For the Service Technician, Public Address Engineer, Experimenter with QUALITY of WORKMANSHIP and MATERIALS at Low Cost.

<table>
<thead>
<tr>
<th>CLASS A INPUT TRANSFORMERS</th>
<th>List Price</th>
<th>Net to Dealer</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS-1 1 plate to 1 grid, 3:1 ratio</td>
<td>$2.35</td>
<td>$1.41</td>
</tr>
<tr>
<td>NS-2 1 plate to 2 grids, split secondary, 2:1 ratio</td>
<td>2.50</td>
<td>1.50</td>
</tr>
<tr>
<td>NS-3 Push pull plates to push pull grids, 1.8:1 ratio</td>
<td>2.75</td>
<td>1.65</td>
</tr>
<tr>
<td>NS-5 Single or double button mike to 1 grid</td>
<td>2.50</td>
<td>1.50</td>
</tr>
<tr>
<td>NS-10 Single plate and carbon mike to one or two grids</td>
<td>3.50</td>
<td>2.10</td>
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</tbody>
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<thead>
<tr>
<th>CLASS A OUTPUTS</th>
<th>List Price</th>
<th>Net to Dealer</th>
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</thead>
<tbody>
<tr>
<td>NS-15 Push pull 2A plates to 8, 4, or 2 ohm voice coil</td>
<td>3.00</td>
<td>1.80</td>
</tr>
<tr>
<td>NS-21 Push pull 2A plates to 500, 8, 4 or 2 ohms</td>
<td>3.50</td>
<td>2.10</td>
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</table>

<table>
<thead>
<tr>
<th>CLASS B INPUT TRANSFORMERS</th>
<th>List Price</th>
<th>Net to Dealer</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS-29 Driver plate to 49, 53, 79 or 89 grids</td>
<td>2.75</td>
<td>1.65</td>
</tr>
<tr>
<td>NS-30 Driver 46 or 59 plate to 46 or 59 grids</td>
<td>2.75</td>
<td>1.65</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>CLASS B OUTPUT TRANSFORMERS</th>
<th>List Price</th>
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</thead>
<tbody>
<tr>
<td>NS-33 Push push 49, 53, 79 or 89 plates to 5000 or 3500 ohms</td>
<td>3.50</td>
<td>2.10</td>
</tr>
<tr>
<td>NS-34 Push push 46 or 59 plates to 5000 or 35000 ohms</td>
<td>3.50</td>
<td>2.10</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>FILTER AND AUDIO CHOKE, FILAMENT TRANSFORMERS</th>
<th>List Price</th>
<th>Net to Dealer</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS-50 Plate Transformer for small power tubes, Class A and B</td>
<td>4.20</td>
<td></td>
</tr>
<tr>
<td>NS-51 Plate transformer for push pull power tubes Class A and B</td>
<td>5.40</td>
<td></td>
</tr>
</tbody>
</table>
So Small yet So Powerful

A 10-watter . . . yet no larger than usual 1-watt carbon job! Aerovox Pyrohm Junior Resistors are genuine wire-wound, vitreous-enameled units designed to meet the demand for small size, low price, high resistance and high wattage rating. Note these striking features:

- Quality resistance wire wound on porcelain tube. Low temperature coefficient for stabilized resistance values.
- Entire unit coated with vitreous enamel for moisture and mechanical protection.
- Wire ends brazed to lugs . . . pigtail leads soldered to terminal bands.

Aerovox also offers larger wire-wound vitreous-enameled resistors, fixed and adjustable. Also carbon resistors, wire-wound strip resistors, lavite resistors and gridleak resistors. Fit companions for Aerovox condensers!

FREE DATA: 1935 Catalog just off the press, covering complete condenser and resistor line. Also sample copy of our monthly Research Worker . . . a practical engineering service for practical radio men.

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We Guarantee that the five volumes of Rider's Manuals contain more pages, more models, cover more manufacturers—and in general contain more service data than ALL OTHER MANUALS...

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Rider's Volume V Contains 1202 pages, (separate index) covers 112 manufacturers and more than 940 models ... and is the latest addition to the Rider Manual series.

Rider's Volume V is the most complete tabulation of service data covering the 1934-1935 line of radio receivers ... Up to date to October, 1934 ... This volume, like the other Rider Manuals—is indispensable to the service technician.

Rider's V, like other Rider Manuals, will cut your operating costs by a tremendous margin ... Modern receivers have 14, 16, 18, 20 and even 24 trimmers ... You MUST have complete data to properly service these sets ... Without the necessary information—great loss of time and failure is inevitable.

PRICE $7.50, Postpaid
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John F. Rider, Publisher
1440 BROADWAY, NEW YORK, N. Y.
A MERRY CHRISTMAS
A HAPPY NEW YEAR
WITH SINCERE APPRECIATION FOR MANY PAST FAVORS
Let’s Talk... MAN to MAN!

There must be a reason why I worked for years to perfect and organize the first courses in this country in Practical Radio Engineering... Today, my courses of instruction are more essential than ever to the ambitious radio technician who wishes to keep up with the rapid pace that Radio is moving.

CRE1 courses are planned for experienced radio men like yourselves who feel the need of more intensive training and education. To all of you interested in our courses we shall be glad to forward one of our new catalogs, by writing either me or Mr. Guilford.

(Signed) E. H. Rietzke, Pres.
HIGH-LIGHTS OF AUTOMATIC VOLUME CONTROL

By H. K. BRADFORD

Of the many methods of manual volume control developed with the progress of radio design, the variable grid bias scheme lends itself most suitable for automatic adaption. Undoubtedly the widespread use of manual bias control suggested automatic applications.

The reason why this type of volume control circuit can so easily be adapted for automatic operation is that very little electrical power is required for its actuation.

Ordinarily the grid bias type of volume control consists of a variable resistor connected from one, two or more cathodes to ground or chassis, where the grid return connections are made. The A.V.C. circuit is in shunt with this resistor or across the apparatus separating the cathodes from the absolute negative of the power supply.

As far as the detector when cut-off has been reached. This amount of amplification which can be obtained from any tube is proportional to its mutual conductance (\(G_m\)). By varying the bias from rated minimum to values vary from infinity to zero. This should be clear as when \(R_2\) is infinite, no current flows through \(R_1\) and it is at ground potential at every point. On the other hand, when \(R_2\) is zero a direct short is established between the tap and B minus.

Replacing this potentiometer with one fixed resistor and one variable one with the grid return connection at their junction as in Fig. 2 we may procure the same general result. As before the voltages across each unit are proportional to their respective values, although the total circuit current varies with the adjustment of \(R_2\).

To obtain zero to 50 volts between ground and the tap in this case \(R_2\) must vary from infinity to zero. This should be clear as when \(R_2\) is infinite, no current flows through \(R_1\) and it is at ground potential at every point. On the other hand, when \(R_2\) is zero a direct short is established between the tap and B minus.

Although the plate circuit of a vacuum tube cannot assume the two extremes outlined above, it is an excellent substitute for \(R_2\). Now let us follow its operation from Fig. 4. Consider a signal of average intensity being fed into the R.F. amplifier. Originally the A.V.C. grid is biased to bring about complete plate current cut-off of the tube or tubes in question.

Let us take a look at some actual circuits. In Fig. 1, manual control is effected by the use of a potentiometer connected between ground and B minus, between which there exists a potential difference of 50 volts.

The assumption, of course, is that 50 volts will be sufficient bias to bring about complete plate current cut-off of the tube or tubes in question. In this arrangement the resistance \(R_1\) is constant in value and the 50 volt potential will be divided in proportion to the resistance ratio of the slider to the ground connection between ground and B minus, between which the grid returns are floated because the cathodes are not at this absolute negative potential at every point. On the other hand, when \(R_2\) is zero a direct short is established between the tap and B minus.

Replacing this potentiometer with one fixed resistor and one variable one with the grid return connection at their junction as in Fig. 2 we may procure the same general result. As before the voltages across each unit are proportional to their respective values, although the total circuit current varies with the adjustment of \(R_2\).

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Although the plate circuit of a vacuum tube cannot assume the two extremes outlined above, it is an excellent substitute for \(R_2\). Now let us follow its operation from Fig. 4. Consider a signal of average intensity being fed into the R.F. amplifier. Originally the A.V.C. grid is biased as indicated to cut-off. As the signal intensity increases, no plate current can flow in the A.V.C. circuit. Any carrier coming to the plate circuit of a vacuum tube is a potential being determined by the factor in the A.V.C. circuit.

The amount of amplification which can be obtained from any tube is proportional to its mutual conductance (\(G_m\)). By varying the bias from rated minimum to values vary from infinity to zero. No signals remain in the circuit.

NEW P. A. KIT

So much interest has been shown in the Radio Supply Company's new model RS-65 portable sound amplifier kit that we are printing a description of it here. The amplifier is not just a diagram, but a tried and tested kit with the original model on display at 912 South Broadway, Los Angeles.

The fact that this amplifier kit is available in kit form only is an obvious protection and advantage to you as a dealer for "John Public" is not interested in parts, but in the completed instrument, which only you can give.

A word as to its application. The removal of all microphone hiss, by the use of the crystal microphone, coupled with the tremendous gain built into this little thirty-pound, 6% Watt, portable amplifier kit, makes it useful for many orchestra applications. It is also suitable for dictaphone use (a select group around the speaker can hear clearly and distinctly soft voices twenty-five feet or so from the microphone), or for the pick-up of music or voice in out-of-the-way rooms such as are often found in churches, schools, halls, restaurants, beer gardens, etc.

All interested parties are invited to write or call at Radio Supply Company for the four page descriptive folder and picture of the completed instrument.

LOW PRICED SHOP EQUIPMENT

The American Tool and Machine Co. has recently announced a new line of low priced quality shop equipment especially designed for radio technicians, wood-workers and others who desire light, efficient equipment at reasonable prices. The line includes metal and wood working lathes, saber saw, sander, buffer, circular saw, and drill press.
THE PENTAGRID CONVERTER TUBES
By J. J. GLAUBER, Chief Engineer Arcturus Radio Tube Co.

(Continued from last month)

PART TWO

A tube was therefore designed as being the best compromise between simplicity, low cost and low cathode current and still perform satisfactorily. The result is a heptode, that is a tube possessing seven elements namely a cathode, five grids and an anode. As far as I am aware the heptode was developed by the RCA Radiotron Company. A similar tube known as a hexode because it contained one less shield grid was developed at the same time by the Hazeltine Corporation.

Proceeding outward from the cathode the structural arrangement is as follows:

1. Indirectly heated cathode
2. Grid No. 1, oscillator grid
3. Grid No. 2, anode grid
4. Grid No. 3, screen grid connected to grid No. 5
5. Grid No. 4, control or modulator grid for R.F. signal
6. Grid No. 5, screen grid connected to grid No. 3
7. Anode

The cathode and grids Nos. 1 and 2 form the oscillator section of the tube. They also constitute a virtual cathode for the modulator unit.

Screening the small bias voltage developed between the small grid No. 4, is electrostatically shielded from the other tube elements by the screen-grids located on both sides of it. The modulator section is the virtual cathode, the modulator control-grid, the screen and the anode. Thus the oscillator portion functions as a triode while the modulator portion functions as a variable-mu tetrode.

In operation, electrons emitted from the cathode 0 are accelerated through the oscillator grid 1 and the anode grid 7 and inner screen grid 3. The anode-grid in reality consists of a pair of side-rods, and lateral wires being wound on them. Most of the electrons approaching the anode-grid possess high velocities so that they shoot past the anode-grid and for the most part through the inner screen-grid 3 and approach the modulator grid 4. This grid has a negative potential, which therefore retards the oncoming electron stream.

The cloud of retarded electrons between grids 3 and 4 therefore constitutes the virtual cathode for the modulator portion of the tube. Electrons may be drawn away from this source in a manner analogous to that by which they were originally accelerated away from the cathode element 0. Elements 4, 5 and 6 together constitute the virtual cathode for the modulator portion of the tube. The radio frequency signal is applied to grid 4 and the intermediate frequency output circuit is connected to the plate 6.

If the oscillator grid 1 is only slightly negative, or even somewhat positive, then the virtual cathode has a slow electron stream for the modulator unit. Whenever the oscillator grid swings to more negative values, the number of electrons arriving at the modulator grid is temporarily reduced or possibly even cut-off. Thus, the oscillator can modulate the signal in the modulator portion and not by the intermediate frequency beat-note in the oscillator circuit.

The current necessary to produce sustained oscillations is controlled by the oscillator grid and not by the modulator grid, the latter being incapable of producing cut-off in the oscillator portion. Thus, the gain of the modulator can be controlled to a nicety over a considerable range by a variable negative bias on the grid 4 without substantially affecting the oscillator unit. The modulator grid shows a gradual and extended cut-off action, somewhat similar to the action of a variable-mu radio-frequency pentode, but the oscillator grid gain is considerably higher. The screen grids increase the output impedance of the tube, thereby improving the gain, and the inner one 3 serves to reduce the local frequency radiation.

This tube does not call for special follow-on design. Control or the oscillator may be the ordinary conventional design as employed in present-day advanced superheterodynes. Voltages less than 250 volts on the anode grid will prove adequate for the best conversion gain. For the 250 volt rating on this element a series resistance of approximately 20,000 ohms should be inserted in order to prevent excessive heating. If the resistor is omitted then rods will get red hot whenever the oscillations are started. The small bias voltage developed across the grid-leak and to the high anode-grid potential. The value of the oscillator grid resistor is determined primarily by the voltage applied to the anode-grid and screen.

With some circuit set-ups an audio-frequency oscillation was experienced. This seemed to be due to excessive feed-back for the value of grid-leak and condenser employed. In these cases it was necessary to correct this by adding a small condenser in series with the grid-leak condenser.

(Continued on Page 26)
RADIO INTERFERENCE BUREAU

MR. W. F. GRIMES, Chief Engineer Radio Interference Engineering Bureau

(This column is a regular feature and each month will consist of a report of interesting cases and activities of the RADIO INTERFERENCE ENGINEERING BUREAU. To report interference Phone Trinity 1244.).

RECEIVER INSTALLATIONS

While it is not within the province of the Bureau to engage in commercial discussions, our records strongly indicate that Radio Dealers and Servicemen, in general, are overlooking splendid opportunities to not only provide the public with good reception but also to develop satisfied customers with consequent goodwill, increased business and profits.

During the month of November, out of a total of three hundred and twenty-nine cases of poor reception investigated, eighty-three were due directly to incorrect installations. Many of these affected late models and recently-purchased receivers which had apparently been sold at just one more piece of furniture.

All engaged in the industry should constantly keep in mind that the public is not familiar with the technical features of the radio receiver and must depend upon the recommendations of the Dealer or Serviceman. If such recommendations are based on a correct understanding of the intentions of the design engineer as to how the receiver is to be installed, the purchaser will gladly pay a small additional charge to obtain complete satisfaction from the receiver.

The Bureau is often asked, "Why didn't they tell me that when I bought the receiver?" "They told me the receiver was..."

Dr. August Hund, noted scientist, delivered an extremely interesting paper on the subject of grid glow tubes. This paper, which weighs only one pound and fits into a space of wire under the carpet.

An honest effort on the part of Dealers and Servicemen to obtain satisfied customers will prevent violent criticism, the necessity for repossession, the wasting of thousands of dollars in advertising true claims of receiver performance which cannot be met without a proper installation--and will prevent much wasted time and effort on the part of the Bureau.

Many, many cases of reported "man made static" will be entirely cleared by so much as a moderately good installation. A good antenna and ground are essential and not necessarily complicated or requiring more than ordinary good common sense in design.

A simple test of installation is to turn the receiver lights on and off, if "click" or change in signal volume is noted in the receiver, the installation is inadequate for good reception. Before making the test, remember that the ground connected to the antenna binding post of the receiver does not, never has and never will constitute a proper installation.

The Bureau will be pleased to cooperate with you in your installation problems. We should all endeavor to cooperate in this all important effort to give the public the best possible reception.

HAND-EE GRINDER

An amazing device has just been announced by the Chicago Wheel and Mfg. Co., manufacturers of high grade abrasive tools and allied equipment for many years. This little grinder is a small motor which weighs only one pound and fits into the hand. Many different types, sizes, and kinds of grinding and polishing wheels, buffers, brushes and drills are available which attach to the armature by means of a small chuck. The motor contains a speed of thirteen thousand RPM making it very useful for countless purposes. It is indispensable to mechanics, technicians, and others who spend considerable time drilling, filing, sanding, cutting and routing—particularly in restrictive space. The price is surprisingly low.

PHILCO ALL-WAVE ANTENNA

Philco now comes into the field with an all-wave antenna system, possessing many outstanding features. According to Philco engineers, this new improved type all-wave antenna was designed to meet the demands of purchasers of the Philco All-Wave Receivers, in order to assure them the utmost in all-wave reception. The antenna comes in kit form and includes coupling units making it adaptable to all receivers as well as Philcos.

YULETIDE GREETINGS TO OUR ADVERTISERS

We wish to take this opportunity to express our best wishes for a Merry Christmas and a Very Happy and Prosperous New Year to all the advertisers of the "Technician." We sincerely appreciate your support in word and act in the past and we shall make every effort to deserve your continued patronage in the years to come and the attendant progress in the radio industry.

NEW FIRM

The newest transcription producing firm is the Earnshaw Radio Productions established early in December by Harry Earnshaw. G. O. Sebreed heads the sales staff, R. E. Messer as auditor, with headquarters in Petroleum Securities Building.
BOOK REVIEW  
(Continued from Page 15)  
to present high fidelity design. The re- 
maining two booklets will be reviewed in 
subsequent issues of the "Technician."  
The treatment of the title subject is ably 
handled in a very thorough and under- 
standable manner. The practical develop- 
ment as well as the technical develop- 
ment of broadcast receivers is thoroughly 
covered and this series of booklets is rec- 
commended to all radio technicians as a 
part of their radio library.

SERVICING SUPERHETERODYNES —  
John F. Rider, Publisher, 1440 Broadway, 
New York City— $1.00. We all know 
Rider's Manuals and their great useful- 
ness to the radio technician. "Servicing 
Superheterodynes" (revised edition) is 
written by John F. Rider and is recom- 
manded to the radio technician. Written 
in a very understandable manner, it com- 
pletely covers design, operation and ser- 
vicing of the superheterodyn broadcast 
receiver. It covers all subjects pertain- 
ing to this type of receiver and should 
be in every radio service technician’s li-

SEASON'S GREETINGS  
To the Members of the 
C R T A  
May Your Good Work 
Continue Through the 
New Year  
California Radio 
Laboratories  
"The Transformer Rewind 
Headquarters of the West"  
2523 SO HILL STREET 
Prospect 3515 
Nites THornwall 4777  

ENCE BUREAU  
adio Interference Engineering Bureau  
so powerful I could hear stations on the 
East Coast without an antenna; or, 
"When I bought the receiver, they gave 
me this installation as called for by the 
purchase price as I bought it completely 
installed. I doubted if I was getting my 
money's worth as I wondered how the 
receiver could possibly operate when they 
wrapped that little piece of wire around 
the gas pipe and threw that other little 
piece of wire under the carpet."

An honest effort on the part of Dealers 
and Servicemen to obtain satisfied cus- 
omers will prevent violent criticism, the 
necessity for repossession, the wasting of 
thousands of dollars in advertising true 
claims of receiver performance which can-
not be met without proper installation— 
and will prevent much wasted time and 
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made static" will be entirely cleared by 
so much as a moderately good installation. 
A good antenna and ground are essential 
and not necessarily complicated or re-
quiring more than ordinary good common 

APPLICATION OF ALL-WAVE 
TEST OSCILLATOR  
(Continued from Page 9)  
the procedure for determining the funda-
mental will be as follows:

TO DETERMINE THE FREQUENCY 
TO WHICH THE RECEIVER IS TUNED 
at a given dial setting, the oscillator dial 
is rotated until the signal is heard in the 
speaker. Continue rotating the dial until 
the second point is found. Of these two 
points the fundamental frequency is the 
lowest frequency heard.

TO TUNE THE RECEIVER TO A GIV-
EN OSCILLATOR DIAL SETTING, the 
same procedure is used except the funda-
mental frequency is the highest frequency 
on the receiver dial.

For shop, home or tool kit. (Model A), A. C. or D. C. 
operation, 110v., 13,000 r. 
p.m. Order on 5-day trial. 
Satisfaction guaranteed.

NEW Master Craftsman's 
Set—17 useful accessories 
to grind, drill, polish, 
sand, cut, carve, engrave, 
etc. . . . Prepaid $5.00.

HAND-EE Grinder  
quicker better 
jobs  
Weighs 1 pound. Plug in 
in any light socket and do 1001 
jobs.

Do away with slow 
hand work. Grinds, 
routs, drills, carves, 
sharpens, cuts, en-
graves.

For shop, home or tool kit. (Model A), A. C. or D. C. 
operation, 110v., 13,000 r. 
p.m. Order on 5-day trial. 
Satisfaction guaranteed.

Chicago Wheel & Mfg. Co.  
112 SOUTH ABERDEEN STREET  
CHICAGO, ILL.
CONVERTER TUBES
(Continued from Page 20)
to reduce the coupling between the oscillator grid and anode-grid coil, or to lowvoltage operation. The virtual cathode provides a tetrode or triode, depending on the control grid return. It is best not to exceed the 14 milliampere maximum rating.

The conversion gain is best controlled by a variable negative voltage on the modulator grid 4. This may be obtained either from a separate supply or from a variable resistance in the cathode circuit. If the latter method is used the oscillator grid return must be made direct to the cathode. Otherwise the oscillator performance will be influenced by variations in the modulator grid bias.
The range of control grid bias voltage required to control the gain will be governed by the screen voltage. With 100 volts on the screen grids 3 and 5, and 3 volts on the signal grid, the range of bias voltage will be from -3 to a value near plate current cut-off. The cut-off will be less remote for lower screen voltages. In conjunction with automatic volume control, the pentagrid converter provides all of the advantages previously obtained with a separate oscillator and a variable-mu first detector. Because of this, its use permitted a reduction in the number of tubes required.

ARCTURUS PORTFOLIO
A new loose-leaf portfolio for distributors and their salesmen has just been issued by the Arcturus Radio Tube Company, Newark, N. J.
Prententious in make-up, the portfolio contains some unusual sampling of advertising materials such as consumers' price-lists and radio logs, characteristic charts, book matches, tube stickers, etc., that are available to dealers and service men. Samples of three post-cards for dealers' direct-mail campaigns, and a combination stationery unit containing letterheads, envelopes and business cards are also included.
Another section of the book is devoted to combination deals on tube checkers, oscillators, set analyzers, and Rider's Manuals.
Still another section shows a comprehensive assortment of cuts or mats of various sizes that are available for newspaper, catalog or other uses. Window display units, a decalcomania and streamers are also shown.

INCREASED BUSINESS
The Pacific Radio Exchange informs us that their over-all volume of business has been very definitely increasing from month to month and that the month of December, up to the time that this is pressed has been their most profitable in the existence of the company. This is indeed good news when we hear so much about depression.

THANKS TO NAT'L SCHOOL
In addition to offering our most sincere wishes for a Merry Christmas and a Happy, Prosperous New Year to all the members of the Nat'l School, we wish to offer the school earnest thanks for the extended use of the auditorium which we have been holding our meetings since the formation of the CRTA. Through the courtesy of Mr. Rosenkranz, we have been allowed full use of the auditorium and extra classrooms for the accommodation of the men taking examinations.

GUILFORD MOVES
Mr. Edw. H. Guilford, West Coast Representative of Capitol Radio Engineering Institute, has moved his office from Glendale and is now located at 1636 N. Serra no Street, Los Angeles, Granite 0755, where he will be glad to meet all radio men interested in furthering their knowledge of radio engineering through the CREI course in practical radio engineering.

TRAVELING THE TERRITORY WITH MILTON
And here we are again, people; just like Santa Claus at Xmas time, still travellin'.

* * *
Bill Whisman, deep down from the vast depths of North Vine Street, comes forward to announce a new "put-put" transformer which he recently received from a local radio supply house. Bill says it is the last unit on the market for eliminating motorboating in amplifiers.

* * *
Julius Hartman, of the firm of Hartman, Hartman, & Hartman (a just plain Hartman Radio Service to you), has just finished modernizing his tube checker. And can he pick our detectors and oscillators for short wave—just watch him!

* * *
We respectfully doff our hat in greeting to our good friend William Hansen, who recently announced the opening of his new store in Beverly Hills. It takes only a moment in the new establishment to be impressed with the good taste displayed in its furnishings, and arrangement of the various apparatus, which is, without doubt, a reflection of the inherent good taste of the man himself. Congratulations and the best of good fortune!

* * *
Bill Hitt, in his eulogy and ode to the consummate half-back at the banquet, was carried away in his enthusiasm for the color and charm which they lent to the occasion. Did he also notice their vivacity? M-m-m.

* * *
They tell us that Al Henkin of Hollywood Radio Service recently received the ranks of the bachelor army for wedded bliss. May all your troubles be little ones. All

MERRY CHRISTMAS
FOR SALE—Double Commutator DAY—FAN motor-generator, 110 volt driven to 450 volts, 60 M.A. D.C. and 7.5 volts 1.75 amp. D.C. Like new, $10. Phone PR. 3515.

Several new Universal and Inca mike and inter-stage transformers. Chas. Miller attenuator and several miscellaneous meters. Norman B. Neely, 1656 N. Serrano, GRanite 0735.

MEN WANTED—Certified Radio Technicians interested in affiliating with a cooperative service organization write giving full details as to training experience and equipment. Mr. Barns, Box D-1, % Technician

NEW—1935 ALL-WAVE SET

"Western made for Western Reception"

Day Rad
Radio Service Equipment

 Represented by
FRANK A. EMMETT CO.
1341 South Hope St.
Los Angeles, Calif.
Richmond 6301

Make More Money in Less Time

Get Up to Date

Modern Receiving Sets are now coming up for servicing. CAN YOU LOCATE THE TROUBLE QUICKLY? Time wasted in trouble shooting cuts down profit—disappoints customers—loses business.

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THE THREE NEW BOOKS
by G. S. GRANGER

BROADCAST RECEIVER DESIGN
ALL-WAVE RECEIVER DESIGN
HIGH-FIDELITY RECEIVER DESIGN

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521 Fifth Avenue, New York, N. Y.

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Send me postpaid volumes checked below, for which I enclose $___

( ) Broadcast Receiver Design $ .50
( ) All-Wave Receiver Design $ .50
( ) High-Fidelity Receiver Design $ .50
( ) Complete Set, Three Volumes $ 1.00

Name
Address

Metal Working LATHE $875

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