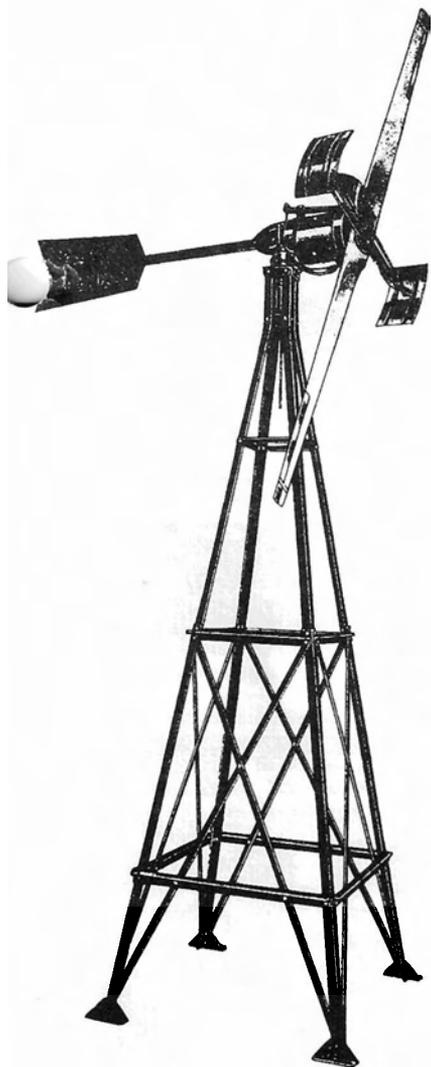


INSTRUCTIONS



FOR
ASSEMBLY

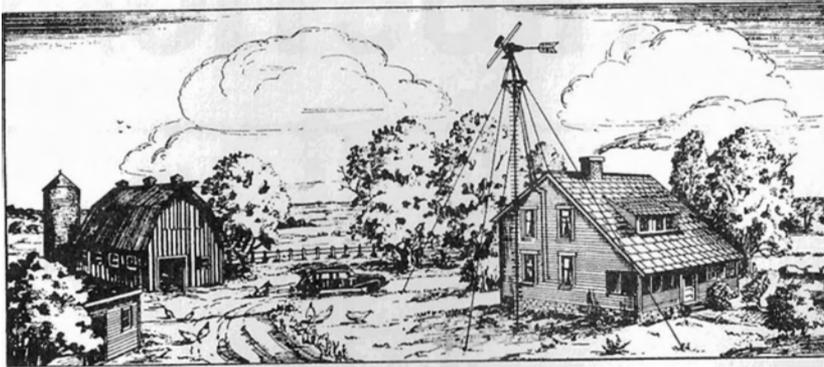
of

MODEL 622
6-VOLT HEAVY DUTY

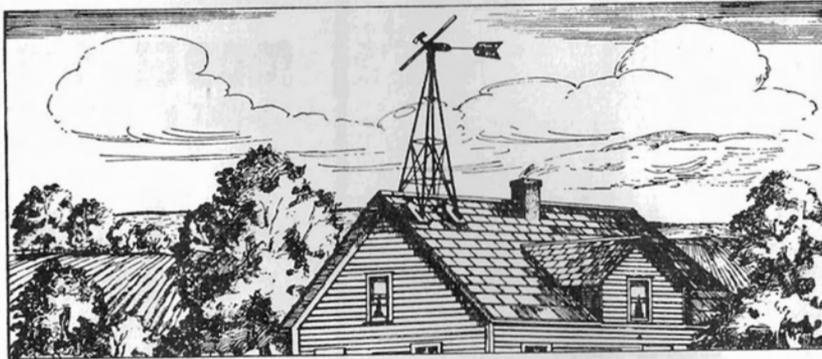
MODEL 1222
12-VOLT HEAVY DUTY

**Wind - Driven
GENERATOR
PLANT**

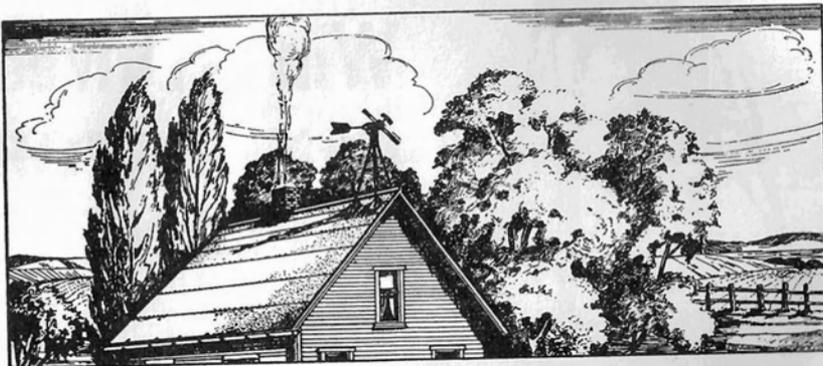
TYPES OF CHARGER LOCATIONS



EXCELLENT



FAIR



POOR

SELECTING TOWER, HEIGHT AND LOCATION

For good performance, it is necessary that the wind driven generator be mounted where the wind from all directions has an uninterrupted flow to the propeller. Any obstructions such as trees, hills, or buildings, even though they are somewhat lower than the charger, will set up rough air currents that seriously decrease the generator output. These "rough" air currents have lost a large part of their power and are continually shifting from one direction to another and also shift upward or downward. They also tend to increase vibration. All of these factors should be considered in selecting a satisfactory location for the charger. The higher the charger the better, for the air currents are smoother and steadier further from the ground. For good operation, **THE CHARGER SHOULD BE MOUNTED AT LEAST FIFTEEN FEET ABOVE ANY OBSTRUCTIONS WITHIN 400 FEET.**

If the charger cannot be mounted any higher than surrounding obstructions, it should be more than 400 feet from these obstructions. If the charger cannot be mounted as high as surrounding obstructions, it should be placed at least 800 feet from these obstructions. Neither of these installations are recommended in preference to an installation in which the charger is mounted considerably above the obstructions. They are merely substitutes for the better type of installation.

Another important fact to remember is that the charger should be mounted as close to the battery as possible. The farther it is mounted from the battery the greater the loss of energy in the wires. Since 100 feet is the maximum recommended distance between the charger and the battery, and since the battery will ordinarily be kept in the house, one of the methods suggested in this book should be followed to mount the charger close to the house and up high enough to receive an unobstructed sweep of the wind. Remember that if the charger is placed farther from the battery the wiring cost will be greater for two reasons: (1) the wire must be longer and (2) the wire must be of larger diameter.

In case there is no way of installing the charger near the house and above surrounding obstructions, it is possible to install the charger at a distance from the house in some unobstructed spot. For greater convenience it may be mounted on a two or four wheeled cart and moved from one location to another depending on the direction of the wind. Unless a very heavy cart is used the tower should always be guyed to prevent it from blowing over in strong winds. The battery in this case will have to be taken to the wind generating plant for charging.

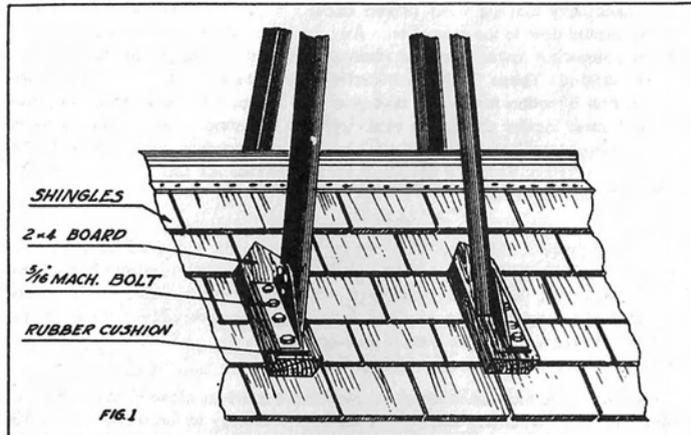
The service and satisfaction of a wind driven generator depends so much upon proper location that it cannot be emphasized too strongly that to make a good installation it is absolutely necessary that the charger not be shielded from the wind from any direction.

The top illustration shows a type of installation superior to either of the others for two reasons: First, the charger is mounted at least fifteen feet higher than any obstructions within 400 feet as recommended and second; the charger is mounted close to the house on a pole so that no vibration and rumble is heard in the house. The first illustration is the ideal type and although a little more difficult, the extra time and money spent in this type of installation will more than pay for itself in the quiet and efficient service it renders.

In the second illustration the installation is better than the one shown at the bottom of the page because the trees are not as high and the 10 foot tower has been used instead of the 5 foot tower. This type of installation will give better performance at all times than the one illustrated below because the air currents will be smoother and steadier.

Note in the bottom diagram the surrounding trees are higher than the propeller. With high winds this type of installation will produce some current but **DO NOT EXPECT GOOD RESULTS WITH THIS TYPE OF INSTALLATION.** The air currents will be rough and very unsteady and the generator output will be low.

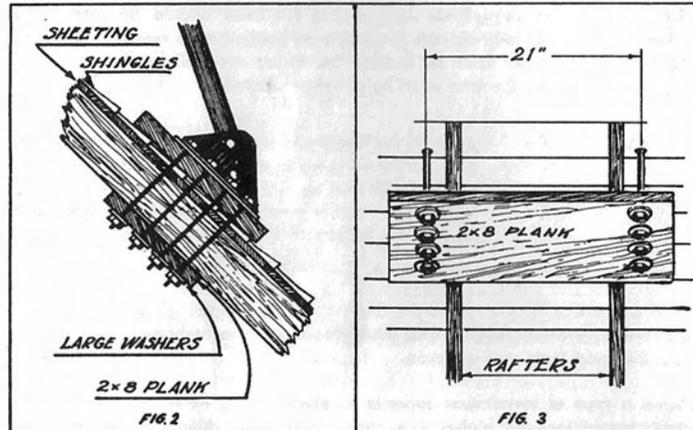
MOUNTING TOWER ON ROOF



There are many ways of mounting the charger satisfactorily. The tower is designed so that it can conveniently be mounted on a roof or any flat surface. The ways shown here are only suggestions; in some cases there may be better ways. The two important things are to have the tower high enough and braced well enough.

Fig. 1 shows a recommended method of mounting the tower securely to the roof. In this method 4 pieces of 2 x 4 one foot long, 2 pieces of 2 x 8 about three feet long and sixteen bolts 5/16 inch in diameter and about 11 inches long are required.

The pieces of 2 x 4 may be pointed at the top as shown to prevent leaves and dirt from collecting at the top. After the tower has been set up on the ground, set it on the pieces of 2 x 4's and mark and drill the holes.



Then set the tower on the 2 x 8 pieces at right angles to the direction in which the 2 x 4's were placed and again mark and drill the holes.

After placing the tower in the desired location on the roof, put the 2 x 4's under the tower feet and insert the bolts in the holes. The 2 x 4's may then be nailed in place to hold them while the tower is removed to drill the holes through the roof.

Place the tower in its proper position and insert the bolts in the holes. The 2 x 8 is then placed on the bottom side of the rafters and the bolts inserted in the drilled holes as shown in Figure 2. Be sure that this 2 x 8 is long enough to reach at least two, and preferably three, rafters. The long bolts may be held with a pair of pliers while the nuts are being tightened. Figure 3 shows the inside view under the rafters.

MOUNTING TOWER ON POLE OR PIPE

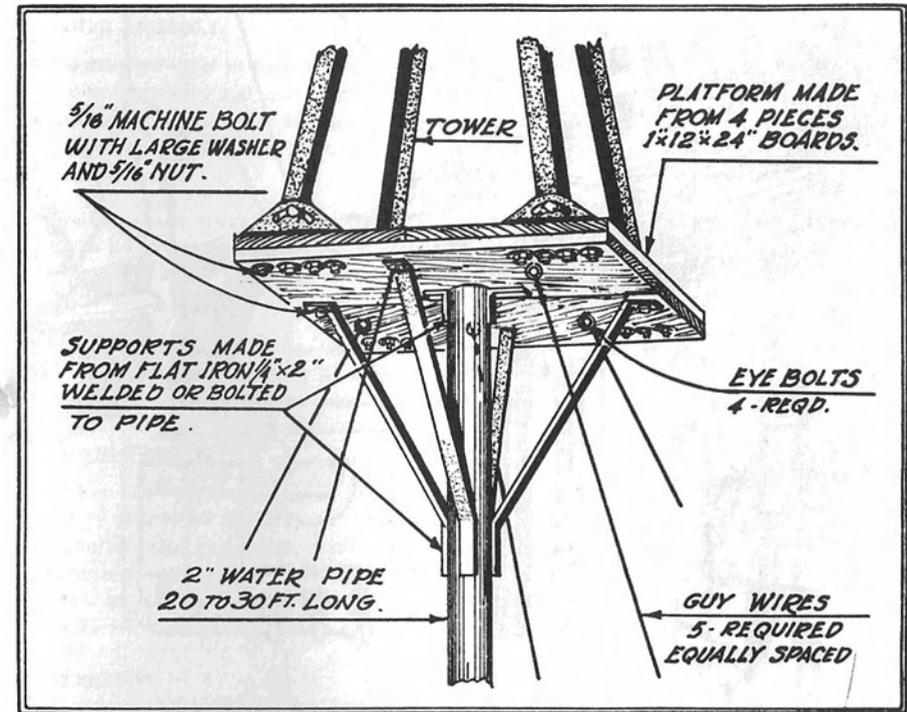


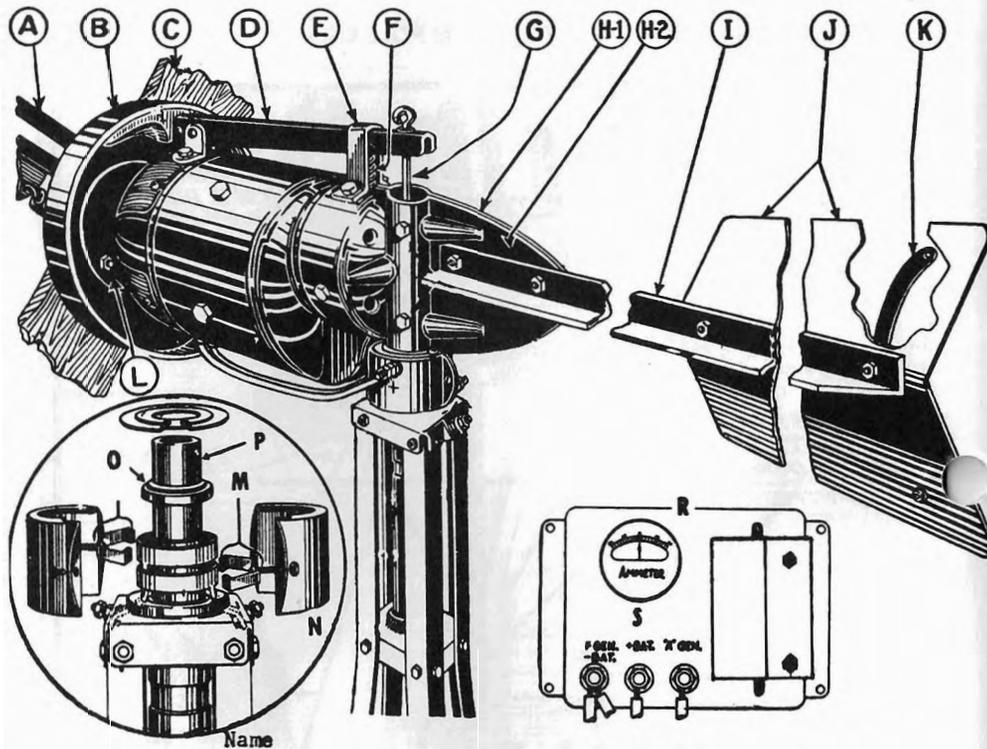
Figure 4 shows a method of mounting a 5 foot tower on a platform on a water pipe. This type of installation works very well but be sure that the platform is sufficiently braced and the tower is properly guyed. Rough fence boards are recommended for platform because they will last for many years. If a coat of creosote or other similar preservative is available it should be used.

The tower should be high enough so that the propeller is fifteen feet higher than any surrounding obstructions within 400 feet. If it is necessary to join two pipes together to obtain this height, the joint should be strengthened by the use of guy wires. Note that in the illustration there are five guy wires attached to the platform. This is the recommended method of guying. Even if one of the guy wires is accidentally broken, the other four will hold the tower in place until repair can be made. The eye bolts to which the guy wires are fastened should all be the same distance from the center and also be the same distance from each other. The bottom ends of the guy wires should be attached to anchors or posts that will withstand several hundreds pounds of pull. Turn buckles should be used to keep the wires tight.

The braces which hold the platform rigid should be made of 1/4 inch iron straps 2 inches wide. Be sure they are drawn up so that the platform cannot rock back and forth.

If a 2 or 3 inch water pipe is not available a 6 inch x 6 inch timber may be used. If it is necessary to splice two of them together, use four 2 x 6's at least 8 feet long lapped over the joint on all four sides.

Braces which hold the platform in place may be made of 2 inch x 4 inch lumber. Be sure they are securely nailed or bolted in place so that any vibration will not loosen them.



Ident. Letter	Name	Pieza
A	Governor	Regulador
B	Brake drum	Tambor del freno
C	Propeller	Helice
D	Brake lever assembly	Palanca del freno
E	Spring housing	Cubierta del resorte
F	Brake lever spring	Resorte de palanca del freno
G	Brake rod	Varilla del freno
H1	Generator bracket (right)	Soporte del generador (derecho)
H2	Generator bracket (left)	Soporte del generador (Izquierdo)
I	Vane angle	Angular de la veleta
J	Vane	Veleta
K	Vane brace	Abrazadera de la veleta
L	Hub	Alambres terminales del generador
M	Collector ring brush	Juego de Escobillas del colector
N	Collector ring cup	Cubierta completa anillo colector con escobillas
O	Collector ring bearing	Cojinete del anillo colector
P	Turntable shaft	Arbol de plataforma giatoria
Q	Collector ring assembly	Juego de anillo colector y placa - guia
R	Instrument panel	Tablero de instrumentos completo
S	Ammeter	Amperimetro
T	Diode	Diodo

TOWER INSTALLATION

1. TOWER ASSEMBLY:

The standard tower that comes with the charger is 5 feet tall. The mounting pipe is shipped with the collector ring assembly and upper and lower support plates already in place. As shown on the opposite page notice that the top of the legs fit inside the upper support plate. Be sure to use the lock washers provided for the tower bolts and tighten all nuts securely. Note that the cross braces fit on the outside of the legs.

(Five-foot Tower Extension: An additional 5 foot section is available to make a 10 foot tower. The legs of the lower extension are bolted on the outside of the legs of the upper section as shown in the diagram on the cover page. Be sure that all cross braces are put in their proper position as shown in the diagram.)

Each foot is attached with two bolts. The lower one is 5/16" x 3/4" and is provided with lock washer and nut. The upper one is 1/4" x 3/4" and is provided with a lock washer, flat washer and nut. In the ten-foot tower the cross braces are bolted to the back side of the upper bolt that extends through the foot.

2. LEVELING THE TOWER:

For best operation the tower must be plumb. This may easily be checked by placing the flat side of a piece of 2 x 4, six inches long, against the mounting pipe directly below the collector ring and placing a level against the 2 x 4 as shown in Figure 5. If the tower leans in any direction it should be corrected by placing metal shims under one or more of the tower feet.

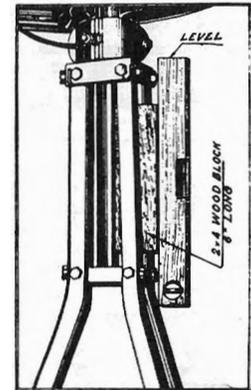


FIG. 5

3. GENERATOR:

The generator is supported on a 1" pipe which extends up through the collector ring cover. Place the generator on this mounting pipe, being sure that the generator brackets rest between the two small knobs on top of the collector ring cover. Two 5/16" x 2" bolts are provided to bolt the brackets to the mounting pipe. A wire pin is used to hold the turntable in place during shipment. It may be removed as soon as the generator brackets are bolt in place. (See P. 6).

4. TAIL VANE:

Assemble the tail vane sections on the vane angle (J) as shown on Page 6 using 1/4" x 3/4" bolts. Then fasten the one vane brace (K) to the vane as illustrated. Remember, there is only one vane brace and it is placed on the side of the vane that does not rest against the vane angle. Next bolt the vane angle assembly to the end plate of the generator (H) using 5/16" diameter bolts.

5. PROPELLER, GOVERNOR AND BRAKE DRUM:

The governor is shipped with the mounting bolts in place. Insert these bolts through the propeller from the side labeled "Mount With This Side Facing Wind," and through the brake drum. Then lift this assembly to the generator and insert the bolts through the hub and put on the lock washers and nuts on the back side of it.

6. BRAKE (Shut-Off) ASSEMBLY:

Pass the brake rod through the small washer provided and down through the end of the brake lever (D) and through the pipe. The loop end of wire should be kept on top of lever as illustrated, being sure washer (L) is in position. Connect a piece of wire to the end of the brake rod and run it down to a place within easy reach from the ground so that the charger may be shut off when desired.

After completing this part of the installation proceed with tracking the propeller and making the electrical connections.

7. PROPELLER TRACK:

To avoid vibration it is important that both propeller tips and both governor flaps travel at equal distances from the tower legs. This distance can easily be measured as shown in Fig. 6. Be sure that the charger does not revolve on the turntable while taking these measurements. If only a small amount of tracking correction is necessary it may be accomplished by tightening one of the propeller bolts a little more. If more correction is necessary, insert a thin metal shim between the hub and the propeller; to do this will require loosening the propeller bolts.

8. CONNECTING GENERATOR WIRES TO COLLECTOR RING COVER:

See Fig. 8. The deluxe models have a white wire to connect between the positive terminal of the generator (marked "A") and the + terminal on the collector ring cover and a black wire to connect between the negative terminal on the generator (marked

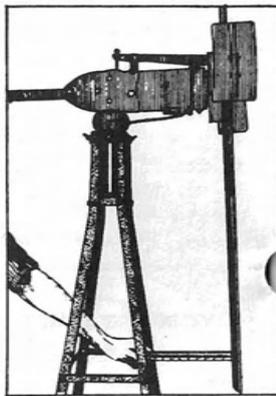


FIG. 6

"F") and the — terminal on the collector ring cover. The heavy duty models use small metal tags attached to the wires to indicate polarity.

Except for connecting the lead-in wires, this completes the work on the tower. The generator has double grease sealed ball bearings on each end of the armature shaft, making it unnecessary to ever oil the generator.

The 1-inch pipe shaft is greased before leaving the factory and will not require greasing for at least three months.

THE GENERATOR SHOULD NEVER BE ALLOWED TO OPERATE ON "OPEN CIRCUIT." That is, it should always be connected to a battery or it should be "shorted out" whenever the propeller is revolving. To "short out" the generator, disconnect the "battery end" of the wire leading from the F. Gen. — Bat. to the negative battery terminal and connect it to the + Gen. terminal on the

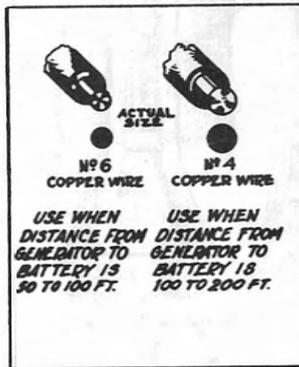


FIG. 7

panel. A spark will be noticed if the generator is charging but this is normal. Shorting out the generator will prevent it from burning out because it is not permitted to "build-up" any voltage. This method is satisfactory for temporary purposes but whenever it is not to be used for several days, it should be stopped with the brake.

8. CONNECTING LEAD-IN WIRES:

There are two terminals on opposite sides of the upper tower support plate. These terminals are marked + and — on the top side of this plate. When connecting the lead wires to these terminals, be

sure that they are marked in some way so that their identity does not become confused. The lead wires should be of large enough diameter to carry the current with very little loss. The shorter and the larger the wires the better. With long wires of small diameter over half of the generated energy may be lost. Under these conditions the generator is also worked at a much higher voltage and produces extra wear and load on the generator.

THE MAXIMUM RECOMMENDED DISTANCE BETWEEN THE GENERATOR AND THE BATTERY IS 100 FEET. For distance up to 50 feet use No. 6 wire, for distances of 50 to 100 feet use No. 4 wire. See Figure 7.

The wires should be held in place with insulators so they cannot sway in the wind nor be struck by the propeller. In connecting these wires to the instrument panel be sure that the insulation is thoroughly scraped off. Bend a loop in the wire before putting it on the terminal bolt; if the wire is bent around the bolt, the insulating washers may be injured.

The wire from the positive (+) terminal on the tower goes to the "A" Gen. terminal on the panel. The wire from the negative (—) terminal on the tower goes to the "F" Gen.-Bat. terminal on the panel. See Figure 8.

10. LIGHTNING PROTECTION:

The charger will serve as a protection against lightning if it is properly grounded. To ground it connect one end of a piece of No. 4 copper wire to the negative terminal on the tower and the other end to a 3/4" galvanized water pipe driven 8 feet into the ground. Be sure good permanent connections are made on both ends; a solderless terminal or bolt is satisfactory for connecting the wire to the rod.

11. CONNECTING WIRES FROM PANEL TO BATTERY:

Regardless of the type of battery used, be sure that the terminals make a good connection **AND CONTINUE TO MAKE A GOOD CONNECTION.** Poor connections to the battery are liable to cause radio interference and burning out of light bulbs and radio tubes during periods when the generator is charging at a good rate. Battery clips are widely used to make connections, not because they make a good permanent connection but because they are handy. The small amount of time and money spent in making a good battery connection is well worth while.

In case farm lighting type cells are used or a radio battery is used, good permanent connections are provided. When a car battery with ordinary short terminal posts are to be used, it is recommended that a clamp type terminal be used. These are available at most auto accessories stores and are large enough to permit inserting the wires from the panel, radio and lights.

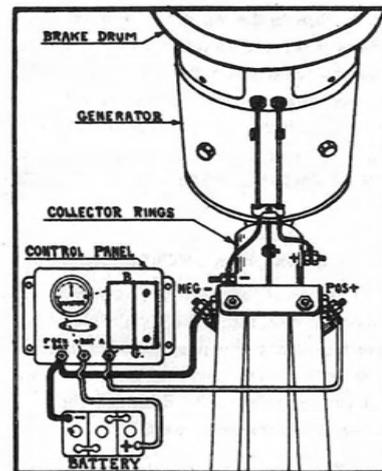


FIG. 8

When it is necessary to use battery clips do not clip the radio clips to the top of the charger clips on the battery because if some corrosion develops between the battery post and the battery clip, the tubes may be damaged due to the higher voltage when the generator is charging. If the clips are put on horizontally, separate clips from the generator and "load" (lights or radio) may be clipped to each post. **COAT THE TERMINALS WITH PETROLEUM JELLY (VASELINE) OR GREASE.** See "Battery Care" on Page 13.

A. BATTERY FOR 6-VOLT MODELS

For good service it is necessary that a battery of large capacity be used. The type most highly recommended is the type ordinarily used for farm lighting. Three regular 2 volt cells are required and they must be connected in series as shown in Figure 9. Each cell should have a capacity of at least 120 ampere hours.

The next most desirable battery for 6 volt use is a heavy duty radio battery of at least 160 ampere hours capacity. These batteries are especially designed to furnish a fairly small amount of current over a long period of time whereas a car battery is designed to furnish extremely high current for starting purposes.

The least desirable battery for radio and lights is a regular car battery. Unless it has extra large capacity, it is recommended that two of them be connected in parallel as shown in Figure 10. **DO NOT CONNECT THEM IN SERIES FOR 6 VOLT USE BECAUSE WHEN CONNECTED IN SERIES THE COMBINATION FURNISHES 12 VOLTS.**

B. BATTERY FOR 12-VOLT MODELS:

The best type of 12 volt battery consists of six Farm Lighting Type Battery Cells connected in series as shown in Figure 11. In series connection, the positive of one cell is connected to the negative of the next one, etc.

Another method is to use two six-volt car or radio batteries connected in series, that is, the positive of one connected to the negative of the other as shown in Figure 12.

Radio batteries are preferable for the reason given in Article 11 A. To increase the capacity of the battery, four such separate batteries may be connected together in a series-parallel combination. Note that in Figure 13 Battery 1 and 2 are connected in series to give 12 volts and Battery 3 and 4 are connected in series to also give 12 volts and this combination is connected in parallel which increases the capacity but does not increase the voltage.

This method will work satisfactorily with four batteries of the same type, size and state of charge but is not recommended for different type of batteries especially if some are fully charged and some partially discharged.

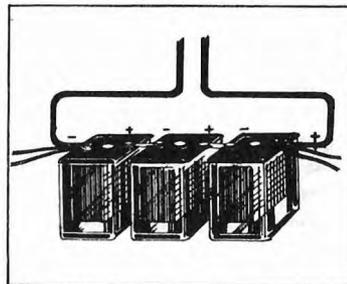


FIG. 9

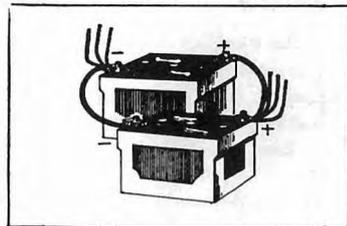


FIG. 10

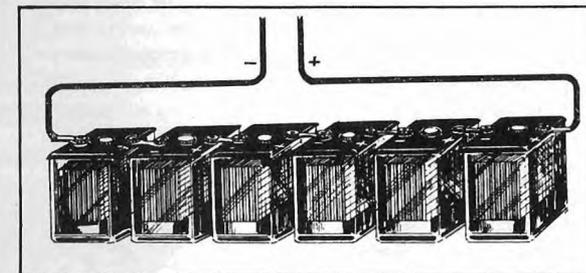


FIG. 11

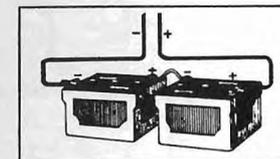


FIG. 12

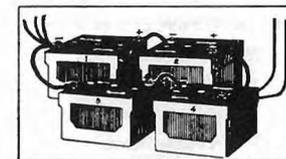


FIG. 13

12. CONNECTING RADIO AND LIGHTS TO BATTERY:

If lights are to be connected to the battery the wires may be connected directly to the battery terminals or to the "+ Bat" and the "F Gen-Bat" terminals on the panel. One of the wires leading to the lights should be equipped with a 30 ampere fuse to protect the circuit. If the lights get brighter and dimmer as the generator charging rate increases and decreases the battery terminals are perhaps corroded. Remove the terminals and clean the connections if necessary.

In the case of a radio, however, a poor battery connection is not as easily noticed and the tubes may be injured by the higher voltage. For this reason it is recommended that the radio be connected directly to the battery as described in Article 11 rather than to the terminals on the panel.

13. INSTALLATION CHECK:

After completing all the connections it is advisable to "motor" the generator. This will properly polarize the generator and will also indicate whether or not the electrical circuit is complete. This installation check is best made when there is no wind. During periods of low wind velocity there is no positive way of knowing whether the generator is "motoring" or whether the wind is causing the propeller to turn.

To motor the generator **RELEASE THE BRAKE** and take a short heavy piece of wire or a pair of pliers and connect together the two points labeled B and G in Figure 8. The ammeter should show a discharge of approximately 4 to 6 amperes while motoring in no wind. If it does not, something is wrong—see "Locating Trouble" on Page 15. If the installation is completed when there is wind one person should release the brake and another person should motor the generator the instant the brake is released before it has a chance to pick up speed.

THE COMPLETE ELECTRICAL CIRCUIT

In the schematic diagram (Figure 14) the complete electrical layout is shown. V represents the commutator which is in the front part of the generator armature. H and I are the brushes. Each of the 49 bars of the commutator are insulated from each other but are connected to the wire coils of the armature. As the armature is turned, the voltage builds up. The diode allows the current to flow only in one direction, that is, from the generator to the battery. If the current was allowed to flow in the opposite direction, that is, back to the generator, it would discharge the battery.

Whenever the armature is turning, current flows from the brush H through the field coils D and C to the brush I. This current is used to give a strong magnetic field in which to rotate the armature, but does not flow to the battery.

When the generator is being turned fast enough so the voltage is higher than the battery voltage, current flows in the following circuit, starting from the (+) brush H, it flows through:

1. A (+) lead wire of the generator (insulated from frame).
2. The connecting wire, terminal, and collector ring brush J.
2. The collector ring K.
4. The Copper strap and (+) terminal L on top of the tower.
5. The lead wire M.
6. The "A" Gen. terminal (insulated) on the instrument panel.
7. The connecting strap and terminal G of the diode.
8. Through the diode to terminal B through the ammeter.
9. The insulated terminal (+) BAT.
10. To the (+) battery terminal, through the battery to the (-) battery terminal, lead wire Z insulated terminal F Gen. (-) BAT.
11. The lead wire Q and the (-) terminal R on top of the tower.
12. The connecting strap and collector ring S.
13. The brush and collector ring terminal and lead wire T, the (-) lead wire of the generator.
14. The lead wire and the (-) brush I.
15. The commutator V and the armature coils (coils not shown).
16. The (+) brush H, to complete the circuit.

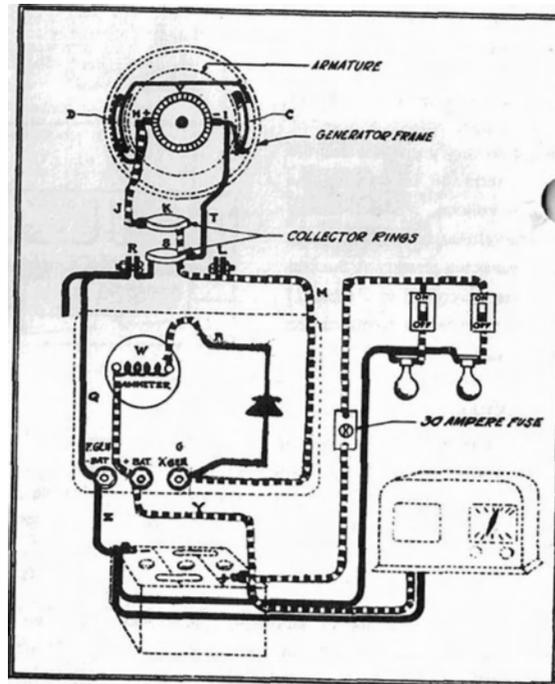


FIG. 14

REMEMBER THAT THERE MUST ALWAYS BE A COMPLETE CIRCUIT FOR THE CURRENT TO FLOW.

SERVICE

1. PROPER CHARGER INSTALLATION:

It is absolutely necessary that the charger be installed where the propeller will obtain the full sweep of the wind from all directions. Unless your charger is properly installed it cannot give good performance. In the majority of cases of poor performance, the installation is faulty. Remember, the charger should be at least 15 feet higher than any obstruction within 400 feet.

2. BATTERY CARE:

The most important precautions in caring for the battery are to keep the terminals clean and to add enough distilled water occasionally to keep the liquid about half inch above the plates. Petroleum jelly applied to the battery posts and lead wire terminals will help to prevent corrosion. If they do become corroded they may be cleaned with a little baking soda and water. If battery acid is spilled on the clothing or floor it should be neutralized immediately with baking soda, washing soda or household ammonia.

Sometimes a plate in a battery becomes shorted resulting in a dead battery and the fault is laid to the generator. Observe the ammeter to see that the generator is charging properly during good steady wind. If the battery cannot be kept charged and the generator is working properly either the load is too heavy or the battery is faulty.

3. GENERATOR BRUSHES

This is a two-brush generator—both stationary.

The brushes are an important item, and should be checked for wear twice a year. Never wait until the brushes become worn to replace them, as this is injurious to the commutator. By checking the brushes occasionally, it is a simple matter to change them before they are worn so low that the springs ride on its stop, taking the spring tension off the brush. The loose brush then makes poor contact on the commutator and results in burning of the commutator. **THE BRUSHES HAVE BEEN ADJUSTED AT THE FACTORY FOR BEST GENERATOR PERFORMANCE. DO NOT TRY TO IMPROVE THIS SETTING.**

4. GREASING THE CHARGER:

GENERATOR: The generator is equipped with double greased sealed ball bearings and will not require further greasing for its entire life.

COLLECTOR RING BEARING AND TURNABLE SHAFT: The turntable shaft and collector ring bearing should occasionally be greased. To do this remove the small bolts which hold the collector ring cup halves together, lift the shaft up a few inches and apply a light coat of cup grease. Unless the turntable shaft is well lubricated the propeller will not face the wind as the wind direction shifts.

GOVERNOR: To insure free operation, a few drops of oil should occasionally be put on the pin joints of the governor.

5. VIBRATION:

One of the common causes of vibration is a propeller that is not tracking properly. See Page 10 for correct tracking methods.

An out of balance propeller or governor will also cause vibration. If necessary, the propeller and governor may be rebalanced during times when there is no wind. Loosen the lower brush cover bolts enough to remove these covers. With a string or piece of fine wire tie the brushes back so they cannot rest on the commutator. The propeller will now revolve very easily with practically no friction. Stop the propeller in a horizontal position (parallel to the ground) with the governor frame in a vertical position (straight up and down). If the propeller and governor start to turn from this position the propeller is out of balance; turn a wood screw into the back edge of the light end of the propeller and put enough weight on it so that balance will be restored. Never add weight more than two feet from the center of the propeller. If there are any balancing weights on the propeller these can be moved to restore balance. When it has been balanced to the point where it does not start to turn by itself, give it a half revolution and again stop it to be sure it will also remain at rest in that position.

After the propeller has been properly balanced in this position stop it in a vertical position (straight up and down) with the governor frame in a horizontal position. If the propeller and governor start to turn from this position, balance may be restored by screwing a weight on one side of the propeller half way between the ends, that is, directly to the side of the center. When it has been balanced to a point where it does not start to move from a horizontal position, give it a half turn and again stop it to be sure that it remains at rest in that position.

With both governor and propeller balanced, they should remain at rest when stopped in any position. **BE SURE TO DO THIS ONLY WHEN THERE IS ABSOLUTELY NO WIND.** A perfect balance can be obtained by this method without removing any part of the charger if done **WHILE THERE IS NO MOVEMENT OF AIR.**

6. CORRECT CHARGING RATES:

The following table shows the current output when the generator is run at various speeds:

Revolutions per minute	6 VOLT HEAVY DUTY Amperes	12 VOLT HEAVY DUTY Amperes
270	0.1	0
350	5	2½
440	10	6
570	15	10
700	20	12
900	25	14

LOCATING TROUBLE

As explained on Page 11, the first thing to do when the plant is completely installed is to motor the generator to polarize it. This is necessary because when it "builds up" a voltage the first time, it is possible that what should be the "positive side" of the generator has become the "negative side," and vice versa. In this case it cannot charge the battery in the right direction and will burn out the diode. Considerable information may be obtained while "motoring" (or trying to motor) the generator. In making any tests shake or bend the wires leading to the battery and generator slightly because often times, shorts and poor connections can be detected more easily when this is done. A "short" is caused when the positive side of the circuit, (wire or terminal) makes contact with the negative side of the circuit. An "open" circuit is caused by a faulty connection which is not making electrical contact or by a broken wire.

I. MOTORING THE GENERATOR:

If a heavy piece of wire is held on points B and G in Figure 8, the propeller should turn (**BE SURE THE BRAKE IS OFF**) and if there is no wind, the ammeter should show a discharge of about 4 to 6 amperes. If there is a little wind it will show less discharge and if there is enough wind to revolve the propeller rapidly, it will show a charge instead of a discharge.

II. SHORT CIRCUITS:

If the generator cannot be "motored" and the ammeter indicates a high discharge rate, there is a short somewhere in the panel, in the wires leading to the generator, or in the generator itself. The trouble may be localized by removing one of the wires (preferably the positive one) at various points in the circuit.

A. First remove the wire from the "A" Gen. terminal on the instrument panel and again touch a wire to points B and G. **If the ammeter still shows a discharge, there is a short somewhere in the panel.** Carefully inspect the wires on the positive side of the circuit, especially at the terminal where an insulating washer is used to keep it from making contact with the panel.

If the ammeter does not show a discharge, the short is not in the panel. Reconnect the wire to the "A" Gen. terminal on the instrument panel.

B. The next place to disconnect the positive wire is upon the + terminal on the tower and again touch a wire to points B and G on the panel. **If the ammeter shows a discharge, there is a short in the wires somewhere between the panel and terminal on the tower.** Examine carefully if there is a short. **If the ammeter does not show a discharge,** there is no short up to this point, so reconnect the wire to the terminal on the tower.

C. The final place to disconnect the positive wire is up on the + terminal on the collector ring cup. Again touch points B and G on the panel. **If the ammeter shows a discharge, there is a short between the + tower terminal and the + terminal on the collector ring cup.** Carefully inspect the insulating washers around the bolt on the + tower terminal and the + collector ring terminal and the insulation on the copper strip running up the inside of the collector ring. **If the ammeter does not show a discharge,** there is likely a short in the generator and it should be checked by a competent repair man.

III. OPEN CIRCUITS:

If the generator cannot be "motored" when points B and G are touched with a short piece of wire and the ammeter hand stays at zero, there is an "open" somewhere in the circuit. This open can be easily detected with a "test light." Take an ordinary house bulb and attach two wires about two feet long.

A. First touch the "test light" wires to the battery terminals. If the test light is correctly connected the bulb should light. If it does not, the battery is dead or there is a loose connection between the cells.

B. Touch the test bulb wires to the "+ Bat" and "F Gen. - Bat" terminal on the panel. The bulb should light. If it does not, there is an open in the wires leading to the battery.

C. Next touch the test bulb wires to the F generator (—) battery terminal and the copper strap leading to the terminal B of the diode. The bulb should light and the ammeter should show some discharge. If the bulb does not light, the ammeter is open and will require replacement.

D. Next **SET THE BRAKE** and connect the test lead wires to the "+ Bat." and "A Gen." terminals on the panel, leaving the other wires on the terminals in place. Now take a short piece of wire and touch the end to the "F Gen. - Bat." and the "A Gen." terminals and the bulb will light if hook-up is properly made. Have another person watch the bulb and touch the ends of the short piece of wire to the + and — terminals upon the tower. It should light. If it does not there is an "open" in the wires leading to the tower terminals. Careful inspection should reveal a break in the wire or a very poor connection. If the bulb lights the circuit is complete to the top of the tower.

E. Leaving the test bulb connected as in Paragraph D, touch a short wire from the + terminal to the — terminal on the collector ring cup. If the bulb lights, the circuit is satisfactory to this point. If it does not, there is an open in this part of the circuit. Take out the bolts which hold the collector rings together so that it may be removed. Touching the wire from one collector ring to the other should light the bulb. If it does not there is an open in the collector ring leads. If it does light, this indicates that since it did not light when touched to the collector ring terminals, a poor contact was being made between the collector ring and the collector ring brush. Carefully clean them with gasoline, polish with sandpaper if necessary and examine the brush springs to see that they have enough tension, hold the brushes firmly against the collector rings.

If the circuit is complete any time the propeller is stopped the test bulb will light when the leads are connected to the + Bat. and "A" Gen. terminals on the panel.

After the "open" is located, be sure to remove the test light from the panel before starting the plant.

IV. BATTERY CANNOT BE KEPT CHARGED:

If the battery cannot be kept charged there may be several causes for the trouble. (1) The charger is installed where the wind does not have a clear sweep to the propeller. (2) The charging rate is low (watch the ammeter and compare with proper charging rate). (3) The battery is in poor condition (be sure to add water when needed). (4) The load is too heavy (using the lights or radio too much) or (5) The diode is shorted allowing the generator to motor when the wind goes down.

If no shorts or opens can be detected in the circuit, and the generator is in working order, and still no charge is indicated during good steady winds, it is possible that the diode is open. While the propeller is turning at a good rate of speed, connect a short piece of wire between points B and G in Figure 8 as explained in Article I. If a charge is indicated when these terminals are connected together but will not show a charge when they are not connected, the diode is open and must be replaced.

V. GENERATOR DOES NOT CHARGE:

In most cases this is caused by an open or short but it may also fail to charge because the brushes are not properly touching the commutator. Remove the lower brush covers on the generator and pull outward on the brushes. If there are any evidences of sticking due to rust or corrosion it should be removed with fine sandpaper and lubricated with a drop of light oil.

VI. LOW CHARGING RATE:

Brushes which are so badly worn that they do not make firm contact on the commutator or a dirty or rough commutator reduces the charging rate of the generator. They may be inspected by removing the generator cover band. If the brushes are worn down to about 1/2 inch they should be replaced.

The normal charging rate of the generator at various speed is on Page 14. If the commutator, brushes and wiring all seem to be satisfactory, but the generator current output is less than it should be according to this table, the generator may be removed and tested at a reliable repair shop. Remember however, that high current outputs cannot be expected in rough swirling air currents, so be sure the charged is mounted high enough.

The commutator need not be of a light copper color for best performance. As long as it is not sticky, burned or pitted it should not be sanded down. It may be cleaned up with gasoline or if in poor condition it may be cleaned up with No. 00 sandpaper (**DO NOT USE EMERY PAPER**). A commutator that is in good condition has a dark brown color and a glossy appearance.

DO NOT TRY TO ADJUST THE BRUSHES TO OBTAIN MORE OUTPUT.

VII. RADIO INTERFERENCE:

Keep the radio aerial away from the generator lead-in wires as far as possible to prevent radio interference. Whenever possible also keep the aerial at right angles to the lead-in wires rather than parallel to them.

A dirty or rough commutator will cause arcing which will result in radio interference. Clean the commutator with gasoline or if in bad condition with a little piece of No. 00 sandpaper.

Be sure the wire leading from the — terminal on the tower is making a good contact with the ground rod and that the ground rod is deep enough. A .5 mfd. condenser is connected between the positive brush and the generator frame. In some cases it may be advisable to use a larger condenser, instead of, or in addition to this condenser. It may also be helpful to use a .5 mfd. condenser connected to the movable brush and the generator frame.

A radio noise eliminator is installed in the rear end plate of the generator. This is a spiral spring-like device which grounds the armature shaft to the generator frame.

If all other methods of stopping interference fail the generator may be "shorted out". This may be accomplished, as described on Page 8, by disconnecting the negative wire leading from the panel to the battery and connecting it to the Gen. terminal on the panel.

HOW TO ORDER PARTS

- On order, always give the following information:
 - PART NUMBER AND DESCRIPTION for each part ordered, as given in this Parts List.
 - The IDENTIFICATION NUMBER, which is found on the plate attached to the instrument panel.
- Parts can be obtained from the Dealer from whom you purchase the charger.

PARTS LIST

All Prices Are Subject to Change Without Notice

No. Part	Part Name	Ship Wt.	
		Lbs.	Oz.
PROPELLER, GOVERNOR AND BRAKE ASSEMBLIES			
9439	Propeller	1	6
1413	Hub	1	12
8830	Governor	1	10
1537	Brake Shoe, Lever and Pivot Brackets (assembled)	1	4
1538	Brake Drum	1	4
114	Spring Housing	1	6
105	Brake Lever Spring	1	8
107	Brake Rod	1	1

INSTRUMENT PANEL

1335	Instrument Panel (Heavy Duty - 6-volt)	1	2
1334	Instrument Panel (Heavy Duty - 12-volt)	1	2
9050	Relay (Heavy Duty - 6-volt)	1	8
45930-2	Diode Assembly (Heavy Duty - 12-volt)	1	8
1420	Ammeter (Heavy Duty - 6-volt)	1	8
576	Ammeter (Heavy Duty - 12-volt)	1	8

COLLECTOR RING ASSEMBLY

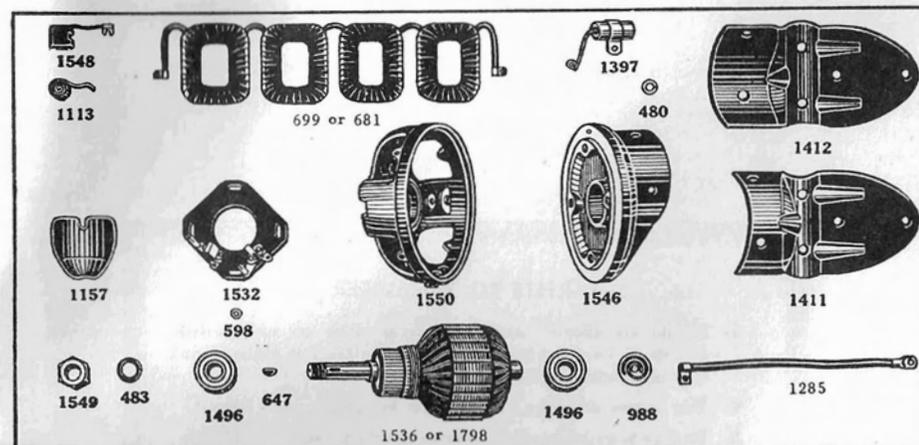
1408	Collector Ring Assembly complete (includes 1458, 1351, 130, 1409, 671)	1	6	8
671	Collector Ring Cup with Brushes	1	1	
1202	Collector Ring Brush - 2 required	1		2
130	Bearing for Collector Ring	1		12
1351	Collector Ring Cover Plate	1		3
1458	Mounting Pipe Assembly (includes Collector Rings and Support Plates)		7	

GENERATOR MOUNTINGS AND VANE

1409	Turntable Shaft	1	2
565	Vane	1	2
1275	Vane Angle	1	3
1515	Vane Brace	1	8

TOWER

672	5-foot Tower Complete with Collector Ring Assembly	1	25	
927	5-foot Tower Extension (To make a 10-ft. Tower)	1	34	
1371	Tower Leg (Top 5' Section)	3	3	
124	Top Horizontal Brace	4	6	
928	Upper Extension Tower Brace	4	10	
930	Extension Tower Leg	4	3	
929	Lower Extension Tower Brace	4	12	
931	Long Cross Brace	8	1	
1082	Tower Foot	4		
673	Bag of Bolts for 5-foot Tower	1	1	2
674	Bag of Bolts for 5-foot Extension	1	1	4



No. Part	Part Name	No. Per Unit	Ship. Wt.	
			Lbs.	Oz.
699	Field Coil Set - 6-volt	1	1	6
681	Field Coil Set - 12-volt	1	1	6
1411	Generator Mounting Bracket L. H.	1	1	12
1412	Generator Mounting Bracket R. H.	1	1	12
1285	Lead Wire	2		4
1157	Brush Cover			8
1397	Condenser	2		3
1532	Brush Holder Assembly	1	1	
1113	Brush Spring	2		1
1548	Brush for 6-volt (2 required)	2		2
1612	Brush for 12-volt (2 required)	2		2
1550	Front End Casting	1	2	
647	Woodruff Key No. 5 (1/8 x 5/8)	1		1
988	Noise Eliminator	1		1
1496	Bearing (203TT)	2		10
1536	Armature - 6-volt Heavy Duty	1	10	
1798	Armature - 12-volt Heavy Duty	1	10	
1549	Armature Shaft Nut	1		6
1546	Rear End Casting	1	6	14

POINTS TO REMEMBER

1. Mount the charger high enough to allow an undeflected sweep of the wind from all directions. (15 feet higher than any obstruction within 400 feet)
2. Use proper size wire from charger to battery. See Page 8.
3. Be sure to make good permanent electrical connections to the battery terminals.
4. Solder and tape ALL wire splices.
5. Always set brake to prevent charger operating when battery is fully charged.
6. Never allow charger to run without a battery connected, or without shorting out the generator.
7. Install the propeller with the correct side toward the wind. This information is stamped on the center of the propeller.
8. Using regular lightning cable or No. 4 wire, connect the negative terminal on the tower to a rod driven 8 feet into the ground.
9. Radio and charger can be connected to same battery, and battery can be charged while radio is in use.
10. The generator is equipped with double grease-sealed bearings, making it unnecessary to ever oil the generator during its entire life.

MANUFACTURED BY

WINCO

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