Distribution of This Issue—50,000 Copies

Courtesy WOR-TV

JANUARY, 1950

CIRCUIT LOSS IN SIMPLE CENTER-FED TV ANTENNAS

By ARNOLD B. BAILEY

In television receiving antenna practice, it is imperative to cover a wide band of frequencies far exceeding the normal capabilities of any one simple center-fed antenna. The TV channels when represented on a frequency-ratio basis bring this out clearly. Table 1 shows present channels on the basis of the nominal center frequency and the appropriate limits to be covered by the proposed vhf channels. Even if a separate simple antenna is used for each of the three bands, the problem, although vastly simpler, is still formidable. For the present, we shall consider only the circuit problem, and evaluate the mismatch loss which directly affects the magnitude of the received TV signal, and which will probably be present when one simple center-fed antenna is operated over a wide frequency band. Another distinctly separate factor relates to the directional response changes which occur over a wide frequency band. These directional response changes will be treated later.

> Editors Note: This material is an *abridged* excerpt of the same subject as found in "Theory and Practice of 30—1,000 Mc Receiving Antennas" a forthcoming book which has been written by the author of this article and will soon be published by John F. Rider Publisher, Inc.

The receiving antenna as a circuit element can be considered as a generator. This generator tries to pump power into the antenna load and can only do so when the load is properly matched to the antenna. We can fix the load resistance by proper selection of the TV receiver input circuit constants and choosing a transmission line to correspond to this receiver input resistance. This fixed load resistance can be made the same value for all TV channel frequencies.

The simple antenna, however, has a different value of resistance at each frequency, which will prevent a perfect match at more than one frequency. At its resonance frequencies the antenna is "in tune" and its Q (ratio of reactance to resistance) is zero. At other frequencies, the antenna is out of tune; the Q is finite and will cause further mismatch losses. Thus we see that we can only have a perfect match at one frequency, and this frequency must, for simplicity, be one of the antenna's resonant frequencies.

This brings about at least three possible ways of selecting load values for a simple antenna. One way is to use a low-load resistance value which equals the antenna resistance at the half-wave resonant frequency. Another way is to use a high-load resistance value which equals the antenna resistance at the full-wave resonant frequency. A third possibility is to use an intermediate-load resistance value, the geometric mean of the other two values.

Figs. 1, 2, and 3 show these three cases for four simple center-fed antennas. The

(Please turn to page 12)

Television Changes

General Electric 811

The Model 811 chassis is similar to that of the 810, which appears on *pages 2-22 through 2-43 of Rider's TV Manual Volume 2,* except for the changes described in the following paragraphs.

When making video i-f alignment, adjust the signal input to each stage to develop ¾-volt peak at the video detector (junction of L16 and C27), as measured with a calibrated oscilloscope, with a contrast bias of -4 volts.

When making audio i-f alignment, adjust the signal input to each stage to give ¾-volt peak at the limiter grid (junction of R104 and C100), as measured by a calibrated oscilloscope, with a contrast bias of -4 volts.

Two types of ion traps were used on this model. One is a single assembly, the other is a rubber sleeve with two magnet rings. Both types should be adjusted to give maximum brightness on the screen. To adjust the first type, it is necessary to put the trap around the neck of the tube with the arrow pointing toward the face of the tube. The assembly should then be rotated and moved forward or backward to give maximum brightness. If the illuminated area gets too bright, reduce the brightness control and readjust the ion trap for maximum brightness. The second type of ion trap is a rubber sleeve with two magnet rings, one large and one small. The trap should be mounted on the tube neck between the focus coil and the tube base, with the smaller magnet ring toward the focus coil and the larger magnet ring toward the tube base. The approximate adjustment requires that the gaps in the two magnets be lined up with the break in the rubber sleeve.

1 With brightness control advanced, turn ion trap assembly so that the gap in the rubber holder is faced up or down and lined up with either pin no. 6 or pin no. 12. Whichever way gives some illumination is the correct approximate orientation of assembly. If the tube, V12, is removed, it will be found much easier to adjust for maximum illumination since the resultant thin line will show illumination even though the magnets are considerably out of adjustment.

2. Move the assembly back and forth, and rotate it while viewing the screen for maximum brightness.

3. If illuminated area gets very bright, reduce brightness control and repeat Step 2. If tube V12 was removed, replace it before proceeding with Step 4.

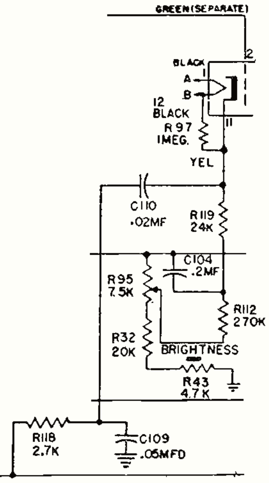
4. If any shadowing of the tube neck is present after completing Step 3, rotate the small front magnet to correct the shadow, and repeat Steps 2 and 3.

Early production used a ten-inch speaker, while late production uses an eight-inch Alnico PM speaker.

Early production used a coil L5 in the grid circuit of V17. This was changed to a transformer T21 with tap 1 connected to R101 and capacitor C106, 5,000 $\mu\mu$f (which is connected to ground), tap 2 connected to the plate of V22, tap 3 to ground, and tap 4 to grid 1 of V17.

Bias voltage was added to the grid of V2-B converter, by a circuit consisting of R120, 1 megohm, R121, 1 megohm, C113, 5,000 $\mu\mu$f, and R4, to prevent the video carrier from modulating the audio carrier and causing a buzzing sound in the audio. R121 and C113 are connected in parallel to ground and the junction of R4 and R120, which goes to the junction of R8 and C19.

A circuit consisting of R118, C109, C110, and C104 has been added to improve blanking of the vertical retrace. This is shown in the accompanying diagram.



Circuit changes for General Electric 811.

An *R-C* filter, R38 and C46, 20 μf, was added to the primary of the vertical output transformer T15, to remove the vertical sawtooth wave from the B+ line which in some cases caused buzzing in audio.

C111, a 5,000-$\mu\mu$f capacitor has been added to the filament of V10 to remove a buzzing sound in the audio.

Model 811 Replacement Parts List is identical to that listed for Model 810, except for the following changes.

These items listed in the parts list for 810 are not used on 811:

Cat. No.	*Symbol*	*Description*
Cat. No.	*Symbol*	*Description*
UOP-577		Speaker—5¼-inch PM speaker
RAB-077		Back—cabinet back cover
RAV-059		Cabinet—model 810 cabinet
RCE-071	C59,60, 61,63	Capacitor—electrolytic
RDW-010		Safety glass—cabinet glass
RJC-008		Connector—picture tube anode, connector assembly
RJS-119		Socket—picture tube socket
RMM-081		Cushion—rubber cushion for picture tube
RRW-029	R97	Resistor—0.65 ohm, 4 w, ww
RTO-054	T17	Transformer—hor. sweep
RTP-062	T18	Transformer—power transformer, 60 cycles.

These items are used on 811, and are not listed for 810:

UOP-867		Speaker—eight-inch PM speaker, used on late production 811
URF-047	R38	Resistor—820 ohms, 2 w, carbon
RAB-084		Back—cabinet back for 811
RAV-072		Cabinet—for 811, using 10-inch speaker, ROP-018
RAV-084		Cabinet—for 811, using 8-inch speaker, UOP-867
RCE-084	C59,60, 61,63	Capacitor—electrolytic
RCE-093	C46	Capacitor—electrolytic
RDE-041		Escutcheon—knob escutcheon
RDW-017		Safety glass
RET-002		Ion trap
RHX-014		Lead damper and spring
RHX-015		Cable—picture tube mounting ring and spring assembly
RJC-002		Contacts—speaker contact clips
RJC-011		Anode connector assembly—for picture tube
RJC-014		Connector—single female plug to connect yoke assembly to chassis
RJC-015		Connector—single male plug connects yoke assembly to chassis
RJP-027		Plug—eight-prong male plug connects yoke assembly to chassis
RJS-114		Socket—female socket connects to RJP-027 on yoke assembly
RJS-128		Socket—for picture tube
RMM-086		Cushion—for escutcheon
RMM-087		Cushion—for safety glass
RMM-099		Bracket—used with RMM-100 and RMX-126 for mounting yoke assembly
RMM-100		Adjusting plate—with two tapped holes
RMX-126		Bracket—for adjusting and clamping deflection yoke
RMS-165		Spring—for mounting picture tube
ROP-018		Speaker—ten-inch speaker, used on early production
RTL-090	T21	Transformer—1st audio i-f
RTO-067	T17	Transformer—horizontal sweep transformer
RTP-300	T18	Transformer—power transformer.

RIDER TV MANUALS VOLUMES 1, 2, and 3

Sentinel 401, 402, 406

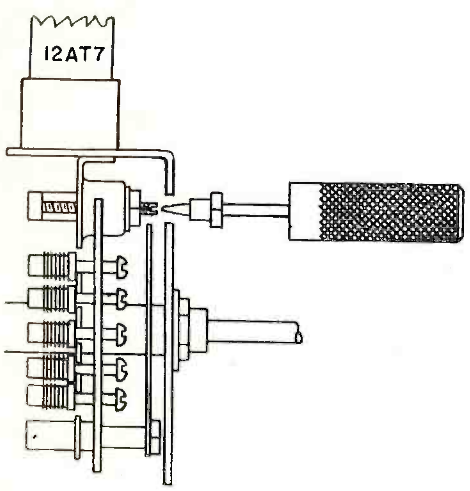
These models appear on *pages 3-8 through 3-17 of Rider's TV Manual Volume 3.* Glass breakage and premature failure of the 6AR5 tube may occur. This happens because the tube shield used over the 6AR5 tube fits very snugly and if there are any minute flaws in the glass envelope, the envelope will break due to the expansion caused by the heat of the tube. When replacing 6AR5 tubes, do not reinstall the tube shield. This shield was used solely to prevent the tube from dropping out of its tube socket during shipment.

Television Changes

Sentinel 400, 401, 402, 405, 406

Models 400 and 405 appear on *pages 2-1 through 2-13 of Rider's TV Manual Volume 2* and on *pages 3-1 through 3-7 of Rider's TV Manual Volume 3.* Models 401, 402, and 406 appear on *pages 3-8 through 3-17 of Rider's TV Manual Volume 3.* If tearing and picture breakup (noise streaks) occur when the set is jarred, on early models 400, 401, 402, 405, and 406 television receivers using a 12AT7 oscillator tube, it is probably due to a loose padder trimmer slug screw in C-11. The loose fit between padder trimmer screw and the threaded sleeve prevent a firm grounding contact and result in a breaking up of the picture, noise streaks, and possible detaining of the received picture. The installation of a locknut bushing, part number PST 500, on the padder trimmer screw will hold the trimmer screw firmly and provide a proper ground.

Slide the locknut bushing on a thin bladed screwdriver with the nut end toward the handle and insert the screwdriver into the trimmer screw slot as shown in the accompanying diagram. While holding the padder trimmer screw so that it will not turn, slide the locknut bushing on the padder trimmer and turn it down by hand until it is tight against the front of the r-f tuner unit chassis.



Adjustment for the Sentinel 400, 401, 402, 405, 406.

Industrial Television IT-35R

This chassis appears on *pages 3-1 through 3-3 of Rider's TV Manual Volume 3.* The following changes are suggested to improve the video response:

Change the value of R42 from 10,000 ohms, ½ w to 3,900 ohms, ½ w.

Add L30, a 470-μh peaking coil, between R42 and the junction of CR1 and C54.

All current production models of the 35R-control chassis will have Standard Coil tuners instead of the G. I. tuners. The phono-jack audio output and four-pin video and control-voltage plug will be replaced by one octal plug.

Muntz M169

This model appears on *page 3-4 of Rider's TV Manual Volume 3.*

The four 30,000-ohm, 2-watt resistors located in the horizontal hold circuit have been replaced by one 20,000-ohm, 10-watt resistor, number RW-2002-210.

General Electric 805, 806, 807, 809

These models appear on *pages 3-1 through 3-15 of Rider's TV Manual Volume 3.* Insufficient horizontal sweep width may be caused by a parasitic oscillation in the type 19BG6 horizontal sweep output tube, V13. To correct this, connect a 47-$\mu\mu$f, 500-v, mica capacitor, Stock No. UCU-1020, from pin 7 of the 19BG6 tube to a ground lug of an existing terminal board on the adjacent side apron.

Correction

On *changes page 3-2 of Rider's TV Manual Volume 3,* General Electric 802 is listed as appearing on *pages 1-28 through 1-49,50 of Rider's TV Manual Volume 1.* This should read "This model appears on *pages 1-52 through 1-72 of Rider's TV Manual Volume 1.*"

Sears Service Hint

Since the failure of capacitor, C92, 0.01 μf, 400 volts, in some television chassis has resulted in the destruction of several other parts, it is expedient to replace it with a 600-volt capacitor, before turning the receiver on for its initial test, as shown in the data for Model 9119, which appears on *pages 3-23,24 through 3-32 of Rider's TV Manual Volume 3,* and for Model 9122, which appears on *pages 3-12 through 3-21,22* of the same Volume. This change has been incorporated in all chassis above serial number B09-T51016 for Model 9119, and above serial number B09-T310002 for Model 9122.

It is not necessary to remove the chassis from the cabinet when making this change. Remove the bottom plate from the cabinet on either the console or table models with the cabinet on the side or upside down on protective pads. The capacitor C92 is mounted between pins 3 and 5 on the 7AF7 horizontal oscillator discharge tube. Unsolder the original part and solder in a good 0.01-μf, 600-volt, tubular paper capacitor.

General Electric 801

This model appears on *pages 1-28 through 1-51 of Rider's TV Manual Volume 1.* Add a 13-volt, bezel-indicator pilot lamp, catalog number UDL-019, to the replacement parts list.

Successful

SERVICING

REG. U. S. PAT. OFF.

Vol. 11 JANUARY, 1950 No. 3

Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

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

JOHN F. RIDER, Editor

CURTAIN TIME

TVI And The Serviceman

For the benefit of those servicemen who need the information, TVI means television interference from a ham station. The spread of television poses many problems for the operating amateur. Judging by reports from different parts of the country where both hams and TV receivers are in use, all operating frequencies used by the amateur station may produce interference. The conditions under which such interference develops, and how they may be cured are varied. We shall discuss some of these in this editorial, but the primary purpose of this brief discourse is to bring to the attention of the serviceman that there is more to the solution of TVI than the simple advice to the TV receiver owner, "write to the FCC". The principle involved is: live and let live.

It would be ridiculous to deny that ham interference can prove annoying to the TV serviceman, and it is also true that one cannot expect the television servicing industry to serve as a liason between the set owner and the ham. It is, however, equally true that when a TV antenna is being installed, it does seem silly to locate it within a few feet of a ham beam, especially when there is adequate room elsewhere for the antenna. We recognize that changing a position of a TV antenna laterally on a roof can materially alter the character of the received picture, but we repeat, that such changes will not always destroy received picture clarity. It may mean a slight loss in signal strength, but in many large centers it can be tolerated. Frequently, a very unhappy situation is created, because a ham who is operating his transmitter in accordance with all of the FCC requirements finds it impossible to go on the air during TV hours because the close proximity between his and the TV antenna results in shock excitation of the latter. Sometimes a fundamental frequency (ham) trap at the TV receiver antenna terminals is a great help, but why create a situation if it can be avoided.

We think that it is the responsibility of the television servicing industry to be as familiar with the problems of ham interference as it is for them to be familiar with the various conditions which control proper reception from a TV station — assuming all other detrimental influences absent.

Neglecting for the moment the matter of justice, the rights of the ham cannot be denied. They are not any more or any less than that right of the public to receive a television picture without any interference. The television serviceman should realize that both parties have rights, and that it is the responsibility of the serviceman to give *proper* advice to the complaining receiver owner. It is neither just nor technically correct to dismiss such interference conditions by recommending a letter to the FCC.

Without question, numerous ham transmitters located in TV areas are emitting harmonics which are frequently the cause for TVI. The FCC has decreed that such harmonic emission would be cleaned up; and in many cases, when this was done, TVI ceased. One manufacturer of ham transmitters has designed his equipment with the elimination of TVI in mind, and there is no doubt that others will do likewise. However, it is also very **significant** to know that in some instances — **and** these must be recognized — television interference has reappeared; and upon investigation, it was found to be in no way connected with the ham transmitter, nor with the TV receiver itself. The trouble issued from corroded joints or poor contacts in the TV antenna system. In other words, it was not a ham problem, but rather a service problem.

We know only too well that the public at large wishes to get the most for the least — that people are not overanxious to recompense a serviceman for any special precautions which he may take or desire to take to assure good TV reception. Yet it cannot be denied that when the locale is such that a ham transmitter is in the proximity of a TV receiver, it is necessary to take the presence of that

(*Please turn to page 15*)

Television Changes

Sears 9123, 9124, 9126

These models appear on *pages 3-1 through 3-11 of Rider's TV Manual Volume 3.* If one of these sets cannot be made to focus properly, the type of focus coil used should be checked carefully and possibly replaced. In original production, the horizontal output transformer produced an anode potential of approximately 7,500 volts. This same transformer had a tendency toward short horizontal scan which, in many cases, was corrected by the addition of a capacitor across part of the transformer wiring. As soon as it was possible, a horizontal output transformer was incorporated which produced an anode potential of 10,000 volts and developed more than adequate scan. The higher-anode potential made it necessary to adopt a new focus coil since the original focus coil would not produce proper focus with potentials higher than about 8,000 volts. A new focus coil can be identified by the fact that the back aluminum cover is not embossed the same as the front cover. In addition, this focus coil, which is an I.T.E. product, has four rivets holding the two aluminum cover plates in position and has six ears. The original focus coil, manufactured by G.E., has only four ears and the securing rivets are located in the ears. It is important to note that the G.E. coil will focus over a second-anode potential of 7 to 8,000 volts, whereas the I.T.E. focus coil will focus over a second-anode potential range of 8 to 10,000 volts.

General Electric 801, 802, 803

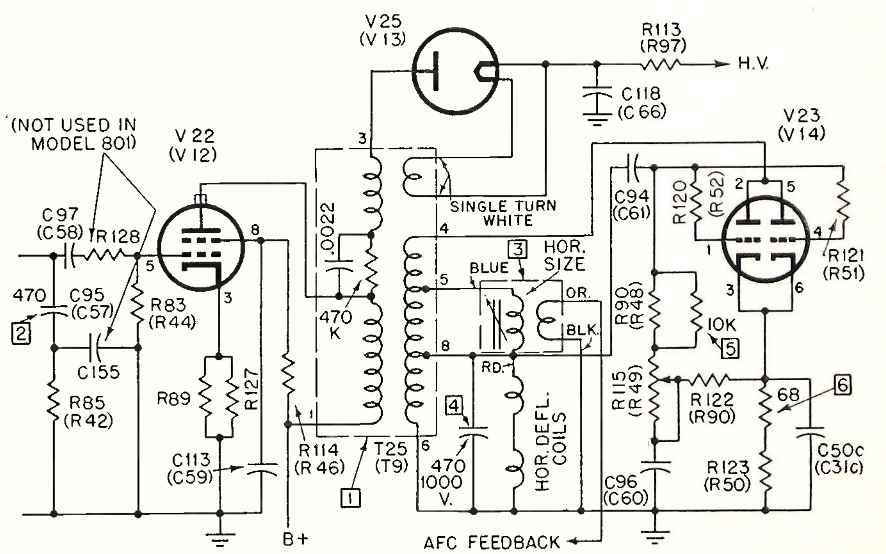
Model 801 appears on *pages 1-28 through 1-51 of Rider's TV Manual Volume 1,* and Model 802 appears on *pages 1-52 through 1-72* of the same Volume. Model 803 appears on *pages 2-1 through 2-21 of Rider's TV Manual Volume 2.* The original molded horizontal sweep output transformer listed for these models has been replaced by a new ceramic core sweep transformer, Stock No. RTO-071. It has several electrical design improvements over the original specified transformer; among them are higher efficiency and better high-voltage insulation. The transformer is equipped with a 470,000-ohm resistor in shunt with a 0.0022-µf capacitor, connected between the primary and hv windings. In order to provide identical electrical characteristics to the original transformer, a few circuit revisions are necessary when the substitution is made. The accompanying diagram shows the six steps required to adapt the circuit for the new transformer. The numbers in the squares correspond to the steps in the procedure. Because the 801 schematic symbol numbers are different from the 802-803, the 801 numbers are shown in brackets.

The procedure is as follows:

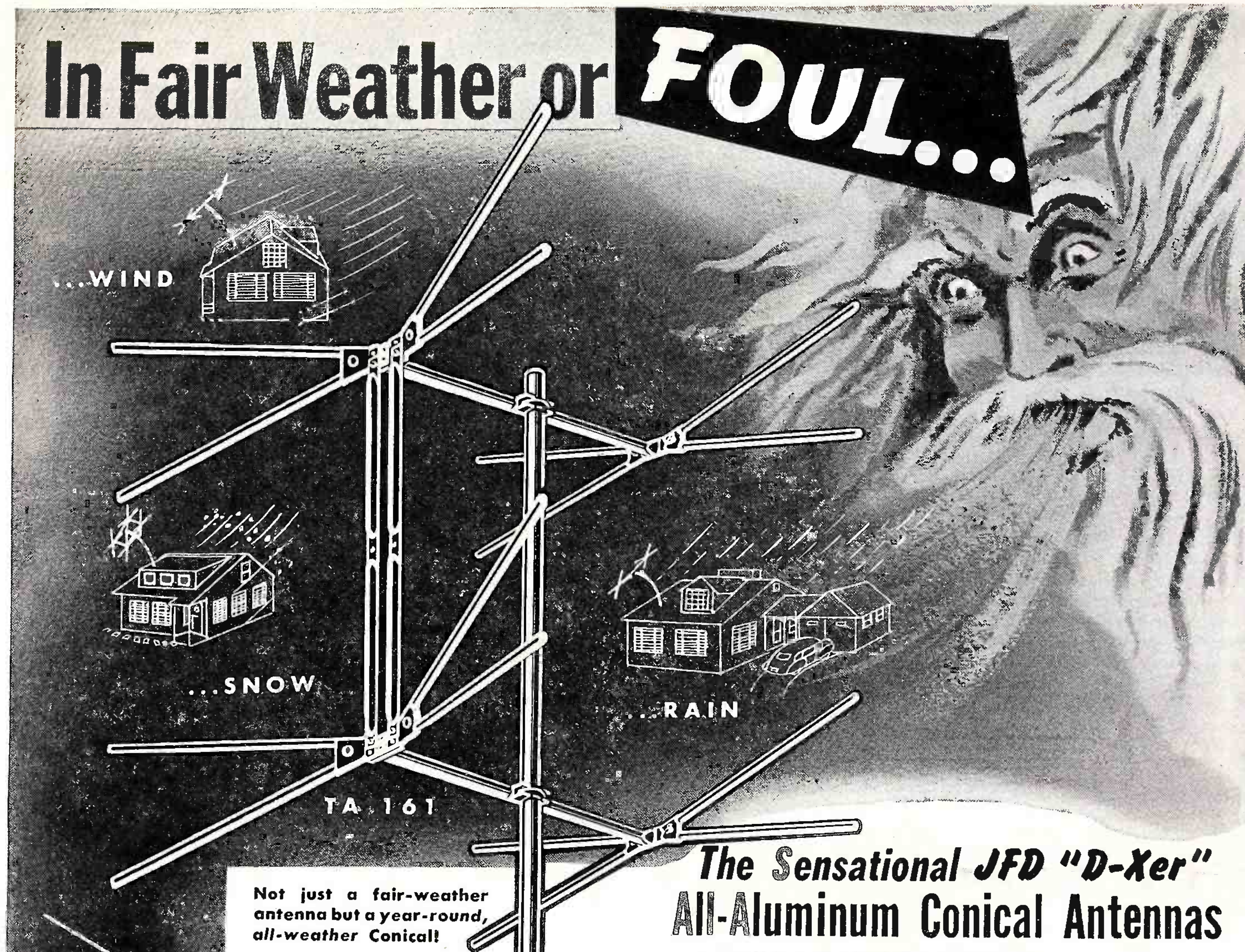
1. Disconnect leads of the old sweep output transformer and remove it from the chassis. Remove and discard the following parts: on Model 801—R107 and width control, L7; on Models 802 and 803—R126 and width control, L23. Mount new transformer on the chassis and connect it as shown to existing components. In some Models 802 and 803 a decoupling choke and capacitor, L2 and C154, were used between B+ and primary of transformer T25. Leave these in the circuit.
2. Change C95 (C57) from a 1,000-µµf capacitor to a 470-µµf, 500-volt mica capacitor. This is in the plate return, pin 5 of V21 (V11).
3. Add new width control and connect as shown. A secondary winding (leads—orange and black) is added to provide the necessary afc feedback voltage for these receivers, which was originally supplied by a tap on the transformer. It is very important to observe color coding when wiring in the control; otherwise the feedback voltage will have improper phase.
4. Add a 470-µµf, 1,000-volt, mica capacitor between terminals 6 and 8 of the sweep transformer. Two 1,000-µµf, 500-volt mica capacitors in series may be substituted.
5. Add a 10,000-ohm, ½-watt, carbon resistor across R90 (R48).
6. Add a 68-ohm, 2-watt, carbon resistor in series with the cathode resistor, R123 (R50) of V23 (V14).
7. Change C93 (C56) from 150 µµf to 180 µµf. This is to assure that all receivers will sync within horizontal hold-control range.

The new parts required are as follows:

Part No.	*Description*
RTO-071	Ceramic iron horizontal sweep output transformer
RLD-017	Horizontal width control (includes secondary for afc feedback voltage)
UCU-1544	470 µµf, mica-C95 (C57)
URD-073	10,000 ohm, ½ w, carbon
URF-021	68 ohm, 2 w, carbon
(see substitute)	470 µµf, 1,000 v, mica (substitute two 1,000 µµf, 500 v, Stock No. UCU-1052, in series)
UCU-2534	180 µµf.



Circuit changes for General Electric 801, 802, and 803. Circuit symbols in parenthesis denote reference numbers for Model 801. A single resistor R45 replaces the parallel resistor, R89 and R127 in Model 801.


In Fair Weather or FOUL...
...WIND
...SNOW
...RAIN
TA 161

Radio Changes

RCA 8V91

This model appears on *pages 19-16 through 19-25 of Rider's Manual Volume XIX*. The following changes in parts list have been made:

Change:
73753 Pull—
to read:
73753 Pull—Door pull (2 required) for mahogany instruments.
Add:
74626 Pull—Door pull (2 required) for blonde instruments.

•

Philco M-12C

This model appears on *pages RCD. CH. 19-55 through RCD. CH. 19-74 of Rider's Manual Volume XIX*. The three parts referred to below were listed twice in the parts list, and should be deleted as indicated.

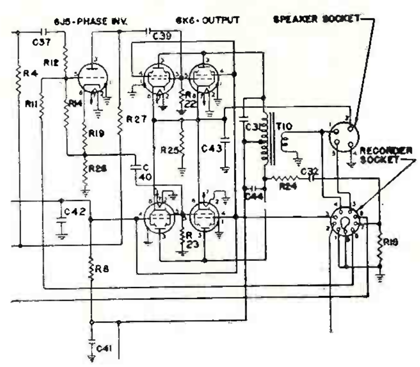
Part No.	*Description*	
56-4647	Retainer spring	Delete
56-5753	Push-off saddle	Delete
76-4008	Base plate assembly	Delete.

•

Hoffman C503 and C513, Ch. 108

These models are identical with Models B503 and B513, which appear on *pages 17-8 through 17-13 of Rider's Manual Volume XVII*, except for the following changes:

1. Push-pull parallel 6K6's are used in the output stage instead of push-pull 6V6's. This is shown in the accompanying diagram.



Circuit changes for Hoffman C503 and C513.

2. On the recorder amplifier the screen dropping resistor R11 has been changed from 0.1 megohm to 2.2 megohms. The cathode resistor, R1, for this stage has been changed from 2,200 ohms to 4,700 ohms. This allows the screen current of the 6SJ7 tube to be self-regulating and to eliminate variations in gain between various 6SJ7's.
3. R31 and C49 have been added in parallel to the S1-sec 2, rear, wafer lead that goes to the phonograph receptacle.
4. Capacitor C30 is now connected to the variable resistor, R20, instead of to ground.

Farnsworth P-10

This a-m—f-m radio chassis used in Model 100-M, is identical to the P-10 chassis which appears on *pages 19-19 through 19-33 of Rider's Manual Volume XIX*, with the exception of the phono-input circuit.

In Model 1001-M, the P-10 chassis employs a 680,000-ohm resistor, from phono-input to chassis ground, instead of a 100,000-ohm resistor, ref. no. 15.

Following is a list of parts which apply to Model 1001-M. These parts are different from those shown in the Manual for the P-10 chassis.

Part No.	*Description*
650183A-G1	Speaker, 10" PM, output trans. assy.
750114B-1	Glass escutcheon
650189A-G1	Loop antenna assy.
650186A-4	On-off volume knob
650186A-2	Tuning knob
650186A-1	Band switch knob
650186A-3	Tone control knob.

United Motors 984296

Model 984296, Pontiac, appears on *pages 19-60 through 19-64 of Rider's Manual Volume XIX*. The following change has been made in all sets above serial number 691137 and B39-54401:

Illus. No.	*Production Part No.*	*Service Part No.*	*Description*
43	1213220	A 151	150 ohms, ½ w, insulated.

•

General Electric 115, 115W

These models appear on *page 18-13 of Rider's Manual Volume XVIII*. The following changes have been made in the parts list.

Delete catalogue numbers and parts RDK-121 and RDK-122.

Add the following:

RAG-019	Grille, for Model 115 and 115W
RDK-150	Knob and bezel, brown, for Model 115
RDK-151	Knob and bezel, white, for Model 115W.

•

Westinghouse H-203

This model appears on *pages 19-29 through 19-32 of Rider's Manual Volume XIX*. If bass response is objectionable, it can be decreased by changing C29 from 0.05 μf to 0.005 μf.

National Service Hints

The NC-183 appears on *pages 19-11 through 19-35 of Rider's Manual Volume XIX*. Following is a list of troubles and suggestions for correcting them:

1. Oscillation in the E band at twice and three times the i.f.
   a. Look for loose screws on sides of coil compartment.
   b. Be sure second i-f and avc amp. plate leads are down near the chassis.
   c. Be sure the diode leads of the 6H6 are down near the chassis.
   d. Check ground leads on side of coil compartment.
   e. Be sure that the first r-f grid lead is down near the chassis.
   f. Check ground at the end of the shield on the bfo lead near the 6H6 det. tube.
2. Oscillation at low end of the B band.
   a. Check ground on main tuning capacitor and the ground brushes on band-change switch shaft.
   b. Be sure first i-f plate lead is down near the chassis.
3. Pulling of signal with antenna trimmer on the A band.
   a. Check ground on band-change switch shaft.
   b. Check ground from tie rod on tuning capacitor to chassis.
4. Motorboating with both r-f and audio gains at zero.
   a. Check value of inverse feedback resistor R47. This resistor should be 4,700 ohms. A lower value than this will cause the motorboating.
5. Audio oscillation.
   a. Output transformer may be wired wrong.
   b. Connecting leads to the transformer may be reversed.
6. Hum with limiter on.
   a. Change limiter tube.
7. Back lash in main tuning or bandspread dials.
   a. Check end bearings of main tuning and bandspread capacitors.
   b. Check tension of spring on antibacklash gears.

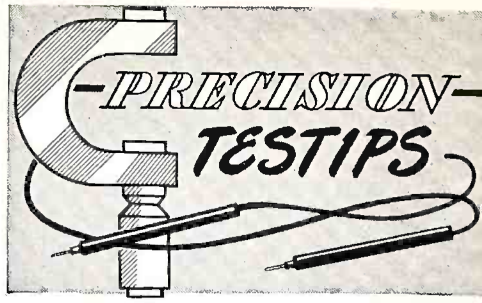
HIWYNI Have It When You Need It

Zenith 8H832, Ch. 8E20

This chassis appears on *pages 19-16 through 19-21 of Rider's Manual Volume XIX*. If replacement of one of the speakers is required, care should be taken when connecting the new speaker in the circuit so that the speakers are properly phased. If the speakers are out of phase, all bass notes will be absent and distortion will be dominant. This condition can be corrected by reversing the voice coil wires on the newly replaced speaker.

RCA 8X71, 8X72, Ch. RC-1070

These models appear on *pages 19-30 through 19-34 of Rider's Manual Volume XIX*. The driver tube (12AU6) cathode resistor, R11, has been changed from 180 ohms to 330 ohms.



CIRCUIT PROBING WITH THE VTVM

Experienced television technicians know that the efficient way to run down sectional defects in a television chassis is to PROBE for the trouble. Such circuit probing is usually done with a vacuum-tube voltmeter, and the measured values are checked against the mfr's. service data.

Circuit probing must frequently be performed under dynamic (signal carrying) conditions and in addition, numerous polarity reversals are also met in modern television circuits. For example, five positive terminals, and six negative terminals appear in the typical sync network shown in Fig. 1.

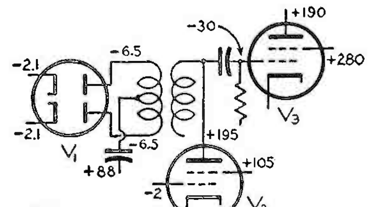


FIG. 1

At first glance, it might be thought that polarity reversals could be taken care of by reversing the test leads of the VTVM. Actually, **this practice can cause incorrect measurements,** because the isolating probe of the VTVM is ineffective when test leads are reversed.

For example, the —30 dc volts of signal-developed bias at the grid of V3 cannot be measured by reversing the test leads. This bias is caused by high-frequency pulses and flow of grid current, — and the pulses are "killed" unless the isolating probe is used at the grid of V3.

The return (ground) test lead of a VTVM does not contain an isolating resistor, but instead is a direct connection to the case of the instrument. It is easy to see that if the instrument case is connected to the grid of V3, the heavy shunt capacitance will "kill" (and/or short) the stage.

Signal-developed bias voltages can be measured if the VTVM has a polarity-reversing switch, because the isolating probe is then always in the "hot" side of the measuring circuit. Such switches, however, are wasteful of both time and tempers. Note that five polarity reversals would be required when probing the network of Fig. 1.

TIME IS MONEY IN THE BUSY SHOP, and it is very important to use the right instruments for the job.

The right answer to the television (as well as general) circuit-probing problems is the **ALL Direct-reading zero-center-scale** as shown in Fig. 2.

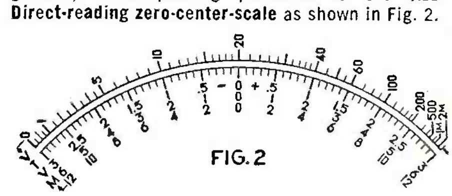


FIG. 2

When the VTVM is provided with such direct-reading zero-center **scales, no polarity switch** is used, and it is **never** necessary to reverse the test leads. Correct measurements will be obtained in all circuits, and no "figuring" is required. **Polarity and magnitude are indicated simultaneously in only one operation.**

The direct-reading zero-center scale puts extra hours into every service day, and is one of the keys to high-speed profitable servicing.

R.G. "Bob" Middleton
Engineering Division

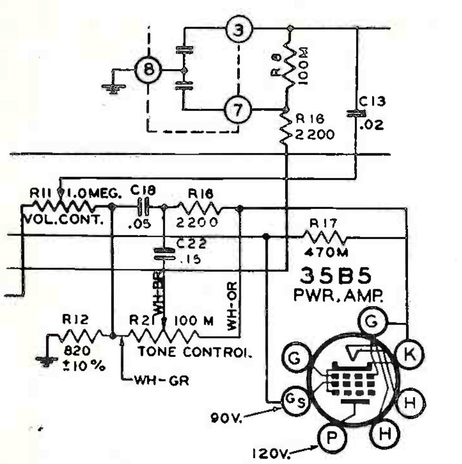
Radio Changes

Zenith 7H822Z, Ch. 7E02Z

Chassis 7E02Z is similar to the 7E02 which appears on *pages 18-21,22 through 18-25 of Rider's Manual Volume XVIII.* On the 7E02Z receiver a tone control has been added and a neon bulb on-off indicator. The accompanying figure shows the tone-control circuit. The following parts list shows the new components included in this receiver:

Part No.	*Description*
12-1546	Indicator socket brkt.
14-857	Model 822Z plastic cab.
22-1025	0.15 μf, 200 v, capacitor
22-1511	50 $\mu\mu f$, ceramic 500 v, capacitor
26-419	Dial scale
46-769	Tuning & vol. con. knob
46-770	Band-switch knob
46-780	Tone-control knob
46-781	Tone-control knob
63-1744	100 ohms, ins. resistor, 20%, ½ w
63-1884	220,000 ohms, ins. resistor, 20%, ½ w
63-2008	Tone control
78-585	Indicator socket
80-402	Dial cord tension spring
83-1593	Felt strip (2 used)
83-1595	Spacer strip
93-961	Ins. shoulder washer
100-105	Neon indicator bulb
199-35	Dial scale
202-687	Instruction book
S-15325	Cab. back & plug cover assy.

The 220,000-ohm resistor, R22, and the neon bulb on-off indicator have been inserted from pin 4 of the 35B5 power amplifier to ground.



Circuit changes for the Zenith 7H822Z, Chassis 7EO2Z.

National Service Hints

The NC-57 appears on *pages 18-1 through 18-16 of Rider's Manual Volume XVIII.* Following is a list of troubles common to the NC-57 and suggestions for correcting them:

1. Audio oscillation with automatic noise limiter (ANL) on and a-f gain on full.
   a. Dress the primary leads to the output transformer under the ANL switch. Pull the excess length of leads through the hole to the top of the chassis.
2. Hum with ANL on and a-f gain on full.
   a. Change the 6H6.
3. Oscillation on B and C bands.
   Check C19 h-f osc. grid coupling capacitor. This should be 100 $\mu\mu f$. A higher value than this will produce oscillation. Also change the oscillator grid resistor from 47,000 to 22,000 ohms.
4. Parasitic oscillation on A band above 50 Mc.
   a. Check the ground lead of the r-f amp. screen bypass capacitor. This should be as short as possible and soldered to the lug on the socket mounting ring adjacent to pin 4. The r-f amp cathode bias resistor should be 220 ohms.
5. Noisy band switch.
   a. Poor contacts in the switch, and poor contact between the switch shaft and the ground brushes on ER 210 coils.
   b. Ground brushes on switch shaft rubbing on the coil partition of the ER 210 coils.
   c. Coil partition mounting screws not tightened down.
6. Noisy trimmer control.
   a. Shorted plates.
   b. Poor rotor brush contact or rotor brush not grounded to the mounting bracket.
   c. Rotor shaft grounding spring on front end of chassis is loose or missing.
7. Oscillation on E band at twice the i.f.
   a. Check to see that there is a metal shield mounted on the trimmer control bracket.

Circuit Loss in Simple Center-Fed TV Antennas

(*Continued from page 1*)

four simple antennas differ from each other only with respect to their thickness (or diameter). The factor P is arbitrarily used to describe this thickness factor and represents the periphery, or circumference, of the antenna rod cross section expressed as a fraction of the free-space wavelength. Table 2 gives a physical picture of what the diameter of the four antennas would be at 200 Mc where, as an example, we will assume the antenna is operating as a half-wave antenna.

Table 2: 200 Mc Half-Wave Antenna

$$P = \frac{\pi D f}{11{,}800} = \frac{D}{18.8}$$

where P is in fraction of wavelength, D is in inches, and f is in megacycles.

	P (fraction of wavelength)	Antenna Diameter (inches)
1.	0.00001	0.0002
2.	0.005	0.094
3.	0.04	0.75
4.	0.20	3.76

The first case (Fig. 1) is only of theoretical interest, since its diameter is physically impractical to use.

If we match these four antennas at 200 Mc (the half-wave resonant frequency) the respective load values required will be 72 ohms, 63 ohms, 46 ohms, and 35 ohms. By inspection of Fig. 1, we see this point is labeled $\frac{f_o}{f_x} = 1.0$, where f_o is the standard half-wave frequency and f_x the signal frequency, which we will vary. The loss at this point is 0 db, since we have chosen a perfect match at the half-wave resonant frequency.

Now if we depart from 200 Mc and examine the antenna mismatch loss at any other frequency, we can obtain the frequency ratio with respect to 200 Mc and note the corresponding loss in signal strength in db. It reaches high values at frequencies which are between *odd* resonant frequencies, as we would expect. The losses are higher for thin than for thick antennas.

When we choose to match the same antennas at the full-wave point (Fig. 2), the respective load values become 9,200 ohms, 2,400 ohms, 960 ohms, and 290 ohms. Except for the last case, this precludes the use of normal transmission lines. It is of interest, however, to note the broad simplicity in the results.

The third case, where the load is selected to be the geometric mean of the half-wave and full-wave value (Fig. 3), requires load resistances of 820 ohms, 370 ohms, 220 ohms, and 110 ohms. By choosing these mean values, the mismatch loss curve is quite constant with frequency ratios above unity. It must be admitted, however, that this third case does not fully match at any frequency and we can expect that this will give rise to the possibility of assisting some reflections (line ghosts) at all frequencies. These reflections in the first and second case were completely eliminated at the matched frequency points, but became very serious at most other frequencies. The following approximations in Figs. 1, 2, and 3 have been made:

TABLE 1. CHANNEL-TO-CHANNEL FREQUENCY RATIO

Channel Number		2	3	4	5	6	7	8	9	10	11	12	13	VHF*				
	Freq. Mc	57.5	63.5	69.5	79.5	85.5	177.5	183.5	139.5	195.5	201.5	207.5	213.5	500	600	700	800	900
2	57.5	1.0	1.1	1.2	1.4•	1.5	3.1	3.2	3.3	3.4	3.5	3.6	3.7	8.8	10.5	12.3	14.0	15.8
3	63.5	0.9	1.0	1.1	1.25	1.35	2.8	2.9	3.0	3.1	3.2	3.3	3.4	8.0	9.5	11.1	12.7	14.3
4	69.5	0.83	0.92	1.0	1.15	1.23	2.6	2.66	2.74	2.8	2.9	3.0	3.1	7.3	8.7	10.1	11.6	13.0
5	79.5	0.72	0.8	0.88	1.0	1.08	2.24	2.32	2.4	2.47	2.54	2.62	2.7	6.35	7.6	8.9	10.3	11.4
6	85.5	0.67	0.74	0.81	0.93	1.0	2.08	2.15	2.22	2.3	2.36	2.43	2.5	5.9	7.1	8.2	9.4	10.6
7	177.5	0.32	0.36	0.39	0.45	0.48	1.0	1.04	1.07	1.10	1.14	1.17	1.21	2.8	3.4	4.0	4.5	5.1
8	183.5	0.31	0.34	0.38	0.43	0.47	0.97	1.0	1.03	1.06	1.10	1.13	1.16	2.7	3.3	3.8	4.4	4.9
9	139.5	0.30	0.33	0.36	0.42	0.45	0.94	0.97	1.0	1.03	1.06	1.09	1.13	2.6	3.2	3.7	4.2	4.8
10	195.5	0.29	0.32	0.35	0.41	0.44	0.91	0.94	0.97	1.0	1.03	1.06	1.09	2.6	3.1	3.6	4.1	4.6
11	201.5	0.28	0.31	0.34	0.39	0.42	0.88	0.91	0.94	0.97	1.0	1.03	1.06	2.5	3.0	3.5	4.0	4.5
12	207.5	0.28	0.30	0.33	0.38	0.41	0.86	0.89	0.91	0.94	0.97	1.0	1.03	2.4	2.9	3.4	3.9	4.4
13	213.5	0.27	0.30	0.32	0.37	0.40	0.83	0.86	0.89	0.92	0.95	0.97	1.0	2.3	2.8	3.3	3.8	4.2
	500	0.11	0.13	0.14	0.16	0.17	0.35	0.37	0.38	0.39	0.40	0.42	0.43	1.0	1.2	1.4	1.6	1.8
V	600	0.10	0.11	0.12	0.13	0.14	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.83	1.0	1.2	1.3	1.5
H	700	0.08	0.09	0.10	0.11	0.12	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.72	0.86	1.0	1.1	1.3
F*	800	0.07	0.08	0.09	0.10	0.11	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.63	0.75	0.88	1.0	1.1
	900	0.06	0.07	0.08	0.09	0.10	0.20	0.20	0.21	0.22	0.22	0.23	0.24	0.56	0.67	0.78	0.89	1.0

* Individual channels not shown.

a. Frequency ratios are plotted as if resonances occurred at integral frequency ratios. (In practice, even resonances may be lowered due to the "physical mismatch"; odd resonances may be modified by smaller amounts. "Physical mismatches" at even resonances where the wave energy is not highly localized are due to the inability of this energy on the antenna to be "funneled" ef-

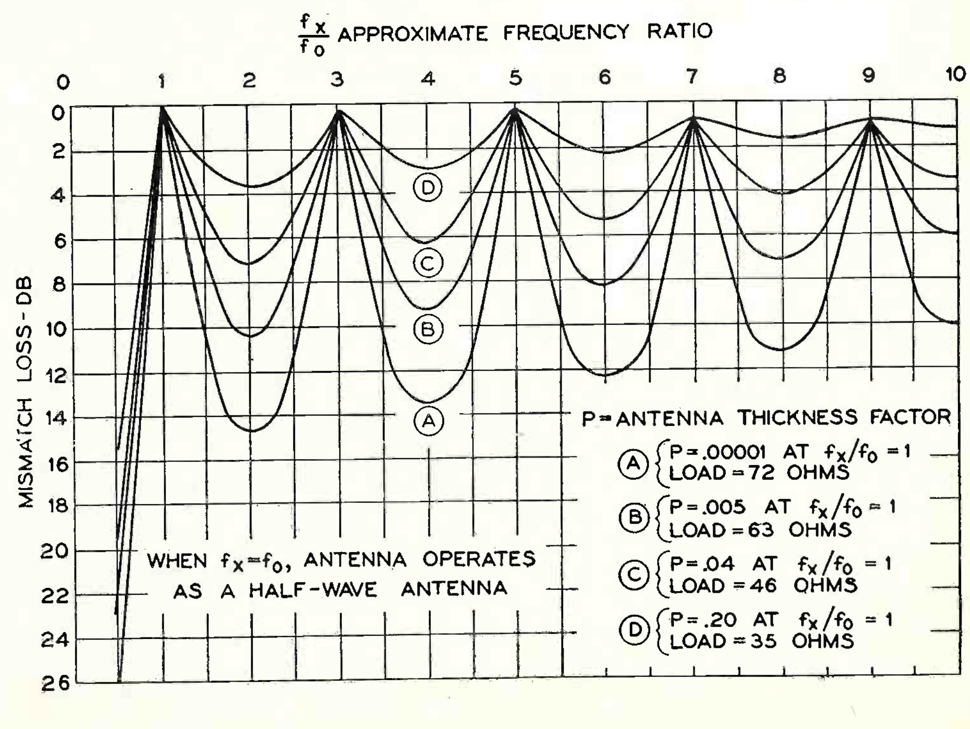


Fig. 1. The mismatch loss of a center-fed antenna over a frequency band is shown for the case where the load is selected to match the antenna resistance at the half-wave point.

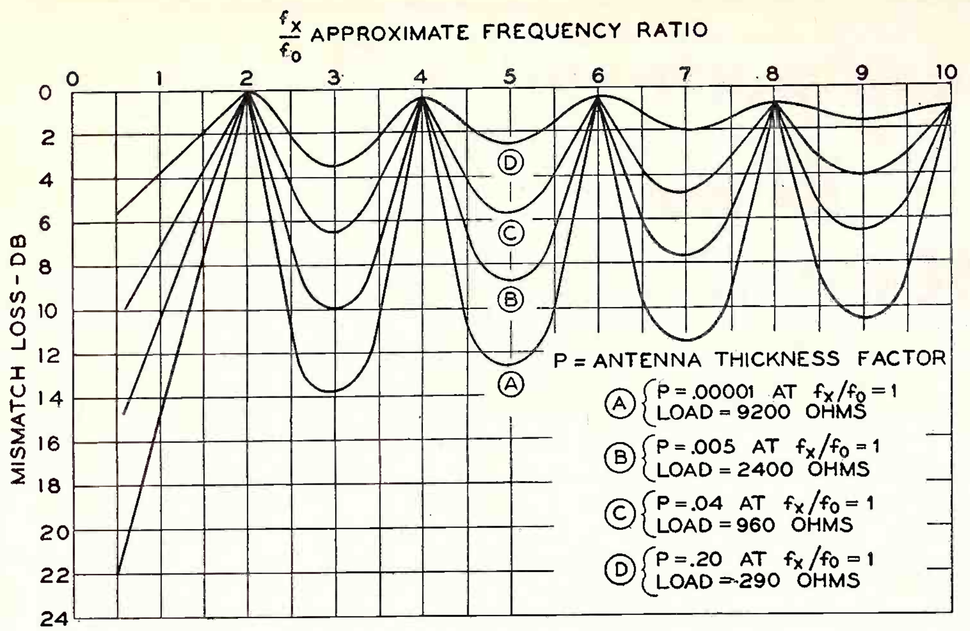


Fig. 2. The mismatch loss is shown for the case where the load is selected to match the antenna resistance at the full-wave point.

ficiently into the physically small transmission line over the right-angle bend between antenna conductor and line. The voltage maximum occuring for even resonances at the load terminals will tend to exaggerate stray capacitance effects in the presence of "physical mismatches".

b. Minor variations in Fig. 3, which may occur in practice, are not shown. These may cause the flat portion of the graph to exhibit cyclic dips of 1 db to 2 db between integral frequency ratios.

c. The antenna feed point is assumed to be free of stray capacitance effects due to "physical mismatch".

These approximations do not impair the utility of the graphs. The losses indicated may be considered as minimum values, which may be *exceeded* in practice, but are rarely less than indicated. There will, however, be slight shifts to lower frequencies at the higher orders of resonance. Figs. 1, 2, and 3 may then be considered to be about the best possible simple approximation to the actual situation.

Let us note some important conclusions from these graphs. If we match an antenna at any resonance point, we find that the maximum loss at other frequencies may be relatively high. If we permit a small constant mismatch, the third case (Fig. 3), we get a loss at all frequencies, but it is much less than the maximum loss for the first case (Fig. 1), or the second case (Fig. 2). Furthermore, the maximum losses of the first case and the second case are approximately equal.

A further precaution is in order. The loss figures of Figs. 1, 2, and 3 take into account only losses produced by *circuit conditions* at the antenna load, as the frequency is changed. We will see presently that we must also evaluate the signal loss (or gain) due to the variation in *directional response* of the antenna with frequency.

This completes the determination of the *amount of power* absorbed by the antenna load for various types of center-fed antennas having uniform cross section, when operated close to the half-wave point or over a band of frequencies.

The practical necessity of considering antenna loads which are not a pure resistance, as may be the case when the antenna is connected to the transmission line, will be considered later. When the far end of the transmission line (at the radio receiver) is terminated in a matching resistance equal to the characteristic impedance of the line, the antenna itself will also see a resistance load equal at all frequencies to the transmission-line surge or characteristic impedance. When the line is not properly terminated, the antenna will see a load consisting of a resistance and a reactance, each varying with frequency. This case may give rise to different loss values, some higher, some lower than those shown on Figs. 1, 2, and 3, but in no case will the over-all trend of these graphs be improved. Essentially, the loss graphs will be modified by substantial "wiggles" or variations around the values indicated. The *number* of wiggles per unit change in frequency will be small if the line is short in terms of wavelengths. If the line is long, the number of wiggles per unit frequency change will be great. The *amplitude* of the wiggles will depend on the line loss and the degree of mismatch at the receiver end of the line. This condition will be treated later as attributable to the line and receiver, and should not be considered as a defect of the antenna.

By proper realization of the values of mismatch loss for simple TV antennas, we shall better appreciate the action for the more complicated forms of TV antennas. It is important to note that what has been said about the mismatch loss for the simple center-fed antenna does *not* directly apply to the conventional simple *folded-type* dipole. The two differ substantially from each other.

Thus it is evident that the choice of antenna diameter and the choice of antenna load resistance both serve either to accentuate or to smooth out the matching losses of an antenna over a wide frequency band. It is not surprising, therefore, that the present TV channels are not all equally well received by TV receiving antennas. It is well to note that optimum results for one particular channel may preclude obtaining a good signal at some other channels, solely because of the circuit losses between the antenna proper and the antenna load.

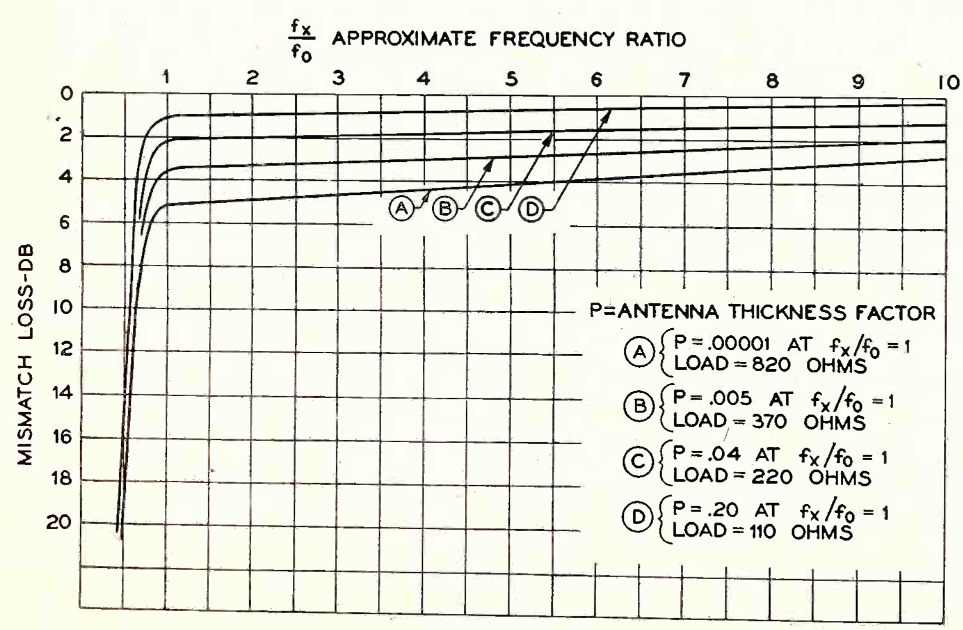


Fig. 3. The mismatch loss is shown for an intermediate case where the load matches neither the full- or half-wave point, but is equal to

$$\sqrt{R_{max} \cdot R_{min}} = 0.59\ Z_A.$$

Coming soon—and worthwhile waiting for!

The New
CATHODE-RAY TUBE AT WORK
by Rider *et al*

More than 900 pages Completely rewritten from start to finish 8½ x 11 inches $9.00

The NEW "Cathode-Ray Tube At Work" is about five times the size of the old standby which has been the standard for almost 15 years. Almost 500,000 words and about 3,000 illustrations have gone into this new edition. Never has there been a book on this subject like this one!

EXAMINE THESE CHAPTER HEADINGS

1. INTRODUCTION
2. PRINCIPLES OF ELECTROSTATIC DEFLECTION AND FOCUSING
3. PRINCIPLES OF ELECTROMAGNETIC DEFLECTION AND FOCUSING
4. MECHANICAL CHARACTERISTICS
5. THE ELECTRON GUN
6. DEFLECTION SYSTEMS
7. SCREENS
8. SPOT DISPLACEMENT
9. LINEAR TIME BASES (SWEEP CIRCUITS)
10. THE BASIC OSCILLOSCOPE
11. SYNCHRONIZATION
12. PHASE AND FREQUENCY MEASUREMENTS
13. NONLINEAR TIME BASES
14. AUXILIARY EQUIPMENT
15. TESTING AUDIO-FREQUENCY CIRCUITS
16. AM, FM, AND TV ALIGNMENT
17. TELEVISION RECEIVER SERVICING
18. AM, FM, AND TV TRANSMITTER TESTING
19. ELECTRICAL MEASUREMENTS, SCIENTIFIC AND ENGINEERING APPLICATIONS
20. COMPLEX WAVEFORM PATTERNS
21. SPECIAL PURPOSE CATHODE-RAY TUBES
22. COMMERCIAL OSCILLOSCOPES

APPENDIX
- I — CHARACTERISTICS OF CATHODE-RAY TUBES
- II — CATHODE-RAY-TUBE BASES AND SOCKETS
- III — PHOTOGRAPHY

The greatest, most complete reference book ever written on the cathode-ray tube! It is a practical, right-down-to-earth volume which will repay its buyer many times over.

Place your order today. NOW! Make certain that you will receive your copy from the first printing. You will not want to be without this book.

And—

THE THEORY AND PRACTICE OF 30-1000 MC RECEIVING ANTENNAS
by Arnold B. Bailey

More Than 500 Pages Cloth Bound $4.50

The radio and television industry — the schools teaching electronics — antenna design engineers — all personnel interested in antennas have long felt the need for a book which reflects world-wide knowledge of the antenna art. This is a book, which not only is practical in every sense of the word, but also has that rare quality of clearly explaining the theory behind the performance of every type of 30-1000 Mc receiving antenna — it will enjoy years and years of use.

EXAMINE THESE CHAPTER HEADINGS

1—Definition and Terminology
2—The Television Signal
3—Problems of TV Reception
4—The Electromagnetic Wave
5—The Radio Path
6—The Theory of Signal Interception
7—The Center-Fed Zero DB Half-Wave Antenna
8—Comparison of Zero DB Half-Wave Antenna
9—Parasitic Element Antennas
10—Special Horizontally Polarized Antennas
11—Vertically Polarized Antennas
12—Practical Aspects of 30-1000 Mc Receiving Antennas

Here is that book — written by an individual with 21 years of designing experience and closest association with the practical aspects of the subject as well. It is a book which will teach — a book which every person interested in antennas will use every day because of the facts and figures it contains. Well planned and clearly written — it is a real gem among texts and reference books.

In the main, it is oriented toward the television art, to serve all the men whose livelihood depends on getting the most out of an antenna system. It is, however, equally important to the antenna engineer, to every student who is studying electronics, to every school where electronics is being taught, and to every ham. It is a singular book, the like of which has never before been written.

ORDER FROM YOUR JOBBER OR DIRECTLY FROM US.

Curtain Time

(Continued from page 5)

installation into account when installing the receiver. It would not do the servicing industry any harm to contact such hams and to ascertain their operating frequencies, and even go so far as to add a filter, which is comparatively inexpensive, across the antenna terminals of the TV receiver, or to recommend to the set owner that it be done. Who can tell how many more TV receivers will be installed in the same area? It may be the easier path to ignore the existence of the ham transmitter, and to simply say that it is the interference which issues from the ham station, and let it go at that, but that is not the soundest business practice. The only trouble with that line of thinking is that quite frequently the ham, in his defense — knowing that he is operating his transmitter in accordance with the regulations — will malign the service organization and may even go so far as to place the service organization in a bad light by adding such a filter. In making these comments, we are not expecting the servicing industry to bear every burden, but it is not stretching the imagination too far to visualize an installation service organization doing everything in their power — naturally, everything within reason — to satisfy a customer.

Despite many expressions to the contrary, hams in the United States are not willfully interfering with TV reception; they are cognizant of their responsibility to the public and to the rights of the public, which is why in many parts of this nation, hams are conspicuous by their absence during TV hours. Every day more and more hams are spending money to eliminate harmonic radiation and thus clean up TVI. This does not call for thanks on the part of anyone, but does call for a little more consideration on the part of the TV serviceman. In saying this, we are not whitewashing the entire ham field because there are many who are flagrant in their violations, and unfortunately, the FCC neither has the man power nor the funds to spot these stations as rapidly as all might desire. Eventually they are caught up with, but in the meantime, the servicing industry cannot indict the entire ham activity because of a few un-co-operative individuals.

Considering the legal status of the ham field, there is much to be said for the approach toward accomplishing an end. There is no harm in telling a TV set owner that his picture is being destroyed by a ham, and that as a servicing facility, little if anything, can be done by that facility to remedy the situation. This, of course, presupposes that corroded joints and poor contacts are absent in the antenna system. However, it is wrong, no matter how you look at it, to arouse the ire of the set owner by condemning the ham. It is just as easy to explain the situation and if possible, to ask the set owner to get in touch with the ham. Nine times out of ten, they will arrive at an amicable solution, and no one's prestige or reputation will be hurt.

What we are leading up to is that it behooves the TV servicing industry to become more familiar with a ham transmitter, the manner in which harmonic radiation affects a TV receiver, and the means of recognizing ham interference in contrast to other types of interference. It would do no harm if servicing organizations contacted hams so as to learn more about them, especially the various means of correcting TVI at the receiver end. It is important for the servicing industry to understand that the FCC, when responding to a complaint, invariably advises the complainant to communicate with the offending ham, and the recommendation is also made that the receiver owner call his serviceman to apply whatever corrective remedies are possible at the receiver site. The ham is called upon to clean up his transmitter but he is not ordered by the FCC to take any corrective steps at the receiving end. Some hams, in their desire to co-operate, do install filters on receivers, but have been discouraged from so doing because in altogether too many cases, a *subsequent failure in the receiver was wrongly attributed to the addition of such a simple thing as a trap across the antenna terminals.*

These remarks do not imply that simple intercourse between people leads to an understanding and a resolution of all problems. Personalities frequently conflict, and where suspicion abounds or where some previous experience may have proved

(*Please turn to next page*)

Curtain Time

(*Continued from page 15*)

distasteful, the attainment of co-operation is difficult. Be that as it may, it does not deny the continuation of attempts to co-operate. Such co-operation between a ham activity and the servicing activity is most important. Since the serviceman is in much more intimate contact with the TV receiver, it seems only logical that the suggestion for greater co-operation be aimed at him. Ham activity is not apart from the radio industry — it is part and parcel of that activity and it must be recognized as such by the servicing group. It can be a headache at times, especially, when a ham refuses to co-operate. Such instances, however, are infrequent rather than frequent, because every ham is anxious to do whatever he can to enable him to be on the air whenever he so desires.

It is silly for the serviceman to malign him — to disparage his usefulness or his hobby. While it is not our desire to laud the ham on the basis of his best accomplishments, the fact remains that much scientific knowledge is still being acquired from ham activities. Maybe all the hams do not contribute to it, but many do. Their unselfish efforts during emergencies cannot pass unnoticed — their service as a communication link between military personnel all over the world and their families here in the United States merits approbation — in other words, the activity as a whole serves a purpose.

Hams and servicemen have been at loggerheads for a long time, exclusive of those who perform both roles. The possibility of ham activity being legally banned as a result of TV receiver pressure is very remote. The possibility of television channels being changed or the ham bands being changed is likewise remote, at least for quite a few years to come. The possibility of TV receivers being designed in such manner as to preclude completely the possibility of ham interference is likewise a comparatively long way off. In other words, the ham, the serviceman, and the public will have to learn to live together. It can be done and it is being done. It may not be achieved successfully in every single instance, but by and large, all can work together.

Admittedly, the magnitude of the television receiver industry overwhelms ham activity, but we cannot ignore the fact that the majority of ham installations in the country represent investments from five hundred to many thousands of dollars. It is not inconceivable that servicemen might be invited to attend ham club meetings and become acquainted, or that recognized hams be invited to address servicemens' associations so that they can hear about the ways and means of curing television interference from ham stations.

To bring these comments to an end, let it be said that these two branches of the radio industry might do well to co-operate with each other and cease fighting each other. Day by day, the hams are trying to do more and more to lick TVI. Day by day, the servicemen should learn more about TVI. In the end, everybody, including the public, will be happier.

JOHN F. RIDER

•

Cover

The photograph on the cover shows two WOR-TV engineers seated in WOR-TV's North Bergen transmitter building at the equipment that enables them to control the picture and sound transmitted by WOR-TV on Channel 9. The engineer at the left is making an adjustment to the picture quality at the operating transmitter control console. The engineer at the the right is stationed at the "mixing desk", which synchronizes picture and sound transmission. In the foreground is a sound desk for playing records or making announcements from the transmitter. Wall units in the background house transmitting equipment.

RIDER MANUALS *Mean* SUCCESSFUL SERVICING

Additions

York Radio and Refrigeration Parts, York, Pa., Almo Radio Company, Wilmington, Del., and Belmont Radio Supply, Chicago, Ill., should have been included in the Jobber List that was published in the December, 1949, issue of SUCCESSFUL SERVICING.

Sec. 562, P. L. & R.
U. S. POSTAGE
PAID
NEW YORK, N. Y.
PERMIT No. 9427

A. J. S. CERINO
2393 PITKIN AVE.
BROOKLYN 8, N. Y.

From
JOHN F. RIDER PUBLISHER, Inc.
480 CANAL ST., NEW YORK 13, N. Y.
Return Postage Guaranteed

Distribution of This Issue—51,000 Copies

Courtesy Western Electric Co.

FEBRUARY, 1950

BLOCKING OSCILLATORS

By SEYMOUR D. USLAN

One of the most common types of circuits used in television receivers to produce a sawtooth waveform, is the *blocking oscillator*. The blocking oscillator is a relaxation oscillator of *R-C* variety that employs a hard tube. Similar to multivibrators, blocking oscillators can be either free-running or of the triggered type. In general, such circuits are considered as pulse generators because of the waveshapes available from them. There are a few different types of blocking-oscillator circuits, but the purpose of each is usually the same, to produce a pulse output. Many pulse-forming circuits can easily be put to use to help produce a sawtooth output voltage. Let us study a common type of blocking-oscillator circuit to see how it operates. A typical free-running circuit appears in Fig. 1.

Editor's Note: This material is an excerpt from the chapter on Linear Time Bases (Sweep Circuits) as found in the *New* "CATHODE-RAY-TUBE AT WORK," a forthcoming book which has been written by Rider *et al* and will soon be published by John F. Rider Publisher, Inc.

Circuit Analysis

The transformer employed in such a circuit is one quick means of distinguishing the blocking-oscillator type of relaxation oscillator from others. This circuit is very similar to the usual type of tickler feedback oscillator commonly employed in radio receivers. In this latter type of circuit, the oscillator is usually tuned by a variable capacitance across the grid coil. The distributed capacitance of the coil, interelectrode capacitances of the tube, and stray wiring capacitances in the blocking oscillator take the place of the variable capacitance of the tuned-grid tickler feedback oscillator. Therefore, the blocking oscillator can be considered a form of tickler-coil oscillator with a high L to C ratio in its grid circuit.

In the tickler oscillator, the time constant of the grid-coupling capacitor and resistor ($C1$-$R1$ if Fig. 1 is considered as a tickler oscillator) is so chosen that, in conjunction with the tuned circuit, the tube is operated class C. With the $C1$-$R1$ combination providing grid-leak bias, the oscillator generates a continuous sine wave at the resonant frequency of the circuit. In the blocking-oscillator circuit, the time constant of $R1$-$C1$ is deliberately chosen to be very large so as to interfere with or *block* the continuous production of sine-wave oscillations. Thus we see the reason why the circuit is called a blocking oscillator.

The inductive coupling between the plate and grid circuit of the blocking oscillator is very tight, and the transformer turns-ratio is such that the signal coupled to the grid will be very strong. The large

(*Please turn to page 12*)

Television Changes

Stromberg-Carlson Service Hint

The TS-10 television receiver is actually a TV-12 with a 10-inch picture tube as explained on *page C3-4 of Rider's TV Manual Volume 3*. With slight changes it can be easily converted to take the 12-inch tube. The additional parts needed are these:

162059	12JP4 picture tube
113033	Tube bracket
113034	Anode connector
154037	12" tube mask
110282	220-$\mu\mu$f, 1,500-v capacitor, C-287, across the secondary of the horizontal output transformer T-204, pins 4 and 5.

The parts to remove include the 10BP4 tube, wooden spacer under the tube, anode connector, and the 10-inch mask.

The wooden spacer under the front of the tube will have to be removed so that the 12-inch tube will fit snugly into its cradle. The lower support will have to be moved back one set of holes (visible on the chassis). To make room for the larger tube, the focus and deflection coils will have to be moved back on the bracket. There is a set of holes provided on the chassis for the new tube bracket.

Circuit changes consist of removing the shorting jumper on R-286B and adding a 220-$\mu\mu$f, 1,500-v capacitor C-287 across the secondary of the horizontal output transformer T-204 (pins 4 and 5). When replacing the 10-inch mask with the 12-inch mask, longer screws will be needed.

Admiral Service Hints

To increase the audio output on the 30A, B, C, and D Series TV chassis for fringe-area operation, the following changes should be made:

1. Remove R620, the 150,000-ohm resistor, in the 4H1 tuner chassis.
2. Increase the values of R219 and R220 ratio detector 15,000-ohm load resistors to 27,000 ohms.
3. Remove the 6AG5 r-f amplifier, V101, grid return from the center arm of R306A contrast control and connect to the junction of R305 and R307. This fixes the grid bias on the 6AG5 r-f amplifier tube at about 1.25 volts, resulting in more r-f gain. However, if the receiver is located in an area where strong signals are to be received as well as weak signals, this change may cause the contrast control to function improperly on strong signals. If this happens, fix the bias at a higher negative voltage by reversing the grid return from the video i-f and the 6AG5 r-f amplifier from the original wiring as shown in the schematic, by changing the i-f grid return from the junction of R304 and R305 to the movable arm of the contrast control. The r-f grid return of the 6AG5 r-f amplifier should then be changed from the contrast control arm to the junction of R304 and R305.
4. Realign the ratio detector transformer.
5. Check the 6AU6's, V201 and V202, in the audio i.f. Be sure these are good tubes.
6. Change the 6KGT audio output tubes V512 and V513 to 6V6GT. No circuit change will be needed.

The above changes will improve audio sensitivity and output, but it is recommended on receivers where the complaint is low volume on TV in fringe-area operation. It must be remembered that, in some areas, the TV transmitter is only deviating its audio transmission 7 to 10 kc instead of the allowable 25 kc, which will result in low audio volume at the receiver. If the station is found to be the cause of low TV audio, these changes will improve output but may not produce more than room volume.

Westinghouse H-196, Ch. V-2130

This model appears on *pages 3-1 through 3-18 of Rider's TV Manual Volume 3*. Although the yoke assembly is stamped V-5946, a replacement assembly should be ordered by part number V-6073 as listed in the parts list. The number stamped on the yoke covers only part of the assembly, while the item is actually stocked as a complete assembly under the part number V-6073.

If insufficient range of the vertical hold control makes it difficult or impossible to "lock-in" the picture, the value of the fixed resistor, R87, in the grid circuit of the 12AU7 vertical oscillator should be checked. In original production the resistor was 1.5 megohms, and it was used in series with a 1.0-megohm vertical hold control R10. Later, the fixed resistor was changed to 1.0 megohms, and the hold control was changed to 2.0 megohms to provide greater hold control range. However, some sets used a 1.0-megohm fixed resistor and a 1.0-megohm hold control. In these sets the range of the hold control is limited, and better results may be obtained by changing the fixed resistor to 1.5 megohms.

Difficulty due to drifting of the horizontal oscillator has been traced to certain capacitors, C93 and C94, in the horizontal oscillator tank and discriminator secondary circuits. If the set goes out of horizontal sync after it warms up, or if the discriminator was adjusted when the set was warm and the set will not stay in sync during the warm-up period, these capacitors should be checked.

Fold-over of the picture can be caused by failure of capacitors C54 or C53. If C54 in the plate circuit of the 6AQ5 horizontal oscillator is leaky or shorted, the differentiating action will be lost, and the horizontal discharge tube will be triggered by a broad pulse rather than by a sharp spike. A fold-over on the picture will result. If C53 across the horizontal-deflection coil is defective, a decrease in picture width in addition to picture fold-over will occur.

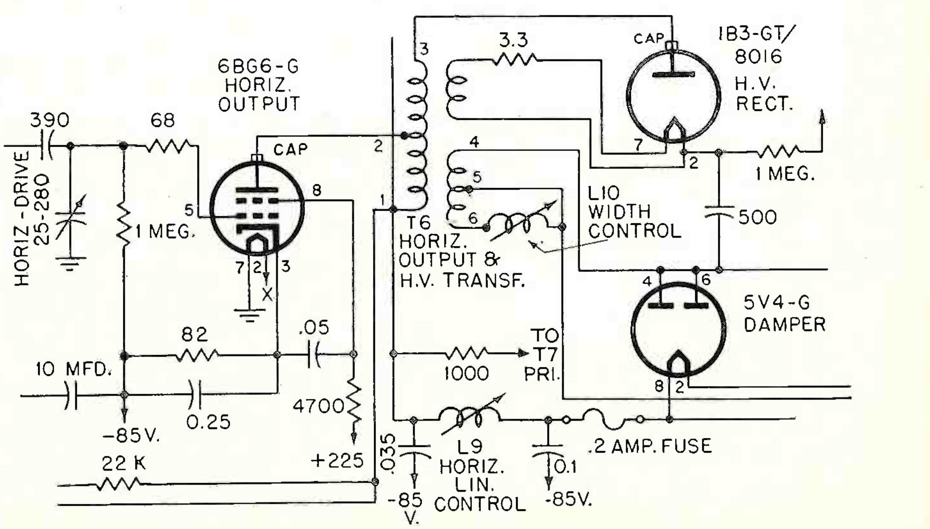
In the parts list, the part number of the 21.6 Mc accompanying sound-trap trimmer capacitor, C38, should be changed to V-3713-3.

De Wald DT-160

The schematic for this model is similar to that for the Models CT-102, CT-103, CT-104 which appears on *page 3-5 of Rider's TV Manual Volume 3*, except for the following changes.

The 0.01-μf capacitor, connected in parallel across the 390-ohm resistor in the plate lead of the 6AL5 horizontal phase detector, has been deleted. The 1,000-$\mu\mu$f capacitor located across L8, the horizontal oscillator control, has been deleted, and the value of the other capacitor across L8 has been changed from 3,900 to 4,300 $\mu\mu$f. The focus-control resistors have been deleted. The value of the cathode resistor of the 1st sound i-f stage (6AG5) has been changed from 82 ohms to 150 ohms. The accompanying diagram shows the other circuit changes that have been made.

The tuner for the DT-160 is the same as that shown for Models CT-102, CT-103, CT-104 on *page 3-4 of Rider's TV Manual Volume 3.*



Circuit changes for De Wald DT-160.

Admiral Service Hints

High-voltage leakage in 16-inch chassis occasionally occurs across the insulator riveted to the bottom section of the picture tube rear mounting bracket. To replace the insulator riveted to the base of the rear mounting bracket would require dismantling the bracket and drilling out the rivets. Thus, to reduce the time required and simplify the repair, there is available a new high-voltage lead with a socket and plug that does not require drilling out the rivets or replacement of the insulator. Both sections of the early high-voltage lead are removed by unsoldering from the second-anode power-supply output and from the insulator in the base of the tube mounting bracket. The new high-voltage lead with socket is soldered to the output of the second-anode power supply. The other half of the new lead with plug and lug is to be used for the lead from the rim of the metal cone of the picture tube, and plugs into the socket of the lead from the second-anode power supply. The terminal on the old riveted insulator in the base of the tube mounting bracket is no longer used. Both parts listed below must be used to replace the early high-voltage leads.

Remove these old parts:

- A1938 High-voltage lead and lug to rim of picture tube.
- 88A16-2 Connector from high-voltage second-anode power supply.

Use these new parts:

- 88A25-1 High-voltage connector and lead to second-anode power supply.
- A2078 High-voltage connector, lead and lug to rim of picture tube.

RIDER TV MANUALS VOLUMES 1, 2, and 3

Automatic AR-TV-709

The schematic diagram for this model appears on *pages 2-1,2,3 of Rider's TV Manual Volume 2*. A 100,000-ohm resistor has been added from the junction of the 0.005-μf capacitor in the cathode circuit of V7 and the contrast control to the primary of the V6 transformer.

•

Muntz 158, 159A, 159B

These Models appear on *pages 3-1 through 3-3 of Rider's TV Manual Volume 3*. The new 10-inch, 12-inch and 16-inch crt picture tubes now being used in these models do not have an aquadag coating upon the outer surface of the tube. In order to put the new tube in a chassis below serial number 22,000, it will be necessary to add a high-voltage filter capacitor. Sets below serial number 22,000 did not contain the high-voltage filter capacitor as the coating on the outside of the picture tube had a capacitance effect and the capacitor was not necessary. The capacitor is to be added as is shown in the schematic for Model M169 which appears on *page 3-4 of Rider's TV Manual Volume 3*. The part number for the capacitor is CC-0070, 500 $\mu\mu$f, 20,000 volts, d.c.

RIDER'S TV MANUAL VOLUME 4

We are fast at work on Rider's TV Manual Volume 4. The reception given TV Manual Volume 3 has been excellent and the first printing was sold out within 30 days of the initial delivery. By the time you read these lines your jobber should have his copies from the second printing.

Concerning TV Manual Volume 4, its publication date will be sometime in April, possibly in very early May. We can tell you now that the manual will have the equivalent of 2,000 pages, the same size as TV Manual Volume 3 and the same format, with a few minor changes in organization which will make the manual still easier to use. All of the pages will be filed into place as in TV Manual Volume 3 and in the regular Volume XX Manual. This is a practice we shall follow on all new manuals.

When Rider's TV Manual Volume 4 makes its appearance, the four TV Manuals will represent a total of approximately 1,000 models of TV receivers which have been produced in the United States by the TV manufacturers. As we have said time and again, nowhere else can you get the coverage on TV receivers, A-M receivers, F-M receivers, and P-A equipment equal to that found in Rider's Manuals. Now is the time to make your Rider Manual library complete pending the arrival of Rider's TV Manual Volume 4 and Rider's Volume XX.

. . . speaking of fan mail

THE MALLORY MIDGETROL IS GETTING FAN MAIL FROM COAST TO COAST

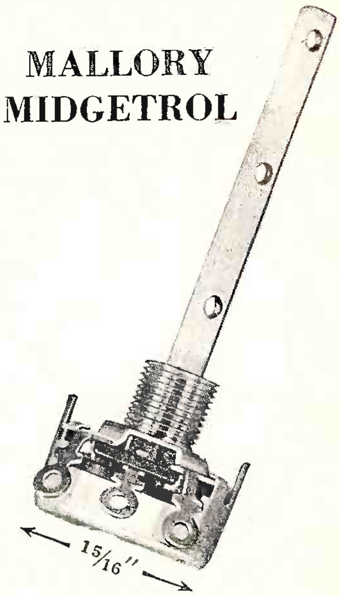
Run your eyes down the quotes below. They are convincing proof that the Mallory Midgetrol is a star performer with servicemen everywhere.

FAN MAIL FROM SERVICEMEN WHO KNOW!*

- "The Midgetrol is a life-saver in the radio repair business!"
- "The new Mallory Midgetrol is the handiest control I have seen."
- "I have been in the servicing game for 17 years now and this is really the first universal control I have ever seen."
- "Your many innovations make this the outstanding control."
- "I like it very much . . . the small size, the better shaft and the improved switch are all very good."
- "It is sure a time and space saver."
- "Thanks for Midgetrol. It's a sensation!"

*Actual quotations from a few of hundreds of unsolicited letters from servicemen.

MALLORY MIDGETROL



- *Fastest of all to install*
- *Saves time*
- *Saves trouble*
- *Saves money*
- *Easiest switch to attach*
- *Eliminates sawing and filing*
- *15/16" size fits all sets*

See your Mallory distributor today!

P. R. MALLORY & CO. Inc.

MALLORY

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

*Reg. U. S. Pat. Off.

APPROVED PRECISION PRODUCTS

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

Successful
SERVICING
REG. U. S. PAT. OFF.

Vol. 11 FEBRUARY, 1950 No. 4

Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

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

JOHN F. RIDER, Editor

CURTAIN TIME

A-M and F-M Receivers

At the risk of being accused of having a fixation, we shall devote a goodly portion of this space to the subject of A-M and F-M receivers. This is not the case of saying A-M and F-M versus TV, because nothing short of a miracle of some kind can work adversely relative to TV. TV is here to stay regardless of all of the problems which surround it. Its potentialities defy the imagination. What we have available to us today as a facility will seem very elementary and very limited ten years from today.

But of equal importance to the servicing industry, which derives its income from a number of phases of communication activity, is the matter of A-M and F-M reception. The thought we are anxious to get across to every man who reads these pages is to cease talking about A-M and F-M being "dead" relative to TV. There is no denying the fact that TV has and will influence the sale of A-M and F-M receivers, tending to reduce the number sold -- but it is entirely reasonable to suppose that every family in the United States will have an A-M or F-M or possibly a combination receiver as a part of its entertainment and cultural facility. This means in round numbers that 35,000,000 A-M and F-M receivers are in use. In addition, the majority of pleasure cars, let alone long-haul trucks, will more than likely contain an operating A-M receiver. By the most conservative estimate, this will mean another 10,000,000 to 15,000,000 receivers. Each year new pleasure cars are made, and a certain number of radio receivers are produced for them.

The replacement of current radio receivers in the home is an assured fact, that is, within all bounds of sound reasoning. Under the circumstances, it is not biased thinking to envision an annual production of 10,000,000 radio receivers, and a like number serviced each year.

The experiences of jobbers and dealers with A-M and F-M receivers during this past Christmas Season in areas where TV has been widespread, can well serve as an objective lesson. The demand for radio receivers was very great and many markets were sold out. This may be explained on the grounds that many TV manufacturers curtailed their radio receiver production quite severely because they did not anticipate the demand that developed. All of that may be true, but the fact remains that the *demand was there*. People bought those receivers because they planned to use them, even when they had a TV receiver in the home. Radio receivers are enjoying wide use during the day, except perhaps when some very special TV program is put on the air. With the exception of holiday seasons, such programs are conspicuous by their absence; so that it is not stretching the imagination too far to say that even in such a city as New York, where TV is available in the afternoons, and to some extent in the mornings, more TV set owners are listening to their radio receivers than watching their TV receivers.

As to the evenings after TV hours, it is only natural that radio receivers will be in use. We reiterate that the survival of conventional A-M and F-M reception is not a sign of any lessening of interest in TV. It is just a natural, orderly reaction of habit, which has been nurtured for well on to 30 years and perhaps can be said to have become more of a daily burden than even a glass of water.

We doubt if 15,000,000 or 18,000,000 radio receivers sales years will ever be with us again; but the 35,000,000 radio receivers which will, without doubt, remain in annual use, plus the replacement sales, the auto radio receiver sales, and truck radio receiver sales represent a potential servicing market which cannot be ignored even in the face of the tremendously expanding television receiver servicing market. Admittedly, the dollar income per unit service is greater from TV than blind radio; but even so, the industry would do well not to neglect the dollar potential still present in the radio receiver which goes on.

(*Please turn to page 15*)

Television Changes

Stromberg-Carlson TV-12H, TV-12L

These models appear on *pages 1-17 through 1-29,30 of Rider's TV Manual Volume 1*. A 0.01-μf capacitor has been added between the range switch and the top of the volume control R-246. This capacitor was added to keep any direct current from flowing through the volume control and making it noisy. If any volume controls are found noisy they should be replaced and the 0.01-μf capacitor should be added.

General Electric 820

This model appears on *pages 3-16 through 3-30 of Rider's TV Manual Volume 3*. The picture tube heater pins do not show complete numbering and connection designation. Pin (1) should also be labeled "A", and the remaining heater pin should be labeled 12 and "B". A and B are the respective heater connections to T18 power transformer secondary, points A and B.

RCA 721TCS Ch. KCS 26A-1, KCS 26A-2

Model 721TCS is similar to Model 721TS which appears on *pages 1-232 through 1-254 of Rider's TV Manual Volume 1*, with the following exceptions. Model 721TCS is a console and employs a 12-inch electromagnet dynamic speaker, 92567-3, voice-coil impedance is 2.2 ohms at 400 cycles. The chassis with tubes in the cabinet, less the kinescope weights 101 pounds; the shipping weight, less the kinescope, is 117 pounds. The dimensions, in inches, are as follows:

	Length	*Height*	*Depth*
Cabinet (outside)	20	40 1/2	17 1/2
Chassis base (outside)	15 3/8	4 3/8	14 3/4
Chassis over-all	15 3/8	14 1/2	16 1/4

In early production receivers an electromagnetic type of ion trap magnet was employed and was connected as shown by the dotted lines in Fig. 1. R196 was omitted in receivers employing this magnet. In early production receivers the resistance of the focus coil was 247 ohms, and R197 was employed only in receivers with the 247-ohm focus coil. Fig. 2 shows the front view of the speaker plug J101. An antenna trap 73239, consisting of L82, L81, C21, 10 $\mu\mu$f, and C22, 10 $\mu\mu$f, is used in some sets. Resistor R194, 82,000 ohms, and capacitor C168, 0.005 μf have been connected between tap 4 of the sound volume control R183 and ground.

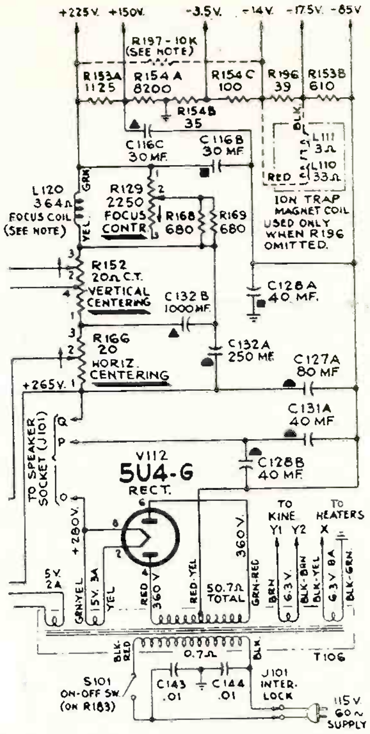


Fig. 1. Circuit changes for RCA 721TCS.

The parts list is the same as that found for the 721TS except for the following changes:

Stock No.	*Description*
53511	Capacitor, ceramic, 10 $\mu\mu$f (C19)
73239	Trap, antenna trap (L81, L82, C21, C22)
39620	Capacitor, mica, 47 $\mu\mu$f (C169)
73100	Capacitor, tubular, oil impregnated, 0.035 μf, 1,000 v (C139)
70636	Capacitor, tubular, 0.05 μf, 600 v (C138)
37396	Grommet, rubber grommet to mount socket RCA #73249 (2 required)
73301	Magnet, ion trap magnet (p-m type)
12493	Plug, 5 contact female plug for speaker cable
32813	Resistor, 39 ohms, 1 w (R196)
12876	Resistor, wire wound, 10,000 ohms, 10 w (R197) (in some sets)
31364	Socket, lamp socket
73249	Socket, tube socket, octal, ceramic plate mounted
	Resistor, fixed composition, 82,000 ohms $\pm$10%, ½ w (R194)
	Speaker Assemblies 92567-3W RL 70R4
13867	Cap, dust cap
71557	Coil, field coil (60 ohms)
11469	Coil, neutralizing coil
36145	Cone, cone complete with voice coil
71560	Plug, 5 prong male plug for speaker
71556	Speaker, 12" e-m speaker (60 ohms) complete with cone and voice coil less transformer and plug
71145	Suspension, metal cone suspension
31301	Transformer, output transformer
	Miscellaneous
71599	Bracket, pilot lamp bracket
70126	Glass, safety glass
13103	Jewel, pilot lamp cap
11765	Lamp, pilot lamp, Mazda 51.

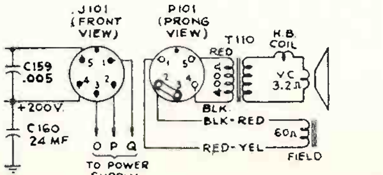
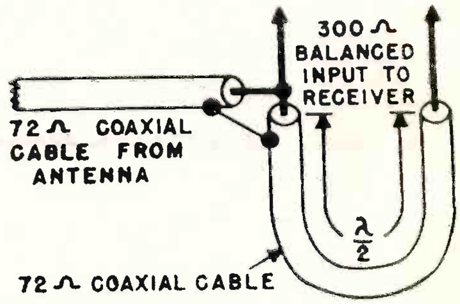


Fig. 2. Speaker plugs for RCA 721TCS.

Westinghouse Service Hints

Jumpy or jittery pictures are sometimes caused by radiation of the deflection yoke currents into the antenna circuit of the receiver. If the twin lead that runs between the antenna terminals and the r-f tuner assembly is dressed too near the deflection yoke leads, sufficient voltage may be induced in the antenna circuit to interfere seriously with the sync pulses transmitted by the station. In some cases, the picture will be jumpy vertically, and in other cases a side-to-side jitter may be noted. If the above symptoms are being caused by radiation into the antenna circuit as described, a simple remedy is to dress the twin lead away from the yoke leads.

In some areas it may be desirable to use a 72-ohm coaxial cable as a transmission line between the antenna and the receiver in order to reduce noise pickup. The problem of matching the coaxial cable to the receiver input in such installations can be solved as shown in the accompanying figure. The matching section should be one-half wavelength long at the most critical frequency. If reception is possible on one channel only, cut the matching section to the video carrier frequency of that channel. If operation on more than one channel is possible, cut the matching section to the video carrier frequency of the weakest signal.



Impedance matching method suggested by Westinghouse.

Stromberg-Carlson TV-12

The voltage chart shown on *page 1-25 of Rider's TV Manual Volume 1* shows erroneous voltages on V-206 (12JP4). The correct voltages are:

Pin	1	0 v
Pin	2	0.4 v
Pin	10	370 v
Pin	11	90 v
Pin	12	6.3 v a.c.

On V-212 (6SN7), pin 2 should be +22 v and pin 4 should be —45 v.

RIDER TV MANUALS VOLUMES 1, 2, and 3

Errata

On page 127 in the "Volume 1 Television How It Works" the last equation in the first column should read:

$$L_p = \tfrac{1}{2}C_t(R_b)^2$$
$$= \tfrac{1}{2} \times 24 \times 10^{-12} \times (2210)^2$$
$$= 58.6 \text{ microhenrys.}$$

On page 13 of "Rider's TV Volume 2—How It Works" the caption for Fig. 6 goes with the diagram of Fig. 7, and the caption of Fig. 7 goes with the diagram of Fig. 6.

-PRECISION- TESTIPS

TUBE TESTING

Many years experience and development have indicated to Precision Field and Factory engineers that: **"General purpose Tube-tester design should not be based upon just one selected characteristic, such as mutual conductance alone."**

It has been conclusively proven that a tube may work well in one circuit, but fail to work in another circuit — simply because different circuits demand different relative performance characteristics. Among these characteristics are: electron emission, amplification factor, plate resistance, mutual conductance, power output, etc.

Tube manufacturers and research laboratories maintain elaborate tube testers which actually measure each characteristic individually. These testers, aside from great size and complexity, are much too expensive for service technicians. Their demand is for a tube tester which is compact, reasonable in cost, simple in operation, and which gives a **reliable indication** of the **general** over-all tube merit, or **performance** capability.

Extensive research has proven to our satisfaction that such a **practical** tube tester should be based upon the common factor that **Tube Output** (voltage or power) **is the result of a plate current caused by an applied control-grid voltage — which current must be adequate even at full peak operating conditions.**

This important principle is illustrated in Fig. 1 and is the heart of the famous, time-proven, Precision Electronamic* tube-tester circuit.

Because of the appropriately phased A.C. character of the test potentials, we refer to it as a **sweep-signal** or "Electronamic" test. It determines tube **performance over a complete path of operation,** from zero to peak output. This point-by-point performance-ability is then integrated by and indicated on a meter in direct terms of Replace-Weak-Good.

*Reg. U.S. Pat. Off.

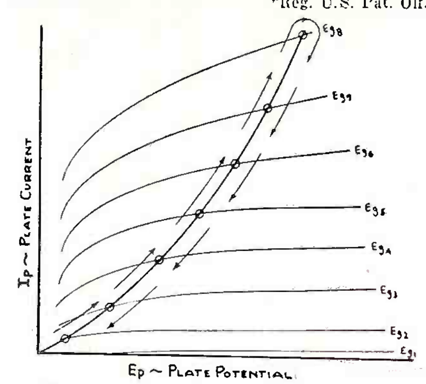


Fig. 1 — The "Electronamic" Method Tests the Tube Over a Complete Path of Operation.

The efficiency of this sweep-signal or "Electronamic" test results from encompassing **several** fundamental tube characteristics, NOT JUST ONE. Accordingly, when a tube passes this demanding performance test, it can be relied upon, to a very high degree, to work satisfactorily in most circuits.

It is for this reason that we find the "Electronamic" tester best to meet the **realistic** requirements of the technician — affording high practical correlation between test results and "in-application" performance.

By comparison, a single-characteristic test, such as the emission tester, has usefulness insofar as the tubes to be tested are used in circuits which depend primarily upon cathode-emission capability (assuming little alteration of vital electrode positions or continuity).

Even other single-characteristic testers have their definite limitations. More practically, the progressive technician will find the sweep-signal or "Electronamic" test to efficiently indicate the general over-all tube performance merit.

R.G. "Bob" Middleton
Engineering Division

Thank You Gentlemen...

INDUSTRIAL TELEVISION INC.
359 LEXINGTON AVENUE GREGORY 3-0900 CLIFTON, NEW JERSEY

December 13, 1949

Mr. John F. Rider
John F. Rider, Publisher, Inc.
480 Canal Street
New York 13, New York

Dear Mr. Rider:

Thank you very much for your letter of December 9 asking for our comments on your TV Volume 3 MANUAL and other publications.

We can say without reservation that we believe your service data and allied work is outstanding and provides the serviceman with an indispensable tool in his difficult work.

Your new format in TV Volume 3 is a definite improvement over previous manuals and you are to be complimented on the completeness of the data, particularly with respect to the smaller manufacturer.

You may use this letter in any manner you wish. Best wishes of the season.

Very truly yours,
INDUSTRIAL TELEVISION, INC.
Horace Atwood, Jr.
Horace Atwood, Jr.
President

ha/gbs

RMA

GUEST Television INDUSTRIAL Telecivers MULTIVISION Systems

FREED RADIO CORPORATION
200 HUDSON STREET, NEW YORK 13, N. Y.

December 13, 1949

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

Dear Mr. Rider:

We felt called upon to write you since receiving your latest Television, Volume III Manual.

In the great many years our company has been established in the Radio industry, the Radio Manual has always been of value to our engineering and service departments. With the advent of television and the greater complexity of circuits, your Television Manual fulfills a dire need to the servicing industry which has grown out of all proportions to its radio counterpart.

We contribute this letter in the hope that it will show you our appreciation of the essential work you are doing for our industry.

Very truly yours,
FREED RADIO CORPORATION
Joshua Sieger
Joshua Sieger
Director of Research and Development

JS/es

TELEVISION RECEIVERS Freed-Eisemann RADIO-PHONOGRAPHS
TRADITIONALLY "ONE OF THE WORLD'S GREAT RADIO-PHONOGRAPHS"... ACHIEVING NEW GREATNESS IN TELEVISION

It is with a great deal of pride and with a feeling of having lived up to our promises that we publish this, the first series of letters containing the expressions of the service managers of some of the leading television receiver manufacturers of the nation.

we hope to merit equal praise in the years to come.

Admiral Corporation
SERVICE DIVISION
201 E. NORTH WATER STREET · CHICAGO 11 · TELEPHONE MOHAWK 4-4622

December 19, 1949

John F. Rider
480 Canal St.
New York, New York

Dear John:

Thank you for your letter of December 9 advising that you are sending us a copy of your TV Volume 3 manual. We have looked it over and believe that your new style is excellent.

You are doing an outstanding job in supplying technical information and service data to the servicemen of the country.

Your books enable servicemen to keep up-to-date on technical subjects and certainly your manuals provide the best means for every serviceman to get manufacturers' service data bound in book form as a permanent reference library.

The important point is that they can get the material for all makes of sets from one source in a compact form, and at a price within reach of any full time serviceman.

Am looking forward to seeing you when you come to Chicago.

Kindest personal regards.

Yours very truly,
ADMIRAL CORPORATION

M. J. Schinke
Service Manager

MJS:EP

...RLD'S LARGEST MANUFACTURERS OF RADIO PHONOGRAPHS WITH AUTOMATIC RECORD CHANGERS
FM Radios • Television • Radio-Phonographs • Refrigerators • Home Freezers • Electric Ranges

STEWART-WARNER ELECTRIC
DIVISION OF
STEWART-WARNER CORPORATION
1826 DIVERSEY PARKWAY ☆ CHICAGO 14, U.S.A.
LAKEVIEW 5-6000

January 5, 1950

John F. Rider, Publisher, Incorporated
480 Canal Street
New York 13, New York

Attention: Mr. John F. Rider

Dear John:

I recently had occasion to review several of your newest publications and was particularly impressed by the outstanding job that your organization is doing. You certainly are rendering an excellent service to the industry and that TV Manual, Volume 3, should really evoke a great deal of praise from television technicians.

This TV Manual reflects a great deal of ingenuity in publication and a deep appreciation of the needs of the service profession. It was especially gratifying to see the neat and orderly presentation of technical information on those large sized loose leaf pages that are so conveniently arranged in the new binder.

Examination of the Manual pages which present data on our Stewart-Warner television receivers again confirms the accuracy of your advertising claim in respect to publication of "authentic" technical information in exact accord with the manufacturer's specifications. In my opinion, this is a vitally important feature as the service technician receives data that is based upon the set manufacturer's wide experience with his own product and for which there is no substitute—the same comment applies to replacement parts recommendations.

Another of your publications that caught my eye is the book entitled, "TV Picture Projection and Enlargement". The subject is very timely, especially in view of the possible wide-spread use of projection systems in connection with color TV. This book does a good job of bringing the reader fully abreast of most recent developments and it is written in an interesting style.

Keep up the good work John; best wishes for your continued success.

Kindest personal regards.

Sincerely yours,
STEWART-WARNER ELECTRIC

N. J. Cooper
Service Manager

NJC:mlc

WE have many more such communications and they will be published in subsequent issues of SUCCESSFUL SERVICING. We reiterate at this time that we consider it our solemn obligation to give to the servicing industry of this nation the utmost in official and authentic service data for the successful operations of the industry.

Radio Changes

Farnsworth P-8

This a-m—f-m radio chassis used in Models 1002-F, 1003-M, and 1004-B, is identical to the P-7 chassis which appears on *pages 19-19 through 19-33 of Rider's Manual Volume XIX*, with the exception of the phono-input circuit. The differences are listed below:

1. The P-7 chassis employed a separate phono preamplifier stage; the P-8 does not.
2. Since the P-8 does not employ a preamp, the preamp power cable and plug and the 3.3-ohm resistor, ref. no. 14, are not included in this chassis.
3. The record changer, Capehart "333", used with the P-8 chassis employs a crystal pickup. Therefore, a 680,000-ohm, ½-watt resistor is connected from the phono-input lead to chassis ground.

Following is a list of parts which apply to the Models 1002-F, 1003-M, and 1004-B. These parts are different from those shown for the P-7 chassis.

Part No.	*Description*
650189A-G1	Loop antenna assembly
59534	On-off volume and tuning knobs
59535	Band switch knob
59537	Treble tone knob
31472	Glass escutcheon.

RCA 8BX5, 8BX54, 8BX55, Ch. RC-1059, RC-1059A

These models appear on *pages 19-5 through 19-9 of Rider's Manual Volume XIX*. It has been found that the values of the resistor (10,000 ohms) and the capacitor (0.01 μf), specified to be used for i-f alignment, result in misalignment (1 to 1.5 kc) of the 1st i-f primary. For more accurate alignment, it is suggested that a 1,000-ohm resistor and a 39-$\mu\mu f$ capacitor be used during i-f alignment.

Ansley 709

Model 709 is the same as Model 53 which appears on *pages 17-1,2 through 17-5 of Rider's Manual Volume XVII.*

Automatic C-65

This model is the same as Model C-60X which appears on *page 16-1 of Rider's Manual Volume XVI.*

Templetone H-727

Model H-727 is similar to model G-725 which appears on *pages 17-3 through 17-6 of Rider's Manual Volume XVII.*

Magnavox AMP-101B

This model is the same as Model AMP-101A which appears on *pages 17-1 and 17-2 of Rider's Manual Volume XVII*, except for the following change in parts values.

Ref. No.	*Part No.*	*Description*
5	250129G4	Capacitor, paper, 0.03 μf, 400 v.

Sears 8005, Ch. 132.839-1

This chassis is similar to Chassis 132.839 which appears on *pages 17-8 through 17-10 of Rider's Manual Volume XVII*, except for the following changes. The filament connections have been reversed on the 50L6 tube socket to prevent burning of resistor R11 and damage to the tube. R12, a 1,200-ohm, 1-watt resistor has been added to the B+ circuit between T3 and C10B. The filter choke L3 has been deleted. The parts list for this chassis is the same as that for the 132.839 except for the following changes:

Ref. No.	*Part No.*	*Description*
R12		Resistor, 1,200 ohms, 1 w
T3	N21921	Transformer, output
Spk	N21922	Speaker, 4", p-m.

General Electric 303

This model appears on *pages 15-37 through 15-39 of Rider's Manual Volume XV*. The symbol for RSW-019, switch, tone control switch, should read S4. Stock no. RMX-013 should be changed to read stock no. RMX-079.

Zenith 5G003Z, Ch. 5C40Z

This model appears on *page 16-4 of Rider's Manual Volume XVI*, R2 is listed as 2,200 ohms. It should be listed as 220 ohms.

HIWYNI Have It When You Need It

Stewart-Warner B92CR Series

These models are similar to Models B92CR1,2,3,4,8,9, and 10 which appear on *pages 19-8 through 19-14 of Rider's Manual Volume XIX*. The following revisions apply to the B92CR Series. Capacitor no. 103 has been changed from 0.01 μf to 0.001 μf. The high side of the capacitor was formerly connected to the grid, pin 5, of the 6V6GT output tube. It is now connected to the grid of the 6SQ7, 1st a-f tube. These changes were made to eliminate low-frequency distortion, and are incorporated in chassis stamped with the letter "S" or "H".

The list of models in the B92CR Series and their code numbers is as follows:

Radio Model No.	*Radio Code No.*	*Radio Model No.*	*Radio Code No.*
B92CR1	9043-A	B92CR8	9043-K
B92CR1LP	9043-ALPW	B92CR9	9043-L
B92CR2	9043-B	B92CR10	9043-M
B92CR2LP	9043-BLP	B92CR12	9043-GR
B92CR2LPX	9043-BLPX	B92CR12LP	9043-GRLP
B92CR2X	9043-BX	B92CR13	9043-GL
B92CR3	9043-C	B92CR13LP	9043-GLLP
B92CR3LP	9043-CLP	B92CR14	9043-GM
B92CR3LPX	9043-CLPX	B92CR14LP	9043-GMLP
B92CR3X	9043-CX	B92CR15	9043-GT
B92CR4	9043-D	B92CR15LP	9043-GTLP
B92CR4LP	9043-DLP	B92CR18	9043-GH
B92CR4LPX	9043-DLPX	B92CR18LP	9043-GHLP
B92CR4X	9043-DX	B92CR19	9043-HM
B92CR5	9043-E	B92CR19LP	9043-HMLP.

Change in parts list is as follows:

Ref. No.	*Part No.*	*Description*
118	505342	Speaker, p-m dynamic (8 inch) used on all models
119	506328	Speaker, p-m, dynamic (8 inch) used on all models except B92CR19 and B92CR19LP
119	506657	Speaker, p-m dynamic (6 inch) used only on models B92CR19 and B92CR19LP.

Montgomery Ward 64WG-2007B, 74WG-2007B and C

These models are similar to 54WG-2007A shown on *pages 15-28 to 15-30 of Rider's Volume XV*, except for the following changes. The drive-cord length has been increased and the following drive-cord replacement instructions are to be used.

Turn the gang condenser to the fully closed position. Use a new drive cord 18 inches in length and tie one end to the tension spring. Fasten the other end of the tension spring to the hook on the drive pulley. Pass the cord through the slot in the drive pulley rim and continue around pulley ½ turn, counterclockwise. Wind 3½ turns counterclockwise (from front of chassis) around tuning shaft. Turns should progress toward rear of chassis. Wind cord counterclockwise around drive pulley in back of previous ½ turn. Pass cord through the slot in the pulley rim. Stretch tension spring and tie free end of cord to the spring. Cut off any excess string.

The component parts are the same as those listed on *page 15-29 of Rider's Volume XV*, except for those listed below.

Ref. No.	*Part No.*	*Description*
C-15	B67204	0.20 μf, 200 v, tubular
C-16	D67104	0.10 μf, 400 v, tubular
C-18	D67102	0.001 μf, 400 v, tubular
C-19	17A123	1.0—12 $\mu\mu$f, trimmer.

Sears 101.206-1, 101.206-2, and 101.206-3

These automatic record changers are similar to Chassis 101.206 which appears on *pages RCD. CH. 18-6 through RCD. CH. 18-9 of Rider's Manual Volume XVIII*, with the following exceptions. Chassis 101.206-1 has a revised pickup-arm hub which permits manual movement of the pickup arm while the changer is in automatic cycle. The cam seat for the pickup arm permits return of the arm to the correct position after manual dislocation, without readjustment of the 10" or 12" drop points. This chassis incorporates a "Manual-Automatic" switch.

Chassis 101.206-2 is the same as the 101.206-1 except that it does not have the "Manual-Automatic" switch. Chassis 101.-206-3 is the same as the 101.206-2 except that the phono-pickup lead has cotton overbraid for insulation from the chassis.

General Electric 356

This model appears on *pages 18-40 through 18-44 of Rider's Manual Volume XVIII*. Resistor R12 has been changed from 220 ohms, ½ w, to 330 ohms, ½ w, ±10%, Cat. No. URD-037.

Radio Wire JS-175

Model JS-175 is the same as Models JS-173, JS-184, and JS-185 which appear on *page 19-16 of Rider's Manual Volume XIX*.

Radio Wire JS-168

Model JS-168 is the same as Model JS-174 which appears on *page 19-17 of Rider's Manual Volume XIX*.

Blocking Oscillators

(*Continued from page 1*)

time constant of the *R1-C1* combination is much greater than the time required to complete one cycle of operation of the tuned-coil arrangement. Because of these factors, a high bias is developed and prevents the circuit from oscillating for any appreciable period of time. Typical waveforms of operation of the blocking oscillator are shown in Fig. 2. The operation of the blocking oscillator of Fig. 1 will be more readily understood by continuous reference to these waveforms.

Let us consider the circuit just as the supply voltage is turned on after the tubes have been warmed up. It should be remembered that this circuit is regenerative, the transformer being connected so that any change of current in the plate circuit will produce a change in the grid circuit which will aid the original change. The application of the supply voltage will cause current to flow in the plate circuit of the tube. Since no current was flowing previously, this current now flowing is considered as a current change. This change in current flows through the plate winding of the transformer and is coupled to the grid of the tube via the grid transformer winding. Since the circuit is regenerative, the voltage that is coupled to the grid must aid the original increase in plate current. Therefore, the polarity of this grid voltage is such as to make the grid positive with respect to ground and hence to cathode. This increase in grid potential causes an increase in the plate current, and the plate-current change is again coupled to the grid as a higher positive voltage, still increasing the plate current. This increase in grid voltage is shown at the beginning of waveform (A) of Fig. 2.

The increasing action of plate current continues. As in the regular tickler oscillator, this positive grid voltage causes grid current to flow through *R1*, with the result that electrons begin to pile up on the grid side of capacitor *C1*, thereby charging it. The charging path of the capacitor is through the transformer secondary and the low grid-to-cathode resistance of the tube. The charging process continues as long as grid current flows.

The circuit impedances and tube characteristics are such that a saturation point will be reached where the plate current, and hence grid voltage, will increase no more. This is indicated at point *2* in Fig. 2. When this maximum point has been reached, the plate current starts to decrease. This means that a change in plate current once again occurs, but in a decreasing direction, and, since the circuit is regenerative, a decreasing voltage is transformer-coupled to the grid. This reduces the positive potential on the grid and also reduces the plate current. The further change (i.e reduction in plate current) causes the grid voltage to likewise reduce still more. This over-all action continues until the grid is driven below its cutoff value.

Once the grid voltage is no longer positive, grid current stops flowing and the electrons which have piled up on the capacitor look for a ready path to leak

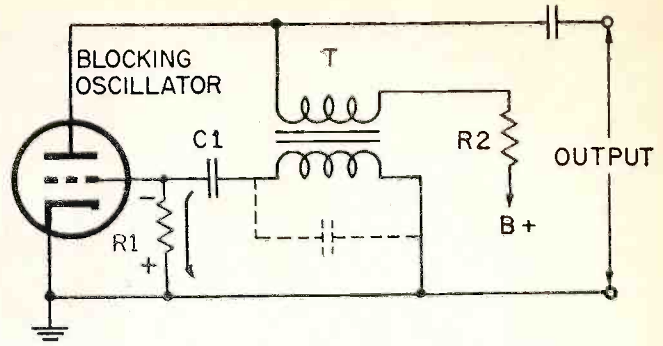


Fig. 1. Typical circuit of a free-running blocking oscillator, where the frequency of operation is primarily determined by the R1-C1 combination.

off. The capacitor discharges through the high-valued grid resistor *R1* because the low-resistance path from cathode to grid no longer exists since the grid-current flow has ceased. Before we examine what happens during the discharge of *C1* through *R1*, let us study the formation of the waveforms up to this point.

First of all, it is seen that as the plate current is increasing, the plate voltage is decreasing to point *2* in Fig. 2B. We also know that the grid voltage rises to a maximum positive value as the plate voltage decreases to a minimum value. As the grid voltage decreases and reaches the cutoff value of the tube, the plate voltage increases to the B+ value since no plate current flows when the tube becomes cut off. The time that it takes the grid voltage at (A) or the plate voltage at (B) to go from points *1* to *3* is primarily determined by the effective inductance of the grid coil, its distributed capacitance, the tube's interelectrode capacitance, and the coil resistance. In short, it is often stated that the periods of these pulses represent a half-cycle of oscillation of the resonant frequency of the grid circuit.

Capacitor Discharge

Let us now refer back to the time when *C1* starts discharging. In the ordinary tickler oscillator the choice of *R1* is relatively small and the time constant of *R1-C1* is of a small enough magnitude so that the charge on *C1* can leak off fast enough to have the circuit continue to oscillate. In other words, the initial pulse between points *1* and *3* in Fig. 2 represents one half-cycle of oscillation in the normal tickler-coil oscillator circuit, with the frequency of oscillation being determined by the so-called tuned circuit of the system. The continuation of the oscillations is indicated in Fig. 2A by the sine waves drawn in dotted form.

In the blocking-oscillator circuit, the grid resistor *R1* is made very high so that, in conjunction with *C1*, a long time constant is represented. This long time constant means that the capacitor will take quite some time to discharge through the high-valued resistor. In actual practice, the product of *R1-C1* is made much larger than the period represented by the half-cycle of oscillation of the effective tuned-

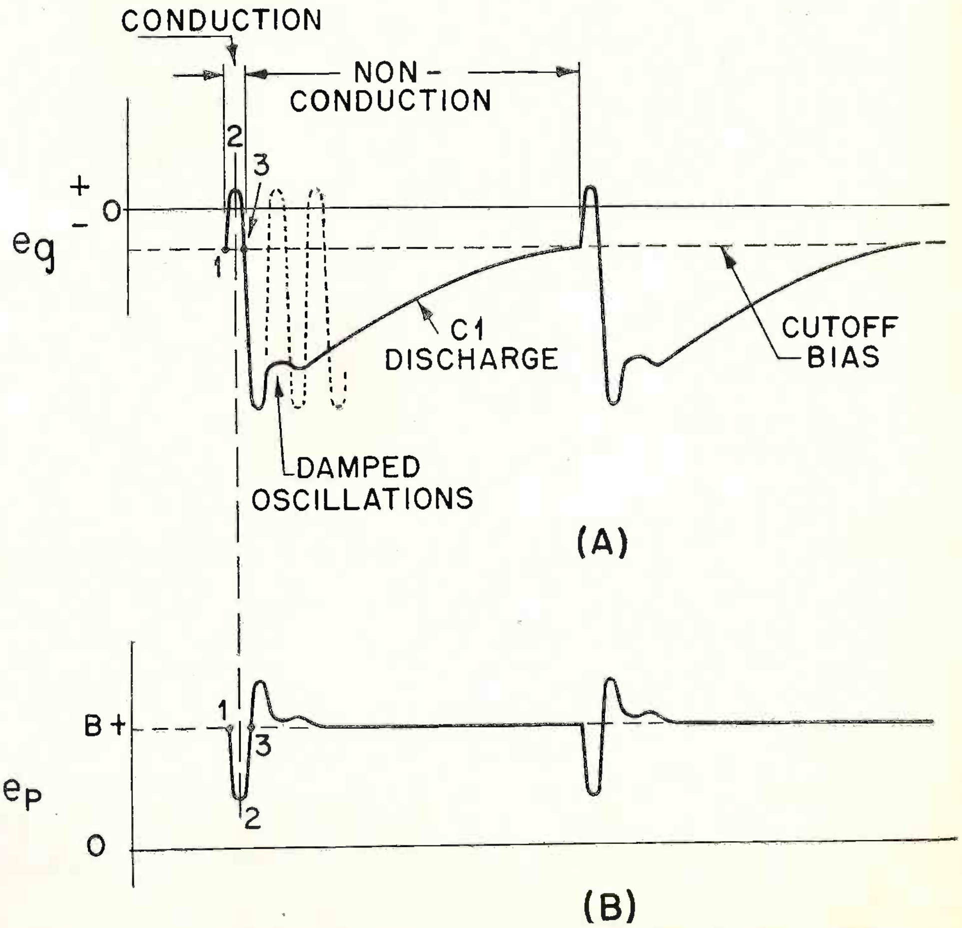


Fig. 2. Typical grid- and plate-voltage waveforms of the blocking oscillator.

grid circuit. The *discharge* current flows through *R1* in the direction indicated in Fig. 1 and causes a negative voltage to be applied to the grid of the tube. This negative voltage is a maximum at the initial moment of discharge.

The effective tuned circuit of the transformer is immediately set into oscillations by the first surge of plate current flowing through the transformer windings. The initial half-cycle of oscillation and the rise and decay of plate current occur very rapidly. When the grid voltage is reduced beyond its cutoff value, which is at the end of the first half-cycle of transformer oscillation, the tuned circuit which is already energized continues to oscillate. However, primarily due to the physical construction of the transformer, which normally has a low *Q*, and the fact that the tube becomes cut off and does not supply any more energy to the transformer, these oscillations are quickly damped out. This is indicated in the waveform drawings of Fig. 2. In some circuits, a resistor is shunted across the grid winding of the transformer to decrease the *Q* and further dampen oscillations. In most practical circuits, the oscillations are immediately damped out so that after the grid is driven beyond cutoff, as capacitor *C1* discharges through *R1*, the tuned circuit no longer oscillates.

As *C1* continues to discharge, the negative voltage on the grid decreases and does so in exponential fashion as seen at (A) in Fig. 2. Since *R1* is a much higher resistance than the grid-to-cathode resistance of the tube when the grid is positive and conducting, a much longer time is required to discharge *C1* than to charge it; hence the grid remains negative for a much longer period of time than it is positive. A time will be reached during the discharge of *C1* when the negative voltage on the grid will be reduced to just above cutoff and plate current will start flowing once again. At the moment this happens, the original operation starts over again; the tuned circuit is forced into oscillations, the grid voltage starts increasing in the positive direction, and *C1* once more begins to charge when the grid goes positive.

The curve at (B) in Fig. 2 is representative of the plate-voltage waveform and also the signal output. The output voltage is in the form of periodic pulses which are seen to be above and below the B+ reference axis. The formation of the pulses below the B+ axis is due to the increasing and decreasing plate-current flow as explained previously. The pulses above the B+ line are formed when the tube is already cut off and plate current no longer flows. These pulses are primarily due to the energy stored in the plate winding of the transformer and are considered as the beginning of the damped oscillations of the tuned circuit.

The frequency of the pulse repetition of the waveforms of Fig. 2 is primarily determined by the *R1-C1* combination for a given system. Other factors, such as the tube used, characteristics of the transformer employed, and circuit voltages, also determine the frequency of operation of the free-running blocking oscillator, but the values of *R1* and *C1* are usually the variable ones.

Obtaining the Sawtooth Voltage

After understanding the basic operation of the blocking oscillator, it is a simple matter to figure out a method of obtaining a sawtooth output. Circuit arrangements, in which a tube has automatic periods of conduction and cutoff and where the conduction period is much shorter than the cutoff period, can be used as a source of sawtooth voltage. What is usually done is to place a capacitor across the output circuit of the tube as is the case for asymmetrical multivibrators. In the blocking oscillator, the tube, by nature of its circuit arrangement, conducts for a much shorter period of time than when it is cut off. Placing a capacitor across its plate circuit produces the same result. Appearing in Fig. 3 is a simple blocking-oscillator circuit used to produce a sawtooth signal output. It is the addition of capacitor *C2* that helps to produce the sawtooth wave. In brief, the sawtooth signal is produced as follows:

During the nonconduction period of the tube, *C2* charges up through *R2* from B supply. The charging is exponential, but the choice of values of *C2* and *R2* is such that only the beginning of the exponential charge curve is utilized, in order that the sawtooth output signal be as linear as possible. As soon as the tube starts to conduct, it represents a very low resistance across *C2* and the capacitor-discharge through this path. Since the period of conduction is very short, the flyback time of the sawtooth output signal, which is represented by the discharge of *C2*, is very rapid. Resistor *R3* is inserted to indicate how the frequency of such a circuit may be controlled. When blocking oscillators are used in the horizontal or vertical oscillator sweep circuit in television receivers, resistor *R3* is usually termed the "hold" control (actually "horizontal hold" or "vertical hold" as the case may be). Resistor *R4* is inserted to illustrate its use as a "damper" to the oscillations produced by the effective tuned transformer circuit. Resistor *R2* is made variable so that it can serve as an amplitude control.

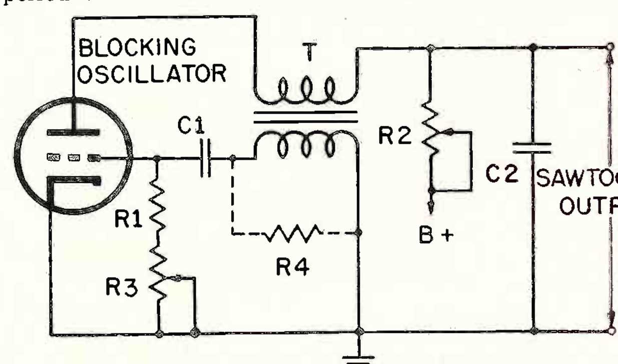
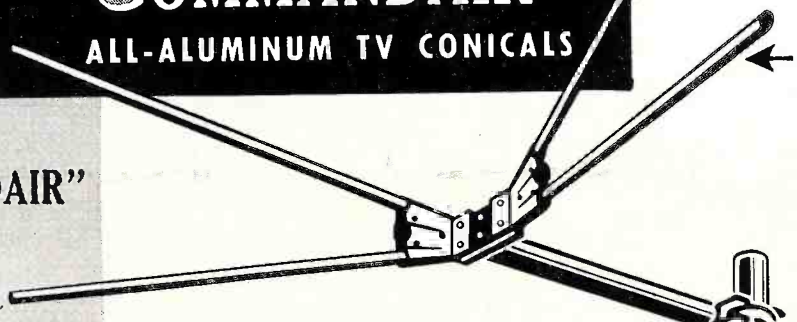


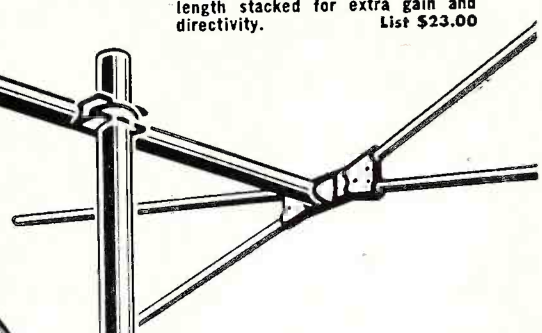
Fig. 3. The addition of capacitor C2 in this blocking-oscillator circuit helps produce a sawtooth wave output.

JFD

"COMMANDAIR"

ALL-ALUMINUM TV CONICALS

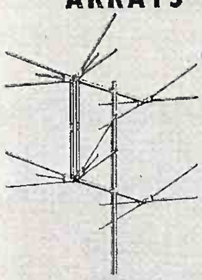




JFD No. C660
"Commandair" All-Aluminum All-Band Conical
List Price (less mast) $10.95

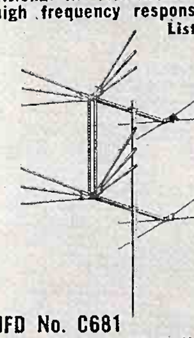
JFD No. C661
Same as No. C660 but 1/4 wave-length stacked for extra gain and directivity. **List $23.00**

OTHER "COMMANDAIR" ARRAYS



JFD No. C671
Same as No. C661 (1/4 wave-length stacked for extra gain and directivity) with additional HF element for peaked high frequency response. **List $24.05**

JFD No. C670
Same as No. C660 but with additional HF element for peaked high frequency response. **List $11.50**



JFD No. C681
Same as No. C661 (1/4 wave-length stacked for improved gain and broader band response) with additional dipoles for extra broad band response. **List $25.60**

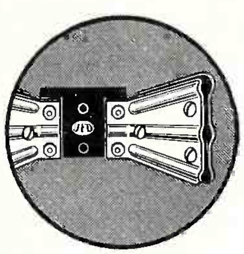
JFD No. C680
Same as No. C660 but with additional dipoles for extra broad band response. **List $12.25**

TOP QUALITY CONSTRUCTION!

Elements made of high-strength, aircraft-type aluminum alloy for greater resistance against vibration and corrosion.

HEAVY DUTY ELEMENT BRACKETS!

Made with extra-long gripping surface for secure anchoring of elements. No wonder that "Commandair" Conicals will stay put in the face of strong winds, under the strain of ice and snow.



UNIQUE BRACKET FLEXIBILITY!

An important feature of these amazing Conicals is their unique flexibility, which permits easy conversion from a standard Conical to a 6-element front and 2-element reflector type.

ENGINEERED FOR MAXIMUM GAIN

Improved signal-to-noise ratio produces brighter pictures with minimized fading.

Write for FREE literature completely describing the JFD "Commandair" Line of All-Aluminum TV Conicals.

NOTE:

The "Commandair" Conical is also offered in a separate, lower-priced "Economy" Line . . . of partial steel construction . . . completely assembled . . . similar to its all aluminum counterpart in design and performance.

JFD **MANUFACTURING CO., Inc.**
6119 16th AVENUE, BROOKLYN 4, N. Y.
FIRST IN TELEVISION ANTENNAS AND ACCESSORIES

Curtain Time

(*Continued from page 5*)

TV servicing will be many times greater — of that there is no doubt — but a high level of service dollars on one kind of product does not justify a total neglect of the other. Summarizing all of this we state very simply, "stop saying that blind radio is dead". Those who have been in the radio field for a long time can well remember the initial impact of radio broadcasting on records. Look where records are today.

We Wonder . . .

The printed circuit is making more progress than might seem evident on the surface, and this is not intended as a pun. All of its problems are far from solution but judging by what one hears here and there, it may suddenly bloom forth and appear in many places. We wonder what is happening to that foreign factory which turned out radio receivers by means of automatic machinery. Is it conceivable that some day the printed circuit, which would well fit such production, will be the A-M receiver in the home?

The Poor Pigeon

The pigeon is, in many parts of the country, a problem for the TV serviceman, perhaps more so for the public. Certain places seem to be plagued by pigeons, which should, by virtue of nature's endowments, have a better appreciation of balance than they display when they perch themselves on TV antennas. Being gregarious, they all gather on one of the elements instead of distributing themselves over the entire antenna. The reports indicate that many TV antenna elements have been broken in this fashion. May be that someone will cook up a "something" which will chase pigeons away and thus prolong the life of TV antennas. It will have to be good because the pigeon is a stubborn bird.

While on the subject of TV antennas, it might be well to comment upon the need for a more realistic approach to antennas mounted at different heights. Quite a long time ago, we stated that the winds which prevail atop 10-, 20-, or 30-story buildings are more severe than those which are experienced at the roof levels of single- and two-family dwellings. Consideration can profitably be given to the use of more substantial antennas at the higher elevations. There will be fewer calls for replacements, and most certainly, less troubles due to loosening of the elements, broken transmission-line connections, etc.

Relative to vibration, a hint which might relieve antenna "singing", which can be annoying when the antenna is not too high above the rooms where people live, is to seal the openings at the ends of the antenna rods with little pieces of cork.

Service

Service is a stone with many facets. Like the diamond, which depends upon its facets for its brilliance, the service business can prosper if its facets reflect a wholehearted

(*Please turn to next page*)

Curtain Time

(*Continued from page 15*)

desire to serve the public. A telephone is a means of satisfying or antagonizing — it all depends upon the approach. Many times, the approach is not what is said, but how it is said. No individual who collects a fee for any work done ever does the customer a favor. He may go out of his way to do the job, but it isn't a favor — it is a gesture toward building good will, and greater sales and greater profits. May be that when television exists on the phone line, the growling "hello" will be accompanied by a smiling countenance. Today, the device is still blind, and the mental image the customer develops when he calls his service station is greatly dependent upon the initial response at the other end of the line. Many a customer, with pent-up feelings ready to explode, has been mollified by a pleasant "good morning" from the other end of the line when he called the service station with his complaint, and if it was the afternoon when he called, it was a pleasant "good afternoon" instead of a growling "hello" or "yeah, what is it".

HIWYNI

Do you always have everything you need when you need it? You don't — most of us don't — but if the need occurs time and time again, the occasion has arrived for the acquisition of that something, and when that something has a life of many years and is an investment which repays you with a profit, one experience of not having it when it is needed should be sufficient. Yes, we are speaking about RIDER MANUALS. Have It When You Need It! Every RIDER MANUAL works for its owner for many years. Tens of thousands of service shop owners who bought RIDER MANUALS 10, 15, and even 20 years ago are still using them, and each MANUAL has returned an excellent profit on the original purchase price. HIWYNI.

John F. Rider

•

Cover

The photograph on the cover shows the servicing of Western Electric mobile radiotelephone equipment. The receiving unit is being repaired in a specially designed copper shielded booth. The work is being done in the Newark Distributing House, repair shops of the Western Electric Company.

Sec. 34.66, P. L. & R.
U. S. POSTAGE
PAID
NEW YORK, N. Y.
PERMIT No. 9427

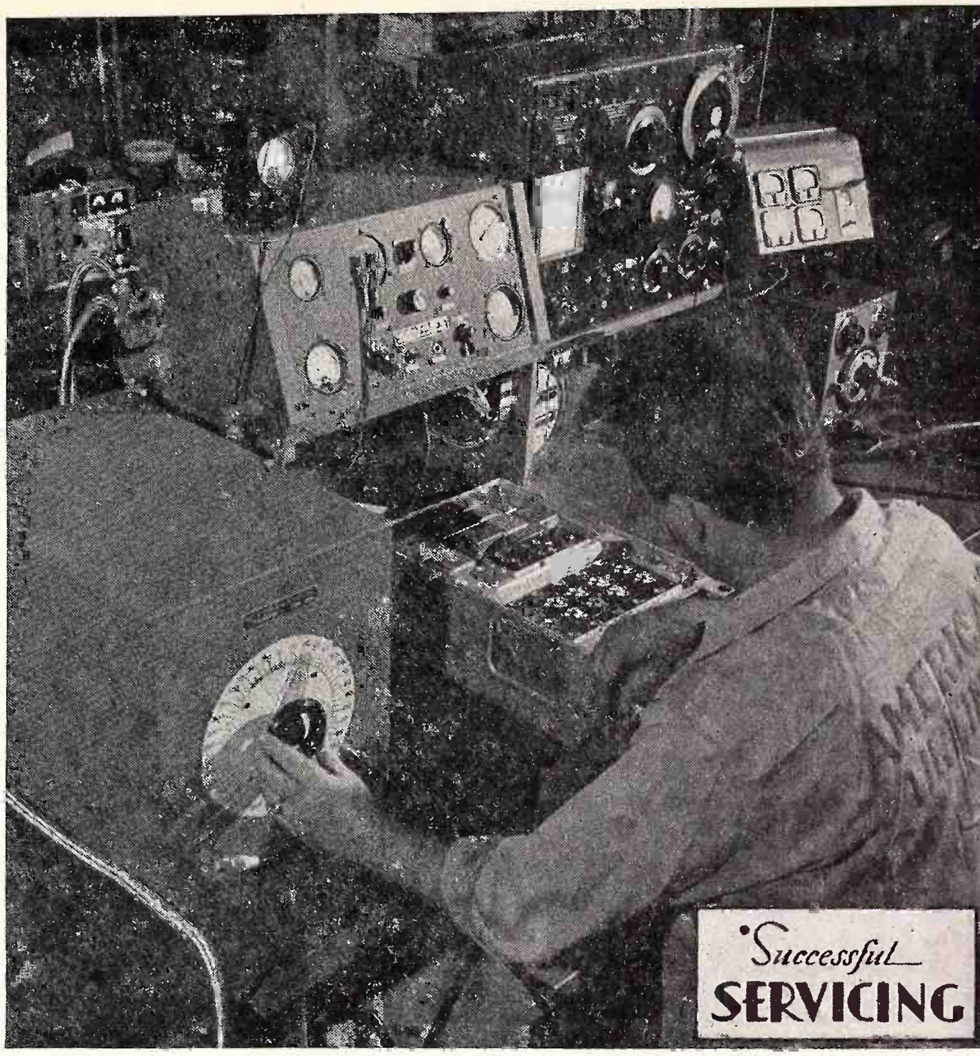
A. J. S. CERINO
2393 PITKIN AVE.
BROOKLYN 8, N. Y.

From
JOHN F. RIDER PUBLISHER, Inc.
480 CANAL ST., NEW YORK 13, N. Y.
Return Postage Guaranteed

Distribution of This Issue—52,000 Copies

MARCH, 1950

THE SIGNAL SEEKING TUNER



Courtesy American Airlines

Editor's Note: This material is an abridged excerpt printed through the courtesy of United Motors Service from their Service Bulletin 6D-620, Delco Tuner.

The signal seeking tuner is an electronically controlled automatic tuner which enables the operator to change stations by merely depressing a single station selector bar on a radio or an auxiliary foot switch. The seeking operation is a unidirectional sweep of the broadcast band from low to high frequency with a nearly instantaneous return. The tuning mechanism is driven by a spring-loaded mechanical motor which is stopped on the station by a triggering circuit actuated by the voltage developed from an incoming signal.

The number of stations on which the tuner will stop can be regulated by use of the sensitivity control. This is a step control which, in the extreme clockwise position, gives maximum stopping sensitivity; while it allows the tuner to stop only on strong local stations when in the minimum sensitivity or extreme counterclockwise position. This control is in the circuit only while the tuner is seeking, and it does not affect the "on station" sensitivity of the receiver.

This discussion of the operation of the signal seeking tuner does not refer to any particular model radio. It covers the over-all operation. The purpose of the electrical components associated with the tuner is to control the relay so that the operator may start the tuner sweeping cycle by merely depressing the station selector bar, so that the sweeping operation will continue until a signal is received. At that time, it is the function of this circuit to tune accurately to the frequency of the selected station. It also provides the necessary conditions to keep the tuner on the station until a change is desired. The operational cycle of the electronic control system of the signal seeking tuner is outlined below.

The Electrical Cycle Outline (See Fig. 1)

I. Starting the tuner seeking (energizing the relay)—the station selector bar (27) is momentarily depressed.

A. Contact #2 of the station selector switch opens first, ungrounding the secondary of the output transformer, and therefore, muting the set as contact #1 closes.

B. Contact #1 closes and provides a circuit from B+ through the relay winding, the 15,000-ohm resistor (30), the selector switch contacts, and the delay-circuit resistor network to ground.

C. The current through this circuit energizes the relay and removes the relay arm from the paddle wheel—starting the tuner, opening contacts #2 and #4, and grounding relay contacts #1 and #3.

II. Keeping the tuner seeking after the selector bar is released (keeping the relay energized).

A. Relay contact #3 is closed, providing a path to ground for the cathodes of the r-f and i-f amplifier tubes. This path is through the sensitivity control so that the sensitivity of the set can be controlled during the sweeping operation.

B. Relay contact #1 is grounded, lowering the cathode-to-ground resistance of the relay section of the trigger tube by putting the 6,800-ohm resistor (24) in parallel with the 47,000-ohm cathode resistor (26). This causes a lowering of the cathode voltage, thereby causing an increased plate current flow which is sufficient to keep the relay energized and the tuner seeking.

III. Stopping the tuner on station with an incoming signal (de-energizing the relay).

A. A voltage from the incoming signal is developed in the primary and the secondary of the 2nd i-f transformer (20).

B. The voltage in the secondary of the i-f coil is rectified by the detector diode developing a d-c voltage across the 330,000-ohm resistor (22).

C. The voltage in the primary of the i-f coil is rectified by the bucking diode

(Please turn to page 12)

Television Changes

Stolle Magic Lantern

This model appears on *page 3-1 of Rider's TV Manuel Volume 3*. The following corrections and revisions should be made to the schematic that appears on page 3-1:

1. Change C9D to C14A.
2. Change C14A to C9D.
3. The value of R26 has been changed from 47,000 ohms to 8,200 ohms.
4. The grounded side of C50 and T10 should not be grounded, but should be connected to the high side of C9C.
5. The high side of C9C should be connected to one side of the filament winding Y-Y.
6. The suppressor of tube V7, 6AU6, should be connected to the low side of R20, not to ground as shown.
7. Transformers T5, T6, T7, T8, and the horizontal oscillator transformer should be slug-tuned.
8. The crystal 1N36 may be replaced by 1N51, 1N64, or 1N65.
9. A 68-ohm cathode resistor, bypassed by C51, a 100-μf electrolytic, should be added to V5, 6AC7. Connect the suppressor to the cathode at the socket.
10. The value of R13, at tube V5, should be changed from 33,000 ohms to 56,000 ohms. R12, the 33,000-ohm resistor, should be deleted.
11. Remove C51, 100 μf, R79, 100 ohms, and R80, 100 ohms, and replace them with direct connections.
12. There should be a connection between the high side of C38A, 20 μf, and the high side of C38C, 40 μf (B+ line).
13. The plate feed of V10, 6SN7, should be disconnected from the low side of R66. The low side of the horizontal yoke from the B+ line should be disconnected and connected to the plate feed of V10.
14. The value of screen resistor R66 of V12, 6BG6, should be changed from 4,700 ohms to 12,000 ohms.
15. The low side of resistor R57, 150,000 ohms, should be disconnected from R58, 10,000 ohms, and connected to the junction of C30, R56, and C52.
16. The value of R40 should be changed from 25 megohms to 2.5 megohms.
17. At the horizontal output transformer, T9, remove L6 from terminals #5 and #6. Remove L7 and replace it with a direct connection between terminal #1 and the cathode of V14, 6W4. Delete C35, 0.035 $\mu\mu$f.
18. The value of R58 should be changed from 10,000 ohms to 8,200 ohms.
19. The picture tube, V6, should be changed from a 12LF4 to a 12LP4.

●

Sovereign 5020

This model is similar to Model 4920 which appears on *pages 3-1 through 3-4 of Rider's TV Manual Volume 3*.

Admiral 94C8-1 and 94C8-2 Tuners

Coils for these tuners are no longer supplied in pairs. Instead, two coils are supplied for each channel separately. The reason for this is that each coil is made to a specific electrical standard and therefore the individual coils are interchangeable. The coils are also mechanically interchangeable, although occasionally the ends of the coil mounting may have to be touched up with a file in order that it will go into the frame readily. The change in the parts list is as follows:

Channel No.	*Part No. Antenna Coils*	*Part No. Mixer-oscillator Coils*
2	98A58-2	98A59-2
3	98A58-3	98A59-3
4	98A58-4	98A59-4
5	98A58-5	98A59-5
6	98A58-6	98A59-6
7	98A58-7	98A59-7
8	98A58-8	98A59-8
9	98A58-9	98A59-9
10	98A58-10	98A59-10
11	98A58-11	98A59-11
12	98A58-12	98A59-12
13	98A58-13	98A59-13.

These replace the 98A45 series. The 98A45 series of coil sets may be split up to make individual coils per the above listing.

RIDER TV MANUALS VOLUMES 1, 2, and 3

Stromberg-Carlson TV-12

This model appears on *pages 1-17 through 1-29,30 of Rider's TV Manual Volume 1*. The resistor R-296, 680,000 ohms, ½ watt has been changed to a 680,000-ohm, 1-watt resistor.

●

General Electric 805

Model 805 appears on *pages 3-1 through 3-15 of Rider's TV Manual Volume 3*. Because of "opens" which have occurred on the fusible wirewound resistors RRW-043 and RRW-044, a new design 4.6-ohm resistor, stock no. RRW-048, is being substituted. The protective resistors, RRW-043 and RRW-044, 5-ohm and 4-ohm resistors respectively, are used in series with a-c line to the selenium rectifier unit on the "transformerless" TV power supply.

A thermal cutout is provided for overload protection on all receivers using the "transformerless" power supplies. There is available a new design cutout, stock no. RSR-002, which opens the circuit more rapidly than the previous design, stock no. RSR-001, thus providing improved overload protection. The two units are physically identical, however, the improved design will have an identifying yellow paint code marking. When the RSR-002 cutout is used, the protective flexible or fusible wirewound resistor must be changed to the new type RRW-048 resistor.

●

Regal CD31, CD36

Model CD31 is similar to Model 16T31 which appears on *page 3-1 of Rider's TV Manual Volume 3*. Model CD36 is similar to Model 16T36 which appears on *pages 3-2 through 3-3 of the same Volume*.

●

Correction

On page 3 in the January issue of Successful Servicing, the Muntz M169 change should read, "The two 30,000-ohm, 2-watt resistors."

Successful
SERVICING
REG. U. S. PAT. OFF.

Vol. 11 MARCH, 1950 No. 5

Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

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

JOHN F. RIDER, Editor

CURTAIN TIME

International Technical Review

About 300-odd magazines, journals, and proceedings, covering electronic engineering, optics, physics, and allied engineering arts, arrive each month from different parts of the world and are placed in our library. The contents of these publications are surveyed for the "Electronic Engineering Master Index" which our associated company publishes annually for the research organizations, patent attorneys, libraries, and other similar organizations throughout the world. We might as well get in a plug for them and say that the 1947-1948 issue, which was published recently, contained about 18,500 references; and the 1949 issue, which will appear in about two months, contains approximately 12,500 references.

It is astounding to see the interest in television in the different parts of the world, especially in the European countries. During the period of January 1 through 31, 1949, more than 900 articles on television were published. Italian, French, and especially British publications are rich in this material. Technical publications of long standing and many new ones are making their appearance in Germany. It is interesting to recall that prior to the war more than 40 per cent of all of the references made to technical material in books and magazines referred to publications which were issued from Germany.

TV Production For 1950 In The U. S.

We were confused recently by some of the financial page statements concerning U. S. production of TV receivers during 1950. It was not the total number of units produced that mystified us, because that number was a representative amount, approximately 3.5 million units; but it was the implication that the peak of production had been passed. It was agreed that 1950 production over 1949 would be up between 20 and 40 per cent. What is wrong with that increase? Admittedly production facilities have been geared for greater output; the fact that the facilities may not be utilized to their fullest extent does not deny increasing popularity of TV. There is no doubt that if the freeze is lifted during 1950, the production will exceed the forecast, and if it is not lifted, 3.5 million receivers equals the total produced during the last four years, 1946-1949. That is nothing to be ashamed of.

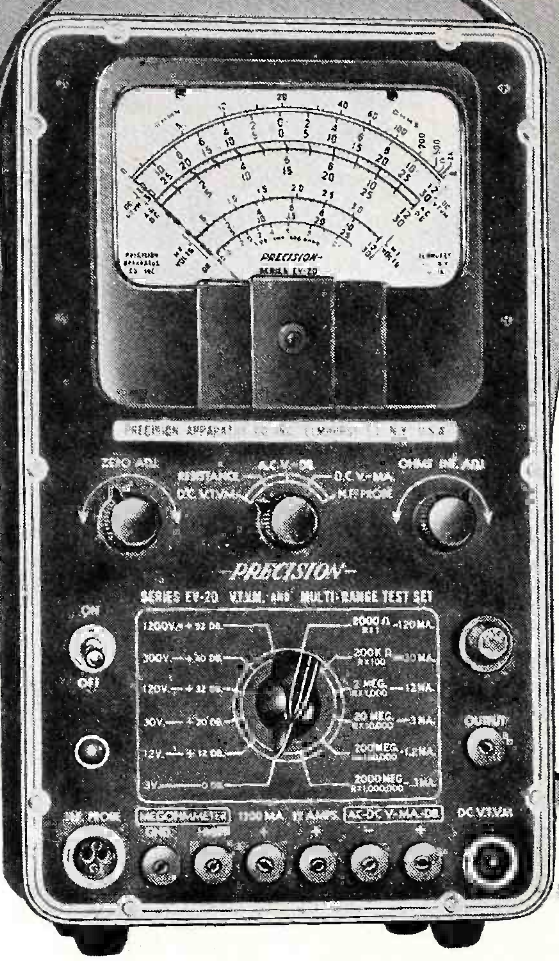
Radio Maintenance And Our Cathode-Ray-Tube Book

Did you see the February issue of *Radio and Television Maintenance* magazine? Editors of that publication examined the manuscript for our new CATHODE-RAY TUBE AT WORK. They agree that the claims we made about this book were true. The send-off they gave it was terrific. Thanks RM! Such comments warrant the many thousands of hours which went into the preparation of this book—the hours of labor and painstaking effort. The manuscript is finally completed and type is now being set. The delay in publication was occasioned by the unlimited desire to include everything up to the minute. This has been done. Watch for the publication date in the April issue of SUCCESSFUL SERVICING. Again, thanks RM.

Random Notes

Contracts for the servicing of TV receivers during the third year are definitely on the wane. The contract price is higher than that for the second year, which is natural, because the risk is much greater. The public, therefore, is looking to the independent shop for non-contract maintenance . . . The largest local radio servicing organization in the nation, ARTSNY of New York City, has made arrangements with the local Board of Education for a program of training TV servicemen . . . The funniest story we have heard of late is the one about a TV installation man who recently installed a receiver. Everything was perfect—except that there was no picture. He gave up in disgust and said that he would call the expert from the shop. The man arrived, took one look inside the cabinet, removed a piece of corrugated paper which was in front of

(Please turn to page 14)



A Compact, Versatile, Portable Circuit-Testing Laboratory for TV — FM — AM

The New PRECISION SERIES EV-20 VTVM and Multi-Range Test Set

Net Selling Price . . . $64^{75}

A Modern, Portable VTVM—Megohmmeter.
TRUE ZERO-CENTER on ALL VTVM ranges
PLUS Direct Reading High Frequency Scales
ALSO, complete, standard 1000 ohms per volt functions
48 RANGES TO
1200 Volts*, 2000 Megohms, 12 Amperes, +63DB

* D.C.-VTVM ranges to 12,000 and 30,000 Volts when used with Series TV Super-High Voltage Test Probe.

Range Specifications

★ SIX ALL-ZERO CENTER VTVM RANGES: —13⅓ Megs. Constant Input Resistance. ±3, ±12, ±30, ±120, ±300, ±1200 volts. Direct Reading to ±12 KV and ±30 KV with Series TV Super-High Voltage Test Probe

★ SIX SELF-CONTAINED OHMMETER-MEGOHMMETER RANGES: 0-2000 - 200,000 ohms. 0-2-20-200-2000 Megohms.

★ FOUR DIRECT READING HIGH FREQUENCY VTVM RANGES: 0-3-12-30-120 volts. *(When used with RF-10A High Frequency Vacuum Tube Probe, Net Price $14.40. No crystal rectifiers employed.)*

★ SIX AC-DC AND OUTPUT VOLTAGE RANGES at 1000 ohms/volt. 0-3-12-30-120-300-1200 volts.

★ EIGHT D.C. CURRENT RANGES: 0-300 microamps. 0-1.2-3-12-30-120-1200 milliamps. 0-12 Amperes.

★ SIX DECIBEL RANGES from —20 to +63DB. Calibrated for 600 ohm, 1 mw., zero DB reference level.

Also ask to see the "Precision" Series EV-10, DeLuxe VTVM—Megohmmeter with extra-large 7" meter. 59 self-contained ranges to 6000 volts and 70 DB.

Series EV-10, affords to the discriminating instrument purchaser, and equipment-conscious service-laboratory, the ultimate in visibility and performance.
EV-10-P (Closed portable)—$92.70
EV-10-MCP (Illustrated) (Open Lab. Type)—$89.95.

See complete EV-10 specifications on page 4 of latest Precision catalog, available at leading radio equipment distributors or write directly to factory for full details.

IMPORTANT FEATURES

★ VOLTAGE REGULATED—BRIDGE CIRCUIT.

★ DIRECT READING, ALL ZERO-CENTER VTVM —indicates BOTH Polarity and Magnitude without switching or test lead reversal.

★ MASTER RANGE AND FUNCTION SELECTORS eliminate frequent and inefficient shifting of test leads.

★ SHIELDED CONNECTORS for both D.C.—VTVM and RF—VTVM. Permits simultaneous and non-interfering connection of both Circuit Isolating Test Probe and optional H.F. Vacuum Tube Probe Series RF—10A.

★ HIGH FREQ. VOLTAGE SCALES—Direct Reading.

★ DUAL-BALANCED ELECTRONIC BRIDGE OHMMETER—MEGOHMMETER uses two 1.5 volt flashlight cells easily replaced at rear of cabinet.

★ 1000 OHMS/VOLT MULTI-RANGE FUNCTIONS permit simple AC-DC voltage, DB and current measurements free of power line requirement.

★ 4⅝" RECTANGULAR METER—200 microamperes, ± 2%. Double-Sapphired, D'Arsonval construction.

★ 1% Film type, Metallized and Wire-Wound resistors for all shunts and multipliers.

★ Heavy gauge, round-cornered, louvred steel case with plastic handle. Etched, anodized, aluminum panel.

NET SELLING PRICE $64^{75}

Complete with coaxial Circuit Isolating Test Probe, Shielded Ohmmeter Test Cable, Standard #227 Super-Flex Test Leads, Ohmmeter battery and full operating instructions.
Case dimensions—10½" x 6¼" x 5"

Shipping Weight: 11 pounds. *CODE:*—Party

PRECISION APPARATUS CO., INC.
92-27 Horace Harding Boulevard, Elmhurst 14, New York
Export Division: 458 Broadway, New York, U.S.A. • Cables—Morhanex

RCA 630TCS, Ch. KCS 20B-1, KCS 20D-2

This model is similar to Model 630TS which appears on *pages 1-79 through 1-116 of Rider's TV Manual Volume 1,* except that Model 630TS is a table model and the 630TCS is a 10-inch console. Model 630TCS employs a 12-inch electro-magnet dynamic speaker, and the voice-coil impedance is 2.2 ohms at 400 cycles. The chassis with the tubes in the cabinet, less kinescope, weighs 124 pounds; the shipping weight is 153 pounds. The dimensions, in inches, are as follows:

	Width	*Height*	*Depth*
Cabinet (outside)	28	40 7/16	20 3/8
Chassis base (outside)	19 1/4	3 3/4	15 1/2
Chassis (over-all)	21 3/4	11 3/4	16 1/8

The instructions and schematics that apply to Model 630TS also apply to the 630TCS except for the following changes. A 150,000-ohm resistor, R239, has been added to pin 10 of the kinescope. Capacitor C164, 1,200 $\mu\mu$f, has been inserted in parallel with capacitor C169; however, in some receivers, C164 may be omitted. Resistor R208 is given as 8,000 ohms, although in some receivers it may be 27,000 ohms. Fig. 1 shows the audio-output network with the speaker plug. Fig. 2 shows the corresponding power-supply connections. A pilot lamp has been added and is connected to the Y lead of transformer T110.

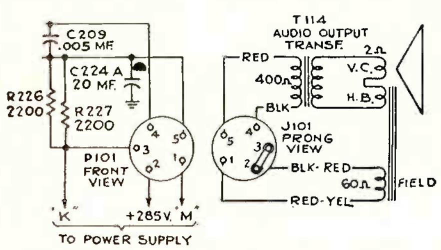


Fig. 1. Audio-output network for RCA 630TCS.

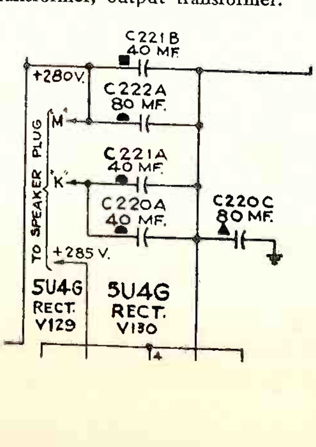
The changes in the parts list are as follows:

Ref. No.	*Part No.*	*Description*
C164	72638	Capacitor, ceramic, 1,200 $\mu\mu$f
R239	30493	Resistor, 150,000 ohms, ½ w
	71911	Back, cabinet back
	71599	Bracket, lamp bracket
	13103	Cap, pilot-lamp cap
	35574	Socket, lamp socket

Speaker Assemblies, RL70R4, 92567-3W

	13867	Cap, dust cap
	71557	Coil, field coil, 60 ohms
	11469	Coil, neutralizing coil
	36145	Cone, cone complete with voice coil
	71560	Plug, 5 prong male plug for speaker
	71556	Speaker, 12" e-m speaker, 60-ohm field, complete with cone and voice coil, less transformer and plug
	71145	Suspension, metal cone suspension
	31301	Transformer, output transformer.

Fig. 2. Power-supply connections for RCA 630TCS.



Television Changes

General Electric 835

This model appears on *pages 3-45 through 3-56 of Riders TV Manual Volume 3.* The following items have been added to the parts list:

RAG-021	Cabinet grille
RMM-097	Cushion, sponge rubber safety glass cushion 9 1/8 inches long
RMM-098	Cushion, sponge rubber safety glass cushion 11 inches long.

Farnsworth 610P

Model 610P is similar to Models 651P and 661P which appear on *pages 2-11, 12 through 2-25 of Rider's TV Manual Volume 2.*

Bace 190C

Model 190C is the same as Model 160C which appears on *page 3-1 of Rider's TV Manual Volume 3,* except that the 190C uses a 19-inch tube, 19CP4.

Sears 110.499

This chassis appears on *pages 3-1 through 3-11 of Rider's TV Manual Volume 3.* To minimize intercarrier buzz, add a 1,500-$\mu\mu$f, 400-volt capacitor from pin 9, the plate of the 6T8 first sound amplifier tube, to ground.

Thank You Gen

GAROD RADIO CORPORATION
Radio and Television Products
70 WASHINGTON STREET BROOKLYN 1, NEW YORK

CABLE ADDRESS DORAG-NEW YORK BENTLEY'S CODE
TELEPHONE MAIN 4-6044

December 16, 1949

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

Dear Mr. Rider:

We have received a copy of your Volume 3 television manual. The change in format is excellent over previous issues. Service Engineers should have very little difficulty in working with the information as presented by the manual layout. The schematic diagrams are very clearly reproduced and have sufficient size for ease in locating circuit elements and components.

A manual of this type will go a long way in allowing Service Engineers to do a competent job in servicing any TV receiver beside our own in a minimum amount of time. The manual should be a must on the shelf of every competent Service Engineer since the information as presented is worth several times its value.

We wish to also compliment you on all your other excellent publications and books relating to FM and Television and the ease of subject presentation to the Service Engineer.

We will continue to supply service information on our TV receivers as soon as available for your publications and future TV manuals.

Assuring you of our cooperation, we remain

Very truly yours,

F. J. Diell
Chief Engineer

FJD:LC

CABLE ADDRESS EMPHONOCO NEW YORK

Emerson
RADIO AND PHONOGRAPH CORPORATION
111 EIGHTH AVENUE NEW YORK CITY, 11

December 13, 1949

John F. Rider Publisher Inc.
480 - Canal Street
New York 13, N. Y.

Att: Mr. John F. Rider

Dear Mr. Rider:

We are in receipt of your letter of December 9th and have just received a copy of your Television Volume 3 manual.

The change in format and size of the manual is certainly a tremendous improvement, particularly for television service manuals since the amount of information and detail in a television service manual is such that it becomes difficult for a serviceman to follow it accurately and your step in putting this on large sheets is a tremendous improvement.

As a matter of fact, the Rider Service Manuals whether they be for Television, Public Address Systems or regular radio, have always been a great service to the service industry since you have made available to the serviceman information from the manufacturer of a product in a form most convenient to refer to.

In addition to your service manuals, I have been the recipient of all the various books and publications which you have issued and, without hesitation, recommend them very highly since the technical information in them has been presented in such a manner to make them comparatively simple for interested persons to follow with ease even without benefit of a formal education in the subjects covered.

Your series of publications entitled "How It Works", particularly on television circuits, was purchased, in quantity, by this department and used as a basis in an instruction course for our television servicemen.

Permit me to thank you for the latest copy of your television manual.

Very truly yours,

EMERSON RADIO & PHONOGRAPH CORPORATION

George [illegible]
General Manager of Parts
Sales & Service Division

OC:VA

IT is with a great deal of pride and with a feeling of having lived up to our promises that we publish this, the second series of letters containing the expressions of the service managers of some of the leading television receiver manufacturers of the nation.

...men • • • • *we hope to merit equal praise in the years to come.*

STillwell 4-6961, STillwell 4-4403

Cable Address, HAMRADS

OLYMPIC RADIO & TELEVISION INC.

34-01 38TH AVENUE, LONG ISLAND CITY 1, NEW YORK

January 3, 1950

Mr. John F. Rider
480 Canal Street
New York 13, N. Y.

Dear Mr. Rider:

Volume #3 of Rider's TV Manual arrived a few days ago and I am impelled to write to you to tell you how much we like it.

As manufacturers of television receivers, having nation-wide distribution, we are anxious to see that full technical information concerning our products is available to service technicians and servicing dealers in every city, town, village and hamelt in the Nation. This result is accomplished in one step by the wide circulation and readership of Rider's Manuals.

For many years past, Rider's Publications have included coverage of our Company's radio receivers and radio phonographs with great benefit to us and we feel that in television, the desirability of your publications to all service men has been greatly enhanced for the reason that accurate, up-to-date and readily accessible information is indispensable for the proper maintenance and servicing of television receivers.

The inclusion of several pages covering Olympic television receivers is a selling aid to our distributors and dealers identifying us, as it does with all other Nationally known and recognized reliable manufacturers. It has been our experience that familiarity with a radio and television product by service men, is a selling aid all the way from manufacturer to consumer because in the final analysis, the consumer very often relies on the opinion of his service man before purchasing a television receiver.

Our Engineering Staff after examining Volumes #1, #2 and #3 are unanimous in praising not only the technical presentation of this information but the physical appearance of the material, particularly the new giant sized pages and the easy-to-read uniform, standardized circuits and symbols.

Very truly yours,

Geo. M. Solomon

George M. Solomon
Manager, Service Department

GMS/1JW

THE Firestone TIRE & RUBBER COMPANY

HARVEY S. FIRESTONE
FOUNDER

AKRON 17, OHIO

GENERAL OFFICES
AKRON 17, OHIO

December 16, 1949

John F. Rider
480 Canal Street
New York 13, N. Y.

Dear Mr. Rider:

Your T.V. Service Manuals are proving exceedingly helpful in our service and analytical work on many makes of television receivers.

We find the information to be accurate and most admirably presented.

Keep up the good work.

Yours very truly,

Hugh Walters

H. T. Walters
National Service Manager

HTW:mg

Listen to the Voice of Firestone every Monday Evening over N.B.C.

WE have many more such communications and they will be published in subsequent issues of SUCCESSFUL SERVICING. We reiterate at this time that we consider it our solemn obligation to give to the servicing industry of this nation the utmost in official and authentic service data for the successful operations of the industry.

Radio Changes

General Electric 250

This model appears on *pages 15-32 through 15-36 of Rider's Manual Volume XV*. Change stock no. RRG-001 to read stock no. RRW-018. Change stock no. RAC-010 to read: Case right end cover (brown). Change stock no. RAC-011 to read: Case right end cover (grey). Change stock no. RAC-012 to read: Case left end cover (brown). Change stock no. RAC-013 to read: Case left end cover (grey). Add the following items to the parts list:

Stock No.	*Description*
RAC-018	Cover, case back cover (Hammertone grey)
RAC-019	Cover, case back cover (Hammertone blue-green)
RAC-020	Cover, case back cover (Hammertone copper)
RAC-021	Cover, case right end assembly (Hammertone grey)
RAC-022	Cover, case right end assembly (Hammertone blue-green)
RAC-023	Cover, case right end assembly (Hammertone copper)
RAC-024	Cover, case left end assembly (Hammertone grey)
RAC-025	Cover, case left end assembly (Hammertone blue-green)
RAC-026	Cover, case left end assembly (Hammertone copper)
RAG-010	Cover, front and grille (Hammertone grey)
RAG-011	Cover, front and grille (Hammertone blue-green)
RAG-012	Cover, front and grille (Hammertone copper)
RAI-004	Brace, rear brace assembly (Hammertone grey)
RAI-005	Brace, rear brace assembly (Hammertone blue-green)
RAI-006	Brace, rear brace assembly (Hammertone copper)
RAX-011	Cover, cabinet cover assembly (Hammertone grey)
RAX-012	Cover, cabinet cover assembly (Hammertone blue-green)
RAX-013	Cover, cabinet cover assembly (Hammertone copper)
RHK-001	Knob, lock mechanism knob (crinkle brown)
RHK-002	Knob, lock mechanism knob (crinkle grey)
RHK-003	Knob, lock mechanism knob (Hammertone grey)
RHK-004	Knob, lock mechanism knob (Hammertone blue-green)
RHK-005	Knob, lock mechanism knob (Hammertone copper)
RHY-003	Handle, cover handle (Hammertone grey)
RHY-004	Handle, cover handle (Hammertone blue-green)
RHY-005	Handle, cover handle (Hammertone copper)
RIP-001	Paint, touch-up paint (crinkle brown)
RIP-002	Paint, touch-up paint (crinkle grey)
RJP-014	Plug, battery terminal contact pins
RWL-005	Cord, power cord
RLL-015	Beam-A-Scope antenna assembly in cover (crinkle grey)
RLL-016	Beam-A-Scope antenna assembly in cover (Hammertone grey)
RLL-017	Beam-A-Scope antenna assembly in cover (Hammertone blue-green)
RLL-018	Beam-A-Scope antenna assembly in cover (Hammertone copper).

•

General Electric 321

This model appears on *pages 15-45 through 15-47 and on page 15-52 of Rider's Manual Volume XV*. If hum is heard only when the volume control is advanced, reverse the position of C31, the 0.005-μf audio coupling capacitor. The outside foil (ground end) of the capacitor should connect toward T4, the inside foil connects to the volume control.

Gamble-Skogmo 43-5006A

This model is the same as Model 43-5006 which appears on *pages 19-1 through 19-4 of Rider's Manual Volume XIX*, except for the dial-drive stringing and dial-pointer stringing. The diagrams for these changes are shown below.

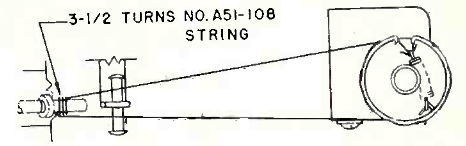


Fig. 1. Dial-drive stringing for Gamble-Skogmo 43-5006A.

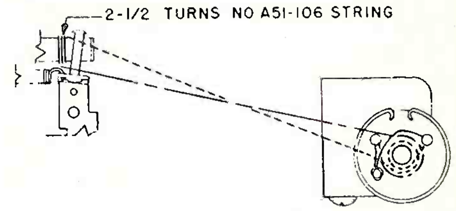


Fig. 2. Dial-pointer stringing for Gamble-Skogmo 43-5006A.

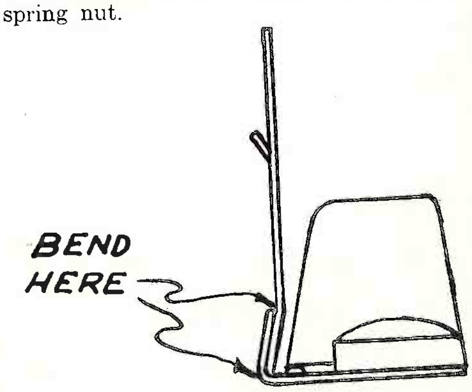
Montgomery Ward 04BR-675B, 04BR-676B

These models are the same as 04BR-675A which appears on *pages 12-8, 12-26, and 12-36 of Rider's Manual Volume XII* with the exception of the value of C18. C18 has been changed to 0.006 μf, 600 v, part no. BE10019.

•

Magnavox Service Hints

Some 12-inch long-playing records have an unfinished edge and are oversized, causing them to rub against the 7-inch pickup arm rest on the small frame, three-speed record changers. To correct this, remove the bracket and bend as shown in the accompanying diagram. Be sure to bend the lever so that it is vertical after the bracket adjustment has been made. To remove the assembly from the motorboard, release the spring nut.



Position of bracket to correct record rub in Magnavox changers.

To tighten a "sagging" grille cloth, spray a fine mist of water on the cloth. Use a fly spray gun and do not apply too much water, or the speaker cone may be damaged.

Radio Changes

General Electric 118, 119

These models appear on *pages 19-8 through 19-10 of Rider's Manual Volume XIX*. The following changes should be made in the parts list. RLC-001 should be changed to RLC-061, T4, coil, oscillator coil. RAY-054 should be RAV-054.

Add:

RAV-056	Cabinet, Model 119 (oak)
RDK-037	Knob, plain, fawn colored
RDK-040	Knob, with arrow, fawn colored
RHH-004	Snapfastener, holds cabinet-back to cabinet on Model 118.

●

Sears 6686A, Ch. 139.151-1

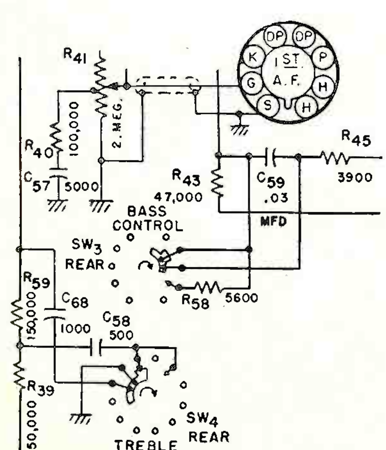
This chassis is similar to Chassis 139.151 which appears on *page 17-1 of Rider's Manual Volume XVII,* except that an "ON-OFF" switch is used in the line cord. The parts list for this chassis is the same as that for the 139.151 except for the following change:

Ref. No.	*Part No.*	*Description*
H	J20667	Line cord, switch and plug.

United Motors R-1253, R-1254, R-1255

Models R-1253 and R-1254 are found on *pages 18-11 through 18-19 of Rider's Manual Volume XVIII.* Model R-1255 is similar to these. The circuit changes for these models are shown in the accompanying diagram. The changes in the parts list are as follows:

Illus. No.	*Production Part No.*	*Service Part No.*	*Description*
C67	CM20A470M	G470	47 μμf, 500 v, ceramic
C68	CM20A102M	G102	1,000 μμf, 500 v, mica
R43	RC40AE473K	C473	47,000 ohms, 2 w, carbon
R45, 47	RC20AE392K	A392	3,900 ohms, ½ w, carbon
R57	RC30AE068K	B068	6.8 ohms, 1 w, carbon
R58	RC20AE562K	A562	5,600 ohms, ½ w, carbon
R59	RC20AE154M	A154	150,000 ohms, ½ w, carbon
SW3	60B265	1218695	Switch, power and tone (bass)
SW4	60B325	1218697	Switch, tone control (treble).



Circuit changes for United Motors R-1253, R-1254, and R-1255.

General Electric 250

This model appears on *pages 15-32 through 15-36 of Rider's Manual Volume XV.* With particularly rough handling, the battery may be cracked while in place in the battery compartment. To forestall this failure, an additional strip of sponge rubber may be installed at the bottom of the battery cover to give added padding. If the battery does not charge and the fuse checks o.k. and the rectifier disks are not defective, check continuity of the power cord. A few isolated cases have been found in which the power cord has opened up where the cord fastens to the prong in the molded plug. An appreciable increase in duration of operation from a fully charged battery can be effected in the following manner, realizing, however, that some degree of performance is sacrificed in regard to sensitivity and power output. Replace power-supply filter resistor R17 (1,500 ohms) with a 4,700-ohm, 1-watt, carbon resistor. This change should be made only when there is a demand for longer duration of operation to one battery charge.

The Signal Seeking Tuner

(Continued from page 1)

developing a d-c voltage across the 1.5-megohm resistor (17).

D. The voltage developed by the bucking diode across the 1.5-megohm resistor (17) opposes the voltage developed by the detector diode across the 330,000-ohm resistor (22). The resultant voltage is applied to the grid of the d-c amplifier section of the trigger tube. This triggering voltage gives a substantially constant tuning accuracy for all signals.

E. When the resultant triggering voltage on the grid of the d-c amplifier becomes positive, it causes the tube to conduct.

F. The plate current flow in the d-c amplifier section develops a biasing voltage across the 120,000-ohm resistor (25), which is between grid and cathode of the relay section of the trigger tube, making the grid more negative than the cathode, thus reducing the plate current.

G. The decrease in plate current flow causes the relay to be de-energized; and the relay arm again engages the paddle wheel, thereby stopping the tuner sweep on a station, opening contacts #1 and #3, and grounding relay contacts #2 and #4.

IV. Holding the tuner on station until a new station is desired (holding the relay de-energized).

A. Relay contact #1 is opened, ungrounding the 6,800-ohm resistor (24) and thus preventing any appreciable current flow in the relay.

B. Relay contact #4 is grounded. This grounds the cathode circuits of the r-f and i-f amplifiers, effectively bypassing the sensitivity control (4), which is now ungrounded, and leaving the set at normal sensitivity.

C. Relay contact #2 is grounded, thereby grounding out the grid of the d-c amplifier. Any voltage now developed across the 330,000-ohm resistor (22) keeps the bucking diode from conducting by applying a negative voltage to its plate. The detector diode now functions as a conventional detector.

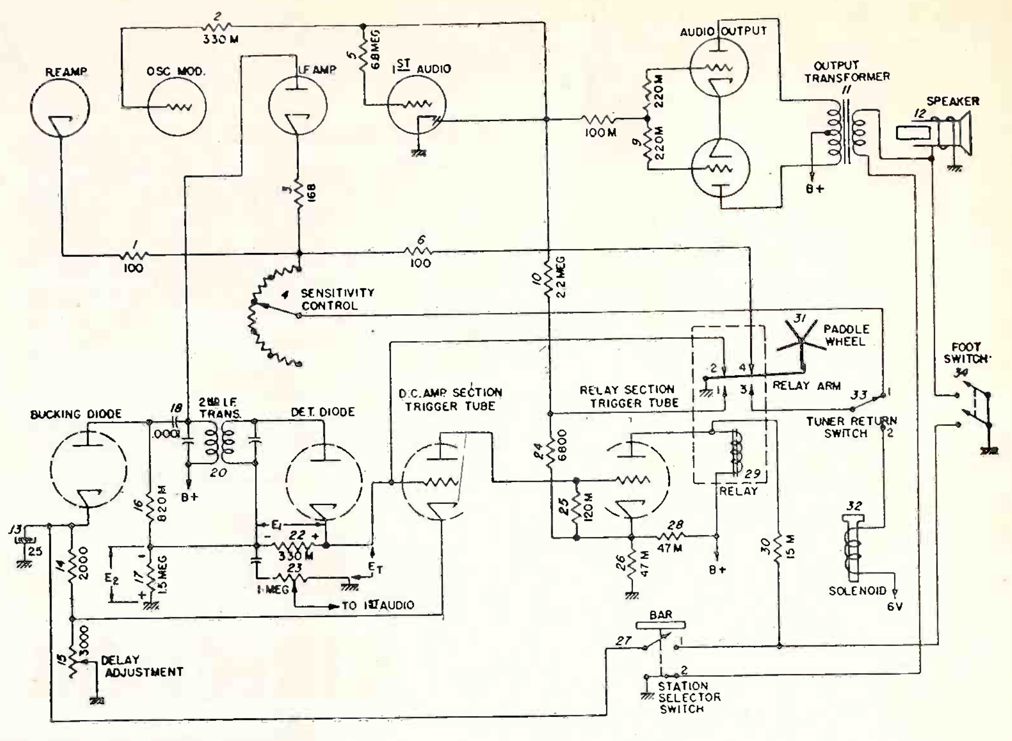


Fig. 1. Schematic for the signal seeking tuner.

The Tuner Detection Circuit (See Figs. 1 and 2)

The purpose of the tuner detection circuit is to take input signal voltages of varying strength and trigger the relay tube so that the tuner will stop accurately on the station frequency. A positive voltage developed by the signal on the grid of the d-c amplifier section causes the tuner to trigger and stop. This is accomplished by using the detector diode and bucking diode to develop voltages of opposite polarity, E_1 and E_2, between grid and ground of the d-c amplifier section of the trigger tube, thus effectively applying the algebraic sum E_T of these voltages to the signal grid. (Note that contacts #2 and #4 of the relay are open.) These relative voltages, plotted against frequency, are shown in Fig. 2, using a station frequency of 1,200 kc. The response curve of the voltage E_2 across the 1.5-megohm resistor (17) is broader and not as large as the voltage E_1 developed across the 330,000-ohm (22) detector load. This is because the detector voltage has the benefit of one more tuned circuit which gives the narrower curve. Also, there is a positive voltage appearing at the cathode of the bucking diode which will have the effect of lowering the voltage E_2 across the 1.5-megohm resistor (17), because it will introduce a delay before the bucking diode. This delay adjustment also controls the trigger level, so that the mechanical delay is compensated for, and the tuner stops exactly on station.

Since the two diodes obtain their voltages from the same incoming signal, the strength of both voltages will vary directly with the strength of the incoming signal. Therefore, while they both rise and fall with the variation in signal strength, their difference E_T which is effectively the trigger pulse, will tend to remain constant. Thus, a station will be tuned in with the same degree of accuracy regardless of whether it is a strong signal or weak signal.

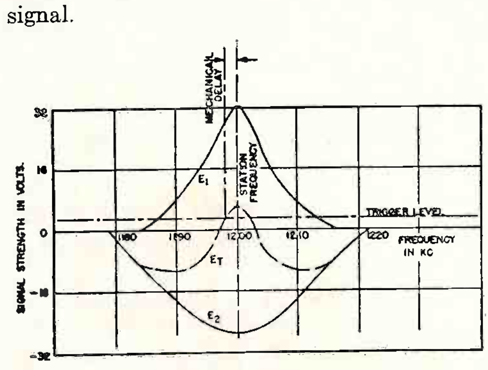


Fig. 2. Response curves of E_1, E_2, and E_T.

Tuner Muting (See Fig. 2)

Various methods of muting are employed in the signal seeker tuner operated radios. To prevent a click in the speaker as the station selector bar energizes the relay, the output transformer circuit is opened [contact #2 of station selector switch (27)], before contact #1 is made. In the case of the foot switch, the speaker voice coil is grounded and the set muted before the relay energizing contact is made.

The receiver is also muted when the solenoid is energized during the return cycle of the tuner. This is accomplished when the tuner return switch (33) is mechanically tripped to position #2 and ungrounds the sensitivity control, which is the cathode return for the r-f and i-f amplifier tubes, thus momentarily disabling the set.

The receiver also may be muted during the sweep cycle of the tuner by applying the negative oscillator voltage to the grids of the audio tubes to cut them off during the sweep time. Then, when the relay stops the paddle wheel on station and contact #1 is ungrounded, enough positive voltage is applied through the 2.2-megohm resistor (10) to counteract the negative voltage from the oscillator and return the output tubes to normal operation. Any excess positive voltage will leak off through the diode to ground in the 1st audio tube.

Sensitivity Control

The sensitivity control is a step resistor which is inserted into the cathodes during the tuning sweep when relay contact #3 is grounded. It is the means by which the operator controls the number of stations on which the tuner will stop.

•

Erratum

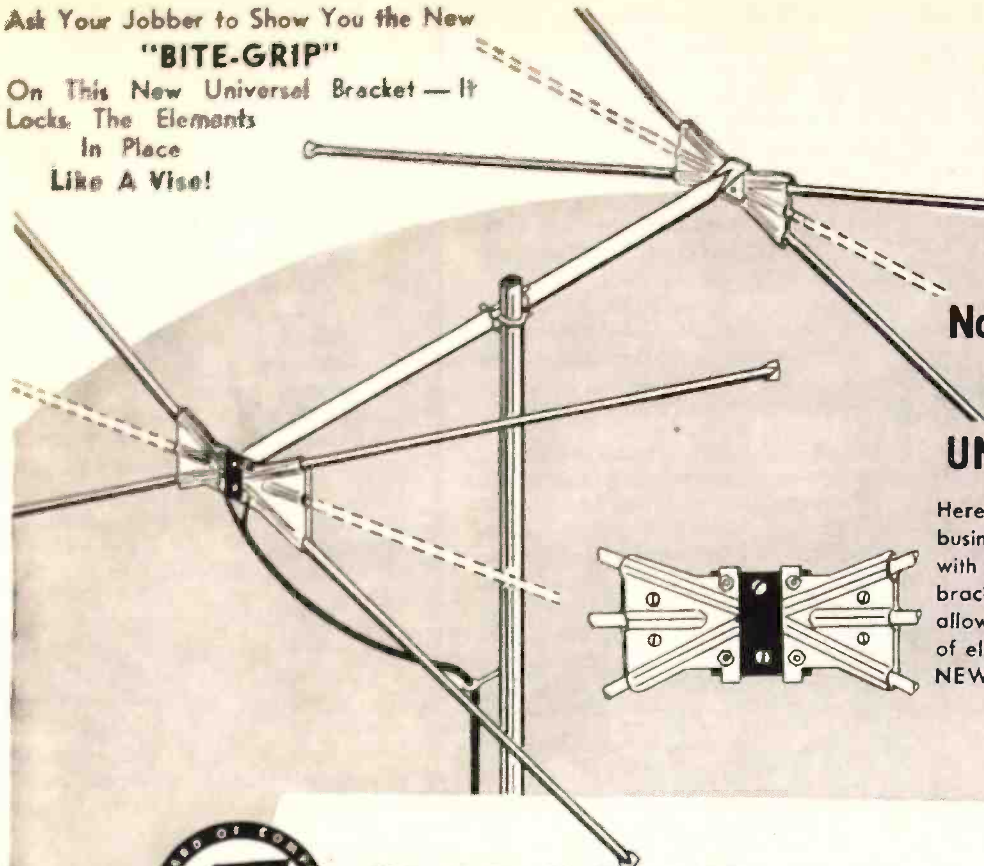
By mistake, the Dakota Radio Supply Company of Yankton, South Dakota, was listed as a Rider Jobber in the December issue of Successful Servicing. This is an error. The only jobbers we have in the state of South Dakota are:

Burghardt Radio Supply, Watertown, S. D.

Power City Radio Company, Sioux Falls, S. D.

Warren Radio Supply, Sioux Falls, S. D.

Ask Your Jobber to Show You the New
"BITE-GRIP"
On This New Universal Bracket — It Locks The Elements In Place Like A Vise!



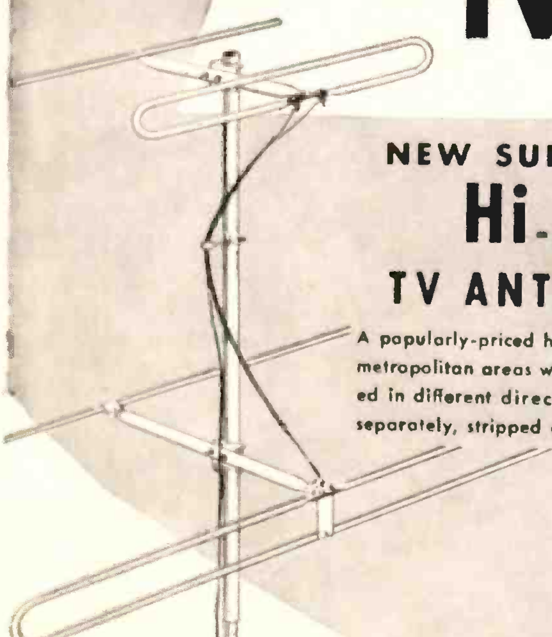
"LAZY X"

The '49 Leader - Now, Improved for '50

With the NEW UNIVERSAL BRACKET

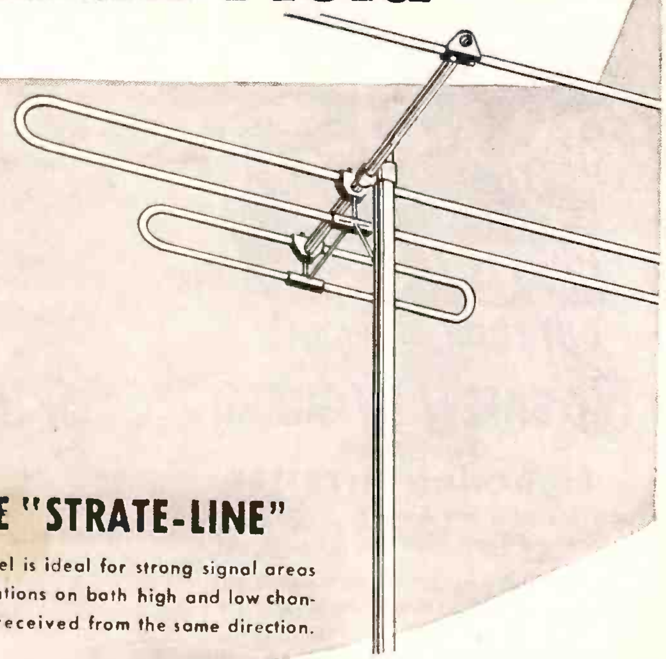
Here is the fastest selling conical in the business . . . NOW made even better with the improved NEW UNIVERSAL bracket! This bracket is truly versatile, allowing for any desired arrangement of elements! AND ALL THIS AT THE NEW LOW PRICES!

RADIART Blankets the TV Antenna Field



NEW SUPERIOR Hi-Lo TV ANTENNA

A popularly-priced hi-lo type . . . for metropolitan areas with stations located in different directions. Available separately, stripped or complete.



THE "STRATE-LINE"

This model is ideal for strong signal areas where stations on both high and low channels are received from the same direction.

IT'S RIGHT WHEN IT'S RADIART

THE RADIART CORPORATION
CLEVELAND 2, OHIO

SUBSIDIARY OF CORNELL-DUBILIER ELECTRIC CORP.

• VIBRATORS • AUTO AERIALS • ROTATORS • TV ANTENNAS • POWER SUPPLIES

Curtain Time

(Continued from page 5)

the picture tube, and everybody went home happy! It is said that truth is stranger than fiction, and so it is . . . The a-m—f-m production lines of several manufacturers have started up again, not on a pre-war basis, but enough to satisfy the demands of distributors of a-m—f-m sets. Believe it or not, a-m—f-m sets are being asked for by set distributors. Please forgive us but we must repeat what we have said for a long time—a-m radio is far from dead . . . We love "cow operas," as we have said on numerous occasions, but we must confess that some of the TV stations are doing their best to kill off this love. Five intermissions for commercials during a 60-minute program is more than we can stomach, even if we do like the bread that they advertise . . . We understand that the FCC has granted an experimental license for phonovision. If it will kill off the commercials or at least limit them during these "cow operas," we are for it . . . Why can't the Texaco program be a model for the commercials on other programs?

Rider Manuals

Thanks for your support of our *Volume XX*. The entire first-print run has been shipped to jobbers. If you were late in placing your order and can not get your copy because your jobber is out of stock, please be patient. We are back on press with the second printing . . . The Rider A-M—F-M Manuals now are in 20 volumes and total the prodigious number of 29,734 pages! . . . The *Rider TV Manual, Volume 4,* now is at the printer. It will be ready in May and contains the equivalent of more than 2,300 (8½" x 11") pages. The physical size of the book is the same as TV Volume 3, and all pages will be in place. When TV Volume 4 appears, this television series will cover more than 1,000 models of American-made TV receivers. Thanks publicly to all the men who wrote us those letters of appreciation about TV Volume 3, especially about the advantages of the larger pages and the pages filed in place.

HIWYNI

"Is not he imprudent, who, seeing the tide making haste towards him apace, will sleep till the sea overwhelms him?"—*Tillotson* . . . Why wait to buy your Rider Manuals; for on each occasion when you need them, and you do not have them, you lose an unnecessary amount of time. A service facility sells time and knowledge. Anything which saves time reduces costs and increases income. Time is money. Examine *your* Rider library. If you are shy a volume, buy it today. Have It When You Need It. Remember that it will work for you for years to come. Think back. How many years have your Rider Manuals been working for you?

JOHN F. RIDER

Vacuum-Tube Voltmeters (Revised)

Our book bearing the above title has been a standard work on vacuum-tube-voltmeter art for about eight years. Its revision has been completed, bringing it right up-to-the-minute. All chapters have been worked on so as to include all the known art related to the subject. The chapter on commercial vacuum-tube voltmeters has been augmented to embrace every device offered on the market during the years since the end of World War II and those being sold currently. The bibliography, which has been complimented by reviewers, has been almost doubled by the addition of all references which have appeared since the initial publication of the first edition.

Every user of vacuum-tube voltmeters will find this revised edition a gold mine of information. It is the theoretical and practical story of the art. Its contents will enable every user of the VTVM to get his maximum money's worth out of his equipment. Watch for announcement of the publication date and all details of the new contents.

Simplophone Amplifier

Simplophone Corporation of America is now marketing a device called Simplophone, that does away with one-hand phoning, as is shown in Fig. 1.

Voice amplification is achieved with no phone-to-Simplophone connecting wires. The Simplophone plugs into a regular 110-volt a-c or d-c circuit. The schematic is shown in Fig. 2. To make or receive a call, place the telephone handset on Simplophone's plastic cradle. The Simplophone does the rest.

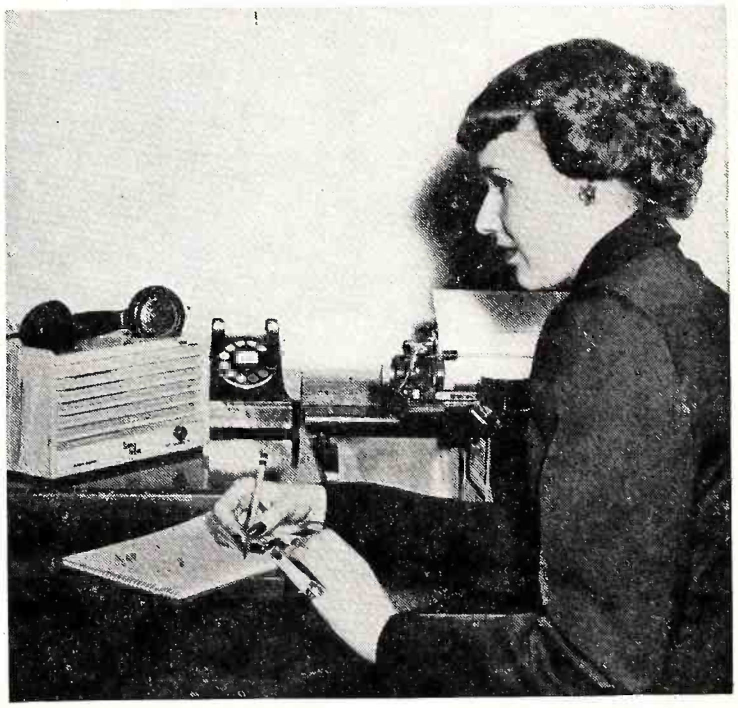


Fig 1. The Simplophone in actual use.

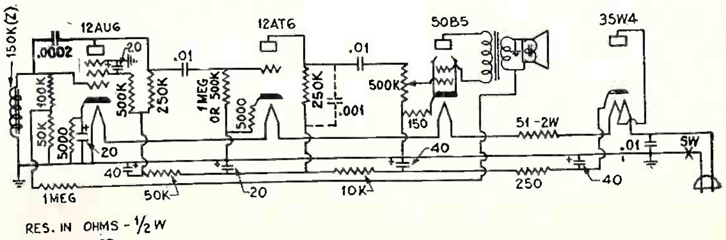
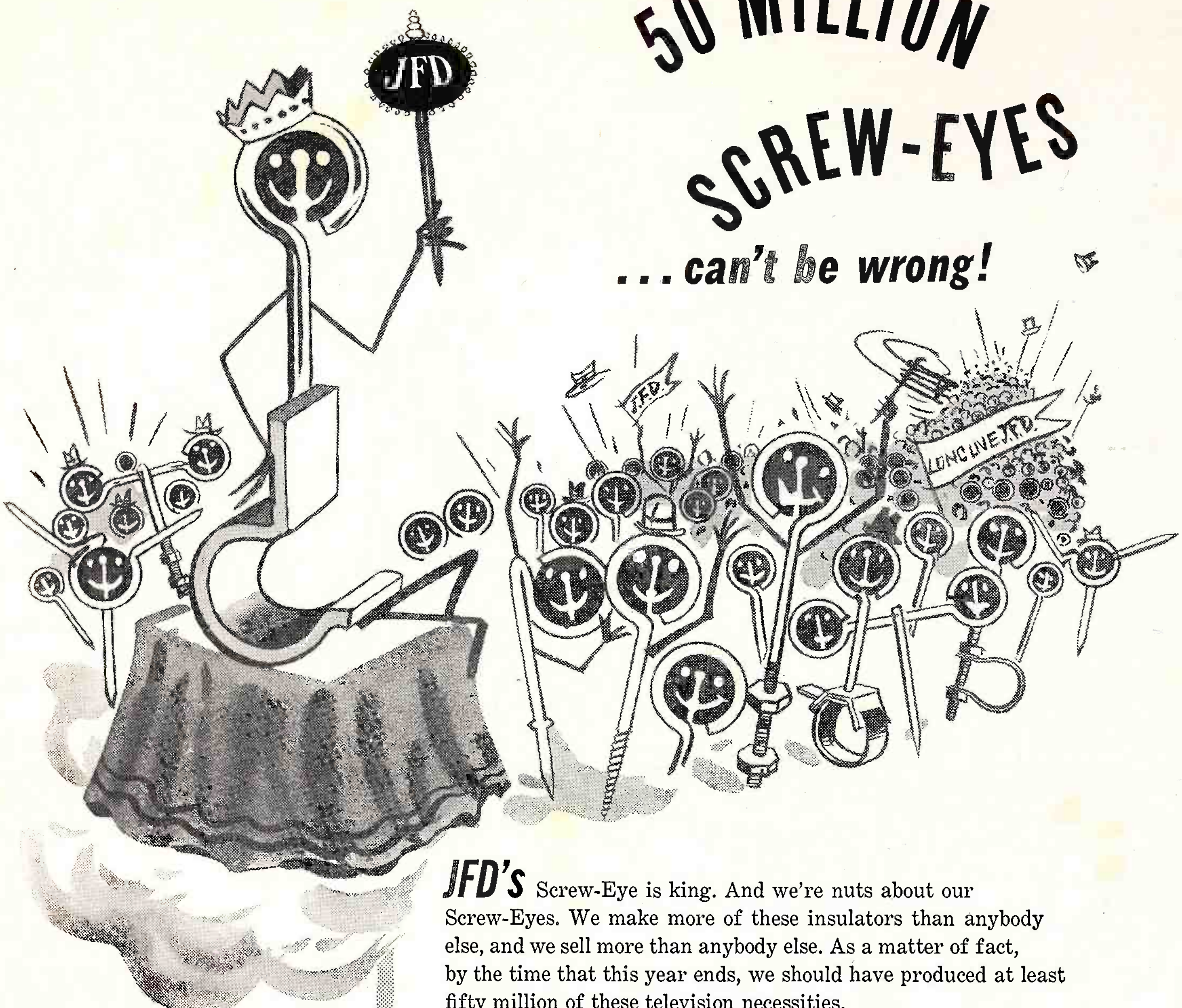


Fig. 2. Schematic of the Simplophone, Model H105.

50 MILLION SCREW-EYES

... can't be wrong!



JFD's Screw-Eye is king. And we're nuts about our Screw-Eyes. We make more of these insulators than anybody else, and we sell more than anybody else. As a matter of fact, by the time that this year ends, we should have produced at least fifty million of these television necessities.

ONE of our most popular (and exclusive) types is the JFD Series SPT125 Snap-On Insulators. No other clamps like them. Snap . . . click . . . and they're on with a tight spring steel grip. They're terrific time-savers . . . and, of course, TV Installation Men are making money with them.

IF you're one of the few who are still unaware of the big profits in these tiny insulators . . . write today . . . and let us open *your* eyes to JFD Screw-Eyes.

Write for FREE Bulletin #4 describing all types of JFD Screw-Eye Insulators.

World's Largest Manufacturer of Television Antennas and Accessories

JFD MANUFACTURING CO., Inc.
6119 16th AVENUE
BROOKLYN 4, N. Y.

Stromberg-Carlson TV-12 Series 12

Model TV-12 appears on *pages 1-17 through 1-29,30 of Rider's TV Manual Volume 1.* The TV-12 Series 12 receiver contains the addition of a fuse ¼-amp., 250-volt, part number 128000, to the horizontal output circuit. The fuse is added between the junction of C-275 and L-219 and the bottom of the primary winding of the horizontal output transformer T-204.

•

Crosley 9-425

This model appears on *pages 3-9 through 3-16 of Rider's TV Manual Volume 3.* Substitute the following r-f tuner parts list for the r-f tuner parts list shown on *page 3-16.*

Ref. No.	*Part No.*	*Description*
C1,2	146924-202	Capacitor, 25 $\mu\mu$f, 10%, ceramic
C3	146924-203	Capacitor, 0.25 $\mu\mu$f, $\pm$0.02 $\mu\mu$f, ceramic
C4	146924-204	Capacitor, 15 $\mu\mu$f, 10%, ceramic
C5	146924-205	Capacitor, 68 $\mu\mu$f, 10%
C6,7,10, 14,15,16,17	146924-206	Capacitor, 680 $\mu\mu$f, 10%
C8	146924-207	Capacitor, 0.005 $\mu\mu$f, disk ceramic
C9	146924-208	Capacitor, 3 $\mu\mu$f, $\pm$ 0.5 $\mu\mu$f
C11A,11B	146924-209	Two-section, capacitor, trimmer
C12	146924-210	Capacitor, 0.5 $\mu\mu$f, 10%, ceramic
C13	146924-211	Capacitor, 1.5 $\mu\mu$f, 10%
R1	39374-25	Resistor, 1,000 ohms, ½ w, 10%
R2	39734-125	Resistor, 10,000 ohms, 1 w, 10%
R3	39374-61	Resistor, 1 megohm, ½ w, 10%
R4	39374-40	Resistor, 18,000 ohms, ½ w, 10%
R5	39374-48	Resistor, 82,000 ohms, ½ w, 10%
R6	39374-123	Resistor, 6,800 ohms, 1 w, 10%
R7	39374-41	Resistor, 22,000 ohms, ½ w, 10%
R8	39374-33	Resistor, 4,700 ohms, ½ w, 10%
R9	39374-43	Resistor, 33,000 ohms, ½ w, 10%
R10	39374-21	Resistor, 470 ohms
R60	39374-48	Resistor, 82,000 ohms
T9	146924-212	Transformer, antenna
L2		Choke, filament (part of 146924-201)
L3		Choke, r-f (part of 146924-201)
	146924-213	Socket, tube (V1, V2)
	146924-214	Socket, tube (V3)
	146924-215	Shield, tube (V3)
	146924-58	Shield, tube (V1)
	146924-201	R-f tuner assembly (complete).

RIDER MANUALS *Mean* SUCCESSFUL SERVICING

Cover

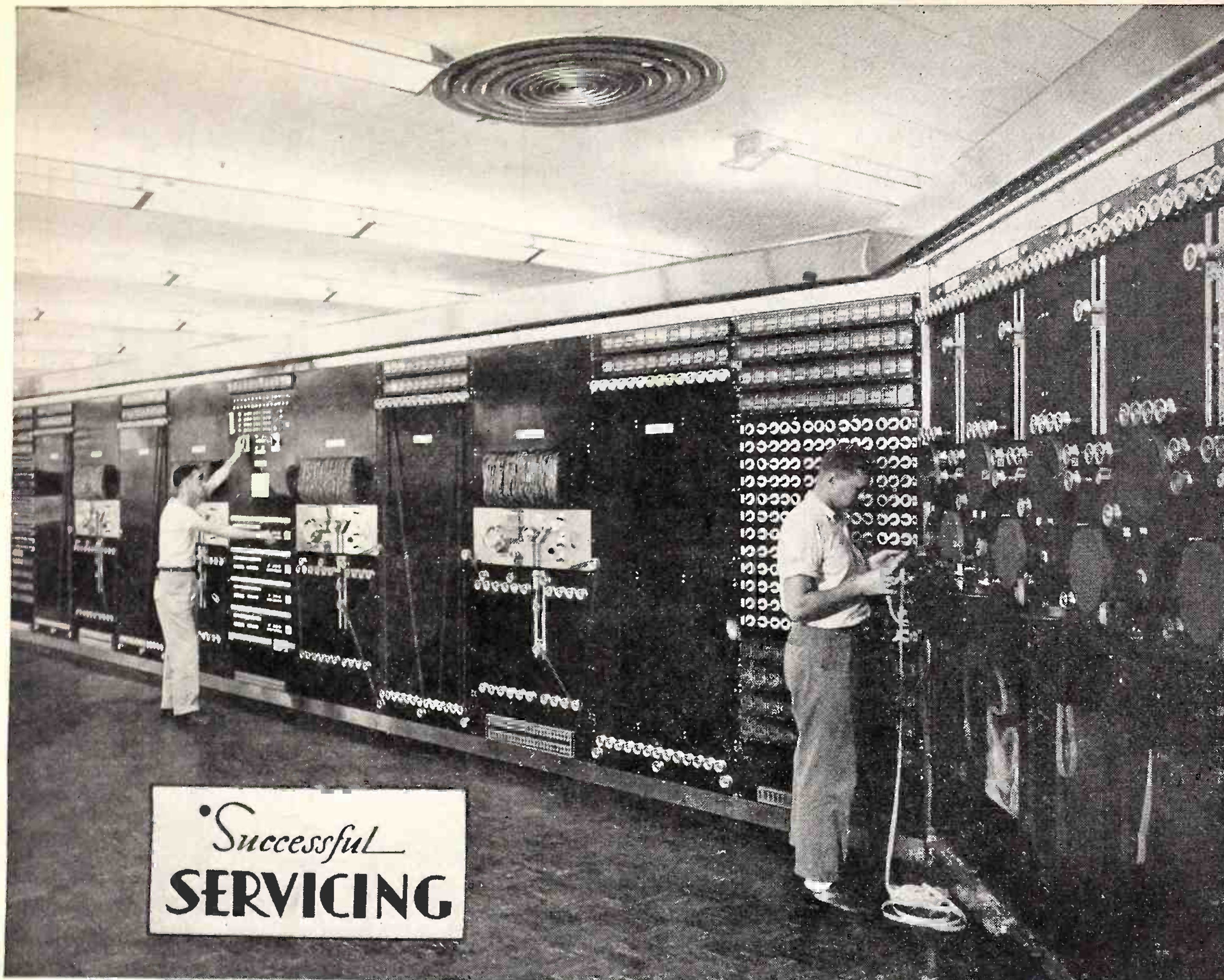
The photograph on the cover shows a mechanic aligning a Bendix MN62A automatic direction finder receiver with American Airlines built equipment.

From
JOHN F. RIDER PUBLISHER, Inc.
480 CANAL ST., NEW YORK 13, N. Y.
Return Postage Guaranteed

A. J. S. CERINO
2393 PITKIN AVE.
BROOKLYN 8, N. Y.

Sec. 34.66, P. L. & R.
U. S. POSTAGE
PAID
NEW YORK, N. Y.
PERMIT No. 9427

Distribution of This Issue—54,000 Copies



APRIL, 1950

Official U. S. Navy Photograph

PARASITICALLY EXCITED ANTENNAS

By ARNOLD B. BAILEY

> Editor's Note: This material is an abridged excerpt of the same subject as found in "Theory and Practice of TV and Other Receiving Antennas," a forthcoming book which has been written by the author of this article and will soon be published by John F. Rider Publisher, Inc.

THE zero-gain half-wave antenna is often unable to supply sufficient signal energy to the radio receiver, and we are forced in such cases to go to more elaborate forms of antennas. One of the simplest ways of obtaining more than zero-db gain is to employ a standard half-wave antenna supplemented by one or more parallel resonant rods. These, by their location in close proximity to the antenna, cause a substantial increase in the antenna's ability to intercept energy from the oncoming radio wave in certain directions. The rods, called "parasitic elements," are not metallicly connected to the antenna circuit, but are close enough to the antenna to augment the radio field in the immediate vicinity.

We have in a previous section indicated that a resonant continuous rod unconnected to any other object can greatly modify the oncoming electromagnetic field in its vicinity. Such a rod can intercept more wave energy than if it were metallicly connected to a load. It must, however, reradiate all that it intercepts. In Fig. 1 is shown the physical arrangement of a connected element *C* and an adjacent parasitic element *P*. In the case shown, the parasitic element is located at the back of the antenna, and signal energy is first intercepted by the connected dipole. The connected dipole *C* not only absorbs energy from the oncoming wave, but also must reradiate as much as it absorbs ¼ cycle later. The parasitic element *P* now is exposed to two sources of wave energy, the original wave plus a retarded one reradiated by *C*. If the parasitic element is so dimensioned as to be nearly resonant, it will efficiently extract energy from both waves, and will reradiate it almost completely a fraction of a cycle later.

This reradiation from the parasitic can now be intercepted by the connected dipole. Half of the intercepted reradiation can be retained in the dipole load, if it is correctly timed. Hence, under proper conditions of timing, the connected dipole will be able to gather useful energy both from the original wave and from the reradiated wave which is sent out by the parasitic element. Timing is chiefly governed by the distance between the parasitic and the connected element and by the length of the parasitic element. The distance between these two elements determines the time at which the original wave reaches the parasitic relative to the time it reaches the connected dipole; it also controls the time required for the reradiation to return to the connected dipole. The reradiation delay from the parasitic is ¼ cycle when the parasitic is at resonance, i.e., the length is critically set for resonance. Reradiation delay is greater than ¼ cycle if the parasitic is longer, and less than ¼ cycle if the parasitic is shorter than the resonant length.

In parasitic reradiation problems, the timing of the returned energy, as well as the

(Continued on page 10)

Television Changes

Crosley 348CP

This model is found on *pages 2-25 through 2-71 of Rider's TV Manual Volume 2*. An explanation of picture pilots and a diagram of a typical circuit are shown on *page 2-36*. The actual wiring diagrams and the corresponding parts lists will be given here. Fig. 1 is the wiring diagram for channels 2-4. The parts list is as follows:

Ref. No.	*Part No.*	*Description*
1,2	C-137727-27	Capacitor, 15 μμf, 5%, 500 v, ceramic
3A,3B	AW-138923	Two section, ceramic—capacitor, 100 μμf, 5%, capacitor, 40 μμf, 2.5%
4,10	B-138942-3	Capacitor, trimmer, 25-270 μμf
6	39012-66	Core, iron
8	39012-75	Core, iron
12A,12B	AW-138923	Two section, ceramic—capacitor, 100 μμf, 5%, capacitor, 40 μμf, 2.5%
13	B-139657-1	Two section, ceramic—capacitor, 5 μμf, 500 v, capacitor, 5 μμf, 500 v
14	B-139657-1	Two section, ceramic—capacitor, 5 μμf, 500 v, capacitor, 5 μμf, 500 v
15,16	39374-56	Resistor, 390,000 ohms, 10%, ½ w
17,18	39374-36	Resistor, 8,200 ohms, 10%, ½ w
19,20		Coil, oscillator
21,24		Coil, primary
22,23		Coil, secondary
25,26	39012-78	Core, iron
	W-138005-1	Pin, antenna (⅛" diam.)
	W-138005-2	Pin, antenna (5/16" diam.)
	W-138607	Seal pin (feed-thru insulator)
	39440	Socket, tube
	AW-138836	Base and pin assy.
	AW-139764	Terminal board, secondary coil
	W-139747	Bracket, secondary core mtg.
	W-138089	Spacer, terminal board mtg.
	W-132366-2	Nut, locking (secondary core)
	W-138796	Nut, core bushing
	W-138795	Bushing (threaded), tuning core.

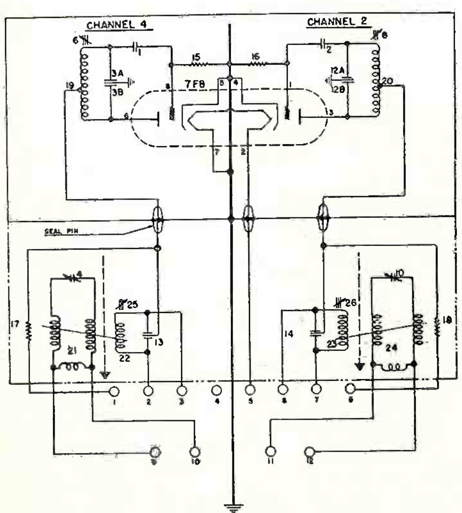


Fig. 1. Wiring diagram for channels 2-4 of Crosley 348CP.

The wiring diagram for channels 3-6 is the same as that shown in Fig. 1 for channels 2-4. The replacement parts list is the same as that given for channels 2-4 except for the following changes:

Ref. No.	*Part No.*	*Description*
6	39012-75	Core, iron
25	39012-79	Core, iron.

The wiring diagram for channels 5-7 is shown in Fig. 2. The parts list is the same as that given for channels 2-4 except for the following changes:
Delete parts 3A, 3B, 13, and 25.

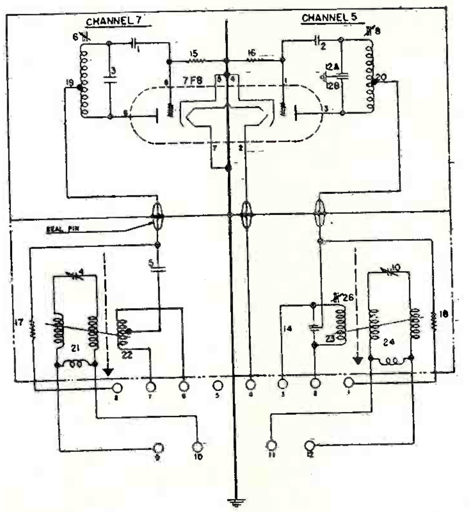


Fig. 2. Wiring diagram for channels 5-7 of Crosley 348CP.

The following changes have been made:

Ref. No.	*Part No.*	*Description*
3	W-142834	Capacitor, 30 μμf, ceramic
4	B-138942-4	Capacitor, trimmer, 12-160 μμf
5	C-137727-20	Capacitor, 91 μμf, 10%, 300 v, ceramic
6	AW-142929	Core, copper
26	39012-79	Core, iron
	AW-138764	Terminal board, secondary coil (chan. 5)
	AW-139886	Terminal board, secondary coil (chan. 7).

The wiring diagram for channels 8-9 and 10-11 is shown in Fig. 3. The replacement parts list is the same as that given for channels 2-4 except for the following changes:
Delete parts 3A, 3B, 12A, 12B, 25, 26, W-139747 and W-138089.
The following changes have been made:

Ref. No.	*Part No.*	*Description*
1,2	C-137727-45	Capacitor, 56 μμf, 10%, 500 v, ceramic
3,12	W-142834	Capacitor, 30 μμf, ceramic
4,10	C-136327-42	Capacitor, trimmer, 10-160 μμf
5,7	C-137727-20	Capacitor, 91 μμf, 10%, 300 v, ceramic
6,8	AW-142929	Core, copper
9	C-137727-8	Capacitor, 1,000 μμf, 300 v, ceramic
13,14	B-142951-1	Capacitor—resistor, 500 μμf, 220 ohms
17,18	39374-25	Resistor, 1,000 ohms, 10%, ½ w.

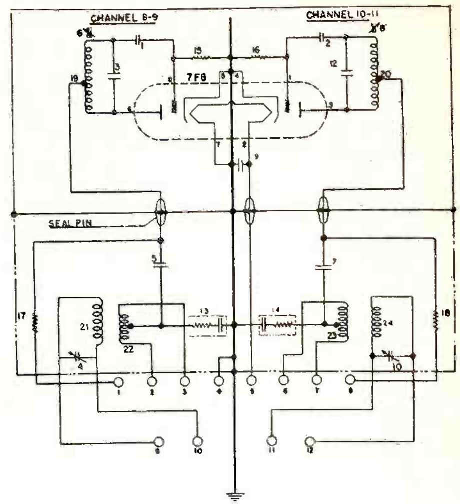


Fig. 3. Wiring diagram for channels 8-9 and 10-11 of Crosley 348CP.

The wiring diagram for channels 12-13 is shown in Fig. 4. The replacement parts list is the same as that given for channels 2-4 except for the following changes:
Delete parts 2, 3A, 3B, 8, 10, 12A, 12B, 14, 16, 18, 20, W-138005-2, W-139747, W-138089, W-132366-2, and AW-139764.
The following changes have been made:

Ref. No.	*Part No.*	*Description*
1	C-137727-45	Capacitor, 56 μμf, 10%, 500 v, ceramic
3	W-142834	Capacitor, 30 μμf, ceramic
4	C-136327-42	Capacitor, trimmer, 10-160 μμf
5	C-137727-20	Capacitor, 91 μμf, 10%, 300 v, ceramic
6	AW-142929	Core, copper
9	C-137727-8	Capacitor, 1,000 μμf, 300 v, ceramic
13	B-142951-1	Capacitor—resistor, 500 μμf, 220 ohms
17	39374-25	Resistor, 1,000 ohms, 10%, ½ w
	AW-143217	Picture pilot (complete).

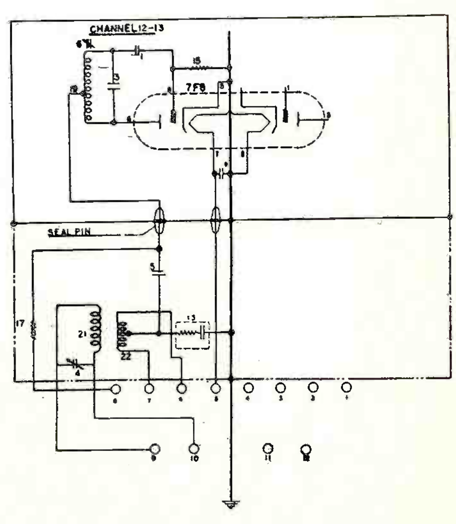


Fig. 4. Wiring diagram for channels 12-13 of Crosley 348CP.

Television Changes

Muntz M-169

This model appears on *page 3-4 of Rider's TV Manual Volume 3.* A bleeder resistor, 30,000 ohms, 10-watt, wire-wound, between ground and pin 8 of the 5U4G low-voltage rectifier, has, upon occasion, been used in sets having 450-working-volt filter capacitors. The purpose of this resistor was to reduce the initial surge voltage and protect the 450-volt filters. The bleeder resistor is now omitted and a better grade of filters is being used. The new 2x40-$\mu\mu$f, 500-volt, capacitor section increases the working voltage from 450 working volts to 500 working volts. The part number should be changed to read CE 0026-A. This change has been incorporated in 10-inch and 12-inch chassis above serial number 35,432, and in 16-inch chassis above serial number 25,495.

Pilot TV-121A, 123

These models are similar to Model TV-121 which appears on *pages 3-10 through 3-21 of Rider's TV Manual Volume 3*, except for the following changes. The antenna tuning coil and capacitor have been added as is shown in Fig. 1.

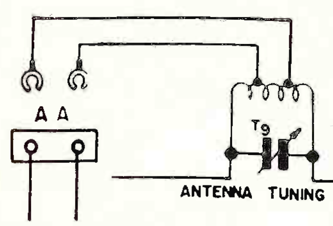


Fig. 1. Antenna connections for Pilot TV-121A, 123.

The value of the grid resistor of the 12AT7 (c) oscillator has been changed from 10,000 ohms to 8,200 ohms. The 1,500-$\mu\mu$f capacitor in the cathode circuit of the 6AU6, 3rd i-f stage, has been deleted. The 1N34 germanium crystal detector, 110-304, contained in the video detector coil assembly, has been changed to a 1N60 germanium crystal. A second sound trap has been added as shown in Fig. 2, to avoid sound-carrier interference in the picture. It is aligned by iron slug S21 to a frequency of 27.25 Mc to absorb excessive sound energy. The part number of the 4.5-Mc trap coil connected to the plate of the 12AU7, 2nd video amplifier, has been changed from 79-75 to 79-85. The value of the contrast control, 39-19, has been changed from 2,000 ohms to 2,500 ohms. S5 is aligned to 23.8 Mc, instead of to 23.5 Mc.

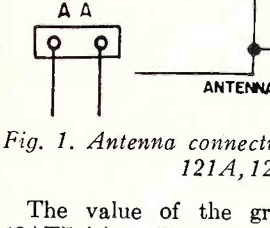


Fig. 2. Sound trap for Pilot TV-121A, 123.

The value of the capacitor connected between pin 2 and pin 4 of the 6SN7GT horizontal oscillator has been changed from 330 $\mu\mu$f to 270 $\mu\mu$f. The value of the resistor connected between pin 4 of the 6SN7GT horizontal oscillator and the horizontal-hold control has been changed from 100,000 ohms to 56,000 ohms. The value of the resistor connected from pin 6 of the 6SN7GT to the horizontal-size control has been changed from 1,000 ohms to 680 ohms. The fuse has been changed from a ¼-amp, 500-volt fuse, type 3AG, no. 111-8, to a ¼-amp, 250-volt fuse, no. 111-9.

The numbering of pins 7 and 2 of the 1B3GT, high-voltage rectifier, should be reversed. The resistor that is shown going to pin 7 should go to pin 2, and the value of this resistor has been changed from 3 ohms to 4.7 ohms. A choke, 75-38, has been added to the a-c line (from the a-c line interlock) which goes to pin 6. A choke, 75-38, has been added to the a-c line which goes to the ON-OFF switch. Between this latter choke, the a-c line interlock, and the antenna, a 100-$\mu\mu$f capacitor has been added.

The radio-frequency chokes, part nos. 75-29, between points A and B, B and C, and D and E, in the filament network have been deleted. The remaining radio-frequency chokes between points Z and A, and C and D, have been changed from 75-29 to 75-37. The 1,500-$\mu\mu$f capacitors between points C and ground and D and ground have been deleted.

The 0.1-μf, 400-volt capacitor and the 220,000-ohm resistor in the plate circuit of the 6AT6, 1st audio amplifier stage, have been deleted. The 100,000-ohm resistor, now in that circuit, goes to the +140-volt supply. The 125,000-ohm, 10-watt resistor from the grid of the 6AQ5 audio power amplifier to the 2-watt, 470-ohm resistor has been deleted. The filament leads of the 6AQ5 go to Y-Y instead of to W-W.

The yoke cable has also been changed. The pin numberings on the plug have been changed as follows: pin 1 of the 121A and 123 chassis, corresponding to pin 2 of the 121 chassis, goes to tap 1 of the deflection-yoke assembly; pin 2, corresponding to pin 3, goes to tap 3; pins 3 and 4, corresponding to pins 1 and 7, are tied together; pin 5, corresponding to pin 6, goes to tap 6; pin 6, corresponding to pin 5, goes to tap 4; and pin 7, corresponding to pin 4, is grounded.

Socket pins 1, 2, 3, 4, and 7 of the 121A and 123 chassis correspond respectively to pins 2, 3, 1, 7, and 4 of the 121 chassis. A 12,500-ohm, 10-watt resistor has been added in the 121A and 123 chassis, from pin 2 to the +140-volt line. Pins 5 and 6 of the 121A and 123 chassis, are connected to the vertical output transformer, 56-27, as shown in Fig. 3. The vertical output transformer has been changed from 56-23 to 56-27 and the connections are shown in Fig. 3.

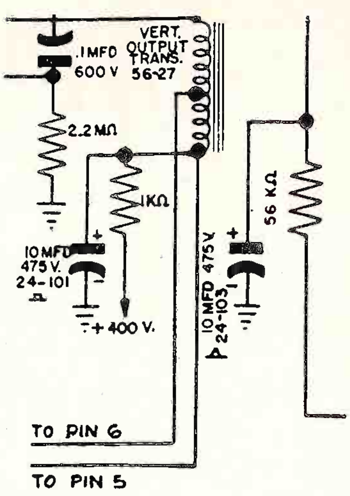


Fig. 3. Vertical-output-transformer connections for Pilot TV-121A, 123.

Stromberg-Carlson TV-12 Series 13

Model TV-12 appears on *pages 1-17 through 1-29,30 of Rider's TV Manual Volume 1.* The series 13 receivers have two changes included in them. Listed below is one change which was made to minimize interference to the vertical sync circuits.

1. Change R-202 from 47,000 ohms to 1,000 ohms.
2. Change R-221 and R-309 from 100,000 ohms to 47,000 ohms, 2 watts each.
3. Add a resistor, 27,000 ohms, 2 watts, from pin 6 of the video amplifier to ground.
4. Remove R-222, a 3,300-ohm, 2-watt resistor.
5. Connect the plus terminals of C-216B and C-216D together.
6. Connect a 10,000-ohm, 2-watt resistor in parallel with R-213A.
7. Change C-244 from 0.05 μf to 270 $\mu\mu$f.

Also included in this series is the following change to quicken the return time of the vertical sweep.

1. Remove R-270, 6,800 ohms, and ground pin 6 of V-216A.
2. Add a 12,000-ohm resistor across the plate winding of T-201, which is between the brown and black leads.
3. Change R-274 from 470,000 ohms to 750,000 ohms.
4. Change R-278 from 3,900 ohms to 4,700 ohms.

Muntz M-159A

This model appears on *page 3-2 of Rider's TV Manual Volume 3.* A 0.005-μf capacitor, CC-60, has been added from filament pin 2 of the 6BG6 horizontal oscillator and output tube to ground. The value of the resistor connected to pin 8 of the same tube is 8,000 ohms, 10 watts.

done, until we got word about the devices which would make their appearance at the IRE show in New York in March. The presses were stopped (believe it or not), and rewrites and additions to chapters were started on advance information about what would appear at the show. Along came the show and with it a deluge of new 'scopes of all kinds. All of these are now in the book (or is it a tome) and the writing job is completed. The new material is being set and that which could be printed is rolling.

A change has been effected in the title of this book, as is announced elsewhere in this issue. Henceforth it will be known as "ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES," instead of the original title of "New Cathode-Ray Tube at Work." Judging by its coverage of the subject, it is encyclopedic in nature and rightfully can be called by that name. And so it is! Changing the name of a text may not be the usual thing to do, but one

An Appeal To 'Scope Mfgrs.

Having spent more than a year on a project, it is reasonable to expect that the opportunity to observe a condition existed during that time. One of the very significant things we noted while working with the 'scopes offered on the commercial market is the diversification in names selected as labels for the controls on the face of the panels. To say the least, they are as varied as the colors in Joseph's coat, and it does not make for greatest ease in understanding.

Isn't it possible to standardize names for a control which performs the same function? Admittedly the names one finds used are not so divergent in meaning as to make comprehension impossible, but it is strange to note that such a simple thing as a potentiometer which varies the level of the signal fed into the vertical or the horizontal amplifier of a 'scope is identified in at least seven different ways. Sometimes the names used on one category of equipment, for example, a general purpose 'scope, are in conflict with the names used for a differently functioning element on a more elaborate device.

We realize, of course, that after a period of experience, the necessary familiarity is attained, and that in the long run, even a variety of names will not defeat the application of the 'scope; neither will it take too much time for an individual to become familiar with the names used on two or three different 'scopes which he may have in the shop. But, all this notwithstanding, it just does not seem proper not to standardize on such a simple thing. Some of the functions labeled in this manner have remained unchanged ever since the first cathode-ray oscilloscope made its appearance, yet the names have changed over the years. Why?

We cannot see how it lends any individuality to the product. It might if any one manufacturer would be consistent in the names which he assigns to similar controls on different models, but even that is not done. This is not a major issue in the life of the electronic industry, we admit, but it is one of those situations which can be remedied so easily with benefits to all, that it is reasonable that it be done.

How about a committee for the standardization of oscilloscope-control nomenclature?

TV Production in 1950

Just to back up the statement made in the last issue of SUCCESSFUL SERVICING about TV production during 1950, it is with glee that we report the production of approximately 380,000 units during the month of February. That's about 10 percent above January. It is also interesting to note, this time, according to the March 27 issue of *Video, the Television Newsletter,* that a total of about 11.5 million other radio units were produced during 1949. Of this total, 4 million were auto radio receivers and 7.5 million were home receivers. Not a bad prospect for future servicing!

HIWYNI

Have It When You Need It. As a figure of speech, it applies to everything man needs

(Continued on page 20)

New

Ma

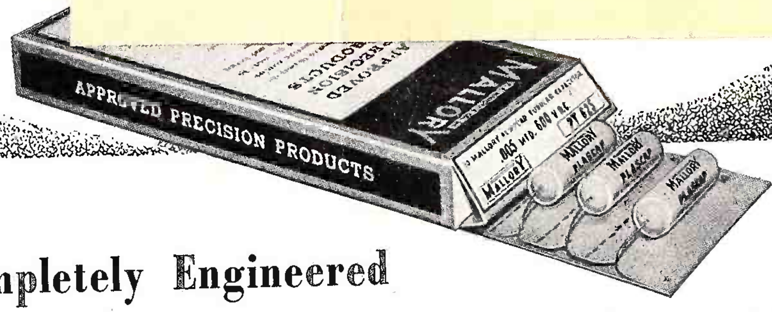
. . . Made

First Class
Permit No. 1307
Sec. 34.9 P. L. & R.
Indianapolis, Indiana

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

—2c POSTAGE WILL BE PAID BY—

P. R. MALLORY & CO., INC.
Wholesale Division
P. O. Box 1558
Indianapolis 6, Indiana



World's First Completely Engineered Plastic Tubular Capacitor

Here's the plastic tubular that's years ahead of its time . . . made possible *now* by Mallocene, amazing Mallory plastic development that gives you *four exclusive* performance firsts, leaves ordinary plastic tubulars far behind!

Gone is the old bugaboo of "call-backs" due to construction weaknesses beyond your control. For the Mallory Plascap is dependable. No oil leakage, no unsoldered leads, no off-center or deformed cartridges, no messy outside wax coating, no insulation problems. The Mallory Plascap makes your service job easier! See your Mallory Distributor.

The Secret of Mallocene . . .

There is only *one* logical way to build a molded type plastic tubular capacitor . . . with a plastic that sticks to the metal leads! But with ordinary construction methods, this has been impossible, for such a plastic would stick to the metal mold!

Here's the secret of the Mallory Plascap. First, an extremely tough plastic shell is molded. The cartridge is carefully centered within this shell. Then, the cartridge is surrounded with Mallocene. When Mallocene hardens, it actually becomes part of the outer plastic shell, and *sticks to the metal leads!* Thus, Mallocene provides a solid plastic tubular capacitor with the *first* moisture-proof construction!

1ST **TRISEAL CONSTRUCTION**—Sealed *three* ways—with moisture-free Mallotrol* . . . tough outer plastic shell . . . exclusive Mallocene!

1ST **FASTITE LEADS**—Permanently fastened . . . sealed with Mallocene . . . unaffected by soldering-iron heat!

1ST **DISTORTION-FREE WINDING** — No flattened cartridges due to molding pressures . . . no failures due to "shorts"!

1ST **TRU-CENTER CARTRIDGE**—Cartridge centered every time . . . uniform insulation guaranteed at all points!

Plus these Top Features: Operates at 85°C . . . . No messy outside wax coating required . . . Great mechanical strength . . . Small in size . . . Light in weight . . . High dielectric strength . . . Lead to outside foil clearly identified . . . Handsome yellow case . . . Legible part-numbers and ratings.

P. R. MALLORY & CO. Inc.
MALLORY
CAPACITORS . . . CONTROLS . . . VIBRATORS . . .
SWITCHES . . . RESISTORS . . . RECTIFIERS . . .
VIBRAPACK* POWER SUPPLIES . . . FILTERS
*Reg. U. S. Pat. Off.
APPROVED PRECISION PRODUCTS
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

*Trade Mark

Successful
SERVICING
REG. U.S. PAT. OFF.
Vol. 11 APRIL, 1950 No. 6
Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

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

JOHN F. RIDER, Editor

CURTAIN TIME

The New Oscilloscope Encyclopedia

We have just completed the final version of our new book on 'scopes. It was finished late last year—at least we thought it was done, until we got word about the devices which would make their appearance at the IRE show in New York in March. The presses were stopped (believe it or not), and rewrites and additions to chapters were started on advance information about what would appear at the show. Along came the show and with it a deluge of new 'scopes of all kinds. All of these are now in the book (or is it a tome) and the writing job is completed. The new material is being set and that which could be printed is rolling.

A change has been effected in the title of this book, as is announced elsewhere in this issue. Henceforth it will be known as "ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES," instead of the original title of "New Cathode-Ray Tube at Work." Judging by its coverage of the subject, it is encyclopedic in nature and rightfully can be called by that name. And so it is! Changing the name of a text may not be the usual thing to do, but one must derive some pleasure from life—and after all, our Constitution gives us some rights and privileges.

An Appeal To 'Scope Mfgrs.

Having spent more than a year on a project, it is reasonable to expect that the opportunity to observe a condition existed during that time. One of the very significant things we noted while working with the 'scopes offered on the commercial market is the diversification in names selected as labels for the controls on the face of the panels. To say the least, they are as varied as the colors in Joseph's coat, and it does not make for greatest ease in understanding.

Isn't it possible to standardize names for a control which performs the same function? Admittedly the names one finds used are not so divergent in meaning as to make comprehension impossible, but it is strange to note that such a simple thing as a potentiometer which varies the level of the signal fed into the vertical or the horizontal amplifier of a 'scope is identified in at least seven different ways. Sometimes the names used on one category of equipment, for example, a general purpose 'scope, are in conflict with the names used for a differently functioning element on a more elaborate device.

We realize, of course, that after a period of experience, the necessary familiarity is attained, and that in the long run, even a variety of names will not defeat the application of the 'scope; neither will it take too much time for an individual to become familiar with the names used on two or three different 'scopes which he may have in the shop. But, all this notwithstanding, it just does not seem proper not to standardize on such a simple thing. Some of the functions labeled in this manner have remained unchanged ever since the first cathode-ray oscilloscope made its appearance, yet the names have changed over the years. Why?

We cannot see how it lends any individuality to the product. It might if any one manufacturer would be consistent in the names which he assigns to similar controls on different models, but even that is not done. This is not a major issue in the life of the electronic industry, we admit, but it is one of those situations which can be remedied so easily with benefits to all, that it is reasonable that it be done.

How about a committee for the standardization of oscilloscope-control nomenclature?

TV Production in 1950

Just to back up the statement made in the last issue of SUCCESSFUL SERVICING about TV production during 1950, it is with glee that we report the production of approximately 380,000 units during the month of February. That's about 10 percent above January. It is also interesting to note, this time, according to the March 27 issue of *Video, the Television Newsletter*, that a total of about 11.5 million other radio units were produced during 1949. Of this total, 4 million were auto radio receivers and 7.5 million were home receivers. Not a bad prospect for future servicing!

HIWYNI

Have It When You Need It. As a figure of speech, it applies to everything man needs

(Continued on page 20)

Television Changes

General Electric 820

This model appears on *pages 3-16 through 3-30 of Rider's TV Manual Volume 3.* On most series "R" productions, a change has been made in the tone compensating network connected across the volume control of the television chassis to extend the high-frequency audio response and to reduce some of the "boom" bass compensation. The change involves the removal of three components, C87, C114, and R96, connected in the volume-control circuit.

Ref. No.	*Part No.*	*Description*
C87	UCC-630	Capacitor, 0.01 μf, paper
C114	UCU-052	Capacitor, 1,000$\mu\mu$f, mica
R96	URD-095	Resistor, 82,000 ohms, carbon.

Zenith Ch. 27F20, 29G20

These chassis appear on *pages 3-1 through 3-19, 20 of Rider's TV Manual Volume 3.* Fig. 1 shows the changes that have been made in the tuner for these chassis. The rest of the tuner is the same as that shown in the Manual except for the terminal numbering. Terminal 11 is now designated as 12, 12 as 13, 13 as 14, 14 as 15, 15 as 16, and 16 is designated as 17. The terminals of the rotor, blade-end view, should be changed to correspond with the terminals of the stator, solder-terminal view, as shown in Fig. 1.

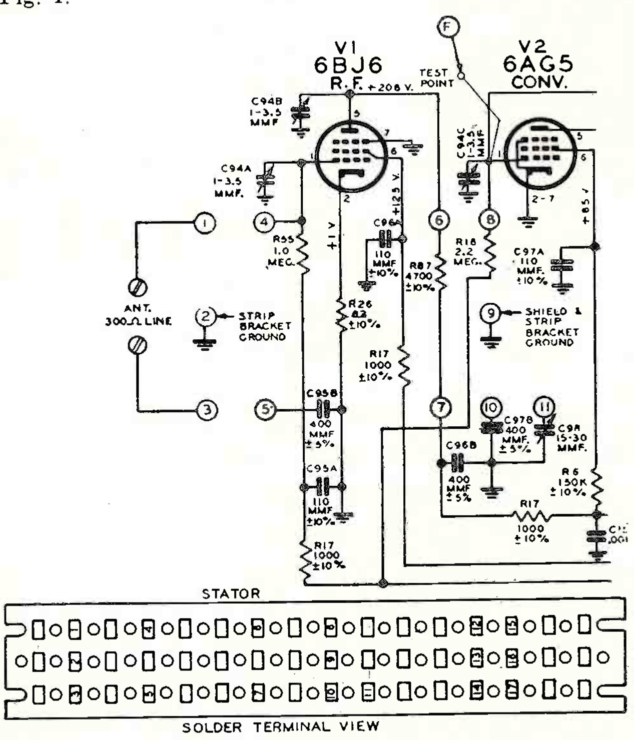


Fig. 1. Changes made in the tuner for Zenith chassis 27F20 and 29G20.

The following changes have been made in the schematics for the channel strips. Fig. 2 is the schematic diagram for channel 2. The schematic for channel 3, ST-3A, is

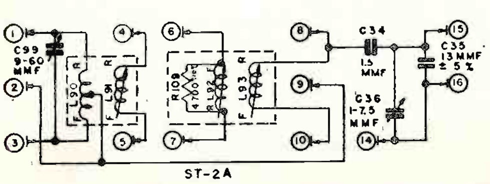


Fig. 2. Schematic diagram for channel 2, Zenith 27F20 and 29G20.

similar to that for channel 2, except that coils L94, L95, L96, and L97 have been substituted for coils L90, L91, L92, and L93 respectively. Capacitor C37, 4.5 $\mu\mu$f, $\pm\frac{1}{2}$ $\mu\mu$f, has been substituted for C35, the capacitor between terminals 15 and 16.

The schematic diagram for channel 4, ST-4A, is similar to that for channel 2, except that coils L98, L99, L100, and L101 have been substituted for coils L90, L91, L92, and L93 respectively. Capacitor C35 has been deleted from across terminals 15 and 16, and Capacitor C88, 18$\mu\mu$f, $\pm$10%, has been added between terminal 14 and C36.

The schematic diagram for channel 5, ST-5A, is shown in Fig. 3. The schematic for channel 6, ST-6A, is similar to that for channel 5, except that coils L106, L107, L108, and L109 have been substituted for coils L102, L103, L104, and L105 respectively. Resistor R90 has been deleted and L40 has been substituted for L36.

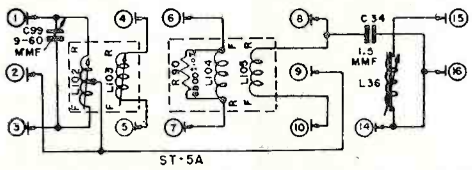


Fig. 3. Schematic diagram for channel 5, Zenith 27F20 and 29G20.

The schematic diagram for channel 7, ST-7A, is similar to that shown for channel 9 in Fig. 4, except that capacitor C86, 24 $\mu\mu$f, $\pm$ 10%, has been substituted for C43. Coils L111, L112, and L113 have been substituted for coils L117, L118, and L119 respectively. The schematic diagram for channel 8, ST-8A, is also similar to that for channel 9, except that coils L114, L115, and L116 have been substituted for coils L117, L118, and L119 respectively. Capacitor C41, 7.5 $\mu\mu$f, $\pm$ ¾ $\mu\mu$f, has been substituted for C43. Fig. 4 shows the schematic diagram for channel 9, ST-9A.

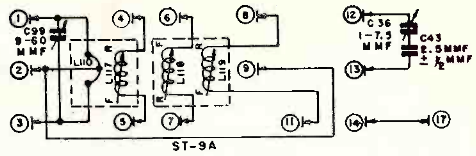


Fig. 4. Schematic diagram for channel 9, Zenith 27F20 and 29G20.

The schematic diagram for channel 10, ST-10A, is similar to that shown for channel 11 in Fig. 5, except that L131, L121, and L122 have been substituted for L120, L124, and L125 respectively. L58 has been deleted from the circuit. Fig. 5 shows the schematic diagram for channel 11, ST-11A.

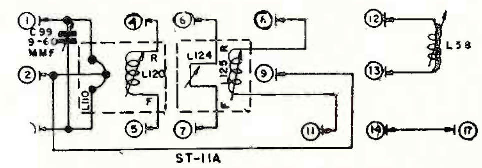


Fig. 5. Schematic diagram for channel 11, Zenith 27F20 and 29G20.

The schematic diagram for channel 12, ST-12A, is similar to that shown for channel 13 in Fig. 6, except that L132, L126, L127, and L66 have been substituted for L123, L129, L130, and L62 respectively. Fig. 6 shows the schematic diagram for channel 13, ST-13A.

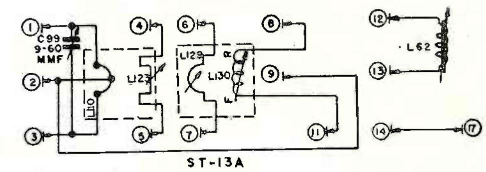


Fig. 6. Schematic diagram for channel 13, Zenith 27F20 and 29G20.

The following changes have been made in the circuit for the 27F20 chassis. Resistor R16, 22,000 ohms, $\pm$ 10%, has been substituted for R27, the 220-ohm resistor connected to pin 6 of V4. Resistor R16, 22,000 ohms, $\pm$ 10%, has been substituted for R27, the 220-ohm resistor connected to pin 6 of V5. Resistor R94, 1 megohm, $\pm$ 10%, has been inserted from the junction of R41, C51, C77, and R48, to the +132-volt line in the 2nd agc amplifier stage (V15B).

The following changes have been made in the circuit for the 29G20 chassis. Resistor R16, 22,000 ohms, $\pm$ 10%, has been substituted for R27, connected to pin 6 of V4; and resistor R16, 22,000 ohms, $\pm$ 10%, has been substituted for R27, connected to pin 6 of V5. Capacitor C77, 15 $\mu\mu$f, $\pm$ 10%, has been substituted for R22, the 47,000-ohm resistor, which was connected to the junction of R41, C51, and C52 in the agc network. Resistor R48, 18,000 ohms, $\pm$ 10%, has been substituted for capacitor C52 in the same network; and resistor R94, 1 megohm, $\pm$ 10%, has been added between the +132-volt line and the junction of R41, C77, C51, and R48.

In both chassis, the agc should be adjusted so that 9 volts is developed at jack "C" with 2 volts bias injected into jack "S". These chassis with S15940 turret tuners are identified by a 6BJ6 r-f amplifier, V1, and a ¾-inch blue disk stamped on the turret.

Television Changes

Jackson 10-, 12-, and 16-inch Sets

The information on *pages 3-1 through 3-4 of Rider's TV Manual Volume 3* applies to the 10-, 12-, and 16-inch sets; however, the following changes have been made. On *page 3-2* the fifth line in the first column should be changed to read: "with a 0.001-μf capacitor as an r-f bypass." On the same page, the second column, the sixth and following lines should be changed to read: "Then set the generator to 23.1 Mc-cw and tune the 4th i-f for maximum, repeat this procedure on the 3rd at 23.2 Mc, the 2nd at 24.5 Mc, and the 1st at 25.7 Mc."

The following changes have been made in the section on sound alignment. Using Fig. 1, connect the VTVM from point 2 to ground and tune top slug of ratio detector for maximum negative voltage. Then connect the VTVM between points 1 and 3 and tune the bottom slug for zero.

The following changes have been made in the schematic diagram. The transformer lead that goes to the plate of the 6AU6 in the audio network is designated as C; B goes to pin 6 of the same tube; D, of the secondary, goes to the cathode, pin 5, of the 6AL5; F goes to pin 7 of the same tube; and A is the tap from the secondary.

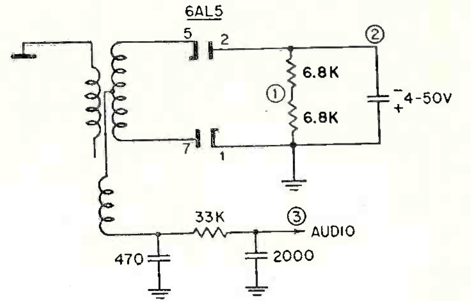


Fig. 1. VTVM connections for sound alignment of Jackson 10-, 12-, and 16-inch sets.

The voltage of the 0.01-μf capacitor connected to pin 6 of the 6AC7 has been changed from 400 to 600 volts. The voltage of the .05-μf capacitor connected to the width control has been changed from 400 to 600 volts. A 10,000-$\mu\mu$f, 400-volt capacitor has been added between ground and the junction of the cathode of 6AL5 and the 1,000-ohm contrast control. The 150,000-ohm resistor, and the 1-megohm resistor (vertical hold) have been switched from pin 4 of the 6SN7 to pin 1, and the connection that went to pin 1 now goes to pin 4.

Fig. 2 shows the tube layout for the 10-, 12-, and 16-inch chassis.

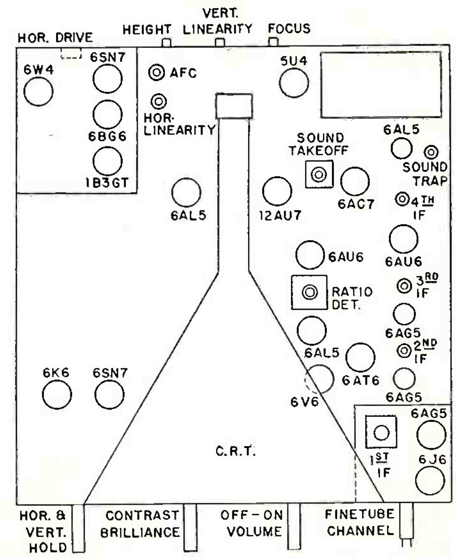


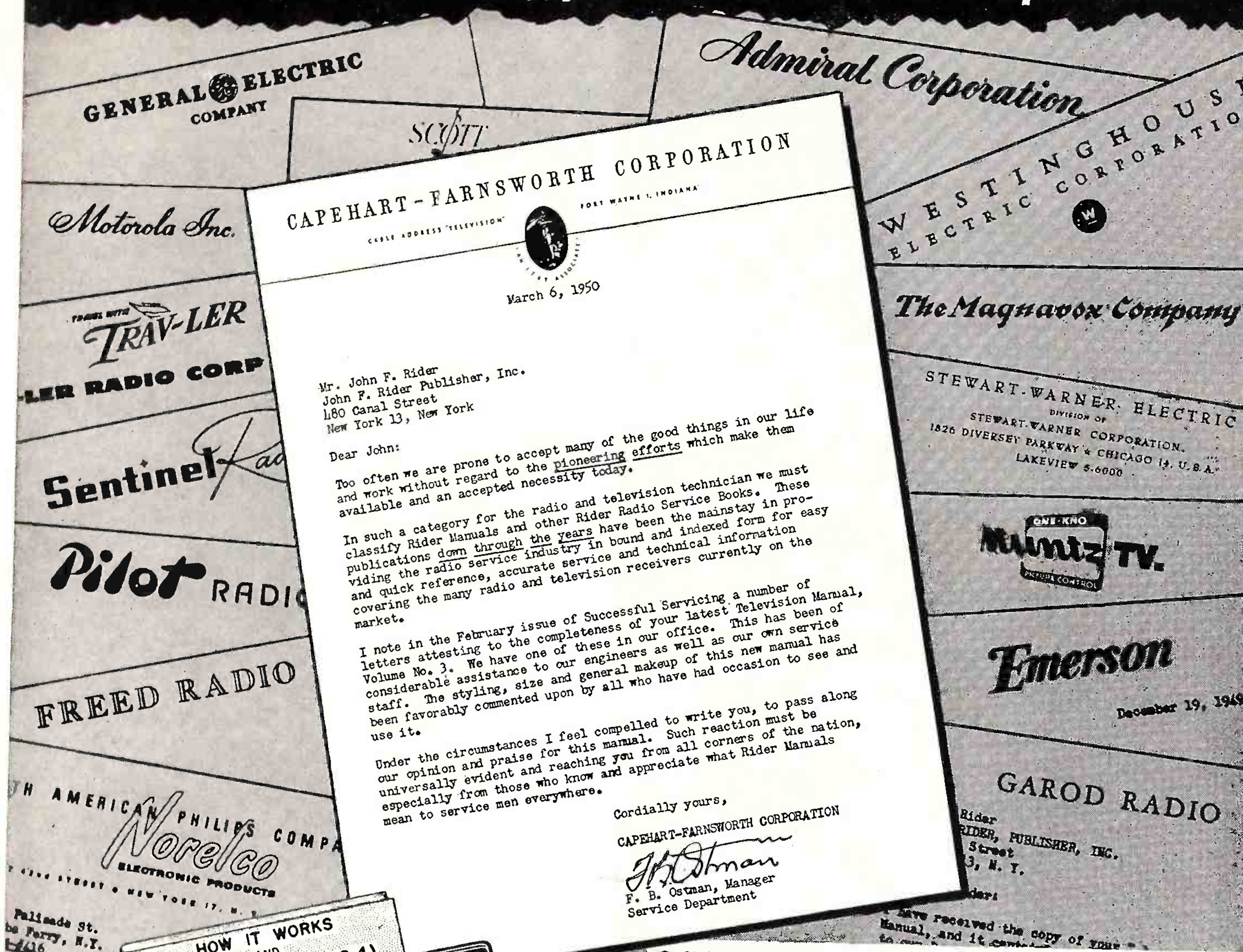
Fig. 2. Tube layout for the 10-, 12-, and 16-inch Jackson Chassis.

Stromberg-Carlson 1220-T

This chassis, used in TV-12 combinations, appears on *pages 1-28 through 1-29, 30 of Rider's TV Manual Volume 1.* To reduce excessive hum the following addition to the chassis has been made:

Connect P-11026, a 25-μf, 25-v capacitor between the cathode terminal of the 6SC7 tube and ground. In most cases this will reduce hum to a point where it will no longer be objectionable. Because of variations in the 6SC7 tubes, hum may sometimes be noted after this capacitor has been added. However, in this case, changing tubes will invariably eliminate the complaint. This change has been made in production, and all new chassis that include this capacitor are designated as series 11.

"RIDER MANUALS down through the years have been the mainstay ...for quick reference, accurate service and technical information"
— Capehart-Farnsworth Corporation



CAPEHART-FARNSWORTH CORPORATION
FORT WAYNE 1, INDIANA
CABLE ADDRESS "TELEVISION"

March 6, 1950

Mr. John F. Rider
John F. Rider Publisher, Inc.
480 Canal Street
New York 13, New York

Dear John:

Too often we are prone to accept many of the good things in our life and work without regard to the pioneering efforts which make them available and an accepted necessity today.

In such a category for the radio and television technician we must classify Rider Manuals and other Rider Radio Service Books. These publications down through the years have been the mainstay in providing the radio service industry in bound and indexed form for easy and quick reference, accurate service and technical information covering the many radio and television receivers currently on the market.

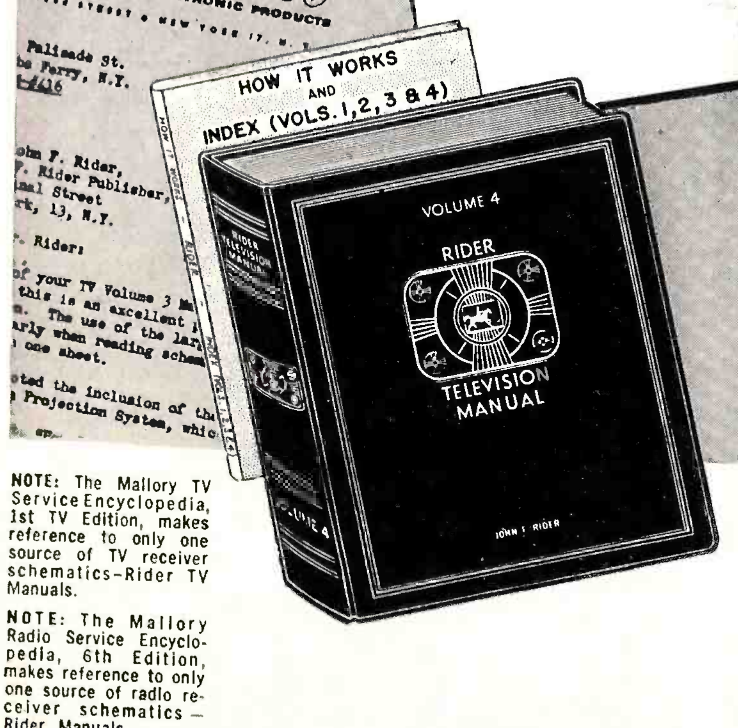
I note in the February issue of Successful Servicing a number of letters attesting to the completeness of your latest Television Manual, Volume No. 3. We have one of these in our office. This has been of considerable assistance to our engineers as well as our own service staff. The styling, size and general makeup of this new manual has been favorably commented upon by all who have had occasion to see and use it.

Under the circumstances I feel compelled to write you, to pass along our opinion and praise for this manual. Such reaction must be universally evident and reaching you from all corners of the nation, especially from those who know and appreciate what Rider Manuals mean to service men everywhere.

Cordially yours,

CAPEHART-FARNSWORTH CORPORATION

F. B. Ostman, Manager
Service Department



COMING LATE IN MAY—
RIDER TV MANUAL Volume 4

More material than ever before, *at no increase in price*. Authentic, accurate, reliable servicing information from 73 TV manufacturers. 494 models. 235 chassis. Larger page size, 12" x 15", with all pages filed in proper place. Giant pages are retained, but now have only one fold. Equivalent of 2296 Pages (8½" x 11") Plus Cumulative Index Volumes 1, 2, 3 and 4 and RIDER "HOW IT WORKS" Book.................................... **$21.00**

RIDER TV MANUAL Volume 3...74 manufacturers. 441 models. 243 chassis. 12" x 15" page size, all pages in proper place. Equivalent of 2032 pages (8½" x 11") plus Cumulative Index Volumes 1, 2, and 3, and RIDER "HOW IT WORKS" Book.................................... **$21.00**

RIDER TV MANUAL Volume 2...Coverage to January, 1949. 67 manufacturers. Equivalent of 2300 pages (8½" x 11") plus Cumulative Index Volumes 1 and 2, and RIDER "HOW IT WORKS" Book.....**$18.00**

RIDER TV MANUAL Volume 1...Coverage up to early 1948. 34 manufacturers. Equivalent of 2000 pages (8½" x 11") plus Index and RIDER "HOW IT WORKS" Book.................................... **$18.00**

NOTE: The Mallory TV Service Encyclopedia, 1st TV Edition, makes reference to only one source of TV receiver schematics–Rider TV Manuals.

NOTE: The Mallory Radio Service Encyclopedia, 6th Edition, makes reference to only one source of radio receiver schematics – Rider Manuals.

NOTE: The C-D Capacitor Manual for Radio Servicing, 1948 Edition No. 4, makes reference to only one source of receiver schematics— Rider Manuals.

All Rider Manuals Mean Successful Servicing

JOHN F. RIDER PUBLISHER, INC., 480 Canal Street, New York 13, N.Y.
Export Agents: Rocke International Corp., 13 E. 40th Street, N.Y.C. • Cable ARLAB.

Parasitically Excited Antennas

(Continued from page 1)

intensity of the energy, is very important. First let us discuss the intensity.

The power which a connected dipole antenna with matched load reradiates is known to be ½ the total power intercepted, and is equal to the magnitude of power absorbed in the load. This means that if the signal wave produces one microwatt in the load, it also produces one microwatt of reradiated power. Now, whenever an antenna reradiates, it can be considered to be a new source of wave energy, which sends out this energy in a directional pattern characteristic of the antenna. In other words, a center-fed half-wave antenna will have the same characteristic directivity pattern, whether it is acting to intercept energy, or whether it is reradiating energy. In view of this fact, we can understand that the simple connected dipole will reradiate most strongly in directions perpendicular to the dipole at its center, less so in other directions, and none at all from its ends.

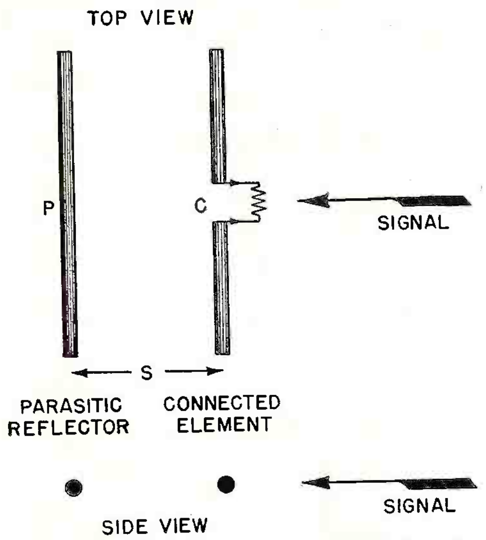


Fig. 1. Physical arrangement of the connected dipole element C and the parasitic element P; in this case the signal energy first intercepts the dipole element.

Furthermore, the intensity of the reradiated energy will decrease with increasing distance from the antenna. The effective radiated electric field will decay in voltage magnitude as it leaves the antenna, as shown by the plot of Fig. 2, where we consider the signal field voltage as unity from a distant transmitting station. The reradiation from the loaded antenna starts at 0.5 and drops off slightly to 0.48 at 0.1 wavelength distance, and more steeply to 0.115 at one wavelength away. This series of values occurs in the plane of maximum directivity, i.e., the plane perpendicular to the antenna at its center. It is evident that the strength of the reradiation is rapidly diminishing and is 20 db below the signal field at about 1¼ wavelengths from the antenna. This reduction of the field with distance would indicate that reradiation is only effective fairly close to the reradiating antenna.

When we consider a parasitic *resonant* element, the reradiation from it must also decay with distance, measured from the parasitic in a similar manner. Its effectiveness, however, is greater, since it reradiates *all* the power it intercepts, instead of just one-half of it. Its efficiency is further increased by the fact that the current induced in it by the signal is twice as much as that for a loaded dipole, since the parasitic element has no connected resistance load, and therefore has only half the resistance. This makes the power reradiated by the parasitic $(2I)^2\frac{R}{2}$ as against $\frac{I^2R}{2}$ for the loaded dipole, or four times as great.

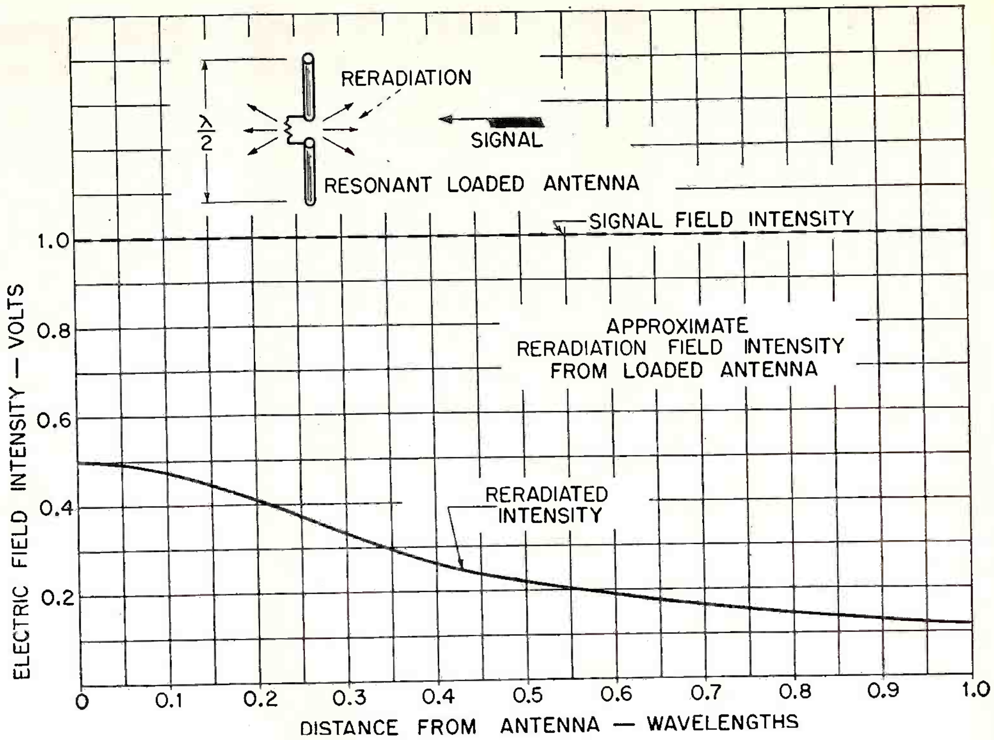


Fig. 2. Decay of reradiated field intensity with distance from the dipole element; the initial signal field intensity is assumed to be unity.

When the reradiated field is examined in the plane perpendicular to the parasitic rod at its center, we obtain voltage values which are twice as high as those for the loaded antenna. Fig. 3 shows the decay in reradiation for the resonant parasitic rod, assuming no ohmic losses in the rod.

If either the parasitic or loaded antennas are operating off resonance, the amplitude of reradiation will be less than Figs. 2 and 3 indicate. If they are tuned only slightly off resonance, we can approach the values indicated.

These basic reradiated voltages shown in Figs. 2 and 3 can only be obtained when the antenna or the parasitic exists by itself. As soon as we place a parasitic element close to an antenna, conditions will change, since each element will be exposed not only to the original signal wave energy, but also to the other's reradiated energy. We cannot assume that each will act independently of the other, but interaction will necessarily occur. The amount of interaction will be greatest when the elements are placed close to each other, where their reradiation voltages are substan-

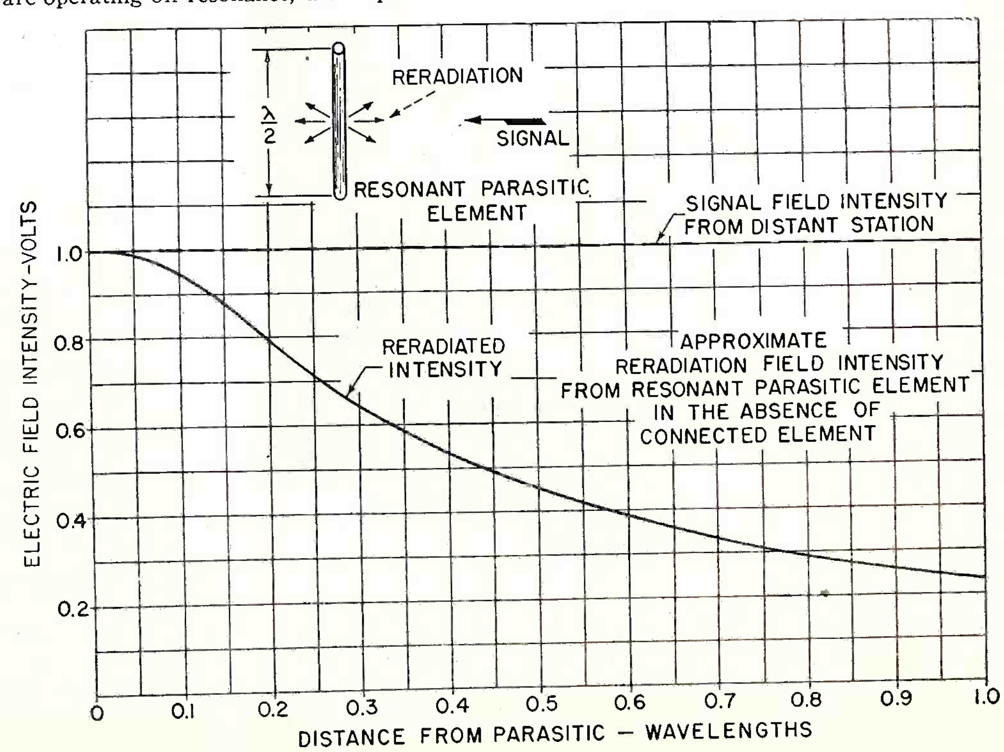


Fig. 3. Decay in reradiated field intensity with distance from the parasitic element (in the absence of the connected element); the original signal field intensity is assumed to be unity.

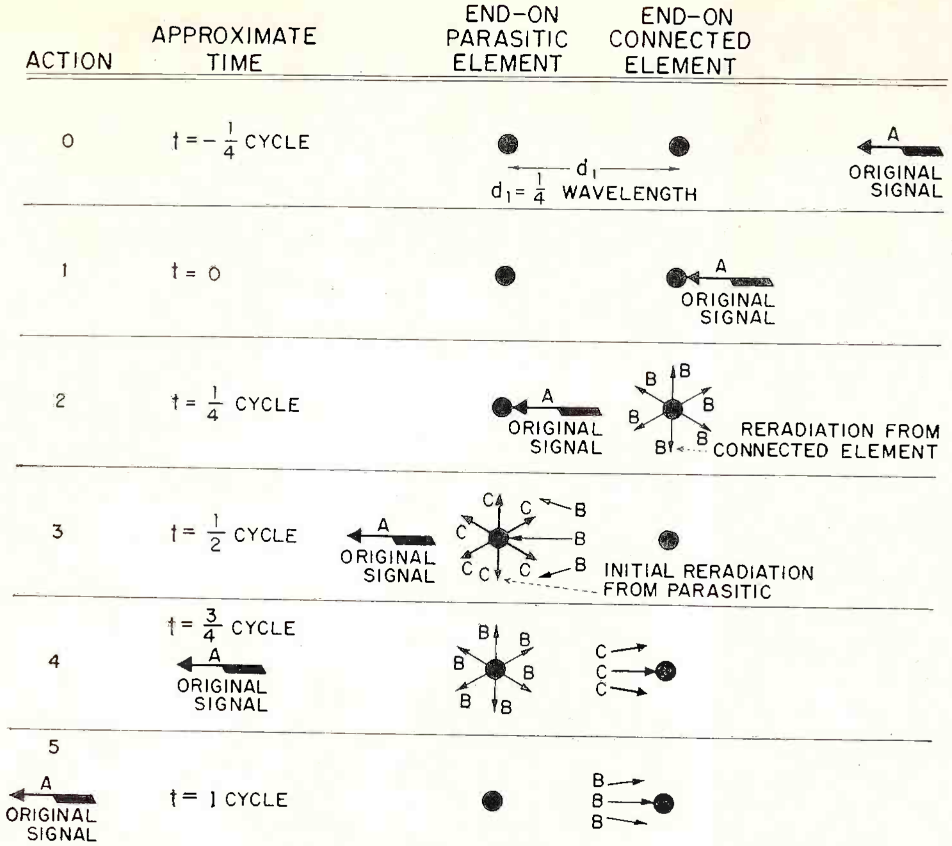


Fig. 4. Breakdown of the separate actions occurring in the presence of a parasitic element; the moment that the original signal is intercepted by the connected element, is taken as the reference time (t=0).

tial compared to the original signal voltage. If the parasitic is to feed power into the antenna, interaction must take place.

Interaction between parasitic and the loaded dipole may have two effects. One is to cause the radiation resistance of each to be affected, usually reducing it. This reduces the feed point resistance. The other is to cause each element to become somewhat detuned. We can attempt to compensate for the detuning effect by appropriate small changes in the lengths of the parasitic and the dipole. This critical behavior is characteristic of antennas containing parasitic elements. The more effective the parasitic element is in assisting the dipole, the greater is the interaction and gain, and hence the more critical is the adjustment of the antenna and parasitic length. This means that the antenna will perform at optimum gain only over a narrow frequency band of about 2 or 3 percent, and will be highly frequency selective in action. At frequencies well removed from this narrow band, the parasitic element effect is absent, and the characteristics of the connected element alone will govern.

Not only are we concerned with the magnitude of the reradiation, but also we are equally concerned with the *timing* of it, and how this timing affects the net result.

Let us take the case for a parasitic rod placed behind the loaded dipole, as in Fig. 1. The signal wave in this case will first reach the connected element *C*. Following this, the original signal wave must travel to the parasitic over a distance *S*, requiring a time of ¼ cycle. At the parasitic element *P*, this energy is then intercepted, and shortly thereafter (about ¼ cycle later), the reradiation from the loaded dipole arrives. These energies are in turn reradiated by the parasitic and sent back to the loaded dipole over path *S*. We have then five actions. These are:

Action 1. The original signal energy is directly intercepted by the loaded dipole at reference time $t=0$.

Action 2. The original signal energy is directly intercepted by the parasitic after traversing *S* at time $t=\frac{1}{4}$ cycle approximately.

Action 3. Signal energy, reradiated from loaded dipole, is intercepted at parasitic element after traversing *S* at time $t=\frac{1}{4}+\frac{1}{4}=\frac{1}{2}$ cycle approximately.

Action 4. The parasitic element reradiates the energy of action (2); this energy traverses *S* to the loaded dipole, arriving at $t=\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=\frac{3}{4}$ cycle approximately.

Action 5. The parasitic element reradiates the energy of (3) which traverses *S* to the loaded dipole, arriving at $t=\frac{1}{2}+\frac{1}{4}+\frac{1}{4}=1$ cycle approximately.

These actions are shown pictorially in Fig. 4. The vector sum of actions (1), (4), and (5) will govern the magnitude of the received signal power at the load.

These approximate actions, however, do not take into account certain necessary qualifications which come about chiefly because radio waves close to the source of radiation are not traveling at constant velocity.

In the close vicinity of a resonant parasitic, or a resonant antenna, the wavelength of a radio wave is shorter than it is in free space, because of the nonuniform retarded velocity near the rod. So in our illustration of Fig. 1 and our discussion above, the effective value of *S* cannot be measured in free-space wavelengths. Furthermore, the nominal delayed action of reradiation by the parasitic does not appear to be ¼ cycle late when observed near the parasitic. This set of complications forces us to solve the practical case by accurate graphical plots which include the retarded velocity effects. These are given in the next section of this chapter.

NOW! Convert 10"-12½"

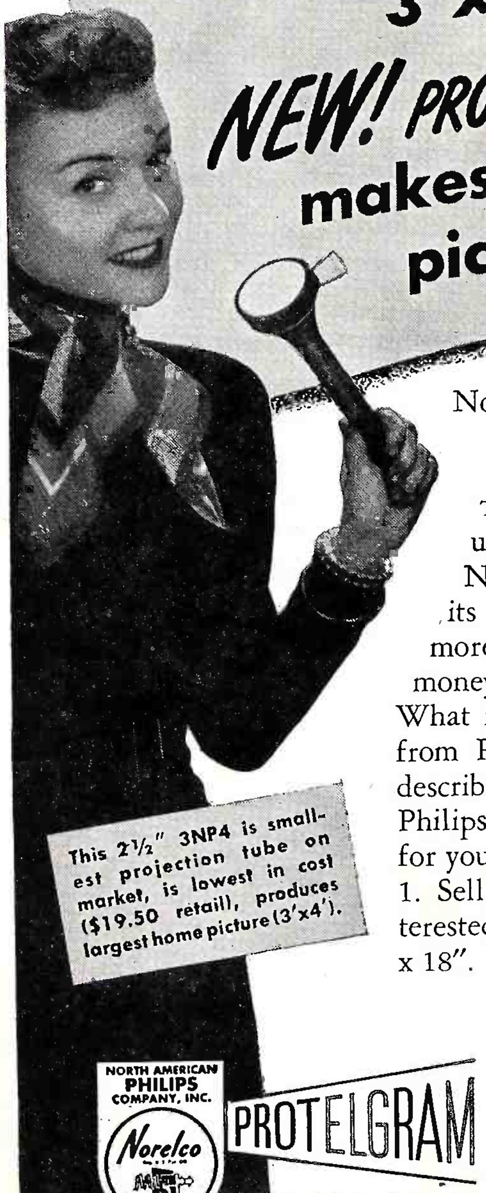
Quickly, Profitably, Easily with

NEW! NORELCO DUO-VUE

world's first dual-purpose TV offers 3' x 4' picture—$199.50 list*

NEW! PROTELGRAM "CONVERSION PACKAGE"

makes possible huge 234 sq. in. picture for trade-in buyers



North American Philips has really BIG PROFIT NEWS for you—and BIGGER, BETTER PROTELGRAM TV pictures for your customers, up to 3' x 4' in the sensational NORELCO DUO-VUE now making its world premiere at $199.50 — more television picture for less money than ever before offered!

What is there in it for you? PROFITS from PROTELGRAM'S Four-Way Plan described on the right.

Philips makes it easy and profitable for you to—

1. Sell PROTELGRAM to set builders interested in bigger pictures — 13½" x 18".

2. Sell PROTELGRAM for custom-built, large-screen installation, up to 3' x 4' for homes, clubs, bars, hotels, etc.

3. Sell NORELCO DUO-VUE, television's newest, finest and biggest picture used with the customer's direct-view table set to produce 3' x 4' pictures on a home-movie screen. A flip of a switch selects either picture, and you can connect DUO-VUE to almost any table-model receiver in less than an hour.

4. Sell PROTELGRAM in a conversion cabinet to customers wanting to convert their 10 or 12½" direct-view receivers to a picture larger than a 20" tube gives. And you can make the conversion in less than one hour following the simple, straightforward instructions provided.

Right NOW is the time to make extra profits with PROTELGRAM. Read every word of this ad. Then get in touch with your distributor or send the coupon now for all the facts.

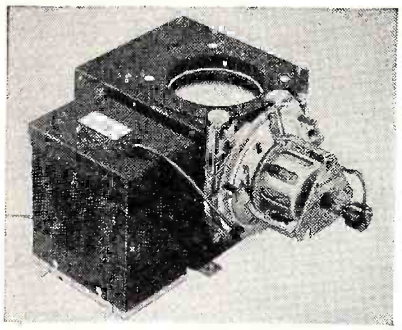
*Prices slightly higher west of Rockies. Connection charges extra.

NORTH AMERICAN PHILIPS COMPANY, INC.

100 E. 42nd Street, New York 17, N. Y.

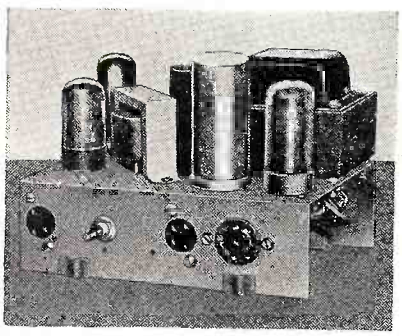
16" Sets to BIG PICTURE TV

PROTELGRAM



PROTELGRAM UNIT

Projection box measures only 8½"x9"x13", contains optical system and alignment assembly, is designed for quick easy service and adjustment. The 2½" 3NP4 projection tube is long-lived, extremely low in cost. Compact 25KV high-voltage unit is only 8½" x 4½" x 7".

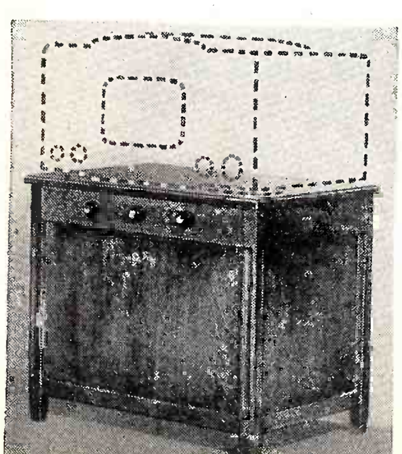


AUXILIARY CHASSIS

New auxiliary chassis fills additional electrical requirements essential to adaption of TV chassis to PROTELGRAM; makes change-over quick and easy. Measures only 8" x 12" x 4".

CONVERSION CABINET

Console cabinet measuring 22" x 27¾" x 46½" provides space for installation of customer's 630 Type TV chassis, comes equipped with complete PROTELGRAM system, auxiliary chassis, cabinet mirror and viewing screen.



NORELCO DUO-VUE

Beautiful cabinet contains PROTELGRAM unit. Only 23½" high. 20" x 26" top holds most any 10" or larger direct-view table model. Concealed ball-bearing casters make it easy to pull out from wall for 3' x 4' viewing on external screen. Offers customers choice of two picture sizes for small and large group viewing.

FOUR-WAY Profit Plan

1 Sell PROTELGRAM to the man who builds his own!

Thousands of TV kits have been sold to the man who likes to build his own equipment. These handymen are ripe for PROTELGRAM, because they can combine it with a TV chassis, get life-size TV at a reasonable cost.

2 Sell PROTELGRAM to custom set buyers

Clients who want built-in installations in walls or cabinets are perfect prospects for PROTELGRAM. Huge picture size, plus compactness and flexibility, makes it the answer for this type of user.

3 Sell PROTELGRAM to trade-in customers

PROTELGRAM sells itself to customers who want bigger pictures, but are reluctant to take a trade-in loss. You can now use their present TV chassis, connect it with PROTELGRAM in a cabinet such as shown at (3) left. They get a 234 square-inch picture, 13½" x 18"

4 Sell NORELCO DUO-VUE for largest home-TV pictures

Only with NORELCO DUO-VUE can you offer both direct-view and 3' x 4' movie-size TV . . . and at a reasonable price. This is the *newest thing in television* for your customers who want the best. Lots of sales opportunities in bars, clubs, institutions and hospitals, too.

CONTACT YOUR DISTRIBUTOR OR SEND COUPON TODAY

NORTH AMERICAN PHILIPS COMPANY, INC.
Dept. PM-4, 100 East 42nd Street, New York 17, N. Y.

Gentlemen: Please send full information as checked

☐ PROTELGRAM SYSTEM ☐ NORELCO DUO-VUE unit
☐ PROTELGRAM SYSTEM with auxiliary chassis ☐ PROTELGRAM SYSTEM for conversion console

NAME.......................... POSITION....................

FIRM NAME...

ADDRESS...

CITY.................................... STATE.............

Check here for Dealer Information on
☐ Norelco Electric Shaver ☐ Lady Norelco Electric Razor

Radio Changes

Stewart-Warner A92CR3S, Code 9028-CS, A92CR6S, Code 9028-FS

These models are similar to Models A92CR3, Code 9028-C, and A92CR6, Code 9028-F, which appear on *pages 17-11,12 through 17-21 of Rider's Manual Volume XVII*, except for the following differences. The "S" chassis is designed to provide greater sensitivity so as to accommodate the requirements of satisfactory performance in low signal strength areas. Due to certain design differences in these models it is desirable to set the band switch to the FM position whenever the record changer is used.

The high side of loop antenna no. 2 is connected to terminal R of antenna coil no. 18 as shown in Fig. 1. This loop is used only for a-m push-button operation. Band-switch section 3A is not used in the "S" chassis. One side of loop antenna no. 134 is connected to terminal L of antenna coil no. 15 through the 0.01-μf capacitor, no. 136. The other side of the antenna is grounded. This loop is used only for a-m operation. The brown lead from the external antenna is routed to terminal L of antenna coil no. 15 through the 100-$\mu\mu$f capacitor no. 135. Terminal L of antenna coil no. 15 is connected to avc through the 680,000-ohm resistor no. 137. The high side of the wave trap consisting of coil no. 39 and capacitor no. 38 is connected to terminal S10 of band-switch section 3C. Resistor no. 69 is deleted and the cathode of the 6BA6 1st i-f tube is grounded. The cathode of the 6SJ7 tube is connected to ground through the 1,000-ohm resistor no. 139, instead of through the 1,500-ohm resistor no. 103. One side of the voice coil of the speaker is connected to the screen of the 6SJ7 tube through a 470-ohm resistor no. 140 and a 0.25-μf capacitor no. 108. The junction point between capacitor no. 108 and resistor no. 140 is connected to terminal S29 of band-switch section 3B. Terminals S30 and S31 are connected to the junction of resistor nos. 128 and 129. The change in section 3 band switch, front view, is shown in Fig. 2.

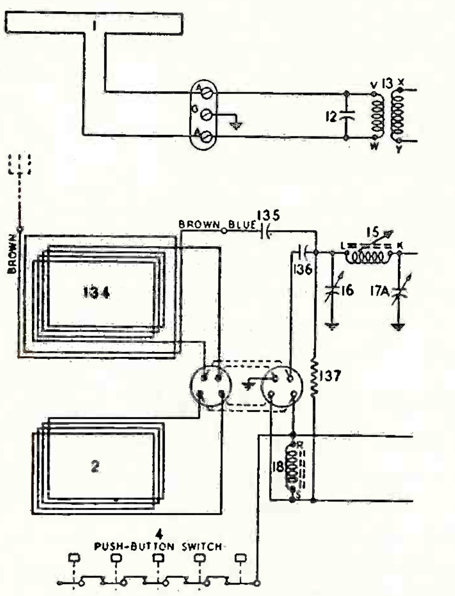


Fig. 1. Circuit changes for Stewart-Warner A92CR3S and A92CR6S.

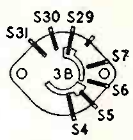


Fig. 2. Section 3, front view, band switch for Stewart-Warner A92CR3S and A92CR6S.

The additional parts used in the "S" type chassis are given below. Other parts are the same as those for the A92CR3 and A92CR6.

Ref. No.	*Part No.*	*Description*
91	502261	Capacitor, 0.01 μf, 600 v
	504725	Capacitor, 0.02 μf, 200 v (used only on chassis with "H" designation)
134	505668	Loop antenna for a.m. (29" x 30 3/8")
135	502931	Capacitor, mica 100 $\mu\mu$f, 500 v
136	502261	Capacitor, 0.01 μf, 600 v
137	502267	Resistor, carbon, 680,000 ohms, 1/4 w
138	502406	Resistor, carbon, 1,500 ohms, 1/4 w
139	502478	Resistor, carbon, 1,000 ohms, 1/4 w
140	502126	Resistor, carbon, 470 ohms, 1/4 w.

INSTALLATION AND SERVICING OF LOW POWER PUBLIC ADDRESS SYSTEMS

"This is a book for the practical man who has the enterprise and ambition to work up an excellent business for himself and be of real service to the public. In general only low-power apparatus is discussed but when this is thoroughly understood, it is easy to expand because much of the high-power equipment is the same or very similar. The book starts with an excellent chapter on the fundamentals of sound, with emphasis on the hearing apparatus and its sensitivity. The following four chapters, Microphones and Phonograph Pickups, Impedance Matching, Amplifier Specifications, and Loudspeakers cover the theory needed. Chapter 6 on Installation gives the practical work on the location of microphones and loudspeakers in auditoriums, restaurants, night clubs, churches, athletic fields, parks, etc., and mobile P-A systems. The final chapter on Servicing gives equipment needed and brief but reliable methods for locating sources of trouble and making the necessary repairs and replacements. The language is clear throughout and a limited number of excellent diagrams assist the student to master the details."—*School Science and Mathematics.*

Farnsworth Service Hints

The following service suggestions are offered in the event that the P70 series changers occasionally drop two or more records at one time. If this situation exists with new records, in which the center hole is not worn, the cause may be one of the following:

1. Misadjustment of the amount of tension on the compression spring (part no. 58789). This adjustment is on the underside of the compression lever assembly (part no. 15195) and consists of the adjustment nut (part no. 37344) and the lock-nut and washer (part nos. 2015-002 and 2121-003). Adjustment of this nut controls the amount of downward pressure exerted on the upper spindle assembly (part no. 13674) by the compression lever, which in turn controls the degree of expansion of the rubber sleeve (part no. 62152). Reference is made to paragraph "D", *page RCD. CH. 19-8 of Rider's Manual Volume XIX*, of the P71 record changer material for proper adjustment of the compression lever. If the rubber sleeve does not expand sufficiently to hold the remaining records on the spindle, one or more of these records will drop along with the record that is to be played. If this sleeve does not expand to the required value, the adjustment nut (37344) should be adjusted while the rubber is compressed to provide the correct expansion. After the adjustment is set, the lock nut should be tightened, and a small amount of Glyptol applied to secure the adjustment.
2. Incorrect position of the outer spindle (part no. 55334). The outer spindle is fastened to the main frame by a special hex-head bolt (part no. 37334) located on the underside of the main frame. The proper position of the outer spindle is given in relation to the inner spindle (part no. 11379) when the changer is in playing position and with no records on the spindle. Under these conditions the top of the outer spindle should be 1/16" below the point of bend of the metal springs on the inner spindle which form the spindle shelf. If the outer spindle is too high, the spindle shelf will recede into the outer spindle before the rubber sleeve is fully compressed, leaving the records without support.
3. If neither of the two previously mentioned suggestions corrects the situation, it is further suggested that the compression lever assembly (part no. 15195) be inspected to determine if the metal roller on this assembly has a diameter of 1/4" or 5/16". If it is the smaller diameter, replace it with one employing the 5/16" roller. The replacement of this compression lever will require a readjustment of the compression spring (part no. 58789) tension.

●

General Electric 250, 260

Model 250 appears on *pages 15-32 through 15-36 of Rider's Manual Volume XV*. Model 260 appears on *pages 16-6 through 16-12 of Rider's Manual Volume XVI*. Add REC-003, Antenna loop connector strip to the parts lists for these models.

Radio Changes

General Electric 233 Kaiser-Frazer

This model appears on *pages 18-29 through 18-36 of Rider's Manual Volume XVIII.* Noise in the form of rattle can be attributed to mechanical insecurity of parts, loose fittings, and screw fastenings, etc. Some of these are:

1. Loose tone control knobs and loose tone and volume control shafts may rattle against the cast grille. The keyway in the tone control shaft may be spread slightly to provide a tighter fit to the control knob.
2. If the shaft assembly seems loose or tends to rattle within the grille mounting hole, a ¾-inch length of #1 spaghetti (fabric or cambric tubing) may be slipped over the shaft assembly and into the bushing. This will displace the loose fitting and cushion against rattle.
3. Vibration of the screen which is set behind the case instrument panel grille causes a buzz sound when loose. The screen may be shimmed at its four corners to stabilize its mounting.

Suggestions for improving circuit and pick-up noise are as follows:

1. The former condition can be improved by antenna selection and careful peaking of the antenna trimmer to increase sensitivity and reduce noise. For metropolitan areas, a 62-inch antenna is quite adequate, while in outlying country areas the antenna length of 93 inches is recommended. Adjustment of the antenna trimmer is important and should not be overlooked. Every receiver installation should be adjusted for normal operation after the receiver has been operating approximately 15 minutes to reach normal operating temperatures, and with antenna fully extended. Tune in one of the weakest stations at approximately 1,200 kc, or near the higher-frequency end of the dial scale. Adjust trimmer for minimum noise level and maximum clarity on station used for test.
2. Noise pick-up may come from various sources, chiefly from ignition circuits of the car. The recommended noise suppressor and noise filter capacitor units should be checked. To eliminate wheel static insert about ½ ounce of powdered graphite through the valve of all four tire tubes. This will provide a ground leakage path to dampen static radiation.

●

Sears 8210, Ch. 101.820-1A

This chassis is similar to Chassis 101.820 which appears on *pages 17-4, 17-5, and 17-15 of Rider's Manual Volume XVII,* except for the changes in the parts list. The parts list for this chassis is the same as that for the 101.820 except for the following changes:

Ref. No.	*Part No.*	*Description*
R10	R62705	Control, On-Off & volume
R15		Resistor, 680 ohms, ½ w
R14		Resistor, 820 ohms, ½ w
T3	R62721	Transformer, output
	R62717	Speaker, 5¼" p-m
	R63190	Cone, voice coil
	R57272	Plug, 1 prong.

General Electric 50

This model appears on *pages 15-1 through 15-4 of Rider's Manual Volume XV.* The following items should be added to the parts list:

Symbol	*Part No.*	*Description*
R4	RRC-013	1.0-megohm volume control
	RJS-060	Tube socket, miniature tube socket for 35W4 rectifier
	RJX-010	Assembly, tube socket and mounting plate assembly for 35W4 rectifier.
	RHH-004	Snapfastener, for mounting cabinet-back.

●

Montgomery Ward 93WG-801A, 93WG-801B, 93WG-801C, 93WG-801D, 93WG-801E, 93WG-802A, 93WG-802B, 93WG-802C

Models 93WG-801A, 93WG-801B, 93WG-801C, 93WG-802A, 93WG-802B, and 93WG-802C are without the built-in loop and their schematics are the same as those for Models 93WG-801 and 93WG-802 that appear on *page 11-47 of Rider's Manual Volume XI.* Models 93WG-801D and 93WG-801E are with built-in antennas and their schematics are the same as that for Model 93WG-801 which appears on *page 11-46 of Rider's Manual Volume XI.*

Sears 101.666-1B

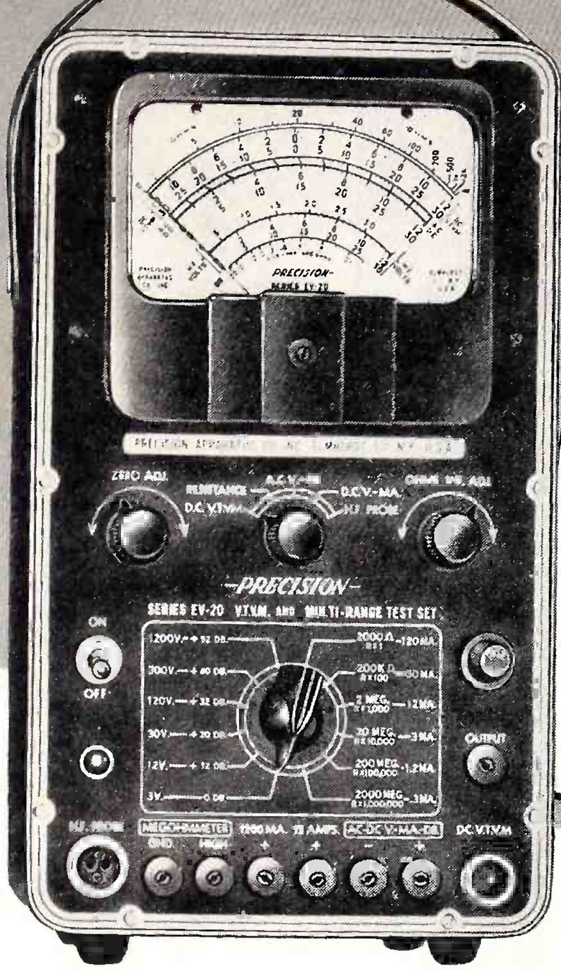
This chassis appears on *page 19-15 of Rider's Manual Volume XIX.* The d-c resistances of the r-f coils (L1 and L3), are 9.6 ohms.

●

Montgomery Ward 74WG-2700C

This model is the same as Model 54WG-2700A that appears on *pages 15-31 through 15-35 of Rider's Manual Volume XV.* The parts lists are the same except for the following changes:

Ref. No.	*Part No.*	*Description*
C2	17A149	1.8-12 μμf, loop antenna trimmer
C6	17A234	300-450 μμf, 600 kc, padder
C7	D67501	0.0005 μf, 400 v, tubular
C16	14A150	Gang condenser assembly
C32	47X182	7 μμf, ceramic
T6	53X235	117 v, 60 cycle, standard power transformer
T7	9A1395	"B" band loop antenna
	12A455	10" electrodynamic speaker, cone and voice assembly
	19X432	Flat washer
	26A382	Pulley mtg. plate assem. complete with idler pulleys, idler studs, brace brackets, string guide and dial background
	10X59	Drive cord
	28X113	Drive cord tension spring
Type V-28A139 Record Changer Parts		
	V-961B	Motor assembly 60 cycle, 115-120 v
Shure	P30-1	Crystal cartridge and semi-permanent needle assembly.



A Compact, Versatile, Portable Circuit-Testing Laboratory for TV — FM — AM

The New

PRECISION SERIES EV-20

VTVM and Multi-Range Test Set

Net Selling Price . . . 64^{75}

A Modern, Portable VTVM—Megohmmeter. TRUE ZERO-CENTER on ALL VTVM ranges PLUS Direct Reading High Frequency Scales ALSO, complete, standard 1000 ohms per volt functions

48 RANGES TO 1200 Volts*, 2000 Megohms, 12 Amperes, +63DB

* D.C.-VTVM ranges to 12,000 and 30,000 Volts when used with Series TV Super-High Voltage Test Probe.

Range Specifications

- ★ SIX ALL-ZERO CENTER VTVM RANGES: —13⅓ Megs. Constant Input Resistance. ±3, ±12, ±30, ±120, ±300, ±1200 volts. Direct Reading to ±12 KV and ±30 KV with Series TV Super-High Voltage Test Probe
- ★ SIX SELF-CONTAINED OHMMETER-MEGOHMMETER RANGES: 0-2000 - 200,000 ohms. 0-2-20-200-2000 Megohms.
- ★ FOUR DIRECT READING HIGH FREQUENCY VTVM RANGES: 0-3-12-30-120 volts. *(When used with RF-10A High Frequency Vacuum Tube Probe, Net Price $14.40. No crystal rectifiers employed.)*
- ★ SIX AC-DC AND OUTPUT VOLTAGE RANGES at 1000 ohms/volt. 0-3-12-30-120-300-1200 volts.
- ★ EIGHT D.C. CURRENT RANGES: 0-300 microamps. 0-1.2-3-12-30-120-1200 milliamps. 0-12 Amperes.
- ★ SIX DECIBEL RANGES from —20 to +63DB. Calibrated for 600 ohm, 1 mw., zero DB reference level.

Also ask to see the "Precision" **Series EV-10, DeLuxe VTVM—Megohmmeter with extra-large 7" meter.** 59 self-contained ranges to 6000 volts and 70 DB.

Series **EV-10**, affords to the discriminating instrument purchaser, and equipment-conscious service-laboratory, the **ultimate** in visibility and performance.
EV-10-P
(Closed portable)—$92.70
EV-10-MCP (Illustrated)
(Open Lab. Type)—$89.95.

See complete EV-10 specifications on page 4 of latest Precision catalog, available at leading radio equipment distributors or write directly to factory for full details.

IMPORTANT FEATURES

- ★ VOLTAGE REGULATED—BRIDGE CIRCUIT.
- ★ DIRECT READING, **ALL ZERO-CENTER** VTVM —indicates BOTH Polarity and Magnitude without switching or test lead reversal.
- ★ MASTER RANGE AND FUNCTION SELECTORS eliminate frequent and inefficient shifting of test leads.
- ★ SHIELDED CONNECTORS for both D.C.—VTVM and RF—VTVM. Permits simultaneous and non-interfering connection of both Circuit Isolating Test Probe and optional H.F. Vacuum Tube Probe Series RF—10A.
- ★ HIGH FREQ. VOLTAGE SCALES—Direct Reading.
- ★ DUAL-BALANCED ELECTRONIC BRIDGE OHMMETER—MEGOHMMETER uses two 1.5 volt flashlight cells easily replaced at rear of cabinet.
- ★ 1000 OHMS/VOLT MULTI-RANGE FUNCTIONS permit simple AC-DC voltage, DB and current measurements free of power line requirement.
- ★ 4⅝" RECTANGULAR METER—200 microamperes, ± 2%. Double-Sapphired, D'Arsonval construction.
- ★ 1% Film type, Metallized and Wire-Wound resistors for all shunts and multipliers.
- ★ Heavy gauge, round-cornered, louvred steel case with plastic handle. Etched, anodized, aluminum panel.

NET SELLING PRICE 64^{75}

Complete with coaxial Circuit Isolating Test Probe, Shielded Ohmmeter Test Cable, Standard #227 Super-Flex Test Leads, Ohmmeter battery and full operating instructions.
Case dimensions—10½" x 6¼" x 5"
Shipping Weight: 11 pounds. *CODE:*—Party

PRECISION APPARATUS CO., INC.
92-27 Horace Harding Boulevard, Elmhurst 74, New York
Export Division: 458 Broadway, New York, U.S.A. • Cables—Morhanex

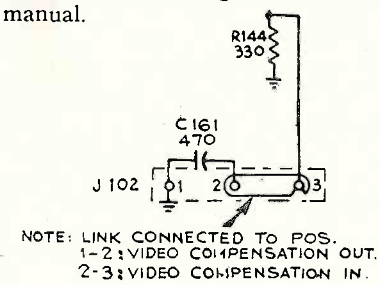
Television Changes

RCA 630TCS

This model is similar to Model 630TS which appears on *pages 1-79 through 1-116 of Rider's TV Manual Volume 1*, with the exceptions that were noted on page 7 of the March issue of SUCCESSFUL SERVICING. The following production changes have been made.

Resistor R177 has been changed from 2,700 ohms to 1,800 ohms. Resistor R240, 12 ohms, is employed in place of R168B. L187 has been changed to 180 μh, and R136 has been changed to 22,000 ohms. R208 has been changed to 18,000 ohms.

In early receivers, the link board, J102, was connected to the horizontal oscillator control tube. In late production, the link was employed to provide optional video peaking and connected as shown in the accompanying figure. In order to determine which type of connection is employed in a particular set, touch the finger to terminal #3. If the picture is displaced horizontally, the board is connected to the oscillator. Little or no effect may be noticed if the board is connected to the video stage. If the board is found to be connected to the control tube in the above test, set the link in the normal position (2 to 3) and proceed according to the directions in the manual.



Link-board connections for RCA 630TCS.

Sovereign 5020

This model is similar to Model 4920, which appears on *pages 3-1 through 3-4 of Rider's TV Manual Volume 3*, except for the following differences.

On *page 3-1* of the Manual, under Sound Alignment, the sentence: "Peak slugs on top and bottom of sound take-off transformer T1, for maximum sound," should be changed to read: "Peak slug of sound take-off transformer L12 of maximum sound."

On *page 3-3*, "Sound take-off coil (T1)" should read, "Sound take-off coil (L12)."

The following changes have been made in the schematic diagram for Model 5020:

Transformer T1 and the two 47-$\mu\mu$f capacitors have been deleted. Coil L12 has been added in parallel with a 47-$\mu\mu$f capacitor from the junction of the 5-$\mu\mu$f capacitor, the 47-$\mu\mu$f capacitor, and the 470,000-ohm resistor to the junction of pin 7 of the 6AU6 tube V9, the 1,500-ohm resistor, and the 0.01-μf capacitor. The value of the resistor in series with the 100,000-ohm resistor from pin 5 of V11, the 6V6GT, is 180,000 ohms. The 5-μf capacitor, C6, from pin 6 of the 7X7, V10, has been deleted and a 1.0-μf capacitor added in its place. The three capacitors designated as C1 are connected so that their high sides are connected to the leads from L10 and L11. The lead from the focus control going to the 4,000-ohm resistor (connected to T4) has been deleted. A lead has been added from the 4,000-ohm resistor (connected to T4) to tap 3 of the horizontal yoke. The 8,200-ohm resistor connected to pin 8 of V14, 6BG6G, now goes to this added lead. For 60° deflection tubes, replace the 0.25-μf capacitor connected to tap 3 of the horizontal yoke with a 0.1-μf capacitor. The value of the resistor connected from pin 1 of the 6SN7GT, V16, and the vertical hold control has been changed from 1 megohm to 470,000 ohms. The junction of the 1-megohm vertical hold control and the 470,000-ohm resistor is now connected to pin 8 of the 6SN7GT, V16. The value of the resistor connected to the tap of the vertical size control has been changed from 1 megohm to 2 megohms. The 3,300-ohm resistor in the grid lead of the 6SN7GT, V16, has been deleted.

●

General Electric 810

Model 810 appears on *pages 2-22 through 2-43 of Rider's TV Manual Volume 2.*

To improve the selectivity of the audio channel and, thereby, to increase the attenuation to the video i-f signal and to vertical pulses which might cause hum or noise, a transformer T21 has been substituted for L5. The addition of this transformer reduces the audio i-f bandwidth to approximately 300 kc. The catalogue number for this transformer is RTL-090. To replace L5 with T21, it is necessary to remove the coupling capacitor C98 and coil L5. The primary of T21 should be connected between pin 5 of V22 and the load resistor R102. Connect terminal 1 of T21 to R102. A bypass capacitor C106, cat. no. RCW-3014, must be connected from the junction of R102 and terminal 1 of T21, to ground. Terminal 2 of T21 should be connected to pin 5 of V22. Terminal 3 of T21 must be connected to ground. Terminal 4 is connected to pin 1 of V17. This transformer mounts in the same manner as L5 and is double tuned. Therefore, when tuning this stage, it is necessary to adjust two iron cores of T21 for maximum amplitude and symmetry about the 21.8 marker.

It has been found that howl may be caused by one or more of the three following reasons:

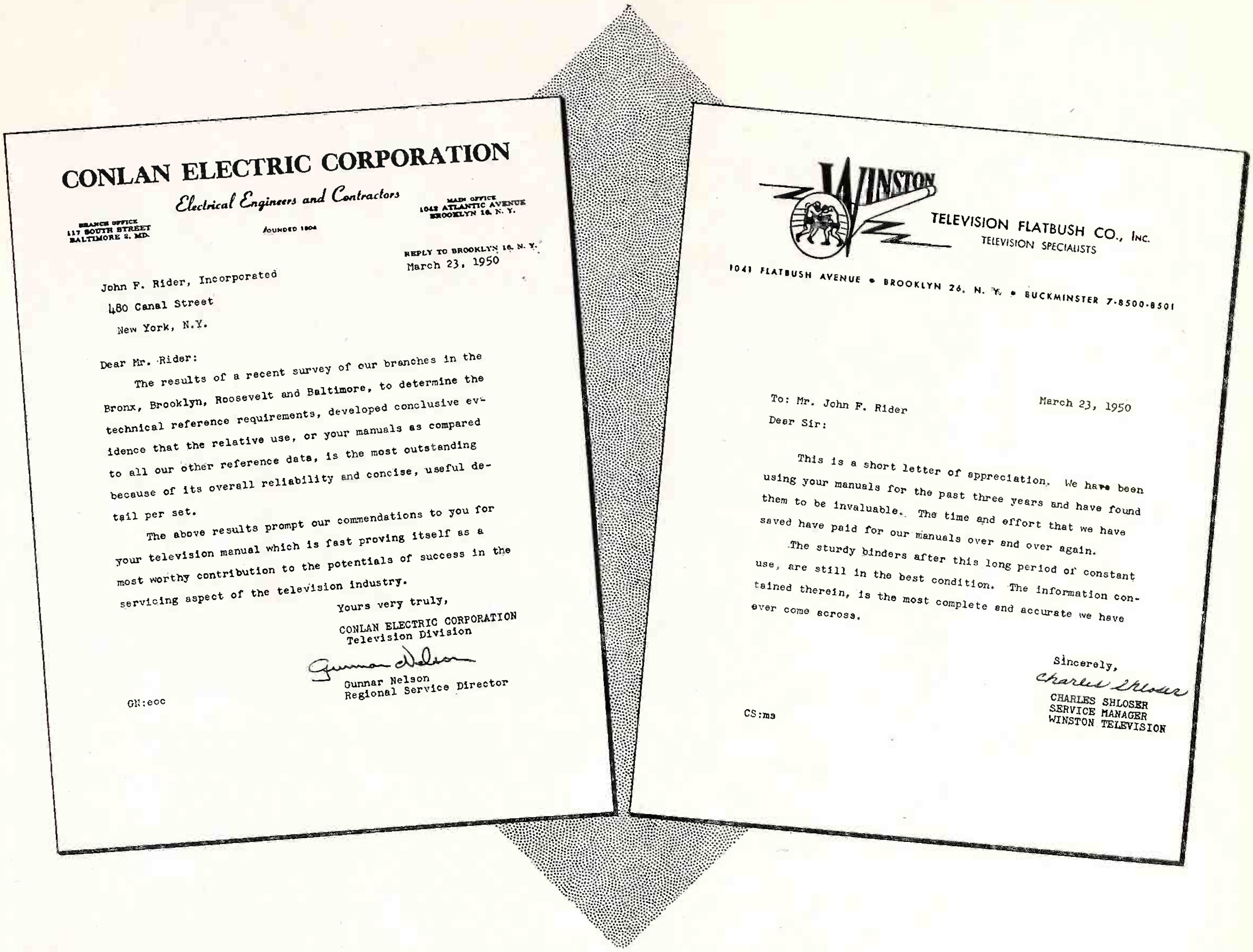
1. A microphonic converter-oscillator tube, V2, type 12AT7.
2. The capacitor C3, located on the head-end unit under the tuning capacitor, may start vibrating.
3. The metal guide ring on the rear side of the oscillator wafer rotor section or the textolite rotor in the oscillator wafer of the channel switch may be loose.

A lead weight, RHX-014, is available to mount over the type 12AT7 tube, V2, which will dampen out mechanical vibration of the tube envelope and the internal components of the tube.

To prevent the capacitor C3 from vibrating, a rubber block, RMM-081, may be wedged between the edge of C3 and the front apron of the head-end unit. To facilitate the installation of this piece, it is suggested that it be cut into a V or wedge shape so that the edge of C3 will be held in the channel of the rubber cushion.

Item 3 can be corrected by cementing the textolite rotor to the shaft and the rotor guide ring on the rear side of the oscillator wafer rotor to the textolite rotor with "Dekadhese Cement." The cement should not touch the fingers of the electrical contact ring which extend through the textolite rotor.

From the Users of RIDER TV Manuals:



CONLAN ELECTRIC CORPORATION
Electrical Engineers and Contractors
BRANCH OFFICE 117 SOUTH STREET BALTIMORE 2, MD.
FOUNDED 1904
MAIN OFFICE 1042 ATLANTIC AVENUE BROOKLYN 16, N. Y.

REPLY TO BROOKLYN 16, N. Y.
March 23, 1950

John F. Rider, Incorporated
480 Canal Street
New York, N.Y.

Dear Mr. Rider:

The results of a recent survey of our branches in the Bronx, Brooklyn, Roosevelt and Baltimore, to determine the technical reference requirements, developed conclusive evidence that the relative use, or your manuals as compared to all our other reference data, is the most outstanding because of its overall reliability and concise, useful detail per set.

The above results prompt our commendations to you for your television manual which is fast proving itself as a most worthy contribution to the potentials of success in the servicing aspect of the television industry.

Yours very truly,
CONLAN ELECTRIC CORPORATION
Television Division

Gunnar Nelson
Gunnar Nelson
Regional Service Director

GN:eoc

WINSTON
TELEVISION FLATBUSH CO., INC.
TELEVISION SPECIALISTS
1041 FLATBUSH AVENUE • BROOKLYN 26, N. Y. • BUCKMINSTER 7-8500-8501

To: Mr. John F. Rider
March 23, 1950

Dear Sir:

This is a short letter of appreciation. We have been using your manuals for the past three years and have found them to be invaluable. The time and effort that we have saved have paid for our manuals over and over again.

The sturdy binders after this long period of constant use, are still in the best condition. The information contained therein, is the most complete and accurate we have ever come across.

Sincerely,
Charles Shloser
CHARLES SHLOSER
SERVICE MANAGER
WINSTON TELEVISION

CS:ms

Thank You, Gentlemen . . . We appreciate your comments and will do all we can to merit your continued praise in the future.

Curtain Time

(Continued from page 5)

for his daily existence. Most certainly it applies to Rider Manuals—AM—FM—PA—TV. Here is the exact comment from Perfect Radio and Television of Bronx, N. Y. "Just a note to let you know that we find your AM-FM-Television Rider Manuals indispensable. Actual count of hours saved on one job—*4 hours*." (Signed) F. Binenbaum. Thanks very much for those kind words . . . And we desire to express our personal thanks for the gratifying letters from Winston Television and from Conlon Electric, reproduced above. These two outfits are among the largest television servicing organizations in the nation.

Proposed 10 Percent Excise Tax On TV Receivers

The people of our nation elect their legislators and live by laws which they promulgate. Among these laws are the taxes imposed upon us. To quote Thiers, "Taxation is the legitimate support of government," but there are times when certain tax proposals are not in the best interests of the people. Now is such a time. The Federal Reserve Bank states that savings are at a very high level. On the other hand, industries which bear the burden of excise taxes can show that their sales have been very badly hurt. People are not spending because they are waiting for lower prices. The television industry has made progress because it has, by means of mass production, lowered prices. The application of an excise tax would offset all of these efforts—it would reduce sales, and, therefore, employment; it would reduce budgets for research—not to mention that it is a discriminatory tax. None of these are in the best interests of the nation.

In these days of uncertainty and international insecurity, nothing should be done which in any way at all would impair research and production facilities. It is the television organizations which will be called upon to manufacture for defense should the occasion for such operations arise. Anything which is done to stunt the growth of TV research and production, or anything which will tend to reduce employment, is a hazard at this time. Every serviceman who reads these lines has a stake in the television industry, in national security. Every member of the industry desires that a maximum number of receivers be sold. The Radio Technicians Guild of Rochester, N. Y., Inc., has gone on record as opposing the proposed 10% excise tax. They feel, as we do, that such action would be most harmful to the entire television industry, and that the greater the number of individual protests, the greater will be the chance of defeating such a proposed tax. Write to your representatives, to your senators—voice your disapproval of the proposed tax.

JOHN F. RIDER

Television Changes

Ch. V-2150-01
ages 3-19 through
l Volume 3. Per-
coils were em-
early production
an be identified by
amped on the coil.
to avoid bringing
act with the coil,
will alter the mag-
mount of current
g. The focus con-
ufficient. With the
he centering range
by the electromag-
luction. The range
adequate when a
ube is used with a
]. Only the electro-
as listed in the
e stocked for re-
onnections are the

e audio i-f trans-
contain a 10-$\mu\mu$f
he capacitor was
located outside the transformer can. The transformers that do not contain C220 are coded with a red dot. In later production, the capacitor was built into the transformer. When replacing one of the red-dotted transformers, the external capacitor should be removed from the circuit.

General Electric Models 800-Series and "T" Version Models 805, 806, 807

Models 805, 806, and 807 appear on *pages 3-1 through 3-15 of Rider's TV Manual Volume 3.* A tuned circuit was added to the horizontal blocking oscillator circuit to stabilize the sync. The method described herewith uses instruments for the adjustment of the circuit which will give better performance than the method described in *Volume 3.* Connect a low-input oscilloscope (General Electric Type ST-2A or equivalent) to the junction of L316, and the horizontal blocking oscillator transformer, L313, through a 0.05-μf capacitor. Connect the ground side of the oscilloscope to B- of the horizontal sweep circuit, as shown in Fig. 1. Other oscilloscopes, while their input capacitances are high, may be used if the special problem shown below is incorporated in the test setup. The value of "R" for a given type oscilloscope is shown in the following table.

Value of "R"	*Type of Oscilloscope*
18,000 ohms	General Electric CRO-3A*
150,000 ohms	General Electric CRO-5A
82,000 ohms	General Electric CRO-5S
82,000 ohms	Du Mont Type 208

*Note: Vertical attenuator set at mid-range.

The television receiver must first be tuned for normal picture, the usual adjustments of either or both, front panel or rear of chassis, horizontal hold controls being made to obtain horizontal sync. The flywheel coil, L316, is adjusted for equal amplitude of its positive peaks, *A* and *B*, as shown in Fig. 2. Keep the picture in sync during adjustment of the flywheel coil by adjusting either or both of the horizontal hold controls.

After properly setting L316, the rear of chassis horizontal hold control should be readjusted as described in the paragraph in *Volume 3* for "Horizontal Hold".

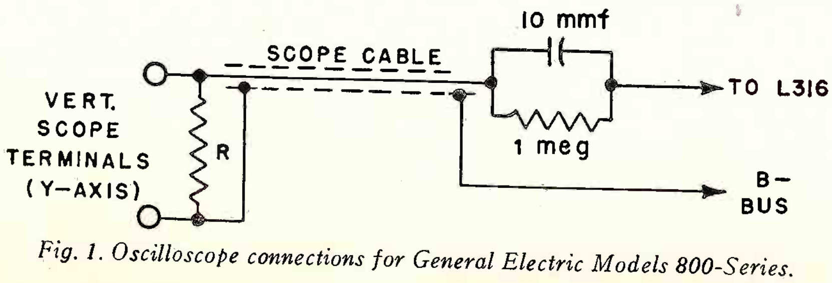


Fig. 1. Oscilloscope connections for General Electric Models 800-Series.

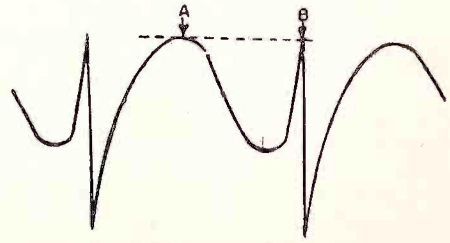


Fig. 2. Flywheel coil adjustment for 800 Series.

Curtain Time

(Continued from page 5)

for his daily existence. Most certainly it applies to Rider Manuals—AM—FM—PA—TV. Here is the exact comment from Perfect Radio and Television of Bronx, N. Y. "Just a note to let you know that we find your AM-FM-Television Rider Manuals indispensable. Actual count of hours saved on one job—*4 hours.*" (Signed) F. Binenbaum. Thanks very much for those kind words . . . And we desire to express our personal thanks for the gratifying letters from Winston Television and from Conlon Electric, reproduced above. These two outfits are among the largest television servicing organizations in the nation.

Proposed 10 Percent Excise Tax On TV Receivers

The people of our nation elect their legislators and live by laws which they promulgate. Among these laws are the taxes imposed upon us. To quote Thiers, "Taxation is the legitimate support of government," but there are times when certain tax proposals are not in the best interests of the people. Now is such a time. The Federal Reserve Bank states that savings are at a very high level. On the other hand, industries which bear the burden of excise taxes can show that their sales have been very badly hurt. People are not spending because they are waiting for lower prices. The television industry has made progress because it has, by means of mass production, lowered prices. The application of an excise tax would offset all of these efforts—it would reduce sales, and, therefore, employment; it would reduce budgets for research—not to mention that it is a discriminatory tax. None of these are in the best interests of the nation.

In these days of uncertainty and international insecurity, nothing should be done which in any way at all would impair research and production facilities. It is the television organizations which will be called upon to manufacture for defense should the occasion for such operations arise. Anything which is done to stunt the growth of TV research and production, or anything which will tend to reduce employment, is a hazard at this time. Every serviceman who reads these lines has a stake in the television industry, in national security. Every member of the industry desires that a maximum number of receivers be sold. The Radio Technicians Guild of Rochester, N. Y., Inc., has gone on record as opposing the proposed 10% excise tax. They feel, as we do, that such action would be most harmful to the entire television industry, and that the greater the number of individual protests, the greater will be the chance of defeating such a proposed tax. Write to your representatives, to your senators—voice your disapproval of the proposed tax.

John F. Rider

Television Changes

Westinghouse H-223, Ch. V-2150-01

This model appears on *pages 3-19 through 3-30 of Rider's TV Manual Volume 3.* Permanent-magnet-type focus coils were employed on some of the early production chassis. Coils of this type can be identified by the part number V-6456 stamped on the coil. Care should be exercised to avoid bringing another magnet into contact with the coil, because prolonged contact will alter the magnetization and affect the amount of current required for correct focusing. The focus control range will then be insufficient. With the permanent-magnet coils, the centering range is less than that afforded by the electromagnet coils used in later production. The range will, however, usually be adequate when a G.E. 10BP4 cathode-ray tube is used with a permanent-magnet type coil. Only the electromagnet type focus coils as listed in the replacement parts list are stocked for replacement purposes. The connections are the same for both coil types.

In early production, the audio i-f transformer, V-6517, did not contain a 10-$\mu\mu$f capacitor C220. Instead the capacitor was located outside the transformer can. The transformers that do not contain C220 are coded with a red dot. In later production, the capacitor was built into the transformer. When replacing one of the red-dotted transformers, the external capacitor should be removed from the circuit.

General Electric Models 800-Series and "T" Version Models 805, 806, 807

Models 805, 806, and 807 appear on *pages 3-1 through 3-15 of Rider's TV Manual Volume 3.* A tuned circuit was added to the horizontal blocking oscillator circuit to stabilize the sync. The method described herewith uses instruments for the adjustment of the circuit which will give better performance than the method described in *Volume 3.* Connect a low-input oscilloscope (General Electric Type ST-2A or equivalent) to the junction of L316, and the horizontal blocking oscillator transformer, L313, through a 0.05-μf capacitor. Connect the ground side of the oscilloscope to B- of the horizontal sweep circuit, as shown in Fig. 1. Other oscilloscopes, while their input capacitances are high, may be used if the special problem shown below is incorporated in the test setup. The value of "R" for a given type oscilloscope is shown in the following table.

Value of "R"	*Type of Oscilloscope*
18,000 ohms	General Electric CRO-3A*
150,000 ohms	General Electric CRO-5A
82,000 ohms	General Electric CRO-5S
82,000 ohms	Du Mont Type 208

*Note: Vertical attenuator set at mid-range.

The television receiver must first be tuned for normal picture, the usual adjustments of either or both, front panel or rear of chassis, horizontal hold controls being made to obtain horizontal sync. The flywheel coil, L316, is adjusted for equal amplitude of its positive peaks, *A* and *B*, as shown in Fig. 2. Keep the picture in sync during adjustment of the flywheel coil by adjusting either or both of the horizontal hold controls.

After properly setting L316, the rear of chassis horizontal hold control should be readjusted as described in the paragraph in *Volume 3* for "Horizontal Hold".

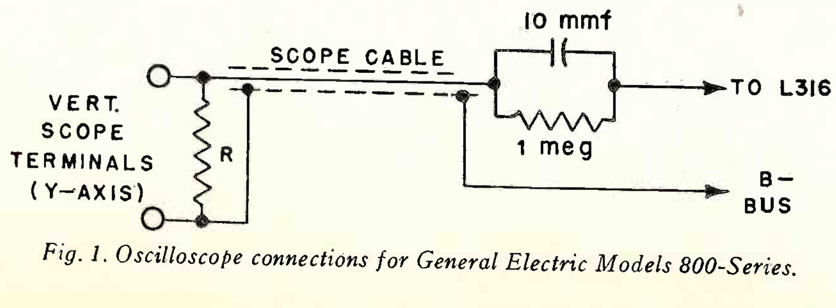


Fig. 1. Oscilloscope connections for General Electric Models 800-Series.

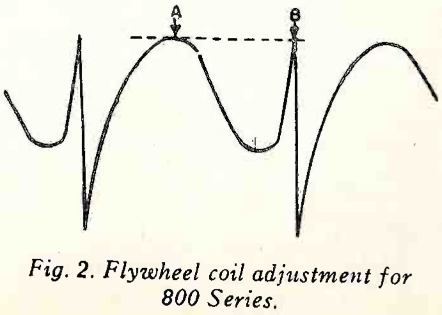


Fig. 2. Flywheel coil adjustment for 800 Series.

NEED YOUR HELP

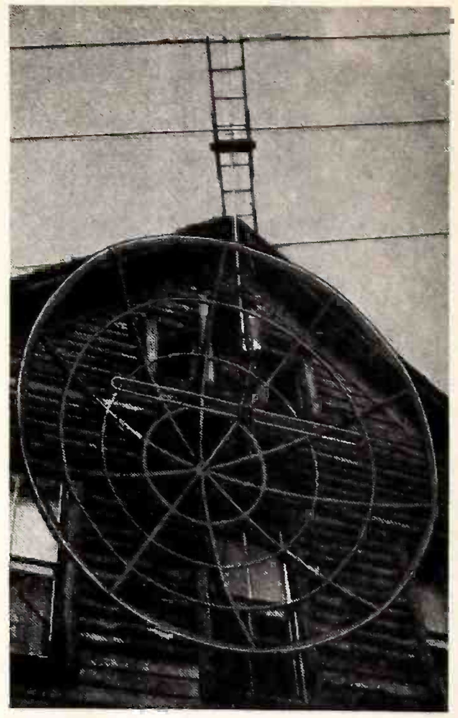
In order to be of service to you, the Rider library of electronic magazines, one of the most extensive in the country, needs the following back issues to complete its files. We will pay $1.50 per copy. For the 1947 Volume of Transactions AIEE we will pay a reasonable figure. Send to John F. Rider Publisher, Inc., 480 Canal St., New York 13, N. Y.

MAGAZINE AND MISSING ISSUES

B.B.C. Quarterly
Vol. 3, No. 4, Jan. 1949
Vol. 4, No. 1, Apr. 1949
Chemical Industries
Jan. — June 1949
Electrical Communication
Jan., July 1934, July 1935, July 1937
Electronic Engineering
Vol. 20, No. 246, Aug. 1948
Engineers Digest
Jan. 1949
Journal of Applied Mechanics
Vol. 16, No. 1, March 1949
Journal of Institute of Electrical Engineers
Part III A, Vol. 93, Nos. 2, 5, 7, 1946
Journal Research of National Bureau Standards
Vol. 42, No. 1, Jan. 1949
Nature (English)
No. 4089 Mar. 13, 1948
4092 Apr. 3, 1948
4093 Apr. 10, 1948
4096 May 1, 1948
4097 May 8, 1948
4108 July 24, 1948
4112 Aug. 21, 1948
Radio
Jan. 1922
Aug., Sept. Oct. 1932
Feb., March, Apr., May 1933
The Engineer
Dec. 13, 1946 — Dec. 27, 1946
Toute La Radio
No. 103, Feb. 1946
Transactions AIEE
1947 (Bound Annual Volume)

A Parabolic Antenna on 10 Meters

For the benefit of those of our readers who operate amateur rigs on 10 meters, here is a photo of the parabolic antenna arrangement conceived by W2WCP, Joe Gibbons, 18 Liberty Street, Port Jervis, N. Y. We give his address because we are certain that readers will desire to secure additional information. We have worked with Joe during the evening hours when no other station from his neck of the woods was audible. It is interesting to note that his location relative to our station is beneath and in back of an 1,800-foot mountain which bears a monument on its peak. We sprayed that monument with our signal and he picked up the reflection with this antenna. The procedure was reversed when he transmitted, he bounced his signal off the monument. To the best of our knowledge the width of the parabolic reflector is 20 feet. The antenna is a quarter-wave folded dipole cut for 28,970 kc, and he operates on that frequency as well as 28,520 kc. The backing is hardware cloth, which we are given to understand is heavy wire with welded joints. Joe states that ordinary chicken mesh will not work well because of the poor joints at the crossover points. By the way, the spacing between the dish and the antenna is one quarter-wavelength. JFR (W2RID)



Parabolic antenna on 10 meters.

What About Free TV Estimates?

We are indebted to Mr. Walter C. Jaeger of Jaeger Radio and Electric Co. of Great Neck, L. I., for raising a very important question. It deserves serious consideration on the part of everyone participating in television servicing. It is the issue of free estimates. It is nothing new to anyone who has been active in radio servicing prior to TV, for that specter raised its ugly head a long time ago. While the issue never was really settled, it died down just prior to, during, and for a while after World War II. Now it is back to plague the industry.

What is your pleasure, gentlemen? What do you who operate service shops think is a solution? Be good enough to let us hear from you so that we can make a resume of all opinions and publish the results in the columns of this publication. By the time your answers arrive we shall have a circulation in excess of 55,000 each month and I'm sure that the industry as a whole will derive some benefit from these findings.

And to those men and women who read these pages, but who are not actively engaged in radio or television servicing—to those engineers who may use outside service talents for your repair work——how about your ideas on the subject of free estimates for repair work. You are the customers and you can give us the viewpoint of the individual who shells out the money. Both sides of the matter are of interest. It means a great deal to the servicing industry at large to know how people think on this subject. Please tell us! It is vital! JFR

Service Hints from Men in the Field

Richard Wiseman of Tomaso's Inc., 7115 West Grand Ave., Chicago, Ill., has come up with a practical solution to the problem of locating a defective component which is defective only when the receiver is heated up during actual operation. Removing the receiver from its cabinet for test will not work since the extra ventilation does away with the damaging temperature rise. Wiseman uses a home hair-dryer to blow a stream of very warm air on the suspected parts. This simulates the "in cabinet" condition quite quickly.

In reference to the suggestion which appeared in Curtain Time in the February issue of SUCCESSFUL SERVICING for relieving antenna "singing," Walter C. Hieber, Jr., of Lake Television, 619 North Ave., Waukegan, Ill., has the following suggestion to offer. He has found that the wind blowing past the antenna elements from certain critical directions causes the elements to vibrate, especially reflector elements used with lower TV channels, with physical lengths running from 80 to 108 inches over-all, and that seamed tubing does not show so great a tendency to vibrate as does hollow drawn tubing. Hieber uses the plugs as suggested in Curtain Time, but only as a means of keeping a dry filling inside the tube. He uses a small amount of dry, fine sand for the filling, to dampen the vibrations.

A New Manual for the TV Man in the Field

We've been waiting a long time to break this news. It took a lot of research in the field and visits with practicing TV servicemen and to their installations. The May issue of SUCCESSFUL SERVICING will announce the publication date and price of a new Rider Manual—a Manual desired by and designed expressly for the TV serviceman for use in the field. It will furnish all the information about TV receivers for use by the TV serviceman on the spot—top views of tube locations showing functions and all other pertinent details, preset controls, kind of filament wiring, key voltage points, crt socket designations, oscillator trimmer positions, i-f trimmer locations—and everything else needed by the man in the field. ALL TV RECEIVER MODELS PRODUCED UP TO MAY 1950 WILL BE COVERED. THIS MEANS MORE THAN 1,200 MODELS. THE PRICE WILL BE RIGHT, THE SIZE WILL BE RIGHT, AND THE INFORMATION WILL BE COMPLETE AND CORRECT!

Radio Changes

Montgomery Ward 04WG-672 Series

Model 04WG-672 appears on *pages 12-31 and 12-32 of Rider's Manual Volume XII*. Models A and B are the same as that model which appears in Volume XII. Models C, D, and E are similar to Model 04WG-672 with the following exceptions. Model C employs a plug-in resistor, R13 and R12. The values remain the same as in the earlier models. Model D employs the plug-in resistor and, in addition, a new oscillator coil and 2 section dry electrolytic capacitor. In Model E the loop antenna assembly has been redesigned.

●

General Electric 106

This model appears on *pages 15-9 through 15-10 of Rider's Manual Volume XV*. Part no. RJX-005 should be changed to read RJX-007. Delete part no. ROP-006. Add part no. UOX-001, cone, replacement speaker cone.

●

Montgomery Ward 14WG-518A, 14WG-519A, 14WG-518B, 14WG-519B

These models are similar to Model 14WG-518 and 14WG-519 which appear on *page 13-46 of Rider's Manual Volume XIII*.

●

General Electric 200 Series

These models appear on *pages 18-19 through 18-20 of Rider's Manual Volume XVIII*. The following changes should be added to the parts list:

RHM-002	Clip, for mounting speaker board
RHM-004	Clip, dial scale mounting clip for plastic cabinet models
RHM-005	Clip, dial scale mounting clip for wood cabinet models.

●

Cover

The photograph on the cover is a view of the front of the Mechanical Calculator installed at Dahlgren, Virginia, for use in guided missile computations. The operator at the left is at one of the control panels. The man at the right is in front of the specially adapted teletypes which punch out the answers on paper tape. Four sequence mechanisms allow the calculator to handle, pass on, or transfer numbers at the rate of 60 numbers a second. Addition of numbers running into the billions can be done in less than one-fifth of a second.

Distribution of This Issue—55,000 Copies

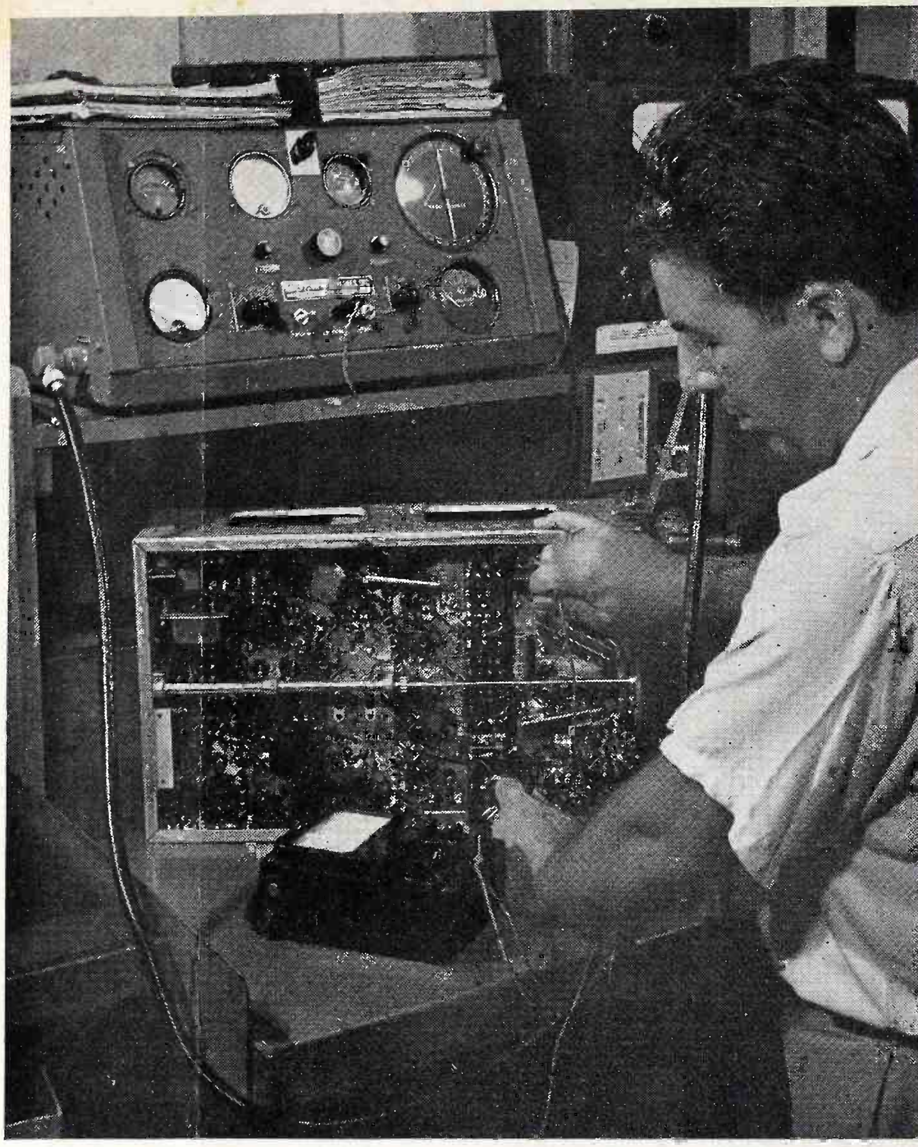
Successful SERVICING

MAY, 1950

THE UNCOMPENSATED ATTENUATOR IN OSCILLOSCOPES

By

JOHN F. RIDER



Courtesy American Airlines

At first thought, one might consider an attenuator control a very simple part of the entire oscilloscope system, since its function is elementary. However, such is not the case, because it has a decided effect on the output waveform of the signal being passed through the vertical amplifier.

In general, attenuator systems employ two arrangements. One form of attenuator is a single continuous amplitude control. The other system is a combination of step control and continuous variation. These may be *symbolized* by a single potentiometer, and by a potentiometer acting in concert with a step voltage divider, as shown in Fig. 1A and B. The elements under consideration in (A) and (B) act like voltage dividers; in (A) the voltage division is regulated by means of a single continuous control, whereas in (B) voltage division is provided by a continuous control in conjunction with a step attenuator.

In view of the simplicity of the former, little need be said about its function as an amplitude control. In the second system, more detail is justified. We identify Rs as the main voltage divider because its function is to afford control of large values of input voltage in steps, usually in multiples of 10.

> Editor's Note: This material is an abridged excerpt from the chapter on The Basic Oscilloscope and Its Modifications as found in the "ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES" (formerly "The Cathode-Ray Tube at Work"), a forthcoming book which has been written by Rider *et al* and will soon be published by John F. Rider Publisher, Inc.

As the switch is advanced along the taps, the voltage fed to the variable control Rv is such as to cover a range of 10 to 1; a calibrated system is the result.

The need for step attenuators, in addition to continuous variation, arises from a number of conditions which must be satisfied and cannot be accomplished by means of a simple potentiometer. The range of signal voltages encountered during oscilloscope use is very broad, yet a smooth control over relatively small increments of signal level is required. This is not possible when a single control, which must be fixed in physical dimensions and still present a high impedance at the input side, is used. If the resistance element of such a potentiometer could be made very large physically and be of a high resistance, it would satisfy these two needs, although they are neither the only, nor the most important, requirements.

The demand for faithful reproduction imposes certain frequency conditions, as well as specific phase- or time-delay conditions. These cannot be satisfied by the use of a single-element potentiometer for reasons which will become evident soon, so that recourse must be made to the combination of a step attenuator and a continuously variable control. The attenuating systems symbolized in Fig. 1 include those used in almost all oscilloscopes. If we concern ourselves only with the basic oscilloscope, the attenuator shown in part (A) of that illustration would be the one most frequently encountered. The other varieties are representative of the more elaborate instruments.

When the multiple type, that is, the step and continuously variable arrangement, is used, the initial setting of the step control should be that which affords the least at-

(Continued on page 18)

Television Changes

Freed-Eisemann 54, 55, 56, 68, and 77

Models 54, 55, 56, 68, Ch. 1620A and Ch. 1620B, are similar to Models 55 and 56, Ch. 1620, which appear on *pages 3-1 through 3-13 of Rider's TV Manual Volume 3*. Chassis 1620A differs from Chassis 1620 in the following ways:

1. A 10,000-ohm, 20-watt resistor, R250, has been added from the 275 B+ lead of the vertical centering control to ground.
2. The 0.005-μf capacitor, C142, originally going to pin 3 of the 6V6 (V108) to ground, now goes from pin 3 to pin 4 of the 6V6.
3. The 20-μf, 500-volt capacitor, C174, connected to the center terminal of the height control now has its negative terminal going to ground, instead of —110 volts.
4. A 56,000-ohm, 2-watt resistor, R251, has been added from pin 3 to pin 5 on the 6W4 socket (V129).
5. Pin 6 on the 6T8 socket (V107), which was previously left open, now is grounded.
6. A 47,000-ohm, ½-watt resistor, R249, has been added between R227, in the plate circuit of V107, and T116; and a 0.1-μf, 400-volt capacitor, C228, has been added between ground and the junction of R227 and R249.
7. A 1,000-ohm, ½-watt resistor, R252, has been inserted from the —2-volt tap of the bias bleeder resistor, R240, to C151.
8. Capacitor C227 going from L211 to pin 1 of V109 is now designated as C226.
9. R251, which was connected from pin 3 to pin 5 of V129, has been deleted.
10. The value of R172, connected to the red lead of T119, has been changed from 7,000 ohms, 5 watts, to 5,000 ohms, 10 watts. R172 is now connected to pin 3 of V129 instead of to +275 volts.
11. The value of R208, focus control, has been changed from 2,250 to 5,000 ohms.

These above changes are incorporated in chassis with serial numbers above 2445.

Chassis 1620B differs from Chassis 1620A in the following ways:

1. Coil L212 is tuned to 21.25 Mc and L211 is tuned to 21.8 Mc. T106, T107, and T108 are tuned to 21.25 Mc.
2. C228 and R249 in the plate circuit of the 6T8 (V107B) have been deleted.
3. A 1,000-ohm, 10-watt resistor, R253, has been added from the 275-volt B+ lead to the junction of R227 and T116. Capacitor C126B, 10 μf, has been added from ground to the junction of R227, R253, and T116.
4. All leads that went to —110 volts now go to —120 volts.
5. Kinescope V117 has been changed from a 16AP4 to a 16GP4. The kinescope is now connected to +14 kv instead of to +13 kv. This change should be indicated at P4 and the connection from R202.
6. In the horizontal peaking network, R189 has been changed from 10,000 ohms to 20,000 ohms; R236 from 5,100 ohms to 10,000 ohms; and, C166 from 510 $\mu\mu f$ to 1,200 $\mu\mu f$.
7. In the second sync amplifier stage, the value of R160 has been changed from 4,700 ohms to 5,600 ohms, and R159 and C126B have been deleted.
8. C226 is no longer connected to tap 4 of T115, but is grounded.

The following servicing remedies apply to Models 54, 55, 56, 68, and 77.

Microphonics: Change the 6J6 oscillator tube in r-f circuit.

Sound bars in picture: Check for gassy 6V6 audio output tube (V108). Also check for gassy 6AG5 tubes (V109—V112). On Model 77, change the grid bias from fixed-bias to self-bias with a 330-ohm, 1-watt, cathode resistor and a 25-μf, 50-volt, bypass capacitor, modifying the circuit to resemble that of Models 54, 55, 56, and 68.

Excess width: Width control open or misadjusted. Check for broken slug.

Weak video (good sound): Check all 6AG5 video i-f amplifier tubes (V109—V112). Check 1N34 crystal to see that the back resistance is over 100,000 ohms and the forward resistance is 50-200 ohms. If there is a loose socket on 6AU6 1st video amplifier (V114), bend the pins of the tube slightly before replacing in the socket.

Inoperative vertical hold at end of control (frame lock): Replace the 1-megohm series resistor, 164, or shunt with a 4.7-megohm, or 3.3-megohm, ½-watt resistor, or replace with 910,000 ohms.

Slow drifting horizontal sync: Change 6AC7 (V124) and 6AL5 (V123). On earlier Models 55 and 77, if drift is still noticeable, shunt the 0.015-μf capacitor, C158, in the 6AC7 circuit with a ceramic capacitor, 1,000 to 1,500 $\mu\mu f$, if this has not already been done.

No picture or raster but sound: Check linearity coil, horizontal circuit tubes, and fuse F2 for 6BG6 (V126). If the 6BG6 plates get red, the 5,000-ohm, 5-watt resistor, R186, in the 6K6GT (V125) plate circuit, is open or the 6SN7GT (V120B) horizontal discharge tube is defective.

Line fuse blows—or 5U4GT (V130) plates get red hot: Check 40-40-μf, 450-volt capacitors, C182A and B, and add a 10,000-ohm, 20-watt resistor from B+ 275 volts to ground to protect the capacitor. If capacitor C142, 0.005 μf, from plate of 6V6GT (V108) to ground is shorted, replace it, connecting it from the plate to the screen of 6V6GT (V130) instead of to ground.

Raster but no picture or sound: Short in the front end or the open filter resistor, 150 ohms, R103. Or shorted 1,500-$\mu\mu f$ filter capacitor, C105.

Corona hiss: Dust—seal tape is leaking where it crosses tube mounting ring, (CRT). Remove lock washers from under screws on the 1B3 (V127) socket. Dress pins of the socket. (Models 54, 55, 56, and 68 only.)

Inoperative focus at end of control: Adjust the position of the focus coil either forward or back on neck of picture tube, or change 6V6GT (V108) audio output tube; or add an additional bleeder of 10,000 ohms, 20 watts, from B+ 275 volts to ground if not already installed.

60-cycle hum (noticeable with volume up):
1. Replace 6T8 audio tube.
2. Ground pin 6 to 6T8 (V107).
3. Move a-c switch leads and pilot light leads well away from audio-volume-control terminals.

60-cycle hum (noticeable with volume down):
1. Remove 25-μf capacitor and green lead from —2-volt terminal on bleeder. Insert 1,000-ohm, ½-watt resistor in series with the bleeder terminal and the capacitor and bias wire.
2. Lift B+ end of the 270,000-ohm plate load resistor of the 6T8 (V107). Place a 47,000-ohm, ½-watt resistor from B+ to these loose ends of the plate load resistor. Place a 0.1-μf, 400-volt capacitor from the intersection of these two resistors to ground.

Sync "buzz" in sound:
1. Occasionally, video hash has been found to be radiated from the 0.05 capacitor that goes from pin 4 of the 6SK7 first sync amplifier (V118). Disconnect the leads going to the terminal strip that supports this capacitor. Re-route this capacitor, and the green lead going to it, so that it is well away from the audio circuits.

"Vertical" buzz:
1. Move unshielded "hot" ends of audio cables away from the cable harness both at the 6T8 audio tube end and at the radio-phonograph switch.
2. The vertical oscillator transformer laminations may be mechanically vibrating. This noise may be removed by crimping the lamination strap with a large pliers.

Tunable hum (usually caused by tuner overloading in exceptionally strong signal areas):
1. Check f-m alignment.
2. In accordance with information given on *page 3-3 of Rider's TV Manual Volume 3*, install attenuating stub to facilitate removal of cross-modulation effects.
3. If the signal still cannot be reduced sufficiently, place an 80-μf, 150-volt, electrolytic capacitor from the tuner B+ terminal to ground.

Internal arcing:
1. This may be caused by the high-voltage capacitor in the flyback compartment breaking down internally. When replacing this capacitor, solder quickly, as excessive soldering heat may cause premature component failure.

Successful
SERVICING
REG. U.S. PAT. OFF.

Vol. 11 MAY, 1950 No. 7

Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

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

JOHN F. RIDER, Editor

CURTAIN TIME

The Free Estimate Problem

Letters being received in response to the question asked in the April issue of SUCCESSFUL SERVICING, concerning free estimates as a part of TV servicing sales are overwhelmingly against the practice. Many non-electronic servicing facilities and other kinds of businesses offer free estimates. Let them do it, is the consensus of opinion, there is no reason why it must become a practice in TV maintenance.

There is no such thing as a free estimate. Somewhere along the line someone pays for it. Either the customer or the service facility must bear the burden. It is understandable that the servicing industry considers the free estimate a customer responsibility, and it is equally understandable that all people do not take the same stand on the subject. Some feel that free estimates, compared to paid estimates, represent competition, and that competition cannot be stifled. Technically that is correct, but unfortunately the practice of free estimates is a bad one because of the competition which still remains on the final service price. In the long run, the service facility takes it on the chin in two ways. If the service charge were fixed so as to assure a reasonable profit at all times, it might be possible to consider free estimating as an advertising expense; but even then, since advertising is a part of the cost of doing business, it would be paid for by the customer. At least that is the sensible way of doing business.

Any other business practice which leads to taking losses, rather than making a profit, is a sure way of going out of business. The exercise of subterfuge and of using inferior replacement parts is unwholesome. It is a well-known fact that in the past years, the practice of giving free estimates resulted in padded service bills in many instances and many other things which did not enhance the reputation of the servicing industry.

The letters which we have received do not suggest that a fixed estimating price be set up; that is left to the discretion of the service facility, but it is felt by all that *free estimates should be avoided.* The public should be expected to pay for estimates.

The conditions of operation in TV servicing are substantially different from those for a-m servicing in the past. TV receivers are not brought to the shop. The estimator must go to the home. A TV receiver contains from 5 to 7 times as many tubes and components as a five- or six-tube midget, so that a snap judgment estimate is a financial hazard. It is doubtful if even an experienced individual can make more than five estimates in an eight-hour day, if he must travel to five different homes. It is conceivable that a part of this cost may be charged to advertising, but all of it cannot be absorbed that way. This leads to the conclusion that estimates should be charged for, and that it is entirely within reason that each charge approximate an hour's time, and that such time is worth $3.00 to $3.50.

Such is the thinking of the people, and we'll have more to say on the subject next month.

An Industry-Wide Service Meeting

We have at hand a communication from the Television Installation Service Association of Chicago, Ill., with headquarters at 5908 South Troy Street in that city. This group of television service companies have taken the bull by the horns and are attempting to call an industry-wide meeting of all receiver manufacturers, distributors, parts manufacturers, television broadcasters, parts jobbers, dealer organizations and others. It is their desire to clean up a situation which can best be described by a quotation from this commmunication, "This association, acting in its capacity as policing agency for a foremost business agency has investigated very many complaints regarding poor quality service. The investigations invariably reveal that the offending companies are chiselers who are representing those as legitimate companies . . . We of TISA are doing our utmost to maintain a healthy, clean service profession for the benefit of the entire industry and the set buyers . . . We, therefore, believe sincerely that the time has come for the entire industry to sit down around the table and discuss its problems."

So much for the quotation from the letter we received. Unfortunately, we do not have space to print everything that was said; but there is no doubt of the stand which this group has taken and of their sincerity. Just what the local entanglements may be and what might tend to keep some organizations away from such a meeting, we do not know. It is certainly hoped that they are as few

(Continued on page 22)

Television Changes

Scott 6-T-11, 400, 800BT

Models 400 and 800BT are similar to Model 6-T-11 which appears on *pages 2-1 through 2-30 of Rider's TV Manual Volume 2*. The following production changes have been made to these models:

1. The 560-ohm, 1-watt resistor that feeds the video plate supply is to be shunted by a second resistor of the same value.
2. The 5,000-$\mu\mu$f capacitor shunting the cathode resistor in the first 6BA6 sound i.f. is removed, and the resistor is left unbypassed.
3. The 470,000-ohm, ½-watt resistor from pin 5 of the video and avc 6AL5 tube and the 140-volt plus supply is changed to 220,000 ohms, ½ watt.
4. The 2.7-megohm resistor from the center lug of the contrast control to the avc bus is changed to 3.3 megohms, ½ watt.
5. The 27,000-ohm and 47,000-ohm resistors in the screen circuit of the 6AC7 horizontal afc circuit are changed in value and voltage supply. A resistor of 47,000 ohms, 1 watt, is used between pin 6 and the chassis frame (ground). A resistor of 15,000 ohms, 2 watts, is used from pin 6 to the 140-volt supply.
6. The value of the 4,000-ohm, 5-watt resistor in series with the screen of the 6BG6 tube (horizontal output) and the plate supply is changed to 12,000 ohms, 2 watts.
7. The value of the 3,000-ohm, 5-watt resistor in series with the focus control is changed to 5,000 ohms, 5 watts.
8. The first sound i-f coil L6 is shunted by a 22,000-ohm, ½-watt resistor.
9. The 470-ohm, 2-watt resistor in series with the B+ supply feeding the Philips high-voltage power supply is removed, and a 500-ohm, 10-watt resistor with a slider tap is inserted. The voltage is adjusted to read 345 volts at 117-volt a-c input. This resistor is connected to the choke L17 after the voltage is filtered, and not to the rectifier tube, directly.
10. The 10,000-ohm resistor from the junction of the 3,900-ohm diode return resistor and the avc bus is changed to 5,600 ohms, ½ watt.
11. The 220,000-ohm grid return resistor in the 6BA6 first sound i.f. is changed to 470,000 ohms, ½ watt.
12. The 6BA6 sync tube plate filter resistor, 6,800 ohms, 2 watts, is changed to 1,000 ohms, 1 watt. The plate resistor remains the same.
13. The 10,000-ohm grid return resistor of the first video 6AU6 tube is changed to 47,000 ohms, ½ watt.
14. A channel #5 trap is added. It consists of a tuned circuit of a coil and a 4 —25-$\mu\mu$f trimmer capacitor. This coil is inserted in series with the grid of the 6AC7 tube, video output, and a 0.05—600-volt d-c capacitor that is added in series with the L10 video peaking coil. A grid return resistor of 470,000 ohms, ½ watt, is inserted at the junction of the 0.05-μf capacitor and the trap coil, and the return where the diode coil is connected.
15. The picture size is increased from 192 square inches to around 228 square inches.
16. A picture tube protection one tube unit is installed. A description of this unit is given below.

(Continued on page 8)

Television Changes

SCOTT 6-T-11, 400, 800 BT

(Continued from page 6)

The 2L4133 picture tube protection unit is designed for use with the Model 400 and 800BT television receivers and is shown in the accompanying diagram. The unit will function to cut off the beam current to the picture tube in the event of a failure in the sweep circuits while the receiver is operating, thus preventing damage to, or destruction of, the picture tube by the intense beam current.

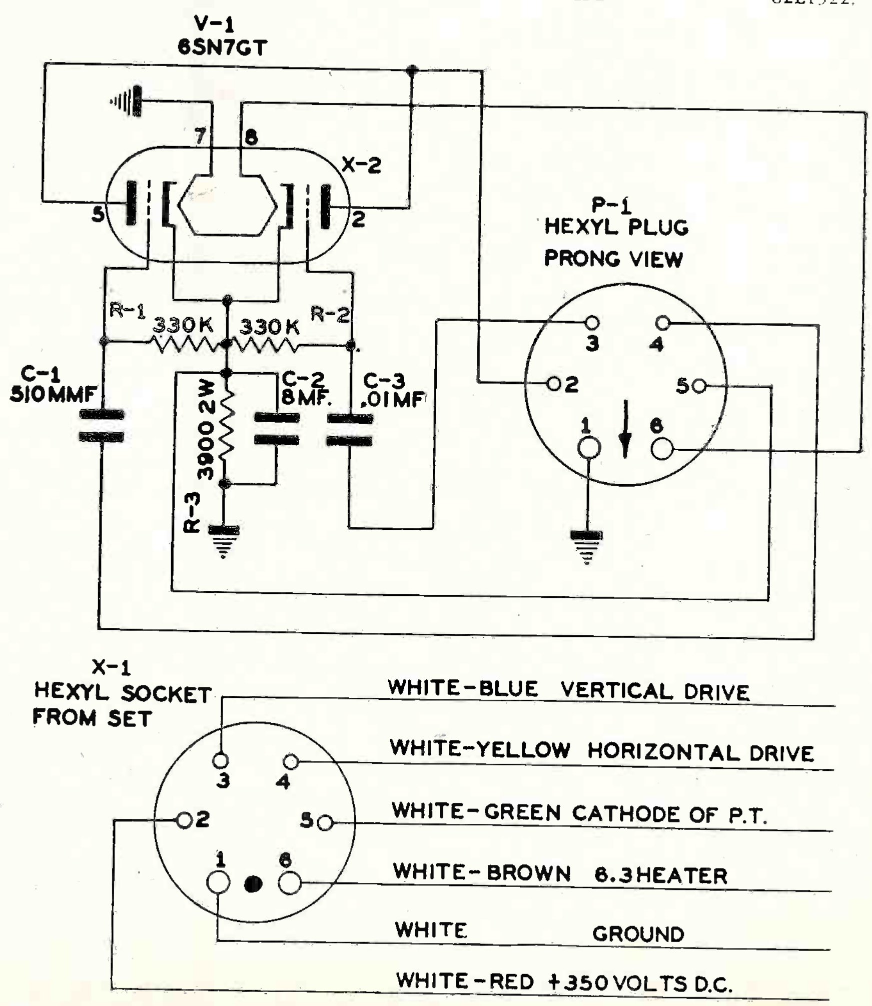
Voltages from the horizontal and vertical scanning oscillators of the receiver are supplied to the grids of the 6SN7 double triode. These voltages are rectified in the grid circuit and the resulting rectified voltages act to bias the tube to cutoff, resulting in negligible plate current. When one or both scanning oscillators fail, the grid biasing voltage ceases, the plate current increases to a high value, and a resistor in the cathode circuit develops a large voltage which is instantly applied to the picture tube cathode, resulting in beam current cutoff. The unit is provided with a disconnecting socket and plug which allows easy installation to the projection receiver.

The installation procedure is as follows:

1. Remove the television chassis from the cabinet, turn upside down on the bench and remove bottom plate.
2. Separate the socket and cable from the protection unit and feed the cable wires through the rubber grommet on the back flange nearest the center of the receiver.
3. Connect the white wire to chassis frame at the 3-point socket which supplies the high-voltage unit.
4. Connect the white-brown wire to the filament terminal (6.3 v) at the 3-point socket.
5. Connect the white-red wire to plus 350 volts on the electrolytic capacitor at the point where the wire-wound resistors are connected.
6. Connect the white-yellow wire to terminal 6 (blank terminal) on the horizontal output transformer. This will necessitate running the wire into the shielded compartment, and will require removing the shield for the operation. After soldering wire to terminal 6, immediately replace shield and screw down securely.
7. Connect the white-blue wire to socket terminals 3-4 on 6K6 vertical output tube.
8. Connect the white-green wire to the low side of the brightness control after removing the connection to frame.
9. Reinstall television chassis in cabinet and restore all connections. Screw down protective unit in any convenient location, insert the plug of the cable into the socket of the protective unit, and dress the cables. Complete reinstallation of cover and back as required.

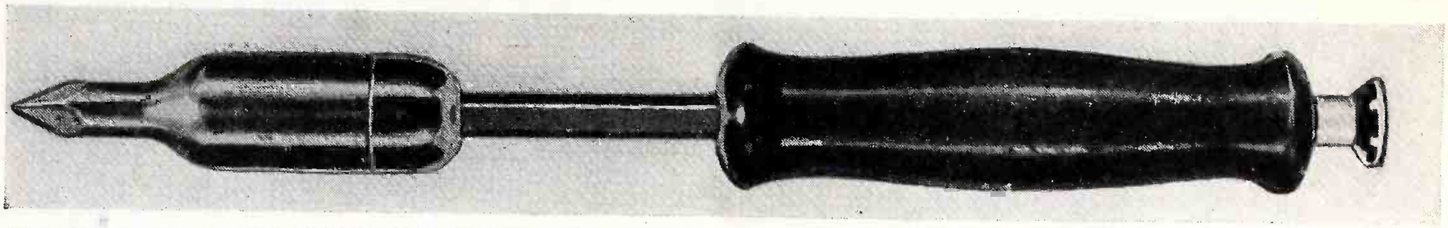
The part numbers are as follows:

Symbol	*Part No.*
C-1	15E1266
C-2	15E2023
C-3	15L3541
R-1	70H26215
R-2	70H2615
R-3	70E1232
V-1	92A230
P-1	65L3366
X-1	82B708
X-2	82E1322.

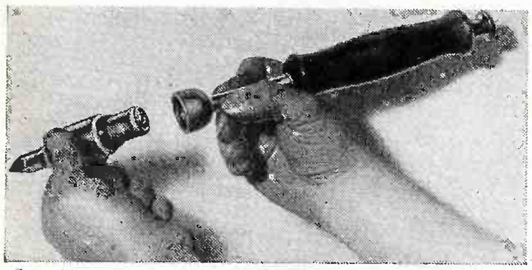


Picture tube protection unit designed for use with Scott Models 400 and 800 BT.

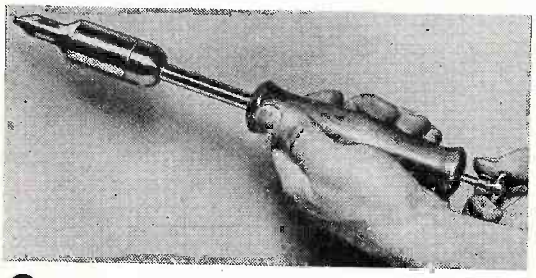
Pull the trigger and the iron heats itself!



Just 2 Things to do
AND THE IRON IS READY FOR USE!



1. Open copper tip at middle, insert Hi-Heat Cartridge! Screw tip into handle.



2. Pull back spring rod at end of handle and release.

When job is finished, unscrew tip, take out cartridge, and allow iron to cool. For jobs exceeding 10 minutes, remove used cartridge and insert a fresh one.

NEW PRICES

QUIK-SHOT IRONS

Model QS 38 (3/8″ tip)	$7.50
Model QS 58 (5/8″ tip)	$7.50
Model QS 100 (1″ tip)	$8.25

(All Irons furnished with 4 QUIK-SHOT Cartridges and Pyramid Tip)

Quik-Shot Cartridges (12 in carton)	$1.92
Separate Tips: 3/8″ or 5/8″ Pyramid or Chisel	$2.25
Separate Tips: 1″ Chisel only	$3.00

New! Amazing Soldering Iron

QUIK-SHOT

REG. U. S. PAT. OFF.

- **Needs no electricity**
- **Needs no flame**
- **Needs no blowtorch**
- **Needs no external heat of any kind!**

INDISPENSABLE—for EVERY EMERGENCY
when line power is not available nor convenient for

TV Antenna Installers
Mobile Radio TV Repair Trucks
Mobile Radio Equipped Vehicles
Sound Trucks
Field Electronic Research Units
Amateur Radio Stations
AM-FM-TV Stations
Stadium Sound Systems
Drive-in Movie Theatres
Elevated Antenna Systems
Power Line Repair Crews
Telephone Repair Crews
Ranch Electricians
Mine Electricians
Mobile Electrical Repair Trucks
Power Station Electricians
Home Mechanics
Private Pleasure Boats
Fishing Vessels
Private Planes
Commercial Transport Planes
Airline Ground Repair Crews
Aircraft Beacon Stations
Gasoline Barges
Geophysical Exploration Vehicles
Oil Field Electricians

And 100 Other Services

Reaches working temperature in 10 seconds . . . Maintains soldering temperature for 6 to 8 minutes . . . Peak wattage rating exceeds 250 watts . . . Accepts 3/8″, 5/8″ or 1″ tips . . . Lasts a lifetime!

Unconditionally guaranteed!

Available through your favorite jobber—If he does not have it, communicate with us.

Mr. Jobber — We solicit your inquiries.

Exclusive Sales Agency
JOHN F. RIDER LABORATORIES, Inc.
480 Canal St., New York 13, N. Y.

Television Changes

Muntz M-158

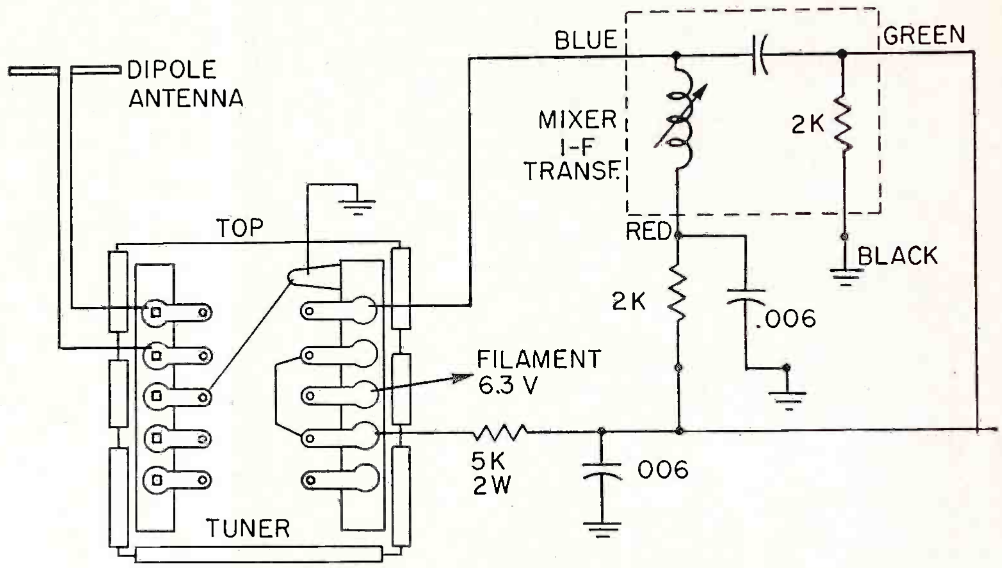
This model appears on *page 3-1 of Rider's TV Manual Volume 3*. The 5,000-$\mu\mu$f capacitor connected to the green-white lead from the tuner has been deleted. The parts numbers for the components of this model were not included on the schematic that appears on *page 3-1*. They are as follows:

Ref. No.	*Value*	*Description*
SK-11	3.2 ohms	Speaker
TO-15		Transformer, output
CP-19	0.01 μf	Capacitor, across TO-15
CP-33	0.2 μf	Capacitor, from junction of 330,000-ohm, 100,000-ohm, and 180,000-ohm resistors to ground
CP-10	0.05 μf	Capacitor, from pins 1-7 of 6AQ5 to pin 9 of 6T8
CE-29	4 μf, 50 v	Capacitor, to pin 7 of 6T8
CC-60	0.005 μf	Capacitor, to pin 8 of 6T8
VC-25	500,000 ohms	Resistor, audio control
CC-60	0.005 μf	Capacitor, connected to high end of VC-25
CC-61	1,000 $\mu\mu$f	Capacitor, from junction of CC-60 and 50,000-ohm resistor, to ground
CC-61	1,000 $\mu\mu$f	Capacitor, from junction of 50,000-ohm and 220-ohm resistors to ground
L1-44		Discriminator coil
CC-60	0.005 μf	Capacitor, between L1-44 and ground
CC-60	0.005 μf	Capacitor, between pin 6 of 6AU6 and ground
CC-60	0.005 μf	Capacitors, two connected in series to pin 7 of 6AU6
LO-33	4.5 Mc	Trap coil
CC-58	1.5 $\mu\mu$f	Capacitor, connected to trap coil
L1-42		Transformer, 2nd i-f
CC-60	0.005 μf	Capacitor, between ground and L1-42
CC-60	0.005 μf	Capacitor, between ground and primary of L1-42
CP-33	0.2 μf	Capacitor, between ground and secondary of L1-42
L1-41		Transformer, 3rd i-f
CC-60	0.005 μf	Capacitor, grid of 6AU6 3rd i-f amplifier
L1-40		Transformer, 4th i-f
CX-27		Cathode detector
CC-59	10 $\mu\mu$f	Capacitor, across secondary of L1-40 and cathode detector
LC-38	170 μh	Coil, blue
LC-4	400 μh	Coil, yellow
CP-10	0.05 μf	Capacitor, from junction of LC-38, LC-4 to pin 1 of 6AU6 video amplifier
VC-23	1,500 ohms	Resistor, contrast control
LC-39	180 μh	Coil, red
CP-33	0.2 μf	Capacitor, to pin 11 of picture tube
LC-40	250 μh	Coil, white
VC-29	50,000 ohms	Resistor, brightness control
CC-60	0.005 μf	Capacitor, connected to primary of L1-41 and ground
CE-26	100 μf, 200 v	Capacitor, connected to junction of 100-ohm resistor and 0.005-μf capacitor and ground
CC-60	0.005	Capacitor connected across CE-26
VC-27	500,000 ohms	Resistor, vertical hold
CM-35	0.002 μf, 1,000 v	Capacitor, mica, from pin 5 to pin 1 of the 6SN7, vertical oscillator and output tube
CP-07	0.05 μf, 600 v	Capacitor, from 8,200-ohm resistor to ground
VC-26	2 M	Resistor, vertical size control
CE-26	100 μf	Capacitor, connected to pin 6 of the 6SN7
VC-28	2,500 ohms	Resistor, linearity control
CP-13	0.1 μf	Capacitor, connected from pin 2 to pin 4 of the 6SN7
CP-16	0.002 μf	Capacitor, connected from pin 2 of the 6SN7 to the 8,200-ohm resistor
CP-17	0.006 μf	Capacitor, connected from ground to the junction of CP-16 and 8,200-ohm resistor, CP-17 was 0.005 μf
CP-17	0.006 μf	Capacitor, from ground to junction of the two 8,200-ohm resistors
CP-16	0.002 μf	Capacitor, from ground to junction of 8,200-ohm and 22,000-ohm resistors
CP-10	0.05 μf, 400 v	Capacitor, to pin 1 of 6AU6 sync limiter and d-c restorer
CP-33	2 μf	Capacitor, from cathode of 6AU6 to ground
CC-59	10 $\mu\mu$f	Capacitor, from 18,000-ohm resistor to junction of the 100-$\mu\mu$f capacitor and 220,000-ohm resistor in grid lead of the 6BG6
TO-16		Transformer, vertical output
CP-33	0.2 μf	Capacitor, across secondary of TO-16
LC-42		Vertical yoke, across secondary of TO-16
CE-26	40 μf	Capacitor, to primary of TO-16, red lead
CC-68	30 $\mu\mu$f	Capacitor, from antenna post to interlock
LC-43		Choke coil, antenna, from pilot light to junction of CC-68 and interlock
LC-37		Coil, focus
VC-24	2,250 ohms	Resistor, to yellow lead of LC-37
CE-26	40 μf	Capacitor, to green lead of LC-37
LC-42		H-yoke
CC-63	100 $\mu\mu$f	Capacitor, to pin 5 of 6BG6, horizontal oscillator and output tube
CC-62	20 $\mu\mu$f, 500 v	Capacitor, to pin 8 of 6BG6
TO-14		Horizontal output transformer
PR-152		Tuner.

Certified 50-8

This model is similar to Model 49-10 which appears on *pages 2-1 through 2-23 of Rider's TV Manual Volume 2*, except for the following changes:

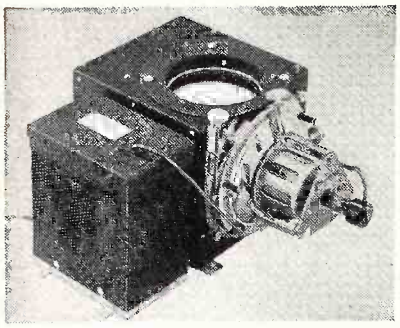
The cathode-ray tube may be either a 10HP4, or 7JP4. The value of the capacitor in the cathode circuit of the 3rd video i-f amplifier is 0.006 μf. The other changes are shown in the accompanying diagram.



Circuit changes for Certified 50-8.

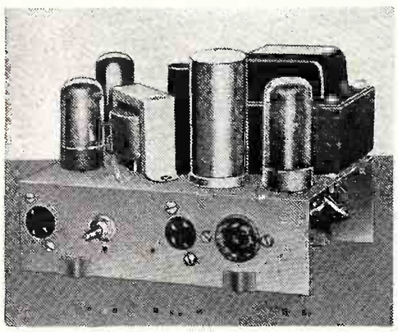
16" Sets to BIG PICTURE TV

PROTELGRAM



PROTELGRAM UNIT

Projection box measures only 8½"x9"x13", contains optical system and alignment assembly, is designed for quick easy service and adjustment. The 2½" 3NP4 projection tube is long-lived, extremely low in cost. Compact 25KV high-voltage unit is only 8½" x 4½" x 7".

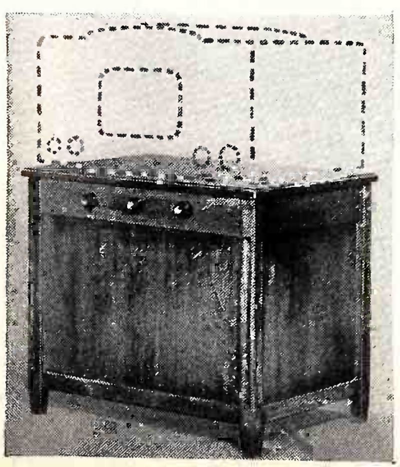


AUXILIARY CHASSIS

New auxiliary chassis fills additional electrical requirements essential to adaption of TV chassis to PROTELGRAM; makes change-over quick and easy. Measures only 8" x 12" x 4".

CONVERSION CABINET

Console cabinet measuring 22" x 27¾" x 46½" provides space for installation of customer's 630 Type TV chassis, comes equipped with complete PROTELGRAM system, auxiliary chassis, cabinet mirror and viewing screen.



NORELCO DUO-VUE

Beautiful cabinet contains PROTELGRAM unit. Only 23½" high. 20" x 26" top holds most any 10" or larger direct-view table model. Concealed ball-bearing casters make it easy to pull out from wall for 3' x 4' viewing on external screen. Offers customers choice of two picture sizes for small and large group viewing.

FOUR-WAY Profit Plan

1 Sell PROTELGRAM to the man who builds his own!

Thousands of TV kits have been sold to the man who likes to build his own equipment. These handymen are ripe for PROTELGRAM, because they can combine it with a TV chassis, get life-size TV at a reasonable cost.

2 Sell PROTELGRAM to custom set buyers

Clients who want built-in installations in walls or cabinets are perfect prospects for PROTELGRAM. Huge picture size, plus compactness and flexibility, makes it the answer for this type of user.

3 Sell PROTELGRAM to trade-in customers

PROTELGRAM sells itself to customers who want bigger pictures, but are reluctant to take a trade-in loss. You can now use their present TV chassis, connect it with PROTELGRAM in a cabinet such as shown at (3) left. They get a 234 square-inch picture, 13½" x 18"

4 Sell NORELCO DUO-VUE for largest home-TV pictures

Only with NORELCO DUO-VUE can you offer both direct-view and 3' x 4' movie-size TV . . . and at a reasonable price. This is the *newest thing in television* for your customers who want the best. Lots of sales opportunities in bars, clubs, institutions and hospitals, too.

CONTACT YOUR DISTRIBUTOR OR SEND COUPON TODAY

NORTH AMERICAN PHILIPS COMPANY, INC.
Dept. PM-5, 100 East 42nd Street, New York 17, N. Y.

Gentlemen: Please send full information as checked

☐ PROTELGRAM SYSTEM ☐ NORELCO DUO-VUE unit
☐ PROTELGRAM SYSTEM with auxiliary chassis ☐ PROTELGRAM SYSTEM for conversion console

NAME.................................POSITION....................

FIRM NAME..

ADDRESS..

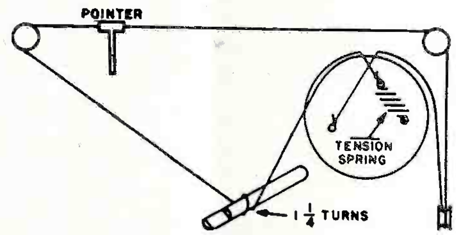
CITY......................................STATE..............

Check here for Dealer Information on
☐ Norelco Electric Shaver ☐ Lady Norelco Electric Razor

Radio Changes

Westinghouse H-190, H-191, H-191A, H-220, Ch. V-2134

Model H-220 is similar to Models H-190, H-191, H-191A, Ch. V-2134 which appear on *pages 19-20 through 19-23 of Rider's Manual Volume XIX*. Model H-220 and late production of Model H-190 are identical, except that different record changers are used. In later production of Models H-190 and H-191 several changes were made. These changes, which are incorporated in all Model H-220 receivers, consist of a different dial-drive system, deletion of the 6BA6 1st i-f cathode resistor R3, and the addition of bypass capacitor C61 in the cathode circuit of the 6BA6 2nd i-f stage. The dial-drive drawing is shown in the accompanying figure.



Dial-drive connections for Westinghouse H-190, H-191, H-191A, and H-220.

All parts listed for Model H-190 in the replacement parts list in the manual, except the crystal cartridge and the phono needle, apply also to Model H-220. Additional parts for Model H-220 are listed below.

Part No.	*Description*
RCM30B222M	Capacitor, 2,200 $\mu\mu f$, mica, C61
V-8038	Crystal cartridge (for V-6313 changer)
V-8037	Needle, phono (for V-6313 changer)
V-1164-1	Cabinet (mahogany)
V-4898-1	Catch, bullet
V-3353-3	Slide mechanism (l. h.)
V-3353-4	Slide mechanism (r. h.)
V-4900-1	Strike, bullet catch
V-4965-3	Cable, phono input.

General Electric 123, 124, 125, 135, 136, 226

Models 123, 124, and 125 appear on *pages 20-13 through 20-15 of Rider's Manual Volume XX*. Models 135 and 136 appear on *pages 20-16 through 20-18 of the same Volume*. Model 226 appears on *pages 20-27 through 20-29 of the same Volume*.

The grid resistor, URD-113, 470,000 ohms, ½ watt, carbon, has been changed in later production receivers to URD-121, 1 megohm. This change improved the audio gain.

HIWYNI Have It When You Need It

Sears 9073A, Ch. 135.244; 9073B, Ch. 135.244-1

These models are similar to Model 9073, Ch. 135.244, which appears on *pages 20-70 through 20-72 of Rider's Manual Volume XX*. Models 9073A and 9073B use a three-speed manual record player, part no. F-7625 and the number F-296 cabinet.

Chassis 135.244-1 is the same as 135.244 except that a protective resistor, R12, has been added to the rectifier circuit, from pin 8 to the junction of C18 and C16.

The change in parts lists is as follows:

Ref. No.	*Part No.*	*Description*
R12	F-4022	Resistor, 33 ohms, ½ w, 20% (in 132.244-1 only)
	F-7625	Motor, phono, 60-cycle (less turntable) (speed indicator arm is in center of rear plate of motor)
	F-7626	Idler wheel
	F-7627	Turntable, 8"
	F-296	Cabinet, radio, molded.

General Electric 135, 136, 226

Models 135 and 136 appear on *pages 20-16 through 20-18 of Rider's Manual Volume XX*. Model 226 appears on *pages 20-27 through 20-29 of the same Volume*.

Late production receivers use a new type output transformer having a tapped primary. The tapped section to the B+ lead is connected in series with the power-supply filter resistor at the input filter capacitor. B+ ripple current through this winding is out of phase with ripple current to the receiver tubes, thus producing bucking voltage and reducing hum. The transformer leads are connected as follows: yellow to input filter capacitor, red to filter resistor, blue to plate of input tube, and secondary leads to speaker voice coil.

The new transformer, catalogue number RTO-078, will be carried in replacement stock in place of the original early production items RTO-063 and RTO-075 for the Models 135, 136, and 226, respectively.

RCA QU-62, Ch. RC-602B

This model appears on *pages 17-12 through 17-20 of Rider's Manual Volume XVII*. Capacitor C12 has been changed from 39 $\mu\mu f$ to 33 $\mu\mu f$. Delete 70934, Capacitor, ceramic, 39 $\mu\mu f$, and add 73247, Capacitor, ceramic, 33 $\mu\mu f$ (C12) to the replacement parts list.

NEED YOUR HELP

In order to be of service to you, the Rider library of electronic magazines, one of the most extensive in the country, needs the following back issues to complete its files. We will pay $1.50 per copy. For the 1947 Volume of Transactions AIEE we will pay a reasonable figure. Send to John F. Rider Publisher, Inc., 480 Canal St., New York 13, N. Y.

MAGAZINE AND MISSING ISSUES

B.B.C. Quarterly
  Vol. 3, No. 4, Jan. 1949
  Vol. 4, No. 1, Apr. 1949
Chemical Industries
  Jan. — June 1949
Electrical Communication
  Jan., July 1934, July 1935, July 1937
Electronic Engineering
  Vol. 20, No. 246, Aug. 1948
Engineers Digest
  Jan. 1949
Journal of Applied Mechanics
  Vol. 16, No. 1, March 1949
Journal of Institute of Electrical Engineers
  Part III A, Vol. 93, Nos. 2, 5, 7, 1946
Journal Research of National Bureau Standards
  Vol. 42, No. 1, Jan. 1949
Nature (English)
  No. 4089 Mar. 13, 1948
  4092 Apr. 3, 1948
  4093 Apr. 10, 1948
  4096 May 1, 1948
  4097 May 8, 1948
  4108 July 24, 1948
  4112 Aug. 21, 1948
Radio
  Jan. 1922
  Aug., Sept., Oct. 1932
  Feb., March, Apr., May 1933
The Engineer
  Dec. 13, 1946 — Dec. 27, 1946
Toute La Radio
  No. 103, Feb. 1946
Transactions AIEE
  1947 (Bound Annual Volume)

Radio Changes

United Motors 986240, Chevrolet

This model appears on *pages 20-48 through 20-58 of Rider's Manual Volume XX*. The following changes are effective on only those sets above serial no. C49-0401050. The voltage at the grid of the r-f amplifier, 6BA6, is now 0 v, and that at the grid of the i-f amplifier, 6BA6, is now 0.3 v. The voltage at the first diode plate of the 6AV6 is —0.3 v. Capacitor 30, choke 8, and transformer 51A have been added, replacing section 51. Capacitor 23 has been deleted. The following changes should be made to the replacement parts list:

Ref. No.	*Prod. Part No.*	*Service Part No.*	*Description*
		Delete:	
23	1217848	1217848	Capacitor, chassis plate
51	7255881	7255881	Transformer, power (potted)
		Add:	
8	7258743	7258743	Choke
30	7257879	E-504	Capacitor, 0.5 µf, 100 v, tubular
51A	7258747	7258747	Transformer, power (unpotted).

HIWYNI Have It When You Need It

General Electric 125

This model is identical mechanically and electrically to the late production Model 123 and 124 receivers, which appear on *pages 20-13 through 20-15 of Rider's Manual Volume XX*. Model 125 is identified by its maroon color plastic cabinet. The cabinet replacement is listed as: RAU-321, Cabinet, plastic, for Model 125.

Philco Model 50-1423

This model is electrically similar to Model 50-1420, which appears on *pages 20-183 through 20-188 of Rider's Manual Volume XX*, except for the differences which are described below. Model 50-1423 is housed in a wood, table-model cabinet, with an M-20 record changer, which appears on *pages RCD. CH. 20-1 through RCD. CH. 20-16 of Rider's Manual Volume XX*.

The connection from pin 6 of the 12BE6 goes to tap 2 of the oscillator transformer T400, instead of to tap 4 of Z300. Resistor R302 now goes from pin 6 of the 12BE6 to pin 6 of the 12BA6. Resistor R401, 47,000 ohms, is connected from pin 2 of the 12BE6 to pin 1, and the lead from pin 2 now goes directly to B—, instead of to tap 2 of T400. The lead from C400B goes to the avc.

The green lead from the aerial section of C400 must be wired to the same loop panel lug as the inside loop lead (side away from cabinet), and the black lead must be wired to the same lug as the outside loop lead (adjacent to cabinet).

The white lead from the oscillator section of C400 must be dressed upward from the chassis, and away from the trimmer screw.

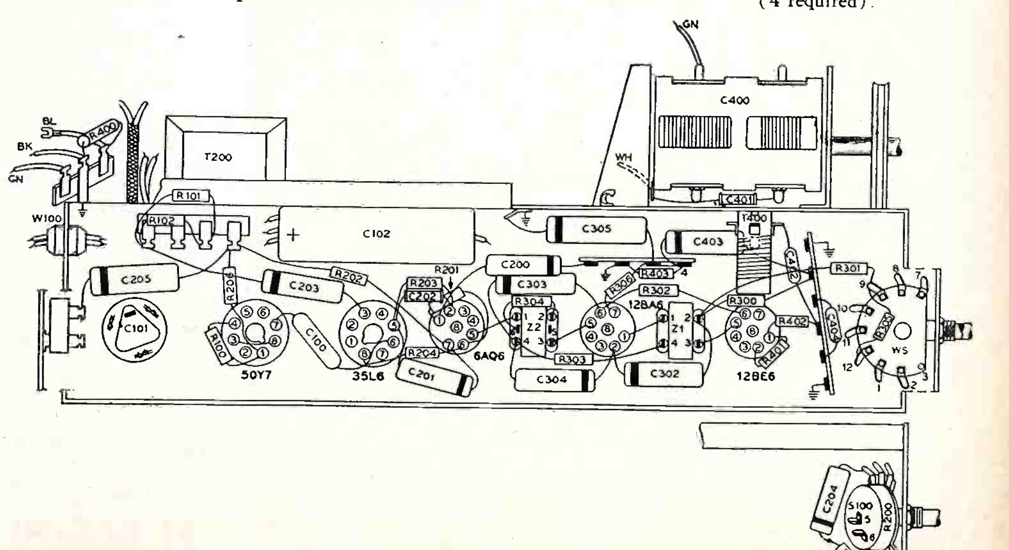
The yellow lead from Z301 to lug 12 of the wafer switch must be wired along the top side of the chassis, and dressed downward to the chassis.

The orange and brown leads wired to lugs 1 and 2 of the wafer switch must be wired along the removable side, and dressed downward to the chassis.

All wiring and components must be kept clear of R100, R101, and R102.

The under-chassis layout of Model 50-1423 differs from that of Model 50-1420. The parts layout of Model 50-1423 is shown in the accompanying figure.

Ref. No.	*Part No.*	*Description*
LS200	36-1629	Loudspeaker, p.m.
R200	33-5564-2	Volume control (with power on-off switch), 2 megohms, tapped at 1 megohm
T200	32-8242	Transformer, output
C400	31-2751-2	Capacitor, tuning gang
LA400	76-2127-9	Loop aerial
	10727	Cabinet
	56-5955	Apron
	40-7550	Baffle-and-cloth ass'y
	56-5931	Bezel
	54-7678-1	Bottom, celotex
	54-4579	Foot, rubber (4 required)
	54-4527-9	Knob, (3 required)
	45-6454	Lid
	56-6434	Butt hinge
	56-5992	Support
	56-7059FA9	Spring, changer mtg. (3 required)
	56-7059-1FJ47	Spring, changer mtg. (3 required)
	54-4630	Window, acetate
	54-5022	Dial scale, metal
	76-3731-1	Drive shaft
	56-6310	Heat shield, aluminum
	27-6233-6	Pilot-lamp-socket ass'y
	56-7001	Pointer
	27-4771-1	Rubber mount, tuning gang (4 required).



Bottom view of Philco Model 50-1423 showing parts placement.

The Uncompensated Attenuator in Oscilloscopes

(Continued from page 1)

tenuation consistent with a reasonably sized image; the continuously variable control should be wide open if possible. The reason for this may not be clear at the moment, but let it be said that, from the viewpoint of frequency response to all types of nonsinusoidal waves, the best characteristics are generally attained when the gain controls are wide open, or at least as close to that condition as is consistent with the development of the required trace dimensions. The qualifying conditions follow.

The Frequency Effect of the Simple Potentiometer Control

Due to the presence of resistance and distributed capacitance in all electrical systems, the simple potentiometer arrangement shown in Fig. 1A is frequency sensitive. Distributed capacitance is to be found across the ele-

value than with low-value units. This introduces another point of interest.

High- and Low-Resistance Potentiometers

It is always best if the input impedance of the vertical amplifier is high, that is, high resistance and low capacitance. The use of a high-resistance potentiometer tends to provide such an input condition. It is desirable in order to present the lowest possible load to the device or circuit which is connected to the input of the vertical amplifier. But, as we have mentioned, the high-resistance-potentiometer attenuator gives rise to the condition stated. The alternative is a low-resistance unit. The difficulty with it, however, is that while it may give rise to less frequency distortion over its range of operation, its low resistance will load the circuit across which it is connected and may, therefore, influence the character of the output of that device.

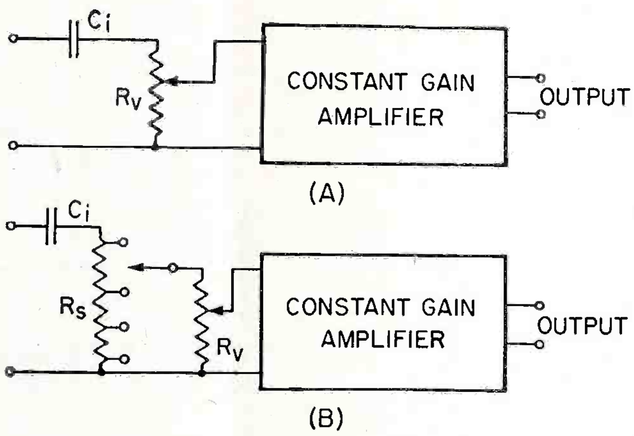


Fig. 1. Two systems of attenuation; (A) is the simple potentiometer, and (B) is a step voltage divider combined with the simple potentiometer.

ment as a whole and most certainly across that section which is delivering the voltage to the input circuit of the tube. Varying the position of the arm along the resistance element alters the constants of the input circuit, that is, the resistance and capacitance. The result is frequency distortion, which is introduced on both sides of an optimum settng between the maximum and zero signal positions. This is shown in Fig. 2. These oscillograms illustrate the performance of a commercial oscilloscope when a 15,000-cps square wave was fed to the input. Although it might be said that too much was expected of the device because of its relatively limited frequency rating, the difference in pattern configuration using this high frequency illustrates most vividly the manner in which the simple potentiometer attenuator setting affects the reproduction. Oscillogram (A) was taken with the control near its zero point; oscillogram (B) for the optimum setting of the gain control, that is, the setting which resulted in a trace that most closely resembled the input square wave; oscillogram (C) shows the trace when the gain control was wide open. A multiplicity of spurious conditions is indicated by these oscillograms, including overshoot, phase shift, and frequency discrimination.

The above is more frequently true with simple potentiometer attenuators of high

As can be seen in Fig. 1, each of the attenuator systems is associated with an isolating capacitance, or a coupling capacitance. This unit is omitted in circuits designed for d-c amplification, but it is present in all a-c amplifiers, and where used, contributes to the magnitude of the input impedance. If the resistance is high, the capacitance can be small and still permit good low-frequency response. But if the resistance is low, as would be the case when a minimum of frequency discrimination was desired by using a low-resistance potentiometer, a very high value of capacitance would be necessary. Since capacitance is a function of the dimension of the active surface, every condition which increases the dimension of electrical components tends to increase the distributed capacitance. Large capacitors and long leads connected to it tend to increase the shunt capacitance across the resistive section of the attenuator, and tend to defeat the purpose of the low resistance.

The Attenuator and Amplifier Frequency Response

A frequency-sensitive or discriminatory attenuator system defeats the purpose of a uniform gain rating over a certain bandwidth. If the rating is predicated on sinewave amplification, and it is so indicated, all well and good. But, an interpretation of a sine-wave rating in terms of nonsinusoidal amplification is very apt to give misleading results. As we said before, simple attenuation of the high frequencies, or attenuation of low frequencies during sine-wave amplification, requires nothing more than correction of the gain-versus-frequency factor. In fact, if the rating is made with the attenuator wide open, the over-all response figures include the behavior of the attenuator. But if the amplifier is to be used for the examination of waves with steep fronts, simple correction for differences in gain at different frequencies by means of multiplying factors becomes meaningless. It then becomes necessary to limit the range of fundamental frequencies of such waves to within boundaries which are not only within the over-all bandwidth of the amplifier, but also within that range where the action of the simple attenuator is not too disturbing. This is a serious restriction for those who have occasion to use oscilloscopes for the observation of square pulses and other nonsinusoidal waves.

Exactly what is meant is shown by the oscillograms of Fig. 3. These are representations of two different square waves, one of 500 cps and one of 15,000 cps. Each was fed into the vertical amplifier of an oscilloscope which would be placed in the category of basic general-purpose devices; it is perhaps not the simplest of this class, but is one which makes use of an uncompensated attenuator consisting of a high-resistance potentiometer.

Oscillograms (A) and (B) show the 500-cps square wave as reproduced with one-third full gain and two-thirds full gain positions respectively, of the attenuator control. A slightly increased curvature at the leading edges is visible in (B), but it is of no importance; the representation would be adequate for all purposes.

Using the same two settings, but applying a 15,000-cps square wave, results in oscillograms (C) and (D). Definite loss in high frequencies is indicated in both; this is more pronounced in (D) than in (C). To show that the condition is a function of the setting of the gain control rather than the amplifier response, oscillogram (E) illustrates the reproduction of the same 15,000-cps square wave at that attenuator setting which afforded the closest approach to the shape of the input signal.

Inasmuch as the oscillograms (C), (D), and (E) in Fig. 3 are made to differ only by the setting of the vertical-amplifier attenuator, it is easy to see that an uncompen-

(Continued on next page)

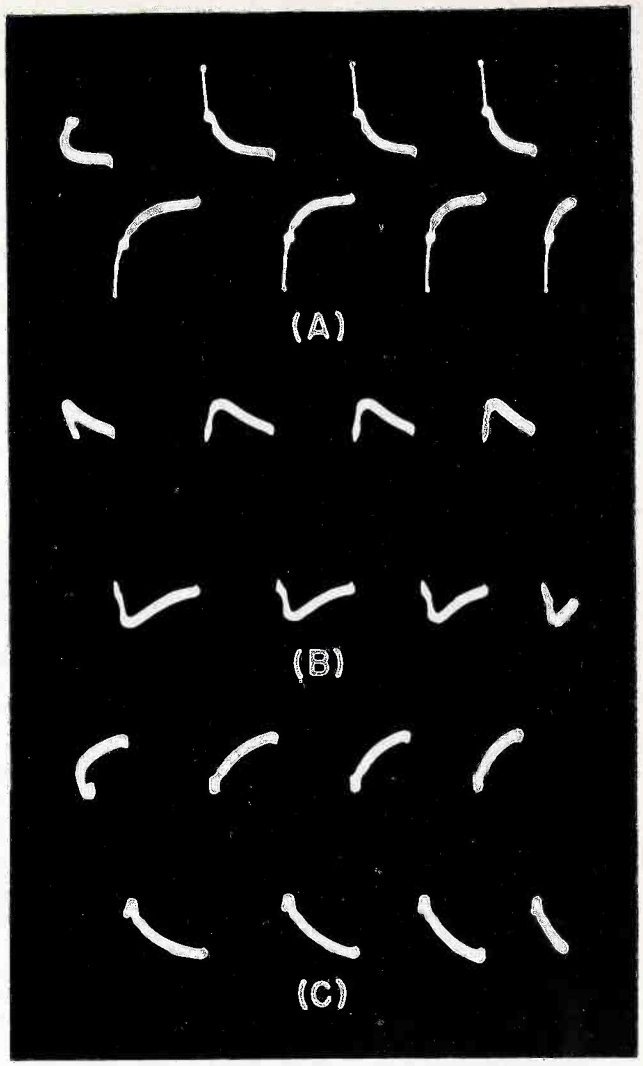


Fig. 2. The oscillograms show the distortion of a square wave at different settings of the attenuator. In (A) the potentiometer is near the zero setting; in (B) the potentiometer is at the optimum setting; and in (C) the potentiometer is near the maximum setting.

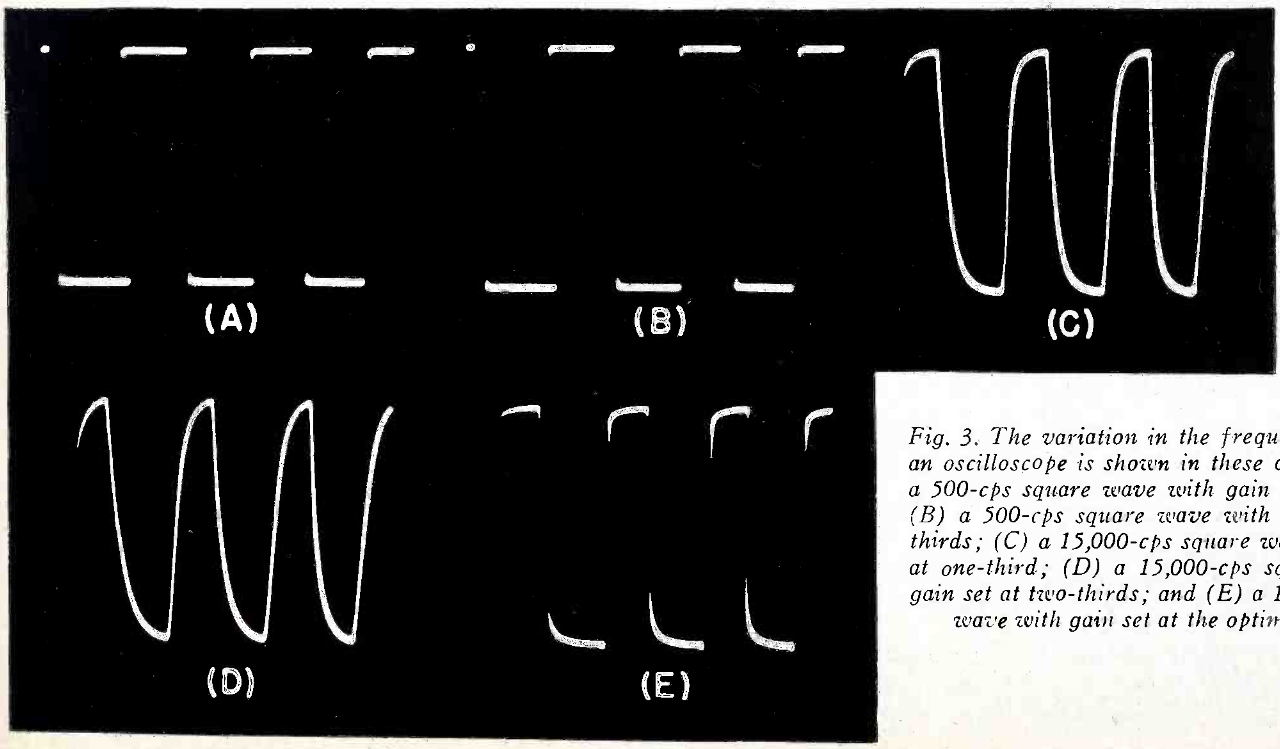


Fig. 3. The variation in the frequency response of an oscilloscope is shown in these oscillograms. (A) a 500-cps square wave with gain set at one-third; (B) a 500-cps square wave with gain set at two-thirds; (C) a 15,000-cps square wave with gain set at one-third; (D) a 15,000-cps square wave with gain set at two-thirds; and (E) a 15,000-cps square wave with gain set at the optimum position.

(Continued from page 19)
sated attenuator deserves serious consideration when the oscilloscope is used for the reproduction of nonsinusoidal waves. It is necessary to mention at this time, although more details will follow next month, that every uncompensated attenuator does not behave this way; some result in even more distortion, but many result in much less. It is a matter of individual equipment design, and we know of no uncompensated attenuators which are entirely free from these effects.

This means that we must live with them, unless it becomes standard practice to use some sort of compensation on all oscilloscopes. This will increase the price, naturally, but it is worthwhile if it enables the general-purpose device to perform its function better. In the meantime, this action of the attenuator is important mainly when nonsinusoidal waves of the square variety are being examined, and then, only when the fundamental frequency exceeds about 0.05 of the rated bandwidth of the amplifier. This figure is an attempt at a compromise between the satisfactory reproduction of a square wave and minimum monetary expenditure for a maintenance oscilloscope. Other types of nonsinusoidal waves are less critical in their frequency requirements, and therefore, the uncompensated attenuator will have less effect. However, it is a good idea to always bear in mind the possible effects of the attenuator when applying the oscilloscope to waves of this type.

(More Next Issue)

UNDERSTANDING VECTORS AND PHASE

"This book, by the well-known text-book writer, John F. Rider, in association with Seymour Uslan, who has supplied the mathematical text, should fill a gap that has existed for a long time between the mathematician and the radio technician. It is not intended for the fully-trained radio engineer and—to quote a portion of the introduction by the author himself—'it is intended for the man who has not had an engineering background, yet is thrown into contact with both vectors and phase in his effort to keep abreast of electronic developments by reading books and magazines.' At the same time, many an engineer who received his training some twenty-five years ago will find at least Chapter 8 very interesting and informative.

The book commences with a simple description of the vector, and finishes with its application and use as applied to an FM discriminator and a phase modulator, in just as simple terms.

Chapter 1 describes the vector and its development; meaning of degree; the radius and the angle; diameter of circle; straight angles; perpendicular diameters; right angles. The explanation is simple and is developed in a most interesting way.

Chapter 2 describes the co-ordinate system; negative and positive angle direction and quadrant designations.

Chapter 3 describes single vector representation and phase; shows the development of a sine wave from the simple 2-pole alternator.

Chapter 4 turns to multiple vector representation and phase; phase lag and lead; phase differences and relative phase; vector notation; one axis representation; quantities in phase; voltage and current relations in resistive, inductive and capacitive circuits and their combinations in series and parallel.

Chapter 5 covers resolution of vectors, describing the resolution of series and parallel impedances; nature of reactive component.

Chapters 6 and 7 cover the heart of vector analysis; the addition, subtraction, multiplication and division of vectors, and conclude the purely mathematical part of the book.

Chapter 8 covers purely the application and use of the vector in radio circuits. It covers radio circuit problems with vector diagrams of double-tuned transformers, I.F. and R.F.; phase reversing for operation of push-pull A.F. stages. The well-known Foster Seely discriminator circuit is discussed, somewhat at length, but no doubt is left in one's mind upon completion of reading. The chapter concludes with a simple description of the phase modulator and describes Major Armstrong's first FM system operated under license of the F.C.C.

This book is well worth reading by technicians and others of the industry who want to keep abreast of developments, but lack a full understanding of the subject of vectors."
—Proceedings of The Institution of Radio Engineers Australia.

Thank You Gentlemen...

we hope to merit equal praise in the years to come.

NATIONAL COMPANY, INC.
ESTABLISHED 1914
ENGINEERS AND MANUFACTURERS

CABLE ADDRESS "NATCO" BOSTON

61 SHERMAN STREET
MALDEN 48, MASS.

January 6, 1950

John F. Rider Publisher, Inc.
480 Canal Street
New York 13, N.Y.

Dear Mr. Rider:

We have many of your manuals on hand and use them regularly for reference. Our service department finds them invaluable as a most complete reference source. The "How it Works" series is also a very valuable and comprehensive source of general theoretical and practical information and we use these books frequently for reference when discussing a particular circuit, or when keeping abreast of the latest developments, particularly in T.V.

Our sincere opinion is that Rider Manuals are a must in every well-equipped service shop, and any service man who takes the time to study the "How it Works" section that comes with each manual will certainly be well-informed on all the latest circuits and have the technical knowledge to know how and why they work.

We might add that some of your other publications such as "T.V. Projection and Enlargement" are written in such a manner that the fundamentals are clearly outlined, and should be easily understood by the new comer as well as the experienced service man.

Keep up the good work.

Yours very truly,

NATIONAL COMPANY, INC.

W. W. Bartell

W.W. Bartell
Service Manager

WWB/eat

STROMBERG-CARLSON COMPANY
Established 1894
ROCHESTER 3, NEW YORK

"There is Nothing Finer than a Stromberg-Carlson"

March 6, 1950

Mr. John F. Rider
John F. Rider Publisher, Inc.
480 Canal Street
New York 13, New York

Dear John:

For several weeks I've been planning to write and congratulate you on the new format that was introduced with Volume 3 of your Television Manual. The delay in writing has been occasioned only by the terrific pressure of this very fast moving business.

I should like to compliment you particularly on your treatment of our TS-16 and 125 Receivers. The job you did was terrific. It seems to me that the large schematics that are possible with these new manuals, plus alignment instructions, voltage charts, block diagrams, dial stringing charts, parts list, etc. must all add up to the real answer to the service man's dream. He has all necessary information at his finger-tips.

May I, therefore, compliment you and your organization again for the help you are giving the man on the firing line, the guy that really has to solve the problems. I am sure, John, that the demand for these new volumes will justify the time, effort and expense that you have put into them. My only advice to you is to keep up the good work.

Sincerely,

F.L. Granger, Service Mgr.
Radio-Television Division

FLG:bfc

CHICAGO KANSAS CITY LOS ANGELES SAN FRANCISCO

It is with a great deal of pride and with a feeling of having lived up to our promises that we publish this, the third series of letters containing the expressions of the service managers of some of the leading television receiver manufacturers of the nation.

Curtain Time

(Continued from page 5)

as possible so that these set manufacturers and set distributors, as well as others who have a stake in television servicing, will hear the expressions of those who are active participants in the servicing industry and who, no doubt, have had experiences which are worthwhile listening to.

The calling of this meeting was news to us, and we expect this editorial will be news to many of our readers; but the situation indicated by the letter is not news, for we have heard about similar conditions in New York and other cities. Under the circumstances, we sincerely hope that a great deal of good will come from this meeting. It may take several more to accomplish a desired result, but certainly this is a start!

HIWYNI Gets A Wife

We have stated time and again that it pays to have service data when you need it. HIWYNI is the abbreviation for one of our slogans, but we never realized just how far it could go. Here is one for the books . . . A service-shop owner received a hurry-up call to repair a certain TV receiver. Apparently someone else had tried before, but failed to do a good job. So the hero of this tale jumped aboard his gasoline steed and honked his way to the rescue. He brought the receiver back to the shop—checked his Rider TV Manual index and found the ailing video to be a late production run that was contained in TV Volume 3.

Nimble fingers and agile mind, and the job was done in less than an hour. Back went the receiver and, believe it or not—for truth is stranger than fiction—the lady fair (the TV-set owner) and our Lochinvar now are Man and Wife! Can you imagine what would have happened if our serviceman friend had had only Rider's TV 1 and 2? He would be without a wife! . . . So we say Get Rider Manuals Today—**Have It When You Need It!** (Seriously though, congratulations and the best of luck, also thanks very much for your lovely letter. We need not mention names for such happenings are unique.)

New Feature

As an added convenience to our readers, beginning with this issue, and continuously thereafter, we will include an index of all the Radio and Television Changes in the issue. The index will be found on the last page of the issue.

JOHN F. RIDER

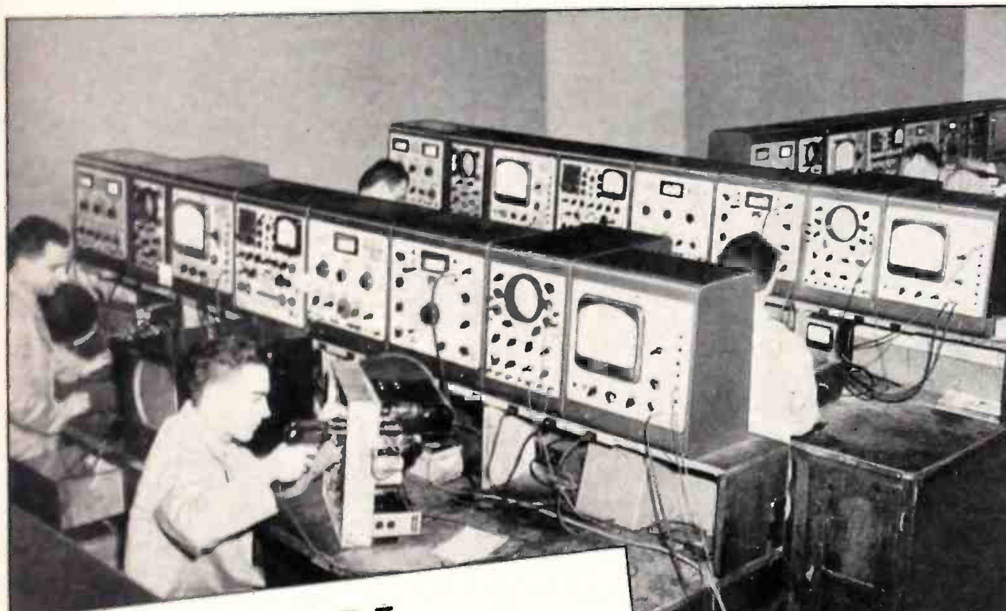
●

Andrea Ch. VK12, VK124, VK15-16

These chassis appear on *pages 2-9,10 through 2-37 of Rider's TV Manual Volume 2.* VK124 also appears on *pages 3-1 and 3-5,6 of Rider's TV Manual Volume 3,* VK15-16 also appears on *pages 3-1 through 3-3,4 of the same volume.* VK12 also appears on *changes page C3-1 of the same volume.* The following list is presented for identification purposes:

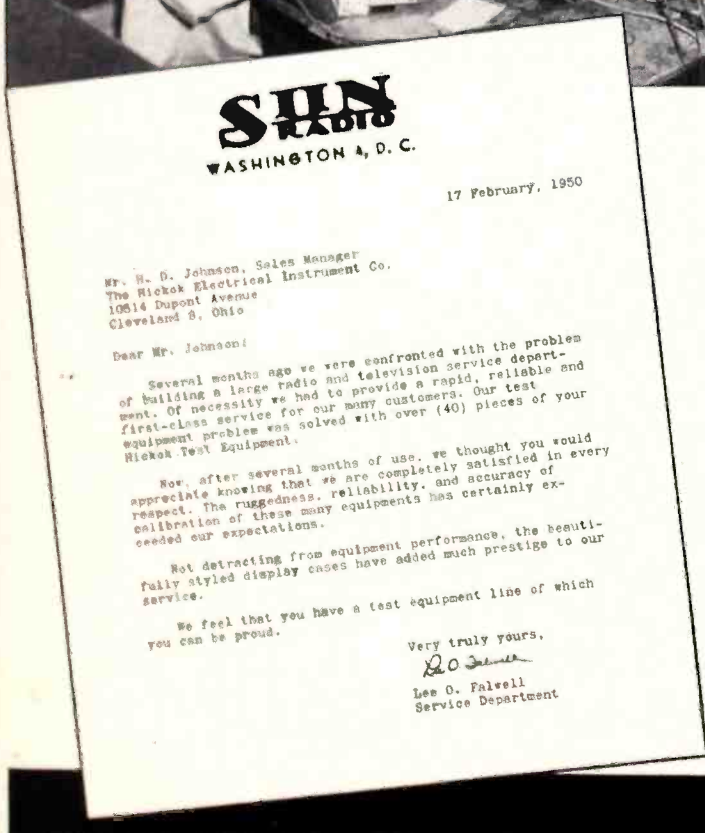
Model Name	*Model No.*	*Chassis No.*
Edgemont	CO-VK124	VK124
Saratoga	TVK-12	VK12
Sharron	TVK-127	VK12
Gramercy	CVK-126	VK12
Ridgeway	COVK125	VK12
Caronia	COVK16	VK15-16
Dynasty	COVK16 "C"	VK15-16
Corinthian	COVK15	VK15-16.

Thousands of Expert Technicians USE HICKOK INSTRUMENTS to successfully service Television..



SUN RADIO services and carries warranty on...

- Admiral
- Bendix
- Capehart
- Emerson
- Farnsworth
- General Electric
- Hallicrafters
- Motorola
- National
- Philco
- R.C.A.
- Stromberg-Carlson
- Westinghouse



SUN RADIO
WASHINGTON 4, D. C.

17 February, 1950

Mr. H. D. Johnson, Sales Manager
The Hickok Electrical Instrument Co.
10514 Dupont Avenue
Cleveland 8, Ohio

Dear Mr. Johnson:

Several months ago we were confronted with the problem of building a large radio and television service department. Of necessity we had to provide a rapid, reliable and first-class service for our many customers. Our test equipment problem was solved with over (40) pieces of your Hickok Test Equipment.

Now, after several months of use, we thought you would appreciate knowing that we are completely satisfied in every respect. The ruggedness, reliability, and accuracy of calibration of these many equipments has certainly exceeded our expectations.

Not detracting from equipment performance, the beautifully styled display cases have added much prestige to our service.

We feel that you have a test equipment line of which you can be proud.

Very truly yours,

Lee O. Falwell
Service Department

HICKOK ACCEPTANCE

There is more HICKOK TV Test Equipment in use today than all other makes combined.

You can build prestige and income when you use HICKOK instruments. Each model is built to the high HICKOK standard for accuracy and dependability—Backed by the HICKOK guarantee.

See the latest HICKOK models at your jobber's, or write today for information on the complete line of AM, FM and TV test instruments.

Please send me full information on the latest HICKOK equipment for servicing Radio and TV.

Name

Address

City State

THE HICKOK ELECTRICAL INSTRUMENT CO.
10520 DUPONT AVENUE • CLEVELAND 8, OHIO

1910 ★ 40th Anniversary ★ 1950

THE BUSINESS HELPER
by Leslie C. Rucker

"Whether or not you are considering a 'fling' at private business, you can well afford this text, which will add to your general education—where it might most affect your bankbook!

Chapter titles are: Choosing a Goal, The Businessman, Storekeeping, Types of Business, Locations, Customers, Buying, Selling, Estimating, Contracts, Overhead Expenses, Banking, Bookkeeping, Collecting, Advertising, Employees, Insurance, New Business, Partnerships, Telephones and Their Use, Associations and Clubs, A Primer on Credit."
—*The Broadcast Engineers Journal.*

INDEX

Cover

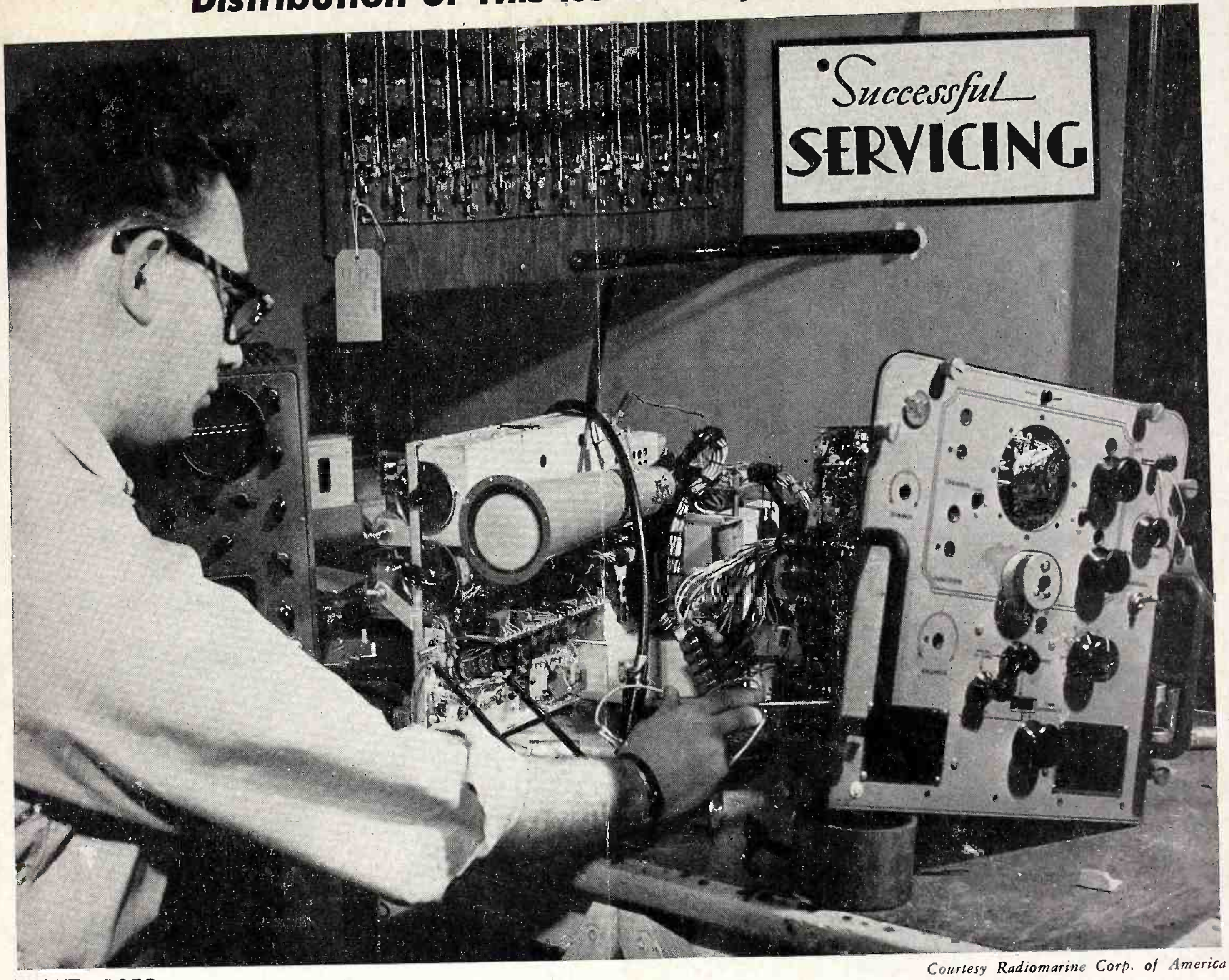
The photograph on the cover shows a pre-inspection test of a radio-compass receiver at American Airlines. The test panel at the top of the picture was built by the American Airline radio shop. A signal generator is shown at the upper right.

From
JOHN F. RIDER PUBLISHER, Inc.
480 CANAL ST., NEW YORK 13, N. Y.
Return Postage Guaranteed

A. J. S. CERINO
2393 PITKIN AVE.
BROOKLYN 3, N. Y.

Sec. 34.66, P. L. & R.
U. S. POSTAGE
PAID
NEW YORK, N. Y.
PERMIT No. 9427

Distribution of This Issue—55,000 Copies



Courtesy Radiomarine Corp. of America

JUNE, 1950

FREQUENCY-COMPENSATED ATTENUATORS IN OSCILLOSCOPES

By JOHN F. RIDER

The action of uncompensated attenuators, as discussed in the last issue of SUCCESSFUL SERVICING, clearly indicates the need for devices which will not cause frequency distortion, yet will permit control of the signal level. They exist and are known as *frequency-compensated attenuators.* They are of the dual-unit variety and are so used with the continuously variable element that the latter becomes a low-impedance device. This minimizes the effect of associated distributed capacitance, yet allows a high input impedance to the vertical amplifier as a whole. In practice, the frequency compensation is applied to the step attenuator at the input of the amplifier; whereas the continuously variable control is located at the output of the first stage, or at some point in the amplifier, where its manipulation will control the signal level consistent with minimum distortion.

> Editor's Note: This material is an abridged excerpt from the chapter on The Basic Oscilloscope and Its Modifications as found in the "ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES" (formerly "The Cathode-Ray Tube at Work"), a forthcoming book which has been written by Rider and Uslan and will soon be published by John F. Rider Publisher, Inc.

Simple Two-Step Attenuator

To follow the manner in which frequency compensation is accomplished, consider the circuit shown in Fig. 1. This is a simple two-step attenuator at the input of a tube. The toggle switch is one example of this mechanism.

The circuit consists of a capacitor *C1* in series with a fixed resistor which is tapped at a point so that the voltage between ground and tap *2* is one-tenth of the voltage between ground and tap *1*. Associated with each section of the resistor and with the resistor as a whole, also at the input of the tube, are different amounts of distributed capacitances. These are shown in dotted lines and indicated as *C2, C3,* and *C4*.

For the initial discussion, we will neglect the presence of the distributed capacitance and consider only *C1, R1,* and *R2*; these three elements form a voltage divider. With the switch set on tap *1*, the two sections of the divider are *C1* and the total resistance of *R1* + *R2*. Regardless of where the switch is set, only a portion of the voltage *E* can reach the input of the tube because the reactance of the capacitor acts as a voltage-dropping element. Whether this drop across *C1* is great or small depends upon the frequency of the voltage and the value of the capacitor. The portion of *E* reaching the tube input depends on the relative value of reactance X_{C1} and resistance *R1* + *R2*. With the switch set at position *1*, the equation for *E'*, the voltage at the tube input, is

$$E' = \frac{R1 + R2}{\sqrt{(R1 + R2)^2 + X^2_{C1}}} \times E$$

(Continued on page 12)

Television Changes

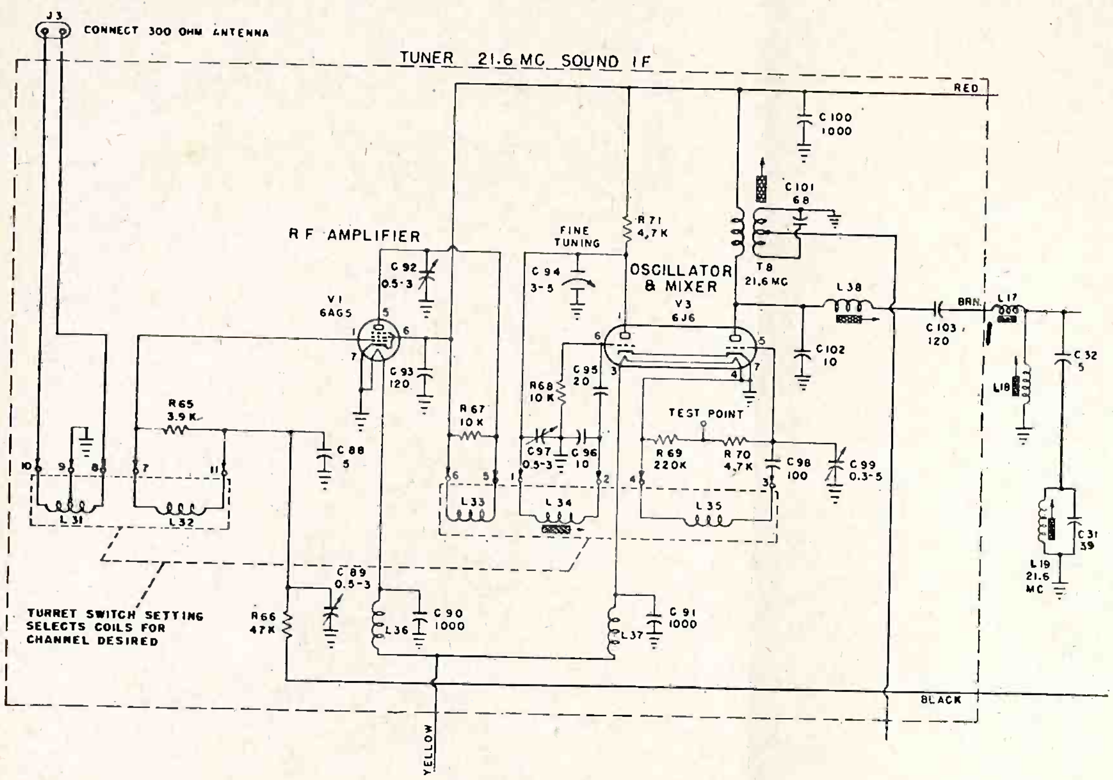


Fig. 1. Tuner for Industrial Television IT-35R.

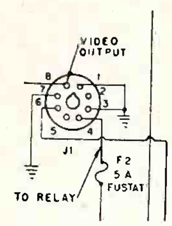


Fig. 2. Socket for Industrial Television IT-35R.

Industrial Television IT-35R

This model appears on *pages 3-1 through 3-8 of Rider's TV Manual Volume 3*. The following production changes have been made. The schematic for the new tuner is shown in Fig. 1. The lead from pin 1 of V9 goes to the center tap on T8 as shown in Fig. 1, instead of to the low side of capacitor C32.

Resistor R29 is now connected to the center tap of R62, and resistor R34 is connected to the junction of R37, R62, and C49. Switch S1 is now designated as S7. The separate audio output socket J4 has been deleted, and the audio output lead goes to pin 5 of the new J1 as shown in Fig. 2. The new component parts location diagram for the IT-35R chassis is shown in Fig. 3.

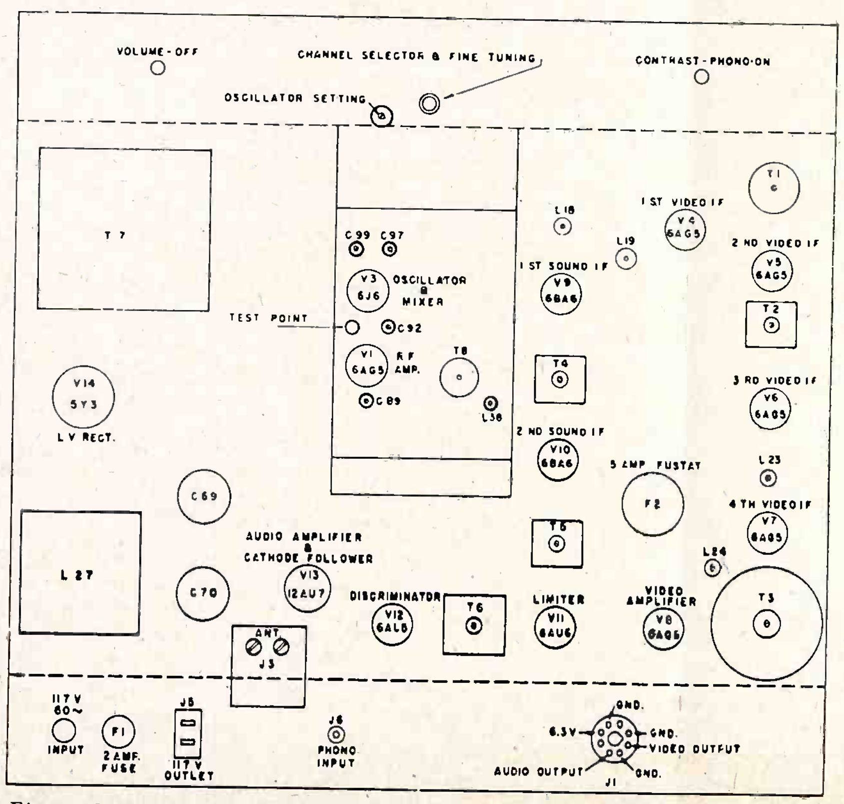


Fig. 3. Component-parts location diagram for Industrial Television IT-35R.

Multiple M-1500, M-2000, MT-1250

These models appear on *page 2-1 (*2-1, 2) of Rider's TV Manuals Volume 2*. In the filament wiring diagram, V127 should be marked V107. The 7.6-volt winding should be marked 5 volts.

NEW INDEXING SYSTEM

With the change in page size of Rider's TV Manual Volume 2 from 8½" x 11" page size to the enlarged 12" x 15" size, a new indexing system will be used in the indexes and TV-change write-ups. This new system is already in use in the indexes for all of our TV Manuals. Page numbers preceded by an asterisk (*) apply to the 8½" x 11" page-size Manuals only. (To avoid confusion, TV1, in addition to the smaller page-size TV2 have the * preceding the page number, although TV1 comes only in the one size, 8½" x 11".)

Examples of the new indexing system, as it appears in the indexes and in the change notices, are given below:

In the Indexes—

Model	*From*	*Through*
Magnavox CT214A	2-1	2-19
	*2-1	*2-37,38

In the Change Notices—

Magnavox CT-214A appears on *pages 2-1 (*2-1) through 2-19 (*2-37,38) of Rider's TV Manuals Volume 2.*

This means that the CT-214A appears on pages 2-1 through 2-19 of the enlarged-sized TV2 Manual (12" x 15" page size), and the CT-214A appears on pages 2-1 through 2-37,38 of the regular TV2 Manual (8½" x 11" page size).

Starting with this issue of SUCCESSFUL SERVICING, all TV-change write-ups will follow this system.

Three Greats—

ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES

By John F. Rider and Seymour D. Uslan

This is the era of the cathode-ray tube. Prodigious strides have been made since its initial applications. The text, precisely up-to-the-minute, describes and discusses completely, practically all kinds of cathode-ray scopes and synchroscopes manufactured during the past ten years. Not only is theory completely explained, but practical every-day uses in virtually all fields are examined. Engineers (electronic, industrial, electrical, and mechanical), servicemen, students, teachers, the Armed Forces, radio amateurs, the medical profession, etc., will find this the most complete reference book ever written on the cathode-ray tube, because it answers thousands of vital questions on the practical applications of this versatile device.

CONTENTS

1—Introduction; 2—Principles of Electrostatic Deflection and Focusing; 3—Principles of Electromagnetic Deflection and Focusing; 4—Mechanical Characteristics; 5—The Electron Gun; 6—Deflection Systems; 7—Screens; 8—Spot Displacement; 9—Linear Time Bases (Sweep Circuits); 10—The Basic Oscilloscope and Its Modifications; 11—Synchronization; 12—Phase and Frequency Measurements; 13—Nonlinear Time Bases; 14—Auxiliary Equipment; 15—Testing Audio-Frequency Circuits; 16—Visual alignment of AM, FM, and TV Receivers; 17—Television Receiver Servicing; 18—AM, FM, and TV Transmitter Testing; 19—Electrical Measurements and Scientific and Engineering Applications; 20—Complex Waveform Patterns; 21—Special Purpose Cathode-Ray Tubes; 22—Commercial Oscilloscopes; Appendix I—Characteristics of Cathode-Ray Tubes; Appendix II—Cathode-Ray Tube Bases and Sockets; Appendix III—Photography.

Radio and Television Maintenance (Feb. 1950) says: "A major event in electronic literature. The FINAL WORD on oscilloscopes."

Thousands of Illustrations
Approximately 980 Pages

Publication Date August

Cloth Bound
8½ x 11 Inches $9.00

TV AND OTHER RECEIVING ANTENNAS (Theory and Practice)

By Arnold B. Bailey, Electronics Consultant

No other book discusses antennas—theory and practical aspects—so fully. It is a book which will teach; a book which every person interested in antennas, especially TV antennas, will use every day because of the facts and figures it contains. All men whose livelihood depends on getting the most out of antenna systems cannot afford to be without this unique text. Well planned and precisely written, it is practical in every sense of the word. Mathematics is made easy to understand through the use of graphs, charts, and tables. The radio and television industry—electronics schools—antenna design engineers—all personnel interested in antennas will agree this is the most helpful source book of its kind ever projected. It embraces world knowledge concerning antennas.

CONTENTS

1—Definitions and Terminology; 2—The Television Signal; 3—Problems of Television Reception; 4—The Electromagnetic Wave; 5—The Radio Path; 6—The Theory of Signal Interception; 7—The Center-Fed Zero DB Half-Wave Antenna; 8—Comparison of Zero DB Half-Wave Antennas; 9—Parasitic Element Antennas; 10—Horizontally Polarized Antennas; 11—Vertically Polarized Antennas and Special Types; 12—Practical Aspects of Receiving Antennas; Bibliography; Index.

Approximately 500 Pages

Publication Date September

Cloth Bound $4.50

TV INSTALLATION TECHNIQUES

***By Samuel L. Marshall*, Television Instructor, George Westinghouse Vocational High School**

Eliminate the nuisance of unnecessary return service calls. Be sure when you make an antenna installation that it will remain intact. It will mean lower costs, higher profits, and savings in valuable time. All these can be achieved in your TV installation activities by using this completely practical "how to do" book. Theory is discussed only where necessary.

Whether the installation is in a metropolitan, suburban, or fringe area, all the necessary mechanical requirements, down to the last detail, are thoroughly discussed. This may be for a short chimney-attached mast, or for an installation of a tower, including the foundation.

Winds and ice loads are responsible for many installation failures. They cost you time and money. Know for sure all the factors of a good installation, from the top-most element of the antenna, to the ground connection on the receiver terminal board.

Receiver adjustments in the home, transmission lines, antenna location—in fact all information necessary for the TV antenna installer is discussed here. It is a practical book from cover to cover.

Every man who is actively engaged in this specialized field of operation, or the man who contemplates entering it, needs this book because of its dollar-making, time-saving contents.

CONTENTS

1—Nature of Television; 2—Radio Propagation; 3—Basic Antenna Principles; 4—Transmission Lines and Special Antenna Systems; 5—Materials and Methods Used in Installations; 6—High Mast and Tower Installations; 7—Problems Arising in Television Installations; 8—Receiver Adjustments and Service in the Home; 9—Municipal Regulations; Appendix.

262 Illustrations
Approximately 500 Pages

Publication Date July

Cloth Bound
8⅜ x 5½ Inches $3.60

ORDER FROM YOUR JOBBER OR DIRECTLY FROM US

Successful
SERVICING
REG. U.S. PAT. OFF.

Vol. 11 JUNE, 1950 No. 8

Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

Published by
JOHN F. RIDER PUBLISHER, INC.

480 Canal Street
New York 13, N. Y.

WOrth 4-8340
WOrth 4-8341

JOHN F. RIDER, Editor

CURTAIN TIME

Licensing of TV Service in New York City

An unjust TV service licensing bill (see page 22 for excerpts) is before the City Council of New York City. In all fairness to the public and to those engaged in the work of installing and servicing TV receivers in New York City, this bill should be defeated. We devote this amount of space because we feel that such a license program accomplished in New York may serve as a pattern in other cities and states in the nation—a very unfortunate situation if it ever comes to pass.

We believe that the sponsor of the bill is sincere in his effort to alleviate a situation which he describes in Section 1 of the proposed bill as follows: "a great many of the inhabitants of the city of New York have received poor and unskilled workmanship and have paid in advance sums of money for yearly service contracts and thereafter failed to receive said service due to financial failure of the service organizations."

As a whole the proposed ordinance is most undesirable because it is discriminatory against the small businessman operating a TV service shop. It favors the large establishments, of which there are few in comparison with the large number of small shops. It places the small TV shops of many veterans in jeopardy; it fosters a condition which can well lead to worse TV service; and, if it comes to pass, all of this will be legalized by the bill. If anything, the public's interest will be impaired rather than improved. It does not solve the problems which are stated in Section 1 of the bill, as being the reason for legislative intervention, for it entirely ignores the roots of the evil. It cannot help but do so because, in the main, these are problems of the TV industry and therefore entirely beyond the jurisdiction of the city authorities.

If passed in its present form, or even in a modified form which would still contain the essence of the proposed ordinance, it would impose increased financial burdens on the purchasers of TV service and installation. The discord which exists today between the prices of TV receivers and the charges for TV service would be intensified. Competition among service facilities is a benefit to the public. This would be reduced by the passage of the bill because of its discriminatory character. The public would gain nothing, perhaps pay even higher prices.

The bill contains no penalities which would be beneficial to the public at large. It contains no reference to an accomplishment of a contract. One element of the bill does reduce the calculated risk on the part of the public when it enters into an annual TV service contract because it tends to establish financial responsibility on the part of the service facility. This is not a guarantee that the facility will not go bankrupt, but it reduces its likelihood. It does nothing about reasons which caused honestly operated TV service contract houses to go into bankruptcy, simply because it cannot do so. The problem must be solved by the TV industry at large. Even in this respect the bill is discriminatory, in that it selects the TV serviceman as a target; whereas, other facilities which render service are not bound by these loose restrictions. It gives the commissioner of licenses the right to demand, at will, interim certifications of financial status and to exact a fee or fees from the service facility. Conceivably, such prerogatives can lead to evil, sufficient to wreck an individual, mentally and financially. This right given to the commissioner is intolerable.

Relative to curing the complaint of poor and unskilled service, the bill contains no provisions for same. It does not define what is meant by poor and unskilled service, nor does it provide the penalties for failure to render good service. If this is so because the nonfulfillment of a service contract, whether annual or individual, is a matter for the civil courts, then this bill contributes nothing which is beneficial to either the public or the industry.

The bill stipulates the equipment requirements, the minimum personnel, the technical qualifications of one individual, the space requirements, and the location of the service facility. Neglecting for the moment that these requirements are capable of imposing so many hardships on the small operator that he may be forced out of business, which in itself is sufficient justification for defeating the bill, none of these stipulations forces any improvement in skill or workmanship which would be beneficial to the public. It does, however, force added expenditures on the part of the small business operator, and will increase the cost of operation, and, therefore, the cost to the public without benefit of any improvement.

The penalty for noncompliance with the requirements of the bill is loss of license to operate, but since these requirements can be met without improvement of either individual service or contract service, the benefit to the public may add up to nothing.

One of the complaints voiced by the public is that television concerns have not lived up to their contractual obligations. Making these concerns employ certain types of people, buy certain equipment, locate in certain quarters, employ a certain minimum number of personnel, have their equipment checked once a year, and be solvent financially, will not solve the complaints. As a matter of fact, compliance with the minimum requirements, as set forth in this bill, may lead to even worse service than is contended to exist today; and it will be legal because the license requirements will be complied with.

Relative to poor and unskilled workmanship, the technical requirements set forth in the bill for the personnel are ridiculous. They reflect poor counsel. To even remotely suggest that an individual who has had two years of attendance at a private or public school where television servicing, maintenance, and installation is taught, may be qualified as a "supervisor of television receiver servicing" is utterly fantastic. That an individual who has had no previous electronic training or experience is made ready for work in the television field only after two years of such schooling, is, perhaps, true; however, he still requires several years of practical experience before he can qualify as a technical supervisor. Such a man might be an installer and grow into a skilled television technician in time; but to say that such training will automatically qualify him for a "certificate of qualification" from the commissioner of licenses, and to further set this type of a man up as the supervisor of the technical personnel in a TV service establishment is incomprehensible. If the City of New York says that an individual with such training is acceptable for duties which give him "immediate supervision OVER the maintenance, servicing and repairing of television receivers," then how in Heaven's name will we ever get good and skilled performance!

We'll venture to say that every TV service establishment not only already has better men than such, but also, if they hired such an in-

(Continued on page 20)

Television Changes

Packard-Bell 2991-TV

This model appears on *pages 4-20 through 4-26 of Rider's TV Manual Volume 4.* Model 2991-TV is erroneously listed as Model 2291-TV in the Index for volumes 1 through 4.

●

Montgomery Ward 94BR-3017B

This model is the same as Model 94BR-3017A which appears on *pages 3-11 through 3-18 of Rider's TV Manual Volume 3,* except for the three i-f amplifier tubes which were changed to 6AG5, and the following changes which are listed below.

The accompanying figure shows the major circuit changes that have been made. In addition to these, R108, C115, C116, and L9 have been deleted. R95, C51, C54, C119, and C64 have also been deleted. C60 is now connected to pin 6 of V10, the 12AU6 video amplifier; and C77, a 10-$\mu\mu f$ capacitor, has been inserted between pin 1 of T8 and pin 5, the plate of V5, the 12AU6 limiter. L26, a filament choke coil, has been inserted between pin 4 of V8 and pin 7 of V15.

The following resistors and capacitors were changed to the values listed below:

Ref. No.	*Part No.*	*Description*
R24	C-9B1-56	3,300 ohms, ½ w, 10%
R26, 34, 35	C-9B1-127	47 ohms, ½ w, 5%
R31	C-9B1-83	56,000 ohms, ½ w, 10%
R78	C-9B1-90	220,000 ohms, ½ w, 10%
R80	C-9B1-100	1.5 megohms, ½ w, 10%
R99	C-9B1-107	5.6 megohms, ½ w, 10%
R97	C-9B1-242	3 megohms, ½ w, 5%
R98	C-9B1-103	2.7 megohms, ½ w, 10%
R105	C-9B1-104	3.3 megohms, ½ w, 10%
R106	C-9B1-86	100,000 ohms, ½ w, 10%
R112	C-9B4-5	47 ohms, 2 w, ±20%
C45,46, 60, 100, 113	A-8G-13962	5,000 $\mu\mu f$, ceramic
C49	C-8G-17349	330 $\mu\mu f$, ceramic
C93	C-8F3-241	470 $\mu\mu f$, 500 v, 5%
C101	B-8D-17699	0.04 μf, 1,600 v
C102	C-8G-13201	1,000 $\mu\mu f$, ceramic
C103	C-8D-17555	0.08 μf, 400 v, 10%.

Sentinel 414

Model 414 is similar to models 412, 413, and 415 which appear on *pages 4-10 through 4-19 of Rider's TV Manual Volume 4,* with the exception of the cabinet, safety glass, and cabinet-back assembly. The following list shows the addition to parts list for this model:

Part No.	*Description*
20E546-7	Cabinet-back assembly with line cord for Model 414
9E28-2	Safety glass for Model 414
7E245	Cabinet, table, walnut for Model 414.

RIDER MANUALS KEEP UP TO DATE FILL IN THE GAPS

DuMont Manchu, Ch. RA-106

A model RA-106 Teleset being produced is named the Manchu. The following chassis are included in the Manchu:

Receiver main chassis is RA-106, Club 20, which appears on *pages 2-34 (*2-57, 58) of Rider's TV Manuals Volume 2.* The flyback power supply is the same as that used in the Club 20. The a-m tuner is the same as that used in the Colony, which appears on *pages 2-5 (*2-5) through 2-33 (*2-55, 56) of the same volume.* The push-pull audio amplifier is the same as is used in the new Colony. A Webster Model 256 dual-speed record player is used.

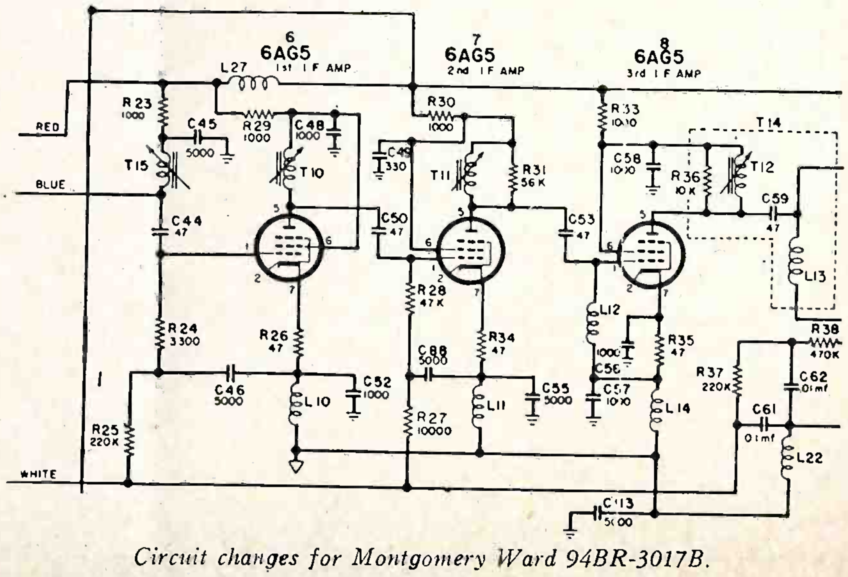
The two speakers used in the Manchu are a three-inch speaker assembly (part no. 18002811) located at the front of the cabinet, and a 12-inch high-quality speaker (part no. 18002821) located beneath the cabinet. The 12-inch speaker is electrically the same as part number 18002801 as used in the new Colony; the difference in part numbers is due to the different lead lengths used.

●

Stromberg-Carlson TC125 Series

This series appears on *pages 4-5 through 4-8 of Rider's TV Manual Volume 4.* The following tabulation should clarify the part numbers of the dual-potentiometer controls used in TC125 models. The model numbers are also given with their corresponding model names.

Model	*Contrast–Volume Part No.*	*Horizontal–Vertical Part No.*
TC125 (Century)	145077	145101
TC125L (Brentwood)	145085	145089
TC125LSM (Salem Chest)	145085	145089
TC125LM2 (Silver Anniversary)	145077	145101.



Circuit changes for Montgomery Ward 94BR-3017B.

Television Changes

Admiral Ch. 20X1, 20Y1, 20Z1

These chassis appear on *pages 4-38 through 4-62 of Rider's TV Manual Volume 4*. There are three causes for excessive sync buzz other than the conditions described under "Elimination of Audio Buzz" on *page 4-41*: sync buzz due to misalignment of the sound i. f., sync buzz due to modulation system used at the transmitter, and residual sync buzz indicated by buzz being heard with the volume control set at a level below sound from the station. The following procedures should be followed after trying the suggestions found in the Manual.

Sync Buzz Due to Misalignment

In many instances, sync buzz may be eliminated by using a television station for alignment, in place of a 4.5-Mc generator. The alignment should be made using the following procedure:

1. Tune in the station with loudest sync buzz.
2. Connect vacuum-tube voltmeter between test point Y and ground.
3. Adjust A5 and A6 for maximum reading.
4. Connect vacuum-tube voltmeter between test point Z and ground, with scale set to zero center.
5. Adjust A7 for zero center reading.
6. Set sharp tuning control at the center position and adjust the channel oscillator slug for minimum sync buzz. The oscillator slug adjustment should be made over a wide range to be sure the minimum buzz position has been found.
7. Repeat step 6 for all other channels in your area.

The sharp tuning control can then always be adjusted for minimum buzz which will coincide with best picture after the above adjustments have been made.

Sync Buzz Due to the Transmitting Station

If the realignment procedure fails to reduce the buzz, the fault is probably due to the video-modulation system used at the transmitter. This type of buzz can usually be identified by its appearance at intervals when there is a large amount of white in the picture. The buzz may be eliminated or reduced to a minimum, in many instances, by modifying the first sound-tube (V201) circuit as follows:

1. Remove C202, 120 μμf, connected between L201 and pin 1 of V201 (6AU6), and replace it with a short length of wire.
2. Remove R201, 1 megohm, connected between pin 1 of V201 and ground.
3. Remove all connections from pin 7 of V201.
4. Connect an 82-ohm, ½-watt resistor (part no. 60B28-31) between pin 7 and ground.
5. Realign the receiver.

Residual Sync Buzz

This type of sync buzz rarely reaches an objectionable level. It is due to stray capacitive coupling and may be reduced to a minimum as follows:

1. Tune in a station and disconnect C208 from pin 5 of V204 (6AS5).
2. Connect approximately 1 inch of insulated wire to pin 5 of V204 and approximately 3½ inches of insulated wire to the terminal connected to pin 6 of V401B (12AU7 sync separator).
3. Twist these leads together a turn at a time, for a minimum in the buzz, and reconnect C208.
4. Connect approximately 1 inch of insulated wire to pin 4 of V203A (6SN7) and approximately 3 inches of insulated wire to the terminal connected to pin 6 of V401B.
5. Twist these leads together, a turn at a time, for a further minimum in the buzz.

HIWYNI Have It When You Need It

Multiple MR-1500, MR-2000

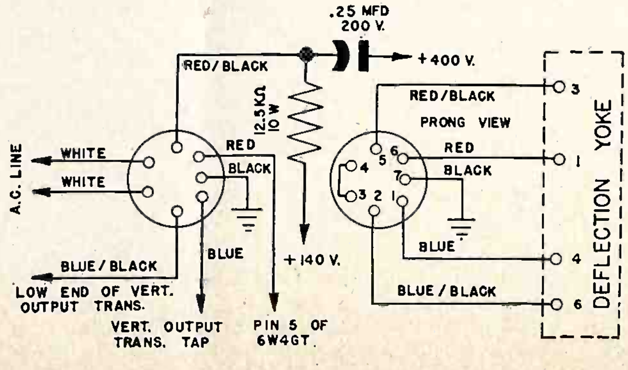
These models appear on *page 2-2 (*2-3,4) of Rider's TV Manuals Volume 2*. The 6-volt winding should be marked 5 volts.

Pilot TV-123

This model is similar to Model TV-121 which appears on *pages 3-10 through 3-21 of Rider's TV Manual Volume 3*, and to Models TV-121A and TV-123 which appeared on page 3 of the April issue of SUCCESSFUL SERVICING. The following changes in the schematic diagram have been made starting with serial number 214001.

A pilot light switch 101-34 has been added between the pilot light and the X lead. Sections 1 and 2 of the 12AU7 video amplifier have been reversed. Contrast control part number has been changed from 39-19 to 39-26. Bandswitch part number has been changed from 100-70 to 100-71. Volume control part number has been changed from 36-35 to 36-36.

The high-voltage filter resistor on the 1B3GT socket has been changed from 220,000 ohms to 680,000 ohms, 2 watts. The 1,000-ohm decoupling resistor on the low end of the vertical output transformer has been returned to pin 5 of the deflection yoke cable instead of to +400 volts. The changes made in the yoke cable are shown in the accompanying diagram.



Deflection-yoke cable connections for Pilot TV-123.

Television Changes

Belmont 12-inch Chassis

Folding at the right of the picture tube, evidenced by a loss of horizontal scanning of one-half to four inches, and a bright vertical line at the right edge of the picture or raster can be cured by following the suggestions below:

1. Replace the 0.001-μf capacitor C112, connected to pin 2 of the 6SN7 horizontal multivibrator, with a 0.02-μf, 600-volt capacitor.
2. If a 3,900-ohm, 2-watt resistor R107 is wired in the chassis, connect another 3,900-ohm, 2-watt resistor in parallel with R107.
3. Replace the 6BQ6 tube if the trouble is not cured.

RIDER TV MANUALS VOLUMES 1, 2, 3, 4,

Starrett Ambassador 3V1-31-9

This model appears on *page 3-1 of Rider's TV Manual Volume 3*. The following changes have been made. A 1-megohm tone-control resistor, in series with a 0.01-$\mu\mu$f capacitor, has been added between the junction of R221 and C204 and the junction of C207, C208, and R224. Resistor R183, 3,600 ohms, 1 watt, has been added in parallel with L195, the 470-ohm focus coil.

Fig. 1 shows the 6SN7-GT tube and accompanying network that have been added to the circuit. R189, R190, R133, R129, R237, and link board J102 have been deleted.

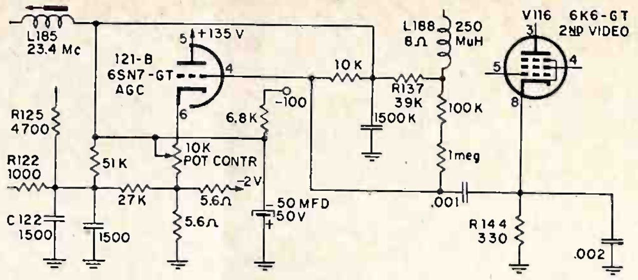


Fig. 1. A 6SN7-GT and the accompanying network have been added to the Starrett Ambassador.

R179A, the 10,000-ohm resistor in parallel with R179, and the value of R179 have been changed to 5,000 ohms, 2 watts. R240, 12 ohms, has been deleted, Resistor R137 has been changed from 3,900 ohms to 39,000 ohms. Resistor R177 has been changed from 1,800 ohms to 1,000 ohms. Capacitor C205 has been changed from 0.0025 $\mu\mu$f to 0.01 μf. Capacitor C207 has been changed from 0.0025 $\mu\mu$f to 0.00025 $\mu\mu$f.

Fig. 2 shows additional changes that have been made in the Ambassador.

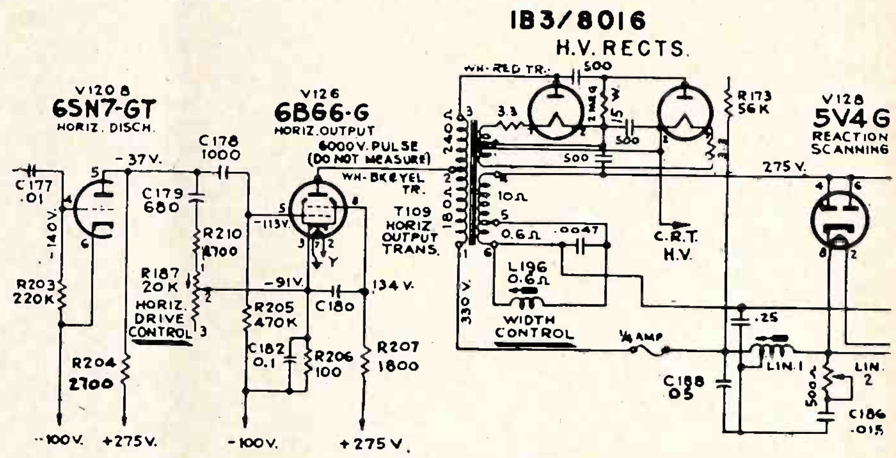


Fig. 2. Additional changes in the Starrett Ambassador.

Admiral 16-inch and 19-inch Sets

To eliminate a charge building up on the picture windows and control panel escutcheons on models with 16-inch and 19-inch metal picture tubes, ground the picture window to the chassis ground. The charge on the control escutcheon, since it is built up through leakage from the picture window, will also be eliminated. A convenient way of doing this is by using escutcheon ground cable assembly A3229 with picture windows 23D61 or 23E62, or A3232 with picture windows 23D61-1 or 23E62-1. This ground cable assembly consists of a spring clip, shielded braid, and a solder lug.

The A3229 spring is fastened by the mounting screw on the lower right corner (facing rear of cabinet) of the 23D61 or 23E62 picture window using the screw hole nearest the end. A number 6 x ⅜ round-head wood screw should be used to fasten the spring to the cabinet.

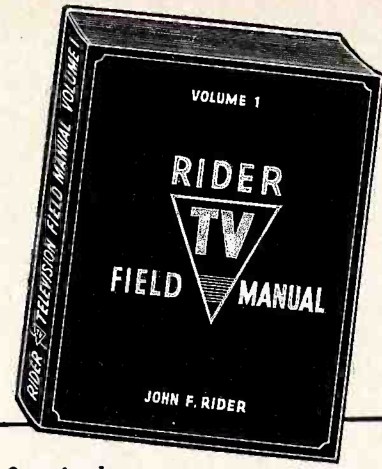
On the 23D61-1 and 23E62-1 picture windows which are mounted with eight 18A45 springs, substitute the A3232 spring assembly for the 18A45 spring in the lower right corner (facing rear of cabinet).

The lug end of the cable assembly may be fastened to any convenient spot on the chassis such as one of the mounting screws for the high-voltage shield.

All present production 16-inch and 19-inch sets incorporate these ground-spring assemblies.

COMING SOON!

In Answer To Requests From The TV Servicing Industry!



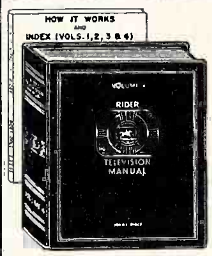
RIDER TV FIELD MANUAL

A New Type of RIDER Manual Designed Specifically For Light TV Servicing in the Home

Here, at last, is the "on the job" servicing Manual that you asked for . . . a companion volume to the regular RIDER TV MANUALS which are intended for shop use. The RIDER TV FIELD MANUAL is accurate, authoritative . . . with information DIRECT from the manufacturers themselves. The coverage includes all production runs . . . not just pilot models.

Everything you need for *light* TV servicing in the home will be found in the RIDER TV FIELD MANUAL. It covers views and functions of tubes, pre-set controls, key-voltage points, crt socket designations, i-f trimmer locations . . . and all the other data needed by the TV man in the field.

TV receiver coverage will be completed up to approximately June, 1950. AND PRICE WILL BE RIGHT. Don't be misled into buying substitutes. Place your order now with your jobber for the RIDER TV FIELD MANUAL.



The Greatest TV Servicing Manual Ever Published!

RIDER TV MANUAL VOLUME 4

Complete coverage from October, 1949 through February, 1950. 494 models. 235 chassis . . . the greatest collection ever assembled in one handy volume. Authentic, Accurate, Factory-Authorized. New, Larger page size, 12" x 15" and all pages filed in place. Giant pages have only one fold for extra convenience and greater durability. Equivalent of 2296 pages (8½ x 11) PLUS Cumulative Index Volumes 1, 2, 3, 4 . . . and "HOW IT WORKS" BOOK. All for only **$21.00**

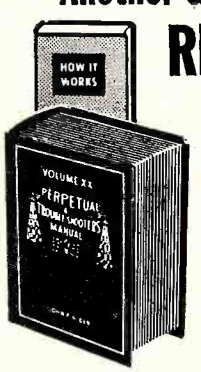
RIDER TV MANUAL Vol. 3 . . . 74 manufacturers, 441 models, 243 chassis. Page size, 12" x 15". Equivalent of 2032 pages (8½ x 11) PLUS Cumulative Index Volumes 1, 2, and 3 . . . and "HOW IT WORKS" Book. $21.00

RIDER TV MANUAL Vol. 2 . . . Complete coverage to January, 1949. 67 manufacturers. Page size, 12" x 15" (June delivery). Contains all data formerly in 8½ x 11 size, plus Cumulative Index Volumes 1 and 2 . . . and "HOW IT WORKS" Book. $21.00

RIDER TV MANUAL Vol. 1 . . . Coverage up to early 1948. 34 manufacturers. Equivalent of 2000 pages (8½ x 11) Plus Index and "HOW IT WORKS" Book. $18.00

Another Great RIDER Servicing "Must!"

RIDER MANUAL Vol. XX



Do a better, more satisfactory job . . . insure repeat business . . . make a larger net profit. Get RIDER MANUAL Volume XX. Complete coverage up to November, 1949—AM-FM, Radio, Auto Receivers, Record Changers. Products of 74 manufacturers. All pages and double spreads filed in proper positions.

1776 Pages . . . Plus Separate "How It Works" Book, and Cumulative Index, Volumes XVI to XX. ONLY $18.00

RIDER MANUALS

Television Manual Volume 4 (Plus "How It Works" Book and Index)	$21.00	Volume XX	$18.00
Television Manual Volume 3 (Plus "How It Works" Book and Index)	$21.00	Volume XIX	$19.80
Television Manual Volume 2 June delivery—in new, larger page size, 12" x 15". (Plus "How It Works" Book and Index)	$21.00	Volume XVIII	$19.80
Television Manual Volume 1 (Plus "How It Works" Book and Index)	$18.00	Volume XVII	$16.50
		Volume XVI	$ 8.40
		Volume XV	$19.80
		Volume XIV to VII (each vol.)	$16.50
		Volume VI	$12.50
		Abridged Manuals I to V (one volume)	$19.80
		Master Index, Covering Manuals, Vols. I to XV	$ 1.50

PA Equipment Manual, Vol. 1....$18.00

NOTE: Are you receiving your copy of "Successful Servicing"? It's Rider's own publication of interest to every Serviceman. Write for it...it's FREE!

NOTE: The Mallory TV Service Encyclopedia, 1st TV Edition, makes reference to only one source of TV receiver schematics—Rider T.V Manuals.

NOTE: The Mallory Radio Service Encyclopedia, 6th Edition, makes reference to only one source of radio receiver schematics—Rider Manuals.

NOTE: The C-D Capacitor Manual for Radio Servicing, 1948 Edition No. 4, makes reference to only one source of receiver schematics—Rider Manuals.

JOHN F. RIDER PUBLISHER, Inc., 480 Canal Street, New York 13, N. Y. • Export Agent: Rocke International Corp., 13 East 40th St., N. Y. C., Cable, ARLAB.

RIDER MANUALS *mean* SUCCESSFUL SERVICING

Frequency-Compensated Attenuators in Ocsilloscopes

(Continued from page 1)

and if the switch is set at position *2*, the equation becomes

$$E' = \frac{R2}{\sqrt{(R1 + R2)^2 + X^2_{C1}}} \times E.$$

Regardless of the frequency, the higher the reactance of *C1*, the greater will be the drop in voltage across it, but the higher the value of the total resistance relative to X_{C1}, the less the voltage drop across the capacitive reactance relative to the voltage drop across the resistive portion of the system. If we imagine the frequency very low, so that X_{C1} is several times higher than $R1 + R2$, comparatively little of the voltage E will appear across $R1 + R2$; whereas if X_{C1} is very low in comparison with $R1 + R2$, most of the voltage will appear across the total resistance. If we take license with the actual frequency and assume X_{C1} to be a very small fraction of $R1 + R2$, then we can say that the presence of *C1* has very little effect on the signal level, although it does act as a blocking capacitor for direct currents.

Why Frequency Compensation is Necessary

It is evident that if a nonsinusoidal wave containing a wide range of harmonics is fed into such a system, the amplitude relationship of the harmonics will not be retained at the output of the divider system. Of course, it is possible to visualize the value of *C1* which will make X_{C1} extremely small relative to $R1 + R2$ at the lowest possible frequency, so that the different degree of attenuation which will take place due to changes in X_{C1} will be negligible. This is possible, but not practical, because of cost and size, and because it is not the entire solution.

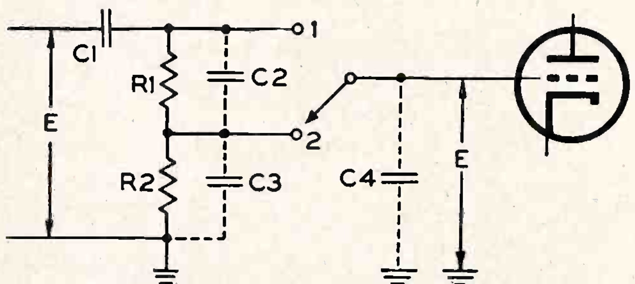


Fig. 1. Schematic of a simple, uncompensated two-step attenuator.

Let us examine the system from another viewpoint. The capacitor *C1* and the resistive elements comprise an *R-C* system with a certain time constant. It is possible to establish such values for *C* and *R* that the resultant time constant is sufficient to satisfactorily accomodate voltages of the lowest frequency which may be fed into the system. If this is done by the use of a very high value of *C1*, the increase in cost, dimensions, and the distributed capacitance may be undesirable. If, on the other hand, a compromise is made and the resistance is made large, it may be too high, relative to the permissible resistance in the grid circuit of the tube. The optimum value of time constant selected for any such system, as reflected in the constants of the elements, must, of necessity, be a compromise, because it is virtually impossible to establish a single system which will perform uniformly in all respects at all frequencies. A certain amount of time delay is expected and accepted; invariably this takes place over the lower end of the frequency range.

Now, if we take cognizance of the distributed capacitance which we have shown as *C2, C3*, and *C4* in Fig. 1, the action of the attenuator over a range of frequencies is still further modified. With these capacitances active in the system, and the switch set at tap *1*, the magnitude of the voltage fed to the input of the tube now is influenced by the distributed capacitances as well as by series capacitor *C1*. These values of distributed capacitances will have much greater effect at the high frequencies than at the low frequencies.

Since these shunt reactances are high at the low frequencies, the division of voltage between X_{C1} and $R1 + R2$ will be affected very little; whereas when the frequency is high, the division of voltage no longer is determined by the values of *R1* and *R2*, but rather by combined effect of the reactance of the distributed capacitances and the resistive elements which they shunt. In other words, the entire attenuator system becomes frequency sensitive; changing the tap position may afford the proper voltage division over a limited frequency range, but not over the entire range.

Under the circumstances, changing the tap positions when the input voltage is of nonsinusoidal character will treat the different components differently and tend to distort the reproduction. The presence of these capacitances will also modify the time constant of the system as the tap positions are changed, and introduce varying time delays. So, both amplitude attenuation and phase shift are the problems of uncompensated step attenuators, just as they are the problems of the simple potentiometer type of dividers.

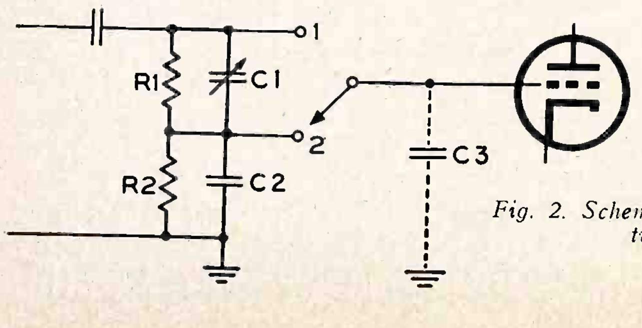


Fig. 2. Schematic of a simple, compensated two-step attenuator.

How Compensation is Accomplished

Compensation in a step attenuator is accomplished by the use of additional shunt capacitances. It is customary to make one or more of these capacitances variable to permit adjustment for variations in circuit capacitance. A simple arrangement is shown in Fig. 2. Capacitors *C1* and *C2* are the added compensating capacitors and are considered to include the switch and wiring capacitances across the taps. *C3* represents the tube and additional circuit capacitances. Neglecting the series blocking capacitor, the voltage at switch position 2, as determined *only* by the resistive divider, will be proportional to $R2/(R1 + R2)$. In order that the capacitive shunting reactances also form the same voltage-divider ratio, the reactance of *C2* and *C3* in parallel, divided by the reactance of *C1* in series with the reactance of *C2* and *C3* in parallel, must be equal to $R2/(R1 + R2)$. When this is accomplished, the attenuator is relatively independent of frequency over a very wide range of frequencies.

The presence of compensation in a step attenuator does not necessarily mean that all variation in the constants of a system has been removed. All it means is that a suitable compromise has been accomplished which minimizes the distortion in the reproduction to a point where it does not impair the utility of the oscilloscope. Such compensation is a very accurate procedure, and it is entirely possible that, after a period of use, some changes will take place in either the adjustment of the trimmers or in the constants of the circuit. When this happens, it will influence the performance of the oscilloscope when the defective switch step is used. An example of this is shown in Fig. 3. Oscillogram (A) is the trace of a 15,000-cps square wave when it was fed directly to the deflection plates of the cathode-ray tube. Oscillogram (B) shows the pattern of the same voltage at one point on a step attenuator which was properly adjusted, while (C) shows the trace when the components of the same step on the attenuator were incorrectly adjusted. The effect of the greatly increased attenuation at the high frequencies is very evident.

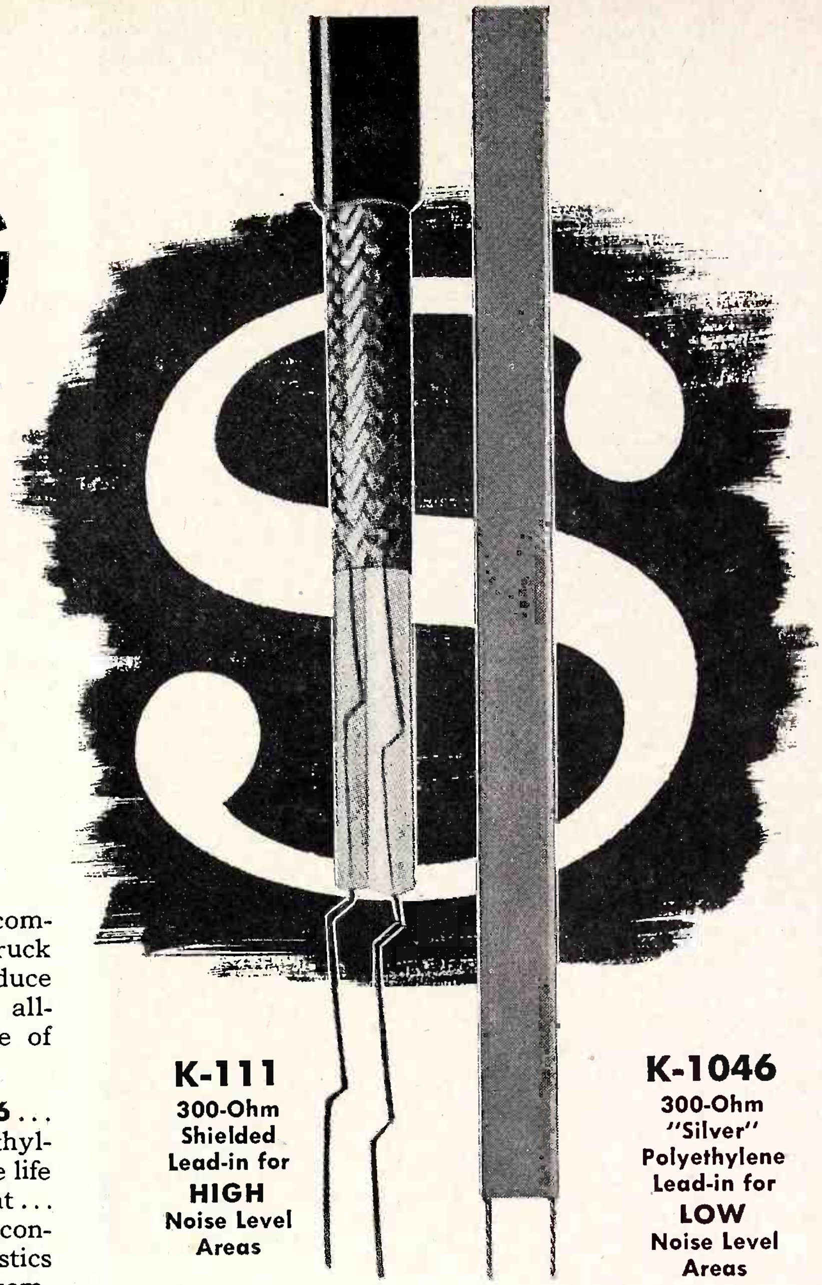
The Cathode-Follower Attenuator

The application of two-section attenuation systems is not as simple as that symbolized in Fig. 1 of the last issue of SUCCESSFUL SERVICING. While several methods are used, the one most frequently employed utilizes a *cathode-follower* stage as an intermediate element between the step attenuator and the continuously variable control. This is symbolized partly in Fig. 4A and fully in Fig. 4B. The reason for

(Continued on page 14)

Are You KEEPING Your TV Installation PROFITS

...Or paying them back in "FREE" Service Calls?



K-111
300-Ohm Shielded Lead-in for HIGH Noise Level Areas

K-1046
300-Ohm "Silver" Polyethylene Lead-in for LOW Noise Level Areas

IT'S expensive...following up nuisance calls and "complaints" during guarantee periods...wasteful in truck operation, traveling time and labor. You can reduce your costs to a new low—with the high quality, all-around ruggedness and dependable performance of Federal lead-in cables!

Where noise level is low—Use Federal K-1046... with distinctive Federal-developed "silver" polyethylene insulation...providing 30 per cent more service life than ordinary polyethylene. K-1046 repels sunlight... fights heat...doesn't dry out, crack, buckle or leave conductors exposed. It holds its original characteristics longer...retains its impedance values. In Weatherometer tests, K-1046 surpassed all competitive types.

Where noise level is high—Use Federal K-111... shielded lead-in...another exclusive FTR development. K-111 is a top item in TV because it minimizes noise, snow and ghosts due to transmission line pick-up. Pictures are clearer, brighter and steadier... all the time. Actually, Federal's K-111 permits TV installations in many noisy areas where good, clear reception was impossible before!

See your distributor now for data and prices on Federal's K-1046 and K-111... for that next new installation or lead-in replacement. You can depend on these highly efficient 300-ohm lead-ins to keep service calls down...to keep profits UP. Insist on Federal...it pays to *start* with the best!

These 2 *Federal* TV Lead-ins Protect Your Profits in HIGH and LOW Noise Level Areas

America's largest producer of solid dielectric high-frequency cables

FEDERAL TELEPHONE & RADIO FTR

Federal Telephone and Radio Corporation

AN IT&T ASSOCIATE

SELENIUM and INTELIN DIVISION, 100 Kingsland Road, Clifton, New Jersey

In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., N. Y.

(Continued from page 12)
the two presentations, is that the former may be used by itself over a limited range of voltages, although in most cases the latter system also finds application.

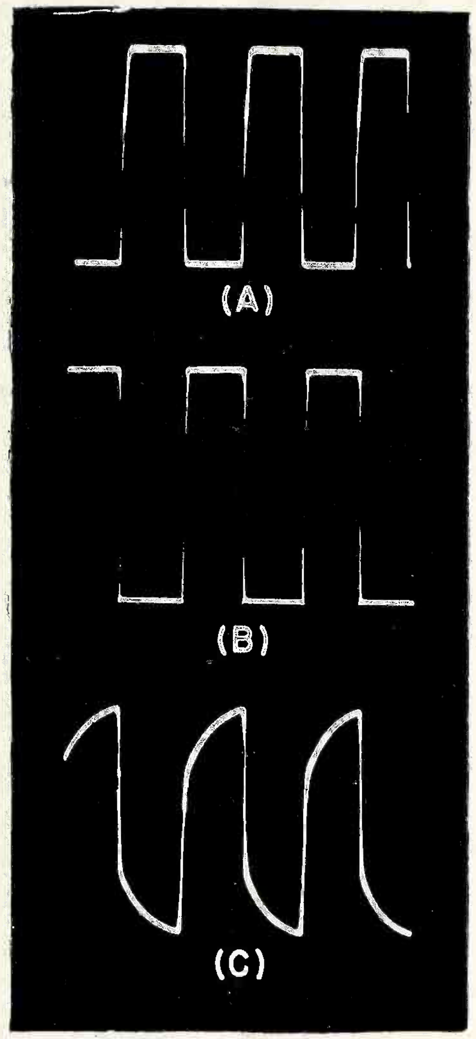


Fig. 3. Oscillogram (A) is the trace of a 15,000-cps square wave fed directly to the deflection plates; (B) is the pattern of the same square wave at a point on a properly adjusted compensator attenuator; (C) is the result of improper adjustment of the attenuator compensating–elements.

Essentially, the cathode follower is a vacuum-tube impedance transformer; its input impedance is high and its output impedance is low and can be varied over an appreciable range. The gain A of such a stage is expressed as

$$A = \frac{R_k}{1/g_m + R_k}$$

where R_k is the cathode-load resistor and g_m is the mutual conductance of the tube. The gain of the cathode follower can never be greater than unity because the quantity $1/g_m$ cannot become zero since g_m is finite. Thus the impedance transformation in this type of system invariably is accompanied by a loss in signal. Fortunately, the loss never is so great as to become a problem, whereas the transformation of impedance affords a definite advantage. The output impedance Z_L of the cathode follower is

$$Z_L = \frac{1}{g_m + 1/R_k}\ .$$

However, for our purposes, it is sufficient to view the cathode circuit as a system with a low-impedance output which permits the application of a low-resistance potentiometer as the continuously variable gain control. A low-resistance control affords a smooth control of amplitude, and the presence of a high-impedance input is retained with all of the advantages which it offers.

Capacitor C_c which couples the potentiometer to the cathode resistor is a blocking capacitor for d.c., and usually is a high value so as to present very little impedance to the passage of low-frequency currents. In the case of d-c amplifiers, this coupling capacitor is omitted, and the cathode resistor may be a potentiometer which serves as the gain control. The d-c voltage variations present in the cathode circuit are the signal voltages which are transferred to the succeeding stages.

In some systems which employ the step attenuator ahead of the first stage (the cathode follower) and the continuously variable element in the output of the stage, the lowest setting of the potentiometer does not reduce the signal to zero. This is done so as to necessitate the use of the step attenuator for full range of signal control, thus tending to minimize the possibility of overloading the input stage with an exceptionally strong signal. Because the variable control does not reduce the signal below a certain minimum, proper trace dimension can be accomplished only by also adjusting the step control.

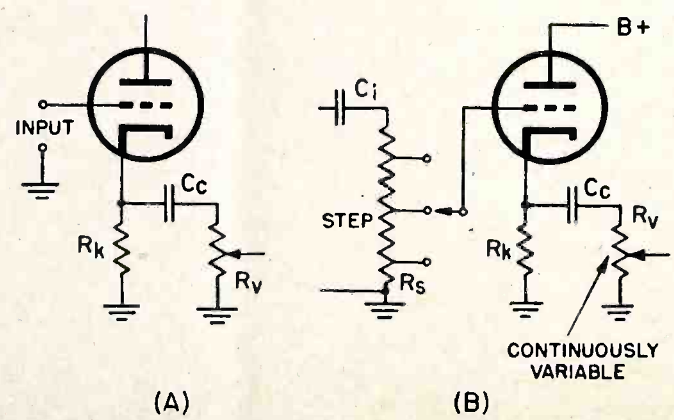
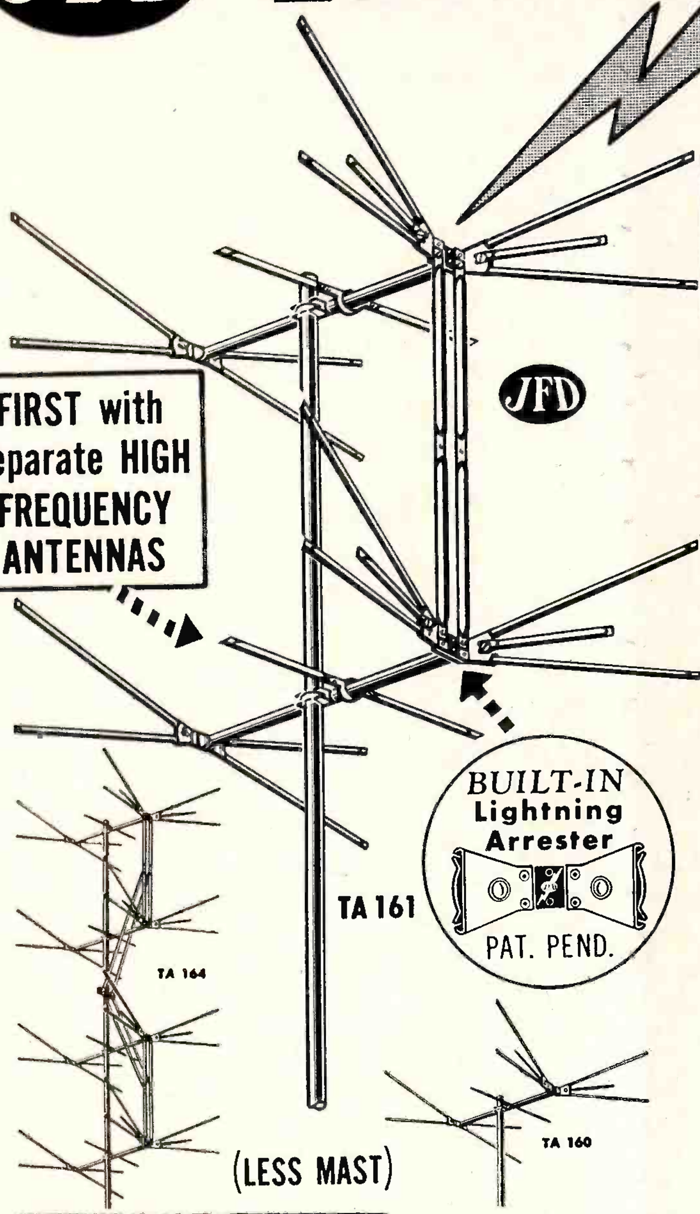
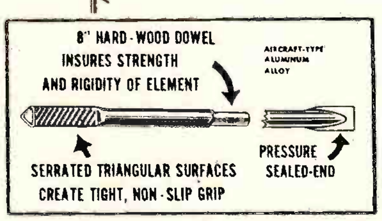


Fig. 4. (A) Cathode follower attenuator employing a potentiometer only; (B) Cathode-follower attenuator employing both a step and a variable voltage divider.

JFD LEADS AGAIN!

FIRST with BUILT-IN LIGHTNING ARRESTER plus SEPARATE HIGH FREQUENCY ANTENNAS ...AT NO EXTRA COST!





ALL ALUMINUM REINFORCED ELEMENTS

Yes, JFD is FIRST again . . . with the **only** antenna that has a **"Built-In"** Lightning Arrester to protect TV sets against lightning and static charges. FIRST again . . . with a **separate** High Frequency Antenna specially engineered to increase upper channel reception.

Both added features now available with all JFD "D-Xer" Conicals at no EXTRA COST. The GREATEST conical value in the field!

JFD-engineered lightning arrester is permanently molded into extra-thick bakelite insulator offering greater structural strength. No special lightning arrester connections required. Only normal antenna hook-up, with mast grounded. Impedance and signal strength remain unchanged.

Unique JFD High Frequency Antenna peaks high frequency response and insures superior upper band signals.

NEW LOW PRICES!

TA 160 **"D-Xer" All-Band Conical,** channels 2 to 13 and FM. Good front-to-back ratio on all TV frequencies. **List price** $13.15

TA 161 **Double "D-Xer" All-Band Conical.** ¼ wave-length stacked. Provides exceptionally high DB gain on both bands. Channels 2 to 13. **List price** $27.80

TA 162 **Double "D-Xer" All-Band Conical.** ½ wave-length stacked for greater broad-band response on all channels. Complete with mast-supported jumper harness. **List price** $29.30

TA 164 **"Super D-Xer" Double Stacked Conical,** channels 2 to 13 and FM. Complete with mast-supported aluminum jumper harness. Unsurpassed for bringing in weak signals over long distances. **List price** $59.60

NOW MORE THAN EVER . . .
The Sensational JFD "D-Xer"
All-Aluminum Conical Antennas
are STRONGER!
MORE ECONOMICAL!
MORE PROFITABLE!

"D-Xer" Conicals sell faster — more easily. They require minimum servicing. Once put up, they stay put up — **and they stay sold! INSIST on JFD antennas! Order by type number! STOCK UP NOW . . . for greater-than-ever profits with these JFD "FIRSTS"!**

Write for FREE BULLETINS

Now . . . right now . . . put your name on the JFD list to receive informative bulletins of JFD "D-Xer" Conicals, and all other fast-moving, profitable JFD products.

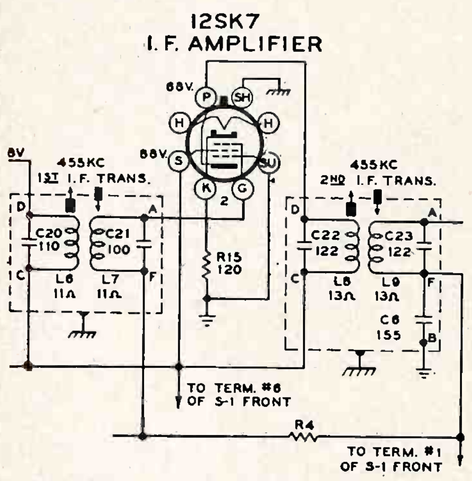
JFD **MANUFACTURING CO., Inc.**
6119 16th AVENUE, BROOKLYN 4, N. Y.
FIRST in Television Antennas and Accessories

Radio Changes

RCA 75ZU 2nd Prod., Ch. RC-1063B

This model is the same as 75ZU, Ch. RC-1063A, which appears on *pages 19-45 and 19-46 of Rider's Manual Volume XIX,* except for the following changes:

Different i-f transformers are used, as shown in the accompanying diagram. Resistor R15 has been added to the cathode circuit of the 12SK7 i-f amplifier, and R14, in the diode circuit of the 12SQ7 2nd detector, has been deleted. Changes that apply to both the RC-1063A and RC-1063B chassis are given in the change notice for 75ZU, RC-1063A, that appears on *changes page C20-10 of Rider's Manual Volume XX.*



Changes for RCA 75ZU, RC-1063B.

The replacement parts list is the same as that for RC-1063A except for the differences listed below:

Part No.	Description
70128	Transformer, first i-f transformer, stamped 922246-11 (L6, L7, C20, C21)
70129	Transformer, second i-f transformer stamped 922246-12 (L8, L9, C6, C22, C23)
	Resistor, fixed composition, 120 ohms, ± 10% (R15).

Sears 9270, Ch. 547.245

This model appears on *pages 20-73 through 20-75 of Rider's Manual Volume XX.* The parts number of "Bearing, tuning shaft," should be changed from V3449 to V9160. A 50-μf capacitor, C28, has been added to the filament network from the junction of pin 7 of the 1U5 and pin 1 of the 1U4, i.f., to the B— line. The following part should be added to the replacement parts list: C28, V4636, Capacitor, electrolytic, 50 μf, 25 v.

Zenith 5D811, Ch. 5E01

Model 5D811, Ch. 5E01, was erroneously listed in the Volume XX Index as 5D811, Ch. 5F01.

Admiral Record Changers RC220, RC221, RC222; RC320, RC321, RC322, early, late production

Record Changers RC221 and RC222 appear on *record changer pages RCD. CH. 20-9 through RCD. CH. 20-20 of Rider's Manual Volume XX.* RC220, RC320, RC321, and RC322 are similar to RC221 and RC222.

The only changes which were made in the late production RC220, RC221, and RC222 changers were the addition of the turntable retaining ring and the trip counterweight, reference number 138. Two types of turntable retaining devices have been used. The early type was a flat external retaining ring (part no. 401A286) which is no longer used. This has been replaced by the present retaining clip (part no. 414A36). When installing this clip, be sure that its "turned-up" ends are facing upward. The trip counterweight was added to eliminate erratic trip action because of a weak or stretched trip cocking spring (ref. no. 110). The trip cocking spring is no longer used. In order to mount the trip counterweight it was necessary to tap the trip lever (111) to accomodate the trip counterweight mounting screw (ref. no. 139).

In the parts list for RC221 and RC222, reference number 17, pickup arm, should have 403C35 as its part number.

The only difference between late production RC220, RC221, RC222 changers and RC320, RC321, RC322 changers is in the method of mounting the pawl and the trip serration plate. This change was made to simplify the adjustment for proper trip on 7-inch 33⅓-rpm records and 10-inch and 12-inch 33⅓-rpm or 78-rpm records. The oscillating trip is used for these types of records.

In the RC320, RC321, RC322 changers, the shape of the pawl (ref. no. 141A) has changed slightly from that shape given in *Volume XX,* and it is now mounted where the trip serrations plate (ref. no. 114) was mounted. The pawl and trip serrations have merely reversed their mounting positions. The accompanying figure shows the layout for this change.

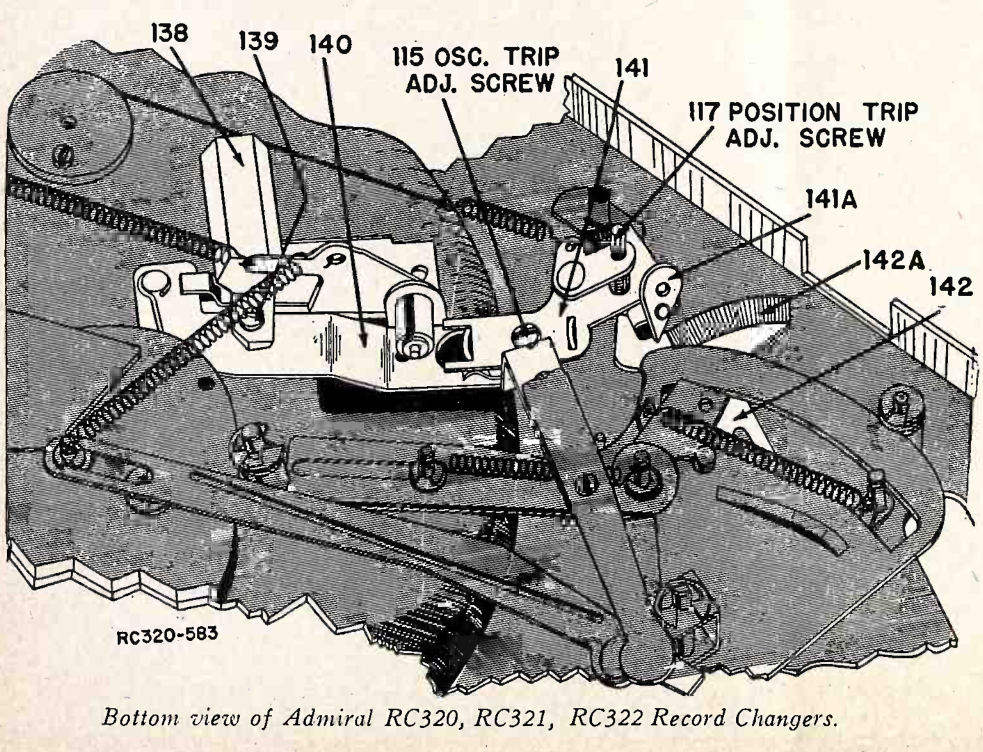
All adjustments on the RC320, RC321, and RC322 changers are the same as for the RC220, RC221, and RC222. The ideal adjustment of the oscillating trip adjusting screw is when the point of the pawl is horizontally even or level with the smooth side of the trip serrations.

In late production of RC320, RC321, and RC322, the 45-rpm centerpost cap (ref. no. 63) was changed to slightly decrease the over-all height of the cap and to include two extra ribs which help prevent the possibility of bending the slicers (65 and 66) if the 45-rpm centerpost adjustment is improperly made. The new centerpost cap is interchangeable with the old cap and should be used when replacing any centerpost cap. Two new cap mounting screws listed below should be used instead of the old type screws.

A felt washer is used between the changer pan and the motor mounting grommet at the mounting stud closest to the centerpost. This prevents the motor from tilting.

The parts listed below include corrections and additions to the parts list that appears for RC221 and RC222. It also contains all new parts for the RC320, RC321, and RC322 changers. For any parts not listed here see the parts list on *page RCD. CH. 20-20 in Volume XX.*

Ref. No.	Part No.	Description
	414A 36	Turntable retaining clip
	5A4-1	Felt washer (¼" ID x ¾" OD x 1/16")
17	403C 35	Pickup arm
63	403A 303	Centerpost cap (new, use on all models)
73	60-1125-C2-47	Screw (2 req.) 6-32 x 1⅛" BH MS
138	402A 203	Trip counterweight
139	85-187-C2-47	Screw, 8-32 x 3/16" BH MS
140	G400A 361	Trip lever and reject arm support
141	G400A 353	Trip engagement and adjusting plate (includes pawl)
141A		Pawl (part of 141)
142	G400A 357	Arm control lever (includes trip serrations)
142A		Trip serrations (part of 142)
	405A 112	50 cycle conversion spring for 33-1/3 rpm shaft
	405A 113	50 cycle conversion spring for 78 rpm shaft
	98A 15-15	50 cycle conversion pulley (45 rpm).



Bottom view of Admiral RC320, RC321, RC322 Record Changers.

Radio Changes

Philco 50-1421 and 50-1422

These models are similar to Model 50-1420 which appears on *pages 20-183 through 20-188 of Rider's Manual Volume XX,* with the exceptions given below.

Model 50-1421 uses an M-9C record changer, which appears on *pages RCD. CH. 19-35 through RCD. CH. 19-54 of Rider's Manual Volume XIX;* while Model 50-1422 uses an M-20 record changer, which appears on *pages RCD. CH. 20-1 through RCD. CH. 20-16 of Rider's Manual Volume XX.*

The connection from pin 6 of the 12BE6 goes to tap 2 of the oscillator transformer, T400, instead of to tap 4 of Z300. Resistor R401, 47,000 ohms, is connected from pin 2 of the 12BE6 to pin 1, and the lead from pin 2 now goes directly to B—, instead of to tap 2 of T400. The lead from C400B goes to the avc.

The inside loop lead must be wired to the aerial section of C400, and the outside lead to the gang frame.

To prevent audio regeneration, the green lead from pin 1 of the 6AQ5 tube to the wiring panel must have excess wire dressed toward the 6AQ5 socket, and away from C203 and the blue lead of T200.

The replacement parts list for Model 50-1420 applies to Models 50-1421 and 50-1422, except for the differences indicated below:

Ref. No.	*Part No.*	*Description*
C100	45-3500	Capacitor, 0.04 μf
C204	61-0179	Capacitor, 0.004 μf
R200	33-5564-3	Volume control (with power on-off switch), 2 megohms
R205	66-3568340	Resistor, 56,000 ohms
LS200	36-1629	Loudspeaker, p.m.
R306	66-0828340	Resistor, 82 ohms
C400	31-2751-3	Capacitor, tuning gang
R401	66-3478340	Resistor, 47,000 ohms
LA400	32-4375-1	Loop aerial, 50-1421 only
	40-7679-1	Baffle-and-cloth ass'y
	54-7745-3	Bottom cover
	10734-B	Cabinet
	56-7059FA9	Changer mtg. spring, 50-1422 only (3 required)
	56-7059-1FA9	Changer mtg. spring, 50-1422 only (3 required)
	76-4477-1	Drive shaft
	56-7001-1FCP	Pointer
	42-1847-2	Radio-phone switch.

General Electric 226

This model appears on *pages 20-27 through 20-29 of Rider's Manual Volume XX.* Resistor R1, tube V1 cathode resistor, was removed from the circuit of late production receivers. This change results in an increase of gain in the r-f amplifier.

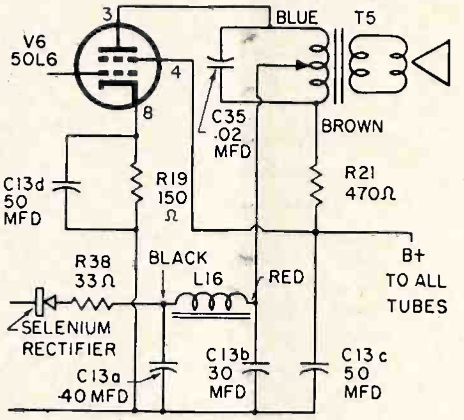
Westinghouse H-214, H214A, Ch. V-2103-3

These models appear on *pages 20-9 through 20-11 of Rider's Manual Volume XX.* In order to prevent i-f oscillation, the green lead from the 1st i-f transformer to the 6SF7 grid should be dressed close to the chassis. The blue and green leads from the 2nd i-f transformer should be separated so far as possible.

As a heat precaution, all leads must be dressed well away from the ballast resistor R4.

Bendix 75B5, 75M5, 75M8, 75P6, 75W5

These models appear on *pages 20-16 through 20-23 of Rider's Manual Volume XX.* It has been found possible to reduce the hum level in these models by installing a choke in the output circuit to the speaker as shown in the accompanying diagram.



Changes for Bendix 75B5, 75M5, 75M8, 75P6, 75W5.

Remove capacitor C35, 0.02 μf, connected from pin 3 of the 50L6 (V6) tube socket and terminal board. Remove red lead from pin 4 of 50L6 tube socket and terminal of electrolytic, C13c. Remove resistor R55, 470 ohms, from pin 6 of 50L6 tube socket and terminal board.

Move the pickup point of brown lead of output transformer from the terminal board to pin 6 of 50L6 tube socket. Move the red lead from terminal C13a, 40 μf, to terminal C13b, 30 μf, of electrolytic capacitor C13.

Drill a hole through the chassis near the electrolytic capacitor for the leads of an added reactor, L16. This choke is available as Bendix stock number LFOIO2. Bend one ear of reactor L16 and mount on top of chassis by soldering both ears to the chassis, or holes may be punched in each ear and the reactor mounted with self-tapping screws. Insert the reactor leads through the hole.

Since leads of capacitor C35, 0.02 μf, are too short, install new capacitor C35 between pins 3 and 6 of 50L6, with tubing over the positive lead, and negative capacitor plate attached to pin 3.

Connect red lead of added reactor L16 to terminal C13b, 30 μf, of electrolytic capacitor C13. Connect black lead of added reactor to terminal C13a, 30μf, of electrolytic capacitor C13.

General Electric 123, 124

These models appear on *pages 20-13 through 20-15 of Rider's Manual Volume XX.* The following changes should be noted in the replacement parts list. Item RDS-083 is a metal dial scale, tan color, with red and white figures. Later production receivers use the same type scale except for color. The later scale, cat. no. RDS-091, is gold in color, with brown and white figures.

The following catalogue numbers have been changed: URD-127 should read URD-137, R5, Resistor, 4.7 megohms, ½ w, carbon; RAU-037 should read RAU-307, Cabinet, Model 124 plastic cabinet (ivory).

General Electric 64, 65, 66, 67, 123, 124, 125, 135, 136, 226

These models are found in *Rider's Manual Volume XX.* Models 64 and 65 appear on *pages 20-3 through 20-8;* 66 and 67 appear on *pages 20-9 through 20-12;* 123, 124 and 125 appear on *pages 20-13 through 20-15;* 135 and 136 appear on *pages 20-16 through 20-18;* and Model 226 appears on *pages 20-27 through 20-29.*

Power-supply filter resistor URF-053, 1,500 ohms, 2 watt, carbon in earlier receivers has been changed in later production to URF-049, 1,000 ohms, 2 watt, carbon. Some of the early Model 135 and 136 receivers will be found to have a 2,200-ohm resistor. URF-049, 1,000 ohms, 2 watts, is recommended for service replacement of the filter resistor and will result in improved tube performance.

Late production receivers incorporate an i-f tube change from the 12SK7 tube of early receivers to a miniature type 12BA6. The tube-pin connections are not the same as those for the 12SK7 tube. This should be considered when reading the diagrams of early production receivers. A tube socket for the 12BA6 tube has been added to the Replacement Parts List and catalogued RJS-141.

For Models 64, 65, 66, 67, 123, 124, and 125, a 47-ohm, ½-watt, carbon resistor, part number URD-017, is used in series with the 12BA6 tube cathode to B— to improve circuit stability.

RCA 54B6, Ch. RC-589UE

This model is similar to Model 54B1, 2nd Production, which appears on *changes pages C18-8 and C18-9 of Rider's Manual Volume XVIII,* and on *pages 15-22 through 15-24 of Rider's Manual Volume XV,* with the exception of the parts listed below:

Part No.	*Description*
73284	Fastener, push fastener to hold loop, chrome (2 required)
73281	Hinge, lid hinge, ivory
73276	Lid, case lid complete with loop support less loop, ivory
73282	Loop, antenna loop complete with connectors less lid, ivory
73280	Plate, backing plate for mounting hinge on lid, chrome
73279	Screw, case cover mounting screw, 1 set, ivory
73286	Bottom, case bottom, ivory
73277	Center, case center, gold
73287	Handle, carrying handle, tan
73288	Link, handle link.

Sears 9005, 9006, Ch. 132.858

These models appear on *pages 20-65 and 20-66 of Rider's Manual Volume XX.* The following changes have been made in the replacement parts list:

Ref. No.	*Part No.*	*Description*
	N22166	Scale, dial, clear plastic
R4		Resistor, 2.2 megohms, ¼ w
R5	N22192	Resistor, volume control & on-off switch, 1 megohm
R6		Resistor, 15 megohms, ¼ w
R7		Resistor, 22 ohms, ¼ w
R8, R9		Resistor, 470,000 ohms, ¼ w
R10		Resistor, 150 ohms, ¼ w
R11		Resistor, 1,200 ohms, 1 w.

Curtain Time

(Continued from page 5)

dividual, he would first begin as an installer, and then, as he gained experience, might find his way into the shop and do service work. We'll go so far as to say that a man graduating from college with a BS in Electrical Engineering and having studied communication engineering would have trouble as a supervisor of TV receiver diagnosis and repair unless he first acquired a sound familiarity with television receivers, faults, conditions of use, etc.

We are not taking the City Council to task for attempting to correct a situation which has been described to them as being undesirable. Neither are we even implying that servicing conditions in the television industry are beyond reproach. Complaints are on record, and suits against service facilities are pending in court. However, how many of these cases are there in comparison with the total number of TV receivers which have been installed in New York City? Have these cases been analyzed so as to develop the proper kind of remedy for the ailment? Do some of the complaints stem from overselling by the TV receiver dealer's salesmen? Is advertising ambiguous or so loosely worded so as to create an impression which really is not so? Will licensing cure any of these problems? Can an unlimited number of calls on a fixed-rate annual service contract permit a profit to the service facility? Will licensing alter conditions if the answer is to the negative?

If a service facility does not keep a receiver in good repair, will licensing make it do so? Can't the Better Business Bureau make suggestions to the TV industry relative to what features of its sales and service efforts warrant changes? Licensing of the service facility is *not* the answer! Let the city dig for the causes and it will find that licensing has no bearing on them. The contents of the proposed ordinance do not disclose any effort to find out what is wrong!

Isn't it reasonable to expect, when such an all-inclusive municipal ordinance is contemplated, that all segments of the industry are represented in the planning so as to ascertain which of many possible ideas and suggestions are feasible and capable of accomplishing the desired result? *This was evidently not done!* The contents of the proposed bill proves it.

Licensing will not cure dishonest tactics. Licensing never made a dishonest man honest. Many investigations of licensed activities have proven this. If incompetency is the problem, licensing will not change the present situation; for, we are told, when such a licensing bill is passed, all people already engaged in the activity must automatically apply for a license. As the bill stands, it tends to modify this rule by setting up conditions of operation which have nothing to do with competency.

This bill is bad and it should not be passed! In fact the licensing portion of it is completely useless. The part which speaks of financial responsibility merits further consideration on a fair and equitable basis. If the City Council is adamant about passing an ordinance willy-nilly, then it must realize that it will affect not only the service facilities, but every distributor and dealer, and every manufacturer of television, radio, record-changer, and public-address equipment, and, in the long run, will be a headache to the municipal authorities because electronics is not a static industry. It is continually changing. The brain children of the design engineers working for the manufacturers issue almost daily; and no school is capable of keeping up to date month after month and year after year. No other activity which has been licensed can be placed in the same category.

The manufacturers of receivers still have many problems to solve. Every one of their design problems has not yet been licked. These design problems reflect on service operations. A great deal is known about television receivers but much more must be learned. Considering the technical complications of TV receivers, propagation differences in receiving conditions, differences in the design of the receivers—all comparisons with licensed industries where technical design has approached a static level are invalid.

With color television on the way, and ultra-high-frequency channels of operation forecasted for the not too distant future, the problems of satisfying the public's needs will mul-

(Continued on page 22)

(Continued from page 20)

tiply. Satisfaction of the public's demands is an industry problem. Education of the industry's personnel likewise is an industry problem. It is related to sales; and the TV industry knows only too well that its sales will suffer if its service is bad.

Assuming that proper financial responsibility is established by all the service facilities in accordance with the size of their operations, the answer might lie in a fixed number of calls on a service contract so that each service outfit can calculate its risk.

Perhaps the answer lies in an open market for the annual service contract fee. We do not recommend that the practice of annual contracts cease, because a large part of the public desires it and also those who want it should be able to get what they want. If there is to be any supervision of the service facility, perhaps this supervision should be the function of the distributor selling to the dealer who hires the service facility. If it is a noncontract service operation, the parts required by the service facility might be made available to the service shop by the distributor. Perhaps the cost of the antenna should not be a part of the service contract; or the service facilities could do something about educating the public, and the TV broadcasters could do likewise. Perhaps the service contract should be between the distributor and the service facility, rather than between the dealer and the latter; in which case, the distributor would be responsible to the public. Perhaps there might be some arrangement between the distributor and service facility which might call for a certain ratio between the number of service personnel and the number of service contracts accepted. Perhaps the industry as a whole might establish codes to aid in determining the content of advertising. Maybe the dealers of TV receivers or the distributors may decide the requirements of service facilities!

All of these are industry problems, and the application of these suggestions, or modifications of these suggestions as deemed necessary, may remove many of the complaints which have caused the City Council so much concern. The bill before the Council does not provide the answers which the TV industry needs. The City of New York cannot solve these problems!

PRSMA Conference and Show in Philadelphia

The annual PRSMA Conference and Show is planned for September 27th in Philadelphia. The session will last three days and a very interesting program of lectures and displays is being developed. We understand that about 70-odd display booths have been arranged for the use of distributors, the representatives of electronic equipment manufacturers, and for the Army, Navy, and Air Forces. The space selected for this year's event is much larger and better arranged than last year, and the managers feel that the attendance will exceed the excellent turnout for the last conference and show.

We have been asked to call attention to the meeting of service association representatives being planned for the evening of the 26th. It is hoped that representatives of service associations from all states of the nation will get to this meeting for a discussion of the ways and means whereby service associations of the country may cooperate to solve many of the problems arising in connection with the spread of TV.

The above is a preliminary announcement, and more details will follow in subsequent issues of this publication as the plans for the show progress.

Have You Heard?

That resistors being delivered to TV receiver manufacturers, and for that matter to all sorts of mfgs who use them, have a 20- to 35-week delivery—That certain types of receiving tubes are in short supply—That the average number of resistors in a TV receiver is around 108—That ball clubs are griping about TV hurting their attendance—That the pickup of scenes from ball parks has greatly improved—That people are getting sick and tired of ten-minute commercials during the intermission in movies shown on TV—That TV stations are still operating in the red—That there are about 104 TV stations on the air—That Rider TV Manuals give the servicing industry of the nation the most complete coverage of commercial TV receivers (all production runs) available in America!—That it pays to have a complete file of Rider Manuals, AM-FM-TV-PA, so that you will *H*ave *I*t *W*hen *Y*ou *N*eed *I*t!

HIWYNI—So long for now!

John F. Rider

HIWYNI Have It When You Need It

PROPOSED TV LICENSING BILL

The following excerpts have been taken from a proposed bill which is before the City Council of the City of New York. The bill deals with licensing and regulating the business of servicing, and maintaining and repairing television receivers.

SECTION 1.

b. Definitions.—1. Wherever used in this section, the term "service organization" shall mean and include any individual, firm or corporation operating and conducting the business of servicing and/or maintaining and/or repairing television receivers.

c. License.—1. Any service organization conducting or operating a business of servicing and/or maintaining and/or repairing television receivers must be licensed by the commissioner of licenses.

2. Said licenses shall be issued to the service organization where (a) said service organization has a member, or employs, a person who has immediate supervision over the maintainance, servicing and repairing of television receivers and who has been qualified by the commissioner of licenses, (b) a certificate of financial status has been filed with the commissioner of licenses, and (c) complies with the regulations set forth in paragraph f hereof.

d. Qualification.—A certificate of qualification shall be issued to a person who

1. has at least five (5) years of actual full-time experience in care, servicing and maintainance of electronic equipment of which at least two (2) years have been devoted to the field of television; or

2. has at least two (2) years attendance at a school, either public or private, in training in the care, installation and maintainance of television receivers, equipment and appurtenances of television, or practical experience in such work of a time duration equivalent to such schooling.

e. Certificate of financial status.—Upon the filing of an application for a license, a service organization shall submit a certificate signed and sworn to by an officer, partner or owner of the service organization setting forth:

1. that the service organization is actively engaged in the business of servicing and/or maintaining and/or repairing television receivers and is able in good faith to carry out its business commitments then in effect;

2. that its current assets exceed its current liabilities and its total assets exceed its total liabilities, exclusive of its capital stock liability or obligations to its partner or owner;

3. that neither it nor, in case of a partnership, any of its partners nor, in case of a sole proprietorship, its owner is insolvent or bankrupt or has committed any act of bankruptcy or made an assignment for the benefit of creditors; and

4. the last annual statement or a certified financial statement covering the last fiscal year of the service organization.

f. Regulations.—All service organizations must comply with the following regulations:

1. Equipment.—All service organizations must own and maintain on its premises the following equipment used in connection with the servicing, maintaining and repairing of television receivers: signal generator; sweep generator (minimum five-inch cycloscope); vacuum tube voltmeter; audio-frequency oscillator; alignment "set-up" (capable of aligning receivers to manufacturers' specifications); adequate facilities to store customers' receivers during repairs; bench area of at least thirty (30) square feet.

2. Commercial establishment.—All service organizations must be located at a commercial establishment; have a minimum of five hundred (500) square feet of work-shop area; be open to the public for at least eight (8) hours a day during normal business hours from Monday through Friday; and have prominently affixed on the main entrance to said establishment the firm name and license number in letters at least 1½ inches high.

3. Personnel.—All service organizations must employ, or have connected with its establishment, at all times at least three (3) persons, to wit: one supervisor, one full-time helper and one full-time office worker. The said supervisor must have a certificate of qualification pursuant to subparagraph d of this section.

4. Insurance coverage.—All service organizations must carry contractor's liability insurance in the amount of \$5-\$10,000 with a recognized insurance company.

5. Verification of testing equipment.—All service organizations must have all its equipment which is used in testing television receivers or their component parts verified and tested for accuracy at least once a year by a testing laboratory accredited by the commissioner of licenses.

g. Period.—Licenses shall be issued by the commissioner for one (1) year periods.

h. 2. The commissioner of licenses may, at any time within the term of the license, or any renewal thereof, demand an interim certificate of financial status. If said certificate is not filed with the commissioner of licenses within ten (10) days of the making of the demand, or said statement fails to set forth all the requirements of subparagraph e of this section, the said license shall automatically terminate without further notice.

i. Conducting business without a license.—After three months from the enactment of this section, any individual, firm or corporation operating or conducting the business of servicing and/or maintaining and/or repairing television receivers without a license issued hereunder shall be guilty of a misdemeanor.

j. Fees.—1. Upon the issuance of a certificate of qualification: \$25.

2. Filing fee for certificate of financial status: \$25.

3. Filing fee for an interim certificate of financial status: \$10.

4. Upon the issuance of a license: \$500.

5. Upon the renewal of a license: \$50.

Vacation Time

The office of John F. Rider Publisher, Inc. will be closed for vacations from July 22 through August 6. Please try and anticipate your needs and send your orders and requests for schematics in to us before July 22 or after August 6. We'll be back all sunburned and rested on August 7, ready to serve you again.

INDEX

Model *Page*

TELEVISION CHANGES

RADIO

Cover

The photograph on the cover shows a technician pretesting the timer chassis of a new direct-reading shipboard Loran manufactured by Radiomarine Corporation of America. The improved circuits now being used make the equipment easy to operate.

Stromberg-Carlson TC10, Manhattan

This model appears on *pages 4-1 through 4-4 of Rider's TV Manual Volume 4.* The following list should be added to the Parts List:

Description	*Part No.*
Front panel, mahogany, perforated	108131
Front panel, mahogany, cut out	108149
Front panel, avodire	108151
Front panel, leatherette	108163
Wrap around, mahogany	108132
Wrap around, avodire	108150
Wrap around, leatherette	108162
Back panel assembly	101107
Bottom panel	101101
Speaker	155087
Speaker grille, mahogany	130116
Speaker grille, avodire	130117
Grille cloth, mahogany	130115
Grille cloth, avodire	130114
Escutcheon, tube ring	125041
Escutcheon, panel overlay	125040
Lens	138023
Mask assembly	174006
Knob "Brightness," brown	134089
Knob "7-13, 2-6" range, brown	134086
Knob "Vertical," brown	134088
Knob "Horizontal," brown	134085
Knob "Picture," brown	134087
Knob "Volume," brown	134090
Knob "Tuning"	134092
Knob "Opera Glass"	134091
Knob "Brightness," avodire	134113
Knob "7-13, 2-6" range, avodire	134110
Knob "Vertical," avodire	134112
Knob "Horizontal," avodire	134109
Knob "Volume," avodire	134114
Knob "Picture," avodire	134111.

Sentinel 412, 413, 414, 415, Series YG

These models appear on *pages 4-10 through 4-19 of Rider's TV Manual Volume 4.* To improve the horizontal hold, the following changes have been incorporated in chassis having "Series YG" stamped on the back of the chassis.

1. The 0.005-μf capacitor C-55 and the 470,000-ohm resistor R-56 parallel filter in the output circuit of the 6AL5 phase detector have been removed from the circuit.

2. The 100,000-ohm resistors R-55 and R-59 in the output circuit of the 6AL5 phase detector have been replaced by a series-parallel resistor and capacitor combination consisting of the following:

The 100,000-ohm resistors R-55 and R-59 have been changed to 470,000 ohms, ½-watt, ± 5%, part no. 27E1009-25. The 0.002-μf, 200-volt capacitors C-85 and C-86 have been added in parallel with R-55 and R-59, respectively.

A 33,000-ohm, ½-watt, ± 10%, resistor R-116 has been added from pin 7 of the 6AL5 phase detector to R-55 and C-85. A 33,000-ohm, ½-watt, ± 10% resistor R-117 has been added from pin 5 of the 6AL5 phase detector to the junction of R-59 and C-86.

Distribution of This Issue—55,000 Copies

Successful SERVICING

JULY, 1950

PHYSICAL FORCES ON TV ANTENNAS

By SAMUEL L. MARSHALL

Editor's Note: This material is an abridged excerpt from the chapter on High Mast and Tower Installations as found in TV INSTALLATION TECHNIQUES. This book has been written by Samuel L. Marshall and is available this month.

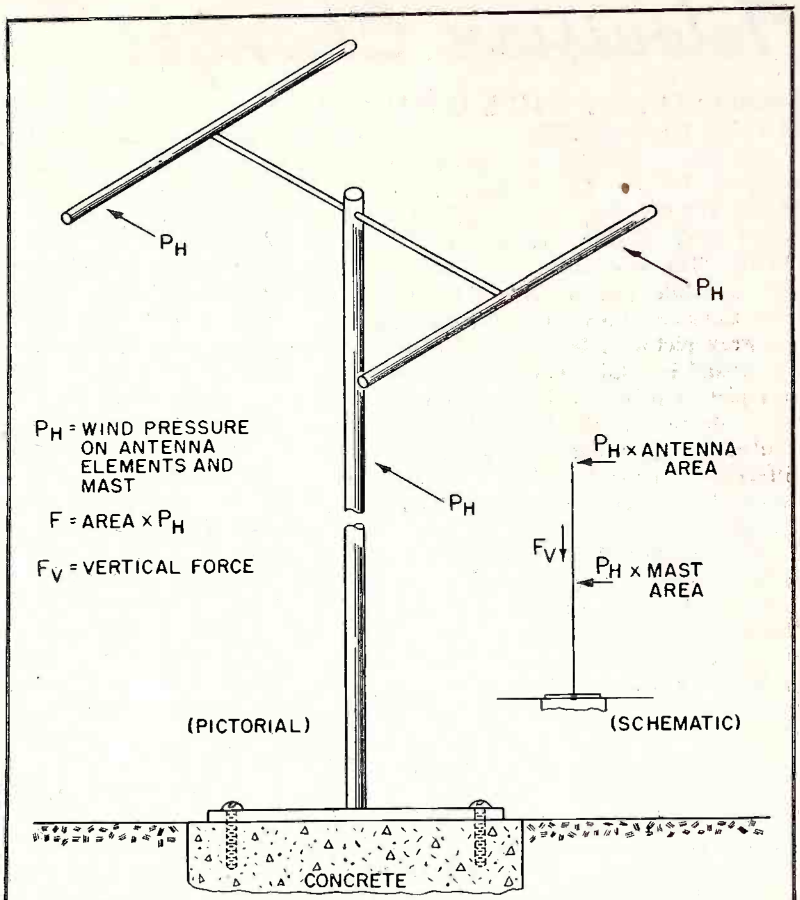


Fig. 1. Forces due to wind pressure on mast and antenna.

Because of the increasing number of fringe-area installations where masts as high as thirty feet find common application, and because many antenna installations, previously considered safe, have failed under heavy winds and inclement weather, it has become necessary for installation technicians to be able to predict just how much stress any antenna and mast will be subjected to so that they may choose their materials accordingly.

Forces on Antennas

Forces due to winds on a typical antenna installation supported by a mast or tower are shown in Fig. 1. The pressure of the wind on the antenna elements and the mast is represented by the symbol P_H. The vertical force F_V is caused by the weight of the antenna, the mast, and any ice formation that may be present.

We will not concern ourselves with the consideration of vertical forces other than to observe that these forces seldom exceed more than a few hundred pounds. The reactions that the vertical forces produce can, in most cases, be easily met by the foundation upon which the mast rests. However, an important cause of failure which is due to vertical loading is ice formation on the horizontal rods. These should be firmly supported in the over-all structure.

Horizontal forces, on the other hand, produce strains in the various members of the structure and its foundation which may easily exceed their safe limits. This results from the fact that the pressure of the wind against the various members of the structure causes the structure to become a huge lever with the fulcrum either at the base of the mast or at any point on the mast where a structural weakness is present.

As an example, consider an antenna mounted on a 30-foot mast. We will assume that the *equivalent area* of the entire structure including the mast is 3 square feet, centered at a point on the top of the mast, and the wind pressure at this point is 9 lbs/sq ft. To find the leverage reaction, or *moment,* at the base of the mast, and the total load imposed on the four bolts used to fasten the mast base to its foundation, we must first find the force at the center of pressure on the top of the antenna. This force is

$$3 \text{ sq ft} \times 9 \text{ lbs/sq ft} = 27 \text{ lbs.}$$

The moment at the base of the mast is

$$27 \times 30 = 810 \text{ ft-lbs.}$$

The load imposed on each bolt, assuming the bolts are spaced 6 inches from the center of the mast as in Fig. 2, is

$$810/2 = 405 \text{ ft-lbs per bolt}$$

(two bolts are effectively in action with the wind from a particular direction, see Fig. 3).

Generally, a safety factor of $1\frac{1}{3}$ is applied to this value before looking up the proper size bolt and anchor so that, for safety purposes, the load on the bolt is

$$405 \times 4/3 = 540 \text{ lbs.}$$

The proper stud-type expansion bolt diameter to use for this load is ¾ inch.

It must be pointed out that the values given in the above problem do not represent maximum loading conditions. Such situations might require even larger bolt sizes as well as a greater number of bolts for safe anchorage of the mast.

In order to standardize the design of masts and towers carrying electric wires and cables, the National Bureau of Standards has issued a handbook[1] in which will be found the maximum wind- and ice-loading conditions in various areas throughout the country. The loadings shown in the map in Fig. 4A refer to the ice loadings. Those shown in the table in Fig. 4B refer to wind loadings in these areas.

Notice that the maximum wind loading anticipated by the Bureau of Standards is 9 lbs/sq ft, equivalent to the force exerted by a 45-mph wind upon an area of 1 sq ft. Figures on this value as given by various agencies, who are concerned with this problem, differ. For instance, the Radio Manufacturers' Association's value for this maximum figure is 20 lbs/sq ft. One cause of this apparent difference is that some agencies use the *full* projected area of cylindrical conductors multiplied by the wind pressure in lbs/sq ft, whereas other agencies allow one half of the projected area of cylinders to be used, but with the higher (20-40 lbs/sq ft) applied wind loadings. Doubling the figures in the table given in Fig. 4B is, therefore, desirable when comparing the two.

Ice-Loading Considerations

Ice loading contributes to the effective area against which the wind exerts its pressure, and increases the weight or vertical loading of all the elements entering into the construction of the antenna. Notice that from Fig. 4B the increased radial width that may be expected in certain states due to maxi-

[1] "Installation and Maintenance of Electric Supply and Communication Lines; Safety Rules and Discussion," National Bureau of Standards Handbook H43, U. S. Government Printing Office, Washington 25, D. C., 1949, pp. 116-117.

(Continued on page 7)

Television Changes

Belmont M-1101, C-1102, C-1104, M-1105, Ch. 12AX22

This chassis appears on *pages 4-6 through 4-10 of Rider's TV Manual Volume 4.* Model M-1101 "The Suburban" is a table model with a white picture tube. Model C-1102 "The Consolette" is a floor model with a white picture tube. Model C-1104 "The Console" is a floor model with a glareless grey picture tube. Model M-1105 "The Suburban" is a table model with a glareless grey picture tube. As changes were made in the production of the 12AX22 chassis, code numbers were assigned to distinguish the differences in the sets. The differences between the different code numbers are explained below:

Code 1. Code 1 chassis are wired as shown in the schematic diagram in Volume 4, except for the tuner chassis filament wiring. Only terminals 6 and 7 should be connected to H. Terminals 5, 8, and 10 should be grounded. There should be no direct connection between C32 and C31, as indicated in Volume 4, C32 should go directly to terminal 6, and C31 should go directly to terminal 7.

Code 2. A 1,000-μμf capacitor is used in place of C111. The value of resistor R92 is changed from 270,000 ohms to 220,000 ohms, and the lead from R92 now goes to the +350–volt line instead of to the +250–volt line. The value of R63 is changed from 560 ohms to 680 ohms, 1 watt.

Code 3. This is similar to Code 2 except that capacitor C109, 47 μμf has been deleted from pin 1 tube 16 to ground.

Code 4. This is similar to Code 3 except that C117 is no longer connected to terminal 1 of T6. It is now grounded.

Code 5. C111, 680 μμf, and C109, 80–480 (A–8E–18508) are now connected in parallel from the junction of C110 and R95 to ground.

Code 6. C116, 0.2 μμf (coil form, A5D–18507) has been added from pin 3 to tube 9–B, the 6SL7 agc amplifier, to pin 5 of tube 18, the 6W4.

Code 7. R48 is no longer connected to the +350–volt line, instead it now goes directly to tap 3 of T6.

Code 8. R98 now goes to the +350–volt line, instead of to tap 3 of T6. C113 is grounded instead of going to the junction of C114 and the +350–volt line. Capacitor C119, 1,000 μμf, has been added from ground to the junction of C118–A and the lead from C114 that goes to tap 3 of T6.

Code 9. The value of R73 is changed from 100,000 ohms to 68,000 ohms.

The following additions have been made to the parts list in Codes 1 through 9:

Parts No.	*Description*
C-12M-18285	Horizontal-deflection transformer
B-55P-18282	Focus magnet
A-19A-14275	Yoke plug
B-15B-14274	Yoke socket
C-2B-18056	Power-supply shield can
A-5B-18446-74	Knob (5 used)
A-6M-18412	Indicator plate.

The deflection–yoke socket is now numbered in the following way: pin 1 is now designated as pin 4, 2 is now 5, 3 is now 1, 4 is now 2.

Code 10. The value of R47 is changed to 68,000 ohms (C–9B1–84), and a switch–on volume–contrast control has been added from R47 to the +250–volt line. R73 is changed to 18,000 ohms (C–9B1–77). R76 is changed to 560,000 ohms (C–9B1–95). R100 has been removed from its position at pin 6 of tube 19 and is now located from the junction of pin 11 of tube 10 and C67 to the tap of R46, brightness control. The value of R100 is 100,000 ohms. R103 is changed to 5,600 ohms, 2 watts (C–9B4–74). R108, 5,600 ohms, 2 watts (C–9B4-74), has been added from C61–D to the +350–volt line. R105 and F–1 have been deleted from the circuit. C118–A is now located from pin 1 of the power–jumper plug to ground; C119 goes from ground to pin 1 of the jumper plug and C114. A ¼–amp fuse has been inserted from pin 6 to pin 1 of the jumper plug.

Code 11. Resistor R107, 3,900 ohms, 2 watts (C–9B4–69) is added from pin 3 of tube 18, the 6W4, to the minus side of C115. The horizontal–deflection transformer T6 has been changed from C–12M–18285 to C–201–18530.

Code 12. Capacitor C120, 7 μf (ceramic, C–8G–11790) has been added in parallel across coil L10.

Code 13. Capacitor C56 has been deleted. R32, contrast control, and R34 are now located as shown in Fig. 1. Additional changes in component location in this circuit are also shown in Fig. 1. The lead from R34 goes to pin 1 of tube 9–B, the agc amplifier. The lead from R37 goes to L16. The lead from pin 1 goes to the junction of C64 and L21. R37 has been relocated, as shown in Fig. 1, and its value is changed from 1,000 ohms to 8,200 ohms. C61–A has been deleted. R35 and C60 have been added. R32, R38, R40, and C63 are changed to 5,000 ohms, 3,300 ohms, 100 ohms, and 22 μμf, respectively. Since the contrast control was moved to a new location after Code 12, the output connection of an oscilloscope or meter will not be connected across the contrast control, but now across resistor R37 (pin 7 of tube 7 to ground).

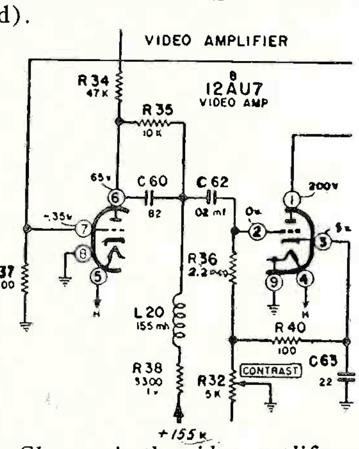


Fig. 1. Changes in the video amplifier circuit of the Belmont 12AX22.

R53 has been deleted and C59 has been added. Additional changes in component location are shown in Fig. 2. The lead from R50 and C59 goes to the agc line. The lead from C71 goes to C116, and the other side of C116 goes to pin 4 of tube 9–A, the 6SL7 sync amplifier. The lead from pin 2 goes to tap 6 (an additional winding which is described below), of T6. C71 is now 1 μμf, and R50 is 2,200 ohms.

R54, which went from R17 to pick–off coil T8, has been deleted. C72 has also been deleted. R99, to tap 5 of T6, has been deleted. T6 has been changed (see parts–list changes listed below), and now has an additional winding which is located between the winding for the filaments on the 1X2 and the winding going to the plate of the 1X2.

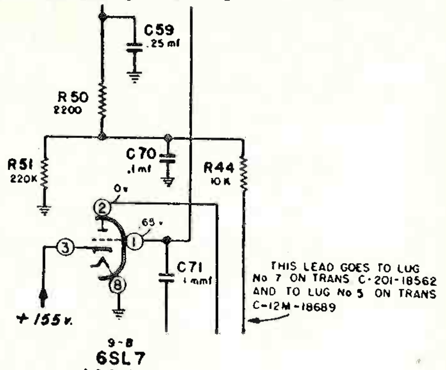


Fig. 2. Changes in the agc circuit of the Belmont 12AX22.

The value of R82 is changed from 1 megohm to 220,000 ohms, and the lead goes to tap 6 of T6, instead of to tap 5. C98 is changed from 75 μμf to 82 μμf. R87 is changed from 1.5 megohms to 680,000 ohms. C110 has been relocated and now goes from R87 to the junction of C112, R96, and R97. The value of C110 is changed from 220 μμf to 22 μμf, 500 volts. R95 has been deleted and the value of C111 is changed from 680 ohms to 820 ohms. Pin 8 of tube 17, the 6BQ6 pulse amplifier, is now tied to pin 2 of the same tube.

The change in parts list is as follows:

Ref. No.	*Part No.*	*Description*
C60	C-8F3-112	82 μμf, mica
C63	C-8F-18569	22 μμf, mica
C70	B-8D-18491	0.1 μf, paper
C71	A-8G-12495-2	1 μμf, ceramic
C98	C-8F3-112	82 μμf, mica
C110	C-8G-11892	22 μμf, 500 volts, ceramic
C111	C-8F6-124	820 μμf, mica
R34	C-9B1-82	47,000 ohms, ½ watt
R35	C-9B1-74	10,000 ohms, ½ watt
R37	C-9B1-73	8,200 ohms, ½ watt
R38	C-9B2-68	3,300 ohms, 1 watt
R40	C-9B1-74	100 ohms, ½ watt
R50	C-9B1-66	2,200 ohms, ½ watt
R82	C-9B1-90	220,000 ohms, ½ watt
R87	C-9B1-96	680,000 ohms, ½ watt
T6	C-201-18562	Horizontal-deflection transformer
	C-12M-18689	Horizontal-deflection transformer, R107 not used with C-12M-18689.

Code 14. R44 is changed from 3.3 megohms to 10,000 ohms, ½ watt (C–9B1–74).

Code 15. The value of R56 is changed from 68 ohms to 120 ohms, ½ watt (C-9B1-51).

Ref. No.	*Part No.*	*Description*
C61	A-8C-18487	30-30 μf x 450 volts, 125 μf x 25 volts
	B-5B-18552-85	Tuning knob (vernier)
	B-2M-18553	Vernier disk
	B-55P-18638	Focus magnet
	A-51A-15713	Iron core, for L4, 8, 9
	A-10B-18794	Vertical size control (screwdriver shaft)
	A-10B-18795	Linearity size control (screwdriver shaft).

In later production, group numbers (chassis identification numbers) were assigned to each set. The production changes made are explained below:

Code 16 or Group Numbers 6,700 to 8,999. Video trap coil L19 was relocated and connected to pin 7 of the 12AU7 video amplifier, tube 8, and L16. Peaking coil L21 (A–16A–17961) was replaced with A–16A–18685 (white dot). The high–voltage capacitor and socket assembly (N–201–18161) was removed and replaced with a wafer tube socket (A–15C–18735), high–voltage ring (A–62C–18734), two insulators (A–5M–18733), and mounting hardware. A 2.2-ohm, ½-watt, wire-wound resistor (C-9C1-1067) or a filament choke (A-16A-18785) was added in series with the 1X2 filament lead as shown in Fig. 3.

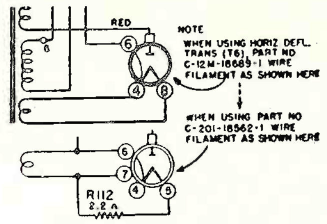


Fig. 3. Wiring for the 1X2 filament lead of the Belmont 12AX22.

Code 17 or Group Numbers 9,000 to 12,399. To reduce "snow" in the pictures, the yellow lead from the tuner (terminal 9) was disconnected from agc and reconnected to ground. To reduce capacitor failures, capacitor C64 is replaced with a 0.01-µf, 600-volt capacitor (C-8D-11128).

Code 18 or Group Numbers 12,400 to 14,199. To reduce horizontal size, the white and black leads to the horizontal-deflection transformer T6, lugs 2 and 3, respectively, were interchanged, black to lug 2 and white to lug 3.

Code 19 or Group Numbers 14,200 and above. Both the C-12M-18689 and C-201-18562 horizontal-deflection transformers were removed and replaced with new transformers. The part numbers are the same with the addition of a dash one (—1). The black and white horizontal-deflection-transformer leads are connected as in Code 17. Resistor R4 is changed to 10,000 ohms. Resistors R8 and R10 are grounded, C33 has been deleted, and the tuner chassis filament wiring has been changed. Pin 4 of the 6AG5 is grounded, pin 3 of the same tube and pin 3 of the 6J6 are tied to tuner terminal 8 and go to H. Pin 4 of the 6J6 is grounded. C30, C31, and C32 have been deleted. C25 has been deleted. The value of R45 is changed to 220,000 ohms (C-9B1-90), and a resistor R110, 220,000 ohms, ½ watt (C-9B1-90) has been added from pin 5 of the 6SL7 sync amplifier, tube 9-A, to ground. R28 is changed to 120 ohms.

To eliminate vertical jitters, R73 is changed to 68,000 ohms (C-9B1-84). R72 is changed to 1.5 megohms (C-9B1-100). C95 is changed to 0.02 µf (C-8D-17607). C106 is changed to 0.1 µf (C-8D-10771). Capacitor C91 is deleted. C90 has been relocated to between R77 and C95, and its value has been changed to 0.005 µf (C-8D-17608). A 27-inch, 300-ohm jumper is connected in parallel between the high- and low-band antenna terminals. The changes applying to C90, C91, C95, C106, R45, R72, and R110 were made to remove horizontal waver and to improve vertical sync. A dual control and switch (A-10A-18441) have been added to the parts list.

Crosley Service Hints

In the 1950 line of television receivers, early production sets are equipped with a 6AK5 for the mixer tube, V2. To replace this tube with a 6CB6 tube, solder lug 7 of the socket to the chassis. Later production sets are equipped with the 6CB6 tube. In these sets the 6AK5 tube may be used as a replacement without making alterations.

Hoffman Service Hints

Symptom: Quivering of the picture due to partial loss of both vertical and horizontal sync pulses has been observed in strong signal areas. This occurs when a strong signal overloads the video i-f amplifiers and a limiting action occurs which clips the sync pulses. *Remedy*: An increase in the agc action, which will produce more agc bias with strong signals, can be accomplished by decreasing the delay bias voltage on the agc diode. This delay bias voltage is derived from the plate, pin 2 of V113A, 2nd sync separator.

Reference to the circuit diagram for Chassis 140, 142, and 146 on *page 3-8,* and for Chassis 143 and 147 on *page 3-9 of Rider's TV-Manual Volume 3,* will show that a 10,000-ohm plate stabilizing resistor, R150, is connected from pin 2 to ground. A smaller diode delay bias can be obtained by effectively tapping down on this resistor.

R150 at present is a 10,000-ohm, ½-watt, 10%, composition resistor. Remove this resistor from the circuit and replace with two 4700-ohm, ½-watt, 10%, composition resistors in series. The junction of the two new resistors provides a centertap for connection of the delay bias lead, a green wire from pin 5 of V110. This green wire is at present connected to pin 2 of V113.

This modification can be made on any Hoffman receiver produced with signal keyed agc and will aid materially in the stabilizing of picture sync in strong signal areas. Factory modification has been accomplished on all sets produced after Serial No. J 921278.

DuMont RA-102 Series

These chassis appear on *pages *1-34 through *1-57 of Rider's TV Manual Volume 1.* Low picture i-f sensitivity will cause the picture level to drop when the sound carrier is properly tuned in. The condition will be most apparent on stations with low signal strength. If this occurs, check the vacuum tubes in i-f chain. Also a defective 1N34 video rectifier or a poor vacuum tube in the inputuner may be the cause.

The following list are given as an aid for servicing RA-102 Telesets:

Indication	*Cause*
No high voltage.	Defective 8016 or 807 in power supply. Defective high-voltage transformer.
Picture has horizontal wobble.	Defective 6AC7 (video amplifier), 807's (horizontal output stage), or 6SN7 (1st sync amplifier).
Notches in picture or raster (moving up and down).	Bad 6AS7.
Picture size varies excessively during evening's operation.	Improperly adjusted high voltage.
Poor definition.	Bad crystal.

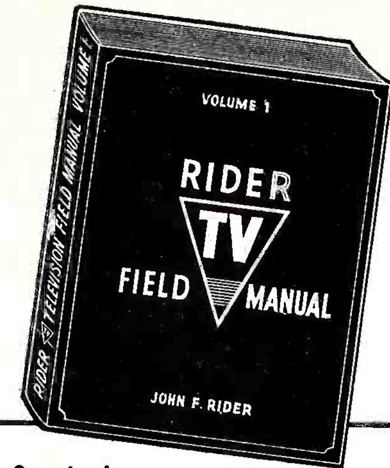
Stromberg-Carlson TC125H, TC125L

These models are similar to Model TC125 which appears on *pages 4-5 through 4-8 of Rider's TV Manual Volume 4.* The differences are given on *page 4-5 of the same volume.*

Radio Merchandise SP-5

TV booster SP-5 is similar to the SP-4 which appears on *pages 4-1 and 4-2 of Rider's TV Manual Volume 4.* In the SP-5, the one pilot light used is a #47 and is connected directly to pin 4 of the 6AK5.

COMING SOON!



In Answer To Requests From The TV Servicing Industry!

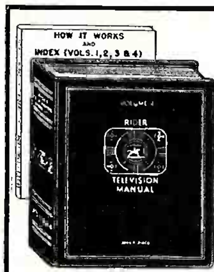
RIDER TV FIELD MANUAL

A New Type of RIDER Manual Designed Specifically For Light TV Servicing in the Home

Here, at last, is the "on the job" servicing Manual that you asked for . . . a companion volume to the regular RIDER TV MANUALS which are intended for shop use. The RIDER TV FIELD MANUAL is accurate, authoritative . . . with information DIRECT from the manufacturers themselves. The coverage includes all production runs . . . not just pilot models.

Everything you need for *light* TV servicing in the home will be found in the RIDER TV FIELD MANUAL. It covers views and functions of tubes, pre-set controls, key-voltage points, crt socket designations, i-f trimmer locations . . . and all the other data needed by the TV man in the field.

TV receiver coverage will be completed up to approximately June, 1950. AND PRICE WILL BE RIGHT. Don't be misled into buying substitutes. Place your order now with your jobber for the RIDER TV FIELD MANUAL.



The Greatest TV Servicing Manual Ever Published!

RIDER TV MANUAL VOLUME 4

Complete coverage from October, 1949 through February, 1950. 494 models. 235 chassis . . . the greatest collection ever assembled in one handy volume. Authentic, Accurate, Factory-Authorized. New, Larger page size, 12" x 15" and all pages filed in place. Giant pages have only one fold for extra convenience and greater durability. Equivalent of 2296 pages (8½ x 11) PLUS Cumulative Index Volumes 1, 2, 3, 4 . . . and "HOW IT WORKS" BOOK. All for only **$21.00**

RIDER TV MANUAL Vol. 3 . . . 74 manufacturers, 441 models, 243 chassis. Page size, 12" x 15". Equivalent of 2032 pages (8½ x 11) PLUS Cumulative Index Volumes 1, 2, and 3 . . . and "HOW IT WORKS" Book. $21.00

RIDER TV MANUAL Vol. 2 . . . Complete coverage to January, 1949. 67 manufacturers. Page size, 12" x 15" (June delivery). Contains all data formerly in 8½ x 11 size, plus Cumulative Index Volumes 1 and 2 . . . and "HOW IT WORKS" Book. $21.00

RIDER TV MANUAL Vol. 1 . . . Coverage up to early 1948. 34 manufacturers. Equivalent of 2000 pages (8½ x 11) Plus Index and "HOW IT WORKS" Book. $18.00

Another Great RIDER Servicing "Must!"

RIDER MANUAL Vol. XX

Do a better, more satisfactory job . . . insure repeat business . . . make a larger net profit. Get RIDER MANUAL Volume XX. Complete coverage up to November, 1949—AM-FM, Radio, Auto Receivers, Record Changers. Products of 74 manufacturers. All pages and double spreads filed in proper positions.

1776 Pages . . . Plus Separate "How It Works" Book, and Cumulative Index, Volumes XVI to XX. ONLY $18.00

RIDER MANUALS

Television Manual Volume 4 (Plus "How It Works" Book and Index) $21.00
Television Manual Volume 3 (Plus "How It Works" Book and Index) $21.00
Television Manual Volume 2 June delivery—in new, larger page size, 12" x 15". (Plus "How It Works" Book and Index) $21.00
Television Manual Volume 1 (Plus "How It Works" Book and Index) $18.00

Volume XX $18.00
Volume XIX $19.80
Volume XVIII $19.80
Volume XVII $16.50
Volume XVI .... $ 8.40
Volume XV $19.80
Volume XIV to VII (each vol.) $16.50
Volume VI $12.50
Abridged Manuals I to V (one volume) $19.80
Master Index, Covering Manuals, Vols. I to XV .... $ 1.50

PA Equipment Manual, Vol. 1.... $18.00

NOTE: Are you receiving your copy of "Successful Servicing"? It's Rider's own publication of interest to every Serviceman. Write for it . . . it's FREE!

NOTE: The Mallory TV Service Encyclopedia, 1st TV Edition, makes reference to only one source of TV receiver schematics—Rider TV Manuals.

NOTE: The Mallory Radio Service Encyclopedia, 6th Edition, makes reference to only one source of radio receiver schematics—Rider Manuals.

NOTE: The C-D Capacitor Manual for Radio Servicing, 1948 Edition No. 4, makes reference to only one source of receiver schematics—Rider Manuals.

JOHN F. RIDER PUBLISHER, Inc., 480 Canal Street, New York 13, N. Y. • Export Agent: Rocke International Corp., 13 East 40th St., N. Y. C., Cable, ARLAB.

RIDER MANUALS *mean* SUCCESSFUL SERVICING

Successful

SERVICING

REG. U.S. PAT. OFF.

Vol. 11 JULY, 1950 No. 9

Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

Published by
JOHN F. RIDER PUBLISHER, INC.

480 Canal Street
New York 13, N. Y.

WOrth 4-8340
WOrth 4-8341

JOHN F. RIDER, Editor

CURTAIN TIME

Up-To-Date Data

Much information of great value is to be found in the manufacturer's descriptions which accompany the receiver service data in Rider Manuals. The same is true about the change notices which are contained in Successful Servicing. We cannot stress too strongly the benefits to be derived from reading this information when a receiver is to be serviced.

Very often circuit modifications are described and the reasons for their use are given. These are important data, inasmuch as the receiver at hand may be one of those released prior to the modification; and modifications contained in the manuals may be the solution to the problems at hand. The same applies to manufacturer's data released each month through Successful Servicing. The manufacturer of the receiver prepares this data for a specific purpose—to inform the service industry of changes and reasons therefore. These data can frequently save hours of time, especially when the fault to be found is an obscure one such as a parasitic oscillation or some condition due to lead dress.

Generally speaking, we cannot emphasize too strongly that all information concerning a receiver should be known to the servicing personnel in a service facility. That is why our publications contain the manufacturer's original information, his changes, his experiences, and his remedies.

Service in the Home

Somehow plans must be made by the servicing industry for increased service of TV receivers in the home. We realize that this is not a simple matter. There are many objections to it, but, not withstanding all of them, solutions must be found so that the amount of activity of this type now carried on will be expanded.

The public are reluctant to give up their receivers for the time required for servicing in a service shop. No matter how anxious a service facility may be to return a receiver with the shortest possible delay, at least several days are usually involved. Whereas more than one radio receiver is available in the home, the majority of families possess only one TV receiver and if it is in a service shop, they miss its presence.

Some of you who read these lines may feel that we make these statements as background for the TV Field Manual we shall publish shortly. Such is not the case. In fact, the reason for the Field Manual is because we realize that TV receivers should be serviced in the home if at all possible. This may require the development of test equipment especially designed for such activity. It is understandable that the present type of test equipment intended for TV servicing does not lend itself to operation in the home. If new equipment of maximum portability is required, the test-equipment industry should develop it. It is apart from equipment intended for the shop so that the worst the test-equipment industry can say about this suggestion is that it will increase their sales. As far as this servicing industry is concerned, it means added expenditure, but this is justified, for its aim must be to serve the public. Test equipment is a capital investment. It is a tool of the trade, and anything which tends to speed up operations and serve the public better, is a means of increasing the financial turn to the industry as well.

John F. Rider

HIWYNI Have It When You Need It

Admiral Ch. 20X1

This chassis appears on *pages 4-38 through 4-62 of Rider's TV Manual Volume 4.* Weak sound may be due to the use of an incorrect type speaker or misalignment of the 4.5-Mc sound i. f.

1. 20X1 chassis imade for combinations models are wired for permanent-magnet type speakers part number 78B52-1 and these chassis may be identified by the letter "C" stamped on the rear of the chassis.

2. 20X1 chassis made for straight TV models are wired for an electro dynamic speaker part number 78B50-1 or 78B51-1 and these chassis are not stamped with letter "C".

If the electrodynamic type speaker is used with a combination model chassis (stamped with the letter "C"), weak sound will result. If a permanent-magnet speaker is used with a chassis wired for an electrodynamic speaker the chassis will be inoperative. Note that the 20Y1 (12-inch) chassis in straight TV models is wired only for an electrodynamic speaker.

Should the sound level be weak in sets with the correct speaker in use, careful realignment of the 4.5 Mc should be made.

Hoffman Service Hints

The following tuner information is given for indentification purposes. RF-1 is manufactured by RCA, RF-2 is manufactured by Sarkes Tarzian, RF-3, RF-4, RF-5, and RF-6, are manufactured by Standard Coil.

Radio Changes

Philco 50-526

Model 50-526 is similar to Models 50-522 and 50-524 which appear on *pages 20-153 through 20-157 of Rider's Manual Volume XX*, except for the following changes. Model 50-526 is housed in a new phenolic-plastic cabinet. The 1-megohm resistor, from the avc circuit, pin 5 of the 14B6 detector to B—, pin 4 of the same tube, that was listed under Modifications on *page 20-155* as R304, is designated now as R305. A 68-ohm resistor, R304, is added in the cathode line of the 12BA6 i-f amplifier. This resistor is connected from pin 7 of the 12BA6 to pin 7 of the 14B6. R301, the grid-return resistor, has been changed in value to 1 megohm.

In Run #2 the tuning gang, C400, has been changed to improve performance, and the new part number is 31-2751.

In Run #3, R301 has been removed to increase sensitivity.

The replacement parts list for Model 50-522 and 50-524 applies to Model 50-526 except for the differences indicated below:

Ref. No.	*Part No.*	*Description*
I100	34-2068	Pilot lamp, 6-8 volt, brown bead
R301	66-5108340	Resistor, grid return, 1 megohm
R304	66-0688340	Resistor, cathode bias, 68 ohms
R305	66-5108340	Resistor, avc load, 1 megohm
Z300	32-4160-6A	Transformer, 1st i-f
Z301	32-4240-2A	Transformer, 2nd i-f
LA400	32-4052-38	Loop aerial
	10769	Cabinet
	54-7911	Back
	40-7778	Baffle-and-cloth ass'y
	54-7761	Baffle, speaker
	76-5157	Dial backplate
	54-5069	Dial scale, glass
	54-4728-1	Grille, plastic
	54-5718-2	Knob (2 required)
	56-5630-14	Pointer
	57-1468FA1	Hairpin fastener, drive shaft
	27-6233-6	Pilot-lamp-socket ass'y
	56-3545-6FA3	Clip, pilot-lamp mtg.
	54-7953	Cover, pilot lamp
	56-7373FA3	Scale strap, l.h.
	56-73731FA3	Scale strap, r.h.

Bendix 75B5, 75M5, 75M8, 75P6, 75W5

These models appear on *pages 20-16 through 20-23 of Rider's Manual Volume XX*. The following changes have been made:

The connection of bypass capacitor C56 has been changed from chassis ground to common B— to eliminate a-c hum modulation. If hum is objectionable on a receiver not using an external antenna, this revised connection is recommended. Capacitor C63, 0.001 μf, is now connected to common B—, instead of to pin 11 of S1B.

To clarify the adjustments in step 4, FM Alignment-CW Meter Method on *page 20-18*, revise it to read as follows:

"Repeat steps 1, 2, and 3 until adjustment in step 1 does not require a readjustment to produce a zero reading on the VTVM in step 3."

The extended length of the spring in the dial cord of 75B5, 75W5, 75M5, and 75M8 has been designated as 1¼ inches minimum, to 1⅜ inches maximum. Revise Fig. 9 on *page 20-21* to show only 2 turns around the lower shaft in lieu of 4 turns originally indicated. The maximum dimensions of 1⅜ inches should also be indicated for spring attached at dial-cord drive wheel.

Westinghouse H-198, Ch. V-2137-2; H-199, Ch. V-2137-1; H-203, Ch. V-2137

Model H-198 appears on *pages 20-1 through 20-4 of Rider's Manual Volume XX*, Model H-199 appears on *pages 20-5 through 20-8 of the same Volume*, and Model H-203 appears on *pages 19-29 through 19-32 of Rider's Manual Volume XIX*.

In later production, a resistor was added and a capacitor deleted in order to minimize effects caused by production variances in the 6AV6 tubes. The resistor, 470,000 ohms, ¼ watt, was inserted in the lead between terminal #2 of the 1st 455-kc i-f transformer and the selector switch. The capacitor that was deleted had been connected between the avc line and ground. This capacitor is shown as C38 on the Model H-198 schematic and as C37 on the Models H-199 and H-203 schematics.

In case of oscillation and poor sensitivity on the f-m band, a check should be made to determine that the capacitor is not present in any chassis in which the resistor has been inserted. If both the resistor and capacitor are present, the capacitor should be removed and the receiver realigned.

RCA 77V2, Ch. RC-606C

This model appears on *pages 19-29 through 19-53 of Rider's Manual Volume XIX*. The top-view diagram of the chassis layout that appears on *page 19-52* illustrates tube V5 as 6K6GT. Tube V5 should be a 6V6GT.

General Electric 124, 135, 136

Model 124 appears on *pages 20-13 through 20-15 of Rider's Manual Volume XX*; Models 135 and 136 appear on *pages 20-16 through 20-18 of the same Volume*.

Where speakers have broken loose from cabinet mountings, or damage occurs when servicing receiver, the speaker can be remounted using screws in place of the original clips where the mounting bosses are broken. It is suggested that all four bosses be reworked to use screws for mounting, since the operation of removing the speaker may result in the breaking of additional bosses. The repair procedure is outlined as follows:

1. Cut off speaker mounting bosses and file flat to the level of the speaker baffle ring.
2. Drill hole 5/16-inch deep in each boss with #42 or 3/32-inch diameter drill.
3. Mount speaker with self-tapping screws #4 x ¼ inch long, Shakeproof Type 25, catalogue number RHS-044.

RCA 9Y7, Ch. RC-1057B

This model appears on *pages 20-21 through 20-23 of Rider's Manual Volume XX*. A 100-ohm, ½-watt resistor, R24, has been added in series with the oscillator coupling capacitor C23, between the capacitor C23 and the oscillator coil L3. This reduces noise caused by parasitics in the oscillator. Add to the replacement parts list: Resistor, fixed composition, 100 ohms, ± 20%, ½ watt, R24.

Physical Forces on TV Antennas

(Continued from page 1)

mum icing conditions is 0.5 inch. This means that the diameter of a 0.5-inch element becomes effectively 1.5 inches, or that the total area subjected to the wind is increased 200 per cent, that is, 300 per cent of the former value. This is shown in Fig. 5, where (A) represents the effective area of a cylindrical surface against which the wind acts, and (B) represents the area of the same element with ice loading.

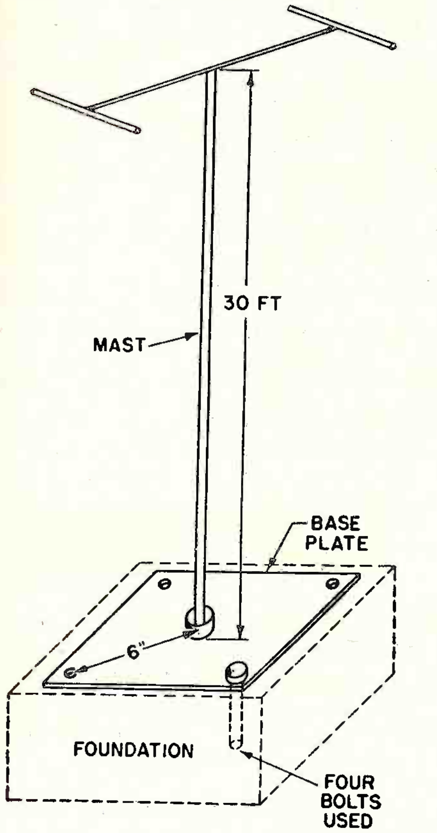


Fig. 2. Thirty-foot tower supported by four bolts fastened to foundation.

Tensile Stress on the Mast

The pressure of the wind against the antenna and the mast produces a moment at the base of the mast which results in compression on one side and tension on the other. This is called a tensile stress and constitutes the basis for determining whether or not a mast will stand up or collapse under a given loading. The ultimate (breaking) tensile strength for 24ST aluminum is 67,000 lbs/sq in. For steel, values between 80,000 and 100,000 lbs/sq in can be obtained. The working strength of good grade steel varies between 18,000 and 26,000 lbs/sq in.

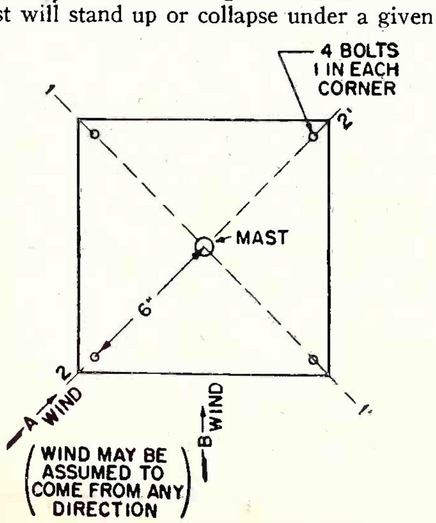
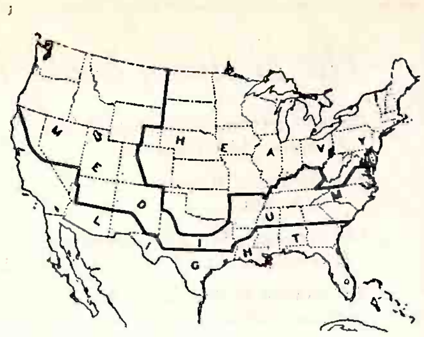


Fig. 3. Effect of wind force on bolts. With wind blowing from direction A, the bolts along the line 2-2' are those bearing the load.



(A)

	Loading district		
	Heavy	Medium	Light
Radial thickness of ice (in.)	0.50	0.25	0
Horizontal wind pressure in pounds per square foot	4	4	9
Temperature (° F)	0	+15	+30
Constant to be added to the resultant in pounds per foot:			
For bare conductors of copper, steel, copper alloy, copper-covered steel, and combinations thereof	0.29	0.19	0.05
For bare conductors of aluminum (with or without steel reinforcement)	.31	.22	.05
For weather-proof and similar covered conductors (all materials)	.31	.22	.05

(B)

Fig. 4. (A) is a map showing the ice-loading areas in the United States. (B) is a wind-loading table for the various areas of the United States.

Let us, as an example, calculate the stresses in an antenna structure with a 30-foot mast of 4-inch hollow steel, substantially anchored at the base. We will assume a wind velocity of 75 mph. To find the pressure exerted by a wind of 75 mph, we use the formula

$$P = 0.004\ V^2$$

where P is the pressure in lbs/sq ft.
V is the velocity of the wind in mph.

For a 75-mph wind, therefore,

$$P = 0.004 \times (75)^2 = 22.5 \text{ lbs/sq ft.}$$

If, for simplicity, we let our antenna have a total exposed area of 1 sq ft, the total wind loading on the antenna is 22.5 lbs. The total moment of the antenna loading taken at the base is

$$22.5 \text{ lbs} \times 30 \text{ ft} = 675 \text{ ft-lbs.}$$

We must add to this the moment due to the wind on the mast area. The wind loading on the mast is

$$22.5 \frac{\text{lbs}}{\text{sq ft}} \times \frac{4 \text{ in.}}{12 \text{ in./ft}} \times 30 \text{ ft} = 225 \text{ lbs}$$

and the moment due to this wind loading (assume the load concentrated at the center of the mast) is

$$225 \text{ lbs} \times \frac{30 \text{ ft}}{2} = 3{,}375 \text{ ft-lbs.}$$

The sum of the moments at the base in in-lbs is, therefore,

$$(675 + 3{,}375) \times 12 = 48{,}600 \text{ in-lbs.}$$

To compute the tensile stress at the base of the mast due to such a moment, we use the formula

$$\text{Stress} = \frac{MC}{I}$$

where M is the total moment around the base, in in-lbs,
C is the radius of the mast, in inches,
I is the moment of inertia of the mast, obtainable from any mechanical engineering handbook, taken around an axis perpendicular to the mast at the base, in inches[4]. For the dimensions of this particular mast, $I = 4.65$. The stress for this mast, then, is

$$\frac{48{,}600 \times 2}{4.65} = 20{,}900 \text{ lbs/sq in.}$$

It is evident that a grade of steel somewhat better than average must be used, that is, with a working strength of between 20,000 and 25,000 lbs/sq in.

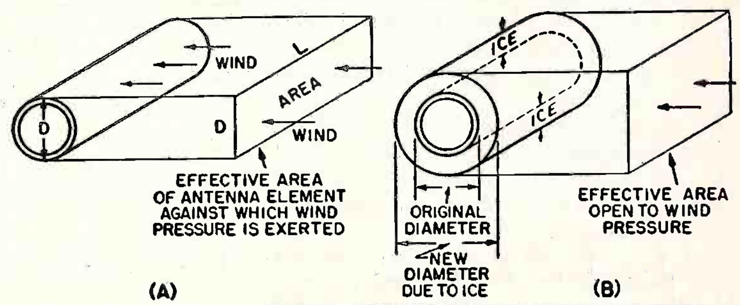


Fig. 5. Effect of ice loading in increasing area of element against which wind is directed.

Television Changes

Industrial Television Ch. IT-21R

This Chassis appears on *pages 4-1 through 4-6 of Rider's TV Manual Volume 4.* The following is recommended in all cases where trouble is experienced with hum or buzz in audio, and will eliminate such trouble and improve the quality of sound and picture:

1. Disconnect primary of T1 from plate circuit of V9.
2. Connect L17 direct to pin 8 of V9.
3. Remove jumper from pin 6, V9 and junction of R51-52 and R53.
4. Connect terminal of T1 which previously was connected to pin 8, to pin 6 of V9.
5. Connect terminal of T1 which previously connected to L17 to junction of R51-52 and R53.
6. Connect 20,000-ohm-per-volt meter across C51, and with meter on 10-volt range, antenna in local plug, and signal tuned in, readjust the top and bottom slugs of T1 for maximum voltage across C51.

Hoffman 820, 821, 822, Ch. 146

These models appear on *pages 3-1 through 3-19 of Rider's TV Manual Volume 3.* Natural springiness of the backboard on Models 820, 821 and 822 tends to pull the power plug from the interlock socket even when all parts are in their normal positions. To prevent the plug from unintentionally being removed from the socket, sets manufactured after Serial No. E 906729 will have a redesigned power-plug mounting.

On sets of prior manufacture, the problem can be satisfactorily solved by putting an additional wood screw, #6-1" length through the backboard and into the wood chassis shelf at a point below the power plug. This additional screw will spring the backboard in, and hold the power plug firmly in place.

Stromberg-Carlson TC and TS Series

Following are the part numbers ot the movable iron cores and the respective coils used in the tuning assembly on TS and TC receivers:

Low-band oscillator	Core no. 118039 with coil no. 114065
Hi-band oscillator	Core no. 118030 with coil no. 114066
Low-band converter	Core no. 118029 with coil no. 114065
Hi-band converter	Core no. 118035 with coil no. 114066
Low-band r.f.	Core no. 118029 with coil no. 114065
Hi-band r.f.	Core no. 118035 with coil no. 114066.

Note: The glass coil forms are color coded (red, blue, and yellow) to indicate the range of diameter size.

In model TC receivers, to assure maximum sensitivity of the high-band section of the television tuner in TC receivers, a 6BC5 tube (part no. 110675) is being used, in place of the 6AG5 tube in the r-f amplifier position. The circuit remains unchanged.

INDEX

Free Evening Courses

Trade extension classes in Radio, Industrial Electronics, and Television, are being offered next fall by New York City Board of Education. These free evening courses are designed to supplement daytime employment so that only those applicants employed in these fields, or closely allied fields, will be accepted. These courses are offered at the following schools:

Elementary and Advanced Radio Work
- Brooklyn Evening Technical Trade School (Brooklyn Technical High School)
- Queens Evening Trade School (Queens Vocational High School)
- Samuel Gompers Vocational and Technical High School

Elementary and Advanced Industrial Electronics
- Brooklyn Evening Technical Trade School
- Samuel Gompers Vocational and Technical High School
- Textile Evening Trade School

Television
- Brooklyn Evening Technical Trade School.

Registration will be held at the aforementioned schools, September 13 and 14, 1950, 7:00 to 8:45 P.M.

Erratum

The Rider ad on page 3 in the June issue of SUCCESSFUL SERVICING listed "TV Installation Techniques" as having approximately 500 pages. The number of pages should have been listed as Approximately 300 Pages.

From
JOHN F. RIDER PUBLISHER, Inc.
480 CANAL ST., NEW YORK 13, N. Y.
Return Postage Guaranteed

A. J. S. CERINO
2393 PITKIN AVE.
BROOKLYN 8, N. Y.

Sec. 34.66, P. L. & R.
U. S. POSTAGE
PAID
NEW YORK, N. Y.
PERMIT No. 9427

Distribution of This Issue—55,000 Copies

Successful
SERVICING

AUGUST, 1950

A-C AND D-C AMPLIFIERS IN OSCILLOSCOPES

By JOHN F. RIDER

Courtesy United Air Lines

> Editor's note; This material is an excerpt from the chapter on The Basic Oscilloscope and Its Modifications as found in the ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES (formerly "The Cathode-Ray Tube at Work"), a forthcoming book which has been written by Rider and Uslan and will soon be published by John F. Rider Publisher, Inc.

The circuits used for the vertical-deflection amplifiers may be the same in different kinds of oscilloscopes, and may differ quite substantially, even among the basic varieties of devices. Many instruments make use of resistance-capacitance of *R-C* coupled systems, others employ direct coupling, but the manner in which the circuit elements are treated, the number of tubes used per stage, the use of single-ended and push-pull stages, the varied forms of phase inversion, and finally, the varied degrees of frequency compensation, represent the differences between oscilloscopes of different categories, functional capabilities, and certainly price class.

A-C and D-C Amplifiers

Two fundamental varieties of circuits are used for interstage coupling between tubes in vertical amplifiers. These are the *R-C* system previously mentioned, which is also known as the *R-C* coupled amplifier, and the direct-coupled amplifier, which is frequently called the d-c amplifier. The first of these is shown in simplified form in Fig. 1.

In the *R-C* coupled system of Fig. 1, three important circuit elements must be taken into account. These are the plate-load resistance *R1*, the coupling capacitor *C* (sometimes known as the blocking capacitor), and the grid-leak resistance *R2*. In view of the location of *C*, the grid of *V2* is isolated from the d-c plate voltage of *V1*. In this respect, it is a blocking capacitor. Let us now examine how a signal is transferred from *V1* to *V2*.

Assuming a quiescent condition in both tubes, that is, no signal, the effective voltage at the plate of *V1* is steady and of a value equal to the B+ voltage minus the drop across *R1* due to the current I_b which is present in the plate circuit. If we can imagine an uncharged capacitor *C* in series with resistor *R2* being placed into the circuit as shown in Fig. 1 a charging current i_c will flow through *R1-C-R2* until *C* becomes charged to a voltage corresponding to the plate voltage of *V1*. This is momentary action but during the time the charge in *C* is changing, the charging current through *R2* will produce a voltage drop i_c *R2* which will be applied to the grid-cathode circuit of *V2* as a momentary signal. Its value, direction, and duration will depend on those of i_c.

When capacitor *C* becomes charged to a value corresponding to the original charging voltage, movement of charges through the *R1-C-R2* circuit ceases. The voltage drop across *R2* disappears, all variables in the circuit have become constant, and the grid in *V2* experiences no effects from the previous momentary signal voltage; the potential of that grid becomes whatever is dictated by the grid bias applied to that tube, just as if there had been no movement of charges in *R1-C-R2*.

Let us now apply a signal to the control grid of *V1* so that a change takes place in the plate current of that tube. This will change the voltage drop across *R1*, which element is fixed in ohmic value. Since the voltage drop across this resistor determined the original charging voltage for capacitor *C*, a change in this voltage will result in a new charging current, that amount necessary to make the voltage across *C* equal to the new value of plate voltage or charging voltage.

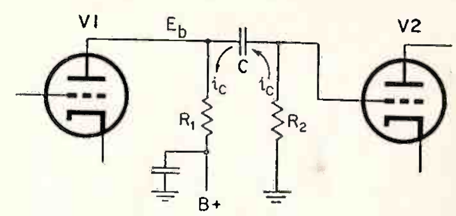


Fig. 1. Simplified schematic of R-C coupled amplifiers.

The path of this charging current is through *R1-C-R2*, consequently, a momentary voltage (signal) will again appear across *R2*, which is the same as saying that it will appear across the grid-cathode circuit of *V2*. The magnitude of this signal input to *V2* is determined by the value of i_b, or the momentary change in plate voltage of *V1*, and while it lasts, it changes the potential of the *V2* grid relative to its cathode so that a signal has again been transferred from the grid of *V1* to the grid of *V2*.

Now the interesting aspect of this action is that a signal appears across *R2* only during changes in the plate voltage of *V1*. We can restate this by saying that changing plate

(Continued on page 6)

Television Changes

Stromberg-Carlson TC125 Series

The following modifications have been made to improve the apparent resolution of these instruments:

1. Resistor R14 changed from 56,000 ohms to 680,000 ohms (part no. 149118).
2. Resistor R73, 22,000 ohms (part no. 27407) has been added across the secondary of the video detector transformer.
3. Capacitor C36 has been changed from 0.01 μf to 0.047 μf (part no. 110544).

A 0.0022-μf capacitor (part no. 110536) has been shunted across C30, the 0.0047-μf capacitor, when the R57B potentiometer in the vertical oscillator is part no. 145078. When a 2-megohm potentiometer (part no. 145101) is used, this shunt capacitor is not used.

The 80-μf capacitors (part no. 111067) in the B-plus power supply, and the 2-μf capacitor (part no. 110675) in C7 position in the agc line are now being supported in position by a center mounting strap. Other heavy tubular-type capacitors are being dressed in such a manner as to prevent transit breakage of the capacitor leads.

To obtain sufficient vertical size under low-line voltage conditions, the value of R52 (vertical-oscillator charging resistor) may be changed from 1.8 megohms and 2.2 megohms to 1.5 megohms. This applies to TC125 receivers not having the opera glass feature.

Gamble-Skogmo "Preview," 05TV1-43-9002A

The "Preview" model 05TV1-43-9002A is electrically identical to Model 94TV1-43-8940A. The 05TV1-43-9002A replacement parts list is identical to the 94TV1-43-8940A except for cabinet parts which are listed below:

Part No.	*Description*
R-24D-18709	Cabinet
C-2M-18191	Escutcheon
C-2M-18187	Escutcheon mask
B-30M-18201	Picture glass
B-2M-17067-1	Channel indicator plate
B-2M-17068-1	Contrast off-volume plate
B-5B-18552-76	Tuning knob
B3B-18555	Tuning knob bushing
A-2M-18558	Tuning knob spring
A-6M-17803	Indicator, tuning knob
B-5B-17761-76	Knob, volume
B-5B-17762-76	Knob, contrast
B-5B-18244-76	Knob, 3 used
B-2M-18553	Vernier arm
B-3B-18554	Vernier bushing
A-3C-18551	Vernier stud
A-2M-18557	Vernier spring
C-23J-18722	Cabinet back
B-14M-17758	Line cord and plugs
C-18A-18157	10" p-m speaker
N-201-8386	TV Antenna assembly
B-5B-18382-36	Antenna knob.

Motorola VT73, VT73A, Ch. TS-4J

Model VT-73 is a portable television receiver which uses chassis TS-4J and is similar to Model VT-71. Model VT-73A is the same as VT-73 except that a fiber-board back cover is used in the VT-73A, while the VT-73 has a metal back cover. The late version TS-4J is the same as the early one except for the following changes:

The value of radio-frequency choke L-34 is 2 μh. Coils L-81 and L-82 have been substituted for L-29 and L-35, respectively. A 10-megohm resistor, R-158, has been added from pin 3 of the 12AT7 converter, V-17A, to tap 2 of T-1. In the video amplifier stage, R-137, R-146, L-58, and L-59 have been deleted and the changes in the schematic are shown in Fig. 1.

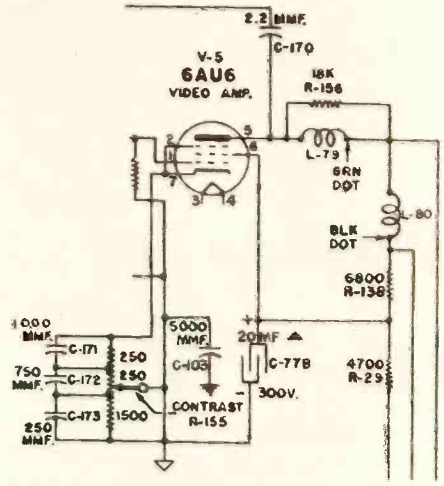


Fig. 1. Circuit changes in the video amplifier stage of Motorola VT73, VT73A,

Ballast tube R-159 has been substituted for R-80. Resistor E has been deleted, and resistors A, B, and D are now connected to pin 6, instead of to 5. The values of the resistors have not been changed.

An 8,200-ohm resistor, R-153, has been substituted for R-134, 10,000 ohms, which was connected from pin 2 of T-8 to the horizontal-hold control. The horizontal-hold control has been changed from R-49, 20,000 ohms, to R-154, 10,000 ohms. Resistor R-132, 220,000 ohms, that goes from pin 1 of the horizontal-sweep oscillator to T-10, has been deleted. Capacitor C-137 is now connected to the high side of R-55, the horizontal-size control, instead of to the brown lead from T-10. Additional circuit changes are shown in Fig. 2.

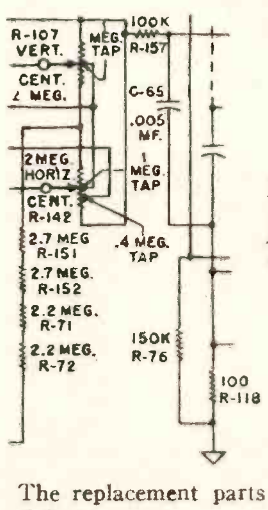


Fig. 2. Circuit changes in the Motorola VT73, VT73A, Ch. TS-4J.

The replacement parts list supplement is as follows:

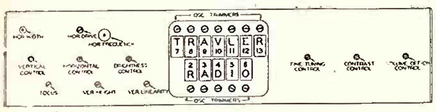
Ref. No.	*Part No.*	*Description*
C-171	21K780599	Capacitor, ceramic, 1,000 $\mu\mu f$
C-172	21K780598	Capacitor, ceramic, 750 $\mu\mu f$
C-173	21K77375	Capacitor, ceramic, 250 $\mu\mu f$, 20%, 500 v
L-79	24A780602	Video compensating coil, wound on 18,000-ohm resistor
L-80	24A780601	Video compensating coil
L-81	24A780142	R-f coil, channels #12 & 13, less form & core
L-82	24A90197	1st i-f plate coil, less core

Note: All resistors are insulated carbon type unless specified otherwise.

Ref. No.	*Part No.*	*Description*
R-148	6R488252	Resistor, 22 megohms, 10% 1 w
R-153	6R5610	Resistor, 8,200 ohms, 10%, 1 w
R-154	18A780098	Resistor, horizontal-hold control, 10,000 ohms
R-155	18A780359	Resistor, contrast control, 2,000 ohms, tapped
R-156	6R5591	Resistor, 18,000 ohms, 10%, ½ w
R-157	6R6031	Resistor, 100,000 ohms, 10%, ½ w
R-158	6R2109	Resistor, 10 megohms, 20%, ½ w
R-159A, B, C, D	17A485459	Ballast tube
	1X780538	Back cover, bumper & line cord ass'y, metal (VT-73 only)
	1X79494	Back cover & line cord ass'y, fiber board (VT-73A only)
	35A790097	Bumper, rubber & bushing, 1-3/32" x ⅜" (cabinet bottom feet)
	37K790006	Bumper, rubber recess, 1" x ⅜" (back screen)
	35A780453	Bumper, rubber recess, ⅜" x ½", (cabinet back feet)
	38K780468	Button, plug, polished brass
	38K790403	Button, strap, polished brass
	30K780512	Cable, antenna, 20", 300-ohm line with spade lugs on one end
	16F780450	Cabinet, portable, leatherette covered
	3K790197	Catch assembly, polished brass (cover latch)
	42A780491	Clamp, line cord, brass plated (back cover VT-73A)
	5A780439	Eyelet, cabinet, brass (vents on sides of cabinet)
	5S3124	Eyelet, 0.187 x 0.252, brass (back cover VT-73)
	5S3139	Eyelet, 0.202 x 0.475, brass (back cover VT-73A)
	32C471295	Gasket, rubber (picture tube)
	36K790199	Handle, cabinet, complete with posts
	55K790401	Hinge, "come-apart" type, complete, polished brass
	14A482129	Insulator, fiber (on cabinet back VT-73 only)
	9A780457	Jack, antenna plug
	29A790117	Lug, spade (on antenna jack leads)
	2A780465	Nut, knurled, bright dip finish (ant jack)
	35A780119	Pad, tube neck
	64A780440	Plate, jack mtg, cad pl
	5K790196	Rivet, bi-furcated, ½" long, polished brass (hinges & catches)
	5A470755	Rivet, shoulder, ⅜" long, (line cord mtg, VT-73)
	5K790482	Rivet, shoulder, ½" long (line cord mtg VT-73A)
	5S7721	Rivet, 0.122 x ¼, brass (line cord clamp mtg VT-73A)
	3S7362	Screw, machine, 6-32 x ½ slotted binderhead, cad pl
	3S7258	Screw, machine, 8-32 x ½ slotted binderhead, cad pl (line cord clamp mtg)
	3S6943	Screw, machine, 8-32 x 1¼ slotted round head, blk nkl (bumper on back cover)
	3K780454	Screw, machine, 8-32 x 1½, (spkr & picture tube mtg)
	3S490333	Screw, sheet metal, #4 x ⅜ PKA slotted acorn head, statuary bronze finish (back mtg)
	3S7453	Screw, sheet metal, #8 x 1 PKZ plain hex head (chassis mtg, 1 used)
	3S7534	Screw, sheet metal, #8 x 1⅜ PKA plain hex head (chassis mtg, 3 used)
	3S7455	Screw, wood, #8 x ⅜ slotted acorn head, antique copper finish
	26K780497	Shield, chassis bottom
	9K790405	Socket, strap, brass
	46K790404	Stud, strap, brass
	4K790402	Washer, finishing, brass (antenna holding strap)
	4S7557	Washer, flat, ⅜ x 11/64 x 0.033 std, cad pl
	4S1745	Washer, flat, 7/16 x 0.203 x 0.030, antique copper finish
	4S488317	Washer, flat, ⅜ x 0.390 x 0.020, bright brass finish (ant jack)
	4A780458	Washer, insulating (ant jack)
	4A482130	Washer, shoulder, fiber (back cover).

Trav-ler 10T, 12T

Resistor R8, 10,000 ohms, has been removed from the plate circuit of VT2. Capacitor C103, 10 $\mu\mu$f, and L16B have been added from the plate of the picture tube to grid 1 of the same tube. Resistor R102, 22,000 ohms, has been inserted from grid 1 to the plate of VT11. C102, 0.05 μf has been inserted from grid 1 to the junction of R73 and the vertical output transformer. The accompanying diagram shows the placement of the front panel controls.



Front panel controls for Trav-ler 10T and 12T.

Hoffman CT800, CT801, CT802, CT900, CT901, Ch. 135

The following trouble symptoms and their probable causes also apply to Model CT902, Ch. 141, and Models CT816, CT817, Ch. 145.

Trouble	*Cause*
A. No raster, Sound o.k.	1. Fuse blown. (Usually caused by shortened V126 or shorting T109.) 2. Shorted or open V126. 3. Open V127. 4. Open or shorted V120B. 5. Shorted C176. 6. Shorted C187. 7. Open or intermittent R235. (Causes picture to bloom when defective.) 8. Defective picture tube. 9. Shorted V128. 10. T109 open or shorted. 11. Check leads going to V126 and V127 in h-v cage to see that they are not touching each other or not arcing to metal cage. 12. Defective V125. 13. Open R199 or R200. 14. Check high-voltage lead going to picture tube. (Voice coil open.)
B. No sound, weak or distorted sound. Picture o.k.	1. Defective or open V104, V105, V106, V107, V108, or V109. 2. Defective speaker. Voice coil open.) 3. Defective T114. 4. Open C206. 5. Defective C208 or C209.
C. A film-like distortion on left side of picture as contrast turned up.	Usually one turn of primary sync lock transformer will phase correctly. This adjustment of sync transformer is under chassis.
D. Picture unstable horizontally.	1. Defective V124. 2. R200 changed value. 3. Open C170—gives sawtooth effect throughout picture. 4. Weak V123. 5. R188 changed value. 6. Arcing under V126. 7. T108 frequency off. 8. Defective C169 and C171. 9. Defective C144. 10. Defective V118-V119. (Usually causes picture to travel sideways.)
E. No picture. Raster o.k. Sound o.k.	1. Shorted C116, C123, C128, C134, C138, or C140. 2. Open L187, L190, or L192. 3. Defective V110, V111, V112, V113, V114, V115, or V116. 4. R127, R134, or R140. If any of these resistors burned, check for cause.
F. Hum.	1. If hum is caused by head end use 5,000-ohm resistor from test loop to ground. 2. V108 for bad contact. 3. 6J6 oscillator. 4. V107, V108, V109. 5. C208 leaky. 6. 6J6 oscillator may induce a slow starting motor-boating effect and increase rapidly until maximum is reached, then become normal.
G. Vertical sync.	1. Defective R171, R166, R167. 2. Defective V121. 3. Defective C151, C152, C153. 4. R162, R163, R164, R165 off value. 5. C149 open.
H. Noisy or chattering sound.	1. Be sure tubes are tight. 2. Check tightness of T111, T112, and T113. 3. Check contact of r-f tubes to head-end sockets. 4. V108, V109 intermittent. 5. Breaking down of C208 and C209. 6. Control shafts rubbing against front metal plate.
I. Hum in picture.	1. Shorted V116 or V114. 2. Loose grid connections on V110, V111, V112, V113. 3. Faulty C224, C223.
J. Insufficient width.	1. Weak V126. Also causes fold over of picture. 2. T109 defective. 3. Open C180. 4. If all above is o.k. then proceed as follows: a. Add 0.05-400v across terminals 5 and 6 of T109. b. Open width coil at terminal 5. This removes shunting effect of width coil.
K. Insufficient height.	1. Leaky C157 and C158. 2. R177 changes value. 3. Weak V122. 4. If vertical linear circuit is normal, parallel R177 with like value for more height.
L. Picture blooms and goes out.	1. R235 intermittent. 2. 1B3 defective. 3. Check high-voltage through following parts: V126, T109, V120, R204.
M. Sound in picture after adjustments made on cathode trap and converter coil.	1. Microphonic V124. 2. V119, V118, V121, V122. 3. Microphonic tubes in r-f unit. 4. Microphonic tubes in picture circuit.
N. Horizontal white line. No picture.	1. Defective V121, V122. 2. If both tubes o.k., check connections under same tubes.
O. Horizontal white line through picture. Also in raster.	1. Irregular characteristic of V122; replace. 2. Replace V121.
P. Horizontal white line accompanied by white flashes.	1. Intermittent V126. 2. Also causes small sawtooth noticeable on black border of pattern.
Q. Dark vertical lines left side of picture on high channels.	1. Replace 6BG6, V126. Lines caused by transients at start of sweep.

RIDER TV MANUALS VOLUMES 1, 2, 3, 4.

Belmont 10-, 12-, and 16-inch Chassis

The permanent-magnet focus assembly used in these chassis are essentially magnets within an assembly so designed as to provide a flexible means for adjusting focus and centering on the face of the picture tube. A screwdriver of a nonmagnetic material should be used to adjust the focus and centering controls, since a magnetic material will increase the flux density of the assembly and a correct adjustment cannot be obtained. The B-55P-18445 focus-magnet assembly used in the 12- and 16-inch receivers has a focus adjusting screw missing. The adjusting screw was deleted to allow proper focus and centering. The 12-inch focus magnet assemblies are coded with a splash of red paint either on the assembly or on the threads. The 16-inch assemblies are not coded.

Admiral Ch. 20A1, 20B1, 21A1

R-f oscillation on the a-m band of 4J1 and 4K1 radio tuners usually may be corrected by replacing the a-m peaking coil. The early peaking coil is coded with a blue dot and the new type peaking coil (part no. 73A5-10) is coded with a black dot.

If oscillations are present when the new type peaking coil is used, it is possible that the trouble is caused by the first a-m i-f transformer T604. In some instances the silver mica capacitors in T604 have become open causing the converter to oscillate. The replacement of transformer T604 (part no. 72B92) will cure the trouble.

Under the heading "Tunable Audio Hum," the resistor mentioned should be 22,000 ohms instead of 2,200 ohms.

Television Changes

Stromberg-Carlson TC10, TC125 Series

The series capacitors C90 and C91 in the low-band coupling network have been changed from 4.2 $\mu\mu$f to 4.5 $\mu\mu$f (part no. 110668).

Capacitor C43 in the horizontal-sweep output stage has been changed from 0.22 μf, 400 volts, to 5 μf, 50 volts (part no. 111030).

Resistor R59 has been changed from 22,000 ohms, ½ watt in TC10 and from 22,000 ohms, 1 watt in TC125, to 22,000 ohms, 2 watts. The required dissipation of about 1 watt was too great for the half-watt value.

A bent metal shield has been added to cover the underside of the first audio-amplifier tube socket to prevent extraneous audio pickup. This shield is designated part number 151104, and mounts with a PK screw which is already in use at that point.

Light vertical fold lines in the picture can usually be corrected by slight readjustment of the horizontal-size-control trimmer capacitor. This capacitor is located in the grid circuit of the 6BG6 horizontal sweep output tubes and bears the symbol of C40. The adjustment is accessible from the underside of the chassis.

To obtain a greater range of contrast, the 750-ohm potentiometer (part no. 145085) has been changed to a 3,000-ohm potentiometer (part no. 145105) in the R19A position. The 3,000-ohm potentiometer will be substituted on all replacement orders in a package assembly, number 81539, which also includes a 47-$\mu\mu$f capacitor (part no. 110597) and instructions for making the change.

Successful
SERVICING
REG. U.S. PAT. OFF.

Vol. 11 **AUGUST, 1950** **No. 10**

Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

Published by
JOHN F. RIDER PUBLISHER, INC.

480 Canal Street **WOrth 4-8340**
New York 13, N. Y. **WOrth 4-8341**

JOHN F. RIDER, Editor

CURTAIN TIME

The administration states that vital things which people eat and those things which they wear are in adequate supply and that panic buying is unjustified. Fine, and we hope that it will remain so. However, the status of the supply of radio and television components is not as rosy: resistors, tubes, and capacitors are short. The likelihood of increasing production facilities in the immediate future is very doubtful, whereas the likelihood of equipment demands for military requirements is a certainty. Which will be met — civilian needs or military needs? Naturally, the latter; and if the statements of the President of the United States are to be taken at face value, we are developing a program which will be in effect for years.

As things stand today, the demands of the Armed Forces for communication equipment are not yet so severe as to require the shutting down of TV and radio production lines. The orders met so far do not even remotely approach the dollar volume of the industry producing for civilian needs. The shortage of components introduces a vital item of control in deciding which kind of equipment will be produced using the parts which are available. If parts were in adequate supply, then both TV, radio, and Armed Forces communication equipment could be produced for quite a length of time in the present plants, at least up to the point where the military needs rose to very substantial amounts. But with a relatively limited supply of components and the severe demands which TV receiver production makes upon the supply, the line must of necessity be drawn somewhere so as to meet the military needs. A circuit element cannot be used in two places at the same time.

We hope we are wrong; however, we do not think it will be too long before we shall have an accelerated demand for communication equipment. In making these statements, we have not presupposed more "wars" in places other than Korea; but, we remember that 85,000 tons of equipment were necessary for each division in combat. If these "policing" actions break out anywhere else, it's going to be all-out, fast. The nation does not want war, but we must be ready for it—if it comes.

It is almost a certainty that TV and radio receiver production will be reduced during the winter to come. How much? That's anybody's guess. Personally, we think that it will be appreciable. This means that servicing of home radio and TV equipment will feel an upsurge. Even today more old radio receivers are in use than there were three months ago. Some of the old units which have not seen service for quote some time are again doing duty, and as time passes, more of them will be resurrected. These will need service.

The demands on the servicing industry will be more severe in the future. Personnel will be lost to manufacturing plants and to the Armed Forces. The students attending radio and TV schools may, and then again may not, reach the ranks of the television servicing industry. The likelihood is the latter for many of these stuents. Those men who were thinking about leaving the servicing industry for other activities should stay put. Their services will be badly needed. Perhaps we sound pessimistic. We cannot help but see a pattern which looks like one we saw before.

JOHN F. RIDER

Cover

The photograph on the cover shows a technician at United Air Lines' maintenance base in San Francisco using an artificial "ear" and "voice" for fast, accurate testing of headsets and mikes. The resultant wave patterns are checked against the pattern of a perfect instrument painted on an oscillograph tube. A mike, for example, is clamped against the "voice" and fed by an audio-oscillator. The tones picked up from the mike are transformed into a tracer on the oscillograph tube for comparison with the perfect pattern.

Hallicrafters T-54, 505, Run #2

Run #2 is similar to Run #1 except for the following changes:

Tube V3, the audio amplifier has been changed for a 6SH7 to a 6AV6; and R22, 680,000 ohms, and C24, 0.05 μf, that were connected to pin 6 of the 6SH7 have been deleted. The tap from the volume control goes to pin 1 of the 6AV6. R20 goes from ground to the cathode, and R21 goes from the cathode to the 110-volt bus. The value of R23 has been changed from 100,000 ohms to 470,000 ohms. Capacitor C98, 10 μf has been added in parallel across cathode resistor (V4) R25.

Tubes 1, 7, 8, 9, 11, have been changed from type 6SH7 to type 6AU6. R33, connected to pin 1 of V7, has been changed from 27,000 ohms to 18,000 ohms. R39, connected to pin 1 of V8, has been changed from 27,000 ohms to 12,000 ohms. R40, connected to pin 1 of V9 has been changed from 27,000 ohms to 18,000 ohms. L24 has been deleted from the 3rd i-f circuit and R117, 6,800 ohms, substituted in its place, from pin 5 to pin 6 of V9. The value of C52, connected from pin 1 of V12 to pin 5 of VII, has been changed from 0.25 μf to 0.1 μf. The value of C17, connected from pin 3 of V12 to pin 2 of V13, has been changed from 0.25 μf to 0.1 μf.

R55 in the cathode circuit of the picture tube V13, has been changed from 150,000 ohms to 470,000 ohms. R11, 5,600 ohms, connected from ground to the brightness control R56, has been deleted. R56 now goes directly to ground.

R116, 6,800 ohms, in the circuit of V14 and in parallel with R58, has been deleted. The value of R58 has been changed from 6,800 ohms to 3,300 ohms. The value of R83, connected from pin 4 of V18 to the vertical hold, has been changed from 680,000 ohms to 560,000 ohms. The values of C73 and C74, connected to pins 2 and 5, respectively, of V20, have been changed from 0.05 μf to 0.03 μf. The value of R108, connected from pin 3 to pin 4 of V12, has been changed from 68 ohms to 120 ohms.

The following changes in the parts list for Run #1 should be made for Run #2:

Halli-crafters Ref. No.	*Part No.*	*Description*
C17,52	46AU104J	0.1 μf, 200 v, tubular
C73,74	46B149	0.03 μf, 6000 v, tubular
C98	45A121	10 μf, 25 v, electroytic
R39	RC20AE123K	12,000 ohms ½ w, carbon
R23,55	RC20AE474M	470,000 ohms ½ w, carbon
R33,40	RC20AE183K	18,000 ohms ½ w, carbon
R83	RC20AE564M	560,000 ohms ½ w, carbon
R117	RC20AE682M	6,800 ohms ½ w, carbon
R58	24BG332E	3,300 ohms 10 w, ww
R108	RC40AE121M	120 ohms 2 w, carbon
V1,7,8, 9, 11	90X6AU6	Type 6AU6, audio i-f; 1st, 2nd and 3rd i-f amp; video amp
V3	90X6AV6	Type 6AV6, audio amp.

A-C and D-C Amplifiers in Oscilloscopes

(Continued from page 1)

current through *R1* causes a changing value of charging voltage to be active relative to the circuit of *CR2*. During these times the grid of *V2* is likewise changing in potential relative to its cathode in conformance with the changes in the voltage i_c *R2* and the capacitor *C* is behaving like a coupling capacitor.

The direction of the charging current through *R1-R2* and into and out of *C* depends on the polarity of the changes on plate voltage of *V1*, and determines whether the potential of the *V2* grid will momentarily rise or fall (will become less negative or more negative) relative to its static, no-signal value as determined by the applied grid bias. The instant that changing current ceases to flow into or out of *C*, therefore, through *R2*, the potential of the *V2* grid returns to its original no-signal value just as if nothing had happened previously. This is illustrated in Fig. 2A and B.

Therein are shown the conditions at the grid of *V2* with steady plate voltage on *V1* and a grid bias of —4 volts on the grid of *V2*, and change in grid potential at *V2* when the plate voltage of *V1* is varying as a sine wave, increasing and decreasing around the steady no-signal value.

It is evident that when the plate voltage of *V1* is constant, the no-signal condition prevails at *V2*. Also that each time the plate voltage of *V1* returns to its no-signal steady value which corresponds to zero change, the grid potential of *V2* returns to its steady no-signal bias value. In between, the grid of *V2* goes more negative and less negative according to the value and polarity of i_c *R2* with respect to the fixed bias of —4 volts.

Let us now imagine a change in bias on *V1* so that the value of plate voltage changes from E_{b1} to a new value E_{b2} and remains constant at the new value for a while, and then, the bias is restored to its original level which naturally returns the plate voltage to its original value E_{b1}. This action of the plate voltage is shown in Fig. 2C. Visibly, the change in grid bias is unidirectional since the change in plate voltage likewise is unidirectional.

What happens in the coupling system *R1-C-R2* and at the grid of *V2*? Let us examine Fig. 2D, as well as C. During the no-signal condition in *V1*, the plate voltage is steady and the grid of *V2* is at the bias potential of —4 volts. Then there occurs a sudden change in plate voltage at *V1*, which means:

1. A new value of charging voltage.
2. A sudden rush of charging current through *R1-C-R2* in the attempt to change the potential of *C* to conform with the new charging voltage.

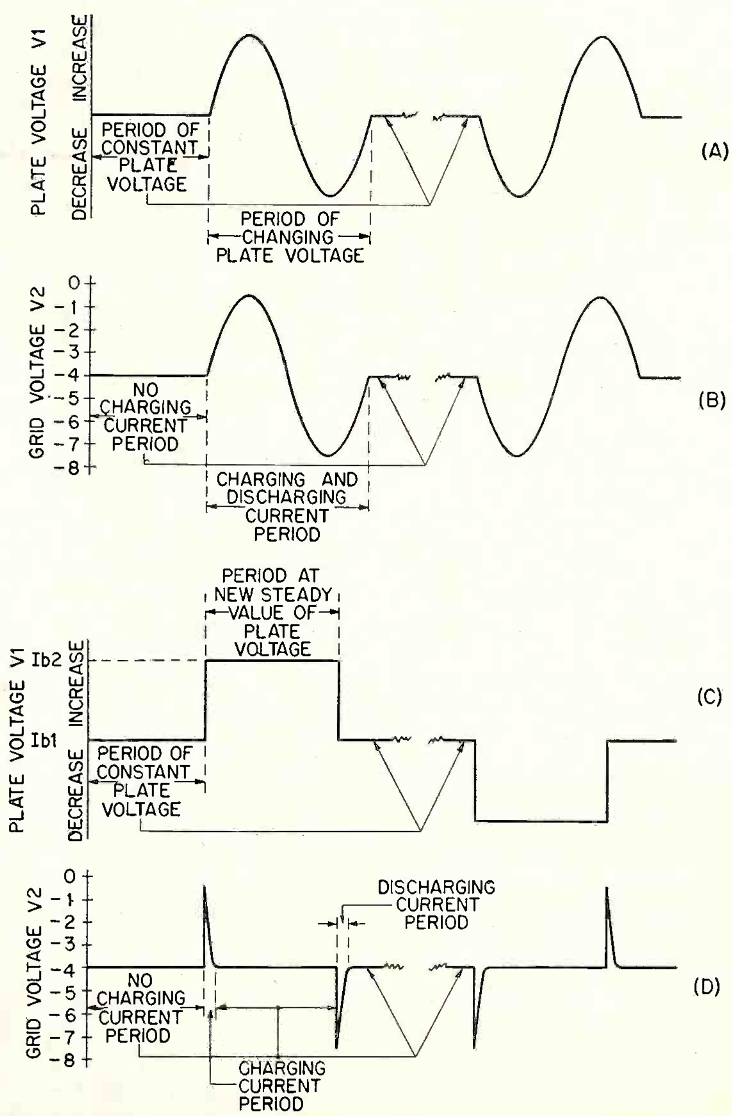


Fig. 2. Illustrating the relation between the driving plate voltage and the driven grid voltage in R-C coupled amplifiers; (A) and (B) for sine-wave signals; (C) and (D) for square-wave signals.

3. The appearance of a momentary volt-
ge drop across $R2$, therefore, a sudden
ange in the potential of the $V2$ grid.

4. When the momentary change in plate
oltage of $V1$ has been accomplished and it
at its new value, the coupling capacitor C
so has been charged to the higher voltage.
here it stays with its charge and the charg-
g current through $R2$ (also $R1$) decreases
zero; and concurrently with that, the grid
f $V2$ returns to the original value which
revailed before anything happened in the
ate circuit of $V1$.

Sometime later the plate voltage of $V1$
restored to its original value. The change
plate voltage becomes a new value of
arging voltage and the capacitor discharges
ome of the energy it has stored. The dis-
arge of current is a momentary rush of
arges through $R2$-$R1$, and a momentary
oltage again appears across $R2$, but now in
e opposite direction to what it was before,
d the grid of $V2$ assumes a potential for
instant. After the coupling capacitor has
en discharged sufficiently so that it is at
e voltage of the plate of $V1$, the discharge
rrent ceases, and the potential of $V2$ grid
sumes its normal value.

Summarizing the contents of Fig. 2, it is
asy to see that the transfer of a signal
rough an R-C amplifier demands a con-
nuous change in voltage conditions in the
oupling system, a steady-state condition,
ich as a d-c change will be accomplished
nly temporarily, namely, during the mo-
ents of transition from one state to the
her. This is shown in Fig. 2C and D, where
e change in value of plate voltage from one
vel to the other is a change in steady-state
onditions. Only when there occurs a con-
nuous change in state as shown in Fig. 2A
d B, does there take place a continuous
ansfer of energy.

Now if we consider a continuous change
conditions to be a-c phenomenon, and the
eady-state condition to be d-c phenomenon,
e reason for calling an R-C coupled ampli-
er an amplifier of a-c signals becomes under-
andable. An R-C amplifier can transfer a
hange in a d-c voltage in exactly the same
anner that it transfers an a-c voltage ex-
ept that it is momentary while the change
sts. Once the changing state is replaced
y a steady state, the a-c coupling system
eases to show any signs of the new condition.

The fact that triode tubes are used in the
nalysis of the R-C amplifier does not impose
ny limitation on the validity of the dis-
ussion. What was said applies equally well
all other types of tubes which see such
ervice.

eneral Electric 226

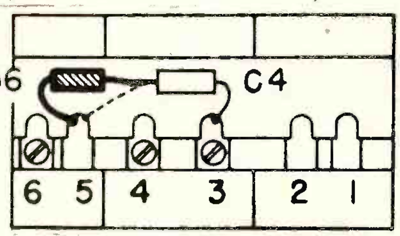
Solid dots indicating circuit wiring connec-
ions should be added and placed in the
athode lead of tube V4, one at the point
here the lead intersects the lower end of
7, the other at the junction of R6 (low end
f volume control) and C10. The circuit will
en show the cathode properly terminated to
—.

Replacement item RTO-075 should read
TO-083, Audio output transformer.

Radio Changes

Bendix 95B3, 95M3, 95M9

The terminals of the gang capacitor are numbered from the front to the rear of the chassis as is indicated in the accompanying diagram. In the figure showing trimmer location, the capacitor designated in the r-f subchassis as C8, is C4. Resistor R56 has been added to the circuit to avoid any possibility of regeneration occurring, and this resistor is soldered from terminal 5 of the gang capacitor directly to capacitor C4. The other lead of capacitor C4 remains connected to terminal 3 of the gang capacitor as indicated in the diagram. On the schematic diagram, resistor R56 should be inserted in the a-m external lead between terminal board J6 and capacitor C4. Add R56, Comp., 1,000 ohms, ¼ w, Part No. RC22A102M to the replacement parts list.



Terminals of gang capacitor used in Bendix 95B3, 95M3, 95M9.

An additional filter capacitor C65 has been added to the avc circuit. The 470-$\mu\mu$f capacitor goes from terminal 10 of switch S1C to chassis ground. Add capacitor C65, Mica, 470 $\mu\mu$f, 500 v, Part No. CM5A38 to the replacement parts list.

The figure showing the f-m antenna should show 26″ as the dimension for the lower half of the f-m antenna, instead of 6″. The dipole should measure 26″ on both sides of the center leads.

General Electric 141, 143

Instability on the high end of the broadcast band might be caused by an oscillator coil whose coupling winding has changed its coupling capacitance. This defect can be corrected by replacing the coupling winding with a capacitor C15 of the value 56 $\mu\mu$f, catalogue number UCG-022. This capacitor connects the "high" side of the tuning capacitor C2 with the oscillator grid, pin 4, of the tube V1, 1R5.

Late production receivers always use capacitor C15 in conjunction with a new type of oscillator coil, RLC-101. This item replaces coil formerly catalogued RLC-089.

●

Bendix 95B3, 95M3, 95M9

The switch and its components for the long-playing record player have heretofore been mounted on the back cover. To avoid future difficulty in removing the back cover, this switch and its components are now mounted on a bracket attached to the rear of the cabinet. The bracket is mounted on the top rear cabinet rail and is placed so that the switch, in Models 95B3 and 95M3, extends through the ventilation louver in the upper left corner of the back cover. The strip between the louvers in Model 95M9 covers the switch and it is necessary to remove the strip between the louvers from the back cover.

INDEX

† The Rider Manual Page Numbers given under Television Changes are for Rider TV Manuals. The volume number is the number preceding the dash. (For example, Admiral 4-1 indicates Admiral page 1 in Rider's TV Manual Volume 4.) Volume numbers preceded by an asterisk (*) apply to the 8½" x 11" page size Manual only.

The Rider Manual Page Numbers given under Radio Changes are for Rider AM-FM Manuals. The volume number is the number preceding the dash.

Stromberg-Carlson TS125, TS16 Series

When tolerances accumulate, the 1.5-megohm resistor R403, in the grid circuit of the vertical blocking oscillator, is sometimes too large in value to permit full control range adjustment. In these cases a 10-megohm resistor may be shunted across R403.

The 1,800-ohm, 1-watt resistor, R412, in the cathode of the vertical output tube has been changed to 3,300 ohms, 1 watt (part no. 149181).

Vertical dark lines at the left side of the picture area, caused by Barkhausen oscillations, can usually be eliminated by adjustment of the horizontal drive control. If the lines persist, changing 6BG6 tubes in the horizontal output stage should be tried. Often the lines are present on the raster, but disappear when the picture is present, so be sure to check under picture conditions.

Sec. 34.66, P. L. & R.
U. S. POSTAGE
PAID
NEW YORK, N. Y.
PERMIT No. 9427

A. J. S. CERINO
5310 OVERBROOK ST.
DOUGLASTON, L. I., NEW YORK

From
JOHN F. RIDER PUBLISHER, Inc.
480 CANAL ST., NEW YORK 13, N. Y.
Return Postage Guaranteed

Distribution of This Issue—60,000 Copies

Successful **SERVICING**

SEPTEMBER, 1950

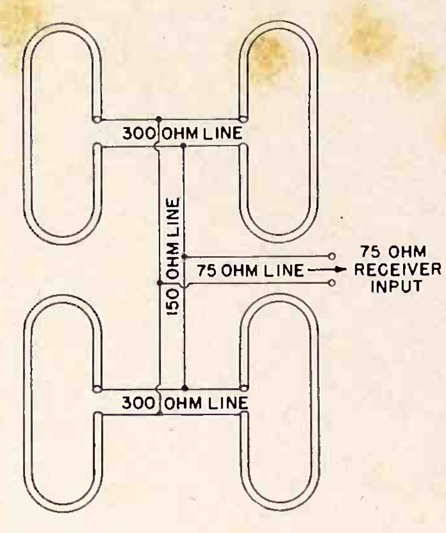


Fig. 1. Antenna array consisting of four folded dipoles.

ANTENNA ARRAY INTERCONNECTIONS

By ARNOLD B. BAILEY

Editor's Note: This material is an abridged excerpt from the chapter on Horizontally Polarized Antennas as found in TV AND OTHER RECEIVING ANTENNAS (THEORY AND PRACTICE), a forthcoming book which has been written by Arnold B. Bailey and will soon be published by John F. Rider Publisher, Inc.

The best type of line interconnections between elements in an array uses the same length of line from each element to a common junction, where all interconnecting lines meet before going to the receiver. This is generally achieved by first grouping the elements into adjacent pairs, connecting each element to a midjunction located equidistantly between the members of each pair.

Consider, for instance, an array consisting of four folded dipoles, shown in Fig. 1. The dipoles are arranged in two pairs. A 300-ohm transmission line connects the elements of each pair; since the antenna resistance of each folded dipole at the center frequency is also 300 ohms, the interconnecting line will match at both ends. The midpoints of each 300-ohm line are then interconnected by a 150-ohm line, required to match the resistance of the two parallel 300-ohm folded dipoles which are connected to each end. The 150-ohm line in turn is tapped at its midpoint by a 75-ohm main line which connects to a 75-ohm receiver input stage.

This case is relatively simple and the required transmission lines are easily obtained. In more complicated cases, however, the method often becomes impractical due to the unconventional values of transmission lines required. For instance, an antenna consisting of 16 elements results in eight midjunctions. These eight midjunctions are then treated in pairs in a like manner, giving four new junctions. These four are connected in the same way to two main junctions which are then brought together as a single pair to the main line going down to the receiver. If the first connecting line surge impedance is made equal to the individual antenna resistance at the center frequency, and the other interconnecting lines have surge impedances equal to the respective junction resistance values, we would see at the main line an impedance equal to one sixteenth of the individual antenna resistance. Furthermore, the line surge impedances would vary between a value equal to the antenna resistance and one sixteenth of this value. It would be impossible in practice to select such lines so that we are forced to use a more practical method.

This consists of employing a transmission line not only for interconnections, but also as an impedance transformer at the same time. For this purpose we use line sections which are an odd quarter wave in electrical length, and whose surge impedances fall within the practical limits of 150 and 600 ohms (for two-wire lines). As covered in another section, the surge impedance of the line section is the geometric mean and hence the square root of the resistances which appear at each end of the line. Taking a specific case, if 16 folded dipoles (each having a resistance of 300 ohms) are to be interconnected, each interconnecting section may be selected to have a surge impedance of $\sqrt{300 \times 600}$ or 424 ohms, so that the impedance is transformed from 300 up to 600 ohms at each step. At each junction, two 600-ohm loads appear in parallel resulting in 300 ohms. These, in turn, are stepped up from 300 to 600 ohms. At the final step, two 600-ohm loads appear in parallel across the 300-ohm main feeder line, thus affording a matched system. There are many other choices which may prove more suitable for specific cases.

Systems which employ unequal lengths of feeder lines from each element to the common junction may be used, but they must take into account the proper phasing of each element with respect to the others. If equal line lengths are used, this is automatically taken care of. A common practice in pairing off antenna elements is to connect them by a half-wave line section (surge impedance not critical), and consider the common junction as being across either one of the elements. This can be done since a half-wave section does not transform the impedance connected to one of its terminations, but presents an exact mirror image of this impedance at the other end. Such a practice for vertical stacks demands that the interconnecting half-wave line be twisted once so that a phase reversal in the line is corrected by reversing the leads of one with respect to the other. If this

(Continued on page 12)

Television Changes

General Electric 810, 811, 835

A new ceramic-core sweep transformer, Stock No. RT0-071, is recommended as a substitute for the original molded horizontal sweep output transformers for these models. It has several electrical design improvements over the original specified transformer, among them are higher efficiency and better high-voltage insulation.

The transformer is equipped with a 470,000-ohm resistor in shunt with a 0.0022-μf capacitor, connected between the primary and high-voltage windings. In order to provide identical electrical characteristics to the original transformer, a few circuit revisions are necessary when the substitution is made. Kits are available which contain all the additional components, except transformers or tube, which are required to make the conversions. Fig. 1 is a sketch of the RTO-071 transformer.

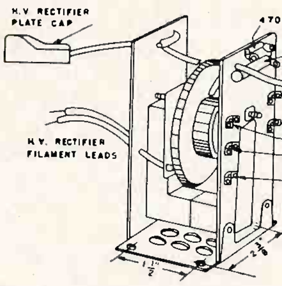


Fig. 1. RTO-071 transformer used in General Electric Models 810, 811, and 835.

Fig. 2 shows the five steps required to change the circuit for the use of the substitute transformer. The procedure is as follows:

1. Disconnect leads of defective sweep output transformer, including filament loop for 1B3GT tube. Notice that R67, R62, and C103 are removed with it. Mount new transformer on chassis. See Fig. 1 for lead identity to effect most satisfactory placement of transformer. Wire new transformer into the circuit according to the diagram in Fig. 2.
2. Add a 27,000-ohm resistor, URF-083, in parallel with R60 and R61 as shown.
3. Disconnect the white lead of the horizontal size control, L18, that connects to pins 4 and 6 of V15, and reconnect it to terminal 8 of the sweep transformer. Make sure that the leads from the horizontal size coil do not short to the frame of the sweep transformer. Connections from terminals 5 and 8 of the high-voltage transformer should be made with the high-voltage insulation wire.
4. Connect the 1,200-$\mu\mu$f capacitor, UCU-2054, in series with the 1,500-$\mu\mu$f capacitor, RCU-285. This series combination is then connected between terminals 6 and 8.
5. Remove the 4,700-ohm resistor, R65, from across the horizontal linearity control L19.

The conversion components required are:
1—Stock RTO-071 transformer
1—Stock RKT-003 kit.

The kit consists of:
1—URF-083, resistor, 27,000 ohms 2 w, carbon
1—USU-2054 capacitor, 1,200 $\mu\mu$f, mica
1—RCU-285, capacitor, 1,500 $\mu\mu$f mica.

Readjustment of the blocking oscillator transformer, T16, may be necessary. In some cases, if proper centering of the horizontal hold control cannot be had, it may be necessary to reduce or increase the value of R52 somewhat to effect the correct adjustment of the blocking oscillator transformer. This change should be limited to values between 35,000 and 82,000.

There will probably be two settings of the horizontal linearity control which will be found to give good linearity. The proper setting is the one with the slug withdrawn from the center of the coil, or minimum inductance. The other position may cause some "squaring" of the outside circle of a test pattern.

Stromberg-Carlson TS125 Series

The 5.6-ohm resistor R395 has been removed, and the 5.6-ohm resistor R396 has been changed to a 15-ohm, 1-watt value (part no. 149158), to reduce picture background noise.

Microphonics in the TS125H and TS125L models have been encountered when the audio feeds back to the r-f oscillators. It can be eliminated in the following manner:

1. Check that the tuner mounting screws do not clamp the tuner too rigidly to the main chassis.
2. Try substituting 6J6 r-f oscillator tubes. The Sylvania 6J6/TV tubes (part no. 162085) are especially good in these two oscillator positions.
3. To dampen possible movement within the oscillator trimmers, a rubber band or a spring (part no. 29628) may be stretched across the two trimmer shafts that project through the top side of the tuner chassis.

●

Westinghouse H-604T10, Ch. V-2150-94; H-604T10A, Ch. V-2150-94A

The schematic diagram for these chassis should be altered to show a decoupling network in the B+ supply lead to the h-v power supply. The network consists of a 68-ohm resistor, R505, inserted in series with the B+ lead that connects from the junction of R501 and R524 to ground. These items are added in later production chassis to eliminate diagonal bars in the picture.

The parts list should be altered as follows. Change R504 to read R524. Add:

Ref. No.	Part No.	Description
—	V-9323-2	Pulley assembly, TV antenna (side H-604T10A)
—	V-9324-2	Pulley assembly, TV antenna (top H-604T10A)
C508	RCP10W4104M	Capacitor, 0.1 μf, 400 v
R505	RC20AE680K	Resistor, 68 ohms, ½ w.

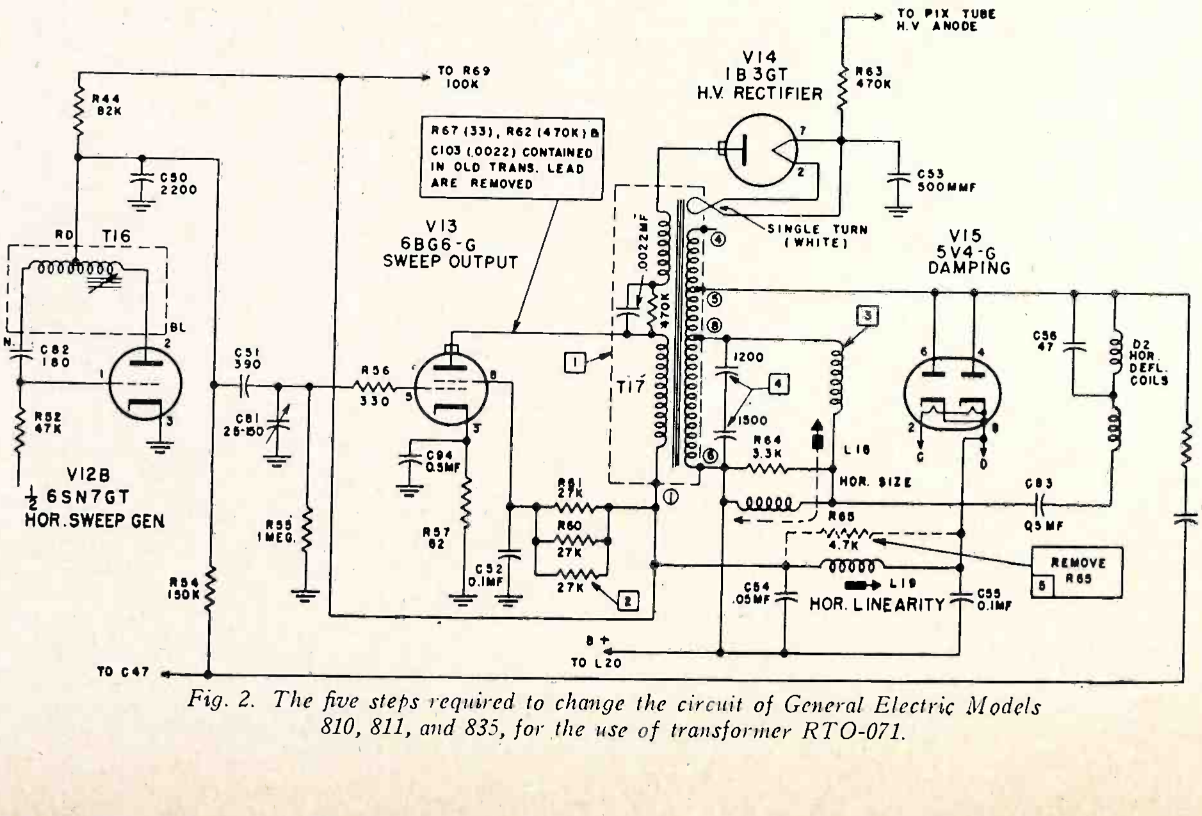


Fig. 2. The five steps required to change the circuit of General Electric Models 810, 811, and 835, for the use of transformer RTO-071.

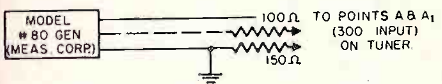
Standard Coil TV-100 Series, TV-201, TV-202, TV-203

In all models C1 is eliminated on some tuners by the use of a 3- to 9-$\mu\mu$f trimmer at C2.

Description

1. Type of r-f amplifier—6AG5 with double-tuned bandpass coupling to converter grid.
2. Type of converter—Triode using one setting of a 6J6. Oscillator excitation is inductively coupled to the control grid.
3. Type of oscillator—Grounded Cathode Colpitts type using the second section of the 6J6.
4. Type of tuning—Switched inductances in a turret-type tuner. Normal channel sequence is progressive, channel 2 to 13; with clockwise rotation, but due to clip in design of the coil assemblies the channel sequence may be changed at will.
5. Vernier tuning—Vernier oscillator tuning is provided by an auxiliary capacitor shunted across the plate portion of the tank circuit. Average coverage on the low range is ±0.5 megacycles; on the high range, ±1.6 megacycles.

Approximate Gain Readings



	Input	*Output*
Channel 13	7,000 μv	100,000 μv
Channel 12	7,000 μv	100,000 μv
Channel 7	5,500 μv	100,000 μv
Channel 6	4,400 μv	100,000 μv
Channel 2	3,500 μv	100,000 μv.

Output measured on Measurements Corporation VTVM #62 at point C to ground on Tuner. Point C loaded to ground with a 15,000-ohm resistor only no i-f tube in circuit. Points A, A_1 and C shown on schematic.

Channel	*I-F Rejection Ratio*	*Image Rejection Ratio*	*Signal/Noise Ratio*
2	1000:1	2000:1	8.1
6	2000:1	550:1	11.7
7	4000:1	590:1	14.2
12	5000:1	240:1	14.6
13	5000:1	240:1	14.6.

1. Input Balance Ratio
1. Input balance ratios measured:

Channel	*Ratio*	*Channel*	*Ratio*
2	43.5	8	8.37
3	8.42	9	11.1
4	9.76	10	14.8
5	6.9	11	24
6	13.2	12	21
7	1.9	13	22.3.

2. Oscillator Radiation

Radiation as measured at the antenna terminals with a tuned r-f voltmeter.

Channel	*Push-Pull*	*Push-Pull*
2	57,500	17,000
3	28,000	12,000
4	18,000	16,000
5	16,500	16,000
6	75,000	45,000
7	16,000	11,000
8	20,000	22,500
9	30,000	22,000
10	42,000	45,000
11	45,000	40,000
12	100,000	43,000
13	100,000	25,000.

Selectivity

The selectivity of the r-f response shall be defined in terms of the attenuation at a bandwidth of 4.5 Mc and of the bandwidth at an attenuation of 6 db. With a sweep generator connected to the antenna terminals and an oscilloscope connected to terminal G (see schematic), the sound and picture carriers are held to within 3-db attenuation from the peak of the r-f curve. Maximum bandwidth 6 db down is 11 Mc.

Antenna Impedance Match

Channel	*Standing Wave Ratio*
2	2.3:1
6	1.8:1
7	2.5:1
13	2.5:1.

Intermediate Frequencies

TV-101 and TV-103 Tuners

Models are aligned to give frequencies of 21.25 Mc and 25.75 Mc for the sound and picture carriers at the i-f output of the tuner. Split sound i-f assemblies have the following ranges:—

Sound trap: 21.0 Mc to 22.0 Mc
Plate circuit: 19.5 Mc to 27.5 Mc.

Adjustment of the brass-oscillator tuning slugs over plus and minus one turn from the aligned position provide a range of 4 Mc on all channels so that the tuner may be used to produce intermediate frequencies of 21.0 Mc to 22.0 Mc for the sound carrier and 25.5 Mc to 26.5 Mc for the picture carrier.

TV-100 and TV-102 tuners are single peaked at approximately 23 Mc. Tuning range is from approximately 18.0 Mc to 27.0 Mc.

TV-104 and TV-111 are double peaked with peaks tuned to approximately 22 and 25.5 Mc.

Oscillator Characteristics

Stability—After one minute from starting the long time warm-up drift is approximately 150 kc on channel 13 and 50 kc on channel 6.

Switch resetability—Maximum detuning of oscillator circuit when switched is approximately 100 kc on channel 13. Minimum B+ voltage, 120 volts, without loss of gain of tuner. Reduction of B+ to 90 v results in approximately 2:1 loss of gain. Change of oscillator frequency from 150 volts to 90 volts results in slightly detectable change in sound

Torque

Torque is held to a maximum of 90 inch-ounces.

●

Stromberg-Carlson TC125H, TC125L, TC125LM-2, TC125LSM

These models are similar to Model TC125. The following list should be added to the Parts List:

Part Numbers by Models TC125H	TC125L	TC125LM-2	TC125LSM	*Part Description*
108144	108134	108152	108153	Cabinet assembly, mahogany
108145	108135	—	—	Cabinet assembly, avodire
155101	155129	155154	155129	Speaker
125044*	125044*	125047†	125047†	Escutcheon, tube ring
174007	174007	174012	174012	Mask assembly
138028	138028	138028	138028	Lens
101120	101120	101127	101129	Back panel
134098*	134098*	134115†	134115†	Knob "Tuning"
134103*	134103*	134120†	134120†	Knob "Brightness"
134106*	134106*	134122†	134122†	Knob "Tone"
134101*	134101*	134118†	134118†	Knob "Picture" contrast
134104*	134104*	134121†	134121†	Knob "Volume"
134100*	134100*	134117†	134117†	Knob "7-13, 2-6" range
134099*	134099*	134116†	134123†	Knob "Horizontal"
134102*	134102*	134119†	134119†	Knob "Vertical"
—	—	103018	103018	Telatenna loop support
—	—	139037	139037	Telatenna loop assembly.

*Indicates metallic gold finish
†Indicates metallic brown finish.

Successful SERVICING
REG. U.S. PAT. OFF.

Vol. 11 SEPTEMBER, 1950 No. 11

Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

Published by
JOHN F. RIDER PUBLISHER, INC.

480 Canal Street
New York 13, N. Y.

WOrth 4-8340
WOrth 4-8341

JOHN F. RIDER, Editor

CURTAIN TIME

The issue of TV service and installation regulation by local municipal ordinances is reappearing in different parts of the nation. Each time, the City Fathers feel that the answer to whatever may be the local problem can be found in licensing. Actually that is not so, because those conditions which have given rise to complaints cannot be cured by any regulations conceived by someone outside the radio-television industry. To mention just a few examples: overselling of TV receivers; the promise that the receiver will perform anywhere under any conditions; unlimited calls on service contracts; and, fixed service contract fees. These are causes which must be resolved by the industry, and the remedies must come from *within* the industry. Licensing will not solve them. Local regulation will not correct them.

It is, however, understandable and justifiable that a municipality may demand that its building codes be complied with, that its citizens be protected from falling TV antennas, that its citizens be assured of financial responsibility on the part of the service facility. A town or city is within its rights if it sets up a building code which governs the placement of antennas and transmission lines relative to the operations of fire department personnel, if it establishes regulations which will assure that the construction of the antenna is such as to withstand whatever weather and winds may be encountered in the locality. It is within its rights if it requires lightning arrestors as a part of the antenna installation, although the number of times lightning has caused damage via a TV antenna installation are very few. It is within its rights if a municipality demands that its citizens be assured of the return of their equipment after it has been picked up and worked on by a service facility, or that the service facility will remain in business long enough to accomplish whatever contract it has signed.

It is recognized that these last two points which pertain to financial responsibility are, in a sense, discriminatory in that they single out the radio-television service facility over numerous other facilities which offer services of varied kinds, but which are not called upon to maintain financial responsibility by regulation. It is our feeling that the discriminatory aspect can well be overlooked, for compliance with such a request can be the means whereby small and large service facilities are placed on par in the minds of the public. It may be the means of achieving public confidence, which then can be bulwarked by good performance. Compliance with all of these requirements established by a municipality can be accomplished without licensing.

If a city requests that a permit be procured before a TV antenna is installed, and that an inspector visit an antenna installation, this, too, can be done without licensing of the installer. Any sane-minded businessman who hopes to run his establishment at a profit realizes only too well that it is to his benefit to see that his personnel are capable of complying with a code. It is too costly for him if his installations do not pass inspection. If the City Fathers have the financial interests of their citizenry in mind, they should realize that any outlet of funds, by any individual engaged in a competitive system, must in some way be passed on to the public. The fees required for a license are unnecessary burdens, placed on the shoulders of people who already are paying ample taxes and in a short time will pay even more.

It is important for those who propose regulations to realize that any regulation which restricts operating capabilities throttles free enterprise, the very basis of the financial growth of this nation. It is equally important for them to realize that restrictions, which are inevitable with licensing, may impose unnecessary hardships on the small operators and their families, among whom are many veterans of World War II. Whatever a City Council can accomplish by licensing, it can accomplish without licensing, with greater benefits to all if the planning of the program is carried out in a judicious way.

(Continued on page 18)

A WORD TO THE WISE . . .

Television Changes

Westinghouse H-600T16, Ch. V-2150-61; H-601K12, H-602K12, Ch. V-2150-41

The following changes should be made in the schematic drawings which appear for Chassis V-2150-61 and V-2150-41:

1. In the tube heater schematic in the lower left portion of the drawing, the five filament chokes that are not numbered should be labeled L404, L405, L406, L407, and L408. In addition, the capacitor across the 6AL5 tube heater should be labeled C406, and the capacitor across the 6BJ6 heater is C407. The capacitor across the 6BH6 heater should be deleted.

2. The 6.3-v line that extends from the heater schematic should connect to terminal 5 of the terminal strip in the tuner section rather than to terminal 3. C306 which is connected to this line on the drawing should be connected between terminal 3 and ground.

3. The plate dropping resistor for the 6BH6 2nd audio i-f amplifier should be labeled R214 rather than R219.

4. The capacitor that is connected between the grid of the 6AV6 1st audio amplifier and ground should be labeled C217 rather than C216.

5. The unnumbered resistor that is connected between the horizontal hold control and the grid of the horizontal multivibrator should be labeled R436, 220,000 ohms.

The parts list for the H-600T16 should be changed as follows:

Ref. No.	*Change—*
R301, R302, L401	Part number to V-9235-2
L404, L405, L406, L407, L408	Part number to V-9099-1
L409, L410, L411, L412	Part number to V-9210-1.

RIDER MANUALS KEEP UP TO DATE FILL IN THE GAPS

Admiral Ch. 20A1, 20B1, 21A1

In areas where any two adjacent channels may be received, the sound transmission from the lower channel may cause interference on the picture of the higher channel. This type of interference may be reduced to a minimum or eliminated by means of an adjacent channel trap fitted to the transformer T302 of the 2nd vidio i-f amplifier.

The trap is constructed by using another sound trap, L308, part number 72A88-1, which should be modified and installed in the receiver in the following manner:

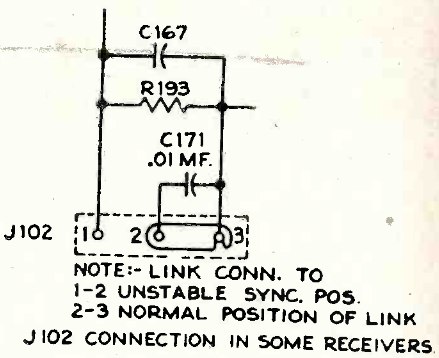
1. Procure this sound trap (part no. 72A88-1) and remove two turns from the coil at the end farthest from the slug screw and resolder the coil to the lug on the form (do not remove the capacitor).
2. Clip the white lead and the bare tinned lead from the coil.
3. Remove the cover from the video i-f strip and locate T302.
4. Procure a short length (approximately 3 inches) of insulated 24- or 26-guage wire and wind approximately 1½ turns in a clockwise direction on T302. These turns should be positioned on the small diameter portion of T302 at the end farthest from the slug screw, with one end of the wire looped under itself to hold the coil in position in a manner similar to the coupling coil of T301.
5. Connect one end of the 1½-turn coil to the ground connection of T302.
6. In a large number of these chassis, an unused ¼-inch hole will be found between V302 and V303, but if the hole has not been punched, one should be drilled and the new trap inserted.
7. Connect the black lead from the new trap to the ground lug of T302 and connect the loose end of the 1½-turn coupling coil to the other lug on the new trap.
8. Realign the video i-f stages. Due to the slope of the video i-f curve, it is difficult to align the new trap to 27.25 Mc with a signal generator, so the slug should be adjusted for minimum interference on the picture. However, care must be used when making this adjustment since it is possible to affect the video i-f bandpass if the adjustment is incorrectly made.
9. Use a sweep generator and scope to check the video i-f bandpass after adjustment to be sure the trap has not affected the i-f bandpass.

Regal TV-1030, TV-1031

In later production models, an e-m speaker is employed with a hum-bucking coil and voice coil, whose impedance is 3 ohms. The three-prong plug has been deleted. The jumper across R232 has been deleted.

J104 is now designated as J102. Filter choke L200 is now a 62-ohm field. In some receivers C19 is omitted. In some receivers C14 is fixed. R239 is omitted in some receivers.

In some receivers J102 is connected to the cathode lead of V123, 6AL5, horizontal sync discriminator, as shown in the accompanying figure.



Circuit change for Regal TV-1030, TV-1031.

Hoffman Ch. 140, 142, 143, 146, 147

The video i-f string may be peaked for additional gain at a sacrifice of bandwidth to aid reception in low-signal areas.

The procedure is set up on the basis that the adjustments may be made in the field without the aid of a sweep generator or 'scope. All adjustments on the i-f coils are reached from the top of the chassis and may be accomplished without removing the chassis from the cabinet, in sets produced prior to Serial No. E 906732.

Ref. No.	*Circuit Position*	*Adjustment*
L102	Plate circuit 2nd video i-f	Counterclockwise, 1½ turns
L103	Plate circuit 3rd video i-f	Clockwise ½ turn
L104	Plate circuit 4th video i-f	Counterclockwise, 1 turn.

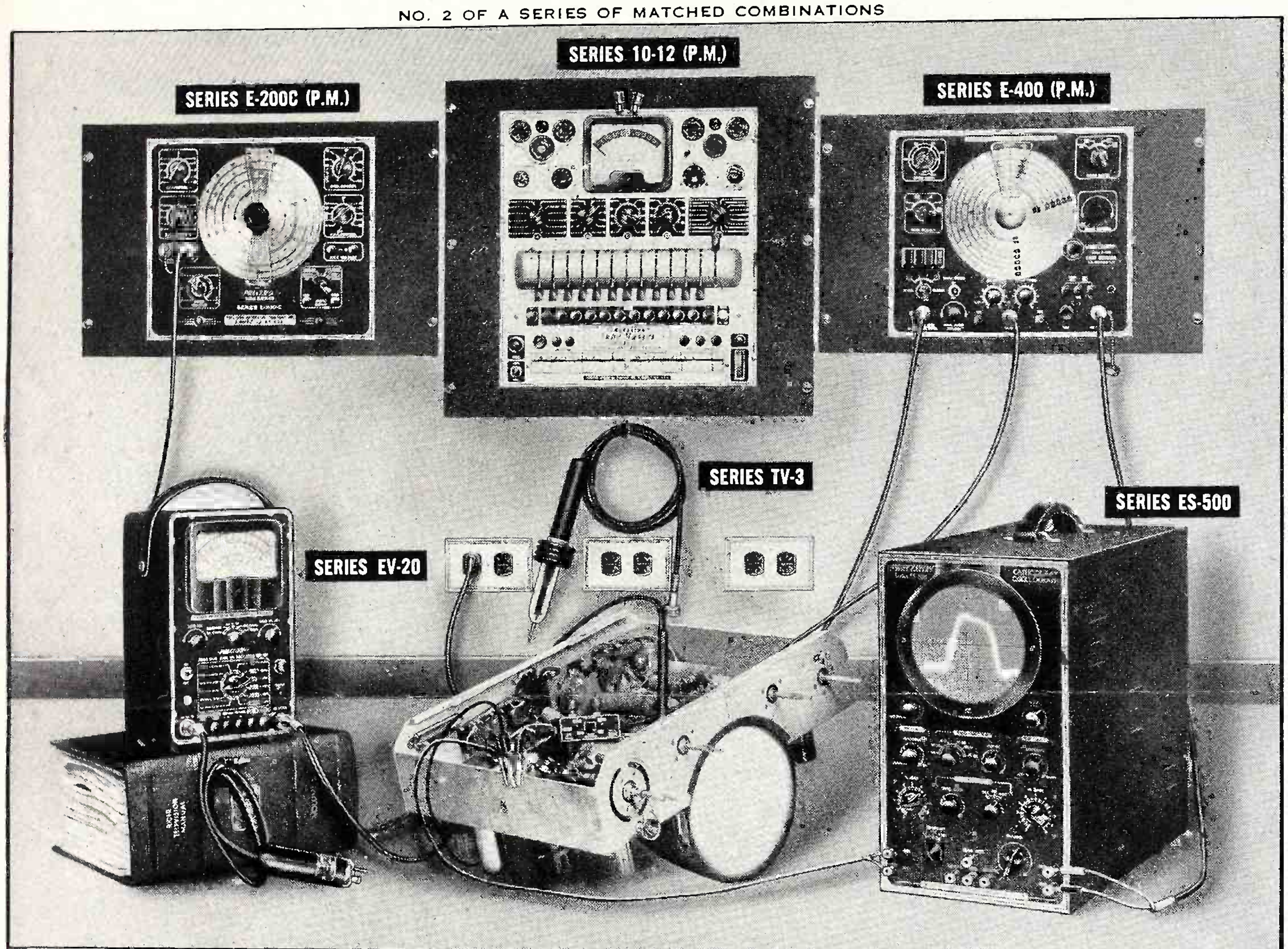
Fine trimming of the i-f tuning may be accomplished with a sweep generator and 'scope. The resultant i-f characteristic will have approximately twice the gain of the normal amplifier, and will have a bandpass of about 3 megacycles between 50% points. This bandpass characteristic applies to all sets, regardless of sound i-f take-off point.

★ Build Your Service-Sales Future on a Firm Foundation With.....

PRECISION TEST EQUIPMENT *Standard of Accuracy...*

These 5 "Precision" Instruments Provide a Complete, Modern Service Lab... for TV-FM-AM ...at only moderate cost.

NO. 2 OF A SERIES OF MATCHED COMBINATIONS



SERIES E-200C (P.M.)
SIGNAL AND MARKER GENERATOR
Exceptional Accuracy and Stability • Direct reading • 88 KC to 120 MC. • 1000 pt. vernier calibrating scale • 0-100% Modulation • A.V.C.-A.G.C. Substitution network • Complete with output cable and technical manual. In standard panel 19 x 12¼". **Net Price: $69.70**

SERIES E-400 (P.M.)
SWEEP SIGNAL GENERATOR
Narrow and Wide Band Sweep for F.M. and TV • Direct Freq. reading 2 to 480 MC. • Multiple Crystal Marker • 8 tubes including V.R. and rectifier • RG/62U Coaxial Terminated Output • Complete with 2 crystals • In standard panel 19 x 12¼". **Net Price: $127.55**

SERIES ES-500
5" OSCILLOSCOPE
Wide Range
High Sensitivity
V. Amp. Response to 1 MC. • Low C, High R input Step Attenuator • Z axis modulation terminals • 9 tubes incl. V.R. and 2 rectifiers • Complete with light shield and mask • Heavy gauge steel case. 8¼ x 14½ x 18". **Net Price: $149.50**

SERIES EV-20
True Zero Center VTVM & Multi-range Test Set
48 ranges to 1200 V., 2000 megs., 63 DB, 12 amps. • Voltage Regulated Bridge Type Circuit • 13⅓ Megs. D.C. Input resistance • Direct reading high freq. scales • Optional RF-10-A High Freq. Probe • Heavy gauge steel case 6¼ x 5 x 10½". **Net Price: $64.75**

SERIES 10-12 (P.M.)
Electronamic*
TUBE MASTER
Employs famous "PRECISION" Electronamic tube performance testing circuit plus dynamic Battery Tester • 12 element, anti-obsolescent-free-point lever system • Roller-chart • Dual short-check • Noise tests • In standard panel 19" x 17½". **Net Price: $99.40**

SERIES TV-3 SUPER HIGH VOLTAGE SAFETY TEST PROBE. Extends range of Series EV-20 to 30 KV direct reading. Series TV probes available to match most VTVM's and 20,000 ohms per volt test sets. (**NOTE:** For deluxe Series EV-10 VTVM, with extra-large 7" meter, order Series TV-1 probe.) **Net Price: $15.45**

*Reg. U.S. Pat. Off.

BUY PERFORMANCE—NOT SPECIFICATIONS!—BUY *"PRECISION"*

"PRECISION" PERFORMANCE, ACCURACY, WORKMANSHIP and VALUE have been setting a standard of comparison for over 15 years. **DO NOT BE MISLED... It is not "PRECISION" test equipment unless it is manufactured by Precision Apparatus Co., Inc., Elmhurst, L. I., N. Y.**

OTHER MATCHED COMBINATIONS

The instruments shown above illustrate one of many possible **MATCHED COMBINATIONS** of diversified ***"PRECISION"*** Test Equipment for TV-FM-AM. Each combination provides a selected and basic, modern, efficient Laboratory at moderate cost.

"Precision" Instruments are on display at leading radio equipment distributors.

· TV · FM · AM

PRECISION TEST EQUIPMENT *Standard of Accuracy*

PRECISION APPARATUS CO., INC.
92-27 Horace Harding Boulevard, Elmhurst 14, New York
Export Division: 458 Broadway, New York, U.S.A. • Cables—Morhanex
In Canada: Atlas Radio Corp., Ltd., Toronto, Ontario

Convenient Purchase Terms can be arranged with your favorite Precision Distributor.

AM · FM · TV ·

Television Changes

Hallicrafters T-54, 505, 506, Run #3

Model 506 is the same as Models T-54 and 505. Run #3 is the same as Run #2 except for the following changes:

Resistor R29 from pin 5 to pin 6 of the r-f amplifier, V5, has been deleted. C61, a 0.005-μf capacitor in the vertical oscillator circuit has been deleted. C23, a 0.05-μf capacitor connected from ground to the volume control has also been deleted. R119, a 220,000-ohm resistor has been added in place of C23, from the volume control to ground. Capacitor C99, 330 $\mu\mu$f, has been added in parallel across C19 and C20 in the f-m detector, V2, circuit. C100, 1.5 μf, has been added from the junction of C13 and C2M to the junction of C14 and C3M.

The parts list for Run #3 is the same as that for Run #2, except for the following changes:

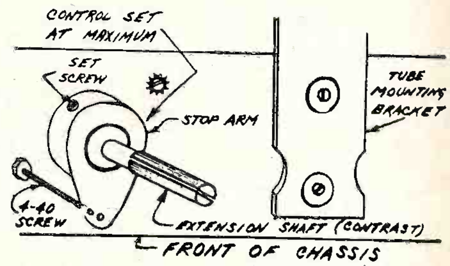
Halli-crafters Ref. No.	*Part No.*	*Description*
C1, 2	44B358	Trimmer assembly, mixer and r-f amp. stage, 13 sections
C3	44B357	Trimmer assembly, osc. stage, 13 sections
C100	47A160-3	1.5 $\mu\mu$f, 500 v, bakelite
C51, 66	46AU503J	0.05 μf, 200 v, tubular
C101	47A168	5,000 $\mu\mu$f, 500 v, ceramic
R120	RC20AE101M	100 ohms, ½ w, carbon
R119	RC20AE224K	220,000 ohms, ½ w, carbon.

Belmont Service Hints

In the process of inspection, repairs, changing of tubes, or for any other reason where it is necessary to work within the high-voltage power supplies, the following should be closely observed:

1. Terminals on 1X2 sockets must be dressed toward the inside of corona ring, and be free of sharp protrusions.
2. Corona ring must be dressed in such a way as to make its presence useful; that is, properly centered and about ⅛-inch below socket terminals.
3. All leads must be dressed as far away as possible from the transformer winding. Excess lead length should be transferred to the underside of chassis.
4. On the race-track type transformer assembly, leads must be dressed away from the *coil and race track*.
5. The tube-cap clip ends must face *away* from the sides of shield can.

Since the contrast control is located on the video i-f strip assembly, an extension shaft and shaft connector are used to operate the contrast control. The extension shaft can be rotated a full 360° while the contrast control will reach its stop after approximately 280°. If the extension shaft is rotated clockwise after the contrast control reaches its stop, the fiber shaft connector will be broken. To prevent the shaft connector from breaking, simply follow the intsructions below and the accompanying diagram.



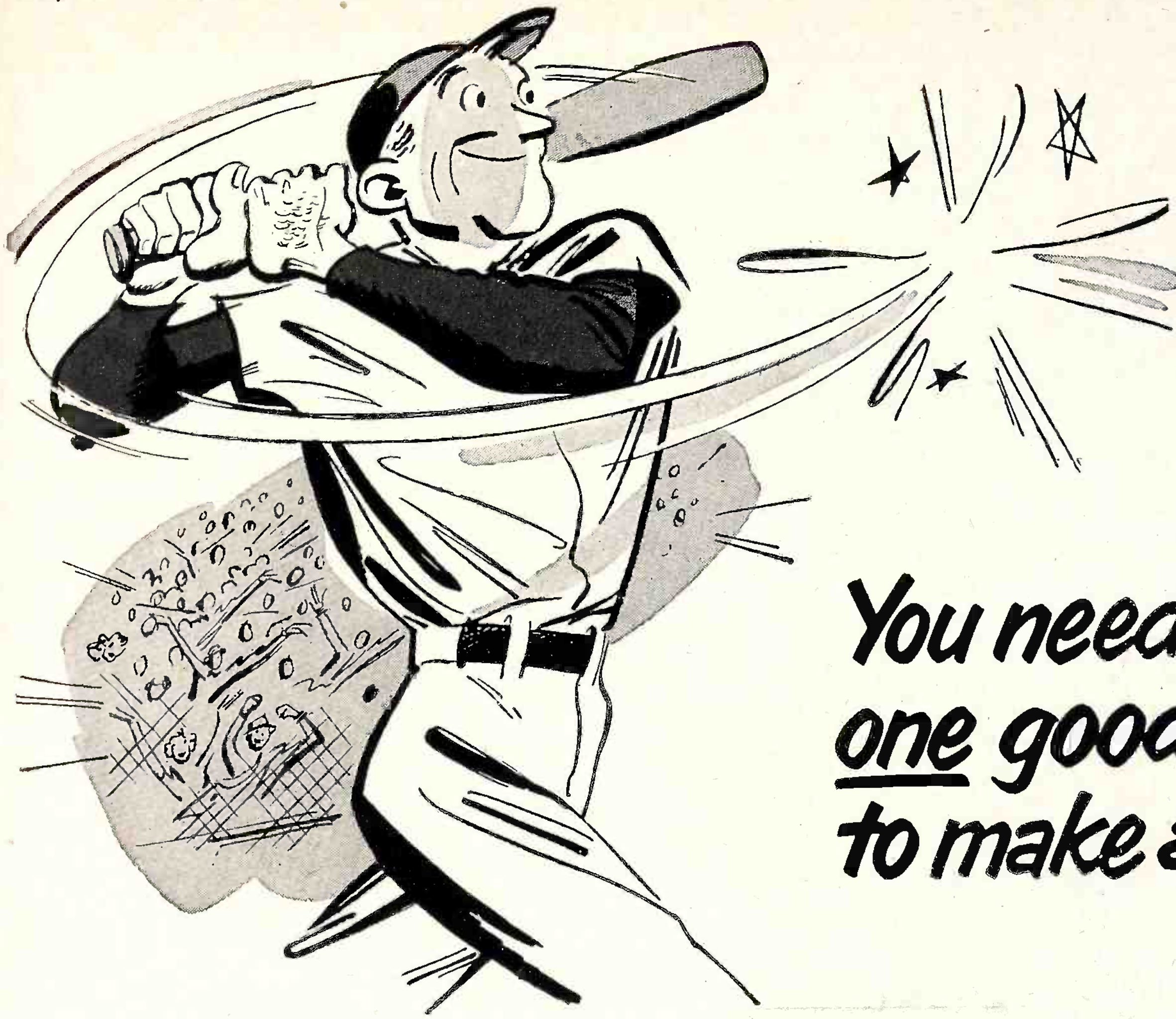
Extension shaft in Belmont Chassis.

1. Remove the chassis from the cabinet.
2. Remove the lower screw and lockwasher holding the contrast-shaft bracket to the front of the chassis.
3. Insert the small 4-40 screw through the hole in the contrast shaft bracket so the screw head is inside the chassis. Tighten to the chassis with the lockwasher and nut provided.
4. Place the stop-arm assembly over the contrast-control extension shaft so the stop arm is away from the chassis.
5. Set the contrast control to maximum (clockwise).
6. Rotate the stop arm clockwise until it reaches its stop (the 4-40 screw).
7. Tighten the two stop-arm assembly set screws.
8. Replace the chassis in the cabinet.

Sears 125, Ch. 478.257; 9125, Ch. 478.252; 9125A, Ch. 478.253

In some localities due to the degree of modulation of the local stations, a variable amount of buzz will be heard in the sound of these models at certain picture levels during transmission. This buzz can be minimized by the following substitutions:

1. In the video amplifier V9, the plate load resistor R47, a 3,300-ohm resistor, should be changed to 1,800 ohms, ½ w, 10 per cent.
2. In the same tube circuit, the plate resistor R42 should be changed to 4,700 ohms, 1 w, 10 per cent.



You need only one good swat to make a hit!

You need only one brand

TO SCORE BIG BATTERY SALES!

YOU'RE smart to stick to "Eveready" radio batteries — the most widely-advertised batteries in the world . . . the batteries known and preferred by your customers!

They've learned that "Eveready" batteries give long, satisfactory playing life in *any* portable.

You know that selling *just one brand*— "Eveready" — streamlines inventory, cuts overhead and builds big battery business with easy profits!

"EVEREADY"
BRAND
THE BATTERY WITH
"NINE LIVES"

"BATTERY-ENGINEERED BY BATTERY* MANUFACTURERS FOR BEST BATTERY PERFORMANCE!"

The terms "Eveready", "Nine Lives" and the Cat Symbol are trade-marks of

NATIONAL CARBON DIVISION
UNION CARBIDE AND CARBON CORPORATION
30 East 42nd Street, New York 17, N. Y.
District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

Television Changes

Stromberg-Carlson TC125

To improve the signal-to-noise level at the ratio-detector stage for clearer audio reproduction, capacitor C56 has been increased from 1 μf to 5 μf, 50 volts (part no. 111030).

Kinescope tubes using the grey-filter face plate (dark-faced) will be used in the subject receivers. These new tube types are identified by the following code numbers: 12½-inch tubes are denoted as 12LP4A (part no. 162075) or 12QP4A (part no. 162080), and the 19-inch tubes as 19AP4A (part no. 162083).

Cases of horizontal instability or jitter in the picture have been encountered where L4, horizontal-oscillator coil (part no. 114069), has developed short-circuited turns. This condition lowers the Q of the coil, in turn lowering the stability of the horizontal oscillator. This situation is best remedied by replacement of the coil.

In the L31 position, focus-coil assembly, part number 114660, is used when a 12LP4 kinescope tube is employed. Focus-coil assembly, part number 114661, is used when a 12KP4 or 12QP4 tube is employed.

Sears Ch. 101.846, 101.854, 101.864, 101.867, 101.868

Low-frequency microphonics (rumble in sound, little or no disturbance of picture) in Chassis 101.864 and 101.868 can be attributed to oversize inserts in the core slide assembly. The view of the core slide assembly shown in Fig. 1 shows one of the four inserts which is affixed to the core slide. These inserts are assembled on each of the four ends or ears of the slides. Due to the push button pressure exerted against the core slide, there can be no forward or backward play of the core slide to cause vibration. However, occasionally there is a sideward clearance between the core slide and the carriage rod to permit mechanical vibration. This movement is what often produces microphonism.

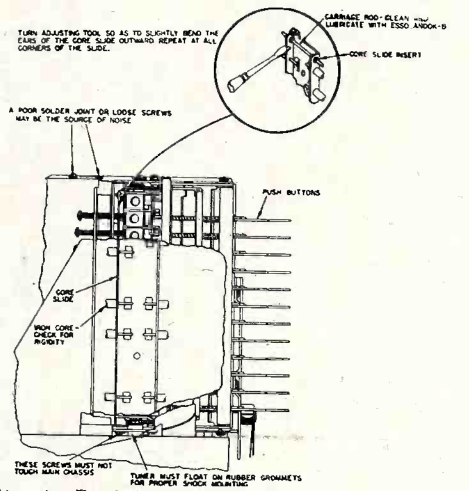


Fig. 1. Push-button tuner for Sears Chassis 101.846, 101.854, 101.864, 101.867, and 101.868.

A very effective and simple remedy can be applied to the tuner without removing it from the main chassis or even removing the tuner cover. Take a 6- to 6½-inch screwdriver having a blade not wider than ¼-inch. File or grind a notch .062- to .067-inch wide and ⅛-inch deep in the end of the blade. Insert the tool into tuner so that the slot in the blade is over one ear of the core slide assembly as shown in Fig. 1. With a slight twisting motion, rotate the tool so the ear of the core slide is bent outward. Only a slight bend should be made insofar as this procedure must be repeated on all four ears or inserts. After each adjustment, work push buttons to make sure core slide will return to normal setting when released. Failure of this will indicate adjustment is too tight. Movement of these slide inserts may necessitate the resetting of the push buttons due to possible shifting of the core slide assembly in relation to the carriage rod supports which also act as stops. If resetting of any push buttons is done, the channel under adjustment should be alternately pushed several times to insure correct setting of the adjusting screw.

Another possible source of low-frequency mircrophonics may come from loose coil dampers on high-band or low-band oscillator coils. Also check all cores, particularly the oscillator cores for rigid mounting.

Three rubber grommets shock mount the push button tuner to the main chassis. Refer to Fig. 1 and note that the grommet mounting nearest the 6AT6 first audio tube may cause the two screws mounted to the tuner to touch the main chassis. If this occurs, add sufficient spacer washers to the grommets to properly shock mount the push button tuner. Likewise the push buttons themselves may make contact with the cabinet escutcheon plate. Remedy by loosening chassis mounting screws and repositioning the chassis so that push buttons are completely free from cabinet.

For the treatment of high-frequency microphonics (high-frequency howl in sound, little or no disturbance of picture), change high-band oscillator tube 7F8. A check should also be made for broken mica on oscillator trimmer.

The following suggestions are offered for the case of noisy tuners in Chassis 101.846, 101.864, 101.867, and 101.868.

Occasionally when the push buttons are actuated, noise may occur due to the grounding braid scraping the chassis base at a different place than where soldered. This grounding braid must make contact with the main chassis only at the soldered joint. Noise will occur particularly at the high-frequency channels.

Another source of noise is the cable clamp shown in Fig. 2. All cables joining at this point have their shields grounded at the antenna coils and also joined together near the clamp itself. However, the shields do not and must not ground to the clamp. Check the cables for frayed insulation. If the insulation needs repair, open the clamp, wrap the cables with insulating tape, and replace the cables in the clamp.

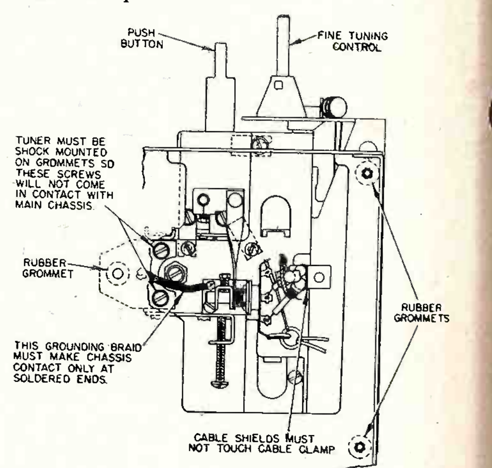


Fig. 2. Tuner for Sears Chassis 101.846, 101.854, 101.864, 101.867, and 101.868.

Check all hold-down screws on the tuner for tightness, especially the screws attaching the cover over the high band coils. Loose screws as well as poor solder joint may be a source of noise.

●

Westinghouse H-223, Ch. V-2150-01, V-2150-02, V-2150-04

Chassis V-2150-01, V-2150-02 and V-2150-04 are used in model H-223. The differences in these chassis are in the r-f tuner assembly.

The V-2150-01 chassis uses a tuner assembly marked V-6771-2. The V-2150-02 chassis uses a tuner marked V-6850. This tuner is electrically the same as the V-6771-2 tuner, but one wafer of the channel selector is mounted on the outside of the tuner housing.

The V-2150-04 chassis uses a tuner marked V-6238. This is the same tuner that is used in Model H-251. The high-frequency oscillator alignment procedure given for Model H-223 applies to the V-2150-01 chassis only. For high-frequency oscillator alignment information on the other two chassis refer to the data on Model H-251.

In early chassis, the resistance values of the V 6464 horizontal hold R403 and vertical hold R404 controls are 250,000 ohms for both sections. With these 250,000-ohm controls, the resistors that are connected in series with each control, R433 and R436, should have the resistances 100,000 and 330,000 ohms respectively. However, in later production the hold-control resistance values were changed to 100,000 ohms for R403 and 500,000 ohms for R404. When the 100,000- and 500,000-ohm controls are used, the values indicated for R433 and R436 are not correct; both R433 and R436 should be 220,000 ohms (RC20AE-224J). Since the controls furnished as replacements under part number V-6464 are the later type, R433 and R436 must be 220,000 ohms when a replacement control is installed.

The following changes should be made in the parts list:

Part No.	*Description*
V-6889-1	Indicator, channel (use with V-2150-01 or V-2150-02 chassis)
V-6282-1	Indicator, channel (use with V-2150-04 chassis only)
V-8200	Tuner assembly, complete less mounting (V-2150-01 and V-2150-02 chassis only)
V-8215	Tuner assembly, complete less mounting (V-2150-04 only).

Hoffman Service Hints

A new type high-voltage transformer is being used in current production of Hoffman television receivers. The new transformer has the advantage of producing greater horizontal sweep output (more width) and also increasing slightly the high voltage. The circuit connections and mounting location are identical to the former transformer; and with associated parts, the new transformer may be used as a direct replacement. The width coil and damping resistor must be replaced when a new type transformer is used. The main change in the transformer is the construction and type of core, which raises the efficiency. The new parts have been incorporated on models with 12-inch picture tube on all sets produced after Serial No. H911744. The part numbers are as follows:

Old Part	*New Part*	*Item*
T107 (5128)	T107 (5134)	Transformer, h-v
L112 (5295)	L112 (5316)	Width coil
R189 (4713)	R189 (4721)	Damping resistor.

The new damping resistor has resistance sections of 11,000, 1,500, 1,300 and 1,200 ohms.

The new parts have been incorporated on models with 16-inch picture tubes on all sets produced after Serial No. H913281. The 16-inch part numbers are as follows:

Old Part	*New Part*	*Item*
T107 (5123)	T107 (5135)	Transformer, h-v
L112 (5290)	L112 (5317)	Width coil
—	R212 (4712)	Damping resistor.

Formerly, no damping resistor was used across the 6W4GT damping diode on the 16-inch set. The damping resistor, 25,000 ohms, 4 watts, is added from pins 5 to 3 of the 6W4GT. The width control coil is connected in the identical manner as the previous part, and it is not necessary to parallel the width coil with a condenser when the new transformer is used.

Philco 50-T1403, 50-T1404, 50-T1406

The chassis of Models 50-T1403, 50-T1404, and 50-T1406 are similar to that used in Model 50-T1400.

ANTENNA ARRAY INTER-CONNECTIONS

(Continued from page 1)

practice is extended too far by interconnecting an array consisting of too many elements, all interconnected as noted above, the frequency bandwidth of the system will be impaired. Another serious effect is that TV signals will probably be distorted, since earlier zero relative phase in the carrier is not a sufficient criterion for bringing all signal components into like phase. Zero absolute phase, obtainable only with equal length lines, is the only safe answer.

Transmission-Line Sections as Transformers

We have seen that over a restricted frequency band sections of transmission lines may be employed to change the resistance of a given load from one value to another. Such line sections may be used at the receiving antenna end of the system, or at the radio receiver end of the system, or in exceptional cases at some intermediate point. Not only can such short lines be employed to transform the resistance value, but also they can sometimes be used to connect a balanced circuit to an unbalanced circuit.

For transforming a resistance value, a line section of one quarter-wavelength or an odd number of quarter-wavelengths is generally used. This line length is measured at the known velocity of propagation for that particular line, and is generally less than a free-space quarter-wave. For high-grade open-wire lines and low-loss coaxial lines, where air is the predominant dielectric, the velocity is usually about 0.98 of the free-space value and the physical length accordingly is also 0.98 times a free-space quarter-wave. For a 300-ohm twin lead, the reduction factor is 0.85, and for RG 8/U solid dielectric coaxial cable the factor is 0.66.

When such a line section is used it will, at the frequency for which the length was determined, connect together efficiently any two resistances *provided their product is equal to the square of the line surge impedance,* or equivalently, the square root of their product is equal to the value of the surge impedance. Furthermore, if the resistance at one end of the line and its surge impedance are known, we can determine the value of the transformed resistance at the other end by dividing the square of the surge impedance by the known value of the resistance termination. This means that the line surge impedance is the geometric mean between one large and one small terminating resistance value. There is a practical limit above which the action becomes very inefficient: when one resistance is exceedingly high and the other very low. This limit is imposed by the loss in the line section. For instance, a quarter-wave section consisting of 300-ohm twin lead at 200 Mc has a length of 12.55 inches and a loss of 2.3 db per hundred feet. The loss resistance per hundred feet is 160 ohms. For one quarter-wave length at 200 Mc (about 1 foot) this would be about 1.6 ohms. If the resistance of the unterminated open-circuit-line section were measured it would be one half of this or 0.8 ohm. If short-circuited, it would be $\frac{(300)^2}{0.8}$ or 112,500 ohms (since the square of the surge impedance equals the product of open- and short-circuited resistance values). It becomes evident that the practical resistance values must be at least in a ratio of 1:10 to the above to avoid serious shunting, or in this case, not less than 8 ohms nor more than 11,250 ohms if the transformation is to be efficient.

If required for practical reasons, a longer physical length may be used, such as any odd multiple of one quarter-wave; but this will further restrict the bandwidth and limit the values of resistance which can be efficiently handled in inverse proportion to the length of the line.

There are many simple and efficient ways to use line sections to connect a balanced resistance to an unbalanced resistance. Usually the "balun," as it is called, also results in an impedance transformation. One method of employing this balancing device is to feed from a 300-ohm balanced antenna system into a 75-ohm coaxial line. One side of the 300-ohm circuit connects to the inner conductor at the end of the main 75-ohm coaxial cable. The other side of the 300-ohm circuit connects to the inner conductor of a short half-wave section of 75-ohm coaxial line. The other end of the short half-wave section is shunted to the main 75-ohm line, connecting sheath to sheath, and inner conductor to inner conductor.

In general, the use of line sections of the above types will tend to restrict the frequency bandwidth of broadband antenna systems to a value from about 0.70 times the center frequency to about 1.4 times the center frequency. Many antenna systems are already much sharper than this, though the use of line sections will have a negligible effect.

Line Interconnections for In-Phase Arrays

Let us now discuss some specific cases of transmission-line feeders for in-phase arrays. For the sake of standardizing the procedure of array interconnections, it is useful to note that the unit antenna resistances (i.e., the resistance of any one element in an array) met in practice, the common transmission-line resistances and the standard receiver input resistance values fall into a few basic categories. The lowest values of resistances occurring in these categories is 72 ohms or 75 ohms, and hence it is simplest to consider all other values as ratios of 72 ohms or 75 ohms. We shall not split hairs here but arbitrarily shall take 75 ohms as the base value. When we do this, we can consider receiver input resistances of 72 ohms, 95 ohms, and 300 ohms, obtaining ratios of 1 (approximately), 1.3, and 4, respectively, when comparing them to the base value of 75 ohms.

Similarly, the common transmission lines fall into the following classes: 72 ohms, 150 ohms, 200 ohms, 300 ohms, and 600 ohms; corresponding to ratios of 1 (approx.), 2, $\sqrt{8}$ or 2.8 (approx.), 4, and 8, when compared to 75 ohms.

Antennas may be classified as shown in Table I below:

TABLE I

ANTENNA RESISTANCE RATIOS

Resistance Unit Value (ohms)	Unit Type	Ratio of Unit-Resistance to 75 ohms
18	Center-fed, half-wave with 2 parasitics Center-fed Yagi	¼
36	Center-fed half-wave with 1 parasitic	½
72	Center-fed standard half-wave Yagi with folded element	1
150	Fan, or Conical dipole Yagi with folded element	2
300	Solid Conical, full-wave	4
600	Thin solid conical, full-wave	8
1,200	End-fed pairs of half-wave dipoles	16
2,400	End-fed pairs of half-wave dipoles	32

Keeping these ratios in mind, we can now employ them for specifying array interconnections and for noting the resistance magnitude at each line junction.

Take, for instance, the 2-element array cases shown in Fig. 2. In each case, the unit

2-ELEMENT ARRAYS

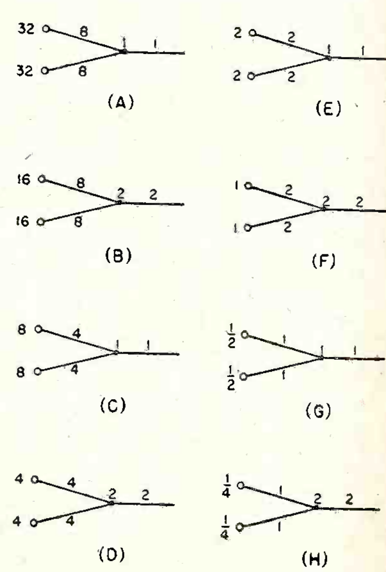


Fig. 2. Line interconnections for various 2-element arrays.

antenna is shown as a small circle representing the feed point. Although we know that each feed point consists of two terminals, we shall show it as a single small circle. Beside the circle is a number which indicates the ratio of the antenna resistance to 75 ohms for that particular unit antenna. From each

(Continued on page 14)

(Continued from page 12)

unit antenna a slanting single line is drawn representing symbolically the interconnecting two-wire line. On this line is a number which represents the ratio of the required surge impedance of that line to 75 ohms. Where two slanting lines meet is the junction of *two* two-wire lines; here again a number is used to give the ratio of the value of resistance presented to the feeder lines to 75 ohms.

The diagrams are based on quarter-wave interconnecting line sections, but also apply to any odd multiple of this length. Thus, they indicate in a simple manner the proper resistance value for the interconnecting lines and the manner in which the individual resistances are transformed to other values. Consider, for instance, part (A) of Fig. 2. Here the two end-fed half-wave dipoles (indicated by *32*) are effectively in parallel and present a resistance of $\frac{2,400}{2}$ or 1,200 ohms, as is evident from Table I. To match this impedance to the 75-ohm receiver input (indicated by *1*), the surge impedance of the two feeder lines in parallel should be $\sqrt{1,200 \times 75} = 300$ ohms, in accordance with our previous rule. Choosing two quarter-wave sections of 600 ohms each (indicated by *8* on the slant lines) they will have a parallel resultant resistance of 300 ohms, as required for a perfect match. Diagrams (B), (C), (D), (E), (F), (G), and (H) of Fig. 2, show different 2-element configurations and may be checked in a similar manner.

For the sake of completeness similar cases are shown for 4- and 8-element arrays in Figs. 3 and 4, respectively, for the antenna systems listed in Table I. Let us consider, for example, the 8-element array shown in (H) of Fig. 4. Here the problem is to match from a low-resistance antenna system consisting of eight center-fed half-wave elements with two parasitics each, or an 8-element Yagi array (see Table I), into a 150-ohm receiver input stage (indicated by a 75-ohm ratio of *2*). The necessary impedance transformations are achieved here by means of quarter-wave line sections. Let us check whether the over-all system is matched, keeping in mind that the surge impedance of the quarter-wave connecting line must equal the square root of the two terminating impedances, or equivalently, the square of the surge impedance divided by one of the terminating load impedances gives the value of the transformed impedance at the other end of the line section. For the purpose of simplifying the calculations we can use the numerical 75-ohm ratios shown in part (H), realizing that the actual impedance values are 75 times as great as the values shown.

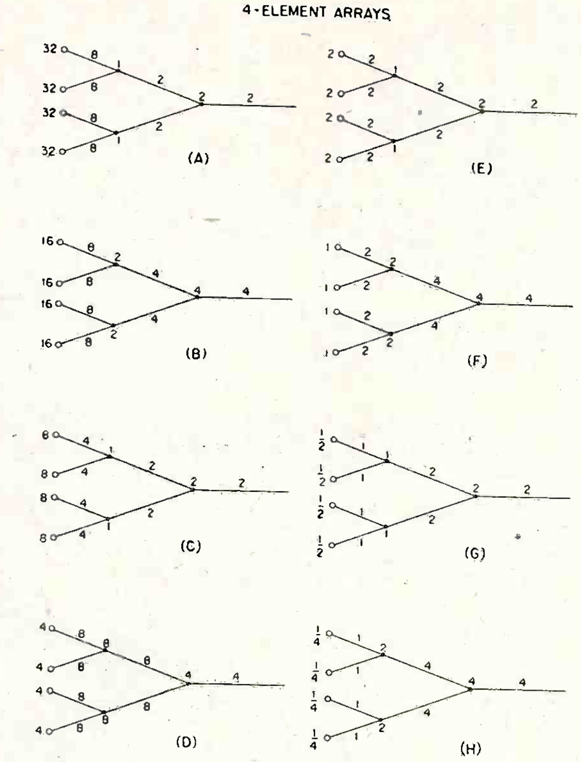


Fig. 3. Line interconnections for various 4-element arrays.

Starting with the upper pair of elements in part (H), we see that two 72-ohm quarter-wave sections (indicated by *1*) are used to connect together the two elements. The transformed output impedance presented by *each* element at the common junction is then the square of the line surge impedance divided by the unit antenna resistance, or $\frac{(1)^2}{\frac{1}{4}} = 4$. Since the two elements are in parallel, the impedance presented at the junction will be one-half of this value or *2*, and has been so marked on the diagram. The same holds true for the other three pairs of elements shown. Let us now look at the interconnection of the upper two pairs by means of two 300-ohm quarter-wave sections, marked *4* in the diagram. Each of these lines couples on to one end of a junction point marked *2*. Hence the transformed impedance at the other end of *each* line section is $\frac{(4)^2}{2}$ or 8, and for the

(Continued on page 16)

THE ELECTRONIC ENGINEERING MASTER INDEX

bibliographical listings of research on electronics, atomics, optics, physics and allied fields

The *Journal of The Franklin Institute* has this to say about the 1947-1948 ELECTRONIC ENGINEERING MASTER INDEX:

"Have you had occasion to use the previous issues of this book? If so, you will be glad to know that 1947-1948 *Index* is now available. If you want a comprehensive bibliography on any phase of electronic engineering, this book puts it at your finger tips.

"Every technical library should have a copy on its reference shelf. Electronics engineers will want a copy of their own especially if a library copy is not easily accessible. And any other engineer or technician interested in the application of electronics to his work or the way in which electronics uses his product will find the subject indexed alphabetically. How are plastics used? Do you have a process control problem? How is electronics applied to medicine? These subjects plus all of the expected radio, television, circuit and tube theory and practice are indexed."

Being Shipped This Month!

1949 edition containing 12,500 references from over 400 world-wide publications, U. S., Canadian, and British declassified documents, and U. S. patents. Over 600 authoritative subject headings. Cumulative subject cross index covering 1925-45, 1946, 1947-48, and 1949 editions also included.

1949 edition $17.50.

Other editions now available:

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

THE ELECTRONIC ENGINEERING PATENT INDEX

1946 edition—(2,000 patents)	$14.50

Books are heavy cloth bound 7½ x 10½ inches.

BACK ISSUE AND PHOTOSTAT SERVICES: To make the articles listed in the MASTER INDEX series available to you, we have inaugurated—by special arrangement with the publications listed below—a Back Issue and a Photostat Service. The charge for back issues is the publisher's regular price. If the desired issue is out of stock, photostats of the desired article can be made. A nominal fee of 20¢, plus postage, is charged for each 8½" x 11" photostat. If two pages can be reproduced on one 8½" x 11" photostat, there is no additional charge.

We Can Supply You With:—

BACK ISSUE SERVICE

Archiv der Elektrischen Ubertragung: 1947-50
Chalmers Tekniska Hoegskolas Handlingar: 1942-50
Communication News: 1947-50
Das Elektron: 1946-50
Das Elektron in Wissenschaft und Technik: 1949-50
Electrical Communications: 1923-49
Elettronica et Televisione: 1946-49 (Formerly Elettronica)
ETZ: 1948-50
FM-TV: 1945-49
H.F.: 1949
Journal of the Television Society: 1946-49
Onde Electrique: 1947-50
Philips Research Reports: 1945-49
Philips Technical Review: 1936-49
Proc. I.R.E. Australia: 1945-50
Radio & Television Maintenance: 1945-50 (Formerly Radio Maintenance)
Radio Bulletin: 1950
Radio Ekko: 1938-47
Radio Francaise: 1946-49
Radio Jornal: 1949-50
Radio Service Dealer: 1949-50
Radio Times of India: 1946-50
Revue Scientifique: 1949-50
Scientific Monthly: 1946-49
Technique Moderne: 1946-49
Televisione Italiana: 1949

PHOTOSTAT SERVICE

Aerovox Research Worker
American Journal of Science*
American Photography
Amphenol Engineering News
Apco Bulletin
Archiv Der Elektrischen Ubertragung
Audio Engineering
Audio Record
A.W.A. Technical Review
Bakelite Review
Bell Laboratories Record
Bell System Technical Journal
British Journal of Applied Physics
Broadcast News*
Broadcasting-Telecasting
Broadcast News*
Bulletin de L'Association Suisse des Electriciens
Canadian Journal of Research
Cenco News Chats*
Chalmers Tekniska Hoegskolas Handlingar
Chemical Engineering Progress*
Chemical Industries*
Chemistry and Industry*
Communication News
Cornell-Dubilier Capacitor
CQ
Das Elektron
Das Elektron In Wissenschraft Und Technik
Electrical Communication
Electrical Review
Electronique
Elektrotechnik und Maschinenbau
Elettronica & Televisione
Engineering
ETZ
FM-TV
Frequenz
Frontier
FTZ
Funk Und Ton
G.E.C. Journal
General Electric Ham News
General Radio Experimenter
Helvetica Physica Acta*
HP Journal
Inco
Instruments
International Projectionist
Iron Age*
Journal of Applied Mechanics
Journal of Geophysical Research
Journal of Mathematics and Physics
Journal of Scientific Instruments
Journal of the American Ceramic Society
Journal of the British Institution of Radio Engineers
Journal of the Franklin Institute*
Journal of the Television Society
Marconi Review*
Marine Engineering and Shipping Review
Mechanical Engineering
Modern Industry
Modern Plastics
Muirhead Technique
Murphy News
Nature
Nickel Topics
Ohmite News
Onde Electrique
Oscillographer
Philips Research Reports
Philips Technical Review
Philosophical Magazine
Philosophical Transactions of the Royal Society, Series A, Mathematical and Physical Sciences*
Post Office Electrical Engineers' Journal
Proc. Koninklijke Nederland Akademie Lan Wetenschappen
Proc. of the Institute of Radio Engineers (Australia)
Proc. of the Institution of Electrical Engineers
Proc. of the Royal Society, Series A, Mathematical and Physical Sciences*
QST
Radio Age
Radio and Electronics (N.Z.)
Radio and Television News
Radio and Television Journal
Radio and Television Retailing
Radio Bulletin
Radio Distribution and Maintenance
Radio-Ekko
Radio Electronics
Radio Francaise
Radio Jornal
Radio Service Dealer
Radio Television and Appliance Sales
Radio Times of India
RCA Ham Tips*
RCA Radio Service News*
RCA Review
Revista Radiotecnica
Revista Telegrafica Electronica
Revue Technique
R.S.G.B. Bulletin
Science and Mechanics
Scientific Monthly
Service
Sylvania News
Sylvania Technologist
Technique Moderne
Techni-Talk
Tele-Tech
Television and the Viewer*
Television Engineering (Formerly Communications)
Television Francaise
Televisione Italiana
Tijdschrift Van Het Nederlandsche Radiogenootschap
Toute La Radio
Transactions and Discussions of the Faraday Society
US
Westinghouse Engineer
Wireless Engineer
Wireless World

* Special permission is required

Electronics Research Publishing Company, Inc. • *Dept. SS-5* • *480 Canal Street, New York 13, N. Y.*

(Continued from page 14)

two lines in parallel the common junction impedance is then 4 as shown. By symmetry, the lower two pairs are interconnected in the same fashion. Finally, the upper and the lower two pairs connect to the receiver input by means of 300-ohm quarter-wave sections marked 4. As seen from the diagram, each presents to the receiver input an impedance of $\frac{(4)^2}{4}$ or 4, and hence for both in parallel a common junction impedance of 2, which matches perfectly the input stage of 300 ohms.

It should be remembered that there are many alternative designs for these array interconnections. It is well to remember a few rules in designing a particular array. The ratio of the surge impedance of the interconnecting line to the resistance it is transforming should be kept as low as possible to prevent undesirable interconnecting line losses as well as sharpening too much the frequency selectivity characteristic of the system. If the diagrams given here do not meet the requirements as to a particular receiver input resistance, it is entirely possible to accomplish the match by inserting a short quarter-wave line section between receiver transmission line and the common output line of the array. If the receiver requires an unbalanced line (coaxial line) input, the transition from balanced array line to unbalanced receiver line may be effected by inserting a quarter-wave balanced line section as has been discussed previously.

The arrays shown in these illustrations cover many possible arrangements without any change of the interconnections specified here. In all of these in-phase arrays, however, each unit antenna should be placed so that:

1. All unit antennas are in one common plane perpendicular to the direction from which the desired signal comes.

2. Its major response direction is perpendicular to this common plane.

3. It is oriented properly with respect to the normal polarization of the incoming signal.

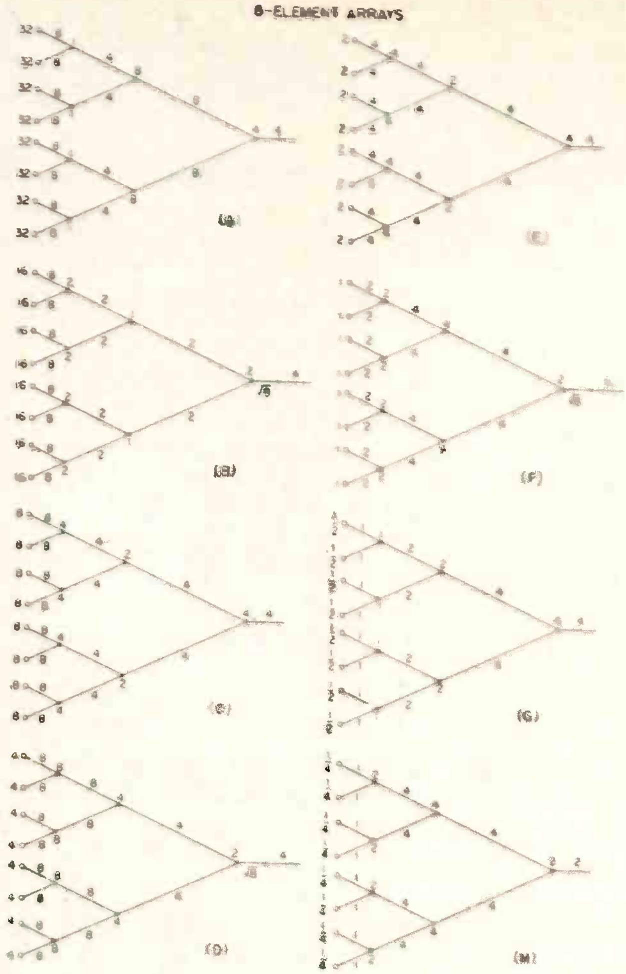


Fig. 4. Line interconnections for various 8-element arrays.

Curtain Time

(Continued from page 5)

We repeat what we have said on many occasions. Licensing does not cure evils. It does not make a dishonest man honest. It will not make a careless worker careful. It will not make an incompetent man competent. If conditions relative to television service are not what they should be, it is an industry problem and the industry should find the solution. As a matter of fact, if any municipality is intent upon establishing regulations which reflect upon the operations of the radio-television servicing industry, it would serve the best interests of its citizenry to serve on the panel and help set up the regulations.

A final bit of advice in the form of fact to City Councils. At the present moment, the rate at which television receiver installations are expanding cannot be matched by the educational facilities which are training men for this duty. Licensing will not get these men out of the classroom more rapidly. The industry requires time to train men. Education of the public is necessary. Cooperation between TV-set dealers, distributors, and manufacturers, so as not to oversell their equipment, is imperative. The development of such programs takes time. Licensing of a service facility will not expedite the implementation of an educational program addressed to the public, the demerits of the sales approach, or the demands of the public when it has an "open sesame" on the service facilities' time. The City Councils can do a great deal in this overall cause by setting up the proper codes. They should forget about added income which they may derive from television service organizations, because in the long run it will do more harm than good.

TV Service Contracts

Every so often a comment is heard to the effect that TV service contracts should be outlawed. That does not make any more sense than if the suggestion were made that we outlaw red cloth—because of the association with a political ideology. There is no doubt that the TV-contract situation is in a mess. Just what the corrective measures will be are still unknown, but it certainly is not the method that has been suggested. If some of the public desire TV service contracts, the contracts should be available to them, at a price which will afford the service facility the means for "proper conduct" of the business. In a few words this means a profit. To deny the public something which some of them may want is silly, regardless of what unhealthy conditions exist in different parts of the country. The conditions did not develop because of the contract; they arose from other conditions surrounding the contract. Correct those conditions and the TV service contract can continue to exist without interfering with the pay-by-call arrangement. We still hold with the opinion we expressed sev-

(Continued on page 24)

(Continued from page 14)

two lines in parallel the common junction impedance is then 4 as shown. By symmetry, the lower two pairs are interconnected in the same fashion. Finally, the upper and the lower two pairs connect to the receiver input by means of 300-ohm quarter-wave sections marked 4. As seen from the diagram, each presents to the receiver input an impedance of $\frac{(4)^2}{4}$ or 4, and hence for both in parallel a common junction impedance of 2, which matches perfectly the input stage of 300 ohms.

It should be remembered that there are many alternative designs for these array interconnections. It is well to remember a few rules in designing a particular array. The ratio of the surge impedance of the interconnecting line to the resistance it is transforming should be kept as low as possible to prevent undesirable interconnecting line losses as well as sharpening too much the frequency selectivity characteristic of the system. If the diagrams given here do not meet the requirements as to a particular receiver input resistance, it is entirely possible to accomplish the match by inserting a short quarter-wave line section between receiver transmission line and the common output line of the array. If the receiver requires an unbalanced line (coaxial line) input, the transition from balanced array line to unbalanced receiver line may be effected by inserting a quarter-wave balanced line section as has been discussed previously.

8-ELEMENT ARRAYS

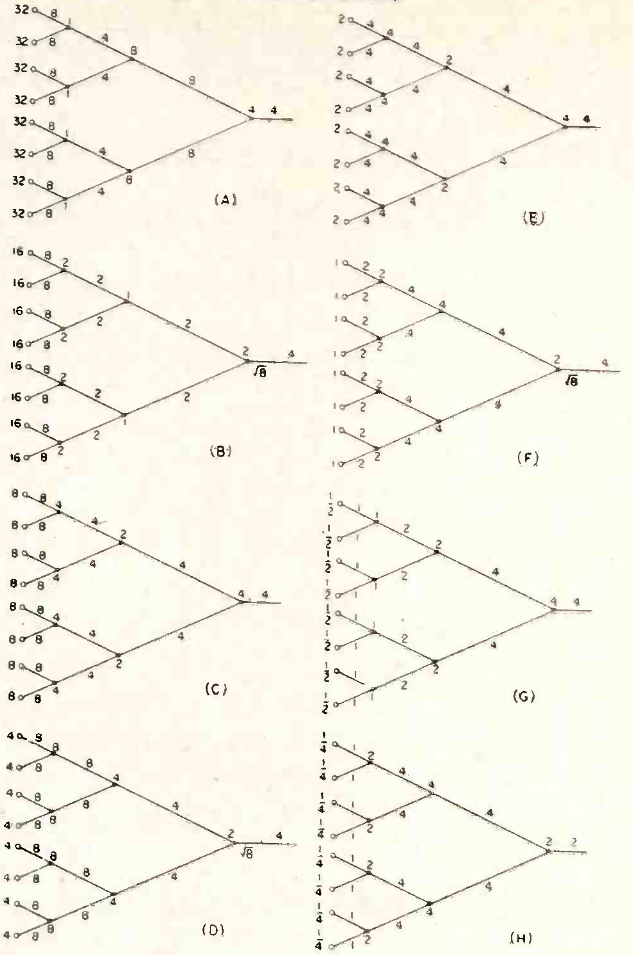


Fig. 4. Line interconnections for various 8-element arrays.

The arrays shown in these illustrations cover many possible arrangements without any change of the interconnections specified here. In all of these in-phase arrays, however, each unit antenna should be placed so that:

1. All unit antennas are in *one* common plane perpendicular to the direction from which the desired signal comes.
2. Its major response direction is perpendicular to this common plane.
3. It is oriented properly with respect to the normal polarization of the incoming signal.

(Continued from page 14)

two lines in parallel the common junction impedance is then *4* as shown. By symmetry, the lower two pairs are interconnected in the same fashion. Finally, the upper and the lower two pairs connect to the receiver input by means of 300-ohm quarter-wave sections marked *4*. As seen from the diagram, each presents to the receiver input an impedance of $\frac{(4)^2}{4}$ or 4, and hence for both in parallel a common junction impedance of 2, which matches perfectly the input stage of 300 ohms.

It should be remembered that there are many alternative designs for these array interconnections. It is well to remember a few rules in designing a particular array. The ratio of the surge impedance of the interconnecting line to the resistance it is transforming should be kept as low as possible to prevent undesirable interconnecting line losses as well as sharpening too much the frequency selectivity characteristic of the system. If the diagrams given here do not meet the requirements as to a particular receiver input resistance, it is entirely possible to accomplish the match by inserting a short quarter-wave line section between receiver transmission line and the common output line of the array. If the receiver requires an unbalanced line (coaxial line) input, the transition from balanced array line to unbalanced receiver line may be effected by inserting a quarter-wave balanced line section as has been discussed previously.

The arrays shown in these illustrations cover many possible arrangements without any change of the interconnections specified here. In all of these in-phase arrays, however, each unit antenna should be placed so that:

1. All unit antennas are in *one* common plane perpendicular to the direction from which the desired signal comes.
2. Its major response direction is perpendicular to this common plane.
3. It is oriented properly with respect to the normal polarization of the incoming signal.

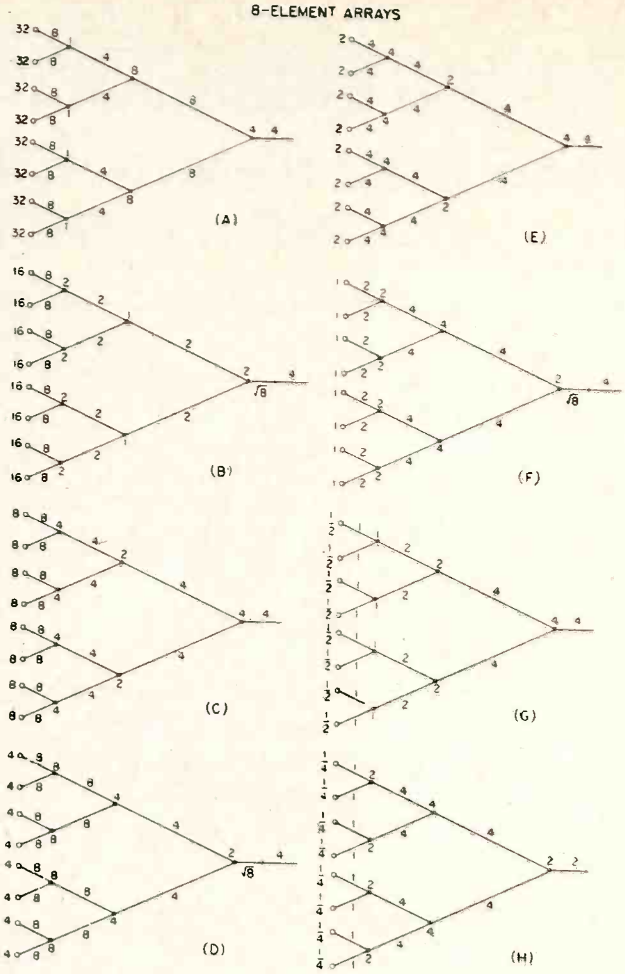


Fig. 4. Line interconnections for various 8-element arrays.

TUNG-SOL

5881

BEAM POWER AMPLIFIER

for the ultimate in reliability where the 6L6 is called for . .

Absolute reliability!

There, in two words, is the net result of all the engineering which TUNG-SOL has put into the 5881. This completely new tube is designed to operate in circuits for which the 6L6 is specified and is completely interchangeable wherever the 6L6 is now in use. Full utilization of the design and production techniques which have proved themselves over the past 15 years, has created this exceptionally reliable tube. The 5881 has tremendous overload capacity. It maintains high efficiency throughout its life and provides low cost operation through reduced maintenance.

The 5881 is manufactured under laboratory conditions accompanied by the most severe tests. It is rugged both mechanically and electrically. Here are six major features which assure its premium performance:

1. **Glass button stem permits compact construction with high resistance to mechanical shock.**
2. **Rugged micanol low-loss base provides full lifetime electrical insulation and minimizes base leakage.**
3. **Cathode materials of exceptional stability give more uniform emission with greater life expectancy. Cathode is not poisoned by inactivity during standby periods.**
4. **Maximum control of grid emission achieved by gold plating and carbonizing.**
5. **Zirconium anode coating is most active under overload conditions providing ample gettering action to prevent accumulation of gases.**
6. **Life tests are made under severe overload conditions to assure adequate safety factor.**

Where reliable service is essential in audio circuits, the TUNG-SOL 5881 is a "must." Order it from your regular TUNG-SOL supplier.

TUNG-SOL
ELECTRON TUBES

The TUNG-SOL engineering which has produced the 5881 is constantly at work on a multitude of special electron tube developments for industry. Many exceptionally efficient general and special purpose tubes have resulted. Information about these and other types are available on request to TUNG-SOL Commercial Engineering Department.

TUNG-SOL LAMP WORKS INC., NEWARK 4, NEW JERSEY

SALES OFFICES: ATLANTA · CHICAGO · DALLAS · DENVER · DETROIT · LOS ANGELES · NEWARK

Also Mfrs. of: RECEIVING TUBES, MINIATURE INCANDESCENT LAMPS, ALL-GLASS SEALED BEAM HEADLIGHT LAMPS and CURRENT INTERMITTORS

Curtain Time

(Continued from page 5)

We repeat what we have said on many occasions. Licensing does not cure evils. It does not make a dishonest man honest. It will not make a careless worker careful. It will not make an incompetent man competent. If conditions relative to television service are not what they should be, it is an industry problem and the industry should find the solution. As a matter of fact, if any municipality is intent upon establishing regulations which reflect upon the operations of the radio-television servicing industry, it would serve the best interests of its citizenry to serve on the panel and help set up the regulations.

A final bit of advice in the form of fact to City Councils. At the present moment, the rate at which television receiver installations are expanding cannot be matched by the educational facilities which are training men for this duty. Licensing will not get these men out of the classroom more rapidly. The industry requires time to train men. Education of the public is necessary. Cooperation between TV-set dealers, distributors, and manufacturers, so as not to oversell their equipment, is imperative. The development of such programs takes time. Licensing of a service facility will not expedite the implementation of an educational program addressed to the public, the demerits of the sales approach, or the demands of the public when it has an "open sesame" on the service facilities' time. The City Councils can do a great deal in this overall cause by setting up the proper codes. They should forget about added income which they may derive from television service organizations, because in the long run it will do more harm than good.

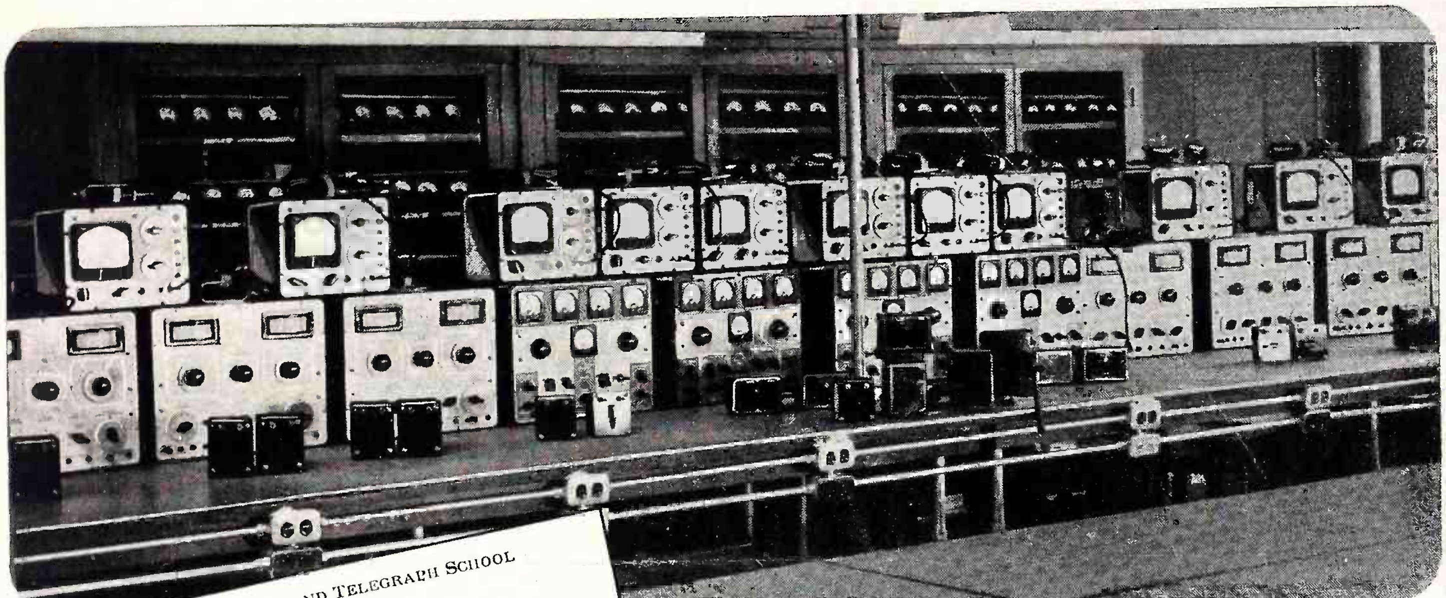
TV Service Contracts

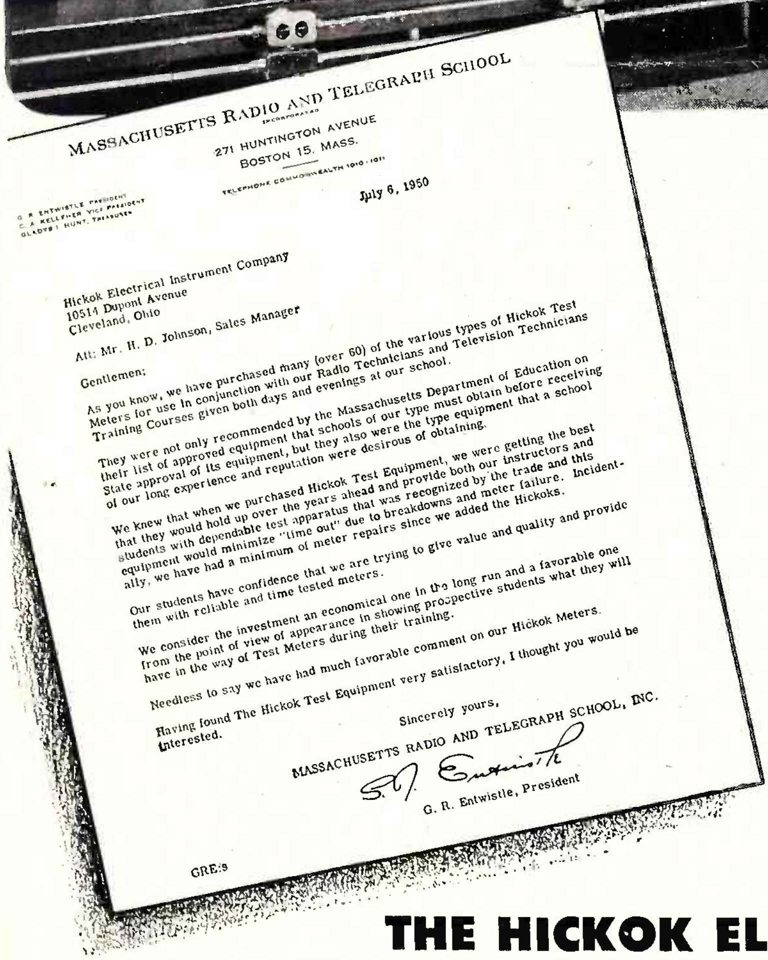
Every so often a comment is heard to the effect that TV service contracts should be outlawed. That does not make any more sense than if the suggestion were made that we outlaw red cloth—because of the association with a political ideology. There is no doubt that the TV-contract situation is in a mess. Just what the corrective measures will be are still unknown, but it certainly is not the method that has been suggested. If some of the public desire TV service contracts, the contracts should be available to them, at a price which will afford the service facility the means for "proper conduct" of the business. In a few words this means a profit. To deny the public something which some of them may want is silly, regardless of what unhealthy conditions exist in different parts of the country. The conditions did not develop because of the contract; they arose from other conditions surrounding the contract. Correct those conditions and the TV service contract can continue to exist without interfering with the pay-by-call arrangement. We still hold with the opinion we expressed sev-

(Continued on page 24)

Where the best is needed... THE CHOICE IS HICKOK

Radio and TV Test Instruments





MASSACHUSETTS RADIO AND TELEGRAPH SCHOOL
INCORPORATED
271 HUNTINGTON AVENUE
BOSTON 15, MASS.
TELEPHONE COMMONWEALTH 1010-1011

G. R. ENTWISTLE PRESIDENT
C. A. KELLEHER VICE PRESIDENT
GLADYS I. HUNT, TREASURER

July 6, 1950

Hickok Electrical Instrument Company
10514 Dupont Avenue
Cleveland, Ohio

Att: Mr. H. D. Johnson, Sales Manager

Gentlemen;

As you know, we have purchased many (over 60) of the various types of Hickok Test Meters for use in conjunction with our Radio Technicians and Television Technicians Training Courses given both days and evenings at our school.

They were not only recommended by the Massachusetts Department of Education on their list of approved equipment that schools of our type must obtain before receiving State approval of its equipment, but they also were the type equipment that a school of our long experience and reputation were desirous of obtaining.

We knew that when we purchased Hickok Test Equipment, we were getting the best that they would hold up over the years ahead and provide both our instructors and students with dependable test apparatus that was recognized by the trade and this equipment would minimize "time out" due to breakdowns and meter failure. Incidentally, we have had a minimum of meter repairs since we added the Hickoks.

Our students have confidence that we are trying to give value and quality and provide them with reliable and time tested meters.

We consider the investment an economical one in the long run and a favorable one from the point of view of appearance in showing prospective students what they will have in the way of Test Meters during their training.

Needless to say we have had much favorable comment on our Hickok Meters.

Having found The Hickok Test Equipment very satisfactory, I thought you would be interested.

Sincerely yours,

MASSACHUSETTS RADIO AND TELEGRAPH SCHOOL, INC.

G. R. Entwistle

G. R. Entwistle, President

GRE:s

Massachusetts Radio & Telegraph School is one of the oldest and best equipped radio technician training centers in the country.

When choosing test equipment, they demand highest accuracy and dependability, for long, hard use by hundreds of students, every day. HICKOK equipment is their choice, just as it's always been the Choice of the Experts, for over 40 years.

You, as a professional Radio and TV Servicing Technician, also know the true value of highest quality test equipment. With HICKOK instruments, you can quickly, accurately and profitably repair the most troublesome receivers. When you choose HICKOK, you know you have the best.

• See your nearest HICKOK jobber, or write a card today for full information on HICKOK Highest Quality Servicing Equipment, including the latest instruments that are built only by HICKOK.

THE HICKOK ELECTRICAL INSTRUMENT CO.
10520 Dupont Avenue · Cleveland 8, Ohio

1910 ★ *40th Anniversary* ★ 1950

Radio Changes

General Electric 141, 143

The hinge used in these receivers can easily be removed and replaced in the plastic cabinet or cover by the application of heat. To remove the hinge from the back cover or cabinet proper, heat the hinge at the half to be removed from the cabinet with a soldering iron. The hinge may then be pulled out of the groove of the plastic hinge recess. Since the cabinet plastic softens at a relatively low temperature, it will be unnecessary to apply the heat very long. To replace the hinge into the new unit, first start the hinge into the slotted recess in the plastic, then heat the hinge with the soldering iron and gently push the hinge into place.

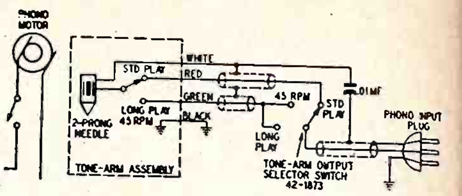
●

Philco 50-1720

This model is electrically similar to Model 50-1725. It is housed in a different style of cabinet and employs an M-20 record changer.

The following schematic changes have been made. The connection from C421 now goes to R409, which goes to the junction of R410 and C422, instead of to R306. L410 has been inserted from the junction of C306 and C422 to the junction of C330 and C309. The value of R403 has been changed from 10,000 ohms to 22,000 ohms. Capacitor C320 has been added from ground to the junction of C306, R300, and tap 4 of Z300. Capacitor C329 is now located from ground to the junction of tap 2 of Z303 and pin 7 of the 6BJ6 2nd i-f amplifier, instead of from B— to ground. Capacitor C331 is now connected from the junction of C332 and C327 to ground, instead of across C333. Capacitor C320 has been deleted. It was connected from ground to the junction of C321 and R312. Capacitor C210 has been inserted from the junction of pin 7 of the 1st audio amplifier, ½ 19T8, to ground. The value of R201 has been changed from 47,000 ohms to 33,000 ohms. Capacitor C105 has been inserted from ground to the junction of L100 and pin 5 of the 19T8. Coils L402, L403, L405, and L408 are ¼ μh.

The accompanying diagram shows the hookup for the record changer, Model M-20.



Hookup for Record Changer, Philco Model M-20, in Philco Model 50-1720.

In Run #2, Capacitor C330 has been removed to improve f-m discriminator performance.

The replacement parts list for Model 50-1725 applies to Model 50-1720, except for the differences indicated below:

Ref. No.	*Part No.*	*Description*
C105	62-110009001	Capacitor, filament bypass, 100 μμf
CR100	34-8003-2	Rectifier, selenium, dry-disk, 150 ma
CR101	34-8003-2	Rectifier, selenium, dry-disk, 150 ma
R100	33-1335-84	Resistor, current limiting, 50 ohms
R101	33-3435-23	Resistor, 2-section filter
C210	62-122001001	Capacitor, cathode bypass, 220 μμf
LS200	36-1610-4	Loudspeaker
R201	66-3338340	Resistor, bass compensation, 33,000 ohms
T200	32-8367-1	Transformer, audio output
C320	62-110009001	Capacitor, plate decoupling bypass (f-m) 100 μμf (rewired)
C329	62-110009001	Capacitor, r-f bypass, 100 μμf (rewired)
C333	62-110009001	Capacitor, r-f bypass, 100 μμf
Z300	32-4257A	Transformer, f-m 1st i-f
Z301	32-4258A	Transformer, a-m 1st i-f
Z302	32-4372-1A	Transformer, f-m 2nd i-f
Z303	32-4160-3A	Transformer, a-m 2nd i-f
Z305	32-4240-2A	Transformer, a-m 3rd i-f
C400	31-2724-7	Capacitor, tuning gang (f-m, 3-section; a-m, 2-section)
L410	32-4143-4	Coil, B— r-f isolating choke, 100 μh
LA400	76-3583-13	Loop aerial
	10762	Cabinet
	54-7846	Back
	1W25345FE11	Screw, back mtg. (12 required)
	219-179	Baffle, wood, speaker
	40-7715	Baffle-and-cloth ass'y
	56-5855	Bezel
	54-5021	Dial scale
	56-2234-3	Scale strap (2 required)
	45-6564	Drop door
	27-4610	Grommet, control shaft, light shield (4 required)
	45-6565	Instrument panel
	27-6233-39	Socket ass'y, pilot lamp

WHERE IS THE SUPPLY?

As publishers, we are concerned with the implements of the trade. The printers are not working three shifts around the clock, at least not as many of them as were doing so during 1942-1947. The photo-engravers who make the cuts for letter-press printing are not flooded with work, in fact some of them are seeking more work. Yet the paper situation is one that has everybody confused. If paper is not available, printing cannot be done, no matter how many hours of idle time are still available in a print shop.

According to the administration there is a plentiful supply of everything. To us, everything means paper, binder's cloth, steel, and all of the materials which go into making up a manual or book, packing it and shipping it. So it is only natural that we are confused by things like the following: The paper we use in our manuals and textbooks is in short supply. Some mills are not accepting orders. Some mills are promising delivery (maybe!) in three months and some in six months with the prevailing price at the time of delivery. Cotton, the base material for manual and textbook binders is supposed to be in ample supply, but the converters say that it is difficult to procure. We are not speaking about prices, these have already risen! We're speaking about supply—where is it? Many mills are already allocating paper—a voluntary allocation without government request.

There are the facts. To say that we don't understand why things are as they are, is putting it mildly! We knew why years ago, but not now—at least not yet! If you are shy any volumes of Rider's Manuals—TV, AM-FM, or PA, get them now. That's all that we can say.

RADIATING TV RECEIVERS

A great deal of interest is being focused on the matter of radiating TV receivers. The FCC feels very strongly on this point and has called on the manufacturers of receivers to remedy the condition. Many of the shifting and weaving herringbone patterns which occasionally appear on TV screens are being attributed to causes far removed from the actual device at fault—another TV receiver being operated in the neighborhood. Many manufacturers are taking steps to minimize such actions in their current receiver output, and some have even gone so far as to correct the trouble in their older receivers, but the situation remains prevalent.

It is a very serious problem to the serviceman. Its detection is difficult and time consuming. It cannot be concluded by simple visual examination of the screen, although, by observing the continuous shifting and even change in intensity, a fairly accurate decision can be made that receiver radiation is the cause. However, actually *correcting* the condition at the receiver being interfered with is another matter. It cannot be done there, since the radiating signal is being picked up just as if it were a television signal, even though it is an unmodulated carrier. The remedy lies at the radiating receiver. The owner of the receiver being interfered with cannot be expected to pay for any service on the offending receiver; and in turn, the owner of the offending receiver cannot be expected to pay for something which is purely a matter of receiver design. So the situation ends in an impasse—except for the fact that the serviceman's technical ability is under suspicion—he has not corrected the defect!

In this respect the serviceman is behind the "eight-ball," for time is required to verify the nature of the trouble, and who will pay for the time! An owner of a receiver being interfered with may be willing to pay for services if the fault is cured, but he will not pay for such a diagnosis without a cure. Then again, who knows but that the receiver being interfered with is also interfering with others.

It seems only fitting and proper that information of this kind which might be of aid to the TV serviceman should be released for his practical use, although it is admitted that its successful application for a fee is doubtful. We might, however, suggest that all known instances of radiation from a TV receiver be called to the attention of the manufacturer, for if he corrects the fault, it will undoubtedly obviate numerous complaints. To say the least, the average manufacturer is anxious to learn about such situations, for it is to his benefit. This means that every TV receiver being serviced by a servicing facility should be checked to determine if it is radiating its oscillator signal. This should be a routine test over all channels.

●

Westinghouse H-251

Under "Miscellaneous" the part number of Knob, magnifier (front), should be changed from V-7893-2 to V-6284-2. L401 in the parts list should be changed to read L501.

Curtain Time

(Continued from page 18)

eral years ago: In the long run, TV servicing will be done on the pay-as-you-call basis. The faster the TV servicing industry develops the required number of technically competent personnel, the sooner this day will arrive.

JOHN F. RIDER

Hoffman Service Hints

Ratings of line fuses for all models have been increased to avoid blowing of fuses during temporary surge currents that may occur when the set is first turned on. The fuses to be used in production are:

Chassis	*Fuse Rating*	*Fuse Type*	*Part No.*
All 10" and 12" Chassis	3 amp, 250 v	3AG Slo-Blo	9648
All 16" and 19" Chassis	5 amp, 250 v	3AG Standard	9661.

This represents a rating increase from 2 amps to 3 amps on 10- and 12-inch sets, and from 3 amps to 5 amps on 16- and 19-inch sets.

More convenient placement of the line fuse is attained by holding the fuse in an extractor type fuse post. This fuse post, part number 447, is located on the rear apron of the chassis, immediately below the a-c power interlock plug. The fuse can be removed without removing the backboard or disassembling the set.

The removable fuse holders and higher fuse ratings will appear on all sets produced after Serial No. A006389.

Stromberg-Carlson TC10 Series

The R68, 1-megohm, ½-watt resistor, in series with the high voltage, has been changed to a 680,000-ohm, 1-watt value (part no. 149202). If flashing horizontal streaks or lines are observed in a TC10H picture when the brightness control is advanced, the receiver may have a defective 1-megohm resistor in the R68 position which should be changed to the 680,000-ohm value, even though the resistor outwardly appears to be good. This resistor will be found on the 1B3 socket terminal in the high-voltage case.

A 150,000-ohm, ½-watt resistor (part no. 27640) has been substituted for the 39,000-ohm, 1-watt resistor in the R15 position.

The first i-f screen resistor R23 has been changed from 33,000 ohms, ½ watt, to 56,000 ohms, ½ watt (part no. 28178).

Resistor R66 in the 1B3 filament circuit has been changed from 3.3 ohms to 5.6 ohms (part no. 149271).

Resistor R43 may be a 1.8-megohm or a 1.5-megohm resistor, if the R57 potentiometer in the vertical sweep oscillator is part number 145086 or 145102, respectively.

INDEX

† The Rider Manual Page Numbers given under Television Changes are for Rider TV Manuals. The volume number is the number preceding the dash. (For example, Admiral 4-1 indicates Admiral page 1 in Rider's TV Manual Volume 4.) Volume numbers preceded by an asterisk (*) apply to the 8½" x 11" page size Manual only.

The Rider Manual Page Numbers given under Radio Changes are for Rider AM-FM Manuals. The volume number is the number preceding the dash.

Sec. 34.66, P. L. & R.
U. S. POSTAGE
PAID
NEW YORK, N. Y.
PERMIT No. 9427

A. J. S. CERINO
5310 OVERBROOK ST.
DOUGLASTON, L. I., NEW YORK

From
JOHN F. RIDER PUBLISHER, Inc.
480 CANAL ST., NEW YORK 13, N. Y.
Return Postage Guaranteed

OCTOBER, 1950

Successful SERVICING

Installing MASTER ANTENNA SYSTEMS

by

IRA KAMEN *and* RICHARD H. DORF

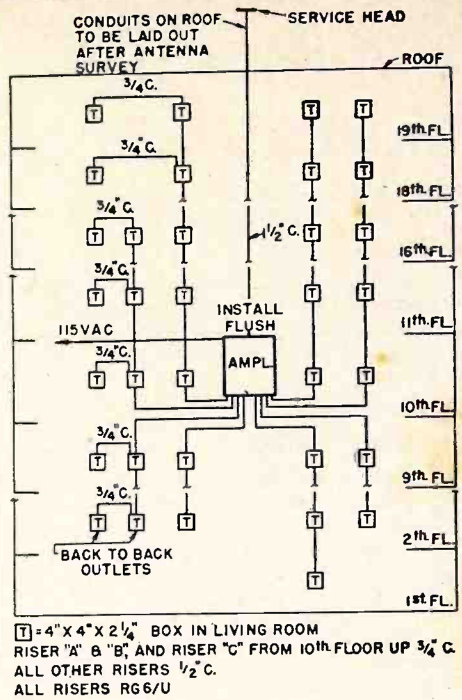


Fig. 1. Consulting engineer's drawing for installation of a master antenna system.

Editor's Note: This material is an abridged excerpt from the chapter on Installing Master Antenna Systems as found in TELEVISION MASTER ANTENNA SYSTEMS (INSTALLATION — DISTRIBUTION), a forthcoming book which has been written by Ira Kamen and Richard H. Dorf and will soon be published by John F. Rider Publisher, Inc.

Once the need for a master antenna system has been established, the preliminary survey accomplished, and all of the paper work preceding the actual installation of the system completed, there remains the substantial task of translating the theory, design, and specification work described so far in this book into and installed, usable antenna system. This is the purpose of the present chapter. We have chosen to describe the complete installation of a sample system, the RCA Antenaplex System, although the information in the text and pictures to follow apply to almost any

Preliminary Work

The builder's consulting engineer prepares a detailed set of specifications which give a thorough picture of the type and placement of the conduit system and the rooftop arrangements to be made by the installing contractor in preparation for the actual installation of the antenna system.

Copies of these specifications are given to electrical contractors who are invited to bid on the job of doing the complete installation work. The bid of each contractor specifies his estimate of the amount of money he will require to install the system in accordance with the consulting engineer's specifications. The specifications include a drawing such as the one in Fig. 1.

Engineer's Layout—Fig. 1 is an engineer's conduit system layout of a Fifth Avenue building into which an RCA Antenaplex System will be installed.

It may be noted that the amplifier is located well below the roof level so as to provide balanced distribution of TV signals to all apartments. Half-inch vertical conduits were allowed in the risers due to improved small size low-loss cables which were developed by RCA in 1950. The outlet boxes specified on the drawing are designed to fit the standard single gang outlet plate which holds the outlet component parts. A separately fused stable source of 115 volts a.c. is available to power the amplifier unit.

Installation Preparations

The contractor whose bid is accepted proceeds to prepare for the system installation. He first reviews the consulting engineer's drawing, Fig. 1, in conjunction with the engineering representative of the system manufacturer. Here the two discuss the exact procedure of installation and establish a delivery schedule for the equipment required.

The contractor next installs the conduits specified in the drawing. In the case of the drawing of Fig. 1, half-inch conduit was specified to lead to the 4 x 4-inch outlet boxes. Fig. 2 shows a section of this conduit and one of the boxes, to which the electrician in the picture is pointing. Fig. 1 shows, and Fig. 2 translates into practice, the fact that this is a vertical conduit installation in which the living rooms of successive floors are in a vertical line and the conduit runs right down the line starting from the top. This is typical of apartment houses. Naturally, the exposed conduits will eventually be within the living-room wall and the outlet boxes will be flush with the wall.

The similar box shown to the right of the antenna-system box is an a-c convenience outlet, which is always placed adjacent to the television outlet by the consulting engineer in his specifications. Under this arrangement the receiver can be installed by the tenant in the most convenient manner, with both power and antenna cords terminated very close to the set and to each other and without unsightly wires running around the room.

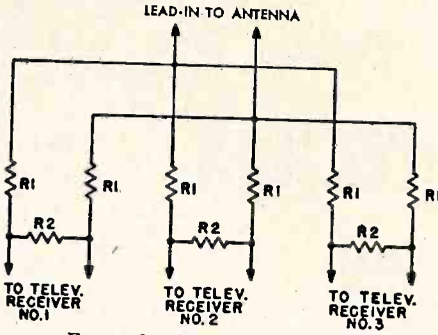
In more expensive buildings additional outlets may be specified in each apartment so that receivers may be located in the dining room, nursery, or other rooms, and more than one receiver can be in use at a time. In cooperative buildings where apartments have been purchased before the system is completed, the buyer is usually able to make whatever arrangements he likes with the architect, consulting engineer, and electrical contractor, to have additional outlets placed where he wants them. Apartment buyers should be advised of this so that they can take advantage of it while the system is being put in. Any special arrangements they desire later will have to be installed externally.

(Continued on page 8)

Television Changes

Stromberg-Carlson TV-12 Series

To connect more than one television receiver to one antenna without the use of switches, resistor pads will be necessary to match the impedance of the lead-in to the impedance of the receiver.



Examples for three receivers.

The table shown below is a chart of the resistors to use with each specified number of receivers. The figures are based on a 75-ohm impedance which is the input impedance of the TV-12 and also the characteristic impedance of the coaxial lead-in (RG-59U or equivalent). Use noninductive carbon resistors and place the pads at the junction point and not at the receiver terminals, as shown in the accompanying figure.

Number of Receivers	*R1*	*R2*
2	56	100
3	100	100
4	120	82
5	150	82
6	180	82
7	240	82
8	270	82.

Sears Ch. 101.865

The following is a revision and supersedes "Ion Trap Magnet Adjustment" under "Television Service Adjustments":

Loosen thumb nut sufficiently to slip ion trap magnet on neck of picture tube from the rear with the narrow magnet ring toward the front of the tube. Tighten thumb nut as required to make magnet adjustable on neck of picture tube. Position the ion trap magnet so that the open part of the "U" is in the direction of the second anode contact. The ion trap rear ring magnet should be approximately over the ion trap flags in the picture tube. The ion trap flags are small, rectangular plates in the neck of the picture tube about 1 inch from the black base of the tube. Starting from this position, adjust the magnet by moving it forward or backward until the raster is observed. Rotate it slightly around the neck of the picture tube for the brightest raster on the screen, and at the same time reduce the brightness-control setting until the raster is slightly above average brilliance. Adjust the focus control (on rear apron) until the line structure of the raster is clearly visible. Readjust the ion trap magnet for maximum raster brilliance. The final touches on this adjustment should be made with the brightness control at the maximum position with which good line focus can be maintained. Tighten thumb nut to permanently hold magnet in adjusted position. Refrain from tightening too much however, since excess pressure may break neck of picture tube.

Under Step 4 of *"Video I-F Alignment,"* the first tuning slug adjustment with the generator set at 23.5 Mc. refers to transformer T8. This transformer should be T9.

The following paragraphs should be added under "Picture Tube Installation":

There are two possible approved methods of installing the web strap around the top of the picture tube. With the picture tube in place, the strap may hang over the flare of the tube. Fasten each end of the strap to the mounting springs attached to the mounting bracket. Carefully pull the strap up the flare of the picture tube until it is in position near the front of the tube. The alternate method is to connect the mounting springs to the strap with the strap in front of the tube. strap with the strap in front of the tube. slip the mounting strap in position around the top of the tube. Never connect one side of the strap and attempt to stretch it around the top of the picture tube before connecting to the other spring.

The following changes have been made to the 101.865 chassis. The Parts List should be revised accordingly.

Ref. No.	*Part No.*	*Description*
	Delete	
C24		Capacitor, 1.5 $\mu\mu f$, ceramic
C33		Capacitor, 680 $\mu\mu f$, ceramic
C41	R70581	Capacitor, 10 μf, 450 v
L24	R65641	Coil, yoke, deflection
	R67849	Glass, picture bezel
	R65489	Magnet, ion trap
R6		Resistor, 1,000 ohm, ½ w
T3	R65427	Transformer, input i-f.
	Add	
C33		Capacitor, 1.5 $\mu\mu f$, ceramic
C24		Capacitor, 15 $\mu\mu f$, ceramic
C30		Capacitor, 25 $\mu\mu f$, ceramic
C41	R70581	Capacitor, electrolytic, 10 μf, 450 v
L24	R65461	Coil, yoke, deflection
	R67849	Glass, picture bezel, 12½"
	R67863	Glass, picture bezel, 10"
	R70842	Magnet, ion trap
R6		Resistor, 150 ohm, ½ w
	R65473	Socket, tube, 8 prong, octal, ring lock
T3	R70656	Transformer, input i-f.

Farnsworth B504P16, Ch. U-12

The B504P16 is a television, a-m—f-m radio and phonograph combination similar to the 504P16. The picture tube used in this instrument is the Farnsworth "160" type (16½ inch direct view). The instrument employs the U-12 television chassis, C-265 h-v supply chassis, P7 a-m—f-m chassis with a separate pre-amplified chassis, and the P777 three-speed record changer. The cabinet has been revised from the original 504P cabinet to provide a "truncated circle" opening for the 16½-inch picture tube.

The C-265 h-v supply chassis is identical to the C-266 chassis which is used in Model 462P12. The C-265 version uses the long cables, whereas in the C-266 the power cable, deflection cable and anode connector are of the short type.

General Electric 817, 821

Under PRESET CONTROLS, the description of the TILT control was omitted. The following should be added:

TILT—if raster is slightly tilted and does not square with the picture-tube mask, rotate the deflection yoke in its clamp bracket by loosening the wing screw.

You need just ONE fast-moving horse to win a race!

You need just ONE brand to CINCH BIG BATTERY BUSINESS!

Profit-conscious dealers follow this principle to simplify inventory, cut overhead costs and build big battery business. They know from experience that famous "Eveready" batteries are the *most widely preferred*...the *most widely advertised* brand in the world! "Eveready" batteries give long, satisfactory playing in any radio. Use this one *complete* line to step up turnover, bring big profits for your store!

"EVEREADY"
BRAND
THE BATTERY WITH
"NINE LIVES"

The terms "Eveready", "Nine Lives" and the Cat Symbol are trade-marks of

NATIONAL CARBON DIVISION
UNION CARBIDE AND CARBON CORPORATION
30 East 42nd Street, New York 17, N. Y.

District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

"BATTERY-ENGINEERED BY BATTERY MANUFACTURERS FOR BEST BATTERY PERFORMANCE!"

Successful
SERVICING
REG. U.S. PAT. OFF.

Vol. 11 OCTOBER, 1950 No. 12

Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

Published by
JOHN F. RIDER PUBLISHER, INC.

480 Canal Street
New York 13, N. Y.

WOrth 4-8340
WOrth 4-8341

JOHN F. RIDER, Editor

CURTAIN TIME

TV Servicing

It is said that there is no ill wind which does not blow some good. All the agitation concerning contract servicing is increasing the amount of individual-call servicing of TV receivers. Better built receivers are requiring fewer and fewer calls on contract, and this situation is being noted by contract holders.

We have stated on numerous occasions that the contract idea will not die out. It need not disappear as a servicing arrangement. If some of the public desire it, they should have it available. Moreover, the failure of contract service outfits does not mean that contract service cannot be made profitable. We have spoken to all segments of the television industry and have seen examples of profitable operation along such lines. Nevertheless, and nothing on the horizon is making us change our mind, we feel that individual service by the smaller service shop will be on the increase. This is happening daily. It can be accelerated greatly by the simple process of giving efficient and prompt service.

A MUST Film

Recently we attended the showing of a TV service film produced under the sponsorship of Capehart-Farnsworth. It depicted the process of installing a TV receiver. It was the finest film of its kind that we have ever seen, containing facts of utmost importance to *every* member of the television servicing industry. It pertained more to the personnel than to the actual techniques, although it covered some very pertinent items in the latter category. It contained so little advertising of the sponsor's product that we say unhesitatingly—it is a film which every service association should arrange to show to its members, it is a MUST! A great deal can be learned from it—and the lessons are of such kind that, once assimilated, will never be forgotten because they benefit each man directly. Above all, this will result in the public's good will toward the service organization as a whole, and in addition will benefit the dealer who originally sold the set. See your nearest Capehart-Farnsworth distributor to make arrangements for showing the film. We understand that it is available on 16 millimeter film and has sound. Whatever may be the cost for renting a sound-on-film projector, we are certain that you will conclude that it was worthwhile.

The Life of Test Equipment

For the second time in a decade it is becoming necessary for each user of test equipment to become thoroughly familiar with his equipment. Now, it is not sufficient just to be able to employ the device—that is all right if, in the event of some failure, immediate replacement is available—the user should be able to repair the instrument.

The trouble is that test equipment is taken for granted. Its full benefits are not sufficiently realized at the present time. It is only when improvisation is required that the ease of using test gear in good shape is appreciated. We don't know any more about the future than anyone else, but we'll bet more than a "plugged dime" that the passage of time will not see an increasing abundance of test equipment for the electronic field. That's the way we put it, although more direct statements are possible—all that one must do is to examine the list of materials which have been placed on the priority list by the NPA.

The ability to repair test equipment is a valuable asset, and one which may well become a requirement. Improperly functioning test equipment materially reduces the operating capabilities of a service shop—of the average service man. Ten to fifteen minutes saved on each job is profit, sometimes the difference between profit and loss. Properly functioning test equipment is as vital as technical competency on the part of the operator. In service work, time is of the essence; the saving of time rests on the conclusions reached after a study of the test equipment indications. A faulty indication can lead not only to misleading conclusions, but also to serious and costly waste of time.

THE ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES

By the time you read these lines this tremendous book will either be at your jobber's or will be in transit to him. It was a personally directed task of huge magnitude. We certainly are happy to see it off the presses and are confident that every purchaser will feel that he has received 100 cents on every dollar he spent for the text. It is the most complete book ever written on the subject. About one-half million words are contained in the 992 8½" × 11" pages, and more than 3000 illustrations are between the two covers. If you desire to know how a 'scope operates, how you can utilize it for profit, this book will give you the answers!

TELEVISION INSTALLATION TECHNIQUES

Thanks to all who have written such nice letters concerning the contents of this book. As the lead article in this issue of SUCCESSFUL SERVICING indicates we have in production another text on a related subject. It has been written by two people who know master television antenna systems and television signal distribution thoroughly. Bailey's book on TV AND OTHER RECEIVING ANTENNAS is rolling off the presses and will be ready during the last week in October.

RIDER MANUALS

It is inevitable that new receiver production will be affected in the downward direction in the months to come. This means that radio and TV receivers out in the field will be called upon to do extended duty. See that your Rider Manual Library—TV, AM, FM, PA—is complete. Have in your possession the Greatest Collection of Service Data in The World—Rider Manuals! JOHN F. RIDER

Bendix 2025, 3033, 6002, Codes C and D

In order to improve electrical centering of the raster and to facilitate easier mechanical adjustment of the focus coil, a revision of the horizontal oscillator and phase detector circuit has been made.

1. Remove lead of capacitor C39 from the junction of capacitors C40 and C41.
2. Connect this lead of capacitor C39 to the junction of resistors R59, R60, and R61.
3. Remove lead of resistor R58 from pin number three of V14, 6SN7GT, horizontal oscillator and phase detector.
4. Connect this lead of resistor R58 to the junction of resistor R55 and capacitor C36.

Price Change

Due to a substantial increase in the over-all production costs plus the addition of over 100 pages for TV AND OTHER RECEIVING ANTENNAS (THEORY AND PRACTICE), it has been necessary to raise the price from $4.50 to $6.00. Notice is hereby given that all orders which were received from jobbers prior to the 11th of September are being honored at the old price. All direct mail orders received in our office prior to midnight of October 12, 1950, will be honored at the old price.

Television Changes

Montgomery Ward 94WG-3006B, 94WG-3009B

Models 94WG-3006B and 94WG-3009B are similar to Models 94WG-3006A and 94WG-3009A except for the following information which replaces the Response Curves section and the R-F Response Curves section for these latter models. All other service information for Models 94WG-3006A and 94WG-3009A is applicable to Models 94WG-3006B and 94WG-3009B.

R-F Response Curves—The response curves shown in Figure 18, for the "A" Series" may be observed by connecting the sweep generator and the marker signal generator (loosely coupled) to the antenna input and by connecting the oscilloscope to the TEST POINT (junction of R-6 and R-7) on the tuner. This TEST POINT is accessible from the top of the tuner chassis and appears as a small insulated tip between the oscillator and mixer tubes as shown in Fig. 1, shown below. An S-25A3 tuner may be used in these models.

The response curves obtained in this check indicate the accuracy of adjustment of the r-f

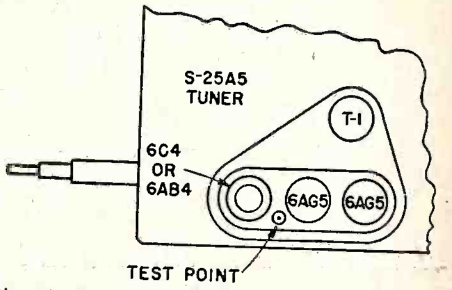


Fig. 1. Test point for Montgomery Ward Models 94WG-3006B and 94WG-3009B.

and converter coils. Any appreciable variation from the curves shown in Figure 18 indicates coil misalignment. To check for correct oscillator coil adjustment on each channel connect the sweep generator and the marker signal generator (loosely coupled) to the antenna input. Connect the oscilloscope to the junction of L-8 and R-51. The response curve should be approximately the same as for the i-f response check. The picture carrier marker should be approximately 45% down and the sound carrier at zero level.

To adjust each oscillator coil, set the Fine Tuning control in the center of its range and adjust each coil screw to properly position the markers.

●

General Electric 810, 814, 820, 830, 835, 840

The following miscellaneous repair parts are added for the head-end unit of the above receivers:

Part No.	*Description*
RBI-001	Strip, textolite bearing strip for selector switch shaft
RHM-070	Washer, oversize "C" washer (47 mils) to remove end play from the switch shaft
RSC-001	Wafer, front switch wafer of head-end unit
RSC-002	Wafer, center switch wafer of head-end
RSC-003	Wafer, rear switch wafer of head-end unit.

●

Sparton 5068, 5069, Ch. 24TV9C

Model 5068 and 5069 are consoles using receiver chassis 24TV9C and power supply chassis 3TV9C.

Crosley Service Hints

The agc adjustment, located at the rear of the receiver chassis, determines the voltage level at which the second detector operates. The set is adjusted to a strong signal. Therefore it should be reset, at the time of installation of the receiver, to the stations in the area in which the receiver will be used.

To properly set the agc adjustment, tune in the weakest station in the area and set the adjustment, by turning counterclockwise or clockwise, to a point where the picture just begins to overload with the contrast control set at maximum. When the adjustment is turned too far counterclockwise, the result may be low sensitivity (weak picture); if turned too far clockwise, the second detector may become overloaded. The result then may be an unstable picture on medium-to-strong signals.

If an overloaded picture is experienced on a strong signal station, after the agc adjustment has been properly set, turn the contrast control toward minimum until the overload is eliminated. If the overload of the strong signal station cannot be controlled with the contrast control, it may be necessary to make a compromise adjustment between the weakest station and the strong signal station with the agc adjustment.

●

Hoffman 826, 827, 828, Ch. 143

A vertical white line sometimes appears in the left portion of the picture, about two- to four-inches in from the left side on some receivers with 16-inch picture tubes. The vertical disturbance may appear in any form from two light, slightly displaced traces to a broad, fuzzy band. The actual condition is a foldover of the raster, and the edge of the raster appears as if it were behind the picture a few inches from the edge. If the horizontal sync pulses are viewed on an oscilloscope, the position of the vertical line will be indicated by two small pips on the sawtooth portion of the horizontal sync trace.

The coupling capacitor C161, to the grid of the 6BG6G horizontal output tube, is at present a 0.01-μf, 400-v paper tubular capacitor (part no. 4112). A capacitor change to 0.001-μf, 500-v, ceramic tubular capacitor will eliminate most cases of the left-side vertical white line. Do not decrease the capacity below 0.001 μf, as coupling capacitance below this value tends to cause a right side foldover. The part number of the new capacitor is 4025.

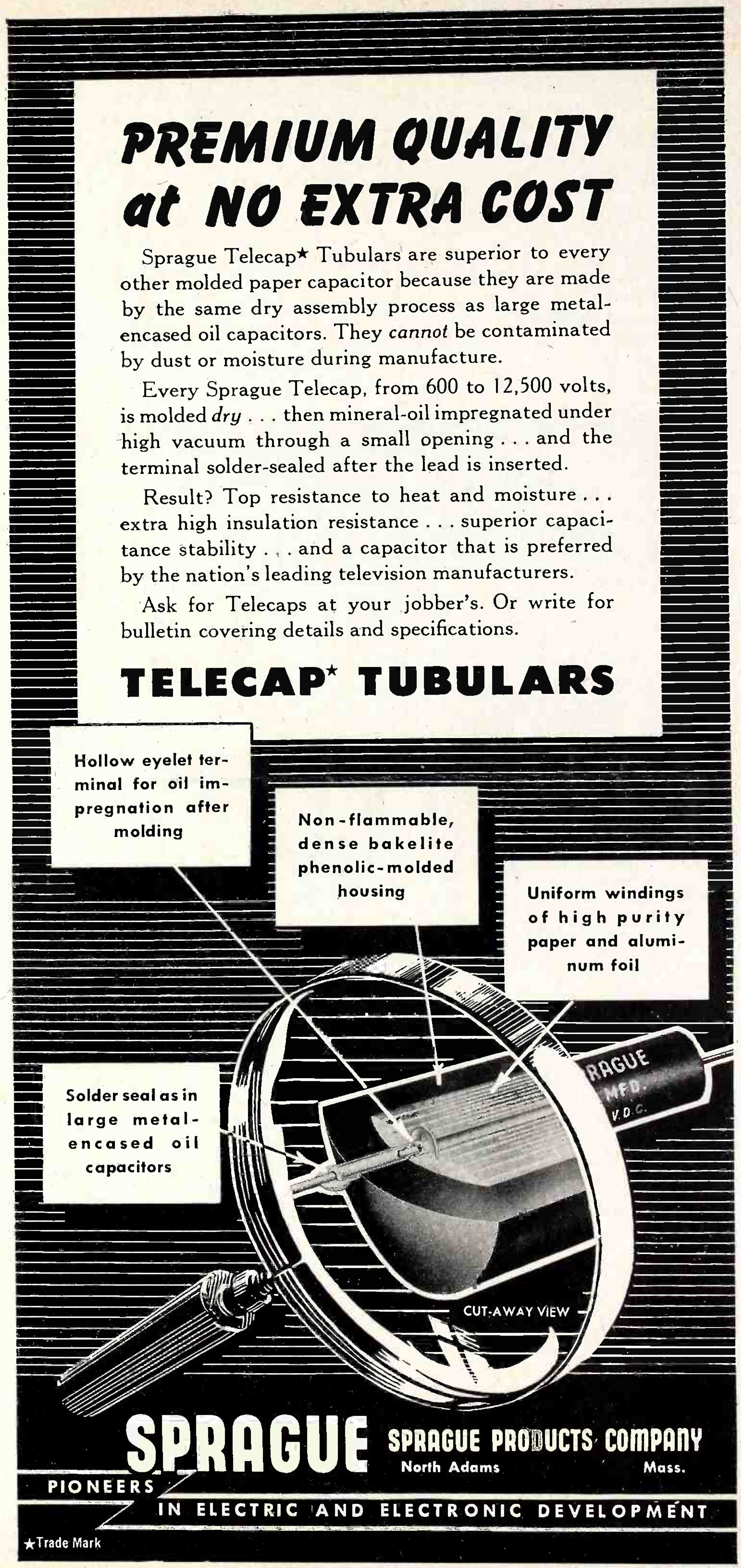
This also applies to Models 830 and 831, Ch. 151 and Models 917 and 918, Ch. 152.

●

Stromberg-Carlson TV-12 Series

In case noise appears as a growl in the r-f tuner as the tuning shaft is rotated, making it difficult to tune in the desired station, especially in the high-frequency channels, the tuner is in need of cleaning and re-lubrication which is done as follows:

1. Remove the cover from the ganged coils in a clean, dust-free location.
2. With a soft small brush and some carbon tetrachloride, clean all the turns of the coils, the end rings, and the coil tracks.
3. Re-lubricate with a small amount of Lubriplate 105, covering all the surfaces just cleaned.
4. Replace the dust cover.



INSTALLING MASTER ANTENNA SYSTEMS

(Continued from page 1)

The particular job covered by the drawing of Fig. 1 called for installation of the channel amplifier assembly flush with the wall in the room in which it was located. In cases like this the contractor must obtain the amplifier-unit cabinet from the manufacturer before the rest of the equipment is furnished. Like the conduit and outlet boxes it must be installed as part of the preparatory operation before the walls are in place.

The contractor's supervisor must check the conduits entering the amplifier cabinet immediately after it has been installed. Using the consulting engineer's drawings, he must check to see that all necessary conduits are in place and that each is located correctly. The conduits which are to contain the antenna cables enter the cabinet at the top; those for the distribution system go out the bottom. Antenna and output distribution cables are never run in the same conduit in RCA installations, and it is not advisable to do so with any system because of the danger of feedback. Experience has shown that when coaxial cables which have 50- to 60-db difference in levels are run together in a single conduit, signal leakage sets up oscillations.

As with the outlet boxes, the cabinet shown in Fig. 3 will finally be flush with the wall which will be built after all the conduit is in place. This is one of the advantages of installing a system at the time the building is constructed. Only the front cover of the cabinet will be seen, without the unsightly exposed box and conduits which would be necessary with surface mounting. In addition,

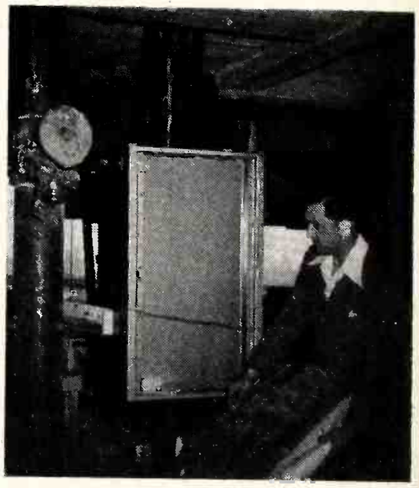


Fig. 2. Outlet box on a vertical conduit with a-c convenience outlet next to it.

the installation leaves a smooth wall surface which eliminates the many dirt-catching surfaces of surface-mounted units and is easy to keep clean.

Another advantage in this particular case is that the hallway in which this cabinet appears will be fairly narrow, as in most buildings, and the flush installation will not be an obstruction. Surface mounting in hallways is often impossible, for building rules insist on full passageway without obstructions in halls or fire stairways.

Antenna Survey

After the "roughing-in" period, during which all distribution-system conduits and boxes are installed, the contractor arranges with the manufacturer's representative to have an antenna survey made. This is done after the roof slabs and structures have been completed so that antenna-cable conduits can be installed from the antenna locations to the amplifier cabinet.

A glance at Fig. 1 reveals that the exact size of the antenna-cable conduit has not been specified. This is because it is not possible to know in advance just where the antennas will be located. As explained in previous chapters, antenna location depends on signal conditions and on surrounding structures. Final determination of the antenna-cable-conduit plan is left to the electrical contractor.

The antenna survey is ordinarily made by the manufacturer's representatives. The procedure is to survey for each channel separately when single-channel antennas are used. As illustrated in Fig. 4, a portable antenna of the same type as is to be used, is mounted on as long a mast as is practical and carried to various parts of the roof, where it is oriented for best reception while signals are checked on a portable calibrated receiver.

After the location for each antenna is determined, the manufacturer's representative organization prepares a drawing which indicates the exact location and the height of each antenna. From the information in this sketch, the electrical contractor can make his own plans for installing the antenna-cable conduits.

While it is possible—and perhaps more convenient in many cases—to lead cable over a rooftop without enclosing it in conduit, most manufacturers prefer and recommend that conduit be used. The conduit protects the cable from the ultraviolet rays of the sun. Experience has shown that many kinds of cable tend to age or contaminate when exposed to the sun for long periods. The aging manifests itself in increased losses, and after a long period may cause standing wave ratio in the lines sufficient to cause reflections. Replacing the cable costs money, both for material and for labor, and also creates a certain amount of customer dissatisfaction, which is understandable. When cable must be run in the open, it is a good idea to attempt to obtain "noncontaminant" cable, which is available from some manufacturers and which resists aging for a much longer period than ordinary cable. Aging is also dependent, to a large extent, on the climate—it is less likely in temperate and cold zones than in lands of "perpetual sunshine."

Fig. 3. The amplifier cabinet will finally be flush with the wall which will be built after all the conduit is in place.

Installing the Cable

After all the conduits have been installed, the electrical contractor begins to put the cable into them. The cable must be installed in strict accordance with the specifications of the manufacturer. These specifications in many cases call for the use of pull boxes at every point where the cable is to be bent, since many kinds of cable will be damaged if bends are too sharp.

The cable is ordinarily purchased by the electrical contractor, either from the system manufacturer or from a cable supplier. The latter arrangement is usually the most practical, since the contractor is in the best position to estimate the amount of cable that will be needed after studying the pertinent drawings and calculating the amount of conduit he has actually installed. The manufacturer also benefits because he does not have to worry about leftover pieces for which he has no use.

Final Installation

After the cable has been installed, the electrical contractor requests delivery of the antennas, amplifiers, transformers, and all other equipment which will be required to complete the installation. At the same time he calls the manufacturer's organization and requests a visit from a field engineer so that all the work to date may be checked and approved. He also arranges for the field engineer and his own foreman to get together to discuss the specific techniques of installing the components of the antenna system.

After all the components have been installed, the contractor again puts in a request for the field engineer for a final operating test. The contractor and engineer work closely together in these final stages, correcting any installation errors, remaking bad connections, and so on. Finally, the field engineer makes the adjustments, such as amplifier gain, alignment of mixing networks, and so on, and demonstrates the operation of the system to assure the builder, consulting engineer, and electrical contractor that all the specifications have been met.

It is standard practice for the manufacturer's organization to take full responsibility for the performance of the antenna system once it has been installed. The electrical contractor passes on to the owners and operators of the building any maintenance guarantees which may have been given to him by the manufacturer or his representative organization.

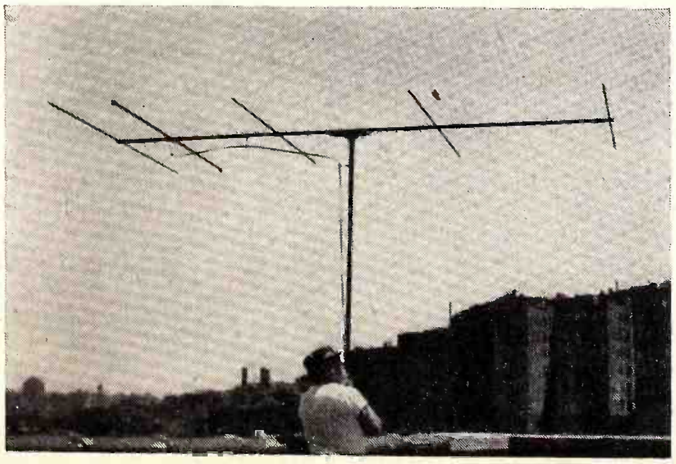


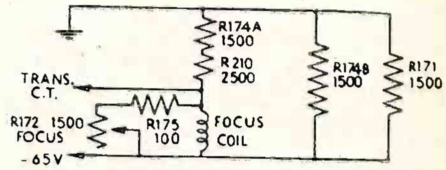
Fig. 4. Manufacturer's representative makes antenna survey with the aid of a portable antenna and pole.

Television Changes

Hoffman 612, Ch. 142; 820, 821, 822, Ch. 146

Insufficient adjustment range of the focus control R172 has occurred in 12-inch chassis using the DuMont 12QP4 picture tube. The 12QP4 tube requires more focusing current through the focus coil than other 12-inch tube types, and maximum counterclockwise rotation of the focus control will not bring the tube to its optimum focus.

Circuit changes to increase the amount of current through the focus coil can be accomplished by changing one resistor and adding another resistor, as shown in the accompanying diagram.



Circuit changes for Hoffman Chassis 142 and 146.

The 2,500-ohm resistor formerly used as R171 may be used as R210. The 1,500-ohm resistor now used as R171 should be the wire-wound type. R174A and B are a single large Candohm resistor, center tapped to form the two sections.

Old Part	*New Part*	*Difference*
R171 (4714)	R171 (4715)	Decreased from 2,500 ohms to 1,500 ohms 5 watts
——	R210 (4714)	Added 2,500 ohms in series with R174A (1,500 ohms).

These changes will increase the current through the focus coil, and bring the adjustment of the focus control near the center of its range. These changes have been made on all sets produced after Serial No. H 913661.

This also applies to Models 601, Ch. 154; 613, Ch. 149, 914, 915, Ch. 150.

●

Sears Ch. 101.865, 101.866, 101.867, 101.868

Due to variation in design of horizontal output transformers, in some sets, the voltage output of the high-voltage power supply is reduced by grounding one side of capacitor C102 instead of returning it to the high side (secondary) of the transformer T11. This reduction of the high voltage (about 800 volts) gives wider scan with certain horizontal output transformers.

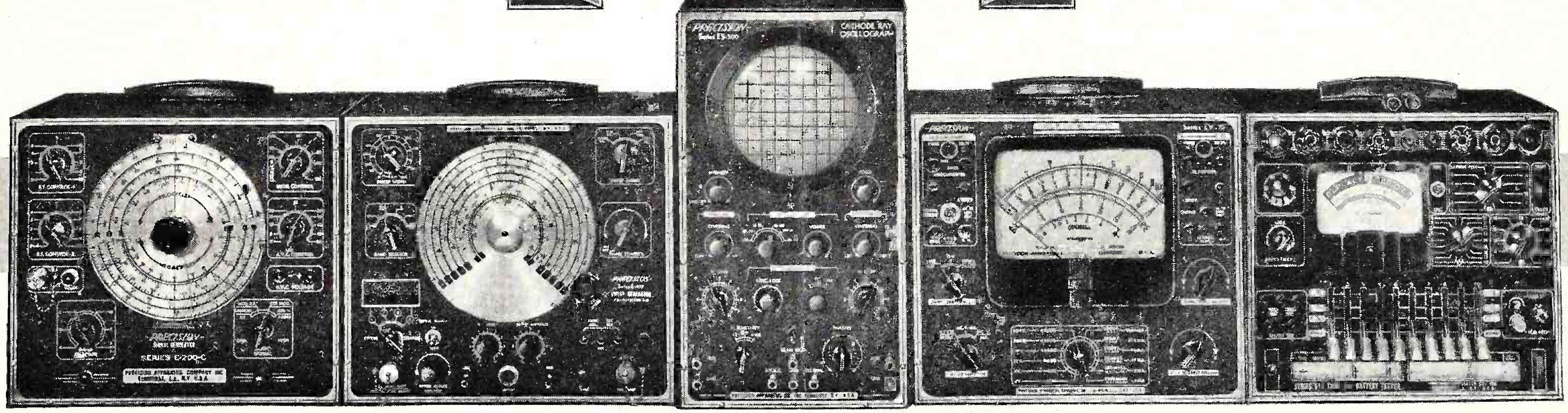
In some sets resistor R147 is omitted in the screen grid circuit of the 6BG6G horizontal output tube. This results in lower screen voltage on the 6BG6G which also affects the horizontal scan.

If under low-line voltage conditions the picture is too dim and it is difficult to get the correct focus, the grounded side of C102 may be returned to transformer T11 as in the original chassis and R147 installed in its original position in the 6BG6G screen circuit. The high voltage will be back to normal. If insufficient scan is experienced, then the horizontal output transformer will have to be replaced. Transformer #70155 is, in all probability, the only one that will require this replacement. There are two transformers currently used—#70930 and #70372, which will be satisfactory replacements where absolutely necessary.

★ Build Your Service-Sales Future on a Firm Foundation with . . . .

PRECISION TEST EQUIPMENT
Standard of Accuracy...

. . . These 5 Matched "Precision" Instruments provide a Complete MODERN SERVICE LABORATORY for TV-FM-AM at only moderate cost.



SERIES E-200-C — Modern Multi-band SIGNAL and MARKER GENERATOR for A.M., F.M., and TV alignment.
Exceptional Accuracy and Stability! 1000 pt. vernier calibrating scale! 0-100% Modulation! A.V.C. substitution network! Direct reading 88KC to 120 MC! Complete with output cable and tech. manual. In matched, heavy gauge case 10½ x 12 x 6".
Net Price:-$71.25

SERIES E-400 — Wide Range H.F. SWEEP SIGNAL GENERATOR Direct Reading from 2 to 480 MC.
Narrow and Wide Band Sweep for F.M. and TV • 1500 pt. vernier calibrating scale • Multiple Crystal Marker • 8 tubes including V.R. and rectifier • RG/62U Coaxial Terminated Output. Complete with 2 crystals. In heavy copper-plated case 10½ x 12 x 6".
Net Price:-$134.50

SERIES ES-500 — 20 MV. High Sensitivity, Wide Range 5 inch C.R. OSCILLOGRAPH.
V. Amp. Response to 1 MC! Low C, High R input Step Attenuator! Z axis modulation terminals! 9 tubes incl. V.R. and 2 rectifiers! Complete with light shield and mask. Heavy steel case 8¼ x 14½ x 18".
Net Price: $159.50

SERIES EV-10 — True Zero-Center VTVM — MEGOHMMETER with large 7" meter — plus complete 1000 Ω/V. functions.
59 ranges to 6000 Volts, 2000 Megs, +70DB, 12 Amps • Voltage Regulated bridge type circuit • Constant 13⅓ Megs input resistance to 600 V. 133⅓ Megs at 6000 V • Optional RF probe. Complete with test cables. Matched heavy gauge steel cabinet 10½ x 12 x 6".
Net Price:- $94.50

SERIES 612 — Modern Free-point Cathode Conductance TUBE TESTER, and dynamic A-B-C Battery Tester.
Incorporates RMA recommended circuit principles! 10 lever free-point element selection! Built-in roller chart! Dual short-check sensitivity! Noise, Ballast and Pilot Tests! Complete, ready to operate. In matched heavy gauge steel cabinet 10½ x 12 x 6".
Net Price:- $69.75

BUY PERFORMANCE — NOT SPECIFICATIONS

For over 15 years, "Precision" **PERFORMANCE, ACCURACY, WORKMANSHIP** and **VALUE** have set a standard of comparison...products of an organization whose sole efforts are concentrated *exclusively* in the design, development and production of the **FINEST TEST EQUIPMENT**...nothing else!

PANEL MOUNTS, PORTABLES, COUNTER TYPES

Most "Precision" instruments are available in various enclosure styles to suit your individual application, field or shop. **WRITE FOR OUR LATEST ILLUSTRATED CATALOG** describing the full line of Precision quality test equipment for all phases of modern radio, television and communications.

SERIES TV — Super-High Voltage Safety Test Probes.
Extends range of Series EV-10 (above) up to 30 KV or 60 KV direct reading, with full safety to operator and equipment. Multiplier cartridges available to match most VTVM's and 20,000 ohms/v. test sets. Complete with 30 KV multipier cartridge for EV-10.
Net Price:—$14.75

"Precision" Performance Engineered Instruments are on display at leading radio parts and equipment distributors.

PRECISION APPARATUS CO., INC.
92-27 Horace Harding Boulevard, Elmhurst 14, New York
Export Division: 458 Broadway, New York, U.S.A. • Cables—Morhanex
In Canada: Atlas Radio Corp., Ltd., Toronto, Ontario

Convenient "Precision" Purchase Terms can be arranged with your favorite authorized Precision Distributor.

AM · FM · TV · AM · FM · TV

AM · FM · TV · AM · FM · TV

Montgomery Ward 94GSE-3011B

Model 94GSE-3011B differs from Model 84GSE-3011A only in type of cabinet covering and cabinet hardware as listed below:

Part Number	*Description*
MW7E179-3	Cabinet
MW20E449-2	Rear door with hinges, antenna post and line cord
MW20E461	Handle with mounting brackets.

●

Motorola KR9, OE9, PC9, SR9

These models are schematically identical to Ch. 8A. Model KR9 is designed for installation in the 1949 Kaiser-Frazer. Model OE9 is designed for installation in all 1949 Oldsmobiles and in the 1948 Futuramic Oldsmobile. Model PC9 is designed for installation in the 1949 Pontiac. Model SR9 is designed for installation in the 1949 Studebaker.

●

Montgomery Ward 94WG-2748C

Model 94WG-2748C receivers differ from the Model 94WG-2748B receivers by the replacement of a V-28A166 record changer with a G.I.-28A168 record changer. The following are the parts applicable to the G.I.-28A168 record changer:

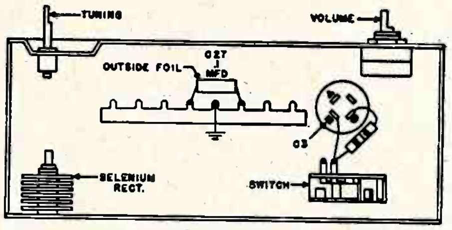
G.I. - 56-76507	Motor, 3-speed, 60 cycles 105-125 volts, a.c.
Astatic - LT3D	Crystal cartridge
	Needle, regular (78 rpm)
	Needle, microgroove (red).

●

Westinghouse H-303P4, H-304P4, Ch. V-2153

The chassis used in later production contains modifications that eliminate the possibility of burning out the filament of the 3V4 tube by inserting the a-c plug in position for battery operation with the on-off switch in off position. Sets that contain the modified chassis are identified by a warning label pasted on the inside of the back cover. The warning, which reads, "Always remove plug from wall socket before operating battery change-over switch," serves as a further precaution against damage. Sets that do not contain the revisions can be modified in the following manner:

1. Remove the chassis from the cabinet.
2. Refer to the accompanying figure, and remove enough components from their positions over C3 to permit ease in performing steps 3, 4, and 5.
3. Remove the 3 red B+ wires from the C3 section lug of the filter capacitor.
4. Solder the 3 wires together and apply tape to the joint until they are well insulated.
5. Connect a single red wire between C3 lug and the battery switch terminal to which R16 is connected. The wire should be the same type as the wires that were removed.
6. Connect a 0.1-μf, 200-v, capacitor (C27, RCP10W2104M) to the terminal board as shown in the figure.



Bottom view of Westinghouse Chassis V-2153 showing wiring revisions.

7. Replace the components that were removed in step 2.

Westinghouse H-207, Ch. V-2130

Model H-207 contains a V-2130 television chassis, the same chassis that is used in Model H-196, and a V-2137 radio chassis, the same chassis that is used in Models H-203 and H-212. The following parts listed are to be added to the parts list for Chassis V-2130 and V-2137.

Part No.	*Description*
V-3283-6	Antenna assembly, a-m loop
V-5986-3	Antenna assembly, f-m dipole
V-6261-1	Bracket, cabinet slide (l.h.)
V-6261-2	Bracket, cabinet slide (r.h.)
V-6262-1	Bracket, drawer slide (l.h.)
V-6262-2	Bracket, drawer slide (r.h.)
V-1169-1	Cabinet, mahogany
V-4965-2	Cable, phono input
V-5860-2	Cable assembly, speaker (radio)
V-4898-1	Catch, bullet
V-6277	Catch, friction
V-4966-2	Cord, record changer, a-c power
V-6296-1	Cord, multiple power
V-6263	Cover assembly, back
V-6254	Decal
V-7883	Doors (set of four)
V-7885	Drawer, record changer (complete with motor board)
V-6155	Fastener, control panel (radio)
V-4902	Glide, furniture
V-6257-1	Grille cloth
V-6258-2	Hinge, upper r.h. radio section
V-6258-1	Hinge, lower r.h. radio section
V-6317-1	Hinge, upper l.h. radio section
V-6317-2	Hinge, lower l.h. radio section
V-6317-2	Hinge, upper r.h. television section
V-6317-1	Hinge, lower r.h. television section
V-6258-1	Hinge, upper l.h. television section
V-6258-2	Hinge, lower l.h. television section
V-6318-1	Interlock assembly, back cover
V-6271-1	Knob, television control panel
V-7892	Knob, fine tuning
V-7893	Knob, channel selector
V-6255-1	Ornament, upper inside doors
V-7884	Panel, control (television)
V-6043-1	Panel assembly, control (radio)
V-6266-1	Plate, front glass
V-6309-1	Pull, drawer
V-6256-1	Rosette, upper outside doors
V-6042	Shield, bottom (television)
V-6268	Speaker, 10" electrodynamic (television)
V-4900-1	Strike, bullet
V-5421-5	Washer, felt (television and radio).

Radio Changes

Zenith 7H820, Ch. 7E01

On some of the later run 7E01 chassis, the wax bypass capacitors were replaced with molded capacitors. Their part numbers are as follows:

Ref. No.	Part No.	Description
C10	22-1778	Capacitor, 0.047 µf, 200 v, molded
C22	22-1750	Capacitor, 0.022 µf, 600 v, molded
C15	22-1754	Capacitor, 0.0022 µf, 600 v, molded
C19	22-1809	Capacitor, 0.01 µf, 200 v, molded
C24	22-1811	Capacitor, 0.0047 µf, 400 v, molded
C25	22-1810	Capacitor, 0.1µf, 200 v, molded.

RCA 8X541, 8X542, 8X545, 8X546, 8X547, Ch. RC-1065C, RC-1065D, RC-1065F, RC-1065H, RC-1065J, RC-1065K

Chassis RC-1065C and RC-1065D are the same as Chassis RC-1065 and RC-1065A except that they have oscillator coils (stock no. 74448) and tuning capacitor (stock no. 74447) stamped 941274-2.

Chassis RC-1065F and RC-1065H are the same as Chassis RC-1065C and RC-1065D except that they use a 50B5 output tube.

Chassis RC-1065J and RC-1065K are similar to Chassis RC-1065C and RC-1065D except that they use stock number 75846 1st i-f transformer (stamped 970441-11), number 75847 2nd i-f transformer (stamped 970441-12) and number 71168 1-megohm volume control (stamped 970776-4).

When excessive hum is encountered in these chassis, the value of R15 should be checked. The correct value of this resistor is 1,200 ohms. In same chassis, two 1½-watt resistors (one each of 2,200 ohms and 2,700 ohms) are connected in parallel and used as a substitute for the 1,200-ohm, 1-watt resistor R15.

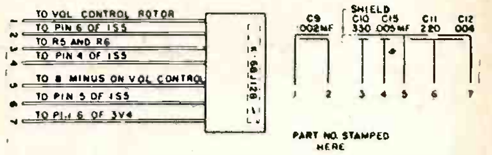
•

General Electric 145

In late productions, resistors R13 and R14 have been combined into one tapped resistor, R25A and R25B. This new resistor is mounted in place of R14. The catalogue number for R25 is RRW-047. R25A is 1,000 ohms and should be wired in place of R14. R25B is 1,300 ohms and should be wired in place of R13.

Late production Models 145 have an automatic shutoff when the cabinet front is closed. New parts for these models are interchangeable and will be carried in replacement stock in place of the original early production items as shown below:

Part No.	Description
RDE-049	Escutcheon replaces RDE-034
RDK-166	Knob and knob clip replaces RDK-149
RAC-067	Cabinet front cover replaces RAC-055
RMC-036	Nameplate and catch, with 2 stud mount for maroon or white cabinets
RMC-038	Nameplate and catch, with 3 stud mount for maroon or white cabinets
RMC-039	Nameplate and catch, with 3 stud mount for brown cabinet.



Lead identification for ceramic capacitor RCW-3015.

The accompanying illustration of the four-section ceramic capacitor, catalogue number RCW-3015, is added to aid in capacitor-terminal identification of C9, C10, C11 and C12.

•

Sears 9073C, Ch. 135.244-1

Model 9073C uses chassis 135.244-1 and is the same as Model 9073B except for the following differences. Capacitor C20 has been deleted from the circuit. The value of resistor R6 has been changed to 1.5 megohms. The value of volume control resistor R6 has been changed to 500,000 ohms. The values of capacitors C12 and C14 have been changed to 0.0001µf and 0.0005µf, respectively. Resistor R13, 2.2 megohms, has been added across the pickup socket. The change in the parts list is as follows:

Pref. No.	Part No.	Description
	F-7881	Arm, pickup (less crystal)
	F-7882	Cartridge, crystal, Shure Bros. P37C
	F-7883	Needle, phono, unipoint, sapphire
	F-7563	Capacitor, variable assembly
C12	F-6015	Capacitor, ceramic, 0.0001 µf 500 V
C14	F-4890	Capacitor, 0.0005 µf 600 V
R6	F-6239	Control, On-Off and Volume
R5	F-3450	Resistor, 1.5 megohm, ½ w, 20%
R13	F-4277	Resistor, 1,000 ohm, 1.0 w, 10%.

•

B. F. Goodrich 93-112, 93-113

These models are the same as Models 93-107 and 93-108.


in big tubes
the big name is

INDEX OF CHANGES

Model	*Page Number* Successful Servicing	Rider Manuals† From	To
TELEVISION CHANGES			
Bendix 2025, 3033, 6002, Codes C and D	5	4-1	4-8
Crosley Service Hints	7		
Farnsworth B504P16, Ch. U12	2		
504P16, Ch. U12		2-9, 10 *2-1	2-15 *2-10
General Electric 817, 821	2	4-9	4-23
General Electric 810, 814, 820, 830, 835, 840	6		
810		2-11 *2-22	2-21 *2-43
814		2-22 *2-44	2-31 *2-57, 58
820		3-16	3-30
830		3-31	3-44
840		4-34	4-51
Hoffman 612, Ch. 142; 820, 821, 822, Ch. 146	10	3-1	3-19
Hoffman 826, 827, 828, Ch. 143	7	3-1	3-19
Montgomery Ward 94GSE-3011B	12		
84GSE-3011A		4-1	4-6
Montgomery Ward 94WG-3006B, 94WG-3009B	6	4-29	4-37
Sears Ch. 101.865	2	3-23, 24	3-32
Sears Ch. 101.865, 101.866, 101.867, 101.868	10		
101.865		3-23, 24	3-32
101.866		4-26	4-35, 36
101.867		4-10	4-17, 18
101.868		4-19, 20	4-25
Sparton 5068, 5069, Ch. 24TV9C	6	3-1	3-25
Ch. 24TV9C		4-1	4-4
Stromberg-Carlson TV-12 Series	2, 7	*1-17	*1-31
Westinghouse H-207, Ch. V-2130	12		
H-196, Ch. V-2130		3-1	3-18
Radio Ch. V-2137		19-29	19-32
RADIO CHANGES			
General Electric 145	14	19-13	19-16
B. G. Goodrich 93-112, 93-113	14		
93-107, 93-108		19-11	19-17
Montgomery Ward 94WG-2748C	12		
94WG-2748B		20-90	20-95
Motorola KR9, OE9, PC9, SR9	12	19-6	19-12
RCA 8X541, 8X542, 8X545, 8X546, 8X547, Ch. RC-1065C, RC-1065D, RC-1065F, RC-1065H, RC-1065J, RC-1065K	14		
Ch. RC-1065, RC-1065A		18-45	18-46
Sears 9073C, Ch. 135.244-1	14		
Page 14 of May issue of *Successful Servicing*			
Westinghouse H-303P4, H-304P4, Ch. V-1253	12	20-12	20-14
Zenith 7H820, Ch. 7E01	14	19-5, 6	19-12

† The Rider Manual Page Numbers given under Television Changes are for Rider TV Manuals. The volume number is the number preceding the dash. Volume numbers preceded by an asterisk (*) apply to the 8½" x 11" page size Manual only.

The Rider Manual Page Numbers given under Radio Changes are for Rider AM-FM Manuals. The volume number is the number preceding the dash.

From
JOHN F. RIDER PUBLISHER, Inc.
480 CANAL ST., NEW YORK 13, N. Y.
Return Postage Guaranteed

A. J. S. CERINO
5310 OVERBROOK ST.
DOUGLASTON, L. I., NEW YORK

Sec. 34.66, P. L. & R.
U. S. POSTAGE
PAID
NEW YORK, N. Y.
PERMIT No. 9427

Successful
SERVICING

NOVEMBER, 1950

TELEVISION *Interference* *from* F-M RECEIVERS

by SEYMOUR D. USLAN

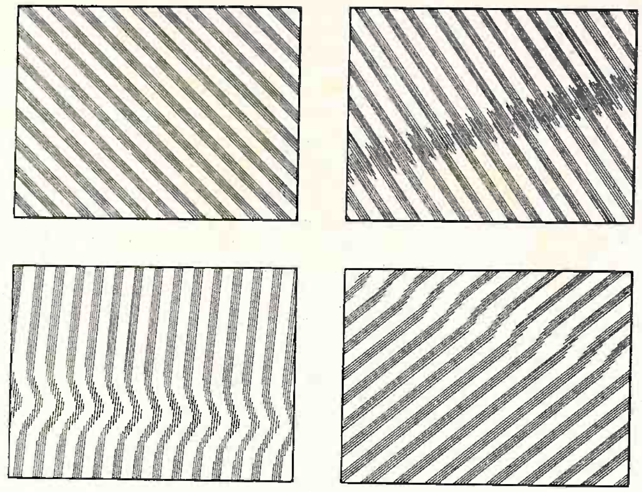


Fig. 1. Typical bar formation patterns due to r-f interference in television receivers. The patterns can take on many shapes. Actually the bars are solid in appearance, but here they are shown composed of lines, to illustrate the tonal qualities and wavy motion.

Every day we are faced with different types of interference in television receivers. Some orms of interference are not too harmful o the reproduced picture because all they do ire to momentarily cause line formation, fading, or a minute distortion to the picture.)ther forms of interference are somewhat nore troublesome, especially when they perist for any length of time.

Today, r-f interference from outside sources s one of the main causes of complaints from elevision owners. Such interference is caused rimarily by radiation from the oscillators of elevision receivers, from the oscillators of f-m eceivers, and from other sources. In this rticle, we will discuss all the possible causes f r-f interference from the oscillators of f-m roadcast receivers.

R-f interference is easily detected by the ppearance of heavy bars throughout the picure. These bars do not conform to any paricular shape as indicated by the typical r-f nterference patterns in Fig. 1. They may e vertical, horizontal, or diagonal bars, either traight or wavy, and may be stationery or n motion when seen on the picture tube. The tronger the interfering signal, the greater vill be the intensity of the bars.

The f-m broadcast band occupies the 88 Mc o 108 Mc region in the frequency spectrum nd is divided into 100 channels, each 200 c wide. The transmitted frequency of the rst channel (#201) is 88.1 Mc, and that f the last channel (#300) is 107.9 Mc. If e heterodyne oscillator in an f-m broadast receiver is tuned *below* the incoming f-m gnal, the oscillator can cause interference its *fundamental frequency* on channels 5 r 6 of the television receiver, and at its *cond harmonic* on television channels 7 hrough 10.

On the other hand, if the heterodyne oscillator of the f-m broadcast receiver is tuned *above* the incoming f-m signal, then the *second harmonic* of the oscillator frequency can cause interference on television channels 10 through 13. *This is all based upon the accepted standard of 10.7 Mc for the intermediate frequency of f-m broadcast receivers.*

The interference from f-m receivers will not exist for the complete tuning range of the receiver but will come only from certain channels. This is so because on some f-m broadcast channels the f-m receiver's oscillator frequency will fall outside the television frequency range. The existing television channels and their frequency allocation are listed in Table I.

TABLE I

Channel No.	*Frequency (Mc)*	*Channel No.*	*Frequency (Mc)*
2	54-60	8	180-186
3	60-66	9	186-192
4	66-72	10	192-198
5	76-82	11	198-204
6	82-88	12	204-210
7	174-180	13	210-216

If the f-m receiver oscillator is tuned below the incoming f-m signal, then only on f-m channels 201 through 254 (frequency range 88.1 Mc to 98.7 Mc) can it cause interference in television receivers. The oscillator range at these f-m channels will be 88.1 Mc less 10.7 Mc to 98.7 Mc less 10.7 Mc, or 77.4 Mc to 88 Mc. From Table I it can be seen that this latter frequency range falls into television channels 5 and 6. This interference is at the fundamental frequency of the f-m oscillator.

If we are to consider the possibility of the second harmonic of the f-m oscillator causing interference when it is tuned below the incoming signal, then it will only be effective on f-m channels 249 through 300. The frequency range of these f-m channel designations is 97.7 Mc to 107.9 Mc, and the oscillator frequency range when the i-f of the f-m receiver is 10.7 Mc will be 87.0 Mc to 97.2 Mc. The second harmonic of this f-m oscillator frequency range is 174 Mc to 194.4 Mc. Checking with Table I, it is seen that this frequency range covers channels 7 through 10.

If the oscillator in the f-m receiver is tuned above the incoming signal by the 10.7-Mc i.f., then only on f-m channels 201 through 247, frequency range 88.1 Mc to 97.3 Mc, can the oscillator cause interference. At these f-m channels, the oscillator range will be 98.9 Mc to 108 Mc; and at the oscillator second harmonic, the frequency range will be 197.6 Mc to 216 Mc. Checking Table I, once again, it is found that this latter oscillator harmonic range includes frequencies covered in television channels 10 through 13.

All possible f-m receiver interference is shown in tabulated form in Table II. The first two columns list the f-m channels and their respective frequency ranges. The next two columns indicate the f-m oscillator frequency range when it is tuned below and above the incoming signal respectively. (Only those frequencies of interest to us are shown.) The last column shows the f-m oscillator second harmonic frequencies that can cause interference. The television channels shown in parenthesis in the third and last columns merely indicate those television channels which are subject to interference.

(Continued on page 11)

Television Changes

General Electric 814, 820, 830, 840

A new ceramic-core sweep transformer, Stock No. RTO-071, is recommended as a substitute for the original molded horizontal-sweep output transformers for these models. It has several electrical design improvements over the originally specified transformer, among them are higher efficiency and better high-voltage insulation.

The transformer is equipped with a 470,000-ohm resistor in shunt with a 0.0022-μf capacitor, connected between the primary and high-voltage windings. In order to provide identical electrical characteristics to the original transformers, a few circuit revisions are necessary when the substitution is made. Kits are available which contain all the additional components, except transformers or tube, which are required to make the conversions. Fig. 1 is a sketch of the RTO-071 transformer.

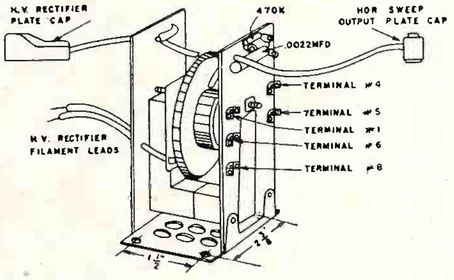


Fig. 1. RTO-071 transformer used in General Electric Models 814, 820, 830, and 840.

Fig. 2 shows the seven steps required to change the circuit for the use of the substitute transformer. The procedure is as follows:

1. Disconnect leads of defective sweep output transformer, including filament loop for 1B3GT rectifier tube. Note that R67, R62, and C103 contained in lead of sweep transformer are removed and discarded.
2. Remove old size control L18 and its shunt resistor R64. Replace it with the new horizontal size control (Stock No. RLD-014). Before installing new control, the mounting hole will have to be enlarged to accommodate the shoulder of RLD-014.
3. Remove old linearity control L19 and its shunting resistor, R65. Replace it by the new linearity control (Stock No. RLD-014).
4. Mount new sweep output transformer (Stock No. RTO-071) in place. See sketch for lead identity so as to effect most satisfactory placement of transformer. Wire the new transformer to the circuit according to the diagram, Fig. 2.
5. Remove type 5V4G tube, V15, and discard. Reconnect V15 socket for new type 6W4GT tube as shown on diagram. Connect the heater of the 6W4GT tube in parallel with the picture tube heater winding. Note: If line voltage remains above 105 volts, the filament of the 6W4GT tube may be connected to the 5-volt winding that supplied the 5V4G damper tube.
6. Remove R60 and R61. Replace them with two 27,000-ohm resistors connected in parallel.
7. Reconnect the h-v capacitor, C53, so that the connection from the stand-off which was disconnected in Step 1, reconnects to chassis ground as shown in Fig. 2.

The conversion components required are:—

1 Stock RTO-071 transformer
1 Type 6W4GT tube
1 Stock RKT-004 kit.

The kit consists of:—

2 URF-083, 27,000, 2 watts, carbon
2 RLD-014, controls.

DuMont RA-101B

The connection from the 4.5-Mc trap (V17) to the junction of L47 and R91 has been deleted. Resistor R91 which goes from L47 to the junction of R89 and R94 has also been deleted.

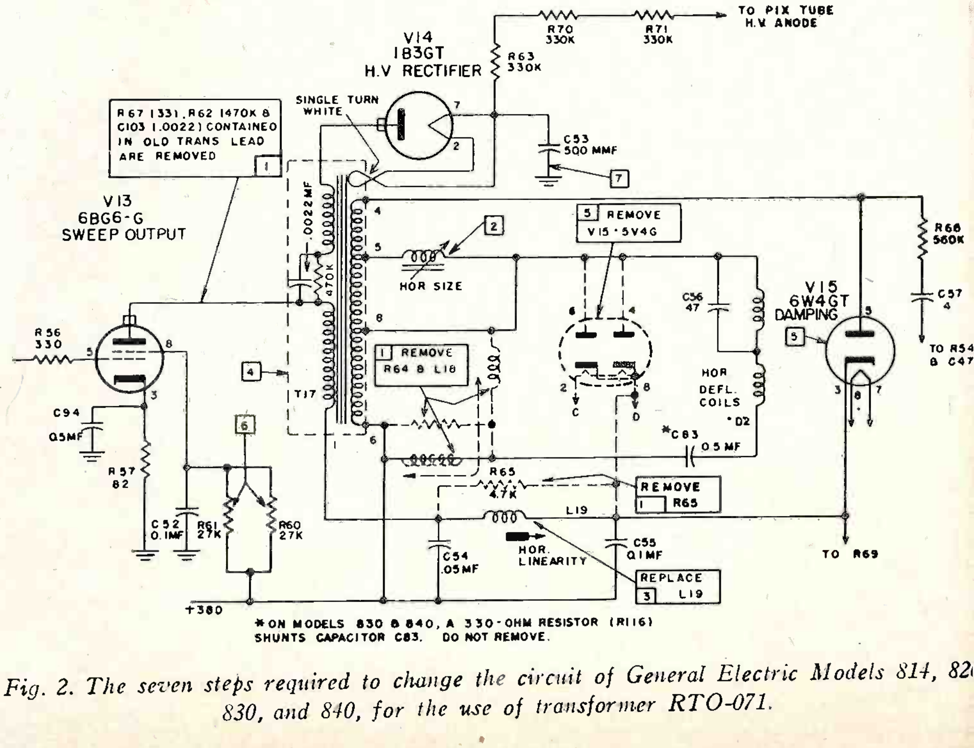


Fig. 2. The seven steps required to change the circuit of General Electric Models 814, 82(cut off) 830, and 840, for the use of transformer RTO-071.

Montgomery Ward 94WG-3006A, 94WG-3009A

The following information supplements the Picture I-F and Trap Adjustment Alignment Table and replaces the Retouching of Picture I-F Adjustments and Response Curves section.

Checking Picture I-F Adjustments — The response curve, secured after completing steps 5 through 12, may be observed by connecting the sweep generator to the junction of C-31 and R-23 (through hole in tuner side of chassis) and by connecting the oscilloscope to the junction of L-8 and R-51. The marker signal generator should be loosely coupled to the sweep generator output leads.

With the Contrast control set at —3 volts as in Step 5, the response curve should be approximately flat topped as shown in Fig. 1.

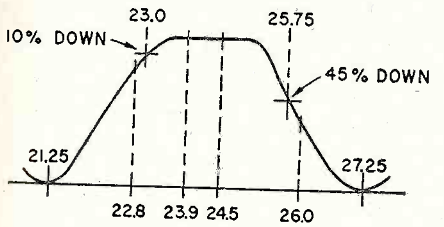
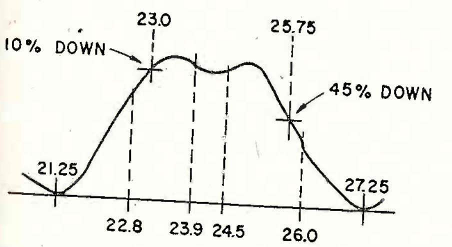


Fig. 1. I-f response for −3 volts on contrast control of Models 94WG-3006A and 94WG-3009A.

A 25.75-Mc (picture carrier) marker signal should appear approximately 45% down, and a 23.0-Mc marker should appear approximately 10% down. A 21.25-Mc signal (sound carrier) and a 27.25-Mc signal (adjacent sound carrier) should have zero response. Some final adjustment of T-1 (bottom), L-5, T-10 (top), and L-7 may be required to secure an ideal response curve. The portions of the curve affected by these adjustments are shown in Fig. 1. Do not change trap adjustments T-1 (top), T-5 or T-10 (bottom) after they have been set according to steps 6, 7 and 8.

In areas of low signal strength it may be desirable to increase the i-f sensitivity by aligning the i-f with a —1 volt setting of the contrast control. If this is done the response curve will be approximately as shown in Fig. 2. The 25.75-Mc (picture carrier) marker and 23.0-Mc marker should have the same relative positions as for —3 volt alignment.



ig. 2. I-f response for −1 volt on contrast control of Models 94WG-3006A and 94WG-3009A.

-F *Response Curves*—The response curves hown in Figure 18 were taken at the input the converter circuit of the tuner, using a rystal diode probe and a sensitive oscillo-ope. Since such equipment is not generally vailable to the service man these curves nnot be observed. However the over-all sponse of the set may be observed by con-cting the sweep generator and marker gnal generator (loosely coupled) to the tenna input and the oscilloscope to the junction of L-8 and R-51. The response curve for each channel should be approximately the same as the i-f response curve, with the picture carrier frequency appearing 45% down and the sound carrier frequency at the zero base line. Be sure the Fine Tuning Control is set in the center of its range. The picture carrier and sound carrier frequencies can be properly positioned for each channel by adjusting the proper oscillator coil screw, as shown in Figure 8.

Note: — All response curves have been shown in the classical manner, with the curve up and the frequency increasing from left to right. The manner in which the curves will appear on any alignment check will depend upon the equipment used, i.e., curves may appear inverted or reversed from the manner shown.

DuMont RA-109A, RA-111A

Type 6CB6 tubes may be substituted for 6AU6's in the 2nd sound i-f amplifiers of the RA-109A and RA-111A sets. This substitution requires the addition of a tube shield (part number 42002530) and a shield base (part number 42002540). The latter may be readily soldered in place, rather than riveted or bolted.

A 6BC5 may be substituted for the 6AU6 first sync clipper, V219, in the RA-111A set. This change does not require the addition of parts or wiring.

Type 6BA6 tubes may be used in place of the 6AU6's in the 1st and 2nd video i-f of the RA-109A and RA-111A sets, providing both 6AU6's are replaced by two 6BA6's simultaneously. It is not advisable to use one 6BA6 and one 6AU6 in these positions.

For Long, Trouble-Free Service

...You Can Rely On MALLORY VIBRATORS!

You get long and trouble-free service from Mallory Vibrators because of a three-way combination that can't be beat. The patented tuned mechanism assures slow contact impact, for minimum wear—high contact pressure, for low resistance—fast contact break, for reduced arcing and pitting. That's a Mallory exclusive!

And that's another good reason why more Mallory Vibrators are used in original equipment than all other makes combined.

When you use Mallory Vibrators for replacement, you are sure of long life, dependable starting and high output efficiency. See your Mallory distributor now!

More Mallory Vibrators Are Used In Original Equipment Than All Other Makes Combined.

P. R. MALLORY & CO. Inc

MALLORY

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

*Reg. U.S. Pat. Off.

APPROVED PRECISION PRODUCTS

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

Successful
SERVICING
REG. U.S. PAT. OFF.

Vol. 12 NOVEMBER, 1950 No. 1

Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

Published by
JOHN F. RIDER PUBLISHER, INC.

480 Canal Street
New York 13, N. Y.

WOrth 4-8340
WOrth 4-8341

JOHN F. RIDER, Editor
E. H. BEAUMONT, Associate Editor

CURTAIN TIME

Color Television

The recent ruling by the FCC approving the CBS color wheel has raised havoc in the television industry and among the public. What we say may be just another voice in the wilderness, but we hope that it will have some meaning to the readers of these pages—that it will bear enough weight so that you will devote a few minutes time necessary to address a letter to your congressman deploring the October 11th ruling of the FCC on color television.

It is an undeniable fact that, given the opportunity to see a television picture in color or in black and white, the public would prefer the color. But that does not mean that the people of the nation are demanding color. Were color their concern, they would not have bought almost 6½ million black and white receivers during the year 1950. Personally, we have never accepted the statements made during some of those FCC hearings, that the public was demanding color.

We are concerned in the main with the fact that FCC rulings are intended to be in the "public's interest"; this means the consumer's interest. No system is in the public's interest if it obsoletes more than 9 million television receivers, representing an investment of several billions of dollars. The fact that present-day receivers may be "converted" or "adapted" for the reception of the CBS color transmissions at a cost, which at the present time is stated as being from $50.00 to as high as $250.00, does not justify a ruling which is supposed to be in the public's interest, especially when additional restrictions are imposed, namely that the maximum practical limit of such color pictures is the equivalent of a 12½" tube screen. Large pictures are possible, but what normal room can accommodate a color wheel 40 to 50 inches in diameter!

The public has clearly demonstrated that it considers a 12½" picture too small. Examination of production records and sales records shows that the public's preference is for pictures 15" or 16" in diameter and larger. By this FCC ruling, the public is forced into needless expense and still limited in their ability to utilize fully that for which they have paid their money. Many people in American have discarded 7", 10", and 12½" screen television receivers for those having 16" and larger screens, only to find that they cannot enjoy the advantages of the larger screens because of the practical limitations surrounding the application of the CBS color wheel.

The ruling is utterly fantastic. It is wholly incongruous in 1950, in this world of electronics, to visualize a rotating disk as a part of television equipment in the home. It is an inconvenience; it is destined to be a nuisance. In every respect, it is incompatible with modern-day thinking.

If, at the time of this writing, no development organization has been able to solve the color television riddle in a manner which is to the public's interest, the only sensible ruling would be to throw the whole thing back into the laboratory. From what we hear, the solution to the public's interest is not too far distant. A recent RCA press release contained the contents of telegrams sent to the radio-television manufacturing industry. The telegrams, signed by E. C. Anderson, Vice President in Charge of the Commercial Department, RCA Laboratories Division, read:

"Reference Color Television Situation. The last demonstration of our color television system was made by RCA to its licensees in Washington on March 30, 1950. Since then, we have made substantial improvements along the lines set forth in our progress report of July 31, 1950, previously mailed to you.

"We are preparing to give our licensees another demonstration which will incorporate the improvements we have made to date in the set and tri-color tube. At this demonstration, we will also show a color converter for the RCA system.

"We expect to be ready to give this demonstration in Washington, D. C., on December 5, 1950. Details of exact time and place will follow. Hope you and your engineers will be present.

"At this demonstration, we will supply you with information about our latest simplified circuits, the converter and the tri-color tube. We shall continue to give you further demonstrations periodically so that you may see the successive steps in our progress.

(Continued on page 8)

Television Changes

Muntz M158, M159, M159A, M159B, M169

Alignment and service data given for Model M169 apply also to the Models M158, M159, M159A, and M159B. The following voltages were taken with the line voltage set at 117 volts, and are subject to ±20%. The meter used is an RCA VoltOhmyst. All voltages were taken from chassis ground to the socket pin contacts.

Pulsed high voltages are present on the cap of the 6BH6 and 1B3 tubes. No attempt should be made to measure voltage at these points. A continuity check of the high-voltage winding will quickly reveal an open winding. Resistance values are given on the various schematics. The high voltage of the picture tube anode can be measured with a kilovoltmeter if necessary. Following is a list of resistances of various components not given on the schematics.

HORIZ. OSC. OUTPUT TRANS. PART #TO-17A

Terminals	Resistance
1 — 2	180 ohms
2 — 3	180 ohms
1 — 3	360 ohms
4 — 5	10 ohms
5 — 6	0.9 ohms
4 — 6	11 ohms
Filament	0.2 ohms

VERT. OUTPUT TRANS. PART #TO-16
Primary — 625 ohms Secondary — 8 ohms

FOCUS COIL PART #LC-37
250 ohms

FOCUS COIL PART #LC-45
385 ohms

DISCRIMINATOR COIL PART #LI-44

Terminals	Resistance
1 — 2	4.0 ohms
3 — 4	0.8 ohms
4 — 5	0.8 ohms
3 — 5	0.8 ohms

TRAP COIL PART #LO-33 4.5 MC.

Terminals	Resistance
Top — Center Tap	4.4 ohms
Bottom — Center Tap	8.5 ohms
Top — Bottom	12.9 ohms

PEAKING COILS

Part #	Code	Value	Ohms
LC-36	Blue	170 Mil-H.	9.0
LC-39	Red	180 Mil-H.	9.5
LC-40	White	260 Mil-H.	12.0
LC-41	Yellow	400 Mil-H.	14.0
LC-44	Green	280 Mil-H.	15.0

The Master Oscillator Frequencies for the r-f curve (Marker Generator Setting Table) for these chassis are the same as those which appear in the R-F Alignment Table for Chassis TV16A1, TV16A2, and TV16A3.

●

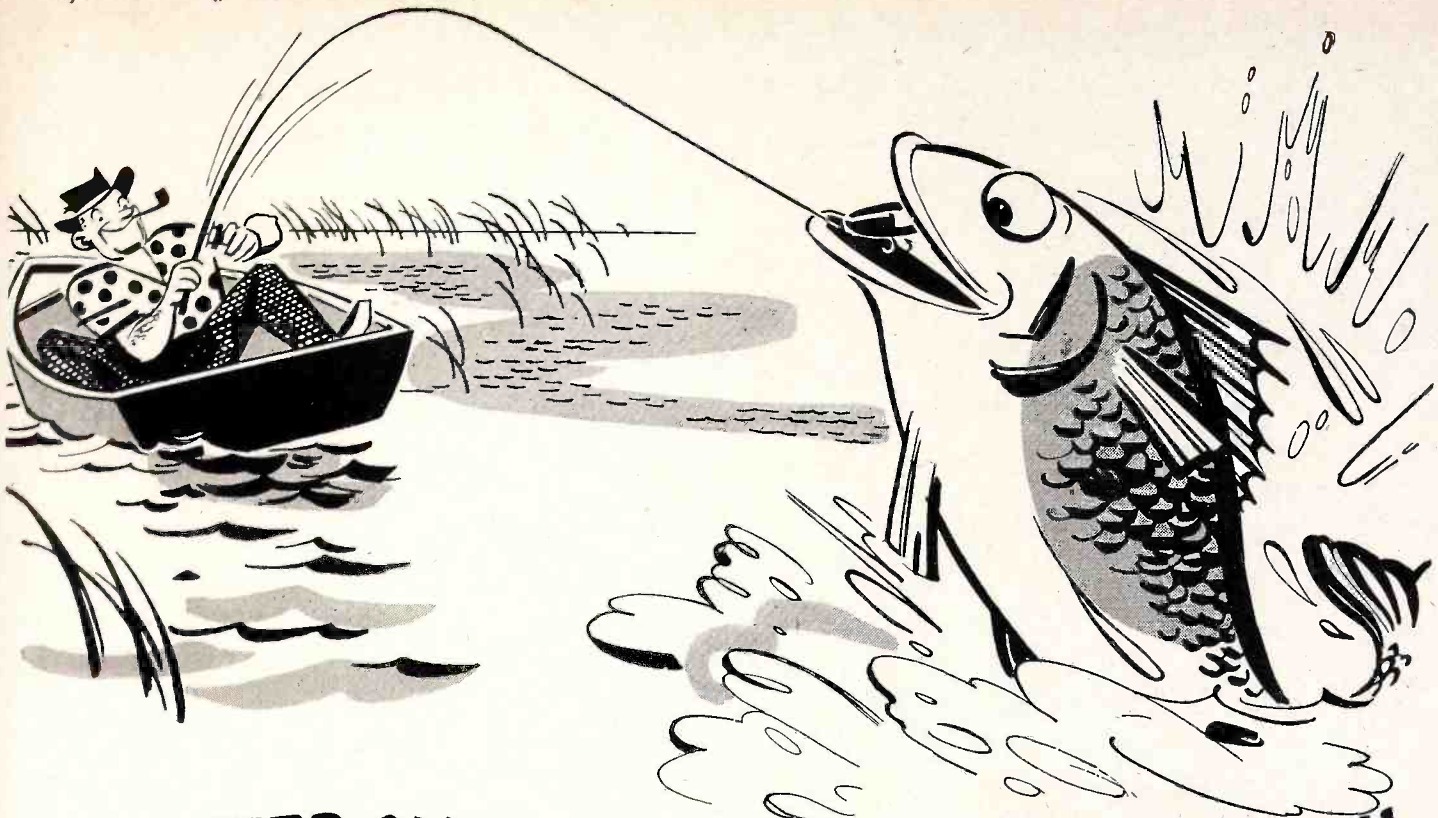
DuMont RA-101B, RA-102, RA-103

If vertical jitter occurs in these chassis the following modification is suggested: (See the schematic for the deflection chassis.)

1. Disconnect the blue lead of the vertical BTO transformer from the B+ supply point.
2. Disconnect the red lead of the vertical BTO transformer from the end of the integrator network, and ground the red lead to the chassis.
3. Connect one terminal of a 0.01-400-v (0.01-450 volt for RA-103 only) paper tubular capacitor to the point from which the red transformer lead was removed in Step 2.
4. Connect the blue transformer lead to the remaining lead of the 0.01 capacitor.
5. Connect a 27,000-ohm, 2-watt carbon resistor to the plate (pin 8) of the vertical sync amplifier V6 (V216-A in RA-103).
6. To the open end of the 27,000-ohm resistor, connect a 4700-ohm, 1-watt, carbon resistor and the positive terminal of an 8-μf, 450-v, electrolytic capacitor.
7. Ground the negative terminal of the 8-μf capacitor to the chassis.
8. Connect the open end of the 4700-ohm resistor to the point from which the blue transformer lead was removed in Step 1.
9. Remove resistor R270, 12,000 ohms. (This step applies to Chassis RA-103 only.)

VOLTAGE SOCKET CHART
Muntz M158, M159, M159A, M159B, M169

FUNCTION	TUBE TYPE	SCREEN		CATHODE		GRID		PLATE	
		PIN	Volts	PIN	Volts	PIN	Volts	PIN	Volts
R.F. AMP	6AG5	6	115	7	0	1	-2	5	105
OSC. MIXER	6J6	- -	- -	7 7	0 0	6 5	-3 -2	1 2	105 70
VIDEO. . . . . I.F. . . . . AMP.	6AU6 6AU6 6AU6	6 6 6	135 135 140	7 7 7	0 .75 .80	1 1 1	-.75 -.75 0	5 5 5	135 135 140
XTAL. DET.	Hot end of XTAL will be approximately -1. to -2.5 Volts.								
VIDEO AMP.	6AU6	6	140	7 7	pic. 0 n. pic. 14	1 1	pic. -1 n. pic. 10	5	90
I.F. SOUND	6AU6	6	290	7	140	1 2	140 140	5	330
FM DET. 1ST AUDIO. . .	6T8			3 3 7	pic. -10 n. pic. -4 0	8	-.75	1 1 2 2 6 9	n. pic. -4 pic. -9 n. pic. -6 pic. -15 -1.5 60
AUDIO OUTPUT	6AQ5	6	360	2	145	1 7	120 120	5	360
SYNC. LIN. & DC - R. .	6AU6	6	140	7 7	pic. 20 n. pic. 4.5	1 1	pic. -10 n. pic. 0	5	110
VERTICAL OSC. & VER. AMP.	6SN7			3 6	0 14	1	V. Hold -8 to -40	2 & 4 5	Height 28 to 42 330
RECTIFIER.	5U4			8	390				
HORZ. OUTPUT OSC . . .	6BG6	8	200	3	0	5	-32		
DIODE DAMPER	6W4			3	420			5	330
HIGH VOLTAGE	1B3								8200



YOU NEED ONLY ONE LINE TO MAKE A CATCH!

YOU NEED ONLY ONE BRAND TO CATCH

BIG BATTERY BUSINESS!

● "Eveready" radio batteries land big battery business because they're the batteries your customers want! They're the most widely advertised brand in the world. Your customers *know* that famous "Eveready" batteries give long, satisfactory playing life in *any* portable. It makes sense to use this one complete line to streamline inventories, to cut overhead costs, to bring in big profits for *your* store!

"EVEREADY"
BRAND
THE BATTERY WITH
"NINE LIVES"

The terms "Eveready", "Nine Lives" and the Cat Symbol are trade-marks of

NATIONAL CARBON DIVISION
UNION CARBIDE AND CARBON CORPORATION
30 East 42nd Street, New York 17, N. Y.
District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

"BATTERY-ENGINEERED BY BATTERY MANUFACTURERS FOR BEST BATTERY PERFORMANCE!"

Curtain Time

(Continued from page 5)

"In our petition of October 4 to the Federal Communications Commission, we said:

'By June 30, 1951, we will show that the laboratory apparatus which RCA has heretofore demonstrated has been brought to fruition in a commercial, full-compatible, all-electronic, high-definition system of color television available for immediate adoption of final standards.'"

As the owner of a television receiver, we are not concerned with who accomplishes the development. All we are interested in is that whatever system is decided upon be to the public's interest. From all we can learn, the interest in color by the public has not been so great as to justify a compromise of the kind established by the FCC ruling of October 11th. If the stage of development of color television by a number of different organizations has reached that point where the public's interest may be served in the not too distant future, then, most certainly, a ruling such as that of October 11th is certainly unwarranted.

Whatever the system that eventually may be used, it must be a compatible system—one which will serve the man, woman, and child who wishes to view the transmissions from any station within the range of the receiver location, and who wishes to watch a picture in color or in black and white, whichever suits his or her fancy.

Perhaps by the time these words see print, the ruling of October 11th may have been rescinded. Let us hope that this will happen. It would be the only sensible thing to do. Under any circumstance, write to your congressman and to the FCC voicing your disapproval of the present ruling, or voicing your approval if, by the time this reaches your hands, the ruling has been revoked.

John F. Rider

NEW AID TO PRACTICAL EDUCATION

INSTRUCTORS: Mr. Samuel L. Marshall, the author of "TV INSTALLATION TECHNIQUES," has prepared a fully comprehensive *Term Plan*, published by John F. Rider Publisher, Inc., for use in television installation courses. This term plan centers around 75 theory lessons, with reference indications to the section numbers in the text "TV INSTALLATION TECHNIQUES," and includes 19 Shop Projects associated with the lessons. The duration of the complete course is left flexible, so that the instructor can determine the length of each individual theory and project lesson and, thereby, the total time allocation for the course. This term plan is yours for the asking, *FREE*, and without obligation of any kind—merely write for it on school stationery.

The Big Three!

FROM JFD

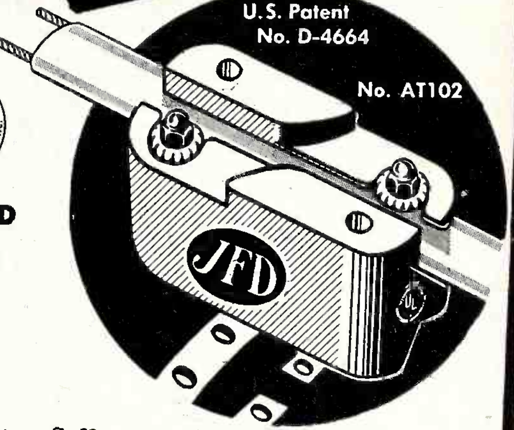
mean more TV business for you!

Natural tie-ins with every TV receiver sold. On-the-spot sales-makers with every servicing call. *No* installation cost. Thousands now in use. Thousands more sold every day in the year. Now, more than ever, JFD means *business!*

Make JFD Your TV Antenna and Accessory Headquarters

Why shop around? You save in every way when you make JFD your single source of supply. No other manufacturer offers you so extensive a line from the smallest screw eye to the largest television array. Count on JFD . . . FIRST In Television Antennas and Accessories.

TWIN LEAD TV LIGHTNING ARRESTER



UL APPROVED

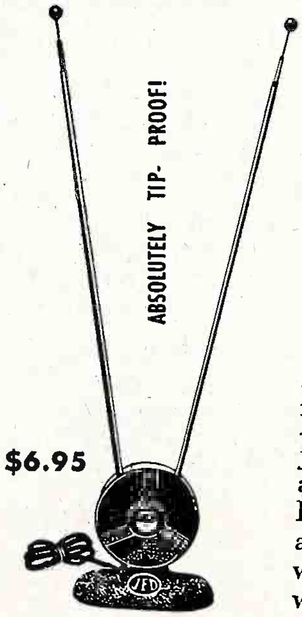
$2.25

The Fastest Selling Lightning Arrester Today!

JFD TWIN LEAD SAFE TV GUARD

Protects TV sets against lightning and static charges. Completely waterproof. Simple to install everywhere and anywhere... no wire stripping, cutting or spreading of wires. The most versatile ever designed... can be mounted on wall, window sill, or cold water pipe. Supplied complete with ground wire and mounting strap.

JFD INDOOR TV ANTENNA



ABSOLUTELY TIP-PROOF!

Panorama

Model No. TA135

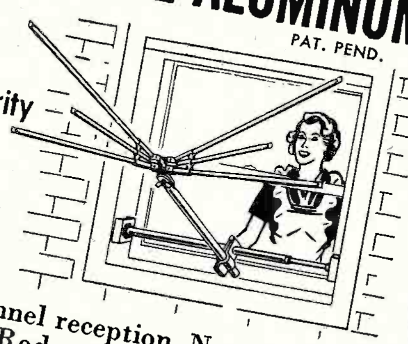
$6.95

3-section, chrome plated, brass telescopic dipoles extend from 15 to 41 inches. Enhances interior decor. No adjustments . . . just set elements at any angle . . . that's all. Beautifully designed, and exceptionally well built. Complete with 6 ft. of twin lead.

JFD CONICAL WINDOW ANTENNA

ALL-ALUMINUM
PAT. PEND.

Approved by New York City Housing Authority For Installation in All City Housing Projects



First-rate all-channel reception. No expensive installations . . . Reduces maintenance and servicing costs . . . No damage to building. Simple to install . . . anybody can do it . . . easily folded and stored. Ideal for apartment houses and all large housing projects. No landlord trouble. **Model No. C119, $13.45.**

Write For Complete Catalogue of JFD Television Antennas & Accessories No. 58R

See Your Jobber or Write

JFD MANUFACTURING CO., Inc.
6119 16th Avenue, Brooklyn 4, N. Y.
First in Television Antennas & Accessories

TELEVISION INTERFERENCE FROM F-M RECEIVERS

(Continued from page 11)

Very little can be done at the television ıceiver to remedy any trouble caused by r-f ıterference due to oscillator radiation from n broadcast receivers. In some cases special ning stubs have been installed. These stubs e made out of twin-lead transmission line t to the frequency of the interfering signal. other cases, special *L-C* tuned circuits ve been installed. In both cases, the installions were made at the antenna terminals the television receiver to reduce the interrence. However, this method of working the television receiver has not met with much success, since it also attenuates the sired signal.

Other possibilities for reducing such interference can be accomplished by first finding the source of trouble, that is, locating the offending f-m receiver. Once found, one remedy would be to install wave traps tuned to the oscillator frequency at the *f-m receiver's* antenna posts if the f-m antenna is used as a means of radiation of the oscillator signal. Thus, the radiation will be greatly minimized. In fact, if the f-m antenna is the radiating element, anything that will present a high impedance to the oscillator signal before it reaches the f-m antenna will be effective.

However, if the radiation emanates by some other means, that is from the chassis, this latter method will not be effective. For this case the most effective means of reducing such radiation would be to shield completely the f-m receiver, or just the oscillator section if possible.

TABLE II

F-M Channels	Freq. Range (F-M Channel) (Mc)	Freq. Range (F-M Osc. tuned below by 10.7 Mc) (Mc)	Freq. Range (F-M Osc. tuned above by 10.7 Mc) (Mc)	Freq. Range (F-M Osc. Second Harmonic) (Mc)
01-254	88.1-98.7	77.4-88 (TV Channels 5, 6)	—	—
49-300	97.7-107.9	87-97.2	—	174-194.4 (TV Channels 7-10)
01-247	88.1-97.3	—	98.8-108	197.6-216 (TV Channels 10-13)

romberg-Carlson 1121, 1135

When f-m drift is encountered the following steps can be taken to assure better grounding and better receiver performance.

1. On the variable tuning capacitor, connect ort lengths of wire braid from the shaft ping contacts to the r-f tube shelf. Also at four points, where the tie-bar of the varie capacitor is connected to the r-f tube elf, use wire braid (heavy) and solder with heavy duty soldering iron to insure a well dered connection.
2. At the converter end of the r-f tube shelf, ere it is mounted to the chassis mounting acket, use a heavy duty iron and sweat in der along the butting junction.
3. The f-m trimmers on the r-f shelf may loose, permitting heat, vibration, etc., to use them to change slightly. If they can turned easily, unsolder the lock-nut, run down a fourth or half turn, as necessary get a smooth but secure hold on trimmer ew, and resolder. Pay particular attention the oscillator section.
4. At the oscillator end of the range switch, eck the contact of the metal spacers to the rods between wafer sections. If they are ating or only grounding intermittently, mp them down tightly against the tie rods d tighten the tie bolts.
5. Substitute wire braid in grounding conctions from r-f shelf to main chassis and der well.
6. Check alignment of the f-m—i-f and crimintor and get proper bandwidth. At same time be sure that the iron core slugs snug so that they will hold alignment. A stac compound can be obtained that acts a non-hardening filler. Particular emphasis ould be given on the discriminator transrmer secondary where a slight movement es the same effect as oscillator drift.

National 686S, 686SB, SPU686S, 1286S

The 686SB power unit is the same as the 686S except that it is equipped with mounting brackets. The SPU686S is the same as the 686S except that it is designed for rack mounting. The 1286S is similar to the 686S except that it is designed to operate from 12 volts d.c. The voltages available at the output socket are 12 volts d.c. and 165 volts at 45 milliamperes d.c.

The following capacitors have been added to the 686S and 1286S power units:

1. C203, 0.01 μf, 300 vdcw, added from the junction of fuse F101 and switch S101 to ground.
2. C204, 0.0043 μf, 500 vdcw, from the B+ terminal to ground.
3. C205, 0.0001 μf, 500 vdcw, across output socket from L201 to A+.

National HRO-7

To eliminate oscillator drift occurring during stand-by periods, the following changes have been made. These changes allow the h-f oscillator, bfo oscillator and output tubes to remain on all the time whether the B+ switch is turned on or off.

1. Move the B+ end of R24 from the B+ tie-point to pin 6 of V9, 6J7.
2. Connect pin 6 of V9 to pin 5 of S1 using 8¾ inches of red wire.
3. Move red lead supplying pin 4 of S1 from the cold terminal of bsw to the hot terminal.
4. Move red lead running to tie-point located on chassis between C31 and C37 from pin 4 of S1 to the cold terminal of bsw.
5. Change the value of R21 to 3500 ohms, 5 watts.

Radio Changes

Farnsworth "N" Series, Capehart

In order to permit the use of the "Magnetic True Timbre" pickup in the N series instruments, a modification kit has been prepared, No. 41141.

A separate phono preamplifier (2-stage) using a 6SC7 twin triode tube, and mounted on a separate chassis, is used in place of the 6J7 preamplifier stage included on the tuner chassis. The schematic diagram for this stage is shown in Fig. 1. The 6J7 tube has been removed and the power cable to the preamp chassis is brought through the unused socket and connections made on the underside of the socket. The 6J7 stage is not used, so a shielded lead is connected directly from the phono input socket to the phono lug on the auxiliary bandswitch.

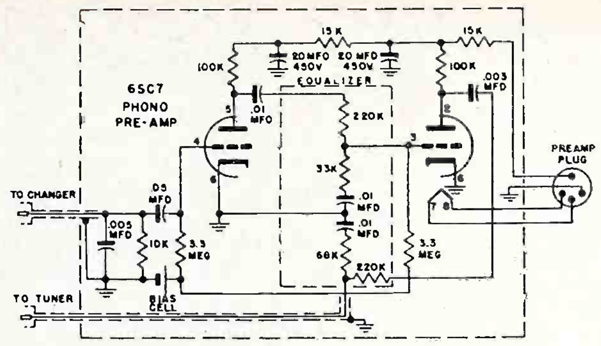


Fig. 1. Schematic for the 6SC7 phono-preamplifier stage used in the Farnsworth "N" Series, Capehart.

The noise eliminator, which is furnished with the record changer modification kit, is also included in these modified N series instruments. The circuit diagram of the noise eliminator is the same as that in the P4 series.

The voltage and resistance readings for the 6SC7 are given below:

Pin	Voltage (volts)	Resistance (ohms)
1	0	0
2	150	200 K
3	—0.3	inf
4	—0.3	inf
5	135	200 K
6	0	0
7	0	0
8	5.4ac	2.5

Zenith H615, H615W, H615Y, Ch. 6G05

These models and chassis are the same as Model G615, Chassis 6G05, except for the differences in their cabinets. Model H615 has a plastic cabinet (part number 14-1274). Model H615W has a white plastic cabinet (part number 14-1275); and Model H615Y has a black plastic cabinet (part number 14-1276).

RCA Record Changers RP-176A, RP-176B

The record changers are the same as the RP-176 except for the following differences. The pickup and arm assembly for the RP-176A is: Stock No. 72716, Arm, Pickup arm complete, less pivot arm, crystal and cable. The motorboard sub-assemblies, complete with all welded and riveted parts, less detachable operating parts, are designated as stock numbers 72717 and 70844, for RP-178A and RP-178B, respectively.

Montgomery Ward 05WG-2745A

This model is the same as Model 94WG-2745A. To reduce regeneration in later production receivers, the following changes were made:

Ref. No.	Part No.	Description
		Removed
L-1	35A5	Insulated choke
C-6	47X496	500 $\mu\mu f$ ceramic capacitor
		Added
R-37	B84562	5,600-ohm, 0.5-w carbon resistor. This resistor replaces the insulated choke L-5 in the circuit diagram.

General Electric 145

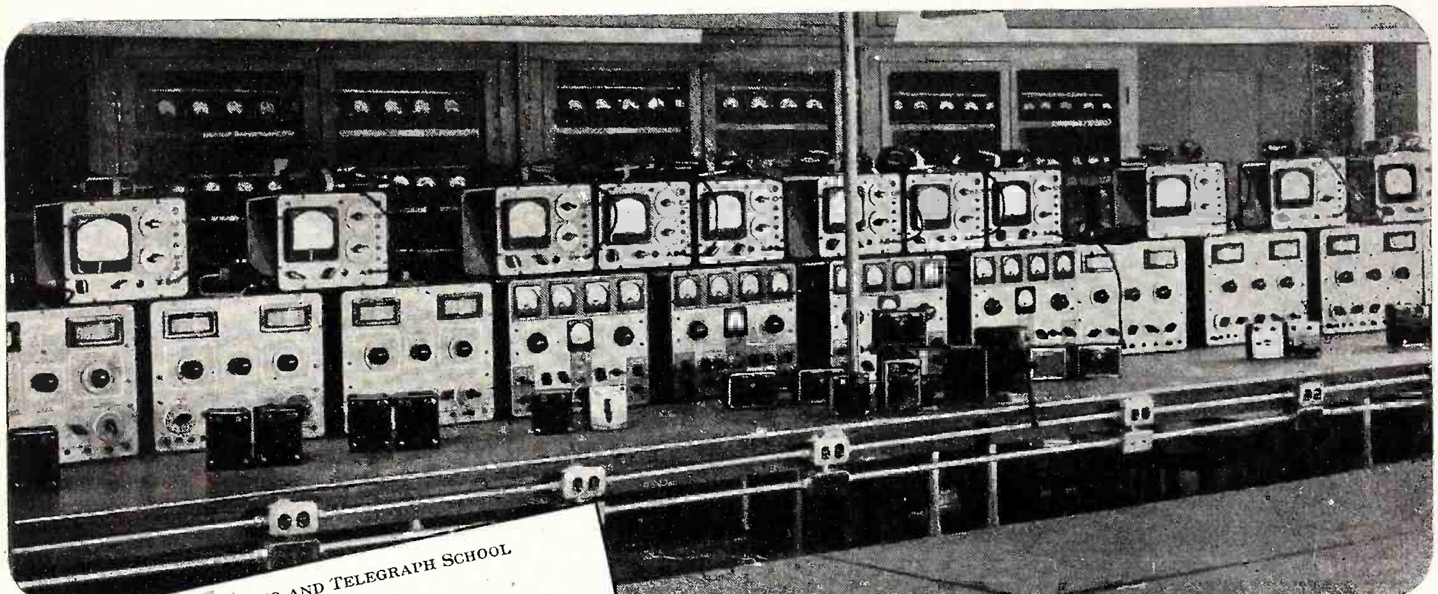
The following parts have been added to provide replacement of the battery cover plate and assembly parts:

Ref. No.	Description
RAC-078	Cover, cover plate only
RHR-009	River, "A" battery spring rivet
RHR-010	River, "A" battery clip rivet
RHW-014	Washer, "A" battery spring washer
RII-027	Insulator, insulator strip
RMC-037	Clip, battery clip
RMS-189	Spring, "A" battery spring.

Where the best is needed...

THE CHOICE IS HICKOK

Radio and TV Test Instruments



MASSACHUSETTS RADIO AND TELEGRAPH SCHOOL
INCORPORATED
271 HUNTINGTON AVENUE
BOSTON 15, MASS.
TELEPHONE COMMONWEALTH 1010 - 1011

G. R. ENTWISTLE, PRESIDENT
C. A. KELLEHER, VICE PRESIDENT
GLADYS L. HUNT, TREASURER

July 6, 1950

Hickok Electrical Instrument Company
10514 Dupont Avenue
Cleveland, Ohio

Att: Mr. H. D. Johnson, Sales Manager

Gentlemen:

As you know, we have purchased many (over 60) of the various types of Hickok Test Meters for use in conjunction with our Radio Technicians and Television Technicians Training Courses given both days and evenings at our school.

They were not only recommended by the Massachusetts Department of Education on their list of approved equipment that schools of our type must obtain before receiving State approval of its equipment, but they also were the type equipment that a school of our long experience and reputation were desirous of obtaining.

We knew that when we purchased Hickok Test Equipment, we were getting the best that they would hold up over the years ahead and provide both our instructors and students with dependable test apparatus that was recognized by the trade and this equipment would minimize "time out" due to breakdowns and meter failure. Incidentally, we have had a minimum of meter repairs since we added the Hickoks.

Our students have confidence that we are trying to give value and quality and provide them with reliable and time tested meters.

We consider the investment an economical one in the long run and a favorable one from the point of view of appearance in showing prospective students what they will have in the way of Test Meters during their training.

Needless to say we have had much favorable comment on our Hickok Meters.

Having found The Hickok Test Equipment very satisfactory, I thought you would be interested.

Sincerely yours,

MASSACHUSETTS RADIO AND TELEGRAPH SCHOOL, INC.

G. R. Entwistle, President

GRE:s

Massachusetts Radio & Telegraph School is one of the oldest and best equipped radio technician training centers in the country.

When choosing test equipment, they demand highest accuracy and dependability, for long, hard use by hundreds of students, every day. HICKOK equipment is their choice, just as it's always been the Choice of the Experts, for over 40 years.

You, as a professional Radio and TV Servicing Technician, also know the true value of highest quality test equipment. With HICKOK instruments, you can quickly, accurately and profitably repair the most troublesome receivers. When you choose HICKOK, you know you have the best.

• See your nearest HICKOK jobber, or write a card today for full information on HICKOK Highest Quality Servicing Equipment, including the latest instruments that are built only by HICKOK.

THE HICKOK ELECTRICAL INSTRUMENT CO.

10520 Dupont Avenue · Cleveland 8, Ohio

1910 ★ *40th Anniversary* ★ 1950

Radio Changes

Zenith 6MF780, Ch. 6D80, Ford; 6MF780E, Ch. 6D80E, Ford; 6MM790, Ch. 6D90, Mercury; 6MM790E, Ch. 6D90E, Mercury

Model 6MM790, Mercury, is erroneously listed in the Indexes and in Volume XVIII as Model 6MN790.

Mercury Model 6MM790E is the export model of the 6MM790. Model 6MF780E, Ford, is the export model of the 6MF780. In these export models the circuit breaker capacitor 22-1148 should be installed as shown in Fig. 1.

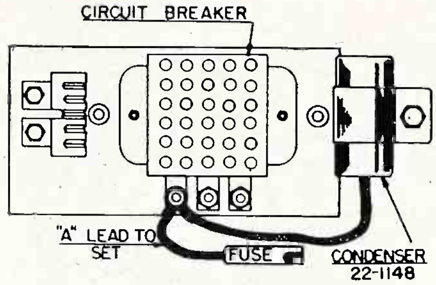


Fig. 1. Circuit breaker used on Mercury Model 6MM790E.

Top and bottom views for Chassis 6D80, 6D80E, 6D90, and 6D90E, are shown in Figs. 2 and 3. The i-f alignment procedure for these chassis is as follows:

1. Remove top and bottom covers from receiver.
2. Set signal generator to 265 kc.
3. Apply signal from generator through a 0.1-μf dummy to the 7B8 converter grid. (Pin 6 on the socket.)
4. Adjust the i-f trimmers, A, B, C, and D (shown in Fig. 2) in the order named for maximum output. Repeat the operation to assure accurate alignment.

The r-f and oscillator alignment is as follows:

1. Connect signal generator leads through dummy antenna lead in socket on receiver.
2. Set the signal generator to 535 kc.
3. Place set in manual tuning position and set dial to 535 kc.
4. Adjust oscillator trimmer C-9 (shown in Fig. 3) for maximum response.
5. Set signal generator to 1200 kc.
6. Tune set to 1200 kc.
7. Adjust converter trimmer C-7 and antenna trimmer C-2 for maximum response.
8. If dial calibration is off after making above adjustments, a correction can be made by loosening dial scale mounting screws and sliding scale to desired position.

When replacing the core or coil the following adjustments should be made:

1. Replace coil or core.
2. Set signal generator to 1700 kc.
3. Connect signal generator leads through dummy antenna to antenna receptacle on the receiver.
4. Set receiver dial to 1600 kc (maximum high-frequency end of dial).
5. Screw the core completely out of the antenna coil, the converter coil, and the oscillator coil.
6. Adjust oscillator trimmer C-9 at 1700 kc.
7. Adjust converter trimmer C-7, and antenna trimmer C-2 for maximum output reading.
8. Replace cores to their approximate original position.
9. Set signal generator dial and receiver dial to 1200 kc.
10. Adjust oscillator core L-5 to scale at 1200 kc.
11. Adjust the antenna core L-2 and converter core L-3 for maximum output reading.

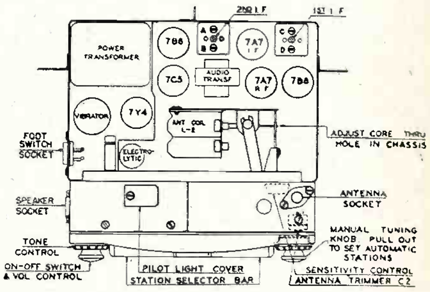


Fig. 2. Top view of Chassis 6D80, 6D80E, 6D90, and 6D90E.

12. Set signal generator to 600 kc.
13. "Rock in" shunt oscillator coil L-6 for maximum output reading. This should be done only as a last resort. This is the same as rocking in the padder capacitor on a ganged capacitor receiver.
14. Check receiver at 1200 kc for calibration and gain. If the receiver is off scale or weak, repeat operations 9, 10, and 11.

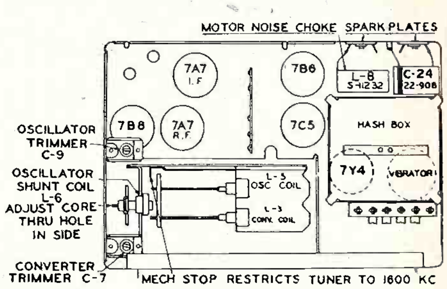


Fig. 2. Bottom view of Chassis 6D80, 6D80E, 6D90, and 6D90E.

15. After alignment is complete, the maximum high-frequency tuning range should be checked. If the range is greater or less than 1605 kc, the mechanical stop for the tuner cross arm should be bent to limit the frequency coverage to 1605 kc. After all adjustments have been made, glue core screws with speaker cement.

RCA 8R71, 8R74, 8R75, Ch. RC-1060; 8R72, 8R76, Ch. RC-1060A

A 15,000-ohm ½-watt resistor, R1, is sometimes used between pin 7 of S1 Rear and the phono outlet. R33, 1000 ohms, ½ watt, has been added from F to G of the a-m oscillator coil. A 0.005-μf capacitor, C10, has been added from pin 3 of the 6AU6 driver, V3, to ground. Filament choke coil L6 has been added from pin 3 of V5 to pin 2 of V6. A 5-$\mu\mu$f capacitor, C11, has been added in parallel across C12 and C13. A 0.005-μf capacitor, C44, has been added from pin 5 of tube V5 to ground.

your viewing public's first choice

Du Mont Teletrons, of course! "Just Right" pictures — not too bright, not boresomely dull; black-blacks, white-whites, with rich life-like gradations; picture sizes the public wants; finest workmanship and materials; and that much-copied Du Mont Bent-Gun Design.

Typical of Du Mont's leadership in cathode-ray tubes, all these features are now offered in their new line of rectangular Teletrons.

Definitely the universally-acknowledged "First With the Finest in Teletrons."

DETAILED LITERATURE ON REQUEST.
LET US QUOTE ON YOUR REQUIREMENTS.

DUMONT

*Teletrons**

ALLEN B. DU MONT LABORATORIES, INC.
CATHODE-RAY TUBE DIVISION
CLIFTON, NEW JERSEY

*Trade-Mark

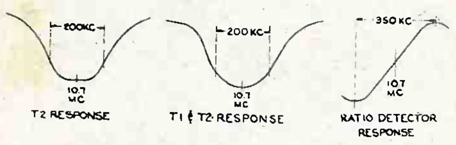
Radio Changes

RCA 8V90, Ch. RC-618, RC-618A; 8V91, Ch. RC-616A, RC-616H

Under Alignment Procedure, Critical Lead Dress, the following additions should be made:

17. The f-m oscillator coil should be cemented to its support. Amphenol No. 912 cement is recommended for this purpose. If it is necessary to loosen the coil, use Amphenol No. 916 solvent.

18. Capacitor C41 should be waxed or cemented to the chassis apron. The f-m response curves are shown in the accompanying diagram.



F-m response curves for Models 8V90 and 8V91.

In Chassis RC-618 the value of R35 is 560 ohms; and R31, the 1-megohm resistor across C4, is used only on early chassis.

Chassis RC-618A is the same as Chassis RC-618 except for the following changes which have been made. A filament choke coil L6 has been added from pin 2 of V8 to pin 2 of the 6AV6 a-f amplifier V5. A 0.005-μμf ceramic capacitor has been added from pin 3 of the 6AU6 driver V3 to ground. A 0.005-μμf ceramic capacitor has been added from pin 5 of V7 to ground. A 100-ohm, ½-watt, fixed composition resistor R36 has been added from pin 4 of V8 to pin 4 of V6. Capacitor C11, 5 μμf, has been added in parallel with C12, and C13 across taps D and B of the oscillator coil L4.

●

Farnsworth P-860

The alignment procedure and table, the chassis component layout, suggested batteries, and dial-cord stringing diagram for Model P-860 are the same as those for Farnsworth Model GP-350.

●

General Electric 165

A tube shield has been added in late production receivers to the 1S5 tube, improving its stability. This item is carried in parts replacement stock at RHS-010.

●

Hallicrafters S-41G, S-41W

In the Alignment Data Table for these models, under the column headed Adjust Trimmers, add C-4A to Step 1, C-4B to Step 2, and C-4C to Step 3. In some models the two capacitors marked C2 have been replaced by variable iron core T6.

INDEX OF CHANGES

Model	Page Number: Successful Servicing	Rider Manuals† From	Rider Manuals† To
TELEVISION CHANGES			
DuMont RA-101B	2	2-1	2-4
		*2-1, 2	*2-3, 4
DuMont RA-101B, RA-102, RA-103	6		
RA-101B		2-1	2-4
		*2-1, 2	*2-3, 4
RA-102		*1-34	*1-57
RA-103		*1-58	*1-80
DuMont RA-109A, RA-111A	3		
RA-109A Series		5-1	5-25
RA-111A Series		5-26	5-43
General Electric 814, 820, 830, 840	2		
814		2-22	2-31
		*2-44	*2-57, 58
820		3-16	3-30
830		3-31	3-44
840		4-34	4-51
Montgomery Ward 94WG-3006A, 94WG-3009A	3	4-29	4-37
Muntz M158, M159, M159A, M159B, M169	6		
M158		3-1	—
M159		4-1	—
M159A		3-2	—
M159B		3-3	—
M169		3-4	—
		4-2	4-6
RADIO CHANGES			
Farnsworth "N" Series, Capehart	12	19-10	19-18
Farnsworth P-860	16		
GP-350		17-17	17-18
Farnsworth 36P10, Capehart	16		
P-10		19-19	19-33
P-73		Rcd. Ch. 18-1	18-9
General Electric 143	16	20-19	20-22
General Electric 145	12	19-13	19-16
General Electric 165	16	20-23	20-26
B. F. Goodrich 92-527, 92-528	16		
92-523, 92-525, 92-526		20-1	20-6
Hallicrafters S-41G, S-41W	16	15-87	15-89
Montgomery Ward 05WG-2745A	12		
94WG-2745A		20-75	20-79
National HRO-7	11	17-21	—
		17-28	—
		17-35	17-48
National 686S, 686SB, SPU686S, 1286S	11		
686S		17-28	—
RCA Q10-3, Q10 Series, Ch. RC-594C	16	15-4	15-7
RCA Q110, Ch. RC-594C	16		
Q10, Ch. RC-594C		15-4	15-7
RCA 8R71, 8R74, 8R75, Ch. RC-1060; 8R72, 8R76, Ch. RC-1060A	14	19-10	19-15
RCA 8V90, Ch. RC-618, RC-618A; 8V91, Ch. RC-616A, RC-616H	16	19-16	19-25
RCA Record Changers RP-176A, RP-176B	12		
RP-176		Rcd. Ch. 17-1	17-12
Stromberg-Carlson 1121, 1135	11		
1121		15-12	15-20
1135		16-8	16-9, 10
		16-16	16-19
Zenith H615, H615W, H615Y, Ch. 6G05	12		
G615, Ch. 6G05		20-19	20-20
Zenith 6MF780, Ch. 6D80, Ford; 6MF780E, Ch. 6D80E, Ford; 6MM790, Ch. 6D90, Mercury; 6MM790E, Ch. 6D90E, Mercury	14		
6MF780, Ford		17-7	17-9
6MM790, Mercury		18-13	18-15

† The Rider Manual Page Numbers given under Television Changes are for Rider TV Manuals. The volume number is the number preceding the dash. Volume numbers preceded by an asterisk (*) apply to the 8½" x 11" page size Manual only.

The Rider Manual Page Numbers given under Radio Changes are for Rider AM-FM Manuals. The volume number is the number preceding the dash.

●

General Electric 143

In late production receivers, C5 was changed to 0.25 μf, 200 volts, Cat. No. UCC-050. This change was made to reduce regeneration which resulted in unstable operation.

●

RCA Q10-3, Q10 Series, Ch. RC-549C

Model Q10-3 is identical to other sets of the Q10 series with the exception of the cabinet which is black and uses ivory color knobs.

The output transformer mounting has been revised to minimize the possibility of breakdown, especially in tropical areas. The transformer in later production sets is mounted on insulation board which is, in turn, mounted on the dial back plate support.

●

RCA Q110, Ch. RC-594C

Model Q110 is the same as Model Q10, Ch. RC-594C, except for the cabinet.

●

B. F. Goodrich 92-527, 92-528

These models are the same as Models 92-523, 92-524, 92-525, 92-526.

●

Farnsworth 36P10, Capehart

Model 36P10 employs the Farnsworth P-10 a-m—f-m radio chassis and the Farnsworth P-73 intermix record changer in a mahogany chairside cabinet with a 12-inch high-fidelity p-m speaker. For information on the radio chassis and record changer used in this instrument see Farnsworth Chassis P7, P9, and P-10 and the Farnsworth P-72 and P-73 Record Changers.

Following is a list of parts which pertain to the Model 36P10 only. Parts for the integral parts of the chassis and record changer are included under their respective chassis.

Part No.	*Description*
H-328	Cabinet (36P10)
750000A	Dial escutcheon
59373	Knob (2)
59316	Knob (2)
650011A-1	Speaker and output transformer
13908	Loop antenna assy.
750004A-1	A-m dial glass
750004A-2	F-m dial glass.

Sec. 34.66, P. L. & R.
U. S. POSTAGE
PAID
NEW YORK, N. Y.
PERMIT No. 9427

A. J. S. CERINO
5310 OVERBROOK ST.
DOUGLASTON, L. I., NEW YORK

From
JOHN F. RIDER PUBLISHER, Inc.
480 CANAL ST., NEW YORK 13, N. Y.
Return Postage Guaranteed

Successful
SERVICING

DECEMBER, 1950

CIRCUIT ANALYSIS and TV SERVICING

SERVICE DATA is usually visualized as a compilation of schematic, tube layout, operating voltage and resistance data, alignment instructions, and the like. It is a well-established fact that such information is vital to successful and profitable servicing operations. No man can remember the complete component organization and operating constants of the television receivers of one manufacturer, let alone the data of all television receivers. Changes in circuit design are inevitable, not only year by year, but also between production runs and between different chassis made for different models. When a service facility handles a variety of receiver brands, the problem of reference service information is even more acute.

The purpose of this article is not to show the need for service data—that much has been established over the years—rather, it is to stress another extremely valuable type of information that is prepared by set manufacturers and appears as service data in Rider Manuals. We are referring to the circuit analyses or the descriptions of the component functions which, in our estimation, are of the utmost importance and greatest benefit to the television servicing industry as a whole. This material is an education in itself. It is a course of instruction. It is information which should be read and digested.

Circuit analysis is printed for a purpose: to acquaint the service technician with the circuit arrangement, the functions of the parts, the reasons for using the circuit, the differences between one system and another, and possible causes of trouble, and thus to lead him to a more rapid analysis of what may be the fault in a defective television receiver. Usage of the circuit analysis data creates an ever-expanding familiarity with television receiver circuit design, a condition which is essential in building up the public's confidence, for it is a means to better servicing.

What is the difference between the component television technician and the individual with lesser technical qualifications? In few words, it is the extent of the understanding of what is going on in the receiver being examined. This includes the functions of the components, the action of the various circuits upon the signal as it passes through the receiver, the different points of control, the places where changes in waveforms occur, and the variety of conditions which may develop and impair the operation of the receiver. Of course, the successful television technician must also be familiar with his test equipment and with service procedures, be cognizant of his responsibility to the public in accomplishing a complete job, and, last but by far not least, the individual who runs a shop must be aware of the business aspects. Reference to the last item may be a digression from the main theme of this discussion, but it belongs here because it is *important,* even though not necessarily related to what we are discussing.

Everyone realizes that time is of the essence in radio and television operations, and that knowledge is gained through experience and through exposure to equipment problems; but what many technicians do not realize, is that their ability to effect a repair rapidly on a radio or television receiver also stems from the many hundreds of thousands of words which have been written about the subject and which they have read at odd moments. Many of us are too prone to forget all the things we do during a day, a month, or a year, in order to attain a certain end. The part played by reading technical descriptions, articles, and textbooks, is seldom fully realized. Most of us are, as a rule, unaware of the vast amount of general information and specific detail that we have absorbed from our reading—it is stored in the mind as information. As we learn something, it is added to what we already know; and, bit by bit, our self-confidence grows and with it our capabilities increase. Knowledge is power—it is the fountainhead of accomplishment.

A technician, when he is servicing a faulty receiver, draws from his store of knowledge. The more he acquires, the easier it is for him to spot the fault and correct it, and his reactions tend to become automatic. Lengthy deliberation is not required because the background instantaneously dictates the items which should be dismissed from all consideration, since they are not related to the problem at hand, and pinpoints those which should be considered. The man with insufficient technical background may be capable of as sound reasoning, as rapid thinking, as the individual who knows what it is all about. However, the former will flounder on a repair job, not because he cannot think or because his intellect is less, but simply because the technical background which is necessary to orient the thinking—properly associate ideas, cause, and effect—is lacking. The proper selection of the direction of approach to a problem is paramount to rapid and profitable trouble diagnosis and successful repair, especially in television receivers.

The ever-changing state of circuit design existing in the television receiver industry imposes more severe demands upon the servicing personnel than in any other known maintenance activity. Without attempting to belittle the problems of conventional radio receiver servicing with respect to those found in the television receiver servicing field, it must be admitted that, by comparison, the modern-day TV serviceman is wallowing in "a sea of cross currents and riptides" which tends to make his existence difficult. The radio and television technician must maintain an uninterrupted program of working and learning. This is not easy to do. The natural impulse is to regard work as the item of primary concern and learning as secondary, and even to go so far as to resent the fact that many books and writings of various kinds are being offered and suggested as "musts" to the servicing industry. The industry is a technical one, one in which the design of equipment is in a state of flux, and it is doubtful if it will ever reach a static level. This means that it is the problem of every television technician to devote a certain amount of time each day to studying and reading. If it cannot be done each day, then it must be done some time during each week, but it cannot be avoided! The demands of competition among manufacturers for the mass market requires the application of the utmost ingenuity on the part of the design engineer, and this means a never-ending chain of changes—changes in circuit design, component design, and operating conditions. A certain amount of familiarity with design, the variations in circuit arrangements, and the manner in which control of the signal is accomplished, is a virtual *must* for every service technician. The burden is greatest at the beginning, when the first attempt is made to do one job less each day or to sacrifice one hour's sleep each night, but it becomes less and less as the stock pile of knowledge grows.

No one textbook or a dozen textbooks are capable of creating that complete familiarity with a commercial product that every serviceman should have and can use to advantage. The schools and texts can provide the foundation on which to build, can provide the fundamentals which makes it possible to understand that which is read later. But having finished schooling or the studying of a textbook, the technician's job has just begun, for now he must cope with the brain children of

(Continued on page 10)

Television Changes

Philco 48-2500

Many cases of apparent lid warpage have been traced to cabinet distortion, which occurs when the cabinet rests on an uneven floor. This distortion may be corrected by simply leveling the cabinet, by placing blocks under the legs.

Before adjusting the keystone magnets, it is advisable to ground the metallic magnet band clamp, to eliminate the static high-voltage charge on the magnets. Where a plastic magnet band clamp is encountered, it is necessary to ground the individual magnets themselves momentarily.

DuMont RA-102

The large amount of noise flashes on the cathode-ray-tube screen has been traced to corona discharge in the high-voltage r-f power supply. The remedies suggested are: (1) lead dressing to lengthen discharge path; (2) insulating sleeving on leads; (3) painting exposed high-voltage points with insulating compound.

Evenly spaced carriers across the broadcast band every 17 kc are caused by continuously running h-v r-f oscillator or horizontal sweep oscillator. Causes may be:

1. Bias on h-v oscillator has dropped so that oscillator is free running without triggering from sweep circuits. Check cathode resistor, grid resistor.

2. Beam cut-off relay not opening when television is switched off. Clean contacts or adjust armature return spring tension.

The front-to-back resistance ratio of the 1N34 crystal rectifier should be at least 100 to 1. If the ratio falls below this, the crystal should be replaced. These resistance ratios may be measured with a common ohmmeter.

Farnsworth, Capehart Models 461P, 501P, 502P, 504P, Ch. U-12

Models 501P, 502P, and 504P use the Capehart P-7 a-m—f-m radio tuner chassis and the Capehart Automatic Intermix Record Changer Model P-71. Model 461P is a television receiver only, and uses, in conjunction with the U-12 Chassis, the Capehart A-13 Audio Amplifier. The schematic for the A-13 is given in Fig. 1. There have been incorporated in production, three versions of the 12-kv high-voltage supply, which were necessitated by the use of three different focus coils.

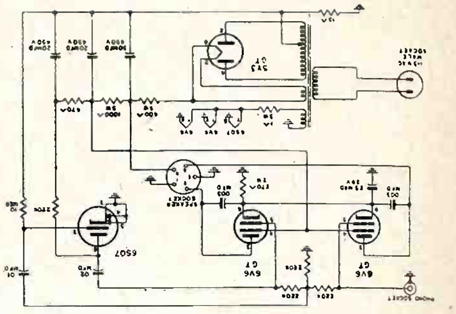


Fig. 1. Schematic diagram for the Capehart A-13 Audio Amplifier.

The focus coil originally used, part number 38955, is an electromagnetic coil. Focus coils part numbers 650001A-1 and 650001A-2 shown in Fig. 2 (for 10- and 12-inch picture tubes, respectively) are part electromagnet and part permanent magnet, therefore the latter two require much less current than the former.

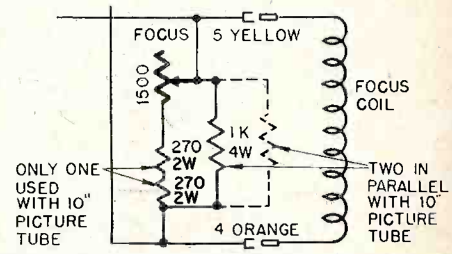


Fig. 2. Focus coils used in the U-12 Chassis.

Two types of r-f sub-assemblies have been incorporated: (1) that switching coils in selection of channels, and (2) that using continuous variable capacitor tuning. The latter, provides 12 channel reception (channel 1 is deleted since this channel is no longer assigned to telecasting service by order of the FCC) and channel identification is by a brass pin extending from the selector switch. The schematic for the 12-channel r-f unit, part number 13900, is shown in Fig. 3.

Additional changes have been made in the U-12 Chassis. A 100,000-ohm resistor has

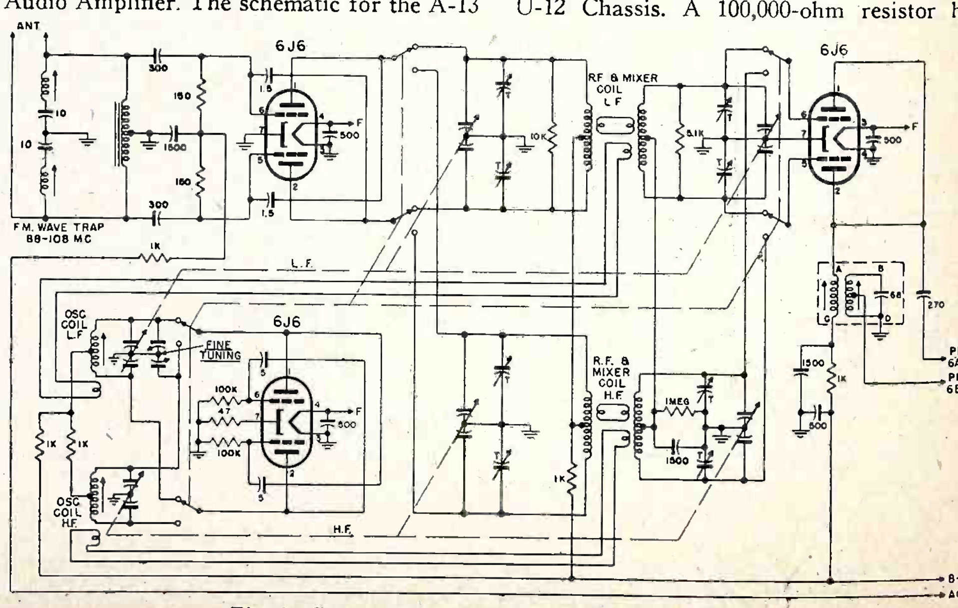


Fig. 3. Schematic for the r-f unit Part No. 13900.

been inserted from R42 to +270 volts. A 0.2-μf capacitor has been inserted from the junction of the 100,000-ohm resistor and R42 to the 3-megohm volume control and C39. Resistors R204 and R208 have been deleted. A 47-ohm, ½-watt resistor has been inserted from tap 2 of T201 to the plate of the 6BG6. Pin 5 of the audio socket is now connected to the junction of the power transformer and C34, and pin 7 is connected to the junction of the jumper and the transformer. (The jumper is removed on Model 461P.) A 9,000-ohm, 5-watt resistor has been inserted from tap 1 of T201 to the junction of R205 and R209. R203 is now connected to the junction of the ¼-amp fuse and the cathode of the 5V4G. The tube socket voltage readings are shown in the accompanying chart.

TUBE SOCKET VOLTAGE READINGS

TELEVISION CHASSIS

TUBE & FUNCTION	Contrast Control at	1	2	3	4	5	6	7	8	9
6J6 r.f. amplifier	Minimum Maximum	pl. 135 63	pl. 108 82	htr. 6.3 a.c. 6.3 a.c.	htr. 0 0	c.g. −29 −0.4	c.g. −29 −0.4	k. 0 0	— —	— —
6J6 r.f. converter	Minimum Maximum	pl. 130 95	pl. 130 95	htr. 6.3 a.c. 6.3 a.c.	htr. 0 0	c.g. −2.5 to −9.0 −2.1 to −7.2	c.g. −2.6 to −6.0 −2.2 to −5.4	k. 0 0	— —	— —
6J6 r.f. oscillator	Minimum Maximum	pl. 108 82	pl. 108 82	htr. 6.3 a.c. 6.3 a.c.	htr. 0 0	c.g. −2.5 to −9.0 −2.1 to −7.2	c.g. −2.5 to −9.0 −2.1 to −7.2	k. .26 .18	— —	— —
6BA6 1st. sound i.f. amplifier	Minimum Maximum	c.g. 0 0	sup.g. 0 0	htr. 6.3 a.c. 6.3 a.c.	htr. 0 0	pl. 125 108	s.g. 125 108	k. 1.9 1.6	— —	— —
6BA6 2nd. sound i.f. amplifier	Minimum Maximum	c.g. 0 0	sup.g. 0 0	htr. 0 0	htr. 6.3 a.c. 6.3 a.c.	pl. 128 110	s.g. 120 105	k. 2.0 1.7	— —	— —
6AU6 3 rd. sound i.f. amplifier	Minimum Maximum	c.g. −.35 −.35	sup.g. 0 0	htr. 6.3 a.c. 6.3 a.c.	htr. 0 0	pl. 52 44	s.g. 44 38	k. 0 0	— —	— —
6T8 sound discr. & 1st. audio amplifier	Minimum Maximum	d.d.pl. −4.6 −4.6	diode pl. −8.0 −8.0	diode k. 0 0	htr. 0 0	htr. 6.3 a.c. 6.3 a.c.	d.d.pl. — —	d.d.t.k. 0 0	d.d.t.c.g. −1.04 −1.04	d.d.t.pl. 86 86
6AC5 1st. pix. i.f. amplifier	Minimum Maximum	c.g. −8.8 −1.0	k.&sup. — —	htr. 6.3 a.c. 6.3 a.c.	htr. 0 0	pl. 130 90	s.g. 130 90	k.&sup. 0 .2	— —	— —
6AG5 2nd. pix. i.f. amplifier	Minimum Maximum	c.g. −8.8 −1.0	k.&sup. — —	htr. 6.3 a.c. 6.3 a.c.	htr. 0 0	pl. 130 95	s.g. 130 95	k.&sup. 0 .2	— —	— —
6AG5 3rd. pix. i.f. amplifier	Minimum Maximum	c.g. −8.8 −1.0	k.&sup. — —	htr. 6.3 a.c. 6.3 a.c.	htr. 0 0	pl. 130 86	s.g. 130 100	k.&sup. 0 .28	— —	— —
6AH6 4th. pix. i.f. amplifier	Minimum Maximum	c.g. 0 0	sup.g. .96 .8	htr. 6.3 a.c. 6.3 a.c.	htr. 0 0	pl. 77 65	s.g. 105 90	k. .96 .8	— —	— —
6AL5 video detector & AGC rectifier	Minimum	k. 0	pl. −115	htr. 6.3 a.c.	htr. 0	k. −112	shield 0	pl. −.4	—	—
6AU6 1st. video amplifier	Minimum Maximum	c.g. −2.1 −2.2	sup.g. 0 0	htr. 6.3 a.c. 6.3 a.c.	htr. 0 0	pl. 248 260	s.g. 135 115	k. 0 0	— —	— —
6K6 GT 2nd. video amplifier	Minimum Maximum	shield — —	htr. 0 0	pl. 105 95	s.g. 137 117	c.g. −7.8 −8.0	n.c. — —	htr. 6.3 a.c. 6.3 a.c.	k.&sup. 3.9 2.8	— —
6AT6 AGC amplifier	Minimum Maximum	c.g. −112 −107	k. −112 −110	htr. 6.3 a.c. 6.3 a.c.	htr. 0 0	diode −112 −112	diode −112 −112	pl. −42 0	— —	— —
½6AL5 AVC limiter	Minimum Maximum		pl. −9 −3	htr. 0 0	htr. 6.3 a.c. 6.3 a.c.	k. −8.7 −1.0	shield 0 0		— —	— —
½6AL5 d.c. restorer	Background Minimum Background Maximum	k. −100 0						pl. −110 0	— —	— —
6SK7 1st. sync. amplifier	Minimum Maximum	shield 0 0	htr. 6.3 a.c. 6.3 a.c.	sup.g. 0 0	c.g. −4.2 −4.4	k. 0 0	s.g. 126 109	htr. 0 0	pl. 180 210	— —
6SH7 sync. separator	Minimum Maximum	shield 0 0	htr. 6.3 a.c. 6.3 a.c.	k.&sup. — —	c.g. −5.1 −10.0	k.&sup. 0 0	s.g. 137 117	htr. 0 0	pl. 137 117	— —
6SN7 GT sync. amp. & horiz. discharge	Minimum Maximum	c.g. −150 −150	pl. −84 −84	k. −115 −115	c.g. −0.8 −2.6	pl. 89 79	k. 0 0	htr. 0 0	htr. 6.3 a.c. 6.3 a.c.	— —
6J5 vertical osc. & discharge	Minimum	shield 0	htr. 6.3 a.c.	pl. 53	n.c. —	c.g. −153	n.c. —	htr. 0	k. −113	—
6K6 vert. output	Minimum	shield —	htr. 6.3 a.c.	pl. 185	s.g. 185	c.g. −95	n.c. —	htr. 0	k. −78	—
2-5U4 G rectifiers	Minimum	n.c. —	htr. 325	n.c. —	pl. 390 a.c.	n.c. —	pl. 390 a.c.	n.c. —	htr. 325	—
6AC7 hor. osc. control	Minimum	shield 0	htr. 6.3 a.c.	sup.g. 0	c.g. −1.65	k. .08	s.g. 100	htr 0	pl. 165	—
6AL5 hor. sync. discriminator	Minimum	k. −1.8	pl. −5.2	htr. 0	htr. 5.1 a.c.	k. −2.4	shield 0	pl. −5.4	—	—
6K6 hor. oscillator	Minimum	shield —	htr. 6.3 a.c.	pl. 198	s.g. 205	c.g. −25.7	n.c. —	htr. 0	k. .28	—

12 KV SUPPLY CHASSIS

TUBE & FUNCTION	Contrast Control at	1	2	3	4	5	6	7	8	PLATE CAP
2-6BG6 G hor. output	Minimum	n.c. —	htr. 0	b.f.pl.&k. −100	n.c. —	c.g. −115	n.c. —	htr. 6.3 a.c.	s.g. 200	Do Not Measure*
5V4 G hor. damper	Minimum	n.c. —	htr. 380	n.c. —	pl. 310	n.c. —	pl. 310	n.c. —	htr. 380	—
6AS7 G hor. damper	Minimum	c.g. 130	pl. 310	k. 310	c.g. 130	pl. 310	k. 310	htr. 380	htr. 380	—
1B3 GT h.v. rectifier	Background Minimum	n.c. —	htr. 8000	n.c. —	n.c. —	n.c. —	n.c. —	htr. 8000	n.c. —	Do Not Measure**
1B3 GT h.v. rectifier	Background Minimum	n.c. —	htr. 12000	n.c. —	n.c. —	n.c. —	n.c. —	htr. 12000	n.c. —	Do Not Measure*

*Has a.c. component of approx. 6000 volts.
**Has a.c. component of approx. 10000 volts.
All voltages measured from terminal to ground.
Line voltage, 117 volts, 60 cycles a.c.

Power transformer tap switch set to 115 volt position.
All controls set for normal operation except where otherwise specified.
No signal received.
All voltages measured with Vacuum-Tube-Voltmeter.

No Need To Worry About Moisture When You Use The MALLORY PLASCAP*

MALLORY FP CAPACITORS

When you select Mallory FP Capacitors, you can be sure of their performance even in circuits where heat is a problem. Every Mallory FP Capacitor will operate continuously at 85° C. In addition, Mallory FP Capacitors are famous for their long shelf-life . . . you can depend on them when you need them. Buy the one line that services both AM and TV sets. They are an outstanding example of Mallory Precision Quality at standard prices.

See your Mallory Distributor right away!

The Mallory Plascap plastic tubular capacitor exceeds R.M.A. requirements for humidity and immersion tests . . . even for metal-cased capacitors. It's the plastic tubular that's years ahead of the rest of the field.

No oil leakage, no unsoldered leads, no messy wax coating, no insulation problems! Check these four exclusive features which make your service jobs surer and easier:

- **TRISEAL CONSTRUCTION.** Sealed three ways . . . with moisture-free Mallotrol, tough outer plastic shell, exclusive Mallocene!
- **FASTITE LEADS.** Permanently fastened . . . sealed with Mallocene . . . unaffected by soldering-iron heat!
- **DISTORTION-FREE WINDING.** No flattened cartridges due to molding pressures . . . no failures due to "shorts"!
- **TRU-CENTER CARTRIDGES.** Cartridges centered every time . . . uniform insulation guaranteed at all points!

You don't have to handle the Mallory Plascap with kid-gloves . . . it is built to "take it"! See your Mallory Distributor, now. Remember, you pay no more for Mallory Precision Quality!

*Trade Mark

P. R. MALLORY & CO. Inc.

MALLORY

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

*Reg. U. S. Pat. Off.

APPROVED PRECISION PRODUCTS

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

Successful
SERVICING
REG. U.S. PAT. OFF.

Vol. 12 DECEMBER, 1950 No. 2

Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

Published by
JOHN F. RIDER PUBLISHER, INC.

480 Canal Street
New York 13, N. Y.

WOrth 4-8340
WOrth 4-8341

JOHN F. RIDER, Editor
E. H. BEAUMONT, Associate Editor

CURTAIN TIME

The latest report on television servicemen licensing legislation in New York City is that it is being held in abeyance. No doubt the change in administration has something to do with it. However, it is also to be remembered that the legality of the demands by the "City Fathers," that service shops establish financial responsibility, is being questioned. From all reports, this will be left out of the bill if some sort of ordinance is enacted.

We also learn from reliable sources that the Detroit Council has decided against the enactment of any legislation governing radio and television servicing in that city, and, instead, has placed the problem in the lap of the servicing industry in the community with the understanding the activity will govern itself by means of a code of ethics, by cooperation with the Better Business Bureau, by proper advertising, etc. From our way of thinking, this is the most sensible road to follow.

The enactment of legislation in the television servicing industry is much easier on paper than in practice. The industry as a whole is still facing a great shortage of competent personnel, and the threatened expansion of the military program cannot help but aggravate the issue because of the increased demands on parts and man power. Admittedly, the servicing situation is not rosy, but we still feel that given time—and time will have to be given—the independent small shop owner will learn how to service television receivers and will do a good job. No matter how black things look at the present time, the answer is not legislation. Rather, the answer lies in the willingness to understand that the growth of television was too rapid to enable the slower development of technical competency to take care of it.

We realize only too well that many producers of television receivers are receiving numerous complaints. We do not mean to imply that these complaints should be ignored but neither do we say that the answer is factory service. We think that the public should be asked to be patient and to understand the problems that exist. It is everybody's responsibility to see to it that educational programs are carried out on a regular basis, and it is the responsibility of the servicing industry—each and every man—to see to it that it betters itself technically. The problem of technical education in the electronic field is one which will be with us for years to come, and the future of the serviceman will be determined by his own efforts and willingness and desire to sacrifice time and sleep to become a better television technician.

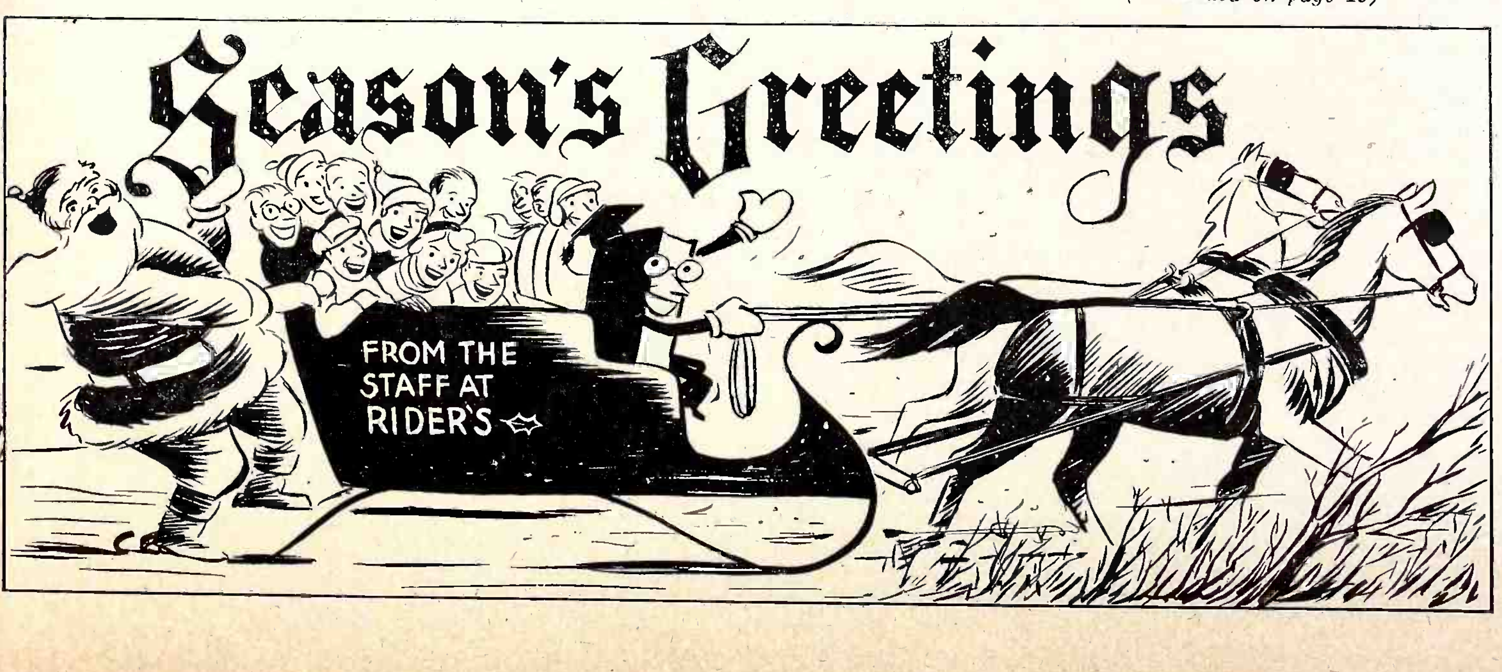
Centralized Transmitting Antennas

Five out of the seven TV stations serving metropolitan New York soon will be located at a centralized point, namely, the Empire State Building tower. A new structure, approximately 200 feet high, has been placed on top of this architectural wonder. To say the least, it is going to be a happy day to most New Yorkers when these five stations are transmitting from this central point. It is not a new thought to centralize such transmitting antennas, for we understand that in Los Angeles all of the stations already have their antennas on top of Mount Wilson. It is a reasonable conclusion that this practice will be followed in other communities where two or more stations provide the public's entertainment and culture by television means. Whether or not the reorientation problem should be considered by servicing facilities which erect television antennas is a matter of individual concern, but, most certainly, it is not the serviceman's responsibility if a television transmitting antenna is changed in location. That is something for which the public should pay.

The Big Wind

The big wind which hit a goodly portion of the United States caused havoc among television antennas. Some roofs were a mess. However, it must also be noted that quite a few antennas remained intact and this was so in the midst of those which fell. A number of conclusions can be drawn—some antennas were spared by the wind, whereas some antennas were not erected properly. The latter is not uncommon. Somehow we believe that it is the responsibility of the antenna manufacturer to describe constructional arrangements in terms of the physical forces which the structure can withstand. In this connec-

(Continued on page 15)



Television Changes

Sparton 4935, 4942, 4954, 4960, Ch. 23TC10; 5002, 5003, 5006, 5007, Ch. 23TD10

Additional sync amplification and improved receiver performance can be provided for all models using the 23TC10 and 23TD10 chassis by following the procedure outlined below:

On V11 (12AU7 Tube)

1. Disconnect resistors R53 (100,000 ohms), R52 (1.0 megohm) and capacitor C47 (0.05 μf) from pin 8.
2. Connect the 1N34 crystal diode (cathode end) to R52, R53 and C47.
3. Move ground from pin 7 to pin 8.
4. Move C48 (22 $\mu\mu$f) from pin 6 to pin 7.
5. Remove R54 (47,000 ohms) on pin 6.
6. Use new R83 (4,700 ohms) from pin 7 to ground.
7. Connect plate side of 1N34 diode crystal to pin 7.
8. Replace R48 (1.0 megohm) from pin 6 to +135-volt line with new R48 (4,700 ohms).
9. Move R115 (22,000 ohms) from pin 1 to pin 3.

On V16 (6AL5 Tube)

10. Interchange C100 and C101 capacitor leads on pins 5 and 7.

New Parts Required

1. 1N34 Germanium crystal diode (Part No. PA4206).
2. 4,700-ohm resistor, ½ watt (Part No. BR12S-472).

Philco Service Hints

As a general rule, the practice of removing the horizontal-oscillator tube during alignment of the r-f and i-f circuits, in order to disable the high-voltage, is detrimental, for the following reasons. The change in B plus voltage may be enough to change the response curve and this would be especially detrimental in fringe areas. Second, in some receivers, removing the drive from the horizontal-output tube causes an abnormally high level of plate current to be drawn by this tube. This may eventually damage the output tube, and in some cases, may overload and damage the low-voltage rectifier tube. Third, adjusting the width coil also changes the amplitude of the plate pulse, and thus affects the oscillations. The adjustments of linearity, drive, and width are all interrelated; therefore, compromising them to reduce Barkhausen effect should not be allowed to deteriorate the picture width, linearity, or brilliance to any marked degree.

To make the built-in aerial matching system tune more sharply on Channel 6, one of the dipole elements was shortened. This change does not affect the reception of the built-in aerial on the other television channels. This change voids previous information stating that the built-in aerial tunes on all channels except 6.

Sears 110.499 Series

Model 9135 employs a 16-inch kinescope, 16AP4, V12. The 16-inch tube has a metal cone that is connected to the high-voltage supply. The tube is insulated from the chassis by mounting it directly to the cabinet. The tube should be installed as follows:

(1) Remove the back cover by removing the screws holding it to the cabinet.

(2) Be sure that the kinescope tube protector (cup) is mounted on the outside of the cabinet back. If it is mounted on the inside, turn it around.

(3) There should be a wooden block mounted in the center of the lower back rail to protect the portion of the kinescope tube extending beyond the cabinet. If it is not there, it will be found in back of the power transformer, remove it, and mount it on the rail.

(4) Unscrew top panel and pull straight out. Do not remove the focus and deflection coils from the panel.

(5) Remove the plastic insulating ring by loosening the two nuts holding the kinescope "U" shape mounting ring and unwrapping the bare wire from the top ends of the mounting ring. (It is not necessary to take the nuts off. Loosen them until you can take the plastic insulating ring out.)

(6) Remove the high voltage connector from the ring.

(7) Remove the wire from the plastic ring. The wire will be used later.

(8) Remove the 5U4 tube.

(9) Place plastic ring on kinescope tube with trade mark facing the neck of the tube.

(10) Place high-voltage connector under the plastic ring in the position indicated in Fig. 1.

(11) Place bare wire in the outer groove of the plastic ring and twist, leaving two equal ends as indicated in Fig. 1.

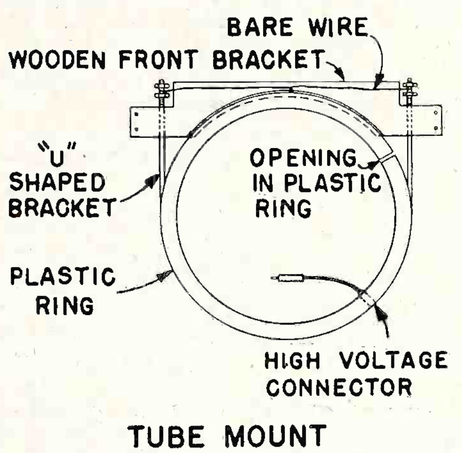


Fig. 1. Front mounting of kinescope, Sears 110.499 Series.

(12) Place kinescope tube and plastic ring into the "U" shaped bracket. The top of the plastic ring will fit into the wooden bracket at the front of the cabinet. Support the tube with your hand.

(13) Slide the top panel into place with the deflection and focus coils over the neck of the tube.

(14) Take up slack in "U" shaped bracket by tightening the nuts.

(15) Wrap one end of the bare wire (circling the plastic ring) around the left-hand end of the "U" shaped bracket, add a second nut and tighten.

(16) Wrap remaining end of bare wire around right end of "U" shaped bracket.

(17) Place terminal lug on one end of ground harness over right end of "U" shaped bracket, add second nut and tighten.

(18) Remove one wing nut from the deflection yoke mounting bracket, place second terminal lug on ground harness under this nut and replace.

(19) Remove one wing nut from the focus coil bracket, place third terminal lug on ground harness under this nut and replace.

(20) Be sure that the remaining end of this ground harness is connected to the chassis.

NOTE: Wire around plastice ring, "U" shaped bracket, deflection and focus coil mounting brackets must all be connected together and grounded to the chassis.

(21) Replace screws in top wooden bracket.

(22) Replace screws in top panel.

(23) Connect high voltage male plug to the female socket coming from the high voltage compartment.

(24) Place ion trap on neck of kinescope tube. (Ion trap will work best near the socket of the kinescope tube.)

(25) Place the socket on the kinescope tube.

(26) Make sure that the hood on the deflection yoke is pushed as far forward as possible.

(27) Push the deflection yoke as far up in the hood as possible.

(28) Place the focus coil as close to the deflection yoke as possible.

(29) Make sure that the focus and deflection cables do not come in contact with the cone of the kinescope tube. (Outer surface of the kinescope is at high potential.)

(30) Proceed with all other adjustments in the same manner as you do on the 10- or 12½-inch models.

Caution: The metal cone of the picture tube is connected directly to the high voltage. Extreme care must be used so as not to come in contact with this cone when the receiver is in operation.

The following changes were made in the schematic diagram of Chassis 110.499, 110.499-1, 110.499-2. The changes are not retroactive, and should not be necessary on early production chassis except for improving a particular function.

Section (2), under Parts Removal, To Remove the Chassis from the Cabinet, should be changed to read: "On all models except 9126 remove the screws holding the antenna terminal strip to the cabinet. On Model 9126 remove the antenna connector plugs connecting the antenna terminal strip and the built-in antenna to the chassis."

The tube chart should have the following changes made:

Tube No.	*Pin No.*	*Old Voltage*	*New Voltage*
V4	5,6	130	140
V5	5,6	132	142
V6	5,6	135	145
V13A	6,7,8	Add 30, 0, 3, respectively, when using new horizontal afc circuit	
V13B	1,2,3	Add 125, 0, 30, respectively, when using new horizontal afc circuit	
V14B	5	350	390
V15	1	3.2	6
	2	−1.6	−6
V16	3,8	10	13
V19	5	—	340
V20	2,8	360	370.

Improve Focus Range

(1) Change R20 and R85 from 47,000 ohms to 18,000 ohms, 2 watts.

(Continued on page 8)

A Compact, Versatile, Portable Circuit-Testing Laboratory for TV — FM — AM

The New PRECISION SERIES EV-20

VTVM and Multi-Range Test Set

Net Selling Price . . . $68.25

A Modern, Portable VTVM—Megohmmeter.
TRUE ZERO-CENTER on ALL VTVM ranges
PLUS Direct Reading High Frequency Scales
ALSO, complete, standard 1000 ohms per volt functions
48 RANGES TO
1200 Volts*, 2000 Megohms, 12 Amperes, +63DB

* D.C.-VTVM ranges to 12,000 and 30,000 Volts when used with Series TV Super-High Voltage Test Probe.

Range Specifications

★ SIX ALL-ZERO CENTER VTVM RANGES: —13⅓ Megs. Constant Input Resistance. ±3, ±12, ±30, ±120, ±300, ±1200 volts. Direct Reading to ±12 KV and ±30 KV with Series TV Super-High Voltage Test Probe

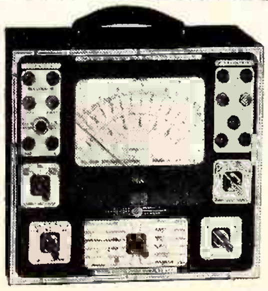
★ SIX SELF-CONTAINED OHMMETER-MEGOHMMETER RANGES: 0-2000 - 200,000 ohms. 0-2-20-200-2000 Megohms.

★ FOUR DIRECT READING HIGH FREQUENCY VTVM RANGES: 0-3-12-30-120 volts. *(When used with RF-10A High Frequency Vacuum Tube Probe, Net Price $14.40. No crystal rectifiers employed.)*

★ SIX AC-DC AND OUTPUT VOLTAGE RANGES at 1000 ohms/volt. 0-3-12-30-120-300-1200 volts.

★ EIGHT D.C. CURRENT RANGES: 0-300 microamps. 0-1.2-3-12-30-120-1200 milliamps. 0-12 Amperes.

★ SIX DECIBEL RANGES from —20 to +63DB. Calibrated for 600 ohm, 1 mw., zero DB reference level.



Also **ask to see the "Precision" Series EV-10, DeLuxe VTVM—Megohmmeter with extra-large 7" meter. 59 self-contained ranges to 6000 volts and 70 DB.**

Series EV-10, affords to the discriminating instrument purchaser, and equipment-conscious service-laboratory, the ultimate in visibility and performance.
EV-10-P
(Closed portable)—$97.25
EV-10-MCP (Illustrated)
(Open Lab. Type)—$94.50.

See complete EV-10 specifications on page 4 of latest Precision catalog, available at leading radio equipment distributors or write directly to factory for full details.

IMPORTANT FEATURES

★ VOLTAGE REGULATED—BRIDGE CIRCUIT.

★ DIRECT READING, **ALL ZERO-CENTER** VTVM —indicates BOTH Polarity and Magnitude without switching or test lead reversal.

★ MASTER RANGE AND FUNCTION SELECTORS eliminate frequent and inefficient shifting of test leads.

★ SHIELDED CONNECTORS for both D.C.—VTVM and RF—VTVM. Permits simultaneous and non-interfering connection of both Circuit Isolating Test Probe and optional H.F. Vacuum Tube Probe Series RF—10A.

★ HIGH FREQ. VOLTAGE SCALES—Direct Reading.

★ DUAL-BALANCED ELECTRONIC BRIDGE OHMMETER—MEGOHMMETER uses two 1.5 volt flashlight cells easily replaced at rear of cabinet.

★ 1000 OHMS/VOLT MULTI-RANGE FUNCTIONS permit simple AC-DC voltage, DB and current measurements free of power line requirement.

★ 4⅝" RECTANGULAR METER—200 microamperes, ± 2%. Double-Sapphired, D'Arsonval construction.

★ 1% Film type, Metallized and Wire-Wound resistors for all shunts and multipliers.

★ Heavy gauge, round-cornered, louvred steel case with plastic handle. Etched, anodized, aluminum panel.

NET SELLING PRICE **$68.25**

Complete with coaxial Circuit Isolating Test Probe, Shielded Ohmmeter Test Cable, Standard #227 Super-Flex Test Leads, Ohmmeter battery and full operating instructions.
Case dimensions—10½" x 6¼" x 5"
Shipping Weight: 11 pounds. *CODE:*—Party

PRECISION APPARATUS CO., INC.
92-27 Horace Harding Boulevard, Elmhurst 14, New York
Export Division: 458 Broadway, New York, U.S.A. • Cables—Morhanex

Sears 110.499 Series

(Continued from page 6)

(2) Connect R20 and R85 to the low-voltage side of the focus coil instead of to terminal 3 of the yoke.

(3) Change focus control R38 from 1,500 ohms to 2,500 ohms.

Improve Contrast and Hold in Fringe Area

This change increases the agc delay voltage from 2.5 volts to 5 volts.

(1) Change R15 from 39,000 ohms to 18,000 ohms, 2 watts.

Increase Vertical Height

(1) Change R64 from 6,800 to 3,900 ohms, and R59 from 1.5 megohms to 1 megohm.

Improve Interlace

(1) Move C45, 4,700 $\mu\mu f$, from the grid lead of the vertical oscillator transformer T4 to the grid return lead.

Reduce Drift of Horizontal AFC and the Ratio Detector

(1) Add R91, a 1.1-ohm, 1-watt resistor, in series with the heater of V15, 6AL5, and V10, 6T8.

Changed Fuse Position

(1) Remove all fuses.

(2) Add a ¼-amp pigtail fuse between pin 5 of the 6W4 damper tube and terminal 4 of the horizontal output transformer T6.

Added Horizontal Centering Control

(1) Add horizontal centering control R90, 750 ohms, to rear of chassis.

(2) Run R39, 1,500 ohms, from focus coil to top of horizontal centering control, instead of from focus coils to plus 360 volts.

(3) Connect R81 from screen of 6BG6B to terminal 1 of the horizontal output transformer, instead of to terminal 3 of the yoke.

(4) Connect top of horizontal centering control to terminal 3 of the yoke.

(5) Connect arm of horizontal centering control to plus 360 volts.

(6) Under Adjustments, Focus and Centering, add: "On later model receivers using electrical centering proceed as follows: (1) Swing the focus coils to center the picture vertically. (2) Turn the horizontal centering control R90 to center the picture horizontally. (3) Adjust the focus control R38 on the rear of the chassis until the lines are in sharp focus. It may be necessary to readjust the ion trap magnet as indicated in step 8 above."

Improve Vertical Flutter

(1) Change C43 from 0.005 μf to 0.01 μf.

Additional changes that have been made are as follows: C2, 10 μf, 150 volts, has been removed from the tap of R30A, contrast control and now goes to -2.5 volts. R16 is also connected to -2.5 volts; and C25 and R30A go directly to pin 1 of V7B. L1, L2, L3, L4, L5, and L6, are 0.1 ohms. Figs. 2 and 3 show additions that have been made to the wave forms.

A new horizontal-hold-control circuit is found in all sets having the chassis number 110.499-3 or those having a higher dash number, such as -10, -11, -12, etc. There are, however, a quantity of receivers with the numbers 110.499, 110.499-1, and 110.449-2 that contain the new horizontal hold circuit. These chassis are identified with the stamped or written letter "O" on the rear apron of the chassis. To convert to the new circuit proceed as follows:

(1) Remove C39, a 0.01-μf capacitor.

(2) Remove C38, a 22-$\mu\mu f$ capacitor.

(3) Remove R47, a 1.0-megohm resistor.

(4) Remove R46, a 47,000-ohm resistor.

(5) Remove R69, a 2,200-ohm resistor.

(6) Remove R45 and add R93, a 3.3-megohm resistor, in its place.

(7) Remove R68 and add R94, a 1,800-ohm resistor, in its place.

(8) Change C65 from 0.1 μf to 0.05 μf.

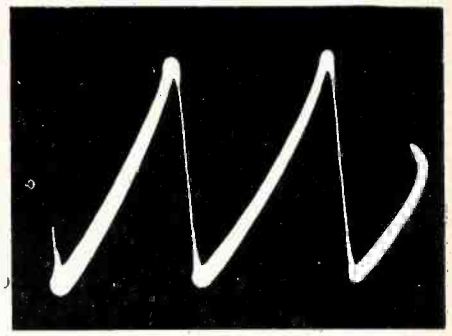


Fig. 2. Waveform at grid of sync amplifier, V13 pin 2, applies to Model 499-3 and all later models.

(9) Add C71, a 0.005-μf capacitor from pin 3 of the horizontal damper tube, 6W4GT, to pins 5 and 7 of the horizontal phase detector tube, 6AL5.

(10) Connect pin 6 to pin 2 of the 12AU7 d-c restorer, sync clipper, sync amplifier and phase splitter tube.

(11) Add R96, 68,000 ohms across R77.

(12) Short out C49, a 0.01-μf capacitor.

The horizontal linearity control is used in all chassis having the chassis number 110.499-20 or higher, such as -21, 22, etc, and 110.499-33 including type "A" and "B" only. To add a horizontal linearity coil to other chassis proceed as follows:

(1) Mount the horizontal linearity coil in the hole provided on the top of the main chassis, using the figure showing the top of the chassis as a guide, near the high-voltage shield and the picture tube.

(2) Change C61 from 0.25 μf to 0.1 μf, 600 volts.

(3) Change R87 from a 22,000-ohm resistor to an 18,000-ohm resistor.

(4) Change R75 from 1,500 ohms to 2,200 ohms.

(5) Remove wire from terminal 1 of the horizontal output transformer T6 and pin 3 of the horizontal damper tube 6W4.

(6) Add a 0.05-μf, 600-volt capacitor, C100, from terminal 1 of the horizontal output transformer and chassis.

(7) Add a 36-$\mu\mu f$ capacitor, C110, in series with C57 and C68 so as to reduce the total value to 12 $\mu\mu f$.

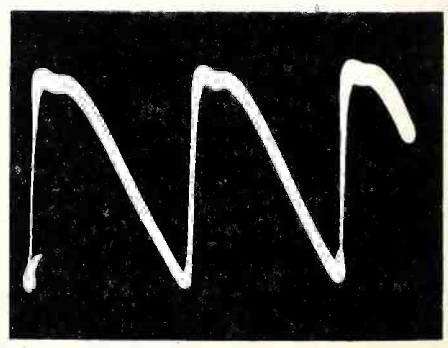


Fig. 3. Waveform of the horizontal phase detector, V15 pins 5 and 7, applies to Model 499-3 and all later models.

(8) Connect one side of the horizontal linearity coil L21 to terminal 1 of the horizontal output transformer T6.

(9) Connect the other side of the horizon-

tal linearity coil to pin 3 of the horizontal damper tube 6W4.

(10) Under Alignment Procedure, Width and Horizontal Drive, add: "(3) On later model receivers having a horizontal linearity control located on top of chassis next to the high voltage shield, adjust this control for the best shaped picture horizontally." When using the horizontal linearity control, use terminal 1 of the horizontal output transformer T6.

A description of the chassis in the 110.499 series is given below.

Chassis No.	*Description*
110.499	Original 10-in. television chassis with tuner #1
110.499A	Original 10-in. television chassis with tuner #3
110.499B	Original 10-in. television chassis with tuner #4
110.499-1	Original 12½-in. television chassis with tuner #1
110.499-1A	Original 12½-in. television chassis with tuner #3
110.499-1B	Original 12½-in. television chassis with tuner #4
110.499-2	Original 12½-in. television chassis with built in antenna switch and tuner #1
110.499-2A	Original 12½-in. TV chassis with built in antenna switch and tuner #3
110.499-2B	Original 12½-in. TV chassis with built in antenna switch and tuner #4
110.499-3	16-in. round metal tube TV chassis with tuner #1
110.499-3A	16-in. round metal tube TV chassis with tuner #3
110.499-3B	16-in. round metal tube TV chassis with tuner #4
110.499-10	Revised 10-in. TV chassis with new horizontal afc and tuner #1
110.499-10A	Revised 10-in. TV chassis with new horizontal afc and tuner #3
110.499-10B	Revised 10-in. TV chassis with new horizontal afc and tuner #4
110.499-11	Revised 12½-in. TV chassis with new horizontal afc and tuner #1
110.499-11A	Revised 12½-in. TV chassis with new horizontal afc and tuner #3
110.499-11B	Revised 12½-in. TV chassis with new horizontal afc and tuner #4
110.499-12	Revised 12½-in. TV chassis with antenna switch, new horizontal afc, and tuner #1
110.499-12A	Revised 12½-in. TV chassis with antenna switch, new horizontal afc, and tuner #3
110.499-12B	Revised 12½-in. TV chassis with antenna switch, new horizontal afc, and tuner #4
110.499-20	Revised 10-in. TV chassis with horizontal linearity control and tuner #1
110.499-20A	Revised 10-in. TV chassis with horizontal linearity control and tuner #3
110.499-20B	Revised 10-in. TV chassis with horizontal linearity control and tuner #4
110.499-21	Revised 12½-in. TV chassis with horizontal linearity control and tuner #1
110.499-21A	Revised 12½-in. TV chassis with horizontal linearity control and tuner #3
110.499-21B	Revised 12½-in. TV chassis with horizontal linearity control and tuner #4
110.499-22	Revised 12½-in. TV chassis with antenna switch, linearity control, and tuner #1
110.499-22A	Revised 12½-in. TV chassis with antenna switch, linearity control, and tuner #3
110.499-22B	Revised 12½-in. TV chassis with antenna switch, linearity control, and tuner #4
110.499-33	Revised 16-in. TV chassis with round metal tube, linearity control, and tuner #1
110.499-33A	Revised 16-in. TV chassis with round metal tube, linearity control, and tuner #3
110.499-33B	Revised 16-in. TV chassis with round metal tube, linearity control, and tuner #4.

The following list is a supplement to the parts list for the 110.499 series:

Ref. No.	*Part No.*	*Description*
•C43	A194-179	Capacitor, paper, 0.01 µf, 600 v, ±10%
C58	A19108	Capacitor, paper, 0.25 µf, 600 v, +30% − 10% 85°C
•C61	A19121	Capacitor, paper, 0.1 µf, 600 v, ±10%, 85°C
•C57, C68		Capacitor, mica, 24 µµf, 1,500 v a.c., 400 v d.c.
C100	A1996	Capacitor, paper, 0.05 µf, 600 v. + 30% — 10%, 85°C
C63	A1998-1	Capacitor, mica, 500 µµf, 10,000 v, 10- & 12½-in set only
C63	A1998	Capacitor, mica, 500 µµf, 15,000 v, 16-in. set only
•C65	A1996	Capacitor, paper, 0.05 µf, 600 v, +30% − 10% 85°C
C70	A194-151	Capacitor, paper, 0.005 µf, 600 v, ±20%
L5	A28253	Coil, i-f choke
L18, L19, L20	A28264	Coil, filament choke
L11	A28273	Coil, focus, p.m., 16-in. set only
L21	A28259	Coil, linearity, horizontal
L14	A28258-1	Coil, width, 10 & 12½-in. set only
L14	A28258-2	Coil, width, 16-in. set only
	A55131	Connector, anode, 16-in. set only
R90	A24106	Control, centering
	A55110	Cord, line, 10- & 12½-in. set only
	A55125	Cord, line, 16-in. set only
	A54611-1	Cushion tube, strap, 10-in. set only
	A54611-2	Cushion tube, strap, 12½-in. set only
	A59458	Escutcheon, tuner #1 and #4 only
	A59517	Escutcheon, tuner #3 only
F1, F2, F3	A54682	Fuse, ¼ amp, 250 v 3 ag with ½-in. pigtail
	A62256	Glass, safety, 10-in. set only
	A62260	Glass, safety, 12½-in. set only
	A62271	Glass, safety, 16-in. set only
	A3202	Ion trap, magnet (ring type)
	•A39204	Knob, brilliance, contrast, horizontal hold, walnut
	•A39198	Knob, brilliance, contrast, horizontal hold, mahogany
	A39190	Knob, fine tuning
	•A39203	Knob, fine tuning, walnut
	•A39197	Knob, fine tuning, mahogany
	•A39205	Knob, off-on sound, vertical hold, walnut
	•A39199	Knob, off-on sound, vertical hold, mahogany
	•A39202	Knob, selector, walnut
	•A39196	Knob, selector, mahogany
	•A39206	Knob, horizontal hold used with A39204, walnut
	•A39200	Knob, horizontal hold used with A39198, mahogany
	A62257	Mask, kinescope, 10 in.
	A62259	Mask, kinescope, 12½ in.
	A62283	Mask, kinescope, 16 in.
	A62287	Mask, kinescope, Model 9140 only
	A54661	Plug, male, line cord, 10-12½-in. set only
	A55126	Plug, interlock cable assy., 16-in. set only
•R54	A231-1223	Resistor ½ megohm, ½ w, ±10%, carbon
•R15	A233-1179	Resistor, 18,000 ohms, 2 w, ±10%
•R20, R85	A233-1179	Resistor, 18,000 ohms, 2 w, ±10%, carbon
•R64	A232-1163	Resistor, 3,900 ohms, 1 w, ±10%, carbon
•R59	A231-2321	Resistor, 1 megohm, ½ w, ±10%, carbon
•R87	A232-1179	Resistor, 18,000 ohms, ½ w, ±10%, carbon
R91	A23151	Resistor, 1.2 ohms, 1 w, ±10%
R93	A231-1233	Resistor, 3.3 megohms, ½ w, ±10%, carbon
R94	A231-1155	Resistor, 1,800 ohms, ½ w, ±10%, carbon
R95	A232-1167	Resistor, 5,600 ohms, 1 w, ±10%, carbon
R96	A231-1193	Resistor, 68,000 ohms, ½ w, ±10% carbon.
	A18160-1	Socket, kinescope, 10- & 12½-in. set only
	A18160-2	Socket, kinescope, 10- & 12½-in. set only
	A54541	Strap, picture tube, 10-in. set only
	A54509	Strap, picture tube, 12½-in. set only
	A54732-1	Support, yoke and focus coil bracket, 10-in. set only
	A54732-2	Support, yoke and focus coil bracket, 12½-in. set only
	A54771	Support, focus coil bracket, 16-in. set only
T6	A10100	Transformer, horizontal output, 12½- & 16- in. set only
	A54735	R-f tuner #3
	A54796	R-f tuner #4.

•Indicates change in value on later models.

CIRCUIT ANALYSIS AND TV SERVICING

(Continued from page 1)

thousands of engineers and do so rapidly, efficiently, and profitably.

It is in this respect that the circuit descriptions, which are prepared by manufacturers as a part of their service literature—and which are reproduced in Rider Manuals without any abridgment—become so vital to the welfare of the servicing industry. We cannot stress too strongly that these are not superfluous data which a manufacturer has prepared in order to keep his engineers employed. They are written because the manufacturer realizes that it is his duty to make servicing as easy as possible—because he realizes that there is no other way for the servicing industry to become familiar with the technical content of his product, with the accomplishments of his engineers. The manufacturer appreciates that each new model of a TV receiver reflects some new design born of necessity or ingenuity and that it is his duty to bring these facts to the attention of the service industry. That is why the majority of manufacturers include circuit descriptions in their service notes.

We, too, recognize these responsibilities, the seriousness of the obligation, and, knowing the requirements of the servicing industry, we consistently have published the set manufacturers' circuit descriptions, breakdown diagrams, and component function information in Rider Manuals. It means more pages, more drawings, more paper, more printing, and higher costs—but it cannot be avoided. We shall continue printing this information, and, whenever economically possible, will further strengthen the effort by publishing even more elaborate explanations in all publications at our disposal. As a matter of fact, we have always considered such information to be a feature of our manuals—an important item in the educational program of the servicing industry.

We have consistently viewed such descriptive text as not being out and out theory, even though when read it appears that way, since the notes are practical. They furnish clues to trouble diagnosis and they point the way in trouble shooting, and in doing so save time and effort, all of which are interpretable in dollars and cents. Let us show you just exactly what we mean when we say that component function information and circuit analysis has direct, practical significance. Three descriptions of horizontal output systems found in the service data for three different brands of television receivers are given in the following paragraphs. An appreciation of the points of similarity as well as the points of dissimilarity are of utmost importance in the development of a general understanding of this section in television receivers. We repeat that these discussions are abstracts only of the full discussion embracing the entire receiver, given by the manufacturers. The full descriptions appear in Rider Manuals, in these specific cases in TV Volume 5.

DuMont RA-109-A1 Series (Rider's TV5, page 5-7)

The horizontal output circuit used in this Teleset is somewhat different from the type formerly used. Examination of the simplified schematic winding shown in Fig. 1, reveals that the secondary winding of transformer T206 (terminals 1, 2, and 3) is essentially in series with the primary, thus forming an autotransformer circuit.

This configuration permits tighter coupling between the primary and secondary windings, resulting in a highly efficient output circuit. Because of this high efficiency, the circuit requires less current, thus permitting the use of smaller wire size to produce a more compact transformer.

The 338 volts used to power this circuit is fed through the parallel 6W4 damper tubes. Capacitors C325 and C303 connected between pin #2 of the second and the boosted B+ are used to increase the return time of this circuit to about 7.5 microseconds. The filaments of the 6W4's are returned to the center tap of the secondary winding to keep the pulse voltage between heater and cathode at a safe voltage in an effort to prevent breakdowns.

A shunt-series type size control is used across the secondary of T206. The portion of the inductance between terminals 1 and 3 is in series with the deflection yoke, whereas that portion between 2 and 3 is in parallel with the yoke. This horizontal size control circuit presents a constant load to the secondary.

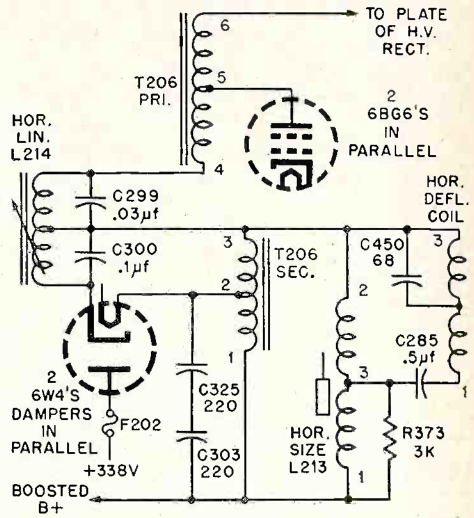


Fig. 1. Horizontal output circuit for DuMont RA-109-A1 Series.

Adjustment of the slug to increase the parallel coil inductance results in a decrease of the series coil inductance, thus maintaining the total inductance constant. This arrangement permits variation of size without affecting linearity. Resistor R373 is used across the series portion of the size coil to prevent ringing.

The sweep signal is capacitive coupled to the horizontal deflection coil. This is necessary in this circuit to prevent d.c. from flowing through the yoke and de-positioning the beam. A 68-$\mu\mu f$ capacitor, C450, is used across one-half of the horizontal deflection coil to prevent yoke ringing which would produce vertical white and dark bars in the picture.

No static damping resistors are needed across the secondary, since the application of

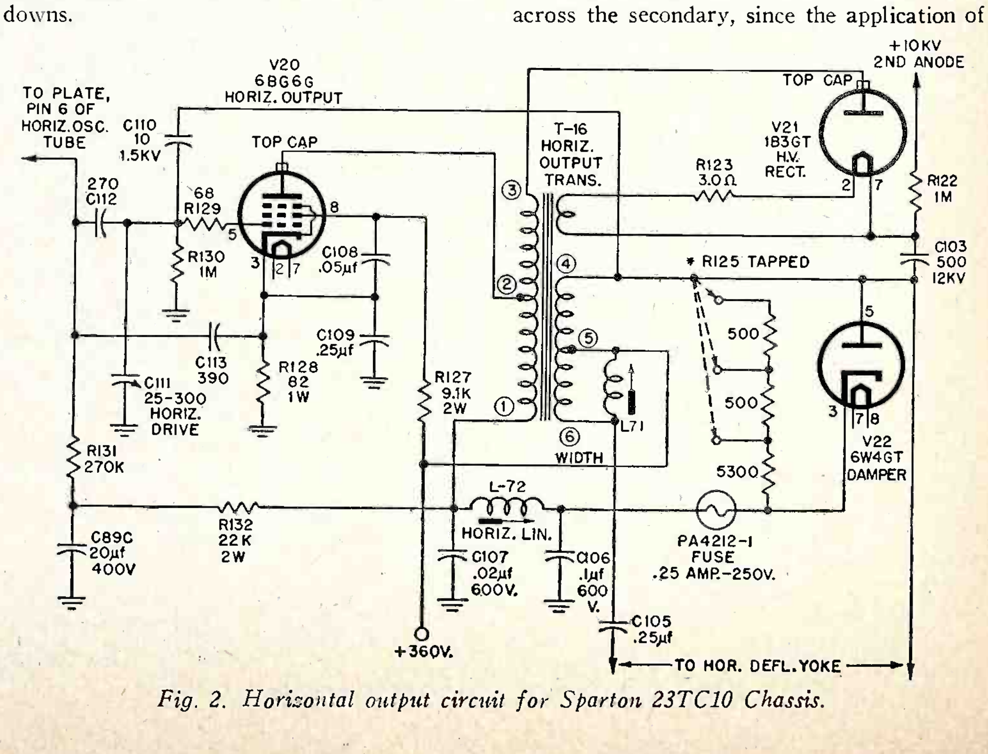


Fig. 2. Horizontal output circuit for Sparton 23TC10 Chassis.

the boosted voltage to the vertical deflection circuits provides sufficient damping.

The horizontal linearity control adjusts the point at which the damper tubes stop providing the sweep energy and the 6BG6's start. Therefore, this control affects the linearity at the center of the picture where this effect takes place.

Sparton Chassis 23TC10 (Rider's TV5, page 5-6)

The horizontal output tube and the damper tube V22, as shown in Fig. 2, produce the required linear sawtooth scanning current in the horizontal deflection coil. The two tubes plus the horizontal output transformer also produce a high-voltage pulse which is used to obtain the kinescope high-voltage supply. The output system is a conventional kickback type except that no electrical horizontal centering is provided. Capacitor C105 is employed to isolate d-c from the yoke. Centering is therefore accomplished by actual physical motion of the focus coil and, to some degree, the ion trap. The output transformer, as far as deflection is concerned, is an impedance matching device for the output tube and yoke.

The width control L71 is provided to vary the output and hence the picture width. This is accomplished by shunting a portion of the secondary winding to change the effective transformation ratio. Clockwise rotation of L71 increases the shunting inductance and hence the width.

Because the horizontal transformer, deflection coil, and associated circuits are designed to resonate at a high frequency (period = 14 microseconds) for fast retrace time, they are shocked into resonance when the magnetic field collapses during retrace. To prevent continued oscillatory currents in the deflection yoke, the damper diode V22 is incorporated. During the first half-cycle (7 microseconds) of retrace resonance, the circuit oscillates freely to insure rapid retrace time. During the next half-cycle, however, the damper plate goes positive and conductance of the 6W4G occurs. This puts a very heavy load on the deflection coil so that it cannot oscillate. R125 is a further damping element in the circuit. It is employed to aid in better scanning linearity. Production variations in yokes and transformers are compensated for with the taps on this resistor. The tap is set at the factory and should not need further adjustment.

The 6BG6G voltage is supplied through the 6W4G which is conducting over the major portion of the trace. Capacitors C106 and C107 are charged during this period, and this charge is sufficient to supply the 6BG6G plate when the 6W4G is not conducting.

The charge is placed on these capacitors by the receiver d-c supply and by the current from the collapse of the field in the horizontal deflecting coil. The a-c axis of the sweep voltage is 360 volts above ground, since the T16 secondary is connected to the receiver 360-volt bus. The charge placed on these capacitors by the coil kick-back is, therefore, in addition to that from the d-c supply, and thus the capacitors are charged to a voltage greater than the d-c supply. This permits operation of the 6BG6G at a higher voltage than is obtainable from the receiver power supply and produces an increase in the system efficiency by salvaging energy that would otherwise have been wasted.

During the trace period, the voltage across C106 varies due to the charging by the deflection coil kick-back and the discharging throughout the output tube. This rise and fall of voltage constitutes an a-c ripple in the plate supply of the output tube. By shifting the phase of this ripple with respect to the tube-plate current requirements, slight variations of plate characteristics are obtained. The horizontal linearity control L72 and C107 constitute a phase shifting network. L72 is variable and it is provided to effect small improvements in linearity. Counterclockwise rotation of the adjustment screw causes the second quarter of the picture to stretch and the first quarter to crowd.

Montgomery Ward Model 94BR-3004 (Rider's TV5, page 5-15)

Horizontal Output Tubes. The grids of the paralleled horizontal output tubes 14, 15, and 16, shown in Fig. 3, are excited by a positive-going sawtooth, and are biased so that the tubes are cut off during the retrace and during the first one-third, approximately, of the trace.

(Continued on page 16)

RIDER MANUALS...

PUBLISHERS OF RIDERS MANUALS AND OTHER RADIO SERVICE BOOKS

John F. Rider
PUBLISHER
INC
480 CANAL STREET · NEW YORK 13, N Y
WORTH 4-0340

December 1, 1950

Mr. Lou Shappe
Shappe-Wilkes Advtg. Agency
215 Fourth Avenue
New York 3, New York

Dear Mr. Shappe:

Here is a photostatic copy of a letter which might well become an advertisement.

It is voluntary and wholly unsolicited. Please let me have your reaction.

Sincerely yours,

JOHN F. RIDER PUBLISHER, INC.

John F. Rider

JFR:RP

Dear John,
This letter IS a powerful ad!
Let's use it WITHOUT ANY CHANGE!

NEW ENGLAND TELEVISION CO.
ELECTRONIC RESEARCH LABORATORIE
544 SIXTH STREET • NEW YORK 9. N. Y.

November 21, 1950

Mr. Schlenger
John F. Rider, Publisher Inc.
480 Canal Street
New York 13, N.Y.

Dear Mr. Schlenger:

We have just completely overhauled and
approximately 200 old television sets of variou
manufacturer's in record time with excellent re
As these television sets were all "trade-ins" o
model sets and several years old; a large numbe
them had component's with wrong value's (obvio
due to previous repairs) or had parts complete
missing.

I wish to state that everyone of these t
sets were put in working order with the aid
Television Manuals, furthermore; as a Televi
engineer, I cannot help but admire the fact
less of what chassis we picked up next we ha
look in Rider's Manuals to find the proper

It may be a bit early for holiday gree
we sincerely wish you and everyone connect
John F. Rider "A MERRY CHRISTMAS AND A HAP

Very truly y

NEW ENGLAND

Joseph

Joseph Fro

jf;mf

PROVEN BEST by

Proven BEST by TEST

and here are the reasons WHY!

Because when you work with RIDER TV MANUALS . . .

- You possess the same information which the original receiver manufacturer uses. This means **accuracy, authenticity, and completeness of detail.** NOBODY — BUT NOBODY ELSE — can make this statement!
- You have at your fingertips descriptions of the circuit action. The five Rider TV Manuals contain **731 pages of such extremely valuable instructional information.** It is like a teacher telling you how the circuit functions. NOBODY — BUT NOBODY ELSE — furnishes this much of this kind of data necessary for successful and profitable TV servicing!
- You have at your fingertips **337 pages of official, accurate, unpacking and installation data.** NOBODY — BUT NOBODY ELSE — **gives this much** of this kind of time-saving, money-making TV servicing data.
- You have at your fingertips **293 pages of signal waveforms** — so vital to rapid trouble diagnosis of picture i.f., sound i.f., video, sync and sweep circuits. NOBODY — BUT NOBODY ELSE — even remotely approaches this much of this kind of time-saving and money-making TV servicing information!
- You have at your fingertips the most **complete coverage** of the TV receiver manufacturers' output — the pilot models and all the changes — from the very beginning. NOBODY — BUT NOBODY ELSE — who sells service data can make this statement!
- Compare the completeness of Rider TV Manuals with any other service and you will see why they are the **Best by Test** — why they are the most economical to buy in the long run and, most popular with all competent TV servicemen. Make your Rider TV Manual Library complete! Get the missing copies today.

In TELEVISION	RIDER P.A. MANUAL	In AM-FM-Auto Radio-Phono
5 RIDER TV MANUALS		21 RIDER MANUALS
★10,544 Pages*	★2,024 Pages	★31,382 Pages
★1,849 Models	★1,285 Models	★28,341 Models

* Equivalent of 8½ x 11 ins. size

Complete your Rider Manual Library today... Get them from your Jobber

21 YEARS of TEST

Television Changes

Admiral 32X26, 32X27, 32X35, 32X36, Ch. 20Z1, Radio Ch. 5B2

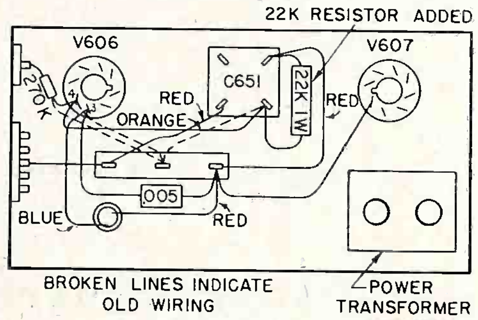
A change has been made in the 2PA1 power supply filter circuit to reduce residual hum. This power supply is used with the 20Z1 chassis in combination models using the 5B2 radio tuner. The following changes will reduce hum to a low level.

1. Remove the lead that connects pin 4 of V606 to center tap of R638-R639 candohm resistor. Remove lead that connects C651B to center tap of R638-R639.

2. Disconnect 270,000-ohm resistor R635 from center tap of candohm and reconnect to pin 4 of V606. Leave center tap of candohm unconnected.

3. Connect a 1-watt, 22,000-ohm resistor (60B14-223) from C651C to C651B and a lead from C651B to pin 4 of V606, as shown in the accompanying diagram.

These changes have been incorporated in 2PA1 power supplies now in production.



Changes for Admiral Models 32X26, 32X27, 32X35, and 32X36.

●

Philco 50-T Series

Operating the 50-T Series with the deflection yoke disconnected removes the load from the 6BG6G tube, causing excessive screen current and damage to the screen dropping resistor. A deflection yoke should always be connected when the receiver is in operation. If a complete picture-tube assembly is not available, a yoke by itself will be satisfactory.

In some cases, horizontal streaks may be caused by video or a-c voltage being fed back into the first v-i-f stage. One cause of this coupling is the leads running to the contrast control, which carry video voltage, being to close to the 28.1-Mc trap. In this case, these wires should be dressed away from the trap, and as close to the chassis as possible. In some extreme cases, it may be necessary to reroute these wires as in later production of Model 50-T1443, Code 123. In this chassis, the wires are routed from the contrast control out through a hole near the control, down the front of the chassis, into a ventilation hole near the bottom-right corner, and thence to the output stage. In all cases, all leads must be dressed away from the 28.1-Mc trap.

●

Emerson 651C, 651D, 658B, 658C, Ch. 120124

In the event that this chassis causes interference on a-m radio sets, the following change will eliminate it:

1. Add a 0.05-μf, 400-volt capacitor from line switch side of a-c input plug.

2. Add a 100,000-ohm, 1-watt resistor in parallel with above capacitor.

The following changes will reduce internal radiation effects upon sync stability:

1. Remove the lead from junction of R-6 (1000 ohms), R-31 (1 megohm), C-37 (0.25 μf), to V-8 (6T8) pin 6.

2. Add a 1500-$\mu\mu$f capacitor from the B+ side of fuse F-1, to chassis. The leads should be ¼" long.

3. One side of R-35 (100,000 ohms) now goes to the chassis, instead of to pin 7 (V-4, 6AU6).

4. Remove the 225-volt B+ lead from the fuse to the dummy lug under T-8, the horizontal oscillator transformer.

5. From the fuse on the dummy lug, add a B+ lead through the high-voltage box, along the top of the chassis to the chassis hole near the power transformer, through this hole to the plus terminal of C-51. C-51 is part of C-49 and is designated by a square on the top of the can.

6. Remove the secondary of the vertical output transformer (T-7) leads from the dummy lug under the deflection yoke.

7. Reroute the leads through the high-voltage box and along the top of the chassis, solder back to the same dummy lugs. These lugs also hold leads from the vertical deflection coils L-8.

8. Reroute the lead from the horizontal size coil L-11 to the horizontal deflection coil L-9 through the high-voltage box and along the top of the chassis.

9. Add a metal shield 4" long by 2" along the side of the i-f dummy-lug strip.

10. Change C-73 from 50 $\mu\mu$f, mica capacitor, to 42 $\mu\mu$f, ceramic, 2000 volts, (part #928058).

Sets coded with triangle 4 have all above changes except Step 10.

Sets coded with triangle 5 have all above changes including Step 10.

●

Crosley 10-401

To prevent breakdown due to arcing between the plate leads of the 6BG6 tube and the damper, install 3½ inches of fiberglass sleeving (part no. 39468-14) over the 6BG6 plate lead. This sleeving should be placed toward the terminal on the horizontal deflection transformer.

Horizontal sweep sing can be caused by vibration of the mounting bracket on the horizontal output transformer, T107. This mounting bracket occasionally vibrates at a sub-harmonic of the 15,750-cps horizontal sweep frequency. On later production sets this condition has been corrected by dipping the core and mounting bracket in a high melting point wax. Receivers that do not have this wax treatment can be corrected by inserting small wedges between each end of the transformer and the chassis. It is not necessary to remove the chassis from the cabinet to make this correction.

●

RCA T121, KCS34C

Poor vertical sync may be caused by capacitor C-136 (cathode bypass V-108) breaking loose from ground. Some vertical oscillator transformers, marked 274011, with too high a *Q* may cause a white condition at the top of the picture and possible instability of sync. If this is the case, lower the transformer *Q* by connecting a 1-megohm resistor across the green and yellow transformer leads.

Curtain Time

(Continued from page 5)

tion we do not hesitate to recommend the contents of the Marshall book on *TV Installation Techniques,* wherein will be found information concerning the proper erection of antennas, and especially calculations for wind and ice loading.

In altogether too many instances, branches of the industry are too prone to ignore the physical factors. All the emphasis is placed on the electrical characteristics. The mechanical characteristics deserve far more recognition than they are receiving. We realize that time is of the essence in every installation, and the more rapidly this can be accomplished, the lower the cost. There is a point of diminishing returns, beyond which this reasoning cannot be carried. It is just as easy to do a good job, one which would approach a semblance of permanency, as it is to do a poor job. In the long run it is cheaper for everyone concerned. Many conditions associated with the way of life have changed, but the formula for a successful business operation still remains giving the customer his money's worth.

In Retrospect

The year 1950 is fast drawing to a close, but many things have happened which will remain in our memory. If we were asked to describe them, we might select one word as the shortest possible description, chaotic. Webster defines the word chaos as "any confused collection or state of things; complete disorder." It well describes 1950 in almost everything which surrounds us. It isn't that we tend to extreme pessimism, but the never-ending statements, refutations, denials, and retractions, eventually get us down. The ability to plan is beset by so many obstacles as to become almost an impossibility. Just about the time that one's thoughts are organized, something happens which upsets the applecart. We have had these things before, and we recall the story of the Persian king who once commanded his wise men to come up with a four-word statement which would fit every occasion, and if they failed they would lose their heads. They complied with "this too shall pass." So, we are not selling America, its industries, its leaders, or its people short. Our way of life is still the best and we have every confidence that it is going to remain that way, all contrary influences notwithstanding.

JOHN F. RIDER

•

DuMont RA-106

A ¼-amp fuse (part number 11001100) is being added in series with L702 at the junction of R724, C714, and the primary of T701, in the power supply chassis. The 4-amp fuse F701 was changed to a 5-amp fuse (part number 11000810), 250 volts. The increase in the fuse rating was made to prevent accidental fuse burnout.

CIRCUIT ANALYSIS AND TV SERVICING

(Continued from page 11)

The plate load for the horizontal output tubes is the horizontal winding of the deflection yoke, T5-A, shunted by the horizontal output choke L28. Direct current for the plates of the output tubes flows through the choke. It is blocked by capacitor C110 from flowing through the yoke, where it would cause a de-centering of the picture. The width of the picture is determined by the amount of a-c plate current flowing in the output tubes, and this in turn depends upon the screen voltage on the output tubes. The width control is a screen-voltage control.

Damper. When the plate current of the horizontal output tubes has reached its peak value and is rapidly diminished to zero, there is a half-cycle of free oscillation of the inductances T5-A, L28, and capacitor C111. This forms the retrace of the horizontal sweep. Immediately following the retrace, while the output tubes are still cut off, damper tube 17 conducts for approximately one-third of the horizontal sweep cycle as it discharges the energy stored in the magnetic field of T5-A and L28. The currents through the damper tube and output tubes combine to form a continuously increasing flow of current through the yoke, which forms the trace section of a current sawtooth.

Focus. The damper tube current flows through the focus coil and its shunting resistors R98, R99, R100, and R101. The setting of the focus control R101 determines the amount of current flowing through the focus coil.

Pulse Rectifier. The rapid change of current through the horizontal yoke winding and horizontal output choke during retrace causes a pulse of approximately 1000 volts magnitude to appear across these inductances. A fraction of that voltage is applied to the pulse rectifier tube 18 through a tap on inductance L28. It is rectified and added to the 130-volt B+ through R116 to form a 250-volt source for the vertical multivibrator and the second grid of the picture tube.

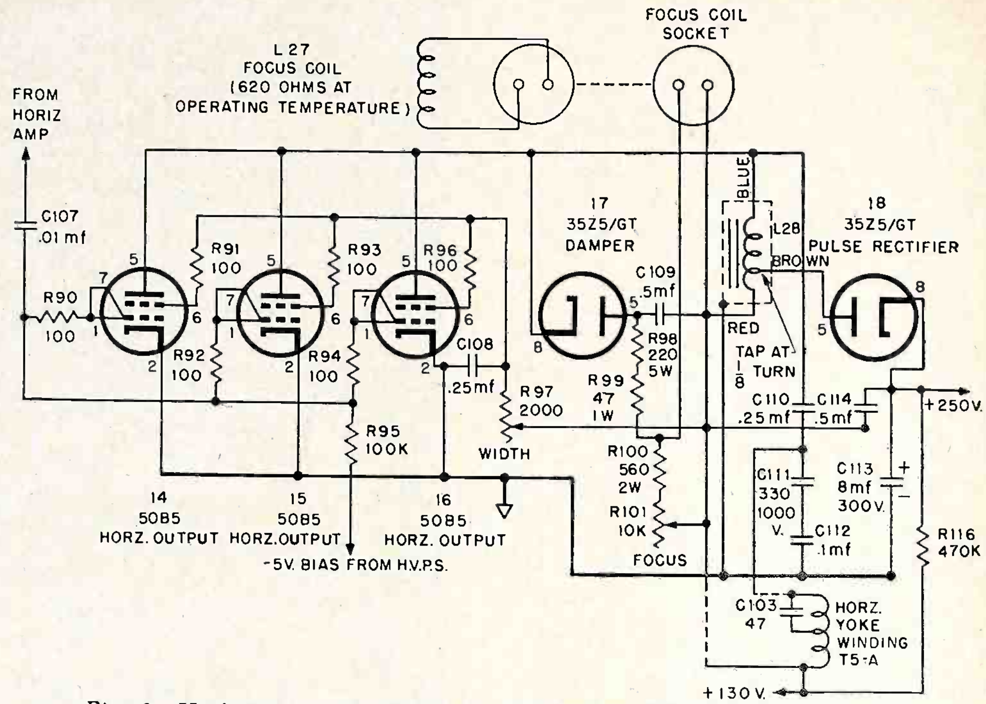


Fig. 3. Horizontal output circuit for Montgomery Ward Model 94BR-3004.

The shield can, around the horizontal output choke L28, is isolated from the chassis to minimize coupling of the horizontal retrace pulse to other parts of the circuit.

Practical Aspects of Circuit Analysis

What is the practical significance of such circuit analysis as presented here? How can a service technician make use of this information? Besides presenting an understanding of how the different types of circuits operate, such data are definitely useful in servicing television receivers.

In those receivers that do not have positioning controls, positioning is generally accomplished by physical placement of the focus coil and/or ion trap. This is well known, and, if a picture becomes horizontally off center, the immediate thought would be for the physical adjustment of these two units. However, if this does not help, where shall the serviceman look next? The circuit analysis notes often help toward this goal.

For example, in each one of the previous discussions, it was indicated that a coupling capacitor is used to feed the horizontal a-c deflection signal to the yoke and that this capacitor also prevents d.c. from getting to the yoke and therefore prevents de-positioning of the beam. If this capacitor becomes leaky, a certain degree of de-positioning will

(Continued on page 18)

CIRCUIT ANALYSIS AND TV SERVICING

(Continued from page 16)

occur; and, with time, the amount of leakage may increase, further de-positioning the beam. From this we see that circuit analysis notes help us decide possible trouble causes other than that which is most common.

Ringing or oscillation in the horizontal output system is a common cause of trouble. However, since this output system is not the same in all types of receivers, it is not a simple matter to locate the exact cause of the trouble. The manufacturers' circuit analyses contribute immeasurably toward isolating the defective components. For example, in one of the discussions it was indicated that a leaky or open capacitor across part of the horizontal deflection coil will bring about this ringing effect *causing white and black vertical bars* in the reproduced picture. This illustrates cause and effect.

The different controls of television receivers are often troublesome. The control circuits performing the same function in different receivers are not always the same, making it somewhat difficult to visualize the exact cause of the trouble. Once again, the manufacturers' circuit analyses are helpful in isolating the trouble. In the discussion of the different controls, the technical aspect of how they operate, what circuit they appear in, and how they affect the circuit, are usually presented. Such discussions may indicate that two similar circuits may have the same type of control, although placed in different parts of the circuit, each, therefore, affecting the circuit in a different manner. Consequently, we see that a knowledge of where and how these controls operate helps in deciding what part of a circuit may be defective.

There is still another factor in which such circuit analyses are beneficial to the serviceman. Many a receiver has new circuits or changes in old types of circuits which make them somewhat different from the usual run of receivers. If one of these circuits becomes defective, it would be difficult to trace the cause of trouble to this circuit without having some previous knowledge about it. For example, in one of the analyses included in this article, a special pulse rectifier was used to help increase the supply voltage on the vertical oscillator and screen grid of the picture tube. The circuit uses the high-voltage pulse from the horizontal output system, rectifies it, and applies the output voltage in series with the available supply voltage to the above mentioned tubes. If the pulse rectifier becomes defective, the vertical oscillator will not function properly because of a low supply voltage. Without the knowledge of how the pulse rectifier operates, it would be difficult to trace the cause of the faulty vertical oscillator to the pulse rectifier.

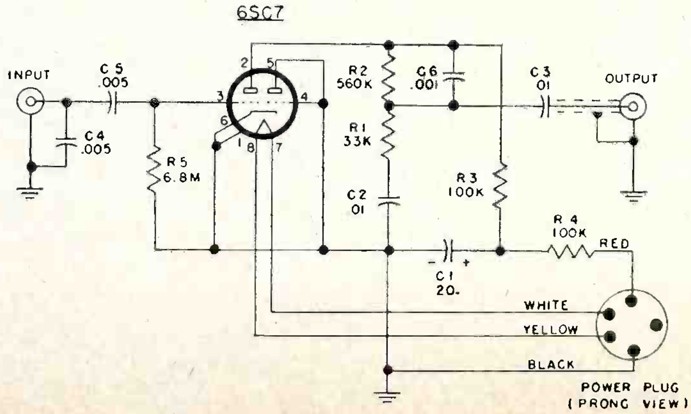
Space does not allow us to indicate all the other possible practical aspects of the manufacturers' circuit analyses, but the above discussion shows clearly how really important they are to the repair of television receivers and toward the elevation of technical competency. More than 730 pages of such information are to be found in the five Rider TV Manuals, and we are grateful to the TV receiver manufacturers of America for their permission to include this data in our publications.

Radio Changes

Westinghouse H-166C

The main chassis used in Model H-166C is the same as that used in Model H-166. A dual-speed record changer is used in Model H-166C. The changer employs a crystal pickup cartridge which has a higher output level than the variable reluctance cartridge used in the other models. For this reason, the phonograph pre-amplifier V-2138-1 in Model H-166C (see accompanying diagram) differs from those used in the other models. It functions mainly as a tone compensating device rather than an amplifier. Replacement parts for the V-2138-1 pre-amplifier are as follows:

Part No.	*Description*
V-4930	Cable, power
V-4931	Cable, output
V-5765	Capacitor, dry electrolytic, 20 μf, 300 v (C1)
RCP10W4103A	Capacitor, 0.01 μf, 400 v (C2, C3)
RCP10W6502A	Capacitor, 0.0005 μf, 600 v (C4, C5)
RCP10W6102A	Capacitor, 0.0001 μf, 600 v (C6)
V-3254S	Connector, phono
V-3345S-5	Grommet, power cord
V-3345S-10	Grommet, socket mtg
RC10AE333M	Resistor, 33,000 ohms (R1)
RC20AE564K	Resistor, 560,000 ohms (R2)
RC10AE104M	Resistor, 100,000 ohms (R3, R4)
RC20AE685M	Resistor, 6.8 megohms (R5)
V-4933	Socket, molded octal.



Phonograph pre-amplifier used in Model H-166C.

Radio Changes

General Electric 143

The connection between terminal number 4 of the 2nd i-f transformer to the 8,200-ohm resistor R2 is connected at the intersection with the B+ line. Late production receivers incorporate the following changes in order to improve the i-f stability. A 0.05-μf, 200-volt paper capacitor has been added in parallel with resistor R9. This capacitor has a reference number of C16 and stock number UCC-045. Capacitor C5 has been changed to a 0.1-μf, 200-volt capacitor, stock number UCC-050.

RCA 9EY3, Ch. RS132

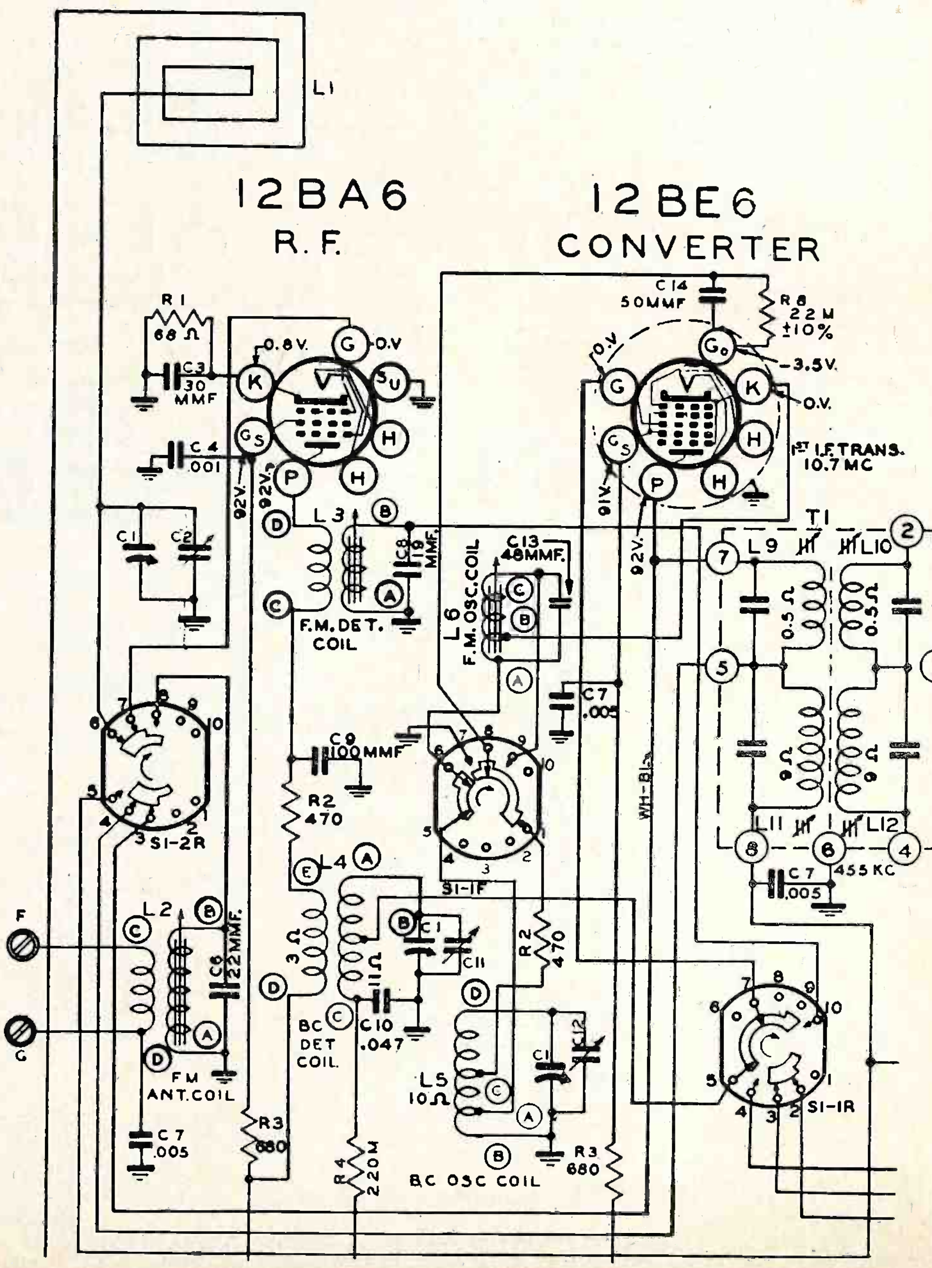
To aid in hum reduction in Record Changer 9EY3, resistor R8 and capacitor C4 have been changed in value. R8 has been changed from 470,000 ohms to 270,000 ohms. C4 has been changed from 0.002 μf to 0.0047μf, 600 volts, tubular.

Zenith 7H820Z, Ch. 7E01Z

Chassis 7E01Z is similar to Chassis 7E01 except that the 45-megacycle f-m band has been removed. The receiver now has the broadcast band and the 100-megacycle f-m band only. The new section is shown in the accompanying diagram. Balancing procedure is the same as for the 7E01.

The change in Parts List is given below:

Ref. No.	*Part No.*	*Description*
C30	22-1775	0.047 μf, 400 v
C10	22-1778	0.047 μf, 200 v
C19	22-1809	0.01 μf, 200 v
C25	22-1810	0.1 μf, 200 v
C24	22-1811	0.0047 μf, 400 v
C22	22-1813	0.22 μf, 600 v
C15	22-1814	0.0022 μf, 600 v
	58-128	Two-prong plug
	74-52	Plastic speaker screen
	83-1545	Insulating strip
	85-443	Bandswitch
	93-690	Felt washer
	93-719	0.031 x 3/16" x 7/16" steel washer
	93-961	Ins. shoulder washer
	114-160	6 x 7/8" hex. hd. s.t. screw
	114-277	8-32 x 9/16" hex. hd. m.s.



Partial schematic for Zenith 7H820Z showing elimination of the 45-Mc f-m band.

You need only one rope to ring the bell!

You need only one brand

TO CINCH BIG SUMMER BATTERY BUSINESS... AND *NOW* IS THE TIME TO CINCH IT!

"EVEREADY"
BRAND
THE BATTERY WITH
"NINE LIVES"

● Customers are checking over portables now . . . getting them ready for spring and summer months! They'll be asking for "Eveready" "Nine Lives" Radio Batteries!

No need to complicate your inventory with more than this one brand! Build a big battery business with "Eveready" Radio Batteries—the brand your customers want!

The terms "Eveready", "Nine Lives" and the Cat Symbol are trade-marks of

NATIONAL CARBON DIVISION
UNION CARBIDE AND CARBON CORPORATION
30 East 42nd Street
New York 17, N. Y.

District Sales Offices:
Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

BATTERY-ENGINEERED BY BATTERY MANUFACTURERS FOR BEST BATTERY PERFORMANCE!

Television Changes

Gamble-Skogmo 94TV1-43-8940A

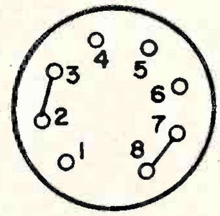
Improper neutralization of the sync amplifier may result in a severe horizontal shift of the entire picture with contrast control adjustments and may also start hunt oscillation (squegging) of the horizontal afc circuit. Squegging, evidenced by white lines or streaks running diagonally across the picture, ringing from the speaker, or singing from the horizontal deflection transformer, may cause damage to the 6BQ6, 6W3, 1X2, or horizontal deflection transformer. If this condition is noticed, it will be necessary to adjust the neutralization of the sync amplifier as shown below:

1. Disconnect the antenna.
2. Ground pin 5 of V7.
3. Rotate the contrast control to its normal operating position.
4. Connect a vtvm ($\pm$10-volt range) across capacitor C-106 (near pin 4 of horizontal multivibrator 6SN7).
5. Short pin 5 of 6SL7 to ground.
6. Turn set on and check vtvm reading. (Should be within $\pm$0.5 of zero volts. If not within this, check capacitors C-99, C-100, C-101, C-102, and resistors R-82 and R-87.)
7. Remove the short at pin 5 of 6SL7 from ground and note vtvm reading. If the voltage goes positive, move the two neutralizing capacitors C-71 and C-116 closer together to reduce the voltage to zero. Should this adjustment be insufficient, spread the black and blue leads connected to pins 2 and 4 of the 6SL7. If the voltage is negative, do the opposite.
8. When the vtvm reading is zero, the receiver is properly neutralized.

●

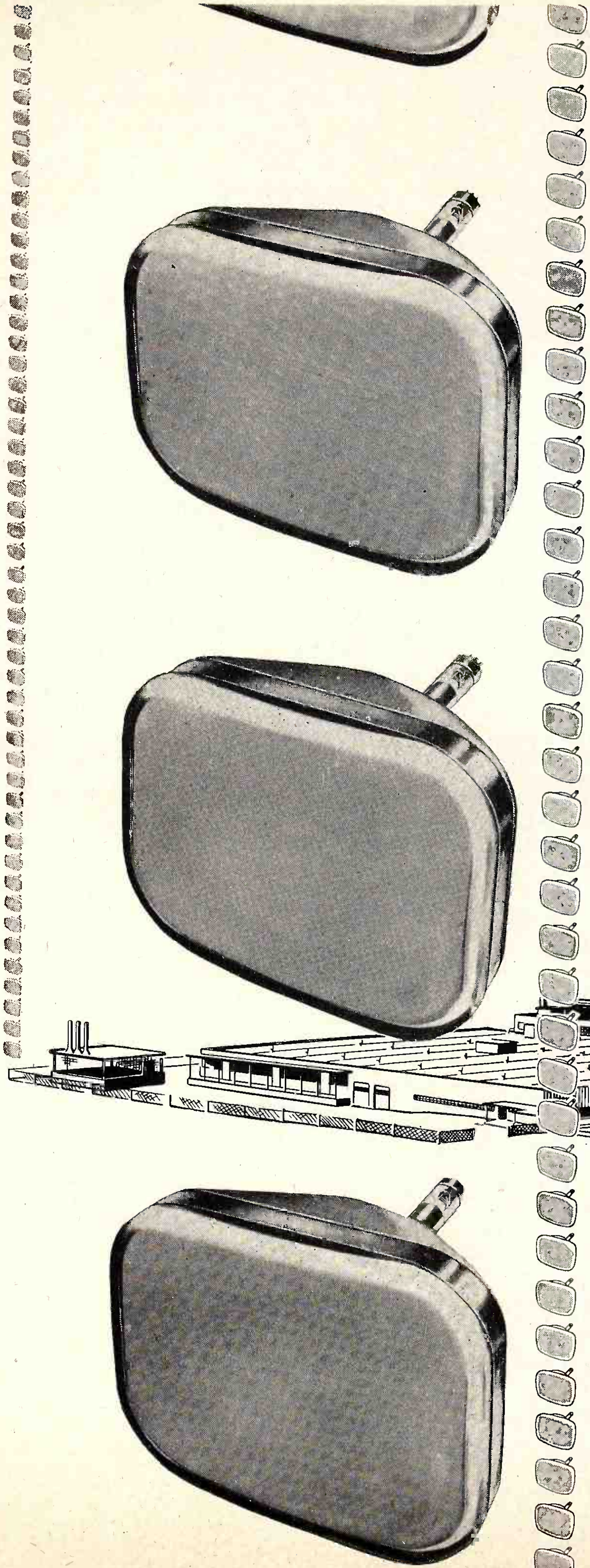
General Electric 12K1, 818

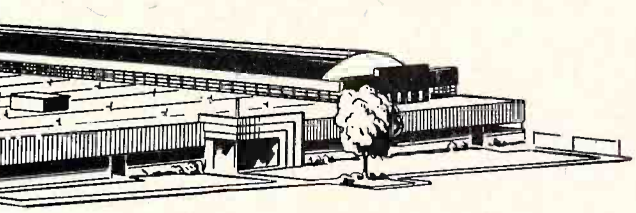
An adapter plug may be made which makes it unnecessary to remove the television chassis when service has to be rendered on the radio chassis only of Models 818 and 12K1. A standard octal tube base is wired as shown in the sketch below. A jumper is connected between pins 7 and 8 and also between pins 2 and 3. This plug is then inserted into the J-4 socket on the radio chassis to re-instate audio continuity and to energize the tube filaments when the radio is separated from the TV chassis. A-c power is furnished at pin 3-4 of P3 or with a suitable plug in receptacle J-2. *Precaution*—When using the latter point for power connection, it requires a male pin jack which makes the pins "hot" at 110 volts.



Wiring for standard octal tube base for General Electric 12K1 and 818.

The plug shown above may also be used when servicing the television chassis separated from the radio chassis. When this plug is inserted into the octal socket J5 on the television chassis, it permits application of power to the television chassis for alignment or trouble shooting purposes.





uniform

Yes, UNIFORM! There's no such thing as a "better tube" or a "poorer tube" when you insist on Du Mont Teletrons. Advanced engineering, precise mechanization second to none, and the most rigid quality control account for *uniformly dependable performance* that has made the Du Mont label symbolic of the finest in TV tubes. Best of all, with a productive capacity in excess of one million BIG picture tubes a year, the giant Du Mont Allwood plant meets *quantity* as well as *quality* requirements. Literature on request.

DUMONT

*Teletrons**

*TRADE-MARK

FIRST WITH THE FINEST IN TV

ALLEN B. DU MONT LABORATORIES, INC.

Cathode-ray Tube Division, Clifton, N. J.

TV ANTENNA "TRIO"

By the time these pages see daylight, we will have off the press the third of the textbooks pertaining to television antennas, namely, TV MASTER ANTENNA SYSTEMS. This completes the "trio" of publications relating to TV receiving antennas, and it offers to the industry a complete story on the subject. Bailey's TV AND OTHER RECEIVING ANTENNAS presents the theory; Marshall's TV INSTALLATION TECHNIQUES takes care of the problems of installation, both electrical and mechanical; and the Kamen-Dorf TV MASTER ANTENNA SYSTEMS furnishes the necessary information on this rapidly expanding phase of TV installation. An interesting side light on all of these books is that all of the authors have had an intimate association with the subject matter they treat: Bailey has designed antennas for 21 years, Marshall has taught TV installations courses and has done installation work, and Kamen and Dorf actually installed every one of the master antennas systems which they describe, which, incidentally, embraces all those available on the market.

Crosley Service Hints

When replacing the picture tube, make certain that the grounding springs (attached to the deflection bracket) are long enough to make contact with the aquadag (external conductive coating on picture tube). If grounding springs are not long enough to make proper contact, fasten a new type grounding spring (Part No. W-149671) to the side of the deflection bracket opposite the anode connector. This may be done with a self-threading screw, or by soldering.

When it is necessary to replace the fuse in a 1951 television receiver, replace it with a 250-ma slow-blow type fuse (part no. 150431).

●

Farnsworth P-63

Record changer P-63 is basically the same as the P-62 record changer—the difference lies in the type of trip mechanism. The P-62 changer employs a fixed position trip; the P-63, a velocity trip.

●

Farnsworth 1000-M, Capehart, Ch. P8

Model 1000-M is similar to Models 1002-F, 1003-M, and 1004-B, and uses a-m—f-m radio chassis P-8.

INDEX OF CHANGES

Model	*Page Number* Successful Servicing	Rider Manuals† From	To
TELEVISION CHANGES			
Admiral 32X26, 32X27, 32X35, 32X36, Ch. 20Z1, Radio Ch. 5B2	14	4-38	4-62
		5-8	5-9
Crosley Service Hints	24		
Crosley 10-401	14	5-25	5-36
DuMont RA-102	2	*1-34	*1-57
DuMont RA-106	15	2-34	—
		*2-57	*2-58
Emerson 651C, 651D, 658B, 658C, Ch. 120124	14		
Ch. 120124B		5-27	5-31
Farnsworth, Capehart Models 461P, 501P, 502P, 504P, Ch. U-12	2, 3		
Ch. U-12		2-9, 10	2-15
		*2-1	*2-9, 10
Farnsworth P7		19-19	19-33
P71		Rcd. Ch. 19-1	19-10
Gamble-Skogmo 94TV1-43-8940A	22	4-21	4-25
General Electric 12K1, 818	22		
12K1		5-12	5-24
818		4-24	4-33
Philco Service Hints	6		
Philco 48-2500	2	*1-23	*1-43, 44
		2-43	2-69
		*2-87	*2-140
Philco 50-T Series	14		
RCA T121, KCS34C	14	5-95	5-110
Sears 110.499 Series	6, 8, 9	3-1	3-11
		5-24	5-29
Sparton 4935, 4942, 4954, 4960, Ch. 23TC10; 5002, 5003, 5006, 5007, Ch. 23TD10	6	5-1	5-14
RADIO CHANGES			
Farnsworth P-63	24		
P-62		Rcd. Ch. 18-10	18-24
Farnsworth 1000-M, Capehart Ch. P8	24		
1002-F, 1003-M, 1004-B, Ch. P8		Page 10 of Feb. issue of *Successful Servicing*	
		19-19	19-19
General Electric 143	20	20-19	20-22
B. F. Goodrich 93-109, 93-110, 93-111	24		
93-104, 93-105, 93-106		19-4	19-10
RCA 9EY3, Ch. RS. 132	20		
		Rcd. Ch. 19-9	19-10
Westinghouse H-166C	18		
H-166		18-12	18-19
Zenith 7H820Z, Ch. 7EO1Z	20	19-5, 6	19-12

† The Rider Manual Page Numbers given under Television Changes are for Rider TV Manuals. The volume number is the number preceding the dash. Volume numbers preceded by an asterisk (*) apply to the 8½" by 11" page size Manual only.

The Rider Manual Page Numbers given under Radio Changes are for Rider AM-FM Manuals. The volume number is the number preceding the dash.

●

B. F. Goodrich 93-109, 93-110, 93-111

These models are the same as Models 93-104, 93-105, 93-106.

From
JOHN F. RIDER PUBLISHER, Inc.
480 CANAL ST., NEW YORK 13, N. Y.
Return Postage Guaranteed

A. J. S. CERINO
5310 OVERBROOK ST.
DOUGLASTON, L. I., NEW YORK

Sec. 34.66, P. L. & R.
U. S. POSTAGE
PAID
NEW YORK, N. Y.
PERMIT No. 9427