

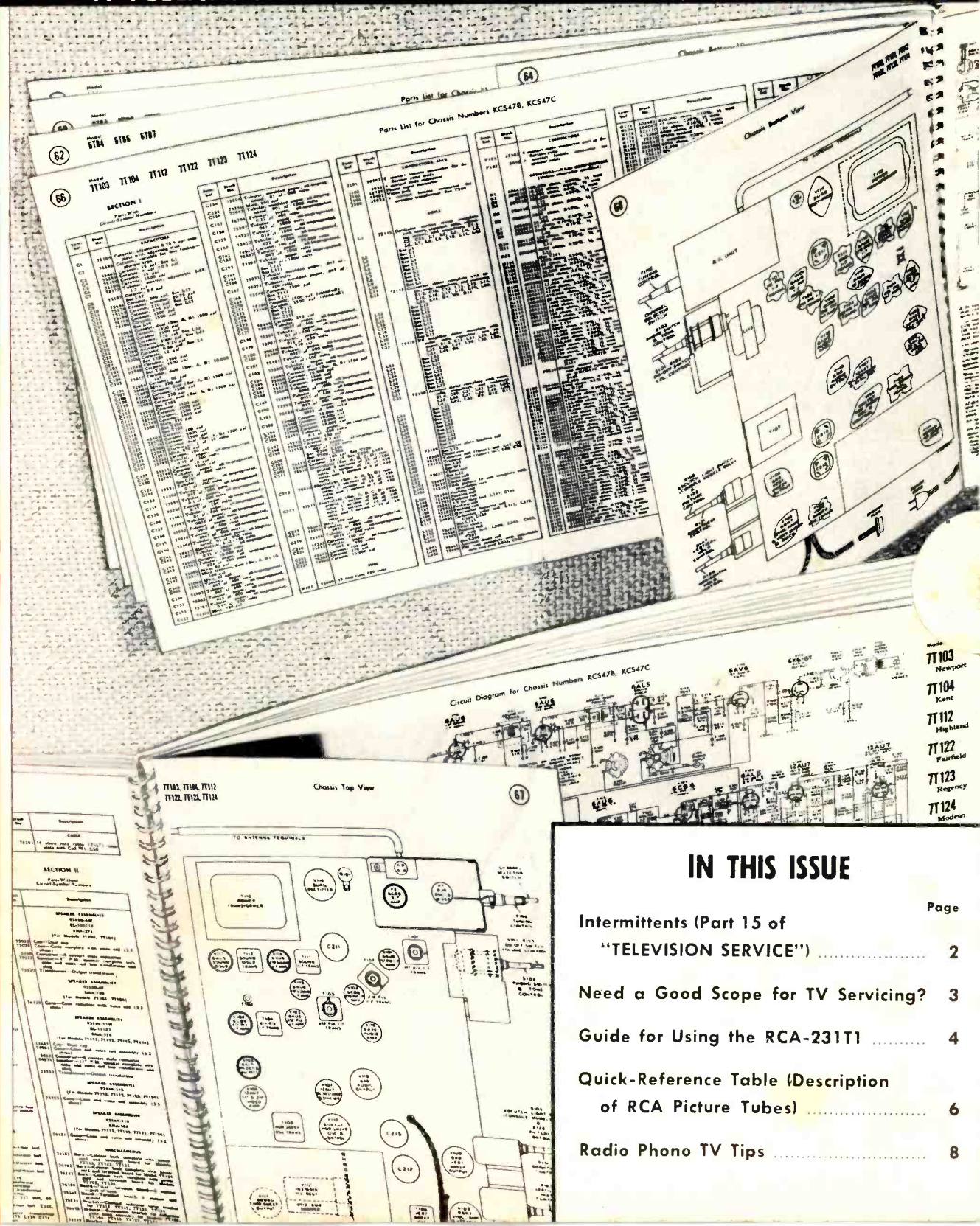


RADIO AND TELEVISION *Service News*

A PUBLICATION OF THE RCA TUBE DEPARTMENT

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INTERMITTENTS

By John R. Meagher

RCA Television Service Specialist

While complete in itself, this article is Part 15 in the series, "TELEVISION SERVICE" by Mr. Meagher

This article, the first in a series on intermittents, describes different varieties of intermittents found in television receivers and discusses a general method for localizing such troubles by "monitoring" the suspected sections.

The causes of elusive intermittents in television receivers can be determined by following a logical procedure:

1. Determine how the intermittent is "triggered." The usual causes include mechanical motion or vibration, change in temperature, voltage breakdown, and incorrect line voltage (either too high or too low).

2. Apply the necessary triggering condition to make the intermittent trouble persist or recur frequently—it is difficult to find an intermittent while the receiver is operating normally.

3. Localize the trouble to a particular section, and then to a particular stage, by analyzing the visible and audible symptoms, and by using suitable test equipment.

External Intermittents

On all complaints of intermittents, it is advisable to be certain, before "pulling" the receiver, that the trouble is actually in the TV set. Intermittents are often due to such external causes as those listed below.

1. **Loose connections, or intermittent shorts, opens, or grounds in the antenna and transmission line** can produce intermittent loss of picture or snow and noise streaks across the picture, especially when the antenna and transmission line are swaying in windy weather. If you suspect the antenna system of being intermittent, try an indoor antenna and look for the same symptoms.

2. **Low line voltage** may cause the rf oscillator to stop operating, with consequent loss of picture and sound. The line voltage may be intermittently low, or it may become low only during a certain time of day or night. If you have reason for suspecting low line voltage, measure the line voltage (with

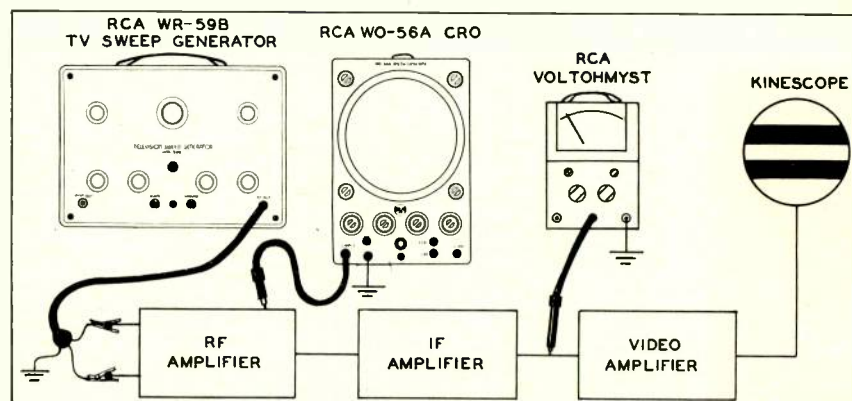


Fig. 1. Intermittent picture trouble can be localized by monitoring the output of the rf, if, and video amplifiers, as shown above. The oscilloscope is connected to the grid-return circuit of the converter. The VoltOhmyst® is connected across the second-detector load resistor. It is necessary to eliminate AGC action by applying fixed bias to the rf and if amplifiers.

the set turned on) at the wall receptacle into which the receiver line cord is plugged.

3. **Excessively high line voltage** may cause intermittent voltage breakdown in one or more of the components in the receiver.

4. **Line-voltage fluctuation** (such as a momentary drop in voltage due to the high starting load of a refrigerator, oil burner, air-conditioning system, etc.) may produce a momentary reduction in the brightness and size of the picture. This condition is very common. A steady fluctuation in line voltage may produce a "pulsing" action in brightness and size.

5. **External interference** from an rf source such as the rf oscillator in a nearby receiver may obscure or blank out the picture for varying intervals.

6. **Station trouble** occasionally produces intermittent picture, sound, sync, or noise streaks. If faulty operation of the station equipment is suspected, it is advisable to check reception of the same station on another receiver.

7. **Loose connections in the power-supply connector, in the house wiring, or in lamps and appliances** may cause intermittent reception, or intermittent noise, when the house is shaken by passing traffic, or by persons walking in the house.

It should be remembered that the intermittent may be in a unit other than the chassis, such as the

kinescope, a separate power supply, an associated radio chassis, or an interconnecting cable, etc. If there is any question about this point, it may be necessary to "pull" the complete receiver, instead of the chassis alone.

Classification of Intermittents

Intermittent troubles may be classified into four groups, as follows:

1. **Intermittents caused by voltage breakdown.** The dielectric in

(Continued on Page 5, Col. 1)

Cover Photo

Typical pages of invaluable service data in our servicing aid, "Service Parts Directory for RCA Victor 1950 & 1951 TV Receivers" (SP-1014). See page 6 for full details.

RADIO AND TELEVISION

Service News

A PUBLICATION OF THE RCA TUBE DEPARTMENT

RCA Radio & Television Service News is published in the interest of servicemen and service dealers. It is written to assist the serviceman in providing better service, and to foster the growth of his business by supplying him with information on the latest trouble-shooting and sales promotion techniques, sales and service aids, together with invaluable data on RCA tubes, batteries, electronic components, and test equipment.

Radio & Television Service News is a bi-monthly publication of the RCA Tube Dept., Harrison, N. J.

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Joseph Pastor, Jr.
Editor

Need a Good Oscilloscope for TV Servicing?

The WO-88A, RCA's New 5-Inch Oscilloscope, Contains Many Features Usually Found Only in Laboratory-Type 'Scopes

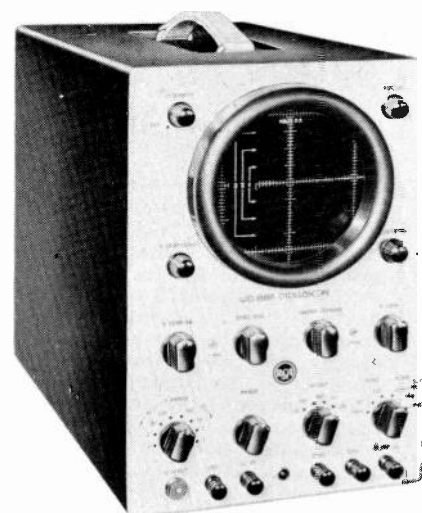
If you are one of the many TV servicemen who have postponed the purchase of an oscilloscope for TV servicing because low-priced oscilloscopes won't quite do the job, and scopes that can do the job are outside your budget, take a look at the photo of the WO-88A—this scope is designed and priced for your service bench!

The all-new WO-88A is designed to meet the special requirements of TV servicing, including the critical tests of sync-pulse reproduction. The exceptional square-wave performance of the "88" insures faithful reproduction of vertical and horizontal waveforms, and a

built-in calibrating voltage source permits simultaneous wave-form observation and peak-to-peak voltage measurements in all sections of the TV receiver!

Performance of the WO-88A can be judged from the unretouched photos shown in *Figures 1 through 5*.

The suggested user price of the WO-88A complete with a set of matched probes and cables (WG-218 Direct Probe and Cable, "slip-on" alligator clip, ground lead, green filter graph screen, and the WG-216B Low-Capacitance Probe) is only \$169.50. See your RCA distributor.



The new 88 really fills the bill for TV servicing. I give it my A-1 personal endorsement.

John Meagher

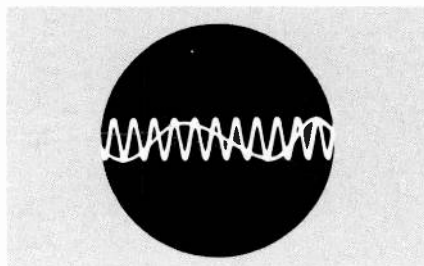


Fig. 1. (Unretouched Photo) 1-Mc sine wave. Sync action is stable over the entire frequency range of the scope. Note the waveform expansion and detail observable on the fast retrace. The vertical amplifier has sufficient output and high-frequency response to provide full-screen deflection at 1-Mc.

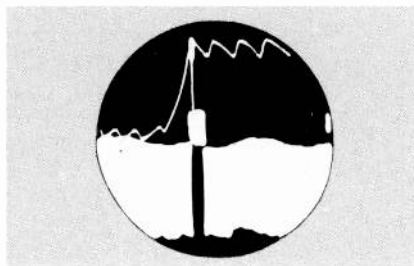


Fig. 2. (Unretouched Photo) Demodulated TV signal in the picture-if amplifier. The high sensitivity of the vertical amplifier in the WO-88A makes possible the observation and measurement of minute voltages in low-level circuits. Using the WG-291 Demodulator Probe*, it is possible to "signal-trace" TV set if amplifiers right up to the grid of the first if stage. *Accessory probe \$7.75 extra.

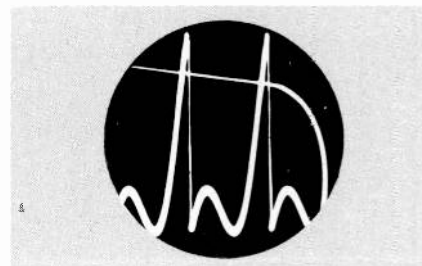


Fig. 3. (Unretouched Photo) Horizontal oscillator waveform. A shunt capacitance of less than 10 μf is applied to the circuit under test when the WG-216B Low-Capacitance Probe (supplied with the WO-88A) is used. With this probe, the over-all input resistance of the WO-88A is 10 megohms.

SPECIFICATIONS

Electrical

Frequency Response (minimum values)

Vertical Amplifier	Flat
From 0 to 100 Kc	within -3 db
At 500 Kc	within -10 db
At 1 Mc	0.5 microsecond or better
Rise time	
Horizontal Amplifier (reference frequency 1000 cps)	within -1 db
At 10 cps	within -6 db
At 200 Kc	

Deflection Sensitivity (minimum limits)

Vertical Amplifier	(rms)	(p-p)
At Input Terminals	0.025	0.07
With WG-218 Direct Probe and Cable	0.025	0.07
With WG-216B Low-Capacitance Probe	0.25	0.7
Horizontal Amplifier		
At Input Terminals	0.6	1.7

Calibrating Voltage

At Input Terminals	0.35	1.0
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Input Resistance and Capacitance

Vertical Amplifier	
At Input Terminals	1 megohm shunted by 30 μf
With WG-218 Direct Probe and Cable	1 megohm shunted by 75 μf
With WG-216B Low-Capacitance Probe	10 megohms shunted by 9.5 μf
Horizontal Amplifier	
At Input Terminals	2.2 megohms shunted by 55 μf

Sweep-Circuit Frequency (Four Ranges)

	15 cps to 30 Kc
--	-----------------

Tube Complement

	6X4, 12AU7, 2-6AU6's, 1V2, and 2-12AT7's
--	--

Power Requirements

Voltage	105-125 volts
Frequency	50-60 cps
Consumption	40 watts

Mechanical

Over-all Dimensions	9 in. wide, 13½ in. high, 16½ in. deep
Weight	25 lb

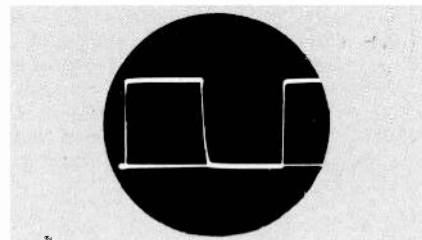


Fig. 4. (Unretouched Photo) 50-Kc square wave. The excellent 50-Kc, square-wave response of the WO-88A (obtained without the use of "peaking" coils) assures accurate reproduction of TV horizontal sync and blanking pulses.

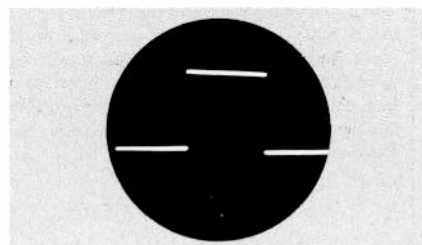
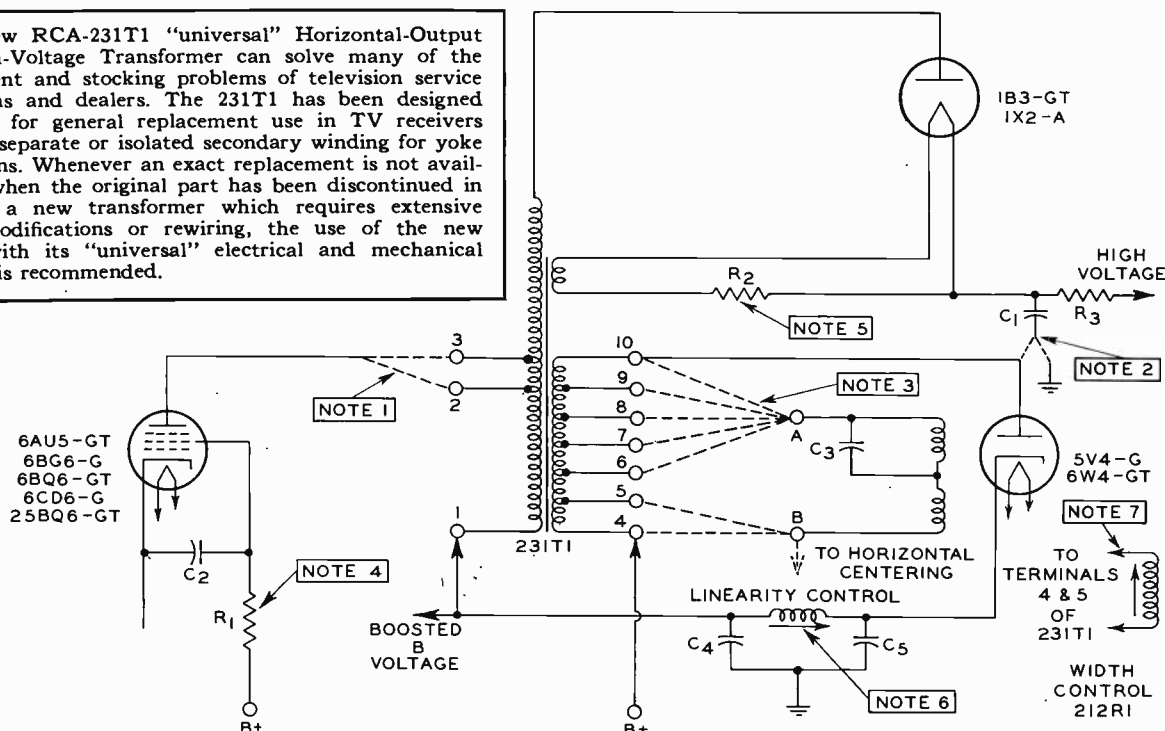


Fig. 5. (Unretouched Photo) 60-cps square wave. Excellent low-frequency response, required for accurate reproduction of sweep-alignment traces and vertical TV waveforms, is an inherent quality of the direct-coupled vertical amplifier used in the WO-88A.

Guide for Using the RCA-231T1 Horizontal-Deflection-Output And High-Voltage Transformer as a "Universal" Replacement

The new RCA-231T1 "universal" Horizontal-Output and High-Voltage Transformer can solve many of the replacement and stocking problems of television service technicians and dealers. The 231T1 has been designed especially for general replacement use in TV receivers having a separate or isolated secondary winding for yoke connections. Whenever an exact replacement is not available, or when the original part has been discontinued in favor of a new transformer which requires extensive circuit modifications or rewiring, the use of the new 231T1, with its "universal" electrical and mechanical features, is recommended.



The unbroken lines to terminals 1, 4, and 10 in the above universal schematic diagram are connections which are always made as shown *regardless of application*; there are three such connections.

The dashed lines indicate connections which are determined by specific applications; of the 11 possible connections, only four are used for any specific application as described in the following text.

Note 1. The 231T1 will accommodate the commonly used horizontal-output tubes. When the total B voltage (including any negative supply voltage, if used) measures between 300 and 375 volts, connect the plate of the output tube to terminal No. 3 on the 231T1. When the total B voltage measures less than 300 volts, connect the plate to terminal No. 2.

Note 2. Capacitor C₁ may be returned to ground or to the plate of the damper tube. In general, use the connection already in the receiver. When capacitor C₁ is returned to the plate of the damper tube, the high-voltage output may be increased by a few hundred volts, although retrace time is increased slightly. When this connection is made, resistor R₃ must be used to isolate the capacitance of the kinescope from the secondary of the high-voltage transformer.

Table I*

Yoke Inductance (mh)	Transformer Terminal No.
8-10	5 & 7
10-14	5 & 8
14-18	5 & 9
18-30	4 & 10

*For zero centering current in horizontal coils.

Table II*

Yoke Inductance (mh)	Transformer Terminal No.
8-10	6 & B+**
10-14	7 or 8 & B+**
14-18	8 or 9 & B+**
18-30	10 & B+**

*For centering current flowing through horizontal coils.

**B+ or horizontal-centering control.

Note 3. See *Tables I* and *II* for specific connections of the deflecting yoke to the 231T1 when the inductance of the horizontal coils is known.

If the receiver has the low-voltage terminal ("cold" side) of the horizontal coils of the yoke connected to a source of dc voltage such as the horizontal centering control, refer to *Table II*. When the yoke is connected in this manner, dc usually flows through it to provide fixed or variable centering.

If the inductance of the horizontal coils of the yoke is not known, it can be *estimated* by measuring the dc resistance of the yoke (between terminals A and B) and comparing this value with the value of the resistance of a yoke of known inductance such as those given in *Table III*.

As a general rule, it may be stated that most of the older receivers (up to about 1949), which utilize the isolated-secondary

(Continued on Following Page)

Table III

RCA Yoke (Type or Stock No.)	Deflection Angle (degrees)	Horizontal Coils	
		Inductance (mh)	DC Resistance (ohms)
201D12	50-57	8.3	13.5
206D1	66-70	10.3	13.2
211D2	66-70	13.3	23.5
74952	66-70	28.5	44.0

a capacitor or the insulation in other components may break down intermittently and cause a partial or complete short circuit, or ground. For servicing purposes, the occurrence of this type of trouble can usually be accelerated by operating the receiver at higher-than-normal line voltage, such as 125 volts. The line voltage may be increased by means of an RCA TV Isotap.

2. Intermittents caused by mechanical expansion and contraction due to changes in temperature. Connections inside tubes, capacitors, resistors, transformers, etc., may open up or become shorted or grounded as a result of expansion and contraction due to change in temperature after the set is turned on or off. The occurrence of such trouble can often be accelerated by heating the suspected components with an ordinary electric lamp, an infra-red lamp, or by allowing the parts to cool. If the chassis has been pulled, remember that temperature changes outside the cabinet are different from those which took place before the chassis was pulled.

3. Intermittent connections. If the intermittent occurs when the chassis is tapped, shaken, or twisted, when cables are pulled and pushed, or when components or

tubes are tapped, the trouble is probably due to an intermittent connection, such as an unsoldered joint, a cold-soldered joint, a stray strand of wire, a stray lump of solder, or a bare wire that is too close to another bare wire, or too close to a bare contact, etc. This type of trouble usually can be located by tapping and by pushing and pulling gently on the connections, components, and wires in the suspected section of the receiver.

4. Intermittent oscillator operation due to low line voltage. The rf oscillator may stop oscillating when the line voltage drops below normal. When the rf oscillator stops working, the picture and sound "go dead." A weak or worn-out oscillator tube or power rectifier contributes to the condition. Intermittent oscillator operation due to low line voltage can be located by operating the receiver with low line voltage—below the lowest line voltage encountered in the particular installation. The RCA TV Isotap is extremely useful in running down this variety of intermittent operation. Many technicians sell the Isotap to set owners for continuous use in locations where the line voltage is always lower or higher than normal.

(Continued on Page 7, Col. 1)

GUIDE FOR USING THE RCA 231T1 (Continued from Preceding Page)

Note 3. (Cont'd) type of high-voltage transformer, employ yokes with 8- to 10-millihenry horizontal coils. Later models sometimes used 10- to 14-millihenry yokes.

Note 4. The proper value for R_2 depends upon the deflecting angle of the kinescope, the value of the total B-supply voltage, and the horizontal-output tube.

The value of R_2 affects the screen voltage of the horizontal-output tube and, as a result, the power input to the entire circuit. In general, the original series screen resistor should be left in the circuit until all other connections have been made. Then, with the kinescope installed, the width can be checked. Excessive width can be reduced by increasing the value of the series screen resistor, thereby lowering the screen voltage on the output tube. Conversely, insufficient width can be corrected by reducing the value of the screen resistor (to raise the screen voltage). *Care should be taken, however, not to exceed the screen-voltage and screen-dissipation ratings of the tube.* A tabulation of these ratings for the commonly used output tubes is given below.

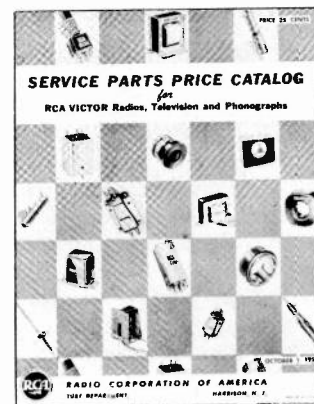
Note 5. Resistor R_2 provides for the proper amount of filament power for the high-voltage rectifier. When the RCA-231T1 is operated to deliver its full output, the value of R_2 should be 3.3 ohms. When the 231T1 delivers less than full output, it may be necessary to decrease the value of this resistor. In receivers using kinescopes having deflection angles of 50 to 57 degrees, this resistor may usually be shorted out.

Note 6. It should not be necessary to make any changes in the horizontal linearity-control circuit unless the original components are defective.

Note 7. Width-control coils can be employed to provide additional "in-cabinet" adjustment. The RCA-212R1 will be found suitable if connected across taps 4 and 5 on the 231T1. An RCA-Type 201R3 linearity control can also be used as a width control with the 231T1.

Tube Type	DC Grid-No. 2 Volts (max.)	Grid-No. 2 Input Watts (max.)
6AU5-GT	200	2.5
6BQ6-GT, 25BQ6-GT	200	2.5
6BQ6-G	350	3.2
6CD6-G	175	3.0

DID YOU GET YOUR COPY?



Form No.
3F659

The "Service Parts Price Catalog for RCA Victor Radios, Television, and Phonographs" lists more than 16,000 parts and contains a cross reference of replacement cabinets. You will find it very helpful when estimating the total cost of a job which includes the cost of a seldom-replaced item such as a cabinet, grille cloth, escutcheon, turntable, door pull, etc.

The following situation is a typical example of the usefulness of this service aid: A new customer asks you how much it will cost to replace a cracked plastic cabinet on an RCA Victor 45-EY-15 phonograph which was the pride and joy of his four-year-old youngster.

SOLUTION A. "Sure, we can replace it" . . . a long pause, and you give him an estimate (arrived at purely by guesswork and sometimes too low). Later, although pleased with the new cabinet, the customer is saddened by the bill—he is a dissatisfied customer.

SOLUTION B. "I'll tell you the cost of a new cabinet in a minute." You quickly find the price of the 45-EY-15 cabinet in your RCA Service Parts Price Catalog (and mention that it may have changed slightly since the publication date) and you favorably impress your customer by being efficient and not wasting his time. When he calls for the repaired phonograph, he doesn't object to paying the price he previously agreed to . . . and you have another satisfied customer!

How would you fare in a similar situation? Although such incidents may not be too common, you should be prepared for them; keep a copy of the Service Parts Price Catalog handy—it may save the day! You can obtain your copy of this publication (Form No. 3F659) from your RCA distributor.

A. G. Petrasek New Manager Of Electronic Components For RCA Renewal Sales

A. G. Petrasek, better known as "Slim," has been promoted to the post of Manager of Electronic Components, Renewal Sales, replacing K. B. Shaffer who is now Manager of the newly-created Kinescope Renewal Sales group.

Slim needs no introduction to the approximately 10,000 service technicians (in over 65 cities in the United States) who have profited by attending his TV-service clinics. These servicemen can be sure that their needs for genuine RCA electronic components are being handled by a qualified expert—Slim Petrasek, who knows the servicing business, and is thoroughly familiar with the serviceman's problems.



Slim is extremely versatile—being able to double in engineering and sales. He has an Electrical Engineering degree from Rensselaer Polytech, and his business experience varies from behind-the-counter retail selling to that of general manager for both a photographic manufacturer and an RCA Visual Products distributor.

Slim came to RCA in 1936 from one of the oldest RCA Victor distributors in the country. He has been: a radio-, phonograph-, and refrigerator-service technician; a theatre-sound technician (for the RCA Service Co.); a radar instructor (at the RCA Signal Corps School during the last war), and Dealer Salesmanager of the 16-mm section of RCA's Engineering Products Department.

In his sales-engineering capacity for the Renewal Sales Section of the RCA Tube Department for the past 3½ years, he has traveled

(Continued on Page 10, Col. 3)

A NEW TIME SAVER ... SP-1014 Service Parts Directory For 1950 and 1951 RCA Victor TV Sets

142 Pages of Schematic Diagrams, Parts Lists,
Top and Bottom Chassis Views for 71 Models

No busy TV serviceman can afford to be without the new "Service Parts Directory for RCA Victor 1950 & 1951 TV Receivers" (Form No. SP-1014). This comprehensive directory contains schematic diagrams, parts lists, and top and bottom chassis views for the 71 1950 and 1951 RCA Victor TV receivers—all indexed by model name vs model number, chassis number vs page number, and model number vs page number.

Designed especially for the convenience of television service dealers and technicians, the directory speeds and facilitates the selection of service parts through the use of an unusual format. For each model, the parts lists and the schematic diagram are printed on facing 11 by 17-inch pages. The top and bottom views of each chassis are printed on opposite sides of an 8½ by 11-inch page which is inserted between the two

large facing pages. This arrangement plus the convenience of a wire-type, lay-flat binding permits easy cross reference because the parts list and the top and bottom chassis views for a particular model conveniently face the corresponding schematic diagram. This arrangement facilitates the location of the stock number of any part shown on the schematic diagram.

The parts list for each model is divided into two sections. SECTION I includes all service parts which are identified on the schematic diagram by symbol number. In this section, items are arranged by symbol number listed in alphabetical-numerical sequence. SECTION II lists alphabetically all parts not shown in the schematic diagram.

The new service parts directory is now available from your local RCA tube and parts distributor.

Quick-Reference Table...Description of RCA Picture Tubes

Type	Shape	Material	Face*	Focus	Deflection
3KP4	Round	Glass	Clear	Electrostatic	Electrostatic
5TP4	Round	Glass	Clear	Electrostatic	Magnetic
7DP4	Round	Glass	Clear	Electrostatic	Magnetic
7JP4	Round	Glass	Clear	Electrostatic	Electrostatic
10BP4-A	Round	Glass	Filterglass	Magnetic	Magnetic
10FP4-A	Round	Glass	Filterglass	Magnetic	Magnetic
12KP4-A	Round	Glass	Filterglass	Magnetic	Magnetic
12LP4-A	Round	Glass	Filterglass	Magnetic	Magnetic
14CP4	Rectangular	Glass	Filterglass	Magnetic	Magnetic
14EP4	Rectangular	Glass	Filterglass	Magnetic	Magnetic
16AP4-A	Round	Metal	Filterglass	Magnetic	Magnetic
16DP4-A	Round	Glass	Filterglass	Magnetic	Magnetic
16GP4	Round	Metal	Filterglass	Magnetic	Magnetic
16GP4-B	Round	Metal	Frosted Filterglass	Magnetic	Magnetic
16KP4	Rectangular	Glass	Filterglass	Magnetic	Magnetic
16LP4-A	Round	Glass	Filterglass	Magnetic	Magnetic
16RP4	Rectangular	Glass	Filterglass	Magnetic	Magnetic
16TP4	Rectangular	Glass	Filterglass	Magnetic	Magnetic
16WP4-A	Round	Glass	Filterglass	Magnetic	Magnetic
17BP4-A	Rectangular	Glass	Filterglass	Magnetic	Magnetic
17CP4	Rectangular	Metal	Frosted Filterglass	Magnetic	Magnetic
17GP4	Rectangular	Metal	Frosted Filterglass	Electrostatic	Magnetic
17HP4	Rectangular	Glass	Filterglass	Electrostatic	Magnetic
17JP4	Rectangular	Glass	Filterglass	Magnetic	Magnetic
17LP4	Rectangular	Glass	Filterglass**	Electrostatic†	Magnetic
17QP4	Rectangular	Glass	Filterglass**	Magnetic	Magnetic
17TP4	Rectangular	Metal	Frosted Filterglass	Electrostatic†	Magnetic
19AP4-A	Round	Metal	Filterglass	Magnetic	Magnetic
19AP4-B	Round	Metal	Frosted Filterglass	Magnetic	Magnetic
20CP4	Rectangular	Glass	Filterglass	Magnetic	Magnetic
20MP4	Rectangular	Glass	Filterglass	Electrostatic†	Magnetic
21AP4	Rectangular	Metal	Frosted Filterglass	Magnetic	Magnetic
21EP4	Rectangular	Glass	Filterglass**	Magnetic	Magnetic
21MP4	Rectangular	Metal	Frosted Filterglass	Electrostatic†	Magnetic

*Spherical faceplate unless otherwise specified.

†Low voltage

**Cylindrical faceplate

INTERMITTENTS

(Continued from Page 5)

General Procedure for Localizing Intermittents

1. **Localize the intermittent to a particular section of the receiver** by analyzing the visible and audible symptoms, and by monitoring the suspected sections, as described later.

2. **Narrow down the location of the trouble to the faulty stage** by monitoring each stage in the suspected section.

3. **Test each component and connection in the faulty stage** to find the cause of the trouble. Replace or repair the faulty item.

If careful testing of each component and connection fails to reveal the fault, it is usually necessary to try new parts in place of the original ones in the faulty stage. Some technicians replace one component at a time and operate the receiver for several hours after each new component is installed in order to determine whether the trouble has been eliminated. Because this procedure often consumes a large amount of valuable time, some servicemen prefer to replace all the parts in the faulty stage at one time. *The latter method is often less expensive in the long run.*

If the faulty stage includes a fairly expensive component such as a deflection transformer, or if a replacement transformer for the particular set is not immediately available, replace all components (in the particular stage) except the transformer. If operation of the receiver shows that the intermittent is still present, try a new transformer. (Incidentally, the new RCA 231T1 Universal Horizontal-Deflection Output and High-Voltage Transformer is extremely helpful in trouble-shooting work because it can be used as a replacement in hundreds of different models of receivers.)

4. **Operate the receiver under the required adverse conditions** (such as high line voltage, low line voltage, vibration or mechanical jarring, high temperature, or low temperature, etc.) for as long a time as is necessary to make certain that the intermittent has been eliminated.

Monitoring Method for Localizing Intermittents

Practically any intermittent can be definitely localized to a particu-

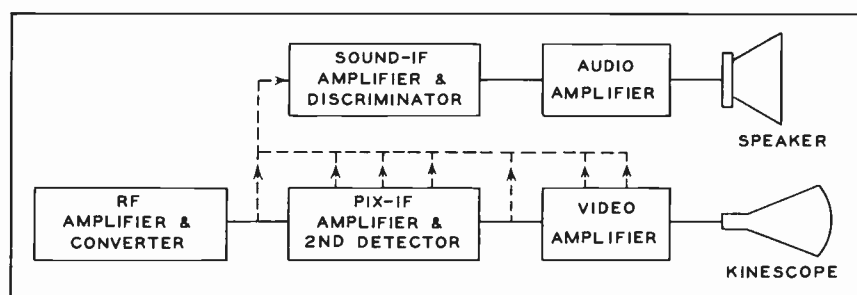


Fig. 2. When attempting to localize intermittents that affect the sound or picture (or both), it is essential to know the location of the sound-if take-off point in the particular receiver. The location of the take-off point depends upon the circuit arrangement as indicated above. The input signal for the sound-if amplifier may be "taken off" after the converter, after one of the stages in the picture-if amplifier, after the second detector, or after one of the stages in the video amplifier.

If both the picture and sound are intermittent, the trouble is probably ahead of the sound-if take-off point, or in the AGC circuit.

If the picture is intermittent but the raster and sound are O.K., the trouble is probably between the sound-if take-off point and the kinescope, or in the AGC circuit.

If the sound is intermittent but the picture is O.K., the trouble is probably between the sound-if take-off point and the speaker.

lar section of the receiver, or to a particular stage, by the use of suitable test equipment to monitor the signals at various points in the suspected sections. *The monitoring method is especially valuable in locating "hair-trigger" intermittents which have an exasperating habit of clearing up temporarily whenever a test probe is touched to the circuit.*

In the monitoring method, the test equipment is connected to the receiver; when the intermittent performance occurs, indications on the test equipment instantly reveal the faulty section.

The monitoring method may be used to localize intermittents in any section of the receiver. An example of a suitable arrangement for monitoring intermittent trouble in the picture section is shown in Figure 1. In this example, the sweep generator provides an rf input signal, the cathode-ray oscilloscope indicates the response of the rf tuner, the VoltOhmyst indicates the output signal at the second detector, and the kinescope shows the video output signal as dark horizontal bars. It is usually

necessary to eliminate AGC action by applying fixed bias to the rf and if amplifiers.

When the intermittent occurs, the three monitors (oscilloscope, VoltOhmyst, and kinescope) indicate the location of the trouble, as follows:

If the bars disappear, but the response curve on the oscilloscope and the VoltOhmyst reading remain practically unchanged, the trouble is in the video amplifier.

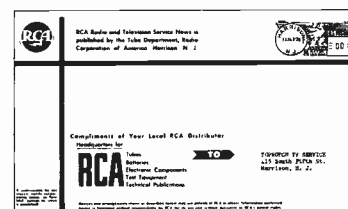
If the bars disappear and the VoltOhmyst reading drops off, but the response curve on the oscilloscope remains practically unchanged, the trouble is in the picture—if amplifier.

If all three monitors indicate a loss of signal, the trouble is in the rf tuner.

After the trouble is localized to a particular section, the monitoring method may be used to localize the trouble to a particular stage in that section.

Additional information about the monitoring method, and more information about intermittents will be given in subsequent articles.

RCA RADIO AND TELEVISION SERVICE NEWS TO BE MAILED DIRECT



When you sign up for RCA's Dealer Registration Program, your name will be automatically placed on a direct-mailing list to receive (at your place of business) regular copies of RCA RADIO AND TELEVISION SERVICE NEWS. See your RCA Distributor for details about this dynamic new campaign.

Time-Saving Directory Lists Parts for 600 RCA Victor Radios from 1938 through 1950

Although TV servicing is in the limelight these days, the alert service dealer still keeps his hand in the radio repair business. If you're engaged in this phase of the servicing business, you will profit by getting a copy of the "Service Parts Directory for RCA Victor Radios." This publication contains the stock number of every major replacement part for more than 600 RCA Victor radios from 1938 through 1950.

RCA Victor radios are listed by model numbers, in numerical-alphabetical sequence. A glance at

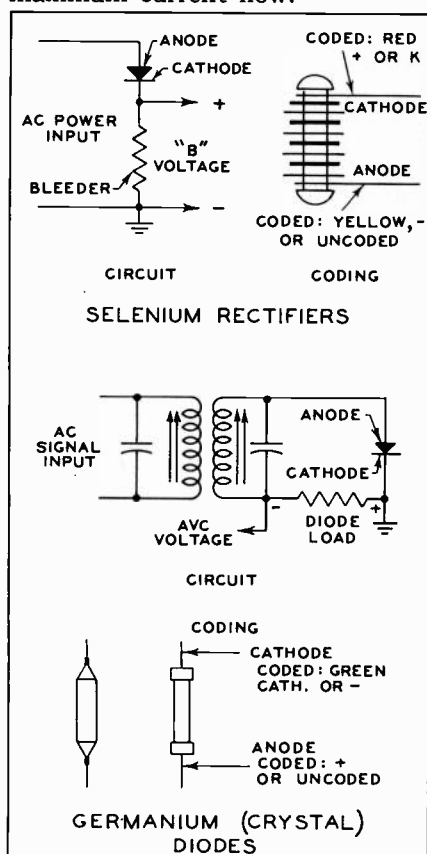
the accompanying illustration, showing a portion of a typical page, will convince you that this service parts directory is a time saver. Opposite each model number you will find the stock numbers of the top-quality components which will restore the set to its original condition. Remember, you gain extra customer acceptance when you replace the faulty components with genuine RCA service parts!

The "Service Parts Directory for RCA Victor Radios" (Form No. SP-1008) is available from your RCA distributor.

All of the service parts listed in the service parts directory can be obtained from your RCA distributor — what could be simpler?

POLARITY CODING OF SELENIUM RECTIFIERS AND GERMANIUM DIODES

The polarity coding of selenium rectifiers and germanium diodes may lead to some confusion since they are coded differently. Each is coded according to its use. As shown in the illustration below, the coding on selenium rectifiers indicates the dc polarity which will result; the coding on germanium diodes indicates the dc polarity that must be applied to obtain maximum current flow.



CHANGE IN CAPACITOR

Models

A-91, 45-W-9 (RC-1095, RC-1095A)
A-101, A-108 (RC-1096, RC-1096B)
45-W-10 (RC-1096A, RC-1096C)

CHASSIS ASSEMBLIES

Delete: 74733 Capacitor—

Add: 76423 Capacitor—

Ceramic, 3 μ f C10.

This change was made to reduce frequency drift on FM during the warm-up period.



SPEAKER SUBSTITUTION

Models A-108, 45-W-10

In some receivers, a substitute speaker was used. The original speaker (stamped 92569-12W) employs a speaker cone with Stock No. 75682. The substitute speaker is stamped 92569-9 with the suffix letter B or W. The 92569-9B speaker requires Stock No. 75875 replacement cone, and the 92569-9W speaker requires Stock No. 74901 replacement cone.

DEFLECTION CIRCUIT CHANGES

Models T100, T120, TC124, TC125, TA128, & TA129

Two different types of deflecting yokes were used in the 10- and 12-inch television receivers. One is

the iron-wire yoke which can be easily identified by a cardboard outer housing, and the other is a powdered-iron yoke which has a molded Bakelite housing.

The two yokes are not directly interchangeable. Although the iron-wire yoke will work in the circuit designed for the powdered-iron-core yoke, the latter type yoke should not be employed in the circuit designed for the iron-wire yoke unless suitable circuit modifications are made.

To minimize confusion, replacement parts will be stocked only for the iron-wire yokes so that field modifications of older sets will not be necessary when replacing yokes.

The iron-wire yoke was used in receivers employing the "ELECTRONIC MAGNIFIER," which is a remotely operated deflection circuit. In these cases R181 was 470K. In some of these models however, this resistor may be 220K as a compromise value for both types of yokes.

When the iron-wire yoke was used in early T100 and T120 receivers which did not employ the ELECTRONIC MAGNIFIER, R181 was one megohm. However, some T100 and T120 sets were built using a 150-K resistor which provided more width and more high voltage. Late models of these two sets may use a 470-K resistor as a compromise which is suitable for either yoke.

If an iron-wire yoke is replaced with a powdered-iron yoke, R181 should not be less than 470K, which provides greatest width, or more than one megohm (for best linearity).

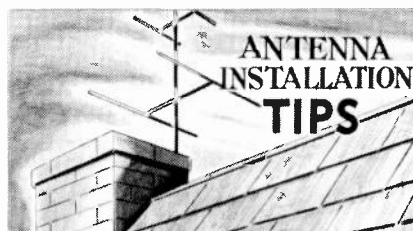
(Continued on Following Page)

PART 6

Installing the Transmission Line

In general, the transmission line run from the antenna to the point of entry into the house should be as direct as possible. However, the following exceptions should be noted:

1. Horizontal runs should not be made unless absolutely necessary.
2. Transmission lines should never be run across windows.
3. Transmission lines must be spaced at least six inches from telephone or power lines.
4. Because of reception difficulties (from ignition interference, etc.) and unsightly appearance, transmission lines ordinarily should not be run down the front of the building.



5. In cases in which future installation of a rotator may be necessary, the transmission line must be run in such a way that the removal of the line from one standoff insulator will provide sufficient slack to permit the insertion of a rotator in the bracket. The standoff insulator causing the deviation from a normal straight-line run should be the one nearest the mast.



The transmission line should follow a direct route, and it should be spaced at least six inches from power and telephone lines.



Every detail in the installation is important—note the drip loop which was provided to prevent rain water from entering the building.

RADIO • PHONO • TV TIPS

MODEL vs. RECORD CHANGER (1943 to 1950)

(Continued from Page 8)

Model	Record Changer	Model	Record Changer	Model	Record Changer
A55	RP 168 & 960282-1	8V151	RP 177B	45-EY-15	RP 168
A78	RP 168 & 960282-1	9EY3	RP 168	45-J	RP 168
A-82	RP 168 or RP 190-2	9EY31	RP 168	45-J-2	RP 190-1
	& 960282-4 or -5	9EY32	RP 168	45-J-3	RP 193
A-91	RP 168 or RP 190-2	9EY35	RP 168	45-W-9	RP 190-2
	& 960284-1 or -2	9EY35U	RP 168	45-W-10	RP 190-2
A-101	RP 190-2 & 960282-4 or -5	9EY36	RP 168	55U, 55AU	960001-5
	or 960284-1 or -2	9EY36U	RP 168	58V, 58AV	960001-1
A-106	RP 168 & 960285-1	9JY	RP 168	59V1, 59AV1	960001-2
A-108	RP 168 or RP 190-2	9QV5	RP 168 & 960282-2	Rod. 62-1	960260-2
	& 960284-1 or -2	9T89	RP 168 or RP 190-2	65U, 65AU	960260-2
			& 960284-1 or -2	65U-1	960260-2
QJY	RP 168	9TW309	RP 168 & RP 178	67V1, 67AV1	960260-1
QEY3	RP 168	9TW333	RP 168 & RP 178	Rod. 75ZU	RP 178 or 960276
QU61	960001-4	9TW390	RP 168 & RP 177B	77U	RP 178
QU62	960001-4	9W51	RP 168	77V1	960260-1
QU68	960001-4	9W78	RP 168 & RP 178	77V2	960260-1
SI000	RP 168 & 960285-1	9W101	RP 168	610V1	960001-5 or -6 or RP 177
TA128	RP 168 & 960282-1	9W102	RP 168	610V2	960001-5 or -6 or RP 177
TA129	RP 168 & 960282-1	9W103	RP 168	612V1	RP 176A or RP 176B
TA169	RP 168 & 960285-1	9W105	RP 168 & RP 178	612V3	RP 176 or RP 176A
2T81	RP 168 or RP 190-2	9W106	RP 168 & RP 178	612V4	RP 176 or RP 176A
	& 960282-4 or -5	9Y7	RP 168	641TV	960001-4 or -6
4QV8C	RP 168 & 960282-2	9Y51	RP 168	648PV	RP 176
6QU3	RP 178-2	9Y510	RP 190-1	710V2	RP 177 or RP 177A
6QU3Y	RP 168	9Y511	RP 168	730TV1	RP 177 or RP 177A
6QV3	RP 178-3	45-EY	RP 168	730TV2	RP 177 or RP 177A
6T84	RP 168 or RP 190-2	45-EY-1	RP 168	711V1	960001-5
	& 960284-1 or -2	45-EY-2	RP 190	711V2	96000F-5
	or 960284-4 or -5	45-EY-3	RP 190-1 or RP 190-3	711V3	960001-5
6T86	RP 168 or RP 190-2				
	& 960284-4 or -5				
6T87	RP 168 or RP 190-2				
	& 960284-1 or -2				
7QV5	960001-4				
8TV41	RP 177A				
8TV321	RP 178				
8TV323	RP 178				
8V7	RP 178				
8V90	RP 178				
8V91	RP 178				
8V112	RP 178				

RP 190-4 and RP 190-6 have been used as substitutes for the RP 190-1. RP 190-6 changer is identical to RP 190-4 except for the use of a different pickup assembly. The pickup has a replaceable sapphire stylus.

Stock No.

74067
74068
74069
74230
74065

PICKUP ASSEMBLY RMP 128-1

Pickup—Crystal pickup cartridge complete with stylus.
Stylus—Sapphire stylus and holder.
Guard—Stylus guard.
Nut—Nut and washer to mount #74068 stylus in #74067 pickup.
Screw—2-56 by 3/16-in. fillister-head screw to mount stylus guard.

RCA BATTERIES AND TUBES ADVERTISED ON POPULAR TV AND RADIO NETWORK SHOWS

Can you think of a better time than while the consumer is enjoying his favorite TV show or radio program to point out that the use of high-quality RCA tubes and batteries will provide dependable top performance of his TV or radio set? We couldn't, and we're sure that RCA's commercials on the popular "RCA Victor Television Show," "Kukla, Fran, and Ollie," and "Phil Harris and Alice Faye" television and radio programs will help you to sell many more RCA replacement tubes and batteries.

Large audiences are being told about the superiority of these RCA products; for example, approximately 50 TV stations across the

country telecast the weekly half-hour "RCA Victor Television Show" starring Dennis Day. "Kukla, Fran, and Ollie," sponsored by RCA Victor on alternate weeks, is aired by 23 stations, and it is broadcast as a kinescope recording by nine other stations. The popular NBC radio-family comedy, "Phil Harris and Alice Faye" emanates from 190 stations.

Next Friday at 8 P.M. (EST), toss aside the problems of TV servicing (for a half-hour) and enjoy the music, mirth, and mimicry of Dennis Day. Don't forget to pay special attention to the RCA commercials!*

*March 27 8 - 8:30 P.M. (EST) NBC TV Network "RCA Victor TV Show"
March 29 8 - 8:30 P.M. (EST) NBC Radio Network "Phil Harris and Alice Faye"

It's your Day every Friday Night on TV...

With a NEW **Dennis Day**

LAUGHS LYRICS

CALAMITIES!

star of the **RCA VICTOR SHOW**

WNBT... Channel 4... 8:00-8:30 pm

It's a new Dennis Day who'll promise you plenty of laughs and lyrics as he collides with trouble. Every Friday night for a full half hour! Don't miss the fun!

Typical ad plugging the "RCA Victor Show" starring Dennis Day.

Latest Information on RCA's Kinescope Exchange Plan

RCA distributors are still offering exchange allowances for the return of certain inoperative kinescopes which are free from visual defects such as scratches in the glass, chipped, cracked, or broken glass, or dents in the metal shell.

The next time you purchase an RCA picture tube, ask your RCA distributor about the liberal allowances he is offering for the following types of inoperative, out-of-warranty kinescopes:

10BP4-A	16LP4-A	17LP4
10FP4-A	16RP4	17QP4
12KP4-A	16TP4	17RP4
12LP4-A	16WP4-A	17TP4
14CP4	17BP4	19AP4-A
14EP4	17BP4-A	19AP4-B
16AP4-A	17BP4-B	20CP4
16GP4	17CP4	20MP4
16GP4-B	17GP4	21AP4
16KP4	17HP4	21MP4
	17JP4	

A. G. PETRASEK

(Continued from Page 6, Col. 1)

extensively while conducting his well-known TV-service clinics. During one trip last year, he conducted 32 meetings in 23 cities (in 9 weeks) and traveled over 13,000 miles!

Slim's TV-service clinics covered all of the usual and many unusual technical-service problems encountered by the average TV-service technician in his everyday work.

Because of his business and sales background, many of his technical meetings evolved into business meetings. Slim claims that a profit-and-loss statement is as important to the TV-service dealer as a telephone—if he wants to stay in business.

"Shop-Efficiency Index" is another of his favorite topics which he often stressed during his service clinics. Slim says that this is the measure of "how fast you can turn out a completed job." It is his contention that the shop-efficiency index is almost inversely proportional to the number of brands of sets serviced by the shop.

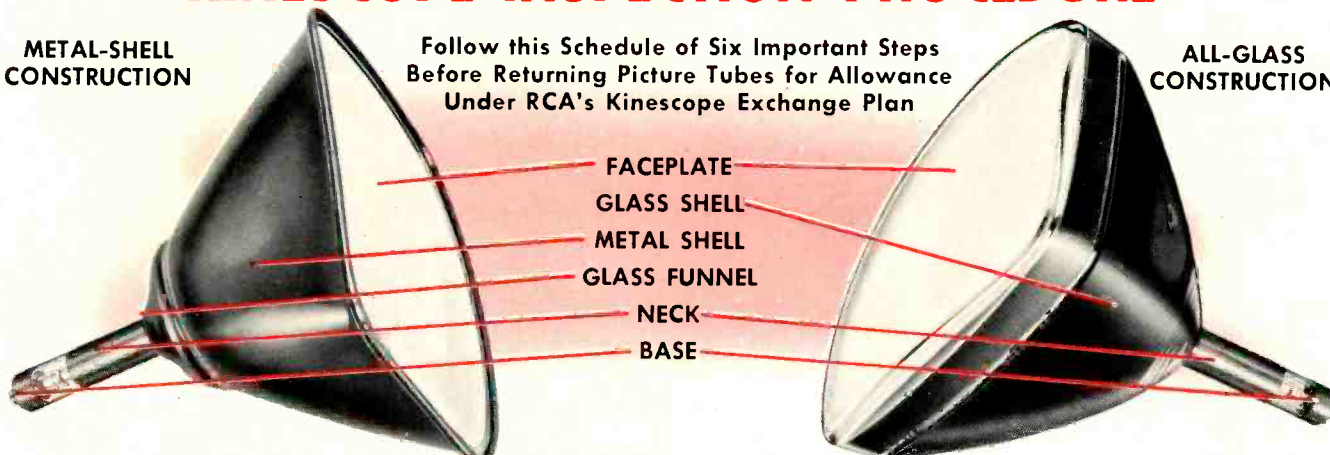
Slim says he is definitely not a TV expert—"an expert doesn't think TV is complicated, but I do"! However, many service technicians, who have heard Slim, disagree—"He has a knack of simplifying our problems and explaining complicated circuits in an easy-to-understand way."

KINESCOPE INSPECTION PROCEDURE

METAL-SHELL
CONSTRUCTION

Follow this Schedule of Six Important Steps
Before Returning Picture Tubes for Allowance
Under RCA's Kinescope Exchange Plan

ALL-GLASS
CONSTRUCTION



CAUTION: Handle tubes carefully and guard against the hazard of IMPLOSION by wearing protective gloves and goggles.

1. BE SURE IT IS AN ACCEPTABLE TYPE



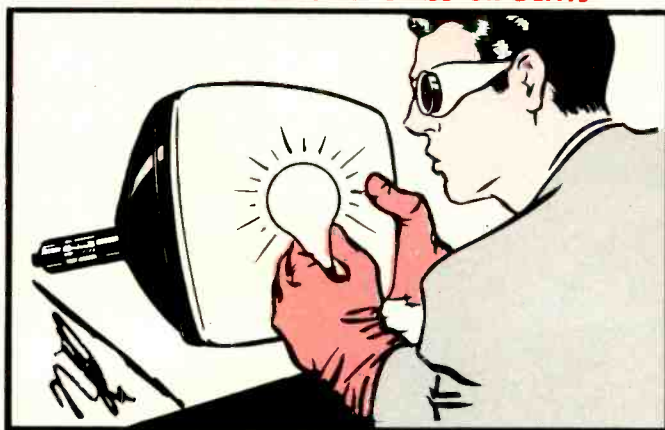
Check the tube type number to make certain it is on the list of types (shown on page 10) acceptable for exchange allowance. **IMPORTANT:** Be sure the suffix letter is correct. Any manufacturer's tubes are acceptable except those on which the manufacturer has permanently marked his name, his symbol, or the type designation on the glass or metal shell.

2. CLEAN THE TUBE CAREFULLY



Before inspecting further, and to make your checking easier, wipe the faceplate and other glass surfaces with a soft cloth. If necessary, use water and soap or a mild detergent. **Do not use an abrasive-type cleanser on the glass.**

3. LOOK FOR CRACKED GLASS OR DENTS



Check all portions of the tube for damage, except the neck area near the base, which will be discarded. The entire faceplate, shell, funnel, and **at least one full inch of the neck directly below the shell or funnel must be totally free from defects.** In these areas, any broken, cracked, or chipped glass (or dent in the metal shell) is cause for rejection.

A 60-watt (or brighter) lamp, held about one foot from the tube, will make inspection for such defects quicker and more thorough. Cracks and chips, which are found more often on the outer edge of the faceplate, will show up as mirror-like lines, star shapes, or rainbow colors.

4. INSPECT FOR SCRATCHES IN THE GLASS



Carefully inspect the glass surfaces for scratches. Reject any tube on which the scratch is deep enough to catch your fingernail when drawn at a right angle across the scratch. This does not apply to frosted face tubes, which must be **entirely free** from scratches, marks, or blemishes that cannot be removed with soap and water.



POSTAGE

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Compliments of Your Local RCA Distributor
Headquarters for:

RCA

Tubes
Batteries
Electronic Components
Test Equipment
Technical Publications

TO

If undeliverable for any reason, notify sender, stating reason, on Form 3547, postage for which is guaranteed.

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RCA VoltOhmysts*

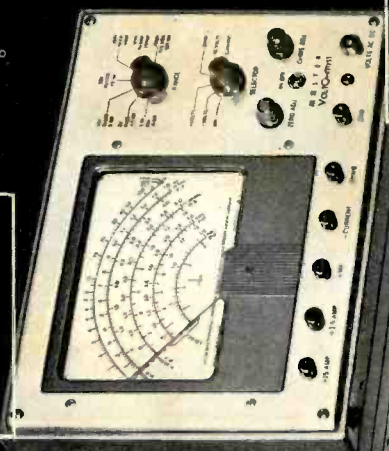
outsell all other VTVM'S



RCA WV-87A
SENIOR VoltOhmyst
\$67.50
Suggested
User Price



RCA WV-77A
JUNIOR VoltOhmyst
\$47.50
Suggested
User Price



RCA WV-87A
MASTER VoltOhmyst
\$112.50
Suggested
User Price

Because they're factory-calibrated under laboratory conditions... incorporate more features... have unusual accuracy and stability... in short, offer you more for your money—RCA VoltOhmysts outsell all other makes of vacuum-tube voltmeters.

All RCA VoltOhmysts employ a degenerative bridge circuit to compensate for line-voltage changes... a sturdy 200-microampere meter movement electronically protected against burn-out... large,

easy-to-read scales... metal shielding against external fields... and have an input resistance of 11 megohms on all dc ranges.

Before you buy a vacuum-tube voltmeter, be sure to get the full details on the RCA VoltOhmyst best suited to your needs. See your RCA Test Equipment Distributor today... or write RCA, Commercial Engineering, Section 67CX, Harrison, N.J.

*Tmk®



RADIO CORPORATION of AMERICA
TEST EQUIPMENT
HARRISON, N.J.