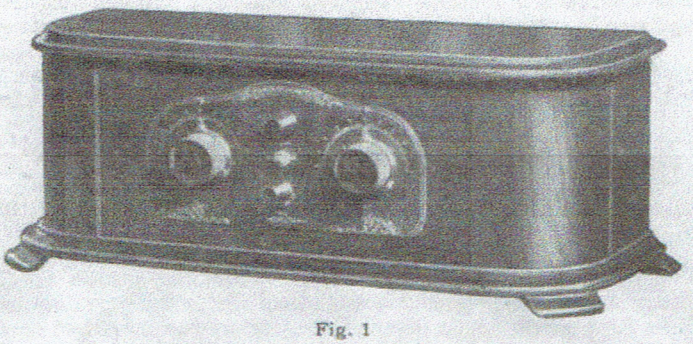
MODEL 27

HOME OTHER ARBORPHONES FACTORIES RELATED CONTACT

The ad to the left was taken from the October 1926 issue of Broadcast Radio Magazine.

The Arborphone 27 is advertised to have a "Two" dial control. The reality is that the dial on the right is really two dials connected to two concentric shafts. It really is a 3 dial radio.

HOME CONTACT



1927
MODEL
27

Fig. 1

UNPACKING ARBORPHONE

The Arborphone is shipped from the factory in a solid wood packing case and so protected by excelsior pads and oil paper that there is very little chance of damage in transit. The complete package contains the following:

One Arborphone Radio Receiver
Four wood feet with screws
One Arborphone Radio Log & Directory
One Radio Map with rule for measuring distances
One Hook-up Diagram or Instruction Book
One set of Postal Cards

Be very careful in removing the set from the packing box so that the finish is not scratched. If the set does not polish up properly by use of ordinary furniture polish, any dull spots can be removed by the use of powdered pumice stone and rubbing oil, which can be purchased at any paint store. Simply sprinkle pumice on the top of the set and pour on a little of the rubbing oil, using a piece of burlap and rubbing with sweeping strokes lengthwise—do not rub in circles and do not rub too hard. The rag will soon become filled with pumice and oil so that when the top is rubbed down you can touch up the sides by rubbing up and down and the base by rubbing lengthwise. This will bring out the full finish and make the cabinet a beautiful thing if it is not received in perfect condition, but usually the use of any good furniture polish is all that is necessary.

Locating holes for the foot screws are to be found on each of the corners on the bottom of the cabinet. The complete set ready to install is shown in Figure 1.

Note the REGISTRATION CARD, which is the upper right hand perforated postal card in a set of six cards packed in the envelope with the log book. Let one of the first things you do after unpacking your set be to fill out the card carefully and mail it to the factory.

There are four applause cards included with the set to make it easy for you to express your appreciation of the wonderful broadcasting that is being done gratuitously for your benefit. Remember, the only way the broadcasting stations have of knowing what you like best in the way of programs and who is listening to their programs is for you to take the time to tell them about it. The postal card makes it very easy for you to do this and remember that if everybody would fail to write the broadcasting stations there would not be any broadcasting, so it is up to you to do your share of boosting. Better programs and features will result.

We have made arrangements with the Multivider Manufacturing Company, Kansas City, Missouri, to supply a certain number of Arborphone users with up-to-date information on changes and additions of broadcasting stations. This service can be had by enclosing the postal card provided, with 25c, and

mailing to the Multivider Manufacturing Company. Do not send this card to the Arborphone factory as during the next few months there is going to be so many changes in the stations that it will take a special organization to keep the information correct, so these special arrangements have been made and it is entirely optional whether or not you subscribe to the monthly service.

All Arborphones are given a final test on actual broadcasting reception just before the set is packed for shipment. In fact, the final test is located on one end of the packing bench so that the set is not handled by anyone between the time of making the last test and packing in the wooden case.

The Arborphone receives two separate and distinct operating tests in the factory. The first test is made after the chassis is complete but to make sure that nothing has happened to the set while either in the stock-room or on the benches, an extra test is made just before packing for shipment. For this reason you will know that your Arborphone was in perfect operating condition when shipped from the factory.

INSTALLATION

It is just as important to properly install a radio set as it is for the manufacturer of the set to design and do his part correctly. From our experience we find many radio sets that are not operating at full efficiency because the equipment used and the aerial are not correct for the particular make of set. Many good sets fail just because the maker's instructions were not carried out. This applies to the Arborphone just as much as to any other set.

The Radio World seems to be full of fellows who apparently claim to know more about radio sets than the factory engineers who designed them, or what is just as bad, work on the assumption that all sets should be installed alike. These fellows are doing radio a great deal of harm and, while they could do a splendid job if they were open to suggestions, they prefer to go on their own knowledge and blame the product rather than themselves. Avoid such men in having your Arborphone installed. See that the man who installs your Arborphone has read this instruction book and that he carried out the following instructions.

On the other hand, there are a class of men who have done much towards making radio what it is today. The Radio Amatures and Dealers' Service men are the back-bone of the industry and they have a very good knowledge of radio in general and being trained men realize that the Experimental Department at the factory has tried about everything that they themselves could think of, and are, therefore, ready and willing to see that the recommendations and instructions of the manufacturer are carried out to the very letter. Such men, when called upon to examine a set that is not operating properly, first get the recommendations of the manufacturer and check up and see whether or not they have been carried out.

LOCATION OF SET IN HOME

In selecting the location of the radio in your home bear these facts in mind:

First—The set should be so placed in the room that the aerial lead-in wire will be just as short as possible and led directly to the left hand end of the set. The lead-in should drop straight down from the aerial above without being carried around corners to the point where it is brought inside and kept just as far from the side of the house or walls both inside and outside as possible.

Fig. 2

Second—Do not place set nearer than six feet to any large masses of iron such as radiators, pipes, stoves, or walls with metal lathing. Never place the set on a porcelain or metal top table. Masses of metal in the vicinity of a radio set broaden the tuning and lower the efficiency.

Third—The ground wire can be tacked along the baseboard or molding and, while the shorter and more direct the better, the length is not of consequence. So, in locating the set, favor the aerial, which must not be tacked to the wall.

Fourth—If these conditions can not be had in the room where you want the loud speaker, it is better to make an extension of the loud speaker cord and place the set in another room where the location is favorable with respect to the aerial lead-in.

LOCATION OF BATTERIES

The use of a table having a compartment to house the batteries and charger is recommended. These tables can be secured at all prices. A practical and beautiful one is made to exactly match the Arborphone and is illustrated in Figure 2. The ordinary five-wire battery cables are long enough for table use and consequently get away from a mass of wires.

If you do not provide a special table for the set it is then better to place the batteries in the basement where they can be easily reached for charging and where there will be no danger of acid being spilled and ruining the rugs and floor. A battery shelf can us ally be made in the basement by nailing two or three boards on the bottom of uprights nailed to a pair of rafters. A hole for the wires can be bored in the floor near the baseboard where it is out of sight.

Do not place the batteries open on the floor underneath the table. They gather dirt and are so unsightly that we do not blame the housewives for complaining. All you need in order to put the batteries in the basement is a few feet of five-wire battery cable that can be purchased at any radio store for a few cents a foot. Always try to keep the wires between the batteries and the set as short as possible. If they are too long (over 7 feet) the set will tune broadly,

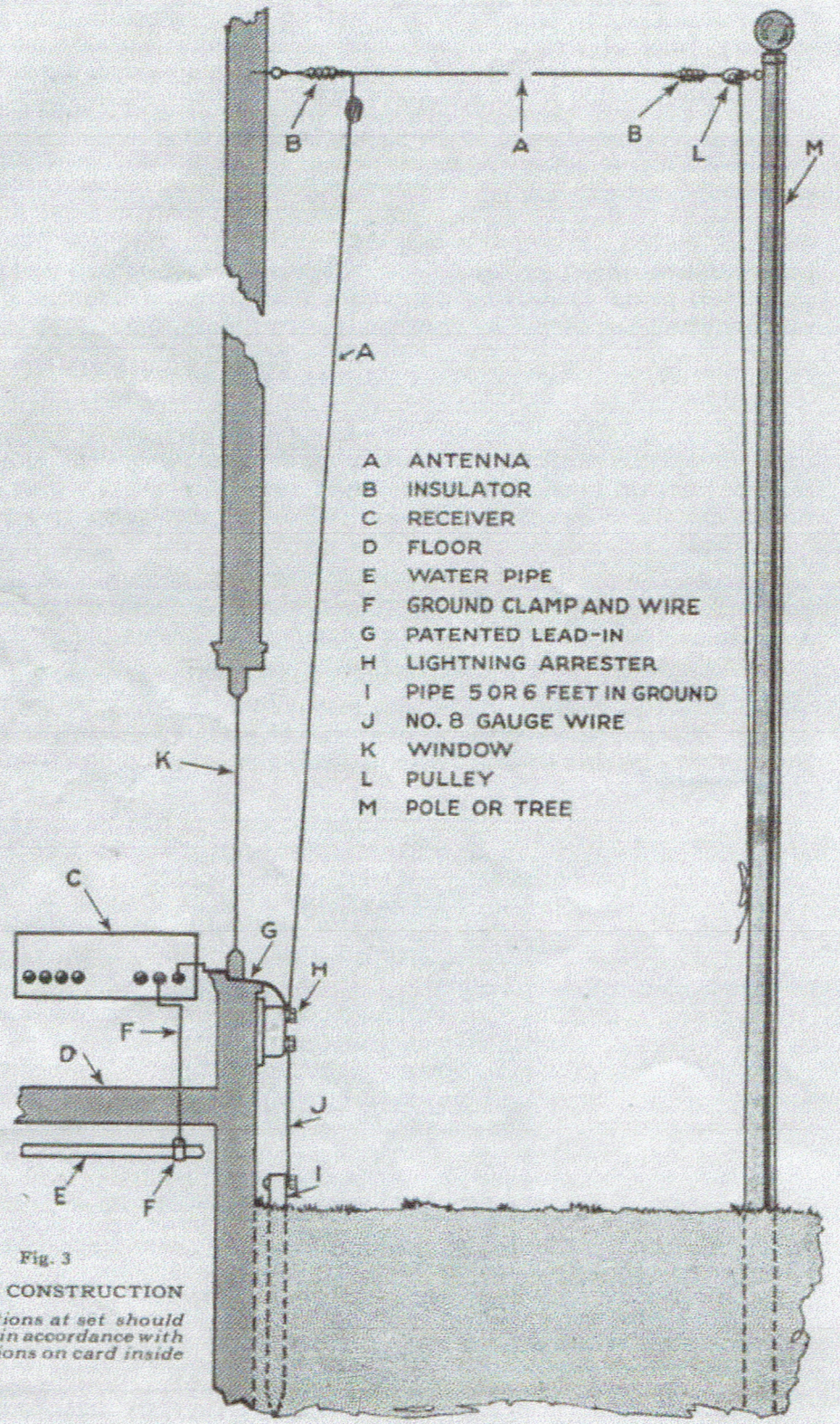


Fig. 3

AERIAL CONSTRUCTION

(Connections at set should be made in accordance with designations on card inside set.)

although this can be overcome by placing a 1.MF fixed condenser between the "B+90 volt" and "A"— binding posts, outside the cabinet but close to the set. This will by-pass the radio frequency currents so that they will not have to pass down in the basement and through the batteries.

If "C" batteries are used they should be placed on the table in back of the set, as these wires must be short. Do not put the "C" battery inside the set, as the metal used in their construction will have a detrimental effect when brought near the coils.

AERIAL INSTALLATION

OUTDOOR AERIAL

The Arborphone requires an aerial in the form of a single-span of wire from 50 to 100 feet long (including the lead-in) perfectly insulated at both ends. The Arborphone will not operate on a loop.

The length of aerial depends upon the height and location with respect to surrounding objects. If erected perfectly in the clear at a height of about 30 or 40 feet above the ground, or building, a straight span of 50 feet with the additional lead-in will be just about right. However, if one end comes near to trees or building roofs or other objects connected to the ground, a longer aerial should be used. A total length of 100 feet is the most that should be used.

If the aerial is too short the reception will be weak and the set will tune so sharply that it will be difficult to handle. On the other hand, if the aerial is too long you will have difficulty in tuning out local stations and you may be surprised to know that the sensitiveness of the set will be ruined due to the overloading of the first stage of amplification, throwing the entire circuit out of balance. For this reason, with the Arborphone, stations will come in louder on a short aerial than on an extremely long one. If you want distance, clearness, and selectivity, use the length of aerial recommended and do not be mis-led into thinking that the longer the aerial the better. This latter is true with crystal sets and some of the insensitive tube sets but it is not true with the Arborphone.

Although the lead-in may be heavily insulated wire, nevertheless, the wire must be kept **at least six inches,** and two feet if possible, from the side of the building, otherwise much of the current needed to operate the set will be dissipated before it reaches the first coil. Another place where losses are apt to occur, especially in wet weather, is in the insulators. Glass or porcelain insulators that will not absorb moisture are the best.

In erecting your aerial remember—Get the wire up high and in the clear to gather the radio waves—insulate perfectly to keep the current after the aerial has gathered it and then conduct the current to the set just as directly as possible before it is lost. It is best to make the aerial and lead-in in one piece. If the lead-in is a separate piece of wire solder every connection and joint with great care.

At best the aerial picks up only a very minute amount of electric current from the air and these feeble high-frequency currents are of such nature that they are hard to insulate, that is, hard to keep on the lead-in wire and conduct down to the set without serious losses.

In bringing the lead-in into the house, the patented lead-in strips that go between the window frame and sill are very convenient although some of the cheap ones are insulated with cotton fabric, that absorbs moisture and leaks current badly when wet. So if you do not want to bore a hole into the window sill and slip in a porcelain tube insulator, use a lead-in strip but buy the very best procurable. Never install the aerial parallel

pipe can stand upright when the block is nailed on the slant. Use a 1¼ inch bit to allow plenty of clearance so that by adjusting the length of the guy wires you can pull the pipe until it stands up perfectly straight. The 3 legs of the aerial must be joined together at the top and it would be well to string the upper insulators and solder these joints before erecting. The lead-in should be soldered to the most convenient leg and carried to an insulator nailed on the end of a stick that will hold the lead-in at least a foot from the eaves and side of the building below.

LIGHTNING ARRESTER

Use a properly grounded lightning arrester. By doing so your aerial then becomes a very good protection against lightning. To get this protection you must use an outside ground (water bib or iron stake) connected to one terminal of the arrester so that any charge from lightning in the aerial can leak off to the ground without harming the set.

While there is really no more danger from an outside aerial than from the electric light and telephone wires, insurance regulations specify the use of an approved lightning arrester. Therefore, use one and be on the safe side. However, if after installation, the set does not work properly try disconnecting the arrester as sometimes they become short-circuited.

INDOOR AERIAL

Inasmuch as the Arborphone is designed to operate on a comparatively short aerial the set lends itself readily to the case where a long outside aerial is impractical. Very good results can be obtained from a wire around the picture molding or underneath a carpet. This wire must be insulated and as long as possible.

Wonderful results are sometimes obtained on an aerial of this sort 20 or 25 feet in length. This aerial should always be connected to the "Short Ant" binding post. If you have an attic, the coil spring aerial stretched out 25 or 30 feet works very well. We have records of both coasts being worked from sets located in the middle west on this type of an inside aerial—but a great deal depends upon location.

USING LIGHTING WIRES FOR AERIAL

In many cases excellent results can be had by the use of the Ducon lamp-socket plug type of aerial. These plugs are provided with a condenser that stops any flow of the electric light current into the set and yet uses the wiring system of the house as an aerial. The success of these plugs depends upon whether or not they are plugged into a lighting circuit in such a way as to allow use of a good long span of wire.

The plugs are furnished with a binding post on each side, both of which should be tried and then the plug reversed in the socket and both terminals tried again as there is a different capacity condenser on the two sides. If it happens that the lamp-socket to which you are connecting has only a very short wire, to a switch or another lamp, little results will be had but if you will try other sockets in the room you will strike a connection that will make a good aerial. This is also true in using the base-board connection plugged in for an aerial. These aerial plugs are inexpensive and it is worth while to try one before constructing any inside aerial. They also provide a second aerial to be used when static is too bad to work on the long outside aerial.

GROUND CONNECTION

The binding post marked "Ground" should be connected by a fairly large wire, preferably No. 14 gauge rubber covered, to a grounded water

pipe through a soldered connection and a copper ground clamp. The water pipe should be filed or scraped smooth and clean before applying the ground clamp. Often radiator pipes make a good ground but the resistance, owing to the radiator joints and boiler connections, is usually a little higher than that of a grounded water pipe that goes directly into the ground.

In practically every home a pipe ground is obtainable but in cases where this is impossible the Ducon plug mentioned above may be used for the ground connection and fair results obtained.

In the country where house piping is not so common, the ground connection should be made by burying an old copper boiler or a sheet of copper plate, to which the ground wire has been carefully soldered, a depth of three or four feet in moist ground. Although not as satisfactory as the boiler or plate, an iron stake driven six feet into moist earth makes a good ground connection. If the house is near a stream of water or a well a ground connection may be made by soldering the ground wire to large pieces of metal and thrown into the water. This is a good thing to remember if you take the set on a vacation trip and operate it out-of-doors.

Avoid using gas pipes as they run to the meter and are apt to offer high resistance. If this is the only pipe available, use a copper wire jumper across the gas meter connected to the pipe that enters the ground.

Remember that for a good ground connection the earth must be moist. Plates buried in dry earth or sand are not suitable.

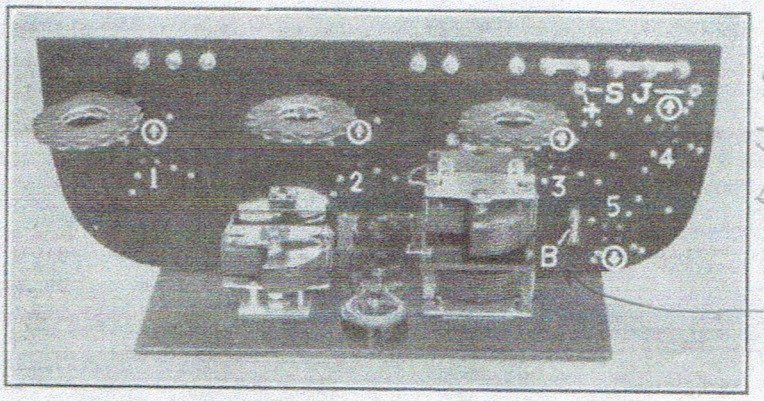
AERIAL SELECTIVITY

It is sometimes quite worth while to install two aerials where greatest flexibility of operation is desired. A short indoor aerial is convenient for local reception when static conditions are bad, while the longer outside aerial may be used when reception conditions are good and extreme distance is required. The short aerial is also helpful in tuning out local stations and often when little or nothing can be done on the long out-door aerial the short aerial brings in distant stations right through the locals. (A fixed grid condenser of .0005 capacity placed in series with the aerial lead-in has the effect of shortening the aerial.)

It is very difficult in some of the large cities, where 15 or 20 stations are on the air at a time, to tune out the local stations and bring in distance. For this work a short antenna must be used and here also the location of the set, with reference to metal objects, is very important. Where stations are very near, the broadcasting wave strikes the receiver wires and tubes with such force that often the stations can be heard even with the first tube removed. In such cases, with the aerial disconnected and all tubes in place, tune in the interfering station and carefully turn the set bodily until the position of weakest reception is found. Often by turning the set half way around greater selectivity is to be had.

The Arborphone is one of the most sensitive sets on the market and many distance records have been made with this set in Chicago and New York where the local stations come in at every point on the dial.

The direction of the aerial wire is of little consequence although if possible it should not be erected so as to point towards a nearby broadcasting station, but really little good can be accomplished through a change of aerial direction and if the directional qualities have not been taken into consideration when installed it is not worth bothering with. See further remarks on selectivity elsewhere.



Speaker Jacks see p. 16

see p. 16

Fig. 5

CAUTION: *Insert Tubes Correctly.*

TUBE EQUIPMENT

TYPES OF TUBES RECOMMENDED

The Arborphone is designed for use with type 201A or 301A tubes with long prongs. The prongs on the tube are of different sizes so that they can not be inserted incorrectly unless forced into the holes in the sub-panel.

INSTALLING TUBES

The figured arrows in illustration, Figure 5, indicate the correct position of the small lock pins on the tube bases when the tubes are installed. Note and remember—All pins to the back except front tube (5) where pin must point to FRONT. If you have some of the old type of tubes with short prongs, they can be used but great care must be taken to see that they are installed in the sockets in accordance with the foregoing or they will be burned out.

INSPECT KEEPER BARS

Make sure that the two keeper bars on the binding posts are in the correct position, as shown in the illustration covering the type of tube you are using. These bars might be missing or have been changed so as to cause trouble.

MAKES OF TUBES RECOMMENDED

The brands of tubes best suited for the Arborphone are Radiotron, made by the Radio Corporation of America; Cunningham, made by E. T. Cunningham, Inc.; and Sylvania, made by the Sylvania Products Company, Emporium, Pa.

The electrical characteristics of these three makes of tubes are almost identical and they all give full amplification in the Arborphone. While there may be other brands of tubes on the market that will work equally well, from what tests we have made the results do not compare with those that can be had

from the tubes recommended. Some Dealers have tested other brands and found them satisfactory. You can safely follow their recommendations in this respect.

Other brands of tubes may work fine in other designs of radio sets but that does not mean that they are satisfactory for the Arborphone. Too much care can not be taken in selecting the proper tubes as the electrical characteristics in the tubes themselves were considered and incorporated in the Arborphone circuit.

The two most important tubes in the set are those used in socket No. 1 and No. 2, Figure 5. Almost any tube of the UX-201A type will give fairly satisfactory results in sockets No. 3, No. 4 and No. 5, but at least provide yourself with two tubes of the recommended brand for the first two sockets. Your possible reception will be cut down many hundreds of miles if you fail to heed these instructions. For all around use, UX-201A tubes in all sockets with the batteries connected as in Figure 6, give the best results.

CARE OF TUBES

The radio vacuum tube is of very delicate construction and must be handled with care. The lighting filament is as fine as a hair and is easily broken or burned out through abuse. To get the longest service from tubes, always keep the volume control turned to the left as far as possible. If the tubes are burned at the brightest and highest temperature they will soon become paralyzed and will either have to be rejuvenated or replaced.

After a set of tubes has been installed and the set is in operation, tune in a distant station and switch the tubes around in the various sockets until best reception is had. The capacities of each tube are all slightly different and after changing from one socket to another you should re-tune the dials. When the best operating position is found for each tube, mark it with a lead pencil so that you will always install them in the same socket.

When opening the lid of the cabinet be very careful not to let the lid fall down as the jar is apt to break the filament of the tubes. Often jarring tubes this way will cause a plate of one of the tubes to break from its support and strike the filament, shorting the high voltage "B" battery through the filament wires and is apt to burn out the other four tubes. This sometimes occurs when the set is in operation but without any apparent reason. It is one of the things that happen in radio that has not yet been entirely overcome but fortunately only one tube in hundreds will cause this trouble. In such instances where all tubes are burned out due to one tube being defective there is really no one at fault for the same tube will cause the same damage in any radio set regardless of make.

In changing wires or batteries always remove the tubes. Sometimes you may simply flash the "B" battery wire on the filament and while the tubes will burn they have become paralyzed and no reception can be had. These tubes can be rejuvenated, and, while they never will be as good as before, will work fairly well at least in the audio and detector sockets.

Occasionally you will find a tube that is microphonic, that is, very noisy to the slightest vibration or causes howling when the loud speaker is brought near the set. This trouble is usually due to the fine grid wires inside the tube not being welded solidly to the grid support. The vibration of the air from a loud speaker will make such a tube howl badly. A tube of this kind is most objectionable in the detector socket No. 3 and should be placed in socket No. 1 or No. 2.

TUBE CAUTION

The filament controls do not permit the using of any set of tubes which combined draw more than 1.5 amperes. The 201A tubes draw ¼ ampere each, so four of these can be used with one of the power tubes drawing not over ½ ampere. This means that you can not use even one of the old UV-200A tubes which draw 1 ampere each. The use of such tubes will burn out the rheostat and resistance cartridge "B," Figure 5. p 9.

POWER TUBES

The Arborphone is so wired and binding posts are provided for the use of any of the new types of tubes. But for the ordinary, small cone, or horn speaker the above recommended 201A tubes throughout is best.

If you wish to operate two or more loud speakers in series or one of the large three-foot cones, or a loud speaker which requires a power amplifier, you can use a type UX-112 power tube in the last stage of audio connected with proper "C" batteries and additional "B" batteries as shown in Figure 8.

We do not recommend the use of the type UX-171 or UV-210 tubes because they will overload the coils in practically all of the presentday loud speakers, except those made especially to work with these tubes. All the volume that is ordinarily required can be had by the use of the UX-112 in the last stage, using 135 volts on the plate and 9 volts of "C" battery.

NEW TYPE DETECTOR TUBE

The new UX-200A Detector Tube, which is a little more sensitive than the UX-201A, may be used in the detector socket (No. 3). However, this tube is usually more noisy and makes a hissing sound that in some instances is objectionable. It is a fact, however, that distant stations can be brought in with greater volume but on the other hand it also causes broader tuning and should not be used when greater selectivity is required. A special binding post is provided for the Detector "B" battery so that the 45 volts required on the plate of this tube may be had by changing the lead at the battery to the 45-volt tap instead of the 22½-volt tap.

In installing any of these special tubes, note hook-up diagrams very carefully and especially note position of keeper bar on the binding posts. A wrong connection may burn out all the tubes.

DRY CELL TUBES

In cases where a storage battery or battery eliminators can not be used, the Arborphone can be operated by the use of Type UX-199 dry cell tubes. When using these tubes it is suggested that the UX-120 Amplifier Tube be used in the last stage of audio and hooked up as shown in Figure 9.

While, naturally, you can not get as much volume or work as great distances with these tubes, operated by 3 dry cells in series, you will be able to receive the principal stations within a radius of 500 miles with plenty of loud speaker volume. The resistance cartridge "B" is just right for the use of these tubes and does not have to be changed.

BATTERY EQUIPMENT

"A" BATTERY

Unless dry cell tubes are used, the Arborphone requires a six-volt storage battery for lighting the filaments of the tubes. The battery should have a capacity of from 80 to 120 ampere hours, depending upon how frequently you will want to recharge the battery. A 100-ampere-hour battery is just about the right size for ordinary use but if the battery has to be taken outside for charging get the largest battery available.

Beware of cheap radio batteries. They will give good service for a short while, but for two or three dollars more you can usually buy a high grade battery that will last for several years if kept charged.

The Positive and Negative terminals can be easily recognized. The positive being marked "P," "+," "Pos," or painted red. The negative terminal is marked either "N," "Neg," or in the minus (-) sign.

CARE OF STORAGE BATTERIES

Before trying to operate the set make sure that the "A" battery is fully charged. This can be determined only by the use of a hydrometer and every set owner should purchase a hydrometer and test the battery frequently, recharging when the test shows "Half-discharged."

It is very harmful to storage batteries to let them become completely discharged and the reception drops off as the voltage of the battery lowers.

Keep the battery terminals well coated with vasoline since if they once start to corrode you will have to continually scrape the connections to provide a good contact. But if you clean the terminals well and coat them, corrosion will not take place.

Occasionally examine the level of the electrolyte or solution in the battery. This should cover the plates at all times. As the solution evaporates it should be replaced by filling the cells one-half inch or so above the plates with pure distilled water. Never add acid. Do not use city water or wellwater that contains chemicals as this is apt to ruin the battery. Do not use water that has been allowed to stand in metal vessels or rain water from a metal roof. Procure a bottle of distilled water from the battery station. It would be well to read the directions on the care of the storage battery, which are furnished with all batteries.

The frequency at which batteries require charging depends upon the number of hours the set is used and the size of the battery. With 201-A tubes throughout the Arborphone draws 1.25 amperes per hour. At this rate theoretically a 100 ampere hour battery would give 80 hours of operation, but storage batteries are not 100% efficient and the reception starts to drop off after the battery is half discharged, so you can not expect this theoretical amount of service from one charge. Small storage batteries, like 80 ampere hour capacity, require more frequent charging than the large batteries, but are all right if used with a trickle charger.

BATTERY CHARGERS

A battery charger is one of the most important accessories and if such a thing is possible you should provide yourself with a charger which can be connected to the battery and switched on at any time, making it easy to keep the battery fully charged and get the best results.

Any of the standard chargers are satisfactory but always remember to disconnect the battery leads to the set when charging as many chargers will blow

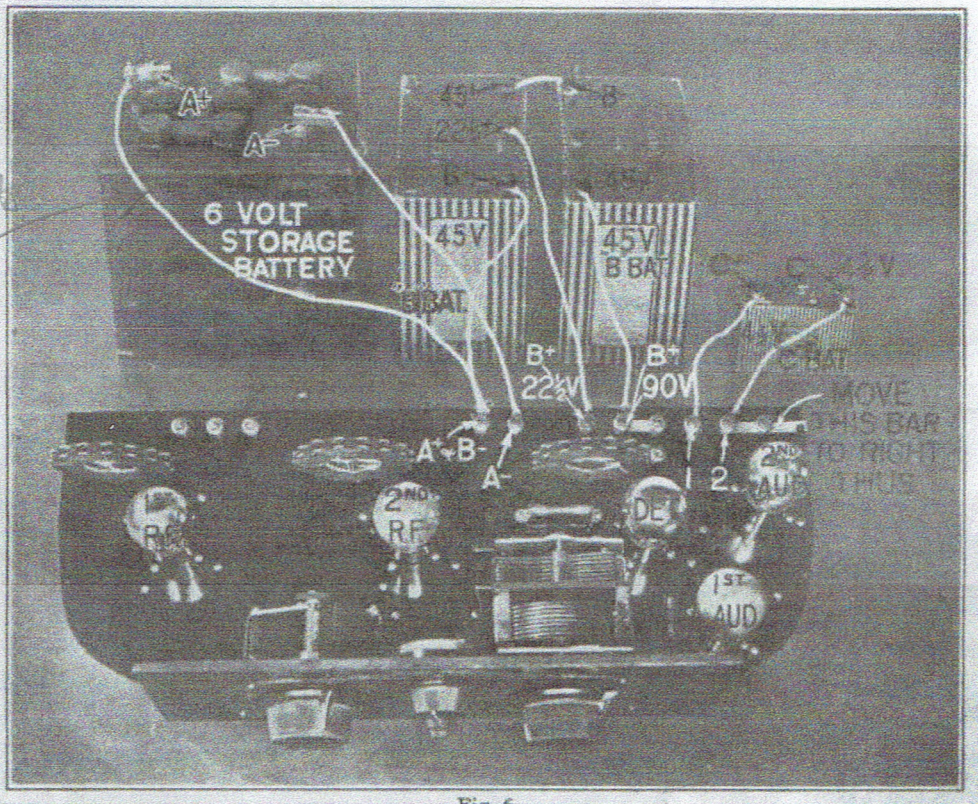


Fig. 6

Battery connections used with UX-201A tubes in all sockets. Note that to use "C" battery the keeper bar connects binding posts Nos. 2 and 3 only, and not all three posts as sets are shipped. For all around use this is the best hook-up. See pages 14, 15 and 16 for other hook-ups.

out the tubes in the set regardless of the position of the "A" battery switch. It is not enough to just disconnect one of the battery wires. **Both battery wires must be disconnected before charging.**

Trickle chargers, which charge the battery constantly when the set is not in use, draw very little current and are very satisfactory although you must be sure to get a charger that has a high enough charging rate to keep the battery charged. This depends, of course, on the number of hours per day you use the set. If you only use the set for two or three hours in the evening the small trickle charger is allright, but if the set is used more than this you should buy one of the trickle chargers that is also equipt with a rectifying tube for charging the battery quickly when it becomes run down. Your radio dealer will advise you correctly in the matter of chargers.

"B" BATTERIES

For a five-tube set the largest 45-volt "B" batteries are the most economical in the long run. The drain on the small batteries is excessive and they do not last only a few weeks. If a "C" battery is used the life of the "B" battery will be greatly prolonged. Of course, here again the life of the battery depends upon the number of hours of steady use.