

« The » "TECHNICIAN"

JANUARY, 1935

"ALOHA OE"

TO OUR FRIEND AND COUNSELOR

JAMES M. CHAPPLE

WHO LEAVES LOS ANGELES FEBRUARY 1st TO ESTABLISH
AN OFFICE FOR THE FEDERAL COMMUNICATIONS COMMIS-
SION IN HONOLULU.

BON VOYAGE AND BEST WISHES FOR CONTINUED SUCCESS.

Standard Parts

AND

Radio Accessories

Exclusively for Dealers and Service Dealers

Radio-Television Supply Company

1701 SOUTH GRAND AVE.

LOS ANGELES

Excellent Parking Facilities Away from the Congested Downtown Area



COMPARE PROFITS

NATIONAL UNION RADIO TUBES

Offers the Dealer and Service Man

GREATER PROFITS

1. Liberal and Steady Discounts.
2. Constant Sales Helps.
3. Proven Helps in Getting Additional Service Business.
4. Up-to-Date Service Equipment.
5. Premium Quality Tubes.
6. Most Liberal Replacement Policy.
7. 100% Price Protection.
8. Consignment or Outright Sale.
9. Uniform Nationally Maintained Retail Price.

All Above Sales Helps and Service Equipment **FREE** to National Union
Dealers Through Earning Power From the Sale of

NATIONAL UNION TUBES

IF YOU ARE NOT NOW TAKING ADVANTAGE OF NATIONAL UNION
PROFITS AND FREE DEALER HELPS, WRITE OR PHONE FOR
FULL INFORMATION

Distributed in Southern California By

Kierulff & Company

1133 Venice Blvd.

LOS ANGELES

Phone Fltzroy 5111



— INDEX —

Tribute	Page 5
By Norman B. Neely	
Little Known Facts	Page 9
About Patents	
By Benjamin Chromy	
Pentagrid Converter Tubes.....	Page 10
By J. J. Glauber	
Book Review	Page 11
73's To Chapple	Page 11
Acetate Recording Discs.....	Page 12
By W. H. Snow	
High-Pass Filters	Page 13
By Charles J. Leipert	
Electrolytic Condenser Ratings....	Page 13
Electrical Measuring Instruments..	Page 14
By C. Clifford Adams	
Seeing The World Fair.....	Page 18
By Norman B. Neely	
Traveling the Territory	Page 20
With Milton	
Questions and Answers.....	Page 21
Radio Interference Bureau.....	Page 22
Service Kinks	Page 23

QUALITY

That word will mean more in
1935 than ever before. Play
safe by using good power
transformer rewinds exclusively

●
"There's No Substitute for a Good
Rewind"

●
FREE

INSTALLATION SERVICE
ONE YEAR GUARANTEE
FILTER BLOCKS and FIELD COILS

**California Radio
Laboratories**

2523 South Hill Street
PR-3515 Nites TH-4777

We Carry At All Times

Most Complete and Biggest Assortment of

RADIO PARTS

— In The West —

All The Nationally Known Makes of

REPLACEMENT PARTS

TEST EQUIPMENT

PUBLIC ADDRESS SYSTEMS

RECEIVERS AND TRANSMITTERS

WHOLESALE TO DEALERS AND SERVICEMEN ONLY

Radio Supply Co.

912 So. Broadway

Los Angeles, Calif.

Phones VAndike 3178 - 3179 3170



Rider's Manual V ... Is Ready!

JUST AN IDEA
of how extensively Volume V covers the field. This is a partial list of the manufacturers in Volume V.

Name	Quantity of Models	Name	Quantity of Models
Acratest	9	Hudson Ross	5
Air King	5	Insuline	6
Allied	21	International	19
Ansley	5	Kingston	10
Atwater-Kent	36	Lafayette	26
Audiola	11	Lang	5
Autocrat	6	Larkin	3
Balkitt	7	Lewol	5
Belmont	16	Mission-Bell	6
Bosch	19	Montgomery-Ward	13
Colonial	16	Noblitt-Sparks	11
Crosley	25	Philco	19
Detrola	7	Pilot	10
Dewald	24	Radolek	13
Echophone	6	RCA-Victor	63
Edison-Bell	7	R.K. Labs	4
Elec. Spec.	5	Sears Roebuck	56
Export	13	Sentinel	26
Emerson	13	Sparton	16
Empire	8	Stewart Warner	38
Erla	12	Supreme Inst.	9
Fairbanks-Morse	22	Tatro	5
Federated	27	T.C.A.	12
Purchaser	4	Webster	8
Ford Motor	7	Wells Gardner	12
Fordson	40	Westinghouse	11
General Electric	13	Weston Inst.	20
Gilfillan	19	Wilcox Gay	13
Grunow	6	Wurlitzer	8
Halsen	5	Zenith	21
Horn			

Send for Our **FREE** monthly House
Organ, "SUCCESSFUL SERVICING"

Patronize Your Distributor

John F. Rider, Publisher
1440 BROADWAY, NEW YORK, N. Y.

NEVER before in the history of Radio has such a stupendous compilation of technical servicing material been collected between two covers. Expense was not spared to make Rider's Volume V all-embracing in its scope. Sets are explained even more lucidly than those of yesteryear, for complications galore are incorporated in 1935 receivers. Seeing is believing—prove to yourself that Rider's Volume V is without doubt the servicing sensation of the year—better than any other manual—the absolute peer!

Rider's Volume V has

More schematics . . . more chassis layouts . . . more I-F. peaks . . . more alignment data . . . more trimmer locations . . . more circuit descriptions . . . more socket layouts . . . more parts lists . . . assembly wiring diagrams . . . **more and better everything than any other manual!**

946 Models 1200 Pages
112 Manufacturers

Volume I . 1000 pages . \$7.50
Volume II . 800 pages . \$6.50
Volume III . 1070 pages . \$7.50
Volume IV . 1040 pages . \$7.50
Volume V . 1200 pages . \$7.50
Servicing Superheterodynes . . \$1

Sold With A Money-Back Guarantee

The "TECHNICIAN"

Official Publication of the Certified Radio Technicians' Association, A Corporation
An Organization of Competent, Qualified and Trustworthy Radio Technicians for the
Purpose of Advancing the Radio Art and for the Protection of the Public.

A. PAUL, Jr., President

JOHN L. VINCENT, Vice-President

V. KARL HATFIELD, Secretary-Treasurer

NORMAN B. NEELY

Editor - Manager



1656 N. Serrano Street
Los Angeles, California

\$1.50 Per Year

15 Cents Per Copy

Vol. II

JANUARY, 1935

No. 5

EDITORIAL

By The Editor

"Tribute"

Our "superior civilization" has brought with it many evils. One of the most far-reaching in its detrimental effects upon the welfare of the average citizen is not readily apparent. It is the stranglehold which large, wealthy concerns have upon the inventive talents and God-given genius of our country. In a large majority of cases the worthwhile and valuable inventions and developments have been due to the efforts and sacrifices of some individual or small concern. But do these persons reap the harvest of returns which are the reward of genius? No! Some large "octopus" either cheats the original inventor out of the credit of originating the idea or by unscrupulous methods forces him to deal with the company on its own terms.

Sometimes these companies pretend to be big hearted and make a deal that is outright and supposedly above board. They may actually go to the inventor or small concern responsible for the organization and development of a worthwhile business based on an original idea or invention and offer to purchase the lion's share of control—at their own prices and under their own terms, of course. The activity behind the scenes is not always apparent to the casual observer, however. Along with such an offer of purchase or merger nearly always goes the threat that if the small concern or individual does not agree to the conditions laid down by the capitalist, he will be run out of business by fair means or foul—usually foul.

The public is forced to stand the financial burden and consequent hardships as a result of this legalized robbery. These

large companies, after acquiring control of important patents, then raise the prices of commodities or devices controlled by such patents and charge small concerns who are composed of members of the great "white collar class" exorbitant license fees for the right to manufacture items under their control. And we, the consumers, are forced to pay this tribute to the capitalists and brokers who in most cases never did a day's honest labor for the sake of humanity in their lives. They are parasites living on the productive energy of a progressive world, riding high on the waves of scientific development.

This practice would be outrageous enough if the money lords came by this control of technical patents by reason of their own efforts, but they don't. They are exploiting the honest labor and creative genius and many times the sacrifices of the true contributor to public welfare for their own selfish ends. They are taking from us who produce and create and selling the same thing back to us at exorbitant profit which goes into their own pockets without having been earned by any deserving expenditure of energy or labor.

Countless thousands of cases are on record where individuals and small groups of individuals have struggled through financial stress and strain, worked night and day for many years employing God-given genius to the utmost to invent and develop every-day commodities and scientific apparatus which are truly boons to mankind. By divine right these men are entitled to the power of control of their inventions. In most cases these men

(Continued on Page 14)



Tubular Condensers:—

- Tested at 3 times the working voltage
- Conservative voltage ratings
- High leakage resistance and low power factor
- Hermetically sealed
- Small size
- Specified by most large manufacturers

Electrolytic Condensers:—

- Possess long-life, trouble free operating characteristics
- Minimum leakage resistance, meaning a very slow decomposition of the electrode elements
- Do not use paper, cellophane or other questionable forms of construction
- Prices competitive with all licensed condensers

Carbon Resistors:—

- Non-inductive—value unaffected by frequency
- Conservatively rated—uniform size
- Positive, noiseless pigtail connections
- Strong, sturdy, tinned wire pigtails for mounting

California Representative
Frank A. Emmet Sales Co.
1341 So. Hope Street
Los Angeles, Calif.

Micamold

1935**1934****1933****1932**

- Through the years Micamold has been our leading condenser and resistor line.
- We have sold tens of thousands of Micamold units to the trade in this territory.
- They have proven their dependability and our claims of quality by years of trouble-free operation.
- We are indeed proud to have been chosen to represent them.

RADIO SPECIALTIES CO.

1816 West 8th Street, Los Angeles, Calif.

ORIGINATORS OF PRACTICAL RADIO ENGINEERING INSTRUCTION

THE CREI DIPLOMA

*is more important than your
tool kit!*

This is the day of the service "engineer" rather than the service mechanic. We provide "tools" in the form of knowledge and training, which, in the long run, will be of far more importance than your "screwdriver."

**The MAN who KNOWS more . . .
is the MAN who EARNS more!**

Radio developments change overnight. No other industry today sets such a fast pace . . . it takes real technical training for the service man to make a success. Only efficiency and understanding can place him ahead of the other fellow.

44-Page Illustrated Booklet Mailed on Request

Capitol Radio Engineering Institute

14th and PARK ROAD N. W.

Dept. T-12

Washington, D. C.

California Representative:

EDWARD H. GUILFORD

1656 North Serrano—GR. 0755

Mr. Guilford, member of CRTA, will be glad to be of assistance to you in answering inquiries and describing courses.

LITTLE KNOWN FACTS ABOUT PATENTS

By BENJAMIN CHROMY, Attorney-at-Law

Radio service men are perhaps among the most prolific inventors. Many worthwhile improvements are invented and patented by service men. Yet, because of the mystery that generally surrounds inventions little appears to be known about the procedure of obtaining patents. This brief article was accordingly written with the idea in mind of presenting a summary of some of the little known facts concerning the procedure of obtaining patents for inventions, for the purpose of guiding and assisting the radio service man who may have made a worthwhile invention and desires to know how he may proceed to protect it and, furthermore, how much protection his patent may afford his invention.

Up to the present time there have been issued several thousand patents for radio apparatus and circuits. These patents are divided according to the type of invention and classified under numerous headings, such as, radio tubes, radio tuners, oscillation generator circuits, receiving circuits, fixed and variable condensers and so on. All patents granted are classified for purposes of future reference and when an application for patent is filed in the Patent Office the examiner in charge of the application makes a search through these classified patents to find whether or not one or more prior patents have been issued for an invention like or similar to the invention claimed in the application.

A similar set of classified patents is available to patent attorneys and the general public in the Patent Office at Washington for the purpose of making searches. These are usually searched prior to filing an application for patent and in order to show more clearly what part they play a brief discussion of the procedure generally followed in obtaining a patent is given in the following paragraphs.

First, after an invention is made and before an application for patent is filed it is always best to search the files of prior patents relating to the same class of inventions, to determine whether or not the same invention has been patented by some prior inventor.

This search should always be made with care unless the inventor is actively engaged in making inventions in the same field and knows what has been patented. Inasmuch as the radio field is at the pres-

ent time rather active and new patents for various improvements are being issued every week it is difficult to keep abreast of all of the new patents and for that reason it is always well to make a search before filing an application for patent.

After the search is made and it is found that the invention has not been patented by some prior inventor the next step is to prepare and file the application for patent.

The patent application consists mainly of the specification which includes the description of the invention in technical and scientific terms, the claims and the drawing. These are prepared in accordance with established rules of the Patent Office and unless an inventor is familiar with the practice he will save both time and money in having this part of the patent application prepared by a recognized patent attorney.

When the patent application is filed in the Patent Office it is placed on the desk of the examiner in charge of the class of applications to which the invention relates. All of the patent applications relating to inventions of the same class are thus examined under the supervision of one examiner. The applications are kept in chronological order and one by one they are examined. The examination by the patent examiner consists, among other things of studying the specification and making a search through the prior patents to determine whether or not he believes the claims of the application to be patentable. After considering a certain application the examiner writes a letter to the inventor's patent attorney (or to the inventor-applicant if there is no attorney in the case). In this letter the examiner cites such prior patents or publications as he may consider relevant to the claims of the application and he either rejects the claims on these prior patents or allows the claims. An answer to this letter must be filed in the Patent Office by the attorney or the applicant within six months. The answer may consist of a revision of the rejected claims, or the cancellation of all or some of the rejected claims, or these claims may be amended, or additional claims may be added or an argument urging the patentability of the rejected claims may be filed.

(Continued on Page 27)

THE PENTAGRID CONVERTER TUBES

By J. J. GLAUBER, Chief Engineer Arcturus Radio Tube Co.

(Continued from last month)

PART THREE

Conventional circuits for a triode oscillator are applicable for the oscillator sections of this tube, provided proper consideration is given to the constants involved. Likewise the detector section may, in general, be considered as functioning in a similar manner to a separate variable-mu detector. However, due to the series modulation which results from the oscillator control of the electron stream, it is not necessary to feed the oscillator voltage into the detector grid circuit; nor is there any cause for anxiety that the signal grid will be driven positive.

A straight series feed oscillator circuit for the oscillator section is practical, and may be employed to advantage where a formed anode oscillator tuning condenser is employed. Somewhat stronger oscillations will be obtained at the high frequency end. If sufficient coupling is used to give reasonably strong oscillations at the low frequency end, the conversion gain will not vary appreciably over the entire range.

Other circuits provide for compensation at the low frequency end, due to the added coupling from the oscillator tracking condenser. With the proper amount of inductive coupling it is easily possible to obtain practically constant oscillation strength over the entire frequency band covered.

The design of the pentagrid converter tube offers an oscillator modulator system that involves only one physical tube structure (single cathode structure) yet which possesses all of the advantages of the two tube system and provides, in addition, several most important improvements in performance. These improvements include:

- (1) A considerably higher conversion gain.
- (2) An oscillator system which is entirely independent of the radio-frequency system.
- (3) The application of a bias voltage that can be used to control volume, resulting in volume control which certainly approaches the ideal.
- (4) The possibility of automatic volume control with a minimum number of tubes.

The pentagrid converter tube is obtainable for 2.5 volts A.C. heater operation, 6.3 volt A.C. or D.C. heater opera-

tion and 2.0 volt D.C. filament operation. The 2.5 volt and 6.3 volt tubes, known as the 2A7 and 6A7 respectively are identical except for the heater characteristics. The 2.0 volt filamentary type is known as the 1A6. The conversion conductance, that is the ratio of the intermediate frequency component of plate current to the radio frequency signal voltage input, the ratio usually being expressed in micro-ohms is 275 for the 1A6 and 475 for the 2A7 and 6A7. Lower screen grid, anode grid and anode voltages are used on the 1A6 than on the heater types. The signal frequency or modulator grid 4 is brought out to a cap on the top of the bulb. The elements are enclosed in the new small dome shaped bulbs. The bulbs are coated internally, to prevent extraneous noises from being generated within the tube by stray electrons which are set free by the high velocity primary electrons from the cathode and which in turn strike the glass wall with sufficient impact to release other electrons which are attracted to the positive plate and contribute to the plate current.

Present-day design seems definitely to call for a reduction in the number of tubes to be employed in receivers, primarily because this reflects lowered production costs and, as a corollary, an increased consumption by the purchasing public. The pentagrid converter tubes mark a definite step forward in the simplification of the most popular type of receiver which, today, seems to be the superheterodyne.

EARNSHAW PRODUCTIONS

The position of Hollywood as a production center for the making of transcriptions for radio stations has been materially strengthened by the formation of the Earnshaw Radio Productions by Harry A. Earnshaw, who, as president of Earnshaw-Young, Inc., wrote and produced Chandu, Black and Blue and many other radio hits of a year or so ago.

The new organization, which does its technical processing at Freeman Lang's sound studios, went into production for the first short story series in December and immediately started a second series in January. Each episode is complete in itself.

Coast stations releasing the radio discs include KNX, Hollywood; KFIO, Spokane; KOH, Reno; KQW, San Jose; KMJ, Fresno; KJBS, San Francisco and KFOX Long Beach.

BOOK REVIEW

Radio Physics Course — Ghirardi — Radio & Technical Publishing Company, 45 Astor Place, New York City—\$4.00.

Ghirardi's Radio Physics Course is well-known in the radio profession. This second edition, revised and enlarged, brings the subject completely up-to-date. This book describes in a simple and easily understandable way the very latest developments in the field of electronics. The book is compiled in such a manner that it may be used as a text book in school and it becomes a very valuable reference book for those who are pursuing a regular course of study in radio. It is recommended as a most necessary volume in the radio technician's library.

Radio Engineering—Terman—McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York City—\$5.00.

This is a comprehensive engineering treatment of the more important vacuum-tube and radio phenomena. It analyzes electrical circuits and vacuum tubes and reduces them to quantitative relations that predict with accuracy and certainty the performance of radio circuits and radio apparatus. It is thoroughly up-to-date and includes much original material. The footnotes include a carefully selected list of references. It is recommended as a standard engineering book on radio and should be in every technician's library.

All-Wave Receiver Design — G. S. Granger—Manson Publishing Company, 521 Fifth Avenue, New York City—50c.

This is the second of three booklets covering the development of the modern receiving set from its earliest stages to present high fidelity design. In this booklet problems peculiar to short wave reception are discussed, including receiver design and antenna design.

All points of importance are adequately covered and the series of booklets is recommended to all radio technicians as a part of their radio library. The complete series of three booklets may be purchased for \$1.00.

TRIUMPH DISTRIBUTOR

The Electric Products Service announces its appointment as authorized distributor for Triumph test equipment. This company, long recognized as one of the foremost distributors and service stations of all types of radio test and service equipment, will be glad to demonstrate the new Triumph instruments to readers of the "Technician."

73's TO CHAPPLE

It is with sincere regret that we must report that on February first of this year our radio inspector for the past several years will be transferred to another locality. Mr. James M. Chapple, friend and counsellor of countless thousands in the radio industry of Southern California, will be sorely missed by those of us who have come to know him and value his friendship and the rare understanding and efficiency with which he has dispatched his duties during his location in Los Angeles. We know we speak for all our readers when we wish Mr. Chapple the greatest possible success and happiness in the pursuance of his work in other surrounding.

W6LRP

A new amateur station is being erected in Inglewood on top of the three story building of the Universal Microphone Co. FCC has given the call letters of W6LRP to E. E. Griffin, who is vice-president and chief engineer of the microphone firm.

The new station will be 100 watts. Towers will be decorated with aluminum varnished paint, and electrically lighted at night because of the close proximity to the Los Angeles municipal airport nearby at Mines Field.

Mr. Griffin holds a class A license to permit station operation of any of the amateur bands for voice and CW. During the war Mr. Griffin was a naval radio operator stationed in Alaskan waters. Later he became chief engineer for KFWC Pomona (now KFXM, San Bernardino) and also for KMIC, Inglewood (now KR-KD, Los Angeles). Both were owned at that time by James R. Fouch, who is now president of the Universal Microphone Company.

AEROVOX REDUCES PRICES ON INTERFERENCE-FILTERS

In keeping with the far-reaching purposes of the interference-prevention campaign launched by the Radio Manufacturers Association during the recent I. R. E. convention at Rochester, N. Y., a marked reduction in list prices of interference filters is announced by the Aerovox Corporation, Brooklyn, N. Y. The reductions on four items are intended to stimulate the greater sale and use of interference-prevention devices so that various localities may enjoy present-day broadcast and short-wave reception to the utmost.

ACETATE RECORDING DISCS

By W. H. SNOW, Chief Engineer Radiotone Recording Co.

Due to the present growing interest amongst experimenters and home recording enthusiasts, in the new field of instantaneous recording, the engineering staff of the Radiotone Recording Co. feel that this should be an opportune time to release certain technical information on Acetate recording discs, which will be of help to those already using this material and to those who contemplate changing over from aluminum or celluloid discs.

The advantages to be obtained are two-fold—lack of surface noise and greater recording brilliance. With a flat amplifier and high fidelity cutting head it is possible to record the entire audible frequency range on Acetate, and if the blank is correctly recorded the finished product will be comparable to the highest type of wax recording.

Since the texture of this type of recording disc is different from any other, a certain procedure is necessary in order to produce perfect results.

A cutting head such as those in general use for wax recording cannot be used as the length of its mounting arm and the distribution of weight in same will not permit it to move up and down fast enough to follow the surface of the record, which in turn will cause the cutting head to bounce badly.

A good quality low impedance pickup with the fulcrum point of its mounting arm located about $2\frac{1}{2}$ " behind the stylus and about $\frac{3}{4}$ " above the record surface will give the best results. The head should be mounted on the arm so that the angle of the stylus can be varied.

No rider jewel is used, the depth of the cut being regulated by the weight of the stylus and cutting head which should be

from $2\frac{1}{2}$ to $3\frac{1}{2}$ ounces depending on the depth of the groove is the same as for wax.

It is important that the stylus angle be correct to obtain the best results. Depending on the stylus used, the angle varies from 87 degrees negative rake to 90 degrees. The correct angle is that at which the stylus makes no noise when cutting. Any noise which the stylus makes while cutting will show up as surface noise in the finished groove.

While this material can be cut without suction, it is advisable to use it if possible, for if the cut thread of material rides back under the stylus it will cause a defect in the groove which will show up as surface noise in the finished groove.

In cases where a number of copies are required this type of disc may be plated and processed similar to wax.

In order to insure long playing life to the Acetate disc, the recorder should apply a light lubricant such as machine oil, with a soft cloth, to the disc after cutting but before playing back.

RIDER'S NO. 5

Volume five of the famous Rider's Service Manuals is now in the field and the large number of technicians who already have their copies report that this Manual is even more extensive, more useful and enables greater benefits than ever before. This famous series of service manuals by the well-known John F. Rider has become a permanent fixture in every progressive radio service shop and Mr. Rider is certainly to be complimented on his outstanding achievement along these lines.

DEPENDABLE METER SERVICE

On All Make and Types of Instruments

FACTORY SERVICE FOR

Supreme — Triplett — Dayrad — Clough-Brengle

Complete Stock of Latest Type Meters and Test Equipment

ELECTRIC PRODUCTS SERVICE

1358 S. Grand Ave., Los Angeles

PRospect 3681

HIGH-PASS FILTERS

By CHARLES J. LEIPERT, Radio Engineer

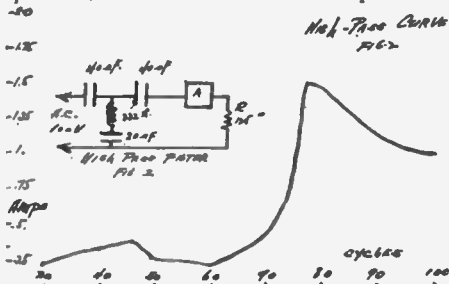
(This is the second article of a series on this subject by the former assistant chief engineer of WOR.)

The common wave-trap is a splendid example of a high-pass filter simplified. Instead of the action occurring at audio frequencies, it represents a radio frequency phenomenon.

A set-up may be obtained by designing a circuit to pass all frequencies above 800 kc-800,000 cycles and to eject all below this frequency. An approximation to a similar condition for a wave-trap application to be used for the broadcast frequencies would consist of 50 turns of No. 26 wire wound on a 3 inch tube and directly over this wind 10 turns of the same wire. A variable condenser of about .00035 mfd. would serve the purpose. It is mounted in shunt to the primary or 50 turn coil. The 10 turn coil is placed in series with the antenna and antenna binding post of the set.

The above is given to give a general idea of how the constants differentiate—at the higher frequencies they become smaller, while at the lower frequencies they are larger. In the latter case iron core inductances and very large capacities predominating.

In Figure number one the hook-up is shown. A frequency meter, voltmeter and ammeter were employed in obtaining the curve. Another glance will show the extremely large condensers used because in this case we are dealing with frequencies at the lower end of the spectrum.



In Figure number two the curve is self explanatory. It starts at .25 of an ampere, increases slightly only to decrease to a minimum value of .20 at 60 cycles. It increases then to a maximum point of 1.5 amperes at 76 cycles. From this position it decreases gradually to 100 cycles where the current is little less than one ampere. The entire condition may be classed as one of high current at high frequency and low current at low frequency.

ELECTROLYTIC CONDENSER RATINGS FOR RADIO

In order that electrolytic condensers may be properly used rather than unknowingly abused, it is well to have an understanding of their ratings. Thus there are three principal factors involved in the rating of electrolytic condensers, namely: (1) The d.c. voltage at which they are normally operated; (2) The a.c. ripple voltage across the condenser; (3) The maximum instantaneous voltage across the condenser at any period of time, as for example at the moment the receiver is turned on. These three factors, according to Howard Rhodes, Chief Engineer for the Aerovox Corporation, are defined as follows:

By d.c. operating voltage is meant the d.c. potential as measured with a potentiometer or equivalent method.

By peak ripple voltage or a.c. component is meant the maximum instantaneous value of a.c. voltage across the condenser, due to the a.c. component in the condenser. This can be measured with a cathode-ray oscillograph or with a vacuum-tube voltmeter.

By maximum surge voltage is meant the maximum potential the condenser will withstand without breakdown or permanent injury, for a period of five minutes when applied to a series combination of the condenser and a resistance, the resistance having a value in ohms equal to 20,000 where C is the rated capacity in mfd.

C

Here are the standard voltage ratings for radio type electrolytics:

D.C. Oper. Volts	Max. Surge Volts	Max. Peak A.C. Ripple Mfd.	Peak A.C. Ripple Mfd.	Voltage at 120 cycles Mfd.	Voltage at 120 cycles Mfd.	Voltage at 120 cycles Mfd.	Voltage at 120 cycles Mfd.
		1,2,3	4,5,6	7,8,9	10-12	13-16	17-25
350	400	30	27	25	20	15	10
400	450	30	27	25	20	15	10
450	525	30	27	25	20	15	10
475	600	30	27	25	20	15	10
500	600	30	27	25	20	15	10

ELECTRICAL MEASURING INSTRUMENTS

By C. CLIFFORD ADAMS, Laboratory Superintendent
Quality Electric Company

Moving Coil Permanent Magnet Type

Practically all D.C. instruments in commercial use are of the D'Arsonval type. All instruments of this type are milliammeters. Some range of milliammeter is chosen as basic range and all higher ranges of milliammeters and ammeters use this size movable system, shunted to give the desired range. Milliammeters of greater sensitivity usually have a different movable system for each range. The same principle applies to voltmeters except instead of a shunt, a resistor is added in series with the moving coil. The value of this resistor depending on the range desired and the sensitivity. The sensitivity of an instrument being the milliamperes necessary for full scale deflection. This current determines the value of the resistor or the ohms per volt necessary for the voltmeter. The ohms per volt of a voltmeter can be determined by dividing 1000 by the milliamperes required for full scale deflection. From this you see if one M.A. is required for full scale deflection, there would be 1000 ohms per volt, if 10 M. A. are required, then there would be only 100 ohms per volt and so on.

Voltmeters of different sensitivity are used for various applications. In radio work where the current drain of a V.M. would have a tendency to change the circuit conditions, high sensitivity V.M. are used of the order of 1000 to 5000 ohms per volt. In other work such as reading voltage on batteries and commercial generators, voltmeters are used of low sensitivity, in some cases as low as 40 ohms per volt.

A voltmeter as the name implies is for measuring voltage or electrical pressure. It is always connected across the circuit at the point which it is desired to determine the voltage.

Ammeters which include M.A. and Microammeters, are connected in series in the circuit in which the current is to be determined. Microammeters and low range M.A. are usually not shunted and the leads are connected directly to the binding posts of the instrument. The higher range M.A. usually have self-contained shunts, and leads would be connected directly to the instrument binding posts. This also applies to the lower ranges of ammeters. In the higher ranges of ammeters, an external shunt is used and the shunt is connected in series with the circuit and leads from the ends of the shunt are connected to the instrument binding posts. An instrument that is to be used with an external shunt is marked

on the scale "To be used with external Shunt", and usually the millivolt drop of the shunt is also marked on the scale. Ammeters that are shunted are actually millivoltmeters which measure the millivolt drop of the shunt but are calibrated in amperes so as to be direct reading.

Voltmeters of low ranges usually have the resistor self-contained in the instrument case, but in those of high range it is necessary to have the resistor mounted external to the instrument on account of the heat generated in the resistance units. The heat dissipated in these units in watts is equal to the square of the current times the resistance. In high ranges, even of high sensitivity, this is considerable compared with the power consumed by the instrument; as an example, the wattage dissipated in heat in the resistor of a 1000 voltmeter of 1000 ohms per volt would be one watt, while if it were 500 ohms per volt it would be 2 watts.

Damping in D.C. instruments of this type is obtained by the use of a metallic coil frame; as the coil moves through the magnetic field, eddy currents are generated in the coil frame which produce a torque that tends to oppose the movement of the coil.

(To be continued)

"TRIBUTE"

(Continued from Page 5)

would desire to have their contributions make life, labor and the pursuit of happiness more easy and enjoyable for all men. However, by a cruel distortion of powers of control by those in the "house of have" these great developments instead of easing the burden upon all humanity merely serve as a means of filling the coffers of the money lords with coin of the realm.

We in the field of radio are particularly aware of this deplorable condition, by which the life blood of our industry is slowly sucked out by Wall Street vampires instead of being allowed to flow through the arteries of the radio industry for the mutual benefit of those who earn a livelihood therein and the great American listening public who depend upon the radio for so much joy and inspiration.

How long can we endure this oppression which falls more heavily upon us year by year? Undoubtedly we owe tribute to those of inventive genius, but not to capitalistic dictators who would exploit God-given genius for selfish gain.

NATIONAL

Radio and Electrical School

The largest Trade School in the West. Located in Los Angeles for over 30 years. Now offers complete, practical training in:

Radio—

Television—

Talking Pictures—

Broadcasting—

Commercial Operating

and

General Electricity



Modern, up-to-date equipment, all actually operating and available to the student to use in learning his trade. Expert instructors. At this institution, you receive friendly, sincere cooperation that makes success assured.

For the man already engaged in Radio work, who is ambitious to go ahead, National offers a particularly valuable opportunity through advanced training.

IN ADDITION, those who find that they need more Electrical knowledge than they have been able to acquire through previous Radio Training and experience will find a definite means to increased income through the outstanding, time-tested Electrical Training offered here.

Laboratories and Studios always open to inspection. We cordially invite you to visit the school at your convenience, without the slightest obligation. We shall be pleased to discuss your plans with you and to offer you every possible assistance toward the realization of your ambitions.

National Radio and Electrical School
4006 S. FIGUEROA STREET
Tel. CEntury 29061 LOS ANGELES, CALIF.



AEROVOX — The Single Source of Supply

AEROVOX TRANSMITTING CONDENSERS



THESE oil-impregnated, oil-filled condensers offer quality first, because transmitting condensers must stand up. And price too, for mass production serves those 1935 pocketbooks.

⊗ for Design

Carefully wound sections which will not deform or develop fluttering plates . . . thoroughly oil impregnated . . . ingeniously sealed container positively leak-proof for oil filling. In round or rectangular cans.

⊗ for Workmanship

Pure linen paper—not kraft or cheaper substitutes . . . longest life with minimum deterioration in service. Also genuine high-tension insulators. Heavy metal containers.

⊗ for Dependability

Conservatively rated . . . best of materials selected for longest service and ample safety factor . . . and backed by enviable record of reliable service in thousands of amateur and broadcasting and commercial transmitters.

⊗ for Low Cost

Popular demand has made possible an enormous production schedule reflected in unusually attractive prices. Just compare our prices with all others, quality for quality! See table at left.

ROUND ALUMINUM CAN TYPES

Type 1005 — 1000 v.			
Cap. Mfds.	Size	List Price	Your Price
1	2x5 $\frac{1}{8}$	\$3.20	\$1.92
2	2x5 $\frac{1}{8}$	4.25	2.55
4	2 $\frac{1}{2}$ x5 $\frac{1}{8}$	6.00	3.60
Type 2005 — 2000 v.			
Cap. Mfds.	Size	List Price	Your Price
1	2x5 $\frac{1}{8}$	\$4.75	\$2.85
2	2 $\frac{1}{2}$ x5 $\frac{1}{8}$	6.50	3.90

Compare These Features:

- ⊗ Pure linen paper . . . deformation-proof and flutter-proof sections.
- ⊗ Sturdy, hermetically-sealed, positively leak-proof container . . . high-tension terminals.
- ⊗ Adequate margin of safety for long and satisfactory service.

● for Quality CONDENSERS and RESISTORS



... and other TRANSMITTING COMPONENTS

These oil-filled transmitting condensers are typical of components engineered by Aerovox and mass-produced in the giant Aerovox plant. Please note also:

⊗ A Complete Line of Condensers

Paper, electrolytic, mica, tubular, in all types, sizes and styles for every transmitting and receiving need, always with that extra touch of Aerovox engineering, and the attractive prices of Aerovox mass production.

⊗ A Complete Line of Resistors

Wire-wound vitreous-enamel either fixed or adjustable, from smallest to largest sizes . . . carbon type resistors, grid leaks, lavite resistors, mountings, etc. Fit companions for Aerovox condensers.

⊗ And at the Right Prices

When purchasing condensers and resistors, always bear in mind that Aerovox list prices are in many instances considerably lower than competitive makes of similar products. Do not pay more when you can have the Aerovox brand with its established reputation.

Write for Data: New 1935 Catalog is yours for the asking. Covers entire Aerovox line of Condensers and Resistors. Also sample copy of our monthly Research Worker—a monthly engineering service to practical radio men.



AEROVOX

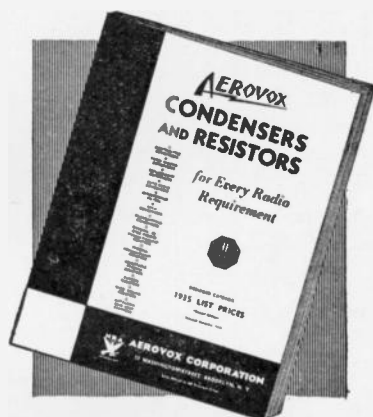
C O R P O R A T I O N

83 WASHINGTON STREET, BROOKLYN, N. Y.

— Pacific Coast Representatives —

W. C. HITT
1341 S. Hope Street
Los Angeles, Calif.

R. R. BEAN
2124 Smith Tower Bldg.
Seattle, Wash.



SEEING THE WORLD FAIR WITH THE EDITOR

By NORMAN B. NEELY

In response to many requests we are continuing the series of World Fair articles started in the September, 1934, issue of The "Technician."

FORT DEARBORN

One of the outstanding exhibits at the fair and of great historical interest was the exact reproduction of Fort Dearborn. This fort and stockade was Chicago's first permanent settlement. The fort was built in a rectangle with block houses at two corners and other buildings built around the walls. The old flag of fifteen stars and fifteen stripes of 1812 was on the mast in the center of the parade ground in the enclosure. Guides in uniforms of the 1812 period were available to conduct sightseers around the fort and explain its many interesting features.

Plans for the original fort by Captain John Whistler were obtained from the U. S. War Department and followed exactly in the reconstruction. The fort's well and oaken bucket, outdoor fireplace and soap kettle, the grist mill, barracks, Indian trading post and powder magazine were all authentically reproduced.

In the living rooms of the fort were the furnishings and equipment as they were originally. There were hand-made chairs, hand-hewn benches, spinning wheels, warming pans for the century-old beds and children's trundle beds that were pushed under the big beds in the daytime. The open fireplaces, with long handled frying pans, spits and big iron kettles, were all built in the cabins as in the original fort. Other items to be found included a wooden meat grinder, horn lanterns and iron candle sticks, maplewood churn and dough tray, flint lock rifles and animal pelts.

The trading post was stocked with jerked beef, cornmeal, calico, peltries, knives and blankets. Among the brass cannon, which were the original ones brought to the fort in 1804, were two which were manufactured in Paris in 1793.

Historic documents tell the story of the old fort and of the massacre. Among them is a facsimile of the letter from General William Hull to Captain Heald, commander of the garrison, ordering the evacuation of the fort, which resulted in the massacre of 60 men and children, and the capture of the survivors.

THE STRATOSPHERE FLIGHT

The stratosphere flight, by Lieut. Commander T. G. W. Settle, U. S. N., and Major Chester L. Fordney, U. S. M. C., was the subject of a special exhibit, the purpose of which was to show the usefulness to practical science of the observations made in the record flight. The instruments used and the records made on the flight were shown and explained.

How mathematical principles are used in gun-fire, in navigation by the position of the stars and in communication was shown here by a United States Navy exhibit. A gyroscopic compass in action had "repeaters" on different parts of the floor showing at all times the direction indicated by the main compass.

THANKS, MR. KANTENBERGER

Mr. William J. Kantenberger, publisher of the "National Technician" at Dallas, Texas, is indeed due a general vote of thanks from the entire service profession in the West, South, and Southwest. Mr. Kantenberger has worked untiringly, without compensation, in an earnest and determined effort to assist conscientious and progressive service technicians to better their position in the professional world. Mr. Kantenberger, of course, being no more free from unjust criticisms than any of us who put ourselves on the spot, so to speak, by taking a lead, has been severely criticised by certain interests who are attempting to destroy the worthwhile progress which he has made on behalf of service technicians in general. All readers of the "Technician" are urged to carefully consider Mr. Kantenberger's efforts on their behalf and we are sure that a serious consideration of his services will result in wholehearted support of his work.

P. A. AMPLIFIER POPULAR

The portable public address amplifier quite recently announced by the Radio Supply Company has proven very popular and many of these excellent amplifiers small and easily portable, but powerful with good quality, have been built. Design and construction data for this amplifier may be obtained by calling in person at the Radio Supply Company.

SHOES VS. WHEELS

By NORMAN B. NEELY

Having been challenged on a statement contained in a recent editorial to the effect that trolley shoes on street cars appreciably reduced radio interference, from such equipment the writer made some personal investigations in order to uphold his previous opinions.

A recent trip to San Diego where the street car system has replaced the obsolete wheels with modern trolley shoes served as conclusive evidence that the use of this type of equipment very definitely reduces radio interference.

While driving slowly through the center of San Diego with street cars on all sides, during the middle of the day, receiving several different out-of-town stations (one at a time, of course) on an automobile radio, located directly beneath the trolley wires, practically no electrical interference was heard. We challenge anyone to make a similar test in downtown Los Angeles under an L. A. Ry. trolley line, without experiencing distressing disturbances.

PIGEONS AT SEA

Freeman Lang, Hollywood transcription producer whose facial expression appears in College Rhythm as the football announcer, has added a new gadget to his power cruiser.

The latest addition is a clay pigeon outfit on the bowsprit with a couple of 20 gauge shotguns so the guests can do target practice while the craft is wending its way to Mexican waters on its monthly fishing cruise all loaded with radio celebrities in vacation mood.

GRINDER POPULAR

The Hand-ee Grinder, manufactured by the Chicago Wheel and Mfg. Co., has received considerable interest from service technicians. Users of this grinder state that the time saved in cleaning and polishing in restricted places pays for the grinder in a short time. In addition to this use, however, it enables one to perform many seemingly impossible operations by use of the many attachments which may be obtained at low cost. These include grinding, buffing, polishing, sanding wheels and slotting saws and wire brushes. Also a universal chuck is available to take all sizes of drills up to one-eighth inch.

TUBE CHECKERS — and — SET ANALYZERS Repaired or Rebuilt—

All types of instruments
Repaired or Calibrated
Shunts or Multipliers made up
for any instrument
PROMPT — ACCURATE
RELIABLE SERVICE
Authorized Service Laboratory
for Weston Electrical
Instrument Corp.

Quality Electric Co.

Tel. TRinity 5981
812 S. San Pedro Los Angeles

SERVICEMEN!



\$4.75

STEP AHEAD

• ELIMINATE GUESS-
WORK IN YOUR
SERVICING!

• DON'T PUZZLE YOUR
PROFITS AWAY!

• ADD 10,000 Hours to
your experience!

of the rank and file—
with
CASE RECORDS
OF BROADCAST RECEIVER REPAIRS

Your work is already done
and recorded for you in
"CASE RECORDS." This
8x12" loose-leaf binder
contains 1,500 alphabet-
ically and numerically ar-
ranged "CASE RECORDS" of SUCCESSFULLY
COMPLETED SERVICE JOBS! Each "CASE REC-
ORD" tells all details for satisfactory repair.
SUPPLEMENTED QUARTERLY FREE for 1 year.
108 receiver makes . . . 3,000 models.
... the FASTEST Technique known to the Pro-
fession!

Enclosed find \$4.75 for which kindly send me "CASE RECORDS"
(immediate refund on return of Manual)

CAPITOL RADIO RESEARCH LABORATORIES INC.
1503 21st St., N. W., Washington, D. C.
H. K. Bradford, President and Technical Director

Name
Address

TRAVELING THE TERRITORY WITH MILTON

Come on, all you brethren—confess to the old Traveler! Just how many times since the new year began, have you been caught writing the date 1934 instead of 1935? Are we leffing!

They tell us that Bill Wilhelms, 'way out at Hansen's Music in Beverly Hills has just gone and bought himself a new automobile. Who said there was a depression?

With the heartiest of congratulations the Traveler shakes hands with his old friend Harry Le Goube of Washburn & Walker, who is about to embark on a one-way voyage aboard the good ship Matrimony. And the Traveler will sure be there in the little church around the corner on that Sunday morning in March when the happy event takes place. Lucky boy! and lucky girl, too.

Those of the radio fraternity who have missed seeing C. A. Addis at his old post on South Vermont Street can find him in his new location on South La Brea. Good luck, "C. A."

The news is brought to us that Oscar Wick, over the bright ocean waves at Avalon Radio Shop in Catalina, has been solemnly contemplating joining the ranks of those in wedded bliss. When asked about the situation, however, Oscar vehemently declares that it is merely Communistic propaganda designed to undermine his reputation as one of the most rabid proponents of bachelorhood. But, as the Traveler has been informed by those qualified to know, that tender far-away look in Oscar's eye is not caused by simply curing the ills of radio sets with his trusty soldering iron, nor is it due to the dextrous manipulation of a transmitter key. Speak freely, Oscar; remember, you're among friends!

After flitting from branch to branch installing so many outside tree lights during the Xmas season, the boys at Village Electric in Westwood have decided to copyright the name "Tarzan" for their own personal use.

Any of you boys who hail from Texas would do well to say "hello" to Roy Turnage in his little shop on East Florence Avenue. Steam engines, automobiles, or radios are all the same to Roy, who has seen 'em all come and go so much that it's just an Easter parade so far as he is concerned. How's about it, Roy?

Way down there in San Pedro Ray Ogborn is still doing his share to keep the radios of his vicinity in working order. Anything from a tiny midget receiver to a transmitting station is all in the day's work for Ray.

The notice comes to us that Les Shaffer now has his own music store in his old stamping-ground, Redondo. The Traveler joins hands with those who are wishing well to the new firm of Redondo Music Co.

Favorite songs of some of the boys in the field: The Man on the Flying Trap-eze, The Continental, Schubert's Serenade, The Strawberry Roan, Stay as Sweet as You Are, Grofe's The Grand Canyon Suite, Mama Loves Papa—and so, far, far into the night.

Did you know that Russ Carruthers, in addition to managing a prosperous little radio business in Santa Monica, is the leader of a popular dance orchestra?

For new kinks in installing pickups on amplifiers we take our hat off to our good friend Pol Verbecke at the House Radio Shop on Santa Monica Blvd. And, what's more, the tone is better, too.

And wishing you all a Better New Year, the old Traveler once more says Au Revoir. See you all in the next issue!

STARS SELL SHOWMANSHIP

By way of reminding radio dealers and service men that romance and glamor are an important part of their stock in trade, Sylvania News, house organ of Hygrade Sylvania Corporation, is featuring a beautiful radio star on the front page of each issue.

"For several years," states Paul S. Ellison, Hygrade Sylvania advertising manager, "we have stressed in Sylvania News the idea that the dealer who talks radio entertainment to his customers will have a distinct advantage over the dealer who talks only of sets and tubes. In picturing some of the attractive stars of the air, we believe that we will help to drive home the fact that radio is as distinctly an entertainment business as the theatre or the movies, and that showmanship is as necessary in radio merchandising as in other entertainment trades."

TECHNICAL QUESTION AND ANSWER DEPARTMENT

Conducted by CHARLES MILLER

Q. Why does Grebe use two trimmers on each section of the tuning condenser?

A. The two sections which tune the band-circuits of the SK4 and SK5 models have extra trimmers to compensate for the fixed capacitance in the following tuned stages introduced by the P-G coupling condenser.

Q. What is wrong when the calibration of a set checks OK at both ends of the dial but is off 5 to 10 KC onKHJ? J.R.P.

A. If the set is a super the I.F. is probably not adjusted to the frequency for which the set was designed. If a TRF or a cheap super the dial was probably calibrated for a different coil and condenser set-up than that used.

Q. What is the cause of a 5-tube super with 456 KC IF's bringing in KGPL at about 800 KC as well as at 1712?

A. It is an image since 800 KC is the spot where KGPL's image would fall if the IF were exactly 456 KC. A set of that class would not justify any steps being taken to eliminate the images. Adjust the IF's to a frequency which will cause the image to fall between local stations if the IF happens to be such that the image falls on one.

REPLACEMENT CONES

A long felt want has been realized and fulfilled, by the foresight of one of our most prominent wholesale service organizations, the ELECTRIC PRODUCTS SERVICE. They have been appointed exclusive distributors for the nationally known CARRON line of replacement cones and already have a large supply of over a hundred different types of replacement cones in local stock.

These cones are complete with spiders and voice coils, and come individually packed in separate cartons to assure ease of handling without damage. They also maintain a wholesale speaker repair service and will install new cones, rewind field coils and make all types of repairs to speakers for the dealer on a wholesale basis.

Complete price lists on all types of cones may be obtained by calling or writing the ELECTRIC PRODUCTS SERVICE.

a complete **PARTS STOCK of ALL LEADING LINES**



**Replacement
Transformers**



Condensers



Resistors



Volume Controls



**Sockets
Etc.**



**We respectfully solicit
your patronage**

**Leo J. Meyberg
Company, Inc.**

**335 W. Washington Blvd.
Los Angeles
PRospect 9255**

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

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).

RADIO AMATEURS

With the development of short wave broadcast reception for entertainment purposes, those engaged in the sales or service of short wave receivers should have a working knowledge of the part played by the radio amateur. Contrary to the general conception of a radio amateur he is in many cases a professional man following radio amateur work as a hobby and in practically all cases is an individual of more than ordinary intelligence. These amateurs are allocated certain specified frequencies in the radio spectrum in which they are licensed to operate, under direct supervision of the Federal government.

Experience of the Bureau indicates that almost without exception the radio amateur will cooperate in every way possible to prevent his activity from in any way interfering with the pleasure of others. One of the greatest difficulties the amateur must tolerate is that a high percentage of the listening public who experience interference from a radio amateur do not report it to the amateur. This condition makes it difficult for the amateur to know whether or not his transmitter interferes with others and consequently he can do little to remedy the situation.

There are conditions over which the amateur has no control and which result in interference of his transmitter with the receiver of the broadcast listener. Conditions have been found where the amateur transmitter is located in close proximity to broadcast receivers which have extremely poor installations and consequently are interfered with by the amateur. Conditions have also been found where amateurs at a considerable distance interfere with broadcast receivers due to the fact that the receivers are of a type using one or more oscillators, which oscillators tend to produce beat note interference by the heterodyne action of the oscillator harmonics with the carrier frequency of the amateur transmitter. This type of interference is most satisfactorily overcome by providing the receiver with at least two stages of tuned radio frequency ahead of the first detector. The use of these two stages not only serves to increase the desired signal strength but also tends to prevent the receiver from picking up signals other than those of the approximate frequency to which the receiver is tuned. There are circuits for accomplishing this same purpose without the use of tubes but these circuits are in most cases difficult of adjustment and are low in efficiency.

The Bureau will gladly assist in the design of keying circuits, filters to prevent radio frequency feed back on the power service line and filters for the prevention of interference with nearby broadcast receivers. The material required for these devices is not expensive.

RADIOTONE MOVES

The Radiotone Recording Company, formerly of 6109 Melrose Avenue, has recently moved to new and larger quarters at 735 N. Seward, near Melrose. This company, designers and manufacturers of high-quality studio and portable recording equipment, is one of the leading manufacturers of this type of equipment in Southern California. They invite your inspection of their complete recording units, recording discs, both aluminum and acetate, condenser microphones and other accessories.

METER ARTICLE POPULAR

The article entitled "Electrical Measuring Instruments," prepared exclusively for publication in the "Technician," by Mr. C. Clifford Adams, of the Quality Electric Company, has met with favorable acceptance by our readers. This article, which is continued in this issue, covers the history of the design and development of all types of electrical measuring instruments and we are most certainly indebted to Mr. Adams and the Quality Electric Company for this worthwhile contribution to our editorial columns.

L. A. RAILWAY IN DOG HOUSE

The Los Angeles Railway is being severely questioned in a hearing by the State Railroad Commission. Richard Sachse, consulting engineer and vice-president of the company, during questioning by Carl I. Wheat, assistant city attorney, admitted that "the equipment of the Los Angeles Railway Co. is inherently unsatisfactory for a city the size of Los Angeles." He reported having declared in 1927 that all the yellow cars were defective in respect to loading platforms. It looks kind of bad for the L. A. Railway when its own experts go on record in the hearing as sharply criticizing its equipment. It is fortunate for the citizens of Los Angeles that we have an alert and aggressive city attorney and staff such as Ray Chesebro and Mr. Wheat.

NEW LINE FOR RADIO SPECS

The Radio Specialties Company has recently taken on distributorship for CASE RECORDS OF BROADCAST RECEIVER REPAIRS, published by the Capitol Radio Research Laboratories and report extensive acceptance by the trade.

WHAT A CALENDAR!

Charlie Sexton, of Radio Products Sales Company, has given service technicians in and about Los Angeles something to think about and remember him by for the entire year of 1935. If you haven't seen one of his calendars, you should by all means investigate, as you are really missing something. We understand that a limited supply is still available to those who call in person at the Radio Products Sales Company.

SERVICE KINKS

SCRATCH REMOVER

A piece of friction tape moistened with oil or vaseline makes a very satisfactory scratch remover. JOHN A. ORME.

FADA

Sometimes the FLASH-O-GRAPH feature in the models using such fails to indicate properly. This can be remedied by shunting the 35,000 ohm resistor connected from one side of the lamp to the ground, with a .5 or larger condenser.

EGBERT JONES.

LYRIC MODEL J

Excessive hum in this model may be eliminated by replacing the condenser connected from the 47 grid return to ground. Use a .1 or larger condenser.

—JLP.

FADING IN SPARTON SETS

Cause—Condenser.

Tuning rotors loose on shaft. Rotor plates are molded to shaft in pot metal and frequently become slightly loose causing fading and noise on carriers.

Remedy—Center punch pot metal close to shaft at several places on each end of each rotor.

—C. G. Esler.

MOTOR NOISE

Motor noise in automobile radio installations can often be overcome to a considerable extent by reversing the primary leads of the ignition coil.

—A. J. Moser.

NEW—1935 ALL-WAVE SET



"Western made for Western Reception"

CARRON REPLACEMENT CONES

For All Makes and Types of Speakers

NOW IN LOCAL STOCK

Ask for the Price List of All Types

Wholesale Speaker Repairs — Field Coils Rewound

Distributed by

ELECTRIC PRODUCTS SERVICE

1358 S. Grand Ave., Los Angeles

PRospect 3681

OIL-FILLED TRANSMITTING CONDENSERS

Designed for performance rather than price, a new line of oil-filled, oil-impregnated transmitting condensers is announced by the Aerovox Corporation, Brooklyn, N. Y.

The units are available in round and rectangular metal cans, in either case with high-tension insulator post terminals. Wound with pure linen paper instead of kraft or cheaper grades, thereby guarding against deterioration even at high operating temperatures. Linen paper dielectric also provides necessary strength for tightly-wound section. Finished sections thoroughly impregnated in high-grade oil, placed in can and surrounded by protective oil bath not only for higher insulation value and long life, but also for proper expansion-contraction properties whereby an oil circulation is set up through the section for cooling purposes. Containers hermetically sealed for complete protection against moisture and leakage.

Round can type includes special reinforcement in winding process, relieving undue strain. Rectangular seamed can type has clamped section for constant pressure in order to avoid plate fluttering—a frequent cause of breakdown when clamps are not used. Units are available in popular working voltages and capacities.

NEW TROYS

Watch the next issue of the "Technician" for an interesting announcement of a complete new line of Troy receivers, which will include short-wave, all-wave, standard broadcast and auto radios—thirty-five models in all.

IRE MEETING

The regular meeting of the Los Angeles Section of the Institute of Radio Engineers was held in North Hall on the campus of the Los Angeles Junior college Tuesday evening, January 15. The subject of the meeting was "The New Wirephoto." Mr. Verne W. Bailey of the Los Angeles Times, discussed the use of this new service from the standpoint of a newspaper organization and Mr. E. H. Schreiber of the Southern California Telephone Co., discussed the technical features of this new and improved system of telephoto service. The meeting was attended by approximately one hundred members and guests all of whom received the papers delivered with extreme interest.

EARLY A. C. TUBES STILL LEAD IN REPLACEMENT

Although engineers and set manufacturers have all but forgotten the original A. C. tubes, the -26 and -27, it is interesting to note that such tubes now lead in replacement sales, according to C. G. Pyle, sales supervisor of the Hygrade Sylvania Corporation.

"A survey of Sylvania tube sales to the jobbing and retailing trade during the past few months indicates the continued heavy demand for the early types of A. C. tubes as replacements in sets sold several years ago," states M. Pyle. "Indeed, types -24A, -26, -27 and -80 account for approximately 50 per cent of our total replacement sales. If type -45 is included, which was introduced some time later, our total is over 60 per cent. Also among the old times still in big demand is that pioneer among satisfactory battery-operated tubes, the -01A detector and amplifier, which averages 3.2 per cent of our sales. Also the 171A power amplifier, averages almost 6 per cent.

"Quite obviously, old sets are still in operation in very large numbers. We have made a careful study of our replacement sales so as to advise our jobbers in the matter of well balanced stocks of tubes," concludes Mr. Pyle.

NEW MODELS

The Electric Products Service, authorized factory service for Supreme, Triplett, Dayrad and Clough-Brengle test equipment, advise they now have a complete stock of the new 1935 model Triplett, Triumph and Supreme test equipment and meters.

They have a deferred payment plan available to those who wish to purchase test equipment in this manner. And they will also make allowance for your old equipment on new models.

U. S. A. IN FOREIGN LANDS

American-made electrical radio transcriptions will be used all over New South Wales with the 104-program series called Pinto Pete and his boys. The hillbilly cowboy group is composed of Los Angeles talent with the discs made here.

A. E. Bennett, Australian representative for the Radio Transcription Company of America, made the arrangements for the sale of the discs to a soap manufacturer who will use the series on several stations in Australasia.

HAND-EE Grinder

*quicker
better
jobs*



Weighs 1 pound. Plug in any light socket and do 1001 jobs.

\$10.00

and up Postpaid U. S. A.

With 3 wheel shapes Free.

Order today.

Do away with slow hand work. Grinds, routs, drills, carves, sharpens, cuts, engraves.

— Ask for FREE Booklet —

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.

Chicago Wheel & Mfg. Co.

112 SOUTH ABERDEEN STREET

CHICAGO, ILL.

COMBINATION RECORDER

The newest item in the production schedule of the Universal Microphone Co. factory at Inglewood, Cal., is a combination pick-up and recorder, impedance 400 ohms.

The equipment is full annular ball bearing mounted, and thus eliminates side wear of grooves.

The spring adjustment is a special feature. It is so assembled that pressure can be easily and quickly adjusted down to a featherweight on the needle groove, thereby eliminating groove and needle wear.

It matches the input of standard microphone transformers. As a recording cutting head, it matches all standard line-to-mixers, tube-to-line and line-to-line transformers.

The instrument permits playing on wax and all soft material. The arm is long enough to play up to 16 inch records.

The Universal combination recorder and pick-up is described by its makers as "A scientific sensitive instrument that ensures clear, colorful recording and reproductions." It is said to be unusually sturdy, compact and long wearing.

CASE RECORDS POPULAR

The new service manual recently introduced to service technicians entitled CASE RECORDS OF BROADCAST RECEIVER REPAIRS, has proven quite popular. This manual, published by the Capitol Radio Research Laboratories of Washington, D. C., seems to fill a very definite need between the field covered by the universally accepted Rider's Manuals and technicians' scratch notes. A wealth of information has been put into these pages by Mr. H. K. Bradford, President of the company, by reason of eliminating lengthy discussions and giving detailed information in a few short words.

FOR SALE OR TRADE

Complete Public Address System
Microphone, 12 inch A. C. Dynamic Speaker and Amplifier. Amplifier consists of 2—24's into 2—27's into 2—45's which drive a pair of 50's.

See Mr. W. H. Nielson at Service Station on 4th and Vermont.

MATH LECTURES

The first of a series of lectures on mathematics as applied to electricity and radio was delivered at the December 14th meeting of the CRTA. The lecturer, Mr. Edw. H. Guilford, Educational Director of the CRTA, and West Coast Representative for the Capitol Radio Engineering Institute, realizing the ever-increasing need of a working knowledge of fundamental mathematics by the service technician has planned a very comprehensive course on the subject.

Through the kindness of Mr. E. H. Rietzke, President of the CREI, Mr. Guilford has secured a supply of lessons from the regular mathematics division of the CREI Radio Engineering Course.

FREE DATA SHEETS

Mr. F. L. Sprayberry, originator and director of "Practical Mechanics of Radio Service" has very kindly offered to furnish readers of the "Technician" with Data Sheets, giving valuable information on how to modernize obsolete analyzers. Data Sheets are available on the Jewell 199, Supreme 400-B, Hickok SG4600 and SG4700 and Weston 547. Technicians desiring Data Sheets should submit their request on their letterhead or that of their employer to Mr. F. L. Sprayberry, 2548 University Place, N. W., Washington, D. C. At the present time only one Data Sheet will be available to each technician.

GUARANTEE SLIP INVADERS CONDENSER AND RESISTOR FIELDS

Condensers and resistors—electrical devices subjected to more use and abuse than any others—are now protected by an adequate guarantee. The Aerovox Corporation of Brooklyn, N. Y., has introduced a guarantee slip which is packed with every item distributed through the regular jobbing and retailing channels. The printed form specifies the conditions of the guarantee as regards workmanship, materials and inspection that go into the product, as well as the proper application and use of the item by the buyer. There is included a handy claim form coupon for the convenience of buyer and dealer.

LITTLE KNOWN FACTS ABOUT PATENTS

(Continued from Page 9)

At this point it may be well to indicate that when a patent is issued its value is to a great extent determined by the scope of the claims that have been allowed by the examiner. About the simplest definition of a patent claim is that it consists of a word definition of the thing that is thought to be the invention. For example, one of the claims to the three element tube or audion might well have been as follows: An electrical discharge device consisting of an envelope having a rarified atmosphere therein, a plurality of electrodes including a cathode, a grid and an anode positioned in said envelope.

Another example of a claim similar to the above claim is as follows: An electrical discharge device consisting of an envelope having a rarified atmosphere therein, a plurality of electrodes including a cathode, a control electrode and an anode positioned in said envelope.

The difference between the foregoing claims is that the first describes one of the electrodes as a "grid" and the other refers to a "control electrode". Both of these definitions may describe the same electrode yet the scope of the two claims may be different because of the difference in meaning of these descriptive words. By using different descriptive words in preparing claims the inventor's attorney may be able to write a large number of claims, each differing from the others in scope, and thus more completely cover and protect the invention for his client.

(Continued in Next Issue)

TRIUMPH TUBE TESTER

The Triumph Manufacturing Company of Chicago announces a new tube tester with many unusual features for a low-priced instrument. It checks **dynamic mutual conductance** on all tubes, has neon leakage test, inter-element short test and English-reading scale. This is a companion instrument to the Triumph Signal Generator and Mutimeter and it is very competitively priced.

This Company also announces a substantial reduction in the price of Triumph Signal Generator.

SYLVANIA ADDS TWO MORE

Russia becomes number eighty-four and French Indo China number eighty-five in the list of countries in which Hygrade Sylvania Corporation is regularly selling tubes, according to an announcement made October 9 by W. A. Coogan, manager of Foreign Sales. Among recent guests at the Sylvania Club, Emporium, Pa., have been sales representatives from Spain, France, Mexico, Chile, Greece, Russia and South Africa.

TO ALL READERS OF THE "TECHNICIAN"

The Certified Radio Technicians' Association solicits members who are actively engaged in technical radio pursuits and who are interested in assisting themselves through cooperation with others to rise above the treacherous lowlands of the often-mentioned depression and advance the radio art as a profession and themselves as technicians. You are cordially invited to attend our meetings and instructive lectures and learn more of our efforts to progress through concerted efforts and unified strength.

ARCTURUS RADIO TUBES

M. D. EALY, Consignment Agent

1214 Venice Blvd.

PRospect 9810

Los Angeles

Classified Advertisements

For Sale or Trade—

One metal sign and a work bench (knock-down) for meters, speakers, tubes, a console cabinet or what have you. John A. Orme.

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 0755.

Laboratory Service—

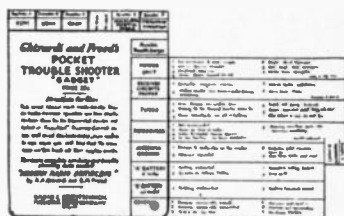
All types of laboratory measurements and calibration of electronic devices and component parts. Dr. John F. Blackburn, Consulting Physicist. GRanite 8179.

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

DAYRAD Radio Service Equipment

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

What a Gadget!



GHIRARDI AND FREED'S Pocket Trouble-Shooter

Servicemen say this is the handiest little gadget they ever saw. For seven types of symptoms (Hum, Weak, Noisy, Inoperative, Intermittent Reception — Fading, Oscillation — Distortion) it gives all the remedies (275 in all) for each possible trouble source in the Power Unit, Receiver Circuits Proper, Tubes, Reproducer, Antenna Ground, "A" Battery, "B" Battery, etc. Keep one in your pocket—it will save you "headaches" and wasted time. Get yours today—

ONLY

25c

Designed by A. A. Ghirardi and
B. M. Freed, Authors of
MODERN RADIO SERVICING

Mail This Coupon Today!

Radio & Technical Publishing Co.
45 Astor Place, New York. Dept. T-1.

- () Enclosed find \$..... for.....
Pocket Trouble-Shooter(s), at 25c each.
- () Send free circular describing Ghirardi and Freed's MODERN RADIO SERVICING.

Name

Address

Occupation

A CONDENSER AND RESISTOR CATALOG

The correct condenser or resistor for practically any standard radio need, can be found in the 1935 edition of the Aerovox General Catalog just issued. Electrolytic, paper, oil-filled, mica, tubular, bakelite case and other types of condensers are listed, as well as wire-wound vitreous enamel, carbon and other types of resistors. The new edition features several new items, such as the high-voltage oil-impregnated oil-filled transmitting condensers, auto vibrator condensers, ultra-compact general utility electrolytics for service work, and exact duplicate replacement condensers, together with the Pyrohm Junior 10, 15 and 20 watt wire-wound vitreous enamel resistors. A copy may be obtained from the Aerovox Corporation of Brooklyn, N. Y.

SOLAR CATALOG

The Solar Manufacturing Corporation, New York City, manufactures of Fixed Capacitors for radio use, announce the issuance of their latest Special Service Catalog No. 6-S. It may be secured by writing direct.

Features of special interest to the service trade include Ultra-Compact Dry Electrolytics, Self-Healing Wet Electrolytic Condensers, Auto Vibrator and Suppressor Condensers and a wide assortment of Paper, Mica, Trimmer and Padding Condensers.

LATEST LOW LOSS SOCKETS

Thomas B. Pritchard, 1214 Venice Blvd., has been appointed distributor for products manufactured by the Mycalex Corporation of America.

Mycalex is now manufacturing the last word in low loss, heat resisting sockets, particularly designed and recommended for short wave and ultra high frequency communication systems. Mycalex will hold its form indefinitely (will not warp) is impervious to moisture, heat and oil; and last, but not least, it is unbreakable.

GUILFORD SPEAKS

Mr. Edw. H. Guilford, West Coast representative for the Capitol Radio Engineering Institute and formerly chief engineer of the Radiore Company, addressed the Inventors Congress at the Roosevelt Hotel in Hollywood, Wednesday morning, December 9th. Mr. Guilford's lecture on the subject of Geophysical Prospecting was attended by an audience of over one hundred members of the Inventors Congress and was enthusiastically received.

CREI CLASS

The special class of ten CRTA members who are studying the CREI course in practical radio engineering under the guidance of Dr. Blackburn, is progressing nicely. The class include Messrs, Neely, Vincent Mattson, Swinney, Elsner, Lewis, Orme, Faust, Ekleberry, and Ullberg, and meets one night a week at Dr. Blackburn's laboratory. The entire CREI course will be thoroughly covered, lesson by lesson, under the tutorage of Dr. Blackburn, who is a practicing radio engineer and a consulting physicist of note.

LETTER WRITING IN

TWO E-Z LESSONS

Gentlemen:

I have your collection letter of such and such a date and I am happy to give you the following information.

We have divided our creditors into three groups:

Class A—Those who will be paid immediately.

Class B—Those who will be paid some day.

Class C—Those who will never be paid.

In consideration of the friendly tone of your letter we are promoting you from class C to class B.

SPEED UP AND INCREASE YOUR INCOME

ADEQUATE SERVICE EQUIPMENT WILL INCREASE YOUR EARNINGS and ELIMINATE the HEADACHES of SERVICING

See Page 31 for T R I U M P H LABORATORY EQUIPMENT



Get This Book and Increase Your Profits . . .

**YOURS
for
10c**



RADIO SERVICE MEN! This book will increase your profits, because in it you will find all of the latest technical information that is necessary for your job . . . how to recognize tube and set troubles . . . and most important, how to solve these problems to get fine, sure performance!

The book contains 114 pages . . . and is crammed with useful information. Complete data on all tubes, including types 15, 18, 255, 25Ys, 2Z2, 46B1 and 182B, and complete descriptions of over 90 types of tubes.

This is Sylvania's latest service help . . . and it's yours for 10c. Take the guess out of tube application! You can if you send for this handy pocket manual.

YOURS . . . FOR 10c IN STAMPS

10c TECHNICAL MANUAL 10c

Hygrade Sylvania Corporation (G-5)

Emporium, Pennsylvania

Please send me the new Sylvania Technical Manual. I enclose 10 cents in stamps.

Name

Address

City..... **State**.....

HYGRADE SYLVANIA CORP.

Makers of

Hygrade Lamps

Sylvania Tubes

Electronic Products



Factories

Emporium, Pa.

St. Mary's, Pa.

Salem, Mass.

Clifton, N. J.

Sylvania

The Set-Tested Radio Tube

—Copyright H. S. CORP. 1934

AT LAST!

— A POPULAR PRICED TUBE TESTER THAT READS —

Dynamic Mutual Conductance

THE MODEL 400 TUBE TESTER BY TRIUMPH

Neon Leakage Indicator Shows Leaks as High as 3 to 5 Megohms
Individual Element Short Test — Spare Socket
Needs No Line Regulator Between 100 and 130 Volts
Separate Tests on Diode or Triode Sections of Multi-Purpose Tubes
Tests All Rectifiers — Simple to Operate
Beautiful Appearance — Counter and Portable Styles

— A REAL TUBE MERCHANDISER —

At a Price Which Makes It Possible for Every Business and Every Technician
to Possess a Real

DYNAMIC MUTUAL CONDUCTANCE TESTER

NET
PRICE

\$34⁹⁵

F. O. B.
CHICAGO

— A Price All Can Afford — A Tube Tester for the Most Exacting —

REDUCED PRICE!

To enable all progressive technicians, service laboratories and factories
to avail themselves of the use of a real laboratory signal generator the
Triumph Model 100 Generator has been reduced to the Very Low

NET PRICE OF **\$29.95** F.O.B. CHICAGO

WRITE THE LOCAL REPRESENTATIVE FOR YOUR FREE COPY OF THE
TRIUMPH SIGNAL GENERATOR HAND BOOK and SHOP NOTES

THE TRIUMPH MFG. COMPANY, Chicago, Ill.

See These Distributors for Demonstrations

RADIO SPECIALTIES COMPANY
1816 West Eighth Street, Los Angeles

ELECTRIC PRODUCTS SERVICE
1358 South Grand Avenue, Los Angeles

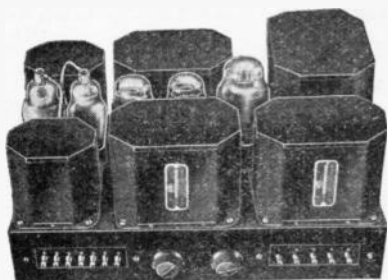
California Representative:
NORMAN B. NEELY, 1656 North Serrano Street, Los Angeles



and now . . . The Newest 1935 Development from
the UTC Engineering Laboratories

the Varitone[★] Audio Transformer

A universal audio input transformer giving continuously variable low end, high end, or low and high end equalization.



VT-1—Designed to work from a single plate or low impedance microphone line to one or two grids.

List price \$8.50

Net to Dealers \$5.10

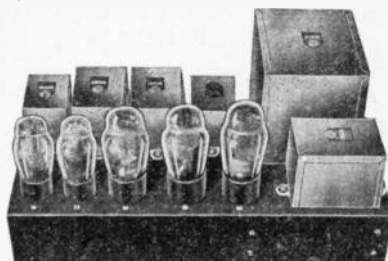
Affords 15DB controllable correction of low and high frequency response, high frequency response, or simultaneous correction of low and high frequency response.

High Fidelity 245 A Prime Receiver Amplifier using the VARITONE
Typical components for use in a popular priced high fidelity receiver amplifier using the VARITONE as an input source.

Units used are the VT-1, PA-132, PA-245, PA-22, PA-44 which list at \$39.50

UTC NIKLSHIELD units are
now available in amplifier
Kit form.

Typical Niklshield 2A3 Double
Push Pull Amplifier



*Patent applied for.

DISTRIBUTED BY

Radio Supply Co. Radio Television Supply Co.
Pacific Radio Exchange Radio Specialties Co.

Complete Warehouse Stocks in Los Angeles

Use - UTC - for - Quality

United Transformer Corp.

U-T-C Representative, C. R. STRASSNER, 1341 South Hope Street
Richmond 6301