



RADIO AND TELEVISION

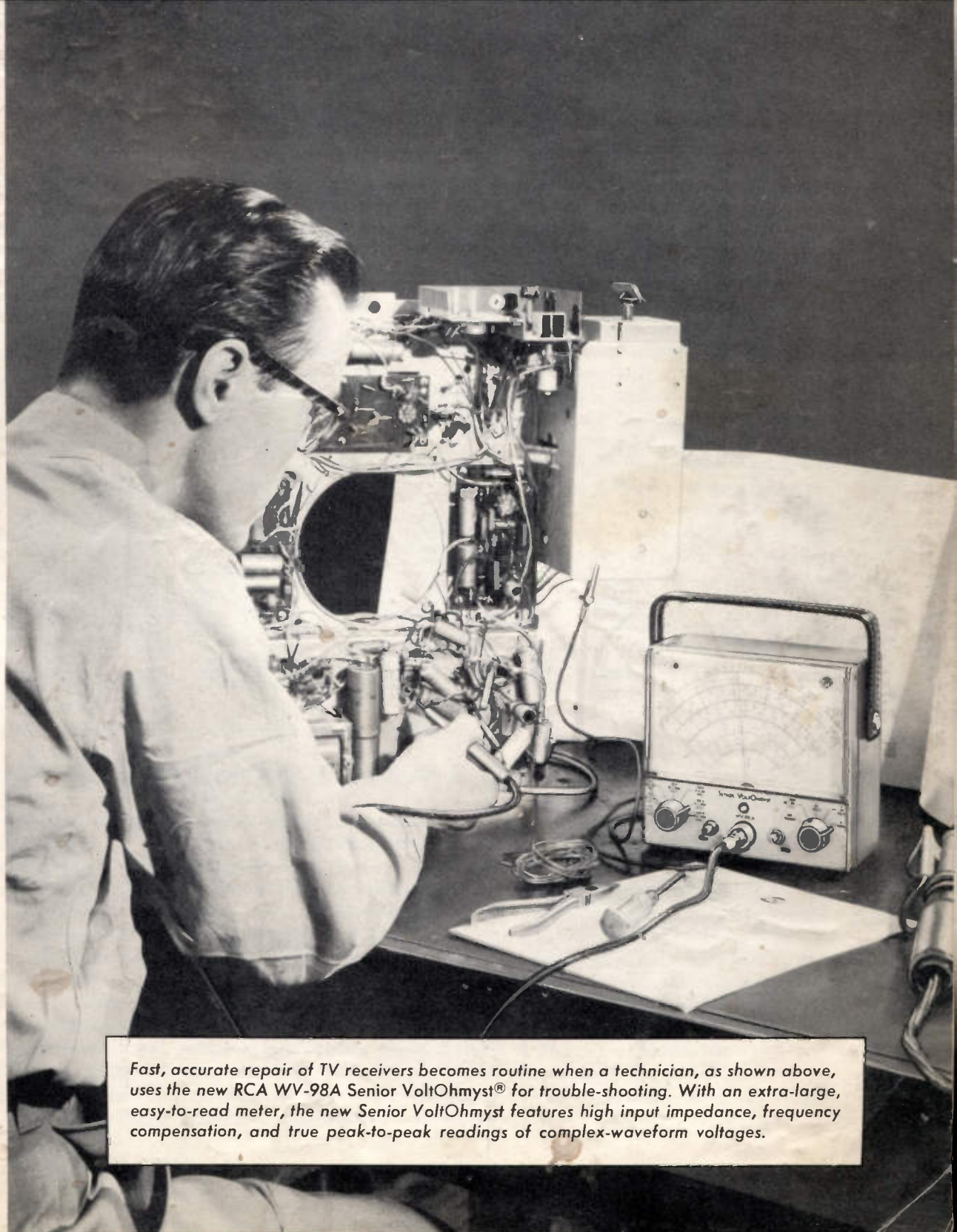
# Service News

A PUBLICATION OF THE RCA TUBE DIVISION

JANUARY

1956

Vol. 21, No. 1



*Fast, accurate repair of TV receivers becomes routine when a technician, as shown above, uses the new RCA WV-98A Senior VoltOhmyst® for trouble-shooting. With an extra-large, easy-to-read meter, the new Senior VoltOhmyst features high input impedance, frequency compensation, and true peak-to-peak readings of complex-waveform voltages.*

# SHY AWAY FROM SO-CALLED 'BARGAIN' TUBES

Time out to salute YOU for heeding the advice offered by RCA two years ago (see box at right) in regard to being wary of rebranded and reprocessed receiving tubes. What with all the current hubbub concerning malpractices within the servicing industry involving "rebrands" and "reprocessed tubes," apparently a few of your fellow dealers and service technicians have not recognized—as you have—that the complexity of present day equipment necessitates the use of highest possible quality replacement tubes and parts such as RCA's.

You have made a wise decision to shy away from "seconds" and "rejects" and to realize that dealings in such lower-quality tubes inevitably cost more than any supposed savings which some service-dealers believe they can realize by using such products.

You have made a wise decision to scrap any old tubes which are not subject to adjustment.

You have made a wise decision to use and market only tubes which meet such high-quality standards as those set by RCA for its first-line products.

Keep it up! You are doing yourself proud by your steadfastness in conducting your business in the most ethical manner and by your continued cooperation in helping RCA and other manufacturing firms to assist law enforcement agencies in stamping out tube counterfeiting.

RCA said it before and will keep right on saying it:

"When it comes to anything so important in radio and television servicing as a receiving tube, *performance* means much more than *price*. After all, when you purchase a receiving tube, you are not buying just glass and metal. Your reputation and your profit depend on the *performance* that tube will provide!

"If you try to cut corners by buying 'seconds'...or by using 'just any tube brand,' you may be in for trouble. Unnecessary callbacks alone can eat up all your profit."

This statement was featured in an ad (reproduced below) run by RCA in leading servicing journals back in November and December, 1953, and January, 1954. That's two years ago! But perhaps the advice offered by RCA then needs repeating now—for, as discussed in the article at left, there is a problem in the industry today which points up the fact that there are still a few dealers and service technicians who are not taking steps to minimize such undesirable practices as rebranding and reprocessing tubes.

The RCA ad stressed that to be sure you are getting unused, factory-fresh RCA tubes, buy them only in the familiar red, white, and black RCA tube cartons through your authorized RCA tube distributor. It went on to point out that there is no such thing as a "second" RCA receiving tube that can find its way to market for, if an RCA tube fails to pass its final test, "it is not only rejected... it is broken up, dumped into a 'meat chopper,' and ground up into so much hash."

"We guard our reputation as zealously as you guard yours," RCA emphasized in its ad. "So let's face it," the ad continued, "you just can't afford to buy anything less than the best in receiving tubes—and that's RCA."

## Let's face it...

... the *best* tube you can buy is your best buy

When it comes to anything so important in radio and television servicing as a receiving tube, performance means much more than price. After all, when you purchase a receiving tube, you are not buying just glass and metal. Your reputation and your profit depend on the performance that tube will provide!

If you try to cut corners by buying "seconds"...or by using "just any tube brand," you may be in for trouble. Unnecessary callbacks alone can eat up all your profit. That's why we think you'll be interested in these two facts about RCA Receiving Tubes:

**First Fact:** There is no such thing as a "second" RCA Receiving Tube that can find its way to market. If an RCA tube fails to pass its final test, it is not only rejected... it is broken up, dumped into a "meat chopper" and ground up into so much hash.

**Second Fact:** The quality of RCA Receiving Tubes is continually being "upgraded." For instance, when laboratory tests show that an improved SENSIT-GT is a result, RCA's SENSIT-GT is a far better tube than the SENSIT-GT of yesterday. You see, we guard our reputation as zealously as you guard yours.

So let's face it... you just can't afford to buy anything less than the best in receiving tubes—and that's RCA.



**RCA** RADIO CORPORATION OF AMERICA  
ELECTRON TUBES  
HARRISON, N. J.

**RCA**

**RADIO AND TELEVISION**

## Service News

A PUBLICATION OF THE RCA TUBE DIVISION

RCA RADIO & TELEVISION SERVICE NEWS is published in the interest of servicemen and service-dealers. It is written to assist them in providing better service, and to foster the growth of their business by supplying them with information on the latest trouble-shooting and sales promotion techniques, sales and service aids, together with invaluable data on RCA tubes, transistors, batteries, parts, and test equipment.

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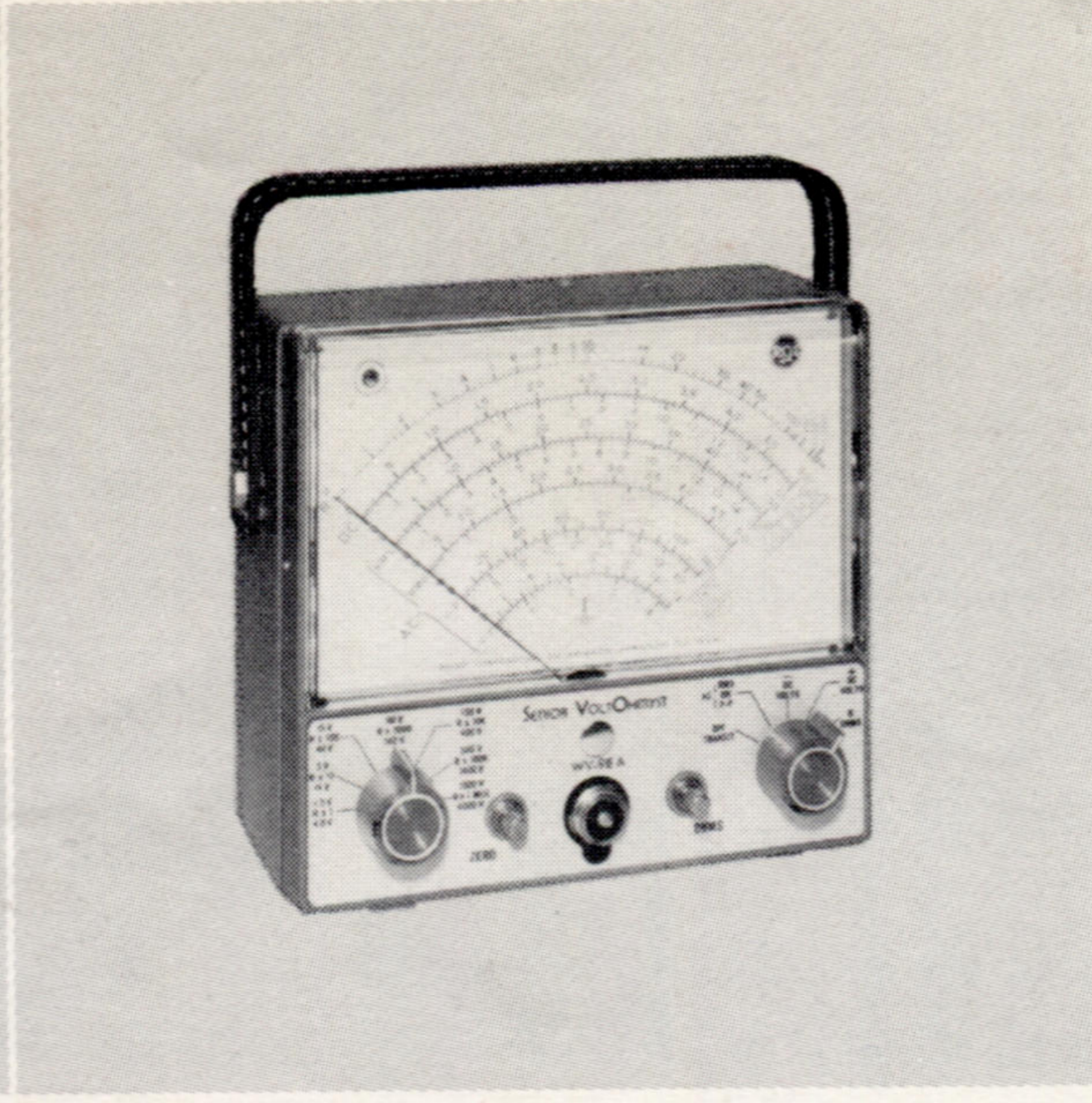
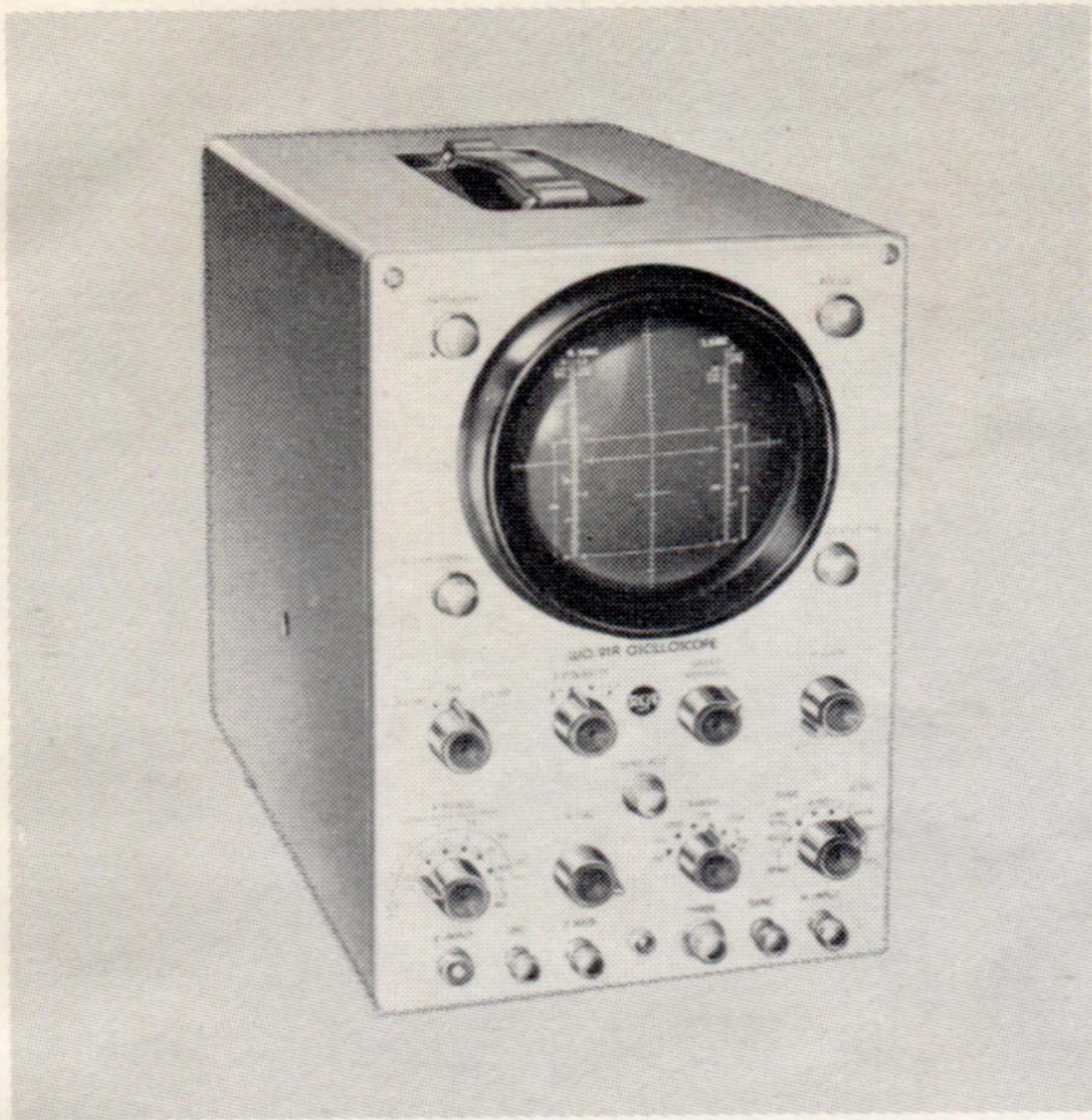
## RCA Receives Award from Philadelphia Servicemen

The Philadelphia Radio Service Men's Association recently awarded a plaque to the Radio Corporation of America in recognition of RCA's lengthy and consistent cooperation with the entire radio and television service industry.

Charles M. Odorizzi, Executive Vice-President, Corporate Staff, RCA, accepted the plaque in behalf of his company. In doing so, Mr. Odorizzi cited RCA's longtime close association and cooperation with independent service organizations in providing them with

up-to-the-minute technical information on all aspects of black-and-white and color TV and asserted that RCA will continue to work closely with independent technicians as a means of improving service standards for the benefit of the public.

Presentation of the award to RCA was made by Richard G. Devaney, President, Philadelphia Radio Service Men's Association. Founded in 1928, PRSMA is regarded as the nation's oldest association of electronic service technicians.



Be sure to read the article beginning on page 10 of this issue. It discusses some little-known facts about the real cost of test equipment.

## Newest RCA Test Instruments

### Electronics

A new oscilloscope O-91A and a new vacuum-tube Volt-Ohmyst WV-98A have just been added to the RCA line of test equipment available from your RCA distributor.

The O-91A is a 5-inch oscilloscope designed for use in production and servicing of both black-and-white and color-TV receivers. Incorporating all the scope functions needed to troubleshoot and repair black-and-white and color-TV sets, the O-91A enables you to observe and measure voltage amplitude of color burst signals, for signal tracing, for aligning wide-band video amplifiers, and for work on color dominance circuits.

The new scope is packed with labor-and time-saving features usually found only in more expensive instruments. Just check a few of the following service work-saving features: "Direct low-capacitance" probe; preset "V" and "H" sweep positions; and semi-automatic voltage calibration circuit.

Here's a list of the top-value features of the O-91A:

(1) Dual band-width. Wide-band operation, frequency response is flat plus or minus 1 db from 10 cps to 4.5 Mc. On narrow-band operation, response is flat plus or minus 1 db from 10 cps to 0.5 Mc; plus or minus 6 db at 1.5 Mc.

(2) Voltage-calibrated, frequency-compensated, 3-to-1 step-attenuator for "V" position.

(3) Separated, semi-automatic voltage calibration for simultaneous voltage measurement and waveshape display.

(4) VTVM-type graph scales (removable) graduated in peak-to-peak volts—read voltage amplitude directly from screen.

(5) Vertical-polarity reversal switch for "upright" or "inverted" trace display.

(6) Sturdy single unit direct low-capacitance probe minimizes circuit loading.

(7) Preset "V" and "H" sweep positions for steady, automatic lock-in at "vertical" and "horizontal" frequencies.

(8) "Z" input facilities permit direct modulation of the thode-ray tube grid.

(9) "Plus" or "minus" internal-c selector.

(10) Shielded vertical-input connector and shielded cable for minimizing hum and stray field pickup.

(11) Positive-lock internal selector.

(12) Slip-on signal-tracing demodulator available as an accessory.

Sensitivity of the O-91A is 0.05 volt, peak-to-peak, per inch (0.018 volt/cm) in the narrow-band position. On wide-band operation, sensitivity is 0.15 volt, peak-to-peak, per inch (0.053 volt rms).

There it is! A scope designed especially for black-and-white and color servicing. And, the RCA O-91A is available at just about half what you'd

expect to pay for a test instrument of such versatility.

RCA's new WV-98A Senior Volt-Ohmyst is an ultra-modern VTVM for all-round servicing of TV, FM, AM, and "hi-fi" sets. Incorporating all the important time-proven performance characteristics of earlier Volt-Ohmysts—including direct voltage measurements of complex waveforms—the WV-98A includes an improved, negative feedback circuit that provides greater accuracy than ever before. In addition, the new WV-98A features an extra-large (6 1/2-inch wide), full-vision meter face with one of the easiest-reading scales ever designed into a vacuum-tube volt-meter.

And here's an "extra": provided with the WV-98A is a new, single-unit dc/ac-ohms probe that has a handy, built-in switch for instant selection of dc, ac, or resistance functions. The new probe (type 299A) comes complete with a generous length of shielded cable.

Here are just a few of the outstanding features of the new RCA Senior Volt-Ohmyst:

#### • DC Voltage Scales

Overall accuracy is plus-or-minus 3% at full-scale reading. Input resistance (including 1 megaohm probe) is 11 megaohms. Even in presence of rf, the WV-98A measures from 0.

volt to 1500 volts, on only three scales, in seven overlapping "3-to-1" ranges.

The WV-98A can be used with an accessory high-voltage (type G-289) probe to extend the use range of the instrument to 50,000 volts.

#### • AC Voltage Facilities

Peak-to-peak measurements available on seven overlapping scales up to 4200 volts. Circuits are frequency-compensated for peak-to-peak values up to 1400 volts; response flat from 30 cps to 3 Mc. The meter reads both peak-to-peak and rms values simultaneously.

Overall accuracy on all ranges is plus-or-minus 3% at full-scale reading. Input resistance and capacitance with type 299A probe set to "Direct" on the 1.5-, 5-, 15-, 50-, and 150-volt ranges is 0.83 megaohms shunted by 70  $\mu$ f; on the 500-volt range the corresponding values are 1.3 megaohms and 60  $\mu$ f; on the 1500 volt range the values are 1.5 megaohms and 60  $\mu$ f.

#### • Resistance Measurement

The WV-98A measures resistance

(Continued on next page)

# Test Instruments

(Continued from preceding page)

from 0.2 ohm to 1000 megohms on a single scale in seven continuous ranges. Requires only a 1.5-volt battery, which is included within the instrument.

- **The Meter**

The new Senior VoltOhmyst uses a rugged 200-microampere movement having an accuracy of plus-or-minus 2%. The meter is housed in a sturdy, clear plastic full-view case.

- **Case**

The WV-98A uses a ruggedized, fully enclosed die-cast aluminum case that shields the interior circuits from rf fields. A compact 7½-inches high by 5¾-inches wide by 4½-inches deep, the complete assembly weighs only 6 pounds.

With the WV-98A, you can accurately measure most of the complex TV waveform voltages found in video, sync, deflection, triggering, blanking, timing and modulating circuits. Servicing these critical circuits requires accurate measurement of the *peak-to-peak* amplitudes of their complex waveform voltages. And since there is no simple relationship between the rms and the peak-to-peak value of these complex voltages, you need a meter that measures peak-to-peak voltages *directly*. (Ordinary vacuum-tube voltmeters of the half-wave rectifier type give a reading that is proportional only to either the positive or negative half of the wave, rather than indicating its true peak-to-peak value.)

The RCA WV-98A Senior Volt-Ohmyst *does* measure peak-to-peak voltages directly. With this one instrument, you can make peak-to-peak voltage measurements of many types of waveshapes directly. In other words, you can work faster and more accurately when you use the new WV-98A.

• • •

See your RCA distributor today. Ask him to demonstrate both the labor-saving WO-91A and the handsome, compact, versatile RCA WV-98A senior VoltOhmyst. Then place your order at once for early delivery of *your* WO-91A and WV-98A.

User prices (optional) of the new RCA test equipment are as follows: WO-91A oscilloscope, \$229.50; WV-98A Senior VoltOhmyst, \$75.00.



## Three New RCA Battery Types For Transistor Applications

To help you satisfy immediate and future customer demands for replacement batteries for transistor applications, RCA recently announced the VS400, VS300, and VS301. Competitively priced, these three new RCA battery types are now available from your RCA battery distributor.

The VS400 is a 4-volt mercury battery with flashlight-type terminals. Specifically designed for "hybrid" portable radios (battery-operated radio receivers whose circuits include transistors as well as tubes), this battery is being currently recommended together with the VS086 for use in Crosley's new Transistor Book Radio Model No. JM8. The same battery combination is also finding wide application in Emerson's popular battery-operated hybrid "Pocket Radio" Model No. 838. Measuring 1-1/32 inches in diameter and

1-31/32 inches in height, the VS400 weighs about 3 ounces.

The VS300 and VS301, specially designed for all-transistor portable radios, are industry "firsts." Small wonder portable radio manufacturers across the nation have reacted enthusiastically to these dry-cell batteries.

Currently recommended for use in RCA Victor's new, miniature transistorized portable radio Model 7BT9, the 9-volt VS300 (NEDA No. 1600) measures 31/32 of an inch in diameter and 1-31/32 inches in overall height and weighs about 4 ounces.

The VS301 (NEDA No. 1601) is currently recommended for long-life use in RCA Victor's transistorized portable radio Model 7BT10. This battery measures 8 inches in length, 1-9/16 inches in width and weighs about 1½ pounds.

### RCA RECEIVING TUBE MANUAL REVISED AND ENLARGED

A revised and enlarged printing of the RCA Receiving Tube Manual—for many years the standard reference book for radio and television service-dealers—is now available from your RCA tube distributor.

This new, 336-page printing contains a 26-page supplement covering 51 newly added tube types—including types developed especially by RCA for use in color-television receiver circuits.

Like former editions, the latest Manual presents a section on electron-tube theory, tube characteristics, and applications. Another section contains

22 circuit diagrams illustrating some of the more important applications of receiving tubes.

Included are several circuits designed for high-fidelity audio amplifiers. Among the charts in the new printing is one listing the operating characteristics of 64 RCA types of kinescopes, including color tube types 15GP22 and 21AXP22.

The revised printing of the RCA Receiving Tube Manual (RC-17) is priced at only 60¢. Order several copies from your distributor today.

# OPERATING NOTE

Service technicians using oscilloscopes that employ direct-coupled input amplifiers (for example, RCA oscilloscopes WO-56A, WO-57A, WO-57B, and WO-88A) are often surprised to see the trace move up or down or off the screen entirely when dc voltages are applied to the 'scope. This action is normal and does not indicate that the instrument is operating improperly. The action may be compared to that of a low-range dc volt-meter which is connected to a high dc-voltage source. The volt-meter pointer will deflect past the full-scale point on the meter.

The vertical-amplifier balance adjustment of the oscilloscope has nothing to do with the off-scale deflection of the trace. It is important, however, that the "V BAL" adjustment be set correctly for best operation of the oscilloscope. Procedure for setting this adjustment is given at the end of this article.

Figures A and B show how the position of the trace on the oscilloscope screen changes when dc voltage is applied. The trace can be brought back into view by adjustment of the vertical-centering control. If the range selector switch is set to an "AC" position, the dc voltage is blocked out of the oscilloscope and the ac component in the test circuit appears on the screen.

Direct-coupled oscilloscope amplifiers have a number of advantages of benefit to the user. To realize these advantages, it is suggested that the user follow the procedure outlined below.

1) Apply power to the instrument and allow 15 minutes for warmup. Set

the vertical range selector to the highest number on the "AC" side. Connect the low-capacitance probe to the plate circuit of a power output (audio) tube in an operating receiver employing about 200 volts B+.

2) Adjust the vertical attenuator and centering controls until the trace is near the center of the screen. This trace is the ac signal only; the dc voltage on which the signal is carried is blocked out of the oscilloscope by the input capacitor which is automatically switched into the circuit when the attenuator is set to "AC".

3) Set the vertical range selector to the corresponding position on the "DC" side. Note that the trace moves upward. The trace may move completely off screen, depending upon the value of the circuit B+ voltage and the setting of the attenuator on the oscilloscope.

4) Turn the vertical range control to different settings on the "DC" side. Note that the trace can be brought back onto the screen at certain settings of the attenuator.

After a few trials, the characteristics of the direct-coupling feature should be understood, and the advantages of simultaneous measurement of both dc and ac voltages demonstrated.

## Trace Displacement In "AC" Positions

A different type of trace displacement often occurs when the "AC" input positions are used. For example, when the vertical-range control is set to an "AC" position and the oscilloscope

probe is connected into a circuit containing dc voltage, the trace may be deflected off screen temporarily but will return to its original position within a short time. The displacement of the trace is caused by charging of the input dc-blocking capacitor by the dc test-circuit voltage. This capacitor is usually quite large and is charged through the series resistance of the input attenuators. If the input attenuator is set to the highest sensitivity position, a large resistance is in series with the capacitor. Consequently, a longer charging time is required and a longer period of time will be needed for the trace to return to an on-screen position. When a low-capacitance probe is used, the additional probe resistance may delay return of the trace for many seconds. This characteristic is normal, however, and does not indicate that the oscilloscope is defective. Trace-return time may often be reduced by first setting the range control to the minimum gain position, connecting the probe to the test circuit, and resetting the range control of the desired input position.

In cases where the trace will not return to an on-screen position, the input capacitor may be leaking. In such cases, it is recommended that a new, high-quality capacitor be substituted.

## Setting the "V BAL" Adjustment

If the trace moves vertically when the vertical-gain control is rotated, the "V BAL" adjustment should be reset. This is done as follows:

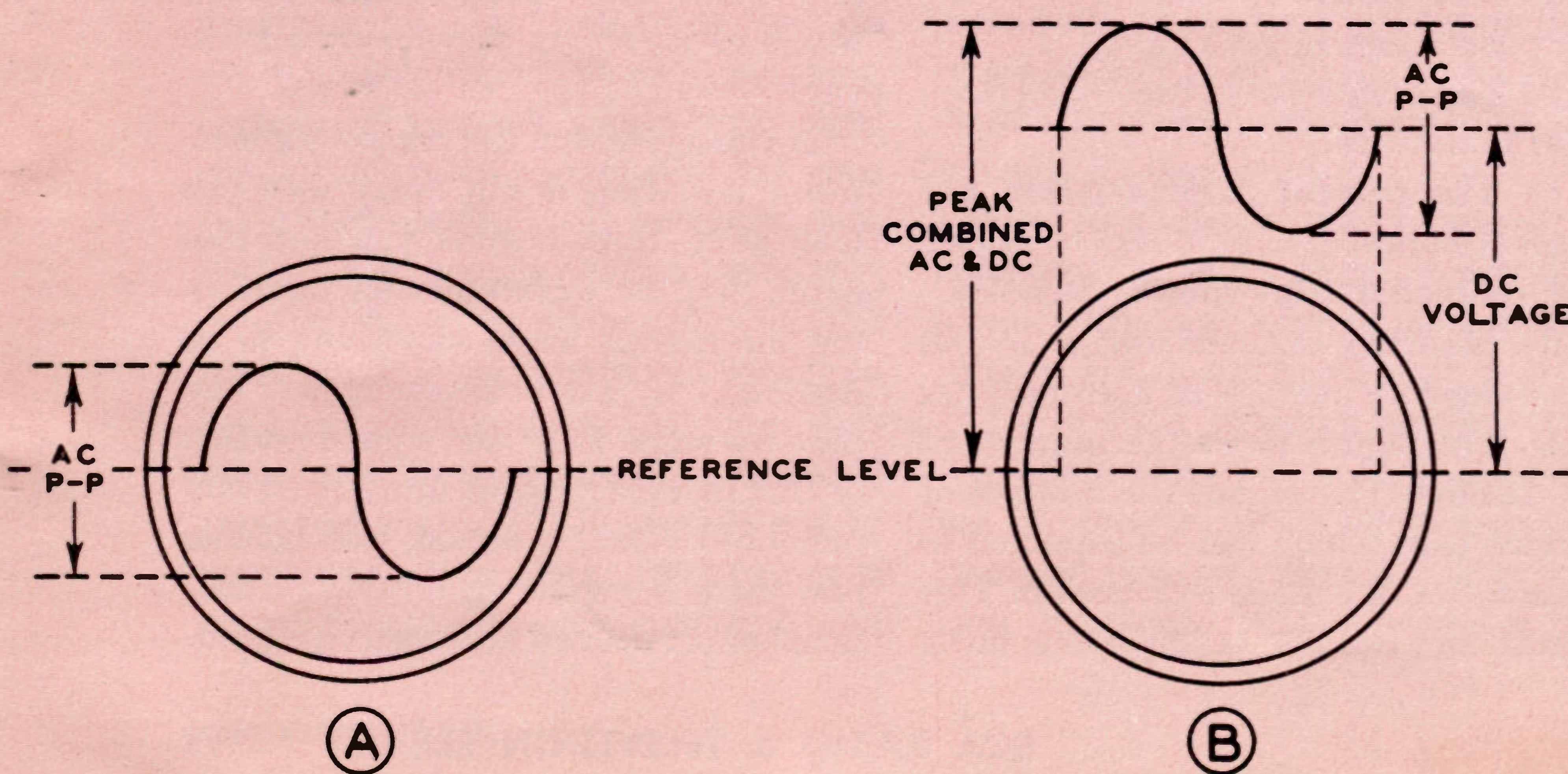
1) Apply power to the instrument and allow 15 minutes for warm-up. Turn up the intensity control for a trace of suitable brilliance.

2) Set the front-panel controls to obtain a horizontal line. The vertical attenuator switch should be set to any of the "AC" positions.

3) Center the trace by adjusting the centering controls.

4) Attach the direct probe and cable and connect the probe tip to a GND terminal on the 'scope.

5) Rotate the vertical-gain control. If the trace changes position vertically, adjust the "V BAL" adjustment with a screw driver until the trace does not change position vertically as the gain control is rotated. It may be necessary to repeat this adjustment if the instrument is used over an extended period of operating time.





**BY ROBERT B. SAMPSON**  
Manager, Market Research, RCA Tube Division

I should like to review a few basic business management principles which, I believe, are applicable to your business.

Basically, they are two-fold: (1) to create and maintain proper levels of sales revenue and (2) to direct all operations in proper relationship to the revenue thus created. Here are two separate and distinct objectives, yet they are so dependent one upon the other that failure on the one can lead to trouble on the other. Elementary—sure it is—but how often do we see evidence of failure on the part of some business concerns to manage their operations in line with these principles.

“Out of balance” is an expression used by bookkeepers to describe an intolerable situation in the process of keeping books. It is a condition that cannot be ignored by good accountants, so countless hours of effort are expended to locate and correct the discrepancy. And, so it is with a business organization. It, too, can be “out of balance” and so, too, should the difficulty be found and corrected.

Let us go over, briefly, some of the factors leading to what I call a “balanced operation.” Obviously, your current and projected levels of sales revenue, or income, requires first consideration.

Is your organization producing a volume of business sufficient in amount to cover the operating costs, assuming for the moment that they are in order, and return to you a pre-tax profit of 10% or better?

This article is from a speech delivered by Robert B. Sampson at the November 9th meeting of the Virginia Electronics Service Association, Norfolk.

Mr. Sampson—a veteran of nearly 24 years of service to RCA as auditor, accountant, and analyst of financial problems—only recently was appointed to his present post as market research manager of the RCA Tube Division. Prior to this promotion, he served for the past year on the corporate staff of RCA as administrator of distributor finances. Previous to that appointment, he served for two years as administrator of the Tube Division's distributor financial services activity.

In his new position, Mr. Sampson is developing and administering a comprehensive market research service, analyzing product and distributing trends, collaborating in the investigation of new products, evaluating commercially existing and proposed products, and developing general statistics relating to the industry.

In addition, he will assist service-dealers and distributors in analyzing their business structures and in solving their financial problems.

## Management for Profit

If not, where does the trouble lie? Well, the answer to that question could lead into many directions. But, there is one point I am sure we can all agree on: there is a good healthy dollar volume of potential business in every neighborhood, and in every section of the total area you serve. Are you getting your share of that business? It is not a difficult matter to determine the answer to that question, and I certainly recommend that you evaluate the market potential for the territory which you believe can be covered with maximum effectiveness.

### Two Questions

Now we have two questions instead of one. First, to determine the approximate area you can cover with minimum efficiency. Second, to estimate the volume of business that is available within those boundaries. The answer to the second, with due consideration for the number of dealers already operating in the area, should govern your action with respect to the first.

Here is what you need to estimate your potential:

- a) The extent (percentage) of TV set penetration in your city.
- b) The number of households (families) in the area.
- c) The percent of penetration (a) times the number of families (b) equals the estimated television households.
- d) Statistics indicate that a TV set is serviced an average of 1.4 times per year. This figure times the number of TV families (b) equals the number of service calls which can be expected to materialize in a 12-month period. This figure, incidentally, is important in its

relation to the number of service jobs which you are experiencing. What is your ratio?

e) The price tag for the area which you are exploring is computed by applying the estimated average service charge per call to the total projected calls. If, for example, we use an average price of \$8.00, and if we have estimated a total of 100,000 calls—the potential volume of service business is \$800,000.

What percentage of that market can you reasonably expect to get and, of equal importance, how much of it can you handle within the limitations of your available manpower, organization structure, capital, etc.? Those are the questions that must be analyzed in planning the scope and depth of your servicing operations for 1956.

The two principal points I would like to make are the existence of a constantly increasing national potential at the service level, and that “X” percentage of that steadily growing business is in your own neighborhood. I do not believe that you have to range far and wide to develop the sales volume you need to liquidate your overhead costs and meet your profit requirements. Much of it is right in your own backyard.

If you agree that the market for electronic servicing is big every way you look at it, then I think you will also agree that the techniques for developing the market leave something to be desired. I do not believe you will dispute me when I say that a good portion of that market remains unsolicited and uninvited. For this reason, I do believe that there is a great deal more promotional effort needed at the service level.

I'll speak from a personal standpoint: "I wish some TV servicing dealer in my neighborhood would ask, by phone or post card, for my business, just once. I am a customer for the asking."

It is important to plan your firm's operations and to evaluate its progress against the background of the service potential in your neighborhood or city, as the case may be. It is equally important to formulate definite plans for the promotional work required to develop and retain the business that is available to you in the area you elect to serve. Do not underestimate the value of advertising and promotion as a means for maintaining service revenue at the required level. Electronic servicing, like the corner drug store, is basically a neighborhood business. But, you've got to make your presence known, day in and day out, if you hope to capitalize on its potential.

There are two remaining points regarding the maintenance of proper levels of service income: the rate at which you sell your labor, and sales from sources other than service labor.

Electronic servicing organization is engaged basically in the sale of labor. The term "service" implies the employment of skilled technical personnel to locate and correct a mechanical difficulty. For the service you render, you should receive a fee sufficient in amount to cover the cost of your productive labor, a proportionate share of the overhead, and a reasonable profit. If your service rates are too low, the revenue from labor sales is not only reduced but, also, the gap between gross income and operating cost is narrowed by the amount of the rate deficiency.

The matter of establishing proper rates for the labor you sell has had widespread attention and discussion. I doubt that I can add anything on that score, and I appreciate that competitive practices play an important role in every neighborhood. There is one thing certain: if you are faced with rigid competitive pricing practices, then your overall operations must be conducted, cost-wise, in proper relation to the revenue produced by these rates. On the other hand, if you have some leeway in establishing the rates, be sure they cover the elements mentioned previously, i.e., 100% liquidation of your productive labor, recovery of a proportionate share of overhead, and

an allowance for return of profit.

In an automobile servicing business, the sales of parts, accessories, etc., and the gross earnings resulting therefrom are a big factor in the profitable operation of the department, or the business, as the case may be. And so it is in the electronic servicing business. Your sales from such sources should approximate 40% to 50% of your total revenue, and the gross profit on these sales will make a substantial contribution to your liquidation of overhead and return of net profit. Are you getting your share of this business? If not, why not? These are questions only you can answer.

#### The Other Side

I have dwelt on the problem of developing and maintaining proper levels of revenue because of its importance to a balanced operation. Now, let us discuss briefly the other side of the equation—the direction of operations in proper relationship to actual and projected levels of sales revenue. This phase of an electronic servicing business is of no less importance than the development of sales. Their obvious inter-relationship needs no further emphasis on my part.

If our objective is to maintain operations in proper relationship to income, then, obviously, we must have up-to-

date, reliable data regarding the costs of operation. Your bookkeeping system is the source of this information. It should reveal to you daily, weekly, and monthly certain key operating data. If it does, then you have taken a big step forward in the task of keeping your operations in balance. If it does not, then this unfortunate deficiency should be corrected without delay. Take the guesswork out of your firm's operation, know your costs down to the very last penny. Regardless of size, there can be no excuse for failure to maintain an adequate set of bookkeeping records.

What precise data should your records reveal to you as an aid to proper management of your business? Let us examine, briefly, some of the data that should be available to you in that respect.

If the principal sources of revenue in a servicing business are (1) the sale of labor and (2) the sale of parts, accessories, etc., then it is important that your books reveal these data, daily, for each category. Under no circumstances should these sales be lumped together, if only for the reason that they are both subject to different methods of control. In the one, productive hours and the cost of productive labor are key factors. In

(Continued on next page)

The RCA Tube Division recently announced the addition of seven new selenium rectifiers to its line.

The new RCA selenium rectifiers are as follows: type 205G1, 65 ma maximum dc output current; 206G1, 100 ma; 207G1, 200 ma; 208G1, 250 ma; 209G1, 350 ma; 210G1, 400 ma; and 211G1, 500 ma. (New rectifiers 210G1 and 211G1 are special types for use where available space does not permit use of the standard-shape RCA rectifiers 203G1 or 204G1.) Seven of the new rectifiers are rated at 130 input volts maximum.

For your ready reference, RCA's complete line of 12 selenium rectifiers, along with their current and voltage ratings, are shown at right.

12 RCA selenium rectifiers—competitively priced—are outstanding for their modern, wide-open construction that provides: (1) improved heat dissipation; (2) dependable per-

formance; (3) long life; (4) smaller size; and (5) rigid construction.

Your RCA distributor is now ready to supply you with quantities of the 12 RCA selenium rectifiers. See us today.

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### RCA'S 12 SELENIUM RECTIFIERS

Max. DC Output Current Rating (ma)	Type
65	205G1
75	200G1
100	206G1
150	201G1
200	207G1
250	208G1
300	202G1
350	209G1
400	203G1
400	210G1 (thin type)
500	204G1
500	211G1 (thin type)

types are rated at 130 ac input volts maximum.

## Management for Profit

(Continued from preceding page)

the other, your inventory and purchases of merchandise are the control points. Does your bookkeeper provide you with a daily report of sales by category? If so, another big step in controlling operations has been taken.

If a primary source of revenue is the sale of technical labor, then it is equally important that your records reflect the productive hours in which this labor was employed and its cost. While this information should be available daily, from a practical viewpoint it need be summarized only on a weekly and a monthly basis.

It would be wonderful if your technicians could be employed productively at a full eight hours per day, or 100% of maximum. We know this is not so; therefore, it is equally important that the hours and the cost of non-productive time be recorded. This idle time, unapplied time, non-productive labor, by whatever term you choose to call it, can be sizable. Furthermore, these costs must be recovered through the sale of productive labor. How can you control these hours and recover their cost if the records do not reveal this information? Unapplied time must be kept at a minimum if your profit objectives from the sale of labor are to be attained.

### Reflect Cost of Withdrawals

Records should also be provided to reflect the cost of withdrawals from stock and material usage. How else can your inventories be controlled so as to avoid losses in this area?

Last, but certainly not least, the books should reflect the actual overhead costs each and every month. It is not sufficient to record only the outgoing expenditures. Provision should also be made for such costs as: depreciation, unpaid taxes, insurance, improvements, bad debt losses, etc. These expenses are easy to compute, and no profit and loss statement or report on "overhead" can be considered complete unless they are included.

I believe you will agree with me that determining costs of operation and the measuring of those costs daily, weekly, and monthly against sales revenue is of great importance in your efforts to maintain a balanced business

operation. Record-keeping in a servicing organization need not be complex or cumbersome. Your records should, however, provide specific information concerning your firm's operations, in the form of a monthly profit and loss statement. Furthermore, this statement should be supplemented with weekly reports dealing with such factors as month-to-date sales, the number of service calls, hours of productive and non-productive labor, cost of labor, gross earnings on parts sales, etc. I am confident that the effort required to prepare this information is small in relation to the means it provides for controlling operations in line with your profit objectives.

In conclusion, I should like to point out that I have only touched on those

areas of your business which appeared to have some major interest to you. You will have observed, of course, that I have made no reference to many other problems and factors concerning your servicing operations. I assume, for example, that a satisfactory job ticket is being used to support every service request and, also, a daily time report to account for each serviceman's time. The information made available through these records can be extremely useful to your management efforts.

The market for electronic servicing at the national and local levels is big. It is getting bigger every day. Your problem is principally that of getting your share of that market, and then directing all supporting operations with maximum effectiveness.

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## When It Comes to Picture Tube Replacement

### BE WISE AND CAPITALIZE WITH RCA

When a service technician encounters a television receiver which needs a picture tube replacement, quite often he is asked by his customer: "What's it going to cost?"

For this reason, many a conscientious serviceman, trying to give the best service possible, figures that if and when a customer balks at the mention of the full price of a new kinescope, the best plan is to switch the conversation to a "cheap" tube. The purchase of this "cheap" tube is false economy for the customer; the sale of this "cheap" tube is false reasoning by the dealer. In the long run, such a transaction "hurts" both the customer and the serviceman.

What does the TV set owner really want? He wants a good picture as inexpensively as possible. Agreed. But he also wants a picture that will last as long as possible with a minimum of service call-backs.

It is up to you to see that "penny wise, pound foolish" does not become the motto of your TV set-owning customer. This should not prove a difficult task, for within 30 seconds you can point out the following facts to your customer whose set needs a new picture tube:

(1) An RCA picture tube will give him the finest, sharpest picture his set is capable of delivering.

(2) Although the initial cost of a new, factory-fresh RCA picture tube

may be higher than that of some lesser-known brands, the true cost becomes lower when figured over the life of the tube.

RCA consistently checks all picture tubes for quality and long life. This involved series of quality- and life-tests is one of the reasons for the higher initial cost of RCA picture tubes. But it pays off for you and your customer in the long run. RCA's exhaustive quality checks are your customer's guarantee of long-life tubes and peak performance. If you point out to your customer that he may have to replace more often when he buys "cheap" tubes, he should recognize the value of your installing a brand-new top-quality RCA tube.

Remember: You are not in business just for today or tomorrow—but for many years to come. A satisfied customer will come back over the years. But if you save a customer a few dollars at the expense of his long-time satisfaction, then you will not have a satisfied customer . . . and you may lose his business entirely. Eventually, he is going to blame you if his set does not perform as well as the one his neighbor has.

So, be sure of peak performance. Install high-quality RCA picture tubes. Indeed, this practice will help you achieve your long-range goal of building and retaining a substantial list of satisfied customers.



## Keeping Ahead ... the year 'round

Have you had a couple of slow days on your hands during the past few weeks? Do you think it's possible that on the very days you were "slow" someone in your vicinity had a radio or TV set that needed servicing—but that they just didn't know whom to call?

That's a provoking thought, isn't it? Chances are that you may have missed another profit opportunity because you lacked just one *important* element: a positive, year-'round selling plan.

In any business, you must have a sales plan to help you sell your services. And the very first step in any selling plan is to tell people that you have something to sell—to get your "foot in the door" with your first sale. After you get that opportunity, and if you do a good job the first time, there's an excellent chance that you'll have another steady customer to add to your list.

The problem, therefore, is to work out a plan that puts your name before all these potential customers who, at any one time, have service problems.

Naturally, a good sales plan is built upon a good product. In the field of TV servicing, a good selling plan presupposes that you "know your stuff" technically and that your shop is well equipped to do a satisfactory job—on time. Then, it's up to you to work out, and carry out, a selling plan that covers every potential customer.

The following check list can be used as a guide to formulate your own selling plan. If you follow this plan conscientiously, you're well on the way to building a steady flow of business, and a firm foundation for the future.

### Your Storefront and Window

- 1) Use your window as a show-window.
- 2) Be sure your window area is well illuminated.
- 3) Dress your window regularly with interesting displays.
- 4) Keep your window glass spotless.
- 5) Feature an illuminated outdoor sign to catch the "eye" of your street traffic.
- 6) Use a colorful window valance to "snap up" your window area.

7) Give your store front the impression of *professional* service by having all your placards professionally done.

8) Place an illuminated sign in your window area to attract attention to your services and to the fact that you use top-quality parts and tubes.

9) Dress your window to fit the season.

### The Inside of Your Store

10) Be sure your store interior is well lighted.

11) Keep your store spic and span.

12) If your store could use a fresh coat of paint, it's worth the expense.

13) Do not clutter counter area.

14) Use interesting display material in the store.

15) Use shelf strips.

16) Use merchandising units to stimulate impulse purchases.

17) Display your merchandise neatly on your shelves.

18) Greet store customers promptly and cheerfully when they enter.

### On the Service Call

19) You and your men should *look* professional . . . neatly shaven and cleanly dressed at all times.

20) On service calls, always be courteous and polite, remembering that you are the only "stranger" who works in the family livingroom.

21) Treat your customer's furniture as though it were your own, being careful not to lay tools or instruments on top of the set, or on any other furniture.

22) Use a drop-cloth to protect your customer's rugs.

23) Remove all old tubes and cartons from the customer's home when your call is completed.

24) Pave the way for future business by placing a "Repeat Service" sticker on the back of every set you service.

25) Give your customer a neat, filled-out repair tag, with your imprint.

26) Use professional-looking service chests on your home calls.

27) Point out to your customer that you use top-quality tubes and parts.

28) Clearly explain your charges to the customer to make him feel that your bill is reasonable.

29) "Touch up" scratches in the cabinet before you leave. A little "extra" such as this goes a long way toward creating a good impression.

30) Deliver the repaired set when promised.

### Outside Activities

31) Send out mailing pieces regularly, at least three or four times a year, to *potential customers* in your area.

32) Send "reminder" or "follow-up" cards to your *regular customers* every six months or so.

33) Consult a local mailing house, or your city directory, to obtain an up-to-date list of prospects in your area.

34) Run a small ad at least once or twice a week in your local newspaper.

35) Have a small billboard at the railroad station, bus terminal, or other busy location.

36) Run a small ad in the classified telephone directories of surrounding communities.

37) Advertise with card cards displayed in the local buses.

38) Take advantage of unusual events to run special ads (for example, antenna repairs after a bad storm, or prompt TV service before a big fight).

39) Leave a small supply of business cards with the service manager of the garage that services your truck. Tell him that you also service auto radios.

40) Take an active part in community activities. The folks in your town may be acquainted with your store but it's also very important that they get to know *you*.

41) If you are in a small city, occasionally use the local television station to offer TV adjustments or antenna repairs. This may be an ideal way to reach prospects while their sets are giving them trouble.

42) Canvass local TV set dealers and department stores to solicit additional servicing work.

43) Decorate your service truck so that it is a "mobile advertisement" for your store.

If you examine the above list carefully, you'll find that even if you plan to do *all* these things (and there's no reason why you shouldn't) the cost to you will be very low. It actually costs nothing when the end result pays off in extra profit.

Remember these three important rules: (1) Have patience. (2) Don't try to do everything at once. (3) Consult your RCA distributor for much of the information and material you'll need to conduct your selling plan. He's ready to provide you with a great variety of sales aids at little or no cost.

# Key to Greater Profits:

## RCA TEST EQUIPMENT MORE THAN PAYS FOR ITSELF

With the ever-increasing complexity of the radio-television service field, the problem of purchasing up-to-date test equipment is becoming a major source of concern to the average service technician.

Practically every serviceman recognizes the worth of proper test equipment in time saved, high-quality work, and professional appearance. The question is often raised, however, as to whether the added benefits of new test equipment are great enough to justify the initial cost.

Instead of trying to balance mentally the total cost of various pieces of test equipment against a general idea of their utilitarian value, a serviceman can analyze his test-equipment problem in two stages. First, he evaluates the above mentioned advantages to be obtained from modern test equipment. Second, he weighs these advantages against the per-week, or even the per-day cost of the equipment. When he has finished, the serviceman can tell to a very close approximation whether the new test equipment will pay for itself.

### Time Saved

In the early days of radio, most receiving sets were quite simple by today's standards. A typical receiver consisted of a long antenna, a single slide-tuning coil, a crystal detector, and a pair of earphones. To service such a set required little or no test equipment. You could try a new crystal, then check for broken or loose wires. As a last resort, you could try another pair of earphones.

Naturally, servicing by the hit-and-miss method took extra time. But in those days the glamour and romance of radio kept most people from worrying about such business-like subjects as the value of time.

Today, however, the radio-television service industry is big business. Reliable estimates indicate that in 1954 the national dollar volume for electronics servicing was \$1.5 billion. By 1959 that figure is expected to be doubled.

With the continuing growth of the radio-television service industry, the value of the serviceman's time becomes

of increasing importance. Nationwide averages indicate that labor charge for radio, television, and phone servicing runs about \$4.00 per hour. This means that if a piece of test equipment costs a serviceman \$4.00 per week, but saves him an hour's time each week, the equipment is paying for itself. Or, if the equipment saves an hour's work each week, and costs less than \$4.00 per week, that equipment is earning a profit for the serviceman.

### Modern Test Equipment

Not too long ago, an oscilloscope was considered a luxury by most service technicians, but today there is probably no greater time-saver in any service shop than an accurate, versatile oscilloscope.

In the RCA test equipment line, there are now four 'scopes ranging in price and versatility to fit practically every pocketbook and every service need. They are the WO-91A, the WO-78A, the WO-56A, and the WO-88A. Each one can save you time and money.

### WO-91A

The newest oscilloscope in the RCA test equipment line, the WO-91A is a 5-inch 'scope that has all the features necessary for both black-and-white and color-TV servicing. A detailed description of this instrument appears on page 3 of this issue.

### WO-88A

The WO-88A, RCA's popular 5-inch oscilloscope, will quickly indicate the source of hum, or reveal by waveshape analysis a defective part or stage in a TV receiver, and give an accurate indication of receiver alignment when used with an RCA Sweep Generator and Calibrator.

In addition, the WO-88A has built-in, front-panel, voltage-calibrating facilities which permit simultaneous waveshape display and peak-to-peak voltage measurements. (Frequently, the *shape* of the TV waveform under observation will be correct but its *amplitude* will be low, causing improper operation. Therefore a TV 'scope is complete only if it can measure the

peak-to-peak voltage of the displayed wave-form.)

Also, on the WO-88A, sync polarity may be reversed by the click of a front-panel switch. Thus, positive or negative TV pulses whose polarity depends upon where the 'scope is connected in the circuit can be measured with a minimum of time.

### WO-78A

The RCA WO-78A is a 5-inch, dual sensitivity, wideband oscilloscope that incorporates features especially important to color-TV servicing.

On its wide band setting of the bandwidth switch, the WO-78A has a frequency response flat, within minus one db, from 3 cps to 4.5 Mc, with direct sensitivity of 0.1 volt peak-to-peak per inch (0.035 volt rms per inch).

On its narrow band setting, the WO-78A has a frequency response flat, within minus-three-db, from 3 cps to 500 kc, with direct sensitivity of 0.01 volt peak-to-peak per inch (0.0035 volt rms per inch).

With the WO-78A, it is as easy to measure the voltage of any desired portion of a waveform as it is to measure dc voltage with an ordinary voltmeter. Here are a few of the design features which result in the WO-78A's ease and accuracy of voltage measurements:

(1) In calibrating the WO-78A, it is not necessary to disconnect the input cable from the circuit under test, or to set the vertical attenuator on a specified range. The "calibrate" pushbutton automatically disconnects the input cable and the attenuator, and applies a fixed internal calibrating voltage to the vertical amplifier. To calibrate, it is necessary only to push the button and set the vertical vernier for two inches of vertical deflection.

(2) A limiter tube in the sync circuit eliminates any need for adjusting sync amplitude. The pattern stays locked in sync over wide ranges of input voltage and over a considerable range of input frequency. There is no need for a sync amplitude knob on the WO-78A.

(3) The vertical attenuator has numerous small steps which provide generous overlapping of ranges. The correct

pattern height is selected by turning the vertical attenuator knob only.

(4) The measurement and visual comparison of low- and high-frequency components of composite waveforms are accurate because the WO-78A has flat response from 3 cps to 4.5 Mc.

### WO-56A

The RCA WO-56A is a 7-inch oscilloscope of high sensitivity and wide frequency range. Its identical vertical and horizontal direct-coupled, push-pull amplifiers have frequency-compensated and voltage-calibrated attenuator networks, along with front-panel peak-to-peak voltage calibration.

Minute trace detail can be examined on the WO-56A because of its horizontal trace expansion of three-times screen diameter, with comparable vertical centering.

Added time-saving features of the WO-56A are its present TV sweep facilities, retractable light shield, 60-cps sweep and wide-angle phasing control, "plus" and "minus" sync for locking in "upright" or "inverted" wave shapes, and a high input impedance.

### WV-77A, WV-98A, and WV-87A

A vacuum-tube voltmeter is another test equipment item long-since removed from the category of "luxuries." Confronted with the many critical circuits of today's FM and TV sets, the up-to-date service technician counts a good VTVM as "basic" rather than luxury equipment.

Probably the best all-round VTVM for the service shop is the RCA Volt-Ohm-st.® Whether it be the WV-77A Junior, the WV-98A Senior, or the WV-87A Master VoltOhmyst you use, you'll have the benefits of high-input resistance, low-input capacitance on dc

functions, ability to measure dc in the presence of ac and *vice versa*, burn-out-resistant meter circuit on all ohms and voltage functions (no need to start voltage checks on the highest scale), metal-case shielding against rf, plus-or-minus 1% multiplier resistors, dc polarity-reversing switch (a big time-saver in itself), negative feedback bridge circuit, zero-center scale adjustment for discriminator alignment, wide frequency response and extended voltage ranges, positive-polarity ohms probe for quick testing of electrolytic capacitors, and many other features.

In TV service work there's still another big advantage to be gained by using a VoltOhmyst: accurate measurement of the peak-to-peak voltage of complex waveforms. These complex waveform voltages in TV sets range from less than about 1 volt to more than 1,000 volts. For speed and accuracy in servicing, you need a meter that measures such peak-to-peak voltages *directly*. The Junior, Senior, and Master VoltOhmysts give you practically all these peak-to-peak voltage readings directly on the scales of the instrument.

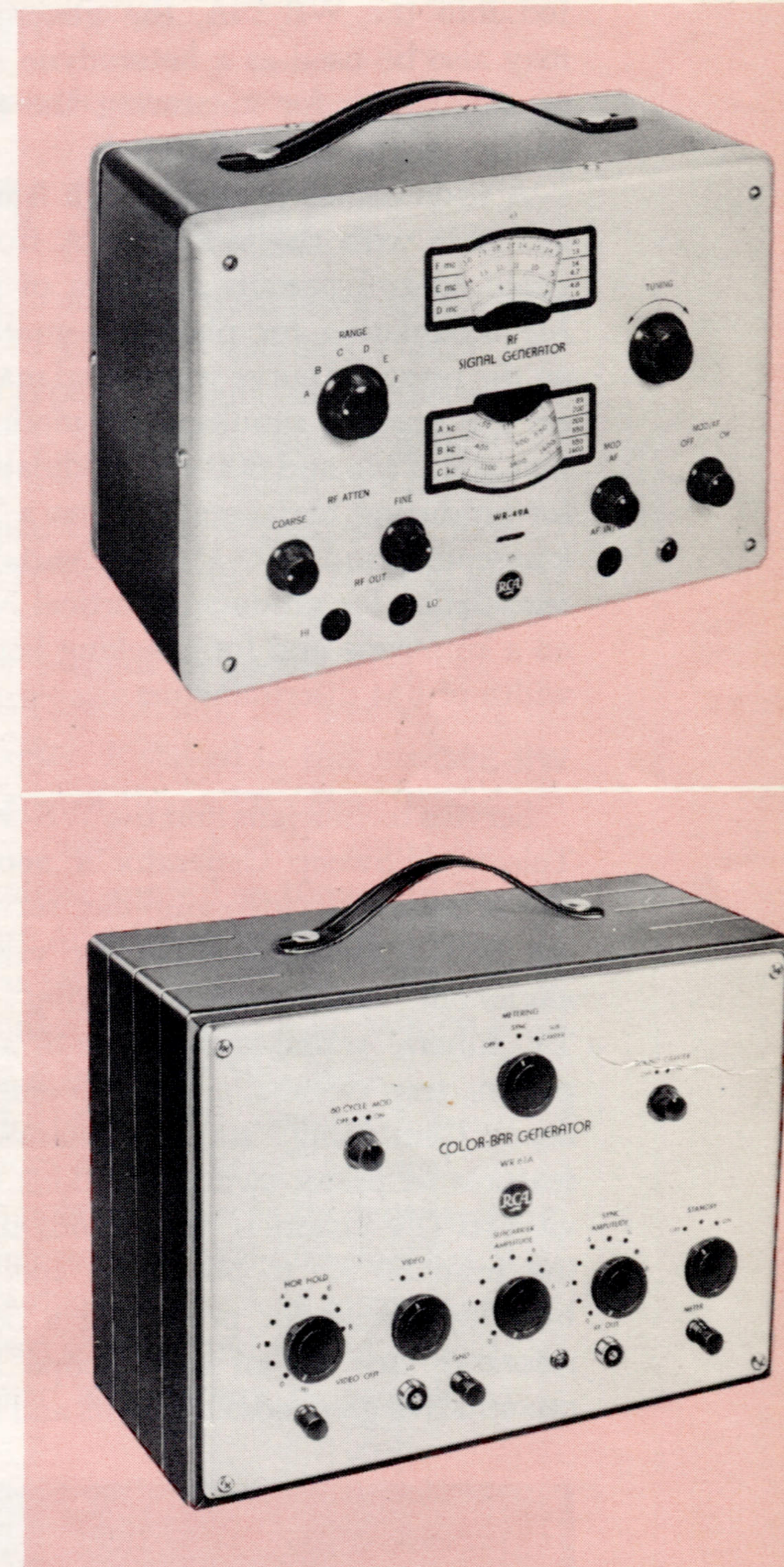
The new WV-98A Senior VoltOhmyst is described in detail on page 3 of this issue. Here is a brief run-down of other major items in RCA's famous line of test equipment.

### WR-89A

Featuring continuous tuning, the RCA WR-89A Crystal-Calibrated Marker Generator furnishes you with an rf carrier of crystal accuracy for use in alignment and trouble-shooting. It is a valuable aid for work on TV and communications receivers, transmitters, and other equipment operating in the frequency range of 19-260 Mc. Calibra-

(Continued on next page)

Pictured below are close-ups of the WA-44A Audio Signal Generator (bottom left), the WR-36A Dot-Bar Generator (bottom center), the WR-89A Crystal-Calibrated Marker Generator (bottom right), the WR-61A Color-Bar Generator (middle right), and the WR-49A RF Signal Generator (top right).



# Key to Greater Profits: RCA Test Equipment

(Continued from preceding page)

tion of the generator may be checked at 2.5 Mc intervals throughout its tuning range by means of a built-in harmonic crystal oscillator of high accuracy.

A separate crystal oscillator in the WR-89A also provides a fixed output frequency of 4.5 Mc for use in aligning inter-carrier-if amplifiers and discriminators. When an external rf signal is fed into the WR-89A, the generator may also be used as a heterodyne frequency meter for measuring the frequency of the external signal.

A wide choice of modulation is also available with the WR-89A. A front-panel control permits selection of 4.5 Mc modulation for placing a marker on the response curve when dual markers are needed; simultaneous modulation at 4.5 Mc and 600 cps modulation for producing horizontal bars on a TV kinescope; and 100-150 kc variable modulation for producing vertical bars on a kinescope and for checking bandwidth of FM discriminators.

## WR-59C

Service technicians find the WR-59C Television Sweep Generator a necessity in color-TV video amplifier servicing and a real time-saver for visual alignment and trouble-shooting of TV tuners, sound-and-picture-if amplifiers, trap circuits, and video amplifiers. Combining such outstanding features as preset switch positions for all VHF-TV channels, continuous tuning from 50 Kc to 50 Mc, a special blanking circuit for producing a zero reference line on an oscilloscope for quantitative gain measurements and for

blanking discriminator circuits, and a high output-voltage flat and free from spurious responses, the WR-59C really simplifies TV servicing.

## WP-25A

RCA TV Isotap WP-25A lets you avoid wasted time and uncertainty in TV trouble-shooting. Use its 500-volt-ampere auto-transformer winding for testing power transformer types of TV receivers. Use its 275-v isolated secondary winding for testing transformerless types of TV and ac/dc radio receivers.

With the WP-25A, you can service sets at normal line-voltage for quick checks of circuit voltages, then make sure the set functions satisfactorily at low line-voltage. Or, you can break down intermittent components by operating the set at an extra-high line-voltage.

By using the RCA TV Isotap you avoid service recalls caused by a difference of line-voltage in the customer's home. In addition, you avoid expensive damage to your own test equipment by eliminating the possibility of crossed line plugs on transformerless receivers and test equipment.

## WA-44A

When it comes to time-saving versatility, the RCA WA-44A Audio Signal Generator can't be surpassed. This one instrument will permit measurement of: intermodulation distortion in amplifiers, amplifier frequency response, frequency response of tone controls, frequency response of phonograph amplifiers, resonant frequency of loudspeakers, and speed of recorder/reproducer mechanism.

This compact, lightweight instrument is equally useful for: tuning bass-reflex enclosures, determining unknown audio frequencies, determining inductance and capacitance, audio signal tracing, determining the resonant frequency of LC circuits, and locating cabinet resonances and rattles.

The RCA WA-44A features a new RC-type oscillator having wide frequency range that facilitates checking the response of high-fidelity amplifiers. And, an amplified-agc circuit insures an output uniform within plus-or-minus 1 db over the entire frequency range of 11 to 100,000 cps.

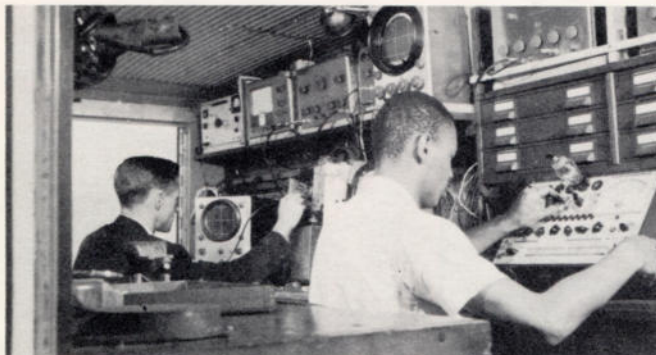
## WR-49A

You don't have to bother stringing dc blocking capacitors to the probe tip of the RCA WR-49A RF Signal Generator. This 85 Kc to 30 Mc generator has built-in dc blocking capacitors. With the WR-49A, you can inject rf signals into plate circuits and other points where dc is present without placing a dc load on the circuit under test. You also gain protection from burn-out in both the equipment and signal generator.

Compact and lightweight, the WR-49A can be depended upon in such applications as alignment and signal tracing of AM and FM radio receivers, alignment of low-frequency if amplifiers in TV receivers, and signal tracing and trouble-shooting in TV receivers.

## WR-86A

"Laboratory performance at a service-instrument price" best describes the RCA WR-86A UHF Sweep Generator. Designed for research, production, and servicing, the WR-86A is suitable for TV applications on color and black-and-white UHF receivers, converters,



**MOBILE TV SERVICE COMPANY**—RCA test equipment plays a prominent part in the mobile servicing operations maintained by the ABC Mobile Television Service Company, whose official address is 522 Forest Glen Rd., Silver Spring, Md. A "complete electronic laboratory" on wheels, ABC

publicizes that it is set up to overhaul a customer's TV receiver on-the-spot—not in but at least right at the customer's home. TV set owners in the area contact the mobile service firm by radio telephone merely by picking up their home telephones and dialing the ABC truck's special phone number.

tuners, filters, antennas, transmission lines, and other equipment operating in the range from 300 to 950 Mc.

The UHF circuits of television receivers must be aligned for flat frequency response — and should be checked for correct input termination. Both of these factors are more important for color reception than for black-and-white, because the receiver must pass not only the usual brightness-signal carrier but also the color sub-carrier—which is separated from the brightness-signal carrier by 3.58 Mc. If the response is “down” at the frequency of the color subcarrier, the color signals will be correspondingly attenuated, and color sync may be unstable. And, if the input impedance of the UHF tuner is a poor match for the antenna transmission line, the overall frequency response is affected.

Thus, for satisfactory results, the UHF sweep generator must provide flat-voltage output over the swept ranges. In addition, it must be designed so that positioning of the output cable does not alter the observed response curve. The RCA WR-86A is an accurate, reliable, and time-saving instrument for aligning the UHF circuits and for checking the input termination of UHF tuners and converters.

### WR-61A

By removing your dependence on a broadcast color bar test pattern, the RCA WR-61A Color-Bar Generator provides up your color setting. The WR-61A is a compact, lightweight instrument for use in setting the overall operation of color receivers, and for adjusting color phasing and magnification.

The WR-61A produces 10 bars of different colors. The color bars are at 30-degree phase intervals, corresponding to the angles of R-Y, B-Y, I, and Q. These intervals thus permit accurate phasing of receivers that demodulate on either R-Y, B-Y, or on I and Q.

In addition to its many other aids to color alignment, when its high-level video output is injected into the video amplifier, the WR-61A is useful in locating a defective stage or section. Trouble may be located ahead of or following the second detector.

A built-in receiver circuit in the

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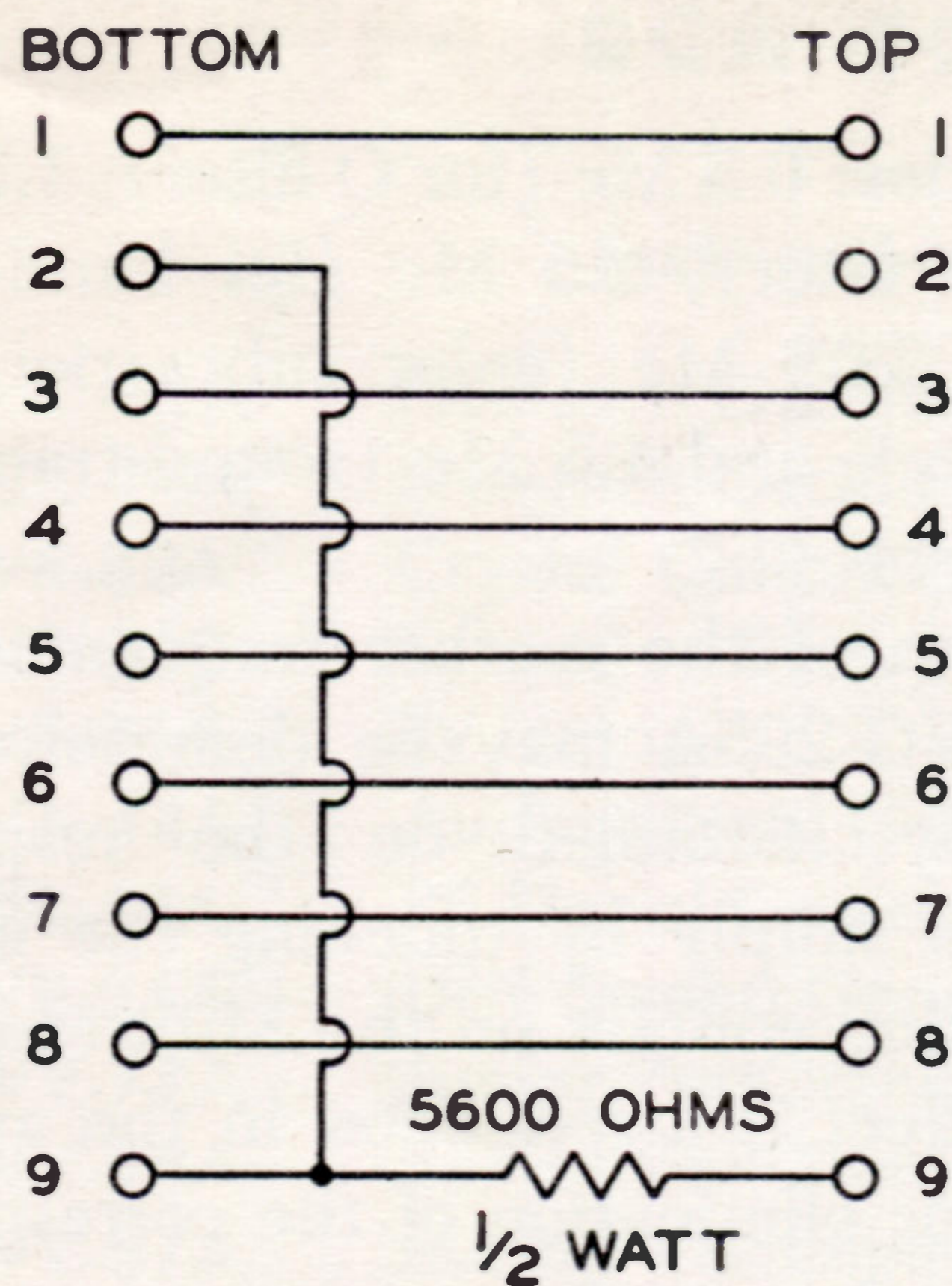


Figure 1: Wiring diagram of WG-305A

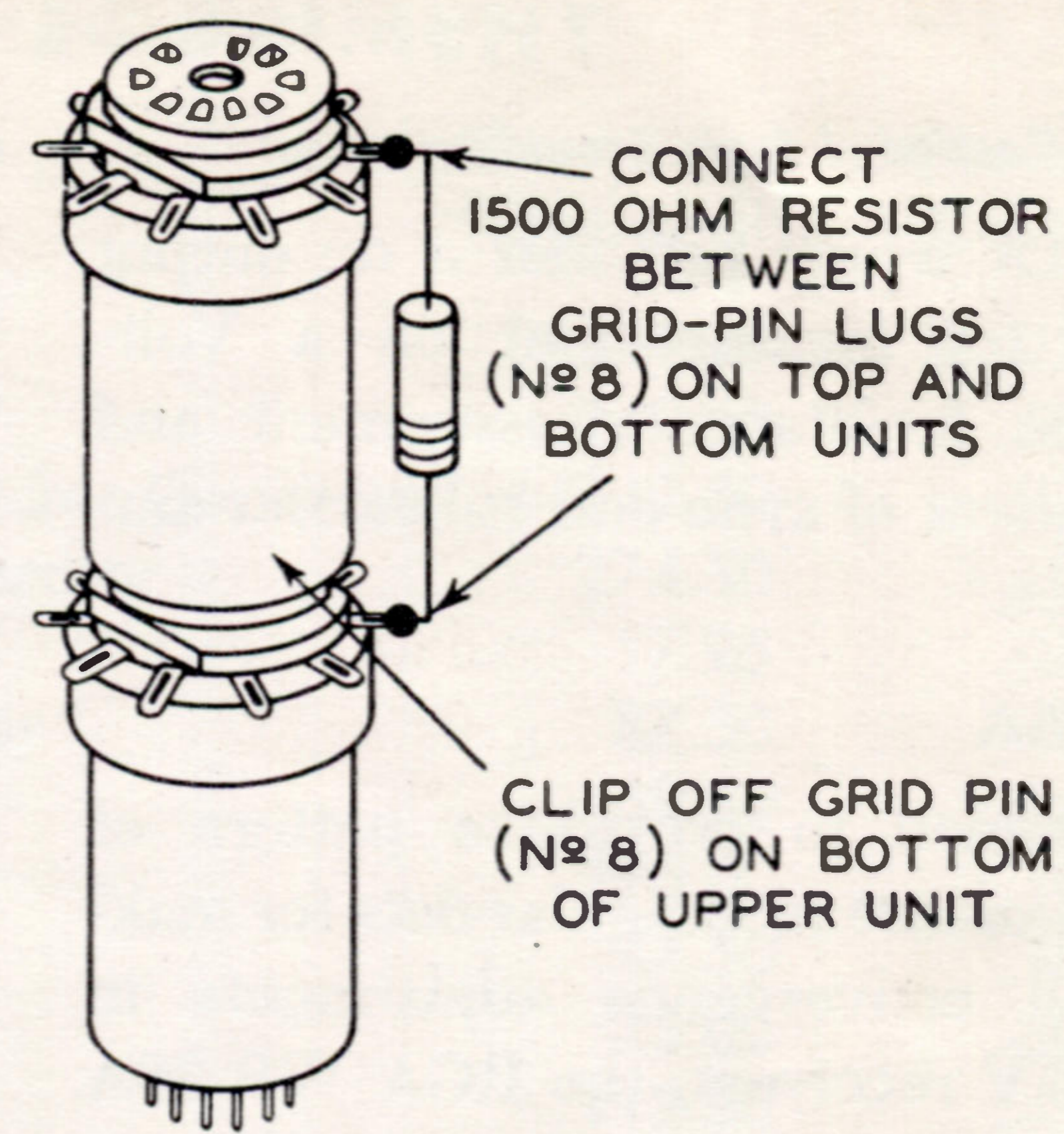


Figure 2: Alternate adaptor for 6AN8

## WG-305A Simplifies Color-TV Servicing

A small, new, inexpensive unit designed to simplify trouble-shooting in the video stages of RCA color-TV receivers 21-CT-661U and 21-CT-662U, as well as all similar receivers employing a type 6CL6 tube in the second video amplifier stage, is now available from your RCA test equipment distributor. Known as the RCA-WG-305A Video-Test Adapter, this instrument prevents attenuation of the video signal from the WR-36A Dot Bar Generator when the contrast control of the receiver under test is set to its minimum value.

The WG-305A can be installed in a few seconds by merely removing the 6CL6 from its socket, plugging the WG-305A into the socket, and plugging the 6CL6 into the top of the adapter. Installed in this manner, the WG-305A adds a resistor between the grid of the 6CL6 (pin #9) and the contrast control. This added resistance prevents short-circuiting the video test signal to ground when the contrast control is turned down.

The simple steps for using the Video-Test Adapter in conjunction with the RCA WR-36A Dot-Bar Generator are as follows:

1) Install WG-305A in receiver and connect a test lead from WR-36A “Video Out” terminal to either lug 2 or lug 9 on top of WG-305A.

2) On RCA receivers 21-CT-661U and 21-CT-662U, connect a sync lead in series with a 150- $\mu$ f capacitor from the “V Sync” terminal of WR-36A to one end of the green vertical tilt potentiometer in the receiver’s convergence assembly. Set “Vert. Sync Selector” of WR-36A to “Ext.” Couple WR-36A’s “H Sync” terminal to a horizontal yoke lead in receiver.

3) Tune in a station on the receiver. Adjust contrast and V- and H-hold controls for a locked-in picture. Stable sync is necessary to provide a locked-in pattern from the WR-36A.

4) Set receiver contrast to minimum and proceed with standard tests.

The service technician may use the WG-305A as a model for constructing adapters for other types of receivers. Shown in Figure 2, for example, is an adapter for use in RCA CT-100 and 21-CT-55 color-TV receivers or similar receivers that employ a type 6AN8 tube in the second video stage. (Note, however, that when using the 6AN8-type adapter shown in Figure 2 in conjunction with a WR-36A Dot-Bar Generator, an additional resistance of 3,300 ohms should be connected between the video output terminal of the WR-36A and the adapter.)

The resistances employed form a voltage divider for the video signal from the WR-36A. The voltage applied to the video stage should be sufficient to provide a sharply defined dot pattern without blooming. When making up adapters for other types of receivers, it may be necessary to experiment with resistance values.

User price (optional) of the WG-305A is \$4.50.

# Key to Greater Profits: RCA Test Equipment

(Continued from preceding page)

WR-61A which provides a dc output signal for measurement on a Volt-Ohmyst facilitates measurement and adjustment of sync and subcarrier amplitudes.

## WR-36A

Designed to provide a pattern of optimum-size rectangular dots for making all convergence adjustments in color-TV receivers, the RCA WR-36A Dot-Bar Generator also provides a choice of horizontal bars, vertical bars, or a cross-hatch pattern for linearity adjustments, in color and black-and-white receivers. The number of bars produced by the WR-36A is adjustable: 8 to 15 horizontal bars; 11 to 13 vertical bars.

Both modulated-rf and video output are provided. The rf output is continuously tunable over channels 2 to 6, with adjustable amplitude. Positive or negative video output of approximately 5 volts is provided for feeding into the video amplifier of color or black-and-white receivers. Choice of internal 60-cps vertical sync, or external sync, is provided.

## WG-295A

For convenience, accuracy, and speed in marking the video response curves of color receivers, RCA has designed the WG-295A Video Multi-Marker. The WG-295A provides five simultaneous absorption-type markers accurately preset at the following fre-

quencies: 0.5 Mc (for Q filter), 1.5 Mc (for I filter), 2.5 Mc (for band-pass filter, 3.58 Mc (color subcarrier frequency), and 4.5 Mc (sound-trap frequency).

Each of the marker frequencies in the WG-295A may be definitely and quickly identified on the response curves simply by touching the corresponding contact on the MultiMarker; the effect is a reduction in the amplitude or elimination of the corresponding marker notch.

With the continuing growth of the radio-television service industry, these time-saving features of RCA test equipment become more important every day. It is quite probable in the near future that only by use of test equipment specifically designed to speed up work will the serviceman find it possible to maintain his present share of the business.

## High-Quality Workmanship

In many service industries, including the radio-television service industry, there are some organizations which are outstandingly successful. Close examination reveals that high-quality workmanship is the foundation on which these organizations have been built. High-quality workmanship enables these organizations to increase their business volume and profits steadily—year after year—regardless of competition.

Price cutting is not the answer to competition in the radio-television serv-

ice industry. Many of the most successful service organizations in this industry, in fact, charge higher prices than their competitors. The American people have demonstrated time and time again that they are willing to pay a fair price for high-quality workmanship. On the other hand, they have no use for inferior work—no matter how low the price.

You take a big step toward high-quality workmanship when you use RCA test equipment. The variety and accuracy of performance of RCA test equipment remove the element of guesswork in servicing. For example: You can depend upon your RCA oscilloscope to give you faithful waveshape reproduction—an important consideration when checking receiver waveshapes against those shown in manufacturer's service notes.

Another example: "Tough Set" servicing is simplified by the use of RCA test equipment; the true performance of individual portions of the receiver can be accurately determined. Then isolation and correction of the defective circuit become a routine matter of service.

Color-television receivers are more complex than black-and-white receivers. Consequently, their circuits must be adjusted with a high degree of accuracy if they are to function satisfactorily. RCA test equipment has the built-in accuracy that can help build a reputation for high-quality workmanship in this growing service field.

## Professional Appearance

There is a wide difference between

## NATIONWIDE SURVEY REVEALS GREAT MAJORITY OF NATION'S 34,500,000 TV

A great majority of the nation's 34,500,000 television set owners are more than pleased with the promptness, quality, prices, and courtesy of TV service technicians. This was the encouraging conclusion reached after the latest nationwide survey of this kind made by Elmo Roper, noted market research expert, for RCA.

Commenting on the Roper report, E. C. Cahill, President of the RCA Service Company, said: "These findings... are a mighty tribute to the integrity and spirit of the more than 100,000 highly-trained and skilled technicians who install and maintain

television receivers in America's homes."

Among other things, the Roper survey—the latest in a continuing study—highlighted the following points:

1) Of the television families interviewed, covering different income brackets in widely-separated parts of the country, "overwhelming majorities" were thoroughly satisfied with all aspects of service received; few set owners had any complaints with repair service they are getting.

2) Further corroboration of this fact was provided by answers to a question used for the first time in the latest survey: "Do you plan to use the same

service company in the future, or not?" Eighty percent said "yes," with only 8% saying "no" and 12% "undecided."

3) Of the 8% who said they would not use the same service company in the future, nearly one half of those interviewed said the reason was because of discourtesy on the part of a serviceman.

4) Forty-nine percent of all persons interviewed who made calls for service during the past year reported "same day" service; 20% received service the next day; 10% within three days. In other words, 79% of all service calls were filled within three days of a call.

the appearance of automobile service stations of only a few years ago compared to the clean, brightly-lit stations of today. So, too, in the grocery business. Today's supermarket — with its neon lights, large show windows, and chrome trim—is a long step forward from the old corner-grocery store. On all sides are examples of forward-looking businessmen paying increasing attention to the appearance of their establishments.

The improvements are paying-off in increased business and larger profits. Customers prefer a business establishment that looks modern and business-like. They buy more merchandise and willingly pay higher prices for it in a store that has a professional appearance.

In the radio-television service field, the professional appearance of RCA test equipment is an important factor in creating a favorable impression in the mind of the customer. The neat, matched effect imparted by modern RCA test equipment goes far to improve the appearance of the entire shop. In addition, the RCA label on your test equipment automatically creates a measure of confidence in the customer's mind. When your service bench displays RCA test equipment, your store already is well on its way to a professional appearance.

#### Amortized Cost

Test equipment is generally considered a capital asset and in many radio and television service organizations the bookkeeping system depreciates it (or

RCA TEST EQUIPMENT		
Instrument	User Price (Optional)	Weekly Cost
WO-91A	Five-Inch Oscilloscope	\$229.50 \$ .92
WO-88A	Five-Inch Oscilloscope	169.50 .68
WR-89A	Crystal Calibrated Marker Generator	242.50 .97
WR-59C	Television Sweep Generator	274.50 1.10
WP-25A	TV Isotap	17.95 .07
WA-44A	Audio Signal Generator	87.50 .35
WR-49A	RF Signal Generator	59.50 .24
WR-86A	UHF Sweep Generator	275.00 1.10
WV-77A	Junior VoltOhmyst	47.50 .19
WV-98A	Senior VoltOhmyst	75.00 .30
WV-87A	Master VoltOhmyst	112.50 .45
WO-56A	Seven-Inch Oscilloscope	274.50 1.10
WR-61A	Color-Bar Generator	247.50 .99
WR-36A	Dot-Bar Generator	147.50 .59
WG-295A	Video MultiMarker	24.95 .10
WO-78A	Five-Inch Oscilloscope	425.00 1.70

“writes it off”) over a period of five years.

This bookkeeping procedure is in no way connected with any schedule of time-payments which may be involved in the purchase of equipment. Neither does this procedure necessarily indicate the life or usefulness of the equipment. Instead it is an accounting procedure that is a factor in determining the profit which a business earns and the taxes which it must pay.

As an example, the WO-88A Oscilloscope has a User price (optional) of \$169.50. When the WO-88A is “written-off” over a period of five years, the cost becomes \$33.90 per year. But each year is normally regarded as having 50 working weeks. On a weekly basis, therefore, the cost of the WO-88A

oscilloscope becomes only 67.8¢ per week.

The table above lists major items of RCA test equipment and shows the User price (optional) for each item as well as the approximate amortized weekly cost. A brief examination of this table shows how truly inexpensive RCA test equipment can be. Remembering the statement made earlier in this article that an hour's service time saved each week is worth \$4, you can see that from the standpoint of saving time alone RCA test equipment should more than pay for itself.

When you add to its time-saving value the advantages of high quality workmanship and professional appearance, it is obvious that RCA test equipment can be your key to greater profits.

5) While the median cost of service calls increased 11% this year over last, reflecting the increased age of the average set, 87% of the persons interviewed reported satisfaction with prices charged, while 7% said the prices were “not very good” and 6% did not know or did not answer.

Regarding the public's opinion of the quality of service received, the survey showed 90% indicated their approval. Seventy-seven percent felt the service “very good,” 13% said “fairly good,” and only 4% expressed dissatisfaction. Six percent did not know. The latest survey is the seventh annual

survey of its kind conducted by the Radio-Television Manufacturers Association for RCA. Undertaken and carried out on a scientific, impartial, and nationwide sampling basis of approximately 5,000 families, the survey has been described as the most intensive ever carried out to determine authentic public feeling toward technicians.

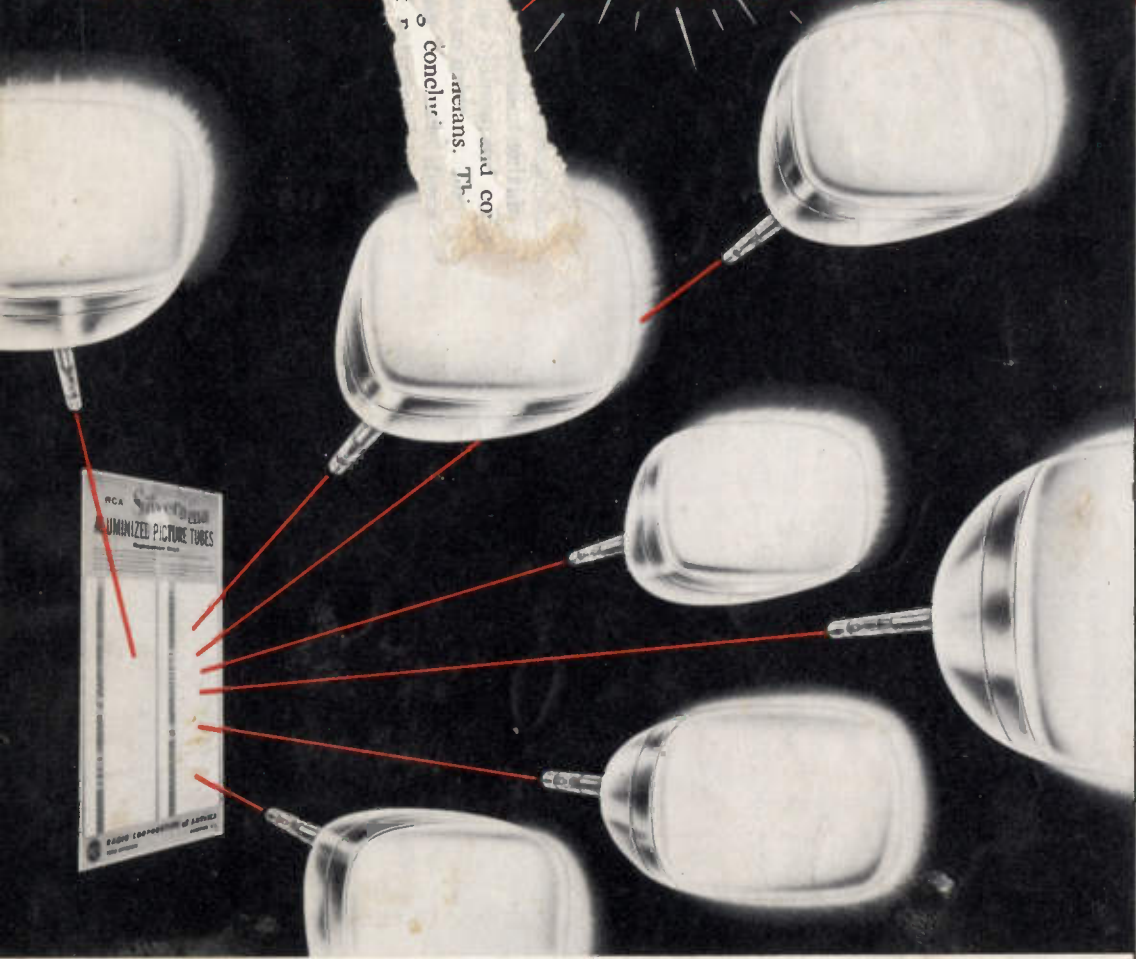
Mr. [Name] said the results of the survey “shows a high endorsement of the service, prices, and attitudes of the thousands of independent service technicians and service associations, as well as television manufacturers, distributors, and dealers by . . . the owners of television sets.”

“The industry has trained and equipped technicians with the service,” stated Mr. [Name]. “The industry should be associated with the public as in its reliable and professional service. It will make up the entire electronics service business. If this most recent survey proves any one thing, it is that the record of the industry's TV service technicians warrants continued public confidence in their work—don't let the industry will continue to provide just as good service in the future as it has in the past.”

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