

SUCCESSFUL

Serviceing

JANUARY 1952

Using the 'Scope for

TV SERVICING

by Walter Boiko and Joseph J. Roche

The oscillograph is one of the most useful instruments available for servicing television receivers. The purpose of this article is to help those who are now using the instrument to obtain maximum value from it.

The utility of the oscillograph is greatly increased if a crystal probe and a voltage calibrator are available. To observe the signals in the r-f and i-f stages of a tv receiver the signal must be detected before it is applied to the vertical input terminals of the oscillograph. The crystal probe performs this function.

Using the Probe

To observe the signals in these stages the output leads of the probe should be connected to the vertical input terminals of the instrument, the ground lead of the probe connected to the chassis, and the positive lead of the probe connected to the circuit to be investigated.

The usual procedure in troubleshooting the r-f and i-f stages of a receiver is to observe the signal at the grid and then the plate of each stage. The probe detects with the same polarity at all times and the 180° phase shift, which occurs between the input and output of each stage, is not observed on the oscillograph screen—a point which often confuses the beginner.

Probe Loading

When the probe is connected to a high-Q tuned circuit it loads the circuit, changing its response characteristics. If this point is not kept in mind, the information appearing on the oscillograph screen can be misleading.

An example of the effect of probe loading occurs in the narrow-band sync amplifier (Fig. 1) of current production Du Mont Telesets. The narrow-band sync transformer, Z209, is sharply tuned. When a probe is ap-

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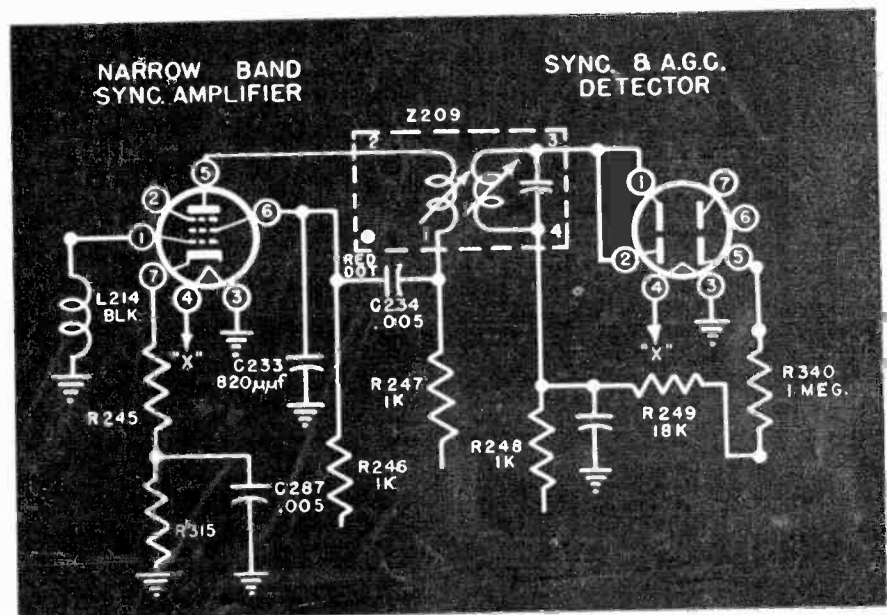
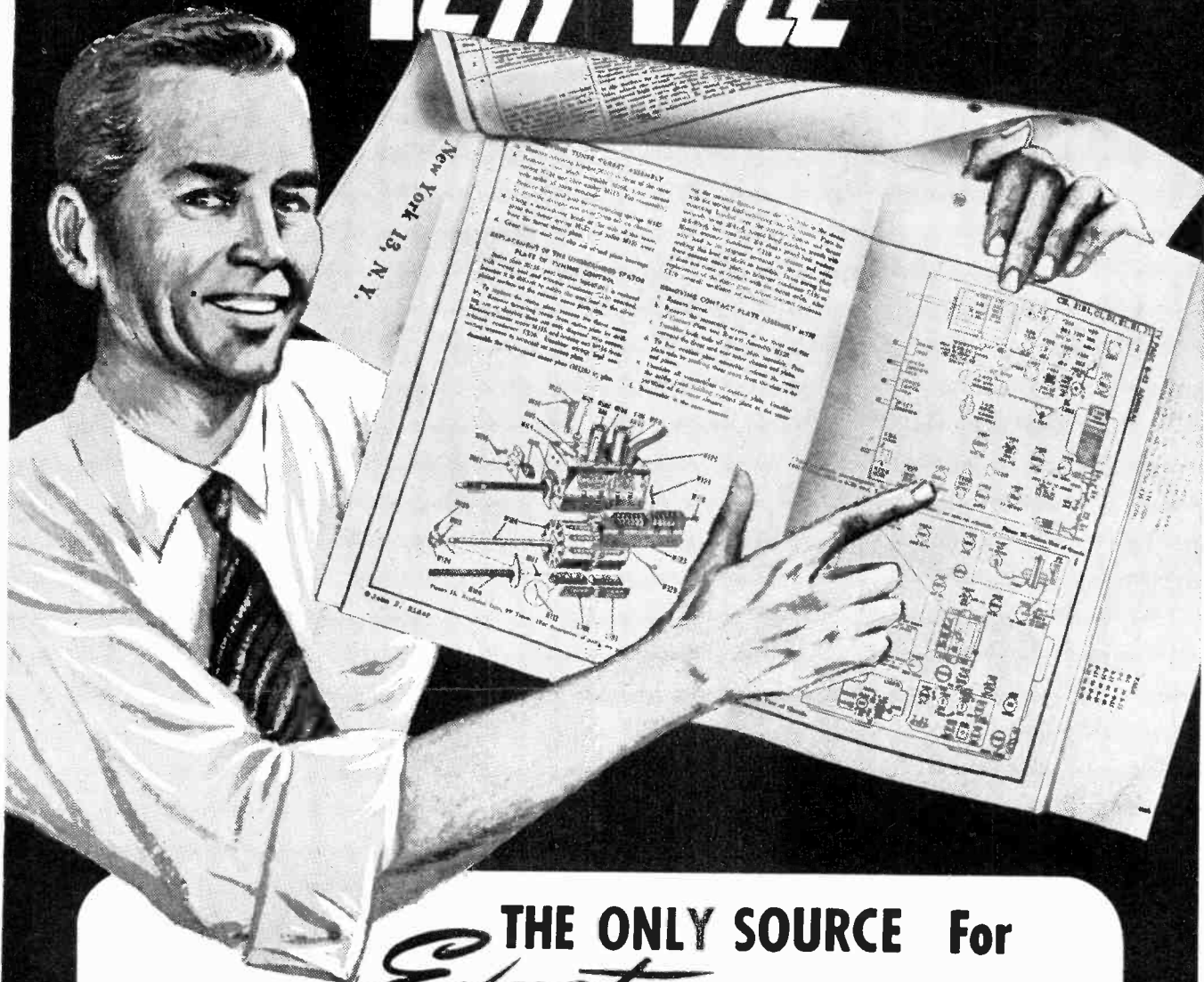


Fig. 1. Narrow-band sync amplifier of television receiver.

TEK-FILE

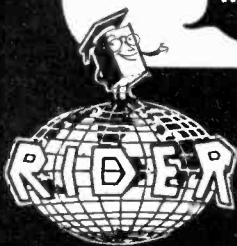


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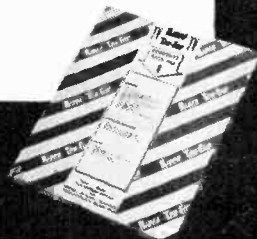
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Fig. 1. Contents of a typical Tek-File pack. Note the waveform diagrams in the service data. Not shown here are the Handies and Binder Coupon included in this pack.



Packaged Service Data

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As new receiver models are made available by the manufacturers, the service data is

incorporated into new RIDER TEK-FILE packs. In this way, the technician has his manufacturer-authorized service data in his shop, ready for the first set to come in for repair. The serviceman's data is up-to-date, up-to-the-minute.

Figure 1 shows part of the contents of a single RIDER TEK-FILE package. This pack contains four file folders, each 9½ x 12 inches. The Westinghouse folder contains all of the factory-tested service data (the equivalent of 104 8½ x 11 inch pages) for 26 different Westinghouse tv receiver models manufactured in 1951. Similarly, the Zenith, Stromberg-Carlson, and Radio Craftsmen file folders in this pack contain the unabridged servicing data for late model television re-

ceivers manufactured by these firms. The V-M folder contains all of the data for the popular model V-M 950 record changer.

Each file folder contains a wealth of factual installation and service data. Included are step-by-step procedures for repairing and correcting actual circuit faults. The Stromberg-Carlson folder (shown open in Fig. 1) contains, for example:

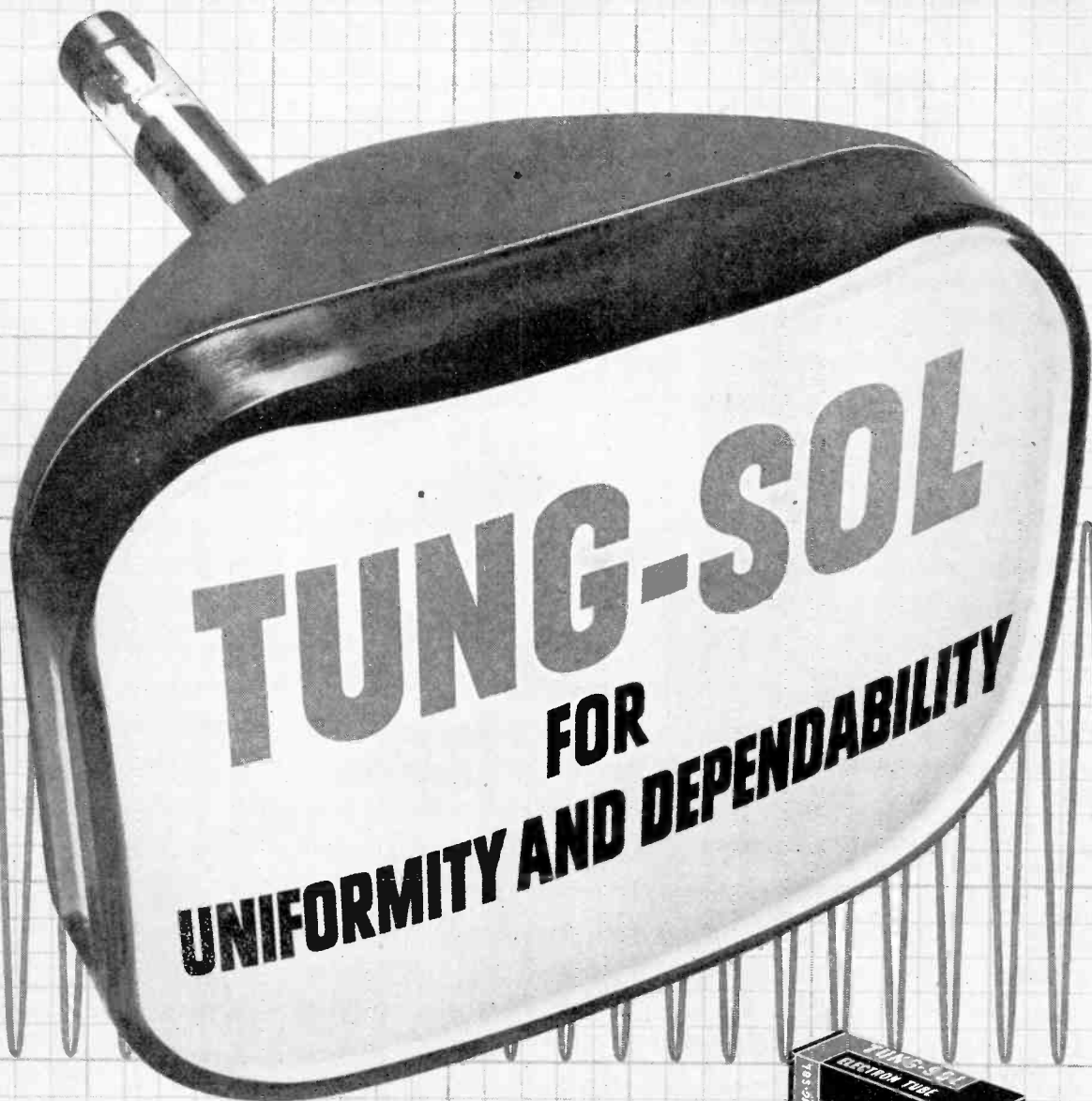
1. A complete physical and electrical description of the Stromberg-Carlson models 317TM and 317RPM television receivers.
2. Factory-tested and recommended installation adjustments.
3. Complete step-by-step alignment procedures for tuner, i-f, and audio stages.
4. The actual oscilloscope waveforms which should be observed at every relevant checkpoint in the chassis are included for faster and more accurate troubleshooting alignment.
5. A tube location diagram.
6. A complete chart of the normal voltages which should be found at the pins of all tubes.
7. A complete parts list giving values and tolerances.
8. Large size, easily followed schematic diagram.

All of this in a convenient folder, with the manufacturer's name clearly marked on the top. This folder is so designed that it can be brought by the technician to his customer's home on a service call. He will therefore have the information he needs right there with him when he needs it. The folder can also be filed in any standard 11½ x 13½ inch file cabinet for quick and easy reference in the shop.

(Continued on page 24)

STROMBERG-CARLSON	MODEL 317 Series
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White noise spots appearing in the picture in fringe areas, caused by video amplifier overshoot, may be reduced by the following changes:	
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2. In the L-25 position, the video amplifier grid, peaking coil Part No. 114725 replaces old Part No. 114715.	
3. In the L-14 position, the video amplifier plate, peaking coil Part No. 114691 replaces old Part No. 114714.	
4. In the L-13 position, the picture tube cathode, peaking coil Part No. 114726 replaces old Part No. 114713.	
5. Capacitor C-101 in the contrast circuit becomes 1,000mmf (Part No. 110599) instead of 750mmf.	
6. Capacitor C-153, 33mmf, in the Noise Reference-Blanking Amplifier section, is removed.	
7. Capacitor C-151, in the same section, is changed from .1mf to .047mf (S-C Part No. 110722).	
8. Resistor R-150, in the same section, is changed from 680K to 1 meg (S-C Part No. 149119).	
9. Resistor R-152, in the same section; is changed from 10K to 18K (S-C Part No. 28173).	
10. Resistor R-160, in the Keyed AGC section, is changed from 18K to 22K (S-C Part No. 149109).	
NOTE: These changes have been made in receivers date-coded 51-18-3 and later.	
© John F. Rider Publisher, Inc	Rider Tek-File Handy
	No. 4

Fig. 2. A typical Tek-File Handy.



REPLACEMENT:

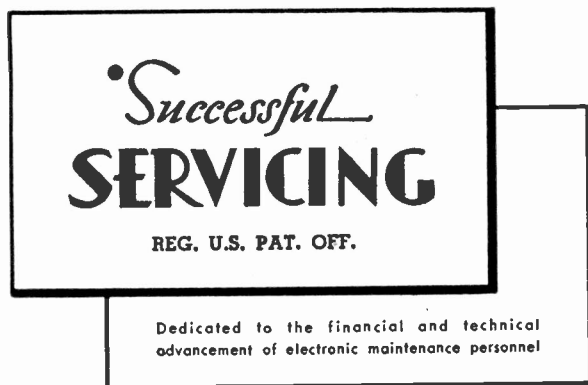
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Curtain Time

How About Your Radio Receiver?

It is safe to say that not one out of one hundred servicemen who call in a home to repair a tv receiver, or to pull a tv chassis, ask the owner about possible radio receiver service. More than likely every home equipped with a tv receiver has one or more radio receivers. The interest in tv reception takes the play away from the radio receiver with the result that its repair, assuming it to be defective, is put off. But the power of suggestion is very great; bring the radio receiver to the attention of the set owner and, having just had his tv receiver repaired properly, he will be prone to have the defective radio set repaired.

The tv servicing industry is missing a good bet in radio receiver servicing. Not only is it a source of added income, but the cost of traveling to and possibly from the home is already paid for by the repair charge for the tv receiver. It is just as easy to return a tv receiver and a radio receiver, as the former only. The solicitation for the radio repair business is made very easy by a good

tv repair job. The confidence is established and this means a great deal.

Statistics show that more than 65,000,000 radio receivers have been sold during the last six years. Add these to those already in the home before 1946, and a pool of at least 100,000,000 radio receivers is potentially available for service. Isn't it an awful waste of income not to do a little selling job on the use of radio and tv in the average home? Make the public conscious of their radio equipment and they will have their defective receivers repaired. Whatever may be the percentage of success in this direction, it is added income with relatively little selling expense.

Vendors of all kinds cook up all sorts of tactics to enable their salesmen to get their foot in the door. Here is the tv service technician who not only gets his foot in the door, but is very welcome because his services are needed—only to overlook his sales and income opportunities.

TV Courses for Servicemen

We have from time to time expressed our belief that many servicemen could further advance in radio and tv theory to the point where it increases their servicing ability. Servicemen's organizations could perform a necessary service to their members by instituting classes on this subject. In fact, this has already been done by a number of such organizations.

The Blair County Association of Radio Service Engineers in Altoona, Pennsylvania, has been running a television school for its members which can very well serve as a model for all similar organizations. The course itself is designed to give the serviceman a solid background primarily in tv theory because during the daytime they work at tv servicing. The course covers all types of receivers, and is given twice weekly from 8 to 10:30 in the evening. The student pays \$5 a month, out of which \$1 is deducted for monthly dues, if the student attends every course session. For the past fifteen months, a class of 40 servicemen have been taking the course in Altoona.

One locality where the local school board has cooperated with a servicemen's organization educational program is New York City, where the Associated Radio and Television Servicemen of New York present a program of radio and tv instruction in cooperation with the New York City Board of Education. The Board furnishes the instructors and classrooms, and the Association furnishes the students.

Besides this program of instruction, the Association operates at its clubrooms, a servicemen's clinic where, during any night of the week, a member may bring up a tv or radio receiver which has been of particular trouble to him in his shop. The other servicemen members discuss the chassis and work out its repair together.

John F. Rider

Using the 'Scope

IN TV SERVICING

(Continued from page 1)

plied directly to the primary or secondary of the transformer, the waveforms observed are distorted, as shown in Fig. 2. The loading can be minimized by connecting a small capacitor (approximately 1mmf) in series with the positive input lead of the probe. A short length of miniature 75-ohm twin lead, connected as shown in Fig. 3, can serve as a capacitor for this purpose. The series capacitor should be used when checking the signal at the primary or secondary of the NBS transformer.

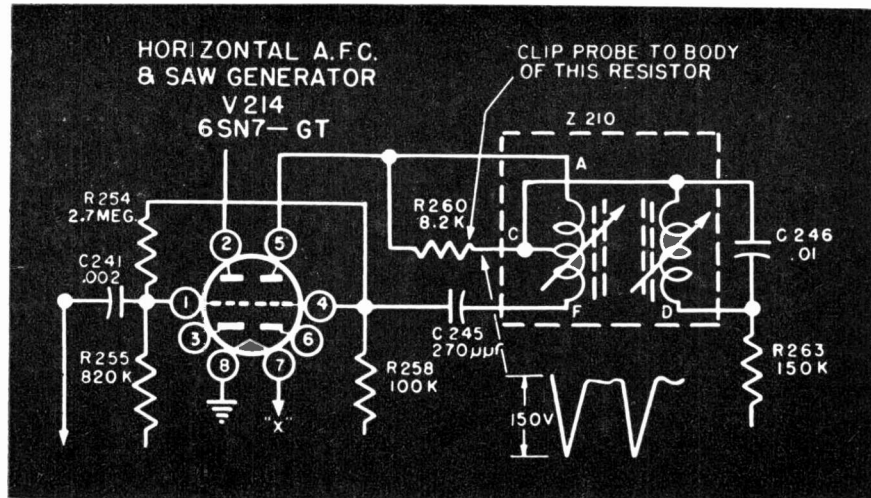
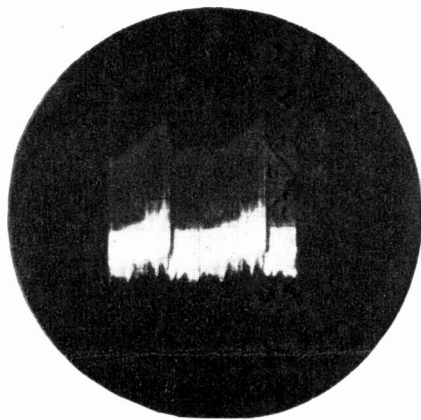
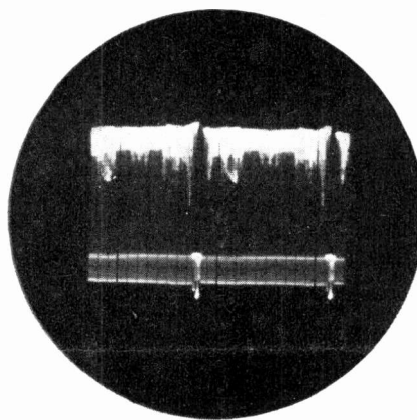


Fig. 4. Horizontal oscillator circuit of typical television receiver.



(A)



(B)

Fig. 2. (A) Waveform at NBS transformer distorted by probe loading, and (B) normal NBS waveform.

Another example of the effect of circuit loading occurs in the horizontal oscillator (Fig. 4) of RA-111A, RA-112A, RA-113 and RA-117A Du Mont Telesets. When adjusting the horizontal oscillator transformer, the oscillator signal is observed on an oscilloscope connected between terminal C of the transformer and ground. Since the signal at this point in the circuit has already been detected (by the sync detector) the crystal in the probe is not used. If the ungrounded vertical input terminal of the oscilloscope is connected directly to terminal C of the transformer, a distorted waveform similar to that shown in Fig. 5A will be obtained. The distorted waveform is identical to that which

is obtained when the transformer is improperly adjusted, and may lead the unsuspecting technician to assume that readjustment is required. The loading effect can be eliminated by clipping the positive probe lead to the body

of R260, the 8.2K resistor connected between terminals A and C of Z210. This minimizes loading of the circuit, eliminates the waveform distortion, and enables the technician to secure the proper waveform, as shown in Fig. 5B.

Troubleshooting

In troubleshooting a television receiver with an oscilloscope, the waveforms of the signals in suspected stages are examined and compared to waveforms which are known to be correct. When a distorted waveform is discovered it is analyzed to determine which components or adjustments could be the cause of the distortion. The components which may be at fault are then checked with a suitable voltmeter and ohmmeter, or by substitution.

The procedure to be followed in troubleshooting can best be described by giving actual examples. Several typical receiver faults and the methods used to locate the defective components are described in the following paragraphs.

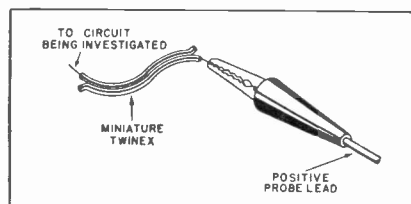
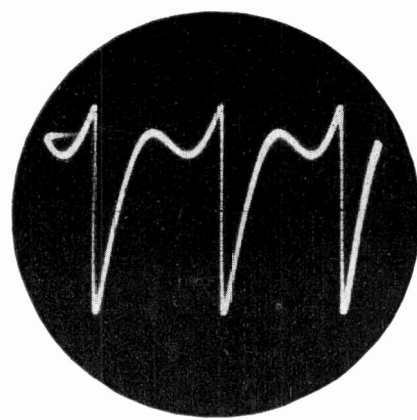
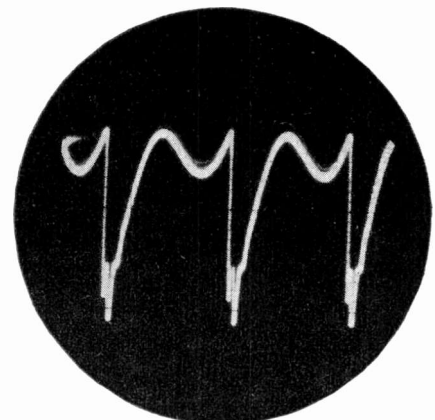


Fig. 3. Method for minimizing loading effect of probe on high-Q tuned circuit.



(A)



(B)

Fig. 5. (A) Waveform at horizontal oscillator transformer distorted by loading and (B) normal waveform at horizontal oscillator transformer.

Sync-Pulse Compression

Compression of the sync pulses accompanying the composite video signal is a common fault occurring in television receivers. It results in poor horizontal and/or vertical stability.

Sync compression is a reduction in the relative amplitude of the sync signals with respect to other information in the composite video signal. An oscillograph pattern of a composite video signal (oscillograph synchronized at vertical sweep frequency) exhibiting sync compression is shown in Fig. 6A. A normal pattern is shown in Fig. 6B. Note the difference in the amplitude of the sync pulses in these signals.

Compression of the vertical and/or horizontal sync signals can be caused by the following.

1. Improper alignment of one or more video i-f stages.
2. Overload resulting from insufficient age voltage.
3. Improper adjustment of the narrow-band sync transformer.
4. A defective component affecting the frequency response or amplitude linearity of one of the stages through which the signal passes.

When a case of horizontal and/or vertical instability is encountered a check should be made for sync compression. This may be accomplished by examining the output of the sync-detector stage with the oscillograph controls adjusted to observe one or two vertical fields.

If sync compression is observed at the output of the sync detector, the stage in which the compression is taking place may be isolated by working toward the front end of the receiver, checking the signal at the plate and grid of each stage. When compression is observed at the plate but not the grid of a stage, the compression is obviously occurring in that stage. Voltage and resistance measurements, and an alignment check in i-f stages, should then be made to determine the exact cause of the trouble.

Hum

The oscillograph is useful when attempting to locate the cause of hum in the video signal. The first step is to determine whether the frequency of the hum is 60 cycles or 120 cycles. This can be accomplished by setting the oscillograph controls to observe two fields (30-cycle sweep) and examining the signal at the output of each video i-f stage, each video amplifier stage, and at the grid of the picture tube. A normal signal, a signal containing 60-cycle hum and a signal containing 120-cycle hum are shown in Fig. 7. Note that there is one cycle of hum per field when the frequency of the hum is 60 cycles (Fig. 7B), and two when the hum is 120 cycles (Fig. 7C). The frequency of the hum may be identified in this way.

60-cycle hum is usually the result of coupling between the filament supply and the signal circuits. The most common cause is filament-to-cathode leakage in one of the r-f,

terminal to the cathodes of each of the suspected tubes in turn. The cathode at which the largest 60-cycle signal appears will usually be that of the faulty tube. The above applies only to tubes using cathode bias.

60-cycle hum can also enter the r-f and video i-f stages through the agc line. The agc line should be checked in the manner described above. If 60-cycle hum is discovered on the line, the tubes in the agc, sync detector and associated stages should be checked.

120-cycle hum is usually the result of a filter capacitor failure. The B+ lines should be checked using the method described for 60-cycle hum. The amplitude of the hum at various points in the B+ voltage-divider circuit will give some clue as to the location of the faulty component. Voltage, resistance and substitution checks may then be used to identify the defective component.

Some 120-cycle hum and 60-cycle ripple—from the vertical-sweep circuits—normally

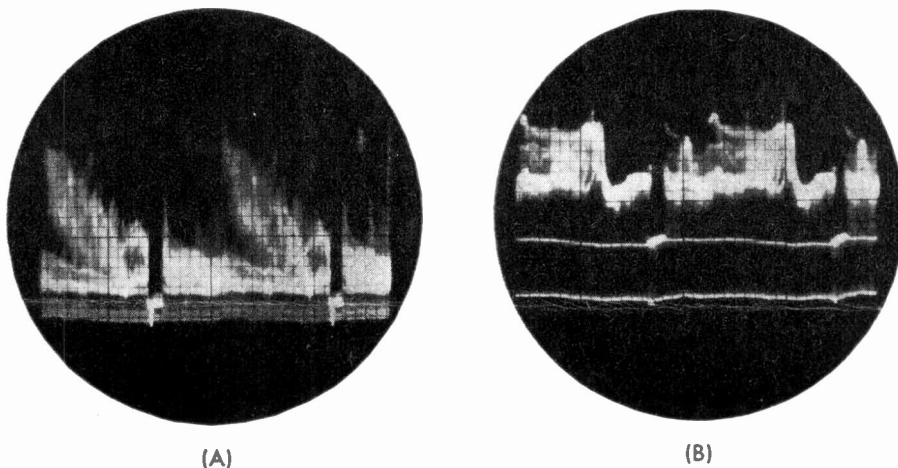


Fig. 6. (A) Composite video signal exhibiting sync compression. (B) Normal composite video signal.

video i-f, or video-amplifier tubes, or the picture tube. To locate the faulty stage, connect the ground terminal of oscillograph to the Teleset Chassis, set the instrument for 30-cycle sweep, and connect the vertical-input

appears in the B+ circuits. In order to avoid being misled the technician should familiarize himself with normal conditions by examining the B+ circuits of a properly operating receiver.

(Continued on page 11)

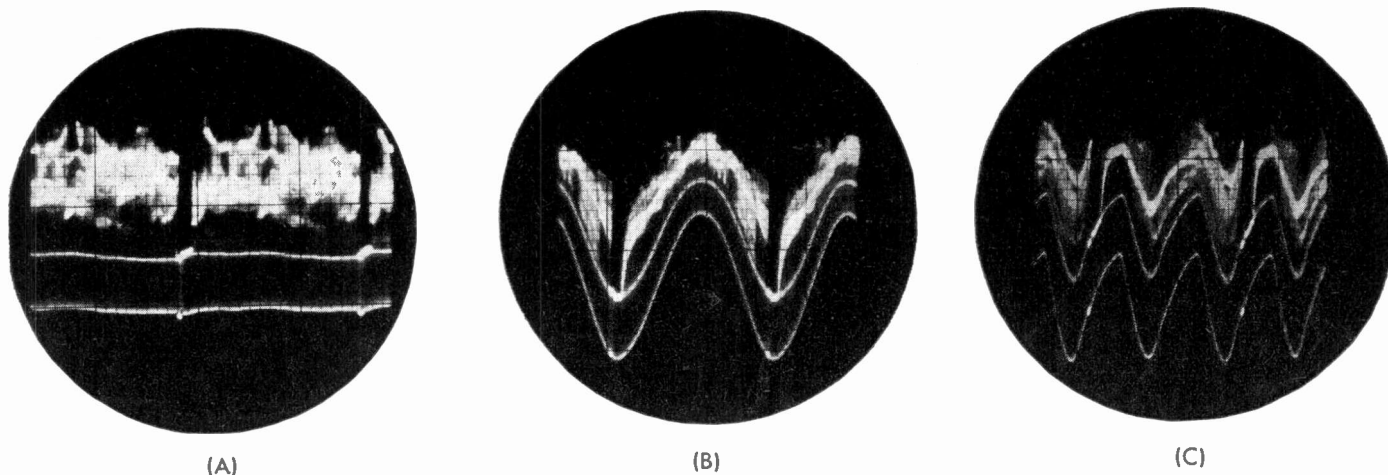


Fig. 7. (A) Normal video signal, (B) video signal with 60-cycle hum, and (C) video signal with 120-cycle hum.



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ASSOCIATION NEWS

From National Alliance of Television and Electronic Service Associations (NATESA) headquarters comes news of the results of the elections in various member groups. . . . The Associated Radio and Television Service Dealers, Columbus, Ohio affiliate, elected Fred Colton President, The Television and Electronics Service Association (formerly the Nebraska-Iowa Television and Electronic Service Association) elected Jim Hustad President. Jim is also Secretary General of NATESA. Edmund Trefari has been elected to a directorship in NATESA by the Radio and Television Servicemen of New Jersey.

The Television Installation Service Association (TISA), Chicago affiliate of NATESA, is making available to its members a little pamphlet on the care of tv receivers for distribution to their customers. The pamphlet is called "Why Service," and does a clever job of informing the tv set owner of the need for periodic service to keep the set in good shape.

A forum on tv servicing, designed to clear up many of the questions on servicing in the minds of industry and the public, was held on January 24th in Detroit, Michigan. Sponsored by the Television Service Contractors Association, Inc., of Detroit, the audience consisted of representatives of manufacturers, set distributors, parts jobbers, manufacturers agents, tv dealers, tv contractors, members of

the Detroit press, and tv stations. Special speakers at this forum were Paul V. Forte, Albert M. Haas, and Paul Wendel.

Servicemen in the Columbus, Ohio area will have an opportunity to hear John F. Rider, well-known radio and tv author and lecturer, and publisher of RIDER MANUALS and Tek-File, on February 13. This talk will be sponsored by Whitehead Radio Company of Columbus, Ohio.

The National Appliance and Radio Dealers Association (NARDA) held its annual convention at the Conrad Hilton Hotel in Chicago on January 13-15. Forty-nine of its members were honored at the annual banquet held in the Grand Ballroom on Monday, January 14, for "playing a leading part in the crusade for higher standards in their industry by working for better understanding and fuller cooperation among the nation's retailers."

Radio Servicemen's Association of Trenton, New Jersey . . . In order to promote a more progressive and active program within the association for the benefit of its members, a series of technical and business lectures have been arranged for and will be held in the studios of the local broadcasting stations. Gibson Grandly, Chairman of the membership committee announced that membership in the Association is open to all radio and tv tech-

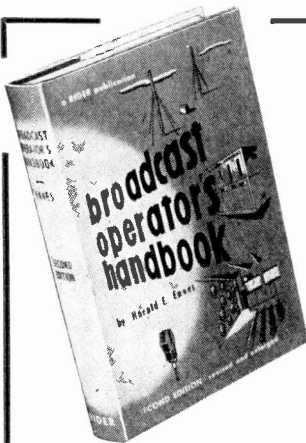
nicians and service dealers in the Metropolitan area of Trenton.

The Blair County Radio Service Engineers Association and the Mid-State Radio Servicemen's Association of Harrisburg among other groups report a rise in membership as a result of the lecture series they have been running. The lectures are not only well attended, but bring many servicemen into the fold after they realize that the local associations are on their toes.

Due to the rapid growth of membership in the Radio and TV Technicians Guild of Florida, it was felt necessary to increase the number of members on the board of directors. The following members were elected to the board for a period of one year: Samuel Kessler, Thomas M. Middleton, and John C. Ryan. This makes a total of eleven men on the board.

The Southern Pennsylvania Radio Servicemen's Association of York, Pennsylvania, became the 10th chapter in that state of the Federation of Radio Servicemen's Association of Pennsylvania. Incidentally, the 50 point program on servicing, as compiled by representatives of the Federation to the Joint Electronic Radio Committee on Service in Philadelphia, is being presented by all chapters to their local distributors and manufacturer's representatives for action.

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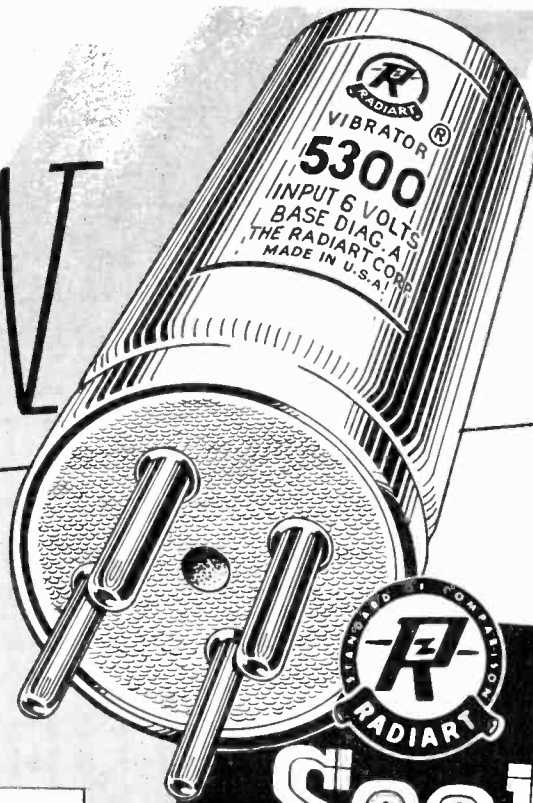
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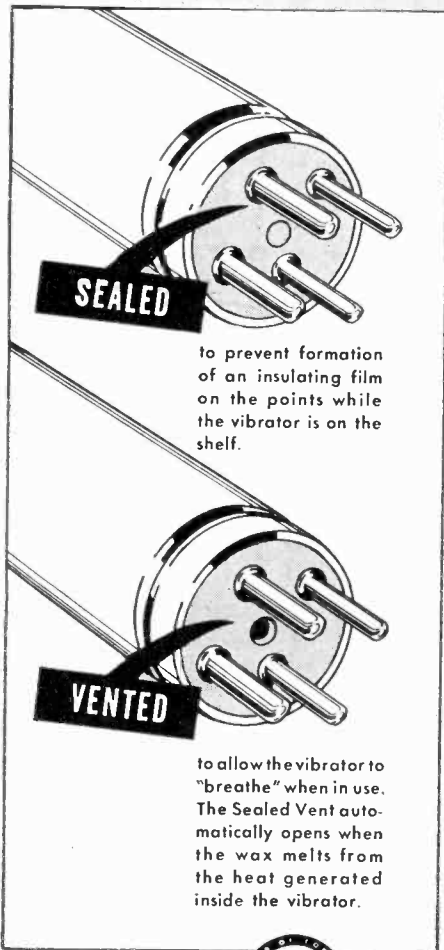
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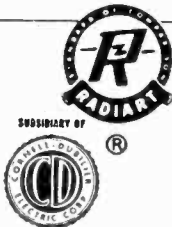
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Using the 'Scope IN TV SERVICING

(Continued from page 7)

Horizontal Nonlinearity

The oscillograph is also useful in locating the cause of foldover and other forms of horizontal nonlinearity.

Horizontal nonlinearity results from improper operation of one of the stages between the horizontal oscillator and the deflection coils. By examining the waveforms in these stages it is usually possible to isolate the fault to a few components.

While a complete discussion of the procedure used to troubleshoot the horizontal sweep circuits is beyond the scope of this article, an example of the manner in which the waveform at one point in the circuit may be interpreted to secure a clue to the fault, will serve as a guide.

Three examples of the manner in which the signal at the grid of the horizontal deflection amplifier is affected in cases of nonlinearity are illustrated in Fig. 8.

Figure 8A illustrates the appearance of the waveform when the linearity-coil bypass capacitor is open. The ripple on the waveform is due to improper filtering of the damper circuit and is thus a clue to the location of the fault. Some ripple of this type is normal

in RA-109A, RA-112A and RA-117A Tele-sets, as shown in Fig. 8D, and does not affect the picture. This type of fault sometimes occurs in earlier chassis such as the RA-103 and RA-105.

Figure 8B illustrates the effect of a shorted drive control potentiometer on the waveform at the grid of the 6BG6. This waveform results in the appearance of a white vertical line in the picture. Note the absence of the negative pulse which results in a reduction in the amplitude of the signal and delays the conduction of the 6BG6, producing the white line in the picture.

A change in the time constant of the horizontal differentiating network produces the waveform shown in Fig. 8C. The fault may be isolated by observing the waveforms at the grid of the sawmaker and the plate of the horizontal oscillator. A normal waveform at the plate of the horizontal oscillator and a distorted waveform at the grid of the sawmaker would indicate that the faulty component was located between these points, or in the differentiating network.

Only a few of the uses of the oscillograph have been described. They are representative of the application of the oscillograph to troubleshooting and when the technician has mastered them he will find little difficulty in expanding his ability to use this valuable instrument.

(Reprinted from *DuMont Service News*; a monthly publication of Allen B. DuMont Labs., Inc.)

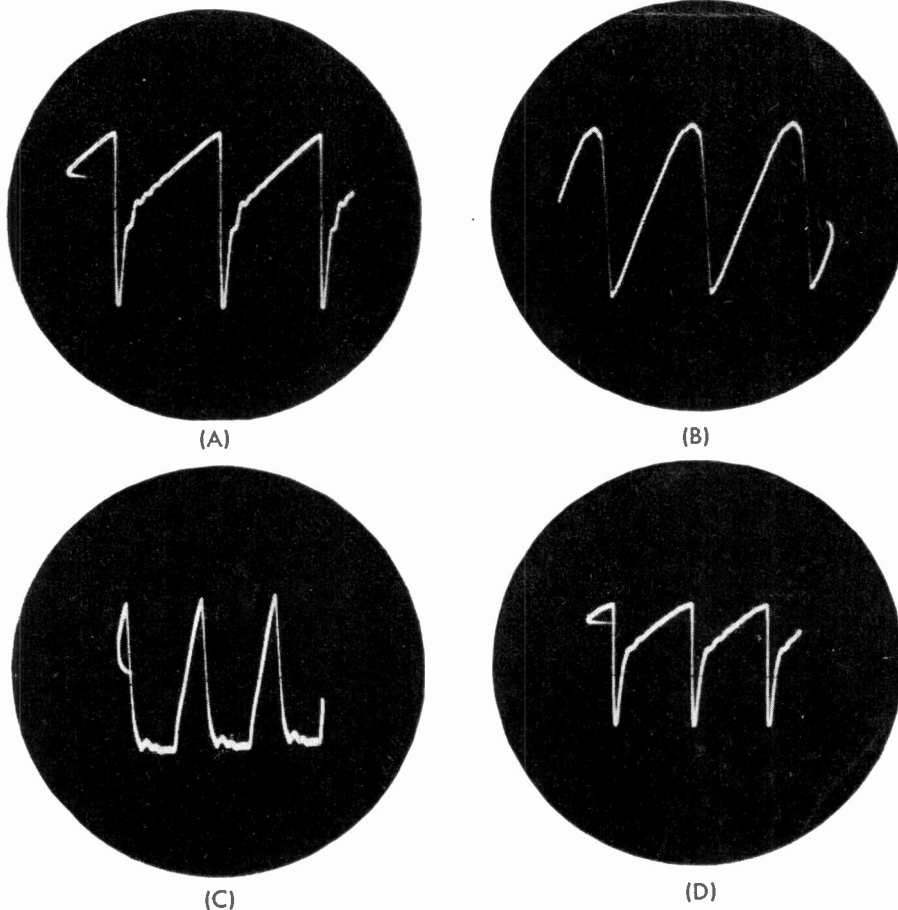


Fig. 8. (A, B, C) Waveforms at the grid of horizontal-sweep amplifier for various circuit defects; (D) normal waveform for this checkpoint.



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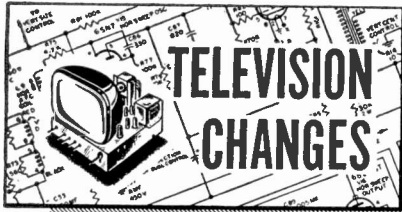
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**RCA 8T270, 8TC270, 8TC271,
Ch. KCS29, KCS29A**

The following production changes have been made. Resistor R102 has been changed to 68 ohms. Resistor R236 has been changed to 100,000 ohms. In some receivers, the phono-switch, S105, and jack, J110, were omitted. In this case, R195 was connected directly to C184, and R224 was connected to -50 volts. The accompanying figure shows the changes that have been made.

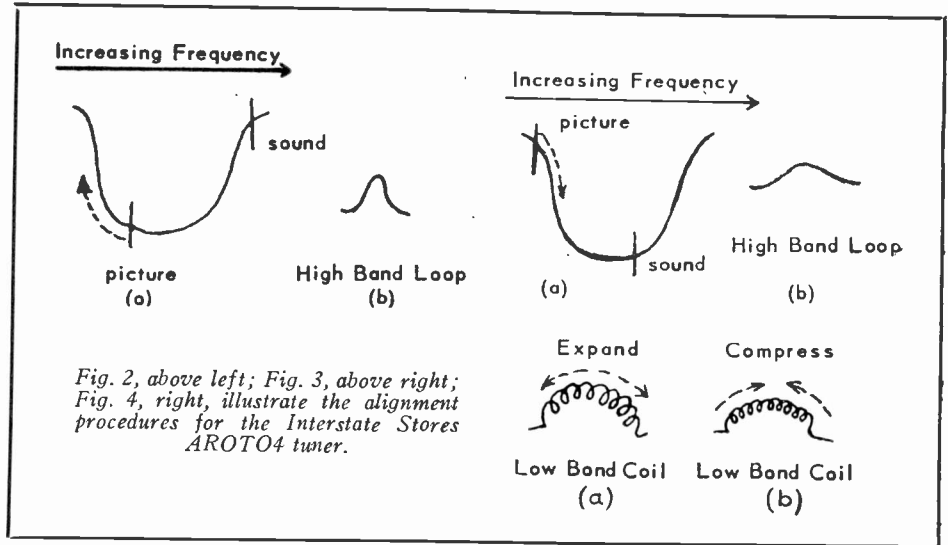
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Interstate Stores (Plymouth) 250, 350, 750

The schematic for AROTO5 tuner, type 2, is shown in Fig. 1.

The following material on oscillator alignment should be added to the information already contained in the service notes for the above models (tuner AROTO4, type 1).

Set generator and tuner to Channel 12 and observe on the oscilloscope the position of the picture carrier. If the picture carrier cannot be centered on response curve by plus or minus one-eighth turn rotation of the fine tuning shaft, adjust L449. (This loop is difficult to see since it is positioned around the switch wafer support rod.) In adjusting L449,



first note position of picture carrier (fine tuning at mid range). If picture carrier is as shown in Fig. 2a, distort loop toward the shape in Fig. 2b. This will move picture carrier down on the response curve. If picture carrier is as shown in Fig. 3a, distort the loop toward the shape as shown in Fig. 3b. This will move picture carrier up on the response curve. The above procedure is also used in the adjustment of L448, L447, L446, L445, and L444.

To adjust the low band channels from two through six, set tuner and sweep generator to channel six, set fine tuning to mid range and adjust the lower screw, the slug for L443, until the picture carrier is 50% down on the response curve.

Set sweep generator and tuner for Channel 5 and observe position of picture carrier on the response curve. If it cannot be centered by plus or minus one-eighth turn rotation of the fine tuning shaft, adjustment to L422 is necessary. If picture carrier is as shown in

Fig. 2a, expand coil with insulated tool as shown in Fig. 4a; this will move picture carrier down on the response curve. If picture carrier is as shown in Fig. 3b, compress coil with insulated tool as shown in Fig. 4b; this will move picture carrier up on the response curve. The above procedure is also used in the adjustment of L441, L440 and L439.

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C8-5	—

Crosley Service Hint

To reduce sweep radiation which interferes with radio reception, the following steps should be undertaken:

1. With glass type picture tubes, make sure that the tube has a good coating of aquadag. If the tube has no coating, it may be necessary to replace the tube. If the aquadag is peeling or is missing from some portion where it is required, repair the aquadag with "Television Tube Koat - No. 49-2," manufactured by General Cement Mfg. Co., Rockford, Illinois. Also, be sure the aquadag is grounded to yoke with ground clip.

2. With Scotch tape, fasten one end of a sheet of aluminum foil (approximately 10" x 10") to the aquadag on the top area of the picture tube. Ground the other end of the foil under the tube strap.

3. Line the inside of the cabinet (area surrounding chassis) by cementing foil to the cabinet and grounding it to the sides of the chassis. Be sure to cut the foil away from any ventilation opening in the cabinet. In some cases it may be necessary to also place the foil completely across the chassis mounting shelf, underneath the chassis. After lining the cabinet with foil the built-in antenna is no longer effective and should be grounded to the chassis. Therefore, it will be necessary to use either an external indoor or outdoor type antenna.

4. Sometimes it may be necessary to make a shield, out of copper screen, to fit over the horizontal output and damper tubes.

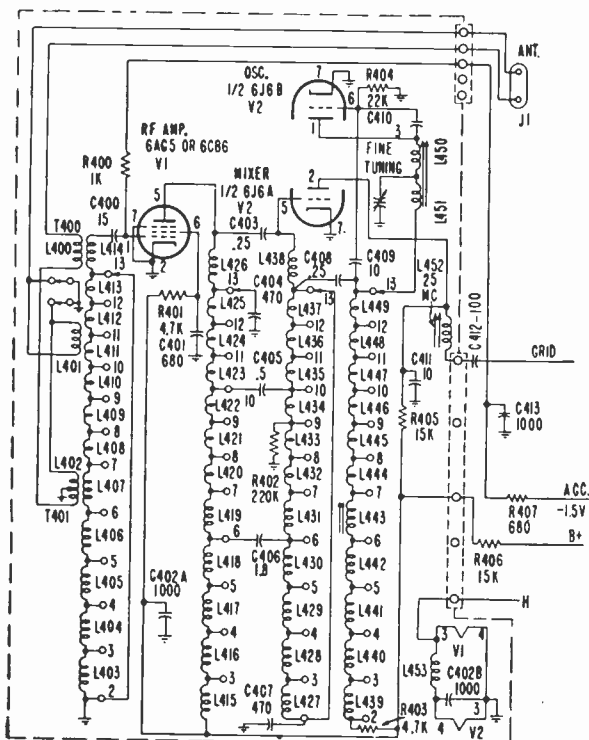


Fig. 1. Schematic diagram for the Interstate Stores AROTO5 tuner.

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Television Changes

(Continued from page 14)

Du Mont RA113

With the substitution of a 6BC5 for the 6AK5 tube V102 in the mixer stage of the Inputuner, it has been necessary to change the mixer circuit in order to maintain high band sensitivity. The new tuner is listed on the parts list as: Inputuner assembly; part number, 8900395. The first chassis so modified at the plant was RA113, serial 1356435, code AK.

In replacing the old tuner with the new, the procedure is as follows:

Connect the red, black-yellow, and solid yellow leads as before.

Remove the lead running from the 20 μf capacitor C103 (in the cathode circuit of the 6J6 tube V101) to ground and connect the formerly grounded side of the capacitor to the tinned side of the twinex lead from the tuner.

Connect the bare side of the twinex to the other side of capacitor C103.

Realign the first video i-f stage.

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Emerson Service Hints

Conditions: No high voltage, no horizontal sync, insufficient width or horizontal non-linearity.

1. Determine whether the horizontal output tube (6BG6, 6CD6, or 19BG6) is fed with a sufficient sawtooth voltage. This can be checked by the amount of grid rectification taking place. The d-c voltage on the grid should be about minus 20 volts, measured with a vtvm from grid to cathode. The best check is to observe the sawtooth on an oscilloscope. It should measure from 40 to 50 volts, peak to peak (about three times bigger than a 6.3-volt a-c wave). Check the linearity of the sawtooth (see Fig. 1). (The wave shape shown in Fig. 1 has more or less damped oscillations superimposed, depending upon the pickup of the leads.)

Caution: The Emerson probe should be used for making this check. If one is not available, use unshielded leads from the oscilloscope, one ground lead and one probe lead. Connect a 20,000-ohm insulating resistor at the test point end of the probe lead.

2. If the above conditions are correct, the trouble is in the horizontal output tube. If they are not, check the oscillator and control tube (6SN7 or 12SN7) outlined in steps (a) to (d) below.

- Check voltages and resistances at the tube socket.
- Check to see that the oscillator grid goes sharply negative with respect to cathode. This indicates the amount of oscillation. The voltage on this grid should change as the tuner is switched to off-channel positions. The voltage on the control grid and the control cathode should also change with switching of the tuner.
- Check to see if the voltage on the control plate varies when varying the horizontal hold control.
- Check the pulses arriving at the control grid. With the oscillator coil shorted

(short any two of the three terminals on the oscillator coil with a clip lead or metal tool), the sync pulse should be seen on the oscilloscope. With the short removed and the tuner switched to off-channel position, the sawtooth fed back from the output should be seen. Under normal working conditions these pulses are superimposed on each other.



Fig. 1. Sawtooth voltage with damped oscillations.

Caution: A slight leakage in any of the capacitors associated with the circuit will completely upset the operation. This should be the first thing to suspect. Check all capacitors carefully and replace the leaky ones with capacitors of a 600-volt rating.

Note: The alignment procedure outlined in the Manual should be carefully followed. This is the only way to properly align the circuit, and it also gives a good indication as to whether the circuit performs normally.

3. If the sawtooth presented at the grid of the horizontal output tube checks correctly, the trouble is in the horizontal output circuit or in the deflection system.

- Check voltages and resistances at the tube socket.
- Check continuity through the deflection system. Very often a partly shorted coil is encountered. This is difficult to find in a continuity check. The symptom is usually insufficient high voltage. A small arc can be drawn from the high-

voltage rectifier plate but the anode cap on the kinescope carries no voltage.

Du Mont RA117A

In some chassis it has been found that inductive feedback from the audio amplifiers to the tuner (through pickup in the red B+ tuner lead) has lead to "motorboating." That is, the resulting variation of voltage on the plate of the local oscillator modulates the oscillator frequency and thereby the sound i-f beat frequency, causing the sound discriminator to deliver the transmitted audio signal plus a feedback audio signal.

To eliminate such feedback, the capacitor C303 connecting the tie point of the red B+ tuner lead to ground, has been changed from a 0.1- μf paper capacitor to a 10- μf electrolytic one. The new capacitor (still C303) is listed on the parts list as: capacitor, FE, 10 μf , 450v; parts number 03 019 410.

The first chassis to be so modified at the plant is RA-117A, serial number 1723060, code 9K.

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Federal Video 209, 309, 409

The tube layout for these models is shown in the accompanying diagram (Fig. 2).

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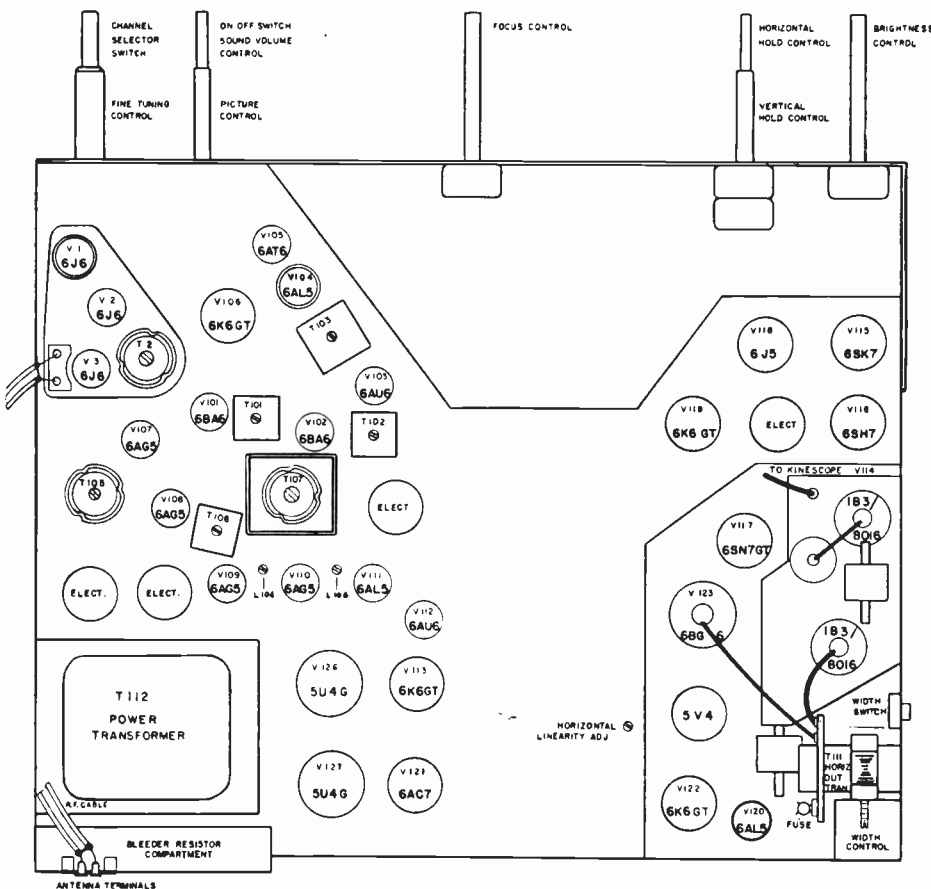


Fig. 2. Tube layout for Federal Video models 209, 309, and 409.

Television Changes

(Continued from page 16)

Westinghouse H-605T12, Ch. V-2150-101, V-2150-106

The schematic diagram of the V-2150-101 chassis should be altered to include later production changes as follows:

1. A 100-ohm resistor R469 has been added between pins 3 and 8 of the 12AU7 horizontal multivibrator, and the upper end of R424 should be connected to pin 3 rather than pin 8. This change improves the horizontal sync stability.
2. The value of R428, located in the pin 1 plate circuit of the 12AT7 1st sync amplifier, has been changed from 5600 ohms to 22,000 ohms.
3. The value of R433, located in the pin 6 plate circuit of the 12AT7 sync separator, has been changed from 33,000 ohms to 22,000 ohms. This and the preceding change help to eliminate vertical jitter in weak signal areas.
4. The value of R439, in the 12AU7 phase inverter grid circuit, has been changed from 100,000 ohms to 2.2 megohms. This change helps eliminate horizontal jitter.
5. The value of R446, located in the grid circuit of the 7A5 horizontal output tubes, has been changed from 470,000 ohms to 100,000 ohms.
6. The value of C430, in the 7A5 grid circuit, has been changed from 47 μf to 270 μf . This and the preceding change help to eliminate foldover.
7. The value of R419, in the pin 3 cathode circuit of the 12AU7 2nd amplifier, has been changed from 220 ohms to 330 ohms. This change improves the vertical hold action.
8. The value of C438, which is connected between pins 1 and 7 of the 12AU7 2nd sync amplifier and phase inverter, has been changed from 390 μf to 0.05 μf . This improves the horizontal sync action.
9. The value of R430, in the pin 1 plate supply circuit of the 12AU7 horizontal multivibrator, has been changed from 10,000 ohms to 33,000 ohms. This improves the stability of the horizontal sweep circuit.

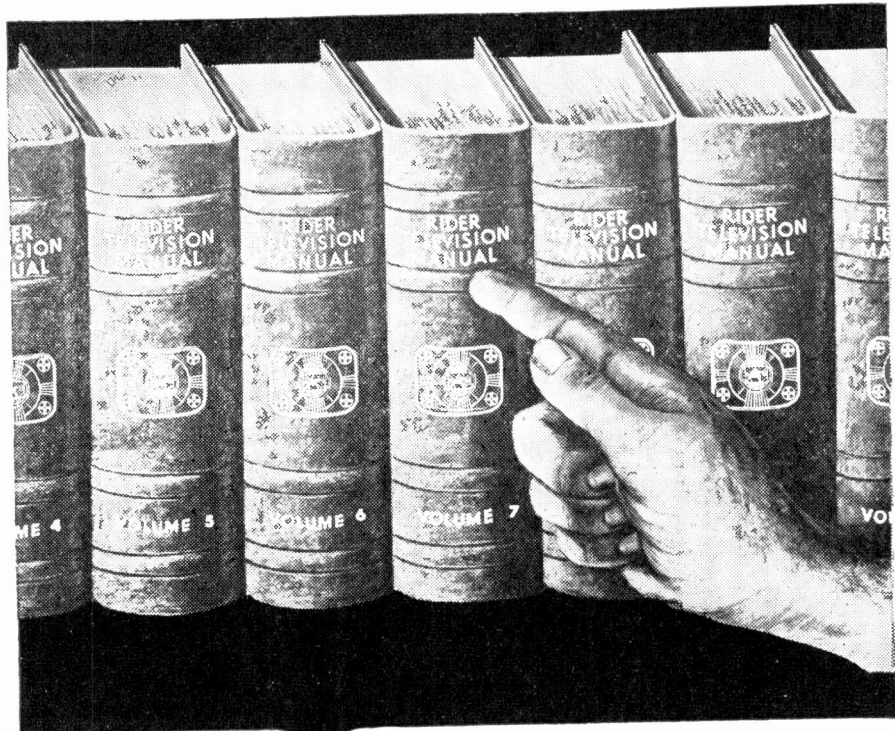
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Stromberg-Carlson Service Hint

Both the EM-PM and PM type focus assemblies used on current receivers can easily be damaged if proper care is not exercised in handling them both within the receiver and in parts stock.

A slight jar or striking with a metallic tool may cause the assembly to lose its magnetism thereby affecting its focusing ability. When working on the receiver chassis, extreme care should be used to prevent damage to the focus assembly. In making any adjustments of this assembly, it is advisable to use a brass or non-metallic screw driver.

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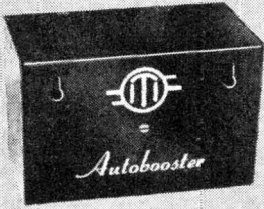
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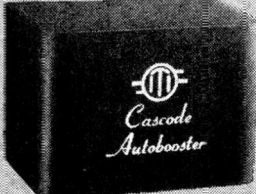
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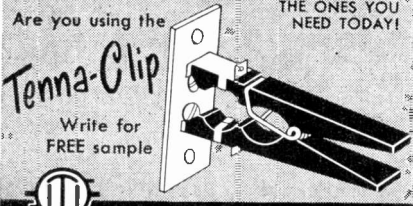
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Television Changes

(Continued from page 17)

Steward Warner Service Hint, Models 9120, 9121

On some of the 26-tube chassis, it is sometimes difficult to obtain correct horizontal linearity through adjustment of the horizontal linearity, horizontal drive and width controls. When such cases are encountered, the .1- μ f capacitor C280 in the return lead (from pin 6) of the horizontal sweep transformer T275 should be changed from 0.1- μ f to 0.25- μ f.

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Air King Series 700 Service Hint

Some chassis of the 700 series have been troubled with an audio buzz or hum due to poor contact of the aquadag coating of the Hytron 16RP4 tubes with the grounding strap. It has been found that under certain conditions of humidity, the binder used in the aquadag will form a calky coating which prevents proper contact between the aquadag and the grounding strap.

This can be corrected by carefully washing the area around and under the contact spring, using a cloth moistened with water. After the area around the grounding spring has been washed and dried, it should be blacked by the application of graphite from a very soft pencil.

Caution: This set must be shut off and the high voltage supply discharged when this is done. No other type of picture tube should be washed in this manner because most standard aquadag coatings are water soluble and would be removed if washed.

When the afc control is correctly adjusted in the chassis of the 700-10 and later series, the picture should fall into horizontal sync instantly when changing from station to station and it should be stable. Sometimes this cannot be done without causing a foldover on either the right or the left side of the picture. This condition is an indication of unstable horizontal hold due to incorrect phasing from the transmitter. At certain adjustments of the afc control the picture will jitter violently. To correct this condition, the 2,700-ohm phasing resistor R52 will have to be increased to approximately 5,000 ohms if the foldover is on the left side of the picture or decreased to about 1,000 ohms if the foldover is on the right side of the picture.

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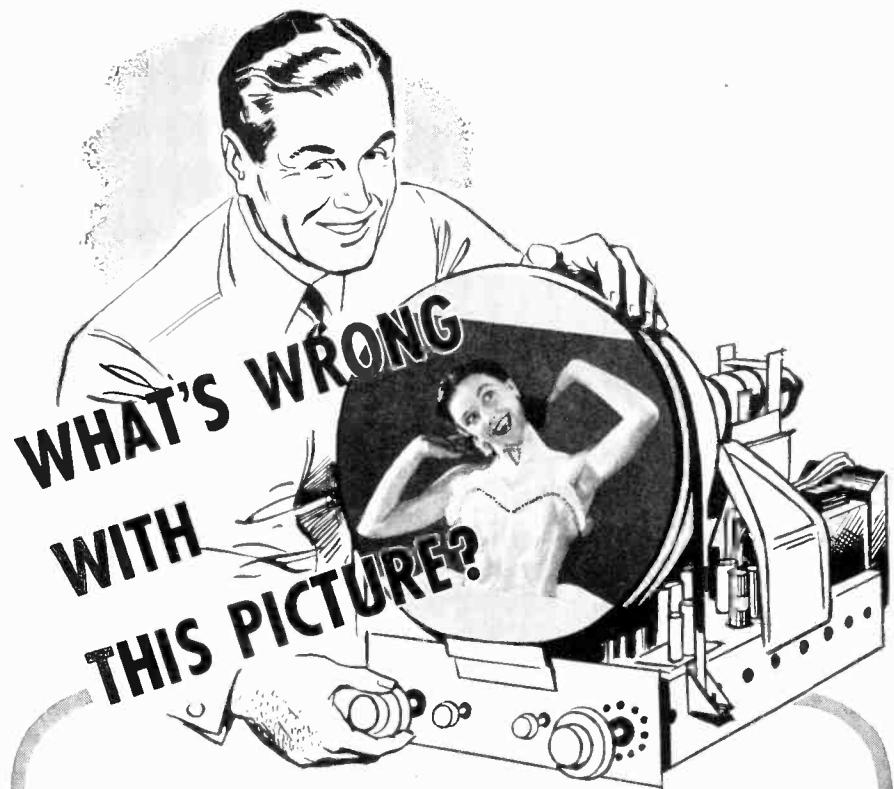
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There's nothing wrong, *yet*. The set's just out of the shop and everything *seems* A-1 . . . but wait until chassis heat goes to work on the paper tubulars. Then it's "out of sync" and another costly call-back for the service technician.

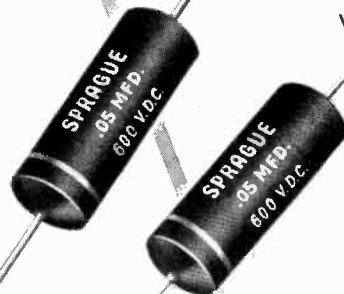
Sprague Black Beauty Telecap Molded Tubulars are a positive guarantee against this sort of trouble. Made by the same "dry process" as expensive metal-encased oil capacitors, they are stable and retrace consistently, unlike ordinary cardboard cased or "wet process" molded tubulars. And this extra quality is yours at no extra cost!

Black Beauty Telecaps are a *must* for every TV replacement job.

Write for Catalog C-607

SPRAGUE
Black Beauty
TELECAPS®

Ask for them by name



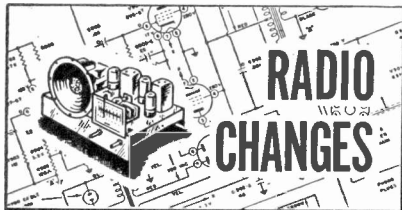
SPRAGUE

SPRAGUE PRODUCTS COMPANY

(Distributors' Division of Sprague Electric Co.)
North Adams, Massachusetts

PIONEERS

IN ELECTRIC AND ELECTRONIC DEVELOPMENT



United Motors, 980797, 980798, Buick

In the Service Parts List, the service part number for Illustration No. 39, which is the 8" permanent magnet speaker, should be changed from 7255895 to 6105.

The spring pointer coil tension which carried the production part and the service part number 7238860 is no longer available.

Rider Radio Manual Page	
From	Thru
18-20	18-21

Philco 51-538

Circuitwise this model is identical to model 51-537.

Sets coded 122 use a 12BA6 tube in place of the 14A7 as an i-f amplifier. A miniature socket (part no. 27-6203-1) replaces the local socket and a new 68-ohm, $\frac{1}{2}$ resistor (part no. 66-0688340) is added in series to the connection from the cathode (pin 7) of the 12BA6 i-f amplifier tube.

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RCA BX55, Ch. 1088-B

The circuits of chassis 1088-B are the same as those for chassis 1088.

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Emerson 702B, Ch. 120136-B

With the exception of the chassis parts list and the addition of a 220,000-ohm resistor from B— to chassis ground, all technical information pertaining to the above model is the same as that covering model 653B using chassis 120136-B.

The new chassis parts list is as follows:

Part No.	Description
140435	Cabinet
520157	Dial Glass
525022-2	Pointer
410904	Dial backplate
460162S	Knob
180045	Speaker
583032	Line cord
575848	Baffle
700063	Loop antenna and back

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RCA BX57, Ch. 1088-C

The circuits of chassis 1088-C are the same as those for chassis 1088-A.

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Jewel, Model 980

The Replacement Parts List is as follows:

Symbol	Part No.	Description
C1, 5	32-17	Tubular Paper Condenser, .002 μ f, 200v
C2, 7	35-4	Mica Condenser, 100 μ f, 500v
C3, 4	32-4	Tubular Paper Condenser, .05 μ f, 200v
C6, 8	32-29	Tubular Paper Condenser, .01 μ f, 200v
C9	32-47	Tubular Paper Condenser, .15 μ f, 200v
C10	32-5	Tubular Paper Condenser, .05 μ f, 400v
C11	31-18B	Electrolytic Condenser, 35x35 μ f, 150v
C12	30-16	Variable Condenser, 2 Gang, 420 & 420 μ f
R1	20-53	Resistor, 4.7 meg, $\frac{1}{4}$ w, 20%
R2	20-123	Resistor, 120,000 ohms, $\frac{1}{2}$ w, 20%
R3	50-14A	Resistor, Volume Control, 100,000 ohms
R4	20-10	Resistor, 270 ohms, $\frac{1}{2}$ w, 10%
R5	20-57	Resistor, 10 meg, $\frac{1}{4}$ w, 20%
R6, 7	20-92	Resistor, 470,000 ohms, $\frac{1}{4}$ w, 20%
R8	20-80	Resistor, 3,300 ohms, 1 w, 20%
R9	20-93	Resistor, 22 ohms, $\frac{1}{2}$ w, 20%
R10	20-96	Resistor, 22 ohms, 1 w, 20%
R11	20-81	Resistor, 150 ohms, $\frac{1}{2}$ w, 20%
T1	62-18	Antenna Coil
T2	60-11	R. F. Coil
	80-14C	4" P.M. Speaker With Output Transformer
	47-3	Antenna Hank, 15 Ft.
	120-36	Cabinet
	122-15	Volume Knob
	122-25	Selector Knob
	140-4	Clock

To align this model, put the output meter across the voice coil, 3.2 ohms; have the volume control at maximum for all adjustments; align for maximum output but reduce input as needed to keep output near 1.28 volts (0.5 watt).

Rider Radio Manual Page	
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20-9	—

Firestone 4-A-99, 4-A-100

The above models are similar to models 4-A-86 and 4-A-95 except for the additions to the parts lists and the use of a 12AT7 as the r-f amplifier and mixer tube instead of two 6AB4 tubes.

Additions to the parts list are:

Part No.	Description
12A5058	8" PM speaker
3A443	12AT7 tube socket
58-1127A	Hinges
61-3313	Catches
61-3314	Baffle
A1560-A276	Door pull
79X12	Grille cloth
79X13	Grille cloth
79X8	Metal grill
79X22	Phono bottom
79X31	Cabinet back
79X36	Cabinet back

Rider Radio Manual Page	
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Vacuum-Tube Voltmeter

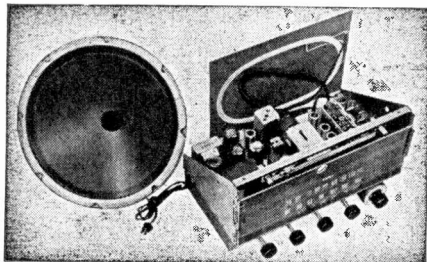
Hickok Electrical Instrument has announced a new vacuum-tube voltmeter of laboratory quality providing the sensitivity and ranges for accurate measurement of sine or complex waves of tv or industrial devices.

The new model 215 features a new design dual-purpose a-c, d-c probe in a single unit with a built-in switching arrangement. It measures a-c and d-c volts, rms or peak-to-peak, and resistances in seven different ranges.

ATTENTION! RADIO SERVICEMEN

THERE ARE THOUSANDS OF OUT-MODED RADIOS IN YOUR "BACK YARD" JUST WAITING TO BE REPLACED . . . AT YOUR SUGGESTION

Here is the custom-built AM-FM chassis that means **BIGGER PROFITS** for you!



The NEW ESPEY model 511-C FEATURES

1. AC Superheterodyne AM-FM Receiver.
2. Improved Frequency Modulation Circuit, Drift Compensated.
3. 12 tubes plus rectifier and Pre-Amp Tubes.
4. 4 dual purpose tubes.
5. Treble Tone control.
6. 6-gang tuning condenser.
7. Full-range bass tone control.
8. High Fidelity AM-FM Reception.
9. Automatic volume control.
10. 10 watts (max.) Push-Pull Beam Power Audio Output.
11. 12-inch PM speaker with Alnico V Magnet.
12. Indirectly illuminated Slide Rule Dial.
13. Smooth, flywheel tuning.
14. Antenna for AM and folded dipole antenna for FM Reception.
15. Provision for external antennas.
16. Wired for phonograph operation with switch for crystal or reluctance pick-up.
17. Multi-tap output trans., 4-8-500 ohms.
18. Licensed by RCA and Hazeltine.
19. Subject to RMA warranty, registered code symbol #174.

Makers of fine radios since 1928.

ESPEY TEL. Trafalgar 9-7000
MANUFACTURING COMPANY, INC.
 528 EAST 72nd STREET, NEW YORK 21, N. Y.

SPECIFICATIONS

Supplied ready to operate, complete with tubes, antennas, speaker and all necessary hardware for mounting in a table cabinet or console, including escutcheon. Power consumption—105 watts.

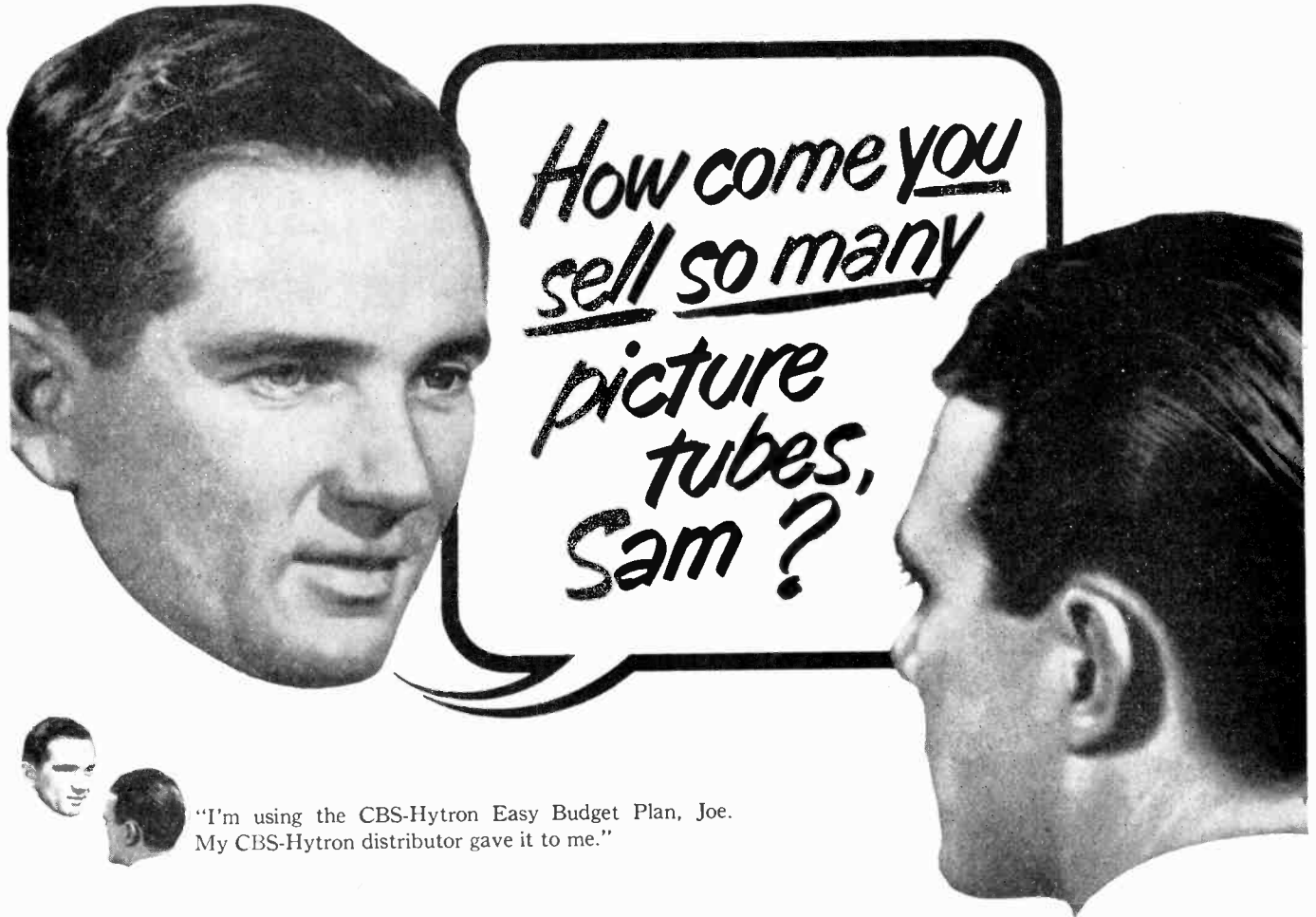
Chassis Dimensions: 13 $\frac{1}{2}$ " wide x 8 $\frac{1}{2}$ " high x 10" deep.

Carton Dimensions: (2 units) 20 x 14 $\frac{1}{2}$ x 10 $\frac{3}{4}$ inches.

Net Weight: 17 pounds each.

Sold through your favorite parts distributor.

WRITE FOR CATALOG KD12
 AND NAME OF NEAREST DISTRIBUTOR.



"I'm using the CBS-Hytron Easy Budget Plan, Joe. My CBS-Hytron distributor gave it to me."



"Tell me more."

"Well, CBS-Hytron's Plan helps me sell TV picture tubes and service to many a customer who just doesn't have \$50 cash. My customer now pays for the job painlessly a few dollars a month. Yet I get my cash right away."

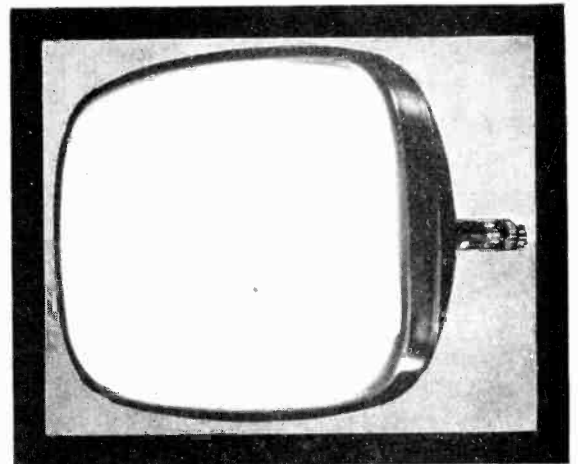


"Fine! How does it work, Sam?"

"Simple. I introduce my customer to the finance company authorized by CBS-Hytron. The finance company does the rest . . . acts as my credit department . . . arranges all details. My customer gets his tube and I get my cash — at once."



"That's swell, Sam! I've sure been losing sales I shouldn't. I need that CBS-Hytron Easy Budget Plan. CBS-Hytron tubes are tops, too. Thanks for the tip. I'll see my CBS-Hytron distributor today."



SAVE THE SALE No need for you to miss a single profitable picture-tube sale . . . just because your customer does not have the cash. Get the details on this original CBS-Hytron service for you. See your CBS-Hytron jobber . . . or write us . . . today!

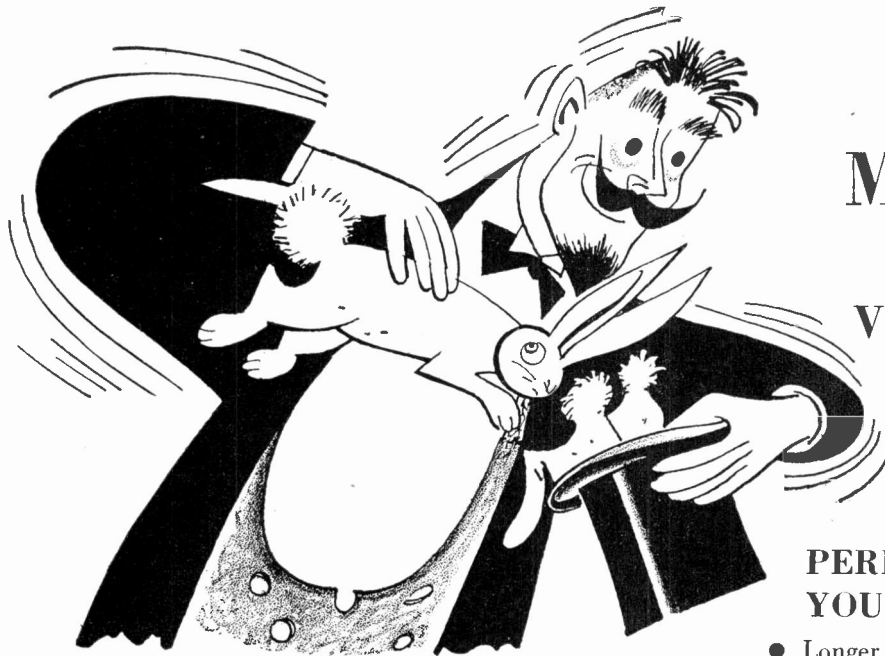
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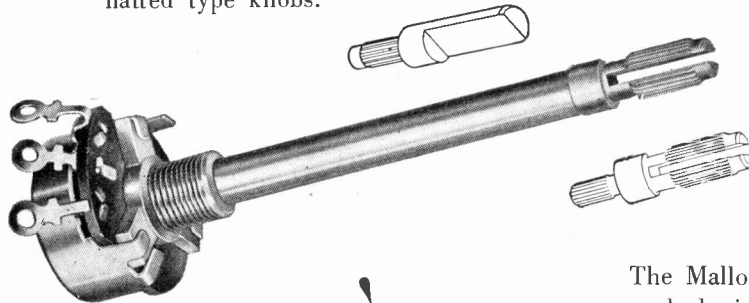


MALLORY MIDGETROL®

ROUND-SHAFT VOLUME CONTROLS

FAST, EASY INSTALLATION

- Because of the wide and easy adaptability of Mallory Midgetrols, it's easy to stock—or get fast from your distributor—just what you need to do your job.
- Round tubular shaft designed and built for fast, easy and accurate cutting.
- Factory-tested AC switch may be attached instantly without disassembling control.
- Speedy adaptability to both split-knurl and flatted type knobs.



**Make Sure!
Make it Mallory!**

PERFORMANCE YOU CAN COUNT ON

- Longer lasting resistance elements even in extremes of temperature and humidity.
- Better and more accurate taper curves resulting from precision processing methods.
- No pigtail connections to break, thanks to Mallory's exclusive sliding contact which gives EXTRA quiet operation.
- Minimum wobble with Mallory's exclusive 2-point shaft suspension.

So versatile are Mallory Midgetrols—both standard and dual—that they reduce by 40% the cost of inventory needed to service the 10 most popular makes of radio and TV sets.

The Mallory Midgetrol is shown with the two shaft ends packed with every control to permit easy use of split-knurl or flatted type knobs. The Mallory Midgetrol line, in addition to round shaft standard controls, includes dual concentric controls that offer fast, easy assembly in five steps *without* special tools. Front and rear sections are factory assembled and inspected. AC switch attachment is easy.

P. R. MALLORY & CO. Inc.

MALLORY

CAPACITORS • CONTROLS • VIBRATORS • SWITCHES • RESISTORS
• RECTIFIERS • VIBRAPACK* POWER SUPPLIES • FILTERS

*Reg. U. S. Pat. Off.

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P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

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A monthly summary of product developments and price changes of radio, electronic, and television parts and equipment, supplied by United Catalog Publishers, Inc., New York City, publishers of RADIO'S MASTER.

These REPORTS will help you to buy and sell to best advantage. They will also help you to keep your inventory up to date. A complete description of most products will be found in the Official Buying Guide, RADIO'S MASTER, available through local parts distributors.

Price Increases

ARRL—Increased prices on "The Radio Amateur's Handbook" to \$3.00.

BRITISH INDUSTRIES—"Loudspeaker" publication increased to \$1.60.

KESTER SOLDER CO.—Increased price \$.02 per pound of their 1 pound, 5 pound and 20 pound spools of acid-core, plastic-core and "Resin-Five" core of solder spools.

RAYTHEON MFG. CO.—Rectifier type RFR-1043-AR increased to \$150.00 user price.

SIMPSON ELECTRIC—Model 381 Capacity Bridge increased to \$28.50 net.

63,500

There are 63,500 references to pertinent electronic and allied engineering articles published from 1925 through 1949 in the five editions of the

ELECTRONIC ENGINEERING MASTER INDEX

- 1925-1945 edition—
(15,000 entries).....\$17.50
- 1935-1945 edition—
(10,000 entries).....\$10.00
- 1946 edition—
(7,500 entries).....\$14.50
- 1947-1948 edition—
(18,500 entries).....\$19.50
- 1949 edition—
(12,500 entries).....\$17.50

Electronics Research Publishing Company, Inc.
Dept. 55 480 Canal St., New York 13, N. Y.

Price Decreases

BARKER & WILLIAMSON, INC.—Reduced prices on Coaxial Connectors CC50 to \$5.85 net and CC51 to \$6.45 net.

CROWN CONTROLS CO.—Reduced prices on their line of antenna rotators.

ELECTRO-VOICE INC.—Model T-10 High Frequency Driver decreased to \$36.00 net.

SYLVANIA—Picture tubes 16AP4B decreased to \$38.00 net along with 16GP4B to \$30.00 net, 16GP4C to \$30.00 net and 19AP4B to \$45.00 net. Also reduced 6BQ7 to \$3.20 list.

TECH-MASTER—Plastic Sleeve & Ring Sets Nos. PL-4, PL-4S, PL-17R, PL-19 and PL-24 reduced in price.

WRIGHT, INC.—Reduced prices on most of their line of speakers & cabinets; grilles; baffles and transformers.

New Items

ASTRON—Introduced type BT series of electrolytic motor starting capacitors; types MX and ME series of metallized paper capacitors and type AQ series of subminiature paper capacitors. Also added additional electrolytics and capacitors to their line.

BOGEN, DAVID, INC.—Added R604 AM-FM Tuner at \$97.35 net. Also Model H010 Power Amplifier at \$95.70 net; Model RXPX, Remote Controller and Pre-amplifier at \$54.45 net and EXT-20, 20 ft. Extension Cable for RXPX at \$9.90 net.

BRACH MFG. CO.—TV antenna 466 added at \$11.44 net.

BRUSH DEV. CO.—Added Model BA-206, Double Headphone at \$16.80 net; Model BA-207, Single Headphone at \$9.60 net and Model BA-208, Lorgnette Phone at \$13.77 net.

CLAROSTAT MFG. CO.—RTV 315 to 322 inclusive (tv replacement controls) added to their "RTV" series.

CORNELL-DUBILIER — Communication Vibrator No. S-8050 added at \$4.62 net.

ELECTRO-VOICE—Introduced Aristocrat 1,2 and Royal 2, Two way Sound Systems; Models 108-111-114, Two way Speaker Component Package; Model X-825, Crossover Network; Model 8-1HD Horn; Model 12BW, Low Freq. Drive; and Royal Speaker Enclosure.

G. E.—Added G7 series of 7 Germanium products and G10 series of 1 Germanium Power Rectifier and 3 General Purpose Rectifiers available in limited quantities within 2 months. "At this time, G. E. does not encourage your stocking these rectifiers until they have reached full production."

HICKOK—Introduced Models 533 ADM, Special Tube Merchandiser; 533 AP, 533 B and 600 A Tube Testers; 605, Combination Tube Tester and Set Analyzer; 670 Cathode Ray Oscillator; 680, Marker Generator and Crystal Calibrator; 700, Lab. Tube Tester; 7001 null reading accessory for Model 700; and 7002, short tester accessory for Model 700.

La POINTE (VEE-D-X)—Now marketing 2 new "Rocket" Boosters; also "LJ" series of 6 new "Long John" 8 element Yagis; the JM-45 Yagi for channels 4 & 3, and Thermo Switch SW-T-1 used in boosters.

MASTER MOBILE MOUNTS—Introduced new series of 12 Junior Mounts.

MERIT TRANSFORMER—Introduced their new series of ii-ri coils which include items for television, fm, short wave and broadcast units. Also introduced A-3080-1, Vertical Output Transformer; MWC-2, Horizontal Output and Hi-Voltage Transformer, and A-4003, Vertical Blocking Oscillator Transformer. Added TV Kit No. 1000 at \$13.63 net.

PERMOFLUX CORP.—Marketing 18 new items of headsets, earphones and cushions. Also introduced new baffle model.

RADIO KITS, INC.—Added 1 new model tv kit and 6 new 3 & 4 band radio receiver kits.

RAYTHEON—Immediately available from your serving warehouse is Raytheon's tv picture tube 21EP4A. 17HP4, also a new tv tube will be available the latter part of December.

RIDER, JOHN F.—Second printing of "Encyclopedia on Cathode-Ray Oscilloscopes and their Uses" now available from jobbers. Also TEK-FILE packs 17 through 32 available this month.

SARKES TARZIAN INC.—Added 17 new tv picture tubes in 10, 12, 14, 17, 19, 20 and 21 inch size. Also added new line of Universal Replacement Tuners TT5R21 and TT5R41.

SUPERIOR INSTR. CO.—Introduced Junior Super Meter at \$21.40 net and TV Bar Generator at \$39.95 net.

SYLVANIA—Added radio receiving tube 6BK7 at \$3.20 list; special purpose tube 5932/6LWGA at \$8.60 net; transmitting tube 5933/807W at \$12.85 and Electroflash tube R-4330 at \$12.50 net.

TALK-O-PRODUCTS INC.—Added CW-1, Cabinet Station at \$18.00 list and S1 Surface Remote at \$15.00 list with quantity discounts on both.

V-M CORP.—Added No. 3950, Pre-cut Mounting Board for the Model 950 record changer at \$1.46 net.

PERFORMANCE Not Size IS WHAT COUNTS

"LITTLE GIANT" LIGHTNING ARRESTER

PROTECTS Against Lightning Hazards

No. AT 105 For ribbon-type and oval jumbo twin lead. **\$1.25 LIST**

ONLY JFD Lightning Arresters offer you these exclusive patented features . . .

1. Strain-relief Retaining Lip prevents pulling or straining of lead against contact points.
2. You actually see positive contact made with lead-in wire.
3. No wire stripping or cutting.

Write for Form No. 84 showing the damage lightning can do to a Television Installation.

JFD MANUFACTURING CO., Inc.
6127A 16th AVENUE, BROOKLYN 4, N. Y.
FIRST in Television Antennas and Accessories

Please mention Successful Servicing when answering advertising.

Discontinued Items

CARTER PARTS CO.—Withdrew electrical controls No. 6 and No. 9.

EDITORS & ENGINEERS, LTD. — Withdrew "World's Radio Tubes," 8th Edition and advised 9th Edition to be published about February 1952.

J F D—Tandem Yagi Antenna TY-7 to TY-13 withdrawn.

PERMOFLUX CORP.—Withdrew their "H" series of transformers.

PHILLIPS MFG. CO.—5 parts in their "VT" series for Model LW Soldering Gun withdrawn.

PICKERING & CO. — Withdrew No. 180L loud-speaker.

RADIO CITY PRODUCTS CO.—Sweep Generator Marker No. TV-80 withdrawn.

RIDER, JOHN F.—Discontinued "Oscillator At Work" (Catalog No. 112) and "The Meter at Work" (Catalog No. 116).

TACO—Discontinued No. 862, Mast Standoff Insulator; 863, Mast Coupling and 888, Guy Wire Thimble.

TELEX INC.—Withdrew 3 items from their line of headsets.

Miscellaneous Changes

DuMONT A. B.—Replacement parts for DuMont Telesets are now available to servicemen through jobber channels.

MERIT TRANSFORMER—Replaced Transformers HVO-6 with HVO-7 and MD-70 with MDF-70.

SCHAUER MFG. CO.—Rectifier Units AR-1-2-3 replaced by AR-4-5-6.

UNIVERSITY LOUDSPEAKERS, INC.—Withdrew "C" bell and incorporated it as standard equipment in Model B-6 and B-12 with corresponding price increase.

The man who uses
RIDER Test-Files & MANUALS
makes more money!

Radio Changes

(Continued from page 20)

General Electric 422, 423

Stage gain measurements by a vacuum tube voltmeter or similar measuring device may be used to check circuit performance and isolate trouble. The gain values may have tolerances of $\pm 20\%$. Readings are taken with low signal input so that the AVC is not effective.

1. *I-f gain.*
 12SA7 grid to 12BA6 grid, 50 @ 455 kc.
 12BA6 grid to 12SQ7 diode plate,
 50 @ 455kc.
2. *Audio Gain.* An input of 0.15 volts at 400 cycles across the volume control R6 with the control set at maximum will develop approximately $\frac{1}{2}$ watt output across the speaker terminals.
3. *Oscillator grid bias.* D-c voltage developed across the oscillator grid leak resistor R4 averages 4 volts at 1,000 kc.

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United Motors 984688, Pontiac

The r-f coupling capacitor on those radios using miniature type tubes has been changed from a .000005 μ f to a .000010 μ f molded mica capacitor (part no. G 100). This change should be made whenever failure necessitates replacement of this component. (Note that this model may use either octal, loctal, or miniature type tubes which necessitate several minor circuit changes).

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General Electric 414, 415, 416, 430

Five groups of transformers, each having a slight difference in specifications, were used throughout production of the above models. Receivers employing transformers marked M77J602-3 use a 68-ohm resistor R12 in the cathode (pin 7) circuit of the 12BA6 i-f amplifier tube V2, while those using transformers M77J460-2, M77J460-3, M77J602-1, M77J602-2 have a 47-ohm resistor.

For this latter group of four transformers the connections for T3 are as follows:

- Terminal 1 to diode plate,
- Terminal 2 to diode load.

Rider Radio Manual Page	
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What's Tek-File?

(Continued from page 3)

Tek-File Handies

As an additional aid for radio and television servicemen using Tek-File, John F. Rider Publisher, Inc. is furnishing a perpetual source of service hints and receiver changes absolutely free. This information is furnished on convenient 3 x 4 $\frac{1}{8}$ inch cards, known as HANDIES, suitable for filing in a 3 x 5 inch card file. Eight different cards are printed on a sheet, perforated for easy separation into individual cards. These sheets are part of the Tek-File pack.

All of the information supplied on the HANDY is manufacturer-authorized, factory tested. A typical HANDY, one of the sixteen included in the Tek-File pack shown in Fig. 1, is reproduced in Fig. 2. This HANDY gives the step-by-step procedure for improving the television receiver models of the Stromberg-Carlson 317 series for fringe area reception. Other HANDIES included in this pack give in detail methods and circuit changes (where necessary) for the elimination of ringing, improvement of vertical and horizontal hold, and suppression of retrace lines and sound bars, and many more. This form of servicing aid is an exclusive feature of RIDER TEK-FILE.

In order to keep radio and television technicians up to date on production changes made by manufacturers on their radio and television receiver models already on the market, these production changes are written up and included in Tek-File packs as Handies. These Handies are inserted in the Tek-File pack pertaining to the receiver manufacturer to which they refer. Wherever possible, however, production changes are included directly in the Tek-File service data for each particular model. In this way, the buyer of Tek-File not only gets the complete service data on the receiver models he needs, but also, he gets all the pertinent production changes.

For the convenience of the users of RIDER TEK-FILE who wish to bind their Tek-File folders together so as to keep them on a shelf or in a bookcase, Rider Manual Binders are supplied. To obtain one of these loose-leaf, large-size binders, the serviceman merely sends to John F. Rider Publisher, Inc. fifteen coupons, one of which is included in each Tek-File pack, and a small fee to cover handling.

Cumulative Index

A specially prepared cumulative index for all Rider TV Tek-File packs is available

RIDER Books Cover The Field

Encyclopedia on Cathode-Ray Oscilloscopes and Their Uses	992 pages	\$9.00
Vacuum-Tube Voltmeters, 2nd Ed.	432 pages	\$4.50
TV and Other Receiving Antennas (Theory and Practice)	606 pages	\$6.00
TV Installation Techniques	336 pages	\$3.60
TV Master Antenna Systems	356 pages	\$5.00
Receiving Tube Substitution Guide Book, 1st Ed.	224 pages	\$2.40
First Supplement, Receiving Tube Substitution Guide Book	48 pages	\$.99
TV Picture Projection and Enlargement	192 pages	\$3.30
Television How It Works	203 pages	\$2.70
FM Transmission and Reception, 2nd Ed.	460 pages	\$3.60
Radio Operator's License Q & A Manual, 3rd Ed.	734 pages	\$6.60
Broadcast Operator's Handbook, 2nd Ed.	440 pages	\$5.40
Radar—What It Is	80 pages	\$1.00
Understanding Vectors and Phase in Radio	160 pages	Cloth cover \$1.89 Paper cover \$.99
Installation and Servicing of Low Power Pa Systems	208 pages	\$3.00
Servicing by Signal Tracing	360 pages	\$4.00
Inside the Vacuum Tube	424 pages	\$4.50
Servicing Superheterodynes	288 pages	\$2.00
Servicing Receivers by Means of Resistance Measurement	203 pages	\$2.00
The Business Helper	134 pages	\$2.00

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Order Your Copy Now!

JOHN F. RIDER PUBLISHER, INC.
480 Canal Street, New York 13, N. Y.

FREE at radio and tv parts distributors all over the country. It is an 8 $\frac{1}{2}$ x 11 inch booklet listing the tv receiver manufacturers and models in Tek-File with their pack and file numbers, and is just as easy to use as the Rider radio and tv manual indexes.

RIDER TEK-FILE packs 1 through 32 are now available at Rider distributors. Ask your distributor to let you examine one, and see for yourself if it doesn't answer all your tv service data needs.

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 RADIO SERVICE CO.
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