NATIONAL RADIO NEWS

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Alumni Association News

April-May
1949

VOL. 13
No. 8

Thanks For Your Many Good Wishes On My Birthday

I HAD a birthday on February 3. I have had quite a number of them in my lifetime. Usually they come and go without event except for the customary little family celebration.

This past birthday, however, was a memorable one for me. I received thousands of cards, even telegrams, of congratulations. These came from our students and graduates from all parts of the world.

It seems Mr. J. A. Dowie, our Chief Instructor, passed out the word that I was approaching another birthday. He suggested that a card of greeting would add to the joy all of us seem to feel on our birthdays. The response was overwhelming. I was made very happy indeed. I am grateful to Mr. Dowie for this fine surprise.

NRI was established thirty-five years ago. I have been head of it, as President, during all that time. Never was I more proud of the school I founded and have seen develop into the outstanding institution it is, than I was on my birthday just passed, when so many of my students—my friends—expressed their good wishes to me. It was a truly great day in my life.

I am taking this means to thank each and every one of you for your thoughtfulness and for your kind expressions of good wishes. Thank you very, very much.

J. E. SMITH, *President.*

Leo M. Conner

Servicing Electrical Appliances In a Radio Shop

By LEO M. CONNER
NRI Consultant

THE use of small electrical appliances has become so general in the past few years that many Radio sales places do a profitable appliance business in addition to their radio business.

Appliances, like radio receivers, need servicing occasionally and the serviceman who offers an appliance service will find it to be a welcome source of additional income.

There are other advantages in that the average customer usually prefers to have all his service work done by one person. Maybe the customer has been having his radio serviced by Joe Bloke and then his toaster started to act up and he found that Joe did not do appliance work. He comes into your shop and finds that you not only repair appliances but you also service radio receivers. The next time his radio needs servicing he will think of you because you offer a more complete service.

There are many opportunities for the serviceman to sell extra electrical outlets and switches when he delivers the repaired chassis. Usually a simple question like, "Do you need any extra wall outlets or switches?" will bring an affirmative reply. The question is unnecessary where you see cords draped all over the place with three or four "double sockets" plugged into each wall outlet. *Editor Note: In some communities you will be required to have an electrician's license before you are permitted by law to do work of this type.*

Many people have a vase that they wish to have made into a lamp. Others have old-fashioned kerosene lamps that they would like to have modernized. These jobs are not very difficult and a nice profit can be made from doing them.

This article will give you some information on appliance servicing that you should find useful.

Clocks

Electric clock complaints are usually divided into two classifications: (1) the clock blows a fuse when it is plugged into the outlet; or (2) the clock won't run.

In the first case the obvious defect is a short circuit. First the cord should be carefully examined for dried insulation that has peeled off leaving bare wires. This usually happens at the point where the cord enters the case. The cure is, of course, a new cord. The clock case should carefully be removed and the old cord removed. The winding for the clock motor will be visible and it will be wound on a laminated core similar to a transformer core. The points where the leads are attached will be insulated with tape so remove this tape carefully so that you will not damage the winding. Next unsolder the cord connections and remove the cord. Feed the new cord through the case and make the connections to the coil terminals. Replace the insulation and then try the clock before replacing the case. While you have it apart locate the bearings and, with a pipe cleaner, apply a little Carbona to the bearings. You will see that a considerable amount of dust and grease has accumulated around the bearings and that the Carbona will remove this accumulation. After the bearings have been cleaned apply ONE DROP of CLOCK OIL to each bearing. Do not apply more oil and do not use anything other than clock oil. You can obtain the proper kind of oil at jewelry stores. Replace the case and the job is finished.

The cleaning and oiling procedure outlined above will usually cure the case where the clock "won't run." However, the first thing to do in checking this complaint is to use your ohmmeter to make certain that the coil or cord is not open. If you get continuity between the prongs of the power plug then the cause of the trouble is most likely dirty bearings.

Should you find that the coil is open—the best thing is to secure an exact duplicate coil from the manufacturer. If the clock is an inexpensive make it is best to tell the customer that the clock can be repaired but the cost might seem too high when the first cost of the clock is considered. *Note: Some electric clocks have a paper condenser in series with the coil winding. This is for protection of the winding should the clock accidentally be plugged into a d.c. line. Of course an ohmmeter check will show the coil winding open unless this condenser is by-passed during the test.*

The same methods apply to the large clocks used in stores, filling stations and other business houses. Even though these clocks have large faces and the minute hand may be almost a foot long the movement is exactly the same size as the movement in a mantel clock. However, it is a little more difficult to get at the movement in these clocks. The first step in the dis-assembly is to carefully remove the back. This is usually made of Masonite and held either by a series of screws or bent over straps. If it is held by straps, straighten them carefully and slip the back off. You will then be able to see "the Works." The movement will be fastened to the face of the clock and the next step is to remove the face. The glass over the face will be held in place by a mounting ring that fastens to the case with several bent over strips. These strips should be carefully straightened and the holding ring and glass cover removed. Now you can get to the hands in order to remove them. They are a "press fit" on the shafts and there will be three concentric shafts. One for the hour hand, one for the minute hand, and one for the sweep second hand. Some clocks have a nut which locks the minute hand, so look for it before you try to pry the hands off the shaft. The prying should be done carefully in order to avoid bending the hands.

After the hands are removed, the motor can be removed for examination. In most cases the outer cover of the motor is a simple band of thin metal held in place with a "bent-over" strip. Once this strip is removed the motor can be cleaned and oiled as described above. The re-assembly process is the reverse of the dis-assembly.

In all cases where the complaint is, "won't run," check to make sure the power line frequency is correct. This complaint may occur when the customer has moved to your locality from another section of the country. If the correct operating frequency is not marked on the clock you can determine the frequency for which it was designed by counting the "teeth," or serrations, on the wheel centered in the core opening. If it is a 60-cycle clock there will be 60 teeth in the outer edge and if it is a 40-cycle clock there will be 40 teeth in the outer edge. Remember that the clock cannot run on a frequency other than the one for which it was designed.

Cleaning and oiling a clock requires less than an hour even when you have had no previous experience and a suitable charge would be between two and three dollars. Of course, if you install a new cord the cost of the cord would be extra.

Universal Motors

Small electrical motor driven appliances such as mixers, electric drills, vacuum cleaners, hair dryers, and hand type power tools all use a universal type motor as a power unit. This type of motor can be distinguished from induction motors, by the fact that they have a commutator and carbon brushes like a d.c. motor. In fact, they will operate equally well on either a.c. or d.c.; therefore, the name, universal motor. All of the iron in a universal motor magnetic circuit must be laminated or else the motor will heat up quickly, when operated on a.c., because of eddy currents. The armature and field windings are series connected, which gives this type of motor some characteristics of a d.c. motor, such as high speed without load, good torque, and easy adaptation to speed control. Some people think that any d.c. shunt connected motor can be connected in series for a.c. operation. Unfortunately this is not usually true. For one thing, many d.c. motors have a cast iron field support instead of a laminated iron support. In addition, the windings of a d.c. motor are not usually correctly designed for universal use, as far as the number of turns on the armature in relation to the number of turns in the field is concerned. Therefore, if such a motor can be made to run at all on a.c. it will very likely lack both speed and power.

Electric Mixers

Three makes of electric mixers will be used as examples of mixer servicing and repair work. Many details will be found to apply to other makes of mixers and motor driven equipment. With a few modifications the methods which will be described can be taken as a general procedure.

The first mixer to be described is an old Star-Rite Magic Maid. This type is about 15 years old and usually needs a complete overhaul because of age.

First, remove the motor unit from the stand, and then remove beaters and handle, by removing the four base screws. Loosen and remove the two

nuts that fit on the long motor tie bolts. Next remove the brushes by loosening and removing the two insulated retaining plugs. Then tap the outer case apart at the center joint and pull off half at the gear box end. This exposes the armature and it may be removed from the end bearing. You are now ready to start inspecting and cleaning. Probably the first thing that you will notice is that, because of long wear, the commutator has become badly blackened and rough. If you do not have a small lathe, the armature should be taken to a shop equipped to do the work and a light cut should be taken across the face of the armature. The resurfacing should be carried to the point where all pitting and blackened copper is removed leaving a smooth bright surface. The turning should be followed with a finishing with a fine sandpaper. DO NOT USE EMERY CLOTH. Some commutators were undercut at the factory, that is, a slot was cut between each segment in order to reduce the height of the mica insulation between the segments. In this case, a tool should be made from a hacksaw blade broken to the shape shown in Fig. 1. The blade may be wrapped in tape to provide a handle. This tool is handy for removing chips of copper and old carbon deposits. If turning the commutator has removed enough copper to reach the depth of the original undercut the commutator should be held in a vise and the "teeth" on the end of the tool should be placed in one of the slots. The tool should then be carefully drawn toward you until the mica is about 1/32" below the copper. Finish with fine sandpaper to remove any sharp edges. In the Star-Rite used for this example the armature had never been undercut and the commutator was merely cleaned up.

An ohmmeter should next be used to test the windings. When each pair of adjacent segments are touched you should get uniform resistance all the way around the commutator. An open coil will show infinite resistance and a shorted coil will most likely show zero resistance. Extremely high or low resistance readings from any pair of segments may indicate a partial short in a coil or other winding trouble. If the windings are in good shape the armature may next be given a "ground check." A lamp and test leads arranged as in Fig. 2 will be satisfactory for this test. The lamp should not light when the test leads are connected between the shaft and each segment. Any indication of light from the test lamp indicates a short between the winding and the shaft.

The field section of the motor should be tested next. The bare ends of the field coils should be touched with the ohmmeter probes. A lack of continuity indicates an open coil and it must be replaced. In this mixer a resistance wire unit is placed between each field coil. Speed control is accomplished by means of a four position switch and these resistance units. See Fig. 3. The resist-

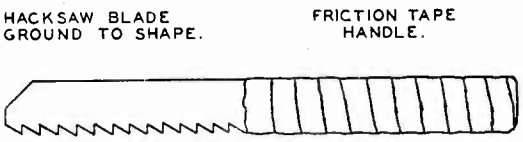


Fig. 1

ance of the units is about 50 ohms each. In order to inspect the resistance units and replace the power cord it is necessary to remove the other half of the motor case. The switch contacts should be checked and cleaned and the tension of the moving arm increased if necessary. After all parts have been cleaned and checked, a few drops of light oil should be placed on each end of the armature shaft and the gear box repacked with fresh grease. The motor should now be reassembled. Be sure to check the armature for free turning during the reassembling process. After the case is back together, the armature should turn freely with finger pressure. In fact, it should be possible to "spin" the armature. Hard turning means that the bearings are bind-

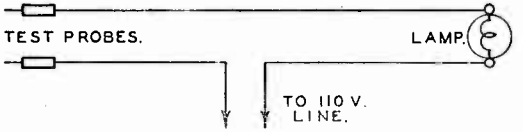


Fig. 2

ing and that the shaft alignment must be corrected. However, if the case fits back together properly the shaft should not bind. If the brushes are worn badly they should be replaced with new ones. See that the brushes move up and down freely in the brush guides. The motor may now be tested by plugging the cord into a power outlet. It should operate as good as new after reconditioning.

The next mixer to be described is the Knapp-Monarch. It may be taken apart by first loosening a set screw in the speed control dial and removing the dial. Underneath is a nut which should be removed. Next the brushes are re-

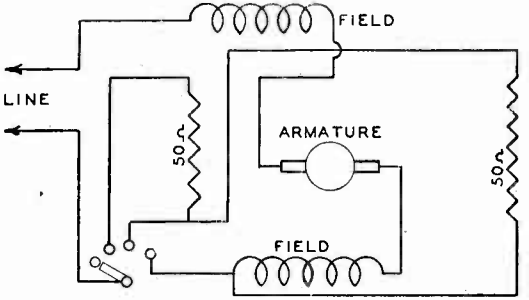


Fig. 3

moved. On the underside of the gear unit at the opposite end of the machine will be found two screws. Remove these screws and the gear unit can be drawn out of the housing. At the extreme forward end, under this unit, there will be three screws. Remove these and then you can remove the handle. It is now possible to remove the housing at the commutator end. The parts should now be laid out for examination. In this machine the speed control is a rheostat mounted in the end. Outside the rheostat is a lever type switch which is operated by the control dial. This switch serves as the ON-OFF switch for the motor. If the switch contacts are dirty or pitted a "point file" can be used to clean them up. The commutator should be examined and, if dirty or pitted, turned and cleaned. Other tests should be made as described for the Star-Rite mixer. The motor should next be lubricated as previously described and reassembled. In mixer work you should always examine the beaters to make sure that they do not strike each other while in operation. If the beaters do not run true, the cause is usually due to bent center rods. It is an easy matter to straighten them by bending with your hands.

One of the most popular mixers is the Mixmaster. The first step in taking this type apart is to pry out the center disc in the speed control dial and remove the nut underneath. This allows the dial unit to be removed. There are two screws in the rim of the next section and after removing these screws the section can be taken off. Next there is a rotary switch and two small brushes that make contact with collector rings. Remove the brushes and loosen the Allen set screw so that the rotary switch can be pulled off the shaft. A careful inspection will show that speed control in this machine is accomplished by means of a governor and that the main part of the governor is the rotary switch. The speed control action is as follows; centrifugal force acts on the pivoted arm and causes the contacts to open and close. This cuts a resistance in or out of the circuit as required to maintain the desired speed. This resistance unit is at the right side of the shaft and the action of the speed control dial on the end of the machine moves a conically shaped, slotted piece in and out. This affects the contacts in the opening cycles thus regulating the speed. With the sliding piece all the way in, lowest speed is obtained, because the contacts will be held open, cutting all of the resistance into the circuit. With the contacts held in the closed position all of the resistance will be cut out and the motor will run at its highest speed. Further dial action operates a plunger rod which connects to the ON-OFF switch. There is a condenser at the left which is connected across the contacts to reduce radio interference and to lessen the arcing at the contacts. Both the condenser and resistor can be replaced, if defective, by simply spreading the brass supporting strips apart and lifting the raised "buttons" on their ends out of the holes in the strips.

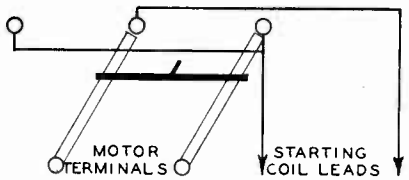


Fig. 4

In checking to determine the condition of these two units you can use an ohmmeter or an R-C bridge. The resistor should be about 250 ohms while the condenser should have a capacity of .08 mfd. and be rated at 160 volts. Check to see that good contact exists between the supports and the resistor and condenser terminals. The ends of the strips should be brightened and bent so that good contact is maintained. Poor contact can cause a lot of trouble. In one unit it was found that the metal end of the condenser was almost burned away because of poor contact. The switch contacts seldom give trouble but it is well to clean and check them. Any necessary work on the motor should be carried out as outlined above. The gear box can be opened by removing the single screw holding the handle in place and then removing the four machine screws in the cover.

In some mixers, after considerable use, the motor bearings may become worn so that the shaft wobbles around when some side pressure is exerted. This defect is indicated by a noisy motor and, in some cases, the motor will not run at full speed. If the sleeve bearings are worn they should be replaced. However, proper lubrication will eliminate most of the bearing wear.

In reassembling the Mixmaster care must be used at the governor end to see that all parts go back in the original position. A short pin with one square end fits in a hole in the metal cover piece, with the square end fitting in the circular groove in the inside of the dial control. The long push-rod also fits in a hole in this cover, with its insulated end resting in a recess in the ON-OFF switch arm. When replacing this cover on the end of the motor be sure that the slotted sliding piece fits in place in the grooves in the center of the rotating governor unit. If the brushes are worn down they should be replaced. If the new brushes have square ends they should be shaped to the curve of the commutator. A piece of sandpaper wrapped around a broom handle may be used to shape the brushes. After the motor has been run for a short time the brushes will wear to a perfect fit.

Reversing Motor Rotation

Usually the motors on machines are mounted in

the factory so that they turn in the correct direction. However, motors do go bad and sometimes the replacement may not turn in the right direction so that the motor cannot be used. It is a simple matter to reverse almost any a.c. motor. All that needs to be done is to reverse the connections between the starting winding and the line. Fig. 4 shows a simple reversing switch that can be installed on motors where control over the direction of rotation is desired. If fixed rotation only is desired then the leads can be permanently connected without the switch.

Grounding of Power Lines

Since about 1930, the National Electric Code has required that on power line installations feeding interior circuits, one wire of the circuit must be grounded. The purpose is to prevent fire damage and accidental shock.

This system of wiring is known as polarized wiring because one of the wires is continuous throughout the house with no breaks. That is, no switches are in series with the lead. This is known as the ground, or neutral wire. In properly installed wiring this wire is always colored white. The ground wire is always connected to the metal in the system at the fuse panel. In other words, a continuity check between the white wire and metal covering over the wire and metal boxes should show a short circuit or a very low resistance. This provides an additional means of protection from electrical shock and also, in some instances, provides a shock hazard.

Courtesy "Radio-Electronics" Magazine

"I don't care if it is FM—I want one that plays in the PM."

Common household electrical appliances with the exception of washing machines and AC-DC radios are constructed and wired so that the connections and "works" are insulated from each other. If the device has a metal frame, or cover, it should be insulated from the rest of the equipment. This is particularly true of irons, mixers, toasters, clocks, heaters, lamps, vacuum cleaners, fans, razors and hair dryers. Tests should be made periodically on these appliances with the test lamp shown in Fig. 2. If the insulation is OK, the test lamp will not light when the leads are touched to the frame and either side of the connecting cord. If it does there is an internal short between the frame and the wiring and the device should be taken apart and looked into. Replace the worn insulation.

Special precautions should be taken with washing machines because the water inside the machine is a good conductor and any leakage between the electric circuit and the frame will make the machine "hot." This is dangerous because the machine is usually in a basement and the floor may be wet around the machine. To prevent shock because of leakage some manufacturers provide a third wire in the cord with one end connected to the frame of the machine and the other end leaving the cord right at the attachment plug. This lead is terminated in a clip which is connected to the metal cover of the box enclosing the electrical outlet. Then, should an internal short develop, the user will not be shocked and the worst that can happen is a blown fuse. Probably the most potentially dangerous device around the house is the AC-DC radio. In some of these sets the metal chassis is connected to one side of the power cord.

Since all standard plugs can be put in an outlet either way, it is possible to get the chassis connected to the "hot" side of the line, and the chassis itself then become "hot" in relation to any grounded object. For this reason, care must be taken not to place these sets near sinks, electric or gas stoves or bathtubs. The papers carry accounts with sickening regularity of adults and children being electrocuted while tuning a radio while they were in the bathtub.

When you install a new appliance keep these things in mind and if you see that unnecessary chances are being taken warn of the danger. Most people don't know about things of this sort and they must be shown why the danger exists.

Along these lines you may have someone ask you why an electric iron may have a label indicating

that it is for use on AC only, while other irons may be used on AC or DC. Offhand it would seem that since resistance is used it would make no difference. However, where the iron is for use on AC only you will find that it is the type controlled by a thermostat. The iron will work on DC but the contacts will become burned very quickly and the iron will be worthless. This happens because on DC there is always 115 volts applied to the iron. When the contacts open there is an arc which keeps up until the space between the gap is too great for the arc to jump. Since there is very little space beween the thermostat contacts the arc keeps going until the contacts are burned up. However, when used on AC the voltage drops to zero 120 times per second and while there will be a small arc when the circuit is broken it will collapse as soon as the voltage drops and then will not start again.

Keep your eyes open and you will see many ways by which you can add to your income and gain additional friends and customers by doing light appliance work. It is interesting and profitable.

BUILDING A TWO STATION INTER-COMMUNICATION SYSTEM

FEW electronic devices are simpler to build than an intercommunication system. Because of the convenience and step saving qualities, an "intercom" system is a worth while addition to shops, garages and homes.

The unit to be described in this article is made from standard parts which may be obtained from any radio parts supply house. (The Institute cannot supply them.) The large unit is the Master Station and the smaller cabinet houses the Remote Station. The two are connected by means of a three-conductor cable and only the master station is connected to the power line. It is possible to communicate over distances up to 500 feet with a simple system of this sort.

The schematic diagram is shown in Fig. 1. The heart of the master unit is a conventional resistance coupled two stage amplifier using a 12SJ7 and a 50L6 tube. A 35Z5 is used as a half-wave rectifier in a standard AC-DC circuit. This type of circuit was chosen because it offers a convenient means of connecting a pilot light in the master unit to show when the system is turned on. The filaments of the three tubes are connected in series with a 200-ohm resistor and then the series group is connected across the AC line. The 200-ohm resistor is larger than necessary, so that the filaments and pilot light operate at slightly less than rated voltage. This is done for two reasons; it provides protection against line voltage surges and prolongs the life of the tubes. This latter reason is no small item when the system is left on continuously.

The filter in the power supply uses a resistor in place of a choke coil. However, a standard AC-DC type filter choke may be used, if desired. The 3900-ohm resistor will give about the same amount of filtering as a conventional 10-henry choke coil. The filter condensers are 30mfd. units rated at 450 working volts in order to give maximum protection against breakdown and assurance of long life. Notice that the negative side of the power supply is not directly connected to the chassis. The heavy line in the schematic indicates the "ground bus" to which all ground returns are made. This bus is insulated from the chassis by the .05-mfd. condenser shown as C_7 on the diagram. This method of wiring goes a long way toward complete removal of the shock hazard, although, as in all AC-DC equipment, it is a good idea to make all metal parts inaccessible. If the units are enclosed in cabinets like those described, this will be completely taken care of. The "ON-OFF" switch can be either of the rotary type or the "bat handle" type.

In these intercoms, four inch permanent magnet type loudspeakers serve as both microphone and speaker. The input transformer (T_1) is a type especially made for intercom use. However, if you cannot obtain this transformer you can use a standard output transformer designed to match a 4-ohm voice coil to a 10,000-ohm load. The 4-ohm winding then serves as the primary of the input transformer and the 10,000-ohm winding serves to feed the grid of the 12SJ7 tube. The output transformer (T_2) is a standard midget with a 2000-ohm primary and 4-ohm secondary.

S_2 is the press-to-talk switch of the master station. Use a standard double pole-double throw toggle switch. The switch is normally in the listen position (as shown in Fig. 1) so that the speaker normally is connected to the output transformer, T_2, and the primary of the input transformer T_1 goes through the terminal strip and the three wire cable to the remote station. There, if the press-to-talk switch, S_3, is operated, the input transformer will be fed by the remote loudspeaker acting as a microphone. When S_2 is thrown to the talk position, the master station

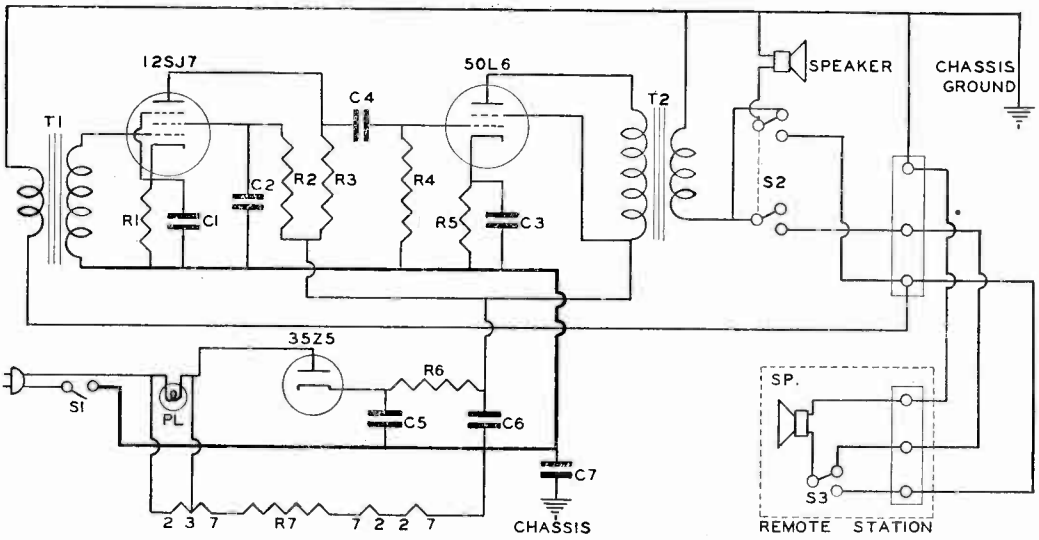


Fig. 1. Schematic diagram of complete "Intercom" System.

PARTS LIST

R1—2,000-ohms, 1/2 watt.
R2—2 megohms, 1/2 watt.
R3—500,000 ohms, 1/2 watt.
R4—350,000 ohms, 1/2 watt.
R5—300 ohms, 2 watt.
R6—3,900 ohms, 3 watt.
R7—200 ohms, 10 watt.
C1—10 mfd., 25 volt electrolytic.
C2—.01 mfd., 400 volt paper.
C3—10 mfd., 25 volt electrolytic.
C4—.002 mfd., 400 volt paper.
C5—30 mfd., 450 volt electrolytic.
C6—30 mfd., 450 volt electrolytic.
C7—.05 mfd., 400 volt paper.
NOTE: Connect the negative terminals of all electrolytic condensers to the negative bus bar.
T1—Input Transformer. 4 ohm to grid. (Stancor A-4744)
T2—Output transformer. 2000 ohm to 4 ohm voice coil.
S1—Single pole—single throw.
S2—Double pole—double throw.
S3—Single pole—double throw.
Speakers—Two 4" permanent magnet.
Pilot light—No. 40—brown bead.
Chassis—7 x 9 x 2".
Two 3 terminal strips.
Three octal sockets.
One 12SJ7 tube.
One 50L6 tube.
One 35Z5 tube.
One power cord.
3 wire thermostat cable.
Masonite for front and back panels.
Wood for cabinets.
Wire or cloth for speaker covers.

speaker serves as a microphone and the remote speaker is automatically connected to the output transformer. Tracing the wiring a time or two will make the switching action entirely clear. S_2 is a single pole-double throw switch. Both S_2 and S_3 should be mounted so that the levers are Up in the listen position.

Ed. Note: In making the drawing for Fig. 1, arrow tips were unintentionally omitted from the righthand ends of the two moving connector bars in ganged switch S-2. An arrow tip was also omitted on the righthand end of the moving bar connector in S-3. Adding these arrow tips to this drawing will help you understand the switch action of S-2 and S-3.

There is no volume control incorporated in the amplifier because there is no great need for one since the volume is about right when normal speech is used standing about arms length from the microphone-loudspeaker. If needed, a standard type audio control may be connected in place of R_1 and the control grid of the 50L6 tube connected to the moving arm of the control instead of the junction of C_1 and R_1. The control should have from 250,000 to 500,000 ohms resistance.

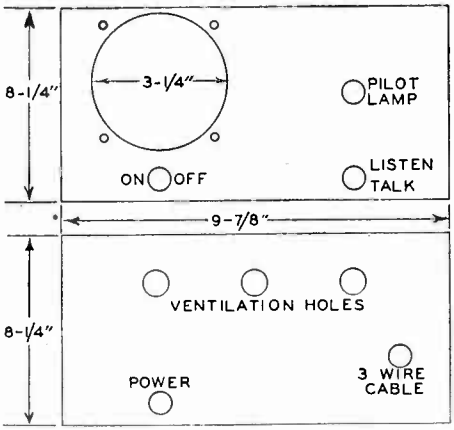


Fig. 2. Front and back panels of master unit.

The chassis is a standard 7" x 9" x 2" unit. The sketch in Fig. 4 shows how the parts should be placed on top of the chassis. The output transformer is mounted on the speaker frame and no output transformer is used on the remote speaker. Wherever possible small tie strips are used to support wiring and parts. Small 3 terminal strips are used to connect the three wire cable to the units. An effort should be made to place all parts on the same level in order to prevent piling parts on top of another and to simplify wiring and servicing of the unit. There is also less chance of accidental short circuits when this method of wiring is used. The hole for the power cord is lined with a standard 3/8 inch rubber grommet. Keep R_7 as far away from other components as possible because it gets rather warm in operation.

One important point came up in the original unit. This was the connection of the common lead from one side of each transformer, and from the speaker to the chassis. Each of these components must be grounded *by a separate wire*, with all wires coming *to the same point* on the chassis. It may seem easier, for example, to wire one side of the speaker to one side of the output transformer and continue the lead from there to ground. It was done this way in the original unit and feedback howling occurred. The use of separate wires as described above completely cured the trouble.

The cabinets are made from 3/8 inch plywood. The master cabinet measures 10" x 8¼"-x 8¼" and the remote cabinet measures 6" x 7" x 4". However, any available wood may be used for the cabinets. Do not use metal cabinets because of the shock hazard. The front panels of both units are made from ¼-inch masonite. The hole for the speaker is 3¼" in diameter and the holes for the switches and pilot lamp mounting are ⅜" in diameter. The panel for the master station is held to the chassis by two 6-32 x ½" machine screws. The same kind of screws are used to hold the speakers to the panels. The large holes for the speakers may be cut with a scroll saw or an expansion bit. In order to protect the speaker cones, the openings were covered with ¼" mesh hardware cloth. If desired, the openings may be covered with cloth instead but, if you do this, be sure to use regular grill cloth because ordinary cloth will muffle the sound.

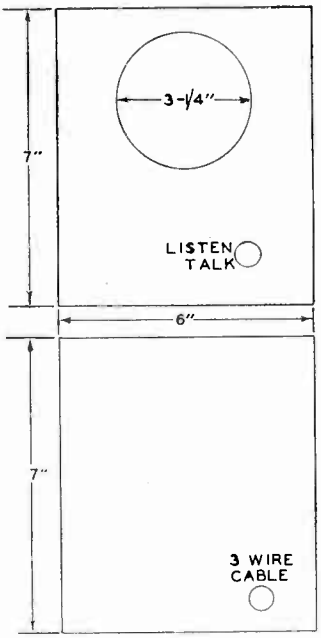


Fig. 3. Front and back panels of remote unit.

Three fairly large holes are needed in the back of the master cabinet in order to allow heat to escape. If the cabinet is to be mounted on a wall the holes should be drilled in the top of the cabinet.

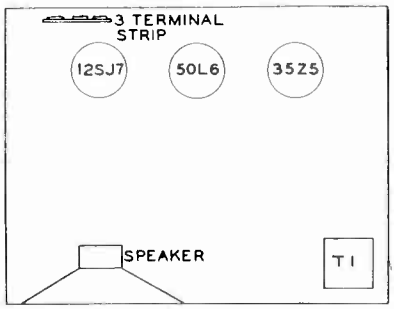


Fig. 4. Parts location—top of master station chassis.

The interconnecting cable can be any 3 wire cable or three strands of hookup wire. However, the wires should be color coded for easy identification. Three wire cable used for thermostat connections is very good for the purpose. It may be obtained at electrical stores. It is known as three wire thermostat cable.

n r i

Excited Young Father — "Quick! Tell me! Is it a boy?"
Nurse—"Well, the one in the middle is."

Graduate Crowther is in the "Dog House" and LIKES it!

Dear Chief Instructor Dowie:

Enclosed you will find some pictures of my little shop, "Dog House" as my wife calls it. I take great pride in it, for the ideas are my own.

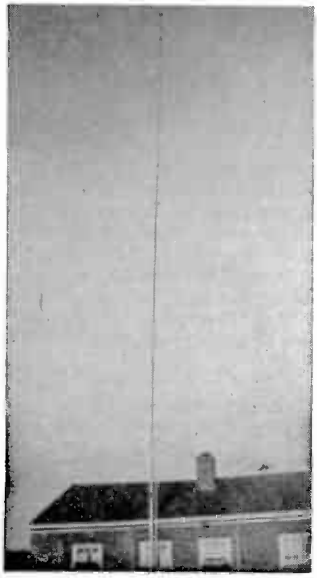
When I started this Course, I knew that I would never go into full time Radio, but I have always wanted to know just how a Radio really does work. Your Course gave me the right information and believe me I have enjoyed working on my lessons. It's a swell Course.

I have been in the electrical field for about twenty-four years, starting out as an electrician's helper in 1924-25 and 26. In 1942 I enlisted in the Navy and for three years of the war I was in the electric field of repair and maintenance and also doing instructors' work. During this time I decided to learn Radio.

Thanks a lot Chief, for your interest. I want to buy some more of your test equipment. I am well satisfied with the Signal Tracer.

RAYMOND R. CROWTHER, New Braunfels, Texas.

n r i



Charles Woodall Sends Photos of Unusual TV Installation

Dear Editor Menne:

I wish to explain that I am in one of the worst locations in Youngstown. I have just put up an inexpensive rotary Television Antenna 76 feet high. Get excellent results from WEWS Cleveland, over 60 miles away. Have a Workshop Manual Mast Rotator #AM2 and a Workshop Beam peaked on Channel 5. When WDTV Pittsburgh came on the air, I rotated the beam to Pittsburgh and the signal faded away. With the antenna beamed on Cleveland, Pittsburgh (on Channel 3) comes in perfectly. Evidently the beam works backwards for Channel 3.

CHARLES T. WOODALL, Youngstown, Ohio.

Long Range Television Reception

By

JEROME E. RESPESS, President

LAPOINTE-PLASCOMOLD CORP.

The material and photographs in this article are through the courtesy of the LaPointe-Plascomold Corporation, Unionville, Conn.

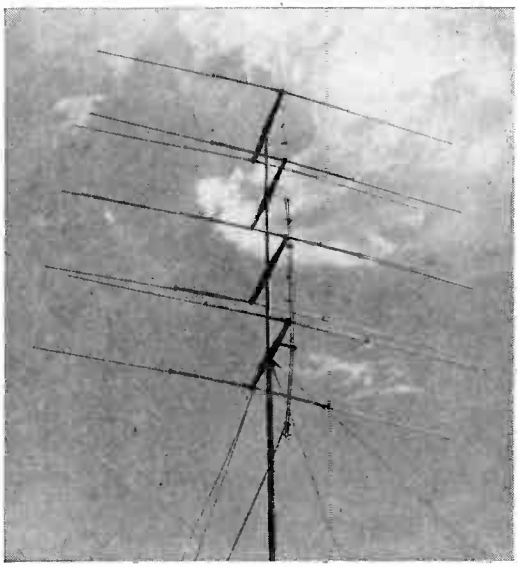


Fig. 1. Typical high-gain television antenna.

CONSISTENT television reception at greater than line of sight distances is now definitely a reality. This was considered impossible for many years by most electronic engineers as well as by the Federal Communications Commission. The general theory was that the signals traveled in a straight line and that once line of sight distances had been exceeded, signals dropped off in strength so rapidly that they were not usable. The fact that these signals travel in a straight line is correct, but the point that was generally overlooked was that refractions occurred and that it was possible to use these refracted signals to produce satisfactory pictures at distances of two and three times line of sight.

Experimenters found that, by using high gain antennas such as the one pictured here (Figure 1), the weaker, refracted signal could be multiplied enough times to produce a satisfactory signal-to-noise ratio and consequently a good picture resulted. Once a satisfactory signal-to-noise ratio had been obtained, it was then possible to use a preamplifier (commonly referred to as a "booster") advantageously. The refracted signal being presently discussed is not to be confused with strong refracted signals brought about by tropospheric ducts which will be discussed later in this article. These refracted signals presently being considered are a normal occurrence and are ever present at distances up to approximately 100 to 125 miles depending upon the height of the transmitting and receiving antennas.

Observations made over a period of nine years over the same path (Hartford, Conn., to New York) indicate that there was never a day in which it was not possible to obtain a picture if adequate receiving equipment was used. This is at a distance of approximately 100 air line miles and approximately 8,000 feet below the line of sight. Many reports of reception at distances up to 300 miles have been noted but this reception is generally not consistent and due to tropospheric ducts or where the receiving antenna is located atop a mountain or a very high building.

Another important factor is the character of the terrain between the transmitter and the receiver. Hills play an important part, particularly if located close to the receiving antenna in the path of the signal. Being directly behind a hill is the most adverse situation possible. It has also been noted that intervening hills located several miles away from the receiving antenna do tend to reduce the signal. Nevertheless, reception at the above distances is still normally possible. Satisfactory pictures have been received daily from Schenectady, N. Y. to Hartford, Connecticut over a period of seven years even though 2,000-foot hills intervene.

Since the Federal Communications "freeze" on all television station construction permits, the term "tropospheric propagation" has been very frequently referred to in this connection. The reason for the so-called "freeze" is that the stations assigned to the same channel are interfering with each other if located less than 300 miles apart. This interference manifests itself in the

form of black lines running through the picture which are commonly referred to as "venetian blinds." Also the audio becomes very garbled. This interference becomes most noticeable and is the severest when an extensive tropospheric duct is causing what is known as a super refraction.

The condition is also greatly accentuated by the presence of aircraft in the vicinity of the receiving antenna. Great interference is presently being experienced between New York, Boston and Schenectady on Channel 4—Buffalo and Cleveland on Channel 4—Cleveland and Detroit on Channel 4—Cleveland and Cincinnati on Channel 4—Chicago and St. Louis on Channel 5—New York and Baltimore on Channel 2—and Philadelphia and New Haven on Channel 6. The FCC recognized this problem almost immediately and put in effect the "freeze order" so that the condition would not be further accentuated and to provide time to study and rectify the already existing situation. Engineering conferences have already been held and experiments are presently being conducted to synchronize the transmitters involved.

The tropospheric ducts referred to occur most frequently in the late spring and early fall of the year, but are also very common during the summer months. They occur only infrequently during the winter. Another noteworthy fact is that they occur more frequently along the coast lines or near large bodies of water such as the Great Lakes.

Such ducts many times cover wide areas and last for varied periods of time. They may be caused by a temperature inversion. However, a temperature inversion does not in itself always cause such a duct to be formed. If the temperature inversion is accompanied by a steep moisture lapse, it almost always causes such a formation. The direction of the wind, therefore sometimes plays an important part in the creation of this phenomena.

What generally happens is that the heat of the Sun is absorbed by the Earth during the day and, as nocturnal cooling occurs during the early evening, the warm air close to the Earth is forced upward so that the air above the Earth is warmer than the air close to the Earth. This is a temperature inversion and may cause the formation of a tropospheric duct which in turn would cause a signal to refract towards the Earth making long range reception better than it normally would be.

If the cooler air moving in is laden with moisture and this moisture is very rapidly dissipated by the warmer air which is rising, a moisture lapse is occurring and this will almost always cause the formation of such a duct when accompanied by a temperature inversion. That is why the direction of the wind is important, because if the wind is blowing off a body of water it blows in cool moist air thereby aiding the condition required.

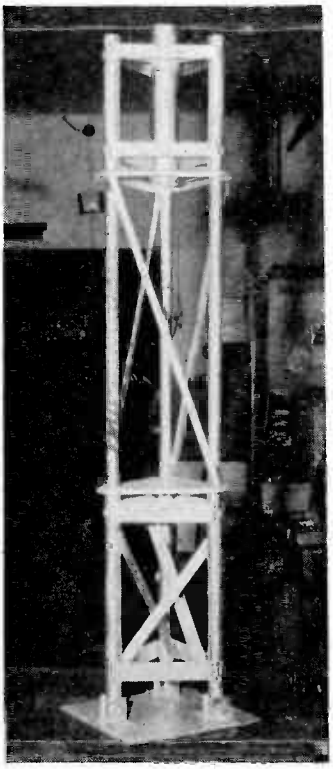


Fig. 2. One section of a typical television antenna tower. Used for heights above forty feet.

A very large duct is sometimes formed and this causes a super refraction making very long range reception possible, sometimes with very simple receiving equipment. This condition occurs 9 out of every 10 nights in the Mediterranean Sea areas, but never occurs in the Arctic areas. This accounts for the fact that reception is so much better during the warmer months than during the Winter.

There are many other elements which should be dealt with in connection with tropospheric propagation, but space here does not permit further discussion. The main point to remember is not to be fooled by abnormal conditions in making a fringe television installation. This has been the downfall of many dealers selling television receivers in remote areas.

In actually making a fringe installation, it is well to test the location for signal strength before deciding on the equipment needed. This can be accomplished by erecting a simple dipole on a portable mast and extending it higher and higher until a favorable signal to noise ratio is obtained. Generally it is possible to go as high as 50 feet in this manner. If greater heights are necessary, it is possible to fashion a folded dipole out of 300 ohm line and fasten it to a piece of balsa wood to keep it rigid. This is then fastened to a balloon filled with helium similar to those used by the Weather Bureau and the signal strength as well as noise may be measured at various altitudes. To satisfactorily conduct this test a good field-strength

meter or a communications receiver with an S or R meter should be used.

After it has been determined that a satisfactory signal to noise ratio can be obtained at a certain height, the method of mounting the antenna at this height should be considered. Thought should be given in this connection to the fact that it may some day be necessary to repair the antenna, make adjustments to it or possibly change the transmission line. Adequate means of climbing to the antenna or a simple method of lowering the mast should always be provided for. All too often no thought is given to ever servicing the antenna and sooner or later the service man is dismayed to find out it is more difficult to take the antenna down than it was to put it up.

For heights over 40 feet, sectional towers such as illustrated in Fig. 2 are very inexpensive and satisfactory. They may be readily climbed thereby making it possible to make adjustments or repairs safely and easily.

For heights of less than 40 feet, magnesium masts as illustrated in Figure 3 are recommended. These are extremely light, strong and clean to handle. This type of mast is very easy to erect since it may be pulled to a vertical position on the swivel base provided. Once installed and secured, its floating guy rings allow orientation without loosening the guy cables. This is extremely important for the obtaining of maximum signal strength when a mechanical rotator is not used. Lastly, this type of installation is neat, pleasing in appearance, and may be lowered very quickly without effort when repairs or adjustments are necessary. Always avoid the use of iron or steel pipe since most antenna masts are constructed of aluminum and, where the aluminum and iron or steel come together, electrolysis occurs causing the mast soon to give way.

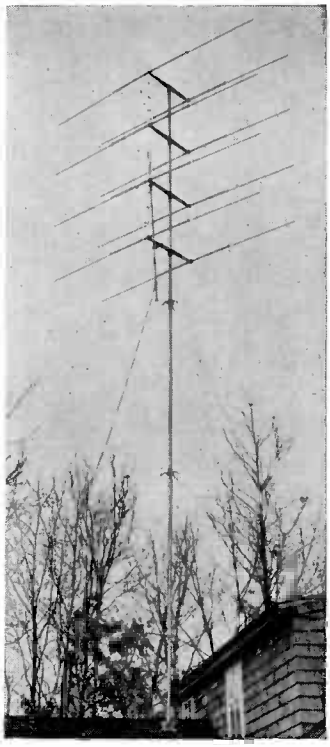


Fig. 3. Strong and light magnesium antenna mast, for heights of less than forty feet.

With regard to the antenna itself, best results at great distances have been obtained with the Vee-D-X Model RD13 which has the highest gain of any antenna commercially available. This is a 4 bay 32 element stacked array constructed of 61 S T duraluminum which provides great strength. The dipoles themselves are ½ wave rather than the ¼ wave ones generally used. This feature, along with the tunable Q section, make it possible to obtain a perfect match. The commonly referred to Q section is really an impedence matching transformer.

While this antenna has a very broad response and adequately covers the entire spectrum, if greater gain on the high channels is desired, the R D H model is recommended. This is a 16 element 4 bay stacked array cut and stacked for any specific channel. This model provides twice the gain in the high channels that it does on the low channels. This is desirable when located in an area some distance from a city having stations operating on both the high and low channels. Usually it is easy to receive the low channel station and difficult to receive the high channel station. The R D H model Vee-D-Z equalizes this situation providing equally good reception from stations in either the high or low TV spectrum.

If high gain is necessary, but a higher front to back ratio is needed, then the Vee-D-X RDY series should be used. This is a 4 element yagi array which, because of its very high front to back ratio, is very effective in areas where two or more stations on the same channel are interferring with each other. This antenna utilizes a 2" boom and has two directors and 1 reflector of one inch tubing. The driven element is a stepped-up folded dipole which, contrary to other yagi arrays, provides an excellent match for 300 ohm line. This type antenna is very sharp and effective on one channel only. Where more than one station is required, two or more antennas may be mounted on the same mast.

Once the proper antenna has been securely mounted on a suitable tower or mast and sufficient signal has been obtained, it is exceedingly important to conserve as much of this signal as is possible. Once the signal has been obtained, it must be transported to the receiver and the transmission line becomes the means of transportation. When selecting a transmission line, choose one with low attenuation. Lines vary considerably in quality. One company alone makes seven grades of 300 ohm line. Avoid cheap line, it is costly in the long run.

Where coaxial cable is necessary, because of

noise, R G 8 U or R G 11 U is recommended. They have a loss of approximately 1.1 DB per 100 feet at 30 megacycles as compared to 2.2 for R G 59 U and R G 22 U at the same frequency. As the frequency increases, the ratio becomes even worse. Where long runs are necessary, Vee-D-X heavy duty line (X-200-A) has the lowest loss of any line commercially available (0.6 DB per 100' at 30 mc).

The selection of a good pre-amplifier and a sensitive receiver are the last requisite for good television fringe reception. Be sure to select a pre-amplifier that is broad enough to pass both the audio and video signal. Many pre-amplifiers now on the market are too narrow and consequently video without audio or vice-versa results. The sensitivity of receivers varies greatly and, while a receiver may function beautifully in a primary area, it may be entirely unsuited for fringe work.

A little time in ascertaining the sensitivity of the receivers being considered for use will be well spent. Many of the most expensive receivers are not as well suited for long range reception as some of the inexpensive ones.

In conclusion, a satisfactory installation in a low signal area must be carefully planned and skillfully carried out. Make-shift, careless installations produce only poor results and serve to retard television. Make only installations you can point to with pride and be proud to say "that's my installation and it's there to stay."

n r i

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NEW TV PICTURE TUBE DEVELOPED BY G. E.

A new television picture tube which will give more viewing area in low-priced sets has been developed by General Electric Tube Divisions' engineers at Schenectady, N. Y.

First of its size ever designed, the new tube has a diameter of eight and one-half inches and will cost no more to build than seven-inch tubes now used for low-priced sets. It will offer, however, 50 per cent more picture to set owners.

Tube Divisions' Manager, J. M. Lang called it a major more to give the public larger pictures in low-priced sets. "Cost of the new tube," he said, "will probably be no more than the present cost of the seven-inch tube."

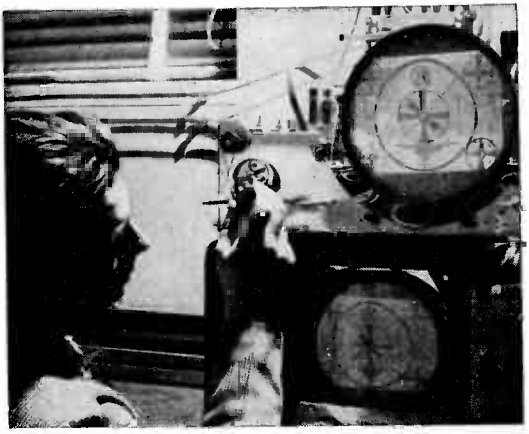
He estimated that the picture on a seven-inch screen covers about 26 square inches of area. The new eight and one-half inch tube easily handles 39 square inches, a 50 per cent larger picture.

Mr. Lang said that the new tube was a metal type and that the development is the result of many months' research by engineers for such a tube.

Samples of the tube will be available shortly, he continued and production will get under way in 1949.

Though engineering details were not released, it was pointed out that picture quality offered by the new tube is comparable with that of the best tubes now in production. It employs magnetic focusing and deflection.

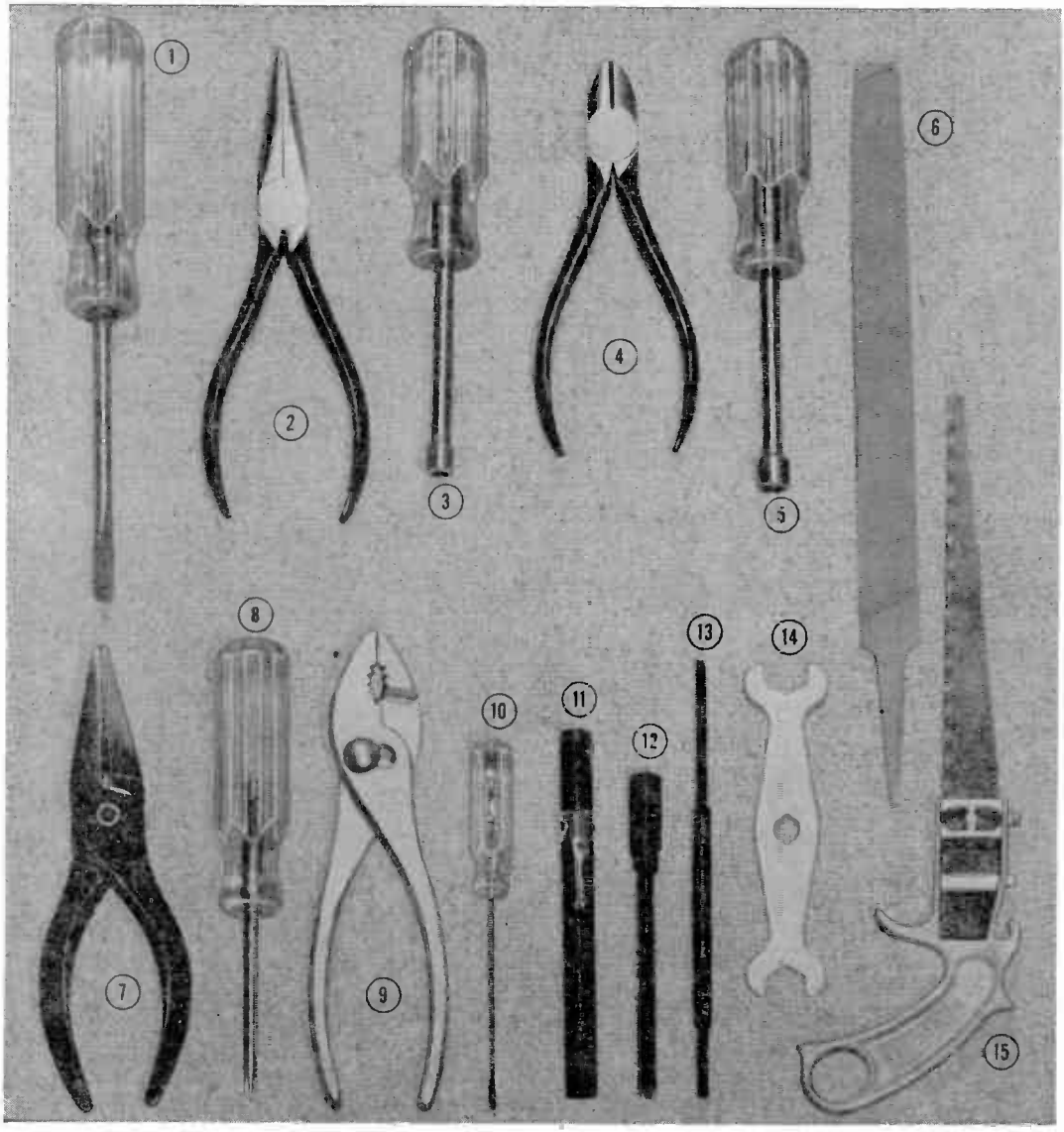
Mr. Lang emphasized that development of the tube would not affect the division's plans for full-scale production of picture tubes in the larger-screen ranges, notably the 10-, 12-, and 16-inch sizes.



The viewing area of the new G.E. eight and one-half inch picture tube for television sets is illustrated in this picture made in the Receiver Division's engineering laboratories at Electronics Park. The new tube was placed in a set chassis (at the top) and compared with the picture on a seven-inch set (at the bottom) by G-E engineer Bob McCreadie. Both are actual photos, made from the faces of the viewing screens, while the test pattern used to test television receivers was "on the air."

NRI RECOMMENDED TOOLS FOR STUDENTS AND RADIO SERVICEMEN

Available to NRI Men at a Money Saving Price



Sold only in kit form—tools not sold individually

THESE ARE PROFESSIONAL GRADE, QUALITY TOOLS

Here it is! Just what you need—all picked out for you—the NRI Professional Tool Kit. It contains fourteen carefully selected, good quality tools in a canvas Roll-Up Carrying Case.

These are not ordinary inexpensive store specials. They are quality tools which, if bought at dealer's net prices, would cost you about $9.50. Yet this complete kit is yours, through NRI, for only $7.95 delivered. You will like the feel of these fine tools. They are just what NRI recommends for doing your experiments. They'll last well into your radio servicing career.

Notice the illustrations on the left hand page. The description of each item is as follows:

1. General utility screwdriver. Chrome vanadium steel. Amber colored plastic handle.

2. Long nose pliers. A professional grade, precision pliers, made of high-grade tool steel. For hard-to-get-at places. Polished head. Smooth handles. 6½" over-all length.

3. Nut driver for ¼" hex nuts. 1¼ inch hollow in shank. Shock proof, amber colored plastic handle. This chrome vanadium steel nut driver and the one in Item 5 are those most needed in radio. They're time savers.

4. Diagonal Cutters. Precision made, of high-grade tool steel. Perfectly aligned. Beautifully polished head. For quick, clean wire cutting. These cutters, and the long nose pliers (Item 2), are the most essential tools to a radio man. Good quality is important.

5. Nut driver for 5/16" hex nuts. 1¼ inch deep hollow in shank. A precision tool.

6. File, 8 inch. Indispensable for cleaning soldering irons, filing screws, and metal hardware.

7. Plastic long nose pliers. Fully insulated, shock proof. For moving radio parts in a live chassis in search of intermittent defects. For light work only.

8. Phillips screwdriver. Correct size for general radio utility. Widely used in radio work. Made of chrome vanadium alloy tool steel with amber colored plastic handle.

9. General Utility slip joint pliers. Non-slip knurled handles. A drop forged steel product which will take a lot of punishment.

10. Small screwdriver. Chrome vanadium steel with insulated shock-proof amber colored plastic handle. Slender 4 inch blade allows easy access to panel knob set screws.

11 and 12. A 4-in-1 neutralizing tool. Bone fiber. Used widely in aligning and adjusting receivers for peak performance. A necessity. Sturdily constructed. Professional grade.

13. Double blade bone fiber neutralizing tool. Designed especially for the new miniature i.f. transformers. One blade shaped particularly for the K-tran unit. The other universal blade may be reshaped to suit any specific need.

14. A special flat wrench. For tightening volume controls and toggle switches. Provided with a "thread chaser" valuable in rethreading stripped screw threads on volume controls and switches. Designed for radio servicing.

15. Metal cutting saw. Highly useful. Excellent for work in close quarters. Light in weight. Removable blade may quickly be placed in any one of four positions. Very valuable in cutting volume control shafts, screws and other metal items in repair work.

May not be sent to Canada under present import restrictions.

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HOW TO GET ALONG WITH OTHERS

By

DR. JAMES F. BENDER, DIRECTOR

THE NATIONAL INSTITUTE FOR HUMAN RELATIONS

MOST of us understand that physical pain can be a good friend. If we didn't burn our fingers we wouldn't learn the danger of fire. If we didn't do something about our real aches and pains our health might deteriorate.

But imagined pain is something else again. Do you know a *hypochondriac?* He's the fellow who imagines he has aches and pains. Although he may be quite sincere in believing he has them, he obviously gets satisfaction from his alleged poor health.

Ordinarily, he's not popular. His thinking is negative. His talk about poor health takes the joy out of life for his associates. He wants more attention than he deserves. He takes advantage of your sympathy for sick people. He sees himself as a martyr, carrying on despite pain—until he understands why he acts as he does.

Then he can get rid of his self-torture. How? By practicing autosuggestion. About 25 years ago a French psychologist, Emile Coué, made his pet saying popular: *"Day by day, in every way, I am getting better and better."*

If you were to flex your arm many times today as you repeated, "My arm feels strange—I believe it's becoming paralyzed—It's getting weaker and weaker—," before long you would notice your arm actually becoming weaker.

Now the opposite, *positive suggestion*, works much better than the negative sort. That early morning groggy feeling can keep you in bed with black thoughts of becoming sick; or, you can take it in your stride and feel fine. You lose the groggy feeling by forgetting it—by suggesting to yourself that you'll be all right as soon as you get your shower and a good cup of coffee. By the time you catch the bus, you're thinking about other things—and you're feeling tip-top.

This secret of right thinking is shared by all really successful people. When the president of a New England mill was a textile salesman, he used to look at himself in the mirror every morning before going down to breakfast. And he said aloud to himself three times, "John—, you're the best textile salesman in America." He'd emphasize the words. He meant what he said. He gestured with his right fist.

He says that his tone of assurance, the determination in his face, and the regularity of his saying it, helped him no end to get to the top. It did. For it was positive autosuggestion.

Now, some may smile. They believe this is childish. But aren't they the doubters? And don't doubters need just the kind of autosuggestion they scoff at?

So if you would feel better, if you would deepen the admiration others have for you, accent the positive. Suggest good things to yourself and the good things of life will flood into your life.

NEW ANTENNA MOUNT

A new Television or FM antenna mount which allows rapid installation is illustrated at the right. This antenna mount will fit round, oblong, square, or rectangular openings from four inches to twenty-two inches. It can be installed in a chimney as shown in the larger illustration, or in a round vent pipe as shown in the small illustration. (Provided the diameter of the vent pipe is four inches or more.)

The antenna mount consists essentially of two collars connected together by means of two long screws, with four pairs of "scissor arms" connected to the collars. Set screws are provided for clamping the antenna mast in position.

The mount will accommodate one inch, 1⅛" and 1¼" masts, small removable inserts being provided for the smaller diameter masts.

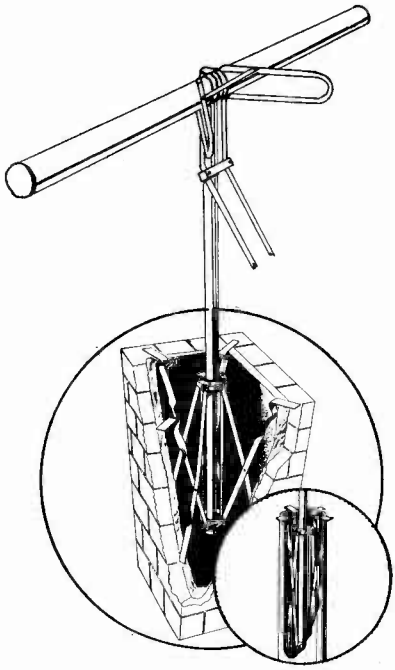
In use, the mast is fitted through the two collars and the lower screw tightened enough to hold the mast in position, but not enough to prevent turning. The scissor arms are then collapsed together and the mount inserted in the opening. The two long screws which pull the collars together are then tightened—as the collars are pulled together, the scissor arms expand, clamping against the chimney or other opening. The lower parts of the arms clamp tightly against the wall of the opening while the upper part of the arms not only clamp against the sides of the opening but also fit over the top of the opening as shown in the illustration.

Once the long screws have been tightened sufficiently to hold the mount firmly in place, the antenna can be rotated for proper orientation. When the antenna is properly oriented, the upper set screw is tightened, fixing the antenna in place.

Thus, only a screwdriver is needed for installation—steel straps, cables, wires, and other accessories are not necessary. Neither is it necessary to drill or chisel holes in masonry, brick, or wood. Because of this, the new mount makes possible a rapid installation.

According to the manufacturer, **La Pointe-Plascomold Corporation of Unionville, Conn.,** the mount permits an antenna installation in sixty seconds.

A sample mount has been in use for some time at the home of NRI's Supervisor of Training, Mr. James B. Straughn, and he has found it to be satisfactory in all respects.



New "Vee-DX" antenna mount.

When the antenna mount is used in a large cast iron or metal vent pipe, as are sometimes found in apartment houses and homes, a special ground for the antenna mast is not required for lightning protection. When the antenna is installed in a chimney, on the other hand, a good ground should be attached to the antenna mount. At least No. 12 wire should be run between the antenna mast and the nearest convenient ground.

In some homes, where the fire-place is not used, a very efficient installation may be easily made. The fire-place usually serves as the "focal point" for the room and thus is a logical location for a television set. The Television set can be mounted in the fireplace, preferably on a low table, and the antenna can be mounted in the chimney, using this new "Vee-DX" antenna mount. The transmission line can then be dropped straight down the chimney to the receiver.

Where this is done, it is desirable to partially close the draft so that rain will not fall on the top of the television set.

For further information, not only on this particular antenna mount, but upon the entire line of "Vee-DX" antennas and accessories, contact your local jobber or write directly to the company (name and address given at the left).

—Louis E. Garner, Jr., NRI Consultant.

Dressing Up the 7RK Receiver

Our Cover Photo

NRI Chief Instructor Dowie examines the handiwork of one of our laboratory instructors. The 7RK cabinet shown on the front cover was constructed in one weekend. Detailed plans for construction of this simple cabinet are included in the article below.

George J. Rohrich

By GEORGE J. ROHRICH
NRI Laboratory Instructor

After you have satisfactorily completed NRI Experiments 61-70 of the RK kits, you own a 5-tube superheterodyne receiver chassis that is typical of thousands of commercially manufactured broadcast-band sets. This chassis, complete with dynamic speaker and calibrated dial is shown in Fig. 1.

Its neat appearance and excellent performance give lasting evidence that you have acquired technical knowledge and ability to do practical work in a precise manner. You are justly proud of your accomplishment. It will give you unlimited pleasure when you settle back to enjoy the radio programs in your spare moments. Letters received regularly at NRI attest to these statements.

Plenty of enthusiasm is shown in the letters received at NRI to indicate the 7RK chassis is used for entertainment of the entire family. No electrical changes are necessary, of course, because the chassis is complete. However, it is evident that many ingenious schemes are employed to dress it up to harmonize with its new surroundings, usually in the busiest room of the home.

The description of various schemes can be summarized by stating that enough unused shelf-space was found for slipping in the chassis and neatly making provisions for hiding the chassis with a hinged door when it is not in use. Here are some of the schemes which should appeal to others for dressing up the 7RK radio chassis.

Several letters described the simple operation of putting the 7RK chassis in a spare section of a wall-cabinet in the kitchen. During preparation of meals or other times when someone is in this room the cabinet door is left open for keeping up with news and music by radio. When the radio is not used, the cabinet door is closed, neatly and easily putting the radio out of sight.

Other letters described a similar thought by slipping the chassis into an unused cabinet originally used for storing piano sheet music or phonograph records. Either type of cabinet is neat and harmonizes well with furniture found in the living room of many homes. If one is not available around your own home, you probably could locate a used cabinet by placing an advertisement for one in your local newspaper.

One description of an installation in a record cabinet tells how the chassis was arranged so the control knobs extended from the right side of the cabinet. This choice was most suitable be-

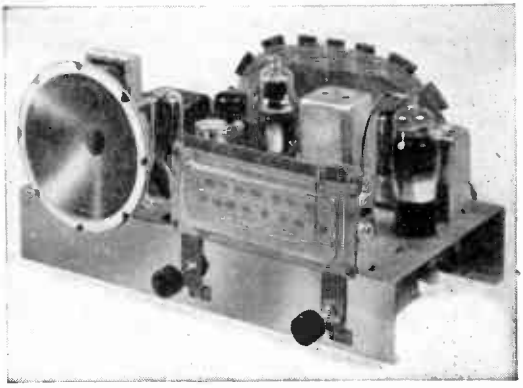


Fig. 1.

cause the cabinet stands near an arched opening between living room and dining room. The cabinet door faces into the living room but the special mounting of the chassis toward its side permits the radio to be heard better in both rooms. Consequently, to suit these special requirements, the right side of the cabinet was carefully provided with openings for the chassis dial, speaker and two control knobs. The opening for the speaker was covered on the inside with grille cloth. A very attractive arrangement was claimed for this installation, along with pleasing reproduction after placement of the chassis in its cabinet. The side of the cabinet forms a baffle for the loudspeaker.

A baffle prevents sound waves from the back of the speaker cone from interfering with those sound waves issuing from the front and also acts to "load" the cone by coupling it to a larger volume of air. This emphasizes the clearness of reproduction from the loudspeaker. Consequently, if you do not put your chassis into a cabinet, where the side or front serves as a baffle, then it would be well for you to add a flat baffle, about eight inches or more square, made of any suitable material like cardboard, plywood, or some substance which can be easily handled for cutting either a circular or square opening to expose the speaker cone. Fasten this baffle with screws inserted through the holes found in the rim of the speaker.

Another practical and popular location in many homes is found in book shelves. Here a bit of cabinet work is usually required for effectively dressing up the 7RK receiver chassis. However, anyone who is handy with the simple cabinet making tools they possess will find added pleasure in working out the details to suit their taste by adapting necessary changes for using a panel similar to the one shown in sketch H accompanying this article.

Still another practical way for dressing up this receiver chassis is to install it in the console of a radio which has outlived its usefulness. In a console cabinet, a baffle is mounted separately, usually below the chassis, where the speaker is fastened. Consequently, when you elect to dress up the chassis in this manner, you will remove the speaker from its original place on the chassis and relocate it in its new position on the baffle. The four wires (red, yellow, black, and blue) between speaker and chassis must be lengthened for this change. Identify these four speaker wires where they pass through the grommet in the chassis by referring to Fig. 13 in your instruction book for 7RK. Solder all splices and tape them well to insulate these lengthened wires.

Building Your Own Cabinet

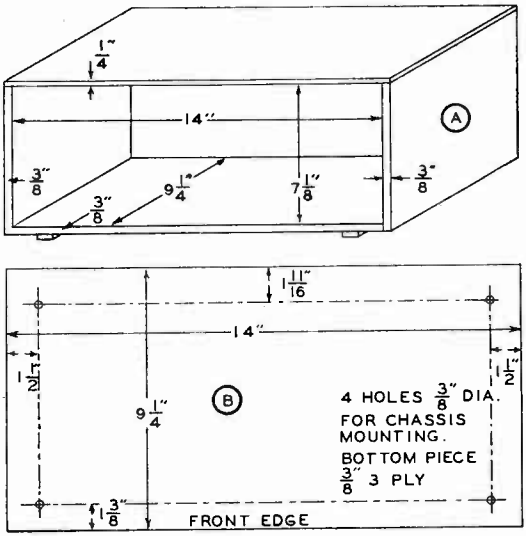
Details for assembling a cabinet, suitable for neatly housing the 7RK chassis, are given in sketches A through H inclusive. The finished cabinet is shown on the front cover of this magazine.

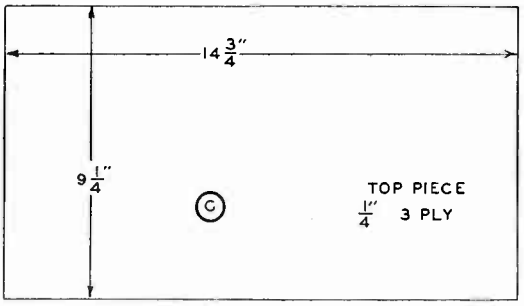
Sketch A gives the general idea how the top, two sides and bottom are put together and mounted on two strips which serve as "feet" for this practical cabinet which you can build. These pieces are glued and nailed together with brads. The details for doing this neatly are given in later sketches so that no nail holes show on the outside of the cabinet.

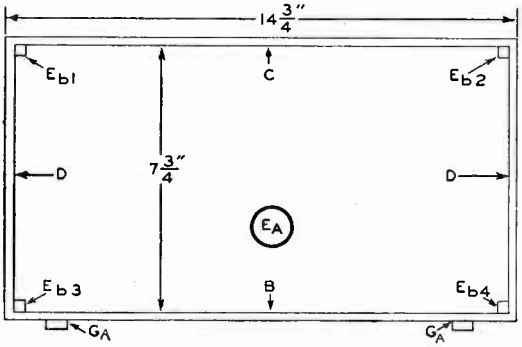
The first piece of the cabinet you will prepare is the bottom. Make this according to Sketch B from ⅜-inch 3-ply plywood. Here you see the length is 14 inches and the width is 9¼ inches. Saw this piece carefully so the finished board has these dimensions. Then drill four holes, one hole in each corner, using a ⅜-inch diameter drill. These holes let you fasten the chassis to the bottom. Notice that the front edge is identified in Sketch B and it is suggested you now mark your front edge accordingly, to conform with the holes you drilled. Later sketches do not show these four holes, because the marked front edge is used for reference, instead, to simplify the sketches. Also, for ready reference purposes that this is the bottom, prepared from Sketch B, mark your finished board with the letter "B."

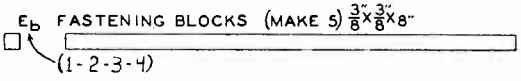
Next, prepare the top piece according to Sketch C. Notice that this is made from ¼-inch 3-ply plywood. (The bottom and sides are thicker than the top and panel H.) All dimensions are those of the finished article, so be sure you mark and cut carefully to secure the dimensions shown in Sketch C. For identification purposes, mark this board with the letter C.

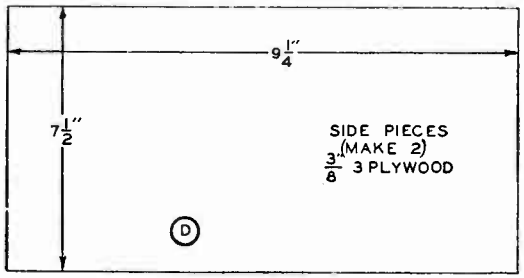
Your next step is to cut out the *two* sides from ⅜-inch 3-ply plywood according to sketch D. Mark each of these sides with the letter D.

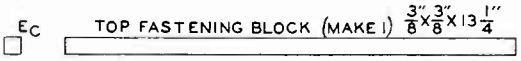


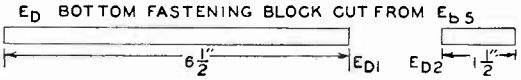












Now study Sketch E_a for the purpose of noting in partial detail how the pieces you have already prepared will be reinforced with four blocks (to be prepared next) as shown in Sketch E_b.

You should make *five* blocks according to Sketch E_b. Four of these are used as shown in Sketches E_a, F_a, F_b, and F_c. Cut the fifth block apart according to Sketch E_d. Mark the larger piece E_{d1} and the smaller piece E_{d2} for identification later. (Their use is shown in Sketches F_a and F_b.)

Also make the top-fastening-block according to Sketch E_c. (Its use is shown in Sketch F_d.)

Now make the two strips from Sketch G_a. Cut them from a piece of 3/8-inch plywood. Each will be 9¼ inches long and 1½ inches wide. Later you will fasten them to the outside of the bottom piece B, as shown in Sketches G_b and F_c. These strips serve as "feet" on which the cabinet rests. Make the panel from ¼-inch 3-ply plywood according to Sketch H. This panel is 14 inches long and 7⅛ inches wide. Cut the square hole (3⅜ by 3⅜ inches) for the speaker with the help of a coping saw and finish its inside edges by carefully filing them with a wood-rasp and fine-cut file. Similarly cut out the oblong hole (5⅛ inches by 1 15/16 inches) for the tuning dial. Drill two holes with a ½-inch drill under the tuning dial opening where the control shafts will project. All necessary dimensions are given in Sketch H.

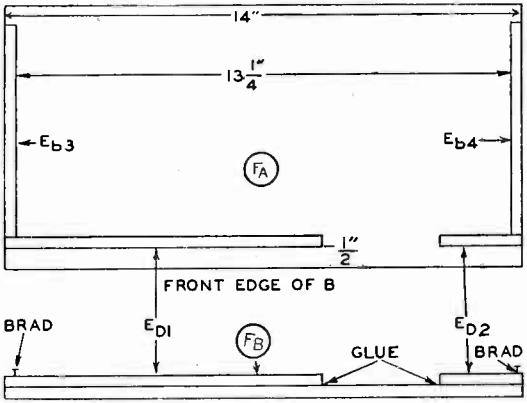
Now you are ready to assemble the pieces which you have made. Select the block E_{d1} and bottom B. Place them before you as shown in Sketch F_c. Note the exact position from Sketch F_a and apply a coat of glue on the under side of the block. Then drive a 5/8-inch brad through the block into the bottom piece B, as shown in Sketch F_b. Two more brads should be enough to securely hold the glued block as shown in Sketch F_c.

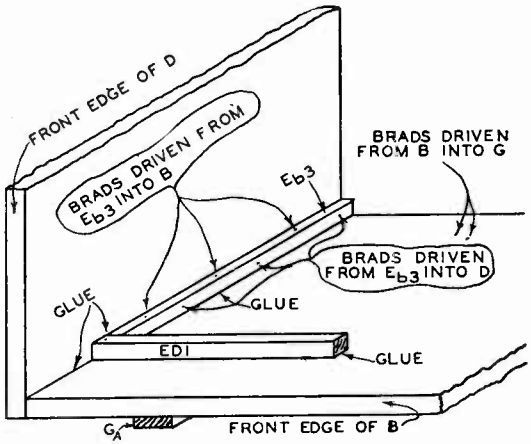
Similarly, fasten block E_{b3} to B with glue and 5/8-inch brads. Use sketches F_c and F_a to get exact position of this block.

Next, fasten E_{d2} to B as shown in Sketches F_a and F_b. Follow this by attaching E_{b4} to B while using these same sketches F_c and F_a.

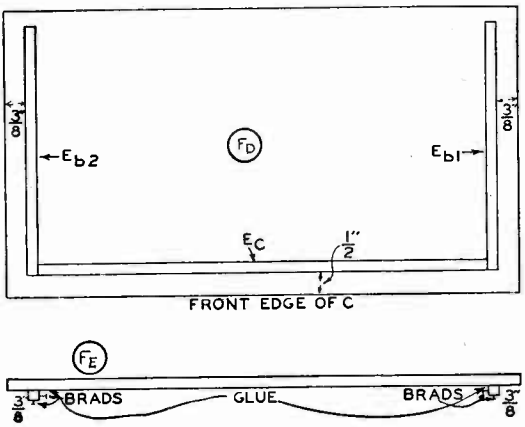
Assemble the three blocks to the top piece C while using Sketch F_d. To secure exact placement of all pieces, you should attach them progressively, starting with E_{b1}, then fastening E_{b2} and finally adding block E_c. Here you should use brads which are preferably not longer than ½ inch, so there is no danger of driving them through the thinner piece of ¼-inch plywood. However, if you prefer using 5/8-inch brads, then you can do so if you will slant the brads so their points will not extend through to the outside of the top piece.

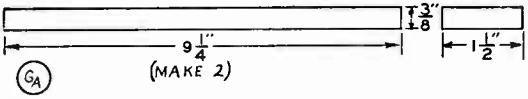
The next step is to attach the strips G_a to the bottom as shown in Sketch G_b. Notice how the

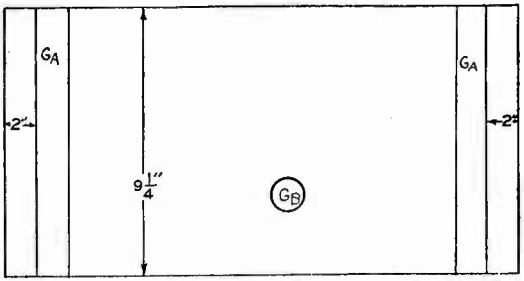


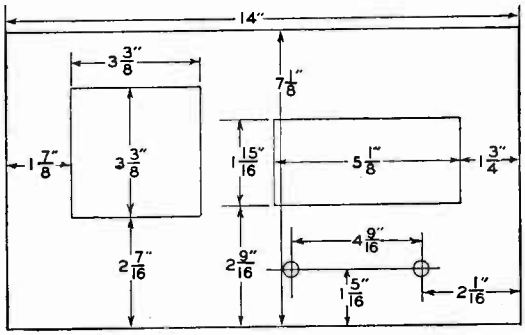


Sketch Fc (Above). Although small nails (brads) are used to reinforce the glued strips, these brads do not show anywhere on the outside of the cabinet.









Sketch H (Above). 1/4" 3-ply panel (make 1). Note: Holes for control shafts should be 1/2" diameter.

brads are driven from B into G (see Sketch F_c) so the heads of the brads will not show on the outside, consequently will not scratch any furniture on which you later place your cabinet.

Again refer to Sketch F_c and prepare to fasten the left side D to B, using glue and brads. Spread the glue along the left edge of B, as well as along the left edge of E_{b3}. Drive several 5/8-inch brads from E_{b3} to securely hold the pieces in place while the glue hardens. This can be done best when you allow D to rest horizontally on your workbench, so B extends vertically, while driving the brads. Be careful that the brads don't extend through D and spoil its outside appearance.

Use this same technique to finish the cabinet assembly so its appearance conforms with the outline sketches A and E_a.

Temporarily put panel H into its final cabinet position, to check it for proper fit. If necessary, dress the edges of H with sandpaper, or use a plane or wood rasp and file, so a neat fit will be secured when the panel is slipped into its front opening of Sketch E_a.

You will see now how the panel is recessed into the front opening, letting the front edges of the cabinet form a frame around the panel.

Before gluing the panel permanently in place, it is advisable now to check and see how your 7RK chassis fits into the assembly of your partially completed cabinet. Therefore, temporarily drive one brad (½ inch long) into each of the strips E_c, E_{s1} and E_{s2}. Let their points barely protrude through each strip until you are ready to drive them a bit further into the panel, just enough to temporarily hold it in place during the checkup which follows. During this nailing job, put a small board on the table and rest the outside of the panel on this board so you have solid backing between your panel and table top.

Remove the knobs from the shafts on the chassis and slide the chassis into the cabinet. Pay particular attention to the dial-pointer running freely when you move this pointer with the tuning control shaft. If your dial pointer rubs against the upper inside edge of the oblong opening, you can correct it. Any one (or all) of three methods may be applied: 1, Don't let the chassis slide forward where the pointer touches the panel; or 2, slightly readjust the pointer, or 3, cut away enough of the inside upper edge, above the dial opening of the panel. The latter method is preferred and can be done readily with a rasp. The panel should be removed if you must do more work to improve its fit. If needed, you can rasp away a generous section of this upper edge so your cut extends inside and upward for an inch or more, while sinking the cut to approximately one-eighth inch, or half of the original thickness of your panel. Of course, if your pointer doesn't require this, then disregard these corrective steps. After you are satisfied that the panel fits perfectly, then permanetly fasten the panel to the cabinet with glue and ½-inch brads.

The next step is to carefully calk any imperfections along the seams or chipped edges of your cabinet. "Plastic Wood" is recommended for this purpose. It may be purchased at any hardware or paint dealer, along with sandpaper and enamel paint needed to finish your cabinet.

The choice of color is optional. White enamel was used on the cabinet shown in our cover photo. This gives a pleasing appearance, resembling white plastic used in many table model commercial receivers. Five coats of enamel were applied, allowing two days for drying each coat before sanding and applying the next coat. Plenty of time must be allowed for drying so the surfaces of enamel harden well and permit neatness during the sanding operations. By drying thoroughly, each succeeding coat of enamel covers more of the grain, until the grain disappears, and a smooth surface of even texture is the final result.

The speaker opening is covered on the inside of the panel with grille cloth. This should be tacked to the panel with small upholstering tacks, using twelve or more tacks to stretch the cloth neatly over the opening.

The finished cabinet is ready now for installing your chassis. As you survey your handiwork and settle back anew to enjoy the radio programs, you are certain to gain and retain added satisfaction from your accomplishment of dressing up the completed 7RK receiver.

Editor's Note: The foregoing article was written with the view that it will be helpful to NRI students who are interested in building a cabinet to house the 7RK Receiver. It should be added that NRI cannot supply any of these materials. You should be able to obtain them locally without much trouble.

———*n r i*———

The Bare Facts

There were three bears, Papa, Mama, and Baby Bear, who sat down on the ice to tell stories to one another. Papa told his tale and Mama told her tale, but when it was Baby Bear's turn, all he could do was sit on the ice and say, "My tail is told."

———*n r i*———

NRI Graduate Paul R. Campbell Co-Owner of SPARX Re-Coning Service

Graduate Campbell making final tests on a repaired speaker.

Graduate Campbell re-coning a loudspeaker.

Dear Mr. Smith:

I thought perhaps you would like to hear something just a little different in the way of the ventures of an NRI graduate. I am now engaged in the business of re-coning and re-building speakers including all sizes, shapes and descriptions. This service includes everything from the voice coil (correct impedance and all) clear down to and including the dust cap which fits over the voice coil and pole piece. Most of the work is done at dealer's net prices for the serviceman.

I am sending two photographs of myself at work at the SPARX Re-coning Service, of which I am co-owner. A little bit about these photos: The one where I am at work at the bench inserting a cone is where the actual re-coning is done. The parts shown in the picture are but a few of the components which are necessary for the work. Our stock of components makes it possible to re-cone practically any speaker manufactured.

In the other photo I am at work at our test bench where the speakers undergo a thorough test before being shipped out to the customer. We have specially built equipment for this testing process which assures proper operation under any conditions. The power supply is shown at top right which supplies the amplifier which I am shown adjusting. The instrument at the bottom right is an audio oscillator which also feeds into the amplifier, giving a frequency check at any frequency in the audible range.

Most of the testing is done around 400 and 1000 cycles. The amplifier is capable of putting out 25 watts of power with less than 1% distortion at 400 cycles. By a balancing arrangement, the impedance of any voice coil can be determined while the speaker is under test and the power going into the speaker determined. The power supply provides high d.c. voltage for the electrodynamic speakers which automatically adjusts itself to the proper voltage. A dry rectifier provides the low voltage for the 6 volt auto receiver speakers.

The work is quite interesting and different from the regular service work which is also done here at another bench. Most of the speakers are reconed for other servicemen and wholesalers, including also quite a number of juke box concerns and outdoor theaters.

I have been surprised at the number of fellows around here who are taking the NRI Course. They all seem quite interested in it and many others have made inquiries after spotting my diploma.

As I told you before, I finished shortly after returning from the service, which laid a firm foundation for my two year electronic course at West Virginia University. I am never hesitant to point out the advantages to any one about the NRI Course.

Very truly yours,
Paul R. Campbell, Clarksburg, W. Va.

———*n r i*———

LATEST TELEVISION TRENDS

The 12", 15" and 20" direct view picture tube will become much more popular during 1949. Production advances and economies should permit large-tube sets to come within the reach of the average household budget.

No obsolescence of present TV receivers is yet in sight. Existing operational standards have been set for years to come. Notable refinements in transmitting equipment and operation during the past years have proved that present receivers are capable of still greater pictorial quality.

Early lifting of the "freeze" by the FCC on UHF frequencies is expected. This means the opening up of many more TV channels, with TV stations for smaller cities, towns, and rural areas.

It seems now as though the densely populated areas will continue to be served by VHF transmitters tuned in by present types of receivers. UHF transmitters would call for a new type of receiver and would present many new problems which can be worked out as channels open up. New types of receiving antennas, along with special coaxial cable downleads would be needed. In some installations it might be found necessary to place the RF amplifier at the antenna itself, so critical are the UHF signals. (This is a look into the future. Actually, if this band of frequencies were opened to TV today, it would be many months before transmitters and receivers were in operation and available to the public.)

There are now well over a million TV sets in use, with production of well over 130,000 per month, which will give at least 2,750,000 by the end of 1949. Television is becoming a real "show business." Meanwhile, coaxial and radio relay networks spread out to a goodly third of our country, covering a large proportion of our population.

Already the East is linked with the Mid-west by a 2,100 mile web of coaxial cable and radio relay, connecting 14 major cities. Network facilities have also expanded rapidly on the West coast. The day does not seem too far off when the East coast and West coast will share their Television Programs.

———*n r i*———

RCA VICTOR ANNOUNCES UNIQUE COLOR SCHEME FOR RECORDS: NEW 45-RPM DISCS IN 7 HUES ACCORDING TO MUSIC TYPES

Camden, N. J. — Translucent, plastic phonograph records in gay, cheerful rainbow colors to identify all categories of music will make their first appearance in the 50-year-old record industry when RCA Victor introduces its completely new 45-rpm system for reproducing recorded music in the home, it was revealed by J. G. Wilson, Executive Vice President of RCA in charge of the RCA Victor Division.

The new distortion-free, vinyl plastic records, in hues characteristic of seven classifications of music, and their complementary phonograph instruments, operating at 45 revolutions per minute, are to be introduced to the public around April 1.

Departing from the varied-size black records, RCA Victor is first to announce a new system featuring small, single-size discs for all classifications of music, with the various categories identified by the use of translucent vinyl plastic in bright shades of red, green, blue, yellow, cerise, and other hues. Though only 6-7/8 inches in diameter, the small 45-rpm record plays up to 5-1/3 minutes of music—equal to the longest playing time of the conventional 12-inch disc.

The selection of characteristic colors resulted from a study by a board of color and design experts headed by John Vassos, nationally known industrial designer. The color assigned to each of the seven classifications of recorded music represents, in the board's opinion, the psychological and aesthetic color connotation of the type of

music represented—ruby red for classical music, midnight blue for semi-classical, jet black for popular, lemon drop yellow for children's, grass green for Western, sky blue for international, and cerise for folk music.

"The buying public today demands appearance and convenience on a par with quality." Mr. Wilson stated. "To the unprecedented distortion-free, noise free quality of our new 45-rpm records we have added bright, cheerful colors which, for the first time in the history of the industry, add eye appeal to ear appeal in the playing of recorded music. The use of colors also serves as a means of classifying and storing records in the home."

Colored records, Mr. Wilson pointed out, will also speed up service in the record dealer's shop and simplify the operation of self-service systems. With all music classifications identified at a glance by color, the shopper will find it easier to locate the classification of his choice. Each color classification will also bear a standard price, helping both the customer and the salesmen to determine more rapidly the price of any selected group of records.

In announcing its new 45-rpm phonograph and record, RCA Victor emphasized that it would continue to manufacture standard 78-rpm records made in the customary black compound and in the red vinyl plastic series.

The new system, a product of ten years of laboratory research and development, represents the first records and players ever developed side by side as complementary units, with the specifications of each selected to meet the requirements of the other.

The new system offers music free from all discernible distortion and surface noise on a small, 6-7/8 inch, non-breakable disc that plays up to 5-1/3 minutes, equal to the playing time of the standard 12-inch record. The new record, offering a small, standard size for all classifications of music, goes a long way toward solving the consumer's record storage problem in the home.

A unique feature of the system is its unusual new record changer—the fastest ever developed—which has been designed to eliminate the traditional problem of chipping, cracking, and breaking records during changer operation.

In a marked departure from most conventional systems, the drop mechanism is housed in the player's center spindle, which has been enlarged from the previous ¼ inch diameter to 1½ inches. By centering the drop mechanism, RCA Victor found it possible to eliminate the usual outside record posts, speed up the changer cycle, simplify the changer mechanism, silence its action, reduce the overall size of the player, and eliminate many costly and intricate moving parts.

The new 45 rpm records have been designed with a raised shoulder between the playing area and the center rim, providing air spaces between the playing surfaces and the center rims of stacked records. In most conventional systems, the record separating blades are required to force their way between the stacked records. This forcing action is often the cause of record damage. With RCA Victor's new design, the blades move into the air spaces provided by the raised shoulders of the records.

The 45-rpm speed was the result of many factors. The objective was to achieve best reproduction possible on the smallest record of single size practical for all types of music, consistent with the trouble-free design of the changer mechanism, that would provide up to 5-1/3 minutes of distortion-free music. Exhaustive tests over a period of years showed this to be a 6-7/8 inch disc revolving at 45 rpm.

While RCA Victor engineers were aware that 45 rpm was a radical departure from turntable speeds previously employed in record and instrument manufacture, it was pointed out that all previous speeds in use had been arrived at with no consideration of the possibility of distortion-less reproduction. In the early days of the phonograph industry, it was recalled, speeds varied from 70 rpm to 90 rpm. The speed of 78 rpm was finally established because it met the requirements of the old acoustic methods of recording and reproduction.

A 33-1/3 speed, still in use for radio transcriptions was chosen originally by technicians when sound motion pictures were being recorded on discs. It was necessary in the "talkies" of that period to have a disc that provided playing time in the ratio of one disc to one reel of film.

Following long established policy in new developments, RCA Victor has shown the 45 rpm system to instrument and record manufacturers and offered to them blueprints and technical information on the theory that the new system offers advantages that may lead to their adoption by the industry as a whole, satisfying the largest number of those who constitute the present and future market for records and phonographs.

Upwards of 15 changer equipment and instrument manufacturers have indicated they plan to make or incorporate RCA Victor's new system in their line of record-playing instruments.

N.R.I. ALUMNI NEWS

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Will Power—You've Got to Have It

By L. L. MENNE, Executive Secretary

NRI Alumni Association

A great deal is written and spoken about will power. Some try to leave the impression it is a mysterious, elusive force. Others wrap it up in all sorts of technical terms, hinting it is a God-given power.

But when we strip it of all these high sounding phrases and carefully analyze it we find, after all, there is really nothing magical about will power. It is simply a determination to complete every task you begin, in spite of all the obstacles and stumbling blocks in your path.

Will power is the force that drives a man on to accomplishment—the human dynamo that pushes a man on from smaller to bigger and bigger jobs. It is the vital force back of most successful men today. All about us we see its results—big jobs being done by men who have the will power to do them.

We see men physically handicapped as a result of sickness or accident who, by sheer will power, have forged to the very top of their professions. The late Charles Steinmetz who became the recognized electrical wizard of the day is a shining example. In our own field—Radio—we, here at NRI, learn of lesser examples, but equally remarkable. Just the other day a graduate from North Carolina called on us. When he enrolled, some years ago, he was unable to walk because of a serious affliction. But he didn't give up and now he gets around fairly well. He licked his handicap. Moreover, he studied his course diligently, and today has one of the most prosperous Radio businesses in his community.

Another graduate does all his Radio servicing from a wheelchair. Still another, bed-ridden because of a serious automobile accident, which probably can't be overcome, conducts his Radio store from his bed by a speaker system through which he talks with his customers. That's courage. That's will power. I mention these examples only to draw a comparison. They should be an inspiration to most of us.

Let's remember this; a man's chief asset is an undying, irresistible determination to win. The will to do—the will power to get ahead.

It's the fellow with will power enough to improve himself by work and study who gets first consideration when a job higher up is to be filled. It is only natural that he should. Employers are looking for men who can do a job better than the average and have the will power to keep behind a plan or idea until it is put across. Such men develop into executive material—because they have the ability to direct the work of others.

This desirable quality of will power cannot be acquired overnight. But it can be developed. Every new task is a challenge. To begin with you must immediately overcome the habit of putting off until tomorrow what you should do today. Admire men who are more successful than you. Try to follow in their footsteps. You must awaken—be alive to opportunity. You must believe in yourself. Your every action must show it. Soon people will see that you are above the average.

Yes, sir, you can develop a power which will not recognize the possibility of failure. Of course, you will not always succeed in everything but you will be sure you have given your best. And, man, when you get the habit of always giving your best—you are way ahead of the field.

"I'll find a way or make one." There's a slogan for you—that's will power.

CHAPTER CHATTER

New York Chapter

Our chapter members have greatly missed the smiling face of Chairman Bert Wappler during the past several weeks. For some time Bert suffered with what was thought to be merely a cold. However his cold has culminated in a serious case of pneumonia, confining him to the Flushing Hospital. We hope that by the time this issue of NR NEWS is published, Chairman Wappler will be well on his way to complete recovery.

Chapter activities have been extremely successful these past months . . . have had an excellent group of speakers. We're fortunate to get plenty of practical information on Television from member speaker Ralph Baer. . . . Ralph is now a Television Engineer. On several occasions, we have called on Willie Fox who always comes through with practical and humorous talks on Television Servicing. . . . Peter Guzy recently delivered a very fine talk on Tuning Indicators. . . . Dick Patten very ably discussed Transformers . . . and, of course, we regularly depend on Alex Remer to conduct our question and answer forum.

We cordially invite NRI men in our locality to meet with us. New York Chapter meetings are held on the first and third Thursday of each month at St. Mark's Community Center, 12 St. Mark's Place—between Second and Third Avenues, New York City.

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Baltimore Chapter

National Vice-President H. J. Rathbun presided during the installation of our officers for 1949. . . . At that time our re-elected Chairman, Percy Marsh, gave a short talk on what we should try to accomplish during the coming year, with suggestions from our members. . . . At this meeting Mr. Gough was appointed chairman of our program committee with Mr. Shue and Mr. Clark. . . . Technical atmosphere was added to this meeting through an excellent talk on Television picture tubes, given by Mr. Clark.

We were pleased to have Executive Secretary L. L. Menne with us from National Headquarters. Mr. Menne had some interesting remarks for us on Alumni Activities. . . . He was accompanied by Mr. J. B. Straughn, Supervisor of Training at NRI. Mr. Straughn gave a very enlightening talk on Television and answered many questions.

Our Vice-Chairman Cliff M. Whitt gave one of his very good talks at a recent meeting. . . . Subject was "Synchronizing of the Picture and Sound on Movie Film with the Television Camera." He also answered questions about FM and TV antennas.

Two new members were admitted to the Chapter. They are Mr. B. D. Evans and Mr. J. F. Pivinski. . . . We're always glad to have NRI men in our locality visit our meetings. We meet on the 2nd and 4th Tuesday of each month at Red Man's Hall, 745 W. Baltimore St., Baltimore. . . . Come and see us!

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Philadelphia Chapter

Ed. Note: As NR NEWS goes to press, we have not received a report from Philadelphia Chapter's secretary. We are sorry the report is late and cannot be included in this issue.

Philadelphia Chapter meets at 4510 Frankford Avenue, in Philadelphia at eight P.M., on the second and fourth Monday of each month. NRI Students and Graduates are always welcomed.

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Detroit Chapter

Activities for the year of 1949 are well under way. Our new Chairman, Robert Mains, is taking his work very seriously and doing an excellent job, with good backing by our entire membership. Plans are already being made for our annual June party.

Floyd Buehler arranged for an excellent film on "Television Circuits." The film provided the background for a well-rounded, group discussion on this subject. Following our discussion, a television set was turned on and all enjoyed an exciting series of boxing matches. . . . Mixing in a little recreation goes well at meetings.

We were pleased to have two Philco Television experts meet with us. They were Mr. Harje, in charge of Television for Philco in the Detroit area, and Mr. Bledsoe, instructor at Philco's Detroit service school for Television. . . . Mr. Harje gave a brief outline of Television since its inception in the Detroit area. He also outlined Philco's service policies for the past and present year. . . . Mr. Bledsoe used blackboard drawings and actual demonstration on setting up and servicing the Philco 48-2500 projection system. Service sheets covering his talk were distributed to all present. Harry R. Stephens took several good photos at this meeting. Look for them in this issue.

At our next scheduled meeting, Floyd Buehler will give us more information on Television. . . . Service Forum, conducted by F. E. Oliver is to follow.

Future meetings promise to be very good. . . . We are always pleased to have NRI men in Detroit area visit us on second or fourth Fridays of each month at Electronics Institute, 4th floor, 21 Henry Street, Detroit.

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Chicago Chapter

Chapter officers who are serving this year are: Harry Andresen, Chairman; Richard McCoy, Secretary; Steve Bognar, Treasurer; Lloyd Immel, Librarian; and Charles Mead, Sergeant at Arms. . . . We feel our chapter is in the hands of very capable leaders.

Biggest news from Chicago is about our new meeting place . . . an excellent location in central Chicago. Our members have already voted to begin holding meetings in the American Furniture Mart Building, 666 Lake Shore Drive. Members should use elevators at west entrance to building. The business meetings will be held in the Assembly Hall at the west end of the 17th floor. Refreshments are included. A laboratory session will then regularly follow . . . to be held on the 33rd floor of the tower. At one of our meetings, Mr. Velasco explained current flow in parallel circuits. . . . A discussion on condenser action followed . . . led by Lloyd Immel and Steve Bognar. . . . Actually, we are so busy planning for our new quarters, that little technical work has been done. Now that we are to have laboratory facilities, we can expect many worthwhile demonstrations at future meetings. . . . Visitors are always welcome. We meet once each month; on the second Wednesday. Our new secretary, Richard McCoy, 6149 Kenwood Ave., Chicago, will be pleased to give further information.

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Salesman—"Is the BOSS of the house in?"
Young Father—"I'll say he is! He's asleep upstairs IN HIS CRADLE!"

TELEVISION BOX SCORE

Stations Operating	55
Construction Permits Granted	67
Applications Pending	317

(AS OF MAR. 3, 1949)

F. Earl Oliver administering the oath of office to National Vice President Charles H. Mills. Mr. Oliver, who is a past president and for many years was a vice president, was very pleased to have the honor of installing Mr. Mills, one of our true stalwarts in Detroit Chapter.

Mr. Bledsoe of Philco demonstrating the Philco projection television system at a Detroit Chapter meeting. On the left Detroit Chairman Bob Mains appears very much interested. On Mr. Bledsoe's right are F. Earl Oliver and Mr. Harje, who is in charge of Philco Television in the Detroit area.

A group of live wires—officers of Detroit Chapter. Left to right they are: Harry R. Stephens, Bob Mains, Charles H. Mills, Clarence McMaster, E. C. Baumgarth, F. Earl Oliver, and Floyd Buehler.

Here And There Among Alumni Members

Mr. Leslie G. Biles of Drexel Park, Penna., was a recent visitor. Mr. Biles graduated in 1924. Now let's see, that is 25 years ago.

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Which brings to mind that NRI will be celebrating its 35th anniversary this year and the NRI Alumni its 20th. NRI was founded in 1914, *but the Alumni Association was not organized until* 1929.

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On this same subject, it is interesting to report that 75 graduates started the NRI Alumni Association. We now have over 8,000 members—8,328 to be exact, and growing every month.

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Nice letter from Roy L. Gallagher. Graduated from NRI five years ago and has been climbing in radio ever since. He is now studio engineer for Station WMCK AM and FM, McKeesport, Pa.

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William Lipke, Oakville, Wash., is now head of the radio section in his National Guard Unit. He is engaged in installation, maintenance, and operation of two-way AM and FM equipment. Lipke already has his 1st class radiotelephone license and is studying for a 2nd class radiotelegraph license with the thought that he may go to sea as a radio operator.

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Thanks for the fine snapshot of yourself, Graduate Robert Tourtellate, of Butte, Montana. We always appreciate receiving photos of our Alumni members. This particular photo was taken during the war at the time Tourtellate had charge of a Jap prison ward.

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Our old friend, Graduate R. Cooper Bailey, of Richmond, Va., tells us he has recently been requested to go back on active duty with the Navy. He expects to be in for a limited time. Bailey served with the Navy as a Lt. Commander during the past war.

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We received several interesting clippings of advertisements for Ode's Radio and Washer Sales and Service of Detroit, Mich. The owner of this prosperous business is Louis Ode, an NRI graduate with 16 *years of servicing experience.*

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M/Sgt. Wilbur A. Peifer, attached to the 86th Fighter Group, now has his amateur license. His call is DI4HO. He says that every day in his present work he finds himself returning to his textbooks in communications for help on difficult jobs.

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Wilfred Hilmar, of Astoria, Long Island, N. Y., now has his first class radiotelephone license. He works for the New York Telephone Co.

Clifford D. Lessig of Frenchtown, N. J., is servicing 10 to 20 radio receivers each week in spare time. He has also built two television receivers from kits, and now is building an oscilloscope. Here's a man who is really taking advantage of each spare moment to get ready for television.

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A very cordial letter received from Victor M. Arndt, of Tahoe Pines, Calif. The real purpose of Arndt's letter was to pay Alumni dues but he took the opportunity to mention that his spare time shop is doing very well. He also mentioned that he had a big time with the capacity relay built from plans given in a recent issue of NR NEWS.

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Mr. and Mrs. Clifton W. Hartley of Arcadia, Ind., are the proud parents of a new baby boy. He has been named David Lynn. We were very sorry to hear that Mrs. Hartley has not gotten along as well as the new son. She was critically ill, and has been confined to a hospital for some time. However, she is now much improved and getting better all the time.

n r i

One of NRI's youngest graduates, Earlwood Smith, of Hartsville, S. C., has just completed his NRI training. Smith is only 17 *years old, and still a senior in high school. He is doing spare time work and already has many satisfied customers. Plans on making radio his life's work.*

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Alexander Kish, of Carteret, N. J., has been in a full time radio and television business of his own since 1946. He reports that he is making out very well, and recently increased his stock of radio replacement parts due to increased business.

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Roby C. Crook, of Lexington, Ky., sent an interesting note with an order for his second NRI Signal Tracer. Says it is one of the most useful instruments in his shop, and that it goes way beyond his expectations of an instrument at this price.

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Harvey Girard, who is in charge of Signals and Radar operations at a large RCAF station in St. Hubert, P. Q., Canada, writes that he has been away on temporary duty in Newfoundland. Was engaged in experimental and installation work.

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Graduate Wilbur M. McDonald, of Dadeville, Alabama, tells us that radio servicing has become a very important part of the Abrams-McDonald Home and Auto Store. Says there is no television in his locality, but FM is increasing rapidly. Getting consistent FM reception from about 10 *stations in a radius of* 125 *miles, and a large part of their work is on FM, as other shops are not equipped to handle it.*

NATIONAL RADIO NEWS
16th & U Sts., N.W., Washington 9, D. C.

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NATIONAL RADIO NEWS
FROM N.R.I. TRAINING HEADQUARTERS

Vol. 13 April-May, 1949 No. 8

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

NATIONAL RADIO INSTITUTE
Washington 9, D. C.

The Official Organ of the N. R. I. Alumni Association. Editorial and Business Office, 16th & You Sts., N. W., Washington 9, D. C.

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J. B. STRAUGHN, TECHNICAL EDITOR

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Printed in U.S.A.