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Old Familiar Strains

a newsletter for collectors of radio strain insulators and related items
Volume 8 No. 4/5 October, 2001

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Radio

BUSINESS BUILDERS

Which bring quick cash and a growing business

SPRAYBERRY ACADEMY of RADIO, 2548 University Place, Washington, D. C.

RADIO BUSINESS BUILDER NO. 1

HOW TO INSTALL A SATISFACTORY ANTENNA SYSTEM

Every Radio receiver requires an "energy collector", commonly called an ANTENNA or AERIAL. In the past many "make-shifts" have been accepted under one or the other of these names. The public, as a whole, does not know what constitutes a proper antenna installation. Therefore, in practice today you will find many inefficient and dangerous devices in use -- some of them veritable noise factories within themselves.

So called "eliminators" are poor substitutes for an antenna, and and nearly always decrease the receiver's sensitivity as well as introduce unnecessary noise. Extending wires thrown out of a window, stretched around the room or loosely tied between two supports, serving as an antenna, are perhaps the cause of more Radio dissatisfaction than any one thing today.

There are scores of unsatisfactory antenna installations in every community throughout the country. Any wide-awake student can make many extra dollars by taking advantage of this situation if he cares to do so. Then, there are always new installations from which many Radio men make a handsome profit.

You can easily tell just how many possible jobs of this nature are available in your community. Take the time off to make a survey of the houses in two or three blocks of your community -- just as a starter. The resident of any house that does not have an efficient and well supported antenna system is a PROSPECT FOR A MODERN ANTENNA SYSTEM. If they have no Radio, then they are a prospect for not only a good antenna system, but also for a Radio receiver.

After you have selected two or three blocks for a survey, go around in back of the houses (walk down the alley) with two objects in mind. (1) Note how many houses have <u>no visible antenna</u> and (2) those which show clumsy make-shifts of wire serving as an antenna.

On those houses (or apartments) where there is no visible wire serving as an antenna, there is one of two explanations. (1) The family may not have a Radio and (2) they may have a Radio with hidden wires or special inside connections serving as an antenna. In this "Business Builder Sheet" we will not be concerned with the family with no Radio -- a latter "Business Builder Sheet" will tell you what to do for non-radio owners.

As you make your survey, list those houses that appear to lead to likely prospects. Get the street number of these houses. This will be your prospect list.

Your next job is to get the names of the people who live in the houses of your prospect list. If you know some of these people, so much the better. If you don't know them, there are several ways for you to find out their names. Children playing in the neighborhood will be able to help you out. Then there is the city or town directory which you can consult in any newspaper office or at the local post office.

Once you know the name of one family in one block and get into their home, you should maneuver the conversation around to the neighbors, and as a result, obtain their names.

The approach to the antenna prospect should be well thought out and gauged to fit local customs and your own personality.

You may make better progress by telephone, mail or direct contact. Try all of these methods of approach and push the one which seems to produce best results for you. In other parts of your Course more specific directions for making contact with your prospects are given. In this "Business Builder" we are more concerned with the technical and practical aspects of installing a good modern antenna that conforms to proper engineering practice and for underwriters regulations.

First let us consider what constitutes an unsatisfactory and undesirable antenna. All of the following are included in this class.

(1) Loose and swaying wires that may come in contact with other objects due to wind, etc.

(2) Lead-in wires which might touch and short to the sides of the building or to rain spouts.

(3) Wires tied or fastened to trees or other MOVABLE objects.

(4) Wires which CROSS OVER high tension, telegraph or telephone wires.

(5) Wires strung around the room or dropped out of a window.

(6) Connection to the water pipe, gas pipe or to the circuit of the electrical wiring.

(7) Special gadgets which are supposed to give better reception, but actually do not.

(8) Zig-zag wires strung about in all sorts of forms and angles.

These are all definitely bad practice and should never be used. Also, if no lightning arrester is used, the fire insurance on the house is usually voided.

Different types of receivers and different locations require different types of antenna installations. Proper directions will be given in the series of "Business Builders" for the different requirements.

Let us first consider the "overhead" inverted "L" type of antenna. This is perhaps the most widely used antenna system in use today -- although in some cases its use is not recommended, as for instance, for an all-wave receiver. An "L" type of antenna is shown in Fig. 1.

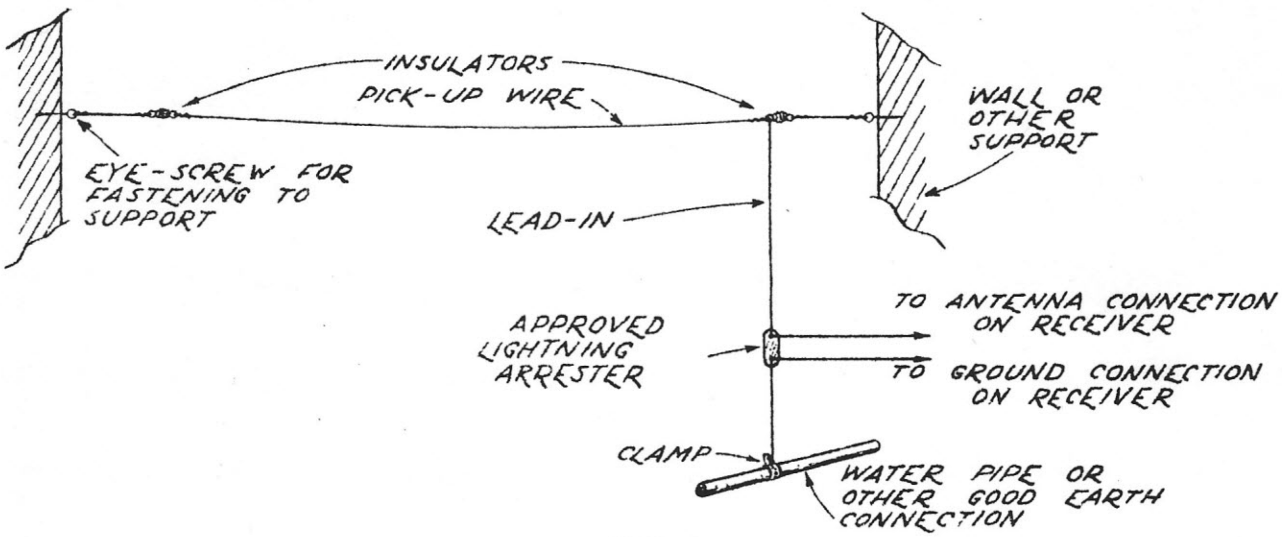

FIG. 1

The pick-up portion consists of seven twisted strands of No. 22 or No. 24 copper or bronze wire. This should be from 30 to 80 feet long, depending on the location and the sensitivity of the receiver. The more sensitive the receiver, the shorter can be the pick-up wire and the less will be the noise. Conversely the longer the pick-up wire, the more noise -- also the longer the pick-up wire, the less will be the selectivity of the receiver -- but you also get an effective increase in the sensitivity of the receiver with the longer pick-up wire. Thus it is seen that the length of the pick-up wire must be a compromise taking into consideration all of the above factors.

The screw eyes of Fig. 1 provide a convenient way to fasten the pick-up wire to supports. These supports may be of wood or even a brick or rock wall. If wood, the eyes will screw right into the wood if you will provide a starting hole with a nail. If you must fasten the screw eyes to brick, rock or other masonary, first drill a hole in it with a hammer and 1/4 inch star drill. Then drive 1/4 inch expanding lead slug in the hole (obtainable from any hardware store). You can then fasten the screw eye in the lead slug and since it expands with each turn of the screw eye, a strong and substantial mechanical fastening point is provided for your screw eye. The wires to the insulators may then be fastened to the screw eye.

The wire between the screw eyes and insulators should be not less than 2 feet long. The insulators may be of the glass or porcelain type, but should be entirely capable of supporting the length of pick-up wire you are using. The pick-up wire should not be stretched tight. Allow it to sag about 6 inches in the center. This will provide for expansion and contraction due to weather changes.

While it is desirable for the pick-up and lead-in wire to be one continuous wire, it is often impossible to accomplish this, since the lead-in wire will almost surely at some time or other come in contact with the building. A more practical way to handle this is to solder No. 14 seven strand, rubber covered, lead-in wire to the pick-up wire.

The soldering joint between the pick-up and lead-in wire should be done carefully, because it is exposed to the weather and may corrode -- thus introducing resistance and noise.

A recommended way to make this joint is as follows: Scrape both wires with a pen knife until they are bright and until the copper of each is exposed. Next tightly wrap about 5 to 6 turns of the lead-in wire around the pick-up wire. Get this joint thoroughly hot with your soldering iron (this operation may be done before putting up the antenna) and then allow plenty of hot rosin core solder to run into the joint and between the wires until a good solid connection is made. Then wrap the joint first with rubber tape and then with several layers of friction tape. This will protect the joint from the weather and it will remain satisfactory for a long time.

The lead-in wire should be protected and arranged properly from the point where it attaches to the pick-up wire to the point where it attaches to the receiver. It should not be permitted to sway or rub against buildings or other objects. Although the lead-in wire is insulated, if permitted to sway, it will soon rub through. When this happens the entire antenna system is likely to be grounded -- this, of course, will decrease the apparent sensitivity of the receiver and will also introduce noise.

Porcelain "nail-it knobs" should be used to hold the lead-in in place and to prevent it from coming in contact with the building or other objects. If the lead-in is brought over the edge of a roof, care should be taken to see that it will not rub against the edge of the roof -- thus in time perhaps grounding or shorting the entire system. If there is no way to hold the lead-in away from the edge of the roof, wrap several turns of friction tape along the wire where it crosses the roof. A better plan however is to provide a support of some kind so that the lead-in will never come in contact with the roof.

In many cases the lead-in wire will pick-up just as much or more energy than will the pick-up wire itself. Therefore, its length should be chosen with reference to the length of the pick-up wire.

Generally speaking, and for average conditions, the total overall length of both pick-up and lead-in wires should not be more than 100 feet.

One of the most important parts about an antenna installation is the way in which the lead-in wire is taken through the walls of the building. A large number of antenna installations fail in this respect, and as a consequence, are noisy and inefficient. To avoid noise and other troubles, the lead-in wire should be continuous -- in other words, without joints or splices. To conform with the underwriters regulations, the lead-in wire should go through a porcelain tube at the point where it enters the building. This means that a hole must be drilled through the wall to accommodate the tube. This is illustrated in Fig. 2. This

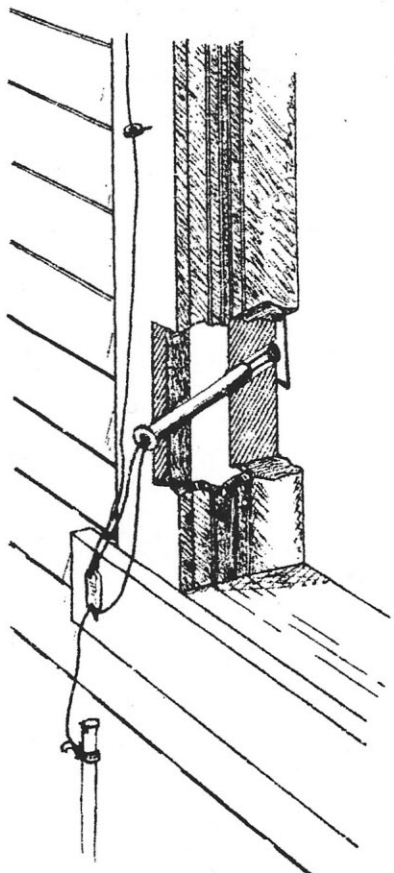

FIG. 2

hole is usually drilled somewhere along a window frame, because it as a rule is made of wood and makes drilling easier. However, a hole may be drilled through a masonary wall at almost any point with a star drill and hammer. This, of course, requires considerably more labor than is usually required, and must be taken into account in your charges. After all, you will have to be guided more or less by the wishes of the owner of the receiver and building. In any case, if a hole is drilled for either the wire or porcelain tube, it should <u>slope upward</u>. This prevents water from entering the building at this point.

If, for some reason, a continuous wire or porcelain tube cannot be used, it is recommended that you use a window strip for the lead-in. Get this from a hardware store. Be sure to solder the lead-in wire to both ends of the window strip. Unless this is done, the installation will always be unsatisfactory.

After the lead-in is brought through the wall it should be tacked along the baseboard of the room in a neat manner up to the point where a connection can be made to the receiver.

The lightning arrester may be installed either inside or outside of the building. For ease of installation however, it is recommended that you install it outside of the building directly in line with the lead-in. Fasten the arrester to the building by means of screws -- do not use nails, or you may crack the porcelain of the arrester. Wrap the BARE lead-in wire around one terminal of the lightning arrester and continue it on to the point where it enters the building. Then ground the other terminal of the lightning arrester to a convenient water pipe or to an 8 foot iron rod driven into the ground. A ground clamp may be used in fastening to the water pipe or iron rod.

Fig. 3 shows the details of a "T" type of antenna installation. In this case, the lead-in is connected to the center of the pick-up wire. It is somewhat less efficient than the "L" type of antenna, but is particularly adaptable to a location where both antenna supports are considerable away from the receiver. This system is in use in many locations and as a rule is entirely satisfactory.

The instructions previously given in regard to the "L" type of antenna also hold true for the "T" type of antenna.

In repairing an old antenna, it is not advisable to use old wire unless it has been recently installed, for after it has been in use for some time, the copper wire becomes corroded and if the lead-in wire is not a very good quality, the rubber insulation will have become dead and brittle. The lead-in strip should be examined carefully for breaks and frayed insulation. If the insulators are of the porcelain type, the finish should be examined for cracks, and if they are glass, they should be thoroughly cleaned.

SELECTION OF THE MATERIALS YOU WILL USE.

As stated before, the antenna is of the greatest importance in Radio reception and no amount of good workmanship will compensate for the use of poor materials, so it will behoove you to be very juducious in the matter.

For obvious reasons we do not recommend any particular brand of materials, but any reputable Radio jobber or mail order house will be glad to supply your requirements. If you live in a district where supplies are readily available, it will not be necessary to lay in a large stock, since it can be replaced as it is used.

For a lasting job, seven strand enameled wire may be used for the pick-up portion and a good grade of insulated No. 14 wire for

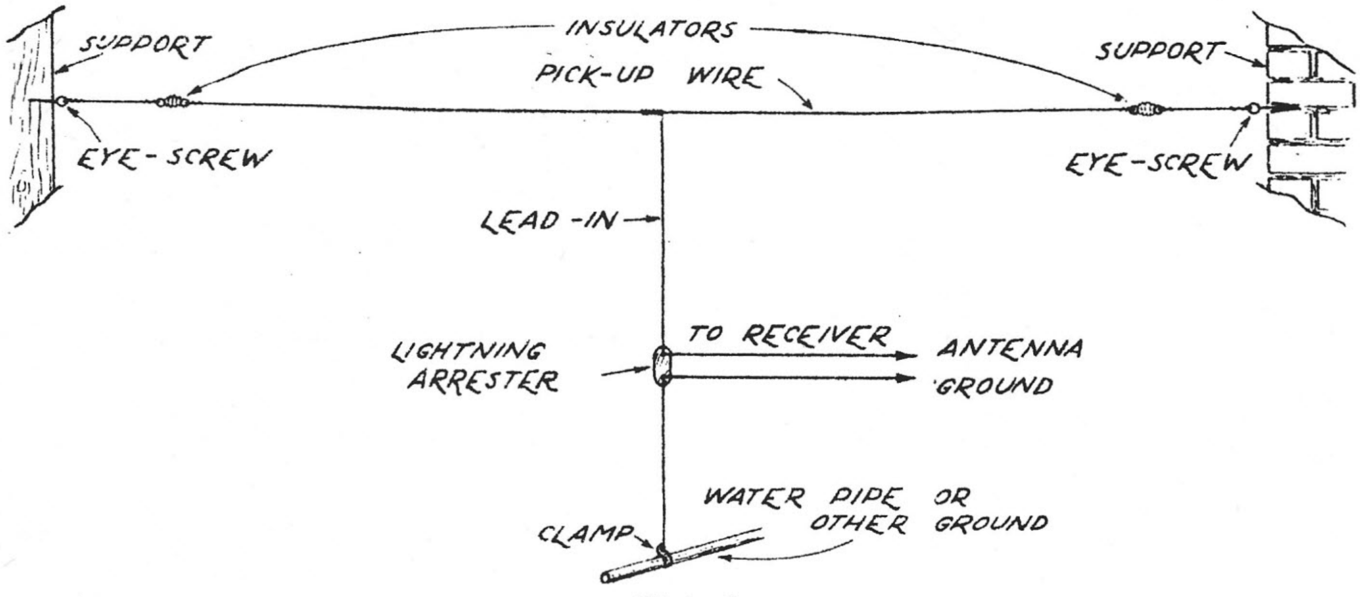

FIG. 3

the lead-in. The following is a representative list of the materials that may be stocked for the ordinary inverted "L" type of antenna which we have discussed.

- 1 Roll (100 feet) seven strand enameled copper wire
- 1 Roll (100 feet) black insulated No. 14 copper wire
- 2 Lead-in strips
- 2 Eight inch porcelain tubes, such as those used by electricians
- 12 Strain insulators (preferably glass)
- 12 Nail-it knobs
- An approved type of lightning arrester
- An assortment of insulated staples of various colors

When actually starting the job, the first thing is the location of the antanna. It is impossible for us to give you definite directions for the location, since each job offers its peculiar problems. However, there are a few salient points to remember and it would be well to impress them on your mind for they apply to all types of antennas that are used in present day practice.

NEVER run the antenna parallel to any power, telephone or trolley lines; always keep the antenna as high as possible above the surrounding buildings and trees; arrange your supports so that the antenna wire will be reasonably tight at all times; and try to locate it so that the lead-in will not run close to electrical or telephone conduits. It is also well to remember that the type of antenna under discussion has very definite directional properties and this should be taken into consideration when you are planning a job. You will remember that the lead-in end of the pick-up wire should point in the direction from which you expect to pick up the most stations and you should map your plans accordingly if it is at all possible.

When planning an antenna job always look your ground connection possibilities over carefully and have your plans very definitely mapped out before starting on the work. This will save you time, you will be able to go about your work with each step planned in advance and will earn a reputation of knowing what you are about and it will pay good dividends.

Incidentally, it might be wise to consult with your local fire and building inspector as to whether there are any regulations regarding the height of antennas, since in some places there are certain regulations regarding minimum height. To find out about this, see your fire inspector who will be familiar with all such rules if any exist.

Radio

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RADIO BUSINESS BUILDER NO. 2

HOW TO CHOOSE SUPPORTS FOR THE PICK-UP WIRE OF THE ANTENNA

Every outside type of antenna will require supports to which you can attach the ends of the pick-up wire. Every antenna installation presents its own problem and you will have to choose your supports to fit the location.

From an expense view point it is desirable to choose supports that are already available. Thus the pick-up wire may be strung between the building and a tree, between the building and a garage, between two buildings, or you may be limited to the length of the building in which the receiver is located.

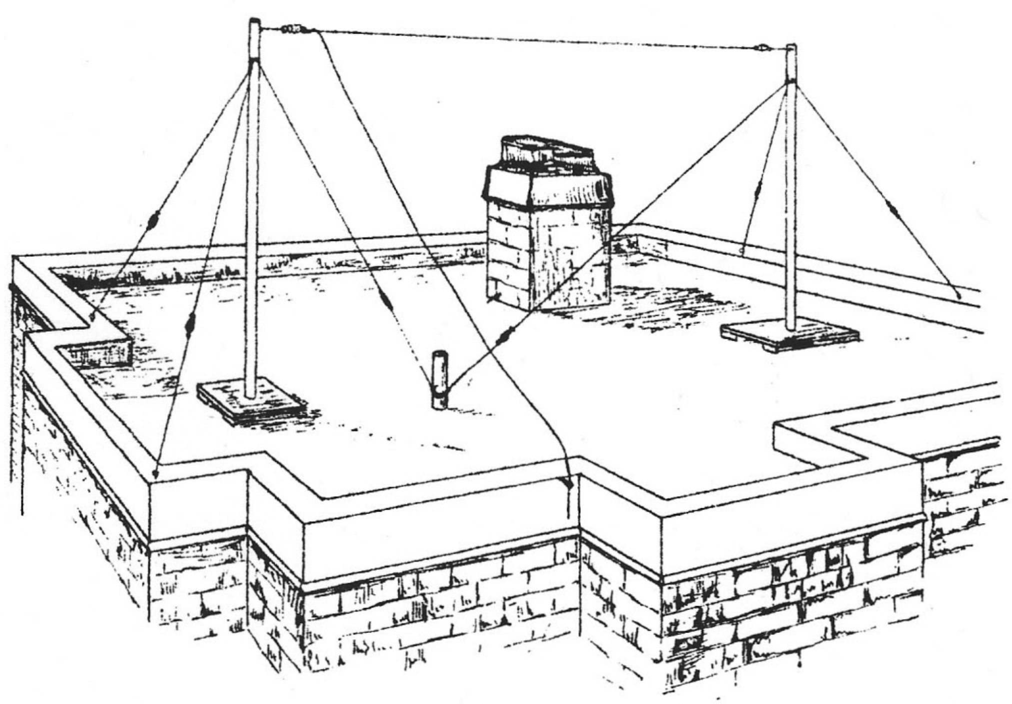

FIG. 1

Before quoting a price on an antenna job you should first look over the building and near by objects very carefully. Decide what you are going to do, and then give your recommendations to the receiver owner. If you decide to string the pick-up wire between two buildings or between a tree and a building, first get the consent of the owners of any property involved. Finally get the consent of the receiver owner for your recommendations. This will protect you against any possible objections that may come up later.

Suppose we consider typical examples of different types of antenna installations. From these cases to be considered you will know how to go about erecting practically any of type of antenna.

Consider first the flat roof with no visable supports for the pick-up wire. It is desirable to locate the pick-up wire at least 10 feet above the roof. This means you will have to erect supports of some kind. These will also have to be fastened to the flat roof in a manner <u>which will insure that there will be no leaks</u>.

The supports may be either wood or iron pipe. Iron pipe is preferred, because it is less susceptible to the vagaries of the weather, more durable and offers less resistance to the wind than would a wood support of comparable strength. Also in many cases, if there is a house wrecking company near you, you can get the pipe cheaper than wood. Of course, the pipe has been used, but in most instances this does not detract from its usefulness as a support and many times you can find it painted to match the building where it is to be used. If wood is used, be sure it is straight grained and free from knots and is of sufficient size to withstand the prevailing winds.

Now we are ready for the actual construction. The base for the supports should be wood blocks about six or eight inches square and of sufficient thickness (one to two inches) not to split easily. It is better not to set the supports flat on the roof. They should have a few strips nailed on the bottom of them about the thickness of ordinary plasterers lath. This will prevent the accumulation of moisture between the block and the roof, which might cause damage to the roof. If iron pipe is used, bore a hole in the base just large enough to accommodate the pipe -- this hole should not go all the way through the base -- the depth of about one-half inch is sufficient. This will provide a firm foundation for the pipe and will prevent it from slipping. If you prefer you may use a regular pipe support which you can obtain from any plumbing supply house.

Always guy the supports with guy wires in such a manner that they will stand up without the aid of the pick-up wire itself. Then in case the antenna wires breaks, there will be no danger of the supports falling over the edge of the roof and causing personal or property damage -- thus possibly preventing a damage action against the owner or lessee of the building or yourself.

It is a good plan not to allow any one piece of guy wire to be over seven or eight feet long. If it runs over this, you should break it and insert an insulator. Fig. 1 shows the details of placing the base and supports for the pick-up wire. Note that turn-buckles are used for each guy wire. These will allow you to tighten each guy wire. You should try to have about the same amount of pull on each guy wire. Any undue strain in any one direction will tend to pull the whole system in that direction.

After erecting the supports and before taking your antenna and lead-in wire to the roof -- assuming that both supports are on the roof -- you should solder the lead-in wire to the pick-up portion. To make the job of swinging the pick-up wire easier, you can use an ordinary clothes line pulley on each support and run a cotton rope through these. Then the pick-up will be easier to inspect or replace should the necessity arise and is easily kept tight -- no small matter in a satisfactory installation.

After the pick-up wire is swung into position and fastened, you are ready to run your lead-in to the receiver. This deserves more care than is usually given it. Be sure to use some means to keep it from rubbing on the edge of the roof. You may use a neat piece of wood or an eye screw with porcelain insulation may be used. The latter is the better way, since it can be more securely fastened and does away with the necessity of driving nails in the building which is to be avoided wherever possible. As the lead-in is brought down the side of the building, a nail-it knob should be used as often as necessary to prevent swaying and chaffing of the insulation.

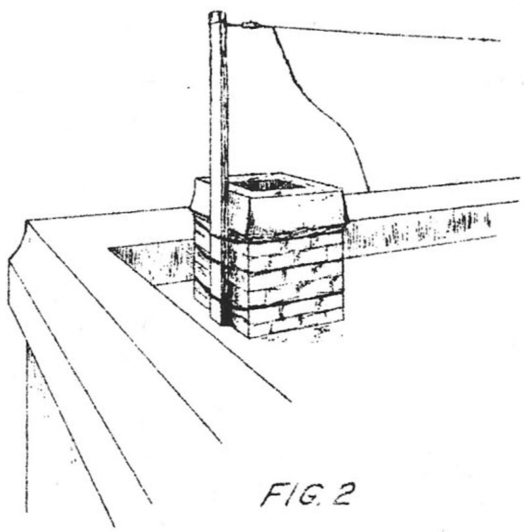

FIG. 2

We are now ready to take the lead-in into the building. There are several ways of obtaining ingress to the building and we shall leave the selection to the discretion of the man doing the work. The most common is the use of the lead-in strip. This strip is so well known that it needs no description and the connections obvious to anyone seeing it. This method is not so satisfactory in all cases, especially when certain types of weather stripping is used. A very good way, if there is a basement and the receiver is on the first floor, is to take the lead-in through a porcelain tube into the basement and bring it up through the floor inside the building. This way the lead-in is kept in one piece which is very desirable and the wire can be brought into the room right where it is to be used. Another way is to bore a hole through the window frame and then proceed the same as for the basement. Here again, you may be called upon to use your own ingenuity, since this too, offers different problems on different jobs and the above are suggestions and may be changed or discarded as the necessity arises.

At this time it will be well to mention the lightning arrester. This is for the protection of the receiver and should be located outside of the building and should be well grounded.

Now we are ready for the ground. This is also a very important part of the installation and just as much care should be used with it as any other part of the work. A sloppy, slipshod ground connection is worse than none at all, since it can be a sourse of noise, fading and in some instances almost cause a cut-off of reception. A cold water pipe, if available, makes an ideal ground. Otherwise, a hot water radiator or a pipe or rod driven well into the ground may be used. The ground wire should always be kept as short as possible and IN NO INSTANCE SHOULD IT BE CONNECTED TO A GAS PIPE OR ELECTRIC POWER OUTLET BOX.

The wires inside the building should be light or dark, according to the finish of the room where the installation is made. If they have to be run around the floor, they should be neatly tacked to the base board, using insulated staples, matching the color of the wire as nearly as possible. Be sure to keep the wires well out of the way of mops, brooms and vacuum cleaners.

Keep your lead-in as short and as straight as possible. Solder and tape all joints in the wire, keeping the pick-up portion of it as straight as possible -- never allow the pick-up wire to double back on itself.

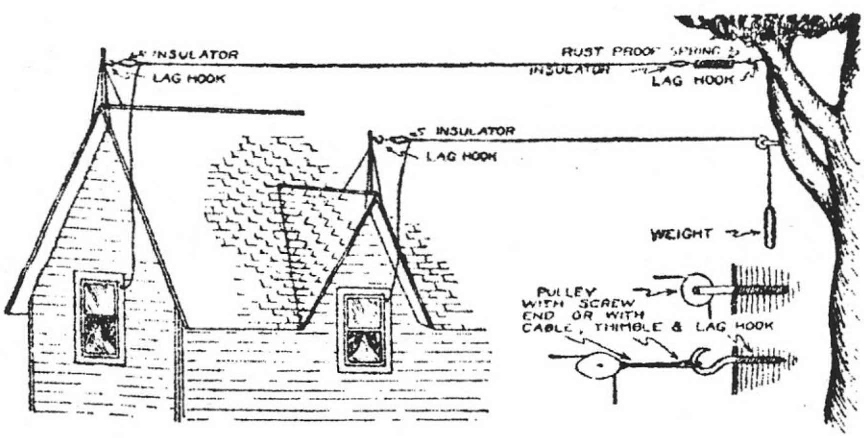

FIG. 3

Very often you will be limited to the length of a building having a gable roof. Such a building has at least one chimney and sometimes two. If the owner of the building will not allow you to erect supports at the chimney (by fastening them to the chimney with wire as shown in Fig. 2), then the only thing left for you to do is to fasten one insulator to the top of the chimney and another to a short support as shown in Fig. 2. If the house or building has two chimneys, then two higher supports may be fastened to the chimneys as illustrated for the one chimney in Fig. 2.

In other installations it may be possible for you to string the pick-up wire between two buildings or between a building and a garage. In the case of two buildings of similar height, all you have to do is to string your pick-up wire between two eye screws in such a way that the pick-up wire is in the clear.

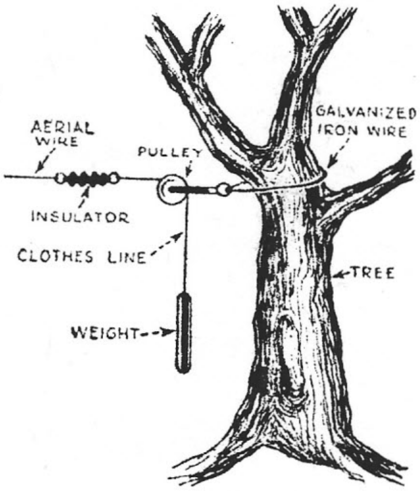

FIG. 4

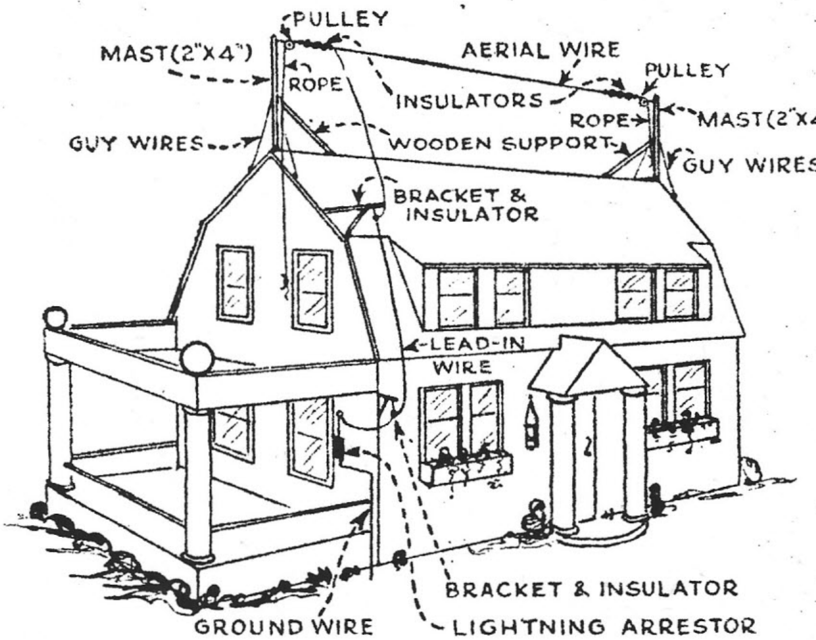

FIG. 5

If there is a building and an adjoining garage, fasten one end of the pick-up wire to the chimney of the building and the other end of it to a support located on the garage.

In many cases it is desirable to locate the pick-up wire between a building and a tree. In this case you have to provide for the swaying of the tree, due to wind. Fasten the pick-up wire to one end of the building in the usual way. At the tree you have a choice of using a coil spring or a rope (which runs through a pulley) with a weight fastened to one end of it.

Fig. 3 illustrates the insullation details of both the pulley and weight as well as the coil spring. Fig. 4 shows another pulley and weight arrangement. Figs. 5, 6, 7 and 8 show various other arrangements of fastening the antenna wires and supports to various types of buildings.

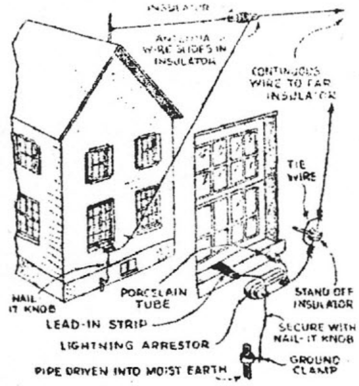

FIG. 6

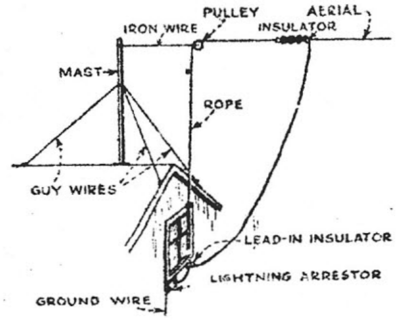

FIG. 7

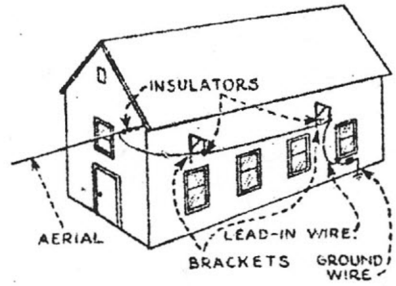

FIG. 8

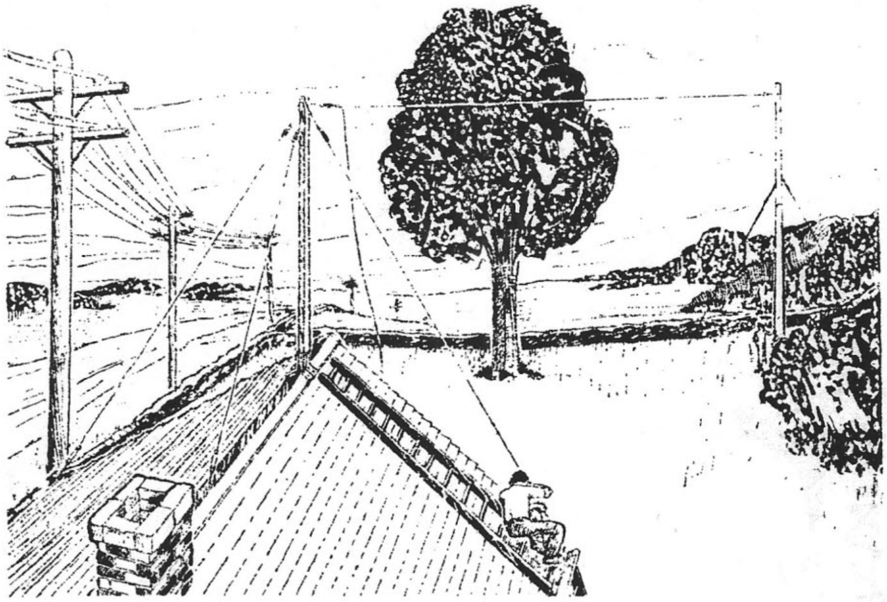

FIG. 9

You want to be careful in working on roofs and when climbing -- make sure of your footing. Fig. 9 shows a neat installation from a roof to a separate support. Note the ladder. It provides a sure footing. If you use a ladder, be sure to fasten it to the roof securely either at the top or bottom. Note the pick-up portion of the antenna in Fig. 9 is at right angles to the wires on the telephone poles. This idea should always be carried out so as to minimize interference from other near by wires.

In Figs. 10 and 11 the details of fastening the lead-in wire to the wall, the installation of the lightning arrester and the ground connections are shown. Fig. 11 also illustrates the pulley and

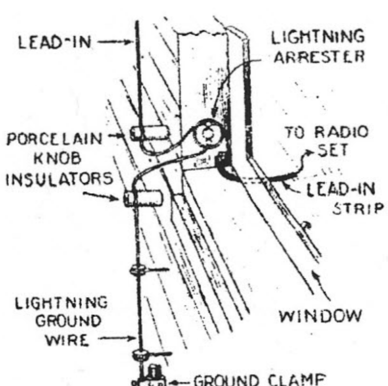

FIG. 10

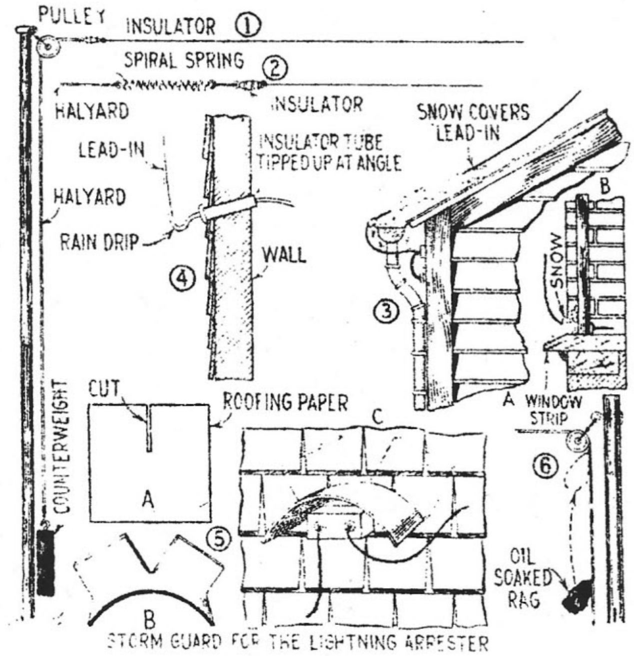

FIG. 11

weight. (1) as well as the coil or spiral spring, (2) methods of fastening to a support. A method using the porcelain tube for the lead-in is shown at (4) of Fig. 11. A method of protecting the lightning arrester from the weather is shown at (5) of Fig. 11. At (6) an oil soaked cloth is used to keep the wire and pulley well oiled. Keep your lead-in away from rain spouts, etc. Snow and dead leaves or obstructions as at (3) of Fig. 11 can collect around the lead-in and may short it or cause noise. If it is necessary to cross a drain pipe or gutter, use a soldered window strip and push it under the drain pipe or gutter as at B of Fig. 11.

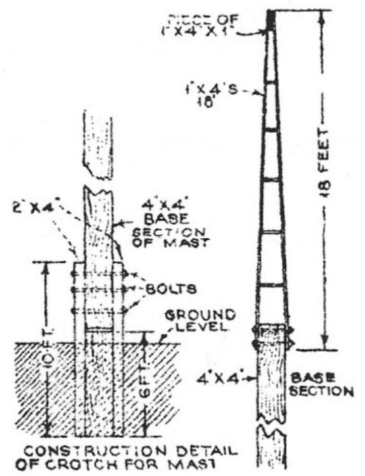

FIG. 12

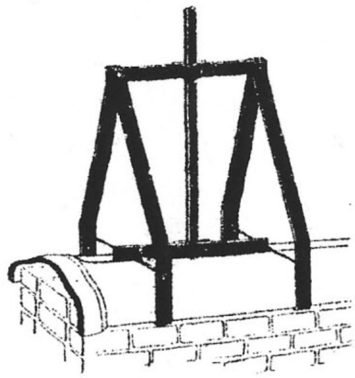

FIG. 13

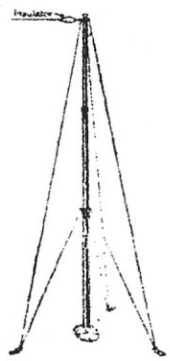

FIG. 14

Fig. 15

Figs. 12, 13, 14 and 15 all show different methods of mast or support construction. Fig. 12 shows the details of home-made wood mast. The base is made from 4 x 4 oak wood with six feet of it in the ground. Bolts are used to hold the pieces together. Pieces of 1 x 4 wood are used for the top part of the mast. When erected, the entire mast should be guyed well with heavy wire and turn-buckles.

Figs. 14 and 15 illustrate the manufactured type of mast. This may be mounted or fastened to the roof at almost any angle. Fig. 13 shows a special type of base for this mast. This mast when shipped to you is fifty inches long. However, it may be opened up so that it will extend up to thirteen feet. The base may be fastened to the roof with wood screws or it may be nailed. The mast is fitted with a guy wire disc at the top and guy wire rings at intermediate points. It may be purchased from practically any Radio mail order firm, complete and ready for installation.

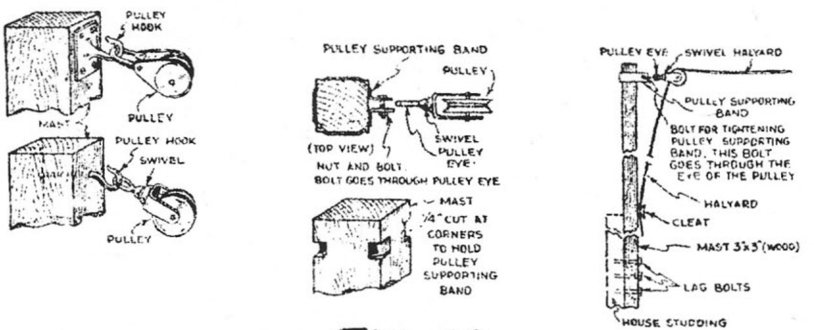

FIG. 16

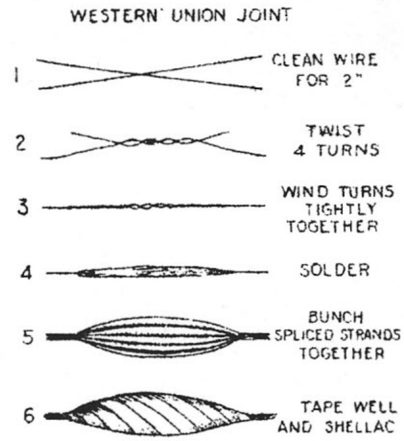

FIG. 17

In fastening any mast to a roof, make sure of a water proof installation. Use tar, pitch or roofing cement around and over all nail and screw holes.

Fig. 16 shows the details of a short mast to be mounted on the roof or side of a building.

Fig. 17 shows how to make a Western Union stranded wire joint. This method should be employed when you have to make a joint in any stranded wire which is exposed to the weather.

Figs. 18, 19 and 20 show different methods of making a ground connection to a water pipe. Fig. 21 shows a special six foot iron rod that may be driven into the ground to act as a ground connection.

FIG. 18

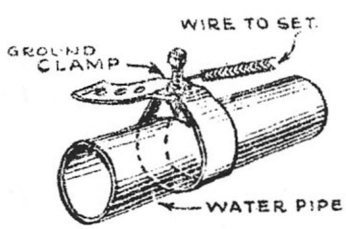

FIG. 19

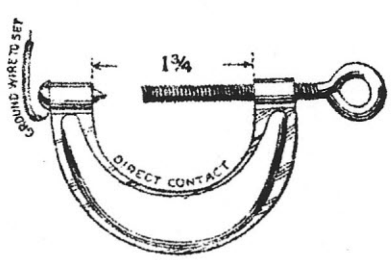

FIG. 20

An approved type of lightning arrester is shown in Fig. 22. Fig. 23 shows a type of porcelain tube used for the lead-in wire. Fig. 24 shows a special spring to be used when the pick-up wire must fasten to a tree. Fig. 25 shows an eye screw with porcelain insulation, while Fig. 26 shows a porcelain nail-it knob used to hold the lead-in wire in place along the side of the building.

FIG. 21

FIG. 22

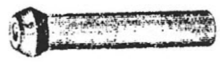

FIG. 23

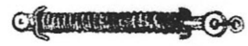

FIG. 24

A special type of lead-in connection is shown in Fig. 27. This requires a hole to be drilled in the window glass. The glass funnels are then held tight against the window glass by means of nuts which screw onto the long brass bolt. The lead-in wire is then fastened to each end of the brass bolt. To drill a hole through a window glass, lay it on a flat surface and use an ordinary steel drill and pour a small amount of turpentine in the hole which you will be drilling. If you keep turpentine in the hole and drill slowly, there

FIG. 25

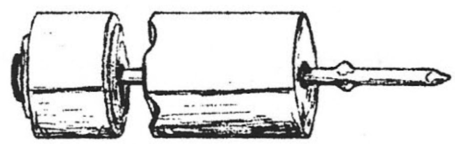

FIG. 26

will be no danger of breaking the glass. Incidentally, this type of lead-in installation is rarely used for a receiving set. In most cases, it is used for amateur transmitters.

We suggest that you study the mechanical details of the illustrations in this Business Builder carefully. If you will do this, you can make a neat and satisfactory antenna installation in almost any location.

All parts needed for an antenna installation may be obtained from any Radio mail order firm or from your local Radio jobber.

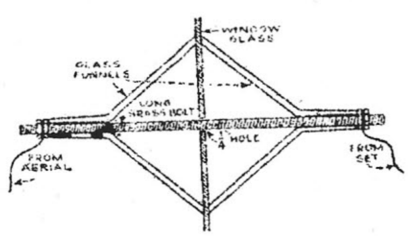

FIG. 27

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RADIO BUSINESS BUILDER NO. 4

HOW TO INSTALL AN ALL-WAVE ANTENNA SYSTEM

Practically all Radio receiver manufacturers recommend that a Modern All-Wave noise reducing antenna be used with receivers which they manufacture. These are recommended for several reasons. First, they are scientifically designed for the frequencies involved -- they match the natural impedance of the antenna system to the input of the receiver. Second, such an antenna picks up less noise than other types of antenna systems, and another advantage is that the pick-up portion of the antenna may be placed as near or as far away from the receiver as is desired without regard to the length of the lead-in. This is accomplished by using impedance matching transformers and a special two wire lead-in called the TRANSMISSION LINE.

Practically all modern receivers sold today are of the All-Wave type and should, therefore, be used in connection with an All-Wave antenna system. Therefore, you should learn all about them and be prepared to make recommendations or be prepared to quote prices or be ready to make installations whenever you are called upon for this type of work.

There are many All-Wave receivers operating without an All-Wave antenna. Whenever you come across one of these, especially where the listener is troubled with man-made interference or where reception is poor or inadequate, try to sell the receiver owner a new All-Wave antenna system. Recommend this procedure to all of your friends and customers. A large amount of extra or spare time work may be obtained in this manner and these installations usually bring from $10 to $20 per installation, depending on the type required and the location. They will find an All-Wave noise reducing antenna a genuine asset to reception.

Do not make the mistake of erecting just any All-Wave antenna system for just any receiver. To work well, the antenna system should be designed to match the input impedance of the receiver in question. Practically all receiver manufacturers either make a particular antenna system for their receivers or else they recommend a certain make. So it is well to take this into consideration when deciding on the type of system to employ.

If you don't know what type to employ, ask the distributor or jobber (in your community for the receiver in question) for his recommendations. If you don't know the distributor or jobber for the receiver, write to the Sprayberry Academy of Radio -- we will be glad to make recommendations.

The following Companies make several types of antenna kits. We suggest that you write to them for further information.

Amy, Aceves & King
11 W. 42nd Street
New York City

Belden Manufacturing Co.
4647 W. Van Buren Street
Chicago, Illinois

Bernback Radio Company
145 Hudson Street
New York City

Consolidated Wire & Assoc. Corps.
512 South Peoria Street
Chicago, Illinois

Continental Wire Co., Inc.
110 Lafayette Street
New York City

Cornish Wire Company, Inc.
30 Church Street
New York City

M. M. Fleron & Sons
113 N. Broad Street
Trenton, New Jersey

General Electric Company
1285 Boston Avenue
Bridgeport, Conn.

Insuline Corp. of America
25 Park Place
New York City

Philco Radio & Tele., Corp.
Tioga & "C" Streets
Philadelphia, Penna.

Philmore Manufacturing Co.
113 University Place
New York City

Pilot Radio Corp.
37-06 - 36th Street
Long Island City, N. Y.

Premax Sales Division (ant. masts)
Chesholm - Ryder Co.
Niagara Falls, N. Y.

RCA Manufacturing Co.
Front & Cooper Sts.
Camden, New Jersey

Technical Appliance Corp.
17 East 16th Street
New York City

Ward Products Corp.
1523 E. 45th Street
Cleveland, Ohio

In selecting a noiseless antenna system, you should be guided by the tuning range of the receiver and its antenna input impedance. Since there is practically no way for the serviceman to determine the latter, he must be advised by the makers of these antennas which one to use for various receivers.

One of the simplest types of noiseless antenna systems consists of a pick-up section, a two wire transmission line and a transformer at the receiver end as in Fig. 1. The pick-up section may be anywhere from 20 to 60 ft. long, depending on the location, altitude and receiver design. If the receiver is very selective a long antenna may be used, but if at a favorable high location, a shorter one is best.

One of the leads of the shielded transmission line is attached to the flat top section of the antenna and the other is attached to

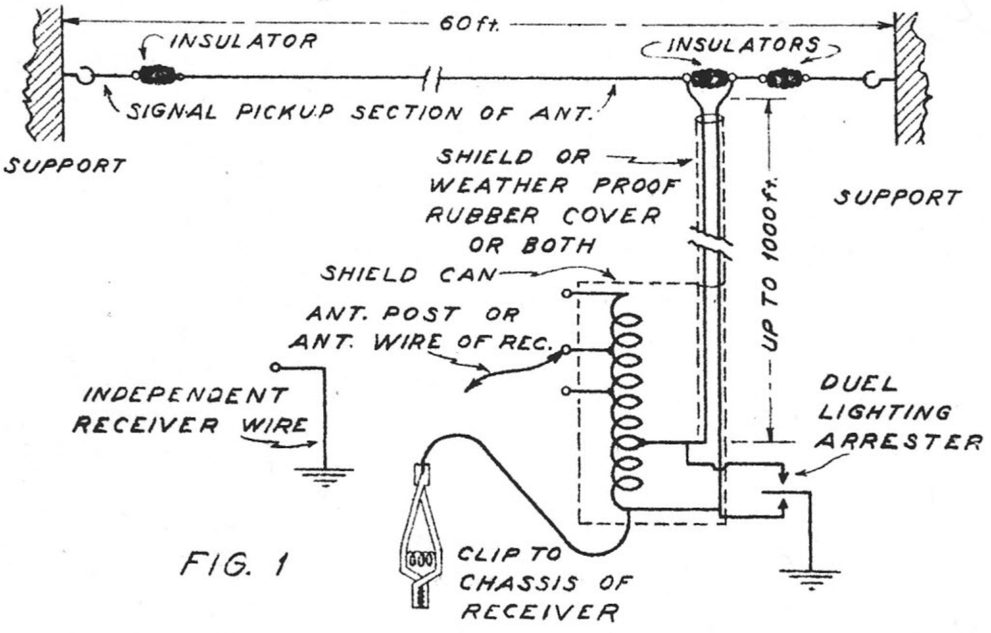

FIG. 1

the other end of the insulator as shown. Depending on how far you can conveniently place the antenna away from the receiver and particularly from any noise making interference, the transmission line may be up to 1000 ft. in length. This much transmission line is not supplied in the usual antenna kit but may be purchased extra if needed. This is mentioned to indicate that the length of this section is not critical. However, always follow the antenna kit manufacturer's instructions in this respect.

At the receiving end of the transmission line is placed a transformer supplied with the kit, which is in the shape of a small round metal can. It is similar in appearance to the small type of I.F. transformer. Some types make use of several taps as shown in Fig. 1 for accurate matching of the transmission line impedance to the receiver input. The one shown in Fig. 1 has a double lightning arrester and ground clip to be attached to the receiver chassis.

The antenna to receiver terminal is connected to the receiver, and while in operation, various taps are tried in various wave band settings to determine the best tap for that receiver. It is left connected to the one which gives the best results.

This unit is an auto transformer, having the transmission line connected across approximately 25 turns -- the total being about 150 turns average -- with taps every 50 turns. The terminals on the outside will be properly marked so that you can make the proper connections without seeing the actual windings. The transmission line shield is connected to the outside cover of the transformer.

Ordinarily the receiver input impedance is high and such transformers are, as a rule, made to match an average high value. For this reason, the same antenna kit may be used for practically any receiver of fairly recent design, such as any one having a greater range than the 550 to 1500 KC broadcast band.

Due to the similarity of input impedance values of various receivers, a somewhat simplified antenna transformer may be used as in Fig. 2. The idea is the same as that of Fig. 1 but the taps and lightning arrester are omitted. This is a very satisfactory type of antenna.

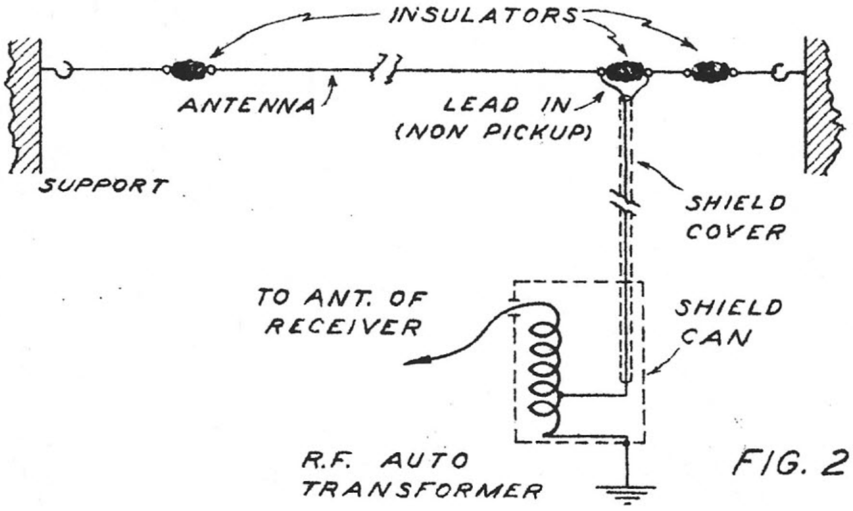

FIG. 2

Instead of two separate leads for the transmission line, note that the two leads consist of a center wire and an outside shield. These form the two transmission line conductors, thus simplifying the system without sacrificing very much efficiency.

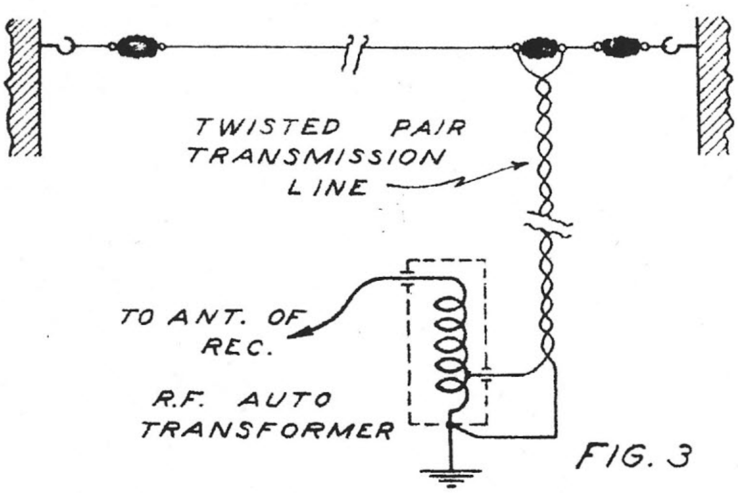

FIG. 3

Another type of transmission line is shown in Fig. 3. It consists simply of a "twisted pair" line similar to a telephone line. It is connected just as those in Figs. 1 and 2 but has no outside shield. The line itself however, cannot pick-up any signals or noise because of the twisted arrangement of the wires. The antenna lead-in is connected to the coil tap while the free lead is grounded.

Greater efficiency is obtained by using separate wire lines run parallel and transposed every few feet by means of special transposition blocks as in Fig. 4. Connections are exactly as in Fig. 3,

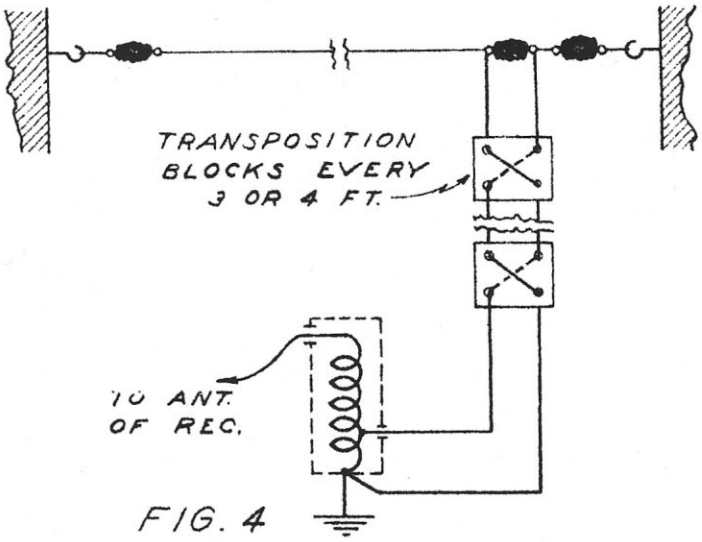

FIG. 4

but the transmission line is of different make up. Due to a definite mathematical relation between the wire diameter and the spacing of the two wires the transposition blocks are made for a special wire furnished with the kit.

This type of transmission line does not pick up any signal or interference of itself. Virtually all of the input voltage operating the receiver is obtained from the flat top or pick-up section of the antenna.

For a still more efficient system as in Fig. 5 an impedance matching

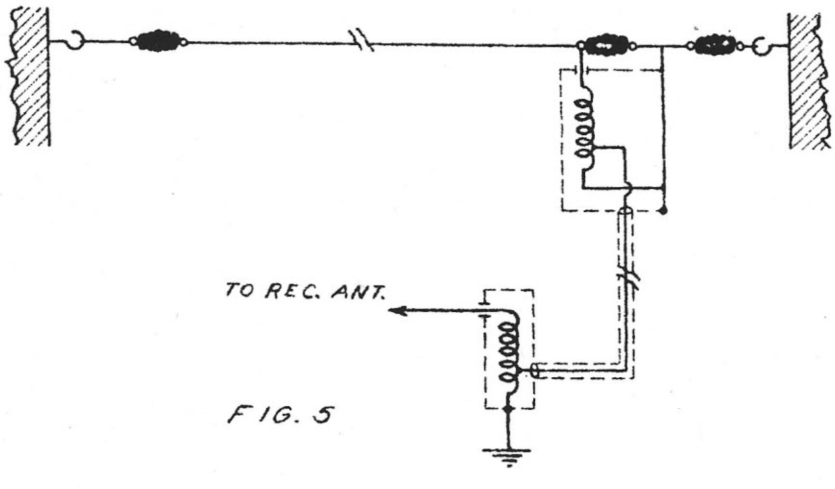

FIG. 5

transformer is used both at the antenna and at the reçeiver. In this case, the transmission line may be of any of the types mentioned and may be up to 1000 ft. in length without any noticeable difference in reception. The length of the pick-up section in this case must be followed more closely than otherwise because of the design of the antenna coupling transformers.

Now, if the receiver will tune up to 20 megacycles or beyond, a doublet antenna is recommended as in Fig. 6.

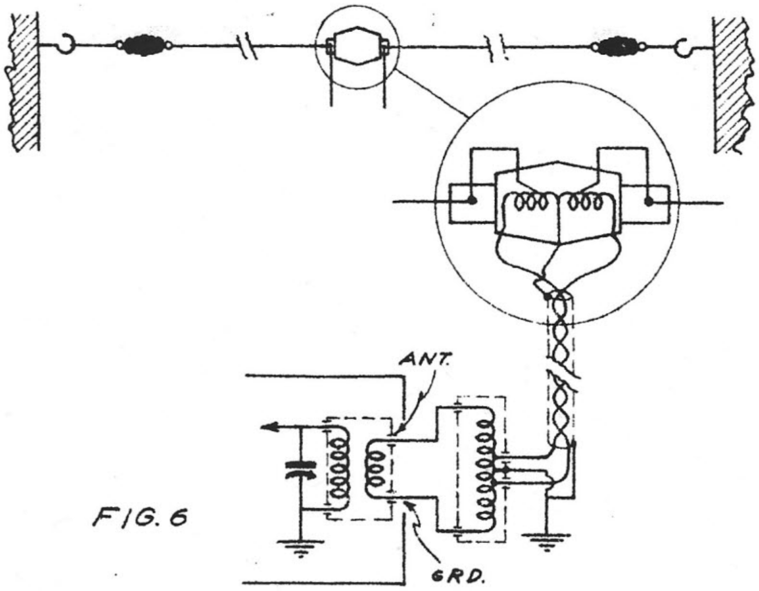

FIG. 6

This type of antenna consists simply of a pick-up section broken in the center for attaching the transmission line instead of at the end. The line may be attached directly only by means of a transformer, perferably as indicated in Fig. 6.

The higher the frequency of the band coverage, the shorter the antenna may be for these bands, but of course, this will decrease the pick-up for the lower frequencies. A good medium value would be around 20 ft. per section, 40 ft. in all. In some cases the transmission line is designed in such a way that it will be most effective when the antenna is cut to a certain specified length. This, of course, is specified in the instructions furnished with the kit.

The doublet can be used more effectively without a transformer at the antenna end than the other type just discussed, because of its characteristics. Several types of transmission lines as mentioned are shown in Fig. 7 with their proper connections to various types of transformers.

Some kits, such as the RCA "Spider Web" antenna includes a multiple transformer and a multiple doublet system, intended to provide an antenna of favorable length for each frequency band. There is no switching to be done, as each antenna will naturally respond to the band of frequencies to which it is most closely tuned by reason of its length.

Of the various kinds of transmission lines, each has its special characteristics. From a strictly technical sense, a coaxial line is by far the best type to use, provided that the inner cable and outer sheath diameter ratio may be optimum for minimum loss.

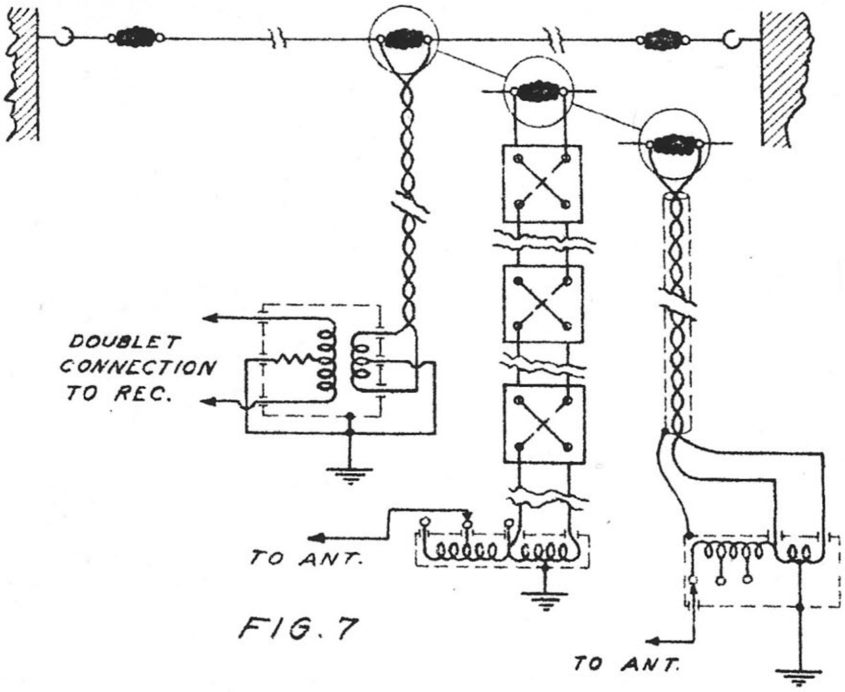

FIG. 7

This specification cannot easily be met for broadcast receiving antennas except at considerable cost. The next best type is the doublet wire transposed line as in Figs. 4 and 7. When connected to the end of a single wire antenna one end of the line is simply left free electrically, while the other is connected to the antenna proper. Connections at the receiver end and the magnetic field about the antenna connection induces a voltage of opposite phase in the free lead and the current flow in this feeder produces a magnetic field exactly opposite to that in the main lead-in connected to the antenna, thus neutralizing it and preventing pick-up.

Any signal picked up by one of these transmission line leads would also be picked up by the other and two equal voltages would be produced in the same direction. Current would flow in the same direction in both wires as in Figs. 6 and 7, and because of the connection to the receiver end with the terminating coil of the transmission line center-tapped with this center-tap grounded, the currents due to these induced voltages, will be equal and opposite and will be cancelled.

The feeder wires, therefore, do not pick up any signal, but simply conduct the signal current produced by the pick-up portion of the antenna to the receiver. Any electrical interference at or near the receiver location is, therefore, considerably reduced as it must travel to the pick-up section of the antenna before it can be picked up. It is likely to be very weak at this point because of its nature of rapidly decreasing with distance.

This kind of an antenna has no advantage over any other kind of an antenna as far as atmospheric (electrical storm) interference is concerned. It is only good for man-made interference and then only when the antenna proper can be well removed from the source of interferenc·

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RADIO BUSINESS BUILDER NO. 13

HOW TO CHECK ANTENNAS FOR POOR CONNECTIONS, NOISE, ETC.

The student of today who is to be the efficient, successful, Radio serviceman of tomorrow must realize the value and necessity of acquiring the knowledge and ability which will enable him to erect and maintain antenna systems capable of operating his customers receivers at maximum efficiency. It is strangely true that prior to the advent of the modern all-wave receivers the erection of an antenna system as executed by a large portion of servicemen consisted in the main of merely swinging a wire in a haphazard fashion between two supports on the roof of a dwelling and connecting this wire by means of a lead-in wire to the antenna wire of the receiver.

This unskilled, and in many cases, careless practice has resulted in a large percentage of so-called antenna systems in use in the field today. Most of them are merely makeshift noise collectors and trouble makers. The receivers connected to these systems will be found to be operating under a handicap -- not being given a fair chance to produce the maximum performance of which they are capable of delivering. Then too, this condition has been further aggravated by many set owners or other inexperienced persons who, in their effort to save the expense incurred by hiring a serviceman to erect a proper antenna, constructed their interpretation of an antenna system which usually produced an energy collector possessing detrimental features which partially impaired, and in some cases, totally destroyed the purpose it was designed to serve.

When you are called upon to service a receiver, regardless of the complaint, it is of the utmost importance that you make a careful and complete test of the antenna system to which the receiver is connected. In performing this operation your antenna installation business will receive a boost, as many inadequate and defective antenna systems will be disclosed by the test but the most important benefit to be gained from this practice will be the protection of your reputation as an efficient Radio serviceman.

Numerous cases of poor sensitivity, fading or intermittent reception, have been traced directly to a faulty antenna system having a high resistance leak, high resistance joint or loose connections. Servicemen have been known to bring receivers to their shop with the troubles just mentioned and when placed on test in the shop, performance was good for several days. However, when returned to the customer's home, the old complaint immediately arose and the serviceman renewed his efforts to find the difficulty in the chassis -- often replacing resistors, coupling condensers, by-pass condensers and whatnot in his desperation to locate the heart of the trouble and in the end being rewarded with failure for his efforts. All of this waste of valuable time and worry would have been avoided by use of a little thought and an inspection of the antenna which would have revealed the real difficulty immediately.

When frequent call-backs arise, it is only a natural conclusion that doubt will form in the customer's mind as to your ability as a serviceman and your prestige suffers in his opinion as a result. A satisfied customer is your greatest advertising asset -- word of mouth recommendation as to your ability to his friends will mean more effective and beneficial advertising than any other form of solicitation.

That is why we say it is imperative you never depart from the home of a customer until you are fully confident he is completely satisfied with the services you have rendered him. And while the inspection of the antenna system is considered a minor detail by most servicemen, and generally disregarded completely by them, we cannot stress too strongly the major importance of making this inspection and test on all jobs as experience has shown that this inspection has been found in a number of cases to be the deciding factor between a successful repair and a total failure.

In order that our test of an antenna system may be conducted in a methodical manner, we will divide it into six distinct sections and consider each section in detail.

(1) The pick-up wire

(2) The lead-in wire

(3) The lightning arrestor

(4) The receiver primary or input

(5) The ground wire

(6) The ground connection

We have spoken repeatedly from time to time throughout these Business Builders relative to the importance of developing your powers of observation. In conducting an antenna system check-up your ability to observe existing conditions will be found to greatly simplify your work of locating and remedying existing faults. The actual testing operations are not difficult to perform and the services of an ohmmeter having a low and high scale reading is the only test instrument required.

THE PICK-UP WIRE: The pick-up wire usually consists of several twisted strands of No. 22 or No. 24 copper or bronz wire. This wire may be bare or it may be enamel covered. The average pick-up is generally from 30 to 100 feet long, depending upon existing conditions in the locality where the receiver is in use.

There exists in all Radio developments a series of compromises and the serviceman must learn to make use of these compromises, particularly as they apply to antenna construction if he is to employ satisfactory judgment as to what constitutes an efficient energy collector for a given installation. Before he can reach a decision there are several factors which must be taken into consideration. First, he must consider the receiver with respect to its sensitivity and selectivity. Second, he must consider the proximity and power used by local broadcasting stations. Third, he must consider noise producing agencies in the form of power houses, ice plants, etc., which may be located in the immediate neighborhood. Fourth, he must consider electric lines -- both high and low tension -- and telephone lines which may be strung near the site of the installation and fifth, the amount of free space he has in which to place the pick-up, unrestricted by trees or other objects.

To more fully illustrate some of the compromises which exist in Radio, let us consider some of the problems which confront the Radio engineer. For example, in designing a receiver he can go only so far in developing the selectivity. If he carries the selectivity past a certain point the receiver will begin to cut side-bands and the reproduction will suffer. Likewise, if he increases the sensitivity too much, stations will spread over a large area of the dial, and if too great an increase is made, the stations will lap into each other. Thus it can be seen that a happy medium must be struck with regard to selectivity and sensitivity by the designing engineer in his finished product.

The serviceman also encounters various problems in his work of erecting or correcting faulty pick-ups and he too, like the designing engineer, is called upon to exert his skill in making an efficient compromise. As said before, it is of major importance that the type of receiver be considered in advance of actual construction or alteration of the pick-up. The more sensitive the receiver, the shorter can be the pick-up and the less will be the noise ratio. Conversely the longer the pick-up wire, the more noise and also the longer the pick-up wire, the less will be the selectivity of the receiver but you will also get an effective increase in the sensitivity of the receiver with the longer pick-up wire.

Therefore, it can be readily seen that the length of the pick-up must be a compromise, taking into consideration all of the above factors. Good judgment naturally decrees that it would be unwise to operate a highly efficient modern superheterodyne on an antenna, the length of which had been adjusted to effectively operate a receiver of the tuned Radio frequency type.

If you are on a service call and in making a routine tuning test of the receiver, your attention is brought to the fact that stations have a tendency to spread over several degrees on the dial, and in many cases, accompanied by stations interferring with each other or the volume of local broadcasting stations cannot be effectively reduced or controlled by the manual volume control, these indications will immediately point out the fact that too large a pick-up is connected to the receiver. A visual inspection of the pick-up will usually verify this to be true and the remedy is, of course, to reduce the length of the pick-up.

This shortening process can be accomplished in two ways. The pick-up may be cut at a point farthest from the end which has the lead-in wire attached to it and an insulator inserted between the two cut ends or a small fixed condenser ranging in capacity from approximately .0025 mfd. to .0001 mfd. may help materially if connected in series with the lead-in. If you desire, a small variable condenser may be used instead of one of the fixed type, thus providing the additional advantage of permitting a finer adjustment.

If, however, the pick-up is too short and the receiver is not of a type possessing extreme sensitivity, a large reduction will be noted when making your tuning test. Another factor which must be taken into consideration is that some receivers are more sensitive at one end of the dial than at the other and the effect of poor sensitivity would naturally be more pronounced at the less sensitive end. Then too, it sometimes happens that the pick-up resonates at the end with good reception and the efficiency rapidly falls off, as the other end of the broadcast band is approached. A change made in the length of the pick-up, which naturally would be an increase will generally remedy this condition. Another detrimental factor which often arises from the use of too short a pick-up is that some types of receivers will oscillate when connected to them.

If very noisy reception exists and upon removing the antenna and ground leads from the receiver the noise stops, you have established the fact that the noise is originating from an outside source and is being picked up and fed into the receiver by the antenna system. If all connections in the antenna system are found to be in perfect electrical condition, a visual inspection should be made to determine if the pick-up is running parallel to telephone lines, power lines or other noise producing agencies. If possible, the pick-up should always be placed at right angles to these trouble makers. When making a visual inspection of a pick-up bear in mind it should be fairly tight between its supports and that it should be well clear of the roof, trees or other objects. The insulators should be carefully inspected and if found covered with soot or dirt, carefully cleaned.

THE LEAD-IN WIRE: The lead-in may be a continuation of the pick-up wire or a separate wire attached to the pick-up. The latter method is the most desired as it is advisable to have an insulated wire serve in this capacity, and No. 14 stranded, rubber-covered wire is ideal for this use. The point where the lead-in wire is connected to the pick-up is usually found to be a source of trouble. Very few of these connections are properly soldered, if soldered at all, and while the installation will function perfectly for a short time after the antenna is erected, the wires will soon corrode and result in a high resistance joint. A careful visual inspection at this point should always be made and if the joints give rise to the slightest doubt in your mind, the lead-in wire should be removed and the connection re-established by first cleaning the wires brightly by rubbing them with sandpaper, then twisting the lead-in wire tightly around the pick-up to provide mechanical strength to the joint and finally soldering by applying heat from the iron to the joint until the solder has flowed through and around it.

Also a visual inspection should be made along the length of the lead-in to see that it does not scrape against the side of the building and that it is properly mounted on stand-off insulators in order that it does not come in contact with the edge of the roof, rain gutter, trees or other grounded objects. It should also be well removed from all telephone and power lines entering the building and under no circumstances mounted parallel with them.

The lead-in should enter the room where the receiver is installed via a porcelain tube insulator which in turn is mounted in a hole bored through the side of the window frame. Many strap type lead-in accessories will be found in use for the purpose of bringing the lead-in into the dwelling and they have proven themselves to be a continual source of trouble. The average strap type lead-in generally consists of a thin strip of copper about a half inch in width and about ten inches long. The body of the strap is covered with an insulating fabric and at each end of the strap a fahnestock clip is attached, held fast by a rivet. The strap may be mounted either at the bottom or top of the window sill and when the window frame is pushed tightly against it, the strap will be held firmly in place. The bare end of the lead-in wire is then placed in the fahnestock clip hanging outside the window and an additional wire is run from the clip inside the room to the receiver. It can be readily seen that the wire within the clips, and even the clips themselves, will soon corrode and give rise to an ideal source of loose or high resistance connections. In many apartment houses the window frames are of metal and during rainy spells, the insulation of the strip may become water-soaked and cause a high resistance leak. There also always exists the possibility that the metal frame may cut through the insulation with a similar effect. When these straps are encountered, the connections at each end should be soldered and the insulation carefully inspected.

If you desire to make a test of the pick-up and lead-in with your ohmmeter for open circuit, high resistance joints and grounds, simply disconnect the antenna and ground leads from the receiver and place the test leads of your ohmmeter, which has previously been set at its highest scale, across them. The reading obtained on your meter when making this test should be of a value showing infinite resistance. If a reading of less resistance is recorded, a ground exists somewhere in the system. An infinite resistance reading obtained on the ohmmeter however should not be taken as a definite indication as to the perfection of the system, as there may be other physical defects which exist, such as high resistance joints or opens. If you desire to make a continuity test of the pick-up and lead-in, you may do so by connecting the free end of the pick-up securely to the metal drain gutter by means of a wire and test with the ohmmeter from the free end of the gutter to the end of the lead-in. With the ohmmeter set on its lowest scale, a reading of very low ohmic value should be shown indicating normal continuity.

THE LIGHTNING ARRESTOR: After an arrestor has been in use for an indefinite period of time dirt or soot may collect between the contacts or connection posts, giving rise to high resistance leaks with its attendant noisy reception. The arrestor may also become defective due to a lightning surge fusing the gap within it and thus produce a short circuit which will stop the reception of distant stations. In testing the arrestor with an ohmmeter, set the ohmmeter to its highest scale and place the test leads across the two binding posts, the correct reading being of infinite value. The simplest test may be made by disconnecting the arrestor and noticing the effect on reception.

Many servicemen, when connecting an arrestor, bring the lead-in wire to it and cut the wire -- the two cut ends are then cleaned of insulation and placed under the binding post marked "Ant.", after which the free wire is carried to the receiver. The ground wire is likewise brought to the arrestor and cut, the two ends being placed under the binding post marked "Gnd." before being carried to the receiver. This practice places the ends of the two wires under each binding post and results in the possibility that a high resistance connection may form under the binding posts as the wires gradually corrode. The best method is to bring the lead-in and ground wires to the arrestor, remove about an inch of the insulation from the wires at the proper point without cutting them and after placing a turn of the bare wire under each respective binding post, secure them tightly against the wires. This insures continuity of both the lead-in and ground wires.

THE RECEIVER PRIMARY OR INPUT: In making a complete test of the antenna system the fact cannot be ignored that the input portion of the receiver -- that is, the part or parts which are connected between the antenna and ground binding posts within the chassis are actually part of the antenna system, being connected in series with it. In conducting a test of a receiver input circuit the serviceman must, of course, be thoroughly familiar with the type of circuit contained in the chassis upon which he is working, otherwise, the test will be apt to prove misleading and of no practical value to him.

If the test prods of an ohmmeter are connected to the antenna and ground binding posts of a chassis, it is normal, in the majority of cases, to receive a reading ranging from a fractional part of an ohm in some cases to approximately 15,000 ohms in other cases. While any reading on the ohmmeter within this range would indicate that continuity exists, the best plan would be to consult a wiring diagram of the receiver and compare the reading obtained with that shown on the schematic. Also in a few remote cases, when the ohmmeter test is made, a reading of infinite value will be obtained. This complete absence of any indication of resistance being present in the circuit will lead the serviceman to assume an open circuit is present only upon a closer inspection to find a condenser connected in series with the input circuit.

The antenna lead-in and ground wire will be found to be connected to the chassis in one of three ways. Binding posts are most generally used, and in most cases, the ground binding post is mounted directly on the metal chassis while the antenna binding post is mounted on an insulated shoulder or strip of fibre or hard rubber. These binding posts will often work loose in their mountings resulting in noisy, intermittent or no reception. They should always be carefully checked and tightened if found to be loose.

Another method often employed is the use of fahnestock clips. Once again, we generally find the ground clip riveted directly on the metal chassis while the antenna clip is isolated by means of an insulated washer or strip. These clips are an ideal source of trouble. The wires placed in them will corrode in time, causing high resistance connections, the tabs of the clip may become bent and loosely hold the wire, resulting in noisy or intermittent reception or the antenna clip may be bent down and rest against the metal chassis and ground the antenna completely. When fahnestock clips are encountered, the lead-in and ground wires should be removed and scraped until bright with a knife or sandpaper and then replaced, making sure they are firmly held by the clips and that the antenna clip does not come in contact with the chassis.

A few receivers will be found to have two wires running out of the chassis -- color-coded to denote the antenna and ground connections. The point where these two wires connect the antenna lead-in and ground wires should be checked. These connections in a number of cases will be found to be twisted in a makeshift fashion often resulting in a high resistance joint. When discovered in this condition, the wires should be cleaned, the connection remade, firmly soldered and the joint covered with a coating of friction tape to provide an insulation.

As said before, some receivers have a condenser connected in series with the input system. This condenser will often be found to be of a variable type to allow a fine adjustment, and in a large number of cases, it is of the compression types as used in trimmer positions. If this condenser is mounted in an exposed position, dust or moisture may collect in it or the mica insulation may become broken or cracked resulting in noisy, intermittent or weak reception. It may also be possible for a ground to exist destroying reception completely. A careful check should always be made of these condensers when they are present in a receiver as they are a source of trouble which is often overlooked by servicemen.

Many receivers are operated on a ground wire alone. Whenever an installation of this type is found, you should endeavor to the best of your ability to discourage the customer from a further continuation of this practice and strongly advise him to allow you to erect an antenna system to provide a safe and adequate pick-up for the receiver. A large number of receivers have a condenser from one side of the A.C. line to the chassis. Many have a dual condenser connected across the A.C. line in such manner that a condenser is connected from both sides of the line to the chassis. One side of the A.C. line is grounded to the water pipe in the vicinity of the meter and the ground wire running to the receiver is likewise grounded to the water pipe. In the case of the single condenser, if the set plug is placed in the receptacle in such manner that the condenser is in the hot side of the line and the condenser breaks down, the current will flow through the condenser to the chassis. As one side of the primary of the input stage is connected directly to the chassis, the current will flow through the primary windings to the ground lead connected to the antenna binding post making a complete short circuit of the A.C. line. The small wire used to wind the primary could not stand this heavy flow of current and would instantly burn out.

In the case of the dual condenser, if the section connected to the hot side of the line should break down, the result would be the same. Explain this danger to your customer emphasizing the destruction and fire hazard involved and you should have no difficulty in gaining an antenna installation job.

THE GROUND WIRE: The ground wire should consist of the same type of insulated stranded wire as used for the lead-in. It should be as short and straight as possible and connected firmly to the cold water pipe. In the cellars of most dwellings, the electric wires are mounted along the rafters in an exposed position. Precaution must be exercised to avoid running the ground wire parallel to these wires and likewise, it should be as far removed from them as possible. It is advisable that the ground connection be made to the water pipe as close to the point where the pipe enters the building as can be reached. In making a visual inspection of the ground wire, check for these conditions.

THE GROUND CONNECTION: The ground connection to the water pipe is generally achieved by use of a copper strap clamp or a set-screw clamp. These accessories are secured in place mechanically by means of a nut and bolt in the case of the copper strap and a pointed set-screw in the case of the set-screw clamp. If a strap type is employed, the surface of the pipe over which it is to be mounted should be scraped until bright and the strap mounted firmly over the cleaned portion. The ground wire must be soldered to the copper strap. In the case of the set-screw clamp, the point of the set-screw cuts into the body of the pipe as the screw is tightened, making it unnecessary to clean the pipe before installing it. A very careful inspection, both visual and mechanical should be made of the ground clamp installation. After observing whether or not the ground wire is properly soldered to the clamp, take hold of it and attempt to move it. If the part moves on the pipe it should be disconnected and the joint remade. High resistance and loose connections will frequently be found to prevail at this point.

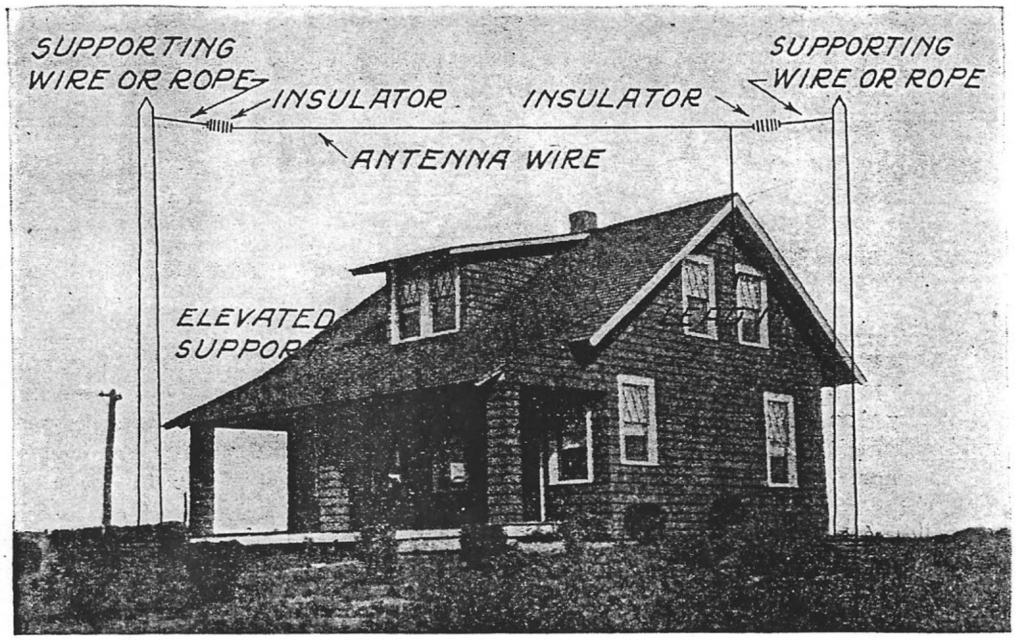
Many persons living apartments have the ground wire attached to the hot water or steam pipe which connects to the heat radiator. This is a very poor method of attaining a suitable ground and should be used only under circumstances which exist preventing a cold water pipe from being reached. If this pipe must be used, the set-screw clamp must be utilized for the connection. A copper strap is not suitable, as the expansion of the pipe when it becomes hot will cause the copper to stretch and when the pipe cools and contracts a loose connection will result. Another adverse condition which arises when using a copper strap in this position is the fact that the pipe will have a tendency to sweat under the strap and this condensation will cause the copper to set up a corrosive action in the form of a greenish film which will in turn cause a high resistance connection.

CHECKING ALL-WAVE ANTENNAS: In checking an all-wave antenna system no difficulty should be xperienced if you have made a careful study of the Business Builder entitled "How to Install An All-Wave Antenna System". Disconnect the transmission line from the receiver transformer and with your ohmmeter check the latter for continuity.

This test may be conducted in a manner similar to making a test of an ordinary Radio frequency transformer. As the transformer contains a primary and secondary, continuity should be found to exist between the terminals of these two windings. If you are doubtful as to the perfection of the receiver transformer, the ends of the transmission line may be connected directly to the antenna and ground posts of the receiver and if reception is restored by this act, it would, of course, indicate the transformer as defective.

To make a check of the transmission line, connect the ohmmeter to the two ends of the line which have been removed from the receiver transformer -- if the antenna end of the transmission line is connected to a transformer, a reading low in value will be obtained. If, however, the antenna is of a doublet type and does not contain a transformer, a very high resistance reading should be registered in the vicinity of infinity. If the insulation has broken down or dust and dirt have collected on the cable, a reading may be obtained ranging from zero ohms to higher values depending upon existing conditions. If the resistance of the cable is indicated by a reading on the meter to be of a value lower than 20,000 ohms, it should be discarded and a new one installed.

If an antenna transformer is used, in order to complete the test disconnect the transmission line from it and make a test similar to the test conducted on the receiver transformer. If the cable is of a shielded type, always make an ohmmeter test from the cable to the shield for leakage.



THE BEST ANTENNA FOR RECEIVING BROADCASTS
A single-wire inverted L-type antenna. The two elevated supports—in this case poles—may be used only in cases where trees or buildings are not available.

The Simplest Receiving Antenna

THE INVERTED L-TYPE

The First of a Series of Short Articles on the Various Types of Antennae and Their Uses

By DAVID LAY

Since the advent of radiophone broadcasting, there has been such a great amount of interest created in radio, and so many receiving sets installed and antennae erected, that one can look out of almost any window in a large city, and see at least one or more antennae or "aerials" as they are popularly called, stretched along the skyline. Some of them are high ones, some of them are low ones, some are short, some are long, some look neat and some look mangled, some are insulated, and some are not, some work well, some fairly well, some poorly, and some do not work at all.

Very few of the beginners who erect their antennae know what they are doing. Some of them have not the slightest idea what it is all about; they just follow the directions and "String up a single wire, about 100 feet long, and as free from surrounding objects as possible."

The antenna and the ground connection form the means of converting the radio waves into electrical oscillations, and if the antenna is inefficient, how can we expect the results to be satisfactory? Even though we have good apparatus, if the antenna does not convert the waves into electrical impulses strong enough to operate the set, we cannot expect the set to work.

This series of short descriptions of the different conventional types of antenna is written to give the beginner an idea of the structural details of the antenna as well

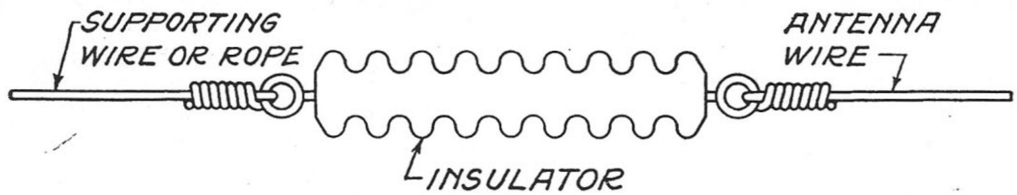


FIGURE I

How the insulator is fastened to the antenna wire and to the supporting wire.

as the uses of the different types so that he will know which type is best suited to his purpose and how to build it.

The type which has gained greatest popularity on account of its simplicity and general usefulness is the inverted "L" antenna. The "L" antenna gets its name from the likeness of its shape to an inverted letter "L."

For broadcast reception the L antenna is usually made of one single wire stretched between two high supports, with an insulator at each end of the wire. The lead in wire is attached (soldered) to the antenna wire at one end and brought down as straight as possible, to the receiving instruments, as in the diagrams on the accompanying photograph. The insulators are attached to ten foot lengths of supporting wires (or ropes) which are fastened to the elevated supports. The supports may be poles, high buildings, large trees, or other elevated structures.

The insulators are used to prevent the currents induced in the antenna by the passing radio waves, from leaking down the elevated supports to the ground without going to the receiving apparatus. These insulators are sold in the radio supply stores and are made of some kind of good insulating material that is waterproof. They are usually made in a tubular corrugated shape to make the surface leakage path across them as long as possible. Two metallic rings are fastened at the ends of the insulator for connecting to the antenna and supporting wires. An insulator of this type is shown in the diagram in Figure 1.

The length of the antenna wire stretched between the insulators should be approximately 100 feet.

The L type antenna will receive better from the two directions in which the antenna wire points than in other directions, and will receive best from the direction in which the lead-in end points.

For transmitting on 200 meters, the L antenna is made with more than one wire in the antenna proper. Four wires are usually used. With this construction, two insulators are used at the ends of

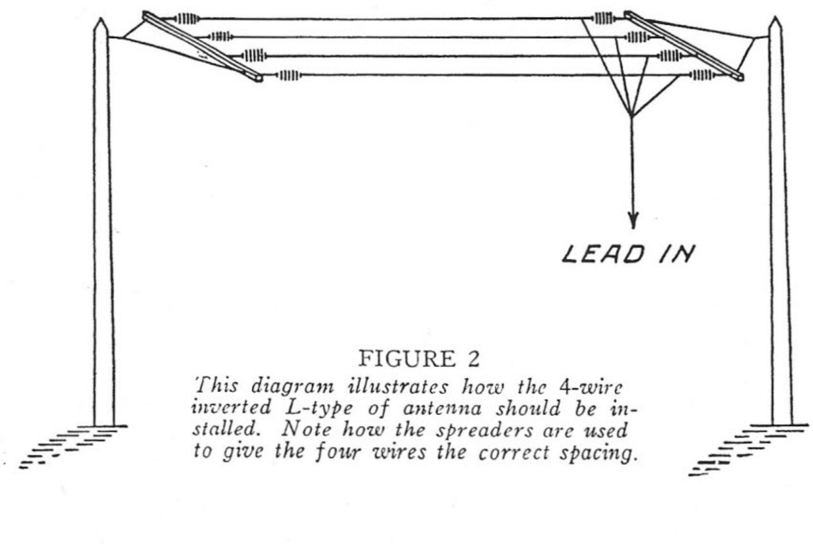


FIGURE 2

This diagram illustrates how the 4-wire inverted L-type of antenna should be installed. Note how the spreaders are used to give the four wires the correct spacing.

each wire as shown in Figure 2. The wires should be spaced at least two feet apart. This is accomplished by the use of two wooden "spreaders," each six feet long. These should be made of hard wood sticks, two inches square. The sticks are connected to the elevated supports by means of wires (or ropes) as shown in the diagram. Four lead-in wires are soldered to one end of the four antenna wires and these are brought to a common junction from which a single wire is run down to the instruments.

This latter type of antenna may be used for both sending and receiving and has a greater electrical capacity than the single wire antenna. It has about the same directional characteristics as the single wire antenna.

Its inductance is of about the same value as the single wire antenna, but its capacity is much greater and this is the main reason for its superiority for use in transmitting. Each of these adaptations of the inverted L antenna should be constructed as high in the air as possible, especially in cases when the antenna is to be used for transmission, as the effective height of the antenna greatly affects the sending range.

The "T" type antenna will be described in a near issue of POPULAR RADIO.

RADIOGRAMS

BY A. J. DE LONG

A MAN *fell off the roof yesterday and broke his antennae.*

* *

THE *station that is issued the call letters GOD will have a lot of publicity to start with.*

* *

ANYBODY *who can throw a stone into a pool of water ought to understand the fundamentals of broadcasting.*

* *

A YOUNG *man who has been saving his money doesn't know whether to buy a radio set or get married.*

* *

WHAT *a radio fan needs is a shop that will repair vacuum tubes while you wait.*

* *

THE *trouble with most folks is that when they get a station good, the program is spoiled because they wonder what another place is doing.*

* *

WHAT *makes the dog scratch so? Maybe he's got the radio bug.*

* *

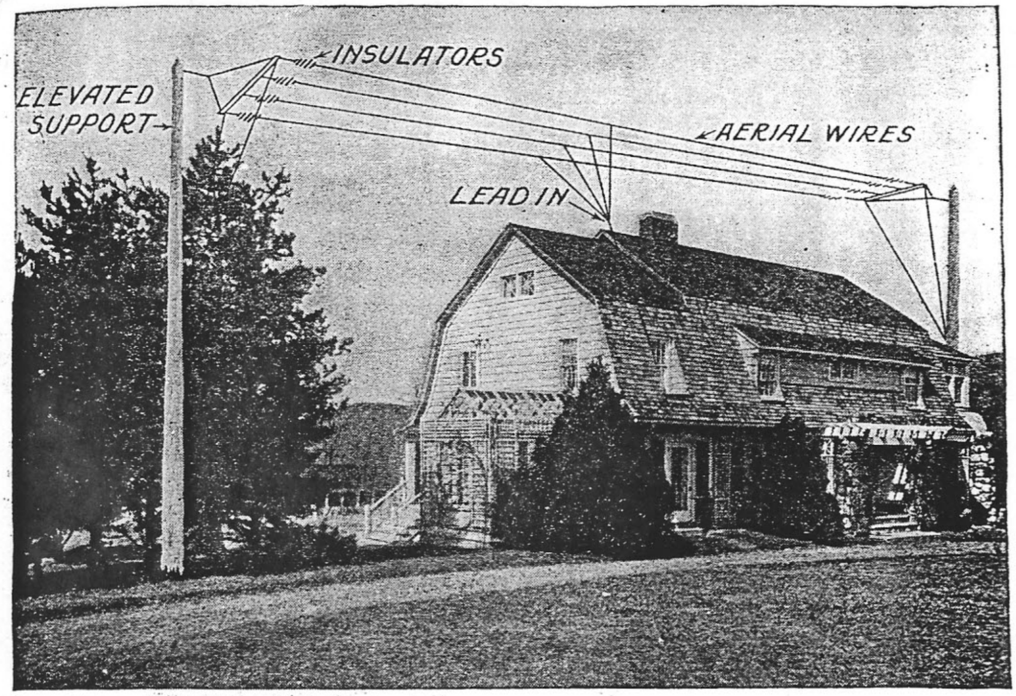
WHY *the lights in the boxes? That's to show the sound waves the path to the receivers.*

* *

A BEGINNER *wants to know if it's the scarcity of radium that makes radio equipment so high.*

* *

NEXT *to the lady who is always knitting on a street-car few things are as annoying as the man who is always getting distance stations.*



From a diagram made for POPULAR RADIO

The Most Popular Transmitting Aerial

THE T-TYPE OF ANTENNA

The Second of a Series of Short Articles on the Various Types of Antennae and Their Uses

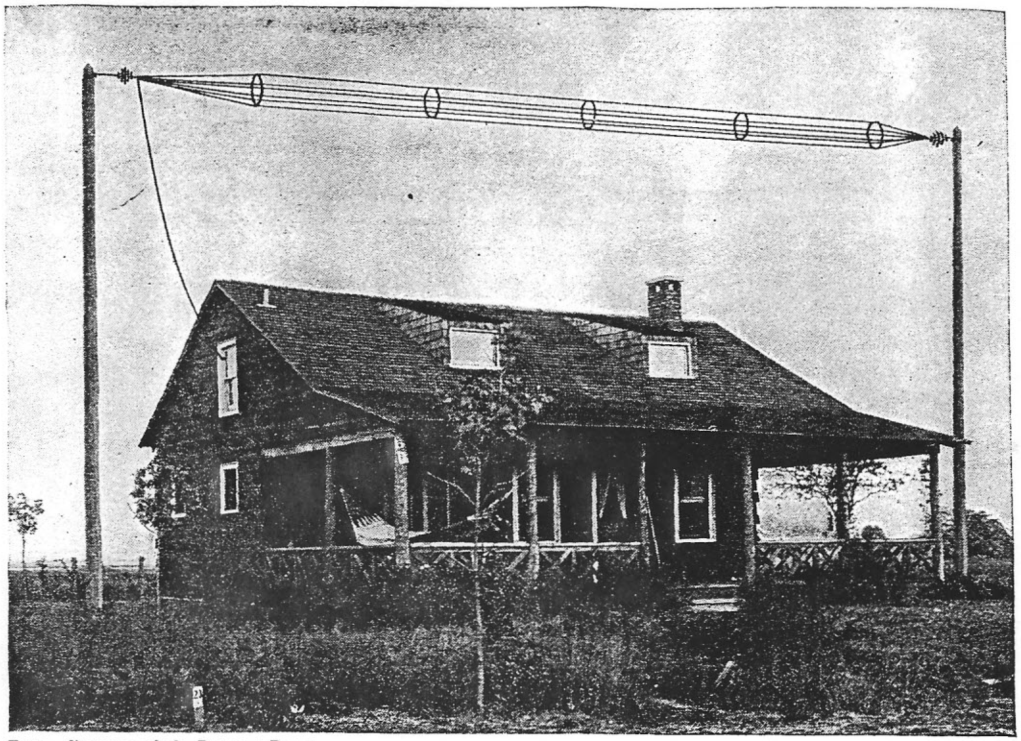
By DAVID LAY

THE inductance of an antenna depends, roughly, on the total of the length of the ground lead and the length of wire from the set to the farthest tip of the antenna. In the case of the inverted L type of antenna this would include the length of the ground lead, the length of the lead-in, and the length of the flat top. This would give a certain wavelength which would correspond to the "natural period" of the antenna.

Suppose, for example, that we should be so located that we could not put up the ordinary 100-foot antenna as used for broadcasting reception, but could put up a longer one, say 150 or 200 feet long. Ordinarily the wavelength or natural period of this antenna would be too high.

If we put up a T antenna of this extra length, (that is, if we should divide the flat top in two, with the lead-in in the center as shown in the diagram on this page), we will have the same over-all length from the ground to the farthest tip of the antenna as in the shorter L type of antenna. This will give us an antenna with approximately the same inductance but twice the capacity. Obviously this antenna would have a lower wavelength than an L type antenna of the same length and would be ideal for transmitting, while at the same time it would be suitable for receiving.

The T type antenna will provide slightly better reception characteristics in the directions in which the two ends of the antenna point, but it will receive well from any direction.



From a diagram made for POPULAR RADIO

AMATEURS HAVE SENT AND RECEIVED TRANSATLANTIC MESSAGES WITH THIS TYPE OF ANTENNA

As the amateur is limited to transmission or low wavelengths a highly efficient antenna is a prime necessity. This is the best for his purpose.

The Best Antenna for Transmitting

THE CAGE TYPE

The Third of a Series of Short Articles on the Antennae Best Adapted for the Amateur's Uses

By DAVID LAY

THE cage type of antenna is meeting with increasing popularity among the advanced amateurs, especially with those amateurs who are trying to establish new records for transmitting. In view of the fact that the amateur is limited to small power for transmitting purposes, any increased efficiency that can possibly be obtained in the apparatus that he uses is of the utmost importance.

The ordinary flat-topped antenna uses four wires, the outside wires carrying more current than the inner wires; or in other words, the outside wires are worked at a higher efficiency than the inner wires. That this is so is shown by the comparison of electrostatic fields around the different wires of such an antenna. A cross-sectional view of these fields is shown in Figure 1. It will be noticed that the two outside wires 1 and 4 have more lines of force connecting them to the ground than the two inner wires 2 and 3. This of course indicates that there is more current flowing in the outer wires than in the inner ones, and this difference in current can be determined by actual test.

In the cage type of antenna the wires

are not spaced in a plane or flat top but are arranged in a circle, as shown in the diagram in the photograph. In an antenna of this design the currents flowing in the antenna wires are more evenly distributed; even the top wire has the same current as the lower ones.

In Figure 2 is shown a diagram of the electrostatic field that surrounds a cross-section of a cage type of antenna. Notice that all the wires have approximately the same number of lines of force attached to them. In this type of antenna all the wires are worked at the same efficiency.

This type of antenna also gets its increased efficiency because of its tubular shape, for it is well known that the metallic tube is the most efficient conductor of high frequency currents.

In building such an antenna it is advisable to cut the wires the correct length and lay them on the ground. If a six-

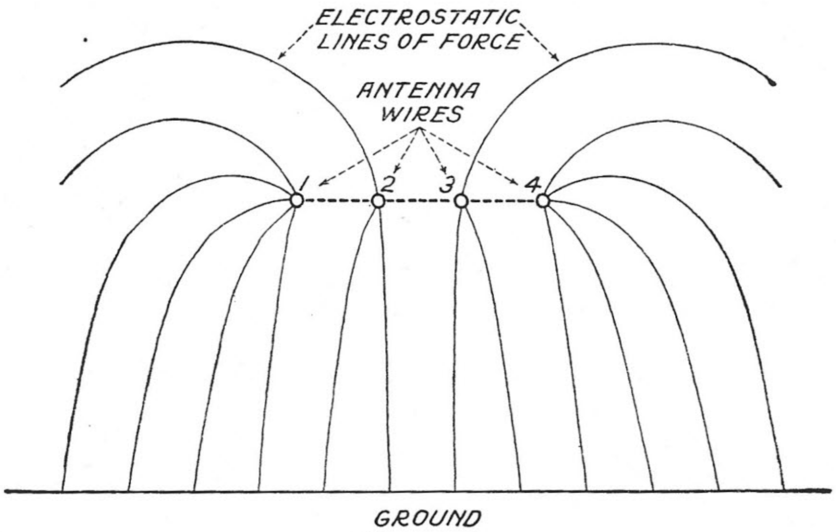


FIGURE 1

The potential gradient around the end wires 1 and 4 in a flat-top antenna is much greater than the middle wires 2 and 3. This is evidenced by the crowding of the electrostatic lines of force around the outer wires. In other words, the two outside wires do most of the work and the top side of the antenna does hardly any work at all.

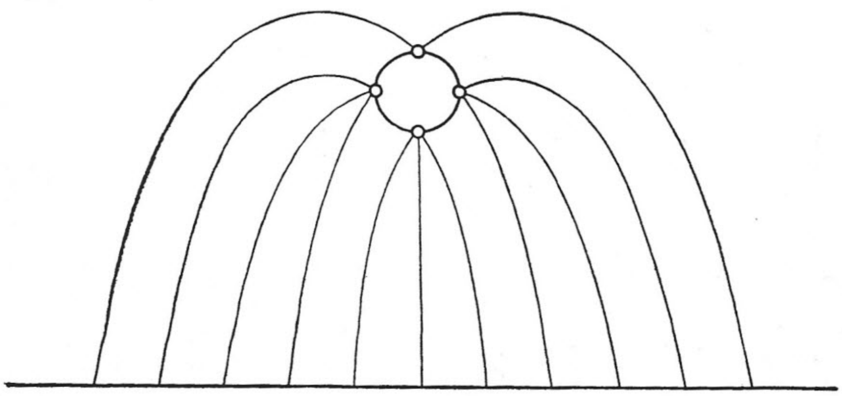


FIGURE 2

In the cage type of antenna, however, all the wires have practically an even chance, and each of them presents a much greater effective radiating surface than in the arrangement shown in the upper diagram.

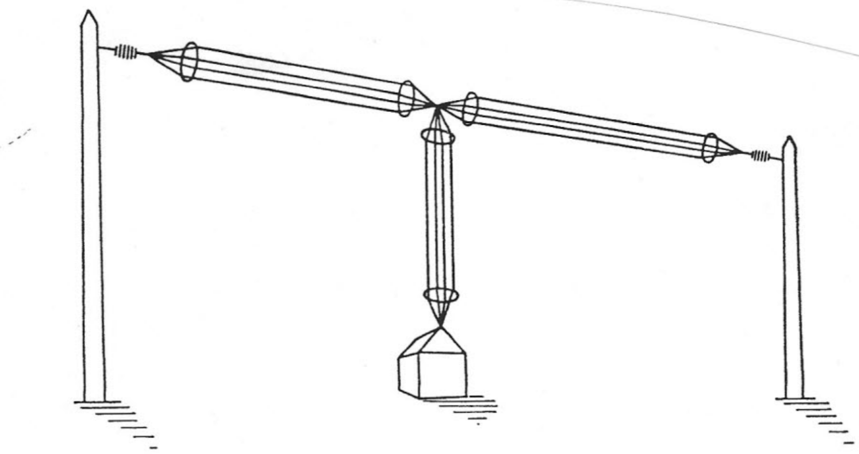


FIGURE 3

The cage antenna may be used as a T-type by building three small cages, using two of them as the horizontal part, with the third cage fastened between them and serving as the lead-in.

wire cage is to be built, six lengths are cut and stretched out along a flat piece of ground and one by one they are fastened and soldered to the supporting loops. These loops can be made of No. 00 hard copper wire bent into a circle one foot in diameter and soldered. There should be a loop at every 15-foot distance along the antenna. Thus for a 75-foot antenna, six loops will be required, including the additional loop at the end. Each loop should be marked with a file into six sections so that the wires can be attached and soldered in such a way that the position of each wire will be exact when the cage is hoisted into place

At the ends of the cage the six wires should be joined together and fastened to a long 22-inch insulator, to the other end of which is attached the supporting cable.

The cage antenna can be used as an inverted L type of antenna (see diagram on photograph), or as a T-type antenna. In the case of the inverted L-type, the lead-in is connected to the end of the cage; in the case of the T-type two smaller cages are used with the lead-in fastened between them as shown in Figure 3.

The lead-in may also be constructed in the form of a cage. The loops for the lead-in should be 8 inches in diameter, instead of one foot.

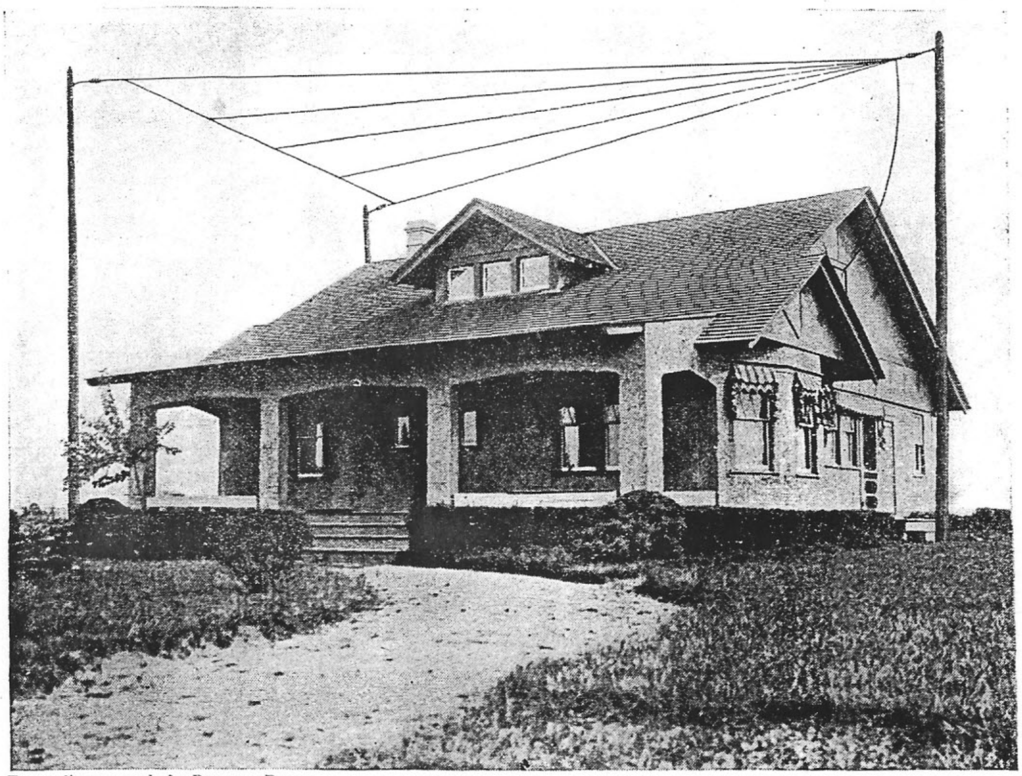
The Public Benefit of Good Broadcasting

To the Editor of Popular Radio:

"I heartily approve of your proposed plan to broadcast good music and valuable information from the great centers of New York and the country. I see no reason why this should not be done, especially as the expense of doing it is now relatively small and the public able to benefit by it is large."

Edward R. Hewitt

Treasurer, Cooper Union



From a diagram made for POPULAR RADIO

THIS AERIAL COSTS ABOUT $11.00—WITHOUT POLES

Usually the wires are attached to trees or buildings, in which case there is no cost for antenna supports. The wire costs about $9.00 and the three insulators about 50 cents each.

An Inexpensive Antenna *for* All-Around Use

NO. 4; THE FAN TYPE

By DAVID LAY

THE fan-type of antenna may be used for either transmitting or receiving. It is rigid in construction and therefore especially suitable for use where the location is swept by strong winds, as there are no heavy spreaders used in its construction.

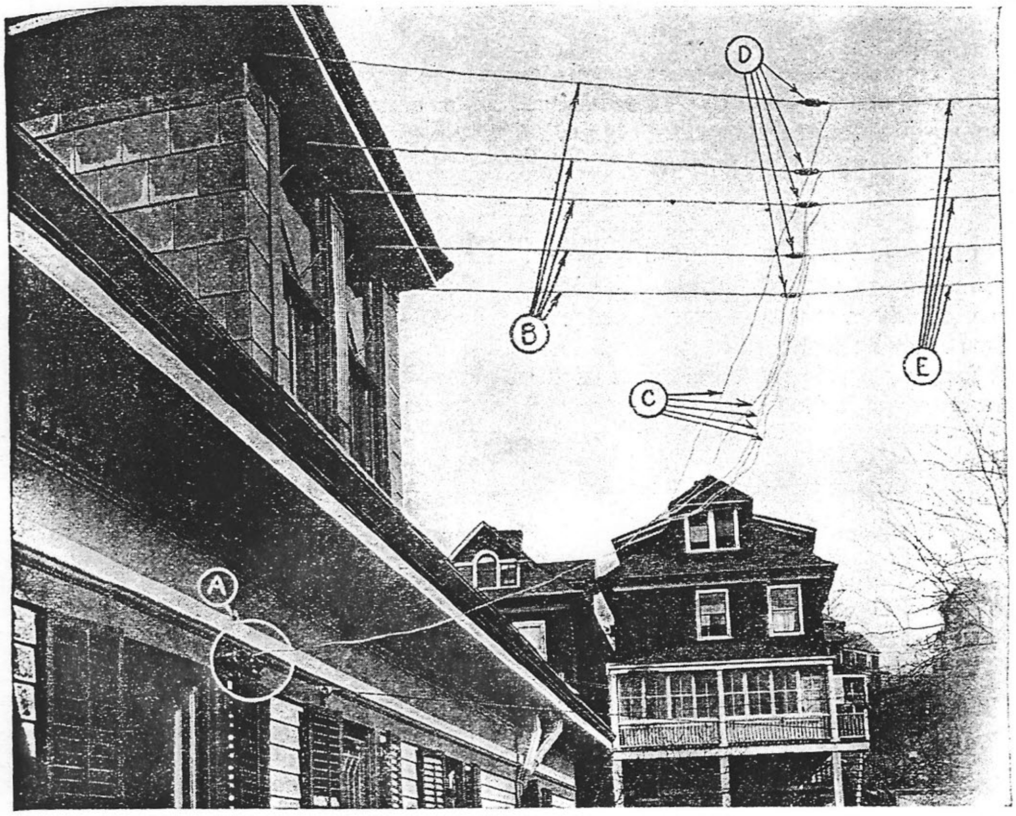
This type of antenna is less directional than the ordinary flat-topped antenna and for this reason is suitable for long-distance work in all directions of the compass.

The wider the fan is made, the less directional will be the reception or transmission. With a fan of 90 degrees the efficiency will be found practically equal in all directions from the station.

The support for the antenna consists of three masts (or other elevated structures) as shown in the above diagram. One of these masts is located at the lead-in end and the other two masts support the far end; these latter two supports are connected by a wire, to which is attached the ends of the three middle wires. The wires are all joined together and soldered at the lead-in end.

Only three insulators are necessary and no guy wires are used.

This type of antenna is simply constructed; it is efficient and at the same time economical in cost.



THE LEAD-IN END OF A WELL-CONSTRUCTED ANTENNA

A is the lightning switch; B the supporting wires; C the lead-in wires which are joined together to form a common lead-in; D the insulators and E the antenna wires that run to another set of insulators and supporting wires or ropes. It will be noted that the antenna is placed out from the tin roof of the house a distance of at least fifteen feet; this is done by lengthening the wires or ropes B.

Pointers *for* Building Your Aerial

By FRED WOODWARD

AERIALS are the ears and mouth of a radio station. Their position and the way they are hung materially affect the distance from which the radio waves may be received.

The ideal location for an aerial is a low, bare hill, as far as possible from other tall objects such as trees, chimneys, telephone wires or tall buildings.

But these perfect conditions are seldom, if ever, encountered at the particular place at which you are obliged to erect the aerial. In this article, therefore, we will assume that the site of your proposed antenna is the only kind that most often may be taken advantage of—the roof. Two convenient objects to which you can attach the supporting poles are a chimney and the covering to the door leading to the roof. Steady these poles with guy ropes fastened to the coping of the roof or to the roof top itself.

If the aerial is to be a comparatively short one, copper wire will do for the purpose. However, copper wire has a tendency to stretch, so that if you are lucky enough to be in the position to have an antenna at least 100 feet long a copper-covered steel phosphor-bronze wire would best serve your purpose. As high frequency currents travel mainly on or near the surface of the wires, it is possible to use a steel wire covered with copper.

Be sure to properly insulate the lead-in wire where it passes over the edge of the roof. In order to keep this lead-in as far as possible from the front of the house, carry it from the roof to the end of a six-foot flagpole projecting from the window through which you bring the antenna wire into the house or take off your lead-in joint a little distance from the end of the aerial. See that the insulators on your aerial are strong enough to withstand the strains of supporting the aerial in all weathers.

The flat topped aerial, as shown in the illustration on page 109, is better than the single wire aerial in cases when a great height cannot be obtained.

Remember that all flat topped, or horizontal forms of aerial possess a "directive" tendency. It is advisable, therefore, to have the end of the aerial at which the lead-in is fastened pointing toward the broadcasting station from which you expect to do the most receiving. A good antenna is half the battle.

DON'TS

DON'T try to master radio all at once. Begin with the simplest things and work up.

* *

DON'T hesitate to ask questions. Ignorance is no disgrace and dealers and manufacturers are glad to give advice.

* *

DON'T expect to have as little trouble in summer as in winter. Static is far more troublesome in warm weather than in cold.

* *

DON'T listen to the advice of beginner friends who know no more than yourself.

* *

DON'T forget that radio is simple but that common sense is as necessary as with anything else.

* *

DON'T forget the importance of little things.

* *

DON'T be in such a hurry to try your set that you skimp things and make slipshod connections.

* *

DON'T try to drive tacks or nails into Bakelite or hard fibre. Drill holes and use screws.

DON'T forget that the wires on a coil may be kept evenly spaced by winding cotton twine between the wires.

* *

DON'T run wires parallel when making a set.

* *

DON'T try to ground a set on an indoor electric light or bell circuit.

* *

DON'T forget that the positive pole of the "B" battery is connected to the plate circuit of your tube.

* *

DON'T forget that if the tube looks blue you have too much "B" battery.

* *

DON'T forget to mark the adjusting knobs or handles when you get the set tuned to a certain station. It will save time in picking it up next time.

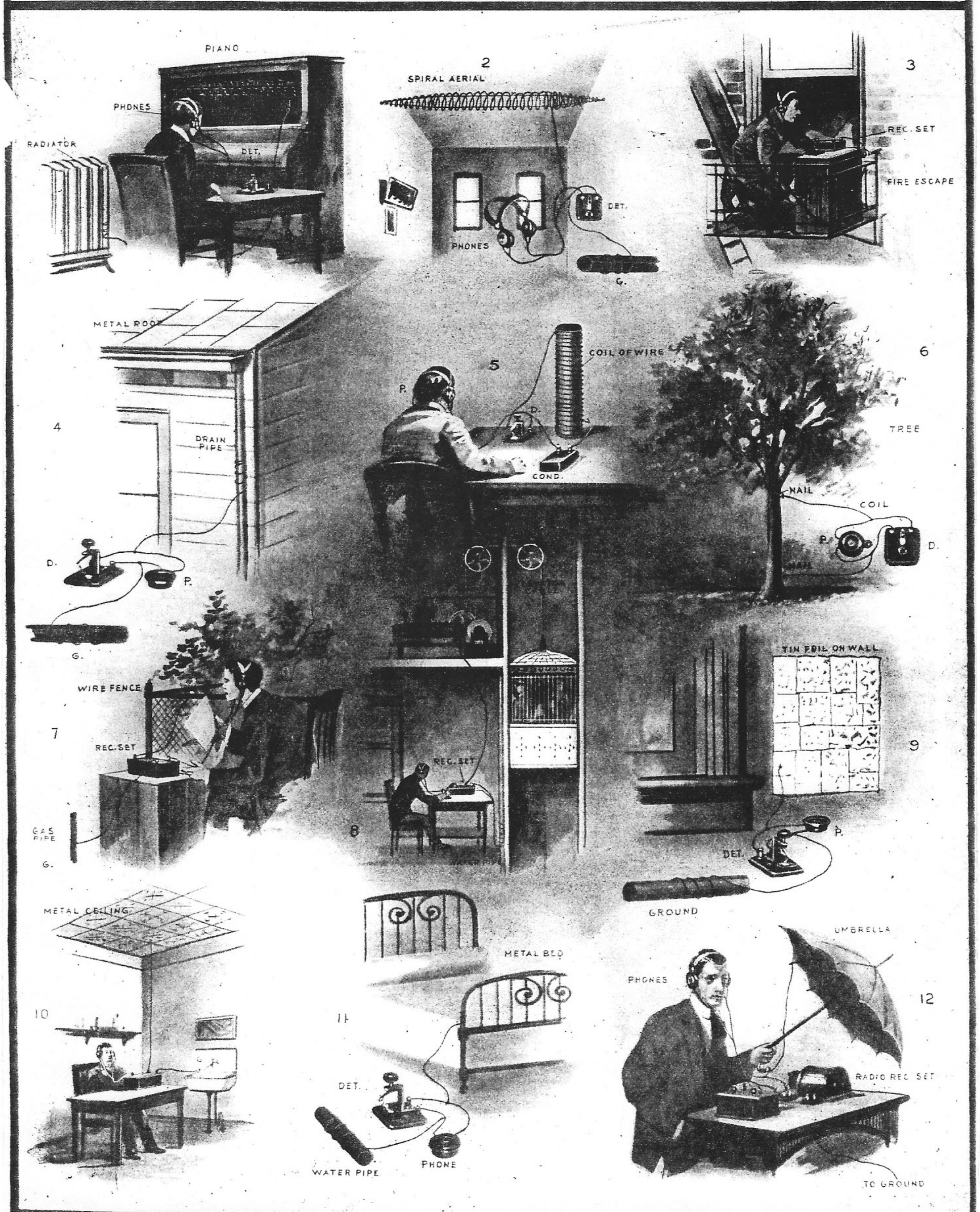
* *

DON'T fail to learn the dot and dash code. You will get far more pleasure from your set if you can read them.

* *

DON'T get wires tangled and snarled. A kink in a wire will cause it to crack or break.

RECEIVING WIRELESS MESSAGES WITH ODD AERIALS



Look for the Antenna?

When I found the National Company ad on the opposite page, I was immediately struck by the message – Look for the Antenna. Though I laud the patriotism expressed by National, as explained by General Horner "Look for the Antenna" has taken on a whole new meaning in modern warfare.

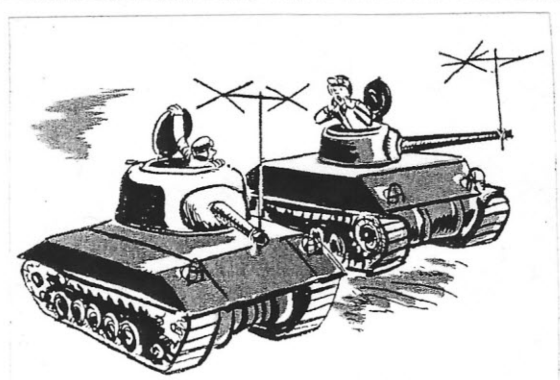
Referring to how he would use the forces at his disposal to defeat the Iraqis, General Chuck Horner had this to say about disrupting command and control:

> "Find enemy headquarters – probably a group of tents or command-and-control vehicles (armored personnel carriers – APCs – ***loaded with antennas***). This is an attacking army, so it has no bunkers. They have to talk. They have to use radios or ground lines. Either way, you'll know it. Without communications a commander can't control anything. (He can use runners or carrier pigeons, but the bandwidth on those is very low).
>
> When you hear them talking, you can do four things:
> (1) listen but otherwise leave them alone, so you can disrupt their attack plan;
> (2) jam them and so deny communication;
> (3) voice over them and deliver the wrong communication ("Sadam Hussein here. I want you to change your direction of attack. Go north. Got that? North.");
> (4) or bomb them (1:20).

Though National's message may have made sense when it appeared in the mid-1940's, it would seem rather ironic to today's tacticians.

End Notes:

1. "Every Man a Tiger," Tom Clancy with General Chuck Horner, (1999: G.P. Putnam's Sons, New York).
2. National Company Ad *Radio News* June, 1930 pg. 231.
3. Tank cartoon *Technician,* March, 1954, pg. 25.



"Ya mind holdin' off the enemy until this program ends?"

PHOTO BY U. S. ARMY SIGNAL CORPS

LOOK FOR THE ANTENNA

Radio equipment has become the symbol of the modern instrument of war. The fast action, quick decisions and perfect coordination of today's war of movement demands perfect communications, and radio provides communication "on the move." We are proud of the part that National Radio Equipment is playing.

NATIONAL COMPANY, INC. MALDEN, MASS.

Shield Insulators

By Dan Howard

The air pocket insulators that we've looked at previously[1] have always been a favorite of mine due to their unusual design. The long, ribbed porcelain hood on the insulators adds length to the leakage path (and also adds considerably to the weight of the insulator).

Though the air pocket design was apparently not patented, two other designs for shielded insulators were granted in 1929.

The first (1,706,987), filed by Oscar Schaffler of Detroit, MI, is a thru-wall insulator according to the written description. However the illustration makes it appear like a strain insulator.

The second (1,707,054), *filed on the same day*, by Otto Doelter of Monteray, CA, is very similar in appearance but is described as a strain.

Though both of these designs were patented, I've never seen examples of either style of insulator. So, were insulators of this type ever made? Were these truly novel ideas?

Seven years earlier, in October, 1922, this ad from Prather Brothers appeared. Although the ad leaves many details to the reader's imagination, I could speculate that, at this early date, the item could have been made from Electrose, porcelain, or hard rubber. The screw-eye type connection would have been typical of any of the materials. Note the huge size of the insulators (7" in diameter and 11" long)! Note also how the design is roughly similar to the all-porcelain air pocket strain insulator.

So yes, shielded insulators were apparently manufactured and sold. And no, the shielded insulator was not a new idea when Schaffler and Doelter's patents were granted in 1929. Apparently the pending patent mention in Prather Brother's ad was not granted, or was dissimilar in some way from the claims filed by the others.

This is the only ad that I have from Prather Brothers, and I have little else to share about the other designs. Do you have a Prather, Schaffler, or Doelter shielded insulator? Can you share any details about its construction? Please let us know.

Sources:

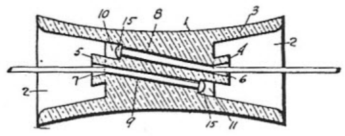
Prather Brothers ad, *Popular Radio* 10/22 pg. 18.

U.S. Patent Gazette March 26, 1929 pg. 939 and 953.

[1] Please see *OFS* April 1996 pg. 12, June 1996 pg. 12, October 1999 pg. 19, June 2001 pg. 14.

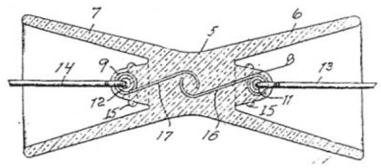
1,706,987. ELECTRIC-WIRE INSULATOR. OSCAR SCHAFFLER, Detroit, Mich. Filed July 18, 1927. Serial No. 206,488. 4 Claims. (Cl. 173—28.)

1. An electric wire insulator adapted for installation within a building wall for insulating electric wires therefrom, comprising an elongated shell casing made of suitable insulating material, said casing having a conical recess formed in each end thereof, substantially par-



allel open channels formed through the body of the shell opening into each of the said end conical recesses, said channels being positioned within the body at an angle with the axis of the shell.

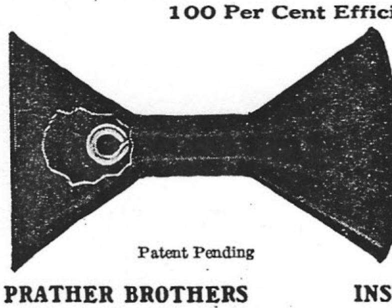
1,707,054. INSULATOR. OTTO DOELTER, Monterey, Calif. Filed Mar. 17, 1926. Serial No. 95,417. 1 Claim. (Cl. 173—28.)



In an insulator, a body portion having flared bell shaped extensions formed thereon, said extensions extending in opposite directions from each other, a projection formed in each of said bell shaped extensions, reinforcing member embedded in said body portion and having an eye extending into and embedded within each of said projections, and surrounding an eye formed in each of said projections and drip rings formed on each of said projections at a point substantially midway between said last named eyes and the body portion for the purpose specified.

THE LATEST IN RADIO—SHIELD INSULATORS

100 Per Cent Efficient Under All Weather Conditions



Patent Pending

An expensive Radio Set with all the equipments that you can buy means nothing if your aerial isn't properly insulated.

Insulators without shield protection have a line losage from **DEW, FOG, FROST, RAIN, SNOW and SLEET.** There is not another Insulator on the market that snow and sleet wouldn't short and put the line out of commission. Equip your aerial with shield Insulators and have your aerial current the same under all weather conditions. The aerial and Insulators are the heart of the set. The BIG SHIELD INSULATOR insulates so completely that they help to relieve static in summer time.

Buy from your dealer; if he cannot supply you, order direct from factory. Send cash with order to save delay.

Mr. Dealer, write for Dealers' Discount, give your customers the best that is going; you owe it to your customer to see that he gets these Insulators and make his aerial 100 per cent efficient under all weather conditions. Discount allowed to dealers only, buying five or more sets. **Insulators 7x11 In., per set $5.50**

PRATHER BROTHERS INSULATOR DEPARTMENT GEORGETOWN, KY.

What is it?

Though these unusual cross-connect (center) insulators are not that rare, if you've not seen one in use before it might take some sleuthing to figure out what they were for.

Among other styles of antennas, large "double-doublet" antennas are often used for lower frequency communications. As shown in "How to Install an All-Wave Antenna" (pg. 21), a doublet antenna typically has two wire "legs" with an insulator in the center. A double-doublet is essentially two doublet antennas that are joined in the center to a common feedline. With its four legs, one double-doublet style antenna can be used on two (or more) ranges of frequencies, making it very efficient. As described on page 26, RCA's Spider Web "multiple doublet" antenna was advertised as covering all frequencies from 140 KC to 23 MHZ!

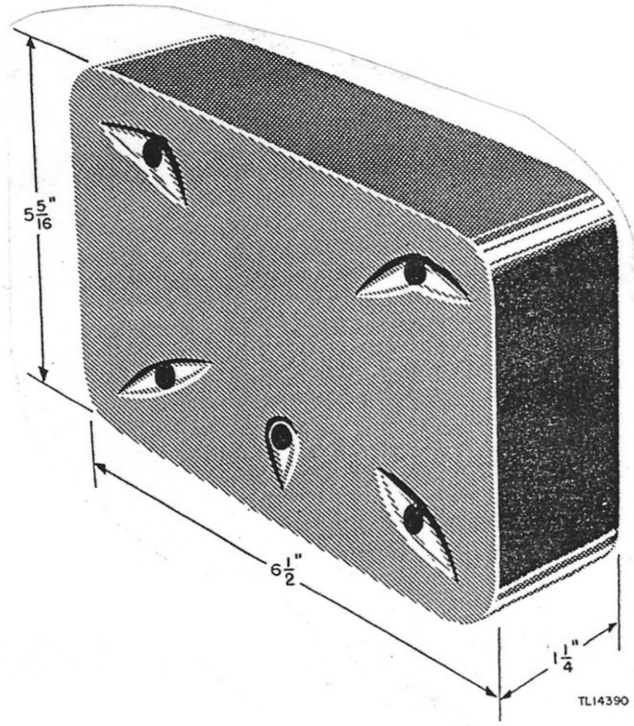
Our "What is it?" insulator is a specialized center insulator designed for use with a military double doublet antenna system. As shown below, four holes are attachment points for the legs of the antenna. The fifth hole serves as a strain-relief point for the feedline from the radio set.

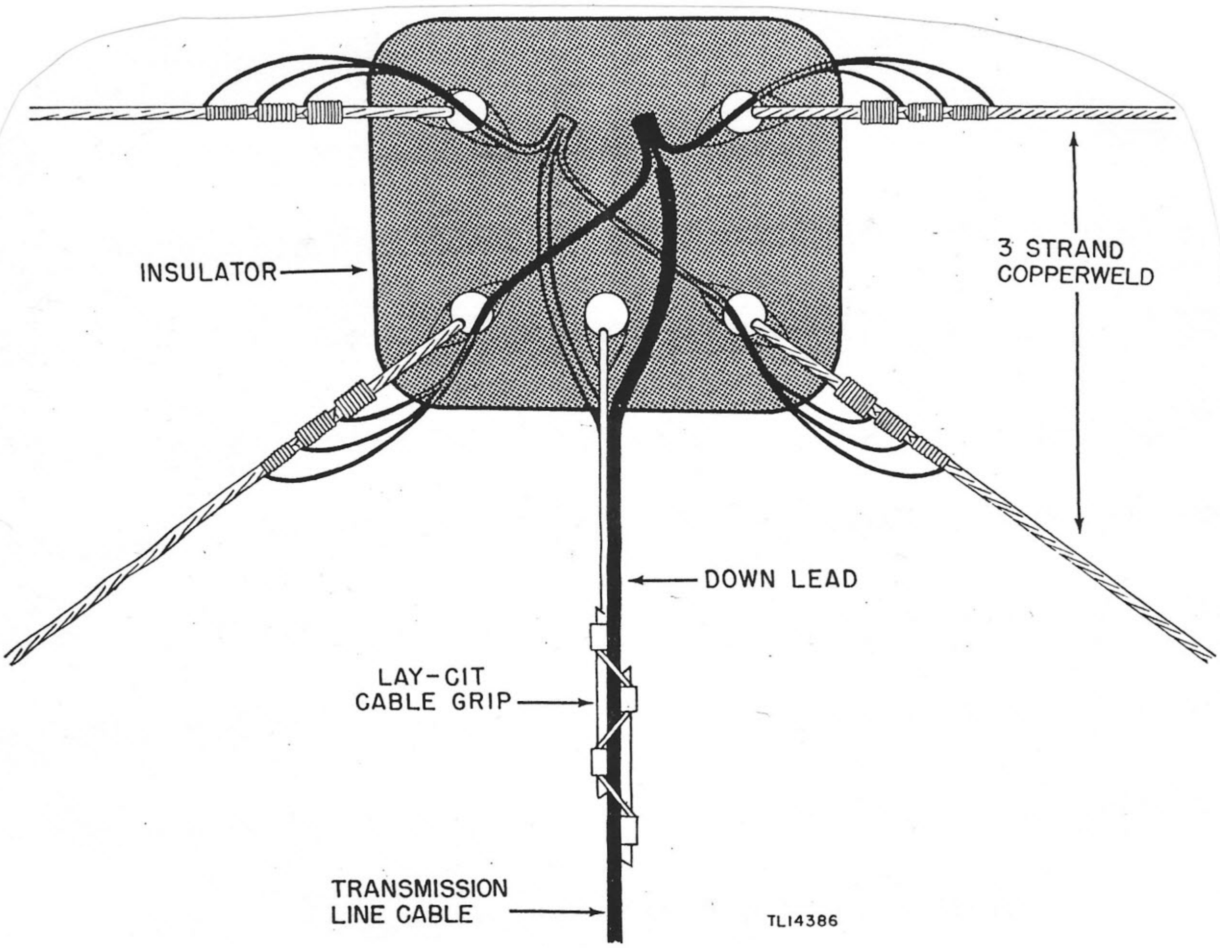
I have had several of these insulators over the years. All have been heavy porcelain with a mahogany-brown glaze. At 5-5/16" high, 6-1/2" wide, and 1-1/4" thick, these insulators are surprisingly heavy – of course they have a big job to do. None of my examples has been marked with a part number or manufacturer's marking.

These illustrations are from TM11-2629 "Antenna Kit for Double-Doublet Receiving Antenna" dated 25 November 1944. In the Maintenance Parts List Appendix, the insulator is described as a "cross connect" insulator and is listed with a Signal Corps stock number of 3G1100-104.3.

Friends tell me that these insulators were used through the war in Viet Nam and I expect that they are probably used today.

As I mentioned at the start of the article, unless you've seen one of these in use, you may have a hard time identifying just what it was used for. A few years ago I picked up one of these at a local junk store. According to the helpful owner, the insulator was part of a propriety power-supply system at a local dairy. The junk dealer went into quite some detail about how this was used to supply power to the milking machines. No doubt the farmer either brought the antenna insulator home from the war or found it a surplus auction. Whether it's a military cross-connect insulator or part of a milking system, this unusual item is sure to generate lots of comments (and questions) from visitors to your collection.


5 5/16"
6 1/2"
1 1/4"
TL14390


INSULATOR
3 STRAND COPPERWELD
DOWN LEAD
LAY-CIT CABLE GRIP
TRANSMISSION LINE CABLE
TL14386

Show Reports

The NARC Radio Meet

Plymouth, MN

May 18-19, 2001

reported by Phillip Drexler

The NARC radio meet in Plymouth, MN on May 18 & 19 was very quiet. Attendance was less than in past years (both buyers and sellers) and I did not see any radios I needed to bring home. I found two Johnson stand-offs (white - $1.00 each), a No. 20 and what looks like the top half of a No. 46 thru-panel insulator. I also found a Fleron stand-off with an rather odd silver-black glaze ($5.00).

I went to look at a radio collection that was being sold by the owner. It turned out that he had sold all the good radios before he called me, but I came home with two great items – one was an unmarked, dark purple strain – very similar to a Brach strain, and the other was a DeJur airgap (visible) arrester in the box.

The purple strain is about the same length as a Brach at 3-1/2", but both the two large ribs and the inner three small ribs are smaller than the Brach. The inner three ribs are not the same size – the middle one is larger than the other two.

The 5th Annual Greater Portland Swap

Portland, OR August 11th, 2001

reported by Dan Howard

We had great weather and an even better turnout for this annual swap in my parent's back yard. **Gil Hedges** and **Robin Harrison** were both on vacation during the show and both were missed. **Tim Woods** made a surprise entrance. Though most people just show up, Tim had contacted me before the show and apologized for having a conflicting engagement. It was great to have him show up, having juggled his schedule to do both. The feedback that I read on the ICON bulletin board indicates that I'm not alone in my opinion that a good time was had by all. I don't recall finding any new insulators or arresters but the great socialization more than made up for it.

The PSARA annual Swap & Sale

Seattle, WA

August 19, 2001

reported by Dan Howard

With my folks on a car trip, I didn't have anyone to share hotel expenses with at this year's PSARA show in Seattle. So a buddy from Seattle agreed to park his 5th wheel trailer overnight in the parking lot where the swap was to take place. Now that was fine, well sort of. I rolled into town Saturday afternoon with time to spare. But I noticed, as I got closer to the show site that there were signs about road closures and some kind of community pride event. Turns out that there was to be a community-wide parade/block party with the whole works ending up in "our" parking lot that evening. Well I pulled in next to Gil's trailer and we "hunkered down" whilst the parking lot filled in around us with fire fighters, politicians giving speeches and kissing babies, teenagers doing what teenagers do these days, a full-fledged carnival, and on and on. Though the parking lot was so full we couldn't have driven anywhere to get dinner, dinner was really no problem at all. The firefighters and several other groups had barbeques set up nearby so dinner was waiting literally right outside our door. We wandered through the booths a few times picking up the free ball points and refrigerator magnets from the local realtors, PTA, etc. The music, which included a rock music venue, a country music stage, and the high school marching band, provided a pleasant (and quite eclectic) backdrop for our evening. We swapped lies in his spacious trailer until the crowd thinned around 10:00 p.m. However, with the lingering crowds and parking lot noise, a restful sleep really eluded me until around 4:00/4:30 (a.m.) when the first of the radio club vendors arrived and the door slamming began again in earnest. What can I say??? Gil and I both found a few new items – in my case a few insulators and a radio parts catalog or two. Will I be back next year? Well of course. And if the free entertainment is missing, well the show just won't be the same.

The Antique Wireless Association 40th Annual Reunion

Rochester, NY

September 5-8, 2001

reported by Dan Howard

The AWA reunion in Rochester, NY was outstanding once again. **George Freeman** prepared a Fields radio display that was fully worthy of the blue ribbon that he won. Traveling by plane limited my options for bringing a display but I enthusiastically participated in the large outdoor swap meet. George and I ended up in adjacent spaces in the far corner of the Mariott's parking lot. Though my sales may have suffered from the out of the way location, it was a perfectly adequate base from which to shop. George found an outstanding 1930's vintage microphone for his soon-to-open Ralogium radio museum. George is a real gentleman and I enjoyed seeing him again.

I helped myself to some of the many insulators and arresters that showed up. One vendor beat me to several boxes of parts, only to set the boxes out for sale at his own space. I don't know exactly what he was seeking from the boxes, but the arresters that I purchased from him were very reasonable. I heard about what may have been a Barkelew fuse-type arrester but I never saw the unit. I did purchase a pair of Keystone Type A radio arresters (see *OFS* 12/99). That completes my collection of Keystone lightning arresters. And, in separate, purchases I found both the two-post and three-post glass Brach arresters.

You just never see those for sale. Several cobalt blue porcelain arresters came my way. And I found a new style of insulator that is a cross between a strain and an egg insulator. Perhaps I'll get a picture of it in print some day. Paper was in abundance and I added several catalogs to my reservoir of pending article ideas. I was waiting on a friend so I didn't get my insulators out for sale early enough to do much good. But I suppose that I'm just as happy to have the new ones.

Dad and I spent the days before and after the convention doing genealogy and putting miles on the rental car visiting antique shops. They have very fine large outdoor flea markets in western New York. But from the dealer's stories, it is clear that I'm not the first insulator collector to discover them. Regardless, the number of vendors and the quality and selection of merchandise was outstanding.

On my trip two years ago I discovered antique lightning rods. We don't have enough lightning here to warrant putting them up. In western New York, you see lightning rods on homes and barns everywhere. After we got home last time I made up my mind to try to find a rod to bring back. It wasn't until our next-to-the-last day on this trip that I finally found a rod to by. The dealers just laughed and assured me that I wasn't the first to ask. Finally, in a little village south of Rochester, I found a Kretzer star pattern rod leaning against the wall in an antique shop. The tripod was complete with Kretzer brand insulators and the bayonet-style top was in beautiful shape. I didn't get a glass ball with it, but I suppose that I'll find one some day. Taking a 72" rod home on the airplane turned out to be interesting. We started with a length of 3" PVC and some foam pipe insulation. After capping the ends of the pipe we were in pretty good shape except for the tripod stand. Taking a quick trip back to the AWA fleamarket parking lot (now only empty parking spaces and litter), we picked up a good-sized rectangular box that had been abandoned. A few miles of tape and a goodly number of zip ties (also a flea market purchase) later, we had the tripod padded and wrapped and joined to the PVC pipe. (We had to join them together to get under the checked baggage limit of 2 pieces). Fortunately the Continental clerk at Buffalo was in good humor as we checked in and took it all in stride. We deplaned on the tarmac in Newark and I happened to look back as the baggage handler was transferring the rod from the hold of the jet to his baggage cart. What a joke watching him struggling to fit the 7' rod package into his 5' baggage cart. But nothing got lost or damaged and the rod is now safe here in Portland. As my Dad might say, I'm probably the first on my block....

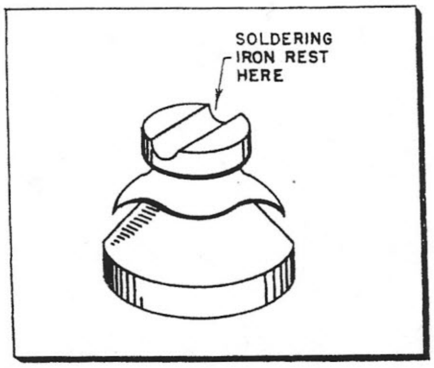
Another item that was tough to pack was the Superball antenna that came my way at the AWA. So it has a few small dents – well who doesn't? Now you may recall from our previous articles (*OFS* 4/01) the superball antenna is nearly 12" in diameter. Let me assure you that it would take a far better man than me to make a 12" ball antenna fit through the approximately 9" tall door in the overhead storage bin. The hop in the small jet between Buffalo and Newark wasn't a problem – the flight attendant stashed it "somewhere" up front for me and I picked it up on the way off the plane. I figured that the BIG jet that we flew between Newark and Portland would have BIG overhead bins, right? Wrong. Son of a gun, they have 9" openings in the storage bins on big jets as well. That flight was full-to-the-gills so my antenna ended up under the plane in a box that was fine for carry-on but really not up to the destruction derby in the baggage hold. However, as far as I can tell, it came through with no more dents than it had when I turned it over to the capable hands of the flight attendant. Though it may not be mint, it's great to add the unit to my collection.

Put Those Spare Pin Insulators to a Good Use

The following article appeared in the "Shop Hints to Speed Servicing" column of *Technician* magazine. (January 1954 pg. 35) I got a chuckle from it. You may wish to make a few copies for your friends that collect pin type insulators

Stable Solder Iron Rest

Some rests for soldering irons on the market, and almost all of those made by the home constructor, have a tendency to get hot and burn the insulation from test leads which accidentally touch them. Some of these stands, especially the wire types, have a tendency to tip, spilling the hot iron on schematics, etc. An excellent stand which doesn't heat up and which is very stable is an old



insulator of the type used on telephone poles (see sketch). The depression in the top serves to hold the iron in a natural cradle, and the flanges serve to make an efficient radiator. The porcelain types seem to work the best, although a glass unit may be used. The insulators can be obtained anywhere the telephone company is replacing chipped insulators, or they may be purchased at any electrical wholesale store for a few cents each.—*John A. Cooley, Washington, D.C.*

New Military Marking

My dad recently found some military strains with a new military marking – CBY.

According to F W Chesson's article, the marking was assigned to Aircraft Radio Corp. That seems quite appropriate since the insulators th... we found were probably specifi... use on a World War II vintag... airplane.

New Email a...

Jeff Hogan's new ... mudhogan@mr...

Long-... chard Dawson join... ortly after the NIA W... Richard has a fine ...

Ric... awson
2243 ... ark Ave
Long beach, CA 90812-2522
(562) 597-7066.

New Address

Chris Lee
262... thrope Way
L... lle, GA 30044-7200

...liography

...s of articles from *Popular* ... appeared in the following ...es:

"The Simplest Receiving Antenna" – *Popular Radio* 9/22 pp. 59-61.

"The Most Popular Transmitting Antenna" – *Popular Radio* 11/22 pg. 189.

"The Best Antenna for Transmitting" – *Popular Radio* pp. 272-274.

"An Inexpensive Antenna for All-Around Use" – *Popular Radio* 1/23 pg. 31.

"Pointers for Building Your Aerial" – *Popular Radio* 2/23 pp. 109-110.

This Month's Cover

The cartoon on this month's cover originally appeared in *Radio News* (June 1927 pg. 1479). Entitled "A Choke Coil," I feel that it is a great lead in to this month's feature on antennas.