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March Issue



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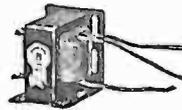


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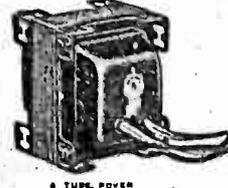
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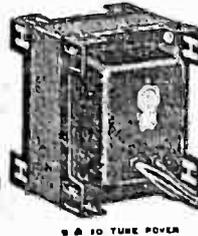
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## EDITORIAL

By The Editor

### "Cut Rate Business"

We have read and heard a great many things concerning the well-known depression—it has been blamed for all sorts of misfortunes and evils and with it have come several things which might be called by-products. Under the dynamic leadership of President Roosevelt and his able lieutenants we are all optimistic concerning the future, and we are all endeavoring to make our united and individual efforts effective in whipping "Old Man Depression" in order to emerge into an era of reasonable prosperity. To do this we must break down the detrimental effects of these many by-products.

One of the foulest, most insidious, dastardly and deceitful of these by-products is CUT-RATE business! Coincident with the depression and undoubtedly one of its chief allies was the campaign of large organizations who attempted, and succeeded to an alarming degree, to utterly demoralize and ruin fair, honest, and straightforward business. The public, always gullible to a large extent because of unfamiliarity with the technicalities of business in its many phases, was very badly deceived by this underhanded and fraudulent practice of offering the fabled "something-for-nothing" bargain.

Webster defines a synonym as "one of two or more words having the same or nearly the same meaning." A little thought on the part of the average intelligent citizen will bring him to the

logical conclusion that "cut-rate" and "cut-throat" are entirely synonymous terms insofar as business is concerned.

Referring to Webster again, we find that he defines a cut-throat as "one who cuts throats; a murderer, an assassin." Cut-rate businesses have cut the throats of our honest, dependable merchants and have, in effect, murdered fair, upright business. The precepts of conducting a commodity business on a fair value-per-dollar basis and the doctrines of maintaining faith between consumer and dealer have been assassinated by this monster.

Every member of the radio industry knows only too well that cut-rate business in the radio field has not only injured the radio business to an extent which makes it extremely difficult to eke out a meager living, but has destroyed the faith of the public in all radio business.

Never will we be able to beat "Old Man Depression" until we have, by determined and united effort, erased the filthy blotch of cut-rate business racketeering—this savage black magic and witchery—from an era of supposed advanced civilization. The firm who displays, in large red (the danger color) letters that it features cut-rate prices not only advertises that it will cheat and swindle its customers, but very openly and brazenly insults the intelligence of the people of an enlightened age.

(Continued on Next Page)

**"CUT-RATE BUSINESS"**

We must all resolve to aid in driving this type of insidious and malicious racketeering from our business world by never patronizing any firm, individual, or organization proposing to sell standard products at cut-prices. We would all like very much to be able to buy the things we buy at a low price, but we must not be blinded by the glitter of fool's gold to such an extent that we believe this type of advertising to be true. The large, red letters are only bait to get the unsuspecting and trusting customer into the lair of the merciless and perverted racketeer and crook who pretends to give a bargain over the counter with one hand while robbing the pocketbook with the other. This is undoubtedly worse than ordinary burglary. A burglar dons a mask, uses a gun, and breaks into houses in the dead of night and pilfers. The cut-rate vulture plies his treacherous racket under the guise of friendliness and fair business! Every one of us must consider these facts and very definitely rise up in righteous revolution against that which is the most serious obstacle to the return of prosperity.

In even a worse category may be classed a good many large manufacturers of nationally-known products who deny any connivance with these cut-rate rats. These large companies, when challenged to explain why their products are sold retail at less than the ordinary dealer's price, answer with an air of injured innocence that certainly "no one would really believe us to be a party to any such dealings." How, then, do their products get into the cut-rate channels? No intelligent person is willing to believe that bankrupt stocks are the only source of supply. This challenge, repeatedly

made in an effort to give the well-known firms a fair chance to explain or stop this supply have never yet been answered, but always is the issue evaded and flimsy, childish excuses or denials given in a protestation of good faith with the legitimate dealer. Again we make this challenge to all nationally-known manufacturers whose merchandise is in the hands of that unspeakable vulture—the cut-rate merchant!

**A-K ANNOUNCES NEW SET**

Ray Thomas, Inc., Atwater Kent distributors, are very enthusiastic concerning the possibilities of the new A-K model 816 auto receiver. It is a six-tube superheterodyne, featuring improved A. V. C. improved tone control and unusual day-time distance-getting ability. The power supply is a synchronous inverter and rectifier delivering 200 volts of smooth d. c. to the plates of the tubes. The audio output of the two type 41 tubes is approximately three watts—enough for all road and traffic conditions.

It is light in weight, easy to install and a feature of considerable interest to service technicians is that the tubes may all be easily removed for test by removing four thumb screws and a cover plate. To insure quiet operation triple shielding is used on the power unit—three complete and separate metallic containers, while, to prevent microphonic noises the variable condensers are mounted on live rubber.

The Ray Thomas Company invites all dealers and technicians to inspect this new receiver and announces that shipments are now being made in the order received.

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**CONSTRUCTION AND CALIBRATION SERVICE  
TEST OSCILLATOR, MODEL NO. 350**

By R. T. POUNDS, Chief Engineer, J. W. Miller Co.

One of the most useful instruments, to the service man or radio experimenter, is a reliable test oscillator. To the service man it represents a great saving in time, and consequently in money, in properly aligning the sensitive and selective receivers of today. The experimenter will find it a distinct advantage in comparing the relative merits of different type receivers, or circuit designs.

However, the cost of a good test oscillator has been rather high, and in fact, beyond the means of the average individual. Moreover, many persons hold the impression that an oscillator is an intricate and difficult instrument to construct, when actually if care is taken to avoid trick circuits and the proper considerations are given the problems involved, it is one of the simplest.

As a general rule, when it is desired to add a new piece of test equipment, the first two considerations are: Is it useful and, how much will it cost? In the case of a test oscillator any discussion of its usefulness at this point would be superfluous. The cost being the next consideration, it would be well to state that in the design of the oscillator to be described every precaution was taken to keep the cost at an absolute minimum, consistent with satisfactory results.

Other requirements affecting the design of the instrument are as follows:

It must be stable in operation. Once calibrated there should be no appreciable deviation from the original calibration over a long period of time. The output should be, at will, either modulated or unmodulated, and it is desirable that the percentage of modulation be made variable; furthermore, the system of modulation must not affect either the calibration of the instrument or, by its nature, produce a broad tuning signal.

It must be well shielded to prevent signal pickup from any point, except at the output, and the output control must vary the signal from maximum to minimum smoothly and with negligible reactance upon the tuned circuits.

The frequency range should cover the broadcast band as well as all the intermediate frequencies and this range should be continually variable.

With the foregoing requirements in mind, actual construction of the oscillator was begun and each detail given full consideration. Many types of oscil-

lator circuits were tried and abandoned for various reasons. The circuit finally selected was an adaptation of the old amateur's standby, namely, the Hartly oscillator. The stability of this type circuit has been definitely proven by the fact it has been used in one way or another for several years. The important factors governing the stability of a radio frequency generator are: Comparatively high L. C. ratio, in the tuned circuits, well-designed coils, loosely coupled output, and the operation of the vacuum tube employed at a level well below the maximum rating.

The coils being the first in importance were designed to fulfill these requirements. The output coupling coils were so proportioned and spaced, that the R. F. power available has proven sufficient for all requirements, and yet the coupling is sufficiently loose that the calibration remains constant with practically any antenna load. As a further assurance of stability the coils are thoroughly dried by baking and hermetically sealed by a process known as "flash dipping" in a special compound of highly refined vegetable waxes. Thus, any moisture in either the coil form or the insulation of the wire is driven out and the coil then protected against further trouble from this source.

To obtain a high L. C. ratio, the tuning condenser employed was a two (2) gang of the type commonly used in the manufacture of midget sets, the two sections being connected in parallel to obtain a total capacity of 700 M. M. F. It is well to note at this time most modern 2 gang condensers available on the market today have a maximum capacity of from 360 to 370 M. M. F. per section as compared with 350 M. M. F. of the earlier models. However, this will make no difference in the operation of the oscillator, as the frequency range was calculated with a maximum capacity of 700 M. M. F. in the circuit, the additional capacity merely extending the frequency range slightly.

The operation of the 56 type tube at a voltage of 75 volts (approx.) instead of its rated voltage of 250 volts, safeguards against excessive heating of the tube elements and prevents frequency drift from this source.

(Continued on Next Page)

### TEST OSCILLATOR MODEL NO. 350

(Continued from page 7)

The audio oscillator and modulator system are also of the Hartly circuit, although used in a slightly different manner. Any push pull transformer may be used here, although an inexpensive small core type will give the best results. In fact, if you can find one of the old style push pull transformers in the junk box it will suit the purpose. More information regarding the audio oscillator will be given later.

Of all the various schemes of controlling the R. F. output, the use of a simple potentiometer has proven most successful.

When the laboratory model of the test oscillator was finally completed and checked, it was carefully calibrated and a curve drawn. The instrument was then put in daily service and was on various occasions used by local service men in their shops as a portable instrument, receiving the usual rough usage most portable instruments are subjected to. When it was returned to the laboratory the calibration was again checked and in each case was found correct.

#### CONSTRUCTION:

Before construction work can be started, the following items are necessary:

- 1 Miller No. T-350 Oscillator coil. List \$1.50.
- 1 Miller No. T-351 Oscillator coil. List \$. 75.
- 1 Metal case and chassis.
- 1 Two (2) Gang condenser, .00035 each section.
- 1 Filter choke. Any small choke having an inductance of 15 to 30 henries.
- 1 "Pec Wee" type midget power transformer.
- 1 Socket—4 prong.
- 2 Sockets—5 prong.
- 1 D. P. D. T. toggle switch.
- 1 Dial.
- 2 Binding posts.
- T1 Push pull audio transformer. See note below.)
- R1 200 ohm potentiometer.
- R2 5000 ohm potentiometer.
- R3 10,000 ohm resistor. (2-watt.)
- R4 10,000 ohm resistor. (1-watt.)
- R5 10,000 ohm resistor. (1-watt.)
- R6 100,000 ohm resistor. (1-watt or less.)
- R7 100,000 ohm resistor. 1-watt or less.)

- C3 .0001 Fixed condenser. Mica.
  - C4 .002 Fixed condenser. Paper.
  - C5 .01 Fixed condenser. Paper.
  - C6 See note below.
  - C7 4 Mfd. filter condenser.
  - C8 4 Mfd. filter condenser.
  - C9 .1-200 volt fixed condenser.
- A. C. cord, plug and necessary hardware.

Note—The audio transformer should be of the small core type. In fact, one from the junk box would be satisfactory. The condenser shown across the secondary (C-6) serves to adjust the audio oscillator to the proper frequency and will vary in value for different types of audio transformers, various values should be tried until the audio tone is approximately 500 cycles. The higher the capacity employed, the lower the frequency. If the frequency is too low, replace C-6 with a fixed resistor to raise the frequency, using same procedure as above.

The actual construction of the oscillator should begin with the laying out of the metal chassis and case. The actual wiring is simplicity itself, as the diagram is itself explanatory and requires no explanation, except that all leads in the tuned circuits should be heavy enough to be self-supporting. This is necessary to obtain accurate calibration. All other wiring should be of any good hook up wire.

#### OPERATION

After the unit is completely assembled and wired, the tubes should be inserted and the voltage checked at the various points noted on the blueprint. These readings should be made using a voltmeter of 1000 ohms per volt or over. Assuming this check proves correct we may now check the operation of the oscillator.

First the modulation control should be turned full "on," the output control full "on," and the output leads connected to the antenna post of a receiver. The frequency range switch should be set for broadcast. Now adjust the oscillator dial until a signal is heard in the receiver. The output control may now be reduced until the signal is not too loud. If the signal tunes quite broadly reduce the modulation control to the point where the carrier may be heard with the signal. The audio tone may now be adjusted as described in the note above.

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### TEST OSCILLATOR MODEL NO. 350

(Continued from page 8)

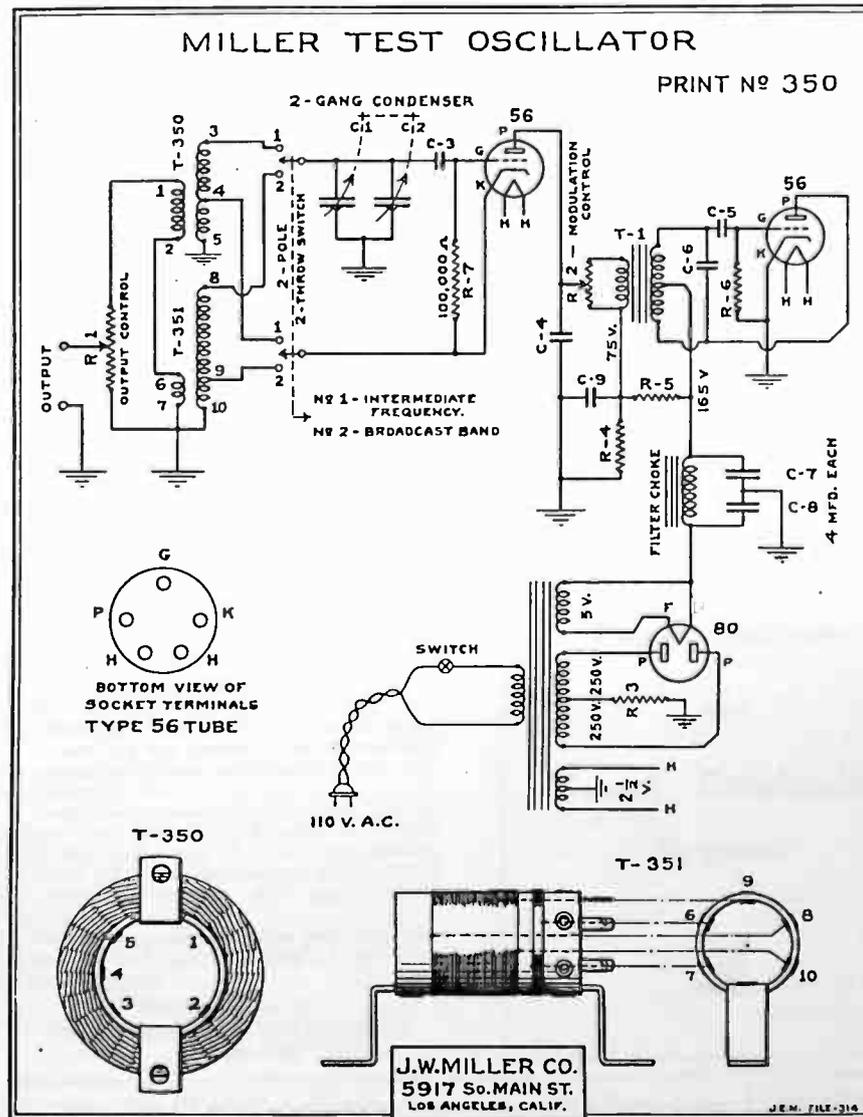
#### CALIBRATION

The oscillator now working, we may proceed with the calibration of the instrument, using the following procedure:

First a T. R. F. type receiver should be tuned to any station of known fre-

quency at the high frequency end of the dial. (Note: A super-heterodyne type receiver may be used for calibration, but to avoid errors due to super-heterodyne image response, a T. R. F. type receiver is suggested. This should be done with the oscillator disconnected. The oscillator should now be connected to the antenna post (leaving the antenna

(Continued on Next Page)



## TEST OSCILLATOR MODEL NO. 350

(Continued from page 9)

also connected), and with the modulation control turned "off" the oscillator dial is varied until zero beat is obtained between the oscillator and the received signal. If no beat can be heard the received signal is too strong and should be reduced by either disconnecting the antenna or connecting a condenser in series. When zero beat is obtained, the oscillator dial reading is noted and the same procedure continued over the broadcast band. Calibration points should be taken at as many points as possible to insure an accurate check of the tuning curve. After the complete broadcast band has been covered you may continue into the intermediate frequency ranges. As the broadcast band also covers part of the intermediate frequencies it is necessary to calibrate this section of the dial in the same manner as the intermediate frequency band proper.

The frequency ranges of the oscillator are: Low frequency section, approximately 125 K. C., to 450 K. C., High frequency section 450 K. C., to 1500 K. C., frequencies higher than these may be obtained by using harmonics of the high frequency section. In order to obtain this range it is imperative that all stray capacities be kept as low as possible. To calibrate the lower frequencies it is necessary to resort to the use of harmonics and therefore, a word regarding this phenomena would be appropriate.

An oscillating circuit generates not only the fundamental frequency to which it is tuned, but also frequencies which are direct multiples of the fundamental.

Thus, a circuit oscillating at 200 K. C. also generates signals at 400 K. C., 600 K. C., 800 K. C., etc. By tuning in a signal on the broadcast band, as for instance, at 1050 K. C., and then zero beating the test oscillator against it we know the fundamental frequency to which it is tuned will be some frequency the multiple of which equals 1050 K. C. Thus the fundamental frequency would be either 210 K. C., 350 K. C., or 525 K. C., as any of these numbers multiplied by a whole number equals 1050 K. C. It now remains to find which frequency we are tuned to. To do this, advance the modulation control and without disturbing the oscillator dial setting vary the receiver dial. By noting at what points the harmonics occur, we may readily calculate the fundamental. Thus,

if, as we advance the receiver dial towards the high frequency end of the dial, the next harmonic occurs at 1260 K. C., we know the fundamental frequency is 210 K. C., as only this frequency can be divided into both 1050 and 1260 without a remainder. As the band coverage of the oscillator is known, it is a simple matter to calibrate by this procedure.

When zero beating for obtaining calibration points, the modulation control should be turned "off." For easily locating harmonics it should be turned "on."

### CONCLUSION

In using the oscillator it should be remembered that some means of reading the output of the set such as an Output Meter should be used when the receiver under test is not equipped with automatic volume. If automatic volume control is incorporated, resonance should be indicated by some means other than the output. A very good method is the use of a vacuum tube voltmeter to measure the A. V. C., bias at the R. F., grid returns, or a milliammeter may be inserted in the plate circuit of one of the R. F. or I. F. tubes, resonance being indicated by minimum meter deflections.

It is our sincere wish that the information contained in this rather brief discussion will assist you in constructing a really useful instrument. If any further information is desired on any particular detail we will be only too glad to be of assistance.

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## OPEN FORUM

Feb. 23, 1934

Mr. Norman B. Neely, Editor  
1569 Munson Avenue  
Los Angeles, Calif.  
Dear Mr. Neely:

After completely perusing your January issue of the "Technician," I am prompted to say that it is, in my opinion one of the finest organs of its type I have ever seen or read.

Naturally interested in any type of printed organ, I have watched your periodical from its beginning a few months ago—and as a result am able to say it has improved and grown more rapidly than it seems possible in your type of magazine.

Adapting itself to the technical questions and answers of the many service folk it serves, the "Technician" no doubt serves its purpose admirably.

I wish to thank you for placing me on your circulation list and I hope for your continued and increasing success.

Sincerely yours,  
CARL C. ROSSON,  
Editor Post-Dispatch.

February 15, 1934

Mr. Norman B. Neely  
Editor, The "Technician"  
1569 Munson Avenue  
Los Angeles, California

Dear Editor:

We have noted the intense effort made by your organization to improve The "Technician" with each issue. Today you have implanted it so firmly and with such a reaction of goodwill from the manufacturers, jobbers, dealers and your own members, that there is no doubt as to its permanent success.

As an advertising medium, The "Technician" has proved of great value to us and we are endeavoring to persuade the factories whose merchandise we sell, to advertise also.

Since the inception of The "Technician" we have been heartily in accord with the endeavors of your organization in your efforts to promote a closer bond of friendship among the members of our industry.

Thanking your members for their cooperation and assuring you of our continued support, we are

Sincerely yours,  
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## "THE FIVE METER BAND"

By J. J. GLAUBER  
Chief Engineer, Arcturus Radio Tube Company  
CONCLUSION

### ANTENNAE

The antennae for 5 meter operation is extremely simple. The main problem seems to be in getting the aerial above surrounding objects. Either current or voltage fed antennae may be used, and if one does not desire to erect a special antenna for 5-meter work only, the regular twenty, forty or eighty meter transmitting antenna may be used. In many cases this has been found to give better results than a current fed antenna with a 5 meter fundamental. A few examples of possible antennae to use are illustrated in Figure 13.

Inductive coupling is to be recommended over conductive coupling. It will be found advantageous to use a condenser in the antenna circuit to tune the feeders properly. About 50 uuf. will usually be sufficient. A good quality variable condenser should be used.

For receiving no particular type of aerial can be recommended. In some cases a small vertical piece of wire will bring in stations with an R8 signal while the same piece rotated to a horizontal position will cause these stations to fade out entirely, but bringing others in not heard on the vertical wire. And then again some stations can only be brought in on a long antenna while others will not be heard with it. It has, therefore, become necessary to have several antennae available if satisfactory reception of a number of stations is desired.

### WAVEMETERS

The simplest method of determining the wavelength of high frequency oscillations is by means of Lecher wires. These may be described as two long parallel conducting wires connected together at one end. This is the input end. If a sinusoidal oscillation is impressed at the input end of such a system, stationary waves are set up in it. The velocity of propagation of these waves on the wires will be very nearly that of the velocity of similar waves in free space, provided the wires of the Lecher system are good conductors and of a sufficient diameter to ensure that their inductance per unit length is not large. If these conditions are fulfilled the wavelength of the stationary waves will be very nearly equal to that of the oscillations impressed on the wires. The positions of the nodes and antinodes of current in the wires may be determined from the readings of

a meter placed in a second bridge which may be moved along the wires. The distance between any two consecutive nodes and antinodes of current is half the wavelength of the stationary waves.

### RANGE TEST

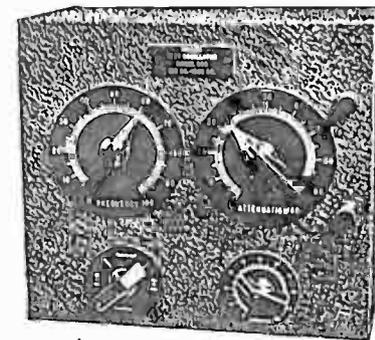
With such a small amount of experience it is rather difficult to draw conclusions as to the method of propagation and behavior of such waves. However, from experiments conducted thus far the following inferences may be drawn:

1. A definite and limited zone exists around the transmitter wherein signals are invariably audible. They apparently get through by brute force.
2. The horizontally polarized wave is apparently the more efficient for communication within this region, but not for long ranges. Owing to the influence of the ground, its plane of polarization becomes changed, rotation taking place, so that within a wave-length of the ground it becomes vertical at extreme ranges.
3. The vertically polarized waves suffer more from attenuation over difficult ground than do the horizontally polarized waves, but there is no trace of change in its plane of polarization under any circumstances or at any range so far obtained. Ground communication is only possible by means of the vertical wave at long ranges.
4. The pure space wave does not undergo any change in plane of polarization, whether emitted horizontally or vertically, or at any range.
5. The influence of conditions local to the receiver seems to have more effect upon the strength of received signals than similar conditions local only to the transmitter. Apparently the radiation is scattered by objects near the transmitter, so that it can be received provided only that the receiver is not shielded also. This is analogous to the case of a powerful light source, the position of which is clearly visible owing to diffused radiation, though the source itself is invisible.

(Continued on page 13)

## N O W — Test Equipment By Miller

### Our Model 350 Test Oscillator



The popularity of the MILLER MODEL NO. 350 TEST OSCILLATOR, having proven so tremendous, we have made arrangements to manufacture the entire unit, as described in our data sheet, rather than following our usual practice of supplying the inductors only.

Our aim in taking this step is to fill a definite need in the line of Radio Test Equipment. It is our firm belief that from no other source can you obtain a Test Oscillator of equal quality having the features embodied in the NEW MILLER OSCILLATOR, even at double this price, and certainly not at the price at which it is offered. Furthermore, these features are real advantages to you, and not merely sales propaganda.

### S P E C I F I C A T I O N S

**COMPLETE A. C. OPERATION:** No dead batteries to affect the calibration, or worse yet, to completely fail at a time when it is most needed. Please note this is NOT the cheaper A. C.-D. C. arrangement; but is equipped with a power transformer, a full size rectifier tube, as well as an adequate filter and bleeder system to insure excellent voltage regulation, and also completely isolates the unit from the power line.

**FREQUENCY RANGE:** Completely variable over entire range of 125 kilocycles to 1500 kilocycles. It is NOT necessary to depend upon harmonics for any frequency within this range. This one feature alone saves the service man considerable time when servicing receivers of which the intermediate frequency is not known, it simply being necessary to rotate frequency control dial until signal is heard in speaker of receiver under test.

**INDIVIDUAL CALIBRATION:** Each complete oscillator supplied by us is individually calibrated. The calibration curves are drawn by hand and bear the serial number of the unit for which they are made. Each unit

is calibrated on at least 32 points from a master oscillator, which is held constant within .015 of one per cent. These points are checked three times before approval. No guess work is tolerated. **IT MUST BE ACCURATE.** **FLEXIBILITY:** The MILLER TEST OSCILLATOR is readily adaptable to almost any purpose for which an oscillator may be used. In addition to the continually variable frequency range, it is equipped with a smoothly operating attenuation control, and a **VARIABLE MODULATION CONTROL**, allowing the modulation to be varied from zero to 100%. In what other oscillator can these features be found?

**APPEARANCE:** While the prime requisite of test equipment is efficiency, it should be remembered that your customer's opinion is formed by its appearance. The MILLER OSCILLATOR is housed in an attractively finished steel case. All controls are of engraved bakelite, adding greatly to the appearance, as well as facilitating easy scale reading. Please note the frequency range dial covers 300 degrees, rather than the usual 180 degrees.

List Price \$32.50---Dealers and Service Men, \$19.50

SEE YOUR LOCAL JOBBER

J. W. Miller Co., 5917 S. Main St., Los Angeles



## A Complete Service Unit for Bench and Portable Use

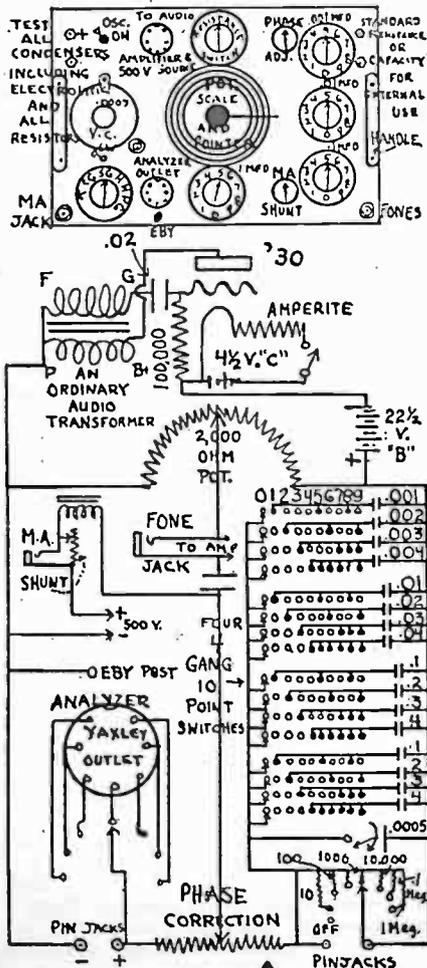
BY CONTESTANT NO. 7

The Bridge, decade condenser, decade resistance and point to point resistance testing unit is not entirely original with me. I have combined information from various sources, notably QST and Radio Craft, and added some of my own ideas gleaned from experience. The idea of a combined instrument and the panel arrangement is original.

The entire instrument is built in a crystalline black finished metal box with handles and fits in a suit case for portable use. As it uses a 230 tube and self-contained batteries, all you have to do in the field is to plug in phones and listen for the null point in testing resistors and condensers.

The only thing it won't do in the field that it will do in the shop is test electrolytic condensers. When it is on the bench, a Yaxley convenience outlet connects to a power pack supplying about 500 volts D. C. for electrolytic condenser testing and also connects the fone jack into a powerful audio amplifier so I may read the audio oscillator on a speaker thus making it unnecessary to anchor myself to a pair of phones.

The single Eby post goes to a flexible wire that clips on a metal chassis and the yaxley outlet from the switch goes to an analyzer plug. Thus you get point to point bridge measurement of resistance from socket terminals to ground. The decade condenser was lifted bodily from Radio Craft with the addition of a .0005 calibrated General Radio variable condenser. An almost infinite number of condenser capacities is provided.



## "THE FIVE METER BAND"

(Continued from page 12)

One must remember that the waves instead of being much longer are now much shorter than the dimensions of such objects as trees and houses, and that therefore these objects present moderately effective reflecting surfaces having dimensions of at least several wavelengths. Experiments on propagation must, therefore, be carried out with great caution and every effort made to exclude the effect of neighboring objects.

Perhaps not the least interesting fact about ultra-short waves is that not a single atmospheric or any noise that could be attributed to atmospheric has so far been heard. However, the motor car engine makes up for this loss.

In conclusion it is sufficient to say that in a great many respects, in regard to propagation, their behavior is very similar to light waves. Consequently, they can only be employed with maximum efficiency under conditions similar to those required for light-wave communication, over which, however, they have the marked advantages that they are unaffected by weather conditions and that the speed of communication can be as great as attained on the longer wavelengths including the possibility of duplex operation.

Their use for beacon purposes seems to deserve close attention, their immunity from atmospheric interference giving them a peculiar advantage in this connection.

### CALIFORNIA BROADCASTER ENDORSES CRTA

Both Mr. Ed Wheeler, editor, and Mr. R. S. Furst, publisher of The California Broadcaster have very definitely endorsed the Certified Radio Technicians Association and have established a classified section open to certified radio technicians only. This very popular and distinctive radio newspaper, with a circulation of over sixteen thousand in Southern California, will be able to do a great service to this association and its members.

We take this opportunity to extend our sincere thanks to these men and the staff of The Broadcaster and we urge every CRTA member to do his bit in returning, at least in part, this very splendid support by taking advantage of any opportunity which may occur to publicize this unusual and enterprising paper.

# We're Tickled Pink! WHY?

Because regardless of adverse conditions, cut-throat competition and a market flooded with cheap transformers every month sees our gross business increasing.

New customers are added to our list daily.

## Proving

There is no substitute for a  
**Good Rewind**

- Transformer Rewinding
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# California Radio Laboratories

2523 South Hill Street  
PRospect 3515

## To Earn More — Learn More

We now have in stock for free distribution to dealers and service men, the following manufacturers catalogues and data sheets:

- THORDARSON — OHMITE — YAXLEY — MALLORY
- CORNELL-DUBILIER — CLAROSTAT — SPRAGUE

Come in and get your copies

## Daniel Specialty Co.

5234 Melrose Avenue Los Angeles

## SHORT WAVE AERIALS

BY CONTESTANT NO. 8

A good short wave aerial is usually a good broadcast aerial as well but the reverse is seldom the case. In no case should a shielded lead-in be used for short waves.

It is agreed by most Radio Engineers, amateurs and experimenters that the best possible aerial for short wave reception is one that has been designed for the specific wave that it is desired to receive.

This usually takes the form of a single wire flat-top aerial with a transposed lead-in. The length of the aerial is one half of the wave length to be received and at least one quarter wave length in height. It should be as far away from all objects as possible.

As a meter is equivalent to 39.37 inches it would be  $\frac{39.37}{12} = 3.28$  feet. There-

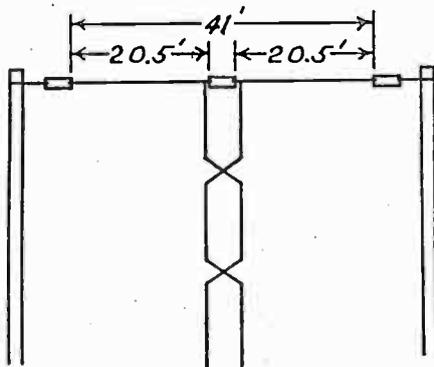
fore, in order to get the length of our aerial, we would multiply the wave length by 3.28 and divide by 2.

The lead-in consists of two wires stretched about two inches apart and transposed as often as possible. It should also be kept as far away as possible from all objects, especially metal. Its length should be some multiple, or half-multiple, of the wave length. (The length refers to the wires before they are transposed).

Most foreign broadcasts are received on either the 25 or 49 meter bands. The 25 is best in the afternoon and evenings and the 49 in the mornings. Most of the U. S. amateurs and broadcasts are on either 20 or 80 meters. Amateurs are also on 42 meters.

Let us now design an aerial for 25 meters. The length will be  $\frac{25 \times 3.28}{2} = 41$

feet. The lead-in can be 20.5, 41, 61.5, 82 feet or any other multiple, or half-multiple, of the wave length. The following sketch shows this aerial:



This sketch shows an insulator inserted in the center and each leg of the lead-in connected to one-half of the aerial. However the lead-in can be connected to either end but in this case only one leg is connected and the other is dead ended.

While this aerial is designed for 25 meters it is also O. K. for 49 meters as the second harmonic is very near 49. It will also give fair results on the other short wave bands and good results on broadcast.

The way this aerial is coupled to the receiver is also very important. If the set has a free primary it can be connected directly to antenna and ground. If it has an antenna adjusting condenser one leg can be connected direct to aerial and the other to ground through a small trimmer type condenser.

It can also be coupled by a small primary placed inside the first R. F. coil or a few turns wound around the outside of it.

Small trimmer type condensers may also be inserted in each leg to adjust sensitivity and vary coupling.

### MAGICIAN ENTERTAINS CERTIFIED TECHNICIANS

Mr. R. R. Reed, of Watson and Wilson, Inc., Grunow distributors, gave a very interesting sleight-of-hand performance at a recent meeting of the Certified Radio Technicians Association held at the National Radio and Electrical School.

Mr. Reed, formerly a magician on the Orpheum Circuit, gave an extremely interesting half-hour performance in which he mystified those present by pulling whole handfuls of playing cards out of the inside coat pocket of an astounded

technician, and similar stunts. After seeing Mr. Reed cause several little red balls to disappear in thin air we feel it wise to advise all technicians and dealers to lock up their tools and anything smaller than a piano when expecting this "artiste" to drop around on a regular tour.

In all seriousness, the entire membership of the Certified Radio Technicians Association certainly wishes to express sincere gratitude to Mr. Reed and Watson and Wilson for the entertainment—we trust that we may have a return engagement.

## WHAT ABOUT RCA RADIOTRON CONSIGNMENT PLAN?

In accordance with the policy of giving its readers authentic information concerning important activity in the radio field as well as technical data, The "Technician" presents herewith the facts as ascertained by considerable effort, concerning a very important matter.

There have been many rumors and conjectures circulating during the last few days concerning the possibility of RCA Radiotron and Cunningham tubes being offered to dealers on consignment. Members of the Certified Radio Technicians Association will recall that some time ago Mr. A. Paul Jr., President of the association, corresponded with the main office of the RCA Radiotron Co., regarding the chaotic state of the tube industry, at least as regards sales. In a reply to Mr. Paul, mention was made of the possibility of the consideration of a consignment policy.

Inasmuch as contradictory statements have been made regarding this matter, The "Technician" has endeavored to collect the important data pertaining thereto, and it is hoped that the publication of these statements will assist the trade in avoiding any complications from existing rumors.

It is definitely pointed out that in no way are these statements to be construed as opinions of this magazine, the Certified Radio Technicians' Association or its officers.

Vol. 2, No. 2

March 13, 1934

To the Trade:

Rumors and statements, indicating a change in sales policy as applied to RCA Radiotrons, have recently been circulated. Statements relative to consignment policy being under consideration by the manufacturer, are premature in view of no official announcements having been made to distributors.

If and when a change of policy becomes effective, the RCA Radiotron Company will naturally notify all members of the trade.

An important change in sales policy must, of course, be carefully planned and submitted to the trade in complete form when announced.

We suggest that you proceed to aggressively merchandise RCA Radiotrons under the existing sales policy of the manufacturer and distributor. Good business dictates that all dealers refrain from being stampeded into commitments involving a new deal based entirely upon conjecture and rumors.

Yours very truly,

LEO J. MEYBERG CO., Inc.  
By Herbert R. Zenker,  
Sales Manager.

HRZ:1

March 14, 1934.

Mr. Norman B. Neely,  
Editor The Technician,  
Los Angeles, California.

My Dear Mr. Neely:

It may be of interest to your readers to be informed that in the near future, RCA-Cunningham tubes will be distributed to dealers and service dealers on consignment plan.

This new plan will eliminate all forms of price-cutting, and you can safely suggest to the members of your organization, that as soon as the new plan is in operation, full protection on the resale prices of RCA-Cunningham tubes is assured.

I personally assume the responsibility for the statement that RCA-Cunningham tubes will be sold to dealers and service dealers on some form of a consignment plan, and if my statement proves incorrect, the laugh and the drinks are on me.

Most cordially yours,

ALEX M. HIRSCH,  
Radio Television Supply Co.,  
1000 South Broadway.

AMH-EM

In response to a telegram sent to G. K. Throckmorton, executive vice-president of the RCA Radiotron Co., Inc., at Harrison, N. J., the following answer was received:

Norman B. Neely,  
Editor Technician.

Sorry cannot make statement regarding consignment plan prior to time our decision in hands of distributors.

R. C. A. RADIOTRON CO., Inc.  
Throckmorton.

# A Thousand Dollar Test Panel For Thirty Cents

BY CONTESTANT NO. 6

I am going to describe a test panel. A great big one. Although it doesn't mean a whole lot it is a mighty handy thing to have around. And the impression that it makes on customers, well, that is where the thousand dollars comes in. I have built one and when nosy customers come back into the shop they say to themselves, "that guy is sure a smart son of a gun."

It consists of a piece of (Masonite) 20x24 inches in size. (That is where the thirty-cents comes in) and a bunch of old meters. Most any kind will do. You have room for about a dozen of them and the more you hang on it the better it looks. I am sure that no matter what you put on it some day you will have use for it.

Of course an 0 to 1 milliammeter is a mighty handy thing to have on it as most anything can be done with it. Mills, volts, ohms, in fact, anything. If you have one by all means include it in the layout. That is one thing that makes

the panel really worth while.

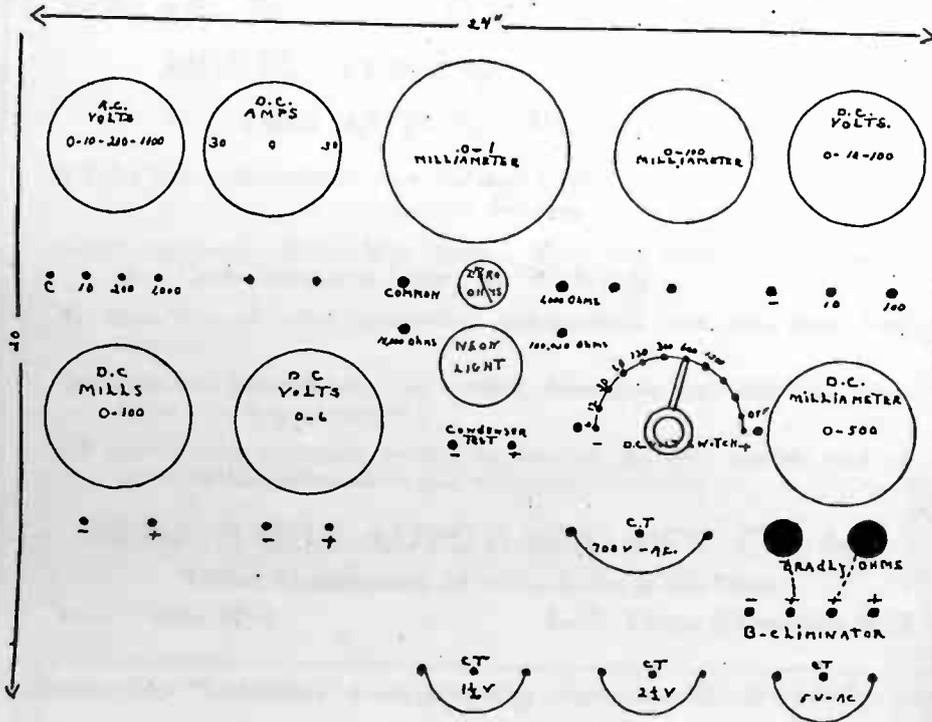
Next, and by far the handiest thing that I have on mine is a power pack hooked up with a neon light for condenser testing.

With the neon light it is also possible to make comparative tests on grid leaks and other high resistances impossible to test with the average ohm meter.

You all have an old power transformer laying around. And we all have some old condensers of some kind. The reason for filtering the power pack is that it makes a mighty handy B eliminator right on the bench where we want it, and after all we still get a battery set to work on once in a while. Be sure to make the voltages variable. Some old bradlyohms will do the trick. Every old Philco eliminator has one in it. They also have a double choke that is not so bad.

And if the transformer has filament windings on it, by all means bring them

(Continued on page 22)



## FREE CIRCUIT DIAGRAMS

Bill Sexton, of "Radio Doc," has very kindly offered to give technicians complete complimentary sets of circuit diagrams of TROY Radio Receivers. There is a large number of these receivers in use in Southern California, and a set of these schematics will undoubtedly prove very useful to all service technicians.

This set of diagrams includes circuits of some of the latest model TROY sets, which are outstanding in their respective classes.

## CHARLIE SEXTON THANKS THE TECHNICIANS

Charlie Sexton, of Radio Products Company, takes this opportunity to thank the Certified Radio Technicians' Association for their patronage and to congratulate them on the fine magazine they have inaugurated, and extends his best wishes for the continued success of The "Technician."

## STOLEN SETS

Mr. H. Cobb, 4213 East 53rd street, Maywood, reports that a radio receiver, a National S.W.-3, his property, was stolen from the quarters of the Bell Radio Club, Tuesday night, January 23rd.

He states that the only identification on the receiver is the fact that the tuning dial is defective at Division 40 in that the black ink is missing at this point.

Any information concerning it will be appreciated by Mr. C. M. Fesy, at LA. 7590, or Mr. Cobb, by mail.

Philco Model 19B, No. J34175, Baby Grand Table model with shadow tuning. Philco Auto Radio, Model 5, No. K14257. Was, or still is, in the possession of Mr. Douglas Swanson. Installed in a Moon sedan, 1925 model, license No. 3N9469.

Forward information to editor of the TECHNICIAN.

## RESEARCH WORKER RE-APPEARS

Technicians and engineers will be glad to know that the AEROVOX RESEARCH WORKER is again being published in bigger and better form than ever. Information regarding this interesting and informative house organ of the Aerovox Corporation may be obtained by writing to the RESEARCH WORKER, in care of the Aerovox Corporation, 70 Washington street, Brooklyn, N. Y.

## WELL-KNOWN FIGURE IN RADIO INDUSTRY MEETS UNTIMELY DEATH

The death of Williard H. Cooke, long identified with the radio industry on the Pacific coast, came as a distinct shock to his host of friends. Mr. Cooke, better known to his many friends as Bill Cooke, was born in Minnesota in 1899, coming with his family to Long Beach when he was very young. A graduate of the University of Southern California, he went into the radio business in 1923 as a manufacturer of coils.

Later he joined a jobbing organization in Los Angeles, with whom he stayed until 1929, when he became the western representative for several eastern parts manufacturers. Principal among these were the Hygrade Sylvania Corporation, the National Co., Inc., Electrad and the Polymet Manufacturing Corporation.

Mr. Cooke came to his untimely end through an auto accident Friday evening, March 2, while on his way home. He leaves his widow, a son, aged nine, and a one-year-old daughter, as well as his mother and two sisters.

Bill Cooke, well-known and well-liked throughout Southern California, and Los Angeles especially, will be sadly missed by his many friends and business associates.

## A THOUSAND DOLLAR TEST PANEL FOR THIRTY CENTS

(Continued from page 20)

out to the binding posts on the panel. Binding posts are plentiful and who knows but what handy filament voltage might come in handy some day?

I don't think that all together I spent a dollar on mine. And with it I can measure any practical voltage, A. C. or D. C., it is a good ohmmeter, it tests condensers at there working voltage, and it has D. C. voltage up to 600 volts. It will also put the baby to sleep, wash your dirty socks and many other things too numerous to mention.

I will include the panel layout of mine. A wiring diagram is not included as you all know how to hook up a power pack.

The condenser tester was described in this magazine (second issue) and one good thing about this panel is that it will never become obsolete.

## OFFICIAL SUPREME SERVICE STATION

The Electric Products Service Co., operated by Mr. F. H. Cole, Jr., and located at 1358 S. Grand Avenue, has recently been appointed an authorized service station for the Supreme Instruments Corporation.

## LAST OF PRIZE CONTEST ARTICLES

The last prize contest entries are published in this issue. The first meeting in April will be the time of selecting the winner of the contest. Be sure to review the other articles which appeared in the December and January issues of The "TECHNICIAN" and be prepared to vote for your choice.

The vote will be taken by ballot and all men in attendance at this meeting will be allowed to vote. The winner will receive \$10.00 in cash given by Mr. Hirsch of the Radio-Television Supply Company, located at 1000 South Broadway.

## TECHNICAL QUESTIONS AND ANSWERS

Conducted by C. E. MILLER

Chairman Technical Board CRTA

- Q-1 How can nichrome wire be soldered?
- A-1 Use plenty of heat and a saturated solution of zinc chloride. Wash the joint with alcohol.
- Q-2 Why can't a 75 tube be transformer coupled?
- A-2 The 75 tube is a high mu tube with a high plate resistance, and hence, the most practical load is a resistance in a resistance coupled amplifier.
- Q-3 Can any other tube be substituted for a 350 M. A. Rathenon B. A. tube?
- A-3 If a filament transformer is added and the socket connections are changed, an 83 is very satisfactory. Move the input filter condenser to the other side of the input choke, and the voltages will be practically the same as originally.

## USE CLASSIFIED ADS

Persons desiring to buy, trade or sell merchandise or services will find the Classified advertising section of The "TECHNICIAN" extremely helpful. A small advertisement will reach a large number of interested persons. Insertions will be made at a very nominal charge to non-members and at no charge to CRTA members.

## THANKS

We are indebted to Mr. Thomas B. Pritchard, Southern California distributor of Arcturus Tubes, for the splendid article, "The Five Meter Band," a four-part technical treatise on this absorbing subject, the conclusion of which appears in this issue. The article was especially prepared and written for the "TECHNICIAN" by Mr. J. J. Glauber, chief engineer of the Arcturus Radio Tube Co., at the request of Mr. Pritchard.

Mr. Pritchard has been and is one of our most earnest supporters in word, act and spirit. We wish to express our sincere appreciation of his kind cooperation and support.

## YOU ARE INVITED TO INSPECT AND TEST— MODELS 11 and 12 1934 AUTOMOBILE RADIOS

6 Tube Superheterodynes, one unit and duplex models.  
Special features

Newly engineered Grounding System, Noise and Interference Suppression, Quiet Operation, Improved "B" Supply.

1/4 microvolt-per-meter sensitivity, guaranteeing not less than forty stations.

Exclusive and beautiful remote control, Aeroplane type dial and many other new improvements.

All service men especially invited to preview the new models and receive service information and schematic drawings.

**MISSION BELL AUTO RADIO MFG. CO., Inc.**

"Oldest Manufacturer of Auto Radio in the West."

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Mention The "Technician" when answering advertisements—It identifies you.

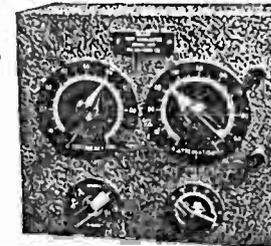
Spauldite

(Laminated Bakelite)

Rod—Tube

Sheet

Special Shapes



Spaulding

Fibre

Rod—Sheet

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San Francisco

### FEWER TYPES BUT BETTER QUALITY RADIO TUBES PREDICTED

The trend in radio tube design is so closely tied in with receiver design that most of the questions which come to tube manufacturers regarding tube development plans and prospects can be answered by a review of circuit requirements, according to Roger Wise, Chief Tube Engineer of the Hygrade Sylvania Corporation. During the past three years the depressed economic conditions have been the controlling factors in the radio industry, and tube design was influenced accordingly.

"The effort of set manufacturers to trim radio receivers to fit the purchaser's purse resulted in extreme efforts to reduce the number of tubes, both by the use of more efficient tubes and combination tubes—such as twin class "B" output tubes and the double diode-triode types," states Mr. Wise. "Many new types were introduced, some of them unnecessary, and many of them difficult to manufacture.

"With the unexpectedly large demand for tubes, which has been straining Hygrade Sylvania factories to the limit to

meet, it is fortunate that conditions have been reversed as a result of improved purchasing power, with the public showing a real interest in sets that will give better performance, even though such sets are higher in price. As buying conditions improve, it is logical, then, to add to the number of tubes used in the receivers, or to replace a double tube with two separate tubes, when by so doing a decided improvement in performance can be obtained. In addition, the full possibilities of many of the newer tubes have not been realized by circuit designers, because of the previously limited demand for the highest quality receivers. With the improved demand for quality products, however, the designer will have a freer hand in utilizing tubes to the best possible advantage, thereby compensating the purchaser for higher cost through better performance and quality.

"We look forward to a period during which the number of new tubes introduced will be few in number but high in quality, conforming in this respect to the trend in circuit design. The number of combined, or double tubes developed, should be greatly reduced—in fact, limited to applications where space limitations or filament consumption is of paramount importance. As the possibilities of the present tubes are exhausted, and new circuit developments arise, an increase in the number of new tubes required may result, and in this event, the progressive policies being followed by this company will insure our keeping pace with the requirements of the radio trade."

### SERVICE HINTS BOOKLET PROVES HIGHLY POPULAR

The demand for the 64-page "Service Hints" booklet, compiled and published by the Sylvania organization and distributed free to service men and radio workers, has exceeded all expectations. The first printing of ten thousand copies was exhausted some time ago and the second printing is now being distributed. A copy of this valuable radio literature containing a vast compilation of selected servicing short-cuts and ingenious trouble-shooting stunts from the experiences of thousands of service men, will be sent free to anyone addressing the Hygrade Sylvania Corporation at Emporium, Pa.

### MINIATURE PRODUCTION PLANTS VIRTUAL PREP SCHOOLS FOR NEW TYPE TUBES

New type tubes have their prep schools. That is to say, new types must pass through two miniature production plants before they are introduced on the factory floor of the Sylvania plants.

The first miniature tube plant, complete in every detail for the production of tubes in limited quantities, is known as the experimental tube plant. Here the ideas, designs and specifications of tube development engineers are translated into sample tubes which are tested by tube and set engineers. Once a given design or type is accepted, it is redesigned for production not only on drafting boards and slide rules, but in actual practice.

Actual production on new types is undertaken in a completely equipped miniature plant known as the production development section. Even a high-speed Sealax or combination sealing and exhaust unit is included so as to approximate final production facilities. Engineers study the operations of stem mounting, perhaps changing the design here and there for an easier and better assembly job. The sealing and exhaust operations are carefully analyzed. Basing, soldering and aging operations undergo careful scrutiny. The tests to which the new type will be subjected are worked out in actual practice in this miniature plant.

In sum, the entire production routine on the new type, from start to finish, is developed in this section, and when a smooth production flow is established, with a thoroughly trained personnel, the new type is introduced on the factory floor, not merely as a new type, but as a smooth-running production unit. In this way, costly mistakes are eliminated, when volume production is undertaken. A vast amount of time and effort is saved in the factory itself, as the result of these virtual prep schools for new type tubes.

### WINDOW CARDS

This month the cards furnished advertisers to display to their customers will be black. Before making a purchase be sure to locate this card. If it is not in evidence ask for it and insist upon seeing it. Again, we urge you to support those who evidence and maintain a desire and honest effort to support us.

## GENUINE ATWATER KENT PARTS

(For All Models)

### REDUCED

From 10 to 35% a short time ago, bringing your cost for them down to the level of substitutes.

Immediate, courteous attention to all requests

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Authorized  
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and Repairing  
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Service  
1358 S. Grand PR. 3681

**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 diagrams 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.

**Miller  
Oscillator Kit**

Complete, Less Tubes  
Net \$12.25

Completely Assembled and  
Calibrated  
Net \$19.50

COILS—CHASSIS—DIALS  
and all other parts in stock at

**Radio  
Specialties Co.**  
1816 West Eighth St.  
Phone FEderal 6633

**SERVICE KINKS AND PET  
EQUIPMENT**

I have just made an addition to my ohmmeter that might interest some of the members. It is a valuable addition and it doesn't cost a cent. The idea is this: Anybody that has an ohmmeter that reads full scale at four and a half volts can just shunt the unknown resistance right across the meter and get accurate readings down to as low as one ohm. Instead of reading backwards the way an ordinary ohmmeter does, it will read from left to right. For instance, if the meter goes back to half scale the unknown resistance is exactly 27 ohms. Before shunting the unknown resistance across the meter it is necessary to set the meter at full scale, then when you measure the resistance the hand on the meter drops back to the percentage of scale deflection given in the following table. The table of resistance values that I have worked out is shown below:

10%	scale deflection	3	ohms
20%	"	6	ohms
30%	"	11	ohms
40%	"	18	ohms
50%	"	27	ohms
60%	"	40	ohms
70%	"	63	ohms
80%	"	108	ohms
90%	"	243	ohms

H. I. O'BRIEN.

**Handling Used Tubes**

Secure a board (5 ply or 3/4 inch) and lay out in equal squares, 2 1/4 inch each. In the center of these squares drill No. 27 holes for each prong of a "Y" tube. Drill No. 19 holes for "X" filament prongs. Push tubes into the holes on the board, use grease pencil on top of each tube denoting type. Shellac the whole board and offer the customer his choice—if he can't afford a new one.

JOHN L. VINCENT.

**CO-OPERATION OFFERED BY  
"CHARLIE SEXTON"**

Through the last ad placed in the "Technician," Charlie Sexton has met numerous new customers and thanks them—old and new—for their patronage. Charlie and his staff are trying to cooperate with the wholesale trade and would appreciate any suggestions as to the furthering of sales. Just call in to the Radio Products Sales Co., 1314 Sout Hill Street, and they'll be glad to hear from you.

**SOMETHING NEW  
IN TEST PRODS**

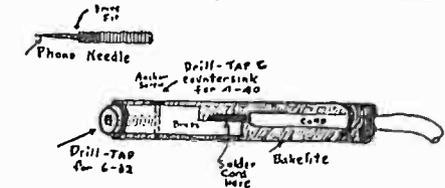
By JOHN L. VINCENT  
Radio Service Laboratory  
Glendale

For those discriminating workers of the "point-to-point" method a good pair of test prods that stand the "gaff" can be built for a small sum.

Procure a length of Spauldite or other Bakelite tubing 1/4 inch inside diameter by 3/8 inch outside diameter, costing about 2c an inch. Cut the length to suit your needs (I prefer 6 inch prods). Take two pieces of brass rod one and a half inches long (1 1/2). Drill one end, using a No. 34 drill so you can tap out for 6-32 thread, make the hole about 3/4 of an inch deep. Now take the other end of this brass piece and cut a saw cut half across, turn it up in the vise and cut down to the saw slot, removing half the piece and leaving a flat place on which to solder.

Slightly bevel the front edge (the

threaded end). Now slip it in the bakelite tubing, leave it protrude say 1-16 of an inch; measure from the end about 5-8 of an inch and drill a hole through using a number 43 drill so we now can tap it out for a 4-40 thread. Using a flat head screw 4-40 be sure and countersink it well in the bakelite. Solder on the wire, slip the terminal back in the tube, insert the lock screw and melt some resin-beeswax compound over the head.



Take a brass 6-32 screw and drill a hole in it so a phonograph needle will drive in. Screw in the end. Or screw in a "banana spring" plug over which can be slipped an "Alligator" clip. These test prods will stand the everyday usage perfectly.

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### VOTE OF THANKS DUE NATIONAL SCHOOL

The Certified Radio Technicians Association certainly owes the National Radio and Electrical School a large vote of thanks for the extended use of the auditorium where we have been holding our regular meetings for the past several months. Through the courtesy of Mr. Rosenkrantz we have been allowed full use of the auditorium and extra class rooms for the accommodation of the men taking examinations.

### NEW TRANSFORMER LINE

The Metal Products Company, a long-established manufacturing concern located in Los Angeles, announces a complete line of power and audio transformers for general replacement use. The engineer in charge of the transformer division is Mr. Charles Smith, recently of Chicago and New York, who has had many years of diversified experience in transformer design. In addition to standard units Mr. Smith solicits orders for transformers of special design for any purpose. The plant is very well equipped with the latest and best machinery available for the manufacture of electrical transformers.

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### OFFICIAL SUPREME DAYRAD SERVICE STATION

The Electric Products Service Co., operated by Mr. F. H. Cole Jr., and located at 1358 South Grand Avenue, has recently been appointed an authorized service station for Supreme and Dayrad testing equipment.

Mr. Cole comes to the "Technician" very highly recommended for his precision workmanship.

Mr. Cole is well equipped for designing, repairing and recalibrating scientific instruments of all kinds, but is particularly well versed in meeting the radio technician's problems, since he is actively engaged in this business himself.

### THANKS DUE MR. McMURRIN

Gratitude demands that we give credit to one of the friends of the CRTA who has labored for our welfare in the background.

Mr. Everard L. McMurrin, attorney-at-law, has given his aid and support to the Association, and has not only prepared the necessary documents for securing the state copyright of the name of the Association, but has given liberally of his time and experience in other matters.

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### RECENT ADVANCES IN TUBE DESIGN

The comparatively large quantity of new tube types introduced during the past year has by weight of numbers, overshadowed a number of advances in tube design. These advances, which frequently made such new types possible, were in many cases the result of work directed toward improved over-all quality, uniformity and reliability in earlier types.

Improvements in radio tube design and construction are not necessarily limited to the steps represented by the introduction of new tube types. Existing types can be made better by careful study leading to the adoption of improved designs and new manufacturing technique.

The RCA Radiotron Company and E. T. Cunningham, Inc., are constantly experimenting to determine how the quality and uniformity of their product can be improved. The past year has marked the introduction of many improvements in the design and construction of Cunningham Radio Tubes and RCA Radiotrons. Some of these improvements are readily apparent, while others of equal importance are not so obvious.

### DOMB BULB CONSTRUCTION

The introduction of the dome-bulb construction has made possible the greater uniformity of RCA Radiotrons and Cunningham Radio Tubes. This dome-bulb construction has been incorporated in most of the newer types. Older types are being adapted to this form of construction as rapidly as development and manufacturing activities permit.

A mica support at the top of the electrode assembly fits into the dome of the bulb, bracing the tube's structure against mechanical displacement. Furthermore, the greater strength of the electrode assembly secured by the dome support has made it possible to simplify the construction of the tube, thus eliminating many welds and parts, and reducing the chances of error during assembly.

The benefits of the resulting increase in uniformity of tube characteristics are immediately obvious to those engaged in radio service work. The greater strength and rigidity of the dome-bulb construction, preventing mechanical displacement or injury to the electrodes in shipment is assurance that the tubes employed for renewal in service work will meet the exacting requirements of such use.

### IMPROVED CATHODE AND HEATER DESIGNS

The quick starting feature of heater-cathode RCA Radiotrons for both house current sets and for automobile service is attained through the use of a special type of heating element developed in the Research and Development Laboratory of the RCA Radiotron Company.

Taking the form of a double helix, this heater is wound on precision equipment which insures accurate spacing of the turns. It is then coated with refined insulating material and processed with a high temperature heat treatment. The result is a well-insulated heater element which combines the features of long life and rapid heating.

Another feature of equal or even greater importance is the quietness of operation obtained through the use of this advanced design of heater.

The form of winding of the double helix heater results in a marked reduction of hum output as compared with earlier designs of tubes for A. C. house current service. In addition, the insu-

(Continued on Next Page)

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lating process minimizes the possibility of the rasping noises which appear in the output of the receiver when inferior insulation is used.

Appearing in all heater-cathode types, except types No. 43 and No. 48 amplifiers and No. 1V, No. 12Z3 and No. 25Z5 rectifiers, where special design requirements call for a somewhat different heater design, the reverse helix heater is an important factor in the improved performance of today's RCA Radiotrons and Cunningham Radio Tubes.

#### REDUCED GRID EMISSION

Grid emission is the term applied to electron emission from the grid structure, when its temperature rises to a point where it actually becomes an emitter of electrons. The condition most apt to produce it are found in close spaced heater-cathode types where the close proximity of the grid to the cathode results in a considerable amount of heat being absorbed by the grid structure.

It usually makes itself apparent in tubes used as R. F. or I. F. amplifiers in receivers employing A. V. C. systems causing fluctuations in volume or slow fading after the set has been turned on for a few minutes. When the receiver is turned off and the tubes allowed to cool, the condition may not recur for a half hour or more, which makes it difficult to trace.

In output tubes used in resistance coupled circuits, it results in loss of bias, causing the plate current to "run away" and the audio system to block.

Grid omission, which is always a troublesome problem in radio tube design and manufacture, has been greatly reduced by the application of new design features and manufacturing methods.

The use of copper side rods, heat radiators, new grid materials, and grid wire which has been carbonized, has aided in the control of grid emission. Certain older types of tubes, such as the 24-A, have been re-designed to use copper side rods for the grid. Copper is a better conductor of heat than materials formerly

used for side rods. The superior conduction characteristic of copper enables it to carry off and dissipate more heat, resulting in a cooler running grid.

Newer types of tubes, such as the No. 43, No. 48, No. 2A5 and No. 42, which employ cathodes requiring a large amount of heat, are subject to grid-emission troubles due to the proximity of the control grid to the cathode. To overcome this difficulty, heat radiators are mounted on the top of the grid side rods to help dissipate the heat which causes grid emission.

In addition, the use of new materials for the grid wires themselves has produced a cooler grid. As one example, the No. 59 employs wire which has been carbonized for the grids adjacent to the cathode. The carbonized metal reduces secondary emission and radiates heat so as to maintain the grid at a temperature low enough to prevent excessive primary emission.

Viewed from the angle of service and maintenance, this improvement in tubes, directed toward eliminating grid emission, minimizes erratic set performance from this rather obscure source, and clears up one of the more common causes of repeat calls on service work.

#### LISTENWALTER & GOUGH ENDORSES CRTA

Listenwalter & Gough, Philco distributors, have taken the responsibility of endorsing, unqualifiedly, the Certified Radio Technicians Association. It really is proof that we are accomplishing our aims when such well-known and substantial firms as this go so far as to advise users of Philco receivers to be sure to have only a certified radio technician service their sets. This company has repeatedly run such notices in its full column advertising in The California Broadcaster.

We thank L. & G. sincerely for their very generous cooperation, and every effort will be made to deserve the trust they have put in this association.

## Classified Advertisements

JOHN A. ORME, Adv. Mgr.  
1348 West 20th Street  
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#### For Sale—

Victor 10-69—Automatic Record Mechanical, complete with matching input transformer. \$15.00; and Western Electric 25B Amplifier, \$10.00. Mission Radio Service, WHitney 7364.

Glass sign "Certified Technician," 8 1/2 x 24 inches, with 2 inch gold and black or silver and black letters. \$1.50 ea. Estimates gladly given on any window lettering desired. C. D. Curtis, 4223 So. Hoover St., Phone ADams 13106.

Triplett and Weston Meters. Complete stock. Radio "Doc."

Phonograph parts, supplies, and expert repairs by experienced man. N. E. Worobieff, ANGelus 2713. 1826 East First Street.

Principles of Radio Communication, by Morecroft; second revised edition. Seymour Miller, 445 North El Molino Ave., Pasadena. WAKEfield 6961.

#### Wanted—

Cash paid for stamp collections. H. I. O'Brien, 1348 E. Colorado Boulevard, Glendale.

Jewell 199, Weston or other similar obsolete analyzer. Will buy for cash or trade meters, parts or ?. Box F-1, Care of Technician.

Wanted second hand or new short wave phone transmitters, also P. A. systems or any radio apparatus suitable and in working order for radio students. Address Prof. Luis Lopez Romero, 406 Sunset Blvd., Los Angeles.

#### LEST WE FORGET

We have been told repeatedly by readers of this magazine that it fills a very definite need in Southern California. The selling price of this publication does not begin to pay the cost of printing alone.

We must not forget that the concerns whose advertisements appear in these pages make the entire publication possible. If you enjoy this magazine and profit by it be sure to reciprocate by patronizing only those firms whose names you find in our advertising section.



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