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Everybody's 5¢ RADIO

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Technical Advisor

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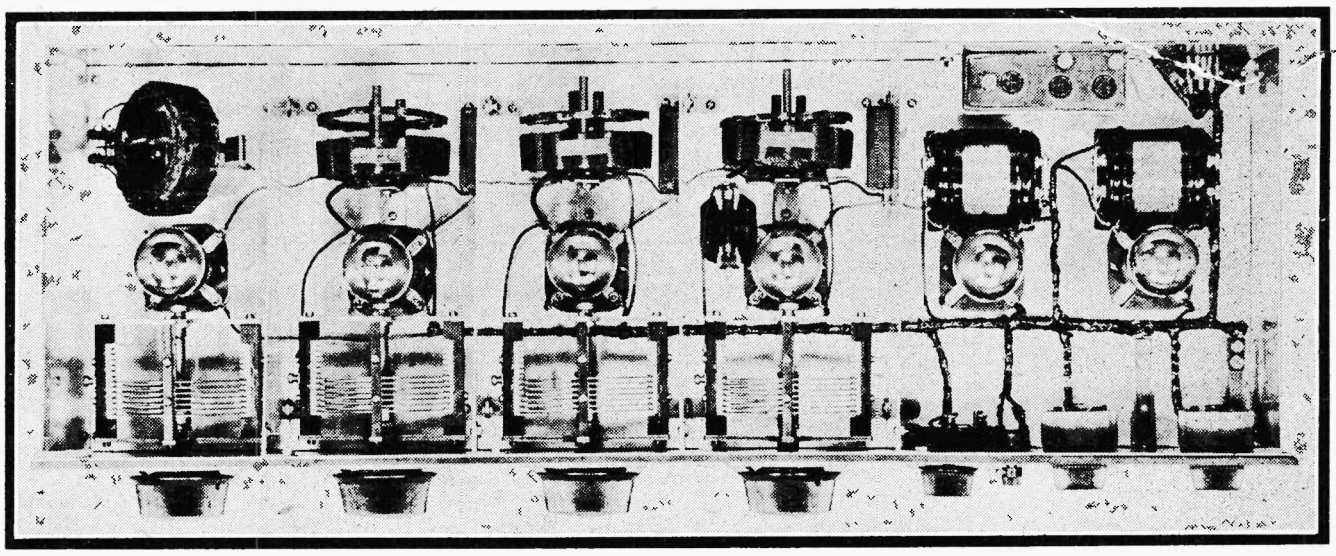
Selectivity with Three-Stage Tuned R. F.

Requirements for Tuning Them Out Lies in the Shielded Compartments of the Set

Pickup in Coils Eliminated with Use of Shielded Divisions of Aluminum



This picture shows the chassis of the six-tube Lossless in which all of the radio frequency transformer coils are enclosed in separate bins or compartments with their tubes and tube sockets. There is no chance for strays to enter the coil and cause it to pick up waves not intended for it. The results are that we get selectivity, tone and distance on increased amplification

WHAT is believed to be the most selective, long-distance receiver of the multitude type, considering quality of tone, as well as simplicity of operation, is offered this week in the model illustrated and described in these columns. It is Model No. 3 of "Everybody's Three-Stage R. F. Lossless" hookup. It should and, we believe, will serve efficiently under the most exacting conditions.

The receiver was not designed for popular favor. It costs too much in time, labor and materials to make it a receiver that everyone will want. But, wherever there is a local condition in a congested section like Chicago, with a powerful radiocasting station close by to interfere and persist in interfering, this receiver will come nearer solving the problem than anything we know of.

The hookup used is the standard "Lossless" circuit. Under most every condition the standard five-tube model suffices. With the extra stage of tuned radio frequency which was shown in Models No. 1 and 2 published recently, extra volume and a slightly increased selectivity was given. In this week's model we have increased the selectivity by the employment of a complete shielding for the entire receiver as well as the individual coils.

There are thousands of radiophans in Chicago and other cities having the same local conditions that live within a mile or so of powerful radiocasting stations. Where these stations are of the low-wavelength type the trouble is still greater. And this is the condition that confronts the Chicago phan.

Most of the Chicago stations that have their transmitting apparatus in the city limits are of the low wavelengths. These are from 217 meters to 302 meters. There are two or three other local stations of higher wavelengths, but these are not in the residential sections and do not cause quite so much interference.

The standard hookups which we publish each and every week in these pages we believe are the most selective that can be devised for normal conditions even in a city like Chicago. Seventy-five per cent of the radiophans will find them sufficient for all purposes, including selectivity. The average phans should be enabled to tune through any of the local stations any night in the week and bring in distant stations without any trouble. The remaining twenty-five per cent, however, will and do have trouble even with the best of parts and the best of construction.

The trouble lies in the pickup qualities of the receivers. Not only does the aerial deliver a station signal, but so do the coils. Each coil acts as a small loop antenna, working independent of the regular aerial.

The interference from this source is increased if the owner of the set is located within a mile or so of a low wavelength station. This is because the coils themselves, having a natural wavelength of their own, and of somewhere around the same wavelength of the offending station, independent of the natural wavelength of the combined coils and aerial, bring in the signal.

While the regular antenna system may be delivering a signal from a 500-meter station and doing it efficiently, the coils themselves will be delivering a still more powerful signal from a closer station somewhere in the neighborhood of 200 or 300 meters. The receiver proper may be sufficiently selective to separate any and all stations, but there is no mechanism so far known that will enable the operator to make the coils themselves perform their part equally as efficient.

There has been a tendency this season to design non-pickup coils. We have had the toroidal type, the "D" or "Figure 8" type and the binocular or twin coil type. The toroidal and the binocular have practically no pickup, but what they gain in that direction they lose in another. Usually there is too much resistance in the coils and they tune too broadly. "Everybody's Radio Laboratories" has tested but one or two of the toroidal types that work efficiently in all points, and even those are not near so satisfactory as other type coils.

The "D" coils, while also being practically without pickup still have more than the toroidals, but they are more selective as a rule. In most localities this type of coil will satisfy.

Still, where there is a powerful local station working on the lower wavelengths, and within a mile or so of operating receiver, the best of coils will not keep out interference.

In these extreme cases there is but one solution—but one remedy, and that is shielding. Shielding, when properly done, will keep out atmospherics and strays, as well as prevent the coils from picking up closeby stations. The shield takes the offending strays and carries them to the ground and thus permits the coils to function as a part of the antenna system instead of miniature loop antennas. The only signal that enters the receiver, therefore, is that which is selected by the tuning of the operator and which comes in through the aerial.

The shielding must not be done in a half-hearted way. Shielding only a portion of the receiver and not all of it will help a little but will not be good enough in the extreme cases. In the model receiver we show this week in these columns we have a design which provides for not only shielding each individual coil and its tuning condenser, but also the completed receiver. The coils, not only are protected from outside interference, but also from interstage coupling. The arrangement is ideal.

No-Pickup Lossless

Cuts Through Interference

THE receiver shown on this page was designed to work in any location that a receiving set can be made to operate in. It won't do the impossible, but will give results that will seem miraculous to many phans.

1 It has the utmost in selectivity. There will be no pickup of nearby locals.

2 It has sufficient amplification (three stages of radio and two of audio) to bring in the most distant station on a loud speaker.

3 It has exceptional tone quality, provided the parts specified are used and the wiring instructions are followed in every detail.

Complete construction details will be given of this wonder receiver in next week's issue. The chassis and pictorial diagram shown this week will give you an idea how the receiver looks.

We are showing the completed receiver, as a chassis only this week. We also are publishing the pictorial and the schematic diagrams. Next week we will publish still another view of the chassis and, in addition give complete construction details. Illustrations of the receiver in various stages of construction will be shown, and particular efforts made to show in picture form, as well as by type text, just how the shielding is made. In the subsequent or following issue we will show the completed receiver in its cabinet and give complete tuning and operating instructions.

While we have used and specified certain parts in this week's model it is not necessary that these specifications be followed exactly. You may use any good coils and any good condensers. The same applies to the other parts. We suggest, however, that parts that have been tested by our Laboratory and specified in these columns from time to time be used. There may be other parts that will answer just as well, but why take a chance?

There is one part that is specified—the variable condenser, which since the model receiver was constructed, photographed and illustrations made therefrom, has been withdrawn from the market. This is the "Crest" condenser. Its manufacture has been stopped. We recommend in lieu of this any of the variable condensers which we have specified in previous issues.

You may have to do some shopping around to get the shielding and the hardware, but we had no trouble in locating what we used in the model receiver. We found it at several of the hardware stores. The Stebbins Hardware Company, in West Van Buren street, is where we purchased our supply. That store cut the aluminum in sheets to our measurement. They, or any other store will do the same for you.

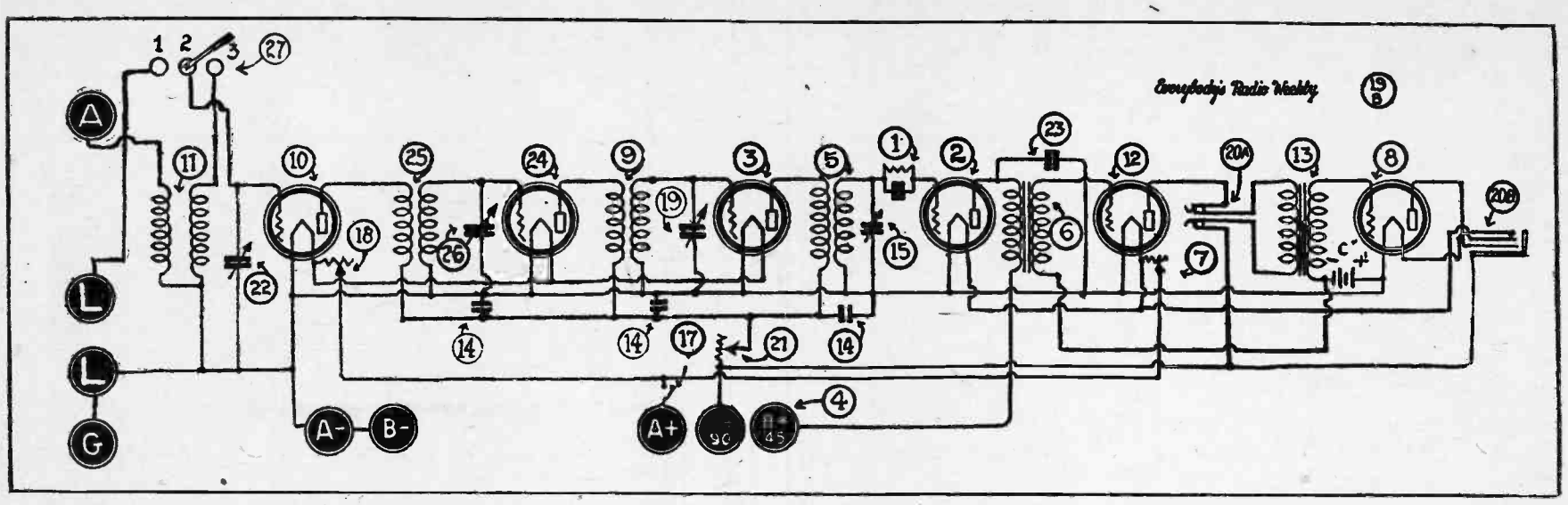
Here is the complete list of parts for the chassis:

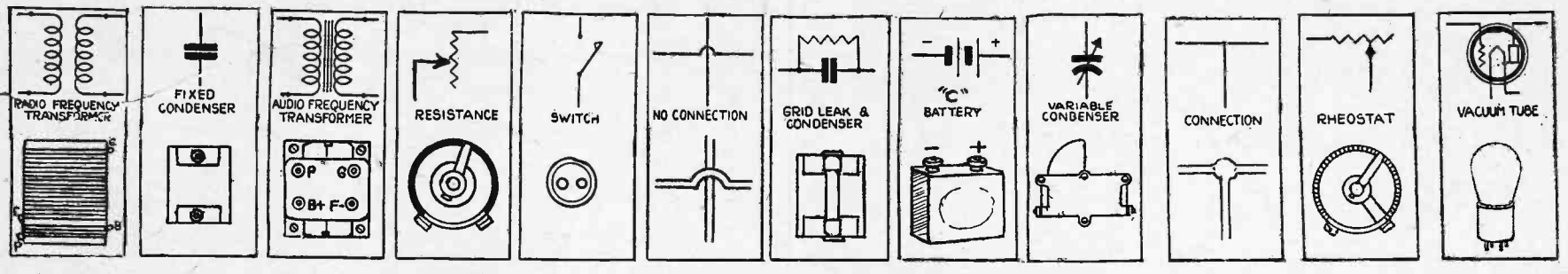
List of Parts Used

Essentials

Fig. 1—Sangamo .00025 fixed condenser, 40c, and Muter 2-meg. grid-leak, 30c ..... $ .70

Fig. 2—Cutler-Hammer socket ..... .60





In the schematic is shown the regular Lossless hook-up which has been used so successfully for more than a year and is of the standard radio frequency circuit. In this is used the coils with little pickup and all are shielded one from the other in the construction of the set, using aluminum for all the walls

Fig. 3—Cutler-Hammer socket	.60
Fig. 4—Jones Multiplug (Type "B M")	4.50
Fig. 5—Gen-Ral Radio frequency transformer for .00025 variable condenser	2.75
Fig. 6—Karas Harmonik all stage audio frequency transformer.....	7.00
Fig. 7—General Radio 10-ohm rheostat	2.25
Fig. 8—Cutler Hammer socket.....	.60
Fig. 9—Gen-Ral radio frequency transformer for .00025 variable condenser	2.75
Fig. 10—Cutler-Hammer socket	.60
Fig. 11—Gen-Ral antenna coupler for .00025 variable condenser.....	3.50
Fig. 12—Cutler-Hammer socket	.60
Fig. 13—Karas Harmonik all stage audio frequency transformer.....	7.00
Fig. 14—Three Muter ½-mfd. by-pass condenser @ $1.10 each.....	3.30
Fig. 15—Crest convertible variable condenser	4.50
Fig. 16-17—Carter "IMP" battery switch	.65
Fig. 18—General Radio 10-ohm rheostat	2.25
Fig. 19—Crest convertible variable condenser	4.50
Fig. 20-A—Carter Hold-Tite jack, No. 104, double circuit.....	1.00
Fig. 20-A—Carter Hold-Tite jack, No. 103, single circuit, filament control	.90
Fig. 21—Central 200,000-ohm modulator	2.00
Fig. 22—Crest convertible variable condenser	4.50
Fig. 23—Sangamo .002 fixed condenser	.50
Fig. 24—Cutler-Hammer socket	.60
Fig. 25—Gen-Ral radio frequency transformer for .00025 variable condenser	2.75
Fig. 26—Crest convertible variable condenser	4.50
Fig. 27—Carter jack switch, No. 3...	1.15
Four Dialog dials, black knob silvered plate, $1.25 each.....	5.00
Celeron panel, 7"x30".....	4.92
No. 18 half hard aluminum cut to size as follows: One front, 7"x30". One back and sides, 7"x49¼". One top, 9¼"x29". Four-stage shields, 6½"x9½". Total for aluminum.....	5.00
Four X-L push posts.....	.60
Hardware, wire, pitch, angle brackets, etc.	1.00
Total for essentials.....	$83.07

By the time you get your parts selected and together we will have next week's issue of the magazine ready for you with the complete construction and wiring details. However, for those of you who feel you can proceed without further help, there is published the pictorial and schematic diagram this week. The shielding may cause a little trouble and you may have to wait until our pictured plans are published.

MAKING A GOOD GROUND

Bear in mind when you drive a pipe or rod into the earth, for a ground connection, to be sure that it is not too short. It should be not less than four or five feet in length, and preferably six or seven feet. In any case it must be long enough so that the lower end is in damp earth at all times. For long-distance reception, several rods driven close together and connected with wires may be used. A network of buried wires, or even a large sheet of copper or zinc, is efficient.

MAKES LOGGING PERMANENT

Different lengths of aerials have no appreciable or noticeable effect on the logging of a radio receiver when an aperiodic or semi-aperiodic primary is used in the antenna coupler. This is because the primary has so few turns of wire its inductance, when compared to the total inductance of the aerial, is so small that any change in the overall inductance is so slight it has little or no influence on the tuning. You're welcome.

AUDIO AMPLIFIER TROUBLE

Remember that the circuits of audio frequency amplifiers are practically standardized, the chief care being to prevent the circuits or transformers reacting on each other and producing howling and squealing. To this end, the leads should be as short as possible and kept well spaced. The use of jacks in the individual stages is not advised. Their advantages are more than offset by the losses in the extra windings and the tendency to howl. A jack in the detector plate and in the last stage audio are all that are really necessary. Control of volume can be had by means of the rheostats.

Transformer coupling is prone to produce distortion and more so when transformers of high ratio are employed to couple the tubes. For best results the transformers should not exceed four to one in ratio and the second stage transformer should be even lower.

LOCATING PARTS ON PANEL

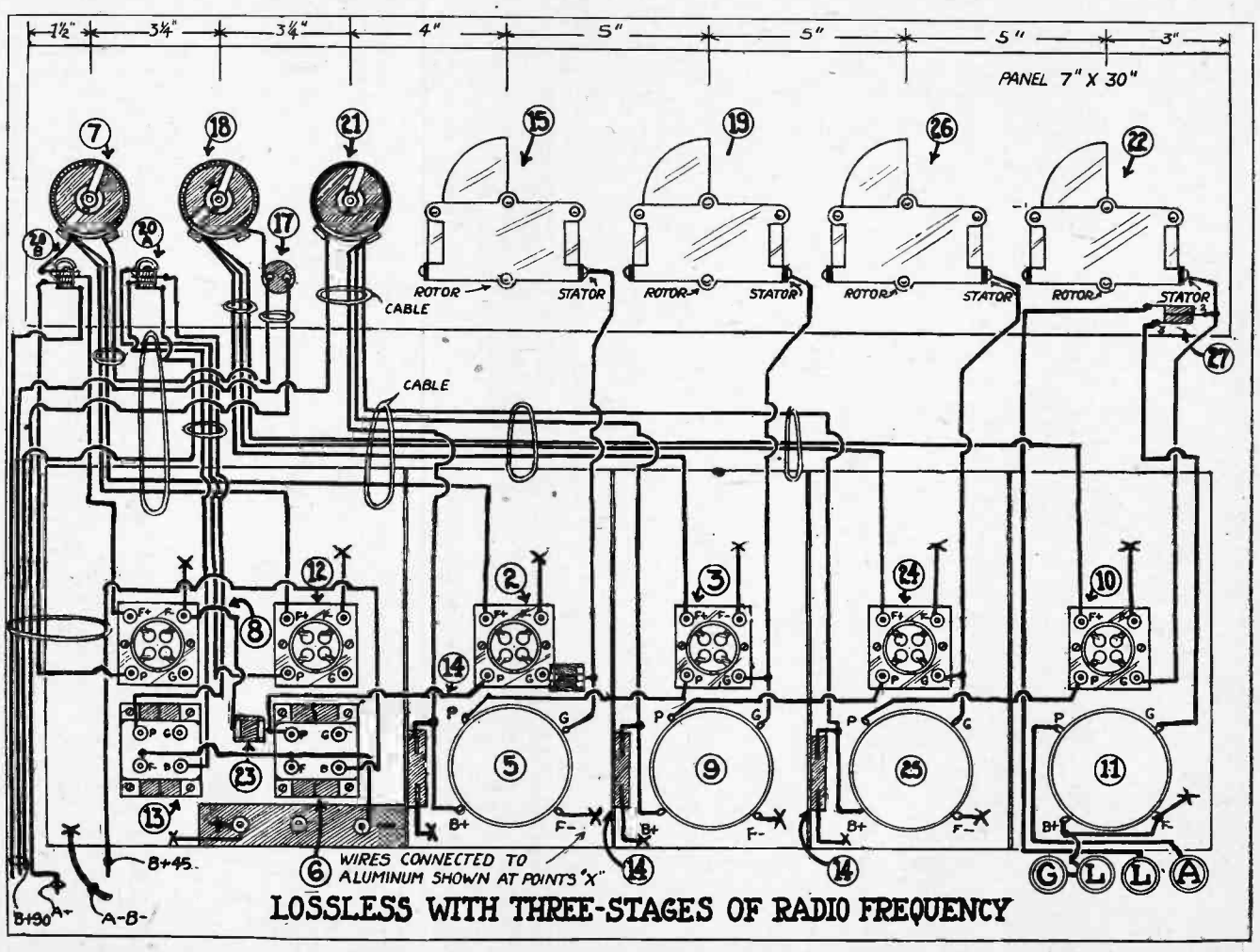
In designing or laying out a new set place all the parts in such a position that they will require the shortest possible leads. This particularly is necessary for those instruments which carry the radio frequency currents, such as the antenna coupler and the grid condenser of the three-circuit sets. One lead three inches longer than it should be may mean poor volume and short distance.

GROUNDING ROTOR PLATES

Some home-built sets tune to one division on the dial when the hand is resting on it and to another place when the tuning is done with a pencil rubber. In most cases this is due to the fact that the rotor plates of the condenser are connected to the grid circuit, and the capacity of the hand near the shaft changes the tuning. The remedy is to reverse the connections to the condenser so that the rotor plates are grounded.

RAINY DAY SIGNALS

Radiocast reception is worse in rainy or cloudy weather than in clear weather for two reasons. The first is that rain water on the antenna supports forms a thin film of water that is slightly conductive. Some of the signal strength leaks through this film. The second reason is that in rainy weather the atmosphere is likely to be distributed and stormy. All such disturbances increase the absorption of radio energy in transit.



With this pictorial in front of you there will be no trouble in building the set and placing the parts so that they will be completely shielded one from the other so that they will make a receiver you can use with satisfaction on both locals and distance

Link Unit Aids Selectivity in Receiver

Homemade Unit Attached to Any Set Clears Up Signals and Gives Tone

THERE are many owners of receiving sets who have been struggling all the season to cut through Chicago locals and, although their sets may be under normal conditions fairly selective, they have found the job a hopeless one. This is particularly true of five-tube tuned radio frequency receivers, although many of the three-circuit regenerative receivers, reflexes and whatnots give just about as much trouble.

For those who have such receivers and who do not feel they can afford to junk them, after having expended considerable time, patience and money on them, the Jim Wells Link Circuit Unit ought to prove a Godsend. It can be built in a small cabinet and placed at one end of the receiver and will sharpen up the offending receiver considerably.

The model unit which is illustrated is the same one that was published November 28, 1925. It could be built from old parts lying around under the kitchen sink, if you are an oldtimer at the set building game. If you can't pick up the parts out of your junk box the cost will not exceed $10 or $12, depending upon the quality of apparatus you select.

All that is needed is an antenna coupler with a variable condenser to match it, .001 mfd. semi-variable condenser and a piece of scrap panel. Of course, there are a few inches of wire. In our illustration we show one of the fixed type couplers, but one with a variable primary would be preferable. One like the Gen-Ral, Buell, Aero or others of a similar type will be very satisfactory.

There are two of the semi-variable .001 mfd. condensers on the local market—the "X-L" and the St. James, but is possible to use a fixed one if you have any trouble locating one of the others. We have used the fix condensers with fairly good success, but have found it necessary to shunt it with a smaller capacity condenser at times to get the best results. Here is the list of parts:

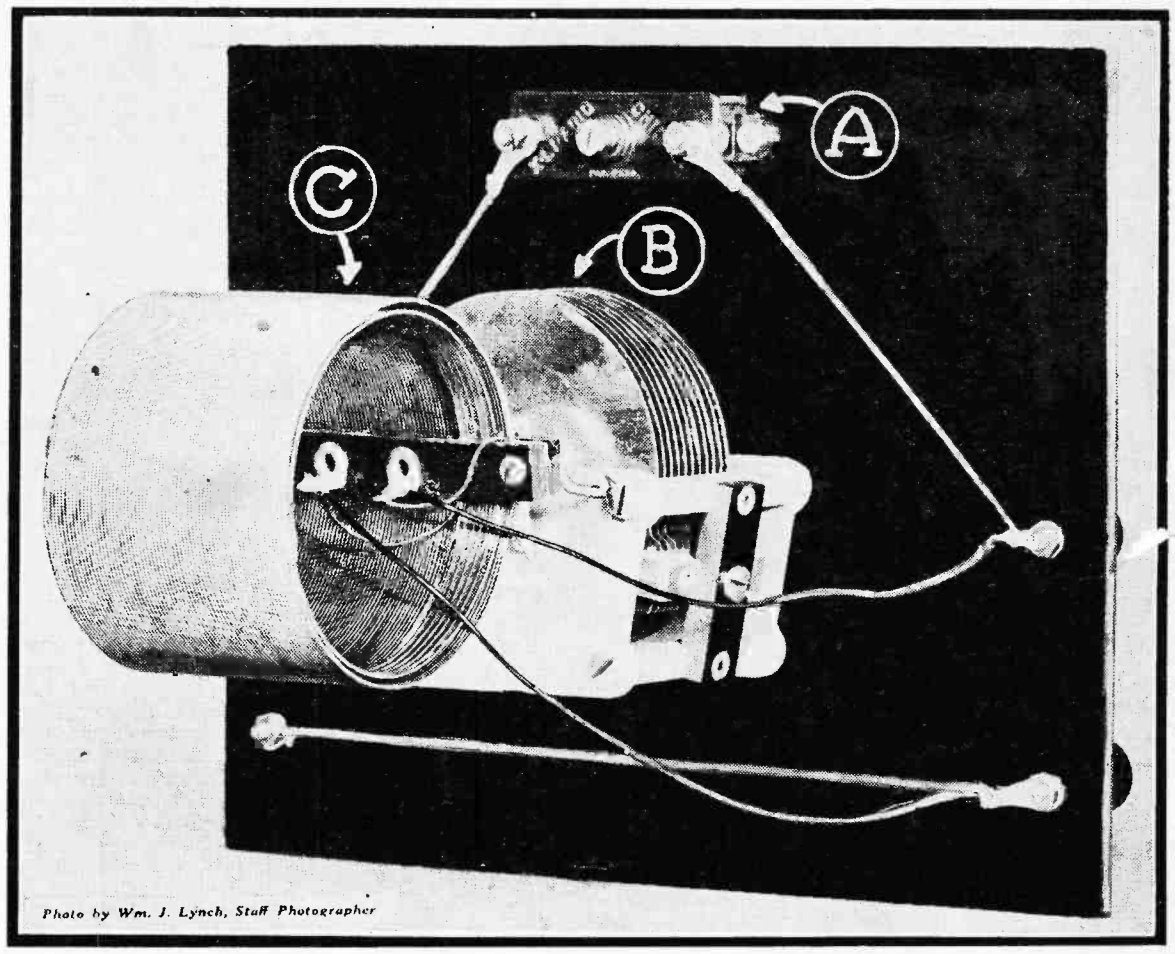
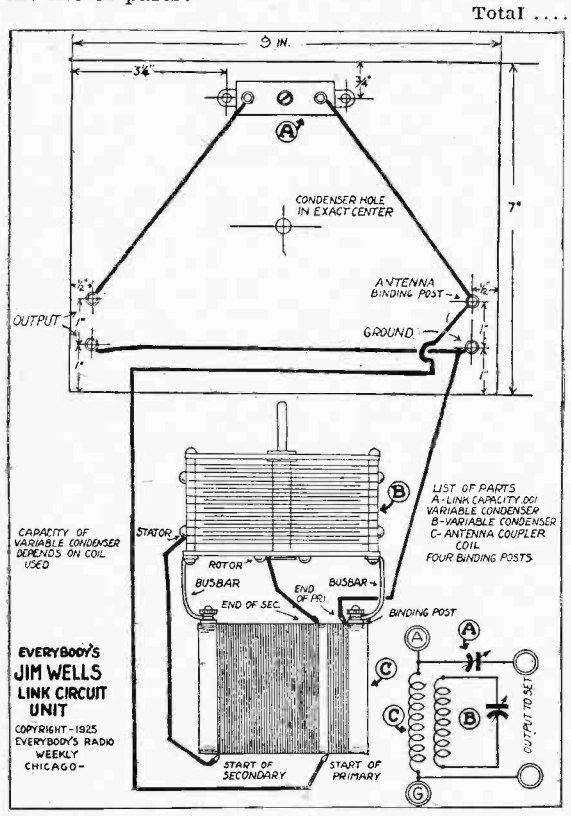


Photo by Wm. J. Lynch, Staff Photographer

You can see here how the Jim Wells Link Circuit looks in a separate unit, from the rear. At the bottom of this page is the pictorial and schematic, the latter being in the lower right-hand corner

Fig. "A"—X-L variodenser Model "G"	$ 1.50
Fig. "B"—Hammarlund straight line frequency variable condenser .0005 cap.	5.00
Fig. "C"—Hammarlund R. F. space-wound R. F. coil	2.50
Four X-L push binding posts	.60
9"x7" Phenolite panel	1.00
Total	$10.60



Pictorial of the Jim Wells Link Unit Circuit. There are few parts to be used in this unit and it can be used to advantage. The schematic is shown in the lower corner of the drawing

To use the Jim Wells Link Unit you attach the aerial and ground wires of your antenna system to the binding posts at the left of the side of the panel, looking at the front view of the unit. See the illustration on page 5. Connect up the other end of the unit to your receiver with short connecting wires, running the wire from the upper output binding post of the unit to the usual aerial wire binding post on your receiver. Connect the lower output post on the unit to the usual ground post on your receiver. That's all there is to it. You need no battery wires on the unit as it does not use the vacuum tube, of course.

There is not much to the hookup of the unit. The panel measures 9"x7". The X-L variodenser (Fig. "A") is mounted near the top with center of the holes for the mounting screws three-quarters of an inch from the top and three and one-quarter inches from either edge. In the exact center of the panel is the hole for mounting the variable condenser (Fig. "B"). There are four holes for the binding posts, two on each side. The center of the bottom hole is one inch from the bottom edge of the panel and one-half inch from the edge. The center of the next hole is one inch from the center of the bottom hole, and one-half inch from the edge. The two on the other side are the same measurements.

The coil (Fig. "C") is attached to the variable condenser by brackets made of busbar. Care should be taken so that the coil is at least one and one-half inches from the condenser. If desired the coil can be mounted on the baseboard in the usual way.

To wire the unit a lead from the right post of the X-L variodenser goes to the top binding post at the right side of the panel. A lead goes from the left post of the X-L variodenser (Fig. "A") goes to the top binding post on the left side of the panel, this is the antenna binding post. Another lead goes from this antenna binding post to the start of the primary winding of the coil (Fig. "C"). A lead from the bottom or ground binding post at the left side of the panel, goes to the bottom binding post at the right side of the panel. Another lead goes from the bottom binding post at the right side of the panel to the end of the primary winding of the coil (Fig. "C").

A lead goes from the start of the secondary winding of the coil (Fig. "C") to the stator of variable condenser (Fig. "B"). A lead goes from the end of the secondary winding of the coil (Fig. "C") to the rotor post of variable condenser (Fig. "B"). This completes the wiring. No baseboard is needed.

Correction for Last Week's Link Set

In the article of last week on the Link Set there appeared in the last paragraph of the fourth column on page 5 this sentence: "All you have to do is to procure one variable condenser, one antenna coupler to fit in any small semi-variable or variable condenser of not less than .0001 mfd. capacity." This should read: All you have to do is to procure one variable condenser, one antenna coupler to fit and any small semi-variable or variable condenser of not less than .001 mfd. capacity. You will note the reading of "in any" in the article and here changed to "and any." You will also note the change in the capacity of the variable condenser from .0001 to .001.

TOOLS IN SET BUILDING

For the construction of receivers, the following tools are all that are necessary. One breast drill with assorted size drills ranging from 3/32 up to ½ inch. Two good screw drivers, one heavy point and one fine point. One pair of compass dividers. One marking tool. One square. One flat file. One three-cornered file. Two pair of pliers, one heavy electrician's pliers and one sharp nosed electrician's pliers. One sharp knife. One hacksaw. One set of good clamps. Some sheets of emery and fine sandpaper. One soldering iron, solder paste and solder.

With these tools and a little common sense any set can be laid out, the panel drilled, and assembled, and the finished set made. If engraving is thought necessary it is best to take the finished drilled panel to some firm that makes a specialty of engraving panels, and have it done. It cannot be done at home unless you have experience in that line.

WATCH YOUR "A" BATTERIES

Keep the top of the battery clean. Wipe off the acid and water that accumulates there. When filling the battery keep the water just about a quarter of an inch above the plates. Fill the battery with distilled water but never add acid.

IT BURNS OUT TUBES

Quite often the occasion arises when one or more tubes must be changed from one socket to another or a new tube inserted to get improved reception. Before this is done, shut off the "A" battery current by turning down the rheostat or using the switch if the set is so equipped. Removal of one or more tubes throws too much current on the remaining tubes. If the tubes are declining they may "break" under the sudden load thrust on them.

"C" BATTERY SAVES "B"

It is estimated that the use of the "C" battery as a grid bias effects a saving in "B" battery current consumption ranging from 100 to 300 per cent. The "C" battery is used in the audio frequency stages. Although the "C" battery reduces the amount of current in the plate circuits of the tubes, it does not cause a reduction in the strength of signals when properly used, but rather a slight increase with added signal clarity. There is no drain on the "C" battery itself.

Helps for the Builder

Indoor Aerials Selective

Remember that for indoor aerials, insulation is not so important, for this type of aerial is not subject to rain and atmospheric conditions. Indoor aerials give selectivity and reduce static, particularly the loop aerial, and for that reason they are extensively used. The decrease in signal strength must of course be offset by radio frequency amplifiers.

It is well to remember also that some locations seem to be dead spots and no set will bring in distant stations when located in one of these places. This condition can only be determined by inquiring if others in the neighborhood have similar troubles.

Importance of By-Pass Condensers

By-pass condensers increase efficiency of most hookups, but are often neglected by the novice experimenter or set builder. He does this because he does not know or understand the purpose of the by-pass condenser or its importance.

The by-pass condenser usually is a fixed condenser of some known capacity. It may be of the small variable type, but since it is not critical, requirements demanding variation or adjustment, the fixed type is just as satisfactory and costs less, as a rule.

This by-pass condenser is placed in a circuit to "pass" or divert stray radio-frequency currents around a certain piece of apparatus or a portion of a circuit, instead of letting it go through. All electrical currents take the shortest path to complete the circuit. Radio-frequency current is no exception.

How to Test "B" Batteries

When testing your "B" batteries, do not touch the ends of the two wires together (as many beginners do) to see if there is any juice left in them. This short circuits the battery, and this form of test will reduce its life greatly. Remember, for testing "B" batteries, use a voltmeter. A voltmeter is always connected across the battery. Do not use an ammeter except in measuring the current consumed by your tubes. An ammeter is always connected in series with only one end of the line. To put an ammeter across the battery will short it and run it down. In testing a storage battery, use a hydrometer.

Preparing Baseboards

There is a right and a wrong way even with the often-neglected baseboard. Be sure it is dry. Kiln dried is preferable. Boil it in paraffine. Never use shellac of the common kind. Do not use paint or stains. Have it heavy enough to be a real support for the panel. It should be at least three-quarters of an inch thick. One inch is better.

Why Signals "Fade"

There has been no proven cause for "fading" of radiocast programs from a distant station. The theory generally accepted is that a wave of some sort of electrical energy, more powerful than that of the signal from the radiocast station sweeps gradually or suddenly, as the case may be, into its path. This acts as a sort of blanket between the receiver and the station and continues as such until it leaves the path.

Why Batteries Get Hot

Storage batteries are said to "boil" when they near the full charge point in recharging. Sulphuric acid has a strong chemical affinity for water. When mixed considerable heat is set free, just as carbon in a fire combines with oxygen in the air and sets heat free. The act of recharging increases the sulphuric acid in the water content of the battery.

Dry Cell Tubes Used on Wet Batteries

Connections for Battery to Use on Receiver That Is Made for Dry Cell Tubes

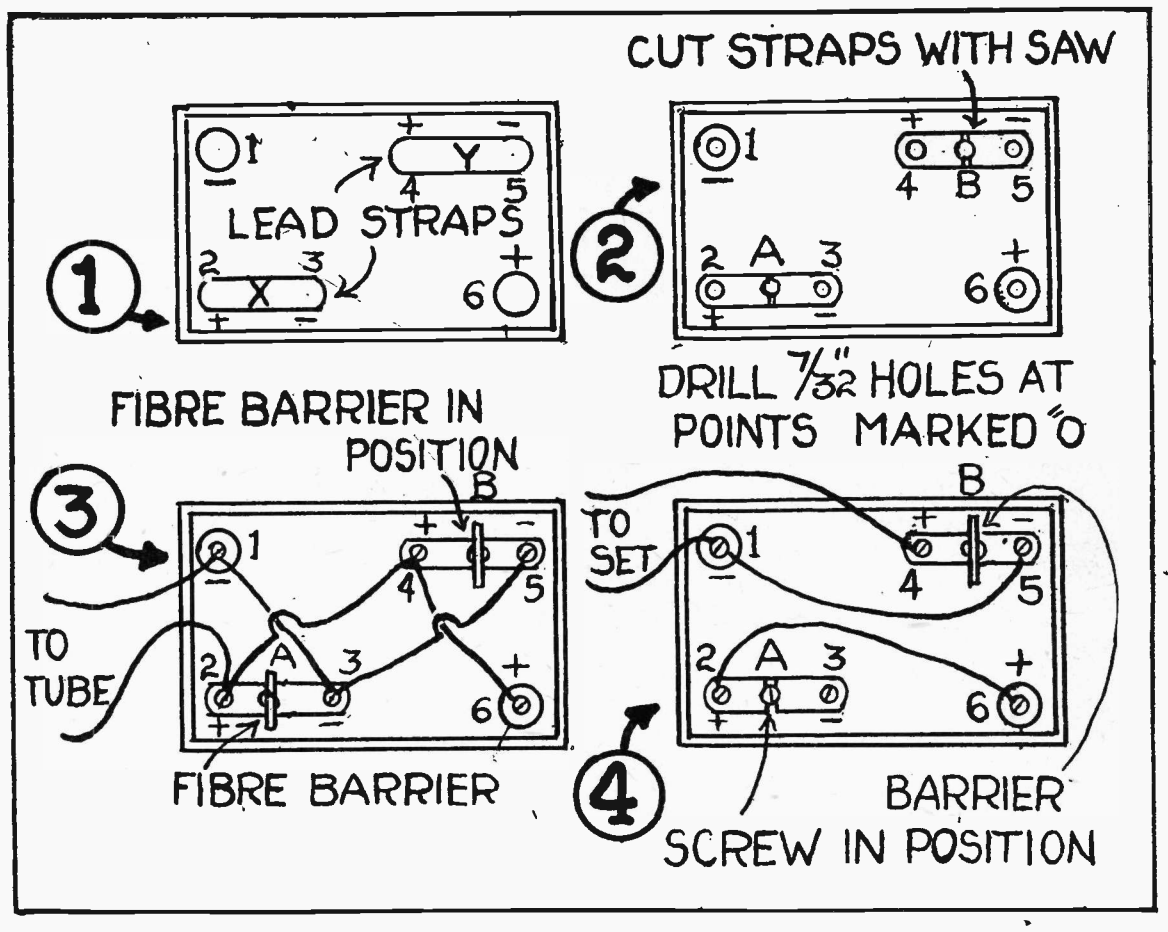


Diagram showing the tops of storage cells in which changes are made to make connections for the dry cell tubes to take their voltage from taps. This aids the user a great deal where he has a set using dry cell tubes

MANY radio phans who have sets using the dry cell tubes do not know that it is possible to use a storage "A" battery with these tubes to a very good advantage.

While it is possible to purchase either two or four volt storage "A" batteries, many phans may have access to a battery taken from an automobile or a regular "A" 6 volt battery. In such case it is possible to use the battery to operate the radio set. In fact it will do the battery good to use it as it is not advisable to allow a storage battery to stand idle for any period of time. Others may have old batteries that have been used on cars and discarded for lack of pep. If the battery is in fair condition it is possible to use it on radio work as the current drawn by the tubes is very small compared to that taken by the starter and often a battery that will not turn the starter over will give several months' service on the radio. Others will want to buy a battery in anticipation of changing over to six volt tubes and in this way they can use the dry cell tubes until they are no longer effective before discarding them.

Please bear in mind that we are not advocating the general use of auto batteries for radio work as a practice as they are not designed for such and may not be as quiet as a regular radio battery. But on the other hand you will no doubt obtain very satisfactory results, sufficient to please all but the most exacting and as the plan does not entail any expense we offer it as a helpful suggestion.

The ordinary auto battery is composed of three cells, each of two volts pressure, connected in series, thus giving six volts between the main terminals. By connecting the cells properly it is possible to obtain either two or four volts as desired with a corresponding increase in the current capacity at the same time.

The top view of a standard six volt storage battery is shown in Fig. 1. Starting at point No. 1, we have the negative main terminal, No. 2 is the positive terminal of the same cell and is connected with No. 3 with a lead strap marked "X" Terminal. Nos. 4 and 5 are also connected with a lead strap marked "Y." Battery is shown connected for six volts. In practice only the main terminals one and six are marked — sometimes minus and plus, or "neg." for negative and "pos." for positive.

When the battery is installed on your car the negative post is generally connected to the frame of the car while the positive post connects with the starter. If you know the polarity of either main terminal you may determine the polarities of the intermediate posts by following the diagram. We suggest that you take a chisel or screw driver and stamp each post with a plus or minus as the case may be. This will help you keep things straight later on.

I have gone into detail for the benefit of those who are inclined to be mystified by anything that deals with electricity so if you follow the directions you can not go wrong. Those of you who are familiar with a battery will find it a very simple matter to connect it up.

To prepare the battery, proceed as follows: Referring to Fig. No. 2, take a hacksaw and cut through the lead straps at points "A" and "B" as shown. Be sure to cut clear through and take a sharp knife and trim the edges so that the connection will be broken. At the points shown by the small circles, drill 7/32-inch holes in the terminals and straps about one-half inch deep. Tap these holes for No. 14—20 or ¼—20 machine screws. If you don't have a tap, point the screw slightly with a file and you can screw it in place without tapping the holes.

Secure from a hardware store or machinists' supply house No. 7 to No. 14—20 or ¼-inch 20-thread round head brass machine screws about three-eighths inch in length. These will be used for binding posts. Other sizes will do in case you have them or can't get these, but you will have to change drill and tap sizes accordingly.

At the battery terminal posts the screws will be used as binding screws and at points "A" and "B" they will be used to connect battery for six volts for charging. Do not install screws at points "A" and "B" at present but cut two pieces of thin fibre or cardboard about one by two inches and insert in these slots to act as barriers and prevent an accidental connection of the wrong voltage. Wedge these barriers in place so there will be no danger of them falling out of position.

To connect battery for type WD11 or 12 one and one-half volt tubes, refer to Fig. 3 and proceed. Make two jumper wires of No. 14 or larger insulated wire and connect from points "2" to "4" and from "4" to "6," scraping about three-fourths inch on each end of the wires and serving around the screws which serve as binding posts. If desired, you may make one long jumper wire instead of two, and scrape enough in the middle to loop around post No. 4. Now make two more jumper wires, or one long one as you wish and connect points 1-3-5 together, using the screws for binding posts as before. See that the fibre or pasteboard barriers are in place at points "A" and "B" and that there is no connection.

The idea of the foregoing connections is to join all negative terminals and make one main negative terminal and in a like manner join all positive terminals to make one main positive terminal.

This connection will deliver two volts and will increase the current capacity of your battery three hundred per cent over the original connection. As all cells are connected in multiple the drain on each cell will be the same and you will find that a fully charged battery will give several weeks' service before requiring charging. Connect your tubes to points No. 1-2 or any pair of opposite points taken across the battery. If you have a low reading voltmeter, it will be well to test across the wires to the tubes to make sure you have the proper voltage. It will be all right to operate the tubes on two volts as you can regulate the amount of current taken by turning the rheostat lower if tubes burn too brightly.

When it becomes necessary to charge the battery, remove all jumper wires and also the barriers at points "A" and "B" and insert screws at these points to close the gaps. Connect a six volt charger to points "1" and "6" and charge same as any battery.

If you want to place the battery back in your car or decide to change over to six volt tubes, remove all wires and take the battery to a service station and have them fill the gaps at "A" and "B" with a lead burning outfit. This will cost only a small sum and will restore the battery to the original six volt connection.

To connect for 199 or 299 (four and one-half volt) tubes. Refer to Fig. No. 4—insert a machine screw and close gap at "A" leaving barrier in place at "B," run No. 14 or 18 insulated jumper wire from point "6" to "2," also connect points "1" and "5" as shown. Connect tubes to points "1" and "4." This arrangement will deliver four volts but it does not draw equally on all cells. In order to equalize the drain on the cells as much as possible, suggest that every three or four weeks you change connections as follows:

Change wire from point "2" to point "4" and also from point "1" to point "3," remove jumper wire from No. 1 before connecting points "2" and "4." At the end of a like period change back to the original connection. Do not change wires leading to set as the polarity will be the same with either arrangement. To recharge battery, remove all wires and insert screw at point "B" and connect charger to points 1 and 6 as in previous case. You will find that the battery will give a good many weeks' service and will probably not require charging oftener than once in two or three months.

In making any of the foregoing connections, care should be taken to follow the instructions explicitly or trouble may result, either you will damage the tubes or the battery. As a test, when making or changing any connection, there should be no spark with your set disconnected. If there is a spark when you bring a wire up to a binding post, it proves you are wrong—stop, check up and find your mistake before proceeding. After hooking up battery, it is well to test across wires to tubes to see if you have the proper voltage. As stated previously, one and one-half volt tubes will operate O. K. on a two volt circuit, the rheostat will take care of the extra voltage and the 199 tubes will function properly on the four volt circuit.

USE PORCELAIN INSULATORS

Do not forget to always insulate your antenna with good insulators. For a short period of time most anything will suffice, but under the wear and tear of changing temperature, of rain and the jerking of the aerial caused when it is blown by the wind, tends to make the composition type deteriorate until it is little better than wood.

Often the metal eyes that protrude from each end fall out of their sockets. The only efficient insulators are those made of porcelain or glass. This is proven conclusively by the fact that the telephone and telegraph companies use porcelain and glass insulators exclusively. It has been proven by testing the leakage in a composition insulator that the aerial wire might just as well have been tied directly to the mast itself as to use the insulator. The most satisfactory type of porcelain insulators are those which are corrugated.

LIGHTING SYSTEM FOR AERIAL

The house lighting system can be used as an antenna of fair value in a pinch. To do this wind a wire around the double lamp cord several times at one end and attach the one end of the wire to the aerial binding post of the receiver. The capacity between the wire and the cord forms a condenser and connects the receiver to the line wires which form the antenna system.

MOUNTING "C" BATTERIES

It is better to procure "C" or bias batteries with screw and nut terminals than the type on which the connecting wires have to be soldered. These batteries can be more readily replaced. If you have the other type, bore holes in the terminal springs or lugs and make your connections with thumbscrew and bolt. You're welcome.

LOW AERIALS INEFFICIENT

It is detrimental to efficient operation to have the aerial less than five feet above the roof. In most cases it is possible to secure some form of mast to two chimneys or to raise a mast upon the roof itself. You're welcome.

THE CAUSE OF HOWLS

Excessive inductance in the plate circuit is responsible for the howls and squeals noted in many regenerative hookups. To remedy this remove a few turns from the tickler coil.

EVERYBODY'S STATION FINDER

This list of stations is arranged for the convenience of the DX-getter. It does not make any pretensions of being a complete list. It has only those stations that "come in easy and often." For a more complete list refer to any of the "Call" books published for this purpose.

LIST OF STATIONS BY CALL LETTERS

Call—Location	Meters
CFCA, Toronto, Ont.	357
CKAC, Montreal, Que.	411
CKNC, Toronto, Ont.	357
CYB, Mexico City, Mex.	270
CYL, Mexico City, Mex.	480
KDKA, Pittsburgh, Pa.	309
KFAB, Lincoln, Nebr.	341
KFDM, Beaumont, Tex.	316
KFI, Los Angeles, Cal.	468
KFKX, Hastings, Nebr.	288
KFMX, Northfi'd, Minn.	337
KFNF, Shenandoah, Ia.	266
KFOA, Seattle, Wash.	454
KFVE, University City, Mo.	240
KFWB, Hollywood, Cal.	252
KGO, Oakland, Cal.	361
KHJ, Los Angeles, Cal.	405
KLDS, Indep'dence, Mo.	441
KNX, Hollywood, Cal.	337
KOA, Denver, Colo.	322
KOIL, Council Bluffs, Ia.	278
KPO, San Francisco, Cal.	428
KPRC, Houston, Tex.	290
KSD, St. Louis, Mo.	545
KTHS, Hot Spr'gs, Ark.	375
KWKH, Shreveport, La.	261
KYW, Chicago, Ill.	535
PWX, Havana, Cuba	400
WAAF, Chicago	270
WAHG, Richmond, N.Y.	316
WBAP, Ft. Worth, Tex.	476
WBBM, Chicago, Ill.	226
WBCN, Chicago, Ill.	266
WBZ, Springfield, Mass.	333
WCAE, Pittsburgh, Pa.	461
WCAP, Washington, D. C.	468
WCBD, Zion, Ill.	345
WCCO, Minneapolis, Minn.	416
WCLS, Joliet, Ill.	214
WCX, Detroit, Mich.	417
WDAF, Kansas City, Mo.	366
WDBY, Chicago	258
WDWF, Providence, R. I.	441
WEAF, New York, N.Y.	491
WEAO, Columbus, O.	294
WEAR, Cleveland, O.	389
WEBH, Chicago, Ill.	370
WEHS, Evanston, Ill.	203
WENR, Chicago, Ill.	266
WFAA, Dallas, Tex.	476
WFBM, Indianapolis, Ind.	268
WFI, Philadelphia, Pa.	394
WFKB, Chicago	217
WGES, Oak Park, Ill.	250
WGN, Chicago, Ill.	303
WGR, Buffalo, N. Y.	319
WGY, Schenectady, N.Y.	379
WHA, Madison, Wis.	535
WHAD, Milwaukee, Wis.	275
WHAR, Atlantic City, N. J.	275
WHAS, Louisville, Ky.	400
WHAZ, Troy, N. Y.	379
WHB, Kansas City, Mo.	366
WHBM, Chicago	233
WHIJ, Chicago	215
WHO, Des Moines, Ia.	526
WHT, Chicago	400
WIBL, Chicago	215
WIBD, Joliet, Ill.	200
WIBM, Chicago	216
WIBO, Chicago, Ill.	226
WIP, Philadelphia, Pa.	508
WJAR, Providence, R.I.	306
WJAZ, Chicago	322
WJJD, Mooseheart, Ill.	370
WJY, New York, N. Y.	405
WJZ, New York, N. Y.	454
WKAR, Lansing, Mich.	285
WKRC, Cincinnati, O.	422
WLIB, Elgin, Ill.	303
WLIT, Philadelphia, Pa.	394
WLS, Chicago,	345
WLTS, Chicago	258
WMAQ, Chicago, Ill.	447
WMBB, Chicago, Ill.	250
WMBF, Miami, Fla.	384
WMC, Memphis, Tenn.	500
WOAI, San Antonio, Tex.	394
WOAN, Lawrenceburg, Tenn.	283
WOAW, Omaha, Nebr.	526
WOC, Davenport, Ia.	484
WOK, Homewood, Ill.	217
WOO, Philadelphia, Pa.	508
WOR, Newark, N. J.	405
WORD, Batavia, Ill.	275
WOS, Jefferson City, Mo.	441
WPG, Atlantic City, N. J.	300
WQJ, Chicago, Ill.	447
WRC, Washington, D.C.	468
WREO, Lansing, Mich.	285
WSAI, Cincinnati, O.	326
WSB, Atlanta, Ga.	428
WSBC, Chicago	210
WSM, Nashville, Tenn.	283
WSMB, New Orleans, La.	319
WSUI, Iowa City, Ia.	484
WTAM, Cleveland, O.	389
WWJ, Detroit, Mich.	353

LIST OF STATIONS BY WAVE LENGTHS

Met.	Call	Location
200	WIBD,	Joliet, Ill.
203	WEHS,	Evanston, Ill.
210	WSBC,	Chicago
214	WCLS,	Joliet, Ill.
215	WIBJ,	Chicago Ill.
215	WIBL,	Chicago
216	WIBM,	Chicago
217	WFKB,	Chicago
217	WOK,	Homewood, Ill.
226	WBBM,	Chicago, Ill.
226	WIBO,	Chicago,
233	WHBM,	Chicago
238	WHT,	Chicago, Ill.
240	KFVE,	University City, Mo.
250	WGES,	Oak Park, Ill.
250	WMBB,	Chicago, Ill.
252	KFWB,	Hollywood, Cal.
258	WLTS,	Chicago
258	WDBY,	Chicago
261	KWKH,	Shreveport, La.
266	KFNF,	Shenandoah, Ia.
266	WBCN,	Chicago, Ill.
266	WENR,	Chicago, Ill.
268	WFBM,	Indianapolis, Ind.
270	WAAF,	Chicago
270	CYB,	Mexico City, Mex.
275	WHAD,	Milwaukee, Wis.
275	WHAR,	Atlantic City, N. J.
275	WORD,	Batavia, Ill.
278	KOIL,	Council Bluffs, Ia.
283	WOAN,	Lawrenceburg, Tenn.
283	WSM,	Nashville, Tenn.
285	WKAR,	Lansing, Mich.
285	WREO,	Lansing, Mich.
288	KFKX,	Hastings, Neb.
294	WEAO,	Columbus, Ohio
297	KPRC,	Houston, Tex.
300	WPG,	Atlantic City, N. J.
303	WGN,	Chicago, Ill.
303	WLIB,	Elgin, Ill.
306	WJAR,	Providence, R. I.
309	KDKA,	Pittsburgh, Pa.
316	WAHG,	Richmond, N. Y.
316	KFDM,	Beaumont, Tex.
319	WSMB,	New Orleans, La.
319	WGR,	Buffalo, N. Y.
322	WJAZ,	Chicago
322	KOA,	Denver, Colo.
326	WSAI,	Cincinnati, Ohio.
333	WBZ,	Springfield, Mass.
337	KNX,	Hollywood, Cal.
337	KFMX,	Northfield, Minn.
341	KFAB,	Lincoln, Nebr.
345	WLS,	Chicago, Ill.
345	WCBD,	Zion, Ill.
353	WWJ,	Detroit, Mich.
357	CFCA,	Toronto, Ont.
357	CKNC,	Toronto, Ont.
361	KGO,	Oakland, Cal.
366	WHB,	Kansas City, Mo.
366	WDAF,	Kansas City, Mo.
370	WJJD,	Mooseheart, Ill.
370	WEBH,	Chicago, Ill.
375	KTHS,	Hot Springs, Ark.
379	WHAZ,	Troy, N. Y.
379	WGY,	Schenectady, N. Y.
384	WMBF,	Miami, Fla.
389	WEAR,	Cleveland, Ohio.
389	WTAM,	Cleveland, Ohio.
394	WLIT,	Philadelphia, Pa.
394	WOAI,	San Antonio, Tex.
394	WFI,	Philadelphia, Pa.
400	WHT,	Chicago
400	PWX,	Havana, Cuba
400	WHAS,	Louisville, Ky.
405	WOR,	Newark, N. J.
405	WJY,	New York, N. Y.
405	KHJ,	Los Angeles, Cal.
411	CKAC,	Montreal, Que.
416	WCCO,	Minneapolis, Minn.
422	WKRC,	Cincinnati, Ohio
428	WSB,	Atlanta, Ga.
428	KPO,	San Francisco, Cal.
441	WOS,	Jefferson City, Mo.
441	KLDS,	Independence, Mo.
441	WDWF,	Providence, R. I.
447	WMAQ,	Chicago, Ill.
447	WQJ,	Chicago, Ill.
454	KFOA,	Seattle, Wash.
454	WJZ,	New York, N. Y.
461	WCAE,	Pittsburgh, Pa.
468	KFI,	Los Angeles, Cal.
468	WRC,	Washington, D. C.
468	WCAP,	Washington, D. C.
476	WFAA,	Dallas, Tex.
476	WBAP,	Fort Worth, Tex.
480	CYL,	Mexico City, Mex.
484	WSUI,	Iowa City, Ia.
484	WOC,	Davenport, Ia.
491	WEAF,	New York, N. Y.
500	WMC,	Memphis, Tenn.
508	WIP,	Philadelphia, Pa.
508	WOO,	Philadelphia, Pa.
517	WCX,	Detroit, Mich.
526	WOAW,	Omaha, Neb.
526	WHO,	Des Moines, Ia.
535	WHA,	Madison, Wis.
535	KYW,	Chicago, Ill.
545	KSD,	St. Louis, Mo.

Adjustable Grid Leaks

This type of grid leak is very handy because it can be easily set to the right value for a particular tube. It is very important that the setting "stay put" after it has been made, otherwise the leak has to be tinkered with constantly. There are various excellent variable leaks on the market. Some of them fit the usual grid leak clips, others mount on the panel. When using the panel mounting type be careful. Don't mount within several inches of any metal shields or grounded binding posts.

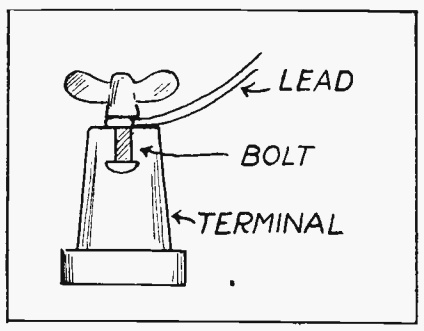
Practical Helps for Home Set Builders

Home Experimenters Develop New and Practical Aids for the Novice in Radio

Improved "A" Battery Connection

By LESLIE WILCOX,
1720 Kimball Ave., Chicago, Illinois

Some of the phans have trouble with the clamps on the "A" battery corroding and causing a poor connection.



I have a way to remedy this: Drill a hole in the center of the terminal on the battery and insert a 10—32 screw. After the screw is in place, solder it well. The best nuts to use for this purpose are wing nuts.

Marking Layout on Panels

By CARL KAPLAN,
843 N. Lawndale Avenue, Chicago, Illinois

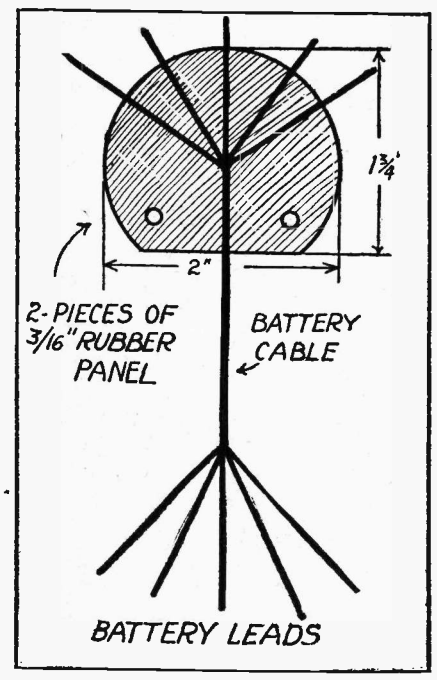
In the marking of panels there is always a drawback in which a surface is scratched if a scriber is used, and lead pencil markings cannot be seen. and they leave a line for the current to flow. In this marking I have a hint that may help others as it has helped me. I had a great deal of trouble in finding the markings after they were made. Now, I take a small, thin edge of a piece of soap to make the marks. These are easily seen, they do not show any scratches and it is easily washed off after the work is completed.

Battery Cables

By JOS. W. COHULY,
3327 N. Oakley Avenue, Chicago, Illinois.

Procure two pieces of rubber panel stock $\frac{3}{16}$ inches thick 2 inches wide and 1¾ inches long, and cut them to the shape as shown by the shaded portion in the illustration. Purchase a regular cable for batteries at your local radio store. This cabling has five wires in it. The ends of the wire from the cable are placed on one of the rubber pieces as shown, the spacing being made to suit the space on the baseboard.

Fasten the lead ends with sealing wax to hold them in place, then place



the other rubber piece on top. Drill two $\frac{3}{16}$ inch holes through both pieces as shown, and place in two small brass machine bolts to hold the parts together.

Melt sealing wax or wax taken from the top of a dry cell "B" battery and pour it in between the leads. Remove the bolts and place the waxed end on the baseboard. The leads can be tinned; then solder the wires to them. No binding posts will be required.

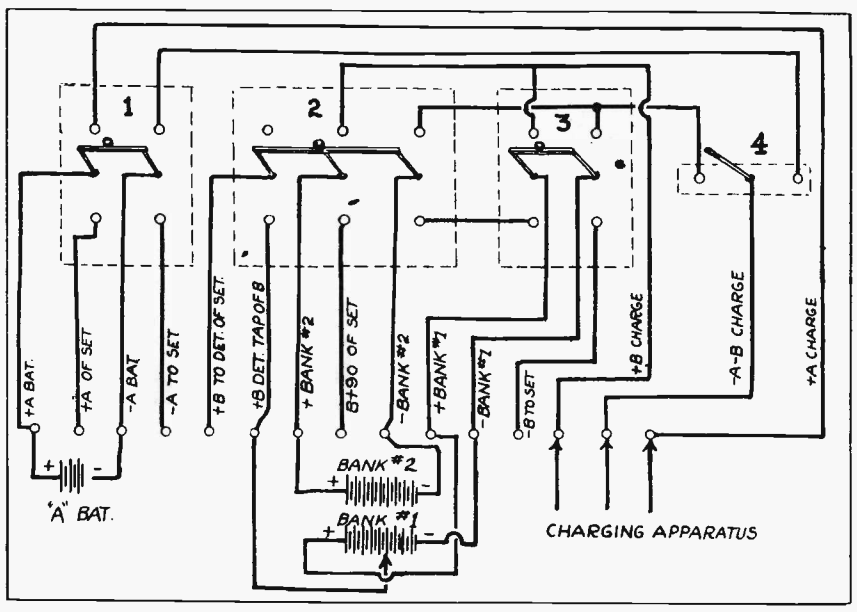
Cash for Practical Aids

IF YOU have worked out some new method that has helped you in home set-building or in the operation of sets, or in some toll that is handy for the work bench, it may help others. For all accepted articles describing such aids we will pay $1. *Each month we will give a grand cash award of* $5 *for the best one published in addition to the* $1. *The articles we cannot use will be returned to the writer, if a self-addressed and stamped envelope is enclosed in your letter. Send such articles to the Practical Hints Editor, EVERYBODY'S RADIO Weekly, 2721 S. Michigan Avenue, Chicago, Ill.*

A and B Battery Switch Panel

By CHARLES D. GILE,
448 E. 88th Pl., Chicago, Ill.

Switching panel arrangement for charging wet "A" or "B" batteries using small standard size battery switches may be made as follows: S. P. D. T. 3¾ inches x 1¼ inches. D. P. D. T. 3¼ inches x 2 inches. T. P. D. T. 3¾ inches x 3¼ inches, which can be made up on a piece of transite or bakelite, size 12 inches x 6 inches x



¼ inch, and mounted wherever most convenient.

In addition to the above material, there is needed 15 binding posts, mounted along the bottom of the panel as shown in the drawing, the leads dropping almost straight down.

The S. P. D. T. No. 4 switch thrown to the left closes the charge circuit for the "B" batteries, provided switch No. 2 and No. 3 are thrown up. Number 3 switch controls the bank No. 1 of 24 cells while No. 2 switch controls the bank No. 2 of 24 cells charging the two banks in multiple. This arrangement allows charging one or both banks at the same time.

By throwing S. P. D. T. No. 4 switch to the right and switch No. 1 closes the circuit for the "A" battery. When closing the circuit to set the switches Nos. 1, 2 and 3 must be thrown down, which puts the two banks of "B" batteries in series. The top left terminal of switch No. 2 has no wire connected to it.. The S. P. D. T. No. 4 switch should be pulled out after charge, as it is a good habit to pull all switches when not using. Be certain of the wiring from your charging apparatus to put them on the correct plus and minus binding posts.

After you have enjoyed your program for the evening, simply pull out your No. 1, 2, and 3 switches, and you have no battery current on your set at all, or if you wish to work on set, pull them out.

This circuit is absolutely fool-proof, as there is no chance of throwing the switches wrong to do any harm.

Remember switches No. 2 and 3 up with switch No. 4 to the left will charge the "B" batteries, while switches No. 1 up and No. 4 to the right will charge the "A" battery, and to operate set switches No. 1, 2 and 3 are thrown down.

Proper Angle Coils

Remember that the angles of the coils in the radio-frequency stages are very critical, especially where two or more stages of tuned radio-frequency are used. There should be plenty of wire left to adjust the angles of the coils when the set is put on trial, as often troublesome oscillations may be avoided and adjusted after the station is received and the conditions of your locality met with. After the coils are adjusted to the maximum selectivity and volume the coils should be firmly fastened down so that small jars will not disturb the location of the radio frequency transformers.

Changing Balance

Changing the tubes in a neutrodyne will throw it out of balance because the capacity between the elements varies in different tubes, regardless of how carefully they are manufactured. When using UV-201A tubes, always test them in another set to make sure they are in perfect condition, for a poor tube is often found to be the cause of poor reception.

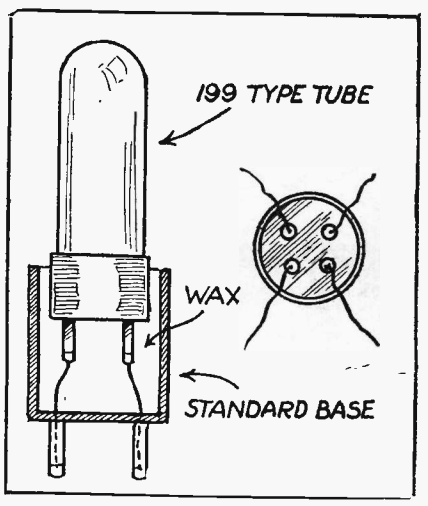
If You Never Soldered

It is a very good plan if you have never done any soldering to take a few pieces of wire and twist them together and practice on these before attempting to solder the set parts.

Standard Base for 199 Tubes

By W. M. SNYDER,
321 Chadwick Avenue, Newark, N. J.

The illustration shows my method of placing a 199 tube in a standard base. I solder small pieces of wire to the contact points of the tubes. These



wires should be about one inch long. The old base or ring from a burned out tube is slipped over the base end of the 199 tube, and if the ring is metal it is soldered. The large space in between the tube base and ring is filled with paraffin.

Take Tubes Out

When repairing or charging the battery connections on a receiving set it is wise to remove the tubes from their sockets. By doing this all danger from blowing them out accidentally is removed. It is not necessary to remove the tubes entirely out of the sockets. They may be disengaged from the slot in the socket and let lie on top, the prong on the side holding it away from the prongs.

Handy Battery Switch

By JOHN SKOPAL, JR.,
1111 S. Homan Avenue, Chicago, Ill.

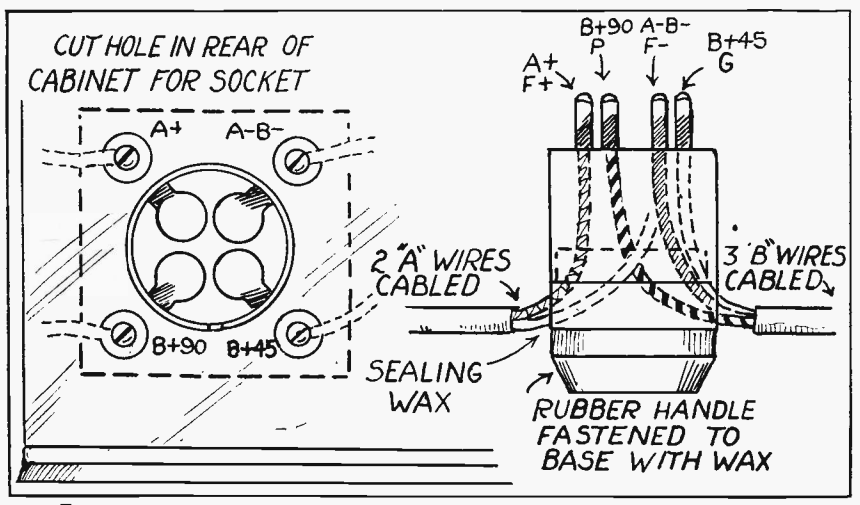
A socket and a base from an old tube can be used to construct a battery switch which will take care of all the batteries.

First, drill a hole in rear of the cabinet, large enough for the upper part of the socket to fit in, then remove the four screws which hold the prongs to the base of the socket, and with a scriber mark them on the back of the cabinet. Next drill these and replace the prongs, and mount the sockets as shown.

The battery connections are as follows: A plus to F plus; A minus, B minus, to F minus; 22.5 or 45 B plus to G; and 90 B plus to P on socket.

Remove the glass tube from the base of the tube by heating it and pulling it off. Solder the wires leading to the batteries. After connections have all been soldered cut a small piece of bakelite or rubber to fit into the base, then fill in the space in the base with hot sealing wax or tar to protect the connections. The handle will be held firmly.

If desired, the B minus does not have to be run into the base of the tube, but can be connected to the A minus terminal of the "A" battery direct.

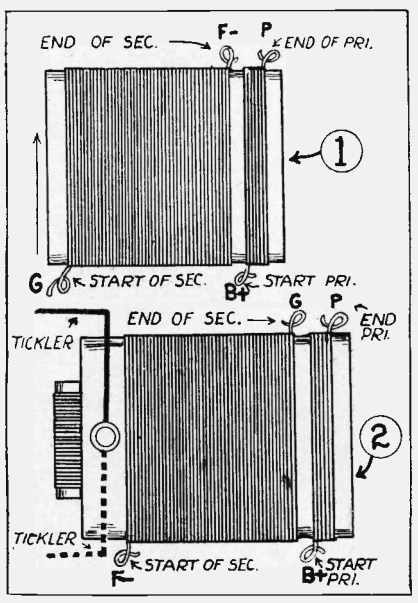


Coil Marking Explained

There seems to be some confusion as to the start and the end of the windings on the coils. The coil in the illustration shows the standard way in which the radio frequency transformer and antenna coupler coils are drawn in our standard diagrams.

The start and end of the windings are merely given as a help in following the diagrams and the wiring details. As an example, the coil in Fig. 1 was wound as follows: Starting at the point "G" on the secondary winding the wire is started on the bare tube. It is wound in the direction shown by the arrow and after the required number of turns have been wound and the wire cut and held in place, this naturally is the end of the secondary winding marked "F" minus. Leaving a space on the tube, the primary winding is started at the point marked "B" plus and wound for the required number of turns finishing at the end marked end of primary "P."

If a person were to wind a coil and started with the primary winding first, the markings of the leads would be the



same although the end of the primary as shown in the drawing would in reality be the start of the winding. The start and end of the windings of the spiderweb coils, where the primary is wound in the center and the secondary outside of this, such as the Phonstiehl coil, are easily determined by looking at the inside of the coil and remembering that the inside is started on the winding form first, and this is usually the start of the primary. The "G" lead would be the one on the end of the secondary winding, as this is farthest from the inner or primary winding, as explained later.

Some markings on the different makes of coils differ, but the majority of them have the markings "G," "F" minus, "B" plus and "P." The "G" naturally stands for grid. When using an antenna coupler or radio frequency coil, it is better to attach the lead going to the grid of the socket to the start of the secondary winding, as shown in Fig. 1. The object of this is to keep the grid away from the being affected by any capacity from the primary. However, in the three circuit tuner shown in Fig. 2, the grid lead is attached to the end of the primary winding as the tickler coil tuning affects it more than the primary in this case.

Other types have two spiderweb coils, one for each winding, such as the Buell antenna coupler. This makes practically no difference where the lead to the grid is attached on the secondary, as both leads on the secondary are separated from the primary coil. The Gen. Ral. is marked as well as the three circuit tuner. The Ellis "Dee" coils are the nearest one to our standard "Dummy" coils illustrated, and the posts on these are marked.

Fig. 2 illustrates the dummy three-circuit tuner shown in our diagrams.

The two leads from the tickler of the three circuit tuner shown in the illustration are attached to the tickler shaft. One is shown in dotted lines representing the lead on the other side of the coil. These leads are not labeled and it is best to experiment by changing the leads first one way and then reversing them and find which way the reception is best before attaching them permanently. The main use of describing the coils as the start and end of the windings in the diagrams and the description of the wiring is to make it easier to follow.

The thing to remember on any coil is the "G" lead should always be farthest from the primary, except on three circuit tuners, in this case the "G" lead is farthest away from the tickler.

SIZE OF WIRE TO USE

The size of the wire used in radio construction work is of importance. Generally speaking, SMALL wire is best for the high frequency (radio) currents, and larger wire for the battery currents. The LENGTH of the leads employed has much to do with the size to be determined. The longer the lead in a BATTERY conductor, the larger the wire should be up to a certain point. This is because of resistance that is set up which causes the wire to "heat up." A heated wire has reduced conductivity. Increasing the size of the wire will remedy the trouble. Battery leads in a set should be from No. 16 to No. 18 in gauge. If the lead from the set to the batteries is not more than six feet, this same size wire may be used there. If longer, increase the size of the wire from the set to the batteries, otherwise there will be a voltage drop at the delivery point, which is the vacuum tube. Because of this possibility it is always best to test battery voltage with a voltmeter placed near the TUBE instead of at the battery, as is commonly done. Where the wire is to conduct or carry a radio or high frequency current an entirely different situation exists. In battery currents the energy travels over the conductor in the center or "core." In the radio currents the energy travels on the outer surface of the conductor, or by the "skin effect." Because of this there is more actual surface for the radio currents to travel over in a given size of wire than there is in the case of the battery current which uses only the "core." No. 22 to No. 26, therefore, makes a good conductor for the radio currents. Primary wires, therefore, can be wound with small wire with better results than with the same wire used on the secondary wire. Also, by the same token, leads that carry radio currents (all leads except battery leads) can and should be of the same gauge. You're welcome.

TWO KINDS OF DIRECT CURRENT

There is a CONTINUOUS direct current and a PULSATING direct current in a radio receiving set. The current supplied from a battery is a continuous direct current. The portion of the high frequency alternating current, which the radio wave is when it comes into the set from the aerial, is rectified by the detector tube and becomes a pulsating direct current, because there is an interval of time between the rectified half of each incoming wave, due to the fact that the other half is not rectified. You're welcome.

MAKE BEST CONDUCTORS

Good conductors in radio are those materials which have the least amount of resistance to electrical currents and permit the free flow of the same. In the order named these materials make good conductors: Silver, copper, brass, gold, aluminum, zinc, platinum, iron, nickel and tin. A solid SILVER wire, therefore, would be the best material to wire or hook up a set with, while solid TIN wire would be the least efficient. You're welcome.

MEANING OF RESISTANCE

A "resistance" in a radio set is some material through which an electrical current is conducted, but which refuses to permit a free flow. The following metals make good resistances, their value being in the order named: German silver, platinum silver, manganin, mercury and graphite or carbon. Ordinary solder used in construction or wiring work is a weak resistance and its resistance is increased by the amount used. Small wire offers more resistance than large wire. You're welcome.

Your Questions Are Answered Here

An Expert Aid for Those Troubled in the Construction and Operation of Sets

QUESTIONS can be answered only by mail. Write your Query on only one side of the sheet and enclose diagram of your circuit whenever it will aid us in locating your trouble. Enclose a stamped and addressed envelope. Address all letters for this department to the Question and Answer Department, care of this magazine. Use separate sheets of paper for messages to each department. Write with typewriter or ink. Supply us with complete information, but make your letter as brief and to the point as possible. Do not write a lengthy description and tell how many stations you have heard. Get to the point of your trouble at once. QUESTIONS CANNOT BE ANSWERED OVER THE PHONE. This will aid us considerably in serving you quickly.

Transformer Troubles

5303—CHICAGO, ILLINOIS: I am a constant reader of your weekly and a great radio phan. A couple of weeks ago I purchased a set of Melloformers and installed them in my set, but they did not deliver volume enough on the locals even for the speaker on my five-tuber, and barely enough for the phones on the last stage.

I thereupon took the set to the Radio Doctors, who returned set to me wired practically as I had wired it and pronouncing set and transformers O.K. Thinking it might be batteries or tubes when I again failed to obtain any results, I bought new "B" batteries, and a set of Red Top tubes, but results are the same and I am now at my wits end to find what is the trouble. Can you help me out? I do not know your street address, but I will be glad to hear from you in regard to what ails my set.

I had Hedgehog transformers, ratio 4-1, before I installed the Melloformers and got a world of volume and excellent distance in all directions with the set on silent nights, although I do not have much success on other nights, but am able to separate all the locals satisfactorily. Since I put in Melloformers am not able to get either distance or volume. I believe that both I and the so-called experts have overlooked something, but I cannot for the life of me locate what it is, so I am sending you this S.O.S. as I believe the Melloformers hard to beat on either tone or volume when everything is properly installed.

If you get more selectivity and volume from the Hedgehog transformers, then why not put them back in the set? Just to say your set does not work gives us no clew to aid you.

Possibly you do not have the proper aerial system. If the set was tested out O. K., then your trouble must be with the aerial. We recommend an outside aerial of about 135 feet, including lead-in, all in one straight line.

Perhaps there is some defect in the transformers. A test will enable you to know if the trouble lies within these parts.

—

No Regeneration

5299—ROCKFORD, ILLINOIS: I built a four-tube set as described by you in your September 26 issue.

I do not get any volume from it. I have checked the wiring several times, so I feel sure that it is right. I am using Buell tuner, Buell antenna coupler, Buell .00025 condenser in tuner circuit and a .00035 condenser with the antenna coupler. Transformers are Multistage Meloformers. I am using UV-199 tubes with a four-volt storage cell type. My "B" batteries are new and my tubes are new.

Moving the tickler coil has no effect on volume. I have changed the tickler leads. When tuning I do not get a whistle, but just run on to the station as I move the dials. Adjusting the rheostats on radio frequency tube or on detector have no effect. I am using a 25-ohm rheostat on the radio frequency tube and a 25-ohm rheostat on the detector tube. These are Howard rheostats. I am using a 30-ohm Yaxley with the two audio tubes. There is no noise in the set and what I do hear is clear.

Perhaps you do not have enough aerial to give you the volume desired.

You mention two different sizes of condensers. Are you sure that they match with the coils they are to tune? If not, this will cause some trouble.

If there is no noise in your set, the noise that precedes getting a station, you do not get regeneration right, and something is wrong with the tickler coil. This coil should have from 19 to 21 turns on it.

—

All Wave Set

5304—CHICAGO, ILLINOIS: I have a five-tube Fada Neutrodyne, through which the music comes spasmodic, then very low, then boisterous. I have checked for loose wires, but do not find any. Can it be my transformers? The set also seems to have a peanut stand whistle in it at times, but this is only at intervals.

I have wet "B" batteries which have given me no trouble, giving them a charge every thirty days, keeping gravity reading above 1200.

My set brings in very little distance and when I have a DX station I have so much distortion, I have to shut them down and be content wtih local reception.

Kindly advise what changes could be made to get better results.

Can your All-Wave set of four tubes be made into a five-tube, and could you furnish blueprints?

In your neutrodyne set your neutralizing condensers are not properly adjusted, or, are at fault.

The fine peanut whistle comes from an improper condenser across the first transformers. When you get it properly adjusted you can bring in distant stations very well.

We have given a description of an all wave circuit, 4 tubes. We do not have it in 5 tubes. We have no blue prints of this set. The only difference in an all wave set from a regular set is that the coils are interchangeable for getting higher as well as the lower meters. There is no difference in the hookup. The General Company is making parts for this kind of a set.

—

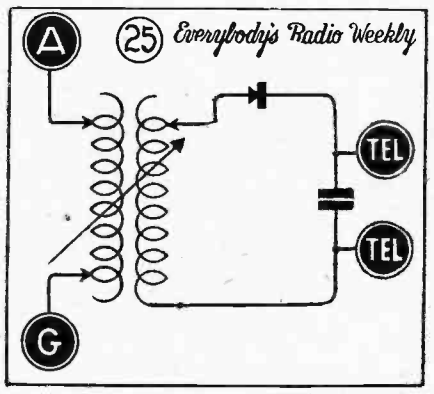
Reflex and Superheterodyne

5318—CHICAGO, ILLINOIS: I have an eight-tube Superheterodyne which I have had for nine months and have always had long distance from coast to coast, but for the last month I have been unable to pick up any long distance stations. I can not pick up anything but stations within the city limits. Can you give me any information as to what might be the trouble? This set works excellent on local stations without either aerial or ground.

I also have a five-tube Acme Reflex, using the Acme D-coil, and this set has no selectivity; can only pick up stations KYW, WGN and WQJ—just these three stations, and can not get any distant stations at all on this set. Can you give me any information as to what might be the trouble with this set?

If you have had a superheterodyne which has worked for many months, and then fallen down, you may look for your trouble in either the tubes, batteries or aerial. The aerial, if you are using an outside one, may have become coated and formed a ground. Your batteries may be low. Your tubes may have run close to their life.

We could not tell you what is your difficulty with the reflex set. Usually the difficulty in selectivity comes from improper coils. The proper setting of coils will give selectivity.



5151—ST. LOUIS, MISSOURI: I would like to see a circuit for a crystal set that would be selective on locals.

A very selective circuit for a crystal set may be obtained by using a loose coupler as shown in the diagram.

—

Five Things a Set Must Do

5319—NASHVILLE, PENNSYLVANIA: I read with a good deal of interest about your new hook-ups and the things they accomplish. I have been using a Gilfillan Neutrodyne for the last year and have been getting splendid reception compared with what I hear from other sets, but I do not get the distance nor the selectivity you seem to get. I have hoped to be in Chicago before this and listen to some of your demonstrations but I have not been able to be there.

For several weeks you advertised that you would wire up any of your sets. I have not noticed this in the last few weeks. Do you still build sets?

I was interested in the performance of your six-tube sets in your issues of December 26 and January 2. I am too much of an amateur to try to build one of these sets, but, like most radio bugs, I would like to have a set that will do the five things best that you claim for the set of December 26. As these are the five main points in radio reception, do you think one of these sets the best you know of at this time, for this purpose? I know very little about radio and I would not want a set that I would have any trouble in learning to tune.

Our Service Department is again in action, and is able to build a set for anybody who wants to have one built.

A set built up for a certain purpose will do that work better than any other set. It is just like a roadster automobile and a touring car. They both get to the same place, but they do not carry so many passengers. The same way with sets. One set will do one thing that another one can't do. It is very difficult to give you a hookup for a set that will do everything that you want it to do.

—

Superhetrodynes

5305—CHICAGO, ILLINOIS: I have built a three-tube regenerative set, and also a link circuit, and have had splendid results with both of them. I am convinced that any set which you recommend is all right, and I am writing you in regard to the Silver-Marshall superheterodynes.

I intend to build a superheterodyne and would like to know which one is best in regard to selectivity, volume, DX and tone quality, the seven-tube or the eight-tube?

The set must have fair tone quality and fairly quiet in tuning and in operation, that is, when a station is being heard.

Can I buy the blueprints for the eight or seven-tube superheterodyne from the Silver-Marshall Company?

Can Pacific and Atlantic coast stations be tuned in in fair weather for radio on a 24-inch square loop aerial?

I am quite determined to build a super, and would be much obliged for your opinion of the Silver-Marshall superheterodynes. The number of tubes in the super is no objection, as I have storage "A" and "B" batteries, and a charger.

We are not making selections of any special set for our readers. We would much rather have the readers select their own sets. The Silver-Marshall superhet is very good. However, we do not handle the blue prints. They may be secured direct from the Silver-Marshall people, 105 S. Wabash Avenue, Chicago.

A loop is never so good for getting distant stations as an outside aerial. You will not be satisfied with the reception on one. We recommend an outside aerial of at least 135 feet, including lead-in, all in one straight line.

—

Tubes Run Down

5298—CHICAGO, ILLINOIS: I'm a constant reader of your magazine and I have built the five-tube Lossless last winter, and had wonderful results. It was easy to get through locals at all times. This winter it is not so good and it tunes very broad. I purchased a set of your blueprints last February. Please advise for better results.

If your set worked right a year ago, it should do the same thing today. Your difficulty must lie in the fact that your tubes are getting old. Probably your aerial has become coated and furnishes a leak to the ground.

These are the things that go to make up for inefficiency in a receiver.

—

General Information

5320—CHICAGO, ILLINOIS: Could the four-tube Knockout set be built on a 7 by 21-inch panel by mounting some parts on the base instead of the panel? If so, how would you accomplish this? Would the set work just as efficiently?

Could the Gen-Ral antenna coupler and three-circuit tuner with Crest condensers be used in place of the Silver No. 205 coil, Silver No. 105 coupler and Silver No. 301 condensers?

Is the use of one rheostat for all four tubes as satisfactory as having the detector on a separate rheostat?

You can do most anything you want to in building a set, but if you want results, follow the directions closely. If the set calls for a panel more than 7 by 21 inches, then use the right one, and do not try to mount your parts differently.

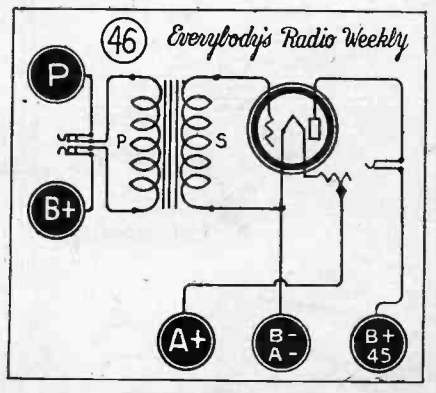
You can use the General antenna coupler and Crest condensers if you choose to do so. Just be sure that they match. You can control the oscillations in the detector tube much better if you have it on a separate rheostat.

Volume in Set

5291—SOUTH HAVEN, MICHIGAN: I am writing you for suggestions as to why my radio won't give me loud speaker volume using a Baldwin adapter for my Brunswick phonograph. I am using the following parts in my set: Barret-Paden condenser .00025; Gen-Ral three-circuit tuner; two-meg. grid leak (Daven); two Karas Harmoniks; .001 fixed condenser across the P and F- of first audio trans.; three UV199 dry cell tubes; two Bradleystats.

These are hooked up according to the Wells Link Circuit as of EVERYBODY'S RADIO Weekly, Nov. 21—without the link. Aerial is 135 feet long; ground is fine. Using phones I have logged clearly over 125 stations, running from KFWB, KFI, KPO to WBZ and Canada. Certainly is most selective and of a delightful tone on phones. Batteries are A1. What do you think can be wrong? Any suggestions will be appreciated.

You had better look into your dry cell batteries on the tubes. It is quite possible you will find your difficulty in the set not giving volume in that you do not have sufficient voltage on the tubes. Dry cells may test the voltage correctly, but when they are put on the tubes they are soon run down, and they are not getting the voltage you think you have on them.



A great many readers ask for a hook-up to add a stage of audio frequency to their present one-tube three-circuit set. In the illustration is shown a schematic of this circuit. The parts necessary are an audio frequency transformer, tube socket, tube, two phone jacks, one a single circuit and the other double, and a rheostat. The illustration plainly shows how the stage is added to a set

—

Loop on Lossless

5311—GARY, INDIANA: Can a loop aerial be used on the six-tube Lossless? How would connections be made? What loop do you recommend? Personally, I prefer an outside antenna, but the party wanting the set with a loop has different ideas, so if you can give me the necessary dope I will try and make a set for him that he will be proud of.

A loop aerial can be used on the Lossless set, but you will not get very much distance by using it. Make the connections from the loop direct to the ground and aerial connections on the set.

We recommend an outside aerial of at least 135 feet, including lead-in, all in one straight line. We do not recommend any special loop. There are several good ones on the market. All those advertised in our magazine are recommended to our readers.

—

Ultra Audion Tunes Broadly

5310—CHICAGO, ILLINOIS: I have built a one-tube Overland circuit, a form of the Ultra-Audion, using a 43-plate variable condenser and a wooden variometer. Why must I put an .001 phone condenser across the phones in order to receive wavelengths over 400 meters? I am using fresh batteries, 22½-volt "B" and three dry cells for a UV-199 tube. Why should this set lack so in volume? Can the volume be increased without adding more "B"?

My set is about two feet away from the telephone. Many times I can hear parties talking through the earphones, while my tube is shut off. Why is this? Would the steady hum in my receiver be due to this situation?

I have at hand two variable condensers, 43 and 23-plate, and a variometer. Can you give or sketch me a circuit to which these parts can be adapted, without the expense of additional apparatus?

Although I know my parts are rather obsolete, I am trying to make use of them.

Naturally, you will not get volume from the old Ultra-Audio circuit. It cannot be very well used with the present-day broadcasting. Usually, the condenser must be placed across the phone posts to get clear reception.

The 199 tubes require 45 volts on the plate. This is one reason you do not get volume.

You get the talk from the telephone

by induction only. No doubt, you get the steady hum from the telephone lines, also the induced current from other sources.

If you have 23-plate condensers you can use them with the newer coils provided you get the ones that will match them. You can not match a 43-plate condenser. The variometers are of no use in circuits of today.

Best Apparatus to Buy

5315—CHICAGO, ILLINOIS: I will be more than pleased if you will give me the following information: I would like to know the best R. F. transformer on the market. I want to know the one that tops the list as my opinion about your magazine stands ace high, barring none.

I would like to know the size of the form to wind it on, the material to use for the form, the size of the wire to use for the different windings, and the different amount of turns to use for a .0005 condenser and who manufactures the best one—as I am quite sure that you know. I want it to cover the wave band to 600 meters.

I am still 100% for your magazine, and also a booster.

There is no BEST transformer in our estimation. There are many transformers, and they are all good. We are not placed in a position to even tell you what we would use. All transformers advertised in our advertising columns are good ones and will work equally well.

You can buy many coils that will match a .0005 condenser. There are quite a few on the market that will match this condenser.

It will depend on the windings of the coil to reach 600 meters. Coils having 10 turns on the primary, and 45 on the secondary, are about right for getting these meter lengths.

Parts for Link Set

5312—CHICAGO, ILLINOIS: I have a three-tube "Everybody's Radio" set, using the Bremer-Tully three-circuit coil and a Union Hardware .00025 Low-Loss 11-plate condenser. I am thinking of building the Jim Wells Link circuit. Please advise me what additional parts to buy to match up with the parts I have on hand. Do you consider the Link circuit better than any other of your hookups? The Bremer-Tully coil I have is rewound according to your instructions.

It does not make much difference what coils or condensers you use in the building of the Jim Wells Link circuit. The coils and condensers must be matched, that is all.

If you will look over the Link circuit you intend to build and check off the instruments you now have on hand, you will note the remaining parts needed in the set.

Baseboard Measurements

5302—CHICAGO, ILLINOIS: I noticed in EVERYBODY'S RADIO Weekly of December 19, 1925, the Jim Wells Link hookup, using Ambassador parts. I would like to build this set as per layout. Please let me know if the baseboard is 9 by 25 and panel 7 by 21, or is this a mistake in the print?

The baseboard as given in the list of parts should be 9x20½ inches. The panel is 7x21. No baseboard measurements were given in the list of parts, consequently there was no mistake in figures. The baseboard should be a little bit shorter than the panel.

Condenser Value

5293—CHICAGO, ILLINOIS: I am a subscriber of your paper and I am contemplating the building of your four-tube "Jim Wells Link" set. I have three .005 23-plate Karas Arthometic SLF condensers. Kindly recommend antenna couplers and three-circuit tuner to use with them; also about what is the Milliampere consumption on the four-tuber and about how much more for three tubes of resistance coupled audio frequency instead of two stages of transformer coupled audio?

In your letter you state that you have three .005 or 23-plate condensers. You are mistaken as to the capacity. It should be .0005. About the only tuner that will work with these condensers is the Ambassador. You will require 20 milliamperes for the 4-tube set. It will take more for a 3-tube resistance coupled audio frequency.

Parts of Receiver

5308—CHICAGO, ILLINOIS: Have been a reader of your radio weekly for over a year and it sure is the best there is in radio. I have made several of your sets. I have now completed your five-tube Lossless, model 19, about which I wish to ask a few questions.

I bought one of your blueprints. The hookup is O.K. I am using three Ellis D coils, .00035 capacity, and three Bremer-Tully 17-plate 350 MMF. condensers. The rest of the parts are listed by you.

Will the D coils work O.K. with these condensers? What capacity are these condensers? The set is O.K. on DX, but not selective enough on locals, when WENR comes in near KYW.

I have a 135-foot aerial with lead-in. Would different condensers or coils make it O.K.?

Your 17-plate condenser should register .00035 capacity. The marking 350 MMF. means 350 micro micro farads, or .00035 capacity. The coils should work all right with these condensers. If the set is built right you should have no trouble with selectivity. You must have a proper length of aerial. We recommend an outside aerial of 135 feet, including lead-in, all in one straight line.

Too Much Oscillation

5288—ST. LOUIS, MISSOURI: I have the following parts, most of which were received as Christmas presents Three Bodine twin-eight coils, three Amsco .00035 SLF condensers, five Bremer-Tully sockets, two meloformers, one grid-leak and condenser, one battery switch, two Yaxley rheostats; also other necessary parts.

I have mounted these parts on a 7x21-inch panel and a ten-inch sub-panel, as I have a 7x21-inch black walnut cabinet, using your five-tube Lossless hookup. I get so much regeneration or oscillation that it is almost impossible to get even a local station and enjoy the program. Can you give me any help as to cutting out this squealing. I have been operating a "D" coil set which I made two years ago, using old style 43-plate condensers, and have no trouble with that set squealing at any time, and cannot figure out why this new one should produce so much noise.

If there is too much generation in your set it is because you have too much battery current. The trouble is not in the mounting of your parts, or your location, providing the "D" coils are set at about 5 or 6 inches apart. Your high resistance unit may not be working right. This resistance controls the oscillations in the radio frequency tubes.

Selectivity in Set

5306—KANSAS CITY, MISSOURI: I am a reader of your weekly and find it a very good radio weekly. But I have built your model 6C 100% Low-Loss three-tube set and have checked it all over and find everything O.K. I have used all parts that you have listed for set and have not got good results out of it.

I cannot tune out locals. They come in anywhere on dial and cannot tune them out. I cannot separate the locals and all DX stations come in very weak, and I am using every part that you have listed for set.

The matter of selectivity depends upon the aerial length and the setting of the primary coil on the tuner. The farther away the setting of this coil from the secondary, the more selectivity you will get, but it will reduce your volume a little. There is a certain point in which this primary can be set that will give you selectivity and distance at the maximum. The outside aerial should be 135 feet long, straight line to the set, including the lead-in. You can not deviate from these rules in radio and expect to get much out of a set.

Ultra Audion Set

5242—CHICAGO, ILLINOIS: I have a three-tube Ultra Audion and cannot get rid of WENR. It comes in all over the dial. Can you please tell me a way to remedy it? I use a variometer to tune the stations in and a 23-plate condenser to clear it. It is a very good set and brings in distance fine. I cannot get the WSBC, for it is too low.

We find that the old sets of the Ultra Audion type can be cleared with the use of the Jim Wells Link unit placed in front of the set. This is about all you can do with such a set. The older type sets tune very broad.

Ellis D Coils

5264—CHICAGO, ILL.: I have built the five-tube Lossless set but have just a little trouble with the coils and condensers. I get two stations at once. I am using Ellis "D" coils and Barrett and Paden condensers of .00035 capacity. What are the numbers of turns required for the .00035 condenser? The number of turns on the coils I have are 55 and 12. When I bought the coils the gentleman told me it would not cause any trouble at all.

You have the proper condenser with the "D" coils. They are wound with the proper number of turns. They should work well in the "Lossless" set.

Are you sure you have followed the hookup in every detail? Check it over and see if you are right. You may have some loose connections.

Rheostat Ohmage

5261—CHICAGO, ILL.: I wrote to you a few days ago, about a five-tube, dry cell hookup, using 199 type tubes. I have received the hookup in good shape and thank you for them.

But what I really want to know is, what type rheostats, and what resistance they should be? Also what resistance is to be used in the place of No. 21 in your five-tube hookup on page 5 of your October 31, 1926, magazine.

In using the 5-tube hookup there are no changes to be made for the use of 199 tubes. In using rheostats for the dry cell tubes, if one tube is used on one rheostat, use about 40 ohms; for two tubes on one rheostat use about 30 ohms; with three tubes about 25 ohms, and with four or five tubes on one rheostat use 15 ohms.

How to Do This and That in Set Building

How to Tin Iron

A soldering iron must be clean and hot. If oxide forms on the iron, solder will gather in globules and will not flow freely or evenly. File off the oxide with a coarse file until the copper point is clean and smooth. Then tin it with acid flux. This consists of muriatic acid into which a piece of zinc has been dissolved until the acid will take no more. Dip the iron tip in this and coat it with the solder. Then be sure to wipe off the copper so that all traces of the flux are removed. Coat the copper again with the solder, repeatedly running an old file across the surface, first putting on the solder and then file until the iron is covered smoothly with the solder. It is then ready to use.

—

Tube Protects "B" Battery

There is no necessity of disconnecting the "B" battery when the set is not in use. There will be no discharge as long as the filament of the vacuum tube is not lighted by the "A" battery current. This is because the tube is not a conductor of electricity except when a stream of electrons is flowing through the heated filament.

It is the heat in the filament and not the potential across it that causes the emission of the electrons. When lighted the tube is a lively piece of mechanism. When cold it is quite dead and almost a perfect insulator. The high resistance in the unlighted tube effectively prevents the discharge of the "B" battery.

—

Use Round or Square Bus Wire

Bear in mind that electrically there is little choice between the two kinds of bus wire. However, when we use bur-bar wire at all, which is often, we prefer the round bus wire, because it is easier to handle. The round bus wire can be bent in any direction, but the square bus wire makes a neat job only when it is bent at right angles to the square sides.

It takes a much longer time to cut and bend the square type of wire than it does with the round, and when your job is completed its general appearance is the same, regardless of the kind of wire that you have used.

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Connecting "B" Battery Switch

Remember that in connecting a "B" battery switch to control the various voltages on the "B" battery it is advisable to use twice as many switch points as there are taps. This is necessary because the switch lever will cause a short circuit between the taps as it is momentarily moved over the gap between them if no such spacing arrangement is used.

If only a few variations are required an inductance switch of the one-hole mount type that are on the market is advisable as it has a one-hole mount and the spacing is already arranged for:

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Test for Bad Grid Leak

If you are using a variable grid leak and find that it has no effect upon the operation of the set, you can take it for granted that it is defective and it should be replaced with a good one. If you have a fixed grid leak and it is of too low a resistance, it will affect the volume of the set. If, on the other hand, the grid leak resistance is too high it will cause a "ticking" which will be noticeable. Interchange fixed grid leaks until you get the maximum volume without "ticking."

—

Construction of Microphone

The phone used for sending out radio broadcasts is not like the ordinary desk transmitter. It consists of a mouthpiece to catch and direct the sound wave, a flexible metal diaphragm and two carbon granules. One of the carbon buttons is stationary, but the other is connected with the diaphragm. When the diaphragm vibrates, the carbon granules are alternately packed more tightly and more loosely together, thus providing a better electrical circuit and varying the amount of current.

Things to Avoid and Things to Do for Radio Phans Who Construct and Operate Their Own Receiving Set

One Way to Ruin Head Phone

Don't follow the example of the phan shown testing his head phones in the manner indicated in the accompanying photo. It is quite likely that he will get a loud click which will ruin them, for they are delicate things to experiment with. However, the kick he will raise when he finds out that the phones are spoiled will be much louder than all the clicks and clucks combined. There are usually only six volts in the average storage battery, but this is sufficient to injure the delicate wire with which the phone magnets are wound.

When the phones are used in a circuit only one side of the battery circuit is connected to them, the other side comes from the plate. It would appear that the phones could stand a high voltage, but this is not so for a direct flow of ninety or more volts do not pass through the phones.

Testing Battery Polarity

If you are in doubt as to polarity of either storage or dry "A" battery, insert both wires in a glass of strong salt water. Bring close together but not touching each other. The negative lead will become coated with bubbles. Trace leads to binding posts. From positive "A" on binding posts trace through rheostats to positive on tube sockets.

If incorrect reverse them. Polarity test may also be made with a voltmeter. Indicating needle on voltmeter will turn to the right (clockwise) when positive (+) lead is touched to positive post of the battery. If it turns to left, reverse voltmeter leads and try again. This polarity test applies alike to "A" and "B" batteries.

—

Poorly Insulated Condensers

Bear in mind that condensers may be poorly insulated. Fiber ends on condensers are subject to leakage and cause trouble which is hard to locate. Use only condensers with bakelite insulation.

—

Reflex Circuits Economical

It is generally conceded by radio engineers that the reflex circuit is probably one of the most economical circuits known at the present time in that the tubes are called upon to do double duty, first as radio frequency amplifiers and then as audio frequency amplifiers. In some reflex circuits a crystal is used as the detector while in others a vacuum tube is used for that purpose.

The crystal detector is the more economical method as it saves the cost and maintenance of one tube and gives signals that are almost a faithful reproduction of the original, the crystal being practically distortionless.

—

Testing "B" Battery

Never test "B" batteries with a pair of pliers by short circuiting them to see if you get a spark. This would be ruinous to even a new battery. Use a high-resistance voltmeter, and even them, leave the voltmeter connected only long enough to get a reading.

A 22½-volt "B" battery should be dispensed with and replaced with a new one when the voltage drops as low as 16½ volts. Replace the 45-volt size when it drops to 33 volts. This will insure better reception for you.

—

Makes Panel Marker

Many home builders scratch the panel to make a marker for their dials so that they may obtain a reading. Instead of making a vertical line, as is customary, a little round circle may be made with the point of a drill. This may then be filled in with a little white lead or any white paint to contrast with the black panel.

Variable Condenser Critical

The proper capacity of the variable condenser is very essential. This unit determines in the majority of circuits the wavelength range of the set, and if it is not exactly right will prevent the set from receiving on these wavelengths that the capacity of the condenser will not cover.

If your set will not receive high wavelengths, increase the condenser capacity; if it will not receive low wavelengths, decrease the capacity.

—

Grid Leak Is Important

As a usual thing, the grid leak either does not get enough attention or else it is constantly being charged. It should not be touched unnecessarily, but some arrangement should be made so that different values of resistance may be employed when necessary. For local stations a comparatively low resistance leak should be employed so that the surplus charge may readily leak from the grid. However, when distant stations are being tuned in, the signal strength is low and a low resistance grid leak would lose almost all of the energy.

—

Watch Lead-in Insulation

Remember that your lead-in should be well insulated and kept distant from the sides of the house along which it is brought down to the receiver. It should not run adjacent or parallel to the other current-carrying conductors of any kind.

At the point of entry into the home great care must be exercised; if the wire is bare (without any covering) it should be passed through a long porcelain tube or brought into the house by some other insulating medium. Under no condition should the barb wire touch any part of the building. After the wire is brought into the room, it should be run to the antenna binding post in the most direct path with the minimum of twists or turns.

—

The Use of "C" Battery

The "C" or bias battery is a very useful addition to the amplification stages of the average set as it improves the operation and also reduces the drain on the "B" battery. If the "B" battery has a potential of less than forty-five volts, the "C" battery is unnecessary; for a sixty-volt battery the "C" should be about three volts, and for a ninety-volt "B" battery the bias should be about four and one-half volts. It is connected with the negative side to the negative leads on the transformers and the positive side goes to the negative filament lead of the set.

—

Single Circuit Tuner

The chief complaint against the single circuit tuner is that it is too broad in tuning and is not selective enough. One broadcasting station is all that is desired at one itme, and that without interference from code transmitting stations. The three-circuit tuner has the advantage of being able to select the station to be received without so much interference from other stations, but this advantage is gained at the sacrifice of simplicity of tuning.

—

Best Wire for Aerial

Use only best quality 7-strand No. 22 bare or enameled copper wire for the antenna and No. 14 rubber covered copper wire for the lead-in. Use high-grade insulators, porcelain entrance bushing and some approved type of lightning arrester or switch. If the enamel wire is used, be sure to remove all the enamel before you attempt to make a solder connection.

—

Proper Filament Current

Use no more filament current than is necessary. The best reception is often obtained when the rheostats are at the minimum and the signals are still audible. It will help in clearing up DX to burn the tubes at their lowest point as the outside noises are not amplified to be bothersome. The noises that some people complain about are all in their sets and if the tubes are burned low a lot of this noise can be eliminated.

Phorum for Phans

Readers of EVERYBODY'S RADIO Weekly are invited to express their comments and opinions on timely subjects of general interest through this department. There are no restrictions except that you must write on ONE SIDE of the paper only and you should confine your remarks to a legitimate discussion of subjects of general interest. The editor assumes no responsibility for the opinions of those who contribute to this department. Address your letters to Phorum Editor, EVERYBODY'S RADIO Weekly.

Superlatives Can't Be Found

Mr. Walter B. Redmond, 1819 N. Austin Avenue, Chicago, Illinois, is a booster when it comes to changing readers over to building EVERYBODY'S sets. He says:

Suffice it to say I am a reader of your most wonderful magazine. In fact, it is the only magazine that I can get up enough interest to read. I enjoy its contents and its individual way of putting things. I have converted many a phan to your magazine, which is no fault of mine. The first copy of your paper will convert almost anyone. I call your attention particularly to a phan whom I work with. He had his mind set on building a Bremer-Tully Counterphase Six, I showed him a copy of your paper and called his attention to your "Link Receiver." It took me some time to get him interested in it. He bought the parts, put it together, and you should hear him tell the world about the "Link Receiver." Superlatives can not be found to express the results he has had with it.

When a booster gets his friend to build a set from our plans, he is doing some real good work, especially in a case where sets work to the satisfaction of the builder. We always like to see our hook-up get into the hands of experienced builders. We know results are sure to be satisfactory.

—

Satisfied Reader

O. S. Seidel, 3452 Beach Avenue, Chicago, Illinois, tells of the satisfaction and pleasure he derives from reading EVERYBODY'S RADIO in a letter:

You have helped others with your knowledge and experience in radio and seem inclined to keep up the good work so I am sending herewith my "S-O-S." I shall certainly continue to boost your magazine more than ever. The fact that I am leaning toward your hookups and writing this, indicates the pulling power of your paper. Those to whom I have recommended your magazine have expressed to me their satisfaction and pleasure.

A thing well told gains favor, and if the thing told about interests the reader, then the combination results in satisfaction. A satisfied reader is a booster always.

—

No Pay for This Service

Geo. M. Klaw, 5539 S. Honore Street, Chicago, Illinois, writes back to our "Question and Answer" department after receiving an answer to his letter of inquiry:

I wish to thank you for all the trouble you went to in answering my questions. Really, words can not express my appreciation of this service. I have four questions to be answered and then I will be all set to fix my set. I feel somewhat embarrassed to have you answer these, as I have written you twice. I would like to pay for this service, as I do not expect this service as gratis. Will you kindly let me know what I owe you for this wonderful service?

You do not owe us a cent for our free service helps. They are given to you gratis. We know that when a fellow gets real service he will always be a booster and we gain by an added member to our family of readers.

—

Odds and Ends

W. L. Suttie, 6246 Giddings Street, Chicago, Illinois, writes a few lines in his letter in this manner:

I am a reader of EVERYBODY'S RADIO, and I have built "Everybody's Friday" three-tube set. It's a dandy. I read with interest your many little hints, how to do this and that, care of batteries, etc., and I am very grateful for this information.

It's the odds and ends that help. When you want to know how to do this and that read it from EVERYBODY'S pages.

—

Everybody's Crystal Set

W. M. Snyder, 321 Chadwick avenue, Newark, N. J., has had good results with the Link Circuit Crystal Receiver. He says:

I tried your crystal set and was much surprised to find I could separate almost all of the stations in this section. In fact, it worked better than the tube set I tried.

Here comes a boost for Everybody's Crystal Set. Not much to the making of this set and it works well on locals. We do not see why that many phans do not make up and use a crystal set. It costs nothing to operate and it is clear in tone and the Link makes it selective.

Link Circuit

Edward Flammang, 3042 N. Racine Avenue, Chicago, Illinois, heard the Link Circuit and this is what he says:

Have enjoyed your publication for many months. I am greatly interested in the Jim Wells Link. I have heard the link on a Pfanstiehl tuner and think it worked wonderful.

When built right the Link Circuit cannot be beat for volume and distance.

—

Wants Every Copy

James Piagari, 1224 N. Laramie Avenue, Chicago, Illinois, expresses his opinion about EVERYBODY'S RADIO in a letter as follows:

I just want to tell you that I have moved so please mail my EVERYBODY'S RADIO Magazine to my new address, from your next issue on, as I do not want to miss a copy of your book. It sure is a wonder and can't be beat for the information I get out of it. I can't understand how other folks can do without it.

There is no need for anybody to be without EVERYBODY'S RADIO. The price is very reasonable.

—

Up-to-the-Minute News

G. Gaylord, 808 Golf Lane, Wheaton, Illinois, says only a few words in his letter, but those words are to the point. Here they are:

Enclosed find check for $2 to cover one year's subscription for EVERYBODY'S RADIO. I derive a great deal from your weekly and highly recommend it to any phan who desires up-to-the-minute radio news.

Boosting EVERYBODY'S RADIO in this manner helps a great deal. Keep it up, Mr. Gaylord.

Questions—Answers

Condenser in Link Circuit

5294—CHICAGO, ILLINOIS: On account of having a Bremer-Tully "Nameless," I purchased B.-T. parts for your Jim Wells Link unit, composed of the following: 1. B.-T. 13-plate condenser. And I did not Core transformer, adjustable primary. 3. B.-T. 12-plate condenser. And I did not get results. Maybe No. 1 is wrong in your unit.

We could not exactly state where your trouble lies in the construction of the link unit.

We are not familiar with the Micro-Mike condenser. If it is made properly, it should work all right in the circuit. However, we would advise you to use the X-L or the St. James. We have tested both of these in the circuit, and find them to be of the right capacity.

You should have no trouble with this set if it is built properly according to directions.

—

Capacity of Condenser

5301—CHICAGO, ILLINOIS: I would be much obliged to you if you would send me a hookup of a "tuned radio frequency unit," also how to wind the coil. I have a Webster 17-plate condenser. I think it is a .0005 and I should like to know if I can use this condenser?

If you desire to build a regular radio-frequency coil to match your 17-plate condenser, you will need 10 turns on the primary, and 55 on the secondary. The Webster 17-plate condenser is of a .00035 capacity.

—

Hum in "B" Eliminator

5317—CHICAGO, ILLINOIS: I am enclosing a diagram of a "B" eliminator that I got from a friend. I built this eliminator and it supplies enough voltage, but there is a hum in it. When locals are on, they drown out the hum but the reception is quite rough and of course the hum is the reason I cannot get distance.

I am sending the diagram to you, hoping that you can suggest some way, by making a better filter system or some other way, to cut out the hum. I hate to discard the eliminator as it is very much more economical.

We have not been able to find a "B" eliminator that can be used with such success in a set. Every one of them will give some sort of a hum that you can hear in the phones or loudspeaker.

There is no way that we can suggest that will help you in any way. We have made many tests in our laboratory and find no possible means to eliminate the hum.

Readers' Free Service Bulletin

Everybody's Radio Free Service Station is conducted for the benefit of its readers. Its benefits are not confined to the helpful articles contained in the editorial pages, nor to the free mail service by the Question and Answer Department. We serve you every time you make a purchase of a receiving set or radio apparatus specified or advertised in these pages. No products are specified or advertised that have not passed the test of our laboratory and of actual practice. So sure are we of the worth of the advertised merchandise, we publish and have published since our first issue a guarantee in each issue which protects our readers. The guarantee of our advertisers is not an empty one. It means something to you. You should know how to get its full benefits.

How to Use Our Guarantee When Buying Apparatus

When you make a purchase from a retail dealer make sure first of all that he gives you a receipt as an evidence of purchase. This receipt should show the name and quantity of the article bought. If the article bought is advertised in EVERYBODY'S RADIO Weekly and it was through such advertising you were influenced to make the purchase, then immediately fill out the blank coupon at the bottom of this page and mail it promptly to the manufacturer. Be sure to DATE the coupon. This coupon is your Notice of Purchase. It tells the advertiser you have bought his products on the strength of his advertising and because of EVERYBODY'S RADIO Weekly guarantee you are holding him responsible for the performance and quality of his product.

The manufacturer will make a record of your purchase and should at any time the merchandise fail to live up to its maker's claim we have evidence of purchase and a prompt adjustment can and will be made.

The next and all other purchases you make of radio apparatus and supplies should be registered. Use the coupon below. If you do not do so our guarantee to you is void and shall not be binding on us.

Everybody's 5¢ RADIO WEEKLY

Dealers Co-operator

To avoid having readers chase here and there hunting for products advertised or specified in EVERYBODY'S RADIO Weekly we have arranged with the retail radio dealers, listed below, to act as our co-operators. They have agreed to stock merchandise advertised in this publication or to obtain same on a few hours' notice. Just tell them you're an "Everybody's" reader and you'll get prompt service.

Buy from These Dealers— *They're Trustworthy*

We have selected these dealers because they are in full sympathy with our quality merchandise policy and will stand back of their promises to you. They have agreed to cooperate with our readers and us because they know that all merchandise advertised in EVERYBODY'S RADIO Weekly has been TESTED and proven for QUALITY and PERFORMANCE and is safe to buy and sell.

LOOP DISTRICT—
CHICAGO RADIO APPARATUS COMPANY
407 S. Dearborn Street, Chicago
NEWARK ELECTRIC COMPANY
226 W. Madison Street, Chicago
NELSON ELECTRIC COMPANY
508 S. Dearborn Street, Chicago
W. A. WELTY & CO.
6th Floor, 36 South State St., Chicago
SIMONS ELECTRIC COMPANY
551 South Clark Street, Chicago

NORTH SIDE DISTRICT—
WONDER SALES COMPANY
3152 Irving Park Boulevard, Chicago

SOUTH SIDE DISTRICT—
H. & H. RADIO SHOP
5638 S. Ashland Avenue, Chicago
K-W RADIO SERVICE
1855 East 71st Street, Chicago
UNITED RADIO COMPANY
6336 Cottage Grove Avenue, Chicago
635 East 63rd Street, Chicago
6805 Stony Island Avenue, Chicago

NOTICE TO DEALERS: Your name will be added to this list without charge if you will qualify as an "Everybody's Radio Co-operator." Phone Mr. Morford, Calumet 3310, for particulars.

How to Play Safe When Buying Either Sets or Apparatus

When buying from a retail radio store to make sure you are doubly protected in your purchases, go to the stores whose names are listed in the panel in the center of this page. These are known as "Everybody's Radio Dealer-Co-operators."

These dealers have signed an agreement to keep in stock all the merchandise advertised in this magazine. If at any time they do not have the item you call for they will secure same for you at once. They also have agreed to stand back of all their transactions and to give you a fair and square deal.

These dealers were selected by us because of their established reputations for square-shooting and because they subscribed to the exacting conditions which we imposed upon them. They pay us nothing for this listing of their names and our only compensation is the satisfaction that we have served you.

If you make a purchase direct from the manufacturer, who is our advertiser, use the coupon below. It establishes a record of your desire to have the protection of our advertisers' guarantee. If you do not do this our guarantee to you is not binding on us.

NOTICE OF PURCHASE

Made through a guaranteed advertisement published in "Everybody's Radio Weekly."

Name of advertiser .....

His street address .....

His city and state .....

Dear Sirs: As a result of your advertisements in "Everybody's Radio Weekly" I have purchased from (Give dealer's name and address) ....

..... (Street) .....

(His city and state) .....

the following items .....

.....

Date: March 6, 1926.

(Sign your name) .....

(Your street address) .....

(Your City and State) .....

MAIL THIS NOTICE TO ADVERTISER AT ONCE

GUARANTEE PURCHASE SLIP

(Name of advertiser) .....

(His street address) .....

(His city and state) .....

Send me by {Parcel Post / Express} the following items, for which I enclose the necessary payment .....

.....

.....

The above merchandise was purchased through your advertisement in "Everybody's Radio Weekly" and I am thus recording my purchase to make sure of the guarantee of you and your merchandise which Everybody's Radio Weekly makes for you.

(Sign your name here) .....

(Your street address) .....

(Your city and state) .....

Date: March 6, 1926.

MAIL THIS ORDER TO ADVERTISER PROMPTLY

Everybody's Radio Laboratory Will Build or Rebuild Your Set For You

It doesn't matter what the hookup may be—as long as it is an **EFFICIENT** one. It may be one of the hookups given prominence in **EVERYBODY'S RADIO** Weekly. It may be one made popular by other publications. It may be one of your own design. We will build it complete and guarantee it to work. We will repair or remodel your old set and guarantee it to work. We will install equipment—test tubes, batteries and erect aerials. We will give personal instruction in operation and maintenance at your home or in our laboratory. All the work will be under the personal supervision of Mr. James G. Wells, technical editor of **EVERYBODY'S RADIO** Weekly and chief in charge of our experimental laboratory. Mr. W. H. Burquest will have direct charge of the service station and Mr. Louis Posth will be the foreman of the shop. None but **EXPERTS** will be employed. This service is created entirely in the interest of our readers who have been imposed upon by the incompetency of the average set-builder. It will not be run as a profit-making institution, although it will operate to be self-sustaining. Modest service fees will be charged.

Here is the Service at Your Command

SET BUILDING

Select your hookup, buy your parts and we will design, construct and deliver ready for operation by a specified time. Each and every set will be given two or three evening tests in our laboratory and customer will be asked to be present at the final one. He will be instructed in its operation and advice given as to installation. If customer desires one of our experts will go to his home, check over batteries, tube, aerial and other local conditions and make any necessary changes or additions. Personal instruction in tuning or operation will be given at the home if desired. A minimum service of ONE DOLLAR will be charged all readers who apply in person at our laboratory for information. Letters addressed to Question and Answer Department will be answered free when accompanied by stamped and self-addressed envelope as has been done in the past.

SET REPAIRING

Any set will be repaired, remodeled or rebuilt completely. Old receivers that fail to give the selectivity, distance or volume desired will be made to perform efficiently. Where local conditions are not favorable for reception best hookup for the situation will be advised. Customer must buy all necessary parts and bring them to the laboratory. We will not make purchases for customers. We supply necessary wiring, screws, nuts and bolts and solder but no other supplies or parts. All our work will be done in accordance with the standard practices of our laboratory. Charges will be made only for actual labor ($2.00 per hour). A minimum service charge of ONE DOLLAR will be made all readers who apply at the laboratory in person. Letters addressed to the Question and Answer Department will be answered as heretofore, **FREE.**

TROUBLE SHOOTING

Those who wish to construct or repair their own sets will be given advice and instructions. A minimum fee of ONE DOLLAR will be charged for this service. Inspection and tests of wiring and parts will be charged for at the rate of $2.00 per hour. Time employed on repairs at the same rate. Where staff man goes to customer's home a charge of $2 per hour will be made from time of departure to time of return to laboratory. Aerials will be erected, ground wires connected efficiently and sets installed. Complete instruction in tuning, operation and maintenance will be given either in customers' home or in our laboratory. Letters seeking information, when addressed to the Question and Answer Department, will be answered **FREE** as heretofore. Stamped and self-addressed envelope must be enclosed.

Customers Must Buy Their Own Parts—We Have None To Sell

We have no parts to sell. Customers must buy their own parts and bring them to us. This is absolutely necessary. Strict observance of this rule will save time and prevent disappointment. Neither will we permit inferior apparatus to be installed in sets we build or rebuild. Apparatus that has been tested and approved only in our laboratory will be used. Standard, advertised apparatus will be accepted, subject to our approval. Where tests must be made to prove reliability and efficiency a charge will be made for the service. It is safer to buy only those parts specified in our magazine. They have been tested and you know and we know they are RIGHT.

MAIL ORDER SERVICE

Out-of-town readers will be given service by mail. When sets are to be constructed be sure to send name and diagram of hookup to be used, especially where it is not one of the circuits exploited in EVERYBODY'S RADIO Weekly. Ship all necessary parts by INSURED PREPAID Parcel Post. Where readers are unable to buy parts specified by us in their home-town we will act as a purchasing agent, procuring the same at manufacturer's LIST price and will make no charge for this service. This offer applies only to out-of-town readers and not to Chicago readers. It is best to write for prices on work contemplated before ordering or shipping parts to us. Cash must accompany all orders.

We Guarantee All the Work

Every hookup described in EVERYBODY'S RADIO Weekly and built by us into a set, is guaranteed to perform efficiently. All our work on repaired or remodeled sets is guaranteed. All sets will be operated by customer to his own satisfaction in our presence.

Service Station
EVERYBODY'S RADIO WEEKLY
2721 South Michigan Ave.
CHICAGO

Phone:
Calumet 3310