The "TECHNICIAN"

Bulletin and House Organ of
The Certified Radio Technicians' Association
An Organization of Competent, Qualified and Trustworthy Radio Technicians for the Purpose of Advancing the Radio Art and for the Protection of the Public.

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One Dollar Per Year

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Ten Cents Per Copy

VOL. I OCTOBER, 1933 NO. 2

EDITORIAL

By The Editor

Integrity!

The confidence of our fellow men is a necessary accessory to the realization of happiness and success. He who may not be trusted by his neighbors and business associates truly is not a man with whom we wish to do business or mingle socially. Unfortunately a few unscrupulous individuals have given the radio industry a "black-eye." It is truly a pity that the honest, competent and conscientious men in our industry must be compelled to bear the stigma created by these racketeers of the radio field.

Let us, as an association of the higher type of radio technicians, restore the confidence of the public in radio as a profession. By wholehearted, concentrated and united action we can undoubtedly accomplish this purpose. Let us operate and behave as individuals as well as members of our association in such a manner that our integrity shall not be impeached. Our profession is one which deserves respect and recognition. Due to the highly technical and specialized nature of the work performed by the radio technician, it is necessary that the customer or employer have absolute faith in him. By deserving this trust and proving our character and qualifications, and our dependability, we can gain and retain that confidence and implicit trust which is necessary to the welfare of everyone dealing in radio.

One of the first and most important steps in realizing the success of our aims and purposes and in gaining public confidence is the elimination of the free and below-cost service call. The advertising of a service call, no matter what misleading name it is given, such as inspection, estimate, consultation, etc., at lower than actual cost creates a condition making it necessary to overcharge or misrepresent on some other item to pay for this service. This is not only a direct violation of the Badham Law, the spirit of the NRA, and of our honest policy, but a direct insult to the intelligence of the customer. Any person may, with a minimum of thought, sense an unnatural and unwholesome condition in existence when that person is offered something supposedly for nothing.

Every one of us must pledge ourselves to stamp out this insiduous practice which is the spawn of the chiseller, the unfair, and the dishonest--we must not and cannot tolerate such a condition. This consideration of lost faith and free service racketeering is perhaps the most burning question that we have to answer today. We should and must take heed and take immediate measures to irrevocably remedy this state of affairs.

To facilitate ready contact with any member of the officers and directors of the Association, the following directory is published for your convenience:

Name	Office	Phone	In Charge of:
A. Paul, Jr.	President	OX. 8877	Public Relations
Ben J. Braun	Vice-President	AL. 8409	Publicity
John A. Orme	Secretary-Treasurer	AT. 9501	
Norman B. Neely	Director	AL. 1628	Meetings, Papers, Publications
E. H. Darrow	Director	AN. 4509	Finance and Budget
Geo. W. Ekelberry	Director	HI. 2788	Employment and Membership
John L. Vincent	Director	KE. 1640	Arbitration, Steering and Parliamentary Proceedure
Charles E. Miller	Director	HE. 2697	Technical and Examining Boards

MEETING OF RADIO TRADES ENGINEERING ASSOCIATION

On Friday, September 29, a special meeting of the Radio Trades Engineering Association was held in the Chamber of Commerce building to determine whether or not radio interference investigation and elimination should continue in the Los Angeles area and if so under what provisions.

Owing to the dissolution of the old Radio and Music Trades Association the entire burden of radio interference was thrown upon the public utilities who have thus far carried the great majority of the load. The utilities have been very generous in their contributions inasmuch as the effective maintainance of the Interference Department has cost oven nine hundred dollars per month for the last four years. This does not include the costs of each of the utilities own radio engineers nor the costs of correcting the sources of interference after they have been found.

The radio industry has so far shouldered only a very small part of this burden and indeed has added to the costs of this service through its lack of understanding of the function of this department. The utilities therefore quite naturally feel that the radio industry should rightly take a more active interest in this work and as soon as possible assume an equitable portion of the financial burden. To facilitate this they have urged that each division of the radio industry be represented on the Board of Governors of the Association. At the special meeting the utilities were represented by their executives and engineers, distributors by a member of their association and the dealers by a member from each of the various factions. The manufacturers failed to send a representative but the broadcasters were represented by two of their association and the Certified Radio Technicians were represented by Messrs. Paul and Orme.

It was definitely decided that the work of the Association should continue. It was also made plain that for the present at least, the Certified Radio Technicians Association was not able to lend financial support.

Mr. Paul made some suggestions which if properly carried out will eliminate a great number of the calls due to interference originating in the set which at present constitute far too large a part of the work of the engineers of the Association.

Another meeting to work out details and policies of the Association has been called for the middle of October and Mr. Paul has been appointed to represent our Association on the Board of Governors and will take his seat at that time.

It is of the utmost importance to influence the continuation of the activities of the Radio Trades Engineering Association. It is of value to every technician and dealer in his every day work. It is of value to the radio public at large in making radio entertainment more thoroughly enjoyable. The public utilities are to be complimented on their sincere interest and financial support of this bureau. We should certainly lend our strength to support this work which so manifestly aids us.—Editor.

An Introduction to Vacuum Tube Theory

By W. F. GRIMES
Chief Engineer Radio Trades Engineering Association

The servicing of receivers, in fact all work having to do with radio circuits of today, requires a knowledge of the fundamental principles of vacuum tube operation. An understanding of these fundamental principles need not be from a mathematical viewpoint, but may be from a simple conception of the function of the various elements of the vacuum tube and its associated circuits. Space will not permit a complete discussion of this problem; it will be treated only by a very elementary discussion of current flow and electron emission.

Current Flow in Conductors

When a battery is connected into a circuit and a current flows through the circuit, this current is ordinarily thought of as flowing from the positive terminal of the battery to the negative terminal of the battery. Early experimenters in electricity thought of this current as a flow of positive electricity from the positive terminal of the battery through the circuit to the negative terminal. More recent investigators are of the belief that the current is a flow of negative charges of electricity in the opposite direction.

The Electron

These negative charges of electricity are thought of as "electrons" and are assumed to be negatively charged unless specifically termed "positive electrons." Electrons are present in very great numbers in all metals and under ordinary conditions move around inside the metal in a haphazard manner. When the battery voltage is applied to the circuit, the electrons are forced to take up a general motion. This drift of electrons around the circuit constitutes the flow of current.

Emmission of Electrons

The haphazard motion of the electrons depends upon the temperature of the metal. When the metal is heated the electrons jump around more readily and are speeded up. At the surface of the metal there exists a film or cloud of such a nature as to not permit the passage of electrons unless they have developed sufficient speed or energy to penetrate the film or cloud.

The filament of an ordinary incandescent lamp in addition to giving light is emitting enormous quantities of electrons. These electrons form a cloud external to the metal of the lamp filament. Since all of the electrons of the cloud are negatively charged and the filament is charged positively because of having lost these negative charges the tendency is for the electrons to be driven back into the filament again; both because of repulsion of the other electrons in the cloud and because of the attractive force of the filament. (In considering this fact it is well to keep in mind that bodies which carry similar charges, both negative or both positive, repel each other and that bodies of unlike charges, one positive and the other negative, attract each other). Such a lamp may be considered a single element vacuum tube.

The Two Element Tube

If the filament of such a lamp be considered enclosed within a container with a second electrode and the container evacuated to an extremely low pressure, a two element vacuum tube or "Hard Valve" is formed. Such a tube is the basis of all vacuum tubes, other electrodes or elements being associated with the two mentioned, for control purposes.

The operation of the two element tube may be readily understood by considering electron emission and current flow as previously explained. The filament of the tube is known as the "cathode" and the second element as the "anode" or plate. When the cathode, which has been raised in temperature, to provide electron emission, is connected to the anode through an external circuit and battery in such a manner as to make the anode positive with respect to the cathode, a current will flow. This current flow is due to the positive anode attracting electrons (negative) emitted by the hot cathode. These electrons enter the anode and pass through the circuit back to the cathode. An ammeter of the conventional type will indicate a flow of current, from the positive terminal of the battery toward the anode, this is to be expected since it has been assumed current flow is in the opposite direction to electron flow.

When the anode is made negative with respect to the cathode, electrons are repelled and no current flows. Because of the fact that current can only flow to the anode of a tube of this type when the anode is positive, the tube can be used to rectify alternating current. If the battery described above is replaced with a source of alternating voltage, current will flow only during the half cycle when the anode is positive; and this current will consist of pulses which are all in the same direction.

LOOKING BACKWARD

to the days when radio was wireless and they used iron and wood to make men and ships

By H. D. HATFIELD
Ex (Long Time Ago) U. S. Navy

Along about 1899 or 1900 the big-wigs in Congress authorized the Navy to construct a series of armored cruisers which were to be the last word in size, armament, speed and especially in the matter of electrical equipment. The guns were to be in electrically controlled turrets, there were to be electric cranes, winches, fire-control, bakeshop and kitchen equipment. In short, no French or English, or even German ships had ever been so modern.

One thing was not provided for, because it had not yet become more than a romantic toy—that was wireless. True enough, Guglielmo Marconi had been fiddling around with this new idea, but it was not considered practical. However, it took some four years to turn these blue prints into 15,000 ton ships, and during the latter part of the four years another dreamer, this time an American named Lee deForest got his wireless set to the point where it looked better to the Navy—at least they decided to try it out.

The West Virginia was commissioned at Hampton Roads in 1905. Some months before this the narrator had joined the Navy to see the world, and after having undergone certain necessary training in the way of spud-peeling, dish-washing, gun-toting, squads-righting, and so forth, was assigned to the new ship. The dish washing experience was of no avail. They assigned me to look after the electrical supplies and to write up the ship's daily log. Thus another potential ship's cook was squelched before he got started. It was, however, to afford many unforgettable experiences in the realm of wireless.

After a short practise cruise the West Virginia went to New York to get her wireless set. Mr. deForest and his helpers came over and measured us. He found that the West Virginia was ideally suited to his wireless in one respect. She had two masts, some 200 feet apart, which were considered just about right for aerial supports. Outside of that there was no room for the rest of the equipment. Finally it was decided to relieve one of the warrant officers of his stateroom, which was done.

This stateroom, even as staterooms go, was a stingy affair, some seven feet wide and nine feet long. The first thing to come was a motor-generator. I do not recall its output capacity, but I do recall that it wouldn't go crosswise of the shack, so they planted it lengthwise and under the "op's" table. Next came a goofy looking circular "show-case" with a coil of copper tubing inside and some other stuff. They called it a Helix Spark. Similar noisemakers have been much cussed and discussed since then. On one of the walls they mounted an ammeter, and never before or since have I seen a larger one. A voltmeter was placed alongside to match and a throw-over switch to the aerial was mounted between the meters. One-fourth inch copper tubing was used throughout as hook-up wire.

The receiver was a liliput affair, about the size of two cigar boxes. I never did know what went on inside it—in fact I always had a suspicion that it was empty. On the top however, was mounted a tuning inductance some eight inches long and one half inch in diameter. A slider was mounted over the coil. Then there was the rectifier, or crystal. It was an electrolytic affair with a cup holding about an ounce of magic liquid, the makeup of which was known to Mr. deForest only. Supported above the cup was an adjustable bracket holding a short length of fine platinum wire. Two binding posts for the phones and one for the aerial completed the layout.

The sending key was a "dinger." It was about like the regulation telegraph key except for size. The base was a piece of porcelain some five by twelve inches and the "handle" was about the same length, with an enormous hard rubber knob. The contacts were fully a quarter inch in diameter and the darn things were always burning off.

To start sending you turned on the M-G, and such a whine as it had! Then you carefully removed the platinum wire (the original cat-whisker) from the electrolyte (otherwise it would burn off) threw the switch from receive to send position, adjusted the spark gap for "local" or "distance" and gave her the works. Between the whine of the M-G and the unholy crash of the gap, and coupled with the ozone smell created by the gap, everyone within shouting or smelling distance knew that the wireless was at work.

To receive, you shut down the power

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A 26 Watt Portable Public Address System

By A. PAUL, JR.
Technical Service Laboratories

The public address system described in this article, while being light enough to be easily carried by one man, has sufficient power to cover with ample volume, such large auditoriums as the Long Beach Municipal Auditorium where it was used by the Retail Hardware Merchants' Association at their annual convention.

It is constructed entirely of locally manufactured parts, which offer besides their superior performance, the advantage of being easily procured and also give employment to our fellow citizens of Los Angeles.

Essentially, the circut consists of a microphone input transformer feeding into the grid of a 56 tube which in turn is resistance coupled to another 56 tube. In the grid circuit of this tube provision is made by means of a jack for the playing of phonograph records by inserting a high impededance pickup in this jack.

The second 56 tube is coupled by means of a transformer to the grids of two 56 tubes working in push pull, which in turn drive the two 46 tubes in class B by means of a special step down transformer which is so designed as to carry the necessary grid current peculiar to class B circuits.

The secondary of the output transformer is tapped so that any reasonable number of speakers may be matched to the plate impedances of the 46 tubes.

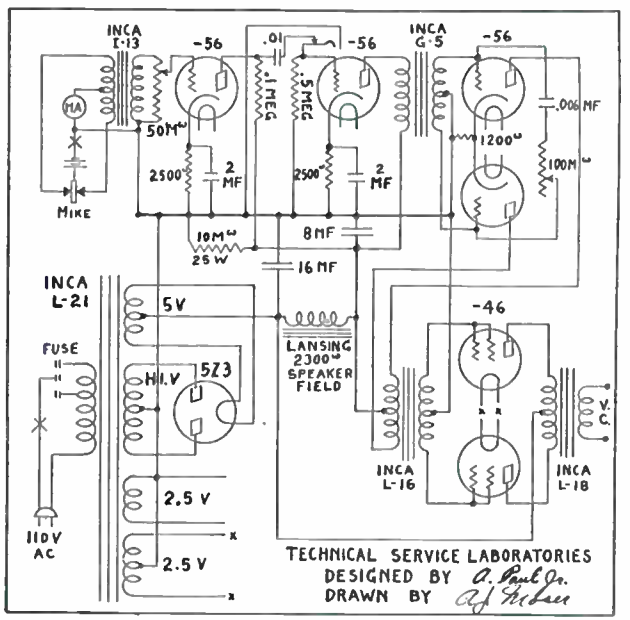
The carrying case is so arranged that the speaker is in the lid, which acts as a baffle, and the amplifier chassis is mounted in the base, there being a 25 foot 4 wire cable connecting the two parts to enable the speaker to be placed at a point this far removed from the operator.

A close talking or highly damped double button microphone should be used to prevent the sound waves from the speaker from affecting the diaphragm of the microphone and thus setting up the howl commonly known as "acoustic feedback."

To play radio music it is only necessary to set the microphone in front of the speaker of a midget receiver, the music from which it will amplify and reproduce with startling volume and fidelity.

List of parts:

1 carrying case
1 chassis
1 Lansing 8 in. Dynamic Speaker (large pot) Model 63
1 50,000 ohm Potentiometer
2 2,500 ohm 1 watt Resistors
1 1,200 ohm 1 watt Resistor



1 .5 meg ohm 1 watt Resistor
1 .1 meg ohm 1 watt Resistor
1 10,000 ohm 25 watt Resistor
1 .1 meg ohm Potentiometer
2 2mf dry electrolytic Condensers
3 8mf dry electrolytic Condensers
1 Inca I-13 Microphone Transformer
1 Inca G-5 Input Transformer
1 Inca L-21 Power Transformer
1 Inca L-16 Input Transformer
1 Inca L-18 Output Transformer

Miscellaneous sockets, switches, wire, hardware, etc.

TECHNICAL QUESTION AND ANSWER DEPARTMENT

Conducted by CHARLES MILLER
Chairman, Technical Board

Q. What takes place when carbon resistors become "open" while still showing no visable sign of mechanical or electrical abuse?—B. P.

A. Carbon resistors are made from heat treated extrusions of a mixture of powdered carbon, some inert filler and a binder which is usually phenolic. The above phenomenon most frequently occurs in resistors of fairly high resistance in which there is a relatively small amount of carbon. In the case of cheap resistors failure may occur at the contact between the terminals and the rod. Failure of the better grades is usually due to separation of the carbon particles, due to slight thermal expansion, at a point in the rod where only a few particles carry all of the current due to non-uniformity of the mixture.

Q. Can the new 2A3 tubes be substituted for 245's in any set?—D. W.

A. Substitution of 2A3's for 245's should be approached with considerable caution. If the set is known to be generously designed the change may be made with reasonable safety. It should be borne in mind that to gain full advantage of the change the 80 should be replaced by a 5Z3 also. The transformer will then be called upon to deliver 15 to 20 watts more power. It is very likely that after this substitution sets having a primary ballast will suffer a serious loss of RF sensitivity due to reduced voltages on the RF tubes.

Q. Why is a load resistance of only about 10 per cent of the plate resistance recommended for pentode tubes while a load of approximately twice the plate resistance is recommended for triodes?—J. V. G.

A. Owing to the fact that is it impossible to operate a pentode under any conditions without a relatively high harmonic content in the output, a load impedance is selected that will give the lowest percentage of harmonics. In the case of a triode the primary consideration is one of energy transfer from plate to load since even with extreme mismatching the harmonic distortion is relatively slight.

Q. What are the relative merits of the A7 pentagrid converter tubes and a separate triode oscillator?—L. B.

A. The A7 is superior in nearly every respect. It has more nearly constant oscillator output, less radiation, higher translation gain, and lower power consumption, and obviously requires less chassis space than two tubes would. Electron coupling makes the oscillator and mixer circuits independent. Its super-control feature gives all the advantages of the super-control tetrode or pentode mixer permitting the application of AVC to the mixer. All of its advantages are retained on short waves. Its chief disadvantage lies in the fact that sets using it cost about the same to build and have one less tube to offer the tube-counting public.

OCT. 33

ELEMENTARY OHM'S LAW AND REVIEW

By NORMAN B. NEELY
Part II.

Last month we discussed the fundamentals of Ohm's Law and its application when series connections or single resistors are concerned. We found that given any two or three fundamental factors in a circuit we could find the third. There are many cases in which we find it necessary to compute the total or effective resistance of two or more resistors in parallel. It may be seen by inspection that when several resistors are in parallel there is more than one path for the current to travel. A certain amount of current will flow through each path depending upon the resistance of the path. A preliminary rule to remember and which may be visualized from the above consideration is that the total resistance of resistors in parallel will be less than any one of the resistors alone.

The total resistance of resistors in parallel equals the reciprocal of the sum of the reciprocals. First, we must take a moment to review our arithmetic sufficiently to be able to set up this formula. The reciprocal of a number is that number inverted. The reciprocal of $\frac{1}{4}$ is $\frac{4}{1}$. When we write 4 we really mean $\frac{4}{1}$. Thus the reciprocal of 4 is $\frac{1}{4}$.

The reciprocal of any whole number then, is that number beneath one. For example let us find the total resistance of 10 ohms, 20 ohms and 50 ohms in parallel. We set up the formula from our rule:

(1) Total R equals $\dfrac{1}{\frac{1}{10} \text{ plus } \frac{1}{20} \text{ plus } \frac{1}{50}}$

(2) Total R equals $\dfrac{1}{.1 \text{ plus } .05 \text{ plus } .02}$

(3) Total R equals $\dfrac{1}{.17}$

(4) Total R equals 5.88 ohms.

5.88 ohms is less than the lowest value in the parallel connection so our answer conforms to our preliminary rule.

Let us diverge for a moment and discuss our formula. Step 1 is merely the setting up of the equation. The reciprocal of the sum of the reciprocals means that we must add the reciprocal values of the parallel resistors and find the reciprocal of that sum. In the majority of cases it is easier to convert the fractions to

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TUBE CHART
for use with modernized Weston 533 Tube Checker
As Described by Mr. A. Paul, Jr., in September Technician.

Tube Type	Socket Number	Filament Voltage	Plate M. A.	Change in M. A.
00	1	5	5	3
01	1	5	4	5
30	1	3.3	4.5	4
99	1	3.3	1.5	3
10	2	7.5	4.5	4
12	2	5	8.5	10
26	2	1.5	5	6
45	2	2.5	6	10
50	2	7.5	6	15
71	2	5	6	22
80	3	5	..	54
81	3	7.5	..	46
5Z3	3	5	..	65
27	4	2.5	3.5	4.5
37	4	6.3	7	6.5
56	4	2.5	7.5	5.5
24	5	2.5	6	5
35	5	2.5	4	6
36	5	6.3	7	5
38	5	6.3	6	11.5
39	5	6.3	6	5.5
44	5	6.3	6.5	6
46	6	2.5	7	15
47	6	2.5	8	11
41	7	6.3	8	13
42	7	6.3	8	12

A Handy Tool For Auto Radio Installation

By CASH L. SWINNEY

The elimination of motor noise in auto radio is some times a very exasperating job to say the least. The tool described in this article makes it a simple matter to locate the source of radiation of the undesirable interferance. A little shielding at this point then and the trouble usually is either eliminated or reduced to a point where it is no longer bothersome.

First, let us make one of these tools then we can go into its use. The materials needed are a piece of ½ inch tubing two and one-half inches long, preferably copper or brass, but any metal will do; a piece of clock spring two and a half inches long and one-quarter to three-eighths of an inch wide and a piece of sheet copper 1¼ inches wide and 4 inches long.

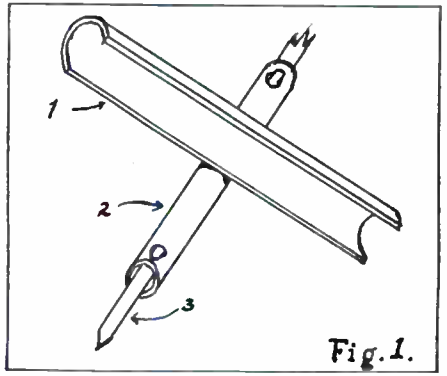
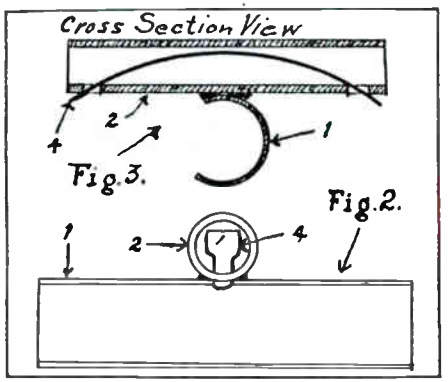


Fig. 1.



First drill a three-sixteenth inch hole ¼ inch in from each end of the piece of tubing and smooth the edges of the holes. Part 2 shown in Figures 1 and 2 is then formed. Next grind each edge of the piece of spring back from each end about ⅜ inch to form a tab ⅛ inch wide as shown at 4 in Figure 2. Be very careful, however, not to get the spring hot while grinding as this will draw the temper of the spring and ruin it.

The spring is then inserted in the tube with the tabs projecting through the holes as shown at 2 in Figure 3. This may be a little hard to do but it should be. After it is once in we don't want it to fall out again.

Next bend the piece of sheet copper lengthwise to a little more than a half circle. About ½ inch gap is just right. This piece is then soldered to part 2 at right angles as shown in Figures 1, 2 and 3.

To finish the tool we will need a piece of ¼ inch rod 14 to 20 inches long sharpened on one end, preferably the same as a screwdriver. Insert this rod through the piece of tubing, part 2, as shown at 3 in Figure 1. The tool is now ready for use.

After having tested with and inserted a by-pass condenser at all necessary points in the low tension system of the car and we find that motor noise still persists we will have come to the point where our little tool is going to prove useful.

We can now start checking for trouble from our high tension wires, that is, spark plug and coil wires. Press the end of the prod, 3 Figure 1, against some grounded part of the car, nearest the wire to be tested for radiation, with part 1 hooked around the wire. If radiation is occuring at this point a marked decrease in interference will be noted. After having gone over all the wires we will have the various sources of interference pretty well cataloged. Sometimes it is also well to test some of the low tension wires too, especially the one running to and from the distributor and coil.

Usually a piece of braid shielding from two to four inches long over the offending wire at each point of interference will be all that is needed to produce the desired results. Wrap tightly with a small piece of tape at each end. Solder a piece of fairly heavy stranded wire or a piece of braid to it and fasten securely to ground.

Never use a shield longer than is absolutely necessary to produce results. Solder ground wires to the center of the shield and where the shield is six inches or more long ground it also at each end. Any shield ten inches or longer should be grounded every four or five inches. AND make all ground leads as short as possible.

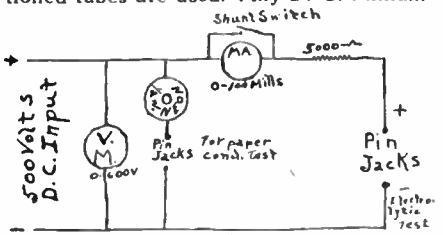
There is a very good reason for this. The current in the wire we are trying to shield induces a current in the shield itself between the grounded points, therefore, if the distance between the grounded points is too great the shield itself may radiate to a troublesome degree especially at the higher frequencies.

A SIMPLE PAPER AND ELECTROLYTIC CONDENSER CHECKER

By E. H. DARROW, Radio Den

The problem of testing condensers of all types, quickly and easily, with confidence in the readings or indications obtained, is one which nearly every technician has considered at one time or another. To accomplish the above without an excessive investment of time and money is within the reach of most everyone with a few odd parts. The device consists of a D. C. supply, a neon tube or similar indicator, a suitable milliammeter and a few odds and ends. A voltmeter to measure the D. C. voltage may either be permanently built into the instrument or pin jacks provided for taking readings when necessary.

Any source of D. C. supply which will give 500 volts output may be used. It is advisable to have a line voltage control on the primary of the power supply in order to reduce the voltage when checking condensers of lower peak voltage than 500 volts. The accompanying diagram shows a ½ watt Neon tube but if preferred a UX 874 glow tube may be used. When checking leaky paper condensers there will be an intermittant flash when either one of the above mentioned tubes are used. Any D. C. Milliam-



meter with a range of 0 to 50 mills or more may be used.

It will be noticed that in the accompanying diagram there is a shunt switch around the milliammeter. This is to project the meter in case a shorted condenser is placed across the pin jacks. The shunt switch is left closed at all times except when actually taking the milliammeter reading. In testing electrolytic condensers when the voltage drops about 100 volts or more showing a short or partial short do not open the shunt switch for the milliammeter reading as it will damage or burn out the meter. (A meter fuse is suggested).

A little time and care in building this tester will be more than compensated for by a few days use in everyday service work and general use around the laboratory.

ELEMENTARY OHM'S LAW AND REVIEW

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decimal values as is shown in step 2, by dividing the numerator of each fraction by its denominator. In step 3 we add the decimals and indicate the reciprocal of the sum of the reciprocals. In step 4 we have the answer after again converting a fraction to a decimal value.

There are many times in servicing when this calculation of parallel resistors is very useful. Many times an odd value or out-of-stock value of resistor may cause serious complication or inconvenience in the days work. By using the correct values in parallel the desired value or its close approximation may be made up with resistors on hand. A little practice in solving for parallel resistance values by making up simple problems will soon give you an easy familarity with the use of the rule.

Any question concerning this series of Ohm's Law articles will be answered in these columns. Address communications to Ohm's Law Course, in care of The "Technician," 1569 Munson Avenue, Los Angeles. Next month we shall discuss the calculation of grid bias resistors in conventional radio circuits.

OPEN FORUM

Los Angeles, Calif.,
October 10, 1933

Editor:

Whenever two or more radio service men get together the talk always drifts around to the poor wages they are getting. This is, in most cases, unfortunately the truth, for taking into consideration the technical knowledge required, the constant study necessary, and the practical experience without which the knowledge is useless, the radio technician is the poorest paid of all the professions.

By education the customer should be made to realize that the technician is a skilled professional man and not a common laborer or a servant whom he can tip as though for personal service. All tips should be courtously but firmly refused until people learn to expect a higher type of man and the work that goes with it.

The technician should dress as well as any professional man and keep his personal appearance up to top notch at all

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LOOKING BACKWARD

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plant, threw the switch to receiver, clamped the single headphone to your best ear, adjusted the crystal just so the wire would barely touch the electrolyte and listened. Sometimes you got an answer, more often there was absolute silence.

Call letters were generally assigned in accordance with the first letter of the ship's name. Thus, "M" was Maryland, "P" was Pennsylvania, etc. The West Virginia had a highbrow call. She was flagship and the letter "F" was assigned. I do not recall what happened when wireless was installed on more than one ship having the same beginning letter.

After Mr. deForest had done all he could with the equipment it became necessary to find some operators and at least one man who knew the "hookup," or who could understand it when it was explained to him. This last named job fell to one Halverson, a Swede lamentably short on the U. S. language but a genius electrically. Eventually he learned to operate reasonably well. Always he was ready with a solution when the old rig refused to percolate. Another chap was selected by virtue of his past Western Union experience. This fellow knew absolutely nothing about the rig, but he could copy American Morse up to 50 per minute, and be a whole sentence behind and still get it all. He could hear a signal that was just audible, and copy it correctly and cuss the ship's billy goat mascot at the same time. This operator was addicted to malt, spiritous and other kinds of liquor—in fact any kind of liquor, and once he got ashore we always had to go after him. Usually we brought him back in a semi-comatose condition, and he was no good for a week after.

I had formerly worked at a telegraph office and could copy ten or twelve per. Being the bookkeeper and also knowing American Morse I got the coveted job of standing relief watch—sometimes.

One night the first operator above referred to, had been ashore and was brought back to sleep it off. He was supposed to be on watch but I took it for him. We were then in Manila Bay. There were about six ships on the China Station who had wireless and four of them were anchored in Manila Bay. As our receiving range was seldom over 100 miles, and more often much less, there wasn't much to listen to. However, we had orders to wear the phones all the time and to copy and report everything we heard. Suddenly I heard a faint general call, with a signature "G." Now "G" was the Galveston, and I knew that she was up the China coast entirely out of range both for sending and receiving. Anyhow, I knew the letter "G" when I heard it and I glued the phone tight and listened. She was sending an 8 p. m. position. This I copied and in accordance with orders took a copy down to the Captain's cabin. He got out of his bunk to read it and look up the latitude and longitude given.

I have been bawled out many times but never before or since like that time. First he told me that the position given was some 900 miles north—which I already knew. Then he sarcastically remarked that such reception was preposterous, impossible—who told me I was an operator anyway? By whose authority was I standing watch? Anyway, get out of that wireless station and never go near it again! Well, I made my get-away, but was put on "report" and bawled out again publicly the next day.

The final outcome was, the Galveston limped in some weeks later and it was discovered that on the night referred to she was at such and such a latitude and longitude, and did send out such a report. For quite awhile I was a hero, and held the long distance record, and was restored to confidence by the "old man."

Having left New York for Asiatic waters via the Suez shortly after our deForest was installed we never had opportunity during the next three years to be equipped with other than the original equipment. It was improved by our wizard Halverson in many ways and it served us well. Those were truly the days when our present day radio was having both birth and growing pains. The good old West Virginia is in the scrap heap now. I wish I knew what became of her original wireless outfit.

I would suggest that those of you boys who are really getting a "kick" out of radio keep a daily or weekly journal. Jot down the things you do, they may not sound interesting now, but if you are living 25 or 30 years from now it will be a prized possession. I think that all of you agree with me that 25 years from now our present day equipment will be as far behind as the rig I have referred to would be at the present moment.

SERVICE KINKS AND PET EQUIPMENT

Putting a drop of wax on the outer end of the rotating arm of the distributor (on an automobile ignition system) and replacing arm and cover and turning over the motor is an effective and safe way of determining the amount of clearance between rotor tip and distributor.

—H. L. Cain.

Silvertone 110 and 111 can be improved as to control on local or nearby stations by the replacing of the volume control with one of 10,000 ohms and using a 500 ohm, 10 watt resistor in series with cathode circuit. L8 and L9 Bosch and Eveready 1, 2 and 3 volume controls can be replaced without cable and pulley by connecting longer leads and placing where control knob is located. The set will have to be re-neutralized. When no plate voltage is found at the RF tubes check the large resistor under the pack. On Bosch 48, clean contacts on condenser shaft and variometer mounting contact.

—H. A. Aanderson.

How to make any Super-Heterodyne tune in KGPL: Open the oscillator grid lead from coil secondary to condenser stator and put any good switch in circuit. Line up set with switch open and cops will be somewhere in the middle of the broadcast band. The sensitivity of the set will be somewhat lowered but this system works anywhere in Los Angeles.

Harold Purkapile.

The four tube Peter Pan midget, manufactured and sold about two years ago, seems to have the ability to develop many troubles which are a bit difficult to locate. One of the most baffling which I have run across is caused by a faulty coupling condenser between the detector plate and the pentode grid. The plate voltage was about thirty per cent low on all tubes but the output of the rectifier-filter system seemed correct. The complaint was poor tone quality, particularly on low volume. The coupling condenser tested O. K. under all tests but replacement in several cases accompanied by these same or similar symptoms proved to be the solution. In the cases I have observed the plate drain and grid bias checked approximately normal, but with reduced plate voltage. In testing, remove the pentode and if the plate voltage at 47 socket comes up to normal the fault is very probably the previously mentioned condenser. —Norman B. Neely.

Classified Directory

LU ULLBERG, Adv. Mgr.
Phone REpublic 4711

Wanted—

AC milliammeter, AC ammeter, O-1 DC milliammeter, AC rectifier type voltmeter. Norman B. Neely, AL. 1628.

Land close to LoLs Angeles. H. A. Aanderson, FI. 2727.

¼ inch electric drill. C. E. Miller. HEmpstead 2697.

Rider's Manual No. 2. Ray Rusthoi, UNiversity 3093.

For Sale or Trade—

Small orange orchard (15 acres with large house) and small chicken ranch near Fresno for sale or anything of value. Norman B. Neely, AL. 1628.

I have several power amplifiers and high priced radio sets (older type) to trade. Want photographic equipment or acreage or what have you? H. A. Aanderson, FI. 2727.

Will trade a Day-Rad tube tester for small drill press. G. W. Eckleberry.

Sciots 16 battery size charger, complete with tungar bulb. Will trade for what have you in radio equipment. W. Feringer, 9987 Tujunga Canyon Blvd., Tujunga, Calif.

New Esco motor generator, 12 volts DC input--750 volts DC output at 165 MA. For meters, electric drill or what have you. John L. Vincent, 305 So. Brand Blvd., Glendale.

City lots, houses and lots, farm lands, etc., near Fresno. Trade for P. A. equipment, beach cottage, automobile, cash or what have you? Norman B. Neely, ALbany 1628.

Will swap a new Weston current-squared meter (thermo-galvanometer 0-115 MA) for a zero to 500 microammeter. Noland B. Stadley, 1408 W. Vernon Avenue.

USEFUL INFORMATION

The following is a list of 1933 Victor models and the corresponding General Electric models, published through the courtesy of Mr. L. C. Lange, of Leo J. Meyberg Co., Inc., RCA Victor distributors:

RCA Victor Model No.	— 1933 — G. E. Model No.	Description
R17M	BX	4 tube Metal AC-DC
R17W	K40A	New 4 tube wood-AC-DC
R27	K40	4 tube wood-AC-DC
R28	K50	5 tube Midget, Super
R37	K60	6 tube Table, Super
R38	K65	6 tube Console, Super
R90	K106	10 tube Con., Super
M34	B40	4 tube Auto
R22S (Syroco)	L50	5 tube AC-DC, Super
R22W (Wood)	L51	5 tube AC-DC, Super
R27	K40	4 tube Wood, AC-DC
R28	K50	5 tube Midget, Super
R28E	K51	5 tube (door), Super
R37	K60	6 tube Table, Super
R38	K65	6 tube Console, Super
RE40	K54	Comb. Table, Super

The following list of Champion records may be played in public by public address operators without interference from the American Society of Composers, Authors and Publishers:

S16465 Hot and Heavy, Fox Trot—Ben Tobier and his California Cyclones

Walking Through a Field of Daises, Vocal chorus by Paul Small

R16521 Give Me Sweet Dreamland, Popular vocal—Brooks & Ross

That's When You Know You're in Love—Reese and Da Silva

S16412 Report on the Party—Sam and Willie, Black Face Comedy

Stranded—Sam and Willie, Black Face Comedy

S16437 Blue Danube Waltz—Pipe Organ. Ed. J. Feimer

Over the Waves—Pipe Organ. Ed. J. Feimer

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OPEN FORUM

(Continued from page 12)

times. If it is necessary for him to crawl under a house or go up a roof, carry a suit of coveralls and change before doing the work. The automobile or truck makes a good dressing room.

The customer is not going to respect a man who doesn't care enough about himself to have clean clothes, a clean shave and his hair trimmed and combed.

It is human nature for everyone to take people by their appearance and if the technician looks like a professional man instead of a laborer and combines satisfactory work with his appearance, in the course of time he is bound to command a higher salary rating.

P. W. FULLERTON.

(We cannot deny the truth of this observation. Let's profit by it.—Editor).

This is the heighth of something or other:

A few days ago a woman telephoned Mr. Ullberg's shop and asked if he would give her the phone number of the Radio Maintenance Co.

NATIONAL UNION LECTURE COURSE IS GREAT SUCCESS

On Monday night, August 14, 1933, Mr. Richard G. Leitner, one of the foremost radio engineers in the country, began a fourteen weeks lecture course concerning radio servicing and practical design, under the auspices of the National Union Tube Company, Inc. These meetings have been held in conjunction with the Certified Radio Technicians regular meetings at the National Radio and Electrical School at Santa Barbara and Figueroa streets. The National Union Tube Company is to be commended for giving the technicians of Southern California this very valuable series of lectures and for being so very considerate and totally unselfish in keeping the meetings entirely free of advertising of any nature whatsoever.

Mr. Leitner's lectures have been very educational as well as interesting. They have been of a very practical nature and actual useful and usable data are given each Monday evening. The attendance has been constantly increasing and the board of directors of the Certified Radio Technicians Association feels that a great deal of credit for the successful formation of our new association is due the National Union Tube Company, Kierulff and Ravenscroft, and Mr. Leitner, for influencing a really large attendance. Every man interested in technical radio is cordially invited and urged to attend these very valuable lectures.

PERSONAL MENTION

Mr. Joseph Tami, Jr. has recently become a member of the Certified Radio Technicians Association. Mr. Tami is instructor of Radio Service at Frank Wiggins Trade School and formerly he was technical representative with RCA Victor. We are pleased and proud to welcome him as a member of our Association.

It is an honor and a privilege to welcome Mr. William H. Heinz as a member of our Association. Mr. Heinz, Lieutenant Commander U. S Army, retired, has had a very extensive and colorful career in the field of radio and electricity. From 1905 to 1919 he was an electrical engineer with the General Electric Company and for seven years he was manager of Radio station WHO at Des Moines, Iowa. Among other activities Mr. Heinz has been a director of the Radio Manufacturers' Association and vice-president of the National Broadcasters' Association.

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— CONSIDER —

The advertisers in this magazine make its publication possible. They solicit and deserve your business and support. It is your duty to patronize them exclusively.

PERSONAL MENTION

Recently returned from a year and a half of operating at sea, Charles Nichols, formerly of Jackson Bell and Mission Bell, has become connected with H. D. Hatfield and Son, radio dealers in Hollywood.

Mr. A. Paul, Jr., our President, has been appointed to the Board of Governors of the Radio Trades Engineering Association.

USEFUL INFORMATION

(Continued from Page 15)

S16537 A Song to Hawaii (Hawaiian)—The Two Islanders
Honolulu Rag (Hawaiian)—The Two Islanders
Honolulu Stomp (Hawaiian—The Two Islanders
My Boat is Sailing
S16427 Kai-Mai-O-Ka-Maoli (Hawaiian) Waikiki Hawaiians
Waii-Luli
R16462 B Flat Rag—Madisonville String Band
Italian Dream Waltz
R16357 Cincinati Rag—Moore and Green
Sally Gooden
S16508 Don't Let Your Deal Go Down, Piano Duet—Smith and Irvine
Hand Me Down My Walking Cane
S16536 Havana River Glide—Martin and Hobbs
Wild Cat Rag
S16518 Lonesome Road Blues, Piano Duet—Smith and Irvine
Sally Gooden
S16503 Next to Your Mother Who Do You Love?—Green's String Band
Pick Away

NOTICE TO CONTRIBUTORS

Contributions to all departments are respectfully solicited. In order to avoid unnecessary complications in preparing copy for the printer, contributors are asked to observe the following suggestions:

Please use a separate sheet of paper for each classification of material.

Sign full name--initials are confusing.

Please use only one side of paper.

Type if possible, if not, be sure the handwriting is legible.

Please double-space.

Clearly indicate the nature of each contribution by classification title at the top of each page.

Arrange your dingrams so they conform to a square if possible.

Check your manuscript carefully for technical, grammatical and subject errors.

Strict adherence to the above suggestions will not only simplify transcription of the material submitted but will greatly reduce the possibility of errors and misconceptions of intent.

—The Editor.