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IN THIS ISSUE

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Television Servicing Methods

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SINCERITY

We are often told that a man must rely on himself for success. In one way this is true —but it is not true that a man can become successful in any line of work without the co-operation of others. Were it not for the fact that we are all living together in associations of various kinds, there would be no point in striving for success, or in being successful.

For this reason, men who desire to become successful can not ignore other people; they can not ride rough-shod over the feelings of others; they must be considerate, courteous, fair, honorable.

Possibly we can sum up all this in two words—be sincere. If you are really sincere, you will be honest, fair, kind and considerate.

All truly successful men are sincere. Success built on insincerity is not success; it can not last, nor is it complete and satisfying. Only merited success is complete and satisfying. Be sincere—if you want the kind of success that brings happiness.

J. E. SMITH, *President.*

Servicing AC-DC Receivers

By J. B. STRAUGHN

NRI Supervisor of Training

THE first AC-DC or Universal receivers made their appearance in 1936. Most of these sets, often called cigar box receivers due to their flimsy cabinet construction, were not made by recognized manufacturers. Many small outfits in New York and other large cities assembled such receivers under various brand names such as "International Majestic," etc., and distributed them widely. Diagrams of these receivers were not published.

In a day when the superheterodyne was the only publicly accepted circuit, the TRF circuit was used exclusively in these sets. Many had dummy tubes which served no purpose save to fool the public as to the nature of the set. However, most of these receivers gave satisfactory results and quite a few are still in service. Although they cannot compare with modern AC-DC supers made by reputable manufacturers, they have their place and the serviceman is often called upon to repair them.

J. B. Straughn

Knowing the capabilities of these sets is extremely important. Their performance must not be compared to the modern receiver of the superheterodyne type. Too many servicemen have spent time trying to improve sensitivity and selectivity in these receivers when the set's operation was perfectly normal.

Although this article deals primarily with the servicing of AC-DC TRF receivers for which circuit diagrams are not obtainable anywhere, the procedures described apply equally well to those TRF receivers on which circuit diagrams are at hand and will also prove of value in servicing more modern AC-DC sets.

The signal circuits of a TRF receiver are extremely simple. Generally there is one stage of radio frequency amplification using a 6.3 volt r.f. pentode tube such as the 78, 6D6 or 6K7. The first two types have the same base and are interchangeable, while the latter uses an octal base.

The r.f. amplifier feeds into the detector, which uses a pentode tube having a sharp plate current cut-off characteristic. Interchangeable types 6C6 and 77 tubes, or the octal base 6J7 tube will generally be found in the detector stage. Usually the detector tube is shielded and sometimes shields are provided for the r.f. tube. Quite frequently the control grid lead going to the top cap of the detector may be shielded and the shield grounded to the chassis.

The audio output of the detector is fed by means of resistance-capacitance coupling into the power output tube, which was generally a type 43 pentode. This tube in turn feeds the loudspeaker; although a dynamic loudspeaker was more often used, occasionally a magnetic type speaker of the midget variety was employed. When the latter type becomes defective it should be replaced with a PM dynamic speaker and output transformer to match the power output tube.

In some sets one or more dummy tubes are often found, with only the filaments connected into the circuit. As long as the filament circuit is not open, the condition of the dummy tube is immaterial; in fact, defective tubes were often used originally by the manufacturer to keep costs down while making the customer think he was getting a better set.

In Figure 1 is shown the typical signal circuit arrangement of an AC-DC TRF receiver. There are several variations from the standard AC receiver which should be noted; these are: 1, the chassis may not be an electrical part of the circuit, in which case the ground symbols simply indicate that the parts so marked are con-

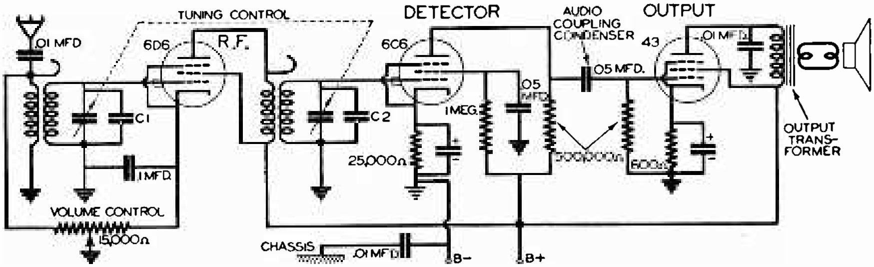

Fig. 1. Signal circuits of a typical universal t.r.f. receiver. Alignment simply involves tuning in station, then adjusting trimmer condensers C_1 and C_2 (mounted on the gang tuning condenser) for maximum output volume.

nected together; 2, the plate and screen of the r.f. tube are operated at the same DC potential; 3, an external ground connection is not used because one side of the power line (which connects to the receiver circuit) is grounded; 4, the small coils connected to the primary r.f. coil windings provide capacitive coupling in addition to the usual inductive coupling between the primary and secondary windings. Often these coils are unshielded, one being placed below the chassis and the other above the chassis to prevent coupling and feedback between them.

Although most modern AC-DC superheterodynes use loop antennas, the TRF varieties employ a flexible wire, known as a "hank antenna," permanently attached to the set and connected to the receiver input circuit through a small tubular or mica condenser. This antenna wire may be connected to a water pipe, or other external ground, in which case the r.f. signals picked up by the ungrounded side of the power line will flow through the primary of the first r.f. transformer, then through the antenna condenser and antenna wire to ground. The r.f. signals passing through the primary induce a signal voltage in the secondary in the usual way.

If the chassis is an electrical part of the circuit and the line cord plug is inserted in such a way that the chassis connects to the hot (ungrounded) side of the power line, you may get a shock when you touch the chassis if some part of your body is grounded. If you get a shock, reverse the line plug if the source is AC; this will connect the chassis to the grounded side of the power line and it may then be touched without danger of a shock. In the case of DC power you cannot reverse the plug, for that would make the polarity incorrect for receiver operation; you will simply have to avoid standing on a concrete floor (a good ground) and avoid touching any grounded object while working on the set with power on. With either AC or DC power, never make a direct connection from the chassis to an external ground, for this may short circuit the power line and blow the line fuse.

If your shop is in an AC neighborhood, and practically all parts of the country now have AC, it is worth while to get an isolation transformer for the operation of receivers and TV sets which do not use a power transformer. A transformer having a 1 to 1 ratio and rated at 150 watts will enable you to work on the largest midget or any TV set not using a power transformer. Also, it is easier to use certain AC operated pieces of test equipment on AC-DC receivers.

A typical power supply circuit used for both TRF and superheterodyne AC-DC sets is shown in Figure 2. Here a 25Z5 tube is connected as a single half-wave rectifier. If the loudspeaker field coil is energized independently of the receiver circuit, there will be a separate connection to each cathode and an extra filter condenser connected directly across the loudspeaker field as indicated in the dotted circle in Figure 2. Incidentally when the field is floated directly across the input of the B supply it serves no other function than to furnish magnetism in the loudspeaker. These fields generally have a resistance of around 3000 ohms and constitute quite a drain on the power supply. If the speaker needs replacement, it is not necessary to get an electrodynamic speaker. A PM speaker will make a more satisfactory replacement. If you replace an electrodynamic speaker having the arrangement shown in the dotted circle in Figure 2 with a PM type speaker, the original field coil will be removed and the two cathodes should then be connected in parallel as in Figure 2.

The tube filaments in an AC-DC set are wired in series and in the earlier sets each filament required .3 ampere. This is the amount of current which must flow through the filament string. The filaments of the type 25Z5 and 43 tubes require 25 volts each, while the 6D6 and 6C6 tubes require 6.3 volts each. This makes a total of approximately 63 volts, and means that the filament voltage dropping resistor must drop 115 minus 63, or approximately 52 volts. Since .3 ampere flows through this resistor, it will have an ohmic value of 52 divided by .3, or approximately 175 ohms. Anything between 160 ohms and 185 ohms would make a satisfactory replacement since the value is not critical.

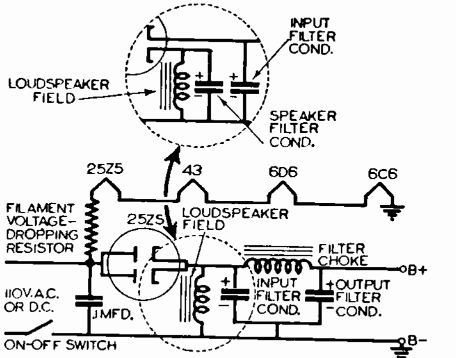

Fig. 2. One type of power supply circuit commonly found in universal receivers. Alternative loudspeaker field coil connections are shown inside the dotted circles.

If pilot lamps are used, they are usually placed in series with the voltage-limiting resistor. Each lamp is operated at about 4.25 volts, and hence the required voltage drop across the limiting resistor is reduced by this amount. Two pilot lamps connected as in Figure 3A reduce this required voltage drop by 8.5 volts. (Although the lamps are rated at 6.3 volts, they are operated at 4.25 volts so that they will not burn out because of the high current when the set is first turned on and before the tubes heat up.)

Pilot lamps are always shunted by a resistor, for these lamps do not draw as much current as the tube filaments. The shunt resistance will be equal to the shunt current (the difference between the .3 ampere filament current and the pilot lamp current) divided into the voltage across the lamp or lamps.

The type of pilot lamp connection used in modern AC-DC sets is shown in Figure 3C. Note that here the filament of the rectifier tube is tapped with the plate being fed from the tap and the pilot lamp connected across the low voltage tapped portion. Here the pilot lamp serves a dual purpose since not only does a portion of the filament current but also the plate current of the rectifier tube flow through it. If a short occurs in the B supply, such as a broken down condenser, the pilot lamp will burn out before the tube is damaged thus showing that something is wrong in the circuit. Also a leaky coupling condenser or a gassy output tube may overload the pilot lamp and burn it out. Frequently however the tapped section of the tube filament will also burn out, and the easiest way to check this is to remove the tube from the socket and check between pins 2 and 3 with an ohmmeter. No reading indicates an open in the tapped portion. The tube will operate with pins 2 and 3 shorted together but this is unwise and prevents operation of the pilot lamp.

Pilot Lamp Color Code

On AC-DC sets, only two types of pilot lamps are ordinarily used. These can be identified by the color of the glass bead through which the filament supporting wires pass. A Mazda No. 40 lamp with a miniature screw base draws .15 ampere and has a brown colored bead. A Mazda No. 26 lamp with a miniature screw base draws .25 ampere and has a blue bead, while a Mazda No. 44 lamp with a bayonet base also draws .25 ampere and has a blue bead. A third type of lamp, having a white bead and drawing .20 ampere, is infrequently encountered. Burned out lamps should be replaced with others having the same bead color and voltage rating. However, before replacing a burned out lamp it is well to make certain that its shunting resistor is not open, or in the case of a power supply circuit as shown in Figure 3C, that the tapped portion of the rectifier filament is not open. An open in the unit shunting the lamp will cause a new lamp to burn out immediately.

Types of Filament Resistors

In modern AC-DC receivers the tube filament voltages add up to approximately the line voltage and no series dropping resistor is required. In the old receivers however it is necessary to place a resistor in the filament circuit to limit the filament current to a safe value. Various types of filament voltage dropping resistors are used in AC-DC sets. Many of the earlier models used ordinary wire-wound resistors mounted under the receiver chassis. (See Figure 3A.) The chief disadvantage was that the heat which was radiated caused deterioration of the electrolytic condensers in the set.

Line cord resistors, having the resistance wire embedded in asbestos and placed in the line cord along with the usual two copper wires, were widely used because they kept the dissipated heat entirely out of the chassis. Such line cords are easily identified by the fact that they have more than two leads. Where four leads are used the extra lead is a tap for the pilot lamp; the resistance wire for the filaments is connected to one of the line wires, the connection being made directly to one of the prongs on the line cord plug. The line wire which connects to this same prong may be identified with an ohmmeter, and always goes to the rectifier plates. The other line wire will go to the on-off switch which is mounted on the volume control of the receiver.

When a receiver which uses a line cord resistor is in operation, the line cord becomes quite hot, but this is natural and is no cause for worry. Never attempt to shorten the line cord when it has a built-in resistance, for this would reduce the resistance value and affect the operation of the receiver.

Ballast tubes are far more satisfactory than

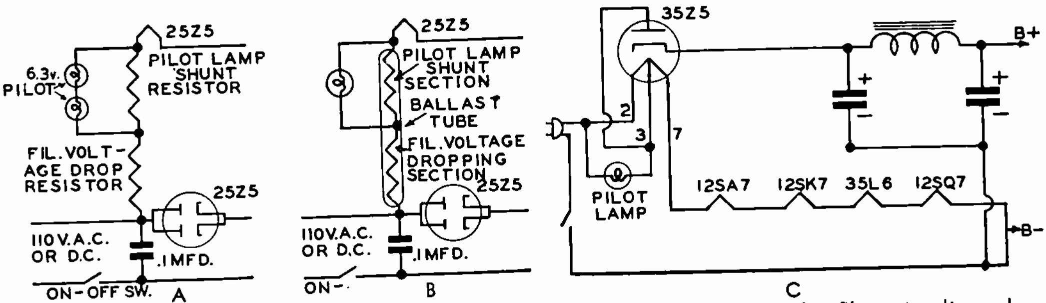

Fig. 3. Pilot lamp connections for power supply circuits. (A) Illustrates the use of a filament voltage dropping resistor. (B) A ballast tube with a pilot lamp tap. (C) A type 35Z5 tube with pilot lamp tap in heater circuit.

line cord resistors for filament voltage dropping purposes. These tubes are furnished with glass or metal envelopes, the metal envelope being the more popular. The resistance element is mounted inside the envelope and connects to prongs on the tube base. In some instances taps are provided, with connections to tube prongs, to eliminate the need for separate pilot lamp shunt resistors; an example of a ballast tube having one tap for this purpose is shown in Figure 3B.

When a ballast tube burns out, try to obtain another having exactly the same type number. However many radio supply jobbers have universal replacement ballast tubes. With these tubes are furnished complete instructions so that they may be used to replace almost any ballast. Ballast tubes become very hot while in use, but as the heat is above the chassis, the critical parts in the receiver are not damaged.

Servicemen are sometimes asked to replace line cord resistors with ballast tubes. Space limitations make it inadvisable to attempt this, for midget receivers are quite compactly constructed. Incidentally, an ohmmeter provides the quickest way of identifying the various prongs on a ballast tube and checking to see if continuity exists in the resistor element. When a ballast burns out temporary repairs may sometimes be made by bending up the little metal tabs which hold the envelope to the tube base. When this has been done the envelope may be slid off, exposing the resistance wires which are usually wrapped around a mica form. You can generally find the break and twist the two broken ends together. The resulting change in resistance is not appreciable and this will often make a satisfactory temporary repair.

Rectifier Circuit Variations

A single 12Z3 rectifier tube, or even a type 37 triode with grid and plate connected together, may be found in a circuit arrangement like that in Figure 4. Since applying field excitation to a dynamic speaker would place too much drain on the rectifier, you may expect to find a magnetic loudspeaker in a receiver using this type power supply. In such cases it is always worth while to replace the original speaker with a permanent magnet type dynamic, together with an output transformer designed to match the voice coil of the speaker to the particular output tube in use.

In Figure 4 the .1 mfd. condenser connected across the power line tends to prevent interference from entering the receiver by way of the power line. In some cases a 2000 ohm 1 watt resistor is used in place of the more efficient but bulky and more costly filter choke as indicated inside the dotted circle in Figure 4. In this case the B+ lead from the primary of the output transformer connects to the cathode of the rectifier. This avoids having the plate current of the tube flow through the filter resistor and reduces the voltage drop which would otherwise occur across this resistor. It is possible to do this because the plate current of the tube is quite insensitive to small changes in plate voltage. The screen of the output tube and the plates and screens of all other tubes however must be fed from B+ to avoid hum.

Another power supply using a 25Z5 rectifier is shown in Figure 5. Here the filter choke is placed in the negative side of the circuit and the DC voltage drop across the choke is used to bias the power output tube. When the voltage drop across this choke is incorrect for bias purposes, a resistor is inserted between point X and chassis in Figure 5, and the control grid return

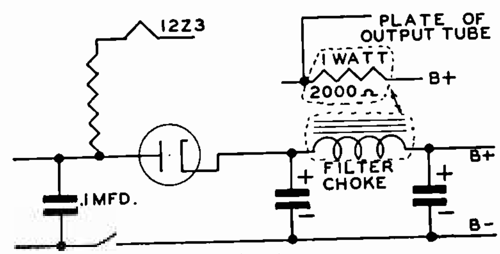

Fig. 4.

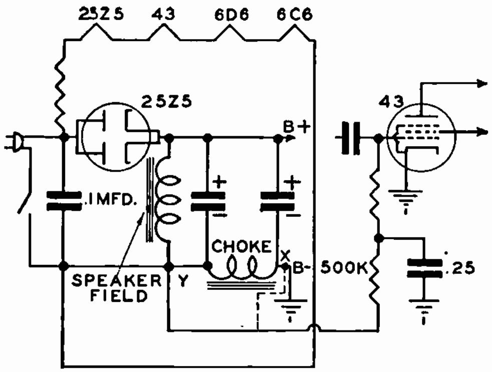

Fig. 5.

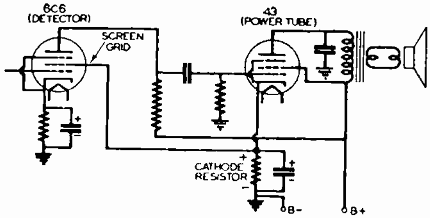

Fig. 6. Detector and output stage of a universal receiver, showing a simple but entirely satisfactory method for getting a low positive screen grid voltage for the detector tube.

lead of the power tube is run to point X, as indicated by the dotted line, instead of point Y. The ohmic value of the inserted resistor is so chosen that the voltage drop across the resistor equals the correct bias voltage for the output tube. Note that the cathode of the output tube is grounded, eliminating the need for an electrolytic cathode by-pass condenser and a bias resistor. However a decoupling resistor and paper condenser are required in the control grid circuit of the tube to prevent voltage variations across the choke from being fed to the tube grid.

A rather unique method sometimes used to secure a positive screen voltage for the detector tube is shown in Figure 6. Observe that here the detector tube screen grid is connected directly to the cathode of the power output tube. The cathode of this tube is sufficiently positive with respect to the detector tube cathode to make the detector screen positive and secure normal operation.

Filter Condenser Connections

When the filter choke is in the positive side of the B supply circuit, all electrolytic condensers will have a common negative lead. When the filter choke is in the negative side of the circuit, however, the negative side of the input filter condenser does not connect to ground (chassis) and consequently requires a separate lead. In this case the two filter condensers may have a common positive lead, as is the case in Figure 5.

Failure of filter condensers is quite a common occurrence in all AC-DC receivers. In many instances, particularly on the older sets, there will be no markings on the condenser block to serve as a guide in ordering new units; in a case like this, the following method of reasoning will allow you to order a satisfactory replacement.

Make a sketch of the old condenser block, showing all leads which come from it. Now trace each condenser lead and determine where it goes in the circuit. By this time you will be able to recognize the type of power supply used. Label each lead on your sketch according to the point at which it connects and indicate its polarity. Once you recognize the type of circuit used, you will have no difficulty in determining the polarity of any point with respect to the B— lead and in drawing the internal connections for the condenser sections. Condenser block sketches for the power supply circuits given previously in this article are shown in Figure 7.

Here are a few tips toward identifying the various leads. If the filter choke is in the positive side of the power supply circuit as evidenced by direct connection from one of the choke terminals to the cathode or cathodes of the rectifier tube then all of the filter condensers in the block will have a common negative lead. You can identify this common lead by the fact that it connects to the receiver side of the on-off power supply switch either through the chassis or through a common lead. Once this is done, you can draw in the internal connections of the condenser block just as has been done in Figure 7.

If the choke is in the negative side of the B supply circuit, as evidenced by the rectifier tube cathode connecting directly to the screen of the output tube without encountering any current limiting or choking devices, you can locate the negative lead for the input filter condenser by the fact that it will be the only filter condenser lead connected to the switch side of the filter choke.

When the loudspeaker field gets its current from a separate section of the rectifier there will be a condenser across the loudspeaker field coil, with its negative lead also connected to the on-off switch. In most cases a single common negative lead is used for both condensers. The positive leads for these condensers are easily identified; the positive lead of the speaker filter condenser will go to that 25Z5 cathode to which the speaker field is also connected, while the positive lead of the input filter condenser will go to the other cathode of the rectifier tube.

Having located the leads and determined the

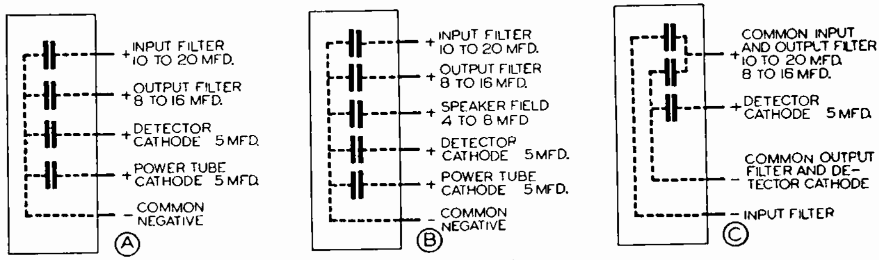

Fig. 7. Typical condenser block diagrams for universal receivers.

functions of the various sections of the electrolytic filter condenser block, you are ready to place on your sketch the approximate capacity values for each section. Use the following general rules as your guide: input filter condenser—any value between 10 mfd. and 20 mfd., rated at 150 volts DC working voltage; output filter condenser any value between 16 mfd. and 50 mfd., rated at 150 volts DC working voltage; loudspeaker field coil filter condenser—between 8 mfd. and 20 mfd. rated at 150 volts DC working voltage; cathode by-pass condenser—5 mfd. to 25 mfd. rated at 25 or 50 volts DC working voltage.

While condensers smaller than the minimum values given should not be used, the maximum values may be exceeded, with one exception, without impairing the operation qualities of the receiver. The voltage ratings can likewise be higher than the minimum values given. The exception is that you must not use too large an input filter condenser as this could damage the rectifier tube. If for any reason the capacity of the input filter condenser must be increased (this may be the only value you have in your shop) place a 25 ohm 1 watt resistor in series with either the plate or cathode of the rectifier tube. This will limit the current through the tube on peaks to a safe value.

Your electrolytic condenser block sketch now gives you sufficient information to order replacements. In practically all cases duplicates of the original blocks are not available and it will be necessary to use individual condensers. Sometimes dual units can be secured and these together with individual condensers will replace the originals. When ordering separate units be sure to check the available space and choose units which are small enough to fit this space. If necessary, condensers can be mounted on top of the chassis and their leads run through holes drilled in the chassis to the proper connection points. In such a case be sure to use spaghetti over the leads to avoid a short. If metal clad electrolytics are hung under the chassis, cover them with tape so they will not short to other parts.

In the case of modern receivers, not as many electrolytics will be employed but similar reasoning can be used in determining values of necessary replacements.

Is the Customer's Complaint Justified?

The operating characteristics of TRF AC-DC receivers must be carefully considered before attempting service work in order to make sure that the customer's complaint is justified. Also the serviceman must be familiar with the capabilities of these receivers for otherwise he may repair the fault causing the original complaint and then come to the decision that something is wrong with the receiver because of its lack of sensitivity or selectivity. I have seen servicemen waste hours in attempting to correct a fault which actually did not exist and the customer in each case was perfectly satisfied with the operation of the receiver since it always operated in that manner.

These little receivers are designed primarily for reception of powerful local stations which are spaced well apart in the broadcast band. The receivers have little selectivity, so that strong local stations which are separated by less than 100 KC may be expected to interfere with each other. The receivers likewise have poor sensitivity, and the reception of distant or even semi-distant stations will therefore be unreliable. Where the complaint of the customer simply involves one of these factors, no service problem exists. Likewise, good fidelity and freedom from blasting at full volume should not be expected from these receivers, particularly if they employ a magnetic type loudspeaker. The installation of a PM type speaker with an output transformer would improve results in this case. The customer making complaints which involves these factors is asking too much of his receiver and requires a better set to meet his needs.

Common Troubles

The simplicity of the circuits used in universal TRF receivers greatly limits the variety of troubles which may develop. The complaints which will most often be encountered are: set is dead; local signals are weak; hum is excessive; set distorts; oscillation (squealing) exists; set operates intermittently.

Servicing Dead Receivers

When the receiver is dead, determine first of all if the tubes light or warm up. An open circuit somewhere in the series filament string is indicated if they do not. Take out each tube in turn and check its filament prongs with an ohmmeter for continuity or test the tube in a conventional tube tester. If tubes are okay, check the filament voltage dropping resistor with an ohmmeter. If a ballast tube is used for this purpose, inspect its socket connections in order to determine between which prongs there should be continuity. If a line cord resistor is used, check with an ohmmeter between the line cord resistor lead and each prong on the power plug (the plug being removed from its outlet). With the power switch open, or one tube removed, there should be continuity between one of the prongs on the wall plug and the receiver end of the line cord resistor if this resistor is okay. If there is a shunt resistor across the pilot lamp or lamps, check this with the ohmmeter for continuity. Check pilot lamps also for continuity.

In more modern receivers using a rubber covered line cord and no internal dropping resistor, be on the lookout for a break at the plug. Hold the plug in one hand and pull on the power cord. If one side seems to stretch you know that there is a break in the wiring and a new plug should be installed in place of the original as it is usually impossible to repair the molded rubber plugs.

If the set is dead but all tubes light up and test okay, use the DC voltmeter section of your multimeter to measure the voltage between the common cathode connection of the rectifier tube and the tuning condenser frame (this usually being at B— potential and convenient to reach with a test probe). With the set plugged into an AC outlet, you should measure between 90 and 150 volts. With the set plugged into a DC outlet, this voltage may be as low as 85 volts. If no voltage is measured here on DC, try reversing the position of the line plug; proper polarity must always be observed on DC.

A low rectifier tube output voltage on AC operation is an indication of defective filter condensers. Check each condenser or condenser section in turn, by disconnecting one of its leads and then checking the condenser for leakage with an ohmmeter. If leakage resistance is lower than the normal value for a condenser of similar size, the condenser is defective and requires replacement. Even if leakage resistance is normal (check the leakage resistance of a new condenser about the same size for comparison if you are uncertain), the condenser may still have deteriorated through drying out of the electrolyte, with the resultant lowering of its capacity and an increase in its power factor. Try a new filter condenser at each position in turn, while the old unit is disconnected. Separate 16 mfd. 450 volt test condensers should be kept on hand for tests like this on any receiver. If the rectifier tube output voltage comes up to normal when a new condenser is inserted, this is a sign that the old condenser was defective.

Even when only one section of the old electrolytic filter condenser is bad, all new condensers should be installed, for there is a good possibility that the other sections of the block will soon fail in a similar manner if left in the receiver. When using a test electrolytic condenser you must of course observe polarity very carefully, for connecting an electrolytic condenser to a voltage source with improper polarity will in most cases ruin the condenser.

In modern AC-DC receivers, the two main filter condensers are often held with a metal strap to the chassis. Frequently leakage will develop through the condenser case to the strap. This can result in low operating voltages or in hum. You should slide the condenser out of its strap mounting and see if there are any green corroded spots on the housing which were covered by the strap. If so you may be certain that leakage is present. Although the condenser will give temporary satisfaction if left in the receiver without the strap, it is best to replace the condenser. Also, in these condensers, leakage frequently develops between sections and the only way to check this is to remove the complete unit and try new condensers so that the results may be observed.

If the rectifier tube output voltage of the dead receiver is normal, check the DC voltages between the B— point in the circuit and each plate and screen grid *PRONG* of each tube. Repeat this test for the corresponding tube socket lugs. Failure of the two readings for any one tube electrode to correspond indicates an open circuit between the lug and the tube socket prong connection, making the installation of a new socket necessary. This usually happens in wafer type sockets. Molded sockets do not seem to develop this defect.

Improper voltages on any tube electrode will point to the source of trouble, just as in the case of an ordinary AC receiver. The circuit diagrams in this article will give you an idea as to what voltages to expect. Obviously the measured detector tube plate voltage and the control grid voltage of the power tube will be low due to the high values of resistance in these circuits unless a very high resistance multimeter or vacuum tube voltmeter is used.

Simple continuity tests of various receiver circuits often prove the speediest way of locating trouble in a dead receiver. There should be continuity between the rectifier tube cathode and the plates, as well as the screen grids, of all other tubes in the receiver, with the exact ohmmeter reading depending upon the sizes of the resistors in the various circuits. There should be continuity from the receiver side of the on-off switch to the control grids, as well as the cathodes, of all tubes in signal circuits.

Rotor and stator plates of tuning condensers are sometimes shorted together. Inspection will often reveal such a short, but if doubt exists disconnect the coil lead from the stator of each section and check each section individually with an ohmmeter. There should be no continuity between the rotor and stator plates of each section.

To check the bias resistors in the cathode leads of the detector and power tubes, first disconnect the electrolytic cathode by-pass condensers and then check the resistor with an ohmmeter. These condensers often have sufficient leakage to mask the effect of an open resistor. While making this test, check the leakage resistance of the by-pass condenser with an ohmmeter.

Circuit disturbance tests on these receivers should be limited to touching the control grid top caps with the finger or removing the caps. Pulling out a tube opens all filament circuits and may mask the effect of the test. The above test should result in location of the trouble in any dead universal receiver which uses a conventional TRF circuit.

Servicing Weak Receivers

Essentially the same tests are made on a weak receiver as on a dead set. In addition, the dynamic loudspeaker field coil and its supply should be checked by applying a screwdriver to a pole piece; absence of pull indicates a defective field coil or no supply voltage to it. The continuity of the aerial should be checked with an ohmmeter and the trimmer condenser should be readjusted for maximum output. Weak reception can often be cured by moving the control grid leads around enough to secure a small amount of regeneration. It is a good idea to check the line voltage in the customer's home when weak reception is the complaint; if this voltage is below normal, report the matter to the local power company. Ordinarily there is nothing you can do to a receiver of this type to offset low line voltage. Excessively high line voltage is not serious in the small receivers, for the tube filaments and the pilot lamps are designed to stand up under all normal voltage fluctuations. With DC power lines particularly, the line voltage on peak loads may drop to a point where no reception is obtained, and again the trouble is not the fault of the receiver.

Servicing Receivers for Hum

A certain amount of hum is to be expected in any receiver operated from an AC power line. Many servicemen forget this fundamental fact and spend hours trying to eliminate perfectly normal hum which they observe after correcting the original defect in the receiver. Hum should never be so loud, however, that it becomes annoying when listening to the program from a local station. Excessive hum is often caused by a reduction in capacity of filter condensers, by high power factor filter condensers, by heater to cathode short in some tube, by an improper connection of a filter condenser, or by an open control grid return. Sometimes a short will develop in a tube filament, placing excessive voltage on the other tube filaments and accentuating cathode to heater leakage. This will not be shown up in a tube checker. However, you can spot it by measuring the AC filament voltage of each tube. If you find that one tube has considerably less than normal filament voltage while the other tubes have high filament voltage the tube with low filament voltage has a partially shorted filament and should be replaced.

Curing Distortion

Improper centering of the loudspeaker voice coil is a common cause of distortion; the usual corrective methods apply here just as in larger receivers. In many instances you will find it necessary to replace the loudspeaker. If the field of the original speaker was not used as a filter choke, but was simply connected across the input to the filter circuit, a PM speaker may be used for replacement purposes. Check to see if the cone has come unglued from the speaker frame at the rim. This may be corrected with speaker cement.

A leaky coupling condenser between the detector and the grid of the output tube is another likely cause of distortion. The way to check for this is to connect the DC voltmeter across the grid resistor of the output tube, with the positive probe connected to the grid end of the resistor. Normally, no DC voltage should be measured. If you measure DC voltage disconnect the coupling condenser. If this removes the voltage the condenser was leaky and it should be replaced. However, if the voltage is still present the output tube is gassy and a new tube should be installed.

Check the ohmic values of the cathode bias resistors and check cathode by-pass condensers for leakage in the manner already described, for these are also possible causes of distortion.

Distortion often occurs when the volume control is turned up too high when tuned to a strong local station. This is a normal condition due to overloading of the receiver stages or of the loudspeaker, and the remedy obviously is for the customer to keep the volume level below the point at which distortion begins.

Curing Oscillation

A certain amount of oscillation is to be expected in midget TRF receivers when the volume con-

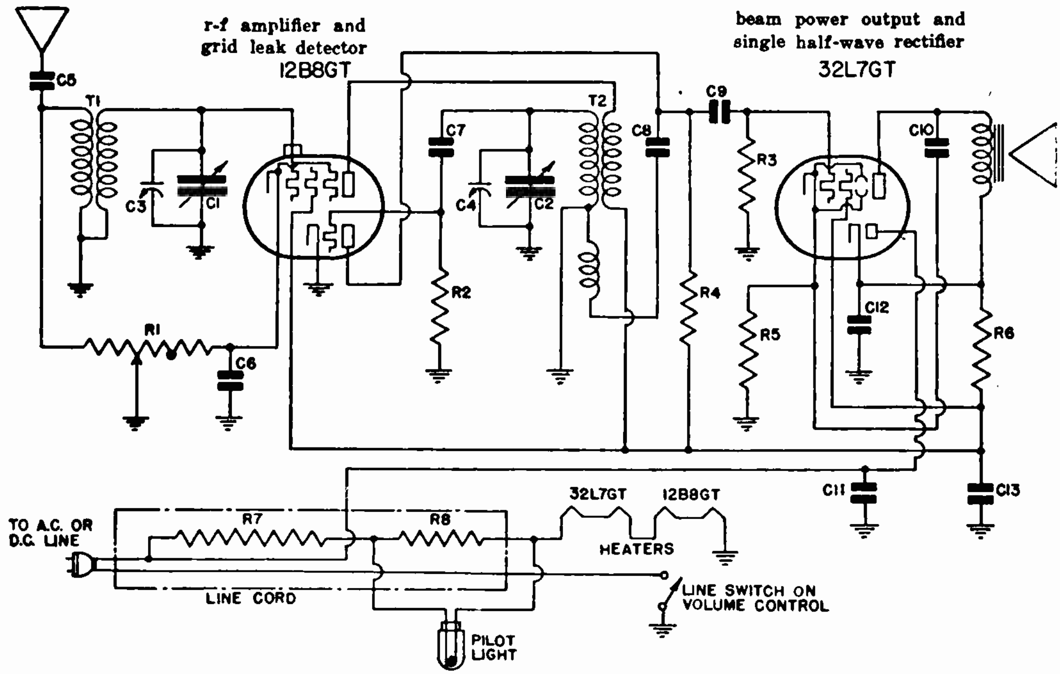

Fig. 8.

trol is advanced to its maximum setting, for the designers of these receivers depended to a certain extent upon regeneration for high gain. Oscillation at low volume control settings can be due to open by-pass or filter condensers, as well as failure to use tube shields if they were originally provided. Shielding of the control grid leads of the r.f. and detector tube, if these leads are over-exposed, or changing the positions of these leads are likely cures. Connecting the aerial to an external ground is sometimes effective in eliminating oscillation. Cramming the aerial into a small space will often cause oscillations; keep this wire stretched out to its extreme length. As a last resort, when oscillation cannot be cured in any other way, detune the trimmer condensers until it ceases. The insertion of a resistor of about 300 ohms in series with the cathode of the r.f. tube and the volume control will also stop oscillation but will reduce the maximum gain of the stage. In ac-dc superheterodynes using a loop, "birdies" will be experienced when tuning to a station in certain localities if an outside antenna is used. This is due to insufficient selectivity ahead of the mixer and is a natural condition. Oscillation in such sets, with the volume control advanced, generally is due to open plate by-pass condensers for the first a.f. or power output stages.

Intermittent Reception

Any of the usual causes of intermittent reception in radio receivers are to be expected in these midgets, but my experience has shown that in most cases either a defective type 43 output tube or a defective coupling condenser between this tube and the detector stage will cause intermittent trouble. Try a new output tube first, then try a new coupling condenser. If the trouble persists, wiggle each of the tubular condensers in the receiver in turn in an attempt to make the trouble appear. If this is not successful, resolder all connections in the receiver.

If the volume control is noisy in its action, install a new control. Be sure to connect the center terminal of the control to B—. In many cases the original control was so designed that the center lug was internally connected to the shaft without any wire being placed on the lug. Replacements however are not built in this manner, and if you fail to ground the center terminal, improper operation is certain to result. Check the aerial with an ohmmeter while bending it slowly back and forth through its entire length, for this will sometimes reveal a break. If the pilot lamp flashes on and off at regular intervals, some tube has an intermittent filament. Check across each tube filament with an a.c. voltmeter on a range which will measure the line voltage. If the reading drops to zero when the filaments go out, the tube under test is all right. But if the filament opens, you will read nearly the full line voltage. Replacement of this tube solves the problem.

Another Case

Figure 8 shows a variation of the four tube universal TRF receiver. Note that here two tubes perform the function of four tubes. The detector is regenerative, feed-back from its plate being obtained by means of condenser C_8 and the coil which is inductively coupled to transformer T_2. These sets are serviced in exactly the same manner as previously described. However, if the 12B8 tube burns out you will have quite a problem on your hands since these tubes are not readily available. Sometimes you can pick one up from a large mail order house but in most instances no replacement can be secured. In a case of this sort it is really best to scrap the receiver, but if the customer is willing to pay for your time and labor you can substitute two separate tubes. Miniature tubes should be used since space is at a premium in these chassis. A bracket of some kind to fit over the old socket of the 12B8 must be arranged and on this bracket should be mounted two miniature tube sockets. The r.f. section of the 12B8 can be replaced by the miniature 6AU6 while the triode section can be replaced by the 6AT6. The diodes in the latter tube are left disconnected, only the triode portion being used. The two filaments are wired in series and will replace the filament of the 12B8 elecrically. A job of this sort should net you about $15, and inasmuch as the receiver originally sold for $9 or $10 your customer may not wish repairs to be made. Replacements for the 32L7 are still available but even if they were not this would not present too much of a problem since a type 43 or a type 25L6 could be used to replace the pentode section and a selenium rectifier could be used in the power supply.

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Our Cover Photo

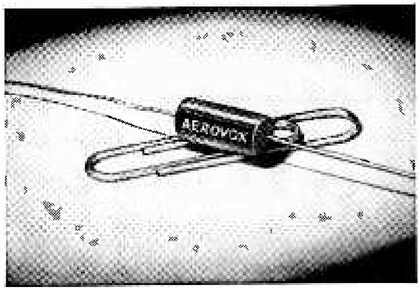
ENJOY YOURSELF! Those blue summer skies and warm beaches are at last here, Lillian Walter, Syracuse co-ed reminds us as she poses with General Electric's latest deluxe portable radio, an enjoyable traveling companion.

The portable (Model 650) is an AC-DC battery receiver in maroon cabinet. Sensitivity of this set is greatly increased by the addition of a tuned RF stage.

n r i

New Printed Circuit TV Tuner

RCA's tube department has announced a new "printed circuit" television tuner, now available to manufacturers. A photo-etching process is used to reproduce the critical circuits, eliminating the mechanical operations involved in winding separate coils. A cylindrical, turret-type construction is used. All that is necessary in making changes in the circuit is to make a new photographic negative.



Micro-Miniature Capacitors

These micro-miniature units, manufactured by the Aerovox Corporation, New Bedford, Mass., measure only 3/16" in diameter and 7/16" in length. This striking bulk reduction is achieved in several ways. First and foremost, metalized dielectric marks a distinct departure form conventional foil-paper and even previous metalized-paper construction. The new dielectric provides both dielectric and electrodes. The unit is impregnated in a case of humidity-resistant molded thermo-plastic.

Because of their small size and "straight through" construction, the self-inductance of the capacitor is an absolute minimum not greater than the equivalent length of wire. The new units are available in 400 VDC (.0005 to .003 mfd.) and 200 VDC (.005 and .01 mfd.).

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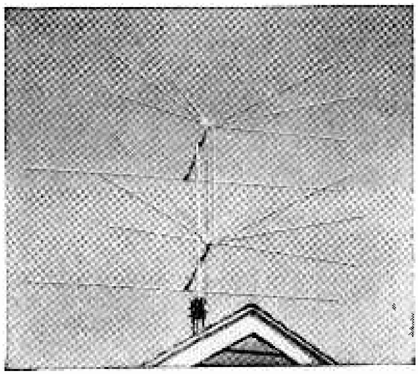
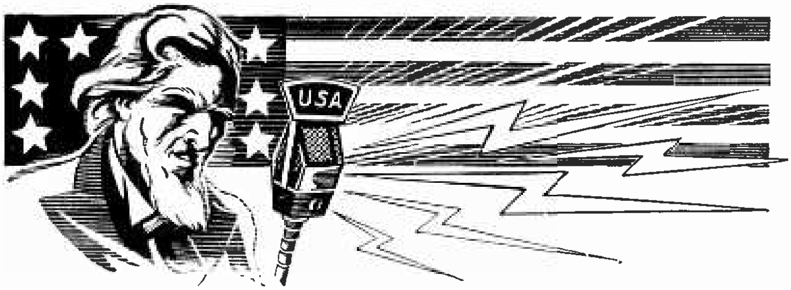


New Taco Tri-X Emphasizes Channels 11, 12, 13

The Technical Appliance Corp., Sherburne, N. Y., manufacturers of TV, FM, and AM antennas, announce a new all-channel high-gain antenna. The Taco Tri-X is offered for areas where the Lazy X does not give sufficient high band gain.



THE VETERANS' PAGE

Devoted to news items and information of special interest to veterans taking NRI courses under the GI Bill of Rights.

Charges Against Entitlement For Correspondence Courses

Only *one-fourth* of the time spent in pursuing a correspondence course under the GI Bill of Rights is deducted from the veteran's entitlement. Thus if you finish a correspondence course in a year, only three months is charged against your entitlement.

Contents of NRI Courses in Radio Servicing and Radio Communications

The NRI course in RADIO AND TELEVISION SERVICING consists of sixty-five lessons, with supplementary material and reference texts, and seven kits of experimental equipment designed to demonstrate the principles of Radio reception.

The NRI course in RADIO AND TELEVISION COMMUNICATIONS comprises seventy-eight lessons and nine kits of experimental equipment designed to demonstrate the principles of Radio transmission.

Payment For Kits Included in the Radio Communications Course

Students of the Radio and Television Communications course who are paying their own tuition fee are required to make deposits in advance for the communications kits of experimental equipment.

But veterans who are taking the Radio and Television Communications course at government expense under the GI Bill of Rights are NOT required to make deposits for these kits. Instead, the Veterans' Administration pays for the kits along with the rest of the veteran's tuition fee.

Why the VA Does Not Provide Veterans With Test Equipment at Government Expense

The GI Bill of Rights authorizes the Veterans' Administration to furnish education and training to eligible veterans of World War II at government expense. In carrying out this law, it is the general policy of the VA to pay for the supplies and equipment necessary for the veteran's education and training. But the VA will *not* pay for tools, instruments, supplies, or equipment the veteran may require to set himself up in a business or trade or to practice a profession.

This general policy varies in specific cases depending whether the veteran takes on-the-job, resident, or correspondence training. In correspondence training the Central Office of the VA in Washington makes a contract with the school and lists exactly what shall be supplied to each veteran.

The National Radio Institute's contract with the VA covers the lessons, the kits of experimental equipment regularly included with the course, and the batteries necessary to operate the kits. But since Radio tools and testing equipment—tube testers, multimeters, signal generators, etc.—are not *required* for the veteran's *training* but only for Radio service work, payment for these would not be authorized.

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The August-September issue of the NEWS will contain information of vital concern to all veterans. Be on the look-out for this page in the next issue.

Are You Interested in Short Success Stories?
Read What These NRI Graduates Say

Nets $10 to $20 a Week in Spare Time

"When I enrolled, I had only a very vague idea of how a Radio worked. Today I have the reputation of being a very good serviceman. I have cracked some tough service jobs that more experienced men gave up on, and have made more than enough money to pay for my course and equipment.

"I can't thank you enough for what you have done for me. My spare time Radio servicing business is really good. I average from $10 to $20 every week—that's net profit."

ERNEST W. BLAKE,
28 John St.,
Springfield, Massachusetts.

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Hopes to Go into Full-time Servicing Soon

"Thanks to NRI training, I hope to go into Radio full time soon. Have been servicing radios since I finished the 10th lesson of your Radio course, and have paid for my course and also the equipment you see in the picture.

"Over 300 tubes in my inventory, as well as perhaps $300 worth of condensers, resistors, and transformers, etc., have all been paid for through servicing radios. This has been a very profitable and enjoyable pastime. I intend to make Radio my life's work very soon."

RODDY ROGERS,
2815 Neals Lane,
Vancouver, Washington.

Finds Own Business Builds Confidence

"I now have my Radio shop in Jacobs Radio and Appliance store. I have purchased a new car and saved some money this year.

"Radio Servicing as taught by NRI is very interesting and profitable. It gives a man confidence in himself to own his own business. I sincerely recommend the NRI course. It is a fine way of learning Radio and Electronics."

ALVIN H. PUDELKO,
R. F. D. 1,
Snover, Michigan.

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Successful Television Technician

"For two years I was a Television Technician with the RCA Service Company. I know that NRI training enabled me to qualify for this work. I did both installation and service work and have had the opportunity of watching Television's rapid growth.

"My present position is with the Smith Electric Company in Cohoes, N. Y. They handle many makes of Television sets. As a result, my experience has become more varied, and I find my NRI training of more value than ever before. The duties with Smith are practically the same as with RCA, although the work is more interesting due to the increased variety. I spend practically all my spare time studying the latest developments in the Television field, and find your articles in NR-TV NEWS very interesting."

LYNDON E. WILCOX,
R. F. D. 1, Box 168,
Watervliet, New York

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Shop in Main Part of Town

"Have been repairing Radios now going on my fourth year as a full time business. Have purchased the Radio Service Department from the Stevens Company and since have operated it under my own name. Have just rented a store with a nice show window, located on the main street in the center of town.

"One thing that I have tried, and it seems to work, is a 90 day 'service free' guarantee with all repair jobs. This is good for any defect that might happen to the radio within the guarantee period, whether it is associated with the previous repair or not. This has helped to show our sincerity toward the public.

"I now have Motorola, RCA, and Admiral Radios and Phono combinations for my sales department, with hopes of being in TV some day."

GERARD R. ST-AMAND,
1 Maple St.,
Orleans, Vermont.

——n r i——

Full Time Shop— Specializes in Auto Radio Repair

"I finished my course in February 1947, and in October 1947, I started a full time radio business —specializing in car radios. My business runs about half car sets and half house sets. Have also been repairing F.M. and expect Television soon.

"I started to repair Radios while studying the 25th lesson. From then until the end of the year, I repaired over three hundred and fifty radios, which gave me a profit of over $500. I enjoyed every minute and every line of the course and believe me there is nothing left out. I have fixed most every make of radio on the market, and I haven't got stuck on one yet—thanks to NRI. Cannot thank the school enough—I feel that when better men are trained, NRI will train them."

ROY L. CURRIER,
North Main St.,
Fair Haven, Vt.

As space permits, from time to time, we plan to ***devote a page or two in NR-TV News to short success stories such as above.*** *They are taken from* ***testimonial letters we have on file. Photographs*** *and letters of this kind are always greatly a***ppreciated by us. We feel we should pass them on*** *to our readers for the inspiration to be gained f***rom a reading of them.***

TELEVISION SERVICING METHODS

By WILLIAM F. DUNN

NRI Consultant

William F. Dunn

THE most useful instrument the TV serviceman has at his disposal is the TV receiver itself. The manner in which the receiver performs usually indicates the circuit in which the defect exists. This is not so in an AM or an FM receiver. For example, suppose one stage in a radio receiver were dead. The receiver would simply fail to operate. The serviceman must perform some sort of isolation test to locate the defective stage. The trouble could be in the power supply, the speaker, the audio section, the i.f. stages, or in the mixer-oscillator stage. In a TV receiver,

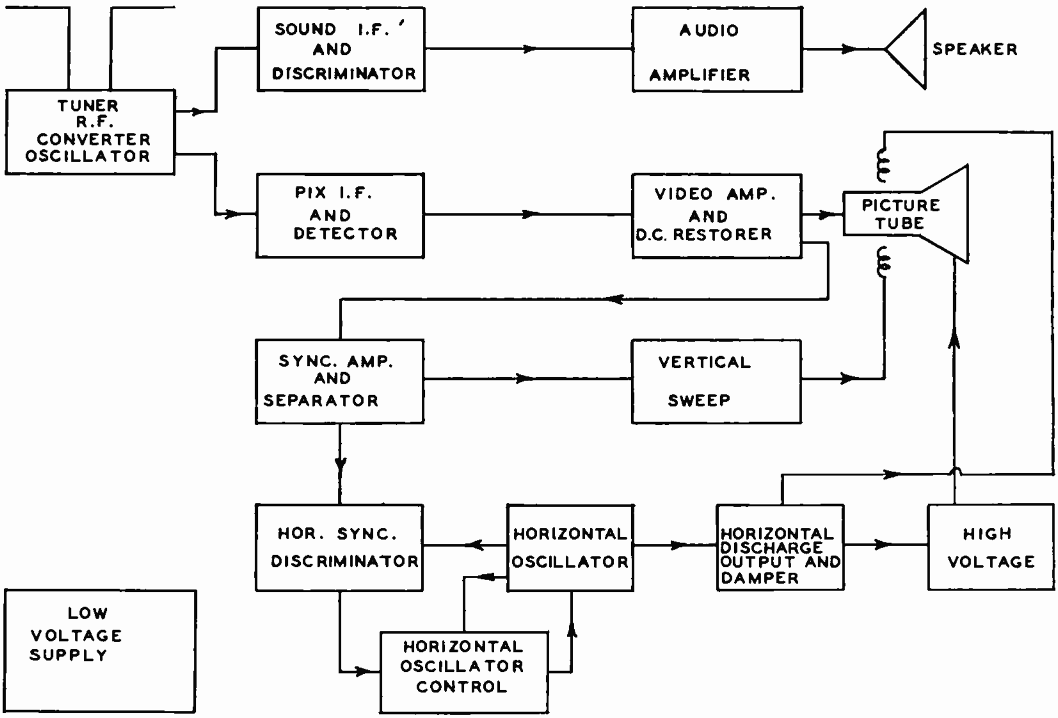


Fig. 1.

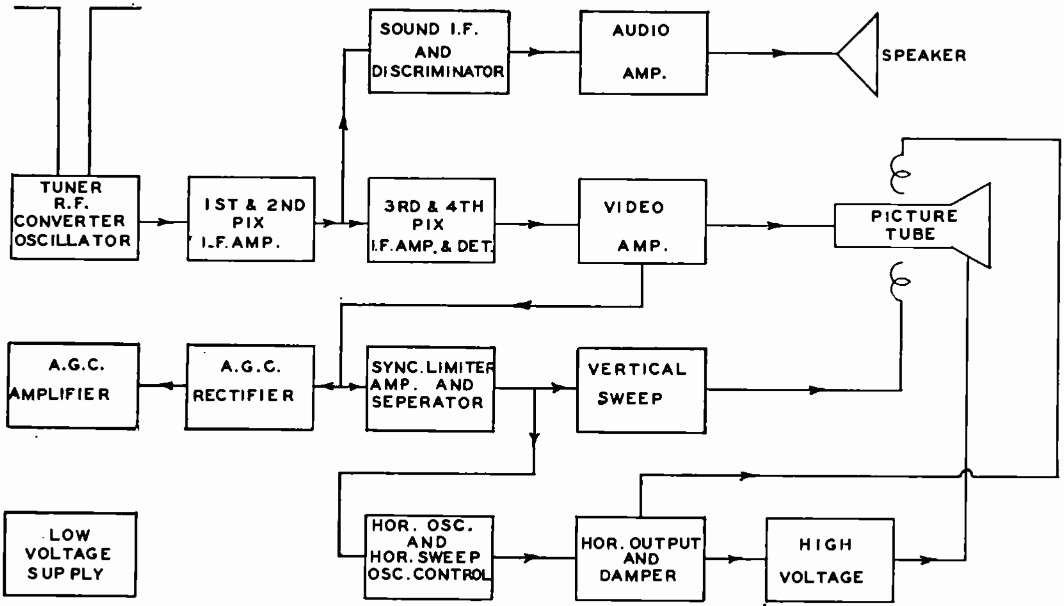


Fig. 2.

when a stage is dead or operating incorrectly, there will be some definite indication that makes it possible to immediately isolate the trouble to one stage or one section of the receiver.

Fig. 1 shows a block diagram of the RCA model 630TS television receiver. This was one of the first TV receivers put out after the war. The circuits used in it more or less set the pace in TV receiver design. Many of the later TV receivers were attempts to duplicate the performance of this receiver with less tubes.

By examining the block diagram of this receiver, it is possible to learn a number of things about the set. For example, notice that there are two separate i.f. systems, one for the sound and one for the picture. Therefore, if a defect developed in the sound i.f. amplifier, it's unlikely that it would have any effect on the picture. Similarly, if a defect developed in the picture i.f. amplifier, it would hardly affect the sound. If this receiver, or one having a similar circuit arrangement is being serviced and the complaint is "no sound, picture alright," there's no point in checking any part of the receiver other than the sound i.f., detector, or audio system. The defect could not possibly be in any of the picture circuits, nor could it be in the power supply, since it supplies the power both to the picture and the sound circuits. Similarly, if the complaint is "sound, but no picture," there would be no point in spending time on the sound i.f. and the audio section of the receiver. In addition, the tuner can be discounted, since both the sound and the picture signals must pass through it. If the sound signal can pass through the tuner, then the picture signals can also pass through it.

Fig. 2 is a block diagram of the RCA T121 television receiver. This is one of the latest TV receivers. Notice that while the basic arrangement is similar to the arrangement in Fig. 1, there are some important changes.

In Fig. 1, the sound and the picture signals are separated at the output of the tuner and are fed to separate i.f. systems. In Fig. 2, the sound and the picture signals are not separated at the output of the tuner, but instead, they are both fed to the first and second picture i.f. stages. Both signals are amplified by these two stages, and then at the output of the second video i.f. stage the two signals are separated and fed to separate i.f. systems. This change in receiver design is important when it comes to servicing a set in which the defect is "sound but no picture," or "picture, but no sound." In either case, we can eliminate not only the power supply and the tuner, but we can also eliminate the first and second i.f. stages as possible causes of the trouble. If these stages are amplifying one signal they will amplify the other, and the defect must be beyond the point where the two signals are separated.

Upon further examination of the block diagram shown in Fig. 2 we see that automatic gain control (agc) has been added to the receiver.

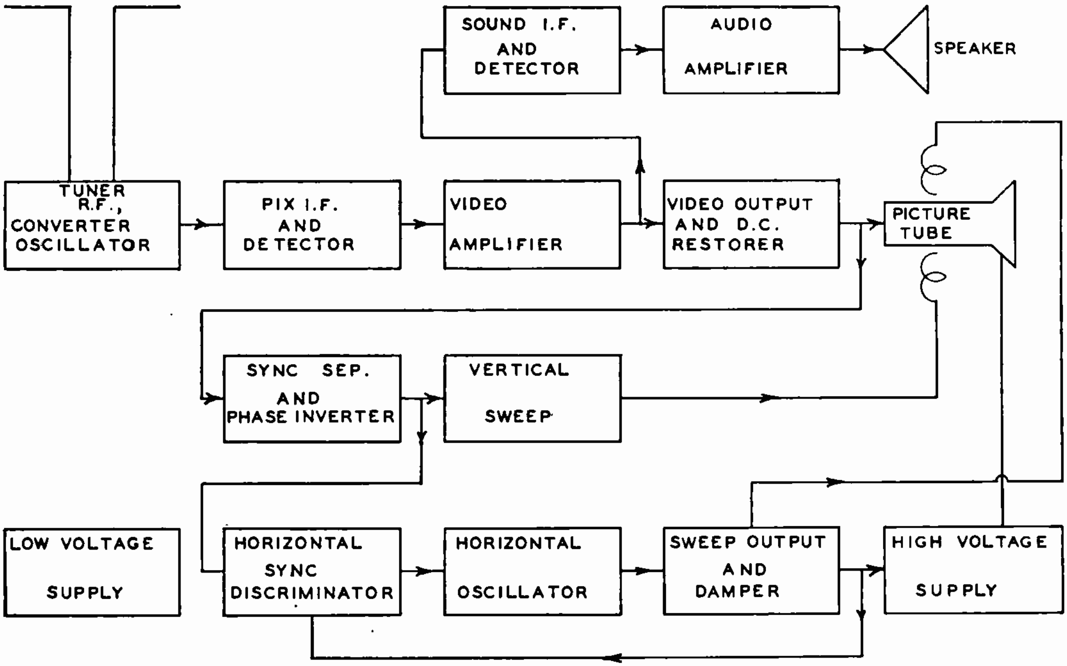


Fig. 3.

This will help to bring in local TV stations at approximately the same setting of the contrast and brightness controls, and thereby simplify the operation of the receiver. In addition to this, the sync and the sweep circuits have been simplified somewhat. The chances are that as time goes on TV receivers will be simplified even more as new tubes and new circuits are developed. But the basic circuits will still be found, and the same techniques used in isolating the trouble to one section of the receiver and then to one stage.

Fig. 3 shows a block diagram of a typical TV receiver in which inter-carrier sound is employed. In a receiver of this type both the sound and the picture signals pass through the video i.f. amplifier. The video i.f. is aligned so that the picture signals will be amplified much more than the sound signals. In the video detector, the two signals will beat together and produce a signal which will be equal in frequency to the difference between the sound and the picture signals. This difference frequency is determined at the transmitter, and with the present standards it is 4.5 mc.

This 4.5 mc. signal will be both AM and FM modulated. The AM will be the picture signal and the FM will be the sound signal. The signal is fed to an i.f. amplifier and then to a detector that is sensitive to FM signals only. The sound signal will be detected by this detector and fed to an audio amplifier.

In this type of receiver, if the complaint is "sound, but no picture," the trouble must be in the video output stage, because the sound signal has passed through the complete video i.f. amplifier, video detector, and first video amplifier. This information greatly simplifies the work of the serviceman. Instead of having the tuner, the entire video i.f. amplifier, and the video detector to check, these stages can all be ignored and he can start right in looking for trouble between the picture tube and the point at which the sound signal is taken off.

Of course, there are numerous defects that may develop in the TV receiver. In addition to those defects that completely stop the operation of one or more stages, there are many defects that merely upset the operation of one or more stages so that while these stages do continue to operate, they do not operate correctly. However, the majority of these defects affect the performance of the receiver in some manner that will make it possible for the serviceman to isolate the trouble immediately to one section of the receiver. He may then check that particular section of the set and usually in a short while locate the defective part.

Dead Receiver—No Pix, No Sound, No Raster

When this defect is encountered we must look for a defect that will affect practically the entire receiver. In other words, we know that the defect has removed the raster from the face of the picture tube and also it has eliminated the sound. Of course, we can't tell whether or not the picture circuits are operating because the face of the picture tube is not lighting. If we wish, we could use a cathode-ray oscilloscope to see if a video signal is present at the grid of the picture tube. Let's assume that we do not have an oscilliscope, and try to diagnose the trouble from the indications given us by the receiver.

No raster could mean that we have a defective picture tube or that we do not have the proper voltage applied to it. A defective picture tube would not affect the sound system of the receiver, and therefore we can rule out a defective picture tube. This leaves us with "improper operating voltages on the picture tube" as the likely cause of the trouble. A defect in the low voltage power supply would affect the sound and also it would affect the raster. It's the only defect that would affect the entire performance of the receiver. Of course, there could be more than one defect in the receiver. There could be a defect that is responsible for the failure of the sound system and another one that is responsible for the lack of a raster, but this would be a coincidence. The chances are that the defect is in the low voltage power supply, and therefore it should be the first circuit to be checked.

Low Voltage Power Supplies

A typical TV receiver low voltage power supply is shown in Fig. 4. In many respects it resembles the power supplies found in AM receivers. The big difference is in the physical size of the power transformer, which, of course, is much larger in the TV receiver. In addition, the amount of filtering used in the TV sets far exceeds that found in the ordinary AM sets.

In this power supply, notice that two 40 mfd. condensers are connected in parallel as the input filter condenser. In a case of a short in the input circuit both filter condensers must be checked. Also, it should be noted that not only would an open filter choke open the B circuit, but also a combination of an open focus coil and an open focus control would open the circuit and remove the operating voltages from the various tubes in the set.

In many receivers an electro-dynamic speaker is used in place of a PM speaker. In these receivers the speaker field will be inserted in the power supply in place of the filter choke. The speakers used in these sets differ from the speakers normally found in AM receivers. The speaker field is wound with a large size wire and has a low resistance. A resistance of about 68 ohms is a common value. In replacing a speaker of this type a replacement having a low resistance field must be used.

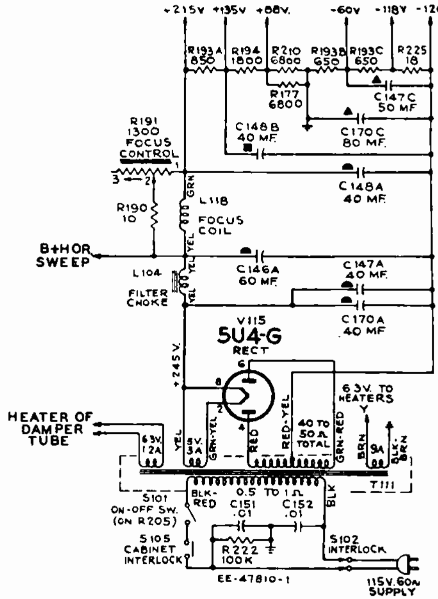


Fig. 4.

Notice that the resistors used in the voltage divider network are comparatively low resistances. Sometimes this makes it difficult to locate a defective filter condenser without disconnecting the leads and checking directly across the condenser with an ohmmeter. A defective condenser may have a leakage resistance of several thousand ohms. Obviously this condenser will not be satisfactory, but unless it is disconnected when checking across it with an ohmmeter it may be impossible to tell whether or not it is good. Even when it is disconnected it may check good when actually it is defective. Frequently a condenser will break down when normal operating voltages are applied to it, but it may check good when tested with an ohmmeter. This type of defect can be located only by substituting condensers one at a time or by checking them with an R-C tester. With an instrument of this type, normal operating voltages are applied to the condenser when it is checked for leakage or shorts. If the condenser is breaking down in the circuit it will show up in this test.

Another typical TV receiver power supply is shown in Fig. 5. This power supply employs two rectifier tubes. Each tube is used as a half wave rectifier. In some TV receiver power supplies using two rectifier tubes, each tube is used as a

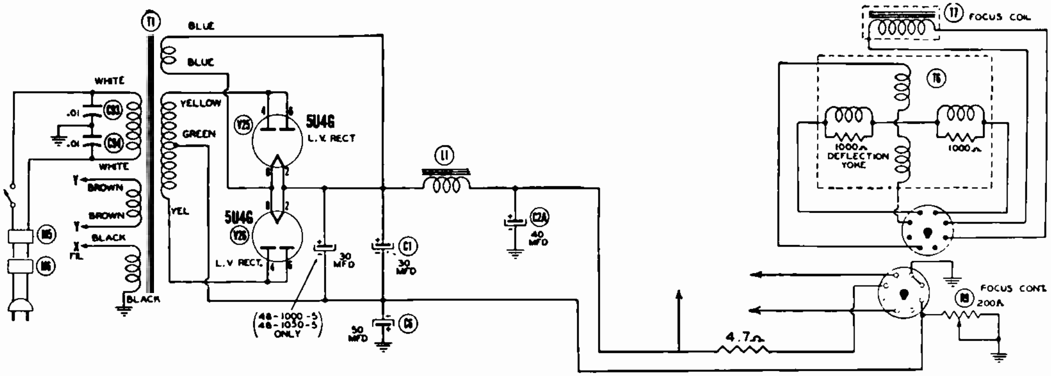


Fig. 5.

full wave rectifier. In this type of circuit, if 5U4G rectifier tubes were used, pin 4 of the two tubes would be connected together and to one side of the high voltage winding, and pin 6 of the two tubes would also be connected together and to the other side of the high voltage winding.

In power supplies of this type that use two tubes, the set may operate satisfactorily for some time if one rectifier tube burns out. In other instances, when one tube burns out, the other tube may soon burn out due to the fact that it cannot handle the increased load.

The circuits discussed thus far have not differed greatly from those found in a broadcast receiver. However, the circuit shown in Fig. 6 is considerably different from the conventional AM receiver power supply. Notice that selenium rectifiers are used in place of the conventional vacuum-tube rectifier. No power transformer is used to obtain the B supply voltages, but instead a voltage doubler is used. This type of supply is becoming quite popular and its use will probably increase since it is less expensive than power supplies that use a power transformer.

In this type of circuit, low voltages are usually due to a defective electrolytic condenser or a defective selenium rectifier. Selenium rectifiers usually cannot be checked with an ohmmeter satisfactorily, and when one is suspected of being defective it's advisable to try a new unit. Selenium rectifiers will overheat and smoke at times. This is not always due to a defective component in the circuit that is overloading the rectifier. Frequently it is due to a defect in the rectifier itself. Whenever a selenium rectifier is overheating, the first step should be to check for a short or excessive leakage that may be causing an overload. If none is found, try a new selenium rectifier. When the set is first turned on, a small resistor (a 47-ohm ½ watt usually works fine) may be inserted in the circuit in series with the rectifier. If there is a short in the circuit, the resistor will overheat and either smoke or burn out. This acts as a warning and usually will prevent damaging the new rectifier.

Of course, in most TV receivers there are usually a number of by-pass or decoupling condensers used that could break down and place a short directly across the power supply. Frequently these defects will cause one or more resistors to burn up. These defects are not difficult to locate. They can usually be pinned down to one component simply by observing which resistors have burned up. Then by identifying these resistors on the receiver diagram, it's usually possible to determine which condenser or component would cause these resistors to burn up if it broke down.

It would be impossible to list all the defects that may occur in a TV power supply. Some TV receivers use circuits in the power supply that may be found only in that particular receiver. Naturally these sets will have power supply defects found only in that particular set. However, the general discussion on TV power supplies should help the serviceman to locate the defective component when the receiver performance indicates a power supply defect.

Raster, But No Pix, No Sound

When this complaint is encountered, we have a defect that has affected both the sound and the picture signals without affecting the sweep circuits. In some receivers that have two separate low voltage power supplies, this could be due to a defect in one of the power supplies. But, in most TV receivers, the fact that a raster is present indicates that the low voltages power supply is operating, and that the defect is in one of the signal circuits.

Reference to the receiver shown in Fig. 1 shows that we have two separate signal paths when the signals leave the tuner. It's possible that there are two defects, one in the sound channel and the other in the picture circuits. But it's more likely that there is a defect in one circuit affecting both the sound and picture signals. This immediately points to a defect in the tuner, since this is the only part of the receiver through which the sound and picture signals pass together.

In the circuit shown in Fig. 2, the sound and the picture signal not only pass through the tuner before being separated, but they also go through the first and the second video i.f. stages. Therefore, in this particular circuit the defect could be in either of these two i.f. stages as well as in the tuner. In the receiver that uses inter-carrier sound shown in Fig. 3, the defect could be in the tuner, the video i.f., the video detector or the first video amplifier. Since the trouble could be in the tuner in each of the circuits discussed, let's look into common defects found in tuners.

TV Tuners

In most TV receivers, the tuner is mounted on a separate chassis that is bolted to the main chassis. Thus it can be removed and replaced without too much difficulty. The distributor of that particular brand of receiver usually has an arrangement worked out whereby the serviceman can exchange a defective tuner for either a new or a rebuilt tuner. This is far cheaper than purchasing a new tuner without turning the old one in. Tuners that have been reconditioned by the manufacturer are usually satisfactory and are less expensive than a new tuner.

There are many different types of tuners on the market today, and as time goes on many new types will appear. So far, the majority of tuners in use have been of three types: (1) the continuous tuner that covers the entire TV spectrum, either in one continuous tuning operation or in two steps, one for the low band and the other for the high band; (2) the tuner that consists of a switching arrangement that has a different position for each TV channel; (3) the push button arrangement that appeared on some of the earlier TV receivers. This type was not as efficient as the other two types and has disappeared on more modern receivers.

To date, the most popular tuner has been the one with the switching arrangement with a different position for each channel. Since any one location will not have any more than seven TV stations, some of these tuners were made with seven or eight positions. However, the majority have had twelve positions available so that the set can be used in any location without having to change coils.

A typical example of this type of tuner is the RCA shown in Fig. 7. This particular tuner was used on many of the TV receivers manufactured

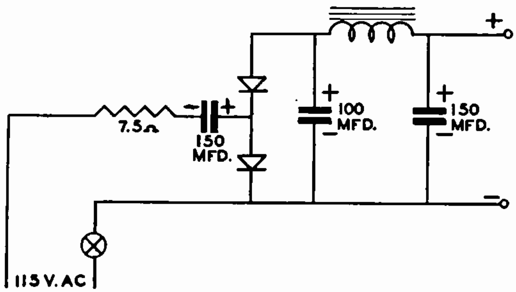
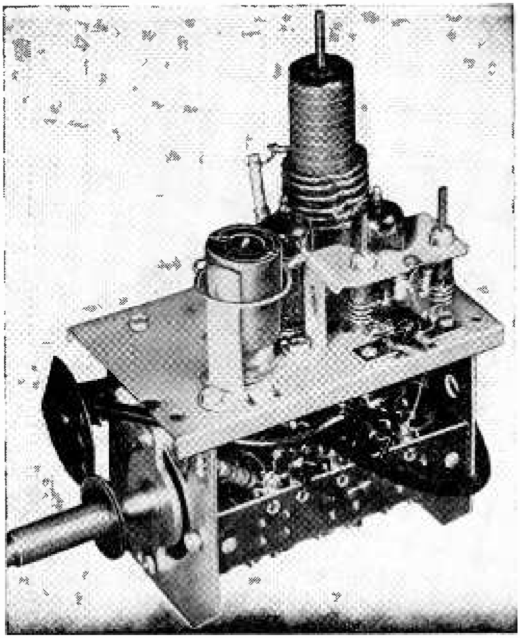


Fig. 6.

in 1947. It has given excellent service, but since the tuner has been in use a number of years, some trouble is being experienced with it now. As far as the electrical performance of this tuner is concerned, very little trouble is experienced from anything other than defective tubes. The tubes may simply burn out or they may become noisy resulting in considerable jumping and tearing of the picture, and also excessive noise in the sound channel. Incidentally, it may be well to point out here that if the oscillator tube burns out, the new tube may have a very noticeable effect on the alignment of this circuit. The inter-electrode capacities of the new tube may be so different from those of the old tube that the oscillator frequency will change enough to make it impossible to pick up any stations. Rather than go to the trouble of re-adjusting the oscillator on all channels, it is far simpler to try several oscillator tubes. The chances are it will be possible to find a tube with inter-electrode capacities close enough to those of the old tube to make it possible to take care of any small differences simply by adjusting the fine tuning. Needless to say, it's far better to spend a little time finding a suitable tube than to re-align the oscillator section.

Next to tube failure, probably the most common trouble with this type of tuner is a mechanical failure. The trouble is usually due to wearing or breaking of the detent used in the switching arrangement. In switching from channel to channel, a rather simple arrangement is used to lock the channel selector switch in the correct position. This consists of a disc with a series of twelve holes, arranged in a circle. Through the center of this circle is passed the shaft of the channel selector switch which mechanically rotates the various contacts. Also fastened to the shaft is the part referred to as the detent. This is a piece of spring steel which has a hole in it located the same distance from the shaft as the twelve holes arranged in a circle around the shaft. The detent is arranged so that the end of it springs up against the disc. A small ball bearing, somewhat larger than the hole in the detent, is inserted between the detent and the disc. This provides the snapping arrangement



Courtesy RCA

Fig. 7. The RCA Tuner.

used in switching from channel to channel. The ball bearing falls into one of the holes in the disk and locks the shaft and the switch decks attached to it in place. When the tuner is switched to the next channel, the ball bearing is moved out of the hole in the disk and moved until it falls into the next hole, at which time the shaft and the switch decks will again be held in that position. Fig. 8 shows what the disc and detent look like.

When this tuner rotates freely without snapping into position, the ball bearing may have fallen out of place. It's usually possible to get it back into place without taking the tuner apart. When the tuner is a little loose, or fails to snap into position properly, the detent is usually bent, or else the steel has become weakened by continuous use. In this case, it's possible to dismantle the tuner and replace the detent. Sometimes the detent alone may be replaced, but frequntly the detent and the shaft are sold as one piece, and in this case both must be replaced. When replacing the detent in a tuner of this type, care must be taken to handle the tuner carefully. If any of the decks of the switching arrangement are allowed to rotate, they may turn 180° and then the tuner will not operate. It may be quite difficult to determine which deck of the tuner has been rotated.

In this tuner, tuning to lower frequency channels adds inductance to the circuit. When tuning from channel 13 to channel 12, we connect additional coils into the circuit. When we tune from channel 12 down to channel 11, the coils in the circuit for channel 12 are left in the circuit, and inductance is increased by adding still additional coils. Therefore, if one of the coils used on the high channels is open or broken, the tuner will fail to function on that channel and on all lower channels. Should it be necessary to adjust the oscillator in a tuner of this type, the highest channel must be adjusted first, working in order through to the lowest channel. Usually only one or two adjustments are provided for the converter and r.f. stages, since these are so broad the tuning usually is not too critical.

In the next tuner to be discussed a somewhat different principle is employed. Instead of simply adding coils to change channels, new coils are inserted in the circuit on each channel. A typical example of this type of tuner is the Philco tuner shown in Fig. 9. In this tuner the coils are fitted into a turret which is rotated in changing from one channel to another. Electrically, this tuner

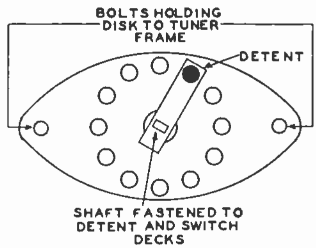
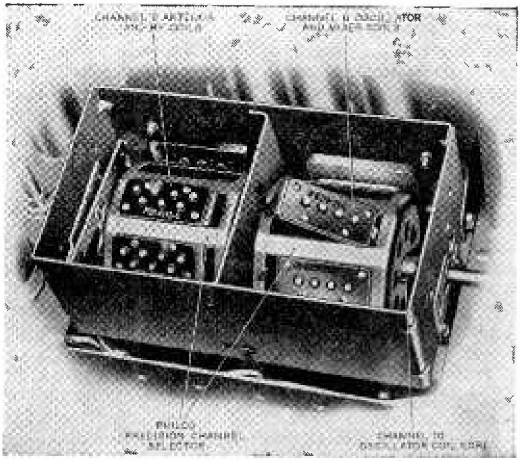


Fig. 8.

is practically trouble free. The only components in the tuner that give any trouble are usually the tubes themselves.

In this unit automatic frequency control "a.f.c." is used on the local oscillator. The a.f.c. voltage is picked up from the sound detector, therefore no fine tuning control is necessary. The a.f.c. system will automatically adjust the oscillator for best sound. Sometimes, due to aging of the oscillator tube or some of the components in the oscillator circuit, the frequency of the oscillator will drift so far that the a.f.c. system cannot correct the frequency drift of the oscillator. When this happens the sound does not come in on one or more channels. This difficulty may be easily corrected. Simply remove the channel selector knob by pulling it off the shaft. At one side of the hole in the escutcheon plate through which the shaft protrudes, there is another small hole. By using a thin long screwdriver, the slug inside the oscillator coil can be reached and readjusted. After the oscillator has been adjusted, switch off the channel and then back on again



Courtesy Philco

Fig. 9. The Philco Tuner.

to make sure that the sound comes in. It is possible to adjust the oscillator so that the sound will come in and then pass through the best adjustment and still have sound present. However, once the set is changed to a different channel and then back again, the a.f.c. system, unless properly adjusted, is not capable of pulling the oscillator back to the correct frequency.

In this particular tuner the oscillator coils require adjustment from time to time. Sometimes the threads on the oscillator slug adjustments will become worn and loose. This will necessitate replacing the oscillator coil. This is a comparatively simple replacement; the coil simply snaps out of position as shown in Fig. 9, and a new coil can be put in its place. When ordering coils it is important to specify the correct channel number.

The contacts on the turret make contact with two strips mounted on the side of the tuner. Spring type contacts are used on the fixed strips. The spring will break occasionally. This may cause the set to be dead completely, the sound and the picture may be weak, or the receiver may operate intermittently. When these symptoms are encountered, the contacts on the strips should be carefully examined. The two strips are held in place by means of rivets. When the contact is broken the strips must be replaced. First, the rivets must be removed either by drilling them out or by knocking them out (drilling them out is preferable). The new strip should then be inserted in place and riveted into position.

Another common complaint with this tuner is that it is extremely difficult to turn it from one channel to another, or else it fails to make positive contacts in each position. When this situation is encountered, a good picture can generally be obtained by exerting a slight amount of pressure to rotate the tuner in one direction or another, but the picture will not come in when the channel selector is easily rotated into position.

These troubles are usually due to a small wheel that is used to lock the turret in position. The wheel is fixed on a shaft, and it is held up against a fluted wheel. The fluted wheel has eight flutes (one for each channel). The small wheel drops into the flutes and is held in place by a spring. This holds the turret in position so that the contacts on the coils make contact with the two strips. The small wheel will frequently wear flat on one side. When this happens, the channel selector switch is very difficult to turn or the tuner may fail to make good contact because the flat side of the wheel falls into the flutes and fails to line the turret up in the same position each time. Fig. 10 shows how the small wheel fits into the flutes to lock the turret into position. When trouble is encountered with this wheel a replacement should be obtained.

The position of the shaft that holds the small wheel in position is adjustable. It can be slid back and forth somewhat, and the positioning of this shaft will control the position of the contacts on the turret. The shaft must be carefully positioned to obtain a good connection between the contacts on the turret and the contacts on the strips in each position of the tuner. This can be done simply by lining up the contacts before tightening the screws which hold the shaft in position.

A similar tuner is the Standard tuner shown in Fig. 11. This tuner operates in the same manner as the Philco tuner. The difficulties encountered in this tuner are the same, except since a.f.c. is not used, local oscillator adjustments of the oscillator slugs from time to time are usually not required. The position of the contacts on the turret is determined by the setting of the spring and idler wheel used to lock the turret in position on each channel. To adjust this tuner to make the contacts line up properly, simply loosen the screw that holds the spring in position, manually rotate the turret until the contacts line up, and make sure that the small wheel on the spring is in one of the indented positions. Tighten the screw that holds the spring in place and then the contacts should line up.

There are many other tuners being used today that are similar to the types discussed here. The difficulties that are encountered in these tuners are usually the same as those outlined. The important thing to remember in working with one of these tuners is not to jump into the job hastily. Give the job some thought and decide whether it would be more economical to replace the tuner, or to try to repair the old one. Although the

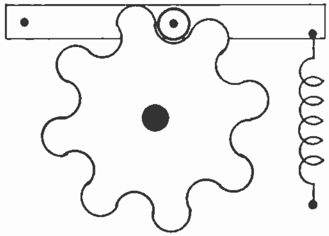


Fig. 10.

price of a replacement tuner is comparatively high, it may be cheaper to install a new tuner than to repair a seriously defective unit.

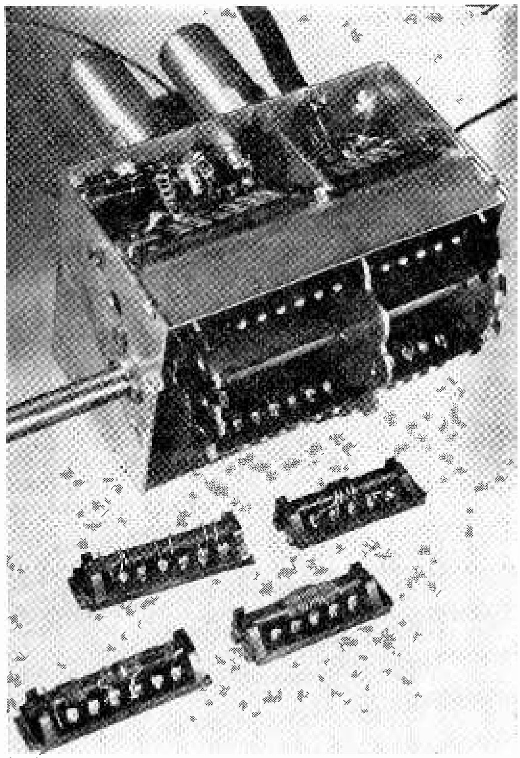
Another popular type of tuner is the continuous tuner. There are two types; one in which inductance is varied and another in which capacity is varied. Fig. 12 shows the Mallory Inductuner. This tuning unit consists of three coils wound on ceramic forms that are mounted on an insulated shaft. A sliding contact rides between the coil wire and the plate, and maintains contact between the two. As the tuning mechanism is rotated the contact moves along the coil shorting out an increasing number of turns.

This unit covers the low TV channels and the high TV channels and the entire frequency spectrum between them in one continuous operation. Since the tuner covers the FM band in going from the low TV channels to the high TV channels, receivers using this tuner will automatically cover the FM band. The tuner has proved exceptionally satisfactory. Little or no difficulty has been experienced with the sliding contact. When difficulty is encountered, it usually can be overcome by cleaning the contact and the coils with carbon tetrachloride. After cleaning, a small amount of suitable lubricant should be applied. This can be done by dipping the finger in grafoline, and then holding the finger on the coil as the coil is rotated. Do not apply too much lubricant.

Careless handling of this unit will usually break a small isolantite coupling used between the tuning knob shaft and the shaft on which the coils are mounted. When this difficulty is encountered, it is the usual practice to remove the tuner from the set and return it to the manufacturer for repairs. Most service men do not try to repair these units.

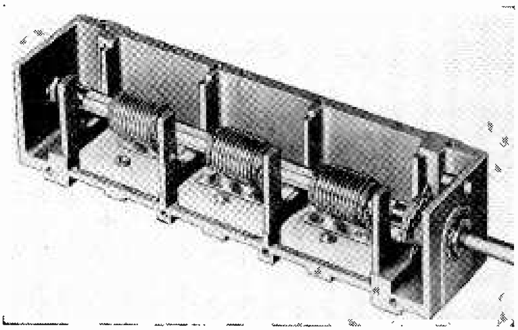
Fig. 13 is a photograph of the General Instrument tuner. This is a continuous tuner in which the capacity is varied. The tuner is comparatively free from mechanical difficulties. Fig. 14 is a photograph of a pushbutton tuning arrangement that can be used for all channels. This tuner was used on the early receivers manufactured by the Hallicrafters Co. While the tuner does not have the gain that some of the other tuners have, it is comparatively simple and does not give a great deal of trouble. One of the most common troubles is drifting that occurs over a period of several months. This can easily be corrected simply by tuning the oscillator trimmer on the particular channel in question, and then adjusting the detector and r.f. trimmers. The oscillator trimmer is mounted on the front of the unit, the mixer trimmer is in the center, and at the back is the r.f. trimmer. Another difficulty frequently encountered is broken ground straps. These straps are used to bond the tuner to the chassis. When one breaks loose, due to rough handling of the set or to poor soldering, the set will be either dead or the sound and picture will be extremely weak.

Probably due to the fact that the losses in the oscillator circuit used in this tuner are quite high, the oscillator will sometimes fail to oscillate even though the 6C4 tube used may work in some other oscillator circuit. When the oscillator fails to operate, snow can usually be seen on the face of the picture tube and a fair amount of noise is



Courtesy Standard Coil Products, Inc.

Fig. 11. The Standard Tuner.



Courtesy P. R. Mallory and Co., Inc.

Fig. 12. The Mallory Inductuner.

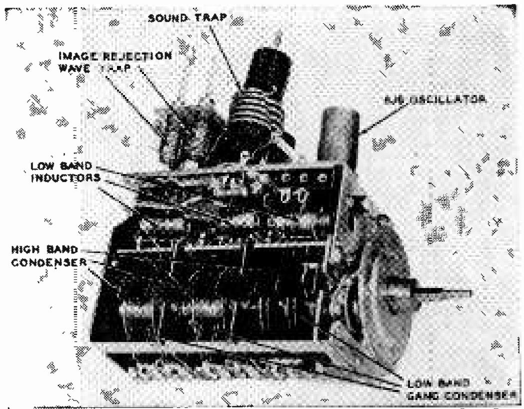
usually heard in the speaker. When this situation is encountered, try a new 6C4 tube even though the old one may appear to be in good condition.

Sometimes the contacts on the switching arrangements will go bad. When this difficulty is encountered it is usually possible to set up an unused pushbutton to bring in the channel that was supposed to have come in on the defective switch section. For example, suppose that in a certain area there are stations on channel 7 and channel 9. The pushbutton used on channel 7 is defective. Channel 8 can usually be set up so that channel 7 will come in on this pushbutton. In this case, if channel 9 is defective instead of the button used on channel 7, channel 9 can probably set up on the button used on channel 10 or channel 8.

When servicing any front end do not rely too much on a tube tester to indicate whether a tube is good or bad. Many tubes will test good on a tube tester, but fail to operate at the high frequencies normally encountered in TV tuners. This is particularly true of a tube used in the oscillator section, but it is also true of the tube used in the r.f. stage and also the tube used in the mixer stage. Whenever a tube is suspected of causing trouble in a TV tuner it should be replaced.

In most TV tuners the oscillator tube will have a tendency to be somewhat microphonic. This is not due to any defect in the tubes, but rather it is due to the fact that at such high frequencies any small shifting of the spacing between the elements of the tube will cause the oscillator frequency to vary. When excessive microphonics are encountered it is worthwhile to try several tubes; a particular one may reduce this trouble to a minimum.

When working at the high frequencies encountered in a TV tuner, stray capacities are important. Changing the physical location of a component even a small amount may have a noticeable effect on the performance of the tuner.



Courtesy Howard W. Sams and Co., Inc.

Fig. 13. The General Instrument Tuner.

Therefore, whenever it is necessary to replace a defective component in a tuner, every effort should be made to replace that component without moving or upsetting any other parts in the tuner.

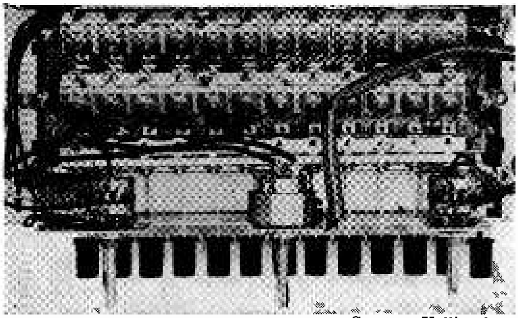
Servicing Video I.F. Amplifiers

As pointed out previously, in a receiver in which there is neither sound nor picture, the trouble is often due to a defect in the video i.f. amplifier. In sets where the sound is taken off at the second video i.f. stage, the trouble may be in the first or second video i.f. stages. In receivers that use intercarrier sound the trouble can be anywhere in the video i.f. amplifier, or in the detector or video amplifier stages.

Fig. 15 is a diagram of a typical video i.f. amplifier. Notice that the sound is taken off after the second i.f. stage. Therefore if both sound and picture are missing we can expect a defect in one of these stages, or else a defect that has somehow upset the operation of these two stages. This is of course assuming that we have already eliminated the tuner as a possible cause of the trouble.

As might be expected, the most common trouble in an i.f. amplifier of this type is due to defective tubes. While the requirements of this amplifier are not as rigid as those of the tuner, we must remember that the picture i.f. will normally be somewhere around 25 megacycles, which just a few years ago was considered a rather high frequency. As in servicing tuners, suspected tubes can be checked by substituting new tubes. In the i.f. stages, however, a tube that tests "good" in a tube tester will normally work satisfactorily.

Next to defective tubes, the most commonly encountered trouble is due to one of the numerous by-pass condensers breaking down. Because of the manner in which they are used in conjunction



Courtesy Hallicrafters

Fig. 14. The Hallicrafters Tuner.

with isolating resistors, it is usually possible to tell whether or not any have broken down, and if one has broken down, which one is defective, without even using an ohmmeter to check them. This is done simply by examining the condition of the various isolating resistors. If one of the by-pass condensers is defective one or more of the isolating resistors will be placed directly across the B supply and they will burn up. For example, if the 1500 mmfd. condenser C109 broke down, it would place R108, R109 and R114 directly across the B supply and they would burn up. Therefore if we were servicing this set and found these resistors burned, we would know immediately that either the second pix i.f. tube was shorted or that C109 was defective. Similarly, if we found resistors R109 and R114 damaged, we would know that some component had broken down and placed them across the power supply. In this case it obviously could not be C109 because then R108 would also be damaged. Similarly, it could not be C105 because R106 would also be damaged, and, therefore, it must be C110 that is causing the trouble.

Coupling condensers C106, C111, C115 and C121 will sometimes break down. When it is necessary to replace one of these condensers it is advisable to use exact duplicate replacements so as to avoid changing the band-pass characteristic of the i.f. amplifier.

The transformers and coils in the i.f. amplifier seldom give any trouble, nor do they require frequent adjusting. It may be well to point out that it is usually a good idea to leave the adjustments alone, unless there is positive proof that alignment is needed. When a receiver is operating and suddenly stops it is never due to improper alignment. If the alignment adjustments are touched it is going to make it just that much more difficult to repair the receiver.

When a TV receiver has been in use for some time, and the quality of the picture has gradually deteriorated, it may be due to one or more weak tubes. It also is frequently due to aging of the components in the i.f. amplifier that has changed the alignment of the i.f. stages. In this case, new tubes should first be tried and then the operating voltages should be checked. If everything appears to be in good operating condition, it is usually worthwhile to go over the alignment of the receiver.

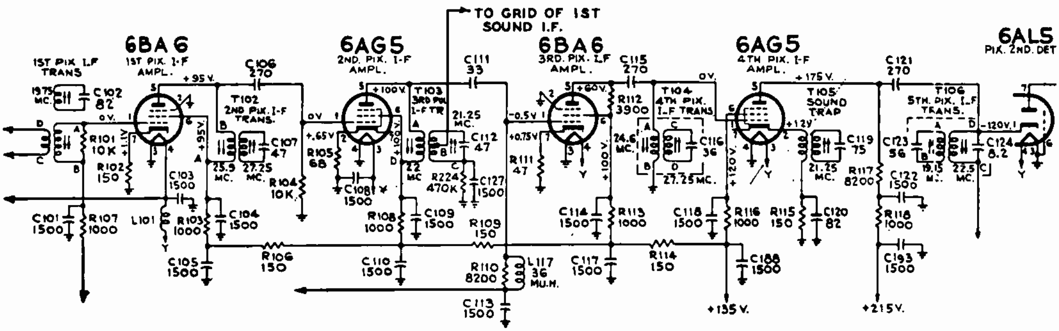


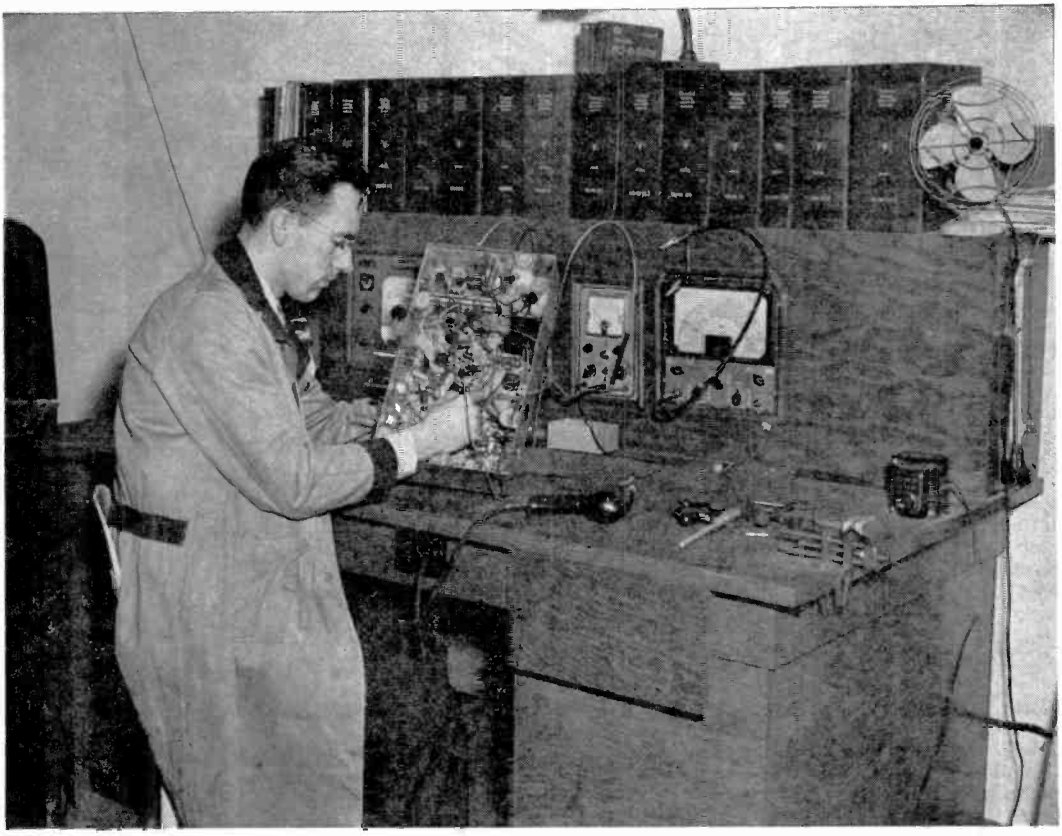
Fig. 15.

The suggestions given in this article should be helpful in servicing a TV receiver where the indications point to a defect in the low voltage power supply, the tuner, or the i.f. amplifier.

n r i

Job Opportunity in Public Address Work

The following is taken from a letter recently received from the Williams Equipment Co., 1005 A Street, Tacoma, Wash. "We are in need of a man with Electronic training to work with a journeyman in installing, servicing and repairing inter-com and public address equipment. Do you have any advanced students or recent graduates available in the Pacific Northwest?" Qualified men who are interested may write directly to this firm.



A SUCCESSFUL FUTURE AHEAD

Dear Mr. Smith:

"I opened my Radio Sales and Service Shop in Kelso, Washington, just six months ago, and can see an increasing amount of business each month. As you have told me in my course, starting one's own shop is not a basket of roses to begin with, but I can see nothing but success for the business in the future.

"Kelso has a population of 12,000, and there are only three shops in this city. Of course we have the surrounding territory to service also.

"I have built up a stock of tubes and parts, and also have my own equipment and fixtures. The total value would probably amount to $5,000. As for income, I can figure on $250 a month.

"Working on all types of Radio receivers and sound equipment. Television has not as yet come close enough to this area, but we are hoping that it will not be too long before we have it. I am considering handling a popular brand of Radios, and am also thinking somewhat of operating a coin Radio business as a sideline. My shop is in front of one hotel, and another hotel is just down the street. This really is a good spot for such a sideline.

"Thank you for giving me a wonderful start."

William R. Channer,
208 N. Pacific,
Kelso, Washington.

N.R.I. ALUMNI NEWS

Harvey W. Morris .... President
F. Earl Oliver .... Vice Pres.
Alexander M. Remer .... Vice Pres.
Oliver B. Hill .... Vice Pres.
Claude Longstreet .... Vice Pres.
Louis L. Menne .... Executive Secretary

Chapter Chatter

IT'S time to go to press again and we are glad to have full reports from each of the local Chapters of the NRI Alumni Association, as well as several interesting photographs. Our readers will notice the many fine technical activities which each Chapter is carrying out. It is also easy to catch the fraternalistic spirit of the local chapters, especially as it is expressed in frequent social meetings.

Baltimore Chapter

We have had a membership drive under way for the past several weeks, and results have been indeed encouraging. As a sequence, several of our older members have been reinstated in our organization and we are proud to welcome Mr. Robert Thibault, of Baltimore and Mr. Marion E. Griffinl, of Halethorpe, Maryland, as new members of our chapter.

Our old stand-by, Ernest W. Gosnell spoke recently covering AC-DC power supplies, AC-DC filament hook-ups, and general servicing of AC-DC receivers. Another member, Frank J. Orban, spoke on "Mathematics in Radio." Several of our meetings have been devoted to informal discussions on Radio and Television. This open forum type of meeting is a good way to learn more about the actual problems and needs of our members. We have plans for a series of motion pictures covering Radio subjects, to be shown at future meetings. One of our members, Mr. C. R. Keller, has made arrangements for these Army training films.

We regularly meet on each Tuesday night of the month (except the first Tuesday in the month) at 745 West Baltimore Street, in Redman's Hall. Those in our area who are interested in attending meetings should contact our secretary.

Thomas Kelly, Secretary
1414 Mt. Royal Ave.
Baltimore 17, Maryland

Phila-Camden Chapter

Our newly formed educational committee has started to function with a bang. We recently had the pleasure of hearing a lecture on "Television Deflection Circuits," by Mr. Bernie Bycer, of the Lehigh Radio Company. A former Philco design engineer, before coming with Lehigh, Mr. Bycer holds several patents on coil designs. This particularly fine meeting was finished off with refreshments.

(Above) Mr. John F. Hirst,. Field Service Engineer for Zenith Radio who spoke to Phila-Camden Chapter on Television problems. (Below) Note the intense interest shown by these members as they listen to Mr. Hirst.

Our main speaker at another meeting was Mr. John Hirst, Field Service Engineer for Zenith Radio. Mr. Hirst brought two television receivers along with him, and explained much about installation and setting up these receivers. His talk was down to earth, a practical demonstration that everyone enjoyed. Mr. Hirst is shown in the accompanying photo.

At another meeting we were pleased to have distinguished visitors from the National Radio Institute, Washington, D. C. They were William Franklin Cook, NRI Chief of Training, and L. L. Menne, Executive Secretary, NRI Alumni Association. This was strictly a social meeting, and it was thoroughly enjoyed by all. L. L. Menne, as well as our own Harvey Morris, Charley Fehn, and Norman Kraft spoke briefly allowing plenty of time for the principal speaker of the evening, Mr. Cook. He told us much regarding plans and progress of NRI training. Mr. Cook, who prefers to be called just plain "Frank," made a big hit with our members. He is a very likable fellow who shoots straight at the point. He is a Radio man's type of instructor who talks facts, in plain language. Mr. Clifford Hill, our Chairman, presided over the social meeting in masterful style, adding much to its complete success. He is quite a speaker in his own right.

Recent new members include Edward Penneth, Frank Denick, E. J. Drumheller, Joseph Jesberger, Charles Tatteroon, Joseph Ely, Frank Koarns, Michael Branella, and Jack Resnick. Our educational committee is planning something new each month, so we hope that NRI men in our locality will come out and benefit with us from the knowledge of men that know Radio and Television from A to Z.

Meeting nights are the second and fourth Monday of each month, at 4510 Frankford Avenue, in Philadelphia.

Robert L. Honnen, Secretary
132 S. 58th St.
Philadelphia 39, Penna.

Upper and lower pictures show Mr. Yale Saffro of Bede Instrument Co., delivering a lecture on meters. The center photo shows four of the shining lights in Chicago Chapter, left to right, Charles C. Mead, Secretary; Harry G. Andresen, Chairman; Louis Gold; and Clark Adamson, Treasurer.

Chicago Chapter

Our meetings are going along in good shape. Members are bringing in more and more Radios to be repaired in our laboratory. We try to have speakers at all of our meetings.

A recent speaker was Mr. Walter Nichols, of the Precision Hearing Aid Company. He lectured on hearing aids and demonstrated an actual instrument. This is an interesting new field for the Radio repairmen. At another meeting we enjoyed a lecture given by Mr. Yale Saffro, of the Bede

Instrument Company. One of the accompanying photographs shows Mr. Saffro during this lecture.

We cordially invite interested students and graduates to visit us at our next meeting. Our regular meetings are held once a month, on the second Wednesday of the month, in Room 1745 Merchandise Mart, 666 North Lake Shore Drive. (Enter the building through the West Door.) Refreshments at each meeting.

Charles C. Mead, Secretary
666 N. Lake Shore Dr., Rm. 227
Chicago 11, Illinois

Detroit Chapter

Several photographs, not ready at the time of our last report, are enclosed herewith (see below). These photographs were taken by one of our members, Mr. Floyd Buehler. The photographs show various members in the home of our friends, Mr. and Mrs. Merrifield. Incidentally, we have already begun discussions for our next party which will be held in the month of June. Either a picnic or another social party will probably be given.

Our series of television lectures is progressing steadily. Recently member F. E. Oliver gave an excellent television lecture covering "Beam Deflection Circuits." We have also just purchased a television receiver kit. We opened the new TV Kit at one of our meetings, and spent a good portion of the evening inspecting the instructions and parts, as well as planning construction of the receiver. Six of our members will meet each week and do the actual assembly work. One member of each group will be chosen as spokesman for the group. He is to report the progress made to the next group.

Other meetings have been utilized for showing technical films, and for our "Service Forum." We encourage any of our members to bring in sets which are in need of repairs.

Regular meetings are held at 21 Henry Street, at Woodward, on the second and fourth Fridays of each month.

Harry R. Stephens, Secretary
5910 Grayton
Detroit 24, Mich.

New York Chapter

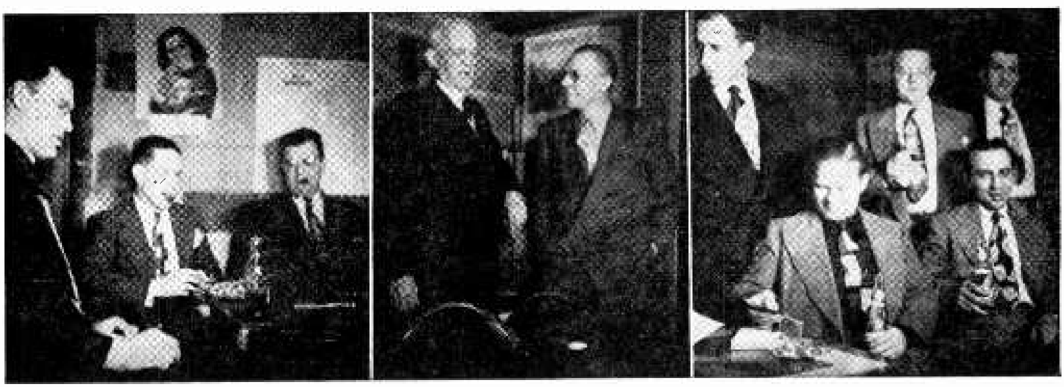
Excellent speakers and very interesting technical subjects are giving our members a real Radio and Television education. Member James Newbeck delivered his final lecture of a series on oscilloscopes, the title of this talk being "Servicing with the Oscilloscope."

Member, Peter Guzy spoke one evening on "Phase Inversion." We are glad to have another of our old time speakers back with us again. He is Eugene Williams, who gave a talk recently on "Servicing Television Receivers." We have also had comments on servicing television receivers from member Israel Weinberg. These comments were extremely interesting.

A new speaker is Thomas Hull, Jr., who recently spoke to us on "Automatic Volume Control." We are extremely glad to have member Hull with us, both as a part of our organization, and as an excellent speaker.

As usual, we want to extend a cordial invitation to all NRI men in this vicinity to attend our regular meetings. We meet on the first and third Thursday of each month, at St. Marks Community Center, 12 St. Mark's Place, between 2nd and 3rd Avenues, in New York City. The meeting time is 8:30 P.M.

Louis J. Kunert, Secretary
539 Seaford Ave.
Massapequa, New York



Some informal snaps taken at Detroit Chapter social party.

Here And There Among Alumni Members

It was very pleasant having Mr. and Mrs. Herbert Jacobs, of Paterson, New Jersey, visit the National Radio Institute. We noticed immediately that this particular young couple seemed especially cheerful, and we later learned that they were en route to Miami, Florida, on their honeymoon—just stopping off in Washington, D. C., for a little sight seeing. Mr. Jacobs is employed full time in television work by the Dippel Television Company, Incorporated, Fairlawn, New Jersey. He also does spare time television servicing. Jacobs is so enthusiastic about his work that Mrs. Jacobs told us confidentially she is not sure whether she acquired a husband or a television machine!

—n r i—

We were sorry to hear that NRI Alumnus Austin Sanburn, owner of "Sandy's Radio Service," in Long Beach, California, has been confined to his home due to sickness, since last December. "Sandy" plans to enroll with NRI again for our new course in Radio and Television Communications just as soon as he can obtain Veterans Administration approval. Lots of luck to you, Sandy, and best wishes for a quick recovery.

—n r i—

We have a report that NRI graduates LeRoy Barbin and George St. Germaine are employed by one of the largest Radio and Television stores in Bridgeport, Connecticut. Unfortunately this report did not name the concern where they are employed.

—n r i—

Our good friend, graduate C. E. Davidson, of New Orleans, Louisiana, writes to enroll one of his employees. Mr. Davidson owns the Columbia Radio and Supply Company, a large Radio wholesale supply house in New Orleans.

—n r i—

NRI graduate Lieutenant David Silver has just returned to the United States from occupation duty in Japan. His work with the United States Army in Japan was at the Eta Jima School Command, the former Japanese Imperial Naval Academy. Graduate Silver was engaged in the Radio and Radar Training Division. He mentioned that at least twelve of the instructors there were NRI graduates. We were very glad to have Lieutenant Silver visit NRI while he was in Washington, D. C.

—n r i—

R. P. Conley of Falcon, Kentucky, a GI graduate of NRI, informs us he has secured a Radio telephone license, second-class and will soon go up for his first-class ticket.

Graduate Lawrence T. Simon, of St. Louis, Missouri, has opened a full time Radio and Television Servicing Shop. He also has a side line installing church tower sound systems and electric chime attachments for church organs.

—n r i—

NRI Graduate Carl Saglimben, of Gowanda, New York, now has his Class A Amateur License, and is busy studying for his commercial operator's license.

—n r i—

A Cole Camp, Missouri, graduate, Mr. P. F. Fryberger, reports that for the past several months he has been averaging about $75 a month for his spare time service work. In Fryberger's own words, "that ain't hay, even in these times!"

—n r i—

NRI graduate Leo Goudreau, of Campbellton, New Brunswick, Canada, has a new amateur license, call VE1HW.

—n r i—

Charles L. Buffington has accepted a position as a Radio and Television Technician with the C. and M. Appliance Company, of Union Bridge, Maryland.

—n r i—

NRI Graduate T. L. Kidd has just accepted a new position as Chief Engineer of Radio Stations KFH and KFH-FM, in Wichita, Kansas. KFH is a 5000 watt station, and Kidd is especially impressed with the modern installation and modern transmitting equipment. Until accepting this new position, Kidd was serving as Chief Engineer for Radio Station KVRH, Salida, Colorado.

—n r i—

Graduate John E. McGloin, of Norfolk, Connecticut, has just received his Class "B" Radio Amateur's License. Congratulations.

—n r i—

Joining the ranks of NRI graduates who hold first-class Radiotelephone licenses is Morris Segal, an enthusiastic member of Phila-Camden Chapter. He also operates a spare time Radio and Television Servicing business.

—n r i—

Donald A. Simmons is employed as a commercial airline pilot, with headquarters in Atlanta, Georgia. He is another GI graduate of NRI who plans eventually to have his own Radio and Television shop.

—n r i—

Congratulations to Graduate George L. Davenport. He is now employed as a transmitter engineer with Station KSUM, a one kilowatt station, located in Fairmont, Minn.

—n r i—

John Ward, of Toronto, Ontario, Can., has been employed for the past year by the Philco Corporation of Canada. Now a line supervisor!

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