$84.50 OSCILLOGRAPH ANNOUNCED

RCA UNIVERSAL TRANSFORMERS FIT ALL SETS

Assortment of Four New Power Transformers Offered at Low Cost

Now service engineers can install true RCA quality in replacement power transformers for any make or model of a-c set manufactured to date and do so from a stock of only four transformers. The new line of four types of RCA Universal Power Transformers is priced surprisingly low, yet has really unusual mounting brackets, removable end-bells, wide range of windings and taps, and is really universal both electrically and mechanically.

Since the charge for replacing a power transformer is the one on which customers most frequently balk, many service shops will welcome the opportunity to be able to offer a replacement transformer carrying the famous RCA trade mark with its assurance of quality and established value.

Four Units Handle Any Job

The transformers have been divided into four classes, for ten or twelve tube receivers, for class E receivers, for five to nine tube receivers, and also for four tube receivers. RCA Parts division officials are proud of the fact that except the small transformer for four tube receivers the larger will be available shortly.

Sufficient windings and taps have been brought out in all the new transformers to cover any of the receivers that have been manufactured under the particular tube designation indicated on the transformers. Mechanically, these transformers have mounting slots which permit a wide variety of mounting positions and arrangements. An exclusive feature is the removable end-bell, which permits all connections to be made orverically and horizontally.

An Eyeful and an Earful

Patriot of the recently-opened Roxy-Mauchbaum Theater of Philadelphia get both an "eyeful" and an "earful." Above are shown twelve of the thirty-two Roxyettes, the world's most famous precision dancers, who lend their charm to the Roxy stage productions. To give patrons the very finest "earful" of Roxy music, one of the world's largest amusement palaces, has installed the latest type of Roxy Photophone High Fidelity Sound Equipment.

Many Pencils Awarded for Antenna Sales

RCA Antenna Popularity Brings Remarkable Pencil to Many Service Men

With RCA World-Wide Antenna sales booming as a result of the proven performance of the product and the national advertising it is receiving, radio service engineers the country over are rapidly equipping themselves with the unique RCA Service Engineer's Pencil, which automatically calculates resistor values from the Code and which is given free for the labels from any RCA World-Wide Antenna Kit.

The patented pencil, which is an exclusive RCA contribution to radio service work, is offered at a low cost and is not suitable for radio service work.

Price of Complete New RCA Instrument Includes Ray Tube

Linear and Vertical Amplifiers, Sweep Circuit, and Beam Centering Are Among Desirable Features

(See advertisement, page 8)

It's here! And it costs only $84.50 net with full complement of tubes, including RCA-906 Cathode Ray Tube! The RCA Cathode of Ray Oscillograph, a complete laboratory-type instrument, is now ready for every Service Engineer who wishes to render factorey-precision service to complicated modern receivers.

For years radio manufacturers have used highly-expensive oscilloscopes for testing and aligning and have regretted that the cost of the equipment prevented the men who serviced their products from having similar equipment. The development and perfecting of a low-priced cathode ray tube by the RCA Radio and Television Research Laboratories, the first step toward making possible an oscillograph of moderate costs. While simple oscilloscopes without variable frequency sweep circuits or vertical and horizontal amplifiers are easily and cheaply produced, they have only limited uses and are not suitable for radio service work.

It remained for RCA to design and produce a complete and inexpensive oscillograph suitable not only for radio service work but also for amateur radio operators, high schools and colleges, radio manufacturers, radio dealers, or anyone who needs an instrument for research and study of alternating currents.

Rider Speaks

"I believe that the cathode ray oscillograph will prove to be the most useful instrument ever developed for the servicing industry. Its versatility will enable service operations hitherto beyond the capabilities of the industry with equipment developed and those operations will not only ease the standards of servicing, but will materially enhance the financial income. The obstacles presented to the service technician as a result of modern receiver design trends and the limitations of existing meter-type of servicing equipment will be overcome by the proper application of the cathode ray tube.

JOHN F. RIDER

Publisher of "Rider Manuallas"

No Diagrams Needed for Connecting

(Continued on page 2, column 4)

RIDER MEETS

1935 RCA Service Men at Many Service Centers

The first of the 1935 series of RCA Victor Service Meetings was held in the Hotel Pennsylvania in New York City, on January 21, 1935. This meeting inaugurated a most new series of meetings for service engineers that will extend over the entire country with meetings in both large and small cities and towns. The exact dates of these meetings in any locality will be obtained from the nearest RCA Parts distributor.

The subject for the first series of meetings in one that is of extreme interest to all service engineers, and much as it has been a source of considerable profit to them in the past year and will be to a greater extent in the forthcoming year. This subject (Continued on page 2, column 2)

HE ALSO SERVES — An Editorial

By E. M. Hartley, Manager, RCA Parts Division

"He also serves who only sits and waits"—but in most cases he doesn't serve enough customers to spend his waiting time figuring how to invest his surplus income.

Too many radio service engineers are sitting and waiting for customers to call.

There are approximately 18,000,000 radio sets in the United States. If only one of them was merely checked over and inspected once a year, the radio service business would be rolling in prosperity.

Surveys have shown that four out of five radios need one or more new tubes. The great majority of sets operate with severely inadequate antenna systems. And how many sets are struggling along with unbalanced circuits, burned-out parts, etc., there is no way of knowing, but anyone in the radio service business knows that it is far too many.

True, we have been through a depression, but it has not been lack of money on the owners' parts that has kept these sets from getting the attention of the radio service engineer that they badly need.

In most cases they just don't know how much extra satisfaction they would get from a few dollars spent for radio service.

(Continued on page 2, column 1)

E. M. Hartley

Publisher of "Rider Manuallas"

No Diagrams Needed for Connecting

(Continued on page 2, column 4)
BETTER TIMES PROMISED BY TRADE SURVEY

Dun and Bradstreet Says 1935 Will Be Busy Year For Radio Business

The radio industry has turned the feature corner and it seems reasonably certain for prosperity judging from a survey recently completed by no less an authority than Dun & Bradstreet, Inc. 1934 was the best year in the history of the industry and 1935 promises to be even better.

Although the figures were more or less occluded during 1934, current indications point to an increased demand during the first quarter of 1935, with some peak usage being anticipated during the last six months of that year, which would bring the total for the year to the highest survey of the radio industry.

Sales at New Peak

In spite of the encouraging progress made during the first six months of the present year, it is estimated that the total for the year will not have been abated since the new models were brought on the market. A comparison with the totals for the corresponding period of 1933, however, is being reported in no part of the country, with sales ranges from 25 to 50 per cent.

Higher Units of Sale

The prices of radio sets have been brought fairly, but the proportion is not so large that economic depression has been decided a shift to the higher-priced models during the last three months. Based on the returns for the eleventh month of the year, the trend of the market appears to be toward a country, as a whole, average 40 per cent higher than for the comparative period of 1933. This would bring total sales for the year to 1935, as compared with the previous year of 7.5 million.

From 60 to 65 per cent of the units sold are for about the same amount as in 1933, as a large discount is made to the radio industry. While a few models are two or three years, owners now turning in their old sets for the new all-wave models.

Wider Interest in Broadcasts

In October, the highest sales in broadcasting history were recorded, with $6,527,000, a gain of 35 per cent over previous sales, and 40.4 per cent higher than in October, 1932. For the first time, the sales figure was approximately $3,260,000, or 35.8 per cent higher than the previous year, and 59.2 per cent over the figures, and 2.7 per cent in excess of the 1934 model. Sales for the year, which represented the all-time high.

Price Trend Upward

World depression in prices has been absent since last Spring, and the current market is that of the market that the offer has been extended indefinitely so that every service engineer can get in on the effects of the telephone.

Antenna Line Complete

The recent additions to the RCA antenna line make it easier to win a service job. For a list price of only $1.25, there is now a full RCA Universal Wide-Antenna which reduces noise on all broadcast bands, including the standard domestic broadcast.

THE ALSO SERVES—An Editorial

(Continued from page 1)

It is time for radio service engineers to stop sitting and waiting. In justice to ourselves and to the public, we must tell the public what it needs, what we have to offer. We must advertise.

The people who beat a path through the woods to the door of the man who makes a better mouse trap do so because the mice are getting bad at home—and they know they don't like mice. But they will not beat a path to the radio service store, do not like mice. But they will not beat a path to the radio service store, because they do not know the man who makes a better one.

No longer can the radio service engineer expect the simple business card—"John Jones, Radios Repaired"—to bring customers flocking to him. He must tell people how much they will enjoy a properly serviced radio set and that John Jones is the man with the knowledge, the equipment, and the integrity to do the job.

So much of the radio service advertising that has been done is misleading nature that a rich reward awaits those legitimate service engineers who advertise in a simple, straightforward manner but promise only honest work and high-quality parts for honest prices.
**FUTURE RADIO WONDERS SEEN BY GOLDSMITH**

Says Radio May Transmit Sensations of Touch and Taste in Future

Cleveland, Ohio — Speaking through a tiny microphone no larger than a matchbox, fastened to his coat lapel, a radio engineer described as "permitting one man to be heard above a multitude," Dr. Alfred N. Goldsmith, noted scientist and consulting engineer of the RCA Manufacturing Company, has described and demonstrated some recent scientific developments from the leading radio research laboratories.

Better Talks

To illustrate the remarkable progress which has been made in improving the quality of sound motion pictures, Dr. Goldsmith demonstrated for the first time in public a radically new system of high quality sound-on-film recording which according to the RCA Victor engineers who developed it will be the "motion picture sound of tomorrow," because it completely eliminates background hissing noises and theoretically makes possible the ultimate of realism in sound-on-film recording and reproduction.Using a special film recording of a musical performance in the Radio City Music Hall in New York, Dr. Goldsmith called attention to the ability of the new system to reproduce all the instruments in the orchestra.

"This X-Ray of Radio Service"

A remarkable new RCA device called an oscillograph was connected to a number of radio receivers to permit everyone to "see" the characteristics of the human voice or other sound in the form of fluctuating waves. A stream of electrons, otherwise known as a "wave form," is produced from the sound waves on a glowing, or "fluorescent," screen. The oscillograph, according to Dr. Goldsmith, is expected to become a tool of both electrical and mechanical research and development what the X-ray is to diagnosis in medicine. Originally designed for radio service men and engineers it is finding a wide range of applications in many other fields, including certain phases of biology, automotive, and public utility industries.

**CHASSIS VIEW SHOWS DETAILS OF QUALITY CONSTRUCTION**

RCA leadership in engineering and manufacturing is evident in every constructional detail of the RCA Cathode Ray Oscillograph. Symmetrical layout of parts, elimination of shielding, advanced circuit design and fool-proof construction are visible evidence of the built-in quality of the RCA Cathode Ray Oscillograph.

**WELL-ARRANGED AMATEUR STATION**

Dr. H. A. D. Beer, Director of the Baer Hospital, Allentown, Pa., reports excellent results from the new R.C.A. Communications Receiver, ACR-136, recently installed in his amateur station W2YX. A remarkable value at $69.50, this new RCA receiver has already become favorably known with a large number of progressive amateurs.

"Using a simple receiver and detector coil system similar to that of the famous RCA Victor "Magic Brain" receiving, this instrument has excellent performance in every operating requirement," says Dr. Baer, who is to be congratulated on the fine appearance and excellent equipment used in his station, which also includes an RCA Test Oscillator, Type DVM-92 B.
CHURCH USES SOUND SYSTEM TO CORRECT POOR ACOUSTICS

Vincent Microphones, Directional Speakers, and Twenty-Watt Amplifier Solve Problem

Tremendous sales possibilities for service engineers and dealers in every city, town, and hamlet are the story of how RCA engineers converted the acoustical conditions in St. Gregory's Church, Brooklyn, New York.

Similar problems confront thousands of churches and churches served by and for RCA Victor dealers, who have the solution, RCA Victor distributors will gladly tell you.

The poles of a large transformer, thus eliminating the possibility of any field effects. The unique, simple construction, together with high-quality operation, makes the Velocity microphone ideally suited for public-address and sound-systems. The microphone's simplicity is complemented by the ease of service.

The RCA Cabinet Refinishing Kit contains the necessary equipment for refinish operations that are to be performed, and is designed to facilitate manufacturing operations. Unlike the ordinary lamp, the head and tail sections are geared so that both sections rotate at exactly the same speed, thus preventing any distortion of the glass tube.

The RCA Cabinet Refinishing Kit is a collection of all the essential and hard-to-get materials needed for cabinet touch-up work. The materials are contained in convenient cans which are packed neatly in a handy Canterbury case.
SERVICE TIPS

Win a handsome pigeon watch. Until further notice, these popular wallats will be given to all whose tips on any phase of radio service are published in this column. Send your tips to the Service Tips Editor, RCA Radio Service News, Camden, N. J.

Subjects for Service Tips Pointed Out

Interruption Operation is Likely Subject for Wallet Winner

The "Service Tips" section of RCA RADIO SERVICE NEWS is rapidly becoming a recognized medium for exchanging worthwhile service ideas. While it is impossible to use all of the many tips sent in, the Technical Editor wishes to thank those who have sent in tips and ideas which have not been used.

Reviewing many of the tips sent in reveals that some of them are really "tips," but may be classified as routine service procedures. Some of the ideas presented are number of letters merely mentioned that after thoroughly checking a receiver, it was found that a tube ceased to be the cause of the difficulty. Others have reported the failure of a particular part, such as a resistor or a condenser, and still others have reported lack of alignment as being the cause of some difficulty.

Good Tips Usually Simple

While many service tips are extremely simple (usually the best tip is an extremely simple nature), letters containing the changing of tubes or the beginning of defective parts are not usually considered suitable for the "Tips" column, because these will probably be considered routine servicing.

An important thing of the kind of tips that are of interest to all is a tip having to do with intermittent operation. A simple tip of placing a pig-tail on a one or two radio men service that set before· these may cause intermittent operation service engineer.

The usual service methods will not dis-...
MAGNETIC ACTIVITY

SIX HOUR TOTALS OF HOURLY RANGES OF HORIZONTAL INTENSITY, ONE SCALE DIVISION=30GAMMAS

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Sources of Signal and Profits

Because of its remarkable performance, small size and quality construction, the RCA Test Oscillator, TMV-97-B, continues to lead in popularity with service engineers, although it was introduced only a year ago. Its companion instrument, the RCA Output Indicator, Type TMV-121-A, which cannot be burnt out, also now sold become older, re-alignment will become a more important item of revenue for service engineers than it has been in the past. All radio receivers perform better if re-aligned periodically, especially their short-wave bands, require periodic re-alignment.

All RCA Parts Distributors are featuring these instruments. The RCA Test Oscillator, Type TMV-97-B, is sold with standard calibration, plus or minus 5% at $29.90 net. Individual calibration guaranteed accurate plus or minus 1/2 of 1% is $3.00 additional. The RCA Output Indicator, including its neon bulb, is sold by RCA Parts Distributors for $4 net to service engineers. Because of the extremely high frequency of alignment points and because this realignment is much more evident due to the general low level of signals, a satisfactory job cannot be performed without proper equipment.

As more all-wave receivers are sold and those now sold become older, re-alignment will become a more important item of revenue for service engineers than it has been in the past. All radio receivers perform better if re-aligned periodically, at least once a year. All-wave receivers, especially their short-wave bands, require periodic re-alignment.

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**PRINCIPLES OF NOISE-REDUCING ANTENNAE**

**PART II**

By W. H. BOHLKE and V. D. LANDON

RCA VICTOR ENGINEERING DEPT.

The new De Luxe RCA World-Wide Antenna System has been developed to meet the growing demand for antenna systems in which the noise-reducing feature has been taken care of in the form of the average All-Wave Receiver. The antenna design of this new system has also eliminated the need for a Switch on the Receiver Coupling transformer.

The De Luxe System, Stock No. 9550, differs from the front and standard system, Stock No. 9500 System, in that a transformer is employed for purposes of comparison. The broadcast transformer acting as high impedance transmission line and runs from the antenna end of the transmission line. The same "Double-Double" antenna arrangement is used and the same type of transmission line is employed for the new type.

**De Luxe System Explained**

The fundamental development which makes the De Luxe design possible is the idea of using different transformers for different frequency bands and placing the transformers in series to obtain transmission over the combined frequency ranges.

The circuit arrangement for doing this is shown in Figures 6-A. The transformers (b) have the same inductance, transmit the highest frequency waves, and are bypassed around the other transformers (c) and (d) by condensers C2 and C3. Lower frequency waves are transmitted by (c) and (d). There is a certain intervening frequency at which the transformers (b) and (c) are equally effective in passing the waves. At this frequency (g) gives a double phase reversal due to the effect of the condensers C and the leakage reactance of the transformer (a), thus the two transformers and the antenna together provide the mutual reactance of the antenna. The inductance of the transformer (a) and (b) are additive, providing the sign of the mutual inductances of the transformers are the same.

In this manner any desired number of transformers may be connected in series and the frequency range extended almost without limit in either direction. The efficiency of transmission is high and practically constant over the extended frequency band.

In designing this transformer system the component transformers are designed separately for each frequency band, and each is connected together as shown.

**Feeding an All-Wave Receiver**

In feeding an All-Wave Receiver from a De Luxe System, it is necessary to maintain primary systems in each transformer as shown in Figure 6-B. The values of the inductance and condensers are calculated in the same manner as described in the case of the "Double-Double." An ordinary single loop of wire wound on a form of a non-magnetic core is connected to the broadcast transformer as used with the De Luxe System, Stock No. 9500, and as illustrated schematically in Figure 6 and noise pick-up on the transmission line is eliminated. The broadcast transformer acts as a high frequency band. Without further change, however, the pick-up is too weak for broadcast band (550 KC to 1500 KC).

Will Sing On RCA Radio Program

Gabrielle Daley, shown above, will be a featured singer on February 13, on RCA-sponsored Radio City Matinee, New York feature which is already a great favorite with all Wednesday afternoon (2 P.M.) audience.

Radio City Matinee is rapidly becoming one of the most popular of the afternoon programs. Audience response results in the form of in­

practical because the required noise (measured at the receiver output and practically constant over the ex-

The recording equipment in Symphony Hall, Boston, where the orchestra makes all of its phonograph records and where the radio program originated, was set in series during the broadcast and a selection by the orchestra re-

](Continued from page 1, column 2)

**NEW YORK—Radio listener—who has heard many novel broadcast features during recent months, including the phonograph record by a world famous orchestra for the first time—is already a great favorite with all Wednesday afternoon (2 P.M.) audience.

The Radio City Matinee is rapidly becoming one of the most popular of the afternoon programs. Audience response results in the form of increased audience. RCA, in operation, is—receivers to receivers with world-wide anten-

sinal reception blocks, etc., necessary. (Continued from page 1, column 2)

The Boston Symphony Orchestra, under the direction of its famed conductor, Serge Koussevitsky, was the guest attraction at the broadcast on January 23, and made a new RCA Victor record while the program was on the air.

**Program on Victor Records**

The recording equipment in Symphony Hall, Boston, where the orchestra makes all of its phonograph records and where the radio program originated, was set in series during the broadcast and a selection by the orchestra recorded after further release as a regular RCA Victor record.

The composition to be preserved was "The piece of resistance" of the full hour broadcast by the famous station.

**RCA Radio Video News**

Sells For Only $84.50

(Continued from page 1, column 2)

ODE Ray Oefficient. One new feature for a moderately-priced phonograph, for instance, is the vertical and horizontal amplifiers having a flat frequency range of from 20 to 90,000 cycles with an amplifier gain of 48. This is a feature which without which the high sensitivity of two volts per inch could not be obtained.

Another new feature is the line of "ประโยคบริบท" which has a wide frequency range from 20 to 15,000 cycles. This permits the close observation of extremely high frequencies.
Engineer Explains Oscillograph Uses
For Service Men, Amateurs and Schools

Visual Alignment and Locating Overloads Among
Valuable Uses for Service Men. Amateurs
Can Monitor Oscillation

By H. H. Schrader
RCA Development Engineer

The Cathode Ray Oscillograph as illustrated in the RCA Radio Service News, February 4, 1935 is an infor-
mative and varied use in the radio-electrical industry. The completeness of the instrument recommends it
well to schools, universities, engineers and experimenters.

Oscillograph Uses in Radio Service Work

The uses of the Cathode Ray Oscillograph to the service engineer are many. It may be used to analyze
the wave form of current and voltage present in circuits. This means to find the proper operating conditions for
a receiver and to readily determine and adjust.

Visual Alignment

One of the most important uses of the instrument is that of visual alignment of the receiver. For this applies a test oscillograph and a small grid-driven capacitor are re-
quired in addition to the oscillograph. If the frequency of the grid-driven capacitor is connected in parallel with the tuning
capacity of the test oscillator, we have a source of radio frequency voltage on the plate circuit of the oscillograph.
The average frequency of this source may be varied over a range of audio frequencies or radio frequency within the range of the oscillograph. If the source of voltage applied to any of the i.f. or r.f. stages of a radio receiver there will appear across the detector output circuit an a.
c. voltage depending in amplitude upon the selectivity curve of the re-
civer. If this voltage is applied to the vertical deflecting circuit of the oscillograph and the timing axis is adjusted to the proper frequency the timing curve is presented by the rate of rotation of the motor-driven capacitor, the frequency of which is illustrated by the curves in Figure 2 of the receiver will appear on the screen. If the characteristics of the oscillograph or amplifier stage under test is doubled the curves may be observed as in Figure 2. These curves represent proper alignment of the oscillograph but if improperly aligned a curve such as Figure 3 might appear on the screen.

Cathode Ray Oscillograph

Stock No. 9545

$8450
With RCA Tubes, Including RCA-906 Cathode Ray Tube

Complete...

The RCA Cathode Ray Oscillograph, Stock No. 9545 is complete in every essential requirement for immediate use. It includes two power supplies (one for the Cathode Ray Tube and one for the antenna) and horizontal and vertical amplifiers, saw-tooth frequency generator and six tubes, including the RCA-906 Cathode Ray Tube (3-inch).

2 Volts per Inch...

Through the use of two wide-frequency-range high-gain amplifiers, the sensitivity is guaranteed at 2 volts A. C. per inch for both vertical and horizontal deflection. The amplifiers were carefully frequency corrected between 20 and 90,000 cycles ± 10 per cent. The amplifier gain is approx-
imately 40.

20,150 Cycles...

A linear saw-tooth timing frequency oscillograph with a special synchronizing circuit is an integral part of the RCA Oscillograph. The frequency range extends from 20 to 15,000 cycles. A special examination of a single cycle up to 15,000 cycles or the equivalent of six cycles up to the limit of the amplifier—90,000 cycles. Suitable switching is pro-
vided so that either the internal timing oscillograph or an external source of timing may be used. In addition to the plates, the timing axis may be observed and the oscillograph or amplifier base plate may be connected directly to the plates for operation above 90,000 cycles with a sensitivity of 75 volts per inch.

Beam Centering

Two screwdriver adjustments are provided for centering the beam on the fluorescent screen. This may be required because of changes in geographical location or variations in tubes and circuit constants.

With these connections the wave form of the modulation may be readily ob-
served and corrections to the transmi-
ter made if improvements are desired. If it is desired to monitor the per-
centage modulation and obtain an image on the screen which does not move as the modulating frequency is varied, a second method is perhaps pref-
erable. Apply the i-f voltage as before.