



# RADIO SERVICE NEWS

VOLUME XVI, No. 3

RCA TUBE DEPARTMENT, HARRISON, NEW JERSEY

September-October, 1951

## GOLD RUSH ON, AS RCA OPENS "TREASURE CHEST" PROMOTION

### "GOLD" TREASURE TOKENS KEY TO PRIZE PACKAGE

If you ever needed more positive proof that RCA kinescopes mean "gold" in your pocket, here it is. Under the RCA "Treasure Chest" program you will receive, with every RCA kinescope you purchase, a "gold" coin, or "Treasure Token," as proof of your purchase. *Save these coins!* When you have collected 10 Treasure Tokens, present them to the RCA Tube Distributor from whom you purchased your 10 RCA kinescopes and receive, without cost, the complete RCA Treasure Chest of servicing aids.

These gold coins eliminate the need for complicated record keeping; you can determine at a glance how many RCA kinescopes you have purchased toward your RCA Treasure Chest. Ask your RCA Tube Distributor for your free Treasure Token key chain, on which you can string your Treasure Tokens.

The Treasure Chest is obtainable only by presenting 10 RCA Treasure Tokens to your RCA Tube Distributor.

You may collect as many Treasure Chests as you earn (one for each serviceman in your shop) by simply returning the gold coins to your RCA Tube Distributor before the deadline date. See your RCA Tube Distributor today and start collecting your "gold" Treasure Tokens at once.



Trade 10 of these "Treasure Tokens" for your giant RCA Treasure Chest of servicing aids. You get a Treasure Token with every RCA kinescope you purchase during this program.

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Service Dealers Trade 10 RCA "Treasure Tokens" for De Luxe Tube-and-Tool Carrying Case Filled with Valuable Servicing Aids



Russ Jimieson, of the Walker-Jimieson Company, RCA Tube Distributor in the Chicago area, is presented with one of the new custom built tube and tool carrying cases, full of special dealer service aids, offered by the RCA Tube Department in its current "Treasure Chest" promotion. Beaming approval is Max Branigan, Manager of RCA Renewal Receiving Tube Sales. Dealers and servicemen who purchase ten RCA kinescopes during the promotion will receive from RCA Tube Distributors seven valuable service aids packed in the handy tube and tool carrying case.

### COPY OF "TV SERVICING" OFFERED WITH PURCHASE OF TWO RCA KINESCOPIES

New Publication Contains a Guide to TV Tuner Alignment and Features John R. Meagher's Entire Series of Articles

As an extra bonus offer during the "Treasure Chest" program, RCA offers a new, 48-page booklet, "TV Servicing." In this publication, RCA has combined the entire series of famous articles by John R. Meagher, which originally appeared in "Radio Service News" under the heading "Television Service" and "Television Antennas and Transmission Lines." His recent articles entitled, "Horizontal Pulling" and a previously unpublished article on audible hum and buzz have also been included to increase the usefulness of this publication.



John R. Meagher

"Television Tuner Alignment," by Art Liebscher is a thorough, practical guide to tuner alignment. It will be particularly welcomed by those servicemen who have shied away from this phase of TV Servicing. You'll certainly want to add this book to your reference shelf. TV Servicing may be obtained, without charge, by purchasing two RCA kinescopes. An extra bonus copy is furnished with every RCA "Treasure Chest" of servicing aids. See your RCA Tube Distributor today.

The RCA Tube Department has introduced a dramatic "gold rush" promotion campaign, complete with treasure chests and "gold" coins. Heart of the promotion is an offer of "paydirt," in the form of an RCA "Treasure Chest" containing useful radio and television servicing aids. These aids are designed to help the serviceman do a better job, in less time, and to add that extra professional "touch" to his business.

Tagged the RCA "Treasure Chest," the campaign nets each dealer and serviceman who purchases ten RCA kinescopes of any type during the promotion a complete prize package of eight different service aids, including a lightweight, de luxe, luggage-type tube and tool carrying case.

In addition to the roomy, custom-built case, the prize package includes a roll-up tool kit containing a variety of standard and Phillips-type screw drivers, a water-resistant drop cloth, a new and complete book containing basic data on virtually every kinescope now on the market, a book on television servicing written by two well-known RCA specialists, TV program holders (intended as souvenirs for the serviceman's customers), a yearly tube movement and inventory guide, and a manual on receiving tubes for radio and television.

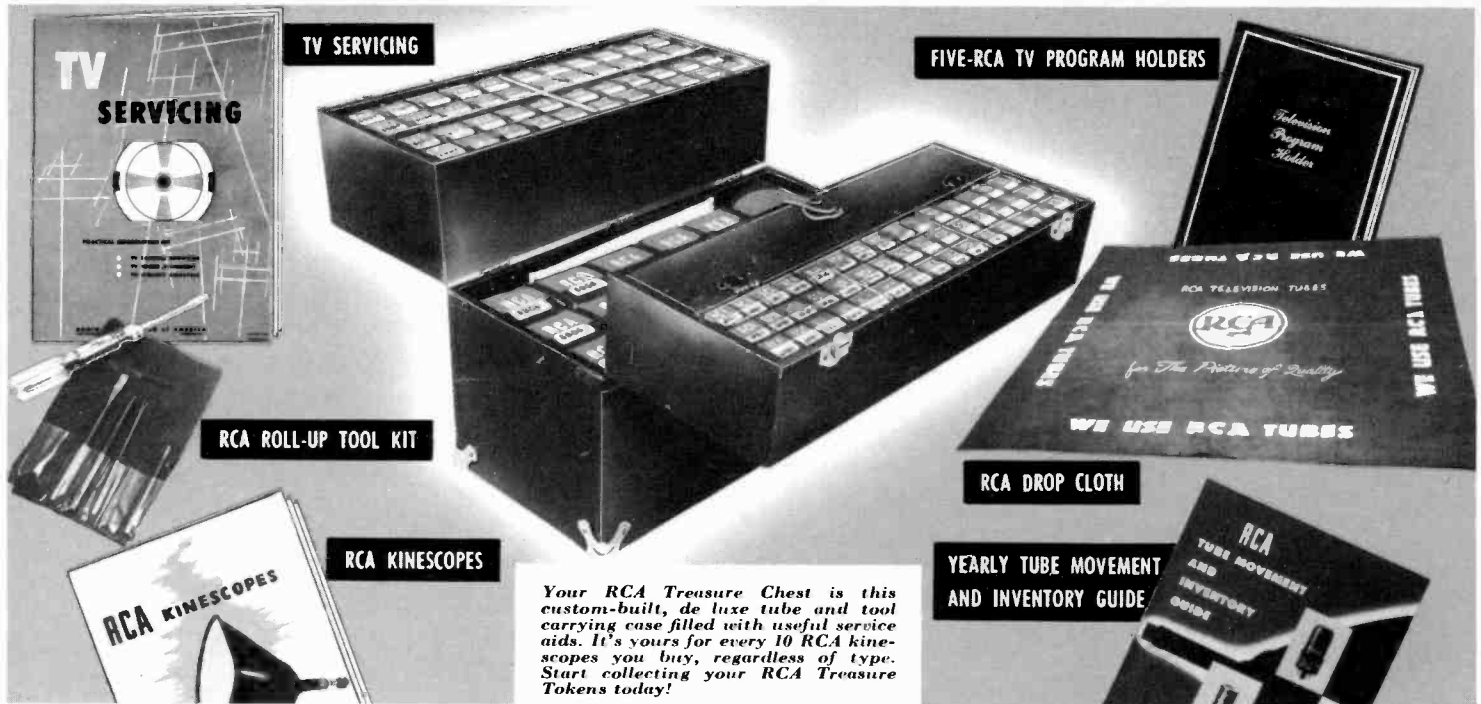
These seven service aids, packed  
(Continued on Page 2, Column 1)



"TV Servicing,"—a compilation of factual, easy-to-understand articles by John R. Meagher and Art Liebscher. Copies are available, without cost, with every purchase of two RCA kinescopes made during the Treasure Chest program.

Photolithographed in U. S. A.

## THESE VALUABLE SERVICE AIDS AVAILABLE WITH PURCHASE OF 10 RCA KINESCOPIES



Your RCA Treasure Chest is this custom-built, de luxe tube and tool carrying case filled with useful service aids. It's yours for every 10 RCA kinescopes you buy, regardless of type. Start collecting your RCA Treasure Tokens today!

### "TREASURE CHEST" PROMOTION (Continued from Page 1)

in the carrying case, can be obtained without cost, by purchasing 10 RCA kinescopes of any type before the program's expiration date.

During the Treasure Chest program, each service dealer will receive from his distributor, with each RCA kinescope purchased, a special "gold" RCA Treasure Token. When the dealer has collected ten of these coins, he need only return them to the distributor from whom he purchased the tubes to claim his Treasure Chest. Each distributor has been assigned an exclusive "gold mine" number which will appear on all coins furnished him for distribution to his dealers.

Here are details of all the promotion items included in the Treasure Chest program:

#### Tube-and-Tool Carrying Case

This handsome, ruggedly-constructed case was designed to accommodate a full selection of tubes most commonly used in television receivers.

It's a light-weight case, roomy yet not bulky, with a sturdy wood frame and durable leatherette covering. The case is fitted with metal braces and kickplates on each corner. It is designed to hold 45 miniature, 44 GT, and 15 larger-size tubes, totaling 104 tubes in all. All tubes are in full view when the case is opened. The case measures 16 by 14 by 7½ inches and has a large tool compartment.

The orderly arrangement of your tubes and tools in this new case will save precious minutes on each service call. At the same time, the case will add that extra professional touch to your activities. You'll be proud to carry this RCA Tube Carrying Case on all of your service

calls. It is available only as part of the RCA Treasure Chest merchandising package.

#### Drop Cloth

First impressions are lasting impressions. When you spread this attractive RCA Drop Cloth on the floor in front of your customers' sets, they cannot fail to be impressed—it's a magic carpet to "customer confidence."

Measuring 48 inches long, this bright red drop cloth protects your customers' floors and rugs, and implies that you are a neat, careful technician.

The RCA Drop Cloth is water repellent so that it may be used to protect the TV receiver chassis from the weather on the way to and from your shop. It folds neatly into the tube and tool carrying case, and is available only as part of the RCA Treasure Chest merchandising package.

#### Roll-Up Tool Kit

Here is a handy kit consisting of a ratchet-type screw driver handle and five screw driver blades. Both standard and Phillips-type blades of various sizes are furnished in a handy leatherette roll-up case that fits neatly into the tool compartment of the RCA Tube and Tool Carrying Case.

This kit contains all of the screw drivers you will require in everyday service work. The RCA Roll-Up Tool Kit, a valuable addition to your own set of tools, is available only as part of the RCA Treasure Chest of servicing aids.

#### "RCA Kinescopes"

Here is the very latest, most authoritative, most complete booklet on kinescopes available in the industry. It was prepared by the

RCA Commercial Engineering staff, which produces the most authoritative and widely used technical literature in the trade. This booklet furnishes you with all the information you need on virtually every kinescope now on the market—well over 100 types. It tells you what to do when converting from glass to metal, from round to rectangular, from small to large size. You'll find "RCA Kinescopes" to be one of the most valuable pieces of literature on your reference shelf. It is available now in the RCA Treasure Chest.

#### TV Program Holders

Have you ever looked for an attractive, useful gift item which you could leave each time you make a service call? Here's the ideal answer—a handsome, leatherette television program holder.

The RCA TV Program Holder is designed to hold the weekly television-radio program listings, or any of the popular television program guides. Five TV program holders are included within each RCA Treasure Chest. In addition, an order form is supplied so that you can order an additional supply. These program holders can be imprinted with your name, address, and phone number.

#### Yearly Tube Movement and Inventory Guide

Here is the new, improved RCA Tube Movement and Inventory Guide that helps to eliminate your inventory-order headaches. The new guide is designed for keeping a full year's record of your tube sales. It has space for every RCA receiving-tube type, and has ample space for newly added types.

With this 16-page guide, you can determine at-a-glance, the quantity of each tube type that you sold last month. With the aid of this guide, it is possible to conveniently compare

this month's tube sales with those of previous months. You can use this guide to simplify stock control and to determine the quantity of each tube type needed for a balanced inventory.

#### "TV Servicing"

"TV Servicing" is a compilation of articles by John R. Meagher which originally appeared in past issues of RCA RADIO SERVICE NEWS, together with new articles by the same author and an article on TV tuner alignment by Art Liebscher.

The articles in this booklet are written in an easy-to-understand style. This booklet will prove to be your most valuable reference on television servicing and troubleshooting.

A bonus copy may be obtained, without cost, by purchasing two RCA kinescopes on the Treasure Chest program. Get several copies, one for each technician in your TV service shop.

#### Plus

As an extra dividend, the 24-page bulletin "Receiving Tubes for AM, FM, and Television Broadcast" (Form 1275-E) is included in each Treasure Chest.

#### THIS OFFER IS LIMITED!

The valuable RCA Treasure Chest can be obtained only through the RCA Treasure Chest program, and from your RCA Tube Distributor. Redeem your "gold" coins immediately as this offer is limited. Coins presented after date of expiration will not be honored by your distributor. Coins are redeemable only by the distributor from whom they are obtained. Start saving your RCA Treasure Tokens today!

## TELEVISION SERVICE

By John R. Meagher

Television Specialist, RCA Renewal Sales

### Part XIII Microphonic Troubles

Wires, components, and tube elements in the receiver may be shaken or vibrated by sound waves from the speaker, or by sound vibrations that are transmitted through the cabinet and chassis as a result of the motion of the speaker cone.

Vibration of wires, components, or tube elements, with respect to each other or with respect to the chassis, produces slight variations in the capacitance and inductance of a circuit. Relative vibration of the elements inside a tube produces slight variations in gain also.

Minor variations of capacitance and inductance, due to a normal amount of mechanical vibration, have no noticeable effects in any circuit except the rf oscillator, in which even the slightest changes in circuit constants produce considerable variation in the frequency of the rf oscillator. Such variations in frequency, or frequency modulation, can result in an audible microphonic whistle.

Minor variations in gain, due to mechanical vibration of tube elements, have no noticeable effects except in the horizontal afc tube, where slight changes in gain can produce an appreciable amount of microphonic horizontal picture pulling.

The term "microphonic" is applied to these troubles because the electrical action is a result of mechanical vibration, as in a microphone.

#### Microphonic RF Oscillator

One of the most common types of microphonic trouble is a sustained

whistle (or howl, growl, or squeal) resulting from mechanical vibration in the rf-oscillator circuit. This trouble can be identified by the following symptoms:

1. The whistle is present only when a sound signal is being received. The signal may be from a TV, FM, or other station, with or without modulation.

2. The whistle is most likely to occur when the receiver is operated at moderate to high volume level. The whistle stops when the volume is reduced to a low level.

3. The trouble is most likely to occur on the high-band channels (7 to 13).

4. The whistle may cease during certain sound modulation, which breaks up the rhythm of the mechanical vibration.

5. The whistle may be stopped temporarily by tapping the cabinet, the chassis, or the rf-oscillator tube. The tapping disturbs the rhythm of the mechanical vibration.

6. The whistle can sometimes be stopped permanently or "semi-

permanently" by slightly moving or tilting the rf-oscillator tube in its socket.

7. The trouble does not occur in inter-carrier type receivers.

The complete cycle of operation of a microphonic trouble is as follows:

(a) Sound waves or transmitted vibrations from the speaker set up mechanical vibrations in one or more of the wires, components, or tube elements in the rf-oscillator circuit.

(b) This mechanical vibration produces slight variations in the capacitance and inductance of the oscillator circuit, which causes corresponding frequency variations, or frequency modulation, of the rf-oscillator signal.

(c) The frequency modulation of the rf-oscillator signal produces corresponding frequency modulation of the sound-if signal.

(d) The frequency modulation of the sound-if signal is detected in the sound discriminator, which produces audio-frequency output.

(e) The audio-frequency output

of the discriminator is amplified in the audio amplifier, and produces motion of the speaker cone.

(f) The motion of the speaker cone produces sound waves and mechanical vibrations that tend to increase the amplitude of vibration in the rf-oscillator circuit.

(g) The above action is repeated, with reinforcement on each cycle, until a stabilized condition is attained. The result is an audible whistle that may last indefinitely, or occur intermittently, as an annoying background to the station's sound.

When the rf-oscillator signal is frequency modulated, it produces the same amount of FM in the picture-if signal, as in the sound-if signal, but there is rarely any visible evidence of this modulation in the picture. The FM response of the picture-if amplifier and second detector is much less than the FM response of the sound-if amplifier and discriminator, due to the difference in the slope of the two response curves.

Inter-carrier receivers are not affected by a slight percentage of FM in the rf-oscillator signal. In inter-carrier receivers, the final sound-if signal of 4.5 Mc is formed by the difference-frequency beat between the sound-if and picture-if signals. Although these two signals are frequency modulated as a result of FM in the rf-oscillator, the two signals vary up and down together in frequency, and the difference between their frequencies remains con-

(Continued on Page 4, Col. 1)

## TV ANTENNA INSTALLATION TIPS

### PART 3

#### Instructions on the Safe Use of Ladders



When a ladder is placed against a building, at least four rungs should extend above the point of contact with the building.



Always face the ladder when ascending or descending, and always have one hand free—develop the safety habit.

Develop the safety habit. Equip your truck with 100 feet of safety rope. Use this rope whenever necessary to assure safe ladder work.

1. Always face the ladder when ascending or descending.

2. Always have one hand free

when ascending or descending.

3. Do not use a defective ladder under any circumstances.

4. Lash ladder carefully and securely before ascending.

5. Rubber soled shoes are recom-

mended for all ladder and roof operations.

Hook ladders are specifically designed for scaling purposes only, and they should be used accordingly.

If a chimney mount is to be used, and if there is any question as to

whether the standard strap is of sufficient length, measure the chimney after the hook ladder is put in place.

Always remember that the greatest single aid to safety is the use of good, old-fashioned common sense.

## TELEVISION SERVICE (Continued from Page 3)

stant at 4.5 Mc. Hence, FM in the rf-oscillator signal does not appear in the final sound-if signal of 4.5 Mc, and there is virtually no possibility of microphonic whistle due to normal mechanical vibration in the rf-oscillator circuit of inter-carrier receivers.

### Remedies For Microphonic RF Oscillator Troubles

1. Try several new tubes in the rf-oscillator circuit. When new oscillator tubes are tried, it is advisable to maintain the following conditions:

(a) Leave the chassis and speaker in the cabinet.

(b) Tune the receiver to the station for which the microphonic whistle has been most troublesome.

(c) Place the original tube shield and weight on each of the new tubes.

(d) Tune the receiver correctly, and set the volume at the level used by the customer, or slightly higher.

(e) Replace the back cover (or top) on the cabinet while each new tube is being checked.

The first and last precautions are necessary to maintain normal acoustic conditions inside the cabinet.

If it is found that a new tube corrects the trouble, it is necessary to check and readjust the oscillator frequencies.

If the use of new oscillator tubes proves unsuccessful, it may be assumed that the trouble is caused by vibration of one or more of the components or leads in the rf-oscillator circuit.

2. Try "floating" the speaker. If the microphonic whistle is caused by vibrations that are transmitted through the cabinet and chassis from the speaker (rather than by sound waves), it may be helpful to "float" the speaker on rubber grommets.

To avoid possible waste of time, it is advisable to make a preliminary check to determine whether floating of the speaker is actually helpful in the particular receiver: Remove the speaker mounting screws or nuts, and have an assistant hold the speaker in approximately its normal location, being careful that the frame of the speaker does not touch the cabinet or the mounting bolts. Check the receiver for microphonic action. If the whistle is diminished or stopped, it indicates that the speaker should be floated. Double check by pressing the speaker against the cabinet to make certain that the whistle recurs.

Use rubber grommets, with metal limit bushings and washers, of the type that are used to float the speaker in some receivers. The grommets require  $\frac{3}{8}$ -inch diameter mounting holes in the speaker frame.

If the microphonic whistle is caused almost entirely by sound waves from the speaker, the trouble can occasionally be reduced or eliminated by placing a sheet of soft wall-board between the speaker and the rf tuner.

3. Check the rf-oscillator circuit for vibrating components. A method for

locating vibrating components in the rf-oscillator circuit consists in damping out vibration by pressing lightly on each part with a suitable probe while the receiver is in operation, and while the microphonic whistle is present. When the probe is pressed on the microphonic component, the whistle will diminish or stop. More than one component may be involved.

To apply this method, remove the chassis from the cabinet and expose the rf-oscillator circuits by removing the shielding from the rf tuner. In turret-type tuners, remove all coil strips except the one that is in use (if removal of the strips is necessary to provide access to the rf-oscillator circuit).

Feed an rf signal into the receiver. Tune the receiver to the TV channel that has proved troublesome, or use a strong unmodulated signal from an accurate television signal generator, such as the RCA WR-39C.

A strong unmodulated signal provides the most rigorous check for microphonic action in the rf oscillator. Tune the generator to the rf sound-carrier frequency of the selected channel. Keep the generator away from the speaker, and, if necessary, mount the generator on a thick soft-rubber pad to avoid microphonic action in the generator.

Mount the speaker on a small baffle of wood or cardboard, and place it near the rf tuner. Advance the volume control until the microphonic whistle occurs. Do not increase the volume any more than is necessary to maintain the whistle.

Press the end of the probe (which should be a long, thin, low-loss plastic stick) against each resistor, capacitor, lead, coil, tuning adjustment, switch plate, fine-tuning cam, etc., in the rf-oscillator circuit. If the whistle is diminished or stopped by pressing the probe against one or more of these parts, it may be assumed that these parts are vibrating and are responsible for the microphonic action.

The acoustic and vibration conditions are altered considerably by removal of the chassis from the cabinet, and by removal of the shielding from the rf tuner; consequently, it may be impossible to produce the microphonic whistle, even with the speaker close to the rf-tuner, and with the volume control advanced. If the whistle cannot be produced, the microphonic parts can be located by lightly tapping each component with the probe. Tapping produces momentary vibration and frequency modulation, which results in a "pinging" sound from the speaker. The parts that are most susceptible to microphonic action produce the strongest pinging sound.

When the microphonic parts have been located, the next step is the reduction of the amount of vibration, a change in the frequency of the mechanical resonance, or a reduction of the amount of variation in capacitance and inductance that results from the vibration. These

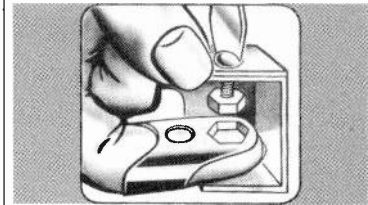
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## HANDY SET OF FINGERTIP WRENCHES AVAILABLE FROM RCA TUBE DISTRIBUTORS

Designed to aid the radio and television serviceman in working in "tight spots," the new RCA Fingertip Wrenches are practical time-saving tools which neatly solve the problem of placing and holding nuts in hard-to-reach corners of radio and television sets.

The wrenches are worn on the finger and are used to hold the nut as the bolt is tightened or loosened. Each set consists of five wrenches of the most commonly used sizes— $\frac{3}{16}$ ,  $\frac{1}{4}$ ,  $\frac{5}{16}$ ,  $\frac{11}{32}$ , and  $\frac{3}{8}$  inch. The wrenches are made of steel and are nickel-plated for rust resistance. They are adjustable for individual finger size.

Furnished in a colorful self-storing container, the new RCA Fingertip Wrench set fits conveniently into a corner of a tool kit. This unique set of finger-tip wrenches is available from local RCA Tube Distributors.



## NEW PACKAGE PROVIDES PROTECTION AND INSTANT IDENTIFICATION OF STYLUS

A distinctive new package is now being used for RCA Victor Styli. Each stylus is now individually packed in a container which resembles a miniature RCA Victor 45-rpm record.

Functional, as well as attractive, the new stylus package is especially designed to give super-protection to the delicate shock-sensitive stylus. A dust-proof, clear-acetate cover makes the stylus visible for easy identification.

The stock number of the stylus appears on the front and back of its

## VOLUME VI OF RCA VICTOR SERVICE DATA AVAILABLE

A sixth bound volume of the well-known RCA Victor Service Data series, which provides service and technical data on all 1950 models of RCA Victor television and radio receivers, and phonographs, is now available.

Designed as a permanent reference volume, this hard-cover book contains the information provided by the single service-data booklets issued during 1950 for individual RCA Victor instruments, including those in the famous "Million-Proof" line.

The contents include servicing information such as schematic and wiring diagrams, electrical and mechanical specifications, alignment and adjustment procedures, complete service parts lists, chassis layouts, and other useful and essential service data.

Volume VI contains 472 pages and is an addition to the five previously issued bound volumes, which provide service data on RCA Victor instruments from 1923 through 1949. The price of Volume VI is \$5.50.

All of the bound volumes, as well as single booklets on RCA Victor instruments for 1950 and 1951, are available to servicemen from RCA Distributors.



package. In addition, the stock number of the crystal cartridge with which the particular stylus may be used, appears on the back of each container.

## HOW TO GET YOUR COPY OF RADIO SERVICE NEWS

Many inquiries are received about where and how RCA Service News can be obtained, regularly. Here's the answer.

Radio Service News is published bi-monthly by the RCA Tube Department in the interest of radio servicemen and dealers everywhere. It is distributed to the trade through RCA Distributors, who supply it to

their customers either by mail, or over the counter. Ask your RCA Distributor to put you on his regular mailing list or, if he passes it out in the store, to save you a copy.

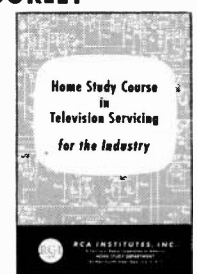
If you are now receiving a copy from your local RCA Distributor, don't forget to notify him when you change your address.

## WRITE IN FOR THIS BOOKLET

Complete details about RCA Institutes' new Home Study Course in television servicing are given in this eight-page booklet entitled, "Home Study Course in Television Servicing for the Industry." An informative article on the Home Study Course appeared in the April-May issue of RADIO SERVICE NEWS.

This booklet contains a complete description of the contents of each of the ten study units of the course as well as full details on group and individual enrollment rates.

Send for a free copy of this booklet to the RCA Institutes, Inc., Home Study Dept., 350 W. Fourth St., New York 14, N. Y.



# RADIO-PHONO-TV Tips \*

## PICTURE "SMEAR"

Smear is generally interpreted as an extension or washing out of white or black trailing edges of the right-hand edges of the picture elements so that the trailing edge is not sharply defined, but is "smeared out" toward the right side of the screen.

This type of smear may result from incorrect:

1. RF-unit response in the receiver.
2. IF-amplifier response in the receiver.
3. Over-all rf-if-amplifier response in the receiver.
4. High-frequency response of the video amplifier in the receiver.
5. High-frequency response in the transmitter.
6. High-frequency response due to relayed or cabled transmission.

The initial step in the elimination of smear is a check to make certain that the rf and if stages are cor-

rectly aligned. Particular care should be taken to have the 26.25-Mc, 25.50-Mc and 24.75-Mc markers at the proper locations on the over-all rf-if response curve.

Additional peaking of the high video frequencies can be obtained in the video amplifiers in the 16-in. models 6T53, -54, -64, -65, -71, -74, -75, -76, -84, -86, -87, and in the 19-in. models 9T57, -77, -79, -89 by:

1. Adding a 1500- $\mu$ f capacitor across R126 (cathode of first video amplifier).
2. Adding a 100- $\mu$ f capacitor from the junction of R126 and R224 to ground.
3. Changing L105 (grid circuit of first video amplifier) from 120  $\mu$ h to 500  $\mu$ h (Use Stock Number 75252).
4. Capacitors C190, C132, and C133 should be "dressed" away from each other to reduce coupling.

## CORONA INTERFERENCE

(Models 9T57, -77, -79, -89)

An interference pattern consisting of narrow vertical bars, at the left-

hand side of the raster, may be mistaken for Barkhausen oscillation. If the usual Barkhausen preventive methods, such as adjusting the drive, placing a magnet over the 6BG6, etc., are ineffective, this interference may be caused by internal corona, or arcing, within the 4.7- $\mu$ f capacitor (C198) located in the plate circuit of the horizontal-sweep output tube. If such a condition is encountered, the capacitor should be replaced.

## INCREASED SOUND AND PICTURE GAIN

(Models 6T53, -54, -64, -65, -71, -74, -75, -76, -84, -86, -87, & 9T57, -77, -79, -89)

The following changes, which have been incorporated in production, are suggested where necessary to provide additional sound and picture gain on very weak signals:

1. Change the 1st- and 2nd-picture if cathode resistors (R104 and R108 in the 12 $\frac{1}{2}$ -in. models, and R103 and R107 in the 16-in. and 19-in. models) from 120 ohms to 82 ohms. This provides additional gain in these stages.

2. Move the point of sound take-off (connection C on the trap of T103), up two turns on the coil. This provides additional 21-Mc sound voltage to the sound if amplifier.

3. After the above changes, accurately realign the sound- and picture-if amplifiers.

## AGC CONTROL SWITCH (Chassis KCS47T, -47AT, -48T, -49T, -49AT, & -60T)

The AGC switch used in these chassis is a four-contact, three-position rotary type. It is very similar to that used in the earlier production of the current-line receivers, the difference being that the new rotor is longer, and contacts terminal 4 when the switch is in the center (number 2) position. In addition, the leads to terminals 3 and 4 are reversed.

The correct setting for the AGC switch can be determined as follows:

1. POSITION #1 (CCW when viewed from rear). Maximum AGC voltage is used in this position. It is the correct position for strong signals.

2. POSITION #2 (Center). In this position, the rotor contacts terminals 1, 2, and 4 of the AGC switch. This reduces the AGC voltage and changes the time constant of the AGC system to allow quicker recovery of the AGC from any tendency to "setup" on noise. In addition, improved noise immunity results from the change in cathode resistance of the dc restorer. This position of the AGC switch should be used when receiving medium to weak signals.

3. POSITION #3 (CW). In this position, the AGC voltage is completely shorted out. The receiver operates at maximum gain and maximum noise immunity. This position should only be used for very weak signals.

\*Courtesy RCA Service Co., Inc.

## RCA FIELD ENGINEERS WORK SIDE-BY-SIDE WITH THE MILITARY

"Colonel's orders—radar to be hot and operating at 1500. We must be on the air for a test flight with Fighter Command."

Having thus accomplished his mission of presenting the Colonel's compliments to RCA Field Engineer George Wellesley, the Lieutenant continued on his way to lunch.

George and his crew of G.I.'s had been working on the new equipment since early that morning and were just now beginning to see daylight. This 346-tube radar giant was their baby to nurse, and they were staying with it until they found and corrected the cause of its illness. Too, the Colonel was a grand C.O., and they certainly were not going to let him down.

At 1325, their last test completed, and with "baby" checked out in perfect health, George finally headed for the Officers' Club.—"Hope they have a couple sandwiches left."

This is just one experience in the daily lives of the hundreds of RCA Government Service Field Engineers now stationed at military establishments all over the continental United States and in eighteen foreign countries. They are doing a man-size job working with the Army, Navy, and Air Force on all types of electronic equipment. They help in the supervision of the installation, the training of military personnel in the operation and maintenance of the equipment, the super-

vision of maintenance teams, and they generally assist the military in technical electronics problems.

From Headquarters Far East Air Forces, Major General L. C. Craigie writes, "We appreciate the fine job your engineers are doing in this theater and have no suggestions for improvement of the RCA service at this time."

RCA Field Engineers are highly qualified electronics technicians, capable of handling the many complex assignments given to them by the military. They are experienced technicians when they start their employment with the Government Service Division of RCA Service Company in Camden, New Jersey. They are recruited from the service industry, from colleges, and from among the thousands of men who have had previous experience as electronics technicians and officers in the military services.

Upon their arrival in Camden from all parts of the country, the "recruits" are given a short refresher course in basic electronics and radar fundamentals. Next, they are given practical experience and maintenance training on actual military equipment. When it has been determined to which of the various projects the men are to be assigned, they receive specialized training on the specific equipments that will be encountered on these jobs.

RCA Government Service Field

Engineers are well paid because they are in responsible positions. In addition to their base salary—which goes up 25 per cent on foreign assignments—they also receive a substantial daily living allowance. They have officer status for housing, messing, and other privileges at all overseas military establishments to which they are assigned.

Some of these men, looking at the attractive salary and living allowance, have taken overseas assignments with the thought of eventually returning to their homes with enough savings to start up that little business they dreamed about for so many years. They are gaining invaluable additional electronics knowledge and experience; they're putting in one of the toughest and yet most enjoyable working periods of their lives.

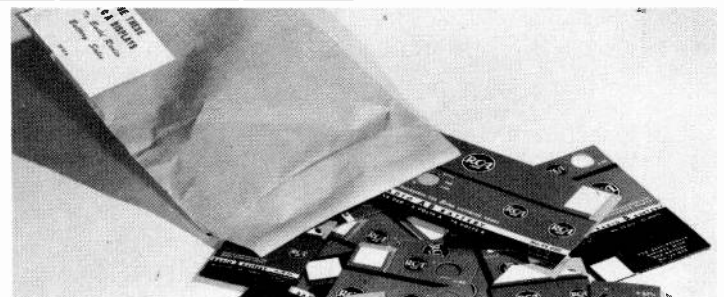
Through their technical ability these men have earned an enviable reputation for themselves with the military people. Their practical

thinking, always popular with the military, is reflected in the RCA Service Company slogan, "Fix it for sure, fix it for keeps."

## HANDY DISPLAY KIT CONTAINS DUMMY CARTONS OF RCA RADIO BATTERIES

The RCA Radio Battery Display Kit (Form 3F374) contains dummy cartons of four of the best-selling RCA batteries. With the aid of this handy 15-piece display kit, it is a simple operation to construct an attractive window or counter display.

Included in this display kit are dummy cartons of the VS013, VS016, VS019, and the VS050—all four batteries are popular portable-radio types. The kit, which may be obtained from your local RCA Distributor, is useful in building mass displays of batteries to help identify your store as the local headquarters for portable-radio batteries.



These dummy cartons of four popular portable-radio batteries can be periodically arranged to form effective display pieces.

## TELEVISION SERVICE

(Continued from Page 4)

corrective measures require care because even slight changes in the position of components and leads may shift the oscillator frequency by an excessive amount.

The following information may prove helpful:

(a) *Variations in capacitance and inductance are greatest when the vibrating component is close to the chassis, close to leads, or close to other components*, including brackets, shields, and insulating material. Microphonic action can be reduced by moving the vibrating component away from other parts and leads, or by shifting the other parts and leads away from the vibrating component.

(b) Vibration of resistors and capacitors can be damped to some extent by flowing an excess of solder on the leads, but this reduces the series inductance.

(c) Flat-shaped capacitors should be oriented edge-wise to the chassis, rather than parallel, in order to reduce the amount of variation in capacitance and inductance resulting from vibration of the capacitor.

(d) Loose turns on rf coils should be cemented sparingly with good coil dope. Loose tuning cores and loose core-adjustment screws should be cemented.

(e) Mechanical vibration of switch wafers can be damped by cementing rubber pads between adjacent wafers, as is done in early types of RCA rf tuners.

Rubber pads can sometimes be used to reduce vibration of the fibre cam-type, fine-tuning control. Any rubber that is used in the rf-tuner should be sulphur-free because sulphur fumes tarnish the silver plating on switches, and cause noisy contact. A simple check for the presence of sulphur can be made by leaving a sample of the rubber and a small piece of freshly-polished silverware in a closed box or paper bag. If the silver becomes tarnished, the rubber is not satisfactory for use in the rf tuner.

(f) Do not shift the position of components and leads any further than is necessary to stop the microphonic action. If any parts are shifted in position, it is necessary to check and readjust the oscillator frequencies. Check the frequencies again after the shielding is replaced on the rf tuner.

(g) The rf oscillator is coupled to the converter, and the converter is coupled to the rf amplifier: Excessive vibration of a component or lead in the converter or rf amplifier can produce appreciable frequency modulation of the rf-oscillator signal.

4. *Use of external speaker.* Microphonic whistle, and other microphonic effects are usually most troublesome in commercial installations, such as bars, restaurants, and public places, where the receiver is operated at high volume level. A simple remedy in such locations is to remove the speaker from the cabinet, and mount it on a suitable baffle some distance from the re-

(Continued on Column 4)

## RCA PLANT OPENS IN CINCINNATI



A new RCA electron-tube manufacturing plant, to be devoted exclusively to the production of miniature and subminiature tubes, was dedicated and formally opened on June 11.

The location of the new plant makes a major nearby source of miniature and subminiature electron tubes available to the many producers of military and industrial-electronic equipment with factories throughout the mid-west.

Frank M. Folsom, President of the Radio Corporation of America, made the principal address at formal ceremonies dedicating the plant to the memory of John G. Wilson, late Executive Vice President in charge of the RCA Victor Division.

Highlight of the ceremonies was the unveiling by Mr. Folsom of a permanent plaque to Mr. Wilson at the main entrance of the plant, marking the first time that RCA has named a manufacturing center in honor of an individual.

In his tribute to Mr. Wilson, Mr. Folsom declared that it was not alone for his business leadership and his vision and wisdom that the new plant was being given his name, but also for his great humanity—his warmth and humor, and his love for people.

"We believe this plant to be an appropriate memorial to Joe Wilson," Mr. Folsom added, "because the values exemplified in his personal and business life are inherent

in the philosophy that has guided the Radio Corporation of America in serving our nation and its people."

Walter A. Buck, Vice President and General Manager of the RCA Victor Division, stressed the fact that although tube requirements for a great variety of electronic weapons, computers, communications systems, and other military devices are a vital factor in the present production plans, RCA is building for the future and intends to "grow roots" in Cincinnati.

L. W. Teegarden, Vice President in charge of Technical Products, presided at the ceremonies and expressed the appreciation of the Tube Department for the cooperation given RCA by local business and civic leaders in establishing the plant.

The new installation has been completely modernized and is being equipped for exclusive production of miniature and subminiature tubes to meet the increasing demands of the National-Defense Program, as well as communications and industrial needs. One complete manufacturing unit is already in operation.

The new one-story plant occupies a tract of 17 acres and provides 136,000 square feet of floor space. New features of the plant include an air-conditioned cafeteria and infirmary, comfortable rest areas, modern kitchens, and parking areas capable of accommodating hundreds of vehicles.

## TELEVISION SERVICE

(Continued from Column 1)

ceiver. Removal of the speaker decreases the intensity of the sound waves inside the receiver, and virtually eliminates the possibility of microphonic trouble.

If a small speaker is used in the receiver, it is not difficult to sell the owner on the advantage of using a larger, external, pm speaker.

When an external speaker is used, it is advisable to leave the audio-output transformer in the receiver, and run two leads from the secondary of the transformer to the voice coil of the external speaker. Ordinary lamp cord is satisfactory for this purpose. The dc resistance of the voice coil in the new speaker should be approximately the same as that of the original speaker. The voice coil in the original speaker should be disconnected.

## Sound Bars In The Picture

"Sound bars" are horizontal bars that vary in step with the modulation of the signal from the station.

The number of bars varies with the frequency of the audio signal. At moments when the sound frequency is 300 cycles, there are five horizontal dark bars; when the sound frequency is 3000 cycles, there are 50 horizontal dark bars (one dark bar per 60 cycles).

The intensity of the bars varies with the strength of the audio signals. At moments when the audio signal is strongest, the bars also are strongest; at moments when there is no audio signal, the bars are absent.

There is a tendency to classify all varieties of sound bars as "microphonic." Actually, only a few types of sound bars are caused by microphonic action. Both microphonic and non-microphonic sound-bar troubles are described below.

1. *Microphonic tube in the rf, picture-if, or video amplifiers.*

A microphonic tube in the rf, picture-if, or video amplifier may produce sound bars in the picture when the receiver is operated at high volume level. The bars are not present at low volume level. These same symptoms also apply to the following trouble:

2. *Inadequate or defective filtering in the plate or cathode supply circuits of the audio-output stage.*

When the receiver is operated at high volume level, there are large audio-frequency variations of current in the plate and cathode circuits of the audio-output stage. These large current variations impose a varying drain on the B-supply. If the plate and cathode supply circuits are not adequately filtered, the current variations in the audio-output stage may produce an appreciable amplitude of audio-frequency ripple in the B-supply voltages. This ripple can affect the operation of various sections of the receiver, producing audio-frequency variations in picture-signal gain, in width, in horizontal sync phasing, and other effects. The general effect is the appearance of sound bars in the picture. The bars are not present at low volume level.

(Continued on Page 7, Column 1)

## PROFESSIONAL TELEVISION SERVICE



This illuminated sign is available to all servicemen using RCA test equipment. It carries the legend "Professional Television Service" and the well-known RCA trademark in bright red on a white plastic background. It calls attention to the fact that your service shop, equipped with RCA quality test instruments, provides better and faster service. Suitable for mounting in the window or on the wall, the sign is furnished with six feet of hanging chain.

## TELEVISION SERVICE

(Continued from Page 6)

When sound bars can be eliminated by reducing the volume level, it is necessary to determine whether the trouble is caused by microphonic action, or by inadequate filtering in the plate or cathode circuits of the audio-output stage. To determine which condition exists, open the voice-coil circuit of the speaker and advance the volume control. *Opening of the voice-coil de-energizes the speaker and eliminates possibility of microphonic action.* If the sound bars remain present, it indicates that there is inadequate filtering in the plate or cathode supply circuits of the audio-output stage. If the bars disappear when the voice coil is opened, it indicates that the trouble is probably due to a microphonic tube.

When this check is made, it is advisable to substitute a dummy-load resistor in place of the voice coil. The resistor should have approximately the same value as the dc resistance of the voice coil. The volume control should be set at the position where sound bars are visible, but below the overload point of the audio amplifier. After making this check, remove the dummy-load resistor and reconnect the voice-coil.

If the check shows that the sound bars are caused by microphonic action, check the rf, picture-if, and video tubes, either by *lightly* tapping each one to locate the faulty tube, or by substituting a new tube in each socket. Also try a new tube in the horizontal afc circuit.

If the check shows that the sound bars are caused by inadequate filtering, check the electrolytic filter capacitors in the plate and cathode circuits of the audio-output stage, and also the capacitors in the B-supply circuit, or try shunting an external electrolytic capacitor across each of the filters. If it is found that the original capacitors are good, and if the trouble cannot be corrected by the use of additional capacitors, it is advisable to find out whether the manufacturer has issued instructions on circuit changes to correct the trouble. All receivers of a particular model may exhibit this trouble when they are operated at high volume level, but actual complaints about the trouble may come from only a few commercial installations where the receivers are operated at high volume.

3. *4.5-Mc beat and herring-bone sound bars.* Sound bars may appear in the picture if the 4.5-Mc beat signal between the sound-if and picture-if carrier gets through the video amplifier to the picture tube. The appearance of these bars is quite different from the appearance of the bars for the two previous troubles. The 4.5-Mc signal produces approximately 240 fine dark vertical or slanting lines in the picture. The FM sound modulation in the 4.5-Mc signal produces horizontal herring-bone sound bars in the 240 lines. The bars vary in step with voice and music. Unlike the two previous troubles, *the intensity of the bars is not affected by adjustment of the volume control.*

In inter-carrier receivers, the

## UNIQUE "CASH AND CARRY" TV SERVICE SHOP SPEEDS REPAIRS WITH RCA TEST EQUIPMENT

Modern RCA test equipment is a contributing factor in the growing success of a unique "cash and carry" Television Servicenter in suburban Upper Darby, Pa., which boasts same-day servicing on all makes of television receivers.

The "cash and carry" shop is the inspiration of Mort Farr, nationally known Philadelphia appliance dealer. The shop offers set owners the dual attraction of speedy, same-day service at a charge appreciably reduced by the elimination of transportation costs. The unusual operation encourages set owners to deliver their balky receivers to the shop while on their way to work in the morning, and to call for them on their way home.

"The success of a rapid-service operation such as this depends to a large extent on the rapidity with which technicians can diagnose the trouble and its causes," stated Mr. Farr in a recent interview. "Each day, our technicians have from sun-up to sun-down to expose and cor-

rect a multiplicity of troubles in a sizable quantity of different receivers. Complete testing equipment is therefore an operating necessity. Our technicians have at their fingertips virtually all types of RCA test equipment to assure not only the quality of their work, but equally important, that the customer will find his receiver ready as promised."

The Servicenter is equipped with representative instruments of virtually the complete RCA "Blue Ribbon" test-equipment line, including the Senior VoltOhmyst (WV-97A), seven-inch oscilloscope (WO-56A), Television Calibrator (WR-39C), and Television Sweep Generator (WR-59B).

"Since installing this equipment," Mr. Farr added, "nearly all of my servicemen have brought their own television sets from home to have them realigned and serviced for dependable operation in the future. This is the first time that my fellows have been sufficiently enthusiastic, about any test equipment, to have checked their own receivers."



Albert Dubsky (right), service manager, demonstrates to Mort Farr how RCA instruments facilitate the alignment of a TV receiver.

presence of a 4.5-Mc beat in the picture may be caused by incorrect alignment of the picture-if amplifier, or the 4.5-Mc. transformer or trap(s) in the video amplifier.

In receivers that have a separate sound channel, the presence of a 4.5-Mc beat in the picture may be caused by incorrect tuning of the receiver, or by incorrect alignment of the sound-if traps in the picture-if amplifier, or the 4.5-Mc trap in the video amplifier.

4. *Harmonic of sound-if signal.* Harmonics of the sound-if signal are present in the output of the sound-if amplifier. If the frequency of one of these harmonics falls in the rf band of a particular channel, and if there is sufficient coupling between the output of the sound-if amplifier and the rf circuits of the receiver, the harmonic will produce a beat pattern in the picture. The beat frequency is equal to the difference in frequency between the rf picture carrier and the particular harmonic. The FM sound modulation in the harmonic produces horizontal her-

ring-bone sound bars in the beat pattern. The bars vary in step with the modulation. *These bars are not affected by adjustment of the volume control.*

There is a simple check to identify this type of trouble: Temporarily remove a tube from the sound-if amplifier. Removal of the tube kills the sound-if output and also the harmonics. If the beat pattern and sound bars disappear when the tube is removed, the trouble is caused by a harmonic of the sound-if signal getting into the rf circuits.

5. *Microphonic tube in the horizontal afc circuit.* Vibration of the elements in the horizontal afc tube may cause variations in the gain of the tube and corresponding variations in horizontal sync phasing (horizontal picture pulling). If the vibrations are caused by sound waves, or by transmitted vibrations from the speaker, the horizontal pulling occurs at the sound frequency, and therefore has the appearance of sound bars. The amount of pulling varies with the

intensity of the sound signal. *This trouble is not present at low volume levels.*

To become acquainted with this trouble, tap the horizontal afc tube *lightly*. Tapping may produce horizontal pulling or ripple in a portion of the picture. *A certain amount of microphonic ripple is to be expected under this relatively severe check.* Try several tubes in the afc socket, tapping each tube. Note that the microphonic action is less in some tubes than in others.

This microphonic action in the horizontal afc tube may be remedied by trying several new tubes and selecting the one that is least microphonic. If the afc tube socket is shock-mounted, arrange the leads (under the socket) to permit free-floating action. If these remedies are unsuccessful, the trouble probably is not caused by microphonic action. In this case, check for inadequate filtering, as described in item 2.

If a new tube is placed in the horizontal afc socket, check the horizontal-control action and make any necessary adjustments as specified by the receiver manufacturer.

## Microphonic Troubles vs Intermittent-Contact Troubles

It is helpful to make a sharp distinction between microphonic troubles and intermittent-contact troubles.

*The term "microphonic troubles" should be restricted to cases where mechanical vibration of a component or tube produces an undesired electrical effect, but does not result in an intermittent contact, short circuit, or grounding.*

Vibration of the elements in a 6SN7-GT tube in a horizontal afc circuit may produce microphonic horizontal picture pulling. The same tube, however, can be used in any other 6SN7-GT socket of the receiver without trouble. When normal vibration in a 6SN7-GT produces an intermittent contact or short circuit between two of the elements, the tube should not be used in any circuit.

*Vibration is involved in both of these examples, but the first case is a microphonic trouble, and the second case is an intermittent-contact trouble.* These examples show that there is a considerable difference between the two types of trouble.

In factory parlance, intermittent-contact trouble is known as "NWT," which means "noisy when tapped." The noise may appear in the sound, in the picture, or in both. Intermittent-contact trouble may show up under slight vibration, such as can be created by the speaker, or the trouble may show up only when the parts are vigorously vibrated by rapping the chassis with a tool, or by running the sound level so high that the parts vibrate.

Intermittent-contact troubles are caused by such things as (a) unsoldered joints, (b) cold-soldered joints, (c) stray strands of wire, (d) stray lumps of solder, (e) bare wires that are too close to other bare wires, or too close to the chassis, or too close to bare contacts, etc., etc.

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From

## RADIO SERVICE NEWS

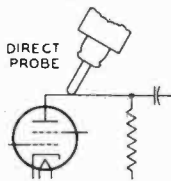
RCA Radio Service News is published by the RCA Tube Department in the interest of radio servicemen and dealers everywhere. It is distributed free of charge to members of the radio-service fraternity through the courtesy of RCA and its tube, battery, test equipment and parts distributors.

TO:

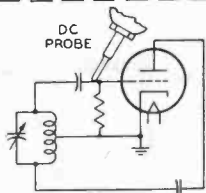
**SAGER ELECT'L SUPPLY CO.**  
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# Now ... a NEW Junior VoltOhmyst\* ...the WV-77A

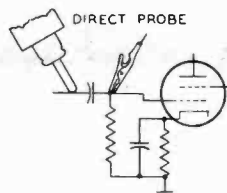
For all regular  
 measurements  
 and specialized  
 measurements  
 as illustrated.



MEASURES AC VOLTS ... such as signal voltage on plate of af or rf tube.



MEASURES DC VOLTS ... such as oscillator grid bias. One-megohm resistor in probe prevents circuit loading.



MEASURES RESISTANCE ... such as leakage in coupling capacitor up to 1000 megohms.

### Check these Important features ...

- ✓ Accurate laboratory calibration.
- ✓ Meter electronically protected against burn-out.
- ✓ Metal case shielding ... extra stability in rf fields.
- ✓ Sturdy 200-microampere meter movement.
- ✓ Carbon-film 1% multiplier resistors ... dependability plus.
- ✓ Zero-center scale ... for discriminator alignment.
- ✓ Frequency response flat from 30 cps to approximately 3 Mc.
- ✓ High ac input resistance for greater accuracy.
- ✓ Constant dc input resistance ... 11 megohms on all scales.
- ✓ Negative feedback circuits for greater over-all stability.
- ✓ Ohms cable always positive ... for quick leakage measurements of electrolytic capacitors.
- ✓ Polarity reverse switch ... eliminates cable switching.
- ✓ ± 3% over-all accuracy on +dc scales, and ± 5% on ac and -dc scales.

Available from your  
**RCA Test Equipment  
 Distributor**

Just one probe cable and one slip-on probe handle all measurements.

## An all-electronic ac-operated vacuum-tube volt-ohmmeter by RCA ONLY \$47.50.

Includes DC probe, AC direct probe and cable, ground lead, and alligator clip. The RCA WV-77A VoltOhmyst\* provides the extra features you have tried to find in an inexpensive VTVM. Using the famous VoltOhmyst electronic bridge circuit, 200-microampere meter movement, and carbon-film multiplier resistors, the WV-77A incorporates features you would expect to find only in more expensive instruments. Sturdily built ... calibrated against laboratory standards ... and backed by a 12-month warranty ... the WV-77A has the durability, versatility, and accuracy to please discriminating customers such as service technicians, engineers, amateurs, and military personnel.

As a DC Voltmeter it measures dc from 0.05 volt to 1200 volts in five ranges. Uses 1-megohm resistor in isolating probe; probe has less than 2-uuf input capacitance. Has 11-megohm input; useful for measuring high-resistance circuits such as oscillator, discriminator, and avc.

As an AC Voltmeter it measures ac from 0.1 volt to 1200 volts rms in five ranges.

Uses high-impedance diode tube as signal rectifier. Frequency range is more than adequate for measurement of power line, audio, and ultra-sonic frequencies.

As a wide-range Ohmmeter the WV-77A measures resistance from 0.2 ohm to 1 billion ohms in five ranges. Requires only 1.5-volt battery as burn-out protection in measuring such low-power elements as battery-type tube filaments.

The all-new RCA WV-77A VoltOhmyst comes completely equipped with probes and cables as illustrated. For complete details, see your RCA Test Equipment Distributor today ... or write to RCA, Commercial Engineering, Section 42EX, Harrison, N. J.

### Accessories Available on Order

The WG-289 High-Voltage Probe and WG-206 Multiplier Resistor extend the dc range of the WV-77A to 50,000 volts.

The WG-264 Crystal-Diode Probe extends frequency range of the WV-77A to 250 Mc.

\*Reg. U. S. Pat. Off.



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 TEST EQUIPMENT  
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