



RADIO AND TELEVISION

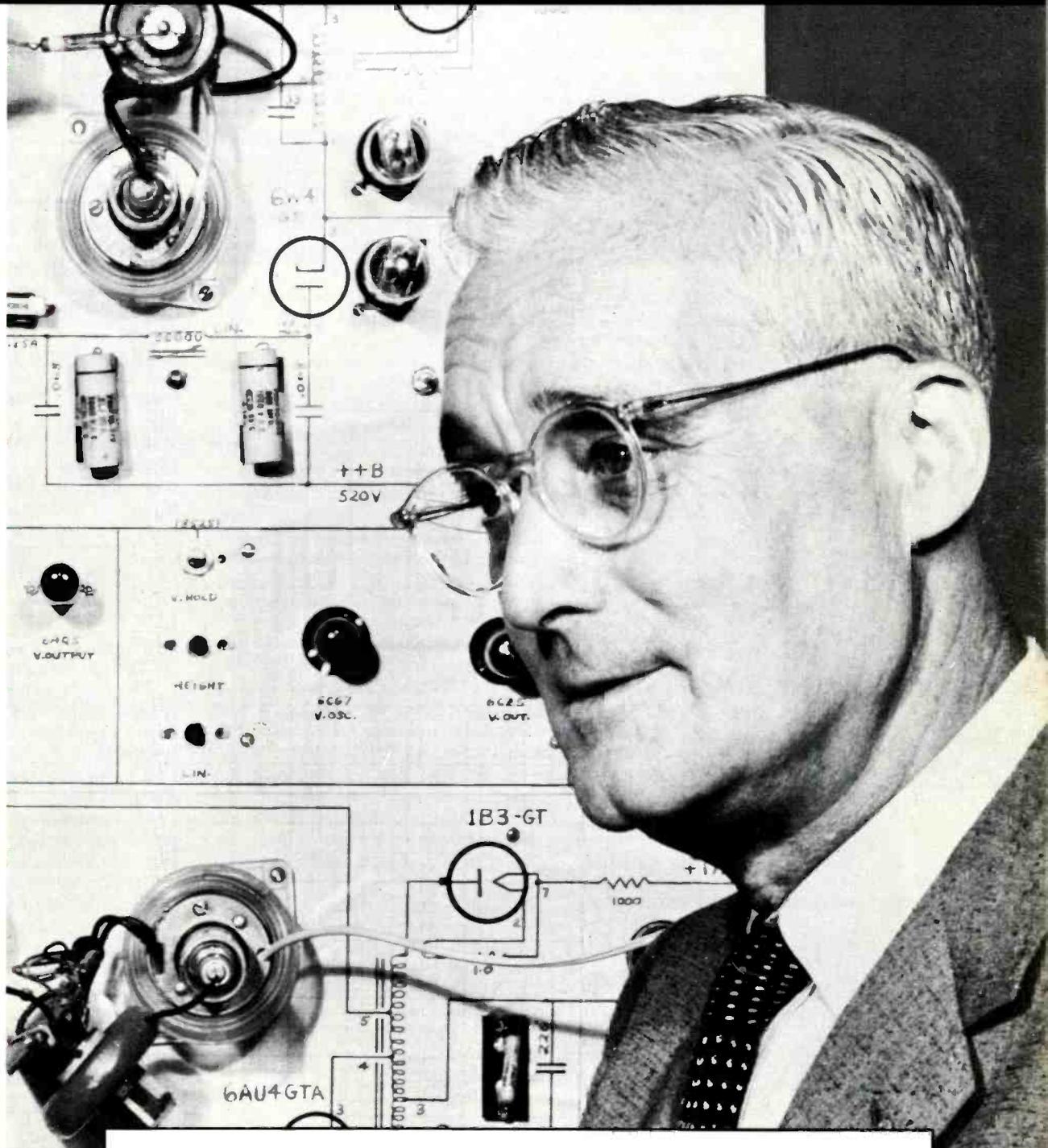
Service News

A PUBLICATION OF THE RCA ELECTRON TUBE DIVISION

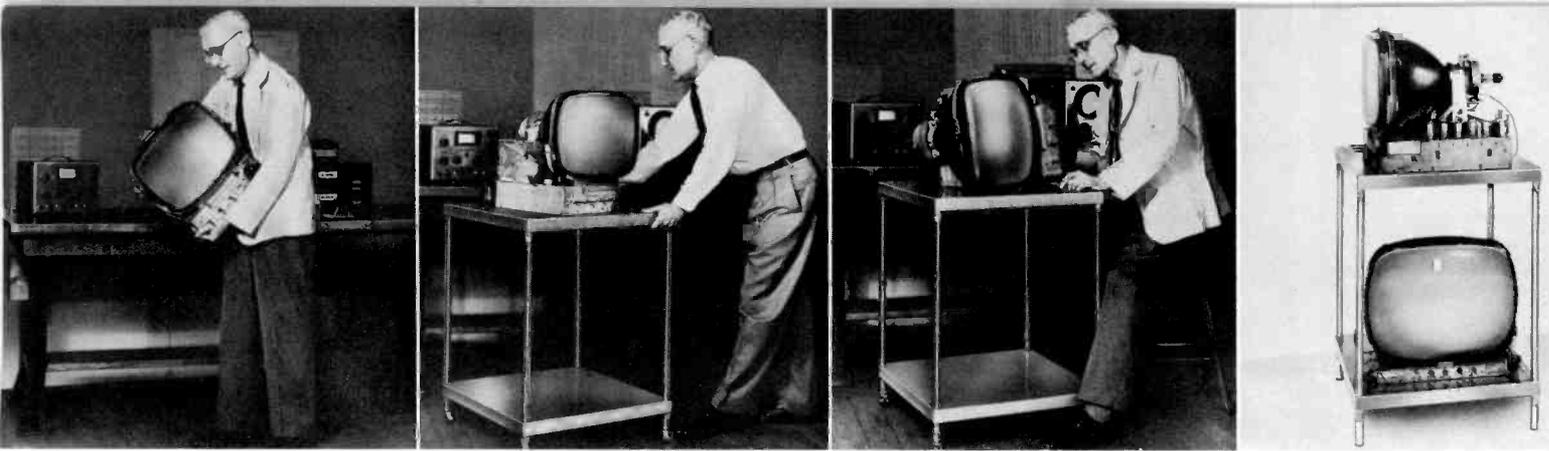
SEPTEMBER

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Close-up on John R. Meagher, RCA expert on practical television servicing whose new series of photographic features on "Troubleshooting with an Oscilloscope" begins on page 6. Renowned technical editor, field engineer, author, and lecturer, Mr. Meagher designed the RCA TV-Toter Table (see page 2), compiled the famous RCA Pict-O-Guides, both for color and black-and-white television, and developed the TV Dynamic Demonstrator.



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In the series of eight photographs above, the versatility of the amazing RCA TV-Toter Table is demonstrated by its designer, John R. Meagher, RCA expert on practical television servicing. As shown left to right, (1) you

don't have to carry that TV chassis any longer. (2) You can roll it on the rugged TV-Toter Table, the hardest working service aid a TV technician ever had. Please note also that this handsome service table—constructed of

Service Technicians Clamor for Widely Acclaimed TV-Toter Table and Triple Pindex—Obtainable Free With Purchases of RCA Entertainment Receiving Tubes

Last call for you to obtain the industry's highest praised servicing-aid duo: the RCA TV-Toter Table and RCA Triple Pindex. While they still last, they are being offered to service-dealers free with their purchases of

RCA entertainment receiving tubes from participating RCA distributors.

Reports indicate that television dealers and technicians by the thousands already possess these vital new servicing helpmates, and have started to put them to good use in making servicing jobs easier and more profitable. It's small wonder that these service-dealers are overwhelmingly enthusiastic in their acclaim of the lightweight, rugged, and amazingly versatile TV-Toter Table and the extremely handy Triple Pindex, a 280-page volume that presents valuable base diagram information in the easiest-to-follow form.

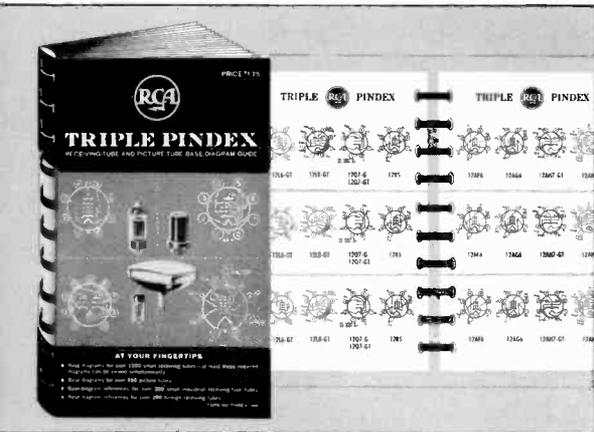
Lauded as the hardest working servicing aid the television technician ever had, the TV-Toter Table was designed by John R. Meagher, RCA's nationally recognized authority on practical television servicing. This handsome service table is constructed of 20-gauge reinforced steel and features a durable office-grey hammertone finish and chrome-plated steel tubular legs.

Just right to support a TV chassis at convenient bench height, the TV-Toter Table measures 24 inches by 24 inches by 33½ inches high. Each table comes supplied with a set of four leg extensions and four casters, permitting speedy changeover from a no-tilt table to a handy roll-about unit. Also included is a rubber mat, for use in protecting and insulating the table top when required.

The impressive RCA Triple Pindex was produced by RCA's Commercial Engineering Department. Just flip through the pages of this brand new book and you will immediately be made aware of how much assistance it can give you in your shop and on your

home calls. You will see at a glance that never before has so much important service information been prepared in such a simple-to-use style.

Featuring base diagrams for more than 1500 small receiving tubes, the RCA Triple Pindex is unique in that at least three required diagrams can be viewed simultaneously. But that's not all! This remarkable receiving-tube and picture-tube base-diagram guide also includes a section containing an industry-wide listing of over 400 picture tube types and their base diagrams. Another section describes premium and special-purpose types cross-referenced to entertainment receiving-tube base diagrams. And to make the



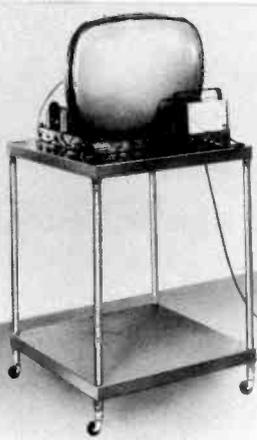
RCA Markets Kit

"You ain't seen nothing yet!"

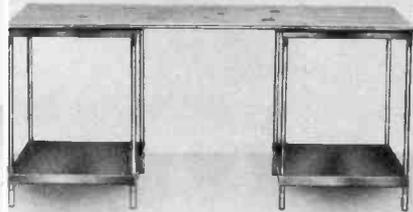
This now-famous idiomatic and oft-spouted expression aptly applies to RCA's expanding family of test instruments that are available either as factory-wired units or as easy-to-assemble kits.

The recently announced WO-33A portable oscilloscope and the WV-38A volt-ohm-milliammeter now join with the previously publicized and highly accepted WV-77E VoltOhmyst® as the three types which currently make up RCA's vital new series. Many more such attractively styled instruments, also to be offered by your RCA distributor in both kit and wired form, are anxiously anticipated by the service technicians who greeted the launching of this much-requested line with comments of extreme enthusiasm.

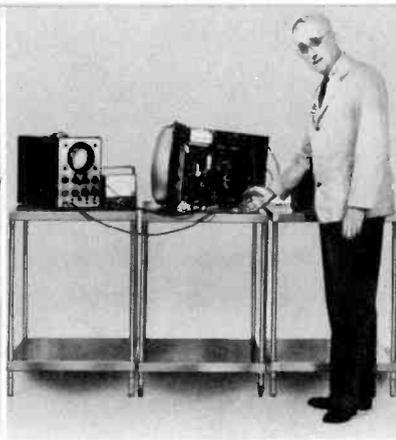
Economy-minded technicians, who have shown their preference for these instruments in ready-to-assemble form, are particularly pleased with the simple step-by-step instructions and oversized drawings included as part of the



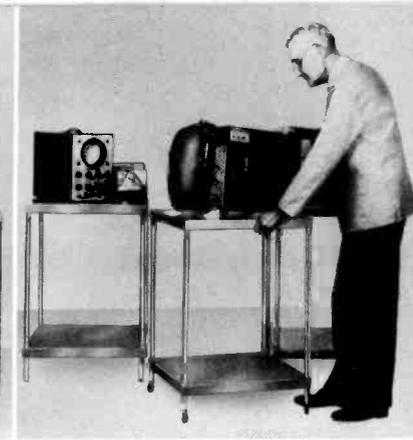
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20-gauge reinforced steel and featuring steel tubular legs—will (3) increase your workbench area, (4) add to your storage facilities, and (5) improve your shop efficiency when you use the table for tough and inter-

mittent jobs. In addition, (6) two TV-Toter Tables may be used as a fixed bench, while (7) three TV-Toter Tables may be put together as a three-section bench with a surprise feature: (8) a roll-out center section.

RCA Triple Pindex even more valuable to the service technician, it also provides a listing of more than 200 foreign tube types with their base diagrams cross-referenced to U. S. types.

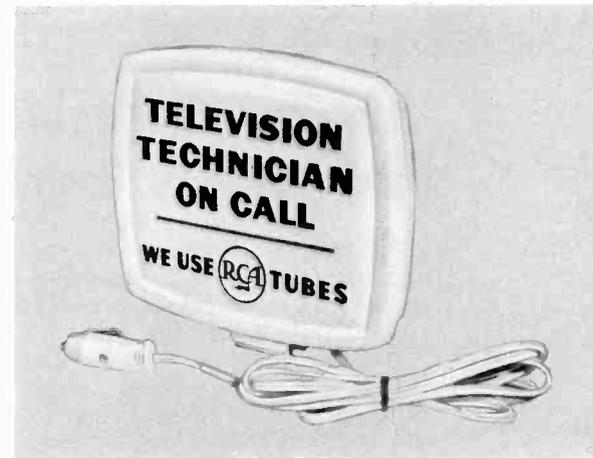
TV Service Auto Light

At the time you place your request for the two new RCA service aids, also be sure to ask your distributor about the RCA TV Service Auto Light (Form 4F180)—which indeed can be referred to as Aladdin's magic lamp converted into modern practical use. A rugged plastic display with built-in light, it will brightly advertise your services and products to everyone who sees your parked truck or car with the Auto

Light prominently displayed.

By means of its magnetic base, the TV Service Auto Light easily attaches to the top of the dash for front windshield viewing when your car is parked—or to any metal part inside your vehicle. Clearly visible during the day, this Auto Light can be brightly lit for night-time display by plugging it into a car cigarette lighter socket.

Measuring 7¼ inches by 6 inches by 3¼ inches, the RCA TV Service Auto Light is large enough to draw attention of passersby, small enough to be conveniently tucked away when not in use. The unit comes supplied with a 12-volt auto lamp and cord with lighter plug-in adaptor.



TV Service Auto Light (Form 4F180)

and Wired WO-33A Oscilloscope and WV-38A VOM

special worksheet supplied with each RCA test equipment kit. This worksheet completely covers the instrument's mechanical assembly and electrical connections. Center area of the work-sheet is for the actual building

of the kit. Hence, no time is lost looking up separate reference material.

The kits' laminated circuit board construction is another reason why technicians are choosing RCA test kits over competitive models. With the

RCA units, components are keyed to their proper location and mounted on one side of the circuit board. Solder connections are made on the other side.

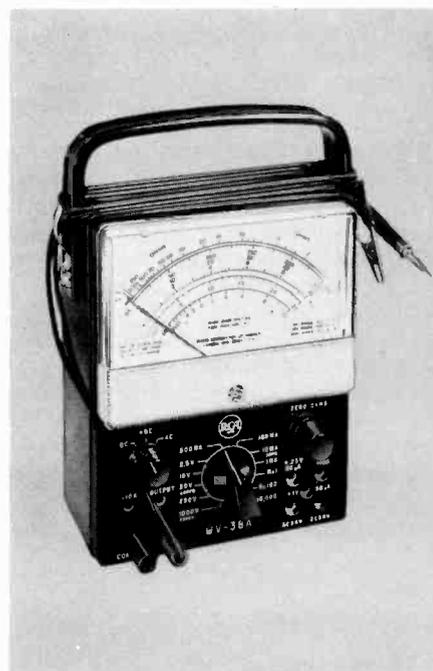
One more reason why technicians favor RCA kits is that there is no "do-it-yourself" nomenclature on the front panel. To identify each of RCA's home-assembled units as a kit, the letter "K" following the serial number is stamped on the bottom of the case.

Quality and Reliability

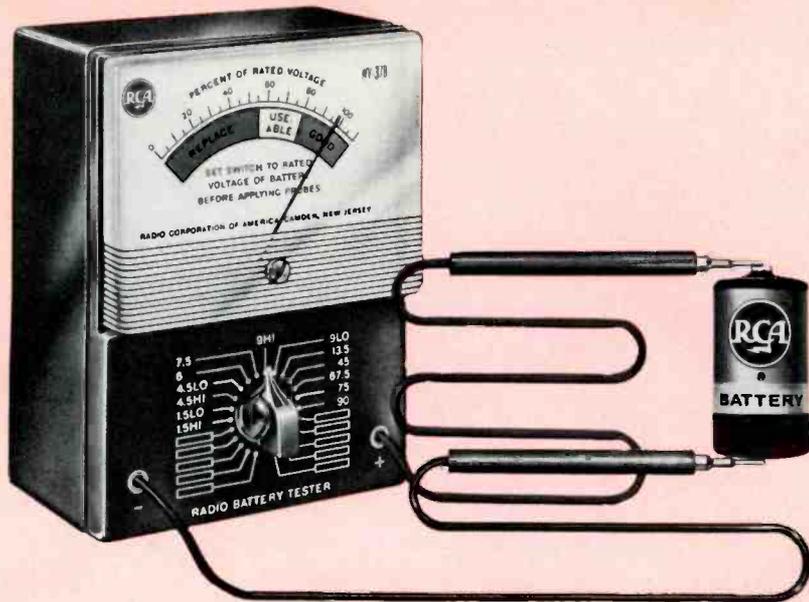
Of course, the key factor affecting a technician's decision as to which competitively priced unit he should purchase is the overall quality and reliability of the instrument itself. This you can always be assured of when you select an RCA product.

For example, when your purchase an RCA WO-33A (K) kit—or its factory-wired and calibrated equivalent, the

(Continued on next page)



RCA's WV-38A Volt-Ohm-Milliammeter (at left) and WO-33A 3-Inch Oscilloscope



One of the major service aids that are part and parcel of the 1959 RCA battery program is the WV-37B Battery Tester, an accurate, attractive, and highly flexible instrument.

and stimulate battery sales throughout the year.

Accurate, attractive, flexible, RCA's WV-37B Battery Tester can check all the tube-portable and transistor-portable radio batteries now being marketed, both those in the RCA line as well as competitive counterparts. There are also blank positions on the switch which allow for testing additional battery types.

The Window/Counter Display (Form 4F363) is an eye-catching promotion piece, mounted on sturdy cardboard. Tailor-made for placement on the counter or in your store window, it bears the caption, "Keep your portable happy—Use RCA Radio Batteries."

To further impress the "Keep your portable happy" theme on your customers, you can use two of RCA's new Window/Wall Streamers (Forms 4F364A and 4F364B). The third new streamer (Form 4F364C) publicizes the free testing of batteries with the WV-37B Battery Tester.

The four RCA Dealer Direct-Mail Postcards (Forms 4F366A-D) also stress the idea of happy portables. Use these humorous mailing pieces throughout the year to remind your customers to call on you for all their RCA radio battery needs.

Look up RCA's assorted Dealer Ad Mats (Forms 4F369A-J) on the Dealer Ad Mat Proof Sheet (Form 4F369). Select the advertisements you wish to use—and then place them in your local press to focus community attention on your store as neighborhood headquarters for RCA radio batteries.

The "Pow-Wow for Profits" radio-TV spot scripts are incorporated in a special booklet (Form 4F374) that contains 60-second, 20-second, and 10-second TV commercials, 60-second and 30-second radio announcements.

For a fast cross-reference on the RCA battery equivalents to Burgess, Eveready, Montgomery Ward, NEDA, Olin, P. R. Mallory, Philco, Ray-O-Vac,

'Pow-Wow for Profits' Sales Aids Spark Bonus Battery Business All Year Around

It's time to re-evaluate your merchandising strategy to fully capitalize on the year-round consumer need for portable radio batteries.

No longer should RCA battery dealers tag the battery-selling "season" with a summertime label. This "season" is now 12-months long—what with RCA batteries in ever-increasing service in the growing number of portable radios that accompany their owners not only to beaches but also to football and baseball games, on hunting and fishing trips, on skiing excursions, and to ice-skating "rink"-sides. And, since consumers have also become accustomed to the giving of portable radios as Christmas and birthday gifts and as back-to-school presents, you're missing out on extra sales if you don't continually remind your customers that you can always provide them with the RCA batteries they want for these portables.

Bear in mind, too, that of the millions of new portable radios sold annually, 90% or better are of the transistorized variety. Battery dealers who offer the highly accepted RCA brand, therefore, currently have a more extensive battery market than ever before.

If you wish to make the most out of today's battery business potential, then ask your RCA battery distributor without delay about how you can best take advantage of RCA's 1959 battery promotion campaign—"Pow-Wow for Profits." It features a host of dynamic RCA service and business aids: the WV-37B Battery Tester; a traffic-stopping window/counter display; three colorful window/wall streamers; four dealer direct-mail postcards; an assortment of dealer ad mats and radio-TV spot scripts; a 1959 battery interchangeability wall chart, and two new technical catalogs. They are all geared to help you build customer confidence

New Test Equipment Kit And Factory-Wired Units

(Continued from preceding page)

WO-33A—you will own a portable 3-inch oscilloscope of which you can be proud. And when you decide on RCA's new volt-ohm-milliammeter—the WV-38A (K) kit or the WV-38A factory-assembled unit—you also can be certain you have chosen an instrument with important extras in facilities and performance.

RCA's new WO-33A is just the kind

of 3-inch 'scope you've been asking for to take "on the job"—anywhere. Small, lightweight, good-looking, it weighs only 14 pounds and measures 6½-inches wide, 8¾-inches high, and 10¼-inches deep. The instrument features built-in brackets to hold the power cord and cables.

An "all-purpose" 'scope, the WO-33A provides all the bandwidth you need for servicing color-TV receivers as well as video broadcast monitors and cameras, and for square-wave testing of audio and ultrasonic equipment. It also gives you all the gain you need

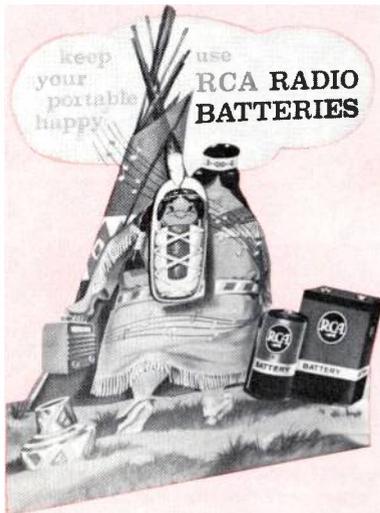
for low-level audio work in servicing pickups, microphones, and preamps. With this 'scope, you can signal trace radios and amplifiers and troubleshoot communications signaling systems, "ham" radios, "hi-fi" equipment, and industrial electronics machinery.

Accurate and stable, the WO-33A has a voltage-calibrated, frequency-compensated, 3-to-1 attenuator and a "Plus-Minus" internal sync that holds sync to 4.5 Mc. A scaled graph screen and calibrated voltage source allow direct reading of peak-to-peak voltages; and a special cathode-ray tube

Sears & Roebuck, and Zenith radio batteries, you can turn to the RCA Battery Interchangeability Wall Chart (Form 4F368). Battery manufacturers are listed alphabetically in large, easy-to-read type.

Of the two new RCA technical catalogs, one (the BAT-134-D) provides basic descriptions of more than 100 RCA battery types. In this book, you will also find a complete battery replacement guide for portable radios placed on the market over the past 10 years, as well as battery specifications and an interchangeability guide.

What with the big consumer demand for transistor portables these days, the other new RCA technical catalog—"Batteries for Transistor Applications" (Form TBA-107-A)—should also prove an invaluable reference book. It contains typical data on dry batteries specially designed for compact applications utilizing transistors. Also included in this group of batteries are single-voltage and multiple-voltage types.



Window/Counter Display (Form 4F363)

design provides clear, sharp pattern displays.

What about the RCA WV-38A volt-ohm-milliammeter? Take note that never before have so many valuable features been packed into a VOM. It contains a new 1-volt scale and 0.25-volt scale for transistor circuit measurements. An extra-large meter (5¼ inches) enables fast and easy reading. And, for increased carrying convenience, the unit is provided with handle clips to store test leads and probes.

Other features of this handsomely styled instrument:

Arizona Apprenticeship Standards Guide On-Job Training of Service Technicians

Strong measures must be taken to alleviate the critical shortage of skilled radio-television-electronic service technicians.

Recognizing this need, Better Electronic Service Technicians (BEST) of Arizona, Inc., has devised and adopted special "Apprenticeship Standards"—employer-employee guideposts for the selection of apprentice technicians and for their development within a four-year period of instruction and on-the-job training. These standards were set up in cooperation with the U.S. Department of Labor, Bureau of Apprenticeship and Training.

Responsibility for the administration of the BEST apprenticeship plan has been delegated to an apprenticeship committee which has control over all BEST apprentices in Arizona's radio, TV, and electronic service industry. Where warranted, this committee establishes local subcommittees that directly oversee all BEST apprentices in their respective areas and that are responsible for carrying out the following intent and purpose of BEST's Apprenticeship Standards:

"To enable the youth of our country, who qualify, to take advantage of apprenticeship so as to equip themselves for a career in the industry and also to attract into the industry the highest type of potential applicants for apprentices now in the trade and those who are entering."

Outlining vocational responsibilities, BEST of Arizona's Apprenticeship Standards handbook emphasizes that the radio-TV-electronic servicing trade demands neat and efficient technicians with a natural ability to handle tools. This handbook goes on to elaborate

that "the industry is always advancing, and the apprentice needs basic training to get started and to keep up with the new theories. All technicians and apprentices are expected to know and use the test equipment and hand tools of the trade. Math and theory and experience help make the technician and apprentice an all-round Master Technician."

Under the Arizona plan, to be accepted for apprenticeship an applicant must meet seven requirements. He must be an American citizen between the age of 17 and 25,* and he must have a high school education or its accredited equivalent. Every applicant must be physically fit for the work of the trade, with due regard to aptitude, attitude, and personal characteristics. Hence, he must present the apprenticeship committee with a copy of his birth certificate, a transcript of school courses taken and grades obtained and, when requested, a physical examination report. In addition, the committee may require the applicant to take an aptitude test to warrant his consideration.

When an applicant is accepted for apprenticeship, he (and his parent or guardian, if he is a minor) and the employer's agent or employer then sign an Apprentice Agreement which is registered with the Arizona Apprenticeship Council. Copies of this agreement are retained by the apprentice,

(Continued on page 15)

*Exceptions to the maximum age limit may be made in the case of an applicant who has had previous experience in the trade, who has unusual educational training, or who has other unusual qualifications. Applicants over the age limit also may be considered acceptable if they were in military service and have applied for apprenticeship within a reasonable length of time after being discharged.

- A protected ohms-divider network fuse.
- A polarity-reversal switch.
- Excellent frequency response.
- A full-wave bridge rectifier.
- Low circuit loading.
- Standard dbm ranges.

Specifications for the new WV-38A show that it has an input resistance of 20,000-ohms-per-volt for dc measurements, and 5,000 ohms-per-volt for ac measurements. This VOM can measure from 0 to 5,000 volts dc in eight ranges; 0 to 5,000 volts ac in six ranges; currents from 50 microamperes full

scale to 10 amperes full scale in six ranges; and resistance from 0 to 20 megohms in three ranges.

User prices (optional) are: \$129.95 for the factory-wired WO-33A oscilloscope and \$79.95 for the WO-33A(K) kit; \$43.95 for the factory-wired WV-38A volt-ohm-milliammeter and \$29.95 for the WV-38A(K) kit.

The WO-33A(K) 'scope kit comes complete with low-cap/direct-input probe and cable. The WV-38A(K) VOM kit includes probe and cable with slip-on alligator clip, ground lead and clip, and internal batteries.

CHART No. 1

Normal TV Signal Waveforms

TROUBLESHOOTING

with an

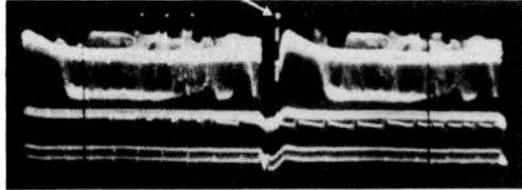
OSCILLOSCOPE

by John R. Meagher

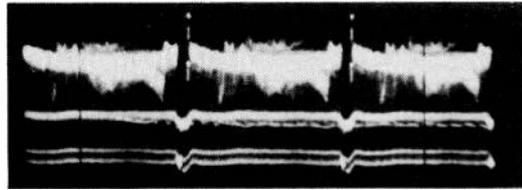
RCA Electron Tube Division, Harrison, N. J.

The CRO photographs in this chart show the composite TV signal waveforms at the output of the second detector or in the video amplifier.

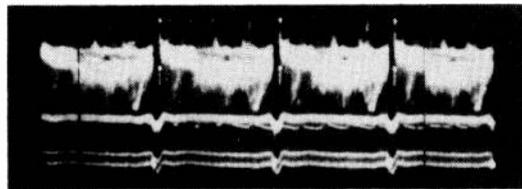
White-Level*
Test Signal



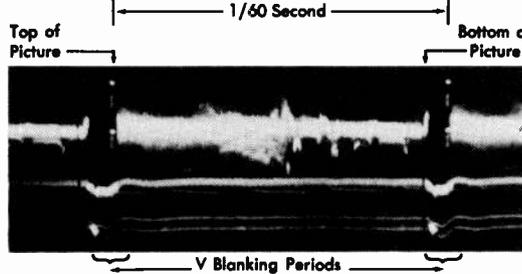
1A. CRO sweep rate = 30 cycles (1/2 of 60 cycles).



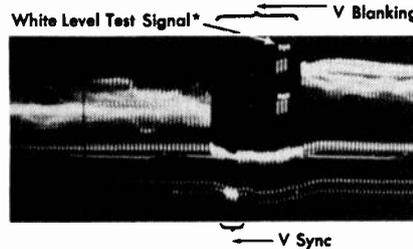
1B. CRO sweep rate = 20 cycles (1/3 of 60 cycles).



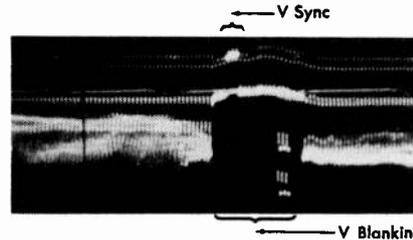
1C. CRO sweep rate = 15 cycles (1/4 of 60 cycles).



1D. Similar to 1B (20-cycle sweep rate), but with the horizontal gain control advanced so that the center pattern nearly fills the screen.

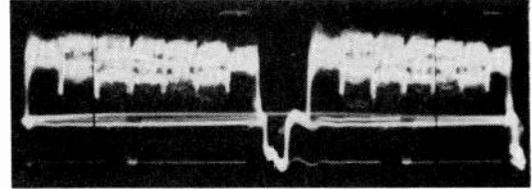


1E. Similar to 1A (30-cycle sweep rate), but with the horizontal gain control advanced in order to expand the vertical sync and blanking signals.

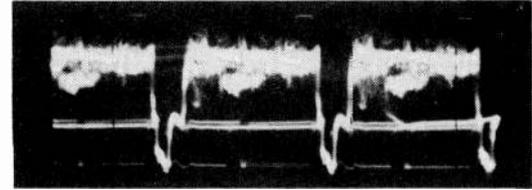


1F. Like 1E, but opposite polarity.

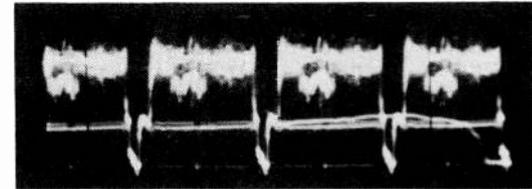
Picture Signals
Sync Signals



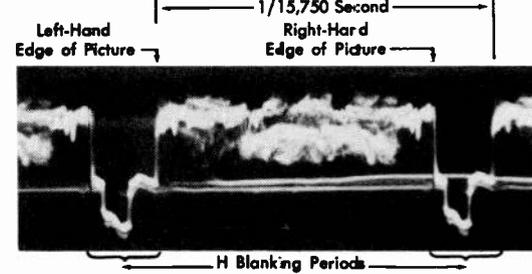
1G. CRO sweep rate = 7,875 cycles (1/2 of 15,750 cycles).



1H. CRO sweep rate = 5,250 cycles (1/3 of 15,750 cycles).

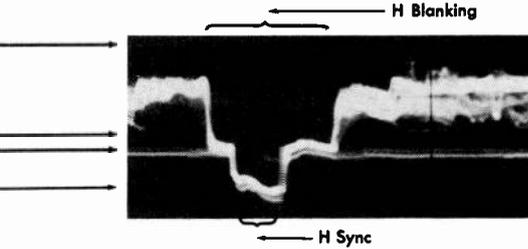


1I. CRO sweep rate = 3,937 cycles (1/4 of 15,750 cycles).

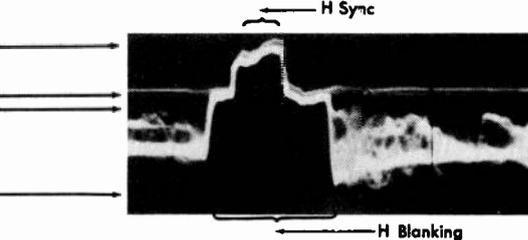


1J. Similar to 1H (5,250-cycle sweep rate), but with the horizontal gain control advanced so that the center pattern nearly fills the screen.

Picture Signals
Sync Signals



1K. Similar to 1G (7,875-cycle sweep rate), but with the horizontal gain control advanced in order to expand the horizontal sync and blanking signals.



1L. Like 1K, but opposite polarity.

*The white-level test signals, which are transmitted by some stations, will be described in a later chart.

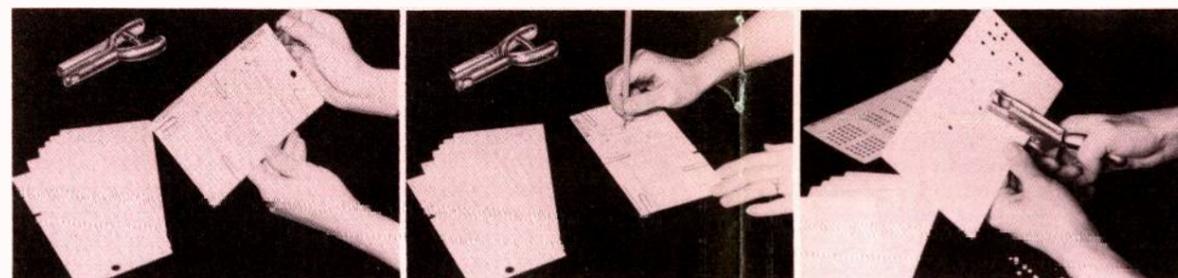
Punching Information Service Technicians Can Use to Prepare Special Cards for RCA's Portable WT-110A Automatic Electron-Tube Tester

Tube Type	Hole Locations	Notes
1A6	A5 B3 D4 E2 G1 J5 K9 L5 M2 M6 N1 N6	—
1AK4	A6 B1 D4 D10 E5 G2 G3 J10 K7 L1 M3 M6 N2 N6	Use WG-337A 6-Pin Adaptor
1C6	A6 B1 D4 D10 E5 G2 G3 J10 K10 L1 L6 L7 M3 M6 N2 N6	Use WG-337A 6-Pin Adaptor
1C7	A2 B7 D5 D10 E4 G3 G6 J10 K10 L1 L6 L7 M3 M6 N2 N6	—
1D7	A2 B7 D5 D10 E4 G3 G6 J10 K8 L1 M3 M6 N2 N6	—
1E7	A2 B7 D4 D5 E8 F3 G6 J6 K7 L1 L6 L7 M3 M6 N2 N6	Test P1 and P2
1F4	A1 B5 D3 E4 G2 J6 K7 L1 L6 L7 M3 M6 N2 N6	Use WG-337A 5-Pin Adaptor
1F6 Diode Section	A1 B6 F5 G4 K10 L3 M3 M6 N2 N6 (Card 1 of 2 cards)	Test P1 and P2; reject if below 2; use WG-337A 6-Pin Adaptor
1F6 Pentode Section	A1 B6 D10 E3 G2 J6 K3 L1 M3 M6 N2 N6 (Card 2 of 2 cards)	—
1G4	A2 B7 D5 G3 J9 K4 L1 M5 M6 N3 N6	—
1H6 Diode 1	A2 B7 G5 K9 L3 M3 M6 N2 N6 (Card 1 of 3 cards)	Reject if below 3
1H6 Diode 2	A7 B2 G4 K9 L3 M3 M6 N2 N6 (Card 2 of 3 cards)	Reject if below 3
1H6 Triode Section	A2 B7 D6 G3 J5 K6 L1 M3 M6 N2 N6 (Card 3 of 3 cards)	—
1J3	A7 B2 G10 K10 L5 M3 M6 N4 N6	Reject if below 3
1J5	A2 B7 D5 E4 G3 J10 K2 L1 M3 M6 N2 N6	—
1K3	A7 B2 G10 K10 L5 M3 M6 N4 N6	Reject if below 3
1LA4	A1 B8 D6 E3 G2 J7 K3 L1 M5 M6 N3 N6	—
1M3/DM70 (Card 1)	A4 B5 D1 G8 J1 L1 M5 M6 N3 N6	Eye tube; full illumination; use WG-339A Adaptor
1M3/DM70 (Card 2)	A4 B5 D1 G8 J10 L1 M5 M6 N3 N6	Eye tube; full illumination; use WG-339A Adaptor
1N3	Same as 1M3 (above)	Eye tube; 1/4" illumination; use WG-339A Adaptor

Tube Type	Hole Locations	Notes
1S2 (DY87)	A9 B5 G10 K10 L4 M5 M6 N3 N6	Reject if below 4
2A4G	(Gas triode—no test)	—
2A5	A1 B6 C5 D4 E3 G2 J1 K4 L1 M4 M6 N2 N6	Use WG-337A 6-Pin Adaptor
2A6 Diode Section	A1 B6 C5 F3 G4 I6 I10 K10 L3 M4 M6 N2 N6 (Card 1 of 2 cards)	Test P1 and P2; Reject if below 2; use WG-337A 6-Pin Adaptor
2A6 Triode Section	A1 B6 C5 D10 G2 I6 I10 J2 K8 L1 M4 M6 N2 N6 (Card 2 of 2 cards)	See instruction for gas test; use WG-337A 6-Pin Adaptor
2A7	A1 B7 C6 D5 D10 E3 G2 G4 I6 I10 J9 K9 L1 M4 M6 N2 N6	Use WG-337A 7-Pin Adaptor
2B7 Diode Section	A1 B7 C6 F5 G4 I6 I10 K10 L3 M4 M6 N2 N6 (Card 1 of 2 cards)	Test P1 and P2; reject if below 2; use WG-337A 7-Pin Adaptor
2B7 Pentode Section	A1 B7 C6 D10 E3 G2 I6 I10 J6 K9 L1 M4 M6 N2 N6 (Card 2 of 2 cards)	Use WG-337A 7-Pin Adaptor
2E5 Eye Section	A1 B6 C5 E4 F2 L1 M4 M6 N2 N6 (Card 1 of 2 cards)	Shadow max.—P1; shadow min.—P2; use WG-337A 6-Pin Adaptor
2E5 Triode Section	A1 B6 C5 D3 G2 I6 I10 J6 K10 L1 M4 M6 N2 N6 (Card 2 of 2 cards)	Use WG-337A 6-Pin Adaptor
2T4	A3 B4 C5 D2 G1 I8 I9 J1 K1 L1 L6 L7 M3 M6 N2 N6	—
2V2	A2 B7 G10 K9 L5 L6 L7 M3 M6 N2 N6	Reject if below 2
2V3	A2 B7 G10 K6 L5 M4 M6 N2 N6	Reject if below 3
3A8 Diode Section	A2 B7 G8 K10 L3 M4 M6 N2 N6 (Card 1 of 3 cards)	Reject if below 3
3A8 Triode Section	A2 B7 D5 G6 J2 K10 L1 M4 M6 N2 N6 (Card 2 of 3 cards)	—
3A8 Pentode Section	A7 B2 D10 E4 G3 J2 K7 L1 M4 M6 N2 N6 (Card 3 of 3 cards)	—
3B7	A4 B8 B1 D3 D6 F7 G2 J1 K1 L1 M5 M6 N3 N6	—
3C6/XXB	A1 A8 B7 D4 D5 F3 G6 J2 K3 L1 M5 M6 N3 N6	Test P1 and P2
3D6/1299	A1 A8 B7 D6 E3 G2 J7 K4 L1 L6 L7 M5 M6 N3 N6	—

Tube Type	Hole Locations	Notes
4BY6	A3 B4 C2 D1 D7 E6 G5 I6 I10 J5 K8 L1 L6 L7 M1 M6 N4 N6	—
4BZ8	A4 B5 C3 C8 D2 D7 F1 G6 I7 I9 J1 K2 L1 L6 L7 M4 M6 N1 N6	Test P1 and P2
4CE5	A3 B4 C7 D1 E6 G5 I6 I7 J1 K9 L1 L6 L8 M4 M6 N1 N6	—
4ES8	A4 B5 C3 C8 D2 D7 F1 G6 I6 I8 J1 K2 L1 L6 L7 M5 M6 N2 N6	Test P1 and P2
4EW6	A3 B4 B7 C2 D1 E6 G5 I7 I9 J1 K7 L1 L6 L8 M1 M6 N4 N6	See instructions for gas test
5W4	A2 B8 F4 G6 K6 L5 L6 L10 M5 M10 N2 N9	Test P1 and P2; reject if below 4
6A3	A1 B4 D3 G2 J10 K4 L1 L6 L8 M4 M10 N2 N9	Use WG-337A 4-Pin Adaptor
6AB5/6N5	A1 B6 C5 D3 E4 G2 I6 I10 J2 K10 L1 M5 M10 N2 N9	Triode test—P1; shadow min.—P1; shadow max.—P2; Use WG-337A 6-Pin Adaptor
6AF3	A4 B5 C10 G9 I6 I10 K5 L4 L6 L10 M4 M10 N1 N9	Reject if below 4; connect external lead to tube cap
6AL7	(No test possible)	—
6BK4	A2 B7 C1 G5 G10 K9 L3 M5 M10 N2 N9	Emission test only; reject if below 4
6BR5/EM80	A4 B5 C2 D1 E3 E8 E9 G7 I6 I10 J2 K9 L1 M5 M10 N2 N9	Amp. Sec. Test on P1 Position; Shadow min.—P1 Position; Shadow max.—P2 or P3 Position
6CA5	A3 B4 C1 D2 D5 E6 G7 I6 I10 J5 K1 L1 L6 L7 M10 M3 N1 N9	—
6CL5	A2 B7 C3 D4 E8 G10 I6 I7 J1 K5 L1 L6 L7 M4 M10 N2 N9	—
6CR8 Pentode Unit	A4 B5 C3 D2 E7 G6 I7 I10 J1 K3 L1 L6 L7 M3 M10 N1 N9	—
6CR8 Triode Unit	A4 B5 C8 D9 G1 I6 I10 J4 K10 L1 L6 L8 M3 M10 N1 N9	—
6CW5 (EL86)	A4 B5 C3 D2 E9 G7 I6 I10 J9 K6 L1 L6 L8 M5 M10 N2 N9	—
6CZ5	A4 B5 C7 D3 E1 G9 I9 I10 J1 K7 L1 L6 L7 M5 M10 N2 N9	—
6D8	A2 B7 C8 D5 G3 G4 G6 G10 I6 I10 J7 K9 L1 L6 L7 M5 M10 N2 N9	—
6DA4	A7 B8 C3 G5 I6 I10 K4 L4 L6 L10 M4 M10 N1 N9	Reject if below 3
6DS5	A3 B4 C2 D1 E6 G5 I7 I9 J1 K4 L1 L6 L7 M5 M10 N2 N9	—
6DQ5	A2 B7 C3 D1 E4 G10 I6 I8 J10 K4 L1 L6 L7 M4 M10 N2 N9	—
6DZ8 Triode Unit	A4 B5 C8 D1 G9 I6 I9 J3 K8 L1 M4 M10 N2 N9	—

In preparing a punched card: first, line up index slots and bottoms of Master Card and blank card. Clip the two cards together. Next, as shown center, use a sharp-pointed pencil to inscribe hole outlines on blank card. Then, center each penciled-hole outline exactly in die on top of punch before punching hole.



(More card-punching information on next page)

Tube Type	Hole Locations	Notes
6DZ8 Pentode Unit	A4 B5 C2 D3 E7 G6 I8 J2 K4 L1 L6 L7 M4 M10 N2 N9	—
6E5	A1 B6 C5 D3 E4 G2 I6 I10 J2 K9 L1 M5 M10 N2 N9	Triode test—P1; Shadow min.—P1; Shadow max.—P2; use WG-337A 6-Pin Adaptor
6EA8 Triode Section	A4 B5 C8 D9 G1 I7 I10 J1 K3 L1 L6 L7 M5 M10 N2 N9 (Card 1 of 2 cards)	—
6EA8 Pentode Section	A4 B5 C7 D2 E3 G6 I6 I10 J2 K4 L1 L6 L7 M5 M10 N2 N9 (Card 2 of 2 cards)	—
6EB8 Triode Section	A4 B5 C1 D2 G3 J1 K4 L1 M5 M10 N2 N9 (Card 1 of 2 cards)	See instructions for gas test
6EB8 Pentode Section	A4 B5 C6 D7 E8 G9 I7 I10 J1 K7 L1 L6 L8 M5 M10 N2 N9 (Card 2 of 2 cards)	—
6EH5	A3 B4 C1 D2 E6 G7 I7 I10 J1 K6 L1 L6 L8 M5 M10 N2 N9	—
6ER5	A3 B4 C1 C6 C7 D2 G5 I6 I10 J2 K8 L1 L6 L8 M5 M10 N2 N9	See instructions for gas test
6ES8 (FCC89)	A4 B5 C3 C8 D2 D7 F1 G6 I6 I8 J1 K2 L1 L6 L7 M5 M10 N2 N9	Test P1 and P2
6EU8 Triode Section	A4 B5 C6 D2 G3 I8 I10 J1 L3 L1 L6 L7 M5 M10 N2 N9 (Card 1 of 2 cards)	—
6EU8 Pentode Section	A4 B5 C8 D7 E9 G1 I7 I9 J1 K5 L1 L6 L7 M5 M10 N9 (Card 2 of 2 cards)	—
6EW6	A3 B4 B7 C2 D1 E6 G5 I7 I9 J1 K7 L1 L6 L8 M5 M10 N2 N9	See instructions for gas test
6F7 Pentode Unit	A1 B7 C6 D10 E3 G2 I7 I10 J6 K9 L1 M3 M10 N1 N9	Connect external lead to tube cap
6F7 Triode Unit	A1 B7 C6 D5 G4 I6 I10 J6 K10 L1 M3 M10 N1 N9	Has low GM; reject if below 2
6FV6	A3 B4 C2 C7 D1 E6 G5 I7 I10 J1 K2 L1 L6 L7 M5 M10 N2 N9	—
6G6	A2 B7 C8 D5 E4 G3 I6 I10 J6 K3 L1 M5 M10 N2 N9	—
6S7	A2 B7 C5 C8 D10 E4 G3 I6 I10 J6 K6 L1 M5 M10 N2 N9	—
6ST7 Diode Section	A7 B8 C3 F4 G5 K8 L4 L6 L7 M5 M10 N2 N9 (Card 1 of 2 cards)	Test P1 and P2; reject if below 3
6ST7 Triode Section	A7 B8 C3 D2 G6 I6 I10 J7 K8 L1 M5 M10 N2 N9 (Card 2 of 2 cards)	—
6T7 Diode Section	A2 B7 C8 F4 G5 I6 I10 K6 L4 M5 M10 N2 N9 (Card 1 of 2 cards)	Test P1 and P2; reject if below 3
6T7 Triode Section	A2 B7 C8 D10 G3 I6 I10 J2 K8 L1 M5 M10 N2 N9 (Card 2 of 2 cards)	See instructions for gas test
6U4	A7 B8 C3 G5 I6 I10 K5 L4 L6 L10 M3 M10 N1 N9	Reject if below 3
6U5	A1 B6 C5 D3 E4 G2 I6 I10 J3 K10 L1 M5 M10 N2 N9	Triode test—P1; Shadow min.—P1; Shadow max.—P2; use WG-337A 6-Pin Adaptor
6V8 Diode Unit	A5 B4 C3 G9 I6 I10 K2 L4 M4 M10 N2 N9	Reject if below 2

TUBE TYPE	USE CARD OF
1612	6L7
1620	6J7
1621	6F6
1622	6L6
1634	12SC7
1644	12L8
5591	6AK5
5654	6AK5
5679	7A6
5691	6SL7
5692	6SN7
5693	6SJ7
5725	6AS6
5726	6AL5
5732	6K7
5749	6BA6
5750	6BE6
5814A	12AU7
5824	25B6
5871	6V6
5881	6L6
5910	1U4
5930	2A3
5931	5U4G
5961	6SA7
5992	6V6
6005	6AQ5
6006	6SG7
6028	6AK5
6046	25L6

★ New Tube Inventory Guide

The new 18-month RCA Tube Movement and Inventory Guide for 1959-1960 (Form 3F37-D) and RCA Electron Tube Order Blank (Form 3F-231-G) are now being channeled to service-dealers by local RCA tube distributors.

As with previous editions, the current RCA Tube Movement and Inventory Guide will help you eliminate your tube-inventory problems. It is based on a thorough study of national movement by tube type in the renewal market,

With the photographic study at left and special introductory article below, RADIO AND TELEVISION SERVICE NEWS launches a new series of technical features by John R. Meagher, nationally recognized RCA authority on practical television servicing.



ABOUT 150 MISSISSIPPI DEALERS AND SERVICE TECHNICIANS recently gathered at the King Edward Hotel in Jackson for a special meeting on "Troubleshooting Horizontal-Output Circuits" conducted by John R. Meagher, famed RCA lecturer, author, editor, and field engineer whose special feature begins at left. This assembly was jointly sponsored by Ryan Supply Company, Swan Distributing Company, and Teague Electronics, RCA distributing firms headquartered in Jackson. In the photograph above, Mr. Meagher (second from left) graciously accepts congratulations from Ed Nizinski, parts manager of Ryan Supply. Standing by in agreement with the laudatory comments on Mr. Meagher's outstanding performance (left to right): T. F. "Budd" Scott of the RCA Electron Tube Division field sales force; Guy Venable, store manager for Teague Electronics, and Leo Swan, owner of the distributing company that bears his name.

During the last 10 years, I have given hundreds of demonstration-type lectures on TV troubleshooting methods. These talks, sponsored by RCA distributors and by service associations, have been held in all parts of the United States. I have also had the pleasure of discussing specific troubleshooting problems with thousands of competent and conscientious technicians throughout the country.

Based on this close and continuing study of the technical problems of a large number of technicians, it appears that there is a real need for more information, and better information, on troubleshooting methods—especially in relation to difficult, obscure troubles.

Those technicians who started early in TV, and who have handled thousands upon thousands of service jobs, are rarely stumped for long by any servicing problem.

Technicians who started later, or who have not yet acquired such extensive experience, are naturally likely to encounter greater difficulties in handling the more obscure problems.

It has been extremely gratifying to me to witness the year-by-year improvement in the technical knowledge and ability of all TV technicians. But despite the great improvement in technical "know-how," and the enormous increase in experience, the so-called "tough" sets or "dogs" are still with us, and they still present a problem in varying degrees to all technicians. It is a serious problem because too often the time spent on these sets is not fully recovered in the service charges.

It is time for all of us to face up to the fact that the majority of "dogs" are creatures of our own making. A "dog" is usually an ordinary set on which you or I have not been lucky enough, or smart enough, to find the trouble quickly. When we do eventually find the fault, it almost invariably turns out to be something simple, like leakage in a fifty cent coupling capacitor. If we had been fortunate enough to find the trouble quickly, we would not have classified the set as a "dog."

There are, of course, many real "dogs," such as sets with multiple troubles, sets which have been "repaired" by do-it-yourselfers, and old

sets in which there are numerous leaky and shorted capacitors.

I covered the subject of "Tough Sets or Dogs" several years ago in a booklet (Form TVS-1031, price 15¢) which is available from Commercial Engineering, RCA Electron Tube Division, Harrison, N. J. If you have not read this booklet, I suggest you order a copy.

In an effort to cope with the tougher servicing jobs, a few technicians tend to flit from one piece of test equipment to another, seeking an electronic substitute for technical "know-how" and resourcefulness. I believe that what these men are really seeking is a sure-fire procedure that will enable them to locate the cause of trouble without too much thought.

Such a procedure might have been found to work 10 years ago because there was then only one basic circuit in use, that employed in the RCA 630, in which the various sections in this circuit were virtually free from interlocking action.

But now there are thousands of different circuits with scores of interlocking actions between sections which normally would be independent of each other.

These interlocking circuits are potential booby traps in the diagnosis of

troubles, and they have made it virtually impossible to prepare a single troubleshooting procedure that can be applied to all models.

We should not, however, lose sight of the fact that all competent technicians can diagnose and fix the majority of sets in a reasonable amount of time, with no great mental strain.

I mentioned before that I have had the pleasure and benefit of discussing specific troubleshooting problems with thousands of technicians. Most of these discussions centered around some particular trouble in a set on which the technicians had exhausted all of his troubleshooting skill, without success.

The technician is aware that I, without seeing the set, without seeing the symptoms, without seeing the circuit diagram, and without actually working on the set, cannot help him greatly with his problem. But the technician hopes that I might offer a helpful clue or suggest a different method for attacking the problem.

In each case, the technician has analyzed the symptoms and has decided that the trouble is in one particular section of the set. He has tried new tubes in this section. He has checked the voltages and measured

(Continued on page 12)

TUBE TYPE	USE CARD OF
6058	6AL5
6060	12AT7
6063	6X4
6066	6AT6
6067	12AU7
6072	12AY7
6080	6AS7
6101	6J6
6106	5Y3
6113	6SL7
6118	6Q7
6134	6AC7
6180	6SN7
6201	12AT7
6485	6AH6
6660	6BA6
6661	6BH6
6662	6BJ6
6663	6AL5
6669	6AQ5
6677	6CL6
6678	6U8
6679	12AT7
6680	12AU7
6681	12AX7
6922	6DJ8
6927	6J6
6928	6AQ5
E88CC	6DJ8
XXD	7AF7

and Electron Tube Order Blank

with considerations given to new trends and developments.

Complete with easy-to-follow instructions on how to keep accurate and up-to-date records, this Guide will prove an accurate tool to gauge your business volume. When used properly, it will key you on your opening inventory each month, your unfilled orders, your completed orders, and your sales by type. Such information will facilitate your maintenance of a balanced stock inventory.

Tube Type	Hole Locations	Notes
6V8 Dual Diode Unit	A4 B5 C3 C8 F2 G7 I6 I10 K1 L3 L6 L7 M4 M10 N2 N9	Test P1 and P2; reject if below 4
6V8 Triode Unit	A4 B5 C3 D6 G1 J7 I10 J1 K7 L1 M4 M10 N2 N9	—
6W7	A2 B5 B7 C8 D10 E4 G3 I6 I10 J6 K7 L1 M5 M10 N2 N9	—
6Y7	A2 B7 C8 D4 D5 F3 G6 I6 I10 J2 K8 L1 M3 M10 N1 N9	Test P1 and P2; see instructions for gas test
6Z7	A2 B7 C8 D4 D5 F3 G6 I6 I10 J2 K8 L1 M3 M10 N1 N9	Test P1 and P2; see instructions for gas test
7AD7	A1 B8 C4 C7 D6 E3 G2 I7 I10 J1 K7 L1 L6 L8 M3 M10 N1 N9	—
7AH7	A1 B8 C4 C7 D6 E3 G2 I8 I10 J1 K1 L1 M3 M10 N1 N9	See instructions for gas test
7E5	A2 B8 C4 D1 G3 I6 I10 J3 K3 L1 M5 M10 N2 N9	See instructions for gas test
7E6 Diode Section	A1 B8 C7 F6 G5 I6 I10 K10 L3 M3 M10 N1 N9 (Card 1 of 2 cards)	Test P1 and P2; reject if below 2
7E6 Triode Section	A1 B8 C7 D3 G2 I6 I10 J6 K10 L1 L6 L7 M3 M10 N1 N9 (Card 2 of 2 cards)	—
7E7 Diode Section	A1 B8 C7 F4 G3 I6 I10 K10 L3 M3 M10 N1 N9 (Card 1 of 2 cards)	Test P1 and P2; reject if below 2
7E7 Pentode Section	A1 B8 C7 D6 E5 G2 I6 I10 J2 K6 L1 M3 M10 N1 N9 (Card 2 of 2 cards)	—
7J7 Triode Section	A1 B8 C7 D4 G3 I6 I10 J3 K7 L1 M3 M10 N1 N9 (Card 1 of 2 cards)	—
7J7 Heptode Section	A1 B8 C4 C7 D6 E5 G2 I6 I10 J3 K5 L1 M3 M10 N1 N9 (Card 2 of 2 cards)	—
7T7	A1 B8 C4 C7 D6 E3 G2 I6 I10 J2 K7 L1 L6 L7 M3 M10 N1 N9	—
7X6	A1 B8 C2 C7 F6 G3 I6 I10 K7 L4 L6 L10 M3 M10 N1 N9	Test P1 and P2; reject if below 4
8BA8 Pentode Section	A4 B5 C6 D7 E8 G9 I6 I7 J1 K2 L1 L6 L7 M5 M10 N3 N9 (Card 1 of 2 cards)	—
8BA8 Triode Section	A4 B5 C1 D2 G3 I6 I10 J7 K4 L1 M5 M10 N3 N9 (Card 2 of 2 cards)	—
8BQ7	A4 B5 C3 C8 D2 D7 F1 G6 I7 I8 J1 K9 L1 L6 L8 M5 M10 N3 N9	Test P1 and P2
8EB8 Triode Section	A4 B5 C1 D2 G3 J1 K4 L1 M3 M10 N2 N9 (Card 1 of 2 cards)	See instructions for gas test
8EB8 Pentode Section	A4 B5 C6 D7 E8 G9 I7 I10 J1 K7 L1 L6 L8 M3 M10 N2 N9 (Card 2 of 2 cards)	—
8EM5	A4 B5 C7 D3 D6 E1 G9 I6 I8 J1 K6 L1 L6 L7 M5 M10 N3 N9	—
9AK8 Diode Section	A4 B5 C3 C7 F2 G6 H1 I6 I10 K7 L3 L6 L8 M5 M10 N4 N9 (Card 1 of 2 cards)	Test P1, P2, and P3; reject if below 4
9AK8 Triode Section	A4 B5 C7 D8 G9 I6 I10 J2 K8 L1 M5 M10 N4 N9 (Card 2 of 2 cards)	See instructions for gas test

Tube Type	Hole Locations	Notes
9AU7	A4 B5 C3 C8 D2 D7 F1 G6 I6 I10 J1 K1 L1 M5 M10 N4 N9	Test P1 and P2
9AQ8	A4 B5 C3 C8 D2 D7 F1 F6 I6 I7 J1 K5 L1 L6 L7 M5 M10 N4 N9	Test P1 and P2; see instructions for gas test
10EB8 Triode Section	A4 B5 C1 D2 G3 J1 K4 L1 M4 M10 N5 N9 (Card 1 of 2 cards)	See instructions for gas test
10EB8 Pentode Section	A4 B5 C6 D7 E8 G9 I7 I10 J1 K7 L1 L6 L8 M4 M10 N5 N9 (Card 2 of 2 cards)	—
12AF3	A4 B5 C10 G9 I6 I10 K5 L4 L6 L10 M1 M10 N2 N9	Reject if below 4
12AX5	A2 B7 C8 F3 G5 I6 I10 K6 L5 L6 L10 M2 M10 N3 N9	Test P1 and P2; reject if below 4
12BN6	A3 B4 C1 D2 G5 G6 G7 J1 K8 L5 L6 L7 M2 M10 N4 N9	—
12BR7A Triode Section	A4 B5 C3 D2 G1 J1 K7 L1 L6 L7 M2 M10 N3 N9 (Card 1 of 2 cards)	See instructions for gas test
12BR7A Diode Section	A4 B5 C8 F6 G7 I6 I10 K7 L3 L6 L8 M2 M10 N3 N9 (Card 2 of 2 cards)	Test P1 and P2; reject if below 4
12CM6	A4 B5 C7 D3 E1 G9 I6 I10 J8 K8 L1 L6 L7 M2 M10 N4 N9	—
12CS7 Triode Section 1	A4 B5 C8 D7 G6 I6 I10 J6 K6 L1 M2 M10 N3 N9 (Card 1 of 2 cards)	—
12CS7 Triode Section 2	A4 B5 C9 D3 G1 I6 I10 J7 K1 L1 M2 M10 N3 N9 (Card 2 of 2 cards)	—
12CX6	A3 B4 C2 C7 D1 E6 G5 I8 I10 J1 K7 L2 L6 L7 M2 M10 N3 N9	See instructions for gas test
12DL8 Diode Unit	A4 B5 C8 F1 G9 I6 I10 K7 L4 L6 L7 M2 M10 N4 N9	Test P1 and P2; reject if below 3
12DL8 Tetrode Unit	A4 B5 C2 D7 E3 G6 I6 I10 J1 K5 L2 L6 L8 M2 M10 N4 N9	—
12DZ6	A3 B4 C2 C7 D1 E6 G5 I7 I9 J1 K8 L2 L6 L7 M2 M10 N3 N9	—
12EG6	A3 B4 C1 C2 D7 E6 G5 I7 I10 J1 K9 L2 M2 M10 N3 N9	Reject if below 3; see instructions for gas test
12EH5	A3 B4 C1 D2 E6 G7 I7 I10 J1 K6 L1 L6 L8 M2 M10 N3 N9	—
12EL6 Diode Unit	A3 B4 C7 F5 G6 I6 I10 K1 L4 M2 M10 N4 N9	Test P1 and P2; reject if below 2
12EL6 Triode Unit	A3 B4 C7 D1 G2 I6 I10 J1 K8 L2 M2 M10 N4 N9	—
12EM6 Diode Unit	A4 B5 C2 G9 K6 L4 M2 M10 N4 N9	Reject if below 2
12EM6 Tetrode Unit	A4 B5 C2 D1 E3 G6 I6 I10 J1 K3 L2 L6 L7 M2 M10 N4 N9	—
12F5GT	A2 B7 C8 D10 G4 I6 I10 J2 K8 L1 M2 M10 N4 N9	Connect external lead to tube cap
12FK6 Diode Section	A3 B4 C2 F5 G6 I6 I10 K1 L4 M2 M10 N3 N9 (Card 1 of 2 cards)	Test P1 and P2; reject if below 4
12FK6 Triode Section	A3 B4 C2 D1 G7 J1 K8 L2 M2 M10 N3 N9 (Card 2 of 2 cards)	See instructions for gas test
12K8 Hexode Unit	A1 A2 B7 B10 C8 D5 G3 G4 I6 I7 J1 K5 L1 M2 M10 N3 N9	Connect grid cap to external tube connection

TROUBLESHOOTING WITH AN OSCILLOSCOPE

(Continued from page 7)

the resistors. He has checked the capacitors and the coils. He has substituted several new parts. He has checked the wiring and the joints. He has checked, double checked, and triple checked, but the trouble is still there.

I usually ask the technician numerous questions to see if he has overlooked any possibilities. Depending on the nature of the trouble, I also ask these questions:

- (1) Did you check the waveform of the composite TV signal at the second detector?
- (2) Did you check waveforms in the suspected section(s)?
- (3) Do the peak-to-peak voltage amplitudes of these waveforms agree with the values in the service notes?

In almost every case, the technician had *not* checked the waveforms or the peak-to-peak amplitudes.

This situation is not good. Here are a large number of good technical men whose income depends largely on their troubleshooting ability, yet they have failed to take advantage of the most useful, the most helpful, the most indispensable piece of troubleshooting equipment that a technician can use—the oscilloscope!

Based on my conversations with thousands of technicians, I believe that the principal reason why so many technicians are failing to take full advantage of the help that an oscilloscope offers is because there is no good information on the interpretation of *abnormal* waveforms.

Service notes show *normal* waveforms. Books and articles show *normal* waveforms. Lecturers show *normal* waveforms. But where can a technician find useful, practical, and complete information that will assist him in recognizing the possible causes for *abnormal* waveforms?

It is evident that there is a

large gap in information on this subject.

In order to fill this void, and also to comply with requests from numerous service associations for a new series of articles on practical troubleshooting methods, the RCA Electron Tube Division has given me the go-ahead signal to take several hundred photographs of abnormal, and normal, waveforms. These photographs, in the form of quick-reference charts, begin in this issue under the title, "Troubleshooting with an Oscilloscope."

These charts are offered simply as an aid to assist you in your troubleshooting work. The charts are not intended to be a magical answer to your troubleshooting problems, but they should be of great help to you.

To become proficient in recognizing the causes of abnormal waveforms, you should:

- (a) Use a TV set to duplicate the effects which will be shown in each chart.
- (b) Study the resulting waveforms as they appear on your oscilloscope.
- (c) Observe and remember the corresponding visible symptoms in the TV picture.

If you do not have an oscilloscope, or if the one you have is inadequate, I urge you to buy a good one. I believe that it is the best investment you can make if you really want to save time and effort on your troubleshooting jobs. When you buy a scope, get one that has flat response to at least 4 megacycles, with a voltage-calibrated attenuator in 3-to-1 steps, with built-in provision for voltage calibration, and with a scale on which you can easily and quickly read peak-to-peak voltages.

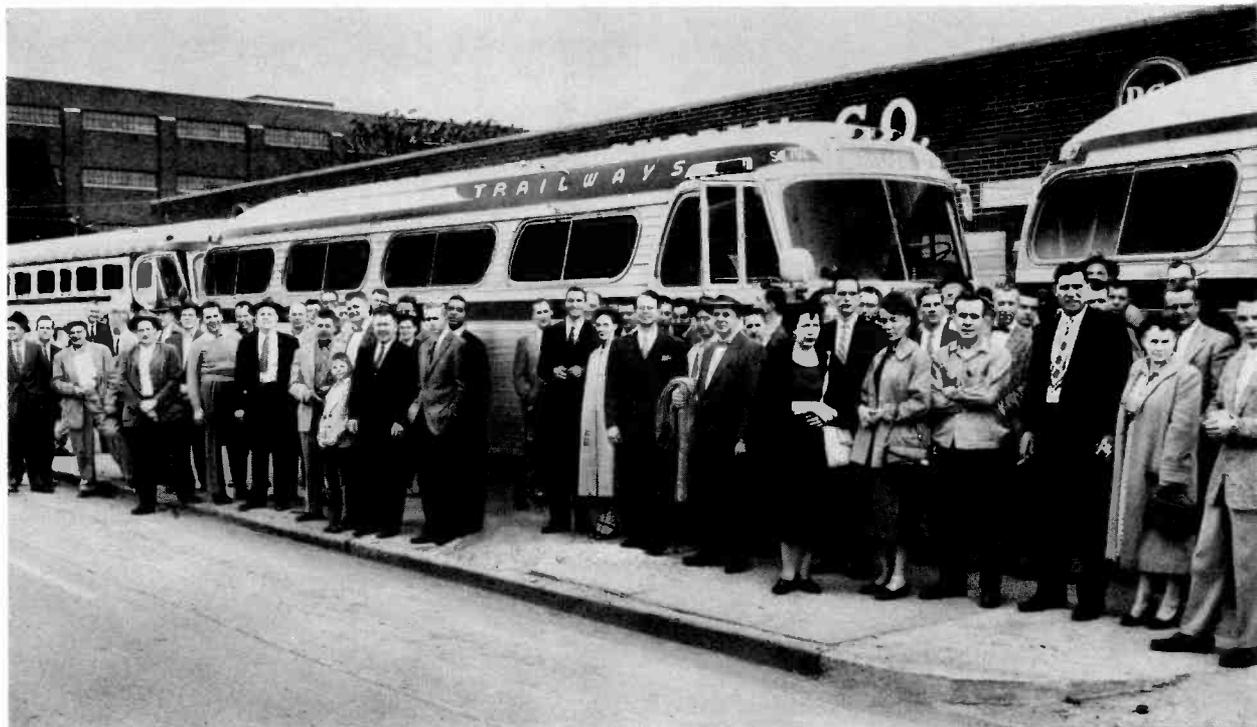
Because these charts are primarily for use by experienced technicians, we will not start with simple applications. For instance, we will not cover signal tracing and gain checks. Instead, we will start at the second detector of a set, and work through the sync separator and deflection circuits, where most of the "tough dogs" hole up.

In order to prepare a foundation for future charts, the first one (on page 6) shows *normal* waveforms of composite TV signals.

Tube Type	Hole Locations	Notes
12K8 Triode Unit	A7 B1 B2 C8 D5 G6 I6 I10 J1 K8 L1 L6 L7 M2 M10 N3 N9	—
12Z3	A1 B4 C3 G2 I6 I10 K6 L4 L6 L10 M2 M10 N3 N9	Use WG-337A 4-Pin Adaptor; reject if below 3
14A5	A1 B8 C7 D6 E3 G2 I8 I10 J1 K1 L1 M2 M10 N5 N9	—
14B8	A1 B8 C7 D4 G2 G3 G5 G6 I6 I10 J7 K8 L1 L6 L7 M2 M10 N5 N9	—
14C5	A1 B8 C7 D6 E3 G2 I6 I10 J8 K8 L1 L6 L7 M2 M10 N5 N9	—
14E6 Diode Section	A1 B8 C7 F6 G5 I6 I10 K10 L3 M2 M10 N5 N9 (Card 1 of 2 cards)	Test P1 and P2; Reject if below 2
14E6 Triode Section	A1 B8 C7 D3 G2 I6 I10 J6 K10 L1 L6 L7 M2 M10 N5 N9 (Card 2 of 2 cards)	—
14E7 Diode Section	A1 B8 C7 F4 G3 I6 I10 K10 L3 M2 M10 N5 N9 (Card 1 of 2 cards)	Test P1 and P2; reject if below 2
14E7 Pentode Section	A1 B8 C7 D6 E5 G2 I6 I10 J2 K6 L1 M2 M10 N5 N9 (Card 2 of 2 cards)	—
14H7	A1 B5 B8 C4 C7 D6 E3 G2 I6 I10 J2 K5 L1 L6 L7 M2 M10 N5 N9	—
14J7 Triode Section	A1 B8 C7 D4 G3 I6 I10 J3 K7 L1 M2 M10 N5 N9 (Card 1 of 2 cards)	—
14J7 Heptode Section	A1 B8 C4 C7 D6 E5 G2 I6 I10 J3 K5 L1 M2 M10 N5 N9 (Card 2 of 2 cards)	—
14K7 Diode Section	A1 B8 C7 F5 G6 I6 I10 K3 L4 M2 M10 N5 N9 (Card 1 of 2 cards)	Test P1 and P2; reject if below 3
14K7 Triode Section	A1 B8 C2 D4 G3 I9 I10 J1 K8 L1 M2 M10 N5 N9 (Card 2 of 2 cards)	—
14N7	A1 B8 C2 C7 D4 D5 F3 G6 I6 I10 J1 K8 L1 L6 L7 M2 M10 N5 N9	Test P1 and P2
14S7 Triode Section	A1 B8 C7 D4 G3 I6 I10 J3 K7 L1 M2 M10 N5 N9 (Card 1 of 2 cards)	—
14S7 Heptode Section	A1 B8 C4 C7 D6 E5 G2 I6 I10 J3 K1 L1 M2 M10 N5 N9 (Card 2 of 2 cards)	—
14W7	A1 B8 C4 C5 C7 D6 E3 G2 I8 I10 J1 K6 L1 L6 L7 M2 M10 N5 N9	—
14X7 Diode Section	A1 B8 C4 C7 F6 G5 I6 I10 K7 L3 L6 L8 M2 M10 N5 N9 (Card 1 of 2 cards)	Test P1 and P2; reject if below 2
14X7 Triode Section	A1 B8 C4 D3 G2 I6 I10 J2 K9 L1 M2 M10 N5 N9 (Card 2 of 2 cards)	See instructions for gas test
14Y4	A1 B8 C7 F3 G6 K6 L5 L6 L10 M2 M10 N5 N9	Test P1 and P2; reject if below 4
18DZ8 Pentode Unit	A4 B5 C2 D3 E7 G6 I8 I9 J2 K4 L1 L6 L7 M5 M9 N4 N8	—
18DZ8 Triode Unit	A4 B5 C8 D1 G9 I6 I9 J3 K8 L1 M5 M9 N4 N8	—
18FW6	A3 B4 C2 C7 D1 E6 G5 I7 I10 K7 L1 L6 L7 M3 M9 N2 N8	—
18FY6 Diode Section	A3 B4 C2 F5 G6 I6 I10 K3 L4 M3 M9 N2 N8 (Card 1 of 2 cards)	Test P1 and P2; reject if below 4
18FY6 Triode Section	A3 B4 C2 D1 G7 I6 I10 J2 K10 L1 L6 L7 M3 N9 N2 N8 (Card 2 of 2 cards)	See instructions for gas test

Additional card-punching information will appear in subsequent issues.

WELCOME TO THE 'CLUB'—In keeping with the RCA Marion, Ind., plant's open-door policy of welcoming periodic, pre-arranged service-dealer tours, some 135 TV dealers and service technicians—three bus-loads full—recently inspected the renowned picture tube manufacturing facility. All customers of Meunier Radio Supply, Indianapolis distributor who joined with RCA to host the event, their plant tour satisfied their warranted curiosity in seeing for themselves why RCA Silverama and Mono-gram picture tubes rate their reputation as preferred sellers.



Four Test Equipment Repair Depots Added

Earlier this year, RADIO AND TELEVISION SERVICE NEWS alerted its readers to the local RCA test equipment repair depots set up across the nation to quicken the company's overall repair service to television and radio technicians. Recently, RCA increased its list of local repair depots to include four

more independent companies, bringing the total number to an even dozen. Hence, you are advised to send your RCA test instruments in need of repair to one of the following test equipment repair branches or shops nearest you:

- Douglas Instruments Labs., 176 Norfolk Ave., Boston 19, Mass.
- Electro-Tech Equipment Co., 690 Murphy Ave., S.W., Atlanta, Ga.
- Electro-Tech Equipment Co., 308 Canal St., New York 13, N. Y.
- Electro-Standards Labs., 387 W.

South River Drive, Miami, Fla.

- Industrial Certification Corp., 28212 Beach Drive S., Box 57, Redondo, Wash.

- InSCO Company, Inc., 4947 Colorado Blvd., Denver 16, Colo.

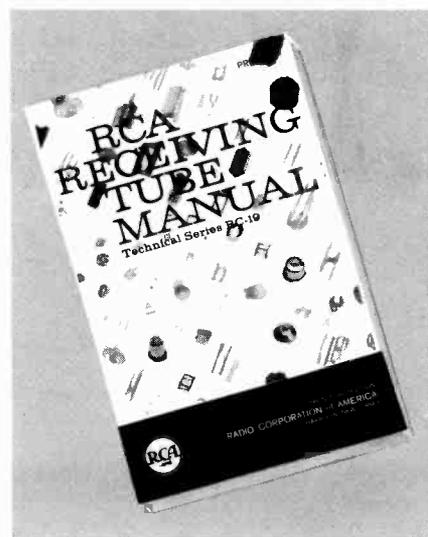
- Nelson Electronics Engineering Co., 6333 Prospect St., Dallas 14, Tex.

- Otto's Instrument Service, Ontario International Airport, Ontario, Calif.

- Speed Instrument Co., 2718 E. Rothgeb Drive, Raleigh, N. C.

- Sturtz Instrument Co., 4705 Mis-

Latest Edition of RCA Receiving Tube Manual Highlights Technical Data



The industry's most authoritative and comprehensive tube manual was recently revised and is now available to you from your local RCA tube distributor. It's the new edition of the popular RCA Receiving Tube Manual (RC-19)—of which more than 3½-million copies have been sold since the first edition was issued 23 years ago.

List priced at 75¢, the RC-19 features technical data for more than 625 receiving tubes, covering types for black-and-white and color television and series-string applications, and more than 95 TV picture tubes including color types. Also presented is an easy-to-understand section on basic tube theory and application, as well as an expanded section on electron tube applications, including a description

of tone-control circuits for high-fidelity audio amplifiers and high-voltage regulator circuits for color TV receivers.

Other portions of the revised RCA Receiving Tube Manual contain information on generic tube types, interpretation of tube data, and electron-tube installation.

The receiving-tube classification

Two New Mercury Batteries:

Your RCA battery distributor now offers you two new mercury types: RCA's VS150 and VS163. Both are employed in transistorized TV remote control units recently announced by Philco and RCA, respectively. The VS150 is also used in portable radios.

With a List Price (optional) of only

Apprenticeship Plan Guides On-Job Training

(Continued from page 5)

the employer, the apprenticeship committee, and the Arizona Apprenticeship Council.

The Apprentice Agreement covers the terms and conditions of employment and training, pointing out that the apprentice shall attend related, theoretical instruction for at least 576 hours, or a minimum of 144 hours for each year of his apprenticeship. It also contains a statement of the trade learned, as well as a schedule of the work processes and wage rates.

When signing the Apprentice Agreement, the employer does not become liable for any injury sustained by the apprentice engaged in related instruction at a time when his employment has been temporarily or permanently terminated. In addition, the employer is not bound to actually hire the apprentice, but he is obligated to try to provide

sion Road, Kansas City, Kans.

- Sunshine Scientific Instrument Co., 1810 Grant Ave., Philadelphia 15, Pa.

- Weshler Electric Company, 4250 W. 130th St., Cleveland, Ohio.

Please note that if your RCA WT-110A Automatic Electron-Tube Tester needs service work, do not send it to any of the 12 local repair depots. Instead, forward it to the specially established RCA WT-110A Repair Service Station, Main and Cotton Sts., Philadelphia.

for Over 700 Types

chart and the picture-tube characteristics chart have been revised to include the latest data. In addition, the popular circuits section at the rear of the book shows new diagrams for an intercom, "hi-fi" audio preamplifiers, an audio control unit, and two complete "hi-fi" amplifiers having outputs of 10 watts and 35 watts.

RCA VS150 and VS163

47¢, the VS150 is a 1.4-volt type that is interchangeable with the Eveready E640, the Mallory RM640, and the Philco P640.

The 4-volt VS163, interchangeable with the Eveready E163 and the Mallory TR163R, has a List Price (optional) of \$1.60.

reasonable, continuous employment for him.

Here is a breakdown on the recommended hours an apprentice should spend in specific functions during four years of on-the-job training:

- Counter service and general check—500 hours.

- Unpacking, preparing, and checking electronic equipment and parts—500 hours.

- Installation of electronic equipment—1,300 hours.

- General diagnosis and repair of electronic equipment—1,300 hours.

- Outside service work—2,000 hours.

- Shop repair of electronic equipment—4,000 hours.

Salary Rates

According to BEST of Arizona's apprenticeship plan, as noted in the special handbook, salary rates for the "trainees" should be as enumerated below—"provided, however, that no apprentice shall receive an increase in pay at the end of any 1248-hour period unless his progress on the job and related instruction is satisfactory to the committee."

- 1st 26-week period—52%

- 2nd 26-week period—55%

- 3rd 26-week period—60%

- 4th 26-week period—65%

- 5th 26-week period—70%

- 6th 26-week period—75%

- 7th 26-week period—80%

- 8th 26-week period—90%

The handbook mentions that the above schedule is based upon the prevailing technician's rate as ascertained by BEST of Arizona. It also states that "employers shall not pay the apprentice a higher rate of pay than specified above, and shall pay him for the proper period as stipulated in his Apprentice Agreement."

The "proper period" referred to here is contingent on the apprentice's previous experience. In most cases, the apprentice begins a four-year term (divided into eight 26-week periods) during which he participates in an approved schedule of work experience for approximately 9600 hours and during which he attends classes related to the trade for at least 576 hours. However, in special instances, an apprentice is granted an advanced standing as a credit for his previous trade experience. Hence, if an apprentice begins his on-the-job training at an advanced level, he is paid the wage rate of the period in which he is entered.

Hours of employment for appren-

tices are the same as that for technicians. An apprentice, however, is not permitted to do overtime or out-of-town work if it will interfere with his related, technical instruction.

During the apprentice's first three years (or 150 weeks) of on-the-job training, he is required to work under the immediate supervision of a qualified technician. During the last year (or 50 weeks) of his four year "course," he may work alone under the general supervision of the employer or his authorized supervisor. An apprentice is never allowed to work overtime unless he is accompanied by a technician.

As listed in the BEST handbook, here are some of the responsibilities of apprentices:

- To respect the property of the employer as well as others, and to abide by the working rules and regulations of the employer and the apprenticeship committee.

- To regularly attend and satisfactorily complete the required hours of instruction in subjects related to the trade.

- To maintain such records of on-the-job work experience and related instruction subjects as may be required by the committee.

- To develop safe working habits, and to conduct himself in his work in such a manner as to assure his own safety as well as that of his fellow employees.

- To work for the employer to whom assigned to the completion of his apprenticeship, unless he is reassigned to another employer or his Apprentice Agreement is terminated by the committee.

- To conduct himself at all times in a creditable, ethical, and normal manner, realizing that much time, money, and effort will be spent in affording him an opportunity to become a competent radio, television, and electronic technician.

- To be neat in appearance at all times, clean shaven and suitably dressed in clean clothes, as a neat appearance will lend dignity to the industry.

- To furnish the required hand tools necessary to perform the work of an apprentice technician.

* * *

If you would like further details on the Apprenticeship Standards established by the Better Electronic Service Technicians of Arizona, Inc., write to BEST's apprenticeship committee at P.O. Box 1284, Phoenix, Ariz.



POSTAGE

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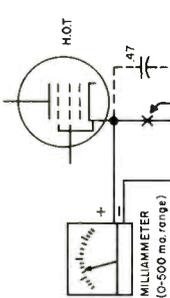
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415 S. Fifth Street
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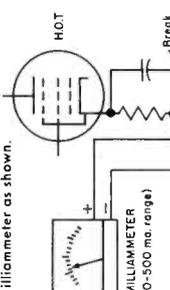
TO

Form 3547 Requested

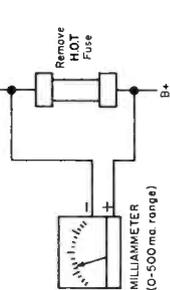
4 SIMPLE WAYS TO
MEASURE "H.O.T." CURRENT



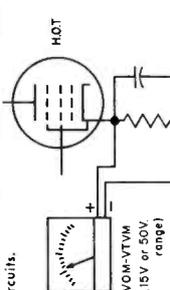
Disconnect cathode circuit at the "H.O.T." socket. Connect 0.47 μ f capacitor and dc milliammeter as shown.



If "H.O.T." circuit has bypassed cathode-bias resistor, connect milliammeter as shown.



Remove "H.O.T." circuit fuse. Connect meter across fuse holder as shown. Indicated current will be slightly higher than actual cathode current because it includes boosted "B" current to vertical oscillator and/or other circuits.



Measure dc-voltage across "H.O.T." cathode-bias resistor. Voltage should not exceed value shown in service data for the set. Compute cathode current by dividing the voltage by the resistance.

TYPICAL RCA "H.O.T." TYPES AND MAX. A DC CATHODE CURRENT (MILLIAMPERES)	MAX. A
6AU5-GT	110
6AV5-GA	110
6AV5-GT	110
6BQ6-GA	110
6BQ6-GT	110
6BQ6-GT8/6CU6	112.5
*6C85	200
6CD6-A	200
6CD6-G	200
6CD6-GA	200
6DQ5	285
6DQ6-A	140
12AV5-GA	110
12DQ6-GT8/12CU6	140.5
17BQ6-GT8	112.5
17DQ6-A	140
*198C6-GA	110
*198C6-G	110
25BQ6-GT8/25CU6	112.5
25CD6-GA	200
25CD6-GB	200
25DN6	200

*Discontinued RCA Type—Replaced by RCA "A" or double-branded version.
A Values shown are measured with the receiver operating at a line voltage of 117 volts, 60 cycles.

How to keep your profits from going to the "dogs"!



**AVOID CALLBACKS
DUE TO PREMATURE
TUBE FAILURE...**

...when you replace a defective horizontal output tube check operating cathode current.

Premature horizontal output tube ("H.O.T.") failure can be caused by excessive cathode current—*higher than recommended by the manufacturer*—due to misadjustment or defective components in the horizontal output stage. Whenever you replace the "H.O.T.", protect your profits with these precautions: (1) measure "H.O.T." cathode current; (2) if excessive, find the trouble and fix it; and (3) adjust Horizontal Drive, Width, and Linearity.

Keep your hard-earned profits to yourself. Take time to check "H.O.T." cathode current. And, do as most successful service technicians do: always replace defective horizontal output tubes with *power-to- spare* RCA tubes. They pay off in fewer callbacks, finer reputation, and bigger profits.



RCA-6DQ6-A—typical of RCA's excellent tube quality. Mount structure is designed to give maximum heat dissipation, prevent "hot spots" on the plate, allow cooler operation of the grids—help cut callbacks! Available at your RCA Tube Distributor.



RADIO CORPORATION OF AMERICA
Electron Tube Division
Harrison, N. J.