

SPECIAL NATIONAL RADIO PARTS SHOW



RADIO SERVICE NEWS

PUBLISHED · IN · THE · INTEREST · OF · RADIO · SERVICE · SALE

JUNE, 1938

CAMDEN, NEW JERSEY

Test Equipment Offered on Tube

Parts Catalog Features New RCA Products

Soon Available at All RCA Parts Distributors

An attractive new RCA Parts Catalog, featuring all RCA Test Equipment, Antennas and Accessories, will soon be distributed by all RCA Parts Distributors. This catalog, which is finely printed in black and red, gives service engineers a complete listing of RCA products that they need and use every day in the conduct of their business. It contains 16 pages, lists more than 100 items and should be kept handy by everyone in the radio service or parts business.

Supplementing the RCA Test Equipment previously announced, this new catalog will feature those



new products described in this issue of RCA Radio Service News plus others that have not been previously announced. Make sure you get your copy and see what RCA offers before buying that new test equipment or accessories. It'll pay you to make sure!

Announce New 2-Inch Cathode Ray Radiotron

To Carry a Low Net Price of \$7.50—Has Im- proved Sensitivity

A new high quality, high sensitivity, two-inch cathode-ray tube, having a small, well-focused spot, has just been announced by D. Y. Smith, Manager of RCA Transmitting and Special Purpose Tube Division.



This new tube, known as the RCA-902, employs electrostatic deflection and operates with an anode No. 2 voltage as low as 400 volts and as high as 600 volts. The brilliant luminous spot produced by this tube has a greenish hue. The 902 is electrically interchangeable with the RCA-913, provided the anode No. 2 supply is 400 volts or more. RCA-902 is also electrically interchangeable in many circuits designed for two-inch cathode-ray tubes of other manufacturers.

Because of its small size and its ability to produce a bright image at low voltages, the 902 is especially suited for compact, portable, oscillographic equipment. These features, in addition to the relatively low cost of the 902 and its associated apparatus, make this tube practicable for use in many types of test equipment where a larger cathode-ray tube would not ordinarily be employed.

The new RCA-902 cathode-ray tube is being featured in the RCA two-inch oscillograph that has just been announced. This oscillograph is described on page 4.

New Model Has Many Features



The newly announced RCA Victor Model 97KG has many features never previously found in popular priced radio consoles. Electric Tuning, Victrola Push Button, Console Grand Cabinet and straight-line dial are but few of its many fine features. And it is priced well below \$100, truly an outstanding value

RCA Victor Master Antenna Has New Noise-Balancing Adjustment

Not Dependent on Location for Noise-Reducing Properties. Available in Two Kits for All Radios

A new antenna — the first to carry the RCA Victor name—and the first to be packed with higher priced RCA Victor Radios and Combinations, is now available to service engineers and radio dealers through their RCA Parts Distributor. This new antenna—known as the RCA Victor Master Antenna — operates on principles entirely different from those formerly employed by noise-reducing antennas. Instead of depending on location for its noise reducing qualities, it has a special counterpoise coupling arrangement which permits an individual balancing adjustment to be made on each particular installation. The method of making this adjustment is to set up some severe interfering device in the room with the radio and adjusting the coupling unit until the noise disappears!

Two Kits Available

Two kits of the RCA Victor Master Antenna are available. The Model MA is designed for 1939 RCA Victor instruments that have a built-in noise eliminator. Models having this feature are those of eight tubes or more. This kit sells for \$5.00 list. The other kit, known as Stock No. 9845, includes a receiver coupling transformer and may be used on any radio, regardless of type or manufacturer. This sells for \$6.95. The coupling transformer is available as an individual

unit, Stock No. 9846, List Price \$1.95.

The radio service dealer today must have a background of educational training and practical experience in the fundamentals of radio service. Also, the radio service dealer, in order to operate a profitable radio service business, must have available up-to-date test equipment. A service dealer is foolish (Continued on page 2 column 5)

Uses Doublet and Counterpoise



The new RCA Victor Master Antenna differs from the usual noise-reducing antenna in that it employs not only a doublet but also a counterpoise. The counterpoise is adjusted to effectively balance the noise picked up by the entire system

We Celebrate a Birthday!

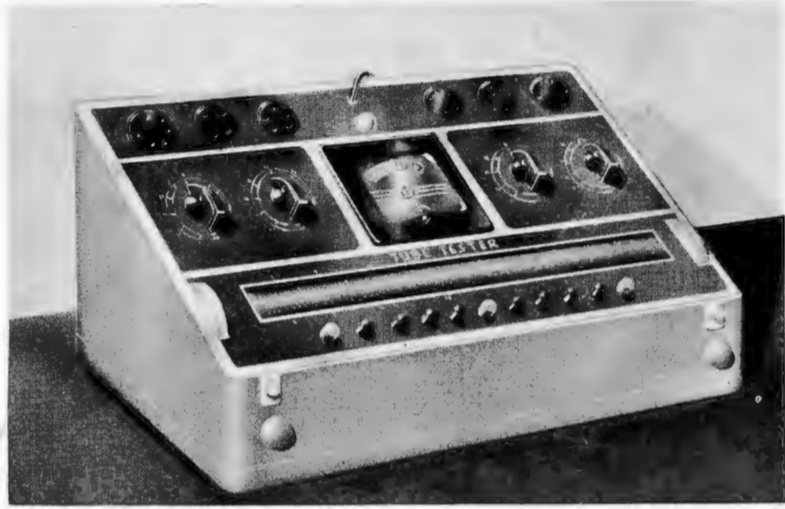
RCA Radio Service News is beginning to feel like a veteran among radio trade papers. For with this issue, we celebrate a fourth birthday. Our first issue was that of April 20, 1934, and since then we have been coming out regularly six times each year.

During that time, we have witnessed with pleasure the ever increasing importance of service engineers to manufacturers of radio tubes, parts and accessories. The purchasing power of service men is a sizable portion of the nation's total radio business. And RCA believes that its modest contributions have made considerable of this progress possible.

At this time, the many manufacturers of radio tubes, parts and accessories are gathered at the National Radio Parts Show in Chicago. The very existence of this great show is a tribute to the service engineers of America. For it is their purchases of the products produced by these manufacturers that have made possible this outstanding show.

RCA takes this occasion for congratulating the Radio Service Engineers of America. We know that an even better future awaits those who keep themselves posted on the fast-moving technical front and who support the manufacturers who have helped make their progress possible.

Hold Everything!



A preview of RCA's new Tube Tester. This new instrument literally has everything. Your RCA Parts Distributor will shortly have it in stock. Be sure and wait to see it before you buy that new Tube Tester

1937 Service Note Book Is Now Available
Library of Service Notes Has Eight Volumes

"The new 1937 RCA Victor Bound Volume of Service Notes is a necessity for every practicing service engineer," said L. A. Goodwin, Jr., of the RCA Parts Division at a re-



cent meeting of service engineers. "Not only does it contain the complete circuit diagrams of all 1937 RCA Victor receivers, but it also includes a wealth of supplementary

information such as tube charts, service hints, alignment instructions and other information that is obtainable from no other source," said Goodwin.

This book, which is now available at all RCA Parts Distributors, sells for the low net price of only \$1.25, the same price as other service volumes of the RCA Victor Library. It contains 384 pages, covers 85 instruments, includes photographs of all receivers and is bound in a durable hard cloth cover. Service Engineers whose library is not complete, should bring it up-to-date with this new book and with others of the RCA Victor series which he may not own. The eight volumes now available, cover every RCA Radiola, Victor Talking Machine and RCA Victor machine ever produced, except the current models now in production. The volumes are as follows: 1923-28, 1929-30, 1931-32, 1933, 1934, 1935, 1936 and 1937. The price of each is \$1.25 net.

Record Changer Has Top Loading Crystal Pickup
Plays seven records in mixed sequence

That RCA is tops in the field of record reproducing devices, is amply proven by an examination of the new RCA Automatic Record Changer, Stock No. 9844 which has the attractive list price of only \$74.95.

This unit, which is standard equipment on the finest 1939 RCA Victor Combinations, has features never before offered in an RCA Automatic Record Changer. The RCA Senior Crystal Pickup Arm insures the greatest fidelity of reproduction. A new simple, fool-proof mechanism plays seven 12-inch or eight 10-inch records automatically and repeats the last record. Or, if the records are not warped or chipped, any seven, either 10 or 12-inch, may be played in mixed sequence—a feature highly desired by every record user. An eject lever is incorporated in the design which automatically feeds the next record at any desired time.

Has Top Needle Loading

An important feature is the top loading crystal pickup with automatic needle ejector and receptacle. Whenever it is desired to remove a needle, the needle screw is merely loosened and the ejector lever pushed down. When not used for ejecting, this bracket functions as a needle positioning bracket for the top needle loading feature.

A shock-absorbing coupling between the motor and turntable avoids the transfer of mechanical vibration to the motorboard and insures constant speed. Shock-proof mounting parts are furnished for mounting the motor board in the cabinet.

A special model is available for 50-60 cycle operation, Stock No. 9844, List Price \$76.45.

Prices Cut on RCA Universal Transformers

Four units cover all replacement needs

RCA Universal Power Transformers for radio sets having 2.5 or 6.3 volt heaters are now sold at unusually low prices. For example, the price of the Class "B" transformer, Stock No. 9552, has been radically cut from \$6.00 to \$4.50. And the price of all others have been similarly reduced.

This group of Universal Power Transformers will prove a real value to all service men. In adaptability and use, they are universal both electrically and mechanically. Furthermore, with these four transformers listed below the service man will be able to take care of practically any power transformer replacement required in modern radio receivers. They are unbeatable in value and performance with anything in their price range. Maxi-



Stock Nos. 9551, 9552 and 9553

mum mechanical flexibility is obtained in these transformers due to the convenient slots made for mounting in every conceivable position. Soldered terminals and an insulated terminal cover are other important features.

Favorite With "Hams"

The Class "B" Transformer, Stock No. 9552, has always been a strong favorite with amateurs, and due to the substantially reduced list price, it will undoubtedly continue as a leader with them. Amateurs have found it especially useful for modulation power supply and other important experimental uses. By checking the taps and voltages, both the amateurs and service men will see the sound value in these transformers.

Large Reductions

The price of the Class "B" transformer is now \$4.50 as compared to the former price of \$6.00. Other reductions have been made, too: Stock No. 9551 Power Transformer for 10-12 tube sets now sells at \$4.25 as against its old price of \$5.50. Transformers for 5-9 tube sets, Stock No. 9553, now list at \$3.75, whereas they formerly sold at \$4.75. A saving of one dollar!

Another big value is seen in Stock No. 9556, listing at \$1.45, showing a large reduction compared with its former list of \$2.00.

Test Equipment Now Offered on RCA Tube Deals

(Continued from page 1, column 5)

to handicap himself with inferior equipment, because people no longer tolerate makeshifts in the radio service business. But now, with RCA's new equipment deal, every radio service engineer can have the world's finest test equipment. Not



only will this enable him to do his work better, but it will materially increase his income. Customers are willing to pay more for better work, and good test equipment is a necessity for proper service work.

New Television Tube Has Many Applications

RCA-1851 Is Pentode of High Efficiency

In announcing the RCA-1851, RCA adds another link to the already lengthy chain of related RCA tubes and circuit components designed expressly for amateur and experimental television applications. The introduction of this new television receiving tube marks another step in RCA progress to make television components available to all experimenters at the lowest possible price.

The RCA-1851 is a heater-cathode type of metal tube intended for use in experimental television receivers. This new pentode has extremely high grid-plate transconductance at ultra-high frequencies. It is recommended for use in the r-f or i-f stages of the picture amplifier, as well as in the first stages of the video amplifier when several video stages are employed. The 1851 can also be used as a mixer tube and makes a good oscillator in low-voltage applications.

RCA-1851 is available for immediate delivery from all RCA Transmitting Tube Distributors. The net price is \$2.10.

Changes Both 10 and 12 Inch Records



A new RCA Automatic Record Changer that plays seven 12-inch or eight 10-inch records automatically. It will also play both 10 and 12-inch records in mixed sequence, provided they are not chipped or warped

Here's Why—Cunningham Radio Tubes are the SERVICE MAN'S SPECIAL

1—Designed for the Service Man

2—Engineered for the Service Man

3—Manufactured for the Service Man

4—Advertised for the Service Man

5—Priced for the Service Man



Get full details from your distributor
OVER 90,000,000 CUNNINGHAM TUBES HAVE BEEN SOLD FOR REPLACEMENT SERVICE WORK

Cunningham Radio Tubes
STANDARD SINCE 1915

Board Member



Robert Shannon, newly elected member of RCA's board of directors

RCA INSTITUTES HOME COURSES OFFERED TO SERVICE ENGINEERS

Obtainable without Cost through RCA and Cunningham Radio Tube Distributors on Attractive "Deal"

Realizing that there are thousands of radio service men who could materially increase their income if it were possible to obtain complete and reliable information in the highly technical field of radio service work, the RCA Manufacturing Company has made available to Radiotron and Cunningham tube dealers, absolutely without cost with the purchase of tubes, the complete Home Study Radio Service Course as offered by RCA Institutes.

"This complete course begins with the fundamentals of radio and is composed of 9 groups of lessons covering every conceivable phase of radio service work. It has been designed especially for those men who

ningham tube dealers all over the country the larger share of the profitable replacement tube business. It also pointed out to thousands of radio service men that there was more to service business than tube replacements and repair jobs.

"Keeping in mind the fact that the radio service business is continuing to grow in importance, the RCA Manufacturing Company realized that some definite effort must be made to familiarize service men with the rapid changes of technical application. Failure to keep abreast of changes means poor service and poor radio service is not only detrimental to the radio service fraternity as a whole, but also to the manufacturer of parts and accessories, who should be responsible to a large extent for supplying technical knowledge to radio service men.

Obtained Home Study Course

Realizing this responsibility, the Radiotron Division obtained for Cunningham and Radiotron service dealers the complete Home Study Radio Service Course as offered by RCA Institutes. This complete course if purchased by the dealer would cost \$81.00. However, by special arrangement, it is now available to all tube dealers absolutely free of charge with the purchase of Radiotron or Cunningham tubes.

"We understand that the radio service business today is no longer classed as an infant in the industry, and it has always been the aim, and will continue to be the aim, of the RCA Manufacturing Company to boost the radio service man and to aid him in establishing a sound and profitable radio service business."



Ask your Distributor for this brochure

desire to follow the profession of radio service," said Mr. Teegarden, of the Renewal Tube Sales Division.

"By making available this Home Study Course in RCA Institutes, we honestly believe that we are taking the right step in stressing the importance of radio service work as a profitable full time business.

"As a manufacturer of radio tubes and parts, the RCA Manufacturing Company has been in a position to closely follow the progress of radio service men.

Checkup Campaign Successful

"In the Fall of 1934, RCA inaugurated a Check-Up Program. This program was successful in more ways than one, inasmuch as it brought RCA Radiotron and Cun-

Elect Shannon to RCA Mfg. Co. Board of Directors

Announcement of the election of Robert Shannon, Vice President and General Manager of the RCA Manufacturing Company, as a member of the Board of Directors, was made recently by David Sarnoff, Chairman of the Board.

Mr. Shannon, who is 46 years old, and a resident of Haddonfield, N. J., has been identified with radio manufacturing and administration since the earliest days of radio.

Starting 27 years ago in an incandescent lamp factory, where his pay was at the rate of 17½ cents an hour, he has progressed steadily to his present new position.

At Tube Plant

He was in charge of radio tube manufacturing for the Westinghouse Company when RCA took over this activity from the General Electric and Westinghouse Companies in 1930. He joined the new RCA Radiotron Company, and shortly afterward became Plant Manager. Four years later he was appointed Manager of the RCA Manufacturing Company's Camden plant. A year later he was elected Vice President in charge of all the Company's manufacturing activities. He was promoted to Vice President and General Manager last year.

Television Receiver



A new photograph of one of the television receiving sets used in connection with NBC's broadcasts of RCA experimental television. Only technicians of the two companies have these sets in their homes. Notice that the television picture is not viewed directly on the screen (properly called Kinescope). It is reflected in the mirror lining of the lid

Among "Those We Love"



Jean Rogers, featured in several Universal picture serials, has joined the all-movie cast of the NBC-Blue Network serial, "Those We Love." The attractive young actress has the role of Elaine Dascom, the second feminine lead. The serial is broadcast Tuesdays at 8:00 p. m., EDST

Tube Promotions Based on Facts, Says Tube Head

Experience best guide, explains L. W. Teegarden

"Consistent merchandising and promotional assistance have been largely responsible for the increase in tube volume for RCA Radiotron dealers," said L. W. Teegarden, Manager of Renewal Tube Sales, at a recent meeting of service engineers.

"The formula used by the Radiotron Division in mapping out merchandising plans is most effective. All merchandising programs, of course, should be based on facts, and facts should be the easiest thing in the world to determine, but sometimes they are mighty elusive.

Facts Determined

"Extensive research is often necessary to determine which is fact and which is fancy. Therefore, the Radiotron Division has never presented a major campaign to its dealers without first having searched out and substantiated the facts which are of vital importance in

planning a successful program. A first-hand survey of conditions by persons who are best qualified is also very necessary. These surveys may be made by the headquarters staff in Camden or by Radiotron field representatives, but in most cases it is a particular group of service men or dealers who qualify by answering questionnaires.

"Suffice to say that we get the facts if it is humanly possible. Our plans are then guided by the results thus revealed, and if the program fails to pass the test, it is rejected. If it makes the grade we can then go to dealers and say it will work because it has worked.

No Guesswork

"I have often seen merchandising and promotional programs which were obviously founded on guesswork, and as a result the dealers using such plans have been unable to obtain any increase in volume, and in many cases have shown a definite decrease. Guesswork has no more place in the planning of a merchandising and promotional program than it has in bookkeeping. If you would attract tube buyers you must first put yourself in the customer's place and then plan your program to fit his habits, inclinations and preferences.

"The RCA Radiotron Division has followed out the system of 'fact-finding' consistently, and as a result those dealers who have used Radiotron merchandising and promotional programs have noticed a definite increase in volume and profit without annoying detours and delays."

Lead-in Cables Added to RCA Auto Antennas

Prices lowered on cables purchased separately

The popularity of RCA Auto Antennas now has made it possible to include the antenna lead-in cable at no additional cost. These cables formerly sold at 90 and 75 cents each and their inclusion with the antenna is the equivalent of a 20% price reduction, according to an announcement from the RCA Parts Division.

Cables will be packed in cartons with the antennas, providing a complete installation for the customer. The antennas involved are the famous RCA Monogram Antenna, which has a list price of \$4.95; the RCA Cowlenna, list price \$3.65, and the two RCA Rodtennas, which have lists of \$3.50 and \$2.75 respectively.

Individual Cables Reduced

At the same time, the prices of the cables sold individually have been reduced. The Cowlenna Cable, Stock No. 9829, is now 75 cents, reduced from 90 cents, while the cables for the Rodtennas, Stock No. 9830, have been reduced from 75 to 60 cents.

Window Features RCA Tubes and Equipment



This attractive window of the Fred S. Dean Company, 400 American Avenue, Long Beach, California, RCA Distributor, shows a fine selection of new RCA Equipment

Uses New 2-Inch Tube



The new RCA 2-inch Cathode Ray Oscilloscope No. 151-2 sells for only \$49.95 net. It includes panel beam centering controls, vertical and horizontal amplifiers, internal saw tooth sweep frequency and has unusually high sensitivity—0.5 volts rms per inch deflection

**Sensitivity Up
In New 2-Inch
Oscilloscope**

Uses new RCA 902
Cathode Ray Tube

A genuine RCA Cathode Ray Oscilloscope using the new RCA-902 2-inch Cathode Ray Tube has just been made available to service engineers by RCA Parts Distributors. This new oscilloscope not only has every feature necessary for performing all service and laboratory applications, but has the additional feature of high sensitivity for giving maximum deflection with a minimum deflecting voltage. The actual sensitivity is 0.5 rms volt per inch at maximum gain. This new unit sells at the attractive net price of \$49.95, which places it within the reach of every service engineer. The stock number is 151-2.

The new RCA 2-inch oscilloscope may be used either in conjunction with an oscillator, such as the RCA No. 9595 battery type, or the No. 153 a-c type when modulated by a frequency modulation such as the RCA No. 9558. It also will give you excellent results with the new No. 150 Electronic Sweep Test Oscillator. Any of these combinations will be found ideally suited for radio service work.

**Modernization
Jobs Easy With
New Motor Board**

Also Excellent for Public
Address Purposes

A new motorboard assembly for modernization and sound work has just been introduced by the RCA Parts Division. Selling at the attractive list price of only \$29.95, stock No. 9850, this unit has features that will appeal to every discriminating record user and service engineer.



Stock No. 9850

Some of its important features are an automatic stop, a top loading crystal pickup, a combination needle box and needle ejector, self-starting motor, and a pickup shorting switch. It is finished in an attractive brown wrinkle lacquer, which makes a neat appearing installation and is suitable for use with all radios and amplifiers. A new rubber spindle cap prevents vibration transfer to the record, while the entire assembly is furnished with a shock-proof spring mounting suspension.

Ask your RCA Parts Distributor to demonstrate this new unit.

**Auto Radios
Feature Push-
Button Tuning**

New RCA Models Priced
at \$24.95 and \$29.95

The ease and convenience of automatic push-button tuning has been added to improved tone quality, noise-free reception and low-cost in the design of two new RCA Victor auto radios announced by Paul C. Richardson, Manager of the Phonograph and Radio Division of RCA Victor.

"Now that 'push a button—there's your station' has become a necessary part of every modern home receiver, RCA Victor engineers have made this newest radio convenience available to the radio listener on the road," Mr. Richardson said. "Push-button tuning has, in addition, a particular value to the automobile driver because it permits him to tune his favorite programs or change from station to station without taking his eyes from the road."

Accommodate Five Stations

The new models have provisions for tuning five stations automatically, and have manual tuning controls as well. Both instruments are of the single unit type, with the controls, chassis and speaker in a compact case which may be mounted in any style of car without drilling the face of the instrument panel. One of the models, known as 9M1, is a 5-tube superheterodyne. The tone and overall performance are of a quality usually found only in larger receivers. The colors of the knobs, push buttons and illuminated dial are matched in this sturdy instrument. Its equipment includes RCA Victor Metal Tubes, improved electro-dynamic speaker and antenna adjustment trimmer. List price is \$24.95, f. o. b. Camden, N. J.

The other model, known as 9M2, is a 6-tube superheterodyne using a 3-gang condenser and one stage of radio frequency. It is a dependable distance getter and is unusually selective. It is designed to operate on the popular new type low-capacity antennas. However, the antenna adjustment trimmer enables the set to be properly adjusted for any antenna. The housing case is the same in color, shape and size as the 9M1. The knobs, dial, push-buttons and escutcheon plate are of a different color, giving the receiver a rich and dignified appearance. List price is \$29.95, f. o. b. Camden, N. J.

Stations Easy to Set

"A very simple method is used in setting up the stations," Mr. Richardson pointed out. "In fact, all the buttons can be set during the time it takes to fill up with gas and oil. A child can do it. No tools or instruments are necessary. The push-button cap is simply pulled out and a set screw loosened one-quarter turn with a ten-cent piece. Then while the button is held in with one hand, the desired station is tuned with the manual control. All that is necessary after that is to continue to hold the button in until the set screw is re-tightened. Replace the cap and the job is done."

RCA Victor recently announced five other auto radios in every price range. These begin with an economy model, 8M, priced at \$19.95, f. o. b. Camden, N. J. It is a 5-tube single-unit instrument which can be installed in any style of car. It incorporates the same high standards of dependability, ruggedness and year-around efficiency that have been built into the larger models.

Other types in the RCA Victor Auto Radio line are the 8M1, a 6-tube single-unit receiver with a new watch-type dial for the control dash which is used in all the larger models; the 8M2, a 6-tube two-unit receiver with an 8 in. dynamic speaker in a separate case; the 8M3, the most powerful single-unit auto radio RCA Victor has ever designed. It also provides for an extra speaker in the rear of the car if desired; and the 8M4, a deluxe two-unit model with Magic Voice and a tremendous reserve of power.

New Dramatic Star



Nan Grey is the most recent recruit to the ranks of the National Broadcasting Company's regular dramatic stars. She plays the part of Kathy Marshall in the new dramatic serial heard over the NBC-Blue Network each Tuesday at 8:00 p. m., EDST

**Audio Oscillator
Has Range from
30-15,000 Cycles**

Uses RCA Metal Tubes—
Net Price only \$49.95

A fine new beat frequency audio oscillator has just been added to RCA's complete line of modern service equipment. That it is an outstanding job, both for shop and laboratory use, is quickly evident by a check of its features. Complete a-c operation, high output, low distortion, large easily read dial and many other features mean value to every service engineer.

The addition of a high quality audio oscillator to a service engineer's equipment places him in a position to offer many services that otherwise could not be performed. For example, testing loudspeakers for rattles requires an alternating current of variable frequency over the range of the speaker. Also, cabinet rattles are quickly discovered in a similar manner. Overall fidelity checks of any radio require a variable frequency source of oscillator modulating voltage, while all sound service requires a good audio signal.

RCA Parts Distributors are now featuring this and other RCA Test Equipment.

Specifications

- Power Rating—110-120 V., 50-60 cycles, 35 watts.
- Fuse Protection—0.5 ampere.
- Output Frequency—30-15,000 cycles, ± 1 db from 30 to 10,000 cycles, down 2 db at 15,000 cycles.
- Output Voltage—Open circuit, 37.5 volts; 5000 ohm load, 25 volts;

**Improved Record
Player Has New
Crystal Pickup**

Sells at Low List
Price of \$14.95

A new record-player instrument for use with electrically operated radio receivers, and which embodies many technical improvements, has been introduced on the market by RCA Victor. Retailing at \$14.95, it is designed to provide a good quality record reproducer for new converts to recorded music and for high school and college student record enthusiasts.

The new record-player is known as Model R-93-C. It is equipped with a new type of lightweight crystal pick-up which provides improved tone quality. Other structural and performance improvements on the R-93-C include a new true-tracking tone arm for better reproduction; a newly developed motor with bearings and supports cushioned in rubber for quiet operation; volume control and powerswitch in one conveniently placed control; and a special plug for easy connection to RCA Victor receivers. The case is of heart walnut veneer in simple, graceful lines.

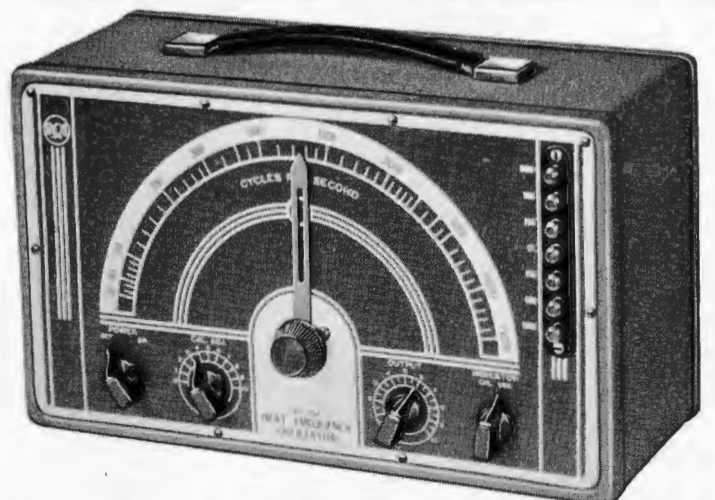
- 500 ohm load, 7.5 volts; 250 ohm load, 5.2 volts.
- Power Output—125 milliwatts.
- Radiotrons—RCA 6K7, variable oscillator; RCA 6J7, fixed r-f oscillator; RCA 6C5, detector; RCA 6J5, output amplifier.
- Hum Level—-60 db below maximum output.
- Distortion—Less than 5% rms over entire range.
- Dimensions—9 1/2" x 13 1/4" x 6 1/2".
- Weight—15 lbs.

Merchandise Catalog



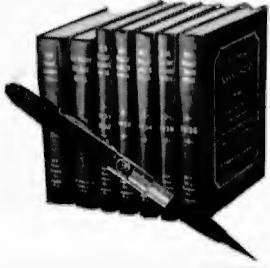
Everything from sewing machines to bicycles is included in the new RCA Trading Post Catalog. And not only are they included, but every item may be obtained in connection with the purchase of RCA Radiotron or Cunningham tubes. See your distributor and obtain your copy at once

Low Distortion Oscillator



The overall distortion of the new RCA Beat Frequency Oscillator No. 154 is less than 5% over the entire range from 30 to 15,000 cycles

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.

Defective Pilot Lamps

Pilot lights burning out in some midget radios cause poor reception because of filament voltage drop. The Stewart-Warner R-1711 model is a bad offender. The remedy, of course, is to replace the lamp immediately.

A. Rosenstein
Chatham Radio Service
16 Victory Drive, E.
Savannah, Georgia

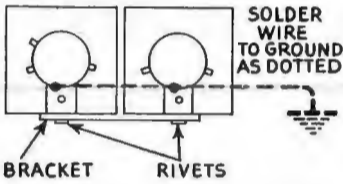
Line Condenser

I have made it a point to check the line condenser for "shorts" or "leaks." A bad condenser will result in a burned-out antenna coil if a radiator or water pipe is used as an aerial. And plenty of radiators are used for aerials!

George H. Koether, Jr.
Severna Park
Round Bay, Maryland

Philco Model 54, 59 and All Small Compacts

Philco Model 54, 59 and all small compacts that use the two-coil assembly under the chassis that are riveted to a small bracket. Check the rivets that hold the aluminum shield to the bracket where the coils are fastened. The ground returns of the coils are through the brackets, and when the rivets aren't making good contact between the coil shield



and the brackets it is bound to act the same as an intermittent bi-pass condenser, and the condensers are bound to be blamed. Either hammer the rivets or run a wire to the ground returns of the coils, and solder the wire to chassis. Better still, do both. Note diagram, in Philco Manual, on model 59. Coils #2 and 7.

H. S. Keller
1834 W. Grand Avenue
Chicago, Illinois

RCA Victor C-11-1

Complaint on this set very often is that the set changes very much in volume when speech-music control is varied, and is rather hard to find, but it can be remedied by installing new capacitor pack #11318. This pack contains condensers C-25, C-28 and resistors R-12, R-13. This capacitor pack is located on the front of the chassis and connects to both the volume and speech music controls.

Steve Pochiber
Pochiber's Radio Electric Service
P. O. Box 641
Leechburg, Pennsylvania

Inoperative Magic Eye

Many sets using "Magic Eye" tuning indicators use an adaptor with self-contained 1 meg. 1/4 watt resistor from plate to target. If this resistor becomes damaged, the Magic Eye becomes inoperative. The adaptor can be taken apart in most cases and a new resistor soldered in place or the entire adaptor assembly replaced.

Samuel Caracio
P. O. Box 73
Roseto, Pennsylvania

Cheap Scriber

A good scriber can be made by placing a common phonograph needle in the lead channel of a mechanical pencil. The needle may be removed and the lead replaced when the scriber is not needed.

Neil A. Hakko
Goodland
Minnesota

Brandes Model B-15

This set would be playing and at once it would blast out very loud and cut off very quick. This can be traced to open grid resistors on the RF tubes. Replace with 2700 ohm resistors.

Ralph Grim
Stanley Radio Shop
Stanley, Virginia

Philco 91X

One cause of bad distortion in this model is plate voltage on grid of second detector. The primary leads inside the can of the second IF transformer cross the secondary coil breaking down insulation where they come in contact. The remedy is to clear the primary leads which are held in place by wax. This condition was intermittent making location difficult.

C. S. Fisher
1020 Monroe St., N.W.
Washington, D. C.

220 Volt Operation

When using standard 110-volt receivers on 220-volt mains by using a 220-110 step down transformer the following change is beneficial.

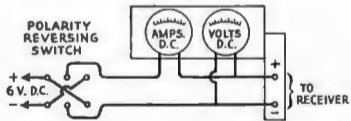
Change the location of the power switch from the primary of the receiver transformer to the 220-volt side of the step down transformer. This switches the entire assembly "off" when the switch is turned "off."

R. S. Sahota
P. O. Box 109
Tanga
Tanganyika Territory

Quick Tester

Many customers bring their sets in for estimate in a hurry!

With the set-up shown in the diagram below, tedious job of taking chassis out of cabinet, taking vibrator test, tube test, etc., can be eliminated in many cases. If there's a short circuit in the set, the fault is quickly evident by excessive cur-



rent drawn as indicated by ammeter reading. The average set draws 6 amps. Price of a new vibrator plus labor charge may be used as approximate estimate. The voltmeter keeps the serviceman informed as to the condition of the battery or power supply (6 volts).

Dick Wong
192 W. Santa Barbara Avenue
Los Angeles, California

Auto Radio Noise Elimination

When using a "Fish-Pole" Antenna on rear bumper of any car, excessive noise will be picked up. A simple way to effectively eliminate all this noise pick-up is to drill a hole in the bottom of the trunk close to bumper and then bring lead-in up thru this hole and next drill another hole in front of trunk or rear seat so as to bring lead-in up into floor of car running it along underneath the floor mat up to radio set.

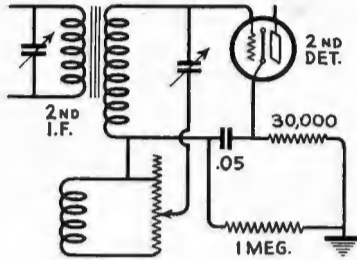
This will eliminate all pick-up of noise including tire and brake static which is usually very bad using this type antenna.

Norman E. Nelson
Box 211
Mayville, No. Dakota

RCA Model R-10

RCA Model R-10 and others in that series used a unique volume control circuit, as shown below.

The complaint was a noisy volume control, and volume cannot be attenuated to cut out the signal. A



new volume control eliminated the noise, but still no attenuation. Finally I discovered the .05 capacitor in the grid return of the 2nd detector to be open. Replacement caused the volume control to function normally.

A. J. Olick
Marlboro Street
Philadelphia, Pa.

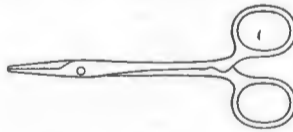
Display Tip

When setting up No. 2486 auto radio display board, be sure to run a short piece of bare hook-up wire from the volume control cable to the watch dial unit, under the nuts which hold these parts to the panel. Otherwise the pilot light will not light, as there will be no return for the current, since the panel is wood and the dials are designed to be mounted on a metal instrument panel.

E. W. Jacquet
Interstate Electric Co.
300 Spring Street
Shreveport, Louisiana

Handy Tool

One of the most frequently used tools on my work bench is a common hemostat, which may be purchased at any surgical supply house. The tool is much more slender than ordinary long-nosed pliers, and the



jaws may be easily locked, thus holding wires together for soldering, etc., in restricted spaces and leaving the hands free and the view unobstructed. The jaws are instantly unlocked by a slight additional pressure.

William R. Warner
Warner's Service Store
Vashon, Washington

An Appeal to Service Engineers

Fellows, service tips are beneficial—when they are tips. Such tips as open resistors or shorted condensers in power circuits or anything in that order should show up in most cases with regular analysis. A defect that would show up on a proper analysis is not a tip!

Service tips space is limited, let's use it to a better advantage!

Wm. Meiners
Meiners Radio Service Engineering
Weslaco, Texas

Wells Gardner 6-F

Bad crackling. Voltages and currents remain normal. Replace candohm marked 43X46. Total resistance 6630 ohms.

V. F. Daidone
Daidone Radio Laboratories
212 Fairmount Avenue
Newark, New Jersey

EXTRA! EXTRA!

MERCHANDISE AWARDS AVAILABLE TO RADIOTRON AND CUNNINGHAM DEALERS

Catalog Contains More Than 200 Top Quality Premiums

Here's an opportunity for Radiotron and Cunningham Radio Tube Dealers to obtain many valuable merchandise awards at NO COST with the purchase of tubes.

In the Trading Post Catalog shown on page 4, there are listed more than 200 top quality premiums—merchandise for the dealer himself, his family, his home and his office.

Each one of these premiums is exactly as represented in the catalog, and each has been taken from the regular grade A stocks of America's best known manufacturers. These premiums and catalogs are available through Radiotron and Cunningham distributors. Ask them for complete details.

Ready for Summer



Summer sports mean swimming to Dorothy Arnold, attractive NBC actress, so she tries on the latest in swim suits, a zebra pattern. The blonde young actress is now heard over the NBC networks.

Victor Record Society Real Profit Maker

Easily Sold on Service Jobs — \$4.50 Profit

For that extra-profit item, to sell on service jobs, the Victor Record Society is a natural, according to reports from Krich-Radisico, RCA Victor distributor for northern New Jersey.

Arrangements to sell the Victor Record Society by service engineers should be made through the RCA Victor Instrument Distributor in the territory where the service engineer is located.

Selling the Society permits you to offer your customers a \$25.95 value for only \$14.95. The customer receives:

	Value
1—RCA Victor Record Player Model R-93-B	\$14.95
2—His choice of \$9.00 worth of Victor Records	9.00
3—Subscription to Victor Record Society Review	2.00
	\$25.95

This value is one that any owner of a modern radio will find hard to resist, and doubly so when presented by service engineers. The reason for this is that wherever a service job is completed in the customer's home, it is but a matter of minutes to connect a record player and demonstrate how fine Victor records sound through their radio.

Complete details for handling such sales will be gladly furnished by your RCA Victor Instrument Distributor.

They'll Do It Every Time

By Jimmy Hatlo



TELEVISION

For the Service Engineer

The increasing importance of a thorough knowledge of the principles involved in the design and construction of television receivers is becoming more and more evident daily. While we don't yet have television receivers, nevertheless, the progressive service engineer will want to be ready when they do appear. The following article is the first of a series written by RCA engineers for Radio Service men. We believe they will greatly help to thoroughly understand the basic principles upon which this art rests and will be an aid in understanding other problems of an associated nature.

Before an understanding of television can be achieved, it is necessary to review the meaning of some of the words and nomenclature that are used. The following definitions are recommended by RMA and cover most of the general terms used in connection with television:

Television—Television is the electrical transmission and reception of transient visual images.

Frame—A Frame is a single complete picture.

Scanning—Scanning is the process of analyzing successively, according to a predetermined method, the light values of picture elements constituting the total picture area.

Scanning Line—A Scanning Line is a single continuous narrow strip which is determined by the process of scanning.

Frame Frequency—Frame Frequency is the number of times per second the picture area is completely scanned.

Aspect Ratio—The Aspect Ratio of a frame is the numerical ratio of the frame width to frame height.

Progressive Scanning—Progressive Scanning is that in which scanning lines trace one dimension substantially parallel to a side of the frame and in which successively traced lines are adjacent.

Interlaced Scanning—Interlaced Scanning is that in which successively scanned lines are spaced an integral number of line widths, and in which adjacent lines are

scanned during successive cycles of the field frequency scanning.

Field Frequency—Field Frequency is the number of times per second the frame area is fractionally scanned in interlaced scanning.

Positive Transmission—Positive Transmission occurs when an increase in initial light intensity causes an increase in the transmitter power.

Negative Transmission—Negative Transmission occurs when a decrease in initial light intensity causes an increase in transmitter power.

Contrast Control—Contrast Control is the control which varies the amplitude of the video frequency voltage impressed on the reproducing device.

Spottiness—Spottiness is the effect on a television picture resulting from the variation of the instantaneous light value of the reproduced image due to electrical disturbance between the scanning and reproducing devices.

Video Frequency—The Video Frequency is the frequency of the voltage resulting from television scanning.

Brightness Control—Brightness Control is the control which varies the average illumination of the reproduced image.

Automatic Brightness Control—Automatic Brightness Control is a device for automatically controlling the average illumination of the reproduced image.

Television Receivers

E. W. Engstrom and R. S. Holmes
RCA Manufacturing Co., Inc.

In television we are concerned with a broadcast type of service in which adequate coverage of a service area is the prime consideration. The frequency of the radio carrier must be high enough to permit the relatively wide sidebands which are required, and so high that reflections from the ionosphere will not regularly occur. The second requirement is necessary to prevent multiple images caused by reflections from the ionosphere, and to permit duplication of frequency assignments with reasonable geographical separation of stations on the same channel. Further, in television we are concerned with a service requiring high signal strength at the receiver locations. Thus, the radio carrier must be at such a frequency so as to permit generation of adequate power. The carrier frequency must be such that the attenuation caused by obstacles on or near the transmission path is not too great, and so that the shadows cast by obstacles are not too sharp or too dense. All these considerations point to frequencies above and

near 40 megacycles—for example, 44 to 108 megacycles—if television is to be practicable in the near future.

Two Carriers Required

An advantageous channel arrangement for television is one such that each transmission channel is complete within itself, that is, includes means for transmitting the video, synchronizing and sound signals. In such a system the video and synchronizing signals may be transmitted on one carrier and the sound signals on another carrier. (The video and synchronizing signals are transmitted alternately.) One obvious advantage is that, being adjacent in frequency assignment, these two carriers have nearly identical propagation characteristics. With a fixed separation between the sound and picture carriers within each channel, simplified receiver operation can be obtained and a single control of receiver tuning is possible. Thus, it is possible to include both carriers in the frequency band accepted by a single r-f system

Television's Control Room



Three engineers man the control room of the NBC experimental television studio in the RCA Building, New York. The engineer in the foreground monitors sound, the one at back monitors the picture. In the center sits the program director, facing a "talk-back" microphone, which connects directly with earphones worn by the men who focus the Iconoscopes in the studio

and separate them in two intermediate frequency channels following a single oscillator and heterodyne detector.

It has been found that the picture carrier and sound carrier should be

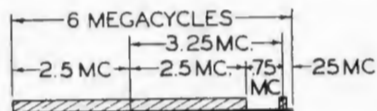


Figure 1

of approximately the same power. This is determined by considerations of receiver selectivity for separating the picture and sound signals and considerations of the effects of noise

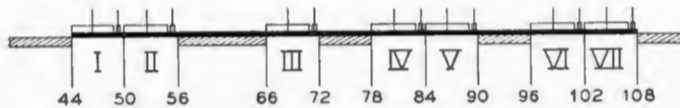


Figure 2

interference on the reproduced image and sound.

Scanning Lines

As the number of scanning lines in the television image is increased, the frequency band required for transmission also increases. Thus, practical limits are encountered in amplifiers and transmission methods. Limits are also present in resolution and in signal-to-noise ratio of the Iconoscope and resolution of the Kinescope. The most definite limit is probably the frequency space available in the radio spectrum for television channels. Experience indicates that an image of 400 lines or more will provide satisfactory performance for home type television entertainment and results in characteristics which can be obtained in practice. A tentative standard of 441 lines has been adopted for the United States.

The frequency band required for a television image is proportional not only to the amount of detail transmitted, but also to the rapidity with which it is transmitted—that is, the number of frames per second. The frame frequency and field frequency (for interlaced scanning) are determined by flicker and power supply frequency. To reduce the visual effects of a-c ripple in the reproduced image, the frame frequency should have an integral ratio to the power supply frequency; for example, a frame frequency of 30 per second is satisfactory for a power supply frequency of 60 cycles per second. In order to have satisfactory conditions with regard to image flicker, an effective frame frequency of 50 or more per second is required. This may be obtained without an increase in band-width by using interlaced scanning. By this method odd-numbered lines are scanned first and then the even-numbered lines, with two fields of scanning for each frame. A tentative standard of frame frequency of

30 per second and a field frequency of 60 per second has been adopted for the United States.

Standards Adopted

For a television channel a tentative standard has been adopted. This is for a channel 6 megacycles wide and with a spacing between picture and sound carriers of approximately 3.25 megacycles. Such a channel arrangement is shown diagrammatically on the accompanying drawing, Fig. 1. For such a channel the sidebands of the picture transmitter may extend 2.5 megacycles on either side of the carrier, leaving a 0.75 megacycle guard band between the maximum

frequency of the upper sideband and the sound carrier. The channels allocated for television broadcasting (in the lower frequency group) are shown by Fig. 2.

RCA Victor 1939

Line Contains 38

New Instruments

44 Features Include New Cabinet Styles

Electric Tuning for every price range, 18th Century and Console Grand cabinets, a noise eliminating antenna system, Victrola push-button and a new Electrical Magic Voice which greatly improves tone quality are only a few of the 44 improvements incorporated in the new series of RCA Victor radio instruments which were presented to the RCA Victor wholesalers at conventions in Atlantic City and French Lick.

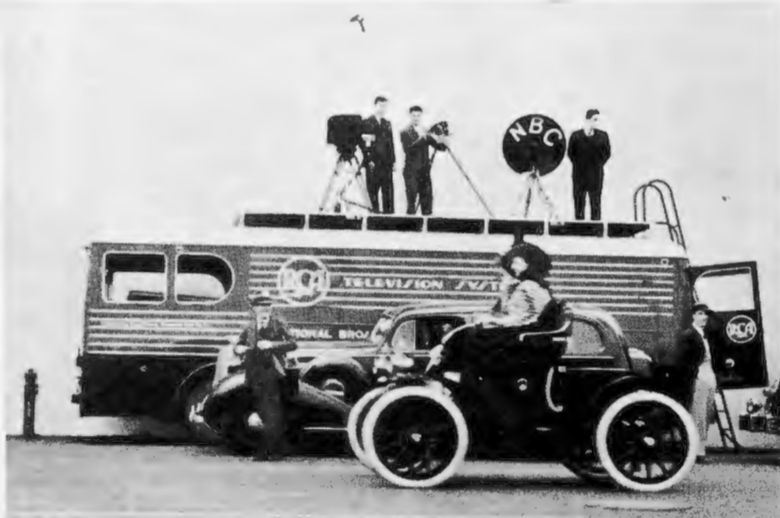
From both the trade and public standpoints, the outstanding feature of the new merchandise is that it offers more value for the radio dollar throughout its range than ever before in RCA Victor history, according to Henry C. Bonfig, RCA Victor Commercial Vice President. Built into the new instruments are "44 outstanding features that mean more sales and bigger profits," Mr. Bonfig declared.

38 New Models

Out of the famous RCA research laboratories at Camden have come no less than 38 new models designed to fit every modern need in the home and in the automobile. There are more than 20 AC-operated table and console models in a wide variety of designs and styles. Five new table models operate on either AC or DC current. There are eight phonograph-radio Victrolas, some of them with simplified automatic record-changing mechanisms, and Victrola Attachments for playing records through the radio set. For farm areas there are five battery-operated models. Then, there are several outstanding auto radio models, two of which incorporate automatic tuning with push buttons. In the new RCA Victor radios improved and speedier action of the push-button tuning control is now brought within financial reach of everyone.

"The 'Push a Button, There's Your Station' idea, which RCA Victor engineers introduced for the first time last year, has won a strong hold with the public," Mr. Bonfig said. "In the new models electric tuning works so much faster that scarcely before the finger has left the control button, the station comes in with all the clarity and quality of a perfectly tuned instrument."

Television Unit in Parade



The NBC-RCA television unit, first mobile television station built in America, took part in the World's Fair motorcade on April 30. The unit, which will be used in experimental pick-ups of outdoor events, consists of two motor vans, the first of which contains cameras for both picture and accompanying sound

16 Tubes Plus High Fidelity



RCA Victor Model HF-8 is a true High Fidelity Radio. Housed in an attractive 18th Century cabinet that will enhance the beauty of any room. Includes American and foreign tuning, triple cone speaker, 7 band overseas dial, electrical magic voice, and many other fine features

Traveling Sound Exhibit



This Pullman car, with the greatest exhibit of sound equipment ever assembled, has just completed a 7000-mile tour, with stops at 24 cities

RCA SOUND EXPOSITION TOURS COUNTRY IN PULLMAN CAR

\$35,000. Sound Products Exhibit Travels 7000 Miles, Visit 24 Cities—Thousands View Display

A special Pullman car, crammed with the most extensive array of commercial sound amplification and reproducing products ever assembled in a single exhibit, has recently returned from a 7000 mile tour with stop-overs in twenty-four principal cities.

This novel exhibition tour, which was conducted in collaboration with RCA Victor commercial sound wholesalers, had two main purposes. One was to call the attention of dealers to the unusual marketing possibilities of sound products in a constantly growing field of applications. The other, to provide a spectacular means of demonstrating the variety, scope and technical excellence of the new RCA Victor commercial sound products to architects, engineers, building owners, school administrators, entertainment operators and industrial managers.

At each stop, invited groups of dealers, architects, electrical contractors and school authorities were conducted through the car. W. L. Rothenberger, Manager of RCA Commercial Sound Sales, was in direct charge of the tour. Together with two RCA engineers, he accompanied the exhibits and occupied the living quarters in the car. This same Pullman car made recent musical history under RCA Victor sponsorship when it was occupied by Leopold Stokowski, Eugene Ormandy and Jose Iturbi on two successive nation-wide concert tours with the entire personnel of the Philadelphia Orchestra.

Two of the most interesting exhibits, from the popular science standpoint, were an Electron Multiplier tube developed by RCA's television scientist Dr. V. K. Zworykin, which played music on a light beam; and a cathode-ray tube exhibit for studying the characteristics of the voice and other sound. There was an array of sound reinforcement and public address ap-

paratus ranging from compact assemblies for portable use to the powerful systems used in large auditoriums and theaters. Much of this equipment has been so standardized and designed that it can be merchandised by radio and electrical supply dealers like packaged merchandise, with a minimum of technical supervision.

Low Voltage Operation of RCA 913

By W. H. PAINTER, RCA Radiotron Division

The RCA 913 oscillograph tube, a 1" diameter tube enclosed in a metal envelope, is especially useful to service men. The small size of the tube and the fact that it will operate at voltages between 250 and 500 volts contribute to the compactness of an oscillograph utilizing this tube. However, the use of voltages as low as 250 volts requires the exercise of certain precautions, the nature of and reasons for which are not generally understood.

Fluorescent screens used in cathode-ray tubes commonly are composed of combinations of various chemical elements in a crystalline state. The #1 Phosphor screen used in the '913 is made by mixing certain forms of zinc, silica, and manganese together and heating the mixture to a high temperature. The resulting mass is ground to a fine powder, mixed with liquid and applied to the end of the tube with an air pressure spray gun.

Such fluorescent screens are quite good insulators. Unless a means of discharging the screen is provided, negative electrons from the beam may build up a negative charge on the screen material to the point where it eventually becomes so negative that the electrons of the beam are repelled and can not reach the screen. Fortunately, a discharging means is provided by the phenomena of secondary emission. Primary electrons in the beam knock one or more secondary electrons out of the screen when they strike, providing the velocity of the primary electrons is great enough. These secondary electrons are collected by the shell

Senior Crystal Pickup Includes Shorting Switch

Automatic Needle Ejector Makes Operation Easy

A new Senior Crystal Pickup having many unique features has just been added to RCA's line of both crystal and magnetic pickups. This new unit, which has the attractive list price of only \$6.95, is identical with that used in RCA's



Stock No. 9847

new Automatic Record Changer. Top needle loading, automatic needle ejection and a novel pickup shorting switch are features highly desired by every pickup user. In addition to these, the new sealed crystal and true-tracking arm insure excellent frequency response, while a needle pressure of 3 ounces minimizes record wear.

The needle box and pickup rest is a separate unit, Stock No. 9848, List Price 75 cents. By mounting the box under the pickup at its off-record position, the box serves as a needle positioning bracket. After the record is played, loosening the needle screw and pressing the lever ejects the needle into the needle box. This feature greatly facilitates the ease of needle insertion and ejection. It is obtainable only on this RCA Pickup. The following specifications give the important features of this unit:

- Impedance—100,000 ohms at 1,000 cycles (1600 mmfd. over range 70-7000 cycles).
- Frequency Range—70-7000 cycles.
- Output Voltage—1.5 volts at 1000 cycles with 500,000 ohm load.
- Needle Pressure—3 ounces.
- Finish—Brown wrinkle lacquer.

Low Voltage Operation of RCA 913

of the '913. In actual operation, the screen assumes a potential such that the ratio of primary to secondary electrons is one.

In this dependence on secondary emission for maintaining the screen potential we find the explanation of the fact that sometimes no light can be obtained from the '913 screen. When the power switch of an oscillograph unit is turned on, all the tube filaments light up. As the rectifier filament gradually warms up, voltage builds up slowly on Anode #2 of the cathode-ray tube. In the meantime, the cathode of the cathode-ray tube has begun to emit electrons which are drawn to the screen. Because the anode voltage has not reached its minimum rating of 250 volts, the velocity of these electrons is so low that they cannot release secondary electrons from the screen. Thus the screen is driven negative and the velocity of succeeding electrons is reduced despite the fact that the anode voltage is increasing. In this manner the velocity of the beam electrons is kept so low that no light can be produced.

Cure Simple
The cure for this difficulty is simple and is effective in a majority of cases. The potentiometer controlling the voltage on #1 grid should be turned to that position which would completely bias off the beam under operating conditions before the power is turned on. Thus the negative bias on the control grid will build up as the cathode-ray tube cathode starts to emit, and will prevent any electrons from reaching the screen. After sufficient time has been allowed for Anode #2 to reach its full potential the bias may be reduced and, since only high velocity electrons reach the screen, the tube will operate normally.

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.

Electric Tuning—40 Cycle Operation

It is possible to adapt models 811K, 812K, 813K and 816K to operate on a 40 cycle supply line by changing the power transformer and electric tuning drive motor in accordance with the following:

Power Transformer—Must be either the standard 105-125 volt, 25 cycle type or the standard 110/150/220 volt, 40-60 cycle type, as specified in Service Notes on the model concerned.

Electric Tuning Motor—Must be the type supplied for normal 105-125 volt, 50-60 cycle operation.

Motor Circuit—A 5 ohm, 25 watt resistor must be connected in series with one of the yellow leads of the power transformer secondary winding which supplies drive motor current.

in series with the 6J7 cathode; and (2) a jumper between terminal #3 and the contact ring of the Power-Modulation switch, "C" section.

Code Marking of Coils #30747, #30748 and #30749 Models HF-1, 87K1, 87K2, 87T2 and U-106

These coils used in the oscillator circuit in conjunction with "push button" tuning, are coded as follows for identification purposes:

Stock Number	Range	DC Resistance	Color Code or Number
30747	770-1550kc	3.0 ohms	Red 1
30748	600-1260kc	3.7 "	Orange 2
30749	540-1160kc	3.8 "	Black 3

Increase in Filter Capacitor Models 94X, 94X1 and 94X2

Capacitor #30873 originally specified to comprise one 16 mfd. and 5 mfd. sections has been revised to include two 16 mfd. sections. All replacement capacitors will have the larger capacitor in the second section.

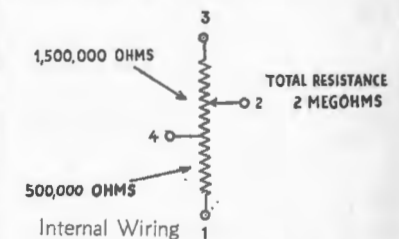
Electrolytic Capacitors Stock #5212; #11203 and #14531

The wet electrolytic capacitors employed in filter circuits are too frequently replaced because of an apparent "shorted" condition. A "short circuit" in capacitors of this type is very unusual, and results only when severe mechanical damage is done to the unit. The deficiency which has the nature of a "short" is generally a case of excessive leakage current through the capacitor due to its not being formed. Abnormal shelf life or long periods of standing idle in receivers are responsible for this temporary loss of "forming". An unformed unit will form properly in the receiver, if the d-c voltage of the rectifier is maintained for sufficient time. As much as twenty minutes should be allowed for a capacitor to be restored to normal leakage current, which indicates correct formation. The current will be high initially and will gradually decrease with the time of voltage application. Where a 5Z4 or 5W4 is used as rectifier, it is advisable to install a 5T4 during the forming process to provide an ample source of current. The capacitors may also be conveniently formed outside of the receiver, on a well regulated source of the proper d-c voltage. The various electrical characteristics of commonly used capacitors are as follows:

Stock No.	DC Forming Voltage	Max. Operating Voltage DC	Max. Leakage Current MA	Capacitance MFD
5212	300	300	3	16
11203	475	440	3	10
14531	475	460	4	25

PARDON US!

In the January, 1938, issue of RCA Radio Service News a diagram was published showing the various mechanical arrangements of the No. 13144 Volume Control. One of the illustrations was in error, and service engineers should correct their information as shown below.



Model 95T1—Technical Information and Service Data

The chassis, loudspeaker, circuit and all miscellaneous components of Model 95T1 are similar to those of Model 95T. Published service information on the 95T is therefore applicable to the 95T1, and separate notes on this instrument will not be printed. Dealers and servicemen should be accordingly advised.

Loudspeaker Jumper Cable

The jumper cable assembly used on later instruments 810K1, 811K, 813K, 816K, U-107 and U-109 is available in complete form, including the male plug and female connector, as Stock #30678. The cable is 25 inches long. The unit list price is \$1.00.

Model 811K—Resistor R-34

The 18,000 ohm resistor of the high voltage supply circuit to the plate and target electrodes of the Magic Eye tube, has been omitted on recent production sets. Performance of the receiver is not affected by this change.

Model 153—Test Oscillator

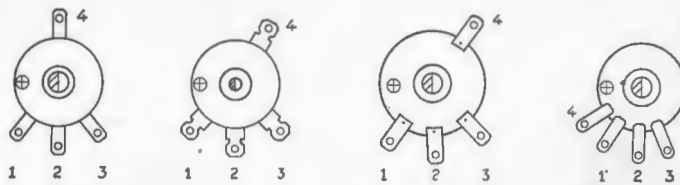
Any stray signal leakage that may be noted, can be eliminated by cleaning and adjusting the spring contacts between the case and front shield.

The circuit diagram of this instrument, shown on page 4 of the "Instructions" should be revised to include:—(1) an 82 ohm resistor

Model 9M1



A new push-button RCA Victor Auto Radio having the low eastern list price of only \$24.95



NEW RCA VICTOR SYMPHONY RADIO HAS WIDE A-F RANGE

Distortion Less Than 0.6% at One Watt— Selectivity Adjustable for Maximum Fidelity

By P. F. G. HOLST and L. R. KIRKWOOD
RCA Engineering Department

The new RCA Victor Symphony Radio Model HF-1 is RCA Victor's first high fidelity radio receiving instrument. In its design are many new features that make possible a quality of reproduction that is truly amazing in its naturalness. The following article describes some of the important design features that are built into this fine instrument.

In the design of a commercial broadcast receiver, widely varied requirements must be taken into consideration. The receiver must be a compromise between such characteristics as sensitivity, selectivity, sound quality, distortion and noise level.

If a receiver was designed for a limited distribution, it would be possible at a reasonable cost, to emphasize certain characteristics such as quality and ease of operation. The HF-1 is a receiver of this type, it is produced for an exacting group of listeners located in metropolitan areas, where high quality reproduction is possible. It is designed to provide a demonstrable improvement in quality together with the utmost simplicity and stability of operation.

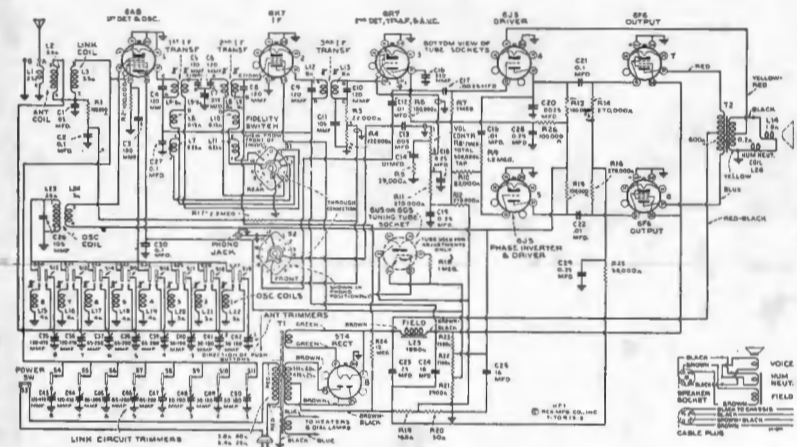
Quality Improved

An improvement in quality over that provided by standard broadcast

"power-off" switch, while the selection of any station automatically turns the receiver on.

The 455 kilocycle i-f amplifier employs six tuned circuits. Two are located between the RCA-6K7 i-f amplifier tube and the diode of the RCA-6R7 second detector tube. This stage is similar to that used in standard broadcast receivers.

The remaining four tuned circuits are used between the RCA-6A8 detector-oscillator tube and the RCA-6K7 i-f amplifier tube. Referring to the circuit diagram below, the coils L₄ and L₅ are coupled inductively. The degrees of coupling may be controlled by means of the fidelity switch, which changes the circuit from an under to over-coupled i-f transformer. Coils L₈ and L₉ form a similar i-f transformer, which is coupled to L₄ and L₅ by means of the condenser C₇. The adjacent channel attenuation may be varied by this ar-



Schematic Circuit Diagram

receivers may be accomplished in several ways. The high frequency range beyond 4,000 cycles is usually highly attenuated in commercial instruments in order to provide satisfactory service under adverse receiving conditions and the low frequency reproduction is imperfect for several reasons. While the HF-1 does not solve all these problems it provides a marked advance in many of them, in addition to which its audio amplifier is designed to greatly reduce distortion due to the non-linearity of the speaker impedance and "hang-over" effects caused by the mechanical low frequency resonance.

To what extent and by what means these results have been achieved will be discussed briefly.

Link Circuit Used

The r-f signal is selected by means of a link circuit tuned with compression mica trimmers. The link circuit was incorporated to reduce cross-modulation and squeals caused by powerful local stations. Although it would be desirable to use an over-coupled link circuit, alignment difficulties in the field rendered this impractical.

It was possible to increase the coupling between the antenna and the link coil, since the circuits are separately aligned on each selected station, eliminating the loss of performance caused by improper tracking.

The oscillator circuit is similar to the one used in the 87K1, which has been described in an earlier article on that receiver in RCA Radio Service News.

Eight stations may be selected by means of a push-button switch. The pre-selection of the stations eliminates the possibility of careless and inaccurate tuning by the listener, and thereby permits the use of side band attenuation in the i-f amplifier as the high frequency tone control. An additional button functions as a

range between 12 and 500, while the attenuation of the 7 kilocycle side bands changes between 1.3 and 70.

The a-c loading of the second detector output has been kept at a minimum to prevent cutoff distortion at high percentages of modulation.

Magic Eye Tube for Initial Adjustment

A socket has been provided for an RCA-6U5 indicator tube to facilitate alignment in the field. The service man is instructed to remove this tube after completing alignment of the receiver.

The power output stage consists of two RCA-6F6 pentode tubes op-

One Magic Wave Antenna Supplies Entire Community

New Use for Popular Antenna Profitable for Service Engineers

A recent installation of the RCA Magic Wave Antenna by an enterprising service engineer has opened up a whole new field for antenna installations, according to J. L. Schwank, Manager of RCA Engineering Products Division. This installation was made in a small community where excessive noise offered a real problem to good radio reception. The solution was simple and was one that every service engineer can easily do—at a real profit.

A high vertical antenna was erected 500 or 600 feet from the group of houses under consideration. An underground transmission line was then run to a central distribution point which supplied direct lines to each of the houses involved.

Such a multiple installation can be made at a low cost per outlet to the individual home owner and generally provide superior reception—especially in regard to noise reduction. From the profit end, the service engineer can offer each home owner a scientific noise free antenna system completely installed for from eight to ten dollars. The entire installation while costing the home owner less, is also more profitable for the service engineer than if individual antennas had been installed on each home.

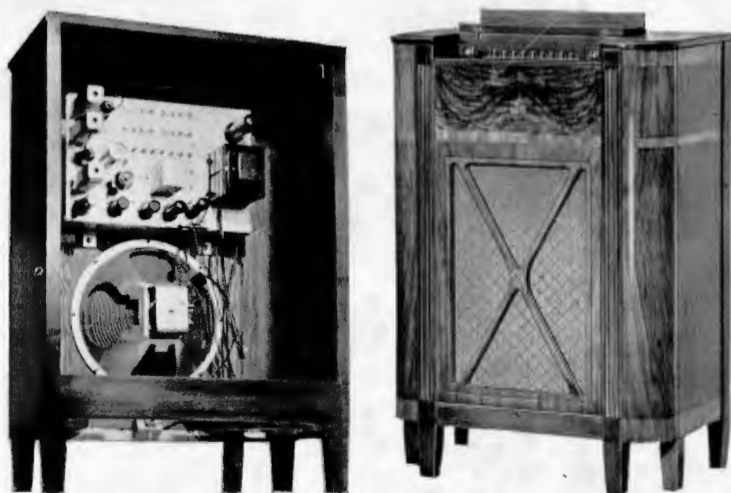
erated in push-pull class "AB." Preceding the output stage, two 6J5 tubes supply the driving voltage, operating in a phase inverter circuit. This stage is coupled degeneratively to the output transformer secondary. Such coupling provides 9 db degeneration at 400 cycles and reduces the hum and distortion by the same amount. It also lowers the apparent output impedance below that obtained using RCA-2A3 tubes. This furnishes a loading of the speaker impedance and damps its low frequency mechanical resonance as mentioned previously.

Flat Characteristic

Since the response characteristic of the feedback amplifier is essentially constant from 10 to 30,000 cycles it was necessary to incorporate an amplifier stage outside the feedback-loop in order to secure additional high frequency audio tone control on switch point No. 4, and a low frequency cut-off. This cut-off is necessary to obtain stable operation at reasonable cost.

The receiver also incorporates a "Radio-Phono" connection, which occupies two of the six positions on the fidelity switch. One position provides full high frequency response while the other reduces the high frequency response somewhat.

Novel Chassis Arrangement



Vertical mounting of the chassis plus elimination of the conventional dial are unique features of the RCA Victor Symphony Instrument, Model HF-1. Its wide audio range extends from 50 to 7000 cycles

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.

1ST PRIZE WINNER Professional Contact

Doctors and other professional people are an excellent means for securing prospects for radio sales and service. Recently I provided a doctor with an old set that had been in my shop for use in his waiting room, free of charge, and agreed to keep it serviced provided that he would let me place a small sign and a supply of my cards on it. The sign reads:

Patients—

Tune in and enjoy
Your regular program
while

Waiting your turn for the Doctor.

PERRY RADIO-ELECTRIC SERVICE

164 N. 9th St. Paterson, N. J.
Call For Scientific Diagnosis
Sher. 2-2218 of Your Radio Ills.

The results of this waiting room radio are:

1. It has more than paid for itself.
2. It has given me customers in outlying towns.
3. It has proved better than all other methods of contacting prospects.
4. It has given me all the work I can handle. I sometimes have to call on a fellow service man to give me a hand.

My advice to service men who have an old radio or two on hand is to contact some doctor, dentist, tavern owner, etc., and try the same idea.

Frank H. Perry
Perry Radio-Electric Service
164 N. 9th Street
Paterson, New Jersey

2ND PRIZE WINNER Window Shop

The service man who is fortunate to be on a street floor and have a window will find it to his advantage to set up his work bench in full view of the street, preferably right in the show window. Under modern time payment plans, it is not difficult to purchase an impressive instrument panel with analyzer, tube tester, oscillograph, etc.

The work bench, of course, must be kept clean and neat, with the proper place for each tool used. To watch the capable service man do his work under such conditions will favorably impress the passer-by, and it is surprising how many of these will become customers. Observing the proper handling of a service job sells the prospect on your ability.

Nat Polaner
2276 Creston Avenue
Bronx, New York

3RD PRIZE WINNER Psychological Selling

It is a human failing that really is a blessing in disguise that makes it difficult for us to part with something we have already experienced as our own, even if we know that it was only a "loan."

Here is a brief "case history." Mrs. X just got her new gleaming white electric refrigerator. At a certain time a day later I brought into her kitchen a small white AC-DC radio and tuned in her favorite foreign-speaking program. I did not utter a word. I let the radio talk for me. And it sold itself right there—in Mrs. X's own language. Think on this, boys, and act NOW.

Samuel F. Greenbaum
249 S. Fifth Street
Philadelphia, Pa.

Selling Tubes

Placing a name plate, with our name, date and the list of tubes that test weak and will shortly need replacing, has proven to be an excellent means of producing extra sales. It also is a reminder to the customer of the name of their previous serv-

ice man, and we have found it to more than pay for itself.

Ben Wolf
372 Tremont Street
Boston, Massachusetts

Additional Filtering for Midget Sets

The power supply filtering in most midget receivers, while quite sufficient for normal use, is never enough to reduce the hum level for operation at low volume. This is particularly annoying to invalids, etc., who use these receivers. By the simple expedient of installing additional 4 to 8 mfd capacitors, hum-free operation is secured and many sets are sold and kept sold that otherwise would have been in stock for several months.

Paul A. Williams
716 Masonic Avenue
San Francisco, California

New Set Sales

I have made many radio sales by close observation of the prospect and his family. For example, if there are children around ten or eleven years of age in the family, I tune in on Police calls or Aviation and Amateur calls. This fascinates them, and they use their influence towards keeping the receiver. If the parents are of foreign extraction I tune in one of the short wave stations from their country, which is extremely effective in closing sales. This is a very simple idea, but it certainly produces real results.

Russ R. Yochum
c/o A. S. Riland
Main & Market Streets
Bethlehem, Pa.

Auto Radio Prospects

Purchasers of new cars are excellent prospects for auto radios. I have made an agreement with the salesmen for new cars to furnish me with a list of the names and addresses of purchasers who have not purchased radios with their cars. By following up these leads I have found as high as 50% have purchased radios for their cars.

O. F. Klein
O. K. Radio Service
2235 N. 39th Street
Milwaukee, Wisconsin

Sings Blues on "Johnny Presents"



Beverly Freeland sings blues songs with the Swing Fourteen on the "Johnny Presents" broadcasts, heard over the WABC-Columbia network Saturdays from 8:30 to 9:00 p. m., EDT