



RADIO SERVICE NEWS

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NEW RCA AUTO ANTENNAS READY

**New Low Prices
Announced for
Oscillographs**
Three-inch Job Now \$63.95
—One-inch \$39.95

The finest in oscillographs, at prices within the reach of every service engineer, are now made possible by the reduction in prices of RCA's most famous instruments, the Stock No. 9545 3-inch and the Stock No. 151 1-inch Cathode Ray units. These oscillographs, which have been leaders since their introduction, have been exceptional values at their old prices. The 3-inch unit was \$84.50—now \$63.95, while the 1-inch job formerly was \$47.50—now \$39.95. Because of the economies resulting from volume production, RCA is offering both of these instruments at prices which a few years ago would have been virtually impossible.

Complete Units

The Stock No. 9545 Cathode Ray Oscillograph uses the RCA 906 tube, includes both vertical and horizontal amplifiers and is complete in every detail ready for the most advanced applications. It is RCA's finest portable oscillograph.

The Stock No. 151 1-inch oscillograph uses the 913 Cathode Ray Tube and includes vertical and horizontal amplifiers. This unit is admirably suited for all service applications. While being of compact design, the Stock No. 151 Oscillograph is a real service instrument, making difficult jobs extremely easy.

All RCA Parts Distributors are now featuring these new low prices. In addition, with each piece of RCA Test Equipment purchased during January and February an RCA 3-Point Service System, including the Service Tip File complete with 200 selected tips and 11 tip packets of 20 tips each, is given free.

Has 22 Scales



The new RCA Ultra-Sensitive D-C Meter can readily measure one-millionth of an ampere on its .02 micro-ampere full-scale range

Miss "Horatio Alger"



Lucille Manners, beautiful NBC soprano, whom admiring friends along Radio Row have dubbed Miss "Horatio Alger." And well they might, too, because in the short space of two years Miss Manners rose from a secretarial job in New Jersey to her present position, the prima donna of the Friday night Cities Service Concerts, broadcast at 8:00 p. m., EST, over the NBC-Red Network

**Prices Increase
For RCA Tubes
January Third**

**Dealers Benefit By Higher
Lists On Many Types**

L. W. Teegarden, renewal tube sales chief, has recently announced a list price increase effective January 3 on many types of glass tubes manufactured by RCA.

At the present time approximately fifty tube types represent eighty-five per cent of the replacement tube business; and in view of the fact that efficient low cost manufacturing depends upon large volume, fast moving types can be sold at lower prices than slow moving types.

Older type tubes continually de-

crease in volume because fewer and fewer sets remain in service which employ them. As a result production costs rise and price adjustments become necessary.

Says Mr. Teegarden, "The radio tube industry has long awaited the announcement of a price increase, and I firmly believe that the initiative taken by RCA will do more to elevate the replacement tube business to the position it rightfully deserves than any other single step taken by a manufacturer during the past few years."

"The radio industry is fast becoming aware that check-up or reconditioning programs, originally sponsored by RCA, produce the bulk of the replacement tube business. It is hoped that the initiative being taken by RCA in announcing this price increase will encourage other tube manufacturers to establish a sound price policy under which distributors and dealers can operate profitably."

The very evident scramble for radio tube business during the past few years has caused confusion if not disgust to many dealers, and RCA officials believe that by initiating a price increase it will tend to stabilize the activities of the industry.

**RCA MONOGRAM ANTENNA ADDS
STYLE NOTE TO INSTALLATIONS**

**Five Antennas Fill Every Installation Need — Cowl-
tenna Is of Telescopic Design**

A complete new line of automobile antennas embodying the latest design trends in both style and technical efficiency have just been announced by J. A. Milling, Manager of the RCA Parts Division. These antennas strike a new note in the combination of high signal pickup and outstanding ornamental qualities. With their new satin finish and non-rusting construction, they add greatly to the appearance of any car, old or new.

Uses RCA trade-mark

The new RCA Monogram Antenna is designed around the famous RCA trade-mark as a central theme, the trade-mark being finished in polished metal against a bright red background. A telescopic extension permits the length to be adjusted from 21" to 35½", while the front extension to the cowl connection may also be adjusted over a range sufficient for all variations in windshield height.



Stock No. 9823
List Price \$4.95

The streamline bakelite insulator is provided with a special suction cup, which may be cemented to the car top—no hole required. The extension through which connection is made is fitted with an insulated bushing which makes a perfect seal in the cowl. An 8" shielded cable, fitted with a male bayonet connection, simplifies all connections to the receiver. The list price of the RCA Monogram antenna is \$4.95—Stock No. 9823.

(Continued on Page 3, Column 1)

**RCA Television
Tubes Ready for
Experimenters**

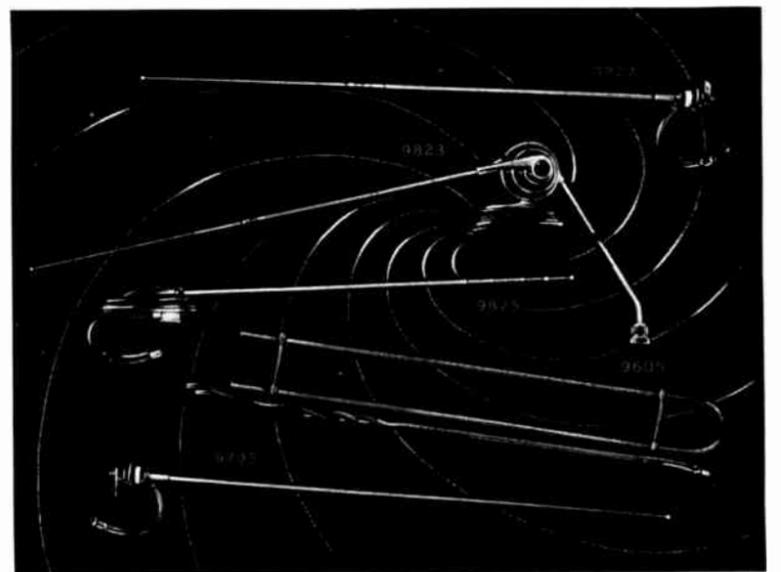
**New Deflecting Yoke Also
Made Available**

Two cathode-ray tubes suitable for television reception are being made available to radio amateurs, educational institutions, laboratories and others interested in experimental television by the RCA Manufacturing Company. While some television equipment has been sold to the National Broadcasting Company and to the Columbia Broadcasting System, this is the first television apparatus offered for general sale by RCA in the United States.

In announcing these tubes RCA is emphasizing that placing the tubes

(Continued on Page 2, Column 5)

Streamlined Plus!



The artist's conception of streamlining adds even more to the beautiful appearance of the new RCA Auto Antennas for 1938. These fine antennas will fill every installation need for a highly efficient, attractive auto antenna

Bonfig Elected New RCA Victor Vice-President

Deakins, Woodcox and Shannon Advance to New Posts

The Board of Directors of the RCA Manufacturing Company has elected three new Vice-Presidents and increased the responsibilities of another, according to an announcement by George K. Throckmorton, President of the RCA Manufacturing Company.

Henry C. Bonfig, formerly Sales Manager of package goods, has been elected Commercial Vice-President heading the Company's commercial activities in all fields.

Mr. Bonfig, or "Bonny" as he is affectionately known to his legion of friends, has had a long and distinguished career as a radio merchandiser since 1920. At that time he headed his own wholesale radio organization under the name of the Sterling Radio Company, in Kansas City, Missouri. For twelve years thereafter he directed his Company's radio, record and refrigerator sales activities. In 1932, he joined the General Household Utilities Corporation as Vice-President in charge of sales. Four years later he joined the RCA Manufacturing Company to become Western Division Sales Manager. A short time afterward he was transferred to Camden headquarters to coordinate package goods sales under the Executive Vice-President. He was appointed Sales Manager in charge of package goods activities later in 1936, which position he held until his election as Commercial Vice-President.

Deakins Directs Engineering Products Sales

Frank R. Deakins, formerly Sales Manager of engineering products and RCA Photophone sound recording and reproducing activities, has been elected Vice-President and will continue to direct the same activities. Mr. Deakins has an unusual background in the electrical and radio industries. After completing his course in Electrical Engineering at the Alabama Polytechnic Institute, he joined the General Electric Company at Schenectady. In that company he advanced to the position of Assistant Sales Manager in 1930 when the General Electric and Westinghouse companies were transferred to Camden. In Camden, he has held the post of Assistant to the President, Executive Vice-President of the Victor Talking Machine Company of Canada and Manager of Engineering Products and Photophone Divisions.

Shannon Vice-President and General Manager

Robert Shannon, Vice-President in Charge of Manufacturing, has

New RCA Vice-Presidents



Robert Shannon



H. C. Bonfig



Vance C. Woodcox



Frank R. Deakins

Election of three new Vice-Presidents and increasing the responsibilities of a fourth has just been announced by G. K. Throckmorton, President of the RCA Manufacturing Company

been elected Vice-President and General Manager. Mr. Shannon will coordinate in the general direction of all activities except those under the direction of the Commercial Vice-President. Mr. Shannon has had a long and varied career identified with the lamp, vacuum tube and radio manufacturing industries since 1912. Starting with the Westinghouse Company, he has progressively handled and supervised practically every function in manufacturing production and factory administration. In 1935, Mr. Shannon came to Camden from the Harrison plant as Manager of all RCA radio manufacturing activities. A year later he was elected Vice-President in Charge of all Factory Activities.

Vance C. Woodcox, formerly engaged in supervisory sales activities, as assistant to the package goods Sales Manager, has been elected Vice-President, succeeding Mr. Bonfig as head of all package goods merchandise activities. Mr. Woodcox brings to his new position a wealth of sales and merchandising experience. He joined RCA in 1935 and became the company's first Central Division Sales Manager. Shortly after he joined RCA he was transferred to Camden to take charge of the company's field activities. Early this year he was promoted to assist the Sales Manager in Charge of all Package Goods Sales. With his election as Vice-President, Mr. Woodcox takes over the former duties of Mr. Bonfig and heads all package goods merchandise activities.

12 Sentenced in Radio Racket to Protect Buyers

New York and New Jersey Prosecute Violators of Penal Laws

According to reports in Radio Today, Radio Weekly and other national radio trade magazines, misbranded inferior radio receivers, tubes and other equipment have virtually disappeared from shop windows following a clean-up instituted in New York City and Newark by authorities acting in the public interest.

Violations of the Penal Laws of the State of New York brought twelve convictions and sentences for radio shops, their proprietors and certain employees who were tried in the Court of Special Sessions of New York County, where three similar cases are pending and four other defendants are awaiting sentence. The defendants were convicted of selling spurious sets bearing the trade-marks "Victor," "Brunswick" and "Edison."

Eight Defendants in N. J.

At the same time, in New Jersey the County Prosecutor of Essex County began a similar clean-up in Newark. Following consent decrees entered in suits brought in Equity by manufacturers against a total of eight defendants, permanent injunctions have been obtained to stop them from selling sets and tubes improperly bearing the trade-marks of nationally known radio manufacturers, and the criminal prosecutions there have been dropped.

The offense charged in the criminal prosecution was characterized by the court in New York as a racket which preyed on the poorer element of the public. People with small amounts to spend, wanting good radio sets were led to believe that they were purchasing recognized manufacturers' sets at astonishingly low prices. When the sets went wrong and they complained to the manufacturers, they found for the first time that the instruments were not genuine. By appealing to those with smaller amounts to spend and others seeking bargains, the infringing dealers are alleged to have defrauded the public and exacted tremendous amounts of money.

RCA Display Rooms Show All Products

Many Visit Chicago and Camden Exhibits

Scores of fascinating radio devices, ranging from complete police and aviation communications apparatus to the newest radio and phonograph instruments, all engineered and built by the RCA Manufacturing Company for an almost limitless variety of applications, have been assembled in two beautifully decorated showrooms in Chicago and Camden, N. J., respectively.

Both showrooms are almost identical in arrangement and appearance. Designed especially to display all of the Company's products under the best possible conditions, they have become a sort of Radio Mecca for visiting dealers, wholesalers, the thousands of RCA employees and their friends. In Camden, the display room is situated on the main floor of the executive office building at Front and Cooper Streets, with L. L. Titus in charge. In Chicago, the RCA Victor Distributing Corporation maintains supervision of the showrooms, in connection with its offices at 441 North Lake Shore Drive, with John H. Schaaf, in charge. There may be seen such sizeable RCA equipment as a complete broadcast transmitting station, or a centralized sound distribution system for schools, as well as the tiny acorn tubes for ultra-short waves and the RCA Faradon capacitors.

Ample Line Displayed

In specially designed settings and niches are displayed every radio and phonograph-radio in the RCA Victor line. In Camden, there is even a beautifully furnished living room complete in every detail to provide an ideal home setting for demonstration. Despite the fact that this showroom is in the heart of an industrial factory district with the worst possible electrical disturbances, an RCA Antenaplex system provides excellent reception for all of the receivers. RCA's complete series of new public address and sound re-enforcement equipment, Photophone sound reproducers for motion picture theatres, test and measuring equipment for service engineers, antennas and parts, Victor record libraries, giant transmitting tubes and every type of receiving tube, are only a few of the products on display.

The Chicago showroom, like the Camden room, has an acoustically treated ceiling to provide the best conditions for demonstrations.

Soloist



Annette King, brunette contralto soloist of the NBC Breakfast Club and the NBC Club Matinee programs, entered Illinois College, Jacksonville, Ill., intent on being a school teacher. That was two years ago and today at 22, she is one of NBC's most promising balladists

RCA TELEVISION TUBES READY FOR EXPERIMENTERS

(Continued from Page 1, Column 4)

on the market for the convenience of experimenters should not be construed in any way as an announcement by RCA of commercial television apparatus for use by the general public. The tubes, known as "Kinescopes", are being made available as a result of inquiries by amateurs, experimenters, laboratories, and schools for cathode-ray tubes suitable for television reception.

Electro-Magnetic Deflecting Types

The tubes are both of the electro-magnetic-deflection type and employ viewing screens on which the picture appears clearly, with a yellowish hue. They are known as RCA-1800 and RCA-1801, the former being a nine-inch tube and the latter a five-inch tube. They carry list prices of \$60.00 and \$40.00, respectively.

The "Kinescopes" each employ an electron gun and a fluorescent screen assembled within a vacuum tube. The negative electrode delivers a stream of electrons varying in intensity with the strength of the signals received. By means of magnetic deflection coils, this beam is made to scan the fluorescent screen which then emits light in proportion to the beam intensity. The beam can be made to trace a pattern of 441 lines, 30 times a second, giving picture definition substantially equivalent to a good photographic enlargement.

5 and 9-inch Television Tubes



The new RCA 1800 and 1801 kinescopes, just announced, together with their deflecting yokes, give experimenters an opportunity to delve into the mysteries of television reception

Camden Parts Display



The entrance of the vast display room of the RCA Manufacturing Company at Camden. One corner shows the complete line of RCA Test Equipment and Parts. All equipment on display is in operating condition

Tube Window



Both RCA receiving and transmitting tubes are featured in the attractive window of T. F. Cushing, RCA Amateur, Parts and Tube Distributor of Springfield, Mass.

NEW RCA AUTO ANTENNAS ARE ANNOUNCED

(Continued from Page 1, Column 5)
RCA Cowlenna latest Vertical Type

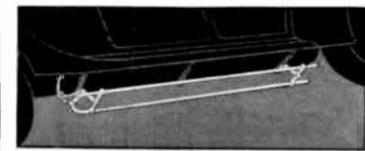
The RCA Cowlenna is RCA's latest vertical type antenna. It may be permanently attached to either side of the car adjacent to the radio receiver. It extends from 28 3/4" to 49 1/2" in height, sufficient for excellent pickup in practically all locations. The stream-lined insulator includes a rubber pad to insure a perfect seal. This antenna is beautifully finished in a high gloss satin finish, guaranteed rust and corrosion proof. Price \$3.65—Stock number 9825.

Two Rodtennas Available
The new RCA Telescopic Rodtenna is a hinge mounting type that

extends from 29 1/2" to 50 1/2" in height. It is made of a new non-rusting metal having high gloss finish and is easily installed by removing either hinge-pin. It uses a new heavy-duty weather-proof insulator having attractive chromium trim. Furnished with special 10 1/2" flat moulded rubber covered lead, terminated with female bayonet fitting. The bracket is designed to permit streamlining the antenna to the car when so desired. List price \$2.75. Stock number 9827.

The RCA Rodtenna is made of high carbon vanadium steel, triple chromium plated with weather-proof moulded rubber insulator with a special 10 1/2" flat connection lead complete with female bayonet connector. It has high signal pickup and eliminates wheel static. A high quality, flexible, easily installed antenna. List price \$3.50, Stock number 9793.

Di-Pole Antenna for Under Car Jobs
For efficient under-car installation, the RCA Di-Pole Antenna will be found to be unexcelled. It is simple in design, efficient in operation and easily installed on any car. Because of its construction and the location of the antenna, ignition in-



terference is reduced to a minimum. Where the signal level is exceptionally low, two may be installed, one under each running-board. Such an installation gives greatly improved pickup. Complete with 50-inch shielded lead-in cable having male bayonet connector, and all necessary fittings. List price \$2.60, Stock number 9605.

Shielded, low capacity 36-inch lead-in cables are also available for use with these new antennas. Stock No. 9829, which has a special terminal shield for the Cowlenna, lists at \$0.90, and Stock No. 9830, for either of the Rodtennas, lists at \$0.70.

Crystal Pickup Features New Top Needle Loading

Needle Has Improved Angle of Tangency

The stock No. 14818 crystal pickup and arm recently made available to service engineers as a separate unit lends itself readily to phonograph modernization work. The general specifications of this unit are: 80,000 ohms impedance at 1,000 cycles, frequency range from 40 to 7,000 cycles, and an output of 400 cycles at 4 1/2 volts.



Stock No. 14818

Top needle loading is an entirely new innovation and is a feature not found on any other type of pickup. This feature alone has greatly impressed users, since it does away with the possibility of sticking needles in one's fingers. A needle positioning bracket is included to properly position the needle as it is dropped into place. This pickup and arm, including the bracket, lists for only \$14.95.

Reduces Record Wear

The construction of the RCA crystal pickup and arm provides an offset needle position which greatly improves the angle of tangency of the needle at all positions on the record. This not only reduces record wear, but greatly improves the quality of reproduction.

The mechanical specifications of this pickup and arm are as follows: Length—center of pivot arm to needle point, 9 5/8 inches.

Diameter hole required in motor-board for pivot arm, 2 3/16 inches.

Recommended location of center of pivot arm, 4 3/8 inches to the rear of turntable spindle and 8 3/32 inches to right of turntable spindle.

The proper connections for this pickup are given in Mr. Cunningham's article on page 6.

Night Clubbing



Ransom Sherman (at the left, in case you missed him), who had never visited an actual night club in his life, decided—after he was handed the job of Master of Ceremonies of the NBC Night Club broadcast—that he had best find something about what goes on at a night club, first hand. Here he is on a visit to the Chez Paree. As he explains it, he is "making a close study of the dancing sounds made by the 'line' so the sound effects on the synthetic Night Club broadcast will be an exact copy of the genuine article." Left to right are: Sherman, Jean Kennelly, Marion Adair, Bernice Thoma and Ruth Goodwin

Superior Tube Quality Is Not An Accident

The Story of Mica

By L. G. LESSIG, RCA Radiotron Division

A radio tube symbolizes the engineering arts perhaps more completely than any other instrument or device of its size. From its hair-like filament to its glass or steel envelope, precision of manufacture and purity of materials is essential. Take for example the material required for insulating and spacing the tube electrodes. It must fulfill very definite requirements. It must have high electrical resistivity, it must be resistive to heat, it must be chemically non-reactive, it must be strong, and it must be non-absorbing. Of the available materials, mica meets these specifications to a high degree.

Mica Obtained from India

Mica is a mineral. It is found the world over in various grades—wherever granite, gneiss, or mica schist exists. Only the finest of all grades is used in radio tubes. This is obtained from India where it is mined from pure mica veins thousands of feet below the surface of the earth. It is extracted in sheets, or "books", which can be split to any desired thinness. Without further refinements or processing, these pure sheets of mica are stamped out by knifelike dies into radio-tube insulators. In the same operation the holes are punched for the electrode supports. The electrode supports are snugly fitted into these holes. Hole diameters are held to tolerances of better than plus or minus one-thousandth of an inch. A small tolerance is essential in order to provide the tight fit necessary to minimize noise and microphonics incurred from the vibration of tube parts. The insulators are ingeniously designed so that their shapes provide the longest practical electrical path between the electrodes which they support. This is done in several ways. One method is to slot the mica between the electrodes so that the leakage current flows around the aperture. Another is to stamp out the insulator in a curved shape which permits the leakage current to flow only in an indirect path between electrodes.

Designed for Long Leakage Paths

The accompanying picture shows a number of ingeniously-shaped insulators, many of which are designed to provide long leakage paths. Before insulators are used, they are checked for overall dimension, hole diameter sizes, color,

thickness, splits, cracks, hardness, and cleanliness. From each batch of mica insulators, a few are also baked in high-temperature furnaces to determine their water-vapor content. It is imperative that mica used in radio tubes be of such high quality that it will not release water vapor under the highest temperatures of tube processing or operation.

After mica insulators are formed and tested, they are sprayed with a non-conductive insulating material. The chemical treatment of the mica not only improves and preserves its insulating quality but, as a result of the roughening effect created by the spray, actually increases the leakage path across its surface. Insulators are sprayed automatically in a revolving drum by means of an oscillating spray gun. This device can treat 280,000 insulators in a single day.

Thus, this crystalline insulation from the land of the Rajahs, is a most important factor in the manufacture of a radio tube. The story of mica is but one of many that are woven together in the complex pattern of a radio tube.

From India



Only the finest mica that can be procured is used in the manufacture of RCA Radio Tubes



Courtesy Phila. Record

"That's the radio I want repaired"

ENGINEERS DISCUSS ADVANTAGES OF RCA ALL-METAL TUBE DESIGN

Highest Production Type for Both Metal and Glass Is RCA-6K7 — Four of Ten Highest Are Metal

By the RCA Radiotron Engineering Department

The all-metal tube has achieved a high degree of popularity in the short span of three years since its introduction. During this time, it has been subjected to a wide variety of severe tests in practical applications. The increasing popularity of these tubes is an obvious answer to any question regarding the results of these practical tests.

Reasons for the high demand for all-metal tubes are readily available. A radio-set manufacturer employs an all-metal tube when he believes



Welding Metal Tubes

it to be economically and technically advantageous to do so. He is concerned, therefore, with tube quality. Poor tube quality is evidenced by high production cost, high tube-handling cost, and trouble in the field. To obtain the true cost of using a tube type, therefore, the effects of poor tube quality must be evaluated and the result added to the initial cost of the tube. The quality of a tube type is definitely related to the quantity produced—high quality is most economically obtained when the quantity produced is high.

Eliminates Shielding

When a tube type is to be shielded, the all-metal tube has many advantages over the corresponding glass type. Consider the total cost of using an all-metal tube and the total cost of a corresponding glass tube plus its shield. In the case of the glass tube, the simple sum of tube cost and initial shield cost does not yield the correct answer. A number of other items should be considered and evaluated. For example, the cost of maintaining a stock of shields, the cost of handling the shields, and the cost of mounting the shields all contribute toward the total cost of using a glass-type tube. Then, too, the possibility of glass breakage in glass-type tubes contributes to the cost of handling these tubes. All-metal tubes may be handled with more facility than glass tubes and do not require shields. Hence, the total cost of using an all-metal tube is very nearly equal to the cost of the tube itself.

All-metal tubes offer obvious technical advantages in shielding. The fact that the envelope of an all-metal tube is the shield insures permanency of shielding, which in some cases results in higher usable gain-per-stage for all metal tubes. In one receiver, a high gain i-f amplifier was necessary in order to meet certain specifications. In this case, nearly the same gain could be obtained from glass as from all-metal tubes. But with glass tubes, full gain could not be used after a period of months, because contact resistance between shield and ground increased with time. Experience had shown that contact resistance between shield and ground increased sufficiently to cause oscillation. This condition, of course, could not occur with metal tubes, which were finally used in this receiver. Difficulties with shields for glass types due to changing shield-to-ground resistance are particularly noticeable when equipment is mobile and subject to vibration.

Prevents Feed-Back

Another interesting case of the shielding advantages of all-metal tubes came to light during the design of a long-wave receiver for export. For certain reasons, it was necessary to bring the antenna and ground leads out from the top of the chassis. Because of the layout

of the components, the antenna lead was near the output tube, which was of the glass type. It was found that high frequencies present in the output were coupled back to the antenna through capacity coupling between output tube and antenna lead, causing oscillation. The glass output tube could not be shielded because of space limitations. The use of an all-metal output tube solved this problem.

A similar situation existed in another radio receiver, except that the first-audio tube was involved. This tube was placed close to a rectifier tube; capacitance coupling between these tubes caused an appreciable amount of high-frequency buzz to appear in the output. Since shielding the glass tube was not feasible, an all-metal tube was substituted for the "G" type and the trouble cleared.

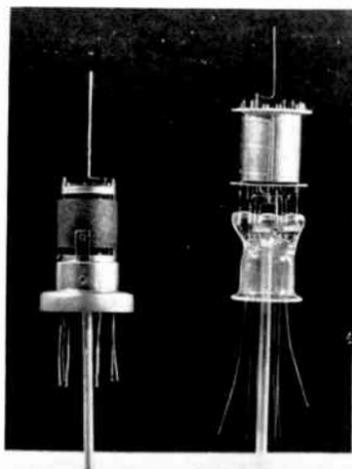
These case histories are merely representative of a large number of similar instances where the inherently good shielding properties of all-metal tubes improved the performance of receivers that were designed originally for glass-type tubes.

Small Size Advantages

The advantages of the small size of all-metal tubes are appreciated by those who must satisfy small-space requirements. The size of receivers and transmitters designed for use in motorcycles, airplanes, and automobiles can be reduced considerably through the use of all-metal tubes. Space is at a premium in these applications; hence, anything that can save space and give improved performance is welcomed with open arms. One engineer who is engaged in the design of aircraft receivers declared that glass tubes are simply out of the picture as far as he is concerned because they require too much space to meet some of the "tight" specifications that are written.

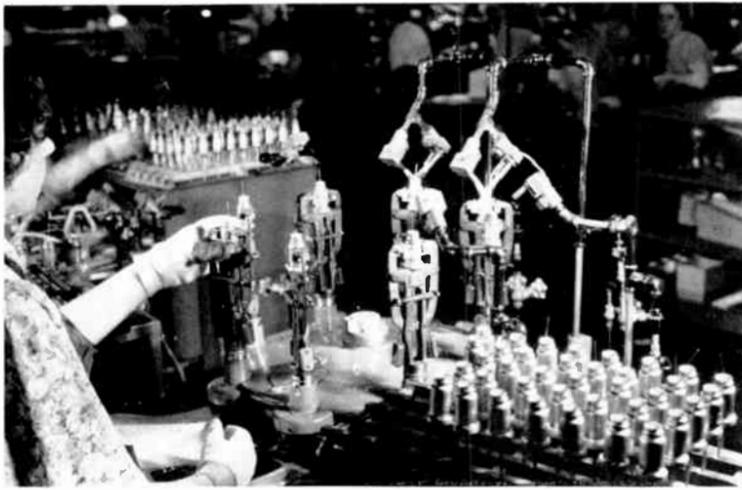
Another example may be cited to illustrate the importance of small size tubes. In this application, a tunable amplifier was operating at about 80 megacycles. With the best placement of glass tube, shield can, and tuned circuit, the length of the lead from coil to grid, together with stray capacitances, was sufficient to tune the lead to about 80 megacycles, the frequency of interest. This placed a high impedance in series with the grid of the tube and made the amplifier useless. When an all-metal tube was substituted for the glass tube and its shield, the length of the lead from coil to grid could be made so small as to have

Metal vs. Glass



The compact assembly of the RCA All-metal Tube is graphically shown above. Note that the operating elements are of approximately identical size

Assembling RCA All-Metal Tubes



Assembling the internal elements to the metal shell is an important operation in the manufacture of RCA All-Metal Tubes. An entire section of the huge RCA Radiotron factory is devoted exclusively to metal tube manufacture

no appreciable effect on the operation of the amplifier.

Has Low Feedback Capacitance

The low feedback capacitance of an all-metal converter tube made it possible to satisfy certain receiver design requirements which could not be satisfied with the corresponding glass type. With the glass-type converter, the r-f frequency range was limited by interaction between plate and signal-grid circuits through the converter tube. With the all-metal converter, the r-f circuits could be tuned to a substantially higher frequency before interaction became important. Because of the improvement in tuning range, these receivers were equipped with all-metal converter tubes.

Has Greater Rigidity

The greater mechanical rigidity of all-metal tubes not only facilitates handling in the factory, but may mean greater electrical stability. For example, a very high-gain amplifier which had tight limits placed on hum output, employed a hum-bucking arrangement to reduce the hum output. With a glass tube in the first a-f stage, the adjustment for minimum hum could not be maintained when the amplifier was handled in a normal manner. Adjustment was easily maintained when an all-metal tube was used. The reason for the superiority of the all-metal tube for this application is not difficult to find. With a critical balance arrangement, the effects of slight changes in capacitances or in insulating properties of materials due to vibration are immediately apparent.

The product of a manufacturer must be sold, and a neat commercial-looking product is a decided asset. The small size and self-contained shield of all-metal tubes permits more latitude in the layout of parts. The result is improved placement of components and a neat, neat-cut appearance.

Appreciated by Tube User

The advantages of all-metal tubes over glass tubes discussed above are inherent in the construction of all-metal tubes and are appreciated by the tube user. There are other advantages of the all-metal tube which are less obvious, but which are, nevertheless, important. The so-called "bulb effect" which exists in glass tubes, but not in all-metal tubes, is an example. When plate voltage is applied suddenly to a clear glass-type tube, the inner wall of the tube may become charged positive by induction. This positive charge, which appears in patches, attracts electrons from the cathode. When the velocity of these electrons at the glass wall is great enough, two or more electrons leave a patch for each electron striking it, and the potential of the patch rises until it is slightly less than that of the plate. Now, if the plate voltage is raised quickly by a small amount, electrons are attracted to the plate from the wall of the tube as well as from the cathode. This "extra" current to the plate means less plate resistance and, hence, less gain in a high-gain amplifier stage. Moreover, a glass tube that exhibits bulb effect is generally more noisy than a tube without bulb effect.

Reduces Bulb Effect

Bulb effect is reduced in glass-type tubes by coating the inner wall

of the tube with a substance which minimizes secondary emission. Thus, every time the inner wall accumulates a positive charge, the electrons that strike the wall discharge it. Bulb effect is not present in all-metal tubes, because the shell is maintained at zero potential. There is a limit to the amount of coating that can be placed on a glass envelope. Too much coating may cause flaking during exhaust and flashing; too little coating does not reduce bulb effect to a low enough value. Thus, applications may exist where bulb effect is of sufficient magnitude to justify the use of metal tubes on this basis only.

Uses Batalum Getter

The batalum getter is another advantage that is characteristic of all-metal tube construction. A batalum getter permits good control over the quantity of getter material used and good control over the distribution of getter material during the flashing process. In this type of getter, a small coil of tantalum wire is coated with getter material. One terminal of the coil is connected to shell and the other is connected to the ground pin. To flash the getter, a current is passed between shell and ground pin to heat the tantalum coil. It is not feasible to use this flashing process with glass tubes because an extra pin is required on the base. Improved control of quantity of getter and of getter distribution during the flashing process mean better and more uniform tubes for the user.

The advantage of metal tubes discussed here are merely representative. Numerous other instances can be cited where the use of metal tubes improved performance at little or no increase in cost. Discussion of additional advantages of all-metal tubes and their applications will appear from time to time.

RCA Victor Issues Sound Catalogue For All Schools

Covers Advances Made in Sound for Educational Field

The first complete catalogue listing RCA Victor sound services available for school use is being put into the hands of 50,000 principals, school supervisors and music supervisors of public, private and parochial schools as the first of a five-piece direct mail campaign for educators. Also receiving the catalogue are CCC camp directors, state superintendents and inspectors.

Included in the catalogue, which is the first compilation of its kind in the field, is RCA Victor equipment, from music appreciation



Now Ready

books and catalogues to elaborate school-wide sound installations, one of which is accurately diagrammed on a double-page spread in the center of the catalogue. Such a system permits announcements to be made to the entire school at the same time while classes are in session by utilizing loudspeakers in the classrooms. The system also includes recording equipment as well as facilities for playing records over all or part of the system.

The catalogue is designed to put before the educators of the country information concerning advances in the field of commercial sound and radio which can be applied to teaching the 33,000,000 students now enrolled in the nation's schools. Use of records, phonographs and radio in education has steadily increased for many years. Recent improvements in recording and sound reproduction are expected to

(Continued on Page 6, Column 5)

RCA Loudspeaker at Chicago Fire



The new RCA "One Mile" Commercial Sound Loudspeaker proved extremely effective at a recent fire in Chicago. Full coverage of all the firemen from one central point greatly increased the efficiency of the equipment

RCA Crystal Pick-up Improves Phonograph Modernizing Jobs

Engineer Explains Typical Connections—Easy to Change from Magnetic to Crystal Pick-up

By D. H. CUNNINGHAM, RCA Engineering Department, Camden, New Jersey

With the more general use of crystal pick-ups in combinations, public address equipment and general record reproduction work, there arises a need for more detailed information on the proper methods of making circuit connections. The following article shows a few of the general circuit requirements and may serve as a guide to those who are using devices such as RCA Stock No. 14818, described on page 3.

Crystal Pick-ups Are High Impedance

One of the first considerations to be remembered in connection with crystal pick-ups is that they have the impedance characteristic of a condenser and are of the very high impedance type. This means that circuits are more susceptible to AC

pickups means that no input transformer is required. They may be hooked directly to the grid circuit of a low gain audio amplifier and have sufficient driving power to give full power output with only a two-stage amplifier.

Loading Required

In order to get good record reproduction, it is necessary that some type of compensation be used. That is, as the volume is reduced in intensity some means must be provided whereby the low and high frequencies are accentuated at the expense of the middle register. The purpose of this is to compensate for the human ear which becomes less sensitive at low and high frequencies than in the middle register at low values of volume. The us-

PROMOTIONAL AIDS BENEFIT SERVICE MEN

New 1938 Material Designed to Speed Tube and Parts Sales

"The Radiotron Division of the RCA Manufacturing Company has prepared one of the most complete and comprehensive promotional programs ever offered in the history of the radio tube industry," says Mr. D. J. Finn, of the RCA Advertising and Sales Promotion Department.



RCA 1938 Reference Book

Finn further states that "it has long been our desire to give Radiotron dealers a program that will not only identify them with the product they sell, but to make available a complete merchandising plan which will show definite results in increased business."

Every piece of material prepared for the 1938 Radiotron promotional program has been worked out with this idea in mind. And, to further insure the success of such a program, it has been planned so that it will continually keep after customers even in the so-called off seasons. One of the features of the 1938 program is a window display service available to all dealers through their local Radiotron distributors.

Available in January

These new displays are the most novel and attractive pieces ever offered a dealer and will be available in January. Dealers interested in the 1938 program will be wise to inform their local Radiotron distributors so that their names may be included on the mailing list for this program.

The new Radiotron Reference Book for 1938 has been completed and is now available. This handy pocket note book contains a wealth of information for the radio service man such as dictionary of terms, radio tube specifications, etc.

This new Radiotron reference book is available through your local RCA Distributor.

From Gay Paree



Rachel Carlay, former star of the world famous Folies Bergere in Paris, brings a sprightly French accent to the songs in Manhattan Merry-Go-Round, the NBC show that features the variety stars who make night life in New York City diverting. It is heard every Sunday, at 9:00 p. m., EST, over the NBC-Red Network

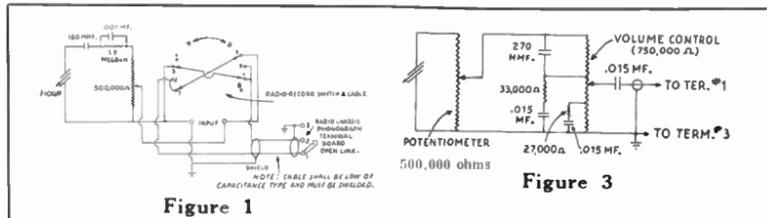


Figure 1

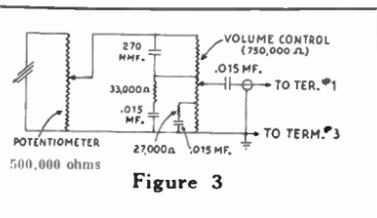


Figure 3

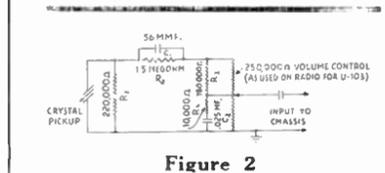


Figure 2

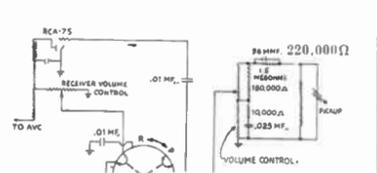


Figure 4

- R₁—Controls low frequency response— increase to increase low frequency response
- R₂—Controls pickup output—decrease to increase output
- C₁—Controls high frequency response— increase to increase high frequency response
- R₃—Controls output obtained at volume control tap—value given should be closely adhered to
- R₄—Provides low frequency compensation for low volume settings—values given should be closely adhered to

Note: Remove present volume control (44,000 ohms) and replace with new volume control specified (250,000 ohms with tap at 60,000 ohms). This provides separate volume controls for radio and for phonograph. Add new switch specified. Remove all present compensation for phonograph and add new compensation specified

Schematic Diagrams of Various Connections to RCA Crystal Pickup

pick-up and other extraneous noises and must be better shielded. It also means that the shielded leads should be of a low capacity type, inasmuch as the usual shielding may result in reduced output. For these reasons the circuits are somewhat more critical and must be treated as such.

By the same token the high impedance characteristic of crystal

ual method of doing this is to provide a compensation network associated with the volume control.

Connection to Radio Receiver

In Figure 1, a typical diagram is shown whereby the switch and cable used in the RCA Victor Model R93-A record player is arranged so that a crystal pick-up may be con-

nected to a chassis in the identical manner as the standard RCA Victor Record Player. Inasmuch as RCA Victor service notes cover such record player connections, this circuit will enable service engineers to make similar connections with crystal pick-ups with equally good results. There is no compensation provided in this circuit, although because of the superior quality of the crystal pick-up the reproduction will be excellent. (Note: This circuit will not apply to those models having terminal connections in series with the cathode resistor.)

Amplifier Connections

Figure 2 shows the proper method of connecting a crystal pick-up to an ordinary power amplifier having a flat frequency characteristic. The volume control has been compensated so that excellent low volume reproduction will be obtained. This same compensation may also be applied to the circuit used with the record player, although, naturally, this will be somewhat more expensive.

Combination Change-Over

If it is desired to change over circuits such as used in RCA Victor models R-96 or R-97 from the magnetic to crystal pickups, then the circuits shown in Figures 2 should be used. Figure 3 is suitable for circuits such as the Model U-105. Figure 4 shows similar circuit conversion for models such as U-101, U-103 and U-102-E, which are not provided with phonograph input terminals.

In all of these circuits, the values given have been chosen for the best possible results and it is recommended that they be adhered to closely.

RCA Announces Ultra-Sensitive D-C Instrument

Utilizes Three RCA-1B4 Tubes In Electronic Circuit

An outstanding instrument for use in laboratories and for many product tests is a new Ultra-Sensitive DC Meter developed by the world-famous RCA electronic research laboratory of Dr. V. K. Zworykin. Announcement of the revolutionary new meter is being made by the Engineering Products Division of the RCA Manufacturing Company.

The meter was developed for accurate measurements of ionic and electronic currents, employing a new electronic circuit which operates with unusual stability and amazing accuracy, even approaching that of the average reflecting galvanometer. It cannot be easily damaged or burned out by overload currents.

22 Scales Provided

In current measurements the new meter provides for twelve scale ranges for measurement to 10,000 microamperes, the lowest full scale reading being 0.02 microampere. For voltage measurements eight other scale ranges are provided, from 0.1 volt to 500 volts, with a meter resistance of 5 megohms. For resistance measurements two scale ranges are provided for measurements of from 0.1 to 100 megohms, and from 20 to 1000 megohms, with less than 0.5 volt across resistance. With 90 volts in series, up to 200,000 megohms can be measured. Conversion of the meter for the three forms of operation is accomplished by means of a selector switch.

Completely Self-Contained

The Ultra-Sensitive D-C Meter is a self-contained, battery operated precision instrument, utilizing three RCA 1B-4 tubes. No external resistances or shunts are required. It is of great value for laboratory work, and is so easily portable as to be even more useful for field or location work, since it requires no special set-up or balancing.

RCA Victor Issues Sound Catalogue for all Schools

(Continued from Page 4, Column 5)

make sound service of even greater importance to the school.

Lists Uses of Victor Records

The catalogue lists uses of Victor Records for teaching elementary, intermediate, high school and college classes in music rhythm, instrumental combinations and music appreciation, as well as for instrumental instruction.

Five RCA Victor publications, recognized as trail-blazing works in their fields and widely used in schools and by individuals, are listed. They include "The Victor Book of the Opera," "What We Hear in Music," "The Victor Book of the Symphony," "Music and Romance" and "Music Appreciation and History of Music." Also included are two Victor Record catalogues and six RCA Victor reference books.

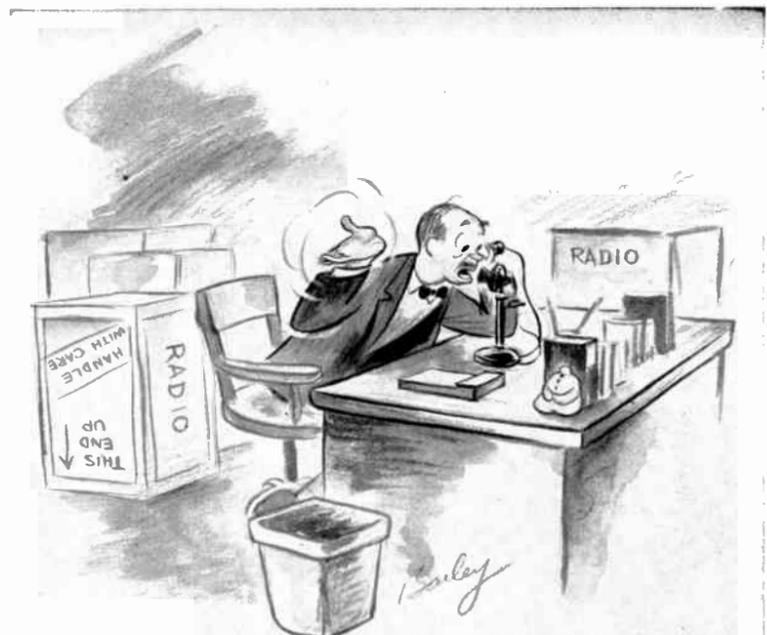
The catalogue is beautifully illustrated with pictures of phonographs, radio-phonograph combinations and radios which are adapted to school use, as well as the latest RCA Victor Recording Equipment, which will both record and reproduce over an audio-frequency range of from 30 to 7000 cycles—a range more than broad enough to meet the most exacting requirements of school use.

Includes Large Diagrams

A large diagram is included to show radio hook-ups for classrooms, music appreciation rooms and the gymnasium for receiving standard broadcasts. A section of the catalogue is devoted to battery sets and equipment for rural schools and portable sound systems. RCA Photophone motion picture projectors, "The Magic Voice of the Screen," are also shown, as is a diagram of NBC Red and Blue network stations blanketing the country with educational radio programs.

Many educators are interested in providing amateur and test equipment for school laboratories. The catalogue illustrates and describes nine such pieces of equipment, including cathode ray oscillographs, oscillators, a Universal A-C Bridge, a frequency modulator and two communication receivers designed for superior performance under modern operating conditions and admirable for radio training in schools.

Mr. Egglemud's Boss



"But, Mrs. Doaks, we've stopped giving fur coats free with each set of tubes."

VAN LOON BOOK AND MAP TO INCREASE RCA SALES

Gives Interesting Story of Short Wave Journey Around World — Available to All RCA Dealers

An intensely interesting booklet written by Hendrick Willem Van Loon, famous historian, geographer and best-selling author, especially for the RCA Manufacturing Company, is one of two unique new sales aids being featured by RCA dealers. Van Loon's new book, "The Arts," is a current Book-of-the-Month Club selection and best seller.

The RCA booklet, entitled "A Short Wave Journey of Discovery," is written in the lucid, reminiscent style which has endeared Van Loon to the hearts of millions. It is il-



being made in the general field of radio and in short-wave transmission in particular which are of far more importance than the layman now realizes.

The booklet includes also two articles by Laurence M. Cockaday giving accurate data on short-wave programs and instructions for tuning them in.

Distribution of the booklet will be made through RCA dealers, who can use it as an aid in promoting the sale of tubes and RCA Victor short-wave radios.

New Map Goes with Van Loon Booklet

RCA's new "Educational, Entertainment and Radio Map of the World" is the second of the two new sales aids. Measuring 34 inches by 22 inches when unfolded, it is lithographed in eight colors. It gives data on the language, musical instruments, products, flags and native animals typical of each country. It also includes all transoceanic airlines, a time comparison chart and a world-wide list of short-wave stations.

The reverse side of the map is illustrated with pictures of foreign countries, and contains a story on RCA Victor and its products.

lustrated with two score of the author's distinctive line drawings, twelve of which are in color. The booklet includes a time map of the world, station listings, and probably the most complete and detailed information on short-wave programs ever included in a log book.

Describes Advances in Communications

Van Loon opens his Journey of Discovery with a simple story of the development of communication facilities from savage drums to the present-day marvel of globe-girdling short-wave transmission. He spots the yarn with scores of his recollections of the early days of the telephone, his first broadcast, and the occasion when, in 1898, the first lives were saved by radio during a shipwreck. He refers to Napoleon's quaint system of church-steeple semaphores by which it was possible to transmit messages fairly accurately at a speed of 50 miles for every 15 minutes.

The author points out that contemporaries nearly always fail to grasp the importance of discoveries made in their day. He recounts that he lived through the first years of radio's development without noticing that such a thing existed. He declares that new discoveries are

FREE! WHILE THEY LAST

The RCA Service Division have a small stock left of the following service lecture booklets:

1. Phonograph Records, Recording and Reproduction.
2. Training the Ear for Radio Servicing.

These booklets are complete, showing all the illustrations and lecture material that were used at the service meetings on those subjects. They are worthwhile additions to any service engineer's library. While they last, just write to RCA Radio Service News for your copy. Please include a three-cent stamp for postage.

Another First



Charming screen actress Wendy Barrie makes her first regular series of appearances on the air in the new Log Cabin broadcasts over NBC. She serves as comedienne with funny man Jack Haley on this new Saturday evening series over the NBC-Red Network from 8:30 to 9:00 p. m., EST.

Ralph R. Beal Appointed New Research Head

Will Coordinate and Supervise RCA Experimental Activities

Ralph R. Beal, supervisor for the past year and a half of RCA's television field tests, has been placed in the newly created position of Research Director of that company, it was recently announced by David Sarnoff, president of the Radio Corporation of America.

The scientific work of more than 550 engineers who are probing new radio fields and perfecting present facilities will be supervised by Mr. Beal under this arrangement. Development of RCA television, in which daily experimental field tests are being conducted and new methods and improved equipment are being perfected, will be part of his duties. The company's widespread research activities in the laboratories of its services—the RCA Manufacturing Company, at Camden and Harrison, N. J.; the National Broadcasting Company, at Radio City; Radiomarine Corporation of America, at New York, and the R.C.A. Communications, Inc., at Riverhead, L. I.—will be further expanded under the new plan of unified control.

Recently Returned from Europe

Mr. Beal, who has just returned from an extended inspection of radio activities in Europe, has been with RCA in an advisory engineering capacity since 1934. For the past 18 months he has been active in coordinating the research activities of RCA scientists. In his new position he will link the progress made by these experts with that of NBC engineers in the development of television studio technique. He also will supervise the research work of other RCA scientists in motion picture sound recording and reproducing, radio tubes, aviation and police radio, facsimile transmission by radio, and many other radio services which RCA has produced and is developing.

SHOP NOTES

FROM RCA SERVICE DIVISION

To keep the readers of Radio Service News posted on the latest changes in and additions to RCA Products and technical literature, the RCA Service Division will report changes in this column from time to time.

To get the most benefit from this column it is recommended that the readers of RCA Radio Service News transfer these changes and additions directly to their Service Notes on the particular model. By doing this, you are assured of always having the latest information handy.

Blocking of Model 84BT

Should any blocking tendencies be noted on this receiver, the IF4 tube should be exchanged. Blocking which is produced by the IF4 tube is particularly noticeable when the battery switch is turned off and immediately turned on again. Wear on the contact of the battery switch may bring this action about when the receiver is first turned on. In such cases it is advisable to replace the switch and, at the same time, investigate the condition of the IF4 tube as well as the "B" batteries.

Cleaning Speaker Air Gaps

Blowing or wiping of metal particles from the air gaps of electrodynamic loudspeakers may be facilitated by applying 110 volts A-C to the field coil. The A-C will eliminate any residual magnetic force that may be present and permit easy removal of the particles. It is very important to carefully inspect and clean the air gap when installing a replacement cone, or when making repairs to the speaker.

Antenna Terminal Link—Six and Seven Tube Sets

Instruments in the class of models 86T, 86K, 87K, etc., have a three-terminal antenna-ground connection board. Terminal "A" is for attachment of the antenna, and terminal "G" for connection of the ground in the regular manner. The extra terminal, to which is attached a link, is to be used only in localities where interference is produced by strong local stations. In the event of such interference in the form of heterodyne beats, image response, or other disturbances due to abnormal signal strengths, the link should be closed so as to connect with the "A" terminal. Always leave the link open where interference does not exist.

Oscillator Condensers—813K and 816K

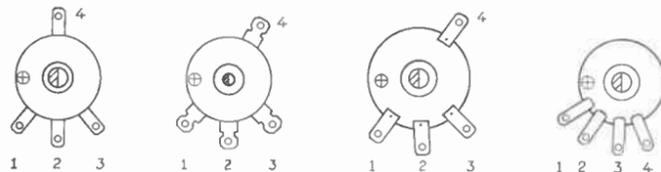
The 100 mmfd. molded Luscite capacitors which connect in parallel with the band-spread oscillator tuning condenser for short wave operation, are specially designed to have a negative thermal coefficient of capacity to compensate for variations in other parts of the oscillator circuit with temperature changes. These capacitors are, therefore, not interchangeable with ordinary types, and replacements should always be of the particular RCA stock number specified in the Replacement Parts Lists. Care must be exercised in replacing these parts, to avoid twisting the leads excessively and allowing too much heat to be applied when soldering.

Toptenna Molded Couplings

The molded bakelite screw cap which secures the Stock #9792 Toptenna forward section to the cowl coupling, is carried in stock as #14673. This part may be ordered for replacement use in repairing any breakages that might occur in service.

Rectifier 5Z4 Replacements

The new RCA-5T4 metal type rectifier may be used for replacement on RCA Victor receivers employing the 5Z4. The arrangement



of pin connections is such that the 5T4 can be plugged directly into the 5Z4 socket without requiring circuit changes. In using the 5T4, somewhat better service will be obtained due to its increased power handling capacity.

The 5T4 tube will be secured in its socket by special packing or shipped in a separate container on

future instruments of the new line. This same packing should be incorporated when repacking and shipping is necessary in the field.

Addition of Resistor—Models 813K and 816K

Resistor, Stock No. 30647, 1.8 ohms, with a five ampere maximum current rating, is now specified for use in the circuit supplying the "Music-Speech" and "Manual-Electric-Remote" indicating lamps. This part should be installed on all chassis of Models 813K and 816K requiring service in the field. It may be conveniently added to the circuit in place of the "brown" lead which connects from the front section of the range switch to the "Manual-Electric-Remote" switch.

Model U-105 Pickup Impedance

The Service Note covering Model U-105 incorrectly classifies the pickup as "High Impedance Type." Proper technical data on this unit is as follows: Low Impedance Type; 96 ohms impedance at 1000 cycles; 27 ohms d-c resistance. Service Note specifications and diagrams should be corrected accordingly.

Rectifier Tube—Models T9-7 and T9-8

Where unstable operation, high or fluctuating line voltage, or development of intermittent hum occurs on these instruments, it is advisable to check the condition of the 25Z6 rectifier tube and the associated C-41, 16 mfd capacitor. Replacement of the 25Z6 with a 25Z6-G will provide more stable performance. These tubes are electrically and mechanically interchangeable in the T9-7 and T9-8 receivers.

Phonograph Rumble—Model U-107

In any instances where a rumble or low frequency vibration causes interference in the reproduction of records, the same can be satisfactorily minimized by spacing the loud-speaker baffle board 3/8 inches away from the cabinet. Small metal or wood spacers may be used for this purpose, employing one over each mounting screw.

Low Frequency Reproduction—Model U-109

It is important that the pick-up voltage be adjusted in accordance with instructions on Page 13 of the Service Note, if normal tone quality is to be obtained. Reproduction will be thin and lifeless if the adjustment is low. With record No. 84519-A being played at 400 cycles, the control should be set to give 5 volts across the speaker voice coil.

Volume Control Connections—Stock No. 14335—The Stock No. 14335 volume control, as used in several models of the new 1937-38 line may have any one of four constructional arrangements.

The different controls are, however, interchangeable both electrically and mechanically. Terminal locations are shown in the above diagram. Terminal No. 1 is the low potential end of unit; terminal No. 2 is the wiper arm; terminal No. 3 is the high potential end of the

"Radio Map of the World"



The new RCA Radio, Amusement and Educational Map of the World tells at a glance just where and when any type of music or program may be heard. It also contains much other valuable information for the short wave listener

