

WISCONSIN

Air Cooled

HEAVY DUTY ENGINES

INSTRUCTION BOOK AND PARTS LIST

MODEL VH4D

ISSUE MM 274-B

WORLD'S LARGEST BUILDERS OF HEAVY DUTY AIR COOLED ENGINES

IMPORTANT

STARTING AND OPERATING OF NEW ENGINES

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

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

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

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

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

THEREFORE READ INSTRUCTIONS CAREFULLY

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

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

Extra copies of this manual are \$1.00 each.

WISCONSIN MOTOR CORPORATION
MILWAUKEE, WISCONSIN 53246

BOOK OF INSTRUCTIONS

WISCONSIN *Air-Cooled*
FOUR CYLINDER ENGINE

MODELS VH4, VH4D

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



NOTE: The VH4 engine with STELLITE exhaust valves and seat inserts has the letter 'D' suffixed to the model designation and is referred to as the Model VH4D.

WISCONSIN MOTOR CORPORATION
MILWAUKEE 46, WISCONSIN

INTRODUCTION

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

Wisconsin Motor Corporation 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.

A listing of approved Wisconsin service stations appears in the back of this manual.

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

Like all fine machinery, 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.

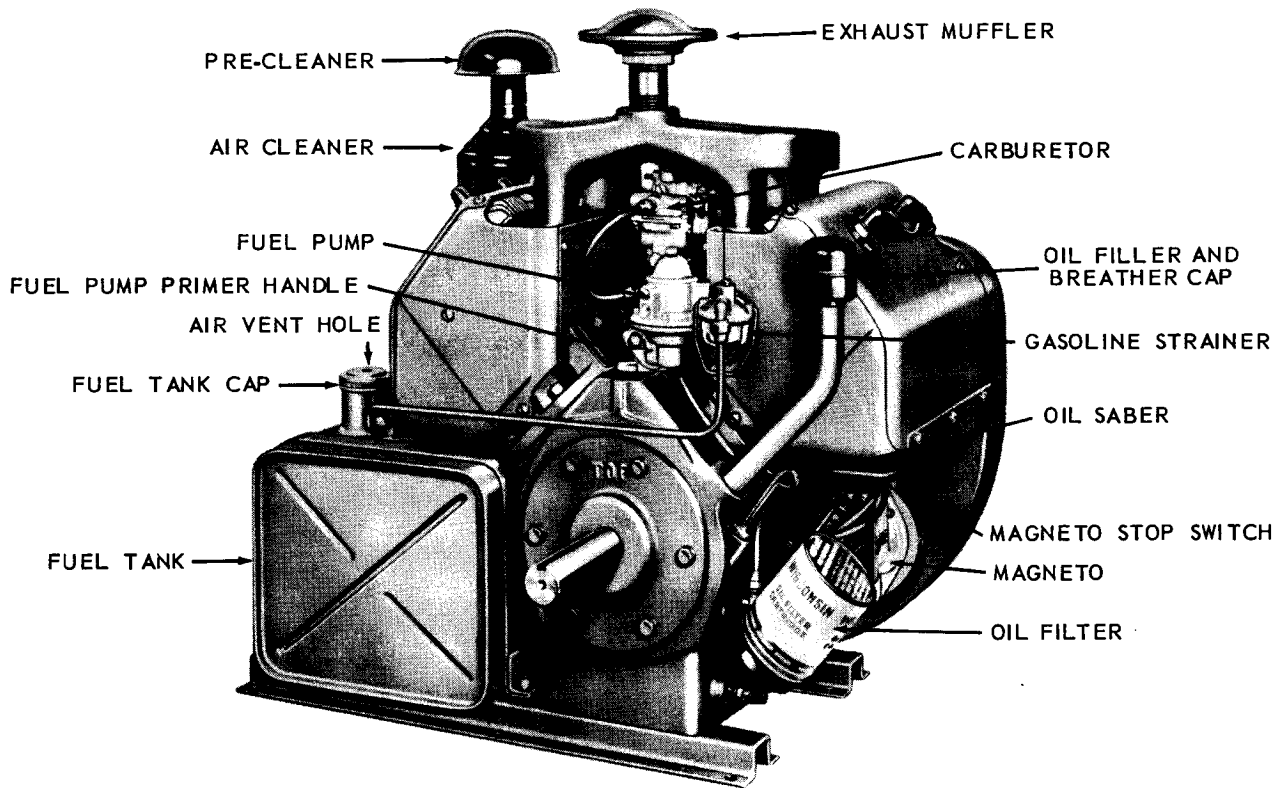
Never operate engine in a closed building unless the exhaust is piped outside. This exhaust contains carbon monoxide, a poisonous, odorless and invisible gas, which if breathed causes serious illness and possible death.

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.

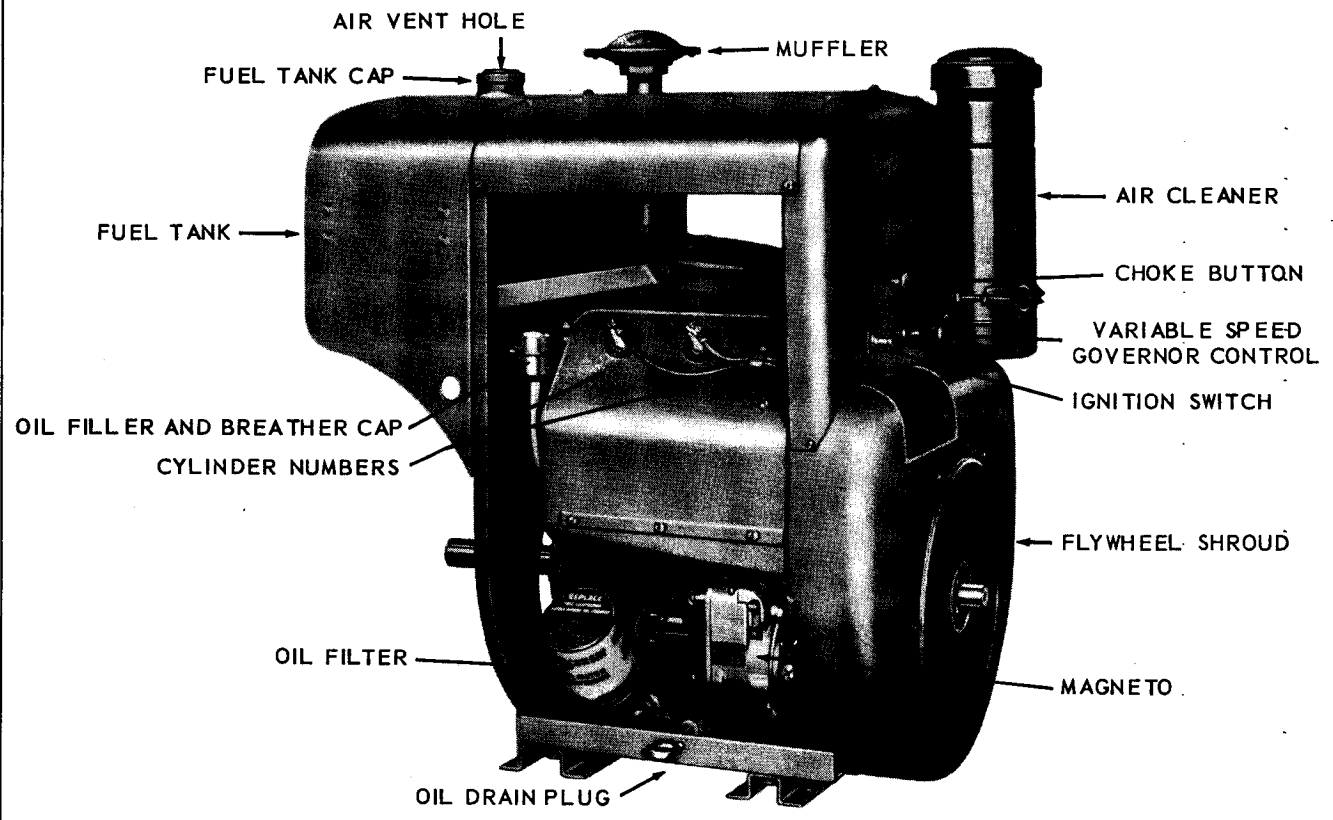
Keep this book handy at all times, familiarize yourself with the operating instructions.

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TAKE-OFF (Side Mount Tank) VIEW OF ENGINE



POWER UNIT FAN END VIEW OF ENGINE

**Fig. 1
MODEL VH4 OPEN ENGINE AND POWER UNIT**

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218642C-1

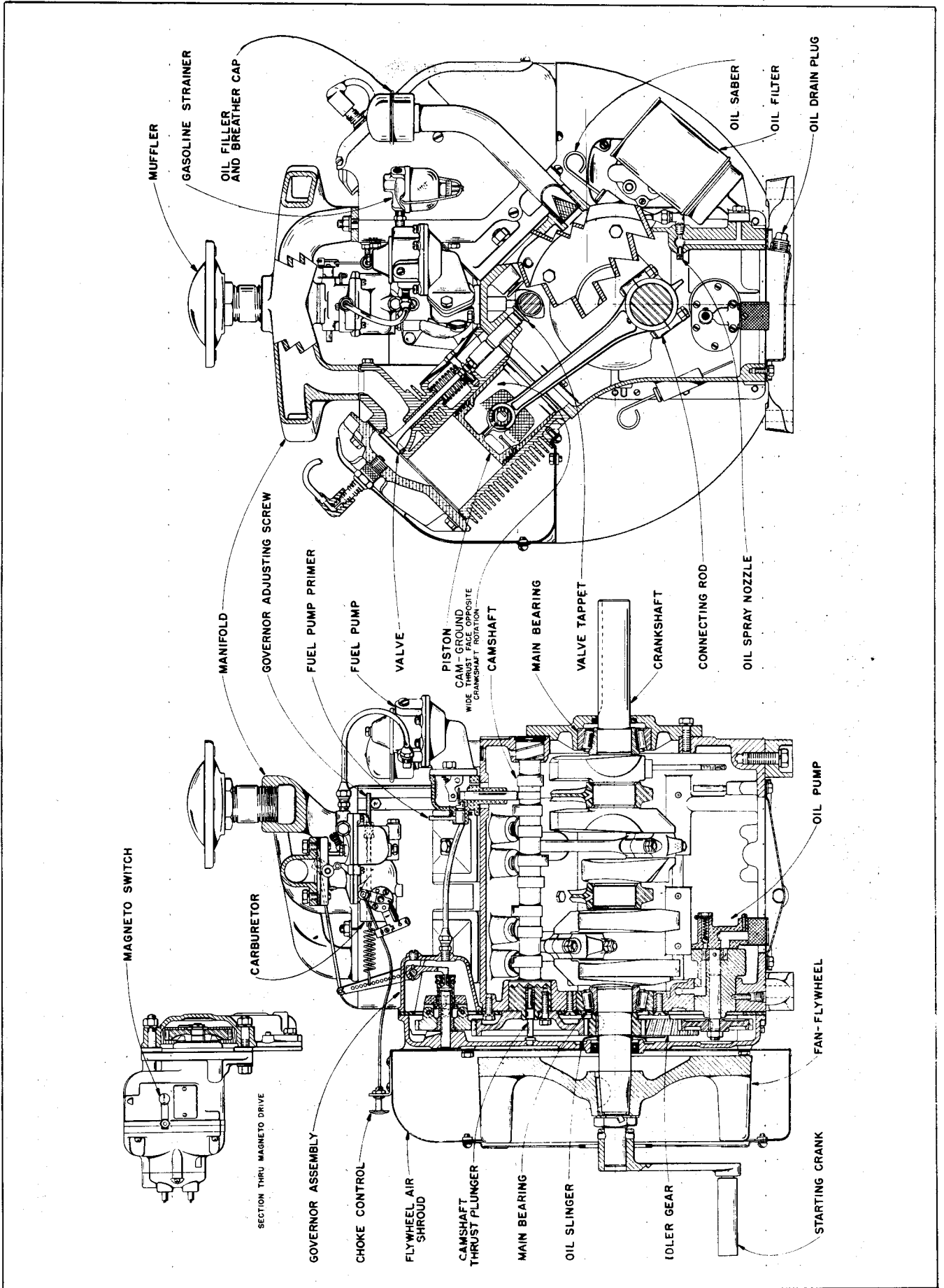
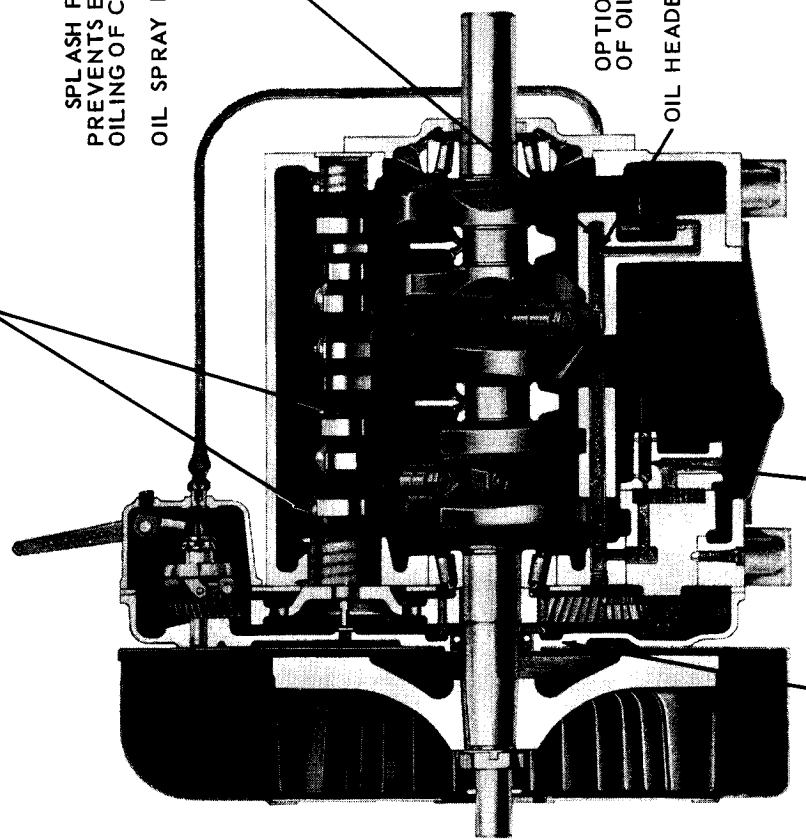


Fig. 2
 CROSS SECTION OF ENGINE MODEL V4A

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.

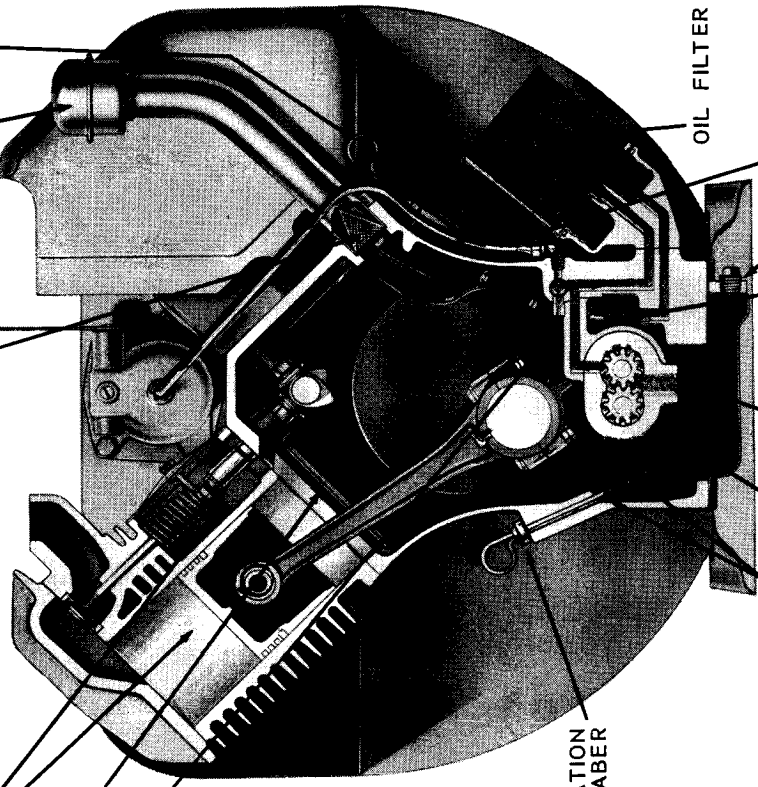
SPLASH PLATES
PREVENTS EXCESSIVE
OILING OF CYLINDERS



CRANKSHAFT OIL SLINGER
OIL PRESSURE RELIEF VALVE
SET FOR 15 POUNDS PRESSURE

STANDARD LOCATION
OF OIL GAUGE SABER
OIL FILLER AND
BREATHER CAP

OIL STRAINER



OPTIONAL LOCATION
OF OIL GAUGE SABER
OIL HEADER TUBE

OIL FILTER
OIL LINE TO
GOVERNOR
OIL DRAIN PLUG
OIL RETURN FROM
FILTER INTO CRANKCASE

FULL AND LOW MARKS
ON OIL GAUGE SABER
OIL PUMP
STRAINER SCREEN

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

Fig. 3
LUBRICATION SYSTEM

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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 distributor rotor turns at half-engine 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 other internal 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.	HORSEPOWER
1400	17.2
1600	20.0
1800	22.5
2000	24.7
2200	26.5
2400	28.0
2600	29.2
2800	30.0

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

Engines that have a sheet metal house built around it, as shown in bottom view of *Fig. 1*, 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 *Mobil-oils* are listed because of their recognized quality and world-wide distribution. **There are other high quality oils on the market that are equally satisfactory for Wisconsin engines.**

GRADE OF OIL

SEASON OR TEMPERATURE	GRADE OF OIL	EXAMPLE
Spring, Summer or Autumn +120°F to +40°F	SAE 30	Mobiloil A
Winter +40°F to +5°F	SAE 20–20W	Mobiloil Arctic
Winter +5°F to –20°F	SAE 10W	Mobiloil 10W
Crankcase Capacity		4 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, with

a 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 fuel tank on power units. 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.

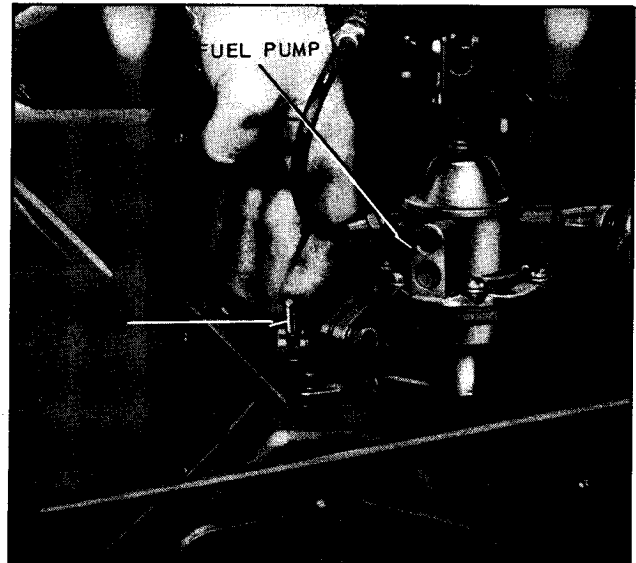


Fig. 4

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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 to pump fuel 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 priming. The primer 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 power unit engines, a push button ignition switch is mounted on the outside of the house panel at the flywheel end. See *bottom view of Fig. 1*. When starting engine, the ignition switch button is pulled out. To stop, push in.

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 op-

tional 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. 12*. Battery is not furnished by engine manufacturer and the electric circuit is **positive** ground.

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, push in switch button, for either magneto or distributor ignition.

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.

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 after every oil change. Refer to Engine Parts List in the back of this manual, for part number of replacement cartridge.

AIR CLEANER

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

Remove the bowl from the air cleaner, as illustrated in *Fig. 5*, 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.

The air cleaner must be serviced frequently, depending on the dust conditions in which the engine is being 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.



Fig. 5

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A collector type pre-cleaner, mounted to the top of the air cleaner as shown in *Fig. 6*, 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.

FUEL STRAINER

The fuel strainer is very necessary to prevent sediment, dirt and water from entering the carburetor and causing trouble or even complete stoppage of the engine. This strainer has a glass bowl and should be inspected frequently, and cleaned if dirt or water are present. To remove bowl, first shut off fuel valve, then loosen the knurled nut below bowl and swing the wire bail to one side. After cleaning bowl and screen, reassemble the parts, being sure the gasket

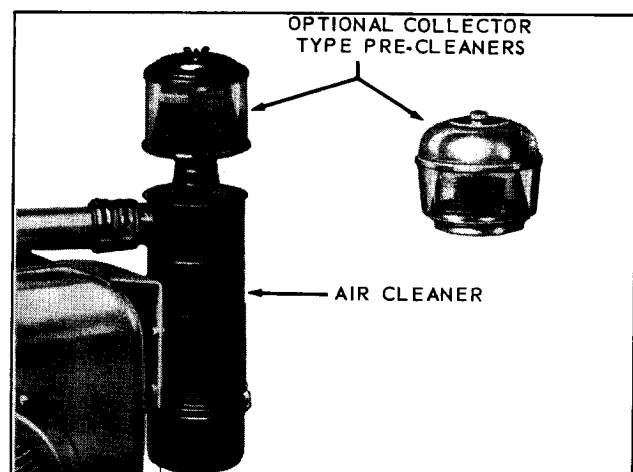


Fig. 6

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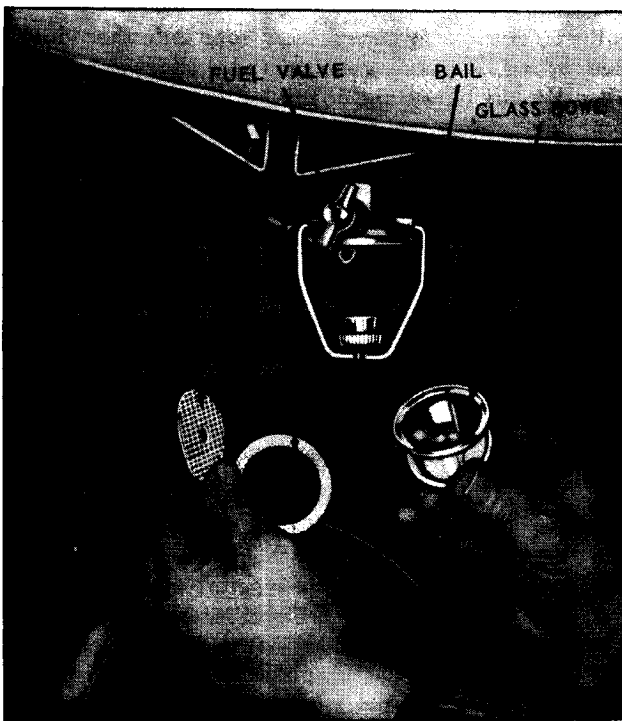


Fig. 7

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is in good condition; otherwise use a new gasket. See Fig. 7, which shows the 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. 8 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. 9. 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 the preceding adjustments are made. Replace magneto end cover carefully

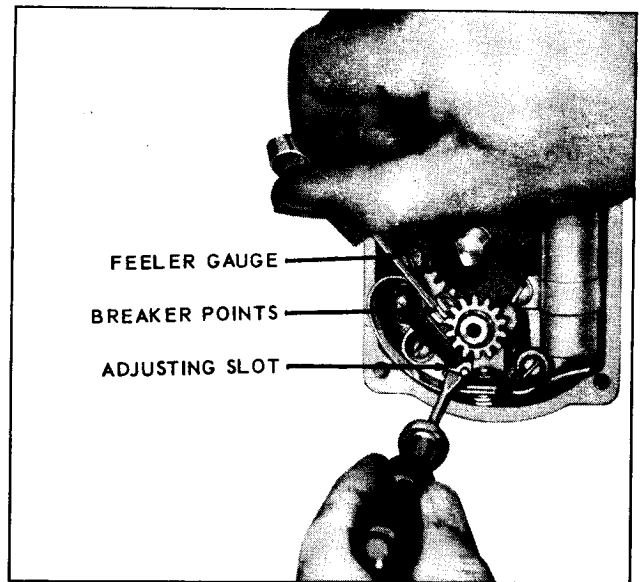
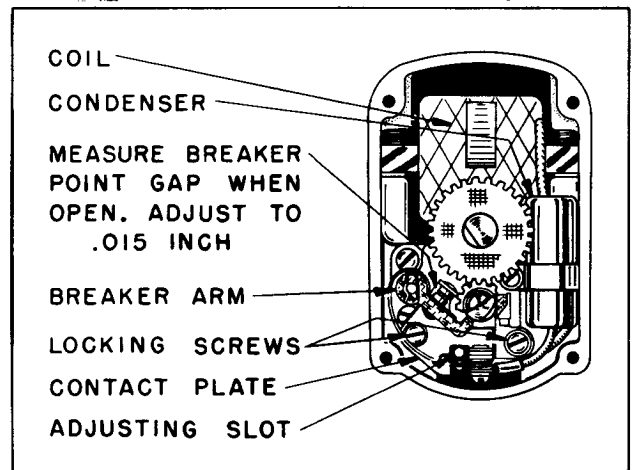


Fig. 8

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OPEN END VIEW OF FAIRBANKS-MORSE MAGNETO

Fig. 9

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 about 1/8 inch away from the air shroud or any other conveniently located metal part of the engine. If the ignition cables have a molded rubber insulated spark plug terminal at the end, as illustrated in Fig. 10, 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 a strong 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

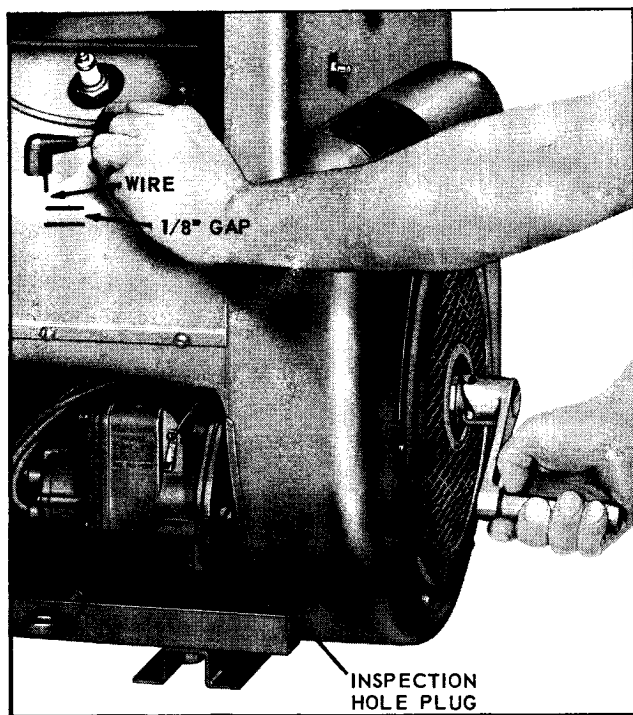


Fig. 10

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"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 cylinders is **1-3-4-2**, and the magneto and battery type distributor rotate at one-half engine speed, as is the case with conventional "in line" engines. The intervals between the firing of the cylinders is 180°. No. 1 cylinder is the one nearest to the flywheel in the left bank of cylinders, when viewed from the flywheel end of the engine. No. 3 cylinder is the other cylinder in this bank. No. 2 cylinder is the one nearest to the flywheel in the right bank of cylinders and No. 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** and the power take-off end, the **rear** of the engine.

MAGNETO TIMING

The magneto is properly timed to the engine at the factory, but 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. See *Magneto Timing Diagram, Fig. 11*.

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 from the air blowing out of the hole.

The flywheel is marked with the letters 'DC' near one

of the air circulating vanes. This vane is further identified by an 'X' mark cast on the end. See *Fig. 11*. When the air blows out of the No. 1 spark plug hole, continue turning 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. 11*. Leave flywheel in this position. At this point the **keyway** for mounting the flywheel is also on top. Reassemble spark plug.

Next, remove the inspection hole plug from the magneto timing opening, located in the gear cover as shown in *Fig. 10*.

Assuming that the magneto has been removed from the engine, the following procedure should be followed before remounting.

The Number 1 cylinder firing position of the magneto must be determined. Insert the ignition cable into the No. 1 tower terminal of the magneto end cap and hold the spark plug terminal at the other end, about 1/8" away from the magneto body. Turn the magneto gear in a clockwise rotation, tripping the impulse coupling, until the No. 1 terminal sparks, then hold the gear in this position. Mount the magneto to the engine, meshing the gears so that when the magneto is in place, the gear tooth marked with an 'X' will be visible through the **lower half** of the **inspection hole** in the gear cover, as shown in *Timing Diagram, Fig. 11*. Tighten the nut and capscrew for mounting the magneto to the gear cover, making sure the magneto flange gasket is in place.

The **No. 1** terminal is identified on the magneto cap. The terminals follow the proper firing order of 1-3-4-2 in a clockwise direction viewing the cap end. The leads from the magneto should be connected to spark plugs of corresponding numbers.

No. 1 cylinder is the cylinder nearest the fan-flywheel of the engine in the left bank and No. 3 cylinder is the other cylinder in that bank. No. 2 cylinder is across the engine from No. 1 and No. 4 is across from No. 3.

When the magneto is properly timed the impulse coupling will snap when the 'DC' and 'X' marked vane of the flywheel, line up with the **mark** on the flywheel shroud which indicate the **centerline** of the No. 1 and 3 cylinders. This can be checked by turning crankshaft over slowly by hand with the starting crank. The impulse will also snap every 180° of flywheel rotation thereafter.

The proper spark advance is 23°. To check timing with a **neon light**, the running spark advance is indicated by a slotted hole on the flywheel shroud. The lower half of the hole is 23° before the centerline of No. 1 and No. 3 cylinders, see *Fig. 11*. The end of the 'X' marked vane should be whitened with chalk or paint for this operation.

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 as shown in *Fig. 15*,

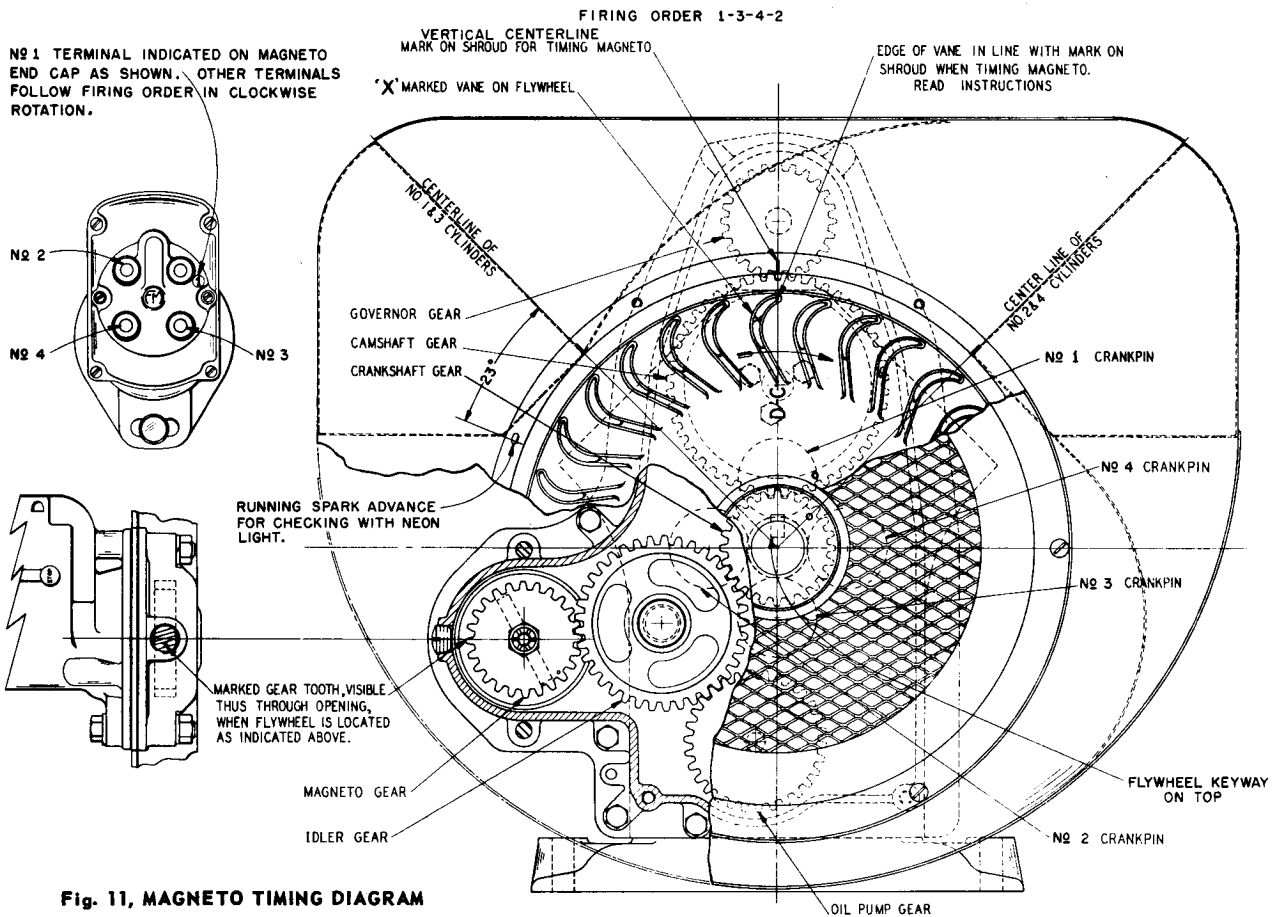


Fig. 11, MAGNETO TIMING DIAGRAM

with the primary terminal toward the circuit breaker on the generator and the snap springs vertical.

The distributor is of the automatic advance type and it is driven off an engine speed shaft through a pair of 2 to 1 helical gears, thus giving the distributor one half engine speed in a counter-clockwise direction when viewed from above. The automatic advance is $11\frac{1}{2}^\circ$ in the distributor, equal to 23° on the crankshaft which is the full amount of spark advance required. Distributor is fully advanced at 1800 R.P.M. of engine. The generator drive gear does not have to be timed to the gear train as timing is set by means of the distributor gear.

ELECTRICAL WIRING CIRCUITS

NOTE: Beginning with engine serial No. 3987113,

the 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. 12, 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, ignition coil and batter are just reversed from those illustrated.

DISTRIBUTOR TIMING

Remove the screen over the flywheel air intake opening by taking out the screws holding the screen in

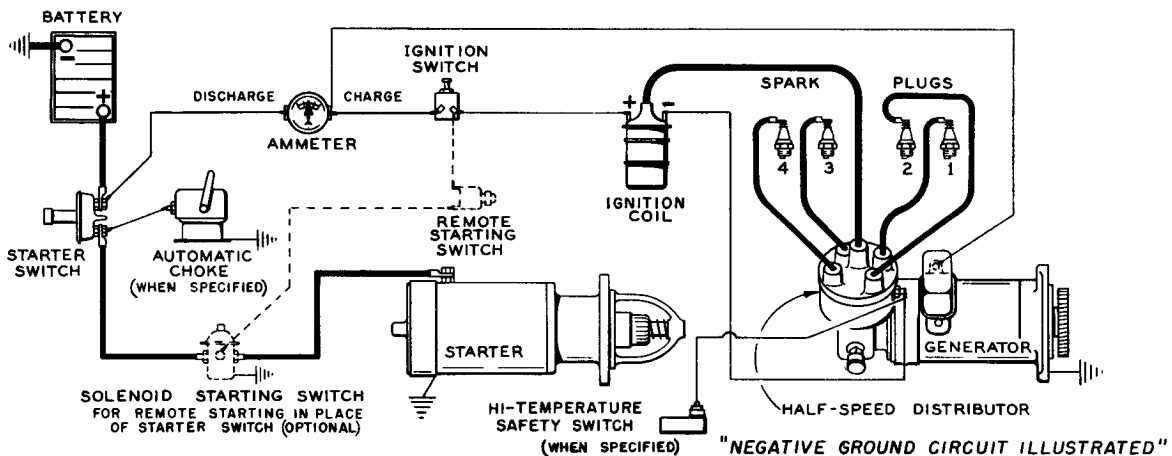


Fig. 12, BATTERY IGNITION-WIRING AND TIMING DIAGRAM

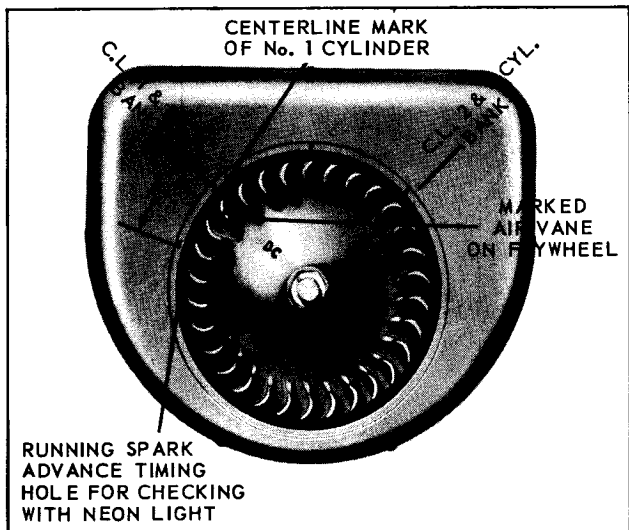


Fig. 13

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place. This will expose the timing marks on the flywheel shroud, also the *vane* on flywheel, marked by an 'X' and the letters 'DC'. See Fig. 13. 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 from the air blowing out of the hole.

Upon reaching the compression stroke, 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 the position shown in Fig. 13. Reassemble spark plug.

Remove the upper half of the distributor body by disengaging snap springs. The *centerline* of the *distributor rotor* should be in line with the *center* 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 Figs. 14 and 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 *distributor rotor* in line with the *notch* in the distributor housing as shown in Fig. 14, and the *primary terminal* pointing toward the generator *circuit breaker*. See Fig. 15. Be sure that the *advance arm lockscrew*, Fig. 14, 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. 14. 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,

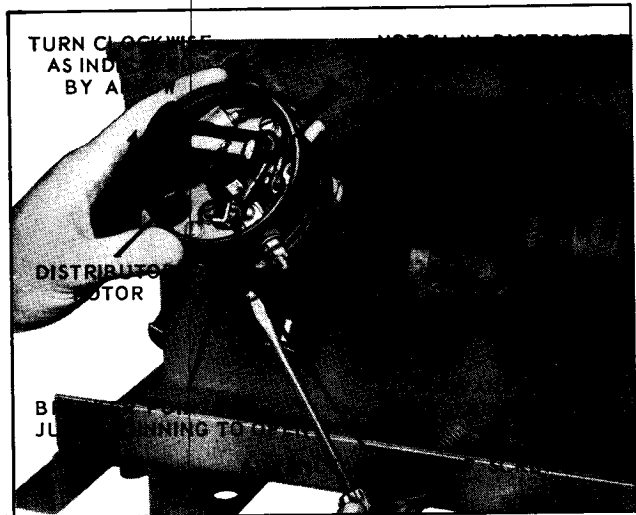


Fig. 14

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Fig. 15

180187C

with the centerline of the *distributor rotor* in line with the *center* of the *notch* in the distributor body as shown in Fig. 14.

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. 15.

NEON LAMP TIMING

The engine should be timed to the 23° advanced position at not less than 1800 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 **1800 R.P.M.** or **over**, allow the flash from the neon lamp to illuminate the whitened vane. At the time of the flash, the leading edge of the vane should line up with the lower half of the **running spark advance timing hole** on the flywheel shroud, *see Fig. 13*. If it does not, the **advance arm clamp screw** should be loosened as shown in *Fig. 14*, and the distributor body turned slightly clockwise or counter-clockwise, as required, until the **white flywheel vane** matches up with the lower half of the **advance timing hole**. Be sure **advance arm clamp screw** is then carefully tightened. If the engine is running below **1800 R.P.M.** when timing, the automatic advance in the distributor will not be fully advanced and the inaccurate timing may cause serious damage to the engine when operating at high speeds.

Be sure and mount flywheel screen after correct timing has been accomplished.

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 lock-nut** 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 after every 50 hours of operation.

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.**

SPARK PLUGS

The spark plug gap should be thirty thousandths (.030) of an inch, and plugs should be kept clean both inside and out. *See Fig. 16*. If the porcelain insulator is cracked, replace with a new plug of correct heat range, like Champion No. D-16, AC No. C86 Commercial, or equal. The spark plug thread is 18 millimeter. Be sure to use a good gasket under the spark plug. Tighten spark plugs, 25 to 30 foot pounds torque.

RESTORING COMPRESSION

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

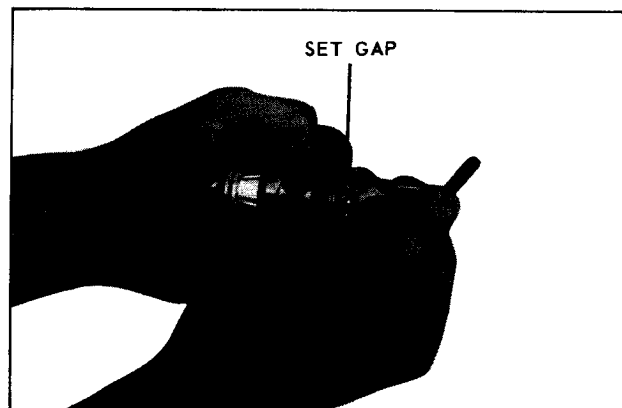


Fig. 16

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ounce of crankcase oil through the spark plug hole into each cylinder.

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

HIGH TEMPERATURE SAFETY SWITCH

As a safety precaution, some engines have a high temperature safety switch mounted on the cylinder head near the **No. 4** spark plug, which will automatically stop the engine when head temperatures rise beyond a safe degree.

This switch is set by the manufacturer to operate at the correct temperature. Consequently, the adjustment of the switch should not be tampered with. If the cylinder head temperature at the spark plug reaches **570°F**, the switch will automatically short out the magneto, or distributor, and stop the engine. A waiting period of about 7 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.* Refer to *Fig. 12* for wiring.

SPECIAL INSTRUCTIONS FOR AGRICULTURAL ENGINES

KEEP YOUR ENGINE CLEAN

This engine is cooled by blasts of air which must be allowed to circulate all around the engine cylinders and cylinder heads to properly cool the engine and thereby keep it in good running condition. If dust 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.

In *Fig. 17* are pointed out the few necessary cleaning precautions which must be followed to insure satisfactory engine performance and engine life.

1. Remove these covers frequently and clean out all dust and chaff. Be sure to replace covers.

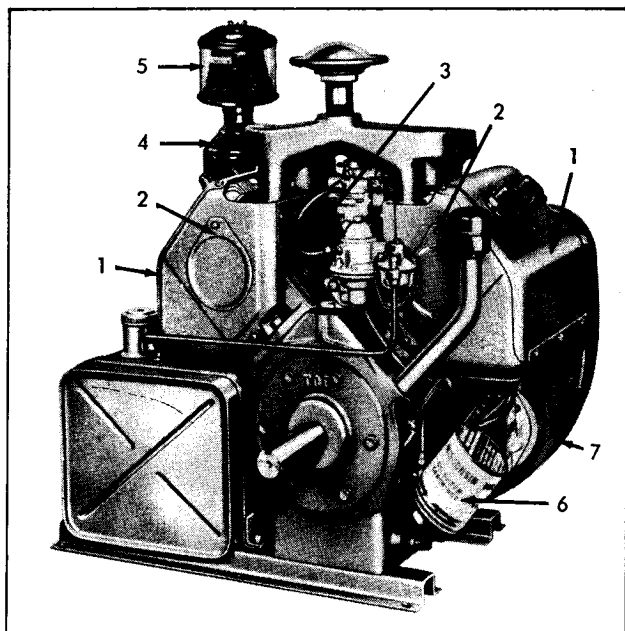


Fig. 17

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2. Open these covers frequently and clean out all dust and chaff. Be sure to close covers.
3. Keep this space between cylinders free of dust and chaff.
4. Read instructions on this air cleaner regarding its care. This is important. The entire air cleaner should be removed from the engine at least once a year, and washed in a cleaning fluid to clean out dirt gathered in the back fire trap in the top part of the air cleaner.
5. Empty pre-cleaner of accumulated dust and dirt frequently. Do not use oil or water in pre-cleaner, this must be kept dry.
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.

Never operate engine with air shrouding removed. This will retard 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 sabre, but no more. See Fig. 3.

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

TROUBLES CAUSES AND REMEDIES

Three prime requisites are essential to starting and

maintaining satisfactory operation of gasoline engines. They are:

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

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

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

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

STARTING DIFFICULTIES

FUEL MIXTURE

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

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

Carburetor not choked sufficiently, especially if engine is cold. See 'Choke', Page 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 handle of a screw driver or similar tool 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 15.

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

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

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

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

Piston rings stuck in piston due to carbon accumulation. If rings are stuck very tight, this will necessitate removing piston and connecting rod assembly and cleaning parts. See *'Piston and Connecting Rod'* Page 21.

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 11 or *'Distributor-Battery Ignition'*, Page 12: 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 15.

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 12.

ENGINE MISSES

Spark plug gap incorrect. See Page 15.

Worn and leaking ignition cables.

Weak spark. See *'Magneto Ignition Spark'*, Page 11, or *'Distributor-Battery Ignition'*, Page 12.

Loose connections at ignition cable.

Magneto or distributor breaker points pitted or worn.

Water in gasoline.

Poor compression. See *'Compression'*, Page 17.

ENGINE SURGES OR GALLOPS

Carburetor flooding.

Governor spring hooked into wrong hole in lever. See *'Governor Adjustment'*, Page 24. Governor rod incorrectly adjusted. See *'Governor Adjustment'*, Page 24.

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 17.

ENGINE OVERHEATS

Crankcase oil supply low. Replenish immediately.

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

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 12.

Loose or burnt out connecting rod bearing.

Engine overheated due to causes under previous heading.

Worn or loose piston pin.

ENGINE BACKFIRES THROUGH CARBURETOR

Water or dirt in gasoline.

Engine cold.

Poor grade of gasoline.

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

Overheated valves.

Spark plugs too hot. See 'Spark Plug', Page 15.

Hot carbon particles in engine.

DISASSEMBLY AND REASSEMBLY OF VH4 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 capscrews 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 clear-

ances 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, 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.

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. 18. 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. 19. First remove cylinder head covers and the screws mount-

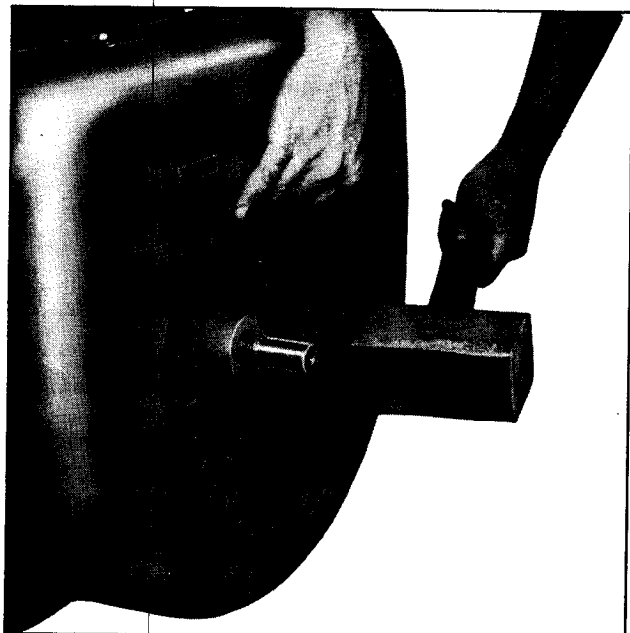


Fig. 18

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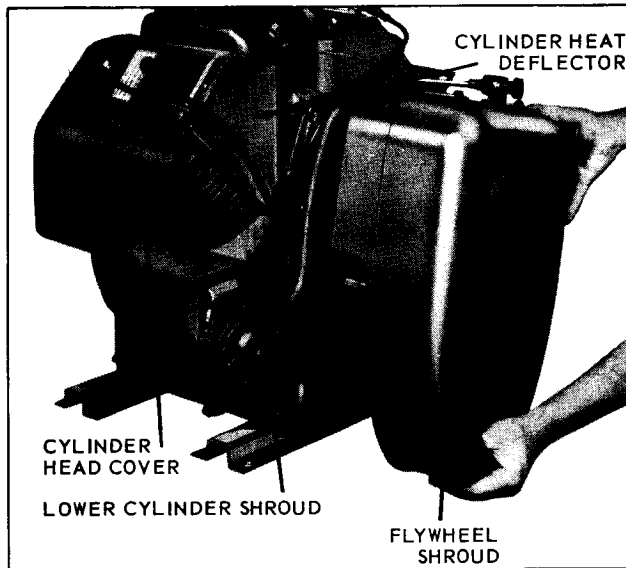


Fig. 19

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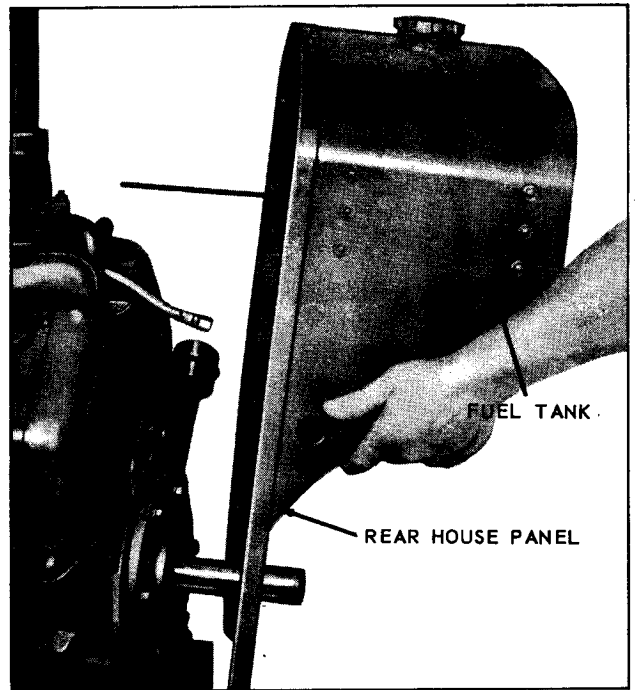


Fig. 21

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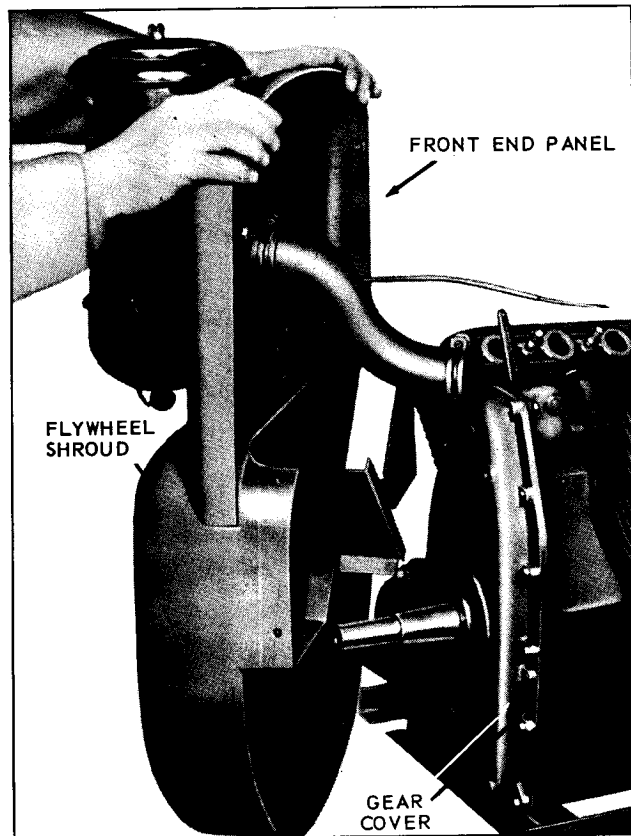


Fig. 20

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ing the flywheel shroud to the lower cylinder shrouds 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. 20* together with flywheel shroud. Remove the rear end panel, *Fig. 21*, complete with fuel tank. Balance of shrouding can now be readily removed.

FUEL TANK

If a side mount fuel tank is used, this should be removed next as shown in *Fig. 22*.

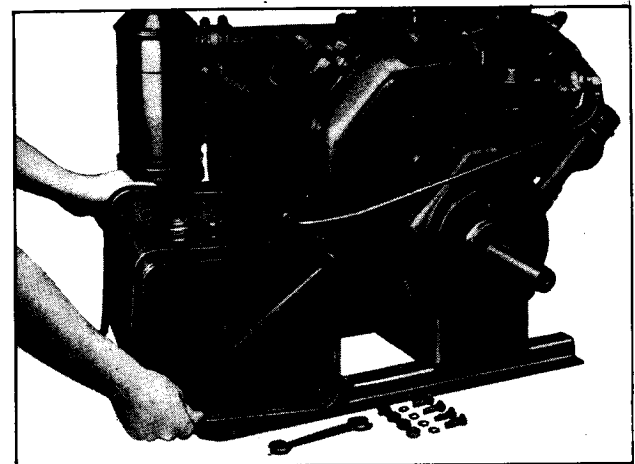


Fig. 22

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CARBURETOR AND MANIFOLD

The carburetor and manifold can be removed as a complete unit.

In reassembly, tighten the nuts for mounting the manifold, 18 to 23 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, re-torque head screws.

GEAR COVER

Disconnect the governor linkage and remove the governor. Remove gear cover screws and drive out the two dowel pins as shown in *Fig. 23*. The cover can then be taken off, exposing the timing gears as shown in *Fig. 24*. In reassembly, tighten cap screws, 14 to 18 foot pounds torque.

CAMSHAFT GEAR

If it is necessary that the camshaft gear be removed, this can be done by taking out the three cap screws and lockwashers which hold the gear to the end of the camshaft. Note that the mounting holes in the camshaft gear are staggered in such a manner that the gear can be assembled to the shaft only one way which will automatically time the gear to the shaft. Pry the gear off the camshaft using a screw driver or similar wedge tool.

IDLER GEAR AND SHAFT

Remove the Allen-head setscrew, on the magneto side of the crankcase, which locks the idler shaft in position. With the use of a gear puller, the idler shaft and idler gear assembly can be removed from the crankcase. See *Fig. 25*. In reassembly, allow .003" to .004" clearance between idler gear and shaft collar.

OIL PAN

The engine can now be inverted so that the supports and oil pan can be removed, see *Fig. 26*.

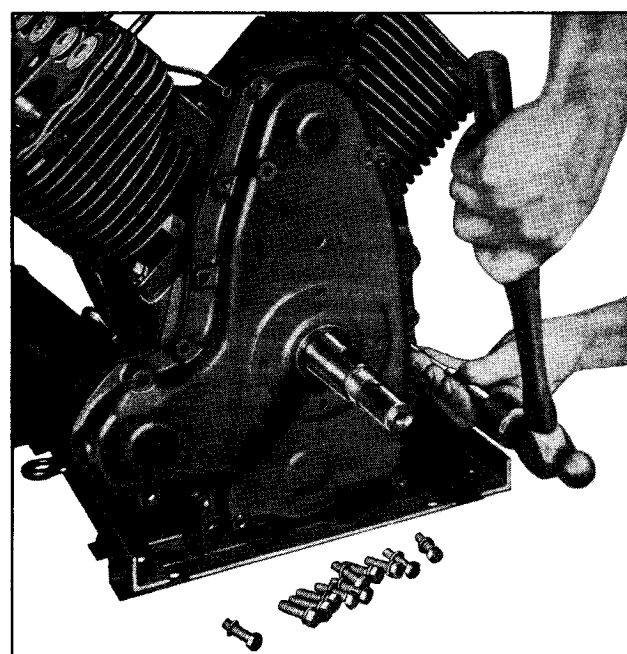


Fig. 23

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In reassembly of oil pan, tighten mounting screws, 6 to 9 foot pounds torque.

OIL PUMP

To remove oil pump, first take out the slotted pipe plug, and then with a 5/32 inch Allen wrench, remove the oil pump lockscrew, as shown in *Fig. 27*. Remove locknut holding oil pump driving gear to shaft. Then, with a soft brass rod or punch, drive shaft through gear as shown in *Fig. 28*. The oil pump can then be withdrawn toward center of crankcase.

PISTONS AND CONNECTING RODS

After removal of the oil pump, all of the connecting rod bolts will be accessible. Remove the palnuts and hexagon nuts, then by tapping the ends of the bolts lightly, being careful not to mar the threads, the connecting rod cap can be freed from the bolts. The rod with the piston can now be pushed up through the cylinder. Be careful not to score the crankshaft jour-

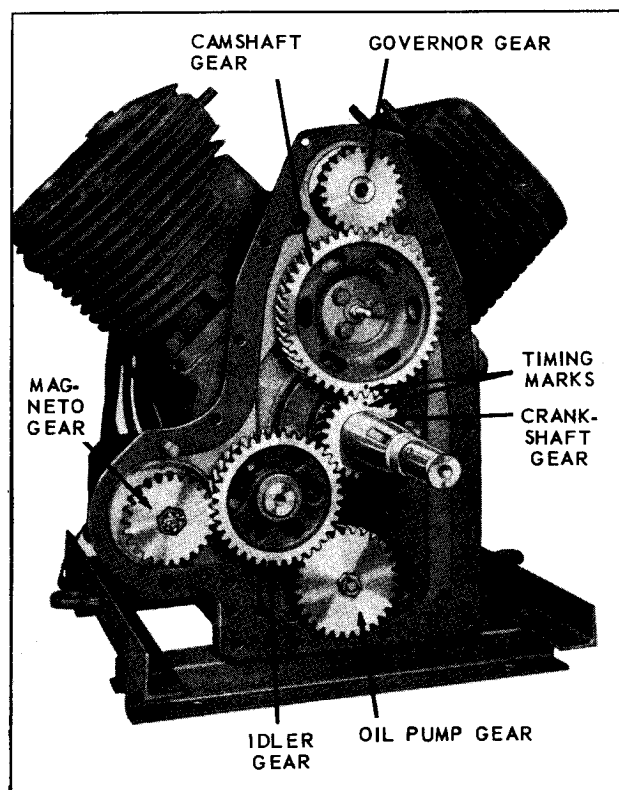


Fig. 24

104716C-1

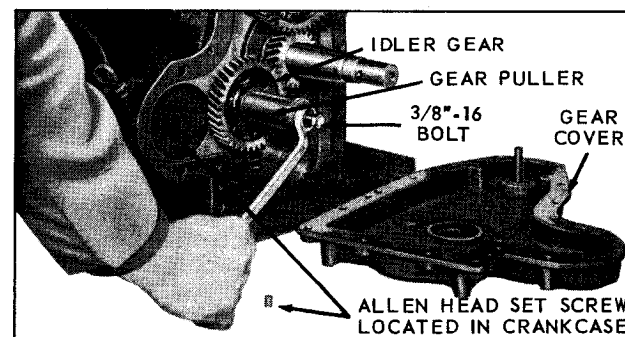


Fig. 25

71066C

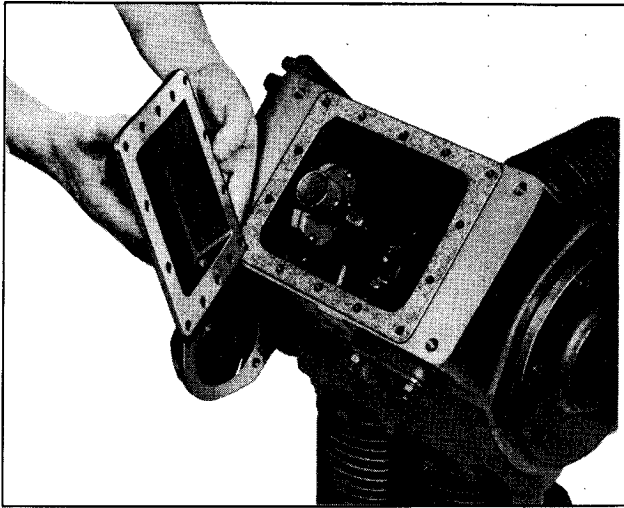


Fig. 26

104721C

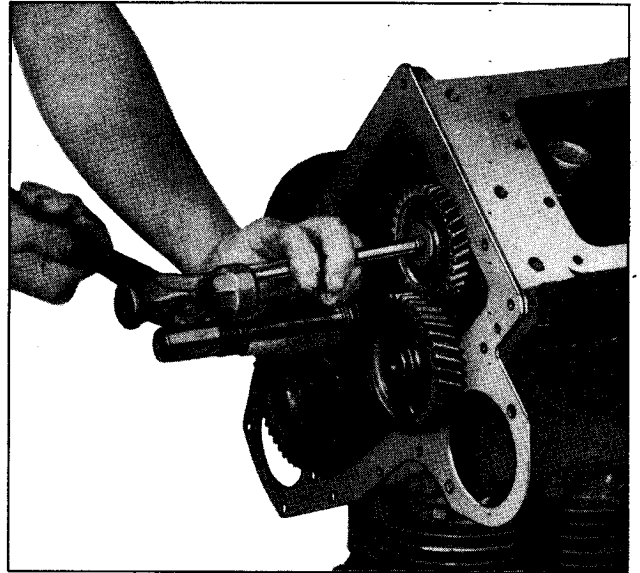


Fig. 28

83615C

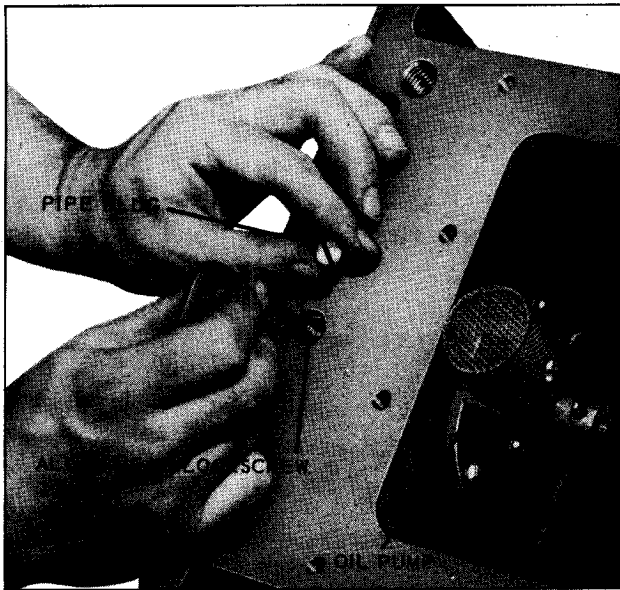


Fig. 27

180178C

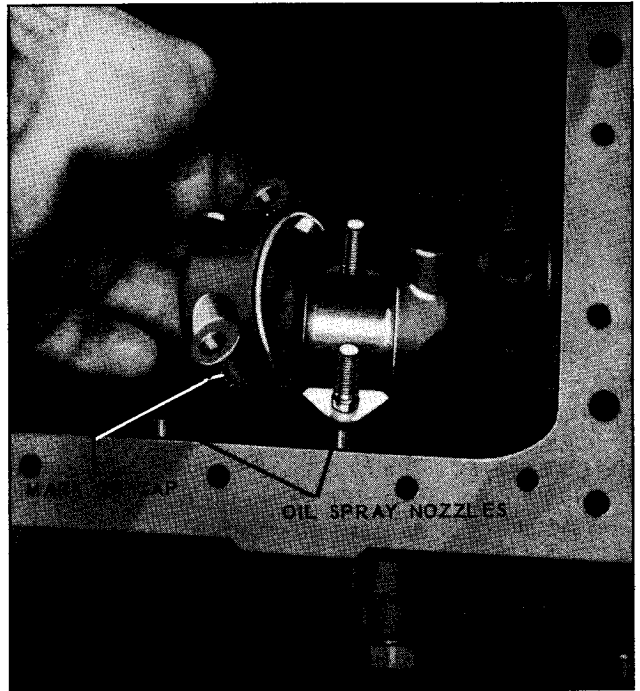


Fig. 29

104819C-1

nals, by allowing the rod bolts to strike or scrape across them, when removing the connecting rod and piston assemblies. Replace the caps on the rods immediately so that they are in the correct position for reassembly, being sure that the shims are in place before the cap is put on. A number is stamped on the side of the rod and cap to match each connecting rod with its corresponding cap. These numbers should be on the same side of the connecting rod in reassembly, see Fig. 29.

The piston skirt is *cam-ground* to an elliptical contour. Clearance between the piston and cylinder must be measured at the center of the thrust face of the piston skirt. Refer to Chart, Fig. 32, for proper clearance. The thrust faces on the piston skirt 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.

Tighten connecting rod nuts, 22 to 24 foot pounds torque, then install 'Pal' locknuts and tighten with

wrench ¼ turn beyond 'finger-tight' position.

Be sure piston and connecting rod assemblies are put back into the same bore from which they were removed.

PISTON RINGS

Install rings by placing the open end of the ring on piston first, as shown in Fig. 30. Spread ring only far enough to slip over piston and into correct groove, being careful not to distort ring.

The scraper ring must be installed on the piston with the scraper edge down, otherwise oil pumping and excessive oil consumption will result. See Fig. 31.

Use a suitable ring compressor in reassembly and



Fig. 30

71152C

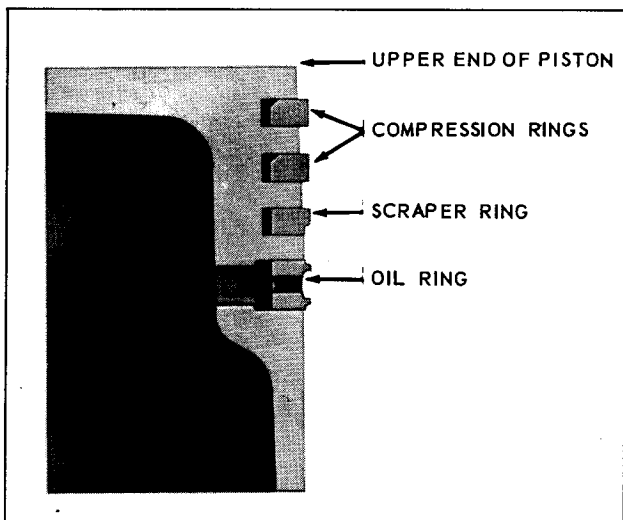


Fig. 31

92200C-1A

stagger the piston ring gaps 90° apart around the piston. Oil the piston, rings, wrist pin, rod bearings and cylinder walls before assembly.

CYLINDERS

The cylinder blocks can now be removed from the crankcase if necessary. In reassembling, put the blocks back on the same side from which they were removed. Clean all dirt and other deposits from between fins and manifold ports. If the cylinders are worn more than .005 inch oversize, they should be re-ground and fitted with oversize pistons and rings. This work should be done by an authorized service station.

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

Tighten cylinder block mounting nuts, 40 to 50 foot pounds torque.

VALVES

Remove the valve tappet inspection plate. Compress the valve springs with a standard automotive type valve lifter as illustrated in Fig. 33. Insert a rag in

PISTON, RING AND ROD CLEARANCES CHART

PISTON TO CYLINDER AT PISTON SKIRT THRUST FACE		.0035 to .004"
PISTON RING GAP		.015"
PISTON RING SIDE CLEARANCE IN GROOVES	Top Ring	.002 to .0035"
	2nd Ring	.001 to .0025"
	Scraper Ring	.001 to .0025"
	Oil Ring	.0025 to .004"
CONNECTING ROD TO CRANK PIN	Diameter	.0007 to .002"
	Side	.009 to .016"
PISTON PIN TO CONNECTING ROD BUSHING		.0005 to .001"

STANDARD CRANK PIN DIMENSIONS

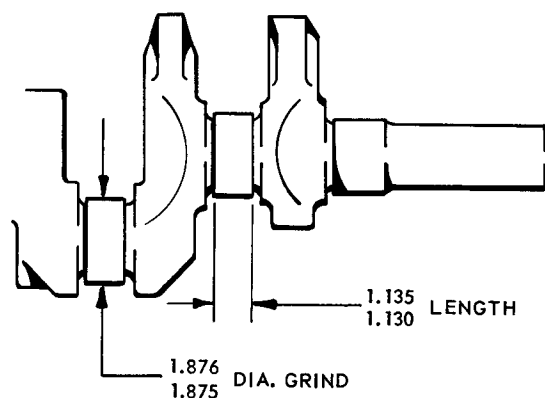


Fig. 32

the opening at the bottom of the valve chamber so the valve spring seat retaining locks do not fall into the engine crankcase. Remove the valve spring seat retaining locks, seats, springs, valves and clean these, as well as the ports and guides, of all carbon and gum deposits. Tag each valve so that in reassembly they will be mounted in the same guide they were removed from.

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

The cylinder blocks have replaceable valve guides and the valve stems have a clearance of .003" to .005" in the guides. When the clearance becomes

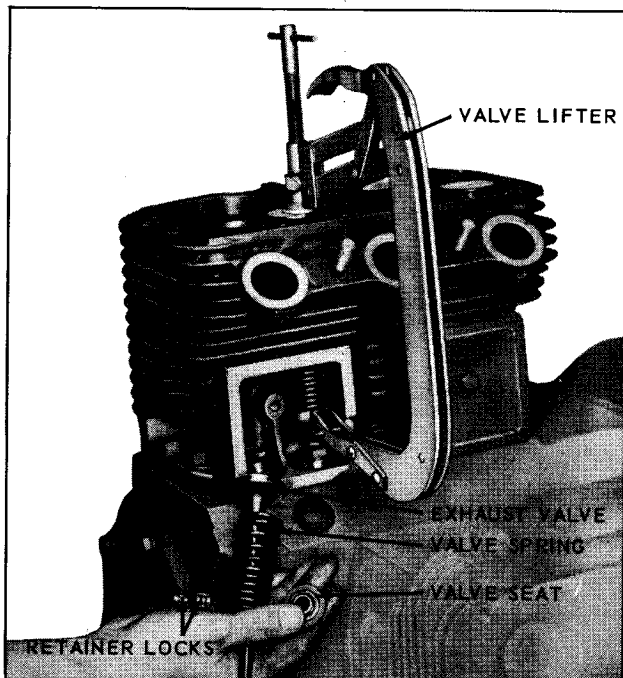


Fig. 33 180188C

.007", the guides should be driven out and replaced with new guides.

These engines that have *Stellite* exhaust valves and inserts are designated as Model *VH4D* and are equipped with *positive* type *exhaust valve rotators*. The action of the rotocap, which rotates the valve slightly each time the valve opens, helps prevent sticky valve and will impart a wiping action between the valve face and valve seat, thereby preventing the build-up of foreign deposits. Valve rotation will also avoid prolonged exposure of any one sector of the valve face to a local hot spot on the seat which will result in lower and more uniform valve face-seat temperatures.

CRANKSHAFT

To remove the crankshaft, first remove the six cap-screws in the main bearing plate at the take-off end of the engine. This plate can then be pried off, and crankshaft removed from that end of crankcase. See *Fig. 34*. Be sure to keep shims and gaskets in place as these are necessary to give the proper end play to

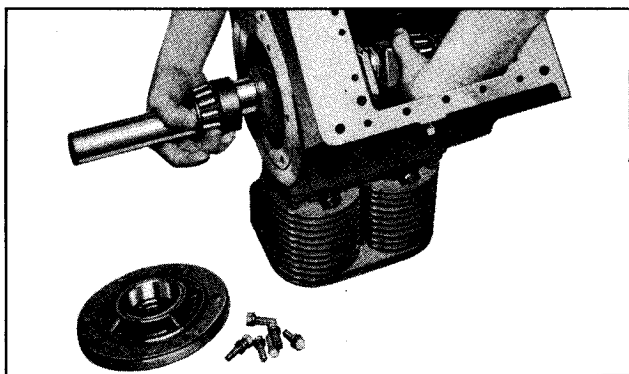


Fig. 34 71075C

the tapered roller main bearings on the crankshaft. This *end play* should be .002 to .004 inch when engine is cold. There is practically no wear in these bearings so that no readjustment is necessary after proper assembly.

When reassembling crankshaft, the timing marks on the crankshaft gear and the camshaft gear must be matched as shown in *Fig. 24*, otherwise engine will not operate properly, or if timing is off considerably, engine will not run at all.

The mounting holes for the main bearing plate are off-set in such a manner that it can only be mounted in the correct position. Tighten main bearing plate capscrews, 25 to 30 foot pounds torque.

CAMSHAFT

The camshaft must be withdrawn from the flywheel end of the engine as shown in *Fig. 35*. When reassembling, 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. 36*. 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 stationary pin driven into the upper part of the timing gear

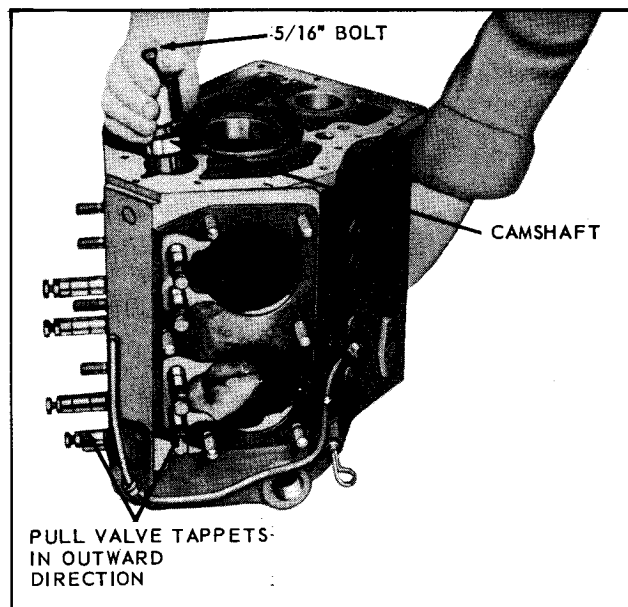


Fig. 35 104726C-A

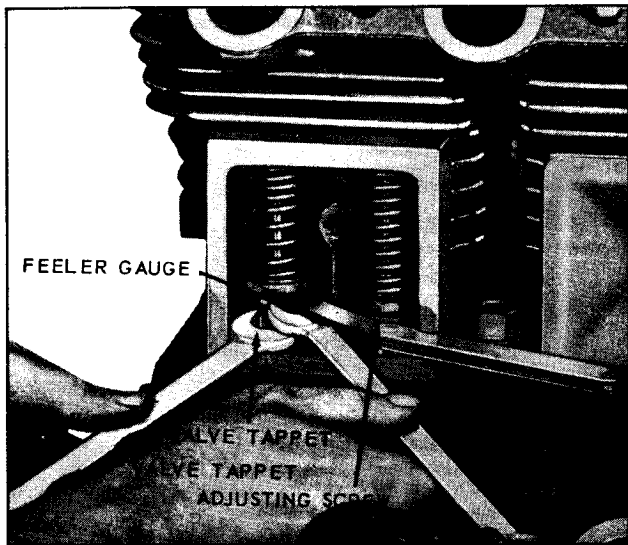


Fig. 36

180186C

cover, and the governor is driven off the camshaft gear at crankshaft speed.

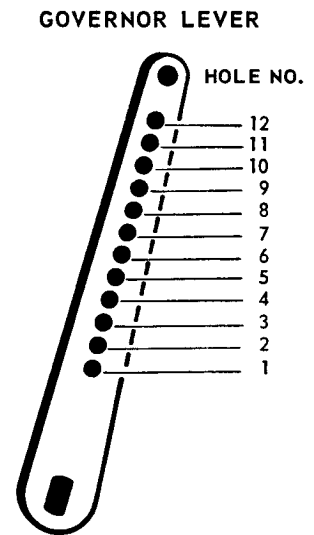
The flyweights are hinged to lugs on the gear. Hardened pins on the flyweights bear against the flanged sliding sleeve, moving it back and forth as the flyweights move in or out. The motion of the sleeve is transmitted through a ball thrust bearing to the governor lever, which in turn is connected to 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 clear-

LOAD R.P.M.	NO LOAD R.P.M.	HOLE NO.
1400	1525	4
1500	1650	5
1600	1725	5
1700	1850	6
1800	1950	7
1900	2025	7
2000	2150	8
2100	2225	8
2200	2350	9
2300	2425	9
2400	2550	10
2500	2625	10
2600	2750	11
2700	2850	12
2800	2925	12

Fig. 37



ance 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. 37*, 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. 37*, shows the *full load* and *no load* speeds of the engine and the hole corresponding thereto. The full load speed will be from 150 to 125 revolutions less than the no load speed. As an example, if the engine is to be operated at 2000 revolutions per minute under load, the spring should be hooked into the 8th hole in the governor lever and the spring tension adjusted, by means of the adjusting screw connected to the spring, to run 2150 revolutions per minute, without 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 while adjusting the governor spring tension to give the proper engine speed.

CLUTCH AND REDUCTION GEARS

CLUTCH

The clutch furnished with this model of engine is of the disc type running in oil. Use the same grade of oil in the clutch as is used in the engine crankcase. 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. 38*.

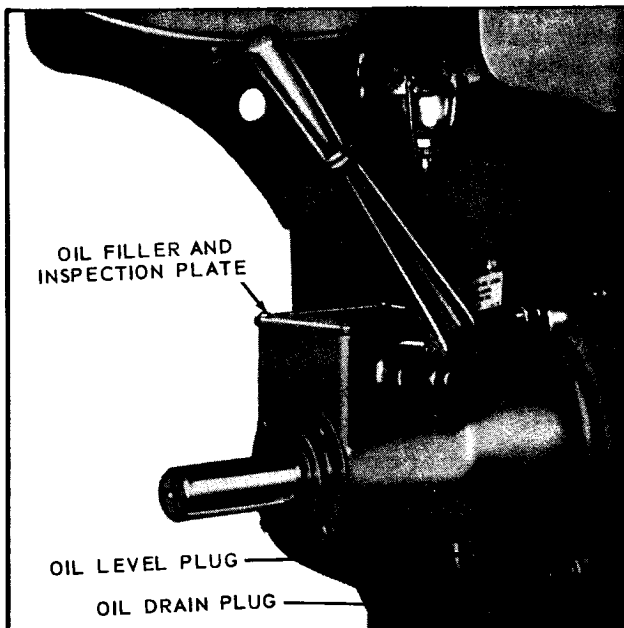


Fig. 38

84066C

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 lockscrew*, one full turn. Keep the engine crankshaft from turning, then, by means of a screw driver as shown in *Fig. 39*, 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 lockscrew. Assemble inspection plate, being sure that the gasket fits properly and is not broken.

CLUTCH REDUCTION UNIT

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 on the top, as shown in *Fig. 40*, and one on both sides of housing. Remove one of the pipe plugs on the side of the housing, located on the horizontal centerline of the engine. Disengage the clutch by means of the clutch lever and turn the engine over slowly with the starting crank until the adjustment lock is visible thru the side pipe plug opening. Loosen the screw holding the adjustment lock in place, enough to relieve the tension of the lock against the notches on the adjusting collar. Keep the engine crankshaft from turning while thru the top pipe plug opening, turn the clutch adjusting collar, with a screw driver, one notch at a time in a clockwise direction, see *Fig. 40*, until a very firm pressure is required to engage the clutch with the lever.

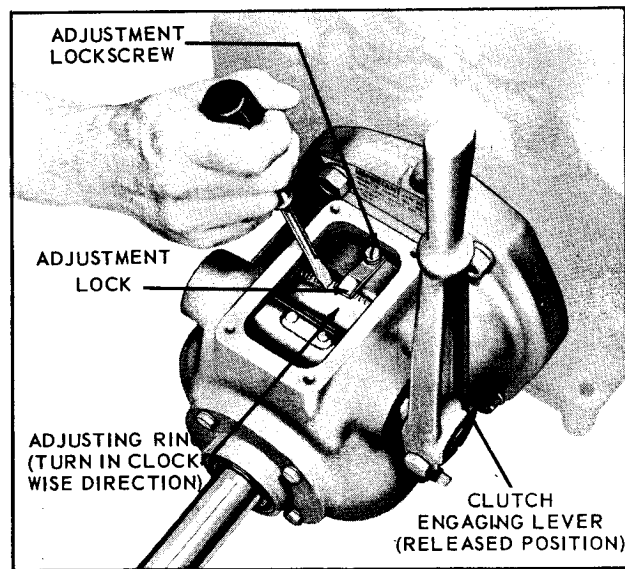


Fig. 39

244949C-A

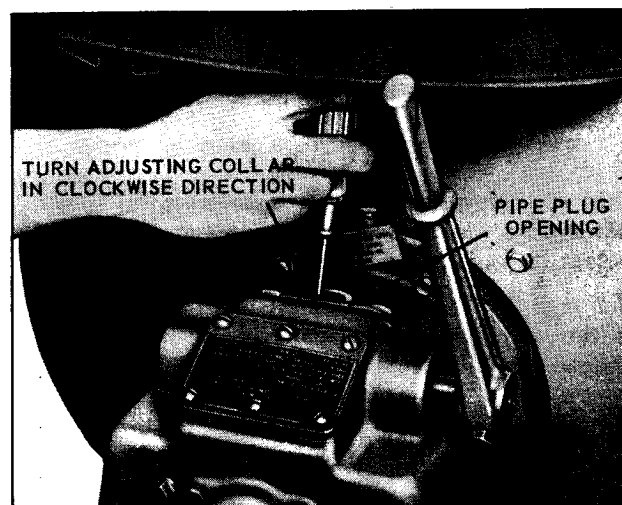


Fig. 40

104575C

Be sure and tighten adjustment lockscrew when adjustment is completed, also mount pipe plugs.

REDUCTION GEARS

Reduction gears are furnished with several different ratios, some with spur gears, others with chains. All are of the same general design, except that some are furnished with clutches, others without. These reduction gears require the same grade of oil as is used in the crankcase of the engine. For various installations these gears are assembled to the engines in various positions. Several plugs are furnished on these reduction gears so that the lubrication may be properly taken care of regardless of the position of the installation. For instance, there will always be one plug on top to be used for filling oil. There will always be one plug below for draining oil, and there will be one plug on the side slightly above the bottom, to be used as an oil level plug. See *Fig. 41*.

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 fre-

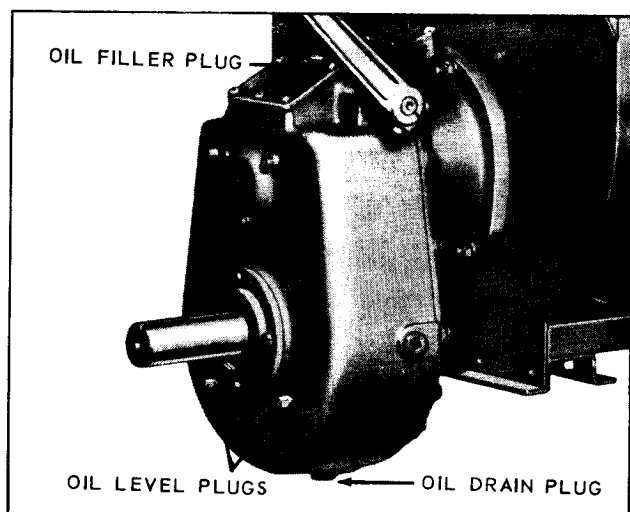


Fig. 41

76090C

quency 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 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 leave 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.

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

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

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

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

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

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

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

REPAIR PARTS LIST

READ THESE INSTRUCTIONS BEFORE ORDERING PARTS

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

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

MODEL	_____	WISCONSIN HEAVY-DUTY <i>Air-Cooled</i> ENGINE ®	R.P.M.	_____
SERIAL NO	_____		SIZE	_____
			SPEC. NO	_____
OPERATING INSTRUCTIONS				
Fill crankcase with good clean gas engine oil to "FULL" mark on oil sabel. For temperatures of 40°F or over use SAE No. 30 oil, for 5°F to 40°F use SAE No. 20-20W oil, for colder temperatures use SAE No. 10W oil. Fill fuel tank with good clean gasoline of the REGULAR grade.			With ELECTRIC STARTING, depress starter switch, repeat if necessary.	
TO START ENGINE			TO STOP ENGINE	
1. Open gasoline shut-off valve.			Idle for a few minutes, to cool engine, before stopping. Depress magneto switch, hold down until engine stops, or PULL OUT switch button on panel. With DISTRIBUTOR IGNITION, PUSH IN switch button to stop engine.	
2. With MAGNETO IGNITION, lever type switch on magneto is always in the "ON" position, or button type magneto switch on panel should be PUSHED IN for starting. With DISTRIBUTOR IGNITION, PULL OUT switch button on panel.			CARE IMPROVES SERVICE, REDUCES REPAIRS	
3. Pull-out choke button. Push in gradually as engine warms up.			Drain old oil and refill with new oil after every 50 hours of operation. If oil filter is used, change oil and replace filter cartridge every 100 hours. Spark plug gap should be .030 inch. A good air cleaner on carburetor must be used and cleaned daily. Firing order of cylinders 1-3-4-2. No. 1 cylinder is nearest flywheel.	
4. Engage hand crank and pull up briskly in clockwise direction. Repeat if necessary.			KEEP ENGINE CLEAN AT ALL TIMES.	
WISCONSIN MOTOR CORPORATION			MILWAUKEE, WISCONSIN U.S.A.	

SD-115-N

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

1. State exactly, quantity of each part and part number.
2. State definitely, whether parts are to be shipped by express, freight or parcel post.

SERVICE FACILITIES

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

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

PARTS RETURNED FOR CREDIT

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

PARTS FOR MODEL VH4 ENGINE

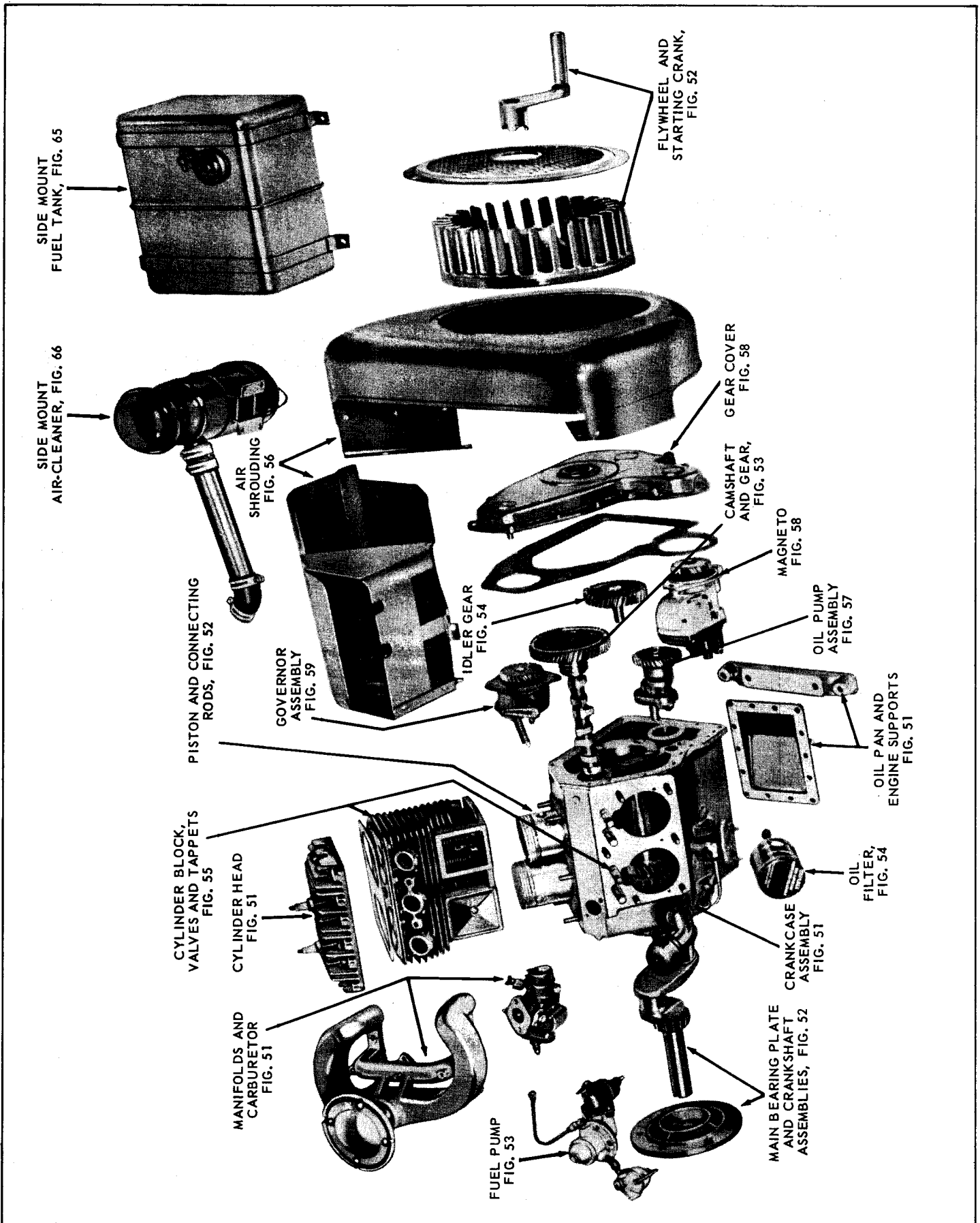


Fig. 50, EXPLODED VIEW OF ENGINE
Refer to figure numbers for break down of parts.

222265C

PARTS FOR MODEL VH4 ENGINE

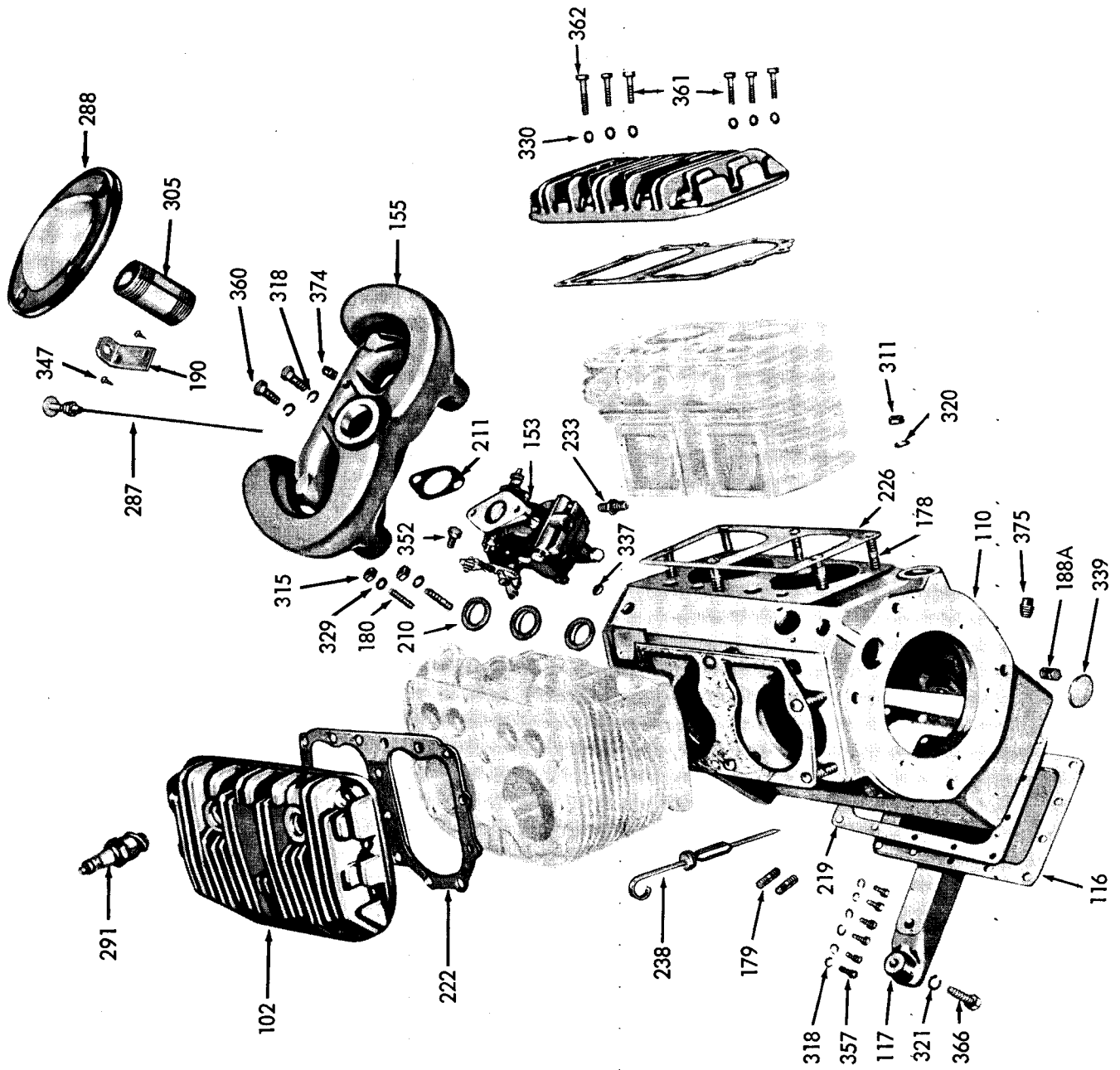


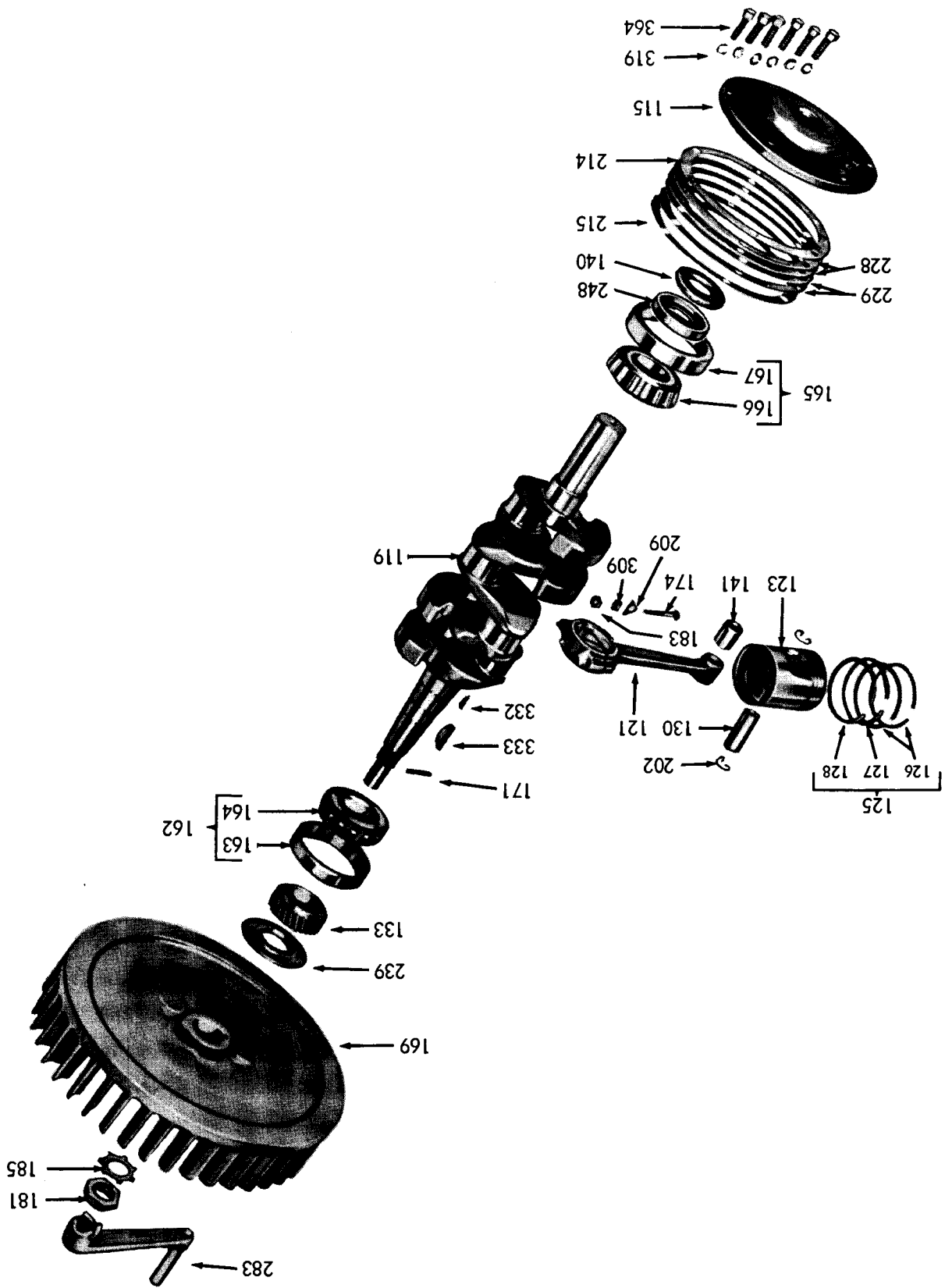
Fig. 51, MANIFOLD AND CRANKCASE GROUP

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

222266C-1

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

222267C



PARTS FOR MODEL V4 ENGINE

Fig. 54, OIL FILTER AND OIL FILLER MOUNTING GROUP
Parts are identified by reference number. See parts list for correct part number.

222268C-1

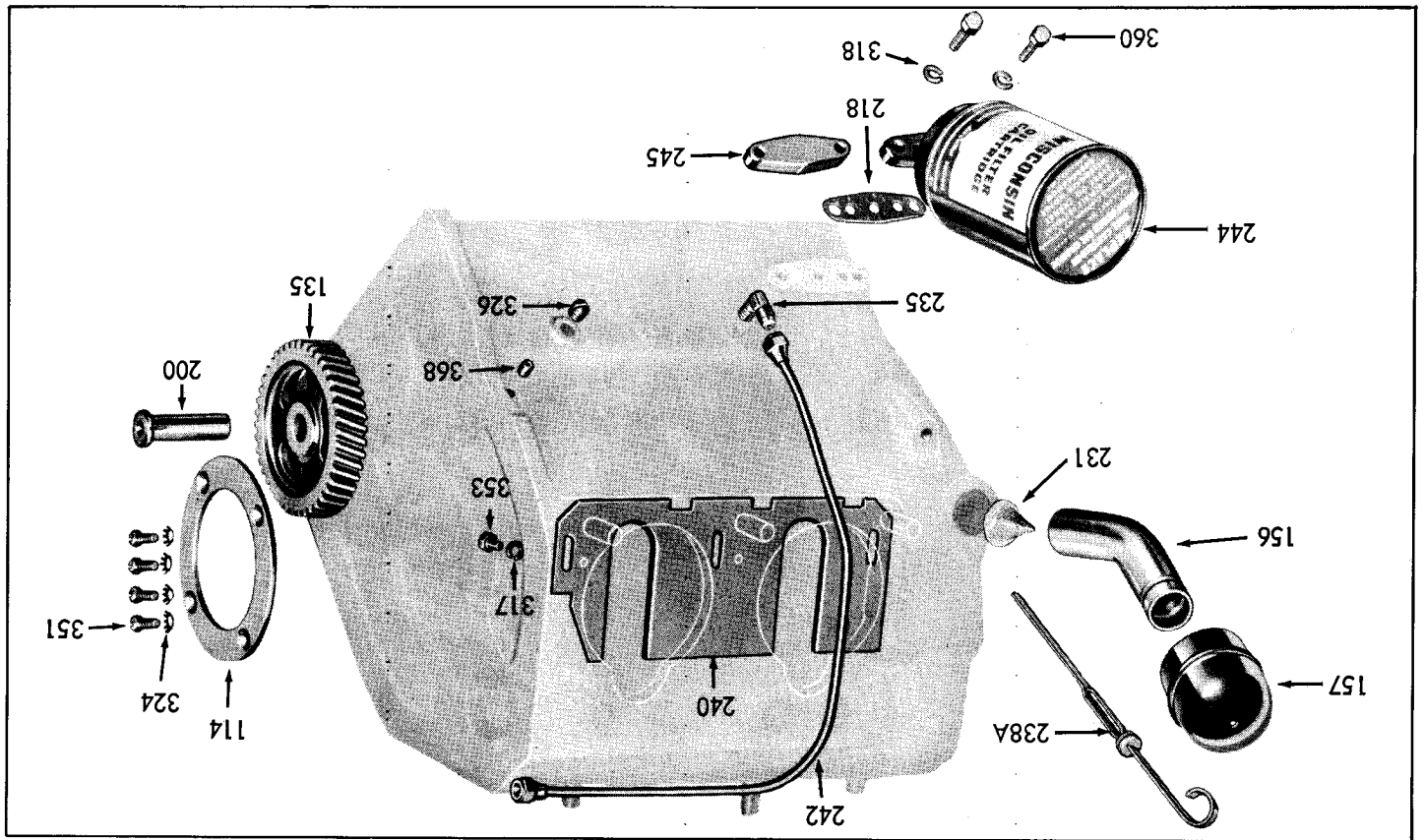
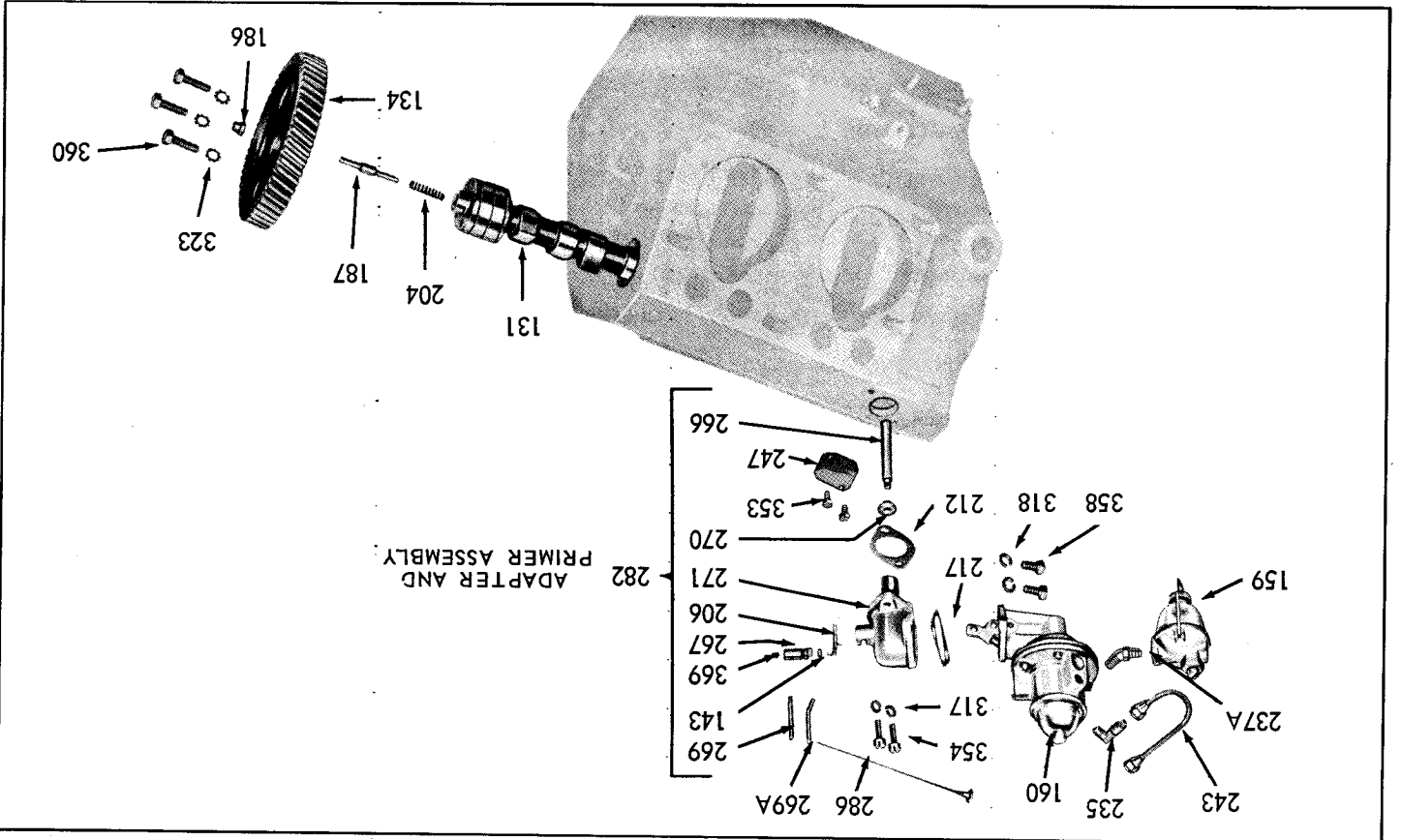


Fig. 53, CAMSHAFT AND FUEL PUMP MOUNTING GROUP

180193C-B 1

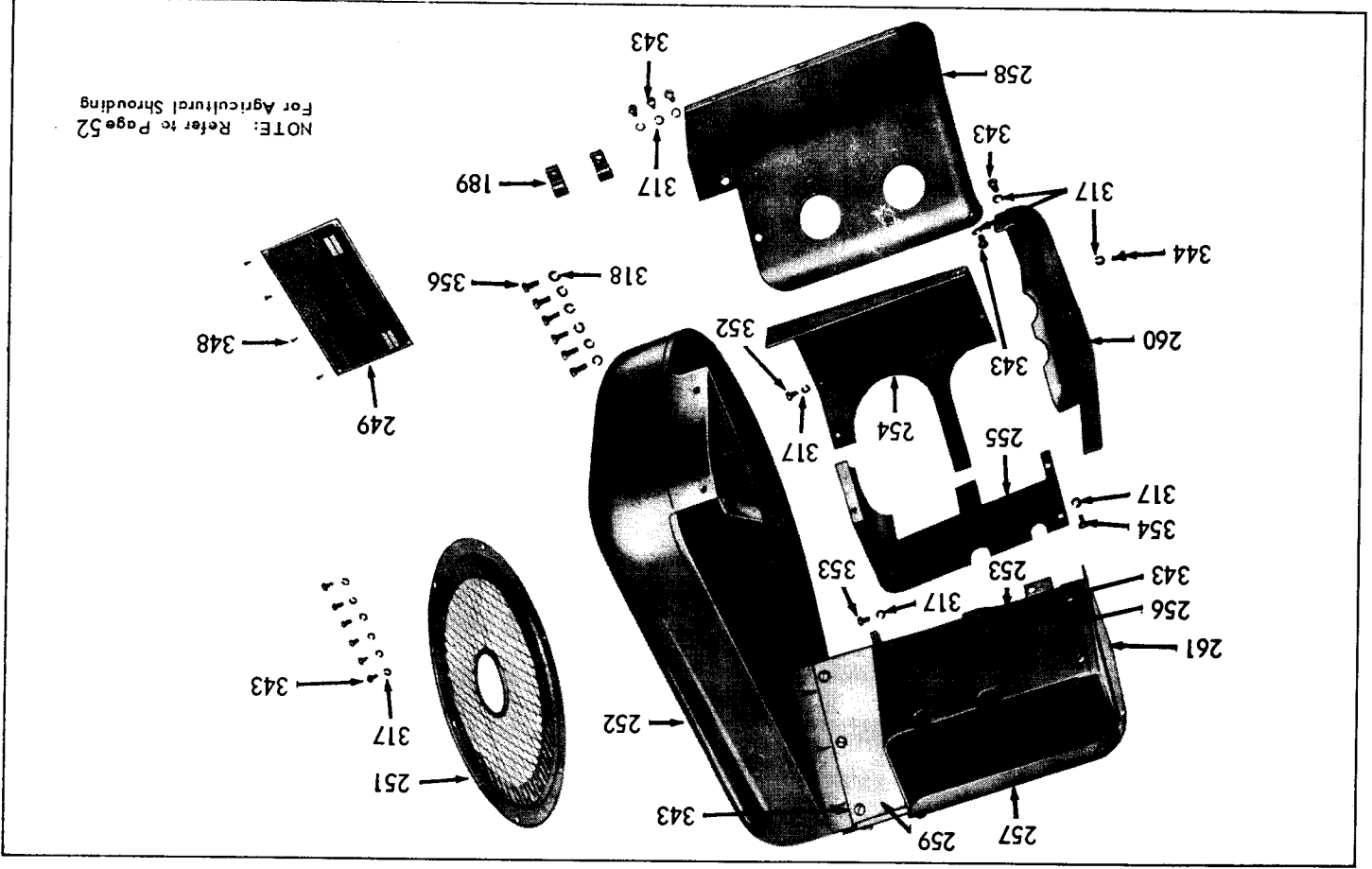


PARTS FOR MODEL V44 ENGINE

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

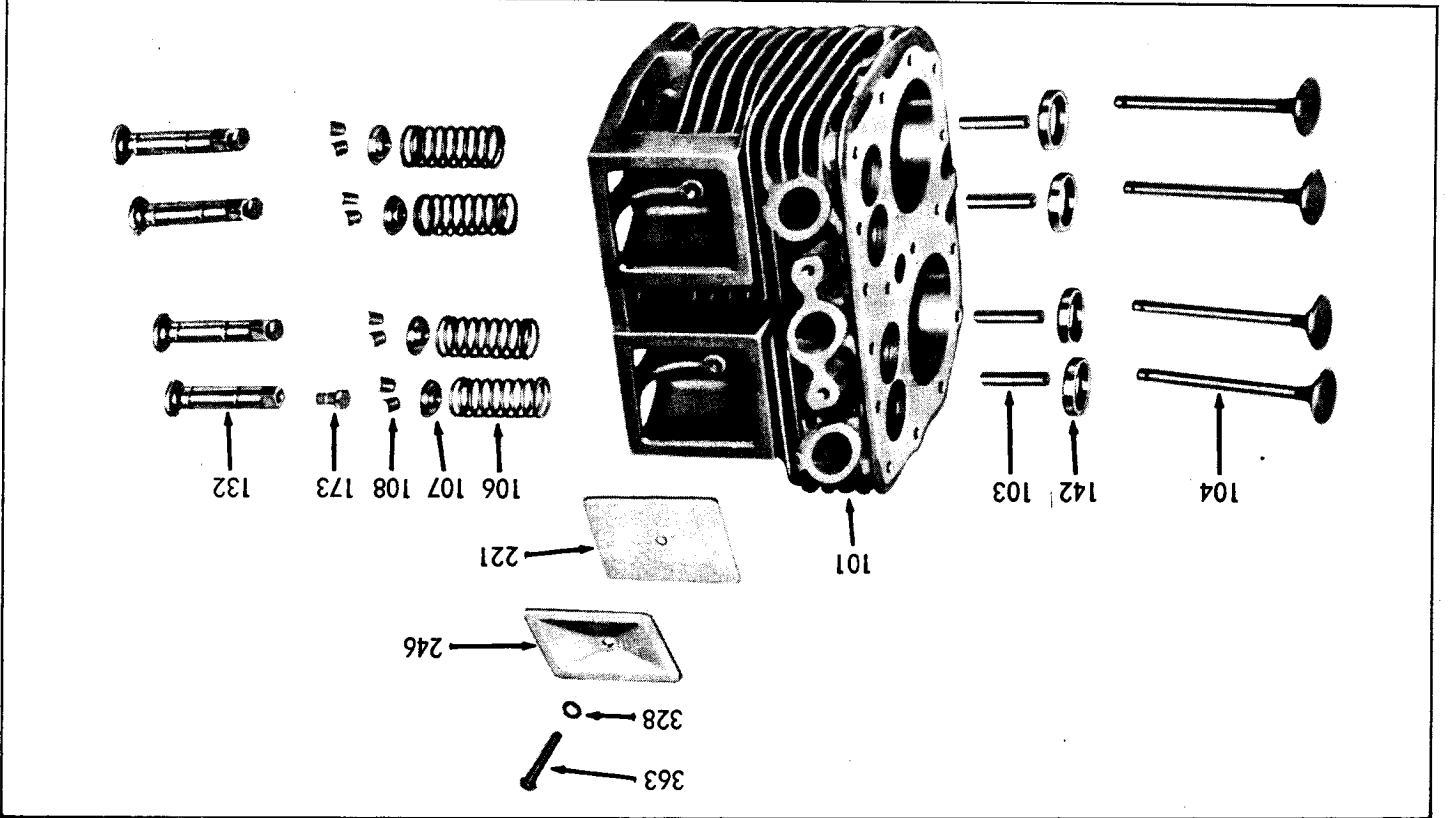
219076C

Fig. 56, AIR SHROUDING



222269C

Fig. 55, CYLINDER BLOCK ASSEMBLY



PARTS FOR MODEL V44 ENGINE

PARTS FOR MODEL V44 ENGINE

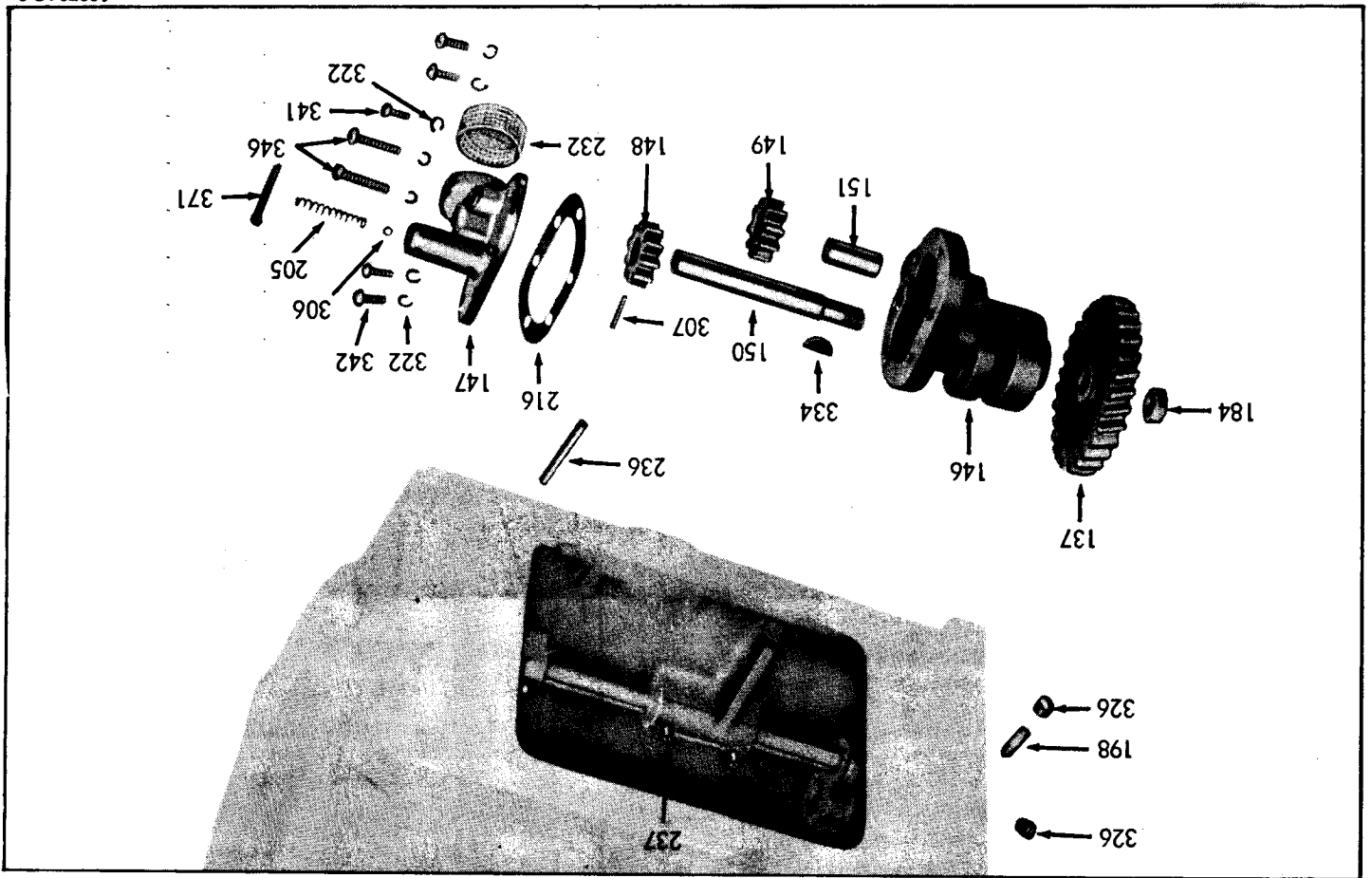


Fig. 57, Ref. No. 144, OIL PUMP ASSEMBLY

129786C-2

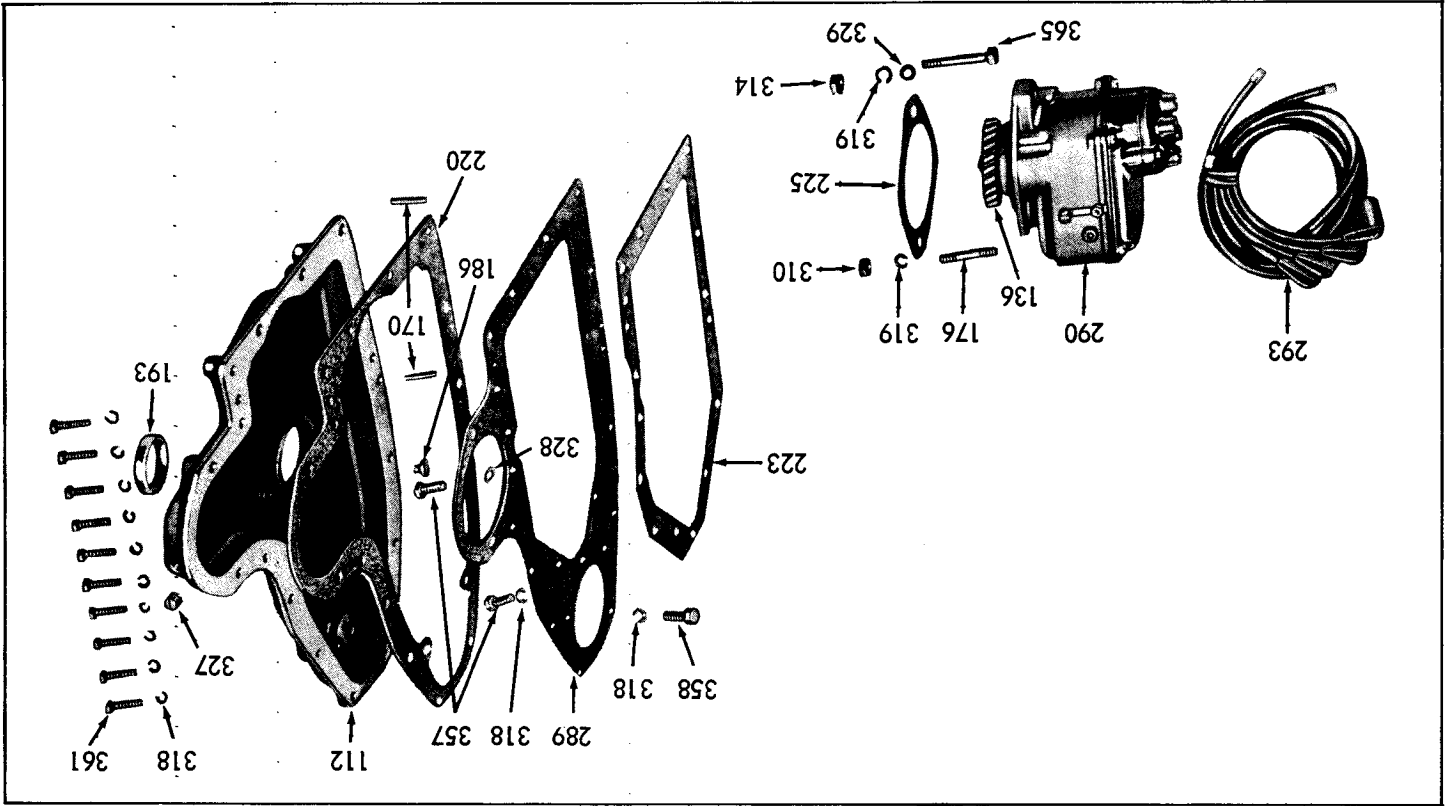


Fig. 58, MAGNETO AND GEAR COVER GROUP

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

85759C-1

PARTS FOR MODEL VH4 ENGINE

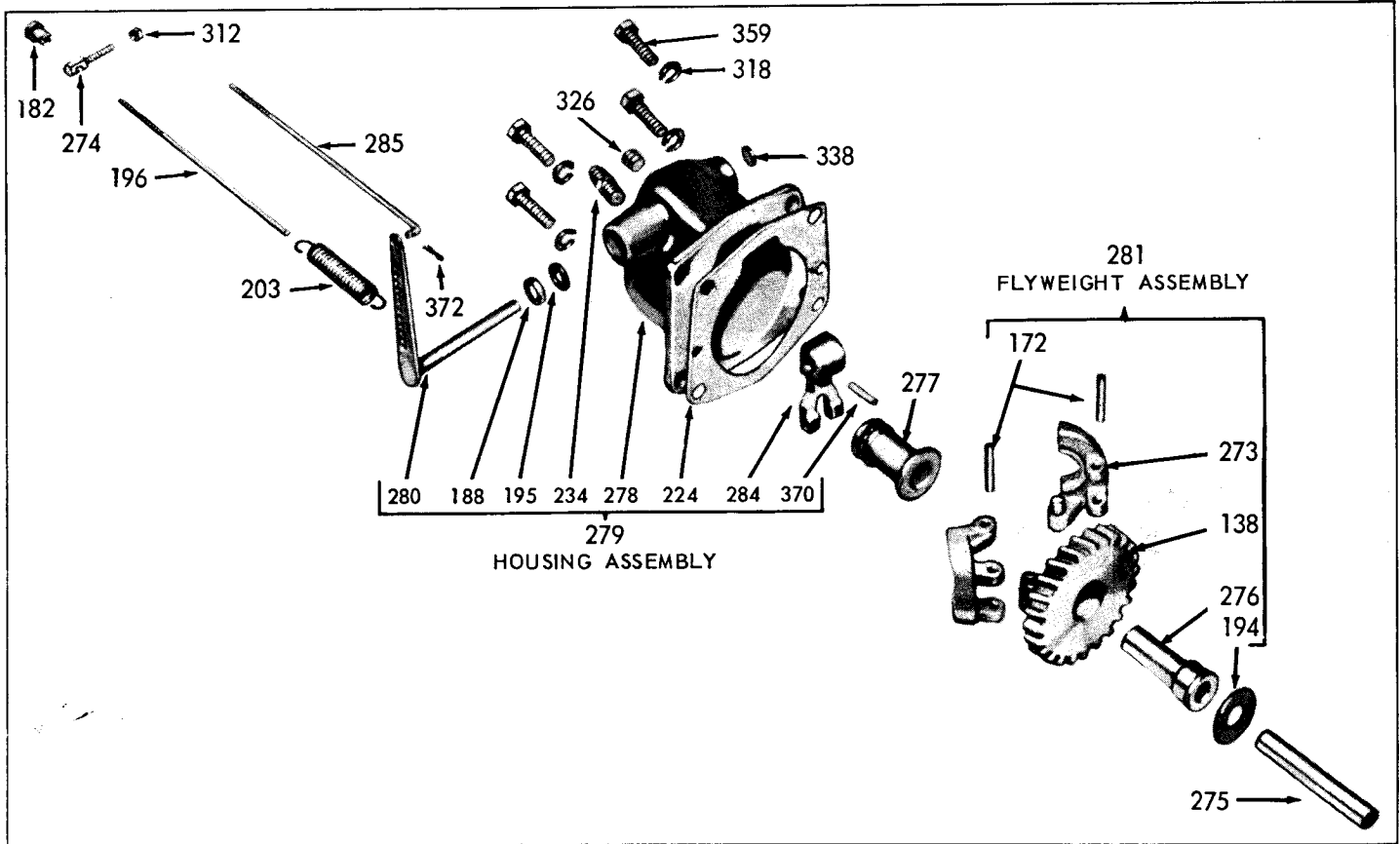


Fig. 59, Ref. No. 265, GOVERNOR ASSEMBLY

129792C-1

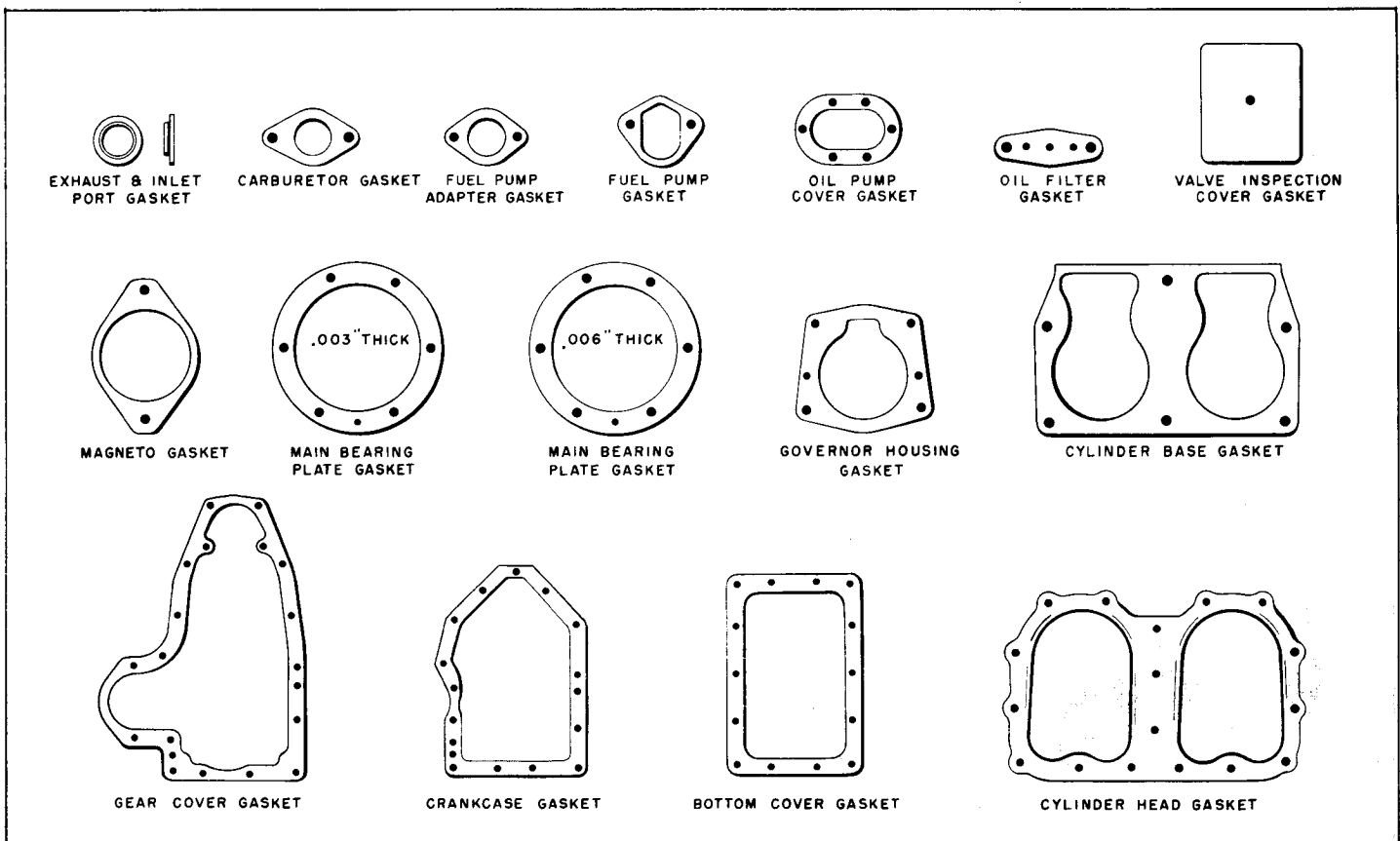


Fig. 60, Ref. No. 208, GASKET SET

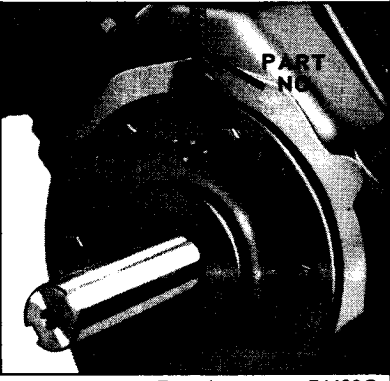
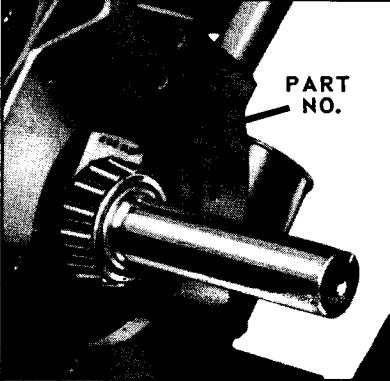
Parts are identified by reference number. See parts list for correct part number.

PARTS LIST

MODEL VH4, 4 CYLINDER STANDARD ENGINE

The following parts are for a standard engine without house. If power unit house parts are required, refer to Page 41.

ENGINE HAVING STELLITE EXHAUST VALVES AND VALVE SEAT INSERTS, HAS POSITIVE TYPE EXHAUST VALVE ROTATORS AND IS DESIGNATED AS MODEL VH4D.

Ref. No.	Part Number	Description	No.		Net Wt.		Ref. No.	Part Number	Description	No.		Net Wt.		
			Req	Lb	Oz	Req				Lb	Oz			
101	AA-98-S1 (VH4)	CYLINDER BLOCK ASSEMBLY Complete - Consisting of: 1 AA-98 Cylinder block 4 AD-41 Valve stem guides 4 AE-75-B Valves 4 AF-49-A Valve springs 4 AG-26 Spring seats 4 AH-9 Retainer locks 4 HG-201 Valve seat inserts 2 PC-406 Studs 2 PH-14 Washers 2 QD-612-A Gaskets 2 SA-68 Inspection covers 2 XD-21 Screws	1	33	8			NOTE: The basic standard crankcase part number is BA-48-C . 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 . Order by complete number and by giving the Model, Specification and Serial Numbers of the engine.						
	AA-98-S7 (VH4D)	CYLINDER BLOCK ASSEMBLY Complete but with STELLITE exhaust valves, seat inserts and exhaust valve ROTATORS .		33	8		112	BD-100C-2-S1	GEAR COVER ASSEMBLY Consisting of: 1 BD-100C-2 Gear cover 1 PF-25 Plug 1 PH-299 Seal 1 PF-52 Button 1 TC-388-1 Shaft	1	12			
102	AB-100	CYLINDER HEAD	2	3	14		114	BG-209	BEARING RETAINER PLATE Flywheel end.	1		10		
103	AD-41	VALVE STEM GUIDE	8		2		115	BG-210C-S2	MAIN BEARING PLATE ASSEMBLY , std Take-off end. Consisting of: 1 BG-210-C Bearing plate 1 HF-261 Cork seal 1 ME-114-2 Bearing cup 1 SD-43 Cork retainer	1	6			
104	AE-75-B AE-75-D	VALVE , inlet and exhaust, standard STELLITE EXHAUST VALVE For VH4D engines.	8 4		4 4			116	BH-141-A	CRANKCASE BOTTOM COVER PLATE BH-141A-1, for engines with underslung fuel tank.	1	1	8	
106	AF-49-A	VALVE SPRING , std. inlet and exhaust 2-5/16" free length. Spring rated at 49 pounds when compressed to approx. 1-3/8" height.	8		2		117	BK-65	ENGINE SUPPORT (cast iron).....	2	1	13		
	AF-51	VALVE SPRING , exhaust, with STELLITE valves, less valve rotators 1-31/32" free length, rated at 85 pounds, when compressed to approximately 1-9/32" height.	4		2		119	See Fig. B	CRANKSHAFT ASSEMBLY	1	38			
	AF-54 (VH4D)	VALVE SPRING , exhaust, with STELLITE valves and VALVE ROTATORS .. 1-13/16" free length, rated at 85 pounds, when compressed to approx. 1-1/8".	4		2				Includes: 1 GA-36A Gear 1 ME-114 Bearing 1 ME-71 Bearing 1 PL-53 Key					
107	AG-26 AG-31 (VH4D)	SEAT for valve spring, std. VALVE ROTATOR and spring SEAT (exhaust) used with Stellite valves.....	8 4		1 1				NOTE: The part number of the crankshaft will be found stamped on the cheek facing the take-off end of the shaft as illustrated in Fig. B . ORDER BY THIS NUMBER and by giving the Model, Specification and Serial Number of engine.					
108	AH-9	LOCK for valve spring seat	8 pr		1									
110	See Fig. A	CRANKCASE ASSEMBLY	1	58										
		Consisting of: 1 Crankcase 1 RF-1128 Pipe 1 LJ-300P Tube 4 RF-1143 Nozzles 12 PC-337 Studs 1 RJ-159 Saber 2 PC-396 Studs 1 RJ-159C 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												
														
		Fig. A 76638C							Fig. B 71057C					

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

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

MODEL VH4 PARTS LIST

Ref. No.	Part Number	Description	No.			Net Wt.		
			Req	Lb	Oz	Req	Lb	Oz
121	DA-68-S1	CONNECTING ROD ASSEMBLY Consisting of: 1 DA-68 Rod (Not serviced separately) 1 HG-157A Bushing 2 PB-148 Bolts 2 PD-10 Nuts 2 PD-181 Palnuts 2 QA-114 Shims NOTE: A price allowance is made on connecting rods in which bearings have been burned out, but which are otherwise complete, and in condition to be reab-bitted. Connecting rods are also furnished .010", .020" and .030" undersize.	4	1	5			
123	DB-190A-1	PISTON , cam ground, standard size DB-190-A, with split skirt, replaced by DB-190A-1 Pistons are also furnished .005", .010", .020" and .030" oversize.	4		11			
125	DR-31	PISTON RING SET , standard size..... Consisting of:	1		10			
126	DC-209	COMPRESSION RING	8		1			
127	DC-210	SCRAPER RING	4		1			
128	DC-211	OIL RING Piston rings and ring sets are also furnished .005", .010", .020" and .030" oversize.	4		1			
	DR-42	TRI-CROME RE-RING SET , std. size Also furnished .010", .020" and .030" oversize.		1				
130	DE-65	PISTON PIN , standard size Piston pins are also furnished .005", .010", .020" and .030" oversize.	4		3			
131	EA-113	CAMSHAFT	1	3	8			
132	F-61	VALVE TAPPET with lockscrew.....	8		4			
133	GA-36-A	CRANKSHAFT GEAR	1		14			
134	GB-45-A	CAMSHAFT GEAR	1	2	2			
135	GC-27-B-1	IDLER GEAR	1	1	6			
136	GD-93-C-4	MAGNETO GEAR GD-93-C and GD-93C-2, replaced by GD-93C-4.	1		9			
137	GD-94-C	OIL PUMP GEAR	1		11			
138	GD-100-A	GOVERNOR GEAR	1		7			
140	HF-261	CORK OIL SEAL For main bearing, take-off end. PH-364 Oil seal for engines with clutch, reduction or clutch reduction unit.	1		1			
141	HG-157-A-1	PISTON PIN BUSHING	4		1			
142	HG-201	VALVE SEAT INSERT , standard.....	8		1			
	HG-201-D	STELLITE EXHAUST VALVE SEAT INSERT - for VH4D engines.....	4		1			
143	JK-50	PACKING RING For fuel pump primer shaft.	1		1			
144	K-95-D	OIL PUMP ASSEMBLY , complete (Fig.57)	1	3	13			
146	KA-61A-1-S1	OIL PUMP BODY ASSEMBLY Consisting of: 1 KA-61A-1 Body 1 KD-122 Stub shaft	1	2				
147	KB-42-S2	OIL PUMP COVER ASSEMBLY Consisting of: 1 KB-42 Cover 1 ME-60 Check ball 1 PE-14 Washer 1 PM-111 Spring 1 RD-112 Screen 1 XA-7 Screw 1 XI-16 Cotter pin	1	1				
148	KC-56-1	OIL PUMP GEAR (driver)	1		1			
149	KC-56-2	OIL PUMP GEAR (driven)	1		1			
150	KD-121-S1	OIL PUMP DRIVE SHAFT ASSEMBLY .. Consisting of: 1 PA-64 Pin 1 KC-56-1 Gear 1 KD-121 Shaft	1		5			
151	KD-122	OIL PUMP STUB SHAFT	1		2			
153	L-63-S1	CARBURETOR with gasket, Zenith No. 12098.....	1	1	12			
	Optional L-64-S1	CARBURETOR with gasket, Marvel-Schebler No. TSX-690	1	3	8			
		NOTE: The above are standard carburetors and either one may be used on this model of engine. Refer to stamped part or model number on carburetor for replacement carburetor or parts. See carburetor bulletins in back of manual for service replacement parts list.						
155	LD-253	INLET and EXHAUST MANIFOLD For open engines.	1	15				
	LD-253-1	MANIFOLD , for power units..... Has two 1/4"-20 taps for support straps.		15				
156	LJ-300-P	OIL FILLER TUBE	1		6			
157	LO-60	OIL FILLER and BREATHER CAP	1		6			
159	LP-19-B	FUEL STRAINER , Tillotson OW-444..... NOTE: See illustration, Fig. 65, for service parts list of fuel strainer.	1		6			
160	LP-38	FUEL PUMP	1	1	11			
	LQ-30	DIAPHRAGM KIT for fuel pump..... NOTE: Refer to fuel pump instruction sheet in back of manual for maintenance and repair. LQ-21-B, replaced by LQ-30.	1		2			
162	ME-71	MAIN BEARING ASSEMBLY , flywheel end. Consisting of: ME-69-1 Bearing cup—Timken 414.....	1	1	14			
163		ME-71-1 Bearing cone—Timken 420.....	1		2			
164		ME-71-1 Bearing cone—Timken 420.....	1	1	2			
165	ME-114	MAIN BEARING ASSEMBLY , take-off end Consisting of: ME-114-1 Bearing cone—Timken 3382....	1	3				
166		ME-114-2 Bearing cup—Timken 3328.....	1	2	4			
167		ME-114-2 Bearing cup—Timken 3328.....	1		12			
169	NC-140-G	FLYWHEEL , standard..... NC-140G-1-S1 for engines with electric starter..... Includes: GH-44 Ring gear..... XE-17 Set screw, 1/4"-20 x 3/8" long, headless.....	1	34				
			1		13			
			3		1			
		NOTE: Because of the numerous variations in flywheels; for mounting rotating screens, stub shafts and etc., only the standard and ring gear flywheels are listed. Therefore, give Model, Specification and Serial Numbers of engine when ordering new flywheel.						

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

MODEL VH4 PARTS LIST

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
170	PA-291	DOWEL PIN for gear cover	2		1					Q-28	VALVE GRINDING GASKET SET	1		2			
171	PA-333	PIN for starting crank	1		1						Consisting of: 6 QB-75 4 QD-612-A 2 QD-613-C						
172	PA-340	ROLL PIN for governor flyweight	2		1				209	QA-114	SHIM for connecting rod, .002" thick ...	8		1			
173	PB-169-A	VALVE TAPPET ADJUSTING SCREW	8		1				210	QB-75	GASKET for manifold to cylinder block	6		1			
174	PB-148-S1	CONNECTING ROD BOLT ASSEMBLY Consisting of: 1 PB-148 Bolt 1 PD-10 Nut 1 PD-181 Palnut	8		1				211	QC-71-A	GASKET for carburetor flange	3		1			
									212	QD-67	GASKET for fuel pump adapter	1		1			
176	PC-110	STUD for magneto mounting	1		1				214	QD-527-C	GASKET for bearing plate, .006" thick	2		1			
178	PC-337	STUD for cylinder block to crankcase	12		2				215	QD-527-D	GASKET for bearing plate, .003" thick	1		1			
179	PC-396	STUD for starter bracket	2		1				216	QD-535	GASKET for oil pump cover	1		1			
180	PC-406	STUD for manifold to cylinder block ..	4		1				217	QD-538-A	GASKET for fuel pump mounting	1		1			
181	PD-123	NUT for flywheel mounting	1		3				218	QD-595-A	GASKET for oil filter mounting	1		1			
182	PD-173-A	NUT for governor adjusting screw	1		1				219	QD-610-A	GASKET for crankcase bottom cover ..	1		1			
183	PD-181	PALNUT for connecting rod bolt, 5/16"-24 thread	8		1				220	QD-611	GASKET for gear cover	1		1			
184	PD-195	NUT for mounting oil pump gear	1		1				221	QD-612-A	GASKET for valve inspection cover plate	4		1			
185	PE-66	LOCKWASHER for flywheel nut	1		1				222	QD-613-C	GASKET for cylinder head	2		4			
186	PF-52	BUTTON for camshaft thrust plunger ..	1		1				223	QD-614	GASKET for gear cover spacer to case	1		1			
187	PF-101	THRUST PLUNGER for camshaft	1		1				224	QD-615-A	GASKET for governor housing	2		1			
188	-----	OIL SEAL RETAINER (PF-118) For governor cross shaft. Replaced by PH-571 oil seal.							225	QD-616	GASKET for magneto flange	1		1			
188A	PF-144	PLUG for 7/16"-14 taps in face of case	4		1				226	QD-617	GASKET for cylinder base	2		1			
189	PG-314	CLIP for spark plug ignition cables	2		1				228	QF-33-B	SHIM for main bearing plate, .006" thick	2		1			
190	PG-475	BRACKET for choke control	1		2				229	QF-33-C	SHIM for main bearing plate, .013" thick	2		1			
193	PH-299	OIL SEAL for crankshaft, flywheel end	1		2				231	RC-91	SCREEN for oil filler	1		1			
194	PH-313-A	WASHER for governor gear bushing	1		1				232	RD-112	OIL PUMP SCREEN	1		1			
195	PH-571	OIL SEAL for governor cross shaft	1		1				233	RF-269	STRAIGHT FITTING in carburetor	1		2			
		(Neoprene) mount with lips in. PH-318-A cork seal and PF-118 retainer, replaced by PH-571.							234	RF-269-2	FITTING in governor housing for oil line	1		2			
196	PI-115-F	GOVERNOR SPRING ADJUSTING SCREW	1		3				235	RF-1225	ELBOW for fuel line	2		2			
											1-for fuel pump outlet. 1-for oil line to governor, in crankcase.						
198	PI-143-B	OIL PUMP LOCKSCREW	1		1				236	RF-1128	PIPE for oil filter outlet, in crankcase	1		1			
200	PJ-105	STUD for idler gear	1		5				237	RF-1143	OIL SPRAY NOZZLE	4		1			
202	PK-52	RETAINING RING for piston pin	8		1				237A	RF-1397	ELBOW, 45° male, for fuel strainer mt'g. RF-795 Nipple and XK-77 Street Ell, re- placed by RF-1397.	1		1			
203	PM-76	GOVERNOR SPRING	1		1				238	RJ-159	OIL SABER (short) starter side	1		2			
204	PM-108	SPRING for camshaft thrust plunger	1		1				238A	RJ-159-C	OIL SABER (long) below oil filler tube	1		3			
205	PM-111	SPRING for oil pump relief valve	1		1				239	RK-170	OIL SLING on crankshaft	1		2			
206	PM-145	SPRING for fuel pump primer handle ..	1		1				240	RK-182	SPLASH PLATE for crankcase	2		3			
208	Q-12-J	GASKET SET (Fig. 60) Consisting of: 6 QB-75 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-C 1 QD-611 2 QD-617 1 QD-527-D 4 QD-612-A 1 QD-535 2 QD-613-C NOTE: QB-78, QB-79, QD-527-A and QD-527-B Gaskets, also included in this kit, can be discarded, as they are for the VE4 and VF4 engines. Q-12-F Gasket Set, replaced by Q-12-J.	1		8				242	RM-675	OIL LINE, crankcase to governor	1		3			
									243	RM-850-1	FUEL LINE, pump to carburetor	1		2			
									244	-----	OIL FILTER, consisting of: RV-40-S4 CARTRIDGES (4 pack)	1	3	4			
											RV-40A-1 BASE ASSEMBLY	1	1				
											NOTE: Beginning with engine Serial No. 3408750, the RV-29-A oil filter is re- placed by a BASE ASSEMBLY and CAR- TRIDGE listed above. Replacement car- tridges 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 identi- fication.						

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

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

MODEL VH4 PARTS LIST

Ref. No.	Part Number	Description	No. Net Wt.			Ref. No.	Part Number	Description	No. Net Wt.		
			Req	Lb	Oz				Req	Lb	Oz
245	SA-65-C	PAD COVER, when oil filter is not furnished	1		4	275	TC-388-1	GOVERNOR SHAFT	1		3
246	SA-68	COVER PLATE for valve inspection....	4		9	276	TC-389-1	GOVERNOR GEAR BUSHING	1		2
247	SA-69	COVER for fuel pump pad	1		2	277	TC-391-B	THRUST SLEEVE and BEARING	1		2
		For engines without fuel pump.						For governor.			
248	SD-43	RETAINER for main bearing oil seal cork, take-off end	1		1	278	TC-395	GOVERNOR HOUSING, not serviced separately, order TC-395-S1 Housing assembly.	1		
249	SD-115-N	ENGINE INSTRUCTION AND NAME PLATE	1		1	279	TC-395-S1	GOVERNOR HOUSING ASSEMBLY	1		2
		When ordering name plate, give Model, Specification Number and Serial Number for correct stamping.						Consisting of:			
251	SE-20-B-3	SCREEN for flywheel shroud	1	1	2			1 PF-18 Plug			
252	SE-74-V	FLYWHEEL SHROUD, for standard engine and power unit	1	11				1 PF-118 Retainer			
		SE-74-VA With pad for mounting starter	1	11	6			1 PH-318-A Seal			
		SE-74-VF With pad for air filter mtg.	1	11	8			1 QD-615-A Gasket			
		SE-74-VG With pads for air filter and starter mounting	1	11	14			1 RF-269-2 Fitting			
253	SE-75-B	LOWER CYLINDER SHROUD, Right hand side	1		14	280	TC-398	CROSS SHAFT and LEVER, for gov.	1		2
254	SE-76-B	LOWER CYLINDER SHROUD, Left hand side	1		12	281	TC-405	GOVERNOR FLYWEIGHT ASSEMBLY	1		1
255	SE-77-C	CYLINDER HEAT DEFLECTOR, Left hand side	1		11			Consisting of:			
256	SE-77-D	CYLINDER HEAT DEFLECTOR, Right hand side	1		14			1 GD-100A Gear 2 TC-322D Flyweights			
257	SE-78-C	CYLINDER HEAD SHROUD, Right hand side	1		14			2 PA-340 Pins 2 TC-328D Pins			
258	SE-79-C	CYLINDER HEAD SHROUD, Left hand side	1	1		282	TF-96-10	FUEL PUMP ADAPTER and PRIMER ASSEMBLY, (with straight handle, for open engine.) Consisting of:	1		1
259	SE-80	SIDE COVER for flywheel shroud	1		4			1 JK-50 Packing ring			
260	SE-82-C	REAR SHROUD COVER, Left hand side	1		15			1 PM-145 Spring			
261	SE-83-C	REAR SHROUD COVER, Right hand side	1		15			1 TA-111-B Plunger			
265	T-89-2-S1	GOVERNOR ASSEMBLY (Fig. 59)	1	3	3			1 TA-114 Shaft			
		Consisting of:						1 TA-115 Handle			
		1 TC-391-B Thrust sleeve and bearing						1 TA-116 Cap			
		1 TC-395-S1 Housing assembly						1 TB-105-B Adapter			
		1 TC-405 Flyweight assembly						1 TF-96-12 ADAPTER and PRIMER ASSEMBLY	1		1
266	TA-111-B	PLUNGER for fuel pump	1		1			(with bent handle, for power units with fuel pump.) Consisting of:			
		(TA-116 must also be ordered.)						1 JK-50 Packing ring			
267	TA-114-S1	PRIMER SHAFT, with JK-50 ring	1		1	283	U-212	STARTING CRANK	1	1	8
		For engine with fuel pump.				284	VB-151	GOVERNOR YOKE	1		3
	TA-114-C-S1	PRIMER SHAFT, with JK-50 ring	1		1	285	VE-464	GOVERNOR CONTROL ROD	1		1
		For power unit with fuel pump.						To carburetor.			
269	TA-115	PRIMER HANDLE (straight)	1		1	286	VE-471-4	PRIMER CONTROL	1		1
		For engine with fuel pump.						For power units with fuel pump.			
269A	TA-115-4	PRIMER HANDLE (bent)	1		1	287	VE-693	CHOKE CONTROL	1		4
		For power unit with fuel pump.				288	WD-26-A	MUFFLER, standard, for 1/4" pipe tap ..	1		2
270	TA-116	PLUNGER CAP for fuel pump	1		1	289	WE-182-A	SPACER for gear cover	1		2
271	TB-105-B	FUEL PUMP ADAPTER, not serviced separately, order TF-96-10 (for open engines) or TF-96-12 (for power units), complete adapter and primer assembly.	1			290	Y-97-S2	MAGNETO, 'Fairbanks-Morse', No. FMX-4B7A, with gear and gasket	1		6
							Optional	MAGNETO, 'Wico', No. XHG-4, with gear and gasket			5
273	TC-322-D-S1	GOVERNOR FLYWEIGHT ASSEMBLY ..	2		3		Y-95-S2	NOTE: These engines are equipped with either a 'Fairbanks-Morse' or 'Wico' magneto as shown above. See magneto bul-			
		Includes TC-328-D Thrust pin.									
274	TC-367	ADJUSTING SCREW PIN for governor ..	1		1						

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

MODEL VH4 PARTS LIST

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
		letins in back of manual for service replacement parts list.									
291	YD-6-S1	SPARK PLUG , 18mm, CHAMPION No. D-16.....	4		2	320	PE-6	LOCKWASHER , 7/16" Positive..... For cylinder block to crankcase.	12		1
	Optional YD-6-S2	AC No. C86 Commercial				321	PE-7	LOCKWASHER , 1/2" Positive..... For engine supports to crankcase.	4		1
293	YL-100-A	Set of Magneto Ignition Cables with integral molded spark plug boot	1		12	322	PE-14	LOCKWASHER , No. 10 Positive..... For oil pump cover and screen.	7		1
		Consisting of: YL-339-26 Cable for No. 1 cylinder	1		3	323	PE-46	LOCKWASHER , 5/16" external 'Everlock' For mounting camshaft gear.	3		1
		YL-339-34 Cable for No. 2 cylinder	1		3	324	PE-49	LOCKWASHER , 5/16" countersunk 'Everlock', for bearing retainer plate — flywheel end	4		1
		YL-339-32 Cable for No. 3 cylinder	1		3	326	PF-18	PIPE PLUG , 1/8" slotted	8		1
		YL-339-38 Cable for No. 4 cylinder	1		3			1-for oil hole to pump. 4-for oil spray nozzles. 1-for oil pump lock screw hole. 1-for oil header. 1-for governor housing.			
		YD-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.				327	PF-25	PIPE PLUG , 3/8" slotted	1		2
		STANDARD HARDWARE				328	PH-14	PLAIN WASHER , 5/16" copper	6		1
		NOTE: The following pipe nipples, pins, nuts, capscrews, washers, etc. are of a common hardware variety and can be purchased from local plumbing, hardware or accessory stores.				329	PH-22-A	PLAIN WASHER , 3/8" steel	5		1
305	LJ-184	NIPPLE , 1/4" x 2 1/2" long, W.I. pipe For muffler mounting.	1		5	330	PH-77-A	PLAIN WASHER , 5/16" steel	34		1
306	ME-60	STEEL BALL , 1/4" dia. For oil pump relief valve.	1		1	332	PL-53	KEY , No. 8 Woodruff	1		1
307	PA-64	PIN , 1/8" dia. x 3/4" long, straight..... For oil pump gear.	1		1	333	PL-83	KEY , No. 23 Woodruff	1		2
309	PD-10	NUT , 5/16"-24 thread, hexagon steel .. For connecting rod bolts.	8		1	334	PL-137	KEY , No. 1 Woodruff	1		1
310	PD-11	NUT , 3/8"-24 thread, hexagon steel For magneto stud.	1		1	337	SA-26	PLUG , 5/8" expansion	2		1
311	PD-12	NUT , 7/16"-20 thread, hexagon steel .. For mounting cylinder block.	12		1	338	SA-52	PLUG , 1/2" expansion	1		1
312	PD-77	NUT , 1/4"-20 thread, hexagon steel	1		1	339	SA-58	PLUG , 1-3/8" expansion	1		1
314	PD-79	NUT , 3/8"-16 thread, hexagon steel For magneto mounting screw.	1		1	341	XA-7	SCREW , No. 10-32 thread x 3/8" long, steel round head	1		1
315	PD-206	NUT , 3/8"-24 thread (Seez-proof), hexagon steel	4		1	342	XA-8	SCREW , No. 10-32 thread x 1/2" long, steel round head	4		1
317	PE-3	LOCKWASHER , 1/4" Positive	47		1	343	XA-33	SCREW , 1/4"-20 thread x 3/8" long, round head	29		1
		2-for mounting fuel pump adaptor. 6-for crankcase splash plates. 6-for flywheel screen. 33-for air shrouding.						6-for flywheel screen. 4-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.			
318	PE-4	LOCKWASHER , 5/16" Positive.....	45		1	344	XA-36	SCREW , 1/4"-20 thread x 3/4" long, round head	2		1
		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.				346	XA-56	SCREW , No. 10-32 thread x 1 1/4" long, steel round head	2		1
319	PE-5	LOCKWASHER , 3/8" Positive.....	8		1			For rear shroud cover, top holes. For oil pump cover.			
		6-for main bearing plate—take-off end. 2-for magneto.									

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

MODEL VH4 PARTS LIST

Ref. No.	Part Number	Description	No.			Ref. No.	Part Number	Description	No.		
			Req	Lb	Oz				Req	Lb	Oz
347	XA-65	SCREW, No. 8 x 1/2" long, self-tapping, sheet metal For mounting choke bracket.	2		1	364	XD-29	SCREW, 3/8"-16 thread x 1 1/4" long, hexagon head For main bearing plate-take-off end.	6		2
348	XA-67	SCREW, No. 4 x 1/4" long, self-tapping, sheet metal For mounting name and instruction plate.	4		1	365	XD-33	SCREW, 3/8"-16 thread x 2 1/4" long, hexagon head For mounting magneto (Lower hole).	1		2
	Optional					366	XD-43	SCREW, 1/2"-13 thread x 1 1/2" long, hexagon head For mounting engine supports.	4		2
	XJ-46-A	RIVET, 9/64" dia. x 3/16" long, tubular steel For mounting name and instruction plate to cylinder head cover.				368	XE-55	SCREW, 5/16"-18 thread x 3/8" long, Allen head set For idler stud.	1		1
351	XC-17	SCREW, 5/16"-18 thread x 3/4" long, flat head For bearing retainer plate-flywheel end.	4		1	369	XE-65	SCREW, No. 10-32 thread x 1/4" long, Allen head set For fuel pump primer shaft.	1		1
352	XD-3	SCREW, 1/4"-20 thread x 3/8" long, hexagon head 4-for lower cylinder shrouds. 1-for exhaust manifold tap, R.H. side.	5		1	370	XH-1	TAPER PIN, No. 0 x 3/4" long..... For governor yoke.	1		1
353	XD-4	SCREW, 1/4"-20 thread x 1/2" long, hexagon head 6-for mounting splash plates. 4-for cylinder heat deflector. 2-for fuel pump pad cover.	12		1	371	XI-16	COTTER PIN, 1/8" x 1" long..... For oil pump relief valve spring.	1		1
354	XD-6	SCREW, 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), repl'd. by XD-6.	4		1	372	XI-32	COTTER PIN, 3/64" x 3/8" long For governor control rod.	1		1
356	XD-13	SCREW, 5/16"-18 thread x 1/2" long, hexagon head For flywheel shroud mounting.	6		1	374	XK-1	PLUG, 1/8" pipe, square head For inlet manifold.	2		1
357	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	375	XK-3	PLUG, 3/8" pipe, square head For oil drain.	1		1
358	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						
359	XD-16	SCREW, 5/16"-18 thread x 7/8" long, hexagon head For mounting governor housing.	4		1						
360	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						
361	XD-19	SCREW, 5/16"-18 thread x 1 1/4" long, hexagon head 10-for mounting gear cover. 30-for mounting cylinder heads.	40		2						
362	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						
363	XD-21	SCREW, 5/16"-18 thread x 1 1/2" long, hexagon head For valve inspection cover plates.	4		2						

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

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

REPAIR PARTS LIST

FOR

POWER UNIT HOUSE PARTS

AND

ACCESSORIES COMMONLY SUPPLIED

ON ENGINE

WISCONSIN



ENGINES

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 WISCONSIN MOTOR CORPORATION OR AN AUTHORIZED DEALER OR DISTRIBUTOR BEFORE ORDERING PARTS. IN MOST CASES, A CONVERSION CAN ONLY BE MADE IF MAJOR ENGINE PARTS ARE ALSO CHANGED.

VH4 ENGINE HOUSE WITH FUEL TANK AT TAKE-OFF END

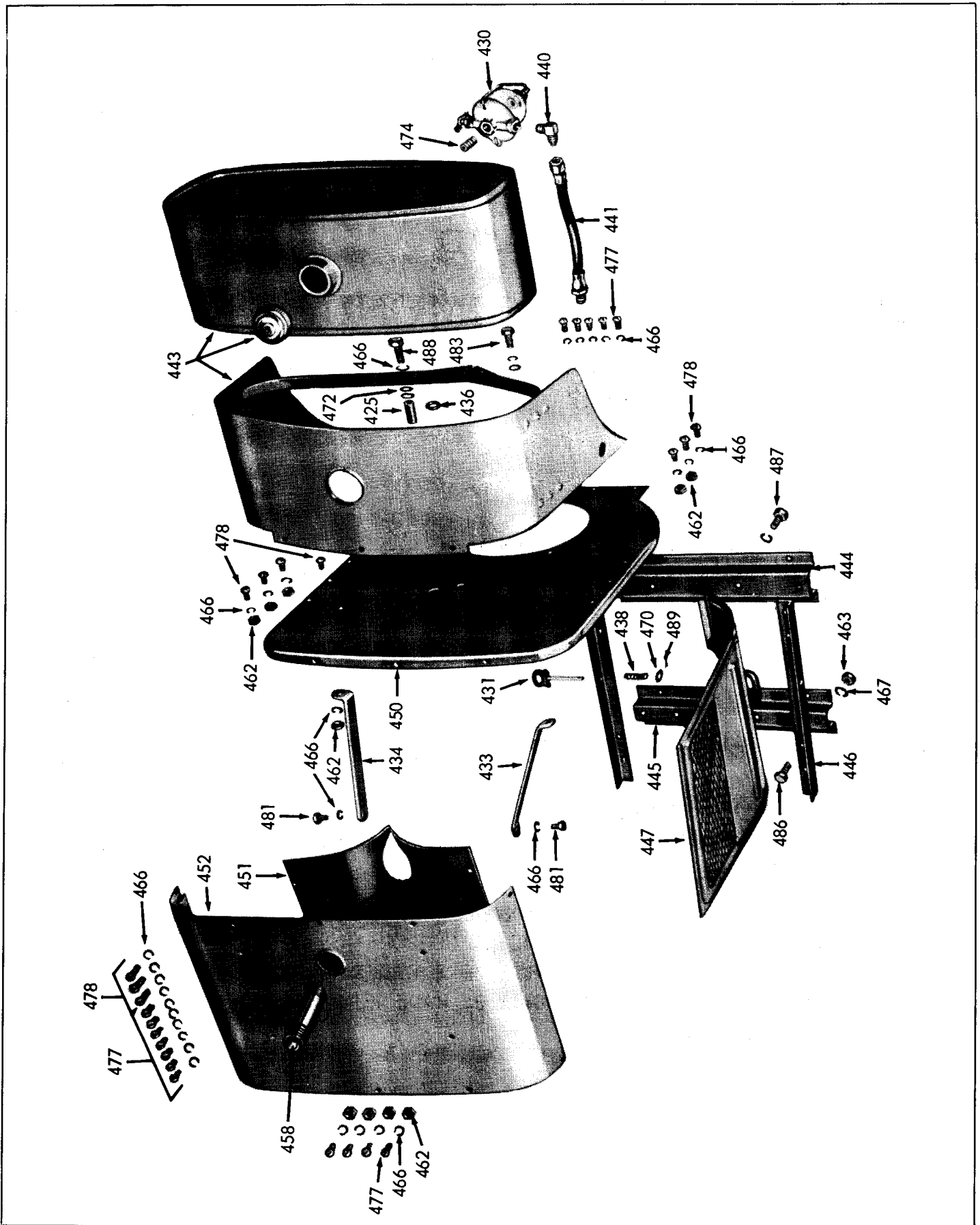
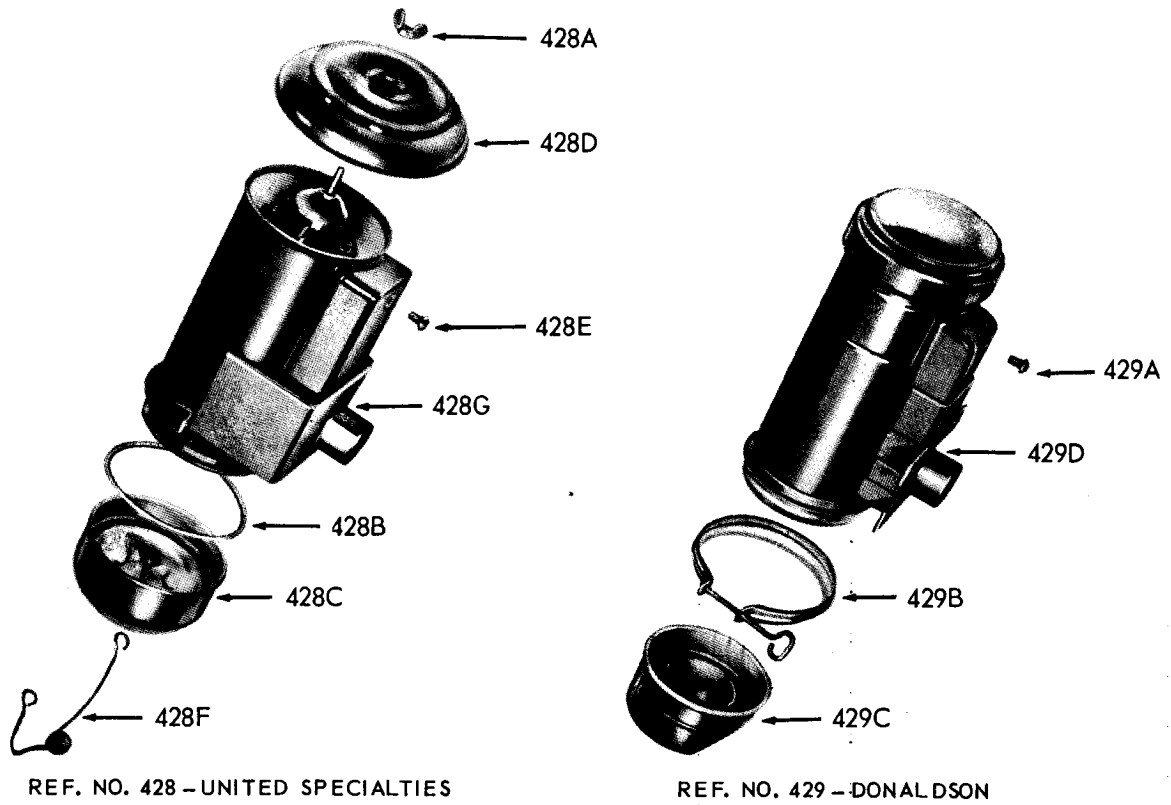


Fig. 61, ENGINE HOUSE WITH FUEL TANK AT TAKE-OFF END
 Parts are identified by reference number. See parts list for correct part number.

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VH4 ENGINE HOUSE WITH FUEL TANK AT TAKE-OFF END



OPTIONAL AIR CLEANERS

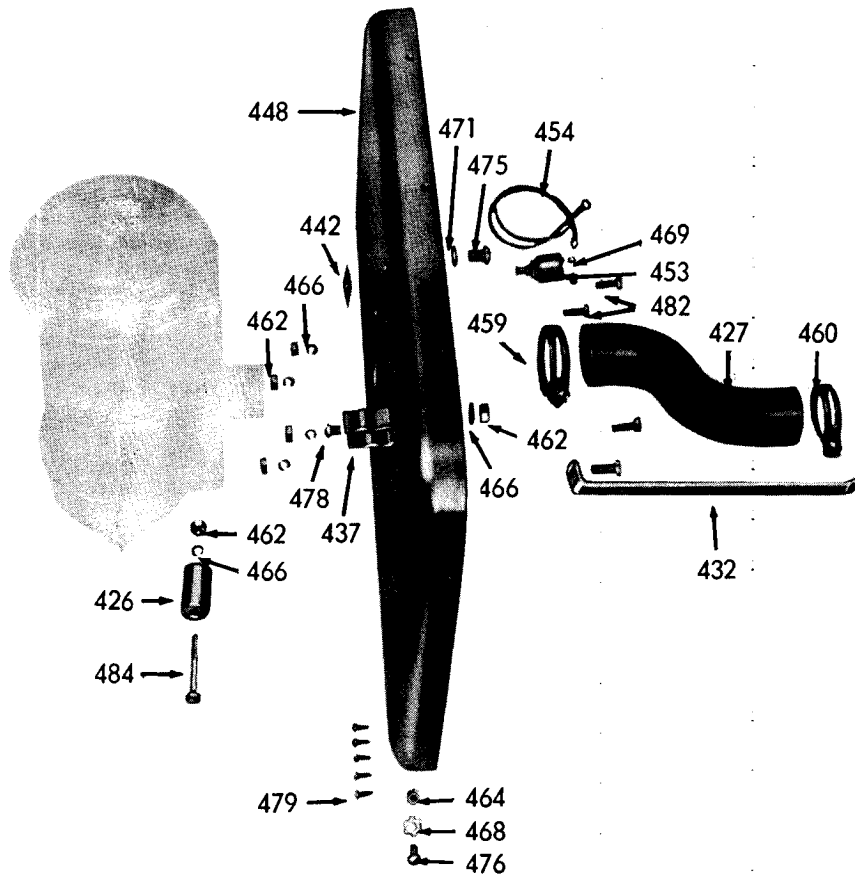


Fig. 62, END PANEL AND AIR CLEANER FOR ENGINE HOUSE WITH FUEL TANK AT TAKE-OFF END

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

164959C

222993C

VH4 ENGINE HOUSE WITH FUEL TANK AT 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
425	HF-380	SPACER for rear panel to cylinder block	1		1	446	WE-195	SIDE RAILS	2	1	8
426	HF-387	SPACER for crank mounting..... (Used only with LO-123 air cleaner).	1		3	447	WE-196	HOUSE DOORS (Standard)	2	4	8
427	LL-64	RUBBER ELBOW for air cleaner to carburetor	1		8			WE-196-F (Bumped out to clear distributor)..... For units with generator and distributor on left hand side of engine.	1	4	8
428	LO-123-S1	AIR CLEANER, United Specialties No. 47D1	1		6	448	WE-197	FRONT PANEL (Standard)	1	4	4
		Service parts: United Specialties Part Numbers.						WE-197-2 (With additional holes for switch and ammeter)	1	4	4
428A		A-1317 Wing nut	1		1			For units with electric starting.			
428B		A-9986 Gasket	1		1	450	WE-199-A	REAR PANEL	1	7	9
428C		335B1 Oil cup and baffle assembly	1		8	451	WE-345	PARTITION PLATE for canopy	1	1	14
428D		A-10713 Top cap assembly	1		6	452	WE-346	CANOPY	1	4	5
428E		A-10962 Screw, 5/16"-18 x 1/2" long	1		1	453	YC-9-F-S1	IGNITION SWITCH ASSEMBLY	1		2
428F		B-9982 Roller and bail assembly	1		3			Includes: SD-109 Tag and PE-72 L.W. YC-9-C, replaced by YC-9-F-S1.			
428G		C-10724 Body assembly (Less fittings)	1		5	454	YL-181	IGNITION WIRE, switch to magneto	1		1
								YL-63 and YL-258, replaced by YL-181.			
429	LO-120-S1	AIR CLEANER, Donaldson Co. No. FDA04-5780 (was No. A-4578)	1		4			STANDARD HARDWARE			
		Service parts: Donaldson Part Numbers.				458	LJ-175	NIPPLE, 1 1/4" x 8" long, W.I. pipe	1		1
429A		P-6658 Support screw	1		1			For muffler mounting.			
429B		P-9595 Oil cup clamp assembly	1		3	459	LK-8	HOSE CLAMP, 2-1/8" I.D.	1		1
429C		P-16457 Oil cup assembly	1		5			For air cleaner connection, cleaner end.			
429D		Body assembly—not serviced, order complete air filter.				460	LK-10	HOSE CLAMP, 2" I.D.	1		1
		NOTE: The VH4 power units may be equipped with either a 'United Specialties' or 'Donaldson' air cleaner as shown above.						For air cleaner connection, carburetor end.			
430	LP-19	FUEL STRAINER, Tillotson OW-418-T	1		12	462	PD-77	NUT, 1/4"-20 thread, hexagon steel	16		1
		NOTE: See illustration on Page 50 for service parts list of fuel strainer.						5-for tank support to rear panel.			
431	PG-323	DOOR CLIP	2		3			4-for air cleaner mounting.			
432	PG-799	HOUSE BRACE, flywheel end	1		8			4-for partition plate.			
433	PG-801	HOUSE BRACE, take-off end, R.H. side	1		4			1-for crank spacer. (Used with LO-123).			
434	PG-816	HOUSE BRACE, take-off end, L.H. side PG-800, replaced by PG-816.	1		6			1-for crank spring clip.			
436	PH-198	GROMMET for fuel line.....	1		1			1-for house brace, L.H. (T.O. end).			
437	PK-87	SPRING CLIP for crank mounting	1		1	463	PD-79	NUT, 3/8"-16 thread, hexagon steel.....	4		1
438	PM-137	SPRING for door clip	2		1			For side rails to engine supports.			
440	RF-1225	ELBOW for fuel strainer outlet	1		1	464	PD-115	NUT, No. 10-32 thread, hexagon steel..	2		1
		RF-270, replaced by RF-1225.						For front panel to side of shroud.			
441	RM-1049-A	FUEL LINE, tank to carburetor.....	1		2	466	PE-3	LOCKWASHER, 1/4" Positive	34		1
442	SD-109	TAG for ign. switch. "To Stop Push In". SD-108 "To Stop Pull Out" Tag. Replaced by SD-109 with YC-9-F switch.	1		1			10-for canopy.			
443	WE-192	FUEL TANK ASSEMBLY	1	17	2			5-for rear panel to engine support.			
		Consisting of:						6-for fuel tank support.			
		WE-192-9 Support and straps	1	10				4-for air cleaner mounting.			
		RC-77 Cap, Easy-on	1		2			4-for partition plate.			
		WE-192-4 Tank (Furnished with cap) ..	1		7			1-for crank spacer. (Used with LO-123).			
444	WE-193-A	ENGINE SUPPORT, take-off end	1	3	1			1-for crank spring cup.			
445	WE-194-A	ENGINE SUPPORT, flywheel end.....	1	2	9	467	PE-5	LOCKWASHER, 3/8" Positive.....	4		1
								For side rails to engine support.			

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

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

VH4 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
468	PE-45	LOCKWASHER, No. 10 External 'Everlock' for front panel to side of shroud....	2			1	487	XD-41	SCREW, 1/2"-13 thread x 1" long, hexagon head For engine supports to crankcase.	4			2
469	PE-72	LOCKWASHER, ignition switch terminal	1			1	488	XD-120	SCREW, 1/4"-20 thread x 3/4" long, hexagon head For rear panel to cylinder block, L.H. side.	1			2
470	PH-2	PLAIN WASHER, 7/16" I.D. x 1/16" thick steel, for door clip	2			1	489	XI-23	COTTER PIN, 1/8" x 3/4" long..... For door clip.	2			1
471	PH-77-A	PLAIN WASHER, 5/16" I.D. x 1/16" thick steel	1			1							
		For air cleaner support screw.											
472	PH-196	PLAIN WASHER, 1/4" I.D. x 1/16" thick steel	3			1							
		For rear panel to cylinderblock mounting.											
474	RF-794	NIPPLE, 1/8" x 1/4" long, close pipe.... For fuel strainer mounting.	1			1							
475		SCREW, 5/16"-18 thread x 1/2" long, round head	1			1							
		Furnished with air cleaner.											
476	XA-8	SCREW, No. 10-32 thread x 1/2" long, round head	2			1							
		For front panel to side of shroud.											
477	XA-33	SCREW, 1/4"-20 thread x 3/8" long, round head	16			1							
		7-for canopy mounting.											
		5-for for rear panel to engine support.											
		4-for partition plate.											
478	XA-34	SCREW, 1/4"-20 thread x 1/2" long, round head	11			1							
		6-for fuel tank support.											
		3-for canopy and tank support.											
		1-for crank spring clip.											
		1-for house brace, L.H. (T.O. end).											
479	XA-65	SCREW, No. 8 x 1/2" long, self-tapping, sheet metal	5			1							
		For front panel to shroud.											
481	XD-4	SCREW, 1/4"-20 thread x 1/2" long, hexagon head	2			1							
		For house braces to manifold.											
482	XD-6	SCREW, 1/4"-20 thread x 1/4" long, hexagon head	4			1							
		For mounting air cleaner.											
483	XD-7	SCREW, 1/4"-20 thread x 1" long, hexagon head	1			1							
		For rear panel to cylinder block, R.H. side.											
484	XD-11	SCREW, 1/4"-20 thread x 2" long, hexagon head	1			1							
		For mounting crank spacer to LO-123 air cleaner.											
486	XD-25	SCREW, 3/8"-16 thread x 1/4" long, hexagon head	4			1							
		For side rails to engine supports.											

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

VH4 ENGINE HOUSE WITH UNDERSLUNG FUEL TANK

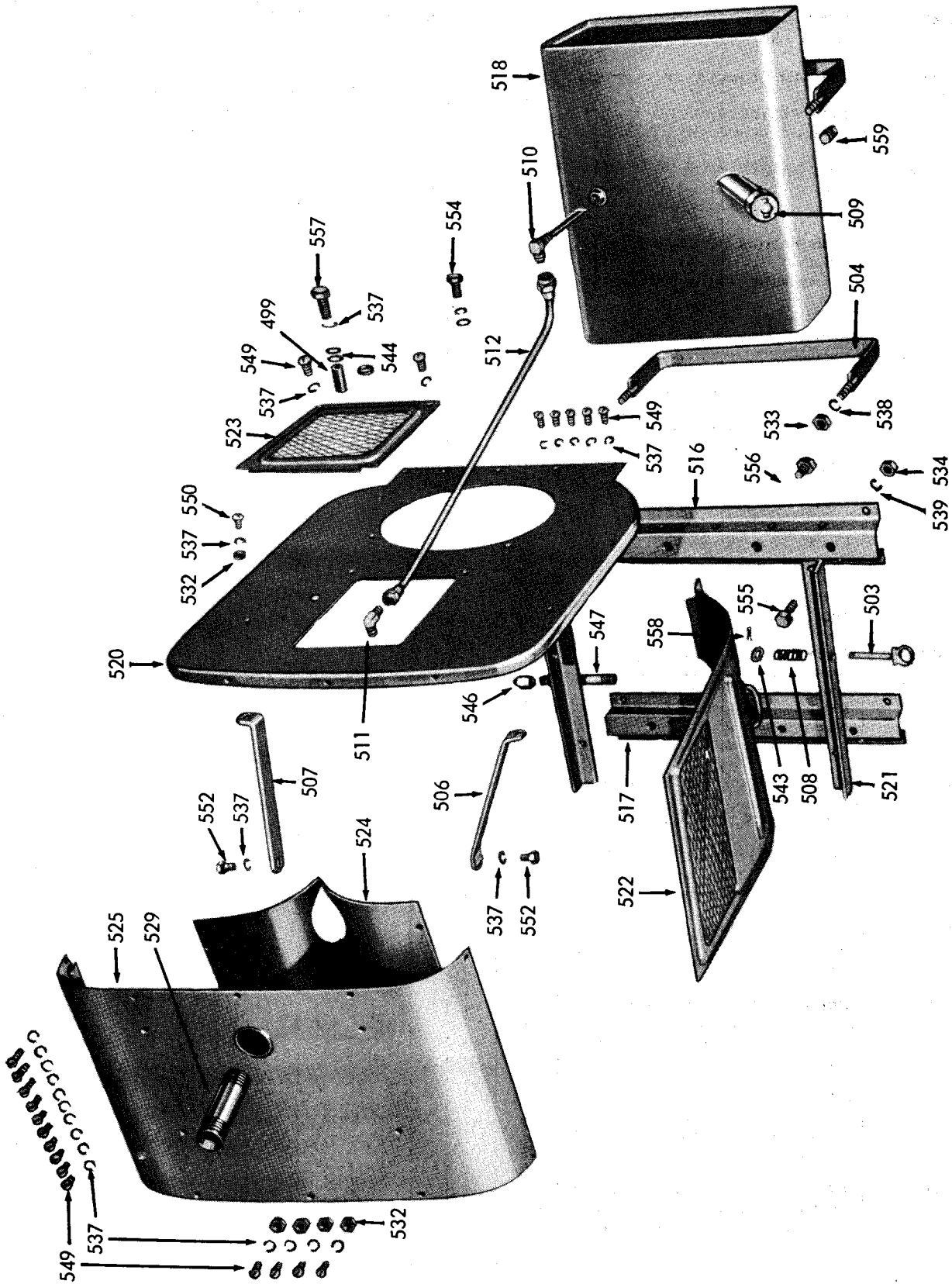
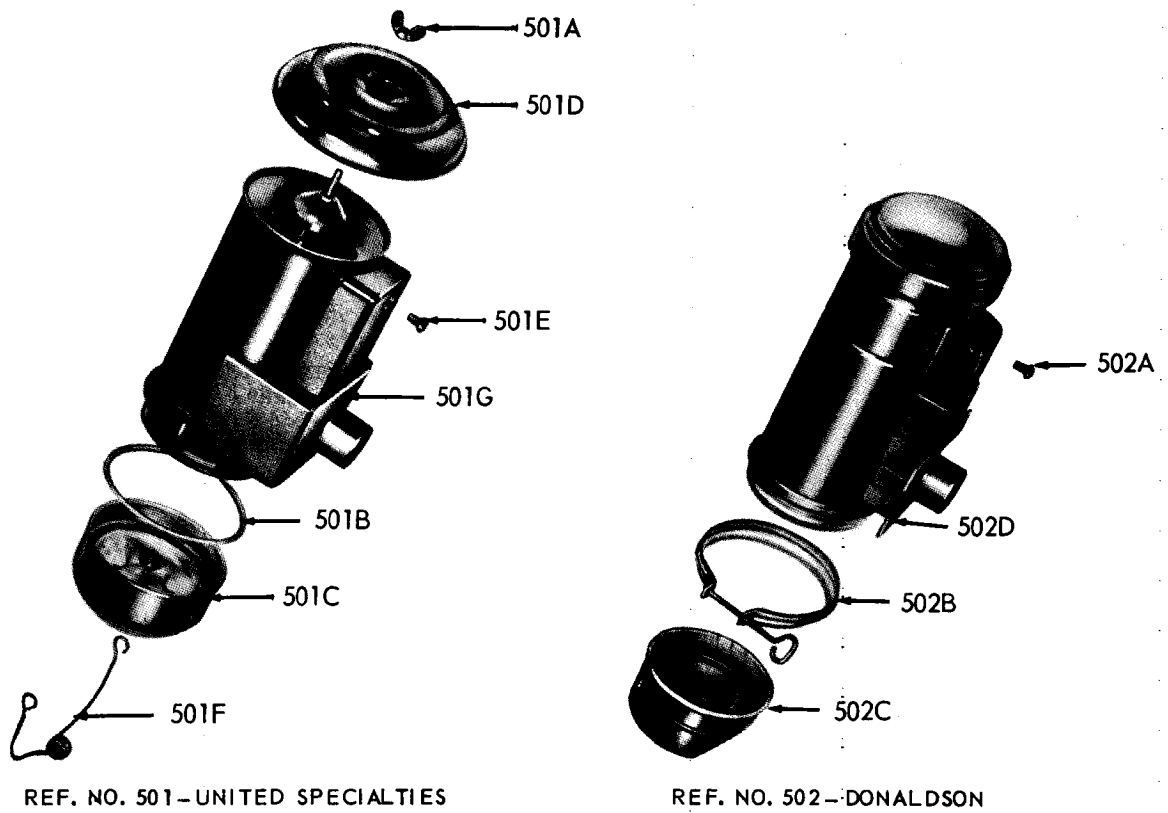


Fig. 63, ENGINE HOUSE WITH UNDERSLUNG FUEL TANK

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

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VH4 ENGINE HOUSE WITH UNDERSLUNG FUEL TANK



OPTIONAL AIR CLEANERS

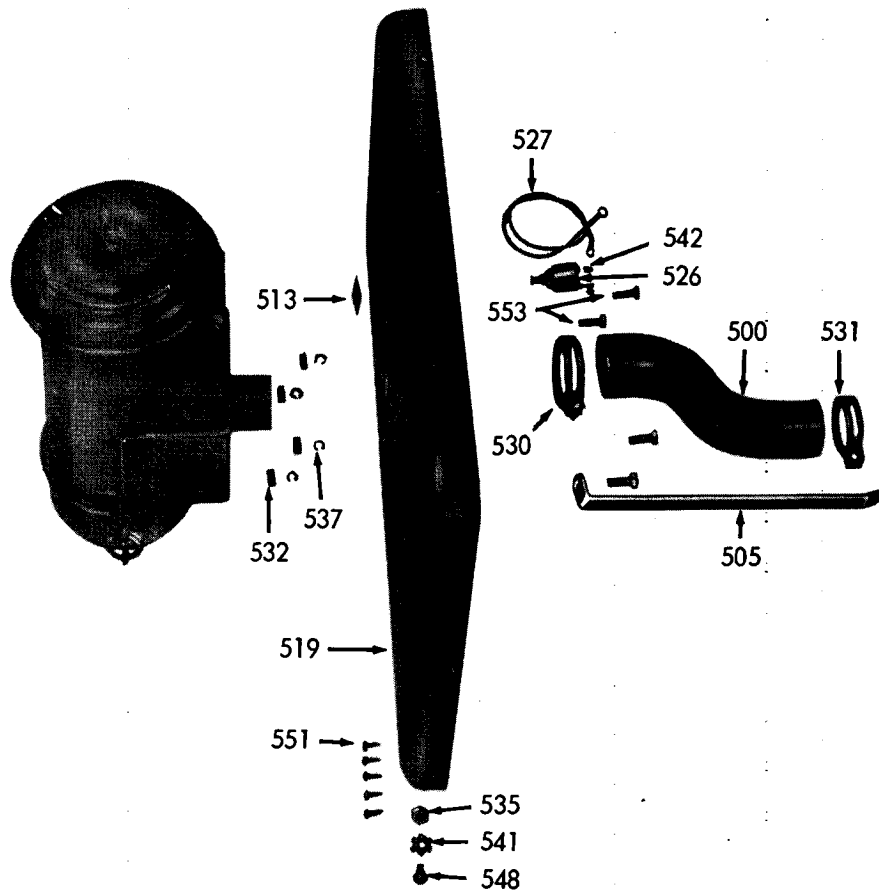


Fig. 64, END PANEL AND AIR CLEANER FOR ENGINE HOUSE WITH UNDERSLUNG FUEL TANK

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

VH4 ENGINE HOUSE WITH UNDERSLUNG FUEL TANK

Ref. No.	Part Number	Description	No. Req	Net Wt.		Ref. No.	Part Number	Description	No. Req	Net Wt.	
				Lb	Oz					Lb	Oz
499	HF-380	SPACER for rear panel to cylinder block	1		1	520	WE-207-A	REAR PANEL	1	5	10
500	LL-64	RUBBER ELBOW for air cleaner to carburetor	1		8	521	WE-208	SIDE RAIL	2	1	8
501	LO-123-S1	AIR CLEANER, United Specialties No. 47D1	1		6	522	WE-209	HOUSE DOOR..... WE-209-E (Bumped out to clear distributor) For units with generator and distributor on left hand side of engine.	2	3	11
		Service parts: United Specialties Part Numbers.							1	3	11
501A		A-1317 Wing nut	1		1	523	WE-211	COVER for rear panel	1		12
501B		A-9986 Gasket	1		1	524	WE-345	PARTITION PLATE for canopy	1	1	14
501C		335B1 Oil cup and baffle assembly....	1		8	525	WE-346	CANOPY	1	4	5
501D		A-10713 Top cap assembly	1		6	526	YC-9-F-S1	IGNITION SWITCH ASSEMBLY	1		2
501E		A-10962 Screw, 5/16"-18 x 1/2" long	1		1			Includes: SD-109 Tag and PE-72 L.W. YC-9-C, replaced by YC-9-F-S1.			
501F		B-9982 Roller and bail assembly	1		3	527	YL-181	IGNITION WIRE, switch to magneto	1		1
501G		C-10724 Body assembly (Less fittings)	1		5			YL-63 and YL-258, replaced by YL-181.			
502	LO-120-S1	AIR CLEANER, Donaldson Co. No. FDA04-5780 (was No. A-4578)	1		4			STANDARD HARDWARE			
		Service parts: Donaldson Part Numbers.				529	LJ-279	PIPE NIPPLE, 1/4" x 3/2" W.I.	1		8
502A		P-6658 Support screw	1		1			For muffler mounting.			
502B		P-9595 Oil cup clamp assembly	1		3	530	LK-8	HOSE CLAMP, 2-1/8" I.D.....	1		1
502C		P-16457 Oil cup assembly	1		5			For air cleaner connection, cleaner end.			
502D		Body assembly—not serviced, order complete air filter. NOTE: The VH-4 power units may be equipped with either a 'United Specialties' or 'Donaldson' air cleaner as shown above.				531	LK-10	HOSE CLAMP, 2" I.D.	1		1
503	PG-323	DOOR CLIP	2		3			For air cleaner connection, carburetor end.			
504	PG-329-B	STRAP for fuel tank with 2" corner radius PG-329-A for tank with 1-1/8" corner radius.	2	1	3	532	PD-77	NUT, 1/4"-20 thread, hexagon steel	10		1
505	PG-799	HOUSE BRACE, flywheel end	1		8			4-for air cleaner mounting. 4-for partition plate. 2-for house braces to panel, take-off end.			
506	PG-801	HOUSE BRACE, take-off end, R.H. side	1		4	533	PD-78	NUT, 5/16"-18 thread, hexagon steel....	4		1
507	PG-816	HOUSE BRACE, take-off end, L.H. side PG-800, replaced by PG-816.	1		6			For tank straps to engine supports.			
508	PM-137	SPRING for door clip	2		1	534	PD-79	NUT, 3/8"-16 thread, hexagon steel.....	4		1
509	RC-87	CAP for fuel tank	1		2			For side rails to engine supports.			
510	RM-1206-C	SUCTION TUBE ASSEMBLY in fuel tank	1		3	535	PD-115	NUT, No. 10-32 thread, hexagon steel ..	2		1
511	RF-1225	ELBOW for fuel pump inlet	1		2			For front panel to side of shroud.			
512	RM-900	FUEL LINE, tank to pump	1		6	537	PE-3	LOCKWASHER, 1/4" Positive	29		1
513	SD-109	TAG for ign. switch. "To Stop Push In". SD-108 "To Stop Pull Out" Tag. Replaced by SD-109 with YC-9-F switch.	1		1			10-for canopy. 4-for partition plate. 5-for rear panel to engine support. 2-for cover to rear panel. 4-for air cleaner mounting. 2-for house braces to panel, take-off end. 2-for house braces to manifold.			
516	WE-202-A	ENGINE SUPPORT, take-off end	1	4	10	538	PE-4	LOCKWASHER, 5/16" Positive	4		1
517	WE-203	ENGINE SUPPORT, flywheel end	1	3	9			For tank straps to engine supports.			
518	WE-204-S1	FUEL TANK with RC-87 cap and RM-1206C suction tube	1		9	539	PE-5	LOCKWASHER, 3/8" Positive.....	4		1
		WE-204A-S1 (Filler neck relocated) for units with electric starter and generator	1		9			For side rails to engine supports.			
519	WE-206	FRONT PANEL (Standard)	1	3	10	541	PE-45	LOCKWASHER, No. 10 External 'Everlock', for front panel to side of shroud	2		1
		WE-206-6 (With additional holes for switch and ammeter)	1	3	10	542	PE-72	LOCKWASHER, ignition switch terminal	1		1
		For units with electric starting.				543	PH-2	PLAIN WASHER, 7/16" I.D. x 1/16" thick steel, for door clip.....	2		1

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

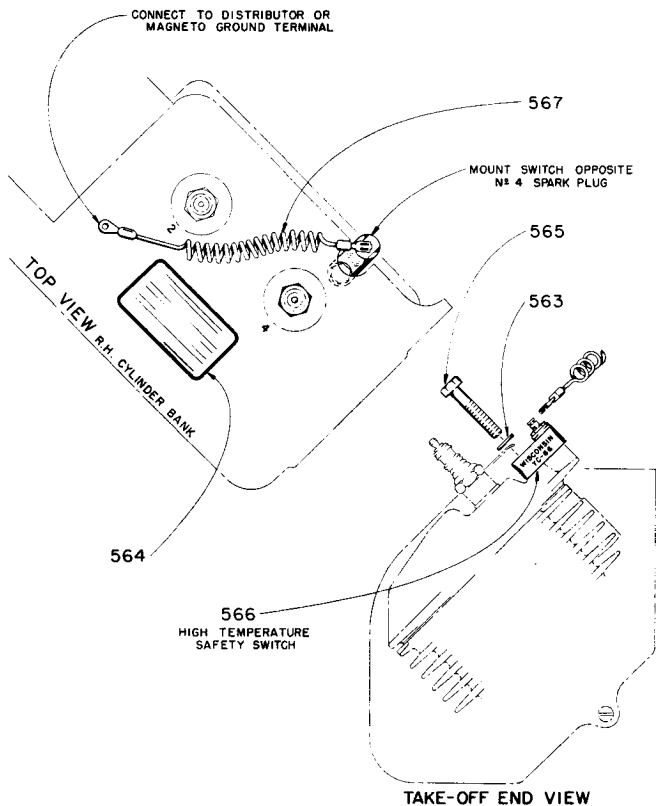
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

VH4 ENGINE HOUSE WITH UNDERSLUNG FUEL TANK

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
544	PH-196	PLAIN WASHER, 1/4" I.D. x 1/16" thick steel..... For rear panel to cylinder block mounting.	3	1	
546	RF-937	COUPLING, 3/8" W.I. pipe For oil drain pipe.	1	2	
547	RF-1086-A	NIPPLE, W.I. pipe..... For oil drain.	1	4	
548	XA-8	SCREW, No. 10-32 thread x 1/2" long, round head..... For front panel to side of shroud.	2	1	
549	XA-33	SCREW, 1/4"-20 thread x 3/8" long, round head..... 10-for canopy. 4-for partition plate. 5-for rear panel to engine support. 2-for cover to rear panel.	21	1	
550	XA-34	SCREW, 1/4"-20 thread x 1/2" long, round head For house braces to panel, take-off end.	2	1	
551	XA-65	SCREW, No. 8 x 1/2" long, self-tapping, sheet metal, for front panel to shroud....	5	1	
552	XD-4	SCREW, 1/4"-20 thread x 1/2" long, hexagon head For house braces to manifold.	2	1	

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
553	XD-6	SCREW, 1/4"-20 thread x 3/4" long, hexagon head For air cleaner mounting.	4	1	
554	XD-7	SCREW, 1/4"-20 thread x 1" long, hexagon head For rear panel to cylinder block, R.H. side.	1	1	
555	XD-25	SCREW, 3/8"-16 thread x 3/4" long, hexagon head For side rails to engine supports.	4	1	
556	XD-41	SCREW, 1/2"-13 thread x 1" long, hexagon head For engine supports to crankcase.	4	2	
557	XD-120	SCREW, 1/4"-20 thread x 3/4" long, hexagon head For rear panel to cylinder block, L.H. side.	1	2	
558	XI-23	COTTER PIN, 1/8" x 3/4" long..... For door clip.	2	1	
559	XK-1	PLUG, 1/8" square head pipe For fuel tank drain.	1	1	

YC-66-S9 HIGH TEMPERATURE SAFETY SWITCH KIT

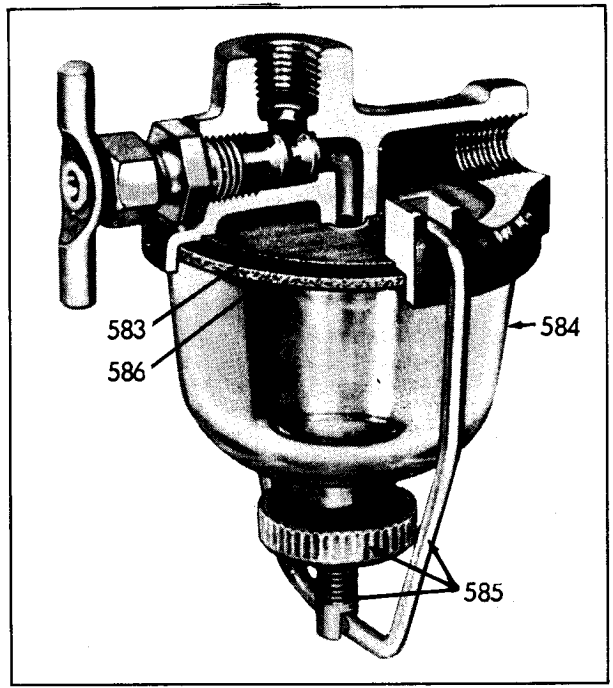
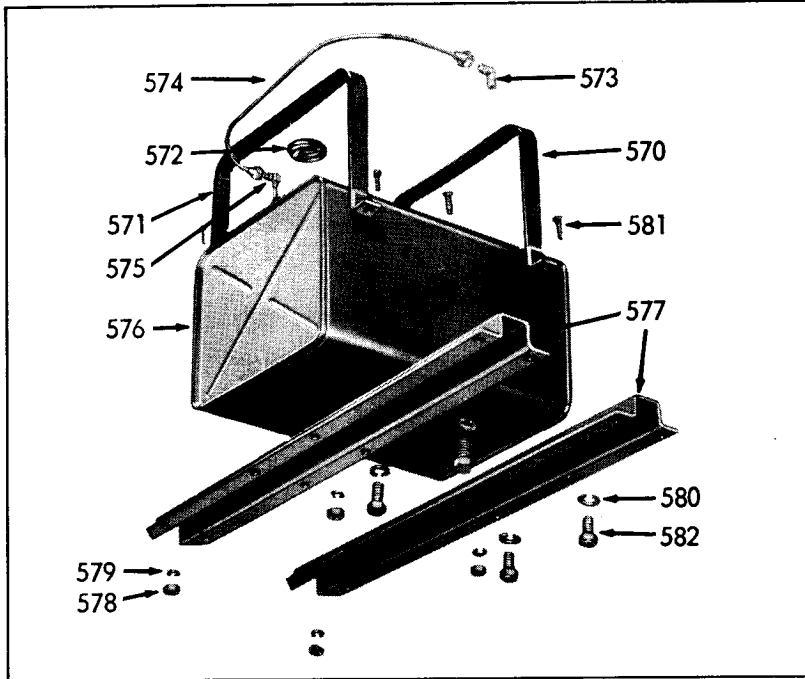


Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
	YC-66-S9	HIGH TEMPERATURE SAFETY SWITCH KIT - Complete Consisting of:		8	
563	PH-77	WASHER, 5/16" I.D., plain steel..... For switch to cylinder head mounting.	1	1	
564	SD-233	INSTRUCTION DECAL	1	1	
565	XD-23	CAPSCREW, 5/16"-18 thread x 2" long, hexagon head For switch to cylinder head mounting.	1	1	
566	YC-66	HIGH TEMPERATURE SAFETY SWITCH..... For replacement, order YC-66-S9 Kit.	1	3	
567	YL-226-A	WIRE ASSEMBLY, 41" long, with terminals. Interchangeable for all engine models.	1	1	

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

**SIDE MOUNT FUEL TANK
FOR VH4 ENGINE**

FUEL STRAINER ASSEMBLIES



104724C

Fig. 65

74918C

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
570	PG-321	STRAP for fuel tank.....	2	1	
571	PH-244-A	FELT for fuel tank strap.....	2		2
572	RC-77	CAP for fuel tank.....	1		3
573	RF-1225	ELBOW for fuel line, in fuel strainer	1		1
574	RM-1161	FUEL LINE from tank to fuel strainer (22½" long)	1		4
		RM-822 for engines with electric starter (26½" 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	1		7
		With RC-77 cap and RM-1206-B suction tube.			
577	WE-188	ENGINE SUPPORT	2	4	11
		WE-188D for engines with electric starter		5	4
STANDARD HARDWARE					
578	PD-79	NUT, 3/8"-16 thread, hexagon steel	4		1
		For fuel tank straps to supports.			
579	PE-5	LOCKWASHER, 3/8" Positive	4		1
		For fuel tank straps to supports.			
580	PE-7	LOCKWASHER, 1/2" Positive	4		1
		For engine supports to crankcase.			
581	XD-27	SCREW, 3/8"-16 thread x 1" long, hexagon head	4		1
		For fuel tank straps to supports.			
582	XD-41	SCREW, 1/2"-13 thread x 1" long, hexagon head	4		2
		For engine supports to crankcase.			

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
	LP-19	FUEL STRAINER ASSEMBLY.....	1		8
		(With Shut-off valve in cover, and glass bowl) Tillotson No. OW-418-T.			
	LP-19-A	FUEL STRAINER ASSEMBLY.....	1		7
		(With Shut-off valve in cover, and metal bowl) Tillotson No. OW-449-T.			
	LP-19-B	FUEL STRAINER ASSEMBLY.....	1		6
		(Without Shut-off valve in cover, and glass bowl) Tillotson No. OW-444.			
	LP-19-C	FUEL STRAINER ASSEMBLY.....	1		5
		(Without Shut-off valve in cover, and metal bowl) Tillotson No. OW-476-T.			
The following serviceable parts are interchangeable for all the above fuel strainers.					
583	OW-352	FILTER SCREEN.....	1		1
584	OW-363	GLASS BOWL	1		2
	06137	METAL BOWL	1		1
585	OW-447	CLAMP WIRE and THUMB NUT ASSEMBLY	1		1
586	06096	BOWL GASKET (Wisconsin No. QD-653)	1		5

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

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

SIDE MOUNT AIR CLEANER FOR VH4 ENGINE

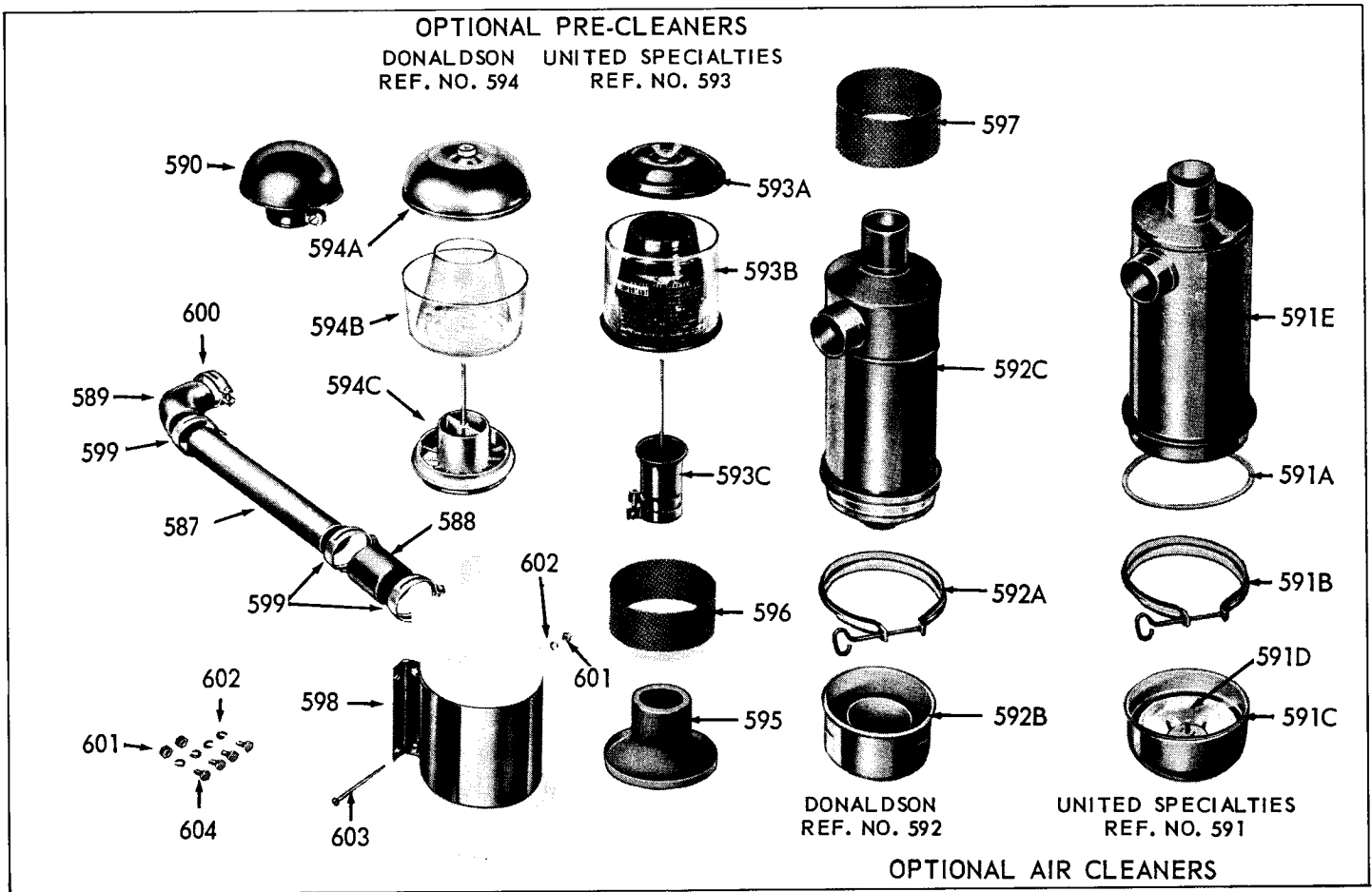


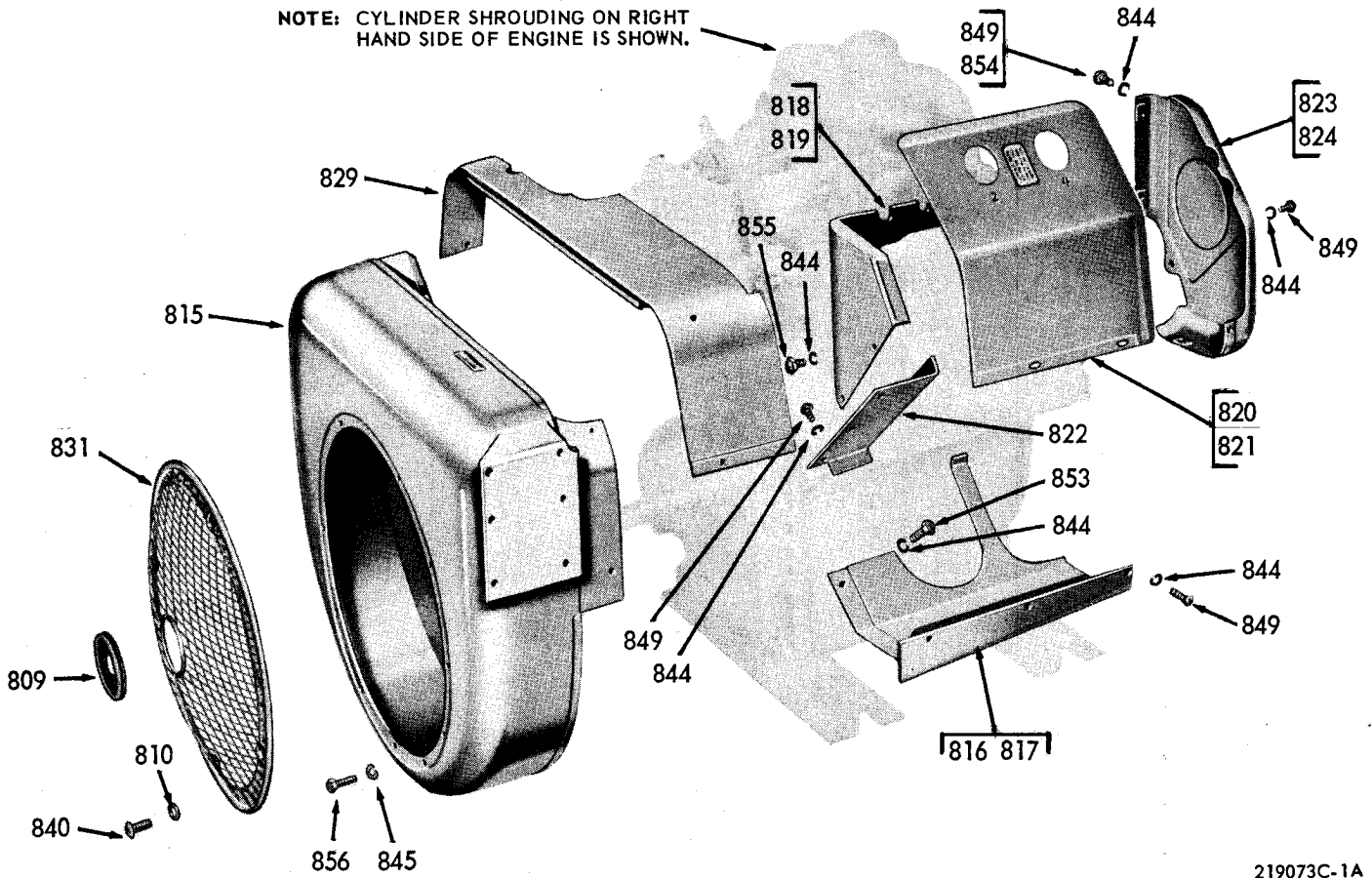
Fig. 66

222996C-1

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
587	LJ-120	TUBE for air cleaner to carburetor elbow	1	1	1	594	LO-114	PRE-CLEANER, collector type	1	1	8
588	LL-27	RUBBER HOSE for air cleaner tube	1		2			Donaldson Co. No. PBH00-0215.			
589	LL-67	RUBBER ELBOW for air cleaner tube	1		4			Service parts: Donaldson Part Numbers.			
590	LO-96	STACK CAP for air cleaner	1		12	594A	P-20116	Cover assembly	1		4
	LO-86	STACK CAP for air cleaner United Specialties No. 6B9.			10	594B	P-20115	Body	1		4
		Donaldson Co. No. GAX00-2017.				594C	P-20120	Sleeve assembly	1	1	
591	LO-121-S1	AIR CLEANER, United Specialties No. 45D4	1	3	12	595	LO-133	BASE for United Spec. pre-screener	1		4
		Service Parts: United Specialties Part Numbers.				596	LO-134	PRE-SCREENER for LO-109 pre-cleaner	1		2
591A		615A6 Gasket	1		1	597	LO-147-A	PRE-SCREENER for LO-114 pre-cleaner and LO-119A-S1 Donaldson cleaner.	1		4
591B		214B1K011 Clamp assembly	1		2						
591C		496B1K111 Oil cup (order baffle separately)	1		6	598	PG-291	STRAP (4-3/8" Inside Diameter) For mounting air cleaner.	1	1	
591D		415B1K11 Baffle	1		3						
591E		311C2K011 Body assembly (less fittings)	1		3						
592	LO-119A-S1	AIR CLEANER (2-5/8" long neck) Donaldson Co. No. FDA04-5791. LO-119 (1 1/2" neck), repl'd. by LO-119A-S1.	1	3	12						
		Service parts: Donaldson Part Numbers.									
592A		P-2846 Clamp assembly	1		3						
592B		P-14818 Oil cup assembly	1		5						
592C		Body assembly—not serviced, order complete air cleaner.									
		NOTE: The VH4 open engines may be equipped with either a 'United' or 'Donaldson' air cleaner and pre-cleaner.									
593	LO-109	PRE-CLEANER, collector type	1	1	12						
		United Specialties No. S-50-B16420.									
593A		A-16380 Cap assembly	1		4	599	LK-8	HOSE CLAMP, 2-1/8" I.D. For air cleaner connections.	3		2
593B		B-16382 Body assembly	1	1		600	LK-10	HOSE CLAMP, 2" I.D. For air cleaner elbow, carburetor end.	1		2
593C		A-16370 Sleeve assembly	1		8	601	PD-77	NUT, 1/4"-20 thread, hexagon steel For air cleaner strap mounting.	4		1
						602	PE-3	LOCKWASHER, 1/4" Positive For air cleaner strap mounting.	6		1
						603	XA-74	SCREW, 1/4"-20 thread x 2 1/4" long, round head, for air cleaner strap clamping.	2		1
						604	XD-4	SCREW, 1/4"-20 thread x 1/2" long, hexagon head, for strap to shroud.	4		1

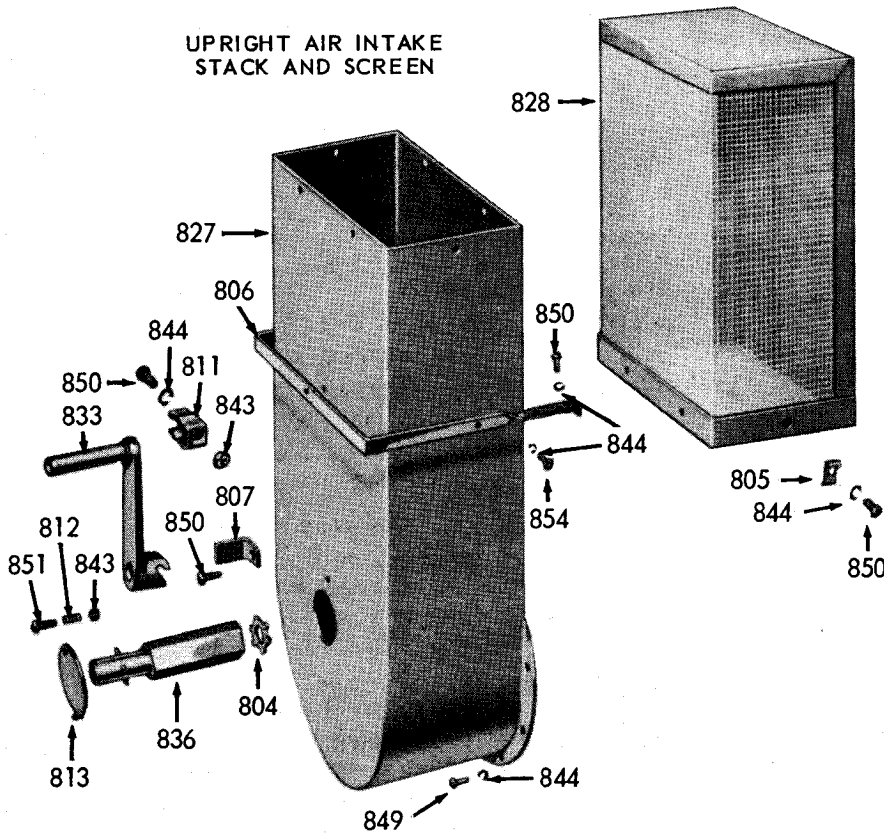
Order parts from nearest **SERVICE STATION** shown in directory following parts list.
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

NOTE: CYLINDER SHROUDING ON RIGHT
HAND SIDE OF ENGINE IS SHOWN.

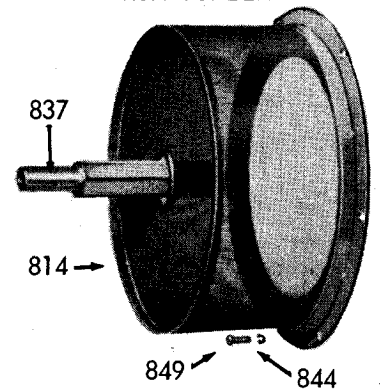


219073C-1A

UPRIGHT AIR INTAKE
STACK AND SCREEN



DRUM SCREEN



219074C

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

AGRICULTURAL SHROUDING, ROTATING SCREEN, UPRIGHT AIR INTAKE STACK AND DRUM SCREEN FOR VH4 ENGINE

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
804	PE-62-1	LOCKWASHER for starting crank nut, with air intake stack or drum screen	1		1	823	SE-82-C-8	REAR SHROUD COVER ASSEMBLY, L.H. side	1	1	2
805	PG-315	CLIP for air intake screen.....	6		1			Consisting of:			
806	PG-325-A	SUPPORT STRAP for air intake stack	1	1	1			PM-128 Spring for cleanout cover ...	1		1
807	PG-481	BRACKET for crank support.....	1		3			SA-76 Cleanout cover	1		4
809	PH-426	GROMMET for center hole in rotating screen	1		1			SE-82C-2 Shroud (not serviced sep.)..	1		11
810	PH-442	WASHER (Rubber faced)	5		1	824	SE-83-C-12	REAR SHROUD COVER ASSEMBLY, R.H. side	1	1	2
		For mounting rotating screen.						Consisting of:			
811	PK-87	SPRING CLIP for crank support.....	1		1			PM-128 Spring for cleanout cover ...	1		1
812	PM-4	SPRING for crank hole cover	1		1			SA-76 Cleanout cover	1		4
813	SA-56	COVER for crank hole in air stack.....	1		2			SE-83C-3 Shroud (not serviced sep.)..	1		11
814	SE-20-D	DRUM TYPE INTAKE SCREEN	1		5			XJ-49 Rivet.....	1		1
815	-----	FLYWHEEL AIR SHROUD	1		12	827	SE-99-B	AIR INTAKE STACK	1	10	5
		NOTE: Because of the variations in flywheel shrouds with pads for mounting starter, air cleaner, stack and etc., order by giving engine Model, Specification and Serial Numbers.				828	SE-100	AIR INTAKE SCREEN for air stack	1	6	4
816	SE-75-B	LOWER CYLINDER SHROUD, R.H. side	1		14	829	SE-102	DUST SHIELD for flywheel shroud	1	1	
817	SE-76-B	LOWER CYLINDER SHROUD, L.H. side	1		12	831	SE-204-C-51	ROTATING SCREEN KIT	1	1	
		NOTE: Beginning with engine Serial No. 3188328, the cylinder head covers, Ref. No's. 820 and 821, have the bale wire spring removed, and thus the standard cylinder heat deflectors, Ref. No's. 818 and 819 are used.						Consisting of:			
818	SE-77-C	CYLINDER HEAT DEFLECTOR, L.H. side	1		12			1 PH-426 Grommet			
		SE-77C-2 Deflector with VE-481 Pin, replaced by SE-77-C.				833	U-212-A	STARTING CRANK for engines with intake stack and rotating screen	1	2	
819	SE-77-D	CYLINDER HEAT DEFLECTOR, R.H. side	1		14			Use Std. U-212 crank for engines with drum screen,			
		SE-77D-1 Deflector with VE-481 Pin, replaced by SE-77-D.				836	UC-73-G-S1	STARTING CRANK NUT ASSEMBLY ..	1	2	
820	SE-78-D-6	CYLINDER HEAD COVER, R.H. side ..	1		14			For engines with intake stack.			
		SE-78D-1 Cover Assembly, replaced by SE-78D-6.						Consisting of:			
		SE-78D-1 consisted of:		1				PA-333 Pin	1		
		PG-388 Clip for spring	1		1			UC-73-G Nut (7-3/16" long)	1		
		PK-120 Spring.....	1		1	837	UC-73-J-S1	STARTING CRANK NUT ASSEMBLY ..	1	2	4
		SE-78-D Cover	1		13			For engines with drum screen.			
		XJ-46 Rivets for clip	2		1			Consisting of:			
821	SE-79-D-5	CYLINDER HEAD COVER, L.H. side..	1		14			PA-333 Pin	1		
		SE-79D-1 Cover Assembly, replaced by SE-79D-5.				840	XA-104	LOK-THREAD SCREW.....	5		1
		SE-79D-1 consisted of:		1				For rotating screen mounting.			
		PG-388 Clip for spring	1		1			STANDARD HARDWARE			
		PK-120-A Spring.....	1		1	843	PD-77	NUT, 1/4"-20 thread, hexagon steel.....	2		1
		SE-79-D Cover	1		13			1-for crank mounting spring clip.			
		XJ-46 Rivets for clip	2		1			1-for crank hole cover.			
822	SE-80	SIDE COVER for flywheel shroud	1		4	844	PE-3	LOCKWASHER, 1/4" Positive.....	49		1
								4-for air intake stack mounting.			
								25-for air shrouding.			
								1-for crank support spring clip.			
								7-for air intake support strap.			
								6-for air intake screen.			
								6-for drum screen.			

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

**AGRICULTURAL SHROUDING, ROTATING SCREEN, UPRIGHT AIR INTAKE STACK AND DRUM SCREEN
FOR VH4 ENGINE**

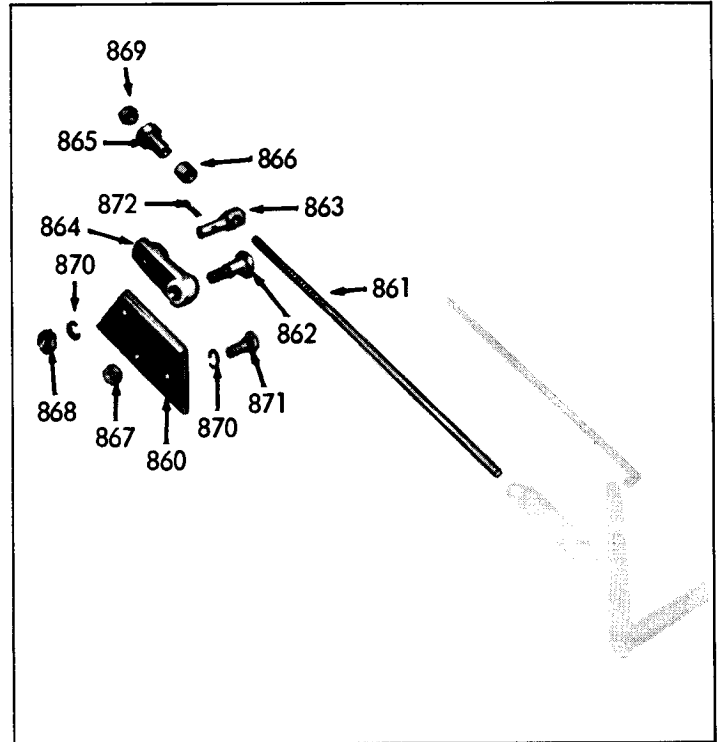
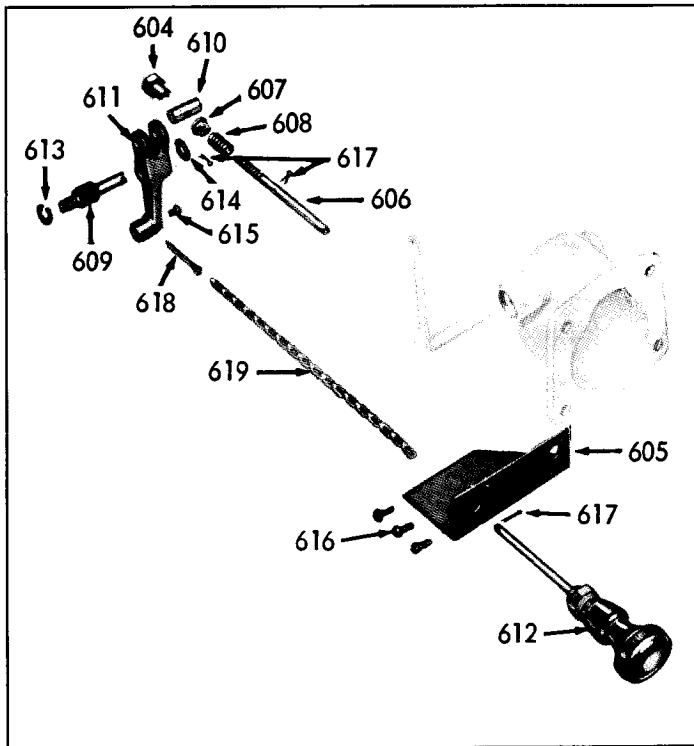
Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
845	PE-4	LOCKWASHER , 5/16" Positive For flywheel shroud to gear cover.	6		1
849	XA-33	SCREW , 1/4"-20 thread x 3/8" long, round head 3-for air intake stack. 4-for lower cylinder shroud, L & R side 2-for cylinder heat deflector, R.H. side 6-for cylinder head shrouds. 3-for air shroud side cover. 2-for rear shroud cover. 6-for drum screen.	26		1
850	XA-34	SCREW , 1/4"-20 thread x 1/2" long, round head 2-for crank bracket and spring clip. 6-for air intake screen. 4-for air intake support screen.	12		1
851	XA-35	SCREW , 1/4"-20 thread x 5/8" long, round head For crank hole cover.	1		1
853	XD-3	SCREW , 1/4"-20 thread x 3/8" long, hexagon head For lower cylinder shrouds.	4		1
854	XD-4	SCREW , 1/4"-20 thread x 1/2" long, hexagon head 2-for cylinder heat deflector to rear cover (L.H. side). 3-for intake support strap.	5		1
855	XD-6	SCREW , 1/4"-20 thread x 3/4" long, hexagon head For cylinder heat deflectors to cylinder block.	3		1
856	XD-13	SCREW , 5/16"-18 thread x 1/2" long, hexagon head For mounting flywheel shroud.	6		1
858	XJ-46-A	RIVET , 9/64" dia. x 3/16" long, tubular steel (not illustrated)..... For mounting instruction plate to R.H. cylinder head cover.	4		1

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

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

**TT-45-D-1
IDLE CONTROL ASSEMBLY**

FOR VH4 ENGINE



104568C-1

Fig. 68

223371C

Ref. No.	Part Number	Description	No. Net Wt.		
			Req	Lb	Oz
	TT-45-L	GOVERNOR CONTROL ASSEMBLY – for open engine	1	1	
	TT-45-L-1	GOVERNOR CONTROL ASSEMBLY – for power unit	1	1	
		NOTE: The following parts are identical on both the above assemblies, except PG-342 bracket is not furnished on TT-45L-1 assembly.			
604	PD-173-A	LOCKNUT for adjusting screw	1	1	
605	PG-342	BRACKET for governor and choke control	1	4	
606	PI-115-E	ADJUSTING SCREW	1	2	
607	PK-121	RETAINER for adjusting screw spring ..	1	1	
608	PM-111-1	SPRING for adjusting screw	1	1	
609	TC-365	PIN for variable speed lever support.....	1	1	
610	TC-368-A	PIN for adjusting screw swivel	1	1	
611	VB-134-A	VARIABLE SPEED LEVER	1	4	
612	VE-527-W	CONTROL	1	8	
		STANDARD HARDWARE			
613	PE-3	LOCKWASHER, 1/4" Positive	1	1	
		For support pin.			
614	PH-77	PLAIN WASHER, 5/16" I.D. x 5/8" O.D. x 1/16" thick steel.....	1	1	
		For variable speed lever.			
615	XA-62	SCREW, 8-32 thread x 1/4" long, round head	1	1	
		For cotter pin in lever.			
616	XA-65	SCREW, 8 x 1/2" long, self-tapping, sheet metal. For control bracket	3	1	
617	XI-1	COTTER PIN, 1/16" x 1/2" long	3	1	
		1-for variable speed lever pin. 1-for adjusting screw spring. 1-for chain at control.			
618	XI-11	COTTER PIN, 3/32" x 1 1/4" long	1	1	
		For chain at lever.			
619		No. 1/0 GALVANIZED SAFETY CHAIN 8 3/4" long. For control to lever.	1 pc	1	

Ref. No.	Part Number	Description	No. Net Wt.		
			Req	Lb	Oz
860	PG-348-A	BRACKET for control lever	1	2	
861	PI-145-B	ADJUSTING SCREW	1	2	
862	TC-380	FULCRUM PIN for control lever	1	1	
863	TC-381	PIN for adjusting screw	1	1	
864	VB-142-5	IDLE CONTROL LEVER	1	4	
865	VE-452-A	CONTROL ROD HEAD	1	2	
866	VE-657	CONTROL ROD NUT	1	1	
		STANDARD HARDWARE			
867	HF-390	WASHER, 9/32" I.D. x 5/8" O.D. x 1/8" thick steel	1	1	
		For mounting bracket.			
868	PD-77	NUT, 1/4"-20 thread, hexagon steel.....	1	1	
		For fulcrum pin.			
869	PD-115	NUT, No. 10-32 thread, hexagon steel	1	1	
		For control rod head.			
870	PE-3	LOCKWASHER, 1/4" Positive	2	1	
		1-for fulcrum pin. 1-for bracket mounting.			
871	XD-4	SCREW, 1/4"-20 thread x 1/2" long, hexagon head	1	1	
		For bracket mounting.			
872	XI-1	COTTER PIN, 1/16" x 1/2" long	1	1	
		For adjusting screw pin.			

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

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

ELECTRIC STARTER, GENERATOR AND DISTRIBUTOR IGNITION FOR VH4D ENGINE

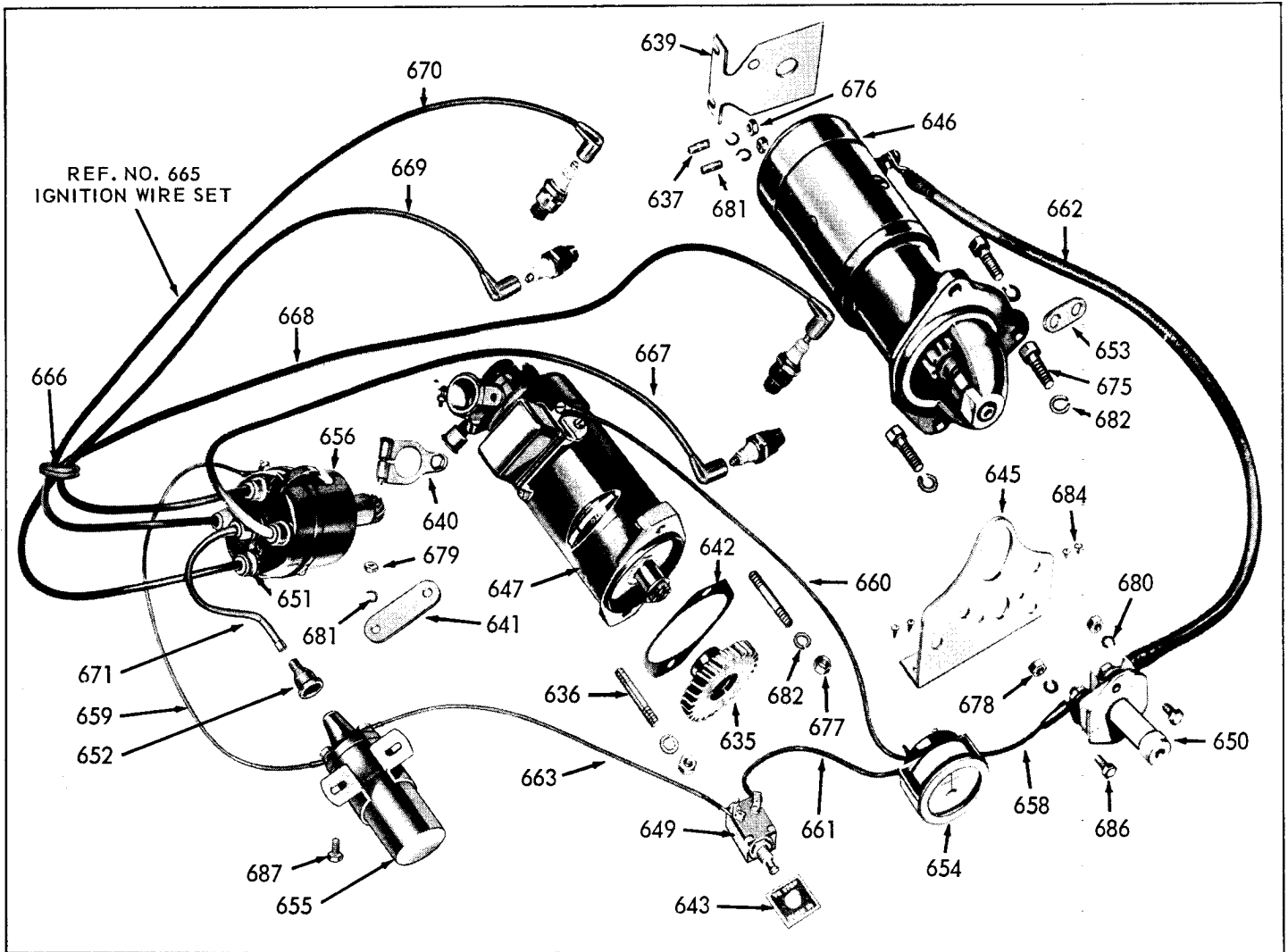


Fig. 69

219075C-1

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
635	GD-97-C	DRIVE GEAR for generator GD-97-A, replaced by GD-97-C.	1		8
636	PC-110	STUD for generator mounting	2	1	
637	PC-396	STUD for starter bracket	2	1	
639	PG-514-A-1	BRACKET, starter support	1	6	
640	PG-543-A	ADVANCE ARM ASSEMBLY	1	3	
		For distributor, Prestolite IG-2860-A3.			
641	PG-791	SUPPORT PLATE for ignition coil	1	1	
642	QD-616	GASKET for mounting generator	1	1	
643	SD-109	TAG for ignition switch	1	1	
		"To Stop Push In".			
645	VE-439-D	CONTROL PANEL	1	8	
		VE-439, replaced by VE-439-D.			
646	YA-19-3-S1	ELECTRIC STARTER (6 volt), Presto- lite No. MZ-4192 (was MZ-4184)	1	18	8
	Optional				
	YA-18-3-S1	ELECTRIC STARTER (12 volt), Presto- lite No. MBG-4109 (was MBG-4024) ...	18		8

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
		NOTE: For electric starter service parts, refer to illustration immediately following this parts list.			
647	YB-16-E	GENERATOR (6 volt), Prestolite No. GAS-4306, with cut-out	1	15	6
	Optional				
	YB-16-G	GENERATOR (12 volt), Prestolite No. GDY-4115N with cut-out relay			
		YB-16-C Prestolite No. GAS-4303 with two charge regulator, repl'd by YB-16-E.			
		YB-16-G Neg. Gr. replaced YB-16-F Pos. Gr.			
		NOTE: For generator service parts, refer to illustration immediately following this parts list.			
649	YC-9-B-S1	IGNITION SWITCH ASSEMBLY	1	2	
		Includes: SD-109 Tag 2, PE-72 Lockwashers			
650	YC-10-C	STARTING SWITCH	1	4	
		YC-10, replaced by YC-10-C.			
651	YD-20	TERMINAL CAP for ignition wires	5	1	
652	YD-20-A	TERMINAL CAP at coil wire	1	1	

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

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

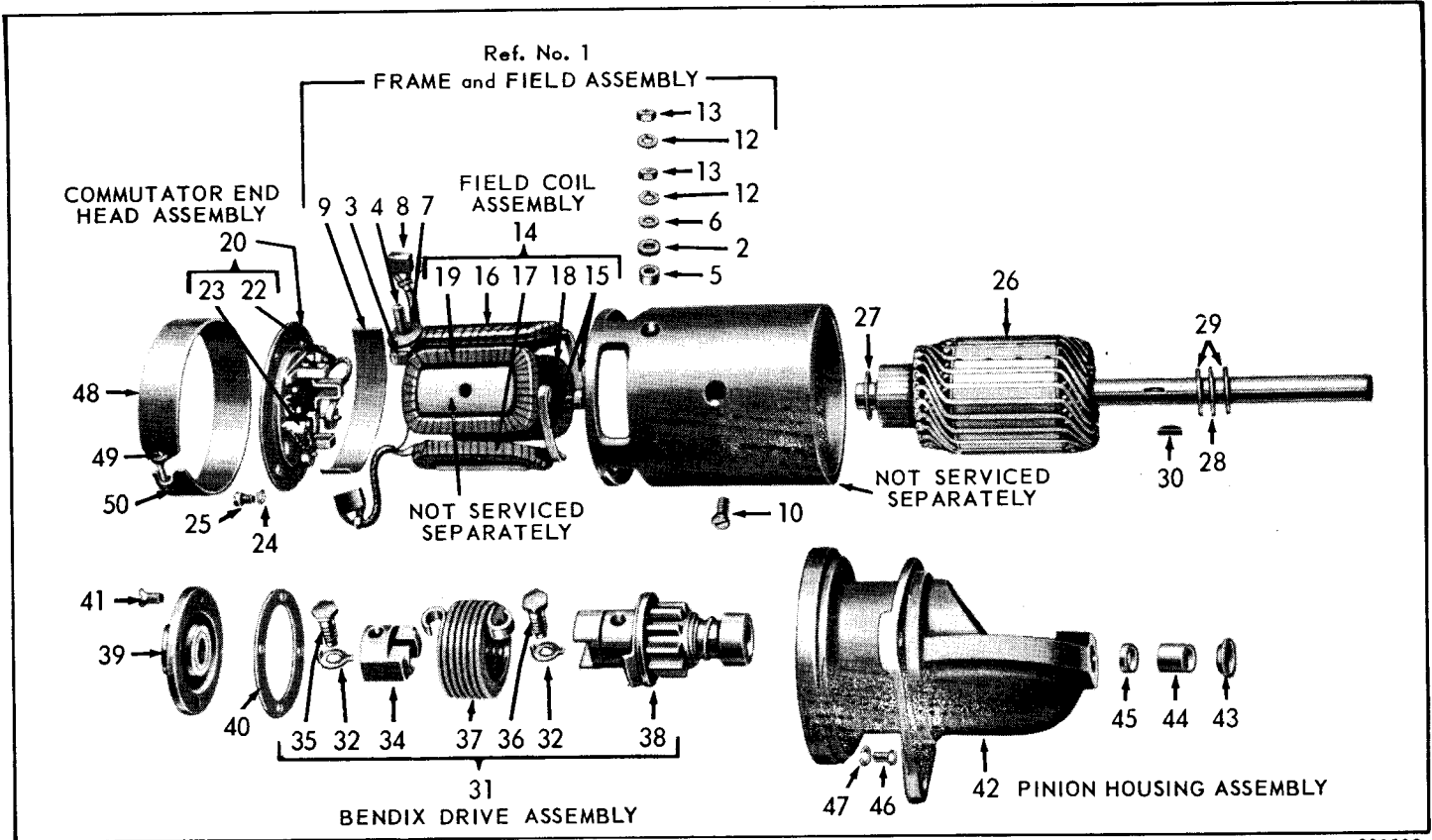
ELECTRIC STARTER, GENERATOR AND DISTRIBUTOR IGNITION FOR VH4D ENGINE

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
-	YD-165	JUMPER STRIP , for YE-16C generator with two charge regulator (not illustrated)	1		1	665	YL-285-F	DISTRIBUTOR IGNITION CABLE SET With integral molded spark plug boot. For YF-10 HALF SPEED DISTRIBUTOR Consisting of:	1		12
653	YD-296	TERMINAL CONNECTOR for ground strap	1		1	666	PH-198 GROMMET		1		1
654	YE-2	AMMETER	1		6	667	YL-339-28 CABLE to No. 1 spark plug..		1		2
655	YF-4-A	IGNITION COIL (6 volt), Prestolite No. 200665	1	1	14	668	YL-339-36 CABLE to No. 2 spark plug..		1		3
	Optional YF-5-A	IGNITION COIL (12 volt), Prestolite No. 200664				669	YL-339-32 CABLE to No. 3 spark plug..		1		2
		Mounted to lower cylinder shroud, Left Hand Side. YF-4 (Prestolite 200604) mounted to PG-345 Bracket at oil filter pad, replaced by YF-4-A, but order SA-85-C Oil Filter Pad Cover.				670	YL-339-42 CABLE to No. 4 spark plug..		1		3
656	YF-10-A-S1	DISTRIBUTOR, HALF SPEED , Prestolite No. IAD-6004-2F	1	3	3	671	YL-278 CABLE to ignition coil		1		1
		Includes PG-543A Adv. Arm Assembly.						STANDARD HARDWARE			
658	YL-353-6	IGNITION WIRE ASSEMBLY	1		1	675	PB-24	SCREW , 3/8"-24 thread x 1-1/8" long, hexagon head	3		2
		6" long, starting switch to ammeter. No. 14 GA. cable with terminals.				676	PD-10	NUT , 5/16"-24 thread, hexagon steel....	2		1
659	YL-352-8	IGNITION WIRE ASSEMBLY	1		1	677	PD-11	NUT , 3/8"-24 thread, hexagon steel.....	2		1
		8" long, coil to distributor. No. 14 GA. cable with terminals.				678	PD-77	NUT , 1/4"-20 thread, hexagon steel	2		1
660	YL-352-26	IGNITION WIRE ASSEMBLY	1		1	679	PD-78	NUT , 5/16"-18 thread, hexagon steel....	2		1
		26" long, ammeter to generator. No. 14 GA. cable with terminals.				680	PE-3	LOCKWASHER , 1/4" Positive	2		1
661	YL-352-4	IGNITION WIRE ASSEMBLY	1		1	681	PE-4	LOCKWASHER , 5/16" Positive.....	4		1
		4" long, ammeter to ignition switch. No. 14 GA. cable with terminals. For open engines.				682	PE-5	LOCKWASHER , 3/8" Positive	5		1
		YL-352-8 WIRE ASSEMBLY , 8" long	1		1	684	XA-65	SCREW , No. 8 x 1/2" long, self-tapping, sheet metal	4		1
		For power unit engines.				686	XD-6	SCREW , 1/4"-20 thread x 3/4" long, hexagon head	2		1
662	YL-356-20	STARTER CABLE ASSEMBLY	1		4	687	XD-15	SCREW , 5/16"-18 thread x 3/4" long, hexagon head	2		1
		20" long, starter to switch. No. 4 A.W.G. cable with terminals. For open engines.						For ignition coil mounting.			
		YL-356-26 CABLE ASSEMBLY , 26" long	1		6						
		For power unit engines.									
663	YL-352-30	IGNITION WIRE ASSEMBLY	1		1						
		30" long, coil to ignition switch. No. 14 GA. cable with terminals. For open engines.									
		YL-352-23 WIRE ASSEMBLY , 23" long..	1		1						
		For power unit engines.									

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

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 clean-out hole in pinion housing by vender necessitated their Part No. change.

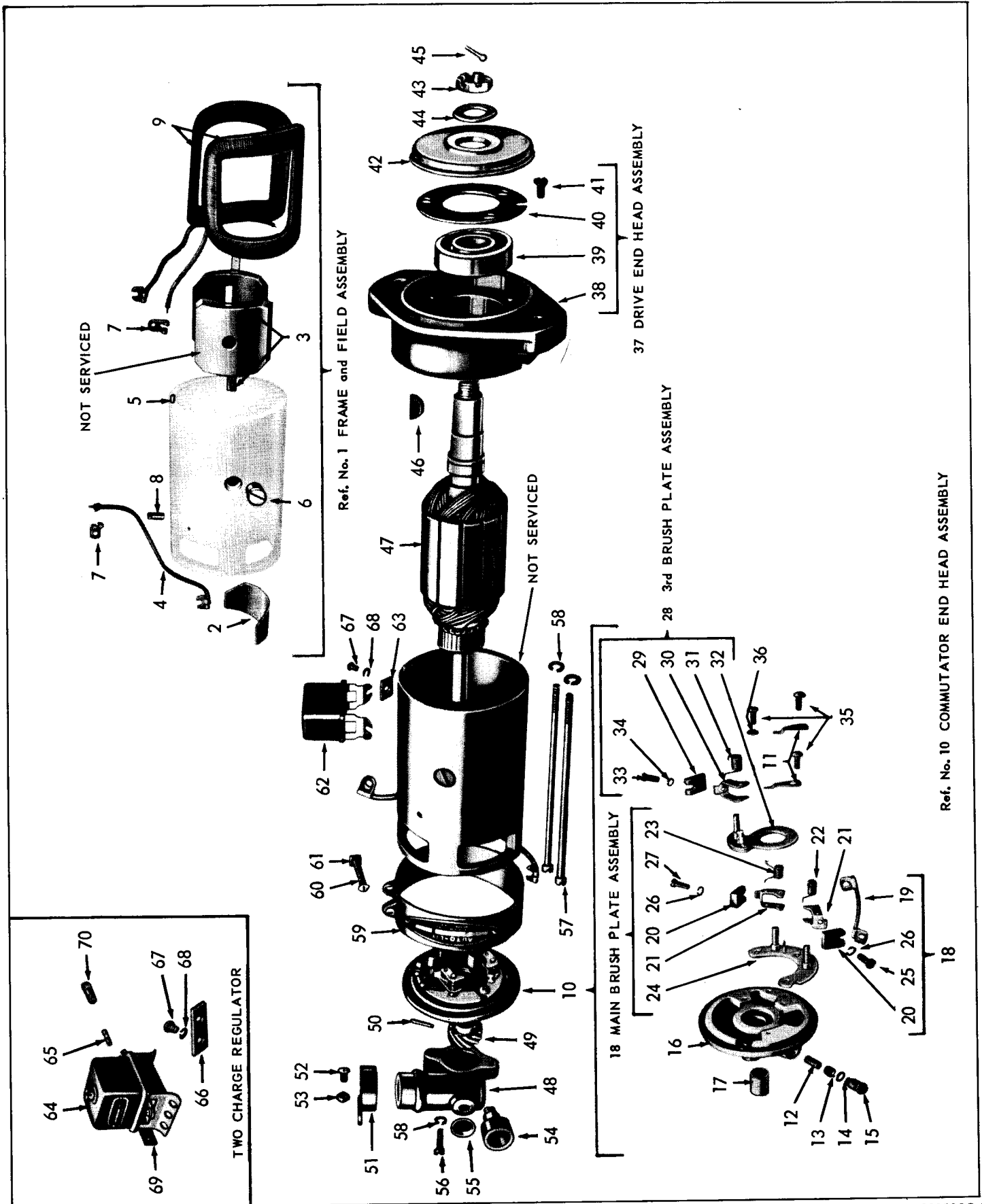


NOTE: All parts are interchangeable for both starting motors, except where noted.

209102

Ref No	Prestolite Part Number	Description	No Req	Ref No	Prestolite Part Number	Description	No Req
1		FRAME and FIELD ASSEMBLY	1	26	MZ-2366 MBG-2366	ARMATURE ASSEMBLY for YA-19-3-S1	1
2	**	Consisting of:		27	***	ARMATURE ASSEMBLY for YA-18-3-S1	1
3	**	INSULATING WASHER, terminal stud	1	28	***	THRUST WASHER for Armature, C.E.	2
4	**	TERMINAL	1	29	***	SPRING WASHER for Armature	1
5	**	TERMINAL STUD	1	30	***	THRUST WASHER for Armature, Int.	2
6	**	INSULATING BUSHING for terminal stud	1	31	EBB-44B	KEY for mounting Bendix, No. 6 Woodruff	1
7	**	PLAIN WASHER, 5/16" for terminal stud	1	31	EBB-44B	BENDIX DRIVE ASSEMBLY	1
8	*	INSULATING WASHER, terminal stud	1			Eclipse No. 480029.	
9		INSULATED BRUSH	2	39	MZ-1360	BEARING PLATE ASSEMBLY, intermediate ..	1
10		INSULATION, field connection	4	40	MZ-359	GASKET for bearing plate	1
12		SCREW for pole shoe	1	41		SCREW for mounting bearing plate	4
13		LOCKWASHER, 5/16", for terminal stud	2			No. 8-32 thread x 3/8" long, flat head.	
14	MZ-3005S MBG-3005S	NUT, for terminal stud, 5/16"-24 thread, hex	2	42	PS-1330B	PINION HOUSING ASSEMBLY	1
15		FIELD COIL ASSEMBLY for YA-19-3-S1	1			Includes:	
16		FIELD COIL ASSEMBLY for YA-18-3-S1	1	43		BEARING CAP	1
17		Consisting of:		44	MZ-364	BRONZE BEARING	1
18		CONNECTOR for field coil	2	45	XA-832	OIL SEAL	1
19		FIELD COIL, U.L.	1	46		SCREW for pinion housing mounting	4
20	MZ-2002F MZ-2002Q	FIELD COIL, L.R.	1			No. 10-32 thread x 31-32" long, hexagon head.	
21		FIELD COIL, L.L.	1	47		LOCKWASHER for housing screw, No. 10	4
22		FIELD COIL, U.R.	1	48	MZ-1024U	COVER BAND	1
23	MZ-195	COMMUTATOR END HEAD ASSEMBLY for YA-19-3-S1	1	49		SCREW for cover band	1
24	*	COMMUTATOR END HEAD ASSEMBLY for YA-18-3-S1	1	50		No. 10-32 thread x 1-1/2" long, round head.	
25		Includes:				NUT for cover band	1
		FELT (not illustrated)	1			No. 10-32 thread, square.	
		BRUSH SPRING SET	1		*	MZ-2012AS BRUSH SET for YA-19-3-S1.	
		GROUNDED BRUSH	2		**	MBG-2012S BRUSH SET for YA-18-3-S1.	
		LOCKWASHER for head screw, No. 10	4		***	P90-368 Terminal Stud Pkg. for YA-19-3-S1.	
		SCREW for head mounting	4			P90-333 Terminal Stud Pkg. for YA-18-3-S1.	
		No. 10-32 thread x 3/8" long, fillister head.				P90-448 Armature Thrust Washer Package.	

- YB-16-C PRESTOLITE (No. GAS-4303) 6 VOLT GENERATOR - WITH REGULATOR
- YB-16-E PRESTOLITE (No. GAS-4306) 6 VOLT GENERATOR - WITH CUT-OUT RELAY
- YB-16-F PRESTOLITE (No. GDY-4115) 12 VOLT GENERATOR - WITH CUT-OUT RELAY
- YB-16-G PRESTOLITE (No. GDY-4115N) 12 VOLT GENERATOR - WITH CUT-OUT RELAY (Neg. Ground)



Ref. No. 10 COMMUTATOR END HEAD ASSEMBLY

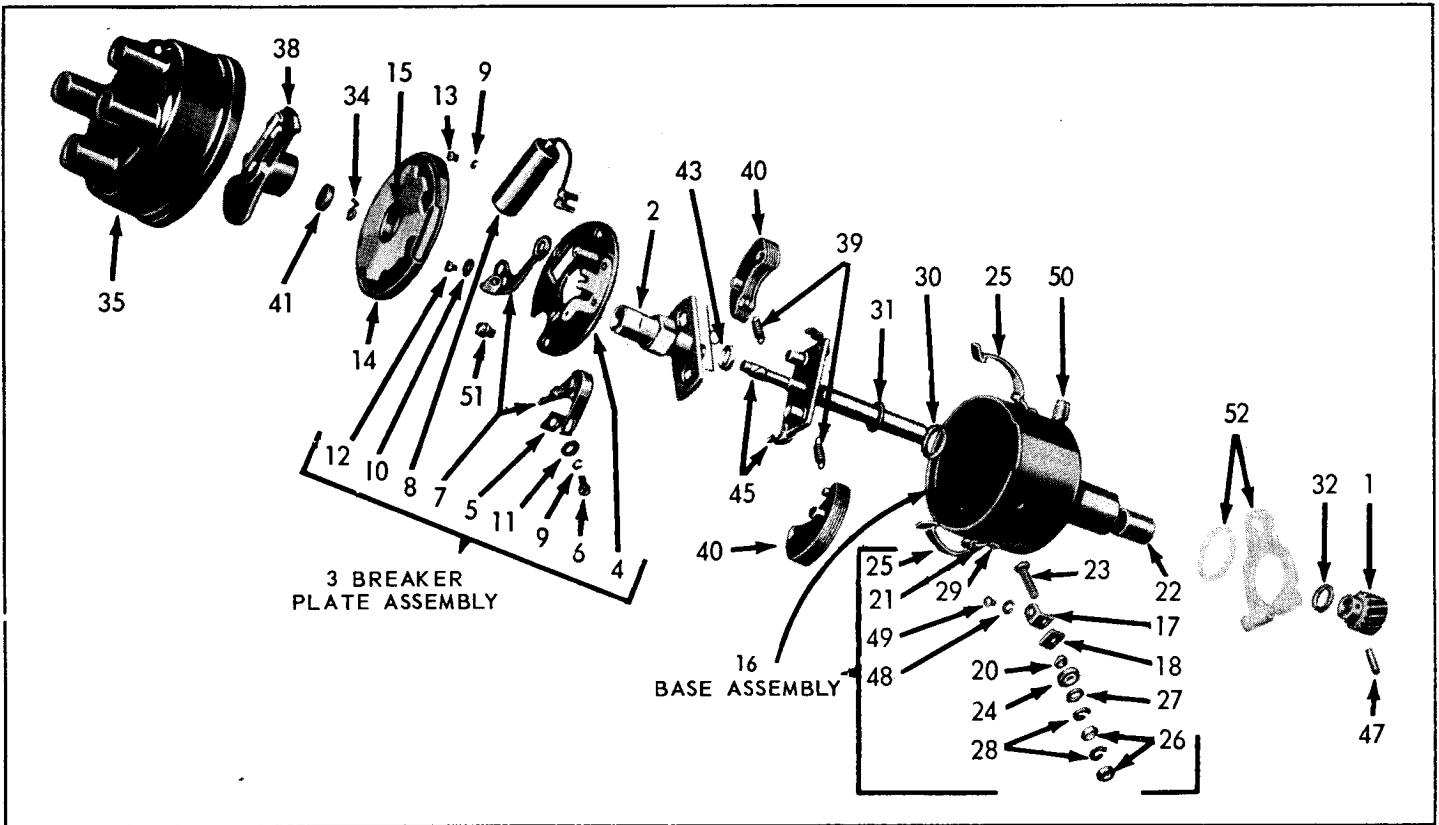
YB-16-C PRESTOLITE (No. GAS-4303) 6 VOLT GENERATOR - WITH REGULATOR
 YB-16-E PRESTOLITE (No. GAS-4306) 6 VOLT GENERATOR - WITH CUT-OUT RELAY
 YB-16-F PRESTOLITE (No. GDY-4115) 12 VOLT GENERATOR - WITH CUT-OUT RELAY
 YB-16-G PRESTOLITE (No. GDY-4115N) 12 VOLT GENERATOR - WITH CUT-OUT RELAY (Neg. Ground)

NOTE: Parts are interchangeable for the above generators, except where noted.

Ref No	Part Number	Description	No Req	Ref No	Part Number	Description	No Req
1		FRAME and FIELD ASSEMBLY	1	44	****	WASHER for armature 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	GAS-2175	ARMATURE (YB-16-C, YB-16-E)	1
4	**	LEAD WIRE with terminal	1		GDY-2175	ARMATURE (YB-16-F, YB-16-G)	1
5		DOWEL PIN	2	48	GT-121B	DISTRIBUTOR MOUNTING HOUSING	1
6		POLE SHOE SCREW	2	49	P90-628	DISTRIBUTOR DRIVER GEAR, & Pin Pkg. ...	1
7		TERMINAL	2	50		PIN for driver gear	1
8	**.	INSULATING BUSHING	1	51	GAG-58A	CLAMP for distributor housing	1
9	GAS-2005D	FIELD COIL ASSEM. complete (YB-16-C)	1			Replaced GAG-58.	
	GAS-2005A	FIELD COIL ASSEMBLY complete (YB-16-E)		52		SCREW for clamp, No. 8-32 thread x 5/8" long,	
	GDY-1005	FIELD COIL ASSEMBLY complete (YB-16-F,-G)				round head	1
10	GAS-2174B	COMMUTATOR END HEAD ASSEMBLY	1	53		NUT for clamp screw, No. 8-32 thread, hex....	1
		Consisting of:		54	X-382	GREASE CUP	1
11		SPRING RETAINER for 3rd brush plate	2	55	GW-19-A	COVER for distributor housing	1
12		FELT WICK	1	56		SCREW for distributor housing mounting	3
13		SPRING for felt wick	1			No. 10-32 thread x 7/8" long, fillister head.	
14		WASHER for felt wick	1	57	GAS-20AS	THRU BOLT PACKAGE	2
15	X-3172	OILER (elbow type)	1	58		LOCKWASHER , No. 10 Positive	5
	X-1573	OILER (straight)	1			2-for thru bolts.	
16		HEAD with GAS-49 bearing	1			3-for distributor housing.	
17	GAS-49	BRONZE BEARING	1	59	GAS-1024JS	COVER BAND (YB-16-C, YB-16-E)	1
18	GAS-2021RA	MAIN BRUSH PLATE ASSEMBLY	1		GAS-1024D	COVER BAND (YB-16-F, YB-16-G)	1
		Consisting of:		60		SCREW for cover band	1
19		GROUND WIRE with terminals	1			No. 10-32 thread x 1 1/2" long, round head.	
20	*	MAIN BRUSH	2	61		NUT , for cover band screw	1
21	***	BRUSH HOLDER	2			No. 10-32 thread, square.	
22	***	SPRING for grounded brush	1	62	CB-4014	CUT-OUT RELAY ASSEMBLY (YB-16-E)	1
23	***	SPRING for insulated brush	1		RA-4002	CUT-OUT RELAY ASSEMBLY (YB-16-F, -G)..	1
24		MAIN BRUSH PLATE	1	63		SPACER for mounting relay (YB-16-E, YB-16-F)	2
25		SCREW for grounded brush	1	64	TC-4329C	TWO CHARGE REGULATOR (YB-16-C)	1
		No. 8-32 thread x 1 1/2" long, fillister head.		65		FUSE for regulator, 5 Amp (YB-16-C)	1
26		LOCKWASHER for brush screw, No. 8	2	66		SPACER for mounting regulator (YB-16-C)	2
27		SCREW for insulated brush	1	67		SCREW for mounting regulator or relay	4
		No. 8-32 thread x 7/16" long, binding head.				No. 10-32 thread x 3/8" long, round head.	
28	GAS-2126A	3rd BRUSH PLATE ASSEMBLY	1	68		LOCKWASHER for mounting regulator or relay,	4
		Consisting of:				No. 10.....	
29	*	THIRD BRUSH	1	69		CARBON RESISTOR for regulator (YB-16-C) ..	1
30	***	BRUSH HOLDER	1	70		FUSE HOLDER (YB-16-C)	1
31	***	BRUSH SPRING	1		*	GAS-2012 Brush Set	
32		3rd BRUSH PLATE	1		**	P90-370 Lead Assem. Package	
33		SCREW for 3rd brush	1		***	P90-438 Brush Holder & Spring Package	
		No. 8-32 thread x 7/16" long, fillister head.			****	P90-630 Arm. Shaft, Nut & Washer Package	
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	GAS-1232B	DRIVE END HEAD ASSEMBLY	1				
		Consisting of:					
38		HEAD	1				
39	X-3003	BALL BEARING , shielded, S.A.E. No. 204	1				
40		BEARING RETAINER	1				
41		SCREW for retainer	3				
		No. 8-32 thread x 3/8" long, flat head.					
42	GAS-1176	OIL THROWER	1				
43	****	NUT for armature shaft, 1/2"-20 thread, slotted ..	1				

NOTE: Items less part number are not serviced separately.

PRESTOLITE IAD-6004-2F DISTRIBUTOR PARTS LIST
WISCONSIN MOTOR PART NUMBER YF-10-A-S1

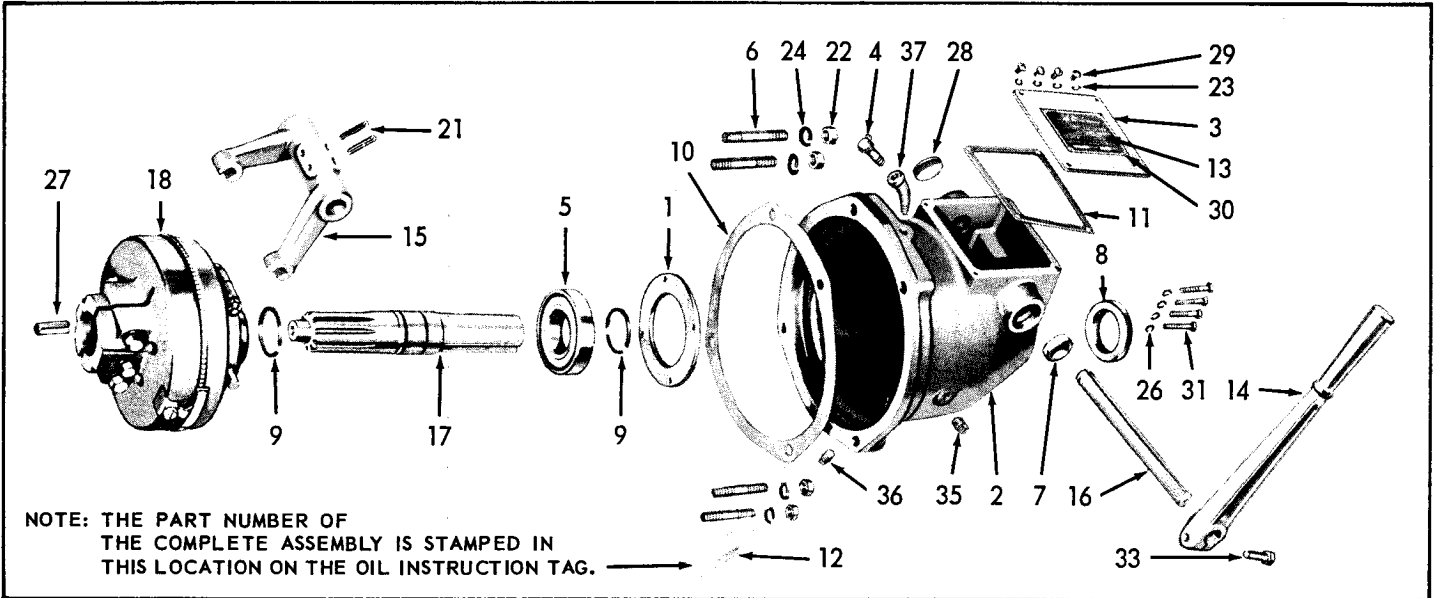


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Ref No	Prestolite Part Number	Description	No Req
1	****	FOLLOWER GEAR	1
2	IAD-1100LE-1	CAM and STOP PLATE, 4 cyl., L.H.	1
3	IAD-2004	BREAKER PLATE ASSEMBLY	1
		Consisting of:	
4		BREAKER PLATE	1
5		SPRING CLIP for contact arm	1
6		SCREW for spring clip	1
		No. 6-32 thread x 5/16" long, hexagon head	
7	IGS-2224L	BREAKER CONTACT SET	1
8	IBB-2042SS-1	CONDENSER	1
9		LOCKWASHER, No. 6	3
		2-for condenser mtg. 1-for spring clip.	
10		PLAIN WASHER for contact lock screw, No. 8	1
11		PLAIN WASHER for spring clip screw, No. 6	1
12		LOCKSCREW for breaker contact	1
		No. 8-32 thread x 3/16" long, fillister head	
13		SCREW for condenser mounting	1
		No. 6-32 thread x 5/32" long, fillister head	
14	IAD-2015	DUST COVER ASSEMBLY , includes:	1
15		FELT WASHER	1
16		BASE ASSEMBLY , includes:.....	1
17	**	CONNECTOR for terminal stud	1
18	**	INSULATOR for terminal stud	1
19	***	BRACKET for mounting breaker plate	2
		(Not illustrated)	
20	**	INSULATING BUSHING for terminal stud ...	1
21	***	BRACKET for cap spring	2
22	*	BRONZE BEARING.....	2
23	**	TERMINAL STUD	1
24	**	INSULATING WASHER for terminal stud ...	1
25	***	CLAMP SPRING for cap	2
26		NUT for terminal stud, No. 10-32 thread	2
27		PLAIN WASHER for terminal stud, No. 10..	1
28		LOCKWASHER for terminal stud, No. 10 ...	2
29	***	RIVET for clamp spring	4

Ref No	Prestolite Part Number	Description	No Req
30	*	THRUST WASHER (inner) for drive shaft	1
31	*	THRUST WASHER (outer) for drive shaft	1
32	*	THRUST WASHER for drive shaft (lower).....	1
34		SNAP RING for cam	1
35	IG-1324D	DISTRIBUTOR CAP ASSEMBLY includes:...	1
		PLUNGER CONTACT (not illustrated)	1
		CONTACT SPRING (not illustrated)	1
38	IG-1657R	ROTOR	1
39	IGC-200S	SPRING SET for governor weights	1
40	IGC-2168LS	GOVERNOR WEIGHT SET	2
41	IGH-28	FELT WICK for cam sleeve	1
42	IGS-32	RUBBER PLUG for vent hole (not illustrated)	1
43	*	CAM SPACER	1
44	IGS-117	FELT WICK (not illustrated).....	1
45	IGS-1180L	DRIVE SHAFT	1
47	*	PIN for gear	1
48		LOCKWASHER for connector screw, No. 6..	1
49		SCREW for connector	1
		No. 6-32 thread x 3/16" long, round head.	
50	X-1590	OILER	1
51		SCREW for breaker plate mounting	2
		No. 10-32 thread x 5/16" long, fillister head.	
52	PG-543-A	ADVANCE ARM ASSEMBLY	1
	*	P90-390 Distr. Shaft Bearing & Parts Pkg.	
	**	P90-337 Terminal Stud & Parts Pkg.	
	***	P90-429 Cap Clamp Spring Pkg.	
	****	P90-427 Dist. Shaft Gear & Parts Pkg.	
		NOTE: Parts less part number are not serviced separately.	

WW-61-E CLUTCH TAKE-OFF ASSEMBLY FOR VH4 ENGINE



84069C-A

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

BG-210-C-1-S2 MAIN BEARING PLATE ASSEMBLY (Not illustrated) consisting of:
 1 BG-210-C-1 Plate 1 PH-364 Oil Seal 1 ME-114-2 Bearing Cup

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

CA-71-A-23-S1 CRANKSHAFT ASSEMBLY (Not illustrated) consisting of:
 1 CA-71-A-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
	WW-61-E	CLUTCH TAKE-OFF ASSEMBLY - 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 hous'g 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.			

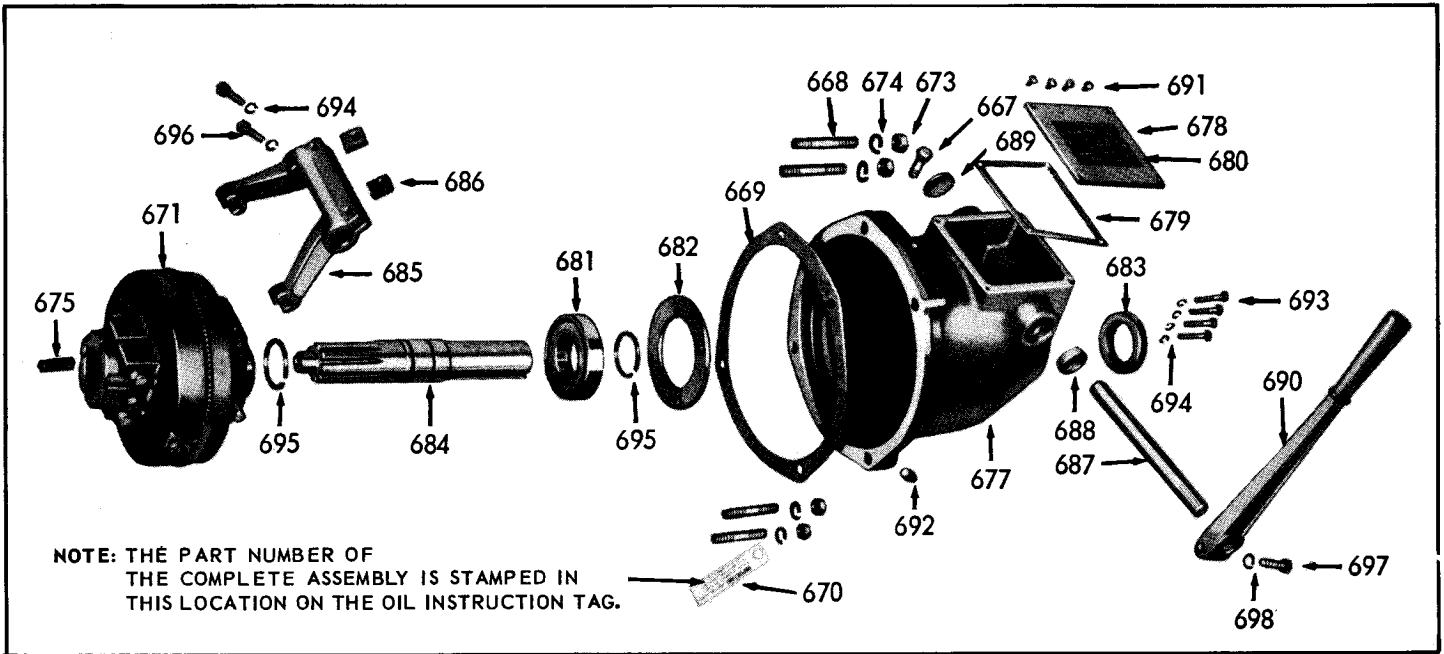
Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
STANDARD HARDWARE					
21	PA-341	ROLL PIN, 1/4" x 1-1/8" long	2	1	
		For clutch yoke.			
22	PD-12	NUT, 7/16"-20 thread, hexagon steel	4	1	
		For mounting clutch housing.			
23	PE-3	LOCKWASHER, ¼" Positive, cover to housing	4	1	
24	PE-6	LOCKWASHER, 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-34	ROUND HEAD SCREW, ¼"-20 x 1/2"	4	1	
		Cover to housing.			
30	XA-106-B	DRIVE SCREW for instruction plate	2	1	
		XA-64 Self-tapping screw, replaced by XA-106-B.			
31	XD-8	HEXAGON HEAD SCREW, ¼"-20 x 1¼"	4	1	
		Bearing retainer plate to housing.			
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-A	ST. ELL, 1/8"-45° brass, for breather XK-77 (Cast iron), replaced by XK-77-A.	1	1	

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

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

WW-58-A CLUTCH TAKE-OFF ASSEMBLY

NOTE: This unit is obsolete and was used on VH4 engines to and including Serial No. 3012339. Replaced by WW-61-E thereafter, and interchangeable as a complete unit, but individual parts are not interchangeable.



84069C

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

BG-210-C-1-S2 MAIN BEARING PLATE ASSEMBLY (Not illustrated) consisting of:

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

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

CA-71-A-23-S1 CRANKSHAFT ASSEMBLY (Not illustrated) consisting of:

- 1 CA-71-A-23 Crankshaft
- 1 ME-71 Bearing
- 1 PL-53 Key
- 1 GA-36-A Gear
- 1 ME-114 Bearing

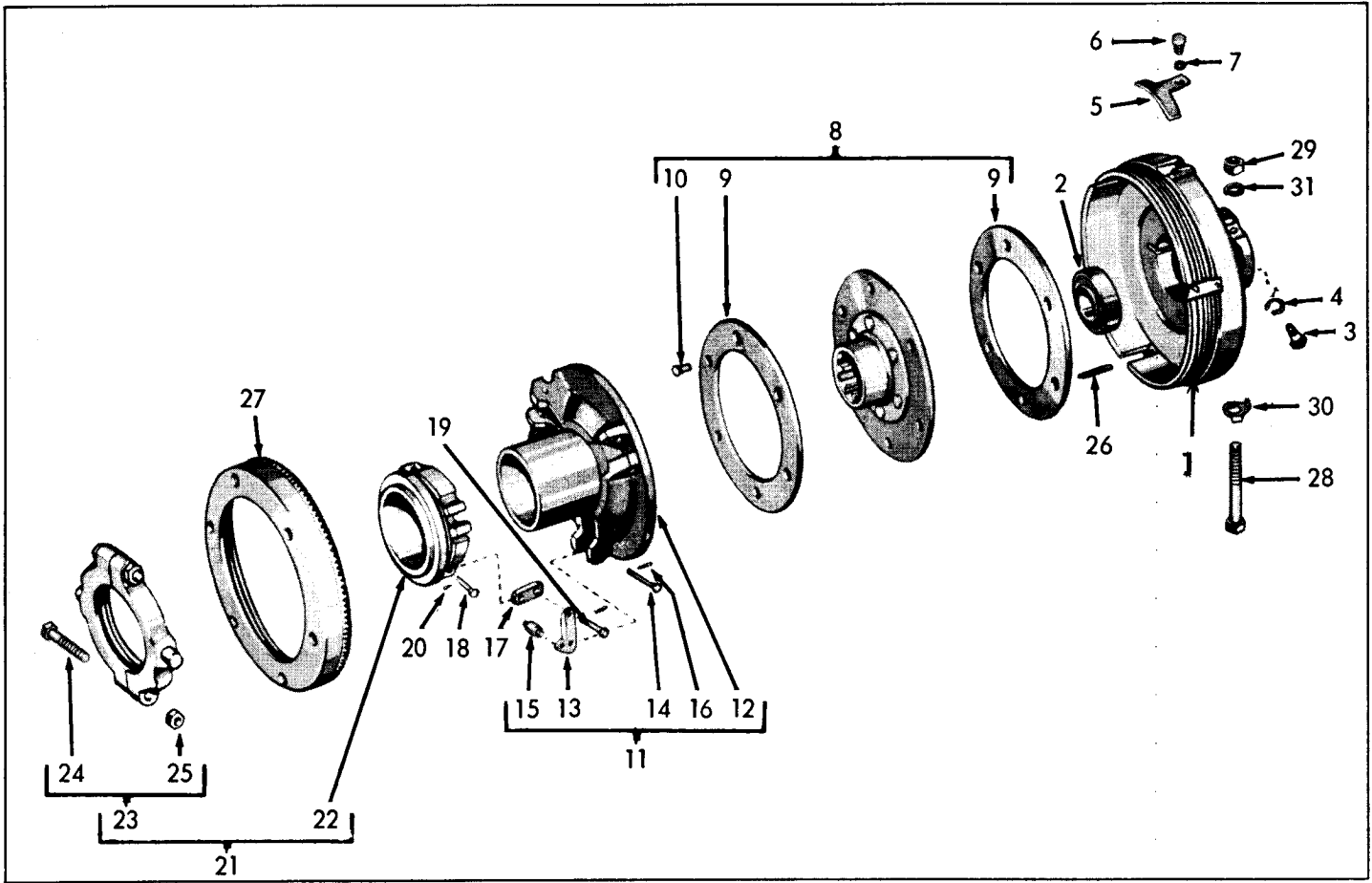
*** NOTE:** Items marked with an (*) are Wisconsin Motor part numbers, all other items are Rockford Drilling part numbers.

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
	*WW-58-A	CLUTCH TAKE-OFF ASSEMBLY - Complete Rockford Drilling No. PTA-S5½15.	1	40	
667	*LO-44	BREATHER	1	1	
668	*PC-419	STUDS for mounting housg to crankcase PC-242, replaced by PC-419.	4	2	
669	*QD-618	GASKET for housing to crankcase.....	1	1	
670	*SD-79	OIL INSTRUCTION TAG	1	1	
671	*WC-288-A	CLUTCH ASSEMBLY Rockford Drilling Model 5½ L.O.C. No. CLA-1467-AF. See Rockford illustration and parts list of clutch.	1	12	
STANDARD HARDWARE					
673	*PD-12	NUT, 7/16"-20 thread, hexagon steel For mounting clutch housing.	4	1	
674	*PE-6	LOCKWASHER, 7/16" Positive	4	1	
675	*PL-140	KEY, 5/16" square x 1-1/8" long, steel For mounting clutch to crankshaft.	1	1	
677	PT-539	HOUSING	1	15	
678	PT-557	COVER for housing	1	10	
679	PT-673	GASKET for cover	1	1	
680	PT-1800	INSTRUCTION PLATE PT-669, replaced by PT-1800.	1	2	
681	*ME-191	BEARING, N.D. No. 7208	1	1	
		PT-578, use ME-191.			
682	PT-536	BEARING RETAINER PLATE	1	8	

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
683	PT-581	OIL SEAL, National No. 50064	1	3	
		For T.O. shaft.			
684	PT-623	CLUTCH T.O. SHAFT	1	3	12
685	PT-1704	CLUTCH YOKE	1	1	3
		PT-531, replaced by PT-1704, but order 2 PT-1707 Roll pins.			
686	PT-533	KEY for obsolete PT-531 Yoke	2	1	
	PT-1707	ROLL PIN for PT-1704 Yoke	2	1	
687	PT-1705	SHAFT for PT-1704 Yoke.....	1	14	
	PT-534	SHAFT for obsolete PT-531 Yoke.....			
688	PT-583	OIL SEAL for yoke shaft	1	1	
689	PT-584	WELSH PLUG	1	1	
690	PT-532	SHIFTING LEVER - straight	1	2	
		PT-564 Off-set Lever, repl'd by PT-532.			
STANDARD HARDWARE					
691	PT-1832	BUTTON HEAD SCREW, cover to hous'g. PT-576, replaced by PT-1832.	4	1	
692	PT-577	PIPE PLUG	2	1	
		1-for oil level hole. 1-for oil drain hole.			
693	PT-579	HEXAGON HEAD SCREW	4	1	
		Bearing retainer plate to housing.			
694	CL-4701	LOCKWASHER (replaces PT-580).....	6	1	
		4-for bearing retainer plate to housing. 2-for obsolete PT-531 yoke clamp.			
695	PT-535	SNAP RING, bearing location on take- off shaft.....	2	1	
696	PT-582	HEX. HEAD SCREW, for obsolete PT-531 yoke	2	1	
697	PT-352	HEX. HEAD SCREW, shifter lever clamp	1	1	
698	PT-353	LOCKWASHER, shifter lever clamp	1	1	

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

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



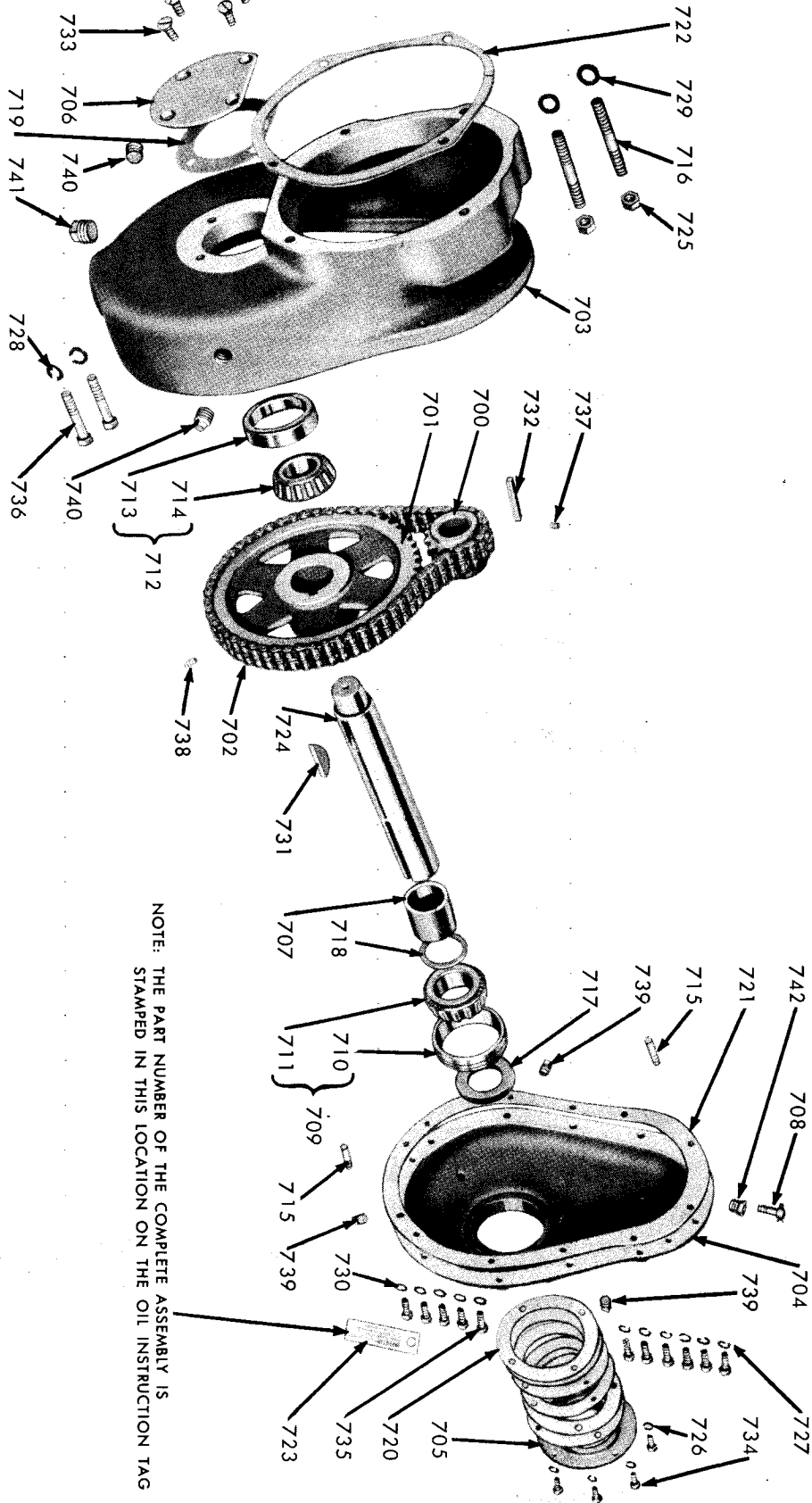
206587C-A

Ref No	Rockford Part Number	Description	No Req	Ref No	Rockford Part Number	Description	No Req
1	CL-5210-1	CLUTCH HOUSING	1	17	CL-4776	CONNECTING LINK	6
2	ME-189 (Wis. Motor) (Part Number)	PILOT BEARING	1	18	CL-5153	LINK PIN, long	3
		CL-5970, use ME-189.		19	CL-5152	LINK PIN, short	3
3	CL-5163	SCREW, 5/16"-18 x 5/8" Dog point hexagon head.....	1	20	CL-5092	COTTER PIN, 1/16" x 3/8"	6
4	CL-3920	LOCKWASHER, 5/16" Positive	1	21	UCL-4-5145	RELEASE SLEEVE ASSEMBLY	1
5	CL-4973	ADJUSTING LOCK	1			Consisting of:	
6	CL-8807-1	SCREW, 1/4"-20 x 3/8" slotted hex. head.....	1	22		CL-5145 Release sleeve.....	1
		CL-3917-1 (Fillister head), replaced by CL-8807-1.		23		UCL-6-5144 Release bearing assembly	1
7	CL-3468	LOCKWASHER, 1/4" Shakeproof	1			Consisting of:	
8	UCL-1-1244-10	DRIVEN MEMBER ASSEMBLY	1	24		Release bearing	
	*	Consisting of:		25		CL-3335-1 Screw, 5/16"-24 x 1-3/4" hexagon head	2
9		Splined center and plate assembly		26	CL-5087	RETURN SPRING	3
10		CL-5321-19 Facing (Thermoid DK).....	2	27	CL-5147	ADJUSTING RING	1
		CL-1011 Tubular rivets (brass).....	6	28	CL-5318	SCREW, 3/8"-24 x 2-1/2" hexagon head	2
11	UCL-5146-1A	PRESSURE PLATE and LEVER ASSEMBLY	1	29	CL-5319	NUT, 3/8"-24 hexagon	2
		Consisting of:		30	CL-5211	SCREW LOCK	1
12		UCL-5146-1 Pressure plate assembly.....	1	31	PT-353	LOCKWASHER, 3/8" Positive	1
13		CL-5544 Lever	6				
14		CL-5156 Lever pin.....	3				
15		LM-408 Roller.....	3				
16		CL-5092 Cotter pin, 1/16" x 3/8".....	3				
						(*) Not serviced separately from sub-assembly it is included in.	

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

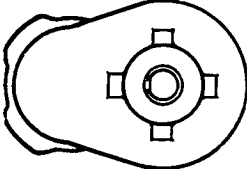
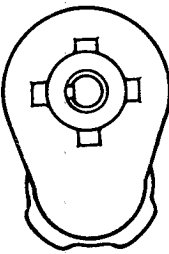
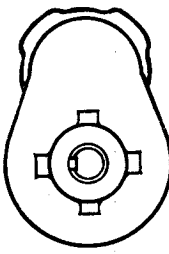
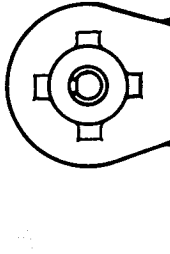
**WW-27-J ETC. REDUCTION GEAR ASSEMBLIES
FOR VH4 ENGINE**

NOTE: THE PART NUMBER OF THE COMPLETE ASSEMBLY IS STAMPED IN THIS LOCATION ON THE OIL INSTRUCTION TAG



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

**WW-27-J ETC. REDUCTION GEAR ASSEMBLIES
FOR VH4 ENGINE**

Determine position of take-off shaft when viewing from cranking end of engine. (Views showing take-off end are shown)	Assembly 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.
 TAKE-OFF SHAFT ON LEFT HAND SIDE (as Viewed from the Cranking End)	WW-27-J	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	.....	BG-149-B-6	BH-119
	WW-27-J-1	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	.....	BG-149-B-6	BH-119
	WW-27-J-2	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	.....	BG-149-B-6	BH-119
	WW-27-J-3	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B-6	BH-119
	WW-27-J-4	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B-6	BH-119
WW-27-J-5	3.79 to 1	Engine-Wise	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-6	BH-119
 TAKE-OFF SHAFT ON RIGHT HAND SIDE (as Viewed from the Cranking End)	WW-27-J-6	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	.....	BG-149-B-7	BH-119-1
	WW-27-J-7	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	.....	BG-149-B-7	BH-119-1
	WW-27-J-8	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	.....	BG-149-B-7	BH-119-1
	WW-27-J-9	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B-7	BH-119-1
	WW-27-J-10	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B-7	BH-119-1
WW-27-J-11	3.79 to 1	Engine-Wise	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-7	BH-119-1
 TAKE-OFF SHAFT ON TOP	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	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-8	BH-119-2
 TAKE-OFF SHAFT ON BOTTOM	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	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	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)	1	13	WW-27-J-12	66	
BH-119	14		GJ-9 (26" long)	1	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		61	WW-27-J-19	68	
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 VH4 ENGINE

NOTE: Engines equipped with a 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) consisting of:
 1 BG-210C-1 Plate 1 PH-364 Oil Seal 1 ME-114-2 Bearing Cup

CA-71A-11-S1 CRANKSHAFT ASSEMBLY (Not illustrated) consisting of:
 1 CA-71A-11 Crankshaft 1 ME-71 Bearing 1 PL-53 Key
 1 GA-36-A Gear 1 ME-114 Bearing

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

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
705	BG-150	PLATE for retaining bearing (outer).....	1	1		720	QD-544	GASKET for bearing retainer plate-outer	6		1
706	BG-151	PLATE for retaining bearing (inner).....	1		6	721	QD-545	GASKET for cover to housing	1		1
707	HF-265	SPACER for take-off shaft	1		3	722	QD-618	GASKET for housing to crankcase	1		1
708	LO-44	BREATHER	1		1	723	SD-79	OIL INSTRUCTION TAG	1		1
709	ME-76	BEARING ASSEMBLY (outer).....	1	1	11	724	WA-55	TAKE-OFF SHAFT	1	6	14
710		Consisting of:									
711		1 ME-76-1 Cup, Timken 3525			10						
712	ME-77	BEARING ASSEMBLY (inner)	1		15						
713		Consisting of:									
714		1 ME-77-1 Cup, Timken 02820			6	725	PD-12	NUT, 7/16"-20 thread, hexagon steel... For housing to crankcase mounting studs.	2		1
715	PA-279	DOWEL PIN for cover to housing	2		1	726	PE-4	LOCKWASHER, 5/16" Positive..... For outer bearing retainer plate.	4		1
716	PC-425	STUD for housing to crankcase (outer holes)	2		2	727	PE-5	LOCKWASHER, 3/8" Positive..... For cover to housing mounting, above oil level.	6		1
717	PH-202	OIL SEAL for take-off shaft	1		4	728	PE-6	LOCKWASHER, 7/16" Positive..... For housing to crankcase mounting, inner holes.	2		1
718	PH-206	Kickhaefer Mfg. Co. A-31-106.									
719	QD-543-A	COLLAR for take-off shaft spacer	1		2						
		GASKET for bearing retainer plate-inner	1		1						

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

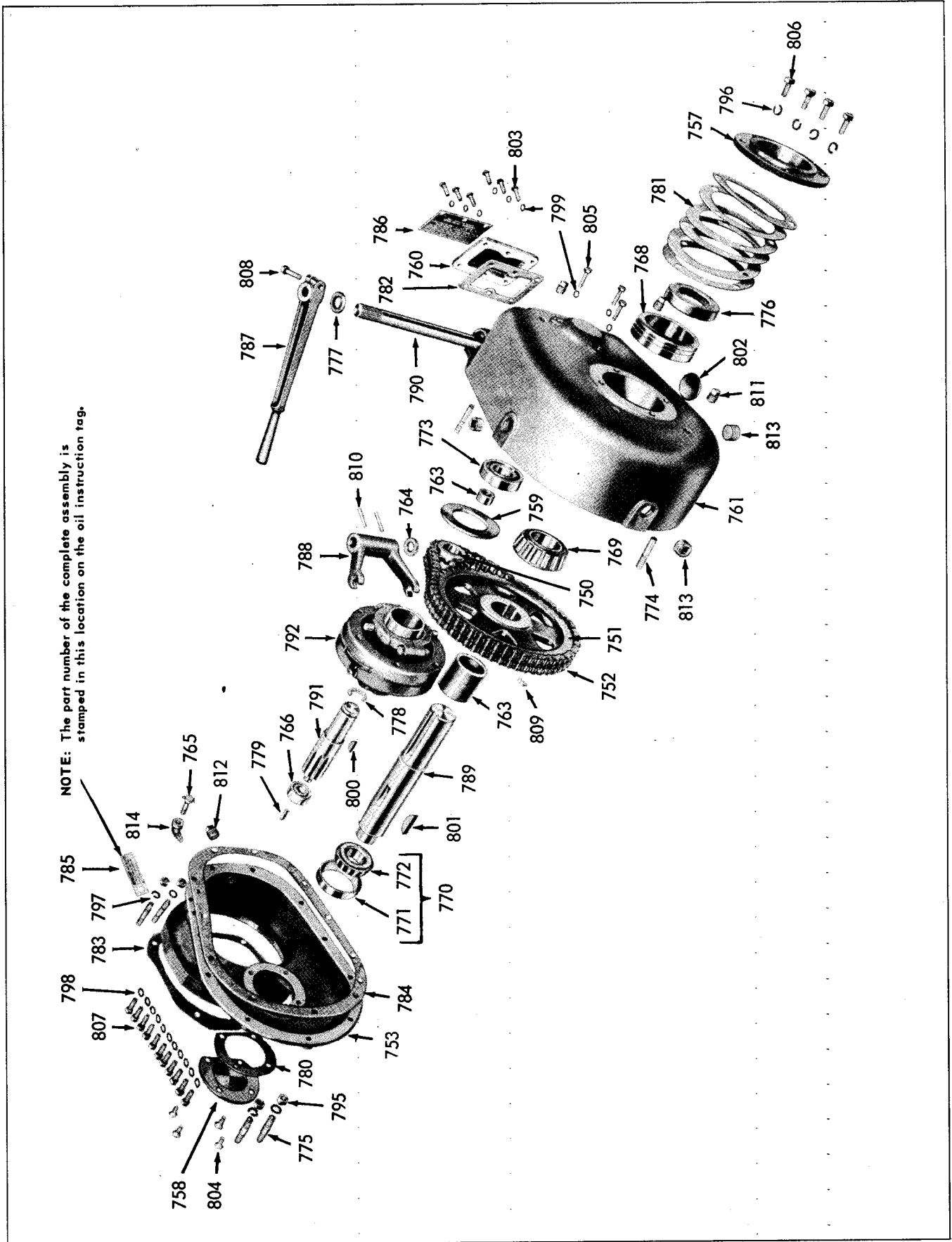
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

**INTERCHANGEABLE PARTS FOR WW-27-J ETC. REDUCTION GEAR ASSEMBLIES
FOR VH4 ENGINE**

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

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

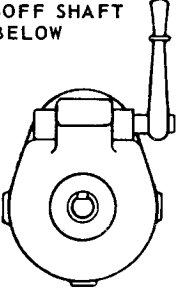
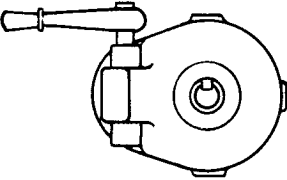
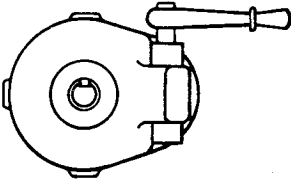
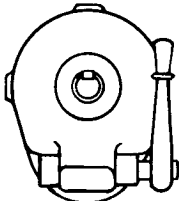
WW-62-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES
FOR VH4 ENGINE



104814C

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

WW-62-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR VH4 ENGINE

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
				Driver Gear Part No.	Driven Gear Part No.	Chain Part No.	Housing Part No.
TAKE-OFF SHAFT BELOW 	WW-62-A	2.07 to 1	Ctr. Engine-Wise	GG-116	GG-67-1	.....	BG-215
	WW-62A-1	3.00 to 1	Ctr. Engine-Wise	GG-117	GG-77-1	.....	BG-215
	WW-62A-2	3.84 to 1	Ctr. Engine-Wise	GG-118	GG-69-1	.....	BG-215
	WW-62A-3	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-215
	WW-62A-4	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-215
	WW-62A-5	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-215
TAKE-OFF SHAFT ON LEFT HAND SIDE as viewed from the cranking end 	WW-62A-6	2.07 to 1	Ctr. Engine-Wise	GG-116	GG-67-1	.....	BG-215-1
	WW-62A-7	3.00 to 1	Ctr. Engine-Wise	GG-117	GG-77-1	.....	BG-215-1
	WW-62A-8	3.84 to 1	Ctr. Engine-Wise	GG-118	GG-69-1	.....	BG-215-1
	WW-62A-9	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-215-1
	WW-62A-10	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-215-1
	WW-62A-11	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-215-1
TAKE-OFF SHAFT ON RIGHT HAND SIDE as viewed from the cranking end 	WW-62A-12	2.07 to 1	Ctr. Engine-Wise	GG-116	GG-67-1	.....	BG-215-2
	WW-62A-13	3.00 to 1	Ctr. Engine-Wise	GG-117	GG-77-1	.....	BG-215-2
	WW-62A-14	3.84 to 1	Ctr. Engine-Wise	GG-118	GG-69-1	.....	BG-215-2
	WW-62A-15	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-215-2
	WW-62A-16	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-215-2
	WW-62A-17	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-215-2
TAKE-OFF SHAFT ON TOP 	WW-62A-18	2.07 to 1	Ctr. Engine-Wise	GG-116	GG-67-1	.....	BG-215-3
	WW-62A-19	3.00 to 1	Ctr. Engine-Wise	GG-117	GG-77-1	.....	BG-215-3
	WW-62A-20	3.84 to 1	Ctr. Engine-Wise	GG-118	GG-69-1	.....	BG-215-3
	WW-62A-21	2.00 to 1	Engine-Wise	GG-113	GG-71	GJ-8	BG-215-3
	WW-62A-22	2.67 to 1	Engine-Wise	GG-114	GG-71	GJ-9	BG-215-3
	WW-62A-23	3.79 to 1	Engine-Wise	GG-115	GG-73	GJ-10	BG-215-3

WEIGHTS OF PARTS LISTED ABOVE

Clutch reduction Gear Assembly No.	Net Wt.		Clutch Reduction Gear Assembly No.	Net Wt.		Clutch Reduction Gear Assembly No.	Net Wt.		Clutch Reduction Gear Assembly No.	Net Wt.	
	lb	oz		lb	oz		lb	oz		lb	oz
WW-62-A	89		WW-62-A-7	89		WW-62-A-14	89		WW-62-A-21	86	
WW-62-A-1	89	8	WW-62-A-8	89		WW-62-A-15	86		WW-62-A-22	85	
WW-62-A-2	89		WW-62-A-9	86		WW-62-A-16	85		WW-62-A-23	87	
WW-62-A-3	86		WW-62-A-10	85		WW-62-A-17	87				
WW-62-A-4	95		WW-62-A-11	87		WW-62-A-18	89				
WW-62-A-5	87		WW-62-A-12	89		WW-62-A-19	89	8			
WW-62-A-6	89		WW-62-A-13	89	8	WW-62-A-20	89				

Part Number	Net Wt.		Part Number	Net Wt.		Part Number	Net Wt.		Part Number	Net Wt.	
	lb	oz		lb	oz		lb	oz		lb	oz
BG-215	19	8	GG-69-1 (73 teeth)	10	15	GG-113 (20 teeth)	1	14	GG-188 (19 teeth)	1	12
BG-215-1	19	8	GG-71 (40 teeth)	5	4	GG-114 (15 teeth)		14	GJ-8 (54 links)	1	13
BG-215-2	19	8	GG-73 (53 teeth)	7	10	GG-115 (14 teeth)		11	GJ-9 (52 links)	1	12
BG-215-3	19	8	GG-77-1 (69 teeth)	10	4	GG-116 (30 teeth)	2	10	GJ-10 (60 links)	2	
GG-67-1 (62 teeth)	8	11				GG-117 (23 teeth)	2	1			

PARTS FOR WW-62-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR VH4 ENGINE

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

- BG-210-C-1-S2 MAIN BEARING PLATE ASSEMBLY** (Not illustrated) consisting of:
 1 BG-210-C-1 Plate 1 PH-364 Oil Seal 1 ME-114-2 Bearing Cup
- CRANKCASE ASSEMBLY** (Not illustrated) Order by giving the **MODEL, SPECIFICATION** and **SERIAL NUMBERS** of the engine.
- CA-71-A-23-S1 CRANKSHAFT ASSEMBLY** (Not illustrated) consisting of:
 1 CA-71-A-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.			Net Wt.		
			Req	Lb	Oz	Req	Lb	Oz
757	BG-150	PLATE for retaining bearing (outer)	1	1				
758	BG-151	PLATE for retaining bearing (inner)	1		6			
759	BG-216	PLATE for clutch bearing.....	1		8			
760	BH-127-B	PLATE for inspection opening..... BH-127, replaced by BH-127-B.	1		8			
761	BH-143	COVER for reduction gear housing	1	20				
762	HF-265-A	SPACER for take-off shaft	1		6			
763	HF-372	SPACER for ball bearing.....	1		3			
764	HF-392	SPACER for shifter yoke..... (Used only when take-off shaft is on the right or left hand side).	4		2			
765	LO-44	BREATHER.....	1		1			
766	ME-189	PILOT BEARING (Furnished as part of WC-288-A Clutch Assembly).....	1		8			
767	ME-76	BEARING ASSEMBLY (outer)..... Consisting of: ME-76-1 Cup, Timken 3525	1	1	11			
768		ME-76-2 Cone, Timken 3578	1	1	1			
769		ME-76-2 Cone, Timken 3578	1	1	1			
770	ME-77	BEARING ASSEMBLY (inner)..... Consisting of: ME-77-1 Cup, Timken 02820	1		6			
771		ME-77-2 Cone, Timken 02877	1		9			
772		ME-77-2 Cone, Timken 02877	1		9			
773	ME-119	BALL BEARING for clutch shaft..... New Departure No. 3206.	1		6			
774	PA-279	DOWEL PIN for cover to housing.....	2		1			
775	PC-419	STUD for housing to crankcase	4		2			
776	PH-202	OIL SEAL for take-off shaft	1		4			
777	PH-234-A	OIL SEAL for shifter lever shaft	1		3			
778	PK-82	RETAINING RING	1		1			
779	PL-140	SQUARE KEY, 5/16" x 1-1/8" long	1		1			
780	QD-543-A	GASKET for bearing retainer plate (inner)	1		1			
781	QD-544	GASKET for bearing retainer plate (outer) 8 to 12 gaskets required for .001" to .003" end play.	12		1			
782	QD-592	GASKET for inspection hole plate	1		1			
783	QD-618	GASKET for housing to crankcase.....	1		1			
784	QD-619	GASKET for cover to housing.....	1		1			
785	SD-79	OIL INSTRUCTION TAG.....	1		1			
786	SD-125-A	INSTRUCTION PLATE, for clutch adj. SD-125, replaced by SD-125-A.	1		1			
787	VB-55-1	SHIFTER LEVER.....	1	2				
788	VB-64-A	SHIFTER YOKE	1	1	8			
789	WA-55-H	TAKE-OFF SHAFT	1	6	10			
790	WA-61-D	SHIFTER SHAFT	1	1	12			
791	WA-87-A	DRIVE SHAFT	1	2	8			
792	WC-288-A	CLUTCH ASSEMBLY	1	12				
		Rockford Drilling Model 5 1/2 L.O.C. No. CLA-1467-AF. See Rockford illustration and parts list of clutch, Page 64.						

Ref. No.	Part Number	Description	No.			Net Wt.		
			Req	Lb	Oz	Req	Lb	Oz
		STANDARD HARDWARE						
795	PD-12	NUT, 7/16"-20 thread, hexagon steel.... For housing to crankcase studs.	4		1			
796	PE-4	LOCKWASHER, 5/16" Positive..... For outer bearing retainer plate.	4		1			
797	PE-6	LOCKWASHER, 7/16" Positive..... For housing to crankcase mounting.	4		1			
798	PH-22	PLAIN WASHER, 3/8" I.D. x 1/16" thick steel..... For cover to housing mounting.	11		1			
799	PH-30	PLAIN WASHER, 1/4" I.D. x 1/16" thick copper	9		1			
		6-for inspection hole cover plate. 3-for bearing retainer plate.						
800	PL-17	KEY, No. 13 Woodruff, for drive gear	1		1			
801	PL-24	KEY, No. 29 Woodruff, for driven gear ..	1		1			
802	SA-58	PLUG, 1-3/8" expansion	1		1			
		For shifter shaft hole.						
803	XA-34	SCREW, 1/4"-20 thread x 1/2" long, round head..... For BH-127-B inspection hole cover. XA-36 (3/4" long) for BH-127 cover.	6		1			
804	XC-17	SCREW, 5/16"-18 thread x 3/4" long, flat head	4		1			
		For inner bearing retainer plate.						
805	XD-7	SCREW, 1/4"-20 thread x 1" long, hexagon head	3		1			
		For clutch bearing retainer plate.						
806	XD-15	SCREW, 5/16"-18 thread x 3/4" long, hexagon head	4		1			
		For outer bearing retainer plate.						
807	XD-27	SCREW, 3/8"-16 thread x 1" long, hexagon head	11		1			
		For cover to housing mounting.						
808	XD-30	SCREW, 3/8"-16 thread x 1 1/2" long, hexagon head, for shifter lever clamp	1		2			
809	XE-44	SCREW, 5/16"-18 thread x 5/8" long, headless set, for driven gear.	1		1			
810	PA-341	ROLL PIN, 1/4" dia. x 1-1/8" long	2		1			
		For shifter yoke to shaft. XH-26, No. 4 x 1-3/8" long, taper pin, replaced by PA-341.						
811	XK-2	PLUG, 1/4" pipe, square head	3		1			
		For oil level.						
812	XK-4	PLUG, 1/2" pipe, square head	1		2			
		For oil filler.						
813	XK-6	PLUG, 1/2" pipe, countersunk head	3		2			
		For oil drain.						
814	XK-77-A	STREET ELL, 1/8" pipe x 45°, brass.. For breather mounting. XK-77, replaced by XK-77-A.	1		1			

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

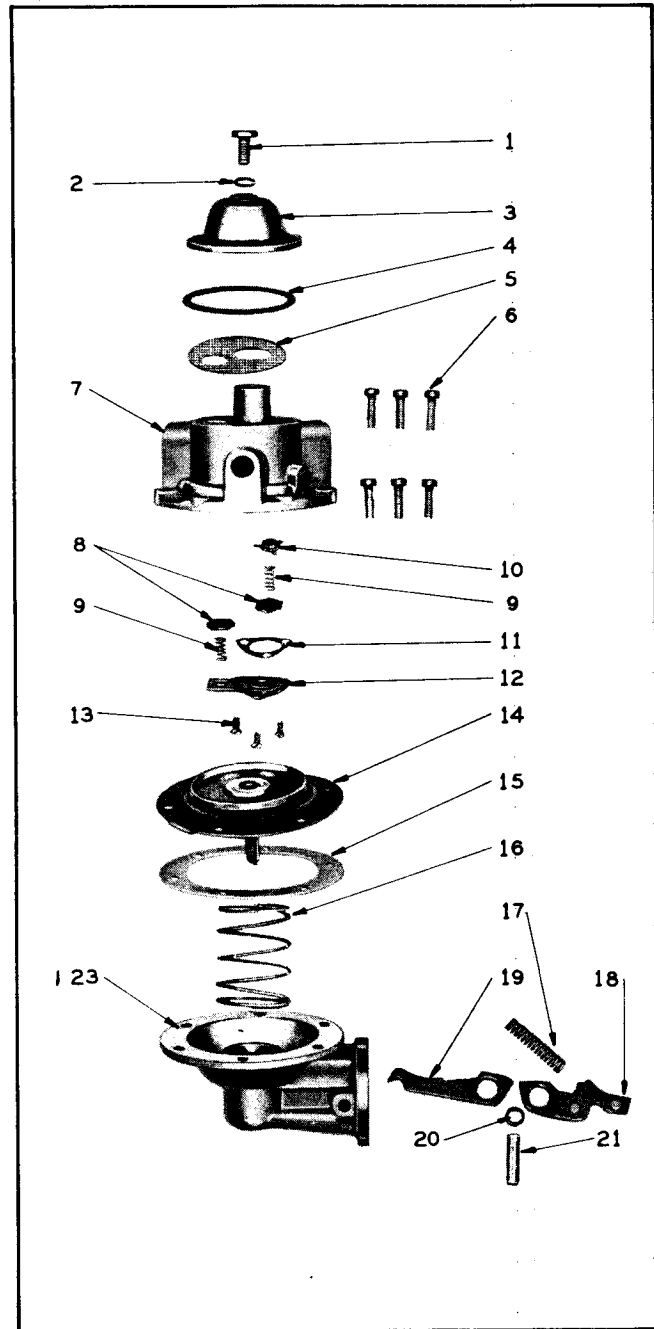
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

FUEL PUMP MAINTENANCE AND REPAIR INSTRUCTIONS

WISCONSIN MOTOR PART No. LP-38 (Standard), LP-38-C (Cold Weather: -65°F)
USED ON 4 CYLINDER AIR COOLED ENGINES

The fuel pump, like all other parts of the engine, is subject to wear and you will find that any time after 500 hours of use, its efficiency will gradually decrease. This is indicated by the engines faltering at high speeds or when heavy loads are suddenly applied. The pump can easily be restored to its normal efficiency by the installation of a Wisconsin Motor No. LQ-30 or LQ-30-A repair kit.

1. Remove the fuel lines and the two mounting bolts which hold the pump to the engine. Take the pump to a work bench or suitable place.
2. With file make an indicating mark across a point at the union of castings (7 and 23). This is a positive location of the fuel line positions when reassembling. Remove six assembly screws (6) and remove fuel head. Dome bolt (1) is taken out, and the dome, (3) dome gasket (4) and filter screen (5) disassembled.
3. Turn head (7) over and remove three screws (13). Remove (8, 9, 10, 11 and 12) valve assemblies noting their positions. Discard Details 8, 9 and 11.
4. Clean head thoroughly with gasoline and a fine brush.
5. Holding fuel head (7) with diaphragm surface (containing 6 clearance holes) up, reassemble the valve spring retainer (10) into position deepest hole. Place new valve plate gasket (11) in position around this hole. Stand on end one of the new valve springs (9) in the retainer. Place a new valve (8) on top of this spring.
6. Place the other new valve (8) on top of brass valve seat next to the previously assembled parts, stand the other new valve spring (9) on top of this valve.
7. Carefully place valve plate (12) over these assemblies so the large raised ring is nearest the valve gasket (11). Insert and carefully tighten the three assembly screws (13).
8. Carefully clean and replace the filter screen (5).
9. Place new dome gasket (4) into the dome (3) and put this unit into position on the fuel head (7).
10. Put new dome bolt gasket (2) on the dome bolt (1), insert in the hole in the dome (3) and tighten properly.
11. Place this fuel head assembly in a clean place and we are ready to rebuild the lower diaphragm section.
12. Using a screw driver inserted into the coils of rocker arm spring (17) remove this spring and save.
13. Hold the mounting bracket (23) in the left hand with the rocker arm toward your body and the thumb nail on the end of the link (19) with the heel of right hand on the diaphragm (14) compress the diaphragm spring (16) at the same time pulling toward your body, this will unhook the diaphragm from the link (19) so it can be removed.
14. Clean the mounting bracket (23) with gasoline.
15. Place the remaining new cork gasket (15) on the corresponding surface of the mounting bracket (23). Replace the diaphragm operating spring (16) standing it into (23). Now repeat in reverse Step 13 using the new diaphragm. Replace rocker arm spring removed in Step 12.
16. Mount this assembly back on the engine in the position from which it was removed, using the new mounting gasket which is the last piece of the repair kit.
17. Crank the engine over to a position where the diaphragm (14) is laying flat on the mounting bracket (23). Place the fuel head (7) back in position so the indicating marks of Step 1 are in line, and start the six assembly screws approximately three turns. Again crank the engine over to a position where the diaphragm (14) is pulled down into (23) mounting bracket and tighten the six assembly screws (6) tightly.
18. Connect the fuel lines and you have a completely rebuilt fuel pump.



76520C

INSTRUCTIONS FOR FUEL PUMP MAINTENANCE AND REPAIR

The gaskets (2 and 4) used in the fuel head (7) of the fuel pump have a natural tendency to shrink when left standing in a dry condition. This shrinking can create vacuum leaks which result in the hard starting of the engine. It is necessary after an engine has stood on the stockroom or show room floor any length of time that the dome bolt No. 1, the assembly screws (6) of which there are six and the fuel line connections be tightened carefully to assure quick starting and satisfactory operation thereafter.

CLEANING OF FUEL PUMP

The industrial engine is used under so many adverse conditions that many times a pump will fail because of the dirt in the fuel head. This can be cleaned by this procedure.

1. With file make an indicating mark across a point of the union of castings (7 and 23). This is a positive location of the fuel line positions when reassembling.
2. Remove the two fuel lines.
3. Remove six assembly screws (6) and remove fuel head.
4. Bolt (1) is taken out, and the dome (3), dome gasket (4) and filter screen (5) disassembled.
5. The preceding steps reveal the sediment cavities of the head which are filled with dirt. Wash this out with gasoline and a fine brush, being careful not to damage the valve assemblies, in the lower cavity of the fuel head (7).

6. The pump is now ready to reassemble. Crank the engine over to a position where the diaphragm (14) is laying flat across the casting face (23). Place the fuel head (7) back in position so the indicating marks of Step No. 1 are in line and start the six assembly screws approximately three turns. Again crank the engine over to a position where the diaphragm (14) is pulled down into (23) the mounting bracket. Now tighten the six screws (6) securely.
7. Carefully clean and replace the filter screen (5).
8. Replace the dome gasket (4) into the dome (3) and put this unit into position on the fuel head (7).
9. Replace the gasket (2) on the dome bolt (1) and insert in the hole in the dome (3) then tighten securely.
10. Replace fuel lines and tighten securely. Your pump is now in condition to give many long hours of additional service.

NOTE: The LQ-30 or LQ-30-A Repair Kit and the parts included there-in, which are identified by an asterisk (*), are the only parts of the fuel pump available for service.

Ref. No.	Description	No. Req.
1	PULSATOR DOME BOLT	1
* 2	DOME BOLT GASKET	1
3	PULSATOR DOME	1
* 4	DOME GASKET	1
5	FILTER SCREEN	1
6	SCREWS for mounting fuel head	6
7	FUEL HEAD	1
* 8	VALVE	2
* 9	VALVE SPRING (7 coils)	2
10	VALVE SPRING RETAINER	1
*11	VALVE PLATE GASKET	1
12	VALVE PLATE	1
13	SCREWS for valve plate	3
*14	DIAPHRAGM—for Standard LP-38 Fuel Pump (LQ-30 Repair Kit)	1
	OR	
	DIAPHRAGM—for Cold Weather, LP-38-C Fuel Pump (LQ-30-A Repair Kit)	1
*15	DIAPHRAGM GASKET	1
*16	DIAPHRAGM SPRING	1
*17	ROCKER ARM SPRING	1
18	ROCKER ARM	1
*19	LINKAGE	1
*20	ROCKER ARM BUSHING	1
*21	ROCKER ARM PIN	1
*22	MOUNTING GASKET (not illustrated)	1
23	MOUNTING BRACKET	1

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

WISCONSIN MOTOR CORPORATION

APPROVED SERVICE STATIONS

The following concerns have service part stocks, facilities and trained personnel to render complete service on Wisconsin Air-Cooled Engines. We recommend you work through these service stations on your Wisconsin engine service requirements.

* DISTRIBUTORS

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ALBERTVILLE J. D. Chandler Cycle Co.
 ANDALUSIA Ben Williams Equipment Co., 1609 E. Three Notch
 ANNISTON East Ala. Auto Parts Co., 102 W. 10th Street
 ATTALLA Brown Service Co.
 BESSEMER Warlick & Miller Battery Co., 218 - 18th Street
 BIRMINGHAM Alabama Air-Cooled Motors, 725 Graymont Avenue
 Tractor & Equipment Co., 4401 First Ave. N.
 Skyline Service & Supply Co.
 BOAZ Tractor & Equipment Company
 DECATOR Auto Electric Company
 DOTHAN Elba Tractor Co.
 ELBA Boyd & Company
 ENTERPRISE Moore Brothers Garage
 EUFAULA V. E. Lund Implement Co.
 FLORENCE The Griffin Company
 GADSDEN Clayton Lawn Mower Shop, 138 E. Broad St.
 HEADLAND Headland Auto Parts
 HUNTSVILLE Auto Electric Service Co., 110 Meridian St.
 JASPER Gaines Parts Company
 MOBILE Gravely of Mobile, Inc., 2014 Halls Mill Rd.
 Turner Supply Company, Box 1429
 MONROEVILLE Speed Auto Supplies, P. O. Box 227
 MONTEVALLO Sim's Service Center
 MONTGOMERY 36104 * Parts Service Co., Inc., 412 Bibb Street
 OPELIKA East Alabama Auto Parts
 OPP Adams Farm Supply
 SCOTTSBORO J. D. Chandler Cycle Co.
 SELMA Auto Parts Company
 TROY Thompson Auto Parts
 TUSCALOOSA Cain Steel & Supply Co., 2650 - 20th Street

ALASKA

ANCHORAGE B & C Auto Electric, 2801 Spenard Rd.
 Northern Commercial Company
 FAIRBANKS B & C Auto Electric
 Northern Commercial Company
 JUNEAU Northern Commercial Company
 KETCHIKAN Brougner Outboard Shop, P.O. Box 321, 1212 Tongass Ave.

* Star Machinery Company
 241 Lander Street
 Seattle, Washington 98134

ARIZONA

CASA GRANDE Diesel Electric Co., 917 N. Pinal Avenue
 CHANDLER Sweet's Equipment Sales, 298 E. Galveston
 CHINO VALLEY Chino Pump & Supply Company
 DOUGLAS Al & Jack's Auto Elec., 247 "G" Avenue
 FLAGSTAFF General Automotive Company, 5 East Benton
 NOGALES Commercial Distributors
 PHOENIX 85002 * Pratt-Gilbert, P.O. Box 2230, 701 So. 7th St.
 Equipment Sales Company, 720 South 19th Avenue
 Norton Co., 1817 E. Indian School Rd.
 Morrison & Ledford, Inc. 733 No. 19th Avenue

KINGMAN
 SAFFORD
 TUCSON

YUMA

Arthur's Sales & Service
 Safford Auto Supply
 Autoplane Elec. Co., 1037 South 6th Street
 Equipment Sales & Service Co., 2525 N. First Avenue
 Yuma Automotive Elec., 229 - 8th St.

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 BERRYVILLE Berryville Machine Shop
 BRINKLEY Fred Williams Welding Shop
 CONWAY Earl Rogers Company
 DeWITT Graves Electric Company
 EL DORADO Magneto Service & Supply Co.
 ENGLAND Morgan Lumber Co.
 Austin Supply Company
 FAYETTEVILLE Reed & Griffith
 FORT SMITH Otis-Tole Equipment Co.
 HARRISON Tri-Lakes Motors
 HEBER SPRINGS Red River Implement Company
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 JONESBORO Jonesboro Lock & Key
 LITTLE ROCK Industrial Equipment Service Company
 Lyons Machinery Co., 904 Broadway
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 Chainsaw Service & Supply, 414 South Pecan
 Nashville Distributing Company
 Farmers Equipment Company, Inc.
 PINE BLUFF Northern Saw Co. Inc., P. O. Box 701
 SEARCY Barker Motor Company
 Joyner Motor Service
 SILOAM SPRINGS Standard Auto Supply
 STUTTGART Waggoner Magneto Service
 TEXARKANA Woodard Implement & Gas Engine Company, Inc.
 1221 Magnolia at State Line
 WYNNE Frazier Repair Shop, 115 Levesque

* RCH Distributors, Inc.
 92 W. Carolina Avenue
 P. O. Box 2828
 Memphis, Tennessee 38102

* Keeling Supply Company
 4400 East Roosevelt Road
 P.O. Box 5119
 Little Rock, Arkansas 72206

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ALHAMBRA Ja R Engine & Supply, 1819 W. Valley Blvd.
 ANAHEIM Superior Equipment Rental & Sales, 1266 E. Lincoln St.
 ANDERSON Taylor Auto Parts, 2820 W. Center Street
 ARCATA Brizard-Matthews Machy. Co., 1219 Eleventh Street
 ARLINGTON R. D. C. Equipment Rental, 9500 Arlington Avenue
 BAKERSFIELD Janco Pump & Engine Company, 2601 M Street
 BLYTHE Bob Meloy's Garage, 201 North Lovekin
 BRAWLEY Valley Auto Supply Co., 535 "E" Street
 BRENTWOOD C & H Tool Center, 236 Oak Street
 BURBANK R. J. Lison Co., 3800 Riverside Drive
 BUTTONWILLOW B. W. Implement Co. Inc., Box 758
 CHICO A. J. Boradori, 287 Humboldt Avenue
 Jeffery Brothers, 2260 Park Avenue

COLUSA I. G. Zumwalt Company, 850 Market St.
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CORCORAN Sawtelle & Rosprim, P.O. Box 38
DELANO Delano Repair Service, 1601 Glenwood St.
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EL CENTRO Valley Auto Supply, 633 State Street
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EMERYVILLE 94608 * E. E. Richter & Son, Inc., 6598 Hollis Street
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ESCONDIDO Palomar Tractor Co., 1350 Mission Rd.
EUREKA Rogers Machinery Co., Inc., 3428 Jacobs Avenue
FRESNO Contractors Equipment & Supply, 1454 North Clark
 Jensen & Pilegard, 2510 Blackstone Avenue
 Schedler's Engine Rebuilding, 624 Broadway
 Centerville Saw & Tool Works, 36848 Fremont Blvd.
FREMONT J & M Service, 11662 Anabel
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LAKEPORT Brandt Bros., 379 West Avenue I
LANCASTER Wright's Garage, 214 N. Sacramento Street
LODI Aceco Equipment Co. Inc., 321 North "G" Street
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LONG BEACH Smith & Thorp, 141 E. Anaheim
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 12915 Weber Way (Hawthorne)
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 Larson Equipment Co., 3838 Santa Fe Ave.
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MADERA Shafer Implement, 1721 Howard Rd.
MANTECA Goodwin Equipment Service, P.O. Drawer 671
MARYSVILLE Middleton Implement Company, 600 Third Street
MERCED Laird Welding & Mfg. Company, 5315 Los Banos Hiway
MODESTO Stanislaus Impl. & Hardware Company, 10th & 'F' Sts.
 Willingers Automotive Clinic, 1125 "G" Street
MONTECLAIR Wolfe & Sons Sales, 10611 Ramona Avenue
MONTEBELLO S & A Engine Sales & Service, 1513 Olympic Blvd.
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NAPA Bert Williams & Son, 831 First Street
NORTH HOLLYWOOD Oliphant Bros., 13261 Saticoy St.
NOVATO Novato Equipment & Service, 1054 First Street
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 Joe & Elwins Repair, Route 1, Box 42B
ORO GRANDE McVey-McCarter Machinery Co.
OROVILLE Oroville Truck Parts & Equip., Inc., Highway 40 A South
OXNARD Maulhardt Equipment Co., 815 N. Oxnard Blvd.
PASO ROBLES H. A. Wood Welding & Machine Shop, 1207 - 13th Street
PERRIS Steve's Auto Parts
PETALUMA Holm Tractor & Equip't. Co., 110 Howard St.
PICO RIVERA Rental Yard Supply Corporation, 7815 Paramount Blvd.
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REEDLEY Growers Supply Company, 953 "G" Street
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 Front and Sacramento Streets
RIVERSIDE W. K. Equipment Co., 1830 Eighth Avenue
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 118 East Ortega Street
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 L. T. Dobe, Inc., 2091 Fairfield Avenue
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 NEW FAIRFIELD Peerless Repair Service, RFD #4
 NEW HAVEN W. I. Clark Company, P. O. Box 301
 NEW LONDON Creem Automotive Service, Inc., 20 Truman Street
 TORRINGTON Bartram Auto Elec. Co. Inc., 176 E. Main St.
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 * John Reiner & Company
 94-15 150th Street
 Jamaica, New York 11435
 WINDSOR LOCKS The Magovern Company, Inc., Lawn Acre Road

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 DOVER Cox Motor Shop, 1261 South Governors Avenue
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 * Jos. L. Pinto
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 Philadelphia, Pennsylvania 19143
 * Potter Equipment Company
 6200 N. Capitol Street, N.W.
 Washington, D. C. 20011

DISTRICT of COLUMBIA

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 EUSTIS Grove Equipment Company
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 Fleet Maintenance Service, 824 N.E. Third Ave.
 L. B. Turf Equip., Inc.
 FORT MYERS Davies Cycle Center, 1407 Citrus Street

FORT PIERCE Minton Equipment Company, P. O. Box 270
 GAINESVILLE Myers Power Tools, 239 E. 16th Avenue
 GROVELAND Harb Tractor Co.
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 Julien P. Benjamin Equipment Co., 2300 McCoys Blvd.
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 LIVE OAK Tyre's Saw and Engine Service, 905 5th Street, N.W.
 MARIANNA 32446 * West Florida Equipment Company
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 PENSACOLA Killinger Marine Company
 PLANT CITY Standard Auto Parts
 POMPANO BEACH Broward Palm Beach Tractor Co.
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 ST. AUGUSTINE Bugeski Sales & Service, 62 San Marco Blvd.
 ST. PETERSBURG Melvin's, Inc.
 Swift Weed Cutter, 326 22nd Ave. N.
 SANFORD Smitty's Snappin' Turtle Garage, P. O. Box 28
 SARASOTA Standard Auto Parts
 TALLAHASSEE Baker Alford Company, 208 N. Adams St.
 TAMPA 33605 * Industrial Supply Corporation, 1800 2nd Avenue
 Frederiksen Enterprises, 5606 S. MacDill Avenue
 M. D. Moody & Sons, Inc., 6001 Hillsboro Ave.
 TITUSVILLE Brevard Tractor Company, Route #1, Box 83B
 VERO BEACH Neely's Repair Shop, 1966 Commerce St.
 WAUCHULA Wilson-Tindell Pump & Supply Company
 WEST PALM BEACH Griffin Equipment Inc., 4115 Georgia Avenue
 WINTER GARDEN M & M Welding Co.

GEORGIA

ADEL Adel Trading Company
 ALBANY 31701 * Blalock Machinery & Equipment Co., Inc.
 105 S. Slappey Drive
 AMERICUS Fox Truck & Tractor Company
 ASHBURN Odom Implement Company
 ATHENS Russell Daniel, Inc., 480 N. Thomas Street
 ATLANTA 30302 * Blalock Machinery & Equipment Co., Inc.
 225 Forsyth St., S.W.
 Stovall & Company, 948 Bankhead Avenue
 W. C. Caye & Co., Inc., 1468 Gordon Hwy.
 AUGUSTA Nimmer Tractor & Implement Company
 BLACKSHEAR Holmam Tractor Company
 BLAKELY Brunswick Battery & Electric Company
 BRUNSWICK Hilton Jones Motor Co., 288 College Street
 COLQUITT Columbus Tractor & Machinery Company, 315 Andrews Rd
 COLUMBUS Mowers & Motors, Inc., 1523 First Avenue
 CORDELE Georgia Implement & Truck Company
 CUTHBERT Randolph Tractor Company, P.O. Box 195
 DALTON J. E. Pitts Garage & Machine Shop, 105 West Waugh St.

DAWSON Foster-Aycock Truck & Tractor
DONALSONVILLE Harvey Implement Co.
DUBLIN Dixie Farm Equipment
EDISON Duke Farm Equipment Company
FITZGERALD Martin Manufacturing Company, P.O. Box 389
HAWKINSVILLE Mashburn Bemby Tractor Company
MACON Forrestry Equipment Company, 4385 Pio Nona Ave.
OCILLA Ocilla Farm Implement Company
OGLETHORPE Macon County Truck & Tractor Company
ROCHELLE Super Service Station
ROME Shorter Ave. Lawn Mower, 1946 Shorter Ave.
SANDERSVILLE Riner Radiator & Battery Company, P.O. Box 235
SAVANNAH Jones Equipment Company
 Morgan's, Incorporated, 111 West Broad Street
STATESBORO Pat Brannen Company
SYLVANIA Sylvania Tractor Company
TIFTON R. E. Carmichael & Company
VALDOSTA Schroer Implement Company
VIDALIA Sea Island Cotton Gin Company, 403 N.W. Main Street
WAYCROSS Waycross Battery & Electric Company, 611 Albany Ave.
WAYNESBORO Brinson Saw Company

* Nixon Machinery & Supply Company
 1300 Carter Street
 Chattanooga, Tennessee 37401

HAWAII

HONOLULU, T.H. 96802 * Honolulu Iron Works Company, Box 3140

IDAHO

BLACKFOOT Kirkham Auto Parts & Service Co.
BOISE 83704 * Arnold Machinery Co., Inc., 5024 Gage St.
BURLEY Elliotts, Inc.
CALDWELL B & M Equipment Co.
GOODING Gooding Tractor & Implement Co., South Main
IDAHO FALLS Tractor Sales & Auto, Inc., 197 Park Ave.
LEWISTON Hodgson Ford Tractor Co., 2934 North & South Highway
MOSCOW State Tractor & Supply Inc., 6th & Washington
MOUNTAIN HOME Mountain Home Auto Parts
TWIN FALLS Leslie Davis & Son

* Arnold Machinery Company, Inc.
 433 West Second South St.
 Salt Lake City, Utah 84110

* Star Machinery Company
 241 Lander Street
 Seattle, Washington 98134

ILLINOIS

ALEDO Thede Company, 213-219 E. 7th St.
ALTON Braun Auto Electric, Inc., 513 Belle Avenue
 Stanka Garage and Marina, 2616 State Street
ARTHUR Kauffman's Sales & Service
BELLEVILLE H. Edwards Farm Equipment Company
 S. 8th Street, Route 13
 Fred Simon's Engine Repair
BLOOMINGTON Bloomington Battery Service Co., 209 So. East St.
CARMI Clinton Murphy Company, 805 E. Main St.
CARTHAGE Smith Implement & Parts Co., 419 Main St.
CASEY Hutton's Parts Service, 14 No. 7th Street
CHAMPAIGN United Auto Supply, Inc., 101 Ea. Springfield

CHICAGO 60623 * Industrial Engine & Parts Company
 2345 S. Pulaski Rd.
 Air Cooled Engine Parts & Supply
 10504 South Halsted Street
 Engines, Inc., 2847 N. Pulaski
 Midtown Ignition & Parts, 3962 South Archer Ave.
 Midwest Handling Inc., 6900 W. 63rd Street
 Bill's Mower & Eng. Repair, 128 Madison St.
CLINTON Lewis Johnson Garage, 310 No. Elizabeth St.
DANVILLE Danville Auto Parts Company, 116 West Main Street
DECATUR Bruce Implement Company, 1845 North 22nd Street
 Combs Service, 339 West Green Street

EAST ST. LOUIS Matt's Mower Mart & Tool Rental, 6127 State Street
 National Auto Supply, 1100 Illinois Avenue
EDWARDSVILLE Madison County Tractor & Equipment Company
EFFINGHAM H & D Motor Service, 111 E. Fayette Ave.
ELGIN Phillips Auto Parts, 370 Brook Street
FAIRFIELD Stephens Oil Field Motor Repair, East Hwy. 15

GARRETT Horton Bros. & Harder
GRAYVILLE Oil Field Motor Service, Inc., Box 98
HARDIN Smith's Garage, West Main Street
HARRISBURG Baker Machine & Supply Co., 626 North Main Street
JACKSONVILLE Cully Implement Company, 222 W. Court St.
JERSEYVILLE C. & W. Equipment Company

JOLIET Zinser-Backstrom Co., 4 North Michigan St.
KANKAKEE Electrical Equipment Co., 231 Dearborn St.

KIRKWOOD Smith Implement Service, 423 Cherry St.
LINCOLN Auto Electric Service, 110 No. McLean St.
LYONS Keen Edge Company, 8615 Ogden Avenue

MARION Patterson Auto Electric, 210 So. Court Street
MATTOON Mattoon Motor Shop, 513 No. 14th Street

MELROSE PARK Hillsman Equipment Co., 2000 North Hawthorne
MENDOTA Kaiser Implement Company

MODESTO Fletcher's Garage

MONTICELLO J. R. Heath & Son

MOUNT CARMEL Deck Hill Battery Co., Third & Market Sts.

MOUNT PROSPECT Charles B. Gray Sales

MOUNT VERNON Ford National Auto Supply Co. Inc., 801 Casey St.

OLNEY Farmers Equipment & Supply Co., 116-120 W. Camp Ave.

PALOS HILLS Portable Equipment Co., 11234 Southwest Highway

PARIS M. Farnham Implement Company, 133 E. Wood St.

PEORIA Power Equipment Co., 3610 Harmon Highway

PONTIAC Wolf's Battery & Electric, 309 No. Oak St.

QUINCY E. M. Chatten Implement Co., 2701 No. 24th Street

ROCKFORD Electric Apparatus Company, 101 Chestnut Street

ROCK ISLAND Lawn & Garden Supply, 2525 South Alpine

SALEM Lohse Lawn & Garden Center, 500 16th St.

SANDWICH Evans Ford Tractor Company, Route 50, West

SOUTH HOLLAND M. Werner & Sons, Inc., 523 E. Church Street

SPRINGFIELD Calumet Farm & Industrial Supply, 16012 Cottage Grove

STERLING James Machinery Co., Inc., 130 W. Jefferson

TAYLORVILLE Burl F. George Company, 118 Dakota St.

URBANA Mylin's Agricultural Store, 221 E. 3rd St.

URBANA R. B. Ream Electric Service, 329 No. Webster St.

URBANA Power Equipment Company, 1810 East University

* Allied Construction Equipment Company
 4015 Forest Park Avenue
 St. Louis, Missouri 63108

* Engine Power, Inc.
 11811 W. Silver Spring Rd.
 Milwaukee, Wisconsin 53218

INDIANA

AUBURN Shorty's Motor Service
BLOOMINGTON Full-O-Pep Company, 424 S. College
COLUMBUS Columbus Auto Supply, 2205 - 25th Street
CONNERSVILLE Winship Tractor & Implement Co.
CORYDON Kenneth H. Brown & Son
EVANSVILLE P. E. Phillips & Son
FORT WAYNE Auto Electric Service, Inc., Harrison & Baker Streets
FRANKFORT Farmers Implement Co.

GARY Lud's Motor Sales, 700 South Clark Road
 GOSHEN Elkhart Co. Farm Bureau Co-op. Ass'n
 GREENFIELD Geo. P. Hinds Garage
 HAMMOND Carstensen's Service Company, 6950 Indianapolis Blvd.
 INDIANAPOLIS 46207 * Eagle Machine Co., Inc., 635 E. Market Street
 KOKOMO Murray & Davis, 928 So. Union Street
 LAFAYETTE Lafayette Auto Parts, 118 S. 4th Street
 LaPORTE Borst Auto & Engine Service, 610 Indiana Ave.
 MADISON Irwin Farmers' Store
 MARION The Challenge Distributors
 MICHIGAN CITY Michigan City Auto Parts, 1007 East Michigan Blvd.
 MOUNT VERNON Stephan Implement Company
 MUNCIE B & K Machine Co., 1215 S. Franklin St.
 NEW CASTLE Stohler Implement Co.
 PENDLETON Wm. Ring & Sons
 PORTLAND Justin Schafer Company
 PRINCETON Adams & Morrow, Inc.
 RICHMOND Remsco, Inc., 1541 South 9th St.
 ROCKVILLE Cummins-Flock Implement Co. Inc.
 SCOTTSBURG Keenan's Radiator Service
 SELLERSBURG A. Diefenbach & Sons
 SEYMOUR Corde's Hardware
 SHELBYVILLE D & S Sales & Service
 SOUTH BEND American Distributing Co.
 SULLIVAN Jared Implement Sales
 TELL CITY Dauby Motor Company
 TERRE HAUTE Smith & Decker, Inc., 1026 Wabash Ave.
 TIPTON F. Ray Hull & Son
 VALPARAISO Ketterman's Sales & Ser.
 VINCENNES Wabash Parts Corp.
 WINCHESTER Carpenter's Auto Supply

* Atlas Machine and Supply, Inc.
 1326-30 W. Jefferson
 Louisville, Kentucky 40203

* Industrial Engine & Parts Company
 2345 S. Pulaski Rd.
 Chicago, Illinois 60623

* Cincinnati Engine & Parts Company, Inc.
 2863 Stanton Ave.
 Cincinnati, Ohio 45206

IOWA

ATLANTIC George's Auto Electric, 207-209 Walnut
 BELMOND Followwill Implement and Seed Company
 BOONE Erickson Auto Electric
 BURLINGTON Frick Motor Company, 801 S. Main St.
 CEDAR RAPIDS Happel & Sons, Inc.
 CLINTON Nelson Auto Electric
 CLINTON Nelson Auto Electric
 COUNCIL BLUFFS Ballinger Automotive Service Company,
 113-17 East Broadway Street
 CRESTON Dieleman Auto Parts
 DAVENPORT Emeis Electrical Service
 DECORAH Decorah Implement Company
 DES MOINES 50308 * Port Huron Mchry. Company, 301 E. Court Avenue
 David Mattson Company
 DUBUQUE Farm & City Distributing Company
 ELDORA Bolar Repair Company
 ESTHERVILLE Electric Motor Service Company
 FORT DODGE Fort Dodge Machinery & Supply Co.
 IOWA CITY Pyramid Services
 KEOKUK Leon Short & Son
 MARSHALLTOWN B & K Company, 112 East Church Street
 MASON CITY Floyd & Leonard Auto Electric Co.
 MOUNT PLEASANT Peterson Implement, Inc.
 MUSCATINE Lamp-Rehwaldt Company
 OSKALOOSA Everett's Magneto & Carb. Service
 OTTUMWA Valley Supply Company, 1200 West 2nd St.

SIoux CITY
 STORM LAKE
 WASHINGTON
 WATERLOO
 WAUKON

Carlson Machine Works, 417-19 Wall Street
 Clough Motor Service
 Loveless Supply Company
 Central Battery & Electric, 217-219 W. 5th
 Valiere Dundee Implement Company

KANSAS

ARKANSAS CITY C & M Engine Service, 1425 So. Summitt St.
 BELOIT Boettcher Supply Company, 120 West Court
 CHANUTE Martin Tractor Company, Box 591
 COFFEYVILLE Acme Foundry & Machine Company, 1502 Spruce St.
 COLBY Gunnels Tractor Co., 145 North Franklin St.
 DODGE CITY Scheufler Supply Co. Inc., 319 West Trail
 EMPORIA Sperman Du-All Fixit, 331 Commercial
 GARDEN CITY Kemper Auto Electric, Stevens Avenue
 GOODLAND Sherman Motor & Implement Co., 1607 Main St.
 GREAT BEND Scheufler Supply Co. Inc., 1515 Kansas Avenue
 HAYS Scheufler Supply Co. Inc., 507 Main St.
 HILL CITY S & W Supply Company, Inc., West Highway 24
 HOXIE Patman Salvage Yard
 HUTCHINSON Reno's Ace Hardware, Inc., 275 So. Main St.
 KANSAS CITY AAA Engine & Electric, Inc., 700 Southwest Boulevard
 LARNED Roth Equipment Co., Inc., 504 North Topeka, Box 310
 LIBERAL Magneto & Electric Co., 522 North Kansas St.
 MARYSVILLE Brauchi Bros., 704 Center St.
 NORTON Norton Implement Company, 218 North First
 PITTSBURG W. A. Thomas Supply, 112 West 3rd. St.
 PLAINVILLE Farm Implement & Supply Co.
 RUSSELL Scheufler Supply Co. Inc., 114 West Wisconsin
 SALINA Vahsholtz Implement Company, 145 South Fifth
 SCOTT CITY Scott City Motor Supply, 408 Main Street
 TOPEKA Martin Tractor Co. Inc., 3320 Topeka Blvd., Box 1698
 WAKEENEY Midwest Marketing Company
 WICHITA 67202 * Harley Sales Company, 505 South Main Street
 WINFIELD Brad's Magneto Electric, 801-807 Manning

KENTUCKY

ALBANY Ferguson Brothers
 ASHLAND Barney Williams Company
 BARDSTOWN Bardstown Auto Parts Company
 BOWLING GREEN Motor Parts Depot
 CAMPBELLSVILLE Kessler Implement Company
 CARMARGO Carmargo Oliver Sales
 CORBIN Central Automotive Supply, 600 Main St.
 CYNTHIANA Harrison Motor Co.
 DANVILLE Triplett Farm Service
 ELIZABETHTOWN Hardin County Implement Company
 EMINENCE Foree Implement Company
 FRANKLIN Harris Feed Company
 GLASGOW G. H. Bowles & Son
 GREENVILLE Wein Auto & Equipment Parts Co.
 HENDERSON Henderson Farmers Supply Company
 HODGENVILLE A. L. Hazle
 HOPKINSVILLE Cayce Mill Supply Company, 505 First St.
 LANCASTER Sanders Supply Company
 LEBANON Farmers Feed & Implement Co.
 LEXINGTON 40501 * Womwell Automotive Parts Co., Inc., 240 Clark St.
 LOUISVILLE 40203 * Atlas Machine & Supply, Inc., 1326-30 W. Jefferson St.
 Ky. Lawn Service
 MADISONVILLE Baker Auto Electric Co.
 MAYFIELD Eaton Dairies Farm Supply Co.
 MAYSVILLE Ellington Farm Machinery
 MOREHEAD Monarch Supply Company
 MORGANFIELD S & K Auto Supply Co.
 MURRAY McKeel Equipment Company
 OWENSBORO E. A. Carter Supply Company, Inc., 511 Frederica St.
 PADUCAH Rasche Cycle Company, 713 Kentucky Street
 PARIS Farmer's Supply

PIKEVILLE Campbell Oil Tool Company, Inc.
 RUSSELLVILLE Russellville Tractor Co.
 SCOTTSVILLE York & Massey
 SOMERSET Somerset Machine Shop
 STURGIS S & K Auto Supply Co.

* Cincinnati Engine & Parts Company
 2863 Stanton Ave.
 Cincinnati, Ohio 45206

LOUISIANA

ABBEVILLE Mayers Hardware Store, 232 S. Main Street
 ALEXANDRIA United Electric and Magneto Service, 825 Tenth Street
 BATON ROUGE Fletcher Equipment & Supplies, 1605 Choctaw Road
 Kerr Lawnmower Center, 2615 Airline Highway
 Wm. F. Surgi Equipment Corp., Seigen Lane at
 Airline Highway
 BASTROP Kinnaird's Small Eng., 411 S. Pine
 COUSHATTA Coushatta Farm Implement Co.
 EUNICE Dovic Fruge Repair Shop
 GOLDEN MEADOW Golden Meadow Electric Shop
 HAMMOND Wendelken Machine Shop
 HARVEY Westside Specialty Co., 3028 Fourth St.
 KAPLAN Vermillion Motor Service, 106 W. Fifth Street
 LAFAYETTE Southland Engine Co., 103 Arnold
 LAKE CHARLES Eagleson Lawnmower Shop, 903 Third Ave.
 LAROSE Welch Sales & Service, P. O. Box 218
 LOCKPORT Lockport Hardware Company
 MINDEN Martin's Cycle & Lawnmower Center
 MONROE Howard Griffin, 712 S. Grand Street
 MORGAN CITY Mike's Fix-It Shop
 NATCHITOCHES Cane River Supply Co. Inc., P. O. Box 908
 NEW IBERIA Voorhies Machine Supply Company
 NEW ORLEANS 70150 * Wm. F. Surgi Equip. Corp., 1149 Tchoupitoulas St.
 OPELOUSAS J. L. Hebert Engine Sales & Service, 111 South Liberty St.
 RAYNE Haure Machine Shop
 RUSTON Montgomery Feed & Seed
 SHREVEPORT Construction Machinery Corp.
 Continental Engine Sales & Service, 2136 E. Texas St.
 United Power Co., P. O. Box 1383
 VENICE Ellzey Marine Supply
 WINNSBORO McLemore Wholesale Grocery

MAINE

AUGUSTA Parker Danner Company, Riverside Drive
 BANGOR H. E. Peabody Co., 100 Thatcher St.
 HOULTON James S. Peabody Company, Bangor Street
 PORTLAND Chadwick-BaRoss, Incorporated, 803 Forest Avenue

* Diesel Engine Sales & Engineering Corp.
 Fish Pier Road
 Boston, Massachusetts 02210

MARYLAND

ANNAPOLIS Farmers Sup. & Equip. Co. Inc., 2024 West St.
 BALTIMORE (34) Alco Engine Company, 1808 Taylor Ave.
 (18) General Supply & Equipment Co. Inc., 530 E. 25th Street
 John C. Louis Co. Inc., 1805 Cherry Hill Road
 BELTSVILLE John S. MacBryde Co., 10511 Tucker St.
 CHASE Chase Lawn Mower Service
 CHESTERTOWN Silver Hill Shop
 CHURCHVILLE Walter G. Coale, Inc.
 FREDERICK Baker's
 FUNKSTOWN (Hagerstown) Lutherville Supply & Equipment Co. Inc.
 108 East Baltimore Avenue
 GAITHERSBURG Norman & Staiger, Inc., P.O. Box 66

HUGHESVILLE South End Garage
 HYATTSVILLE Irons Bros., Inc., 4800 Baltimore Ave.
 MILLINGTON Julian E. Leager, Main Street
 PASADENA Jack's Repair Service, 2460 Mountain Road
 POCOMOKE CITY Pocomoke Foundry & Machine Works
 SALISBURY MacMillan Bros.
 WALDORF Maryland Tobacco Growers

* Potter Equipment Company
 6200 N. Capitol Street, N.W.
 Washington, D. C. 20011

MASSACHUSETTS

BOSTON 02210 * Diesel Engine Sales & Engineering Corp.
 Fish Pier Road
 BROCKTON F. H. Sargent & Son, 1000 Montello Street
 DANVERS Clifford T. Whittaker Company, 3 Hobart Street
 HYDE PARK Parker-Danner Company, Factory Street
 PITTSFIELD Smith Auto Electric Service, Inc., 1328 East Street
 SPRINGFIELD Springfield Auto Electric Service, Inc., 50 Carew St
 WORCESTER Worcester General Repair Shop, 43 Chandler Street

MICHIGAN

ADRIAN Auto Parts Company
 ANN ARBOR Auto Parts Company
 BATTLE CREEK Haddock Brothers, 19 Green Street
 BAY CITY O. J. Herman
 CHARLOTTE Fowler Sales Company
 COLDWATER Treat Auto Parts
 CRYSTAL FALLS H. Malkin & Sons, Inc., 11 Superior Ave.
 DETROIT Arthurs Auto Parts, 837 South Dix
 48227 * R. G. Moeller Company, 14415 Meyers Road
 ESCANABA Escanaba Machine Co., 1704 Ludington Street
 FARMINGTON Mays Nursery, 29900 Ten Mile Rd.
 FLINT Matthews Sales & Service
 GRAND RAPIDS 49509 * R. G. Moeller Company, 2564 Chicago Dr., S.W.
 HARTFORD Walkers Service
 HOUGHTON Vivian Paynter Equip. Corp., U. S. Hwy. 41
 JACKSON Superior Sales & Service, 114 North State
 KALAMAZOO Kalamazoo Impl. Co., 3617 W. U.S. 12
 LANSING Bert Howard Company, 1419 Turner Avenue
 MARQUETTE Carroll Motor Supply, 321 So. Front Street
 MENOMINEE Automotive Products Co., 520 So., 1st Street
 MILBURG L. Gelder & Sons
 MT. CLEMENS Power Equipment Distributors on Gratiot Avenue
 MT. PLEASANT Ben Traines & Sons, Inc.
 MUSKEGON H. G. Davis & Son
 Great Lakes Equipment Co., 1461 Evanston Avenue
 NILES Klute Electric
 PONTIAC King Brothers, 2391 Pontiac Road
 RICHMOND J. C. Ernst
 SAGINAW Youngs Farm Equipment, 4135 East Rd.
 SCOTTVILLE Howard Thiel
 ST. CLAIR SHORES D'Haem's Tool Rental
 SAULT STE. MARIE Electric Equipment Company
 TRAVERSE CITY Mapleton Garage, RFD No. 1
 TRENTON Dix Equipment Co., Dix Toledo Highway

(Northern)
 * Engine Power, Inc
 11811 W. Silver Spring Rd.
 Milwaukee, Wisconsin 53218

MINNESOTA

ADA Munter Motor Service, 403 We. Thorpe Avenue
 CHASKA Molnau Implement Company

CROOKSTON Hegland Motors, 811 South Main Street
DULUTH Ray's Auto Shop & Supply, 339 So. 1st Avenue East
EAST GRAND FORKS Johnson Iron & Machine Co., 1201 DeMers Ave.
FAIRMONT International Town & Country Equipment Co.,
921 North State Street
FERGUS FALLS Worner Rambler Co., 321 So. Mill St.
HIBBING Horn Electric Service, 1923 - 2nd Avenue, East
HUTCHINSON C. H. Stocking Company, 218 Main St.
MANKATO Cutkosky & Jones, Jct. Highways 22 & 83 S.E.
MINNEAPOLIS-ST. PAUL
R. L. Gould & Company, 500 Jackson Street (St. Paul)
Industrial & Truck Parts, Inc., 4135 Hiawatha Avenue
Minneapolis Equipment Company
520 Second Street S.E.
Engine Parts Supply, Inc.
1221-9 Harmon Place
Zeco Company, 9033 Lyndale Ave. So.
Campbell Implement Company, 311 So. First St.
Koehl Sales & Service, 1012 Atlantic Ave.
Griebel Implement Company, 500 No. Front Street
C. J. Ost Farm Implement Company, 114 Rose St.
Schultz Impl.
Preston Iron Works, Mill St.
Behrens Auto Supply Co., 211 Main St.
Falls Implement Company
Alexander Auto Electric Co., 410 - 6th Avenue
Vos Mower Service, 1900 7th St. No.
Northern Engine & Supply, Box 111
Johnson Implement Co., 112 Tenth Ave. S.E.
John Peterson Implement Company, Box 311
Auto Electric Service Co., Cor. 2nd & Johnson
Western Implement Company, 508 Oxford St.

MONTEVIDEO
MORRIS
NEW ULM
OWATONNA
PLAINVIEW
PRESTON
RED WING
REDWOOD FALLS
ROCHESTER
ST. CLOUD
VIRGINIA
WASECA
WILLMAR
WINONA
WORTHINGTON

* Engine Power, Inc
6336 Lakeland Avenue, North
Minneapolis, Minnesota 55429

MISSISSIPPI

ABERDEEN Brown Auto Parts
CLARKSDALE Wilson Tractor Co.
CLEVELAND George's Lawn Mower Service
COLUMBUS Bidly Saw Works
GREENVILLE Thompson Battery & Electric Company
GREENWOOD Mississippi Tractor Parts & Implement Co. Inc.
GRENADA J. H. Bidly & Sons
GULFPORT Gulfport Battery
HATTIESBURG Carburetor & Ignition Company, 109 Green Street
Taylor Machinery Corp., Broadway at 63rd St.
Bellipanni Brothers
Taylor Machinery Corp., U. S. Hwy. 80 at S. Gallatin
Buck's Service Shop
Laurel Devine Sales & Service, 329 N. Maple Street
Louisville Taylor Machine Works
McCOMB Guyton's Auto Electric, 125 S. Broadway
Meridian Kelley-Williams Co.
Natchez Hammett Supply Company
Pascagoula Bell Auto Parts, 735 Telephone Rd.
Quitman Reliable Welding & Radiator Company
Rolling Fork Motor Parts, Inc.
Tunica Planters Tractor & Implement Company
Tupelo Tupelo Farm Equipment Company
Vicksburg Melsheimer's Garage, P. O. Box 739
West Point Clieft Auto Parts Company
Yazoo City Motor Parts Co.

* Wm. F. Surgi Equipment Company
1149 Tchoupitoulas St.
New Orleans, Louisiana 70150

* RCH Distributors, Inc.
92 W. Carolina Avenue
P. O. Box 2828,
Memphis, Tennessee 38102

MISSOURI

CANTON Canton Implement Company
CAPE GIRARDEAU Schneider Equipment Company
Highway 61 & Bloomfield Road
CHILLICOTHE Kaye Implement Company
COLUMBIA Blackmore's Automotive Service, Inc.,
Highway 40 & Garth
ELLISVILLE Ed's Lawn and Garden Shop, 1325 Manchester Road
HAMILTON Hamilton Supply Company
INDEPENDENCE Al's Farm & Garden Equipment, 1622 West 24 Highway
JEFFERSON CITY Harry Blackwell, Inc., 420 Jefferson Street
JOPLIN Motor Electric Service, 622 Wall Street
KANSAS CITY 64105 * A. A. Klughart Machinery Company
1205 Woodswether Road
Automotive Equipment Service, 3117 Holmes Street
MARSHALL Whitlock Coal & Implement Company
MARYVILLE Lewis G. Moore Tractor & Implement Co.
MEXICO T & H Auto Supply
MONETT Gaetz Service & Supply Co.
MONTGOMERY CITY Ray Oliver
PERRYVILLE Prost Implement Company
PLATTSBURG Long Farm Supply Company
POPLAR BLUFF Vernon's Implement Co.
RICHMOND Stuart Machine Company
ROLLA Ozark Equipment Company
ST. JOSEPH Farm Supply Company
ST. LOUIS 63108 * Allied Construction Equipment Company
4015 Forest Park Avenue
(31) Outdoor Equipment Co. Inc., 12012 Manchester Rd.
George F. Smith Company, 755 South Lindberg
Wollgast Supply Company, 2783 Dunn Road
Gibson Implement Company
Hay's Saw & Mower Center, 115 South Handy
Springfield Cave Carburetor Exchange, 307 W. Pershing
Trenton Tractor Sales & Service
Washington Hartbauer Auto Parts Co.
West Plains VanderTook's Diesel, North Highway 63, SS Route, Box
North Highway 63, SS Route, Box 140B

SEDALIA
SIKESTON
SPRINGFIELD
TRENTON
WASHINGTON
WEST PLAINES

MONTANA

BIG TIMBER Starr Motor Company
BILLINGS 59101 * Midland Implement Co., Inc., 402 Daniels
Hustad Implement Co.
BOZEMAN Brennan Tractor Co.
BUTTE Automotive Supply Company
CHESTER Chester Implement Company
Tiber Tractor Company
CHOTEAU Simms Elevator, Inc.
CONRAD Farmer Supply Co-op
CUT BANK Service Supply
DILLON Southmont Tractor Co.
DUTTON T. J. Cheatham & Son
FORSYTH Wallin Mercantile Company
FT. BENTON Missouri River Lumber Co.
GLASGOW Farm Equipment Sales Company
GLENDDIVE Kampschorr Implement Co.
Milne Implement Company
GREAT FALLS Johnson Farm Equipment, Inc.
Midland Implement Company, Inc
Hamilton Motor Supply
HARDIN Big Horn Implement Co.
HARLOWTON Brown's Ranch Supply
HAVRE Farm & Ranch Equipment Co.
HELENA Steffek Equipment Company
KALISPELL Modern Equipment Company
Stedje Brothers
LEWISTOWN Horning Implement Co.
MALTA Malta Auto Company
MILES CITY Miles & Ulmer
MISSOULA Bedford Implement Company

PLENTYWOOD
RED STONE
SHELBY
SHERIDAN
SIDNEY

TOWNSEND
WHITEHALL
WOLF POINT

Holje Implement Company
Nash Brothers Garage
K & T Hardware, Inc.
Halse Motors
Richland Machinery Co.
Sidney Carburetor & Electric Co.
Neifert White Co.
Pehl Implement & Supply
Moe Motor Co.

NEBRASKA

BEATRICE
BROKEN BOW
CHADRON
COLUMBUS
CRAWFORD
DORCHESTER
FREMONT
GENEVA
GORDON
GRAND ISLAND
GRANT
HASTINGS
HOLDREGE
IMPERIAL
KIMBALL
LEXINGTON
LINCOLN

LYONS
McCOOK
NORFOLK
NORTH PLATTE
OMAHA
ORD
PIERCE
SCHUYLER
SCOTTSBLUFF
SIDNEY
VALENTINE
WEST POINT
YORK

Henderson Farm Equipment Company
Sprague Electric Service
Pirnie Bros.
Chadron Implement
Automotive Sales and Service
Bruer and Son Company
Bill's Garage
Auto Electric
Chaney Implement
Modern Equipment
Reitan's, Inc.
Andrews & Son
Sherman Service Center
Bierman Service
Prior's
Rohrbaugh Farm Equipment
Ray's Repair Shop
* Port Huron Machinery & Supply Company
801-813 'Q' Street
Nelsen Farm Equipment
Kleins Motor & Electric
Harry's Motor
Frank's Farm Equipment
American Auto Service, 1116 Jackson Street
Howard Huff
Kolterman Service Company
Hamata Bros.
Keeley Auto Electric Inc.
Larson Machinery Co.
Lutter Implement Company
Zobel Farm Store
Nabers Automotive

NEVADA

ELKO
FALLON
LAS VEGAS
LOVELOCK
RENO
WINNEMUCCA
YERRINGTON

Bellinger Motors Sales & Service, 608 Commercial St.
I. H. Kent Company
Blystone Equipment Co., 3184 Fremont
Carpenter's, Inc., P. O. Box 500
Air Service Company, 241 South Virginia Street
Etchart Machinery, Box 168
Nevada Equipment Company

* E. E. Richter & Son, Inc.
6598 Hollis Street
Emeryville, California 94608

* Lanco Engine Services, Inc.
12915 Weber Way
Hawthorne (Los Angeles), California 90252

* Arnold Machinery Company, Inc
433 West Second South Street
Salt Lake City, Utah 84110

NEW HAMPSHIRE

CONCORD
MANCHESTER
WALPOLE

New Hampshire Explosives & Machinery Company
323 South Main Street
Dunbar Farm Equipment Company,
Daniel Webster Highway & West Hale Ave.: Hooksett
R. N. Johnson, Inc., Bellows Falls Road

* Diesel Engine Sales & Engineering Corporation
Fish Pier Road
Boston, Massachusetts 02210

NEW JERSEY

BELLMAWR
BLAWENBURG
BRIDGETON
FLEMINGTON
HIGHLAND PARK
HIGHTSTOWN
HILLSIDE
JERSEY CITY
LINWOOD
MORRISTOWN
NEWARK
RED BANK
RIDGEWOOD
TRENTON

VINELAND
WESTFIELD
WOODSTOWN

Lawn Mower Parts, Inc., 717 Creek Rd.
J. Perry Van Zandt
Serata Sons Co., 53 So. Pearl Street
Flemington Farm Equipment Company
Kish Bros., 179 Woodbridge Ave.
Hights Farm Equipment
Equipco, 620 Ramsey Ave.
Wishbow Bros. Inc., 696 Communipaw Avenue
Seaview Service & Supply Co., 1904 Shore Rd.
American Auto Parts, 8 Mt. Kemble Avenue
Bell Magneto Service, 191 Second Street
J. H. Kelly Company, 157 Broad Street
Ace Motor Company, 33 Douglas Place
Bill Blackwell's Garden Supplies, 1962 Olden Street
(8) Equipco-Trenton, Inc., 303 Whitehead Road
Pagano Bros. Inc., 416 Wood Street
Storr Tractor Co., 469 South Ave., East
Owen Supply Company, East Ave. & Broad St.

* John Reiner & Company
94-15 150th Street
Jamaica, New York 11435

* Jos. L. Pinto
5918 Baltimore Avenue
Philadelphia, Pennsylvania 19143

NEW MEXICO

ALBUQUERQUE
87101

ARTESIA
CARLSBAD
CIMARRON
CLOVIS
FARMINGTON
GALLUP
HATCH
HOBBS

LAS CRUCES
LAS VEGAS
LOVINGTON

PORTALES
RATON
ROSWELL
SANTA FE
SPRINGER

Carson & Ellis, Inc., 2401 First St.
Central Auto Electric Co., 808 Second Street, N. W.
Lively Equipment Company, 2601 - 4th N. W.
Motor Machine Company
Hall Machinery
Cimarron Merchandise
Tucker Equipment Co., 2119 W. 7th
Justis Supply Company
Tony Ray, 210 West Maloney
Archer Company
Magneto Service & Supply
Engine & Industrial, 1010 Broadway
Cruces Auto Supply, Inc., P. O. Drawer "B"
J. S. Torres Stores
Magneto Ignition Company
Marks Engine Service, 1410 S. Love
White Equipment Co., P. O. Box 177
Mack & Sons Marine, 695 Collier
Savage Brothers Electric
Santa Fe Auto Electric
Springer Service & Supply, P. O. Box 608

NEW YORK

ADAMS CENTER
AUBURN
BATAVIA

The Talcott Falls Tractor Sales, Inc. Route 11
Wayne Auto Electric, 26 E. Genessee St.
Devener Automotive Supply, 238 West Main Street

BINGHAMTON Norton's Service, Inc., 359 Court Street
 BOLIVAR Bolivar Magneto Co., 65 Wellsville St.
 BUFFALO Fox Equipment Co., 2018 Seneca Street
 CANANDAIGUA Donald Howard, Hopewell Center Road
 CANTON Canton Auto Parts
 EAST AVON Mark J. Davin
 EAST WALDREN Master Equipment, Route 52
 ELMIRA Ritter's Automotive Electric Service, 307 Railroad Ave.
 FREDONIA P. J. Zebrasky & Son, East Main Road
 GLOVERSVILLE McCue's Auto Parts, Inc., 70 North St.
 GOSHEN Gar-Dun's, Inc., R.D. 2, Finnegan's Corners
 GOUVERNEUR Gouverneur Auto Parts & Supply Co., 16 Park Street
 HUDSON Pitcher Accessories, Inc., 732 Columbia Street
 HUNTINGTON STATION Island Auto Parts, 995 New York Ave.
 JAMESTOWN Jamestown Unit Parts Co., Inc., 208 W. Fourth Street
 KINGSTON Ulster Foundry & Machine Corp., 20 St. James Street
 LAKE GEORGE Smith Equipment, Rte. #9 South
 LIBERTY Charles E. Lennon & Son, Revonah Park
 MARLBORO Ralph C. Herman Company, Route 9W
 MASSAPEQUA PARK (LONG ISLAND) George Smith & Sons, Inc.,
 4736 Sunrise Highway
 MASSENA V. S. Jerry & Sons Corp., East Orvis St. Road
 MIDDLEPORT Clayton & Dickenson, R. D. Route 104
 NEW YORK CITY 11435 * John Reiner & Company

94-15 150th Street, Jamaica
 NORTH WHITE PLAINS Austin & Barrett, 868 North B'dway
 NORWICH Grannis & Stratton, White Store Road
 ONEONTA Oneonta Tire & Auto Parts, 116 Main St.
 PLATTSBURG Vincent S. Jerry & Sons, Inc., 5 Macdonough Street
 POUGHKEEPSIE Waelde the Welder, 6 North Clinton Street
 RIVERHEAD Tryac Truck & Equip. Company, Pulaski Street
 RENSSELAER Van's Equipment Sales, Inc., Route 9 & 20
 ROCHESTER Keystone Builders & Supply Company, 85 Palm Street
 SCOTIA Scotia Machine & Tool Co., Inc., 8 John St.
 STATEN ISLAND Forest Equipment Co., 1319 Forest Avenue
 SYRACUSE 13208 * John Reiner & Co., Inc., 2250 Park Street
 UTICA Stiefvater Electric Co., 320 Lafayette Street
 WASHINGTON MILLS Halligan & Roberts, Route 8
 WILLIAMSON Ralph A. Verbridge, Route #104
 WOLCOTT Wolcott Implement Co., 79 Lake Avenue

NORTH CAROLINA

AHOSKIE L. S. Jernigan & Son, Company
 ALBEMARLE Ivey Sales Co. Inc., 138 S. Depot St.
 ASHEVILLE R. T. Clapp Company, Inc., 201 Cox Avenue
 BEAUFORT Barbour Marine Supply, Front Street
 BURLINGTON Clifford Foster Repair & Parts Co.
 1523 East Webb Avenue
 CHARLOTTE Arrow Construction Equipment Co.,
 1415 Independence Blvd.
 Contractors Service & Rental, Inc.,
 317 West Worthington Avenue
 H. B. Owsley & Sons Co.
 DURHAM Colvard Farm Equipment Co., 748 E. Greer St.
 ELIZABETH CITY Farmers Supply Co., 208 S. Water St.
 ENFIELD Enfield Tractor Company, 147 E. Whitfield Street
 FARMVILLE Farmville Implement Company
 FAYETTEVILLE Eastern Turf Equipment, Inc., 148 Maxwell Street
 Edmac Truck Sales & Service, Dunn Road
 Johnson-Sherman Co.
 GOLDSBORO 27402 * King-McIver Sales, Inc., So. Elm St. Extension
 GREENSBORO R. F. McLawhon & Sons Co.
 GREENVILLE Farm Tractor & Equipment Co., 231 E. Montgomery St.
 HENDERSON The Flowers Co.
 HICKORY Johnson-Sherman Co.
 KINSTON John Blue Company
 LAURINBURG Leonard Machine Company, 100 West Fifth St.
 LEXINGTON Johnson Cotton Company
 LUMBERTON Southwest Equipment Company
 NEW BERN S. M. Crocker & Sons
 RALEIGH Harding & Grizzard, Inc., 300 Roanoke Avenue

ROCKY MOUNT Browning Auto Parts, 205 E. Thomas Street
 SANFORD Mann Implement Company, 312 S. Endor Street
 SHELBY Lutz-Yelton Tractor & Truck Co., 400 N. Lafayette St.
 WASHINGTON W. C. Mallison & Sons, Company
 WHITEVILLE Elliott Implement Co., Highway 701 South
 WILLIAMSTON Reddick Equipment Co., Highway 64 West
 WILMINGTON Hundley Equipment Co.
 WINSTON-SALEM Arrow Construction Equipment Company

NORTH DAKOTA

BACKOO Holen Repair Shop
 BEACH Dakota Farm Equipment
 BEULAH Unruh Garage
 BISMARCK Bismarck Farm Equipment
 BOTTINEAU Olson Equipment Company
 BOWMAN Pond's Implement
 COOPERSTOWN Farmers Oil Co.
 CARRINGTON Frank Johnson Implement Inc.
 CROSBY Sortland Implement
 DEVILS LAKE M. & I. Electric Company
 DICKINSON Decker Implement
 DUNN CENTER Dunn Center Motor Co.
 FARGO 58103 * Fargo Farm Equip. Sales Co., Inc., P.O. Box 1911
 Rent or Buy
 WELLS COUNTY IMPLEMENT
 GRAFTON Grafton Auto & Electric
 GRAND FORKS Rent or Buy
 HARVEY Nelson Auto & Implement
 HETTINGER Hettinger Farm Equipment
 HILLSBORO Rent or Buy
 JAMESTOWN A & D Diesel
 LANGDON Ray Lebrun
 LINTON Schotz Auto & Implement
 LISBON Sturdevant's Auto Electric
 MINOT Motor Service Company
 MINTO Super Service Garage
 NAPOLEON Sievert Implement & Auto
 Hopkins & Kipp Auto Electric, 315 Bowery Ave.
 Western Implement
 NEW ENGLAND Page and Anderson, Inc.
 NEW ROCKFORD Ray Anderson Implement
 NORTHWOOD Tedin Implement
 OAKES Welander & Son Implement
 ROLLA Dan's Aviation
 RUGBY Nelson Implement Company
 STANLEY Farmotor, Inc.
 VALLEY CITY Sturdevant's Auto Electric
 WAHPETON Wicklander Machine
 WASHBURN Electric Magneto Service Co.
 WILLISTON

OHIO

AKRON Gauer Service & Supply, 676 Waterloo
 Hopkins & Kipp, 348-352 W. Bowery St.
 ASHLAND Dilgard Auto Parts, 312 Cleveland Avenue
 ASHTABULA Friends Auto Electric
 CADIZ Cadiz Mfg. Company, Buffalo St.
 CANTON Arch-Linder Tractor & Equip. Co.,
 3709 Columbus Rd., N.E.
 CECIL Harts Auto Parts
 CINCINNATI 45206 * Cincinnati Engine & Parts Co., Inc., 2863 Stanton Ave.
 Farm Implements, Inc., 9770 Montgomery Road
 CLEVELAND Brooklyn Tractor & Mower Co., 247 Brookpark Rd.
 Industrial Engine Parts, Inc., 1437 East 32nd St.
 COLUMBUS 43212 * McCune & Co., Inc., 1066 Kinnear Road
 Machinery & Tool Rentals, 511 West Town St.
 Ohio Auto Parts Company, 4th & Spring St.
 DAYTON Flack Equipment Company, 1240 McCook Ave.
 Ludlow Ignition
 EATON Barber & Conley

FINDLAY Phil Burt Implement, 1501 Lima Avenue
 GEORGETOWN East End Garage
 GREENVILLE Batten's Electric & Magneto Service Co.
 HAMILTON Savage Auto Supply Co., 630 Maple Ave.
 HURON Huron Auto Parts Co., 808 Williams St.
 LEBANON McCurley Implement Company
 LIMA Lima Flack Equipment
 MANSFIELD Oaklief Saw & Mower Service, 1074 Lucas Rd.
 MARIETTA Marietta Ignition, Inc., 181 Front St.
 MENTOR Mentor Elevator Company, 927 Center Street
 MIDDLEBURG Scholarie Equipment Co., Route #30
 MIDDLETOWN Schrock's, Inc., 801 Yankee Rd.
 MILLERSBURG Plains Machine Shop, R. D. No. 5
 NORTH RIDGEVILLE Worcester Sales & Service
 PORTSMOUTH Staker Sales & Service, 1424 9th St.
 SPRINGFIELD S.A.F. Implement Co., 1837 Columbus Ave.
 STEUBENVILLE Tobin Auto Electric, 807 Market Street
 TIFFIN Earl J. Crane, Inc.
 TOLEDO Toledo Auto Electric, 35 - 17th Street
 VAN WERT Van Wert Tractor Sales
 WALBRIDGE V. E. Peterson Company, Box 183 R.D.
 WARREN Automotive Incorporated
 WILMINGTON Compton Metal Products
 YOUNGSTOWN 44515 * McCune & Co., Inc., 3721 Mahoning Avenue
 Electric Equipment Company, 22 W. Myrtle Avenue

* Eagle Machine Company, Inc
 635 E. Market Street
 Indianapolis, Indiana 46207

OKLAHOMA

ADA Ada Auto Supply, 301 East 12th Street
 ALTUS Altus Electric & Engine Service, 210 South Hudson
 BARTLESVILLE Keystone Supply Company, 543 South Rogers
 BLACKWELL Crawford Welding & Magneto Service, 122 East Frisco
 BRISTOW Standard Auto Parts Co., 205 East Seventh
 CHANDLER Stinchcomb Implement Co., 906 West 15th Street
 CHICKASHA Sheppard's Supply, 111 So. 6th St.
 CUSHING DeJarnett Battery & Electric Co., 216 West Broadway
 DUNCAN Motor Parts & Service, 209 North 7th Street
 DURANT Williams Implement Company, 115 South 2nd Street
 EAKLY King's Irrigation Sales & Service, Route 3
 ENID Brueggemann Supply Co., 412 North Independence
 HEALDTON Lewis Magneto & Supply
 HUGO Hugo Implement Company, 1104 West Jackson
 LAWTON C & E Supply Company, 207 "D" Avenue
 MUSKOGEE Victory Motors, 215 North Cherokee
 NORMAN Sandlin Tractor Co., Route 2 - Box 47
 NOWATA Keystone Supply Company
 OKLAHOMA CITY City Auto Parts & Machine, 31 Northeast 10th Street
 Industrial Engine Parts & Machine, Inc.
 1016 Northwest First St.
 PAULS VALLEY Ed Jackson Machine Shop, 301 West Paul
 PERRY Wurtz & Wurtz Motor Company, 624 Elm Street
 PONCA CITY Edwards Equipment Co., 401 South First Street
 SEMINOLE Magneto Ignition Co. Inc., 106 North 4th Street
 SHAWNEE Abernathy Engine Works, 708 East Main St.
 TULSA * Harley Sales Company, P. O. Box 1259
 WALTER Copeland Equipment Company

OREGON

ALBANY Herrold and Jensen Implement Co., Box 321
 BEND Moty & Van Dyke Inc.
 BURNS Oards Service & Garage
 CANBY Canby Motor Parts, Box 877
 COOS BAY Coos Bay Marina, Box 1011
 CORVALLIS Herrold & Jensen Impl., 1950 So. 3rd.
 EUGENE J & J Power Equipment, 1305 W. Sixth
 GRANTS PASS Stewarts Small Engine Service, 509 S. W. G. Street

GRESHAM Vic's Motors, 1821 E. Powell
 HAINES Haines Commercial Equipment Co.
 HARBOR Allied McCulloch, P.O. Box 186
 HILLSBORO Hillsboro Impl. Co., 31675 Tualitan Valley Hy.
 HOOD RIVER Central Sales Inc., Route 4
 KLAMATH FALLS Moty & Van Dyke, Inc., Box #801
 LAKEVIEW Albertson Tractor Co., Box 828
 LEBANON Moty & Van Dyke Inc.
 MC MINNVILLE Cascade Tractor & Implement Co., Box 146
 MEDFORD Eatherton Engine & Equipment Co., 335 E. McAndrews Rd.
 PENDLETON Oregon Motor Service, P.O. Box 258
 PORTLAND A. S. E. Supply Company, 431 N.W. 9th
 Hamilton Engine Sales, 2580 N. W. Upshur
 97210 * Independent Distributors, 2355 N.W. Quimby St.
 Welders Supply Co. Inc., 2313 N. E. Union
 RICKREALL Rickreall Farm Supply
 REDMOND Kelsey's Electric, P. O. Box 1442
 ROSEBURG Le Bleau Motors, Inc., 319 S.E. Jackson
 SALEM E. H. Burrell Company
 SILVERTON Cascade Farm Machinery, 709 McClaine St.
 THE DALLES Dielschneider's Inc., P.O. Box 500
 WOODBURN Witham Garden Center, 894 N. Pacific Hiway

PENNSYLVANIA

ALIQUIPPA Walters Farm Service, R. D. 1
 ALTOONA Maximon Machine Co., 801 N. Logan Blvd.
 BEAVER FALLS Reliable Motor Parts Co., 1700 Seventh Ave.
 BELLEVILLE Samuel Crissman Service Station
 BETHLEHEM Eastern Chain Saw & Supply Co.,
 R. D. 2, Nazareth Pike
 BIGLERVILLE Adams County Fruit Packing Company
 L. W. and M. S. Kleinfelter
 BRADFORD Tool "n" Toy Service Center
 BRYN MAWR Aviation Automotive Parts, Inc., 899 Penn St.
 BUTLER Hoffman Auto Parts, 237 West Jefferson Street
 CHAMBERSBURG Paul Byers
 CLARION Furlong Service
 CLEARFIELD Gray Storage Battery Co., 212 E. Locust Street
 CONNELLSVILLE Back Creek Lumber Company
 DOYLESTOWN Doylestown Agricultural Co.
 DRUMS Highway Equipment & Supply Co.,
 U. S. Route 309, P. O. Box 127
 EASTON Easton Electrical Devices
 EPHRATA (Lancaster County) * Hamilton Equipment, Inc., P. O. Box 178
 ERIE Jorgensen Garage, 1929 West 26th St.
 GREENCASTLE Meyers Farm Supply Co.
 GREENSBURG Auto Electric & Brake Service, 107 Urania Ave.
 HANOVER W. L. Sterner, 516 Frederick Street
 HARRISBURG Highway Equipment Company, 5100 Paxton Street
 JOHNSTOWN Battery & Electric Corporation, 700 Franklin Street
 KINGSTON Standard Equipment Company
 LANCASTER Bart's Repair & Service, 1952 Landis Valley Rd.
 L. H. Brubaker, R. D. 4
 LEBANON Krall Battery & Ignition Company, 5th & Cumberland St.
 Elmer Plasterer, Inc., 26 Evergreen Road
 MARION CENTER W. R. Wynkoop Company
 MARTINSBURG Forshey's Feed & Grain Company
 MEADVILLE Mason's, Inc., 182 Mead Avenue
 MONTOURSVILLE Keebler's Feed & Farm Supply
 NEW CASTLE Storage Battery & Electric Service
 NEW HOLLAND A. B. C. Groff
 Hochstetler's Magneto Service, 243 E. Franklin Street
 NEW PROVIDENCE Walter McVey
 NORRISTOWN Edelen & Boyer Co., 1502 DeKalb Pike
 PHILADELPHIA 19143 * Jos. L. Pinto, 5918 Baltimore Avenue
 (32) Cline-Thornton, Inc., 3307 Old York Rd.
 (19) Lawn & Golf Supply Co., 6701 Chew Avenue
 Jack M. Lotsey, 863 N. 28th St.
 (14) Messick & English, 9240 State Road
 (39) The Ransome Corporation, 5526 Arch St.
 Service Supply Corporation, 20th St. & Erie Ave.
 Thompson Rubber Co., 5222 North Fifth St.

PHOENIXVILLE Lawn & Golf Supply Co., 647 Nutt Road
 PITTSBURGH 15212 * Contractors Equipment Service Company
 1415 Brighton Road, N. S.
 Vitte's Mower Center, 969 Castle Shannon Blvd.
 ST. MARY'S St. Mary's Super Service
 SCRANTON Penn Auto Service & Supply, 711 Mineral Avenue
 SHAMOKIN Shamokin Cycle Shop, 212 West Independence Street
 SILVERDALE I. G. Rosenberger Company
 SPRINGS (Somerset County) Miller Brothers
 TOWER CITY Tallman Supply Co.
 TUNKHANNOCK Gay-Murray Company
 VERONA Certified Auto Parts, 730 Allegheny River Blvd.
 WASHINGTON Kimble Farm Equipment, 2585 Jefferson Avenue
 WEST CHESTER Fruit Growers of Chester County
 250 South Franklin Street
 WEST READING Berkleigh Tractor Div., Seaman Mill Supplies
 200 Penn Ave.
 YORK Burgard Bros., West and Philadelphia Street

* McCune & Company, Inc.
 3721 Mahoning Avenue
 Youngstown, Ohio 44515

RHODE ISLAND

EAST PROVIDENCE J. J. Gregory & Son, Inc., 77 Highland Avenue
 * Diesel Engine Sales & Engineering Corp.
 Fish Pier Road
 Boston, Massachusetts 02210

SOUTH CAROLINA

ANDERSON Foundry & Steel Company
 CHARLESTON Craven Auto Electric Co.
 COLUMBIA 29202 * Columbia Supply Company, 823 Gervais Street
 CONWAY Eastern Sales Company
 FLORENCE Planters Equipment & Supply Co.
 GREENVILLE Greenville Implement Company
 Battery & Electric Company
 GREENWOOD Bourne Auto Parts Company
 HEMINGWAY Stuckey Bros. Farm Supply
 KINGSTRÆE King Equipment & Supply Co.
 LAKE CITY Johnson Cotton Co.
 MARION Atkinson Implement Company
 NEWBERRY Shealy Tractor & Implement Co.
 ORANGEBURG Shulers Small Engine Service
 ROCK HILL Hallman Battery & Ignition Company
 SENECA Wigington Saw & Equipment Company
 SPARTANBURG Spartan Automotive, Inc., 300 West Main Street
 SUMTER Booth Boyle Livestock Company

SOUTH DAKOTA

ABERDEEN Paisley Auto Supply, Inc.
 BELLE FOURCHE Hoseth Auto Electric
 BRITTON Thorpe Auto Company
 BROOKINGS Robertson Auto Electric Company
 CHAMBERLAIN Chamberlain Motor
 GETTYSBURG Hottman Implement Company
 HOWARD Frank J. Dold
 HURON General Auto Electric
 ISABEL Automotive Company
 LEMMON Hersrud Implement Co.
 McLAUGHLIN McLaughlin Implement
 MITCHELL United Auto Parts, Inc.
 PLATTE Home Implement Company
 RAPID CITY Johnson Machine Company

REDFIELD Spink County Farm Implement
 SELBY Jake Rabenberg Implement
 SIOUX FALLS 57101 * Dakota Iron, Box 934
 STURGIS Black Hills Implement Co.
 WATERTOWN Marquardt's Service & Supply Co.
 YANKTON Swenson Repair

TENNESSEE

BRISTOL LeRoy M. Hull Company, 1201 West State Street
 CHATTANOOGA 37401 * Nixon Mchry. & Supply Co., Inc., 1300 Carter St.
 DYERSBURG J. M. Collins Auto Parts
 JACKSON Jackson Bearing Company
 Wilson Outdoor Equipment Co.
 JOHNSON CITY Young Supply Company
 KINGSFORT Cox-Mills Machinery Co., 402 E. Market St.
 KNOXVILLE Nixon Machinery & Supply Co., Inc.
 4717 Clinton Highway
 LEBANON Lebanon Auto Parts Company
 MARYVILLE Lane Auto Services, 1703 East Broadway
 MEMPHIS * RCH Distributors, Inc.
 92 W. Carolina Avenue
 P. O. Box 2828,
 Memphis, Tennessee 38102
 Choctaw, Inc., 1184 Tupelo
 Hawkins Equipment Company, 1475 Thomas Street
 Mid-South Small Engine Service
 NASHVILLE 37210 * Nixon Machinery & Supply Co., Inc.
 208 Crutchfield Avenue
 Wilder Motor Co., 126 - 14th Ave., North
 SO. FULTON Duke's Auto Parts Company

TEXAS

ABILENE Carter Engine & Equipment Co., 2316 Pine Street
 Hoppe Auto Electric Co., 157 Burger Street
 ALICE Oilfield Motor Service, Drawer 90, 301 W. 1st
 ALVIN Christianson-Keithley Company, Box 869
 AMARILLO Wilson Battery & Electric Service, 618 Jackson Street
 ANDREWS Magneto Service & Supply, 906 S. Main
 ARLINGTON Witch Equipment Co. of North Texas,
 316 North West Street
 ATHENS S. P. Barkley Company, South Carroll & Madole Streets
 AUSTIN Austin Machine & Grinding Company
 201 East First Street
 BAY CITY M. J. Denn & Son, 1308 Avenue F
 BAYTOWN Sims Repair Shop, 1205 North Fifth
 BEAUMONT Oil City Tractors, Inc.
 3999 South 11th Street (Box 710)
 Teel's Maintenance & Supply Co., 1110 South 4th St.
 BEEVILLE Roberts & McKenzie, Inc., Box 1030
 BIG SPRING Hall Auto Parts, Box 1367
 BONHAM Brown Tractor Company, Route #1
 BORGER Radcliff Bros. Electric Co., 504 East Tenth
 BOWIE Bowie Machine Works, Inc., Drawer 630
 BRENHAM Washington County Tractor Co. Inc.
 304 Lubbock (Box 885)
 BROWNFIELD Brownfield Magneto & Electric Company
 702 Lubbock Road
 BROWNSVILLE Bill Grindle Auto Electric Company, 953 East Adams
 BROWNWOOD Carlson's, Clark & Anderson Streets
 BRYAN Bryan Tractor & Implement Company
 1008 West 25th Street (Box 512)
 CLEBURNE Zimmerman Sons & Company, 1-3 East Henderson
 CLEVELAND Gates Saw Company, 301 North Washington
 CONROE Gates Saw Company, Box 733, 1/2 Mi. on Highway 75
 CORPUS CHRISTI Russell's Machine & Supply, Inc.,
 Box 1978, 110 North Chaparral

CORSICANA Stroube Implement Company, Ltd., Highway 75 South
CROCKETT Driskell Farm Service Company, Houston Highway
DALLAS Ben Griffin Tractor Company, 5220 Harry Hines Blvd.
P. A. Ross Machinery Company, 2424 South Central
Expressway

DEL RIO Tim B. Cobb Hardware Company, 822 South Main Street
DENTON Travelstead Auto Supply Co., 215 East Hickory St.
DONNA Wood Implement Company, Inc., Box 1025
EL CAMPO Industrial Motor Service, 1202 East Jackson
EL PASO Wes Kerns' Repair Shop, 2020 Bassett
Tri State Equipment Co., 1501 East Paisano Drive

FLORESVILLE Eschenburg Implement Company, 1326 3rd St.
FORT WORTH 4 Better Welding Company, 440 So. Main Street
FREDERICKSBURG Fredericksburg Machine & Appliance Co., Inc.,
105 East San Antonio St.

FREEPORT Paris, Inc., 623 North Gulf Boulevard
GALVESTON Island Marine Sales & Service, 4222 Broadway
National Cotton, Inc., 1828 Avenue C
Jaegers Incorporated, 1309 East Austin (Box 36)

GIDDINGS S & W Repair Shop
GLADEWATER Rogers Magneto & Electric, 508 Second St.
GRAHAM Hamlin Auto Parts, 129 South Central
HAMLIN Smith & Jones
HAMILTON Hillsboro Farm Machinery, 111-113 West Franklin
HILLSBORO * Harley Sales Company, 4427 West 12th
HOUSTON 77001 McKenzie Equipment Co., Inc.
9260 Bryant Street (Box 60460)

KATY Katy Farm Equipment, Inc., Box 97
KERMIT Kermit Engine & Electric, Box 1144
KILGORE Magneto Sales & Service Co., 707 South Commerce
KINGSVILLE Burris Motor Service, 206 East Lee
LaGRANGE Janssen Bros., Box 600
LAREDO Yeary Battery Co. Ltd., Houston & Juarez
LIBERTY Industrial Engine Service, 818 Highway 90
LONGVIEW Magneto Sales & Service, 319 W. Marshall
LUBBOCK Gordon Machinery Co., 2908 Avenue A
LUFKIN Lufkin Supply Company, 417 Lufkin Ave.
MADISONVILLE Madison County Tractor Company
MARSHALL Power Supply Company, 305 E. Austin
McALLEN Hoff Service, Inc., 500 South 10th Street
McKINNEY Air-Cooled Engine Supply, 344 E. Louisiana
MISSION Mission Auto Electric, W. Highway 83
MONAHANS Rutherford Machine Company, 100 South Calvin
MULESHOE Ladd Engineering Company, Box 75
NAVASOTA Mallard Tractor Company, Box 289

NORTH PORT ARTHUR Gillespie Engine Service & Supply, Box 3527
ODESSA 79761 * Harley Sales Company, 701 County Road West
ORANGE Nelson's Supply House, 88 West Cypress Ave.
OZONA Ozona Sprayer Company
PALESTINE Anderson County Equipment Co., 806 West Oak
PAMPA Radcliff Bros. Electric Company, Box 151, 519 S. Cuyler
PARIS Allen Farm Store, 1545 North Main
PECOS Equipment Service Company, 2000 Balmorhea Highway
PERRYTON Tri-County Tractor & Equipment Co., 123 S.E. 2nd Ave.
PLAINVIEW W. O. Speck Machinery Company, 1000 Broadway
PORT LAVACA Auto Parts & Grinding Co., 132 North Guadalupe
POTEET Tuttle Motor Company
REFUGIO Kircher's Repair Shop
ROSENBERG Lamar Tractor Company, 2810 Avenue H
SAN ANGELO Rogers Machine Co., 113 East Concho
SAN ANTONIO Catto & Putty, Inc., Box 2408, 510 Soledad St.
Gibtrac, Inc., 6625 South Flores Street
Wright Motor Company, 210 East Avenue A
Shipp Motor Company, 307-309 South Travis Street
Boehm Tractor & Auto Sales
Y-Z Engineers Service, Box 176
Owens Sales Company, 118 North Main (Box 116)
H. F. Walker Tractor Company, Route 1
Simon J. Burg Sprayer Company
The Banks Company, 120 Oak Avenue
Sweetwater Electric Company, 100 Elm Street
Walter Jezek Company, Box 512
Farm Equipment Service, 2306 So. First St.
Rodenbeck Auto Supplies, 525 West Highway

TYLER Acme Machinery Company, 115 North Hill Avenue
VERNON Bud's Automotive Machine & Supply, 1500 Cumberland
VICTORIA United World Supply Co., 301 N. George
WACO The Motor Shop, 420 South 5th Street
Richards Equipment Co., 910 Franklin
C. R. Feaster Company, 418 South Rogers Street
Loessin Implement Company
Wharton Tractor Company, 1007/Richmond Road North
WAXAHACHIE Mike Carter Engine Works, 219 Indiana Avenue
WEIMAR Janssen's, Box 338
WHARTON
WICHITA FALLS
YORKTOWN

UTAH

LOGAN Bullens, 1475 North Main
OGDEN Egan Farm Service, 745 Wall Avenue
PROVO Bradshaw Auto Parts Company, 335 West Center
SALT LAKE CITY 84110 * Arnold Machinery Company, Inc.
433 West Second South Street
SPANISH FORK Bradshaw Auto Parts Company

VERMONT

RUTLAND Berkshire Tractor Co., 274 South Main St.
SOUTH BURLINGTON Parker Danner Co., 1901 Williston Road
(VERMONT STATE LINE)
WALPOLE, NEW HAMPSHIRE R. N. Johnson, Inc., Bellows Falls Rd.
* Diesel Engine Sales & Engineering Corp
Fish Pier Road
Boston, Massachusetts 02210

VIRGINIA

ANNANDALE Universal Cycle & Mower Company,
7575D Little River Turnpike
ARLINGTON Phillips Machinery & Tractor Co.,
2910 Jefferson Davis Hwy.
CHESAPEAKE G & S Equipment Co., Inc., 1335 South Military Highway
DANTE Phillips Auto Supply
DANVILLE Motor Parts & Equipment Co., 920 Riverside Dr.
FAIRFAX Krauser Equipment Co., 3301 Pickett Road
FARMVILLE Taylor-Forbes Equipment Co.
FREDERICKSBURG A. W. Mitchell Company
HAMPTON Dixie Diggs Auto Parts, Inc.,
Cor. N. King St. & Pembroke Ave. P.O. Box 364
McIlhany Equipment Company,
207 East Mercury Boulevard
HARRISONBURG Whitesel Brothers
MARTINSVILLE Motor Parts & Equipment Co., Ten Liberty Street
LEESBURG Turpin's Supply Service, Route 4
LYNCHBURG McIlhany Equipment Co. Inc., 2280 Carroll Avenue
Myers & Rhodes Equipment Co., Inc.
NEWPORT NEWS W. L. Gleason Co., 3511 Jefferson Avenue
NORFOLK Highway & Industrial Equipment Co.
5630 Virginia Beach Blvd.
Land & Coates, Inc., 3505 Virginia Beach Blvd.
PETERSBURG Ritchie Hardware & Implement Co., Inc.
RICHMOND 23228 * Phillips Machinery, Inc., Staples Mill Rd. at Greendale
Richmond Auto Parts Co. Inc., 1207 North Boulevard
Baker Brothers, Inc., 1402 Williamson Road
McIlhany Equipment Co., Inc., P. O. Box 121
ROANOKE Whitesel Brothers, Inc.
STAUNTON J AND E Auto Supply
SUFFOLK Sun Warehouse Dist., Automotive Parts Warehouse
SUN North on 63 - P. O. St. Paul, Virginia
WINCHESTER Lupton Equip. Co., Inc., 560 N. Loudoun St.
WYTHEVILLE R. P. Johnson Sons

* Engine Sales & Service Co., Inc.,
919 Virginia Street, East
Charleston, West Virginia 25301

* Potter Equipment Company, Inc.
6200 N. Capitol Street, N.W.
Washington, D. C. 20011

WASHINGTON

ABERDEEN Grays Harbor Equipment Company
BELLINGHAM Automotive Parts Service, 1322 State Street
BREMERTON Williamson's Machine Shop, 2612 Burwell
CENTRALIA Ron's Auto Electric, 309 West Main
CHEHALIS Graham Implement Company
ELLENSBURG Rathbun Implement Co., 3rd & Water Sts.
EVERETT Cordz Auto Electric, 2915 Rucker Avenue
LONGVIEW Manthe Equipment Co., 1039 California Way
MOSES LAKE Skagg's Automotive Supply, Inc.
MT. VERNON Piston Service Co., 410 Second Street
OKANOGAN Hamilton Farm Equipment Center, Inc.
OLYMPIA Andrews Auto Parts, North Miller & 13th Street
PASCO Pasco Motor Supply, Inc.
PORT ANGELES Dobson's, P. O. Box 872
PROSSER General Parts Supply
PUYALLUP Ray Bock Equipment Company
11th N.W. at River Road
QUINCY Quincy Truck & Implement Co.
SEATTLE 98134 * Star Machinery Company, 241 Lander Street
Abel Service Company, 5326 Roosevelt Way N.E.
SPOKANE 99202 * Star Machinery Company, East 415 Sprague Avenue
Andrews Equipment Service, East 4620 Trent
Skaggs Automotive Supply, Inc., 1107 West Second
Motor Parts & Equipment Co., 1745 Jefferson
TACOMA Wheeler's Gas Engines, 2604 E. Evergreen Blvd.
VANCOUVER Walla Walla Motor Supply, Inc.
WALLA WALLA Wells & Wade
WENATCHEE Turner Implement Company, 2006 South First Street
YAKIMA

* Independent Distributors
2355 N.W. Quimby St.
Portland, Oregon 97210

WEST VIRGINIA

BECKLEY Raleigh Motor Sales, Inc., P. O. Box 1370
CHARLESTON 25301 * Engine Sales & Service Co., Inc.
919 Virginia Street, East
CLARKSBURG West Virginia Mine Supply Co., 212 Ohio Avenue
FAIRMONT Craig Motor Service Company
HUNTINGTON Contractors Equip. & Supply Co., 2867 Third Avenue
MOUNDSVILLE Gordon Auto Parts, Second & Cedar
PARKERSBURG Hartman Oil & Gas Co., 841 Janette St.
WESTON Craig Motor Service Co.
Lovett Welding & Repair, Route #4, Box 54

* Contractors Equipment Service Company
1415 Brighton Road, N. S.
Pittsburgh, Pennsylvania 15212

* Potter Equipment Company, Inc.
6200 N. Capitol Street, N.W.
Washington, D. C. 20011

WISCONSIN

ANTIGO Gresch Implement Company, 613 5th Ave.
APPLETON Schreiter Auto Supply, 603 West College Avenue
ASHLAND Farm Equipment Service Company, Inc., 1314 W. Front St.
BARABOO Kinnamon Saw & Magneto Service, Rt. 4, Hwy. 12
EAU CLAIRE Johnson Motor & Supply Co., 508 Water Street
FOND DU LAC Ericksen Auto Supply, Inc., 108 South Macy St.
GREEN BAY Fond du Lac Implement Company, So. Main Street
JANESVILLE Paynter Equipment Corporation, 1734 Cass Street
KENOSHA Van's Supply & Equipment, 314 No. Madison St.
Wilke Motors, 215 East Milwaukee
Highway Service Garage, Rt. 3, Box 470

LaCROSSE Willard Auto Electric, 516 No. 4th St.
MADISON Engine Power, Inc., 2501 So. Stoughton Road
MANITOWOC Seibold Implement Company, Rt. 1, Box 285
MARSHFIELD Wegner Welding & Repair, 108 North 1st Street
MAYVILLE Mayville Welding Industries, 520 Dayton
MEDFORD The Eggert Company, 127 Broadway
MERRILL Knispel & Krueger, Inc., 108 N. Genesee St.
MILWAUKEE 53218 * Engine Power, Inc., 11811 W. Silver Spring Rd.
Motor Grinding & Parts Company
817 W. National Avenue
2529 W. North Avenue
The LakeView Shop, 304 Marion Road
OSHKOSH Portage Magneto & Electric Service
PORTAGE Valley's Small Engine Service, 667 East Blackhawk Drive
PRAIRIE DU CHIEN Moore Electric Service, 535 W. Seminary
RICHLAND CENTER Len Scharfner Implement Company, 25 Larch Street
STURGEON BAY Henry Rohner Implement Company
STURTEVANT Hanley Implement Company, 641 W. Main St.
SUN PRAIRIE Neuman Automotive Service, 1111 Ogden Avenue
SUPERIOR Kennedy Automotive Supply Company, 906 Superior Ave.
TOMAH Buch Farm Equipment, 102 W. Bridge St.
WAUSAU J. H. Medinger Co., 9513 We. Greenfield Avenue
WEST ALLIS B & B Implement & Welding, Rt. 4 - Box 541
WISCONSIN RAPIDS

WYOMING

BASIN Spratt & Bayne Implement Company
BUFFALO Johnson County Implement Company
CASPER Studer Tractor & Equipment Company
CHEYENNE Lewis Auto Electric Co.
DOUGLAS Gene L. Payne Co.
GILLETTE Axel W. Ostlund & Son
POWELL Park County Implement Company
RIVERTON Valley Implement Company
ROCK SPRINGS Martin Construction Co. Inc.
SHERIDAN Auto Electric Company
K-B Tractor Co.
Tracy Motor Co.
SUNDANCE Keeley Auto Electric Co.
TORRINGTON Burzlaff Implement Co.
WHEATLAND Fausset Implement Company
WORLAND

* Central Equipment Company
4477 Garfield
Denver, Colorado 80216

* Midland Implement Company, Inc
402 Daniels
Billings, Montana 59101

* Arnold Machinery Company, Inc
433 West Second South Street
Salt Lake City, Utah 84110

WISCONSIN MOTOR CORPORATION

DISTRIBUTORS and APPROVED SERVICE STATIONS

CANADA

The following concerns have service part stocks, facilities and trained personnel to render complete service on Wisconsin Air-Cooled Engines. We recommend you work through these service stations on your Wisconsin engine service requirements.

* DISTRIBUTORS

ALBERTA

BROOKS	Park Sales and Service
CALGARY	* Mumford, Medland, Limited 235 - 66 Avenue, S. E.
CAMROSE	Crawford & Company, Ltd.
CARBON	Wright Motors Ltd.
CLARESHOLM	TNT Equipment
DRUMHELLER	E. O. Parry Auto & Farm Machinery, Ltd.
EDMONTON	* Mumford, Medland, Limited 10809 - 105th Ave.
ELK POINT	Zarowny Motors Ltd.
FAIRVIEW	Connelly Motors Ltd.
GRAND PRAIRIE	Kens Farm Service
HIGH PRAIRIE	Ike's Modern Motors
LETHBRIDGE	Oliver Chemical Company, Ltd. 3 Avenue & 9 Street, North
MANNING	Turner Bros. (Manning) Ltd.
MEDICINE HAT	Foughty Cycle Shop 580 Parkview Drive
OYEN	Alvin Carren
OLDS	Stauffer's Auto Electric, Ltd., Box 1060
PEACE RIVER	Moro Machine Shop
RED DEER	Loveseth Ltd., 5104 Gaetz Avenue
SPIRIT RIVER	D. Ross & Sons
STETTLER	Modern Machine Shop (Stettler) Limited
TABER	Farm Equipment Centre
TROCHU	J. E. Frere & Son
VEGREVILLE	Demkiw & Yakimetz Equipment, Ltd., 4917-51st Ave.
VERMILION	M. P. Norton Implements Ltd.
VULCAN	Noble Blade Sales Ltd.
WAINWRIGHT	Hughie's Auto Electric
WESTLOCK	A. Miller Farm Equipment Ltd., P. O. Box 478
WETASKIWIN	Pahal Motors, Limited, P. O. Box 1688

BRITISH COLUMBIA

ALBION	Albion B. A. Service Station
CHILLIWACK	C. R. Fortin & Son 125 Trans-Canada Highway West
DAWSON CREEK	Bob Whyte Industrial Equipment, 1549-95th Avenue
FORT ST. JOHN	T. & W. Implement Ltd., P.O. Box 2759
KAMLOOPS	Stan Steele Limited 142 - 2nd Avenue
KELOWNA	Kelowna Industrial Supply Company, 274 Lawrence Avenue
NANAIMO	The Nanaimo Foundry & Engineering Works Limited 100 Comox Road
OLIVER	Imperial Motors, P.O. Box 946
PENTICTON	L. R. Bartlett Ltd. 166 Westminster Ave. W.
PRINCE GEORGE	Northern Magneto and Electric 975 Second Avenue at Queen Street
SALMON ARM	Peterson Bros. (Salmon Arm) Ltd.
VANCOUVER	* Pacific Engines & Equipment, Ltd. 40 East Cordova Street Magneto Sales & Service, 126 Gore Avenue McBain Air-Cooled Engine Co. 1968 West Georgia Street Western Air Cooled Engines Ltd., 1859 West Georgia Street

VERNON

Jack Fuhr Limited, 3405 Bernard Avenue
Hub Tractor Sales Ltd., 2607 - 35th Street
Mayhew & Strutt Ltd., 2300 Douglas Street

VICTORIA

MANITOBA

BALDUR	Ramage & Sons
BEAUSEJOUR	Stefaniuks Garage
BOISSEVAIN	Dixons Auto Service
BRANDON	Frank Lawson & Sons
CARMAN	Johnston Farm Supply
DAUPHIN	B-B Farm Supply
KILLARNEY	H. L. Freeman & Son
MANITOU	D. Voth & Sons
MELITA	Griffith Brothers
MORDEN	Hamm's Garage
MORRIS	Art's Farm Equipment
NEEPAWA	William Whitmore
PORTAGE la PRAIRIE	Dillon Electric Limited 352 Saskatchewan Avenue East
RUSSELL	Clement's Farm Equipment
ST. LAZARE	Fouillard Implements Exchange
SHOAL LAKE	Lake Motors
STEINBACH	Thomas Wiebe & Company, Limited
SWAN RIVER	C. P. Sorensen & Son, P. O. Box 359
VIRDEN	Runion's Farm Equipment
WINNIPEG	* Mumford-Medland, Ltd., 576 Wall Street

NEW BRUNSWICK

FREDERICTON	Engine Machine Shop & Supply Limited
RIVERVIEW	* Consolidated Engines & Machy. Co. Ltd. Coverdale Road (P. O. Box 848, Moncton)
SUSSEX	Wm. Kelso & Sons Limited

NEWFOUNDLAND

CORNER BROOK	Newfoundland Tractor & Equipment Co., Ltd P. O. Drawer 13
GRAND FALLS	Newfoundland Tractor & Equipment Co., Ltd. P. O. Box 100
ST. JOHN'S	* Newfoundland Tractor & Equipment Co., Ltd Kenmount Road, P. O. Box 1150

NOVA SCOTIA

HALIFAX	* Construction Equipment Company, Ltd P. O. Box 67, 135 Lower Water Street
KENTVILLE	Scotian Gold Co.-Op. Ltd.
SYDNEY	Atlantic Spring & Machine Co., Ltd.
TRURO	Wilson Equipment Ltd.

ONTARIO

BRANTFORD Riverview Automotive Machine Co., 120 Water St.
 BURLINGTON Duke Lawn Equipment Ltd.
 CHATHAM Settingrington Motor Sales
 FORT WILLIAM Acklands Ltd., 831 May Street
 HAMILTON Capital Construction Equipment Co. Ltd.
 67 Frid Street
 Standard Engines, Equip. & Supplies Ltd.
 516 Parkdale Ave. N.
 HUNTSVILLE G & G Huntsville Automotive Supply Ltd.
 9 Minerva Street
 KINGSTON Kingston Auto Motor Rebuilders, 40 James St.
 KITCHENER Jacobs Tractor & Equipment, Ltd.,
 1138 Victoria Ave. N.
 LONDON E. P. Abey Limited, Wharncliffe Road, South
 NORTH BAY Roy Gordon Equipment Rentals Ltd.
 164 Lakeshore Drive
 OSHAWA Herb Robinson Wholesale Ltd., 72 Richmond St.
 OTTAWA Craig Construction Equipment, 21 Chamberlain
 Welch & Johnson Ltd., 472-476 Bank Street
 OWEN SOUND Slater's Auto Electric Ltd., 260 8th St. E.
 PETERBOROUGH MacLeod Motors (Peterborough) Ltd.
 RENFREW Powell's Auto Service Ltd.
 ST. CATHERINES D. A. Dalziel Equipment Ltd., 251 St. Paul St., West
 SARNIA Lambton Equip. Co., 792 Phillip Street
 SAULT STE. MARIE Bert's Auto Supply Limited, 415 Queen St. E.
 SUDBURY V.O.B. Heavy Equipment Repair Ltd.
 187 Sillpaa Street
 Yuill & Craig Ltd., 378 Whittaker Street
 Harnden and Newell Ltd., 271 First Avenue
 TIMMINS (14) *Consolidated Engines & Machy. Co. Ltd.,
 241 Birmingham Street
 TORONTO M. L. Baxter Ltd., 1900 St. Clair Ave. West
 Builders Tool Supplies, Ltd., 1210 Caledonia Road
 Herc Industrial Engines, Ltd.,
 37 Minford Avenue (Scarborough!:)
 Marathon Equipment & Supply, Limited
 15 Birch Avenue
 TRENTON Quinte Machine & Repair Co., 23 Balsam Street
 WALLACEBURG Labombards (Wallaceburg) Ltd.,
 330 Selkirk St.
 WINDSOR Windsor Automotive Supply, 649 Wyandotte St. E.
 WOODBRIDGE Humber Automotive Limited

PRINCE EDWARD ISLAND

CHARLOTTETOWN J. H. England Equipment
 * Construction Equipment Co., Inc.
 P. O. Box 67, 135 Lower Water St.
 Halifax, Nova Scotia

QUEBEC

CHICOUTIMI Perron Equipment, Inc., 234 Blvd. Lamarche
 MONTREAL (9) * Consolidated Engines & Machy. Co. Ltd.
 8550 Delmeade Rd. (TOWN OF MT. ROYAL)
 Crankshaft Grinder Reg'd., 820 Notre Dame St. W.
 Engine Rebuilders Ltd., 6389 St. Lawrence Blvd.
 J. A. Faguy & Sons
 International Electric Co., 6500 Upper Lachine
 Magneto Auto Electric Ltd., 3325 Hochelaga Street
 Simplex Motor Parts, 4670 St. Denis
 QUEBEC CITY General Diesel Incorporated, 101 Henderson Street
 Quebec Gas and Diesel Engines Ltd., St. Edourd St.
 Rene Talbot Limited, 205 St. Paul Street
 RIVIERE du LOUP J. S. Levesque, 107 Rue Fraser
 ROUYN Lariviere & Freres Ltd., Rue Principale

ST. HYACINTHE
 ST. PHILOMENE
 SEPT ILES
 THREE RIVERS

Maska Auto Electric Reg'd., 540 Vaudreuil Street
 Pridex Reg'd., R. R. #2 Hwy. 4
 International Electric Company, Limited
 Stanley Motors & Equipment Ltd., 1948 St. Philippe

SASKATCHEWAN

ASSINIBOIA Harvey's Hardware Ltd.
 AVONLEA Nelson Motors Ltd.
 CANORA Acme Motors & Implements Ltd.
 CARLYLE Humphries Garage
 CARNDUFF R - M West End Motors
 CARROT RIVER Fichtner Motors Limited
 CHOICELAND Lloyd R. White Farm Equipment
 CUTKNIFE Finley's Auto & Farm Supply Ltd.
 DAVIDSON Midway Service Ltd.
 DINSMORE A. McLellan
 ESTEVAN Kendall's Auto Electric
 ESTON Farmer's Supply Co.
 FRANCIS S. J. Helfrick & Sons
 GLENAVON Evans Motors
 GRENFELL Schlamp's Garage
 GULL LAKE A & P Motors
 HUMBOLDT Hergott Farm Equipment Limited
 IMPERIAL Art Ulmer
 KAMSACK Kamsack Co-operative Association Ltd.
 KINDERSLEY Halpenny Agencies
 LANDIS Landis Co-Op Association
 LEADER Lawrence Nagel
 LLOYDMINSTER Mayston Auto Electric & Machy. Ltd., 4402-49 Ave.
 LUSELAND Luseland Motors
 MAPLE CREEK Link Farm Equipment
 MARS DEN Forster Brothers
 MEADOW LAKE Auto & Tractor Supply Company, Ltd.
 MELFORT Creurer Bros.
 MELVILLE Peter's Farm Equipment
 MOOSE JAW Moose Jaw Distributing Company
 NIPAWIN Rourke's Service Centre
 NORTH BATTLEFORD Hornsby & Son, 1022-102nd St.
 OGEMA Fritz Frank Garage
 PELLY Campbell's Garage Limited
 PONTEIX Ponteix Central Garage Ltd.
 PRINCE ALBERT P. A. Electric Service Centre Ltd., 29 - 11th St. E
 RADVILLE E. E. Bourassa & Sons
 REGINA * Mumford, Medland, Limited, 740 Albert St.
 ROCANVILLE Goodman's Esso Service
 ROSETOWN G. L. Conlin & Son Ltd.
 SASKATOON Certified Machinery Co., Ltd., 1729 Ontario Street
 SHAUNAVON John's Auto Electric
 SHELLBROOK Moker & Thompson Ltd.
 SPIRITWOOD Green Line Equipment
 STRASBOURG E. E. Erickson
 SWIFT CURRENT Houston Equipment, Ltd.
 TISDALE E. G. Groat
 UNITY Krips (1958) Ltd.
 WADENA Hanson Brothers
 WATROUS Findley Machine Shop Ltd.
 WEYBURN Maurer Motors, 301 - 1st Avenue
 YORKTON Parkland Marine & Boat Supply, 22-4th Avenue

WISCONSIN MOTOR CORPORATION

WORLD WIDE DISTRIBUTION

The following concerns have service part stocks, facilities and trained personnel to render complete service on Wisconsin Air-Cooled Engines. We recommend you work through these service stations on your Wisconsin engine service requirements.

* DISTRIBUTORS

ALGERIA

ALGIERS * Hamelle-Afrique
27 Boulevard Camot
ORAN * Hamelle-Afrique
4 Rue de l'Artilerie

ANGOLA (PORTUGUESE WEST AFRICA)

LUANDA * Organizacao Lusitana De Importacoes Vendas E
Representacoes Lda. (O.L.I.V.E.R.)
Post Office Box 2871

ARABIAN GULF

KUWAIT * Al-Khonaini Al-Katami Trading & Contracting Co.,
P. O. Box 593

AUSTRALIA

NEW SOUTH WALES Ronaldson Bros. & Tippett Ltd.
16 Warren Avenue, Bankstown
QUEENSLAND Ronaldson-Tippett (Qld.) Pty. Ltd.
81 Jurgens Street, Woolloongabba
SOUTH AUSTRALIA Finsbury Sales & Service (S.A.) Pty. Ltd.
570 Torrens Road, Finsbury
TASMANIA Eric E. Howard and Son Pty. Ltd.
170 Murray Street, Hobart
Eric E. Howard and Son (Launceston) Pty. Ltd.
177 Brisbane Street, Launceston
VICTORIA * Ronaldson Bros. & Tippett Ltd.
Creswick Road, Ballarat
Ronaldson Bros. & Tippett Ltd.
168-174 Dorcas Street, South Melbourne, S. C. 5
WESTERN AUSTRALIA Venables Service Pty. Ltd.
97-101 Oxford Street, Leederville
Barrow Linton Pty. Ltd.
763-767 Wellington Street, Perth.

BAHAMA ISLANDS

GRAND BAHAMA Bahamas Tractor & Equipment, Ltd.
P. O. Box 128, Freeport
NASSAU * Bahamas Tractor & Equipment Ltd.
P. O. Box 638

BARBADOS (B.W.I.)

BRIDGETOWN * The Emtage Electrical Co., Ltd.

BECHUANALAND

GABERONES Construction Equipment Supply Co., Ltd.
* Barlow's Tractor & Equipment Co., Ltd.
P. O. Box 291
Salisbury, Southern Rhodesia

BELGIUM

BRUSSELS * Matériels & Matériaux de Construction
en Belgique S.A.
710-714 Chaussee de Louvain

BERMUDA

HAMILTON * Masters Ltd

BOLIVIA

LA PAZ * Industrial Agencies (Bolivia) Ltda
Avenida Montes No. 731
Cajon Postal No. 2449
ORURO * Industrial Agencies (Bolivia) Ltda
P. O. Box 430

BRAZIL

ACRE

Cruzeiro Do Sul M. S. Pedreira & Cia
Xapuri Abib Kalume & Cia

AMAZONAS

Manaos Moto Importadora Ltda
J. G. Araujo & Cia. Ltda

CEARA

Fortaleza A. Fiuza Filho & Cia

DISTRITO FEDERAL

Rio de Janeiro * Fonseca Almeida, Comercio E. Industrial S.A.
P.O. Box 422-XC-00

RIO de JANEIRO (State of)

Radio Luz Importadora, Campos
Bryale & Cia., Rezenre
Oficina Rex Ltda., Rio Bonito
Irmaos Tardelli, Terezopolis

ESPIRITO SANTO

Vitoria Importadora Capichaba

MARANHAO

Sao Luiz Guimaraes & Souza & Cia

MATO GROSSO

Poxoreu Genesio Martins

MINAS GERAIS

Belo Horizonte E. Marinho S/A
Carangola Chevrard & Milton
Juiz de Fora Maquinas Junqueira Ltda
Lavras Industrias Libeck & Cia Ltda
Manhumirim Tostes & Cia
Muriae Renato Rabelo
Patos de Minas Oscar Pacheco
Ponte Nova Oficina Mecanica Garavini
A. Fonseca

Theophilo Otoni
Santos Dumont

PARA

Belem Soc. Geral de Export. Ltda

PARANA

Curitiba Lima & Valente Ltda
Londrina Lima & Valente Ltda

PERNAMBUCO

Recife Jose Lobo Comercio S.A.

PIAUI

Parnaiba Pontion Rodrigues & Cia. Ltda

RIO GRANDE DO SUL

Porto Alegre Cocito Irmaos Tec. e Com. S/A
Caxias do Sul Evaristo de Antoni & Cia. Ltda
Cruz Alta Arno L. Pereira
Erechim Irmaos Valentini & Cia. Ltda
Horizontina Schneider, Logemann & Cia. Ltda
Pelotas Soc. Com. e Impor. de Materiais
Agro-Pecuarios Ltda

Passo Fundo
Santa Maria

Santa Rosa
SAO PAULO
Sao Paulo

Menegaz, Tagliari & Cia
Sul Brasileira de Com., Import. e
Representacoes (CIPRA) Ltda
Irmaos Mayer Ltda

Cocito Irmaos Tecn. e Com. S/A

BRITISH GUIANA

GEORGETOWN * J. P. Santos & Co. Ltd.
34 & 35 High & Leopoldo Streets, P.O. Box 106

BRITISH HONDURAS

BELIZE * The Belize Supply Co., Ltd
P.O. Box 542

CAMEROON

DOUALA * HAMELLE-AFRIQUE
P. O. Box 4041

YAOUNDE * HAMELLE-AFRIQUE
P. O. Box 117

CHILE

CONCEPCION Importadora Y. Comercial Del Sur S.A.
"IMCOSUR" Barros Arana 730 - Casilla 55 C

OSORNO Importadora Y. Comercial Del Sur S.A.
"IMCOSUR" Ramirez 957 - Casilla 520

SANTIAGO * Sociedad General De Comercio S.A.
"SOGECO" Almada B. O'Higgins 1170 -
Casilla 904

VALPARAISO Societed General De Comercio S.A.
"SOGECO" Salvador Donoso 140 2 esq.
Pudeto - Casilla 208-V

COLOMBIA

BARRANQUILLA General Sales Corporation Ltda.
Calle 37 No. 46-03

BOGOTA * Riccardi & Cia. Ltda.
Carrera 12 No. 16-73
Apartado Aereo No. 6864

Ambrosi & Cia. Ltda
Carrera 12 No. 16-73

Mecanelectro Ltda.
Calle 13 #18-23

U. S. Motors De Colombia, Ltda.
Carrera 10, No. 23-09
Apartado Aereo No. 7958

BUCARAMANGA Alfonso Silva Silva & Cia.
Calle 36 No. 18-24

CALI General Sales Corporation Ltda.
Calle 25 No. 3-36

Mecanelectro Ltda.
Carrera La #22-67

CUCUTA Almacen Del Ingeniero
Calle 10 No. 4-62

IBAQUE Herramientas & Equipos
Carrera 4a #14-23

MEDELLIN Mecanelectro Ltda.
Carrera Bolivar #41-28
Peter Santa-Maria & Cia. Ltda.
Calle 50 No. 53-2

REPUBLIC of the CONGO

ELISABETHVILLE * Bureau Technique Bia
Post Office Box 1874

LEOPOLDVILLE * Bureau Technique Bia
P. O. Box 8843 LEO 1.
Route Traffic Lourd

* Bureau Technique Bia

CONGO REPUBLIC

BRAZZAVILLE * HAMELLE-AFRIQUE
P. O. Box 107

COSTA RICA

SAN JOSE * Costa Rica Machinery Company, Inc
P. O. Box 1328

DAHOMEY

COTONOU * HAMELLE-AFRIQUE
P. O. Box 124

DENMARK

COPENHAGEN * Aktieselskabet Dansk Wimex
Hauchsvej 12

DOMINICAN REPUBLIC

SANTO DOMINGO * The General Sales Co. C. Por A.
Apartado 746

ECUADOR

GUAYAQUIL * Organizacion Comercial Vallejo Araujo, S.A.
Ave. 9 de Octubre 721-723
P. O. Box 717

QUITO * Organizacion Comercial Vallejo Araujo, S.A.
P. O. Box 245

EL SALVADOR

SAN SALVADOR * Salvador Machinery Co. S.A.
Boulevard Ejercito Nacional
P. O. Box 125

ENGLAND

SURREY * Power Units & Equipment Company
No. 35 Store
Canbury Park Road
Kingston-On-Thames

REPUBLIC OF FINLAND

HELSINKI * Oy Nortek AB
Georgsgatan 30
P.O. Box 10144

FORMOSA (TAIWAN)

TAIPEI * Frazar & Co. Inc.
No. 29-(2) Chunghua Rd.
P. O. Box 1173

* Frazar & Company, Inc
250 Broadway
New York 7, New York

FRANCE

BEZONS, (Seine-&-Oise) * Union Automobile Technique et Commerciale
53 Rue Claude-Bernard

REPUBLIC OF GABON

LIBREVILLE * HAMELLE-AFRIQUE
P. O. Box 31
PORT-GENTIL * HAMELLE-AFRIQUE
P. O. Box 530

GREECE

ATHENS * George A. Makris
30 Petraki Street

GUAM

AGANA * International Equipment of Guam, Inc.
P. O. Box 637

GUATEMALA

GUATEMALA CITY * Equipos Mecanicos de Guatemala, S.A.
Apartado Postal 472
7A. Avenida No. 1-40/60-Zona 9

REPUBLIC OF GUINEA

CONAKRY * HAMELLE-AFRIQUE
P. O. Box 473

HAITI

PORT-au-PRINCE * Charles Fequiere & Cie.
84, Rue Pavee
& 77 Rue Christophe Colomb
P. O. Box 398

HONDURAS

CHOLUTECA Casa Comercial Mathews, S.A.
TEGUCIGALPA, D.C. * Casa Comercial Mathews, S.A.
P. O. Box 39
SAN PEDRO * Casa Comercial Mathews, S.A.
SULA, D.D. P. O. Box 37

HONG KONG

HONG KONG * Frazar International (Hong Kong) Ltd.
Room 505, Wing On Life Building
22 Des Voeux Road, Central
(P. O. Box 1351, General Post Office)

* Frazar & Company, Inc.
250 Broadway
New York 7, New York

* Honolulu Iron Works
#20 Somerset Road
Kowloon Tong

ICELAND

REYKJAVIK * Elding Trading Company

INAGUA

MATTHEWTOWN * Inagua General Store, Limited

INDONESIA

DJAKARTA * P. T. Masayu Trading & Industrial Co.
P.O. Box 2107

IRAN

TEHERAN * Mohammad Sadegh Mahshid
Saray Mohamadi
IRAQ

BAGHDAD * A. M. Khayat Inh. Co.
Sinek Street

ISRAEL

TEL-AVIV * Palestine Engineering Stores
P. O. Box 509

ITALY

LA SPEZIA * Oto Melara
Via Valdilocchi 35
Casella Postale 237

REPUBLIC OF THE IVORY COAST

ABIDJAN * HAMELLE-AFRIQUE
P. O. Box 1326

JAMAICA

KINGSTON * Masterton, Limited
23-25 Hanover Street, P. O. Box 73

JAPAN

SAPPORO, * Frazar International (Japan) Ltd
Sassho Building
No. 2, Nishi 4-Chome Kita Ichijo

TOKYO * Frazar International (Japan) Ltd
Room 401, Yaesu Bldg.
6, 2-Chome, Marunouchi, Chiyoda-Ku

* Frazar & Company, Inc.,
250 Broadway
New York 7, New York

KOREA

SEOUL * Frazar & Company, Inc
Bando Building, Room 624
International P. O. Box 1108

* Frazar & Company, Inc.,
250 Broadway
New York 7, New York

LEBANON

BEIRUT * Abdunnur Commercial & Engineering Co.

LIBERIA

MONROVIA * Liberia Tractor & Equipment Co.
P. O. Box 299
United Nations Drive

MALAGASY REPUBLIC

TANANARIVE * Henri Fraise Fils & Cie.

MALAWI

BLANTYRE * Barlow's Tractor Company (Nyasaland) Ltd.
P. O. Box 526
Construction Equipment Supply Co., Ltd.
P. O. Box 526

MARTINIQUE (F.W.I.)

FORT-DE-FRANCE * Guy Vieules
P.O. Box 233

MEXICO

AGUASCALIENTES GUERRERO J. Ramiro del Villar
Alejandro Sotelo
Ave. Cuauhtemoc 79, Acapulco

HIDALGO Central de Maquinaria, S. A.
Pachuca

JALISCO Maquinaria Del Pacifico, S. A.
Esq. Lopez Cotilla Y Maestranza
Guadalajara

MEXICO 1, D.F. * Motores de Combustion Interna Wisconsin S.A.
Av. Juarez No. 157
Comercial de Maquinaria, S. A.
Victoria No. 85
Ings. Acosta y Padilla
20 de Noviembre No. 136

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KENITRA Socar
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MEKNES * Hamelle-Maroc
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OIJDA Labor
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RABAT * Hamelle-Maroc
73, Rue Capitaine Petitjean

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Caballero Eligio Ayala Mexico

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PORTO * Joao Felix da Silva Capucho
139 R. Mousinho da Silveira 143

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SAN JUAN * Ricardo Davila Sucesores
Recinto Sur 319
P. O. Box 3669

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BANGUI * Hamelle-Afrique
P. O. Box 128

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Box 76
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791 Main Street
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TRANSVAAL * Barlow's Tractor & Machinery Company
P.O. Box 11, Isando

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BARQUISIMETO Casa Roda Industrial, C. A.
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Intagro, C. A., Edif. La Palma, Calle 23
I. A. Senior & Hijo, Suc., S. A.
Avenida 20 No. 26-47
Macamps, S.A., Avenida 20 No. 28 - 70
Maquinarias Mendoza, C.A.
Apartado Postal No. 13

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Lorenzo Bustillos M. & Cia, Susc., C.A.
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Estatua Sucre a Parque Artigas
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Montemayor & Cia., Suc., S.A.
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MARACAY Maquinarias Mendoza, C.A.
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P. O. Box 4072

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232 Duong Trinh-Minh-The

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30 Broad Street
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ST. THOMAS * The West Indian Co. Ltd

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Hahnstrasse 48
Postfach 109

ZENITH 68-7 SERIES CARBURETOR

Wisconsin Motor Corporation Part No. L-63 Series

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. This design makes them particularly adaptable to smaller farm tractors and a great variety of agricultural machines and industrial units.

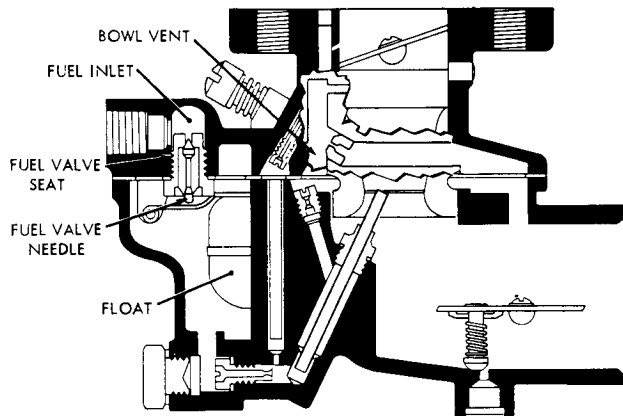


Figure 1

Fuel supply system, Fig. 1, is made up of the threaded fuel inlet, the fuel valve seat, fuel valve needle, float and fuel bowl.

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

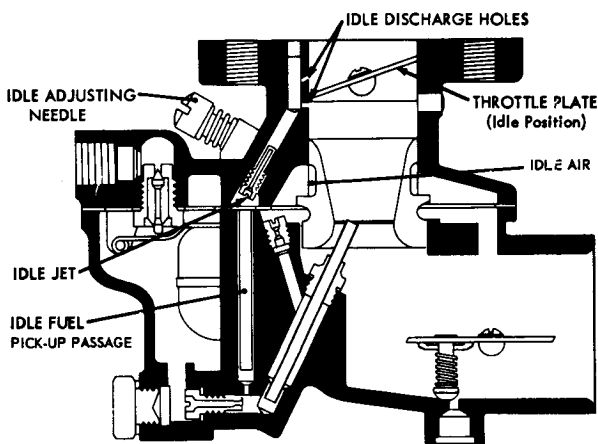


Figure 2

Idle system, Fig. 2, consists of two idle discharge holes, idle air 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 pas-

sage. The fuel travels through this channel to the idle jet calibration. The air for the idle mixture originates back of (or from behind) the main venturi. The position of the idle adjusting needle in this passage controls the suction on the idle jet and thereby the idle mixture. Turning the needle in closer to its seat results in a greater suction with a smaller amount of air and therefore a richer mixture. Turning the needle out away from its seat increases the amount of air and reduces the suction, and a leaner mixture is delivered. The fuel is atomized and mixed with the air in the passage leading to the discharge holes and enters the air stream at this point.

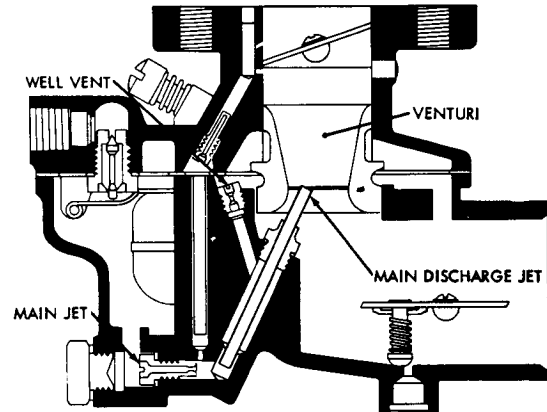


Figure 3

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

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

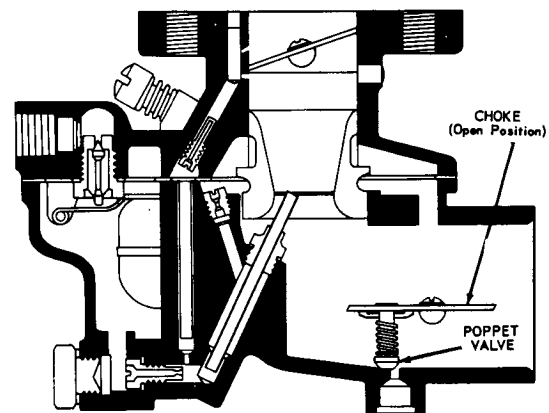
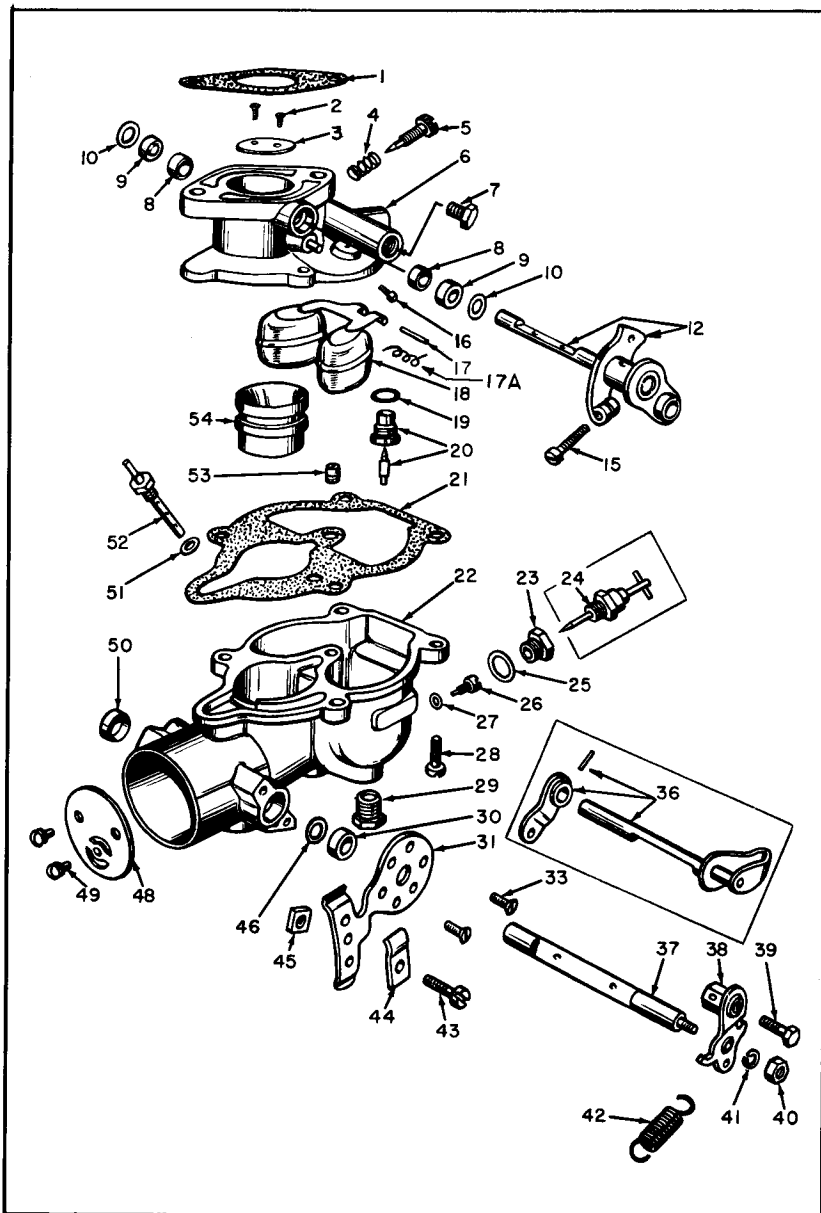


Figure 4

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.



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

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

Ref No	Zenith Part Number	Description	No Req
1	C141-4-5 *	GASKET - FLANGE	1
2	T315S5-4	SCREW - THROTTLE PLATE	2
3	C21-176	PLATE - THROTTLE for 1, 2, 3, 4, 6, 9, 11, 13, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26	1
	C21-205	PLATE - THROTTLE for 5, 7, 8, 10, 12, 14, 18	1
4	C111-17	SPRING - IDLE NEEDLE	1
5	C-46-6 *	NEEDLE - IDLE ADJUSTING	1
6		BODY - THROTTLE (Not serviceable. Purchase complete carburetor).	
7	T91-3	1/8" PLUG - FUEL INLET R.H.	1
8	C-9-75	BUSHING - THROTTLE SHAFT	2
9	T48-9 *	SEAL - THROTTLE SHAFT	2

Ref No	Zenith Part Number	Description	No Req
10	T52-57 *	RETAINER - SHAFT SEAL	2
12	C29-491	SHAFT & STOP LEVER - THROTTLE for 1, 3, 6, 9, 11, 17, 19, 20, 21, 22, 23	1
	C29-1301	SHAFT & STOP LEVER - THROTTLE for 4, 13	1
	C29-926	SHAFT & STOP LEVER - THROTTLE for 5, 7, 8, 10, 14, 18	1
	C29-1418	SHAFT & STOP LEVER - THROTTLE for 25	1
	C29-1476	SHAFT & STOP LEVER - THROTTLE for 15, 16	1
	C29-858	SHAFT & STOP LEVER - THROTTLE for 2, 24	1
	C29-1475	SHAFT & STOP LEVER - THROTTLE for 12	1
	C29-1584	SHAFT & STOP LEVER - THROTTLE for 26	1

PARTS LIST FOR ZENITH MODEL 68-7 CARBURETOR

Ref No	Zenith Part Number	Description	No Req	Ref No	Zenith Part Number	Description	No Req
15	T858-12	SCREW - THROTTLE STOP for 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26	1	39	T858-7	SCREW - CHOKE LEVER SWIVEL for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	1
	T858-10	SCREW - THROTTLE STOP for 25	1	40	T2258	NUT - CHOKE SHAFT for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	1
16	C55-6-12	JET - IDLE for 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26	1	41	T41-10	LOCKWASHER - CHOKE SHAFT NUT for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	1
	C55-22-11	JET - IDLE for 25	1	42	C112-6	SPRING - CHOKE LEVER RETURN for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	1
17	C120-4 *	AXLE - FLOAT	1	43	T858-8	SCREW - BRACKET CLIP for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	1
17A	C117-79	SPRING - FLOAT for 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 22, 23, 24, 25, 26	1	44	C110-7	CLIP - BRACKET TUBE for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	1
18	C85-103	FLOAT and HINGE ASSEMBLY	1	45	T2158	NUT - CLAMP SCREW for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	1
19	T56-70 †	FIBRE WASHER - FUEL VALVE SEAT	1	46	CT57-4 *	SEAL - CHOKE SHAFT for 1 thru 25	1
20	C81-17-35 *	VALVE & SEAT - FUEL for 1, 4, 6, 16, 21	1		T48-9 *	SEAL - CHOKE SHAFT for 26	1
	C81-50-35 *	VALVE, SEAT, SPRING - FUEL for 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26	1	48	C101-80	PLATE - CHOKE for 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26	1
	C81-50-25 *	VALVE, SEAT, SPRING - FUEL for 17, 18, 19	1		C101-85	PLATE - CHOKE for 2, 13, 25	1
	C81-17-25 *	VALVE & SEAT - FUEL for 20	1	49	T31555-4	SCREWS - CHOKE PLATE	2
21	C142-74 †	GASKET - BOWL TO BODY	1	50	CR37-1X1 *	PLUG - CHOKE SHAFT HOLE for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26	1
22	B3-121B-1	BOWL - FUEL for 1, 6, 20, 21	1	51	T56-48 †	FIBRE WASHER - DISCHARGE JET	1
	B3-121A-3	BOWL - FUEL for 2, 5, 10, 12, 18	1	52	C66-114-60	JET - DISCHARGE for 1, 4, 6, 16, 20, 21	1
	B3-121A-1	BOWL - FUEL for 3, 7, 8, 9, 11, 14, 17, 19, 22, 24	1		C66-114-45	JET - DISCHARGE for 2, 13, 25	1
	B3-121B-2	BOWL - FUEL for 4	1		C66-114-50	JET - DISCHARGE for 3, 9, 11, 15, 17, 19, 22, 23, 24, 26	1
	B3-121A-2	BOWL - FUEL for 13	1		C66-114-40	JET - DISCHARGE for 5, 7, 8, 10, 12, 14, 18	1
	B3-121E-1	BOWL - FUEL for 15, 23	1	53	C77-18-12	JET - WELL VENT for 1, 4, 6, 16, 20, 21	1
	B3-121F-1	BOWL - FUEL for 16	1		C77-18-13	JET - WELL VENT for 2, 13, 25	1
	B3-121D-6	BOWL - FUEL for 25	1		C77-18-22	JET - WELL VENT for 3, 9, 11, 15, 17, 19, 22, 23, 24, 26	1
	B3-121A-7	BOWL - FUEL for 26	1		C77-18-17	JET - WELL VENT for 5, 7, 8, 10, 12, 14, 18	1
23	C138-24	PLUG - MAIN JET PASSAGE for 1, 3, 4, 8, 10, 15, 16, 19, 20, 21, 22, 23, 24, 26	1	54	B38-74-18	VENTURI for 1, 3, 4, 6, 9, 11, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	1
24	C71-21	ADJUSTMENT - MAIN JET for 2, 5, 6, 7, 9, 11, 12, 13, 14, 17, 18, 25	1		B38-74-19	VENTURI for 2, 13, 25	1
25	T56-23 †	FIBRE WASHER - PASSAGE PLUG	1		B38-74-17	VENTURI for 5, 7, 8, 10, 12, 14, 18	1
26	C52-7-22	JET - MAIN for 1, 4, 16, 20, 21	1	-	C24-54AD-1X2	LEVER - THROTTLE CLAMP for 15, 16	1
	C52-7-33	JET - MAIN for 2, 13, 25	1	-	T8B10-9	SCREW - LEVER CLAMP for 15, 16	1
	C52-7-26	JET - MAIN for 5, 7, 11, 12, 14, 17, 18	1	-	T8B8-10	SCREW - LEVER SWIVEL for 15, 16	1
	C52-7-25	JET - MAIN for 6	1	-	C181-329	KIT - GASKET	1
	C52-7-19	JET - MAIN for 8	1	-	LQ-39	KIT - REPAIR PARTS for 1, 4, 6, 16, 21	1
	C52-7-30	JET - MAIN for 9	1	-	LQ-33	KIT - REPAIR PARTS for 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26	1
	C52-7-21	JET - MAIN for 10	1	-	K-2130	KIT - REPAIR PARTS for 18	1
	C52-7-23	JET - MAIN for 3, 15, 19, 22, 23, 24, 26	1	-	K-*	KIT - REPAIR PARTS for 17, 19, 20	1
27	T56-24 †	FIBRE WASHER - MAIN JET	1				
28	T301S10-10	SCREWS - BOWL TO BODY ASSEMBLY	4				
29	T91-3	PLUG - BOWL DRAIN	1				
30	C131-4X2 *	RETAINER - CHOKE SHAFT SEAL for 1 thru 25	1				
	T52-53 *	RETAINER - CHOKE SHAFT SEAL for 26	1				
31	C109-60C	BRACKET - CHOKE for 1, 3, 6, 7, 8, 9, 11, 14, 15, 16, 17, 19, 20, 21, 23, 24, 26	1				
	C109-60C-2	BRACKET - CHOKE for 4, 13	1				
	C109-60C-1	BRACKET - CHOKE for 22	1				
33	C140-58	SCREWS - CHOKE BRACKET ASSEMBLY for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	2				
36	C108-280	SHAFT & FRICTION LEVER - CHOKE for 2	1				
	C108-279	SHAFT & FRICTION LEVER - CHOKE for 5, 10, 12, 18	1				
	C108-277	SHAFT & FRICTION LEVER - CHOKE for 25	1				
37	C105-286	SHAFT - CHOKE for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	1				
38	C106-2	LEVER - CHOKE for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	1				

* Parts in Repair Kit
† Parts in Gasket Set
** Specify Carburetor Assembly Numbers

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

MARVEL-SCHEBLER L-64 Series

TSX CARBURETER

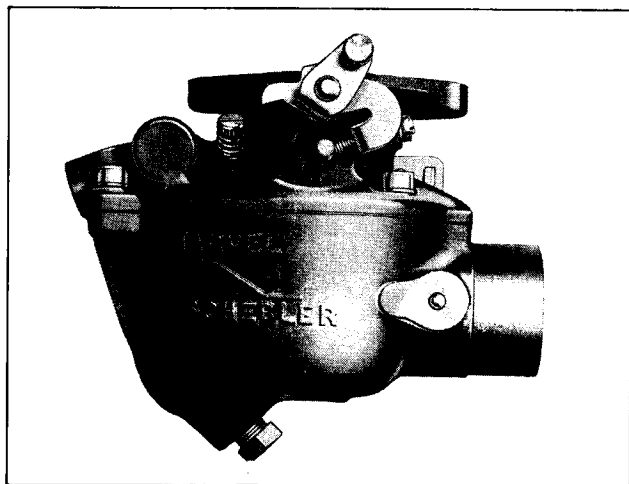


Fig. 1 76941C
FIXED JET CARBURETER

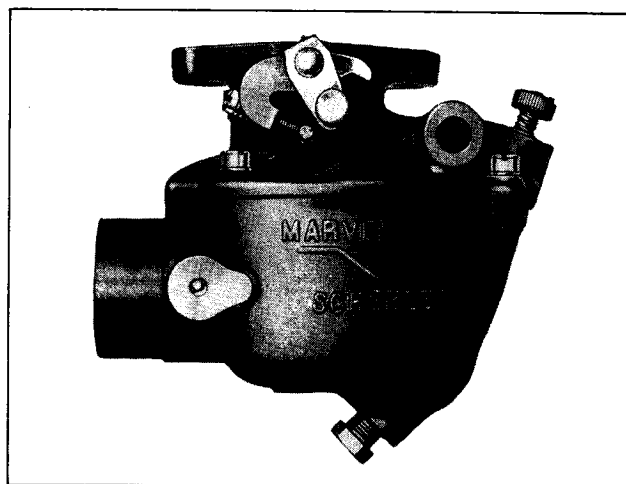


Fig. 2 78863C
ADJUSTABLE JET CARBURETER

DESCRIPTION

Fig. 1, Marvel-Schebler No. TSX-690 Carbureter. Wisconsin Motor Part Number L-64, for engine Model VH4.

Fig. 2, Marvel-Schebler No. TSX-770 and TSX-676. Wisconsin Motor Part Number L-64A, for engine Model AGN.

PRELIMINARY ADJUSTMENTS

Set **throttle stop screw** so that throttle fly is open slightly. Make certain that gasoline supply to carbureter is open. Set throttle control lever to one-third open position. Close choker fly by means of choke control button or choke lever on carbureter. Adjust **idle needle**, as described in "Low Speed Adjustment" paragraph. Start engine and partially release choke. After the engine has been run sufficiently to bring it up to operating temperature throughout, see that choke is returned to wide open position.

LOW SPEED ADJUSTMENT

On the L-64 carbureter, the **idle needle** should be set $7/8$ of a turn, off of the seat, plus or minus $1/4$ turn.

On the L-64-A carbureter, set the **idle needle** $1\frac{1}{4}$ turns off the seat, plus or minus $1/2$ a turn. Care should be used when seating the idle needle so as not to score the point of the needle, by turning too tight.

Set throttle or governor control lever in slow idle position and adjust **throttle stop screw** for the correct engine idle speed. (On a new, stiff engine this speed

must be slightly higher than required for a thoroughly run-in engine.) Turn **idle adjusting needle** in, or clockwise, until engine begins to falter or roll from richness, then turn **idle adjusting needle** out, or counter-clockwise, until the engine runs smoothly.

Note: It is better that this adjustment be slightly too rich than too lean.

HIGH SPEED ADJUSTMENT

On the L-64-A carbureter, illustrated in Fig. 2, the **high speed adjusting needle** should be set $1\frac{5}{8}$ turns off of the seat, plus or minus a $1/2$ turn.

With the engine running at governed speed under load, turn the **adjusting needle** in, or clockwise, a little at a time until the power drops appreciably. Then turn needle out, or counter-clockwise, until the engine picks up power and runs smoothly. This will give an economical part throttle mixture, and, due to the economizer action, the proper power mixture for full throttle operation. If, in trying out the engine, it is inclined to backfire when the load is picked up, richen the mixture by backing out the adjustment needle a little at a time until good acceleration is obtained.

FLOAT SETTING

The float should be set so that with the throttle body in an inverted position, the float is $1/4$ " from the throttle body to bowl gasket, keeping the edges of the float parallel with this gasket.

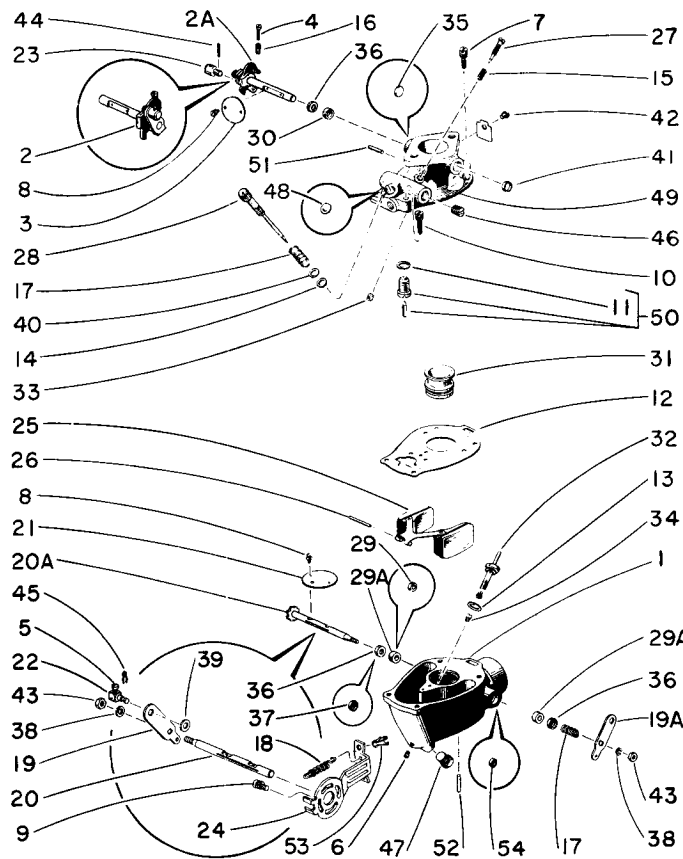
MARVEL-SCHEBLER CARBURETOR DIVISION, BORG-WARNER CORPORATION

DECATUR, ILL., U. S. A.

MARVEL-SCHEBLER TSX CARBURETERS

MARVEL-SCHEBLER No.
 TSX-690
 TSX-770 and TSX-676

WISCONSIN MOTOR PART No.
 L-64
 L-64-A



ALL PARTS ARE INTERCHANGEABLE FOR CARBURETERS LISTED ABOVE EXCEPT WHERE NOTED.

Ref. No.	Marvel-Schebler Part Number	Description	No. Req.	Ref. No.	Marvel-Schebler Part Number	Description	No. Req.
1	10-4101	BOWL BODY ASSEMBLY (for L-64)	1	25	30-600	FLOAT and LEVER ASSEMBLY	1
	10-4259	BOWL BODY ASSEMBLY (for L-64-A)	1	26	32-27	SHAFT, float lever	1
2	13-1246	THROTTLE SHAFT and LEVER ASSEMBLY (for L-64)	1	27	43-33	NEEDLE, idle adjusting	1
2A	13-1202	THROTTLE SHAFT and LEVER ASSEMBLY (for L-64-A)	1	28	43-716	HIGH SPEED NEEDLE ASSEM. (for L-64-A)	1
3	14-169	THROTTLE FLY (20°)	1	29	44-39	PACKING, choke shaft (for L-64)	1
4	15-118	SCREW, No. 8-32 x 5/8 Fillister head, throttle stop (for L-64)	1	29A	44-38	PACKING, choke shaft (for L-64-A)	2
	15-42	SCREW, No. 8-32 x 3/4 Fillister head, throttle stop (for L-64-A)	1	30	44-63	PACKING, throttle shaft	1
5	15-285	SCREW, No. 8-32 x 5/16 Fillister head, choke swivel (for L-64)	1	31	46-A145	VENTURI, 23/32" dia. throat (for L-64)	1
6	15-409	SCREW, No. 8-32 drill plug, for nozzle hole ..	1		46-A144	VENTURI, 3/4" dia. throat (for L-64-A)	1
7	15-A82	SCREW, No. 12-24 x 5/8 Fillister head, throttle body to bowl	3	32	47-465	NOZZLE (for L-64)	1
8	15-A91	SCREW, No. 4-40 x 1/4 bind head, Sems	4	33	49-257	NOZZLE (for L-64 A)	1
9	15-A93	SCREW, No. 8-32 x 3/8 Fillister head, choke bracket (for L-64)	1	34	49-101-L	IDLE JET	1
10	15-A206	SCREW, No. 12-24 x 1-1/8 Fillister head, throttle body to bowl	1	35	49-178	POWER JET (for L-64)	1
11	16-4	GASKET, float valve seat	1	36	55-230	CUP, throttle shaft (for L-64)	1
12	16-80	GASKET, throttle body to bowl	1		55-231	RETAINER, throttle shaft packing	1
13	16-449	GASKET, main nozzle	1			1-for throttle shaft packing.	
14	16-491	GASKET, high speed needle (for L-64-A)	1	37	55-243	2-for choke shaft packing (L-64-A).	
15	24-340	SPRING, idle needle	1	38	78-62	RETAINER, choke shaft packing (for L-64).	1
16	24-485	SPRING, throttle stop screw (for L-64)	1	39	78-184	LOCKWASHER, No. 8, for choke shaft	1
	24-262	SPRING, throttle stop screw (for L-64-A)	1	40	78-299	WASHER, choke swivel (for L-64)	1
17	24-A1	SPRING (for L-64-A)	2	41	80-169	PLAIN WASHER, high speed needle (L-64-A)	1
		1-for high speed needle 1-for choke lever		42	80-171	PLUG, throttle shaft (for L-64-A)	1
18	24-A324	SPRING, choke return (for L-64)	1	43	81-145	PLUG, idle drilling	1
19	25-661	CHOKE LEVER ASSEMBLY (for L-64)	1	44	82-14	NUT, No. 8-32, choke lever	1
19A	25-322	CHOKE LEVER (for L-64-A)	1	45	82-16	COTTER PIN for throttle swivel	1
20	26-357	CHOKE SHAFT (for L-64)	1	46	99-4	CLIP, choke swivel (for L-64)	1
20A	26-847	CHOKE SHAFT and HEAD ASSEMBLY (for L-64-A)	1	47	99-7	PLUG, 1/8" slotted pipe, for fuel inlet	1
				48	179-11	PLUG, 1/8" hex. head pipe, for bowl drain ..	1
21	27-254	CHOKE FLY (for L-64)	1	49	227-1492	PLUG, throttle body, Expansion (for L-64) ..	1
	27-587	CHOKE FLY (for L-64-A)	1	50	233-536	THROTTLE BODY ASSEMBLY (for L-64) ..	1
22	28-49	SWIVEL, choke lever (for L-64)	1	51	62-167	THROTTLE BODY ASSEMBLY (for L-64-A) ..	1
23	28-94	SWIVEL, throttle lever	1	52	62-247	FLOAT VALVE and SEAT ASSEMBLY	1
24	29-557	CHOKE BRACKET ASSEMBLY (for L-64)	1	53	29-155	PIN, throttle stop	1
				54	80-167	PIN, choke fly stop	1
					16-590	CLIP, choke casing support	1
					16-597	PLUG, choke shaft (for L-64)	1
					286-1228	GASKET SET (for L-64)	
					286-1248	GASKET SET (for L-64-A)	
						REPAIR KIT (for L-64)	
						REPAIR KIT (for L-64-A)	

WICO MODEL XHG-4 MAGNETO

FOR WISCONSIN MODELS VG4D AND VH4 ENGINES

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. 19*). This felt, which lubricates the breaker arm at point of contact with the cam, should be replaced whenever it is necessary to replace the breaker contacts.

IMPORTANT

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

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

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

DISTRIBUTOR CAP AND ARM

The distributor cap (*Ref. No. 43*) may be removed by loosening the 4 screws, 5622, which hold it in place.

After the cap has been removed the distributor arm, (*Ref. No. 57*), may be pulled off the bridge. When replacing the arm make sure the timing marks on the distributor arm and the pinion gear are in line.

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 screwdriver 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 and washer, (*Ref. No. 14*) and (*Ref. No. 18*), 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 in *Breaker Contacts* paragraph. 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. 35*), first disconnect the condenser lead by removing the breaker arm spring screw (*Ref. No. 48*), then remove the two condenser clamp screws (*Ref. No. 22*), 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, and distributor arm, 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 (*Fig. No. 38*). 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. 40*) is held tight on the core (*Ref. No. 29*) by a spring wedge. 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.

WICO ELECTRIC COMPANY

WEST SPRINGFIELD, MASSACHUSETTS

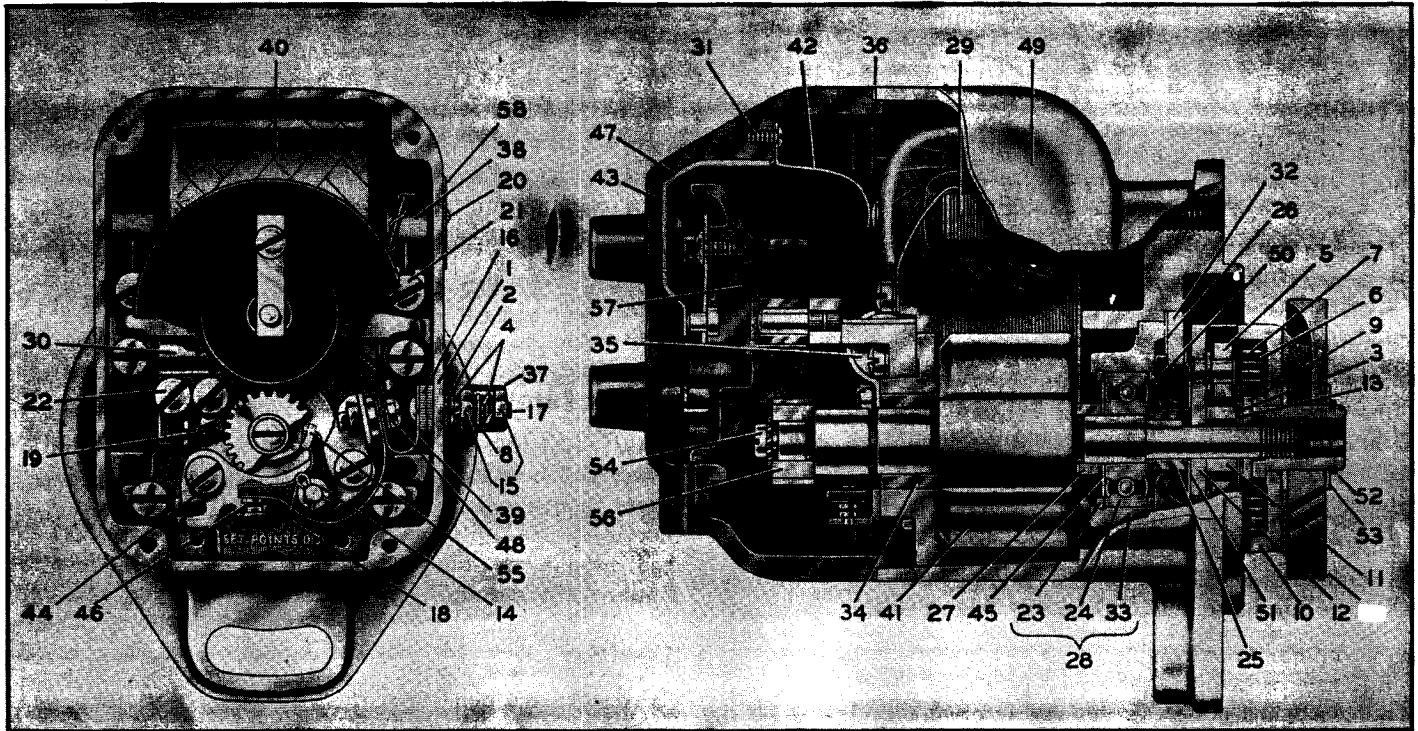
WICO MODEL XHG-4, NO. XH-2207 MAGNETO

WISCONSIN MOTOR CORPORATION

Y-95-S1 FOR MODEL VG4D ENGINE WITH GD-103 GEAR

Y-95-I-S1 FOR MODEL VH4 ENGINE WITH GD-93C GEAR

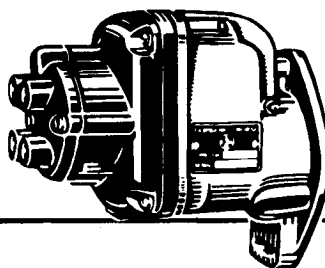
SERVICE PARTS LIST



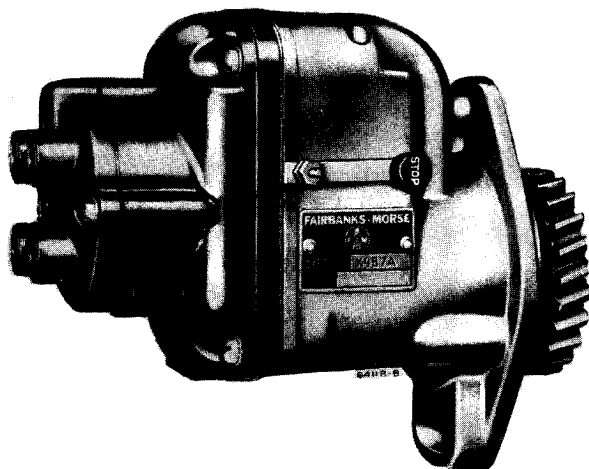
Ref. No.	Wico Part No.	Description	No. Req.
1	M-34X	SPACING WASHER for ground stud (insulating)	2
2	M-35X	WASHER for ground stud (insulating)	1
3	M-42XA	SPACING WASHER for driven flange	1
4	M-55XA	GROUND STUD L.W.	2
5	A-179X	TRIP ARM	2
6	15-186	DRIVE SPRING	1
7	A-243X	SNAP RING	2
8	IXA-256	WASHER for ground stud (steel)	1
9	IVA-583	SPACING WASHER for drive cup	1
10	9352	DRIVE CUP	1
11	2122	DRIVEN FLANGE SPACER	1
12	X2286	DRIVEN FLANGE GROUP	1
13	2288	RETAINER for drive spring	1
14	3219	PIVOT WASHER for breaker arm	1
15	3230	NUT for ground stud	2
16	3539	INSULATING LOCK for ground stud	2
17	3945	GROUND STUD	1
18	4210	BREAKER ARM LOCK	1
19	5077	CAM WIPER FELT	1
20	5250	NAME PLATE SCREW	2
21	5411	CLAMP SCREW for coil core	2
22	5411	CLAMP SCREW for condenser	2
23	5516	RETAINING RING for rotor bearing	1
24	5517	ROTOR BEARING	1
25	5518	IMPULSE SPACER	1
26	5519	IMPULSE STOP GASKET	1
27	5520	SPACER for bearing cage group	1
28	X5521	BEARING CAGE GROUP	1
29	X5524	COIL CORE GROUP	1
30	5532	CONDENSER CLAMP	1
31	5536	COIL CONTACT SCREW	1
*	5536	SCREW for distributor cap window clamp plate	2
32	X5549	IMPULSE STOP GROUP	1
33	5567	BEARING CAGE	1
34	5610	BREAKER PLATE BUSHING	1
35	X5614	CONDENSER ASSEMBLY	1
36	5618	GASKET for distributor cap	1
*	5622	SCREW for distributor cap	4

Ref. No.	Wico Part No.	Description	No. Req.
37	X5632	STOP BUTTON GROUP	1
38	5633	COIL CORE CLAMP	2
39	5635	GROUND CONNECTOR	1
*	X5654	GROUND CONNECTION UNIT (Includes Ref. Nos. 1, 2, 4, 8, 15, 16, 17, & 39)	1
40	X5700	COIL GROUP	1
41	Y5710	ROTOR	1
*	5717	ALIGNING WASHER for breaker point	1
*	5719	GASKET for distributor cap window	1
*	5753	WINDOW for distributor cap	1
42	5773	COIL CONTACT SPRING	1
43	X5777	DISTRIBUTOR CAP UNIT	1
*	5895	CLAMP PLATE for distributor cap window	1
44	5900	CLAMP SCREW for fixed contact	2
45	5926	BALL BEARING SHIELD	1
46	X5996	BREAKER CONTACT SET	1
47	X6001	SECONDARY INTERLEAD GROUP	1
48	5431	CLAMP SCREW for breaker spring	1
49	X6195	MAIN HOUSING ASSEMBLY	1
50	6199	OIL SEAL	1
51	6204	OIL SLINGER	1
52	6424	IMPULSE LOCK RING	1
53	6425	THRUST WASHER	1
*	K6445	IMPULSE LOCK NUT KIT (Includes Ref. Nos. 52, 53, and nut)	1
*	6465	CLAMP SCREW for impulse stop	4
54	6466	DISTRIBUTOR GEAR SCREW	1
55	6468	BREAKER ARM FELT	1
*	X9366	IMPULSE COUPLING UNIT (Includes Ref. Nos. 3, 5, 6, 7, 9, 10, 11, 12, 13, 52, and 53)	1
56	6865	DISTRIBUTOR GEAR	1
57	X6866	DISTRIBUTOR ARM GROUP	1
58	8792	NAME PLATE	1
*	10407	BREAKER POINT ALIGNING WASHER (thin) (if nec.)	1

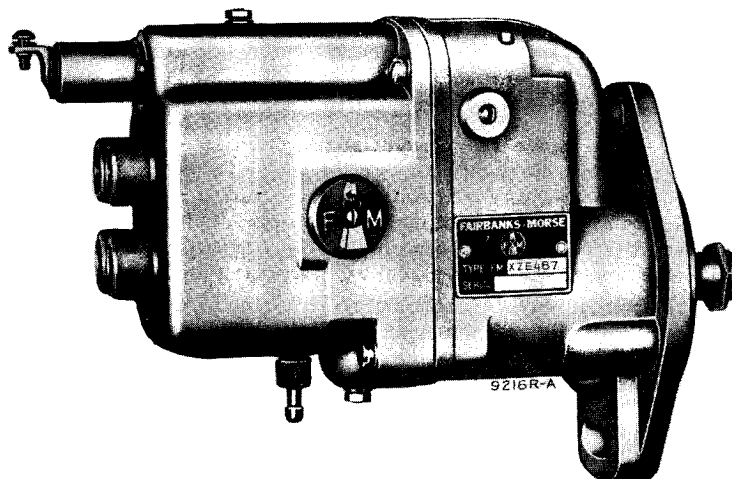
* Not illustrated.



TYPES FM-X4B7A AND FM-XZE4B7 MAGNETOS FOR WISCONSIN MOTOR CORPORATION



Type FM-X4B7A



Type FM-XZE4B7

SERVICE PROCEDURE

Improper functioning of the magneto is often believed to be the cause of much engine trouble arising from other sources, such as a flooded carburetor, an obstructed air intake, defective ignition connections, or corroded spark plug points. Since a brief engine inspection will often locate the trouble before the magneto is reached, it prevents maladjustment of magneto parts in good condition. It is suggested that the magneto be opened only when it is certain that the ignition spark produced is unsatisfactory.

TESTING THE IGNITION SPARK

With properly adjusted spark plugs in good condition, the ignition spark should be strong enough to bridge a short gap in addition to the actual spark plug discharge. This may be determined by holding the end of the ignition cable not more than 1/16 in. away from the spark plug terminal while the engine is running, taking the usual precautions against electric shock. The engine should not misfire when this test is made. However, ignition tests made while any part of the system is wet are useless.

TESTING THE MAGNETO SPARK

Tag the four ignition cables to insure proper replacement and remove them from their respective sockets. In the case of the FM-XZE4B7 magneto, the cable outlet nuts must first be removed to free the metal cable sheaths. The ignition cables of the standard FM-X4B7A are removed by pulling them out of their sockets in the end cap cover. Remove 1/2 in. of the insulation from the end of a short piece of stiff, rubber-covered wire and insert in one of the sockets. Be sure this wire reaches the bottom of the socket and contacts the brass insert. Bend the other end of the wire to within 1/8 in. of the engine or magneto frame and watch closely for a spark between the wire and the engine (or magneto) frame every fourth time the impulse coupling releases when the engine is turned over slowly. Repeat this test with the wire in each of the other sockets. If a

strong spark is observed with the wire in each socket, it is recommended that the magneto be eliminated as the source of difficulty and that the cables, terminals, and spark plugs be thoroughly inspected. If no spark occurs, the ignition switch should be examined to make certain it has not accidentally become closed.

END CAP COVER REMOVAL (Type FM-X4B7A)

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 very important that these air passages be kept free of dirt and other foreign matter. If these passages are obstructed for any length of time, corrosion of all metal parts within the end cap is almost certain. Examine the high tension coil 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.

END CAP REMOVAL

Before examining the breaker points of either the standard Type FM-X4B7A magneto or the radio-shielded Type XZE4B7, it is first necessary to remove the end cap by taking out the four end capscrews. In the case of the radio-shielded unit, the high tension lead brush and spring in the center of the distributor block should be inspected upon removing the end cap.

Inspect the breaker points for evidence of pitting or pyramiding. A small tungsten file or fine stone may be used to resurface the points except in the case of badly worn or pitted points, which 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 in. at full separation. This adjustment is made in the following manner: Loosen slightly the contact support locking screws, identified in

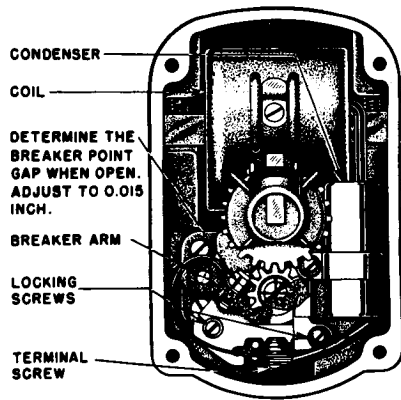


Fig. 1. End View of Type FM-X4B7A Magneto

Fig. 1. Then move the contact support until the proper breaker point clearance is obtained. This is accomplished by means of a screwdriver inserted in the horizontal slot at the bottom of the contact support and pivoted between the two small bosses on the bearing support. Lock the assembly in place by tightening the locking screws, and take a final measurement of the breaker point gap after the locking screws are tightened.

FURTHER FIELD SERVICE NOT RECOMMENDED

The cam felt wick, if dry or hard, should be replaced by a new factory-impregnated wick. This is done by substituting a new cam wick and holder assembly for the old assembly. Other than this, Types FM-X4B7A and FM-XZE4B7 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 Magneto Service Station. Coil and condenser replacements, while simple, are not recommended unless test equipment is available. No attempt should be made to remove the magneto rotor from the frame. It is locked in a special drive end thrust bearing and specific instructions must be carefully followed in releasing the shaft.

INTERNAL TIMING

If, for any reason, the magneto has been dismantled to the extent that the distributor gear has been removed the teeth must be properly meshed with those of the magnetic rotor gear upon reassembly. The gear teeth are marked to facilitate the internal timing of the magneto. Since Types FM-X4B7A and FM-XZE4B7 magnetos are both clockwise in rotation, the single marked tooth of the rotor gear must mesh between the two teeth of the distributor gear designated by the letter C.

SEALING TYPE FM-X4B7A MAGNETO

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

TIMING MAGNETO TO ENGINE

The importance of correctly timing the magneto to the engine cannot be overemphasized. Two methods are given: (1), the advance spark position method and (2), the impulse coupling trip method. Whichever method is used, the breaker points must first be accurately adjusted to secure proper timing of the ignition spark.

(1) Advance Spark Position Method

A. Magneto

Set the magneto for advance spark position in the

No. 1 cylinder. This is done by first mounting the distributor rotor on the distributor shaft and then turning the magnetic rotor until the distributor contact points diagonally upward to the right, 45° above the horizontal, as illustrated in Fig. 2. This applies to both the standard Type FM-X4B7A magneto and the radio-shielded FM-XZE4B7. The magneto is now timed for advance spark position in the No. 1 cylinder and should be held exactly in this position until it is coupled to the engine.

B. Special Drive Gear Types FM-X4B7A and FM-XZE4B7 magnetos are both equipped with a special drive gear mounted on the rotor shaft and locked to the impulse coupling by means of the drive lugs. The gear is a slip fit on the coupling bushing, since movement of the gear with respect to the coupling bushing and rotor shaft occurs during the impulse period. If the gear has been removed, it is necessary to exercise care in reassembly, since both coupling and gear are symmetrical.

With the distributor rotor in the position described in Paragraph A above, mount the drive gear on the magnetic rotor shaft so that the marked tooth is aligned with the impulse coupling pawl stop pin. See Fig. 3.

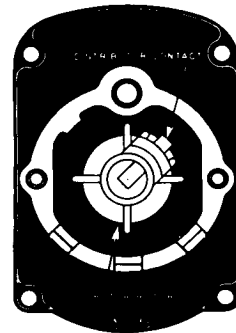


Fig. 2. Timing Diagram

C. Engine

Engine builders usually indicate by marks on the flywheel and flywheel housing the position of the engine for advance timing. Refer to the engine instructions for details concerning the timing marks on your particular engine. Then rotate the crankshaft until the timing marks coincide, indicating that the No. 1 cylinder is in advance spark firing position. Be sure that the piston is on its compression stroke.

(2) Impulse Coupling Trip Method

This method is convenient to use when the drive gear has not been removed from the magneto.

A. Magneto

If the magneto is the standard non-radio shielded unit, remount the end cap cover on the end cap, following the same procedure used in sealing the joint between the end cap and the magneto frame. If the magneto is the radio-shielded FM-XZE4B7, replace the end cap on the frame, preferably using a new lead gasket between the

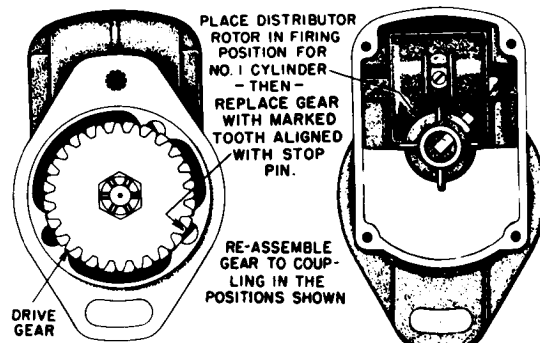


Fig. 3. Drive Gear Marking and Assembly

contact surfaces. Next, set the magneto for spark discharge to the No. 1 terminal. This is accomplished by use of a short, stiff length of wire placed in the No. 1 socket and bent to within 1/8 in. of the magneto frame. Then turn the magnetic rotor from the impulse coupling end in its normal direction of rotation until a spark is observed between the wire and the frame. Hold the coupling in the position in which the trip occurred.

B. Engine

Remove the spark plug, or otherwise determine top dead center for the piston in the No. 1 cylinder. Then turn the engine over until this position is reached, being certain the piston is just at the end of its compression stroke.

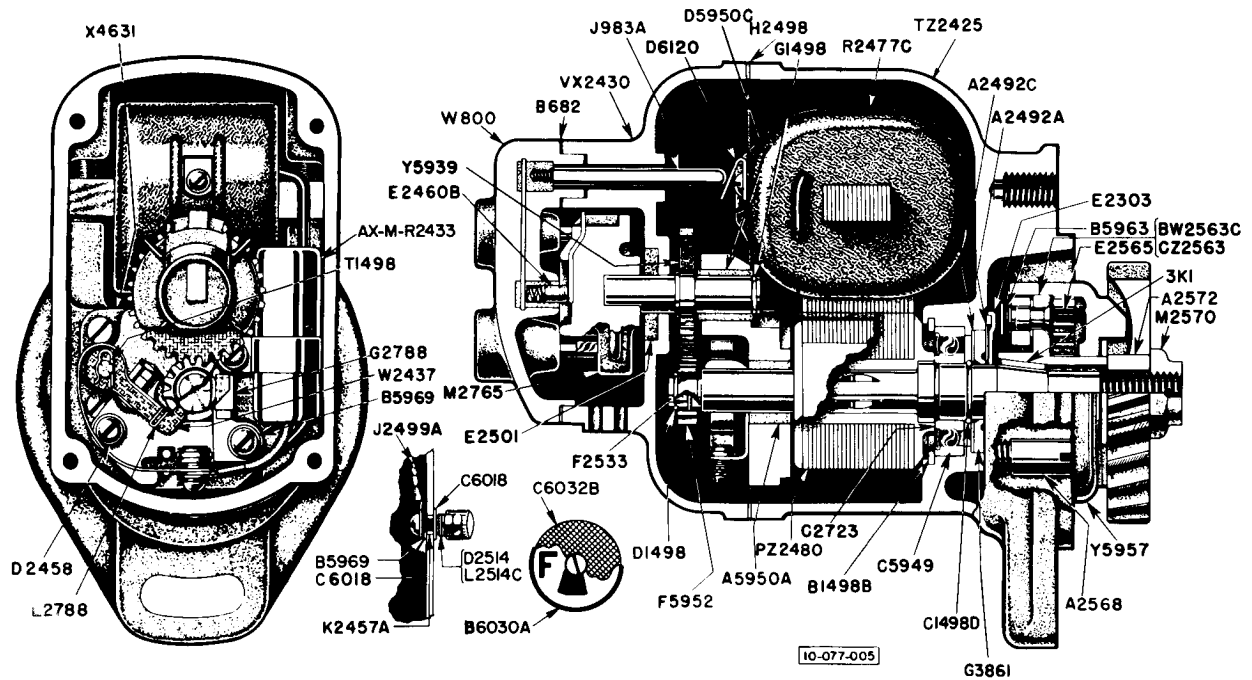
COUPLING MAGNETO TO ENGINE

Without disturbing the setting of either magneto or engine as determined above, couple the magneto to the en-

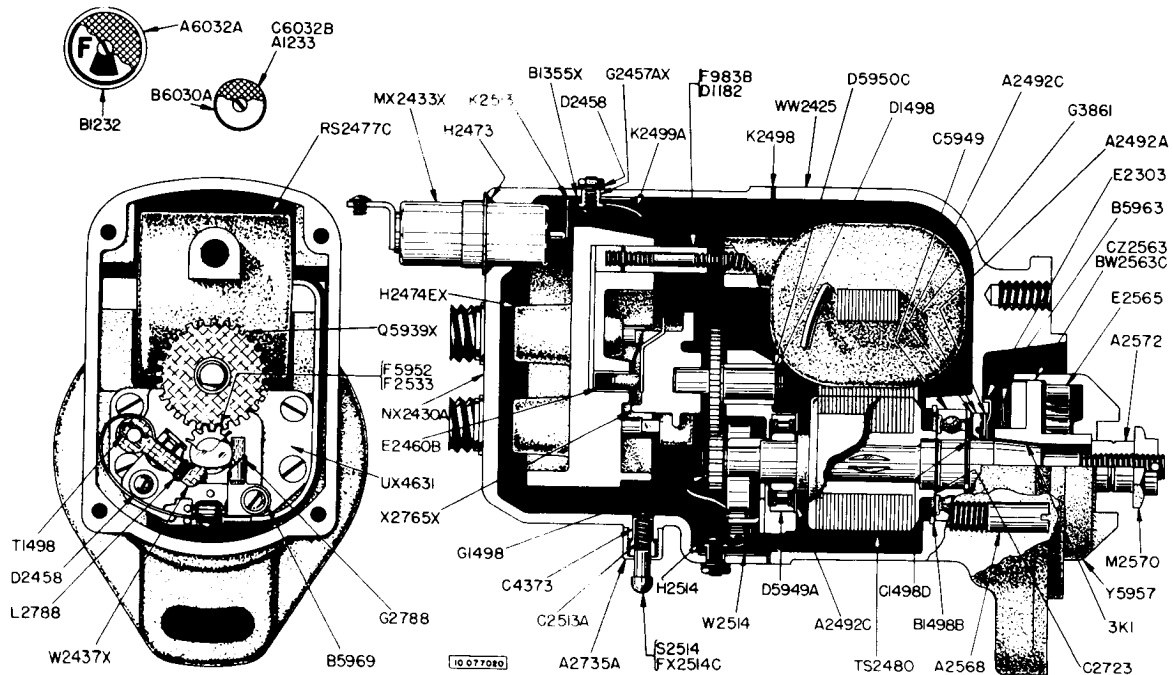
gine by engaging the teeth of the magneto gear with those of the engine drive gear. A slight rotation of the engine flywheel may be necessary to secure accurate alignment of the gear teeth. Tighten capscrews and nuts securely.

MAGNETO SERVICE FACILITIES

Authorized Fairbanks-Morse Magneto Service Stations, located throughout the United States and foreign countries, have been carefully selected by Fairbanks, Morse & Co. to insure highly efficient and complete repair service to owners of Fairbanks-Morse magnetos. These service stations, which are specially equipped for magneto repair and manned by highly-trained personnel, maintain close contact with the factory service and engineering departments. The station most convenient may be located by use of Bulletin FM18D.



REPAIR CHART FOR FM-X4B7A MAGNETOS



REPAIR CHART FOR FM-XZE4B7 MAGNETOS

Order by Part No.	Name of Part	No. Used		Order by Part No.	Name of Part	No. Used	
		FM-X4B7A	FM-XZE4B7			FM-X4B7A	FM-XZE4B7
B682	End Cap Cover Gasket	1	-	C2513A	Ground Switch Button Spring	-	1
W800	End Cap Cover	1	-	D2514	Ground Switch Insulating Lever	1	-
8S9D	End Cap Cover Screws - #8-32x9/16	2	-	H2514	Primary Ground Terminal Strip	-	1
J983A	High Tension Lead	1	-	6S8N	Ground Switch Terminal Screw #6-32x $\frac{1}{2}$	-	2
F983B	High Tension Lead	-	1	6LW1	Ground Switch Terminal Screw Lockwasher	-	2
D1182	Suppressor Insulator	-	1	6N1	Ground Switch Terminal Screw-Nut	-	2
BL232	Vent Cover	-	2	S2514	Ground Switch Push Button	-	1
6S6N	Vent Cover Screw #6-32x $\frac{3}{8}$	-	2	W2514	Ground Switch to Contact Support	-	1
A1233	Vent Cover Copper Wool	-	4	L2514C	Primary Ground Switch Complete	1	-
BL355X	Ground Strip Guide	-	1	8S12N	Primary Ground Switch Screw #8-32x $\frac{1}{4}$	1	-
D1498	Rotor Gear Snap Ring	1	1	8LW5	Primary Ground Switch Screw Lockwasher	1	-
G1498	Distributor Shaft Snap Ring	1	1	8LW6	Primary Ground Switch Screw Shakeproof Lockwasher	1	-
T1498	Fulcrum Pin Snap Ring	1	1	8N1	Primary Ground Switch Screw Nut	2	-
V1498	Ground Switch Button Snap Ring	-	1	FX2514C	Push Button Ground Switch Assembly	-	1
BL498B	Rotor Drive End Bearing Snap Ring	1	1	F2533	Rotor Gear Pin	1	1
C1498D	Rotor Drive End Shaft Snap Ring	1	1	CZ2563	Coupling Hub Assembly	1	1
E2303	Oil Slinger Baffle Disc	1	1	BW2563C	Impulse Coupling Complete	1	1
TZ2425	Frame	1	-	E2565	Impulse Coupling Drive Spring	1	1
WW2425	Frame	-	1	A2568	Impulse Coupling Pawl Stop Spring	1	1
VX2430	End Cap	1	-	M2570	Impulse Coupling Nut	1	1
NX2430A	End Cap	-	1	A2572	Impulse Coupling Bushing	1	1
10S10D	End Cap Screw - #10-24x $\frac{5}{8}$	-	2	C2723	Rotor Drive End Bearing Shim	1	1
10S14D	End Cap Screw - #10-24x $\frac{7}{8}$	4	-	A2735A	Ground Switch Nut	-	1
10S18D	End Cap Screw - #10-24x1 $\frac{1}{8}$	-	2	M2765	Distributor Rotor	1	-
MX2433X	Feed-thru Condenser	-	1	X2765X	Distributor Rotor	-	1
6S6D	Condenser Mtg. Screw #6-32x $\frac{3}{8}$	-	2	G2788	Cam Wick and Holder	1	1
AX-M-R2433	Condenser (Bracket in "R" Position)	1	-	L2788	Breaker Arm Wick	1	1
8S4U	Condenser Mounting Screw - #8-32x $\frac{1}{4}$	1	-	G3861	Rotor Drive End Seal	1	1
W2437	Breaker Arm Support Bracket and Points	1	-	C4373	Ground Switch Bushing	-	1
W2437X	Breaker Arm Support Bracket and Points	-	1	X4631	Bearing Support	1	-
6S6U	Breaker Terminal Screw & Lockwasher #6-32x $\frac{3}{8}$	1	1	UX4631	Bearing Support	-	1
6S6U	Contact Support Locking Screw and Lockwasher #6-32x $\frac{3}{8}$	1	1	8S6G	Bearing Support Screw - #8-32x $\frac{3}{8}$	4	4
8S6U	Contact Support Locking Screw and Lockwasher #8-32x $\frac{3}{8}$	1	1	Q5939X	Distributor Gear	-	1
G2457AX	Ground Switch Insulating Bushing	-	1	Y5939	Distributor Gear	1	-
K2457A	Ground Switch Insulating Bushing	1	-	C5949	Rotor Drive End Bearing	1	1
D2458	Contact Support Locking Screw Flat Washer	1	1	D5949A	Rotor Cam End Bearing	-	1
D2458	Ground Switch Screw Plate Washer	-	1	A5950A	Rotor Cam End Bearing	1	-
E2460B	Brush and Spring Assembly	1	1	D5950C	Distributor Bearing	1	1
H2473	Condenser "O" Ring Seal	-	1	F5952	Rotor Gear	1	1
H2474EX	Distributor Block	-	1	Y5957	Impulse Coupling Shell	1	1
8S8D	Distributor Block Screws - # 32x $\frac{1}{2}$	-	4	B5963	Impulse Coupling Pawl Spring	1	1
R2477C	Coil	1	-	B5969	Contact Support Locking Screw Plate Washer	1	1
RS2477C	Coil	-	1	B5969	Ground Switch Plate Washer	1	-
25SS14A	Coil Bridge Setscrew $\frac{1}{4}$ -20x $\frac{7}{8}$	2	2	C6018	Ground Switch Insulating Washer	2	-
TS2480	Magnetic Rotor	-	1	B6030A	Vent Cover	2	2
PZ2480	Magnetic Rotor	1	-	6S5N	Vent Cover Screw - #6-32x5/16	2	2
A2492A	Rotor Drive End Seal Outer Washer	1	1	A6032A	Vent Cover Screen	-	2
A2492C	Rotor Drive End Seal Inner Washer	1	1	C6032B	Vent Cover Screen	2	2
A2492C	Rotor Bearing Grease Retaining Washer	-	1	D6120	Coil Clip	1	-
H2498	End Cap to Frame Gasket	1	-	6S3W	Coil Clip Screw #6-32x3/16	1	-
K2498	End Cap to Frame Gasket	-	1	3K1	Key (Rotor to Impulse Coupling)	1	1
J2499A	Ground Switch Wire Assembly	1	-	GK22	Gasket Kit	-	1
K2499A	Ground Switch Wire Assembly	-	1	GK17	Gasket Kit	1	-
E2501	Distributor Shift Seal Washer	1	-	SK38	Service Kit	1	-
K2513	Condenser Contact	-	1	SK39	Service Kit	-	1

FAIRBANKS, MORSE & CO.

MAGNETO DIVISION - БЕЛОIT, WISCONSIN

FLYWHEEL ALTERNATOR

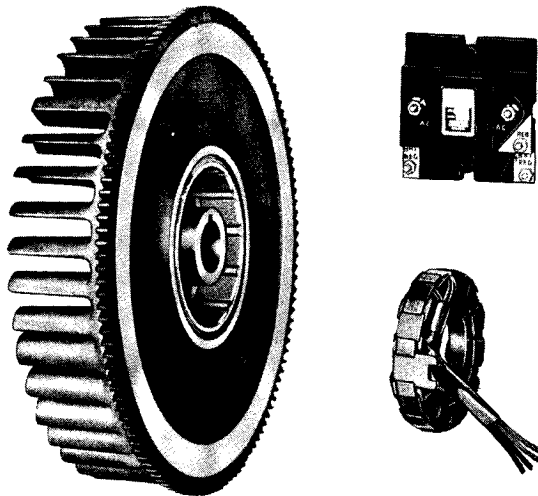
for WISCONSIN ENGINES



12 VOLT - 30 AMPS

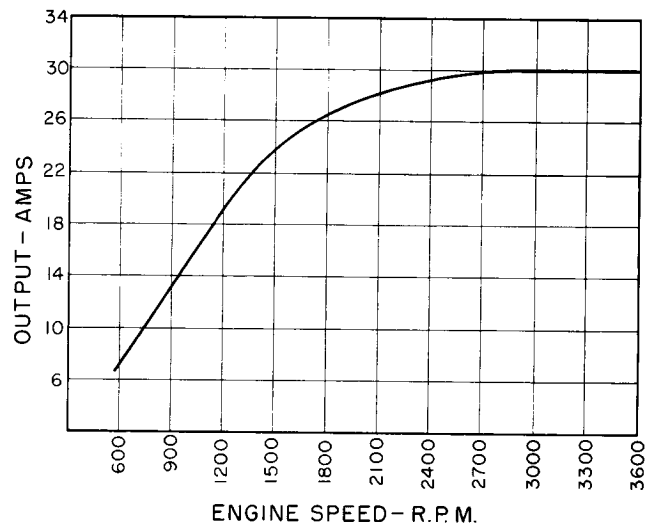
The flywheel alternator is of the permanent magnet type and has *no brushes, commutator, belts or adjustments*. A series of coils is mounted to the engine gear cover and the magnetic flux is provided by permanent magnets mounted in the flywheel.

A *flywheel* with magnetic rotor, *stator* and *rectifier-regulator* are the three major components which make up this light weight - space saving power plant. Refer to Page 4 for engine models flywheel alternator is available on.



291601C

PERFORMANCE CURVE



There are four wires from the alternator, two red and two black, as illustrated in Fig. 1. The black wires bring the alternating current to the rectifier-regulator and are connected to the terminals marked "AC". Either wire can be connected to either terminal. The two red wires are the control winding wires and are connected with one to the "+ BAT-REG" terminal and the other to the "REG" terminal. These two red wires can be interchanged.

The regulator consists of a bridge-type rectifier and a regulating section made with solid state components (commonly called transistors). There are no coils, armatures, points, springs or anything else which can get out of adjustment. In fact, there are *no adjustments required*.

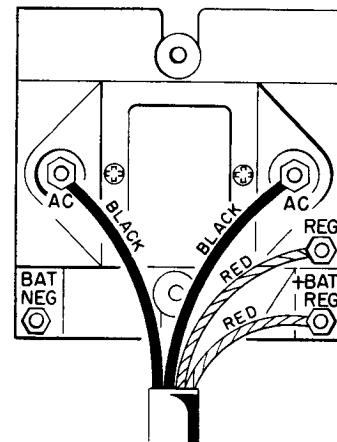


Fig. 1

WISCONSIN MOTOR CORPORATION

MILWAUKEE, WISCONSIN 53246

ALTERNATOR WIRING

The metallic portions of the regulator are isolated from the mounting, and so the same regulator can be used in either a positive or negative ground system. WISCONSIN MOTOR, however, has adopted *negative ground* as standard for all 12 volt generating circuits. All alternator-regulator wiring furnished by WISCONSIN will be for *negative ground*, and wired in accordance with the diagram illustrated below. The white wire attached to the 'BAT-NEG' terminal on the rectifier-regulator is grounded to the engine at a lug under one of the starter mounting bolts. This lug is also used for attaching the ground cable from the *negative* post on the battery, to the engine.

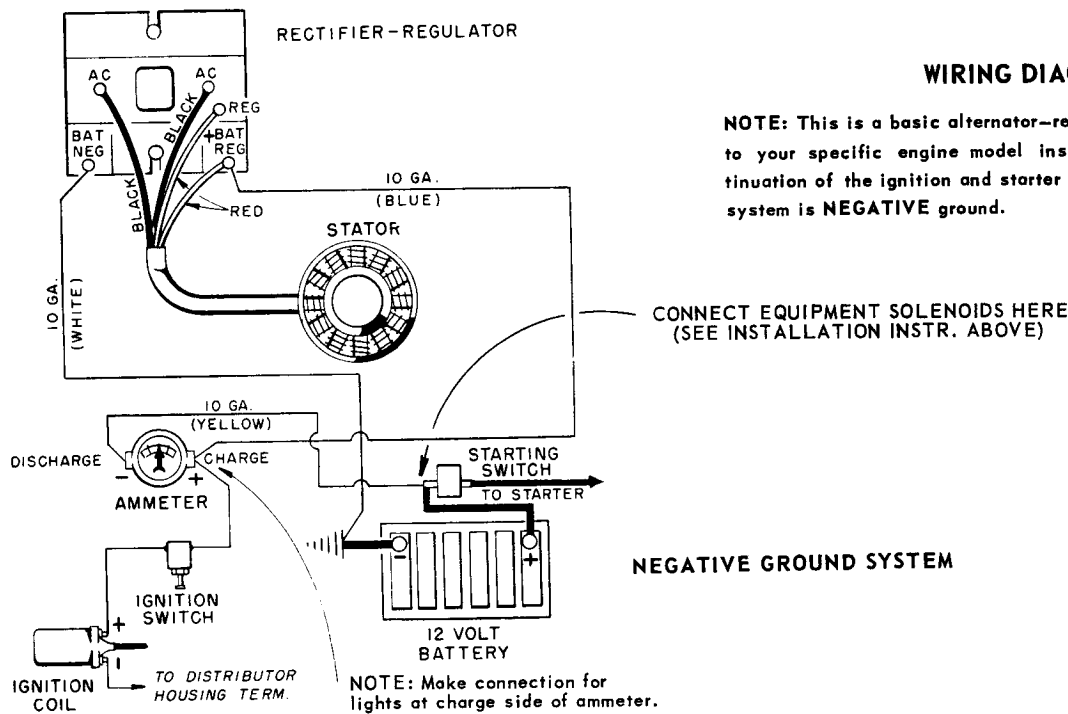
All leads from rectifier-regulator must be **10 gage wire** and shall not exceed 10 feet in length. If longer leads are needed, 8 gage wire must be used.

INSTALLATION OF EQUIPMENT SOLENOIDS:

1. **Do not** connect solenoid power lead to rectifier-regulator "+ BAT-REG" terminal.
2. Make power lead connection at starter switch (as close to battery as possible). See Wiring Diagram.
3. Add by-pass condenser at solenoid term. Use a 1 MFD condenser similar to that used for auto radio suppression.

RECTIFIER-REGULATOR MOUNTING

The *rectifier-regulator* is insensitive to vibration and thus can be mounted to any type of support. Installation must however, be in a *vertical position*. This chimney effect mounting tends to dissipate heat more efficiently. The four lead wires from the stator are 36" long, and if it is desired to mount the rectifier-regulator at some location other than the standard position on the engine shroud, approximately 15" of wire is available for this purpose.



WIRING DIAGRAM

NOTE: This is a basic alternator-regulator wiring diagram. Refer to your specific engine model instruction manual for the continuation of the ignition and starter wiring circuits, but note that system is **NEGATIVE** ground.

Because an alternator is different than a D.C. generator, there are *precautions* to be exercised in its use:

1. **Do Not** reverse battery connections.
2. Connect booster batteries properly; positive to positive and negative to negative.
3. Disconnect the regulator to battery lead if a fast charger is used.
4. Never use a fast charger to boost battery output.
5. **Do Not** attempt to polarize the alternator. It needs no polarization.
6. **Do Not** ground output wires or field wires between the alternator and regulator.
7. When arc welding on machine, disconnect battery ground lead.
8. **Do Not** operate engine with battery disconnected from system.

SD-293 Decal
Listing precautions,
available upon request.

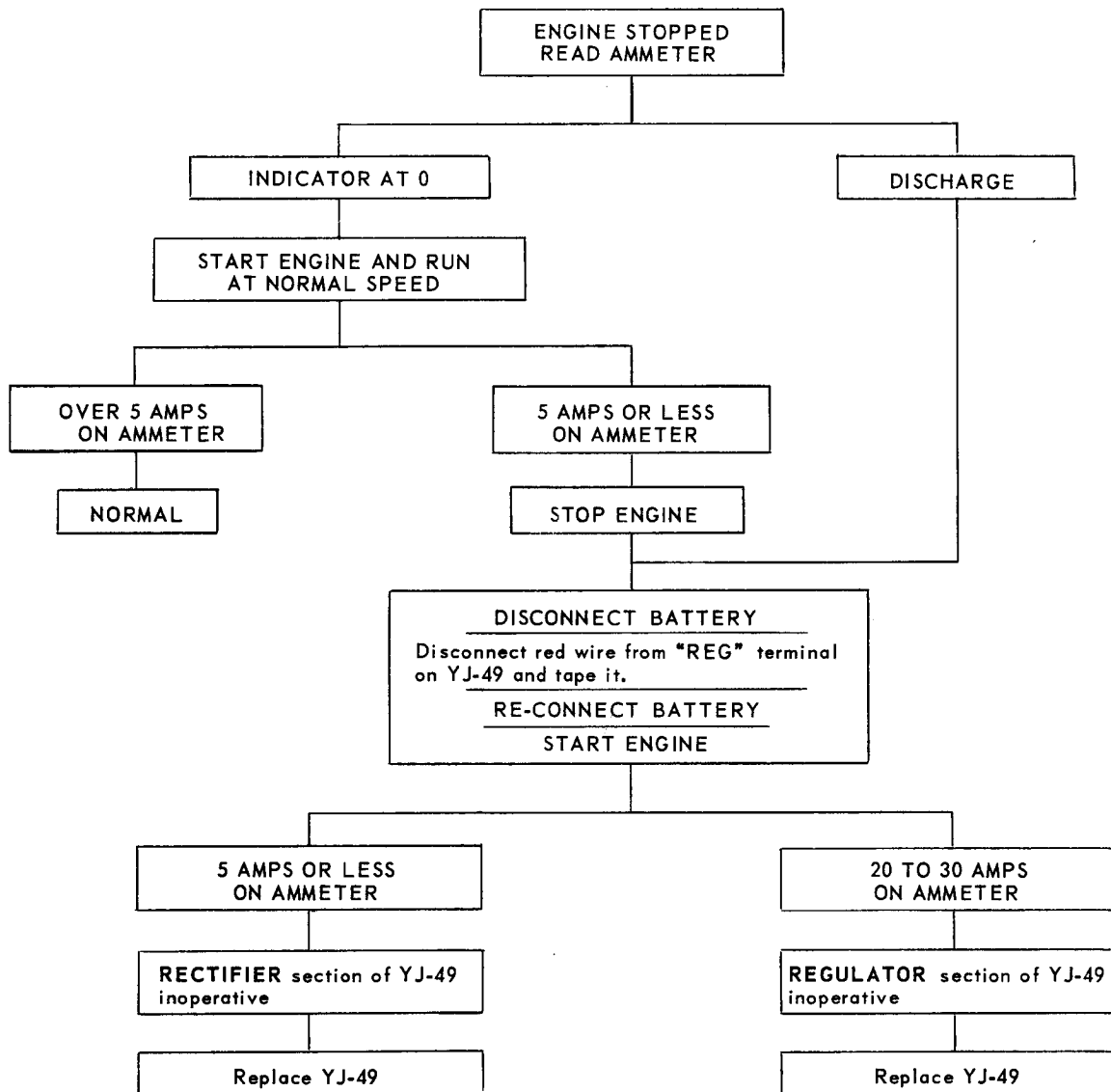
TO CHECK STATOR

Examine leads for broken wires or loose connections. If none is found, remove one *red* and one *black* lead from RECTIFIER-REGULATOR. Using an ohmmeter with R x 1 scale (Simpson Model 260, or similar meter with ohm-meter sensitivity of 20,000 ohms/volt) check continuity as follows:

METER PROBE CONNECTIONS	CORRECT METER VALUE	REPLACE STATOR
RED TO RED	2.0 OHMS	} 0 Indicates Short Circuit, ∞ Indicates Open Circuit.
BLACK TO BLACK	0.1 OHM	
RED TO BLACK	∞	} Any reading indicates a short circuit
RED TO ENGINE	∞	
BLACK TO ENGINE	∞	

FLYWHEEL ALTERNATOR - TROUBLE SHOOTING

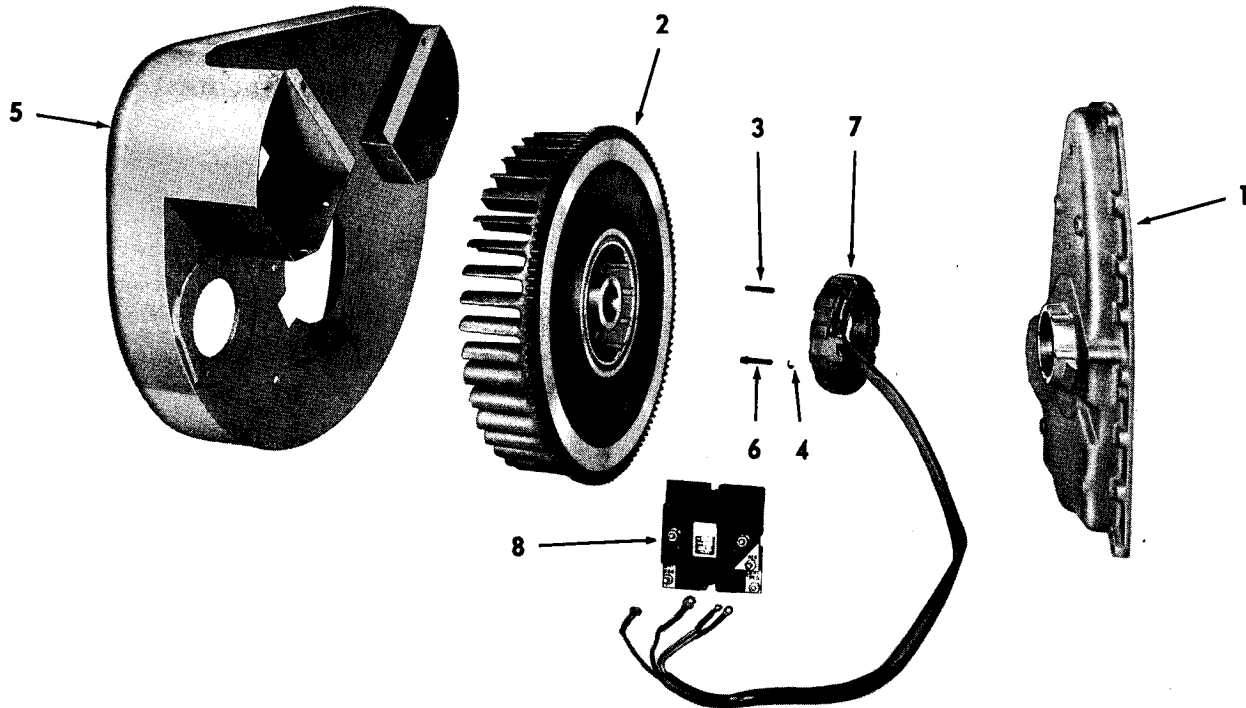
Use following procedure *only* when battery is *not* fully charged. Determine charge with hydrometer and it should not exceed 1225.



FOR EMERGENCY USE: Operate with "REG" wire disconnected and taped (to prevent short). After 1 hour, connect loose red wire to "AC" terminal. Charge will be 5 amps. After additional operation, if battery requires more charge, remove red wire from "AC" and repeat.

REGULATOR RECTIFIER ASSEMBLY MUST BE INSTALLED IN VERTICAL POSITION.

SERVICE PARTS LIST: The following items are in addition to, or replace similar parts found in the standard engine parts manuals.



291304C

FOR ENGINE MODEL AGND

FOR ENGINE MODEL THD

Ref. No.	Part Number	Description	No Req
1	BG-343-S1	BEARING RETAINER PLATE and STATOR SUPPORT	1
2	N-103	FLYWHEEL ASSEMBLY, includes magnetic rotor and ring gear	1
3	PA-340	ROLL PIN for stator mounting	2
4	PE-14	LOCKWASHER, No. 10, for stator mt'g.	4
5	SE-217H	FLYWHEEL SHR OUD	1
6	XB-106	SCREW, No. 10-32 thread, for stator mt'g.	4
7	YB-67	STATOR ASSEMBLY	1
8	YJ-49-S1	RECTIFIER-REGULATOR ASSEMBLY	1

NOTE: Special crankcase required — order by giving Model, Specification and Serial Numbers.

Ref. No.	Part Number	Description	No Req
1	BD-103-F-S1	GEAR COVER ASSEMBLY	1
2	N-102	FLYWHEEL ASSEMBLY, includes magnetic rotor and ring gear	1
3	PA-340	ROLL PIN for stator mounting	2
4	PE-14	LOCKWASHER, No. 10, for stator mt'g.	4
5	SE-135-AK	FLYWHEEL SHR OUD	1
6	XB-106	SCREW, No. 10-32 thread, for stator mt'g.	4
7	YB-67	STATOR ASSEMBLY	1
8	YJ-49-S1	RECTIFIER-REGULATOR ASSEMBLY	1

FOR ENGINE MODELS VH4D, VE4D, VF4D

FOR ENGINE MODEL VG4D

Ref. No.	Part Number	Description	No Req
1	BD-100-F-S1	GEAR COVER ASSEMBLY	1
2	N-101	FLYWHEEL ASSEMBLY, includes magnetic rotor and ring gear	1
3	PA-340	ROLL PIN for stator mounting	2
4	PE-14	LOCKWASHER, No. 10, for stator mt'g.	4
5	SE-74-YC	FLYWHEEL SHR OUD for open engine (with pads for starter and air cleaner)	1
	or		
	SE-74-YA	For power unit (with starter pad)	1
6	XB-106	SCREW, No. 10-32 thread, for stator mt'g.	4
7	YB-67	STATOR ASSEMBLY	1
8	YJ-49-S1	RECTIFIER-REGULATOR ASSEMBLY	1

Ref. No.	Part Number	Description	No Req
1	BD-101-B-S1	GEAR COVER ASSEMBLY	1
2	N-100	FLYWHEEL ASSEMBLY, includes magnetic rotor and ring gear	1
3	PA-340	ROLL PIN for stator mounting	2
4	PE-14	LOCKWASHER, No. 10, for stator mt'g.	4
5	SE-124-AM	FLYWHEEL SHR OUD for power units (with starter pad)	1
	or		
	SE-124-AP	For open engines (with starter pad and air cleaner pad)	1
6	XB-106	SCREW, No. 10-32 thread, for stator mt'g.	4
7	YB-67	STATOR ASSEMBLY	1
8	YJ-49-S1	RECTIFIER-REGULATOR ASSEMBLY	1

Order parts from nearest **SERVICE STATION** shown in Engine Instruction Book.
IMPORTANT: Always give Model, Specification and Serial Number as shown on name plate.

WARRANTY

We guarantee each new engine sold by us to be free from defects in material and workmanship for a period of one year, dating from delivery to the original user. The obligation under this Warranty, statutory or otherwise, is limited to the replacement or repair at our Milwaukee, Wisconsin factory, or at a point designated by us, of such part as shall appear to us, upon inspection at such point, to have been defective in material or workmanship.

This Warranty does not obligate us to bear the cost of labor or transportation charges in connection with the replacement or repair of defective parts, nor shall it apply to an engine upon which repairs or alterations have been made unless authorized by us.

We make no Warranty in respect to trade accessories, such being subject to the Warranties of their respective manufacturers.

We shall in no event be liable for consequential damages or contingent liabilities arising out of the failure of any engine or parts to operate properly.

No express, implied or statutory Warranty other than herein set forth is made or authorized to be made by us.

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.

**For Your Own Record, Do Not Cut Out and Return to Factory.*

WISCONSIN MOTOR CORPORATION
MILWAUKEE, WISCONSIN 53246

WISCONSIN MOTOR CORPORATION
MILWAUKEE, WISCONSIN 53246

3 to 60.5 H.P.

