREW, 5/16-24 x 7/8	2
33	31-C6032B	VENT SCREEN	2
34	31-B6030A	VENT COVER	2
35	31-654U	COVER SCREW, 6-32 x 1/4	2
36	31-QS2477C	COIL	1
37	31-C6120	COIL CLIP	1
38	31-8N1	CLIP NUT	1
39	31-GW2425	HOUSING	1
40	31-A195	NAME PLATE	1
41	31-L2514C	GROUND SWITCH, complete	1
42	31-8N1	SCREW NUT	3

Y-106 Series  
TYPE FM-ZV4B7

Ref. No.	Part Number	Description	No. Req.
43	31-8LW5	LOCKWASHER, switch screw .....	1
44	31-M2514	LEVER, ground switch .....	1
45	31-C6018	INSULATING WASHER, ground switch ....	2
46	31-K2457A	SWITCH BUSHING .....	1
47	31-J2499A	WIRE ASSEMBLY, ground .....	1
48	31-8S14N	SWITCH SCREW, #32 x 7/8 .....	1
49	31-52568	PIN, pawl stop .....	2
50	31-A2492C	WASHER, seal (inner) .....	1
51	31-G3861	SHAFT SEAL .....	1
52	31-A2492A	WASHER, seal (outer) .....	1

Ref. No.	Part Number	Description	No. Req.
53	31-GX2563C-30	COUPLING, complete (30° lag angle).....	1
54	31-A1498J	LOCK SPRING, pawl .....	1
55	31-Q2566	COUPLING PAWL .....	2
56	31-T5963	PAWL SPRING .....	2
57	31-EX2563-30	HUB ASSEMBLY (30° lag angle) .....	1
58	31-F2565	COUPLING SPRING .....	1
59	31-Y5957	COUPLING SHELL .....	1
60	31-F2572	GEAR BUSHING .....	1
61	31-M2570	COUPLING NUT .....	1

## FIELD SERVICE AND ADJUSTMENT



### GENERAL DESCRIPTION

This magneto is a special unit designed and built for use on engine models VE4D, VF4D and VP4D, manufactured by the Wisconsin Motor Corporation. These engines have a firing interval of 180°-270°-180°-90°. The magneto, having a four pole rotor and a four lobe cam, meets this requirement by producing four sparks per revolution of the rotor, running at crankshaft speed. In a complete cycle of two engine revolutions, four sparks are used for ignition and four fire in the exhaust.

### SERVICE PROCEDURE

Improper functioning of the magneto is often believed to be the cause of engine trouble arising from other sources. A brief engine inspection will often locate the trouble before the magneto is reached and prevent maladjustment of magneto parts in good condition. It is suggested that the magneto be opened only when it is certain that the magneto spark is unsatisfactory. This condition may be determined by a simple ignition spark check, as outlined in engine INSTRUCTION MANUAL.

### END CAP COVER REMOVAL

If no spark is obtained from one or more of the magneto terminals, remove the end cap cover, taking care not to damage the gasket. Remove the distributor rotor and clean the distributor compartment thoroughly, observing whether the air passages are open or clogged. **IT IS EXTREMELY IMPORTANT THAT THESE AIR PASSAGES BE KEPT FREE OF DIRT AND OTHER FOREIGN MATTER.** Examine the high-tension lead brush and replace it if noticeably worn or damaged. This brush should move freely in its holder and should be under slight spring pressure.

### 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. Refer to engine INSTRUCTION MANUAL for breaker point adjustment procedure.

### 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, these magnetos do 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 Service Center. Coil and condenser replacements are not recommended, unless test equipment is available.

### SEALING MAGNETO

Opening the magneto for breaker point adjustment or other service necessitates resealing the magneto upon reassembly. The surfaces between magneto frame and end cap should be thoroughly cleaned and a new gasket provided. Remove the vent hoods and clean vent screens of all foreign material.

### SPECIAL DRIVE GEAR

The magneto is equipped with a special drive gear mounted directly to the impulse coupling. If it is necessary at any time to remove the drive gear, special care must be exercised in reassembly. Remove the entire end cap and turn the rotor until the contact segment is in firing position for No. 1 cylinder as shown in Fig. 1. With the distributor rotor in this position, fit gear to the impulse coupling lugs so that the punch mark on the face, and "X" mark on the outer edge of the gear tooth, are located as shown. Securely tighten coupling locknut.

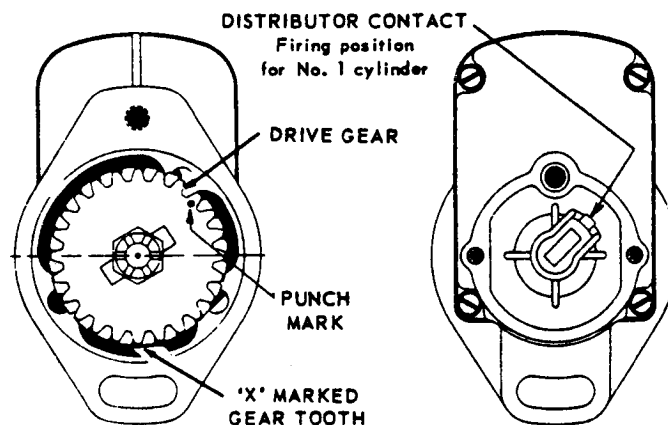


Fig. 1, DRIVE GEAR TIMING MARK ASSEMBLY

### TIMING MAGNETO TO ENGINE

Refer to magneto timing in the front section of ENGINE INSTRUCTION MANUAL, for proper method of mounting magneto to engine in order to obtain correct ignition timing.



# CARBURETOR

## ZENITH MODEL 68-7

The Zenith 68-7 Series carburetor is of an up-draft single venturi design with a 1" S.A.E. barrel size and a 7/8" S.A.E. flange. The carburetors are made with selective fuel inlet, and with or without a main jet adjustment. These carburetors are "balanced" and "sealed", and the semi concentric fuel bowl allows operation to quite extreme angles without flooding or starving.

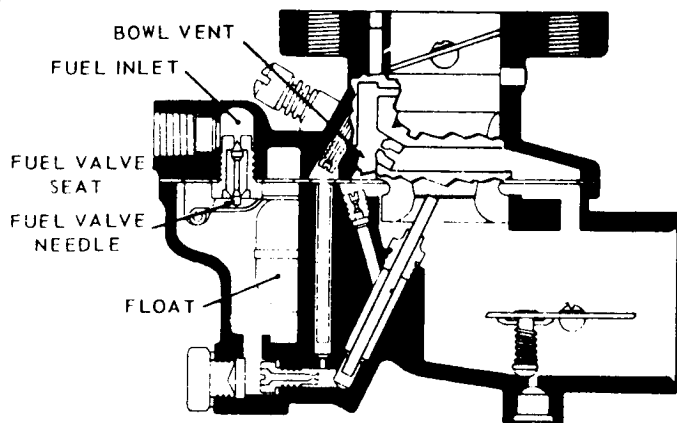


Fig. 1

Fuel supply system, Fig. 1, is made up of a threaded fuel inlet, fuel valve seat, fuel valve needle, float and fuel bowl. Fuel travels through the fuel valve seat and passes around the fuel valve needle 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 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".

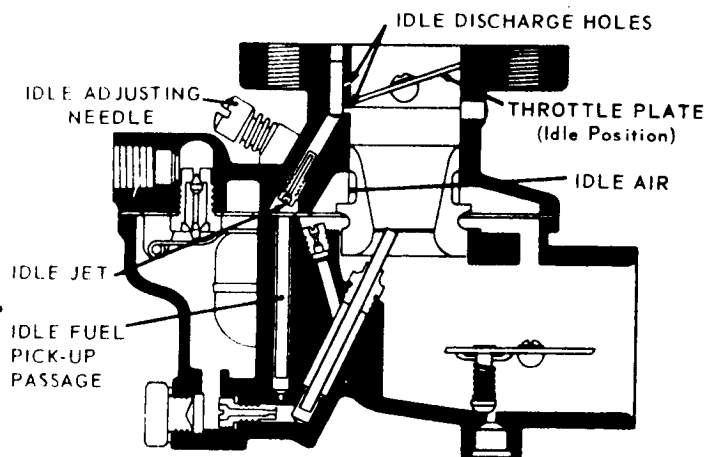


Fig. 2

Idle system, Fig. 2, consists of two idle discharge holes, idle fuel pick-up passage, idle adjusting needle, idle jet, and fuel pick-up 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. The air for the idle mixture originates back of (or from behind) the main venturi. The position of the idle adjusting

## WISCONSIN L-63 SERIES

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 the air in the passage leading to the discharge holes and enters the air stream at this point.

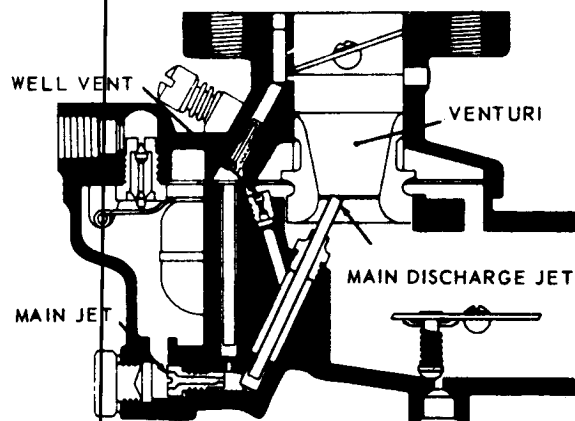


Fig. 3

High speed system, Fig. 3, 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 and engine speeds; and a main discharge jet, which delivers the fuel into the air stream.

The main jet controls the fuel delivery during part throttle range from about one-quarter to full throttle opening. To maintain a proper mixture, a small amount of air is admitted through the well vent into the discharge jet through 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.

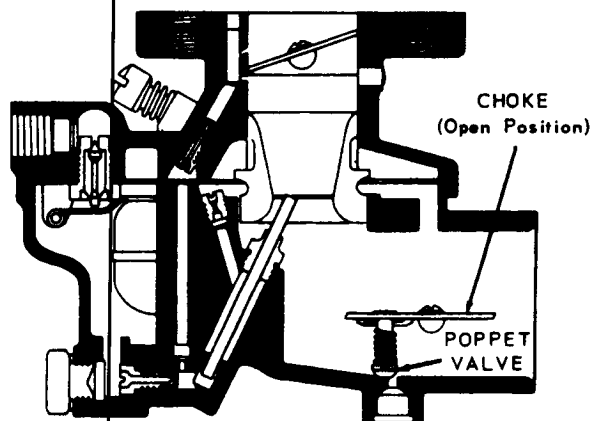


Fig. 4

Choke system, Fig. 4, 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

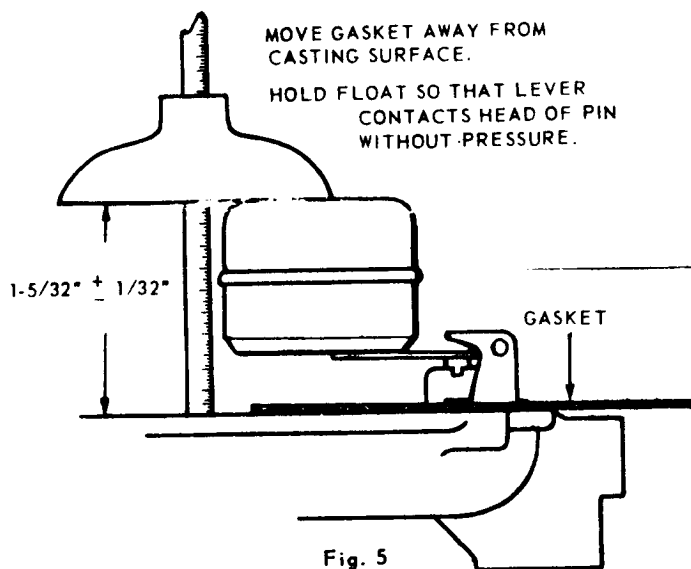
when starting the engine. The choke valve is of a "semi-automatic" type, having a poppet valve incorporated in its design, which is controlled by a spring. The poppet valve opens automatically when the engine starts and admits air to avoid over-choking or flooding of the engine. The mixture required 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.

#### FLOAT SETTING, Fig. 5

If float position is not to the dimension shown, use a long nose pliers and bend lever close to float body, to obtain correct float setting.

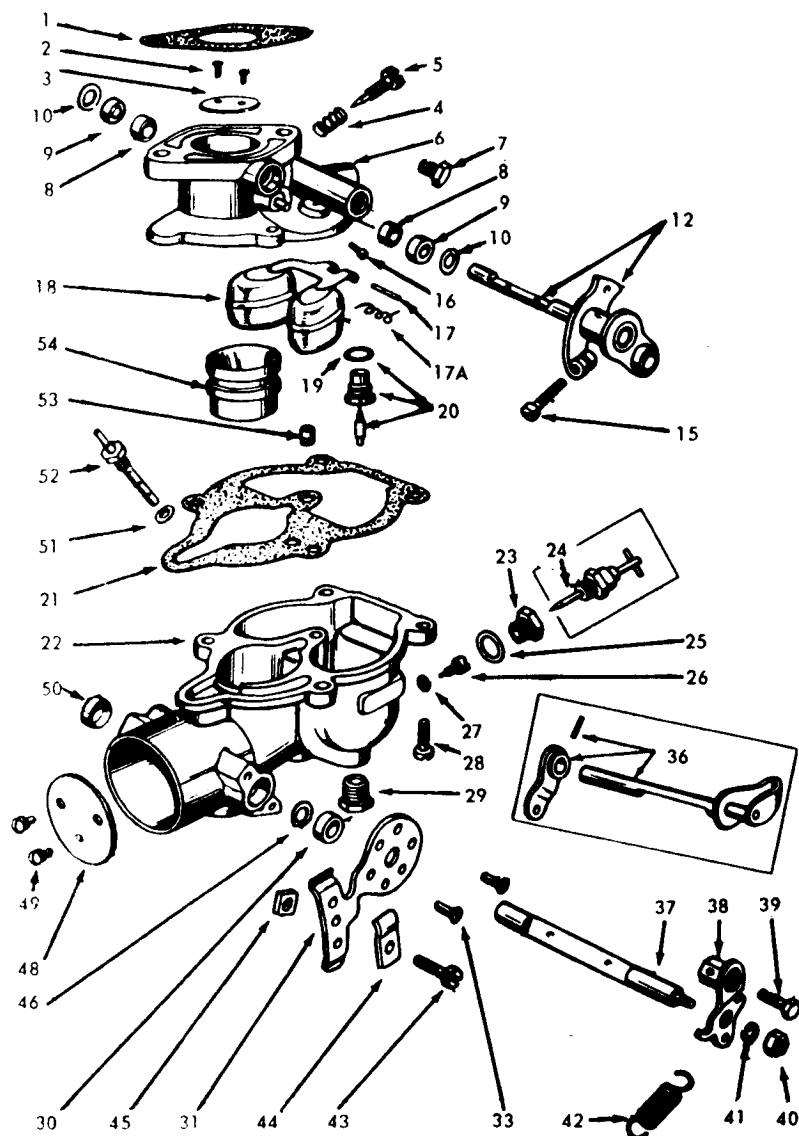
#### FUEL LEVEL

The liquid level in float chamber is  $17/32$  to  $19/32$  inch below top of float bowl. This level was established with a #35 fuel valve seat at  $1\frac{1}{2}$  p.s.i. and a sight tube approximately  $1/4$  to  $9/32$  inch i.d.



## SERVICE PARTS LIST

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



CARB. REF.	ZENITH NO.	WISCONSIN NO.
1	12098A ●	L-63
2	12188G ●	L-63-A
3	12158D ●	L-63-C
4	12325	L-63-D
5	12199E ●	L-63-E
6	12205A ●	L-63-F
7	12235E ●	L-63-G
8	12236	L-63-H
9	12239C ●	L-63-J
10	12234F ●	L-63-K
11	12288C ●	L-63-L
12	12300	L-63-M
13	12599D ●	L-63-N
14	12375D ●	L-63-R
15	12448D ●	L-63-U
16	12449D ●	L-63-V
17	12545C ●	L-63-W
18	12543C ●	L-63-Y
19	12546	L-63-Z
20	12647	L-63-AA
21	12253A ●	LZ-63-2
22	12229D ●	LZ-63-C
23	12238D ●	LZ-63C-2
24	12744B ●	L-63-AF
25	12982B ●	L-63-AN
26	13201A ●	L-63-AP
27	13238A ●	L-63-AQ
28	13405A ●	L-63-AV
29	13420A ●	L-63-BC
30	13449A ●	L-63-BD
31	13694	L-63-BL

NOTE: Beginning with this letter designation ●, bushings (Ref. 8) were discontinued.

# CARBURETOR PARTS LIST

## ZENITH MODEL 68-7

## WISCONSIN L-63 Series

Item No.	Part Number	Description	No. Req.	Item No.	Part Number	Description	No. Req.
1	QC-71-A *	GASKET - flange, (Zenith No. C141-4-5) .....	1		93-C81-50-35 *	VALVE & SEAT, fuel (spring type) for 2, 3, 7, 9, 11, 12, 14, 15, 22, 23, 24, 26 .....	1
2	93-T31555-4	SCREW & WASHER - throttle plate .....	2		93-C81-50-25 *	For 17 and 19 .....	1
	93-T315B5-4	SCREW & WASHER - throttle plate, for 30 .....	2				
3	93-C21-176	PLATE - throttle, for all except 5, 7, 8, 10, 12, 14, 18 .....	1	21	93-C142-74 † *	GASKET - BOWL TO BODY .....	1
	93-C21-205	PLATE - throttle, for 5, 7, 8, 10, 12, 14, 18 .....	1	22	93-B3-121B-1	BOWL - FUEL, for 1, 6, 20, 21 .....	1
4	93-C111-17	SPRING - idle needle .....	1		93-B3-121A-3	BOWL - FUEL, for 2, 5, 10, 12, 18 .....	1
5	93-C46-6 *	NEEDLE - idle adjusting .....	1		93-B3-121A-1	BOWL - FUEL, for 3, 7, 8, 9, 11, 14, 17, 19, 22, 24, 29, 31 .....	1
6		BODY - throttle, (Not available for service)			93-B3-121B-2	BOWL - FUEL, for 4 .....	1
7	93-T91-3	1/8" PLUG - fuel inlet R.H. ....	1		93-B3-121A-2	BOWL - FUEL, for 13 .....	1
8	93-C9-75	BUSHING - throttle shaft (See Note) .....	2		93-B3-121E-1	BOWL - FUEL, for 15, 23, 30 .....	1
9	93-T48-9 *	SEAL - throttle shaft .....	2		93-B3-121F-1	BOWL - FUEL, for 16 .....	1
10	93-T52-57 *	RETAINER - shaft seal (1 used for 28) .....	2		93-B3-121D-6	BOWL - FUEL, for 25 .....	1
	93-C131-38	CUP PLUG, for 28 .....	1		93-B3-121A-7	BOWL - FUEL, for 26 .....	1
12	93-C29-491	SHAFT & STOP LEVER - throttle, for 1, 3, 6, 9, 11, 17, 19, 20, 21, 22, 23, 29, 31 .....	1	23	93-C138-24	PLUG - MAIN JET PASSAGE, for 1, 3, 4, 8, 10, 15, 16, 19, 20, 21, 22, 23, 24, 26, 28, 29, 30, 31 .....	1
	93-C29-1301	SHAFT & STOP LEVER - throttle, for 4 .....	1	24	93-C71-21	ADJUSTMENT - MAIN JET, for 2, 5, 6, 7, 9, 11, 12, 13, 14, 17, 18, 25, 27 .....	1
	93-C29-926	SHAFT & STOP LEVER - throttle, for 5, 7, 8, 10, 14, 18 .....	1	25	93-T56-28 † *	WASHER (fiber) - PLUG & ADJUSTMENT ..	1
	93-C29-1418	SHAFT & STOP LEVER - throttle, for 25, 27 .....	1	26	93-C52-7-22	JET - MAIN, for 1, 4, 16, 20, 21, 28, 29, 30 .....	1
	93-C29-1476	SHAFT & STOP LEVER - throttle, for 15, 16, 30 .....	1		93-C52-7-33	JET - MAIN, for 2, 13, 25, 27 .....	1
	93-C29-858	SHAFT & STOP LEVER - throttle, for 2, 13, 24 .....	1		93-C52-7-26	JET - MAIN, for 5, 7, 11, 12, 14, 17, 18 .....	1
	93-C29-1475	SHAFT & STOP LEVER - throttle, for 12 .....	1		93-C52-7-25	JET - MAIN, for 6 .....	1
	93-C29-1584	SHAFT & STOP LEVER - throttle, for 26 .....	1		93-C52-7-19	JET - MAIN, for 8 .....	1
	93-C29-1607	SHAFT & STOP LEVER - throttle, for 28 .....	1		93-C52-7-30	JET - MAIN, for 9 .....	1
15	93-T858-12-NP	SCREW - THROTTLE STOP, for all except 25, 27, 30 .....	1		93-C52-7-21	JET - MAIN, for 10 .....	1
	93-T858-10-NP	SCREW - THROTTLE STOP, for 25, 27, 30 .....	1		93-C52-7-23	JET - MAIN, for 3, 15, 19, 22, 23, 24, 26 .....	1
16	93-C55-6-12	JET - IDLE, for all except 25, 27, 29, 30 .....	1		93-C52-7-24	JET - MAIN, for 31 .....	1
	93-C55-6-10	JET - IDLE, for 29, 30 .....	1	27	93-T56-28 † *	WASHER (fiber) - MAIN JET .....	1
	93-C55-22-11	JET - IDLE, for 25, 27 .....	1	28	93-T301S10-10	SCREWS - BOWL TO BODY ASSEMBLY .....	4
17	93-C120-4 *	AXLE - FLOAT .....	1	29	93-T91-3	PLUG - BOWL DPAIN .....	1
17A	93-C117-79	SPRING - FLOAT, for all except 1, 6, 16, 21, 28 .....	1	30	93-C131-4X2 *	RETAINER - CHOKE SHAFT SEAL, for 1 thru 25, 27, 29, 30, 31 .....	1
18	93-C85-103	FLOAT and HINGE ASSEMBLY .....	1		93-T52-57 *	RETAINER - CHOKE SHAFT SEAL, for 26, 28 ..	1
19	93-T56-20 † *	WASHER (.040" thick fiber) for 93-C81-17 .... Solid type fuel valve and seat.	1	31	93-C109-40C	BRACKET - CHOKE, for 1, 3, 6, 7, 8, 9, 11, 14, 15, 16, 17, 19, 20, 21, 23, 24, 26, 29, 30, 31 .....	1
	93-T56-70 † *	WASHER (.020" thick fiber) for 93-C81-50 .... Spring type fuel valve and seat.	1		93-C109-40C-2	BRACKET - CHOKE, for 4, 13, 27 .....	1
20	93-C81-17-35 *	VALVE & SEAT, fuel (solid type) for 1, 4, 5, 6, 8, 10, 13, 16, 21, 25, 27, 28, 29, 30, 31 ..	1		93-C109-40C-1	BRACKET - CHOKE, for 22 .....	1
	93-C81-17-25 *	For 18 and 20 .....	1		93-C109-40E-1	BRACKET - CHOKE, for 28 .....	1
				33	93-C140-58	SCREWS - CHOKE BRACKET ASSEMBLY .. For all except 2, 5, 10, 12, 18, 25.	2
				36	93-C108-280	SHAFT & FRICTION LEVER - CHOKE, for 2	1
					93-C108-279	SHAFT & FRICTION LEVER - CHOKE, for 5, 10, 12, 18 .....	1
					93-C108-277	SHAFT & FRICTION LEVER - CHOKE, for 25	1
				37	93-C105-286	SHAFT - CHOKE, for all except 2, 5, 10, 12, 18, 25 .....	1
				38	93-C104-2	LEVER - CHOKE, for all except 2, 5, 10, 12, 18, 25 .....	1
				39	93-T858-7	SCREW - CHOKE LEVER SWIVEL, for all except 2, 5, 10, 12, 18, 25 .....	1
				40	93-T2258	NUT - CHOKE SHAFT, for all except 2, 5, 10, 12, 18, 25 .....	1

(Continued)

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

**CARBURETOR PARTS LIST**  
**ZENITH MODEL 68-7** **WISCONSIN L-63 Series**

Item No.	Part Number	Description	No. Req.
41	93-T41-10	LOCKWASHER - CHOKE SHAFT NUT, for all except 2, 5, 10, 12, 18, 25 .....	1
42	93-C112-6	SPRING - CHOKE LEVER RETURN, for all except 2, 5, 10, 12, 18, 25 .....	1
43	93-T858-8	SCREW - BRACKET CLIP, for all except 2, 5, 10, 12, 18, 25 .....	1
44	93-C110-7	CLIP - BRACKET TUBE, for all except 2, 5, 10, 12, 18, 25 .....	1
45	93-T2158	NUT - CLAMP SCREW, for all except 2, 5, 10, 12, 18, 25 .....	1
46	93-T57-4	* SEAL - CHOKE SHAFT, for all except 26, 28	1
	93-T48-9	* SEAL - CHOKE SHAFT, for 26, 28 .....	1
48	93-C101-80	PLATE - CHOKE, for all except 2, 13, 25, 27	1
	93-C101-85	PLATE - CHOKE, for 2, 13, 25, 27 .....	1
49	93-T31555-4	SCREW & WASHER CHOKE PLATE, for all except 30 .....	2
	93-T315B5-4	SCREW & WASHER CHOKE PLATE, for 30 ..	2
50	93-CR37-1X1*	PLUG - CHOKE SHAFT HOLE, for all except 2, 5, 10, 12, 18 .....	1
51	93-T56-48 †*	WASHER (fiber) - DISCHARGE JET .....	1
52	93-C66-114-60	JET - DISCHARGE, for 1, 4, 6, 16, 20, 21, 28	1
	93-C66-114-45	JET - DISCHARGE, for 2, 13, 25, 27 .....	1
	93-C66-114-50	JET - DISCHARGE, for 3, 9, 11, 15, 17, 19, 22, 23, 24, 26, 29, 30, 31 .....	1
	93-C66-114-40	JET - DISCHARGE, for 5, 7, 8, 10, 12, 14, 18	1
53	93-C77-18-12	JET - WELL VENT, for 1, 4, 6, 16, 20, 21, 28	1
	93-C77-18-13	JET - WELL VENT, for 2, 13, 25, 27 .....	1
	93-C77-18-22	JET - WELL VENT, for 3, 9, 11, 15, 17, 19, 22, 23, 24, 26, 29, 30, 31 .....	1
	93-C77-18-17	JET - WELL VENT, for 5, 7, 8, 10, 12, 14, 18	1
54	93-B38-74-18	VENTURI, for 1, 3, 4, 6, 9, 11, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 28 .....	1
	93-B38-74-19	VENTURI, for 2, 13, 25, 27, 29, 30, 31 .....	1
	93-B38-74-17	VENTURI, for 5, 7, 8, 10, 12, 14, 18 .....	1
	93-C2454AD1X2	LEVER - THROTTLE CLAMP, for 15, 16, 30	1
Not Illustr.	93-T8B10-9	SCREW - LEVER CLAMP, for 15, 16, 30 .....	1
	93-T8B8-10	SCREW - LEVER SWIVEL, for 15, 16, 30 ....	1
-	93-C181-329	GASKET KIT .....	1
-	LQ-33	REPAIR PARTS KIT (with spring type fuel valve and seat) for 2, 3, 7, 9, 11, 12, 14, 15, 22, 23, 24, 26 .....	1
-	LQ-39	REPAIR PARTS KIT (with solid type fuel valve and seat) for 1, 4, 5, 6, 8, 10, 13, 16, 21, 25, 27, 28, 29, 30, 31 .....	1
-	93-K-2130	REPAIR PARTS KIT, for 17, 19 .....	1
-	93/K-**	REPAIR PARTS KIT, for 18, 20 .....	1
		* Parts in Repair Kit	
		† Parts in Gasket Set	
		** Specify Zenith Carburetor Number	

Order parts from nearest **WISCONSIN DISTRIBUTOR** or **SERVICE CENTER**.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

## Teledyne Total Power Limited Engine Warranty

TELEDYNE TOTAL POWER, a division of Teledyne Industries, Inc. (herein "Teledyne") warrants that each new engine or service engine assembly sold by it will be free, under normal use and service, from defects in material and workmanship for a period of one (1) year after the date of delivery to the original retail purchaser, or 2000 hours of operation, whichever shall first occur.

Teledyne's obligation under this Limited Warranty shall be limited to the repair or replacement, at Teledyne's option, of any part or parts which upon examination is/are found, in Teledyne's sole judgment, to have been defective in material or workmanship. It shall be a condition of Teledyne's obligation under this Limited Warranty that Teledyne, directly or through one of its Distributors or Warranty Stations authorized to service the particular engine involved, receive prompt notice of any warranty claim and that the engine or the part or parts claimed to be defective be promptly delivered, transportation prepaid, to such Distributor or Warranty Station for inspection and repair. All repairs qualifying under this Limited Warranty must be performed by Teledyne or one of its authorized Distributors or Warranty Stations. The labor necessary for removal and reinstallation of an engine in connection with a covered warranty repair shall be included only to the extent allowed in the particular case by Teledyne, in its sole discretion. The Customer shall be responsible for the remainder of the labor charges incurred in the removal and reinstallation of the engine.

The repair or replacement of any part or parts under this Limited Warranty shall not extend the term of the engine warranty beyond the original term as set forth above.

**LIMITATIONS AND EXCLUSIONS:** This Limited Warranty shall not apply to:

- A. Any engine which shall have been subject to negligence, misuse, accident, misapplication or over-speeding.
- B. Any engine that has been installed, repaired, or altered by anyone in a manner which in Teledyne's sole judgement adversely effects its performance or reliability.
- C. Any engine which has been fitted with or repaired with parts or components not manufactured or approved by Teledyne which in Teledyne's sole judgment adversely affects its performance or reliability.
- D. Engine tune-ups and normal maintenance service including, but not limited to, valve adjustment, normal replacement of service items, fuel and lubricating oil, fan belts, anti-freeze, etc.
- E. Damages caused by prolonged or improper storage of the engine.

The customer is responsible for all transportation charges in connection with any warranty work.

Teledyne reserves the right to modify, alter or improve any engine or parts without incurring any obligation to modify or replace any engine or parts previously sold without such modification, alteration or improvement.

No person is authorized to give any other warranty or to assume any additional obligation on Teledyne's behalf unless made in writing and signed by an officer of Teledyne.

**THIS WARRANTY, AND TELEDYNE'S OBLIGATIONS HEREUNDER, ARE IN LIEU OF ANY OTHER WARRANTIES OR OBLIGATIONS OF ANY KIND, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. TELEDYNE SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES.**

**TELEDYNE TOTAL POWER**

**MEMPHIS, TENNESSEE 38118**

