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# TM 5-5193

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

## ENGINE HEAVY DUTY AIR COOLED WISCONSIN MODELS VE4, VF4 INSTRUCTION BOOK AND PARTS LIST

1579

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## **IMPORTANT**

Since there is a right way, and many wrong ways to operate an engine, it is important that this manual be read carefully before you start your engine. This will avoid unnecessary delays and expense which might be caused by improper operation.

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.

**WISCONSIN MOTOR CORPORATION**  
MILWAUKEE 46, WISCONSIN

DEPARTMENT OF THE ARMY  
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TM 5-5193 is published for the information and guidance of all concerned.

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# **BOOK OF INSTRUCTIONS**

## **WISCONSIN FOUR CYLINDER ENGINES**



### **MODEL VE4**

**3" Bore**

**3¼" Stroke**

**91.9 cu. in. Disp.**

### **MODEL VF4**

**3¼" Bore**

**3¼" Stroke**

**107.7 cu. in. Disp.**



**NOTE:** Engines having Stellite Exhaust Valves and Inserts are designated as Models VE4D or VF4D.

The letter 'I' suffixed to the engine model designates that the engine has Cast Iron Pistons.

GIFT  
NOV 8 '57

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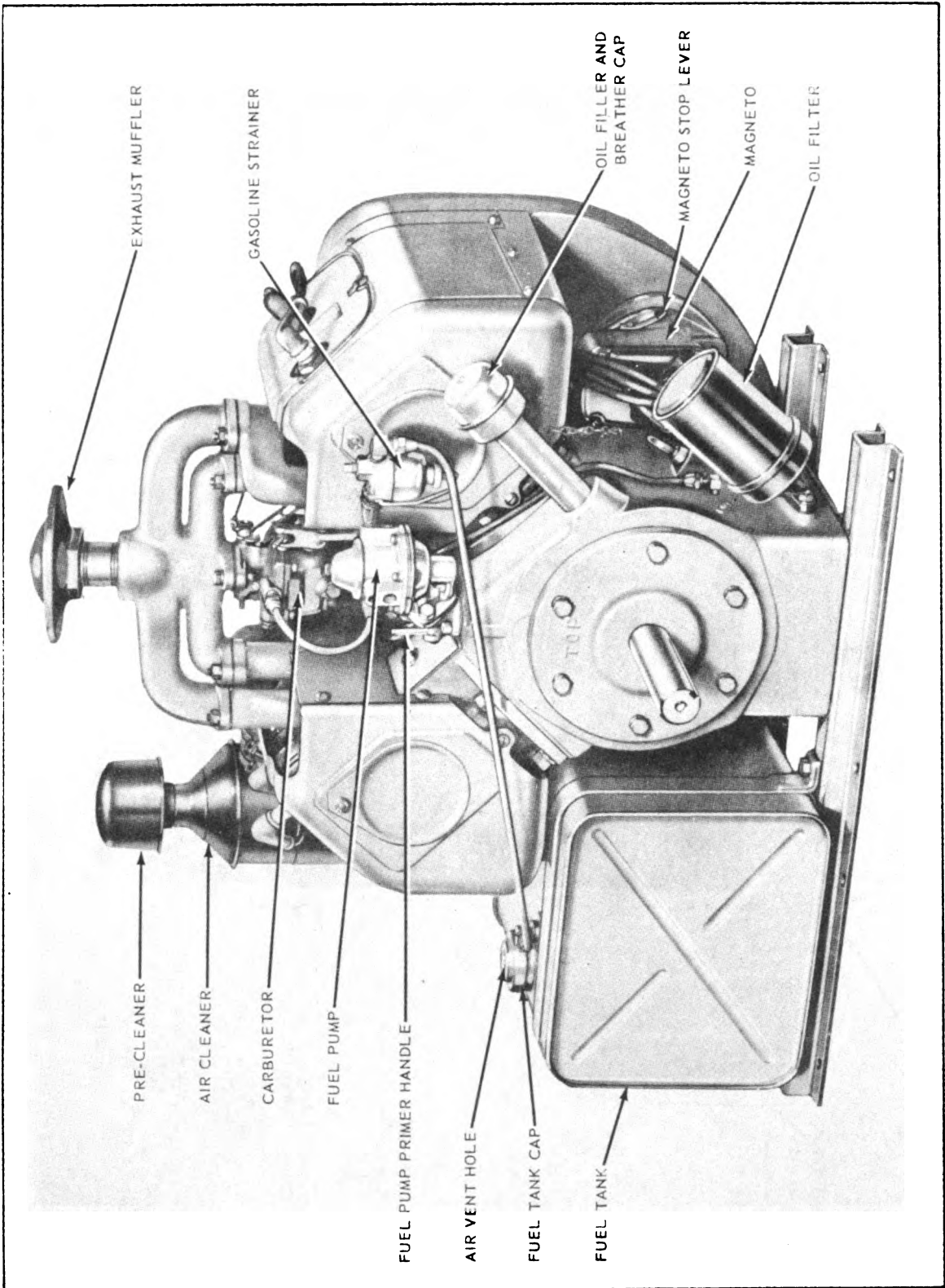


Fig. 1

TAKE-OFF (Side Mount Tank) VIEW OF ENGINE

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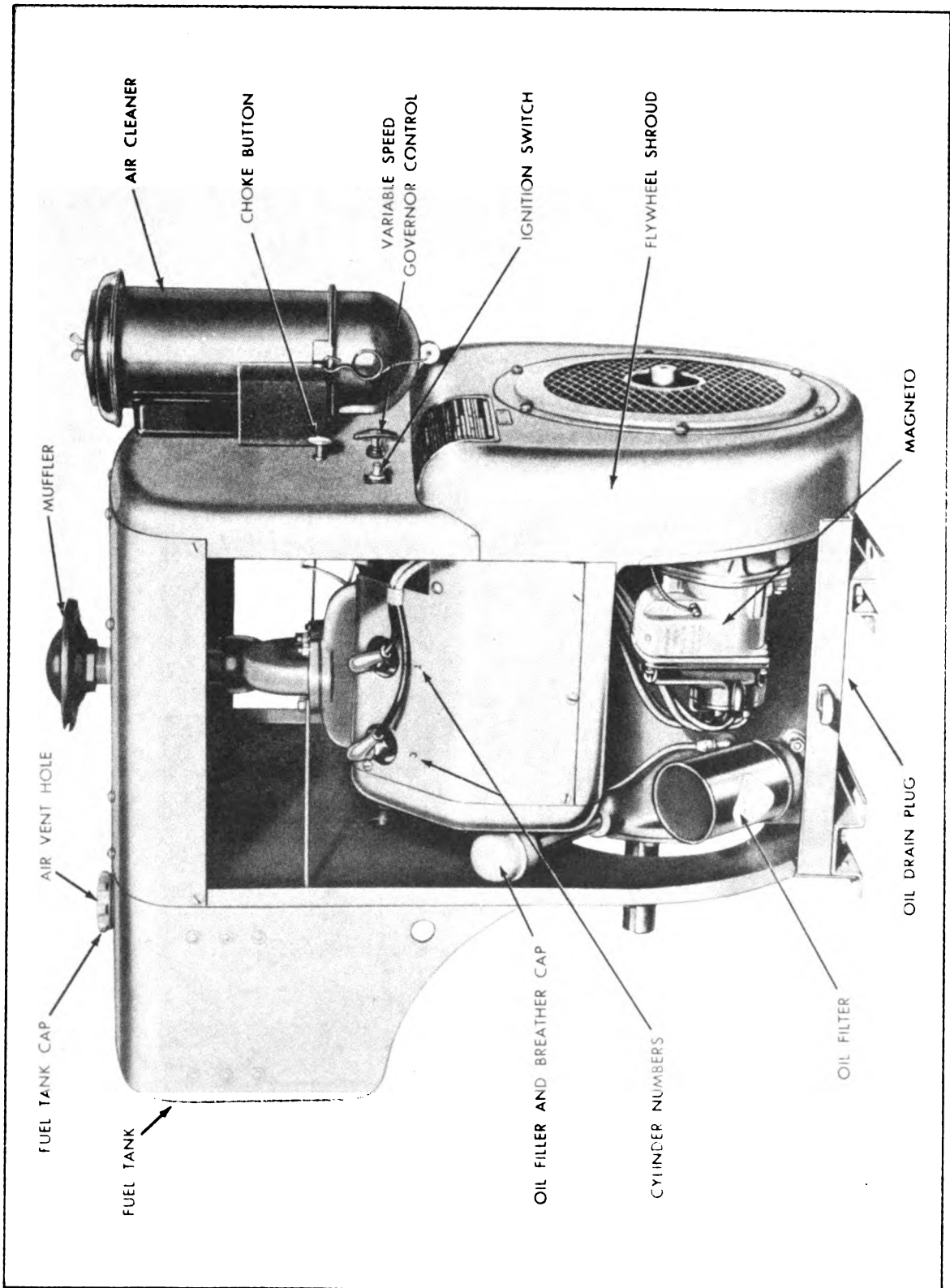


Fig. 2

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POWER UNIT FAN END VIEW OF ENGINE



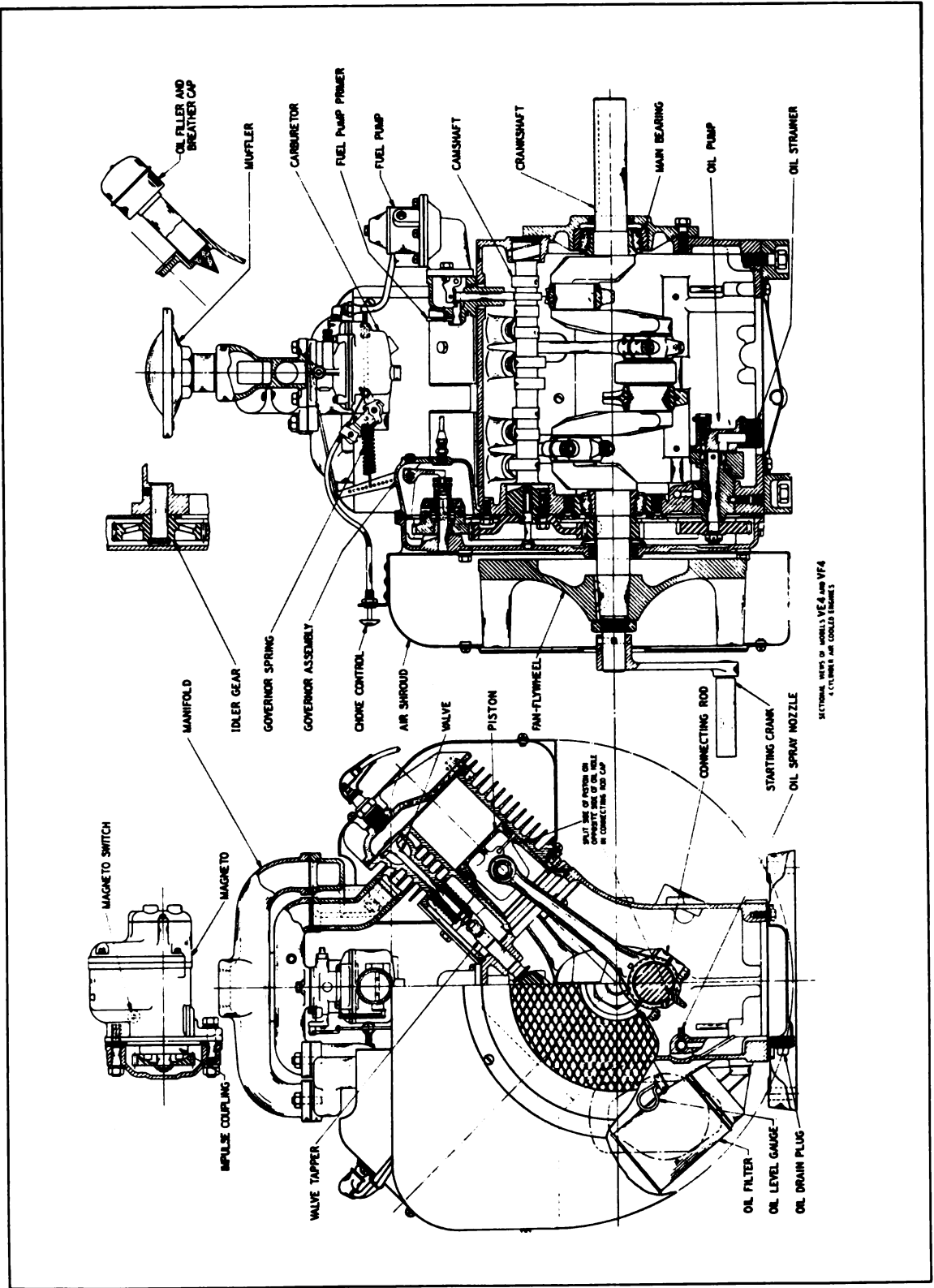
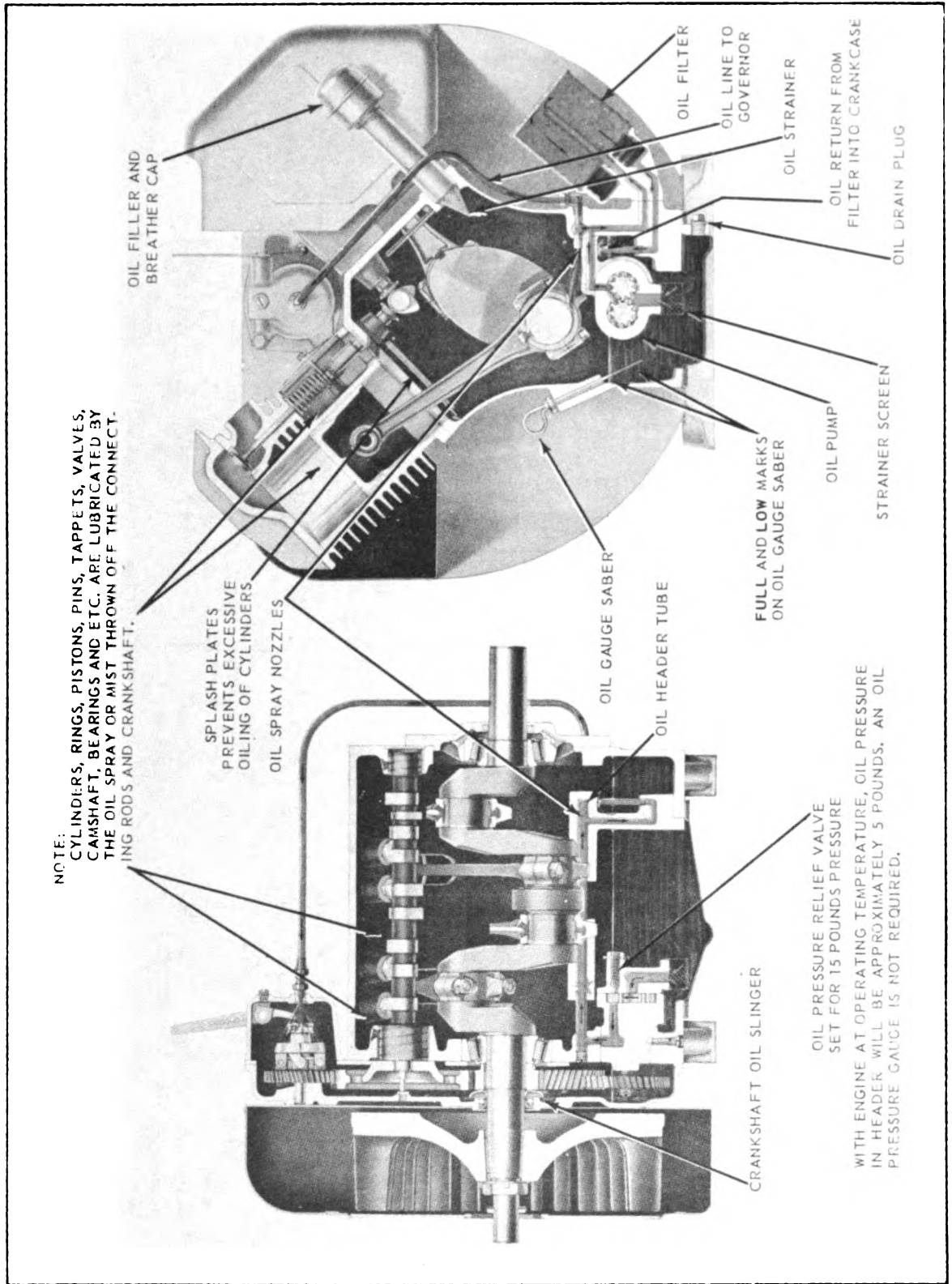


Fig. 3  
**CROSS SECTION OF ENGINE**



166737C

166738C

Fig. 4  
LUBRICATION SYSTEM

## GENERAL INFORMATION

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

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

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

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

## GENERAL DESIGN

*Wisconsin* engines are of the four cycle type, in which each of the four operations of suction, compression, expansion and exhaust requires a complete stroke.

This gives one power stroke per cylinder for each two revolutions of the crankshaft.

## COOLING

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

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

## CARBURETOR

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

## IGNITION

The spark for ignition of the fuel mixture is furnished by a high tension magneto driven off the timing gears at crankshaft speed. The magneto is fitted with an impulse coupling, which makes possible a powerful spark for easy starting. Also, the impulse coupling automatically retards the timing of the spark for starting, thus eliminating danger of a kick back from the engine when starting. When electric starter and generator is furnished, battery ignition is used. See Page 12.

## LUBRICATION

A gear type pump supplies oil to four nozzles which direct oil streams against fins on the connecting rod caps. Part of the oil enters the rod bearing through holes in the rods, and the balance of the oil forms a spray or mist which lubricates the cylinders and all other parts of the engine. See Fig. 4.

## GOVERNOR

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

## ROTATION

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

## HORSE POWER

R.P.M.	VE4	VF4
1400	13.0	15.0
1600	15.0	17.5
1800	17.0	19.5
2000	19.0	21.0
2200	20.5	23.0
2400	21.5	25.0

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

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

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

For each 1000 ft. altitude above sea level there will be a reduction in horsepower of 3%.

The friction in new engines cannot be reduced to the ultimate minimum during the regular block test, but the 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.

## INSTRUCTIONS FOR STARTING AND OPERATING

Some of these engines are furnished with a house, as shown in Fig. 2, while others are furnished without a house, as shown in Fig. 1.

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

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

## LUBRICATION

Before starting the engine, fill the oil base with good gasoline engine oil. Fill through the breather pipe up to **FULL line on oil gauge sabre, see Fig. 4.** On most of these engines the sabre is on the magneto side, except when some accessories interfere then it is located on the opposite side.

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	Mobiloil 'Arctic'
Winter +5°F to -20°F	SAE 10W	Mobiloil 'Arctic Special'
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. See Fig. 4. Oil should be drained while engine is hot, as it will then flow more freely.

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.

## OIL FILTER

A by-pass type oil filter is furnished on these engines see Fig. 4, except in a few cases where the use of other accessories prevents the fitting of the 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. See Fig. 5.

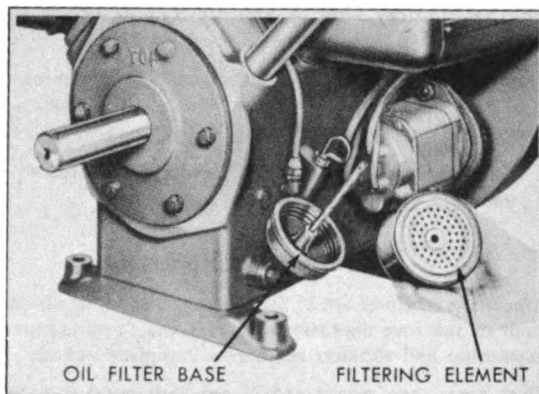


Fig. 5

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## 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. See Fig. 6 and Fig. 7. Fill the bowl to oil level line with the same grade of oil as used in the crankcase. Detailed instructions are printed on the air cleaner.

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

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

When a collector type pre-cleaner is used on top of the air cleaner, the glass jar should be emptied of accumulated dirt frequently, depending on dust condi-

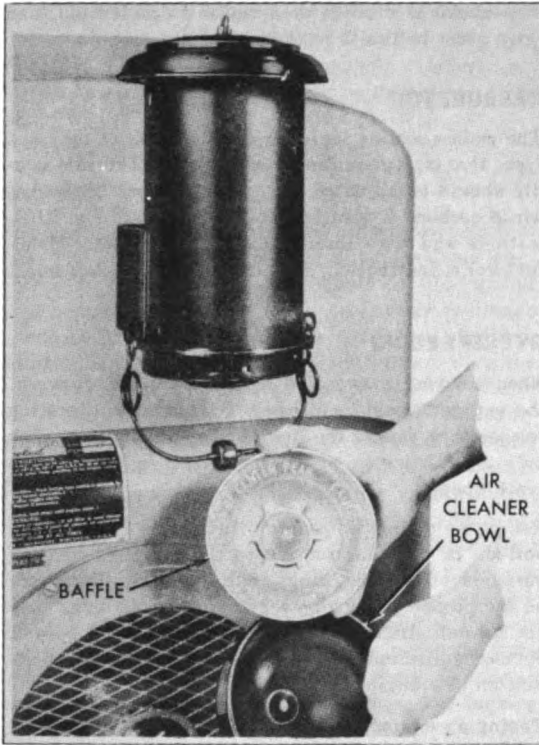


Fig. 6 71069C

tions. See Fig. 7. Do not use oil or water in glass precleaner jar. This should be kept dry.

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

## FUEL

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

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

*We recommend using gasoline with an octane rating of 70 to 75.*

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, too.

Be sure to open the gasoline shut-off valve below the fuel tank when gravity feed tanks are used. Also

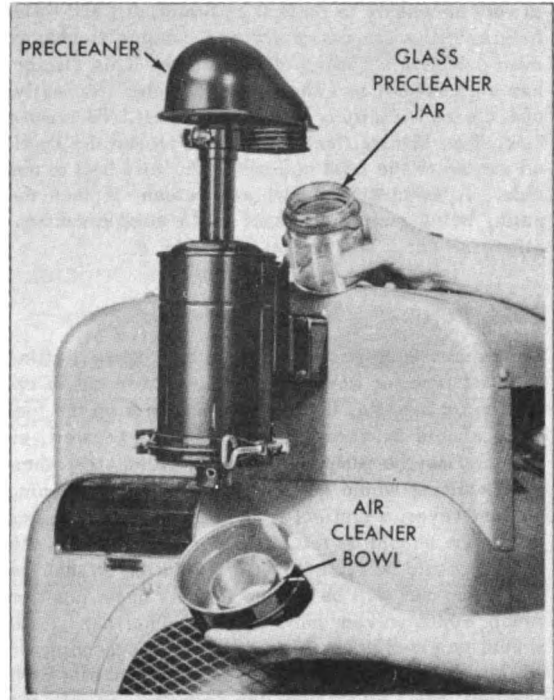


Fig. 7 71732C

be sure air vent hole in fuel tank cap is open, otherwise gas cannot flow to the carburetor.

## GASOLINE STRAINER

The gasoline strainer on the bottom of the fuel tank

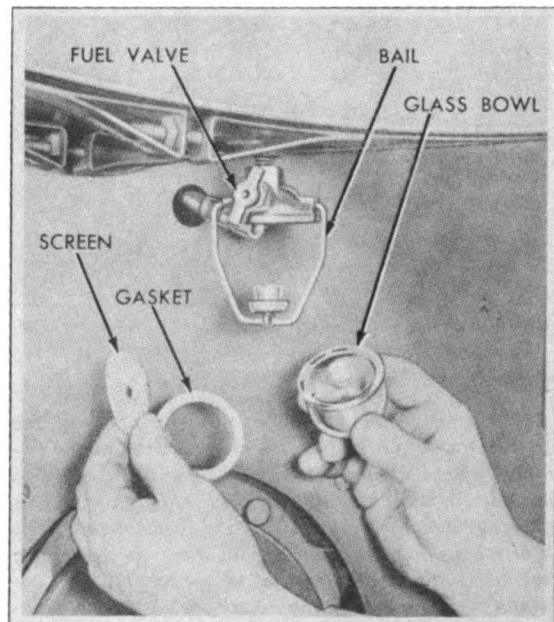


Fig. 8 71051C

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 is present. To remove bowl, first shut off fuel valve, then loosen the knurled nut below the bowl and swing the wire bail to one side. After cleaning bowl and screen, replace the parts, being sure the gasket is in good condition, otherwise use a new gasket. See Fig. 8.

### FUEL PUMP

On engines equipped with fuel pumps, 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 before attempting to start, so that fuel may be pumped into the dry carburetor, otherwise starting would be very difficult. When priming by hand lever, a distinct resistance of the fuel pump diaphragm should be felt. If this is not the case, the engine should be turned over a revolution so that the fuel pump cam will be rotated from its upper position which would prevent hand priming. This hand lever should be given about 20 to 30 strokes, depending on how much fuel, if any, there is in the carburetor float chamber. See Fig. 9. When the carburetor is full, the hand primer lever will move more easily.

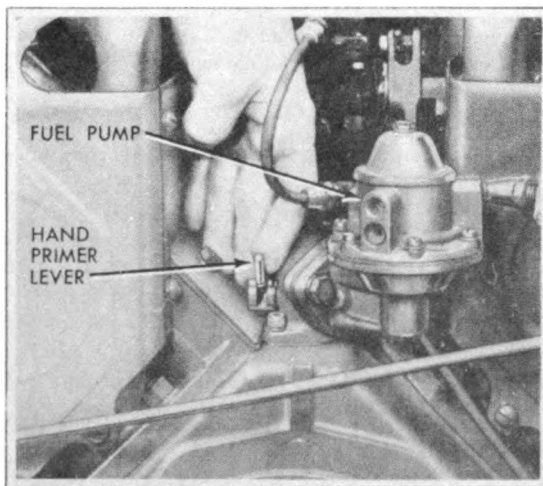


Fig. 9

83422C

### CHOKE

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

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

### CARBURETOR

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

### OVERSPEEDING

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

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

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

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

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

Therefore 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.

### IGNITION SWITCH

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

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

## MAGNETO

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. See Fig. 10 which shows the end cover of the Fairbanks-Morse magneto removed. The crankshaft should then be rotated with the starting crank, (this also rotates the magneto), until the breaker points are wide open. The opening or gap should then be measured with a feeler gauge and if necessary reset as shown in Fig. 11. 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. 11. After tightening the locking screws, recheck breaker point gap to make sure it has not changed. If it is found that the breaker points

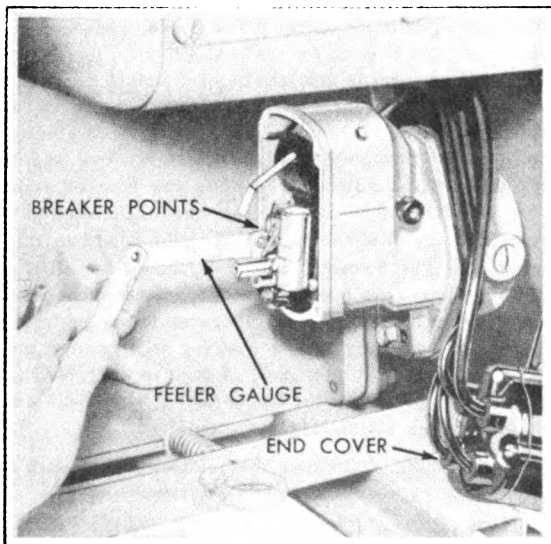
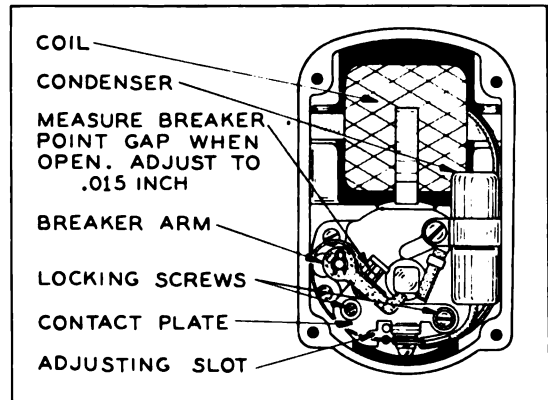


Fig. 10

have become rough, they should be smoothed with a breaker point file before the above adjustments are made. Replace magneto end cover carefully so that it will seal properly. Do not force cover screws too tightly otherwise cover may crack. For further information see Fairbanks-Morse or Wico Magneto Maintenance Manual in back of this book.



OPEN END VIEW OF FAIRBANKS-MORSE MAGNETO

Fig. 11

## MAGNETO IGNITION SPARK

If difficulty is experienced in starting the engine or if engine misses firing, the strength of the ignition spark may be tested by removing the ignition cable from the spark plug and holding the terminal 1/8 inch away from the cylinder head shroud, as shown in Fig. 12. Turn the engine over slowly by the starting crank as shown.

When the impulse coupling on the magneto snaps there should be a good spark at the ignition cable terminal. If there is a weak spark, or none at all, first check breaker point opening as mentioned in preceding paragraph under 'Magneto'. If this does not

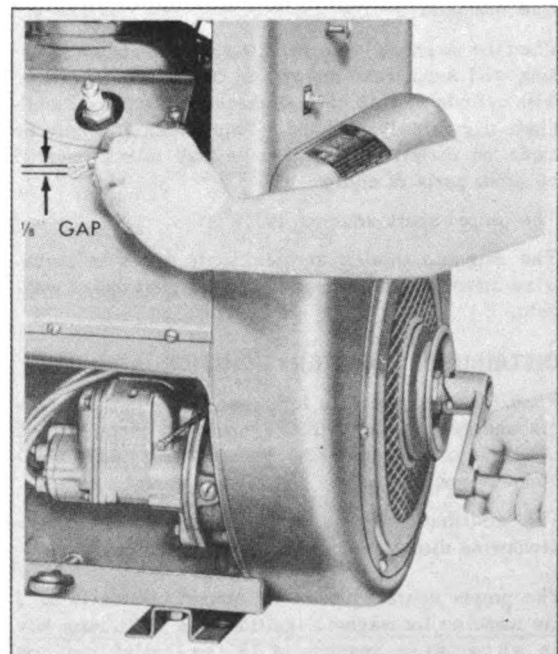


Fig. 12

104816C

remedy the trouble, it may be necessary to install a new condenser. See Magneto Manufacturer's Maintenance Manual in back of this book.

## MAGNETO TIMING

The magneto is properly timed at the factory, but if for any reason it is necessary to retime the magneto, the following instructions will be helpful.

First remove the screen over the flywheel air intake opening by taking out the six screws holding the screen in place. This will expose the timing marks on flywheel shroud for timing magneto. See Timing Diagram, *Fig. 13*.

Next remove the spark plug from No. 1 cylinder. Then turn engine over slowly with the starting crank until the compression in this cylinder blows the air out of the spark plug hole.

The flywheel is marked with the letters DC near one of the air circulating vanes. This vane is further identified by a mark cast on the end. See Diagram, *Fig. 13*. 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 shroud as shown on Timing Diagram. Then leave flywheel in this position. (At this point No. 1 and No. 4 cranks are vertical. The keyway at take-off end of crankshaft is also on top.)

The magneto should then be fitted to the engine so that the marked tooth on the magneto gear is visible through the opening in timing gear housing as shown on Timing Diagram, *Fig. 13*. The distributor cap on the magneto is numbered from 1 to 4. The leads from the magneto should be connected to spark plug of like numbers.

When the magneto is properly timed the impulse coupling will snap when keyway in crankshaft is in line with cylinders. This can be checked by turning crankshaft over slowly by hand. This check can only be made on installations where keyway is not covered by other parts of equipment.

The proper spark advance is 27°.

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

## DISTRIBUTOR - BATTERY IGNITION

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

The distributor rotates at engine speed in counter-clockwise direction when viewed from above.

The proper spark advance for normal speeds is 27°, the same as for magneto ignition. The distributor has an automatic advance of 15° so that at very low speeds, (below 500 R.P.M.) there would be an igni-

tion advance of 12° before top dead center position of the piston.

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

First remove the screen over the flywheel air intake opening by taking out the six screws holding the screen in place. This will expose the timing marks on the flywheel shroud, also the vane on flywheel, marked by an 'X' and the letters DC. See *Fig. 14*. Then remove the spark plug from No. 1 cylinder and turn engine over slowly, by the starting crank until the compression blows the air out of the spark plug hole.

Continue turning starting crank until the leading edge of the marked vane on the flywheel is in line with the center punch mark on the flywheel shroud. See *Fig. 14*.

Remove upper half of distributor body by disengaging snap springs.

The distributor rotor should then line up with center of the notches in the distributor housing. See *Fig. 15*.

If the rotor is not in this position, withdraw entire distributor from the generator, and re-engage the gears at the bottom of the distributor in a new position so rotor will be located properly. The spark advance lever should now be locked firmly in position by the advance lever lock screw. See *Fig. 15*, as a manual spark advance is not used with these engines.

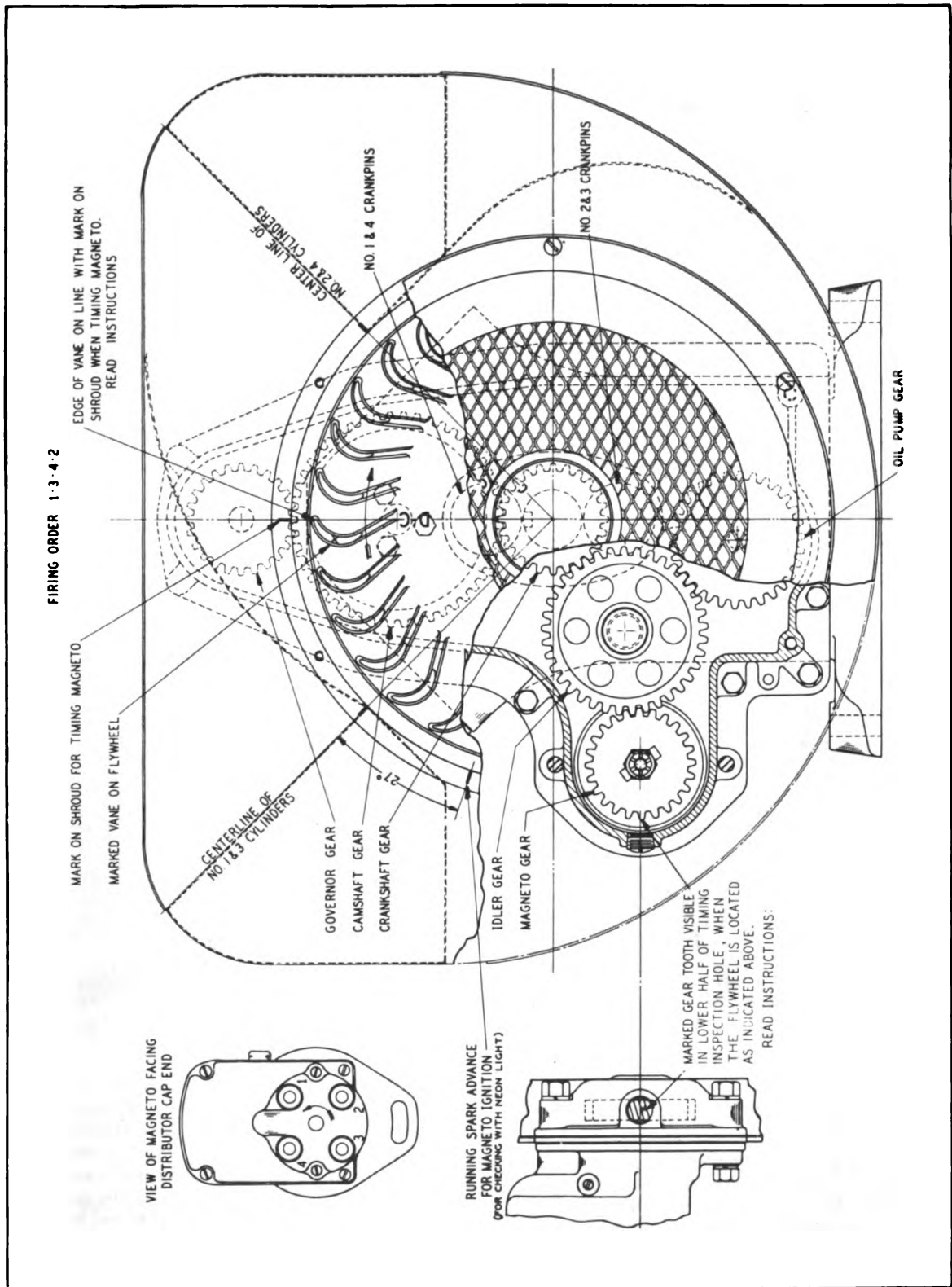
With the distributor clamp screw loose, see *Fig. 16*, first turn the distributor body slightly in a counter-clockwise direction until the breaker points are firmly closed. Then turn the distributor body in a clockwise direction until the breaker points are just beginning to open. At this point a slight resistance can be felt as the breaker point cam strikes the breaker point arm. The distributor clamp screw should then be tightened, so the distributor will be held firmly in this position. The breaker point gap should be .018 to .022 inches. This opening should be checked before the distributor body is set, otherwise any adjustment made to the breaker point opening will change the ignition advance adjustment. If care is exercised in the above operations the spark timing should be accurate enough for satisfactory operation.

If it is desired to recheck the ignition timing with a neon lamp, this may be done as follows:

Connect the neon lamp in series with the No. 1 spark plug ignition cable. Chalk the end of the marked vane on the flywheel, using white chalk. Then with the engine operating at normal speed, allow the flash from the neon lamp to illuminate the whitened vane. At the time of the flash, the leading edge of the vane should line up with the 'running spark advance mark' on the flywheel housing. See *Fig. 14*.

The four ignition cables from the distributor should be connected to the same number spark plug as the





**Fig. 13**  
**MAGNETO TIMING DIAGRAM**

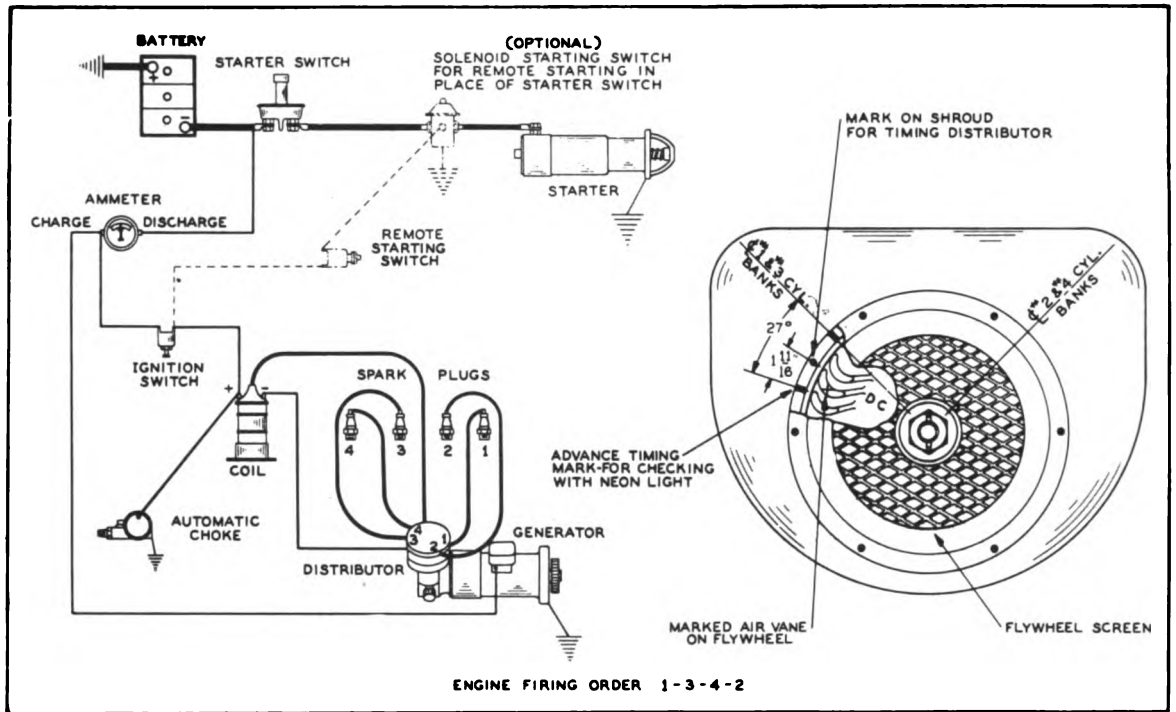


Fig. 14

**BATTERY IGNITION - WIRING AND TIMING DIAGRAM**

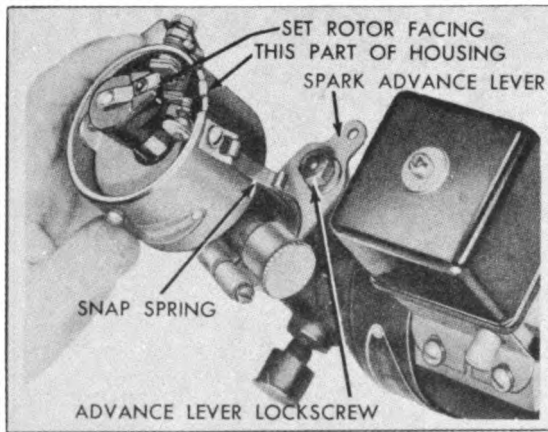


Fig. 15

77930C



Fig. 16

77931C

number on the distributor. See Fig. 17. The center cable from the distributor is connected to the ignition coil.

The grease cup on the distributor should be given one turn every 64 hours of operation. Use a high melting point grease. Do not over lubricate, otherwise grease will enter the generator and the distributor and may cause trouble.

**FIRING ORDER**

The firing order of the cylinder is 1-3-4-2. Number 1

cylinder is the one nearest to the flywheel in the left bank of cylinders, when viewed from the flywheel end of the engine. Number 3 cylinder is the other cylinder in this bank. Number 2 cylinder is the one nearest to the flywheel in the right bank of cylinders and Number 4 is the other cylinder in this bank. The cylinders are numbered from 1 to 4 on the air shroud near the spark plugs. See Fig. 2. The flywheel end of the engine is designated the front end, and the power take-off end, the rear end of the engine.

As these engines are of the V type, the interval be-

tween firing of the cylinders is as follows: Crankshaft rotation between firing of cylinders No. 1 and No. 3 is 180°; between No. 3 and No. 4 is 270°; between No. 4 and No. 2 is 180°; and, between No. 2 and No. 1 is 90°.

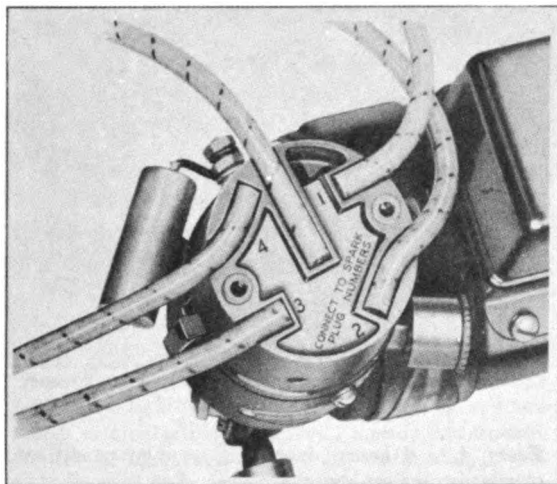


Fig. 17

77932C

### 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. 18. If the porcelain insulator is cracked replace with a new plug of correct heat range, like Champion No. 8 Com., AC No. 85 or equal. The spark thread is 18 millimeter. Be sure to use a good gasket under the spark plug. Tighten spark plugs, 25 to 30 foot pounds torque.

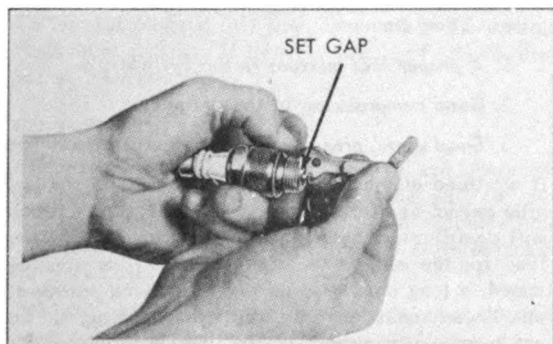


Fig. 18

104713C

### ELECTRIC STARTER

The electric starter is an optional accessory, furnished only upon request when engine is purchased. The starter and generator cannot be mounted in the field unless provisions were made when engine was purchased. The starter and generator are products of

the Electric Auto-Lite Company, Toledo, Ohio, and it is recommended that all repairs for this accessory be done through their authorized Service Stations. For wiring diagram, see Fig. 14. Battery is not furnished by engine manufacturer.

### STARTING

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

### RESTORING COMPRESSION

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

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

### TO STOP ENGINE

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

## 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 the Figs. 19 and 20, 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.
2. Open these covers frequently and clean out all dust and chaff. Be sure to close covers.

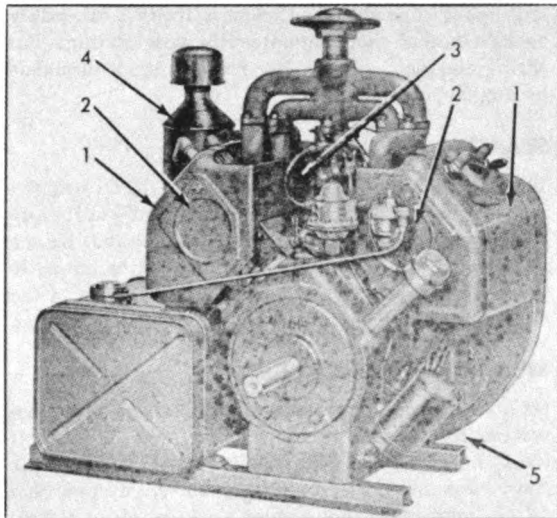


Fig. 19

104725C

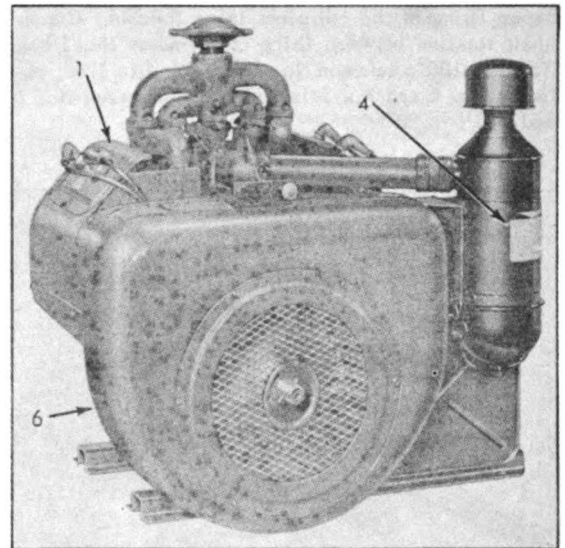


Fig. 20

104813C

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. 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.
6. 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 the air cooling.*

#### SAFETY PRECAUTIONS

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

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

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

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

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

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

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

### TROUBLES CAUSES AND REMEDIES

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

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

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

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

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

## STARTING DIFFICULTIES

### FUEL MIXTURE

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

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

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

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

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

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

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

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

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

### COMPRESSION

If the engine has proper compression, considerable resistance will be encountered in the pull on the starting crank. 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 in cranking engine, due to escaping gas mixture on compression stroke.

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

Valve stuck open due to carbon or gum on valve stem. To clean valve stems, see *'Valves'*, Page 23.

Valve tappets adjusted with insufficient clearance under valve stems. See *'Valve Tappet Adjustment'*, Page 24.

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 15.

### ENGINE SURGES OR GALLOPS

Carburetor flooding.

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

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 9.

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 23.

Overheated valves.

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

Hot carbon particles in engine.

## DISASSEMBLING AND REASSEMBLING ENGINES

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

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

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

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

### ACCESSORIES

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

### SHEET METAL HOUSE

With engines enclosed in a sheet metal house, the top cover or canopy of the house should be removed by taking out the screws holding it to the end panels. For removing end panels, see following paragraphs.

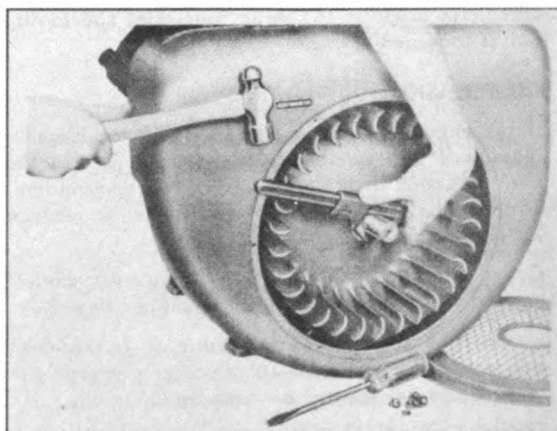


Fig. 21

76690C

### FLYWHEEL

It is necessary that the flywheel be removed next. After the flywheel screen has been removed, the fly-

wheel nut should be taken off as shown in *Fig. 21*. Then as shown in *Fig. 22*, the flywheel can be removed from the crankshaft by tapping the end of the crankshaft with a babbitt hammer. Do not use a hard hammer as it would ruin the crankshaft and bearings.

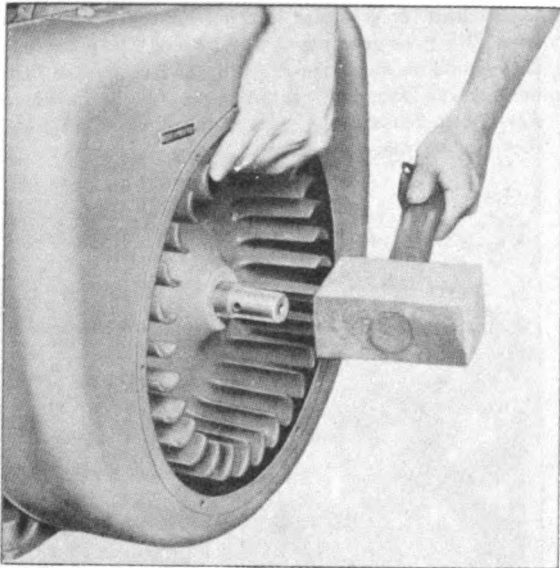


Fig. 22

76696C

## AIR SHROUDING

To disassemble air shrouding, (see *Figs. 23 to 25*) first remove cylinder head covers and the screws mounting the flywheel shroud to the lower cylinder shrouds and cylinder head deflectors, then remove the screws holding the flywheel shroud to gear cover. When complete engine house is disassembled, remove the front end panel as shown in *Fig. 23* together with flywheel shroud and the rear end panel, see *Fig. 24*, complete with fuel tank. Balance of shrouding can now be readily removed.

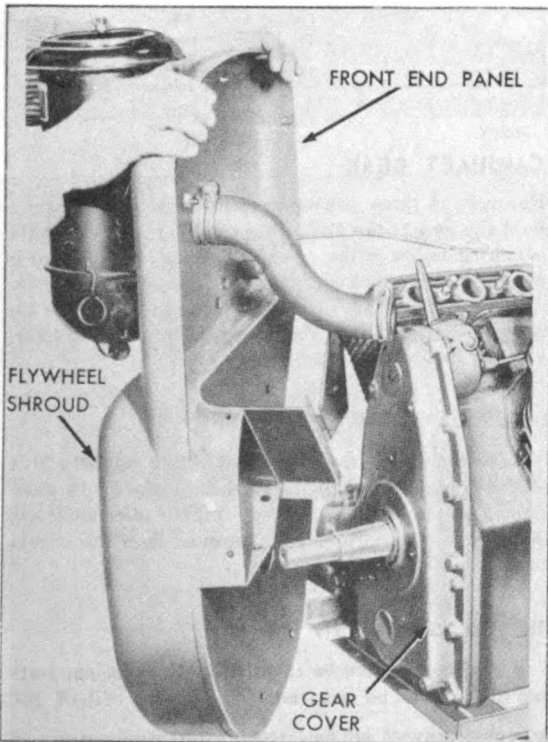


Fig. 23

104719C

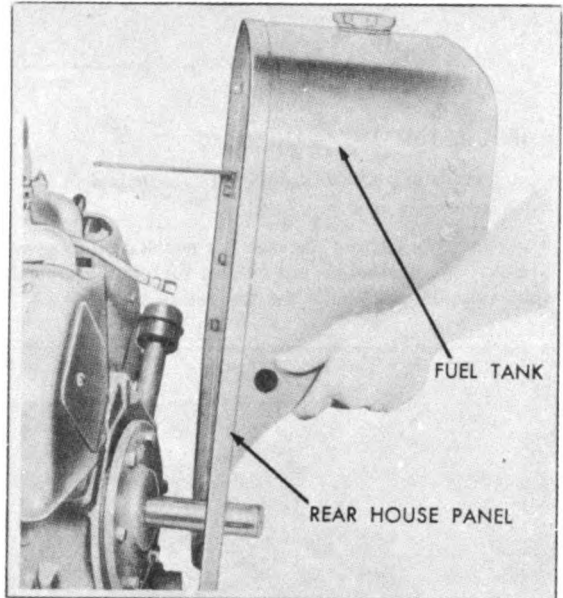


Fig. 24

71050C

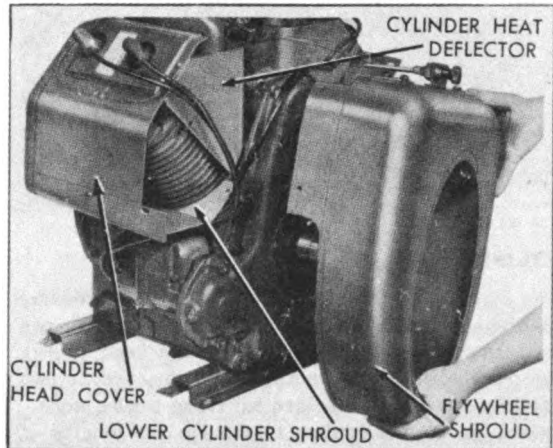


Fig. 25

104811C

## GAS TANK

If a side mount gasoline tank is used, this should be removed next. See *Fig. 26*.

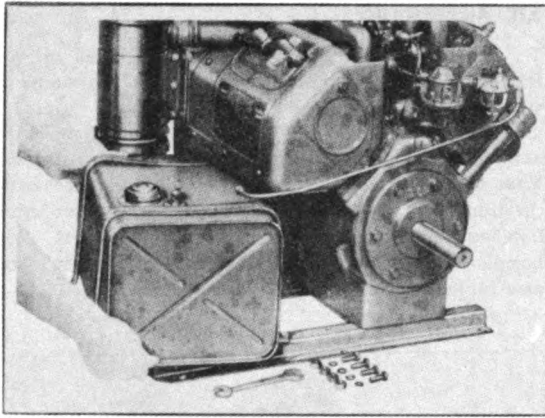


Fig. 26

83608C

### CARBURETOR AND MANIFOLDS

The carburetor and manifolds can be removed in sections as shown in Fig. 27.

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

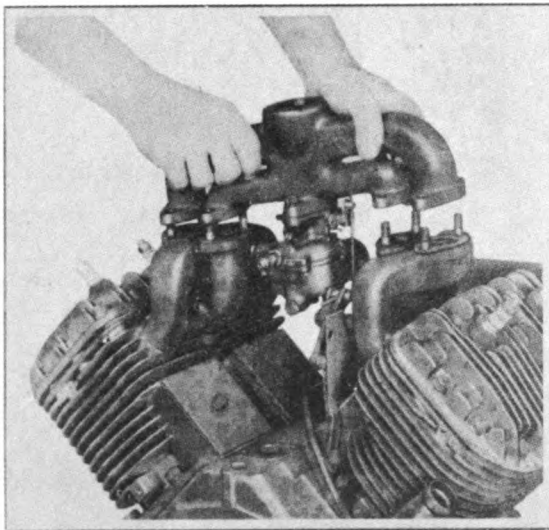


Fig. 27

83620C

### 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 rod. 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 head, all carbon and lead deposits should be removed. It is recommended that a new cylinder head gasket be used on reassembly as the old gasket will be compressed and hard

so that it may not seal properly. Mount gasket with the bend toward the cylinder block. Tighten cylinder head screws, 22 to 24 foot pounds torque.

### GEAR COVER

Disengage the governor linkage as described on page 24 before removing gear cover, since the same mounting screws for governor housing and gear cover are used. Remove gear cover screws and drive out two dowel pins as shown in Fig. 28. The cover can then be removed exposing the timing gears as shown in Fig. 29. In reassembly, tighten cap screws, 14 to 18 foot pounds torque.

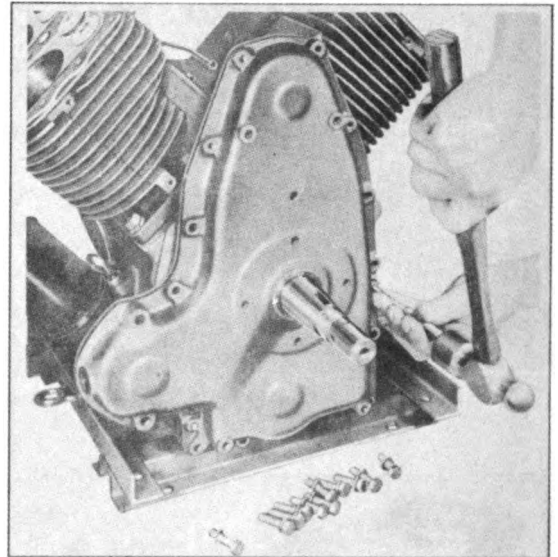


Fig. 28

71056C

### CAMSHAFT GEAR

Remove the three cap screws and lock washers 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 set screw 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. 30.

### OIL PAN (See Fig. 31)

The engine can then be inverted so that the supports and oil pan can be removed.

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



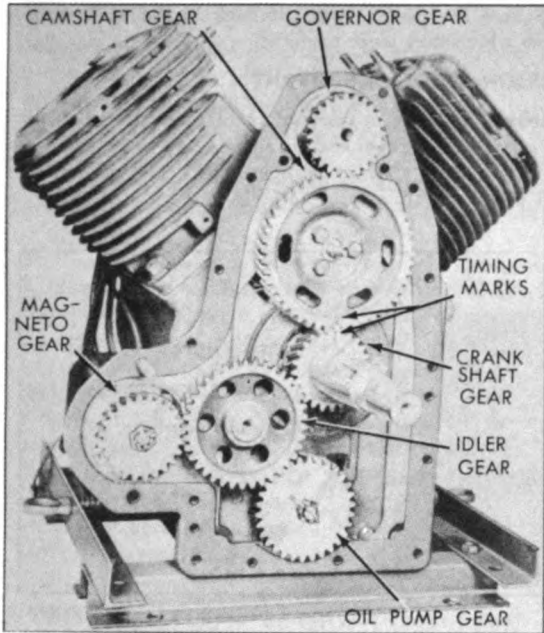


Fig. 29

104716C

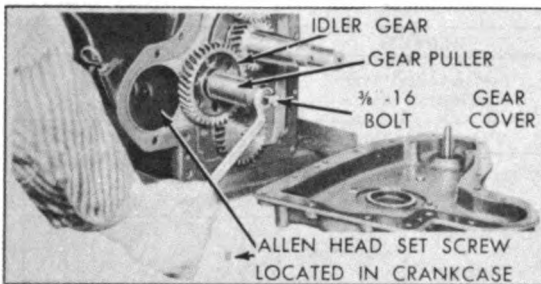


Fig. 30

71066C

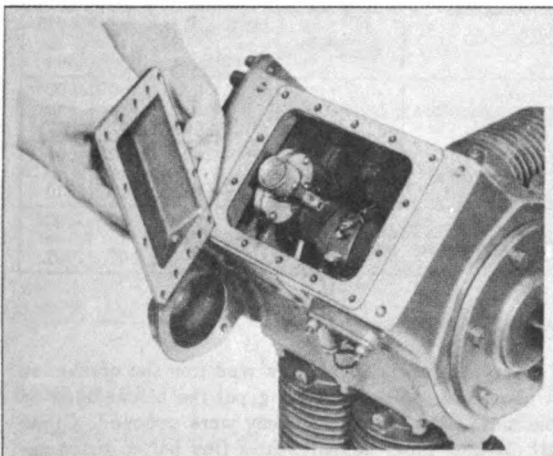


Fig. 31

104721C

### OIL PUMP

To remove oil pump, first take out the slotted pipe plug, and then the oil pump lock-screw as shown in

Fig. 32. Remove lock nut holding oil pump driving gear to shaft. Then, with a soft brass rod or punch, drive shaft through gear as shown in Fig. 33. The oil pump can then be withdrawn toward center of crankcase.

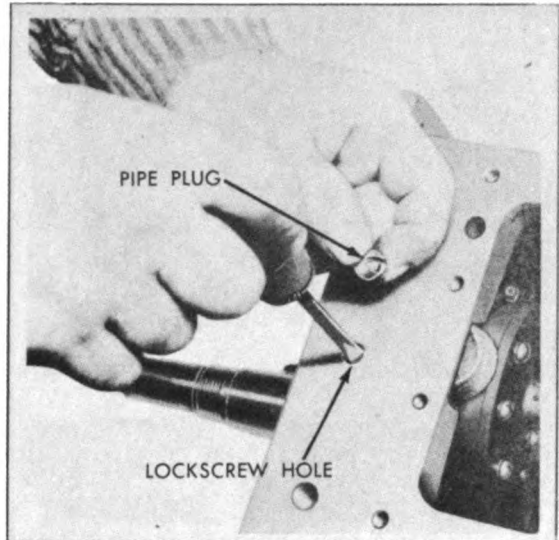


Fig. 32

71054C

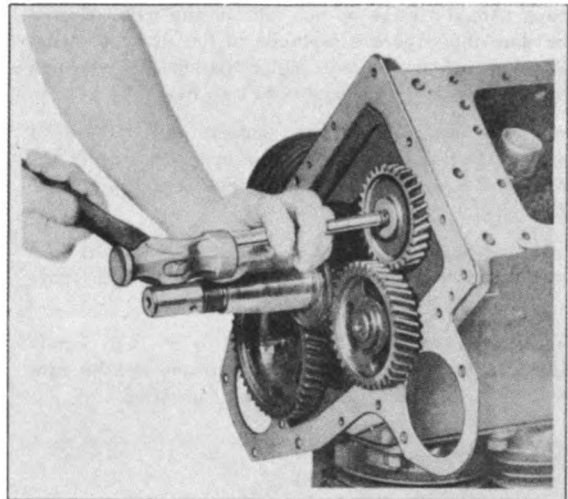


Fig. 33

83615C

### PISTONS AND CONNECTING RODS

After removal of the oil pump, all of the connecting rod bolts will be accessible. The nuts should be removed from the bolts, then by tapping the ends of the bolts lightly, being careful not to mar the threads, the connecting rod caps can be freed from the bolts. Be very careful that all shims will be kept in their places. After the caps are removed, the nuts should be immediately put back on the bolts so none of the shims will be displaced. The connecting rods with the pistons can now be pushed through the cylinders. The

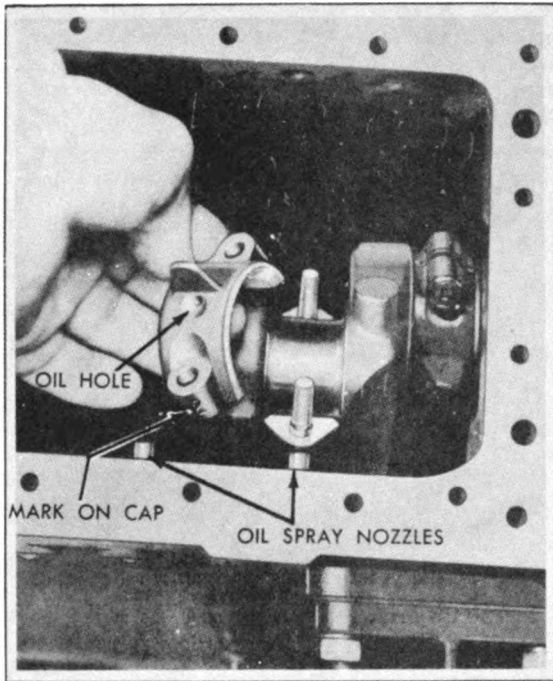


Fig. 34

104819C

caps should always be put back on the rods. Always be sure the caps are replaced in the exact position as when removed, according to the numbers stamped on the side of the rod and cap. See Fig. 34.

When reassembling piston to connecting rod, the split side of piston should be on the opposite side of the rod to the oil hole in the connecting rod cap. See Fig. 3.

When reassembling the engine, be sure the oil hole in the connecting rod cap is toward the oil spray nozzle. See Fig. 34.

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

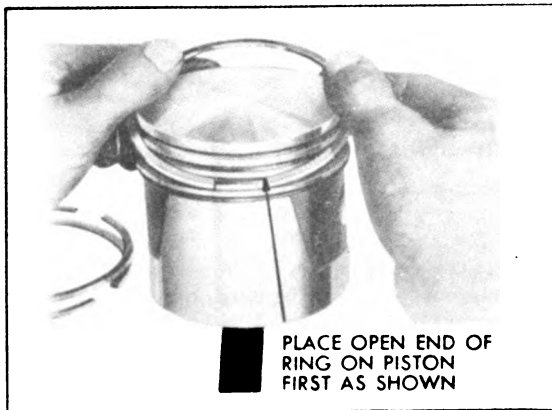


Fig. 35

71152C

Be sure the pistons are put back in the same bore from which they were removed.

### PISTON RINGS - IMPORTANT

Rings should be assembled to pistons as shown in Fig. 35. The scraper and oil rings must be assembled to the pistons with the scraper edge down, otherwise oil pumping will result. See Fig. 36.

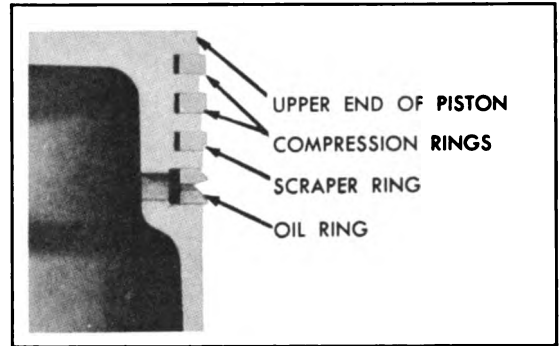


Fig. 36

92200C

### --PISTON, RING AND ROD CLEARANCES CHART

MODELS		VE4	VE41	VF4	VF41
Piston to Cylinder at Piston Skirt		.004 to .0045	.003 to .0035	.004 to .0045	.0035 to .004
Piston Ring Gap		.015	.015	.015	.015
Piston Ring Side Clearance in Grooves	Top Ring	.002 to .0035	.003 to .0045	.002 to .0035	.003 to .0045
	2nd Ring	.001 to .0025	.002 to .0035	.001 to .0025	.003 to .0045
	Scraper Ring	.001 to .0025	.001 to .0025	.001 to .0025	.002 to .0035
	Oil Ring	.0025 to .004	.0025 to .004	.0025 to .004	.0025 to .004
Connecting Rod to Crank Pin	Diameter	.0007 to .002	.0007 to .002	.0007 to .002	.0007 to .002
	Side	.004 to .010	.004 to .010	.004 to .010	.004 to .010
Piston Pin to Connecting Rod Bushing		.0005 to .001	.0005 to .001	.0005 to .001	.0005 to .001

### CYLINDERS

The cylinders 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 fins before reassembling. If the cylinders are worn more than .005 inch oversize, they should be reground and fitted with oversize pistons and rings.

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

## VALVES

Remove valve tappet inspection plate. Compress the valve springs with a valve lifter. The valve spring retainer locks should then be removed from the valve stems. The valves can then be withdrawn from the top of the cylinder block. See Fig. 37. The valves, valve seats, ports and guides in the cylinder block, should be cleaned of all carbon and gum deposits.

The valve seats should be reground to a good seat by spreading a small quantity of fine valve grinding compound on the valve and then rubbing the valve on its seat by a back and forth motion with a screw driver (vacuum cup tool if valves do not have a slot) or a reciprocating advancing valve grinding tool. Occasionally rotate valve to another position during the grinding operation so seat will be ground true. See Fig. 38. A uniform seat about  $3/32$ " wide should show entirely around the valves. All grinding compound should be carefully washed off the valves and cylinder block with gasoline or kerosene.

The valve stems should have a clearance of  $.004$ " in the guides.

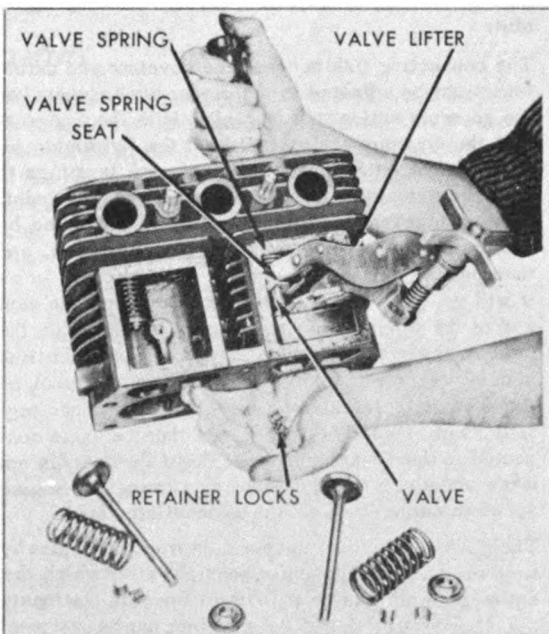


Fig. 37

71073C

## CRANKSHAFT

To remove the crankshaft, first remove the four cap screws in the bearing retainer plate on end of engine opposite flywheel. This plate can then be pried off, and crankshaft removed from that end of crankcase. Be sure to keep shims in place. See Fig. 39. The shims are used to give the proper end play to the Timken main bearings on the crankshaft. This end play

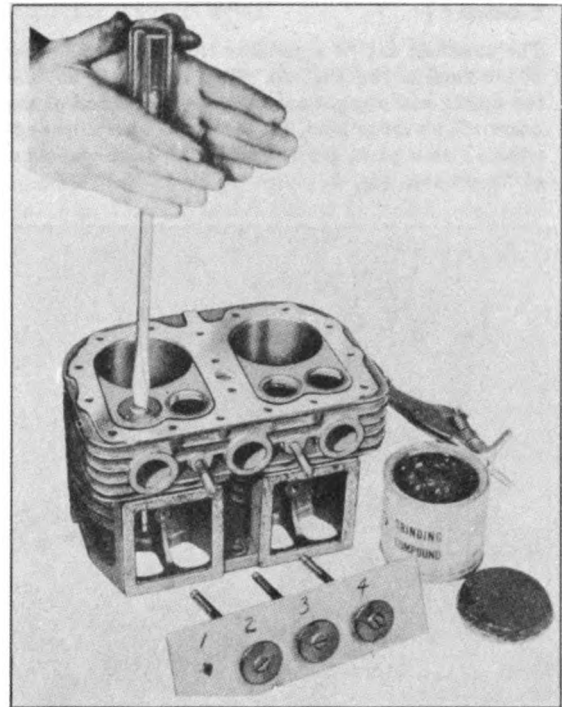


Fig. 38

71071C

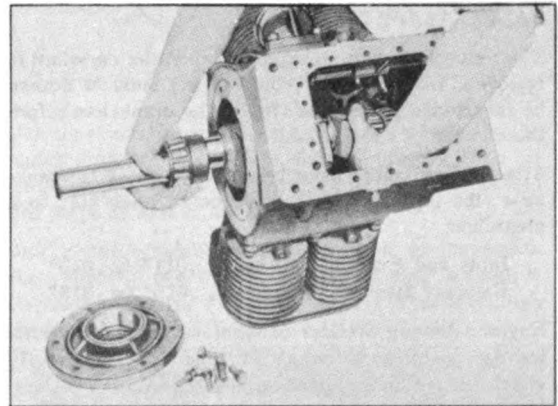


Fig. 39

71075C

should be  $.002$  to  $.004$  inch when engine is cold. There is practically no wear in these Timken 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 (See Fig. 29), otherwise engine will not operate properly, or if timing is off considerably, engine will not run at all.

Tighten main bearing plate cap screws, 25 to 30 foot pounds torque.

## CAMSHAFT

The camshaft can be withdrawn from the flywheel end of the engine. See Fig. 40. When replacing, be sure the spring and plunger are in place in the end of the camshaft, as these hold the camshaft in position endwise. These parts are shown in the sectional view of the engine, Fig. 3.

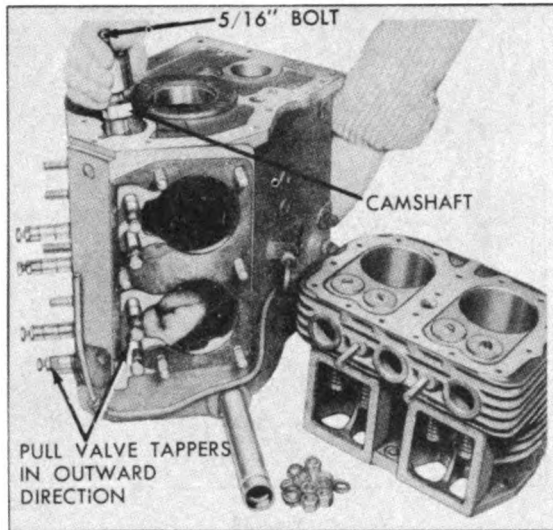


Fig. 40

104726C

## VALVE TAPPETS

The valve tappets will drop out when the camshaft is removed. In reassembly, the tappets must of course be inserted in proper position in the crankcase before the camshaft is reassembled.

After the cylinders have been reassembled to crankcase, the tappets should be adjusted when cold to a clearance:

Inlet and Exhaust valves..... .011" to .013"  
Exhaust Stellite valves..... .016" to .018"

Engines having Stellite exhaust valves and inserts are designated as Models VE4D and VF4D. Carefully check the model designation on name plate when adjusting tappets. See Fig. 41.

## GOVERNOR

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

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

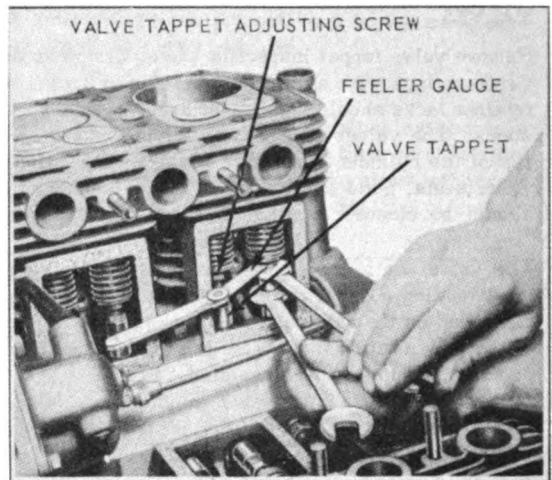


Fig. 41

71059C

their inner position, also to hold the carburetor throttle open. As the engine speed increases the centrifugal force in the flyweights acts against the spring and closes the throttle to a point where the engine speed will be maintained practically constant under varying load conditions. This speed can be varied to suit conditions by adjusting the governor spring to suit.

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

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

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

LOAD R.P.M.	NO LOAD R.P.M.	HOLE NO.	GOVERNOR LEVER	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		

be operated at 2150 revolutions per minute without 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 on the spring to run 2150 revolutions per minute. The speed at full load will then be approximately 2000 revolutions per minute.

## CLUTCH AND REDUCTION GEARS

### CLUTCH

The clutch furnished with Models VE4 and VF4 engines is of the disc type running in oil. Use the same grade of oil in the clutch as is used in the crankcase of the engine. The oil should be filled through the inspection plate opening, to the height of the oil level plug. Approximately a pint of oil is required. See Fig. 42.

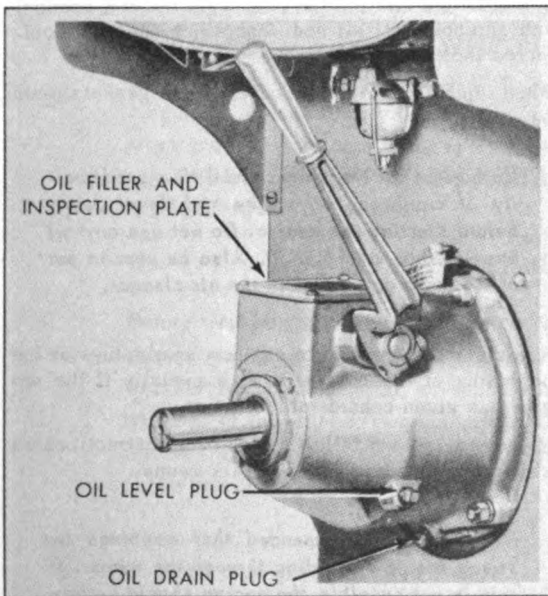


Fig. 42

84066C

### CLUTCH ADJUSTMENT

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

First remove the clutch inspection plate. This will expose the notched adjusting collar. Release clutch engaging lever. Turn adjusting collar in clockwise direction with a screw driver or similar instrument. See Fig. 43. The collar should be turned one notch

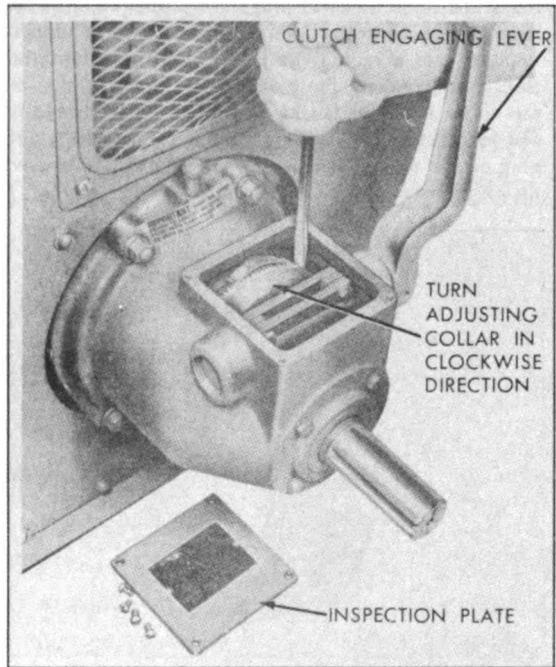


Fig. 43

104572C

at a time until a definite pressure is felt on the clutch lever when clutch is being engaged. Then replace inspection plate, being careful that the gasket fits properly and is not broken.

On the clutch reduction gears, there is no inspection plate directly over the clutch. A pipe plug is furnished however and the clutch adjustment is made through the pipe plug hole. See Fig. 44.

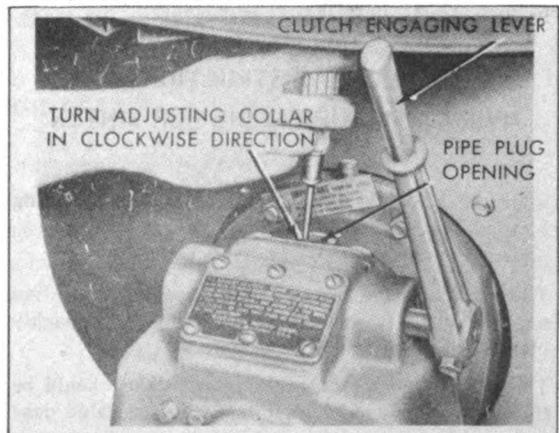


Fig. 44

104575C

## 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 engine 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 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. 45.

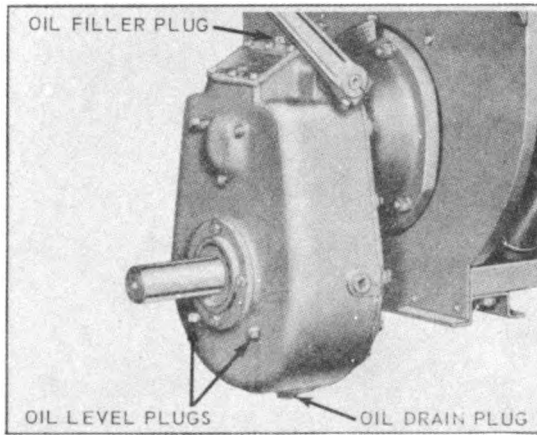


Fig. 45

76090C

The oil should always be filled when the engine is at rest. When the oil becomes dirty it should be drained while the engine is hot and fresh oil added. The frequency at which these oil changes should be made depends entirely on the kind of service in which these gears are used, but even with light service the 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.

## SPECIAL INSTRUCTIONS FOR LAYING UP ENGINE FOR WINTER

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

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

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

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

On engines where there is no pet cock on the intake manifold, the kerosene and oil mixture 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 old used oil should be drained from the crankcase while the engine is warm, as the oil will then flow much more freely than when cold.

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

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

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

A good plan, and one that is recommended is to remove the crankcase bottom cover or 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 bottom cover, 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



TO INSURE PROMPT AND ACCURATE SERVICE, THE FOLLOWING  
INFORMATION MUST 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 MODELS VE4 AND VF4 ENGINES

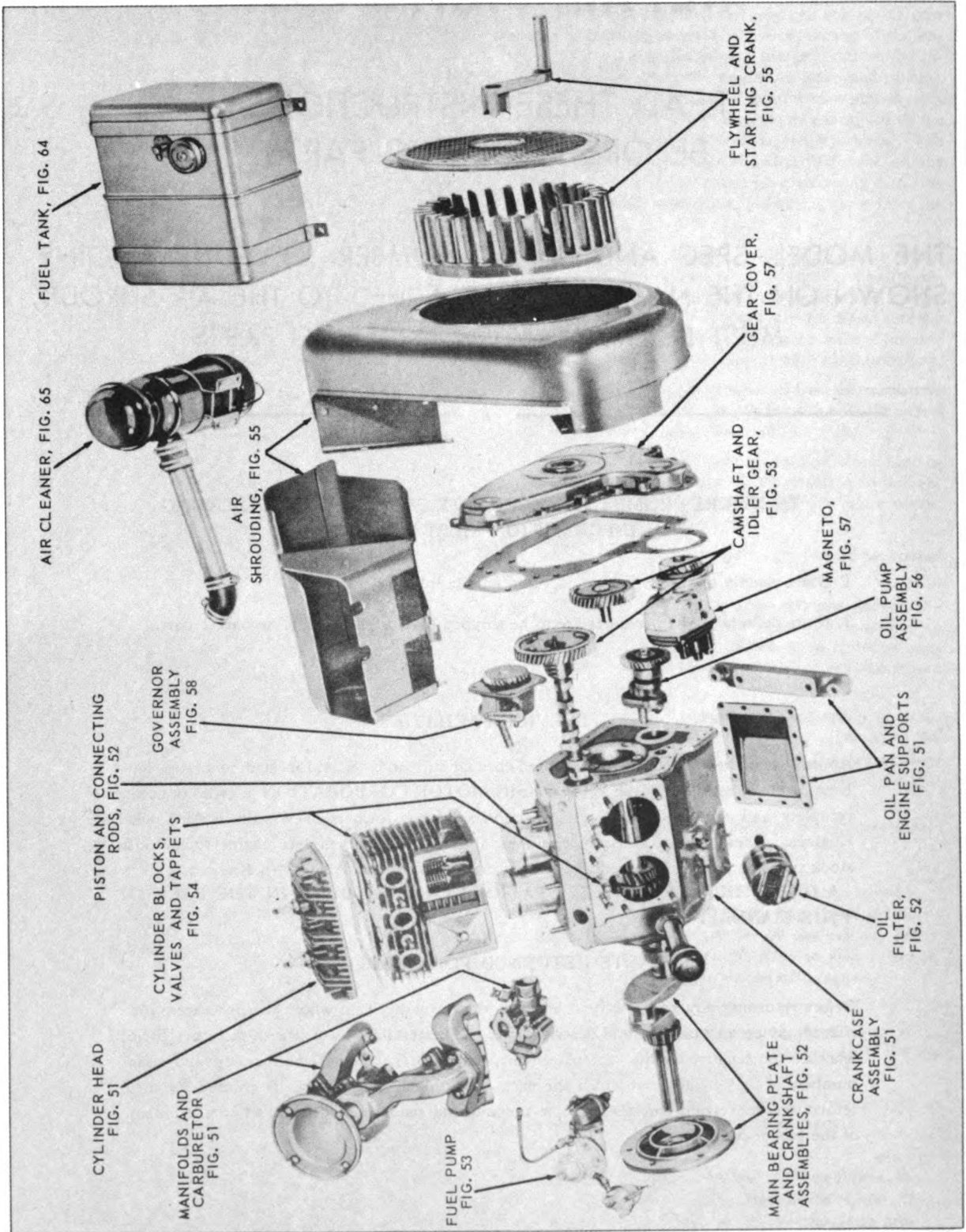


Fig. 50, EXPLODED VIEW OF ENGINE

Refer to figure numbers for break down of parts.

164956C



PARTS FOR MODELS VE4 AND VF4 ENGINES

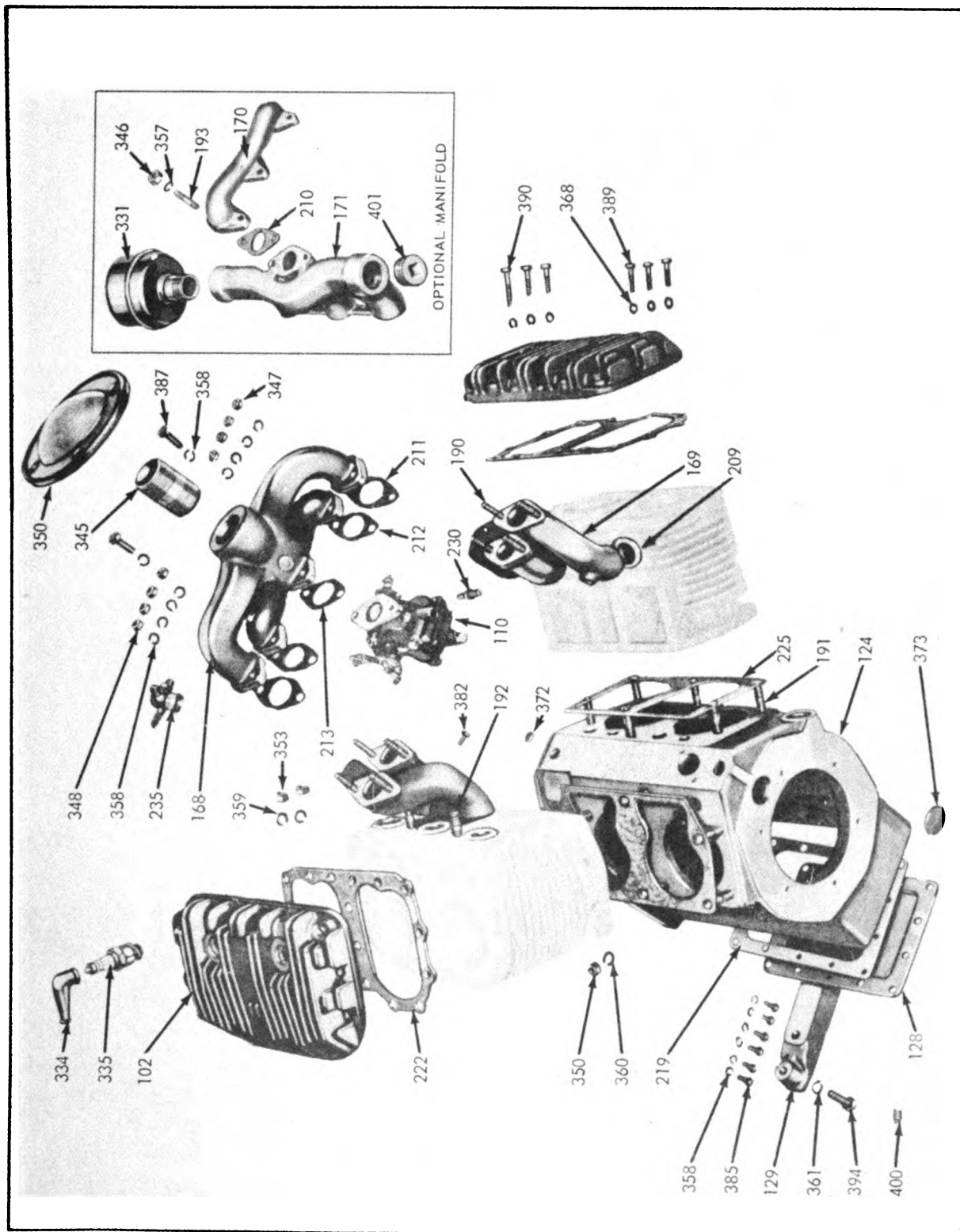
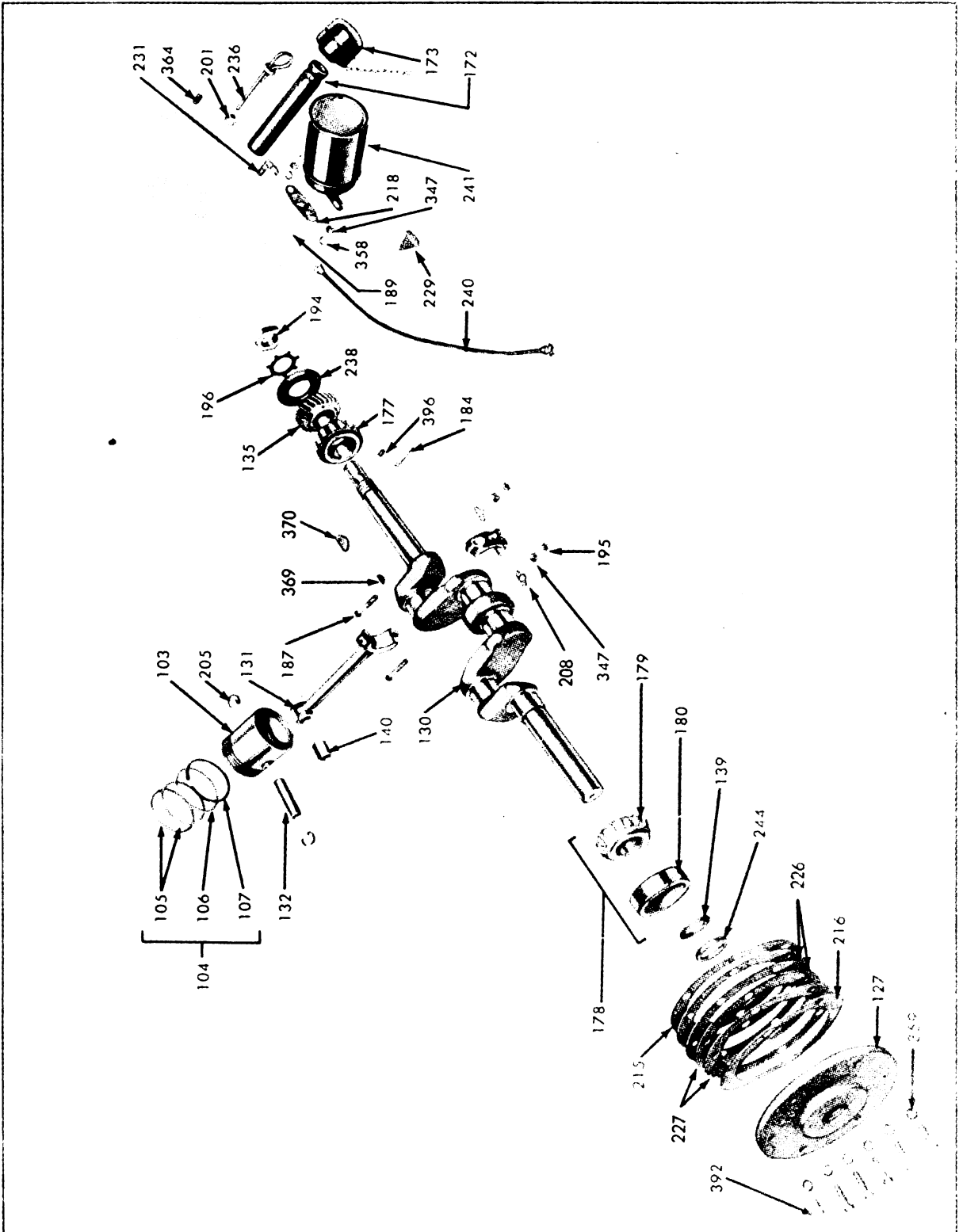


Fig. 51, MANIFOLD AND CRANKCASE GROUP

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

104809C-1

PARTS FOR MODELS VE4 AND VF4 ENGINES



**Fig. 52, CRANKSHAFT, PISTON AND CONNECTING ROD GROUP**

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

104809C

PARTS FOR MODELS VE4 AND VF4 ENGINES

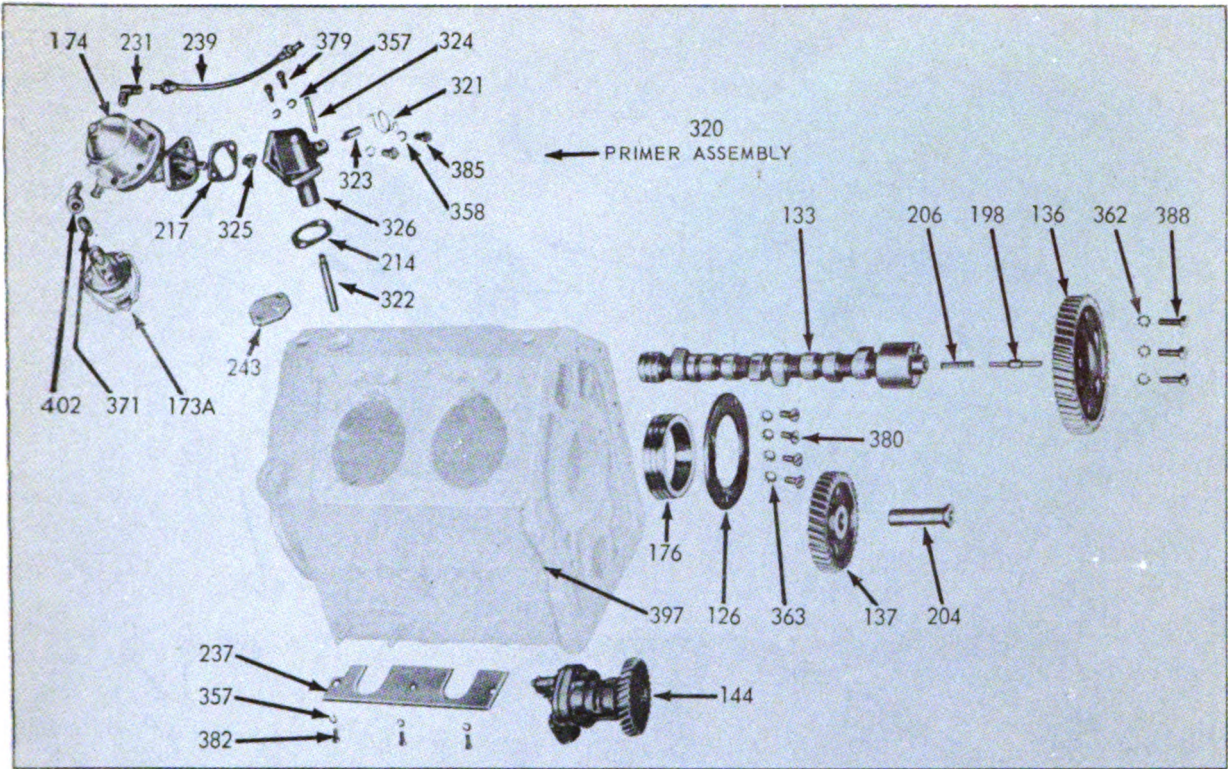


Fig. 53, CAMSHAFT AND FUEL PUMP MOUNTING GROUP

104818C-1

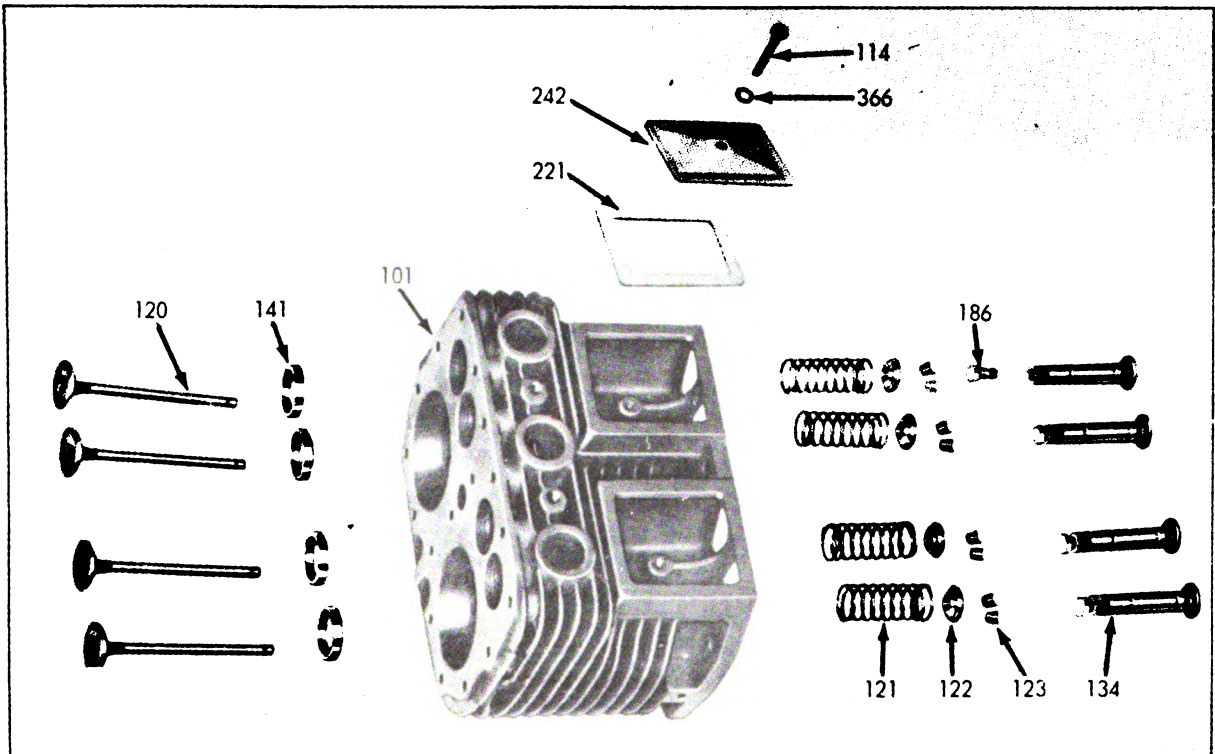


Fig. 54, CYLINDER BLOCK ASSEMBLY

70506C-1

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

PARTS FOR MODELS VE4 AND VF4 ENGINES

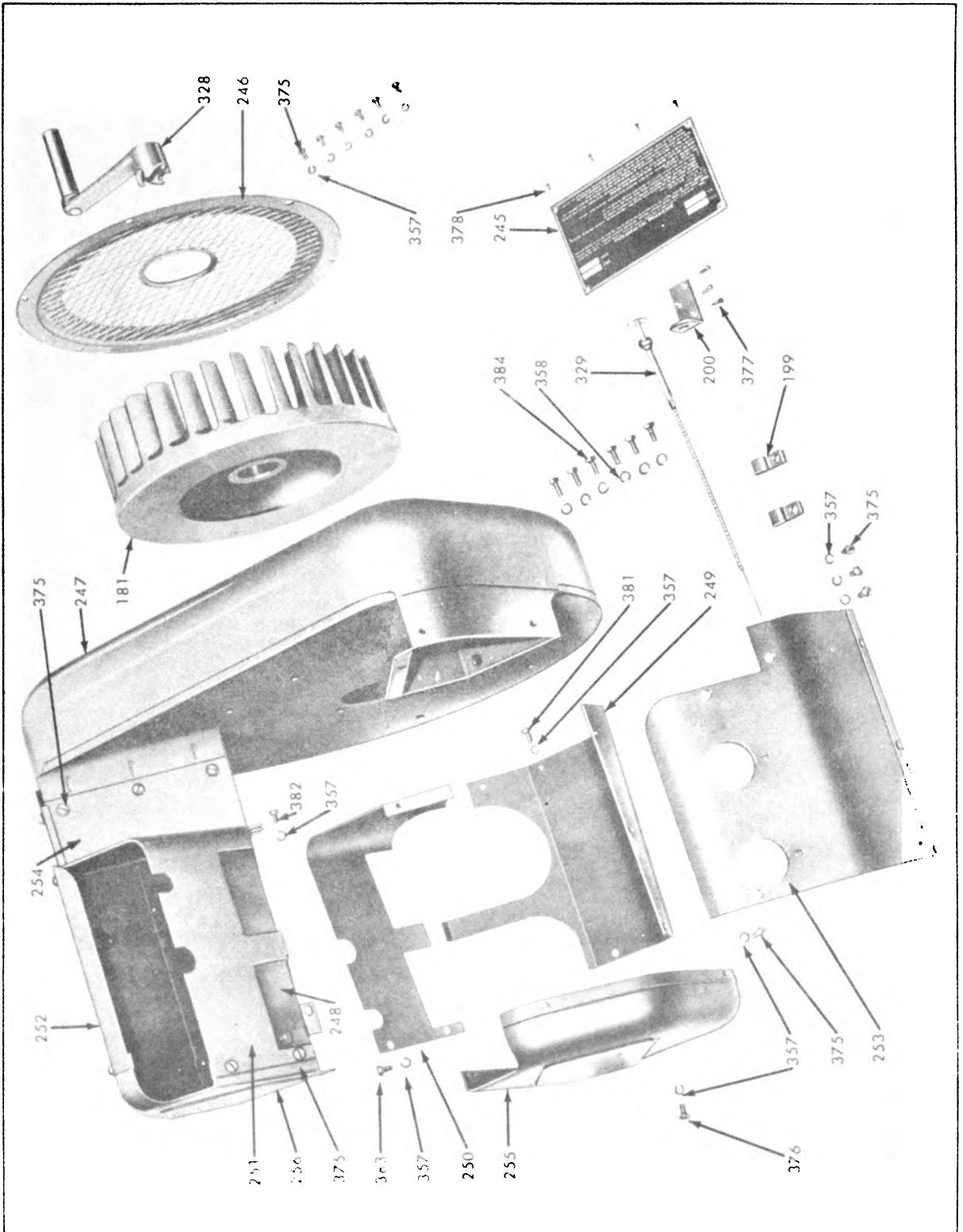
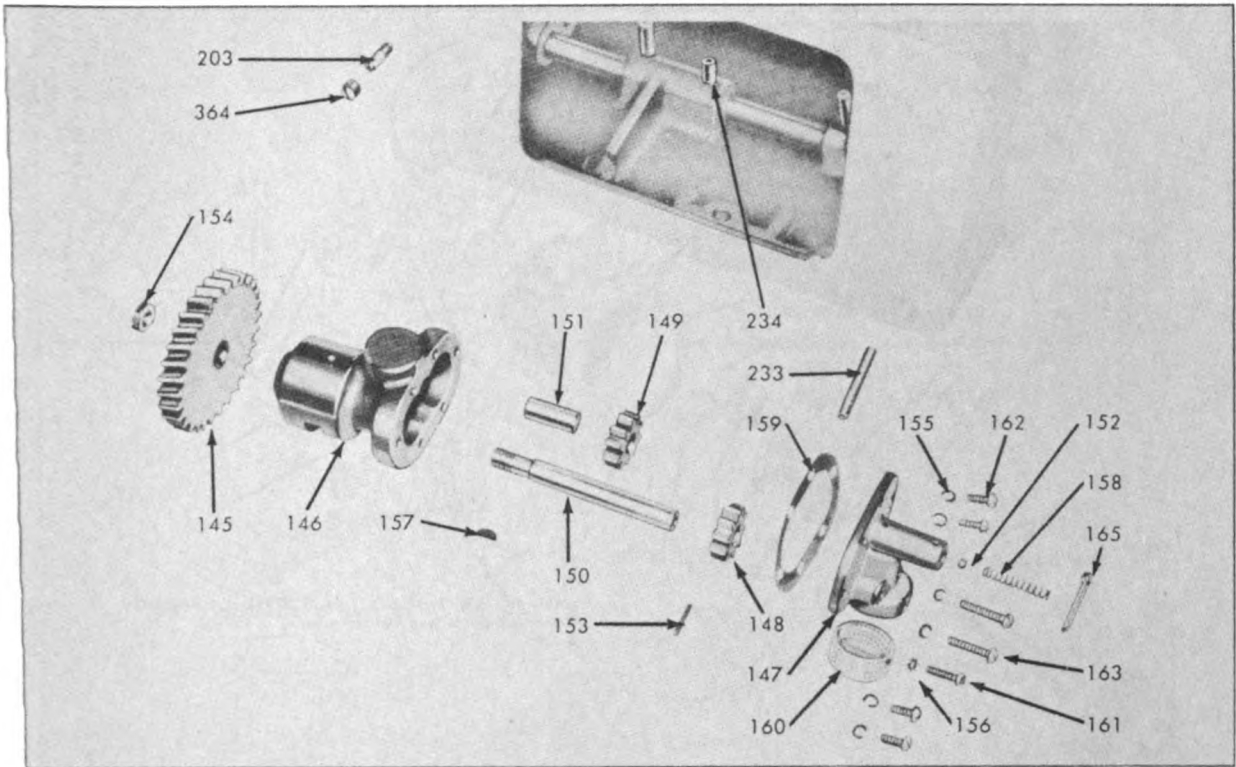


Fig. 55, AIR SHROUDING

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

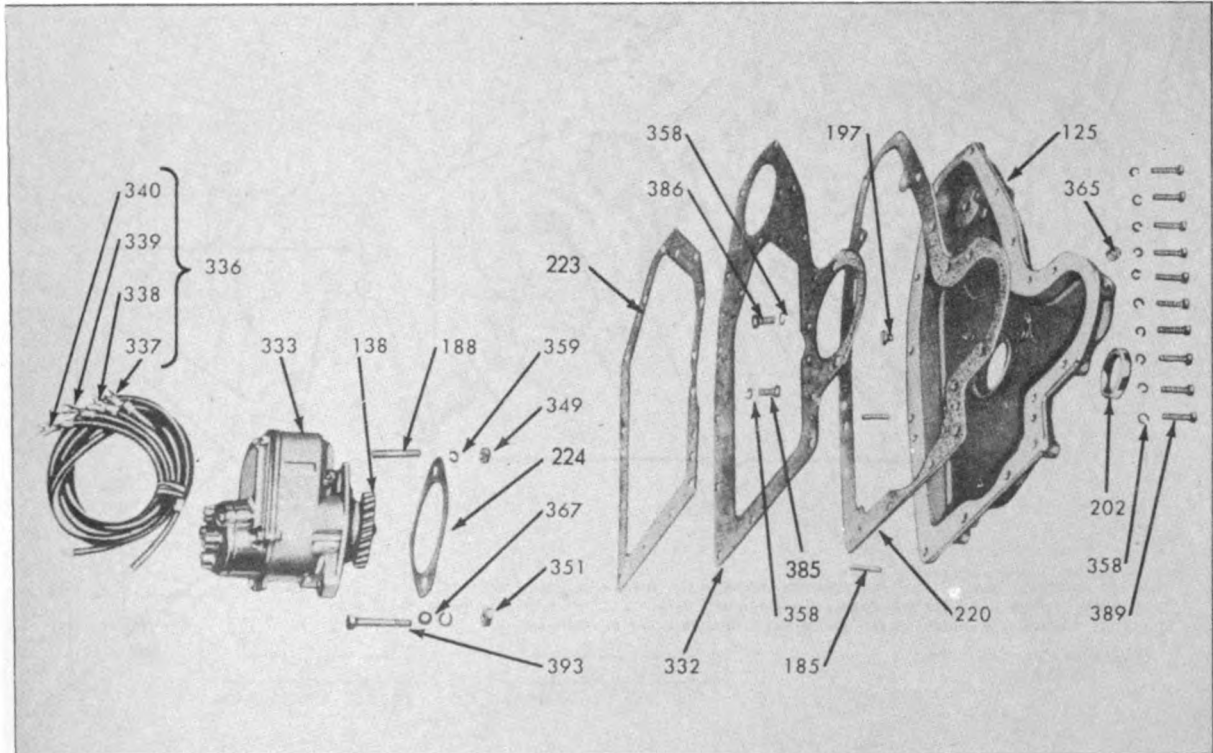
79500C

**PARTS FOR MODELS VE4 AND VF4 ENGINES**



**Fig. 56, OIL PUMP ASSEMBLY**

104718C-1

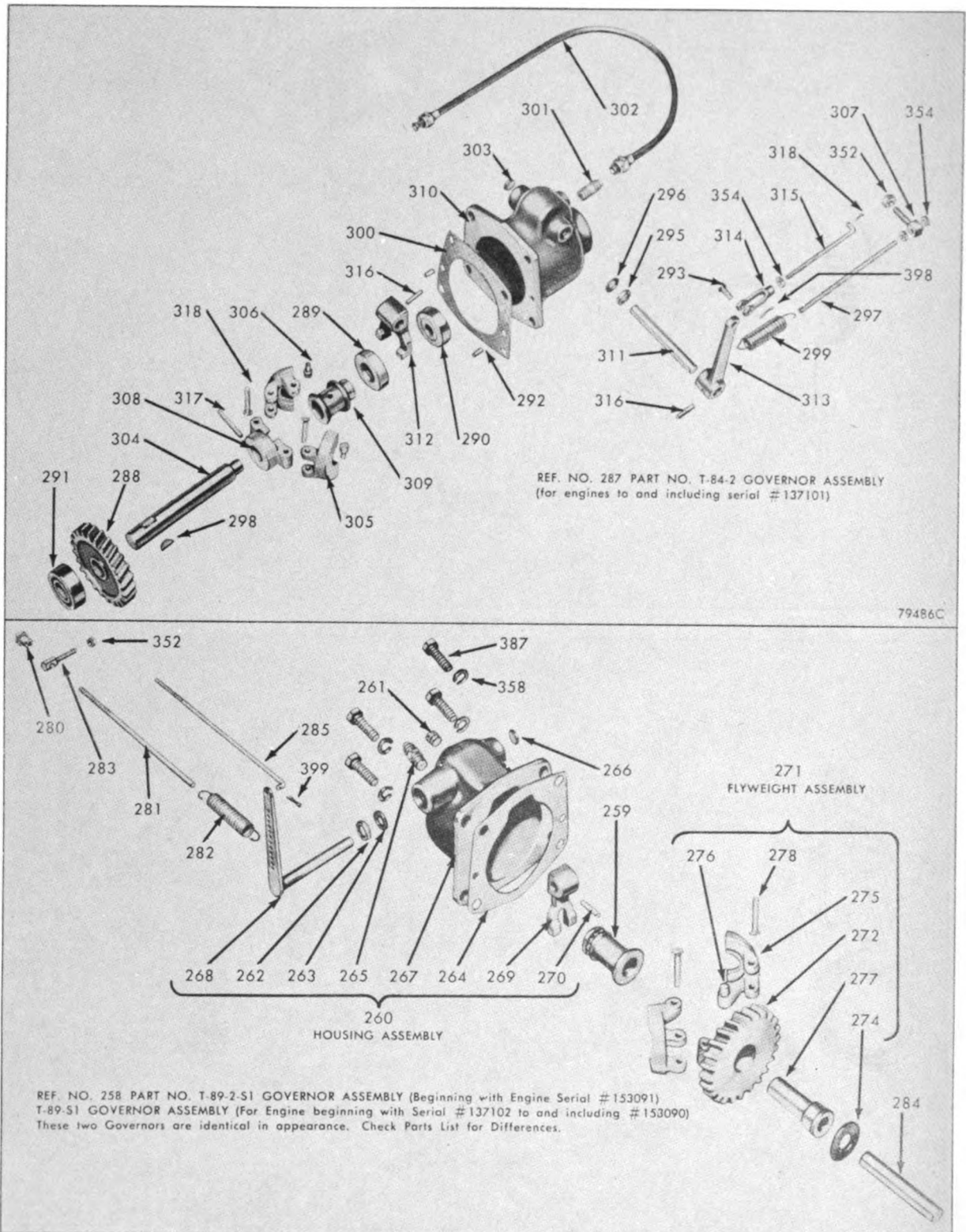


**Fig. 57, MAGNETO AND GEAR COVER GROUP**

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

85759C

# PARTS FOR MODELS VE4 AND VF4 ENGINES



**Fig. 58, GOVERNOR ASSEMBLY**

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

104722C-1

# GASKET SET

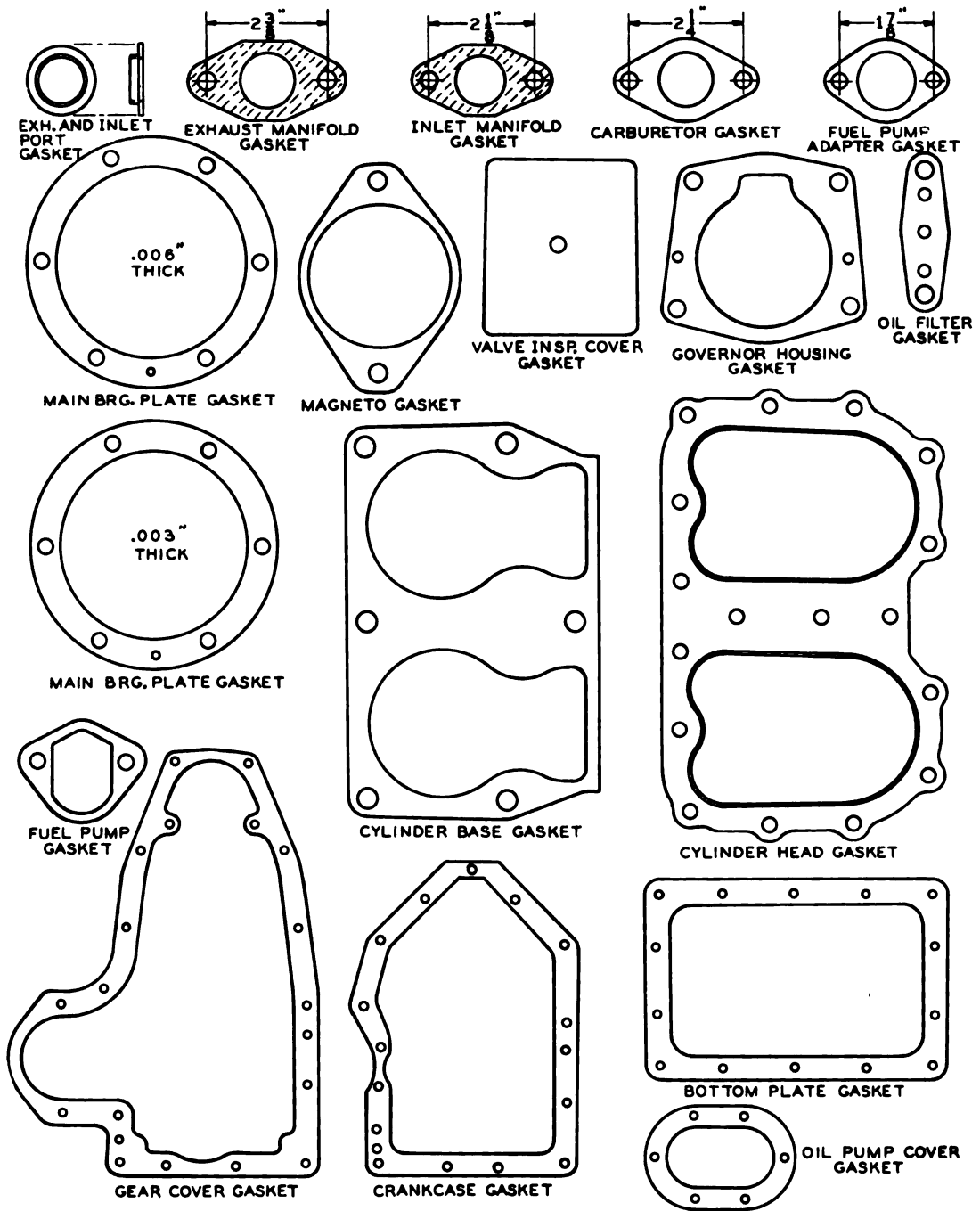


Fig. 59, Ref. No. 207, GASKET SET

## PARTS LIST

### MODELS VE4 AND VF4 – 4 CYLINDER STANDARD ENGINES

ENGINES HAVING STELLITE EXHAUST VALVES AND INSERTS ARE DESIGNATED AS MODELS VE4D AND VF4D

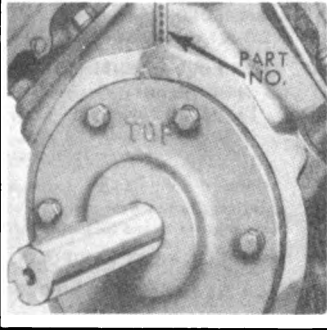
The following parts are for a standard engine without house. If power unit house parts are required, refer to Page 44

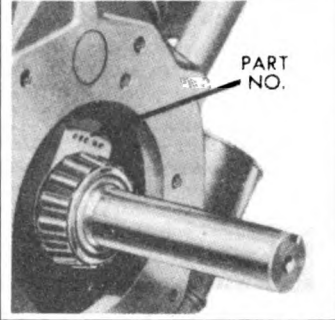
Ref. No.	Part Number		Description	No. Req.	Net Weight			
	Model VE4	Model VF4			Lb	Oz		
101	AA-85-S1	AA-86-S1	<b>CYLINDER BLOCK ASSEMBLY</b> , standard ..... Complete with valves, springs, seats, locks, inserts, studs, inspection plate, gasket and screws.	2	31			
	AA-85-S5 (VE4D)	AA-86-S5 (VF4D)	<b>CYLINDER BLOCK ASSEMBLY</b> , complete with <b>STELLITE</b> exhaust valves and inserts.					
	AA-85-S2	AA-86-S2	<b>CYLINDER BLOCK</b> , standard, with valve seat inserts and studs .....					
	AA-85-S6 (VE4D)	AA-86-S6 (VF4D)	<b>CYLINDER BLOCK</b> with <b>STELLITE</b> inserts.					
102	AB-80-E	AB-80-E	<b>CYLINDER HEAD</b> ..... AB-80, AB-80-A, AB-80-G – replaced by AB-80-E	2	2	13		
		AB-86-A	<b>CYLINDER HEAD</b> ..... AB-86 – replaced by AB-86-A	2	10	10		
103	DB-208		<b>PISTON</b> , standard size, aluminum ..... DB-187-B-2 – replaced by DB-208  The suffix letter 'I' in the Model 'VE4I' designates cast iron pistons. <b>DB-199</b> Piston, cast iron .....	4		12		
			<b>DB-199</b> Piston, cast iron .....			1	1	
		DB-190-A	<b>PISTON</b> , standard size, aluminum ..... DB-190 – replaced by DB-190-A  The suffix letter 'I' in the Model 'VF4I' designates cast iron pistons. <b>DB-203</b> Piston, cast iron .....			4		13
			<b>DB-203</b> Piston, cast iron .....					1
104	DR-12	DR-13	<b>PISTON RING SET</b> , standard size ..... Consisting of:	1		10		
105	DC-163	DC-125-2	<b>COMPRESSION RING</b> .....	8		1		
106	DC-163-1	DC-125-3	<b>SCRAPER RING</b> .....	4		1		
107	DC-109	DC-112-A	<b>OIL RING</b> .....  Piston rings and ring sets are also furnished .005", .010", .020" and .030" oversize.	4		1		
110	L-48		<b>CARBURETOR</b> , Zenith Model 161-7, No. 10034 .....	1	2	15		
			<b>L-45-11</b> , Stromberg Model UC-7/8, No. 426026 .....			3	8	
			<b>L-49</b> , Marvel-Schebler, No. TSX-148 .....			3	8	
		L-48-2	<b>CARBURETOR</b> , Zenith Model 161-7, No. S-632 .....	1	2	15		
		<b>L-45-20</b> , Stromberg Model UC-7/8, No. 426041 .....	3			8		
114	XD-22		<b>SCREW</b> , 5/16"-18 thread x 1-3/4" long, hexagon head .....	4		2		
		XD-23	<b>SCREW</b> , 5/16"-18 thread x 2" long, hexagon head..... For valve inspection cover plate.			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.



**PARTS INTERCHANGEABLE ON MODELS VE4 AND VF4**

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
120	AE-75-B	VALVE, inlet and exhaust .....	8		4
	AE-75-D	STELLITE EXHAUST VALVE .....	4		4
121	AF-49-A	VALVE SPRING, standard .....	8		2
	AF-51	VALVE SPRING, exhaust, for VE4D and VF4D engines with Stellite exhaust valves.....	4		2
122	AG-26	SEAT for valve spring .....	8		1
123	AH-9	LOCK for valve spring seat .....	8 pr		1
124	See Fig. 1	CRANKCASE ASSEMBLY .....	1	60	
		Consisting of:			
		1 Crankcase			
		1 LJ-300-A Oil filler tube			
		2 PC-112 Studs			
		12 PC-337 Studs			
		7 PF-18 Pipe plugs			
		1 RC-91 Oil filler screen			
		1 RF-1128 Pipe			
		4 RF-1143 Spray nozzles			
		2 SA-26 Plugs			
		1 SA-58 Plug			
		NOTE: The part number of the crankcase is stamped on the case in the location shown in Fig. 1. ORDER BY THIS NUMBER and by giving the Model Specification and Serial Number of the engine.			
					
		Fig. 1		76638C	
125	BD-100C-2-S1	GEAR COVER ASSEMBLY (Beginning with engine serial 153091).....	1	12	
		Consisting of:			
		1 BD-100C-2 Gear cover			
		1 PF-25 Plug			
		1 PF-52 Button			
		1 PH-299 Oil seal			
		1 TC-388-1 Governor shaft			
		BD-100C-4-S1 Gear Cover Assembly .....	1	12	
		(For engines to and including Serial 137101.)			
		BD-100C-S1 Gear Cover Assembly .....	1	12	
		(Beginning with engine Serial 137102 to and including 153090.)			
126	BG-209	BEARING RETAINER PLATE,.....	1	10	
		Flywheel end.			

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
127	BG-210-S1	MAIN BEARING PLATE ASSEMBLY .... take-off end. Consisting of: 1 BG-210 Bearing plate 1 HF-261 Cork seal 1 SD-43 Cork retainer	1	7	2
128	BH-141-A	CRANKCASE BOTTOM COVER PLATE BH-141A-1, for engines with underslung fuel tank.	1	1	8
129	BK-65	ENGINE SUPPORT .....	2	1	13
130	See Fig. 2	CRANKSHAFT ASSEMBLY.....	1	27	
		Consisting of:			
		1 Crankshaft			
		1 GA-36-A Gear			
		1 ME-71 Bearing assembly			
		1 ME-114 Bearing assembly			
		1 PL-53 Key			
		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. 2. ORDER BY THIS NUMBER and by giving the Model, Specification and Serial Number of the engine.			
					
		Fig. 2		71057C	
131	DA-51-B-S1	CONNECTING ROD ASSEMBLY .....	4	1	7
		(Beginning with engine Serial 677075)			
		Consisting of:			
		1 DA-51-B Connecting rod (Not furnished separately)			
		1 HG-157-A Bushing			
		2 PB-148 Bolts			
		2 PD-10 Nuts			
		2 PD-181 Palmuts			
		2 QA-114 Shims			
		DA-51A-S1 CONNECTING ROD .....	4	1	7
		(For engines to and including Serial 677074.) Consisting of:			
		1 DA-51-A Connecting rod (Not furnished separately)			
		1 HG-157-A Bushing			
		2 PB-148 Bolts			
		2 PD-148 Nuts			
		2 QA-108A-S1 Shims			
		2 XI-1 Cotter pins			
		(Continued)			

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

**PARTS INTERCHANGEABLE ON MODELS VE4 AND VF4**

Ref. No.	Part Number	Description	No.			Net Wt.		
			Req.	Lb	Oz	Req.	Lb	Oz
		NOTE: DA-51-B-S1 and DA-51-A-S1 connecting rods are interchangeable and either one is used for service.  Allowance on connecting rods in which bearings have been burned out, but which are otherwise complete, and in condition to be rebabbitted  Connecting rods are also furnished .010", .020", and .030" undersize.						
132	DE-65	PISTON PIN, standard size ..... Piston pins are also furnished .005", .010", .020" and .030" oversize.	4		3			
133	EA-102	CAMSHAFT .....	1	3	8			
134	F-61	VALVE TAPPET with lockscrew ..... FA-40-B Tappet—replaced by F-61	8		4			
135	GA-36-A	CRANKSHAFT GEAR .....	1		14			
136	GB-45-A	CAMSHAFT GEAR .....	1	2	2			
137	GC-27-B-1	IDLER GEAR .....	1	1	6			
138	GD-93-C	MAGNETO GEAR .....	1		9			
139	HF-261	CORK OIL SEAL .....	1		1			
		For main bearing, take-off end.						
140	HG-157-A-1	PISTON PIN BUSHING .....	4		1			
141	HG-201 HG-201-D	VALVE SEAT INSERT, standard ..... STELLITE EXHAUST VALVE SEAT INSERT—for VE4D and VF4D engines.	8		1			
144	K-95-D	OIL PUMP ASSEMBLY .....	1	3	13			
		This pump supersedes K-95 and K-95A oil pump and is interchangeable. Parts shown with an engine serial number are not interchangeable and must be ordered accordingly. Consisting of:						
145		GD-94-C Oil Pump Drive Gear .....	1		11			
146		KA-61A-1-S1 Body with stub shaft ..... Beginning with engine Serial 596951. KA-61-A Beginning with engine Serial 80147 to and including 596950..... KA-61 To and including Serial 80146 .....	1	1	15			
			1	1	15			
			1	1	15			
147		KB-42-S2 Cover Assembly, includes relief valve and screen ..... Beginning with engine Serial 596951. KB-39 To and including Serial 596950..	1		11			
			1		6			
148		KC-56-1 Driver Gear .....	1		1			
		KC-54-1 Beginning with engine Serial 80147. Replaced by KC-56-1, interchangeable. KC-54 To and including Serial 80146....	1		1			
149		KC-56-2 Driven Gear .....	1		1			
		KC-55-1 Beginning with engine Serial 80147. Replaced by KC-56-2, interchangeable. KC-55 To and including Serial 80146....	1		1			
150		KD-121-S1 Drive Shaft with KC-56-1 gear .....	1		4			
151		KD-122 Stub Shaft .....	1		2			
152		ME-80 Check Ball, 1/4" dia. steel .....	1		1			
153		PA-64 Pin, 1/8" dia. x 3/4" long steel straight .....			1		1	
154		PD-195 Jam Lock-Nut, 7/16"-20 thread For gear mounting. PD-100-1 Nut and XI-9 Cotter Pin, replaced by PD-195.			1		1	
155		PE-14 Lockwasher for cover, No. 10 Positive .....			6		1	
156		PE-45 Lockwasher for screen, No. 10 External .....			1		1	
157		PL-137 Key, No. 1 Woodruff.....			1		1	
158		PM-111 Spring for relief valve .....			1		1	
159		QD-535 Cover Gasket .....			1		1	
160		RD-112 Screen Beginning with engine Serial 596951..... RD-112-2—replaced by RD-112, interchangeable. RD-119 To and including Serial 596950			1		1	
161		XA-7 Screw for screen, No. 10-32 thread x 3/8" long steel round head .....			1		1	
162		XA-8 Screw for cover, No. 10-32 thread x 1/2" long steel round head .....			4		1	
163		XA-56 Screw for cover, No. 10-32 thread x 1-1/4" long steel round head .....			2		1	
165		XI-16 Cotter Pin for valve, 1/8" x 1" long steel.....			1		1	
168	LD-227-D	MANIFOLD, upper branch .....			1	6	1	
		LD-227—replaced by LD-227-D.						
169	LD-228-S1	MANIFOLD ASSEMBLY, Lower branch..	2	3	12			
		Consisting of: 1 LD-228 Manifold 4 PC-171 Studs 1 XD-4 Screw for plugging tap						
		Optional manifold with double exhaust outlet. (Furnished as standard equipment on engines to and including Serial 85815)						
170		LC-261-A INLET MANIFOLD .....			1	2		
171		LD-226 EXHAUST MANIFOLD .....			2	4	8	
172	LJ-300-A	OIL FILLER TUBE .....			1		6	
173	LO-60-1	CAP for oil filler and breather.....			1		6	
173A	LP-19-B	FUEL STRAINER, Tillotson OW-444 .... NOTE: See illustration in back of manual for service parts list of fuel strainer.			1		6	
174	LP-38 LQ-21-B	FUEL PUMP, Blackstone GI-195..... REPAIR KIT for fuel pump .....			1	1	11	
					1		3	
175	ME-71	MAIN BEARING ASSEMBLY, flywheel end. Consisting of: .....			1	1	14	
		1 ME-69-1 Bearing cup—Timken 414 .....					12	
176		1 ME-71-1 Bearing cone—Timken 420 ..					2	
177								
178	ME-114	MAIN BEARING ASSEMBLY, take-off end Consisting of: .....			1		3	
		1 ME-114-1 Bearing cone—Timken 3382				2	4	
179		1 ME-114-2 Bearing cup—Timken 3328					12	
180								
181	NC-140-D	FLYWHEEL Beginning with engine Serial .....			1	33	8	
		(Continued)						

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

**PARTS INTERCHANGEABLE ON MODELS VE4 AND VF4**

Ref. No.	Part Number	Description	No.			Net Wt.		
			Reg	Lb	Oz	Reg	Lb	Oz
		NC-140 To and including engine Serial .....				30		
		NC-140D-1-S1 Flywheel for engine with electric starter. Beginning with engine Serial .....	1	34		8		
		Includes:						
		GH-44 Ring gear .....	1			13		
		XE-17 Set screw, 1/4"-20 x 3/8" long, headless .....	3			1		
		NC-140-1-S1 Flywheel for engines with electric starter. To and including engine Serial .....				31		
184	PA-239	PIN for starting crank .....	1			1		
185	PA-291	DOWEL PIN for gear cover .....	2			1		
186	PB-169-A	VALVE TAPPET ADJUSTING SCREW, For F-61 tappet. PB-147 Screw with PD-141 nut for obsolete FA-40-B tappet. ....	8			1		
187	PB-148-S1	CONNECTING ROD BOLT ASSEMBLY Consisting of: 1 PB-148 Bolt 1 PD-10 Nut 1 PD-181 Palnut .....	8			1		
188	PC-110	STUD for magneto mounting .....	1			1		
189	PC-112	STUD for oil filter mounting .....	2			1		
190	PC-171	STUD for lower to upper manifold mounting .....	8			1		
191	PC-337	STUD for cylinder block to crankcase mounting .....	12			2		
192	PC-369	STUD for manifold to cylinder block mounting .....	4			1		
193	PC-405	STUD for inlet to exhaust manifold. For engines with LC-261A and LD-226 manifolds. ....	4			1		
194	PD-123	NUT for flywheel mounting .....	1			2		
195	PD-181	PALNUT for connecting rod bolt, 5/16"-24 NOTE: PD-181 palnut and PD-10, 5/16"-24 plain nut replace PD-148 slotted nut and cotter pin. ....	8			1		
196	PE-66	LOCKWASHER for flywheel nut .....	1			1		
197	PF-52	BUTTON for camshaft thrust plunger .....	1			1		
198	PF-101	THRUST PLUNGER for camshaft .....	1			1		
199	PG-314	CLIP for spark plug ignition cables .....	2			1		
200	PG-319-A	BRACKET for choke control .....	1			2		
201	PH-245	CORK WASHER for oil level gauge .....	1			1		
202	PH-299	OIL SEAL for crankshaft, flywheel end .....	1			2		
203	PI-143-B	LOCKSCREW for oil pump. Beginning with engine Serial 145636. PI-143-A, replaced by PI-143-B. PI-143 Lockscrew To and including engine Serial 145635. ....	1			1		
204	PJ-105	STUD for idler gear .....	1			5		
205	PK-52	RETAINING RING for piston pin .....	8			1		
206	PM-108	SPRING for camshaft thrust plunger .....	1			1		

Ref. No.	Part Number	Description	No.			Net Wt.		
			Reg	Lb	Oz	Reg	Lb	Oz
207	Q-12-B	GASKET SET ..... Consisting of: 6 QB-75 1 QD-527-B 4 QD-612-A 2 QB-78 1 QD-535 2 QD-613-C 2 QB-79 1 QD-538-A 1 QD-614 1 QC-58-A 1 QD-595-A 1 QD-615-A 1 QD-67 1 QD-610-A 1 QD-616 2 QD-527-A 1 QD-611 2 QD-617  Q-10-B Gasket Set—replaced by Q-12-B.	1			8		
208	QA-114	SHIM for connecting rod, .002" thick ..... Beginning with engine Serial 677075, for DA-51-B-S1 connecting rod.  QA-108-A-S1 Connecting Rod Shim Assembly, 1/8" thick .....	8			1		
		To and including engine Serial 677074 for DA-51-A-S1 connecting rod. QA-108A Shim—replaced by QA-108A-S1, interchangeable.	8			1		
209	QB-75	GASKET for manifold to cylinder block ..	6			1		
210	QB-77	GASKET for manifold, upper to lower branch .....	2			1		
		For engines with LC-261A and LD-226 manifolds.						
211	QB-78	GASKET for exhaust manifold, upper to lower branch .....	2			1		
212	QB-79	GASKET for inlet manifold, upper to lower branch .....	2			1		
213	QC-58-A	GASKET for carburetor flange .....	1			1		
214	QD-67	GASKET for fuel pump adapter .....	1			1		
215	QD-527-A	GASKET for main bearing plate, .006" thick .....	2			1		
216	QD-527-B	GASKET for main bearing plate, .003" thick .....	1			1		
217	QD-538-A	GASKET for fuel pump mounting .....	1			1		
218	QD-595-A	GASKET for oil filter mounting .....	1			1		
219	QD-610-A	GASKET for crankcase bottom cover plate .....	1			1		
220	QD-611	GASKET for gear cover .....	1			1		
221	QD-612-A	GASKET for valve inspection cover plate ..	4			1		
222	QD-613-C	GASKET for cylinder head .....	2			4		
		QD-613B—replaced by QD-613-C.						
223	QD-614	GASKET for gear cover spacer to crankcase .....	1			1		
224	QD-616	GASKET for magneto flange .....	1			1		
225	QD-617	GASKET for cylinder base .....	2			1		
226	QF-33	SHIM for main bearing plate, .006" thick ..	2			1		
227	QF-33-A	SHIM for main bearing plate, .013" thick ..	2			1		
229	RC-91	SCREEN for oil filler .....	1			1		
230	RF-269	STRAIGHT FITTING in carburetor for fuel line .....	1			2		
231	RF-270	ELBOW for fuel line .....	2			2		
		1-for fuel pump. 1-for oil line to governor, in crankcase.						

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## PARTS INTERCHANGEABLE ON MODELS VE4 AND VF4

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
233	RF-1128	PIPE for oil filter outlet, in crankcase	1		1	253	SE-79-A	CYLINDER HEAD SHROUD, Left hand side	1	1	
234	RF-1143	OIL SPRAY NOZZLE, short. Beginning with engine Serial 615486 Previous to engine 615486 the following nozzles were used: RF-1121 Long Nozzles, for No. 1 and No. 3 cylinder rods RF-1143 Short Nozzles, for No. 2 and No. 4 cylinder rods	4		1	254	SE-80	SIDE COVER, flywheel shroud	1		4
			2		1	255	SE-82-B	REAR SHROUD COVER, Left hand side	1		15
			2		1	256	SE-83-B	REAR SHROUD COVER, Right hand side	1		15
235	RG-12	PRIMING CUP for inlet manifold	1		2	258	T-89-2-S1	GOVERNOR ASSEMBLY Beginning with engine Serial 153091 Consisting of:	1	3	3
236	RJ-143	OIL LEVEL GAUGE with PH-245 cork	1		2	259		TC-391 Thrust sleeve and bearing	1		2
237	RK-167	SPLASH PLATE for crankcase	2		3	260		TC-395-S1 Housing assembly Consisting of:	1	2	2
238	RK-170	OIL SLING	1		2	261		PF-18 Pipe plug—1/8" slotted	1		1
239	RM-850-1	FUEL LINE, tubing with nuts, pump to carburetor	1		2	262		PF-118 Cross shaft seal retainer	1		1
240	RM-980	OIL LINE, tubing with nuts, crankcase to governor	1		3	263		PH-318A Cross shaft seal	1		1
241	RV-29-A	OIL FILTER ASSEMBLY Consisting of: RV-29 Cartridge QD-885 Cartridge gasket Body (not serviced separately) RV-27-A Oil Filter, replaced by RV-29A RV-27-1 Cartridge, replaced by RV-29	1	1	13	264		QD-615A Housing gasket	1		1
			1		12	265		RF-269-2 Straight fitting	1		1
			1		1	266		SA-52 Plug—1/2" expansion	1		1
242	SA-68	COVER PLATE for valve inspection	4		9	267		TC-395 Housing	1	1	14
243	SA-69	COVER for engine without fuel pump	1		2	268		TC-398 Cross shaft and lever	1		2
244	SD-43	RETAINER for main bearing oil seal cork, take-off end	1		1	269		VB-151 Yoke	1		3
245	SD-115-N	ENGINE INSTRUCTION AND NAME PLATE When ordering name plate, give Model, Specification Number and Serial Number for correct stamping.	1		1	270		XH-1 Pin for yoke—No. 0 x 3/4" long taper	1		1
246	SE-20-B-3	SCREEN for flywheel shroud	1	1	2	271		TC-405 FLYWEIGHT ASSEMBLY Includes:	1	1	
247	SE-74-V	FLYWHEEL SHROUD, for standard engine and power unit SE-74, replaced by SE-74-V. SE-74-VA With pad for mounting electric starter SE-74-A, replaced by SE-74-VA. SE-74-VD With pad for air filter and air stack SE-74-D, replaced by SE-74-VD. SE-74-VG With pads for air filter and starter mounting SE-74-G, replaced by SE-74-VG.	1	11	6	272		GD-100A Gear	1		7
			1	11	8	274		PH-313A Bushing washer	1		1
			1	11	14	275		TC-322A Flyweight	2		3
248	SE-75-B	LOWER CYLINDER SHROUD, Right hand side	1		14	276		TC-328 Thrust pin	2		1
249	SE-76-B	LOWER CYLINDER SHROUD, Left hand side	1		12	277		TC-389-1 Gear bushing	1		2
250	SE-77-A	CYLINDER HEAT DEFLECTOR, Left hand side	1		11	278		XJ-47 Flyweight fulcrum rivet Replaces PA-265 fulcrum pin and 2-XI-33 cotter pins.	2		1
251	SE-77-B	CYLINDER HEAT DEFLECTOR, Right hand side	1		14			The following governor linkage parts are not included in the T-89-2-S1 governor assembly.			
252	SE-78-A	CYLINDER HEAD SHROUD, Right hand side	1		14	280		PD-173A Governor adjusting screw nut	1		1
						281		PI-115F Governor adjusting screw	1		3
						282		PM-76 Governor spring	1		1
						283		TC-367 Adjusting screw pin	1		1
						284		TC-388-1 Governor drive shaft	1		3
						285		VE-464 Governor control rod	1		1
							T-89-S1	GOVERNOR ASSEMBLY Beginning with engine Serial 137102 to and including 153090 This governor is the same as T-89-2-S1 with the following exceptions:	1	3	3
								TC-405-1 Flyweight assembly in place of TC-405		1	
								TC-389 Gear bushing in place of TC-389-1			2
								TC-388 Governor drive shaft in place of TC-388-1			3
						287	T-84-2	GOVERNOR ASSEMBLY To and including engine Serial 137101 Consisting of:	1	6	
						288		GD-95A Governor gear	1		9
						289		ME-100 Thrust bearing, Nice 5774	1		6
						290		ME-111 Housing bearing, Nice 120	1		6
						291		ME-112 Shaft bearing, Nice 123	1		6
						292		PA-294 Housing dowel pin	2		1
						293		PA-251 Yoke pin	1		1

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**PARTS INTERCHANGEABLE ON MODELS VE4 AND VF4**

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz.					Lb	Oz.
295		PF-118 Cross shaft seal retainer.....	1		1			Y-54-S1 Magneto, "Wico" XH-1343, with gear.....			6
296		PH-318 Cross shaft seal.....	1		1			Y-37C Magneto, "Wico" J-1343, replaced by Y-54-S1			
297		PI-115B Adjusting screw.....	1		2			NOTE: These engines are equipped with either a 'Fairbanks-Morse' or 'Wico' magneto as shown above. See magneto bulletins in back of manual for service replacement parts list.			
298		PL-21 Gear key—Woodruff No. 3.....	1		1						
299		PM-76 Governor spring.....	1		1						
300		QD-615 Housing gasket.....	1		1						
301		RF-269-2 Straight fitting.....	1		1						
302		RM-980 Oil line to crankcase.....	1		4						
303		SA-52 Plug—1/2" expansion.....	1		1						
304		TA-112 Drive shaft.....	1		6	334	YD-12	SPARK PLUG SAFETY NIPPLE.....	4		1
305		TC-322A Flyweight.....	2		3						
306		TC-328 Thrust pin.....	2		1	335	YD-6	SPARK PLUG, Champion No. 8 Com., 18 MM (or equivalent).....	4		2
307		TC-330 Adjusting screw pin.....	1		1						
308		TC-346B Flyweight hub.....	1		4	336	YL-100	SET OF MAGNETO IGNITION CABLES Consisting of:	1		8
309		TC-348 Thrust sleeve.....	1		2			IGNITION CABLE to No. 1 cylinder.....	1		2
310		TC-363 Housing.....	1	2		337	YL-79	IGNITION CABLE to No. 2 cylinder.....	1		2
311		TC-364 Cross shaft.....	1		2	338	YL-80	IGNITION CABLE to No. 3 cylinder.....	1		2
312		VB-98A-2 Yoke.....	1		2	339	YL-81	IGNITION CABLE to No. 4 cylinder.....	1		2
313		VB-132 Lever (Give engine Serial Number when ordering).....	1		5	340	YL-82				
314		VE-158-1 Control rod yoke.....	1		1			<b>STANDARD HARDWARE</b>			
315		VE-273B-1 Control rod.....	1		1			NOTE: The following pins, nuts, cap-screws, washers, etc. are of a common hardware variety and can be purchased from local plumbing, hardware or accessory stores.			
316		XH-1 Pin, No. 0 x 1/4" long, taper.. XH-2, replaced by XH-1.	2		1						
317		XH-9 Pin, No. 2 x 1 1/4" long, taper	1		1						
318		XJ-47 Flyweight fulcrum rivet..... Replaces PA-265 fulcrum pin and 2 XI-33 cotter pins.	2		1						
320	TF-96	<b>FUEL PUMP ADAPTER AND HAND PRIMER ASSEMBLY</b> .....	1		1						
		Consisting of:				345	LJ-184	NIPPLE, 1 1/4" x 2 1/4" long, W.I. pipe.....	1		5
321		PM-145 Spring.....	1		1			For muffler mounting.			
322		TA-111-1 Plunger (TA-116 must also be ordered).....	1		1	346	PD-9	NUT, 1/4"-28 thread, hexagon steel.....	4		1
323		TA-114 Primer shaft.....	1		1			For mounting LD-226 manifold.			
324		TA-115 Handle.....	1		1	347	PD-10	NUT, 5/16"-24 thread, hexagon steel....	14		1
325		TA-116 Cap.....	1		1			2-for oil filter mounting. 4-for inlet manifold studs. 8-for connecting rod bolts.			
326		TB-105B Adapter (Beginning with engine serial 347770).....	1		4	348	PD-10-A	NUT, 5/16"-24 thread, hexagon brass....	4		1
		TB-105A and TB-105B-1 (To and including Serial 347769 for engines without primer assembly) Not furnished—order a complete adapter and hand primer assembly. See Ref. No. 320, Part No. TF-96.						For exhaust manifold studs.			
328	U-212	<b>STARTING CRANK</b> .....	1		7	349	PD-11	NUT, 3/8"-24 thread, hexagon steel.....	1		1
329	VE-575	<b>CHOKE CONTROL</b> ..... VE-435—Replaced by VE-575, interchangeable	1		4	350	PD-12	NUT, 7/16"-20 thread, hexagon steel....	12		1
330	WD-26-A	<b>MUFFLER</b> , standard, for 1 1/4" pipe tap....	1	2	1			For mounting cylinder block to crankcase.			
331	WD-35	<b>MUFFLER</b> , for 1" pipe tap, used on engine with LD-226 manifolds.....	2		15	351	PD-76	NUT, 3/8"-16 thread, hexagon steel.....	1		1
332	WE-182-A	<b>SPACER</b> for gear cover (Beginning with engine Serial 137102).....	1		2			For magneto mounting screw.			
		WE-182A-1 (To and including engine Serial 137101).....	1		2	352	PD-77	NUT, 1/4"-20 thread, hexagon steel.....	1		1
333	Y-74-S1	<b>MAGNETO, "FAIRBANKS-MORSE" No. FM-XV4 B7</b> with gear..... Y-41-S1 Magneto, FM-JV4B7, replaced by Y-74-S1.	1	7	8	353	PD-109	NUT, 3/8"-24 thread, hexagon brass....	4		1
								For manifold to cylinder block studs.			
						354	PD-115	NUT, No. 10-32 thread, hexagon steel....	3		1
								2-for governor adjusting screw. 1-for governor control rod (T-84-2 Gov.)			
						357	PE-3	<b>LOCKWASHER</b> , 1/4" positive.....	51		1
								2-for mounting fuel pump adaptor. 6-for crankcase splash plates. 6-for flywheel screen. 4-for LD-226 exhaust manifold. 33-for air shrouding.			

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**PARTS INTERCHANGEABLE ON  
MODELS VE4 AND VF4 STANDARD HARDWARE**

Ref. No.	Part Number	Description	No.			Ref. No.	Part Number	Description	No.		
			Req	Lb	Oz				Req	Lb	Oz
358	PE-4	<b>LOCKWASHER, 5/16" positive</b> ..... 1-4-for crankcase bottom cover plate. 6-for flywheel shroud to gear cover. 1-7-for gear cover and spacer. 4-for governor housing. 2-for fuel pump. 2-for carburetor. 2-for oil filter. 8-for lower to upper manifold.	55		1	377	<b>XA-65</b> <b>SCREW, No. 8 x 1/4" long, self tapping, sheet metal,</b> ..... For mounting choke bracket.	3		1	
359	PE-5	<b>LOCKWASHER, 3/8" positive</b> ..... 4-for mounting manifold to cylinder. 6-for main bearing plate—take-off end. 2-for magneto.	12		1	378	<b>XA-67</b> <b>SCREW, No. 4 x 1/4" long, self tapping, sheet metal</b> ..... For mounting name and instruction plate.	4		1	
360	PE-6	<b>LOCKWASHER, 7/16" positive</b> ..... For cylinder block to crankcase.	12		1	379	<b>XB-75</b> <b>SCREW, 1/4"-20 thread x 1/2" long, Allen head capcrew</b> ..... For mounting fuel pump adapter.	2		1	
361	PE-7	<b>LOCKWASHER, 1/2" positive</b> ..... For engine supports to crankcase.	4		1	380	<b>XC-17</b> <b>SCREW, 5/16"-18 thread x 1/2" long, flat head.</b> For bearing retainer plate—flywheel end .....	4		1	
362	PE-46	<b>LOCKWASHER, 5/16" external 'Everlock'</b> For mounting camshaft gear.	3		1	381	<b>XD-3</b> <b>SCREW, 1/4"-20 thread x 3/8" long, hexagon head</b> ..... For lower cylinder shrouds.	4		1	
363	PE-49	<b>LOCKWASHER, 5/16" countersunk 'Everlock',</b> for bearing retainer plate—flywheel end.....	4		1	382	<b>XD-4</b> <b>SCREW, 1/4"-20 thread x 1/2" long, hexagon head</b> ..... 6-for mounting splash plates. 1-for exhaust manifold, R.H. side. 4-for cylinder heat deflector.	11		1	
364	PF-18	<b>PIPE PLUG, 1/8" slotted</b> ..... 1-for oil hole to pump. 4-for oil spray nozzles. 1-for oil pump lockacrew hole. 1-for oil header.	7		1	383	<b>XD-6</b> <b>SCREW, 1/4"-20 thread x 3/4" long, hexagon head</b> ..... For cylinder heat deflector, L.H. side.	2		1	
365	PF-25	<b>PIPE PLUG, 3/8" slotted</b> ..... For gear cover.	1		2	384	<b>XD-13</b> <b>SCREW, 5/16"-18 thread x 1/2" long, hexagon head</b> ..... For flywheel shroud mounting.	6		1	
366	PH-14	<b>PLAIN WASHER, 5/16" copper</b> ..... For valve inspection cover plate.	4		1	385	<b>XD-14</b> <b>SCREW, 5/16"-18 thread x 5/8" long, hexagon head</b> ..... 1-4-for crankcase bottom cover plate. 2-for mounting fuel pump. 5-for mounting spacer to crankcase.	21		1	
367	PH-22-A	<b>PLAIN WASHERS, 3/8" steel</b> ..... For magneto mounting screw.	1		1	386	<b>XD-15</b> <b>SCREW, 5/16"-18 thread x 3/4" long, hexagon head</b> ..... For mounting spacer to gear cover.	2		1	
368	PH-77-A	<b>PLAIN WASHER, 5/16" steel</b> ..... For mounting cylinder heads.	34		1	387	<b>XD-16</b> <b>SCREW, 5/16"-18 thread x 7/8" long, hexagon head</b> ..... 2-for mounting carburetor. 4-for mounting governor housing.	6		1	
369	PL-53	<b>KEY, No. 8 Woodruff</b> ..... For crankshaft gear.	1		1	388	<b>XD-17</b> <b>SCREW, 5/16"-18 thread x 1" long, hexagon head</b> ..... For mounting camshaft gear.	3		2	
370	PL-83	<b>KEY, No. 23 Woodruff</b> ..... For mounting flywheel.	1		2	389	<b>XD-19</b> <b>SCREW, 5/16"-18 thread x 1 1/4" long, hexagon head</b> ..... 10-for mounting gear cover. 30-for mounting cylinder heads.	40		2	
371	RF-794	<b>PIPE NIPPLE, 1/8" x 3/4" long</b> ..... For mounting fuel strainer.	1		1	390	<b>XD-21</b> <b>SCREW, 5/16"-18 thread x 1 1/2" long, hexagon head</b> ..... For mounting cylinder heads.	4		2	
372	SA-26	<b>PLUG, 5/8" expansion</b> ..... For camshaft bearing oil hole.	2		1	392	<b>XD-29</b> <b>SCREW, 3/8"-16 thread x 1 1/4" long, hexagon head</b> ..... For main bearing plate—take-off end.	6		2	
373	SA-58	<b>PLUG, 1-3/8" expansion</b> ..... For camshaft end hole.	1		1	393	<b>XD-33</b> <b>SCREW, 3/8"-16 thread x 2 1/4" long, hexagon head</b> ..... For mounting magneto (Lower half).	1		2	
375	XA-33	<b>SCREW, 1/4"-20 thread x 3/8" long, round head</b> ..... 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.	29		1	394	<b>XD-43</b> <b>SCREW, 1/2"-13 thread x 1 1/4" long, hexagon head</b> ..... For mounting engine supports.	4		2	
376	XA-36	<b>SCREW, 1/4"-20 thread x 1/2" long, round head</b> ..... For rear shroud cover, top holes.	2		1						

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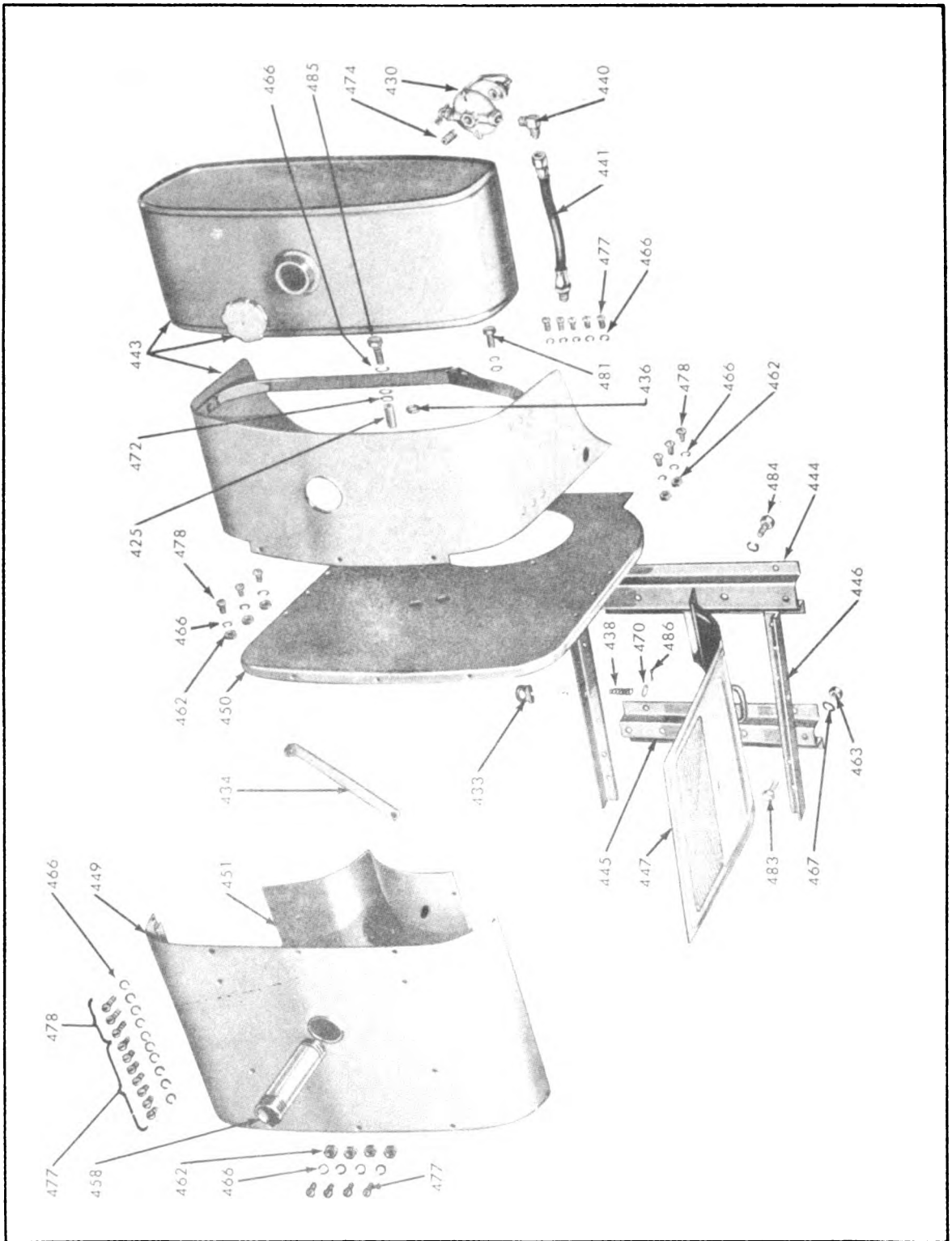
**PARTS INTERCHANGEABLE ON  
MODELS VE4 AND VF4 STANDARD HARDWARE**

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
396	XE-64	SCREW, 1/4"-20 thread x 3/8" long, Allen head set..... For cranking pin.	1		1
397	XE-55	SCREW, 5/16"-18 thread x 3/8" long, Allen head set..... For mounting idler stud.	1		1
398	XI-1	COTTER PIN, 1/16" x 1/2" long ..... For governor yoke pin (T-84-2 Gov.).	1		1
399	XI-32	COTTER PIN, 3/64" x 3/8" long ..... For governor control rod.	1		1
400	XK-3	PLUG, 3/8" pipe, square head ..... For oil drain.	1		1
401	XK-12	PLUG, 1" pipe, countersunk head ..... For LD-226 exhaust manifold.	2		2
402	XK-77	STREET ELL, 1/8" x 45° ..... For mounting strainer.	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.

# HOUSE PARTS FOR MODELS VE4 AND VF4 ENGINES

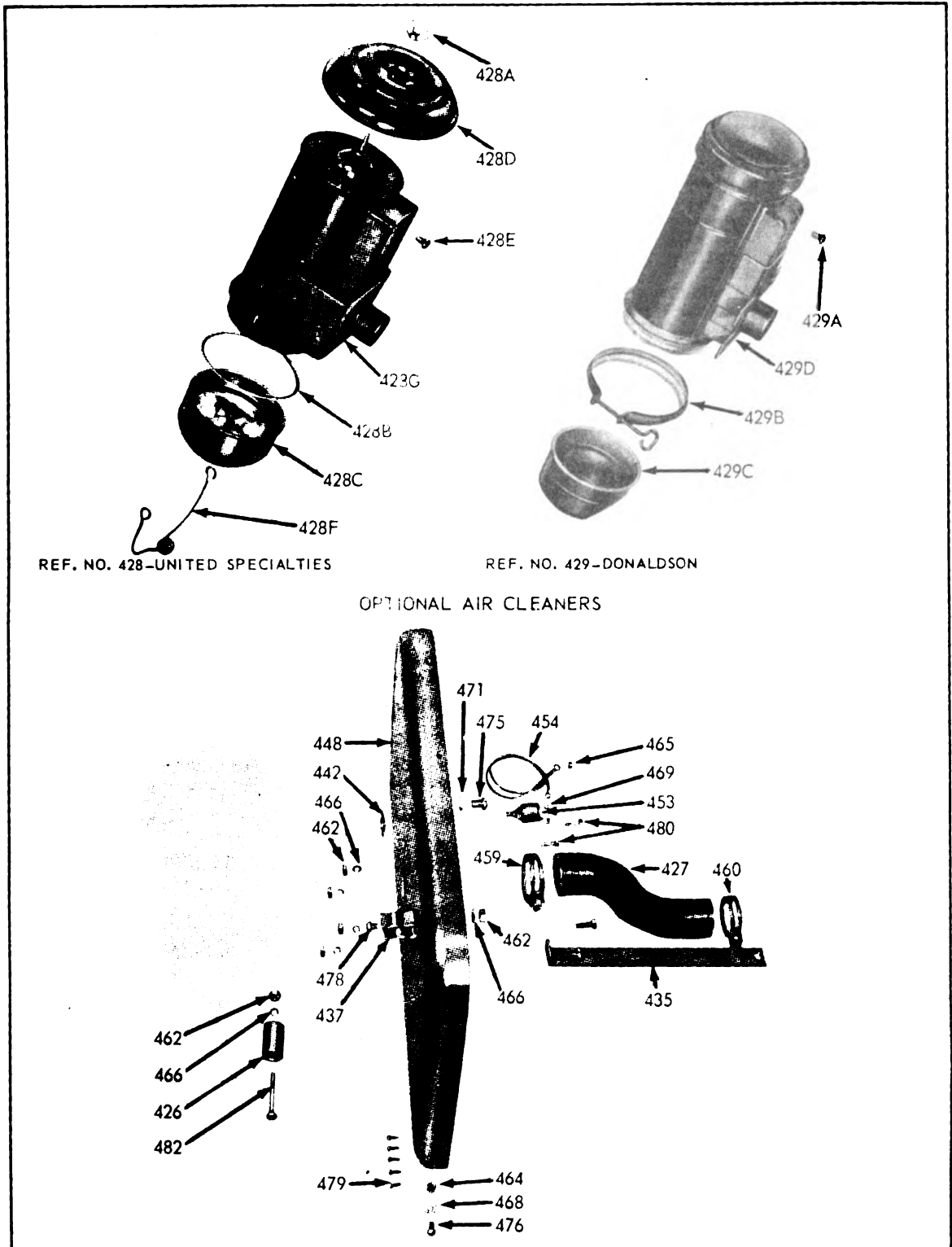


**Fig. 60, ENGINE HOUSE WITH FUEL TANK AT TAKE-OFF END**  
 Parts are identified by reference number. See parts list for correct part number.

104815C



HOUSE PARTS FOR MODELS VE4 AND VF4 ENGINES



164959C 104723C-1

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

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

## VE4 AND VF4 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	447	WE-196	HOUSE DOORS (Standard) .....	2	4	8
426	HF-387	SPACER for crank mounting .....	1		3			WE-196-A (Bumped out to clear distributor) .....	1	4	8
427	LL-64	RUBBER ELBOW for air cleaner to carburetor .....	1		8			For units with generator and distributor on left hand side of engine .....			
428	LO-66	AIR CLEANER, United Specialties No. CT50-10505 .....	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	449	WE-198-A-1	CANOPY (Beginning with engine Serial 84249) .....	1	4	5
428B		A-9986 Gasket .....	1		1			WE-198 Canopy (To and including engine Serial 84248) .....	1	4	5
428C		A-10141 Oil cup and baffle assembly.....	1					Not available, use WE-198-A-2 with WE-218-1 Partition plate.			
428D		A-10713 Top cap and screw assembly ....	1			450	WE-199-A	REAR PANEL .....	1	7	9
428E		A-10962 Screw .....	1		1	451	WE-218	PARTITION PLATE (Beginning with engine Serial 84249) .....	1	1	14
428F		B-9982 Roller and ball assembly .....	1					WE-200 Plate (To and including engine Serial 84248) .....	1	1	14
428G		C-10724 Body assembly (Less fittings) ..	1			453	YC-9-C	IGNITION SWITCH .....	1		2
429	LO-97	AIR CLEANER, Donaldson Co. A-4542 ..	1					YC-9-A, replaced by YC-9-C.			
		Service parts: Donaldson Part Numbers.				454	YL-63	IGNITION WIRE—switch to magneto.....	1		1
429A		P-6658 Support screw .....	1		1						
429B		P-9595 Oil cup clamp assembly .....	1								
429C		P-10498 Oil cup assembly .....	1								
429D		Body assembly—not serviced, order complete air filter. NOTE: The VE4 and VF4 power units may be equipped with either a 'United' or 'Donaldson' air cleaner as shown above.									
430	LP-19	FUEL STRAINER—Tillotson OW-418-T NOTE: See illustration in back of manual for service parts list of fuel strainer.	1		12						
433	PG-323	DOOR CLIP .....	2		3						
434	PG-401	HOUSE BRACE—take-off end .....	1		6	458	LJ-188	NIPPLE, 1/4" x 6" long, W.I. pipe .....	1		12
435	PG-402	HOUSE BRACE—flywheel end .....	1		7			For muffler mounting.			
436	PH-198	GROMMET for fuel line .....	1		1	459	LK-8	HOSE CLAMP, 2-1/8" I.D. ....	1		1
437	PK-87	SPRING CLIP for crank mounting.....	1		1			For air cleaner connection, cleaner end			
438	PM-137	SPRING for door clip .....	2		1	460	LK-11	HOSE CLAMP, 1-7/8" I.D. ....	1		1
440	RF-270	ELBOW for fuel strainer outlet .....	1		1			For air cleaner connection, carburetor end.			
441	RM-1049-A	FUEL LINE—tank to carburetor .....	1		2	462	PD-77	NUT, 1/4"-20 thread, hexagon steel .....	15		1
442	SD-108	TAG for ignition switch .....	1		1			5—for tank support to rear panel. 4—for air cleaner mounting. 4—for partition plate. 1—for crank spacer. 1—for crank spring clip.			
443	WE-192	FUEL TANK ASSEMBLY .....	1	17	2	463	PD-79	NUT, 3/8"-16 thread, hexagon steel .....	4		1
		Consisting of:						For side rails to engine supports.			
		WE-192-9 Support and straps .....	1	10		464	PD-115	NUT, No. 10-32 thread, hexagon steel....	2		1
		RC-77 Cap, Easy-on .....	1		2			For front panel to side of shroud.			
		HC-92 and RC-92-1 Brass screw type cap, replaced by RC-77 steel stamping, Easy-on cap (not interchangeable).....	1		8	465	PD-152	NUT, No. 6-32 thread, hexagon steel .....	1		1
		WE-192-4 Tank (Furnished with cap)....	1		7			For magneto ignition wire.			
444	WE-193-A	ENGINE SUPPORT—take-off end .....	1	3	1						
445	WE-194-A	ENGINE SUPPORT—flywheel end .....	1	2	9						
446	WE-195	SIDE RAILS .....	2	1	8						

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.

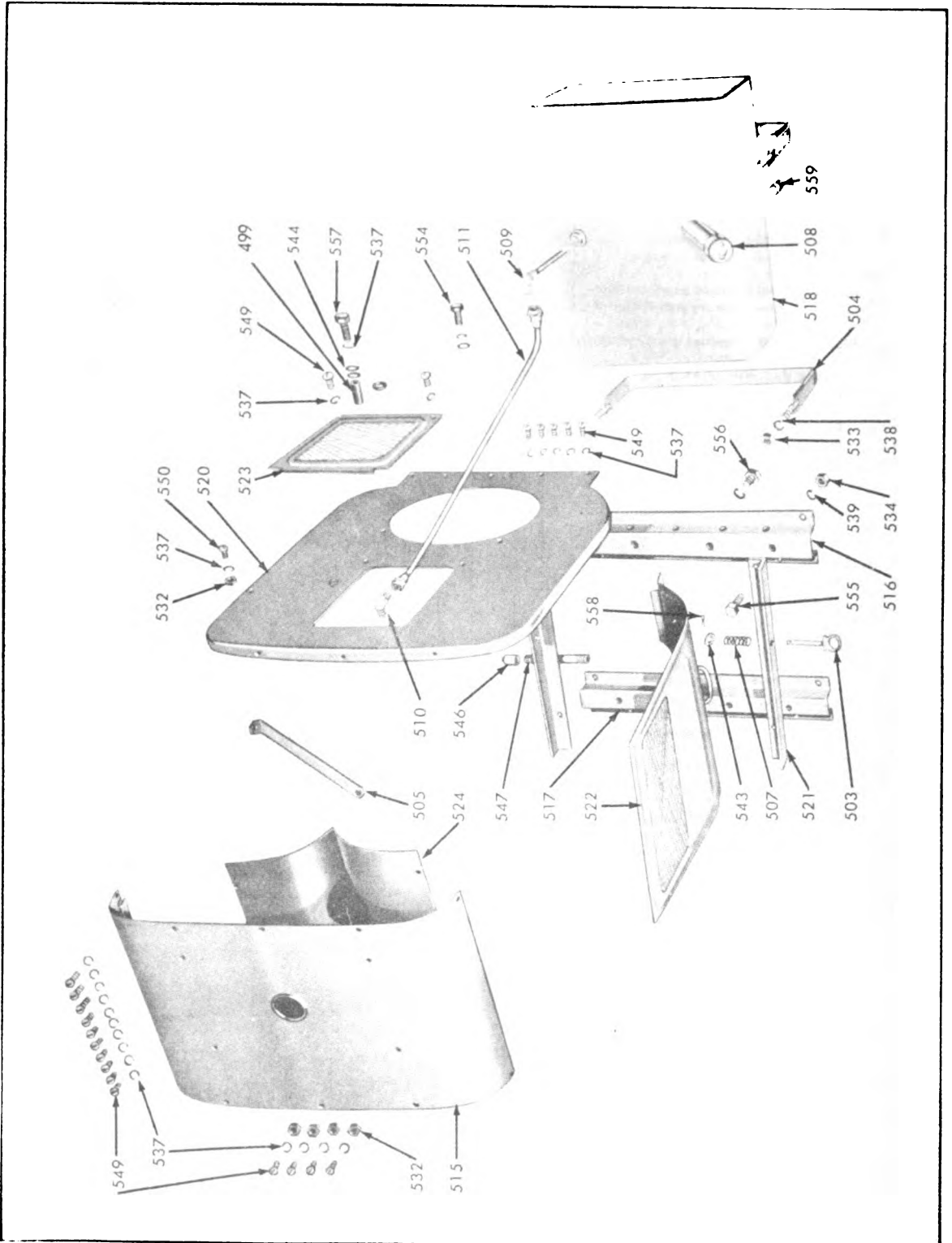
## VE4 AND VF4 ENGINE HOUSE WITH FUEL TANK AT TAKE-OFF END

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

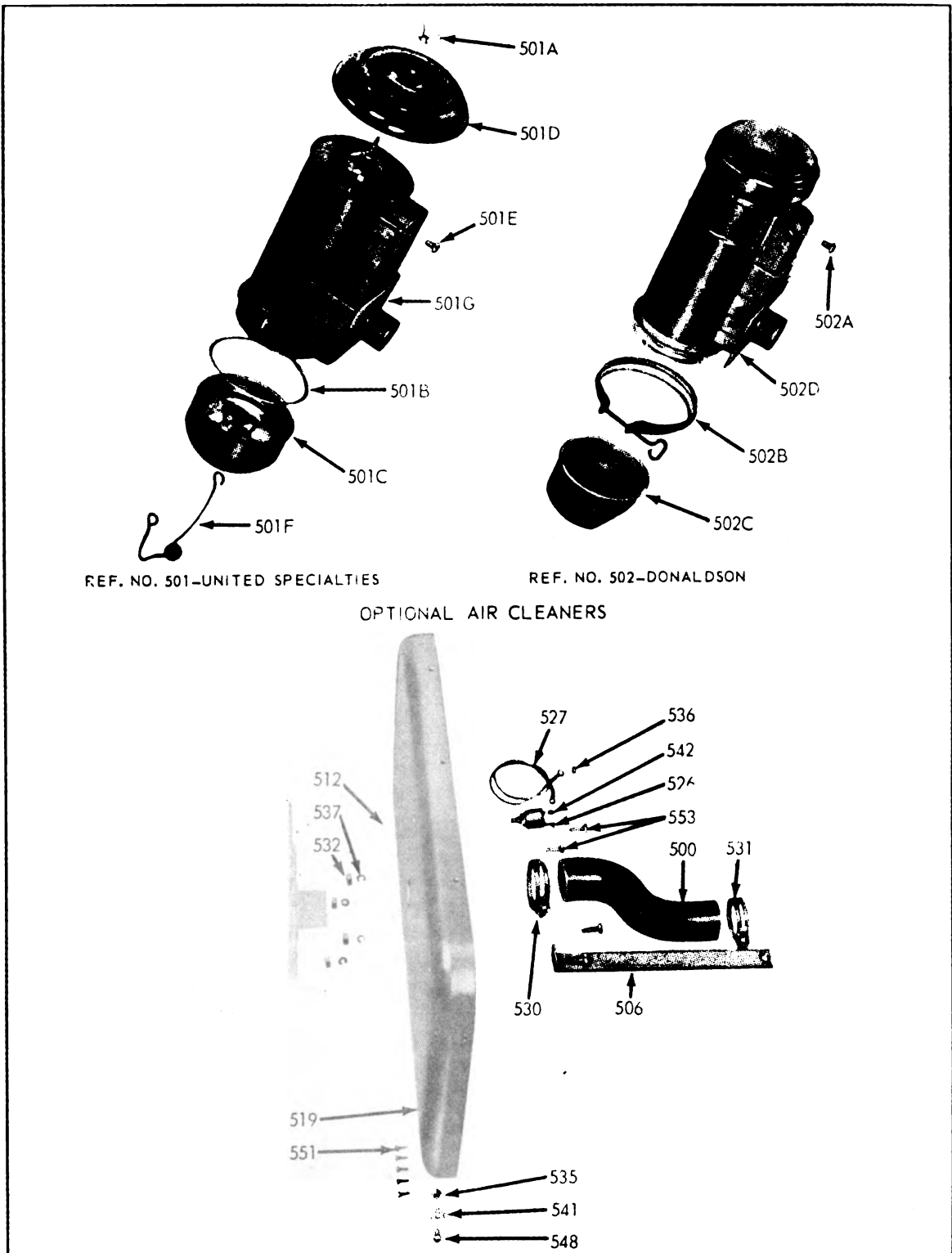
# HOUSE PARTS FOR MODELS VE4 AND VF4 ENGINES



**Fig. 62, ENGINE HOUSE WITH UNDERSLUNG FUEL TANK**  
 Parts are identified by reference number. See parts list for correct part number.

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HOUSE PARTS FOR MODELS VE4 AND VF4 ENGINES



164959C 104817C

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

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

## VE4 AND VF4 ENGINE HOUSE WITH UNDERSLUNG FUEL TANK

Ref. No.	Part Number	Description	No.			Net Wt.			Ref. No.	Part Number	Description	No.			Net Wt.		
			Req	Lb	Oz	Req	Lb	Oz				Req	Lb	Oz	Req	Lb	Oz
499	HF-380	SPACER for rear panel to cylinder block ..	1		1				519	WE-206	FRONT PANEL (Standard) .....	1	3	10			
500	LL-64	RUBBER ELBOW for air cleaner to carburetor .....	1		8						WE-206-6 (With additional holes for switch and ammeter) .....	1	3	10			
501	LO-66	AIR CLEANER, United Specialties No. CT50-10505 .....	1		6				520	WE-207-A	REAR PANEL .....	1	5	10			
		Service parts: United Specialties Part Numbers.							521	WE-208	SIDE RAIL .....	2	1	8			
501A		A-1317 Wing nut .....	1		1				522	WE-209	HOUSE DOOR .....	2	3	11			
501B		A-9986 Gasket .....	1		1						WE-209A (Bumped out to clear distributor) .....	1	3	11			
501C		A-10141 Oil cup and baffle assembly .....	1								For units with generator and distributor on left hand side of engine.						
501D		A-10713 Top cap and screw assembly .....	1						523	WE-211	COVER for rear panel .....	1		12			
501E		A-10962 Screw .....	1		1				524	WE-218	PARTITION PLATE .....	1	1	14			
501F		B-9982 Roller and ball assembly .....	1						526	YC-9-C	IGNITION SWITCH .....	1		2			
501G		C-10724 Body assembly (Less fittings) .....	1						527	YL-63	IGNITION WIRE—switch to magneto .....	1		1			
502	LO-97	AIR CLEANER, Donaldson Co. A-4542 ..	1								<b>STANDARD HARDWARE</b>						
		Service parts: Donaldson Part Numbers.															
502A		P-6658 Support screw .....	1		1				530	LK-8	HOSE CLAMP, 2-1/8" I.D. ....	1		1			
502B		P-9595 Oil cup clamp assembly .....	1								For air cleaner connection, cleaner end.						
502C		P-10498 Oil cup assembly .....	1						531	LK-11	HOSE CLAMP, 1-7/8" I.D. ....	1		1			
502D		Body assembly—not serviced, order complete air filter.									For air cleaner connection, carburetor end.						
		<b>NOTE:</b> The VE4 and VF4 power units may be equipped with either a 'United' or 'Donaldson' air cleaner as shown above.							532	PD-77	NUT, 1/4"-20 thread, hexagon steel .....	9		1			
503	PG-323	DOOR CLIP .....	2		3						4-for air cleaner mounting.						
504	PG-329-A	STRAP for fuel tank .....	2	1	3				533	PD-78	NUT, 5/16"-18 thread, hexagon steel ....	4		1			
505	PG-401	HOUSE BRACE—take-off end .....	1		6						For tank straps to engine supports.						
506	PG-402	HOUSE BRACE—flywheel end .....	1		7				534	PD-79	NUT, 3/8"-16 thread, hexagon steel .....	4		1			
507	PM-137	SPRING for door clip .....	2		1						For side rails to engine supports.						
508	RC-87	CAP for fuel tank .....	1		2				535	PD-115	NUT, No. 10-32 thread, hexagon steel ....	2		1			
509	RM-1206-C	SUCTION TUBE ASSEMBLY in fuel tank .....	1		3						For front panel to side of shroud.						
		RF-270 Elbow for fuel tanks with built-in suction tube .....	1		1				536	PD-152	NUT, No. 6-32 thread, hexagon steel .....	1		1			
510	RF-1225	ELBOW for fuel pump inlet .....	1		2						For magneto ignition wire.						
		RF-320-3, replaced by RF-1225.							537	PE-3	LOCKWASHER, 1/4" positive .....	26		1			
511	RM-900	FUEL LINE—tank to pump .....	1		6						10-for canopy.						
512	SD-108	TAG for ignition switch .....	1		1						4-for partition plate.						
515	WE-198A-1	CANOPY (Beginning with engine Serial 84249) .....	1	4	5						5-for rear panel to engine support.						
		WE-198 Canopy (To and including engine Serial 84248) .....	1	4	5						2-for cover to rear panel.						
516	WE-202-A	ENGINE SUPPORT—take-off end .....	1	4	10						4-for air cleaner mounting.						
517	WE-203	ENGINE SUPPORT—flywheel end .....	1	3	9						1-for house brace to panel, take-off end						
518	WE-204-S1	FUEL TANK with RC-87 cap and RM-1206C suction tube .....	1		9				538	PE-4	LOCKWASHER, 5/16" positive .....	4		1			
		WE-204A-S1 (Filler neck relocated) for units with electric starter and generator .....	1		9						For tank straps 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.

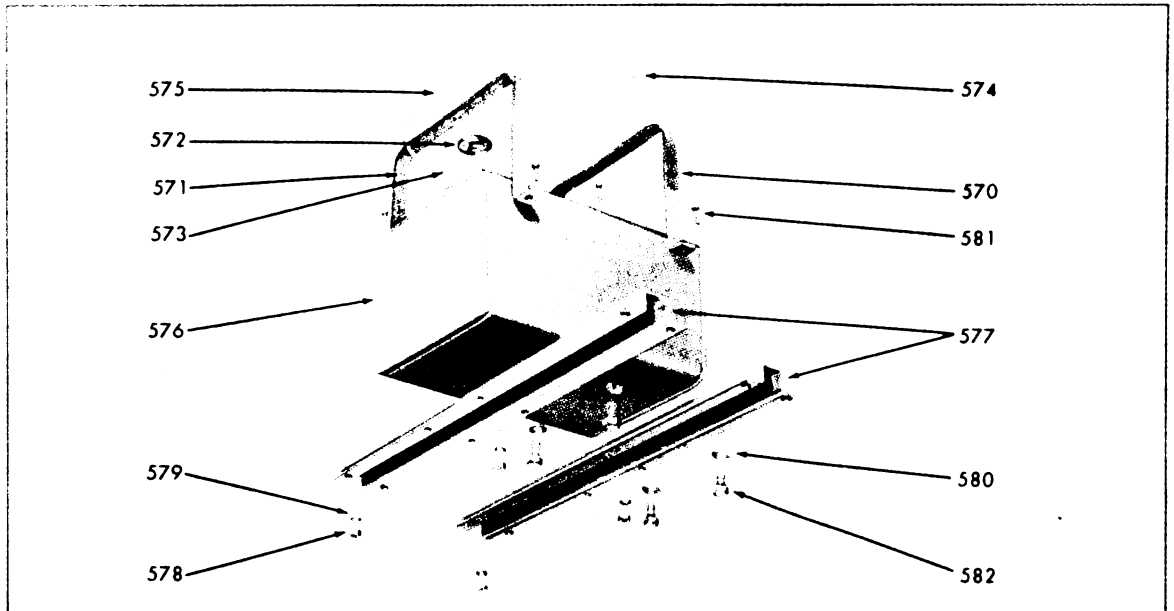
## VE4 AND VF4 ENGINE HOUSE WITH UNDERSLUNG FUEL TANK

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
539	PE-5	LOCKWASHER, 3/8" positive ..... For side rails to engine supports.	4		1
541	PE-45	LOCKWASHER, No. 10 external 'Everlock', for front panel to side of shroud.	2		1
542	PE-72	LOCKWASHER, Ignition switch terminal	1		1
543	PH-2	PLAIN WASHER, 7/16" I.D. x 1/16" thick steel, for door clip.....	2		1
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 ..... RF-1086 Nipple—replaced by RF-1086A.	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 brace to panel, take-off end.	1		1
551	XA-65	SCREW, No. 8 x 1/2" long, self-tapping, sheet metal, for front panel to shroud....	5		1
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

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 VE4 AND VF4 ENGINES



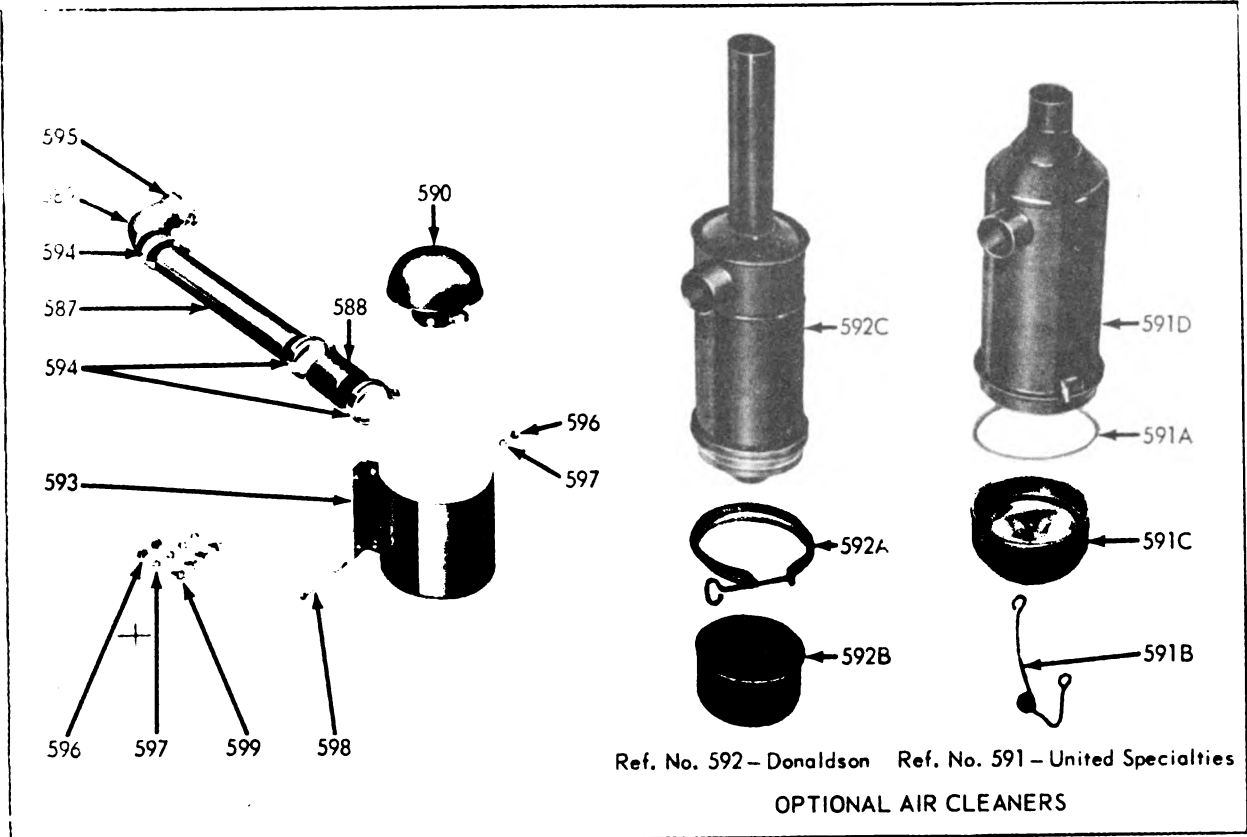
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Ref. No.	Part Number	Description	No. Req.	Net Weight	
				Lb	Oz
570	PG-321	<b>STRAP</b> for fuel tank .....	2	1	1
571	PH-244-A	<b>FELT</b> for fuel tank strap .....	2		2
572	RC-77	<b>CAP</b> for fuel tank .....	1		3
573	RM-1206-B	<b>SUCTION TUBE ASSEMBLY</b> - in fuel tank .....	1		3
		RF-270 Elbow for fuel tanks with built-in suction tube .....	1		1
574	RF-1225	<b>ELBOW</b> for fuel line - pump inlet .....	1		2
575	RM-1161	<b>FUEL LINE</b> - tank to pump (23-1/8" long) .....	1		4
		RM-822 for engines with electric starter (27-1/8" long) .....	1		5
576	WE-187-S1 WE-187E-S1 (Optional)	<b>FUEL TANK</b> -6 gal. capacity, with cap and RM-1206-B suction tube .....	1	7	
577	WE-188	<b>ENGINE SUPPORT</b> .....	2	4	11
		WE-188-D for engines with electric starter .....	2	5	4
<b>STANDARD HARDWARE</b>					
578	PD-79	<b>NUT</b> , 3/8"-16 thread, hexagon steel .....	4		1
		For fuel tank straps to supports.			
579	PE-5	<b>LOCKWASHER</b> , 3/8" positive .....	4		1
		For fuel tank straps to supports.			
580	PE-7	<b>LOCKWASHER</b> , 1/2" positive .....	4		1
		For engine supports to crankcase.			
581	XD-27	<b>SCREW</b> , 3/8"-16 thread x 1" long, hexagon head .....	4		1
		For fuel tank straps to supports.			
582	XD-41	<b>SCREW</b> , 1/2"-13 thread x 1" long, hexagon head .....	4		2
		For engine supports to crankcase.			

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



## SIDE MOUNT AIR CLEANER FOR VE4 AND VF4 ENGINES



Ref. No. 592 - Donaldson    Ref. No. 591 - United Specialties

### OPTIONAL AIR CLEANERS

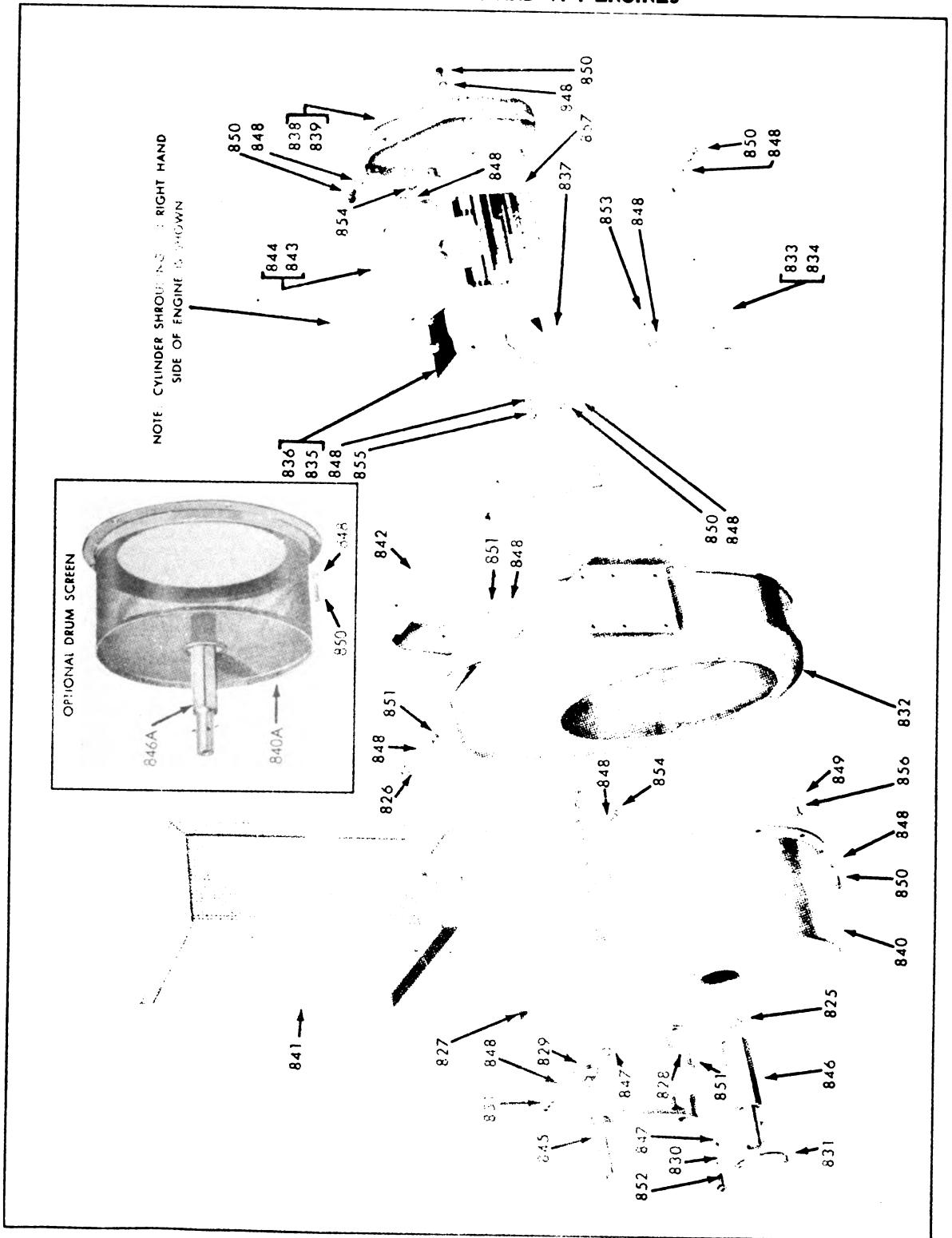
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Ref. No.	Part Number	Description	No.			Net Wt.		
			Req.	Lb	Oz.	Req.	Lb	Oz.
587	LJ-120	TUBE for air cleaner to carburetor elbow	1	1	1			
588	LL-27	RUBBER HOSE for air cleaner tube	1		2			
589	LL-67	RUBBER ELBOW for air cleaner tube	1		4			
590	LO-96	PRE-CLEANER, United Specialties No. B-14885	1		12			
	LO-86	PRE-CLEANER, Donaldson Co. No. 2X-1672-1			10			
591	LO-64	AIR CLEANER, United Specialties No. CT50-14920 Service parts: United Specialties Part Numbers.	1	4	7			
591A		A-9986 Gasket	1		1			
591B		B-9982 Roller and bail assembly	1					
591C		B-10141 Oil cup and baffle assembly	1					
591D		15114 Body assembly (Less fittings)	1					
592	LO-85	AIR CLEANER, Donaldson Co. A-454 Service parts: Donaldson Part Numbers	1	3	12			
592A		P-2846 Clamp assembly	1					
592B		P-3507 Oil cup assembly	1					
592C		Body assembly—not serviced, order complete air filter. <b>NOTE:</b> The VE4 and VF4 open engines may be equipped with either a 'United' or 'Donaldson' air cleaner as shown above.						
593	PG-328	STRAP For mounting LO-64 air cleaner.	1	1	2			
	PG-291	STRAP For mounting LO-85 air cleaner.			15			
<b>STANDARD HARDWARE</b>								
594	LK-8	HOSE CLAMP, 2-1/8" I.D. For air cleaner connections.	3		2			
595	LK-11	HOSE CLAMP, 1-7/8" I.D. For air cleaner connection, carburetor end.	1		2			
596	PD-77	NUT, 1/4"-20 thread, hexagon steel For air cleaner strap mounting.	4		1			
597	PE-3	LOCKWASHER, 1/4" positive For air cleaner strap mounting.	6		1			
598	XA-74	SCREW, 1/4"-20 thread x 2 1/4" long, round head For air cleaner strap clamping.	2		1			
599	XD-4	SCREW, 1/4"-20 thread x 1/2" long, hexagon head For air cleaner 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.

# UPRIGHT AIR INTAKE, DRUM SCREEN AND AGRICULTURAL SHROUding FOR VE4 AND VF4 ENGINES



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

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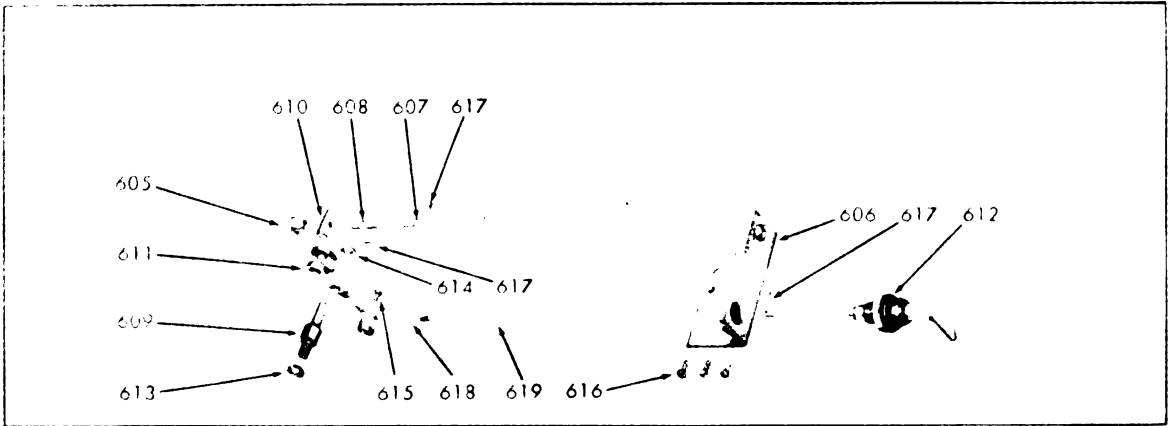
**UPRIGHT AIR INTAKE, DRUM SCREEN AND AGRICULTURAL  
SHROUDING FOR VE4 AND VF4 ENGINES**

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
825	PE-62-1	LOCKWASHER for starting crank nut ....	1		1	846	UC-73-G-51	STARTING CRANK nut assembly..... For engines with intake stack. Consisting of: PA-239 Pin .....	1		2
826	PG-315	CLIP for air intake screen .....	6		1			UC-73-G Nut .....	1		
827	PG-325-A	SUPPORT STRAP for air intake .....	1	1	1	846A	UC-73-J-51	STARTING CRANK nut assembly..... For engines with drum screen. Consisting of: PA-239 Pin .....	1	2	4
828	PG-481	BRACKET for crank support.....	1		3			UC-73-J Nut .....	1		
829	PK-87	SPRING CLIP for crank support.....	1		1			<b>STANDARD HARDWARE</b>			
830	PM-4	SPRING for crank hole cover .....	1		1	847	PD-77	NUT, 1/4"-20 thread, hexagon steel .....	2		1
831	SA-56	COVER for crank hole in air stack .....	1		2			1-for crank mounting spring clip. 1-for crank hole cover.			
832	SE-74-VD	FLYWHEEL SHROUD (with pads for intake support and air cleaner mounting) .. SE-74-D, replaced by SE-74-VD.	1	11	8	848	PE-3	LOCKWASHER, 1/2" positive .....	49		1
		SE-74-VH (with pads for intake support, air cleaner and electric starter mounting) SE-74-H, replaced by SE-74-VH.	1	11	14			4-for air intake shroud. 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.			
833	SE-75-B	LOWER CYLINDER SHROUD, R.H. side	1		14	849	PE-4	LOCKWASHER, 5/16" positive.....	6		1
834	SE-76-B	LOWER CYLINDER SHROUD, L.H. side	1		12			For flywheel shroud to gear cover.			
835	SE-77-A-2	CYLINDER HEAT DEFLECTOR ASSEMBLY—left hand side..... Consisting of: SE-77-A Deflector .....	1		12	850	XA-33	SCREW, 1/4"-20 thread x 3/8" long, round head.....	26		1
		VE-481 Spring clip pin.....	1					3-for air intake shroud. 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.			
836	SE-77-B-1	CYLINDER HEAT DEFLECTOR ASSEMBLY—right hand side..... Consisting of: SE-77-B Deflector.....	1		14	851	XA-34	SCREW, 1/4"-20 thread x 1/2" long, round head.....	12		1
		VE-481 Spring clip pin.....	1					2-for crank bracket and spring clip. 6-for air intake screen. 4-for air intake support strap.			
837	SE-80	SIDE COVER for flywheel shroud .....	1		4	852	XA-35	SCREW, 1/4"-20 thread x 5/8" long, round head, for crank hole cover .....	1		1
838	SE-82-B-3	REAR SHROUD COVER ASSEMBLY—left hand side .....	1	1	2	853	XD-3	SCREW, 1/4"-20 thread x 3/8" long, hexagon head, for lower cylinder shrouds .....	4		1
839	SE-83-B-4	REAR SHROUD COVER ASSEMBLY—right hand side..... The above assemblies both consist of: PM-128 Spring for cleanout cover .....	1	1	2	854	XD-4	SCREW, 1/4"-20 thread x 1/2" long, hexagon head.....	7		1
		SA-76 Cleanout cover .....	1					4-for cylinder heat deflectors. 3-for intake support strap.			
		Rear shroud cover (not furnished separately) .....	1			855	XD-6	SCREW, 1/4"-20 thread x 1/2" long, hexagon head, for cylinder heat deflectors.....	2		1
		VE-481 Spring clip pin.....	1			856	XD-13	SCREW, 5/16"-18 thread x 1/2" long, hexagon head .....	6		1
		XJ-49 Rivet.....	1					For mounting flywheel shroud.			
		PA-251-1 pin, PH-84 washer and XI-1 cotter pin, replaced by XJ-49.	1			857	XJ-46-A	RIVET, 9/64" dia. x 3/16" long, tubular steel.....	4		1
840	SE-99-B	AIR INTAKE SHROUD .....	1	10	5			For mounting instruction plate.			
		SE-99 replaced by SE-99B, interchangeable.									
840A	SE-20-D	DRUM TYPE INTAKE SCREEN .....	1		5						
841	SE-100	AIR INTAKE SCREEN .....	1	6	4						
842	SE-102	DUST SHIELD for flywheel shroud.....	1		1						
843	SE-103-1	COVER ASSEMBLY—right hand side .....	1		14						
844	SE-104-1	COVER ASSEMBLY—left hand side .....	1		14						
		The above assemblies both consist of: PG-388 Clip for spring.....	1								
		PK-85 Spring .....	1								
		SD-117 Instruction decal .....	1								
		Cover (not furnished separately) .....	1								
		XJ-46 Rivets for clip mounting.....	2								
845	U-212-A	STARTING CRANK for engines with intake stack .....	1		2						
		Use Std. U-212 crank for engines with 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.

**TT-45-L AND TT-45L-1 VARIABLE SPEED GOVERNOR CONTROL ASSEMBLIES  
FOR VE4 AND VF4 ENGINES**

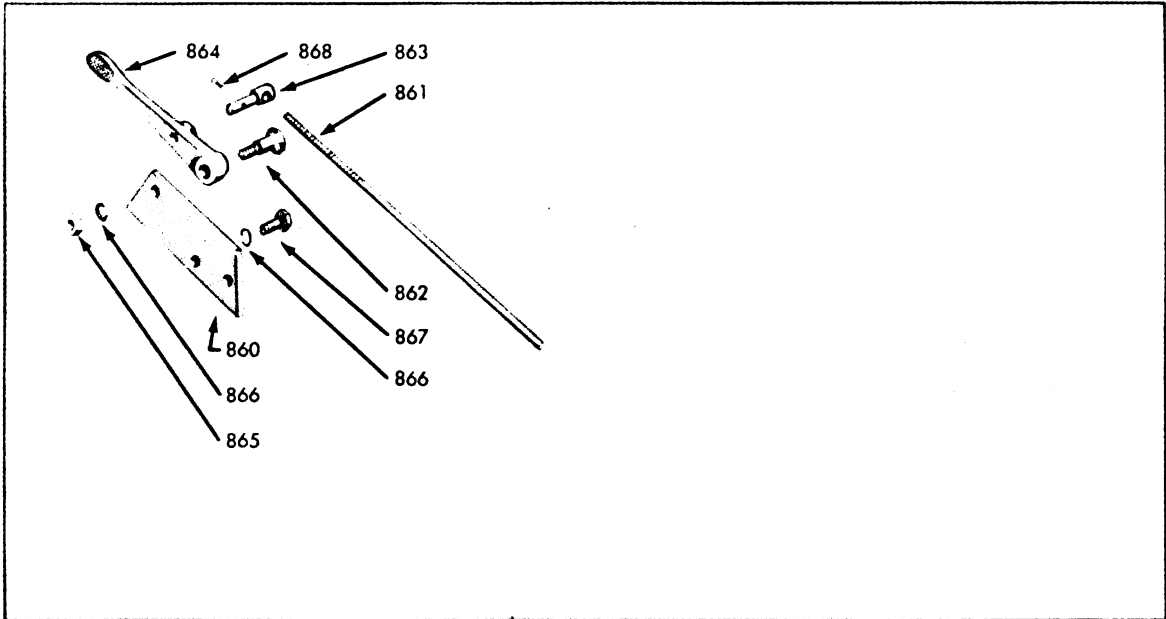


104568C

Ref. No.	Part Number	Description	No. Req.	Net Weight	
				Lb	Oz
	<b>TT-45-L</b>	<b>GOVERNOR CONTROL ASSEMBLY</b> —for open engine .....	1	1	
	<b>TT-45L-1</b>	<b>GOVERNOR CONTROL ASSEMBLY</b> —for power unit .....	1	1	
		<b>NOTE:</b> The following parts are identical on both the above assemblies except PG-342 bracket is not furnished on TT-45L-1 assembly.			
605	PD-173-A	<b>LOCKNUT</b> for adjusting screw .....	1		1
606	PG-342	<b>BRACKET</b> for governor and choke control .....	1		4
607	PI-115-E	<b>ADJUSTING SCREW</b> .....	1		2
608	PM-111-1	<b>SPRING</b> for adjusting screw .....	1		1
609	TC-365	<b>PIN</b> for variable speed lever support .....	1		1
610	TC-368-A	<b>PIN</b> for adjusting screw swivel .....	1		1
611	VB-134-A	<b>VARIABLE SPEED LEVER</b> .....	1		4
612	VE-527	<b>CONTROL</b> .....	1		6
		<b>STANDARD HARDWARE</b>			
613	PE-3	<b>LOCKWASHER</b> , ¼" positive .....	1		1
		For support pin.			
614	PH-77	<b>PLAIN WASHER</b> , 5/16" I.D. x 5/8" O.D. x 1/16" thick, steel .....	1		1
		For variable speed lever.			
615	XA-62	<b>SCREW</b> , 8-32 thread x ¼" long, round head .....	1		1
		For cotter pin on lever.			
616	XA-65	<b>SCREW</b> , 8 x ½" long, self-tapping, sheet metal .....	3		1
		For control bracket.			
617	XI-1	<b>COTTER PIN</b> , 1/16" x 1/2" long .....	3		1
		1—for variable speed lever pin.			
		1—for adjusting screw spring.			
		1—for chain at control.			
618	XI-11	<b>COTTER PIN</b> , 3/32" x 1¼" long .....	1		1
		For chain at lever.			
619		<b>No. 9100G GALVANIZED FURNACE CHAIN</b> , 10" long .....	1pc		1
		For control to lever.			

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-D IDLE CONTROL ASSEMBLY  
FOR VE4 AND VF4 ENGINES**

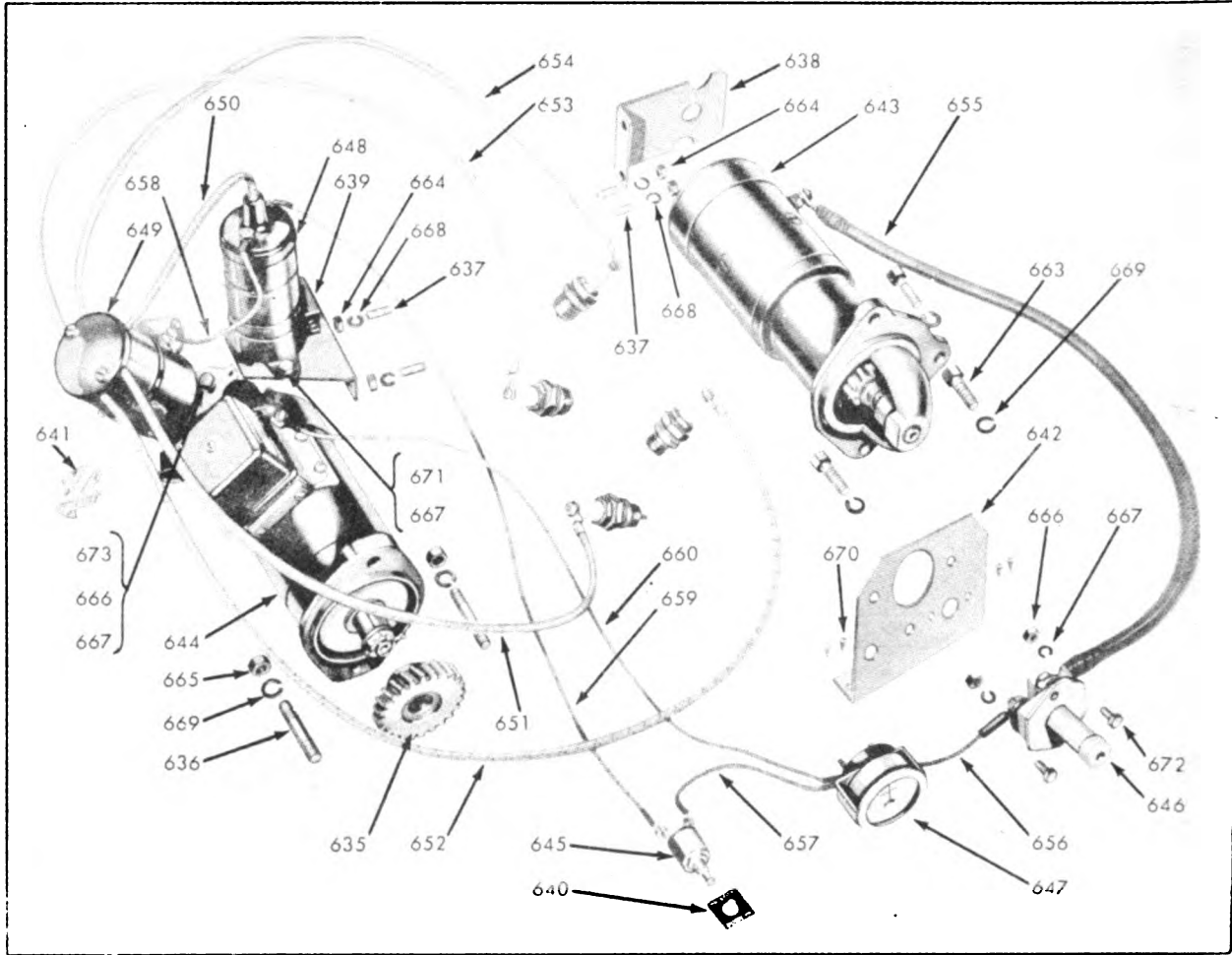


135517C

Ref. No.	Part Number	Description	No. Req	Net Weight	
				Lb	Oz
860	PG-348	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	IDLE CONTROL LEVER.....	1		4
<b>STANDARD HARDWARE</b>					
865	PD-77	NUT, 1/4"-20 thread, hexagon steel..... For fulcrum pin.	1		1
866	PE-3	LOCKWASHER, 1/4" positive..... 1-for fulcrum pin. 1-for bracket mounting.	2		1
867	XD-4	SCREW, 1/4"-20 thread x 1/2" long, hexagon head..... For bracket mounting.	1		1
868	XI-1	COTTER PIN, 1/16" x 1/2" long..... For adjusting screw pin.	1		1

Order parts from nearest **SERVICE STATION** shown in directory following parts list.  
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## ELECTRIC STARTER, GENERATOR AND DISTRIBUTOR IGNITION FOR VE4 AND VF4 ENGINES



104812C

Ref. No.	Part Number	Description	No.		Net Wt.		Ref. No.	Part Number	Description	No.		Net Wt.	
			Req.	Lb	Oz.	Req.				Lb	Oz.		
635	GD-97-A	GEAR for generator drive	1		7								
636	PC-110	STUD for generator mounting	2		1								
637	PC-396	STUD 2-for starter bracket. 2-for ignition coil bracket.	4		1		644	YB-16-A	GENERATOR (6 volt) Auto-Lite No. GAS-4301	1	15	6	
638	PG-514	BRACKET, starter support, for YA-10 starter PG-331 Bracket for YA-4-B starter	1		4				NOTE: For all repairs contact the Electric Auto-Lite Co. at Toledo, Ohio, or their nearest service station.				
639	PG-345	BRACKET for ignition coil mounting	1		6		645	YC-9-B	IGNITION SWITCH YC-9, replaced by YC-9-B.	1		2	
640	SD-109	TAG for ignition switch	1		1		646	YC-10	STARTING SWITCH, Auto-Lite SW-4001	1		4	
641	SD-141	TAG for distributor cap	1		1		647	YE-2	AMMETER, Moto-Meter No. 5722A	1		6	
642	VE-439	CONTROL PANEL	1		10		648	YF-4	IGNITION COIL (6 volt) Auto-Lite No. IG-4064	1	1	14	
643	YA-10	ELECTRIC STARTER (6 volt) Auto-Lite No. MZ-4118 YA-4-B Starter (Auto-Lite No. MAK-4022) replaced by YA-10 but PG-514 Bracket must also be ordered.	1		17		649	YF-6	DISTRIBUTOR, Auto-Lite IGW-4159-A NOTE: For all repairs contact the Electric Auto-Lite Co. at Toledo, Ohio, or their nearest service station.	1	2	7	

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.

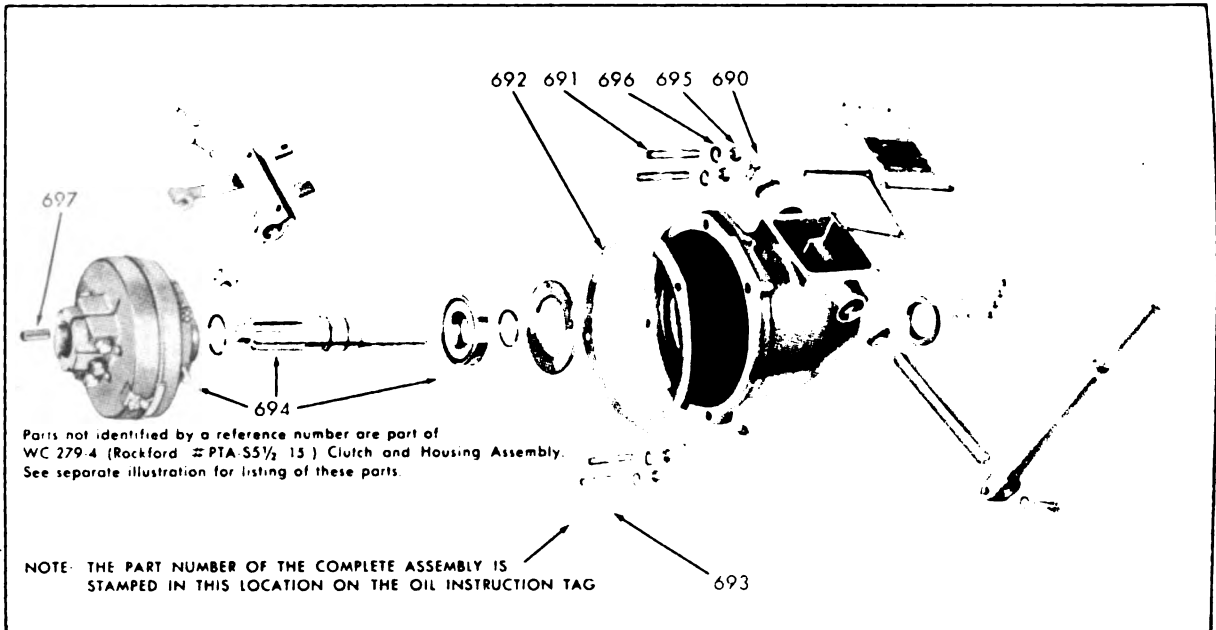
## ELECTRIC STARTER, GENERATOR AND DISTRIBUTOR IGNITION FOR VE4 AND VF4 ENGINES

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
460	YL-125	IGNITION CABLE ASSEMBLY, 9" long, distributor to coil, No. 7 MM cable with terminal .....	1	1				<b>STANDARD HARDWARE</b>			
461	YL-126	IGNITION CABLE ASSEMBLY, 24" long, distributor to No. 1 spark plug, No. 7 MM cable with terminal .....	1	2		663	PB-24	SCREW, 3/8"-24 thread x 1-1/8" long, hexagon head .....	3		2
								For mounting electric starter.			
462	YL-127	IGNITION CABLE ASSEMBLY, 33" long, distributor to No. 2 spark plug, No. 7 MM cable with terminal .....	1	3		664	PD-10	NUT, 5/16"-24 thread, hexagon steel.....	4		1
								2-for mounting starter bracket. 2-for ignition coil bracket.			
463	YL-128	IGNITION CABLE ASSEMBLY, 32" long, distributor to No. 3 spark plug, No. 7 MM cable with terminal .....	1	3		665	PD-11	NUT, 3/8"-24 thread, hexagon steel.....	2		1
								For mounting generator to gear cover.			
464	YL-129	IGNITION CABLE ASSEMBLY, 40" long, distributor to No. 4 spark plug, No. 7 MM cable with terminal .....	1	3		666	PD-77	NUT, 1/4"-20 thread, hexagon steel .....	3		1
								2-for starter switch mounting. 1-for distributor advance lock.			
465	YL-130	STARTER CABLE ASSEMBLY, 26" long, starter to switch, No. 4 AWG cable with terminals .....	1	4		667	PE-3	LOCKWASHER, 1/4" positive.....	5		1
								2-for starter switch mounting. 1-for distributor advance lock. 2-for ignition coil mounting.			
466	YL-131	IGNITION WIRE ASSEMBLY, 5" long, switch to ammeter, No. 14 GA cable with terminals and insulators .....	1	1		668	PE-4	LOCKWASHER, 5/16" positive .....	4		1
								2-for mounting starter bracket. 2-for ignition coil bracket.			
467	YL-132	IGNITION WIRE ASSEMBLY, 6" long, ammeter to switch, No. 14 GA cable with terminals and insulators .....	1	1		669	PE-5	LOCKWASHER, 3/8" positive .....	5		1
								2-for mounting generator to gear cover. 3-for mounting electric starter.			
468	YL-133	IGNITION WIRE ASSEMBLY, 7" long, coil to distributor, No. 14 GA cable with terminals and insulators .....	1	1		670	XA-73	SCREW, No. 7 x 3/8" long, self-tapping sheet metal .....	4		1
								For mounting control panel.			
469	YL-134	IGNITION WIRE ASSEMBLY, 22" long, switch to coil, No. 14 GA cable with terminal and insulators .....	1	2		671	XD-4	SCREW, 1/4"-20 thread x 1/2" long, hexagon head.....	2		1
								For mounting ignition coil.			
460	YL-135	IGNITION WIRE ASSEMBLY, 24" long, ammeter to generator, No. 14 GA cable with terminals and insulators .....	1	2		672	XD-5	SCREW, 1/4"-20 thread x 5/8" long, hexagon head, for starter switch mounting...	2		1
						673	XD-6	SCREW, 1/4"-20 thread x 3/4" long, hexagon head .....	1		1
								For distributor advance lock.			

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 FOR VE4 AND VF4 ENGINES



84069C

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

**BG-210-B-52 MAIN BEARING PLATE ASSEMBLY** (Not illustrated) consisting of:  
 1 BG-210-B Plate                      1 PH-364 Oil Seal                      1 ME-114-2 Bearing Cup

**NOTE:** Beginning with engine serial No. 1004016, PH-364 manufactured Oil Seal and BG-210-B Bearing Plate is used in place of STD. Engine, HF-261 Cork Seal and SD-43 Retainer with BG-210 Bearing Plate. The seals are not interchangeable unless bearing plates are changed accordingly.

**CA-55-23-51 CRANKSHAFT ASSEMBLY** (Not illustrated) consisting of:  
 1 CA-55-23 Crankshaft                      1 ME-71 Bearing                      1 PL-53 Key  
 1 GA-36-A Gear                              1 ME-114 Bearing

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

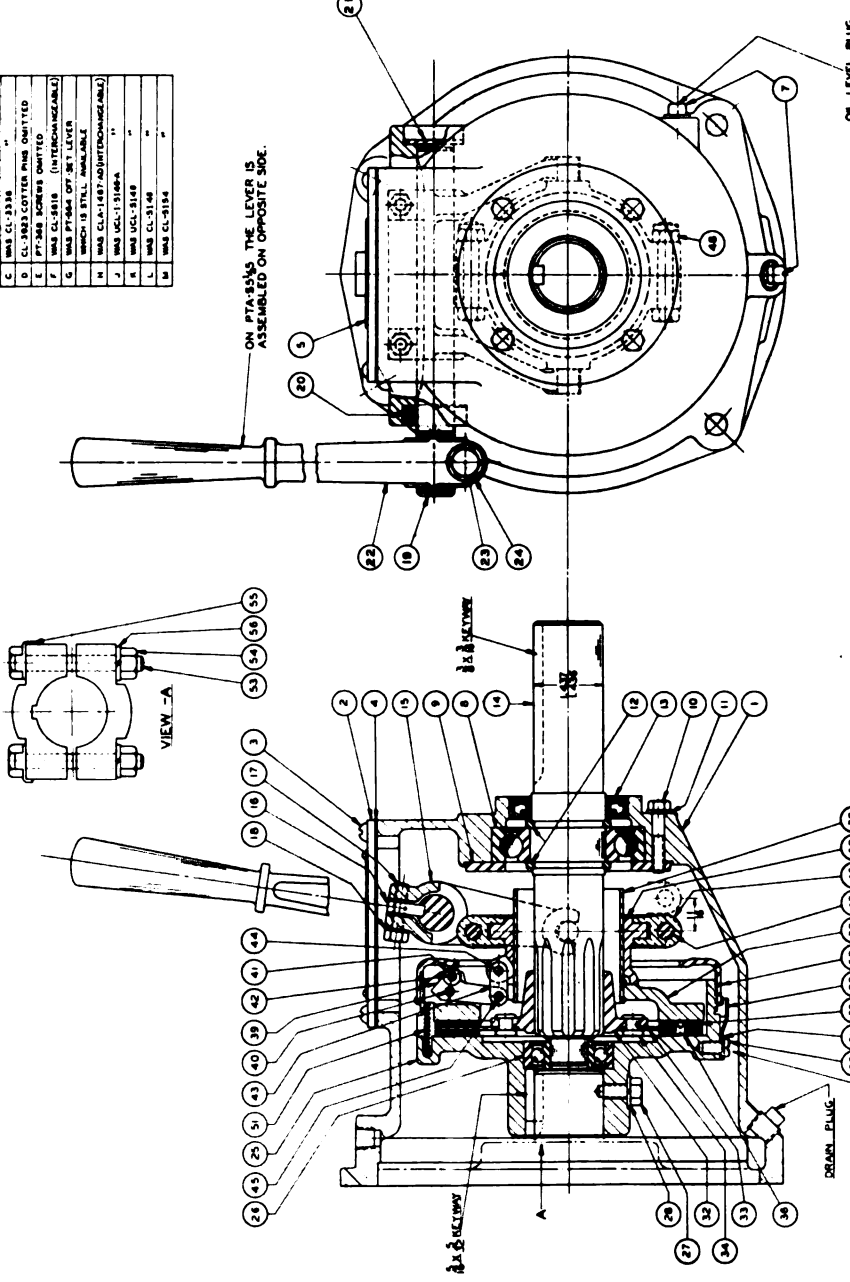
Ref. No.	Part Number	Description	No. Req.	Net Weight	
				Lb	Oz
	<b>WW-58-A</b>	<b>CLUTCH TAKE-OFF ASSEMBLY COMPLETE:</b> Consisting of: .....	1	40	
690	LO-44	<b>BREATHER</b> .....	1		1
691	PC-419	<b>STUDS</b> for mounting housing to crankcase .....	4		2
		PC-242—replaced by PC-419.			
692	QD-618	<b>GASKET</b> for housing to crankcase .....	1		1
693	SD-79	<b>OIL INSTRUCTION TAG</b> .....	1		1
694	WC-279-4	<b>CLUTCH and HOUSING ASSEMBLY</b> —Rockford Drilling No. PTA-55 1/2 15 .....	1	39	
		<b>NOTE:</b> See Rockford Drilling illustration and parts list of Clutch and Housing Assembly			
		<b>STANDARD HARDWARE</b>			
695	PD-12	<b>NUT</b> , 7/16"–20 thread hexagon steel—for mounting clutch housing .....	4		1
696	PE-6	<b>LOCKWASHER</b> , 7/16" positive—for mounting clutch housing .....	4		1
697	PL-140	<b>KEY</b> , 5/16" square x 1-1/8" long—for mounting clutch to crankshaft .....	1		1

Order parts from nearest **SERVICE STATION** shown in directory following parts list.  
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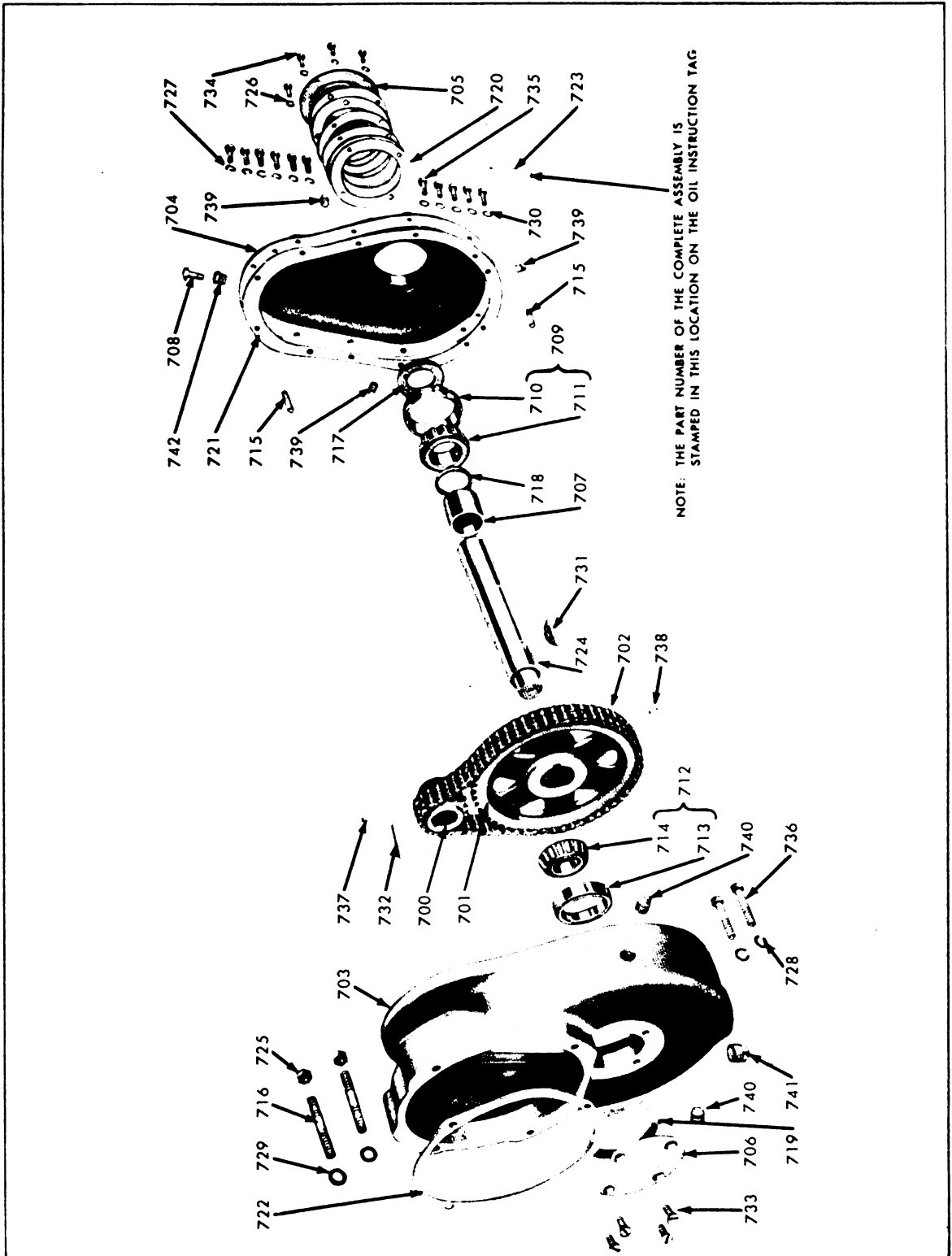
REF	PART NO.	PART NAME	QTY
1	PT-539	HOUSING	1
2	PT-557	COVER	1
3	PT-576	BUTTON HO. SCREW	4
4	PT-673	GASKET	1
5	PT-689	INSTRUCTION PLATE	1
6	PT-577	PIPE PLUG	2
7	PT-578	7208 N.D. BEARING	1
8	PT-536	BRC. RET. PLATE	1
9	PT-579	HEX. HEAD SCREW	4
10	PT-580	LOCK WASHER	4
11	PT-535	SNAP RING	2
12	PT-581	"50064 NAT. OIL SEAL	1
13	PT-623	DRIVE SHAFT	1
14	PT-531	CLUTCH YOKE	1
15	PT-533	KEY	1
16	PT-582	HEX. HEAD SCREW	2
17	PT-580	LOCK WASHER	2
18	PT-534	YOKE SHAFT	1
19	PT-583	"5044 NAT. OIL SEAL	1
20	PT-564	WELSH PLUG	1
21	PT-532	HEX. HEAD SCREW	1
22	PT-532	HEX. HEAD SCREW	1
23	PT-532	HEX. HEAD SCREW	1
24	PT-533	LOCK WASHER	1
25	CL-1487-AF	CLUTCH ASSEMBLY	1
26	CL-520-1	CLUTCH HOUSING	1
27	CL-470	7204 N.D. OR EQUIV.	1
28	CL-548	LOCK WASHER	1
29	CL-3820	LOCK WASHER	1
30	CL-4973	ADJUSTER LOCK	1
31	CL-3917-1	FILLISTER HO. SCR.	1
32	CL-3468	SHAKEPROOF WASHER	1
33	CL-1244-10	DRIVEN WEA. WASHER	1
34	CL-5200	SPLINED CENTER	1
35	CL-486	CLUTCH PLATE	1
36	CL-3321	FLAT HO. RIVET	6
37	CL-1011	FACING THIRWOOD ON 2	2
38	CL-1011	TUBULAR RIVET	6
39	CL-5148-1A	P.P. LEVER ASSEM.	1
40	CL-5148-1	PRES. PLATE ASSEM.	1
41	CL-7089	PRESSURE PLATE	1
42	CL-5544	SUPPORT SLEEVE	1
43	CL-5544	LEVER	6
44	CL-4775	LEVER PIN	3
45	CL-4971	ROLLER PIN	3
46	CL-5092	COTTER PIN	3
47	CL-4776	CONNECTING LINK	3
48	CL-563	LINK PIN LONG	3
49	CL-562	LINK PIN SHORT	3
50	CL-5092	COTTER PIN	6
51	CL-5148-1A	REL. SLEEVE ASSEM.	1
52	CL-5148-1	REL. SLEEVE ASSEM.	1
53	CL-3331-1	RELEASE RELAYING	2
54	CL-3331-1	HEX. HEAD SCREW	2
55	CL-7346	ELASTIC STOP NUT	2
56	CL-545	RELEASE SLEEVE	1
57	CL-5087	RETURN SPRING	3
58	CL-547	ADJUSTING RING	1
59	CL-538	HEX. HEAD SCREW	2
60	CL-539	LIGHT HEX. NUT	2
61	CL-521	SCREW LOCK	2
62	PT-553	LOCK WASHER	2

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84. REV. UCL-3146 (INTERCHANGEABLE)
85. REV. UCL-3146 (INTERCHANGEABLE)
86. REV. UCL-3146 (INTERCHANGEABLE)
87. REV. UCL-3146 (INTERCHANGEABLE)
88. REV. UCL-3146 (INTERCHANGEABLE)
89. REV. UCL-3146 (INTERCHANGEABLE)
90. REV. UCL-3146 (INTERCHANGEABLE)
91. REV. UCL-3146 (INTERCHANGEABLE)
92. REV. UCL-3146 (INTERCHANGEABLE)
93. REV. UCL-3146 (INTERCHANGEABLE)
94. REV. UCL-3146 (INTERCHANGEABLE)
95. REV. UCL-3146 (INTERCHANGEABLE)
96. REV. UCL-3146 (INTERCHANGEABLE)
97. REV. UCL-3146 (INTERCHANGEABLE)
98. REV. UCL-3146 (INTERCHANGEABLE)
99. REV. UCL-3146 (INTERCHANGEABLE)
100. REV. UCL-3146 (INTERCHANGEABLE)



**ROCKFORD CLUTCH**  
 PART NOS. PTA-535, PTA-535-1, PTA-545  
 (WISCONSIN MOTOR NO. 718-4)

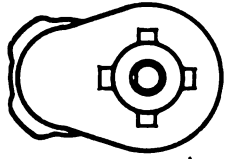
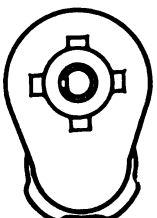
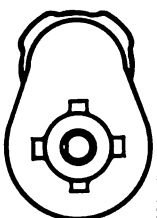
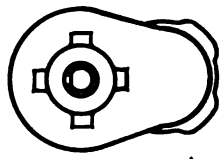
**WW-27-J ETC. REDUCTION GEAR ASSEMBLIES  
FOR VE4 AND VF4 ENGINES**



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.

104715C

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

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 Driver Gear Part No.	Ref. No. 701 Driven Gear Part No.	Ref. No. 702 Chair Part No.	Ref. No. 703 Housing Part No.	Ref. No. 704 Housing Cover Part No.
 <p style="text-align: center;"><b>TAKE-OFF SHAFT BELOW</b></p>	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	GG-83	GG-73	GJ-10	BG-149-B-6	BH-119	
 <p style="text-align: center;"><b>TAKE-OFF SHAFT ON LEFT HAND SIDE (as Viewed from the Cranking End)</b></p>	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	GG-83	GG-73	GJ-10	BG-149-B-7	BH-119-1	
 <p style="text-align: center;"><b>TAKE-OFF SHAFT ON RIGHT HAND SIDE (as Viewed from the Cranking End)</b></p>	WW-27-J-12	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	.....	BG-149-B-8	BH-119-2
	WW-27-J-13	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	.....	BG-149-B-8	BH-119-2
	WW-27-J-14	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	.....	BG-149-B-8	BH-119-2
	WW-27-J-15	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B-8	BH-119-2
	WW-27-J-16	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B-8	BH-119-2
WW-27-J-17	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-8	BH-119-2	
 <p style="text-align: center;"><b>TAKE-OFF SHAFT ON TOP</b></p>	WW-27-J-18	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	.....	BG-149-B-9	BH-119-6
	WW-27-J-19	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	.....	BG-149-B-9	BH-119-6
	WW-27-J-20	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	.....	BG-149-B-9	BH-119-6
	WW-27-J-21	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B-9	BH-119-6
	WW-27-J-22	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B-9	BH-119-6
WW-27-J-23	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-9	BH-119-6	

See following page for weights and description.

**WEIGHTS OF PARTS SHOWN ON PRECEDING PAGE**

Part Number	Net Wt.		Part Number	Net Wt.		Part Number	Net Wt.	
	Lb	Oz		Lb	Oz		Lb	Oz
BG-149-B-6	22		GG-81 (20 teeth)	2		WW-27-J-9	62	
BG-149-B-7	22		GG-82 (15 teeth)	1	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 VE4 AND VF4 ENGINES**

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

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

**NOTE:** Beginning with engine serial No. 1004016, PII-364 manufactured Oil Seal and BG-210-B Bearing Plate is used in place of Std. Engine IIF-261 Cork Seal and SD-43 Retainer with BG-210 Bearing Plate. The seals are not interchangeable unless bearing plates are changed accordingly.

**CA-55-11-S1 CRANKSHAFT ASSEMBLY** (Not illustrated) consisting of:  
 1 CA-55-11 Crankshaft                      1 ME-71 Bearing                      1 PL-53 Key  
 1 GA-36-A Gear                      1 ME-114 Bearing

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

Ref. No.	Part Number	Description	No. Req.	Net Wt.		Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz					Lb	Oz
705	BG-150	PLATE for retaining bearing (outer)	1	1		719	QD-543-A	GASKET for bearing retainer plate-inner	1		1
706	BG-151	PLATE for retaining bearing (inner)	1		6	720	QD-544	GASKET for bearing retainer plate-outer	6		1
707	HF-265	SPACER for take-off shaft	1		3	721	QD-545	GASKET for cover to housing	1		1
708	LO-44	BREATHER	1		1	722	QD-618	GASKET for housing to crankcase	1		1
709	ME-76	BEARING ASSEMBLY (outer)	1	1	11	723	SD-79	OIL INSTRUCTION TAG	1		1
		Consisting of:				724	WA-55	TAKE-OFF SHAFT	1	6	14
710		1 ME-76-1 Cup, Timken 3525			10						
711		1 ME-76-2 Cone, Timken 3578			1						
712	ME-77	BEARING ASSEMBLY (inner)	1		15						
		Consisting of:									
713		1 ME-77-1 Cup, Timken 02820			6						
714		1 ME-77-2 Cone, Timken 02877			9	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 Kichhaefer Mfg. Co. A-31-106.	1		4						
718	PH-206	COLLAR for take-off shaft spacer	1		2						

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

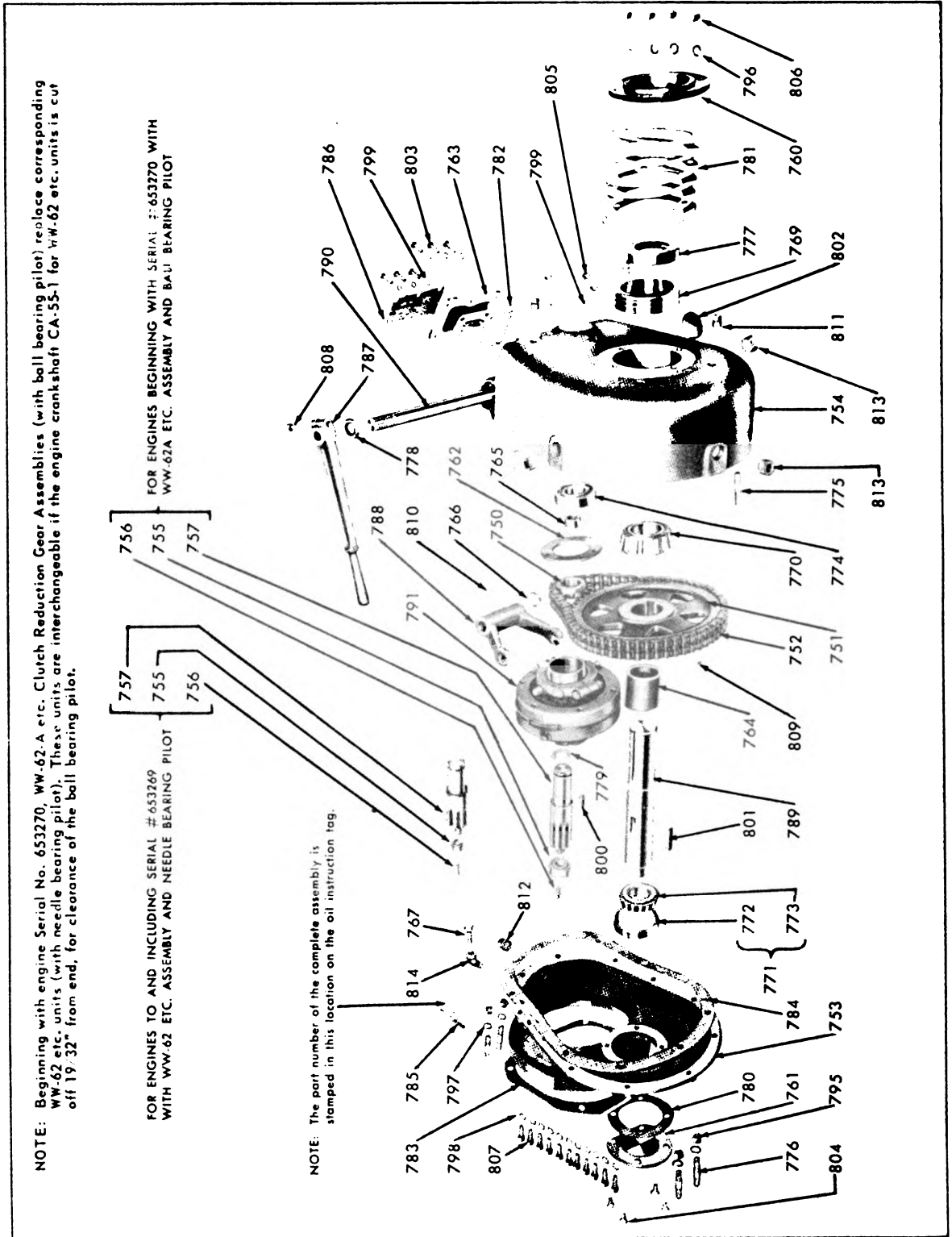
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

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

Ref. No.	Part Number	Description	No. Req.	Net Wt.	
				Lb	Oz
728	PE-6	LOCKWASHER, 7/16" positive ..... For housing to crankcase mounting, inner holes.	2		1
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 1/2" long, flat head ..... For inner bearing retainer plate.	4		1
734	XD-15	SCREW, 5/16"-18 thread x 1/2" 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, 1/2" 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.

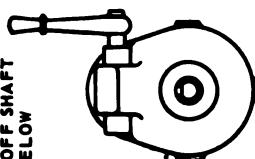
# WW-62 ETC. AND WW-62-A ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR MODELS VE4 AND VF4 ENGINES



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

	Ref. No. 750	Ref. No. 751	Ref. No. 752	Ref. No. 753	Ref. No. 754	Ref. No. 755	Ref. No. 756	Ref. No. 757			
	Driver Gear Part No.	Driven Gear Part No.	Chain Part No.	Housing Part No.	Cover Part No.	Pilot Bearing	Key	Drive Shaft			
Rotation of Take-off Shaft	Reduction Ratio	Assembly Number	Rotation of Take-off Shaft	Reduction Ratio	Assembly Number	Rotation of Take-off Shaft	Reduction Ratio	Assembly Number			
<p>Determine position of take-off shaft when viewing from cranking end of engine. (View facing take-off end as shown.)</p> <p><b>TAKE-OFF SHAFT BELOW</b></p> 	Ctr. Engine-Wise	2.07 to 1	WW-62 WW-62-A	Ctr. Engine-Wise	GG-116 GG-117 GG-118	GG-67-1 GG-77-1 GG-69-1	BG-215 BG-215 BG-215	BH-143 BH-143 BH-143	ME-115 ME-15-B ME-115 ME-15-B	PL-103 PL-140 PL-103 PL-140	WA-87 WA-87 WA-87 WA-87
	Engine-Wise	2.00 to 1	WW-62-3 WW-62A-3	Engine-Wise	GG-113 GG-114	GG-71 GG-71	GG-8 GJ-9	BH-143 BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Engine-Wise	2.67 to 1	WW-62-4 WW-62A-4	Engine-Wise	GG-115	GG-73	GJ-10	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	2.32 to 1	WW-62-24 WW-62A-24	Ctr. Engine-Wise	GG-131	GG-67-A	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	2.07 to 1	WW-62-6 WW-62A-6	Ctr. Engine-Wise	GG-116	GG-67-1	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	3.00 to 1	WW-62-7 WW-62A-7	Ctr. Engine-Wise	GG-117	GG-77-1	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	3.84 to 1	WW-62-8 WW-62A-8	Ctr. Engine-Wise	GG-118	GG-69-1	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Engine-Wise	2.00 to 1	WW-62-9 WW-62A-9	Engine-Wise	GG-113	GG-71	GJ-8	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Engine-Wise	2.67 to 1	WW-62-10 WW-62A-10	Engine-Wise	GG-114	GG-71	GJ-9	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Engine-Wise	3.79 to 1	WW-62-11 WW-62A-11	Engine-Wise	GG-115	GG-73	GJ-10	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	2.32 to 1	WW-62-25 WW-62A-25	Ctr. Engine-Wise	GG-131	GG-67-A	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	2.07 to 1	WW-62-12 WW-62A-12	Ctr. Engine-Wise	GG-116	GG-67-1	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	3.00 to 1	WW-62-13 WW-62A-13	Ctr. Engine-Wise	GG-117	GG-77-1	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	3.84 to 1	WW-62-14 WW-62A-14	Ctr. Engine-Wise	GG-118	GG-69-1	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Engine-Wise	2.00 to 1	WW-62-15 WW-62A-15	Engine-Wise	GG-113	GG-71	GJ-8	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Engine-Wise	2.67 to 1	WW-62-16 WW-62A-16	Engine-Wise	GG-114	GG-71	GJ-9	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Engine-Wise	3.79 to 1	WW-62-17 WW-62A-17	Engine-Wise	GG-115	GG-73	GJ-10	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	2.32 to 1	WW-62-26 WW-62A-26	Ctr. Engine-Wise	GG-131	GG-67-A	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	2.07 to 1	WW-62-18 WW-62A-18	Ctr. Engine-Wise	GG-116	GG-67-1	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	3.00 to 1	WW-62-19 WW-62A-19	Ctr. Engine-Wise	GG-117	GG-77-1	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Ctr. Engine-Wise	3.84 to 1	WW-62-20 WW-62A-20	Ctr. Engine-Wise	GG-118	GG-69-1	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Engine-Wise	2.00 to 1	WW-62-21 WW-62A-21	Engine-Wise	GG-113	GG-71	GJ-8	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Engine-Wise	2.67 to 1	WW-62-22 WW-62A-22	Engine-Wise	GG-114	GG-71	GJ-9	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
	Engine-Wise	3.79 to 1	WW-62-23 WW-62A-23	Engine-Wise	GG-115	GG-73	GJ-10	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87
Ctr. Engine-Wise	2.32 to 1	WW-62-27 WW-62A-27	Ctr. Engine-Wise	GG-131	GG-67-A	.....	BH-143	ME-115 ME-15-B	PL-103 PL-140	WA-87 WA-87	

\* BH-143—replaces BH-143-1. Order PF-127 plug for fuel strainer clearance on power units.  
See following page for weights and description.

## WEIGHTS OF PARTS SHOWN ON PRECEDING PAGE

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

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

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

**BG-210-B-52**      **MAIN BEARING PLATE ASSEMBLY** (Not illustrated) consisting of:  
1 BG-210-B Plate                      1 PH-364 Oil Seal                      1 ME-114-2 Bearing Cup

**NOTE:** Beginning with engine Serial No. 1004016, PH-364 manufactured Oil Seal and BG-210-B Bearing Plate is used in place of Std. Engine HF-261 Cork Seal and SD-43 Retainer with BG-210 Bearing Plate. The seals are not interchangeable unless bearing plates are changed accordingly.

**CA-55-23-51**      **CRANKSHAFT ASSEMBLY** (Not illustrated) for engines with WW-62-A-etc. units beginning with Serial No. 653270 (with ball bearing pilot).  
Consisting of:  
1 CA-55-23 Crankshaft                      1 ME-71 Bearing                      1 PL-53 Key  
1 GA-36-A Gear                      1 ME-114 Bearing

**CA-55-1-51**      **CRANKSHAFT ASSEMBLY**, for engines with WW-62-etc. units, to and including engine Serial No. 653269 (with needle bearing pilot).

**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.			Ref. No.	Part Number	Description	No.			
			Req	Lb	Oz				Req	Lb	Oz	
760	BG-150	PLATE for retaining bearing (outer) .....	1	1		781	QD-544	GASKET for bearing retainer plate-outer..	6		1	
761	BG-151	PLATE for retaining bearing (inner) .....	1		6	782	QD-592	GASKET for inspection hole plate.....	1		1	
762	BG-216	PLATE for clutch bearing .....	1		8	783	QD-618	GASKET for housing to crankcase .....	1		1	
763	BH-127	PLATE for inspection opening .....	1		12	784	QD-619	GASKET for cover to housing.....	1		1	
764	HF-265-A	SPACER for take-off shaft.....	1		6	785	SD-79	OIL INSTRUCTION TAG .....	1		1	
765	HF-372	SPACER for ball bearing .....	1		3	786	SD-125	INSTRUCTION PLATE..... For clutch adjustment.	1		1	
766	HF-392	SPACER for shifter yoke .....	4		2	787	VB-55-1	SHIFTER LEVER.....	1	2		
		(Used only when take-off shaft is on the right or left hand side).				788	VB-64-A	SHIFTER YOKE.....	1	1	8	
767	LO-44	BREATHER .....	1		1	789	WA-55-H	TAKE-OFF SHAFT .....	1	6	10	
768	ME-76	BEARING ASSEMBLY (outer) .....	1	1	11	790	WA-61-D	SHIFTER SHAFT.....	1	1	12	
		Consisting of:				791	WC-288-A	CLUTCH ASSEMBLY..... Rockford Drilling Model 5/4 L.O.C. No. CLA-1467-AF.	1		12	
769		1 ME-76-1 Cup, Timken 3525 .....			10			NOTE: For engines to and including Serial No. 653269 with needle bearing pilot in crankshaft, use WC-288A clutch but remove ball bearing pilot in clutch drive hub.  See Rockford illustration and parts list of clutch.				
770		1 ME-76-2 Cone, Timken 3578 .....			1							
771	ME-77	BEARING ASSEMBLY (inner) .....	1		15			<b>STANDARD HARDWARE</b>				
		Consisting of:										
772		1 ME-77-1 Cup, Timken 02820 .....			6			795	PD-12	NUT, 7/16"-20 thread, hexagon steel.....	4	1
773		1 ME-77-2 Cone, Timken 02877 .....			9					For housing to crankcase mounting studs.		
774	ME-119	BALL BEARING for clutch shaft .....	1		6			796	PE-4	LOCKWASHER, 5/16" positive .....	4	1
		New Departure No. 3206.								For outer bearing retainer plate.		
775	PA-279	DOWEL PIN for cover to housing .....	2		1							
776	PC-419	STUD for housing to crankcase .....	4		2							
777	PH-202	OIL SEAL for take-off shaft .....	1		4							
		Kickhaefer Mfg. Co. No. A-31-106.										
778	PH-234-A	OIL SEAL for shifter lever shaft .....	1		3							
779	PK-82	RETAINING RING..... For clutch shaft bearing.	1		1							
780	QD-543-A	GASKET for bearing retainer plate (inner)	1		1							

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

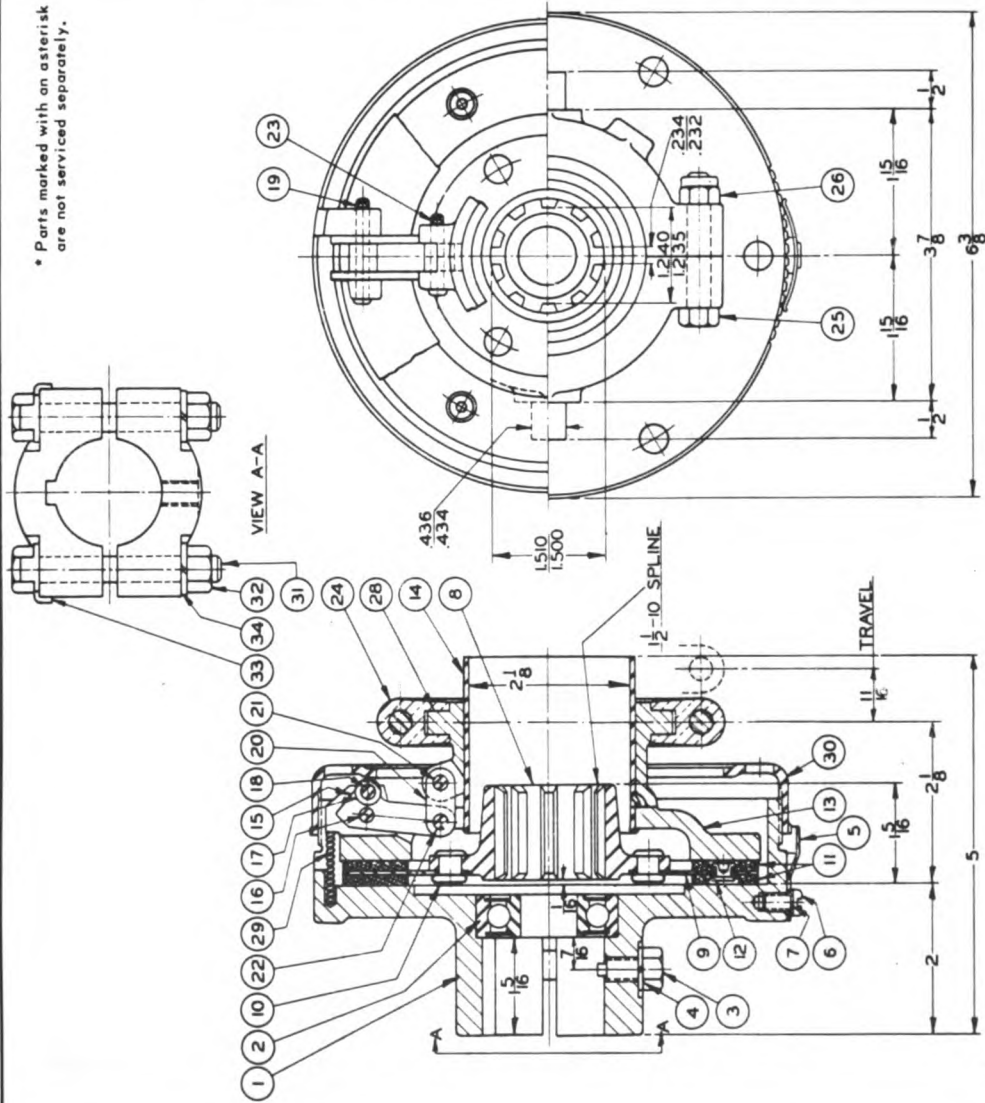
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

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

Ref. No.	Part Number	Description	No.		Net Wt.	
			Req	Lb	Oz	
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, 1/2" I.D. x 1/16" thick copper ..... 6-for inspection hole cover plate. 3-for bearing retainer plate.	9			1
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 ..... For shifter shaft hole.	1			1
803	XA-36	SCREW, 1/4"-20 thread x 3/4" long, round head ..... For inspection hole cover plate.	6			1
804	XC-17	SCREW, 5/16"-18 thread x 3/4" long, flat head ..... For inner bearing retainer plate.	4			1
805	XD-7	SCREW, 1/4"-20 thread x 1" long, hex- agon head ..... For clutch bearing retainer plate.	3			1
806	XD-15	SCREW, 5/16"-18 thread x 3/4" long, hexagon head ..... For outer bearing retainer plate.	4			1
807	XD-27	SCREW, 3/8"-16 thread x 1" long, hex- agon head ..... For cover to housing mounting.	11			1
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 mounting.	1			1
810	XH-26	TAPER PIN, No. 4 x 1-3/8" long ..... For shifter yoke.	2			1
811	XK-2	PLUG, 1/2" pipe, square head ..... For oil level.	3			1
812	XK-4	PLUG, 1/2" pipe, square head..... For oil filler.	1			2
813	XK-6	PLUG, 1/2" pipe, countersunk head..... For oil drain.	3			2
814	XK-77	STREET ELL, 1/8" pipe x 45° ..... For breather mounting.	1			1

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\* Parts marked with an asterisk are not serviced separately.



REF.	PART NO.	PART NAME	QTY
1	CL-5210-1	CLUTCH HOUSING	1
2	CL-6970	77504 ND OR EQUIV.	1
3	CL-5163	DOG PT. HEX. SCR.	1
4	CL-3920	LOCK WASHER	1
5	CL-4973	ADJUSTMENT LOCK	1
6	CL-3917-1	FILLISTER HD. SCR.	1
7	CL-3468	LOCK WASHER	1
	UCL-1-1244-10	DRIVEN MEM. ASSY.	
8	CL-1244-10	SPLINED CENTER	1
9	CL-5206	CLUTCH PLATE	1
10	CL-486	FLAT HEAD RIVET	6
11	CL-5321	FACING (THERMOID)	2
12	CL-1011	TUBULAR RIVET	6
	UCL-5146-1A	P.P. & LEVER ASSY.	
13	UCL-5146-1	PRES. PLATE ASSY.	
14	CL-5146-1	PRESSURE PLATE	1
15	CL-7069	SUPPORT SLEEVE	1
16	CL-5544	LEVER	6
17	CL-5156	LEVER PIN	3
18	CL-4971	ROLLER	3
19	CL-5092	ROLLER PIN	3
20	CL-4776	COTTER PIN	3
21	CL-5153	CONNECTING LINK	6
22	CL-5152	LINK PIN (LONG)	3
23	CL-5092	LINK PIN (SHORT)	3
	UCL-4-47/45	COTTER PIN	6
	UCL-6-5144	REL. SLEEVE ASSY.	
24	CL-5144	REL. BEARING ASSY.	
25	CL-3335-1	RELEASE BEARING	2
26	CL-7356	HEX. HEAD SCREW	2
		ELASTIC STOP NUT	2
28	CL-5145	RELEASE SLEEVE	1
29	CL-5087	RETURN SPRING	3
30	CL-5147	ADJUSTING RING	1
31	CL-5318	HEX. HEAD SCREW	2
32	CL-5319	LIGHT HEX. NUT	2
33	CL-5211	SCREW LOCK	2
34	PT-353	LOCK WASHER	2

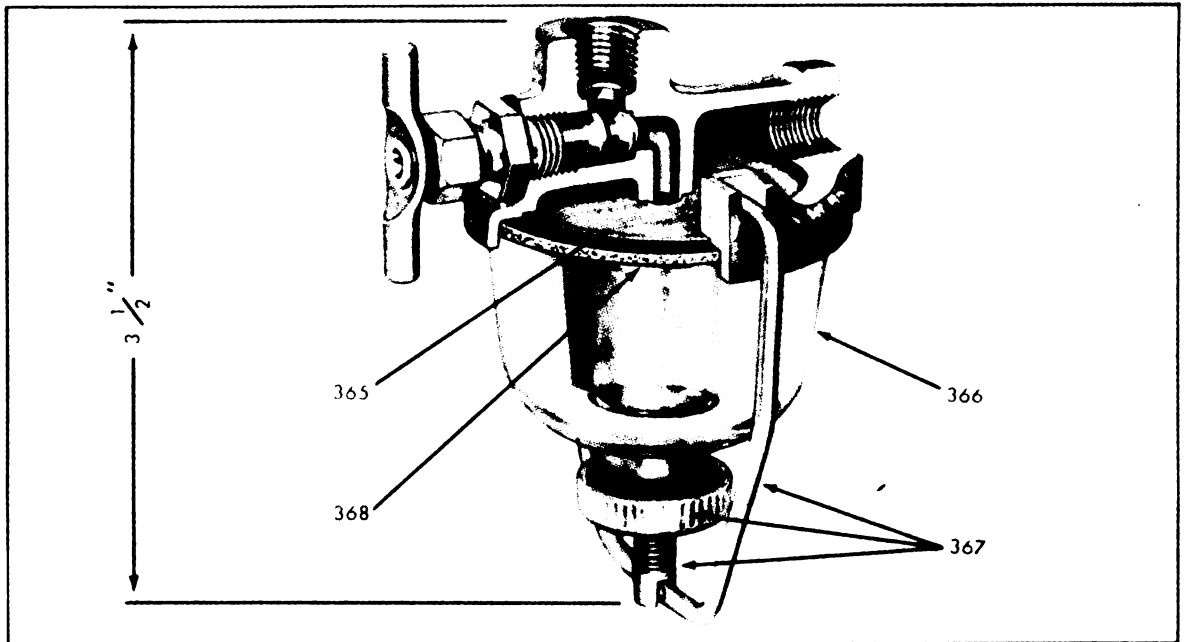
CHANGES

LET	CHANGE	LET	CHANGE
B	was UCL-1-5146A (Interchangeable)	G	was CL-3335 (Interchangeable)
C	was UCL-5146	H	was CL-3336
D	was CL-5146	J	CL-3923 COTTER PIN OMITTED
E	was CL-5154	K	was CL-5616 (Interchangeable)
F	was UCL-5144		

ROCKFORD CLUTCH

PART NO. CLA-1467-AF (REPL. CLA-1467-AD, INTERCHANGEABLE)  
 WISCONSIN MOTOR PART NO. WC-288-A

LP-19, LP-19-A, LP-19-B AND LP-19-C FUEL STRAINER ASSEMBLIES



74918C

Ref. No.	Part Number	Description	No. Req.	Net Weight	
				Lb	Oz
	LP-19	FUEL STRAINER ASSEMBLY (With Shut-off valve in cover and glass bowl) Tillotson No. OW-418-T.....	1		8
	LP-19-A	FUEL STRAINER ASSEMBLY (With Shut-off valve in cover and metal bowl) Tillotson No. OW-449-T.....	1		7
	LP-19-B	FUEL STRAINER ASSEMBLY (Without Shut-off valve in cover with glass bowl) Tillotson No. OW-444.....	1		6
	LP-19-C	FUEL STRAINER ASSEMBLY (Without Shut-off valve in cover with metal bowl) Tillotson No. OW-476-T.....	1		5
<b>THE FOLLOWING SERVICEABLE PARTS ARE INTERCHANGEABLE FOR ALL THE ABOVE FUEL STRAINERS.</b>					
365	OW-352	FILTER SCREEN.....	1		1
366	OW-363	GLASS BOWL.....	1		2
	06137	METAL BOWL.....	1		1
367	OW-447	CLAMP WIRE AND THUMB NUT ASSEMBLY.....	1		1
368	06096	BOWL GASKET (Wisconsin No. QD-653).....	1		5

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# 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

### ALABAMA

**ABBEVILLE** Abbeville Tractor & Implement Company  
**ALBERTVILLE** Birdsong Farm Supplies  
**ALICEVILLE** Kimbrell Tractor & Implement Company  
**ANDALUSIA** Count Darling, Inc.  
**ATHENS** Charles W. Spencer  
**ATMORE** Watson Hardware Company  
**BAYOU LA BATRE** Zewen Marine Service  
**BIRMINGHAM** Alabama Air-Cooled Motors, 725 Graymont Avenue  
 Gerkin-Leaptrot Sales, Inc.  
 Kilgore-McRee Company, 4612 Avenue V  
 Tractor & Equipment Co., 4401 First Ave. N.  
 Watson Hardware Company  
**BREWTON** Bowden Auto & Implement Company  
**CALERA** Oglesby-Orr, Inc.  
**CLANTON** Beaty Motor Company  
**CLAYTON** G. W. Johnson Estate  
**CRILLMAN** Morris Tractor & Implement Company  
**CULLMAN** J. D. Pittman Impl. Co., Inc., Lee & Line Sta.  
**DECATUR** Dean Mfg. Company  
**DOTHAN** A. E. Ludlum  
 Whaley Trading Company, South East Street  
**ENTERPRISE** Bryson Implement & Truck Company  
**EUFULA** Manley Motor & Implement Company  
**FAYETTE** Kimbrell Tractor & Implement Company  
**FLOMATON** Watson Hardware Company  
**FLORENCE** Rice & England  
**FOLEY** Foley Hardware Company  
**GADSDEN** Alabama Farm Supply Co., 230 S. 2nd Street  
**GENEVA** Andrews Truck & Tractor Company  
**GREENVILLE** Burch & Byars Tractor Company  
**GURLEY** Phillips Motor Company  
**HARTSELLE** Groover Tractor & Implement Company  
**HEADLAND** Walden Motor Company  
**HUNTSVILLE** Farm Tractor Company  
**JASPER** Jasper Machinery & Foundry Works  
**LUYERNE** Luverne Implement Company  
**MOBILE** Gravely Mobile Authorized Sales & Service  
 2014 Halls Mill Road  
 Turner Supply Company  
**MONTGOMERY** • Parts Service Corporation, 408 Bibb Street  
 Leary & Owena Machinery Co., 324 N. Perry St.  
 A. H. Turner  
**MOULTON** Opelika Truck & Tractor Company  
**OPELIKA** Farmers Equipment Company  
**OPP** Opp Equipment Company  
**OXFORD** Jones Tractor Company  
**PHENIX CITY** The Mullins Company  
**RUSSELLVILLE** Felton Hardware & Implement Company  
**SAMSON** T. J. Brooks & Son  
**SELMA** Henderson & Allen Implement Company  
 Selma Parts Service  
**TUSCALOOSA** Cain Machine Shop, 1504 Queen Avenue  
 Cochrane Tractor Company, 404 Greensboro Ave.

### ARIZONA

**COTTONWOOD** Smelter City Iron Works  
**DOUGLAS** Arizona Tire & Supply Co., 1065 F Avenue  
 VanDenmark Equipment Company  
**FLAGSTAFF** Hubbard Refrigeration Service, 105 W. Aspen Ave.  
**HOLBROOK** Bentley Pump & Supply Company

**KINGMAN** Arthur's Sales & Service  
**MESA** Lyle H. Trimble, Inc.  
**NOGALES** Louis Arboisiere, 312 Noon Street  
**PHOENIX** • Pratt-Gilbert Hardware Co., P.O. Box 2230  
 Eager Equipment Co., 360R Grand Avenue  
 Guerin Implement Co., 1403 S. Central Avenue  
 Maricopa Tractor & Equipment Company  
 State Tractor & Equipment Company  
 Tovrea Equipment Company, P.O. Box 471  
 Leo Cluff, Pima Garage  
**PIMA** Arizona Mining Supply Corp.  
**PRESCOTT** Seligman Garage  
**SELIGMAN** Bud Fink  
**SPRINGERVILLE** Frank J. Smith, 146 S. 6th Avenue  
**TUCSON** K. N. Richardson  
**WILLIAMS** Winslow Auto Supply Company  
**WINSLOW** Hartnett & Braden Tractor Company  
**YUMA**

### ARKANSAS

**ARKADELPHIA** Ashby Bros.  
**AUGUSTA** E. H. Connors Mercantile Company  
**BATESVILLE** Barnett & Landers  
**BERRYVILLE** Earl Hailey Mercantile Company  
**BLYTHEVILLE** Sixty One Implement Company  
**BRINKLEY** Brinkley Farm Equipment Company  
**CALICO ROCK** Brummitt & Kerr  
**CARLISLE** Birdsong Motor Company  
**CORNING** Corning Implement Company  
**COTTON PLANT** The Leader Company  
**ENGLAND** Wood Machinery Company  
**FAYETTEVILLE** Andrews Implement Company  
**FISHER** Wilson Bros. Equipment Company  
**FOREMAN** Delta Supply Company  
**FORREST CITY** Shearin Implement Company  
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**HARRISBURG** Tarrant Machine Company  
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**JOINER** Bowden Equipment Company  
**JONESBORO** Bridger Supply Company  
**LAKE VILLAGE** Spiver Implement Company  
**LEACHVILLE** W. I. Field Implement Company  
**LITTLE ROCK** • Lewis-Diesel Engine Company, 4121 Asher Avenue  
 Lyons Machinery Company  
 J. D. Wood Implement Company  
**LONOKE** Malvern Supply & Equipment Company  
**MALVERN** W. S. McClintock & Sons  
**MARIANNA** Marked Tree Implement Company  
**MARKED TREE** M. D. Thompson & Son  
**MCCRORY** Love Supply Company  
**MORRILLTON** Nashville Distributing Company  
**NASHVILLE** C. C. Norris & Sons  
**NEWARK** W. P. Davis  
**NEWPORT** Standard Equipment & Supply Company  
**N. LITTLE ROCK** Missco Implement & Hardware Company  
**OSCEOLA** Green Implement Company  
**PARAGOULD** Lewis Engine & Supply Company  
**PINE BLUFF** Sallee Implement Company  
**POCAHONTAS** Prescott Implement Company  
**PRESCOTT** Hurst Equipment Company  
**RECTOR** Huenefeld Implement Company  
**ROGERS** Abboud Tractor Company  
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**STUTTGART** Texarkana Machinery Company  
**TEXARKANA**

WALDENBURG W. K. Neeley  
 WYNNE Murray-Ellis Implement Company  
 Rolfe Implement Company

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ALHAMBRA Ja R Engine & Supply, 1819 W. Valley Blvd.  
 ALTURAS Farmers Exchange  
 ARCATA Brizard-Matthews Machy. Company  
 ARVIN Mitchells  
 BAKERSFIELD Janco Pump & Engine Co., 2309 Chester Avenue  
 BISHOP Black's Machine Shop, 203 E. Willow  
 BLYTHE Beeler-Thomas Implement Company  
 CHICO Jefferey Bros., 2400 Park Avenue  
 Sierra Tractor & Equipment Co., 1240 Park Ave.  
 COLUSA I. G. Zumwalt Company  
 CONCORD Concord Farm Impl. Co., 2086 Concord Avenue  
 CORCORAN Sawtelle & Rosprim  
 COURTLAND Hersog's Garage  
 DELANO Central California Implement Co., 918 Main St.  
 EL CENTRO Valley Auto Supply Co., 633 State Street  
 EL MONTE El Monte Scooter Sales, 11501 E. Garvey  
 EMERYVILLE E. E. Richter & Son, 5725 Hollis Street  
 ESCONDIDO Webb Bros., 252 W. Grand Avenue  
 EUREKA Kramer Auto Supply Company, 4th & "C" Streets  
 FRESNO A. P. Lish, 1427 Broadway  
 Peerless Tractor & Equipment Co., 1776 "H" St.  
 Tietjen-Johnson Company, 1305 Divisidero  
 GARDENA Gardena Mower Works, 1609 W. Redondo Beach Blvd.  
 GEYSERVILLE Lamson Tractor & Equipment Company  
 GLENORA Foothill Supply Company, P. O. Box 218  
 HANFORD Hanford Farm Supply Co., 309 E. 7th Street  
 HAYWARD Gurney Equipment Co., 17180 Foothill Blvd.  
 HEMET Steve's Auto Parts, 1205 E. Florida  
 INDIΟ James E. Wright, Jr., 48th & Van Buren  
 KELSEYVILLE Saderlund Farm Implement Sales  
 KING CITY Pringle Tractor Company  
 LANCASTER Johnson & Schaffert, Ave. I at 10th Street  
 LODI Wright's Garage, 214 N. Sacramento Street  
 LOMPOC Lompoc Equipment Company  
 LONG BEACH Curtis & Christensen, 501 E. Anaheim  
 LOS ANGELES 11/ \* Continental Sales & Service Company  
 3817 South Santa Fe Avenue  
 Harvel Truck Equipment Co., 1000 E. 8th St.  
 Oliphant Bros., 2625 S. LaCienega Blvd.  
 LYNWOOD Franklin Auto Supply Co., 4339 Imperial Highway  
 MADERA Thompson & Gill, Inc., South Pine Street  
 MARYSVILLE Middleton Implement Company, 600 Third Street  
 MERCED Laird Welding & Mfg. Co., 13th & J Sts.  
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 10th & "F" Streets  
 MARIETA Murrieta Machine Shop  
 NAPA Bert Williams & Son, 831 First Street  
 NEWPORT BEACH Power Generator Plants, 634 Coast Highway  
 NORTH HOLLYWOOD Johnson Equipment Co., 6900 Lankershim Blvd.  
 OAKLAND Bay Cities Equipment Co., 2792 Cypress Street  
 ONTARIO Prehn's, Holt at Ramona  
 ORO GRANDE Oro Grande Implement Company  
 OROVILLE Gibbons Equipment & Repair, 2295 Quincy Rd.  
 OXNARD Maulhardt Equipment Co., 815 N. Oxnard Blvd.  
 PASO ROBLES H. A. Wood Welding & Machine Shop  
 1207 - 13th Street  
 PORTERVILLE Porterville Farm Implement Co., 428 S. Main St.  
 RED BLUFF Minch Farm Implement Store  
 REDDING Gerlinger Steel & Supply Co., 1527 Sacramento  
 REEDLEY Grower's Supply Company  
 RIVERSIDE Coates & Son, 263 LaCadena  
 SACRAMENTO Beeby Machinery Company, 2000 Capitol Ave.  
 SALINAS Pringle Tractor Company, 10 Abbott Street  
 SAN BERNARDINO Ray's Equipment Rentals, 1040 E. Baseline  
 SAN CARLOS Wrigley Pump Company, 611 Old County Road  
 SAN FRANCISCO H. V. Carter Co., Inc., 52 Beale

SAN DIEGO Depew Boat Mart, 1800 Rosecrans  
 Webb Bros., 940 "K" Street  
 SAN JOSE Kronk Machine & Mfg. Co., 566 W. Julian Street  
 SAN LUIS OBISPO Fred H. Johnson, 1119 Garden Street  
 SANTA ANA James Requarth, 111 Spurgeon Street  
 SANTA BARBARA/Howard P. Miller 29 State Street  
 Milpas Rental Service, 6 N. Milpas Street  
 SANTA CRUZ Farm Supplies & Equip. Co., 5381 Old San Jose Rd.  
 SANTA ROSA Northern Farm Equip. Co., 1135 South A Street  
 SOUTH DOS PALOS/Yonkers & Johnson  
 STOCKTON Garvey Truck Service 420 N. Wilson Way  
 Valley Engine Shop, 527 N. Wilson Way  
 STRATFORD Sawtelle & Rosprim  
 TRACY W & P Sales Co., South Highway 50  
 TULE LAKE Floyd A. Boyd Company  
 TURLOCK Fernandez Implement Co., 214 S. Center Street  
 J M Equipment, 431 S. Front Street  
 UKIAH Holz Company, Clay at Railroad  
 VAN NUYS So-Cal Equipment & Supply, 7227 Van Nuys Blvd.  
 VISALIA Charles J. Hammer Mch. Co., 915 E. Main  
 WEST LOS ANGELES San's U-Drive, 2431 S. Sepulveda  
 Whittier Motor Parts, 306 S. Greenleaf  
 WILMINGTON Newark Specialty Company, Inc., 804 E. Anaheim St  
 WILLOWS I. G. Zumwalt Company  
 YREKA Floyd A. Boyd Company  
 YUBA CITY Schmidt Pump House & Machine Shop

COLORADO

BRUSH Farmer's Elevator Company  
 BURLINGTON McArthur Impl. Company  
 CENTER Hurt Equipment Company  
 CHEYENNE WELLS Korrell Farm Equipment Company  
 COLORADO SPRINGS Farmer's Impl. Company  
 DELTA Delta Farm Supply  
 Ray Fiegel Trading Post  
 DENVER \* Central Supply Co., 12th & Lincoln  
 Engine Supply Company, 1862 Lawrence  
 McCarty-Sherman, 275 Mariposa  
 Parker Company, 1520 Wazee  
 DURANGO Basin Truck & Implement  
 FLAGLER Blancken Impl. Company  
 FORT COLLINS Stansbury-Ghent Farm Equipment  
 FORT MORGAN Morgan County Impl. Company  
 GRAND JUNCTION Dunn & Knight Appliance Company  
 Ray Fiegel Trading Post  
 Greeley Rainforth Equipment Company  
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 LIMON Quist-Holmes  
 PUEBLO Bernatein Bros. Pipe & Mch.  
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 STERLING Northeastern Equipment Company  
 TRINIDAD Barney's Garage  
 WRAY Lewis O. Wages Impl. Company

CONNECTICUT

BRIDGEPORT The Arnold Company  
 HARTFORD McCallum Motor Service  
 MERIDEN Meriden Equipment Co., 229 Camp Street  
 NEW HAVEN W. I. Clark Company  
 NEW MILFORD New Milford Tractor  
 TORRINGTON Knight's Farm Machinery  
 WATERBURY Contractors Supply Company, Inc.  
 15 East Aurora Street  
 WILLIAMANTIC Wright's Garage, Star Route  
 WINDSOR LOCKS/The F. S. Bidwell Company

\* John Reiner & Company  
 12-12 37th Avenue  
 Long Island City, New York

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 HARRINGTON Taylor & Messick  
 LAUREL W. C. Littleton & Sons  
 SEAFORD Tull Brothers  
 MARSHALLTON F. M. Yearsley  
 TOWNSEND Ralph G. Faries  
 WILMINGTON Corrado's Mower Service, Inc.,  
 W. 4th St. & B. & O. R.R.

- Service Supply Corporation  
 20th & Venango Streets  
 Philadelphia, Pennsylvania

**DISTRICT of COLUMBIA**

WASHINGTON, D.C./Dawson Motor Co., 900 Maine Street  
 Frank Del Vecchio & Son, 1212 - 11th Street  
 • Phillips Machinery & Tractor Company  
 P. O. Box 549  
 Alexandria, Virginia

**FLORIDA**

APALACHICOLA Wefing's  
 ARCADIA Bishop Rotary Mower  
 AVON PARK Ed. Gough  
 BLOUNTSTOWN W. F. Mason  
 BOCA GRANDE Electric Service Company  
 BOWLING GREEN Nicholson Supply Company  
 BRADENTON Ivey Auto Parts  
 BRANFORD Geo. W. Fletcher Company  
 CANTONEMENT Cantonement Service Station  
 CARRABELLE Gulf Supply Company  
 CEDAR KEYS Ice & Storage, Inc.  
 CHIEFLAND Beauchamp Hardware Company  
 CLEARMONT Grove Service & Supply Company  
 CLEWISTON Ross LaByer's One Stop Service Station  
 COCOA Brevard Marine Sales & Service, City Dock  
 CROSS CITY C. E. Glenn  
 CRYSTAL RIVER Packer Motor Company  
 DADE CITY Equipment Sales & Service Company  
 DeFUNIAC SPRINGS City Tractor & Implement Company  
 EVERGLADES Riggs Fish Company  
 FERNANDINA Standard Hardware Company  
 FLORENCE VILLA Growers Service Company  
 FORT MYERS Ed. Boyette Air-Cooled Motor Service  
 Fort Myers Iron Works  
 Jepson Tractor Company  
 Weldrite Welding Company

FORT PIERCE Turner Machine & Supply Company  
 FROSTPROOF Maxcy's Garage  
 GAINESVILLE Dixie Equipment Company  
 GREENSBORO Fletcher Company  
 GREENVILLE Brown Motor Sales  
 HASTINGS Farmer's Supply Company  
 HAVANA Havana Equipment Company  
 Shelfnor & Ellinor  
 INALOOKE Hill York Company  
 JACKSONVILLE • M. D. Moody  
 Brooks Marine  
 JENSEN BEACH Sea Horse Tackle Company  
 KISSIMMEE Smith & Daniels  
 LAKE BUTLER East End Service Station  
 LAKELAND Polk Machine Works  
 Reliable Machine Works  
 LAKE PLACID Standard Garate & Machine Shop  
 LAKE WALES J. R. Edenfield  
 Reliable Machine Works  
 LARGO Largo Small Engine

LEESBURG Nelson Marine Mart, 223 So. 6th Street  
 LIVE OAK Ottis Brown Tractor Company  
 LONGWOOD Courtney Engineering Company  
 MADISON Waring Wyche Hardware Company  
 MARIANA • West Florida Equipment Company  
 MELBOURNE Wolcott, Industries  
 MIAMI • Neff-Thomas Machinery, Inc.  
 1920 N. W. Miami Court  
 Llewellyn Machinery Company  
 Taylor Brothers  
 MIMS Bassler's Garage  
 NOCATEE Link Brothers  
 OCALA Domer Machine Shop  
 OKEECHOBEE • Highway Equipment Service  
 ORLANDO Hunts Garage  
 OVIEDO Palm Service Company  
 PAHOKEE Beasley Tractor Company  
 PALATKA Palmetto Pump Company  
 PALMETTO Hurston Motor Company  
 PANAMA CITY West Florida Truck & Tractor Co., 675 S. O St.  
 PENSACOLA D. M. Witherill Company, 713 S. Palifox Street  
 PERRY Perry Auto Supply Company  
 PIERSON Wells Supply Company  
 PLANT CITY J. S. Carter Pump Company  
 PORT ST. JOE M. G. Lewis & Son  
 PUNTA GORDA Cerny's Machine Shop  
 QUINCY Suber & Johnson  
 ST. AUGUSTINE Richardson Machine Company  
 ST. CLOUD Western Auto Supply Company  
 ST. PETERSBURG J. W. Appley & Son, Inc., 831 - 9th Street, N.  
 SAMOSET Manatee Mfg. Company  
 SEBRING Pounds Zeiss Tractor Company  
 Radebaugh & Sons  
 Ulmer Motors  
 STUART Seabrook Truck & Tractor Company  
 TALLAHASSEE Terry-Rosa Hardware Company  
 TAMPA • Industrial Supply Corporation, 1800 2nd Ave.  
 Barney's Outboard Motors, 103 Jackson Street  
 Hillsboro Pump & Irri. Co., 960 Twiggs Street  
 Machinery Service Company, Box 5067  
 TARPON SPRINGS Leist Engineering Company  
 TITUSVILLE Central Garage  
 TRENTON Lee Roberts Motors  
 VERO BEACH Marvins Garage, Occoala and Commercial  
 WAUCHULA Shag Taylor Pump Company  
 WEBSTER John W. Barber, Jr.  
 WEST PALM BEACH J. P. Carrol Company  
 Coastal Truck & Equipment Company  
 WILLIAMS POINT Williams Garage  
 WINTER GARDEN M and M Welding Company  
 WINTER HAVEN Lake Ida Welding  
 YANKEETOWN Yankeetown Garage

**GEORGIA**

ADEL Adel Trading Company  
 ALBANY • R. S. Armstrong & Bro. Co. of Albany  
 300 South Slappey Drive  
 Clark Tractor Company  
 Gregory Welding Company  
 James Equipment Company  
 Wisconsin Sales & Service  
 Americus Carburetor & Ignition Service  
 Ashburn Georgia Implement & Truck Company  
 Athens Russell Daniel, Inc.  
 ATLANTA • R. S. Armstrong & Bro. Company  
 676 Marietta Street, N. W.  
 Farm Equipment Exchange  
 Augusta Richmond Supply Company  
 Bainbridge Bainbridge Truck & Tractor Company  
 Harold Tractor Company  
 Baxley Lewis Brothers  
 Blakely W. A. Fuqua Live Stock Company

**BRUNSWICK** Coastal Chevrolet Company  
Edgy-Wooten Hardware Company  
Kut-Kwick Tool Company, 1927-29 New Castle St.  
Tidewater Equipment Company  
Sanders Garage

**CAIRO** Shaw Truck & Tractor Company

**CARTERSVILLE** W. B. Taylor & Sons

**CATAULA** Greer Auto Parts Company

**CEDARTOWN** Jones Machinery Company

**CLAYTON** J. A. Drake Company

**COLQUITT** Columbus Tractor & Mchry. Company

**COLUMBUS** McDowell Motor & Implement Company

**CORDELE** Cordele Implement Company

**CUTHBERT** Cuthbert Tractor & Machine Company

**DALTON** J. E. Pitts Garage

**DAWSON** Terrell Implement Company

**DOERUN** J. T. Hortman

**DONALSONVILLE** Harvey Implement Company

**DUBLIN** Walke Implement Company

**EAST POINT** Warr Auto Elec. & Align. Co., 401 S. Main Street

**EASTMAN** McCranie Motor & Implement Company

**ELLIJAY** Ellijay Motor Company

**FT. VALLEY** J. F. Duke & Sons

**FITZGERALD** Martin Manufacturing Company

**GAINESVILLE** Braselton & Allen Tractor Co., 506 S. Main

**GREENSBORO** Greene Supply Company

**GRIFFIN** Carburetor & Ignition Company

**JESUP** Salter-Carawell Corporation

**KINGSLAND** Kingsland Motor Company

**LaGRANGE** Pope-Trotter Tractor Company

**LANIER** Stubbs Company

**LAVONIA** Mason Implement Company

**LOUISVILLE** Wigham & Beall

**LUMPKIN** Singer Company

**MACON** Anderson Tractor & Equipment Company  
C. W. Farmer Company  
Forrestry Equipment Company

**MADISON** Allen Implement & Seed Company

**MOULTRIE** Bynum Implement Company

**NAHUNTA** Nahunta Parts & Service

**NEWNAN** Farm Supply Company

**OCILLA** Ocilla Farm Implement Company

**PELHAM** Pelham Implement Company  
Rogers Garage

**PERRY** George C. Nunn & Son

**QUITMAN** Farm Utility Exchange

**ROCHELLE** Mashburn & Fitzgerald

**ROME** Rome Farm Equipment Company

**SANDERSVILLE** Jesse Newson

**SAVANNAH** Georgia Supply Company

**SCOTLAND** Flanders Brothers

**SHELLMAN** D. K. Bynum

**STATESBORO** Bullock Tractor Company  
Sam J. Franklin Company  
Statesboro Motor & Equipment Company

**SWAINSBORO** Emanuel Implement Company  
Stafford & Johnson

**SYLVANIA** Stubbs Implement Company

**SYLVESTER** SyFester Truck & Tractor Company

**TALBOTTON** McKinnon Garage

**THOMASVILLE** Godwins Garage  
Tuck Implement Company

**TIFTON** R. E. Carmichael Company, Inc.  
Orr Tractor Company  
Paulk & McCauley

**VALDOSTA** Schroer Implement Company

**VIDALIA** Pierson Chevrolet Company

**WASHINGTON** Wright Implement Company

**WAYCROSS** Tractor & Equipment Company

**WAYNESBORO** Waynesboro Farm Equipment Company

**WEST GREEN** McGowans Motor Company

**WOODBURY** Fowler Implement Company

## IDAHO

**AMERICAN FALLS** American Falls Implement

**BOISE** Olson Manufacturing Co., 2223 Fairview Ave.

**BUHL** Valley Tractor & Implement Co.

**BURLEY** Burley Implement Company

**CALDWELL** B & M Equipment  
Farmer's Supply Company  
Wood River Implement

**CAREY** Christiansen Implement Company

**GOODING** Gooding Implement

**IDAHO FALLS** Snake River Equipment Company

**JEROME** Mehlhaff Tractor Company

**LEWISTON** Idaho Cletrac Sales Company, 1515 Main Street  
Jameson Auto Parts

**MONTPELIER** Montpelier Truck & Tractor Company

**MOSCOW** Allwerdt Tractor & Implement Company

**POCATELLO** Rush Feed, Seed & Implement

**PRESTON** Homer Tractor Service

**PRIEST RIVER** Kaniksu Tractor

**REXBURG** Ray Payne Equipment Company

**RUPERT** Rupert Implement Company

**ST. ANTHONY** Browning Equipment Company

**SALMON** Lipe General Sales & Service

**SANDPOINT** Lou's Auto Parts, 429 N. Second Avenue

**SHOSHONE** Shoshone Implement

**SODA SPRINGS** Soda Springs Supply

**TWIN FALLS** Williams Tractor Company

**WEISER** H - J - H Company

**WENDELL** Gates Bros. Machine Shop

- Anderson Machinery  
404 N. W. Broadway  
Portland, Oregon
- Arnold Machinery Company, Inc.  
433 West Second South Street  
Salt Lake City, Utah
- Star Machinery Company  
1741 First Avenue, S.  
Seattle, Washington

## ILLINOIS

**ALEDO** Thede Company

**ALTON** Stanka Garage, Delmar at State Street

**ARTHUR** H. L. Phillips Implement Store

**ASHLAND** Kerry Motor Company

**BELLEVILLE** H. Edwards Farm Equipment Company  
S. 8th Street, Route 13

**BLOOMINGTON** Turley Farm Equipment Company

**BUSHNELL** Lovell Implement Co., 430 E. Ludwig

**CAMBRIDGE** James P. Vinckel

**CANTON** Jaeger Implement Company

**CARMI** Clinton Murphy Company

**CHENOA** Reiners Implement Company

**CHICAGO** • Industrial Engine & Parts Company  
2345 S. Crawford Avenue

**CHRISMAN** Keith Culton Implement Company

**COLUMBIA** Wm. Vogt & Company

**DANVILLE** Tom's Auto Electric Service

**DECATUR** Bruce Implement Company, 929 E. William St.

**DeKALB** Ruff & Halverson

**EDWARDSVILLE** Madison County Tractor & Equipment Company

**EFFINGHAM** H & D Motor Service

**ELGIN** Barron Bros., 408 Brook Street

**ELKART** E. K. Brooker Company

**ELMHURST** Smejs Motors, Lake & Church Road

**FAIRBURY** Farmers Implement Company, Inc.

**FISHER** Williams & Neumann

**FREEPORT** Stukenberg Implement Sls.

**GARRETT** Horton Bros. & Harder

**GOLDEN EAGLE** Haug Mercantile Company

**HARDIN** Hardin Tractor & Equipment Company



**HOMER** Gardner Service  
**HOOPESTON** Cox Bros.  
**JACKSONVILLE** Anderson & Cally  
**JERSEYVILLE** John G. Flautt, 213 S. State  
**KEWANEE** Germans Service Station  
H & H Oliver Store  
**KIRKWOOD** Smith Implement Service  
**LaSALLE** H. A. Linne Company  
**LOSTANT** Englehaupt & Lyona Impl.  
**MACOMB** Cole & Kelso  
**MARISSA** Clyde J. Wylie Tractor Company  
**MATTOON** Turner Seed & Supply Company  
**MENDOTA** Schmitz Implement Company  
**METROPOLIS** Hinners Bros. Company  
**MILTON** Hoover Bros. Company  
**MINONK** Turley Farm Supply  
**MOMENCE** Robert Wille, Inc.  
**MORRISONVILLE** McVey & Son  
**MURPHYSBORO** Backman Implement Company  
**NIANTIC** Bruce Implement Company  
**NORTH AURORA** Ted Plantes  
**OLNEY** Farmers Equipment & Supply Company  
Wilson Sales & Service  
**PARIS** M. Farnham Implement Company  
**PAXTON** Power Equipment Company, 228 East State Street  
**PEORIA** Modera Implement Company  
**PONTIAC** Farmers Implement Company, Inc.  
**PRINCETON** Wilds Motor Service Company  
**PROPHETSTOWN** Thede Company  
**QUINCY** E. M. Chatten Implement Company  
812-18 Hampshire Street  
**RIDGEWAY** Robert Abell Implement Company  
Ellis Implement Company  
**ROCKFORD** Baxter Farm Supply  
**ROCK ISLAND** Lohse Automotive Service  
**SHANNON** Ray M. Truckmiller  
**SOUTH HOLLAND** Calumet Farm Supply, 15700 Cottage Grove Avenue  
**SPRING VALLEY** Burl F. George Company  
**SPRINGFIELD** Grieme Brothers  
**STERLING** Mylin's Agricultural Store  
**STOCKTON** Metcalf Farm Equipment Company  
Steffen's Tractor Sales  
The Ross Company, Inc.  
Power Equipment Company  
H. Edwards Farm Equipment Company  
Union Grain Company  
Schneider Implement Company  
Taylor Implement Company  
Gene Wallace Implement Company  
\* Allied Construction Equipment Company  
4025 Forest Park Avenue  
St. Louis, Missouri  
\* Engine Power, Inc.  
4320 N. 35th Street  
Milwaukee, Wisconsin

**INDIANA**

**ALBANY** Shroyer Implement Company  
**ALBION** Truelove Bros.  
**ANGOLA** Covell Implement Store  
**AUBURN** Koenehan Farm Equipment Company  
**BATESVILLE** Wagner & Fledderman  
**BEDFORD** H. L. McKnight  
**BLOOMINGTON** Ellis Implement Company  
Graham Motor Sales  
**BLUFFTON** Moser Implement Company  
**BRAZIL** Hedge Implement Sales  
**BREMEN** Bremen Equipment Company  
**BROOKSTON** Brookston Implement Company  
**BROOKVILLE** Franklin Supply  
**CAMDEN** Camden Hardware  
**CLAYTON** Stanley Implement Company

**COLUMBIA CITY** R. D. Clapp & Son  
**COLUMBUS** Schneider Implement Company  
**COVINGTON** Kerr-Rayburn Implement Company  
**CRAWFORDSVILLE** O. E. Straub  
**CROWN POINT** Gruel Bros.  
**CULVER** Osborn Seed  
**DECATUR** Klenk's  
**ELWOOD** Landrum Implement Company  
McNight Farm Equipment  
**ETNA GREENE** Ed Heisler  
**EVANSVILLE** P. E. Phillips & Son  
**FARMLAND** W. J. Green  
**FLORA** Humes & Mumert  
**FORAKER** Hess Bros. Garage  
**FORT WAYNE** Korte Bros.  
McCullough & Heine  
**FOWLER** Freeland Auto & Tractor Corp.  
**FRANCESVILLE** Elmer Swing  
**FRANKLIN** Alexander Ice & Coal Company  
**FRANKFORT** Farmers Implement Sales  
**GARY** Lud's Scooter Sales, 457 Massachusetts Street  
**GOODLAND** Beckley Implement Company  
**GOSHEN** Elkhart Co. Farm Bureau Co-op. Ass'n.  
**GREENCASTLE** Farmer's Supply of Greencastle, Inc.  
**GREENFIELD** The Carter Company  
Pope Implement Company  
**GREENSBURG** Thurston Implement Company  
**HAMMOND** Carstensen's Service Company  
6950 Indianapolis Blvd.  
**HARLAN** Harlan Farm Supply  
**HOAGLAND** Hoagland Implement Company  
**INDIANAPOLIS** \* Eagle Machine Co., Inc., 635 E. Market Street  
**JAMESTOWN** Hoovermale & Hedge  
**JASPER** Hoffman Bros.  
**KENTLAND** Kentland Tractor & Implement Company  
**KNOX** Ray Downs & Sons  
**KOKOMO** Conwell Implement Company  
**LaCROSSE** Sumerville Implement Company  
**LAFAYETTE** Lyman Coal Company  
**LaOTTA** Brindle Bros.  
**LEBANON** Potts Implement Company  
**LIBERTY** Brier Implement Company  
**LIGONIER** Nighaonger Farm Equipment  
**LOGANSPOUT** Lehnus Bros.  
**LYONS** Lyons Equipment  
**MARION** Glasser Electric Company  
Ken's Truck & Tractor Service  
**MARTINSVILLE** Crews Implement Sales  
**MELLOT** Kerr Tractor & Implement Company  
**MODOC** Modoc Sales  
**MOORESVILLE** D. C. Jessop & Son  
**MORROCCO** Castogina Tractor & Implement  
**MONTICELLO** Monticello Sales Company  
**MT. VERNON** Stephen Implement Company  
**MUNCIE** Ramsey Tractor Sales  
**NAPPANEE** Nappanee Implement & Supply Company  
**NEW CARLISLE** C. C. Kelley & Sons  
**NEW CASTLE** Wilson Grain & Implement  
**NEW HAVEN** Farm Implement Store  
**NOBLESVILLE** Barker Implement Company  
**OTTERBEIN** Joe Vaughn  
**OTWELL** Scraper Sales Company  
**PAOLI** Orange County Supply Company  
**PENDLETON** Wm. Ring & Sons  
**PERU** Peru Feed & Farm Equipment Company  
Howard Philabaum, R. R. 3  
Downs Brothers  
**PLYMOUTH** Justin Schafer Company  
**PORTLAND** Hunt Motor Sales  
**PRINCETON** Daggett Implement Company  
**RICHMOND** Dewey Prather  
**RILEYSBURG** Dean Neff  
**ROCHESTER** Rockport Implement Company  
**ROCKPORT**

**ROCKVILLE** Ray Bolsley  
**ROLLING PRAIRIE** Wiley & Schultz  
**ROSSVILLE** Ralph Rodkey  
**RUSHVILLE** Power Implement Company  
**RUSSEVILLE** Martin's Service Station  
**SHIPSHEWANA** Wana Implement Company  
**SHELBYVILLE** Needler's John Deere Store  
**SEYMOUR** Corde's Hardware  
**SILVER LAKE** Aaa Hines  
**SOUTH BEND** General Equipment & Machine Company  
**SOUTH WHITLEY** The Farmers Store  
**SPENCER** Ralph Ketchum  
**STROH** Stroh Implement Company  
**SULLIVAN** Monroe Feed & Implement Sales  
**SYRACUSE** Ward Farm Equipment Company  
**TERRE HAUTE** Graham Grain Company  
**TIPTON** Tipton Tractor & Implement Company  
**VALPARISO** Mark W. Stephens  
**VINCENNES** Saiter-Morgan Company  
**WABASH** Wabash Implement Company  
**WAKARUSA** Jonas A. Miller  
**WARREN** Daugherty's Farm Equipment Company  
**WARSAW** Gilliam & Felkner  
**WASHINGTON** Hart Equipment Company  
**WESTFIELD** Sheets Implement Company  
**WILLIAMSPORT** Stamm Implement Company  
**WINCHESTER** Goodrich Brothers, Inc.  
 Super Farm Store  
**WINDFALL** Bollinger Brothers  
**WINIMAC** Winimac Sales Company  
**WORTHINGTON** Farris Trading Post  
 • Atlas Auto Parts & Grinding Company  
 1326-30 W. Jefferson  
 Louisville, Kentucky  
 • Industrial Engine & Parts Company  
 2105 S. State Street  
 Chicago 16, Illinois  
 • Womwell Cincinnati Engine & Parts Company  
 612 Broadway, Cincinnati, Ohio

**IOWA**

**ALGONA** Bradley Brothers  
**ALTA** Russell W. Paterson  
**ARLINGTON** Earl H. Crawford  
**ATLANTIC** Sothman Motor Company  
**AMES** Ames Motor & Implement Company  
**BATTLE CREEK** Miller Implement Company  
**BELLE PLAINE** F. L. Sankott  
**BURLINGTON** Frick Motor Company  
**CARROLL** Kliener Implement Company  
**CEDAR FALLS** Al Matson & Son Implement Company  
**CEDAR RAPIDS** Wood Tractor Company  
**CHEROKEE** F. D. Booth Implement Company  
**COUNCIL BLUFFS** Boyer Implement Shop  
**DAVENPORT** A. H. Wiese Equipment Company  
**DES MOINES** • Port Haron Mchry. Company, 301 Court  
**DUBUQUE** Stampfer's Farm & Home Store  
**ELDON** Thomas Implement Company  
**EMMETSBURG** Nesry Implement Company  
**FAIRFIELD** Emory Snakenburg  
**FARMINGTON** Kinney's Service  
**FORT DODGE** Fort Dodge Implement Company  
**GARNER** Garner Motor Sales  
**HAMPTON** Mott Implement Company  
**HOMESTEAD** Amasa Society  
**IOWA FALLS** Manning W. Howell  
 Rosee Implement Company  
**JEFFERSON** Curtia Implement Company  
**KALONA** Glen Wahl Machine Shop  
**LENOX** Barker Implement Company  
**MANCHESTER** Manchester Implement Company  
**MARION** Marion Machinery Company

**MARSHALLTOWN** Central Iowa Farm Store  
**MASON CITY** Farm Equipment & Supply Company  
**MELBOURNE** Wiemers Implement Company  
**MT. PLEASANT** Lloyd Peterson  
**ONAWA** East Onawa Implement Company  
**OSAGE** Venticher Implement Company  
**OSKALOOSA** Lytle Implement Company  
**PELLA** Mart Hoeksema  
**PILOT GROVE** J. J. Nichting  
**PRESTON** Kunau Implement Company  
**RENWICK** S. H. Klassie  
**ROCK RAPIDS** Geo. Holliday & Son  
**SANBORN** Geo. C. Getting  
**SIOUX CITY** Gene Reilly Farm Store  
**SPENCER** Harold V. Kabrick  
 Sievers Farm Equipment  
**SPILLVILLE** Balik Implement Store  
**THOMPSON** Thompson Machinery Company  
**TIPTON** Brendes Farm Equipment Company  
**VILLISCA** McCracken Implement Company  
**WALCOTT** Ray Wulf Company  
**WAUKON** Valerie Dundee  
**WEBSTER CITY** Roy Lee Sales & Service Company  
**WEST UNION** Ralph Pixler & Son

**KANSAS**

**ATWOOD** Deering Supply  
**ATCHISON** Allen Motor & Implement Company  
**BAZINE** Erb Repair Shop  
 Coolidge Implement Company  
**BELLEVILLE** Myers Repair Shop  
**BELOIT** R. P. Fuller & Son  
**BURLINGTON** Burlington Equipment Company, 506 Neosho St.  
 A. B. Caldwell  
**CAWKER CITY** E. C. Riley Chevrolet Company  
**CHANUTE** Frank F. Young, 17 S. Ashby Street  
**CLYDE** Lowers Implement Company  
**COFFEYVILLE** The Acme Foundry & Machine Company  
**COLBY** Gunnels Tractor Company  
**COUNCIL GROVE** Coolidge Implement Company  
**CUNNINGHAM** Kincheloe Implement Company  
**DODGE CITY** Scheufler Supply Company, Inc.  
**EMPORIA** Coolidge Implement Company, 616 Mechanic St.  
 Rich Farm Supply  
 Homer Neill  
**FREDONIA** Scheufler Supply Company  
**GARDEN CITY** Sherman Motor & Implement Company  
**GOODLAND** Grainfield Salvage & Supply Company  
**GRAINFIELD** Scheufler Supply Company  
**GREAT BEND** Bevan Motor Company, 807 Utah Street  
**HIAWATHA** Humphrey Implement Company  
**HOLTON** Phillips Implement Company  
**HORTON** Patmon Machine Shop  
**HOXIE** Garmon Implement Company  
**HUGOTON** Mack's Motor Company  
**KANARADO** Scheufler Supply Company, Inc.  
**LARNED** Anderson Implement Co., 520 W. 23rd Street  
**LAWRENCE** Elmer Harkness  
**LEOTI** Straub Garage  
**LOUISVILLE** Scheufler Supply Company, Inc.  
**LYONS** O. W. Jorgensen Implement Company  
**MANHATTAN** Jewell County Implement Company  
**MANKATO** Marion Machinery Company  
**MARION** Fred's Tractor Service  
**McDONALD** J. H. Rea  
**MINNEOLA** Kenneth P. Johnson, Oil & Gas Well Supplies  
**OSAWATOMIE** John Sprecher Repair Shop  
**OSWEGO** Almand Brault  
**PALCO** General Machinery & Supply Company  
 202 North Broadway  
**PITTSBURG** W. A. Thomas Supply Company, 106 W. 3rd Street  
**PRATT** K. & W. Electric Company

RANSOM A. H. Cofer  
 RUSSELL Scheufler Supply Co., Inc.  
 SABETHA Gilbert & Lortacher  
 ST. FRANCIS Manson Electric Shop  
 Schlittenhardt Motor Company  
 Chautauque County Machine Company  
 M. B. Salisbury Company, Inc., 114 Quincy  
 Tribune Sales Company  
 WICHITA • Harley Sales Company, 505 South Main Street

**KENTUCKY**

ASHLAND Barney Williams Company  
 AUBURN Auburn Hardware & Implement Company  
 AUGUSTA Richey Sales Company  
 BOWLING GREEN R. E. Petrie  
 CAMPBELLSVILLE Shipp's Garage & Implement Company  
 CLAY CITY Hardin & Kennon Company  
 DANVILLE Withers & Crook Implement Company  
 ELIZABETHTOWN Hardin County Implement Company  
 FARMERS D. R. Perry Supply Company  
 FLEMINGSBURG Sousley & Hamm Tractor Company  
 FRANKFORT Frankfort Automotive Machine Shop  
 FRANKLIN Harris Feed Company  
 FREDONIA W. M. Young Implement Company  
 GEORGETOWN Robey Farm Supply Company  
 GLASGOW G. H. Bowles & Son  
 GREENVILLE E. A. Cohen & Son  
 HARLAN Womwell Automotive Parts Co.,  
 HARRODSBURG Paul Shewmaker Implement Company  
 HARTFORD Tichenor Bros. Implement Company  
 HAZARD Womwell Automotive Parts Co.,  
 HENDERSON Henderson Farmers Supply Co.,  
 HODGENVILLE A. L. Hazle  
 HOPKINSVILLE Planters Hardware Company  
 LANCASTER Sanders Supply Company  
 LEITCHFIELD Farmers Implement Company  
 LEXINGTON • Womwell Automotive Parts Co., 240 Clark Street  
 LONDON Boggs Brothers Implement Company  
 LOUISVILLE • Atlas Auto Parts & Grinding Company  
 1326-30 W. Jefferson Street  
 Roy C. Wayne Supply Company

MADISONVILLE Boggess Bros. Farm Equipment Co.  
 MAYFIELD Fuqua Tractor Company  
 MAYSVILLE Ellington Farm Machinery  
 MIDDLESBORO Lyons & Cox  
 MONTICELLO Roberts Implement Company  
 MOREHEAD Monarch Supply Company  
 MT. STERLING Kratzer Implement Company  
 MURRAY McKeel Implement Company  
 NEBO Stanley Bros.  
 NICHOLASVILLE Central Farm Supply  
 OWENSBORO Guenther Hardware Company  
 PADUCAH Jones Garage & Farm Equipment  
 Wilson Mach. & Supply Company  
 PARIS Bobbitt & Hudson Implement Company  
 Bourbon Implement & Welding Company  
 PIKEVILLE Womwell Automotive Parts Company  
 RICHMOND Cornelison & Moores Brothers  
 SCOTTSVILLE Claypool & Weaver Implement Co.  
 SHELBYVILLE Shelbyville Supply Company  
 SOMERSET Morris Brothers  
 SUMMERSVILLE Holman Lewis Implement Company  
 WILLIAMSBURG Shaw Motor Parts Company  
 WILLIAMSTOWN Pettitt Machinery Company  
 WINCHESTER Stevenson & Delaney

**LOUISIANA**

ABBEVILLE Landry Stores, Inc.  
 BATON ROUGE Alford Safe & Lock Company  
 BOSSIER CITY Wilbanka Farm Equipment Company  
 DELCAMPRE Dooley Bros. Machine & Welding Shop

DES ALLEMAND Bayou Electric  
 DONALDSONVILLE Castagnos Sales & Service  
 GRETNA Gretna Specialty Company, 813-4th Street  
 HAMMOND Hammond Wholesale Company  
 HOUMA Lynch's Garage  
 JENNINGS Farm Machinery & Equipment Company, Inc.  
 LAKE ARTHUR Lake Arthur Machine Shop  
 LAKE CHARLES C. E. Kemmerly & Sons  
 LOCKPORT Lockport Hardware Company  
 MONROE Southern Equipment & Tractor Company  
 NATCHEZ Hammett Supply Company  
 NATCHITOCHE C. E. Collins & Sons  
 NEW IBERIA Voorhies Machine Supply Company  
 NEW ORLEANS • Wm. F. Surgi Equip. Co., 1017 Magazine Street  
 Southern Specialty Sales Co., 617 N. Broad St.  
 OPELOUSAS Cary Iron Works  
 PONCHATOULA Air Cooled Motor Company  
 RAYNE Haure Machine Shop  
 SHREVEPORT Construction Machinery Corp.  
 Harold's Sales & Service  
 Tiller Tractor & Equipment Co., 228 Airport Drive  
 TALLULAH Powell Tractor Company

**MAINE**

AUGUSTA Parker Danner Company, Riverside Drive  
 HOULTON James S. Peabody Company, Bangor Street  
 PORTLAND Portland Tractor Company, 803 Forest Avenue  
 PRESQUE ISLE Roy C. Thompson Company, 253 Stae Street  
 • Diesel Engine Sales & Engineering Corp.  
 Fish Pier Road  
 Boston, 10, Massachusetts

**MARYLAND**

ANNAPOLIS John M. Daves & Sons, 142 Dock Street  
 BALTIMORE • Phillips Mchry. & Tractor Co., 325 W. 23rd  
 Alban Tractor Co., Inc., 725 E. 25th Street  
 L. A. Benson Company, Inc., 6 E. Lombard  
 Chesapeake Supply & Equipment Company  
 1213 E. 25th Street  
 Stuart M. Christhif & Company  
 134 W. Mt. Royal Avenue  
 Curtis Engine & Equipment Co., 104 Light St.  
 Del-Mar-Va Marine Sales, 10 W. Crowwell Street  
 D. C. Elphinstone, Inc., 115 S. Calvert Street  
 General Supply & Equipment Co., 530 E. 25th St.  
 Loane Machinery Co. Inc., 208 S. Hanover Street  
 John C. Louis Company, Inc., 511 W. Pratt St.  
 Henry M. Meyer Company, Inc., 110 S. Howard St.  
 Paving Supply & Equip. Co., 25th & Bonaparte Ave.  
 BEL AIR B. D. Tucker & Sons  
 BRIDGE E. S. Hubbert & Son  
 CHESTERTOWN D. W. Ingersoll, Silver Hill Shop  
 EASTON Elco Equipment Company  
 ELKTON Elkton Boat Yard  
 FREDERICK H. D. Duvall  
 GAITHERSBURG S. F. Smith  
 HAGERSTOWN American Growers Supply Company  
 Downey Brothers, W. Washington Street, Ext.  
 Fearnow & Cline  
 HURLOCK H. E. Parker & Son  
 LEONARDTOWN Atlas Hardware & Supply Company  
 MAYO Cadel Creek Boat Works  
 OCEAN CITY C. P. Cropper Fish & Oyster Company  
 SALISBURY Salisbury Battery Company  
 Taylor Auto Supply Company  
 Shady Side Boat Yard  
 SHADYSIDE The Todd Company, 936 Philadelphia Avenue  
 SILVER SPRINGS J. A. West, Jr., Suitland Easo Service  
 SUITLAND Farm Equipment Center  
 THURMONT

**MASSACHUSETTS**

**BOSTON 10** \* Diesel Engine Sales & Engineering Corp.  
Fish Pier Road  
Clifford T. Whittaker Company  
**DANVERS** Center & Whitlock, Inc., 12 Deerfield Street  
**GREENFIELD** Holyoke Farm Machinery Company, 115-111 High  
**HOLYOKE** Parker-Danner Company, Factory Street  
**HYDE PARK** Robinson Farm Machinery Company  
**NATICK**

**MICHIGAN**

**AKRON** McDonald Sales & Service  
**ALBION** Fred C. Zuehlke  
**ALMA** Browns Auto Equipment  
**ALPENA** Everett Smith  
**BARCULO** Bussis Implement Company  
**BARK RIVER** Bark River Farm Implement Company  
**BARODA** Baroda Hardware  
**BATTLE CREEK** Farm Equipment Company, 1210 E. Columbia  
**BAY CITY** Sam Wieland, 801 N. Euclid Street  
**BAY SHORE** Burnett Brothers  
**BEULAH** Benzie Company  
**CENTERVILLE** John S. Jackson  
**CHARLOTTE** Fowler Sales Company  
**CLARE** Orville Vandawarker  
**CLAWSON** Roy Steele Equipment Company  
**CLINTON** Vaughn Implement Company  
**COHOCTAH** R. E. Pekins  
**COLDWATER** Endicott Implement Company  
**CONSTOCK PARK** Morrissey Farm & Orchard Supply  
**CONKLIN** E. F. Dinkel  
**DAVISON** Amos Sales & Service  
**DECATUR** Decatur Farm Service  
**DETROIT** \* R.G. Moeller Company, 14415 Meyers Road  
**DUNDEE** Kerner Brothers  
**EAST TAWAS** Wm. Look & Son  
**ELK RAPIDS** Elk Rapida Auto Service  
**ELKTON** J. R. Quinn  
**ELLSWORTH** Klooster, Conrad  
**ESCANABA** Escanaba Trading Post  
**EVART** Leach Farm Equipment Company  
**EWEN** Sternal Implement Company  
**FENNVILLE** Fenville Hardware  
**FLATROCK** Hamilton Appliance, 26416 Telegraph Road  
**FLINT** Matthews Sales & Service  
**FOWLER** Huggett Hardware & Implement  
Whittaker Bros.  
**FOWLerville** Marshall Lintennuth  
**FRANKENMUTH** H. J. Schluckebier  
**HANCOCK** Gus Wearala & Sons, Company  
**HARRISVILLE** Jensen & Healy  
**HARTFORD** Hilltop Orchards  
**HASTINGS** B. L. Peck  
**HILLMAN** Main River Farm Equipment  
**HILLSDALE** Kennedy Implement Company  
**HOLLY** Frank Gromak  
**HUDSON** Rollin Clark, Inc.  
**IMLAY CITY** Imlay City Implement Company  
**IRON RIVER** Guy's Auto Shop  
**ITHACA** Leslie D. Reeves  
**JACKSON** Superior Sales  
**KALAMAZOO** Howard Hopkins, Inc., 513 E. Kalamazoo Avenue  
R. G. Moeller Company of Kalamazoo  
248 N. Edwards Street  
Koski Repair Works  
**KEWEENAW BAY** Bert Howard Company, 1419 Turner Avenue  
**LANING** Inman Farm Equipment  
**LAPEER** Henry Diem  
**MARLETTE** Marquette Public Service Garage  
**MARQUETTE** McBain Hardware  
**McBAIN** Parr & Son  
**McBRIDE** Linmeier Implement Company  
**MENOMINEE** Frank Saul  
**MESICK**

**MILLBURG** L. Gelder & Sons  
**MIO** Herold Hebestreit  
**MONTAGUE** Hunt Sales & Service  
**MUSKEGON** B. G. Davis & Son  
**NEWPORT** McCord Farm Supply  
**OWOSSO** Wieland Farm Sales  
**PLAINWELL** Eugene Vis  
**RICHMOND** J. C. Ernst  
**ROCHESTER** Houghton & Sons  
**ROMULUS** Hugo Unger  
**ROSE CITY** Reasner Service  
**RUTH** Ruth Farmers Elevator Inc.  
**SANDUSKY** Robert E. Cork  
**SAULT STE. MARIE** Armstrong Supply Company  
**SCOTTS** White Sales Company  
**SCOTTVILLE** Kaye Implement Company  
Howard Thiel  
**SEBEWAING** Dembowake Sales Company  
**SHELBY** Shelby Ford Tractor Sales  
**SKANDIA** Heath Implement Company  
**SOUTH HAVEN** Michigan Orchard Supply  
**SOUTH IONIA** F & H Grounds Farm & Home Supply Company  
**SPRINGPORT** Vern Losey  
**STANDISH** Miscisin Brothers  
**STURGIS** Lake Motor Sales  
**TRAVERSE CITY** Mapleton Garage, RFD #1  
**UNION CITY** Knauss Implement Company  
**UTICA** Harry E. Lansing  
**VANDALIA** Elk Park Equipment Company  
**WEST BRANCH** Chas. Wangler  
**YALE** Robert Ed. Martin Implement Company

(NORTHERN)  
\* Engine Power, Inc.  
4320 N. 35th Street  
Milwaukee, Wisconsin

**MINNESOTA**

**ADAMS** Mielenaeker Implement Company  
**ALEXANDRIA** M & H Motor Builders  
**AMBOY** Coulter Implement Company  
**APPLETON** LaGrange Chev. Company  
**AUSTIN** Adams Farm Equipment Company  
**BERTHA** Henry W. Herms  
**BLUE EARTH** Smith Implement Company  
**CHASKA** Molnau Implement Company  
**COMFREY** Rinehart & Fesenmaier  
**CROOKSTON** L. W. Wentzel Farm Implement  
Wm. H. Ziegler Company, Inc.  
**DULUTH** Sivertson Marine Equipment Co., 336 Lake Ave. S.  
Smith-Dunn Co., Inc., 18 North 19th Ave. W.  
Wm. H. Ziegler Company, Inc., 330 Garfield Ave.  
**EAST GRAND FORKS** East Side Machine Company  
**ELBOW LAKE** Christianson-Shervey Company  
**FARIBAULT** Spitzack Implement Company  
**FERGUS FALLS** National Bushing & Parts Company  
C. T. Oscarson & Son  
**FULDA** Fulda Implement Company  
J. B. Janssen Implement & Aero. Service  
**GLENCOE** Tanner Implement Company  
**GRAND MEADOW** Myhre & Seim Implement Company  
**GRAND RAPIDS** Hein Implement Company  
**HALLOCK** Bryden & Johnson Implement Company  
**HARMONY** Trouten & Boice  
**HAWLEY** Heimark Bros.  
**HOUSTON** Houston Implement Company  
**HUTCHINSON** C. H. Stocking Company  
**KENNEDY** Kennedy Implement Company  
**LAKE CITY** Hassler & Herman Impl. Company  
**LAKE LILLIAN** Wm. R. Johnson Motor Sales  
**LAMBERTON** Lambertson Implement Company  
**LITCHFIELD** Hamm's Implement Company  
**LITTLE FALLS** A. J. Smith Company

**LIVERNE** Thone Implement Company  
**MADIELIA** James Bros. Company  
**MADISON** Overland Implement Company  
**MANKATO** Cutkoaky & Jones Company  
 National Bushing & Parts Company  
 Schrunks Garage  
**MARSHALL** Industrial Truck & Parts Company  
**MINNEAPOLIS** 1301 Washington Avenue S.  
 Minneapolis Equipment Company  
 520 Second Street S.E.  
 National Bushing & Parts Co.  
 1221-9 Harmon Place  
 Wm. H. Ziegler Company, Inc.  
 2929 University Avenue S.E.  
**MONTEVIDEO** Campbell Implement Company  
 National Bushing & Parts Company  
 Swenson Implement Company  
**MORRIS** Clauss Implement Company, Inc.  
**NEW ULM** Nelson Service  
**NORTHFIELD** M. W. Hertel Company  
**OLIVIA** O'Hotto Supply  
**OSAKIS** C. J. Oat Farm Implement Company  
**OWATONNA** Walkup  
**PIPESTONE** Preston Iron Works  
**PRESTON** National Bushing & Parts Co.  
**RED WING** Fall Implement Company  
**REDWOOD FALLS** National Bushing & Parts Co.  
**ROCHESTER** Swenson Implement Company  
 Otto J. Scharber & Sons  
**ROGERS** Lindberg Motor Company  
**ROTHSAY** Morken's Service  
**RUSHFORD** National Bushing & Parts Co.  
**SAINT CLOUD** Wick Implement Company  
**SAINT JAMES** National Bushing & Parts Company  
**ST. PAUL** Foss Motor Sales  
**SPRING GROVE** Taxeraas Implement Company  
**THIEF RIVER FALLS** Tracy Implement Company  
**TRACY** Koch Implement Company  
**WACONIA** Waseca Implement Company  
**WASECA** Wm. Moll & Sons  
**WELLS** Christianson-Shervey Company  
**WENDALL** Christianson-Carlson Company  
**WHEATON** John Peterson Implement Company  
**WILLMAR** Mulligan & Andrews  
**WINDOM** F. A. Krause Company  
**WINONA** Western Implement Company  
**WORTHINGTON** \* Engine Power, Inc.  
 4320 No. 35th Street  
 Milwaukee 9, Wisconsin

#### MISSISSIPPI

**ABERDEEN** Lann & Carter Hardware Company  
**ACKERMAN** Covington's Garage & Tractor Service  
**AMORY** Delrymple Equipment Company  
**BOONEVILLE** Browns Feed Store  
**CLARKSDALE** Wilson Tractor Company  
**CLEVELAND** Cleveland Machine Company  
**GREENVILLE** Thompson Battery & Electric Company  
**GREENWOOD** R. M. Brown Implement Company  
**GRENADA** J. H. Bidy & Son  
**GULFPORT** Modern Tractor & Appliance Company  
**HATTIESBURG** Beaumont Sporting Goods Company  
**INDIANOLA** Indianola Tractor Company  
**JACKSON** Mills Morris Company, S. State Street  
**KOSCIUSKO** Wambles Machine Shop  
**LELAND** Ayres Company  
**LOUISVILLE** Taylor Machine Company  
**MACON** Noxubee Implement Company  
**MARKS** Marks Tractor Company  
**NATCHEZ** Hammett Supply Company  
**PHILADELPHIA** Moore Hardware & Implement Company  
**SENATOBIA** E. E. Moore & Company

**TUPELO** Coley-Johnson Implement Company  
**WEST POINT** Moseley Implement Company  
**WINONA** Ellis Motor Company  
**YAZOO CITY** Sexton Gardner Hardware Company  
 \* Lewis Diesel Engine Company  
 Main at Butler  
 Memphis, Tennessee  
 \* Wm. F. Surgi Equipment Company  
 1017 Magazine Street  
 New Orleans, Louisiana

#### MISSOURI

**BETHANY** Beeler Implement Company  
**BOLIVAR** Butler Implement Company  
**BOONVILLE** Boonville Equipment Co., 509 Sixth Street  
**BOWLING GREEN** Deters Farm Equipment Company  
**CAPE GIRARDEAU** Schneider Equipment Company  
 Highway 61 & Bloomfield Road  
**CANTON** Canton Implement Company  
**CARTHAGE** Jacobs Implement Company  
**CHARLESTON** French Implement Company  
**CHESTERFIELD** Chesterfield Farmer Elev. & Supply Company  
**CHILLICOTHE** Barnes Implement Company  
**CLAYTON** Lawrence J. Meisel Co., 444 South Brentwood  
**CLINTON** Mansfield's  
**COLUMBIA** Lance D. Henderson Implement Company  
**CUBA** Al West Tractor Sales  
**De SOTO** Bender-Schulz Tractor & Equipment Company  
**DEXTER** Dexter Motor & Implement Company  
**EAST PRAIRIE** French Implement Company  
**ELSBERRY** Elsberry Equipment Company  
**ESTHER** R. E. Larkin  
**FAYETTE** Bolton-Lyons Motors, 106 South Church Street  
**FREDERICKTOWN** Paul Skaggs & Sons, Highway 61  
**FULTON** Maintenance & Engineering Service Company  
**HANNIBAL** Harrison Motor Company, 3716 McMaster Avenue  
**HARRISONVILLE** Harvey Implement Company  
**HAWK POINT** Martinek's Garage  
**JEFFERSON CITY** Reithel Implement Company, 605 Mulberry St.  
**JOPLIN** Dave's Magneto Service, 1702 W. 3rd  
**KANSAS CITY** \* A. A. Klughart Machinery Company  
 1205 Woodsweather Road  
**KEWANEE** Farm Implement Company  
**KIRKSVILLE** Mitchell Implement Company  
**LANCASTER** Beeler Implement Company  
**LIBERTY** Wymore & Son  
**LOUISIANA** Farm Supply Company, 3rd & Alabama  
**MACON** Strong Equipment Company  
**MALDEN** The Stokes Motor & Implement Company  
**MARSHALL** Whitlock Coal & Implement Company  
**MARYVILLE** Carson-Wray Implement Company  
**MEXICO** Fred E. Hollingsworth, 112 Monroe Street  
**MONROE CITY** Mr. C. O. Simpson  
**MONTGOMERY CITY** Ray Oliver  
**NEOSHO** Killingsworth Motor & Implement Company  
**ORCHARD FARM** Otto Wilke  
**OWENSVILLE** Crowder & Ruffner Motor Company  
**PALMYRA** Vaughn Tractor & Implement Company  
**PARIS** Hempstead Implement Company  
**PERRY** Anderson Equipment Company  
**PERRYVILLE** Proat Implement Company  
**PILOT KNOB** Furry Equipment Company  
**POPLAR BLUFF** Miller Tractor & Implement Company  
**ROLLA** Ozark Equipment Company, Inc.  
**ST. CHARLES** St. Charles North Side Sales, Inc.,  
 1900 North Second Street  
 Otto Wilke  
**ST. CLEMENT** Deters Farm Equipment Company  
**ST. JOSEPH** Farm Supply Company  
**ST. LOUIS** \* Allied Construction Equipment Company  
 4025 Forest Park Avenue  
 Atlas Lawn Equipment Co., 9761 Olive St. Road

O. B. Avery Company, 1325 Macklind Avenue  
 Forest Park Lumber & Supply Company  
 6325 Clayton Avenue  
 Hennessey Forrestral Machinery Co.  
 705 Chestnut Street  
 Chas. G. Kruckemeyer Machine & Parts Company,  
 1365-77 Cockrill Street (Wellston)  
 Machinery Incorporated, 5081 Manchester Ave.  
 The Geo. F. Smith Company, Inc.  
 5215 Manchester Avenue

STE. GENEVIEVE Roth Implement Company  
 SALEM Floyd Brothers Implement Company  
 SEDALIA M. F. Wahrenbrock Implement Company  
 1301 South 65 Highway  
 SHELBYNA Marvin O. Jones  
 SIKESTON DeKriek Farm Equipment Co., Highway 60 East  
 SILEX Mudd Equipment Company  
 SPRINGFIELD Chapman & Whitlock Implement Company  
 Engle Implement Company  
 Tractor Sales & Service  
 Trenton Mobley & Meyer  
 WARRENTON Stoenner Farm Equipment Company  
 WASHINGTON Wilson Implement Company  
 WAYLAND Heady Equipment Company  
 WENTZVILLE

#### MONTANA

BILLINGS \* Midland Implement Company, Inc.  
 BOZEMAN Empire Auto & Implement  
 CHESTER Chester Implement Company  
 CUT BANK Cut Bank Motors  
 GLENDIVE Kampschrer Implement Company  
 GREAT FALLS Johnson Farm Equipment, Inc.  
 Midland Implement Company, Inc.  
 Bay Morrisette  
 HARDIN Steffek Equipment Company  
 HELENA Croskery-Carlson Company  
 KALISPELL Garey Motors  
 LEWISTON Lacy Implement Sales  
 MILES CITY Miles & Ulmer Company  
 MISSOULA H. O. Bell Company  
 Davies Farm Supply Company  
 PLENTYWOOD Holje Implement Company  
 SHELBY K & T Implement Company  
 WOLF POINT Ibsen Implement Company

#### NEBRASKA

AINSWORTH Kennedy Equipment Company  
 ALLIANCE Cover-Jones Implement  
 ANSELMO Anselmo Hardware & Equipment  
 AUBURN White Farm Supply  
 BAYARD Yekel Implement Company  
 BEATRICE Henderson Farm Equipment Company  
 BLOOMFIELD M & L Implement Company  
 BRIDGEPORT Bridgeport Equipment Company  
 CEDAR RAPIDS Kayton Implement Company  
 CENTRAL CITY Hilder Implement Company  
 CHADRON Chicoine Motor Company  
 CHAPPELL Deuel County Implement Company  
 Heileger & Hall  
 COLERIDGE Gene's Blacksmith Shop  
 COOK Mannaschreck Implement Company  
 FAIRBURY Ralph E. Turner & Son Implement  
 FALLS CITY Bauer Implement Company  
 GENEVA Chaney Implement  
 GIBBON Schinkel Implement Company  
 GORDON Elmer Davis Repair Shop  
 GOTHENBURG Lepp & Osterloh  
 GRAND ISLAND Midwest Farm Equipment  
 GREELEY Yilk Implement Co.  
 HASTINGS Sherman Service Center  
 HEMINGFORD Burney Bros. Implement

HOLDREGE Holdrege Machinery Company  
 KIMBALL Laramie Farm Machinery  
 LINCOLN \* Port Huron Machinery & Supply Company  
 801-813 "O" Street  
 LYONS Hans Nelson Implement & Garage  
 McCOOK Kleins Motor & Electric  
 MORSE BLUFFS Joe Fencil Repair Shop  
 NELIGH Reinke Implement  
 NORFOLK Spangenburg Implement  
 NORTH PLATTE Schlientz Implement  
 ODELL Callan Hardware & Implement  
 OMAHA American Auto Service  
 Anderson Equipment Company  
 Schoenstein Motor & Implement  
 Kolterman Service Company  
 Hamata Bros.  
 Rolfmeier Implement  
 Larson Machinery Co.  
 Hartman Vackiner  
 Iske Implement  
 Jacob Bender & Son  
 Cram Implement  
 Schroeder's Store  
 Dale Benter  
 Rowley & Walgren  
 Zobel Farm Store  
 Severson Implement

#### NEVADA

ELKO Bellinger Repair Shop  
 FALLON I. H. Kent Company  
 LUND Reid & Carter  
 RENO Sierra Machinery Company, 1025 E. 4th Street  
 WELLINGTON Smith Valley Garage & Implement Company  
 YERINGTON Lomori Bros.  
 \* Arnold Machinery Company, Inc.  
 433 West Second South Street  
 Salt Lake City, Utah  
 \* Continental Sales & Service  
 1950 Santa Fe Avenue  
 Los Angeles, California  
 \* E. E. Richter & Son  
 5725 Hollis Street  
 Emeryville, California

#### NEW HAMPSHIRE

CONCORD New Hampshire Explosives & Machinery Company  
 261 S. Main Street  
 MANCHESTER Dunbar Farm Equipment Co., 340 Massabesic St.  
 WALPOLE R. N. Johnson, Inc., Bellows Falls Road  
 \* Diesel Engine Sales & Engineering Corporation  
 Fish Pier Road  
 Boston 10, Massachusetts

#### NEW JERSEY

BLAWENBERG J. Percy Van Zandt  
 BRANCHVILLE The Roy Company  
 BRIDGETON I. Serata Sons Company  
 CAMDEN Hagner, Inc.  
 CAPE MAY Congress Auto Supply  
 FREEHOLD Sidney W. Reid, Rt. 4 - State Highway  
 GLADSTONE Ellis Tiger Company  
 GREAT MEADOWS 'B & J Farm Service  
 HARMONY Paul M. Souders  
 HIGHLAND PARK Kish Brothers  
 HIGHTSTOWN Heights Repair Shop  
 HILLSIDE H. J. Zoubek Company, Ramsey Avenue & Bley St.  
 MEDFORD Joseph Haines & Son  
 MT. EPHRAIM Donz Midget Motors Co.  
 Black Horse Pike & Valley Rd.

**MT. HOLLY** Weigel Farm Equipment Co., Route No. 38  
**NESHANIC STATION** J. S. Covert & Son  
**NEWARK** Dale & Rankin Inc., 23 Sussex Avenue  
**PLAINSBORO** Isaac Barlow & Son  
**RIVERTON** Riverton Farm Equipment Company  
**SALEM** Pearson Supply Company  
**TRENTON** Bracker Auto Electric Service, 1955 Greenwood Ave.  
**VINELAND** John Pagnano, 718 Landis Avenue  
**WESTFIELD** Storr Tractor & Equip. Company, 469 South Ave.  
**WICATUNK** Conover Bros.  
**WILLIAMSTOWN** Williamstown Motors  
 Black Horse Pike & Saybrook Rd.  
**WOODSTOWN** Owen Supply Company  
 • John Reiner & Company  
 12-12 - 37th Avenue  
 Long Island City, New York  
 • Service Supply Corporation  
 20th & Venango Streets  
 Philadelphia, Pennsylvania

**NEW MEXICO**

**ALBUQUERQUE** Bud Fisher Company  
 Contractors' Equipment & Supply Company  
**ARTESIA** Union Supply Company  
**CARLSBAD** Young Implement Company  
**CIMMARRON** Cimmarron Mercantile Company  
**CLOVIS** Bline Machinery Company  
**FARMINGTON** Justis Supply Company  
**HOBBS** Union Supply Company  
 West Texas Sales Company  
 • Central Supply Company  
 12th & Lincoln  
 Denver, Colorado

**NEW YORK**

**AMSTERDAM** Shelp & Warner Company, 24 River Street  
**AVON** Mark J. Davin  
**BOLIVAR** J & C Magneto  
**BUFFALO** R. G. Fox, 242 Hopkins Street  
**CANANDAIGUA** Donald Howard  
**COLLINS** Collins Service Agency  
**COOPERSTOWN** Earl C. Chase & Sons  
**CORAM** Municipal Machinery Company  
**DELEVAN** John L. Waring  
**DEPOSIT** Deposit Farm Supply, 147 Second Street  
**ENDICOTT** Newing Motor Company  
**HIGHLAND** W. E. Haviland & Company, Bridge Circle  
**HOMER** A. B. Brown & Son  
**HORSEHEADS** Horseheads Tractor & Implement Company  
**HUDSON** Bartnett Implement Co., Route 9, Slottsville Rd.  
**ITHACA** Allen Tractor & Equipment Service  
 901 West Buffalo Street  
**LeROY** Bickford Brothers  
**LIBERTY** Clinton P. Tompkins  
**MIDDLEPORT** Clayton & Dickinson, Johnson Creek  
**NEW YORK CITY** • John Reiner & Company  
 12-12 - 37th Avenue, Long Island City  
**ONEGO** Herbert M. Petzold Equipment Company  
 5th Avenue, Route 17C  
**PINE ISLAND** Ed. Murtha  
**POUGHKEEPSIE** J. E. Andrews Hardware Company, 279 Main St.  
**RENSSELAER** Van's Equipment Sales, Inc., Route 9  
**ROCHESTER** Keystone Builders & Supply Company, 85 Palm St.  
**SCHENECTADY** Scotia Machine & Tool Co., Inc.  
**SHERBURNE** R. R. Jones, North State Street  
**SYRACUSE** Atlantic Tug & Equip. Company, 441 S. Salina  
 Reliable Machine Motor Parts Company  
 940 North Salina Street  
**WARWICK** Harry Van Duynhover, 30 Welling Place  
**WALDEN** Orange Tractor & Equipment Company  
**WATERLOO** Finger Lakes Equipment Company

**WATERTOWN** Northern Implement Company, 215 Coffeen St.  
**WEBSTER** Earl D. Wright, 178 Phillips Road

**NORTH CAROLINA**

**AHOSKIE** L. S. Jernigan & Son  
**ALBEMARLE** Hatley Supply Company  
**ASHEBORO** Southern Motors & Equipment Company  
**ASHEVILLE** Fitzpatrick & Sons  
**BEAUFORT** Barbour's Marine Supply Company  
**CHARLOTTE** Contractors Service, Inc.  
 H. B. Owsley & Son  
 C. S. Proctor Implement Company  
 E. J. Smith & Sons Company  
 Johnson Cotton Company

**DUNN** J. C. Markham & Sons  
**DURHAM** Farmers Supply Company  
**ELIZABETH CITY** Turnell & Morgan  
**ELKIN** Hineshaw Implement Company  
**FAYETTEVILLE** Proctor-Barbour Company  
**FUQUAY SPRINGS** Proctor-Barbour Company  
**GOLDSBORO** Johnson-Sherman  
**GRAHAM** Foster Farm Machinery Company  
**GRANITE FALLS** F. L. German Motor Company  
**GREENSBORO** • E. F. Craven Company  
**GREENVILLE** R. F. McLawhon & Sons  
**HAMILTON** Everett-Mattews Equip. Company  
**HENDERSONVILLE** Francis & Wright, Inc.  
**KINSTON** Johnson-Sherman Company  
**LENOIR** Sharpe Auto Repairs  
**LEXINGTON** Leonard Machine Shop  
**LUMBERTON** Johnson Cotton Company  
**OXFORD** Morton-Sherman Implement Company  
**RALEIGH** S. M. Crocker & Son  
**ROCKY MOUNT** Dillon-Goldston Implement Company  
 Johnson Cotton Company  
 Budd-Mann Company  
 Matchiner Truck & Tractor Company  
 Floyd C. Price & Sons  
 O. E. Ford Company  
 Roberts & Wellons Machinery Company  
 Watts & White Machine Company  
 Casper Marine Service  
 Teal Implement Company  
 W. C. Mallison & Son  
 S. L. Fuller & Company  
 Reddick Equipment Company  
 Marks Machinery Company  
 Etchinson Machine Works

**NORTH DAKOTA**

**BEACH** W. L. Hammond  
 Hardy Motor Company  
**BELFIELD** A. J. Krushensky  
**BISMARK** Western Auto Parts Company  
**BOTTINEAU** Bottineau Implement  
**BOWBELLS** Bowbells Hardware & Implement Company  
**BOWMAN** Omer Sheets  
 Stuber Farm & Ranch Store  
**CARRINGTON** Nicholson & Carr  
**COOPERSTOWN** Griggs County Implement  
**CROSBY** Gubrud Implement  
**DEVILS LAKE** Western Auto Parts Company  
**DICKINSON** Bogner Implement  
 Hecker Garage  
 Slope Motor Implement  
**DUNN CENTER** Dunn Center Motor  
**EDGELEY** Kipp Chevrolet  
**EDINBURG** Evenson Machine Company  
**ELGIN** Alt Supply  
 Laub Motor Sales  
 Dakota Motor  
**ENDERLIN**

EPPING Epping Motor Company  
 FARGO Myhra Equipment  
 Western Auto Parts Company  
 FLORA R. Pope  
 FESSENDEN Wells County Implement  
 FORMAN Dahl Implement  
 Forman Implement  
 GLADSTONE Gladstone Lumber Company  
 GLEN ULLIN Curfew Elev. Company  
 Glen Ullin Roller Mills  
 Zeidler Implement  
 GRAFTON Legwold Farm Equipment  
 GRAND FORKS Price Implement  
 GRENORA Seltvedt Implement  
 HARVEY Hazen Motor Company  
 HAZEN Wolter's Supply  
 HEBRON Clark Motor Company  
 HETTINGER Hettinger Implement  
 Aalsaker Implement  
 HILLSBORO Fuller Land Company  
 HOPE Michelson Implement  
 JAMESTOWN Western Auto Parts Company  
 KILLDEER Dunn Center Motor Company  
 Motor Inn  
 KINDRED Plath Implement  
 LaMOURE LaMoure Auto Implements  
 LANGDON LeBrun Implement  
 LANSFORD Lansford Implement  
 LINTON Linton Auto & Implement  
 MADDOCK General Supply  
 MANDAN Western Auto Parts Company  
 MAYVILLE Moen Implement  
 MEDINA Medina Implement  
 MINOT \* Western Auto Parts Co., 308 - 2nd Street, S.W.  
 Waterman Implement  
 MOHALL Steinberg Implement  
 MOTT Wangsvick's Implement  
 NECHE Letzring Implement  
 NEW ENGLAND New England Implement  
 NEW ROCKFORD Shafer Machine Shop  
 NEW SALEM Toepeke Chevrolet  
 OAKES Emil Tedin  
 PAGE Ruthford Hardware  
 RAY Ray Implement Company  
 REEDER Walch Bros.  
 REGENT Farmers Union Oil Company  
 RICHARDSON Jos. Kilzer & Sons  
 ROLLA Rolla Implement  
 SOURIS Oscar Olson  
 SOUTH HEART Farmers Union Oil Company  
 UPHAM Anderson Implement  
 VENTURIA Tesky Garage  
 WALHALLA Walhalla Motor  
 WESTHOPE Page Motor Company  
 WILLISTON Gubrud Bros.  
 Western Auto Parts Company  
 WILLOW CITY C. G. Emery

**OHIO**

ADA Mallow Farm Service, 514 N. Johnson  
 AKRON Belts Farm & Garden Supply, R.F.D. 1, Box 76  
 Gauer Service & Supply, 676 E. Waterloo Road  
 ALVADA Alvada Tractor Sales  
 AMANDA Young Bros.  
 ANDOVER Sage Tractor & Implement Company  
 APPLE CREEK D.E. Miller Repair, R.D. 1  
 ARCHBOLD Grieser's Farm Equipment Company  
 ATHENS Nye Chevrolet Company  
 ATTICA The E. & W. Implement Company  
 AVON Avon Hardware & Equipment Co., 36735 Detroit Rd.  
 BALTIC Farmerstown Machine Company  
 BATAVIA Anstaeft Farm Service

BELLEFONTAINE Hartley & Nicholls  
 BELLEVUE Danklefsen Tractor & Implement Company  
 Lees Auto Parts, Inc.  
 BELOIT Westville Farm Supply  
 BIRMINGHAM Howe & Bickel  
 BLUFFTON Bluffton Farm Equipment  
 BOWLING GREEN The Banting Company, North Main  
 BREMEN Bremen Hardware  
 BRUNSWICK Brunswick Feed & Implement  
 BRYAN Wood Farm Store, R.F.D. 3  
 BUCYRUS A. J. Halliwell Implement Sales,  
 227 North Sandusky Avenue  
 Ridgerton Elevator, R.F.D.  
 Underwood Tractor Sales  
 J. Ed Sinclair  
 CALDWELL R. D. Buckley  
 CAMBRIDGE Major Equipment Company, 919 Woodlawn Avenue  
 CANFIELD C. O. Probst  
 CANTON Linder Bros. Farm Equipment, R.D. 3  
 CASTALIA R. W. Downing  
 CENTERVILLE Smith Hurst Tractor Sales  
 CHILLICOTHE Drummond Implement Company  
 CINCINNATI \* Cincinnati Engine & Parts Co., 2525 Vine St.  
 Van Atta Seed Company  
 CIRCLEVILLE Wood Implement  
 CLEVELAND Farm Supplies & Power Equipment Company  
 4681 Broadview Road  
 Charles M. Ingersoll, 19930 Detroit Road  
 COLLEGE CORNER College Corner Implement Company  
 COLUMBIANA Paul Witmer & Sons, R. D.  
 COLUMBUS The Adams-Barre Company, 1244 N. High Street  
 Jacobsen Power Lawn Mower Company  
 833 Grandview Avenue  
 Howe-Simpson, Inc., 136 E. Gay Street  
 Shepard Auto Service, 880 Sunbury  
 Trego Farm Supply, 1020 Goodale Blvd.  
 R. E. Woodin Sales Company, 273 E. Spring Street  
 Ivor M. Parker, 401 E. Maple Street  
 CLYDE  
 COLDWATER Dues & Lefeld  
 CORTLAND Keesecker Implement Company  
 COSHOCTON F. D. McIntosh  
 CYGNET Clift Implement Service  
 DANVILLE McMillan Farm Implement  
 DAYTON Flack Equipment Company  
 Ludlow Battery & Ignition Company  
 Strader Garage  
 DELAWARE Greasamar Bros., 115 E. Winter Street  
 Hart & Stout, 36 N. Union Street  
 Eshelman Hill Grain Company  
 DERBY Crawford Bros. Garage  
 DESHLER  
 EAST PALESTINE Rockenberger Motor Parts Service  
 EATON Barber & Conley  
 EDISON Bolinger Bros.  
 ELIDA Suburban Machine Shop, Box 21  
 ELYRIA Eldo-Tread Tire & Supply Co., 109-111 Broad St.  
 Elyria Truck & Implement, Oberlin Road  
 Kane Implement & Supply, Inc., R.F.D. 2  
 HARRY SMOKE  
 ETNA Harry Smoke  
 J. M. Jackson  
 EWINGTON J. M. Jackson  
 FLETCHER McDowell Brothers  
 FOREST Tong Tractor Sales  
 FREDERICKTOWN Fredericktown Farm Supplies  
 FREMONT Goodman Equipment  
 GALENA John W. Shultz Sales & Service  
 GALION Galion Farm Service, Inc., 322 S. Market St.  
 GALLIPOLIS White Implement Company, 218 3rd Street  
 GENEVA Fortier Supply Company  
 GRAFTON Grafton Motor Sales, Inc.  
 GREENVILLE Dancer's Garage, 304 - 12th Street  
 GREENWICH Troxel Farm Supplies  
 HARRISON Strimple Implement Company  
 HARTVILLE Archs Implement & Supply  
 HARVEYSBURG Charles Doster Implement Company



**HILLSBORO** Burch Tractor & Implement Company  
**HOLMESVILLE** Miller Harness & Shoe Shop, R.D. 1  
**JACKSON CENTER** Wiessinger Sales  
**JOHNSTOWN** Childers Farm Equipment  
 Farmer's Supply  
**KENTON** McFadden Implement Company  
**KINGSTON** Jones Implement Company  
 Kingston Sales & Service  
**LANCASTER** Faler Hardware, 821 W. Fair Avenue  
**LEBANON** McCurley Implement Company  
**LEWISVILLE** Elmer H. Egger  
**LIMA** Flack Equipment Company, 1420 Elida Avenue  
**LISBON** Diesel Service Co., Inc., 234 E. Washington Street  
 Shaw-Stapleton, 112 W. Washington Street  
**LIVERPOOL** Turk, Inc., North 6th Street  
**LOGAN** Fred Hack Auto Supply, 120 E. Main Street  
**LONDON** Martin Welding Shop, 67 N. Central Street  
**LOWELL** H. W. Wagner, Walnut Street  
**MALINTA** Heckler & Son  
**MALTA** The Morgan County Farmers Elev.  
**MANSFIELD** Luat Implement Company, 140 N. Main Street  
**MARIETTA** Farm & Orchard Supply Company, 619 Third Street  
 Marietta Ignition Service Sta., 181 Front St.  
**MARION** Dutt Implement Store  
 Marion Implement & Supply Co., 1027-29 N. Main St.  
 Marion Tractor Sales, Box 482  
**MARYSVILLE** Navin Implement & Supply Company  
**MASSILLON** Massillon Quality Supply Company  
**McARTHUR** George Benson & Son  
**McCLURE** McClure Sales & Service  
**MEDINA** Patry Implement Store, 120 N. Court Street  
**MENTOR** Earl Ives Equipment Co., 1585 Mentor Avenue  
**MIDDLEFIELD** Wm. E. Hostetler  
**MILAN** Mayers & Heckelman  
**MILLERSBURG** Beech Farm Service  
 Kline & Kauffman, R.D. 5  
 Millersburg Hardware & Supply  
**MINSTER** Strescher's, 19 S. Main Street  
**MT. ORAB** Donlay Tractor Sales  
**MT. STERLING** Emrick Implement Company  
**MT. VERNON** Earl Levering  
 Mt. Vernon Farmers Exchange, 400 W. Vine Street  
**NEW HOLLAND** Holland Garage & Implement  
**NEW KNOXVILLE** Jauret & Hoelscher Company  
**NEW LEXINGTON** Householder Tractor Supply, Box 262  
**NEW PHILADELPHIA** Sam Bond Sportman's Supply  
 222 Second St., S.W.  
**NEW WASHINGTON** Bishop Supply & Oil Company  
**NEWARK** Bowman Auto Parts, 47-51 W. Main Street  
 Wilkin Farm Store, 21 N. 4th Street  
**NORTH CANTON** North Canton Repair Shop, 110 Sixth Street  
**NORTH FAIRFIELD** Ralph J. Underwood  
**NORTH LIMA** Clabaugh Garage, R.D. 1  
**OAK HARBOR** Oak Harbor Tractor Sales, 300 W. Water  
**OBERLIN** Si Buchs & Sons, R.D. 2  
 Houghton Brothers, R.F.D. 1  
**PANDORA** Donald McDowell, Box 454  
**PATASKALA** Parr Implement Company  
**PAULDING** Sinn Repair Shop  
**PLAIN CITY** Plain City Implement Company  
**REPUBLIC** Hartzel Implement Store  
 Wolfe Tractor Sales  
**RUSSELL'S POINT** Wedge Boat & Motor Sales  
**RUSSELLVILLE** Russellville Implement Company  
**ST. CLAIRSVILLE** Efew Battery & Electric Company  
 303 S. Market Street  
**SALEM** Salem Service & Supply, 135 S. Howard Street  
**SANDUSKY** Motor Equipment Sales Inc., 1720 Mills Street  
 Perry Implement Store  
**SCIO** John B. Harrison  
**SCIOTOVILLE** Wagner Implement Company  
**SHILON** Huston Implement Company  
 Kissell Tractor Sales, R.F.D. 2

**SOMERSET** Kimpel Sales Company  
**SOUTH ZANESVILLE** Zanesville Rubber & Supply, 71 Maysville St.  
**STEBENVILLE** Fellows Feed & Supply Company  
**SUGAR CREEK** Miller Implement & Appliance  
**THOMPSON** G. B. Crandall Company  
**TIFFIN** Dettmerman Tractor-Sales  
 H. Walton & Son  
**TOLEDO 4** Flack Equipment Company, 235 Broadway Avenue  
 The Banting Company, 1150 Central Avenue  
**TROY** Jackson Implement Company  
 Sarver Implement Company  
**UHRICHSVILLE** Allis Chalmers Sales & Service, R.F.D. 2  
**URBANA** Baker Tractor Company  
**UPPER SANDUSKY** Schmidt Machine Company  
**VAN WERT** Wortman Bros. Company, 214 N. Market Street  
**VERMILLION** Marks Welding Shop  
**VERSAILLES** Rosenbeck Implement Company  
**WAKEMAN** W. W. Hooker & Son  
**WAPAKONETA** White's Garage  
**WASHINGTON C.H.** Don Scholl, 206 E. Market Street  
 Washington Implement Company  
**WAUSEON** Richer Motor Company, Fulton Street  
**WELLINGTON** United Welding Company, R.F.D. 2  
**WELLSTON** Deinser Auto Parts Company  
**WESTVILLE** Smith Farm Equipment  
**WILLARD** Heisler's, Inc., Box 179  
**WILLIAMSFIELD** Lipps Bros.  
**WILMINGTON** C. M. Hale, Wayne Road  
**WOODSFIELD** Graham Machine Shop  
**WOODVILLE** C. F. Kaeming Estate  
**WOOSTER** Agricultural & Industrial Service  
 Wooster Farm Equipment Co., U.S. Route 30, W.  
**XENIA** King Tractor Sales, 991 N. Detroit Street  
**YOUNGSTOWN** • McCune & Company, 3721 Mahoning Avenue  
 Stiles Service Shop, 3425 Market Street  
 Geo. H. Gillogly's Stores  
 • Eagle Machine Company, Inc.  
 635 E. Market Street  
 Indianapolis, Indiana

#### OKLAHOMA

**ADA** Theimer Implement Company  
**ALVA** Devery Implement Company  
**ARDMORE** Murphey Machine & Supply Company  
**ATOKA** Setliff Implement Company  
**BLACKWELL** Chermack Farm Equipment Co., 809 S. Main St.  
**BRISTOW** R. A. Krumme, 207 E. 7th Street  
**CLINTON** Fred W. Wagner, Sales & Service  
**CORDELL** Hagin Farm Equipment Company  
**DEWEY** Star Machine Works  
**DUNCAN** Motor Parts & Service Company  
**DURANT** Durant Implement Company  
**EL RENO** Vieth Bros.  
**ENID** Art's Machine Shop, 412 N. Independence  
**FREDERICK** Frederick Hardware Company  
 Whittler Implement Company  
**GUTHRIE** Oil Fields Manufacturing Company  
**GUYMON** Claycomb Electric Company  
**HEALDTON** Lewis Magneto & Ignition Company  
**HOLDENVILLE** H. D. Maloy Implement Co., 111 S. Creek Street  
**KINGFISHER** Vieth Bros., 106 E. Miles Street  
**LAWTON** Lawton Machine Shop  
**LINDSAY** Crawford Products Company  
 Garrett Engine Service, 119 North Main Street  
**MADILL** Sterling Machinery Company  
**McALESTER** Gene Jackson Farm Machinery, 417 South Second St.  
**MEDFORD** Scouten-Webster Equipment Company  
**MUSKOGEE** Warren Kelly Machinery Company  
**NOWATA** Keystone Supply Company  
 Standard Parts Company  
**OKLAHOMA CITY** Victor L. Phillips Co., 1222 West Main Street

Wylie-Stewart Machinery Company, Inc.  
1400 Exchange Avenue

**PAULS VALLEY** Jackson Machine Shop  
McGee Implement Company  
**PERRY** Wurtz & Wurtz Motor Company  
**SAPULPA** Sapulpa Motors, Inc., 215 S. Main Street  
**SHAWNEE** Magneto Ignition Company  
**TAHQQUAH** Crawford Products Company, 320 N. Broadway  
**TOKKAWA** Max Squvres Equipment Co., 110 W. Shawnee  
**TULSA** Charles Jueschke Agricultural Equipment  
**WARWICK** \* Harley Sales Company, 319 Tri-State Building  
**WEBBERS FALLS** Seaba Mfg. Company, Inc.  
**WOODWARD** Conley Service Station  
Gilbert Maytag Company

#### OREGON

**ALBANY** Herrold & Jensen  
**BEND** Moty & Van Dyke  
**CANBY** Elmer Anderson  
**CORVALLIS** Corvallis Implement Company  
**THE DALLS** Dielschneider Equipment  
Mid-Columbia Supply & Equipment Company  
**EUGENE** E. O. Drake  
Ed Jensen Company, Elmira Road  
**FLORENCE** Florence Welding  
**GRANTS PASS** Millers Seed & Feed  
**HILLSBORO** Roy W. Heinrich  
**KLAMATH FALLS** Crater Lake Machinery  
**LAKEVIEW** Brown Equipment Company  
**MEDFORD** Cal.-Ore. Machinery  
**NORTH BEND** Bob's Magneto & Repair  
**ONTARIO** Nicholson Service & Supply Company  
**PENDLETON** Jack Allen Supply  
**PORTLAND** \* Andersen Machinery, 404 N. W. Broadway  
**PRINEVILLE** Diets Implement  
King Bros. Equipment  
**REDMOND** King Brothers Equipment  
**ROSEBURG** Douglas County Co-op.  
**SALEM** Baldwin-Mount  
A. C. Haag & Company, 40 Silverton Road  
**TILLAMOOK** Tillamook Implement Company, 1 East First St.  
**WOODBURN** Norman's Service Station

#### PENNSYLVANIA

**ALBION** John Duda  
**ALQUIPPA** Walters Farm Service, R. D. #1  
**ANNVILLE** Weaver's Farm Service, R. D. #1  
**ANSELMA** Howard White  
**ARENDTSTVILLE** Cameron L. Hoffman  
**ATGLEN** John B. Lapp  
**BELLEFONTE** E. J. Gentzel, R. D. #2  
**BELLEVILLE** Valley Sales & Service  
**BERNEVILLE** Stanley Klopp  
**BETHLEHEM** Fox Machine Shop  
**BIGLERVILLE** L. W. and M. S. Kleinfelter  
**BLUE BALL** Snavely's Farm Supply Company  
**BRADFORD** Bradford Supply & Equipment Company  
**BRIDGEVILLE** A. O. Newton Company  
**BUTLER** Farm Equipment Company, 231 E. Jefferson Street  
Hindman Farm Supply  
**CAMP HILL** L. B. Smith  
**CARLISLE** Ernest Shover  
**CHAMBERSBURG** Paul Byers  
**CLARENDUM** Fullerton Machine Company  
**CLEAR FIELD** Clearfield Equipment Company  
**COCHRANTON** John Oakes  
**CONNELLSVILLE** Beck Creek Lumber Company  
**CORSICA** Clair Kennedy, Box 12  
**DARLINGTON** (Beaver County) F. D. Walters  
**DILLSBURG** Harbold's Garage  
**DOYLESTOWN** Doylestown Agricultural Co.

**EAST BERLIN** M. B. Burgard, R. D. #3  
**EAST STROUDSBURG** Van D. Yetter, Jr., R. F. D. 2  
**EDINBORO** R. R. Walker & Son, 113 Erie Street  
**ELIZABETHVILLE** Swab Wagon Company  
**EPHRATA** Hamilton Equipment Co., Box 178  
**ERIE** Jorgenson's Garage, 1925-1929 W. 26th Street  
**FAIRVIEW** Earle E. Struchen  
**FARMERSVILLE** Farmersville Equipment Company  
**FLICKSVILLE** Vough Repair Shop  
**GAP** Geo. Sellers & Sons  
**GAUGHKENAMON** Mushroom Supply Company  
**GILBERT** A. E. Krose  
**GREENCASTLE** Harry Friedly  
Meyers Implement Company  
**GREENVILLE** Oakes & McClelland  
**HANOVER** Sheets Bros.  
**HARRISBURG** Highway Equipment Co., 840 South 19th Street  
**HAZLETON** Hazleton Machinery & Equipment Company  
**HERNDON** Wilhour Bros. Garage  
**HONESDALE** Geo. W. Kinaman, Main Street  
**HUGHESVILLE** Hughesville Machine Tool Company  
**INDIANA** H. D. Fair Store, 329 N. 4th Street  
**INTERCOURSE** Charles Hooper  
**JERSEY SHORE** Pepperman's Garage, R. D. #2  
**JERSEYTOWN** W. O. Diehl  
**JONESTOWN** Leroy Fake  
**KENNETT SQUARE** Tunis Bros. Co., Broad & Berks Streets  
**KINGSTON** E. F. Schmaltz, 314 Wyoming Avenue  
**KINZER** Arthur Young Company  
**KITTANNING** White's Farm Supply  
**KNOX** Graff's Implement Service, R. D. 2  
Knox Farm Service  
**KUTZTOWN** Harry Knittle  
**LANCASTER** \* Lancaster Engineering Corporation  
L. H. Brubaker, R. R. #4  
Herr The Pump Man, 211 Ann Street  
Ceel Service, Highway 1, R. D. 2  
**LANGHORNE**  
**LEBANON** Elmer Plasterer, R. D. #5  
**LIBERTY** Liberty Garage  
**LITTLESTOWN** Melvin J. Sheffer, 232 N. Queen Street  
**MACUNGIE** Macungie Supply Company  
**MARTINDALE** A. W. Stauffer  
**MCCONNELLSBURG** J. W. Snyder  
**MC EWENSVILLE** H. R. Shearer  
**MENDENHALL** Mendenhall Supply Company  
**MERCER** Mercer County Implement Company  
**MILLWAY** J. H. Reitz  
**MOUNT HOLLY** Paul's Motor Service  
**MOUNT JOY** J. B. Hostetter & Son  
**NEFFS** (Lehigh County) J. M. Snyder  
**NEW BRIGHTON** Farmers Store  
**NEW CASTLE** Lindsey Electric Service, 114 N. Jefferson  
**NEW HOLLAND** A. B. C. Groff  
Snavely's Farm Service  
**NEW PROVIDENCE** Walter McVey  
**NEWPORT** A. C. Schill  
**PALMYRA** N. J. Bashore  
**PHILADELPHIA** \* Service Supply Corporation  
20th & Venango Streets  
**PHILIPSBURG** Meyer Bros. Industrial Service Company  
**PITTSBURGH** \* Contractors Equipment Service Company  
1415 Brighton Road  
**PITTSTON** Medico Electric Motor Company  
**PORTLAND** Brands Motor Company  
**POTTSVILLE** Ost & Ost, 13th & Laurel Streets  
**READING** Berkleigh Tractor & Equipment Company  
449 Lancaster Avenue  
Geo. D. Lessig & Son, 763 North 12th Street  
Lebanon Valley Implement Company  
**RICHLAND**  
**RIEGELSVILLE** Walter A. Smith  
**RIMERSBURG** Lazarine & Tremba Company  
**RONKS** Lester Singer  
**SCRANTON** Scranton Tractor & Equipment Company

**SHARTELSVILLE** Sprague & Henwood  
**SHIPPENSBURG** Joe Kauffman  
**SILVERDALE** John Haberling  
**SPRING HOUSE** I. G. Rosenberger Company  
**STEWARTSTOWN** Alvin G. McClellan, Route 309  
**STOCKERTOWN** Robert Sweeney  
**TOWER CITY** J. A. Lapreati  
**TURBOTSVILLE** Tallman Bros.  
**TUNKHANNOCK** Cooper's Hardware  
**VERONA** Gay-Murray Company  
**WAYNESBORO** Oakmont Motor Supply, 733 E. Railroad Avenue  
**WAYNESBURG** Paul H. Stauffer, 45 E. 2nd Street  
**WESCOSVILLE** Long Tractor Sales, Porter Street  
**WEST CHESTER** B. W. Clauser, R.F.D. #1  
**WEST GROVE** Fruit Growers of Chester, 250 S. Franklin Street  
**WEST WILLOW** S. G. Lewis Company  
**WILLIAMSPORT** Cope & Weaver Farm Equipment Co., Willow St.  
**WYSOX** Servall Machinery & Supply, 140 E. 3rd Street  
**YORK** Robert Kneller  
 Burgard Bros.

**RHODE ISLAND**

\* Diesel Engine Sales & Engineering Corp.  
 Fish Pier Road  
 Boston 10, Massachusetts

**SOUTH CAROLINA**

**CHARLESTON** Charleston Supply Company  
 Marine Shops  
**COLUMBIA** \* Columbia Supply Company, 823 Gervais Street  
**CONWAY** Conway Agency  
 Eastern Sales Company  
**FLORENCE** Turner Implement Co., Inc.  
**GREENVILLE** Greenville Implement Company  
**GREENWOOD** Bourne Auto Parts Company  
**HARLEYVILLE** L. A. Utsey  
**INMAN** Prince Grove Supply  
**SUMTER** McLean Farm Equipment Company  
**TATUM** C. M. Steward

**SOUTH DAKOTA**

**ABERDEEN** Aberdeen Implement Company  
**ALCESTER** Jacobson Implement  
**ARLINGTON** Kneip Implement Company  
**ARMOUR** Armour Implement Company  
**ARTESIAN** Vernie Asper Implement Company  
**ATHOL** Kegler Implement Company  
**BANCROFT** Geo. A. Perry Company  
**BELLE FOURCHE** Belle Fourche Implement Company  
**BISON** Bison Service Station  
**BONESTEEL** Spitzenberger Implement Company  
**BOWDLE** J. Kurle & Sons  
**BRITTON** Thorp Auto Company  
**BROOKINGS** Eugene Beckman Implement Company  
**BRYANT** Matt Kruse  
**BURKE** McFarland Implement Company  
**CHAMBERLAIN** Raish Brothers Implement  
**DELL RAPIDS** F. N. Ginsbach  
**DE SMET** T. J. Williamson  
**EAGLE BUTTE** Eagle Butte Implement Company  
**ELK POINT** Busker Implement Company  
**FIRESTEEL** Herman's Implement Company  
**GARRETSON** Rademacker Implement Company  
**GETTYSBURG** Gettysburg Motor Company  
**GROTON** Berry & Warth  
**HECLA** Hecla Implement Company  
**HERRIED** Huber & Son  
**HOT SPRINGS** Hot Springs Implement Company  
**BOVEN** A. J. Herrick  
**IPSWICH** Wall Implement Company

**IROQUOIS** Salter & Schoenfelder  
**ISABEL** Isabel Trading Post  
**LAKE PRESTON** Kiel Implement Company  
**LEMMON** Krischen Implement Company  
**LEOLA** Becker Implement Company  
**McINTOSH** Peterson Implement Company  
**MANSFIELD** Koester Implement Company  
 Wiltfang Brothers  
**MILBANK** Milbank Implement Company  
**MORRISTOWN** Ed Kouril Implement Company  
**NEW EFFINGTON** Bredvik Implement Company  
**NORTHVILLE** Haselhorst Implement Company  
**ONIDA** Day Implement Company  
**PIERRE** Wegner Auto Company  
**RAPID CITY** S. Dak. Equipment Company  
**REE HEIGHTS** Max Curtis Service Station  
**ROSHOLT** Warner Implement Company  
**SELBY** Rabensberg Implement Company  
**SIoux FALLS** \* Pecaut Industrial Supply Company  
 900 E. 8th Street  
 General Mills, Inc.  
 West Sioux Falls Hardware  
 Dakotsa Equipment Company  
**SISSETON** Spearfish Implement Company  
**SPEARFISH** Halm Implement Company  
**TIMBER LAKE** Swenson & Donahue  
**VERMILLION** Hubbard & Company  
**WATERTOWN** Harry C. Walker & Company  
**WEBSTER** Porter Chevrolet Company  
**WILMOT** Cowman & Hicks  
**YANKTON**

**TENNESSEE**

**ALAMO** Byrd Implement Company  
**ATHENS** Dixie Motor Company  
 Hart's Automotive Parts Company  
 Smith Tractor Company  
**BRISTOL** Maden Motors, Inc., Cumberland & Lee Streets  
**CHATTANOOGA** \* Hart's Automotive Parts Company  
 1230 Market Street  
 Brooks Equipment & Mfg. Company  
 Brooks Welding Supply Company, 1201 Chestnut St  
 Hailey Chevrolet Company  
 Nixon Machinery & Supply  
 Osborne Equipment Company  
**CLARKSVILLE** Black Patch Implement Company  
 Williams Motor Company  
**CLEVELAND** Hart's Automotive Parts Company  
 Fred Robinson Implement Company  
**COLUMBIA** Farmer's Implement Company  
**COOKEVILLE** Dunn's Auto Parts Company  
**COPPERHILL** Copperhill Auto Supply Company  
**CROSSVILLE** Plateau Truck & Equipment Company  
**DAYTON** C. A. Downey Motor Company  
**DUNLAP** Berker's Service Station  
**DYERSBURG** Tri-County Equipment Company  
**ERWIN** Erwin Auto Parts Company  
 Yearwood Motor Company  
 Warren Farm Service  
**FRANKLIN** Iddins Machinery Company  
**GREENVILLE** Halls Grain Company  
**HALLS** Browder Motor Sales  
**HARRIMAN** Hart's Automotive Parts Company  
 Wilson Welding Company  
**JACKSON** Marion County Motor Company  
**JASPER** Thorpe Auto Parts Company  
**JOHNSON CITY** Young Supply Company  
 Mills Motor Company  
**KINGSPORT** Brooks Equipment & Mfg. Company  
**KNOXVILLE** Iddins Machinery Company  
 Osborne Equipment Company  
 Power Equipment Co., 1218 Island Home Avenue  
 Wilson, Weesner & Wilkinson, 202 W. Morelis Ave.

**LaFOLLETTE** Motor Grinding Company  
**LAWRENCEBURG** Niedergesies Bros.  
**MANCHESTER** Coffee County Implement Company  
**MARYVILLE** Hart's Automotive Parts Company  
**McMINNVILLE** Slotton Implement Company  
**MEMPHIS** \* Lewis Diesel Engine Company, Main at Butler  
 Choctaw, Inc.  
 Clarkkey Company  
 Hawkins Equipment Company  
 Hurley Tractor Company  
 Tri-State Equipment Company  
 Weakley Equipment Company  
**MORRISTOWN** Morristown Equipment Company  
**MURFREESBORO** McFarland's Farm Implement Company  
**NASHVILLE** Industrial Supply Company, 420 LaFayette St.  
 McCarthy, Jones & Woodland  
 Nashville Warehousing Company  
 Nixon Machine & Supply Company  
 Wilson-Weeener-Wilkinson Company  
**NEWPORT** W. R. Ness & Company  
**OOlTEWAH** Fred Robinson  
**PARIS** Chenoweth Implement Company  
**PULASKI** Abernathy Grain & Feed Company  
**RIPLEY** Morris Farm Equipment & Supply Company  
**SELMER** Selmer Implement Company  
**SHELBYVILLE** Farm Service Supply Company  
**SOUTH PITTSBURG** J. D. Heiskell  
**SPRINGFIELD** Long & Lucas Implement Company  
**SUNBRIGHT** England Motor Company  
**SWEETWATER** Guthrie Bradley & Jones  
**TULLAHOMA** England Motors  
**UNION CITY** Jackson Implement Company  
**WINCHESTER** Rieben Electric & Machinery Company

**TEXAS**

**ABILENE** Bud Mitchell Garage, 817 Walnut  
**ALICE** Lynn Bros. Garage  
**AMARILLO** Overton & Mims, Inc., 713 E. 10th Street  
**AUSTIN** Austin Machine & Grinding Company  
 219 East 5th Street  
**BALMORHEA** Sprague's Auto, Truck & Tractor Service  
**BEAUMONT** Simmonds Motor & Machine Company, 380 Pine St.  
**BONHAM** Brown Tractor Company  
 Teel Maintenance Service, 1280 S. 4th Street  
**BRADY** A. H. Broad Company  
**BRENEAM** Brentex Tractor Company  
**BROWNSVILLE** Delta Machine Company  
**CISCO** The Walton Electric Company  
**CLEBURNE** Zimmerman & Sons Company  
**COLORADO CITY** Diesel Service Company, 242 W. 4th Street  
**CORPUS CHRISTI** C. E. Russell, Jr., 104 S. Chaparral Street  
**DALLAS** Conley-Lott-Nichols Machinery Company  
 1311 S. Ervay Street  
 P. A. Ross Machinery Company, 3120 Grand Avenue  
**DONNA** Bell Hardware & Implement Company  
**EDINBURG** Cameron Auto Electric Co., 501 E. Harriman St.  
 Equipment Specialties Co. Inc., 222 No. Cloanser  
**EL PASO** Burdick & Burdick, 1701 Myrtle Avenue  
 Tri-State Equipment Company  
 Francis Wagner Company, 1225 Texas Street  
**ENNIS** Ennis Tractor Company, 300 West Brown  
**FORT WORTH** Willis Lee Air-Cooled Engine Service  
 414 West Weatherford Street  
 The Jno. Muller Company, 2nd & Taylor Streets  
**FREDERICKSBURG** Fredericksburg Machine Shop  
**GAINESVILLE** Gainesville Auto Parts, 208 North Dixon  
 S & H Supply Company, Box 579  
 R. H. King Supply Company  
**HARROLD** Weatherby-Davis Company, 200 S. Waco Street  
**HILLSBORO** \* Harley Sales Company, M & M Building  
**HOUSTON** Sabine Machine & Supply Company  
**KILGORE** Janssen Bros.  
**LaGRANGE**

**LAMESA** Shepherd Battery & Electric Co., 213 No. 1st St.  
**LAREDO** Laredo Implement Company, 509 Market Street  
**LEVELLAND** Tom Waters Battery & Electric  
 410 East Houston Street  
**LITTLEFIELD** G. & A. Plumbing & Supply Co., 308 West Second  
**LONGVIEW** Industrial Power & Supply Co.  
 1220 Gladewater Road  
**LUBBOCK** Fred Berryhill Equipment Co., 710 Avenue "Q"  
**MARSHALL** Power Supply Company, 208 Lafayette  
**McALLEN** Cameron Auto Electric Service, 917 Austin St.  
 J. E. Morgan Company, 501 East Hiway  
**McKINNEY** City Auto Parts Company, So. Chestnut at Davis  
**ODESSA** Davenport Engine & Equipment Co., 212 N. Lincoln  
**PAMPA** Redcliff Bros. Electric Company, Box 151  
**PARIS** R. H. Deaton Tractor Co., 257 First St. S.W.  
**PERRYTON** Davis Implement Company  
 S.E. 8th Avenue & S.E. 1st Street  
**PORT ARTHUR** Port Arthur Motor Works, 1147 Savannah Avenue  
**ROCKPORT** Rice Boat Company  
**SAN ANGELO** San Angelo Supply Company, 408 S. Oakes St.  
**SAN ANTONIO** Gibtrac, Inc., Highway 281 & S. Flores Street  
**SAN SABA** W. T. Vogel & Sons  
**SANDERSON** O. T. Sudduth  
**SHERMAN** Clark Equipment Company  
**STEPHENSVILLE** John Wilkins Implements  
**STONEWALL** Simon J. Burg Sprayer Company  
**SWEETWATER** Sweetwater Electric Company  
**TEMPLE** Laramey Implement Company  
**TEXARKANA** Texarkana Machinery Company  
**TYLER** Hobbs Equipment Company, 2021 W. Erwin Street  
**WACO** The Motor Shop, 420 South 5th Street  
 Richards Equipment Co., 4th & Washington  
**WAXAHACHIE** C. R. Feaster & Company  
**WICHITA FALLS** Mike Carter Engine Works, 219 Indiana Avenue  
 Overton & Mims, Inc., 1307 Indiana Avenue

**UTAH**

**BRIGHAM CITY** Brigham Truck & Implement Company  
**CEDAR CITY** General Service Company  
**FILLMORE** Peterson Machinery Company  
**LOGAN** Bullen Farm Equip. Company  
**OGDEN** Raemussen-Thompson Company  
**RICHFIELD** Richfield Feed & Grain  
**SALINA** Salina Feed & Supply  
**SALT LAKE CITY** \* Arnold Machinery Company, Inc.  
 433 West Second South Street  
**TREMONTON** Markham's

**VERMONT**

**BARRE** Marsh-Allen Company  
**BRATTLEBORO** Bemis Tractor & Implement Company  
 \* Diesel Engine Sales & Engineering Corp.  
 Fish Pier Road  
 Boston 10, Massachusetts

**VIRGINIA**

**ALEXANDRIA** \* Phillips Machinery & Tractor Company  
 P. O. Box 549  
**CHARLOTTESVILLE** H. M. Gleason & Company  
**CROZET** Piedmont Tractor Company, Inc.  
**CULPEPER** J. A. Swan, Jr. & Co.  
**FRANKLIN** G. H. Steinhardt & Company  
 2nd Avenue & Mechanics Street  
**FREDERICKSBURG** Collins Farm Equipment Company  
 1919 Princess Anne Avenue  
 A. W. Mitchell, Prince Edward & Wolf Streets  
**GALAX** Felts Pontiac Sales, 121 W. Grayson Street  
**GRETN A** Twin County Motor Company, 306 N. Main Street  
 Gretna Tractor & Implement Company

**HARRISONBURG** Whitesel Brothers  
**LYNCHBURG** Farm Service Company, 1213 Church Street  
 Myers & Rhokes Equip. Co., 1612 Main Street  
**NEWPORT NEWS** W. L. Gleason Co., 3511 Jefferson Avenue  
**NOKESVILLE** W. E. Herring  
**NORFOLK** Bell Equipment Company, 919 W. 21st Street  
 Industrial Service Co., 1532 E. Princess Anne Rd.  
 Land & Coates, Inc., 3301 Virginia Beach Blvd.  
**NORTON** Norton Motor Inn  
**ORANGE** Gill Farm Machinery Company  
 Waugh-Young Equipment Company  
**PETERSBURG** Ritchie's Hardware Company  
**RICHMOND** • Phillips Machinery Company, 929 Moyers Street  
 Bahran & Sons, Inc., 143R E. Franklin Street  
 Producers Co-Operative Exchange, Inc.  
 1438 E. Main Street  
**ROANOKE** Baker Bros., 3213 Williams Rd.  
 Growers & Producers Exchange, 702 First St. S.E.  
**SOUTH BOSTON** Boston Machine & Foundry Company  
**STANLEY** Louderback's Implement Company, Route #1  
**STAUNTON** S. Chester Slade  
**SUFFOLK** Suffolk Equipment Company, 1525 Main Street  
**TAZEVELL** Tazewell Equipment & Motor Corp.  
**WAKEFIELD** Dudley S. Robertson  
**WINCHESTER** Shade Equipment Company  
**WYTHEVILLE** R. P. Johnson

**WASHINGTON**

**ABERDEEN** Grays Harbor Equipment Company  
 Whitcher Machinery Company, 411 E. State St.  
**ALMIRA** Frenn Motors  
**BELLINGHAM** Automotive Parts Service, 1322 State Street  
**BREMERTON** Williamson's Machine Shop, 2612 Burwell  
**BURLINGTON** Johnson-Barclay Implement  
**CHEHALIS** Graham Implement Company  
**ELLENSBURG** Frank Haagen & Son, 202 North Pine  
**EVERETT** Everett Marine Sales & Serv., 1202 Hewitt Ave.  
 Mulligan Implement Company, 2401 Hewitt Ave.  
**EVERSON** Everson Implement Company  
**FERNDALE** Fassett & Barr  
**FORKS** Ulin Maintenance & Supply  
**LYNDEN** Richardson Tractor & Implement  
**MONTESANO** Whitney's Farm Store  
**MOSES LAKE** C. B. Supply Company  
**MT. VERNON** Bert Robinson Implement, 315 Main Street  
**MOXEE CITY** Moxee City Warehouse  
**OKANOGAN** Graves Machine Shop  
**OLYMPIA** Andrews Auto Parts  
**PASCO** Cunther Tractor  
**PORT ANGELES** Groves Farm Equipment, 226 E. First Street  
 Ulin Maintenance & Supply  
**PORT TOWNSEND** DeLeo Bros.  
**PROSSER** Valley Hay & Implement  
**PULLMAN** Pullman Tractor Company  
**PUYALLUP** Ray Bock Equipment Company  
 11th N. W. at River Road  
 Motive Parts Company, 110 Pioneer East  
**QUINCY** Patton & Gregory  
**SEATTLE** • Star Machinery Company, 1741 First Avenue, S.  
 A. H. Cox & Company, 1757 First South  
 Northern Commercial, 419 Colman Bldg.  
 Polson Implement Company, 631 Western Avenue  
 Ed. Short Farm & Garden Tractor,  
 5821 First Avenue South  
 Yukon Equipment Company, 327 Colman Bldg.  
**SNOHOMISH** Poier Implement Company  
**SPOKANE** • Star Machinery Company, East 415 Sprague Ave.  
 Andrews Equipment Service  
 Brende Machinery Company  
**SUMNER** Sumner Farmers Supply, 823 Main  
**TACOMA** Motor Parts & Equipment Co., 1745 Jefferson  
 Service Hdwe & Implement, 1545 East Bay

**WALLA WALLA** Industrial Products Company  
 Melcher-Ray Machinery Company, 202 E. Alder  
**WENATCHEE** Wells & Wade  
**YAKIMA** Rankin Equipment, 1010 So. First

- Andersen Machinery  
 404 N. W. Broadway  
 Portland, Oregon

**WEST VIRGINIA**

**CAMERON** Cameron Tool & Supply Company  
**CHARLESTON** • West Virginia Tractor & Equipment Company  
 Peoples Supply  
**CLARKSBURG** West Virginia Tractor & Equipment Company  
 • Contractors Equipment Service Company  
 1415 Brighton Road  
 Pittsburgh, Pennsylvania

**WISCONSIN**

**ANTIGO** Gresch Implement Company  
**APPLETON** Art F. Fuerst Implement Company  
**ARCADIA** Arcadia Motor Supply  
**BARABOO** Leonard Drescher Impl. Co.  
**BLOOMER** Farmers Store Company  
**BURLINGTON** Fohr & Leiden  
**COLUMBUS** Columbus Implement Company  
**DARIEN** Wilke-Darrien Garage  
**DEFORREST** DeForest Implement Company  
**EAU CLAIRE** Eau Claire Implement Company  
**ELKHORN** Opitz Implement Company  
**ELLSWORTH** Finstad Implement Company  
**FOOTVILLE** Footville Implement Company  
**FOREST JUNCTION** Keller Implement Company  
**FRANKSVILLE** Rasmussen & Hansen  
**GREEN BAY** Brebner Machinery Company  
**INGRAM** Keiser Implement Company  
**JUDA** Carter & Gruenwald Implement Company  
**LAKE BEULAH** Ells Bros. Farm Implement Company  
**LANCASTER** Gurkow Produce  
**LONDON** Carpenter's Garage  
**MANITOWOC** Seibold Implement Company  
**MARATHON** Gertschen Implement Company  
**MIDDLETON** Capitol Farm Implement Co., Inc.  
**MILWAUKEE** • Engine Power, Inc., 4320 N. 35th Street  
 Prime-Best, Inc., 3820 W. Villard Avenue  
 Studer Super Service  
**MONROE** Disch Hardware  
**NEW GLARUS** Lappley Fuel & Implement Company  
**OREGON** Andrew Bode Company  
**POTOSI** Newbold Machinery Company  
**RHINELANDER** Sauk Implement Company  
**SAUK CITY** Husby & Laubenstein  
**STURGEON BAY** Hanley Implement Company  
**SUN PRAIRIE** George Von Haden Implement  
**TOMAH** Seibold Implement Company  
**VALDERS** Kellogg Implement Company  
**VIOLA** Marathon Implement Co.  
**WAUSAU** Deyplex, Inc.  
**WEST BEND** Engel Implement Company  
**WHITEWATER** Central Electric Service  
**WISCONSIN RAPIDS** Central Electric Service

**WYOMING**

**AFTON** Austin Tractor & Implement  
**CHEYENNE** Wortham Machinery Company  
**SHERIDAN** Valley Motor & Implement Company  
**TORRINGTON** Sherling Auto Electric Company  
**WHEATLAND** Valley Implement Company

(Cont'd)

- Arnold Machinery Company, Inc.  
433 West Second South Street  
Salt Lake City, Utah
- Central Supply Company  
12th & Lincoln  
Denver, Colorado
- Midland Implement Company, Inc.  
Billings, Montana

## FOREIGN

### AFRICA

- ALGERIA**
- Ets. Henry Hamelle  
27, Boulevard Carnot, Alger
  - Ets. Henry Hamelle  
4, Rue de l'Artillerie, Oran
- BELGIAN CONGO**
- Bureau Technique Bia  
Boite Postale 729, Elisabethville
  - Bureau Technique Bia  
26 Avenue Paul Hauxeur,  
(B.P. 301) Leopoldville
- EGYPT**
- Mr. Artine Spendjian  
P. O. Box 1505, Alexandria
  - Mr. Artine Spendjian  
15, Rue Emad el Dine, Cairo
- FR. CAMEROUN**
- Ets. Henry Hamelle,  
B. P. 538, Douala
- FR. EQUATORIAL AFRICA**
- Ets. Henry Hamelle  
B. P. 107, Brazzaville
- FRENCH MOROCCO**
- Mr. Fauvergue,  
B. P. 44, Agadir
  - Ets. Henry Hamelle  
35, Avenue Poeymirau, Casablanca
  - Ets. Henry Hamelle  
42 rue Cumy, Fez
  - Ets. Henry Hamelle  
Ksiri  
Mr. Brunel,  
B. P. 191, Marrakech-Gueliz
  - Ets. Henry Hamelle  
Place Henry's, Meknes  
Mr. Alexandre,  
54 rue Victor Hugo, Mogador
  - Ets. Henry Hamelle  
Angle Bd. de la Marne et Rue Caille, Oujda
  - Ets. Henry Hamelle  
Avenue Lyautey, Petitjean
  - Ets. Henry Hamelle  
Av. Clemenceau, Port-Lyautey
  - Ets. Henry Hamelle  
73 Rue Capitaine Petitjean, Rabat
- FR. WEST AFRICA**
- Ets. de Tessieres  
Abidjan (Ivory Coast)
  - Ets. Henry Hamelle  
B. P. 10, Conakry
  - Ets. Henry Hamelle  
B. P. 162, Dakar
- MOZAMBIQUE**
- Johnson & Fletcher, Ltd.  
P. O. Box 196, Beira
- NORTHERN RHODESIA**
- Johnson & Fletcher, Ltd.  
P. O. Box 123, Ndola
- SOUTHERN RHODESIA**
- Johnson & Fletcher, Ltd.  
P. O. Box 224, Bulawayo
  - Johnson & Fletcher, Ltd.  
P. O. Box 118, Gatooma
  - Johnson & Fletcher, Ltd.  
P. O. Box 588, Salisbury
  - Johnson & Fletcher, Ltd.  
P. O. Box 186, Umtali

- SOUTH AFRICA**
- Thos. Barlow & Sons (Natal) Ltd.  
P. O. Box 1011, 365 Smith Street  
Durban
  - Thos. Barlow & Sons (S.A.) Ltd.  
7, Simmonds Street, P. O. Box 6901  
Johannesburg
  - Barlow's (Cape) Ltd.  
P. O. Box 84  
Voortrekker Road, Maitland, Cape
  - Barlow's (Eastern Province) Ltd.  
63, Grahamstown Road, Port Elizabeth

### International Zone of TANGIERS

Agence Generale Albert Tarpin  
B. P. 287, Tangiers

### TUNISIA

- Ets. Henry Hamelle  
58, Avenue de Carthage, Tunis  
Mr. Canaud, Beja  
Messieurs Sacchetti Freres, Le Kef

### ALASKA

- ANCHORAGE** Northern Commercial Company  
Yukon Equipment, Inc.
- FAIRBANKS** Northern Commercial Company  
Yukon Equipment, Inc.
- JUNEAU** Northern Commercial Company  
Chas. G. Warner Company
- KETCHIKAN** Northern Commercial  
Tongass Trading Company  
Fryer Machine Works
- PETERSBURG**
- WHITEHORSE,**
- YUKON TERRITORY** Northern Commercial

- Star Machinery Company, 1741 First Avenue, S  
Seattle, Washington - U. S. A.

### ARGENTINA

- BUENOS AIRES**
- Storer & Cia. Soc. Resp. Ltda.  
Chacabuco 443

### AUSTRALIA

- RYDALMERE, N.S.W.** • Tutt Bryant Ltd.

### BELGIUM

- BRUXELLES**
- Societe Belge de Materiel Automobile  
157, rue de Hal in Brussels-Forest

### BOLIVIA

- LA PAZ**
- Industrial Agencies (Bolivia) Ltda.  
P. O. Box 718
- ORURO**
- Industrial Agencies (Bolivia) Ltda.  
P. O. Box 430

### BRAZIL

- ACRE**  
Cruzeiro Do Sul
- AMAZONAS**  
Manaos
- BAIA**  
Salvador
- CEARA**  
Fortaleza
- DISTRITO FEDERAL**  
Rio de Janeiro
- M. S. Pedreira & Cia.  
Abib Kalume & Cia.,  
Moto Importadora Ltda.  
J. G. Araujo & Cia. Ltda.  
P. Labayle-Couhat  
A. Fiuza Filho & Cia.  
• Luiz F. Braga, Comercio E Industria S. A.,  
Rua Evaristo da Veiga 83-B

**RIO de JANEIRO** (State of)  
 Radio Lus Importadora, Campos  
 Brayle & Cia., Resende  
 Oficina Rex Ltda., Rio Bonito  
 Irmaes Terdelli, Teresopolis

**ESPIRITO SANTO**  
 Vitoria Importadora Capichaba

**MARANHAO**  
 Sao Luis Guimaraes & Souza & Cia.

**MATO GROSSO**  
 Poreore Genesio Mertins

**MINAS GERAIS**  
 Belo Horizonte E. Marinho S/A  
 Carangola Chevrand & Milton  
 Juiz de Fora Maquinas Junqueira Ltda.  
 Lavras Industrias Libeck & Cia Ltda.  
 Manhumirim Testas & Cia.  
 Muriae Renato Rabelo  
 Patas de Minas Oscar Pacheco  
 Ponte Nova Oficina Mecanica Garavini  
 A. Fonseca  
 Theophilo Otoni Henriquez Arruda & Filho  
 Santan Dumont Abreu & Martins Ltda.

**PARA**  
 Belem Soc. Geral de Export. Ltda.

**PARANA**  
 Curitiba Linn & Valente Ltda.  
 Londrina Linn & Valente Ltda.

**PERNAMBUCO**  
 Recife Jose Lobo Comercio S. A.

**PIAUI**  
 Paranaiba Pontion Rodrigues & Cia. Ltda.

**RIO GRANDE DO SUL**  
 Porto Alegre Cocito Irmaos Tecn. 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 Import. de Materiais  
 Agro-Pecuarios Ltda.  
 Passo Fundo Menegaz, Tagliari & Cia.  
 Santa Maria Sul Brasileira de Com., Import. e  
 Representacoes (CIPRA) Ltda.  
 Irmaos Mayer Ltda.

Santa Rosa  
 SAO PAULO  
 Sao Paulo Cocito Irmaos Tecn. e Com. S/A

**BRITISH HONDURAS**

**BELIZE** \* The Belize Supply Co., Ltd.  
 P. O. Box 272

**BRITISH WEST INDIES**

**JAMAICA** \* Masterton, Limited  
 23-25 Hanover Street, P. O. Box 73  
 Kingston

**TRINIDAD** \* Industrial Agencies Limited, 14 High Street  
 San Fernando

**CANADA**

**ALBERTA**

**CALGARY** \* Bruce Robinson Electric Ltd.  
 9th Avenue & 4th Street, West

**EDMONTON** The Bruce Robinson Electric, Ltd.  
 10123, 102nd Street

**BRITISH COLUMBIA**

**VANCOUVER** \* Pacific Engines & Equipment, Ltd.  
 52 E. Cordova Street

**MANITOBA**

**WINNIPEG** \* Mumford-Madland, Ltd., 576 Well Street

**NEW BRUNSWICK**

**FREDERICTON** \* J. Clark & Son Limited  
 123 York Street

**NEWFOUNDLAND**

**CORNER BROOK** Newfoundland Tractor & Equipment Co., Ltd.  
 P. O. Box 683

**ST. JOHN'S** \* Newfoundland Tractor & Equipment Co., Ltd.

**NOVA SCOTIA**

**HALIFAX** \* Construction Equipment Company, Ltd.  
 P. O. Box 67, 135 Lower Water Street

**NEW GLASGOW** Spencer Motors, Limited  
**SYDNEY** Industrial Div., Atlantic Spring &  
 Machine Co., Ltd.

**YARMOUTH** Yarmouth Motors, Limited

**ONTARIO**

**BARRIE** Torgis Automotive Limited, 39 High Street

**BRANTFORD** Brant Feed & Supplies Limited  
 243 Colborne Street

**CLINTON** McAlpine & Dew  
**DUNNVILLE** Cowan & Lymburner

**FORT WILLIAM** The Northland Machy. Supply Company, Ltd.  
**HAMILTON** Contractors Machy. & Equipment Limited  
 194 Barton Street East

**KINGSTON** David M. Nesbitt Motors, 903 Princess Street

**KIRKLAND LAKE** Northland Sales & Service, Towers Street

**KITCHENER** Waterloo Co-op., 60 Frederick Streets  
 203 Hardisty Street

**LONDON** E. P. Abey, Wharncliffe Road, South

**NEW TORONTO** \* Consolidated Engines & Machy. Company, Ltd.  
 14th & Birmingham Streets

**NORTH BAY** Northland Equipment & Supply Company  
 127 McIntyre Street, West

**OTTAWA** Mechron Engineering Products  
 165 Echo Drive

**PETERBOROUGH** Pilon Marine Sales & Service, 176 Simcoe St.

**PORT ARTHUR** Thornes-Sergent, Jobbers-Distributors  
 Violet Street

**SAULT STE MARIE** Soo Equipment Limited, 54 Tancred Street

**SMITH FALLS** Clark & Lewis

**SUDBURY** Duncan Brothers Limited, 84-86 Cedar Street

**TIMMINS** Harnden & Newell Ltd., 70 Pine St., S.

**TRENTON** Quinte Machine & Repair Co., Balsam Street

**WINDSOR** C. H. Henze Company, Ltd., 620 Glengarry Ave.

**QUEBEC**

**CHICOUTIMI** Saguenay Industrial Supplies, Ltd.  
 179 Jacques Cartier Street

**GRANBY** Albert Rainville

**MONTREAL** \* Consolidated Engines & Mchry. Company, Ltd.  
 1822 St. Catherine St., West

**QUEBEC** Rene Talbot Limited, 205 St. Paul Street

**PLESSISVILLE** Forano, Limited

**ROUYN** Lariviere Brothers, 32-38 Rue Principale

**SHERBROOKE** La Societe Cooperative Agricole de  
 Sherbrooke, 43 Lansdowne Avenue

**VICTORIAVILLE** La Fonderie Universel Engr.

**SASKATCHEWAN**

**HUMBOLDT** Bowman Brothers Limited, Fifth Avenue

**MOOSE JAW** Bowman Brothers Limited, 121 High St., West

**NORTH BATTLEFORD** Bowman Brothers Limited, 1032 Main Street

**PRINCE ALBERT** Bowman Brothers Limited, 20-12th St., West

**REGINA** Bowman Brothers Limited, 2329-35 S. Railway Ave  
 Gregg's Machy. Exchange  
 6th Avenue at Halifax Street  
 Robinson Machinery Company  
 The Saskatchewan Federated Co-Operatives, Ltd  
 1150 Rose Street

**ROSETOWN** Bowman Brothers Limited

**SASKATOON** Bowman Brothers Limited, 3rd Avenue & 24th St.  
 (Cont'd)

Mumford-Medland, Ltd., 130 Avenue A North  
The Saskatchewan Federated Co-Operatives, Ltd  
12 - 23rd Street, East  
**SWIFT CURRENT** Bowman Brothers Limited, 51-1st Ave., West  
**TISDALE** Bowman Brothers Limited, 100th Avenue  
**WEYBURN** Bowman Brothers Limited, Railway Ave.

**CHILE**

**CONCEPCION** Sociedad Importadora del Pacifico Ltda.  
Casilla 785  
**SANTIAGO** \* Sociedad Importadora del Pacifico Ltda.  
Alameda Bernardo O'Higgins 1166  
Casilla 82-D  
**VALPARAISO** Compania Comercial De Valparaiso, S.A.  
Cockrane 719

**COLOMBIA**

**BARRANQUILLA** \* Peter Santa Maria & Cia. Ltda.  
Almacen Universal, Calle 37, No. 44-116,  
Apartado Aereo No. 854  
**BOGOTA** "La Electrotecnica"  
Calle 13, Numero 19-57  
Apartado Aereo 3712  
**CALI** \* Peter Santa Maria & Cia. Ltda.  
Almacen Universal, Calle 25, No. 7-60,  
Apartado Aereo No. 1210  
**MEDELLIN** \* Peter Santa Maria & Cia. Ltda.  
P. O. Box 910

**COSTA RICA**

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

**CUBA**

**HAVANA** \* Armando J. Valdes & Cia.  
Ingenieros Importadores, S.A.  
Fabrica No. 13, P. O. Box 824

**DOMINICAN REPUBLIC**

**CIUDAD TRUJILLO** \* General Sales Co. C. Por A.  
Apartado 746

**ECUADOR**

**GUAYAQUIL** \* Luis Vallejo Araujo, P. O. Box 717

**EL SALVADOR**

**SAN SALVADOR** \* Salvador Machinery Company, P. O. Box 125

**ENGLAND**

**GLOUCESTERSHIRE** \* R. A. Lister & Company, Ltd.  
Dursley

**FRANCE**

**PARIS 17E** \* Union Automobile Technique et Commerciale  
24, Avenue de la Grande Armee

**GUATEMALA**

**GUATEMALA** \* Equipos Mecanicos de Guatemala, S.A.  
Apartado Postal 472

**GREECE**

**ATHENS** \* Bio Industrial & Technical Company  
Constantinople Avenue No. 177

**HAITI**

**PORT-au-PRINCE** \* Charles Fequiere & Cie., P. O. Box 198

**HAWAII**

**HONOLULU, T. H.** \* Honolulu Iron Works Company  
Nuuanu & Queen Sta., Box 3140  
**HILO** \* Hilo Iron Works

**HOLLAND**

**ROTTERDAM** \* R. S. Stokvis & Zonen

**HONDURAS**

**TEGUCIGALPA, D. C.** \* Casa Comercial Mathews, Inc.  
P. O. Box 29

**ICELAND**

**REYKJAVIK** \* Elding Trading Company

**INDIA**

**BOMBAY** Intercontinent (Travencore) Limited  
Caltex House, 8 Ballard Road  
**CALCUTTA** G. M. Corporation  
1-2-3, Old Court House Street  
**NEW DELHI** Escorts (Agriculture & Machines) Ltd.  
Pratap Building, Connaught Circus

\* Graymor International, Inc.  
271 Church Street,  
New York 13, New York

**INDONESIA**

**BANDUNG** \* N. V. v/h Ruhaak & Company  
Djl-Sultan Tirtajoso 9-Post Box 133  
**DJAKARTA** \* N. V. v/h Ruhaak & Company,  
Tanah Abeng Barat 6  
**MEDAN** \* N. V. v/h Ruhaak & Company  
Djalan Istana 15-Post Box 42  
**SOURABAYA** \* N. V. v/h Ruhaak & Company

**ISRAEL**

**HAIFA** \* Palestine Engineering Stores  
P. O. Box 243  
**JERUSALEM** \* Palestine Engineering Stores  
P. O. Box 120  
**TEL-AVIV** \* Palestine Engineering Stores  
P. O. Box 509

**LEBANON**

**BEIRUT** \* Richard A. Abdunnur, P. O. Box 1371  
**CHTAURA** \* Richard A. Abdunnur

**MADAGASCAR**

**TANANARIVE** \* Henri Fraise Fils & Cie.

**MEXICO**

**CHIAPAS** Armin Aramoni y Cia. S. de R. L.,  
La Poniente No. 15, Tuxtla Gutierrez



Enrique Gutierrez,  
Edif. Verdun, Tapuchula  
Vincente Yannini  
Mazariegos Ote. No. 18, S. Cristobal las Casas

**JALISCO** Maquinaria Del Pacifico, S.A.  
Esq. Lopez Cotilla Y Maestranza  
Guadalajara  
Motores y Maquinarias, S.A.  
Av. Libertad No. 422, Guadalajara

**MEXICO, D. F.** • General Supply Company, Vallarta No. 1

**OAXACA** Federico Zorrilla Baigts,  
Matamoros y Garcia Vigil, Oaxaca

**PUEBLA** Alfonso Cabrera  
5 de Mayo No. 803-E, Puebla  
Ingenieria y Equipos, S.A.  
Av. Reforma 3104, Puebla

**TABASCO** Distribuidora Comercial Tabasquena, S. de R. L.,  
Jose Ma. Pino Suarez No. 13, Villahermosa

**VERACRUZ** Maquinaria e Implementos, S. de R. L.,  
Av. 1 y Calle 5, Cordoba  
Comercial Navia S.A.  
5 de Mayo No. 102, Veracruz

**YUCATAN** Armin Erosa Casares  
Calle 65 y 52 No. 520, Merida

**NETHERLANDS WEST INDIES**

**CURACAO** • Pablo Frederik, Victory Lubrication Service  
Salinjs 157

**NEW ZEALAND**

**WELLINGTON** • P. D. Trickett & Company, Ltd.  
182 Wakefield Street

**NICARAGUA**

**LEON** • Nicaragua Machinery Company  
Sucursal de Leon

**MANAGUA** • Nicaragua Machinery Company, Apartado 90

**NORWAY**

**OSLO** • Maskin A/S K. Lund & Company  
Revierstredet 3

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# ZENITH 61 AND 161 SERIES CARBURETORS

## OPERATION AND SERVICE

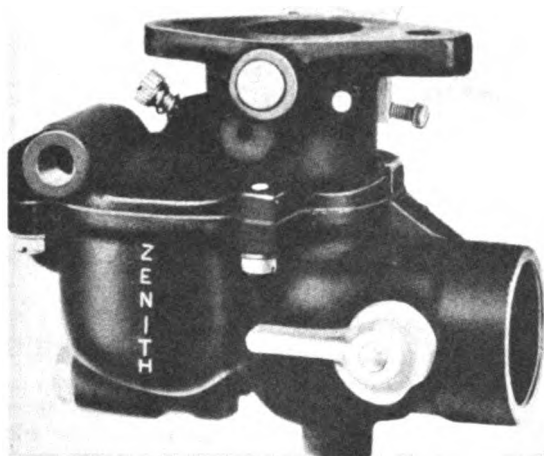


Figure 1

The Zenith 61 and 161 Series carburetors are of updraft single venturi design. They are made in  $\frac{5}{8}$ " and  $\frac{7}{8}$ " S.A.E. barrel sizes; with  $\frac{5}{8}$ ",  $\frac{7}{8}$ ", 1" and  $1\frac{1}{4}$ " S.A.E. flange sizes available. They are made with selective fuel inlet, with or without a back suction economizer and a main jet adjustment.

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

### MODEL DESIGNATION

Type—Updraft.

Material—Barrel and bowl castings, cast iron.

Styles—"A" Throttle and choke shafts parallel.

"D" Equipped with degasser assembly.

"E" Elbow air intake.

"J" Back-suction economizer.

"R" Built-in governor.

"S" Straight through air intake.

"X" Flange next size larger than standard.

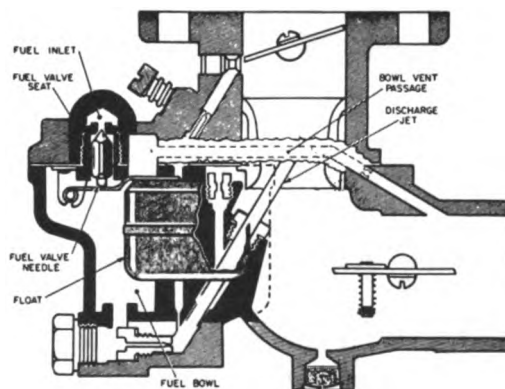
"XX" Flange second size larger than standard.

Size Designation	Nominal Size	Throttle Bore Diameter	Flange Size S.A.E. Standard
5	$\frac{5}{8}$ "	.787 or $1\frac{1}{8}$ "	$\frac{5}{8}$ "
7	$\frac{7}{8}$ "	1.023 or $1\frac{1}{8}$ "	$\frac{7}{8}$ "
X7	$\frac{7}{8}$ "	1.023 or $1\frac{1}{8}$ "	1"
XX7	$\frac{7}{8}$ "	1.023 or $1\frac{1}{8}$ "	$1\frac{1}{4}$ "
8	1"	1.181 or $1\frac{1}{8}$ "	1"

### FUEL SUPPLY SYSTEM

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

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



FUEL SUPPLY SYSTEM

Figure 2

demand of the engine according to its speed and load.

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

## IDLE SYSTEM

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

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

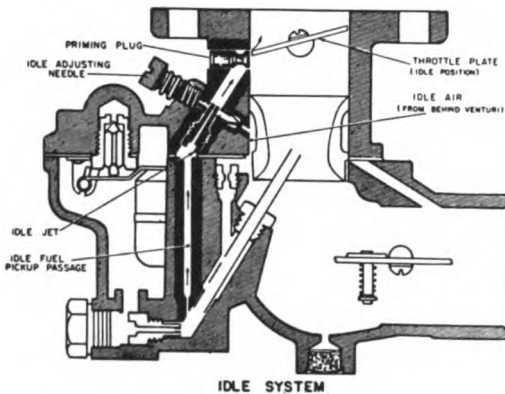


Figure 3

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 port (or priming plug) and enters the air stream at this point.

## HIGH SPEED SYSTEM

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

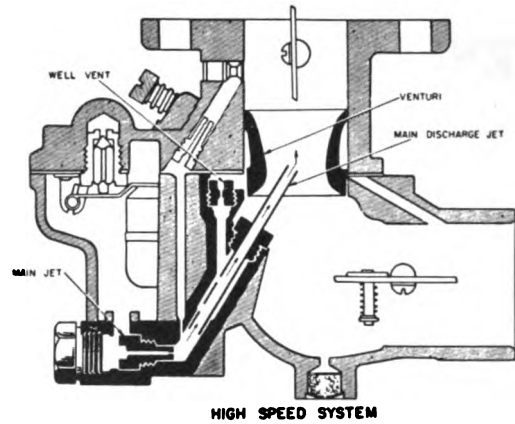


Figure 4

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 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.

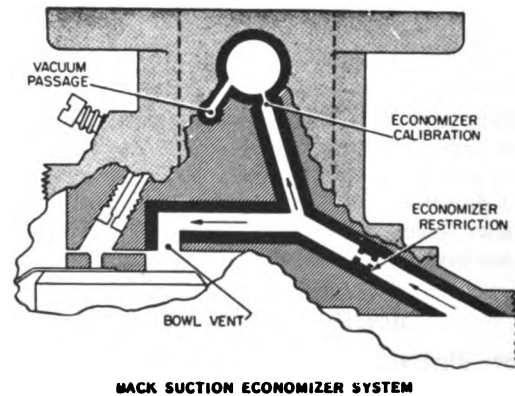


Figure 5

## ECONOMIZER SYSTEM

The economizer system consists of a "milled" slot in the throttle shaft, which acts as a valve to open or close the system; a vacuum passage from the throttle bore to the slot in the throttle

shaft; and a vacuum passage from the slot in the throttle shaft to the fuel bowl.

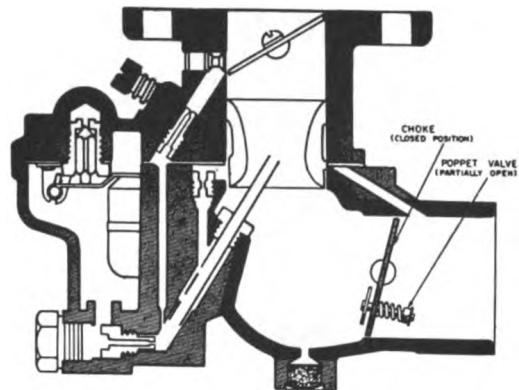
This system allows economical fuel mixture ratios for part throttle operation while still permitting the richer mixture ratios that are needed for full load operation.

The economizer system performs its function by establishing a "back suction" on the fuel in the fuel bowl during most of the part throttle range of operation. This "back suction" is created by manifold vacuum, through the channels connecting the throttle bore with the fuel bowl. This retards the flow of fuel through the metering systems and thus permits the carburetor to operate on leaner part throttle mixture ratios.

The rotation of the throttle shaft controls the economizer system. During part throttle operation from about one-quarter to three-quarters throttle, the passages are open and the pressure in the fuel bowl is lowered. This retards the flow through the main jet and a leaner mixture is supplied. On full throttle opening the passages are closed and the main jet flows to full capacity to supply the richer mixture required.

### CHOKE SYSTEM

The choke system consists of a valve mounted on a shaft located in the air entrance and operated externally by a lever mounted on the shaft. The choke valve is used to restrict the air entering the carburetor. This increases the suction on



CHOKE SYSTEM

Figure 6

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.

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## SERVICE AND REPAIR PROCEDURE

### A. IDENTIFY CARBURETOR

- (a) Check the numbers on metal identification disc riveted to top of float bowl cover against carburetor outline specification chart. The inside number next to the rivet is the Zenith outline assembly number and the one next to the outer edge of the disc is the vehicle manufacturer's.

### B. DISASSEMBLED VIEW

- (a) The disassembled view will identify the various component parts and show their relation to assembly. Use the disassembled view with the identifying part numbers to identify and locate parts when performing the disassembly and reassembly operations.

### C. SELECTION OF TOOLS AND REPAIR PARTS KIT

- (a) The use of the proper Zenith tools and the proper repair parts kits is essential if the best service and repair procedure is to be performed on the carburetor. The following list of Zenith special tools and general hand tools will best perform the service job.

#### (b) Zenith Special Tools

C161-1	Main Jet Wrench
C161-10	Plug Wrench
C161-25	Main Discharge Wrench
C161-71-1	Line Reamer
C161-72-1	Bushing Driver
C161-73-1	Counter Bore Reamer
C161-82	Fuel Valve Seat Wrench
C161-83	Main Jet Wrench

#### (c) General Hand Tools

7/16" Open End Wrench
1/2" Open End Wrench
1/4" Blade Screw Driver
Long Nosed Pliers
6" Depth Gage
1/4" Round File
Light Hammer
Long Rod or Punch

(d) The basic repair parts kit for the 61 or 161 carburetor, except model 61A8SRD, is No. K501. A proper repair job cannot be performed, however, by using the basic kit as such. The basic kit must be "tailored" to fit the particular outline of the carburetor being serviced by the addition of the parts listed in large print on the label of the basic kit container.

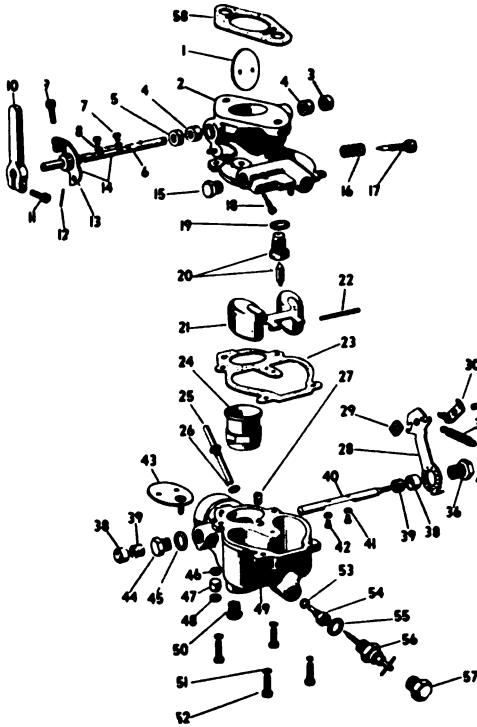


Figure 7

#### D. SEPARATE CARBURETOR BODIES

- (a) Remove the hex plug or filter screen (15) from side of throttle body (2) using a 7/16" wrench.
- (b) Remove the four assembly screws (52) and lock-washers (51) which attach the throttle body (2) to the fuel bowl (49) using a screwdriver.
- (c) Separate the throttle body (2) from the fuel bowl assembly (49).

#### E. DISASSEMBLE THROTTLE BODY

- (a) Remove float axle as follows:
  - (1) Press screwdriver against float axle (22) at slotted side of float hinge bracket and force through hinge bracket.
  - (2) Remove float axle (22) completely with fingers from opposite side and remove float (21)
- (b) Remove fuel valve needle (20).
- (c) Remove the assembly gasket (23) from the machined surface of the throttle body (2).
- (d) Remove the venturi (24).

(e) Remove the fuel valve seat (20) and fibre washer (19) from machined surface of throttle body (2) using Zenith Tool No. C161-82.

(f) Remove the idle jet (18) from passage in machined surface of throttle body (2) near fuel valve seat (20) using a small screwdriver.

(g) Remove the idle adjusting needle (17) and friction spring (16) from the side of throttle body (2).

(h) Remove the throttle plate (1), screws (7), lock-washers (8), shaft and stop lever assembly (14), throttle clamp lever (10), as follows:

- (1) Unscrew throttle stop screw (9) until threaded end is flush with lever (18).
- (2) Make match marks with file on throttle body (2) and all levers to act as a guide to reassemble these parts in the same position as removed.
- (3) Loosen throttle clamp lever screw (11) and remove lever (10) from shaft (14). **NOTE:** Some 161-J Series Carburetors have the throttle lever and the throttle stop lever riveted together. Omit Step No. (3) if this type lever is used.
- (4) File off the riveted or peened end of the throttle plate screws (7).

**NOTE:** When such screws are riveted or peened the threaded end of the two screws must be filed flat before removal to avoid breakage or stripping of threads in the shaft. In some cases it may be necessary to use a small (1/8") round file and cut slightly below the surface of the shaft because of a slight counter bore around the screw hole.

Be sure to avoid striking and cutting the side of the throttle body bore or the throttle plate when filing the screws.

- (5) Remove the screws (7) and pull out the throttle plate (1).
  - (6) Remove the throttle shaft and stop lever assembly (14) from the throttle body (2).
- (i) Remove the throttle shaft packing (4) and packing retainer (5) from the throttle body shaft holes as follows:

- (1) Screw a 5/16" fine thread taper tap into packing retainer (5) until it is firmly seated.
- (2) Insert long punch or rod through opposite shaft hole and drive punch against the end of the tap until retainer (5) is free of the body. (Repeat operation for other packing and retainer.)

**NOTE:** Do not disassemble the throttle plate (1), throttle shaft and stop lever assembly (14), throttle packing (4), and packing retainer (5) from the throttle body (2) unless the throttle shaft is bent or otherwise damaged or unless there is damage to any of the other component parts of the throttle assembly.

## F. DISSASSEMBLE FUEL BOWL BODY

- (a) Remove the main jet adjusting needle assembly (56) and fibre washer (55) from bottom of fuel bowl body (49) using a  $\frac{1}{8}$ " wrench.

NOTE: Some models will have a  $\frac{1}{8}$ " plug (hex) in place of the adjustment.

- (b) Remove the drain plug (hex) (50) from outside bottom of fuel bowl (49), using Zenith Tool No. C161-10.
- (c) Remove main jet (54) and fibre washer (53) from threaded passage in bottom side of fuel bowl (49) with Zenith Tool No. C161-1.
- (d) Remove main discharge jet (25) and fibre washer (26) from center of large opening in machined surface of fuel bowl (49) with Zenith Tool No. C161-25.
- (e) Remove well vent jet (27) from center of large opening in machined surface of the fuel bowl (49) with a small screwdriver.
- (f) Disassemble choke as follows:
  - (1) Remove the bracket spring (37) from the choke lever (35) and choke bracket (28).
  - (2) Make match marks with a file on air shutter bracket (28), air intake body (49) and lever (35) to act as a guide to reassemble these parts in the same position as removed.
  - (3) Remove the choke shaft nut (33) and lock-washer (32) using Zenith Tool No. C161-25.
  - (4) Remove the choke lever (35).
  - (5) Remove the choke bracket screw (36) using a  $\frac{1}{8}$ " open end wrench and remove choke bracket (28).
  - (6) Remove the shaft hole plug (44) and fibre washer (45) using a  $\frac{1}{8}$ " open end wrench.
  - (7) Remove the choke plate screws (42) and lock-washers (41) and remove the choke shaft (40) and choke plate (43).

NOTE: Some models of the Zenith 161-J Series carburetor employs choke shaft packing washers (39) and packing washer retainers (38) in the choke shaft holes around the choke shaft. The disassembly of these packing washers and retainers should be performed in the same manner as the disassembly of the throttle shaft packing washers and retainers which is described in detail in the disassembly of the throttle body.

NOTE: Do not disassemble the choke assembly bracket (28), lever (35), shaft (40) and plate (43) unless there is damage to any one of the above mentioned parts or damage to any of the other component parts of the choke assembly.

## CLEANING AND INSPECTION OF PARTS

### A. CLEANING PARTS

- (a) Clean all metal parts thoroughly with cleaning solution and rinse in solvent.
- (b) Blow out all passages in the air intake and fuel bowl casting (49) and throttle body (2). NOTE: Be sure all carbon deposits have been removed from throttle bore and idle port. It is advisable to reverse flow of compressed air in all passages to insure that all dirt has been removed. Never use a wire or drill to clean out jets.

### B. INSPECTION OF PARTS

- (a) Float Assembly. Replace float assembly (21) if loaded with gasoline, damaged, or if float axle bearing is worn excessively. Inspect top side of float lever for wear where it contacts fuel valve needle. NOTE: Such wear can affect the float level.
- (b) Float Axle. Replace if any wear can be visually detected on the bearing surface.
- (c) Fuel Valve Seat and Needle Assembly. Always replace fuel valve seat and needle (20) because both parts wear and may cause improper float level.
- (d) Idling Adjusting Needle and Spring. Inspect point of needle (17). This must be smooth and free of ridges.
- (e) Throttle Plate. Inspect plate (1) for burrs or damaged edges. Never clean a throttle plate with a buffing wheel or sharp instrument.
- (f) Choke Plate (43). Inspect for bends, burrs or damaged edges.
- (g) Choke Shaft. Check bearing surfaces for wear; see that shaft (40) is straight.
- (h) Gaskets. Replace all gaskets and fibre washers every time the carburetor is disassembled.
- (i) Throttle Shaft. Replace if throttle shaft (6) shows evidence of wear on the bearing surfaces.
- (j) Check Specifications. Use the outline specification chart and verify the correctness of the following parts. Numbers shown on chart will be found on parts. The following calibrated parts should be checked: Venturi, Main Jet, Discharge Jet, Well Vent Jet, Idling Jet and Fuel Valve Seat.

## REASSEMBLY

### A. FUEL BOWL BODY

- (a) Choke Assembly
  - (1) Install the two choke shaft packings (39) and retainers (38) in fuel bowl body (49) as follows. Use bushing driver tool Zenith C161-72-1.
  - (2) Assemble packing (39) and retainer (38) and place completed assembly on bushing driver tool with packing facing small end of tool.

- (3) Insert small end of tool into choke shaft hole, start retainer (38) into counter bore in body (49) and lightly drive retainer (38) into body (49) until it is flush with machined surface.
- (4) Insert choke shaft (40) into air intake (49).
- (5) Insert choke plate (43) into air intake (49).

**NOTE:** Be sure the choke plate (43) is located in the same position in the air intake (49) as regards the poppet valve as when it was disassembled.

- (6) Install choke plate screws (42) and lock-washers (41) using a small screwdriver.
- (7) Install the shaft hole plug (44) and fibre washer (45) and tighten using a 1/4" open end wrench.
- (8) Place the choke bracket (28) against the boss on the air intake (49) and install the choke bracket screw (36) and tighten with a 1/4" open end wrench.
- (9) Place the choke lever (35) on the choke shaft (40) and tighten with the choke shaft nut (33) using Zenith Tool No. C161-25.
- (10) Attach the choke lever spring (37) to the choke bracket (28) and the choke lever (35).

**NOTE:** Use the "Match Marks" put on the choke lever (35), choke bracket (28) and air intake body (49) during disassembly to properly align the choke assembly during re-assembly.

- (b) Install main discharge jet (25) and fibre washer (26) in fuel bowl (49) and tighten firmly with Zenith Tool No. C161-25.
- (c) Install well vent jet (27) in fuel bowl (49) and tighten with a small screwdriver.
- (d) Install main jet (54) and fibre washer (53) in large threaded passage beneath the fuel bowl (49) using Zenith Tool No. C161-1.
- (e) Install the drain plug (hex) in threaded passage bottom of fuel bowl using Zenith C161-10 wrench
- (f) Install main jet adjustment (56) or 1/2" hex plug (57) as the case may be.

## H. THROTTLE BODY

**NOTE:** Any throttle body of a Zenith 161 Series carburetor can have throttle shaft bushings installed to return it to factory specifications as regards fit of the throttle shaft. If the fit of the throttle shaft is sloppy in the throttle body and it is desired to use the same throttle body for reassembly of the carburetor, then, it is absolutely necessary to install throttle shaft bushings. A poorly fitting throttle shaft upsets idling of the engine, for the throttle plate will not be correctly located in reference to the idle discharge port, and also it is possible for additional air to be admitted into the throttle body

around the shaft which will also tend to upset the idle.

The following procedure should be adhered to to properly install throttle shaft bushings in the Zenith 161 Series carburetor.

- (a) Install throttle shaft bushings as follows:

**NOTE:** To properly rebush the throttle body of the Zenith 161 Series carburetor, it is absolutely necessary to have available the proper counter-bore reamer and line reamer and the bushing driver tool needed to install the new bushing. Counterbore reamer No. C161-73-1, line reamer No. C161-71-1, and bushing driver No. C161-72-1 are used. The bushing itself is CR9-13. After the new throttle shaft bushing is in place it will be necessary to redrill the economizer restriction located in the cover and the channel from the throttle body bore into the throttle shaft hole.

To obtain the correct drill sizes for this operation consult the specification card covering the particular outline in question. To drill the channel from the throttle body bore into the throttle shaft hole it will be necessary to remove the brass channel plug in the throttle body. This can be drilled out using a 3/32" drill and a new "oversize" plug (No. CR137-10) should be installed after the drilling operation is completed.

The throttle body should not be rebushed if the extent of wear of the throttle body and shaft does not warrant it. However, if the wear is severe enough to warrant a rebushing job the following procedure should be followed:

- (1) Place a suitable center in the drill press bed. With one throttle shaft hole on this center bring the spindle down until the counterbore reamer contacts the opposite shaft hole. The reamer in this instance is of a diameter to result in a press fit for the outside diameter of the throttle shaft bushing.
- (2) With the casting still in place as described in the above paragraph, set the stop on the press to the length of the bushing. This will give you the approximate setting of the spindle travel.
- (3) The hole is then counterbored to accommodate the bushing.
- (4) A throttle shaft bushing is driven into place using the proper bushing driver tool.
- (5) And this bushing is then reamed with the line reamer. Use the opposite shaft hole as a "pilot" to "align" the line reamer in the bushing.
- (6) Now turn the casting over and prepare the opposite hole to take the bushing. It will be necessary to reset the stops on the spindle again as described before. Then counterbore the hole.
- (7) Drive the second throttle shaft bushing into position.
- (8) Then line ream the inside diameter as the final machining operation. The casting is now ready for reassembly.



**NOTE:** A lathe may be substituted for the drill press in performing the counter-boring and line reaming operations.

(b) Install the two new throttle shaft packings (4) and retainers (5) in throttle body (2) as follows: Use bushing driver tool Zenith C161-72-1.

(1) Assemble packing (4) and retainer (5) and place completed assembly on bushing driver tool with packing facing small end of tool.

(2) Insert small end of tool into throttle shaft hole, start retainer (5) into counter-bore in body (2) and lightly drive retainer (5) into body (2) until it is flush with machined surface. **NOTE:** The packing retainer (5) must be flush with machined surface or slightly below to avoid striking throttle lever (13).

(c) Install the throttle shaft and stop lever assembly (14), throttle plate (1), screws (7) and lockwashers (8) as follows:

(1) Insert the throttle shaft and stop lever assembly (14) in throttle body (2).

(2) Rotate throttle shaft (6) to wide open position, insert throttle plate (1) and rotate to closed position holding the plate in position with fingers.

(3) Start throttle plate screws (7) and lockwashers (8) and tighten with small screwdriver, being sure that the throttle plate (1) is properly centered in the throttle body bore.

**NOTE:** The screw holes in the throttle plate are off center. Start the side of the throttle plate with the shortest distance between the screw holes and beveled edge into the shaft first. The throttle plates are made with two opposite edges beveled to fit the throttle body bore when the plate is closed. The throttle plate will not close tightly if installed upside down. To properly center the plate in the throttle body bore, the screws should be started in the shaft and then with the plate closed, it should be tapped on the mounting flange side. Pressure on the plate must be maintained with the finger until the screws are tightened. When properly installed, the side of the throttle plate farthest away from the mounting flange will be aligned with the idle port when the plate is closed.

(d) Install throttle clamp lever in same position as removed. Refer to match marks placed on lever and throttle body during disassembly step.

(e) Install idle adjusting needle (17) and friction spring (16) in threaded passage on side of throttle body (2). Seat lightly with screwdriver and back out  $1\frac{1}{4}$  full turns.

(f) Install idle jet (18) in counter-bored passage in machined surface.

(g) Install fuel valve seat (20) and fibre washer (19) using Zenith Tool No. C161-82.

(h) Place new throttle body to fuel bowl gasket (28) on machined surface of fuel bowl cover (2).

(i) Install fuel valve needle (20) in seat (20) followed by float (21) and float axle (22).

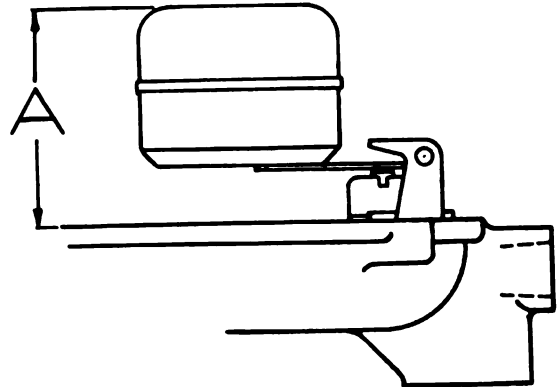


Figure 8

The "A" dimension should be  $1\frac{5}{32}$ " plus or minus  $\frac{3}{64}$ ".

(j) **Float Level.** Check position of float assembly for correct measurement to obtain proper float level using a depth gage. Obtain float setting measurement from outline specification chart. **NOTE:** Do not bend, twist or apply pressure on the float bodies.

(1) With bowl cover assembly (2) in an inverted position, viewed from free end of float (21) the float bodies must be centered and at right angles to the machined surface. The float setting is measured from the machined surface (no gasket) of cover to top side of float bodies at highest point.

(2) **Bending Float Lever.** To increase or decrease distance between float body and machined surface use long nosed pliers and bend lever close to float body. **NOTE:** Replace with new float if position is off more than  $\frac{1}{16}$ ".

(k) Insert venturi (24) in throttle body bore, large opening first.

#### C. ASSEMBLE CARBURETOR BODIES

(a) Assemble the two completed bodies (2 and 49) and four screws (52) and lockwashers (51) and tighten screws evenly and firmly.

(b) Install the hex plug or filter screen (15) in threaded passage in throttle body (2). (C161-10 wrench.)

(c) Hold the throttle lever (13) in a closed position and turn the throttle stop screw (9) in until it just contacts the stop on body (2), then turn screw (9) in  $1\frac{1}{4}$  additional turns.

## ZENITH CARBURETOR DIVISION

696 HART AVENUE



DETROIT 14, MICHIGAN

July, 1952

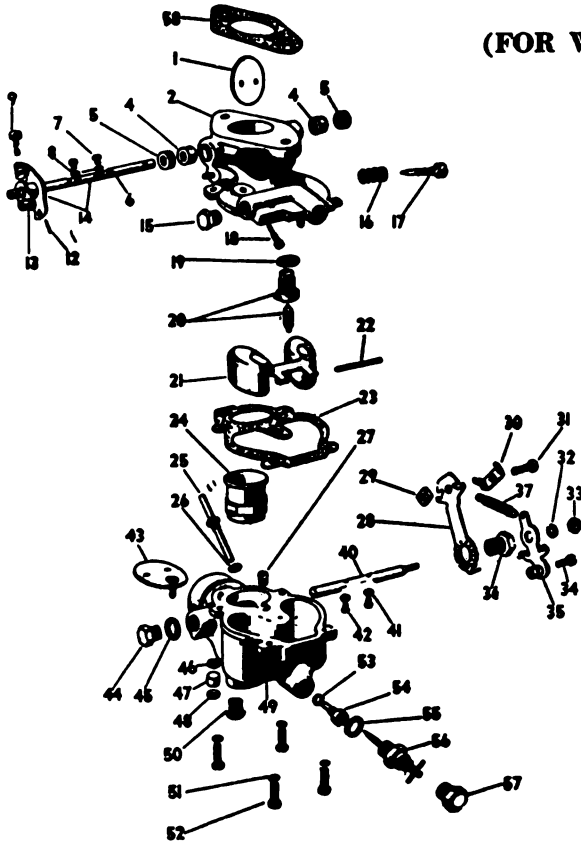
Manufacturers of Zenith Carburetors and Filters

Printed in U.S.A.



# ZENITH 161-7 SERIES CARBURETORS

(FOR WISCONSIN MOTOR CORP.)



ZENITH NO.	WISCONSIN NO.
10034	L-48
S-717	L-48-1
S-632	L-48-2
S-732	L-48-3
S-1164	L-48-B
S-1329	L-48-C
S-1548	L-48-D
10741	L-48-E
10457	L-48-F
10748	L-48-G
10535	L-48-H
10595	L-48-J
10610	L-48-K
10627	L-48-L
10737	L-48-N
10788	L-48-M
10816	L-48-P
10858	L-48-U
10907	L-48-V
10926	L-48-Q
10932	L-48-Y
10955	L-48-Z
11003	L-48-AA
11206	L-48-AB
11372	L-48-AC

## Parts List for Zenith Model 161-7 Carburetors

Ref. No.	Part No.	Part Name
1	C21-88	Plate—Throttle (for all except L-48-C, L-48-J, L-48-U, L-48-AB, L-48-AC)
1	C21-176	Plate—Throttle (for L-48-C, L-48-J, L-48-U, L-48-AB, L-48-AC)
2	B12-	Body—Throttle
4	†CT-57-4	Washer—Shaft Packing
5	†C181-4x2	Retainer—Shaft Packing
7	†T15B5-3	Screw—Throttle Plate
8	†T41-5	Lockwasher—Plate Screw
9	T8S8-10	Screw—Throttle Stop (for all except L-48-U, L-48-AB)
9	T8S8-12	Screw—Throttle Stop (for L-48-AB)
9	T8B10-15	Screw—Throttle Stop (for L-48-U)
	C111-19	Spring—Throttle Stop Screw (for L-48-U)
14	C29-491	Shaft & Lever—Throttle (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-U, L-48-V, L-48-Y, L-48-Z, L-48-AA, L-48-AC)
14	C29-858	Shaft & Lever—Throttle (for L-48-F, L-48-N & L-48-Y)
14	C29-875	Shaft & Lever—Throttle (for L-48-H & L-48-K)
14	C29-926	Shaft & Lever—Throttle (for L-48-G, L-48-Z, L-48-AA, L-48-AC)
14	C29-172-1	Shaft & Lever—Throttle (for L-48-U)
14	C29-963	Shaft & Lever—Throttle (for L-48-V)
15	CT91-3	Plug—Fuel Inlet (3/4" Pipe)
16	C111-9	Spring—Adjusting Needle (for all except L-48-C, L-48-J, L-48-U & L-48-AB)
16	C111-17	Spring—Adjusting Needle (for L-48-C, L-48-J & L-48-AB)
16	C111-68	Spring—Adjusting Needle (for L-48-U)
17	†C46-25	Needle—Idle Adjusting (for all except L-48-C, L-48-J, L-48-U & L-48-AB)
17	C46-6	Needle—Idle Adjusting (for L-48-C, L-48-J & L-48-AB)
17	C46-48	Needle—Idle Adjusting (for L-48-U)
18	†C55-6-12	Jet—Idle (for all except L-48-C, L-48-J, L-48-U & L-48-AB)
18	C55-22-13	Jet—Idle (for L-48-C, L-48-J, L-48-U & L-48-AB)
19	†T56-20	Washer—Fuel Valve Seat
20	†C81-17-35	Valve & Seat—Fuel (for all except L-48-J, L-48-L, L-48-M, L-48-Q, L-48-U, L-48-AB & L-48-AC)
20	C81-50-35	Valve & Seat—Fuel (for L-48-J, L-48-L, L-48-M, L-48-Q, L-48-U, L-48-AB & L-48-AC)
21	C85-28	Float
22	†C120-4	Axle—Float
23	†C142-16	Gasket—Bowl to Body
24	C38-51-16	Venturi (for L-48-D, L-48-F, L-48-G, L-48-L, L-48-N, L-48-P, L-48-Q, L-48-AA & L-48-AC)
24	C38-51-19	Venturi (for L-48, L-48-1, L-48-2, L-48-3, L-48-B, L-48-H & L-48-V)
24	C38-51-	Venturi (#17 for L-48-Y & L-48-Z) (#18 for L-48-C, L-48-E, L-48-J, L-48-K, L-48-M, L-48-U & L-48-AB)
25	C66-47-	Jet—Discharge (#40 for L-48-D, L-48-E, L-48-L, L-48-M, L-48-P, L-48-Q) (#45 for L-48-H)
25	†C66-47-	Jet—Discharge (#50 for L-48-2, L-48-3, L-48-B) (#60 for L-48, L-48-1 & L-48-V)

Ref. No.	Part No.	Part Name
25	C66-47-6-40	Jet—Discharge (for L-48-C, L-48-J, L-48-U & L-48-AB)
25	C66-50	Jet—Discharge (#40 for L-48-F, L-48-G, L-48-N, L-48-Y, L-48-Z, L-48-AA & L-48-AC) (#45 for L-48-K)
26	†T66-52	Washer—Discharge Jet Fibre
27	C77-18	Jet—Well Vent (#13 for L-48, L-48-1 & L-48-V) (#14 for L-48-C, L-48-J, L-48-U, L-48-AB)
27	C77-18-17	Jet—Well Vent (for L-48-E, L-48-F, L-48-G, L-48-H, L-48-K, L-48-M, L-48-N, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
27	†C77-18	Jet—Well Vent (#15 for L-48-D, L-48-L, L-48-P & L-48-Q) (#22 for L-48-2, L-48-3, L-48-B)
28	C109-2	Bracket—Choke (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-U, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
28	C109-31	Bracket—Choke (for L-48-F, L-48-H, L-48-K, L-48-N, L-48-G & L-48-Y)
28	C109-18	Bracket—Choke (for L-48-U)
28	C109-63	Bracket—Choke (for L-48-Z, L-48-AA & L-48-AC)
29	T2158	Nut—Tube Clamp Screw (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-U, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
29	T22B8	Nut—Tube Clamp Screw (for L-48-U)
30	C110-1	Clamp—Bracket Tube (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-Y, L-48-Z, L-48-AA, L-48-AC)
31	T188-10	Screw—Tube Clamp (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-U, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
31	T188-10	Screw—Tube Clamp (for L-48-U)
32	T45-8	Lockwasher—Shaft Nut (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
32	T41-10	Lockwasher—Shaft Nut (for L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
32	T2258	Nut—Choke Shaft (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-U, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
33	T22510	Nut—Choke Shaft (for L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
33	T22B8	Nut—Choke Shaft (for L-48-U)
34	T888-7	Screw—Lever Swivel (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-U, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
34	T188-6	Screw—Lever Swivel (for L-48-U)
35	C106-104	Lever—Choke (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-U, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
35	CR106-157	Lever—Choke (for L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
35	C106-57	Lever—Choke (for L-48-U)
36	C140-2	Screw—Bracket Assembly (except L-48-U)
36	C140-20	Screw—Bracket Assembly (for L-48-U)
37	C112-6	Spring—Lever Return (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
37	C112-11	Spring—Lever Return (for L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
40	C105-60	Shaft—Choke (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
40	C108-107	Shaft & Lever—Choke (for L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
41	†T41-5	Lockwasher—Plate Screw
42	†T15B5-8	Screw—Choke Plate
43	C101-17	Plate—Choke (for all except L-48-C, L-48-E, L-48-J, L-48-M, L-48-P, L-48-Q, L-48-U, L-48-Z, L-48-AA, L-48-AB & L-48-AC)
43	C101-60	Plate—Choke (for L-48-C, L-48-E, L-48-J, L-48-M, L-48-P, L-48-Q, L-48-Z, L-48-AA & L-48-AC)
43	C102-110	Plate—Choke (for L-48-AB)
44	C188-24	Plug—Choke Shaft Hole (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
45	†T66-23	Washer—Shaft Hole Plug (for all except L-48-F, L-48-H, L-48-K, L-48-N, L-48-G, L-48-Y, L-48-Z, L-48-AA & L-48-AC)
46	†CT62-7	Washer—Intake Drain
47	†CT67-12	Washer—Drain Felt
48	†CT888-51	Retainer—Felt Washer
49	B9-35A	Bowl—Fuel (for L-48, L-48-1, L-48-2, L-48-3 & L-48-B)
49	B9-35L	Bowl—Fuel (for L-48-D, L-48-E, L-48-G, L-48-L, L-48-M, L-48-P & L-48-Q)
49	B9-35L-1	Bowl—Fuel (for L-48-C, L-48-J, L-48-U, L-48-Z, L-48-AA & L-48-AC)
49	B9-35R-1	Bowl—Fuel (for L-48-F, L-48-H, L-48-K, L-48-N & L-48-Y)
49	B9-35H-2	Bowl—Fuel (for L-48-V)
49	B9-112-1	Bowl—Fuel (for L-48-AB)
50	CT91-3	Plug—Bowl Drain (3/4" pipe)
51	†T41-10	Lockwasher—Bowl to Body Screw
52	†T1810-10	Screw—Bowl to Body
53	†T66-24	Washer—Main Jet Fibre
54	C52-6	Jet—Main (#13 for L-48-D, L-48-L, L-48-N) (#19 for L-48-AA) (#21 for L-48-C, L-48-J, L-48-U, L-48-AB) (#22 for L-48) (#23 for L-48-K) (#24 for L-48-1, L-48-V) (#25 for L-48-P, L-48-Q) (#26 for L-48-2, L-48-E, L-48-M) (#28 for L-48-3, L-48-B) (#30 for L-48-F, L-48-G, L-48-Y, L-48-Z, L-48-AC) (#33 for L-48-H)
55	†T66-23	Washer—Passage Plug (or Adjustment) Fibre
56	C71-21	Adjustment—Main Jet (for L-48-1, L-48-3, L-48-B, L-48-E, L-48-F, L-48-G, L-48-H, L-48-K, L-48-M, L-48-P, L-48-Q, L-48-V, L-48-Y, L-48-Z & L-48-AC)
57	C188-23	Plug—Main Jet Passage (for L-48, L-48-2, L-48-C, L-48-D, L-48-J, L-48-L, L-48-N, L-48-AB, L-48-AA)
57	C188-52	Plug—Main Jet Passage (for L-48-U)
58	†C141-4-5	Gasket—Flange (not in gasket kit C181-66)
	C24-54Pr2	Lever & Swivel—Throttle Clamp (for L-48-U)
	C181-66	Kit—Gasket
	K560	Kit—Repair Parts (for L-48 & L-48-1)
	K562	Kit—Repair Parts (for L-48-2, L-48-3 & L-48-B)

Note: Repair kits include items marked †. \*Note: Specify Assembly Number to Complete Part Number.

## ZENITH CARBURETOR DIVISION

696 HART AVENUE



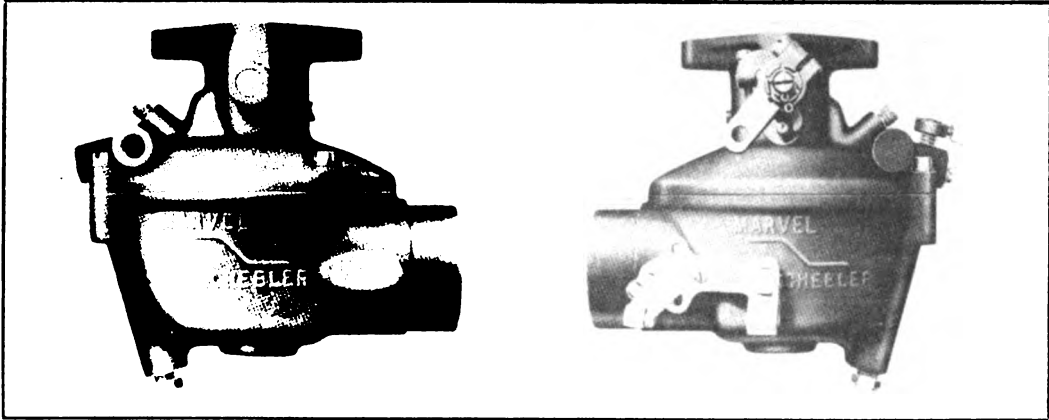
DETROIT 14, MICHIGAN

Manufacturers of Zenith Carburetors and Filters

Prices subject to change without notice

# MARVEL-SCHEBLER CARBURETER TSX

**Wisconsin  
Motors**



## DESCRIPTION

TSX-146 (Wis. L-49-A) Model AGH Engine  
TSX-147 (Wis. L-49-B) Model AHH Engine  
TSX-148 (Wis. L-49) Model VE4 Engine  
TSX-352 (Wis. L-49-C) Model VF4 Special Engine

## PRELIMINARY ADJUSTMENTS

Set throttle stop screw "A" so that throttle disc 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 on instrument board. 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

Set throttle or governor control lever in slow idle position and adjust throttle stop screw "A" 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 screw "B" in, or clockwise, until engine begins to falter or roll from richness, then turn screw "B" out, or counter-clockwise, until the engine runs smoothly.

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

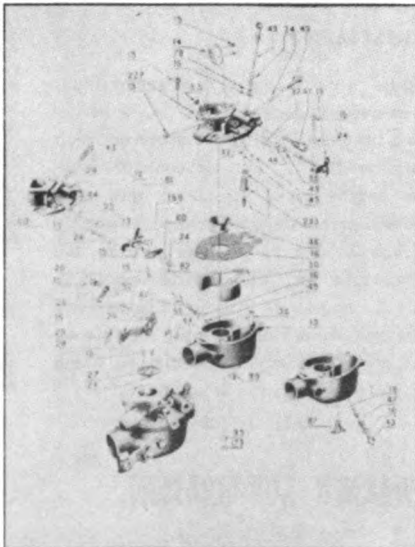
## POWER ADJUSTMENT

With the engine running at governed speed under load, turn power adjusting needle "C" in, or clockwise, a little at a time until the power drops appreciably. Then turn needle "C" 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 up the mixture by backing out the power adjustment needle one notch at a time until good acceleration is obtained.

**MARVEL-SCHEBLER CARBURETER DIVISION, BORG-WARNER CORPORATION  
FLINT, MICHIGAN, U. S. A.**

**SERVICE PARTS LIST**

Symbol No.	DESCRIPTION	TEX-148 L-48	SX-147 L-48-B	TEX-148 L-48-A	TEX-362 L-48-C
10	Carbureter Assembly Complete	10-2630	10-2626	10-2625	10-3214
10	Carbureter Body Assembly	10-2640	10-2535	10-2633	10-3215
13	Throttle Shaft, Throttle Stop and Lever Assembly	13-877	13-851	13-851	13-877
14	Fly—Throttle (20°)	14-169	14-169	14-169	14-169
15	Screw (#8-32 x 3/4" Fill. Head) (Throttle Stop)	15-42	15-42	15-42	15-42
15	Screw (1/4"-28 Headless Idle Drilling)	15-223	15-223	15-223	15-223
15	Screw (#8-32 x 1/8") (Choker Bracket—1; Choker Swivel—1)	15-285			15-285
15	Screw (#8-32) (Choker Lever)		15-397	15-397	
15	Screw (#12-24 x 3/8" Flat Fill. Head) (Throttle Body to Bowl)	15-A82	15-A82	15-A82	15-A82
15	Screw (#4-36 x 1/4" Round Head) (Throttle Fly—2; Ratchet Spring—2)	15-A91	15-A91	15-A91	15-A91
15	Screw (#4-36 x 1/8" Round Head) (Choker Fly)	15-A92	15-A92	15-A92	15-A92
15	Screw (#8-32 x 3/8" Fill. Head) (Choker Bracket to Body)	15-A93			15-A93
16	Gasket—Float Valve Seat	16-4	16-4	16-4	16-4
16	Gasket—Throttle Body to Bowl	16-80	16-80	16-80	16-80
16	Gasket—Main Nozzle	16-449	16-449	16-449	16-449
16	Gasket—High Speed Needle		16-491	16-491	
16	Gasket Assortment	16-590	16-597	16-597	16-590
24	Spring—Choker Return	24-247			24-247
24	Spring—Throttle Stop Screw	25-262	24-262	24-262	24-262
24	Spring—Idle Needle	24-340	24-340	24-340	24-340
24	Spring—Choker Lever		24-480	24-480	
24	Spring—High Speed Needle		24-A1	24-A1	
24	High Speed Adjusting Ratchet Spring Assembly		24-501	24-501	
26	Choker Shaft and Lever Assembly	26-693	26-631	26-631	26-693
27	Choker Fly Assembly	27-539	27-530	27-530	27-539
28	Swivel—Choker	28-49			28-49
28	Swivel—Throttle	28-94	28-94	28-94	28-94
29	Clip—Choker Bracket	29-81			29-81
29	Choker Bracket	29-92			29-92
29	Choker Bracket and Clip Assembly	29-514			29-514
30	Float and Lever Assembly		30-600	30-600	30-600
32	Shaft—Float Lever	32-27	32-27	32-27	32-27
43	Needle—Idle Adjusting	43-33	43-33	43-33	43-33
43	High Speed Needle Assembly		43-627	43-627	
44	Packing—Throttle Shaft	44-38	44-38	44-38	44-38
44	Packing—Choker Shaft	44-39	44-39	44-39	44-39
46	Venturi—1 1/4" Di. Throat	46-457			46-457
46	Venturi—3/4" Di. Throat			46-476	
46	Venturi—1 1/8" Di. Throat		46-A38		
47	Nozzle	47-636	47-180	47-180	47-636
49	Jet—Idle	49-101L	49-101L	49-101L	49-101L
49	Jet—Power	49-162			49-176
55	Cup—Throttle Shaft	55-230	55-230	55-230	55-230
55	Retainer—Throttle Shaft Packing	55-231	55-231	55-231	55-231
55	Retainer—Choker Shaft	55-243			55-243
62	Pin—Throttle Stop	62-167	62-167	62-167	62-167
78	Washer—Choker Lever		78-184	78-184	
78	Washer—Plain (High Speed Needle)		78-299	78-299	
82	Pin—Cotter (Throttle Swivel)	82-14	82-14	82-14	82-14
82	Cotter—Choker Swivel	82-16			82-16
95	Strainer—Gasoline Drain	95-40	95-40	95-40	95-78
99	Plug—Bowl Drain	99-7	99-7	99-7	99-7
179	Plug—Expansion (Throttle Body)	179-11			179-11
179	Plug—Expansion (Gasoline Drain)	179-35	179-35	179-35	
227	Throttle Body Assembly	227-903	227-899	227-899	227-1147
233	Float Valve, Seat & Gasket Assy. (Matched)	233-536	233-536	233-536	233-536
286	Repair Kit	286-067	286-666	286-665	286-845



# WICO MODEL XH-4 MAGNETOS

FOR WISCONSIN MODELS VE4, VF4, VM4 AND VP4 ENGINES

## INSTRUCTIONS

### TIMING

The magneto is properly timed to the engine at the factory. If it becomes necessary to retune 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, 5077. 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, X5653, may be removed by loosening the 3 screws, 5622, which hold it in place. The distributor arm, X5331, can then be removed from the shaft. When replacing the distributor arm be sure that the flat inside of the arm is lined up with the flat on the cam.

### BREAKER CONTACTS - REPLACEMENT AND ADJUSTMENT

The breaker contacts should be adjusted to .015" when fully opened. To adjust the contacts, loosen the two clamp screws 5900, enough so that the contact plate can be moved.

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

To replace the contacts remove the breaker, the spring clamp screw, 6017, the breaker arm lock and washer, 3219, and 4210, then lift the breaker arm from its

pivot. Remove the spacing washer, 5717, and the two breaker plate clamp screws, 5900. 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.

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

### CONDENSER

To remove the condenser, X5614, first disconnect the condenser lead by removing the breaker arm spring screw, 6017, then remove the two condenser clamp screws, 5411, and the condenser clamp 5532. When replacing the condenser make sure it is properly placed between the two locating bosses and that the clamp screws are securely tightened.

### COIL AND COIL CORE

The coil and coil core must be removed from the magneto housing as a unit. After the distributor cap, distributor arm, and breaker shield have been removed and the primary wire disconnected from the breaker arm spring terminal by removing screw 6017, take out the two coil core clamp screws, 5411, and remove the clamps 5633. 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

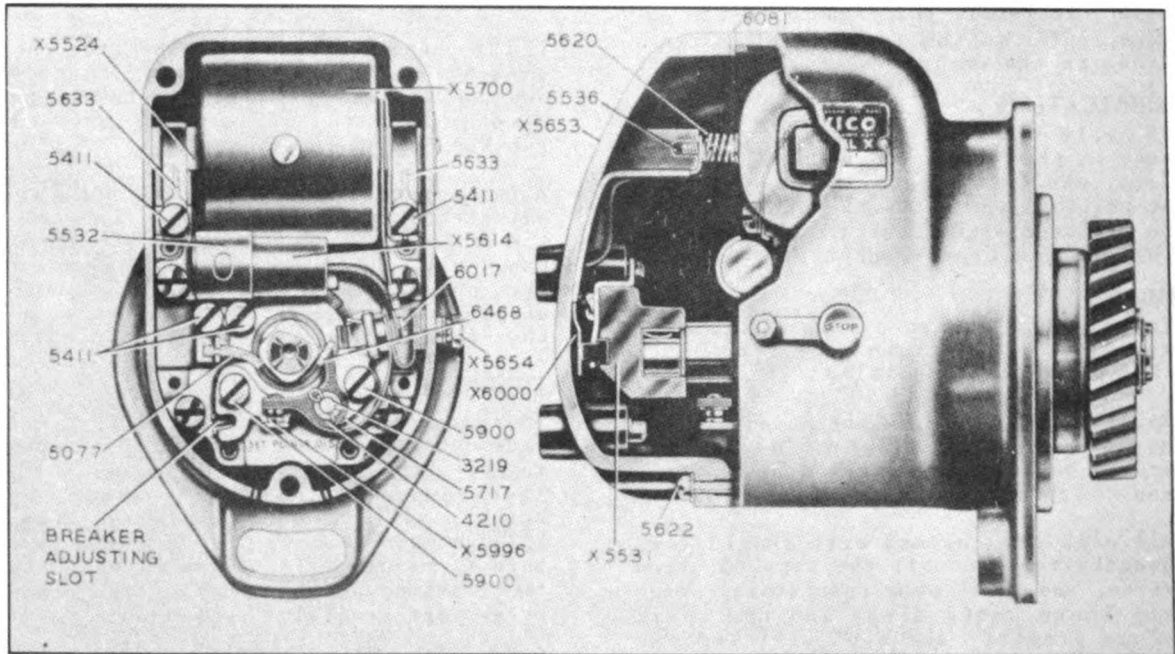
The coil X5700, is held tight on the core, X5524, by two wedges, 10383. It will be necessary to press against the coil core with considerable force to remove it from the coil. The coil should be supported in such a way that there is no danger of the primary of the coil being pushed out of the secondary.

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

**WICO ELECTRIC COMPANY**

WEST SPRINGFIELD, MASSACHUSETTS, U.S.A.

## WICO MODEL XH-4, N<sup>o</sup> XH-1343 MAGNETO WIS. MOTOR N<sup>o</sup> Y-54



PART NO.	PART NAME
3219	Breaker arm pivot washer
4210	Breaker arm lock
5077	Cam wiper felt
5411	Condenser clamp screw
5411	Coil core clamp screw
X5524	Coil core group
X5531	Distributor arm group
5532	Condenser bracket
5536	Coil contact screw
X5614	Condenser group
5620	Coil contact spring
5622	Distributor cap screw
5633	Coil core clamp

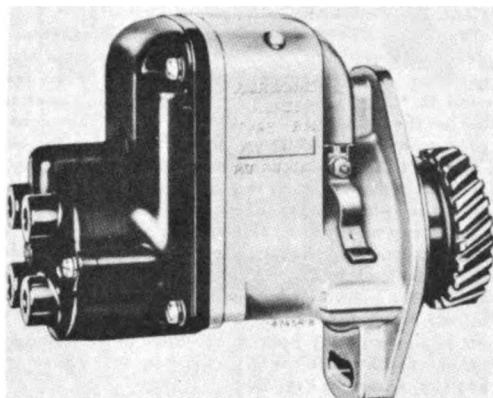
PART NO.	PART NAME
X5653	Distributor cap unit (Includes 6081)
X5654	Ground connection unit
X5700	Coil group
5717	Breaker contact aligning washer
5900	Fixed contact clamp screw
X5996	Breaker contact set (Includes fixed contacts, breaker arm)
X6000	Secondary interlead group
6017	Breaker spring clamp screw
6081	Distributor cap gasket
6468	Breaker arm felt



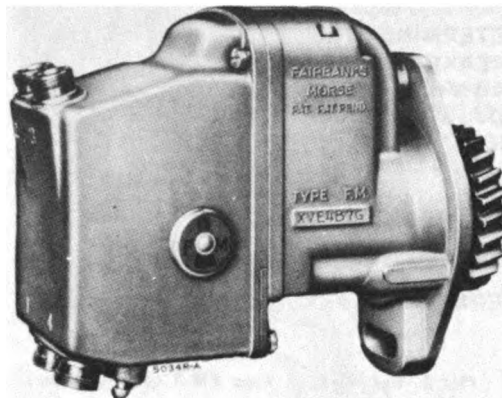
# FAIRBANKS - MORSE

## TYPES FM-XV4B7 AND FM-XVE4B7G MAGNETOS

Adapted only to Wisconsin VE4, VF4, and VP4D Engines



FM-XV4B7



FM-XVE4B7G

### Field Service and Adjustment Information

#### GENERAL DESCRIPTION

Types FM-XV4B7 and FM-XVE4B7G magnetos are special units designed and built for use on Engine Models VE4, VF4, and VP4D, manufactured by the Wisconsin Motor Corporation. These engines are all modifications of the same basic design, each having a firing interval of 180°-270°-180°-90°. Types FM-XV4B7 and FM-XVE4B7G magnetos, each having a four pole rotor and a four lobe cam, meet this requirement by producing four sparks per revolution of the rotor, which runs at crankshaft speed. In a complete cycle of two engine revolutions, four sparks are used for ignition and four fire in the exhaust. These magnetos have the standard SAE flange mounting, but have a special coupling and drive gear arrangement which requires an extended rotor shaft.

#### SERVICE PROCEDURE

Improper functioning of the magneto is often believed to be the cause of engine difficulty arising from other sources, such as a flooded carburetor, insufficient fuel or air, loose ignition connections, or a defective spark plug. Since a brief engine inspection will often localize the trouble before the magneto is reached, it prevents maladjustment of parts in good condition. Type FM-X magnetos are built in sealed frames and should be opened only when it is certain that the ignition spark produced is unsatisfactory. This condition may be determined by ignition spark tests which are easily made in the field.

#### 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. The engine should not misfire when this is done. Ignition tests made while any part of the system is wet are useless.

#### TESTING THE MAGNETO SPARK

Remove all the ignition cables from the magneto end cap sockets and insert a short, stiff wire in one of the

sockets. Bend this wire to within 1/8 in. of the engine block. Turn the engine over slowly one complete revolution and watch carefully for the spark discharge which should occur every time the impulse coupling releases. 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

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

#### SERVICE OF BREAKER POINTS

Before examining the breaker points, it is first necessary to remove the end cap, which is sealed to the metal frame by a gasket joint. The breaker points should then be inspected 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 readjust them to their proper clearance, which is 0.015 in. at full separation. This adjustment is made in the following manner: Loosen the locking screws identified in Fig. 1 shown below. 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

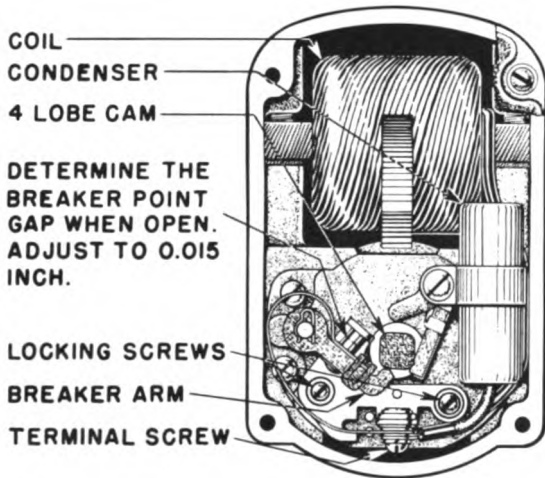


Fig. 1. End View of Type FM-XV4B Magneto.

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 felt wick, if very dirty or completely saturated with grease, should be replaced by a clean, dry wick. The cam, if dry, should be given a light coating of FMCO10 Magneto Grease. Other than this, Type FM-X magnetos do not require field lubrication and any attempt to oil or grease the bearings is inadvisable. The lubricant should be renewed only during a complete overhaul of the magneto by a Factory-Authorized Magneto Service Station.

**SEALING MAGNETO**

Before replacing the end cap on the magneto frame, clean the contact surfaces between the 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.

**SPECIAL DRIVE GEAR**

Types FM-XV4B7 and FM-XVE4B7G magnetos, as adapted to engines manufactured by the Wisconsin Motor Corporation, are equipped with special drive gears mounted directly on the impulse coupling. The gear is a slip fit on the extended coupling nut, since movement of the gear with respect to the coupling nut and rotor shaft occurs during the impulse period. If it is necessary at any time to remove the drive gear, special care must be exercised in reassembly. Remove the end cap cover (the entire end cap on radio shielded units) and turn the rotor until the contact segment is in firing position for No. 1 cylinder as shown in Fig. 2. Notice that the No. 1 firing position of the contact segment is diametrically opposed in the two magnetos. With the distributor rotor in the proper position fit the gear to the impulse coupling lugs so that the prick punch mark on the rim of the gear is in the position shown in Fig. 2.

**RADIO-SHIELDED MAGNETOS**

Complete radio shielding of the ignition system is required in numerous applications, the necessary modification of the magneto being designated as the Type FM-XVE4B7G. On this unit the plastic end cap and end cap cover are replaced by an all-metal end cap in which an insulated distributor block is fitted. Special outlets are provided for the high tension leads so that connection can be made to the shielded cables. A push-button ground terminal is located on the lower side of the end cap. In addition, an auxiliary terminal is provided to connect a ground wire from the magneto to a remote grounding switch.

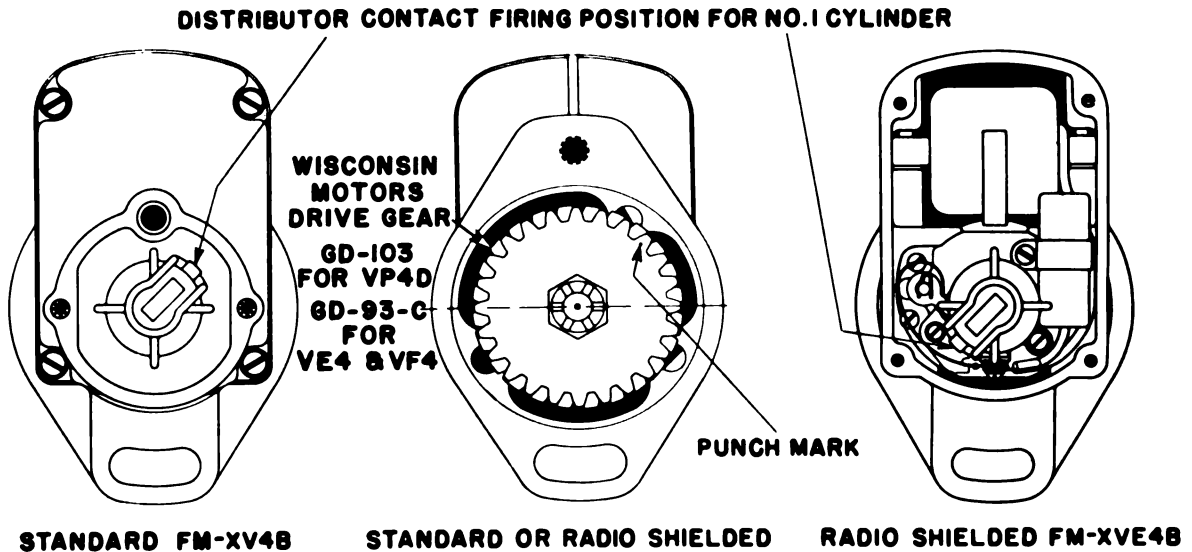
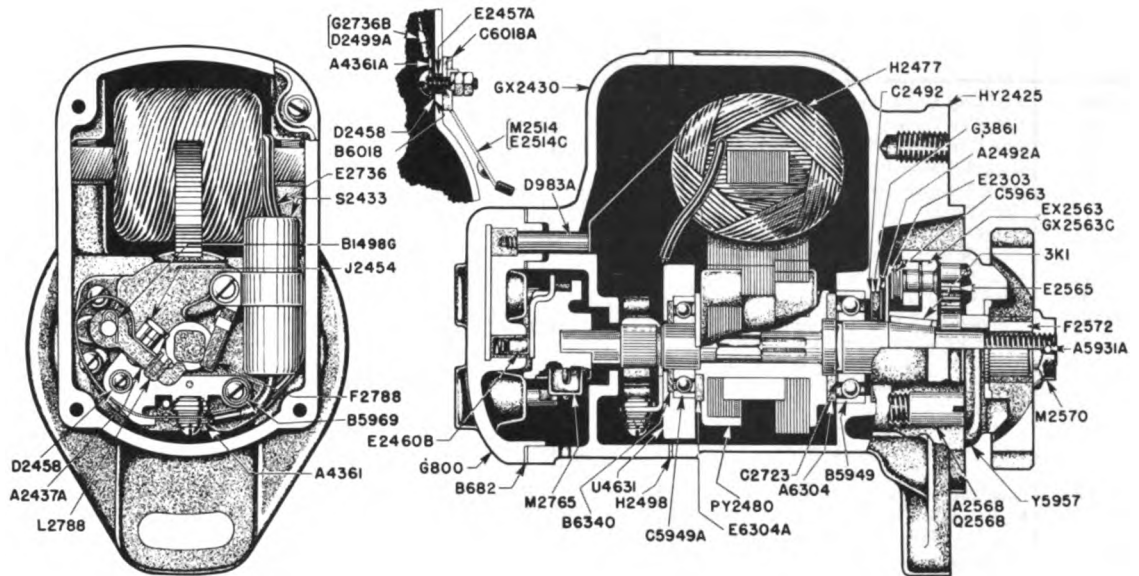
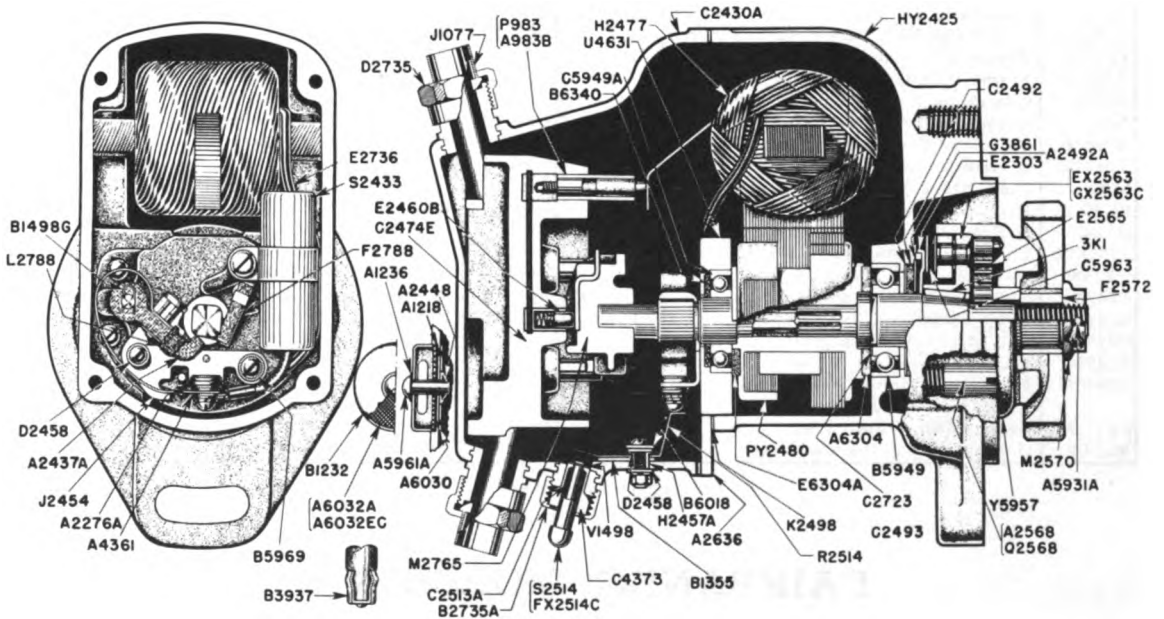


Fig. 2. Distributor Contact Firing Position and Drive Gear Marking.



**Type FM-XV4B7 Magneto (Standard)**



**Type FM-XVE4B7G Magneto (Radio Shielded)**

TYPES FM-XV4B7 AND FM-XVE4B7G MAGNETOS

Instructions

Order by Part No.	Name of Part	No. Used		Order by Part No.	Name of Part	No. Used	
		FM-XV4B7	FM-XVE4B7G			FM-XV4B7	FM-XVE4B7G
B682	End Cap Cover Gasket . . . . .	1	-	R2514	Primary Ground Switch Strip . . . . .	-	1
G800	End Cap Cover . . . . .	1	-	S2514	Ground Switch Push Button . . . . .	-	1
8S9D	End Cap Cover Screw (#8-32x9/16")	2	-	E2514C	Insulated Lever Ground Switch . . . . .	1	-
P983	High Tension Lead (Inc. in A983B)	-	1	FX2514C	Ground Switch Push Button Assembly	-	1
D983A	High Tension Lead Rod . . . . .	1	-	6S8N	Ground Switch Screw (#6-32x1/2")	-	1
A983B	High Tension Lead Assembly . . . . .	-	1	6S10N	Ground Switch Screw (#6-32x5/8")	1	-
J1077	Cable Outlet Ferrule . . . . .	-	4	6N1	Ground Screw Nut (#6-32)	2	1
A1218	Vent Screen Shield Gasket . . . . .	-	2	6LW1	Ground Screw Lockwasher (#6)	1	1
B1232	Vent Screen Shield . . . . .	-	2	EX2563	Impulse Coupling Hub (UB-9, CW)	1	1
A1236	Vent Rivet Gasket . . . . .	-	2	GX2563C	Impulse Cplg. Complete (UB-9, CW)	1	1
B1355	Ground Switch Strip * . . . . .	-	1		(Inc. EX2563, E2565, Y5957)		
V1498	Ground Switch Snap Ring . . . . .	-	1	E2565	Impulse Coupling Drive Spring . . . . .	1	1
B1498G	Brkr. Arm Fulcrum Pin Snap Ring . . . . .	1	1	A2568	Imp. Cplg. Pawl Stop Pin (1-3/16")	1	1
E2303	Oil Slinger Baffle Disc * . . . . .	1	1	Q2568	Imp. Cplg. Pawl Stop Pin (1-1/2")	1	1
HY2425	Frame . . . . .	1	1	M2570	Impulse Coupling Nut . . . . .	1	1
GX2430	End Cap . . . . .	1	-	F2572	Impulse Coupling Bushing . . . . .	1	1
C2430A	End Cap (Inc. A1218, B1232, A1236, A2448, A5961A, A6030, A6032A)	-	1	A2636	End Cap Extension Plate . . . . .	-	1
10S8A	End Cap Screw (#10-24x1/2")	-	2	10S6G	End Cap Ext. Plate Scr. (#10-24x3/8")	-	2
10S10A	End Cap Screw (#10-24x5/8")	-	2	C2723	Rotor Shaft Shim (Use as needed)	2	2
10S12D	End Cap Screw (#10-24x3/4")	4	-	D2735	Ground Cable Outlet Nut . . . . .	-	4
S2433	Condenser Assembly . . . . .	1	1	B2735A	Primary Ground Cable Outlet Nut . . . . .	-	1
8S6D	Condenser Mtg. Screw (#8-32x3/8")	1	1	E2736	Coil Primary Lead Wire Tube . . . . .	1	1
A2437A	Breaker Arm, Stationary Bracket, & Points (Inc. J2454)	1	1	G2736B	Primary Terminal Wire Tube . . . . .	1	-
A2448	Vent Screen Quickie . . . . .	-	2	M2765	Distributor Rotor * . . . . .	1	1
J2454	Contact Support Assembly . . . . .	1	1	F2788	Cam Wick and Holder Assembly . . . . .	1	1
6S5N	Brkr. Arm Term. Screw (#6-32x5/16")	1	1	L2788	Breaker Arm Felt Wick . . . . .	1	1
6LW2	Brkr. Arm Term. Screw Lockwasher	1	1	G3861	Rotor Shaft Seal . . . . .	1	1
6S6N	Cont. Supp. Lock. Screw (#6-32x3/8")	1	1	B3937	Cable Clip . . . . .	-	4
6LW2	Cont. Supp. Lock. Screw Lockwasher	1	1	A4361	Lead Wire Terminal for #8 Screw	3	2
8S6N	Cont. Supp. Lock. Screw (#8-32x3/8")	1	1	A4361A	Lead Wire Terminal for #6 Screw	1	-
8LW3	Cont. Supp. Lock. Screw Lockwasher	1	1	C4373	Ground Switch Bushing . . . . .	-	1
E2457A	Primary Ground Screw Bushing	1	-	U4631	Bearing Support Assembly . . . . .	1	1
H2457A	Primary Ground Screw Bushing *	-	1	8S6D	Bearing Support Screw (#8-32x3/8")	4	4
D2458	Cont. Supp. Lock. Screw Washer	1	1	A5931A	Impulse Coupling Nut Lockwire . . . . .	1	1
D2458	Prim. Ground Switch Plate Washer	1	2	B4949	Rotor Drive End Ball Bearing . . . . .	1	1
E2460B	Coil Lead Brush and Spring . . . . .	1	1	C5949A	Rotor Ball Bearing (Opp. Drive End)	1	1
C2474E	Distributor Block * . . . . .	-	1	Y5957	Impulse Coupling Shell . . . . .	1	1
8S8N	Dist. Block Screw (#8-32x1/2")	-	4	A5961A	Vent Screen Rivet . . . . .	-	2
8LW3	Dist. Block Screw Lockwasher . . . . .	-	2	C5963	Impulse Coupling Pawl Spring . . . . .	2	2
H2477	Coil Assembly* (Inc. E2736, A4361)	1	1	B5969	Cont. Supp. Locking Screw Washer . . . . .	1	1
25SS12A	Coil Bridge Setscrew (1/4-20x3/4")	2	2	B6018	Ground Screw Insulating Washer . . . . .	1	1
PY2480	Magnetic Rotor Assembly . . . . .	1	1	C6018A	Ground Screw Insulating Block . . . . .	1	-
C2492	Rotor Shaft Seal Inner Washer . . . . .	1	1	A6030	Vent Screen Washer . . . . .	-	2
A2492A	Rotor Shaft Seal Outer Washer . . . . .	1	1	A6032A	Vent Screen . . . . .	-	2
H2498	End Cap to Frame Gasket . . . . .	1	-	A6032EC	Hooded Vent Screen Group . . . . .	-	2
K2498	End Cap to Frame Gasket . . . . .	-	1		(Inc. A1218, A1232, A1236, A2448, A5961A, A6030, A6032A)		
D2499A	Primary Terminal Wire Assembly (Inc. G2736B, A4361, A4361A)	1	-	A6304	Rotor Bearing Seal (Drive End) . . . . .	1	1
C2513A	Ground Switch Button Spring . . . . .	-	1	E6304A	Rotor Bearing Seal (Opp. Dr. End) . . . . .	1	1
M2514	Ground Switch Insulated Lever . . . . .	1	-	B6340	Bearing Support Felt Seal . . . . .	1	1
				3K1	Key (Rotor to Impulse Coupling) . . . . .	1	1

\* Fungus-treated parts

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