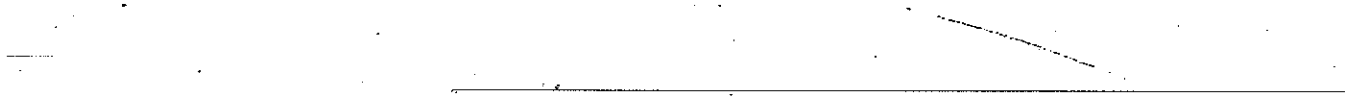
WISCONSIN
MODELS S-10D * S-12D * S-14D

Instruction and Repair Manual

Includes
LP-62 Fuel Pump Repair Instructions
Recoil Starter Instructions, Repair and parts list
Zenith 1408 Carb Operation and Service
Flywheel Alternator Instructions
Solid State Ignition Instructions
Walbro LMH Carb Instructions

Wisconsin Motors, L. L. C.



BOOK OF INSTRUCTIONS

WISCONSIN *Air-Cooled*

SINGLE CYLINDER ENGINES

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

LOCATED IN REAR SECTION OF MANUAL.

SOLID STATE – BREAKERLESS IGNITION SYSTEM, Forms MY-115 and MY-101-4

FLYWHEEL ALTERNATOR, INSTRUCTIONS AND PARTS LIST, Form MY-110-2

Models

S-10D	3-1/4" Bore – 3" Stroke 24.89 cu. in. Displacement
S-12D	3-1/2" Bore – 3" Stroke 28.86 cu. in. Displacement
S-14D	3-3/4" Bore – 3" Stroke 33.1 cu. in. Displacement

ISSUE MM-304
JAN. 85

INTRODUCTION

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

Wisconsin Motors, LLC adapts its engines to suit individual customer requirements when ever practical. However, it would become too involved to include all variations in one manual; therefore, should any problem arise concerning engine servicing, we advise that a Wisconsin Motors Distributor or authorized Service Center be contacted, as they are capable of identifying all parts by the specification number stamped on the name plate of engine.

Wisconsin heavy duty air cooled engines are of the most Advanced design and are built in a modern factory, Equipped with the latest machinery available.

Only the best materials, most suitable for the particular part, are used. During production, every part is subjected to the most rigid inspection, as are also the completely assembled engines. After assembly, every engine is operated on its own power for several hours. All adjustments are carefully made so that each engine will be in perfect operating condition when it leaves the factory.

Wisconsin Motors is backed by over seventy years of engineering experience in the design of internal-combustion engines for every conceivable type of service. The performance of these engines is proof of the long satisfactory service you too can expect from your engine.

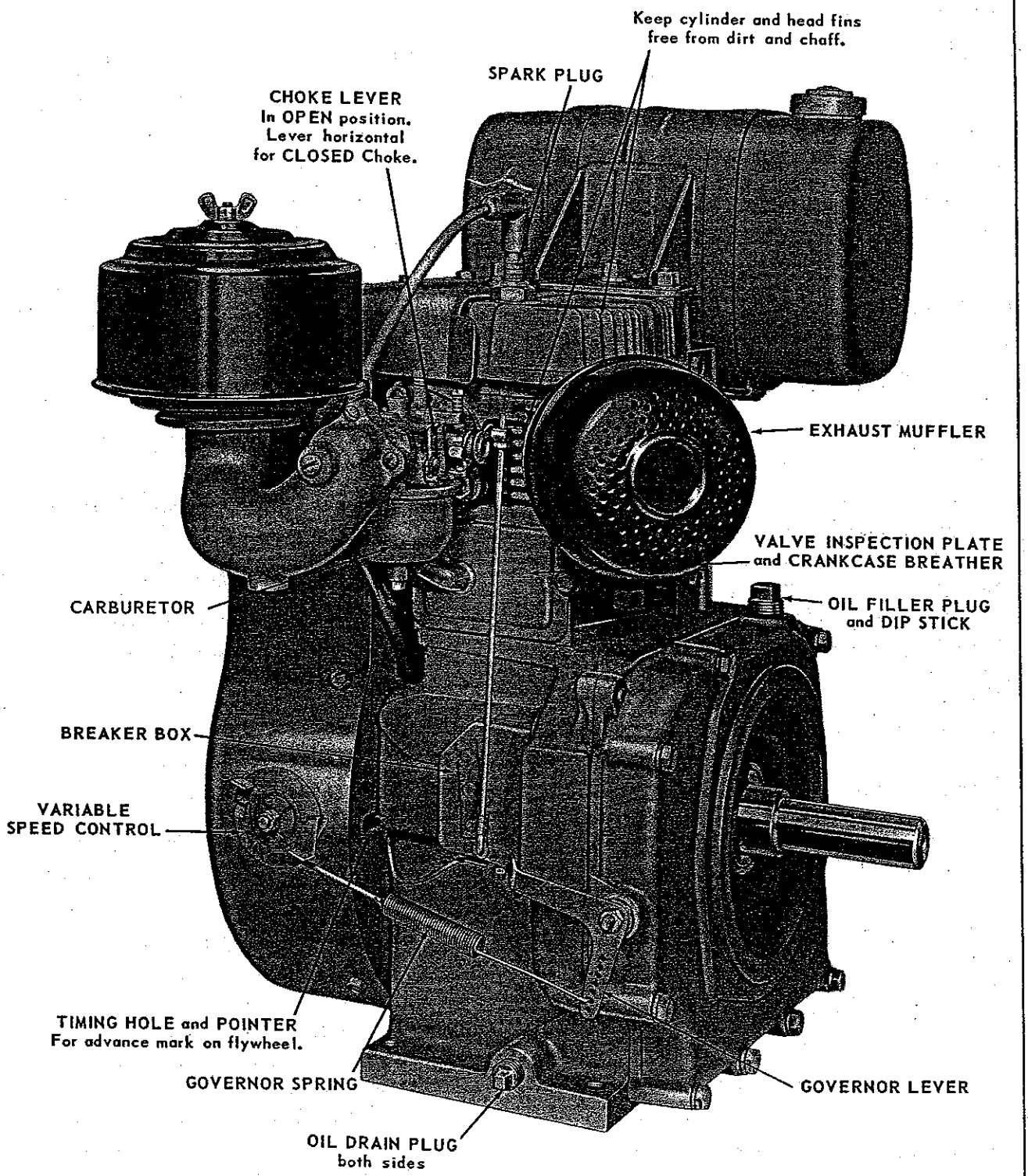
Like all fine machinery, the engine must be given regular care and be operated in accordance with the instructions.

Safety Precautions

- Never fill fuel tank while engine is running or hot; avoid the possibility of spilled fuel causing a fire.
- Always refuel slowly to avoid spillage.
- When starting engine, maintain a safe distance from moving parts of equipment.
- Do not start engine with clutch engaged.
- Do not operate engine in a closed building unless the exhaust is piped outside. This exhaust contains carbon monoxide, a poisonous, odorless and invisible gas, which if breathed causes serious illness and possible death.
- Never run engine with governor disconnected, or operate at speeds in excess of 3600 R.P.M. load.
- Never make adjustments on machinery while it is connected to the engine, without first removing the ignition cable from the spark plug . Turning the machinery over by hand during adjusting or cleaning might start the engine and machinery with it, causing serious injury to the operator.
- Precaution is the best insurance against accidents.

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

INDEX



With **'ZENITH' Carburetor** - See page 32A for engine with **WALBRO** carburetor

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Fig. 1

TAKE-OFF (rear) and RIGHT HAND SIDE VIEW of ENGINE

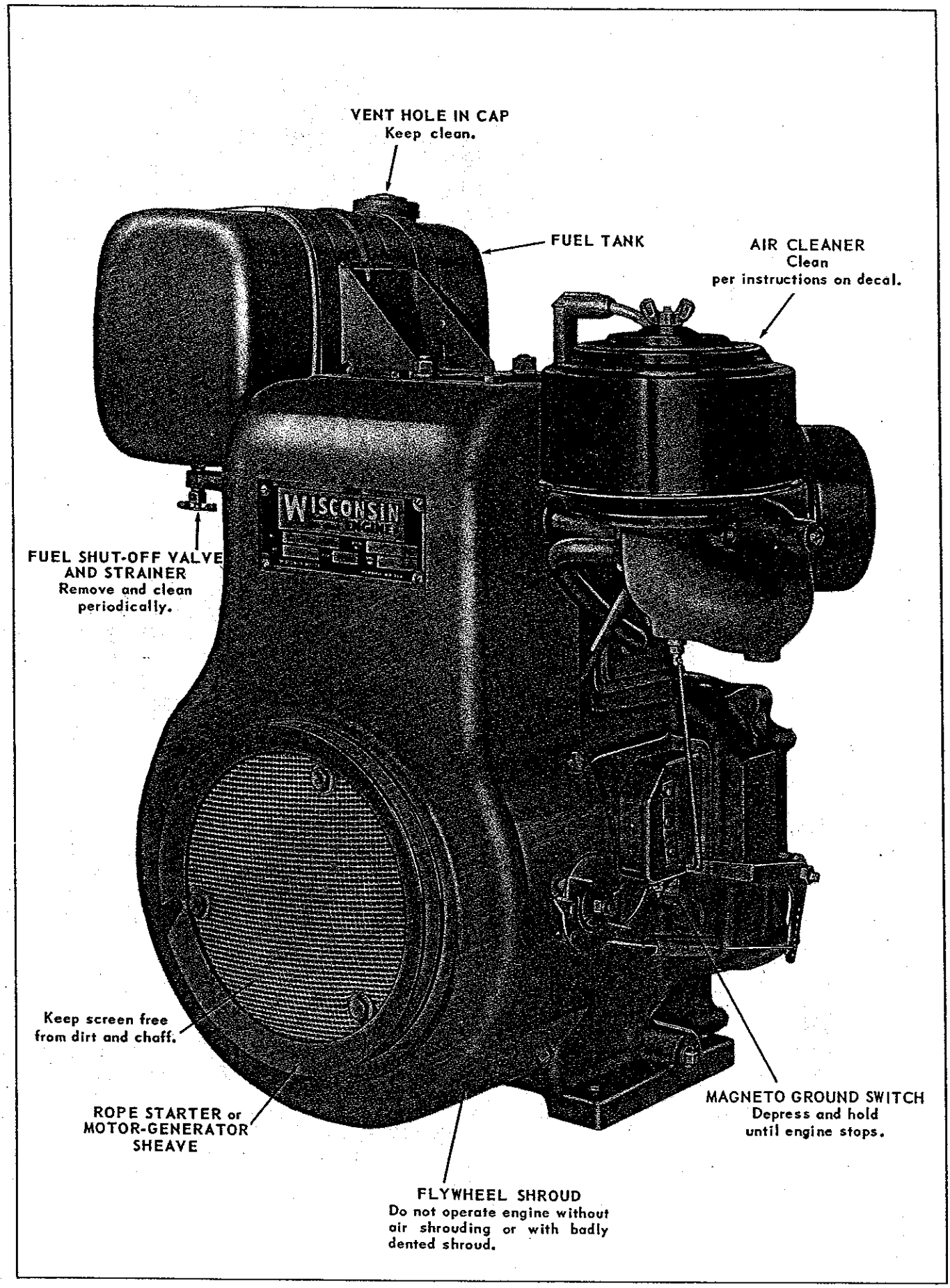

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Fig. 2

FAN END (front) and RIGHT HAND SIDE VIEW of ENGINE

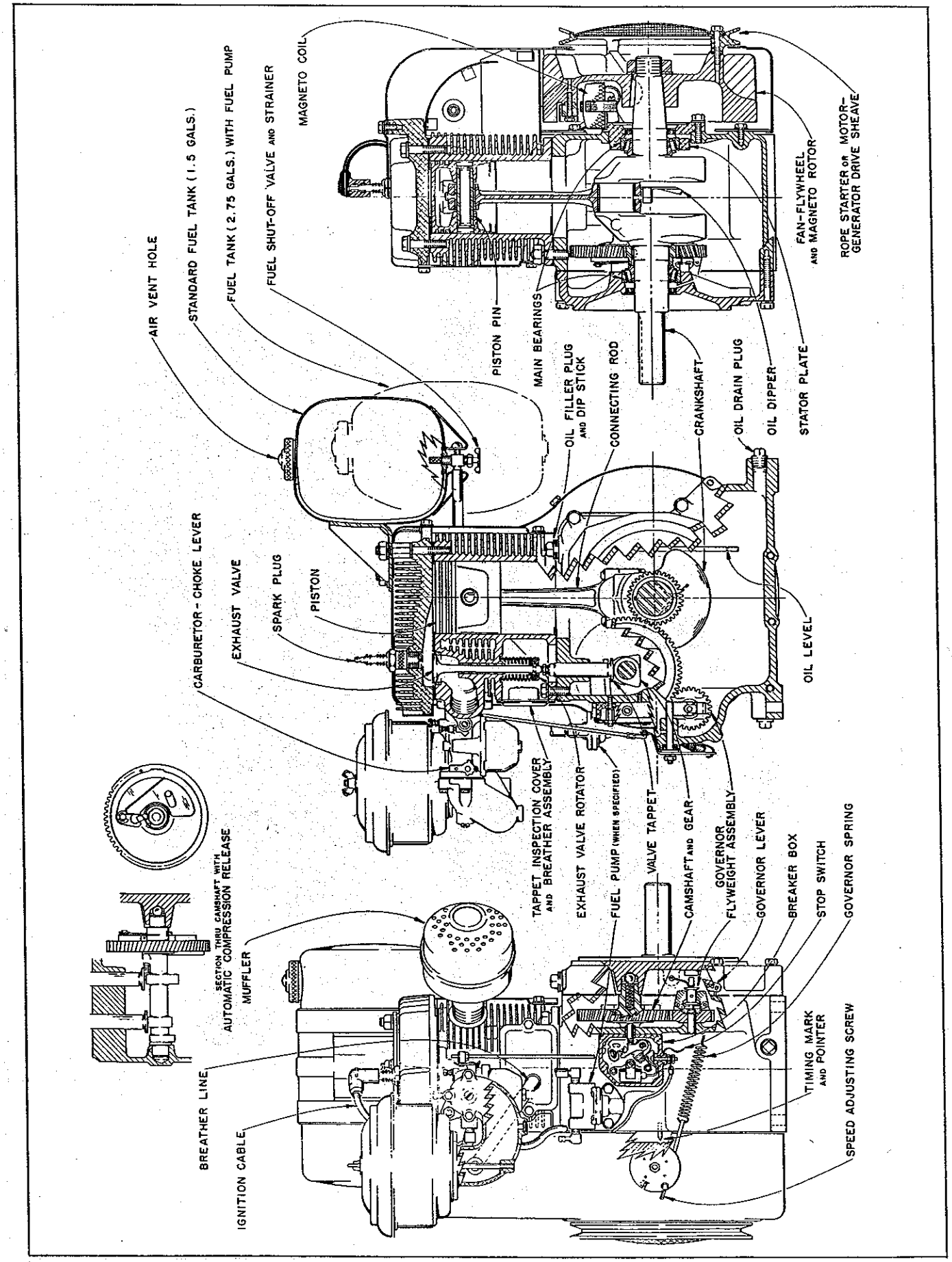


Fig. 3
SECTIONAL VIEWS OF ENGINE

GENERAL DESIGN

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

COMPRESSION RELEASE

A component part of the camshaft that operates automatically and trouble free. Permits fast and effortless starting with no dangerous "kick-back". Incorporated in these models of engines beginning with Serial No. 4225490.

COOLING

Cooling is accomplished by a flow of air, circulated over the cylinder and head 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.

Keep the cylinder and head fins free from dirt and chaff. Improper circulation of cooling air will cause engine to overheat.

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 ***flywheel magneto.*** A stator plate functions as an engine bearing plate as well as a support for the coil and core. The permanent magnet is mounted to the flywheel, and a breaker box on the side of the crankcase contains the points, condenser and stop switch. A push pin, actuated by the engine camshaft, operates the breaker arm at ***half engine speed.***

Battery ignition (12 volt) can be furnished in place of magneto, when specified. An ignition coil and breaker assembly are the means of inducing high voltage to the spark plug. ***Battery is not*** furnished by Wisconsin Motor Corporation.

LUBRICATION SYSTEM

An oil dipper attached to the connecting rod provides for a splash type lubrication system. The action of the dipper striking the oil in the crankcase provides ample lubrication for all internal parts of the engine.

GOVERNOR

A governor of the centrifugal flyball type maintains the engine speed by varying the throttle opening to suit the load imposed upon the engine. These engines are equipped with either a ***fixed speed*** or ***variable speed control,*** to regulate the governed speed of the engine.

ROTATION

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

Horsepower specified in the accompanying chart is for an atmospheric temperature of 60° Fahrenheit at sea level and at a Barometric pressure of 29.92 inches of mercury.

HORSEPOWER

R.P.M.	MODELS S-10D	S-12D	S-14D
1600	5.3	6.3	6.4
1800	5.9	7.2	7.3
2000	6.6	8.1	8.2
2200	7.3	9.0	9.1
2400	8.2	9.8	10.0
2600	8.7	10.5	10.8
2800	9.4	10.9	11.6
3000	9.7	11.6	12.4
3200	10.2	11.9	13.1
3400	10.4	12.2	13.7
3600	10.5	12.5	14.1

For each inch lower the Barometric pressure drops, there will be a loss in horsepower of 3½%.

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

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

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

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

INSTRUCTIONS FOR STARTING AND OPERATING

LUBRICATION

Before starting a new engine, fill crankcase base with the correct grade of engine oil, as specified in *"grade of oil chart"*. Fill thru the filler plug opening, illustrated in *Fig. 4*, with 2 ***quarts*** of oil.

For ***run-in of new engines,*** use same oil as recommended in *Grade of Oil Chart.*

The ***oil level*** is indicated by a groove on the dip stick, as shown in *Fig. 4*. Check oil level by resting bottom of plug at the top of oil filler opening on gear cover. (Do not thread in place to check oil).

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 equality and suitability – never on price.

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

SERVICE CLASSIFICATION OF OIL

In addition to the S.A.E. Viscosity grades, oils are also classified according to severity of engine service. Use oils classified by the American Petroleum Institute as *Service MS, SD* or *SE*. This type of oil is for engines performing under unfavorable or severe operating conditions such as: high speeds, constant starting and stopping, operating in extreme high or low temperatures and excessive idling.

GRADE OF OIL

SEASON OR TEMPERATURE	GRADE OF OIL
Spring, Summer or Fall + 120°F to + 40°F	SAE 30
Winter + 40°F to + 15°F + 15°F to 0°F Below Zero	SAE 20-20W SAE 10W SAE 5W-20
Use oils classified as Service MS, SD or SE	
Crankcase Capacity	2 Quarts

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 at either side of crankcase base. Oil should be drained while engine is hot, as it will then flow more freely.

FUEL

The fuel tank should be filled with a *good quality* gasoline free from dirt and water. The capacity of the standard tank is *1½ gallons*. A larger, 2¾ gallon tank, can be furnished upon request. Some of the poorer grades of gasoline contain gum which will deposit on valve stems, piston rings, and in the various small passages in the carburetor, causing serious trouble in operating, and in fact might prevent the engine from operating at all.

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

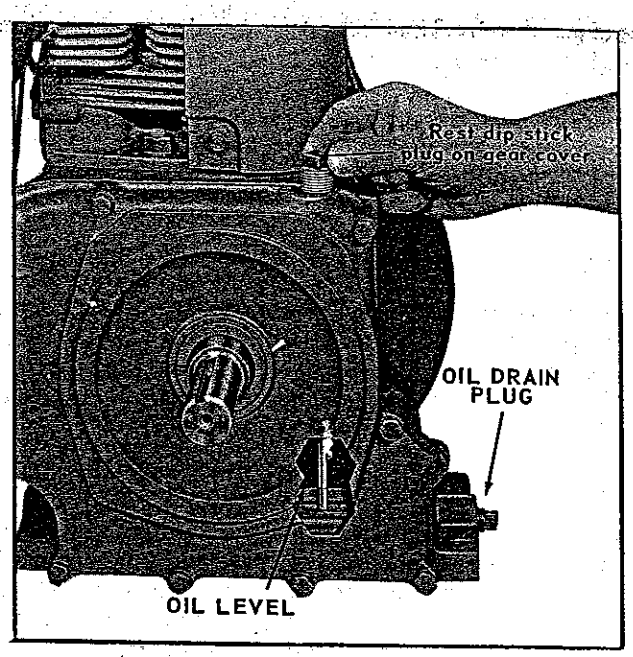


Fig. 4 293053C

The gasoline should have an octane rating of at least 90. Fuel with a low octane rating will cause detonation, and if operation is continued under this condition, severe damage will result to the engine. The cylinder and piston will be scored, head gasket blown out, bearings will be damaged, etc.

Be sure that air vent in fuel tank cap is not plugged with dirt, as this would prevent fuel from flowing to the carburetor.

FUEL PUMP

An engine equipped with fuel pump; when starting for the first time, or when engine has been out of operation for a while, should be primed to prevent hard starting. Disconnect ignition wire at the spark plug, then turn the engine over about 6 or 7 times by means of the rope starter sheave to actuate the fuel pump and thus fill the carburetor bowl with gasoline. Be sure and connect ignition wire after priming has been accomplished.

Fuel pump is an optional accessory and is usually furnished only upon request when engine is ordered. But, beginning with Serial No. 4080373, all crankcases for these models of engines are machined to accomodate field installation of a fuel pump. Instructions for fuel pump maintenance and repair are located in the back of this manual.

STARTING

STARTING PROCEDURE (Fig. 5 and Fig. 6)

1. Check crankcase oil level and gasoline supply. Open fuel shut-off valve.
2. Disengage clutch, if furnished.
3. Set throttle about 1/2 open, if variable speed governor control is furnished. With a fixed speed governor, spring will hold throttle open for starting.

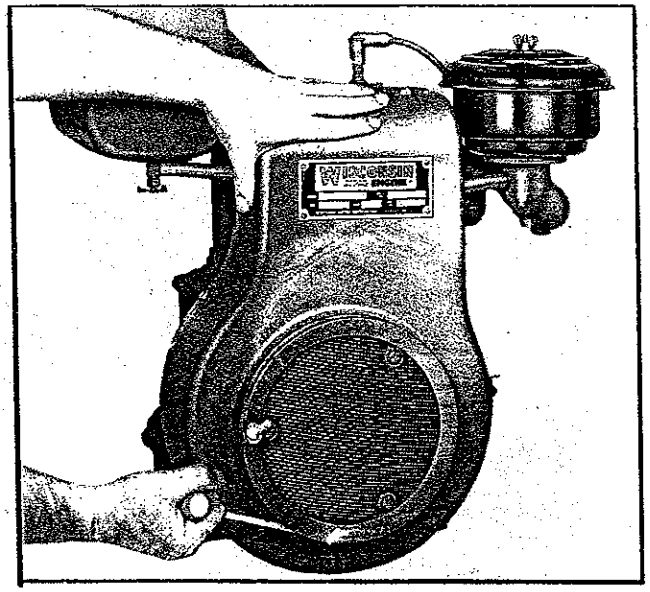


Fig. 5 293054C

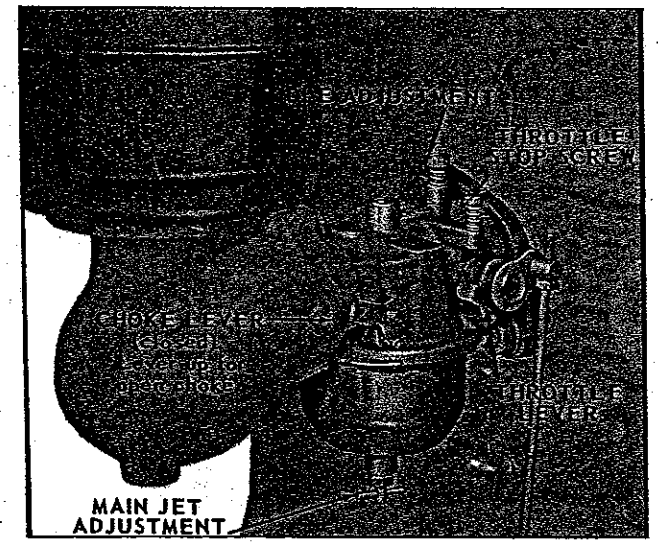


Fig. 6 293055C

4. Close choke on carburetor by pushing choke lever down ***(lever in horizontal position).*** Wind rope fully on sheave and ***pull briskly*** to turn crankshaft over.

   Above 30°F; open choke halfway if engine does not start after two or three pulls.

   With ***starting motor;*** pull out ignition switch *('To Stop Push In'),* and depress starter button.

5. After engine starts ***open choke fully*** (push lever up). Less choking is required in warmer weather or when the engine is warm, than when it is cold. Should flooding occur, open choke fully and continue cranking.

If all conditions are right, engine will start promptly after one or two attempts. Allow engine to warm up a few minutes before applying load, as prescribed in ***'Warm-Up Period'*** paragraphs.

New engines should be "run-in" gradually to insure trouble-free service. Refer to *"Starting and Operation of New Engine"*, on the inside front cover of this manual, for correct "running-in" procedure, with the exception that the initial break-in speed for the first half hour should be 1600 to 1800 R.P.M.

WARM-UP PERIOD

The engine should be allowed to warm up to operating temperature before load is applied. This requires only a few minutes of running at moderate speed. ***Racing an engine*** or ***gunning it,*** to hurry the warm-up period, ***is very destructive*** to the polished wearing surfaces of piston rings, cylinder, bearings, etc., as the proper oil film on these various surfaces cannot be established until the oil has warmed up and become sufficiently fluid. This is especially important on new engines and in cool weather.

Racing an engine by disconnecting the governor, or by doing anything to interfere with the governed control engine speed, ***is extremely dangerous.*** 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 wreck the engine and possibly injure bystanders.

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

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

STOPPING ENGINE

The breaker box on the side of the crankcase has a ***magneto ground switch*** for stopping the engine. ***Depress and hold down until engine stops.*** Engines with ***motor-generator*** or ***battery ignition*** have an ignition switch on control panel, *"To Stop Push In"*.

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

CARBURETOR ADJUSTMENT (Fig. 6)

The ***main metering jet*** in the ***standard engine*** carburetor is of the ***fixed type*** and therefore no adjustment can be made.

On engines furnished with an ***adjustable jet*** carburetor, turn ***main jet adjustment in*** (clockwise), until it seats, then turn *out* (counter-clockwise) 2¼ turns. After the engine is started, warmed up for several minutes and

running at normal operating speed, the needle valve should be readjusted for smooth operation. This adjustment need only be made the first time engine is started. In cold weather, starting may be facilitated by opening needle valve slightly more, then readjusted to normal running position after engine is started.

The correct amount of throttle plate opening for the proper low idle speed is obtained by means of the ***throttle stop screw.*** However, this is set at the factory so that no immediate adjustment is necessary. The ***idle adjustment*** is for smooth low speed operation and this adjustment, if necessary, must be made with the carburetor throttle lever closed. Normal idle setting is approximately *1½* turns off seat.

For further information, refer to Zenith operating and service instructions in the rear of this manual.

MAINTENANCE

AIR CLEANERS

These engines are provided with a ***dry element*** type air cleaner, as illustrated in *Fig. 7A*, with the previously standard ***oil bath*** air cleaner, *Fig. 7*, now furnished as optional equipment.

The air cleaner must be serviced frequently, depending on the dust conditions where engine is operated. Daily attention to the air cleaner is one of the most important considerations in prolonging engine life.

OIL BATH AIR CLEANER, (Fig. 7)

Once each week; the filtering element should be thoroughly washed in a solvent. Remove oil and clean out air cleaner bowl. Add fresh oil to the ***level line*** indicated on bowl, using the same grade oil as is used in the crankcase.

Service daily, if engine is operating in very dusty conditions. Detailed instructions are printed on the air cleaner.

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

DRY ELEMENT AIR CLEANER, (Fig. 7A)

Service daily, if engine is operating in very dusty conditions. Remove cartridge and shake out the accumulated dirt (do not tap or strike element – it may become damaged). Wipe out dirt from inside cover.

Once each week; the filtering cartridge should be taken out and rinsed under a faucet with cold water, then wash by repeated dipping for several minutes in a solution of lukewarm water and a mild, ***non-sudsing*** detergent. Rinse in cold water from the inside out, and allow to dry overnight before installing. In cold weather, protect element from freezing until dry. *Excessive smoke or loss of power are good indications that the element requires cleaning.*

Do not use gasoline, kerosene or solvent for cleaning – Do not oil element.

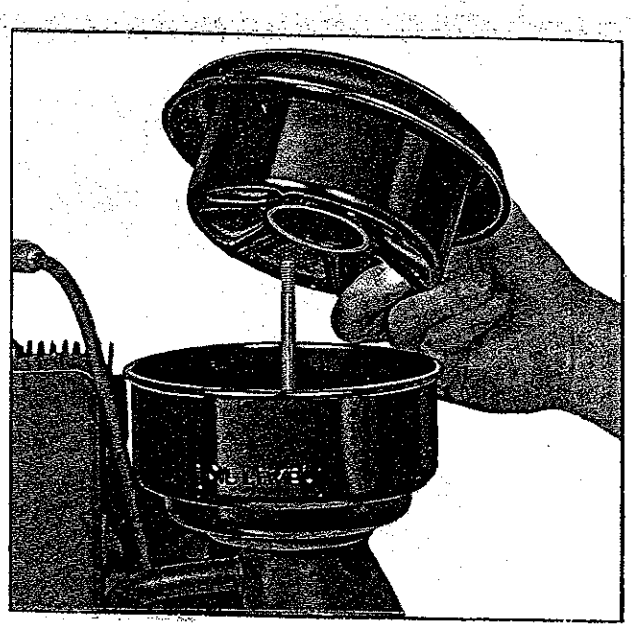


Fig. 7 293057C

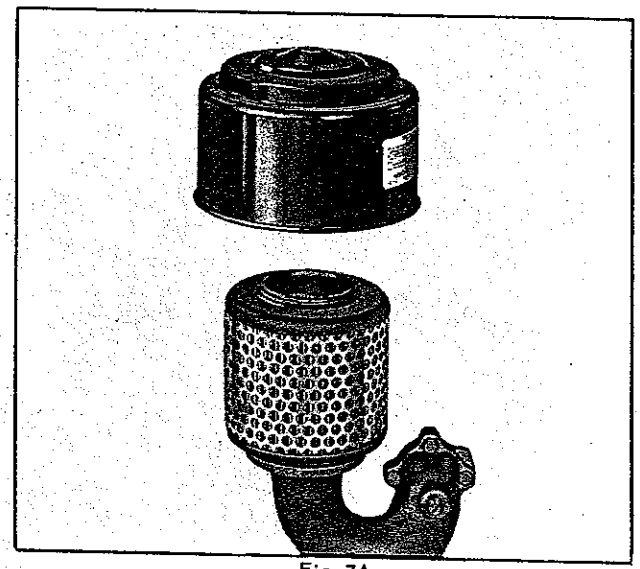


Fig. 7A 311747C

After five washings or one year of service, replace cartridge. New cartridges are available at your ***Wisconsin Engine dealer.*** Refer to parts list section for replacement part number.

CRANKCASE BREATHER

A ***reed*** type ***breather valve*** is an integral part of the valve tappet inspection cover, as illustrated in *Fig. 8.* The valve maintains a partial vacuum in the crankcase, and thus eliminates internal crankcase pressure that would cause oil leaks at the seals, gaskets and breaker box. Keep complete breather system free from dirt. Clean breather valve by washing in solvent, and in reassembly mount with drain hole facing down.

Oil in breaker box may be the result of faulty breather action caused by dirt stuck between reed and seat. This condition can be remedied in the following manner:

1. With engine running at operating speed, pinch neoprene breather line so that it is completely shut off.

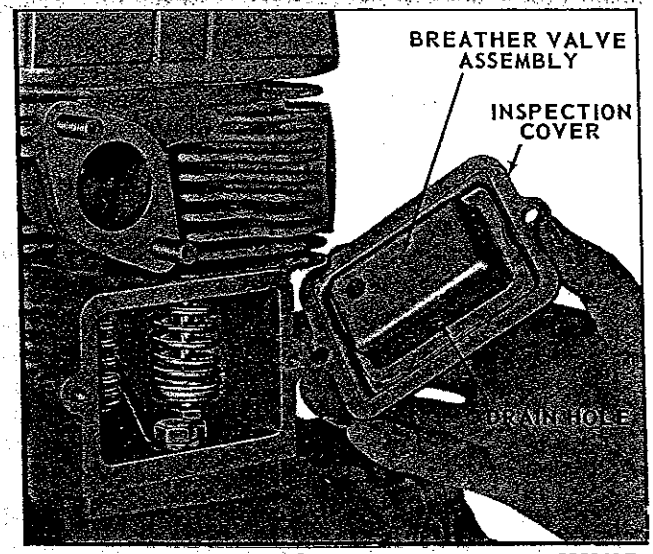


Fig. 8 293068C

2. Hold tubing closed, for a period of not more than 20 seconds, and then release.
3. If oil leak continues, repeat procedure after a 5 minute interval. If this does not remedy the condition; stop engine, take off inspection cover-breather assembly and wash in solvent.

IGNITION SPARK

If difficulty is experienced in starting the engine or if engine misses firing, the strength of the ignition spark should be checked. Remove spark plug from cylinder head and connect ignition wire to it. Turn engine over several times by means of the rope starter sheave, as illustrated in *Fig. 9*, and observe the spark at the plug gap. If a good strong spark occurs, the ignition system can be eliminated as the source of trouble. If there is a weak spark or no spark at all, follow instructions in *"Breaker Point Adjustment"* paragraphs. Also check ignition wires, spark plug, condenser and coil.

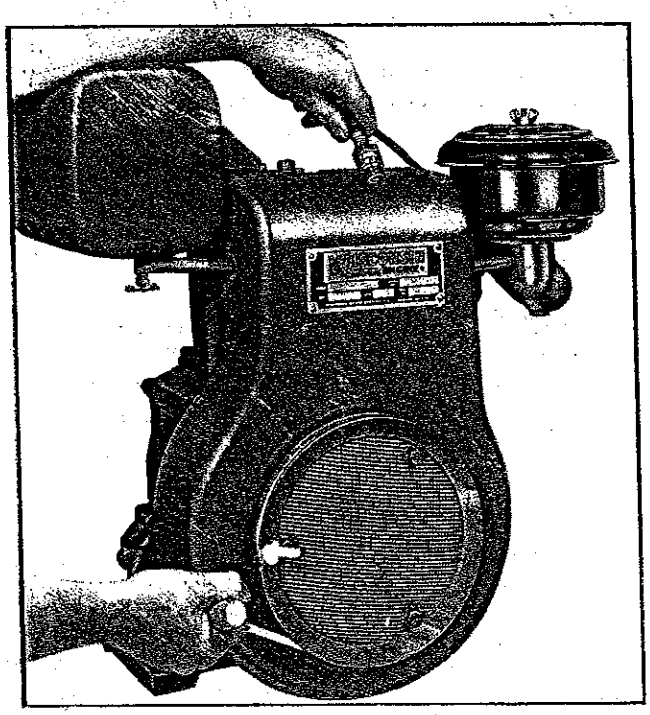


Fig. 9 293056C

MAGNETO IGNITION

MAGNETO

The flywheel magneto used on this model of engine is made up of three component parts; ***flywheel, stator plate*** with coil, and ***breaker assembly.*** The ***breaker box*** mounted on the right hand side of the crankcase contains the ***points, condenser*** and ***ground switch.***

BATTERY IGNITION

IGNITION COIL – 12 Volt

Engines furnished with battery ignition, instead of the standard magneto ignition system, use a conventional 12 volt ignition coil. The same ***breaker point assembly*** is used for both types of ignition, but the ***flywheel*** and fan end ***bearing plate*** differ.

The following *"Breaker Point Adjustment"* and *"Timing"* procedures apply for both ***magneto*** and ***battery ignition*** systems.

BREAKER POINTS

REPLACEMENT and ADJUSTMENT

The magneto ***breaker points,*** *Fig. 10,* are contained in The ***breaker box*** on the right hand side of the engine. A ***push pin,*** actuated by a striker plate mounted to the camshaft, operates the breaker points at ***half engine speed.*** When ever points are replaced, inspect push pin for possible wear and replace if necessary.

If ***oil leaks*** from breaker box, refer to *"Crankcase Breather"* for cleaning of breather valve seat.

At least twice each season or when ignition spark becomes weak, remove breaker box cover, inspect the points and check the gap opening. If there is evidence of pitting or pyramiding and it becomes necessary to resurface or replace points, it will also be necessary to readjust the gap and retime the engine.

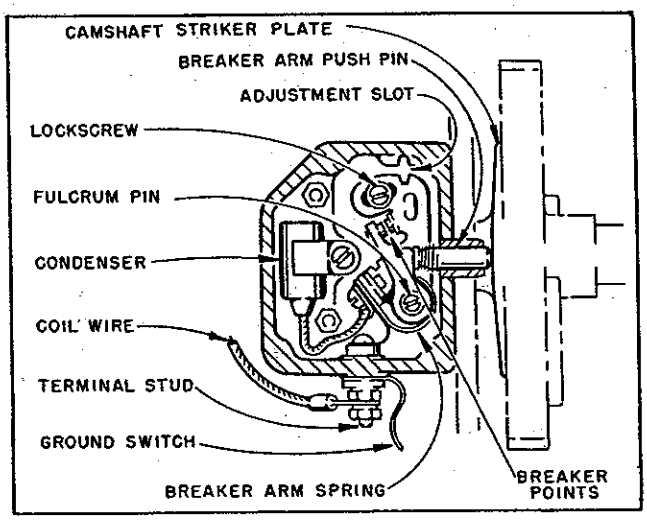


Fig. 10

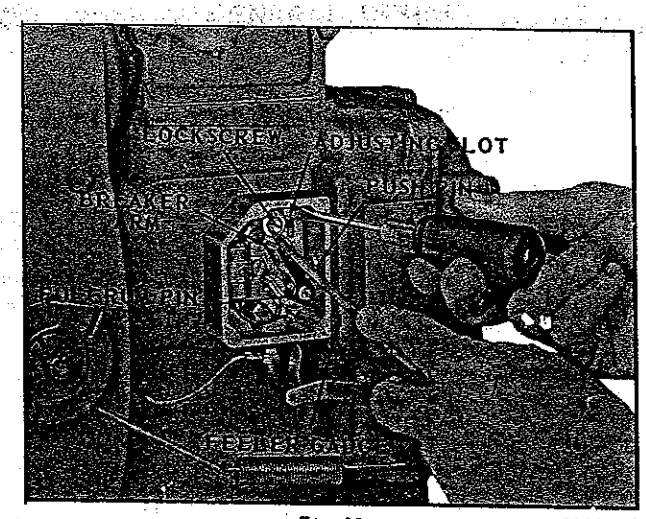


Fig. 11 293069C

Replacement of points: Turn crankshaft over so that breaker push pin is at its inner most position (low point of camshaft striker plate). Mount breaker assembly to crankcase by means of brass ***fulcrum pin,*** and tighten pin to ***22 inch pounds torque*** (do not overtighten). Be sure breaker arm spring is squarely mounted (if spring is cocked, points will be out of line). Mount lockscrew with washer and proceed with point adjustment and timing.

The normal breaker point gap is ***0.023 inch*** at full separation. However, the fixed ***running spark advance*** of ***18°*** is regulated by the point opening, and thus a slight deviation from 0.023 may occur when obtaining an accurate spark advance with a timing light.

With reference to *Fig's. 10* and *11,* adjust breaker point gap as follows, and then proceed as per instructions in *Timing* paragraphs.

1. Turn engine over by means of the starter sheave until ***breaker arm push pin*** is at the high point of the striker plate (maximum point opening).
2. Loosen contact support plate ***lockscrew*** very slightly (just enough so that plate can be moved).
3. Place a ***0.023 inch*** feeler gauge between the points.
4. Insert screw driver in ***adjusting slot*** and open or close points as required, until a slight drag is felt while sliding feeler gauge between points.
5. Securely tighten ***lockscrew*** and recheck point gap.

TIMING

MAGNETO or BATTERY IGNITION

The fixed ***running spark advance*** of ***18°*** is regulated by the breaker point opening and reasonably accurate timing is obtained by simply setting the breaker point gap to ***0.023 inch,*** as explained in *"Breaker Point Adjustment"*. However, ***static timing*** with a ***continuity light,*** as illustrated in *Fig. 12,* is more accurate and advisable. The timing light is Wisconsin Motor part number ***DF-81-S1.***

A ***pointer*** is located in the crankcase, just to the left of the breaker box, to visibly check the ***advance timing mark*** on the rim face of the flywheel.

STATIC TIMING PROCEDURE: *See Fig. 12.*

1. Disconnect ***coil primary wire*** at bottom of breaker box. Remove breaker box cover.
2. ***Timing mark*** on ***flywheel*** can be observed thru the hole in back plate of flywheel shroud, just to the left of the breaker box.

   Since breaker arm operates at ***half engine speed;*** line up ***flywheel timing mark*** and ***pointer,*** with engine on ***compression stroke.*** The compression stroke can be determined by turning starter sheave in a clockwise direction and watch for breaker arm movement by push pin in breaker box.
3. Connect one lead wire of the ***timing light DF-81-S1*** to ground and the other to the ***terminal stud*** at bottom of breaker box. (With points closed, the timing light will be ***on***).
4. Slightly loosen ***lockscrew*** on contact support plate (just enough so that plate can be moved).
5. Insert a screw driver into support plate ***adjusting slot*** and close points so that light is ***on,*** then turn screw driver slowly in the opposite direction until the ***light just goes out.*** Retain points in this position and securely tighten lockscrew.
6. As a final check; turn flywheel counter-clockwise until timing light is ***on.*** Then, slowly rotate flywheel clockwise, and stop immediately when ***light goes out.*** At this point, ***mark on flywheel*** should be in line with timing ***pointer*** in crankcase.
7. Assemble coil primary wire to terminal stud and mount breaker box cover.

MAGNETO SERVICE INSTRUCTIONS

If engine will not start or if it is hard to start and does not run properly, make the following tests to see if the magneto is at fault:

1. Check carefully for loose, corroded, broken or worn ignition wires.
2. Check the spark; refer to *"Ignition Spark"* and *"Spark Plug"* paragraphs.
3. Check points for cleaning, alignment and adjustment. If badly worn or corroded, points and condenser should be replaced. Refer to *"Breaker Points"*.
4. ***Magneto coil replacement*** should be done by a competent mechanic using adequate test equipment. The coil can be tested in the following manner and without removing the flywheel:

   Position flywheel so keyway is at the bottom.

   Remove the coil primary lead from the terminal connection at the breaker box and the spark plug lead from the plug. The coil can now be tested using the primary lead, the high tension lead, and the engine block as the ground connection.

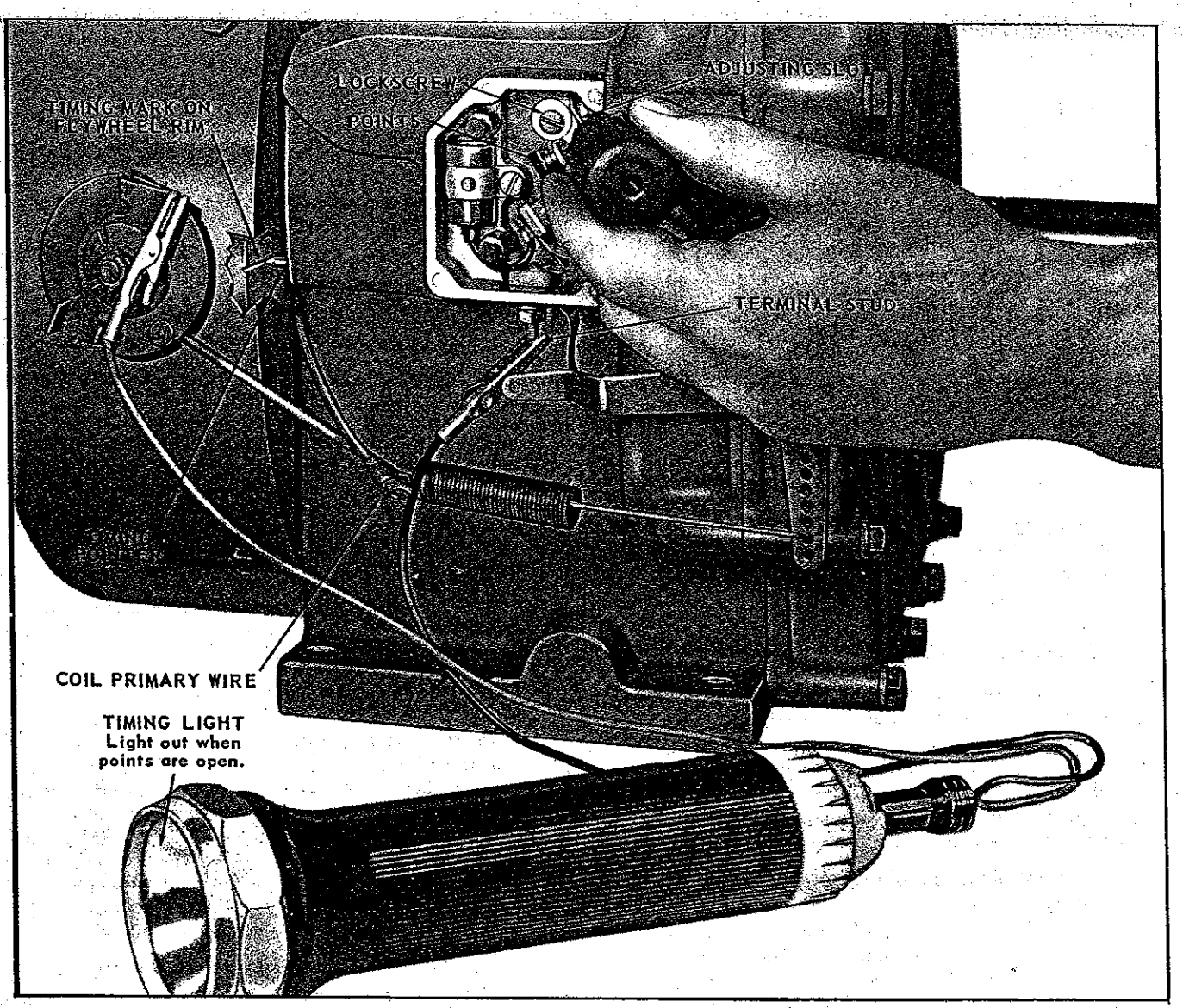


Fig. 12 293065C

It is recommended that a new coil be selected from stock and used as a master coil to calibrate the tester. If the tester is set up with a *"good-bad"* range or *"variable spark discharge gap"*, it can be used with whatever primary input is required to bring it into the desired range.

If the coil does not test to specification, the flywheel will have to be removed to replace the coil.

The *high tension wire* can be removed from the coil by twisting the wire in a counterclockwise direction.

ELECTRICAL EQUIPMENT

ELECTRICAL WIRING CIRCUITS

NOTE: Beginning with engine serial No. 3981420 the standard wiring circuits of all *12 volt* electrical equipment for Models S-10D and S-12D is *negative ground polarity,* instead of the previously furnished positive ground. Model S-14D, always was *negative ground.*

The wiring diagram, *Fig. 13* (magneto ignition), illustrates a *negative ground* circuit. If polarity of motor-generator is for a positive ground circuit, terminal connections at ammeter and battery are just reversed from those illustrated.

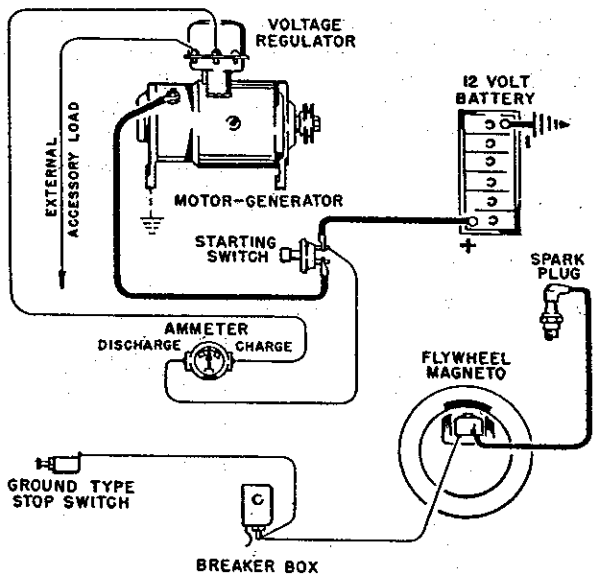


Fig. 13, WIRING DIAGRAM (with Magneto Ignition)

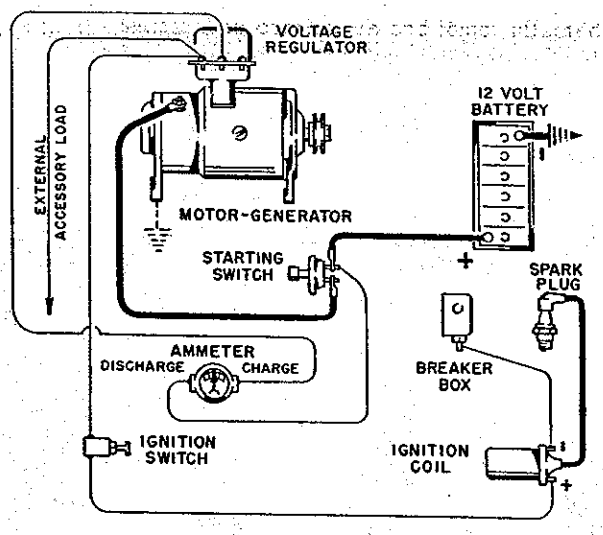


Fig. 14, WIRING DIAGRAM (with Battery Ignition)

Battery ignition engines, are wired in accordance with *Fig. 14.* This type ignition system has always been wired ***negative*** ground. Battery is not furnished by Wisconsin Motor Corporation.

MOTOR-GENERATOR OPERATING INSTRUCTIONS

The combination ***motor-generator*** functions as a cranking motor when the ***starting switch*** is closed. When the switch is open and the engine is running, the unit will function as a generator. The generator output and circuit voltage for the various battery and operating requirements are controlled by a ***current-voltage regulator*** mounted to the generator.

The total electrical output of this ***12 volt*** combination motor-generator is ***12 amperes.*** However, all of the current is not taken off of a single terminal. There are ***two terminals*** on the current-voltage regulator, illustrated in *Fig. 15,* for distributing the generator output. One terminal is marked ***'BAT'*** and a wire is connected from it to the battery, thru an ***ammeter.*** The other terminal marked ***'L'*** is for a battery ignition system, if applicable, and for operating lights or any other customer accessory. For a continuous load, not more than ***5*** or ***6 amps*** should be taken from this terminal if engine has magneto ignition. With battery ignition, maximum draw should be ***3*** or ***4 amps,*** since ***2 amps*** is required for the ignition system. Current from the ***'L'*** terminal is continuous and is not affected by the regulator windings. Whereas, the current to the ***'BAT'*** terminal goes thru the regulator windings and is controlled to keep the battery charged.

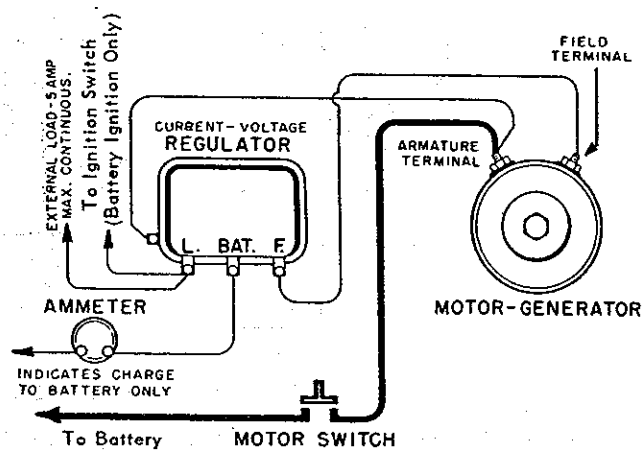


Fig. 15, MOTOR-GENERATOR REGULATOR WIRING

To check if the generator is charging, it is only necessary to observe the ammeter that is connected in the battery circuit. If it shows a charge, the system is functioning properly. If it shows a discharge, remove the load connected to the ***'L'*** terminal until the battery current is restored and the ammeter does register a charge.

Periodically inspect motor-generator and external wiring for conditions which may affect its operation.

Bearings are ***pre-lubricated,*** therefore no external oiling is required.

Inspect the brushes for wear, approximately every ***200*** hours of operation. If they are worn to less than half their original length, they should be replaced.

HIGH TEMPERATURE SAFETY SWITCH

As a safety precaution against overheating, engines can be equipped with a high temperature switch. The switch is mounted to a cylinder head bolt, opposite the spark plug at the take-off end.

When cylinder head temperature becomes critically high, the safety switch will automatically stop the engine by shorting out the ignition system. A waiting period of about ***10 minutes*** will be required before the switch has cooled off sufficiently to re-start the engine. An overheated engine will score the cylinder walls, burn out connecting rod and crankshaft bearings, also warp piston and valves. The cause of the overheating condition will have to be remedied before the engine is re-started. *See* ***Engine Overheats*** *paragraph in Troubles, Causes and Remedies section.*

A ***service kit*** is available for installation on engines in the field. Refer to ***parts section*** in rear of manual for mounting location and illustrated parts list.

SPARK PLUG

The spark plug should be removed periodically, cleaned and re-gapped. The width of the gap between the points of the two electrodes must be very carefully and precisely set, because incorrect settings will have an adverse affect on engine operation. Check spark plug gap with a wire type gauge and regap as shown in *Fig. 16.*

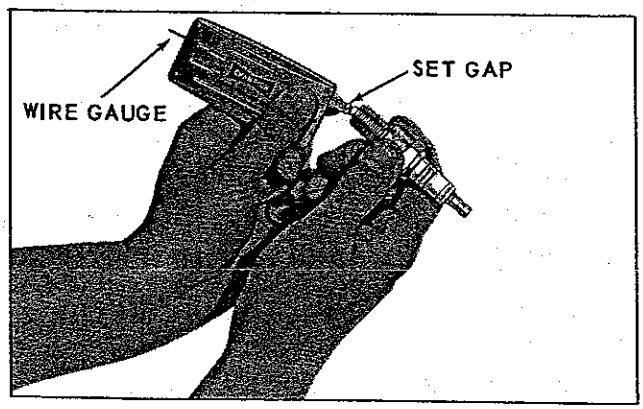


Fig. 16 277779C

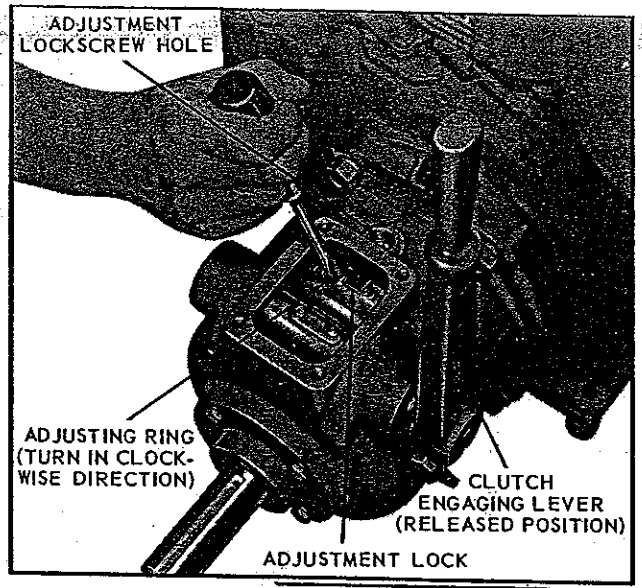


Fig. 20 244949C

lockscrew, one full turn. On *take-off units*, the lockscrew is accessible thru the pipe plug hole behind the inspection opening.

Keep clutch from turning by holding rope starter sheave firmly in place with the left hand. Then, by means of a screw driver, turn *adjusting ring* one notch at a time in a clockwise direction, until a definite pressure is felt on the clutch lever when engaging. When properly adjusted, the clutch will engage with a slight snap. Tighten *lockscrew* and mount inspection cover. Be sure cover gasket is in good condition.

RESTORING COMPRESSION

On a new engine, or 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 plug and pour about a fluid ounce of crankcase oil through the spark plug hole. Turn engine over several times with the rope starter to distribute oil over the cylinder walls. Then mount spark plug and compression should be satisfactory.

WINTER STORAGE

To protect the cylinder, piston, rings, valves, and keep them from rusting and sticking, a half and half mixture of kerosene and good engine oil, (the same kind of oil as used in the crankcase of the engine), should be injected into the pipe tap opening on the air cleaner bracket while the engine is warm and running at moderate speed. About a quarter of a pint is necessary, or enough so that a heavy bluish smoke will appear at the exhaust. The ignition switch should then be shut off and the engine stopped. This fogging operation will leave a coating of oil on the above mentioned parts, protecting them from the atmosphere. After the engine has stopped, disconnect the spark plug cable and turn engine over slowly until the flywheel key or take-off shaft keyway is up, or in the 12 o'clock position and on compression stroke. Both valves will then be closed and the piston will be on top in the cylinder bore. This will minimize rusting of the cylinder bore and help in retaining the oil fog previously injected into the engine.

Drain crankcase oil while engine is warm.

Drain fuel lines, carburetor, fuel pump and tank, to prevent lead and gum sediment from interfering with future operation. Gasoline fumes from gradual evaporation is a dangerous *fire hazard.*

The air cleaner and filter element should be thoroughly cleaned. Tape or otherwise seal off the exhaust and air cleaner openings for the duration of the storage period.

The outside of the engine, including the cooling fins on the cylinder and head, should be thoroughly cleaned of all dirt and other deposits. All exposed unpainted metal parts should be coated with grease or heavy oil.

Before adding new crankcase oil the next season, drain base of condensation which may have accumulated during the storage period.

Fill crankcase with a good quality of oil to the high level point, before starting engine. Do not use any oil heavier than S.A.E. No. 30.

Use a new spark plug at the beginning of the next season, especially if the engine has given considerable service.

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.

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 contribute to hard starting; such as too heavy a load for the engine to turn over at low starting speed, a long exhaust pipe with high back pressure, etc. These conditions may affect starting, but do not necessarily mean 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.

STARTING DIFFICULTIES

FUEL MIXTURE

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

Fuel pump diaphragm worn out or damaged.

Carburetor not choked sufficiently, especially if engine is cold. See *'Starting Procedure', Page 9.*

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

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

Carburetor flooded, caused by too much choking especially if engine is hot. See *'Starting Procedure'.*

Dirt or gum holding float needle valve in carburetor open. This condition should be indicated if fuel continues to drip from carburetor with engine standing idle. Often tapping the float chamber of the carburetor very lightly with the handle of a screw driver or similar tool will remedy this trouble. Do not strike carburetor with any metal tool.

If due to flooding, too much fuel entered the cylinder in attempting to start the engine, the mixture will most likely be too rich to burn. In that case the spark plug should be removed and the engine turned over several times with the starting sheave, so the rich mixture will be blown out through the spark plug hole. The choke must be left open during this procedure. Spark plug should be dried off, assembled, and starting tried again.

COMPRESSION

Beginning with engine Serial No. 4225490, these models of engines were provided with an ***automatic compression release,*** so that the normal method of detecting faulty compression, by the resistance encountered when turning the engine over on the compression stroke, no longer holds true.

Check the following for suspected lack of compression, if the ***fuel*** and ***ignition systems*** are not the cause of starting difficulties and loss of power.

Cylinder dry due to engine having been out of use. *See 'Restoring Compression', Page 16.*

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

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

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

If correcting the above conditions does not remedy the situation, it will be necessary to partially dismantle the engine and check for:

Valve stuck open due to carbon or gum on valve stem. To clean valve stems, *see 'Valves and Seat Insert', Page 19.*

Piston rings stuck in piston due to carbon accumulation. This will require removing piston and connecting rod assembly, and cleaning parts. *See 'Connecting Rod and Piston', Page 22.*

Scored cylinder. This will require reboring the cylinder and fittings with new piston and rings. If scored too severely an entirely new cylinder block may be necessary.

IGNITION

See 'Ignition Spark', Page 11. No spark may also be attributed to the following:

Ignition wires disconnected from magneto, coil, spark plug or breaker box.

Broken ignition wires causing short circuits.

Spark plug cable wet or oil soaked.

Spark plug insulator broken. Plug wet or dirty.

Spark plug point gap wrong. *See Page 15.*

Breaker points pitted or fused.

Breaker arm sticking.

Condenser leaking or grounded.

Oil in breaker box. *See 'Crankcase Breather', Page 11.*

Spark timing wrong. *See 'Timing', Page 12.*

ENGINE MISSES

Spark plug gap incorrect. *See Page 15.*

Worn and leaking ignition cable.

Weak spark. *See 'Ignition Spark', Page 11.*

Loose connections at ignition wires.

Breaker points pitted or worn.

Oil in breaker box. *See 'Crankcase Breather', Page 11.*

Water in gasoline.

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

ENGINE SURGES OR GALLOPS

Carburetor flooding.

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

ENGINE STOPS

Fuel tank empty. Water, dirt or gum in gasoline.

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

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

Air vent hole in fuel tank cap plugged. Engine scored or stuck due to lack of oil.

Ignition troubles. *See 'Ignition', Page 17.*

ENGINE OVERHEATS

Crankcase oil supply low. Replenish immediately.

Ignition spark timed wrong. *See 'Timing', Page 12.*

Low grade of gasoline. Carbon in engine.

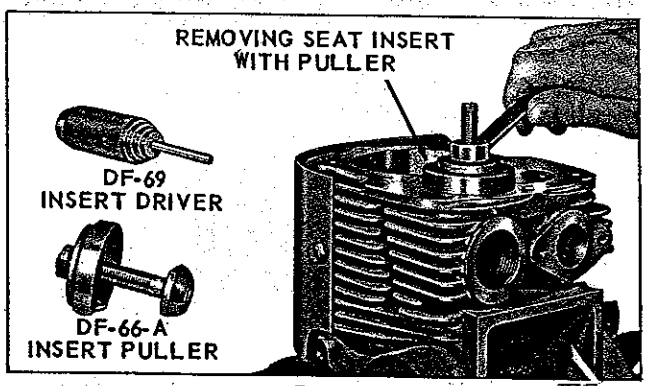
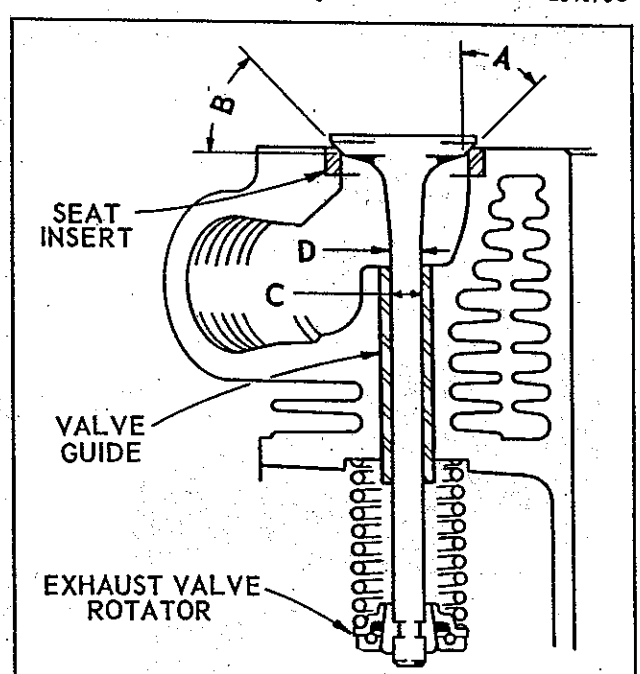


Fig. 26 284070C



SPECIFICATIONS ARE FOR BOTH INLET AND EXHAUST

A – VALVE FACE ANGLE		45°	
B – SEAT INSERT ANGLE		45°	
C – GUIDE INSIDE DIAMETER		.312 – .313	
D – VALVE STEM DIAMETER	Inlet	.310 – .311	
	Exh.	.308 – .309	
MAXIMUM ALLOWABLE CLEARANCE BETWEEN C AND D		IN.	.005
		EXH.	.007

Fig. 27

seats, ports and guides. Replace valves that are badly burned, pitted or warped.

The *exhaust valve face* and exhaust *seat insert* are of *stellite* material. A positive type *valve rotator* is furnished as standard equipment on the exhaust valve only. Clean and inspect operation of rotator.

The inlet and exhaust *seat inserts* can be removed, when replacement becomes necessary, by means of Wisconsin Motor *DF-66-A* insert puller. *See Fig. 26.*

Grinding of valves and *seats* should be done by an authorized Wisconsin service station. See directory in rear of manual.

Before grinding valves, inspect valve guides for possible replacement. Refer to *Fig. 28* for proper

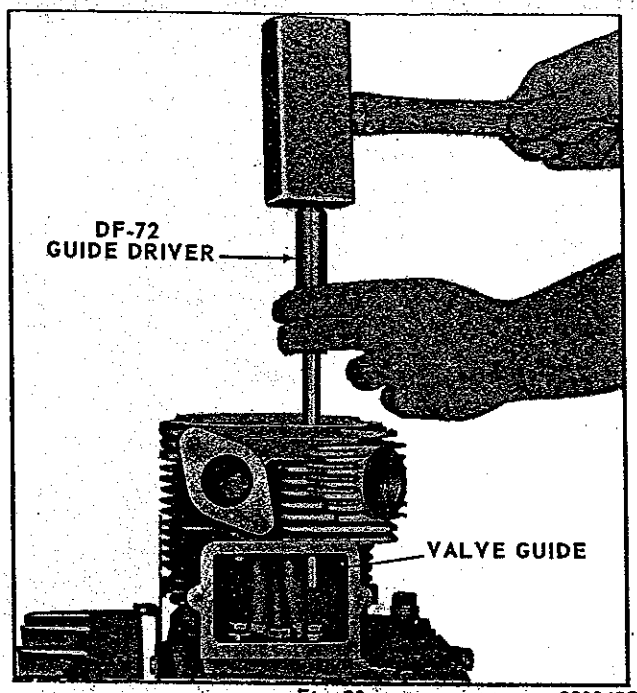


Fig. 28 293045C

method of driving out guides, and see chart, *Fig. 27,* for valve, seat and guide specifications.

After grinding, lap valves in place until a uniform ring will show entirely around the face of the valve. Clean valves, and wash block thoroughly with a hot solution of soap and water. Wipe cylinder walls with clean lint free rags and light engine oil, especially if honing operation was also performed.

VALVE GUIDES (Fig. 28)

When valve stem clearance becomes excessive, the valve guides should be driven out, as illustrated in *Fig. 28,* and new guides pressed in place. Use Wisconsin Motor *DF-72* valve guide driver. In reassembly, press guides into valve ports using the same driver tool. Refer to *Fig. 27* for clearance specifications and proper assembly.

FLYWHEEL (Fig's. 29 and 30)

Caution: If flywheel is to be removed it must be loosened at this time. *Do not* attempt to loosen flywheel after gear cover is removed. Striking the crankshaft, without support from gear cover, would inflict damages to the crankshaft, rod and piston.

Straighten tab of star lockwasher that is bent over on flat of flywheel nut. Place a 1-11/16" box or socket wrench on to flywheel nut and give the wrench a sharp blow with a soft hammer. *Do not remove nut,* simply unscrew it flush with end of shaft.

The flywheel is mounted to a taper on the crankshaft. Take a firm hold on the flywheel fins, pull outward and at the same time strike the end of the crankshaft with a babbitt hammer. The flywheel will slide off the taper of the crankshaft. Do not use a hard hammer as it may ruin the crankshaft and bearings.

Loosen flywheel but do not remove: It is necessary that the flywheel be left on to support crankshaft dur-

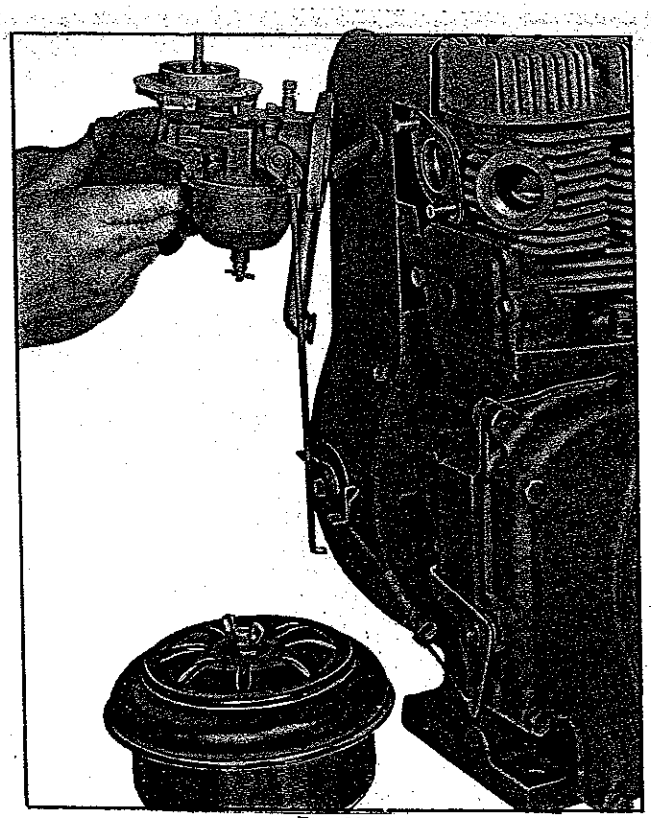


Fig. 22 293052C

In reassembly; when attaching air cleaner bracket to flange on carburetor air horn, use new gasket and tighten the three mounting screws to *34 inch lbs. torque* (minimum).

STARTER SHEAVE and FLYWHEEL SHROUD (Fig. 23)

Remove *starter sheave* and *screen* by taking out the three screws and washers that mount to the flywheel.

Take off *top cover* and cylinder *side shroud*. Unhook governor spring and remove four screws holding flywheel shroud to back plate. *Flywheel shroud* can then be removed. Back plate can be taken off, only if necessary, after flywheel is removed.

CYLINDER HEAD and SPARK PLUG (Fig. 24)

Remove spark plug and take out the three cylinder head studs and five capscrews. After removal of cylinder head and gasket, clean out all carbon deposits from combustion chamber and dirt from between cooling fins.

In reassembly, use new cylinder head and spark plug gaskets. *Note:* Internal contour of cylinder head gaskets at inlet and exhaust valves are not the same. Mount gasket to cylinder block with the larger internal radius located at the inlet valve. *See Fig. 24.*

Apply a mixture of graphite and oil to the threads of the cylinder head studs and capscrews. *Torque* to *32 ft. lbs.* in three alternate stages: 16 ft. lbs., 24 ft. lbs. and finally 32 ft. lbs.

Leave spark plug off temporarily, for ease in turning engine over for remainder of assembly and for timing adjustments. When mounting spark plug, tighten 28 to *30 ft. lbs. torque.*

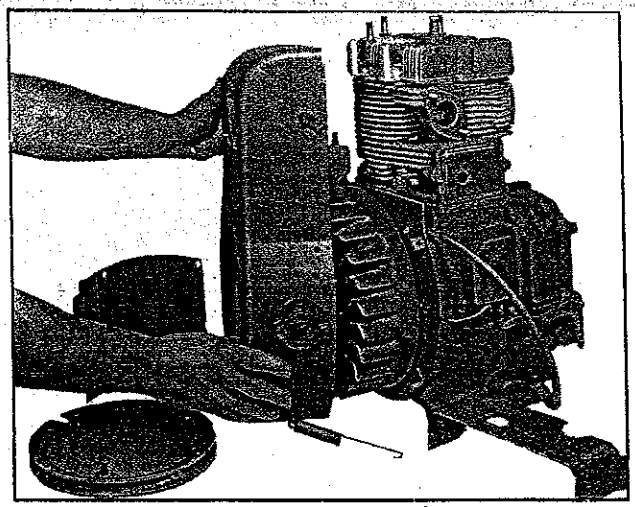


Fig. 23 293066C

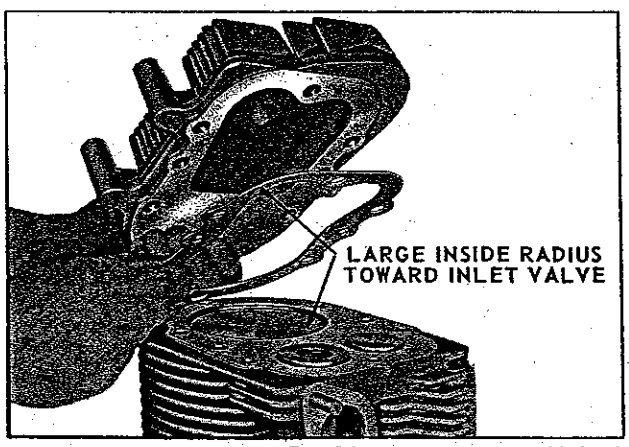


Fig. 24 293067C

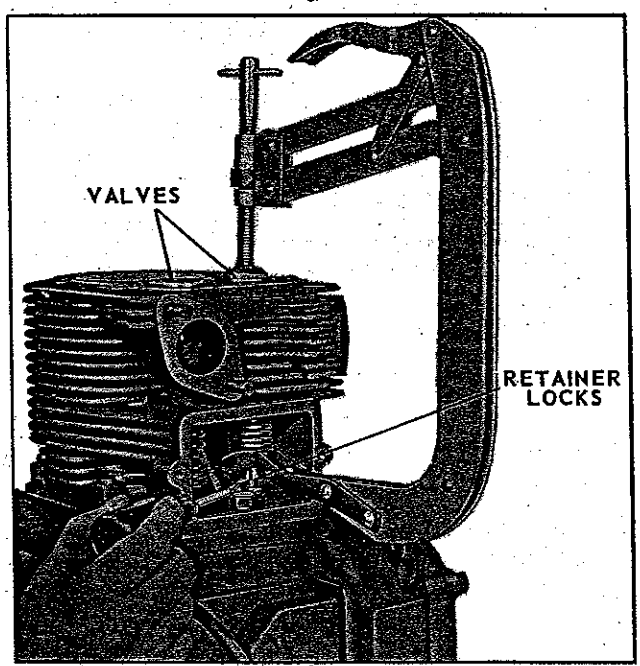


Fig. 25 293044C

VALVES and SEAT INSERTS (Fig's. 25, 26, 27)

Take off the combination valve inspection cover and breather assembly. By means of a standard automotive valve lifter, remove retainer locks and take out valves from top of cylinder block.

Clean out carbon and gum deposits from the valves,

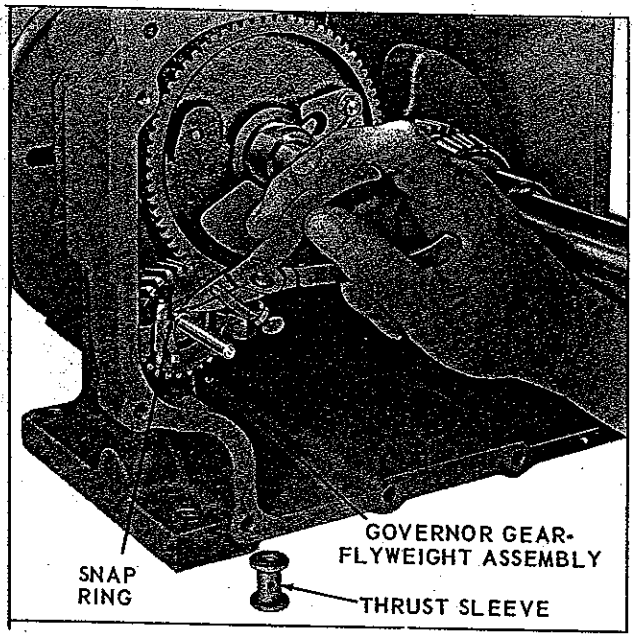


Fig. 33 293043C-1

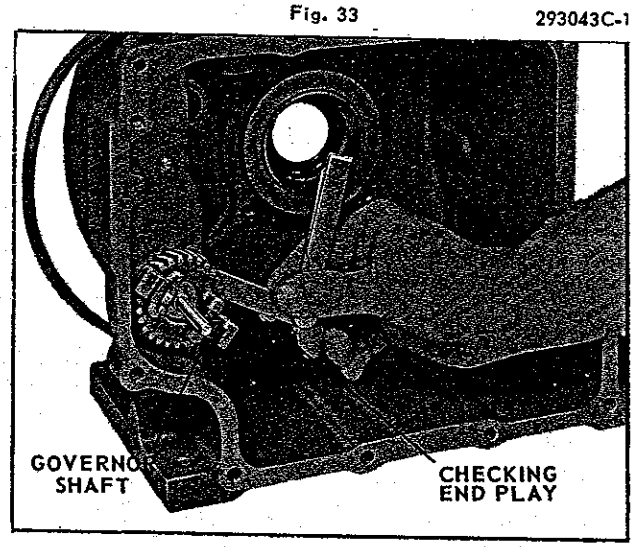


Fig. 34 293047C

a stationary pin pressed into the crankcase and is held in place with a snap ring.

To disassemble: Spread flyweights apart and remove governor thrust sleeve. By means of a snap ring pliers, ***snap ring*** can be removed and the gear-flyweights slipped off the shaft.

Reassembly is made in reverse order. Maintain a clearance of *.003* to *.005"* between gear hub and face of governor shaft boss in crankcase, *see Fig. 34.* This ***end play*** can be adjusted by tapping the governor shaft in either direction. Clearance between shaft and gear is *.0005* to *.002"*. When clearance becomes *.005"*, replace worn parts.

CONNECTING ROD and PISTON (Fig's. 35, 36, 37)

By means of a 1/2" socket wrench, loosen and remove hex nuts from connecting rod bolts. Oil dipper will come off when nuts are removed. Then, by tapping the ends of the bolts lightly, the connecting rod cap will break free from the bolts.

Scrape off all carbon deposits that might interfere with

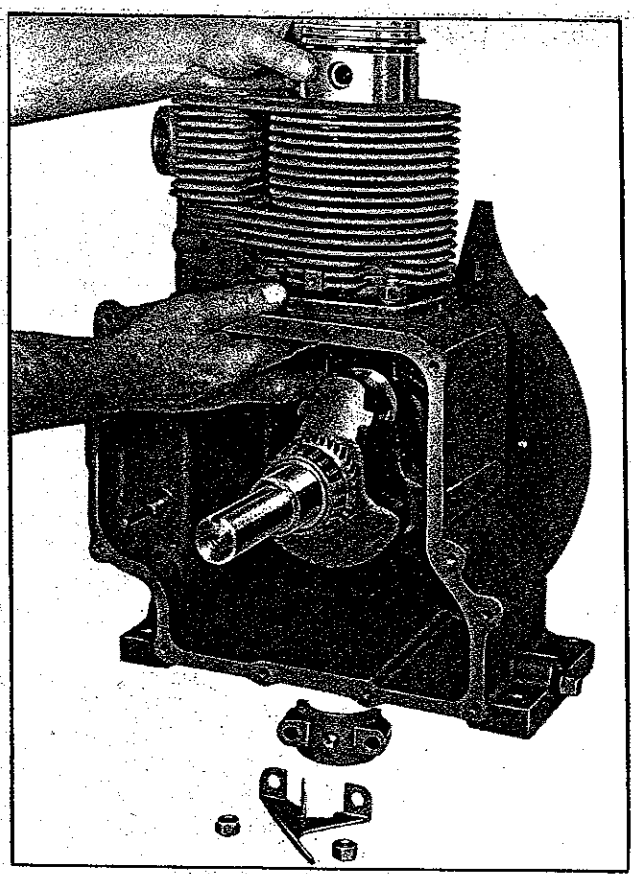


Fig. 35 293046C

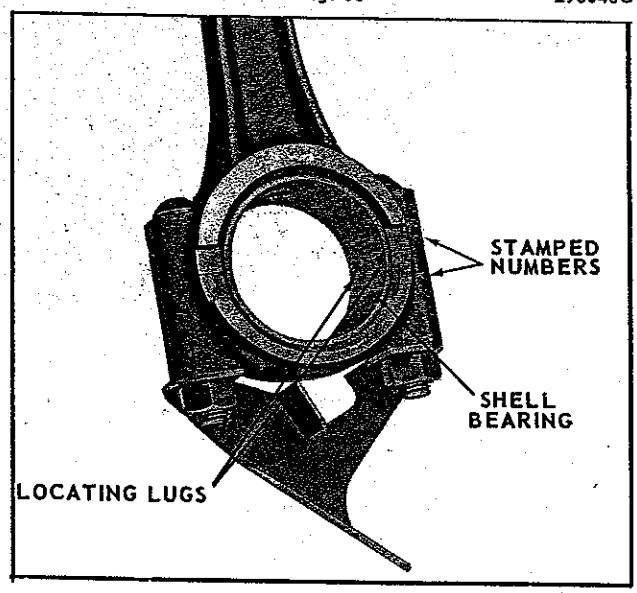


Fig. 36 293048C

removal of piston from cylinder. Turn crankshaft until piston is at top, then push connecting rod and piston assembly upward and out thru top of cylinder. Be careful not to mar the crank pin by allowing the rod bolts to strike or scrape across it.

The connecting rod has a removable shell bearing and care should be taken ***in reassembly*** to mount bearing properly. The cap should be assembled to the rod so that the ***locating lug*** of both bearing halves are on the same side, *see Fig. 36.* Refer to chart, *Fig. 37,* for clearance between shell bearing and crank pin.

The piston skirt is ***cam-ground*** to an elliptical con-

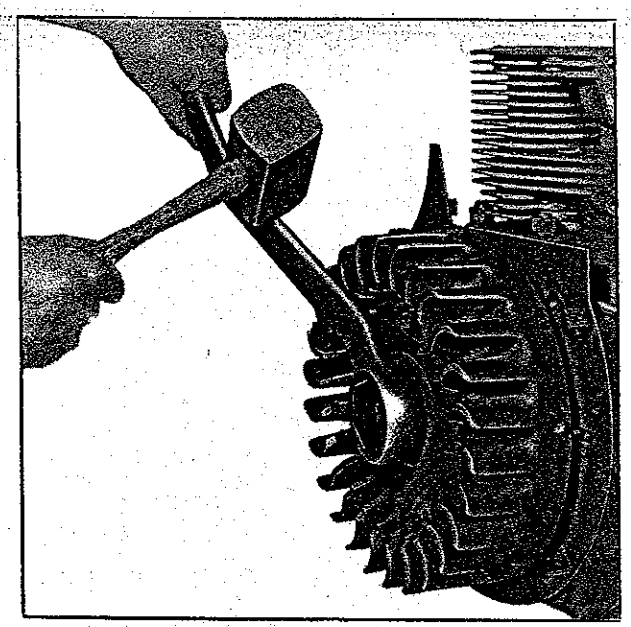


Fig. 29 293061C

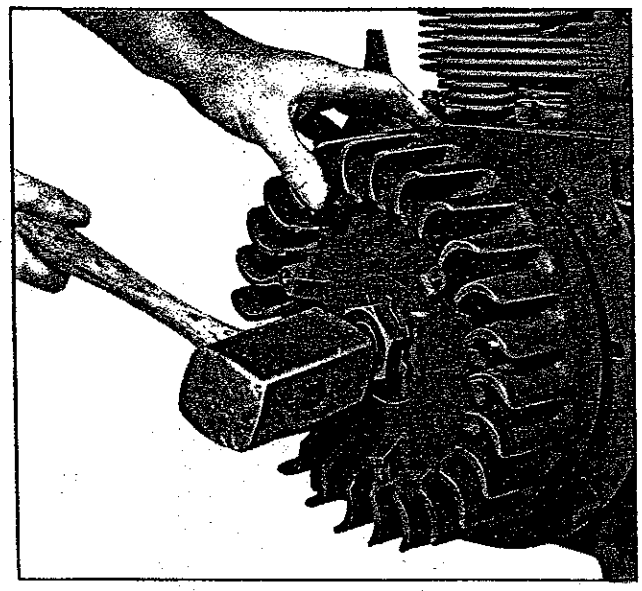


Fig. 30 293042C

ing removal of gear cover and connecting rod, and prevent damaging oil seal in stator plate. ***Take flywheel off after piston and connecting rod are removed.***

In reassembly, mount flywheel immediately after crankshaft is mounted; be sure ***woodruff key is in position*** on crankshaft and is properly lined up with keyway in flywheel hub. ***Do not*** drive flywheel on to taper of crankshaft. Place a short piece of pipe against hub of flywheel and tap end of pipe with a soft hammer to seat flywheel on to taper. Mount star washer with tab inserted in flywheel keyway. Assemble nut and tighten only enough to hold flywheel in place. Then, ***after end play is set*** *(see End Play paragraph)* tighten flywheel nut by placing wrench on nut and giving handle of wrench several sharp blows with a soft hammer. Bend one tab of star washer over flat on flywheel nut.

GEAR COVER (Fig's. 31 and 32)

Remove gear capscrews and take off governor lever. Tap the two ***dowel pins*** with a hammer, from crankcase side, and gear cover will break loose from crankcase. *Caution:* Steel ball for camshaft end thrust will probably fall out when gear cover is removed. Take thrust spring out from end of camshaft to prevent it from becoming lost.

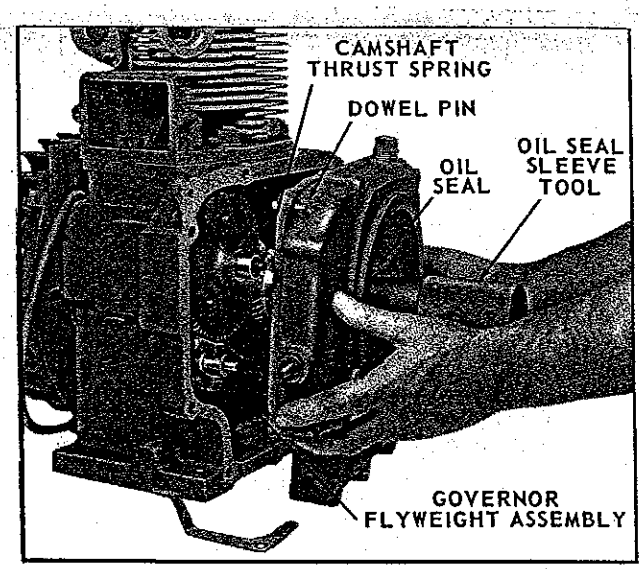


Fig. 31 293062C

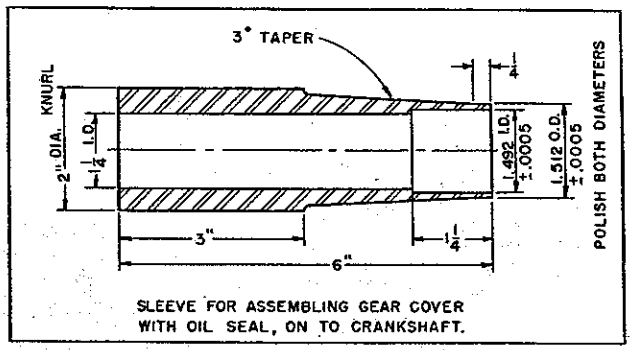


Fig. 32

In reassembly; insert thrust spring into end of camshaft and lubricate bearings, gear train and tappets.

Tap dowel pins into gear cover until they extend about 1/8" past the flange face. Place a dab of low melting grease into hole of gear cover to retain camshaft thrust spring ball in place. Lubricate lip of oil seal and add a light film of oil to gear cover face to hold gasket in place.

Place ***sleeve tool*** *Fig. 32,* in oil seal, drop steel ball into grease filled hole and assemble gear cover by tapping in place with a soft hammer.

Caution: Be sure timing marks on crankshaft and camshaft gear, Fig. 41, remain correctly mated when end of camshaft is pressed into bearing hole of gear cover.

Note: Governor yoke must straddle governor shaft extension and bear against thrust sleeve.

Remove oil seal sleeve, tighten gear cover capscrews to ***22 ft. lbs. torque*** and hammer dowel pins in place. Mount governor lever.

GOVERNOR FLYWEIGHT ASSEMBLY (Fig's. 33, 34)

The governor gear and flyweight assembly rotates on

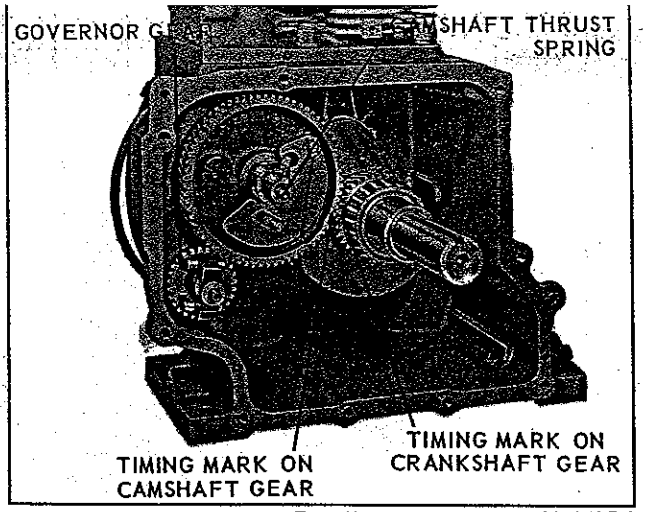


Fig. 41 293041C-1

Remove tappets; check face for scuffing and inspect body for wear. Body diameter of *.6245/.6235"* has a clearance of *.0005* to *.0025"* in guide hole.

In reassembly: Tappets must be inserted in crankcase before camshaft is assembled. Mount camshaft so that *timing mark* on cam gear matches up with *marked gear tooth* on crankshaft gear. *See Fig. 41.* If valve timing is off, engine will not function properly or may not run at all. Be sure *thrust spring* is in place in end of camshaft, before mounting gear cover.

TAPPET ADJUSTMENT (Fig. 42)

Tappet adjustment can be made immediately after assembling the valves, springs and locks, *see Fig. 42.* With the tappets in their lowest position and the *engine cold,* the clearance should be:

inlet – .007 inch
exhaust – .016 inch

Caution: Be sure exhaust tappet is not riding on compression release spoiler cam.

To check tappet clearance on an assembled engine; turn crankshaft so that take-off or flywheel keyways are in a 12 o'clock position, and on compression stroke. Observe position of valve stems in the inspection compartment. Both valves should be in their lowest position (closed); proceed to check clearance.

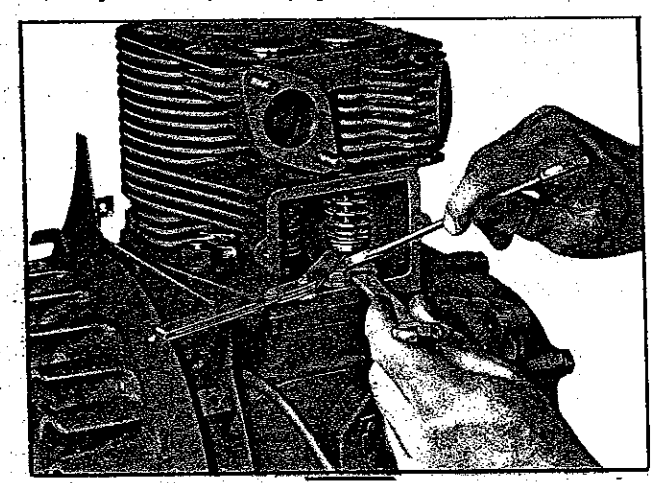


Fig. 42 293060C

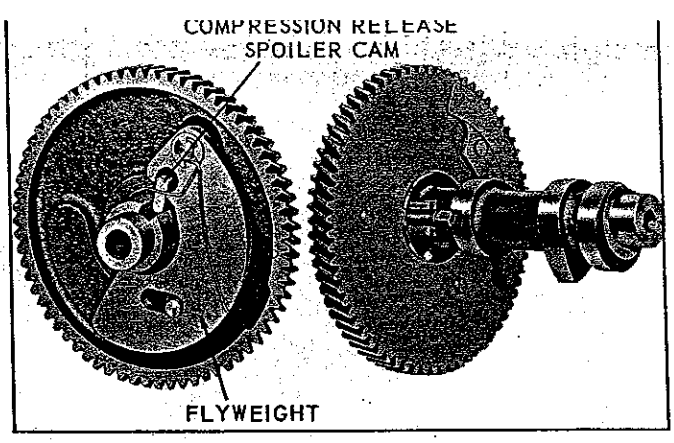


Fig. 43 311748C

COMPRESSION RELEASE (Fig. 43)

The *automatic compression release* is incorporated with the engine camshaft, and with proper engine maintenance should operate trouble free, with a minimum of wear.

While cranking engine, a *spoiler cam* holds the exhaust valve slightly open thru a portion of the compression stroke. This condition reduces the compression pressure, allowing the engine to be turned over faster and with less effort. After the engine starts and speed reaches 650 R.P.M., the *flyweight* places spoiler cam in an inoperative position and normal compression is returned to combustion chamber.

BREAKER PUSH PIN and BUSHING (Fig. 44)

Push pin for breaker arm should be removed, inspected for wear and replaced if necessary. *In reassembly:* Mount *assist spring* under head of push pin and insert pin assembly into guide hole, with *spherical end* of pin toward camshaft striker plate, *see Fig. 44.*

If clearance between new push pin and bushing is excessive, replace bushing. Ream I. D. of bushing *.2785* to *.2790 inches* after pressing in place. Mount bushing to crankcase with LOCTITE if necessary.

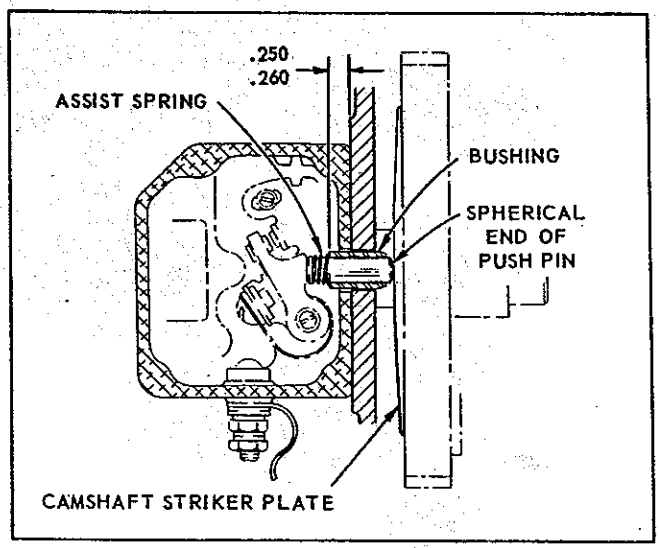


Fig. 44

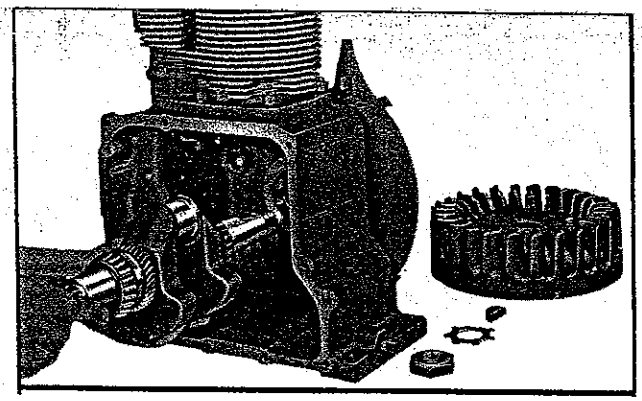


Fig. 45 293063C

CRANKSHAFT (Fig. 45)

Take off flywheel nut and remove flywheel. Knock out woodruff key and pull crankshaft out from open end of crankcase.

In reassembly; mount flywheel after crankshaft is assembled, and hand tighten flywheel nut. Flywheel will support crankshaft for mounting of connecting rod and piston. Flywheel nut is tightened after gear cover is mounted, and previous to checking end play.

STATOR PLATE and END PLAY (Fig's. 46, 47)

The stator plate functions as an adapter for the magneto coil as well as a front bearing support. Since the crankshaft end play is adjusted by means of the stator plate gaskets, it is advisable not to remove the plate unless replacement is necessary.

To remove stator plate, take out four capscrews and tap plate from inside crankcase with a wooden hammer handle. *In reassembly:* Use new gaskets having the same total thickness as those removed. Torque stator plate capscrews to *18 ft./lbs.*

End play is checked after crankshaft, gear cover and flywheel are mounted. The end play should be *.001* to *.004 inch* with engine *cold,* and can be determined as illustrated in *Fig. 47.* Wedge a lever between the flywheel and crankcase, and move the crankshaft forward and backward against a dial indicator. If there is too much end play, a corresponding thickness of gasket will have to be removed from behind stator plate. Not enough end play and gasket will have to be added.

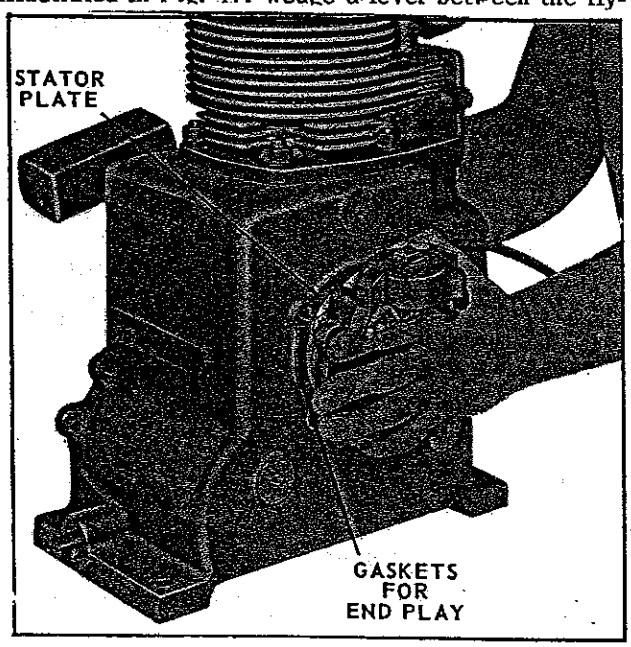


Fig. 46 293049C

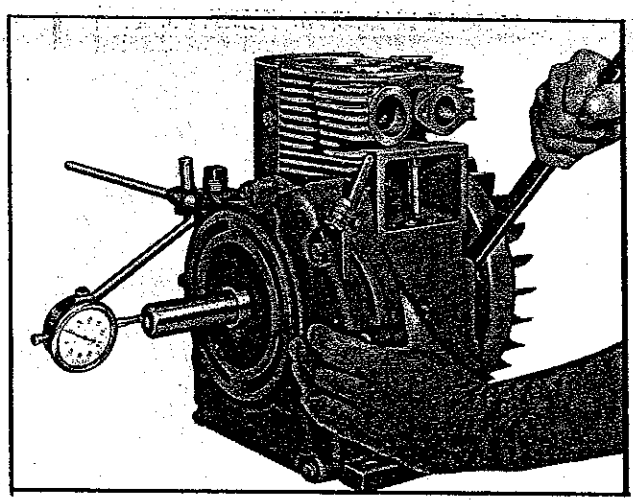


Fig. 47 284080C

If new tapered crankshaft main bearings are installed, seat bearings by alternately striking each end of the crankshaft several sharp blows with a lead hammer. Then proceed to check crankshaft end play.

After end play is set; refer to flywheel reassembly paragraphs, for final instructions on tightening of flywheel nut.

GOVERNOR

OPERATION

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

GOVERNOR ADJUSTMENT (Fig. 48)

The governor rod connection to the carburetor must be very carefully adjusted for length, otherwise the governor will not function properly and may cause the engine to surge badly. With the engine at rest, the governor spring will keep the flyweights in, and the control rod must be of such length as to hold the carburetor throttle wide open at that point.

With the *control rod* disconnected from the *governor lever,* as illustrated in *Fig. 48,* push the rod toward the carburetor as far as it will go. This will put the *carburetor throttle lever* in a wide open position. The

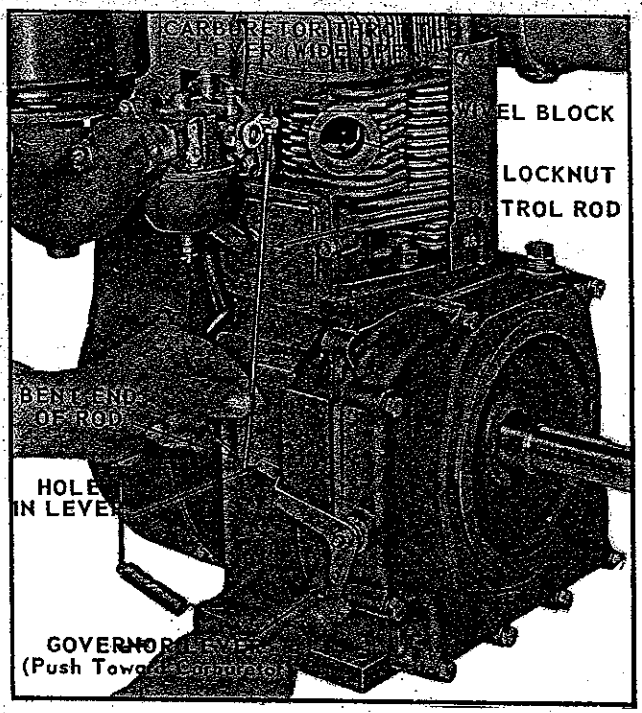


Fig. 48 293050C

governor lever should then be extended as far as possible in the same direction. Holding both parts in the above position, the rod should be screwed in or out of the *swivel block* on the carburetor, until the *bent end* of the rod will register with *hole* in lever.

Snap control rod clip in place and tighten *locknut* against swivel block on carburetor throttle lever.

CORRECT ENGINE SPEED (Fig. 49)

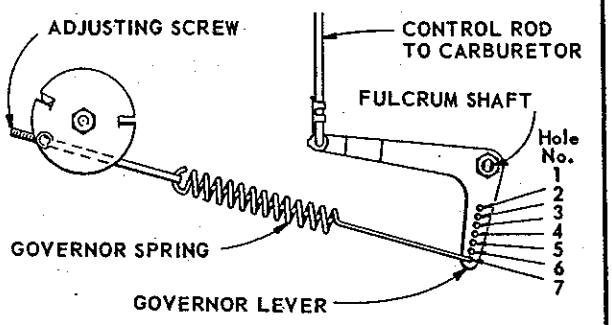
Engine speed is adjusted by hooking governor spring in correct hole of governor lever, and then regulating spring tension by means of an adjusting screw. The governor lever has 7 holes for the governor spring, with the No. 1 hole closest to the fulcrum shaft.

Caution: Beginning with engine serial No. 5,675,598 the *WALBRO* carburetor is standard equipment, with the *ZENITH* carburetor optionally used. When readjusting engine speed, use chart in *Fig. 49* relative to the Carburetor Type.

Note: Two different length adjusting screws are required for the complete range of operating speeds (see chart).

The governor lever chart in *Fig. 49*, shows the *load* and *no load* speeds and the corresponding governor spring hole. After hooking spring into the lever hole relative to the desired *load speed*, run the engine without load and regulate the spring tension by means of the *adjusting screw* until the required *no load* speed is obtained. The governor spring will have to be disconnected from governor lever each time screw is turned in or out.

A tachometer or revolution counter should be used against the crankshaft to check speed while adjusting the governor spring tension. The engine speed without load will vary from 75 to 180 revolutions per minute higher than the speed with load. For instance; if the engine is to operate at 3400 R.P.M. under full load, the speed with no load will be 3520 R.P.M. Refer to the governor lever chart, *Fig. 49* for the variation between load speed and no load (high idle) speed.



Use 3-15/16" long Adjusting Screw			Use 3-5/8" long Adjusting Screw		
LOAD R.P.M.	NO LOAD R.P.M.	HOLE NO.	LOAD R.P.M.	NO LOAD R.P.M.	HOLE NO.
'ZENITH' CARBURETOR					
1600	1760	1	2600	2720	4
1800	1875	2	2700	2810	4
1900	2040	2	2800	2940	5
2000	2120	2	2900	3010	5
2100	2260	3	3000	3150	6
2200	2340	3	3100	3230	6
2300	2400	3	3200	3360	7
2400	2580	4	3300	3455	7
2500	2650	4	3400	3520	7
			3500	3590	7
			3600	3680	7
'WALBRO' CARBURETOR					
1600	1680	1	2600	2735	4
1800	1875	2	2700	2820	5
1900	1985	2	2800	2920	5
2000	2090	2	2900	3020	5
2100	2190	2	3000	3130	5
2200	2305	3	3100	3215	5
2300	2395	3	3200	3350	6
2400	2550	4	3300	3430	6
2500	2630	4	3400	3520	6
			3500	3605	6
			3600	3695	6

Fig. 49

REPAIR PARTS LIST

READ THESE INSTRUCTIONS BEFORE ORDERING PARTS

The MODEL, SPECIFICATION and SERIAL NUMBERS of your engine, shown on the name plate prominently located on the engine, MUST BE GIVEN WHEN ORDERING PARTS.

COPY THE ABOVE SPECIFIED INFORMATION INTO THE SPACES PROVIDED BELOW SO THAT IT WILL BE AVAILABLE TO YOU WHEN ORDERING PARTS.

MODEL		SERIAL NO.			
SIZE		R.P.M.		SPEC. NO.	

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

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

SERVICE FACILITIES

Approved engine service centers, located throughout the U.S. and foreign countries, have been carefully selected by Wisconsin Motors, LLC in order to assure complete and efficient repair and inspection service to owners of Wisconsin air-cooled engines. These service centers, equipped and trained for complete engine repair, also stock parts to facilitate immediate delivery for all Wisconsin air-cooled engines.

LP-62 series FUEL PUMP

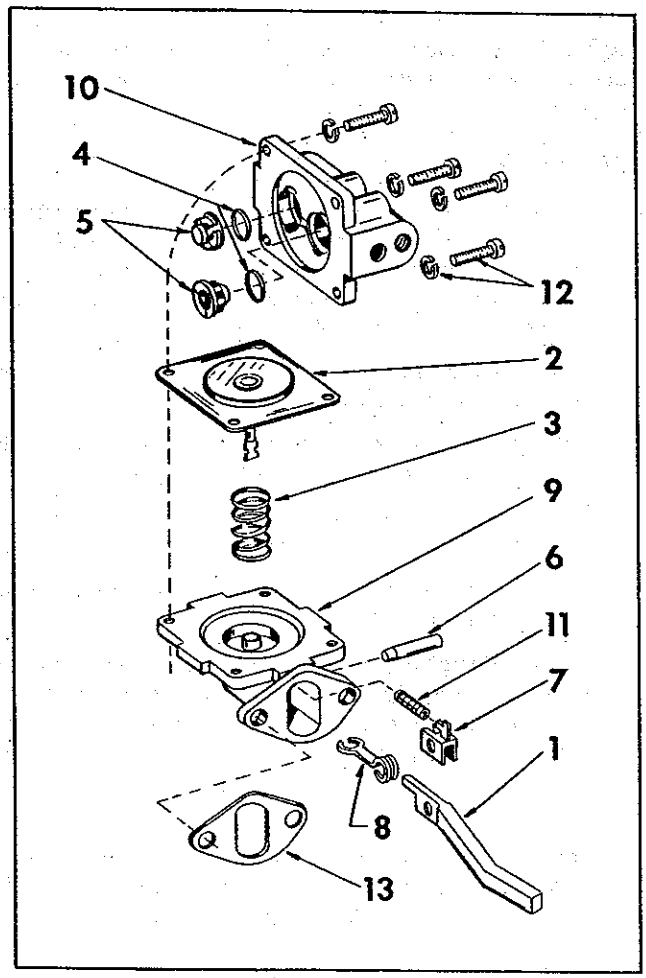
REPAIR INSTRUCTIONS

For single and two cylinder engine models

PART NO.	ENGINE USED ON
LP-62-A	THD, TJD
LP-62-B	ACN, BKN, AENL
LP-62-C	MTHD
LP-62-D	AGND
LP-62-E	S-7D
LP-62-F	S-10D, S-12D, S-14D
LP-62-G	S-8D, TRA-10D, TRA-12D

The fuel pump, like all other parts of the engine, is subject to wear and you will find that any time after 500 hours of use, its efficiency will gradually decrease. This is indictated by the engines faltering at high speeds or when heavy loads are suddenly applied. The pump can easily be restored to its normal efficiency by the installation of a **Wisconsin LQ-51** Diaphragm Kit.

1. Disconnect fuel lines from pump and remove fuel strainer if mounted to pump. Remove fuel pump from engine housing by taking out the two mounting screws.
2. File a groove across a point at the union of castings (9 and 10). This is a positive location of the fuel INLET and OUTLET positions when reassembling. Remove four head to bracket screws (12) and remove fuel head (10).
3. Turn fuel head (10) over, remove and discard both valve assemblies, noting their positions.
4. Clean fuel head thoroughly with kerosene or diesel fuel and a fine wire brush.



5. Hold fuel head (10), with diaphragm surface up, place two valve gaskets (4) into covities where valves were removed. Press valve assemblies (5) in evenly without distortion, and stake in place.
6. Set fuel head assembly aside and proceed to rebuild lower diaphragm section.
7. Insert the end of a small screw driver into the coils of rocker arm spring (11), remove and save.
8. Hold mounting bracket (9) in the left hand, with the rocker arm toward your body and the thumb nail on the end of link (8). With the heel of right hand on diaphragm (2), compress the diaphragm spring (3), and at the same time turn in a clockwise direction 90°. This will unhook the diaphragm from link (8) so it can be removed.
9. Clean the mounting bracket (9) with kerosene or diesel fuel and a fine wire brush.
10. Place the new diaphragm operating spring (3) into bracket (9). Repeat in reverse order paragraph eight, using the new diaphragm. Replace rocker arm spring (11) removed in paragraph seven.
11. Mount this assembly back on the engine in the position from which it was removed, using the new flange gasket (13), which is the last piece of the repair kit.
12. Crank the engine over to a position where the diaphragm (2) is laying flat on the mounting bracket (9). Place the fuel head (10) back in position so that the indicating marks of step one are in line, and start the four head screws approximately three turns. Again, crank the engine over to a position where diaphragm (2) is pulled down into mounting bracket (9) to its lowest position. Securely tighten the four head screws (12).
13. Mount fuel strainer to fuel pump, if applicable, and connect fuel lines.

NOTE: The **LQ-51 Diaphragm Kit** and the parts included therein, which are identified by an asterisk (*), are the only parts of the fuel pump available for service.

Ref. No.	Description	No. Req.
1	**ROCKER ARM**	1
* 2	**DIAPHRAGM ASSEMBLY**	1
* 3	**DIAPHRAGM SPRING**	1
* 4	**VALVE GASKETS**	2
* 5	**VALVE and CAGE ASSEMBLY**	2
6	**PIN** for rocker arm	1
7	**SPRING CLIP** for rocker arm	1
8	**LINK** for diaphragm spring	1
9	**MOUNTING BRACKET**	1
10	**FUEL HEAD**	1
11	**SPRING** for rocker arm	1
12	**SCREW** and **WASHER** for head mounting	4
*13	**GASKET** for mounting flange	1

REWIND (Recoil) STARTER

RWS 116
RWS 117
RWS 118

For Wisconsin Engine Models S-12D and S-14D

Operating Instructions — Repair — Parts List

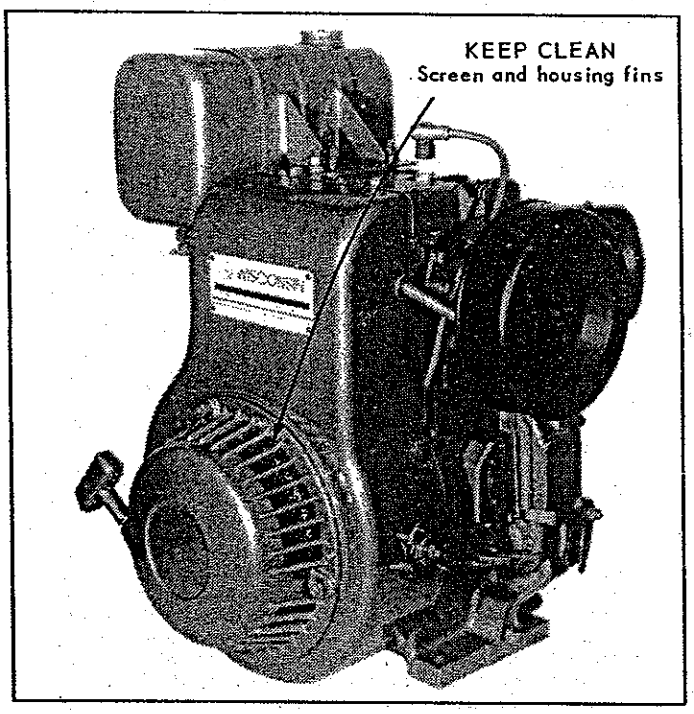


FIG. 1

PRINCIPLES OF OPERATION

A recoil spring, connecting the pulley to the housing, provides tension for actuating the starter, and it rewinds the rope on to the pulley whether the engine starts or not.

Three dogs (pawls) are mounted in a cluster to the starting pulley, around a dog cam attached to a shaft in the housing. As the rope handle is pulled to start the engine, the dogs are forced outward as they act against the contour of the stationary mounted cam. In this outward action the dogs engage with teeth in a flywheel mounted drive hub to turn the engine over.

When the engine starts and the 'T' handle returns, the dogs back out of the drive hub teeth, as the pulley rewinds in the opposite direction, and they revert back to an inactive position by means of the cam and individual dog return springs.

'T' HANDLE LOCATION, Fig. 2

The starting handle can be located in any of three locations with the standard location being toward the left side of the engine, pulling from an approximate 10 o'clock position.

Either of the two optional locations can be obtained by simply removing the three mounting nuts and rotating the housing 120° in either direction. *Caution:* Before tightening the mounting nuts the starter will have to be centered with the drive hub per *Fig. 7*, paragraph *H* on page *3*.

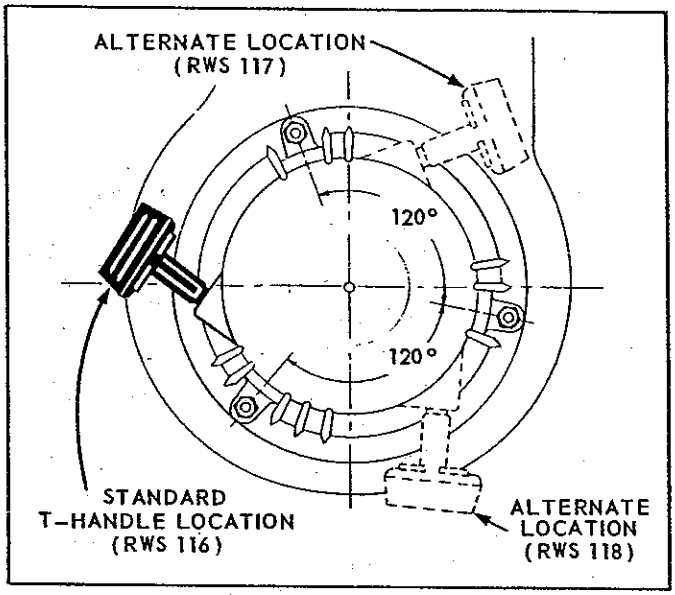


FIG. 2

OPERATING INSTRUCTIONS

1. *To start engine;* open fuel valve and close carburetor choke. Pull engine over against compression. Let rope rewind into starter slowly. Pull firmly and rapidly to start engine. (Repeat procedure if necessary). After engine starts, open choke fully.
2. Always maintain your hold on the starter handle and allow it to return slowly.
3. Pull the starter handle so that the rope remains in a straight line through the handle and guide.
4. *Do not* jerk the cord out to its very end in an unnecessary rough manner. Use a smooth but forceful pull.
5. *Do not* let go of starter handle allowing it to snap back against the starter.
6. *Do not* attempt to pre-load starter spring unnecessarily. Units are properly adjusted at the factory so that the outward pull of the starter is stopped by the end of the cable not the spring.

MAINTENANCE AND REPAIR

Oil and dirt, if allowed to accumulate in and around the the starter, will cause wear and eventual failure of not only the starter parts, but engine parts as well.

Do not allow internal rotating screen and housing fins to become "clogged up" with dirt. Brush clean to allow proper air flow to reach the engine.

Inspect rope for wear – replace before it breaks at a critical time.

If engine does not turn over as rope is pulled out, starter dogs are not engaging with drive hub teeth.

If rope does not rewind; rope or pulley may be binding – insufficient spring tension – spring disengaged or broken.

To overhaul the rewind starter, follow the disassembly and assembly procedures in the following 'Repair Instructions'. ***Rope replacement*** can be accomplished without completely disassembling the starter. *See paragraph D.*

REPAIR INSTRUSTIONS

In order to do any repair work on the rewind starter, it is advisable to secure the starter housing either in a vise, or to a work bench by means of a 'C' clamp.

DISASSEMBLY

A. REMOVE HANDLE and ROPE, Fig. 3

Pull rope out about two feet and tie knot to prevent rope from rewinding into pulley. Extract metal handle reinforcement (129) from handle (128) and untie or cut off end knot. Remove handle and reinforcement from rope, and untie knot that kept the rope from rewinding into the pulley. PULL rope all the way out (about 6 feet) and at the same time hold the starter housing (127), with thumb pressing against pulley assembly (137) to prevent rewinding. Pull the rope knot (visable thru square opening in pulley) and the rope will slide out through rope bushing in housing and hole in the pulley.

Carefully release thumb pressure and the pulley will completely unwind. At this point the main recoil spring is in a relaxed position.

B. REMOVE PULLEY and SPRING, Fig. 3

Remove *cam center screw* (130), *dog cam* (135), *brake spring* (134) and *washer* (125).

Prevent recoil spring from escaping from housing by carefully lifting pulley about 1/2 inch and then detaching inside ***spring hook*** from pulley, with a screw driver. ***Note:*** If spring should escape, it can easily be replaced into cover by coiling in the turns. *See Fig. 6,* for proper direction of spring coiling. If it is necessary to remove spring, start with the inside loop and carefully pull out one loop at a time while holding back rest of turns. When replacing spring, note the position of ***spring hooks*** in *Fig. 6.* Engine rotation is clockwise, viewed from starter end.

C. REMOVAL of DOGS, Fig. 3

Remove dog ***retainer clips*** (133) using a screw driver or other pointed tool. The ***dogs*** (132) and ***springs*** (131) can then be lifted off the axis pins.

Dogs and springs can be removed and replaced without removing rope, recoil spring or cam retainer screw.

D. ROPE REPLACEMENT, Fig. 3, 4, 5

If it is only necessary to replace the rope, the starter need not be completely disassembled.

Assuming the rope has broken, remove what ever remains of the rope from the starter. Tie knot at end of new rope. Turn the ***pulley*** in starter ***counter clockwise*** until it stops (about 6-7 turns). Allow the pulley to rotate slightly in the opposite direction (clockwise) until the hole in the pulley is in line with the rope bushing in the housing. Lock sheave in this position by placing a screw driver between two of the housing support ribs and wedging the end of the screw driver under the dog cam and against the dog, *see Fig. 4.* Thread rope through hole in pulley and through ***rope bushing*** in housing. Pull rope completely through until the knot in end of rope (previously tied) can be tucked

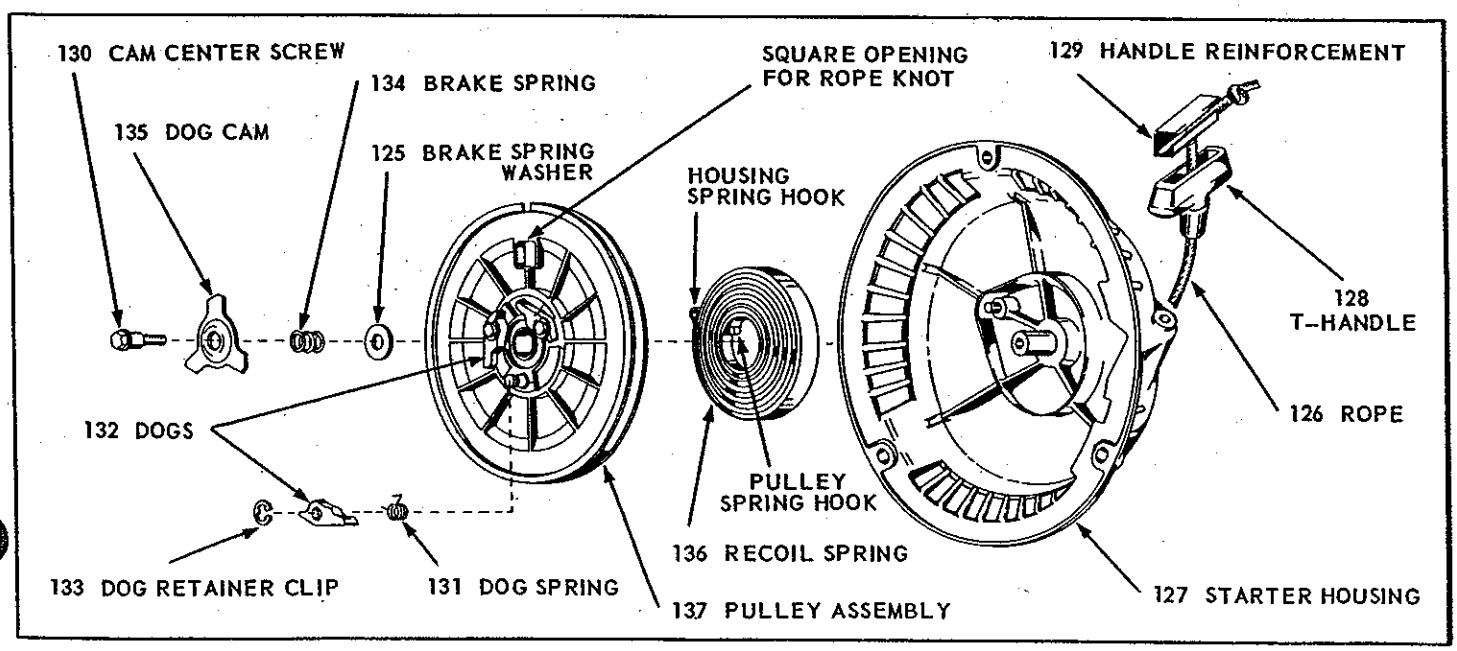


FIG. 3

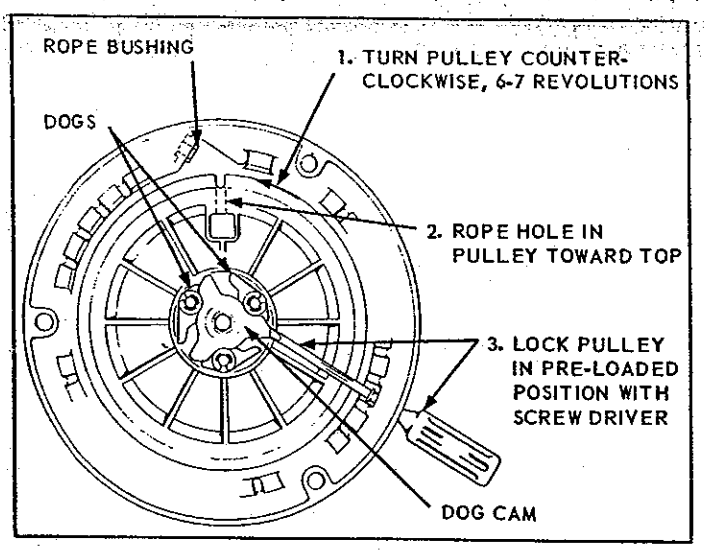


FIG. 4

into the ***square pocket*** in the pulley, *see Fig. 5.* Allow the rope to recoil into the pulley about 2 feet, then tie a ***retaining knot*** in the rope to prevent it from being completely rewound into the pulley. Install the 'T' handle (128) on the rope, then the handle insert (129). Tie a knot at end of rope and tuck it into the handle insert, then assemble insert into the rubber 'T' handle. Remove the retaining knot and allow the rope to recoil completely.

E. RECOIL SPRING REPLACEMENT, Fig. 6

Spring holders furnished with replacement springs simplify the assembly procedure. Place ***recoil spring*** in proper position as shown in *Fig. 6*, with the outside loop hooked around the ***anchor post***. Then press spring into ***housing cavity*** thus releasing the spring holder. A few drops of SAE 20 or 30 oil should be applied to spring and light grease on housing shaft.

REASSEMBLY

F. ASSEMBLY of PULLEY, Fig. 6

After recoil spring has been installed in housing, mount pulley. Push housing and pulley together with a twisting motion so that the ***hook*** on end of spring engages the ***notch*** in pulley. When this occurs, the pulley will seat properly in the housing.

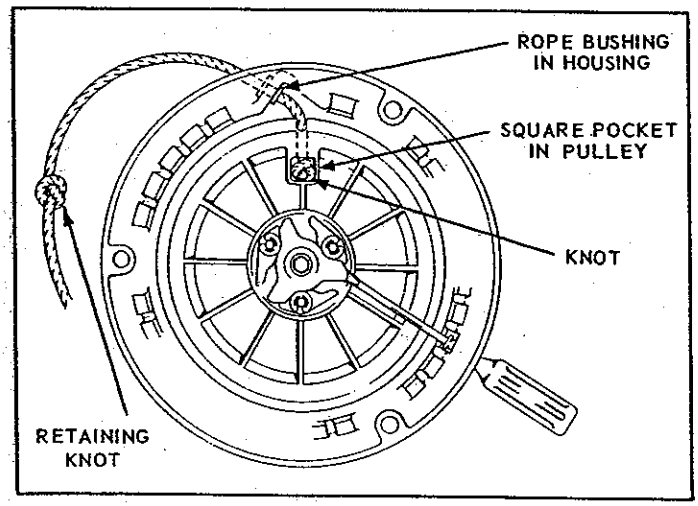


FIG. 5

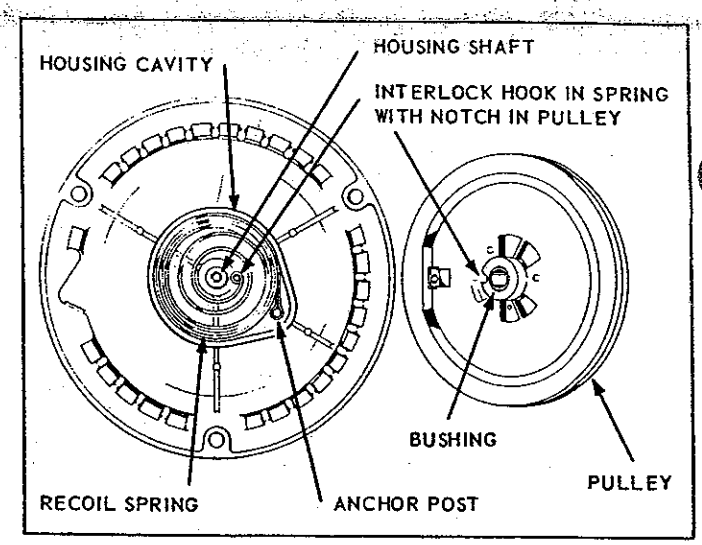


FIG. 6

G. ASSEMBLY of DOG GROUP, Fig. 3

Assemble brake washer (125), brake spring (134), dog cam (135), cam and center screw (130). Torque center screw 115-130 inch pounds. Install three dog springs (131) over the axis pins on the pulley and seat in the pockets. Mount the three dogs (132) on the same pins on pulley. Make sure that the ***dog springs are actuated*** as the dogs are positioned – to insure that the dogs are held in against the cam plate (135). Install three dog retainers (133). ***Note:*** When ever the dog retainers (133) are removed they should be replaced with new parts.

H. REWIND STARTER ALIGNMENT, Fig. 7

Mount rewind starter to support ring studs with ***'T'*** handle in required starting position. Place the three plain washers, lockwashers and nuts on studs and ***hand tighten only*** – for alignment purposes.

Proper ***alignment*** of the starter is obtained by pulling out the ***'T'*** handle until a substantial resistance, indicating starter engagement, is obtained. This automatically centers the starter to the ***drive hub.*** Hold starter in this position and securely tighten the three mounting nuts. ***The starter will become damaged if it is not centered properly.*** The engine is now ready to start.

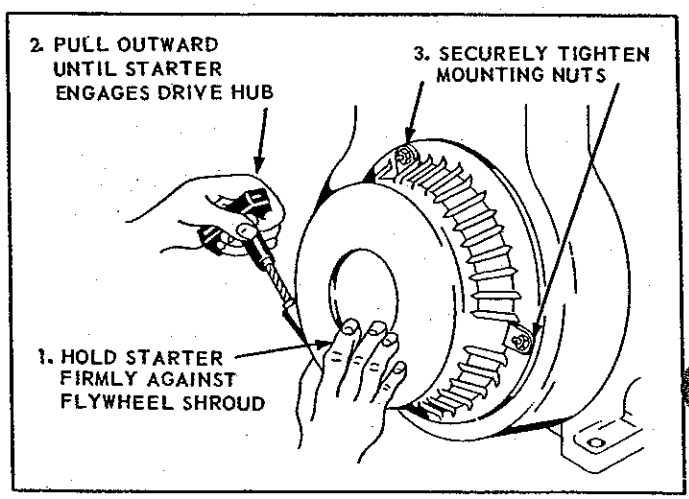
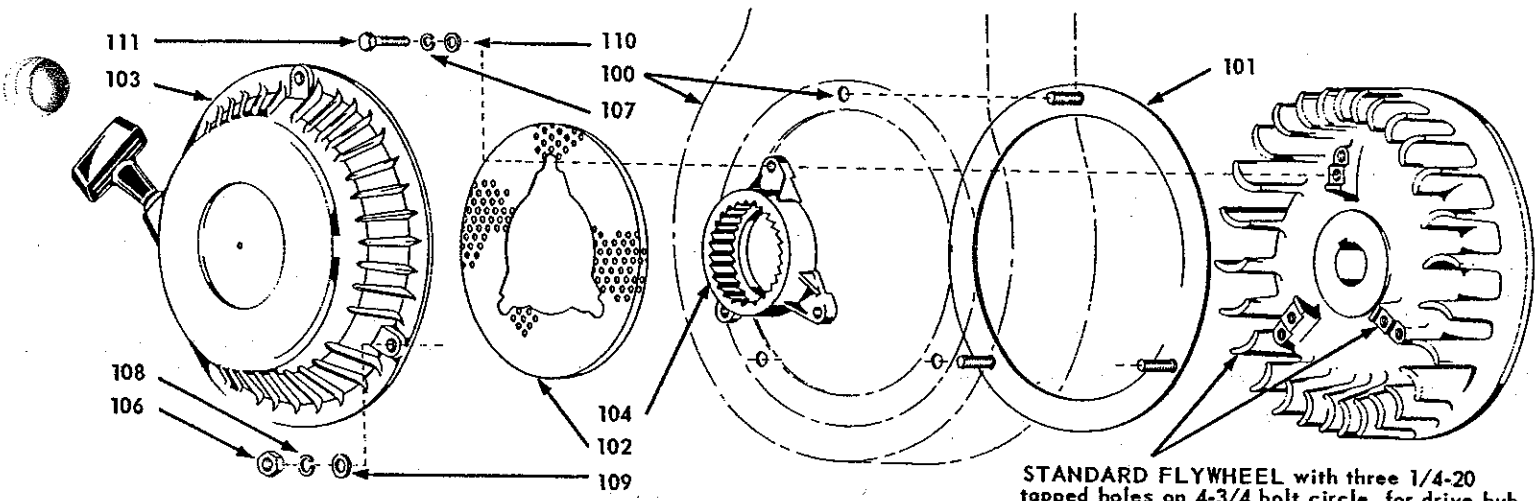


FIG. 7

RWS 116 REWIND STARTER ASSEMBLY – SERVICE PARTS LIST

RWS 117, RWS 118 Same as RWS 116 except T-Handle in alternate locations, see Fig. 2.

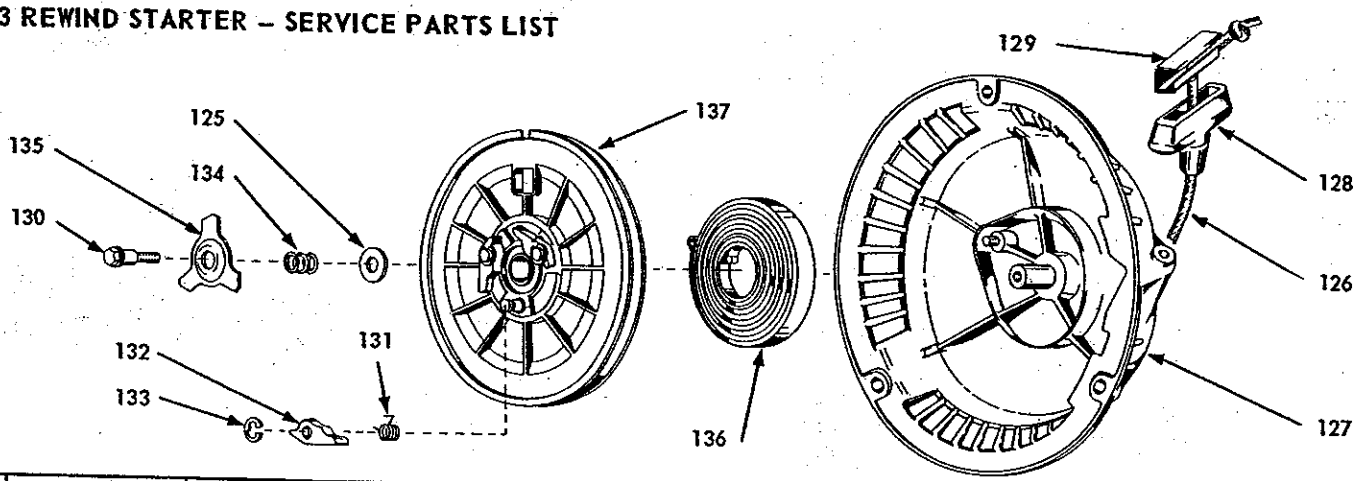


STANDARD FLYWHEEL with three 1/4-20 tapped holes on 4-3/4 bolt circle, for drive hub.

Ref. No.	Part Number	Description	No. Req.
100	SE 337-1	FLYWHEEL SHROUD replaces standard ..... Same as std. shroud except with three 3/8 inch holes on a 8-1/2 inch bolt circle for mounting starter.	1
101	PG 1300	SUPPORT RING	1
102	SE 334	SCREEN, rotating	1
103	U 283	REWIND STARTER ASSEMBLY	1
104	UC 204	DRIVE HUB	1
		STANDARD HARDWARE	
106	PD 78	NUT, 5/16-18 thread, hexagon steel ..... For rewind starter mounting.	3

Ref. No.	Part Number	Description	No. Req.
107	PE 3	LOCKWASHER, 1/4" spring lock ..... For drive hub to flywheel mounting.	3
108	PE 4	LOCKWASHER, 5/16" spring lock ..... For rewind starter mounting.	3
109	PH 14 D	WASHER, 5/16" x 19/32" O.D., plain steel .... For rewind starter mounting.	3
110	PH 293 A	WASHER, 1/4" x 7/16" O.D., plain steel ..... For drive hub to flywheel mounting.	3
111	XD 7	SCREW, 1/4"-20 x 1" long, hex head ..... For drive hub to flywheel mounting.	3

U 283 REWIND STARTER – SERVICE PARTS LIST



Ref. No.	Part Number	Description	No. Req.
125	27-504-015-0	WASHER, brake spring	1
126	27-504-022-0	ROPE, No. 6 x 74" long	1
127	27-504-116-0	HOUSING ASSEMBLY	1
128	27-508-008-0	T HANDLE	1
129	27-508-009-0	REINFORCEMENT, T handle	1
130	27-525-003-0	SCREW, cam center	1
131	27-525-007-0	DOG SPRING	3

Ref. No.	Part Number	Description	No. Req.
132	27-525-008-0	DOG	3
133	27-525-012-0	DOG RETAINER CLIP	3
134	27-525-013-0	BRAKE SPRING	1
135	27-526-001-0	DOG CAM	1
136	27-526-003-0	RECOIL SPRING	1
137	27-526-504-0	PULLEY and BEARING assembly	1

ZENITH MODEL 1408 CARBURETOR

For WISCONSIN Engine Models S-10D, S-12D, S-14D

OPERATION and SERVICE

DESCRIPTION

The 1408 Series Carburetor is a horizontal "balanced" type with concentric fuel bowl, a single "doughnut"-shaped float, fixed main jet, three-position, spring-loaded choke plate, an idle adjusting needle and throttle stop screw. The venturi is cast integral with the throttle body and the idle tube, main discharge tube and well vent tube are pressed permanently into an elongated boss on the throttle body. This boss serves as the mounting support for the fuel bowl, as well as the main jet. In the "balanced" type carburetor, all air for float chamber ventilation, well ventilation and for idle and main jet operation must enter through the air cleaner. In this design, any restriction in the air cleaner will have a minimum effect upon the fuel-air mixture admitted to the engine.

The **FUEL SYSTEM** controls the level of fuel in the float chamber (fuel bowl) at all times and under all conditions of operation. The Fuel Supply System consists of: the fuel inlet fitting, float chamber, fuel valve (needle and seat), doughnut-shaped float with double hinges, and a single float lever.

The **IDLE SYSTEM** supplies the fuel-air mixture for idle and off-idle (low part – throttle operation). The Idle System consists of: idle tube, idle air bleed, connecting channels, three idle discharge hole, idle adjusting needle and throttle plate.

The **HIGH SPEED (main metering) SYSTEM** supplies the fuel-air mixture for part throttle to full throttle operation. The High Speed System consists of: venturi, discharge nozzle, metering well and tube, well vent, main jet and connecting channels.

The **CHOKE SYSTEM** provides a richer mixture of fuel and air for starting a cold engine. The Choke System consists of: an external choke lever and detent spring, choke shaft and choke plate.

OPERATION

FUEL SUPPLY SYSTEM (Fig. 1)

Fuel under pressure is supplied to the carburetor through the fuel inlet, to the fuel valve (needle and seat), and on to the float chamber. With fuel in the float chamber, the float automatically regulates the opening through the fuel valve to maintain a specified level of fuel in the float chamber even though the fuel flow demands vary with engine speed and load.

IDLE SYSTEM (Fig. 2)

The fuel for idle operation is drawn from the metering well through the idle tube calibration and mixed with air entering through the idle air bleed in the channel leading to the idle discharge holes. At low idle speed, the throttle plate is positioned so that only the #1 idle discharge hole is exposed to engine vacuum. Since the #2 and #3 idle holes are exposed to the air entering the carburetor, air is admitted through idle holes #2 and #3 to be mixed with the fuel-air mixture in idle channel before being discharged through the #1 idle discharge hole into the intake manifold. Opening the throttle plate slightly exposes the #2 idle discharge hole to engine vacuum to feed more fuel-air mixture

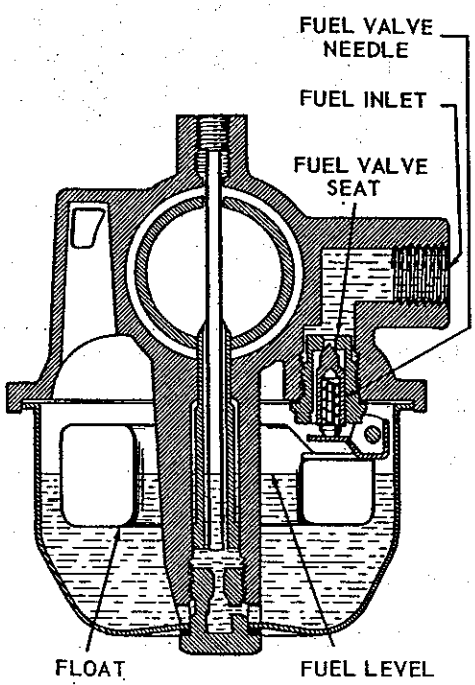


Fig. 1 FUEL SUPPLY SYSTEM

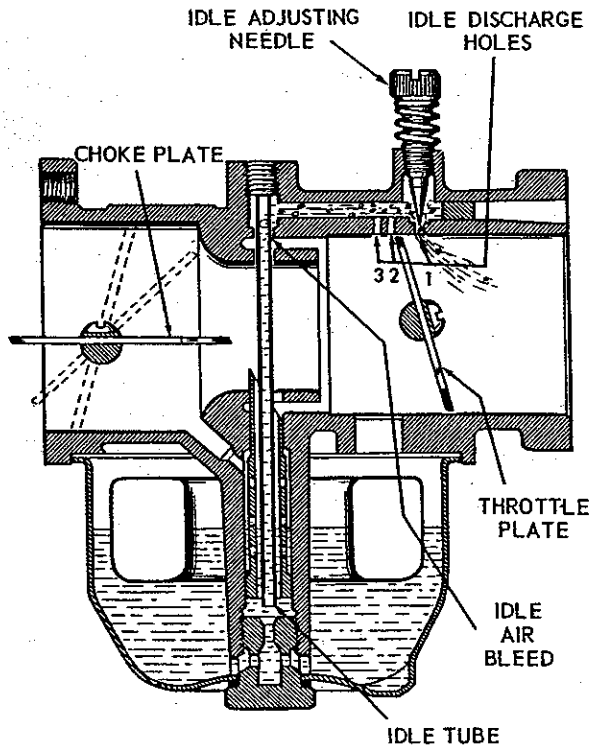


Fig. 2 IDLE AND CHOKE SYSTEMS

into the engine. As the throttle is advanced slightly, the #3 idle discharge hole is also exposed to engine vacuum, increasing the fuel-air supply to the engine still further. At this throttle position, any further throttle advance brings the high speed system into operation. The idle adjusting needle regulates the fuel-air mixture flowing through the #1 idle discharge hole. Turning the idle needle valve IN (clockwise) results in a leaner mixture. Turning it OUT (counter-clockwise) provides a richer mixture. **The idle speed is set by adjusting the throttle stop screw and not by the idle adjusting needle.**

CHOKE SYSTEM (Fig. 2)

Before cranking the engine, the carburetor throttle should be opened just enough to expose all three idle discharge holes to engine vacuum. The choke should be held fully closed during cranking and opened slightly (one notch) shortly after the engine starts. As the engine warms up, the choke should be opened to the third notch, wide-open, and the throttle should be returned to the low idle position.

HIGH SPEED SYSTEM (Fig. 3)

Fuel for the off-idle to full throttle range of operation is supplied from the fuel bowl through the main metering jet to the discharge nozzle, where it is mixed with air taken in from the air intake in front of the venturi and with air drawn into the discharge nozzle from the chamber surrounding the venturi. This mixture of fuel and air then passes through the discharge nozzle into the air stream at the throat of the venturi. To insure the correct mixture ratio, a small amount of air is added from the well vent or high speed bleed, through the air bleed holes located in the wall of the metering well at various levels. By introducing air into the system below the fuel level in the fuel bowl, the surface tension of the fuel is reduced, enabling the fuel to flow at lower suction. At high suction, the air from the well vent proportionately reduces the flow of fuel to provide a correctly balanced mixture ratio at all engine speeds and loads.

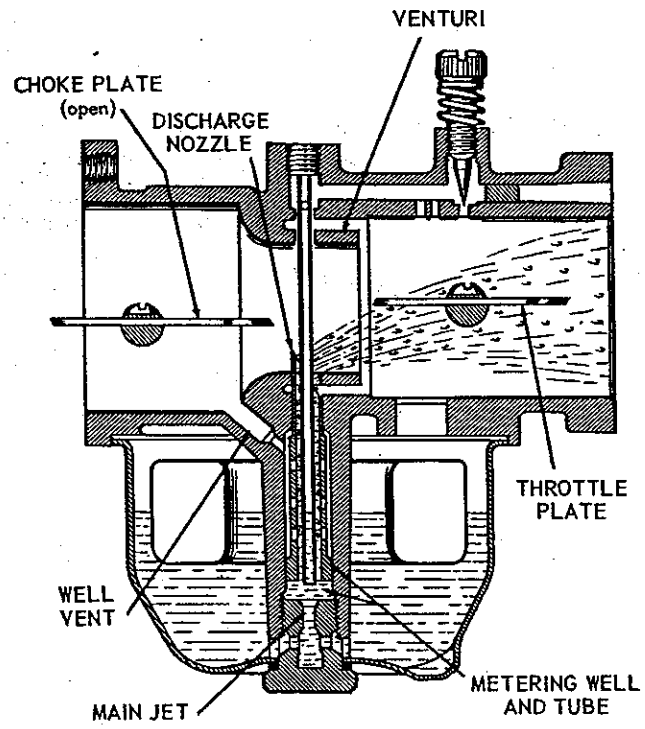


Fig. 3 HIGH SPEED SYSTEM

SERVICE AND REPAIR PROCEDURE

IDENTIFY CARBURETOR

Check the numbers on the metal identification disc pinned to the top of the throttle body or indented in it. The plain number is the Zenith assembly number, the number with the letter "L" pre-fixed to it is the engine manufacturer's part number, for the complete assembly.

EXPLODED VIEW (Fig. 4)

The exploded view identifies the serviceable component parts of the carburetor and shows their relationship to the complete assembly. Use the key numbers on the exploded view to identify and locate parts when performing both the disassembly and assembly operations.

DISASSEMBLY

REMOVAL OF FUEL BOWL

1. With carburetor inverted, loosen main jet (18). Remove main jet assembly, washer (19) and fuel bowl (12).
2. Inspect main jet (18) for wear.

DISASSEMBLY OF THROTTLE BODY

1. Stand throttle body (1) on end and use scribe or heavy wire to press float axle (10) out of float hinges. Remove axle and float (9).
2. Hold hand under fuel inlet and turn throttle body to horizontal position. Catch fuel valve, pin and spring (parts of 20) as they fall from seat.
2. Remove idle adjusting needle (5) and spring (6) by unscrewing them (counterclockwise). Remove throttle stop screw (7) and spring (8) in the same way.
4. Lay throttle body down with fuel bowl side up. Use large screwdriver to remove fuel valve seat (part of 20) and washer (21) from fuel inlet port.
5. Remove bowl to body gasket (11).
6. Close choke plate (16), and use small screwdriver to remove screws (17). Slide choke plate out air intake opening and choke shaft and lever (15) out shaft hole. **Do NOT** remove choke detent spring (24) unless it is damaged and must be replaced.
7. Close throttle plate (13), and use small screwdriver to remove screws (14). Slide throttle plate out manifold opening and throttle shaft and lever (23) out shaft hole. Use small screwdriver to pry seal retainer (3) and seal (2) off shaft hole boss. **Do NOT** remove shaft hole plugs (4) unless they are damaged and must be replaced.

CLEANING

Thoroughly clean all metal parts in Bendix Metalclene or Speedclene and rinse in cleaning solvent. Blow out all passages in throttle body and fuel bowl with reduced air pressure. Be sure all carbon deposits have been removed from throttle bore and idle discharge holes. Reverse the flow of compressed air through all passages to insure the removal of all dirt. **NEVER USE A DRILL OR WIRE TO CLEAN OUT JETS OR IDLE HOLES.**

INSPECTION OF PARTS

1. Float Assembly – Replace if loaded with gasoline, damaged or if float axle bearing is worn excessively. Inspect float lever for wear at point of contact with fuel valve needle. Replace if wear is excessive.
2. Float Axle – Replace if any wear has occurred on the bearing surface.
3. Fuel Valve (Needle & Seat) Assembly – Replace as a complete unit. Wear of any of these parts can seriously affect the operation of the float.
4. Idle Adjusting Needle – Inspect tapered end of the needle to make sure it is smooth and free of grooves. Replace if pitted or grooved.

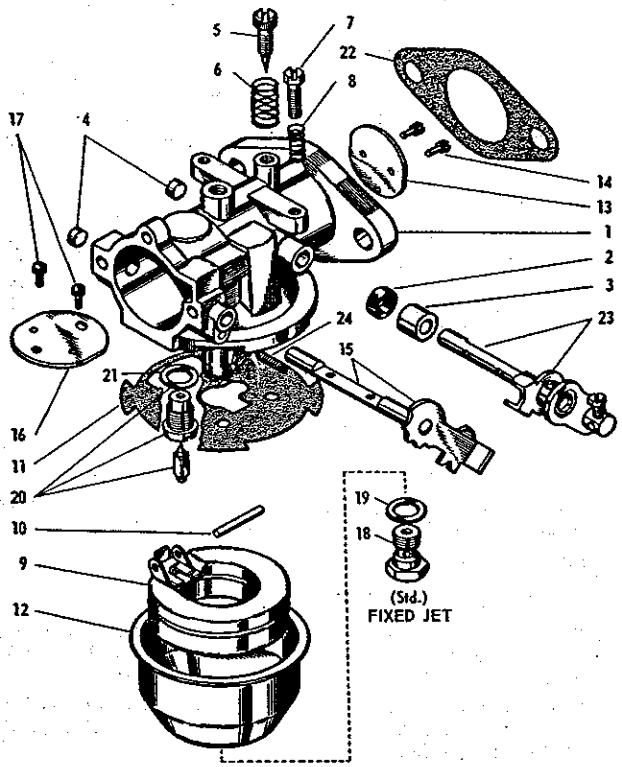


Fig. 4 EXPLODED VIEW

5. Gaskets, Seal and Retainer – Replace all gaskets, throttle shaft seal and retainer each time the carburetor is overhauled.

REASSEMBLY

ASSEMBLY OF THROTTLE BODY

1. Slide throttle shaft and lever (23) into seal retainer (3) and seal (2). Insert shaft into throttle shaft hole at manifold end of throttle body (1). Seat shaft in hole on opposite side of throttle bore and press seal and retainer firmly against shaft hole boss.
2. Rotate throttle lever so flat center section faces out manifold opening. Install throttle plate (13) with screws (14), using small screwdriver.
3. Slide choke shaft and lever (15) into choke shaft hole and seat in hole on opposite side of air intake bore.
4. Rotate choke shaft so flat center section faces out intake opening. Install choke plate (16) with screws (17), using small screwdriver.
5. Lay throttle body down with fuel bowl side up and install bowl to body gasket (11).
6. Install washer (21) and fuel valve seat (part of 20). Use large screwdriver to tighten seat to 100 in-lbs. Insert valve, spring and pin (parts of 20) into seat.
7. Install float (9) and float axle (10) on support brackets of throttle body. Check operation of the float to be sure the hinge and axle do not bind and that the float moves in a perpendicular direction.
8. Install throttle stop screw (7) and spring (8). Adjust screw to open throttle slightly but not far enough to uncover #2 idle discharge hole, see Fig. 2.
9. Install idle adjusting needle (5) and spring (6). Screw needle IN (clockwise) until it seats lightly against the #1 idle discharge hole, then back it out 1½ turns as a preliminary idle adjustment.

FLOAT SETTING

1. With fuel bowl removed, set depth gauge to dimension recommended in illustration, Fig. 5.
2. Hold throttle body assembly in an inverted position and at the same time, support float so that tab or float lever just contacts fuel needle valve without any pressure or weight.
3. Place depth gauge in position as illustrated in Fig. 5.
4. CHANGING FLOAT LEVEL POSITION
   a. If float position is not to the dimension shown by depth gauge, remove float and bend tab (or lever) that contacts the needle pin (use long-nose pliers – close to the float body), until correct dimension is obtained. Reassemble float to throttle body and re-check float level position.

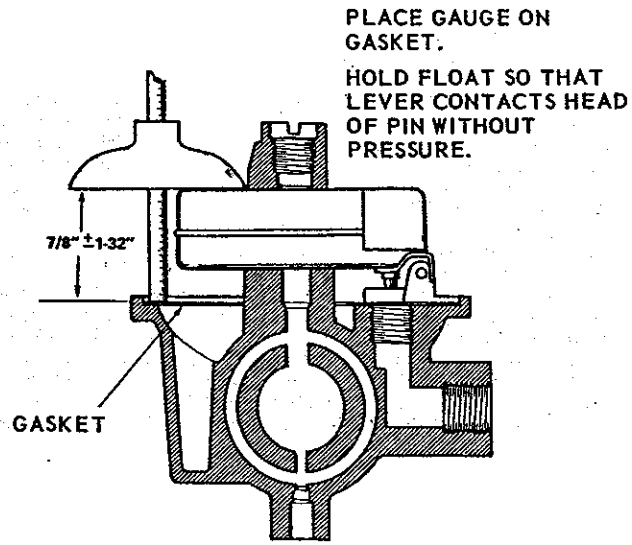


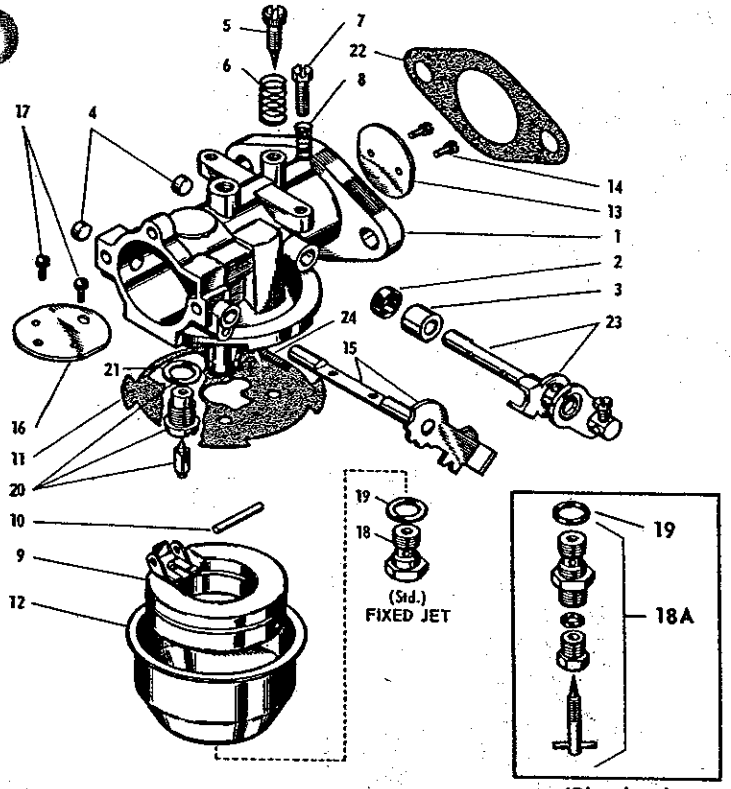
Fig. 5, FLOAT SETTING

ASSEMBLY OF FUEL BOWL TO THROTTLE BODY

1. Assemble washer (19) on main jet (18) and install fuel bowl (12) on inverted throttle body, using care to avoid damage to the float. Screw main jet with washer into throttle body boss, using 1/2" wrench and tighten to 100 in. lbs.

Assembly is now completed.

SERVICE PARTS LIST
ZENITH SERIES 1408 CARBURETOR
For Wisconsin Engine MODELS S-10D, S-12D and S-14D



CARB. REF. NO.	ZENITH ASSEMBLY NO.	WISCONSIN PART NO.
1	13022-B	L-86-A-S1
2	13027-B	L-86-B-S1
3	13040-B	L-86-C-S1
4	13064-A	L-86-D-S1
5	13137-A	L-86-E-S1
6	13138-A	L-86-F-S1
7	13155-A	L-86-G-S1
8	13208-A	L-86-H-S1
9	13224-A	L-86-J-S1
10	13225-A	L-86-K-S1
11	13187-A	L-86-L-S1
12	13188-A	L-86-M-S1
13	13322-A	L-86-Q-S1
20	13385-A	L-95-S1
21	13417-A	L-95-A-S1
22	13395-A	L-95-B-S1
23	13561-A	L-95-C-S1
25	13557-A	L-95-E-S1
26	13573-A	L-95-F-S1
28	13648-A	L-95-H-S1

NOTE: Parts are identical for all carburetors, except those identified by carburetor Ref. No.

Item No.	Part Number	Description	No. Req.
1		THROTTLE BODY – Not serviced separately	
2	93-T48-9 †	SEAL – Throttle Shaft	1
3	93-C116-33 †	RETAINER – Throttle Shaft Seal	1
4	93-CR-137-19	CUP PLUGS – 1/4"	2
5	93-C46-49	NEEDLE – Idle Adjustment	1
6	93-C111-155	SPRING – Idle Adjustment	1
7	93-T18S8-10	SCREW – Throttle Stop, #8-32 thread	1
8	93-C111-10	SPRING – Throttle Stop Screw	1
9	93-C85-129	FLOAT & HINGE ASSEMBLY	1
10	93-C120-75 †	AXLE – Float	1
11	93-C142-80 †	GASKET – Bowl to body	1
12	93-C3-132	FUEL BOWL for all except 5 and 6	1
	93-C3-132A	FUEL BOWL ASSEMBLY for 5, 6	1
		Includes: (Not illustrated)	
		93-C104-27 Drain valve assembly	1
		93-T75-3 "O" Ring seal	1
		93-C111-211 Spring	1
		93-CR115-13 Spring retainer	1
13	93-C21-219	PLATE – Throttle	1
14	93-T315S5-4	SCREW & WASHER throttle plate, 1/8"-40 thrd.	2
15	93-C108-278	LEVER & SHAFT ASSEMBLY – Choke For 1, 2, 3, 4, 5, 6, 7, 20, 21, 23, 26.	1
(Not Illust.)	93-C108-290	LEVER & SHAFT ASSY. – Choke for 8, 22	1
	93-C105-286	CHOKE SHAFT for 9, 10, 11, 12, 13, 25, 28	1
	93-CR106-3A	CHOKE LEVER for 9, 10, 11, 12, 13, 25	1
	93-T22-S8	LEVER NUT for 9, 10, 11, 12, 13, 25, 28	1
	93-T41-10	CHOKE LEVER LOCKWASHER For 9, 10, 11, 12, 13, 25, 28.	1
16	93-C102-147	PLATE – Choke 93-C101-89 (with poppet valve), replaced by 93-C102-147.	1
17	93-T315S5-4	SCREW – Choke Plate, 1/8"-40 thread	2

Item No.	Part Number	Description	No. Req.
18		MAIN JET ASSEMBLY – Fixed	
	93-C52-39-20	For carburetors 1, 2, 5, 9, 10	1
	93-C52-39-23	For 3, 4, 6, 7, 8, 11, 12, 13.	
	93-C52-39-29	For 20, 21, 22, 23, 25, 26, 28.	
18A	(Obsolete)	ADJUSTABLE MAIN JET ASSEMBLY Used on carburetors previous to the Letter designation following the above listed ZENITH carburetor assembly numbers.	
	93-C71-64-24	For carburetors 1, 2, 5, 9, 10.	
	93-C71-64-30	For 3, 4, 6, 7, 8, 11, 12, 13.	
	93-C71-64-34	For 20, 21, 22, 23.	
19	93-T56-23 †	WASHER – Main jet adjustment	1
20		FUEL VALVE & SEAT ASSEMBLY	
	93-C81-50-2-25 †	For carburetors 1, 3, 8, 9, 11, 21, 22, 26, 28	1
	93-C81-50-35 †	For 2, 4, 5, 6, 7, 10, 12, 13, 20, 23, 25	1
21	93-T56-80	GASKET – Fuel valve seat for 1, 3, 8, 9, 11, 21, 22, 26, 28	1
	93-T56-70	GASKET – For 2, 4, 5, 6, 7, 10, 12, 13, 20, 23, 25	1
22	QC-12-A †	FLANGE GASKET	1
23	93-C29-1463	THROTTLE SHAFT & LEVER ASSEMBLY For all except 7 and 13.	1
	93-C29-1565	THROTTLE SHAFT & LEVER ASSEMBLY For 7, 13.	1
24	93-C111-208	SPRING – Choke lever detent For 1, 2, 3, 4, 5, 6, 7, 20, 21, 23, 26.	1

†PARTS INCLUDED IN REPAIR KIT

LQ-44 Repair Kit for 1, 3, 8, 9, 11, 21, 22, 26, 28.

LQ-45 Repair Kit for 2, 4, 5, 6, 7, 10, 12, 13, 20, 23, 25.

FLYWHEEL ALTERNATOR

with solid state regulation

12 Volt – 10 amp and 25 amp Systems For
WISCONSIN Single, Two and Four Cylinder Engine Models

DESCRIPTION of Change

Beginning with engine serial No. 5188288, a new *two module* flywheel alternator system replaces the previously furnished three module system, that included an isolation diode module, and the two unit system without the isolation diode.

The *isolation diode* module was incorporated into the old system to eliminate battery discharge problems during shut down, cranking and idling.

INTERCHANGEABILITY

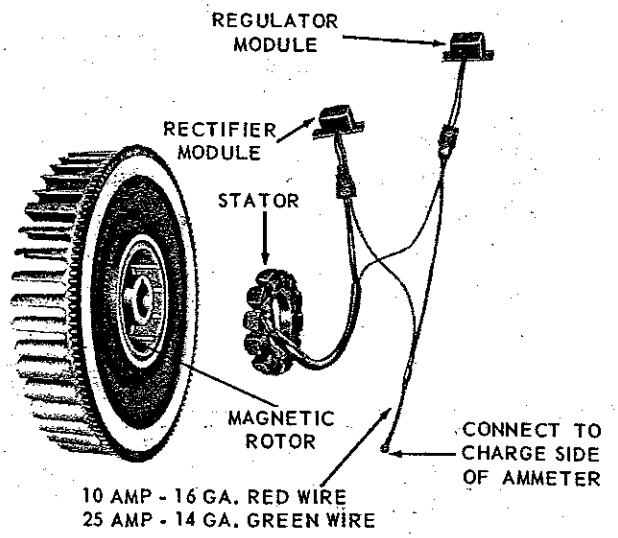
The *Regulator module* was not changed and is completely interchangeable between the new and old systems. The *Rectifier module* and *Stator assembly* have been modified to incorporate the advantages of an isolation diode without adding a third module. These new parts are *not* interchangeable with the old unless both rectifier and stator are replaced simultaneously. The new system has a *three prong* plug connector between the rectifier and stator – the old system has a two prong connector.

DESCRIPTION and OPERATION

This flywheel alternator is of the permanent magnet type and has *no brushes, commutator, belts* or *adjustments*. A series of coils (stator) is mounted to the engine gear cover, and the magnetic flux is provided by a permanent magnet in the flywheel which rotates around these stationary coils. Only four components make up this light weight space saving system; a *flywheel* with magnetic rotor, *stator, rectifier* module and *regulator* module.

The *center-tap* rectifier arrangement prevents damage to the alternator system when arc welding, because the winding acts as a choke and its inductance prevents the transient voltage from damaging the diodes.

Since the physical appearance of both 10 amp and 25 amp alternator systems are very similar, the *25 amp unit* can be distinguished from the *10 amp unit* by the ammeter calibrations, and by a *14 gage green wire* in place of a *16 gage red wire,* from the ammeter to the stator-regulator connector.



319423C-1

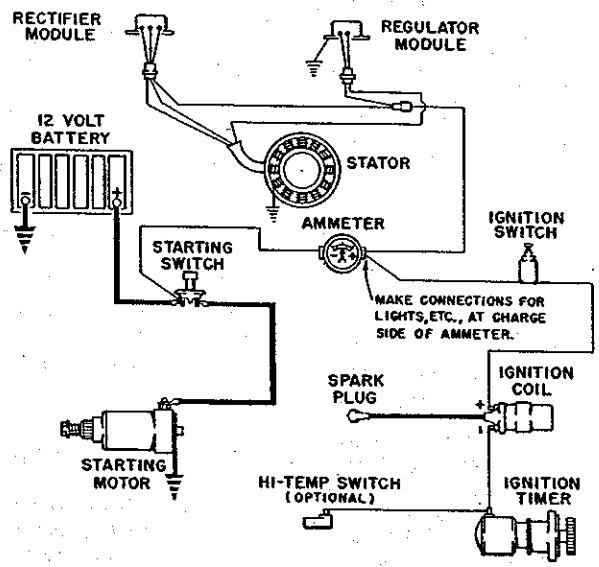
PRECAUTIONS to be exercised in the use of this flywheel alternator:

1. *Do Not* reverse battery connections. This is for a *negative ground* system only.
2. Connect booster batteries properly – positive to positive and negative to negative.
3. *Do Not* polarize the alternator.
4. *Do Not* ground any wires from stator or modules which terminate at connectors.
5. *Do Not* operate engine with battery disconnected from system.
6. Disconnect at least one battery lead if a battery charger is used.

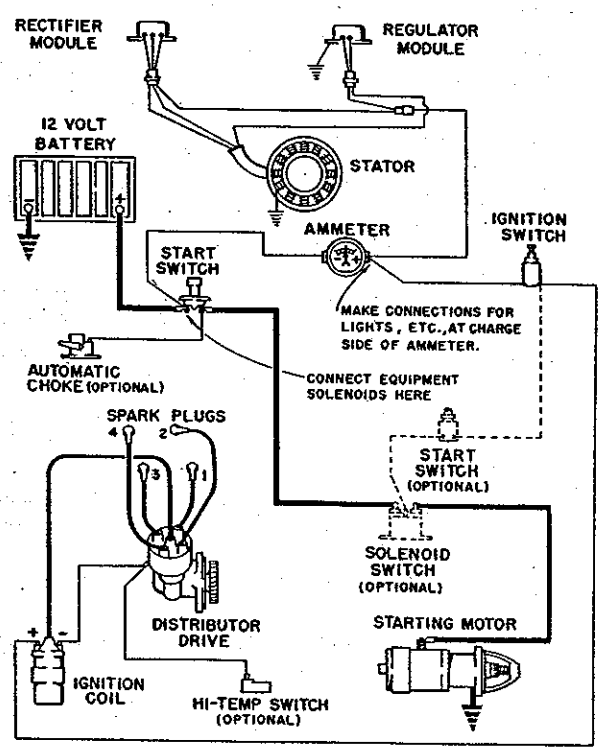
WIRING CIRCUIT

The *fool-proof* type connectors used prevent incorrect wiring from the stator to the rectifier and regulator modules. To disconnect plugs, squeeze outer ends of receptical and pull apart.

The rectifier is insulated from ground, but the stator and regulator module are grounded to the engine thru their mounting surface. The regulator module therefore should not be removed and mounted at some remote location. This is a ***negative ground circuit***. Connect ground strap from negative post of battery to starting motor flange, or good clean grounding surface on engine.



WIRING DIAGRAM
For Single Cylinder Models



WIRING DIAGRAM
For Two and Four Cylinder Models

SERVICE PROCEDURE:

Prior to electrical testing, a thorough visual inspection should be made to eliminate conditions that may be interpreted as a defected alternator. Examine leads for broken or loose connections, and make sure modules are securely mounted. The ***regulator module*** must be mounted to a metal surface for grounding purposes, while the ***rectifier module***, although insulated from ground, should be securely mounted for heat dissipation. The mounting surfaces must be clean and free of contaminants, oil, grease, etc. When assured that the problem is with the alternator, follow the tests outlined in *'Trouble Shooting'*.

TROUBLE SHOOTING

10 and 25 amp Flywheel Alternator

Problem: Battery Overcharge	Possible Cause & Remedy
Test 1.0 With engine running at full RPM, check battery voltage w/ DC Voltmeter.	
1.1 If voltage is over 15.0	1.1 Regulator not functioning properly. Replace module.
1.2 If voltage is under 15	1.2 Alternator functioning properly. Check battery condition.

Problem: Low/No Charge	Possible Cause & Remedy
Test 1.0 With engine running at full RPM, check battery voltage w/ DC meter. If voltage is greater than 14 volts, place * load on battery to reduce voltage below 14 volts.	
1.1 If the charge rate increases —	1.1 Alternator functioning properly. Battery was fully charged.
1.2 If the charge rate does not increase—	1.2 Proceed with Test 2.0.

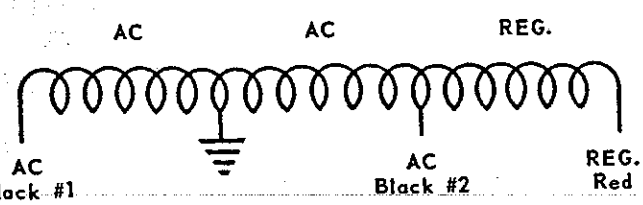
* Place as many 12 volt light bulbs across battery as required to reduce voltage below 14 volts.
A carbon pile resistor may be used in place of bulbs.

Problem: Low/No Charge	Possible Cause & Remedy
Test 2.0 Conditions and procedure the same as Test 1.0 except the regulator module is disconnected.	
2.1 If the charge rate increases —	2.1 Regulator was at fault. Replace regulator module.
2.2 If the charge rate does not increase—	2.2 Regulator is not at fault. Continue with Test 3.0.
Test 3.0 Test conditions and procedure the same as 1.0 except with new rectifier module plugged in.	
3.1 If the charge rate increases —	3.1 Rectifier module at fault. Permanently install new rectifier module.
3.2 If the charge rate does not increase—	3.2 Continue with Test 4.0.
Test 4.0 With engine stopped, unplug all connectors between modules and stator. Start engine and run at 2400 RPM. With AC voltmeter check voltage between each of the black stator leads and ground.	
4.1 If one of the two voltages is zero or they are over 10% apart —	4.1 The stator is faulty and should be replaced.

Further testing can be done on the component level with the engine stopped, and the stator and module connections including output lead uncoupled.

TO CHECK STATOR

Use an ohmmeter and check continuity as follows:



NOTE: Wire numbers indicated for probe connections are for convenience only and are not indicated on the connectors.

For 10 amp unit STATOR

METER PROBE CONNECTIONS +	–	METER VALUE	REPLACE STATOR
Black #1	Black #2	APPROX. 2.0 ohms	0 Indicates Short Circuit.
Black #1	Eng. Gnd.	APPROX. 1.0 ohm	
Black #2	Eng. Gnd.	APPROX. 1.0 ohm	
Black #1	Red	APPROX. 3.0 ohms	∞ Indicates Open Circuit.
Black #2	Red	APPROX. 1.0 ohm	

For 25 amp unit STATOR

METER PROBE CONNECTIONS +	–	METER VALUE	REPLACE STATOR
Black #1	Black #2	APPROX. 0.40 ohm	
Black #1	Eng. Gnd.	APPROX. 0.20 ohm	∞ Indicates Open Circuit.
Black #2	Eng. Gnd.	APPROX. 0.20 ohm	
Black #1	Red	APPROX. 3.20 ohms	
Black #2	Red	APPROX. 2.80 ohms	

STATOR IDENTIFICATION:
10 amp — 3/8" wide flange 25 amp — 5/8" wide flange

TO CHECK RECTIFIER MODULE, Part No. YJ-68

The same module is used for both the *10 amp* and *25 amp* systems. It can be distinguished from the *regulator* by the three lead wires instead of two and the identification decal. Use an ohmmeter and *static check* continuity as follows:

METER PROBE CONNECTIONS +	–	METER INDICATION
White lead	Black #1	No Continuity
Black #1	White lead	Continuity
White lead	Black #2	No Continuity
Black #2	White lead	Continuity

Note: Continuity shall be in one direction only. If readings are not as indicated, replace module.

TO CHECK REGULATOR MODULE, Part No. YJ-60

The same Regulator module is used for both the *10 amp* and *25 amp* systems. Use an Ohmmeter and *static check* as follows:

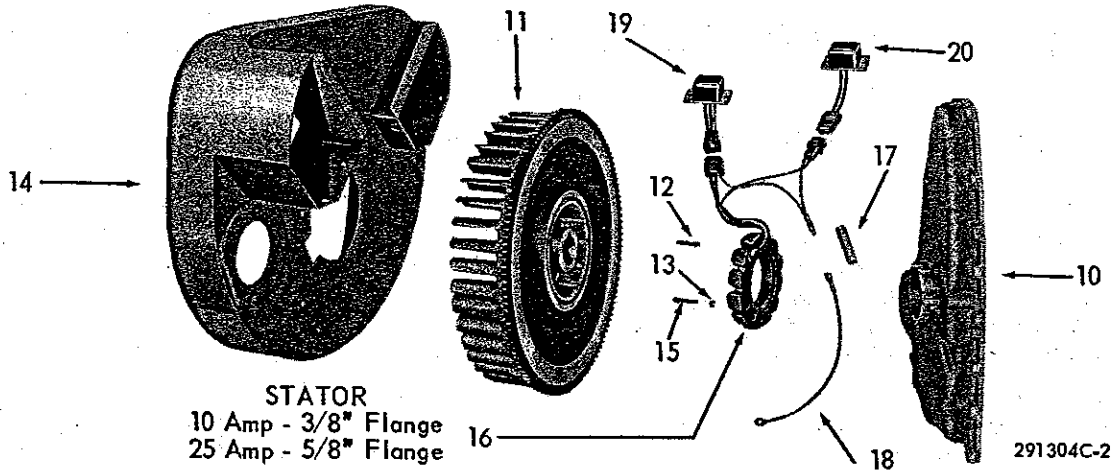
METER PROBE CONNECTIONS +	–	METER INDICATION	REPLACE MODULE
Red	Eng. Gnd.	No Continuity	Continuity
Eng. Gnd.	Red		
Red	Black		
Black	Red		
Black	Eng. Gnd.		
Eng. Gnd.	Black	Continuity	No Continuity

AMP OUTPUT regulated by engine speed

MODEL	MAXIMUM ENGINE SPEED	10 AMP SYSTEM	25 AMP SYSTEM
S-12D, S-14D AENL, TJD	3600 RPM	10 amps	25 amps
AGND	3200 RPM	10 amps	23 amps
VH4D	2800 RPM	9 amps	20 amps
VG4D	2400 RPM	8 amps	17 amps

For Engines beginning with Serial Number 5188288

SERVICE PARTS LIST: The following items are in addition to, or replace similar parts found in the parts manual of each specific engine model. The parts illustration is for the **VG4D** engine, but can be applied to all models.



STATOR
10 Amp - 3/8" Flange
25 Amp - 5/8" Flange

REF. NO.	DESCRIPTION	NO. REQ.	PART NUMBER PER ENGINE MODEL					
			AENL	AGND	S-10D, S-12D, S-14D	THD, TJD	VF4D, VH4D	VG4D
10	GEAR COVER ASSEMBLY BEARING RETAINER PLATE – flywheel end	1 1	BG-344-S1	BG-343-S1	BG-350A-S1	BD-103J-S1	BD-100K-4-S1	BD-101B-S1
* 11	FLYWHEEL with rotor and ring gear For 10 amp alternator circuit For 25 amp alternator circuit	 1 1	 N-104-5 N-104-9	 N-103-5 N-103-9	 N-105-2 N-105A-3	 N-102-5 N-102-9	 N-101-6 N-101-10	 N-100-5 N-100-9
12	ROLL PIN – For 10 amp stator For 25 amp stator	2 2	PA-336 PA-362	PA-340 PA-340		PA-368 PA-340	PA-368 PA-340	PA-368 PA-340
13	LOCKWASHER, No. 10, for stator mt'g.	4	PE-14	PE-14	PE-14	PE-14	PE-14	PE-14
* 14	FLYWHEEL SHROUD	1	SE-154-A	SE-217-H	SE-289-A w/ SE-301B-1 Pl.	SE-135-AT	SE-74-YA	SE-124-AM
15	SCREW – For 10 amp stator mt'g. For 25 amp stator mt'g.	4 4	XB-114 XB-110	XB-113 XB-106	XB-113 XB-106	XB-113 XB-106	XB-113 XB-106	XB-113 XB-106
16	STATOR ASSEMBLY – For 10 amp circuit For 25 amp circuit	1 1	YB-81 YB-82	YB-81 YB-82	YB-81 YB-82	YB-81 YB-82	YB-81 YB-82	YB-81 YB-82
17	INSULATOR – ammeter wire connector	1	YD-350	YD-350	YD-350	YD-350	YD-350	YD-350
18	WIRE ASSEMBLY – stator plug to ammeter For 10 amp stator For 25 amp stator	 1 1	 YL-381-6 YL-380-6	 YL-381-6 YL-380-6	 YL-381-18 YL-380-18	 YL-381-14 YL-380-14	 YL-381-18 YL-380-18	 YL-381-22 YL-380-22
19	RECTIFIER MODULE – For 10 and 25 amp	1	YJ-68	YJ-68	YJ-68	YJ-68	YJ-68	YJ-68
20	REGULATOR MODULE – For 10 amp and 25 amp circuit	1	YJ-60	YJ-60	YJ-60	YJ-60	YJ-60	YJ-60

PARTS REQUIRED – NOT ILLUSTRATED

* CRANKCASE	1	AA-91B-10	BA-54-20				
ENGINE BASE	1	BB-128A-5					
CLIP for stator wires	1	PG-630-1	PG-430				
GROMMET for stator wires	1			PH-198B-1			
GASKET for bearing retainer plate	1	QD-833					
NUT, #10-32, for mounting modules	4	PD-115	PD-115	PD-115	PD-115	PD-115	PD-115
LOCKWASHER, #10 I.E.T., for mounting modules	4	PE-78-A	PE-78-A	PE-78-A	PE-78-A	PE-78-A	PE-78-A
SCREW, #10-32, for mounting modules	4	XA-7	XA-7	XA-7	XA-8	XA-8	XA-8

* **NOTE:** Because of the available variations in Flywheels, Flywheel Shrouds and Crankcases – give Engine Model, Specification and Serial Numbers when ordering.

NEW! WISCONSIN Solid State Breakerless Ignition

WITH EXTERNALLY MOUNTED IGNITION MODULE

EYC 112 For Engine Model TRA-12D

DESCRIPTION

Solid state ***breakerless ignition*** was designed to eliminate ignition maintenance and improve starting by electronically controlling the spark. A ***magnet ring, ignition coil, stator*** and ***ignition module*** are the basic parts of the solid state ignition system.

No timing adjustment or ***breaker point setting*** is necessary. The only mechanically moving part is the magnet ring, a component part of the flywheel.

OPERATION

Alternating current is generated as the flywheel ***magnet ring*** passes over the coil poles on ***stator*** plate. The current is then directed through a ***diode rectifier,*** an electronic device that allows the current to flow in only one direction, thus changing the alternating current to direct current. The direct current then continues on to a ***capacitor*** where it is stored momentarily. As the flywheel continues to turn, the permanent ***magnet*** in the ring passes over a ***trigger coil*** which generates a small amount of current to the ***solid state switch*** (Silicon Controlled Rectifier). The SCR is triggered by this current and releases the stored up energy in the capacitor to the primary windings of the ***ignition coil*** where a high voltage is induced into the secondary windings and on into the ***spark plug.***

The spark timing is permanently established by the position of the trigger coil in the stator plate, relative to the flywheel keyway. *See illustration, Page 2.*

SERVICE REPLACEMENT

Beginning with engine serial No. 5,626,521 for model TRA-12D, and serial No. 5,635,132 for models S-12D, S-14D, the Single unit Stator Assembly is replaced by a Two Unit system consisting of a ***stator*** and separate ***ignition module.*** The Ignition Module contains the ***rectifier, capacitor*** and SCR ***switch,*** and is externally mounted to the shroud for service convenience.

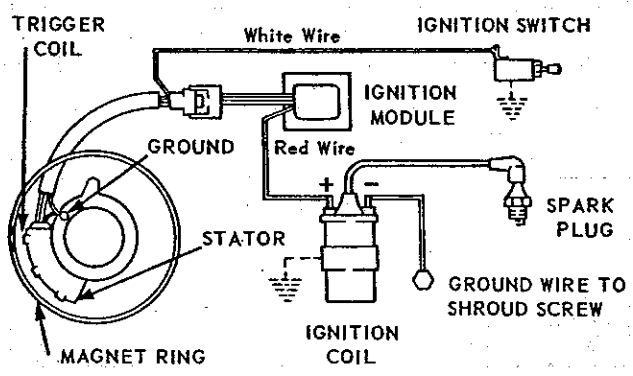


Fig. 1 Wiring Diagram

EYC 113 For Engine Models S-12D, S-14D

The Two Unit system is completely ***interchangeable*** with the Single Unit system and is mounted and wired per *Fig. 1, Fig. 2* and *Service Parts Illustration Page 2.*

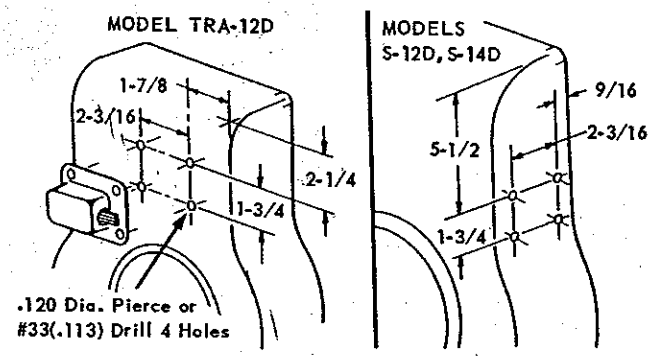


Fig. 2 Ignition Module Mounting

IGNITION TIMING – SPARK ADVANCE

The accuracy of the spark advance timing can be checked with a neon timing lamp and 12 volt battery. Timing, however, ***cannot*** be changed, since it is electronically controlled by the trigger coil on the stator plate. Connect lamp leads to positive terminal of battery, spark plug terminal and ground.

The spark is retarded 10 to 12° before top dead center for starting, and automatically advances as engine speed increases. The ***running spark advance*** (2500 R.P.M. and over) is **20°.**

Model TRA-12D: The flywheel is marked with a groove to indicate the 20° running spark advance. With the engine operating at 2500 R.P.M. or over, the ***timing mark*** (groove) on rim of flywheel will appear ***in line with timing pointer, left view, Fig. 3.***

Models S-12D and S-14D: The timing groove on the rim of flywheel, *Fig. 3 (right),* is marked for the 18° magneto and battery ignition advance, and timing can be checked to this mark for solid state ignition while the engine is running at 1000 R.P.M. When checking the ***20° running spark advance,*** at 2500 R.P.M. or over, the ***timing mark*** (groove) will appear about ***1/8 inch above the timing pointer.***

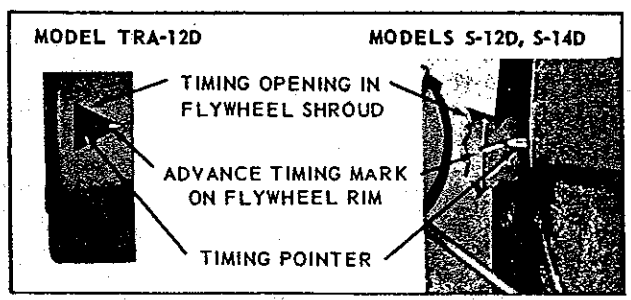


Fig. 3 Ignition Timing

IGNITION FAILURE

In the event of malfunction of the ignition system, check the following:

Broken, frayed, loose or disconnected ignition wires.

Faulty spark plug – wet, dirty, insulator broken or incorrect plug gap.

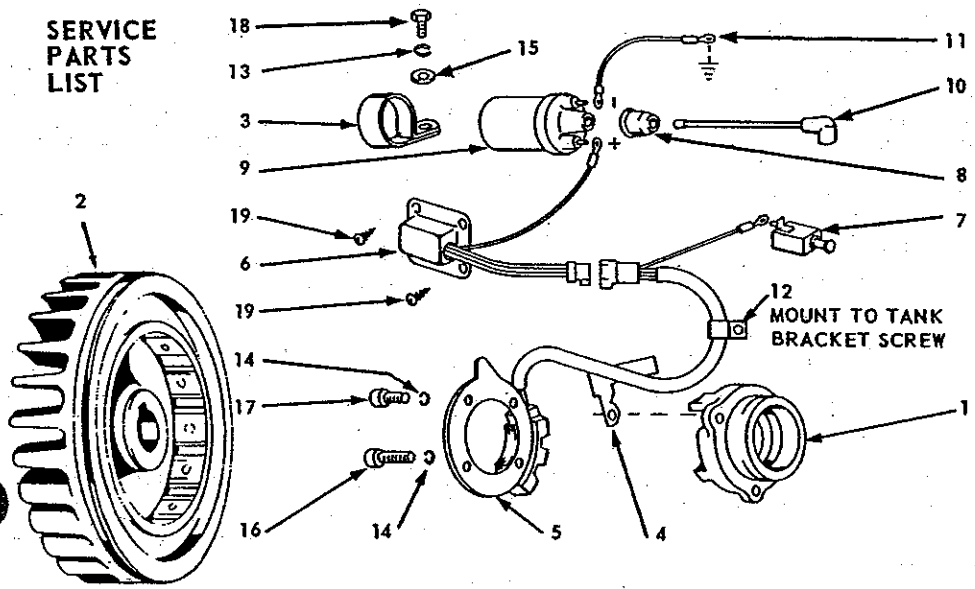
Check for spark – remove ignition cable from spark plug and wedge a piece of stiff bare wire into the terminal boot and leave one end of the bare wire extended. With the extended wire held about 1/8 inch from cylinder head shroud, turn engine over by means of the starter sheave or starting motor and observe the spark discharge which should occur during the cranking cycle. A weak spark or no spark at all will indicate a defective *stator* or *ignition module*.

First, plug a *new ignition module* into the circuit, if this does not correct the malfunction, then replace the *stator*.

It is unlikely that the ignition coil or ignition switch would become defective, however these parts can be checked with an ohmmeter. The ignition switch should indicate O ohms in the closed position and ∞ in the open position. The ignition coil primary winding resistance is so low that it is inadvisable to try to measure it. The secondary winding, measured from the coil output to the coil case or ground, will indicate between 4000 and 6000 ohms. These static ohmmeter readings should be made with no external connections to the ignition switch or coil.

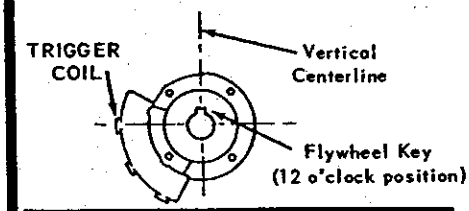
Stator **must be mounted** with the coils in a position relative to the vertical centerline of engine.

SERVICE PARTS LIST

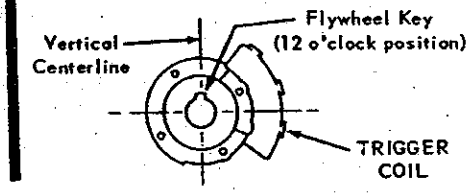


STATOR MOUNTING
(facing flywheel end of engine)

Model TRA-12D



Models S-12D, S-14D



Ref. No.	PART NUMBER Model TRA-12D	PART NUMBER Models S-12D, S-14D	Description	No. Req.
1	BG-351-S1	BG-350A-S1	**BEARING PLATE ASSEMBLY,** flywheel end (rep'l. std.)	1
2	N-106	N-105-4	**FLYWHEEL** with magnet ring (rep'l. std.)	1
		N-105-3	**FLYWHEEL** with magnet ring and **GH-48** ring gear	
3	PG-556	PG-556-2	**STRAP** for ignition coil	1
4	PG-1144A	PG-1144A	**CLIP** for stator wire	1
5	YB-83	YB-83	**STATOR ASSEMBLY** YB-80 Previous to Serial No. 5626521-Replaced by **YB 83 S1** Stator and Module Kit.	1
6	YJ-69	YJ-69	**IGNITION MODULE**	1
7	YC-9F-S1	YC-9F-S1	**IGNITION SWITCH ASSEMBLY**	1
8	YD-20A	YD-20A	**RUBBER NIPPLE** for ignition coil cable	1
9	YF-37	YF-37	**IGNITION COIL**	1
10	YL-339-6	YL-339-6	**IGNITION CABLE,** coil to spark plug	1
11	YL-355-5	YL-355-5	**WIRE ASSEMBLY,** coil to ground (top shroud screw)	1

Ref. No.	PART NUMBER Model TRA-12D	PART NUMBER Models S-12D, S-14D	Description	No. Req.
12	PG-630-1	—	**CLIP,** stator harness support to tank bracket screw	1
			STANDARD HARDWARE	
13	PE-4 (5/16")	PE-5 (3/8")	**LOCKWASHER,** spring lock, for mounting coil	1
14	PE-113	PE-113	**LOCKWASHER,** No. 10 internal tooth for mounting stator plate	4
15	PH-209B (5/16")	PH-513 (3/8")	**PLAIN WASHER,** for mounting coil	1
16	XB-113	XB-113	**SCREW,** 10-32 x 3/4" long, stator plate – wide flange section	1
17	XB-115	XB-115	**SCREW,** 10-32 x 1/2" long (socket head), stator plate mounting	3
18	XD-162 (5/16"-18 x 2-1/2)	PC-588 (std. stud)	**SCREW,** hexagon head, for mounting coil	1
19	XA-73	XA-73	**SCREW,** No. 7x3/8 lg. self-tap. for ignition module mounting	4

Printed in U.S.A.

WALBRO CARBURETOR Model LMH

L-106 series

For WISCONSIN Engine Models S-12D and S-14D

L106 (LMH-16) Fixed Jet

L106A (LMH-18) Adjustable Jet

NOTE: The L106A Adjustable Jet carburetor replaces the L106 Fixed Jet carburetor and is interchangeable for Production and Service requirements. An Adjustable Jet is included in the LQ54A Repair Kit so that Fixed Jet carburetors can be converted when carburetor overhaul becomes necessary.

OPERATION, Fig. 1

Fuel from supply tank flows around float valve seat (1) through inlet valve (2) and into fuel bowl (3). As the level in fuel bowl increases, the float (4) rises, shutting off fuel supply by forcing inlet valve (2) into seat. As fuel is being used, the float lowers and allows additional fuel to enter bowl through the inlet valve.

Fuel from the bowl enters the main metering jet (5), then up to the main nozzle (7). At full throttle, fuel passes through main nozzle (7) where it is mixed with air from nozzle air bleed (8) and enters into venturi (9). At low idle speeds, fuel flows through the idle jet (10), up the idle channel (11), around idle adjustment (12) and into the emulsion channel (13), where it is mixed with air entering the idle air bleed. This air-fuel mixture then enters the throttle bore of carburetor through the outer idle hole. As the throttle is gradually opened, the inner idle hole starts to feed the throttle bore, and assists the main nozzle (7) in taking over the full throttle range.

When starting, the choke valve is closed and the throttle valve (14) is opened causing an abnormally high suction on both idle and main systems, thus providing a rich mixture for starting.

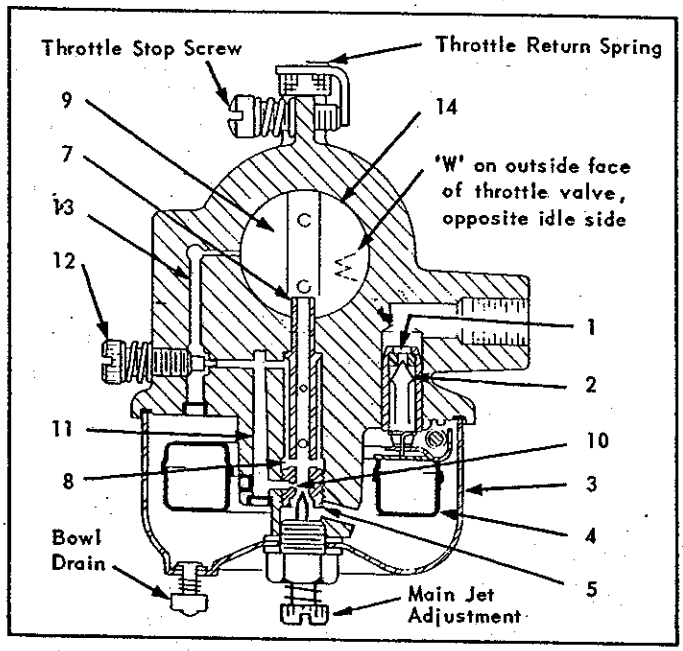


Fig. 1

CARBURETOR TROUBLES – CAUSES AND REMEDIES

Dirt is the major cause of field service carburetor problems: Service air filter daily – keep carburetor and linkage free of dirt.

FUEL LEAKS FROM CARBURETOR

Float level set too high: Remove bowl, invert carburetor and set float flush with bowl casting rim. See Fig. 2 and Float Setting Instructions, page 2.

Dirt under inlet valve: Remove inlet valve, clean seat by rinsing in clean fuel and blow off with compressed air.

Bowl vent plugged: Remove bowl and blow clean with compressed air.

Collapsed float, caused by blowing assembled carburetor with compressed air: Replace float.

Carburetor gummed from storage - float stuck: Remove fuel bowl and clean.

ENGINE SMOKES AND RUNS RICH

Dirty air filter: Clean per instructions.

Improper adjustment: Set Idle Needle 1 turn open from seat, Main Jet Adjustment 1-1/4 turns open. Refer to Adjustment Instruction, page 2.

Bowl retainer gasket leaks: Tighten securely, or replace.

Air bleed in carburetor plugged: Remove fuel bowl and idle needle. Clean thoroughly with compressed air.

ENGINE RUNS LEAN

Improper adjustment: Set Idle Needle 1 turn open from seat, Main Jet Adjustment 1-1/4 turns open. Refer to Adjustment Instructions, page 2.

Idle holes plugged. Dirt in fuel delivery channels: Remove fuel bowl and idle needle. Clean thoroughly with compressed air.

Low fuel level: Set float flush with bowl casting rim. See Fig. 2 and Float Setting Instructions page 2.

Fuel tank filter plugged: Remove and clean.

ENGINE STARTS HARD

Improper adjustment: Set Idle Needle 1 turn open from seat, Main Jet Adjustment 1-1/4 turns open. Refer to Adjustment Instructions page 2.

No fuel in carburetor: Check carburetor drain valve. Clean tank, filter and carburetor.

Choke valve not closing: Check linkage for proper travel.

GOVERNOR SURGE

Governor sticking: Check linkage for binding.

Throttle shaft and valve binding: Remove and replace shaft if worn. Clean carburetor body and reassemble throttle shaft. Push assembly into carburetor body as far as possible.

DISASSEMBLY

Before disassembling: Clean outside of carburetor from all foreign material.

CAUTION: When cleaning a completely assembled carburetor do not blow with compressed air, you may collapse the float.

DO NOT soak or boil carburetor or body in chemical solutions. Idle channel is permanently sealed – solution will seep in and cause corrosion.

Disassemble parts in the following sequence; Refer to exploded view, page 2.

1. Adjustable Jet screw ..(19)
2. Retainer gasket .....(13)
3. Fuel bowl .....(4)
4. Retainer gasket .....(14)
5. Fuel bowl gasket .....(12)
6. Float shaft .....(10)
7. Float and spring .... (9, 24)
8. Fuel valve-Spring .....(29)
9. Idle needle assembly ..(25)
10. Throttle stop screw .....(17)
11. Choke valve screws ...(18)
12. Choke valve .....(8)
13. Choke shaft .....(7)
14. Throttle valve screws ..(18)
15. Throttle valve .....(6)
16. Throttle shaft .....(5)
17. Throttle shaft seal .....(28)
18. Throttle return spring ..(23)

CAUTION: Do not remove nozzle (Ref. 11) from carburetor, unless replacing it with a new service nozzle - idle holes will not line up. Tighten 30 to 40 inch pounds torque.

Viton seat for fuel valve can be replaced if necessary. Pull out by means of a small hook on the end of a wire paper clip.

Clean throttle shaft seal in gasoline and dry. Re-oil with No. 30 weight oil or equivalent.

REASSEMBLY

Wash all other parts with carburetor cleaning solvent and blow off with compressed air.

Install choke shaft and valve. Mount valve with part number toward the outside with the valve in a closed position.

Mount throttle valve, with letter "W" on valve facing outward and opposite idle side of carburetor. Make certain valve plate does not bind when opening and closing throttle. Be sure that return spring tension holds throttle valve closed.

Viton fuel valve seat; press in place with groove end toward seat hole.

FLOAT SETTING

Mount all other parts in reverse order of disassembly. Before mounting fuel bowl, check float setting per illustration, Fig. 2. Bend adjustment tab to raise or lower fuel level. Mount float support spring as shown.

ADJUSTMENTS

Set Idle Needle 1 turn open from seat, and Main Jet Adjustment 1-1/4 turns open.

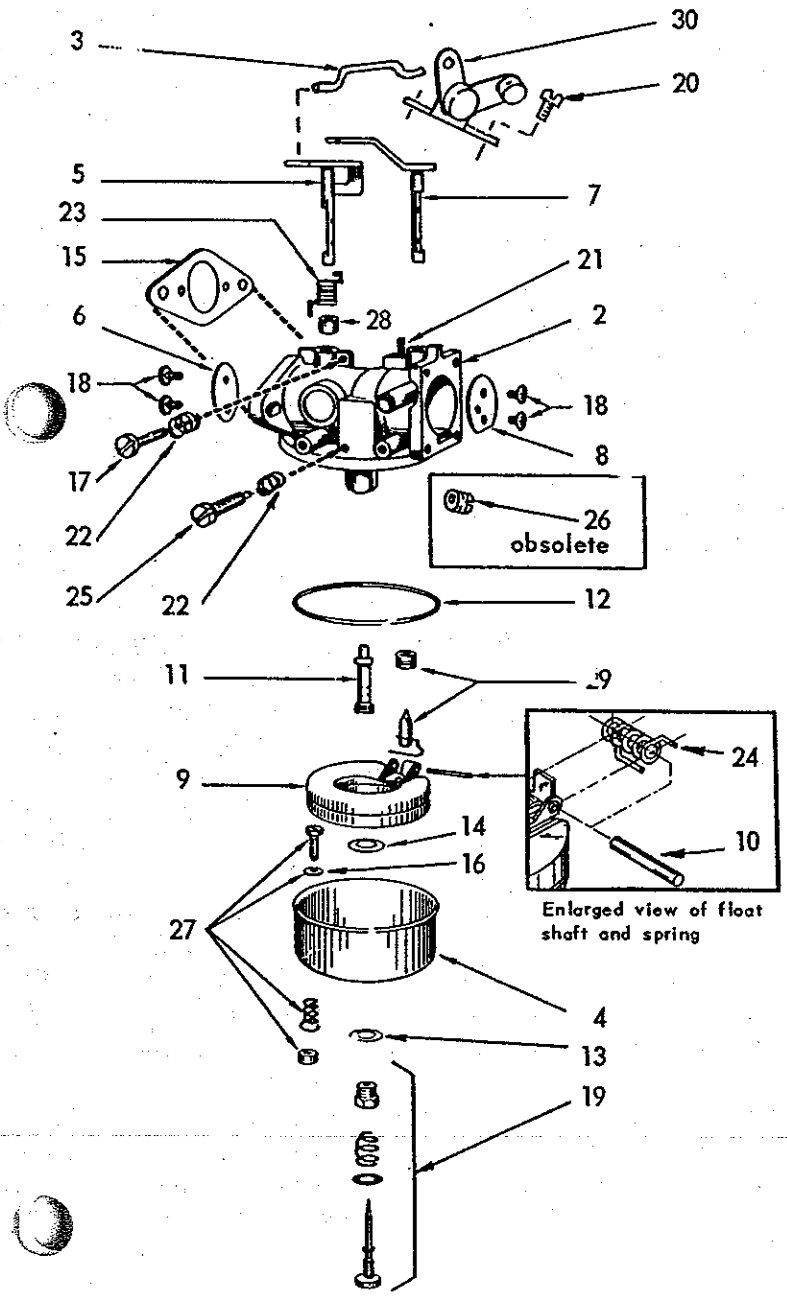


Fig. 3, EXPLODED VIEW

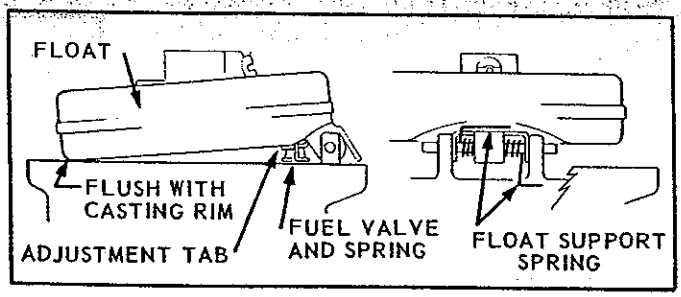


Fig. 2, FLOAT SETTING

Turn throttle stop screw in until throttle valve is slightly open.

Adjust idle mixture for smooth low running with throttle valve closed and engine running at about 1200 R.P.M.

Adjust throttle stop screw for the desired low idle speed.

Main Jet Adjustment: Turn adjustment until engine runs smooth at operating speed. If engine hesitates when speeding up from idle to high speed, open adjustment 1/8 to 1/4 turn at a time until hesitation is eliminated.

SERVICE PARTS LIST — WISCONSIN L 106, L 106 A

SERVICE PARTS ARE THE SAME FOR BOTH CARBURETORS. Remove Fixed Main Jet (26), as used in L 106, and install Adjustable Main Jet (19) in place of fuel bowl retainer screw, thus converting to L 106 A.

Item No.	Part Number	Description	Qty.
2		**THROTTLE BODY** (not serviced)	1
3	83-19-19	**LINK** — throttle	1
4	83-20-513	**FUEL BOWL** with drain assembly	1
5	83-30-796	**THROTTLE SHAFT** assy—Incl. Items 23, 28	1
6	83-34-18	**VALVE** — throttle	1
7	83-40-693	**CHOKE SHAFT** — assembly	1
8	83-62-70	**VALVE** — choke	1
9	83-75-502	**FLOAT** — assembly	1
10	†	**SHAFT** — float	1
11	83-86-174	**NOZZLE** — main (service)	1
12	*	**GASKET** — fuel bowl	1
13	*	**GASKET** — bowl retainer — outer (red)	1
14	*	**GASKET** — bowl retainer — inner (black)	1
15	*	**GASKET** — flange	1
16	*	**GASKET** — bowl drain	1
17	83-96-18	**SCREW** — throttle stop, 10-32 x 5/8 Fill. hd.	1
18	83-96-263	**SCREW** — throttle and choke valve No. 6-32 x 3/16 Pan head	4
19	†	**ADJUSTABLE MAIN JET** (L 106 A)	1
20	83-96-549	**SCREW** — swivel bracket retainer No. 4-40 NC x 5/16 Pan head	2
21	83-98-13	**SPRING** — choke stop	1
22	†	**SPRING** — idle needle, and stop (1 in Kit)	2
23	83-98-335	**SPRING** — throttle return	1
24	†	**SPRING** — float support	1
25	†	**NEEDLE** — idle	1
26	(obsolete)	**JET** — main fuel (L 106). **Use Item 19** Included in LQ 54 A Repair Kit	1
27	83-154-503	**KIT** — bowl drain	1
28	83-156-18	**SEAL** — throttle shaft	1
29	†	**FUEL VALVE** and **VITON SEAT**	1
30	83-167-514	**BRACKET** — assembly with swivel	1
	† Q 46	**GASKET SET** (also included in Repair Kit) * Parts included in Q 46 Gasket Set	
	LQ 54 A	**REPAIR KIT** (Replaces LQ 54) † Parts included in LQ 54 A Repair Kit	

LIMITED ENGINE WARRANTY

WISCONSIN MOTORS, LLC (herein "Wisconsin"), warrants to the original retail purchaser (herein "Purchaser"), that each new Wisconsin Motors, L. L. C. engine or service engine assembly (herein "engine(s)") will be free from defects in material and workmanship for a period one (1) year after delivery, or for up to 2,000 hours of operation by the Purchaser, whichever occurs first. Wisconsin's obligation under this Limited Warranty shall be limited, at Wisconsin's option, to repairing or replacing the engine, which upon examination is found to be defective in material or workmanship. The repair or replacement of any engine under this Limited Warranty shall not extend the term of the engine warranty beyond the original term as set forth above.

All repairs qualifying under this Limited Warranty must be performed by Wisconsin or one of its authorized Distributors or Warranty Stations. In the event that any engine is found to be defective during the warranty period, the Purchaser shall notify Wisconsin, or one of its authorized Distributors or Warranty Stations of any claimed defect within thirty (30) days after such defect is discovered. The engine claimed to be defective must then be promptly delivered to an authorized Distributor or Warranty Station for inspection, repair or replacement. The Purchaser is responsible for all transportation charges in connection with any covered warranty work. In connection with a covered warranty repair or replacement, Wisconsin may, in its sole discretion assume responsibility for a portion of the labor necessary for removal and reinstallation of an engine. However, the Purchaser shall be responsible for other labor charges not assumed by Wisconsin and for all labor charges and travel expenses incurred in connection with travel to and from Purchaser's location.

This Limited Warranty shall not apply to:

A. Defective conditions caused, in whole or in part, by an engine which has, in Wisconsin's opinion been subjected to negligence in use, misuse, abuse, improper installation or application, improper maintenance or repair, alteration, repair or alteration by an unauthorized repair facility, over-speeding, casualty or improper storage, transportation, or handling; and

B. Engine tune-ups and normal maintenance service as specified in the Operator's Manual, including, but not limited to, valve adjustment, normal replacement of service items, fuel and lubricating oils, fan belts, anti-freeze, etc.

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