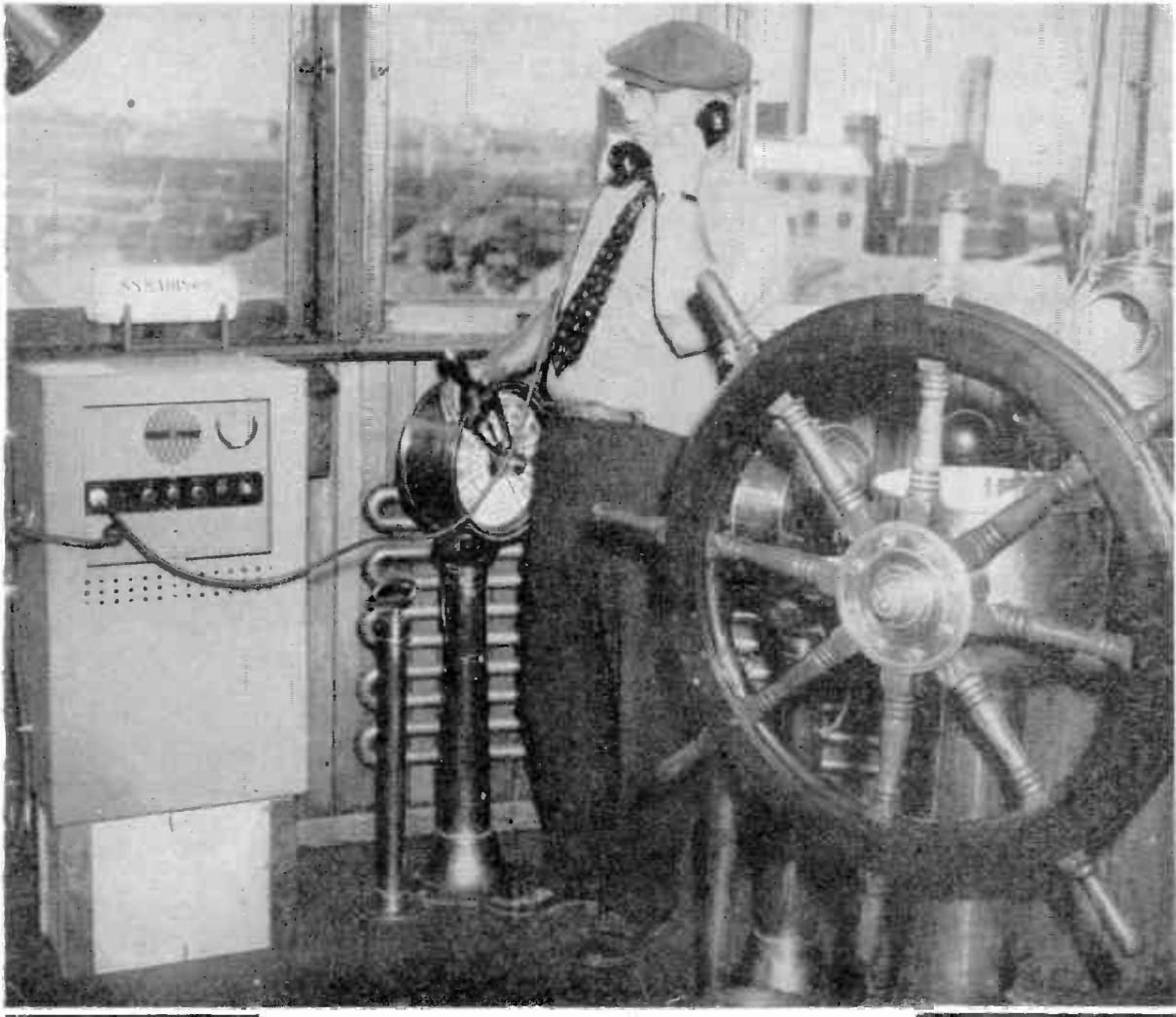
NATIONAL RADIO NEWS



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Alumni Association News

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WASTED TIME

A minute seems such a little thing—something most of us thoughtlessly throw away. But, just as pennies make dollars, so do minutes make hours. Few people realize that ten minutes wasted daily make over sixty hours—more than a work-week—in a year's time.

Study the habits of most successful men and you will find that they made use of odd moments, reading or writing, or *thinking*. Those precious minutes gave them the *extra* weeks, months, and years of time necessary to prepare and to advance themselves.

Now, time spent in healthful recreation is not being wasted. But, how much of your time is spent in idle amusements instead? How much time do you waste "stalling" before starting a task—doing unnecessary or useless things—or doing nothing at all?

Study your actions during the day. Make a list of the things you do. You'll be surprised at the number of five- or ten-minute intervals you can put to better use, in studying or planning for the future. Be ready for your opportunity when it comes!

J. E. SMITH, *President.*

Soldering, A Basic Technique For The Serviceman

by L. T. BRISEBOIS

N.R.I. Consultant

JUDGING from the number of receiver troubles and experiment failures which can be traced directly to poor soldering, too many servicemen fail to realize the importance of this basic technique. Perhaps a few paragraphs on why good soldering is so important and how it can be achieved will help you avoid this pitfall.

First, why is it necessary to solder connections? Why is a mechanical bond insufficient? There are two important reasons.

A mechanical bond, no matter how initially secure, will work free when subjected to constant vibration. You can quickly demonstrate this by tying a knot in two pieces of hook-up wire and wiggling them for a few moments. On the other hand, if these two wires can be joined together as though one, the vibration will not cause them to work apart.

The other reason is that metals of any sort, when exposed to the air, will oxidize. I am sure you have seen this demonstrated in the rusting of iron. This is actually a burning process. The same thing happens to the metal that

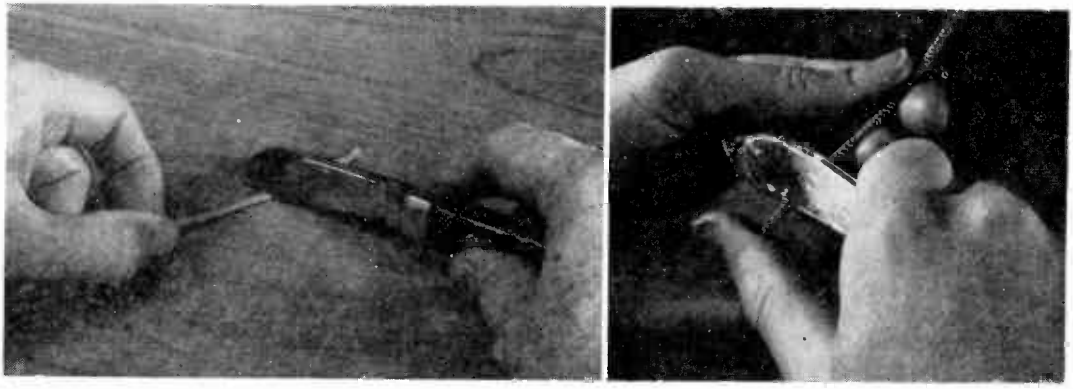


Fig. 1. When the insulation of a wire is too tough to be broken by squeezing with pliers, the pocket knife technique illustrated here is employed by some radio men for cutting through the outer braided covering on the wire. The knife must be sharp and must be held lightly so as to avoid cutting too far and nicking or breaking the copper wire.

happens to wood in a fireplace. The metal combines with the oxygen forming a new substance. This new substance is different for every metal but has one common characteristic. This new substance has a very high resistance.

Obviously if two wires are joined together through a very high value resistor, the circuit

Fig. 2. Fine sandpaper (about No. 00) may be used to remove enamel from stranded wire. Press the folded sandpaper together with the wire in between, as shown here. Then draw out the wire. Repeat this process until the enamel is entirely removed from the portion of the wire which is to be soldered.

operating conditions will be changed. This is just exactly what happens when connections oxidize.

If the connections are held together by means of some metal which has fused with each lead or terminal, excluding the air, then oxidation may take place but it will not take place inside the joint and no resistance will form at the joint. This is the condition we want to achieve by means of well soldered connections.

A third important fact is that other servicemen and customers will judge the quality of your work, frequently, by the quality of your soldering. The good opinion of these two groups of persons is greatly to be desired.

There are five steps in the procedure for making good soldered connections. Let's list these in the correct order:

(1) The leads and terminals to be soldered together must be clean.
(2) A firm mechanical joint must be made.
(3) The iron used must be hot and well tinned.
(4) Use a good grade of rosin-core solder.
(5) The joint to be soldered must be heated sufficiently so that the solder will melt to a liquid on the joint, not on the iron tip.

CLEANING. In cleaning parts, it is first necessary to remove any insulation from the wires. Insulation is usually composed of cloth covering. rubber covering, or enamel. The first two can be removed with wire strippers or by carefully cutting off the insulation with a knife. Enamel can be removed by heating the wire in a flame to burn the enamel off or by scraping it off with a piece of fine sandpaper. Figures 1, 2 and 3 illustrate several of these techniques.

Wires or terminals may be covered by dust, dirt, grease, or corrosion. These must also be removed to clean the parts. Dust can usually be removed merely by wiping the part with a cloth. However, in order to remove grease it is frequently necessary to use a solvent of some sort. Carbon tetrachloride or varsol are excellent solvents for this purpose.

It is sometimes necessary to scrape off corrosion with sandpaper or with a knife. Be sure the leads or terminals are free of this corrosion for if some of the corrosive material is left under the solder it may continue to act on the terminal and will, in time, ruin the soldered connection.

MECHANICAL CONNECTION. Next, it is necessary to join the leads and the terminals together with a firm mechanical joint. This will

Fig. 3. If enamel covered wire is held just inside the tip of the inner cone of an alcohol burner flame, as illustrated here, the wire will become red hot and the enamel will burn off.

strengthen the connection and will mean that any mechanical stress will not be on the solder. Solder is a very ductile material and does not stand mechanical stress as well as do copper, steel, cadmium, or other similar tough materials used for terminals and leads.

Once in a while, of course, it will be absolutely impossible to make a mechanical connection. However, make every effort to avoid such condi-

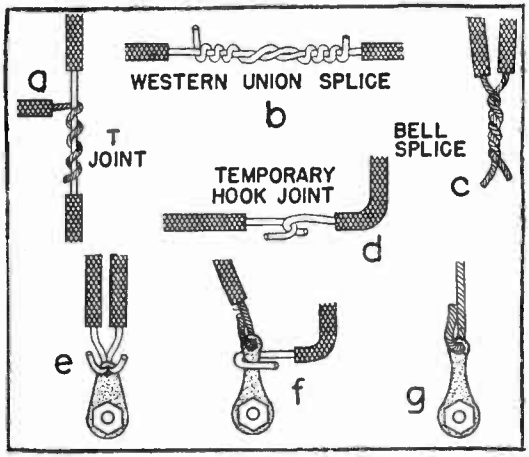


Fig. 4. Various types of connections and their uses are shown here. One quickly learns through practice just which type of connection to use for a particular need. Any of these can be adapted to fit a special case.

tions. A little forethought will enable you to select a length of hook-up wire sufficiently long to permit satisfactory mechanical joints.

There are three general types of connections. The T joint is used to connect one wire to another wire somewhere along its length. The splice is used to connect the ends of two wires. Hook joints are used to connect wires to terminals or to connect two wires together.

A T joint, a Western Union splice, and a Bell splice are illustrated in Figure 4. Of course, there are other types but these are the connections most commonly used for this purpose.

Sometimes you want to connect leads or terminals together temporarily. For this type of connection, a temporary hook joint is used. This can best be described as an open hook joint. Figure 4d shows a temporary hook joint used to connect two leads together. Figure 4e shows the same type of connection used to join leads to terminals.

To make a permanent connection to a terminal, a closed hook joint is used. Sometimes it isn't possible to make this connection through the eye of the terminal. It may be necessary to make it around the terminal. These types of connections are shown in Figures 4f and 4g.

TINNING. Before solder can be applied to the terminals, the iron used must be hot and well tinned. If you are using an electric iron, heating the iron involves only plugging the iron into the wall outlet. Usually you do this five or ten minutes before you are ready to begin soldering so the iron will have sufficient time to come up to operating temperature.

If you are using a flame type iron, you must start heating it about ten minutes before you want to use it. Figure 5 shows a nice arrangement for heating a flame type iron.

When the iron tip becomes sufficiently hot, solder should be applied to the tip so that it will have a shiny mirrored surface. If you are breaking in a new iron or are reconditioning an iron which has become badly corroded, it is usually necessary to wipe off the protective film or crust on the tip. This can be conveniently done with a bit of steel wool. Only in extreme cases use a file. Filing will wear away the copper tip, a part irreplaceable at the present time.

If the tip will not tin correctly, try applying a little rosin flux to the tip and wiping it off with a bit of steel wool or a damp cloth. Then apply the solder to the tip. You will usually find that the solder will then adhere to the tip, tinning it properly.

As you are working along, part of your job will be to keep the point of the iron tinned. You will find that the tip oxidizes because it is hot and is in contact with the air. It will be necessary to frequently wipe the tip of the iron with steel wool or with a damp cloth. If you are careful about this, you should have no trouble in keeping your iron correctly tinned. Figure 6 shows how a well-tinned iron should look. Keep your iron tip looking like this at all times.

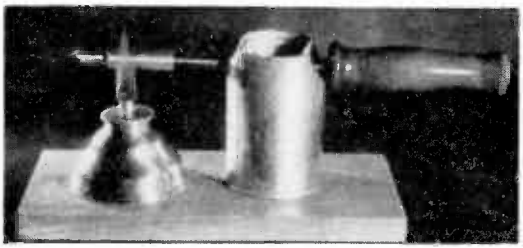


Fig. 5. Completed alcohol burner in use. The base is a wooden board of any convenient size. Three finishing nails hold the oil can in position on the base and prevent accidental tipping. A large empty tin can with notches cut in opposite sides may be used as a holder for the soldering iron, or you can cut a holder out of sheet metal for this purpose. The holder can be fastened to the base with two wood screws, in a position such that the copper barrel will be in the upper third portion of the flame.

It is important that your iron tip have the correct shape. Most servicemen prefer a diamond type point but some prefer a spade type point. This is a matter of individual preference and either is satisfactory.

The angle of the faces is very important. If the angle is too great, there will be insufficient working surface and if the angle is too long, there

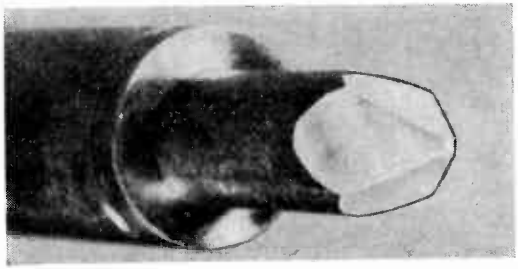


Fig. 6. Close-up photograph showing a properly tinned soldering iron tip. Note that only the flat surfaces of the copper tip are tinned.

will be too much working surface. In either of these cases, the joint to be soldered will not get the maximum heat from the tip. Figure 7 shows good and bad angles for the faces.

Use your iron only as a heating device. Never use it to pry joints apart. If you do, the copper point will become pitted, necessitating extreme filing to reshape the point. As copper tips are unobtainable at the present time, I am sure you can see the danger of this practice. Needle-nosed pliers are made to aid in opening joints. Use these for this job.

SOLDER AND FLUX. It is essential to use the best grade of solder obtainable and to use only rosin as a flux. The reasons for these are many.

Careful scientific experimentation has proved that rosin is the only non-corrosive fluxing agent. All other agents, including sal ammoniac and various types of acids, will eventually react with the solder and with the metal of the leads and terminals to create a by-product which will cause the formation of a high resistance joint. This is exactly what we want to avoid by soldering the joints in the first place.

In the case of acid flux, also, there is great danger that the acid may spatter over on delicate parts such as coils. The acid will gradually eat away the wire of the coil, ruining the part and necessitating another repair job.

Solder itself is composed of tin and lead in various percentage combinations. The preferred percentage is 40% lead and 60% tin. This gives a product with a low melting point which fuses into a firm product. However, at the present time, solder with this percentage ratio is not always available.

If you have to accept solder with other percentages of tin and lead, you will usually find that heating your iron to a higher temperature will enable you to use this solder satisfactorily. The change in percentage combination results in a higher melting point because lead, the ingredient increased in quantity, has a higher melting point than tin.

Again let me urge you to purchase the best grade of rosin core solder and rosin flux available. Even if you find these slightly more expensive, they will be well worth the investment. In an emergency you may have to use 50-50 bar solder and lump rosin which you can get at a music store. *If your iron is sufficiently hot* you can get excellent results using these.

SOLDERING. The final step in the procedure is to heat the joint and then to apply the solder to it. This is, of course, the most important part of the entire procedure but your success here de-

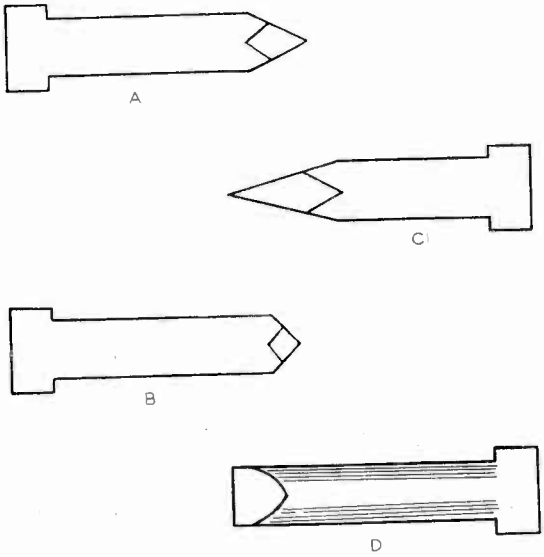


Fig. 7. The tip shown at A is properly shaped. The tip shown at B is too small. There is not sufficient heating surface. The tip shown at C is too long. Too much surface is exposed and too much heat will be radiated from the long faces. The correct shape for a spade tip is shown at D.

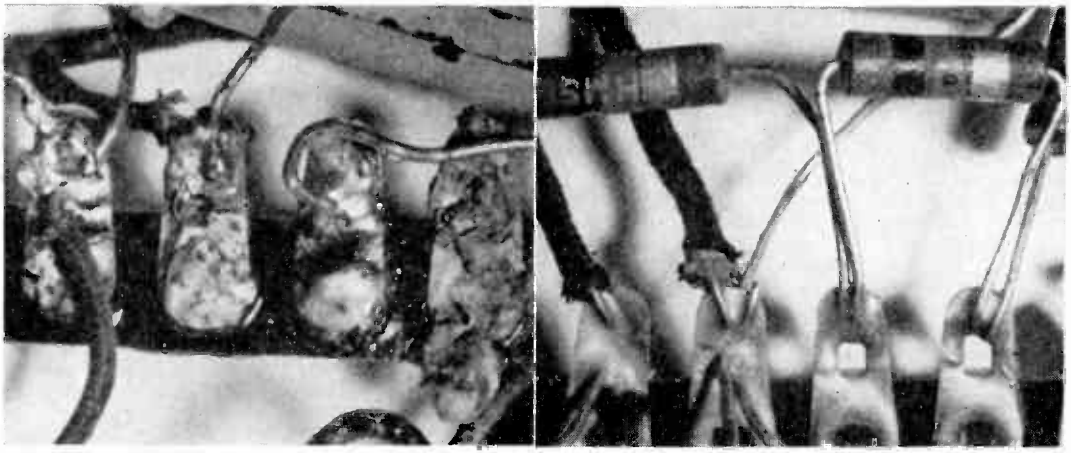


Fig. 8. An example of poor soldering. The lumpy, cracked appearance shows too much solder was used and the joints were not heated enough.

Good soldering produces a smooth, even coating of solder. The joints have been heated sufficiently to melt the solder, and just enough solder has been used to coat the joint thinly.

pends entirely on the care with which you carried out the preceding steps.

The joint to be soldered must be heated to a temperature sufficient to melt the solder directly on the joint, not on the iron tip. At this temperature, the solder will fuse directly with the metal of the terminal or lead, forming a perfect electrical connection. This is the condition for which we are aiming.

In order to bring the joint to this temperature, it is necessary to apply the hot iron properly to the joint. Practice and common sense will enable you to determine the position which will bring a maximum area of the joint in contact with a maximum face area of the iron. Sometimes the iron will be applied to the top of a connection. In other cases it will be more practical to have the iron under the connection. Any technique which will not endanger near-by parts and which will heat the connection quickly is quite satisfactory.

One note of caution; don't let a face of the iron rest on a large metal surface, such as a chassis. If you do, this large metal surface will draw the heat away from the tip of the iron and the iron will be well below operating temperature.

Of course, once in a while you have to make a soldered connection to a chassis. This is occasionally necessary when making ground connections, for example. In that case, you must apply a face of the iron directly to the chassis to bring it to a temperature sufficient to be tinned. It is easier, of course, to heat the spot to be soldered with a blow torch or a Bunsen burner. You must be very careful in this, however.

After heating the joint for several moments, apply the solder to the joint itself. The solder should melt immediately, flowing all over the joint. If the joint is hot enough, this will be instantaneous and you will need only a very small amount of solder to make an excellent connection.

The iron and roll of solder are immediately removed from the joint and the joint is allowed to stand for five minutes or so to become firm.

This is essential. Do not wiggle or test a joint too soon. If the solder has not had time to anneal, the quality of the joint will be ruined.

The finished soldered connection should have a dull, silvery metallic appearance. The solder should not be grainy or lumpy. The dimensions of the joint should have been increased only a very slight amount by the addition of the solder. You will quickly learn to judge the quality of your soldered connections by means of a visual inspection. Figure 8 shows some good soldered connections.

For comparison, some very poor connections are also shown. Do not let your connections look like these. You will be ashamed of them and they will lead to nothing but trouble.

As in every technique, there are some "tricks

of the trade" which make the job easier. Here are some which I am sure will help you.

It is always a wise idea to tin wires or terminals to be soldered. If the parts are first tinned, the solder will fuse much more quickly and easily into a perfect electrical connection.

Solid hook-up wires and terminals are easy to tin. Of course, any insulation or coating must be removed first. This procedure has been outlined above.

After the part has been cleaned and freed of insulation, apply a tiny bit of soldering flux to the part.* Then heat the part and apply solder to it while the part is still in contact with the iron tip. This same technique can be used for tinning terminals although you may prefer to melt a drop of solder on the tip of the iron and then apply this melted drop of solder to the terminal to be tinned. Try each technique and use the one which seems more natural to you.

this group of strands momentarily on the tip of the iron so they will fuse together into a single unit. I am sure you can see that a connection will be easy to make with this tinned wire.

Occasionally, in the tinning process, it will be worthwhile to leave a little excess solder on the terminal or lead. This is particularly true in cases where the connection is to be made at a very crowded spot. In that case, the extra solder already on the lead or terminal will be sufficient to form a good electrical bond and it will not be necessary to add additional solder.

This procedure is known as "swetting." The one essential precaution in using this technique is that you must be sure the parts soldered together in this manner are thoroughly heated so the solder will fuse properly.

Sometimes you may find it advisable simply to lap a wire over a terminal and solder it. You may need only a temporary connection, or the

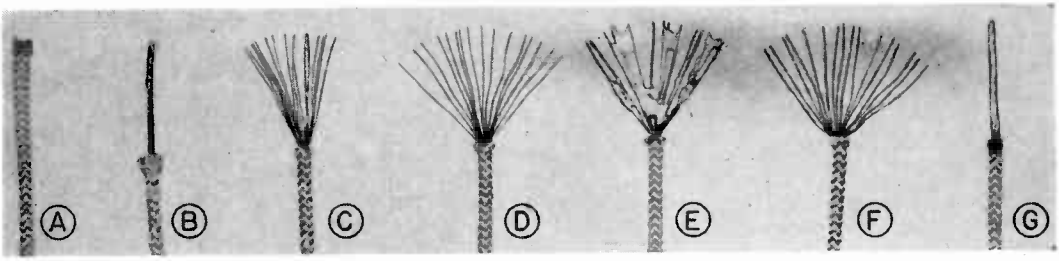


Fig. 9. Steps in preparing stranded, untinned lamp cord are shown here. A—original wire; B—wire with insulation removed from end; C—strands spread out for cleaning; D—cleaned strands ready to be tinned; E—completely tinned strands; F—tinned strands after surplus solder has been removed; G—tinned strands twisted together again.

The hardest material to tin is stranded wire. Figure 9 shows the series of steps in this procedure. First the wire is stripped. Then the individual strands are fanned out as shown in C and D. If there is any enamel or other coating on the wire, it must be removed by one of the methods previously described.

The fanned wires are then heated and solder is applied as shown in E. In order to remove the excess solder as shown in F, either quickly hit the ends of the wire or spring the ends of the wire off the iron tip. Either of these sharp motions will cause the excess solder to fly off, leaving the individual strands free.

As soon as these strands cool, they should be twisted together as shown at G. Then, heat

wire may not be long enough to make a hook joint. This type of connection is perfectly satisfactory if you are sure it is well soldered to a terminal. Such a connection, however, should not be under any strain for the solder may not be strong enough to stand pressure over a long period of time.

If the soldered joint has been raised to a sufficiently high temperature, the rosin used as a flux will be forced out to the edges of the connection. This makes a rather messy-looking connection, but don't try to remove the rosin immediately.

If you wait an hour or two before removing the rosin, you will find that it has solidified into a crystalline product. This crystalline product can very easily be chipped off with the tip of a screw driver. If you try to remove the rosin too soon, however, you will find that it has a

* The application of external flux is not a "must" since the solder itself contains flux which is liberated as the solder melts.

gluey consistency and cannot be satisfactorily removed. Just wait a little while and the rosin will chip off without any trouble whatsoever.

After you have finished a soldered connection, inspect it carefully to be sure there is no danger of the bare joint shorting to some part or terminal and causing electrical damage. If there is any such danger, the connection must be covered with friction tape as a precaution against such damage. If you have been using push-back wire and have exposed some of the wire, you may be able to re-cover the wire by pushing the insulation toward the joint. This should be done whenever possible as added protection to the wire.

It has taken a good many words to outline the correct soldering procedure, and the first few soldered connections you make will take some little time. However, don't cheat these first connections in any way. Go through the procedure carefully and slowly.

If you do this, you will establish the habit of making a good soldered connection. As this habit is formed, your production speed will go up and up. In a very short time you will be turning out professional joints rapidly of which you can be justly proud.

n r i

"Hello! Hello! Is this you, Mike? Did you see the story of my death in the morning paper?"
"Sure, I saw it, Joe. Where are you talking from?"

—Allied News.

n r i

Drawn by Graduate Art Miller

"Ask him if he has a 50L6GT?"

Our Cover Photo

Participating in the first of a series of FM radio communications tests on the Great Lakes, Acting Captain Walter Dummer of the car ferry, SS Madison, is seen talking to the Port Washington, Wisc., Station of the Lorain County Radio Corporation using FM radio equipment developed by General Electric engineers. Seen at the left in the photo, the equipment is completely self-contained, except for the power supply.

These FM tests, in operation since last July, are being conducted by the Lorain County Radio Corporation and General Electric Company engineers, over a 90-day period. In addition to the equipment at the Port Washington shore station and aboard the SS Madison, five other FM transmitter-receiver units are being operated on car ferries, fish tugs, and other cargo vessels operating on the Great Lakes.

n r i

N.R.I. Blood Donors

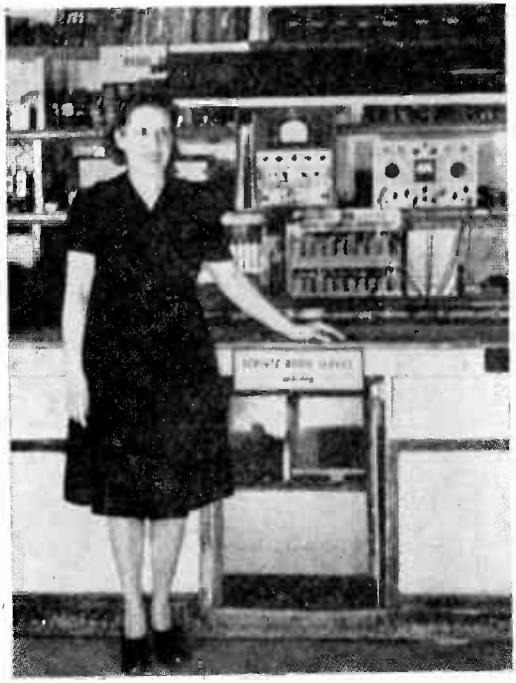
Those of us at N. R. I. who have been to the Red Cross Blood Bank one, two or three times are proud to salute the large group of the N. R. I. family who make regular visits to the Red Cross Blood Donors Service. The names and number of blood donations follow:

Lucy Brisebois, 11
Jeannie Chew, 11
Isabelle Fant, 9
Margaret Mantel, 8
Stuart M. Armstrong, 7
Theodore Rose, 6
W. Franklin Cook, 6
Margaret Matthias, 5
Don B. Looney, 6
Katherine Hollenbeck, 4
Ethel Coffman, 4
Rose Marie Geraci, 4
J. B. Straughn, 4

Those at N. R. I. who have given blood one, two or three times are as follows:

Nora Turvey
Clarence Buse
Doris Dunnington
Margaret Grabham
Gertrude Hager
Ruth Witmer
Vera Myers
Helen Gregg
Louis L. Menne
Louise Martorelli
Jesse Elliott
Gertrude Lombardy
Albert Doig
Mary Marean
Anna Shearwood
Ina Harrigan
Mary Clarke
Blanche Shapiro
Shirley Slackman
Marion Cotter
Charles T. Jones
Joseph Cunningham
Nancy Hammett
George Lipscomb
Richard Silverman
Donald Quade
Jule Shelton
Mark Cassidy
Robert Nicholson
Martin Hollenbeck

Public Address -- Main Street



Mrs. Schlotz, poetess, home-maker, canner of Victory garden vegetables, and radiowoman.

Sound Spells Sales for Schlotz in Marion, Kansas—Radioman and Family in All-Out Wartime Effort

This story regarding an N.R.I. Student originally appeared in Radio & Television Retailing and is reproduced here through courtesy of that publication.

NOVEL use of public address equipment successfully advertised the business of the Ted Schlotz Radio Co., Marion, Kansas.

Saturday night crowds gathered around the speaker in front of the Schlotz store to hear "broadcasts" over a Wilcox-Gay Recordio. Since the performers were all local people, the interest was great, and the events became so popular that the local theatre was provided with real competition as a result.

Each "broadcaster" received a free record of his part in the program.

Many customers for radios and appliances were secured through these programs. Peacetime lines carried in the Schlotz store included Zenith, Crosley and RCA radios, Crosley refrigerators and Horton laundry equipment.

Due to unusual business conditions, and a great rush of repair work, the Schlotz organization had to drop using the plan for a while. "We will use the 'broadcasting' again as soon as we can spare the time," says Mrs. Ted Schlotz, wife of the proprietor, "as it is the best form of advertising we have found."

In the early days of the war, Ted Schlotz and his wife were worried over what course to take in the rapidly changing business picture. How they solved the problem of aiding the war effort and continued to serve their loyal customers, is best described by Mrs. Schlotz, who says:

"We didn't want our business to become another blank space in the current group of empties

Radioman Ted Schlotz, who joins his family in "Hitting at Hitler," shown with his 3 children, Bill, Don and June.

along Marion's Main Street. Since our shop is located in the Marion Hardware & Auto Supply, we couldn't branch out in those lines, and it hardly seemed logical to overlap lines of others.

"Marion isn't as lively as it was. In a small town where you know everyone—the population formerly 2,000, these days dwindles alarmingly. Every volunteer, draftee or war worker who leaves makes another vacant place that we can't overlook; impressing on the rest of us the fact that we, too, might do something more important.

"My husband, Ted, was baffled by this mental question of duty and by the problems of depleted tube stock, and lack of new radios. But he didn't want to desert his customers, acquired the past ten years, through good service, reasonably priced.

"We decided that I could keep the radio shop open, while Ted worked as aircraft electrician at a nearby air base.

"For the past seven months Ted has been driving with a group, making the 76-mile round-trip each day. He is gone 12 hours, then works about three hours in the shop.

"Now, I wait on customers, do coil work, soldering, remove and replace chassis, and test tubes, but I haven't learned to do complete jobs.

"After school our children: Bill, seventeen, helps at our shop, and is assistant operator at the theatre; Don, fourteen, works on the *Marion Record*, and June, thirteen, helps with the housework.

"We all worked in our Victory garden. Besides all the fresh vegetables we ate, we canned over 300 quarts, stored 17 bushels of potatoes.

"In my spare time I study radio, short story writing, and write poetry. I do the washing, ironing and darning for the five of us, and I helped with one Bond Drive.

"So you see we've all been busy Hitting at Hitler. We *are still here*, and plan to expand after the war."

INDUSTRIAL TELEVISION SYSTEMS

THE broad field of television can be divided roughly into the two general classifications of (1) broadcast television and (2) industrial television.

Broadcast television will bring a new world of entertainment right into the home and will provide advertisers an opportunity to display and demonstrate their products in a manner never before possible.

Industrial television systems will transmit pictures and sound from one point to another by means of wires or coaxial cable for various private commercial uses. Such systems will not require licenses granted by the Federal Communications Commission or approval by the Government.

Industrial television, explains J. D. McLean, General Electric commercial engineer, might be used in a large manufacturing establishment to allow management to view operations in the various departments of the factories. Hazardous manufacturing operations in dangerous or explosive atmospheres could also be watched by such a system, he explains. In fact, industrial television can be used for any application "if you want to see where you don't want to be."

Perhaps the most important application of industrial television after the war will be its use as a powerful merchandising medium by department stores, McLean points out. "Large stores have thousands of display points carefully chosen to catch and direct attention to specific products. The animation of certain of the primary display points and the addition of sound bringing an advertising message or an explanation, is regarded as a great step forward in advertising technique. The ability to televise fashion shows, demonstrations, featured products, etc., on one floor of a department store and transmit pictures and sound to display projectors on all other floors and in the show windows at the same time will provide a service long desired in the department store field."

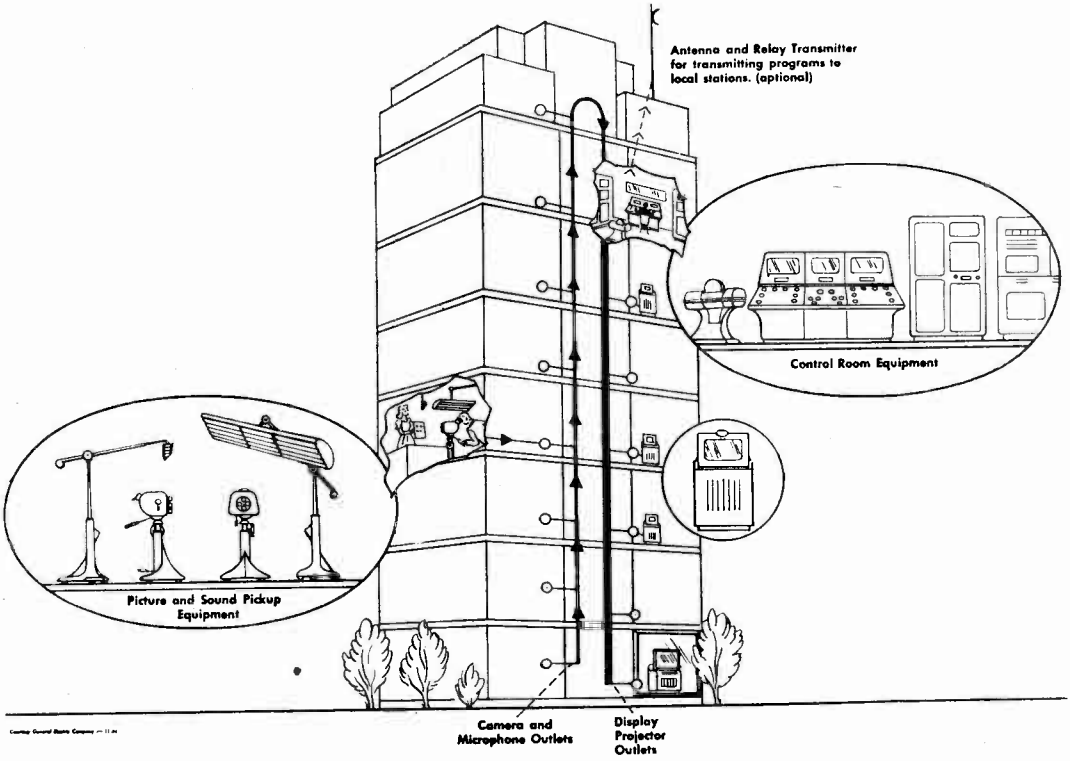
"The apparatus required in an industrial television system will not be as complicated as that required for a regular television broadcasting station," he says. "It must be kept in mind, however, that industrial television systems should use standard television studio equipment generating standard television signals, since the installation of such equipment will allow the broadcasting of television programs from any establishment using this industrial television system by the addition of ultra-high frequency radio relay transmitters which can carry the pictures and sound from the department store to the nearest television broadcast station. Using standard television studio equipment in a department store will allow that organization to produce programs not only for internal distribution but also for broadcasting over local television stations."

The attached General Electric block program of a typical industrial television system outlines the basic equipment required. On the left are shown outlets for both portable television cameras and sound microphones. The diagram is set up to show how these camera and microphone outlets can be distributed on several floors of a department store. Two channels are provided for two portable cameras as well as an alternative film projector and film pick-up camera. Picture and sound are picked up by the portable cameras and microphones and are fed to a control and monitoring console through cables. The monitoring console is a simple adaptation of the standard console supplied to television broadcasting stations. Associated with the monitoring console is a camera amplifier channel for each portable camera, an audio amplifier for the sound, and pulse generator to provide the timing signals.

The control and monitoring console in this diagram includes monitors for both cameras and an output monitor as well as picture control and switching equipment. Two outlets are available at the output monitor which allow picture and sound to be fed through a multiple cable to any number of display projectors throughout the store and also to carry the signals to a coaxial line or low powered link transmitter for transmission to the nearest television station. The control console and associated equipment can be installed in a small room centrally located in the store, thus providing a central point from which all operations are directed.

"In conjunction with the television system," McLean explains, "it is proposed that portable water-cooled mercury vapor flood lamps be used with suitable outlets on all floors so that they may be made available at any location in the store. Adequate lighting must be provided wherever television cameras are used. The mercury vapor flood lamps provide a high level of illumination without heat."

It is impossible today to estimate postwar prices for industrial television equipment because of uncertain labor and material conditions so the figures given below are based on prewar prices for similar equipment. As an example, however, consider a typical industrial television system installed in a five-story department store. Two camera outlets and one microphone outlet are



Department Store Television System

made available on each floor. Four display projectors are also available on each floor. A small control room housing the control and monitoring console and associated apparatus is built in a convenient location on one floor. The equipment required for such a system is outlined below.

Two camera channels, including camera, amplifiers, camera dolly, plugs and cable, camera sweep generator, video amplifier, monitor console, shading and camera control equipment, distribution and mixing panel at $14,850 each	$29,700.00
One pulse generator	4,500.00
One audio equipment, including microphone, portable preamplifier, audio amplifier, control and monitor equipment	2,500.00
One 16-mm motion picture film projector and film pick-up camera, including amplifiers and camera tube	8,200.00
Twenty display projectors (18 by 24-inch picture)	7,000.00
Ten camera outlets	100.00
Five hundred feet—camera cable	750.00
Two thousand feet of receiver cable	400.00
Twenty receiver plugs	20.00
Four portable mercury vapor flood lamps	2,000.00
Total approximate prewar price	$55,170.00

To the above figure must be added the cost of installation.

A system such as that described above will allow a department store to produce and televise its own programs throughout its store and also to originate programs for local television stations, according to McLean. It is a complete and flexible system to which additional display projectors or camera channels can be added without modification of the original apparatus. Since standard studio equipment is used, the equipment is designed for continuous operation, attractive appearance, and ease of maintenance.

General Electric is accepting reservations for industrial television systems under its Equipment Reservation Plan.

Radio Best Before Full Moon

Radio reception has now been found to vary with the phases of the moon, it was disclosed here in a General Electric Science Forum address by Dr. Harlan True Stetson of Cambridge, Mass., director of the laboratory for Cosmic Terrestrial Research, Massachusetts Institute of Technology.

Citing the results obtained from data after more than 20,000 hours of observation over two periods of four years each, Dr. Stetson said:

"From the study of our data, made on those nights when the moon was overhead, we found radio reception definitely improved from the time of the moon's first quarter to shortly before full moon. After full moon, radio reception deteriorated, but began to improve again from about the last quarter until a few days before new moon. This, of course, is true for a certain particular frequency over a certain path we were measuring."

However, in observations made when "the moon was below the horizon"—observations made in the dark of the moon, "we found no such effect, where no radiation from the moon's surface could reach the radio waves over the path we were studying," Dr. Stetson pointed out.

"The same thing happened in both series of data, except that the lunar effect was more pronounced during the second four years of our data than during the first four years," he declared.

"We know there is increasing evidence to believe that out in space the sun must be emitting very penetrating rays of high energy, probably similar to X-rays," Dr. Stetson said.

"It is these rays which bombard the upper atmosphere to stop or absorb these rays. Every physical laboratory worker knows that when X-rays, or very short ultraviolet rays, shine on a metal plate—or almost any substance, for that matter—the object so illuminated sends off electrons. This is what we call the photoelectric effect.

"It is what happens in every photocell that counts the automobiles that pass along the highway, or operates the self-opening doors found in so many public buildings.

"In our hypothesis, we believe that photo-electrons are emitted from the moon, as the very intensive sunlight in space bombards the unprotected surface of the moon. We believe that it is these photo-electrons coming from the moon and entering the earth's atmosphere that have the necessary energy to increase the ionization of our radio ceiling.

"In fact, radio observations show that the intensity of ultraviolet light hitting the top of our atmosphere is more than twice as great during sunspot maximum than during sunspot minimum. We should, therefore, have a right to expect that the photo-electrons emitted from the moon would be appreciably increased with the increase in the intensity of the solar rays accompanying large number of sunspots."

n r i

Newspapers By Radio Being Planned

"Everything is ready for newspaper publishers to avail themselves of the opportunities presented by Facsimile, multiplexed with FM Broadcasting," says George Henry Payne, Historian of Journalism and for many years a member of the Federal Communications Commission.

Mr. Payne, who has become vice president of Finch Telecommunications, Inc. of Passaic, N. J., states that the Finch Co., realizing that newspaper publishers are intensely interested in this subject, have established an advisory committee to consult with them from a public relations as well as a technical standpoint. Mr. Payne, who is chairman of the committee, says that Finch research, engineering and manufacturing facilities have been greatly expanded during the war.

"Even before 'Pearl Harbor,'" he continued, "when Facsimile was in its experimental stages, home receivers for Finch Facsimile were available at $75 retail, a price within the reach of many more people than existing facilities could supply. The original machines were 2- columns wide, but at the World's Fair 4- and 5-column models were shown, capable of reproducing eight full pages of newspapers of tabloid size in one hour. Postwar models will have still greater speed and remarkable definition.

"Mass production will result in mass audiences for Facsimile broadcasting as surely as it did for radio. Plans are far advanced for every owner of a Finch Facsimile recording set to receive a daily newspaper supplement by radio, with news, maps, cartoons, newsflashes, menus, household hints, illustrated advertisements—national and local, and much else that is desirable in the great modern metropolitan dailies of today."

n r i

A Dozen Phone Calls Ride One Radio Band

The process of taking a dozen telephone conversations off the long-distance wires, combining them upon a single radio telephone band for the 25-mile hop across the mouth of Chesapeake Bay, and then sorting them out to complete their individual journeys by wire again, is described by Austin Bailey of the American Telephone and Telegraph Company in the Spring

issue of the *Bell Telephone Magazine*. which has just been published.

A telephone call from Norfolk, Va., on the southern shore of the bay, to Cape Charles, on the opposite side, would once have had to make a 400-mile journey around the bay, through Richmond, Washington, Baltimore, Salisbury and Onancock.

Scientists and engineers of the Bell System set themselves to figuring how the shorter gap could be bridged, with a consequent saving in directness on calls in this Eastern Shore region.

A submarine cable would carry the voices without difficulty; but tides, winds and dragging anchors were hazards to be reckoned with.

Meanwhile, "carrier" systems were being applied to land telephone wires and cables, whereby several telephone conversations could be stepped up to high frequencies for transmission, and then unscrambled into their separate units again at their destinations. Could the carrier technique be adapted to radio transmission?

Having proved experimentally that "carrier" could be applied to a radio beam as well as to a wire or cable, telephone men put up 200-foot transmitting and receiving antennas at Cape Charles and East Ocean View, built buildings and installed equipment, and proved likewise that it would work practically and commercially.

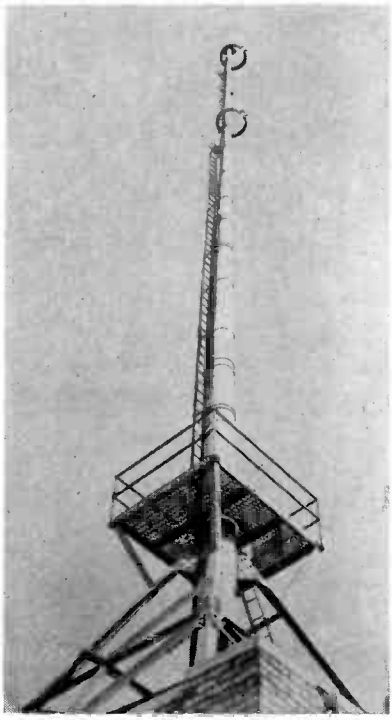
To the telephone user, it makes no difference whether his long-distance conversation is handled over this radio bridge across Chesapeake Bay or by another route. To the communications engineer, however, Dr. Bailey points out, the significance of the radio link is primarily in the development of the telephone art so that "carrier" technique now provides 12 talking channels in a single radio frequency band.

n r i

French Sailor Looks to the Future

Raymond Michel is a sailor in the French Navy. He came to the United States on the Richelieu when that historic ship ran the German blockade. Having had a taste of Radio and wanting to know more about it, Mr. Michel enrolled with N. R. I. in June 1943. Although he has completed only two-thirds of the course he is now averaging $60 a month servicing Radios in his spare time.

Two-bay Circular Antenna



This is a new two-bay General Electric circular antenna recently installed by Columbia Broadcasting System engineers atop the 700 ft. building at 500 Fifth Avenue, New York City, for use by their station WABC-FM. Provision has been made for adding two more bays to this 14-ton structure, the height of which is 100 ft. above the roof. When the antenna is put into use C.B.S. will have the first FM station in New York City to cover its assigned area.

n r i

Type O Urgently Needed

"Would you like to have your blood typed?" asked the very pleasant Red Cross nurse of an N.R.I. employe who was giving blood. Answering in the affirmative, he was told that his blood was type O. "The kind possessed by most people—the kind urgently needed for our wounded fighting men. Your blood will leave here tonight by airplane for France and will be available for use tomorrow—it may save some soldier's life within the next 48 hours."

The truth of this statement is bound to give any man or woman a real thrill. If you are not a blood donor go to your nearest Red Cross Blood Donors Service Headquarters tomorrow — the need for blood is great.

Recognizing Stages and Circuits in Servicing Radio Receivers

by WILLARD R. MOODY

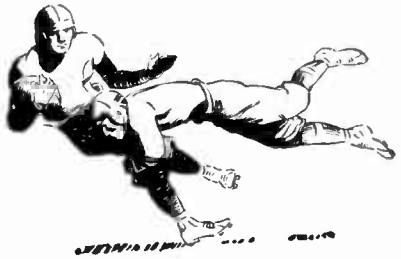
N.R.I. Consultant

Willard Moody

THE student and beginner in servicing may find it somewhat difficult, at first, to use stage* by stage testing or the circuit disturbance method of testing because he does not have the ability to recognize the stages in the radio receiver. In finding the trouble and analyzing a circuit he may be slow because of lack of skill in identifying parts and sections of the set. Practical servicemen who have learned by experience how to do the work efficiently use definite methods which will be outlined here and which should help the beginner in identifying stages and parts.

In stage identification, which is the first step in the repair of a receiver, we may observe certain rules or bear in mind specific principles. First of all, each stage has parts which are characteristic of it. But before we even take the step of making an effort to find the characteristic parts we should be familiar with the circuits of a receiver. A typical set is shown in Fig. 1. This set is the RCA 40X-31. The signal picked up by the loop antenna is fed into the 12SA7 mixer. The mixer then supplies an i.f. signal to the 12SK7 i.f. stage. The i.f. stage supplies a signal to the following 12SQ7 second detector and the output of the detector is fed to the triode grid of the 12SQ7. The triode plate of the 12SQ7 in turn works into the grid of the 35L6GT output tube. The output tube then drives the loudspeaker. As you can see, we have a definite sequence in the passage of the signal through the radio.

In the mixer stage we find an oscillator and r.f. tuning condenser, but the striking feature of this set, and of many sets like it, is the loop antenna. Checking from the loop to the mixer is easy, and having identified the mixer we can work from the mixer plate to the first i.f. transformer primary. To find the mixer plate connection and other pin terminal connections, we use a tube chart. The tube chart is very important and you should obtain one and study it, use it in your work whenever the need arises and that



Don't tackle difficult jobs until you are sure that you can handle them!

*Stage by stage testing is a useful servicing technique in which a signal generator is employed for finding the defective stage. It was discussed in the 30th Anniversary issue of the News, and, in the issue preceding, the circuit disturbance method of testing was described. In both cases, a signal is produced and introduced into a stage. If the signal is not heard, a following stage is supplied a signal. Should the signal now be heard, the first stage mentioned has a defect or there is a lack of proper coupling between the stages.

need will arise frequently as any experienced serviceman will tell you.

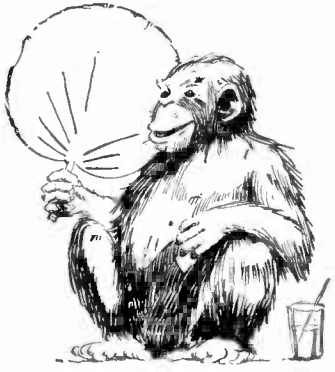
Having located the first i.f. transformer we may trace from it to the 12SK7 i.f. amplifier and then, locating the plate connection of the 12SK7, at the socket, we can trace to the primary of the second i.f. transformer. The secondary of this transformer connects to the diode second detector, the diode section of the 12SQ7. With the 12SQ7 identified we can proceed to work into the output stage. Another help in identifying the 12SQ7 is to trace the connections from the volume control to the 12SQ7 tube socket. The 12SQ7 triode plate connects to a condenser which in turn connects to the output tube grid. The output tube is a 35L6GT and its plate connects to the primary of the output transformer. The secondary of this transformer connects to the voice coil of the loudspeaker.

Use the suggestions given in this article, as they will prove valuable to you in your work.

From the plate return of the output tube, or output transformer primary, we can trace to the screen of the output tube and to the speaker field. The field, in turn, connects to the rectifier cathode, thus permitting identification of the rectifier. The rectifier may be identified in still another way and that is by tracing from the line cord to the rectifier plate circuit. With the rectifier tube identified we may, if desired, trace the wiring from its filament to the output tube filament and then go on down the line to the mixer, i.f. amplifier and first audio tube filaments.

As you can see, identifying the tubes aids greatly in identifying the stages. Therefore, become familiar with tubes by ready and frequent reference to a tube manual.

Some general hints as to stage identification have been given. Now, we may consider some of the principles in identifying the parts of the radio. In finding the r.f. tuning condenser we may first of all locate the loop or antenna coil of a radio and trace from it to the tuning condenser. Sometimes it is perfectly obvious that we have a tuning condenser, but to establish whether it is the r.f. or oscillator tuning condenser we may want to trace the circuits. Having found the mixer tube, traced from the loop to the tube, we can check from the oscillator grid of the mixer to the oscillator tuning condenser and can locate the oscillator grid resistor or grid leak and the oscillator grid condenser. In Fig. 1, pin terminal 5 of the 12SA7 is the oscillator grid. The r.f. grid is connected to pin terminal 8. We can easily find the oscillator coil by tracing from pin terminal 6, which is the cathode of the 12SA7, to the tap on the oscillator coil. As mentioned previously to locate the first i.f. transformer we need only trace from the plate pin of the 12SA7 mixer to the primary of the first i.f. The secondary connections of the transformer can be traced by working from the grid of the 12SK7 i.f. tube to the secondary and from the 2.2. megohm a.v.c. resistor to the secondary. The a.v.c. resistor can be found by first locating the volume control and then tracing from it to the resistor. The a.v.c. resistor is connected through a 47,000 ohm resistor to the high side of the volume control, as you can see by referring to Fig. 1.



Radio servicing jobs may be difficult on occasion, but none will make a "monkey" out of you if you will apply your N.R.I. training correctly.

If you can't trace the circuit or locate the stage, don't work on the set with a pick ax! Be patient and use a tube chart to identify pin terminals of tubes, work with your ohmmeter and make point to point resistance measurements to trace circuits easily, and to identify stages.

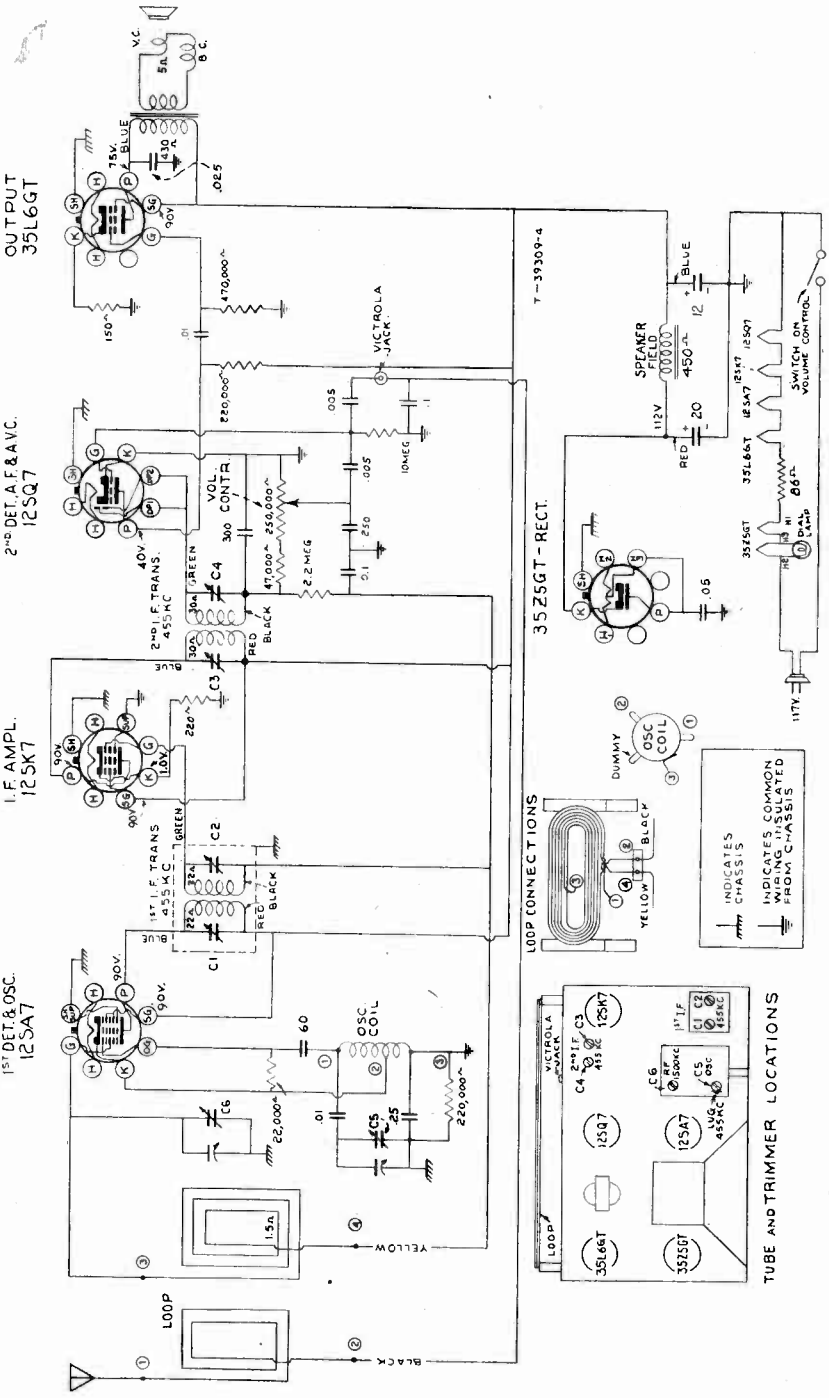


Fig. 1

The 220 ohm cathode resistor of the 12SK7 is easily found by tracing from it to pin terminal 5 of the 12SK7. The second i.f. transformer primary can be found by tracing from the 12SK7 plate to the primary. The 47,000 ohm decoupling resistor in the second detector circuit can be located by tracing from the high side of the volume control to the resistor. Then, the sec-

You may find it necessary to "look into things" in tracing the circuits of a radio.

ondary of the second i.f. connects to this resistor of 47,000 ohms. Also, the 12SQ7 diode detector plate connects to the secondary, a further fact which permits identification of the secondary winding on the second i.f. transformer. The 300 mmfd. condenser across the volume control is easily identified since it connects directly to the control circuit. The 250 mmfd., .005 mfd. and .1 mfd. condensers connected in the volume control circuit easily are identified. From the grid of the 12SQ7 triode we trace to the 10 megohm resistor and the victrola jack. The .005 and .1 mfd. units in this circuit are easily found.

The plate of the 12SQ7 triode very clearly connects to the 220,000 ohm resistor and .01 mfd. condenser. Thus, the values of these parts may be determined by reference to the wiring of the set and to the diagram. The 470,000 ohm grid resistor of the 35L6GT is easily identified by tracing to it from the grid pin (No. 5) of the 35L6GT. The 150 ohm cathode resistor is located by tracing from pin terminal 8 of the 35L6GT to the resistor.

The .025 mfd. condenser in the plate circuit of the output tube can be located by tracing from pin terminal 3 of the 35L6GT to the condenser From the output tube plate circuit and primary of the output transformer, we proceed to the speaker field and the output filter condenser can be located by tracing from the 35L6GT plate return and screen to the filter. The input filter condenser is readily identified by tracing from pin terminal 8 of the 35Z5GT to the input condenser.

Thus far, we have been concerned primarily with the identification of stages and the location of parts in the receiver. When the stages and parts are known, and we wish to interpret our measurements, we find it useful to have in our mind a simplified picture of the equivalent resistances. The first step is to think of each amplifier tube as a resistance. Between a plate and a cathode we have a voltage and since current flows in the circuit we know that the plate voltage divided by the plate current will give us the d.c. plate resistance. The resistance is increased if we make the grid more negative and is decreased if we make the grid less negative. Varying the grid potential of a tube by applying an input signal will result in a change in the d.c. plate resistance and, therefore, a change in the plate current of the tube—representing a signal. This output signal will be greater in intensity than the input signal because of the ability of a tube to amplify. However, in circuit analysis we are generally more concerned with d.c. values, so far as voltage measurements are concerned, and interpretation of the measurements. Referring to Fig. 1, we have the diagram of a typical radio receiver. Now, let us see just how we can simplify this circuit and give the equivalent circuit in terms of resistances.

Referring to Fig. 2, the 12SA7 tube is shown as a simple resistance so far as the plate-cathode is concerned. (For simplicity the screen grid — cathode resistance is omitted.) Between the plate terminal and the output filter condenser we have the resistance of the first i.f. primary. The 12SK7 has the resistance of the primary of the second i.f. transformer in series with its plate. The 12SQ7 tube has a very high resistance, 220,000 ohms, between its plate and the output filter condenser. The 35L6GT has the primary resistance of the output transformer between its plate and the output filter condenser. Between the common B plus connection to the output filter condenser and the rectifier cathode we have the speaker field connected and this field has a resistance value of 450 ohms. The screen grid-cathode resistances, of course, are also in the circuit, but for simplicity's sake have been omitted to make the drawing simple and clear. It

A radio man has to be something of a detective. His clues are the symptoms given by an ailing set. Clues lead to detection of radio troubles.

is plain, using this simplified sketch, that an open, for example, in the primary of the first i.f. transformer would result in loss of plate voltage for the mixer tube. The circuit must be complete in order to have voltage on the plate. If we had a loss of emission in the tube, there would be a reduction in the amount of current flowing

through the circuit and, therefore, the d.c. voltage drop across the primary resistance of the first i.f. transformer would be lower than normal. This resistance is so small, however, that in practice the voltage would be very small. In the i.f. tube plate circuit the drop would also be small, but in the high resistance circuit of the 12SQ7 a loss of emission in the tube or a break at the socket would mean an appreciable increase in the voltage at the plate, because of the decreased voltage drop in the plate load resistance as the result of the decreased flow of current in that

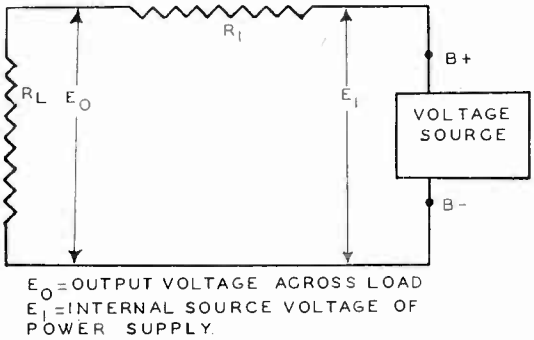


Fig. 3

plate load. ($E = I \times R$) In the output tube circuit where we have a relatively large value of plate current flow, despite the fact the d.c. resistance in the plate circuit of the output tube is not very great, generally not more than 100 to 300 ohms, the high current causes an appreciable voltage drop that can be measured using ordinary instruments.

We can further simplify the circuit shown in Fig. 2 by assuming that all of the tubes used as amplifiers are equivalent to a single net resistance. (RL) This is illustrated in Fig. 3. Now, we can gain a better idea of just how the voltage in the circuit will behave when we decrease the value of load resistance. If we have a lower than normal bias on the output tube, for all practical purposes we may say that the plate-cathode resistance has been decreased and this, in turn, means a lowered net load resistance. The net resistance is the resistance of all the tubes in parallel. In Fig. 3, lowering the load resistance R_L will mean that less voltage will appear across

The radio man has to "use his noodle." Instruments are a great help, but they can't think for you. Learn to reason from effect to cause.

the load, since we have a simple form of voltage divider. The voltage across the internal resistance R_I of the supply, which is the difference voltage between the source voltage and the load voltage, will rise and the supply will tend to be overloaded and to heat up excessively if we decrease the load resistance too much. It is important to visualize a drop in output voltage as the load resistance is decreased in value. Then, you can better appreciate the results of excessive leakage in a filter, or by-pass condenser, and the effect of a lower than normal bias on an output tube. In a similar way, if we decrease the amount of current taken from the source, (increased load resistance) the output voltage will rise. The decreased amount of current results in a lowering of the voltage drop across the internal resistance of the source, R_I, in Fig. 3, and, accordingly, the output voltage of the supply goes up. A higher than normal bias on a tube, therefore, will cause the apparent plate voltage of the tube to rise, and we should bear this principle in mind if we find, in taking a voltage measurement, that we have a larger than normal value of plate voltage.

By thinking in terms of simple resistances, we can more clearly and accurately visualize the basic action of the circuits.

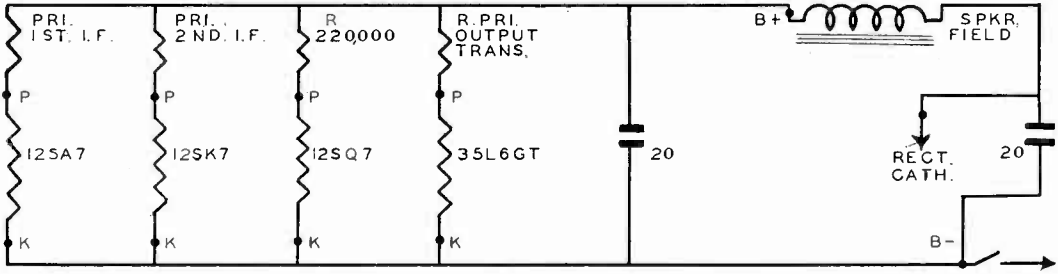
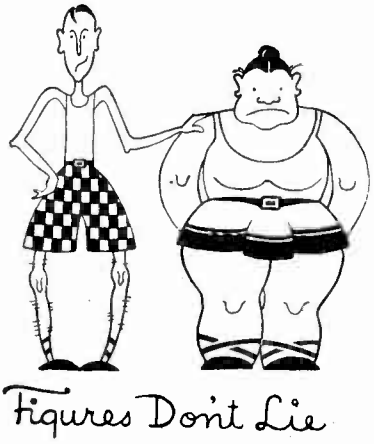


Fig. 2

A careful reading of the material presented should have cleared up your ideas concerning circuit analysis and the basic action of the circuits. If, however, you find that there is some point or idea that you do not understand, go over



Voltage and resistance measurement figures are a great help in servicing, and "figures don't lie." Rely on your instruments.

the article again, and read each section two or three times. This is the proper method to use in studying and you may apply this method, as well, to the study of your course and other lesson material with profit.

n r i

Student Jack M. Andrews, of South San Antonio, Texas, sent Chief Instructor J. A. Dowie a very nice letter complimenting N.R.I. on our Course, and method of instruction. Young Jack Andrews is conducting a spare time Radio servicing business that nets him about $10 a week on an average. Not bad for a starter. He says further, "When I get stuck on a problem my father, P. R. Andrews, who is a N.R.I. graduate, helps me out. If I can learn as much Radio as my father knows I will be satisfied and I don't see why I cannot learn more, for he graduated in 1934. I am determined to learn all there is to know about Radio. I think it is the most fascinating study of all."

n r i

On page 10 of this issue is a story of the Radio business of Ted Schlotz of Marion, Kansas. Mr. Schlotz also has enrolled his son, Bill, for N.R.I. training. Because N.R.I. has been established for thirty-one years undoubtedly there are a considerable number of father and son combinations such as these. It will be interesting to hear from them.

THE AMERICAN RED CROSS AIDED LAST YEAR:

Over 60,000 victims of disaster . . . American and United Nations prisoners of war . . . 10,800,000 food parcels were shipped, and additional parcels of clothing and medical supplies.

Servicemen and their families, including hospitalized veterans. . . .

MAINTAINED LAST YEAR:

More than 700 clubs and rest homes overseas and nearly 200 clubmobiles. Also theaters, bathing beaches, and canteens. . . .

Blood donor centers in 31 cities. . . .

Facilities in 3,748 of its 3,757 chapters to aid servicemen's families. . . .

TRAINED LAST YEAR:

Over 80,000 volunteers for hospital service as nurses' aides, dietitians' aides, or Gray Ladies. . . .

And, in addition, recruited 15,000 nurses for service in the Army and Navy. . . .

n r i

Helpful data on tube substitutions may be obtained by writing directly to Sylvania Electric Products Company, Emporium, Pennsylvania. An RCA tube manual, which you may obtain by writing directly to RCA Manufacturing Company, Camden, N. J., would also be very helpful in working out tube substitution problems. Adapters can be used in many cases. Consult your radio dealer or distributor.

NEWS OF THE RADIO WORLD

BY Willard R. Moody

Walkie-talkies have been used experimentally on the golf course, where they have proved successful in transmitting play-by-play accounts of tournaments, thus indicating the possibility of postwar use by golfers and others who would like to keep in touch with their home and offices. The lightweight radio with attached antenna was developed by Motorola. The equipment is similar to the walkie-talkie used on the war fronts by the U. S. Army Signal Corps. Many improvements in this type of equipment have resulted from the war.

n r i

The use of two-way radio equipment for communication between a central office and taxicabs operating in the city of Cleveland, Ohio, may develop after the war if present plans of the General Electric Company's Electronics Department and Cab Research Bureau, Inc., go through.

n r i

A new super-bomber of American manufacture requires over 800 tubes.

n r i

The total number of civilian tubes available amounts to less than one and a half million per month. Before the war, replacement tubes were used at the rate of about thirty-three to thirty-six millions per year. The increasing age of old sets and the lack of new radio sets has boosted replacement tube requirements to sixty or seventy million per year. Today, the average jobber gets about 30% of the tubes he received in 1941.

n r i

According to Thomas F. Joyce, General Manager, Radio, Phonograph and Television Department of RCA Victor, television is ready for the public. Postwar television home receivers will be offered ranging in price from about $150 for a table model to $395 for a large projection model, including standard and frequency modulation reception.

n r i

Motion picture companies are interested in theatre television and are requesting wide "high-fidelity" channels for television purposes. These channels will be capable of greater detail than present 525-line home video receivers can afford.

n r i

The communications service of the United States Army is the Signal Corps. Its most important contribution to the war is the maintenance of practically instantaneous contact between theatre areas and general staffs. Like a vast sensitive nervous system, the radio networks of the Army radiate from the War Department Signal Center in Washington to every point of the world where American and allied soldiers are fighting and working.

n r i

A study of captured enemy radio equipment shows how far ahead the United States Army is in Signal Corps equipment. German apparatus, though good and occasionally ingenious, averages five years behind our own in the opinion of many experts. By the same standard, Japan's equipment is considered 10 to 15 years behind ours.

n r i

The Signal Corps is the world's largest user of electrical equipment and the remarkable developments in radio, more than any other factors, have made it what it is today. *A single B-29 super-fortress demands a ton of aircraft radio equipment.*

n r i

Newest model of the walkie-talkie is a man-packed radio set weighing about 25 pounds, used by front-line troops for short and direct communications. The handie-talkie is a 5-tube set weighing 6 pounds, built with utmost precision, the smallest successful radio now used in battle.

n r i

Many new and effective law enforcement methods will be used after World War II, according to Frank J. Wilson, chief of the U. S. Secret Service. "With television," he said, "we will be able to flash pictures of missing persons or dangerous criminals, or expose the tricks of criminals, on television screens in the living rooms of millions of people at the same instant."

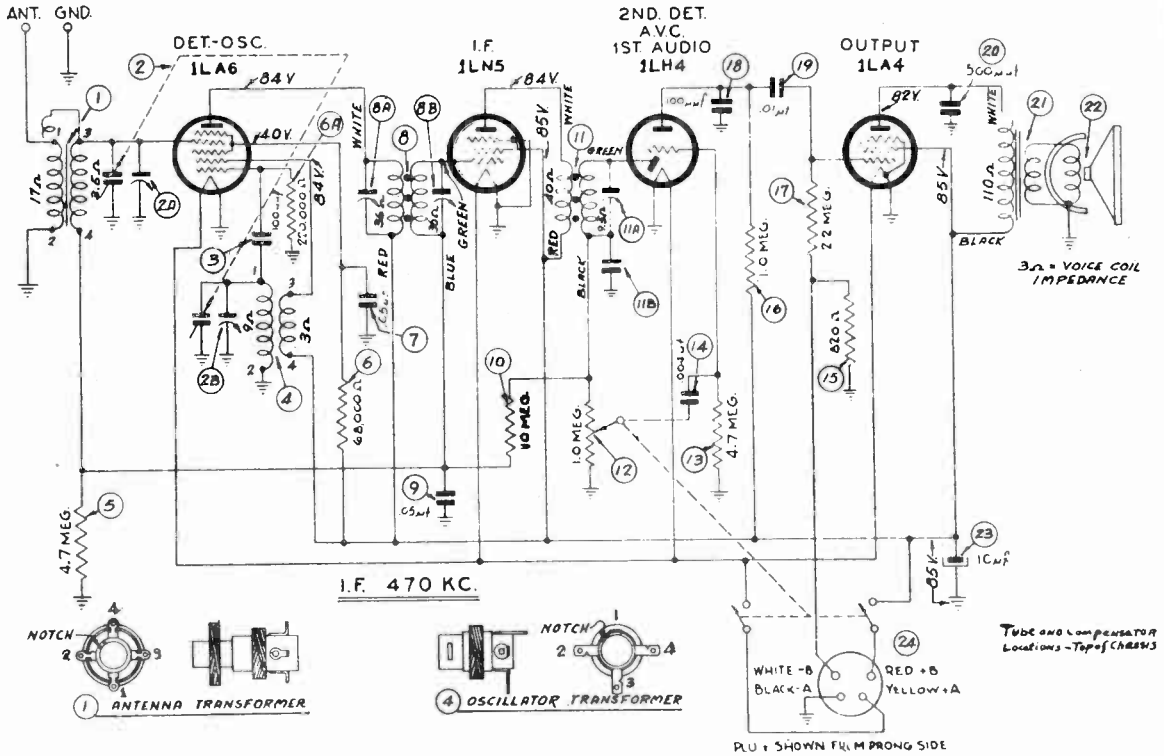
n r i

Nylon will be used for insulating radio wires in the postwar world according to a report released last month by duPont deNemours and Company. Nylon has a number of outstanding properties for wire coating. It is fire-resistant, and when ignited by a free flame extinguishes itself after the flame is removed. It looks as though the ladies will not be the only ones to speak of nylons after the war—radio men will be interested in nylon wires.

n r i

Educational station WBEZ, F.M. outlet of the Board of Education, Chicago, put 385 hours of programs for school classes on the air during the second semester of the 1943-44 school term, according to a recent report. One hundred and one schools reached by the programs possessed 1226 radios and have an audience of 263,561 students.

RADIO-TRICIAN
REG. U.S. PAT. OFF.
Service Sheet
Compiled Solely for Students and Graduates
NATIONAL RADIO INSTITUTE, WASHINGTON, D.C.



SCHEMATIC DIAGRAM—PHILCO MODEL 42-121, CODE 121

The D.C. voltages indicated in the above diagram were measured from the tube socket contacts to chassis with a 1,000 ohms per volt voltmeter, Philco Model 027. Batteries at full rated voltage.

Readers who file Service Data in separate binders remove page carefully, trim on dotted line for same size as data published heretofore.

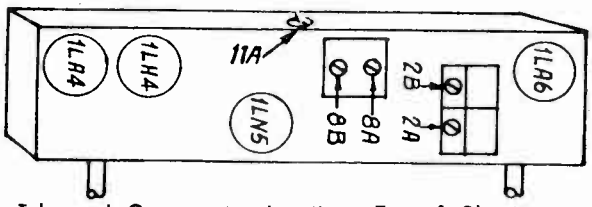
PHILCO MODEL 42-121

TYPE OF CIRCUIT—Four (4) tube battery operated single band superheterodyne circuit covering 540 to 1720 K.C. In addition, other features included are: pentode audio output stage, automatic volume control, high output permanent magnet speaker, Philco low current drain LOKTAL tubes, and an "ON-OFF" indicator.

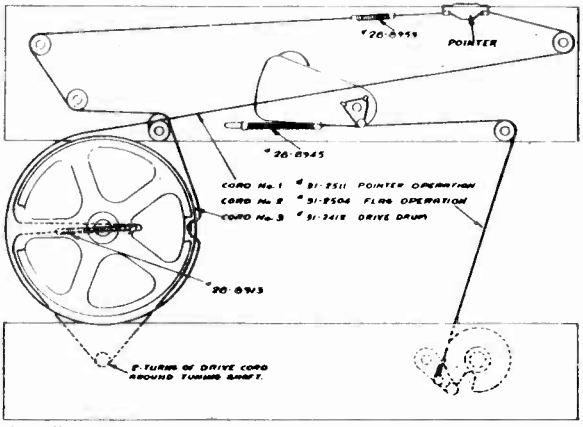
INTERMEDIATE FREQUENCY—455 K.C.
BATTERIES REQUIRED—Philco combination "A-B" battery type No. P-60B-6L.
BATTERY VOLTAGE AND CONSUMPTION—"A" 1.5 volts, 200 Ma., "B" 90 volts, 6.9 Ma.
AUDIO OUTPUT—100 milliwatts.

AERIAL AND GROUND

To obtain the maximum receiving performance an outside aerial should be used with these models. A good ground connection is also required. The ground connection should be made to a water pipe or a metal rod driven into four feet of moist earth.



Tube and Compensator Locations, Top of Chassis, Model 42-121.



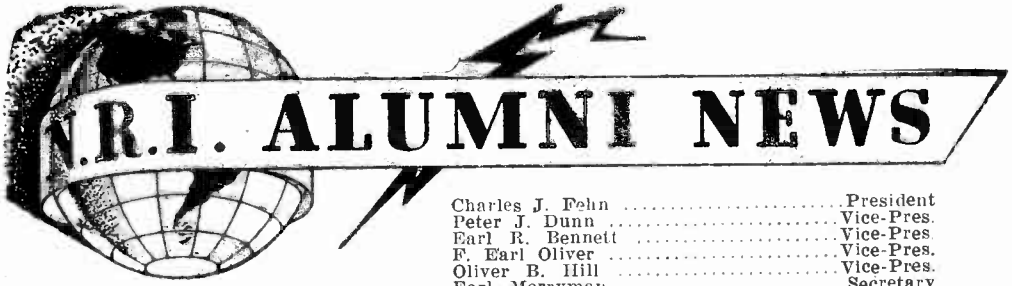
Installation of Drive Cords. Pointer at Low Frequency End of Dial, Gang Closed View Shown From Rear of Chassis.

ALIGNING INSTRUCTIONS

Due to the dial being mounted on the cabinet, it will be necessary to align receiver when mounted in the cabinet. Follow instructions given in table to the right.

Operations in Order	SIGNAL GENERATOR			RECEIVER				Special Instructions
	Output Connections To Receiver	Dummy Aerial	Dial Setting	Dial Setting	Control Settings	Adjust Compensators		
						42-121	42-122 42-123	
1	Stator Plate lug-aerial tuning cond.	.1 mfd.	455 K.C.	580 K.C.	Vol. Max.	11B, 8B, 8A	11A, 10B, 10A	Note A
2	Aerial Connection Receiver	225 mmfd.	1700 K.C.	1700 K.C.	Vol. Max.	2B	2B	
3	Aerial Connection Receiver	225 mmfd.	1500 K.C.	1500 K.C.	Vol. Max.	2A	2A	

NOTE A—Dial Calibration: Before adjusting the R.F. Compensators, the dial pointer must be adjusted to track properly with the tuning Condenser. To adjust the pointer, turn the tuning Condenser to the closed position (maximum capacity) and set the pointer to the mark at the left hand end of the dial below 550 K.C.



ALUMNI ELECTION RESULTS

Fehn of Philadelphia is New President. New Name is Added to Roster of Vice Presidents

THE 1945 President of the N.R.I.A.A. is Charles J. Fehn of Philadelphia. Good old reliable Charlie, who has been prominent in Alumni affairs ever since he joined Philadelphia-Camden Chapter many years ago, has at last, been honored with the Presidency of our organization. No one is more deserving. No one is better qualified to fill the job. Charlie Fehn has always been a worker for the benefit of Radio servicemen.

Harry Stephens of Detroit, who ran against Charlie Fehn, made a very fine showing for a first time candidate. He will be heard from again in future elections.

Four Vice-Presidents were elected. Peter J. Dunn of Baltimore is re-elected. He is very popular with our members. At present he is on governmental duty on the West Coast.

Earl R. Bennett of Wilmette, Illinois has also been re-elected. Bennett has a top-notch Radio store in Wilmette as well as a long established Radio business in Evanston, Illinois. These are suburbs of Chicago, on the fashionable north shore of Lake Michigan.

F. Earl Oliver of Detroit was re-elected a Vice-President. Mr. Dunn, Mr. Bennett and Mr. Oliver are former Presidents of the N.R.I. Alumni Association and continue to have many loyal supporters.

A new name is included in our field of Vice-Presidents. Mr. Oliver B. Hill of Burbank, California was elected a Vice-President completing the roster of four. Mr. Hill has been a candidate for office in previous years. He is an expert Radio man. For years he was head technician for the RCA distributor in Moscow, Idaho. When Uncle Sam called for experts Mr. Hill went with the Lockheed-Vega Aircraft Company where he is now in the Plant Engineering Department in the Test Lab. We extend congratulations to this newest member of our official family.

Mr. Earl A. Merryman was re-elected Secretary and Mr. L. L. Menne was re-elected Executive Secretary.

To the retiring candidates who served us so well during 1944 we express our deep appreciation for another successful year for the National Radio Institute Alumni Association. Again there has been a substantial gain in our membership. The Alumni Association took an active part in a number of ways in promoting the welfare of Radio service men in which we had the whole-hearted support of our officers and members of some of our local chapters.

Our congratulations to the newly elected officers who will serve during 1945. Again the N.R.I.A.A. marches forward.

New York Chapter

New York Chapter, in keeping with the spirit of the times, has been very conservative in all its actions. Our one objective has been to do everything possible to help win the war and not to do anything which might in the very least retard our victory.

That was the thought uppermost in our minds when we arranged our winter special affair. In spite of our conservatism the party was a huge success. What a blow-out!

Mr. J. E. Smith, President of N.R.I. was our honor guest. Mr. L. L. Menne, our Executive Secretary, also was present. Seventy-two of our members turned out to give our Washington guests a grand reception.

A complete program had been carefully planned. The committee in charge did a wonderful job with not a single oversight—everything ran along like clock-work.

First of all a committee consisting of 1944 Alumni President Lou Kunert and New York Chapter Chairman Bert Wappler met Mr. Smith and Mr. Menne at the station and took them to dinner during which a number of topics were discussed with emphasis on Alumni affairs. After an enjoyable dinner meeting the four moved to our meeting headquarters where our members gave Mr. Smith and Mr. Menne a great welcome. What a set-up the various committee members had arranged! There were neatly covered tables, plenty to eat and drink, microphones, a photographer, musicians, singers, a magician, — nothing was overlooked. Best of all it was talent exclusively from our own Chapter. John Music, for example was the magician. Boy, could he make things disappear right before your eyes. Just when we had concluded that Music was a man of mystery up stepped Pete Peterson and darned if he didn't mystify all of us with some of the same stunts.

Joel Robinson played the banjo. Wm. Fox played the violin, Adolph Schlette played the piano, Angel Merced did most of the singing accompanied by two guitar players. They were great.

Robert Gordas supplied the P.A. system, Pete Peterson spent most of the day arranging the food, assisted by Mrs. Peterson and the wives of some other members whose names the writer does not have at the moment. Frank Zimmer also was voted a big thanks for his efficient work in greeting members at the door.

Speeches were plentiful but held to a time limit and most of them were mighty good. Only Mr. Smith was given unlimited time. Mr. Menne, who presented Mr. Smith was little short of terrific. Mr. Smith held our members spellbound with his serious, earnest review of the growth of N.R.I. and his big plans for the future. Mr. Wappler, Mr. Kunert, Mr. Peterson, Mr. Zimmer, Mr. Ireland, Mr. Burt and others took a turn at the microphone.

Then came the time for "the eats." The food was temptingly delicious with plenty for all. Then followed the second portion of our entertainment program with few leaving before midnight when the party broke up to permit our members to get the ever necessary rest for the big work day to follow. It was a party which made history in New York Chapter events. (Photos on pages 28 and 29.)

Following this party we held our meetings in the regular way on the first and third Thursday of the month. Mr. Paul Ireland spoke on Transformers and Mr. Pete Peterson gave a resume of some of his experiences in a day's work at a Radio bench. At another meeting, Mr. Paul Ireland spoke on Tube Substitutions. So it goes. Always something worthwhile for those who attend our meetings. Once again—we meet every first and third Thursday at St. Marks Community Center, 12 St. Mark's Place (between 2nd and 3rd Aves.) New York City. N.R.I. students and graduates are always welcome.

FRANK ZIMMER, *Assistant Secretary.*

Chicago Chapter

Chicago Chapter held its annual fall dance at Lake View Post Hall, 3944 Lincoln Ave. We did not expect a large attendance. The dance was for the exclusive benefit of our members and their families and for this purpose the dance was a complete success.

The object of the dance was to raise a little extra money with which to purchase a number of used Radio testing instruments for the use of our members at meetings. This equipment has now been purchased and has made a big hit with our members. More will be purchased as soon as we find what we want. We are on the lookout for good used instruments since new instruments are not available. Now we devote about two hours a meeting to actual Radio service work on receivers brought to the meetings by our members. This interesting type of work is sure to increase our attendance.

We are still meeting at 2759 Crawford Ave., in Chicago but we are considering new quarters where we can make better use of our facilities.

Election of officers will be announced next issue. This election will take place during our January meeting but the results will reach you too late for this issue (This issue of N.R. News went to the printer on January 2).

Students and Graduates in this area who are interested in attending our meetings will receive a real welcome. Send name and address to the undersigned at 2306 West 51st St., Chicago 9, Ill.

LLOYD C. IMMEL, *Secretary.*

Baltimore Chapter

To close the year of 1944 we set aside one evening to celebrate the Fifteenth Anniversary of the N.R.I. Alumni Association and the Thirtieth Anniversary of the National Radio Institute.

This was a social affair which followed a brief business meeting. Refreshments were served and our members cut loose a bit with entertainment of various sort.

Mr. L. L. Menne was present to join in the fun. He is still trying to figure out how the shell game is worked.

A most welcome visitor was Mr. John B. Gough, one of the real old timers in our Chapter who is always interested in our affairs. Mr. Gough likes to lend his influence to anything that will help build character in men. His talks are always deeply sincere and inspiring.

This chapter runs along smoothly. Our officers are very regular in attendance and stick close to our policy which is for very little formality and lots of practical radio work and discussions.

We meet every second and fourth Tuesday at Redman's Hall, 745 West Baltimore St. You are welcome to join us.

E. W. GOSNELL, *Chairman.*

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Phila-Camden Chapter

Our Chapter membership still exhibits real interest in the schedule which we have been following for some time, with business affairs being confined to the first Thursday of the month. Of course, this is followed up by blackboard technical, practical and actual service discussions. The third Thursday being confined to real servicing and demonstrations.

Following with this plan a little further, the Chapter intends to obtain and have on hand a supply of material which is generally required on these nights.

The officers for 1945 are as follows:
Chairman, Laverne Kulp
Vice-Chairman, Harvey Morris
Recording Secretary, Harry Schneider
Financial Secretary, Milton Tice
Treasurer, Charles Fehn
Librarian, Chester Klabe
Sgt. at Arms, James Sunday

Members admitted recently include Edward McGinley of Norristown, Pa., W. C. Hooten of Philadelphia and Edgar F. Boyer of Wilmington, Del. Meetings on the first and third Thursday of the month in the Post Office Building, 4706 Comly St., in Philadelphia.

HARRY SCHNEIDER, *Recording Secretary.*

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Detroit Chapter

Our own Ted Steinmetz spoke on "Practical Use of Radio Laws." Ted is a Radio Engineer and a whiz on the subject of Radio. We are fortunate to have men of such capabilities right in our own chapter to speak to us occasionally. The talk by Ted was very educational.

We held our annual election and the following officers were elected for 1945:
Chairman, Harold E. Chase
Vice Chairman, John Stanish
Secretary, Harry R. Stephens
Ass't. Secretary, F. Earl Oliver
Financial Committee, John Bandos
Jack W. Hasen
Librarian, Val Guyton

The Chairman immediately appointed two new committees, namely:
Educational Committee, W. L. Wayman
Bernard Hiller
Refreshment Committee, John Stanish

A motion was carried to limit any member in office to two consecutive terms. This we feel will make for a more healthy chapter and give more members an opportunity to take an active part in the affairs of our chapter.

Those two outstanding Detroit Radio men, Mr. W. L. Wayman and Mr. Henry Rissi, who have done so much for our chapter and members were presented with Honorary membership cards. Our Chairman, Mr. Harold Chase made a very appropriate presentation of the membership cards.

The chapter is setting aside a portion of its funds for the purchase of a motion picture projector.

Mr. L. L. Menne, Our Executive Secretary attended one of our meetings. We held our usual meeting after which the committee on refreshments, in the person of John Stanish, went into action.

The following day, Mr. Menne and Mr. Stephens visited a number of Radio establishments owned by our members including that of our Chairman Chase on Grand River.

In the Detroit area please send your name and address to the undersigned at 5910 Grayton Road to receive notices of meetings.

HARRY R. STEPHENS, *Secretary.*

Some Candid Camera Shots

Taken at N. Y. Chapter Party

1. Frank Zimmer at the microphone. 2. J. E. Smith, guest of honor, whose talk made a big hit. 3. Lou Menne in a jovial mood. 4. A group of New York Chapter members surround Mr. Smith while Pete Peterson coaxes a laugh, (seated) Lou Kunert, 1944 N.R.I.A.A. President, Mr. Smith. (Standing) Peterson, Zimmer, Ireland and Schlette. Menne listens in at extreme left. 5. Hickey and Jacobsen get some serious pointers from Mr. Smith. 6. Chairman Bert Wappler (seated center) in a light discussion with Ass't Secretary Frank Zimmer. S. Hickey is seated at left. Pete Peterson is standing. 7. Lou Kunert and Bert Wappler toast one another to the amusement of A. Krause. 8. Most of the 72 who attended remained for this picture which was taken rather late in the evening. 9. The entertainers in high speed. They were immense. 10. LaRoche, Hickey, Robinson, Ireland, Corrar and Toussant in that order around the table. Paul Ireland, New York Chapter Radio Consultant, is always a popular fellow at meetings. 11. J. E. Smith reaches for a snack while S. Hickey studies the situation a bit. A party long to be remembered.

Here And There Among The Alumni Members

A sight to behold was Frank Zimmer, Assistant Secretary of New York Chapter in action while eulogizing Lou Kunert, 1944 President. Zimmer puts a lot of punch into what he says. His enthusiastic talk made a big hit at the New York Chapter social party.

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It never fails to happen! With 72 Radio men present at the party given by New York Chapter, the P. A. system acted up. But with plenty of willing hands the trouble was quickly remedied.

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Louise Schultz, daughter of Clarence Schultz, past chairman of Chicago Chapter has completed a course in Radio Engineering at Purdue University and is now with RCA Engineers in Camden, N. J.

n r i

Robert H. Ammons of Miles, Texas, has been Fourth Echelon maintenance man on the electronic auto-pilot and is now Electrical Inspector at an Army base in Texas.

n r i

Calvin Crowley is doing very well in Radio Servicing in Evansville, Indiana—much better financially than he was doing as a miner.

n r i

Did you like the story relating to Ted Schlotz, which appears on page 10 in this issue? His is a typical American family, like millions of others, the kind that has made America strong. By the way, Ted Scholtz has also enrolled his son, Bill, with N.R.I.

n r i

Mrs. Sadie Kunert, wife of our 1944 President, is mourning the loss of her brother, who died in action in France. Mrs. Kunert says her brother was overseas only one month—that he was a real soldier who liked the Army and was eager for action. Impressive memorial services were held for him in this country. Another fine boy who has died so that others might live.

n r i

John M. Storm of Burley, Idaho is Aircraft Communicator for the Civil Aeronautics Administration.

n r i

Rene Schunior is Radio mechanic for the Naval Air Station in Corpus Christi, Texas, under Civil Service. Doing very nicely. Before enrolling with N.R.I. he was a painter.

n r i

Edward J. Hayes, of Jersey City, N. J. is a Radio Operator in the Army. His N.R.I. foundation admitted him to an Army Signal Corps School for thirteen weeks which course he completed with good marks.

Carl P. Beseler of Wheeling, West Virginia has been in the Army about a year. For ten years previous to entering the Army he was with Radio Station WWVA, Wheeling, West Virginia, and what do you suppose he is assigned to in the Army? Typing? Yes, sir, typing. No wonder he is trying to get a transfer.

n r i

We have just been informed that our graduate, Phillip Ressico formerly of Johnstown, New York, was killed in action in France in July, 1944. Our deepest sympathies are extended to his widow, Mrs. Irene Ressico.

n r i

Two months after graduating, Frank A. Richards, of Bayonne, N. J. obtained a position as Radio Technician with Western Electric Co., Kearny, N. J. He has been with them almost three years and has progressed to where he now holds their highest technical grade held by less than twenty-five men from several thousand employees. He has just been promoted to Supervisor of the Radio Technician Maintenance Department.

n r i

Frank Braun of Chicago who had his ups and downs during the past ten years is now getting some good breaks. He has a swell job with Zenith —makes a good salary and recently purchased his own home from his radio earnings.

n r i

James Iler informs us that his father, our good member, G. T. Iler of Fanwood, N. J. passed away. Death was caused by a cerebral hemorrhage. Mr. Iler enrolled with N.R.I. on September 16, 1931.

n r i

John Music, who did hat and card tricks at the New York Chapter party is mighty clever. At one time he got himself all tangled up in his own tricks and we were afraid we might have to call the cops to untangle him. And Music is a member of the New York City Police Force. He is studying Radio as a hobby.

n r i

The retiring officers of the N.R.I.A.A. and the Chairmen of local chapters for 1944, were presented with handsome medallions as a mark of appreciation for their services.

n r i

Note the pictures on Page 32 of Lt. Richard W. Anderson and his wife. Andy sent us some very interesting photos taken on South Pacific islands. Mrs. Helen Anderson, a nurse, was a 2nd Lieutenant at last report. Andy, who is a 1st Lieutenant said then (June, 1943) his one big worry was to stay at least one grade above the rank of his wife. Thinking of post war, no doubt.

n r i

Art Miller of Chicago is the chap who draws clever cartoons for us—see page 9. Helen and Art Miller recently sent us an announcement of the arrival of baby Gayle. Congratulations!

He Stopped to Think

I thought I would write and tell you about a very amusing experience which I have just had. In most cases a shorted tube is as bad as a "blown" one. However, I repaired one! The 12SK7-M which was shorted in the Admiral B6 Radio is now back in the set operating nicely. By using the N.R.I. Tester "Ohm" section, I found that the short was between the suppressor grid and plate. So by using a Sylvania Tube Manual and my N.R.I. training I reasoned: Why?—Wouldn't a hard blow loosen the suppressor grid from the plate and open the short?

I "beat" the tube over a vise (hope this was a metal tube—Editor) and checked the tube on the "Ohm" section until no reading was obtained between the Suppressor grid and plate, inserted the tube, and presto, the set played. Was I happy? 12SK7 is a critical and an almost unobtainable. I am beginning to see why N.R.I. training means so much. I am over the top and nearing my goal.

BILL J. FAIR,
Cave Springs, Ark.

n r i

Best Investment He Ever Made

I knew absolutely nothing about Radio when I enrolled for the N.R.I. Course. Spare time servicing paid for the Course before I had completed it. I do spare time servicing now and have all the work I can handle. The money I spent for your Radio Course was the best investment I ever made.

JOHN STEPHENS,
York, Pennsylvania

n r i

Secured Civil Service Position

I want to take this opportunity to thank you for the education which I have so generously received from the National Radio Institute. It has enabled me to secure a position under Civil Service at the Naval Air Station in Corpus Christi, Texas as a Radio Mechanic. Without your Course I could not have secured this position.

RENE SCHUNIOR,
Corpus Christi, Texas

Radio Work on Fighter Planes

Since my last letter to you in April, I have travelled a long way. I'm still doing radio repair work on fighter planes, which has been keeping me very busy.

We have been making good use of Japanese radio gear captured here. It is made very similar to our equipment. I have a 13-tube radio from a bomber that I have repaired and am using as a personal radio.

PAUL SEELEY,
Marine Corps

n r i

Stage by Stage Testing

I extend heaps of praises upon Willard Moody and his fine article—Stage By Stage Testing—in the 30th Anniversary issue of NATIONAL RADIO NEWS. In simple and concise language he has done more to raise my self-confidence and my estimation of a future in radio than all of the works of some others, similarly written, purportedly as an aid to servicemen.

By all means, Mr. Dowie, let us have more of Mr. Moody's articles as well as servicing technique and servicing aids as were printed in the last three issues of NATIONAL RADIO NEWS.

ARNOLD ROWRAY,
Two Rivers, Wis.

n r i

Has Successful Radio Business

In May 1943 I opened a Radio repair store. In two months time there were about 150 radios ahead of me and I have been kept on the jump since then.

In August I hired a Radio technician to help me.

I made around $20 a week from spare time work beginning after the forty-sixth lesson. During the past year my profits were approximately $3600. This Course includes everything to make a man tops in Radio.

RAYMOND D. FOUKE,
Trenton, Michigan

Signal Corps Officer and Army Nurse Wife Meet in South Pacific

This picture of N.R.I. graduate, 1st Lt. Richard W. Anderson, Signal Corps, and his wife was taken in Saipan. Mrs. Anderson was one of the first ten nurses to be sent to Saipan for duty. This was a happy meeting which lasted five days while Lt. Anderson was on furlough. Among other campaigns he took part in the Kwajalein occupation. Mrs. Anderson also has a commission.

This is one of several pictures sent to us by Lt. Anderson. These are natives of Kwajalein. Lt. Anderson calls our attention to the Indian features.

NATIONAL RADIO NEWS

FROM N.R.I. TRAINING HEADQUARTERS

Vol. 11 February-March, 1945 No. 7

Published every other month in the interest of the students and Alumni Association of the

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J. B. STRAUGHN, TECHNICAL EDITOR

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