



RADIO SERVICE NEWS

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NEW RCA TUBE TESTER SELLS FOR \$37.95

ANNOUNCE RCA TUBE CONTEST PRIZE WINNERS

G. N. Henderson, of Seattle, Awarded RCA Test Equipment

Winners in the novel RCA Modernization Contest conducted among radio service engineers and dealers by the Radiotron Division of the RCA Manufacturing Company have been announced by L. W. Teegarden, in charge of Renewal Tube Sales. More than 600 contestants wrote letters describing methods they had used to modernize radio sets by replacement of "G" type glass tubes with RCA Radiotron and Cunningham Metal Tubes.



G. Brindley 2nd Prize Winner

Gene N. Henderson, 4544 University Way, Seattle, Washington, was awarded first prize of five RCA service test instruments of his own selection and all the RCA bench tools, 14 units in all, valued at \$250. Mr. Henderson will be permitted to select any five standard test instruments.

2nd Prize Home Study Course

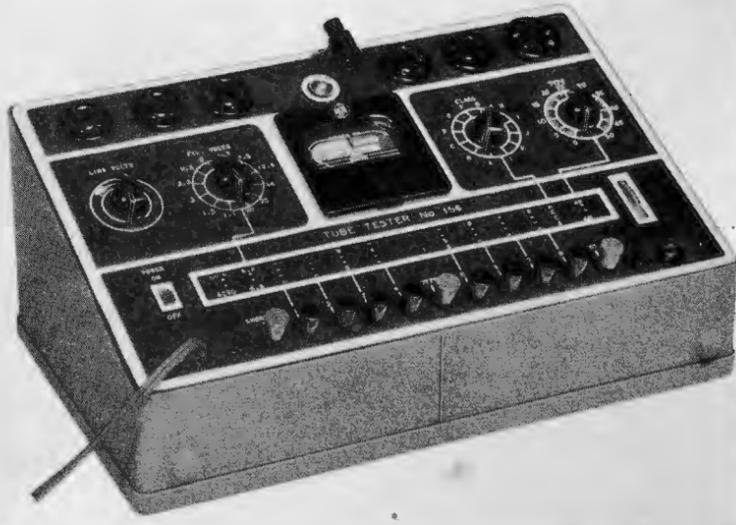
Gibson Brindley, 1101 Hamilton Ave., Trenton, N. J., is entitled to either the Home Study Radio Service Course offered by RCA Institutes, or RCA test instruments to the value of the study course, \$140, as winner of the second prize.

Third prize, a choice of any two standard RCA test instruments, has been awarded to Emil J. Giara, 1704 Dunn Ave., Carlin, Ky.

Fourth and fifth prizes, the new

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Simplicity Plus!



An ingenious inter-locking push-button assembly and a roller chart are features of the RCA Tube Tester that add greatly to its ease of operation. Line voltage may be read up to the actual instant that the test is made

RADIO HEATED RIVET COMPLETES STEEL WORK OF RCA BUILDING

New York World's Fair Structure to House Television Booths and Other Interesting Displays

Radio waves were put to a new and novel use recently when, as the erection of steel on the Radio Corporation of America's exhibit building at the New York World's Fair 1939 was completed, the last rivet to go into place was heated by radio.

The demonstration was held at RCA's building site on the World's Fair grounds in the presence of World's Fair executives and newspaper men. Robert Shannon, vice president and general manager of the RCA Manufacturing Company, held the rivet suspended in a concentrated field of radio waves, and in little more than a minute it was white-hot. Then the rivet was driven into place by H. C. Bonfig, commercial vice president of the RCA Mfg. Co.

"While this demonstration may

not be looked upon now as a practical application for the construction industry," Mr. Shannon said, "at the same time, it is indicative of the many potential uses of radio and electronics. Our exhibit in the Fair next year is being designed to show all of the products and services of the RCA companies. Like no other single organization, RCA participates in every field of the radio industry, including research and development, manufacturing, broadcasting, communications and technical education. Its present-day products and services, together with some of those that are to come in the future, will be demonstrated in our World's Fair exhibit."

Part of Transmitter

The oscillator unit of a regular radio transmitter was set up on the framework of the RCA exhibit building for the demonstration. Usually the output of an oscillator is directed into an antenna, but in this case it was directed into a coil of wire. The result was that instead of being broadcast over a wide area, the radio waves were concentrated in a field at the center of the coil. The intense heat thus generated made it possible to cause a metal object to become white-hot by simply suspending the object in the field of concentrated radio waves.

The contractors started the work of erecting the walls and interior of the exhibit building immediately after the demonstration. They expect to have the building completed by the middle of October. As previously announced, the building has been designed to take the form of a radio tube affixed to a base and

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TESTS NEW 1.5 VOLT BATTERY TUBES AND ALL OTHER TYPES

Interlocking push buttons and new nine-foot guide roller are other important features.

The new RCA Radio Tube Tester, furnished in both counter and portable models, is now being shown by all RCA Parts Distributors. This tester, which features unusual simplicity of operation, incorporates the experience of the world's largest radio tube manufacturer. The counter type, known as Model 156-A, has the low net price of \$37.95, while the portable type, Model 157, complete with sturdy cover and snap-out type handle, is priced at \$39.95.

While the RCA Tube Tester has been built to stand the most severe service, its design is so simple that it can be operated accurately with one finger. The eleven push buttons on the control panel are released or retained automatically as required for testing. The roller chart has easily-read figures for setting the various controls. Guide lines on the control panel indicate the proper controls to be operated.

Has Spare Socket

The tube tester has six sockets, including one spare to minimize the possibility of the unit becoming obsolete with the introduction of new tube types. All types of gas tubes, such as the OA4-G, OZ4-G, 874 and others, ballast tubes and battery tubes, including the newly developed 1 1/2-volt types, may be tested. It will test one- and two-inch cathode ray tubes for shorts and emissions and will discover noisy welds and circuit breaks in four-prong and

(Continued on page 3, column 5)

832 IDEAL FOR LINE-OF-SIGHT TRANSMITTERS

Television Pentodes and New Beam Power Amplifier Added to Line

Announcement of four new tubes has just been made by D. Y. Smith, Manager of the RCA Power and Special Purpose Tube Division.



RCA-832

Two of these tubes are for Transmitting purposes, one being a transmitting beam power amplifier and the other being an ultra-high frequency push-pull r-f beam power amplifier. The two Receiving tubes are television amplifier pentodes. With the increased interest in high frequency transmission and research, experimenters are finding these new tubes a welcome addition to the RCA line.

RCA-832 Is of Unconventional Design

The RCA-832 is a new ultra-high-frequency transmitting tube of unconventional design incorporating two beam power units. It is intended primarily for service as a push-pull r-f power amplifier with maximum ratings at wavelengths as short as 2 meters, and with reduced ratings at wavelengths as short as 1 meter. Its total plate dissipation is 15 watts for class C telegraph service. The balanced and compact structure of the beam power units, the close electrode spacing, the excellent internal shielding, the low internal lead inductance, the terminal arrangement to facilitate symmetry of circuit layout—these are all features of the RCA-832 contributing to its exceptional efficiency at ultra-high frequencies.

RCA 1619 Metal Beam Power Transmitting Tube

The RCA 1619 is a metal beam power transmitting tube, featuring an oxide-coated filament. The spe-

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Style!



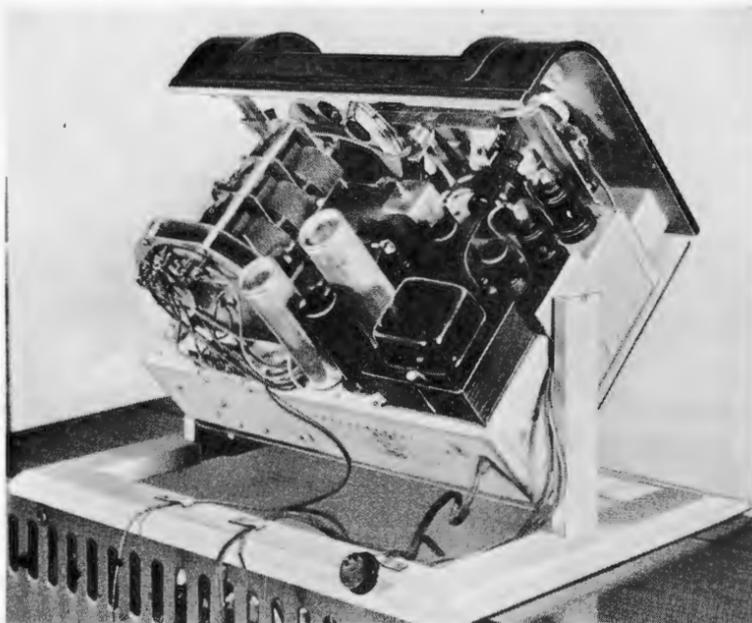
Some glamour gals may wear their hearts on their sleeves, but Florence George, NBC singing star, wears an NBC microphone done in silver on her sheer black stockings

Rivet Heated by Radio



Radio waves were used to heat the last rivet as steel work on the Radio Corporation of America's exhibit building in the New York World's Fair 1939 was completed. Participating in the event were, left to right, Joseph D'Agostino, RCA exhibit co-ordinator; H. C. Bonfig, commercial vice president of RCA Manufacturing Company; Robert Shannon, vice president and general manager of the same company, and John de J. Almonte, assistant to the president of the National Broadcasting Company

Shows Electric Tuning Action



This action display shows just what happens when you "Push a Button." A plate glass bottom reveals the "workings," and the pivot supports permit the chassis to be turned at will. Comes complete with panel, escutcheon and shaft assembly for returning model 910KG to normal appearance after removing chassis

New Display To Demonstrate RCA Electric Tuning

Permits Mechanism to Be Viewed While in Operation

An unusual "Electric Tuning Demonstrator" which permits complete examination of an operating RCA Victor radio chassis in any position has been made available to dealers for use in show rooms, window displays and on counters to demonstrate the speed and precision of the new RCA Victor Electric Tuning.

The chassis of a 10-tube (910-KG) Console Grand radio is used in the demonstrator. The unit is placed on top the radio cabinet and connected to the loudspeaker with cables and fittings that are supplied. The demonstrator itself is a rugged cradle, carefully balanced at the center of gravity so that at a touch of the finger either the top or the bottom of the chassis may be turned into view.

When the tuning buttons are pressed, customers are able to see the tuning mechanism operate and the dial indicator move, and then hear the station as it comes in, perfectly tuned. A sturdy plate glass on the bottom of the cradle permits the underneath part of the chassis to be seen.

The demonstrator is attractively finished in silver lacquer and includes an instrument control panel complete with dial and escutcheon so that the appearance of the radio with which it is used need not be altered. A dummy shaft assembly is provided for, replacing the chassis in the cabinet.

All RCA Victor Instrument Distributors are featuring this display at an especially attractive price.

DID YOU KNOW THAT—

—the radio tube factories of RCA are the world's largest manufacturers of radio tubes, and that

—they contain more than 650,000 square feet of floor (almost eight city blocks) space devoted to tube manufacture?

—these factories are capable of producing 40,000,000 tubes annually?

—the average receiving tube is given more than 100 electrical and mechanical tests before it reaches the customer?

—40,000,000 tubes, if placed end to end, would more than span the United States, from ocean to ocean?

—RCA makes nearly 300 different tube types?

—the largest tube sold by RCA stands over 5 feet high and is capable of giving 100,000 watts output?

Money Back Offer Has New Sales Appeal

Attractive Cigarette Boxes to Be Given Free

A new and novel promotion has just been announced by L. W. Teegarden, Manager of Renewal Tube Sales.

Said Mr. Teegarden, "It is high time that the radio tube industry took an active part in educating radio owners to the fact that weak, run down radio tubes are responsible in many cases for poor and impaired radio reception.

"Automotive engineers have shown that modern makes of automobiles require oil changes, under normal driving conditions, every 2,000 miles. However, the oil companies, on the other hand, have sold the idea to most automobile owners that it is necessary to change oil at least every thousand miles.

"Therefore, why shouldn't we, of the radio tube industry, prepare and actively promote a program which would sell radio owners on the same idea, or that in order to obtain better radio reception, radio tubes should be replaced at least once a year."

Usually the decline in the performance of any radio set is due to weak, run down radio tubes and this decline is so gradual and becomes so unnoticeable that it is often necessary to use delicate test instruments to show the difference.

Many Tubes Five Years Old

We have received numerous letters from radio owners stating that the tubes in their radios are still operating efficiently after five years of service. However, in many cases should these radio sets be analyzed,

New RCA Polish Gives Cabinets Fine Appearance

Gives Service Men and Dealers New Profit Item

A new furniture polish, identical with that used for the final finishing of RCA Victor cabinets, has just been announced by J. A. Milling, Manager of the RCA Parts Division.

This polish, which carries the attractive list price of only 49 cents for a 12-ounce bottle, offers service engineers and radio dealers a new source of income. Every new radio or Victrola instrument purchaser and every radio owner who has just had his receiver repaired is an excellent prospect for this outstanding polish.

The service engineer who cleans the cabinet of each job with RCA Victor Furniture Polish will find that he has practically sold the product before the bottle is shown.

RCA Formula

RCA Victor Furniture Polish is produced entirely by RCA. It is unlike any other polish and has been

(Continued on page 8, column 5)

Demonstrates Antennas



By means of this kit, the noise-reducing qualities of the RCA Victor Master Antenna or the Master Noise Eliminator in all 1939 RCA Victor radios having eight tubes or more may be easily demonstrated without erecting an antenna!

Appeal!



Not only will this vivacious young lady appeal to the passer-by, but a new set of RCA Tubes will appeal to football fans who want the clearest radio reception

ers in replacing their tubes.

This program, known as the "Money Back Guarantee" plan, was tested out in 10 different markets and resulted in an amazing number of sales not only of radio tubes but service work, records, and parts as well.

The "Money Back Guarantee" plan involves the offer of a free premium to those customers who bring their radio tubes in for free testing. Should any of the tubes test weak, the dealer will then be able to offer the consumer a written guarantee to the effect that "New RCA Radiotron or Cunningham Radio Tubes must improve the performance of your radio set or the full purchase price will be refunded upon return of the tubes."

After one week's trial, if the customer is not satisfied that these new RCA Radio Tubes have improved

(Continued on page 7, column 3)



Here's what you get with the Money Back Guarantee Kit. Ask your distributor how to obtain this promotion at no extra cost with purchase of tubes

we would find that they are operating only 50% efficiently and that the owner is not aware of the difference. Therefore, in line with this thinking, RCA has started the ball rolling by making available to radio tube dealers a comprehensive merchandising program which we feel sure will, in part, interest radio own-

Noise Eliminator Is Demonstrated With Unique Kit

Contains Interference Generator and Dummy Antenna

While service engineers and radio dealers have sold many thousands of noise-reducing antennas, nevertheless they have been handicapped because a demonstration before actual installation was practically impossible. Now, however, with the new RCA Victor Master Noise Eliminator Demonstration Kit, both the Master Noise Eliminator, which is an integral part of all RCA Victor 1939 radios having eight tubes or more, and the RCA Victor Master Antenna System, may be demonstrated without installing an antenna. Actually the demonstration takes but a few moments and shows prospective customers in a startling manner just how effective are these two systems of noise reduction.

The kit, which is shown at the left, consists of an interference gen-

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Fall Schedules Shown on New Tube Displays

Include Football Games in All Sections

"The new Fall Radiotron and Cunningham window displays have been completed and are now being shipped to those dealers who subscribed to the 1938 Window Display Service last February," said D. J. Finn, Radiotron Advertising and Sales Promotion Manager.

"Although the design of these displays has been changed from the original idea, nevertheless we feel that they bring about a new trend in window trims because they not only have eye appeal but serve a very definite and useful purpose."

Two features of these displays are well worth mentioning here. The vivacious young lady acting as cheer leader on the Radiotron display was painted by none other than the popular artist Hayden Hayden, who is known for his many beautiful paintings.

Includes Football Schedules

In addition, the schedule of football games which appears on the large pad on each display was chosen by Stan Baumgartner, Sports Editor of the Philadelphia Inquirer, as being the most interesting games so far as keen football competition is concerned. Stan Baumgartner himself was a star football player in the University of Chicago as well as a Major League ball player and is now known as one of the top-notch football authorities in the country.

These displays list six games each week for nine weeks of the season, and each of the single sheets on the pad covers two important games in the East, Middle West and Far West, so that these displays will be objects of interest to fans all over the country.

Both displays are lithographed in eight colors and are fitted with a sturdy easel. The size is such that it warrants their use both inside the store as well as in the window. It is not too large to dominate a whole window, but can be placed in one particular spot and left there so that the people who pass the store will know just where to look for the games to be played on the following week-end.

Increases Store Traffic

Dealers who feature the Radiotron and Cunningham Football Displays can create store traffic by printing cards which list the games shown on the football displays and making these cards available to customers.

The customer who estimates most accurately the total number of points scored in the seven games for that particular week will receive as



This display is sent to all dealers who have subscribed to the Cunningham display service

a prize a table model radio, a free check-up, or tickets to a local football game.

A promotion such as this ties in very definitely with the Cunningham and Radiotron displays and will result not only in obtaining an active mailing list but will help materially by moving other items the dealer might have for sale.

Mobile Sound System



The new RCA MI 12754 Mobile Sound Unit has an output of 25 watts and operates from either a 6-volt storage battery or 110-watt A.C. It is completely self-contained and is an excellent unit for sporting events, amusement parks, political meetings, and other places where a high quality sound system is required

RCA LECTURES RESUMED WITH FALL SERIES

Technical Meetings Scheduled for 100 Cities

"Technical Features of the 1939 RCA Victor Radios" is the subject matter of a new series of service meetings recently announced by Edward C. Cahill, Service Manager of the RCA Manufacturing Company. These

lectures will be conducted during the fall months in cooperation with RCA wholesale distributors in more than 100 principal cities throughout the country. The lectures will include many practical demonstrations and service engineers will find them extremely beneficial to their regular work, explained Mr. Cahill.

The important technical features of the new 1939 RCA Victor radios and Victrola instruments will be discussed by qualified technical experts at each meeting. In addition, the features of RCA's simplified facsimile system for broadcast stations and the home receiving and transmitting will be described.

Held During Sept., Oct. and Nov.

Service engineers, radio dealers and salesmen will be invited to the meetings, which will be sponsored jointly by the Company and the distributors during September, October and November. Distributors will schedule the meetings for their respective territories.

Some of the new technical radio features to be discussed include the RCA Victor Master Antenna System, the new special service features of the instruments, fidelity control systems, high fidelity audio amplifiers, the triple-cone loudspeaker, the improved RCA Victor Electric Tuning system and the new "gentle-action" automatic record changer.

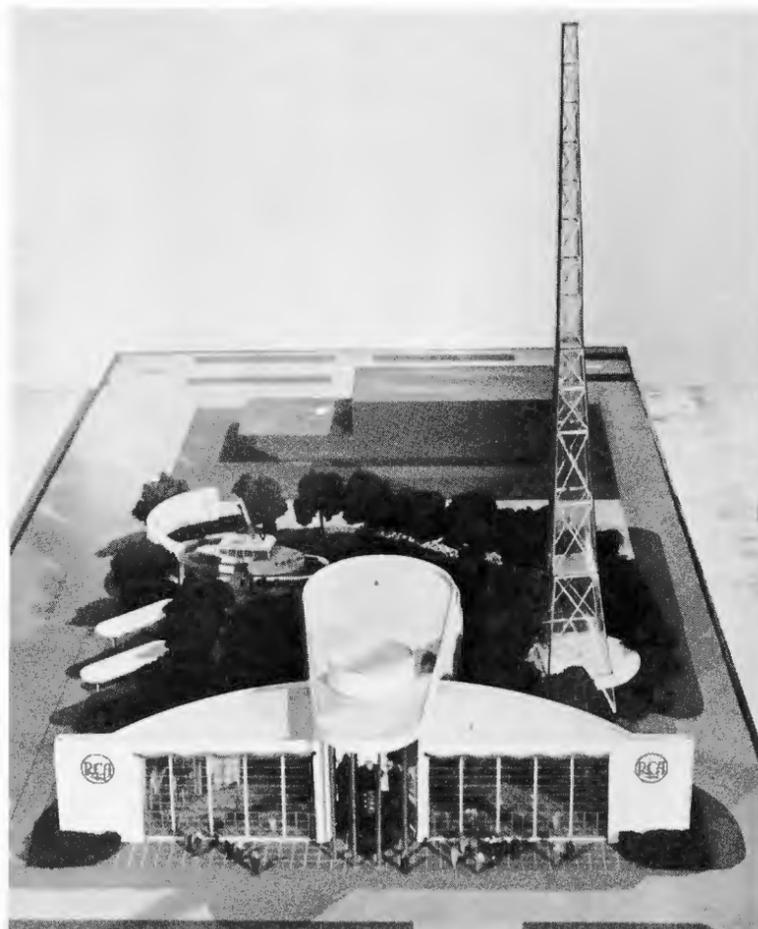
Meetings Scheduled

The following meetings have been definitely scheduled. For other locations check your RCA Victor Instrument Distributor for exact dates:

Akron, Ohio	October 6
Atlanta, Georgia	" 4
Baltimore, Maryland	" 27
Birmingham, Alabama	" 25
Bridgeport, Connecticut	" 24
Burlington, Vermont	" 17
Cambridge, Mass.	" 10
Canton, Ohio	" 11
Charlotte, N. C.	" 19
Chattanooga, Tennessee	" 6

Cincinnati, Ohio	October 20
Cleveland, Ohio	" 4
Columbus, Ohio	" 27
Davenport, Iowa	" 11
Dayton, Ohio	" 25
Detroit, Michigan	" 27
Evansville, Indiana	" 19
Fresno, California	" 6
Grand Rapids, Michigan	" 13
Harrisburg, Pa.	" 26
Hartford, Connecticut	" 20
Indianapolis, Indiana	" 14
Jackson, Mississippi	" 20
Jacksonville, Florida	November 1
Knoxville, Tennessee	October 7
Louisville, Kentucky	" 18
Madison, Wisconsin	" 21
Memphis, Tennessee	" 13
Miami, Florida	November 3
Milwaukee, Wisconsin	October 18
Nashville, Tennessee	" 11
Newark, New Jersey	" 3
New Orleans, Louisiana	" 18
Oakland, California	" 4
Peoria, Illinois	" 27
Philadelphia, Pa.	" 11
Pittsburgh, Pa.	" 5
Providence, R. I.	November 1
Richmond, Virginia	" 3
Sacramento, California	October 5
Saginaw, Michigan	" 6
San Francisco, California	" 3
South Bend, Indiana	" 7
Springfield, Mass.	" 31
Tampa, Florida	November 8
Toledo, Ohio	October 20
Washington, D. C.	" 25
York, Pennsylvania	" 12
Youngstown, Ohio	" 13

RCA Building at N. Y. World's Fair



Above is shown a miniature model of the RCA Building at the New York World's Fair. This building is now under construction and will contain interesting exhibits of RCA activities. One of the highlights will be a number of television receiving booths

PARTS CATALOG HAS MANY NEW PRICE CHANGES

Antennas and Microphones Priced at Lower Figure

With the distribution of the new RCA Parts Catalog by RCA Parts Distributors in all parts of the country, announcement has been made of a number of price reductions in items included in this booklet. While the merchandise affected was outstanding value at the older prices,

the new ones make it more than ever super-values.

The RCA Magic Wave Antenna System has gained a reputation for being one of the most easily installed and efficient antennas ever offered. Thousands were sold at its old price of \$6.95. However, at its new low list price of \$5.95, it gives service engineers an even greater



RCA Magic Wave Antenna

antenna value to offer their customers. And its unique feature of being adaptable to the operation of any number of radios up to 16, makes it the most economical antenna available for multiple outlet installations.

Auto Antennas Included

RCA Auto Antennas are universally accepted as the finest car antennas possible to procure. They are not only highly efficient in performance, but they are unusually attractive. RCA Auto Radios definitely add to the beauty of any car in which they are installed. With

Exercise for Beauty



Lovely Lola Shaw, 19-year old actress heard on a number of NBC dramatic shows, believes firmly in exercise—obviously including swimming—as a beauty aid. Another reason why radio owners should keep their radios in top-notch condition

the exception of the di-pole under-car antenna, which remains at the popular



RCA Monogram Antenna

list price of \$2.60, all RCA Auto Antennas have been reduced in price as follows:

	Old List Price	New List Price
RCA Monogram Antenna, No. 9823	\$4.95	\$3.95
RCA Cowlenna, No. 9825	3.65	2.95
RCA Rodenna, Flexible Type, No. 9793	3.50	2.75
RCA Rodenna, Telescopic Type, No. 9827	2.75	2.25

In addition to the two Rodennas mentioned, a new popular priced unit has been added to the line, known as Stock No. 9851, List Price \$1.95. This antenna is rust-proof, has an extended length of 47½ inches and includes a 36 inch shielded cable.

Microphone Reduced

Another important price reduction is that of the popular priced RCA Aerodynamic Microphone. The low impedance unit now has the attractive list price of \$22.95 instead of its former price of \$26.50. This is complete with a 6 foot shielded cable, but less stand. The attractive table stand shown retains its old list price of \$3.75. The high impedance Aerodynamic Microphone



now lists at \$25.95 instead of \$29.95. Its impedance is 40,000 ohms and it is popular in P. A. work. The price includes a 30 foot shielded cable but does not include the stand.

All RCA Aerodynamic Microphones now include a polished chromium fitting for adapting the 1/8" pipe fitting to 3/8"-27 thread used on standard microphone stands.

RCA Parts Distributors are now featuring these attractively priced items.

Steel Work Completed in RCA Building

(Continued from page 1, column 3) the whole lying on its side, the bottom of the base being the front of the building. The front will extend the entire length of a 200-foot frontage on the Avenue of Patriots. Present plans also call for a small yacht basin on one corner of the building lot and a 250-foot antenna tower on one side. A sizeable yacht completely equipped with modern radio marine devices will be floated in the basin. Special antennae for television and facsimile transmissions will be strung on the radio tower.

RCA engineers are now conducting various tests for television and facsimile to determine interference values and the most effective antenna systems by which the most perfect reception conditions possible may be assured.

To Have Television Display

The general public will be given its first showing and demonstration of television and facsimile by RCA at the World's Fair exhibit. Plans now call for six special television viewing rooms in the RCA building. Each one of the rooms will permit from fifteen to twenty-five persons to see a demonstration at one time. Television programs will be transmitted from various points. It is expected the spectacular events on the Fair grounds will be televised by mobile units and picked up on receivers in the viewing rooms.

New RCA Tube Tester Is to Sell at \$37.95

(Continued from page 1, column 5) octal base ballast tubes. Magic Eye tuning indicator tubes may be tested for brilliance and for opening and closing of the eye.

The new instrument makes all tests according to RMA standards. Line voltage adjustment is provided to adapt the unit for 100 to 125-volt line power. It is not necessary to set the line voltage before inserting tubes in the sockets.

Both the counter and the portable models are equipped with four soft rubber feet on the bottom of the case, while the portable has a new type of snap-out handle for easier carrying. Power consumption is 25 watts, with one rectifier tube being used. Total weight of the instrument is 14 pounds. It is 13½" long, 8" high and 5¾" deep.

RCA VICTOR MASTER ANTENNA REDUCES MAN-MADE STATIC

Counterpoise and Individual Balancing Adjustment Insures Maximum Reduction in All Locations

By V. D. Landon and J. D. Reid
RCA Engineering Dept.

The introduction of the RCA Victor Master Antenna for the first time gives the radio service man an antenna that does not depend on location for its noise-reducing qualities. In the following article, Messrs. Landon and Reid describe the principles upon which this outstanding antenna operates.

When receiving signals on an ordinary antenna, a considerable portion of the noise encountered is man-made static and arrives on the receiver power cord. This noise current flows to ground through the ground lead but the impedance of the ground lead is practically always quite high and a voltage drop occurs along it. This noise voltage occurring from chassis to ground is, in effect, applied to the input of the receiver. Noise arriving in this manner is by far the most important kind when no attempt at noise reduction has been made.

When an efficient noise reducing antenna is employed, this type of noise is greatly reduced. The amount of noise remaining is a function of the accuracy of balance of the transmission line and trans-

This may be more readily understood by referring to Fig. 2 which is the same circuit redrawn to show that the circuit is essentially a bridge. Two of the arms of the bridge are the antenna capacity and the counterpoise capacity. A third arm is the distributed capacity of the lower end of the primary winding to chassis. The fourth arm is the capacity of the other end of the primary to chassis in parallel with the balancing condenser. The output load impedance of the bridge is the primary winding. Since the capacity of the antenna is greater than that of the counterpoise, it is evident that the capacity from chassis to antenna must be made greater than that from chassis to counterpoise if a balance is to be obtained. The balance adjustment is to be made at the time of installation by the service man.

Noise-free Area Not Required

It should be noted that it is not necessary to have the antenna in a noise free area. If direct capacity exists between power line and antenna, the only result is that a

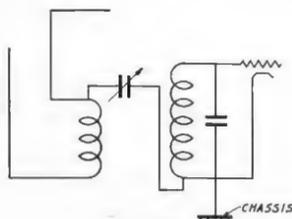


Figure 1

formers, and of the amount of noise field at the antenna proper. In the average installation, the noise reducing kit makes a big improvement but the remaining noise is sufficiently high to justify an attempt at further improvement. However, a large share of the remaining noise is pick-up on the antenna proper. The relative percentage of noise from antenna pick-up and from unbalance will, of course, vary from one installation to another. An adjustable balance of noise picked up on the antenna proper is required if further improvement is to be made.

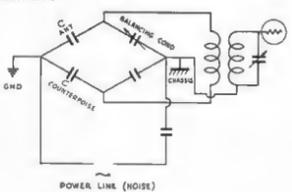


Figure 2

Choosing the Circuit

In choosing the circuit, it is desirable to select one in which the balance adjustment has as little variation with frequency as possible. Also, as little dependence should be placed on balance as possible. In other words, noise reduction should remain good in spite of imperfect balance. Of the circuits tried, the circuit of Fig. 1 seemed to fulfill these requirements best. The arrangement shown in this figure is suitable for long wave operation only. The modification required for the addition of high frequency reception is shown later.

In this figure, the antenna consists of an inverted L about 80 feet long. A counterpoise is run parallel to and close beside the antenna for a distance of one-half its length. The spacing is not critical but should be about six inches. A primary coil of high inductance is connected from antenna to counterpoise and is coupled to a resonant secondary. A small variable condenser is placed from antenna to chassis and is used to balance out the noise. The theory of operation is as follows:

Noise disturbances on the power line cause a voltage from chassis to ground. A small portion of this noise voltage is transferred to the antenna and counterpoise by capacity coupling. If the voltages on the antenna and counterpoise are equal, then no current will flow in the primary and no voltage will be induced in the secondary.

slight readjustment of the balancing condenser is required.

A factor to be avoided is capacity from the primary to the high potential end of the secondary. At first sight, even this appears to be harmless, since a re-adjustment of the balancing condenser regains good noise reduction. Unfortunately, the degree of re-adjustment required varies with frequency. Thus, the balance point varies somewhat with frequency when capacity is present from the primary to the high potential end of the secondary.

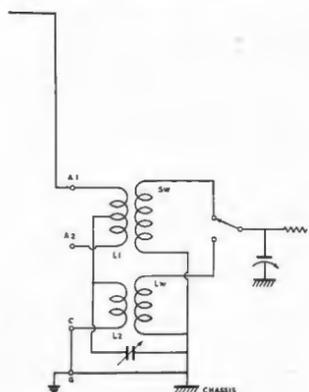


Figure 3

In appraising the circuit, it is important to realize that if no capacity existed between the primary winding and the chassis, then good noise reduction would result even without the balancing condenser. It follows that if the primary capacity to chassis is small, then fair noise reduction is obtained even with an imperfect balance. A critical balance is required for the best noise reduction, but fair results are obtained even with the balancing condenser omitted.

At low frequencies, the bridge consists essentially of four capacities and hence the balance point does not vary greatly with fre-

quency. At frequencies close to the fundamental of the antenna, the inductance of the antenna becomes important. As a result, the balance varies badly with frequency and at some points, a balance cannot be obtained at all. For this reason, it is not recommended that this principle be used for frequencies close to or above the fundamental resonance of the antenna.

In Fig. 3, a circuit is shown in

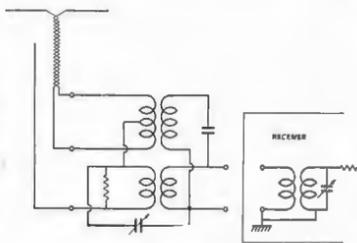


Figure 5

which an adjustable balance is used for the broadcast band and a dipole with a transmission line is used for short waves. The dipole and transmission line together act as the broadcast antenna. The broadcast counterpoise is placed alongside the transmission line. The connections are such that no switching is required in the primary circuit.

This arrangement is used as an antenna kit as an integral part of the receiver. The balancing con-

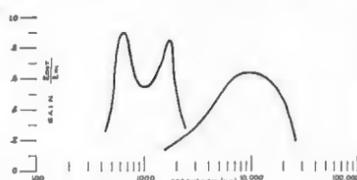


Figure 6

denser and primary winding are mounted on the receiver chassis and add to its cost only by the cost of the condenser, since similar primaries would be required in any case. The antenna kit itself is quite low in cost as it contains no transformers, the wires and insulators being all that are required.

Transmission Line Cut

When making an installation of this antenna, the transmission line is cut to length to suit the requirements of the installation. The counterpoise is also cut to an appropriate length so that the required setting of the balancing condenser is about the same in each location. The proper length of counterpoise is one-half the length of the transmission line plus ten feet.

The primary system is so designed that satisfactory operation is obtained on an ordinary antenna. The connections are shown in Fig. 4. The path for short wave currents from the antenna is through one-half of L_1 and the balancing condenser to ground. L_1 and the balancing condenser have a negligible

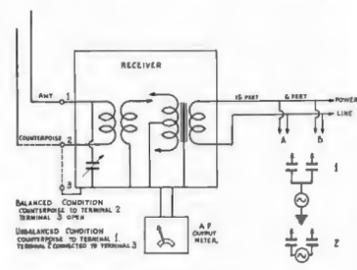


Figure 7

effect on low frequency currents which flow through L_2 .

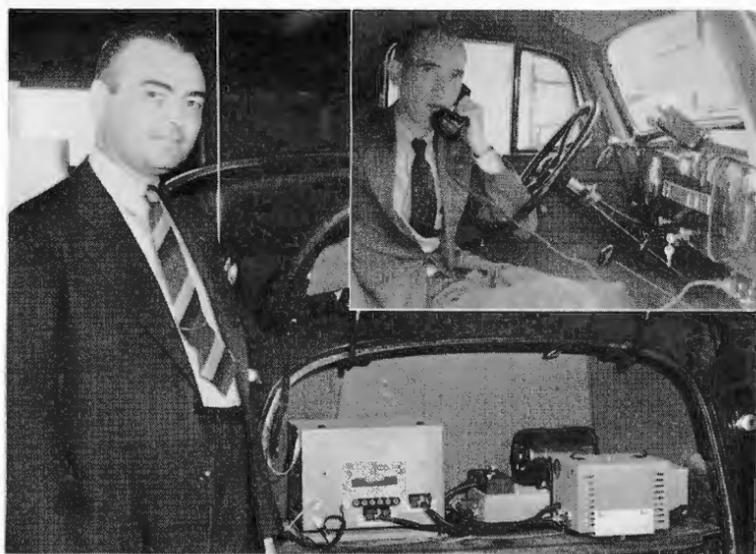
The same antenna is also designed for use with receivers not especially designed for it. This requires a transformer external to the receiver because most receivers have one side of the primary grounded. The circuit is shown in Fig. 5. The operation of the primary circuit is about the same as when it is built into the receiver.

The only difference is in the resonance point. When the primaries are built into the receiver, the broadcast primary circuit is resonant just outside the low frequency end of the band, in the conventional way. When an external transformer is used, the broadcast primary and secondary circuits are separately resonant in the band, but are so tightly coupled as to push the peaks to the extremes of the band. A resistor is shunted across the primary to flatten the response. The response curve taken into a 2000 ohm load is given in Fig. 6.

The high frequency section of the transformer was designed to match a 100 ohm line to a 200 ohm load. The high frequency portion of Fig. 6 shows its performance under these conditions.

To evaluate the noise reduction performance of this antenna system, measurements were made using

Two-Way Cleveland Police Radio



A. G. Kemp, RCA Victor representative at Cleveland, is shown at the left inspecting one of the city's new police cars equipped with two-way RCA Police Radio. The upper right shows Lloyd Chatterton, Superintendent of communication of the Cleveland Police Department testing one of the new installations by talking back to headquarters

CLEVELAND TO INSTALL TWO- WAY RCA RADIO

Police Network to Include Fifty-Six Suburbs

The largest and most modern two-way police radio system in the world is being installed by the Cleveland Police Department. The system will provide instantaneous communication facilities for all parts of the city and for the police departments of fifty-six suburbs covering an area of 600 square miles around the city.

Engineers of the Police Radio Section of the RCA Manufacturing Company have begun installation of the first shipment of 4½ tons of equipment designed and built at the Camden RCA Victor laboratories and factories. This radio policing system will include three powerful transmitting stations strategically placed to provide complete coverage of the city, two-way radio equipment for each of scores of patrol cars, detective cruisers and accident prevention cars, and receiving equipment for all ambulances and police motorcycles.

Largest in World

"This installation will give Cleveland the largest and most modern police two-way radio system in the world," said Lloyd Chatterton, Superintendent of Communication of the Cleveland Police Department.

"Cleveland has the distinction of being the first city in the country to operate a licensed police radio station. In the ten years since, Cleveland has built up a large one-way radio system which is being replaced by the new RCA system. At the same time we are completely reorganizing the teletype, telegraph and telephone facilities of our department and are centralizing the administration of the department at the Central Police Station."

requires a slightly different adjustment. A change in frequency usually means that the balance must be re-adjusted if any advantage is

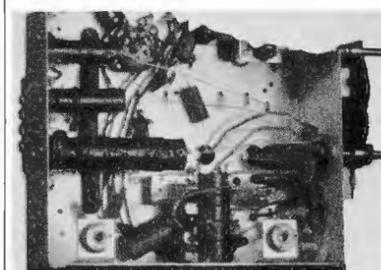


Figure 10

to be obtained from the resistor. For this reason, the use of the resistor is not considered practical for general use. It might prove quite valuable, however, in isolated cases where the required noise attenuation could not be obtained by any simpler means.

a setup shown in Fig. 7. A signal from a signal generator is applied to the power cord of the receiver and the sensitivity of the receiver to this signal is measured both with a normal antenna and with the noise reducing antenna. The ratio of these two sensitivities is a measure of the effectiveness of the noise reducing antenna. In Fig. 8, a curve is given of attenuation versus frequency. Each point on this curve is the average of four measurements, the method of applying the voltage being either between the line and ground (Method No. 1) or across the line (Method No. 2) and each method being applied at points A and B. Ratios of the same order were obtained for each condition.

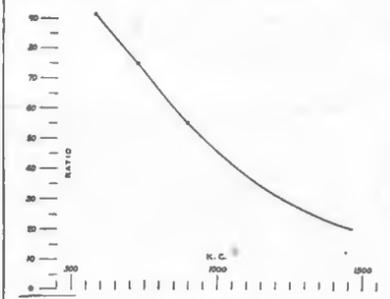


Figure 8

Serve Three Bands

The previous receiving bands have shown only two receiving bands, a low frequency or broadcast band, and a high frequency or short wave band as used on the simpler receiver. A circuit for a three band receiver having a medium frequency band intermediate to these aforementioned bands is as shown in Fig. 9. This circuit again avoids primary switching which is advantageous, in that, it enables the capacities of primary to ground and to secondary to be kept at a minimum. If an antenna is used, of dimensions suitable for the long wave band, it is

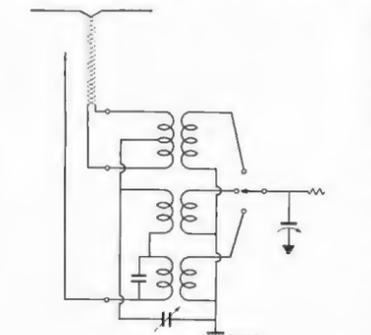


Figure 9

resonant in the medium band, and a balance cannot be obtained on the medium band except at the lower frequencies although there is an improvement in noise reduction over the conventional receiver with primary grounded to chassis. The accompanying slide illustrates a commercial application of this circuit to a 3-band receiver. (Fig. 10).

It is of some interest to note that still further improvement in noise reduction can be obtained by using a variable resistor in parallel with the balancing condenser or in series with it. When this is done, a critical adjustment of both resistor and condenser may be found which results in infinite attenuation of the noise from any given source. Noise from a different source sometimes

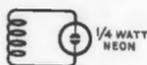
Service Tips



Now you can win your choice of a handsome RCA Service Engineer's Pencil or any volume of RCA Victor Service Notes by sending tips to RCA Radio Service News, Camden, New Jersey. . . . Service Tips must be acceptable for either RCA Radio Service News or the RCA Radio Service Tip File. . . . All tips become the property of RCA to be used as they see fit. . . . Service Tips are our readers' ideas, not ours. While RCA Radio Service News believes they are worthwhile, we cannot be responsible for results.

Interference Detector

To detect high frequency leakage in auto radios, make three or four turns of heavy gauge wire around a 3" form. Remove the form, connect the ends of the coil to a 1/2 watt neon lamp and move the coil



around possible sources of leakage until the lamp lights or flickers. With this gadget I have found loose wires that appeared to be tightly connected and making good contact. The diagram of this gadget is shown below.

James W. Hoskins
26 S. Fremont
Alhambra, California

Noise in 1937 Zenith

A decided scratching noise on tuning a '37 Zenith with the spinning flywheel, having the appearance of dirty tuning condensers or condenser blades touching, is often due to the flywheel shaft not making proper ground at the end of the shaft. Tighten spring at end of shaft by means of moving fully toward center and tightening. Oil with a drop of oil.

Harvey H. Schock
311 W. Windsor Street
Reading, Pennsylvania

Excessive Motor Noise

One of the causes of excessive motor noises in most makes of cars is due to the improper grounding of the steering post. A good method of getting rid of this noise is by the use of two jaw type ground clamps, the kind found in RCA all-wave antenna kits. One of these clamps is installed on the steering post, the other on some part of the motor, such as the intake manifold, and bonded together by a piece of 1" shielding mesh. Care should be taken to make allowance in the length of the mesh to take care of the vibration of the motor.

Sidney Weitz
Economy Radio
1135 Liberty Avenue
Brooklyn, New York

Philco Model 5 Transitone

A loud howl develops when volume is turned up. This howl is heard intermittently and is very hard to locate. Place insulated paper around the output transformer, as the terminals are making intermittent contact with the volume control terminals and shields.

Dwight L. Cooley
404 Magee Street
Lawndale, Philadelphia
Pennsylvania

GE S-132

Distortion, clearing when dial is turned a bit either side of resonance. Check 745 mmf. condenser in series-parallel arrangement across oscillator coil. There is another 745 mmf. condenser connecting tap on oscillator coil through resistor to grid of 27 oscillator tube. Try interchanging, but use care when removing. Last-mentioned condenser is not so critical.

Clifton S. Krumling
315 East 2nd Street
Blue Earth, Minnesota

RCA Victor Model R-5

In many cases it will be found impossible to cut out the signal of a powerful broadcasting station on an RCA Model R-5. In order to remedy this condition, change the volume control circuit as shown in the diagram. Removing the .00013 mfd. condenser will sharpen the tuning.

George H. Nakao
732 Spencer Street
Honolulu, Hawaii

Atwater Kent #627

The complaint on this set is, weak, and the stations were off track. The trouble was traced to the oscillator grid circuit of the oscillator trimmer; disconnected all wires to trimmer, checked it, and found a high resistance reading, due to moisture between mica and ground side of trimmer.

James Domino
58-81 Maspeth Avenue
Maspeth, New York

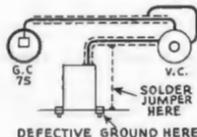
Philco 37-602

Loss of reception on stations above 1010 kc. on dial is due to bad contacts between wires and lugs of oscillator coil. Have found many of these coils to be defective. Application of a hot iron and some solder remedies this defect.

Leslie B. Balins
c/o West Radio
228 Columbus Avenue
New York, N. Y.

Zenith Jr. Auto Radio Model 7

Constant or intermittent ability to control volume would indicate a defective volume control. However, this is not the case. One end of the volume control and the grid lead shields are soldered to the top of the I.F. shield can, depending upon the can mounting bolts for a ground



to the chassis. The can becomes loose and the ground imperfect, resulting in the symptoms given above.

Remedy: Tighten the I.F. can mounting bolts and solder a piece of wire braid from the can to the chassis.

C. D. Smith, Service Dept.
Maumee Appliance Co.
1256 Dorr Street
Toledo, Ohio

Insect Trouble

Recently I had a midget receiver (Sparton) completely infested with cockroaches that were causing the trouble. To remedy this epidemic I used "Eng Lighter Fluid" to rid coils and then blew out and powdered "20 Mule Team Borax" in cabinet of set. Was there recently to see how it was working, and, believe me, no insects of any kind were around that set!

Albert C. Hart
603 Logan Street
Hammond, Indiana

RCA Radiola 60

When this set seems to be aligned properly but lacks sensitivity, it is a sure sign that the antenna-ground coil is open. Before checking other parts of the circuit, much time can be saved by checking this portion of the set first. I have found three receivers of this series, in succession, to be in the above condition.

Peter Athas
2602 Barnard Street
Savannah, Georgia

Tuned R-F Receivers

In the older tuned radio frequency receivers the radio frequency stages are very unstable and liable to oscillation. To prevent this and also to make these circuits much more stable, I have found that a .04 mfd. condenser connected between one side of the primary of the power transformer and the chassis (or ground circuit) is very helpful. This is not applicable to AC-DC receivers.

Bernard Seamon
Wiscasset Hardware Co.
Water Street
Wiscasset, Maine

Radio Brush

Over a year ago I repaired a Philco midget. The owner of the radio asked me if I had something to clean the inside of the radio of the dust that collects, whereupon I gave her a brush with the guarantee of six months written on it, which cost me ten cents.

I was surprised to see the inside of the radio looking so clean after the year's service, and thought it would be a good idea to give a brush to each customer buying tubes. It is a very practical article.

Alexander Sabirski
428 Wilson Avenue
Brooklyn, New York

Hallicrafters Sky Buddy (Earlier Model)

When excessive frequency drift is encountered (sometimes as much as 10 or 15 kc.) in this model receiver, it can usually be traced to the resistance of the screen dropping resistor for the 6A7 (osc. and 1st detector) and the 6F7 (i.f. and BFO) rapidly changing value.

Replace the original 25,000 1/2 watt resistor with a 25,000 5 or 10 watt resistor, and your problem is generally solved.

Wilbur W. Cashwell
1503 West Cass
Tampa, Florida

Power Transformer Protector

On sets having power transformer failures I always install a miniature socket with a 6.3 volt dial light either of the .15 ampere or .25 ampere rating (depending on the total current drain from the rectifier) in series with one power transformer high voltage center tap lead so as to burn out when a condenser breaks down. This stunt has never failed yet on numerous sets and is a sure guard against transformer burn-outs.

D. Breit
C/o Chatham Radio Service
16 E. Victory Drive
Savannah, Georgia

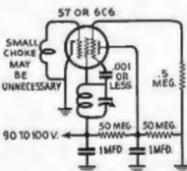
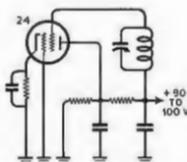
Setting Push Buttons

When setting up the push button RCAs that have a Magic Eye always put a mirror in front of them; then you can see when you have the station tuned to the exact spot. This saves the time that would be used to hook up an output meter and a signal generator. By using the mirror, all you have to do is punch the next button and tune that station.

Thomas Carter
Dunwoody
Georgia

National Pfanstiel

Notable for its dynatron oscillator. When trouble is encountered in this circuit, change the socket to



a six-prong one and use the circuit shown. Dynatrons are easily spotted because the control grids are grounded.

Edward Lovick, Jr.
2502 Harlan Street
Falls City, Nebraska

Triple-Cone



The new RCA Victor High Fidelity Radios feature the new triple-cone speaker shown above. This speaker has an essentially uniform range from 50 to 8000 cycles

New Circuit Is Used To Improve 1939 RCA Radios

Electrical Magic Voice and Triple-Cone Speaker Reduce Distortion

An electrical "Magic Voice" and a triple-cone loudspeaker are two new technical developments which operate together to provide tonal reproduction of a new high standard in several of RCA Victor's radio and Victrola instruments for 1939.

The electrical Magic Voice made its first appearance in RCA Victor's recent HF-1 model radio designed for the highest quality "local" reception. It provides an improved reproduction over a much wider range of frequencies than that of an ordinary radio and, together with the new triple-cone high fidelity speaker, also developed in the RCA Victor research laboratories, gives an essentially uniform frequency response from 50 to 8,000 cycles by the use of three different sized cones in place of the usual one.

In all the models employing the electrical Magic Voice the i-f amplifier has been designed to pass a

RCA Institutes Offers Course In Television

Special Equipment Constructed for Use of Students

Starting with the fall term, convening September 6, 1938, the RCA Institutes is offering courses in Television Engineering. For persons who have had no previous training in Radio Engineering, the course requires a period of two years in the day school or five years in the evening school. Special Television Units of six months duration in the day school or one year in the evening school are available to applicants possessing adequate technical background.

The instructors handling these courses have had immediate contact with development of television and have studied at first hand the many problems with which this new art has been confronted. Concurrently other members of the school staff have been engaged in the preparation of lesson material and construction of special television demonstration equipment.

Further information concerning these courses may be obtained by addressing a request to, RCA Institutes, 75 Varick St., New York, N. Y., Dept. S. N.

frequency band sufficient to provide reception up to 7500 cycles, the same as the HF-1.

Uses Inverse Feed-Back

The electrical Magic Voice employs inverse feed-back in the audio amplifier, feeding back the audio signal from a tap on the output transformer secondary to the cathode of the second A.F. tube. This reduces the gain in the audio circuit from 10 to 15 db. in the various receivers employing this circuit. The loss of gain is made up by means of an additional audio amplifier stage preceding the amplifier within the feed-back loop.

The inverse feed-back circuit has a beneficial effect upon such undesirable characteristics as hum, amplitude and harmonic distortion, and

(Continued on page 6, column 3)

Test Equipment Par Excellence!



QUALITY EQUIPMENT AT LOW PRICES.
ASK FOR FREE CATALOG

Seven outstanding pieces of RCA test equipment are now being featured by RCA Parts Distributors on the attractive display shown. Be sure and check this equipment carefully before you make your next purchase. It is truly "Quality Equipment at Low Prices"



Television Receivers

E. W. Engstrom and R. S. Holmes

RCA Manufacturing Co., Inc.

(Continued from June Issue)

NEW RECEIVER PROBLEMS

The design of a television receiver is based upon many considerations which differ from those encountered in sound receivers. Two signals must be received and simultaneously utilized—picture and sound. The bandwidth required for the picture is many times greater than that required for sound broadcasting. For simplicity of operation, tuning should be uni-control for picture and sound. For many reasons a super-heterodyne circuit is well suited for meeting the receiver requirements.

For the radio frequencies planned for television transmission (above 40 megacycles) there will be practically no natural static. Man-made interference will, however, impose severe conditions. The wide picture frequency bands make the receiver more susceptible to noise pickup than are more selective receivers. These factors point to the necessity of high signal levels at the receiver input, and consequently somewhat less sensitivity is required than is common for sound broadcast receivers.

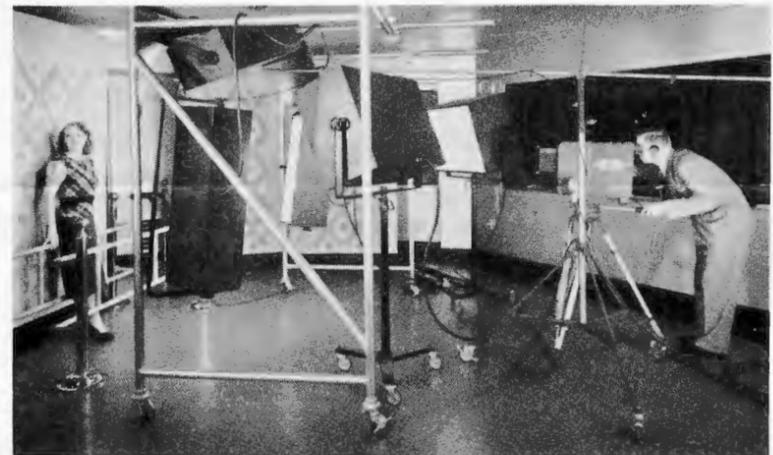
The picture and sound carriers in all television channels will have the

frequencies are amplified through their respective intermediate frequency amplifiers and rectified by separate second detectors. Separate automatic volume controls (as per Fig. 3) maintain the proper signal levels on the two detectors. The sound signal passes through a high fidelity audio amplifier to the loudspeaker.

Video Signal Amplified

The rectified picture, or video, signal is amplified through the video frequency amplifier and impressed on the control grid of the Kinescope. This amplifier must be so designed that it will pass the full video frequency band of approximately 60 cycles to at least 2,500,000 cycles with negligible amplitude and phase distortion. An output of the order of 50 volts peak to peak is usually required on the Kinescope grid.

The input to the synchronizing separator circuit is also obtained from the video frequency amplifier at some point where the amplitude and polarity of the video signal are correct, but ahead of the contrast (video gain) control, so that the synchronizing is not affected by the



Betty Goodwin, NBC's first television announcer, before the camera in the new demonstration studio, being televised with Robert W. Clark, television engineer, behind the televising camera. The studio is the high spot of guided NBC tours

same frequency separation. Therefore, by properly choosing the pass bands of the two intermediate frequency amplifiers, both carriers can be heterodyned by a single oscillator. The picture intermediate frequency must be high because of the extremely wide video frequency band. This wide frequency band means that more amplifier stages are required to compensate for the low gain per stage. Methods are employed to reduce the total frequency band which the receiver must pass, and these contribute to economy in receiver design.

Accepts Carrier and One Sideband

It has been found that if the receiver is designed to accept the carrier and one sideband, rejecting a major portion of the other sideband, good performance can be obtained with very much greater economy. It is present practice where only one sideband is fully accepted by the receiver to accept the high frequency sideband and reject the lower. In the discussion of receiver design in these articles it is assumed that this economy is used.

To simplify the discussion of the various components of the receiver and their relation to each other, a block diagram is very useful. Figure 3 is a block diagram of a typical receiver, showing the respective functions of the various parts of the circuit and giving an indication of the wave shapes occurring there.

Since both sound and picture are to be reproduced by this receiver, it is desirable to use a single antenna for picking up both carriers. Both signals are passed by the radio frequency circuits to the first detector, where they are heterodyned to intermediate frequencies by the local oscillator.

These two bands of intermediate

video contrast control adjustment.

The synchronizing separator must separate the synchronizing pulses out of the composite video signal, and then separate the horizontal and vertical pulses from each other and impress them on the deflecting circuits in the proper amplitude and polarity to synchronize the deflecting oscillators.

The deflecting circuit consists essentially of three parts. First, an

New Circuit is Used to Improve 1939 RCA Radios

(Continued from page 5, column 5)

on so-called "hangover" effects caused by the mechanical resonances in the loudspeaker cone. Actual measurements show that hum and harmonic distortion is reduced to the same extent as the gain is lowered by the feed-back circuit.

While it is desirable by means of feed-back to minimize the amplitude distortion within the audio frequency band that is to be reproduced, it is equally undesirable to leave too large a response region outside this band where no signals will be received. The region of no signal response would reproduce line surges at the low frequency end of the band and "monkey chatter" and noise at the high frequency end. It is not possible to control the response within the feed-back loop, so an audio stage is added before the feed-back amplifier in which suitable filters are added to control the undesirable responses.

It has been found that the feed-back circuit may be made to cause a very much larger reduction in the effective output impedance. This low impedance loads the loudspeaker cone circuit and thereby damps the mechanical oscillation within the cone, resulting in a marked improvement in the "hangover."

In previous models the problem of tone quality improvement was handled by acoustic treatment of the radio cabinet. A wooden shell was constructed behind the speaker to minimize the back wave from the loudspeaker and to remove resonances within the cabinet. RCA Victor engineers report that the electrical Magic Voice system has definite advantages over the acoustic treatment both as to efficiency and for ease of servicing.

Three Speakers in One

The new-type speaker is actually three loudspeakers in one. The large outside cone diaphragm, the same size and shape as in an ordinary 12-inch speaker, reproduces tones in the range between 50 and 4,500 cycles. The second cone diaphragm, which is superimposed on part of the larger cone, handles fre-

quencies between 4,500 and 8,000 cycles. The third diaphragm, a dome-shaped cap in the center, tunes the mechanical circuit of the second cone to operate at a higher amplitude, thus increasing the volume of the higher frequencies without distortion. The largest diaphragm is attached directly to the voice coil. The two others are fastened to the first at its apex.

RCA Victor engineers explained that the uniform response of the triple-cone speaker over the entire range has never been equalled before in a single-coil speaker. The two ranges blend together perfectly in a fidelity of tone that marks a long step forward in that field of radio engineering.

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(To be continued in next issue)

Television Receiving Set



Betty Goodwin, NBC's first television announcer, and Robert Morris, Development Engineer of the National Broadcasting Company, inspect the machinery in the receiving-monitor, enclosed in glass for the benefit of visitors on the new Television Tour just made available to the public. The back of the machine also is open, and visitors are able to see inside by means of mirrors

quencies between 4,500 and 8,000 cycles. The third diaphragm, a dome-shaped cap in the center, tunes the mechanical circuit of the second cone to operate at a higher amplitude, thus increasing the volume of the higher frequencies without distortion. The largest diaphragm is attached directly to the voice coil. The two others are fastened to the first at its apex.

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oscillator which generates pulses of large amplitude, synchronized by the incoming synchronizing signal; second, a circuit for changing the large (voltage) pulse into a voltage of sawtooth wave shape, and, third, a circuit for changing the sawtooth of voltage into a sawtooth of current through the deflecting coils, to deflect the Kinescope electron beam. Both deflecting circuits perform essentially the same functions, but the circuit arrangements and constants are different because of the great difference in operating frequency, i. e., 60 per second for the vertical and 13,230 per second for the horizontal (30 frames, 441 lines).

Other components of importance in the receiver are the power supplies, of which there must be two—

(To be continued in next issue)

New Antenna Coupling Unit Is Announced

Adds Noise-Reduction to Existing Antennas

A new antenna coupling transformer which makes possible the conversion of existing antenna installations to provide all the features of the noise-reducing RCA Victor Magic Wave Antenna when used in conjunction with the proper receiver coupling transformer, has



Stock No. 9849. This unit includes an efficient lightning arrester which is housed in the sturdy porcelain case

been introduced by the RCA Parts Division. Designated as Stock No. 9849, the new unit lists at \$2.00.

Up to 16 radios may be operated at one time from a single antenna using the new coupling unit together with associated distribution and receiver coupling transformers. Such an installation is ideally suited for radio dealers, apartment houses and hotels. An outstanding feature of the new transformer is a built-in lightning arrester. The unit is completely enclosed in a sturdy porcelain case with screw terminals for easy connections.

Same As Magic Wave

The same highly efficient noise reducing features found in the Magic Wave Antenna may be obtained by using the new unit with the recently introduced No. 9813 set coupling transformer and either a vertical or horizontal antenna and transmission line. Noise reduction will be accomplished on both standard and foreign broadcast bands between 530 and 23,000 kcs., with high signal pickup.

The new unit may be used with any antenna from 20 to 120 feet long with a transmission line of any length not exceeding 500 feet. An iron pipe 20 to 30 feet in length may be used for a vertical antenna.

Major Components of Television Receiver

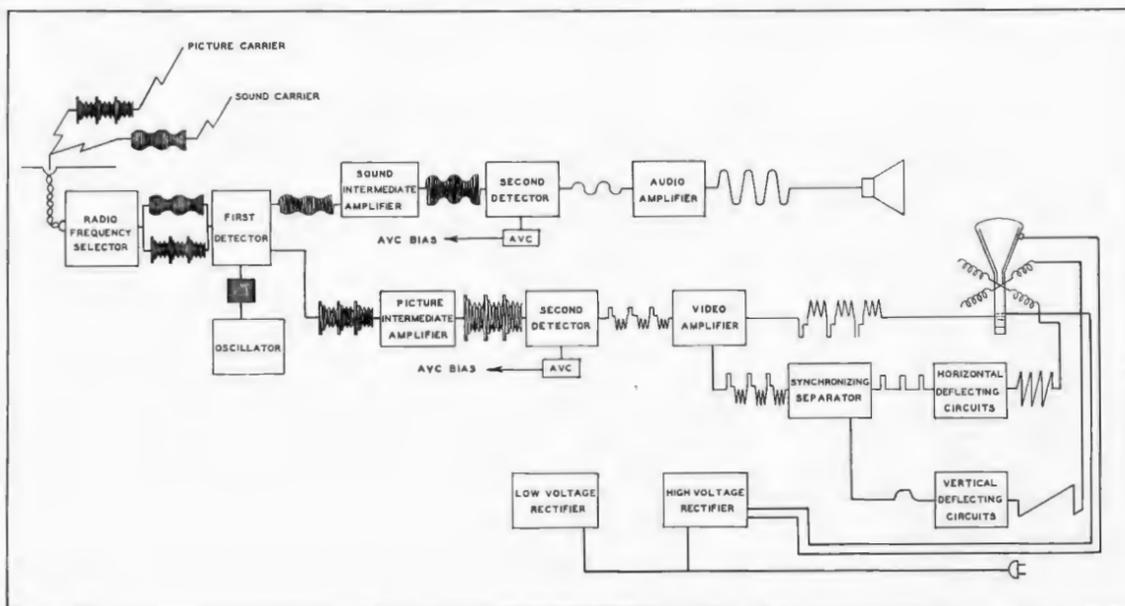


Figure 3.—The illustration above shows the various components of a modern television receiver and their relation to each other. Their function is also indi-

cated with the wave shapes occurring at each stage. Note the separation of the picture and sound carriers and the position of the deflecting circuits

RCA Executives Promoted



E. W. Ritter



D. F. Schmit

NEW SPEAKER HAS SUPERIOR PERFORMANCE

Easily Handles Up to 25 Watts Output

Introduced as a companion to RCA's powerful 100-watt and 60-watt loudspeakers, a new 25-watt permanent magnet speaker is announced by RCA for a multitude of outdoor and indoor applications where a small, light-weight unit of superior performance is required. Designated as MI-6260, the new unit has a list price of \$89.00, FOB Camden, N. J.

W. L. Rothenberger, manager of the RCA Commercial Sound Division, announced the new unit, pointing to its value for use in small ball parks, at swimming pools and small bathing beaches, in school yards, recreation fields, on sound trucks, and for many other outdoor installations. It is also adapted for use in small auditoriums, in churches and for other indoor applications. Its total weight is only 19½ pounds.

Similar to 100-Watt Design

"This speaker is more powerful than the average permanent magnet speaker of its size and therefore can do the work of two or more such units," Mr. Rothenberger declared. "The same qualities which have gone into our famed 100-watt and 60-watt speakers have been built into this unit, insuring dependability and superior performance. Like the larger units, it is completely weather-proof."

The overall length of the new speaker is 29¾", and the bell diameter is 18½". Frequency range is from 140 to 8000 cycles. The standard 15 ohm voice coil employed in all RCA high powered mechanisms is used. The distribution angle is 50 degrees. It is finished in wrinkled gray and black.

Easily Handles 25 Watts



The new RCA Commercial Sound Loudspeaker MI-6260 features a permanent magnet for field excitation, thereby eliminating the extra expense of such units and their associated wiring. It has an excellent frequency response from below 140 cycles to 8000 cycles

New Power and Television Tubes Added to Line

(Continued from page 1, column 4)

cial filament construction in this tube provides fast heating, suitable for application where quick response in on or off operation is essential. The high power sensitivity of the 1619 makes the tube especially suited for use as an a-f or r-f power amplifier, or as modulator, frequency multiplier or oscillator. The maximum plate dissipation is 15 watts.

Suitable for Amateur Use

The 1852 and 1853 are intended for use by the amateur and experimenter in experimental television receivers. Both feature a special shielded-lead construction to permit bringing out the control-grid lead to a base pin rather than to a cap. With this construction it has been possible to keep the grid-plate capacitance as low as that of this tube if it were constructed with a grid cap. From a circuit standpoint the proximity of grid pin to cathode pin simplifies wiring and decreases the size of the inductance loop connecting the input circuit to the tube. These are features important at high frequencies because they provide decreased feedback and improved circuit stability.

The 1852 is a metal tube having extremely high grid-plate transconductance (9,000 micromhos). It is recommended for use in the r-f and i-f stages of the picture amplifier as well as in the first stages of the video amplifier when several video stages are used.

The 1853 is a metal tube having also a high transconductance (5,000 micromhos). The transconductance of the 1853 is not as high as that of the 1852, because the 1853 is designed with an extended cut-off characteristic so as to make it especially suitable for use in the r-f and i-f stages of the picture amplifier of television receivers employing automatic gain control.

Ritter Named Plant Manager At Harrison

D. F. Schmit Heads Tube Engineering

Elevation of Eugene W. Ritter, as General Manager of the RCA Manufacturing Company's Harrison Plant, replacing J. C. Warner, deceased; and of D. F. Schmit, to succeed Mr. Ritter as Manager of Research and Engineering at the Company's tube making plant, was announced by Robert Shannon, Vice President and General Manager.

Mr. Ritter, who is a resident of West Orange, has been associated with radio vacuum tube manufacturing, engineering and research since 1925, when he became a member of the General Electric Company's engineering staff at NELA Park, in Cleveland. When the tube manufacturing activities of the GE and Westinghouse Companies were taken over by the newly formed RCA Radiotron Company, in 1930, Ritter was placed in charge of a group working on the design, development and testing of receiving tubes. Two years later, he was placed in charge of receiving tube and cathode ray design and development. In 1934, he was appointed head of all of the Company's research and engineering at Harrison.

Joined Company in 1926

D. F. Schmit also dates his association with vacuum tube engineering to the early days of radio, in 1923. He joined the E. T. Cunningham Tube Company in 1926, and came with the RCA Radiotron organization a year after it was formed. Before his new appointment, Mr. Schmit was in charge of radio receiving and cathode ray tube design and development. He is a resident of Summit.

Money Back Offer Has New Sales Appeal

(Continued from page 2, column 4)

the performance of his radio set and returns them to the dealer for a refund of his purchase price, the dealer may then send these trial tubes to his distributor who will replace them in kind.

In order to place this offer before the public, we have prepared a complete kit of promotion material so that the dealer can set up this program in his market with a minimum amount of effort. This kit contains 12 premium items, together with colorful window streamers, mailing pieces, post cards, handbills and other material necessary to operate this program successfully. Cunningham and Radiotron distributors have been informed of this program, and the kits are now ready for distribution to dealers.

A presentation book containing complete details concerning this program is also available and can be obtained from Radiotron and Cunningham Distributors upon request. Each kit contains:

- 12 attractive Two-color Cigarette Boxes
- 3 Window Streamers
- 1 Counter Card
- 100 Duplex Business Reply Cards
- 100 penny post cards, unstamped
- 100 direct mail letters
- 200 handbills
- 1 pad consumer guarantee certificates
- 1 Presentation Folder
- 1 Pindex
- 1 RC-13 Manual
- 1 Socket Layout Guide
- 4 Newspaper mats
- 1 Tube Return Certificate

These can be obtained either from your local radio tube distributor or by writing directly to the RCA Manufacturing Company, Camden, New Jersey, enclosing check or money order for \$1.34.

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.

Pickup Falling Off Record—1939 Automatic Record Changer

A clockwise twist in the pickup cable will tend to throw the pickup off the record. When securing the pickup lead to the cabinet, before plugging the cable into the chassis, the lead should be twisted about ¼ turn in the direction (counter-clockwise) tending to hold the pickup on the record.

Electric Tuning Mechanism—1939 Instruments

Operation of the electric motor tuning mechanism is described in Service Notes pertaining to the particular model. This information and the accompanying illustration should be studied by everyone concerned with the sales, demonstration and service of instruments involved.

The principle of operation necessitates that the mechanism go through several quick reversals on arriving at the desired station frequency and before reaching a dead stop. Three of four reversals are not considered excessive and are within factory tolerance of adjustment. The number of reversals and consistency of operation depends mainly on the flywheel friction adjustment; however, in some cases the selector disc and station setting contacts are involved. The following suggestions may be helpful where excessive pointer oscillation is experienced in the field:

Oscillation on Certain Buttons Only—Related to Selector Disc

- (1) Check contact tip of selector assembly for loose fit in body. See that nose of contact is not burned nor distorted out of correct shape.
- (2) Clean the insulating gap of selector disc, being sure to remove all metal particles and metallic fragments from beveled edges of the brass. Each contact should be checked to assure that clearance exists (approx. .010") between it and the disc when stopped in position on the station.
- (3) Inspect the insulating gap to see that it has not changed shape due to bending or warping. Replace the disc if cleaning and adjustment fail to give correct operation.

Oscillation on All Buttons—Related to Motor Flywheel

- (1) Slow oscillation indicates friction adjustment of flywheel is too tight. Loosen set screw slightly.
- (2) Rapid oscillation indicates friction adjustment is too loose. Tighten set screw slightly.
- (3) If definite adjustment cannot be reached, remove spring from behind flywheel set screw and increase its length by stretching; replace and make the necessary adjustments. A heavier and stronger spring, Stock #31242, is supplied as replacement.
- (4) See that leather friction pad is not binding in its hole, and that it is saturated with lubricant. "Neats-Foot" oil should be used for this purpose.
- (5) The balance of the flywheel sometimes prevents correct adjustment. The standard service replacement flywheel, Stock #31240, may be used to definitely eliminate this cause.
- (6) The number of oscillations varies somewhat with line voltage. Avoid making adjustments at very low (105v) or very high (125v) voltages. Adjustments made at 115-118 volts provide good operation of the rated range.
- (7) Stability of adjustment is slightly better if made after a brief run-in period.

Speaker Rattle—Models 94X, 94X1 and 94X2

The mounting of the dry electrolytic adjacent to the speaker is such that the cone may possibly strike it, causing a bad rattle in the reproduction. This source should always be checked before replacing speaker parts. The electrolytic clamp can be bent so as to give ample clearance.

High Capacity Auto Antennas with Models 8M, 8M1, 8M2, 8M3 and 8M4

On a number of cars having built-in antennas of relatively high capacitance it is frequently difficult to obtain best signal-to-noise ratio, due to improper matching of the antenna system to the input. This is particularly true where the insulated steel top insert, running board or rear trunk is employed as antenna. Improved performance can be obtained by changing the value of the antenna series capacitor C-1 from 680 mmfd. to a value of 300-400 mmfd. Correct matching is indicated by ability to reach a definite peak adjustment on the "Antenna Compensating Capacitor."

Vibrator Interference—Model 8M4

Noise or hum interference may develop when the Local-Distance switch is operated on the local position, if there are poor grounds at the car battery or insecure contact between various members of the car chassis. The interference can be eliminated by installing a 500-ohm resistor, preferably a flexible pigtail type, in series with the BLACK lead to the Local-Distance switch on the control head assembly.

Push Buttons Not Latching—1939 Electric Tuning

As in previous designs, the position of the chassis in the cabinet with respect to the push buttons is important in obtaining positive latching action. It may be necessary in some cases to elevate the front of the chassis slightly (approx. ¼") by placing washers under its mounting feet, in order to obtain the best operation.

Mechanical Motor Rumble—1939 Electric Tuning

Under certain conditions related to acoustics of room, placement of instrument and general noise level, the mechanical noise of some electric tuning motors may be found objectionable. Should such a condition exist, it may be due to an unbalanced flywheel or noisy gear system. Check to see that intermediate gear Stock #31238 is the "micarta" type, and that the flywheel, Stock # 31240, is correctly "balanced." The standard replacement units meet these requirements.

Noise Eliminator Is Demonstrated With Unique Kit

(Continued from page 2, column 4)

erator, a receiver coupling transformer, two dummy antenna wires and an attractive container. A forty or sixty-watt standard lamp is required, but is not supplied.

A demonstration is quickly made in the following manner:

1. Connect the interference generator to any 110-volt a-c or d-c source.
2. Connect the short antenna lead to the counterpoise connection, and the long lead to the antenna connection of any 1939 RCA Victor radio having eight tubes or more or to the counterpoise and antenna connection of the transformer supplied. This may be used with any type of receiver.
3. Tune in any station on the broadcast band. The noise from the interference generator will be plainly and usually quite loudly heard.
4. Adjust the Master Noise Eliminator on the transformer adjusting screws until the noise is eliminated.

That's all there is to it—a demonstration that is unlike any you have ever made. And it's a sure sale every time you make it.

RCA Victor Instrument Distributors are offering this demonstration kit at an attractive price. Every service engineer should make a demonstration a regular part of his customer contact.

National Prize Winner



Gene N. Henderson (left), Service Manager of the University Music Store, is seen receiving from E. A. Black, of Harper-Magee, Seattle distributors of RCA products, his official notification that he won first prize in the RCA Radio Tube Modernization Contest

ENGINEERS DESCRIBE FEATURES OF RCA RADIO TUBE TESTER

Inter-locking Switches and Roll Chart Make Operation Easy—Gives Highly Accurate Test

By D. T. COOPER and R. F. BOV

The new RCA Stock No. 156 Portable Tube Tester was designed to test tubes according to R. M. A. standards. In developing and designing this equipment, cost, simplicity of operation and appearance were considered of prime importance.

Much thought was given to the appearance of the equipment. The cabinet is finished in a blue-gray durable baked wrinkle finish. A patented type durable snap handle was used in preference to the cheaper type of stamped out leather or rubber composition. The equipment has eight rubber feet, preventing scratching counters and floors when used. The internal wiring gives a neat workmanlike appearance. Cable type color coded wiring is used, the conductors being tinned copper wire with double acetate rayon braid, wax impregnated insulation. All metal parts are plated to prevent corrosion.

Easily Removed

The equipment may be removed from the case by removing one screw at the bottom and lifting the panel with a small screw driver through the two slots at the front and two holes at the rear. Additional switch points are available for use in testing a new tube that may be made, thus avoiding obsolescence of the equipment.

The push button switch is of a special design using two latch bars and operates in the following manner:

When the "Short" button located on the left end of the switch is depressed, each numbered button on being pressed releases the numbered button that was previously pressed. When the "Test" button located on the right end of the switch is depressed, each numbered button on being pressed locks in without disturbing any other numbered button. Pressing either the "Test" or "Short" button clears the switch.

The "Output" button located in the center of the switch changes the meter circuit from measuring line voltage to measuring tube output. This arrangement of the push button switch provides a logical testing sequence which is, in a sense, automatic. After completing the "Short" test, pressing a single button switches to the "Test" position, clears the push button bank, making it ready for the new test and sets the locking mechanism so any numbered button that is depressed will lock in without affecting its neighbors. To make the tester operation still simpler, a roll chart has been made an integral part of the unit with guide lines connecting each column to its appropriate control. The guide lines direct the eye up to the control and back to the chart obviating the necessity of carrying a push button sequence in one's mind, thus greatly reducing the chance of making an error in setting. Functionally, this avoids finding the test data, setting part of it, hunting it up again and setting some more of it. This procedure tends to become confusing, requiring a recheck before finally testing to be sure there were no errors made in originally setting up the test.

Chart 9 Feet Long

The chart is 9¾ inches wide by approximately 9 feet long. At the start of the chart, there are instructions telling the procedure for changing charts and operating instructions for the tube tester. There are approximately 435 different types of tubes listed, including 180 ballast tubes. Some tubes require two and three lines for different tests. A clear bold faced gothic 12 point (approximately 1/8 inch high) type is used, making the chart easy to read even in a poor light. The chart is protected by a clear celluloid window. This window has a black line making the columns easy to read.

Announce RCA Tube Contest Prize Winners

(Continued from page 1, column 1)

153 RCA Test Oscillator, were awarded to Gaylord Walter, Riceville, Iowa, and David J. Krassen, 910 North Sixth St., Philadelphia, respectively.

All that was necessary to enter the contest was to write concerning the technical aspects of the modernization jobs they completed during the contest period and the methods used to sell them. Judges were R. S. Burnap, in charge of the Radiotron Commercial Engineering Section; Forrest Crain, Radiotron Advertising executive, and Mr. Teegarden.

"Selection of the winners was a difficult task because of the excellence of practically all the letters received," Mr. Teegarden said.

"Results of the contest have been more than satisfactory from every standpoint. The entrants profited by the hundreds of changeover jobs they sold as entries for the contest, while the letters have proved to be gold mines of merchandising ideas for radio tubes. Entries were judged for technical and selling ingenuity alone, not for literary merit."

In addition to the major prizes, a number of \$5.00 awards have been made for letters other than the winning five. Writers of letters considered acceptable, but which are not published, will be awarded handy RCA Monogram cigarette lighters.



Gaylord Walter
4th Prize Winner



D. J. Krassen
5th Prize Winner

Idaho RCA Sound Dealer Reports Many New Jobs

Finds Authorized Dealership To Be Valuable Franchise

That the RCA Victor Authorized Commercial Sound Dealership is a real money maker is amply proven by the experience of C. Earl Neyman. Mr. Neyman, who operates the Associated Radio Service Company at Capitol and A Streets, Idaho Falls, Idaho, has found that even newspaper advertising pays in the sound business. In one of his first ads Mr. Neyman featured a reproduction of his RCA Authorized Sound Dealer certificate, with excellent results.

Other medias for advertising include RCA Victor mailing pieces furnished to all Authorized Sound



C. Earl Neyman, of the Associated Radio Service Company, Idaho Falls, Idaho and his well-equipped sound service shop. This company is an Authorized RCA Sound Dealer

SELLING TIPS

Selling Tips are our readers' contributions for selling their services or products. All readers of RCA Radio Service News are invited to submit their ideas for increasing business. All Selling Tips printed will win one of the new RCA Service Engineer's Pencils. Let's have yours.

Demonstrating RCA Magic Wave Antenna

We are fifty miles from the nearest broadcast station of 5000 watts. To make matters worse, there is an electrified railroad here with 11,000 and 44,000 volt lines and an especially bad 110,000 volt line right through the town. To demonstrate the antenna, I first find a location within 300 or 400 feet of the house where signals are strong and the noise level is low. I do this with a car radio. Then I run the transmission line along the ground from the set to the quiet spot. Ordinarily, merely stretching the antenna proper a few feet above the ground and properly grounding the antenna transformer will give a signal of quality good enough to convince the customer that a properly installed antenna will give good results. I have installed several of these antennas, and to date have never had a failure. Every installation is a booster.

Robert P. Walters
Radio Sales & Service
Skykomish, Washington

Selling Used Radios

When I have several accumulated radios, motors or parts of some value I use several small classified advertisements in the same issue of our local paper, listing the merchandise for sale or trade. I always get results, often trading in equal grade merchandise that needs small repairs, and then have a stock to repeat the above process.

J. O. Roberts
RADIO SERVICE
St. Louis, Michigan

Selling Midget Radios

When I repair a console or combination I always leave a new RCA Victor 85T in the customer's home while the larger set is being repaired. This is done not only for the convenience of the customer, but to sell them another smaller model.

George Nakao
Easy Appliance Co.
RCA Dealer
P. O. Box 2788
Honolulu, Hawaii

Scientific Show

In order to inspire public confidence in our Radio and Electrical ability we built up a few pieces of apparatus demonstrating the various uses of the "Electric Eye," Oscilloscope and Stroboscope. We built a giant "Tegla Coil" capable of giving a 24" spark and produced some magical tricks with it and "Black Light."

All this was arranged to give an entertainment lasting about an hour and was tied in with local newspaper advertising on Radio & Electrical Service.

Dealers and other such pieces. And, most important, to quote Mr. Neyman: "The universal acceptance of RCA's superiority in the sound field has thoroughly convinced me that it is the best on the market, regardless of price or make."

The show, aside from being a success in itself, produced amazing results on service and sales of parts, tubes and accessories.

James R. Blundin
Blundin's Radio Service
Mt. Carmel, Pa.

Contract Service

I have spent quite some time considering the possibilities of selling radio service on a contract basis. My idea is this: For a fixed annual fee the serviceman agrees to furnish all labor, replacement of defective parts; and aerial maintenance, the customer agreeing to purchase from the serviceman whatever tubes he recommends. There may be various additional services included, such as keeping the cabinet polished, installation, and removal whenever the customer moves, etc. It would be absolutely necessary to make several calls a year, making a test of all tubes and general performance and, whenever necessary, any additional repairs and adjustments.

The serviceman would have to work on a law of averages in determining his charge. The average set owner calls a serviceman, let us say, about once in two years, and only a small portion of these calls require expensive part replacements. Regular inspections every three months or so would further cut down the percentage of major breakdowns. The sale of tubes would increase considerably, for the customer would be informed immediately of poor performance and, according to contract, would be required to purchase new tubes when recommended.

No doubt servicemen in the past must have attempted something along these lines. I am anxious to learn from these men as to their experiences and their charges on such work; also what other servicemen think of the possibilities of contract work.

Very truly yours,
Nat Polaner
2276 Creston Avenue
Bronx, New York

Dairy Farmer Customers

I make it a point to know anything new that a good Farmer is trying. I find this an easy starter talking with others. A man likes to talk about something he understands. Then, he is likely to tell me something new he himself is doing, which makes it easy for me to tell something new I have to sell. I find that Farm Women are nearly always willing to be interested in what I want to sell. I feel that I can get the sale easier if I can get the man to show some interest in me personally.

Ralph A. Foote
Orwell, Vermont

New RCA Polish Gives Cabinets Fine Appearance

(Continued from page 2, column 2)

compounded to bring the finish of RCA Victrola instruments and radio cabinets to their fine lustre. It gives outstanding results on all fine furniture and woodwork. The results are outstanding—a beautiful finish that does not collect dust.

RCA Victor Instrument Distributors are now offering RCA Victor Furniture Polish on a special introductory deal. With the purchase of one case (12 bottles) having a total list price of \$5.88—subject to your usual discount—you get an attractive counter display and a one-half gallon can of polish for your store or shop use—entirely free. This offer is for a limited time, and dealers and service engineers should act quickly.