

INSTRUCTIONS

for the
INSTALLATION, OPERATION and MAINTENANCE

of a
MODEL 8RA1 TYPE NO. 4005

EIGHT HUNDRED WATT ONE HUNDRED AND TEN VOLT SIXTY CYCLE
SINGLE PHASE ALTERNATING CURRENT REMOTE CONTROL DELCO-
LIGHT ENGINE-GENERATOR

THE DELCO APPLIANCE CORPORATION
ROCHESTER, NEW YORK

Distributed and Serviced by
THE UNITED MOTORS SERVICE INCORPORATED
GENERAL MOTORS BUILDING
DETROIT, MICHIGAN

Price 25 Cents

IMPORTANT INFORMATION

Dealer's Name _____

Dealer's Address _____

Dealer's Telephone Number _____

Date of Installation _____

HAVE YOU MAILED THE WARRANTY CARD? _____

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BE SURE TO STUDY SECTION II OF THIS MANUAL

SECTION I

INSTALLATION INSTRUCTIONS

IMPORTANT - READ THESE INSTRUCTIONS CAREFULLY before starting installation.

This instruction book is prepared for the purpose of assisting you in making a correct installation, and the owner in the proper care of his engine-generator.

Proper installation and periodic care of your Delco-Light engine-generator and storage battery will permit many years of satisfactory service.

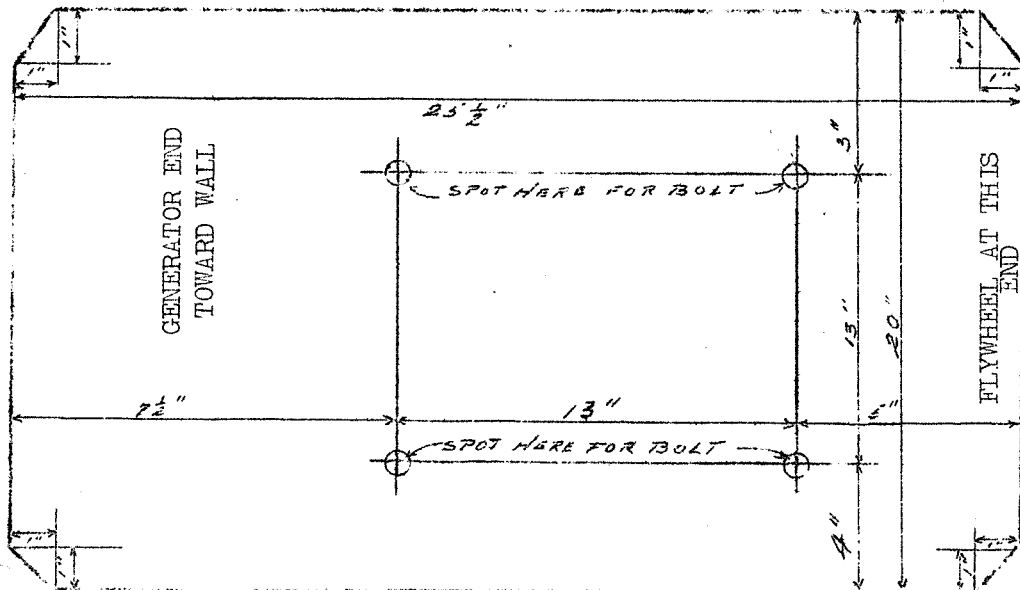
LOCATION

This engine-generator is 22" over-all in length, 18" wide, and 23" high, and weighs approximately 240 lbs. It should be mounted on a neatly designed concrete base. This base should be at least 12" above the floor level to facilitate drainage of oil.

The gasoline engine of your power and lighting unit is air-cooled. It is, therefore, necessary to locate the concrete base for the engine-generator three feet from any wall, and in a place where the engine will be allowed proper ventilation and protection from rain or snow. This base should be at least one foot high. Ventilation of the engine-generator is necessary to prevent over-heating. Locate it in a place where it will not be subjected to excessive dust, lint, feathers, etc.

INSTRUCTIONS FOR INSTALLING PLANT BASE

The base for the engine-generator should be made in accordance with the dimensions shown in the drawing below. It should be at least a foot high. Extend it higher if necessary.



A GOOD INSTALLATION PROTECTS YOUR INVESTMENT- INSIST UPON IT.

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Use 1/2 x 18" bolts, and extend them 2-1/2" above the concrete. The bolts may be hung in place from slats across the top of the form. Place a large washer on the head of each. Make the base of concrete. Mix one part cement to five parts of unscreened gravel. Allow the concrete base to set for about a week to harden.

EXHAUST

Always place muffler outside of the building. Screw the brass nipple of 1" diameter pipe into the exhaust of the engine. To this brass nipple connect a standard 1" union. From the union run additional pipe outside the building and attach the muffler. Always use right angle bends instead of pipe elbows where a turn is necessary in the exhaust pipe.

When the exhaust pipe is run straight out cut a hole 7" in diameter in the wall in line with the opening of the engine for the exhaust pipe. Slip the tin disc over the end of the pipe which goes through the wall and nail the disc in place over the hole.

In no case permit the engine-generator to exhaust indoors. If the muffler is to be located more than 25 feet from the engine use a large pipe with reducing coupling on each end to prevent back pressure.

In cases where a quiet operation is desired, the muffler may be installed in a pit or buried barrel. This will deaden the sound caused by the exhaust. The pipe should be inspected periodically to prevent caving or filling and consequent back pressure. Provide adequate vent for the pit. Never run a long vertical exhaust pipe up into the air unless a trap for condensation is provided. Otherwise trouble will be experienced in cool weather by condensed water running back into the engine.

A condensation trap may be made by installing a 1" T and nipple in the horizontal line near the engine. Cap the bottom end of the nipple. Drain this nipple periodically.

FUEL CONNECTIONS

Connect the 1/4" fuel line to the fuel pump. Connect the 1/4" overflow line to the carburetor. The overflow line must not extend more than 1/2" through the top of the fuel tank. It is essential to install an overflow line because the carburetor used depends upon the overflow to keep the fuel at a constant level. Slope the overflow line uniformly to the fuel tank without any trap.

If an underground fuel tank is desired use extreme care in its proper installation. Locate it outside of the building and vent it with a pipe in accordance with local rulings. Condensation will form inside the tank and provisions must be made for pumping out this water at regular intervals.

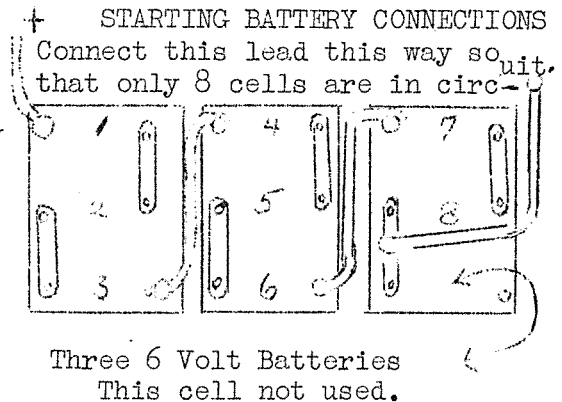
CAUTION: - A large fuel tank requires definite periodic checks of lubricating oil level and condition in engine crankcase to prevent serious damage.

The fuel pump is not recommended to operate on vertical lifts of over six feet and horizontal run of more than 10 feet.

STARTING BATTERY

Locate the starting battery as close to the control box as possible. Use #6 flexible insulated wire for connecting the battery to the control box terminals. See Wiring Diagram No. 5039664. The 16 volt starting battery may be composed of three 6 volt automotive batteries, connected so that one cell is left out of the circuit.

Unscrew the vent plug, and inspect the height of electrolyte and its specific gravity with a reliable hydrometer at least once every two weeks. The battery is discharged at approximately 1.165 specific gravity, and fully charged at approximately 1.285 specific gravity. AFTER taking a hydrometer reading, add distilled or clean rain water to the cells if necessary to bring the level to just below the vent cap opening.



CAUTION: NEVER LET THE ELECTROLYTE LEVEL DROP BELOW THE TOP OF THE PLATE SEPARATORS.

In freezing weather always add the water just before starting the engine-generator and keep the battery fully charged. Keep the battery terminals clean and treat with vaseline to prevent corrosion. In case corrosion forms, remove it by washing the terminals with hot water and soda.

The battery is kept charged by a trickle charge from the DC generator windings through the resistance unit on the control box. See paragraph "STARTING BATTERY CHARGE" for detailed instructions for varying charging rate.

ELECTRICAL CONNECTIONS - MODEL 8RA1 - Control Box 4026

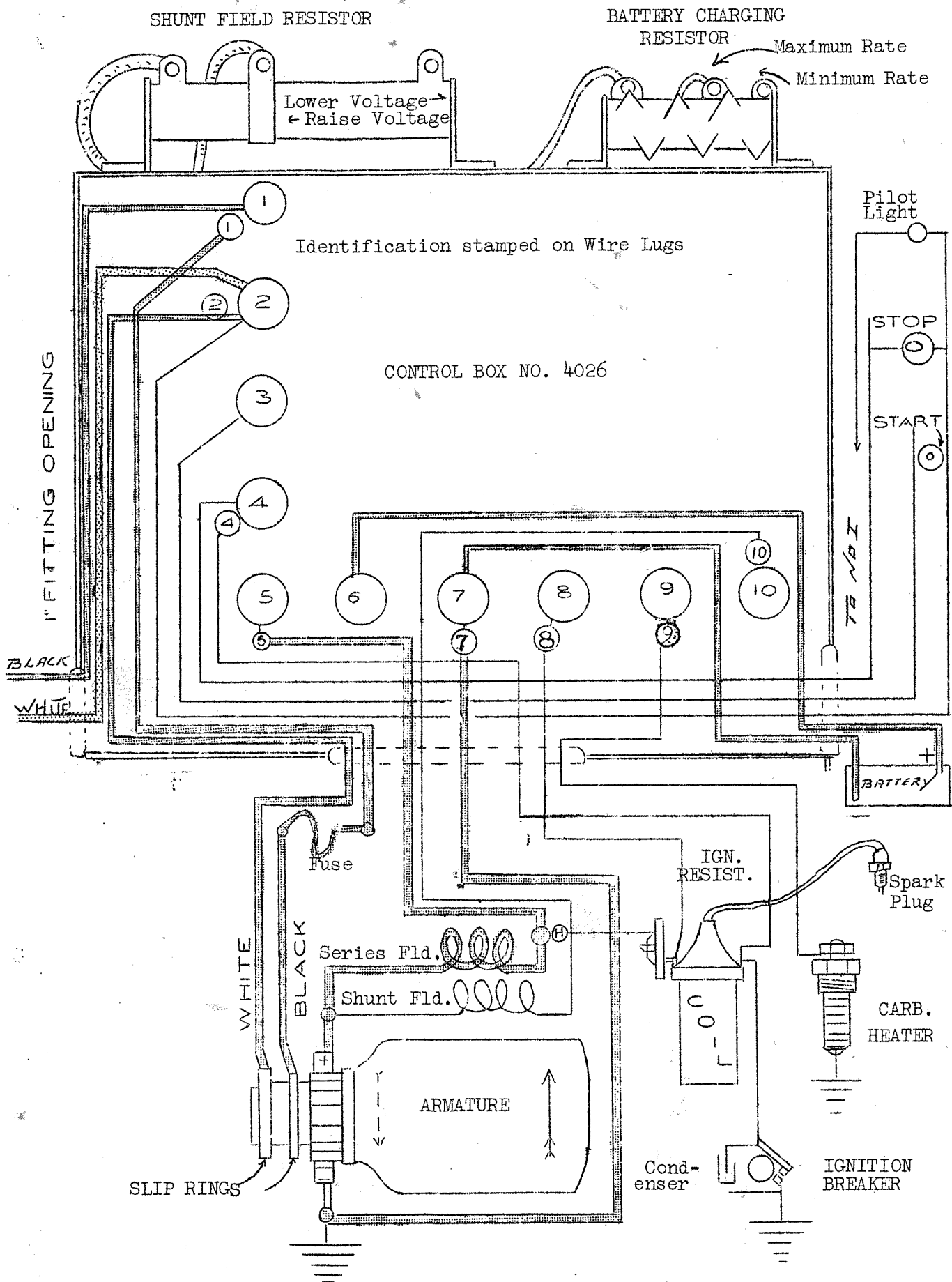
The electrical connections for the remote control Delco-Light are simple but it is very important that they be made correctly. See Wiring Diagram No. 5039664. One or more "Starting" push buttons may be installed. Likewise one or more "Stopping" push buttons may be used.

SERVICE LINE CONNECTIONS

One side of the service line connects to the #1 terminal on the control board. This should be a black wire and of sufficient size to carry the maximum current requirements.

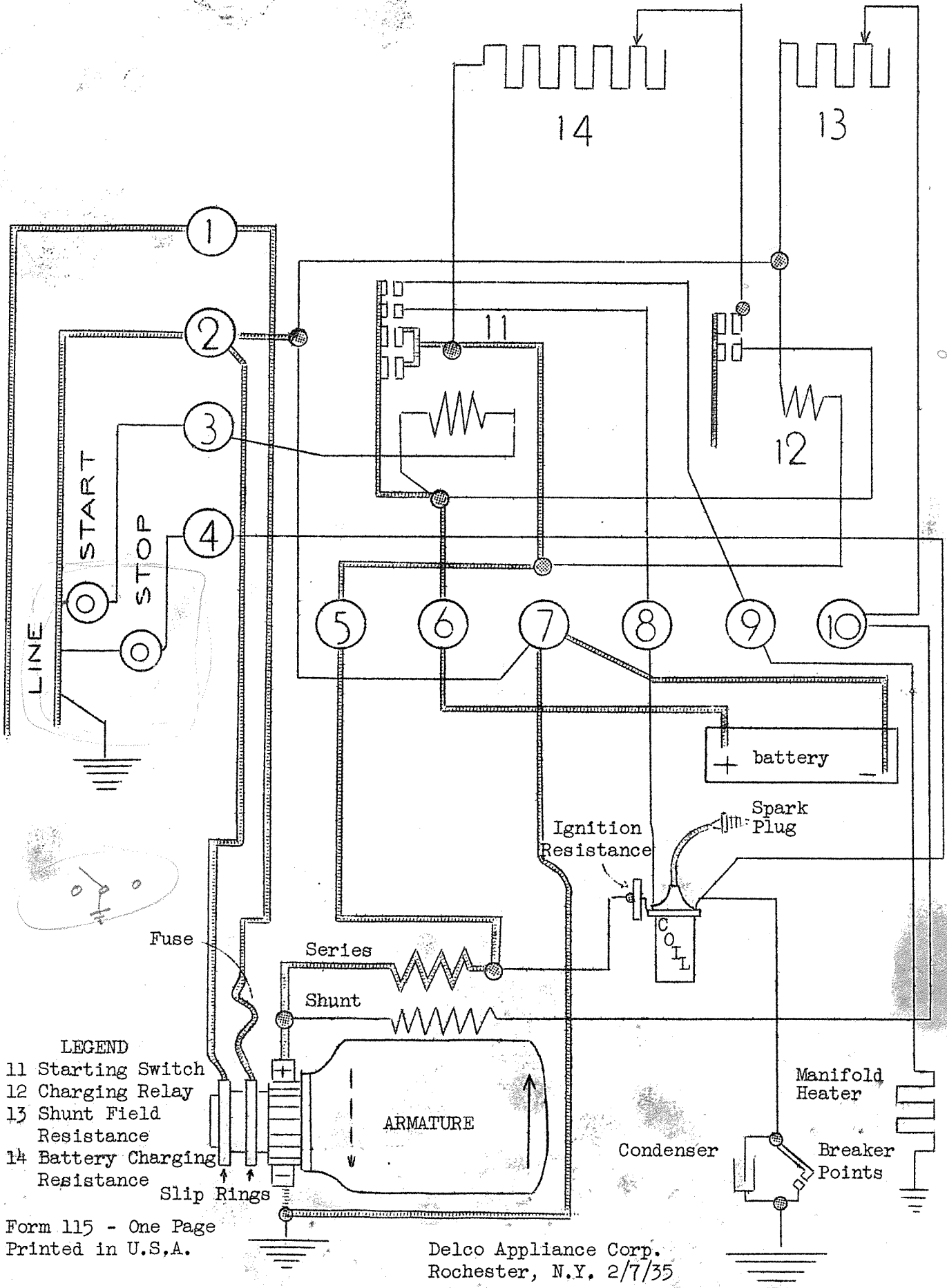
The other side of service line connects to the #2 terminal on the control board. This should be a white wire of sufficient size to carry the maximum current requirements.

MODEL 8RA1 DELCO-LIGHT INSTALLATION WIRING DIAGRAM



MODEL 8RA1 DELCO-LIGHT ENGINE-GENERATOR COMPLETE WIRING DIAGRAM

CONTROL BOX NO. 4026



LEGEND

- 11 Starting Switch
- 12 Charging Relay
- 13 Shunt Field Resistance
- 14 Battery Charging Resistance

Form 115 - One Page
Printed in U.S.A.

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Rochester, N.Y. 2/7/35

ENGINE-GENERATOR CABLE CONNECTIONS Control Box No. 4026

The engine-generator and control box are already connected when they are delivered. However, if it ever becomes necessary to reconnect the cable to the control box proceed as follows. Each lead in the cable is equipped with a lug stamped with a number.

No. 1 cable lead connects to control box terminal marked 1. This is black wire.

No. 2 cable lead connects to control box terminal marked 2. This is white wire.

No. 4 cable lead connects to control box terminal marked 4.

No. 5 cable lead connects to control box terminal marked 5.

No. 7 cable lead connects to control box terminal marked 7. Note: Negative Battery also connects to this post.

No. 8 cable lead connects to control box terminal marked 8.

No. 9 cable lead connects to control box terminal marked 9.

No. 10 cable lead connects to control box terminal on the extreme right. This is marked 10 on diagram.

DESCRIPTION OF LEADS IN FLEXIBLE ARMORED CABLE.

No. 1 is the black lead connected to the brush on one slip ring on the AC Generator. This lead connects thru a fuse mounted on brush plate.

No. 2 is the white lead connected to the brush on the other slip ring on the AC generator.

No. 4 is the lead connected to the ignition coil terminal — that connects to the ignition breaker points to short circuit them and stop the engine when one of the "Stop" buttons are pushed.

No. 5 is the lead connected to the series field. The series field is the cranking field of the DC generator. An ignition lead is connected to the series field lead in the junction box on the generator frame. This is the red lead coming from the ignition coil resistance and is stamped H.

No. 7 is the lead connected to the D.C. generator negative brush.

No. 8 is the lead connected onto the ignition coil terminal +. It is this lead that shorts out the resistance during the cranking period and facilitates starting.

No. 9 is the lead connected to the carburetor manifold heater. This lead furnishes current to the heater during the cranking period.

No. 10 is the lead connected to the shunt field in the DC generator.

Note: (Shunt Field Resistance Leads)

The two leads in the control box connect to the shunt field resistance on top of the control box.

One connects to the slider. The other connects to the terminal on the end. These leads are connected to the resistance unit at the time of assembly. There is a terminal on both ends of the resistor. In case it becomes necessary to reconnect the resistance be sure that the two original terminals are used. The other end terminal may be used if the resistance is adjusted to correspond to original setting.

STARTING BATTERY CONNECTIONS

Connect the negative terminal of the starting battery to control box terminal marked (7). Use No. 6 wire.

Connect the positive terminal of the starting to control box terminal marked (6). Use No. 6 wire.

IMPORTANT - FUSED LINE SWITCH

A load line switch - a double pole single throw fused line switch of approved design - should be installed in the line as close to the engine-generator as possible. Ten ampere fuses (Part No. 5036990) should be used. This will permit breaking the line circuit if necessary to work on the engine-generator. It is recommended that an ammeter be installed in the line, in order that the load may be checked at all times.

Motor Loads

The maximum size motor that this engine-generator will operate alone cannot be definitely stated because two conditions must be met.

First - the engine capacity of 800 watts of power must not be exceeded.

Second - the generator capacity of 8.4 amperes must not be exceeded.

The current (amperes) in an alternating motor circuit lags behind the impressed voltage. Only that part of the current measured on the ammeter that is in phase with the line voltage is effective in placing a load on the engine. The part that is in phase with the line voltage is the current measured on the ammeter times the cosine of the angle of lag (Power Factor.) Therefore the direct current method of calculation of power (volts x amperes = watts) is not true in alternating current circuits. This Power Factor must be put in the above power calculation to make it correct. Then volts x amperes x Power Factor does represent the true power consumed in the alternating current appliance. The Power Factor (P.F.) is for convenience expressed in percent (%) The Power Factor varies on different kinds of appliances.

Approximate Power Factors are:

Heating and Lighting Load	95%	Power Factor
Lighting and Small Motors	70%	" "
Small Motors	60%	

Typical Calculations of loads within capacity (watts) of this engine-generator.

	Ammeter Reading	Voltmeter Reading	P.F.	Total Load Watts
	7.	120	95%	800
x	9.5	120	70%	800
x	11.9	120	60%	800

x - These ampere loads are too great for the generator.

Typical Calculations of loads within Capacity (Amperes) of generator.

	Ammeter Reading	Voltmeter Reading	P.F.	Watts
	8.4	120	95%	x - 957.6
	8.4	120	70%	705.6
	8.4	120	60%	604.8

x - This load is too great for the engine.

Conclusion:- This engine-generator will operate loads within either of these two limits.

- (1) Total amperes within the capacity of generator (8.4) and at a power factor which will cause not more than 800 watts to be consumed.
- (2) Total watts within the capacity of the engine (800) and at a power factor which will cause not more than 8.4 amperes to be consumed.

ALWAYS USE GENUINE DELCO-LIGHT LUBRICATING OIL

SECTION II

THINGS TO UNDERSTAND AND DO BEFORE PUTTING THE ENGINE INTO OPERATION

FUEL

This engine-generator is equipped with a carburetor which is designed to operate upon gasoline only. The fuel tank should be filled with a good grade of gasoline and care taken that no water gets into the tank. The overflow line should extend into the tank only 1/2". The suction line should nearly touch the bottom.

A fuel pump mounted on the side of the generator supplies fuel to the carburetor. The glass gasoline filter bowl, attached to the fuel pump should be cleaned whenever height of water and foreign matter exceeds one inch. To clean filter, loosen thumb nut and remove glass bowl and screen. Clean bowl and reassemble. Be sure to tighten thumb nut. The pump will not operate unless the glass filter bowl is tight against the gasket. Be sure that the guide tips of the filter screen are inside the bowl.

DO NOT USE KEROSENE

INTAKE MANIFOLD HEATER AND THERMOSTATIC CARBURETOR CHOKE

A thermostatic carburetor choke and an electric heater plug in the intake manifold are provided to facilitate starting the engine when the engine is cold. These are entirely automatic in their operation and once adjusted at the factory should not ordinarily require further attention. The thermostatic choke is attached to the carburetor close to the exhaust pipe.

LUBRICATION

There is only one place to oil the engine-generator. Whenever fuel is added the oil level in the crankcase should be checked. The proper level is to the bottom thread in the oil filler pipe. Oil is distributed to the working parts of the plant by the oil throwing gear and the movement of the crankshaft and connecting rod.

A baffle located between the crankcase and cylinder provides for proper cylinder lubrication. At the same time, it serves as a reservoir that supplies the armature end main bearing with oil. When even the engine stops oil continues to flow from the baffle and fills the main bearing reservoir.

The valve cam followers and the valve stems are lubricated by the action of the oil throwing gear. A return hole is provided for the return of the oil back into the crankcase. A cover with gasket is provided over the valve adjustment to keep the oil from running outside the engine; also protects the valve mechanism from dirt and other foreign matter.

The gear which drives the igniter is lubricated by the oil throwing gear. The oil then flows back to the bottom of the crankcase.

FAMILIARIZE YOURSELF WITH THIS MANUAL. THE KNOWLEDGE OF ITS CONTENTS WILL SPARE YOU INCONVENIENCE AND SAVE YOU MONEY.

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Rochester, N.Y. -6/27/34

DRAINING OIL

The best of lubricating oils deteriorate with use. After using for 300 hours, drain out and replace with fresh Delco-Light Lubricating Oil. Do not continually add oil. Supply the engine-generator at regular intervals with clean oil by thoroughly draining the old oil from the crankcase.

FOR BEST RESULTS USE GENUINE
DELCO-LIGHT OIL

HOW TO CLEAN CRANKCASE FUME ELIMINATOR

The round assembly on top of the engine-generator is a crankcase fume eliminator. It will eventually gather enough dust to cause inefficient operation. It is easily cleaned and should be cleaned at least once every six months.

Remove the thumb screw from the top and lift cover. Remove circular filter assembly and wash this and its inside baffle plate with gasoline. Reassemble it after you have allowed all gasoline to dry off. **BE SURE BAFFLE CUP IS AT BOTTOM OF FILTER SCREEN WITH THE FLANGE TOWARDS THE BOTTOM OF THE HOUSING.**

PROCEDURE FOR PUTTING THE ENGINE-GENERATOR INTO OPERATION.

After the engine-generator has been mounted on its base and fuel lines and exhaust connections completed the electrical connections should be made. Before making final battery connection proceed as follows:

1. Make certain that oil drain fittings are tight.
2. Fill the crankcase with approximately five pints of the proper grade DELCO-LIGHT LUBRICATING OIL. "Light" grade in cold temperatures; "Medium" grade in warm temperatures. **BE SURE FILLER PLUG IS IN PLACE BEFORE ENGINE IS STARTED.** Fill until oil level raises to bottom thread of filler opening. Initial oil supply is shipped with engine-generator in fuel tank.
3. Fill fuel tank with good grade of clean gasoline. Check again to make sure overflow line from carburetor does not extend into fuel.
4. Make sure all electrical connections are in order.
5. Make final battery connection.

STARTING THE ENGINE-GENERATOR

The engine-generator starts when one of the starting buttons is pushed and held in until the engine gains enough speed to carry its load. The initial start will require extra time to fill the fuel distribution system full before it begins to fire.

STOPPING THE ENGINE-GENERATOR

It stops when one of the stopping buttons is pushed and held in until the engine stops coasting.

FAMILIARIZE YOURSELF WITH THE WARRANTY ON DELCO-LIGHT ENGINE-GENERATORS

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IF YOU HAVE ANY TROUBLE

Requirements necessary for the Successful Operation of the Engine

In order that the engine-generator will function properly at all times, it is necessary that the user become familiar with the following points with regard to the engine:

Fuel
Lubrication
Ignition
Compression
Exhaust
Ventilation

If at any time the engine fails to operate satisfactorily, the user may be sure that he has neglected one or more of these important items.

HELPING HINTS FOR THE USER

ENGINE WILL NOT CRANK

1. Control circuit may not be complete.
2. Battery connections may be loose or corroded.
3. Battery low or discharged.
4. Generator brushes or commutator dirty or worn excessively.

ENGINE CRANKS BUT DOES NOT START

1. Gasoline tank may be empty.
2. Spark plug may be dirty, have broken porcelain, or may have a loose connection.
3. Compression leak, gasket blown, spark plug loose.
4. Battery low or discharged.
5. Ignition contacts dirty or gap too wide.
6. Generator negative brush ground wire may be burned off.
7. Jet in carburetor may be clogged or there may be a leak in gasoline suction line to fuel pump.

ENGINE RUNS BUT DOES NOT GENERATE

1. Brushes worn and not making good contact.
2. Commutator or slip rings dirty or rough.
3. Generator Fuse Blown.

GENERATES BUT CURRENT IS NOT AVAILABLE ON LINE

1. Line switch open or fuses blown.
2. Line wire open.

GENERATES BUT VOLTAGE LOW

1. Too much load.
2. Engine in poor mechanical condition.
3. Too small service wires.

WARRANTY

We warrant every new Delco-Light Engine-Generator to be free from defects in material and workmanship under normal use and service, and we will, within one year from delivery to the original purchaser, repair or at our option replace without cost to the owner, any part or portion thereof (when returned to us transportation charges prepaid) which our inspection proves to be thus defective.

This warranty does not apply to any material which has been subject to misuse, neglect, or accident; is in lieu of all other warranties, expressed or implied; and we do not authorize any person or representative to assume for us any other liability in connection with our products.

USE GENUINE DELCO-LIGHT PARTS

The Delco Appliance Corporation is interested in your getting the best results possible from your Delco-Light equipment. We know that to get the best results it is necessary to use "Genuine Delco-Light Parts" and "Genuine Delco-Light Oil." We can be responsible for our warranty only when we have received this cooperation from you.

NOTICE--When you want Service, Genuine Delco-Light parts, or Lubricating Oil for your Delco-Light Engine-Generator, telephone or write to the Authorized Delco-Light Representative.

Name _____
Address _____
Town _____ State _____
Telephone Number _____
Date of Installation _____

HAVE YOU MAILED THE WARRANTY CARD?

SECTION III

SERVICING SECTION

Piston Rings

There are two compression rings and one oil control ring on each piston. Their end clearance should be .020". The ring side clearance should be .004" to .005". The piston dia. is 2 9/16".

Piston Pin

A full floating piston pin is used and held in place by an aluminum button in each end. The pin should fit the piston with .001" to .0015" oil clearance.

Connecting Rod

The connecting rod has an integral babbit bearing. The connecting rod bearings should be tightened so they will be snug but will fall from a horizontal position.

Crankshaft

The crankshaft has counter weights forged integral with it. A steel backed babbit sleeve bearing is used on the flywheel end. This bearing is pressed into the crankcase with special tools. A steel backed babbit bearing is used on the armature end. This bearing is in a removable plate. It is replaceable as an assembly. The flywheel is keyed to the straight end of the crankshaft. The armature is keyed to the tapered end of the crankshaft. Flywheel puller Tool No. 5031706. Armature Puller Tool No. 5031022.

Camshaft

The camshaft and gear assembly revolves on an axle supported in a hole on each side of the crankcase. This axle is held in place by a screw passing through the generator end bearing plate and into the end of the axle.

BE SURE THIS SCREW IS REMOVED BEFORE THE BEARING PLATE IS REMOVED OR THE AXLE WILL BE PULLED OUT WITH THE BEARING PLATE. THIS WOULD ALLOW THE CAMSHAFT TO FALL OUT OF PLACE. Over the flywheel side end of the camshaft is pressed into the crankcase opening a flat disc, Part No. 5017088 to keep the oil in. This disc should be coated with shellac before it is driven into place.

Breather Valve

When the piston goes down it puts a slight pressure in the crankcase. When it comes up it places a slight vacuum in the crankcase. This action is controlled by a "breather valve" to maintain a constant vacuum on the crankcase. The reed type valve is located in the cylinder head and closes the opening between the crankcase and the crankcase fume eliminator. The valve opens when the piston goes down and closes when the piston comes up. Thus is produced a crankcase vacuum of from 2 1/2" to 4" of water.

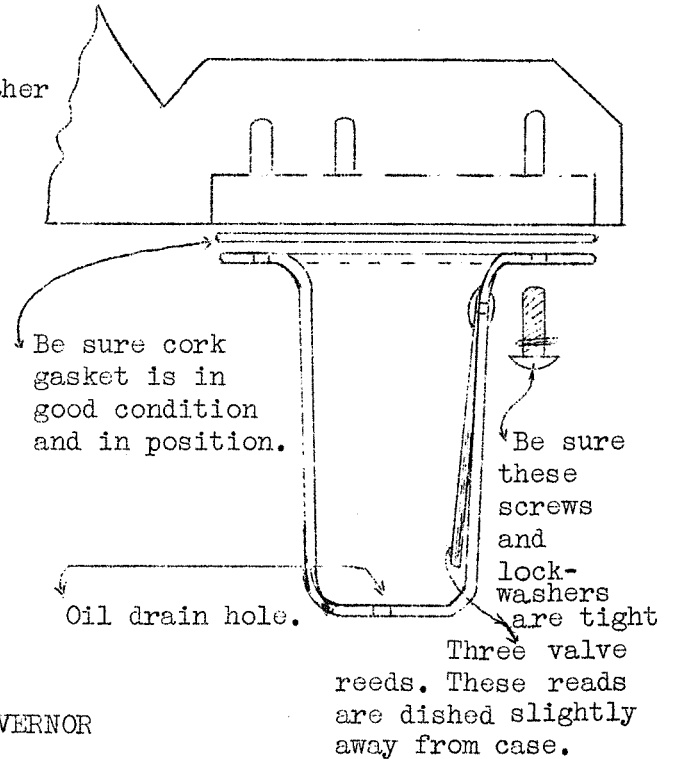
This vacuum

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is enough to keep lubricating oil from coming out around the bearings and prevents oil leaks. Oil leaks are, in ninety-nine percent of the cases, traceable directly to a stuck or loose fitting breather valve.

BREATHER VALVE CONSTRUCTION

Note: In the bottom of the breather valve cup is a small hole for the condensed oil to drain back into the crankcase. This hole should be open but should not be made larger.



ENGINE SPEED GOVERNOR

The speed of the engine is held automatically at 1780 to 1830 R.P.M. This speed regulation is obtained by a gear driven, spring controlled ball type governor driven from the timing gears. The governor arm action is controlled by a coil spring wound around a capscrew passing through the central section of the arm. This capscrew is threaded into the governor housing. Turning this capscrew clockwise (right) increases the tension on the spring, speeds up the engine and raises the voltage; turning it counterclockwise (left) decreases the tension, lowers the engine speed and the voltage.

ENGINE SPEED GOVERNOR - VOLTAGE REGULATION

If it becomes necessary to change the control box or the shunt field resistance the voltage may have to be adjusted. Proceed as follows:

After tightening all connections and placing the cranking cutout lever in the running position connect an A.C. portable volt meter across the two line terminals of the control box.

Connect the full load across the line, not over 800 watts of lamps.

The plant will start when the load is connected. After the plant has run for 30 minutes or more, check the reading on the volt meter.

With the 800 watt lamp load connected across the line, the reading on the volt meter should be between 110 and 113 volts.

Disconnect all of the load except 50 watts and again check the volt meter reading. With the 50 watt load connected across the line, the volt meter reading should be between 120 and 125 volts.

As a rule, the above readings will be obtained without making any adjustment to the engine governor or the generator field resistance.

If the volt meter reading with the full load of 800 watts connected across the line is lower than that shown above, tighten one turn on the governor spring adjusting screw. If this adjustment does not give the correct reading on the volt meter remove the cover from over the resistance unit mounted on the top of the automatic control box. Loosen the sliding contact clamp of the large resistance unit and move the sliding contact clamp two or three turns of the resistance wire to the left or to a point so as to obtain between 110 and 113 volts reading on the volt meter.

The speed of the engine should be between 1790 and 1810 r.p.m. at full load of the generator, 800 watts at 110 to 113 volts.

After obtaining the above reading at full load, disconnect all of the load except 50 watts and again check the volt meter reading with the 50 watt load connected across the line.

If the volt meter reading is found to be higher than 120 to 125 volts, adjust the governor so as to hold the engine speed correct for the desired voltage reading.

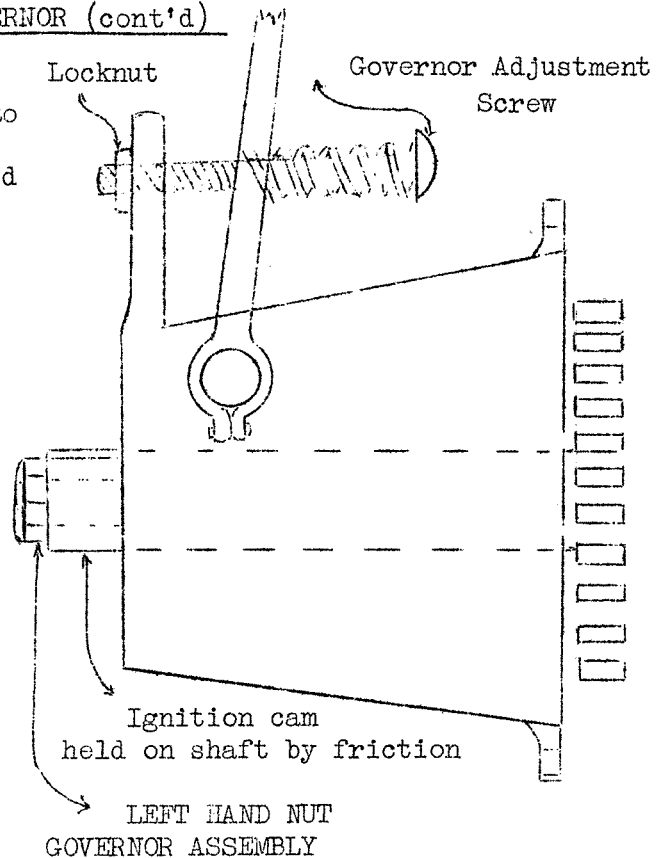
It may be necessary to check back and forth between the generator field resistance unit adjustment and the engine governor three or four times to obtain the correct reading.

The engine speed will be from 40 to 60 r.p.m. higher with the 50 watt load than with a full load of 800 watts connected across the line.

ENGINE SPEED GOVERNOR (cont'd)

The governor arm is connected to the carburetor throttle by an adjustable link that is adjusted to the correct length before the unit leaves the factory. Be sure this link and its connections have no play in them.

As the engine slows down under the load the spring forces the governor arm forward, the carburetor throttle is opened and the engine is speeded up.



HOW TO CLEAN THE CARBURETOR

If no gasoline or an improper mixture is going into the cylinder, the carburetor jets may be clogged up. Remove the jet (the brass screw on bottom of carburetor) and clean out the hole in its end. If blowing fails to loosen the dirt, use a small soft wire of less diameter than the hole. Do not ream out the opening. Gasoline flowing from the overflow line while plant is cranking is proof that the fuel pump is working satisfactory.

Failure of the fuel pump to deliver gasoline may be caused by a cracked or loosely fitted glass filter bowl or loose line connections. Check these items.

THERMOSTATIC CHOKE

Explanation

The thermostatic choke depends upon the combined action of the bi-metal coiled spring and the intake air stream, both working on the butterfly valve.

The spring closes the butterfly valve when it gets cold.

The intake air stream tends to open the butterfly valve because the shaft

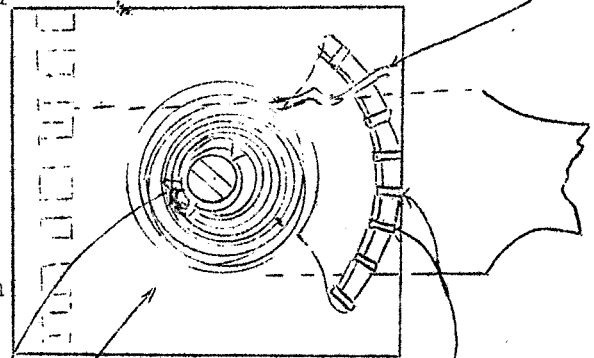
is located above center and more air force is exerted on the one side of the butterfly valve than on the other. Therefore, even when the spring tends to hold the valve shut, the increased air flow due to the increased engine speed opens it and minimizes the choke enough for the engine to carry its load. As the engine warms up, the spring uncurls and opens the choke wide.

Adjustment End of thermostat spring should be in this slot. Squeeze slot together to hold spring rigid.

Remove the carburetor assembly and look at the choke spring assembly from the open side. See Sketch. Place end of spring in second slot from the counterclockwise (left) end of adjustment quadron.

At ordinary temperatures, approximately 75 degrees, the butterfly shaft should be in a position shown in the sketch.

This is factory setting and performs satisfactorily in 99% of the installation. However, if special conditions demand unusual choking, move the end of the spring clockwise (right) for more choke effect and counterclockwise (left) for less choke.



Adjustment Slots

Thermostat Spring

Butterfly valve shaft. At room Temperature (approx. 75°F) the shaft should be in position shown

IGNITION

The engine requires a hot, regular and properly timed spark. If the engine fires irregularly or does not run at all, the following test should be made for ignition.

1. While engine is cranking, hold spark plug lead terminal about 1/8" away from engine frame. If a hot thick spark jumps the gap, it is proof that the ignition is supplied to the plug. Examine the spark plug for dirt, oil and improperly spaced electrodes and cracked porcelain. The gap between electrodes should be 25 to 40 thousandths of an inch. (.025 to .040")
2. If none or a weak spark appeared on test #1, check the ignition breaker points. They should be clean, smooth and properly adjusted so they make good contact every time they close. If necessary, clean the contact points with a clean ignition file.
3. Excessive flashing at the breaker points after they have been cleaned indicates that the condenser (the tubular device right under the breaker box) is faulty and needs replacement or that its connections are loose.
4. If none or weak spark still exists after checking the above items, the ignition coil assembly may be faulty and should be replaced.

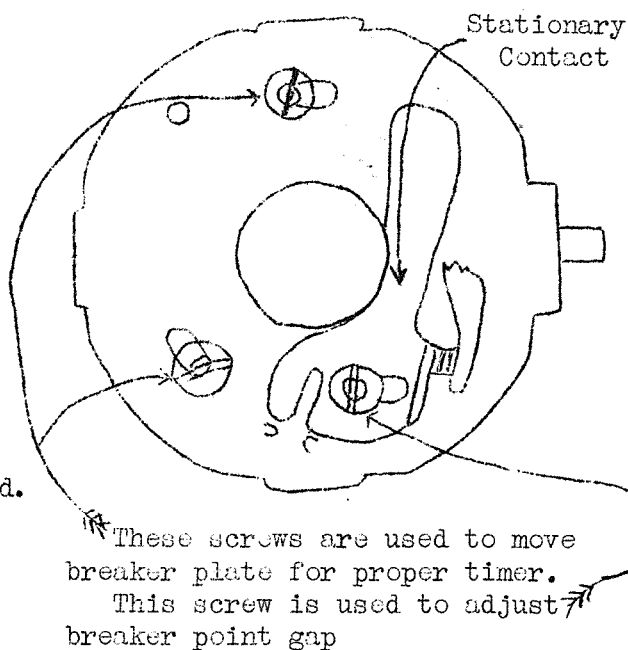
IGNITION POINT ADJUSTMENT

The distance between the contacts should be twenty thousands of an inch (.020") when the fibre on the moving arm is riding the highest round part of cam. Adjust contact points by loosening lock screw directly under the breaker shaft and shift stationary contact arm to right to decrease gap or to left to increase gap.

IGNITION TIMING

Before adjusting ignition timing, disconnect starting battery so that engine will not start to crank accidentally. Turn over flywheel by hand until point of compression is reached. Continue to turn flywheel until the top dead center mark on the flywheel (arrow cast on fin) is approximately $1\frac{1}{2}$ fins ahead of top dead center mark on the draft cover of the engine. When the flywheel is in this position, the ignition points should be just separated. To secure this adjustment, loosen retaining screws, one directly over breaker shaft, other to lower left of shaft, and move breaker assembly until the desired result is obtained. Turn breaker assembly to the right (clockwise) to retard spark timing. Turn it to the left (counterclockwise) to advance spark timing. Tighten screws and again check adjustment.

BREAKER PLATE ASSEMBLY



COMPRESSION

To determine whether the engine has compression, remove screen on flywheel by turning to the left (counter clockwise). Disconnect starting battery. Turn the flywheel over with crank in the direction of rotation. If the engine has compression it should turn hard during a portion of every other revolution. Little or no compression can usually be traced to the following.

1. Spark plugs. At all times the spark plug must be tight and gasket in place. The porcelain insulator must be in good shape. If it is found to be cracked, the plug should be replaced with a new one.
2. Valve clearance. The clearance between the valve stem and the push rod should be .008". Not enough clearance on the valves may cause the valve to hold open and result in loss of compression. If the valve clearance is adjusted too great, the valve will not open at the proper time and the engine will not have full efficiency. Remove valve cover plate and gasket. To adjust the clearance of the valves, turn the flywheel over by hand until the valve that you wish to adjust is at its lowest position and the cam follower of the opposite valve is at its highest position. Insert cam follower holding tool, part #5030983 between the flats on the cam followers. This tool will hold each from

turning while valve adjustment is being made. With a wrench, loosen the lock nut on the cam follower adjustment. Turn this adjustment screw until the proper clearance is made. Check this clearance with a reliable thickness gauge. Tighten the locknut and again check the clearance to be sure that the adjustment was not changed. Repeat this for each valve. Remove cam follower holding tool, holding tool #5030983. Replace valve cover plate and gasket.

3. Valve may not be seated properly. Due to normal carbon deposits formed in the combustion chamber and operating temperature, the valves may become worn and pitted. Occasionally the valves should be removed and resealed.

4. Piston rings may be worn, broken or stuck in their grooves. Remove the cylinder, inspect the piston and rings and replace those parts not in good order. Scrape the piston grooves free of any carbon so that the reinstalled rings will be free to move. Allow .004" to .005" side clearance.

5. Head Gasket. If the head gasket leaks it can easily be heard from the hissing sound made every time the piston comes up on compression. The leak may be caused by a poor gasket. **IMPORTANT:** Always be sure that the gasket is placed on the cylinder properly, if it is not, preignition may be experienced. Always tighten cylinder head bolts down evenly. Be sure that the heavy lockwashers are replaced on the cylinder head hold down bolts.

RESEATING VALVES

CAUTION- Disconnect the starting battery before starting to work on the engine-generator.

Remove exhaust line at union. Remove the top draft cover, remove fuel and overflow line, remove carburetor, remove cylinder head.

Force the valve springs up and remove the retaining clip. Use valve lifting tool #5033653. Lift out the valves and thoroughly scrape the carbon deposit from their heads and stems. The first time valves are ground after the engine has been in service for some time, the seats should be refaced before regrinding the valves. Reseating tool #5034615 may be used.

Place valve grinding compound on the bevel edge of the valve and then put valve back in its place in the cylinder. With a screw driver, turn the valve back and forth on its seat with an oscillating motion. Do not turn too long in one place, but constantly shift the valve from its seat and replace it in another position until it shows a gray ring all the way around. Do not use too much pressure on the valve. Clean the valve seat thoroughly with gasoline before reassembling. Be sure valve clearance is adjusted properly.

VALVE TIMING

In order that the engine may develop its maximum power with greatest efficiency, it is necessary that the valve be timed in accordance with the movement of the piston so that the gas vapor will be compressed when the piston is on the upward compression stroke. On this stroke both the valves should be closed.

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Time the valves as follows: Mesh the marked crank shaft gear tooth between the marked teeth on the camshaft gear. In this position both cam followers will in turn show a slight movement when the crankshaft is rocked slightly back and forth with the piston on top dead center at the end of the exhaust stroke.

EXHAUST BACK PRESSURE

Back pressure or retarding the escape of exhaust gases results in poor efficiency and an overheated engine. Run the engine without load other than charging the battery and note its speed. Stop the engine and disconnect the exhaust pipe at the cylinder. Start the engine. Again note the speed. If the speed in the second case is appreciably greater than the first, it indicates back pressure in the pipe or muffler.

Some of the soot deposit can be blown out of the exhaust pipe and muffler if the user periodically taps the pipe and muffler with a hammer while the engine is running.

GENERATOR

The generator field ring is bolted direct to the engine crankcase. The generator armature is mounted on the engine crankshaft and keyed in position on the tapered crankshaft and held tight with a locknut. Armature may be removed with puller No. 5031022. Loosen the small screw in the top of the locknut before attempting to remove it.

Four D.C. brushes are mounted on the commutator and four A.C. brushes on the collector rings. When the brushes are worn down to a point where the brush arms almost touch the top of the brush holders, new brushes should be installed. When installing new brushes care must be taken to see that they fit the curvature of the commutator.

To do this place a strip of #00 sand paper under the brush and pull paper back and forth several times, being careful to see that the brushes and the commutator have the same curvature.

See that the brush springs are in good condition and that the brushes move freely in the brush holders.

GENERATOR FUSE

A fuse that protects the generator is located on the generator frame inside the end cover. It is easily replaced after the generator end cover is removed. It is a 10 ampere cartridge fuse. Part No. 5036990.

SPECIAL ATTENTION SHOULD BE GIVEN THE STORAGE BATTERY WHEN LEAVING PLANT OUT OF SERVICE

When Delco-Light Engine-Generators are located in summer homes or cottages, or in other places

which are closed several months at a time, special attention should be given the battery before leaving the installation. This will insure against the possibility of the electrolyte freezing during the winter time and insure against the battery standing in a discharged condition for a considerable length of time. Before leaving the unit, proceed as follows:

- 1 - Add distilled water or rain water to each cell if needed, until the electrolyte level in each cell is just below the bottom of the filling openings.
- 2 - Charge to maximum gravity, which is approximately 1.285.
- 3 - Be sure all vent plugs are in place, that the hole in the top of each vent plug is open, and that the tops of all battery cells are clean.

Do not leave tools, such as wrenches, pliers, screw drivers, etc., on top of the cells.

If possible leave battery with a competent battery shop or a garage during a long period of idleness.

TO PUT THE BATTERY IN SERVICE AFTER A PERIOD OF IDLENESS

When it is desired to place the battery in service again after having stood idle for some time, see that the liquid in the cells is just below the bottom of the filling openings.

STARTING BATTERY CHARGE

Starting battery charging rate must necessarily be changed for different types of installations. For example, there will be installations where the plant starts very often and runs for a short period of time. This installation requires a high charging rate. On the other hand there are installations where the plant makes a few starts but continues to run for long periods of time. This installation will require a small charging rate.

On the control box there are two resistance units. See wiring diagram No. 5038463. One resistance has a sliding contact and the other has tapped connections. The one with sliding contact is the shunt field resistance. The shunt field resistance allows a slight voltage adjustment. The unit with tapped connections is the battery charging resistance. There is a single contact on one end of this resistance and two contacts close to the other end. These two contacts afford two charging rates.

Connect the adjustable lead to the contact on the end for a minimum charging rate and connect it to the one nearest the center for maximum charging rate. A careful observation of the starting battery state of charge at the end of a few weeks operation will point to what charging rate the battery should have.

STARTING THE ENGINE-GENERATOR WHEN STARTING BATTERY IS DISCHARGED

This engine-generator derives its ignition from the starting battery. If the starting battery is discharged it is necessary to supply the engine-generator ignition from an external battery.

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Connect the positive lead from a six volt battery to the ignition coil terminal holding the resistance unit. Connect the negative lead to the frame of the engine. Crank the engine. Remove six volt ignition connections as soon as generator will carry ignition.

RADIO INTERFERENCE ELIMINATION

The ignition interference may be eliminated by attaching one suppressor, part #5029553, to the spark plug.

The interference caused by generator noises rising mostly from the brushes may be reduced by connecting one terminal of condenser part #5029670 to the negative generator lead, and the other terminal of the condenser to the generator frame. Also connect one terminal of condenser #5029669 to the positive line, and the other terminal of the condenser to the ground. This connection should be made as close to the radio set chassis as possible. If the interference noise is not eliminated by attaching condenser and suppressor as outlined above, try connecting the condenser at different points on the generator, and line, such as the positive generator lead to ground, across generator brushes, from negative line to ground, on the engine-generator or radio set. Try both types of condensers, part #5029670 and #5029669.

On unusually stubborn cases try connecting one or both of the condensers, (Part No. 5029670 or Part No. 5029669) to one or both sides of the service lines at some remote point on the electrical distribution system. Particularly has this proved effective in some cases where the antennae parallels the service line.

Experience has taught that the majority of the interference can be eliminated by doing the things outlined in the beginning of this section, but beyond that point, it is necessary to do some experimenting.

MODEL 8RA1 and MODEL 8AA1 DELCO-LIGHT REPLACEMENT PARTS LIST

NAME OF PART	QTY. USED	PART NO.
DELCO-LIGHT PLANT - MODEL 8 RA-1		
		4005
MODEL 8 AA-1		
		4023
Spark Plug	1	841980
Cylinder Head Holddown Nut Lockwasher	7	108580
Set of two Valves (Intake and Exhaust)	1	5031217
Valve - Intake	1	5029130
Valve - Exhaust	1	5029135
Valve Spring	2	200212
Valve Spring Retainer	2	5035386
Valve Spring Clip	2	200214
Piston	1	5033228
Set of three Piston Rings	1	5035332
Piston Rings (upper)	1	5033231
Piston Ring (lower)	1	5033233
Piston Ring (center)	1	5033231
Piston Pin	1	5033229
Connecting Rod Assembly	1	5029113
Gasket - Cylinder Head	1	5033308
Gasket - Cylinder	1	5029157
Gasket - Governor Housing	1	5029163
Gasket - Valve Cover	1	5029374
Gasket - End Bearing	1	5029523
Gasket - Carburetor Adapter	1	5034670
Gasket - Adapter & Cylinder	1	5029533
Breaker Plate complete	1	5029630
Breaker Arm	1	5025835
Stationary Breaker Contact	1	5023581
Ignition Coil	1	5034101
Condenser	1	5034237
Carburetor Jet	1	5035335
Carbon Collector Brush (A.C.)	2	5033430
Carbon Brush (D.C.)	4	5029133
Fuse (10 Amps.)	1	5036990
Brass Exhaust Nipple	1	5029660
Remote Control Box (Model 8RA1)	1	4026
Installation Wiring Diagram (Model 8RA1)	1	5039664
TOOLS		
Armature Puller	5031022	
Flywheel Puller	5031706	
Valve Lifter	5033653	
Valve Reseating Set	5034615	
Valve Cam Follower Holding		
Tool	5030983	
Automatic Control Box (Model 8AA1)	1	4024
Installation Wiring Diagram (Model 8AA1)	1	5038960