



RADIO SERVICE NEWS

VOLUME XIV, No. 4

RCA TUBE DEPARTMENT, HARRISON, NEW JERSEY

Sept.-Oct., 1949

REPLACEMENT PARTS FOR RCA VICTOR 45-RPM RECORD CHANGER

New Parts Folder Lists and Identifies All Components

The ever-expanding popularity of the 45-rpm record player is leading to new sales opportunities.

To help service-dealers participate in this new market, RCA has announced a complete line of replacement parts for all RCA Victor 45-rpm models. All parts are exact duplicates of those used in RCA Victor Record Changers, and meet manufacturer's specifications for this revolutionary new changer in all respects. You are assured of top quality and dependable performance when you buy genuine RCA 45-RPM replacement parts.

Listing this new parts line, and clearly showing each part for easy identification, is a brand new RCA Flier, SP-1005. Featured in the Flier is an exploded view of the entire RCA Victor 45-rpm mechanism which illustrates the exact location of each part, and identifies it by stock number. The Flier also describes the RCA 202W1 Record Player Selector Switch. With this unit, a 45-rpm RCA Victor Record Changer may be attached to current combination sets with a minimum of effort. A flick of the switch connects the radio's internal phono or the external 45-rpm changer to the set's audio system, an attractive feature to help you make added record player sales. For receivers not having a record player or phono input jack, the RCA 240X1 Radio-Phono Switch described in the SP-1005 makes possible the conversion of a customer's receiver to an enjoyable phono-radio combination.

Ask your Distributor for a copy of the SP-1005 Parts List Flier for 45-rpm players.

NEW DIRECTORY LISTS RCA TV COMPONENTS

NOW—at your fingertips—a new RCA Components Directory for TV Receivers which quickly points up the major component replacements in 214 television receivers of 38 manufacturers. It directs you to the proper RCA part you need for a first-line servicing job. Get your copy of the RCA TV Components Directory, SP-1006, from your local RCA Distributor.

RCA ANNOUNCES RADIO REPAIR TUNE-UP CAMPAIGN



A highlight of the big RCA Tune-Up Campaign, this attractive set of posters will lend plenty of eye-appeal to service-dealers' store windows and counters. It's one of the ways this well-planned business-building program will help increase sales and service.

NEW PROMOTIONAL PROGRAM BUILDS SALES—SERVICE

With an estimated 10 million radio receivers needing repairs now in homes all over the country, the RCA Tube Department has prepared a "Radio-Repair Tune-Up" merchandising campaign for use by radio service dealers. The new RCA campaign is aimed directly at the consumer and strongly slanted to emphasize that, for relatively slight cost, the average noisy or inoperative radio can be restored to first-class condition.

Purpose of the campaign is to stimulate new business for the radio service dealer by overcoming the average consumer's feeling that radio repairs may be too expensive. In addition the campaign provides the dealer with the ready-made means to merchandise and price his services effectively and professionally.

THE RCA RADIO REPAIR TUNE-UP SPECIAL offers a down-to-earth, bread-and-butter plan, through which servicemen and

(Continued on Page 5, Col. 3)

PRESTIGE AND ADVERTISING PAY BIG DIVIDENDS FOR SERVICEMAN

Read Carefully—It's Proof Positive of the Powers of Advertising and Prestige-Building

From time to time RCA RADIO SERVICE NEWS has emphasized to dealers and servicemen the prestige-value of using and selling products and equipment made by leading electronic manufacturers. We have also often urged the use of good advertising and promotion as business builders. To prove both points again, here's another true story:

The scene is set in a small town in upstate New York—Spencerport, population 1340 by the 1940 census, located about 20 miles west of Rochester. Here we find Harold Wright operating his radio and appliance, sales and service store.

Look back in the March-April issue of RCA RADIO SERVICE NEWS and you'll find a picture of Harold Wright with his brand new RCA Test Equipment rack which he bought from Masline Radio and Electronics in Rochester.

After setting up the rack and test instruments, Mr. Wright placed an advertisement in the local "Community Advertiser," circulation 3000, showing and describing his new

equipment. A follow-up ad in the next week's issue (shown in actual size on page 7) further explained the merits of the new set-up and told how customers would benefit through the installation. Business began to climb for Wright's Appliance Co. Not a seasonal rise, but a meteoric one, for in not too many weeks, Harold Wright had to employ an additional serviceman.

Here's a true case history where not only advertising, but prestige gained through quality equipment, paid big dividends. The following letter from Harold Wright is quoted in full and gives his version of the story.

(Continued on page 7, column 1)

"GOTTA LITE?"



Do you have one of the new RCA Key-Chain Flashlights? They're really neat—a key chain plus a small flashlight, just right for finding that dark keyhole or searching into the dark corners of a radio or TV receiver. The Key-Chain Flashlight is attractively and colorfully finished in durable enamel. See your RCA Battery Distributor today—get your RCA Key-Chain Light while he has a supply.

THEORY AND APPLICATION OF ELECTRONIC METERS

By R. G. Middleton, RCA Commercial Engineering

Until the RCA VoltOhmyst* appeared on the market, radio servicemen used simple non-electronic volt-ohm-milliammeters. With the advent of pentode amplifiers, superheterodyne receivers, and automatic-volume-control circuits, these early instruments were no longer adequate and wide-awake servicemen, therefore, found the use of electronic meters necessary. FM and television, in turn, present additional measuring requirements which further emphasize the usefulness of electronic meters.

Technicians have known for some time that accurate measurements of plate and screen voltages in resistance-coupled amplifiers cannot be made with non-electronic voltmeters because such meters may have an input resistance as low as 1000-ohms per volt, and seldom more than 20,000 ohms per volt. When such meters are used to "measure" the voltage drop across a load resistance of 250,000 ohms, for example, the input resistance of the meter may be as low as, or even less than, the load resistance. As a result, the accuracy of measurement of such instruments is poor.

Non-electronic meters introduce another type of circuit disturbance when they are used to measure the dc grid bias developed across the grid leak of the local oscillator in a superheterodyne receiver. The presence of dc bias in such circuits depends upon the presence of rf voltage at the grid of the tube. Because the test lead of a simple voltmeter places high capacitance in shunt with the circuit under test, the rf is drained away through the test lead, the oscillator "goes dead", and, as a result, no dc bias is indicated by the instrument.

Modern electronic meters are designed to avoid these difficulties. The input resistance of a typical VTVM, illustrated in Fig. 1, is 10 megohms on all ranges. Since this rating is very high as compared with the value of usual plate load resistance or screen-dropping resistors, this instrument will measure the drop in plate or screen voltage with good accuracy.

*Reg. Trade Mark, U. S. Pat. Off.



Figure 1. The RCA 195A VoltOhmyst* Electronic Voltmeter is a valuable tool for any type of electronic servicing.

For measurement of oscillator grid bias, the electronic instrument is designed with a portion of the dc attenuator in the dc probe. A 1-megohm resistor, termed an isolating resistor, is placed between the probe tip and the coaxial test lead to the instrument. This resistor minimizes the effective input capacitance of the dc probe and blocks passage of rf energy.

The high input resistance of the electronic voltmeter is also essential for measuring of avc voltages. Such voltages are developed by high-resistance sources and are conducted to the grids of the controlled tubes through time-delay networks which may have a resistance of one or two megohms. Unless the instrument has sufficiently high input resistance to avoid disturbance of the avc circuit, indicated values will be seriously in error. An electronic voltmeter with an input resistance of 10-megohms permits the technician to measure avc voltages with considerable accuracy.

FM receivers present measurement problems which are unknown in the AM field. Discriminator circuits develop either a positive or a negative output voltage depending upon the value of the carrier frequency with respect to the center frequency. The output of a discriminator is zero at the center frequency. A discriminator circuit, therefore, must be adjusted with a dc voltmeter which indicates both positive and negative values. This requirement is met in the modern electronic meter by provision of zero-center indication. The pointer of the instrument is shifted to a "0—+" center-scale position, and voltages of either polarity can then be measured. For example, if the 10-volt range is used, "zero-center" is located at "5" on the scale. An input voltage of 2+ volts causes the pointer to deflect to "7", or, an input voltage of -2 volts will cause the pointer to deflect to "3".

This zero-center feature is useful in many other applications. For example, a leaky blocking capacitor causes the grid of the associated tube to have a positive bias instead of a negative bias. A quick check for a leaky blocking capacitor can be made by touching the dc probe of the VTVM to the grid terminal. A positive indication will indicate either a leaky blocking capacitor or a gassy tube.

(Continued on Page 6, Col. 3)

NOVEL PACKAGE FOR RCA VS022 FARM PACK



Here is another example of the outstanding merchandising and promotional support that backs up the sale of RCA Batteries. It's the new RCA-VS022 Farm Pack carton, in the form of a sturdy, colorful toy truck, which is easy for children to assemble. It offers dealers an unusual opportunity to build sales volume and RCA brand loyalty.

RCA FARM PACK CONTAINER ASSEMBLES INTO TOY TRUCK

A new RCA-VS022 Farm Pack carton, in the form of a sturdy, colorful toy truck, has been announced to RCA Battery Distributors and Dealers. Field-tested in Southeastern states, the new VS022 Toy Truck won outstanding consumer acceptance almost overnight. Dealers report widespread enthusiasm for the new package.

The new carton is easy for children to assemble. Directions for converting the package into a realistic truck are on an instruction sheet inside the carton.

To support the merchandising of the new carton, RCA has launched an extensive advertising, publicity, and promotional program.

Your distributor can supply samples of the Toy Truck together with samples of the promotional pieces for your use. Toy truck postcards for mailing to farm pack users, form No. 3F320, are priced at only \$1.00 per hundred; newspaper ad mats, form No. 3F321, are available free of

charge; and Toy Truck display samples, form No. 3F313, are priced at 15 cents each.

The new Toy Truck offers the dealer-serviceman an unusual opportunity to build lasting sales loyalty for RCA farm packs. Here is another example of the outstanding merchandising and promotional support behind RCA Batteries—the Radio Battery for the Radio Trade. See your RCA Battery Distributor—order your supply of promotion material plus an adequate inventory of RCA VS022's in the Toy Truck carton.

RCA FLASHLIGHTS FOR ADDED SALES

Display a card of RCA's attractive penlights, type LU-020, or a display carton of standard-size two-cell flashlights, type LU-010 or RT-22R. The standard-size flashlights are also available in individual cartons. You'll profit by many tie-in sales when displaying these attractive, serviceable flashlights. Everyone can use a flashlight—at home or in the car.

Ask your RCA distributor for a flier describing these three RCA lights—place your order with him for extra profit sales.

WANTED!

RADIO SERVICE NEWS wants pictures of service shops equipped with RCA's 3-piece or 6-piece matched test equipment rack. If your service department boasts either of these sets, drag out the camera and take a couple of shots of the layout. Send a clear glossy print, any size, to Editor

RADIO SERVICE NEWS
Tube Department
Radio Corp. of America
Harrison, N. J.

Sorry, no pictures can be returned but if your photo is published you'll receive a token of our appreciation.

TELEVISION SERVICE

By John R. Meagher

Television Specialist, RCA Renewal Sales

PART VII—Vertical Deflection Troubles

It may be helpful at this time to review the guiding principle behind this series of articles. This principle was outlined in the first issue, from which we quote:

"When something goes wrong in a television receiver, it generally shows up as a definite symptom in the picture. On no other type of electronic equipment are the troubles and symptoms so clearly displayed before our eyes. If we learn to recognize these visible symptoms, we can quickly localize the trouble to a particular portion of the set. For those who hope to become expert in television service, it will pay to study, observe, and learn how to analyze symptoms in the television picture . . . in this series of articles we will concentrate on diagnosing and localizing troubles by analyzing their effects on the picture."

We began this series of articles by showing how the vertical and horizontal wedges, which are incorporated in virtually every variety of TV test pattern, can be used to determine the frequency and phase response of the receiver. We then showed, by means of actual photographs, how typical troubles in the video amplifier affect the picture, how incorrect rf-if alignment affects the picture, how troubles in horizontal deflection affect the picture, and now in this issue, how troubles in vertical deflection affect the picture.

We do not expect the reader to be able to look at a faulty picture and say, "That must be R192, or C287½". We will feel that we have accomplished our aim when the reader can look at the picture and decide definitely that the fault lies in one particular section of the receiver. Sectionalizing, or localizing of the trouble is 90% of the job, because any one section of a TV receiver is relatively simple, consisting of only a few tubes and a handful of components. Once the fault has been accurately localized to one particular section of the receiver, the rest of the job is relatively simple and straightforward. The tubes can be checked by substituting new ones. The components and circuit voltages can be checked with a VoltOhmyst.* The signal can be traced through the particular section with an oscilloscope, or "signal injection" may be used as outlined in this article.

The author has seen actual cases where much time was wasted by orienting the antenna and even installing new antennas in an effort to eliminate multiple pictures and "ghosts" that were due in one case to the horizontal oscillator being off frequency, and in several other cases, to incorrect rf-if alignment. These instances emphasize the need for accurate analysis and localization of troubles.

By reviewing the pictures that we have published thus far, the observant reader will note the following important facts as an aid in sectionalizing troubles:

1. Pronounced streaking or smearing is due to troubles in the video amplifier section.
2. Poor definition is generally due to incorrect alignment of the rf-if sections.
3. Foldover on the left- or right-hand sides of the raster, or bright vertical bars, are due to troubles in the horizontal deflection coils.
4. Foldover on the top or bottom is due to troubles in the vertical deflection section.
5. Keystoning on a direct-view electro-magnetically deflected kinescope is due to open or short circuits in the deflection coils.

The author earnestly recommends that the reader obtain a copy of the RCA "Pict-O-Guide" volume 1. This book, prepared by the author, contains photographs of typical troubles in various sections of a TV receiver, plus a written outline of the troubles generally found in each section. The photographs are printed on high-gloss cards bound in an attractive and rugged pocket-size ring binder. The Pict-O-Guide is available only through RCA, RCA Victor or Cunningham distributors without extra charge, but with the purchase of RCA, RCA Victor or Cunningham tubes. Other Pict-O-Guide volumes are planned; the entire series should prove extremely valuable in diagnosing television troubles.

*Reg. Trade Mark, U. S. Pat. Off.

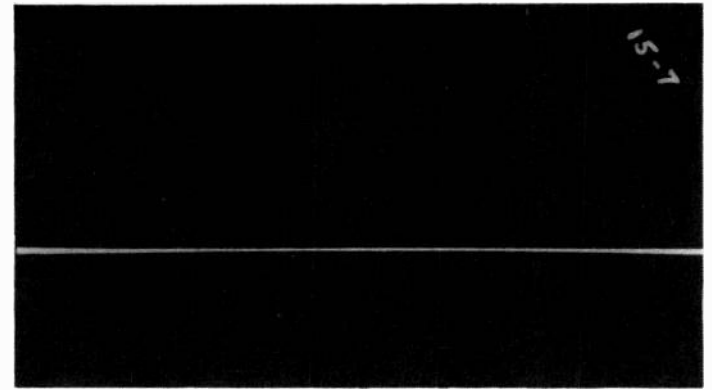


Fig. 2. Absence of vertical deflection. All of the horizontal scanning lines (approximately 500) are compressed into a single bright horizontal line. This photograph was made with a "dead" vertical output tube. The same effect is produced by failure of the vertical oscillator, by an open coupling capacitor between the vertical oscillator and the vertical output tubes, by an open winding in the vertical output transformer, or by an open circuit in both halves of the vertical deflection coil.

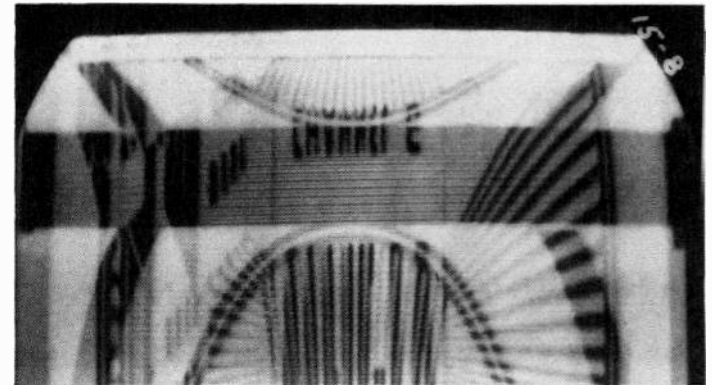


Fig. 3. When there is no vertical deflection, a quick check on the vertical output section can be made by introducing 60-cycle ac into the grid of the vertical output tube. When this picture was made the coupling capacitor between the vertical oscillator and the vertical output tubes was opened, and 60-cycle voltage was introduced into the grid of the output tube by placing a finger on the grid. The hum voltage picked up by the body is usually sufficient to produce some vertical deflection as shown above. Note in this picture that the test pattern appears to be wrapped around a cylinder, due to the sine-wave deflection. This simple check shows that the vertical output circuit, including the tube, output transformer, and vertical deflection coils, are in operating condition, thereby indicating that the trouble is ahead of the vertical output tube. As mentioned previously, the fault in this case was an open coupling capacitor between the vertical oscillator and output tubes. This system of "signal injection" to find troubles quickly in the vertical deflection circuit can be extended and improved by using a good audio oscillator, such as the RCA WA-544 to provide a 60-cycle sine-wave signal of adjustable amplitude. First feed the audio oscillator directly across the vertical deflection coils, then across the primary of the vertical output transformer, then into the grid circuit of the vertical output tube, and finally into the output circuit of the vertical oscillator. Absence of vertical deflection on the kinescope at any one of these test points will reveal the location of the trouble.

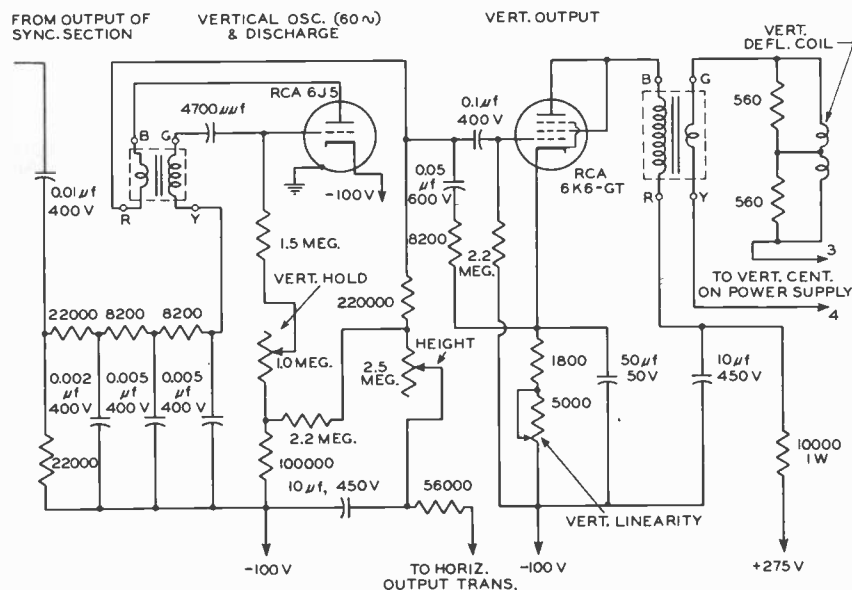


Fig. 1. Diagram of vertical oscillator and vertical deflection section of a typical TV receiver.



Fig. 4. When the raster or test pattern on a directly viewed kinescope has a trapezoidal or keystone shape, the trouble is usually due to a short circuit or open circuit in the deflection coils. In this photograph, one half of the vertical deflection coil is short circuited.



Fig. 5. Same effect as in Fig. 4, but the other half of the vertical deflection coil is shorted, causing keystone in the opposite direction.

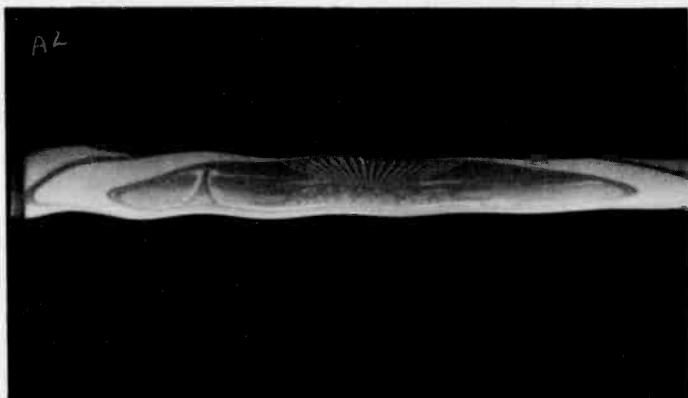


Fig. 6. Keystone due to an open circuit in one half of the vertical deflection coil.



Fig. 7. Keystone produced by a short circuit across one half of the horizontal deflection coils. This photograph is included in this issue so the reader may compare it with Figures 4, 5, and 6.



Fig. 8. Damped ripple (ripple of decreasing amplitude) on left half of each horizontal scanning line, produced by open resistors across both sections of the vertical deflecting coil. This damped oscillation occurs in the horizontal deflecting circuit and it is coupled into the vertical deflecting circuit. The resistors across the vertical deflection coils prevent the ripple from becoming evident.

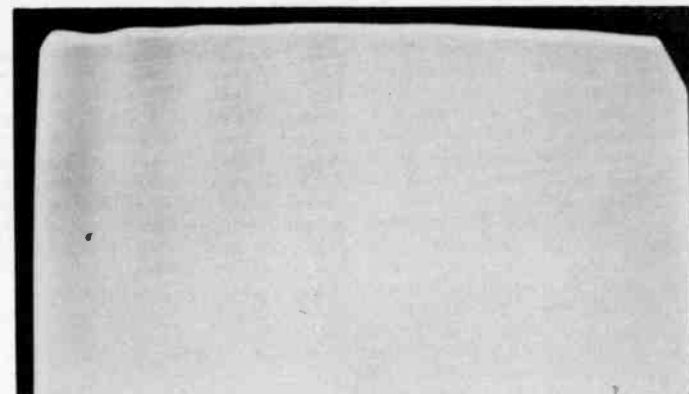


Fig. 9. In addition to the ripple shown in Fig. 7, faint dark vertical bars are produced on the left-hand side of the raster when both of the resistors across the vertical deflecting coils are opened. These bars show up more clearly on the raster alone in this photograph than on the test pattern of Fig. 8.

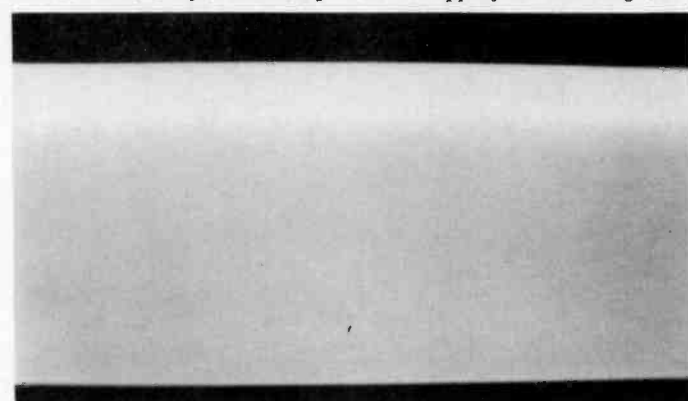


Fig. 10. Foldover or brightness at top of raster produced by heater-cathode leakage in the vertical output tube.



Fig. 11. Insufficient height and poor vertical linearity may be due to incorrect value of the vertical discharge capacitor (0.05 uf), or to open electrolytic capacitors in the cathode and plate circuits of the vertical output tube.

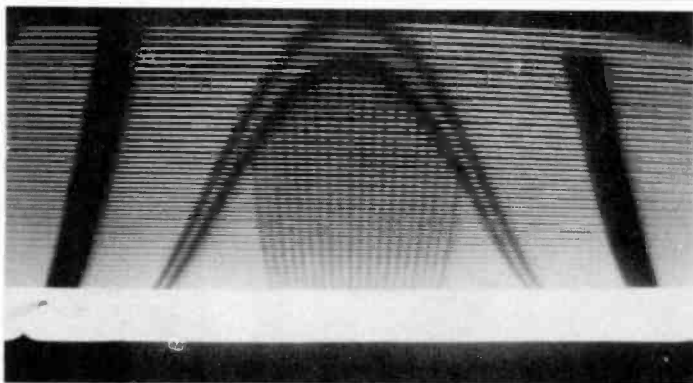
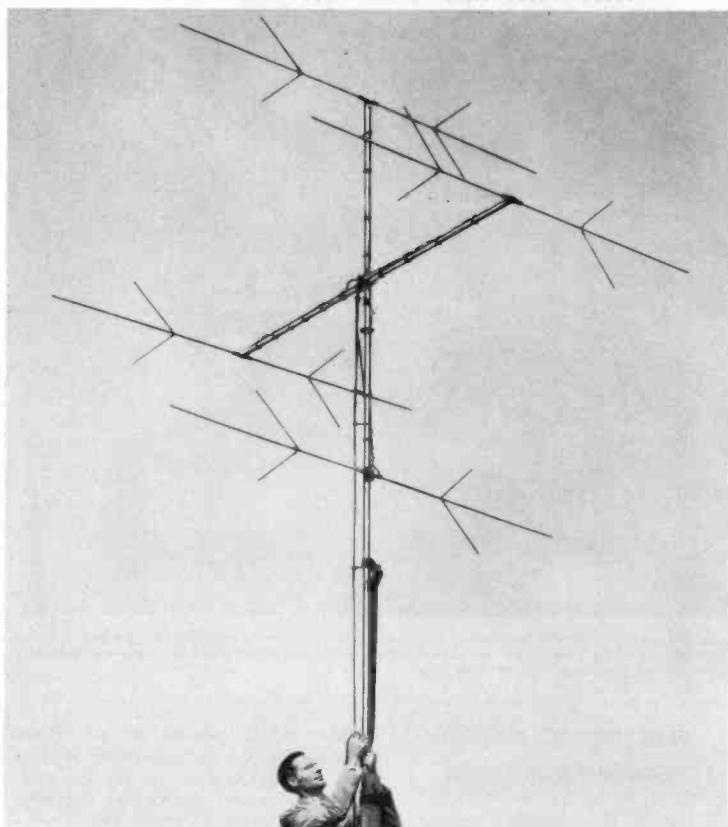


Fig. 12. Foldover at bottom produced by leakage across the coupling capacitor between the vertical oscillator and the vertical output tubes, or by a low value grid resistor in the vertical output tube.

When this photograph was made the vertical linearity control was adjusted to make the horizontal scanning line structure clearly evident. Note that each white horizontal scanning line becomes thinner to produce the effect of black on the inner circles and on the lines of the vertical wedge. It may also be observed in this photograph that there is some tendency toward "pairing" of the interlaced sets of lines. That is, the 2nd and 3rd lines are closer together than the 3rd and 4th, etc.

THE RCA REVERSIBLE-BEAM ANTENNA



The RCA-212A1 Reversible-Beam TV Antenna Array. The new antenna is engineered specifically for use in fringe television areas located between stations transmitting from opposite directions and occupying the same or adjacent channels. An outstanding feature of the new array are high-frequency "V" attachments which provide unidirectional reception on all channels. A high overall front-to-back ratio is achieved through the use of driven elements instead of parasitic elements. This design also makes possible the unique feature of lobe switching by means of a diplexer unit mounted at the receiver.

See this really new TV antenna, RCA-212A1, at your RCA Distributor's today. Suggested list price \$59.50, including dipole elements with "V" attachments; terminal board assembly; 3 five-foot sections 1 1/4 inch mast; cross arms; guy rings; standoffs; diplexer switching assembly; and installation instructions.

COMING ATTRACTIONS—In the November 1st issue of **RCA RADIO SERVICE NEWS** you'll find another important article for which you've been waiting—How to choose the right antenna for TV installations. The "RCA Television Antenna Selection Guide" outlines common situations encountered in TV areas and specifies the correct RCA Television Antenna for maximum performance. Be sure to get a copy of the November **RADIO SERVICE NEWS** from your local RCA, RCA Victor or Cunningham Distributor.

NOW — THE RCA PRICING KIT!



Show prices on your merchandise and make more sales! Use this Kit to price merchandise—in the window, on counters, and in the store. Learn how to get your Kit today . . . see your RCA Tube Distributor before the supply is exhausted.

TUNE-UP CAMPAIGN

(Continued from Page 1)

dealers can **PRICE THEIR SERVICE** and **ADVERTISE THEIR SERVICE** simply and effectively. Here are the important basic features of the campaign.

1. For a predetermined special price, established by the serviceman, set owners are offered the following 8-point check up service:
 - (1) Test all tubes.
 - (2) Re-align circuits.
 - (3) Solder loose connections.
 - (4) Check Volume and Tone Controls.
 - (5) Clean Chassis.
 - (6) Check Speaker.
 - (7) Touch up scratches.
 - (8) Polish Cabinet.

2. So that the serviceman can price and advertise his services—a colorful group of powerful promotional materials and sales aids have been specially prepared.

There is a systematic, three-piece direct-mail advertising campaign—featuring the service dealer's own special radio repair tune-up offer, and personalized with the service dealer's own price, his name, address, and phone number.

A beautiful RCA Tune-Up Display Kit consisting of 5 colorful selling pieces. (See front page illustration).

A colorful window streamer.

Ad mats to use in local newspapers during the campaign.

Tie-in spot radio announcements.

Secondly, so dealers can have an easy, attractive way to price window and counter merchandise—RCA is making available a *unique pricing kit of numbers, dollar signs, and bases*. Colorfully finished in attractive black, red, and yellow plastic, each kit consists of 6 bases and 6 sets of numbers. Identification slips are provided to note other information

such as Model No., Terms, Down Payment, Special Sale Price, etc.

Space won't permit printing all the important details of the new **RCA RADIO TUNE-UP SPECIAL CAMPAIGN** here. Your best bet is to see your RCA, RCA Victor, or Cunningham Distributor **NOW** and get the full story from him. Your Distributor has a colorful flier describing every detail of the **TUNE-UP SPECIAL CAMPAIGN**. Get your copy and plan to join this important merchandising program. You're sure to profit by the added sales and service it will help bring in.

RCA BATTERIES FOR RCA TEST EQUIPMENT

Owners of RCA Test Equipment will obtain more efficient service when the units are equipped with RCA Batteries. Correct batteries for various RCA instruments, pre- and post-war, are listed below for your convenience in ordering.

RCA Test Equipment	RCA Batteries Required
20A (163), 165	1-VS100 (3V)
TMV-97A, B, & C, 9595	1-VS102 (22 1/2 V) 1-VS130 (1 1/2-3-4 1/2 V)
308A	8-VS196 (1 1/2 V) 2-VS029 (7 1/2 V tapped) 3-VS112 (22 1/2-45 V)
312A	4-VS028 (4 1/2 V) 2-VS112 (22 1/2-45 V) 2-VS106 (1 1/2 V) 3-VS034 (1 1/2 V)
318A	1-VS112 (22 1/2-45 V) 1-VS106 (1 1/2 V)
WV65A	4-VS036 (1 1/2 V) 2-VS055 (45 V)
9819 (TMV-178A)	7-VS029 (7 1/2 V tapped) 2-VS001 (1 1/2 V) 2-VS106 (1 1/2 V)
165A, 195, 195A, 170-A	2-VS036 (1 1/2 V)
WV-75A, WV-95A	2-VS036 (1 1/2 V)
WV-81A	2-VS106 (1 1/2 V) 2-VS102 (22 1/2 V)

SAFETY-FIRST IMPORTANT IN HANDLING KINESCOPIES

Like numerous other mechanical and electrical devices, the television receiver presents certain safety considerations. While its high-vacuum kinescope, or picture tube, is safe when properly handled, it can also be potentially hazardous with careless treatment.

Recognizing this, the Radio Manufacturers Association has set up a set of simple rules governing the correct handling of kinescopes by servicemen, dealers, and others in the trade.

These are:

1. Don't expose picture tube until you are ready to use it.
2. Always wear goggles when handling a naked tube.
3. Keep people away at a safe distance when a picture tube is exposed.
4. Place the used tube in the carton which contained the new tube and take it away.
5. Always keep the picture tube in the protective container whenever possible. Always place an exposed tube on some sort of clean soft padding when necessary to set it down.
6. Don't leave any picture tubes lying around. There are two safe ways of disposing of used tubes:
 - a. Place the old tube in a shipping carton properly sealed and then drive a crowbar or similar instrument through the closed top of the container.
 - b. An alternative method in the disposing of more than one tube, is to use a metal ash can with a plunger operated through the closed top.
7. Don't use regular picture tubes for displaying purposes. Contact

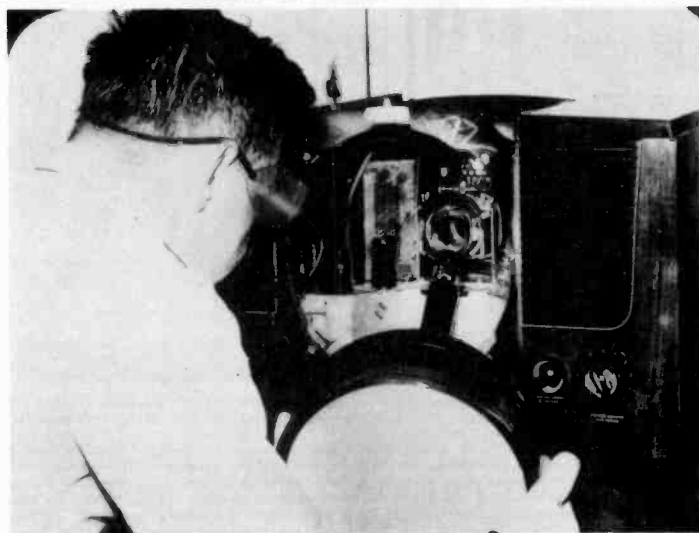
your supplier for special display tubes which are not evacuated.

It is also the responsibility of dealers and servicemen to explain to owners of television receivers the dangers inherent in improper kinescope handling. Emphasis should be given to the hazards which confront untrained persons who attempt to repair or otherwise tamper with television receivers.

Five basic rules will insure the safety of a set owner and his family:

1. Read carefully the manufacturer's manual of instructions for the set owner and carefully observe all precautions.
2. Don't tinker with the inside equipment of your set. In case of trouble, call a reputable serviceman.
3. Don't let members of the family hover around a serviceman when he works on your set, especially when a picture tube is exposed.
4. Ask the serviceman immediately to put the used picture tube in the protective container and to take it away when he leaves.
5. Don't try to dust or clean the interior of a television receiver. The serviceman should do this whenever he makes adjustments or repairs.

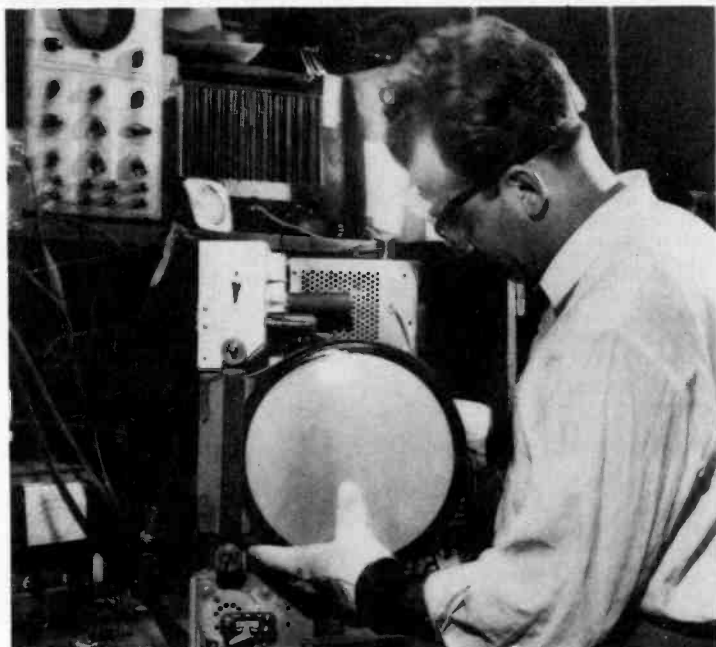
"Safety first" is important in handling kinescopes. Don't take chances!



2. Exercise extreme caution when removing or replacing kinescopes. If the tube sticks or fails to move smoothly from or into its socket, or deflecting yoke, investigate and remove the cause of the trouble. Do not force the tube.



3. Kinescopes which have been removed from receivers after serving their useful life span should be placed in a sealed carton and destroyed by driving a blunt instrument through the carton top.



1. Gloves and safety goggles are important safeguards when kinescopes are handled in the shop or home. By following this safety rule servicemen and dealers can avoid injury to themselves or others.

ELECTRONIC METERS

(Continued from Page 2)

Note: If the coupling capacitor only leaks slightly, this test will be ineffective. In such case the high-resistance range of the electronic meter is used to test the leakage resistance of the suspected capacitor. It should be noted that this test cannot be made with a low-resistance voltmeter, or conventional non-electronic ohmmeter.

The zero-center feature is also useful for checking the polarity and condition of bias cells. In fact, whenever the polarity of a circuit terminal or voltage source is in question, the zero-center setting should be used.

Television receivers have horizontal and vertical-deflection oscillators in addition to local rf oscil-

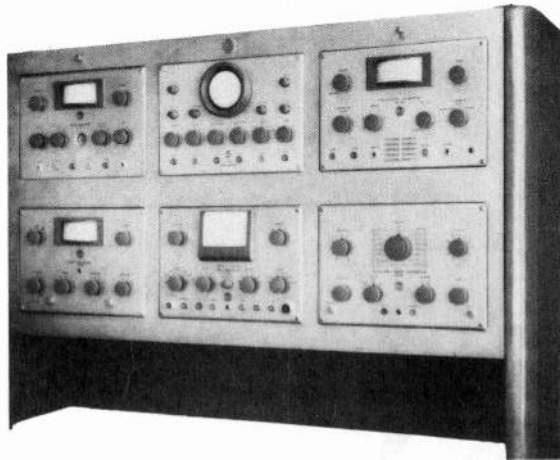
lators. Grid biases of all three oscillators can be measured with a suitable electronic meter. In addition, sync and deflection voltages can be traced through faulty circuits; in properly operating circuits, the tubes are usually overdriven to some extent, and a dc bias is therefore developed across the grid leaks.

In addition to high input resistance, circuit isolation, and zero-center indication, a well-designed electronic meter provides safety against meter-movement burnout. Technicians are well aware of the danger of accidental probe contact with a plate terminal, for example, when grid bias is measured. A good electronic meter provides inherent limiting action, which makes it impossible to burn out the meter movement.

(Continued on Page 7, Col. 2)

NOW!

In Our Modern Service Shop



NEW TV-FM-AM TEST EQUIPMENT

Last week we told you what this panel means to us— this week we will tell you what it means to you.

It enables us to service your set in less time, and when we are finished with it, it is balanced exactly as the engineer who designed it, meant it to be.

It means more stations, better tone quality, better selectivity.

Come in and see for yourself. Bring along that "slightly ailing" radio — we will show you what we mean.

Wright Appliance Co.
Spencerport, New York

Harold Wright's simple, straight-from-the-shoulder ad, second of the two he ran, is reproduced here in actual size.

MR. WRIGHT'S LETTER

(Continued from page 1)

"To Whom It May Concern"

Prior to the purchase of my RCA Radio-Television Test Panel I had been able to do all of my own radio service. Shortly after I bought it I found that my service had increased to the extent that it was necessary for me to hire a man. Now I am contemplating hiring another man.

I feel that the increase in service business is a direct result of the prestige that the panel has given our shop, and the fine service that we have been able to render our customers.

By showing prospective customers how well we are equipped to handle service we have been able to substantially increase our sales of radio and television.

(S) Harold F. Wright"

You too can cash in on the same plan as that of Wright's Appliance Company. See your RCA Distributor today and arrange to equip your shop with the finest in TV, FM and AM servicing instruments.

ELECTRONIC METERS

(Continued from Page 6)

These features can be understood from inspection of the circuit diagram shown in Fig. 2. The isolating resistor in the shielded dc probe is shown at R1. Resistors R2 through R7 form a step attenuator which permits definite fractions of input voltages to be applied to the grid of T1. Input voltages up to 1000 volts can be accommodated.

Input voltages are applied to the grid of T1 through a resistor R8. This resistor which has a value of several megohms prevents T1 from drawing grid current in case excessive input voltages are accidentally

applied. R17 operates in a similar manner to prevent T2 from drawing grid current. These resistors, in combination with other circuit design factors, prevent meter burnout in case of accidental overload.

Note: Although the grid of T2 cannot be driven positive in the simplified circuit of Fig. 2, the actual meter includes switching facilities for application of input voltages directly to the grid of T2.

Capacitors C1 and C2 prevent rf voltages from developing between the grid and cathode of either T1 or T2; such voltages, if excessive, can impair the accuracy of measurement and may find their way into the instrument when the probe is used in a high-voltage rf circuit.

The bridge circuit is very interesting. T1 is coupled to T2 through the common cathode resistor R11; when the grid-to-cathode potential of T1 goes positive, more current passes through R11 and the grid-to-cathode potential of T2 is caused to go negative. Resistors R9 and R10 help to equalize the characteristics of tubes T1 and T2.

Resistors R12 and R13 form a voltage divider which biases the grids of T1 and T2 to provide proper tube operations.

Because the grid of T2 goes negative when the grid of T1 goes positive, the plate voltage of T1 decreases when the plate voltage of T2 increases. This voltage difference is indicated by meter M1, which is calibrated to read directly in terms of input volts.

R15 and R16 are plate-load resistors. R14 is a zero-set control which enables the operator to balance the bridge circuit so that the meter reads exactly zero when no input voltage is applied.

It might be considered that T2 could be replaced by a simple resistor to make possible a more economical instrument; however, T2 serves an important function in that it enables the bridge to be balanced for grid currents as well as plate currents. In sensitive instruments such as the VoltOhmyst, the minute grid currents are balanced out to prevent errors of indication. T2 also permits the bridge circuit to remain

in balance under conditions of line-voltage variation.

Thus, the VoltOhmyst circuit is essentially an electronic bridge in which T1 and T2 are one pair of arms and R15 and R16 are the opposing pair of arms. This bridge circuit is a modernized electronic version of the classical Wheatstone bridge used in every laboratory.

The resistance-measuring circuits of the VoltOhmyst comprise the input network of a multimeter, plus the electronic bridge. The meter, therefore, is protected against accidental overloads on the resistance ranges, as well as on the dc-voltage ranges.

Similar protection against meter-movement burn-out is obtained on the ac-voltage ranges. The ac voltage to be measured is first rectified in a balanced-diode circuit which provides accurate response even at very low input levels. The rectified output from the balanced-diode circuit is applied to the electronic bridge.

The instrument illustrated in Fig. 1 is also provided with a scale which allows decibel level and gain measurements to be made in audio-frequency circuits. It is well known that decibel values are closely related to ear response, while voltage values are not. For use in rural areas, airplanes, and boats, a battery operated VoltOhmyst is available.

In the television field, models of the VoltOhmyst are available which permit the technician to make peak-to-peak measurements of rf voltages or recurrent pulses at frequencies up to 250 Mc. A specially designed diode probe is used for this purpose. A crystal probe is also available at lower cost for peak measurements of rf voltages at frequencies up to 100 Mc.

Some models of VoltOhmysts permit measurements of dc current from a few microamperes to 10 amperes, and measurements of capacitance from 4 uuf to 1000 uf. With a suitable high-voltage probe, any VoltOhmyst can be used to measure dc voltages up to 30 Kv. The great versatility of the electronic meter makes it the basic test instrument of television technicians.

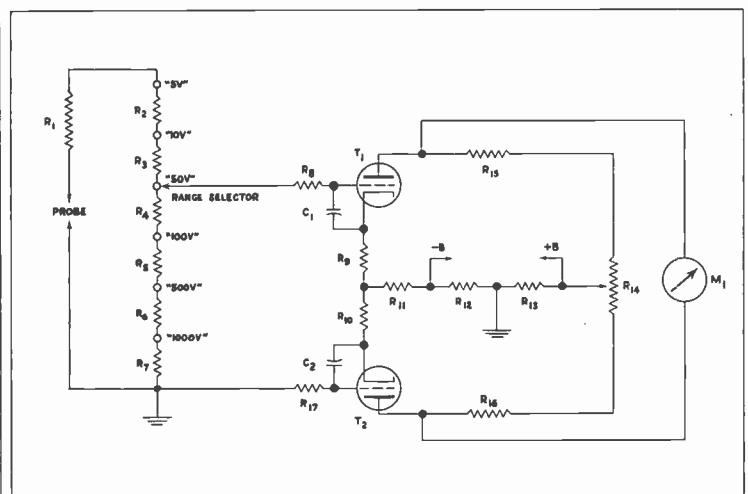


Fig. 2. Simplified drawing of the basic dc measuring circuit used in the RCA VoltOhmyst.

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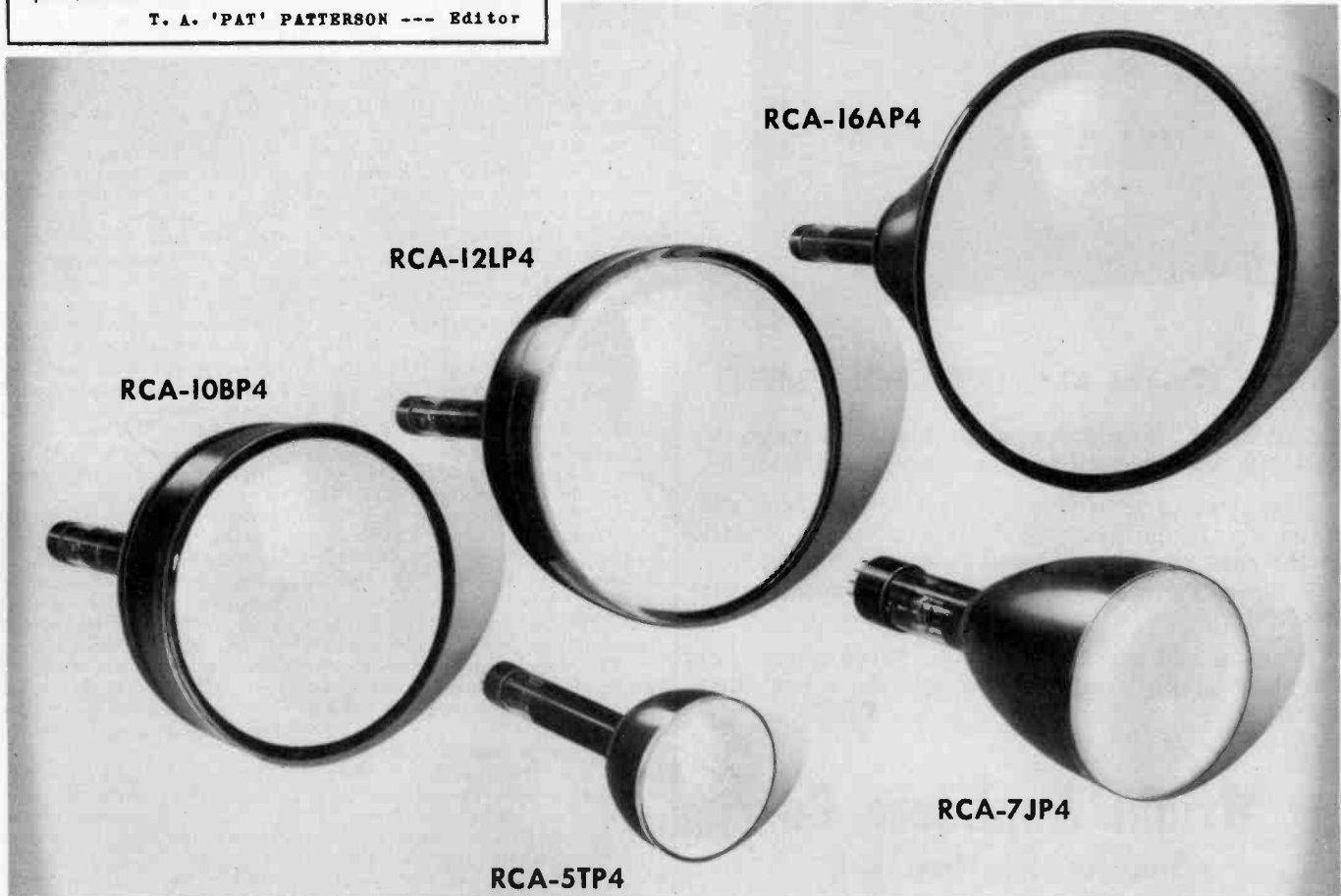
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203 ANN STREET
HARTFORD 3, CONN

RADIO SERVICE NEWS

RCA RADIO SERVICE NEWS is published by the RCA Tube Department in the interest of radio servicemen and dealers everywhere. It is distributed free of charge to members of the radio-service fraternity through the courtesy of RCA and its tube, battery, test equipment and parts distributors.

T. A. 'PAT' PATTERSON --- Editor

TO:



THE FOUNTAINHEAD OF MODERN TUBE DEVELOPMENT IS RCA

RCA knows how to make television picture tubes . . . the best your money can buy

RCA has all the popular type television picture tubes to meet your present and future renewal requirements. And you can get them from *one* dependable source . . . your RCA Tube Distributor.

Mass-produced under superior quality controls, RCA television kinescopes of all types are the best that money can buy. You can count on them to meet the critical requirements of television reception.

When you renew with an RCA kinescope, you're selling the brand that has top public preference. RCA kinescopes will help *your* business grow by leading customers to you as a dependable source for television and radio needs.

Get the full details on the leading line of television picture tubes and sales promotion material from your local RCA Tube Distributor today.



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ALWAYS KEEP IN TOUCH WITH YOUR RCA TUBE DISTRIBUTOR