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RADIO SERVICE NEWS

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BATTERY LINE MAKES RAPID SALES STRIDES

Produced to Meet Radio Requirements — Batteries Gain Wide Trade Acceptance

RCA's new battery line—offered by the Tube Division in response to widespread customer demand—has cut its eye teeth! As a matter of fact, it frolicked over most of the growing pains of early life and assumed, from the start, the solid-sales qualities and substantial, all-round performance of a long established, mature product line.

Of course, the battery assortment started out with advantages. It was conceived and guided by radio engineers—men who knew radio and had spent years at their profession. And, there was a real need for a line of batteries built and merchandised to meet specifically the requirements of the radio replacement market—batteries that would "give extra listening hours."

Controlled Manufacture

The new RCA battery line is being given all the benefits of the Tube Division's years of radio "know how." Controlled manufacturing processes govern the batteries' fabrication and each must meet rigid inspection requirements. From a performance standpoint the line is one of superior quality and performance.

Then, too, RCA batteries possess a dating system that clicks. There was much to be wary of—service expiration dates, shelf period dates, dates which set a limit on a battery's useful life—lack of standardization had resulted in much customer confusion through the use of these systems. Battery sales were hindered not helped. So, instead, RCA batteries are code dated—a code decipherable only by the distributor and dealer—which definitely states when a particular battery is manufactured and encourages systematic rotation of battery stocks.

Advertising Program

Next, the matter of package design. RCA batteries are dressed in "Sunday suit attire" that meets a seven-day working schedule—sparkling, eye-catching, sturdy red and

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SHE OUGHT TO BE IN TELEVISION, TOO!

Jane Russell, comely young United Artists' star, currently appearing in "Young Widow," snatches a brief rest during shots on the movie lot.

PRACTICAL ASPECTS OF TELEVISION*

By W. H. BOHLKE, ENGINEERING PRODUCTS DIVISION, RCA
and
M. M. BRISBIN, RCA SERVICE COMPANY

To quickly familiarize the reader with the general problems of television, it may be well to compare it with sound transmission and to analyze briefly the differences between the nature of sight and sound.

Disturbances in the air causing sound sensations arrive at the ear in successive pulses which depend upon the correct time sequence for intelligibility. Sight sensations, however, depend upon a correct space arrangement of the elements of a scene for the production of an intelligible picture. An image of a scene being viewed is formed in the eye because of the variations of light intensity reflected by all of the various portions of the scene at a given instant. The image of the scene being viewed is a picture because of the space arrangement of these variations of brightness. Thus, for intelligibility of sound, orderly time arrangements must be maintained; whereas for picture definition, orderly space arrangement must be maintained. Sound transmission therefore is readily adaptable to radio broadcasting. Picture transmission and reception, however, required that the picture be subdivided into minute elemental areas so that information on the illumination of each small picture element can be transmitted in an orderly sequence and the bits of information reassembled in the correct sequence at the receiving end to form a complete picture.

A picture being reassembled or reproduced by television appears to be quite continuous because of a peculiarity of the human eye which retains an image for a short period of time. As a result, althougl minute

(Continued on Page 2, Column 1)

*Excerpts from "Practical Television by RCA"; completely revised by authors to include latest television data.

ALL RCA TUBE ACTIVITIES IN NEW DIVISION

More Efficient Service to Distributors and Dealers Foreseen

Since the last issue of RADIO SERVICE NEWS, all RCA tube activities have been centered in the Tube Division, with headquarters in Harrison, N. J. Establishment of the Tube Division with L. W. Teegarden as Vice President and General Manager, provides for complete integration and coordination of RCA's extensive tube activities and strengthens and streamlines its operations in meeting the vast new demand for electron tubes.

Tube sales to dealers and servicemen through distributors are administered by the Renewal Sales Department under the guidance of its manager, D. J. Finn. Responsibility for specialized phases of sales activities in the department is vested in three administrative heads —D. H. Branigan, general electron tube sales; A. C. Duncan, Jr., battery sales; and J. H. Owens, tube analyst for the amateur market. Field activities of the Renewal Sales Department are handled by fifteen Sales Representatives, who personally contact distributors and dealers, and whose combined territory covers every state in the union.

Largest Tube Producer

Although RCA is today the largest producer of electron tubes in the world, it was not until 1930 that the company acquired its own tube manufacturing facilities.

In January of that year RCA began the manufacture of a full line of radio receiving tubes and a limited number of power and special type tubes. Production on a full line of air-cooled power tubes was begun in 1934, and more recently the company has expanded its production of large water-cooled and forced air-cooled types. The manufacture of metal receiving tubes, which have found widespread military applications during the war, was begun in 1935. The RCA filament-type miniature tube was developed and introduced in 1938 as the heart of the RCA personal radio receiver. The RCA cathode type miniature, now widely used in high-frequency applications, came into being in 1940.

ASPECTS OF TELEVISION

(*Continued from Page 1, Column 3*)

portions of the scene are reproduced at different times, the whole process is completed so quickly that the eye sees the picture as a whole. The retentivity of the human eye is utilized in television in a manner somewhat similar to the manner in which it is utilized to create the illusion of motion in motion pictures. In the latter the illusion of motion is accomplished by projecting a sequence of time-related still pictures in such rapid succession that the eye retains the image of one picture until the next is projected, thereby creating an illusion of continuity. Television is complicated by the necessity of transmitting in an orderly sequence the information on minute picture elements and then rearranging the information on the screen of the picture tube of the receiver in the same sequence to form a picture of the original scene.

Electronic Scanning

To clarify the over-all procedure, the steps required to pick up, transmit and reproduce a television picture will be discussed briefly. In the upper left corner of Figure 1 is shown an artist whose picture is to be transmitted. Light reflected from the face of the artist is collected by the lens system and focussed on the plate of the television camera tube known as the Iconoscope. This plate is covered with a material which, in effect, forms an innumerable quantity of minute photo-electric cells and is called a "mosaic." The Iconoscope also incorporates an electron gun similar to that used in a standard cathode ray tube. The scanning, in the case of the Iconoscope, is accomplished by deflecting the electron beam electromagnetically by means of coils external to the tube. These coils are excited at frequencies which cause the point of impact of the electron beam to move across the mosaic in approximately a horizontal line at a uniform speed, then fly back and scan another line, and so on until the entire mosaic has been scanned by 525 lines in the desired sequence. This complete scanning is repeated at a rate of 30 times per second. When the electron beam falls upon a dark portion of the mosaic, current will flow through the output circuit of the Iconoscope. When it falls on a partially illuminated portion a smaller current will flow, and when it falls on an illuminated portion very little current will flow. Hence, current pulses will be generated which will correspond in time sequence to the light and dark areas of the artist's image as they are scanned by the electron beam. The resulting voltage pulses, which are called video signals, are amplified and combined with special artificially manufactured signals for controlling the timing of the Kinescope (picture tube of television receiver) deflection circuits and for extinguishing (or blanking as it is usually called) the Kinescope's electron beam during the return time. The resulting composite signal is then used to modulate a high frequency transmitter.

In the receiver, the received signal is amplified and separated into its components. The picture components are amplified and applied in such a way as to produce variations in the intensity of the electron beam of the Kinescope which is similar to a conventional cathode ray tube. In the particular case under consideration, deflection is accomplished electromagnetically with coils external to the tube. The oscillators which furnish the energy for deflection operate at the same frequencies as the deflection oscillators associated with the Iconoscope and are held in synchronism by the transmitted sychronizing pulses. Thus the electron beam of the Kinescope moves in synchronism with the electron beam of the Iconoscope and the variations in brilliancy of illumination at the point of impact on the Kinescope screen correspond to variations in illumination of the respective areas of the Iconoscope mosaic. In this manner the image on the mosaic of the Iconoscope is dissected and information on each element transmitted separately in a manner which permits the receiver to take these bits of information and use them to produce corresponding variations in illumination on the Kinescope screen and thus produce a picture of the original scene.

The foregoing over-all description of the television system gave very little attention to the details of the process. It may be interesting now to go back and consider some of these details. The scanning process is not as simple as might be inferred from the previous discussion. In order to reduce flicker to an acceptable amount without needlessly increasing the band width required for high definition pictures, alternate lines are scanned successively. This type of scanning is called "interlaced" scanning. Thus scanning may start with line No. 1, then No. 3, No. 5, No. 7, etc., until line No. 525 is scanned. This is called one "field" and requires 1/60 of a second. Then the spot flies back to the top of the picture and scans the even numbered lines in order, starting with line No. 2, then No. 4, No. 6, No. 8, etc., until line No. 524 has been scanned. This also requires 1/60 of a second. The term "field" designates one scanning of either all the even or all the odd numbered lines. Two fields, or a complete scanning of all 525 lines, is called a "frame" and requires 1/30 of a second.

Picture Definition

It has been rather common knowledge that the RMA standard for high definition television pictures designates 525 line scanning, but the reasons for the choice of this number are not so obvious. The reasons for selecting 525 lines are:

First—To obtain pictures of adequate size with best detail, as many lines as possible should be used. A limiting factor is the high picture signal frequencies involved. An analysis indicates that the number of lines should not be much less than 500 if pictures with good definition are desired.

Second—Interlaced scanning requires that the number of lines be odd.

Third— For reasons too involved to discuss here, the number should have simple odd factors. The number 525 has the simple odd factors of 3, 5, 5 and 7.

With 525 line interlaced scanning and a frame frequency of 30, the reasons for the great range of frequencies involved in television become apparent. To obtain as good picture detail horizontally as is obtained vertically, it must be possible to put picture elements into a line as close together horizontally as the vertical spacing of the lines. As the picture width is 4/3 times the picture height, there should be 700 elements in each line.

Successive black and white elements (such as in a checker board pattern) would represent the greatest possible distribution of elements. Each succession of a black and white element represents a complete signal voltage cycle. It should be possible, therefore, to transmit 350 cycles (700 divided by 2) while one line is being traced. As 525 lines are traced during 1/30 of a second, it is apparent that the output from the Iconoscope will cover a great range of frequencies. A consideration of all factors indicates this to be approximately four million cycles per second.

Modulation considerations require that the transmitter carrier frequency be appreciably higher than the highest modulation frequency. The fact that the modula-

(*Continued on Page 4, Column 1*)

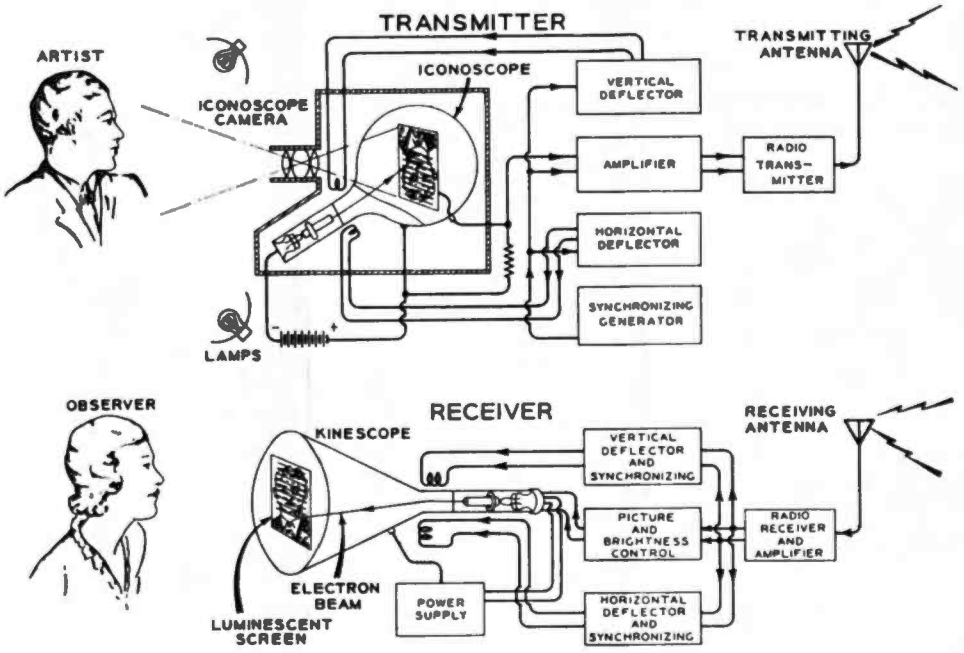


Figure 1—Schematic of RCA Television System (Sound portions not shown)

FIG. 1
Schematic of RCA Television System
(Sound portions not shown)

VOLTOHMYST PREPARED FOR F-M REQUIREMENTS

By A. B. LIEBSCHER
RCA Test and Measuring Equipment Department

The original VoltOhmyst brought to the radio service man a new and different version of his most used test instrument. It enabled him to test high resistance circuits without the serious loading effects which had plagued every such reading up to that time.

The VoltOhmyst made it possible to test radio receivers while the signal was present and without interfering with that signal. The VoltOhmyst made it possible to measure high value resistors which were previously guessed at and it enabled measurement of low resistance values without resetting the ohmmeter scale. The principal feature of interest to the service man was, however, the electronic circuit of the VoltOhmyst which enabled him to forget meter burn-out worries in the application of d-c voltage to its self-limiting electronic bridge circuit.

The introduction of the Type 195-A VoltOhmyst brings another great advance—the incorporation of a balanced diode circuit, supplying linear readings over a very wide range of audio and low radio frequencies; here again without meter burn-out worries—even on the a-c ranges which measure up to 1000 volts!

Used in F. M. Testing

The VoltOhmyst diode is well adapted to its new part in testing the frequency response of high fidelity and f-m receivers. Readings for this purpose can be made either in a-c volts or in volume units.

As a feature which lends itself well to the growing need for information on receiver band-width adjustment, the a-c voltmeter with its flat audio response will indicate the overall band pass characteristics of an f-m receiver when dynamic frequency measurements are made. This is accomplished by employing the VoltOhmyst as an output meter, when an audio oscillator is used to modulate an f-m test oscillator as a source of input signal to an f-m receiver (Fig. 1). The audio oscillator itself can also be checked for constant modulating voltage conditions by simply switching the probe from receiver output to audio oscillator output.

Still another method of testing wide band response characteristics is to observe the d-c discriminator deviation limits resulting from point to point input signal shifting (Fig. 2-a). This implies that a signal generator can be connected to the antenna or the i-f input and tuned through the expected frequency range (75 k-c on each side of center frequency), to produce d-c discriminator output response, which should be linear for the entire band width.

Video Applications

The new VoltOhmyst is also adaptable to another important f-m receiver servicing adjustment; discriminator balancing. Beside the usual socket and power supply voltage tests, the ten megohm high input resistance for d-c measurements provides a good sensitive indication for f-m discriminator voltages.

The discriminator d-c output voltage can be accurately adjusted by employing the new zero center indicator, first with the 30 volt range for coarse adjustment and then with the 5 volt range for a final precision adjustment. With a fixed i-f signal applied, the discriminator output voltage can be balanced by observing the counteracting effects of both positive and negative peak rectification. (Fig. 2-b).

All of the foregoing can be usefully applied to the f-m sound channel of television receivers. Here again the VoltOhmyst will prove its versatility in the numerous requirements for r-f, i-f and audio testing, as well as in picture channel r-f, i-f and video indications.

The VoltOhmyst has been improved time and again to keep pace with modern developments, for Test and Measuring Equipment is the backbone of progress in electronics.

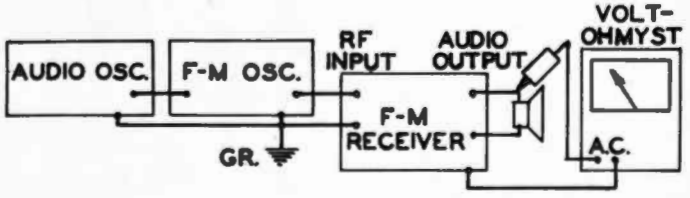
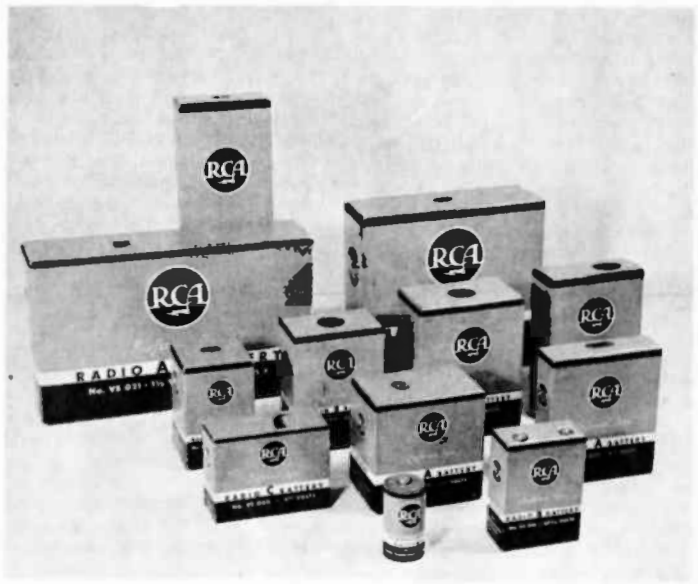


FIG. 1

Checking the fidelity of an F-M receiver is easy with this arrangement. The VoltOhmyst indicates overall response when audio oscillator frequency is varied.

A PORTION OF RCA'S NEW BATTERY LINE



RCA "radio-engineered" batteries are built to exacting standards and meet the requirements of dealers and servicemen by giving "extra listening hours."

BATTERY LINE

(Continued from Page 1, Column 1)

black containers—topped with the famous RCA monogram to lend customer appeal and blend with dealers' store and window displays.

At the same time, proven, national advertising is telling the trade and the consumer about how the RCA battery group gives "more listening hours" per dollar spent. Well directed publicity is finding its mark—and customer inquiries and sales are on the upswing. In fact, recently, one well known department store in New York City displayed RCA batteries together with five other brands—and more than 50% of the total batteries sold during that period were RCA!

Fits Dealer Set-Up

How does RCA battery line fit into the dealer and serviceman set-up? Primarily, it is a radio man's battery, "Radio-engineered," and produced specifically to meet radio requirements — whether portable sets or farm radios. Next, application of the "preferred tube type" idea to the battery line permits servicing 80 to 90 per cent of the radio sets in current use with a small group of carefully selected types. That means smaller inventories and quicker stock turnover.

Finally, the dealer and serviceman get the certain benefit of an extensive advertising and sales promotion program that is being sponsored to feature the sales clinching theme "more listening hours in RCA batteries." Merchandising aids, including counter and display cards, consumer direct mail pieces, newspaper advertising mats and catalogues are also being made available to dealers.

The new RCA battery line—radio engineered for radio service—is going places fast. Dealers and servicemen can jump on the bandwagon—get the merchandising effectiveness and the certain profits of the RCA battery line—by contacting their RCA tube and battery distributor or by writing the Renewal Sales Department, Harrison, N. J.

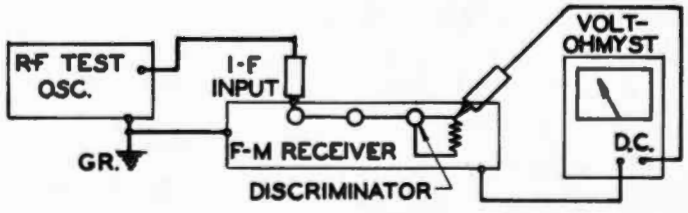


FIG. 2

(a) When the oscillator frequency is varied within the band width the resultant audio response can be determined by the discriminator voltage deviation from "zero center."

(b) The discriminator can be quickly and accurately balanced at center frequency when an unmodulated signal is applied.

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(*Continued from Page 2, Column 4*)

tion frequencies extend up to four megacycles and above, and the lack of available space in the other portions of the radio spectrum require that the carrier frequencies be in the ultra high frequency region. The lower picture side-band is attenuated permitting a sufficiently wide spacing of 4.5 mc between picture and sound carriers to allow a wider upper picture side-band so necessary for adequate reproduction of fine detail of the original scene.

Synchronizing Pulses

Of course, in order that the television program will be complete, the sounds accompanying the scene must also be broadcast. The sounds are picked up by a microphone in the usual manner and the amplified energy is used to modulate another ultra-high frequency, frequency modulated, transmitter operating at a frequency 4.5 mc above the picture carrier frequency.

Present American television receiver design practice is to use superheterodyne receivers with antenna and r-f circuits which are sufficiently broad in frequency response to accept the entire pass band covered by the two carriers and their transmitted side-bands. No separation occurs until after the first detector. The output of a single local oscillator is heterodyned with both sound and picture carrier signals to produce signals of two intermediate frequencies. By having separate picture and sound intermediate frequency amplifying systems, each of which is tuned to the correct i-f, the television picture and sound signals may be separated. The sound amplifying system from that point on is in most respects identical to that of a conventional fm radio receiver.

The television picture signal must be separated into its components. As previously explained, timing or "synchronizing" and extinguishing or "blanking" pulses are transmitted along with the video signals which provide the information on variations in illumination of picture elements. At the end of each scanning line, synchronizing pulses for holding the horizontal scanning oscillator at the proper frequency and blanking pulses for extinguishing the electron beam during the horizontal return time are transmitted. At the end of each field, synchronizing pulses for holding the vertical scanning oscillator at the proper frequency and blanking pulses for extinguishing the electron beam during the vertical return time are transmitted.

The synchronizing pulses must be separated from the video signal, and the vertical and horizontal pulses selected and applied to control the proper scanning oscillator. The video signal and blanking pulses must be applied to the control grid of the Kinescope through suitable amplifier and circuit arrangements to control the Kinescope illumination.

Receiver Maintenance

Although this brief over-all description of a television system may lead the reader to believe that the system is comparatively simple, such is by no means true. Much of the apparatus required to produce the conditions described is of necessity extremely complex. The development of many of the apparatus and circuit arrangements has called for unusual knowledge, skill and ingenuity on the part of the engineers responsible for our present highly advanced system. Fortunately for the television technicians who must install and service these receivers, these engineers have continually sought to evolve a system which does not utilize unnecessarily complicated receivers.

ANOTHER EXAMPLE OF RCA TUBE "KNOW HOW"

One of the many rigid inspection tests which every tube must pass with flying colors before it leaves the factory. Small wonder that RCA tubes are preferred by retail customers everywhere for unsurpassed performance value.

ONE OF THE 1946 DEALER PROMOTION ITEMS

This Cunningham streamer will go to dealers and servicmen as part of the powerful new RCA promotion program. Many other display pieces and advertising items will be made available to help stimulate sales and build customer acceptance.

RICH PROMOTION PROGRAM SPONSORED BY RCA IN 1946

The beginning of the new year brings a new episode in the operation of Radio Service Shops and Renewal Tube Dealers. From now on the service-dealer will find it necessary to promote the sale of his service, his skill, and his merchandise if he is to maintain his trade and name in the community.

The 1946 RCA Advertising and Sales Promotion Program is designed to render the dealer-serviceman all the assistance possible in carrying out this program of selling his store and his service. To this end RCA will continue its two-phase Promotional Program:—

a. A complete line of attention-getting *Sales Aids*—will be continuously available to service dealers through their distributors.

b. RCA will provide from time to time *sparkling displays*, *promotional items*, and *advertising facilities* and plans to bring the serviceman into the attention of the customer.

During the war years, RCA maintained a nucleus of Sales Aid material—stationery, package tape, tube stickers, service garments, tube catalogues, interchangeability references and others.

The famous RC-14 Receiving Tube Manual and the very valuable HB-3 looseleaf Handbook have been kept up-to-date even though it has been impossible, often, to deliver many of the tubes listed. Army-Navy requirements came first!

The present small number of sales aids will shortly be augmented to help you sell your service through many channels. Electric clocks, electric signs, cloth banners, various kinds of package tape, labels, stationery cuts and electrotypes, decalcomanias, metal signs, giant tube carton displays and many more items will be available to help the service dealer continuously sell himself to his community.

Display material, for walls, counters, windows and floors, advertising mats for newspapers, direct mail postcards, spot radio announcements—all of these will bring your service into the homes of those who need your services.

All of these items will be announced in the SERVICE NEWS, in broadsides and by your Local RCA Tube Distributor.

Orders for Sales Aid material should be placed with your distributor and should include *Form Number*, *Name of Item* and *Exact Quantity*.

In many cases small charges are made for Sales Aid material at cost or a fraction of cost. This is done to insure efficient use and distribution of promotional items.

To be on the ground floor in obtaining this material—see your RCA Tube Distributor for prices and announcements, and follow RADIO SERVICE NEWS.

THE ULTRA NEW BIG "C"

The new Cunningham carton, attractively colored in orange and blue, and designed for more effective merchandising in dealer and service-outlet displays.

SALES AND SERVICE TIPS

Once again you can win a handsome RCA Service Engineer's Pencil by sending tips to RCA Radio Service News, Harrison, New Jersey .... All tips become the property of RCA to be used as they see fit .... Service Tips are our readers' ideas, not ours. While we believe they are worthwhile, we cannot be responsible for them.

REPAIRING CRACKED RP-151 PICKUP ARM

Pickup arms (of the dual pickup type) used in Model RP-151 record changers are occasionally damaged when service men, not familiar with this changer, attempt to pull the upper and lower pickup heads further apart to prevent records from rubbing against the pickup arm, a method that is incorrect and usually cracks the arm. The experienced service man would correct such a condition by adjusting the turntable until the record is properly centered between the upper and lower pickup arms.

Since no replacement arms are available, it becomes an individual service problem to repair arms damaged in this way. Welding of the crack has not proven satisfactory because the heat is apt to buckle or melt the alloy metal and leave lumps to be dressed down.

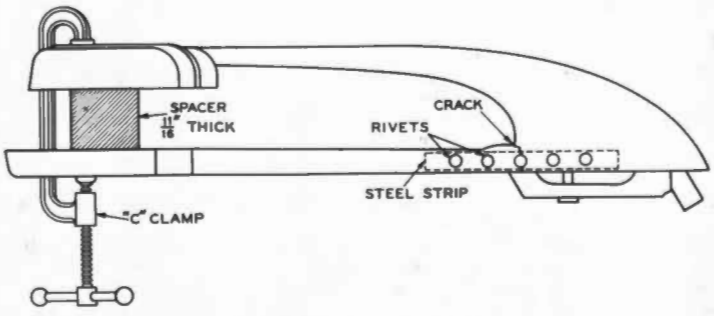
The following method is suggested as the most convenient and practical way to make repairs, using materials that are on hand, or can readily be obtained.

Materials Required:

1. "C" Clamp.
2. Steel or brass strip, approximately 2⅜" x 3/32" x 1/16".
3. Rivets or screws for riveting the strip or strips to the pickup arm.
4. Spacer, 11/16" x 1⅜" x 1½" (can be wood or metal).

Repairs:

a. Remove both pickups to avoid possible damage to sapphires.
b. Insert the 11/16" spacer between the pickup heads, using "C" clamp to prevent any movement or misalignment of pickup heads during repairs.
c. Lay out and drill holes in strip to fit rivets or screws to be used.
d. Use the strip as a template to drill holes in the pickup arm as shown in the drawing.
e. Rivet strip in place, using tubular rivets or brass screws (6/36) cut to the correct length.



Method of Repairing Cracked Arm.

REPLACING 2V3G WITH 2X2/879

If a 2V3G tube is not available for replacement of the high voltage rectifier tube in RCA Victor TRK-9, -12, -90, -120 television receivers, a 2X2/879 tube may be substituted by changing the socket and plate cap. The maximum peak inverse voltage rating of the 2X2/879 is somewhat exceeded in this use, but practice has shown satisfactory results. In some respects, such a revision is advantageous, the 2X2/879 being a heater-type tube and therefore less susceptible to filament-plate shorts. Instructions for the revision follow:

Parts Required

1—2X2/879 tube.
1—Stock number 19458 ceramic socket.
1—Stock number 12118 cap.

Detailed Instructions

1. Remove the receiver power cord plug from the power supply receptacle.
2. Carefully disconnect all the SPU cables to the kinescope and other units of the receiver.
3. Remove the high voltage SPU from the cabinet.
4. Connect a shorting lead to chassis (first), then to the high side of both high voltage filter capacitors.
5. Remove the protective cover over the 2V3G high voltage rectifier tube.
6. Remove the 2V3G tube.
7. Unsolder the three gray (heavy rubber) leads from the "F" terminals of the 2V3G tube socket.
8. Remove the socket retaining ring from the groove on the under side of the 2V3G socket.
9. Slip the 2V3G socket upwards, out of the hole in the bakelite plate.
10. Insert the 4-prong socket (stock number 19458-ceramic, or any good quality 4-prong socket of the same type as the 2V3G socket which was removed) into the hole in the bakelite plate.
11. Snap the retaining ring into the groove on the under side of the socket.
12. Solder the three gray (heavy rubber) leads, previously removed in "7" above, to the heater (large) pins of the 4-prong socket.
13. Remove the plate cap connector from the high voltage lead (red wire, top of chassis), replacing it with the larger top cap connector (stock number 12118) required for the 2X2/879.
14. Insert the 2X2/879 tube in the socket; connect top cap lead.
15. Replace the protective cover over the 2X2/879.
16. Remove the shorting lead: high voltage capacitors to chassis.
17. Return the SPU to the cabinet; reconnect to kinescope and other units of the receiver.
18. Mark SPU Chassis with sticker or indelible crayon to indicate change to 2X2/879 tube.
19. With receiver again in operation, check focus control adjustment.

BP-10 SPEAKER

The following speakers used in the RCA BP-10 Personal Sets are available only upon the return of a defective speaker.

RCA 36504 Speaker, round, stamped 84991-1.

RCA 37807 Speaker, elliptical, stamped RL-95-2.

Replacement cones are available for both type speakers.

For RCA 36504 Speaker (Round) replacement cone is RCA 39467. Suggested list price $1.10.

For RCA 37807 Speaker (Elliptical) replacement cone is RCA 37951. Suggested list price $1.10.

WATCHING THE CROWD — AND ENJOYING IT

Pretty Marie McDonald—called "The Body" by her friends—is one case where no deep thought was needed to think up an appropriate nick-name. She can be seen in "Getting Gertie's Garter," a United Artists' production.

FIBER GEAR

Fiber Gear only available for Phonograph Motors RCA 31462 and RCA 31461.

RCA stock #70319 is assigned to cover the fiber gear only used on spindle shaft and gear assembly RCA stock 31621. This gear can be used for the repair of motors stamped 84323-1 (RCA 31461) and 84323-2 (RCA 31462) for instruments R-98, U-119—U-122E and U-124. For identification dimensions of gear are listed.

O. D. = 1 1/32"

Bore = ¼"

Thickness = 1/16"

No. teeth = 48

Suggested list price for gear $.70 each.

RCA 31917 FIELD COIL

RCA 31917 Field Coil for R-100 type motor is replaced by RCA 31918 Coil. This coil is now available. Suggested list price seventy cents ($.70) each.

STOCK 31689 OSCILLATOR COIL

Stock 31689 "A" Band Oscillator Coil for instruments HF-6, HF-8, U-132, U-134 is replaced by stock 32148 coil. Stock 32148 Coil is currently available. Suggested list price ninety cents ($.90) each.

EXCESS STOCK SECTION

PICKUP CABLE

We have available a limited stock of pickup cables 30" long, single conductor shielded with ⅛" dia. phonograph plug (RCA 31048). Order as RCA stock 70054. Suggested list price fifty cents ($.50) each.

BLEEDER RESISTORS

The following multiple section Resistors are available for prompt shipment subject to prior sale. Values of resistors are indicated to permit use of resistors in circuits requiring voltage dropping resistors of comparable values.

RCA 34537 Resistor. Suggested list price $.95.

	Resistance Value	*Wattage*
Section 1—2	3000	9
Section 2—3*	2500	4.2
Section *3—4	10	.18
Section 4—5	170	3.2

* #3 Terminal grounded to case.
Designed for RCA Instruments U-44, U-45, K-105.

RCA 35020 Resistor. Suggested list price $.90.

	Resistance Value	*Wattage*
Section 1—2	3000	10
Section 2—3*	2500	4.5
Section *3—4	7	.2
Section 4—5	135	4.5

* #3 Terminal grounded to case.
Designed for RCA Instruments U-46, K-130.

RCA 38808 Resistor. Suggested list price $1.00.

	Resistance Value	*Wattage*
Section 1—2	3000	9.0
Section 2—3	2500	4.2
Section 3—4	10	.2
Section 4—5	25	.5
Section 5—6	145	3.0

Designed for RCA Instruments V-215, V-219, V-225.

FP Type Dry Electrolytic Condensers.

Stock #	*Capacitance*	*Diameter*	*Length*	*Suggested List Price*
38571	10 mfd. 400 V 10 mfd. 400 V 20 mfd. 25 V	1"	2"	$1.45

Station Markers

RCA Stock#	*Used for RCA Instruments*	*Suggested List Price*
31589	96E2, 97K2, U-30, U-129, TRK-9, 12, U-122E, HF-2, HF-4, U-130, U-132, etc.	$ .10*
33842	T-64, T-80, K-60, K-80, U-44, U-45, K-105, 16-T, etc.	.10*
36149	110-K, 17-K, 19-K, V-170, V-205, V-300, V-301, V-302, VHR-202, VHR-207, etc.	.10*

* This is a substantial price reduction and is subject to change or withdrawal without notice. Take advantage of this saving and make additional profit on service of instruments using push button tuning by replacing station marker tabs.

Volume Controls

RCA Stock #	*Value*	*Tap*	*Shaft*	*Switch*	*Suggested List Price*
70064	1 meg.	200,000	2"	SPST.	$ .75
70066	2 meg.	400,000	2¾"	SPST.	.75

PICKUP COIL

Pickup Coil and Board for RCA Small Magnetic Pickup Unit replaced by Coil only.

Stock 11732 Pickup Coil and Board assembly (2000 turns) used in instruments 7-U, R-93, R93-A, U-101, U-102-E, etc., is replaced by stock 70252 Coil only.

Stock 14672 Pickup Coil and Board assembly (500 turns) used in instruments QU-51, QU-52M, U-105, etc., is replaced by stock 70253 Coil only.

Suggested list price for above coils 60 cents.

Parts Available

The following is a list of RCA Replacement items on which we have been out of stock. The parts listed below are now available, subject to prior sale.

RCA Stock No.	*Description*	*RCA Instruments*	*Suggested List Price*
2314	Pickup Coil	9-54, 10-69, CE-66, 7-26X, 9-56	$1.08
2620	Damper	RE-75, RE-57, RE-156, CD-10X, etc.	.12
2769	Coil	R-86, RE-57, RE-17, RE-18, RAE-26, RAE-59, CE-29	.90
10777	Pickup Coil	RE-45, RE-75, E-135, E-35, etc.	.50
11703	Governor	U-119, U-122E, U-124, R-94B, M-81, M-82, 85-E	3.05
12860	Control	9U, 9U-2, 9K-3, 15U, 10K-1, 9K-2, 9T-3, 10K	1.50
14384	Belt	U-106, U-107, 810-K, 88-K, 87-K, etc.	.16
14646	Coil	U-103, 85E, 86X, 85T-1, etc.	1.70
14422	Vibrator	CV-8	4.05
30599	Resistor	812-X	1.20
31293	Coil	99-T, U-126, U-128, U-30, U-129, etc.	1.30
31251	Socket	TRK-9, TRK-12, MTE-162, MI-5024, WR-158	.25
31323	Capacitor	9-X, MI-7818, 98T-2, MI-2204, etc.	.65
31366	Control	96T-2, 96-K, U-124, 97-E, 96T-3, etc.	3.00
31716	Dial	HF-6	1.65
31795	Vibrator	8QB, 8QBK, QB-3	4.95
32485	Capacitor	96T-2, 96K, 97T, 96T-3, U-122E, U-124	2.10
32544	Ballast Resistor	96X1, 96T-4, 5Q-8, 96X-2, etc.	.80
32548	Condenser	96X1, X-2, X-3, X-4, etc.	.65
32566	Dial	9TX-5, 9TX-6, 9TK-1, etc.	.45
33014	Capacitor	KC-5, Q-27, QU-52C, Q-30, W-22	1.90
33345	Cap	R-100	.15
33601	Coil	T-60, T-62, T-55, U-12, U-10, etc.	1.00
33824	Capacitor	6Q4X, Q-24	2.30
34965	Capacitor	BP-55, 56, 85, 25-BP, P-5	.70
35079	Dial Crystal	45X11, 45X12, 46X1, 55X, 25BP, etc.	.65
35091	Indicator	46X-11, 46X-12, 46X-13, 14BT-1, 14BK	.25
35124	Dial	45X-1, 45X-2	1.00
35348	Capacitor	45X-13A, 46X-3A, 46X-1A, 45X-11-A, etc.	.95
35747	Capacitor	5Q66, Q-17	2.15
35761	Capacitor	Q-20, 5Q-21	.90
35946	Control	Q-25	2.00
36092	Coil	14BT-1, 14BT-2, 14BK	.50
36234	Coil	15X, 15X-1, 15X-2, 15X-3	.60
36599	Capacitor	V-300, V-301, V-302	1.85
37250	Capacitor	QU-7, QU-8, QU-88, QB-1, etc.	.60
37845	Capacitor	V-101, V-175, V-140, WR-42X-2	1.00
37846	Capacitor	V-140, V-101, V-175, etc.	.50
39152	Capacitor	28X, 28X-5, R-1214, WR-12X-16	.85
39500	Capacitor	R-56, V-135, 56BP	.50
39501	Capacitor	V-135	.85
70036	Bushing	R-100	.10
70044	Gasket	For 5" Speakers	.05
70091	Switch	812-K, 811-K	.75
70113	Capacitor		.55
70117	Capacitor		.65

DIAL DRIVE CORDS AND ACCESSORIES

The following is a list of RCA Dial Drive Cords and accessories currently available.

RCA Stock No.	
32634	50" length of silk dial drive cord (light) including 10 clamp rivets. Suggested list price $.10.
34662	100" length of silk dial drive cord (light) including 6 clamps. Suggested list price $.20.
38306	150 ft. spool of silk drive cord (heavy). Suggested list price $3.75.
70331	3600 ft. spool silk (light) dial drive cord. Suggested list price $56.50.
32635	60" length of Phosphorus Bronze dial drive cord with 10 clips. Suggested list price $.24.
38201	100 clamps for silk drive cord. Suggested list price $.60.
38203	100 clamps for Phosphorus Bronze dial drive cord. Suggested list price $.25.

ANALYSIS OF RADIO INTERFERENCE PHENOMENA

Character, Cause, Type Receivers Affected, Where Prevalent, and Service Remedies

Type of Interference	Character of Interference	Cause	Type Receivers Affected	Where Prevalent	Suggested Service Remedies
IMAGE RESPONSE	Heterodyne whistle or second signal when tuned to certain stations.	Strong signal at a frequency 2Ix-F above desired station.	Superhet only. (1) With limited number tuned circuits ahead first detector. (2) With low impedance, high frequency resonant antenna primary circuits.	Locality strong BC stations near high end of band. Vicinity 1610-1750 Kc. Police Stations. Vicinity 1700-2000 Kc. amateur band.	(1) Wave trap tuned to interfering station. (2) Band elimination antenna such as RCA Magic Wave. (3) Re-align I-F.
HARMONIC OF I-F	Heterodyne whistle when tuning a station having same frequency as a harmonic of the I-F.	Second harmonic of station combines with oscillator fundamental forming a spurious I-F.	Superhet only. Selectivity does not affect.	Vicinity of station operating at twice I-F.	(1) Wave trap tuned to station. (2) Wave trap tuned to station second harmonic in mixer grid circuit. (3) Re-align I-F.
DIRECT I-F RESPONSE	Non-tunable code with intensity increasing toward low frequency end of band.	Commercial shore-to-ship code signal having frequency in I-F range, reaching input to I-F system.	Superhet only. (1) With limited selectivity ahead of I-F input and relatively high I-F gain. (2) With high impedance, low frequency antenna system.	Coastal areas near location of commercial stations.	(1) RCA Magic Wave antenna. (2) I-F wave trap. (3) Re-align I-F. (4) Orient loop for minimum.
HARMONICS OF OSCILLATOR	Reception of short wave code or broadcast signals at points in standard broadcast band.	Oscillator harmonics combine with short wave signals producing the required I-F. Especially prevalent on loop receivers due to secondary resonances of loop.	Superhet only. (1) With loop antenna. (2) Having oscillator rich in harmonics.	Rurally or where SW signals of proper frequency are intense.	(1) Use wave trap on interfering station. (2) Orientation of loop. (3) Re-align loop circuit. (4) Reduce oscillator excitation.
COMBINATION OF I-F	Whistle or second station(s) heard on practically all carriers.	Differences in frequency of two strong stations equal to I-F of receiver; the two stations mixing within receiver to form a constant spurious I-F.	Superhet only; having limited selectivity ahead of first detector.	Metropolitan areas, generally.	(1) Check by tracking of RF and antenna circuits. (2) Reduce size or effectiveness of antenna. (3) Install wave trap and tune to frequency of one of interfering stations. (4) Shift I-F.
HETERODYNE OSCILLATOR RADIATION	Whistle on a particular desired station, disappearing or changing frequency at random.	Radiation of receiver's heterodyne oscillator, due to oscillator strength, unusual coupling, resonant antenna, or transmission via power line.	Superhet only. (1) Without good shielding. (2) Without R-F stage.	Metropolitan areas, generally.	(1) Filter power line. (2) Use RCA Magic Wave antenna. (3) Reduce oscillator grid leak. (4) Shift I-F.
CROSS MODULATION WITHIN RECEIVER	Second station(s) appearing in background when tuned to desired station.	Strong interfering station modulating carrier of desired station within a non-linear circuit or element of the receiver; or pickup and detection taking place in audio system.	TRF and Superhet. (1) With limited or no selection ahead of first tube. (2) With exposed grid circuits and wiring associated with early tuned stages. (3) Without variable-mu input tubes.	Metropolitan areas. Vicinity of very strong stations.	(1) Wave trap in antenna tuned to station causing trouble. (2) Filter power line. (3) Install RCA Magic Wave noise reducing antenna. (4) Shield exposed grid leads and wiring of first stages.
CROSS MODULATION EXTERNAL TO RECEIVER	Second station(s) in background on or between other stations.	Detection within, and re-radiation from, as power lines, telephone lines, and other aerial metallic structures.	All types of receivers are affected regardless of selectivity or design.	Vicinity of unusually strong stations, especially where open-wire power lines are prevalent. Generally changes with weather.	(1) See that power line and telephone grounds are secure. (2) Ground conduits solidly. (3) Use RCA Magic Wave antenna. (4) Orient loop antenna for minimum interference.
SAME CHANNEL BEAT	Flutter, waver, or growl heard in background when tuned to desired station.	Second station assigned to same channel, but differing very slightly in carrier frequency.	Receivers with high sensitivity and extended base response.	In areas remote from a usable assortment of strong stations. Wherever signals of two stations on same channel are comparable in strength.	(1) Use directive or loop antenna. (2) Reduce sensitivity of set. (3) Reduce base response.
ADJACENT CHANNEL BEAT	Steady 10,000 cycle note or whistle.	Adjacent channel carrier beating with carrier to which receiver is tuned.	TRF and Superhet; especially those with limited selectivity and wide range of audio response.	Localities where adjacent channel station is strong compared to desired station.	(1) Suppress adjacent station with sharply tuned wave trap. (2) Re-align receiver carefully. (3) Reduce high-frequency response. (4) Use directive antenna.
MONKEY CHATTER	Unintelligible modulation superimposed upon desired station, having character of "inverted speech."	Side band of adjacent channel overlapping side band and combining with carrier of desired station. Also caused by harmonics from over-modulation of adjacent station.	TRF and Superhet; having wide band selectivity and audio response.	Localities where adjacent channel station is strong. Also aggravated by extended high frequency response of transmitter.	(1) Precisely re-align receiver to make more selective. (2) Reduce high frequency audio response.