Instruction Book
and
Repair Parts List
for
CHARGING SET-300 WATT
Manufacturers Model Numbers
EG1-300
EG2-300
EG3-300

OUTBOARD MARINE & MANUFACTURING
CO. OF CANADA Limited
PETERBORO, CANADA
INTRODUCTION

The Charging Set covered by this Manual, is designed to charge a 12 volt storage battery, or two 6 volt storage batteries, connected in series. The generator output with full field is 20 amps at 15 volts; the charging rate may be regulated by a field rheostat, which is built into the unit.
THE GENERATOR

The STARTER-GENERATOR is a self contained unit and requires no attention other than to regulate the output according to the load on the batteries to keep them properly charged. The output of the GENERATOR is indicated by the Ammeter on the front panel and is adjusted by means of the small knob on top of the Control Box. (See Fig. 2) The GENERATOR is of the four pole, four brush, shunt wound type (See Fig. 3) and the output or charging rate is adjusted by means of a variable rheostat in series with the shunt field, which varies the excitation in the shunt field and increases or decreases the output accordingly.

The GENERATOR consists mainly of field frame, field coils, (series, field and shunt field) armature, brushes and brush plate. It has no bearings that require attention as the armature is mounted directly on the crankshaft and is supported by the engine bearings. It is also equipped with an electrical cut-out (See Fig. 3) that automatically connects the GENERATOR to the batteries when the engine is started and disconnects the batteries when the engine stops, which prevents the batteries from being discharged back through the GENERATOR after stopping.
GENERATOR WIRING DIAGRAM
12 VOLT, 300 WATT
MODEL CHI

NOTE:
- Short Lead to Insulated Brush Post.
  Lead 4½" long. Terminal for 8-30 Screw.
  Series Lead to Starter Contact on Instrument Panel. Lead 3½" long.
  Terminal for 8-30 Screw.

When facing the back of the Ammeter, the left-hand post is the "Positive".

Fig 3
BATTERIES

Storage batteries of the type used in the modern automobile for starting and lighting, with 100 to 150 ampere hour capacity, are recommended. Be sure the ampere hour capacity is given at the S.A.E. rate and not at the radio rate or low discharge rate. The length of time that lights or radio can be operated from a storage battery, before it has to be recharged, is determined by the ampere hour capacity and the load—the useful life of a storage battery is governed by the number of times it is charged and discharged—thus it can be readily noted that a battery of high ampere hour capacity will give longer life and will require less frequent charging which will offset the additional cost over a smaller battery in reduced operating expense and more satisfactory operation of the entire plant. Ampere hour capacity is a true measure of value.

For practical purposes it is possible to use about 80% of the rated ampere hour capacity from a fully charged battery before it is necessary to recharge it. As an example we will assume that we intend to operate two 50 watt bulbs and four 25 watt bulbs all at the same time, which gives us a total of 200 watts, from one 100 ampere hour 12 volt battery. (Two 6 volt batteries of 200 ampere hour rating, connected in series, have the same capacity as one 12 volt battery with a 200 ampere hour rating). We now divide the total watts by 12 (the voltage) to find the total amperage consumed by the six bulbs which in this case is approximately 16.5 amperes. Then divide 160 (80% of the 200 ampere hour capacity) by 16.5 to get the total number of hours the six bulbs may be expected to give satisfactory operation before it is necessary to recharge the battery. In this case we find the total to be approximately 9.7 hours. Fewer or smaller bulbs will operate longer and more or larger bulbs a shorter time in proportion, from the same capacity battery.

It is not recommended that the batteries be completely discharged before the GENERATOR is started nor that a heavy load be drawn from the batteries for any length of time without the GENERATOR in operation.

BATTERY CONNECTIONS

When two six volt batteries are used they should be connected in series to furnish the necessary twelve volts. The Positive (+) post of one battery should be connected to the Negative (−) post of the other with a short, heavy cable provided with a regular battery clamp securely soldered at each end.

After connecting the batteries in series as mentioned above, the remaining Positive (+) post should be connected to the Positive (+) terminal (See Fig. 2) on the front of the GENERATOR Control Box, and the remaining Negative (−) post should be connected to the Negative (−) terminal on the GENERATOR Control Box by means of the battery leads furnished with each unit.

The wires to the light or other appliance should also connect direct to the batteries with the same battery clamp terminals that are used to connect the GENERATOR to the batteries. After all the connections are made tight the battery posts and clamps should be coated with a light coat of thin grease to prevent corrosion.

If one twelve volt battery is used it is merely necessary to connect the Positive (+) post to the Positive terminal of the GENERATOR and the Negative (−) post to the Negative terminal of the GENERATOR using the battery leads furnished. The wires to the lights or other appliance are also connected direct to the battery as mentioned previously.
CARE OF BATTERIES

Storage batteries, like human beings, will suffer from thirst, starvation, overwork and over feeding. The amount of proper care given a battery will determine the amount of satisfactory service it will give.

The batteries should be inspected at regular intervals and should be kept filled to within one-half inch above the plates with good clean Distilled Water. Do not fill above this level as the solution will expand with heat when the batteries are charged and overflow the cells. Do Not use city water or well water as the impurities in any but distilled water are harmful to a storage battery.

CAUTION — Battery solution contains a POISONOUS, DANGEROUS ACID and should not be spilled on clothing, upholstery, etc., nor allowed to come in contact with the skin. NOTE — In case of accidental spillage, the battery solution should be washed off immediately with Ammonia Water.

To determine the amount of charge in a battery the cells should be tested with a hydrometer and if the specific Gravity is down to 1.150 or lower the GENERATOR should be started and left running until the specific gravity is 1.275 or higher. A fully charged battery has a specific gravity of 1.275 to 1.295. (See Chart).

INSTALLATION

The charging set and batteries should preferably be installed in an outside building or shelter that will furnish adequate protection from dust, dirt, moisture and extremely low temperatures.

The installation should be made in such a manner that the battery wires furnished with the GENERATOR (which are of the proper size and length to insure minimum losses both when starting and charging) can be used to connect the batteries to the GENERATOR—that the wires from the batteries to the lights or radio will be as short as possible—that the complete setup will be readily accessible for refueling, oil changing and care of the batteries — and that adequate ventilation will be provided to insure proper cooling of the engine.

When the installation is to be permanent both the GENERATOR and the batteries should be mounted on a good substantial base high enough above the floor to avoid dirt and moisture, and to simplify the care and operation of the complete installation. Do not mount the GENERATOR directly on a concrete base or floor but provide a wooden sub-base to absorb part of the vibration and prevent damage to the unit, which might result if it were bolted solid to a rigid base.

It is also well to install the GENERATOR in such a manner that the combination V pulley and rope starter, which is on the flywheel side of the engine, will be readily accessible in case you should desire, in case of emergency to start the unit manually with the rope starter.
EXHAUST

THE CHARGING SET SHOULD NOT BE OPERATED INSIDE A BUILDING UNLESS THE EXHAUST IS PIPED OUTSIDE NOR WITH THE EXHAUST OUTLET LOCATED IN SUCH A MANNER THAT THE FUMES WILL BE BLOWN INTO LIVING QUARTERS THROUGH AN OPEN WINDOW OR DOOR. The Exhaust pipe should be absolutely leakproof, as short and straight as possible and should be made of ¾” pipe.

If the exhaust pipe rises above the engine a condensation trap should be provided to prevent moisture from getting into the engine which might result in serious damage. (See illustration). This is easily accomplished by installing an ordinary pipe T in the exhaust pipe at the lowest point, with a short length of pipe installed in the side opening of the T pointing downward and provided with a drain plug to permit the accumulated moisture to be drained out. This should be done at regular intervals to prevent the trap from becoming full and overflowing into the engine.

Do Not support more than one foot of exhaust pipe from the exhaust opening in the cylinder, any length of pipe over this amount should be provided with additional support to prevent breakage of the cylinder casting.

If the exhaust pipe passes through a wall constructed of wood or other combustible material plenty of clearance should be provided at this point and the necessary precautions taken to eliminate a fire hazard. The muffler furnished with the unit should be installed at the end of the exhaust pipe outside the building to silence the exhaust.

REMEMBER—THE EXHAUST FROM ANY GASOLINE POWERED ENGINE CONTAINS DEADLY POISONOUS CARBON MONOXIDE FUMES AND FOR THIS REASON SHOULD NOT BE OPERATED INSIDE A BUILDING UNLESS THE EXHAUST GASES ARE PIPED OUTSIDE AS OUTLINED ABOVE.

Keep the exhaust pipe as short and straight as possible and Do Not use elbows but make long pipe bends where necessary, to eliminate back pressure and prevent excessive accumulation of carbon.

WIRING

Before going ahead with any wiring installation the possibilities and limitations of low voltage lighting systems should be thoroughly understood in order that the charging set can be used to the best advantage and to eliminate unsatisfactory performance due to improper or wrong size of wiring.

The distance that lights can be operated from the batteries is shorter than with 110 volt current, due to the fact that 12 volts are used and that larger wire is necessary to conduct the current from the batteries to the lights.

To get a better understanding of why larger wire is necessary at low voltage let us illustrate the characteristics of electricity by comparing it with water.

<table>
<thead>
<tr>
<th>ELECTRICITY</th>
<th>WATER—</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>Storage Tank</td>
</tr>
<tr>
<td>Volts</td>
<td>Pressure</td>
</tr>
<tr>
<td>Amperes</td>
<td>Gallons</td>
</tr>
<tr>
<td>Wire</td>
<td>Hose</td>
</tr>
<tr>
<td>Resistance</td>
<td>Friction</td>
</tr>
<tr>
<td>Bulb</td>
<td>Nozzle</td>
</tr>
<tr>
<td>Light</td>
<td>Stream</td>
</tr>
</tbody>
</table>
When water is forced through a hose the friction of the water against the inside of the hose tends to hold back or slow down the flow of water and for this reason the pressure at the nozzle is less than at the supply tank. If a larger hose is used the friction is much less and the pressure loss is less in proportion.

Likewise, when a wire is used to conduct electricity from one point to another, the wire has a tendency to hold back the electricity, which in electrical terms is known as resistance, thus causing the voltage at the end of the wire to be less than at the battery. As is the case with the hose, a smaller wire has more resistance than a larger wire and a larger wire has less resistance than a smaller wire of the same length.

If the voltage (or pressure) is low to start with, the voltage lost through resistance will be a greater percentage of the original voltage and means a greater loss of efficiency. For example a 3 volt loss in a 12 volt system is a 25% loss, which means a corresponding loss in lighting efficiency.

The amount or number of gallons forced through a hose at a certain pressure determines the size of hose necessary to prevent excessive friction loss.

The same thing applies to any electrical circuit—the number of amperes necessary to operate a light bulb, or a group of light bulbs, and also the distance of the load from the batteries, determines the size of wire necessary to prevent excessive voltage drop. A long wire will have to be bigger than a short wire to carry the same load.

Following is a wire size chart from which the wire sizes can be determined for various light loads at various distance from the batteries.

**WIRE SIZE CHART**

**DISTANCE BETWEEN BATTERY AND LAMPS (ONE WAY)**

<table>
<thead>
<tr>
<th>Wire Size</th>
<th>1 Lamp</th>
<th>2 Lamps</th>
<th>3 Lamps</th>
<th>4 Lamps</th>
<th>5 Lamps</th>
<th>6 Lamps</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1,000 ft.</td>
<td>500 ft.</td>
<td>325 ft.</td>
<td>250 ft.</td>
<td>200 ft.</td>
<td>150 ft.</td>
</tr>
<tr>
<td>6</td>
<td>600 ft.</td>
<td>300 ft.</td>
<td>200 ft.</td>
<td>150 ft.</td>
<td>125 ft.</td>
<td>105 ft.</td>
</tr>
<tr>
<td>Lamps of 25-Watt</td>
<td>8</td>
<td>375 ft.</td>
<td>195 ft.</td>
<td>130 ft.</td>
<td>95 ft.</td>
<td>75 ft.</td>
</tr>
<tr>
<td>size</td>
<td>10</td>
<td>250 ft.</td>
<td>125 ft.</td>
<td>80 ft.</td>
<td>60 ft.</td>
<td>50 ft.</td>
</tr>
<tr>
<td>12</td>
<td>105 ft.</td>
<td>75 ft.</td>
<td>50 ft.</td>
<td>35 ft.</td>
<td>30 ft.</td>
<td>25 ft.</td>
</tr>
<tr>
<td>14</td>
<td>95 ft.</td>
<td>55 ft.</td>
<td>32 ft.</td>
<td>24 ft.</td>
<td>18 ft.</td>
<td>16 ft.</td>
</tr>
<tr>
<td>4</td>
<td>500 ft.</td>
<td>250 ft.</td>
<td>165 ft.</td>
<td>125 ft.</td>
<td>100 ft.</td>
<td>75 ft.</td>
</tr>
<tr>
<td>Lamps of 50-Watt</td>
<td>6</td>
<td>300 ft.</td>
<td>150 ft.</td>
<td>100 ft.</td>
<td>75 ft.</td>
<td>65 ft.</td>
</tr>
<tr>
<td>size</td>
<td>10</td>
<td>125 ft.</td>
<td>60 ft.</td>
<td>40 ft.</td>
<td>30 ft.</td>
<td>25 ft.</td>
</tr>
<tr>
<td>12</td>
<td>50 ft.</td>
<td>35 ft.</td>
<td>25 ft.</td>
<td>17 ft.</td>
<td>15 ft.</td>
<td>12 ft.</td>
</tr>
</tbody>
</table>

**DISTANCE BETWEEN BATTERY AND RADIO (ONE WAY)**

<table>
<thead>
<tr>
<th>Amps</th>
<th>W'ts</th>
<th>10 ft.</th>
<th>20 ft.</th>
<th>30 ft.</th>
<th>40 ft.</th>
<th>50 ft.</th>
<th>60 ft.</th>
<th>70 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>9</td>
<td>No. 18</td>
<td>No. 18</td>
<td>No. 18</td>
<td>No. 16</td>
<td>No. 14</td>
<td>No. 14</td>
<td>No. 12</td>
</tr>
<tr>
<td>8-Volt</td>
<td>2.0</td>
<td>12</td>
<td>No. 18</td>
<td>No. 16</td>
<td>No. 16</td>
<td>No. 14</td>
<td>No. 12</td>
<td>No. 12</td>
</tr>
<tr>
<td>Radio</td>
<td>2.5</td>
<td>15</td>
<td>No. 16</td>
<td>No. 16</td>
<td>No. 14</td>
<td>No. 12</td>
<td>No. 12</td>
<td>No. 10</td>
</tr>
<tr>
<td>3.0</td>
<td>18</td>
<td>No. 16</td>
<td>No. 16</td>
<td>No. 14</td>
<td>No. 12</td>
<td>No. 12</td>
<td>No. 10</td>
<td>No. 10</td>
</tr>
</tbody>
</table>

Note: Wire size determined by Amperes carried.

**STARTING AND OPERATING INSTRUCTIONS**

LUBRICATION—Before starting the charging set, remove the large plug in the front of the crankcase (See Fig. 1) and fill to the overflow point with high grade oil S.A.E. No.
OILING INSTRUCTIONS FOR SUB-ZERO TEMPERATURES

When operating motor in sub-zero temperatures, mix kerosene with oil as follows:

32° to – 10. S.A.E. No. 10W
– 10° and below SAE No. 10W with 20% Kerosene.

Under no circumstances should more than 30% kerosene be used. No kerosene should be used at temperatures above zero.

When filled to the overflow point, with the unit in a level position, the oil is at the proper level. Replace the plug tightly to prevent leakage. Do Not Mix Oil With the Gasoline.

The oil level should be checked each time the unit is put in operation or after every eight hours of running, and filled to the proper level if necessary.

After every 25 hours of running the oil should be all drained out (while the engine is hot) by removing the small plug below the filler plug, and the crankcase should then be refilled to the original level with a Fresh Supply of the correct grade of oil.

GASOLINE—Remove the large plug in the left front corner of the cast base (See Fig. 1) and fill with any good grade of REGULAR gasoline. Do not fill too full but leave room for expansion to prevent the gasoline from overflowing. Do Not Use High Test or Premium Gasoline. Most brands of gasoline now on the market contain Ethyl-lead in various quantities—however, this will in no way affect the operation or performance of the engine as long as the REGULAR grade is used.

The gasoline should occasionally be all drained out of the tank to remove any moisture that may have gathered due to condensation, by removing the small plug below the filler plug.

WARNING—Gasoline should not be allowed to stand for long periods of time in the gasoline tank if the charging set is not in use. All brands and grades of gasoline, if allowed to stand unused for long periods, will form a gum deposit on the inside of the tank, in the carburetor and all other parts exposed to the gasoline, which may seriously interfere with the operation of the engine. Should this condition exist, it will be necessary to remove the gum deposits by washing the affected parts in Alcohol.

TO START—Turn the Output Control to LOW (to the left as far as it will go)—this is important in order that the starter will develop its maximum power when cranking the engine, especially during colder weather when the oil is in a congealed condition.

Pull out the Choke, which is located on top of the flywheel shroud and firmly depress the Starter Button. After the engine has made several revolutions the Choke should be slowly pushed in until the engine starts to fire and run under its own power. After the engine starts to run, release the Starter Button and slowly push the Choke all the way in, allowing sufficient time for the engine to warm up and run steadily.

If the engine does not start readily or runs unevenly, it is possible the needle valve (See Fig. 3) may not be properly adjusted. Turning the needle valve to the right LEANS the fuel mixture and turning it to the left RICHENS the mixture. The approximate setting with the engine warm and under load is ½ to ¾ turn to the Left from the fully closed position. When turned to the Right as far as it will go the needle valve is fully closed. CAUTION—Do Not turn the needle valve too tightly against its seat as this will damage both the needle valve and the seat which will result in not being able to properly adjust the carburetor.

TO STOP—Depress the Stop Button, located on the back of the Magneto plate (See Fig. 1) and hold down until the engine has completely stopped turning.

TO OPERATE INDEPENDENT OF BATTERIES—The ignition system of the CHORE HORSE is a highly efficient, self-contained, flywheel-type magneto which requires no outside assistance to furnish an intense spark to the spark plug at cranking speed as well as operating speed. For this reason the unit can be started and operated without storage batteries or in case the batteries should accidentally become discharged.
TO START WITH DISCHARGED BATTERIES — Should the batteries become discharged to the point where they will no longer turn the engine when the starting button is pressed—operate the Choke in the usual manner, wrap the starting rope around the starting pulley with the knot engaged in the slot, and spin the engine with a quick steady pull—**Do Not Jerk.** Repeat as necessary until the engine starts.

TO OPERATE AS A GASOLINE ENGINE POWER PLANT — Turn the Output Control to OFF (to the left as far as it will go) and operate as directed above.

**INSTRUCTIONS FOR THE CARE AND MAINTENANCE OF THE ENGINE**

**THE FOUR STROKE CYCLE**

The engine operates on the 4 (stroke) cycle principle—requiring four strokes of the piston to complete the event of the cycle—INTAKE, COMPRESSION, POWER AND EXHAUST.

Admission of fresh fuel charges and discharge of the burned gases is by way of two poppet valves (intake and exhaust), operated by cams and timed to open and close at predetermined positions of the piston as follows:

**INTAKE:**
1. Piston moving downward.
2. Intake valve opened by cam.
3. Suction created by downward movement of the piston draws fuel vapor from carburetor into cylinder.

**COMPRESSION:**
1. Piston moving upward.
2. Valves closed.
3. Fuel charge compressed.

**POWER:**
1. Both valves closed.
2. Spark ignites compressed fuel charge.
3. Fuel charge burns and expands rapidly—forcing piston down to deliver power impulse. (Piston moving downward).

**EXHAUST:**
1. Piston moving upward.
2. Exhaust valve opened by cam.
3. Exhaust gases forced out of cylinder into atmosphere.
CARBURETION

For starting purposes a choke arrangement is built into the carburetor which when closed, restricts flow of air through it on the intake stroke—consequently, a comparatively high suction is created, resulting in the gasoline being drawn or lifted into the carburetor where it is mixed with air and passed on into the cylinder in the form of a dense vapor.

![Diagram of carburetor and fuel system]

Since three strokes of the piston intervene between each suction stroke (compression, power and exhaust), a check valve is installed in the gas tank to prevent gasoline in the carburetor and gas line flowing back into the tank during this period, thereby maintaining proper fuel level in the carburetor while the engine is in operation.

This check consists merely of a small disc resting on a seat in such a manner that suction in the gas line will cause it to rise and permit flow of gasoline to the carburetor; however, as suction is diminished, return of gasoline to the tank is prevented by the disc resting firmly on its seat, due to weight of the gasoline in the gas line.

CARE OF FUEL SYSTEM

No difficulty should be experienced with the fuel system if a good clean grade of gasoline is used and poured into the tank from a clean container and funnel—Be sure funnel is clean.

The check valve assembly in the tank and gas line should be removed periodically for cleaning. Simply blow through gas line. The check valve screen can be cleaned by washing in gasoline. It is not necessary to take the check valve assembly apart to clean, as it can be thoroughly cleaned by washing and by blowing through it from the screened end.

When re-installing the gas line, make certain the connections are air tight. This is IMPORTANT since the carburetor is of the vacuum lift type. Air seepage at either end of the gas line will result in hard starting, faulty operation or possibly failure to start at all.

CARBURETOR ADJUSTMENT

1. Turn needle valve “A”, as shown in illustration, to right until the needle rests gently on its seat. (Under no circumstances screw it down tightly as this will injure both needle and seat—resulting in difficulty to obtain satisfactory adjustment thereafter).

![Illustration of carburetor with needle valve “A” highlighted]

2. Unscrew needle valve approximately 1½ turns.

3. Start engine as instructed—allow to run with load until normal operating temperature is reached.

4. Turn needle valve slowly to right until engine loses speed due to lean mixture—note position of slot; then, turn slowly to left until engine appears to labour and speed drops slightly—note position of slot. Finally, slowly turn needle to right position midway between the lean and rich settings. (Average should be about ½ turn open under full load when engine is warm).

In event carburetor throttle lever has been removed or requires adjustment set
carburetor valve full open, hold governor arm in extreme left position (facing engine),
set throttle lever at right angle or perpendicular to engine base, tighten set screw on
throttle lever.

Be sure all governor link connections are free and that there is no indication of
binding.

GOVERNOR THROTTLE CONTROL

Since the charging set is designed to operate at 2200 R.P.M. the carburetor is con-
structed with a butterfly valve which is controlled by a mechanical governor as the
engine load varies.

The governor is built on to
the crankshaft and is of the
flyweight centrifugal type—con-
ected to the carburetor valve
by means of a small crank arm
and link.

As long as the engine re-
mains motionless, the butterfly
valve is held open by a small
spring attached to the control
link; however, upon having been
started, the governor weights
are thrown outward, due to cen-
trifugal force causing movement
of the governor arm resulting in
partial closing of the butterfly
valve, thereby reducing the
charge admitted to the cylinder.
Further increase in engine speed
has a considerable effect on the
governor weights — caus ing
greater action of the governor
arm, consequently, closing the
butterfly valve to a point where
a constant speed of 2200 revolu-
tions per minute is maintained.

Any increase in the load ap-
plied will cause a drop in revolu-
tions—reducing the effect of
centrifugal force on the gover-
nor weights, resulting in the butterfly valve being opened to admit a larger charge until
normal engine speed has been reached.

Governor control is adjusted at the factory and should not be altered.

TO ADJUST ENGINE SPEED

Speed of the engine is controlled by action of the governor and tension of the
governor spring, therefore any change in the tension of this spring will effect the
speed at which the engine is running.
Since the spring acts to hold the butterfly valve open to admit a full charge to the cylinder, a decrease in tension will result in slower engine speed. An increase in engine speed is then obtained by increasing the tension on this spring.

Various spring tensions can be obtained by hooking the spring in one of the several holes in the control link for this purpose.

If you have reason to assume the engine is not turning at its recommended R.P.M. (2200), apply a speed indicator to the end of the crankshaft to determine definitely at what speed it is operating. If higher than recommended, reduce tension of spring by hooking in one of the small holes closer to the governor arm. To increase engine speed, simply increase tension of the spring by attaching it to one of the holes further distant from the governor arm, as indicated by arrows.

(CAUTION: No attempt to stretch the governor spring. Any change in length will render it useless so far as obtaining correct speed and speed variation is concerned).

LUBRICATION

Lubrication of moving parts is accomplished by the SPLASH System. The cam gear operates in a small oil sump, into which the proper amount of oil is metered at all times, in such a manner that oil is picked up between the teeth of the gear and forced out with considerable pressure as the teeth of this gear and the crankshaft gear mesh as shown. The spray of oil from the gears is then picked up by the revolving crankshaft and distributed throughout the crankcase and cylinder, thus an ample supply of oil reaches all bearings and bearing surfaces.

There are no additional moving parts required to circulate the oil—if the crankcase has been filled to the proper level, oil circulation commences the instant the engine is started.

AIR GOVERNOIR THROTTLE CONTROL

All EG2-300 and EG3-300 engines with air governor are different from EG1-300 engines as they are equipped with an Air Vane Governor, instead of the flyweight centrifugal type. The vane consists of a small raffle plate mounted on a shaft to resemble a flag, which is suspended in the air stream of the engine cooling system. The outer end of the shaft is fitted with a lever which is connected to the carburetor throttle lever with a small rod. The Air Vane is designed to close the throttle when the engine is operating. Therefore a countering force is required for proper governor control, which is furnished by a spring attached to the lever on the air vane shaft. Note that the opposite end of the spring is anchored to a notched bracket to provide various adjustments.

TO SET ENGINE SPEED

The engine is designed to operate most efficiently at 2200 R.P.M. When the engine is motionless, the governor spring holds the carburetor valve open. When the engine is started the R.P.M. will increase until the air pressure on the vane equals the tension of the governor spring. If it is desired to increase the throttle valve then closes until the air pressure on the vane is increased thus increasing the tension of the R.P.M. is reduced by decreasing the spring tension. Should the carburetor or governor controls at some time be removed from the engine, they should be re-assembled in the center notch. In the event the engine R.P.M. is too high, even when the engine and partly close the throttle valve by loosening the set screw in the throttle shaft lever, and turning the shaft slightly to the left, or counter-clockwise. Then tighten set screw. The throttle valve is then wide open when the engine is motionless. This operation may be repeated if necessary.
THE MAGNETO

The magneto, as supplied on the engine, is a self contained unit requiring no assistance from outside sources such as dry cell or storage battery to produce the strong spark, so essential to easy starting. It consists chiefly of an armature plate, on which are mounted the ignition coil, condenser and breaker points and a permanent magneto built into the flywheel.

Its operation is extremely simple:—As the pole pieces of the magnet pass over the heels of the coil, a magnetic field is built up about the coil, causing a current to flow through the primary winding.

At the proper time, the breaker points are opened by action of a cam machined on the crankshaft, thus breaking the primary circuit. This stops the flow of primary current, which causes the magnetic field about the coil to break down instantly—an electrical current of exceptionally high voltage is induced in the fine secondary winding of the coil, which is carried to the spark plug where it jumps the gap between the points to ignite the compressed charge in the cylinder.

Due to its rugged construction, the magneto will perform efficiently throughout the entire life of the engine. It requires no lubrication, therefore, no attention other than occasional inspection of the breaker points and spark plug connections.

CARE OF IGNITION SYSTEM

SPARK PLUG—Remove spark plug for occasional inspection, cleaning and adjustment of points.

Correct setting of the gap .030”.

Be sure porcelain or insulator is dry and clean before replacing. Wipe off with dry cloth to remove traces of moisture or residue.

Examine for cracked or broken porcelain. (Hard starting, missing and faulty operation are often caused by a defective insulator).

Test plug by placing it on cylinder head with ignition lead attached—crank engine to observe spark between points. (The spark may not be visible in bright light, nevertheless, a pronounced “snap” is audible if sparking takes place).

MAGNETO—Under no circumstances should the magneto be tampered with unless it is evident that hard starting or faulty operation can be traced to some irregularity in it.

Before attempting to make adjustments, remove ignition lead from the spark plug—hold it approximately ¼” from cylinder head; crank engine to observe spark. If a weak or no spark appears, the difficulty is most likely due to improperly adjusted, pitted or corroded breaker points.

In this event it is necessary to remove the flywheel, see instructions for removing flywheel. Page 18.

Upon removal of flywheel, notice the breaker points are operated by a flat surface machined on the crankshaft.