

## **IMPORTANT**

### **STARTING AND OPERATING OF NEW ENGINES**

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

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

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

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

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

### **THEREFORE READ INSTRUCTIONS CAREFULLY**

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

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

Extra copies of this manual are \$1.00 each.

**WISCONSIN MOTOR CORPORATION**  
MILWAUKEE, WISCONSIN 53246



# **WISCONSIN**

## *Air Cooled*

# **HEAVY DUTY ENGINES**

**INSTRUCTION BOOK AND PARTS LIST**

**MODELS TRA-10D, TR-10D**

ISSUE MM-302-C

WORLD'S LARGEST BUILDERS OF HEAVY DUTY AIR COOLED ENGINES

**BOOK OF INSTRUCTIONS**

**WISCONSIN** *Air-Cooled*  
**SINGLE CYLINDER ENGINES**

**MODEL TRA-10D**

3-1/8" Bore - 2-7/8" Stroke

22.05 cu. in. Displacement

**MODEL TR-10D**

3-1/8" Bore - 2-5/8" Stroke

20.2 cu. in. Displacement



**WISCONSIN MOTOR CORPORATION**  
Milwaukee, Wisconsin 53246, U. S. A.



# INTRODUCTION

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

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

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

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

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

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

## SAFETY PRECAUTIONS

Precaution is the best insurance against an accident.

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

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

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

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

# INDEX

	PAGE		PAGE
Air Cleaner .....	10	Governor - Description .....	7
Battery Ignition .....	11	Governor - Operation .....	23
Breaker Point Adjustment .....	11	Horsepower .....	7
Breather - Crankcase .....	10	Ignition (Description) .....	7
Carburetor - Adjustment .....	9	Ignition Spark .....	10
Carburetor Repair - See Manufacturer's Bulletin in Back of Manual.		Lubrication .....	7
Compression .....	15	Lubrication System .....	7
Compression Release .....	7-22	Magneto Ignition .....	11
Compression - Restoring .....	14	Magneto Service Instructions .....	12
Cooling .....	7	Oil - Grade of and Classification .....	8
Cross Section of Engine .....	6	Parts List Section .....	25
Disassembly and Reassembly .....	16	Rotation .....	7
Breaker Push Pin and Bushing .....	22	Safety Precautions .....	2
Camshaft and Valve Tappets .....	22	Service Station Directory - See Back of Manual.	
Carburetor and Air Cleaner .....	17	Spark Plug .....	14
Connecting Rod and Piston .....	20	Starting and Operating Instructions .....	7
Crankshaft .....	23	Starting - Procedure .....	8
Cylinder .....	23	Starting and Operation of New Engine (See Inside of Front Cover).	
Cylinder Head and Spark Plug .....	17	Stopping Engine .....	9
Flywheel .....	19	Storage of Engine for Winter .....	14
Flywheel Shroud .....	17	Testing Rebuilt Engine .....	16
Fuel Tank .....	17	Timing .....	11
Gear Cover .....	20	Timing Marks .....	22
Piston, Ring and Rod Clearance Chart .....	21	Troubles - Causes and Remedies .....	15
Piston Rings .....	21	Backfires Through Carburetor .....	16
Starter Sheave .....	17	Ignition .....	15
Stator Plate .....	23	Knocks .....	16
Valves and Seat Insert .....	18	Misfires .....	16
Valve Guides .....	18	Overheats .....	16
End Play .....	23	Starting Difficulties .....	15
Engine Illustration .....	4-5	Stops .....	16
Engine Speed .....	24	Surges or Gallops .....	16
Electrical Equipment Wiring Circuits and Motor-Generator .....	13	Valves - Grinding and Tolerance Chart .....	18
Fuel .....	8	Tappet Adjustment .....	19
Fuel Pump .....	8	Warm-Up Period - Overspeeding .....	9
General Design .....	7		
Governor Adjustment .....	24		



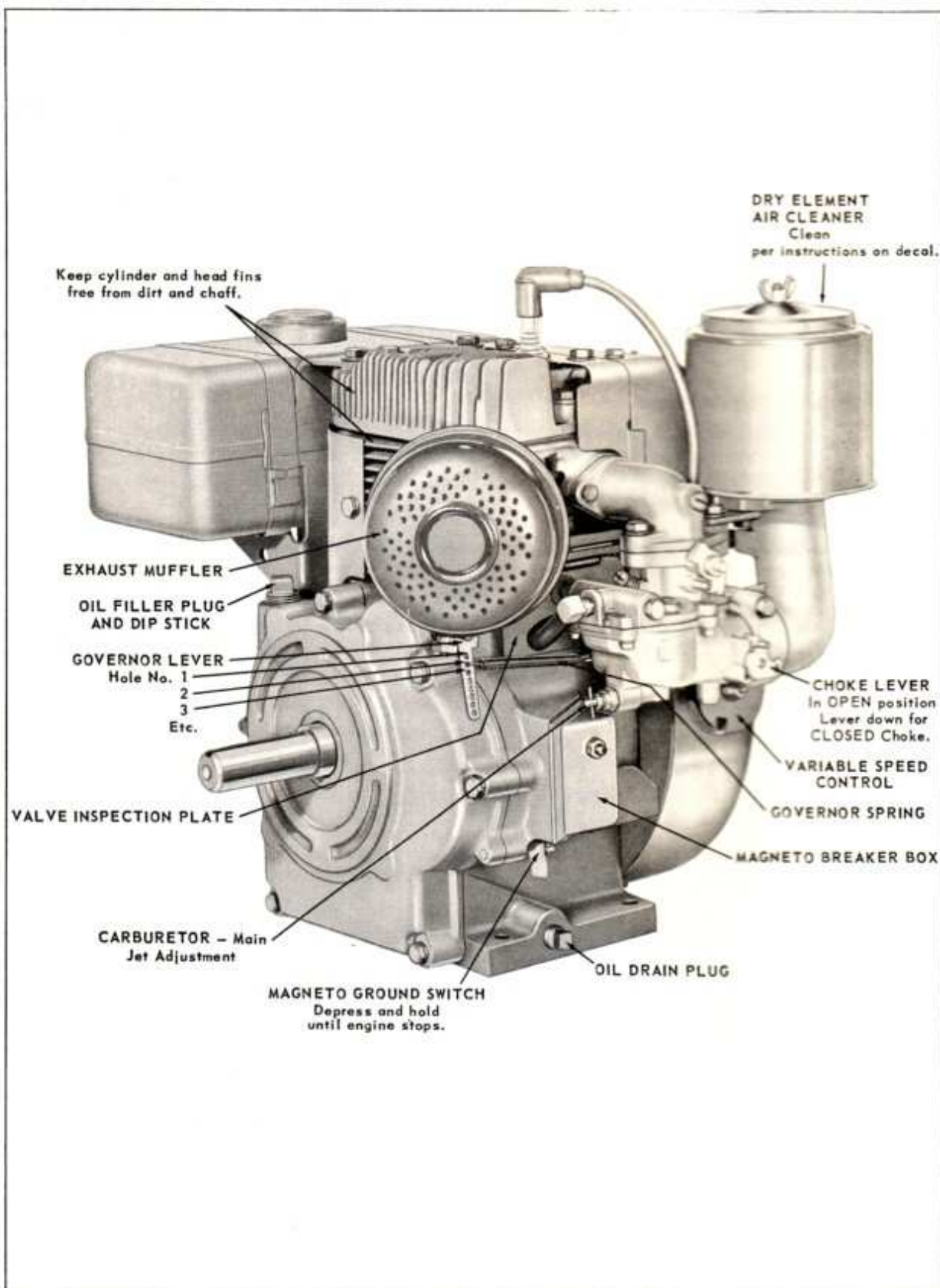


Fig. 1  
TAKE-OFF (rear) and LEFT HAND SIDE VIEW of ENGINE

289860C

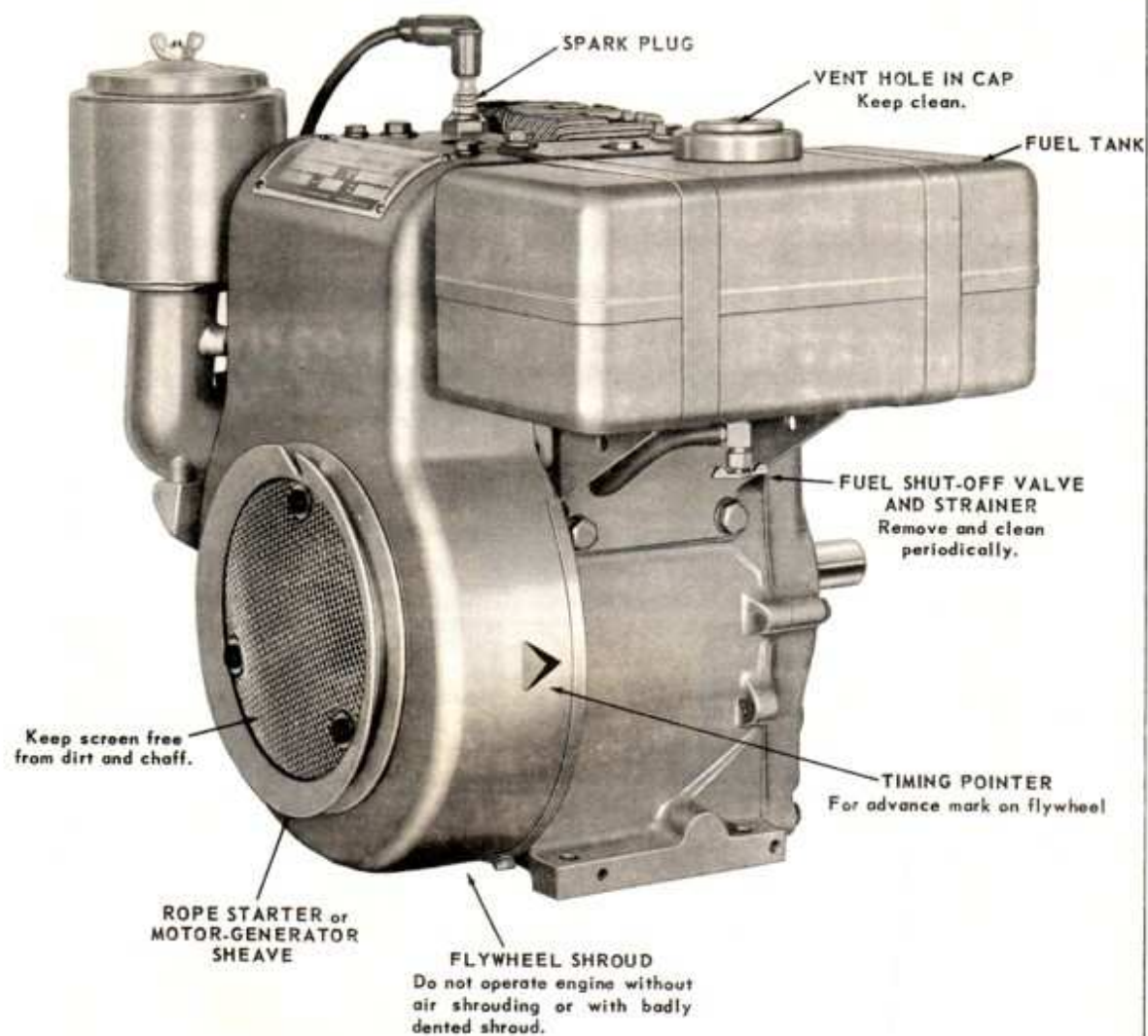


Fig. 2

289864C

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

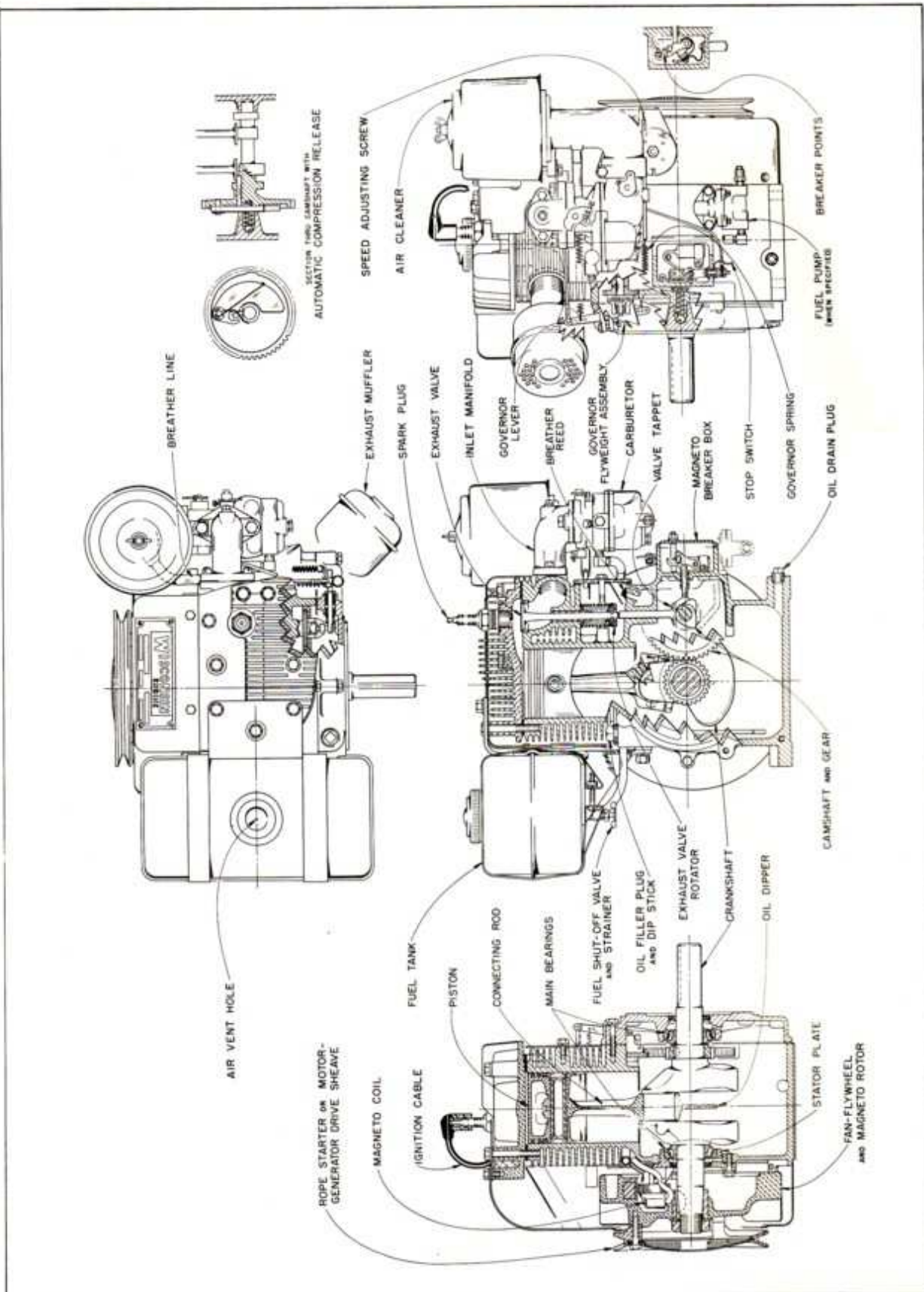


Fig. 3  
SECTIONAL VIEWS OF ENGINE



## 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".

### COOLING

Cooling is accomplished from 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 an integral part of 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 on the connecting rod provides for a splash type lubrication system. The action of the dipper striking oil in the crankcase provides ample lubrication for all internal parts of the engine.

### GOVERNOR

A governor of the centrifugal flyball type controls the engine speed by varying the throttle opening to suit the load imposed upon the engine. Manually operated variable speed controls are available for practically all applications.

## ROTATION

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

*Horsepower* given 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.	MODEL TRA-10D
2000	5.4
2200	6.1
2400	6.8
2600	7.6
2800	8.3
3000	8.8
3200	9.4
3400	9.8
3600	10.1

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.

## 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 dipstick plug opening illustrated in *Fig. 4*, with *1 quart* of oil.

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

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

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



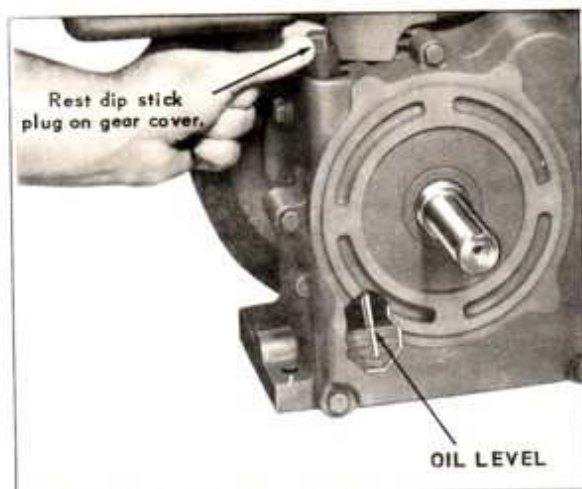


Fig. 4

284081C

it is the cheapest item of operating cost. Select your oil solely on quality and suitability—never on price—for no one thing is so sure to bring about unsatisfactory performance and unnecessary expense as incorrect lubrication.

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

#### GRADE OF OIL

SEASON OR TEMPERATURE	GRADE OF OIL	EXAMPLE
Spring, Summer or Autumn + 120°F to + 40°F	SAE 30	Mobiloil A
Winter + 40°F to + 15°F + 15°F to 0°F Below Zero	SAE 20-20W SAE 10-10W SAE 5W-20W	Mobiloil Arctic Mobiloil 10W Mobiloil 5W-20W
Use oils classified as Service MS		
Crankcase Capacity		1 Quart

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

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

**Check oil level every 8 hours. Change oil every 50 hours of operation.**

To drain oil, remove drain plug illustrated in Fig. 1. Oil should be drained while engine is hot, as it will

then flow more freely.

#### SERVICE CLASSIFICATION OF OIL

In addition to the S.A.E. Viscosity grades, oils are also classified according to severity of engine service. Use oil classified as **Service MS**. 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.

#### FUEL

The fuel tank should be filled with a **good quality** gasoline free from dirt and water. The capacity of the tank is **one gallon**. Some of the poorer grades of gasoline contain gum which will deposit on valve stems, piston rings, and in the various small passages of the carburetor, causing 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.**

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 to prevent engine from accidentally starting. 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. Due to special machining of crankcase, fuel pump can be furnished only upon request when engine is ordered. 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. The **main jet adjustment** on the carburetor is made when engine is tested at the factory. Refer to 'Carburetor-Adjustment' for further information.
3. Disengage clutch, if furnished.
4. 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.



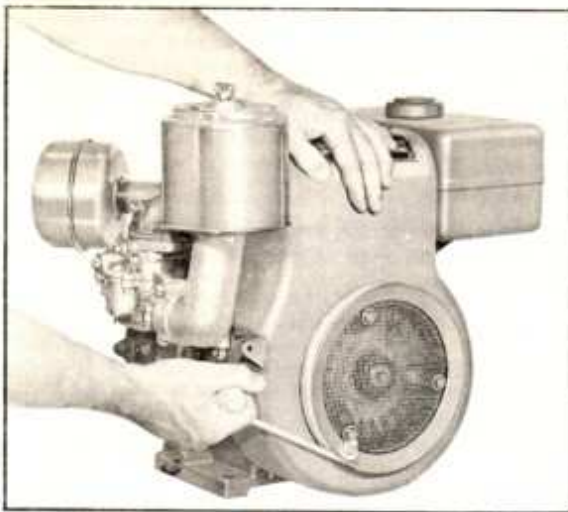


Fig. 5

289865C

5. Close choke on carburetor (push choke lever down), and turn engine over once. Open choke half-way, turn engine over to compression with starter sheave and then turn back one-half turn. Wind rope fully on sheave and **pull briskly** to turn crankshaft over.

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

6. After engine starts **open choke fully**. Less choking is necessary 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. After engine starts, allow it to warm up a few minutes before applying load, as prescribed in 'Warm-Up Period' paragraphs.

New engines started for the first time should be "run-in" gradually to insure trouble-free service and long engine life. 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 on piston, rings, cylinder, bearings, etc., as the proper oil film on these various surfaces cannot be established until the oil has warmed up and become sufficiently fluid. This is especially important on new engines and in cool weather.

**Racing an engine by disconnecting the governor**, or by doing anything to interfere with the 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

cause wrecking of the engine and possible injury to bystanders.

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

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

#### STOPPING ENGINE

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, depending on how hot the engine is. 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

The carburetor can be adjusted in the following manner, and with reference to Fig. 6.

Turn **main jet adjustment** in, (clockwise) until it seats. Then turn out, (counter-clockwise) 1 to 1 1/4 turns. After the engine is started and warmed up for several minutes and running at normal operating speed, the needle valve should be readjusted for best operation. This adjustment need only be made the first time the engine is started. After that, the needle should be left in that position. In cold weather, starting may be facilitated by opening the 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

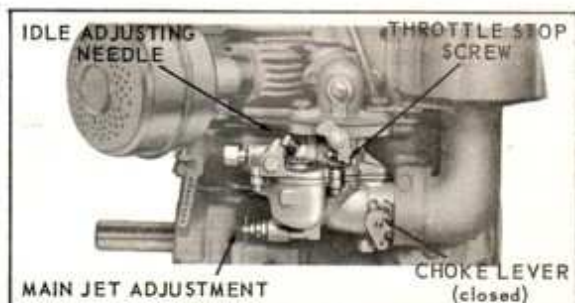


Fig. 6

289861C



idle adjustment is for smooth low speed operation and this adjustment, if necessary, must be made with the carburetor throttle lever closed.

For further information on the carburetor, see the Zenith operating and service instructions in the rear of this manual.

### AIR CLEANER

The *dry element* air cleaner, illustrated in Fig. 7, must be serviced frequently, depending on dust conditions where the engine is being operated.

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

The filter cartridge is easily removed by unscrewing the wing nut and taking off the cover. See Fig. 7.

*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.

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

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

### CRANKCASE BREATHER

A *reed type breather valve* is located in the valve spring compartment, as illustrated in Fig. 8. The valve maintains a partial vacuum in the crankcase, and thus eliminates internal crankcase pressure that



Fig. 7

289863C

would cause oil leaks at the seals, gaskets and breaker box. Keep complete breather system free from dirt, and replace reed if it becomes damaged.

**Oil in breaker box** is the direct 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.
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 and take off valve inspection plate. Remove breather reed and clean seats.



Fig. 8

285956C

### 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 and lay it across the cylinder head. 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



Fig. 9

289866C



a weak spark or no spark at all, follow instructions in "Breaker Point Adjustment" paragraphs. Also check ignition wires, spark plug, condenser and coil.

## MAGNETO IGNITION

### MAGNETO

The flywheel magneto used on this model of engine is a product of either the *Fairbanks-Morse* or *Wico Electric* companies. The magneto is made up of three component parts; *flywheel*, *stator plate* with coil, and *breaker assembly*.

The *breaker box* is an integral part of the crankcase, and the *points* and *condenser* contained there-in are used for either Wico or Fairbanks-Morse magnetos. The other components; *flywheel* and *stator plate*, must be of the same manufacturer when service replacement becomes necessary. In other words *do not* use a Wico flywheel with a Fairbanks-Morse stator plate or vice versa. The manufacturers name is cast on these parts for identification.

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

## 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 POINT ADJUSTMENT

The *breaker points* are contained in the *breaker box* on the left hand side of the engine. The points are actuated by a *push pin* operating off the camshaft. The hardened *steel head* of the *push pin* contacts the *breaker cam* on the camshaft, as illustrated in Fig. 10.

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 to its proper clearance, and retime the engine.

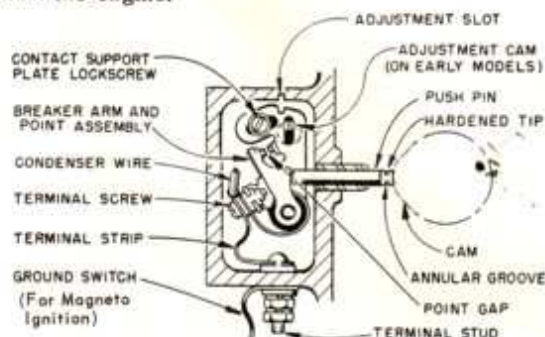


Fig. 10

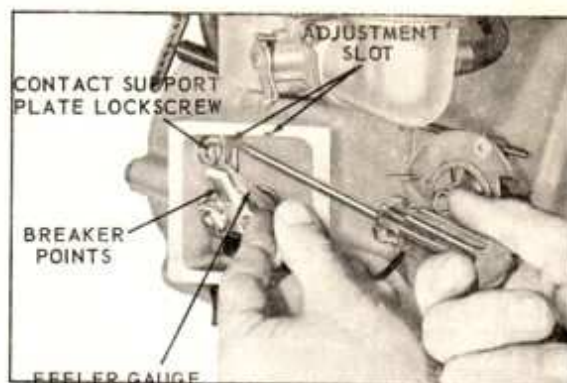


Fig. 11

287045C-1

The normal breaker point gap is *0.020 inch* at full separation. However; the fixed *running spark advance* of *18°* is regulated by the point opening, and thus a slight variation in gap opening may occur when obtaining an accurate spark advance.

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 cam (maximum point opening).
2. Loosen *contact support plate lock screw* just enough so that plate can be moved.
3. Place a *0.020 inch* feeler gauge between points.
4. Insert a screw driver into *adjusting slot* (earlier model engines had an adjustment cam) and open or close the contacts, by moving the plate, until proper point gap is obtained.
5. Tighten *lock screw* and recheck breaker 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 *0.020 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*.

The accuracy of the timing can be checked with a *neon lamp* and the engine running at operating speed. It is however, not advisable to adjust the timing while engine is running. See "Static Timing Procedure".

A *timing pointer* is located on the right hand side of the flywheel shroud, to indicate the correct placement of the flywheel *advance timing mark*.

### STATIC TIMING PROCEDURE: See Fig. 12.

1. Disconnect *coil primary wire* at bottom of breaker box. Remove breaker box cover.
2. Grooved *timing mark* on *flywheel* can be observed thru the opening on right hand side of flywheel shroud.



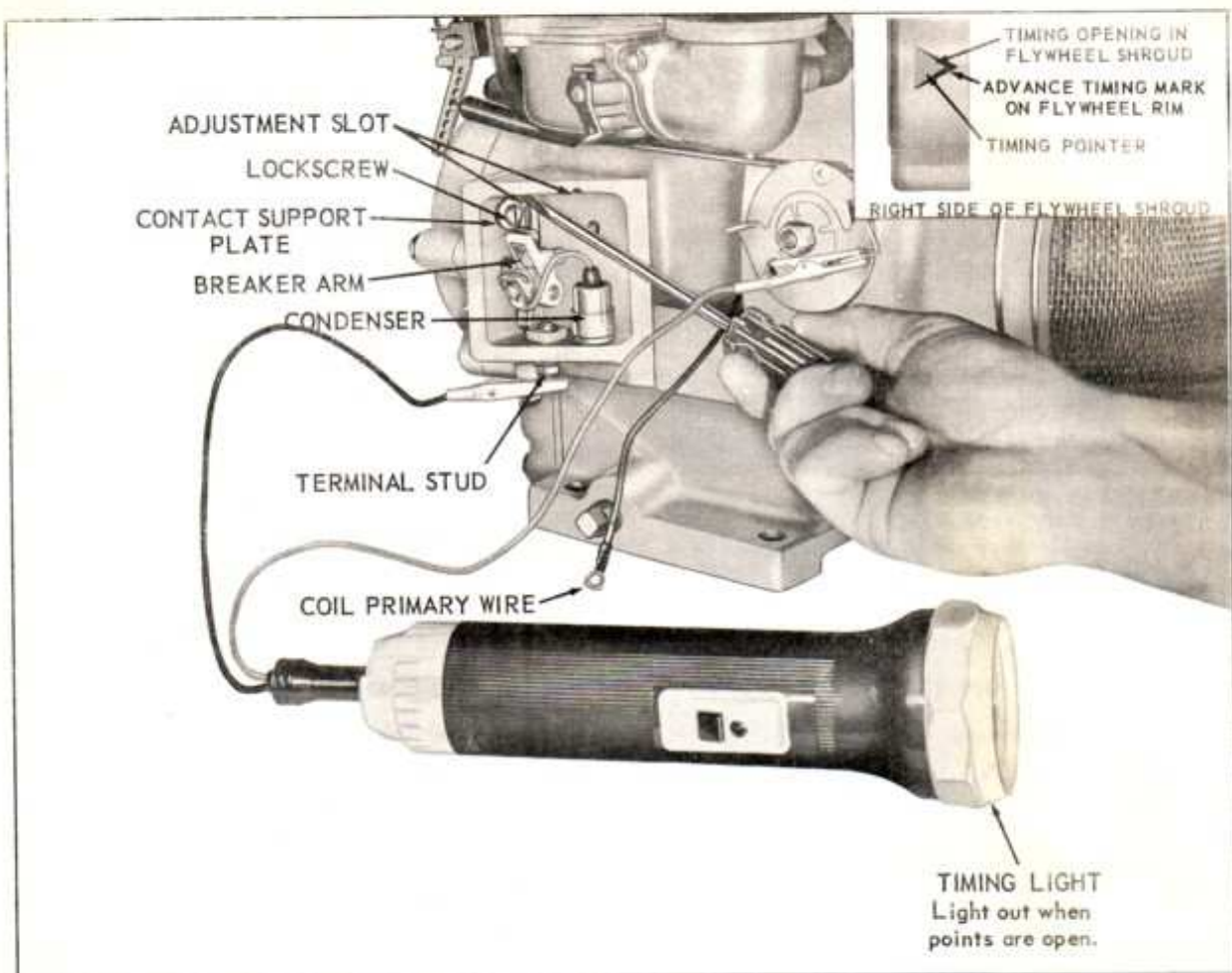


Fig. 12

287044C-1

Since breaker arm operates at *half engine speed*, it is necessary to line up *flywheel timing mark* with *pointer*, while engine is 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 *lock screw* 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 lock screw.
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 line up with *pointer* in shroud.
7. Assemble coil primary wire to terminal stud and mount 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 and adjustment. If badly worn or corroded, points and condenser should be replaced. Refer to "Breaker Point Adjustment" paragraphs.
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 the flywheel so the 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.



## WICO MAGNETO COIL TEST

The coil test specifications for the Wico MA-60 and the Graham tester are listed below:

### MA-60 SPECIFICATIONS

Operating Amps.	Secondary Continuity
2.0	40-60

### GRAHAM SPECIFICATIONS

Coil	Maximum Secondary	Maximum Primary	Coil Index	Minimum Coil Test	Maximum Gap Index
X13000	8000	.9	60	16	60

## FAIRBANKS-MORSE COIL TEST

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 rotating the wire several turns in a counterclockwise direction.

## ELECTRICAL EQUIPMENT

### ELECTRICAL WIRING CIRCUITS

**NOTE:** Beginning with engine serial No. 3989524, the standard wiring circuits of all 12 volt electrical equipment for Model TR-10D is *negative ground polarity*, instead of the previously furnished positive ground. All Model TRA-10D engine motor-generators are *negative ground*.

The wiring diagram, Fig. 13 (magneto ignition), illustrates a *negative ground* circuit. If polarity of

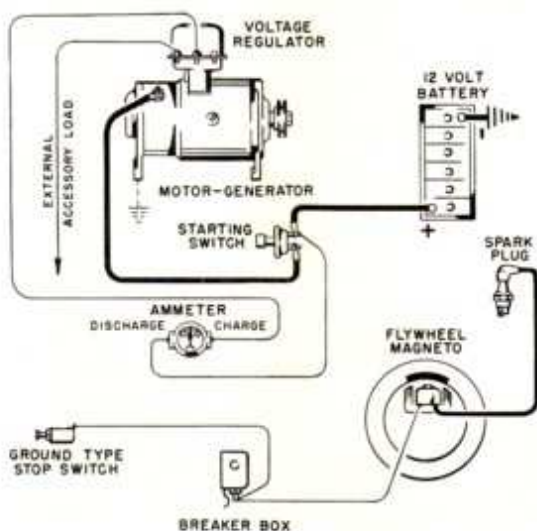


Fig. 13, WIRING DIAGRAM  
(with Magneto Ignition)

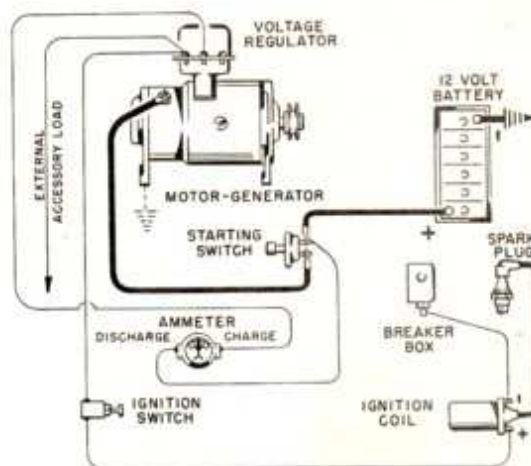


Fig. 14, WIRING DIAGRAM  
(with Battery Ignition)

motor-generator is for a positive ground circuit (see parts list for polarity according to part number), terminal connections at ammeter and battery are just reversed from those illustrated.

**Battery ignition engines**, in which the low battery voltage is transformed to high voltage by an ignition coil, 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 10 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 amps should be taken from this terminal if engine has magneto ignition. With battery ignition, maximum draw should be 3 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.

The *ammeter* in this circuit indicates only the current going into the battery to keep it charged and does not indicate the total generator output. If it is necessary to check the amount of current coming from the 'L' terminal it will be necessary to put a second ammeter



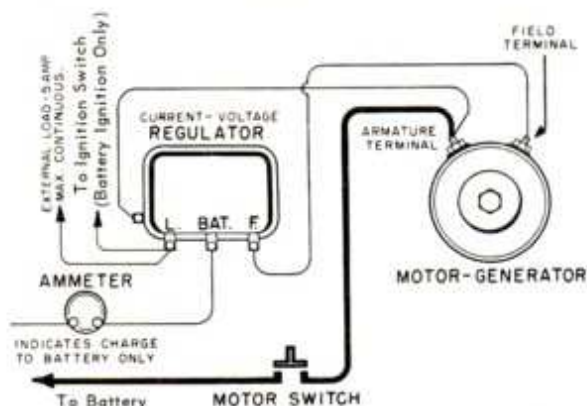


Fig. 15, MOTOR-GENERATOR REGULATOR WIRING

in the circuit between the 'L' terminal and the load. Add the two values indicated on the ammeters to get the total generator output.

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 the motor-generator and the 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.

### 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 needs to 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.

*Spark plug gap - 0.030 of an inch.*

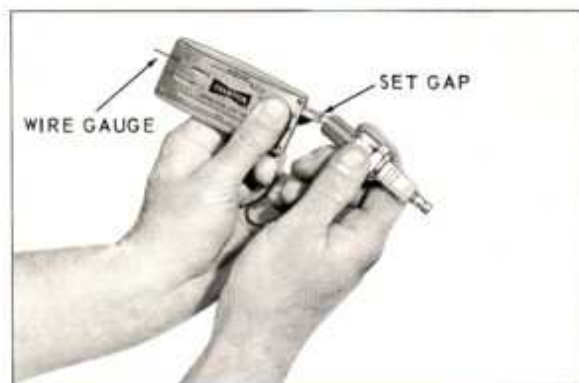


Fig. 16

277779C

Use a new spark plug at the beginning of the next season. Replacement plug must be of the correct heat range, like Champion No. D-16J, AC No. C86 commercial or equal. Thread size is 18mm.

Use a new gasket when mounting either old or new plug and thoroughly clean threads in cylinder head before installation. Tighten spark plug 28 to 30 foot pounds torque. If torque wrench is not available, tighten plug until it begins to seat on the gasket, then turn 1/2 to 3/4 of a turn more.

### 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 the engine over several times with the rope starter to distribute the oil over the cylinder wall. Then replace the 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 gas engine oil, (the same kind of oil as used in the crankcase of the engine) should be injected into the air intake of the carburetor while the engine is warm and running at moderate speed. The air cleaner will have to be removed to do this. About an eighth of a pint is necessary, or enough so that a heavy bluish smoke will appear at the exhaust. The ignition should then be shut off and the engine stopped. This fogging operation will give a coating of oil on the above mentioned parts, protecting them from the atmosphere. After the engine has stopped, disconnect the spark plug cable and turn engine over slowly thru the compression stroke until the flywheel key or take-off shaft keyway is up, or in the 12 o'clock position. Both valves will be closed and the piston will be on top in the cylinder bore, with the crankshaft in the described position. 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 system, including gasoline lines, carburetor, fuel pump and tank to prevent lead and gum sediment interfering with future operation. Gasoline fumes from gradual evaporation is a dangerous **fire hazard**.

The air cleaner cover 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 accumu-



lated during the storage period.

**Be sure to fill the crankcase with a good quality of crankcase oil to the high level mark before starting the engine. Do not use any oil heavier than S.A.E. No. 30.**

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

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

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

## TROUBLES CAUSES AND REMEDIES

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

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

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

As a guide to locating any difficulties which might arise the following causes are listed under the three headings: **Fuel Mixture, Compression, and Ignition**. In each case the causes of trouble are given in the order in which they are most apt to occur. In many cases the remedy is apparent, and no further remedies are suggested.

## STARTING DIFFICULTIES

### FUEL MIXTURE

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

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

Carburetor not choked sufficiently, especially if engine is cold. See *'Starting Procedure'*, Page 8.

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'*, Page 8.

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

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

### COMPRESSION

The Model TRA-10D is furnished 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 for some time. See *'Restoring Compression'*, Page 14.

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 19.

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 18.

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 20.

### IGNITION

See *'Ignition Spark'*, Page 10. 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.



Spark plug wet or dirty.

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

Condensation on spark plug electrodes.

Breaker points pitted or fused.

Breaker arm sticking.

Condenser leaking or grounded.

Oil in breaker box. *See 'Crankcase Breather', Page 10.*

Spark timing wrong. *See 'Timing', Page 11.*

### ENGINE MISSES

Spark plug gap incorrect. *See Page 14.*

Worn and leaking ignition cable.

Weak spark. *See 'Ignition Spark', Page 10.*

Loose connections at ignition wires.

Breaker points pitted or worn.

Oil in breaker box. *See 'Crankcase Breather', Page 10.*

Water in gasoline.

Poor compression. *See 'Compression', Page 15.*

### ENGINE SURGES OR GALLOPS

Carburetor flooding.

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

### ENGINE STOPS

Fuel tank empty, or 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 15.*

### ENGINE OVERHEATS

Crankcase oil supply low. Replenish immediately.

Ignition spark timed wrong. *See 'Timing', Page 11.*

Low grade of gasoline, or engine overloaded.

Restricted cooling air circulation.

Part of air shroud removed from engine.

Dirt between cooling fins on cylinder head.

Engine operated in confined space where cooling air is continually recirculated.

Dirty or incorrect grade of crankcase oil.

Restricted exhaust, or carbon in engine.

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

### ENGINE KNOCKS

Poor grade of gasoline or of low octane rating.

Engine operating under heavy load at low speed.

Carbon or lead deposits in cylinder head.

Spark advanced too far. *See 'Timing', Page 11.*

Loose or burnt out connecting rod bearing.

Engine overheated due to causes under previous heading.

Worn or loose piston pin.

### ENGINE BACKFIRES THROUGH CARBURETOR

Water or dirt in gasoline, or poor grade of gasoline.

Sticky inlet valves. *See 'Valves and Seat Insert', Page 18.*

Overheated valves, or hot carbon particles in engine.

Engine cold.

## DISASSEMBLY AND REASSEMBLY OF ENGINE

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

Tighten the capscrews of the cylinder head, gear cover, connecting rod, stator plate and the spark plug to the specified torque readings indicated in the paragraphs of reassembly, relative to these parts.

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

While the engine is partly or fully dismantled, all of the parts should be thoroughly cleaned. *Use all new gaskets* in reassembly and lubricate all bearing surfaces.

### TESTING REBUILT ENGINE

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

The engine should be started and allowed to run for about one-half hour, at about 1600 to 1800 R.P.M. without load. The R.P.M. should then be increased to engine operating speed, still without load, for an additional three and one-half to four hours.

The proper "running-in" of the engine will help to establish polished bearing surfaces and proper clear-



ances between the various operating parts.

### DRAIN OIL FROM CRANKCASE BEFORE DISASSEMBLY

#### ACCESSORIES

Remove muffler and disconnect ignition wire from spark plug. If engine is to be completely overhauled, remove all accessories.

On engines equipped with a combination **motor-generator**; disconnect wires and adjusting strap at the generator. Remove bracket and motor-generator from side of crankcase as a complete unit.

**Caution:** In reassembly, do not put too much tension on drive belt.

#### FUEL TANK (Fig. 19)

Close fuel valve in tank and disconnect fuel line at carburetor. Remove two capscrews holding fuel tank bracket to crankcase, and take out the two screws holding tank bracket and control panel (if applicable) to cylinder head. **Fuel tank** and **bracket** can be removed as a complete unit.



Fig. 19

284082C

#### STARTER SHEAVE and FLYWHEEL SHROUD (Fig. 20)

Remove **starter sheave** and **screen** by taking out the three screws and washers that mount them to the flywheel. Disassemble **flywheel shroud** and **back plate** by unhooking governor spring, and then removing two capscrews holding shroud to bottom of crankcase and two screws at the cylinder head.

#### CARBURETOR and AIR CLEANER (Fig. 21)

The carburetor and air cleaner should be removed both to facilitate working on the engine and to prevent damage to these parts. Disconnect breather line at inspection cover and throttle rod clip at governor lever. Take out the two screws holding manifold to cylinder, and remove air cleaner, bracket, carburetor and manifold as a complete unit.

#### CYLINDER HEAD and SPARK PLUG

Remove spark plug and take out remainder of cylinder head screws. Disassemble cylinder head, gasket, cylinder head cover and cylinder side shroud. Clean out



Fig. 20

287042C



Fig. 21

289862C

carbon from combustion chamber and dirt from between the cooling fins.

**In reassembly**, use new cylinder head and spark plug gaskets. Mount cylinder head cover, fuel tank bracket and cylinder head all at the same time, as these parts are all mounted with the cylinder head capscrews. Use the different length capscrews according to the height of the bosses on the cylinder head. **Torque** head screws to 18 ft. lbs., in three alternate stages: 10 ft. lbs., 14 ft. lbs. and finally 18 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.

### VALVES and SEAT INSERT (Fig's. 22, 23, 24)

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

**Caution:** Do not damage breather reed in spring compartment, when inserting lifter tool.

Clean out carbon and gum deposits from the valves, seats, ports and guides. Replace valves that are badly burned, pitted or warped.

The **exhaust valve face** and replaceable exhaust **seat insert** are of **stellite** material. The inlet seat is an integral part of the cylinder block. A **positive type valve rotator** is furnished on the exhaust valve. A faulty rotator may be the cause of a burned exhaust valve face or seat, and thus should be replaced.

The exhaust valve **seat insert** can be removed when replacement becomes necessary, by means of Wisconsin Motor **DF-66-A** insert puller. See Fig. 23.

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

Before grinding, inspect valve guides for possible replacement. Refer to Fig. 25 for proper method of driving out guides, and see chart, Fig. 24 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. Wash valves and block thoroughly with gasoline or kerosene and **do not assemble valve springs** until tappet clearance has been checked. See 'Tappet Adjustment'.

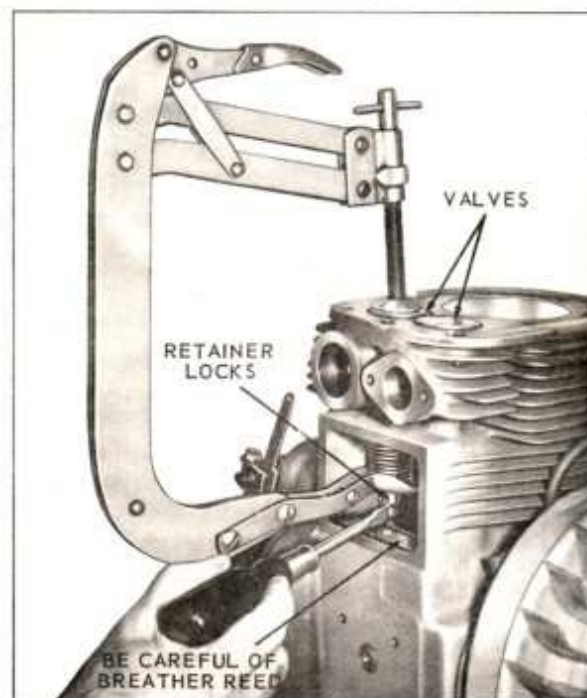


Fig. 22

284092C

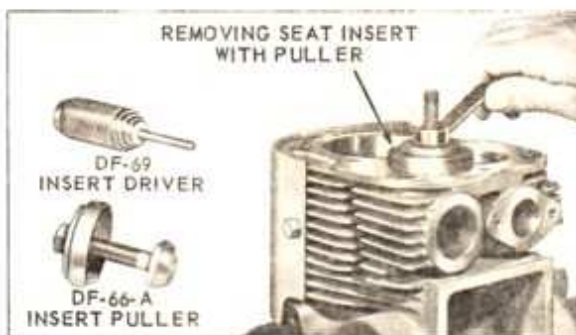
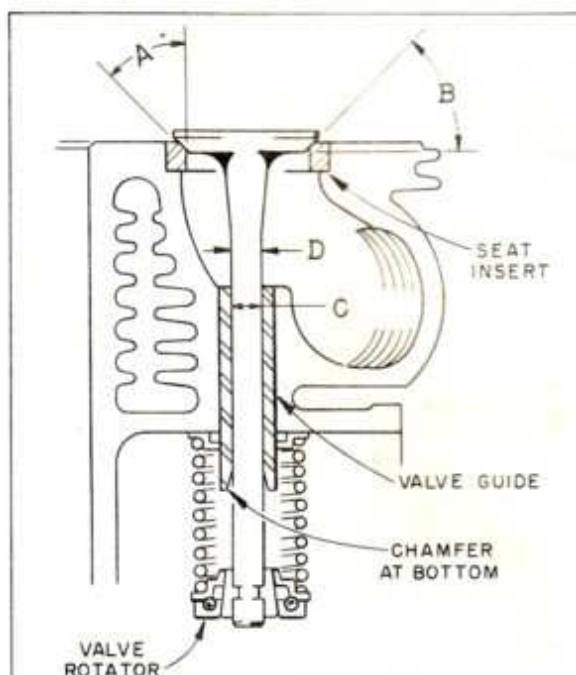


Fig. 23

284070C



SPECIFICATIONS ARE FOR BOTH INLET AND EXHAUST, EXCEPT WHERE NOTED

A - VALVE FACE ANGLE		45°
B - SEAT INSERT ANGLE		45°
C - GUIDE INSIDE DIAMETER		.312 - .313
D - VALVE STEM DIAMETER	INLET	.310 - .311
	EXH.	.309 - .310
MAXIMUM ALLOWABLE CLEARANCE BETWEEN C AND D		.006

Fig. 24

### VALVE GUIDES

When valve stem clearance becomes excessive, the valve guides should be driven out, as illustrated in Fig. 25, and new guides pressed in place. Use Wisconsin Motor **DF-72** valve guide driver. In reassembly, press guides into valve ports with the **internal chamfer in guide pointing downward**. Refer to Fig. 24 for clearance specifications and proper assembly.



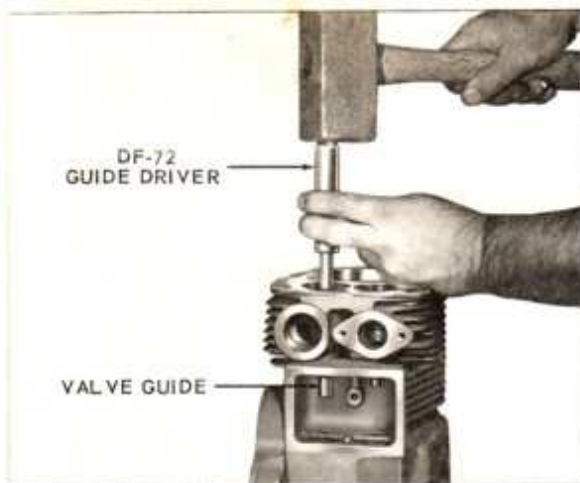


Fig. 25

284076C

### TAPPET ADJUSTMENT (Fig. 26)

With tappet in it's lowest position, hold valve down and insert feeler gauge between valve and tappet stems. The clearance with engine cold:

*inlet* - 0.006 inch    *exhaust* - 0.012 inch

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

If the clearance is less than it should be, grind the end of valve stem a very little at a time and re-measure. Stems must be ground square and flat. Re-assemble the valve springs, exhaust rotator and inlet spring seat, locking them in place with the retainer locks. Be sure the valve springs are seated properly in the valve spring locating cups lest they cock off to one side and hamper the valve action.

To check tappet clearance on an assembled engine; turn crankshaft so that take-off or flywheel keyways are up, or 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), then proceed to check clearance.



Fig. 26

284088C

### FLYWHEEL (Fig's. 27 and 28)

Place a 1-1/2" 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.

Use a **knock-off** type **puller** to loosen flywheel. If this type tool is not available, proceed as follows: Turn crankshaft, by means of the flywheel, until the flywheel keyway is located in about a 10 o'clock position. Wedge a box wrench or pry bar between flywheel and crankcase at the above keyway position, to act as a lever. Then, strike end of flywheel nut with a babbitt hammer and at the same time wedge outward with the pry bar. See Fig. 28.

**Loosen flywheel but do not remove:** It is necessary that the flywheel be left on to support crankshaft during removal of gear cover and connecting rod, and thus prevent damage to the oil seal in stator plate. **Take flywheel off after piston and rod are removed.**



Fig. 27

284073C

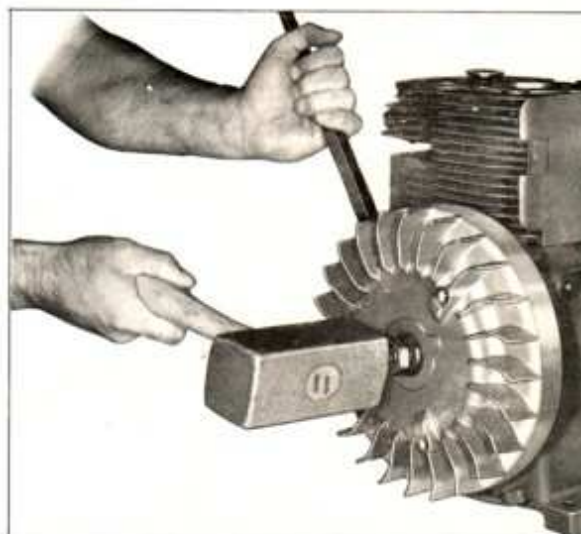


Fig. 28

284072C



In reassembly, mount flywheel immediately after crankshaft is mounted; be sure woodruff key is in position on shaft. Do not drive flywheel on to taper of crankshaft and do not overtighten flywheel nut. Simply turn nut until lockwasher collapses. Then, after end play is set, (see End Play paragraph) tighten flywheel nut by placing wrench on nut and giving handle of wrench 1 or 2 sharp blows with a soft hammer. If torque wrench is available, tighten 50 to 55 ft. lbs.

#### GEAR COVER (Fig's. 29, 30 and 31)

Remove six capscrews holding gear cover in place and drive out two dowel pins from crankcase side. Tap gear cover with soft hammer at oil filler boss. **Caution:** Steel ball for camshaft end thrust will probably fall out when gear cover is removed. Take out thrust spring from end of camshaft and remove flyweight assembly from governor shaft.

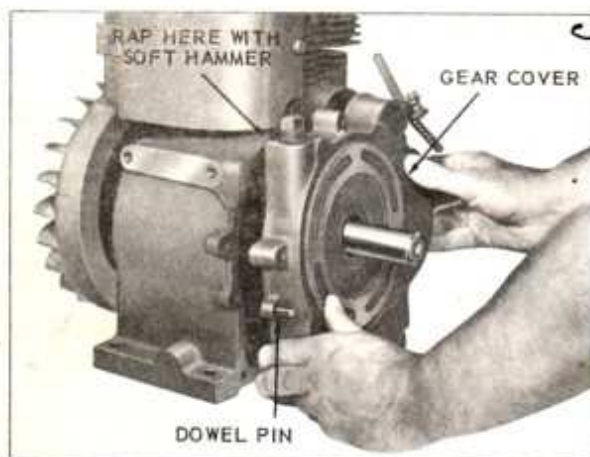


Fig. 29

284086C

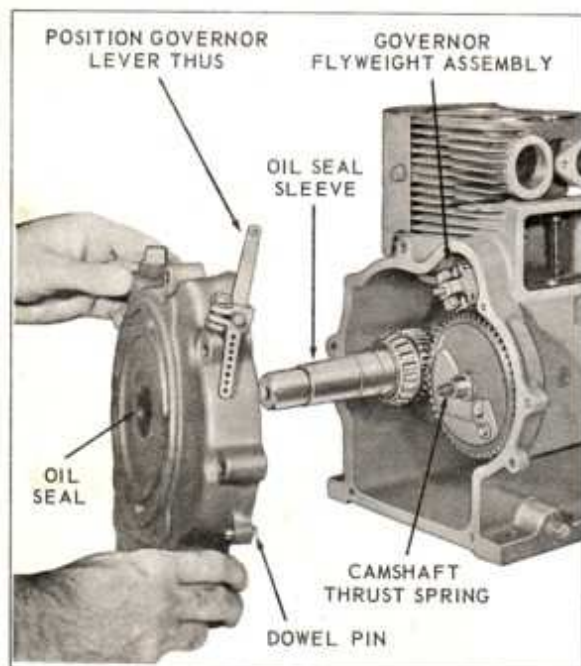


Fig. 30

303976C

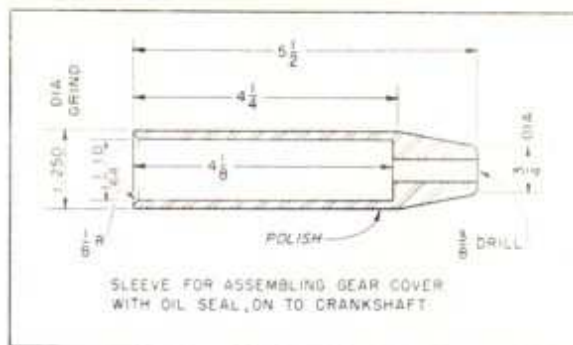


Fig. 31

In reassembly, insert thrust spring into end of camshaft and mount governor flyweight assembly. 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 oil seal sleeve, Fig. 31, on to crankshaft, 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. 38, remain correctly mated when end of camshaft is pressed into bearing hole of gear cover.

**Note:** Governor lever must be leaning in a direction toward the engine, as shown in Fig. 30. This position will prevent the internal governor vane from becoming entangled with the governor flyweights.

Remove oil seal sleeve, tighten gear cover capscrews to 8 ft. lbs. torque and hammer dowel pins in place.

#### CONNECTING ROD and PISTON (Fig's. 32, 33, 34)

By means of a 1/2" socket wrench, loosen and remove connecting rod bolts, and take off connecting rod cap.

Scrape off all carbon deposits that might interfere with removal of piston from upper end of cylinder. Turn crankshaft until piston is at top, then push connecting rod and piston assembly upward and out thru top of cylinder.

The piston skirt is cam-ground to an elliptical contour. Clearance between the piston and cylinder must be measured at the bottom of the piston skirt thrust face. Refer to Chart, Fig. 33, for proper clearance. The thrust face on the piston skirt is 90° from the axis of the piston pin hole.

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

**Note:** Mount piston and rod assembly with the cast arrow on the connecting rod bolt boss facing toward the open end of the crankcase, and the oil hole in



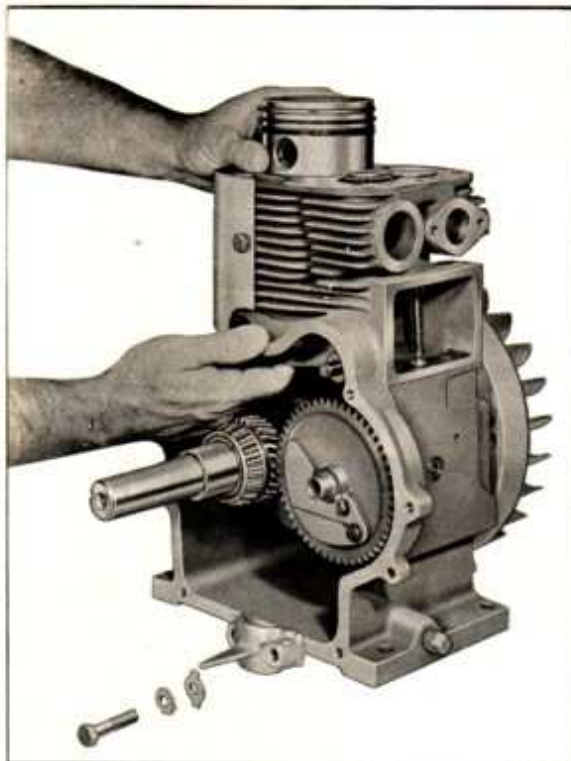


Fig. 32

304536C

#### PISTON, RING AND ROD CLEARANCE CHART

PISTON TO CYLINDER AT PISTON SKIRT THRUST FACES		.004 to .0045"
PISTON RING GAP		.010 to .020"
PISTON RING SIDE CLEARANCE IN GROOVES	TOP RING	.002 to .0035"
	2nd RING	.001 to .0025"
	OIL RING	.002 to .0035"
CONNECTING ROD TO CRANK PIN	DIAMETER	.0015 to .0005"
	SIDE	.009 to .016"
PISTON PIN TO CONNECTING ROD		.0002 to .0008"
PISTON PIN TO PISTON		.0000 to .0008" tight

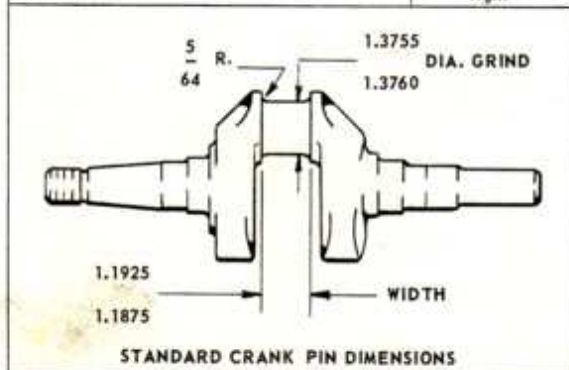


Fig. 33

rod toward camshaft side of engine. See Fig. 34. Assemble connecting rod cap in like manner so that the

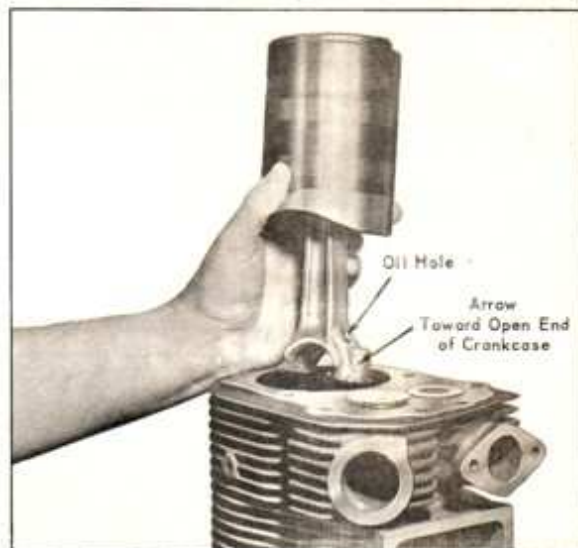


Fig. 34

303970C

two arrows are on the same side. Turn crankshaft to lower end of stroke and tap piston down until rod contacts crank pin.

The oil dipper in Model TRA-10D is an integral part of the connecting rod cap, whereas the Model TR-10D has a sheet metal dipper that must be mounted so that the connecting rod bolts are accessible from the open end of the crankcase. Torque bolts to 22 ft. lbs.

#### PISTON RINGS (Fig's. 35 and 36)

If a ring expander tool is not available, install rings by placing the open end of the ring on piston first,



Fig. 35

71152C

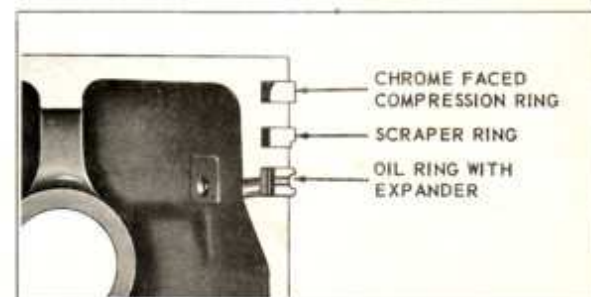


Fig. 36

285335C

as shown in Fig. 35. Spread ring only far enough to slip over piston and into correct groove, being careful not to distort ring. The word 'top', stamped on the compression and scraper rings, indicates the proper mounting of these two rings. See Fig. 36 for correct placement of all three rings.

#### CAMSHAFT and VALVE TAPPETS (Fig's. 37, 38)

To prevent tappets from falling out and becoming damaged when camshaft is removed, turn crankcase over on its side as shown in Fig. 37. Push tappets inward to clear cam lobes, and remove camshaft.

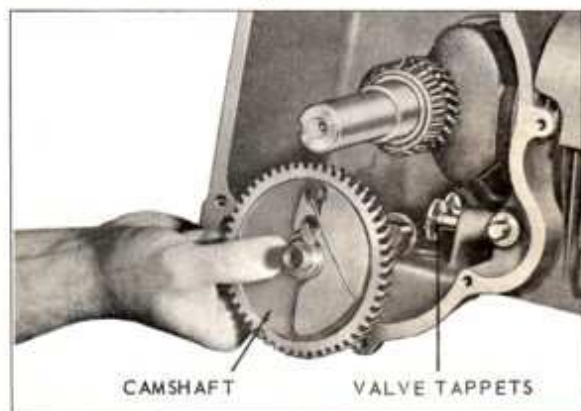


Fig. 37

303975C



Fig. 38

303974C

**Note:** Withdraw tappets and mark them for identification with the hole that they were removed from. **In reassembly,** put tappets back in their corresponding guide hole. This will eliminate unnecessary valve stem grinding for obtaining correct tappet clearance.

The tappet stem diameter is .309/.310, and has a clearance of .002 to .006" in the guide hole.

**Timing mark** on camshaft gear must be located between

the two marked teeth on the crankshaft gear. See Fig. 38. If valve timing is off, engine will not function properly or may not run at all.

Insert **thrust spring** into end of camshaft before mounting gear cover.

#### COMPRESSION RELEASE (Fig. 39)

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



Fig. 39

303971C

While cranking engine, a **spoiler cam** holds the exhaust valve slightly open thru a part 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. 40)

**Push pin** for breaker arm should be removed, inspected for wear and replaced if necessary. **In reassembly:**

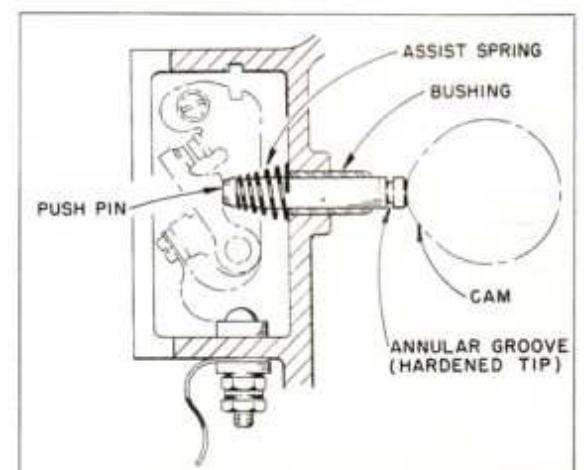


Fig. 40



Insert pin into guide hole with the *hardened steel tip toward camshaft*. The hardened tip is identified with an *annular groove*. Service pins are furnished with an *assist spring*, and should be mounted as illustrated in Fig. 40.

If *bushing* needs replacement; use a *PF-157A-S1* service kit that includes bushing, push pin with spring, and installation instructions. Factory standards are duplicated, with a minimum amount of work and without special tools, by using this kit.

### CRANKSHAFT (Fig. 41)

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



Fig. 41

284085C

*In reassembly*; mount flywheel after crankshaft is assembled, and hand tighten flywheel nut. Flywheel will support crankshaft for mounting of connecting rod and piston. After gear cover is mounted tighten flywheel nut until lockwasher collapses, or just enough to hold flywheel firmly in place for checking end play.

### STATOR PLATE and END PLAY (Fig's. 42, 43)

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

To remove stator plate, take out three capscrews and tap plate from inside crankcase with a wooden hammer handle.

*In reassembly*: Use new gasket and shims having the same total thickness of those removed.

Torque stator plate capscrews to 8 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. 43; 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 or shim will have to be removed from behind stator plate. Not enough end play and gasket or shim will have to be added.

If new tapered crankshaft main bearings have been installed, seat the bearings by alternately striking



Fig. 42

284079C

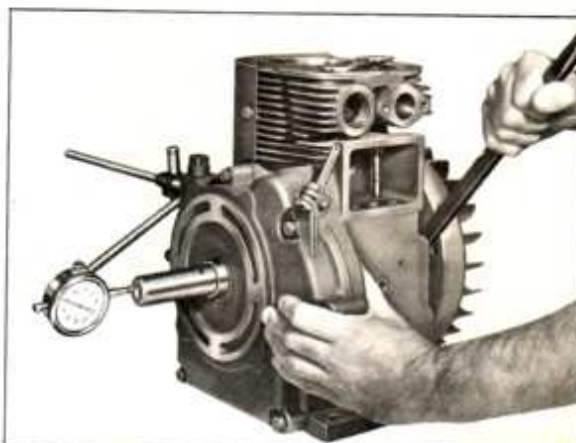


Fig. 43

284080C

each end of the crankshaft several sharp blows with a lead hammer. Then proceed to check end play.

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

### CYLINDER

If cylinder is scored or worn more than .005 inch over standard size, it should be reground and fitted with an oversize piston and rings. This work should be done at an authorized service station.

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

### GOVERNOR

#### OPERATION

Two flyweights are hinged to lugs on the governor gear. Hardened fingers on the flyweights bear against a thrust pin, moving it back and forth as the flyweights move in or out. The motion of the thrust pin is transmitted through a vane attached 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, the centrifugal force in the flyweights acts



against the spring and closes the throttle to a point where the engine speed will be maintained practically constant under varying load conditions. This speed can be varied to suit conditions by adjusting the governor spring tension. An idle return spring is hooked into the upper end of the governor lever and connected to the breather tube on tappet cover.

### GOVERNOR ADJUSTMENT (Fig's. 44 and 45)

To maintain correct carburetor throttle opening and obtain proper governor regulation, the governor lever must be properly positioned on the fulcrum shaft. This procedure is only necessary if governor lever was loosened or removed from fulcrum shaft.

1. Assemble **control rod**, from carburetor throttle lever to governor lever.
2. Connect **governor spring**, from **adjusting screw** to hole in **governor lever**. This will hold carburetor throttle wide open.
3. Loosen governor lever **clamp screw** so that fulcrum shaft can be turned independently of governor lever.
4. Turn **fulcrum shaft** counter-clockwise until you feel the internal governor vane stop against the flyweight thrust pin.
5. Tighten **clamp screw** as illustrated in Fig. 44, and mount **idle return spring** from breather tube to governor lever as shown in Fig. 45.

### ENGINE SPEED (Fig. 45)

**Engine speed** is adjusted by hooking governor spring into correct hole of governor lever, and then regulating spring tension by means of an adjusting screw. The governor lever has 8 holes for the governor spring, with the No. 1 hole closest to the fulcrum shaft.

A change in design of the governor flyweights was incorporated in TR-10D engines beginning with Serial No. 3909152. Governor regulation is affected as a result of this change, so in readjusting engine speed,

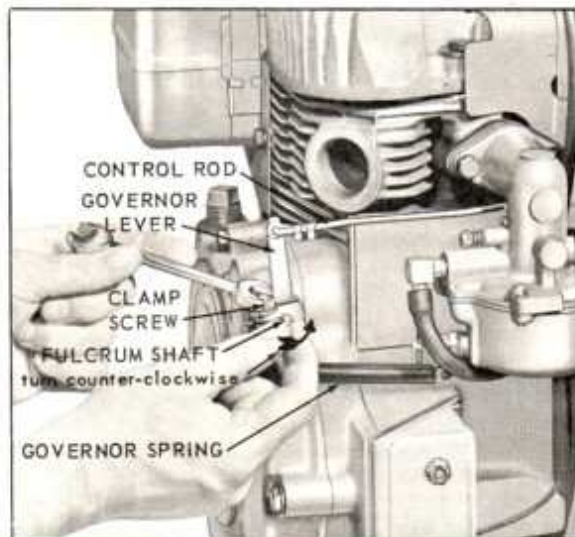


Fig. 44

287046C

refer to **Governor Lever Chart, Fig. 45**, for all TRA-10D engines and if this change is pertinent to your TR-10D engine.

TR-10D engines built previous to Serial No. 3909152 were set for full throttle operation:

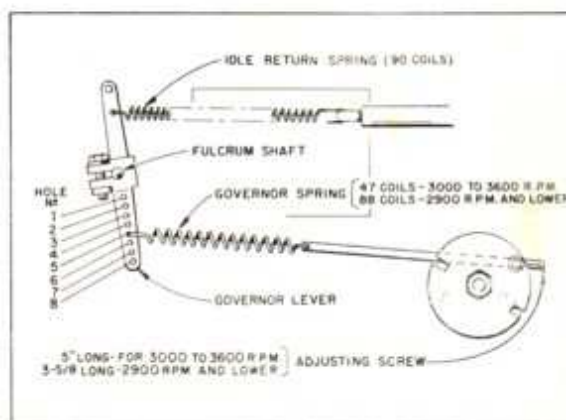
#### Spring in Hole No. 2

No Load R.P.M. - 3800

Load R.P.M. - 3450

The governor lever chart, Fig. 45, shows the **full 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 adjusting screw 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 be higher than the speed with load. For instance, if the engine is to operate at 3000 R.P.M. under full load, the speed with no load will be 3230 R.P.M. and this should be kept in mind when adjusting the governor. Refer to the governor lever chart, Fig. 45, for the variation between load speed and no load (high idle) speed.



Load R.P.M.	No Load R.P.M.	Hole No.	Load R.P.M.	No Load R.P.M.	Hole No.
2000	2520	1	2900	3160	2
2100	2580	1	3000	3230	3
2200	2610	1	3100	3300	3
2300	2690	1	3200	3380	3
2400	2740	1	3300	3460	3
2500	2800	1	3400	3615	4
2600	2890	1	3500	3690	4
2700	2935	1	3600	3850	5
2800	3065	2			

Fig. 45

FOR ALL MODEL TRA-10D ENGINES.  
For TR-10D engines beginning with Serial No. 3909152.



# REPAIR PARTS LIST

READ THESE INSTRUCTIONS BEFORE ORDERING PARTS

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

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

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

MODEL \_\_\_\_\_ SERIAL NO. \_\_\_\_\_

SIZE \_\_\_\_\_ R.P.M. \_\_\_\_\_ SPEC. NO. \_\_\_\_\_

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

278228C

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

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

## SERVICE FACILITIES

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

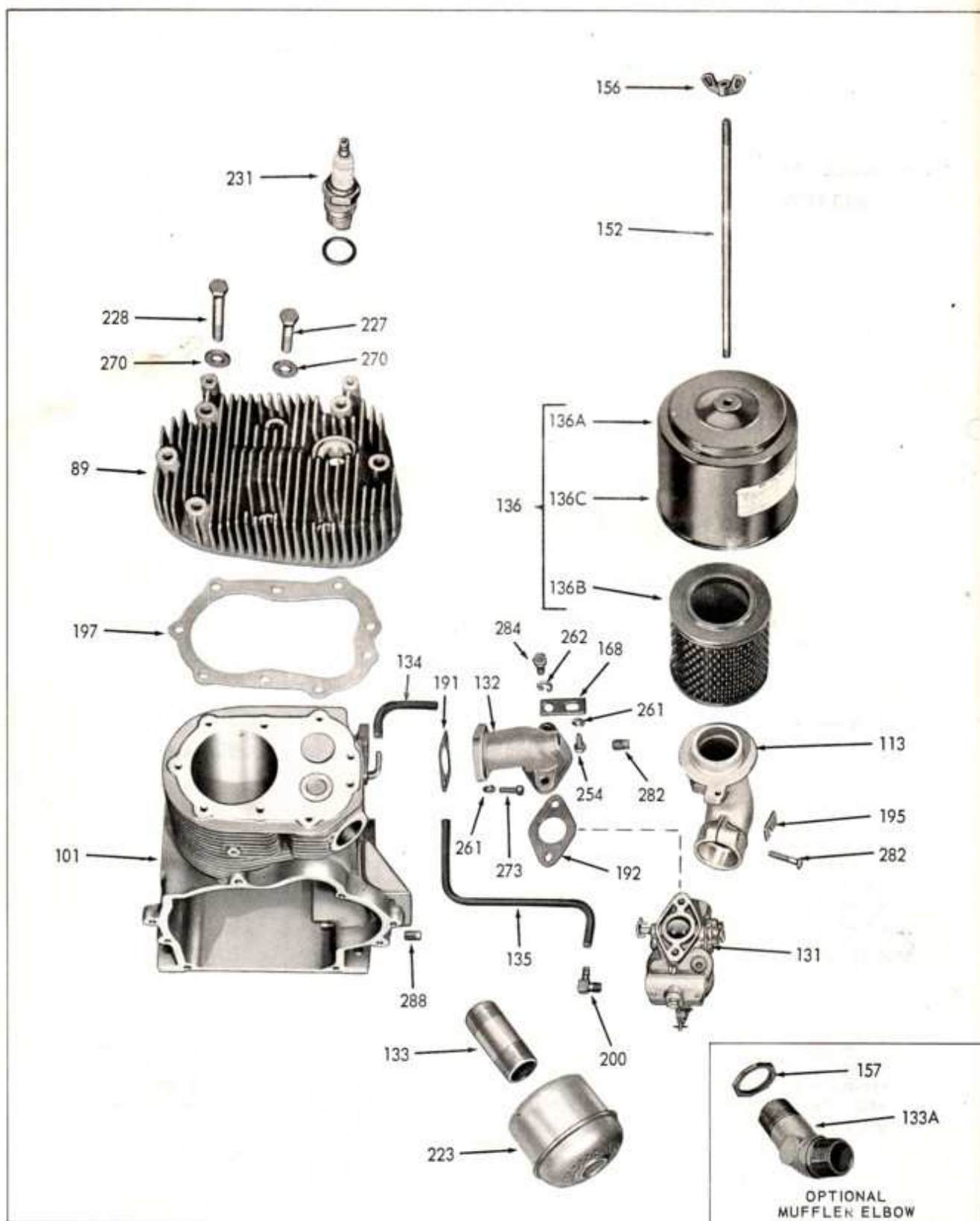
A DIRECTORY OF SERVICE STATIONS CAN BE FOUND IN THE BACK OF THIS MANUAL.

## PARTS RETURNED FOR CREDIT

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



# PARTS FOR ENGINE MODELS TRA-10D AND TR-10D



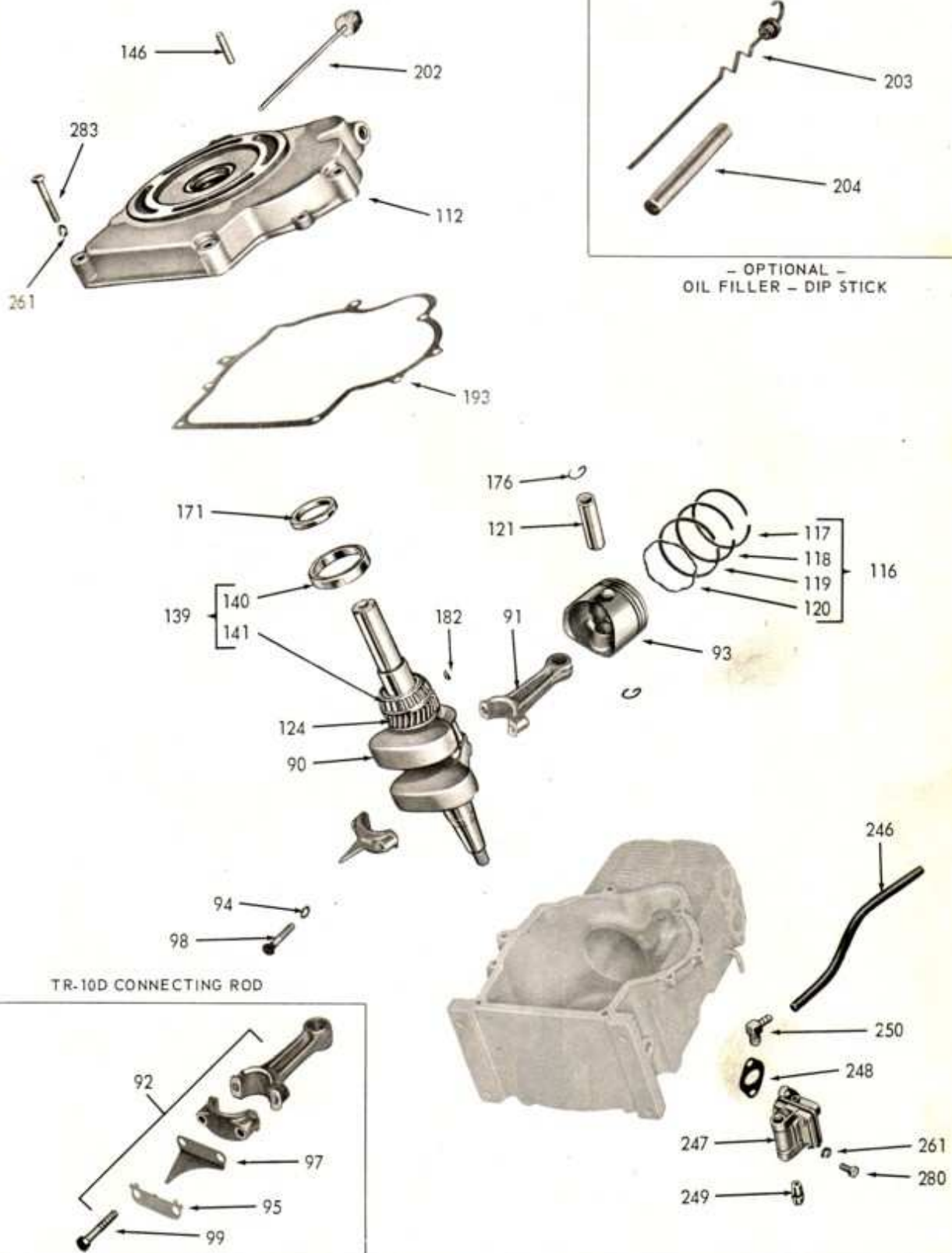
## CRANKCASE, CYLINDER HEAD, CARBURETOR and AIR CLEANER GROUP

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

290651C



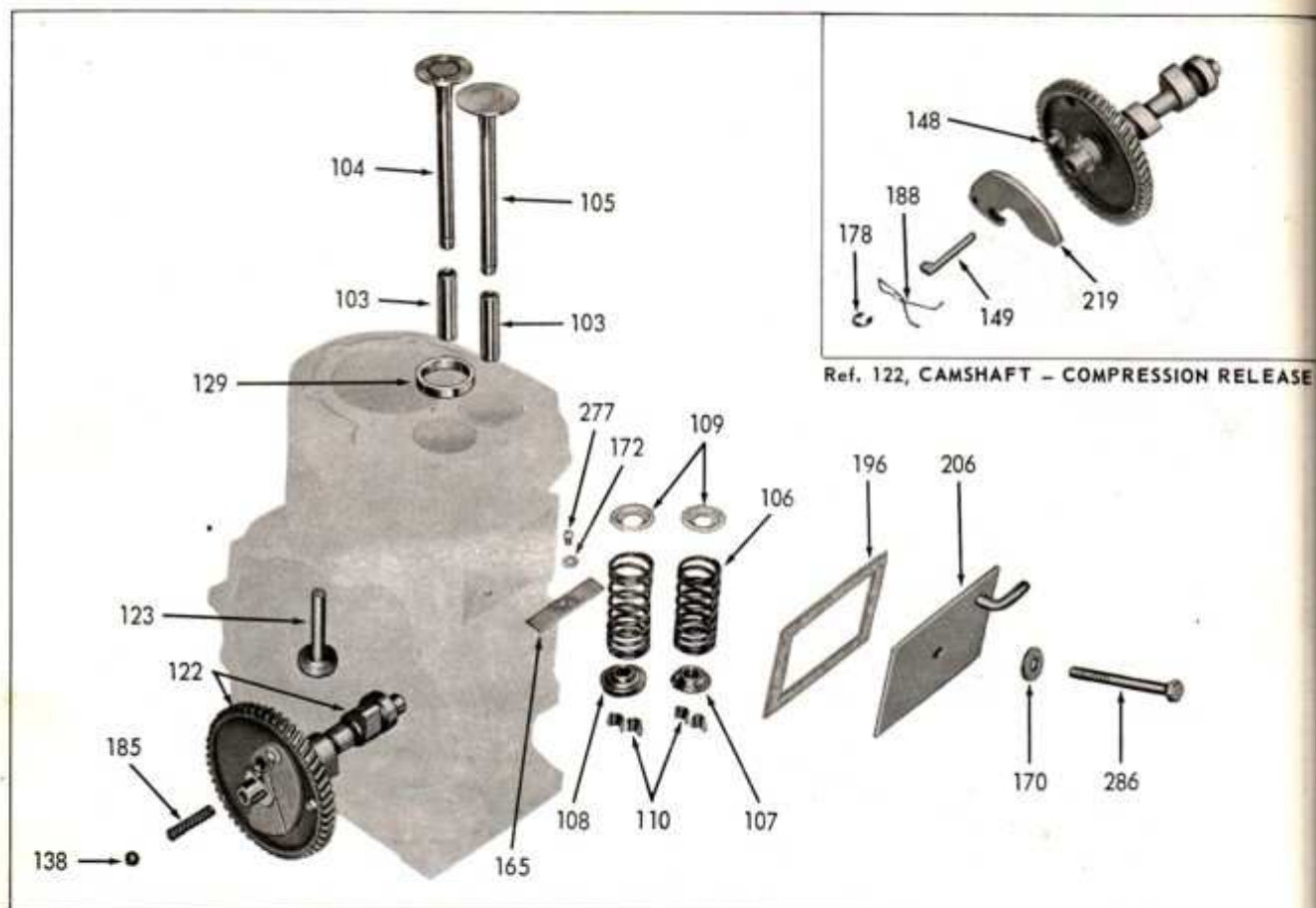
# PARTS FOR ENGINE MODELS TRA-10D AND TR-10D



## GEAR COVER, CRANKSHAFT, PISTON, CONNECTING ROD and FUEL PUMP GROUP

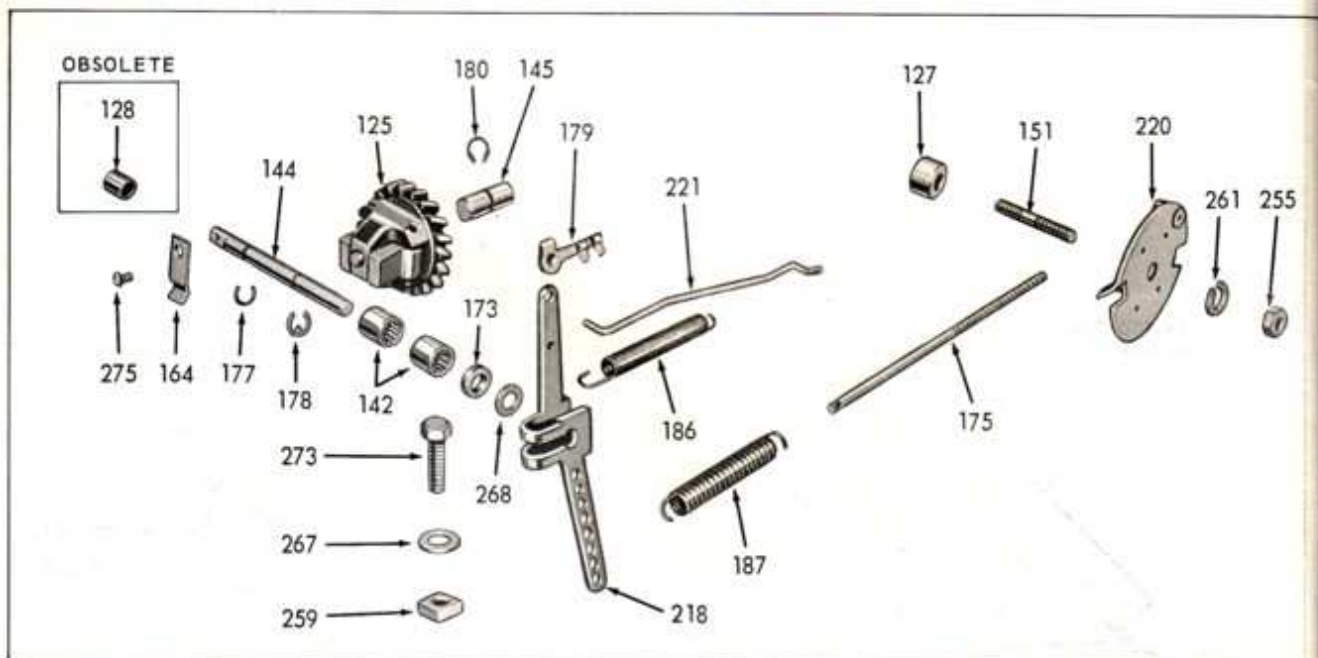
Parts are identified by reference number. See parts list for correct part number.

# PARTS FOR ENGINE MODELS TRA-10D AND TR-10D



VALVES and CAMSHAFT GROUP

285307C-A



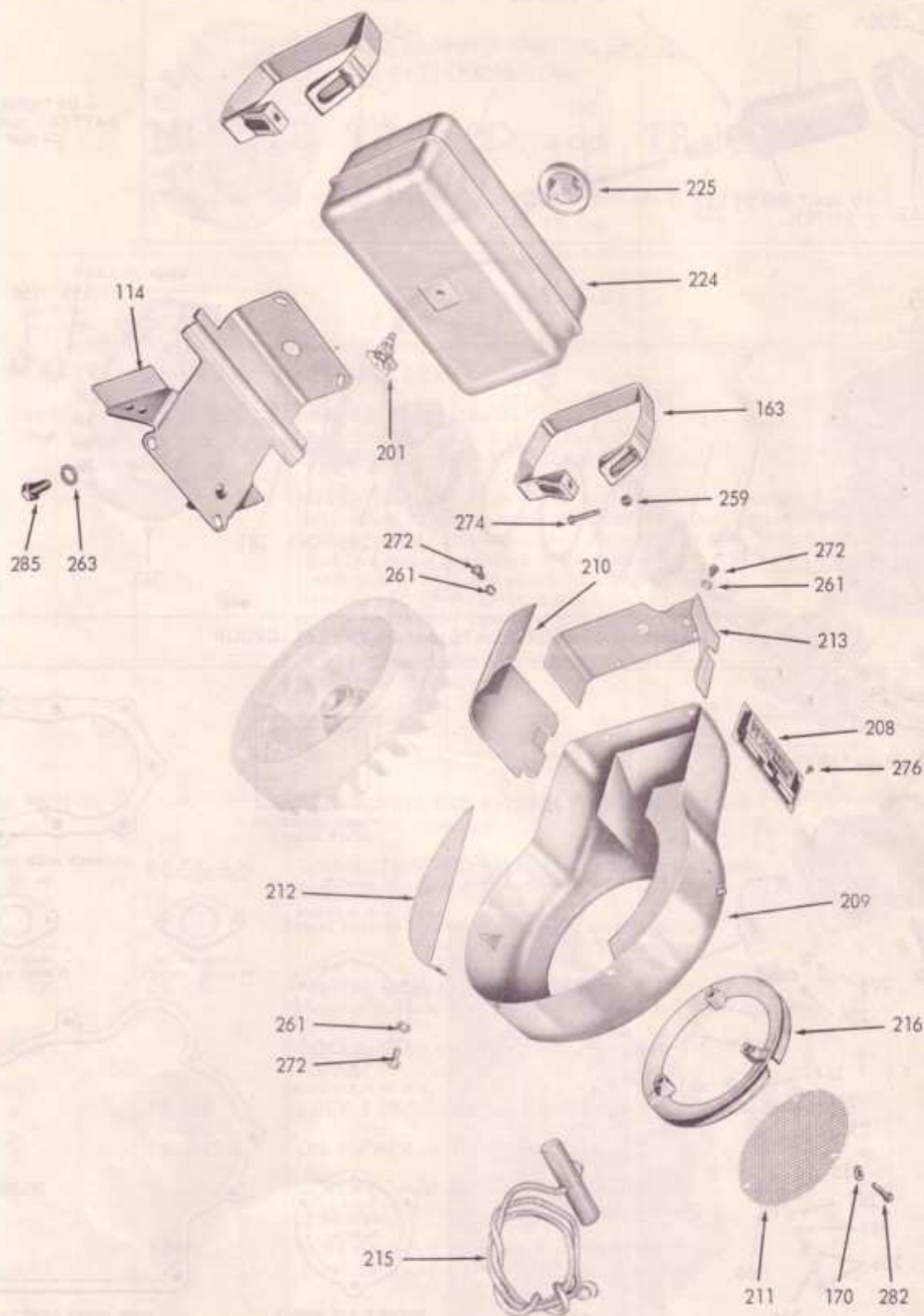
GOVERNOR ASSEMBLY

291042C-1

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



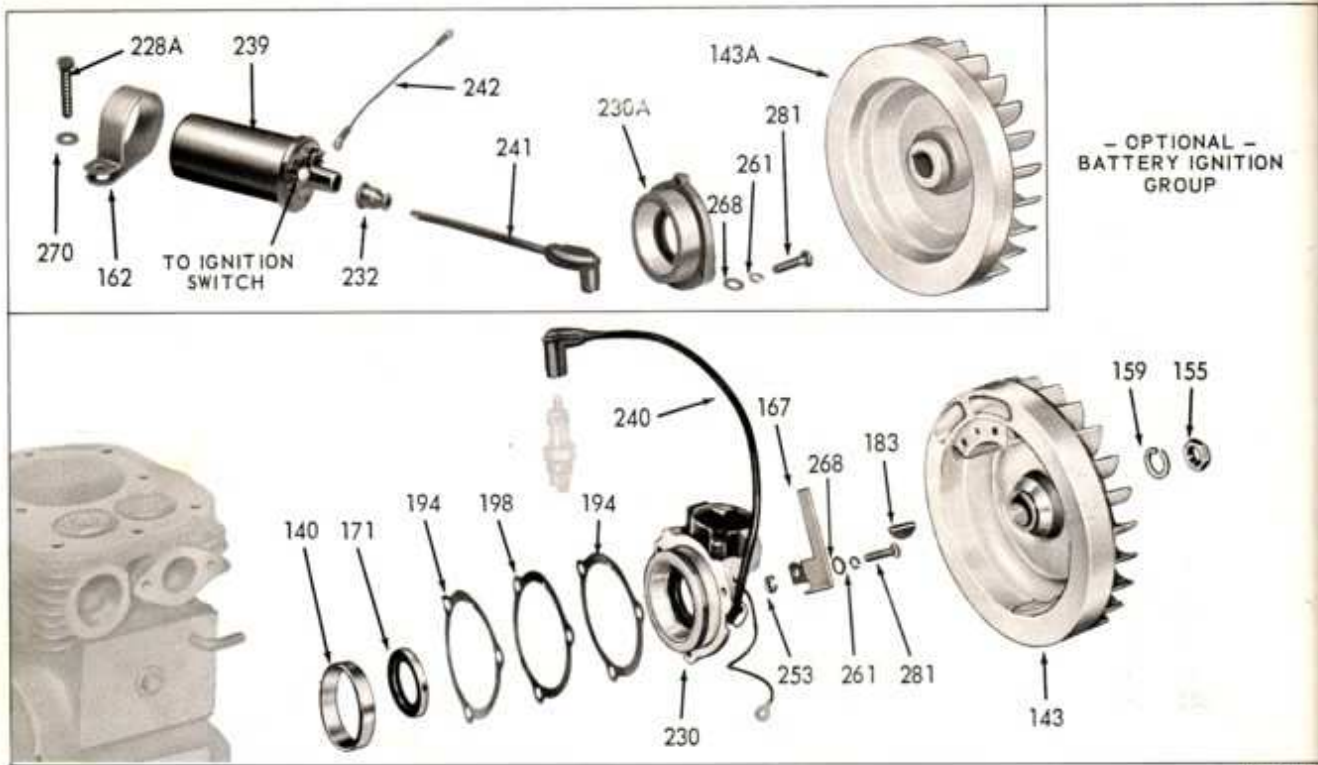
# PARTS FOR ENGINE MODELS TRA-10D AND TR-10D



## AIR SHROUDING and FUEL TANK GROUP

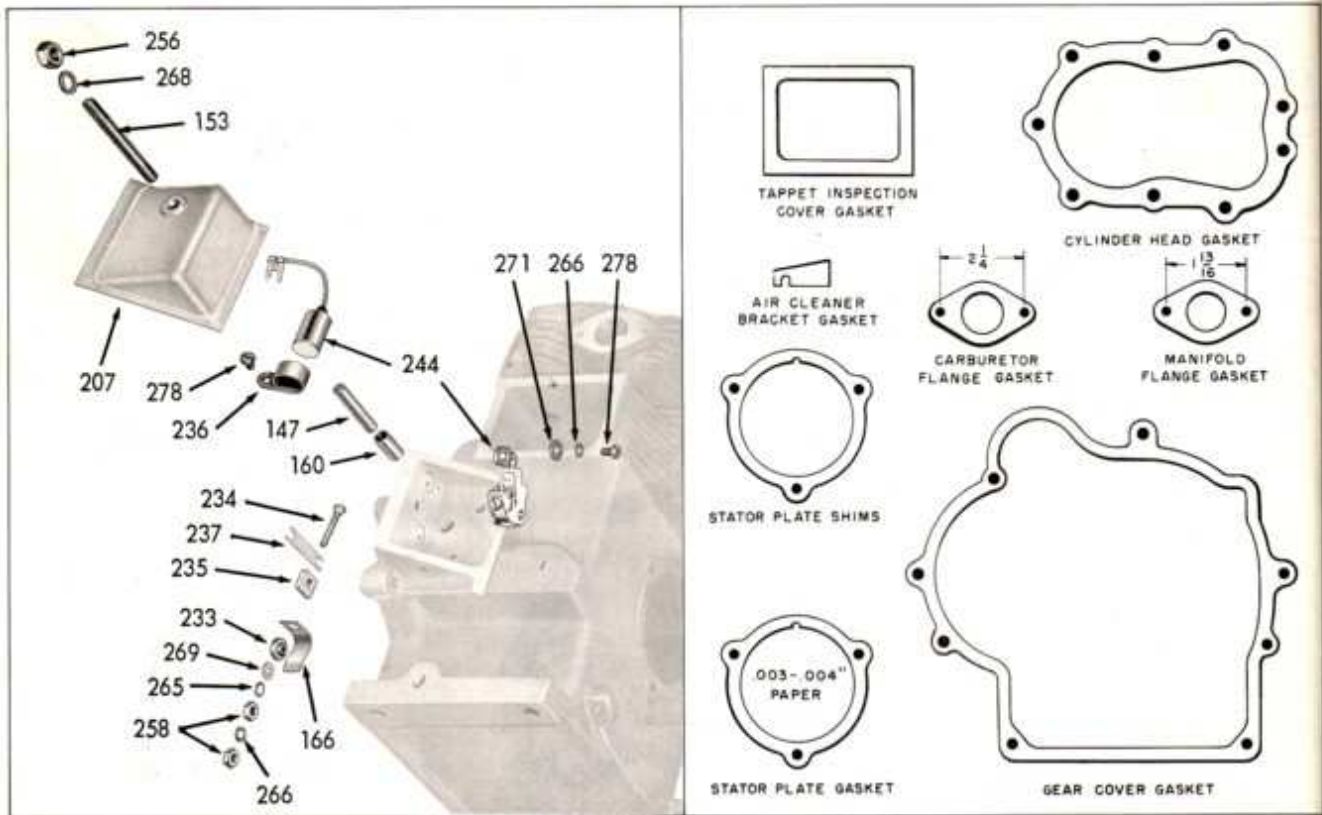
Parts are identified by reference number. See parts list for correct part number.

# PARTS FOR ENGINE MODELS TRA-10D AND TR-10D



MAGNETO STATOR PLATE and FLYWHEEL GROUP

303973C



BREAKER POINT GROUP

285306C

Ref. No. 190, GASKET SET

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




# PARTS LIST

FOR STANDARD MAGNETO IGNITION ENGINE,  
AND BATTERY IGNITION


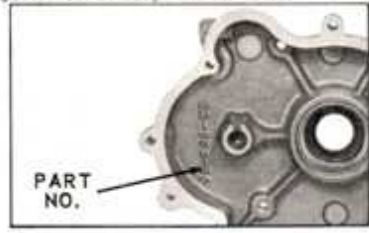
## MODELS TRA-10D and TR-10D

THE FOLLOWING PARTS ARE NOT INTERCHANGEABLE BETWEEN  
MODELS TRA-10D AND TR-10D

REF. NO.	PART NUMBER		DESCRIPTION	NO. REQ.	NET WEIGHT	
	MODEL TRA-10D	MODEL TR-10D			LBS.	OZ.
89	AB-112A-1	AB-112-A	CYLINDER HEAD .....	1	2	12
90	CA-84-Etc. (Ref. to Note and Fig. A)	CA-82-Etc.	<b>CRANKSHAFT ASSEMBLY</b> ..... Includes: 1 GA-45 Gear 2 ME-170 Bearings 1 PL-21 Key	1	9	8
<p><b>NOTE:</b> The standard and basic engine crankshaft part number, as listed in part number column, can be identified by raised letters on the side of the counter-weight. Dash numbers are added to the basic part number to identify special machining at the take-off end. The dash (-) number will be found stamped on the cheek facing the flywheel end of the shaft, as illustrated in Fig. A. Order by <b>complete part number</b>, (dash number added to basic number), and by giving <b>Model, Specification and Serial Numbers</b> of the engine.</p>						
						
				Fig. A	290652C	
91	DA-77-S1		<b>CONNECTING ROD ASSEMBLY</b> complete with lock-washers and capscrews .....	1		7½
92		DA-73C-4-S1	<b>CONNECTING ROD ASSEMBLY</b> complete with lock-dipper, lock-tap and capscrews .....	1		8
Connecting rods are also furnished .010", .020" and .030" undersize.						
93	DB-230-1	DB-230	<b>PISTON</b> , standard size (cam ground) ..... Pistons are also furnished .010", .020" and .030" oversize.	1		8
94	PE-46		<b>LOCKWASHER</b> for connecting rod capscrews 5/16", external tooth type .....	2		1
95		PE-106	<b>LOCK-TAB</b> for connecting rod capscrews .....	1		2
97		PG-1075-A	<b>OIL DIPPER</b> for connecting rod .....	1		2
98	XD-20		<b>SCREW</b> (special hardness) for connecting rod 5/16"-18 thread x 1-3/8" long, hexagon head.	2		1
99		XD-22	<b>SCREW</b> (special hardness) for connecting rod 5/16"-18 thread x 1-3/4" long, hexagon head.	2		1

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

# PARTS INTERCHANGEABLE ON MODELS TRA-10D AND TR-10D

Ref. No.	Part Number	Description	No. Req.	Net Wt. Lb. Oz.
101	See Fig. B	<b>CYLINDER and CRANKCASE ASSEMBLY</b> Complete with valves, springs, seat, exh. roto-cap, locks, insert, guides, cover, gasket, governor pin, breaker rod bushing, breather and drain plug.	1	29
<p><b>NOTE:</b> The standard cylinder-crankcase part number is <b>AA-107</b>. Any special machining is indicated by a number stamped on the fuel tank bracket pad as illustrated in Fig. B. Add this number to the basic <b>AA-107</b> part number. The further addition of an <b>S1</b>, specifies the cylinder-crankcase is complete with valves, springs, seats and etc. <b>Order by this number</b> and by giving the <b>Model, Specification and Serial</b> numbers of the engine.</p>				
				
Fig. B 90845C				
103	AD-41-E	VALVE STEM GUIDE, inlet and exhaust	2	1
104	AE-74-D	EXHAUST VALVE	1	4
105	AE-96	INLET VALVE	1	4
106	AF-43-B	VALVE SPRING, inlet and exhaust	2	2
107	AG-26	VALVE SPRING SEAT, inlet	1	1
108	AG-31	ROTO-CAP and SEAT for exhaust valve	1	1
109	AG-34-A	VALVE SPRING LOCATING CUP	2	1
110	AH-9	VALVE SPRING SEAT LOCK (2halves)	2pr	1
112	See Fig. C	<b>GEAR COVER ASSEMBLY</b> , includes: 2 ME-152 Bearings 1 PH-529 Oil seal 1 ME-170-1 Brg. cup 1 PH-568 Oil seal	1	7 6
<p><b>NOTE:</b> The standard gear cover part number for this model engine is <b>BD-111-9</b>. Any special machining would be indicated by a different number stamped behind the basic <b>BD-111</b> cast part number. See Fig. C.</p>				
<p>Order by part number and by giving <b>Model, Specification and Serial</b> numbers of engine. The further addition of a <b>-S1</b> behind the complete part number indicates the gear cover is furnished complete with bearings and oil seals.</p>				
				
Fig. C 290653C				

Ref. No.	Part Number	Description	No. Req.	Net Wt. Lb. Oz.
113	BI-375-C-S1	<b>AIR CLEANER BRACKET ASSEMBLY</b> Consisting of: BI-375-C Brkt. PE-3 Washer LL-179-3 Hose PC-1155 Brace PD-160 Screw QD-647 Gasket PC-598 Stud XD-8 Screw PD-147 Nut BI-375A-S1, replaced by BI-375C-S1.	1	1
114	BK-120	<b>FUEL TANK BRACKET</b> BK-100-A, replaced by BK-120.  BK-120-S1 Tank and Bracket Assembly with strapping	1	2  4 6
<p><b>NOTE:</b> For tank service straps, see Ref. 163.</p>				
116	DR-54-A	<b>PISTON RING SET</b> , standard size	1	4
<p>Consisting of:</p>				
117	DC-347	Compression ring, top groove	1	1
118	DC-315	Scraper ring, 2nd groove	1	1
119	DC-316	Oil ring, 3rd groove	1	1
120	DC-317	Expander, 3rd groove	1	1
<p>DR-54, replaced by DR-54-A.</p>				
DR-55		<b>TRI CROME RE-RING SET</b> , std. size.. Piston ring sets are also furnished .010", .020" and .030" oversize.		8
121	DE-65	<b>PISTON PIN</b>	1	3
122	EA-130-A	<b>CAMSHAFT ASSEMBLY</b> , includes gear and compression release	1	1 14
<p>EA-123-B Camshaft (less compression release) for Model TR-10D, available for service, but EA-130-A with compression release can be used in its place.</p>				
123	FA-47	<b>VALVE TAPPET</b>	2	2
124	GA-45	<b>CRANKSHAFT GEAR</b>	1	5
125	GD-137-F	<b>GOVERNOR GEAR and FLYWEIGHT ASSEMBLY</b> GD-137-E Assembly (not available), used on TR-10D engines to and including Serial No. 3909151. For replacement of obsolete GD-137-E, use GD-137F-S3 Service Kit listed below.	1	4
GD-137F-S3		<b>GOVERNOR GEAR and FLYWEIGHT KIT</b> for TR-10D engines to and including Serial No. 3909151 Consisting of: GD-137-F Gear and Flyweights PA-395-C Fulcrum Shaft PK-135 Snap Ring PM-200-A Governor Spring	1	8
127	HF-52	<b>SPACER</b> for governor control disc	1	1
128	HF-426	<b>SPACER</b> for governor fulcrum shaft (Obsolete) used in TR-10D engines previous to Serial No. 3909152. Replaced by PK-135 Retaining Ring and PA-395-C Fulcrum Shaft.	1	1

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

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



# PARTS INTERCHANGEABLE ON MODELS TRA-10D AND TR-10D

Ref. No.	Part Number	Description	No. Req.	Net Wt. Lb. Oz.
129	HG-201-D	VALVE SEAT INSERT, exhaust	1	1
131	L-63-AN-S1	CARBURETOR (Standard) with gasket Zenith No. 12982, Model 6B-7.	1	1 12
	LQ-33	Repair kit	1	3
		NOTE: See carburetor bulletin in back of manual for service replacement parts.		
132	LC-281	INTAKE MANIFOLD	1	14
133	LJ-158	PIPE NIPPLE, 1" x 3" long	1	6
	Optional	For muffler mounting.		
133A	XK-140	MUFFLER ELBOW (long)	1	13
	XK-140-1	MUFFLER ELBOW (short)	1	6
134	LL-178-4	HOSE for breather line	1	1
135	LL-178-14	HOSE for fuel line	1	2
136	LO-173	AIR CLEANER, dry element type	1	1
		Consisting of:		
136A	LO-173-A	Cover	1	8
136B	LO-173-B	Element	1	8
136C	SD-276	Instruction decal	1	1
138	ME-37	STEEL BALL for camshaft, 3/8" dia.	2	1
139	ME-170	MAIN BEARING ASSEMBLY	2	8
		Consisting of:		
140	ME-170-1	Bearing cup	3	
141	ME-170-2	Bearing cone	5	
142	ME-152	NEEDLE BEARING for governor fulcrum shaft	2	1
143	NC-203	FLYWHEEL for Wico magneto engines	1	11 10
	or			
143	NC-204	FLYWHEEL for F.M. magneto engines	1	9 14
		NOTE: The above flywheels are not interchangeable, unless the corresponding manufacturers coil-stator plate, Ref. No. 230, is used.		
143A	NC-202-2	FLYWHEEL for battery ignition engines	1	
144	PA-395-C	FULCRUM SHAFT for governor lever	1	2
		PA-395-A, replaced by PA-395-C.		
145	PA-396-A	SHAFT for governor gear	1	1
		PA-396, replaced by PA-396-A.		
146	PA-425	DOWEL PIN for gear cover	2	1
147	PA-428K-S1	PUSH PIN and SPRING ASSEMBLY	1	1
		For breaker points. Field replacement for PA-428-E (standard engine part).		
148	PA-454	FULCRUM PIN for compression release flyweight	1	1
149	PA-455	SPOILER CAM for compression release	1	1
151	PC-377	STUD for governor control disc	1	1
152	PC-598	STUD for air cleaner mounting	1	2
153	PC-590	STUD for breaker cover	1	1
155	PD-137	NUT for flywheel mounting	1	1
156	PD-147	WING NUT for air cleaner mounting	1	1
157	PD-204	LOCKNUT for muffler elbow	1	1
159	PE-58	LOCKWASHER for flywheel mounting	1	1
160	PF-157A-S1	BREAKER BUSHING and PIN KIT	1	3
		For field replacement of PF-157 bushing. Includes: PF-157-A bushing and PA-428K-S1 push pin and spring.		
162	PG-556	STRAP for battery ignition coil	1	4
163	PG-1201	FUEL TANK STRAP	2	6
		PG-733, replaced by PG-1201.		
		NOTE: Steel Binder Strapping and Seal for mounting fuel tank on engines sent out from the factory are not serviceable in the field. Order 2 PG-1201 straps with 2 ea. XA-61 screws and FD-239 nuts.		
164	PG-1019-A	GOVERNOR VANE	1	1
165	PG-1073	REED for crankcase breather	1	1
166	PG-1132	GROUNDING CLIP	1	1
167	PG-1144-2	CLIP for ign. wires and fuel line support	1	3
168	PG-1156	BRACE for air cleaner bracket	1	1
170	PH-442	WASHER (rubber faced)	4	1
		3-for starter sheave.		
		1-for valve inspection cover.		
171	PH-529	OIL SEAL for crankshaft	2	2
		1-in gear cover.		
		1-in stator plate.		
172	PH-546	SPRING WASHER for breather reed	1	1
173	PH-568	OIL SEAL for governor lever shaft	1	1
175	PI-217-1	ADJUSTING SCREW for governor spring	1	1
	or			
	PI-217-5	5" long, for 3000 to 3600 R.P.M.		
		3-5/8" long, to and including 2900 R.P.M. load.		
176	PK-52	PISTON PIN RETAINING RING	2	1
177	PK-135	RETAINING RING (inner) for governor lever shaft, on engines beginning with Serial No. 3909152	1	1
178	PK-144	RETAINING RING	2	1
		1-for governor lever shaft (outer).		
		1-for compression release flyweight.		
179	PK-160	CLIP for throttle rod mounting	1	1
180	PK-167	SNAP RING for governor gear beginning with Engine No. 3909152	1	1
182	PL-21	WOODRUFF KEY, No. 3	1	1
		For crankshaft gear mounting.		
183	PL-47	WOODRUFF KEY, No. 18	1	1
		For flywheel mounting.		
185	PM-108	SPRING for camshaft thrust	1	1
186	PM-61-A	IDLE RETURN SPRING (90 coils)	1	1
187	PM-200-A	GOVERNOR SPRING (47 coils) for engine speeds 3000 to 3600 R.P.M. beginning with Serial No. 3909152	1	1
	or			
	PM-166	(88 coils) to and including 2900 R.P.M. load		1
		PM-142 (54 coils) for TR-10D engines previous to Serial No. 3909152		1
188	PM-225	SPRING for compression release	1	1
190	Q-37-A	ENGINE GASKET SET	1	8
		Consisting of:		
		1 QD-53 1 QD-71 1 QD-847		
		1 QD-799-A 3 QD-799-A 1 QD-801		
		1 QD-825 2 QD-114-A		
		Q-37, replaced by Q-37-A.		

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

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



# PARTS INTERCHANGEABLE ON MODELS TRA-10D AND TR-10D

Ref. No.	Part Number	Description	No. Req.	Net Wt. Lb. Oz.	Ref. No.	Part Number	Description	No. Req.	Net Wt. Lb. Oz.
191	QC-53	GASKET for manifold flange	1	1	225	RC-77	FUEL TANK CAP (furnished with tank)	1	3
192	QC-71	GASKET for carburetor flange	1	1	227	XD-21	SCREW (Special hardness) 5/16"-18 thread x 1 1/2" long, hexagon head For mounting cylinder head.	5	1
193	QD-798-A	GASKET for gear cover	1	1	228	XD-140	SCREW (Special hardness) 5/16"-18 thread x 2 1/4" long, hexagon head For mounting cylinder head.	4	1
194	QD-799-A	GASKET for stator plate (paper) .003"-.004" thick.	3		228A	XD-162	SCREW (Special hardness) 5/16"-18 thread x 2 1/4" long, hexagon head For mounting cylinder head and battery ignition coil strap.	1	1
195	QD-647	GASKET for air cleaner bracket clamp	1	1	230	Y-130-51	STATOR PLATE ASSEMBLY For Wice magneto, includes: 1 ME-170-1 Bearing cup 1 PH-529 Oil seal 1 X13000 Coil assembly 1 11409 Coil clip For Fairbanks-Morse magneto Includes: 1 ME-170-1 Bearing cup 1 PH-529 Oil seal 1 X2477 Coil assembly 1 D2476 Coil clip	1	1 6
196	QD-801	GASKET for tappet inspection cover	1	1		or			
197	QD-825	GASKET for cylinder head	1	1	Y-131-51				
198	QF-114-A	SHIM for stator plate, .010" thick * Use as required to give .001 to .004" crankshaft end play (2 normally used).	*	1	230A	BG-334-1-51	BEARING PLATE ASSEMBLY (fan end) For battery ignition engine. Includes: 1 ME-170-1 Brg. cup 1 PH-529 Oil seal	1	1
200	RF-1439	ELBOW in carburetor, for fuel line	1	1	231	YD-6-51	SPARK PLUG, 18mm, Champion #D-161	1	3
201	RG-41	SHUT-OFF VALVE and STRAINER, in tank	1	2		Optional			
202	RJ-141-5	DIP STICK (screw in) Saber Type	1	3	YD-6-52		SPARK PLUG, AC #C86 Commercial	1	3
203	RJ-171	DIP STICK (long hook)	1	3	232	YD-20A	RUBBER NIPPLE for coil terminal	1	1
204	RJ-171-A	DIP STICK (short hook)	2		233	YD-316	INSULATING WASHER (outer) for ground stud	1	1
204	LJ-348	TUBE (for saber type dip stick)	2		234	YD-321	TERMINAL STUD for ground clip	1	1
206	SA-124	COVER for valve tappet inspection	1	5	235	YD-324	INSULATING WASHER (inner) for ground stud	1	1
207	SA-130-A	COVER for breaker points	1	3	236	YD-325	CONDENSER CLAMP	1	1
208	SD-249	NAME PLATE When ordering name plate, give model, specification and serial numbers for correct stamping.	1	1	237	YD-326	TERMINAL STRIP for breaker arm	1	1
209	SE-270-B	FLYWHEEL AIR SHROUD	1	2	239	YF-5-B	COIL (12 volt) for battery ignition	1	1 6
210	SE-271	CYLINDER SIDE SHROUD	1	4	240	YL-339B-20	HIGH TENSION LEAD for magneto coil	1	2
211	SE-273	SCREEN for rope sheave	1	1	241	YL-339-6	HIGH TENSION LEAD for battery ignition coil	1	2
212	SE-282	BACK PLATE for flywheel shroud	1	3	242	YL-352-16	IGNITION WIRE, breaker box to battery ignition coil	1	1
213	SE-297	CYLINDER HEAD COVER	1	6	244	YQ-12	POINTS and CONDENSER KIT Consisting of: 1 YD-314-A Point set. 1 YD-315 Condenser. 1 YD-326 Terminal strip.	1	4
215	U-268	STARTING ROPE ASSEMBLY	1	6			FUEL PUMP MOUNTING (Not part of standard engine)		
216	UC-184	STARTER SHEAVE (less screen)	1	7	246	LL-178-8	FUEL LINE, pump to carburetor	1	1
218	VB-234A-51	GOVERNOR LEVER ASSEMBLY Includes: PD-239 Nut, XA-36 Screw, PH-27-A Washer.	1	2	247	LP-42-N-51	FUEL PUMP LQ-28 Repair Kit	1	10
219	VB-257	FLYWEIGHT for compression release	1	4			NOTE: Refer to fuel pump instruction sheet in rear of manual for maintenance and repair.		
220	VC-43-A	DISC ASSEMBLY for gov. control rod Includes: 1 PH-314 Washer 1 VE-514 Swivel block	1	3					
221	VE-783-C	THROTTLE ROD, lever to carburetor	1	1					
223	WD-66-A	MUFFLER (less pipe nipple) WD-66A-51 with LJ-155 pipe nipple.	1	1					
224	WE-409	FUEL TANK (with protruding seam) for engines beginning with Serial No. 4213945 WE-343-C (small seam tank) for engines previous to Serial No. 4213945, no longer available - for replacement order BK-120-51 Assembly (WE-409 Tank, BK-120 bracket and steel binder strapping).	1	2					

NOTE: Fuel tank is mounted to bracket with steel binder strapping which is not serviceable. When replacing fuel tank only, order replacement straps (Ref. 163).

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

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



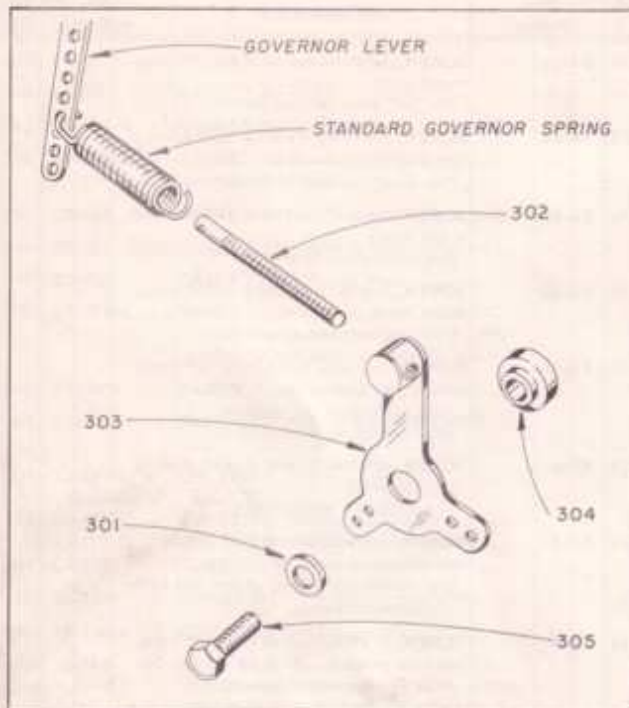
# PARTS INTERCHANGEABLE ON MODELS TRA-10D AND TR-10D

Ref. No.	Part Number	Description	No. Req.	Net Wt. Lb. Oz.	Ref. No.	Part Number	Description	No. Req.	Net Wt. Lb. Oz.
248	QD-670	FLANGE GASKET	1	1	274	XA-61	SCREW, 1/4"-20 thread x 1-3/4" long, round head	2	1
249	RF-269	STRAIGHT FITTING for fuel inlet	1	1			For fuel tank service straps.		
250	RF-1439	ELBOW in pump outlet	1	1	275	XA-66	SCREW, No. 5-40 thread x 1/4" long, round head	1	1
		STANDARD HARDWARE					For governor vane to shaft.		
253	HF-390	SPACER, 3/32" I.D. x 5/8" O.D. x 1/8" thick	1	1	276	XA-67	SCREW, No. 4 x 1/4" long, self-tapping, sheet metal	4	1
		For F.M. stator plate ignition wire clip.					For name plate to shroud.		
254	PB-160	SCREW, 1/4"-20 thread x 3/4" long, hex. hd.	1	1	277	XA-80	SCREW, No. 8-32 thread x 5/16" long, round head	1	1
		For air cleaner bracket support.					For breather reed mounting.		
255	PD-9	NUT, 1/4"-20 thread, hexagon steel	1	1	278	XA-118	SCREW, No. 8-32 thread x 5/16" long, plated pan head	2	1
		For governor control disc stud.					1-for breaker point bracket.		
256	PD-77	NUT, 1/4"-20 thread, hexagon steel	1	1			1-for condenser mounting.		
		For breaker cover.			280	XD-6	SCREW, 1/4"-20 thread x 3/4" long, hexagon head	2	1
258	PD-153-2	NUT, No. 8-32, hexagon steel	2	1			For mounting fuel pump.		
		For ground terminal stud.			281	XD-7	SCREW, 1/4"-20 thread x 1" long, hexagon head	3	1
259	PD-239	NUT, 1/4"-20 thread square steel	3	1			For coil-stator plate, or fan and bearing plate mounting.		
		1-for governor lever clamp.			282	XD-8	SCREW, 1/4"-20 thread x 1-1/4" long, hexagon head	4	1
		2-for fuel tank service straps.					3-for starter sleeve mounting.		
261	PE-3	LOCKWASHER, 1/4" spring lock	20	1			1-for air cleaner bracket clamp.		
		6-for gear cover to crankcase.			283	XD-9	SCREW, 1/4"-20 thread x 1-1/2" long, hexagon head	6	1
		1-for air cleaner bracket support.					For gear cover to crankcase.		
		3-for shrouding.			284	XD-16	SCREW, 5/16"-18 thread x 7/8" long, hexagon head	2	1
		1-for governor control disc.					For mounting carburetor.		
		2-for fuel pump mounting.			285	XD-25	SCREW, 3/8"-16 thread x 3/4" long, hexagon head	2	1
		2-for mounting manifold.					For mounting fuel tank bracket.		
		3-for stator plate.			286	XD-147	SCREW, 1/4"-20 thread x 2-1/2" long, hexagon head	1	1
262	PE-4	LOCKWASHER, 5/16"	2	1			For valve inspection cover mounting.		
		For mounting carburetor.			287	XK-1	PIPE PLUG, 1/8" square head	1	1
263	PE-5	LOCKWASHER, 5/8"	2	1			For inlet manifold.		
		For mounting fuel tank bracket.			288	XK-2	PIPE PLUG, 1/4" square head	1	2
265	PE-72	LOCKWASHER, No. 8 internal	1	1			For oil drain.		
		For ground clip.							
266	PE-89	LOCKWASHER, No. 8 Positive	2	1					
		1-for ground clip.							
		1-for breaker point bracket.							
267	PH-27-A	PLAIN WASHER, 1/4" I.D. x 9/16" O.D.	1	1					
		For gov. lever clamp screw.							
268	PH-30-A	PLAIN WASHER, 1/4" Steel	5	1					
		3-for coil-stator plate mounting.							
		1-for breaker cover.							
		1-for governor fulcrum shaft.							
269	PH-86-B	PLAIN WASHER, 11/64" I.D. x 3/8" O.D.	1	1					
		For ground terminal stud.							
270	PH-209-B	PLAIN WASHER, 3/16" Steel	9	1					
		For cylinder head mounting.							
271	PH-236	PLAIN WASHER, 13/64" I.D. x 1/2" O.D.	1	1					
		For breaker point bracket.							
272	XA-34	SCREW, 1/4"-20 thread x 1/2" long, hexagon head	5	1					
		3-for flywheel shroud to crankcase.							
		2-for flywheel shroud to cylinder head.							
		1-for cylinder side shroud to crankcase.							
		XD-4, replaced by XA-24.							
273	XA-36	SCREW, 1/4"-20 thread x 3/4" long, indented hexagon head	3	1					
		1-for governor lever clamp.							
		2-for manifold mounting.							
		XD-20, 1" long filler head screw, replaced by XA-38.							

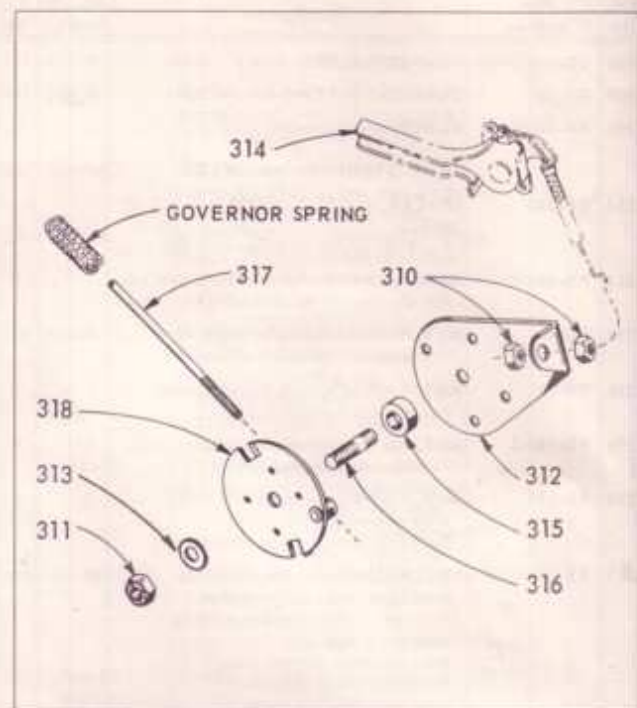
Order parts from nearest **SERVICE STATION** shown in directory following parts list.  
**IMPORTANT:** Always give Model, Specification and Serial Numbers as shown on name plate.

# VARIABLE SPEED GOVERNOR CONTROL ASSEMBLIES MODELS TRA-10D and TR-10D

TT-94-A



TT-94-C



Ref. No.	Part Number	Description	No. Req.	Net Wt. Lb. Oz.
	TT-94-A	INCLUDES THE FOLLOWING:		
301	PH-84	WASHER, 1/4" L.D. x 1/2" O.D. x 1/16" thick, plain steel ..... For lever mounting screw.	1	1
302	PI-115-B	ADJUSTING SCREW .....	1	2
303	VB-238-A	CONTROL LEVER ASSEMBLY .....	1	2
304	VE-570-A	FULCRUM SPACER for control lever .....	1	1
305	XA-35	SCREW, 1/4"-30 thread x 5/8" long, Indented hex. head ..... For mounting control lever.	1	1

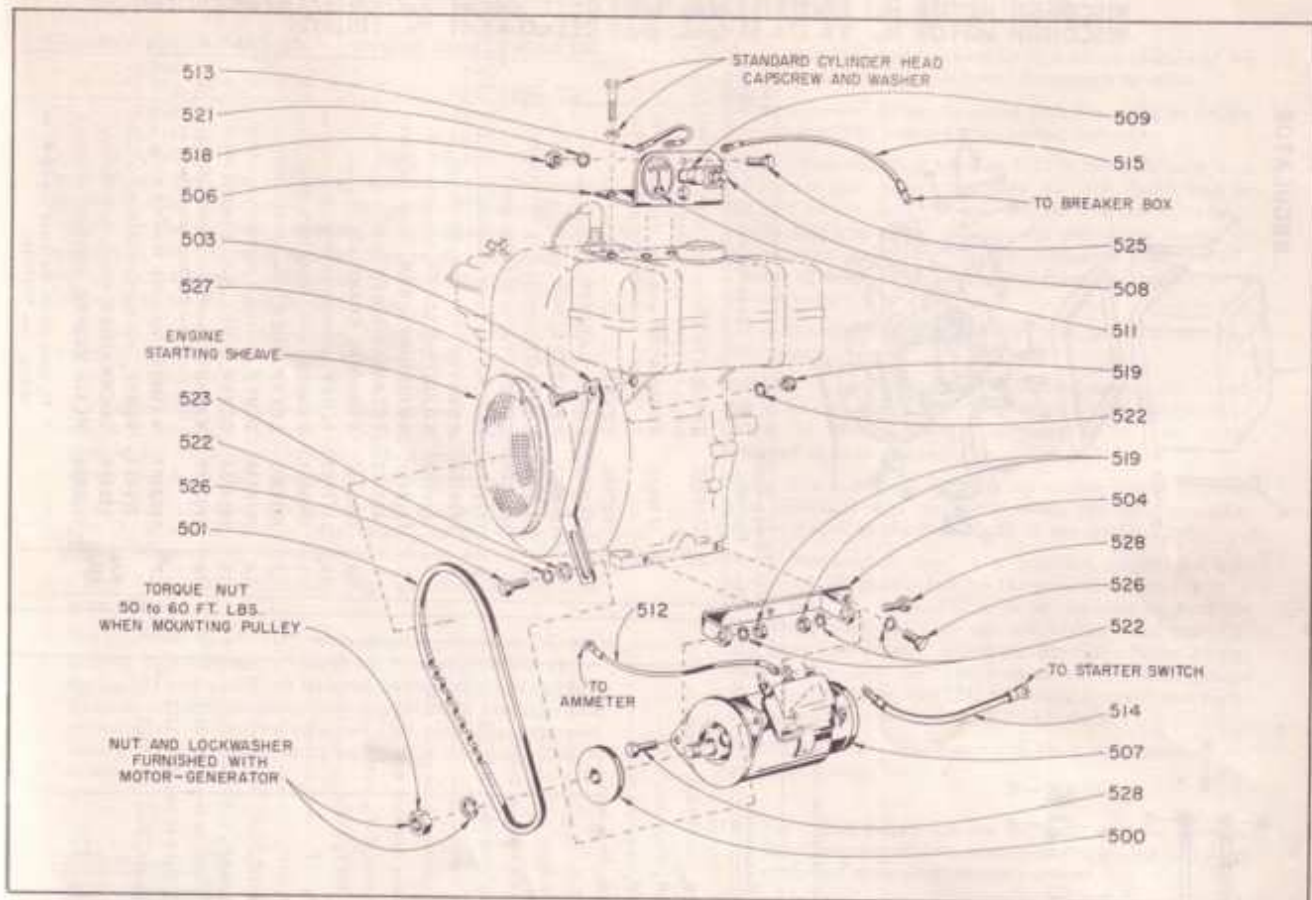
Ref. No.	Part Number	Description	No. Req.	Net Wt. Lb. Oz.
	TT-94-C	INCLUDES THE NEXT FOUR ITEMS:		
310	PD-187	LOCK NUT for wire casing .....	2	1
311	PD-251	LOCK NUT for control disc ..... PD-217, replaced by PD-251.	1	1
312	PG-1104	BRACKET for casing support .....	1	5
313	PH-30-A	WASHER for control disc .....	1	1
314	- - - -	CONTROL ASSEMBLY with wire and casing: Order by giving engine spec number, and required length. NOT INCLUDED AS PART OF TT-94-C ASSEMBLY.		
		THE FOLLOWING ITEMS ARE PART OF THE STANDARD ENGINE AND ARE NOT INCLUDED AS PART OF TT-94-C ASSEMBLY.		
315	HF-52	SPACER for control disc .....	1	1
316	PC-377	STUD for control disc .....	1	1
317	PI-217-1	ADJUSTING SCREW .....	1	1
318	VC-43-A	CONTROL DISC ASSEMBLY .....	1	3

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

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



# SK-1388 MOTOR-GENERATOR EQUIPMENT



Ref. No.	Part Number	Description	No. Req.	Net Wt. Lb. Oz.
500	MD-367-B	PULLEY for motor-generator, included with YB-37R-S1 motor-generator, but may be purchased separately when required.	1	4
501	MH-183	DRIVE BELT, 31" long, cog	1	6
503	PG-979	ADJUSTING STRAP	1	6
504	PG-1070	BRACKET for motor-generator	1	1
506	VE-799-B	CONTROL PANEL	1	8
507	YB-37R-S1	MOTOR-GENERATOR, 12 volt-10 amp. Delco-Remy No. 1101871 (neg. ground), beginning with engine No. 3889524. (Was No. 1101868 with 1118984 regulator) YB-37A-S1 (positive ground), Delco-Remy No. 1101872, replaced by YB-37R-S1, but with negative ground. NOTE: See Delco-Remy illustration for motor-generator service parts.	1	21
508	YC-9-F-51	GROUND SWITCH ASSEMBLY Includes: SD-109 Tag, PE-72 L.W.	1	2
509	YC-10-C	STARTER SWITCH	1	4
511	YE-6	AMMETER	1	6
512	YL-352-16	IGNITION WIRE ASSEMBLY Ammeter to regulator. (Batt. term.)	1	2
513	YL-353-4	IGNITION WIRE ASSEMBLY Starter switch to ammeter.	1	1
514	YL-356-20	STARTER CABLE ASSEMBLY Starter switch to motor-generator.	1	6
515	YL-352-23	IGNITION WIRE ASSEMBLY Ground switch to breaker box.	1	2

Ref. No.	Part Number	Description	No. Req.	Net Wt. Lb. Oz.
STANDARD HARDWARE				
518	PD-77	NUT, hexagon steel, 1/4"-20 thread For mounting starter switch.	2	1
519	PD-78	NUT, hexagon steel, 5/16"-18 thread 2-for mounting motor-generator. 1-for mounting adjusting strap.	3	1
521	PE-3	LOCKWASHER, 1/4" Positive For mounting starter switch.	2	1
522	PE-4	LOCKWASHER, 5/16" Positive 2-for mounting motor-generator. 2-for mounting adjusting strap. 2-for mounting bracket.	6	1
523	PH-209-B	WASHER, 5/16" plain, for adjusting strap at generator	1	1
525	XA-36	SCREW, 1/4"-20 thread x 1/2" long, indented hex head For mounting starter switch.	2	1
526	XD-15	CAPSCREW, hexagon head, 5/16"-18 thread x 1/2" long 1-for adjusting strap to generator. 2-for bracket to crankcase.	3	1
527	XD-16	CAPSCREW, hexagon head, 5/16"-18 thread x 7/8" long For adjusting strap to link bracket.	1	1
528	XD-19	CAPSCREW, hexagon head, 5/16"-18 thread x 1-1/4" long, heat treated For mounting motor-generator.	2	1

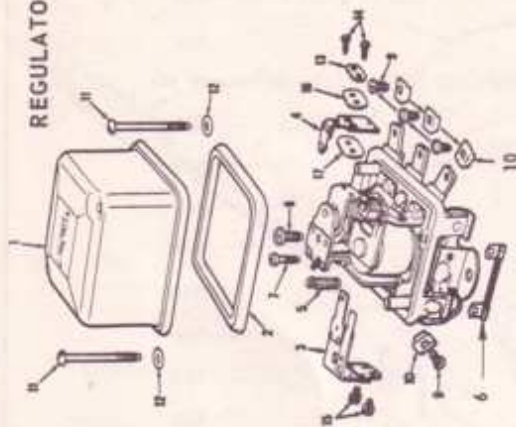
Order parts from nearest **SERVICE STATION** shown in directory following parts list.

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



**12 VOLT MOTOR-GENERATOR WITH REGULATOR**  
 WISCONSIN MOTOR No. YB-37R-51 (neg. grd.) DELCO-REMY No. 1101871 (was 1101868)  
 WISCONSIN MOTOR No. YB-37A-51 (pos. grd.) DELCO-REMY No. 1101972

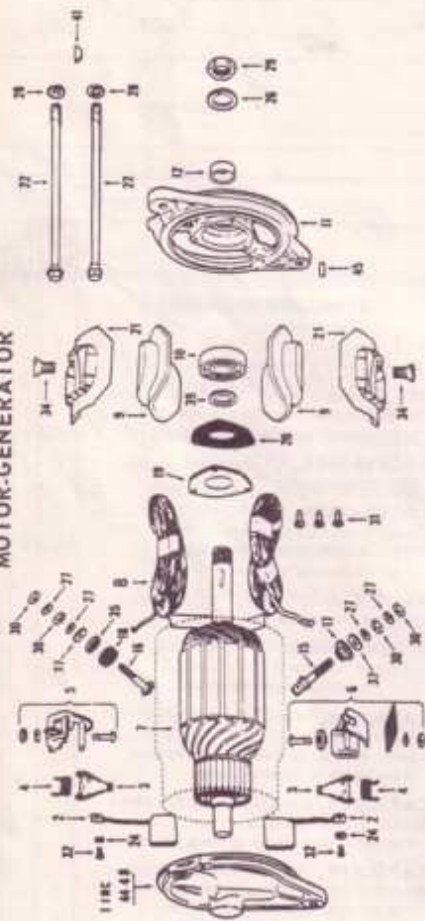
**REGULATOR**



Ref. No.	Delco-Remy Part No.	Description	No Req
1	1118983	REGULATOR (neg. grd.) for YB-37R-51 (repl. 1118984 for 1101868 motor-gen.)	1
2	1118985	REGULATOR (pos. grd.) for YB-37A-51 For service replacement use 1118791.	1
3	1927980	COVER	1
4	1953902	COVER GASKET	1
5	1878780	ARMATURE, relay	1
6	1878493	CONTACT, regulator (For 1118983)	1
7	1878517	CONTACT (For 1118985 reg.)	1
8	1912176	SPRING, regulator armature	1
9	1910174	RESISTOR, 475 ohms, in ground	1
10	1944590	ADJUSTING SCREW, regulator arm.	1
11	1912159	ADJUSTING SCREW, relay armature	1
12	433418	TERMINAL SCREW	4
13	1868137	TERMINAL CLAMP	4
14	1927982	SCREW, cover mounting	12
15	1915031	WASHER, ins., cover mounting	12
16	1878305	LOCKWASHER, reg. contact mt'g.	12
17	1878516	SCREW, regulator contact mounting	12
18	1924764	SCREW, (with L.W.), armature relay	12
19	1922599	WASHER, insulating (with bushing) For regulator contact mounting	12
20	1878507	WASHER, ins., reg. contact mt'g.	12
21	178451	SCREW, regulator mounting	12
22	138479	LOCKWASHER, regulator mounting	12
23	1856056	PLAIN WASHER, regulator mounting	12

\* If date code on base is 8-K or above, use 1939646.

**MOTOR-GENERATOR**



NOTE: Parts are interchangeable for both units, except where identified by motor-generator number.

Ref. No.	Delco-Remy Part No.	Description	No Req
1	1939907	FRAME, commutator end, (for 1101871) Includes 44, 46 and 1948326 plug.	1
2	1962407	FRAME (for 1101972)	1
3	1946427	BRUSH	2
4	1944373	BRUSH ARM (for 1101871)	2
5	1878183	BRUSH ARM (for 1101972)	2
6	1916324	BRUSH SPRING (for 1101871)	2
7	1908829	BRUSH SPRING (for 1101972)	2
8	1940421	GROUND BRUSH PACKAGE	1
9	1940422	INSULATED BRUSH PACKAGE	1
10	1939954	ARMATURE	1
11	1939952	FIELD COIL, R <sub>LH</sub> , with term. stud	1
12	1955597	FIELD COIL, L <sub>LH</sub> , with term. stud	1
13	1931258	POLE SHOE	2
14	954378	BALL BEARING, D.E.	1
15	1962412	FRAME, D.E.	1
16	1959991	COLLAR, D.E.	1
17	1858749	STUD, armature terminal	1
18	1858749	STUD, field terminal	1
19	1921362	BUSHING, armature terminal	1
20	1939894	BUSHING, arm. term., inside (not ill.)	1
21	1955494	BUSHING, field term. (incl. with stud)	1
22	1912008	PLATE, bearing retainer, D.E.	1
23	1914491	GASKET, bearing retainer plate	1
24	1914491	INSULATION, field coil	2

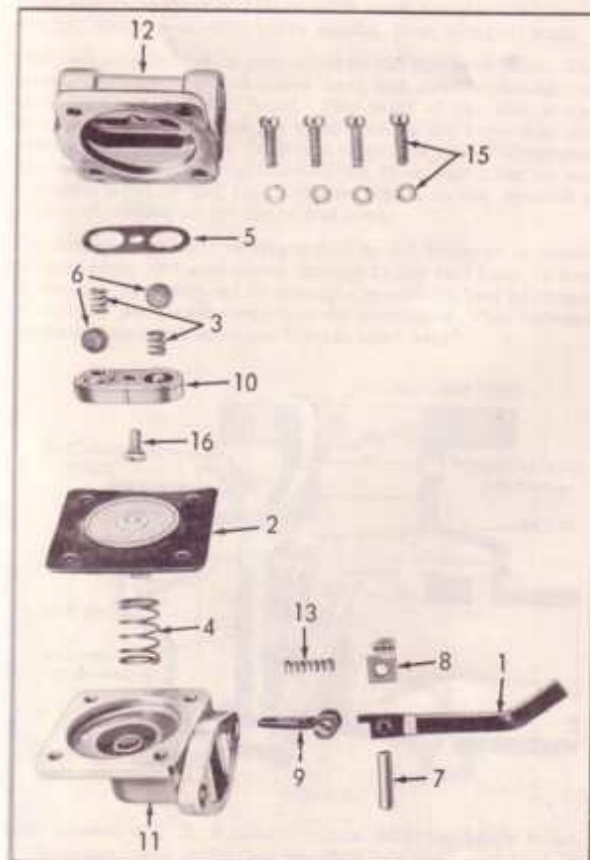


## INSTRUCTIONS FOR MAINTENANCE AND REPAIR OF FUEL PUMP

WISCONSIN MOTOR PART NO.	ENGINE MODELS USED ON
LP-42-A	THD
LP-42-B	ACN, BKN, AENL
LP-42-G	AGND
LP-42-L	S-7D
LP-42-N	S-8D, TR-10D, TRA-10D

The efficiency of the fuel pump will gradually decrease any time after 500 hours of operation. This will be dictated by the engines faltering at high speeds or when heavy loads are suddenly applied. The pump can easily be restored to its normal efficiency by the installation of a Wisconsin Motor No. LQ-28 repair kit.

1. Remove the fuel lines and the two mounting bolts which hold the pump to the engine. Take the pump to a work bench or suitable place.
2. With file, make an indicating mark across a point at the union of castings (11 and 12). This is a positive location of the fuel line positions when reassembling. Remove four assembly screws (15) and remove fuel head.
3. Turn head (12) over and remove one screw (16). Remove (10, 3, 6 and 5) valve assemblies, noting their positions. Discard the above parts (3, 6 and 5).
4. Clean fuel head thoroughly with gasoline and a fine wire brush.
5. Holding fuel head, (12) with diaphragm surface (containing four clearance holes) up, reassemble the valve spring (3) and valve (6) into the cavity from which they were removed. Now place new gasket (5) in position and reassemble the valve retainer (10) into position and lock it by inserting and tightening the fuel pump valve retainer screw (16).



176824C

6. Place this fuel head assembly in a clean place and we are ready to rebuild the lower diaphragm section.
7. Using a screw driver, inserted into the coils of rocker arm spring (13), remove this spring and save.
8. Holding the mounting bracket (11) in the left hand with the rocker arm toward the body and the thumb nail on the end of the link (9) with the heel of the right hand on the diaphragm (2) compress the diaphragm spring (4) at the same time, turning in a clockwise position 90°. This will unhook the diaphragm from the link (9) so it can be removed.
9. Clean the mounting bracket (11) with gasoline and fine wire brush.
10. Replace the new diaphragm operating spring (4), standing it into casting (11). Repeat in reverse step eight, using the new diaphragm. Replace rocker arm spring removed in step seven.
11. Mount this assembly back on the engine in the position from which it was removed, using the new mounting gasket which is the last piece of the repair kit.
12. Crank the engine over to a position where the diaphragm (2) is laying flat on the mounting bracket (11). Place the fuel head (12) back in position so that the indicating marks of step one are in line, and start the four assembly screws approximately three turns. Again, crank the engine over to a position where the diaphragm (2) is pulled down into (11) mounting bracket and tighten the four assembly screws (15) tightly.
13. Connect the fuel lines and you have a completely rebuilt fuel pump.

**NOTE:** The LQ-28 Repair 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	1
* 3	VALVE SPRING	2
* 4	DIAPHRAGM SPRING	1
* 5	VALVE GASKET	1
* 6	VALVE	2
7	ROCKER ARM PIN	1
8	SPRING CLIP for rocker arm	1
9	LINKAGE	1
10	VALVE PLATE and SEATS	1
11	MOUNTING BRACKET	1
12	HEAD	1
13	ROCKER ARM SPRING	1
15	ASSEM. SCREW and LOCKWASHER	4
16	VALVE PLATE SCREW and LOCKWASHER	1
*	MOUNTING FLANGE GASKET (not illustrated)	1

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



# ZENITH 68-7 SERIES CARBURETOR

Wisconsin Motor Corporation Part No. L-63 Series

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

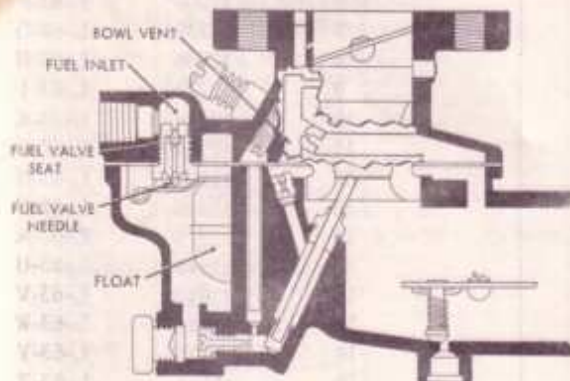


Figure 1

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

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

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

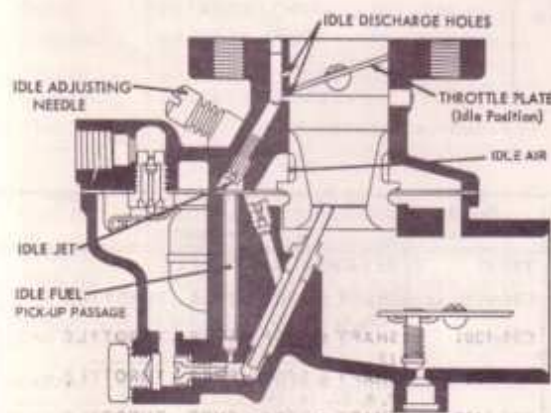


Figure 2

Idle system, Fig. 2, consists of two idle discharge holes, idle air passage, idle adjusting needle, idle jet, and fuel pick-up passage.

The fuel for idle is supplied through the main jet to a well directly below the main discharge jet. The pick-up passage is connected to this well by a restricted drilling at the bottom of this pas-

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

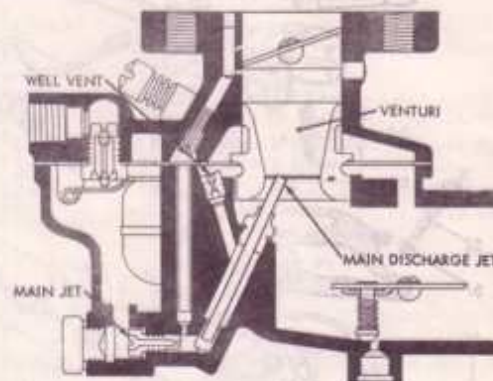


Figure 3

High speed system, Fig. 3, controls the fuel mixture at part throttle speeds and at wide open throttle. This system consists of a venturi, controlling the maximum volume of air admitted into the engine; the main jet, which regulates the flow of fuel from the float chamber to the main discharge jet; the well vent, which maintains uniform mixture ratio under changing suction and engine speeds; and a main discharge jet, which delivers the fuel into the air stream.

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

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

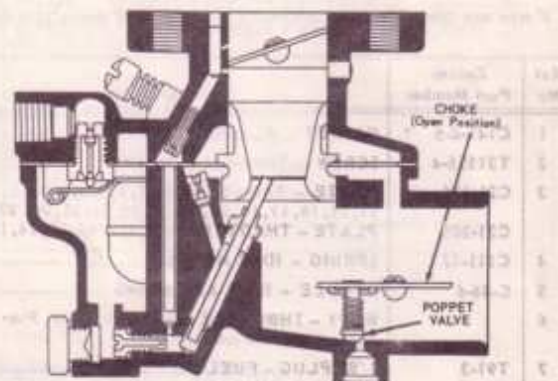


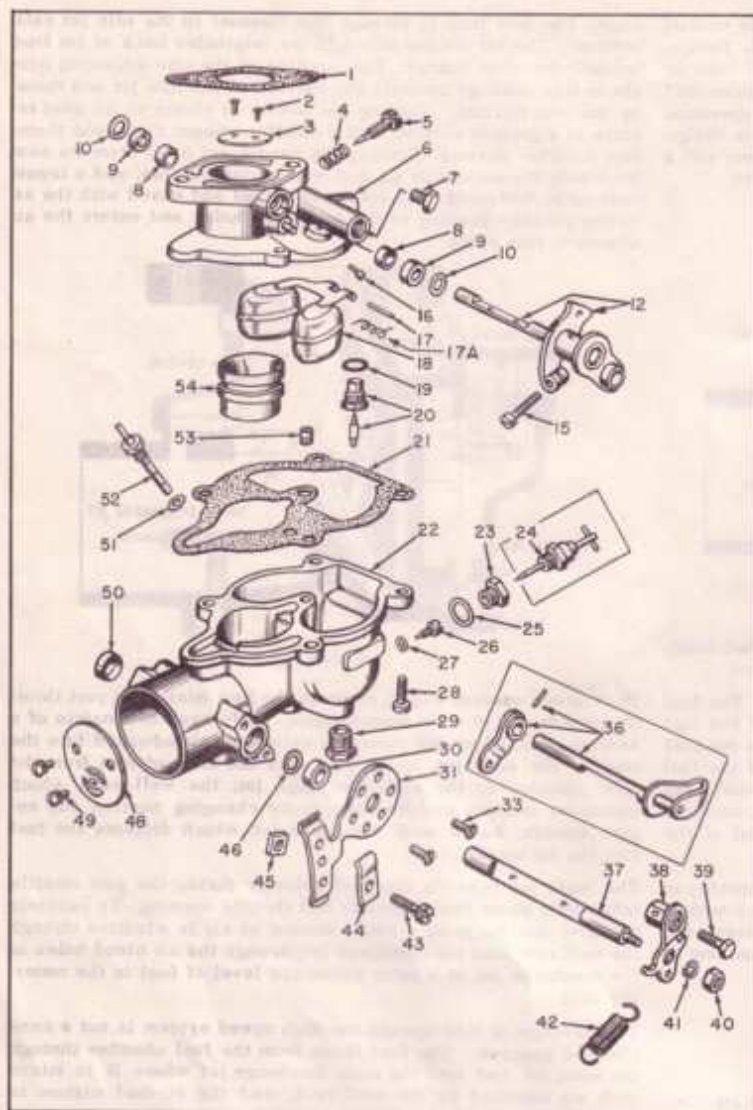
Figure 4

Choke system, Fig. 4, consists of a valve mounted on a shaft



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

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



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

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

Ref No	Zenith Part Number	Description	No Req
1	C141-4-5 *	GASKET - FLANGE	1
2	T3155-4	SCREW - THROTTLE PLATE	2
3	C21-176	PLATE - THROTTLE for 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27	1
	C21-205	PLATE - THROTTLE for 5, 7, 8, 10, 12, 14, 18	1
4	C111-17	SPRING - IDLE NEEDLE	1
5	C-46-6 *	NEEDLE - IDLE ADJUSTING	1
6		BODY - THROTTLE (Not serviceable. Purchase complete carburetor).	1
7	T91-3	1/8" PLUG - FUEL INLET R.H.	1
8	C-9-75	BUSHING - THROTTLE SHAFT	2
9	T48-9 *	SEAL - THROTTLE SHAFT	2

Ref No	Zenith Part Number	Description	No Req
10	T52-57 *	RETAINER - SHAFT SEAL	2
12	C29-491	SHAFT & STOP LEVER - THROTTLE for 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23	1
	C29-1301	SHAFT & STOP LEVER - THROTTLE for 4, 13	1
	C29-926	SHAFT & STOP LEVER - THROTTLE for 5, 7, 8, 10, 14, 18	1
	C29-1418	SHAFT & STOP LEVER - THROTTLE for 25, 27	1
	C29-1476	SHAFT & STOP LEVER - THROTTLE for 15, 16	1
	C29-858	SHAFT & STOP LEVER - THROTTLE for 2, 24	1
	C29-1475	SHAFT & STOP LEVER - THROTTLE for 12	1
	C29-1584	SHAFT & STOP LEVER - THROTTLE for 26	1



# PARTS LIST FOR ZENITH MODEL 68-7 CARBURETOR

Ref No	Zenith Part Number	Description	No Req
15	T858-12	SCREW-THROTTLE STOP for 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24	1
	T858-10	SCREW-THROTTLE STOP for 25, 27	1
16	C55-6-12	JET-IDLE for 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26	1
	C55-22-11	JET-IDLE for 25, 27	1
17	C120-4	AXLE-FLOAT	1
17A	C117-79	SPRING-FLOAT for 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 22, 23, 24, 25, 26, 27	1
18	C85-103	FLOAT and HINGE ASSEMBLY	1
19	T56-70	FIBRE WASHER-FUEL VALVE SEAT	1
20	C81-17-35	VALVE & SEAT-FUEL for 1, 4, 6, 16, 21	1
	C81-50-35	VALVE, SEAT, SPRING-FUEL for 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26, 27	1
	C81-50-25	VALVE, SEAT, SPRING-FUEL for 17, 18, 19	1
	C81-17-25	VALVE & SEAT-FUEL for 20	1
21	C142-74	GASKET-BOWL TO BODY	1
22	B3-121B-1	BOWL-FUEL for 1, 8, 20, 21	1
	B3-121A-3	BOWL-FUEL for 2, 5, 10, 12, 18	1
	B3-121A-1	BOWL-FUEL for 3, 7, 8, 9, 11, 14, 17, 19, 22, 24	1
	B3-121B-2	BOWL-FUEL for 4	1
	B3-121A-2	BOWL-FUEL for 13	1
	B3-121E-1	BOWL-FUEL for 15, 23	1
	B3-121F-1	BOWL-FUEL for 16	1
	B3-121D-6	BOWL-FUEL for 25	1
	B3-121A-7	BOWL-FUEL for 26	1
	B3-121A-8	BOWL-FUEL for 27	1
23	C138-24	PLUG-MAIN JET PASSAGE for 1, 3, 4, 8, 10, 15, 16, 19, 20, 21, 22, 23, 24, 26	1
24	C71-21	ADJUSTMENT-MAIN JET for 3, 5, 6, 7, 9, 11, 12, 13, 14, 17, 18, 25, 27	1
25	T56-23	FIBRE WASHER-PASSAGE PLUG	1
26	C52-7-22	JET-MAIN for 1, 4, 16, 20, 21	1
	C52-7-33	JET-MAIN for 2, 13, 25, 27	1
	C52-7-26	JET-MAIN for 5, 7, 11, 12, 14, 17, 19	1
	C52-7-25	JET-MAIN for 8	1
	C52-7-19	JET-MAIN for 9	1
	C52-7-30	JET-MAIN for 9	1
	C52-7-21	JET-MAIN for 10	1
	C52-7-23	JET-MAIN for 3, 15, 19, 22, 23, 24, 26	1
27	T56-24	FIBRE WASHER-MAIN JET	1
28	T301510-10	SCREWS-BOWL TO BODY ASSEMBLY	4
29	T91-3	PLUG-BOWL DRAIN	1
30	C131-4X2	RETAINER-CHOKE SHAFT SEAL for 1 thru 25, 27	1
	T52-53	RETAINER-CHOKE SHAFT SEAL for 26	1
31	C109-60C	BRACKET-CHOKE for 1, 3, 6, 7, 8, 9, 11, 14, 15, 16, 17, 19, 20, 21, 23, 24, 26	1
	C109-60C-2	BRACKET-CHOKE for 4, 13, 27	1
	C109-60C-1	BRACKET-CHOKE for 22	1
33	C140-58	SCREWS-CHOKE BRACKET ASSEMBLY for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 27	2
36	C108-280	SHAFT & FRICTION LEVER-CHOKE for 2	1
	C108-279	SHAFT & FRICTION LEVER-CHOKE for 5, 10, 12, 18	1
	C108-277	SHAFT & FRICTION LEVER-CHOKE for 25	1
37	C105-286	SHAFT-CHOKE for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 27	1
38	C106-2	LEVER-CHOKE for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 27	1

Ref No	Zenith Part Number	Description	No Req
39	T858-7	SCREW-CHOKE LEVER SWIVEL for 1, 3, 4, 5, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 27	1
40	T2258	NUT-CHOKE SHAFT for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 27	1
41	T41-10	LOCKWASHER-CHOKE SHAFT NUT for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 27	1
42	C112-6	SPRING-CHOKE LEVER RETURN for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 27	1
43	T858-8	SCREW-BRACKET CLIP for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 27	1
44	C110-7	CLIP-BRACKET TUBE for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 27	1
45	T2158	NUT-CLAMP SCREW for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 26, 27	1
46	CT57-4	SEAL-CHOKE SHAFT for 1 thru 25, 27	1
	T48-9	SEAL-CHOKE SHAFT for 26	1
48	C101-80	PLATE-CHOKE for 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26	1
	C101-85	PLATE-CHOKE for 2, 13, 25, 27	1
49	T31555-4	SCREWS-CHOKE PLATE	2
50	CR37-1X1	PLUG-CHOKE SHAFT HOLE for 1, 3, 4, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27	1
51	T56-48	FIBRE WASHER-DISCHARGE JET	1
52	C66-114-60	JET-DISCHARGE for 1, 4, 6, 16, 20, 21	1
	C66-114-45	JET-DISCHARGE for 2, 13, 25, 27	1
	C66-114-50	JET-DISCHARGE for 3, 5, 11, 15, 17, 19, 22, 23, 24, 26	1
	C66-114-40	JET-DISCHARGE for 5, 7, 8, 10, 12, 14, 18	1
53	C77-18-12	JET-WELL VENT for 1, 4, 6, 16, 20, 21	1
	C77-18-13	JET-WELL VENT for 2, 13, 25, 27	1
	C77-18-22	JET-WELL VENT for 3, 5, 11, 15, 17, 19, 22, 23, 24, 26	1
	C77-18-17	JET-WELL VENT for 5, 7, 8, 10, 12, 14, 18	1
54	B38-74-18	VENTURI for 1, 3, 4, 6, 8, 11, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26	1
	B38-74-19	VENTURI for 2, 13, 25, 27	1
	B38-74-17	VENTURI for 5, 7, 8, 10, 12, 14, 18	1
-	C24-54AD-1X2	LEVER-THROTTLE CLAMP for 15, 16	1
-	T8B10-9	SCREW-LEVER CLAMP for 15, 16	1
-	T8B8-10	SCREW-LEVER SWIVEL for 15, 16	1
-	C181-329	KIT-GASKET	1
-	LQ-39	KIT-REPAIR PARTS for 1, 4, 6, 16, 21	1
-	LQ-33	KIT-REPAIR PARTS for 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26, 27	1
-	K-2130	KIT-REPAIR PARTS for 18	1
-	K-*	KIT-REPAIR PARTS for 17, 19, 20	1

\* Parts in Repair Kit

† Parts in Gasket Set

\*\* Specify Carburetor Assembly Numbers

Order parts from nearest **SERVICE STATION** shown in directory

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