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TV SIGNAL STRENGTH VERSUS ANTENNA HEIGHT

By ARNOLD B. BAILEY

In the standard broadcast band (550-1600 kc), it is usually immaterial how high the receiving antenna is placed above the earth. The signal strength remains quite uniform with elevation. At television frequencies, cancellation of the signal at the receiving antenna because of reflections of the earth becomes a problem, as the receiving antenna is raised above ground.

As we leave the surface of the earth, we find ourselves in a region of "interference" of at least two waves. One of these is the "direct" wave which leaves the transmitting station and travels to the receiving antenna by a direct path. The second wave is that which leaves the transmitting antenna and travels toward the surface of the earth from which it is reflected at an angle, and then strikes the receiving antenna. Whether these two signals will aid each other, or cancel each other, or create a condition in between, is the matter of importance. At ground level, cancellation is complete and the signal is zero. For the first few feet *above* the surface of the earth, cancellation gradually becomes less, and as the height increases, the signal becomes stronger. Soon a maximum is reached.

It is above this first maximum or critical height that cancellation and a corresponding minimum signal again occur. As the receiving antenna is raised higher and higher, we successively arrive at high-signal and low-signal points. The spacing between these minima and maxima points is expressible in feet, and this spacing will be unique for each receiving site.

As to the distance above earth where this phenomenon may be observed, it has been found that several thousand feet up, these nonuniform spots appear. An example of this is shown in Fig. 1. This graph depicts a typical case of the behavior of such waves over what is normally said to be the "low band" and "high band" in the present-day television channels, and the proposed 500- to 890-Mc band. It will not apply to all receiving locations, but is given to indicate the broad trends. It is important to appreciate the value of this graph from the broad aspect rather than the exact conditions at any one receiving site, on any one specific channel within these bands. It is very interesting to

(Please turn to page 8)

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.

Television Changes

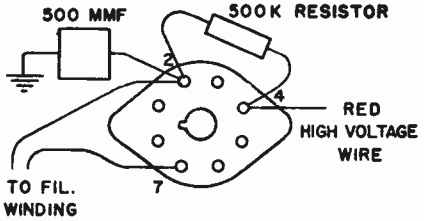
Muntz M-169

This chassis appears on *page 3-4 of Rider's TV Manual Volume 3.* When a picture fails to fill the mask in height completely, it is due to the slightly high value of the vertical-size resistor in the plate circuit of the 6SN7 tube. If changing the 6SN7 tube does not correct this, the following change is suggested:

The vertical-size resistor, 1.5 megohms, connected to pin 4 of the 6SN7 tube must be lowered in value to 1.2 megohms. Remove the 1.2-megohm resistor between pins no. 1 and no. 8 on the 6AU6 tube (video amplifier) and replace it with the 1.5-megohm resistor, replacing the 1.5-megohm resistor in the plate circuit of the 6SN7 with the 1.2-megohm resistor. This change applies only to chassis below serial number 24400 in 10- and 12-inch tubes, and below serial number 31254 in 16-inch tubes.

If the picture appears to bounce up and down, the addition of a 33,000-ohm resistor to the vertical hold circuit, connected between the 0.004-μf capacitor and pin no. 1 of the 6SN7 tube, will help to stabilize the circuit. The resistor is listed as Part No. RC-330-18 Resistor, carbon, 33,000 ohms, $\pm$10%, ½ watt. This change has been incorporated in chassis above serial number 36000 in the 10- and 12-inch tubes. and in chassis above serial number 25969 in the 16-inch tubes.

If a "frying sound" comes from the rear of the cabinet, it is due to a slight corona condition (arc) that exists from the high-voltage leads to ground beneath the 1B3 tube socket. To correct this, connect a 500,000-ohm resistor across pins no. 2 and no. 4, and the high-voltage leads to pin no. 4. The high-voltage filter now connects to socket pin no. 2 and the filament leads connect to pins no. 2 and no. 7, as shown in the accompanying diagram. The air space will be increased and prevent the high voltage from arcing to ground. This change applies to chassis below serial number 31886 in 12-inch tubes, and to chassis below serial number 24419 in 16-inch tubes.



The bottom view of the 1B3 socket for Muntz M-169.

●

U.S. Television

The Model 15 inch receiver that appears on *changes pages C-24 of Rider's TV Manual Volume 2* is designated as T15823.

Sears 9119, 9120

These models appear on *pages 3-23,24 through 3-32 of Rider's TV Manual Volume 3.* The new models are being shipped with a centering ring in place on the neck of the picture tube. The centering ring is used to center the raster within the picture tube mask. A centering action of approximately ¾ inch in any direction may be obtained by rotating the ring around the neck of the picture tube. Proper centering is accomplished by correctly adjusting the focus coil position and rotating the ring as required.

●

Pilot T-531

The schematic for this model is identical to that given for the T-530 Series which appears on *pages 18-1,2 through 18-5 of Rider's Manual Volume XVIII.*

Certified Radio 49-710

This model is the new number for Model 49-10 that appears in *Rider's TV Manual Volume 2 on pages 2-1 through 2-23.*

●

Westinghouse H-196

This model appears on *pages 3-1 through 3-18 of Rider's TV Manual Volume 3.* Early chassis used a 5Z4 tube as a low-voltage rectifier. In later production a 5V4G, which has a higher current rating, was used in place of the 5Z4. To prolong tube life in the early chassis, it is recommended that the 5Z4 low-voltage rectifier be replaced (direct substitution, no wiring change required) by a 5V4G.

In weak signal areas the sync may be improved by replacing the 12AU7 sync amplifier tube, used in early chassis only, with a 12AT7, which will provide greater sync amplitude. This change is a direct substitution, and no wiring changes are required.

Under very low line-voltage conditions, the picture width may not be sufficient even though the width control is at maximum. If this is the case, check the code number of the deflection yoke. This number is located under the "V" number on the yoke. If the number is 98, 108, 11, replace the yoke with one carrying any other code.

Hum in the audio section may be reduced by adding a 30-μf capacitor, V-6570, across C99 which is connected between the screen of the 6AQ5 audio output tube and ground. This change has been incorporated in later production.

Hallicrafters T-54, 505, Run No. 1

These models appear on *pages 1-1 through 1-29,30 of Rider's TV Manual Volume 1,* on *pages C2-2 through C2-3 of Rider's TV Manual Volume 2,* and on *C3-2 of Rider's TV Manual Volume 3.* The alignment frequencies should read 24 Mc i-f adjustment for the video detector, 25 Mc i-f adjustment for the 2nd i-f amplifier, 23 Mc i-f adjustment for the 1st i-f amplifier, and 26 Mc i-f adjustment for the mixer.

Hallicrafters is now using reference numbers which differ from those that appear on the schematic on *pages 1-29,30 of Rider's TV Manual Volume 1.* The complete parts list for T-54, 505, Run No. 1 with Hallicrafters' numbers and the corresponding Rider numbers is given below:

Reference Numbers Rider's	Hallicrafters'	*Description*	*Hallicrafters' Part Number*
C100A-C112A	C-1	Trimmer assembly, osc. stage, 13 sections	44B357
C100B-C112B	C-2	Trimmer assembly, mixer and r-f amp. stage, 13 sections	44B358
C100C-C112C	C-3	Trimmer assembly, mixer and r-f amp. stage, 13 sections	44B358
C-83, 88,85, 93,8,71	C-4, 7,9,11, 36,78	4.7 $\mu\mu$f, 500 v, bakelite	47A160-6
C-90,53	C-5,49	10 $\mu\mu$f, 500 v, bakelite	47A160-11
C-89,87	C-6,8	3.3 $\mu\mu$f, 500 v, bakelite	47A160-5
C-86	C-10	2.2 $\mu\mu$f, 500 v, bakelite	47A160-4
C-84, 91,92	C-12, 13,14	39 $\mu\mu$f, 500 v, ceramic	47B20390K5
C-59, 57,47, 24,25	C-15, 48,55, 68,69	100 $\mu\mu$f, 500 v, ceramic	47B20101K5
C-60, 66,70	C-16, 21,26	0.02 μf, 200 v, tubular	46AU203J
C-80,49, 51,48	C-40,17, 52,53	0.25 μf, 200 v, tubular	46AT254J
C-65, 4,5,79, 74,72, 55,81,7, 33,44, 43,42, 41,40, 37,38,39	C-22,32, 34,41, 42,44, 45,46, 56,79, 86,87, 88,89, 90,91, 92,93	1,000 $\mu\mu$f, 150 v, ceramic	47B20A102N1
C-63,50	C-19,54	5 μf, 50 v, electrolytic	45A109
C-64	C-20	330 $\mu\mu$f, 500 v, ceramic	47B0331K5
C-67,68, 54,22,	C-23,24, 51,66	0.05 μf, 200 v, tubular	46AU503J
C-69	C-25	0.01 μf, 200 v, tubular	46AU103J
C-58	C-27	1-$\mu\mu$f, 500 v, bakelite	47A160-2
C-1,2	C-30,31	47 $\mu\mu$f, 500 v, ceramic	47B20470K5
C-6	C-33	1.5 $\mu\mu$f, 500 v, bakelite	47A160-3
C-75	C-35	0.68 $\mu\mu$f, 500 v, bakelite	47A160-1
C-9	C-37	Trimmer, fine tuning	48A199
C-76, 78,56	C-38, 39,47	50 $\mu\mu$f, 500 v, ceramic	47B20500K5
C-52, 36,45	C-50, 83,84	0.1 μf, 200 v, tubular	46AU104J
C-11B, 11A	C-57A, 57B	60-30 μf, 450-300 v, electrolytic	45B126
C-13A, 13B	C-58A, 58B	40-40 μf, 300 v, electrolytic	45B125
C-12A, 12B	C-59A, 59B	30-30 μf, 200 v, electrolytic	45B123
C-10A, 10B	C-60A, 60B	100-100 μf, 150 v, electrolytic	45B124

Television Changes

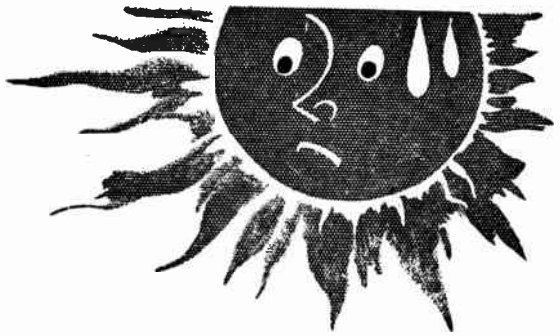
Reference Numbers Rider's	Hallicrafters'	Description	Hallicrafters' Part Number
C-14,15	C-61,62	0.005 μf, 200 v, tubular	46AU502J
C-17,19, 23,30,31	C-63,65, 67,76,77	0.25 μf, 600 v, tubular	46AX254J
C-18, 82,46	C-64, 75,85	0.01 μf, 600 v, tubular	46AY104J
C-26	C-70	680 μμf, 500 v, mica	CM20A681M
C-29,28	C-71,72	0.005 μf, 6,000 v, tubular	46A145
C-20,21	C-73,74	0.05 μf, 6,000 v, tubular	46B144
C-32	C-80	Trimmer, adjustable, hv osc.	44A359
C-34,35	C-81,82	0.001 μf, 6,000 v, tubular	46A146
C-16	C-95	0.01 μf, 600 v, tubular	46AZ103J
C77,3	Omit		
	C-18,28, 29,43,94	1,000 μμf, 150 v, ceramic	47B20A102N1
	C-96,97	3.3 μμf, 500 v, bakelite	47A160-5

Hallicrafters number C-18 has been inserted from the junction of Rider's numbers R8 and R9 to L29 and ground. C28 has been inserted between the antenna and the junction of Rider's numbers C1 and L32. C29 has been inserted between the antenna and the junction of Rider's numbers L32 and C2. Rider's number C73 has been changed to Hallicrafter's numbering, C43, and the value has been changed to 1,000 μμf. The location of the 7JP4, V13, has been changed to the junction of Rider's number C40 and the 6SH7-5 (audio) and the 6X5 (rect.) C94 has been inserted between the junction of the new location of the 7JP4 and the 6X5 and ground. The value of Hallicrafters' C96 (Rider's C27) has been changed to 3.3 μμf. C97 has been inserted in parallel with C96.

Reference Numbers Rider's	Hallicrafters'	Description	Hallicrafters' Part Number
R-110	R-1	1,000 ohms, 1 w, carbon, part of L-12	
R-11	R-2	2,200 ohms, 1 w, carbon, part of L-11	
R-112	R-3	3,300 ohms, 1 w, carbon, part of L-10	
R-49	R-4	3,300 ohms, 1 w, carbon, part of L-8	
	R-5	2,200 ohms, 1 w, carbon, part of L-7	
	R-6	3,300 ohms, 1 w, carbon, part of L-6	
R-46	R-7	1 megohm, 1 w, carbon, part of L-4	
R-47	R-8	1 megohm, 1 w, carbon, part of L-3	
R-48	R-9	1 megohm, 1 w, carbon, part of L-2	
R-108	R-10	1 megohm, 1 w, carbon, part of L-9	
R-109	R-11	1 megohm, 1 w, carbon, part of L-5	
R-114	R-12	1 megohm, 1 w, carbon, part of L-1	
R-94, 69,27	R-13, 55,91	150,000 ohms, ½ w, carbon	RC20AE154M
R-96,99, 102,66, 38,17	R-14,18, 21,52, 62,76	33,000 ohms, ½ w, carbon	RC20AE333M
R-95	R-15	12,000 ohms, ½ w, carbon	RC20AE123K
R-97,98	R-16,17	10,000 ohms, ½ w, carbon	RC20AE103J
R-100	R-19	1 megohm, volume control	25B721
R-101, 1,3	R-20, 26,27	150 ohms, ½ w, carbon	RC20AE151M
R-103, 22	R-22, 83	680,000 ohms, ½ w, carbon	RC20AE684M
R-104	R-23	100,000 ohms, ½ w, carbon	RC20AE104M
R-105	R-24	470,000 ohms, ½ w, carbon	RC20AE474M
R-106	R-25	100 ohms, 1 w, carbon	RC30AE101M
R-2, 14,28	R-28, 32,88	2.2 megohms, ½ w, carbon	RC20AE225M
R-4	R-29	10,000 ohms, ½ w, carbon	RC20AE103M
R-5, 45,44, 43,8	R-30, 36,37, 38,57	100 ohms, ½ w, carbon	RC20AE101M
R-6,58, 63,32	R-31,44, 49,66	1 megohm, ½ w, carbon	RC20AE105M
R-7, 51,52	R-33, 39,40	27,000 ohms, ½ w, carbon	RC20AE273M
R-50,53	R-34,35	120,000 ohms, ½ w, carbon	RC20AE124K
R-55	R-41	1 megohm, ½ w, carbon, part of L-19	
R-56	R-42	560,000 ohms, ½ w, carbon	RC20AE564M
R-57,88, 71,68	R-43,89, 111,113	5,600 ohms, ½ w, carbon	RC20AE562K
R-62	R-45	68,000 ohms, 1 w, carbon, part of L-20	
R-61	R-46	1 megohm, 1 w, carbon, part of L-21	
R-60	R-47	8,200 ohms, ½ w, carbon	RC20AE822M
R-59	R-48	1,000 ohms, ww, contrast control	25B739
R-64,67	R-50,54	330,000 ohms, ½ w, carbon	RC20AE334M
R-93	R-51	82,000 ohms, ½ w, carbon	RC20AE823M
R-65	R-53	6,800 ohms, ½ w, carbon	RC20AE682M
R-70	R-56	25,000 ohms, brightness control	25B722
R-9	Omit		
R-13	R-59	22,000 ohms, ½ w, carbon	RC20AE223M
R-40,18, 24,25	R-60,77, 85,86	100,000 ohms, 1 w, carbon	RC30AE104M
R-39,20	R-61,79	47,000 ohms, 1 w, carbon	RC30AE473M
R-36,21	R-63,81	680 ohms, 1 w, carbon	RC30AE681M
R-35	R-64	500,000 ohms, horizontal control	25B720
R-34	R-65	270,000 ohms, ½ w, carbon	RC20AE274M
R-41,42	R-67,68	47,000 ohms, 2 w, carbon	RC40AE473M
R-30,29	R-69,70	4.7 megohms, ½ w, carbon	RC20AE475M
R-31	R-71	220,000 ohms, ½ w, carbon	RC20AE224M
R-10	R-72	680 ohms, 2 w, carbon	RC40AE681M
R-11	R-73	18 ohms, 2 w, carbon	RC40AE180M
R-12	R-74	1,200 ohms, 1 w, carbon	RC30AE122M
R-15	R-75	470 ohms, ½ w, carbon	RC20AE471M
R-19	R-78	1.5 megohms, ½ w, carbon	RC20AE155M
R-16	R-80	4,700 ohms, ½ w, carbon	RC20AE472M
R-107	R-82	500,000 ohms, vertical control	25B720
R-23	R-84	2.5 megohms, height control	25B724
R-26	R-87	2,700 ohms, 1 w, carbon	RC30AE272M
R-87	R-90	120,000 ohms, 1 w. carbon	RC30AE124K
R-86,85	R-92,93	3.9 megohms, 1 w, carbon	RC30AE395M
R-84	R-94	5 megohms, focus control	25B723
R-83,82, 76,72	R-95,96, 100,106	4.7 megohms, 1 w, carbon	RC30AE475M
R-81,80, 78,79	R-97,98, 101,102	3.3 megohms, 1 w, carbon	RC30AE335M
R-77, 74	R-99, 104	5.6 megohms, 1 w, carbon	RC30AE565M
R-75	R-103	5 megohms, vertical position control	25B723
R-73	R-105	5 megohms, horizontal position control	25B723
R-92	R-107	18 ohms, 10 w, ww	24BG180E
R-90	R-108	68 ohms, 2 w, carbon	RC40AE680
R-91	R-109	47 ohms, 1 w, carbon	RC30AE470K
R-89	R-110	39 ohms, 1 w, carbon	RC30AE390K
R-54	R-112	33,000 ohms, 1 w, carbon, part of L-18	
R-33	R-114	2.5 megohms, width control	
R-37	R-115	470 ohms, 1 w, carbon, part of L-22	
	R-16, 58	6,800 ohms, 2 w, carbon	RC40AE682M

R58 is located where R9 ((Rider's number) was located. Resistor R116 has been added in parallel with R58 (Hallicrafters' number). C16 and R15 (Hallicrafters' numbers) have been relocated in parallel from the cathode lead of the 6SH7-4, audio i-f stage, to the G2 lead.

Reference Numbers Rider's	Hallicrafters'	Description	Hallicrafters' Part Number
	T-1	Transformer, f-m sound detector	50B406
	T-2	Transformer, audio output	55B080-3
	T-3	Transformer, hv osc.	51B1038
L-1	L-1	Coil, osc. stage	51A1041
L-2	L-2	Coil, osc. stage	51A1042
L-3	L-3	Coil, osc. stage	51A1043
L-4	L-4	Coil, osc. stage	51A1044
L-5	L-5	Coil, mixer stage	51A1045
L-6	L-6	Coil, mixer stage	51A1046
L-7	L-7	Coil, mixer stage	51A1047
L-8	L-8	Coil, mixer stage	51A1048
L-9	L-9	Coil, r-f amp. stage	51A1049
L-10	L-10	Coil, r-f amp. stage	51A1050
L-11	L-11	Coil, r-f amp. stage	51A1051
L-12	L-12	Coil, r-f amp. stage	51A1052
L-31, 27,30	L-13, 24,29	Choke, r-f (red color code)	53B008
L-14, 15,16, 17	L-14, 15,16, 17	Coil, i-f amplifier	50A372
L-18	L-18	Coil, video peaking, video detector	51A1053
L-19	L-19	Coil, video peaking, video detector	51A1054
L-20	L-20	Coil, video peaking, video amp.	51A1055
L-21	L-21	Coil, video peaking, video amp.	51A1057
L-22	L-22	Coil, sync, shaping	51B1040
L-29	L-23	Coil, 45 Mc, sound trap	51B1037
	L-25	Choke filter	56C093
L-26,25	L-26A,B	Choke, dual winding, hv oscillator	53A134
L-23,24	L-27A,B	Choke, dual winding, 6C4 oscillator fil.	53A133
L-32	L-28	Antenna coil	51A1039
	V-1,3,7, 8,9,11	Type 6SH7, audio i-f; audio amp.; 1st, 2nd and 3rd i-f amp.; video amp.	
	V-2	Type 6AL5, f-m detector	
	V-4	Type 25L6GT audio output	
	V-5,6	Type 6H6, mixer, r-f amp.	
	V-10	Type 6H6, video detector	
	V-12,17, 18,19,20	Type 12SN7GT, video output; horizontal osc.; vertical osc.; horizontal amp.; vertical amp.	
	V-13	Type 7JP4, kinescope	
	V-14,21	Type 6C4, r-f oscillator, hv osc.	
	V-15	Type 25Z6GT, rectifier	
	V-16	Type 6X5GT, rectifier	
	V-22	Type 1B3GT, hv rectifier	
	CR-1	Rectifier, silenium	27B147



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CURTAIN TIME

Report To The Servicing Industry

It is all well and good to read prognostications, but it is perhaps better to formulate your own ideas from the summaries of statistical reports. They definitely reflect trends and should orient thinking about matters relating to the activities of the radio servicing industry. That which happens in the radio manufacturing industry mean much to the servicing industry. It forecasts the future.

At this time about 90 TV stations are on the air. About 22 more stations are under construction. What happens after that due to the freeze is yet to be seen. The most popular TV receivers in terms of sales are those with screens of around 12 inches in diameter, although the 10-inch job is not yet dead. They rank high in production and sales, as do the receivers with screens larger than 12 inches.

Here and there one hears stories about picture tube replacement. When looked into, it is found that more coloring than flavor exists in the stories. You would be surprised to know how insignificant picture tube failures are in comparison to the number of TV receivers which are sold. Naturally, the service outfit handling comparatively few TV receivers will experience a much higher percentage of tube failures than the outfit handling many receivers. This just happens to be the rule in sampling; an *appreciable volume* always must be sampled in order to arrive at a reasonably correct average. By and large, TV picture tubes have stood up very well all over the nation.

More than 15 individual cities in the U.S. have more than 30,000 TV receivers. Six cities have more than 100,000 receivers and N.Y.C. leads the nation with more than 600,000 units in use. As to large centers where TV receivers have been sold, they exceed 50 in number. Although there are many cities in the U.S. this number of large cities embraces virtually most of the industrialized areas of the nation, where the greatest population is to be found.

Relative to other kinds of receivers, AM and FM, the industry is still doing a job. It is not turning out as many units as during the years of 1946 and 1947, but October showed a substantial increase over the previous months. Somewhere around 650,000 units were produced. Conventional AM-FM receiver servicing is still a significant part of the service shop activity. *Don't Sell It Short!!*

Morals and Manners

The entertainment world recently lost one of its leading figures, Bill "Bojangles" Robinson. While he will be remembered for having added a word "copasetic" to the American language, he will be better remembered for some advice he once gave. "Morals and manners," he said, "will open the doors where money will not." We knew Bill, and we know that he meant just what he said, but above all, we will always remember him for his willingness to unstintingly contribute his wonderful talent to every charitable activity regardless of how frequently they occurred. Rest In Peace, Bill.

Please Finish The Job

This is addressed to the men who have been working on our TV receiver. Why not finish the job completely? We know that you did your best in making certain additions to the receiver and it was to our best interest. But, for heaven's sake — don't leave the insulation clippings and the strands of wire on the floor in back of the receiver. It was really a pile of stuff and while we understand what happened — some other customers may not be so agreeable. Also please try each soldered connection after you make it. We were happy with the results until the picture went bad and we traced it to a cold soldered joint which you had made the day before.

After being married to me for 21 years, my wife has some appreciation of the problems of the radio servicing industry, but even she can't understand the sudden development of triple images. So, be a good guy the next time — won't you? — Please finish the job. Then I'll have some peace in the family. Thanks.

TV-3

Well, our TV Manual Volume 3 is off the presses and being shipped. By the time this column sees daylight your jobber will have his copies. To say the least we are proud of it — in fact we're proud of the comments it elicited. We say with pardonable pride that it is the best thing we have ever done in manuals. Now that it's out, we're heading for TV-4, which will be ready around March or April 1950.

21 and Not 2

Due to a printer's error one of the mail order house catalogs listing the Antenna book by Arnold B. Bailey, soon to be published by us, stated that his background is 2 years. *What an error!* The man has 21 — we repeat, 21 years of experience in the design and installation of VHF and UHF antennas. We must confess that it did interfere with our sleep the first time we saw that mistake.

JOHN F. RIDER

Rider receives Educational Pioneering Award

John F. Rider, president of the publishing company bearing his name, was the recipient of an award presented by the Empire State Federation of Electronic Technicians Associations.

Samuel L. Marshall, education director, made the presentation on November 12, 1949, at the banquet held at Locust Lawn,

Ionia, New York by the Radio Technicians' Guild of Rochester, N. Y.

Mr. Rider received the award for his unceasing efforts on behalf of the radio-television servicemen of the country. He was instrumental in inaugurating the current ESFETA TV lecture series, having delivered the opening talk of the series. In addition, during the past year he has traveled extensively for ESFETA, lecturing at servicemen's meetings.

The author of a score of textbooks now being used by radio servicemen and technical educational institutes, Mr. Rider has actively participated in the educational development of the radio serviceman since 1921.

Television Changes

Sears 110.499 Series

This series appears on *pages 3-1 through 3-11 of Rider's TV Manual Volume 3*. The following production changes have been made:

Capacitor C45, 4,700 $\mu\mu$f, has been changed from its position in series with the vertical oscillator transformer, T4, pin number one of the vertical oscillator tube, to a position in the low side of the vertical oscillator transformer in series with R53, the 8,200-ohm integrating resistor. This change was made to improve the interlace characteristics of the receiver and, therefore, improve the apparent focus.

To widen the range of the vertical hold control, a 1.2-megohm resistor has been placed across the control from the top center to the grid side. In addition to this, a 1.2-megohm resistor has been placed in series with the vertical hold control to center the control area in the mid-portion of the potentiometer range.

To eliminate slight vertical unsteadiness or jitters, which was present in a few receivers, the 0.005-μf capacitor in the integrating circuit of the vertical oscillator has been changed to 0.01 μf.

To further improve the horizontal stability and eliminate all trace of jitters, a 1.3-ohm resistor has been placed in series with the filament of the 6AL5 horizontal phase detector to lower the filament voltage and eliminate the effect of variance in tubes.

General Electric 805, 806, 807, 809

These models appear on *pages 3-1 through 3-15 of Rider's TV Manual Volume 3*. Under 9. B+ Power Supplies, the 6th paragraph should read "B371 is a thermal cutout to protect the receiver in cases of excessive current drain from the power line or from excessive heat within the chassis. After this cutout has opened the power line circuit, a five-minute period should elapse before it is reset".

Under Video I-F Alignment, note 3, K27 should read 27,000-ohm resistor.

Under R-F Alignment, note 1, delete "through a capacitor". The finish of this sentence should read "and coupled to the antenna terminals at the head-end unit, Figure 18".

Under R-F Alignment, the following should be added to paragraph 2 "On U and W version receivers, add a bias battery across C385 and adjust control to give -4 volts bias on V2".

Under step 11 of R-F Alignment Chart, the signal generator frequency of 203.25 Mc should read 203.75 Mc.

On the schematic diagram, Figure 28, at clipper-grid-circuit tube V11B, change C314 to 5,000 $\mu\mu$f value and R311 to 2.2 megohms. Reconnect R311 so that it is between pin 1 of V11B and the junction of R314 and R312. When these changes are made, this clipper-grid circuit will be the same as the circuit in Figure 27.

On the schematic diagram, Figure 30, the 1-μf capacitor C345, at the sound discriminator, should be relabeled C346.

V13, pin 3, of Figure 32 should be changed to read 0 volts and 0 resistance for "T" version receivers.

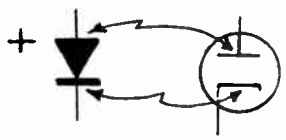
Under Replacement Parts List change Stock No. RCN-024 to read RCU-289, C332, capacitor—82 $\mu\mu$f, ceramic, 1,500 volts.

On Waveshape Diagram, Figure 27, note diagram corrections as follows: (1) Test scope for steps 9-32 should connect to B- of head-end unit not to B1-, (2) Test scope for steps 1-4 should connect to B2- or B3-, not to B1-, (3) VTVM shown at sound i-f discriminator should be shown connected to B2-, not to B1-.

General Electric Service Notes

When it is necessary to perform alignment, measure socket voltages, or trouble shoot a TV receiver, it is desirable to remove the picture tube for convenience as well as a personal safety precaution. In receivers with series lighting of the filaments, the removal of the picture tube breaks the continuity of the heater circuit for all tubes and a substitute resistor or suitable filament element must be used to restore continuity. A defective 6SN7GT tube with a good heater may be used for this purpose. To prepare the 6SN7GT tube, saw or clip off all base pins except 7 and 8. These are the filament pins and it will be found that they will insert readily into the crt socket pin openings 1 and 12. This will re-establish the continuity and provide proper voltage division on the filament strings. The keyway on the altered 6SN7GT will not line up with the keyway slot in the crt socket; however, it will not interfere with the insertion of the tube into the socket.

The germanium crystal diode is used in many of the current TV receivers for two different circuit applications: (1) video detection and (2) d-c restoration at the picture tube grid. This diode is symbolized as shown with the corresponding tube equivalent symbol. The polarity marking on the case of the diode will be designated by a plus (+) mark, which corresponds in function to the plate of the rectifier tube.



Germanium Diode Symbol and Marking.

●

Radio & Television

Page 3-1 of Rider's TV Manual Volume 3, the bottom left-hand corner reads "See Model L-14, TV2 page 2-1 through 2-13,14." This should read "See Model L-14, TV2 pages 2-15, through 2-21".

TV Signal Strength Versus Antenna Height

(Continued from page 1)

note that the maximum on one band is not necessarily the maximum for another band. We can interpret this again as signifying that the maximum of one channel in any one band is not the same as for another channel in the same band. The primary value of the graph from the practical viewpoint is to indicate that a good starting point relative to elevation of the antenna is as low as possible, consistent with the location, rather than the usual procedure of immediately raising a TV antenna to the maximum practicable height. Time and again, it has been found that the high antenna is inferior to the low antenna, in this case "high" and "low" signifying elevation.

The matter of cancellation or augmentation of signals is a function of the angle of arrival of signals at the point of earth's reflection, for this determines the phase relationship between this signal and the direct-wave signal at the receiving antenna. In turn, the angle of arrival of signals at the point of earth's reflection is determined by the geometry of the radio path. As the angle increases, the electrical chararter of the earth at each particular operating frequency must be taken into account because of its effects on the final signal which operates the receiver.

(Editor's Note: Details pertaining to the electrical character of the earth are discussed in the text.)

Both the efficiency of the reflection and this angular phase change at reflection are effected by the character of the earth.

Two effects may be noted with an increase in height of the receiving antenna above ground. The first is, that as the receiving antenna is raised, the signal which strikes it is one which has a higher angle at the point of reflection than the signal which strikes the receiving antenna at a lower elevation. This makes the reflection less perfect, and increases the path length of the reflected signal without substantially changing the length of the direct path. These conditions change the time of arrival of the reflected signal in relation to that of the direct signal, and consequently, not only prevent perfect cancellation, but also may, if the receiving antenna is raised high enough, actually assist the direct signal, thus producing a stronger resultant signal at the receiver.

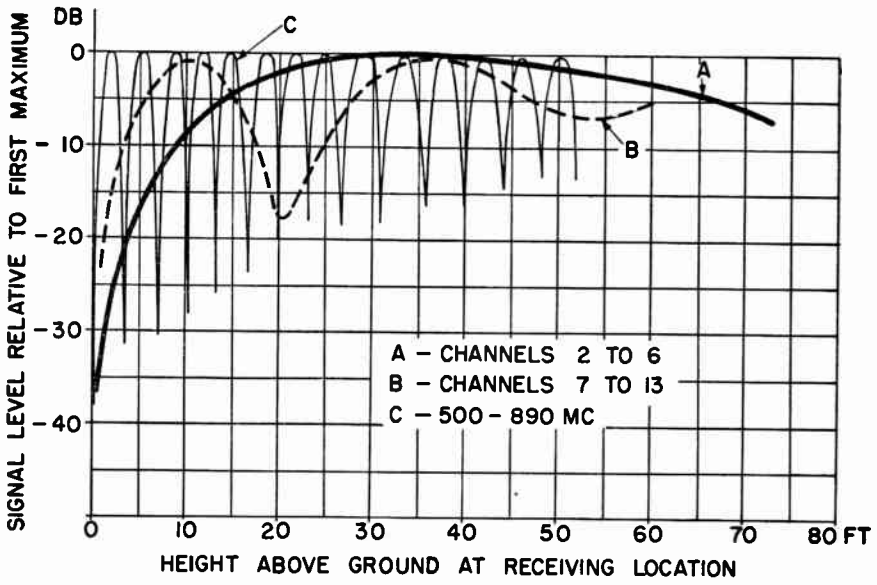


Fig. 1. A typical case showing how the signal strength varies with height at the receiving location.

This point above earth is called the "first maximum". Further increases in height will change the receiving conditions because they involve a different angle of reflection. The effect is usually less distinct at very great heights, since the reflected signal will become weaker, and hence less able to cancel out the direct signal.

Just how high these maxima and minima are located is not always easy to predict, but it is important, nevertheless, to appreciate their existence, because they can have a beneficial effect upon the problem of installation.

Many factors contribute to the aforementioned conditions, such as the frequency, distance from the transmitter, whether the location is high or low compared to the height of the surrounding terrain, where the reflection occurs, and the transmitting antenna height. It is, therefore, important not to consider the one case in the figure as being universally applicable to every case.

(Editor's Note. Methods for estimating optimum heights are given in the book.) It is interesting to note that you can be situated *too high* as well as *too low*, and experience based on actual tests is the best way to find the exact location of the extreme points.

The maxima and minima occur closer to the ground on Channel 13 than they do on Channel 2 (Fig. 1). In fact, they are not as clearly defined on the higher channels, because not only do reflections occur at a point on the earth between transmitter and receiver, but also reflections occur locally at these higher frequencies at points almost *directly below* the receiving antenna, and the transmitting antenna, if the ground slopes away from either antenna location. The net effect of additional local reflections is to "mask" the normal maxima and minima, and produce secondary effects. This is particularly noticeable at 500-Mc. and above, where the maxima and minima will occur very close together in terms of height, but is also predominant at Channels 7 to 13.

Thus we see that, at television frequencies, each receiving location is experiencing an intricate and complex radio field pattern. Furthermore, over the wide range of television channel frequencies substantial changes in this pattern may occur. Appreciation of this effect may allow us to seek out preferred antenna positions and these may not always be at extreme heights above ground.

Rider Diagram Service

Are you taking full advantage of the Rider Diagram Service?

If you are interested in diagrams which we have not yet published we have a diagram service to meet your needs. Naturally, a time lag exists between the publication of the volumes of Rider Manuals and it is to fill this gap that we have this service, so that you may have whatever you need in the way of service data as yet unpublished. The charges for this service are as follows:

1. 35 cents is the charge for all the available data on any radio receiver model up to and including six pages. Each page thereafter will cost 10 cents.
2. If additional money is required to cover the data requested, you will be notified. We cannot forward data without receiving your remittance.
3. Service data on television receivers may be obtained at costs varying from 35 cents to $1.50. It is suggested that you inquire the cost before sending us a remittance for television data.
4. Be sure to enclose a self-addressed envelope bearing a 3-cent stamp.

If you will follow these rules, it will simplify matters for both of us and you will receive the data you need with a minimum of delay.

~ 1950 ~

A Report to the Industry

We Have Kept Our Promise . . .

We have stated, consistently, that the service shop owner who places his faith in Rider Manuals will find that faith justified — will find that he can depend upon the Rider Organization to furnish him with the servicing information that he needs year after year, day in and day out.

The entire Rider Organization is dedicated, in its Manuals, to serve the servicing industry . . . to place in its hands, regularly, those data which the equipment manufacturer has declared to be his official and authentic information. For more than 20 years Rider Manuals have been geared to the needs and interests of the radio servicing industry.

The 19 volumes published to date comprise a complete, chronological history of factory-authorized American circuits and data on radio receiver design and operation. These volumes contain 27,958 fact-filled pages on 27,112 models, 14,176 chassis.

And the Rider Public Address Manual, one complete volume of 2,024 pages, contains all of the required data for 1,285 models, 1,106 chassis, covering the years from 1938 to 1948.

Then along came Television. And the radio servicing industry, taking on the job of television servicing, required the more highly complex data for television receivers. The close co-operation which has existed between receiver manufacturers and the Rider Organization for more than 20 years continued without interruption. Rider TV Manuals soon appeared.

Rider TV Manuals are now in three volumes and cover the products of 116 manufacturers. In the equivalent of 6,332 pages, they incorporate the factory-authorized servicing data for more than 741 different models of TV receivers.

Of course, we take pride in being able to say, without any fear of contradiction, that nowhere else can you find as much TV servicing data . . . such *complete* data, such *complete* coverage . . . as in Rider's TV Manuals.

But most important of all is the fact that the concerns who believed in Rider Manuals—who continued to build their Rider Manual library through these many years—have found that their faith was not misplaced . . . that when the radio manufacturing industry took on this new outlook, the Rider Organization was there—continuing to serve the servicing industry.

While we have not published many book titles, each has been well received, several selling up to 200,000 copies. Each selection has reflected a most sincere effort on the part of both author and publisher to print such texts as were specifically needed to clarify some of the more complicated phases of servicing problems. We published those books which we were convinced would prove most useful, year after year, to the purchaser. The textbooks scheduled to appear during the first three months of this new year will be vivid testimony of this philosophy in book publishing.

We promised that we would "be thar fustest with the mostest"—and we have kept that promise.

We Pledge . . .

That we shall continue to recognize our obligations to the servicing industry, and to the receiver manufacturers who build the products which are the daily bread for the serviceman . . .

That Rider Manuals shall continue to serve these two groups, and these only . . .

That your faith in Rider Manuals, which has been time-tested and proven, will be merited . . .

That you will always have the best . . .

That we are here to serve you . . . as we have for more than 20 years.

John F. Rider

JOHN F. RIDER PUBLISHER, INC.

RMA RADIO MANUFACTURERS ASSOCIATION MEMBER

Actual-Size Page Reproductions from "RADIO OPERATOR'

EXPLANATORY DIAGRAM
typical of the 193 diagrams appearing throughout the book

QUESTION
in bold-face type consecutively numbered, duplicating the Government Study Guide

ANSWER
presented in a clear, concise manner

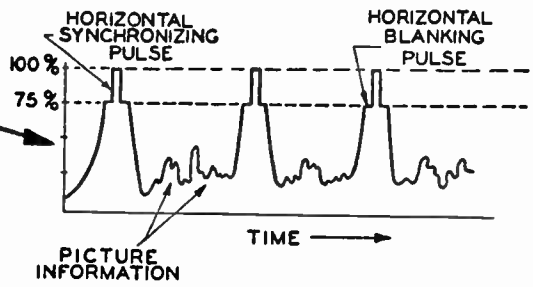


Fig. 4.260. The video signal, including the synchronizing pulses.

D. There are two types of synchronizing pulses, the amplitude of each type being confined to the region between 75% and 100% modulation. The upper tip of the synchronizing pulses is at an amplitude corresponding to 100% modulation and the base of the pulses at an amplitude corresponding to 75% modulation. The horizontal pulses are rectangular in shape and extend above the top of the horizontal blanking pulses (see the figure). They have a width equal to about 5.08 microseconds. There is one horizontal synchronizing pulse for each horizontal line, or 525 per frame and 15,750 per second. The horizontal synchronizing pulse normally occurs at the time when the electron beam has progressed to the extreme right hand edge of the picture. The pulse acts upon a horizontal multivibrator or blocking oscillator type of sweep generator in such a way as to initiate the start of the horizontal retrace.

The vertical sychronizing pulse is somewhat more complicated being formed from 6 vertical serrated pulses which are electronically added in an integrating circuit to form a single pulse. There is one complete vertical synchronizing pulse for every field or 2 per frame and 60 per second. The vertical pulse acts upon a vertical multivibrator or blocking oscillator type of sweep generator in such a way as to initiate the starting of the electron beam to return to the top of the picture from the extreme lower part. (See also Question 4.258.)

Q. 4.261. What is the effective radiated power of a television broadcast station if the output of the transmitter is 1000 watts, antenna transmission line loss is 50 watts and the antenna power gain is 3?

A. The effective radiated power is 2850 watts.

D. Since the transmitter output is 1000 watts and the line loss is 50 watts, the power delivered to the antenna is $1000 - 50 = 950$ watts. The antenna power gain is 3 so the effective radiated power $= 950 \times 3 = 2850$ *watts.*

Q. 4.262. Besides the camera signal, what other signals and pulses are included in a complete television broadcast signal?

A. The following signals and pulses are included:

1. Horizontal synchronizing pulses, (525 per frame, 15,750 per second).

For a quick review of the essential theory, as well as a refresher for advancement in the field, student and operator will find this the most complete, comprehensive treatment of the subject. Instructors will discover enough material here to develop an entire course. The six elements of the FCC examination are completely covered by thorough discussions of the answers. Appendices on Small Vessel Direction Finders and Automatic Alarm provide an extra expansion of the subjects not ordinarily included in a volume of this type.

The author, Milton Kaufman, is an instructor in the Department of Radio Operating at RCA Institutes. This background enables him to write with complete assurance and knowledge of the subject.

2. Horizontal blanking pulses, (525 per frame, 15,750 per second).
3. Vertical synchronizing pulses, (1 per field).
4. Equalizing pulses, (12 per field, 6 on either side of each vertical synchronizing pulse).
5. F-m sound carrier frequency and sidebands.
6. Video carrier frequency.

D. See Questions 4.260, 4.263, and 4.264.

Q. 4.263. What are synchronizing pulses in a television broadcasting and receiving system?

A. These are short duration rectangular pulses which are used to control the synchronism of both the transmitting and receiving scanning generators.

D. See Question 4.260.

Q. 4.264. What are blanking pulses in a television broadcasting and receiving system?

A. Blanking pulses are rectangular pulses of short duration used to extinguish the electron beam during the retrace periods.

D. See the figure for Question 4.260. Blanking pulses are of negative polarity when applied to the intensity grid of the electron gun at both the transmitting and receiving cathode ray equipment. At the end of each horizontal line just before the retrace is initiated, the horizontal blanking pulse extinguishes the electron beam so that it returns to the left side of the picture unnoticed. The horizontal blanking pulse width is 10.16 microseconds, and there are 525 per frame or one for each horizontal synchronizing pulse. When the scanning beam reaches the extreme bottom of the picture and just prior to the vertical retracing, the vertical blanking interval pulse causes the electron beam to be extinguished so that the lines moving upward will not be seen. The duration of the vertical blanking interval pulse is about 1250 microseconds and there are 60 per second.

Q. 4.265. For what purpose is a voltage of sawtooth wave form used in a television broadcast receiver?

A. To produce the desired scanning pattern on the Kinescope screen.

D. A voltage (or current) of sawtooth wave form is provided by the horizontal and vertical sawtooth generators in the receiver and synchronized by the incoming horizontal and vertical synchronizing pulses. These sawtooth waveforms are applied to the horizontal and vertical deflection plates (or coils) for the purpose of producing a linear scanning pattern upon the Kinescope screen. (See also Questions 4.258 and 4.260.)

Q. 4.266. In television broadcasting, what is the meaning of the term "aspect ratio"?

TABLE OF CONTENTS

Radio Changes

Farnsworth P73

This model appears on *pages RCD. CH. 18-1 through 18-9 of Rider's Manual Volume XVIII.* The following part should be added to the parts list:

71245 Removal needle only, osmium tipped (P73).

•

Automatic A.T.T.P.

The alignment and battery information that appears on *page 17-8 of Rider's Manual Volume XVII* under the heading of Models 660, 662, 666, Series C is labeled incorrectly. This page should be labeled Model A.T.T.P. The schematic for Model A.T.T.P. appears on *page 16-1 of Rider's Manual Volume XVI.*

•

Westinghouse H-161, H-168, H-168A, H-168B

These models appear on *pages 18-6 through 19-32 of Rider's Manual Volume XVIII.* In production of some chassis, V-5596 "HI-KAP" capacitors are substituted for the following capacitors:

V-5040-15 (C7, C8, C9, C61, C62)
V-5040-11 (C19, C20, C63).

Templetone G418, G4108

Model G418 appears on *page 17-1 of Rider's Manual Volume XVII.* The value of resistor R5 has been changed to 10 megohms. Model G4108 is the same as G418.

•

RCA 9W101, 9W103, Ch. RC-618B

These models appear on *pages 19-36 through 19-44 of Rider's Manual Volume XIX.* In some chassis i-f transformers stamped 970435-2 have been used as a substitute for 2nd i-f transformers stamped 970435-5.

The 455-kc windings of 970435-2 transformers use resonating capacitors of 235 $\mu\mu$f each; the d-c resistance of each winding is 8.2 ohms. The transformer indicated in the schematic diagram is stamped 970435-5.

The addition to parts list is as follows:

74579 Bumper, rubber bumper (black) for front panel of record changer drawer, walnut or mahogany instruments, Models 9W101 and 9W103 (2 required)

74580 Bumper, rubber bumper (white) for front panel of record changer drawer, blonde or limed-oak instruments, Models 9W101 and 9W103 (2 required).

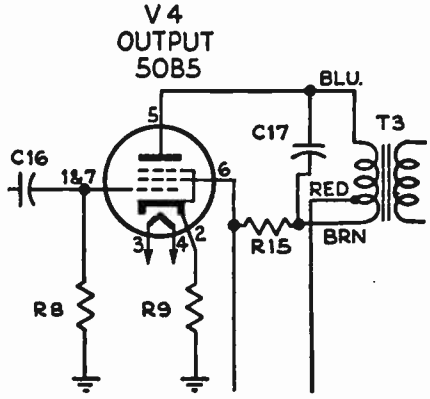
RCA 8X541, Ch. RC-1065F, 8X542, 8X547, Ch. RC-1065H

These instruments are similar to Models 8X541, 8X542, 8X547 which appear on *pages 18-45 through 18-46 of Rider's Manual Volume XVIII,* except that an RCA 50B5 tube is used in the output stage. The tuning capacitor and oscillator coil used are those described for the second production of the above models.

Chassis RC-1065 is used in Models 8X541, 8X544, and 8X545. Chassis RC-1065A in used in Models 8X542, 8X546, and 8X547. Chassis RC-1065B is used in Models 8X541, 8X544, 8X545 2nd production. Chassis RC-1065C is used in Models 8X542, 8X546, 8X547 2nd production.

The addition to parts list and the output tube circuit appear below:

74822 Socket—tube socket, miniature, for 50B5 tube.



Output tube circuit for RCA chassis RC-1065F and RC-1065H.

•

United Motors 7258155

This model appears on *pages 19-76 through 19-80 of Rider's Manual Volume XIX.* The following changes have been made in the parts list after serial 5596000:

Illus. No.	*Production Part No.*	*Service Part No.*	*Description*
6	1219508	1219508	1st i-f assy. (miniature)
7	1219509	1219509	2nd i-f assy. (miniature)
26	7240724	M908	Electrolytic
26A			20 μf, 25 v
26B			20 μf, 400 v
26C			20 μf, 400 v

•

United Motors 984249

Model 984249, Pontiac, appears on *pages 19-65 through 19-70 of Rider's Manual Volume XIX.* The 330-ohm, ½-watt, i-f cathode resistor, No. 54, has been replaced by a 390-ohm, ½-watt resistor on the late production sets. It has been found that the tendency to motor boat is caused by a 6SK7 tube with a much higher than average contact potential. A slightly higher bias on the i-f tube corrects this tendency, and the slightly higher value of cathode resistor accomplishes this.

Westinghouse H-203, H-212

These models appear on *pages 19-29 through 19-32 of Rider's Manual Volume XIX.* The volume control is tapped at 50,000 ohms from ground rather than 450,000 ohms as shown on the schematic diagram.

In later production, a 33-ohm, ¼-watt resistor (RC10AE330K) was inserted in the lead from pin 7 of the 6BE6 oscillator-converter tube. The purpose of this resistor is to suppress parasitic oscillations that may develop when certain 6BE6 tubes are used.

In early sets, R35 in the cathode circuit of the 12AT7 FM r-f amplifier and mixer tube served as a form around which was wound the reactor, L21. For convenience in later production, the resistor was deleted from the circuit and the reactor was wound on other material. The part number, V-4886-10, shown in the parts list for this item applies to the later version which does not include the resistor, and R35 should be disregarded.

On some chassis, V-5596 "HI-KAP" capacitors are substituted for V-5040-13, C36 and C37, capacitors. These capacitors were substituted for convenience in production, and the operation of the receiver is not affected by the substitution.

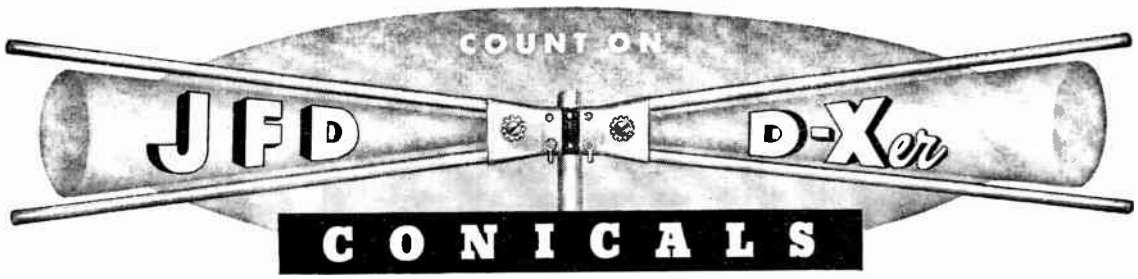
Sears 101.211-4

This model appears in the *Record Changer Section of Rider's Manual Volume XIX on pages RCD. CH. 19-1 through 19-14.* Chassis 101.211-4 is basically the same as the 101.211-1; however, the 101.211-4 incorporates a revised spindle assembly, turntable and hinge body assembly. The change in parts list is as follows:

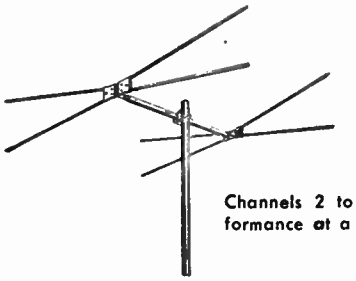
Location Number	*Part Number*	*Description*
5	R57943	Turntable assembly
12	R49953	Hinge pin
14	R57945	Hinge body assembly
15	R57710	Adjusting screw
20	R65101	Cartridge-syntronic pickup (grounded)
21	R66691	Arm-pickup (less cartridge)
68	R62360	Motor assembly, 110-volt, 50-cycle (Alliance)
70	R57902	Spindle assembly
70	R57934	Spindle shaft and base assembly
71	R57940	Record pusher
73	R57903	Pusher spring
76	R57051	Turntable bearing
81	R57768	Spring-pusher shaft
105	R49958	Spring-counterbalance

Location number 83 through 88 and number 103 have been deleted.

The 456.211-5 Record Changer is basically the same as the 101.211-1, except that the 456.211-5 incorporates a bottom pan assembly, R66692, and a revised spindle assembly, turntable and hinge body assembly. The syntronic pickup arm and grounded syntronic cartridge replace the old style plastic arm.



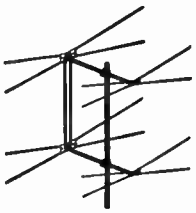
JFD Conicals. *Superior* Conicals. *More* powerful Conicals. *More* economical Conicals . . . to fill any and *all* of your TV antenna requirements. The *largest* and most *complete* line in the whole, wide world. *You'll do better with JFD . . . better* in sales, *better* in customer satisfaction, *better* in profit! Here are some of the more popular models:



TA160 "D-Xer"

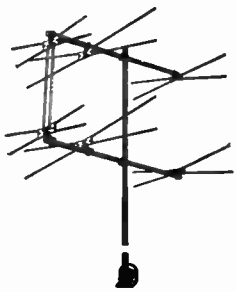
ALL BAND CONICAL

Channels 2 to 13 and FM. Outstanding performance at a price that's right. Less Mast, LIST **$13.95**



TA 161 "Double D-Xer" STACKED ALL-BAND CONICAL. Exceptionally high DB gain on all channels. ¼ wavelength stacked....Less Mast, LIST **$29.25**

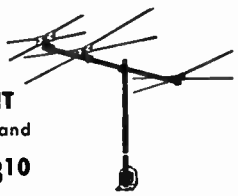
TA 162 Same as TA 161 but ½ wavelength stacked....Less Mast, LIST **$30.90**



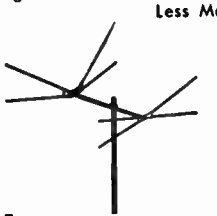
TA 167 "Inline D-Xer" DOUBLE STRAIGHT LINE CONICAL

Channels 2 to 13 and FM. Provides ultra-sharp directivity and ultra-high gain. Ideal for remote areas. ¼ wavelength stacked. .....Less Mast, LIST **$56.70**

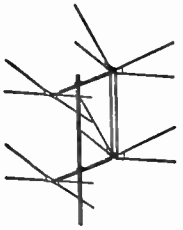
TA 168 Same as TA 167 but ½ wavelength stacked..Less Mast, LIST **$58.20**



TA 166 "Inline D-Xer" STRAIGHT LINE CONICAL. Sharper directivity and extra gain on all channels. Less Mast, LIST **$28.10**



C 360 "COMMANDAIR" ALL-BAND CONICAL. As simple to assemble as opening an umbrella....Less Mast, LIST **$9.95**



C 361 Same as C 360 but ¼ wavelength stacked for greater gain in low signal areas.....Less Mast, LIST ONLY **$20.95**

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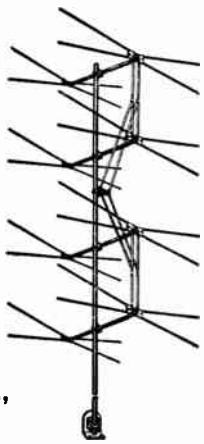

TA164 "Super D-Xer"

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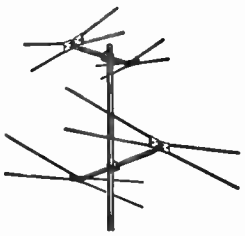
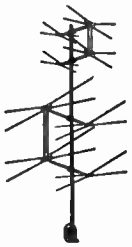
Delivers unsurpassed DB gain for pulling in weak signals from long distances. .....Less Mast, LIST **$61.80**

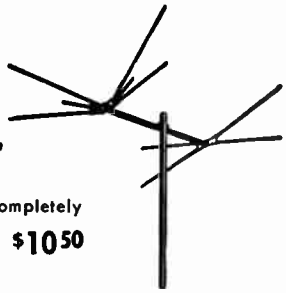
TA 165 "Single D-Xer" CONICAL WITHOUT REFLECTORS. For areas where high and low band transmitters lie in approximately the same direction....LIST **$11.50**



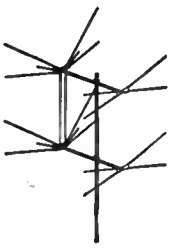
TA 169 Duo-Orienting HI-LO ALL-BAND CONICAL. Ideal where upper and lower band transmitters tune in different directions. .....Less Mast, LIST **$23.45**



TA 170 Same as TA 169 but ¼ wavelength stacked for extra gain in weak signal areas. .....Less Mast, LIST **$49.40**



C 370 "COMMANDAIR" ALL-BAND CONICAL with High Frequency Element. Completely pre-assembled. Installs in an instant! .....Less Mast, LIST ONLY **$10.50**



C 371 Same as C 370 but ¼ wavelength stacked for long-distance reception. Less Mast, LIST ONLY **$22.10**

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Radio Changes

Noblitt-Sparks Models 358T, 359T

Arvin Models 358T and 359T have the same chassis assembly as Models 152T and 153T which appear on *pages 18-1 through 18-3 of Rider's Manual Volume XVIII*. The only difference in these models is the color of the cabinet, rear cover, and knobs. The parts that differ from those listed in the 152T-153T parts list are as follows:

AA22993-1	Cabinet, sandal wood, for Model 358T
AA22993-2	Cabinet, willow green, for Model 359T
AC21696-3	Cabinet rear cover assy., willow green, for Model 358T
AC2169-4	Cabinet rear cover assy., willow green, for Model 359T
AC20501-3	Knob, gold for Model 358T and Model 359T.

United Motors R-705

This model appears on *pages 17-1 through 17-6 of Rider's Manual Volume XVII*. This receiver may be installed in the 1949 Chevrolet by using speaker and control mounting parts in adapter package No. 4415. Speaker installation instructions noted under "Pontiac" are used for mounting the speaker to the instrument panel.

RCA RP168 Series

The RP168 Series record changer appears on *pages RCD. CH. 19-1 through 19-8 of Rider's Manual Volume XIX*. The RP168-2 differs from the RP168-1 essentially in that it uses a capacitor-type motor. It also has a power input receptacle and audio output jack mounted on the base sub-assembly. The RP168-3 is identical to the RP168-1 except for the use of a motor which will operate satisfactorily on a 50-cycle power supply. For conversion to 50-cycle operation, a spring sleeve is added to the motor spindle shaft.

The changes in the replacement parts list for the RP168 Series are as follows:

Stock No.	*Ill. No.*	
		RP168-1
74620	1	Nose—spindle nose (late type—thick wall)
74427	46	Spring—reject lever spring (0.203" O.D. x 0.531"—13 turns) (late type, 2 required)
74426	59	Spring—trip lever spring (0.171" O.D. x 0.595"—30 turns)
74453	....	Washer—bearing washer between trip pawl (Ill. No. 37) and trip pawl lever (Ill. No. 66)
		RP168-2
74472	1	Nose—spindle nose
74445	8	Turntable—turntable and mat—less spindle nose and separator assemblies
74471	8A	Mat—turntable mat
74470	24	Wheel—idler wheel
74468	45	Base—sub-base assembly complete with all staked and riveted parts including idler lever and reject lever
74469	73	Motor—105/125 volts, 60-cycle capacitor type motor complete with connector and 5-μf capacitor
74621	....	Capacitor—motor capacitor—5μf
74473	....	Bracket-metal bracket with power input connector and audio output jack
		RP168-3
74624	73	Motor—105/125 volts, 60-cycle motor (stamped 941072-1) complete with connector and RCA 73158 spring sleeve (for 50-cycle conversion)
73158	....	Spring—spring sleeve to convert 941072-1 motor to 50-cycle operation
		RP168A-1
74209	75	Cover—mounting screw cover (threaded type) (3 required) use with 74424 screw
74581	75	Cover—mounting screw cover (plug-in type) (3 required) use with 74582 screw
74424	76	Screw—No. 8-32 x 1 ¼" special screw (with tapped hole) for mounting record changer (3 required) use with 74209 cover
74582	76	Screw—No. 8-32 x 1 ¼" special screw (non-tapped hole) for mounting record changer (3 required) use 74581 cover
74422	78	Spring—conical spring for mounting record changer—upper—L.H. side (2 required)
74423	79	Spring—conical spring for mounting record changer—bottom (3 required)
74208	80	Nut—tee nut for mounting record changer (3 required)
74184	81	Motorboard—motorboard complete with welded brackets and stud—less rest and operating parts
74421	84	Spring—conical spring for mounting record changer—upper—R.H. side (1 required)

The replacement parts listed above are for the specific models mentioned, other parts not listed are identical with those listed for RP168-1 in *Rider's Manual Volume XIX*.

RP168-2

This changer uses RP168-2 mechanism and RMP130-1 pickup and arm assembly

74467	83	Knob—reject control knob
74444	81	Motorboard—motorboard complete with welded brackets and stud—less rest and operating parts
74446	82	Rest—pickup arm rest
74474	.	Switch—ON-OFF switch.

RCA 9W101, 9W103, 9W105

These models appear on *pages 19-35 through 19-44 of Rider's Manual Volume XIX*. The original mounting screws used a cover which screwed into the top of the mounting screw. The screws now being used have a plug-in type of cover. This applies to the RCA 9Y7 also. The change in parts list is as follows:

74209 Cover—mounting screw cover (threaded type) for RP168A-1 record changer (3 required) (used with RCA 74424 screw)

74424 Screw—8-32 x 1 ¾" special screw (tapped hole) for RP168A-1 record changer (3 required) (used with RCA 74209 cover)

74581 Cover—mounting screw cover (plug-in type) for RP168A-1 record changer (3 required) (used with RCA 74582 screw)

74582 Screw—8-32 x 1 ¾" special screw (nontapped hole) for RP168A-1 record changer (3 required) (used with RCA 74581 cover).

A-C VACUUM-TUBE VOLTMETERS

By Henry Chanes

The a-c signal voltages in a television receiver can also be measured by the use of an a-c vacuum-tube voltmeter. This meter is usually the same instrument as the d-c VTVM referred to under d-c measurements, but with the addition of an a-c probe. The probe contains a vacuum-tube diode rectifier which rectifies the a.c. and the resultant d.c. is measured by the d-c VTVM, which is also calibrated for a-c voltage measurements. The a-c rectifier is built into the probe rather than into the meter unit in order to reduce the input capacitance as much as possible.

The RCA-advanced Voltohmyst is an example of this type of vacuum-tube voltmeter. This particular meter has a frequency range from 30 to 250 Mc. As mentioned before, the frequency range required for measuring video, sync, and sweep signals is from 60 cycles to 300 kc, therefore a meter of this type is adequate. In addition, this meter can be used at the intermediate and radio frequencies encountered in television receivers which go up above 200 Mc. However, it is seldom necessary to measure these voltages directly. In the servicing of television receivers, almost all the a-c voltage measurements are of the video, sync, and sweep voltages. This meter employs a full-wave diode rectifier probe which will respond to either the positive or negative peaks of the signal being measured. The reading of the meter is, therefore, an indication of the peak-to-peak value of the voltage being measured, which, of course, is the type of reading desired. Although the meter itself responds to peak-to-peak voltages, the scale is calibrated in terms of the rms value of a sine wave. It is, therefore, necessary to multiply the meter reading by 2.83 to obtain the peak-to-peak value.

With the a-c probe in this meter, voltage measurements to 100 volts rms, or 283 volts peak-to-peak, can be made. If a higher range is desired, a multiplier which extends the voltage range 10 times is available. The use of this multiplier limits the frequency range to a 15-kc sine wave. The horizontal sync and sweep signals are at 15,750 cycles but have high-order harmonics due to their complex waveform. These harmonics will be attenuated by the multiplier and cause error in the meter reading. However, large vertical sync and sweep signals can be measured with the multiplier since the fundamental frequency in this case is only 60 cycles, and the harmonics are still within the frequency range of 15 kc.

Not all vacuum-tube voltmeters employ full-wave rectifiers in the a-c probe. Some use a half-wave rectifier. This type of meter responds to only one half of the cycle, either the positive or negative half depending upon the manner in which the rectifier is connected in the circuit. The scales on this type of meter are calibrated in rms volts of a sine wave and it is necessary to multiply by 1.414 to obtain the peak value of the half-cycle that is being measured.

It may seem at first glance that multiplying by 2.83 will give the peak-to-peak value of the signal. However, this is true only in special cases where the waveform is symmetrical such as ideal sine, square, or sawtooth waves. Unfortunately, many of the waveforms encountered in a television receiver are far from symmetrical, and the positive peak will not equal the negative peak of the signal.

In most cases, it is possible to obtain peak-to-peak readings with a half-wave type of a-c probe by measuring first one peak, then the other, and adding the two values. To illustrate this, let us suppose we have a half-wave type of probe that responds to the positive half of the cycle. The probe is first connected normally, that is, the low side to the chassis of the television receiver and the high side of the probe to the signal being measured. The meter reading is multiplied by 1.414, giving the positive peak of the signal. The probe terminals are then reversed and the reading thus obtained is also multiplied by 1.414 to give the negative peak of the signal. The positive-peak and negative-peak values are added together to obtain the peak-to-peak value of the signal. If desired, the two rms readings can be added together and the sum multiplied by 1.414. Either method will give the same result.

When the probe terminals are reversed to obtain the negative peak of the signal, the low side of the probe is connected to a "hot" point in the receiver circuit. This low side of the probe is usually also connected to the chassis of the VTVM. Therefore, the meter chassis will be at the same potential as the point where the signal is. If there is d.c. at this point in addition to a.c., it is a good idea to use a capacitor (about 0.01 μf) between the low side of the probe and the point being measured, to keep the d-c voltage off the meter chassis and lessen the danger of shock. The meter chassis will also introduce capacitance at the point being measured which might cause a serious error in the measurement. To lessen this effect, the VTVM should be placed away from the television receiver chassis. Also, the VTVM itself or the probe should not be touched while the negative peak is being measured, so as not to add additional capacitance across the circuit being measured.

If only a d-c VTVM is available, it is possible to adapt it for a-c voltage measurement by the addition of a crystal probe. These probes are available as accessory equipment for most popular types of vacuum-tube voltmeters. The crystal probe is a half-wave rectifier type and is very similar to the usual r-f probe except that it uses a crystal for rectification rather than a diode. The frequency range of the crystal probe is usually in the order of 60 cycles to about 100 Mc. Within its frequency range, the crystal probe can be used instead of the diode type of a-c

(*Continued on page 20*)

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Van Sickle Radio Co.

SPRINGFIELD
Harry Reed Radio & Supply Co.

MONTANA

BILLINGS
Electronic Supply Co.

GREAT FALLS
George Lindgren Co.

NEBRASKA

LINCOLN
Hicks Radio Co.
Leuck Radio Supply

OMAHA
J. B. Distributing Co.
Omaha Appliance Co.
Radio Equipment Corp.

SCOTTS BLUFF
Joachim Radio Supply

NEVADA

LAS VEGAS
Metcalf's Radio Supply

RENO
Saviers Electrical Products Corp.

NEW HAMPSHIRE

CONCORD
Evans Radio

DOVER
American Radio Corp.

MANCHESTER
De Mambro Radio Supply Co., Inc.
Radio Service Laboratory

NEW JERSEY

ATLANTIC CITY
Almo Radio Co.
Radio Electric Service Co. of Pa., Inc.

BRIDGETON
Joe's Radio Shop

CAMDEN
General Radio Supply Co.
Radio Electric Service Co. of Pa.

CLIFFSIDE
Nidisco

EAST ORANGE
International Distributing Co.

JERSEY CITY
International Standard Electric Corp.
Nidisco

NEWARK
Continental Sales Co.
Krich Radisco, Inc.
Aaron Lippman & Co.
Radio Wire Television, Inc.
Variety Electric Co.

PASSAIC
Nidisco

PERTH AMBOY
Bennetts Radio Supply

PHILLIPSBURG
Carl B. Williams

RED BANK
Monmouth Radio Supply Co.

TRENTON
Allen & Hurley
Nidisco

NEW MEXICO

ALBUQUERQUE
Monsen-Dunnegan-Ryan Co.
Radio Equipment Co.
L. B. Walker Radio Co.

ROSWELL
Supreme Radio Supply

NEW YORK

ALBANY
Ft. Orange Radio Distributing Co.
E. E. Taylor Company

AMSTERDAM
Adirondack Radio Supply

AUBURN
Dare's Radio Service

BINGHAMTON
Federal Radio Supply Co.

BRONX
Bronx Wholesale Radio
Fordham Radio Supply Co.
National Radio Distributors
Radio Wire Television
Slate & Co.
Wilco Radio Distributors

BROOKLYN
Ben-Ray Distributing
Sam Buchman
Electric Equipment, Inc.
Green Radio Distr.
Hornbeam Distributing Co.
National Radio Parts Distributing Co.
Stan-Burn Electronics Corp.

BUFFALO
Dymac, Inc.
Genesee Radio & Parts Co.
Radio Electric Products, Inc.
Radio Equipment Corp.
Standard Electronics Distributing Co.

COHOES
Empire State Distributors, Inc.

CORTLAND
C. A. Winchell Radio Supply Co.

CROTON-ON-HUDSON
W. R. O. Radio Laboratory

ELMIRA
Fred C. Harrison Co.

GLEN FALLS
Ray Distributing Co.

HEMPSTEAD
Davis Electronics Corp.
Island Radio Distributors
Standard Parts Corporation

ITHACA
Stallman of Ithaca

JAMAICA
Chanrose Radio
Harrison Radio
Norman Radio Distributors, Inc.
Peerless Radio Distr.

JAMESTOWN
Johnson Radio & Electronic Equipment

MIDDLETOWN
L & S Radio Sales

MOUNT VERNON
Davis Radio Distributing Co.
Hugh Radio & Television Parts

NEW YORK
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Blan, Inc.
Bruno-New York
H. L. Dalis
Douglas Radio Co.
Federated Purchaser
Fischer Distributing Co.
Harrison Radio Corp.
Harvey Radio Co.
Rene M. Jacobs Co., Inc.
Newark Electric Co.
O. W. Radio Co.
Radio Wire Television
Radionic Equipment Co.
Sanford Electronics Corp.
Stan-Burn Electronics
Sun Radio & Electronics Co., Inc.
Sylvan-Wellington Co.
Terminal Radio Corp.

NIAGARA FALLS
Niagara Radio Parts Co.

PLATTSBURG
Ray Distributing Co.

POUGHKEEPSIE
Chief Electronics

ROCHESTER
Beaucaire Inc.
Hunter Electronic
Masline Radio & Electronic Equip. Co.
Radio Parts & Equipment Co.
Rochester Radio Supply Co.

SCHENECTADY
Electric City Radio Supply
Maurice Schwartz & Sons

SYRACUSE
W. E. Berndt
Robert & O'Brien
Stewart W. Smith

TROY
Trojan Radio Co., Inc.

UTICA
Beacon Electronics, Inc.
Electronics Laboratories & Supply Co.
Vaeth Electric Co.

WHITE PLAINS
Westchester Electronic Supply Co., Inc.

NORTH CAROLINA

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Freck Radio & Supply Co.
Long's Distributing Co.

CHARLOTTE
Dixie Radio Supply Co.
Radiotronic Distributors, Inc.
Shaw Distributing Co.

CONCORD
The Question Shop

FAYETTEVILLE
Eastern Radio Supply

GREENSBORO
Johannesen Elect. Co. Inc.

RALEIGH
Southeastern Radio Supply Co.

WINSTON-SALEM
Dalton-Hege Radio Supply
Lambeth Electric Supply Co., Inc.
Noland Co.

NORTH DAKOTA

FARGO
Bristol Distributing Co.
Radio Equipment Co.

MINOT
Radio & Sound Division

OHIO

AKRON
Olson Radio Warehouse, Inc.
The Sun Radio Co.
Warren Radio

ASHTABULA
Morrison's Radio Supply

CANTON
Armstrong Radio Co.
Burroughs Radio Co.
The Sommer Electric Co.

CINCINNATI
Chambers Radio Supply Co.
Herrlinger Distr. Co.
Hughes-Peters, Inc.
Steinberg's Inc.
United Radio Inc.

CLEVELAND
Broadway Electric Supply Co.
Goldhamer, Inc.
Olson Radio Warehouse of Cleveland
Pioneer Radio Supply Corp.
Progress Radio Supply Co.
Radio & Electronic Parts Co.
Winteradio Inc.

COLUMBUS
Hughes-Peters, Inc.
Thompson Radio Supplies
Whitehead Radio Co.

DAYTON
Hughes-Peters, Inc.
Srepco, Inc.
Stoots-Friedman Co.

EAST LIVERPOOL
D & R Radio Supply

LIMA
Lima Radio Parts Co.
The Northwestern Radio Co.
Warren Radio Co.

MANSFIELD
Burroughs Radio Co.

PORTSMOUTH
Sound Electronic Suppliers

SPRINGFIELD
Eberle's Radio Supply

STEUBENVILLE
D & R Radio Supply

TOLEDO
Toledo Radio Specialties
Warren Radio Co.

YOUNGSTOWN
Radio Parts Co.
Ross Radio

ZANESVILLE
Thompson Radio Supplies

OKLAHOMA

OKLAHOMA CITY
Electronic Supply Co.
Miller-Jackson Co., Inc.
Radio Supply, Inc.

TULSA
Radio Inc.
S & S Radio Supply

OREGON

EUGENE
United Radio Supply, Inc.

KLAMATH FALLS
R & F Supply Co.

MEDFORD
Verl G. Walker Co.

PORTLAND
Bargelt Supply
Harper-Meggee, Inc.
Lou Johnson Co.
Northwest Radio Supply Co.
Portland Radio Supply Co.
Stubbs Electric Co.
United Radio Supply, Inc.

PENNSYLVANIA

ALLENTOWN
Luckenbach & Johnson, Inc.
Radio Elec. Service Co.

ALTOONA
Hollenbach's Radio Supply

BETHLEHEM
Buss Radio Electric Supply

EASTON
Radio Electric Service Co.

ERIE
John V. Duncombe Co.
Jordan Electronic Co.
Warren Radio, Inc.

HARRISBURG
D. & H. Distributing Co., Inc.
Radio Distributing Co.

JOHNSTOWN
Cambria Equipment Co.

LANCASTER
George D. Barbey Co., Inc.
Eshelman Supply Co.

NORRISTOWN
Kratz Bros.

PHILADELPHIA
A. C. Radio Supply Co.
A. G. Radio Parts Co.
Allied Electric Appliance Parts, Inc.
Almo Radio Company
Barnett Brothers Radio Co.
Emerson Radio of Pennsylvania, Inc.
Herbach & Rademan
Nat Lazar Radio Co.
M & H Sporting Goods
Penn Electronics Co.
Radio Electric Service Co. of Pa. Inc.
Radio Elec. Service Co.
Raymond Rosen & Co.
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CHARLESTON
Radio Laboratories

COLUMBIA
Dixie Radio Co.
Electronics, Inc.

GREENVILLE
Carolina Radio Supply
Dixie Radio Supply Co., Inc.
Gilliam Radio Co.

SPARTANBURG
McElhenney Radio Supply
Noland Company

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SIOUX FALLS
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YANKTON
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TENNESSEE

CHATTANOOGA
Curle Radio Supply
Radio Sales Co.
Specialty Distributing

KINGSPORT
Radio Electric Supply Co.

KNOXVILLE
Chemcity Radio & Elect. Co.
Roden Electrical Supply Co.

MEMPHIS
Bluff City Distributing Co.
Lavender Radio
W. & W. Distributing Co.

NASHVILLE
Braid Electric Co.
Currey's Wholesale Distr.
Electra Dist. Co.
Radio & Appliance Corp.
Randolph & Cole

TEXAS

ABILENE
R & R Electronic Co.

AMARILLO
R & R Electronics Co.
West Texas Radio Supply

AUSTIN
The Hargis Co.
Standard Radio Supply, Inc.

BEAUMONT
Montague Radio Distributing Co.

CORPUS CHRISTI
Electronic Equipment & Engineering
Modern Radio Supply, Inc.
Wicks De Vilbiss Co.

DALLAS
Crabtree's Wholesale Radios
Southwest Radio Supply
Wilkinson Bros.

EL PASO
Elliot Electronics
Momsen-Dunnegan-Ryan Co.
M. G. Walz Co.

FORT WORTH
The Electronic Equipment Co.
Ft. Worth Radio Supply Co.
Scooter's Radio Supply Co.
Bill Sutton's Wholesale Electronics

GALVESTON
Radio Enterprises

HOUSTON
Automatic Distributing Corp.
A. R. Beyer & Co.
Houston Radio Supply Co.
Sterling Radio Products Co.
Straus-Frank Co.

LAREDO
Guarantee Radio Supply Co.
Radio & Electronics Supply Co.

LUBBOCK
R. & R. Parts & Supply Co., Inc.

McALLEN
Rio Radio Supply Co.

SAN ANTONIO
Mission Radio, Inc.
Modern Radio Supply
Olsen Radio Supply
South Texas Radio Supply Co.
Straus-Frank Co.

(*Continued on next page*)

LIST OF AUTHORIZED RIDER JOBBERS

(Continued)

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TYLER
Lavender Radio Supply Co.
WACO
The Hargiss Co., Inc.
WICHITA FALLS
Clark & Gose Radio Supply

UTAH
OGDEN
Ballard & Carter
SALT LAKE CITY
Central Radio Supply Co.
O'Loughlin's
Radio Supply Co.
S. R. Ross, Inc.
Standard Supply Co.

VERMONT
BURLINGTON
Vermont Appliance Co.

VIRGINIA
BRISTOL
Bristol Radio Supply Co.
DANVILLE
Womack Electric Supply Co.
LYNCHBURG
Eastern Electric Co.
Lynchburg Battery & Ignition Co.
NEWPORT NEWS
General Supply Co.
Nolan Co., Inc.
NORFOLK
Ashman Distributing
Radio Equipment Co.
Radio Parts Distr. Co.
Radio Supply Co.
PETERSBURG
Virginia Battery Ignition Co.
RICHMOND
Johnston-Gasser Co.
D. R. Johnston Co.
Radio Supply Co.
ROANOKE
H. C. Baker Co., Inc.
Dixie Appliance Co.
Leonard Electronic Supply Co.
STAUNTON
M. A. Hartley & Co.
Southern Electric Co.

WASHINGTON
EVERETT
Pringle Radio Wholesale Co.
SEATTLE
General Radio, Inc.
Harper-Meggee, Inc.
Seattle Radio Supply Co., Inc.
Western Electronic Supply Co.
Herb E. Zobrist Co.
SPOKANE
Columbia Electric & Mfg. Co.
Harper-Meggee Inc.
Standard Sales Co.
TACOMA
C & G Radio Supply Co.
A. T. Stewart Co.
WALLA WALLA
Kar Radio & Electric Co.
YAKIMA
Lay & Nord

WEST VIRGINIA
BLUEFIELD
Whitehead Radio Co.
CHARLESTON
Chemcity Radio & Elec. Co.
Hicks Radio
The Mountain Electronics Co., Inc.
CLARKSBURG
Trenton Radio Co.
White Electric Co.
HUNTINGTON
Electronic Supply, Inc.
King & Irwin, Inc.
MARTINSBURG
Plummer's Radio & Electric Supply
MORGANTOWN
Trenton Radio Co.
PARKERSBURG
Randle & Hornbrook
WHEELING
General Distributors

WISCONSIN
APPLETON
Appleton Radio Supply
Valley Radio Distributors
GREEN BAY
G. M. Popkey Co.
MADISON
Satterfield Radio Supply, Inc.
MARINETTE
G. M. Popkey Co.
MILWAUKEE
Electro-Pliance Distr. Inc.
Juneau Radio Supply Co.
Marsh Radio Supply Co.
Radio Parts Co. Inc.
Taylor Electric Co.
Charles E. Turnock Co.
RACINE
Standard Radio Parts Co.
WAUSAU
Radio Service Supply Co.

WYOMING
CHEYENNE
Houge Radio & Supply Co.

ALASKA
ANCHORAGE
Alaska Radio Supply

HAWAII
HONOLULU
Nylen Bros. & Co. Ltd.
Precision Radio Service & Supply Co.
Radio Wholesale & Supply Co.

CANADA

ALBERTA
CALGARY
Radio Supply Co., Calgary Ltd.
Taylor Pearson & Carson
EDMONTON
Radio Supply Co., Ltd.

BRITISH COLUMBIA
VANCOUVER
Hygrade Radio Ltd.
Taylor & Pearson Ltd.
Western Agencies, Ltd.
VICTORIA
Ellison Queale Radio Supply Ltd.

MANITOBA
WINNIPEG
Sparling Sales Ltd.

NOVA SCOTIA
HALIFAX
Manning Equipment Ltd.

ONTARIO
BELLEVILLE
The Big A Co., Ltd.
HAMILTON
East Hamilton Radio Exchange
Western Radio Supply Co.
KITCHENER
MacDonald Electric Ltd.
LONDON
Fisher Radio Co.
OTTAWA
Radio Television Laboratories
TORONTO
Alpha Aracon
Radio Trade Supply Co.
Wholesale Radio & Electronics Ltd.
WINDSOR
Bowman-Anthony, Limited

QUEBEC
MONTREAL
Canadian Electrical Supply Co., Ltd.
Commercial Radio Supplies
Manis Radio & Electric Supply Co., Inc.
Payette & Co.
QUEBEC
John Millen Quebec, Ltd.
SHERBROOKE
Dawson Auto Parts, Ltd.

SASKATCHEWAN
REGINA
Radio Supply & Service Co.
SASKATOON
Bowman Bros. Ltd.
A. A. Murphy Sons, Ltd.

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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 Transactions AIEE we will pay a reasonable figure—make us an offer. Send to John F. Rider Publisher, Inc., 480 Canal St., New York 13, N. Y.

MAGAZINE AND MISSING ISSUES

B.B.C. Quarterly
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Vol. 4, No. 1, Apr. 1949

Chemical Industries
Jan. — June 1949

Electrical Communication

July 1922	July 1934
Oct. 1922	July 1935
Jan. 1923	July 1937
Jan. 1934	

Electrical Review
Vol. CXLIV, Nos. 3711 to 3714, Jan. 7, 14, 21, 28

Electrical West
Vol. 102, Nos. 4 — 7 Apr., May, June, July 1949

Electronic Engineering
Vol. 20, No. 246, Aug. 1948

Engineers Digest
Jan. 1949

Journal of Applied Mechanics
Vol. 16, No. 1, March 1949

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

Proceedings of The Radio Club of America
Jan. to June 1949

Radio
Jan. 1922
Aug., Sept., Oct. 1932
Feb., March, Apr., May 1933

The Electrician
Vol. CXLII, Nos. 25 — 52, Jan. — June 1949

The Engineer
Dec. 13, 1946 — Dec. 27, 1946

The Iron Age
Vol. 163, Nos. 21, 22, May 26 and June 2, 1949

Toute La Radio,
No. 103, Feb. 1946

Transactions AIEE
1947 (Bound Annual Volume)

—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.

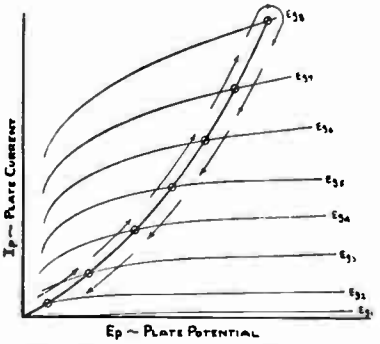


Fig. 1 — The "Electronamic" Method Tests the Tube Over a Complete Path of Operation.

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.

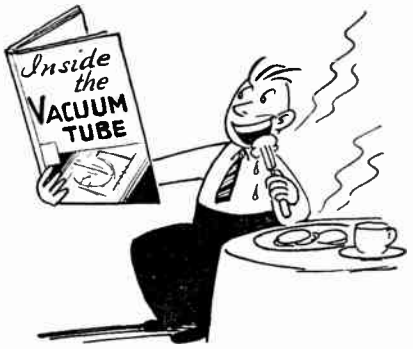
R.G. "Bob" Middleton
Engineering Division

A-C Vacuum-Tube Voltmeters

(*Continued from page 19*)

probe. As with any other half-wave rectifier probe, it responds to only one peak of the signal being measured, and is not very convenient for peak-to-peak measurements. These, however, can be made by measuring each peak separately, as described previously.

The crystal probe has one rather serious limitation with regard to its use on television receivers. This is its inability to measure very large signals without introducing errors in the reading due to the nonlinearity of the crystal characteristic at large amplitudes of voltage. The largest peak voltage that can be accurately measured is about 20 or 30 volts. This limits peak-to-peak readings to 40 or 60 volts, which is sufficient for many of the video and sync signals. However, some of the sync and most of the sweep signals are quite high, in some cases as high as 900 volts peak-to-peak. Adding multipliers is usually not possible due to their adverse effect on the frequency response.



Regal 1107, 7254

Models 7254 and the revised 1107 are the same as Model 1107 which appears on *page 19-S of Rider's Manual Volume XIX* with the following changes:

Antenna loop, 30-128, has been changed to an antenna coil, 30-145.

Ganged variable capacitors 40-101 have been changed to 40-101G.

The value of the 13,000-ohm resistor connected to the B lead of 30-127 has been changed to 15,000 ohms and is designated as 65-155.

The 200,000-ohm resistor, 65-142 has been changed to 220,000 ohms and is designated as 65-108.

The 0.01-μf capacitor connected to the A lead of 30-127 has been changed to 0.006 μf and is designated as 50-101.

Resistor 20-101 is now 20-103, the value remains the same.

Capacitor 53-103 is now 55-103, the value remains the same.

The 25-ohm, ½-watt resistor, 65-101 has been changed to 22 ohms, ½ watt, and is designated as 65-160.

The two 50-μf capacitors, 60-106, have been changed to 40 μf and are designated as 60-108.

The 2,400-ohm resistor, 65-132, has been changed to 2,200 ohms and is designated as 65-162.

SUCCESSFUL Servicing
JANUARY 1953
with Tex-Fle Index

TV Filament Circuits

THERE ARE TWO important ideas to keep in mind in dealing with the filament circuits of a television receiver. First of all, chokes may be used in series and capacitors in parallel with filaments in a television receiver to prevent coupling of signals between the several sections; secondly, series and parallel arrangements of the filaments may be found. In addition to these, manufacturers may not use the same filament circuits in their different models. Also, more taps may be used on the power transformer to supply the different filament voltages and to divide the load, as well as to prevent unwanted coupling between stages. Therefore, the serviceman cannot haphazardly pull out tubes which are not lighted and replace them thinking that the trouble has been fixed. The wiring diagram must always be checked.

R-F Chokes and Bypass Capacitors

The eye is more sensitive to changes than is the ear. In the same way the video section of a television set is more sensitive to irregularities than is the audio portion. Since r-f signals are inaudible, the sound system does not usually have to be protected from any stray r-f signal. However, r.f. may easily be coupled through to the *video* stage causing interference in the picture if precautions are not taken.

Coupling in the filament stage occurs through the small but still significant capacitance between the cathode and filament of a tube (see Fig. 1). For instance the twin triode, the 12AT7, has a filament-to-cathode capacitance (for each unit) of 2.5 $\mu\mu$f. This might be thought small, but at the frequencies used in a television receiver, it becomes important. At a frequency of 80 mc the reactance of this 2.5-$\mu\mu$f capacitance is equal to

$$\frac{1}{2\pi fC} = \frac{1}{6.28 \times 80 \times 10^6 \times 2.5 \times 10^{-12}} = 800 \text{ ohms.}$$

A low-impedance path into the filament circuit from the cathode is thus presented to high-frequency signals. We are dealing with a very real circuit component even though it is not represented on the schematics of receivers. It would be simple for signals to be coupled through the filament of an r-f tube back to the common source, and then to the filaments and the cathodes of the picture and video tubes, thus causing interference in the picture.

It has been shown that these signals may be coupled into the circuits of other tubes. How can this be prevented? If another component were inserted in series, or in parallel, with the filament, blocking or bypassing of the signal is readily accomplished. For instance, with the 12AT7, the filament resistance for parallel operation is equal to the filament voltage divided by the current

$$= \frac{6.3 \text{ volts}}{0.3 \text{ amperes}}$$

or 21 ohms. The effective r-f circuit is shown in Fig. 1B. Since the filament offeres a low-impedance path to signals, an r-f choke is placed in series with it. The reactance of even a 1-μh choke at a frequency of 80 mc is $2\pi fL = 6.28 \times 80 \times 10^6 \times 1 \times 10^{-6}$ or about 500 ohms. This

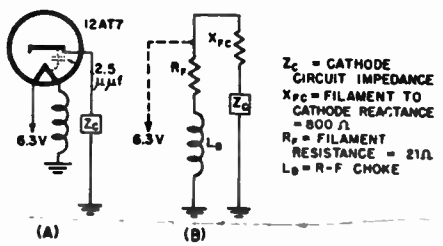


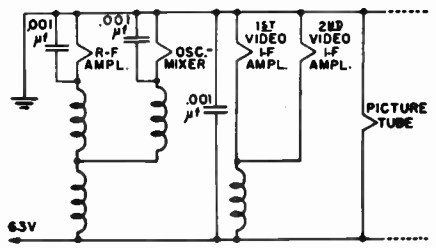
Fig. 1.—(A) shows a simplified tube circuit showing the filament-to-cathode capacitance. (B) is the equivalent r-f circuit showing the low filament-to-cathode reactance used for coupling the filament and cathode circuits of a tube.

will effectively block or drop most of the stray r.f. in the *filament* circuit and prevent it from entering any other circuit. At 60 cps the reactance of the choke is negligible, being much less than a small fraction of an ohm.

In addition to this, a capacitor may be placed directly across the filament. The action with a 5,000-$\mu\mu$f capacitor would be as follows. Its reactance at 25 mc is $\frac{1}{2\pi fC}$ = 1/6.28 x 25 x 10^6 x 5,000 x 10^{-12} or a little over 1 ohm. Therefore, the r-f signal is effectively bypassed to ground, and does not pass to the other filament circuits of the set.

Examples of Filament Isolation

In Fig. 2 the partial filament circuit for Admiral Chassis 20X1 is shown. One side of the circuit is grounded, the other being at



After Admiral

Fig. 2.—The schematic diagram of the Admiral Chassis 20X1 filament circuits with the use of r-f blocking chokes and bypass capacitors.

an a-c potential of 6.3 volts. The r-f amplifier and the oscillator-mixer are each in series with a choke, the two circuits being in parallel, and both are in series with another choke. The first and second video i-f amplifiers, in contrast, are directly in parallel with each other, the combination then being in series with a choke. The high-frequency stages are thus isolated from the rest of the circuits; the r-f tuning unit more so than the video i-f stages. The rest of the filaments are directly in parallel across the 6.3-volt supply.

The filament circuits of Capehart-Farnsworth Models 3001-B and 3001-M, 3002-B and 3002-M, and their Series A, are shown in Fig. 3. It is seen that the *B-* is connected to one side of one 6.3-volt winding. There is no ground involved in this source of filament voltage. However, there is another 6.3-volt source used, one end of which is grounded. This winding is used to supply the four video i-f amplifiers and the r-f tuning unit filaments. These stages are seen to

(Continued on page 36)

USING AN A-M SIGNAL GENERATOR ...IN PLACE OF A CROSS-HATCH GENERATOR

Fig. 1. Pattern produced by signal generator with 400-cycle modulation.

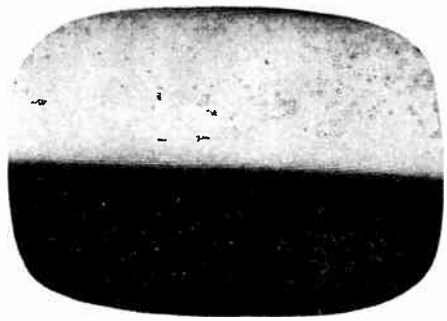


Fig. 2. Pattern produced by signal generator with 60-cycle modulation.

**This material originally appeared in the General Electric Company's copyrighted publication Techni-talk.*

In some areas tv stations have either reduced "test-pattern time" to only a few minutes a day or the time is such, that when the test pattern is on, very few if any receivers can be installed and adjusted. Several manufacturers of test equipment are producing cross-hatch generators which can be conveniently used to adjust the height, width and linearity controls. These instruments should be used whenever available since they are designed for this particular application. Some service-technicians may not as yet have acquired one of these instruments or in a large service organization there may not be a sufficient number to go around. If a cross-hatch generator is not available an ordinary a-m signal generator can be used for the same purpose.

The vertical linearity and height controls can be checked and adjusted by setting the channel selector to some channel not used in your area. This should probably be one of the lower channels since most of the older signal generators do not cover the high tv channel frequencies. The r-f output cable of the signal generator should be connected to the antenna terminals of the receiver. The output of the signal generator must be modulated since it is the frequency of the modulation which is visible on the picture tube screen. Most signal generators have provision for 400-cycle modulation which produces a bar pattern similar to that shown in Fig. 1.

The output of some signal generators such as the General Electric YGS-3 can be modulated by a 60-cycle or 400-cycle fixed frequency, or by any frequency within the variable frequency range of 100 to 12,000 cycles. The 60-cycle modulation produces a pattern consisting of two horizontal bars as shown in Fig. 2. The positive half of the sine wave produces the bright bar, while the negative half produces the black bar. The 400-cycle modulation produces six bright bars and five dark bars as shown in Fig. 1. The number of black and white bars will vary depending on the frequency of the audio modulation. If the frequency of the audio modulation is increased to 1,500 cycles, the number of black and white bars will increase to 25 as shown in Fig. 3. The number of bars which appear on the screen can also be varied somewhat by adjusting the vertical-hold control which changes the frequency of the vertical oscillator.

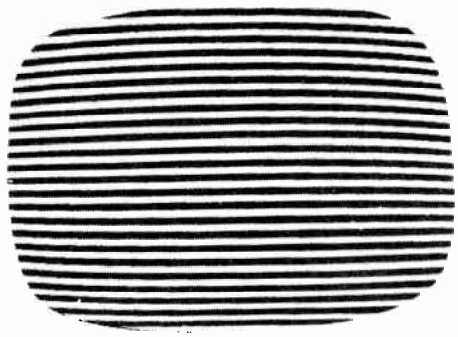


Fig. 3. Pattern produced by signal generator with 1500-cycle modulation.

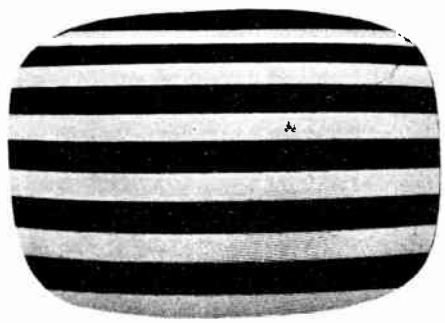


Fig. 4. 400-cycle modulation with poor vertical linearity.

Fig. 5. 1500-cycle modulation with poor vertical linearity.

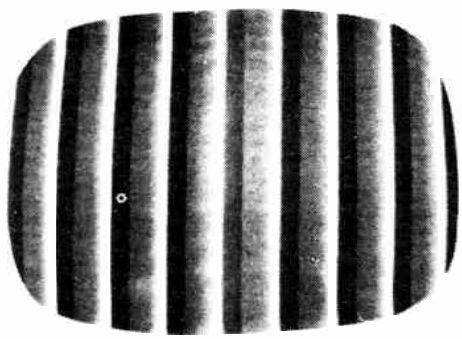


Fig. 6. Pattern produced by Signal generator with 157.5 K C unmodulated output.

The vertical linearity and height controls can be adjusted with either 400-cycle modulation or some higher frequency such as 1,500 cycles. A squeezing at the top is shown with 400-cycle modulation in Fig. 4 and with 1,500-cycle modulation in Fig. 5. The controls should be adjusted until the spacing between each bar is the same, keeping in mind, of course, that the top and bottom should not extend more than one-half inch beyond either the top or bottom of the screen.

Reasonably good vertical adjustments can also be made without instruments by checking the scanning lines for crowding near the top or bottom of the screen. This type of adjustment can be made somewhat easier if the vertical-hold control is adjusted so that the vertical scan lines for each frame *pair up* or *overlap*. If a receiver has good interlace, this point may be very close to the position where the vertical loses sync.

Still another method which can be used is to adjust the vertical-hold control so that the vertical *rolls* slowly. The height of the blanking bar between frames can be observed as it moves from the top to the bottom of the screen. If the height of this bar changes either near the top or near the bottom of the screen, the picture will be affected in the same way at the same point.

(Continued on page 8)

Successful SERVICING
REG. U.S. PAT. OFF.
Dedicated to the financial and technical advancement of electronic maintenance personnel

VOLUME 14 NUMBER 1 JANUARY, 1953

JOHN F. RIDER, *Publisher*
ANNETTE M. TRICARICO, *Editor*
Stuart Flexner, *Assistant Editor*
Milton S. Snitzer, *Technical Advisor*

Advertising Representative
H. J. Olsow & Co.
3951 Grand Central Terminal
New York 17, N. Y.
MUrray Hill 6-4670

MEMBER

Curtain Time

The Itinerant TV Service Technician

It has been common practice to do light TV servicing — mainly tube changing — in the home. Judging by the comments of some large service facilities of all sorts, customers' home service will be expanded in the future to where virtually all troubles will be remedied in the home. Only in extreme cases will chassis be pulled.

This approach to TV servicing will, more than likely, result in other changes too. It is going to mean a greater investment in test equipment — portable equipment which can be taken into the home. This means that test equipment manufacturers will have to design equipment specifically for this purpose.

It is going to give the small independent operator the opportunity to survive. It has been the general opinion that TV servicing set a limit on the minimum number of personnel required by a service facility because of the to-and-fro movement of a TV receiver. Doing most of the service in the home enables a TV service facility to operate with whatever number of technicians the facility wishes to place in the field — as few as one man.

Another practice associated with this kind of service is the use of the rolling parts stock, that is, the replacement parts stock will be in the truck which is driven to the job. This is being done to a limited extent today and is proving successful. In fact, the roving service truck idea was talked about years ago — at the advent of television, but it did not gather too much momentum, except as applied to receiver and antenna installations. Now it looks like it will become an everyday occurrence.

The idea will be accepted by the public. Even though the average housewife is not too happy at the prospect of having one of her rooms cluttered with servicing equipment, it still is the lesser of the two evils relative to all the possibilities of what can occur when the chassis is removed from the home. In the mind of the public anything can happen after a chassis is pulled — even to having to pay a ransom to get it back. Having it serviced in the home will reduce the period during which the receiver is inactive. It will cut the travel time cost, to say the least.

Once the practice blooms, it will be necessary for all service facilities to follow suit. This is becoming evident today in the form of the responses received by those shops that advertise service in the home. They outpull the ads which do not make the same offer.

Doing extensive TV servicing in the home will place a greater than ever premium on technically qualified men. In fact, successful operation cannot be carried on in any other way. Properly handled, it should minimize repeat calls because it is possible to demonstrate the performance of the receiver before the technician leaves; also it means freedom from the complications of operating a receiver in one location and servicing it in another, where completely different receiving conditions prevail.

All in all, major service in the customer's home offers interesting possibilities. Let's see what happens.

The OPS Price Order for TV Service

The price order covering TV service has yet to be issued by the OPS. According to reports it will be done, providing the regulatory body will remain after the new administration becomes active. We have not changed our ideas as expressed in the November, 1952 issue of SUCCESSFUL SERVICING. We feel that the problem of diagnosis of TV receiver troubles, the "bugs" which frequently develop in TV receivers — in general the behavior of electronic equipment makes it necessary to treat the repair of these devices differently than ordinary electrical and mechanical equipment.

It is reported that the contents of the proposed regulation has the approval of TV service facilities. We hope that diagnosis time was given its full due apart from the time required for the repair.

John F. Rider

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Replacement Parts in TV Receivers

Part I - Capacitors (cont'd)

This is the third in a series of articles on "Replacement Parts in TV Receivers." "Capacitors" will be continued next month.

by John F. Rider

DIFFERENCE BETWEEN CAPACITORS

The various names which appear in the capacitor family tree designate both physical and electrical differences in the components and in the behavior and suitability of the component for different classes of service. As to the physical differences in dimensions, these require no special comments other than to say that, in the final analysis, the suitability of a capacitor on this basis, is determined by its location in the receiver.

Mica Capacitors. The differences between foil mica and silver mica capacitors are manifold. The foil type, or ordinary "molded" mica is made up of alternate slabs of active surface (usually metal foil) and mica dielectric. The assembly is compressed under high pressure and housed in a molded case, usually of brown bakelite, although yellow bakelite also is used for this purpose. The uniformity of closeness of the foil to the dielectric slab determines in a great measure the electrical behavior of the device. This behavior is a function of the materials used, the pressure applied when the unit is encased, and the expansion or contraction of the casing under the influence of varying temperature. This in turn gives rise to changed spacing between the active surfaces and the dielectric, and a change in capacitance.

The variation in capacitance under varying temperature conditions is minimized by the use of yellow bakelite, but since the foil type represents a category of component, certain conditions of behavior are acceptable. Thus the usual brown bakelite mica capacitor is acknowledged to possess certain operating characteristics and is used on that basis.

The tendency toward change in capacitance with variation of temperature has given rise to a sub-classification. This is the deliberately engineered temperature coefficient mica capacitor, wherein the capacitance changes by a prescribed amount per degree C. change in operating temperature. This type was popular years ago for correcting circuit behavior with changing temperature, but, as is discussed in detail later, it has been supplanted by the ceramic dielectric unit.

The silver mica variety, whether of the "postage stamp" or "button" shape, uses a deposit of silver on the two sides of the mica dielectric. This produces a firm bond between active surface and dielectric. Moreover, the assembly is housed in either red or yellow bakelite; that is, in material which maintains its dimensional stability with changing temperature. The result is a capacitor which is very efficient electrically; is much more stable in capacitance than the ordinary mica; can be produced to a much greater degree of accuracy relative to capacitance rating; in general is much more suitable for use in all critical circuits under varying conditions of frequency (including UHF), temperature and humidity. It too is available in a variety of temperature coefficient characteristics, although in the main it is a positive temperature coefficient capacitor.

Manufacturing know-how enables producers of mica capacitors to deliver an end product which displays prescribed characteristics relative to an increase or decrease in capacitance within prescribed limits for unit changes in operating temperature. This establishes the "class" or "characteristic" of the capacitor. Since the set designer weds the characteristic of the capacitor to the circuit requirements, it is a relatively important consideration in the matter of replacement. In essence, the characteristic is a designation of the temperature coefficient of the capacitor. More about this later.

The comparative superiority of the silver mica capacitor over the ordinary foil mica type does not make the latter a bad unit. It is an excellent capacitor and enjoys a great variety of uses; it is simply that where frequency stability is a very important item, and the frequency is controlled by capacitance (as for example in oscillators and other critical tuned circuits) the silver mica unit is preferred.

The use of mica as a dielectric provides high insulation resistance. This is true for both kinds of active surface construction; hence the mica capacitor is frequently used for d-c isolation (and coupling) where d-c leakage must be kept very low. To minimize the absorption of moisture in humid atmosphere, and also to keep surface leakage between the connecting wires low, the complete capacitor often is coated with a layer of wax.

Ceramic Capacitors. Ceramic capacitors are available in a number of types. Neglecting physical differences, the ceramic unit is highly efficient electrically. Construction-wise, regardless of the shape, it consists of a metallic deposit on the opposite surfaces of a ceramic dielectric with connecting leads soldered to the active surfaces. The result is a very stable capacitor, and one in which, by selection of the ceramic dielectric material, a variety of electrical characteristics can be achieved. One of its paramount virtues is a relatively high value of capacitance in a small, compact-sized unit. In this respect it is superior to all other types of capacitors.

Another feature stemming from the easy control of the specific composition of the ceramic dielectric, is the ability to manufacture a capacitor which will *change* in capacitance in a definite direction and decrease or increase by a predetermined amount with changes in operating temperature. While this is possible with the foil type of mica capacitor, it is much more easily controlled in the ceramic, with the result that the latter variety of temperature compensating capacitor has displaced the

(Continued on page 26)

Using An A-M Signal Generator etc.

(Continued from page 3)

The height and vertical linearity controls should then be adjusted until the height of the blanking bar is uniform regardless of its position on the screen.

Although the vertical height and linearity controls can be adjusted for reasonably good linearity without a test pattern or test equipment, the adjustment of the horizontal linearity control does require some type of a pattern on the screen. An incorrect adjustment of the height and vertical linearity controls is more noticeable on the ordinary program than is an incorrect adjustment of the horizontal controls. This does not mean that the horizontal adjustments can be overlooked, however, since the owner will see a number of programs on which a circle will be used, and if this is not a reasonably true circle, a return service call will probably be required.

The signal generator can also be used to make this adjustment without removing the chassis from the cabinet. The only additional items required are a .01-μf capacitor and a piece of thin spaghetti. The location of the first video amplifier tube must also be known. This tube can, of course, be identified if a circuit diagram is available. If a diagram is not on hand, the tube layout will ordinarily indicate the video amplifier tube or this tube may be recognized by its location on the chassis.

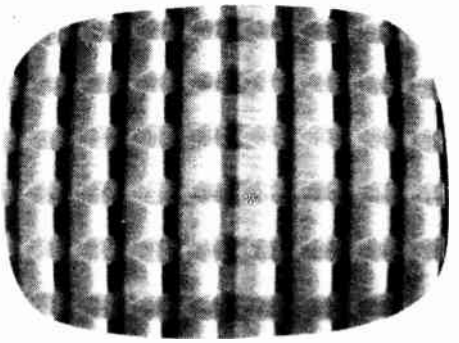


Fig. 7. Pattern produced by signal generator with 157.5 kc modulated by 400-cycle audio.

A number of manufacturers are also including test jacks located at various points in the circuit which can be used for trouble-shooting or signal insertion. One of these test jacks is usually located at the output of the video detector or the input to the first video amplifier. If a test jack is available the output of the signal generator can be connected to this point through a .01-μf capacitor by inserting one end of the capacitor, bent to make proper contact, into the test jack.

If a test jack is not available at this point in the circuit, contact can be made by connecting the .01-μf capacitor to the grid pin on the first video amplifier tube. A piece of thin spaghetti should cover both of the capacitor terminal wires so that only about one-quarter inch of wire is exposed at the end of each wire. One end can then be bent so that it will fit snugly over a miniature pin, and the other end can be bent to fit over an octal pin. Either end can then be used depending on the tube used in the receiver. The spaghetti will prevent a short either to the chassis or to some other tube pin.

The channel selector should be sent on a blank channel and the r-f output cable of the signal generator connected to the unused end of the .01-mf capacitor. The output of the signal generator should be unmodulated and the frequency adjusted for some harmonic of the horizontal sweep frequency of 15,750 cycles, such as the tenth harmonic which is 157,500 cycles or 157.5 kc. This will produce about ten vertical dark and light bars across the screen as shown in Fig. 6. The spacing of these bars can then be used to adjust the horizontal-linearity control. If more bars are preferred the frequency of the signal generator can be increased; if fewer bars are desired the frequency can be decreased. The vertical bars will sync in at harmonics of the horizontal-sweep frequency. If the audio modulation is not turned off the bars will be wavy as shown in Fig. 7.

If either a cross-hatch generator or an a-m signal generator must be used, it should be remembered that these instruments are only substitutes for the test pattern. If a pattern can be used it should be preferred although reasonably close linearity adjustments can be made with instruments.

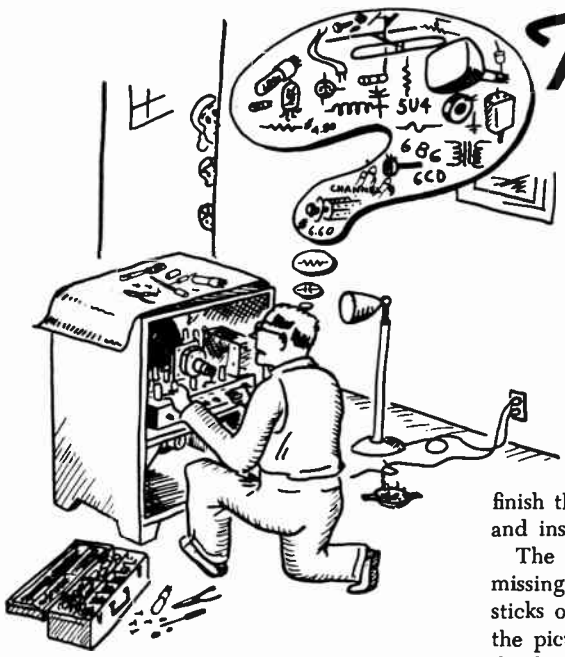
Addition to TV 10 and TEK-FILE Pack 67

National TV Model 1701

VOLTAGE CHART

Tube No.	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V1	-.5	0	6.3 AC	0	80	80	0	
V2	96	96	6.3 AC	0	-3.5	-2.5	0	
V3	-.45	0	0	6.3 AC	90	90	.4	
V4	-.45	0	6.3 AC	0	90	90	.5	
V5	-.45	0	0	6.3 AC	90	90	.6	
V6	0	0	0	6.3 AC	90	90	.7	
V7	-2.5	-.2	0	6.3 AC	.5	0	-3	
V8	0	6.3 AC	-.4 to -2.5	-2.5	.4	160	0	115
V9	90	-9	4.5	0	0	0	0	0
V10	20	0	0	6.3 AC	20	-.6	0	
V11	0	0	6.3VAC	0	13	NC	-9	
V12	NC	NC	6.3VAC	0	320	-90	0	
V13	NC	0	350	350	27	0	6.3VAC	0
V14	25	220	13	-7	120	13	6.3VAC	0
V15	NC	6.3VAC	1.7	TP*	-18	NC	0	320
V16	HV RECTIFIER							
V17	NC	280	540	NC	360	NC	6.3VAC	6.3VAC
V18	PICTURE TUBE							
V19	0	0	0	6.3AC	88	90	.6	
V20	96	140	340	90	94	96	90	
V21	88	92	42	92	280	150	92	
V22	0	90	320	250	90	90	90	105
V23	NC	390	0	0	360	0	NC	390
V24	88	88	92	92	92	NC	80	

*Tie point



The Quick Diagnosis

or

Working Under Pressure

by John D. Burke

What goes on in the head of a TV repairman when he goes into a house or apartment to "take a look" at a TV set?

Within the space of a very few minutes a *torrent* of thought surges through his head. Yet, to the observer, it would seem that the repairman has little on his mind.

From years of personal experience I shall try to set down a record of such thinking. Perhaps it will be interesting to psychologists. At any rate, my fellow repairmen should be interested, amused, even compensated for their somewhat tonguetied characteristic — unable to convey to an outsider that which we of the trade undergo.

Since we are dealing with a torrent of thoughts — the only organization possible is movement. It will start at one point, and finish at another.

• • • •

"What could it be? It must be just a tube! We had all the tubes overhauled just last month! Must be just an adjustment! Maybe the aerial has blown down! Do you think it is the picture tube? What do you think of these.....sets? What kind of a set do you have? Which set would you recommend? Let the man alone! What's that? An ash tray? (Gladly they rush to bring an ash tray. Gives them something to do. Like a doctor asking for hot water.)"

". . . Hmm. They *never* think to clear the junk off the top! Where's the light? Living rooms are certainly dark nowadays since television . . . ah, at least this floor lamp still has a bright bulb. What is it? A console. Drag it out. Careful, watch out for that rug . . . remember, put something on the top . . . this paper will do. Never forget the time I accidentally burned a tiny spot on a top. So small it rubbed out easy . . . looked like they'd kill me . . . refused to take pay for the job . . . told 'em to apply it to refinish the cabinet . . . man came to my shop and insisted on paying for my work.

The back . . . oh no . . . screws mostly missing. Watch out for that tube neck . . . sticks out! If the back drops . . . bang goes the picture tube. Hey! Better take a look at the front *before* pulling off the back. What's the complaint? Plays a while — then goes crazy. Hmmm — at least this one's got the hold controls on the front . . . Ah, not enough width . . . 5U4 or more? Gee, I hope it doesn't use a 6CD . . . haven't got one with me Lousy intermittent. Picture's solid now. Try to speed up the craziness . . . rotate band switch. Turn set on and off . . . rotate hold controls. The people will think I'm ruining their set — swinging these knobs so fast. Those fix-it books — TUUUUUURN SLOOOOWLY — got everybody nuts. 'Fraid to turn a knob. Never forget the old pair that thought the set should be turned *off* before changing stations!

O.K. — there she goes. Sync. Is it both vert and hor? Vertical very unstable . . . horizontal, no sync at all. Oh, oh — breaks into multiple images sideways. Nice. Hope its just the oscillator. Nice, clean, simple — through in a wink. Maybe the horizontal amplifier, too. Hope not. Rough to explain *that* tube's price. Off with the back . . . where's my junk? Ah, ah, somebody's broken the cheater off the back. No need to use my cord . . . always forgetting them . . . such a hurry to get out after the job is done I forget the cord.

How about the controls? Marked on the chassis . . . ? Those engineers should have to work on some of their own monstrosities. What is this . . . intercarrier or conventional? Looks intercarrier. How many tubes in the sync . . . Mmmm. Horizontal oscillator — where the devil is it? The places they put tubes! Ah, at least this one has a spring mount base. That's the baby . . . oh, oh . . . wait . . don't pull it or you'll blow a fuse!

Off with the cord . . . change tubes . . . hope this *new* one is good! Now . . . let's see . . . before turning it on . . . Where's the fuse? In the box. Good. Lucky. Better open her up before turning it on again. May see something. Some case, that last one! Somebody just laid a new fuse on top of the old one! That set sure acted crazy. How about finger smears on the tubes? Yeh, they've been in here. Just feeling to see if they are hot. Hey! How about the trap . . . have they been at it, too? Yeh! Mm . . . doesn't look like they moved it. It looked O.K. when the set did play before . . .

Would the horizontal oscillator tube being bad explain lack of vertical sync? Might. If vertical draws voltage from the damper — damper works off horizontal . . . O.K. Let's see how she works . . . look at the people watching me! Every move I make. Probably figure I'm trying to cheat them . . . they should know. If I get out of this without a shop job, or an argument, I'll be happy.

Set's two years old . . . plenty trouble due any minute now. Original picture tube . . . funny, it looked bright in spite of its age . . . O.K. . . . she holds. How's that hold control? Whoops! Got to readjust the back to permit centering of front control. Where's that mirror . . . *That's alright . . . I'll just hold my own. Thanks!* Wonder if it was just the tube? How long should I let it play to be sure? Oh-oh-look at that width jumping! In and out an inch on each side! . . . Damper? Sound seems steady . . . vertical, too. Must be the 6BG — variation in screen current, maybe . . . lucky it's not a 6CD . . . lucky if it is just the tube. Hate to put one in . . . Nobody believes a tube can be four-eighty. When they hear six-sixty for a 6CD . . . Man! . . . Ouch! That tube's hot! Pry it out with a screw driver . . . burn your fingers! . . . Alright. Try again. When they saw that second tube come up their eyebrows went up too! Width . . . good . . . steady.

Focus? Where is it? Um, um. Linearity? Just a touch—O.K. That does it. How about the glass? Not too bad. Does the front come off? No! Too bad. I'm not going to pull out the chassis for that little dirt on the face. If I did, I'd surely be blamed for every future trouble. "It was working fine till *you* pulled out the chassis!" Glad this thing wasn't a series filament job . . . hate em.

Oh! Look at that ghost on Channel 9! . . . Sneak a look at the people . . . are they

(Continued on page 29)

Here are more data that will keep your RIDER'S DEPENDABLE REPLACEMENT PARTS LISTING published in TV Volume 10 up to date. This is also to be included in TEK-FILE Packs 58, 59, 60, 61, 63, 64, 67, 68, 70, 71, 75, and 76.

ADDITIONS:

Set Mfg.	Set Mfg.'s Original Part No.	Replacement Part Mfg. Name	Dependable Replacement Part No.	Remarks
Belmont	8C-17845	C. D.	C031	
"	8C-18487	C. D.	D078*	*Omit 125mf section
"	8C-19546	C. D.	BR2015A	
"	8C-19564	C. D.	BR1015	
Hallicrafters	45B173	C. D.	C036*	*Parallel sections
Motorola	25B710925	Stancor	A-3877	
Philco	30-2417-7	C. D.	BBR2-50T	
		Mallory	TC 302	
"	30-2570-57	C. D.	D 111	
		Mallory	FP 476	
"	30-2570-66	C. D.	XA 004	
		Mallory	FP 117	
"	30-2584-9	C. D.	D 111	Parallel sections
		Mallory	FP 344.5	
"	30-2584-10	Mallory	FP 225	
"	30-2584-15	C. D.	UPT 435	
		Mallory	FP 255-TC 72	
"	32-8242-11	Stancor	A-3823	
"	32-8522	Stancor	A-3825	
		Triad	F-21A	
Starrett	CO 1050-2	Aerovox	AFH-3-44	
"	CO 1050-3	Aerovox	AFH-4-14	
Stromberg-Carlson	161030	Stancor	C-2326	
Western-Auto	12C-18743	Stancor	A-3878	
		Triad	S-8X	
"	12M-18241-1	Stancor	A-8125	
		Triad	A-97X	

CORRECTION:

Western-Auto	12M-18241	Change A-99X to A-97X in Triad Sweep Transformers column.

CORRECTIONS FOR VARIABLE RESISTANCE CONTROLS LISTINGS:

Crosley	153348	Change P 128 to P1-128 in IRC Outer Shaft column.
Emerson	390156	Transpose DS-36 from Mallory Switch No. column to Inner Shaft column.
"	390181	Transpose DS-36 from Mallory Switch No. column to Inner Shaft column.
"	390183	Transpose DS-36 from Mallory Switch No. column to Inner Shaft column.
Firestone	78X12	Change QJ-375 to QJ-418 in IRC Stock No. column.

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ATTENTION AUTHORS:

We are soliciting articles concerning radio, television, and allied electronic maintenance. All aspects are of interest. Articles of 1,000 to 2,000 words are desired. Preference is given to subject matter which reflects practical work rather than theory. The presentation should be *direct*, to the *point*, and amply illustrated. Finished art work will be prepared by us from the roughs submitted. Photographs are welcome. The rate of payment is on a word basis — and, needless to say, good writing rates good pay!

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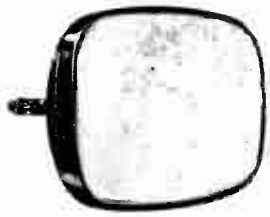
Longest experience with production . . . with applications . . . with improvements . . . all count. *CBS-Hytron-built* 1AX2, 1X2A, 6GQ6GT, 12A4, 12B4, 12BH7, 12BY7, 12BZ7, 25BQ6GT, 16RP4, etc. *are* more trouble-free. Prove it to yourself.

2. BY ENDLESSLY IMPROVING STANDARD TV TYPES.

Close co-operation with leading set makers alerts CBS-Hytron daily to needed betterments. Take one of endless examples: the CBS-Hytron 6CB6. You will find its clear, non-carbonized bulb eliminates undesirable loading effects at vhf.

3. BY APPLYING "RELIABLE" TUBE TECHNIQUES.

CBS-Hytron 6AL5 is typical. Experience with the military 6AL5 family (JAN 6AL5, 6097/CT, 5726) is passed on to you. You profit by a commercial CBS-Hytron 6AL5 made truly reliable.



4. BY MATCHING EACH TUBE TO THE SET.

Daily, CBS-Hytron analyzes leading TV chassis. Dynamic socket-by-socket checks, plus continuous field experience, pay off. Give you CBS-Hytron matched-to-the-set performance . . . with the accent on trustworthy replacements.

Take advantage of CBS-Hytron extras like these. Keep your customers happy. Guarantee yourself against profit-slicing call-backs. Demand dependable CBS-Hytron tubes.

NOW...TEST THE *EASY* TOPSIDE WAY!

Wish you could test a chassis topside? Without first pulling and wrestling with the heavy chassis? Without disturbing wiring and parts by digging underneath for buried sockets? How much faster, easier, safer you could work! New CBS-Hytron Test Adapter does the trick. Just replace a 7-pin miniature tube with the Test Adapter. Plug tube into Test Adapter. Presto, all socket connections are topside . . . within instant reach of your test prod or clip. Just one job pays for this new CBS-Hytron Test Adapter. Get yours today!

HERE'S HOW! With the CBS-Hytron Test Adapter, you quickly measure voltage, resistance, gain. You inject and trace signals . . . monitor intermittents. You check oscillating stages. Or the effect of adding a bypass condenser or shunt resistor.

With several CBS-Hytron Test Adapters you make stage-by-stage circuit checks . . . fast. You do all this dynamic testing the e-a-s-y way . . . topside. With no ill effects at a-f frequencies. And only slight capacitance and inductance effects at much higher frequencies.

You will like: The positive contact of the low-resistance, silver-plated base pins and test points. The plainly marked pin connections. The easy insertion and tight grip. CBS-Hytron Test Adapter is another designed-by-and-for-you "must" you must have. See your CBS-Hytron jobber today.

CBS HYTRON RADIO TUBES

MANUFACTURERS OF RECEIVING TUBES SINCE 1921
HYTRON
RADIO AND ELECTRONICS CO.
A DIVISION OF COLUMBIA BROADCASTING SYSTEM, INC.
DANVERS, MASSACHUSETTS

TV Set Functions With Transitors*

T. R. Kennedy Jr.

A complete portable television receiver functioned perfectly here today without radio vacuum tubes. Instead, it utilized thirty-seven bits of laboratory magic known as "transistors," which even now are said to perform nearly all the functions of the ordinary radio tube, and do some of them even better.

The video receiver, which was battery operated and about one-quarter the weight and size of an ordinary home table model set, was only one of a number of familiar electronic devices such as home and automotive radios, record players and public address systems — using only transistors — demonstrated for the first time as a "transistor application progress report" in this new field by the David Sarnoff Research Center of the Radio Corporation of America.

The only conventional type of vacuum tube in the video set was its own self-contained picture tube, on which the image was created.

And even that last conventional radio tube in the home video may in time give way to a newer device patterned after the transistor. Dr. E. W. Engstrom, vice president of the R.C.A. Laboratories Division, expressed such views as the new transistor-operated devices were demonstrated for newspaper men and technical writers, who saw them for the first time.

"Even now we are thinking along such lines," he said. "Tomorrow's video screen may be something entirely different than we have in today's sets. We have seen more progress in four years of transistor development in the laboratory than in twenty for the radio tube."

Great Cost Production Seen

Dr. Engstrom explained that the small size of the viewing screen of the receiver demonstrated — five inches wide — had nothing to do, however, with the transistors inside the unit, which provided only the amplification of the signal and converted it to something the viewing screen could turn into a moving image. The laboratories had only tried to eliminate the thirty-seven ordinary tubes.

With transistors in use, however, the largest element of cost in the ordinary home video set except the viewing screen — the power needed to light twenty-four to thirty ordinary tube filaments — might be reduced almost to nil. It was Dr. Engstrom's estimate that tomorrow's video receivers with full complement of transistors and the usual cathode-ray viewing screen might be, when production is stepped up, "something about half of today's costs."

For those not familiar with transistor history, Dr. Engstrom explained that the original device was a product of the work of Dr. William Shockley and associates of the Bell Telephone Laboratories in 1948, and since then under intensive development in many electronic laboratories, including the R. C. A.'s.

In the various branches of the laboratories the visitors saw transistors being made from refined bars of metal called "germanium," which must be first purified, then contaminated with other elements to achieve the required end of being good amplifiers and generators of electric currents — "better than most radio tubes and far more versatile than many."

When the germanium bars are finished they are sliced up into minute particles, the bits, mounted in plastic holders, "cat whiskers" of fine wires applied through which small voltages are applied from batteries. The result is amplification of a radio signal, without the heated filaments in ordinary vacuum tubes.

Reprinted through courtesy of The New York Times.

RIDER · TEK-FILE INDEX

PACKS 1–77

HOW TO USE THIS INDEX

To locate service data instantly, all you need to know is the manufacturer's name and the model or chassis number of the set.

The index is compiled alphabetically, according to manufacturer. Note the column headings at the top of each page: MODEL, PACK-FILE, PAGES.

Model numbers run in numerical sequence, starting with the smallest number under a manufacturer's name. This applies also to model numbers using letters. (i.e. model AR precedes model CG). Model numbers starting with letters precede model numbers starting with numbers.

Under the column PACK-FILE, the first number is the TEK-FILE Pack number, and the second number is the File number.

Under the column headed PAGES, the first and second numbers indicate the page where the information starts; the last number shows where the data is concluded.

As an example, let's look up ADMIRAL model 36X36AS. It shows that the information is in (1-1) Pack No. 1, ADMIRAL, File No. 1. The data (8=23-46) starts on page 8-23 and runs through page 8-46. There is also data on the ADMIRAL record changer model RC 550. It's in (1-RC2) TEK-FILE Pack No. 1, in ADMIRAL Record Changer File No. 2, The data begins on page 21-9 and ends on page 21-16.

If you remove the pages from the TEK-FILE Files and insert them in the TEK-FILE binder, you can disregard the PACK-FILE column and refer to the PAGES only.

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S7C20, S7C30	32-2	7=1-14
S7C20, S7C30, Rev.	32-2	9=11-18
S7C70, S7T65	32-2	7=1-12
S-1015, S-1020, S-1030	32-2	5=8-12
S-1055	32-2	5=10-14
		7=1-12
S-1055X	32-2	7=1-12
S-1060, S-1066	32-2	5=10-14
		7=1-12
S20C10, S20T20	32-2	9=11-18
7C42, 7C52, 7T32	61-3	10=1-11
721, 775T	61-3	10=1-11
42.55, 42.64, Tuners used with 'S' Series	32-2	9=3-10
THE FIRESTONE TIRE & RUBBER CO.		
13-G-44, 13-G-45	4-1	8=10-24
13-G-51, 13-G-52	4-1	8=25-39
13-G-53, 13-G-54, Ch. 700-90, 700-96	4-1	8=40-51
13-G-55, Ch. 700-93	4-1	8=40-51
13-G-56	4-1	8=52-59
13-G-57	4-1	8=1-9
Record Changer VM-950	4-RC1	RCH22=1-16
13-G-58, 13-G-59, 13-G-79, Ch. 700-96	4-1	8=60-70
13-G-110, Code 334-2-MS31C/A	61-3	10=1-10
13-G-115, 13-G-118, 13-G-119, 13-G-120, Code 334-2-MS31C/A	61-3	10=1-10
700-90, 700-93, Ch.	4-1	8=40-51
700-96, Ch., 13-G-53, 13-G-54	4-1	8=40-51
700-98, Ch., 13-G-58, -59, -79	4-1	8=60-70
FRANKLIN AIRLOOP CORP.		
500-A-10, Tuner	4-1	8=1-2
FREED-EISEMANN See FREED RADIO CORP.		
FREED RADIO CORP. (FREED-EISEMANN)		
54, 55, 56, 68, Ch. 1620C	32-1	5=1-7
101, 102, 103, 104, Ch. 1900	32-1	5=8-10
110, 111, 112, Ch. 700-120	50-2	9=1-8
121	50-2	9=9-14
700-120, Ch.	50-2	9=9-14
1820C, Ch.	32-1	5=1-7
1900, Ch.	32-1	5=8-10
GAMBLE-SKOGMO, INC. (CORONADO)		
05RA4-43-8935A	31-2	6=1-6
05TV1-43-9014A, Ch. 16AY210	31-2	6=7-16
05TV2-43-8950A	31-2	6=17-26
05TV2-43-9010A	31-2	6=17-26
05TV6-43-8935A	31-2	6=1-6
15RA2-43-9105A, Ch. 16AY210	31-2	6=7-16
15TV1-43-8957A	5-1	8=1-8
15TV1-43-8958A	31-2	9=1-8
15TV1-43-9008A	5-1	8=9-18
15TV1-43-9015A, 15TV1-43-9016A	5-1	8=1-8
15TV1-43-9020A, 15TV1-43-9021A	31-2	9=1-8
15TV2-43-9101A, 15TV2-43-9102A	5-1	8=19-27
Record Changer VM-950	5-RC1	RCH22=1-16

MODEL	PACK-FILE	PAGES
GAMBLE-SKOGMO, INC. (Cont'd)		
15TV2-43-9025A	5-1	8=28-35
15TV2-43-9025B	5-1	8=28-38
15TV2-43-9026A	5-1	8=26-35
15TV2-43-9026B	5-1	6=28-38
15TV4-7003U, Ch.	5-1	6=39-46
15TV4-43-8946A, 15TV4-43-6949A, Ch. 15TV4-7003U	5-1	8=39-46
16AY210, Ch.	31-2	6=7-16
25TV2-43-9022A	62-4	10=1-10
94TV2-43-8972A, 94TV2-43-8973A	32-3	5=1-8
94TV2-43-6967A	32-3	5=1-8
94TV2-43-6993A, 94TV2-43-6994A, 94TV2-43-6995A	32-3	5=1-8
94TV6-43-6953A	32-3	5=9-14
GAROD RADIO CORP.		
12C4, 12C5; 94 Series	19-1	5=1-14
12T2, 12T3, 12T6; 94 Series	19-1	5=1-14
14C4, 94 Series	19-1	5=1-14
14CT4, 97, 98 Series	19-1	5=1-20
14T2, 14T6; 94 Series	19-1	5=1-14
16C4, 16C5, 16C6; 94 Series	19-1	5=1-14
16CT4, 16CT5; 97, 98 Series	19-1	5=1-20
16T2, 16T3; 94 Series	19-1	5=1-14
19C6, 19C7; 97, 98 Series	19-1	5=1-20
1042, 1042G Late	19-1	5=1-14
1042GU, 1042T Late	19-1	5=1-14
1043, 1043G Late	19-1	5=1-14
1043GU, 1043T Late	19-1	5=1-14
1142 Late, 1143 Late	19-1	5=1-14
1244, 1244G Late, 1244GU	19-1	5=1-14
1244T Late, 1244TX	19-1	5=1-14
1245, 1245G Late, 1245GU	19-1	5=1-14
1245T Late, 1245TX	19-1	5=1-14
1344 Late, 1345 Late	19-1	5=1-14
1348	19-1	5=1-14
1546, 1546G Late, 1546GU	19-1	5=1-14
1546T Late	19-1	5=1-14
1547, 1547G Late, 1547GU	19-1	5=1-14
1547T Late	19-1	5=1-14
1548, 1548G Late, 1548GU	19-1	5=1-14
1548T Late	19-1	5=1-14
1549, 1549G Late, 1549GU	19-1	5=1-14
1549T Late	19-1	5=1-14
1646, 1647, 1648, 1649; Late	19-1	5=1-14
1671, 97, 98 Series	19-1	5=15-17
1672, 1673, 1674, 1675; 97, 98 Series	19-1	5=18-20
1900, 97, 98 Series	19-1	5=1-20
1974, 1975; 97, 98 Series	19-1	5=18-20
2042T Late, 2043T Late	19-1	5=1-14
2546T, 2547T, 2548T, 2549T; Late	19-1	5=1-14
GENERAL ELECTRIC CO.		
10C101, 10C102	19-2	5=1-11
10T1. 10T4, 10T5, 10T6	19-2	5=1-11
12C101. 12C102, 12C105	19-2	5=25-34
12C107, 12C106, 12C109, B Version	19-2	5=35-47
12K1	19-2	5=12-24
Record Changer GE P14	19-RC1	RCH21=5-12
12T1	19-2	5=25-34
12T3, 12T4	19-2	5=25-44
12T3, 12T4, B Version	19-2	5=35-47
12T7	31-4	6=1-11
14C102, 14C103	31-4	6=12-21
14T2, 14T3	31-4	6=12-21
16C110, 16C111	31-4	6=35-44
16C113	19-3	7=1-10
16C115	31-4	6=35-44
16C116	19-3	7=1-10
16K1, 16K2	31-4	6=22-34
16T1, 16T2	31-4	6=35-44
16T3, 16T4	19-3	7=1-10
17C101, 17C102	19-3	7=1-12
GENERAL ELECTRIC CO. (Cont'd)		
17C103, 17C104, 17C105	5-1	6=21-32
17C107, 17C108, 17C109	5-1	8=21-32
17C110, 17C111	5-1	8=1-20
17C112	50-5	9=1-8
17C113	50-5	9=9-24
17C114	50-5	9=1-6
17C115	50-5	9=9-24
17C117	50-5	9=9-24
17C120	50-5	9=9-24
17T1, 17T2, 17T3	5-1	6=21-32
17T4, 17T5, 17T6	50-5	9=1-8
17T7	50-5	9=9-24
19C101	5-1	6=33-44
20C105, 20C106	63-7	10=39-53
20C150, 20C151	62-6	10=1-22
20T2, 21C200	63-7	10=39-53
24C101	62-6	10=23-38
815	19-3	7=13-22
GENERAL INSTRUMENT CORP.		
44, Tuner	35-2	5=1-4
45, Electuner	31-1	6=1-6
THE HALLICRAFTERS CO.		
B919120, Ch.	49-5	9=17-24
C919120, Ch.	35-4	5=1-10
D1000D, Ch.	63-5	10=25-38
D919120, Ch.	26-2	6=1-6
E800D, Ch.	49-5	9=25-36
E900D, Ch.	63-6	10=1-11
F900D, Ch.	63-6	10=1-11
G900S, Ch.	49-5	9=67-64
J600D, Ch.	49-5	9=25-36
K800D, Ch.	49-5	9=25-36
K1000D, Ch.	64-7	10=45-56
L800D, Ch.	49-5	9=53-66
L900D, Ch.	49-5	9=37-52
L1000S, Ch.	64-7	10=59-68
L919120, Cn.	28-2	6=21-28
M800S, Ch.	6-1	6=1-16
M900D, Ch.	49-5	9=37-52
P600S, Ch.	49-5	9=67-64
Q1000D, Ch.	64-7	10=45-58
R900D, Ch.	49-5	9=37-52
R1000D, Ch.	64-7	10=45-56
U600S, Ch.	49-5	9=67-64
U1000D, Ch.	63-6	10=25-38
Y800D, Ch.	63-6	10=12-24
603, 604	64-7	10=39-44
660, 661, Ch. B919120, Run 3	49-5	9=17-24
690, Ch. B919120, Run 3	49-5	9=17-24
715, 715A, Ch. B919120, Run 3	49-5	9=17-24
716, 717, Ch. C919120	35-4	5=1-10
730, 731, Ch. C919120	35-4	5=1-10
740, 741, Ch. C919120	35-4	5=1-10
745, Ch. D919120	28-2	6=1-6
747, 748, Ch. D919120	26-2	6=1-8
750, 751, Ch. D919120	28-2	6=1-8
760, 761, Ch. D919120	28-2	6=1-6
805, 806, Ch. M600S	6-1	6=1-16
810, Ch. M800S	6-1	8=1-16
810A	28-3	9=1-14
810C, Ch. M800S	6-1	6=1-16
811	6-1	6=17-28
811, Ch. E800D, Runs 2-6	49-5	9=25-36
615	28-3	7=1-11
616	26-2	6=9-20
616, Ch. K800D, Runs 2-6	49-5	9=25-36
820, 821	6-1	6=17-28
820, 821, Ch. E600D, Runs 2-6	49-5	9=25-36
622	28-3	7=12-22
632, 633, Ch. L919120	28-2	6=21-26
660, 661	6-1	6=17-28
Record Changer GENERAL INSTRUMENT 700F	6-RC1	RCH19=1-10
860, 861, Ch. E600D, Runs 2-6	49-5	9=25-36
Record Changer GENERAL INSTRUMENT 700F	49-RC1	RCH19=1-10
870, 671	28-3	7=1-11
THE HALLICRAFTERS CO. (Cont'd)		
880	28-3	9=1-14
14806, Ch. R900D, Runs 1, 2	49-5	9=37-52
14808A, Ch. D1000D, Run 1	63-6	10=25-36
14808B, Prelim.	28-3	9=15-16
14808B, Ch. U1000D, Run 1	63-6	10=25-38
17804C, Ch. L600D, Runs 1-3	49-5	9=53-66
17610C, 17610M, 17610MG, Ch. G900S, P600S, U600S, Run 1	49-5	9=67-64
17811-H, Ch. Y800D, Runs 1-3	63-6	10=12-24
17612, 17613, Ch. L800D, Runs 1-3	49-5	9=53-66
17814, Ch. F900D, Run 1	63-6	10=1-11
17815-H, Ch. L600D, Runs 1-3	49-5	9=53-66
17816, 17817, Ch. Y600D, Runs 1-3	63-6	10=12-24
17819, Ch. L600D, Runs 1-3	49-5	9=53-66
17824, 17625, Ch. L800D, Runs 1-3	49-5	9=53-66
17638, Ch. L800D, Runs 1-3	49-5	9=53-66
17848, 17649, 17650, Ch. L800D, Runs 1-3	49-5	9=53-66
17660-H, 17661-H, Ch. Y800D, Runs 1-3	63-6	10=12-24
17905, Ch. L1000S, Run 1	64-7	10=59-68
20623, Ch. M900D, Run 1	49-5	9=37-52
20623B, Ch. L900D, Run 1	49-5	9=37-52
20823C, Ch. R1000D, Run 1	64-7	10=45-58
20872, Ch. G900S, P600S, U800S, Run 1	49-5	9=67-84
20882, Ch. E900D, Runs 1, 2	63-6	10=1-11
20990, 20990S, Ch. J800D	49-5	9=25-36
Record Changer GENERAL INSTRUMENT 700F	49-RC1	RCH19=1-10
20994, Ch. J600D	49-5	9=25-36
Record Changer GENERAL INSTRUMENT 700F	49-RC1	RCH19=1-10
21923, Ch. Q1000D, Run 1	64-7	10=45-56
21928, Ch. K1000D, Run 1	64-7	10=45-56
21940, Ch. Q1000D, Run 1	64-7	10=45-58
THE HERTNER ELECTRIC CO. (PRECISION)		
L-10	35-1	5=1-12
HOFFMAN RADIO CORP.		
Tuner	29-2	6=1-4
RF-6, RF-7, RF-8, Tuners	29-3	9=11-16
7B104, 7B303, Ch. 190, 190B	64-5	10=1-24
7M103, 7M302, Ch. 190, 190B	64-5	10=1-24
7P105, 7P304, Ch. 190, 190B	64-5	10=1-24
20B102, Ch. 183T	65-6	10=25-32
20B102F, Ch. 194	64-5	10=1-24
20B501, Ch. 183T	65-6	10=25-32
20M101, Ch. 183T	65-6	10=25-32
20M101F, Ch. 194	64-5	10=1-24
20M500, 20P502, Ch. 163T	65-6	10=25-32
21B107, 21B301, Ch. 191, 191B	64-5	10=1-24
21B504, 21B701, Ch. 191, 191B	64-5	10=1-24
21B901, Ch. 192	64-5	10=1-24
21M106, 21M300, Ch. 191, 191B	64-5	10=1-24
21M503, 21M700, Ch. 191, 191B	64-5	10=1-24
21M900, Ch. 192	64-5	10=1-24
21P108, 21P505, 21P702, Ch. 191, 191B	64-5	10=1-24
21P902, Ch. 192	64-5	10=1-24
24B707, 24M708, Ch. 187, 187B, 167C	29-3	9=1-10
140, 142, Ch., Rev.	35-4	5=8-16
149, Ch.	35-4	5=6-16
150, Ch.	35-4	5=7-16
151, 152, Ch.	35-4	5=17-24
153, Ch.	29-3	7=1-5
154, Ch.	35-4	5=1-5
155, Ch.	35-4	5=1-5 5=7
156, 157, Ch.	29-3	7=3 7=6-21
158, Ch.	35-4	5=1-7
HOFFMAN RADIO CORP. (Cont'd)		
159, 160, Ch.	29-2	6=5-14
164, Ch.	29-3	7=3 7=6-21
170, 171, Ch.	29-2	6=15-28
172, Ch.	29-3	7=22-30
173, Ch.	29-2	6=15-26
174, Ch.	29-3	7=22-30
175, Ch.	29-2	6=15-28
176, Ch.	29-3	7=22-30
180, Ch.	6-1	8=26-34
183, Ch.	6-1	8=8-25
163B, 183M, 183T, Ch.	65-6	10=25-32
184, 185, 186, Ch.	6-1	8=8-25
167, 187B, 187C, Ch.	29-3	9=1-10
190, 190B, 191, 191B, Ch.	64-5	10=1-24
192, 194, Ch.	64-5	10=1-24
600, Ch. 154	35-4	5=1-15
601, Ch. 155	35-4	5=1-5 5=7
610, Ch. 140, Rev.	35-4	5=6-16
612, Ch. 142, Rev.	35-4	5=6-16
613, Ch. 149	35-4	5=6-16
620, 621, Ch. 155	35-4	5=1-5 5=7
622, 623, Ch. 149	35-4	5=8-16
630, 631, Ch. 159	29-2	6=5-14
630, 631, Cn. 170	29-2	6=15-28
632, 633, Ch. 160	29-2	6=5-14
632, 633, 634, 635, Ch. 171	29-2	6=15-28
636, 637, Ch. 183	6-1	6=8-25
636B, 637B, Ch. 183B, 183M	65-6	10=25-32
638, 639, Ch. 160	6-1	8=26-34
630, 631, 632, Ch. 151	35-4	5=17-24
636, 637, 640, Ch. 153	29-3	7=1-5
841, 642, 643, Ch. 158	35-4	5=1-7
646, Ch. 151	35-4	5=17-24
647, 646, 649, Ch. 156	29-3	7=3 7=6-21
850, 851, 652, Ch. 151	35-4	5=17-24
856, 857, 658, Cn. 153	29-3	7=1-5
860, 661, 862, Ch. 157	29-3	7=3 7=6-21
666, 667, 868, Ch. 171	29-2	6=15-28
666A, 867A, 868A, Ch. 173	29-2	6=15-28
670, 671, 672, Ch. 170	29-2	6=15-28
676, 677, 878, Ch. 171	29-2	6=15-28
876A, 677A, 876A, Ch. 173	29-2	6=15-28
860, 681, 862, 663, 864, 665, 666, 667, Ch. 163	6-1	6=6-25
666B, 667B, Ch. 163B, 163M	65-6	10=25-32
690, 691, 692, Ch. 175	29-2	6=15-26
693, 694, 695, Ch. 165	6-1	6=6-25
Record Changer VM-950 or WEBSTER 100	6-RC1	RCH22=1-16 RCH21=1-10
696, 697, Ch. 165	6-1	8=8-25
896B, 697B, Ch. 183T	65-6	10=25-32
914, 915, 916, Ch. 150	35-4	5=7-16
917, 916, 920, Ch. 152	35-4	5=17-24
921, Ch. 150	35-4	5=7-16
930, 931, 932, Ch. 150	35-4	5=7-16
936, 937, 936, Ch. 152	35-4	5=17-24
946, 947, 946, Ch. 164	29-3	7=3 7=6-21
950, 951, 952, Ch. 172	29-3	7=22-30
950A, 951A, 952A, Ch. 174	29-3	7=22-30
953, 954, 955, Ch. 164	6-1	8=8-25
Record Changer VM-950 or WEBSTER 100	6-RC1	RCH22=1-16 RCH21=1-10
960, 961, 962, Ch. 176	29-3	7=22-30
963, 964, 965, Ch. 186	6-1	8=6-25
Record Changer VM-950 or WEBSTER 100	6-RC1	RCH22=1-16 RCH21=1-10
HYDE PARK See MACY'S		
INTERSTATE STORES BUYING CORP. (PLYMOUTH)		
AR-21, AR-21B	50-2	9=1-16

MODEL	PACK-FILE	PAGES
INTERSTATE STORES BUYING CORP. (Cont'd)		
AR-71, AR-71B	50-2	9=1-16
AR-73L	50-2	9=1-16
ARC-21, ARC-21B	50-2	9=1-16
ARC-71, ARC-71B	50-2	9=1-16
ARD-21M, ARD-22B	50-2	9=1-16
ARD-72, ARD-72B	50-2	9=1-16
250, 350	35-1	5=1-11
750	35-1	5=1-11
P1650T	35-1	7=1-8
P1652, P1653	35-1	7=1-8
P1751, P1752, P1753	35-1	7=1-8
P2052	35-1	7=1-8
JACKSON INDUSTRIES, INC.		
114G, Ch.	6-1	8=1-8
114H, Ch.	65-2	10=10-17
116G, 117G, Ch.	6-1	8=1-8
117H, Ch.	65-2	10=10-17
120G, Ch.	6-1	8=1-8
120H, Ch.	65-2	10=10-17
217A, 217B, Ch.	65-2	10=1-9
220A, 220B, Ch.	65-2	10=1-9
221A, 221B, Ch.	65-2	10=1-9
1400T, Ch. 114G, 116G, 117G, 120G	6-1	8=1-8
1700C, 1700T, Ch. 114G, 116G, 117G, 120G	6-1	8=1-8
1700T, Ch. 117H	65-2	10=10-17
2000C, Ch. 114G, 116G, 117G, 120G	6-1	8=1-8
2000C, 2000CD, 2000CDB, Ch 120H	65-2	10=10-17
3170C, Ch. 114G, 116G, 117G, 120G	6-1	8=1-8
Record Changer VM-950	6-RC1	RCH22=1-16
5120C, Ch. 114G, 116G, 117G, 120G	6-1	8=1-8
Record Changer VM-950	6-RC1	RCH22=1-16
KAYE-HALBERT CORP.		
Cambridge, Hideaway	30-2	6=1-7
Normandy, Windsor	30-2	6=1-7
014, 024, Ch. 253	6-1	8=1-6
044, 045, 046, Ch. 253	6-1	6=1-6
074, 076, 077, Ch. 253	6-1	8=1-8
231, Ch	30-2	6=1-7
231, 232, 233, Ch. 231, 242	30-2	6=1-7
234, Ch. 231, 242, Hideaway	30-2	6=1-7
235, Ch. 231, 242, Windsor	30-2	6=1-7
236, Ch. 231, 242, Normandy	30-2	6=1-7
237, Ch. 231, 242, Cambridge	30-2	6=1-7
238, Ch. 231, 242	30-2	6=1-7
239, Ch. 231, 242, Hideaway	30-2	6=1-7
240, Ch. 231, 242, Windsor	30-2	6=1-7
242, Ch	30-2	6=1-7
252, Ch	6-1	8=1-6
421, Ch. 253	6-1	8=1-6
724, 724, Ch. 253	6-1	8=1-6
731, 733, Ch. 231, 242	30-2	6=1-7
744, 745, Ch. 253	6-1	8=1-6
777, Ch. 253	6-1	6=1-6
914, Ch. 253	6-1	8=1-8
MACY ASSOCIATES See MACY'S		
MACY'S		
AR14L, Ch. TVG, Artone, Hyde Park	7-1	9=21-30
AR-16 T-66, Artone	7-2	9=31-38
AR17L, Ch. TVG, Artone, Hyde Park	7-1	9=21-30
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19K2BE, 19K2E, Ch. TS-119, TS-119A	9-1	8=25-38
19K3, Ch. TS-101	47-5	7=57-65
19K4, 19K4B, Ch. TS-101	47-5	7=57-65
20F1, 20F1B, Ch. TS-119, TS-119A Record Changer MOTOROLA RC-36A	9-1 9-RC1	8=25-38 RCH21=1-16
20F2, 20F2B, Ch. TS-119B, TS-119C Record Changer MOTOROLA RC-36A	9-1 9-RC1	8=25-38 RCH21=1-16
20K1, 20K1B, 20K2, Ch. TS-119B, TS-119C	9-1	8=25-38
20K3, 20K3B, Ch. TS-119D	67-7	10=51-58
20K4, 20K4B, Ch. TS-119D	67-7	10=51-58
20K6, 20K6B, Ch. TS-307	70-8	10=42-50
20T1B, Ch. TS-119B, TS-119C	9-1	8=25-38
20T2, Ch. TS-119D	67-7	10=51-58
20T2A, Ch. TS-307	70-8	10=42-50
20T2B, Ch. TS-119D	67-7	10=51-58
20T2BA, Ch. TS-307	70-8	10=42-50
20T3, 20T3B, Ch. TS-307	70-8	10=42-50
21F1, 21F1B, Ch. TS-351	70-8	10=13-41
21K1, 21K1B, Ch. TS-351	70-8	10=13-41
21K2, 21K2B, Ch. TS-351	70-8	10=13-41
21K3, 21K3B, 21K3W, Ch. TS-351	70-8	10=13-41
21T1, 21T1B, Ch. TS-351	70-8	10=13-41
21T2, 21T2B, Ch. TS-351	70-8	10=13-41
M. P. TELEVISION		
16T503, 17T504	9-1	8=1-4
MULTIPLE TELEV. MFG. CO.		
EC20, Ch. 630K3B	9-1	8=1-2
HFD17, HFD20, Ch. 630K3B	9-1	8=1-2
LFD17, LFD20, Ch. 630K3B	9-1	8=1-2
OF17, OF20, OF20R, Ch. 630K3B	9-1	8=1-2
630K3B, Ch.	9-1	8=1-2

MODEL	PACK-FILE	PAGES
MUNTZ T-V, INC.		
M31, Ch. TV17A2	36-1	6=1-12
M31R, Ch. TV17A3	36-1	6=1-12
M32, M32R, Ch. TV17A3	36-1	6=1-12
M33, M34, Ch. TV17A4	36-1	6=1-12
M41, M42, Ch. TV17A3A	36-1	6=1-12
M46, M49, Ch. TV17A7	36-1	6=1-12
TV17A2, Ch.	36-1	6=1-12
TV17A3, TV17A3A, Ch.	36-1	6=1-12
TV17A4, TV17A7, Ch.	36-1	6=1-12
WG2060	51-2	9=13-20
17B1, 17B2, 17B3, 17B4, Ch.	51-2	9=1-12
17B4, Carco, Ch.	67-3	10=1-10
17B5, 17B6, Ch.	51-2	9=1-12
17B6, Carco 17B6, Ch.	67-3	10=1-10
*1750, 1751, 1752, Ch. TV17A3A	36-1	6=1-12
*2053, 2054, 2055, 2056, Ch. TV17A7	36-1	6=1-12
2053-A, 2054-A, 2055-A, Ch. 17B1, 17B2	51-2	9=1-12
2055-B, Ch. 17B2	51-2	9=1-12
2056-A, Ch. 17B1, 17B2	51-2	9=1-12
2158-A, 2159-A, Ch. 17B5		
2158-A, 2159-A, Ch. 17B6, Carco 17B6, Late	67-3	10=1-10
2162-A, Ch. 17B5, 17B6	51-2	9=1-12
2162-A, Ch. 17B6, Carco 17B6, Late	67-3	10=1-10
2457-A, Ch. 17B3, 17B4	51-2	9=1-12
2457-A, 2461-A, Ch. Carco 17B4, Late	67-3	10=1-10
NATIONAL CO., INC.		
TV1701	67-1	10=1-12
NORELCO See NORTH AMERICAN PHILLIPS CO., INC.		
NORTH AMERICAN PHILLIPS CO., INC. (NORELCO)		
The Irvington	38-1	6=1-11
The Mt. Vernon	38-1	6=1-11
PT200, Ch.	38-1	6=1-11
PT200, Ch. PT200, The Irvington	38-1	6=1-11
PT300, Ch. PT200, The Mt. Vernon	38-1	6=1-11
OLYMPIC RADIO & TELEV. INC.		
Broadmoor	44-1	6=1-12
Catalina	44-1	6=1-15
Challenger	44-1	6=1-12
Lancaster, Marlborough	44-1	7=1-8
Monte Carlo	44-1	6=1-12
Prince George	44-1	6=1-15
Riviera	44-1	6=1-12
Riviera Deluxe	44-1	7=1-8
Windsor	44-1	7=1-8
DX-214, DX-215, DX-216	44-1	4=1 5=1-8
DX-819, DX-820	44-1	5=1-7
DX-821	44-1	5=1-7 6=13-15
DX-822	44-1	5=1-7
DX-931, DX-932	44-1	5=1-7
DX-950	44-1	5=1-7
TG, Ch.	67-2	10=1-9
TH, Ch.	67-2	10=10-16
XL-210, XL-211	44-1	5=8-14
XL-812, XL-813	44-1	5=8-14
17C24, 17K31, 17K32, Ch. TG	67-2	10=1-9
17T20, 17T33, Ch. TG	67-2	10=1-9
21C28, 21D29, Ch. TH	67-2	10=10-16
21K26, 21T27, Ch. TH	67-2	10=10-16
752, Riviera	44-1	8=1-12

* See Muntz HANDY No. 6, Pack 36

MODEL	PACK-FILE	PAGES
OLYMPIC RADIO & TELEV. INC. (Cont'd)		
758U	44-1	6=1-12
753, Monte Carlo	44-1	6=1-12
753U	44-1	6=1-12
755, Challenger	44-1	6=1-12
755U	44-1	6=1-12
762, Riviera Deluxe	44-1	7=1-8
764, Broadmoor	44-1	6=1-12
764U	44-1	6=1-12
766, Catalina	44-1	6=1-15
766U, 767	44-1	6=1-12
769, Prince George	44-1	6=1-15
783	44-1	7=1-8
967, Windsor	44-1	7=1-8
968, Lancaster	44-1	7=1-8
970, Marlborough	44-1	7=1-8
PACKARD-BELL CO.		
2001-TV, 2002-TV	44-2	5=1-8
2091-TV, 2092-TV	44-2	5=3-8
2101, 2102, Ch. 2101-2	44-2	7=1-9
2101-2, Ch.	44-2	7=1-9
2105,2105A, Ch. 2101-2	44-2	7=1-9
2202-TV, 2204-TV	44-2	7=10-16
2111, Ch. 2111-2	52-3	9=15-20
2111-2, Ch.	52-3	9=15-20
2112, 2113, Ch. 2111-3	52-3	9=15-20
2114, Ch. 2114	52-3	9=15-20
2114, Ch.	52-3	9=15-20
2115, Ch. 2115-2	71-4	10=1-10
2115-2, Ch.	71-4	10=1-16
2116, DeLuxe, Standard, Ch. 2115-2	71-4	10=1-10
2117, DeLuxe, Standard, Ch. 2117	71-4	10=1-10
2117, Ch.	71-4	10=1-10
2116	71-4	10=17-26
2301, 2302	9-1	6=1-13
2311	52-3	9=1-14
2421, Ch. 2421-2	71-4	10=27-39
2421-2, Ch.	71-4	10=27-39
2422, DeLuxe, Standard, Ch. 2421-2	71-4	10=27-39
2423, DeLuxe, Standard, Ch. 2423-2	71-4	10=27-39
2423-2, Ch.	71-4	10=27-39
2601-TV	44-2	5=9-14
2602	44-2	7=1-9 8=14-19
2611	52-3	9=21-24
Record Changer VM-960	52-RC1	RCH22=1-16
2612, Ch. 2115-2	71-4	10=11-16
2692-TV	44-2	5=9-14
2801-TV, 2801A-TV	44-2	6=1-7
2803	9-1	8=1-13
Record Changer WEBSTER 100	9-RC1	RCH21=1-10
2611	52-3	9=1-14
Record Changer WEBSTER 100	52-RC1	RCH21=1-10
2611, Late	52-3	9=1-14
2622, Ch. 2822	71-4	10=27-39
2822, Ch.	71-4	10=27-39
PATHE TELEVISION CORP.		
TAP, Ch.	10-1	8=1-5
14-PT	10-1	8=6-11
17-N25, Ch. TAP	10-1	8=1-5
17-PC	10-1	8=6-11
17-RPC, 17-RPT, Ch. TAP	10-1	8=1-5
PHILCO CORP.		
RC-1 Remote Control Unit	10-1	8=1-4
C-2, CP-1, Ch.	22-3	9=1-16
D-1, D-4, Ch.	22-3	9=17-32
F-2, Ch.	22-3	9=1-16
G-1, Ch.	71-6	10=1-12
G-2, Ch.	68-7	10=13-21
G-4, Ch.	68-7	10=22-34
J-1, Ch.	68-7	10=35-44
33, 35, 37, 38, Ch.	22-3	9=1-16
41, Ch.	22-3	9=17-32
42, Ch.	68-7	10=13-21
44, Ch.	22-3	9=17-32
44, Ch.	68-7	10=22-34
50-T1104, Codes 121, 122	34-4	5=1-6 6=16-20
50-T1105, Codes 121, 122	34-4	5=1-6 6=19-20
50-T1106	34-4	5=1-6 6=19-20
50-T1403, Code 125	34-4	5=7-16 6=29-32
50-T1404, Codes 123, 124, 125	34-4	5=7-16 6=29-32
50-T1406, Codes 123, 124, 125	34-4	5=7-16 6=29-32
50-T1432, Code 124	34-4	5=7-16 6=29-32
50-T1443, Codes 122, 123	37-5	6=33-43
50-T1476, 50-T1479	37-5	6=44-54
50-T1476, 50-T1477	37-5	6=44-54
Record Changer PHILCO M-20	37-RC1	RCH20=1-16
50-T1461, 50-T1482	37-5	6=44-54
Record Changer PHILCO M-20	37-RC1	RCH20=1-16
50-T1483	22-2	7=1-10
50-T1464	37-5	6=44-54
50-T1600, Code 121	34-4	5=17-23
50-T1600, Code 122	22-2	7=11-17
50-T1630, Code 121	22-2	7=18-21 5=17-23
50-T1630, Code 122	22-2	7=16-32
50-T1632, 50-T1633, Code 121	34-4	5=17-23
50-T1632, 50-T1633, Code 122	22-2	7=11-17
50-702, Code 122	37-5	6=9-17 5=17-23
51-PT1207, 51-PT1208	10-1	6=5-12
51-PT1234	10-1	6=5-12
51-PT1282	10-1	6=5-12
Record Changer PHILCO M-22	10-RC2	RCH22=1-12
51-T1443B, 51-T1443L, 51-T1443M	22-2	7=33-40
51-T1443PL, 51-T1443PM, 51-T1443PW	22-2	7=41-50
51-T1443X, 51-T1443XL	22-2	7=33-40
51-T1601, 51-T1601T, 51-T1602, Codes 121, 122	22-2	7=51-56
51-T1634, Codes 123, 124	22-2	7=51-58
51-T1636, 51-T1636L, Code 123	10-1	8=14-31
51-T1638, Code 124	10-1	8=14-31
51-T1670, 51-T1672, Code 121	10-1	8=14-31
Record Changer PHILCO M-22	10-RC2	RCH22=1-12
51-T1674, 51-T1674L, Code 121	10-1	8=14-31
Record Changer PHILCO M-22	10-RC2	RCH22=1-12
51-T1675, Code 121	10-1	8=14-31
Record Changer PHILCO M-20	10-RC1	RCH20=1-16
51-T1676, Code 124	10-1	8=14-31
Record Changer PHILCO M-20	10-RC1	RCH20=1-16
51-T2134, 51-T2136, 51-T2136, Code 124	10-1	8=14-31
51-T2175, 51-T2176, Code 124	10-1	8=14-31
Record Changer PHILCO M-20	10-RC1	RCH20=1-16
52-T1602, Ch. 33, C-2, Code 122	22-3	9=1-16
52-T1602, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1602, Ch. 71, G-1, Code 124	71-6	10=1-12

PHILCO

MODEL	PACK-FILE	PAGES
PHILCO CORP. (Cont'd)		
52-T1804, Ch. 33, C-2, Code 122	22-3	9=1-16
52-T1804, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1804, Ch. 71, G-1, Code 124	71-6	10=1-12
52-T1808, Ch. 33, C-2, Code 122	22-3	9=1-16
52-T1808, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1808, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T1810, Ch. 33, C-2, Code 122	22-3	9=1-16
52-T1810, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1810, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T1810-L, Ch. 33, C-2, Code 122	22-3	9=1-16
52-T1812, Ch. 33, C-2, Code 122	22-3	9=1-16
52-T1812, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1812, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T1820, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1820, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T1830, Ch. 71, G-1, Code 124	71-6	10=1-12
52-T1831, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1831, Ch. 71, G-1, Code 124	71-6	10=1-12
52-T1832, Ch. 71, G-1, Code 124	71-6	10=1-12
52-T1831, Ch. 33, C-2, Code 122	22-3	9=1-16
52-T1831, Ch. 33, C-2, Code 124	22-3	9=1-16
52-T1839, Ch. 33, C-2, Code 122	22-3	9=1-16
52-T1839, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1839, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T1840, Ch. 33, C-2, Code 122	22-3	9=1-16
52-T1840, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1840, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T1841-L, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1841-L, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T1842, Ch. 33, C-2, Code 122	22-3	9=1-16
52-T1842, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1842, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T1842-L, Ch. 33, C-2, Code 124	22-3	9=1-16
52-T1842-L, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1844, Ch. 33, C-2, Code 122	22-3	9=1-16
52-T1844, Ch. 33, C-2, Code 124	22-3	9=1-16
52-T1844, Ch. 37, C-2, Code 123	22-3	9=1-16
52-T1844, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T1845, Ch. 71, G-1, Code 124	71-6	10=1-12
52-T1850, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T1882, Ch. 35, CP-1, Code 122	22-3	9=1-16
Record Changer PHILCO M-22	22-RC2	RCH22=1-12
52-T1882, Ch. 36, CP-1, Code 123	22-3	9=1-16
Record Changer PHILCO M-22	22-RC2	RCH22=1-12
52-T1883, Ch. 44, D-4, Code 121	22-3	9=17-32
52-T2106, Ch. 35, F-2, Code 122	22-3	9=1-16
52-T2106, Ch. 36, F-2, Code 123	22-3	9=1-16
52-T2106, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2108, Ch. 35, F-2, Code 122	22-3	9=1-16
52-T2108, Ch. 36, F-2, Code 123	22-3	9=1-16
52-T2108, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2110, Ch. 35, F-2, Code 122	22-3	9=1-16
52-T2110, Ch. 36, F-2, Code 123	22-3	9=1-16
52-T2110, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2120, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2120, Ch. 71, G-1, Code 124	71-6	10=1-12
52-T2122, 52-T2122-L, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2122, 52-T2122-L, Ch. 71, G-1, Code 124	71-6	10=1-12
52-T2140, Ch. 35, F-2, Code 122	22-3	9=1-16
52-T2140, Ch. 36, F-2, Code 123	22-3	9=1-16
52-T2140, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2142, Ch. 35, F-2, Code 122	22-3	9=1-16
52-T2142, Ch. 36, F-2, Code 123	22-3	9=1-16
52-T2142, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2144, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2145X, Ch. 44, D-4, Code 125	22-3	9=17-32
52-T2150, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2150, Ch. 71, G-1, Code 124	71-6	10=1-12
52-T2151, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2151, Ch. 71, G-1, Code 124	71-6	10=1-12
52-T2151L, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2151-L, Ch. 71, G-1, Code 124	71-6	10=1-12
52-T2152, Ch. 71, G-1, Code 124	71-6	10=1-12
52-T2175, 52-T2176, Ch. 35, F-2, Code 124	22-3	9=1-16
52-T2175, Ch. 42, G-2, Code 125	68-7	10=13-21
52-T2182, 52-T2182-L, Ch. 44, D-4, Code 121	22-3	9=17-32
Record Changer PHILCO M-22	52-RC3	RCH22=1-12
52-T2224, Ch. 41, D-1, Code 121	22-3	9=17-32

MODEL	PACK-FILE	PAGES
PHILCO CORP. (Cont'd)		
52-T2244, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2245, Ch. 44, D-4, Code 121	22-3	9=17-32
52-T2252, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2252, Ch. 71, G-1, Code 124	71-8	10=1-12
52-T2253, Ch. 44, D-4, Code 121	22-3	9=17-32
52-T2254, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2256, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2258, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2259, Ch. 41, D-1, Code 121	22-3	9=17-32
52-T2275, Ch. 35, F-2, Code 122	22-3	9=1-16
52-T2283, Ch. 44, D-4, Code 121	22-3	9=17-32
53-T1824, 53-T1825, 53-T1826, 53-T1852, Ch. 71, G-1, Code 124	71-8	10=1-12
53-T1853, 53-T1853L, Ch. 91, J-1, Code 128	68-7	10=35-44
53-T1883, 53-T1884, Ch. 44, G-4, Code 125	68-7	10=22-34
53-T1888, 53-T1886L, Ch. 44, G-4, Code 125	68-7	10=22-34
53-T2128, Ch. 42, G-2, Code 125	68-7	10=13-21
53-T2127, Ch. 91, J-1, Code 128	68-7	10=35-44
53-T2183, Ch. 44, G-4, Code 125	68-7	10=22-34
53-T2260, 53-T2282, 53-T2284, Ch. 42, G-2, Code 125	68-7	10=13-21
53-T2266, 53-T2268, Ch. 91, J-1, Code 126	88-7	10=35-44
53-T2269, 53-T2270, 53-T2271, Ch. 91, J-1, Code 126	68-7	10=35-44
53-T2273C, 53-T2273M, Ch. 91, J-1, Code 128	68-7	10=35-44
71, Ch.	71-8	10=1-12
76-4402, 78-5411, 76-5433, Series; Tuners	37-5	6=1-8
91, Ch.	68-7	10=35-44
PHILHARMONIC RADIO & TELEV. CORP.		
C-6161, T-818	22-1	7=1-5
1116, 5816	22-1	7=1-5
PILOT RADIO CORP.		
TV-126	20-1	5=1-13
TV-127	37-2	6=1-10
TV-161	20-1	5=1-12
TV-183	20-1	5=1-14
TV-184	37-2	6=1-10
TV-165	20-1	5=1-14
TV-167A	37-2	8=1-10
*TV-167B, TV-168	37-2	6=1-10
TV-191	37-2	8-1-10
*TV-191	37-2	8=1-10
TV-271, TV-273, TV-274	53-3	9=1-14
TV-293, TV-294	53-3	9=1-14
PLYMOUTH See INTERSTATE STORES BUYING CORP.		
PRECISION See THE HERTNER ELECTRIC CO.		

* See Pilot HANDY No. 1, Pack 37.

MODEL	PACK-FILE	PAGES
RADIO CORP. OF AMERICA		
Ainsworth	72-12	10=64-72
Albury	72-12	10=55-63
Ashton	72-12	10=55-63
Belgrove	74-13	10=73-82
Bently	16-3	9=1-16
Brandon	74-13	10=73-82
Brett	72-12	10=64-72
Bristol	16-5	9=73-80
Bristol, Late	72-12	10=17-34
Brookfield	74-13	10=73-82
Caldwell	72-12	10=17-34
Calhoun	72-12	10=17-34
Clarendon	16-4	9=45-52
Colby	68-11	10=1-18
Covington	72-12	10=17-34
Crafton	68-11	10=1-18
Donley	16-4	9=45-52
Fairfield, Final	16-5	9=53-72
Glenside	68-11	10=1-16
Hadley	72-12	10=55-63
Hampton	18-5	9=73-80
Hampton, Late	72-12	10=17-34
Haywood	16-3	9=17-30
Highland, Final	16-5	9=53-72
Hillsdale	11-2	8=62-76
Hillsdale, Late	72-12	10=35-54
Kentwood	72-12	10=55-63
Lambert	74-13	10=73-82
Lansford	74-13	10=73-82
Lindale	74-13	10=73-82
Kendall	16-5	9=73-80
Kent, Modern, Newport; Final	18-5	9=53-72
Preston	16-5	9=73-80
Preston, Late	72-12	10=17-34
Provincial	11-2	8=82-76
Provincial, Final	18-5	9=53-72
Provincial	72-12	10=35-54
Regency, Final	18-5	9=53-72
Rockingham	16-4	9=45-52
Rutland	10-1	8=31-48
Shelley	72-12	10=55-63
Somerville	10-1	8=1-18
Suffolk	16-4	9=45-52
Talbot	16-4	9=31-44
Whitfield, Late	72-12	10=17-34
Winston, Final	16-5	9=53-72
York	11-2	8=82-76
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KCS31-1, Ch., S1000	20-6	5=48-64
KCS31-1, Ch., 9TW390	20-6	5=32-47
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KCS38, Ch.	34-7	5=65-79
KCS38C, Ch.	20-8	5=1-15
KCS40, KCS40A, Ch.	37-8	6=1-15
KCS40B, Ch.	46-10	7=50-64
KCS41-1, Ch.	20-6	5=16-31
KCS45, KCS45A, Ch.	46-9	7=1-18
KCS46, Ch.	46-9	7=17-32
KCS47, KCS47A, KCS47AT, Ch.	46-10	7=33-49
KCS47B, KCS47C, KCS47D, Ch.; Final	16-5	9=53-72
KCS47E, Ch.	16-4	9=31-44
KCS47F, KCS47G, Ch.; Final	16-5	9=53-72
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KCS49BF, KCS49BF-2, Ch.	72-12	10=35-54
KCS49C, Ch.	11-2	8=62-76
KCS49C, Ch., Late	72-12	10=35-54
KCS49CF, KCS49CF-2, Ch.	72-12	10=35-54
KCS60A, Ch.	11-2	8=77-94
KCS61, Ch.	16-3	9=1-18
KCS62, Ch.	10-1	8=1-16
KCS66, Ch.	16-5	9=73-80
KCS66, Ch., Late	72-12	10=17-34
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KCS66A, Ch., Late	72-12	10=17-34
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KCS74, Ch.	72-12	10=64-72
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T120, Ch. KCS34C	34-7	5=80-94
T121, Ch. KCS34C	34-7	5=95-110
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7T112B, Ch. KCS47G, Final	16-5	9=53-72
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9T128, Ch. KCS49C, Provincial	11-2	8=62-76
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17T153, Ch. KCS66, Bristol	16-5	9=73-80
17T153, Ch. KCS66, Bristol, Late	72-12	10=17-34
17T154, Ch. KCS66, Whitfield, Late	72-12	10=17-34
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17T172, Ch. KCS66A, Covington, Late	72-12	10=17-34
17T172K, Ch. KCS66D	72-12	10=17-34
17T173, Ch. KCS66A, Calhoun, Late	72-12	10=17-34
17T173K, Ch. KCS66D	72-12	10=17-34
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17T200, Ch. KCS72, Shelley	72-12	10=55-63
17T201, Ch. KCS72, Hadley	72-12	10=55-63
17T202, Ch. KCS72, Kentwood	72-12	10=55-63
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17T220, Ch. KCS72, Alhury	72-12	10=55-63
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17T261DE, Ch. KCS74, Ainsworth	72-12	10=64-72
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21T177, Ch. KCS68C, Donley	16-4	9=45-52
21T178, Ch. KCS88C, Rockingham	16-4	9=45-52
21T179, Ch. KCS88C, Clarendon	16-4	9=45-52
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		8=21-25
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		8=28-31
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		8=28-31
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		8=6
		8=31
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		8=22
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		8=31
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		8=6
		8=31
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H2250RQ, Ch. 22H20	42-3	6=1-20
H2255E, Ch. 22H20, Morley	42-3	6=1-20
H2255EQ, Ch. 22H20	42-3	6=1-20
H2328E, Ch. 23H22	42-3	6=1-20
H2328EZ, Ch. 23H22Z	42-3	6=1-20
H2328R, Ch. 23H22, Walton	42-3	6=1-20
H2328RQ, Ch. 23H22	42-3	6=1-20
H2328RQZ, H2328RZ, Ch. 23H22Z	42-3	6=1-20
H2329R, Ch. 23H22, Burton	42-3	6=1-20
H2329RQ, Ch. 23H22	42-3	6=1-20
H2329RZ, Ch. 23H22Z	42-3	6=1-20
H2352R, Ch. 23H22, Mansfield	42-3	6=1-20
H2352RQ, Ch. 23H22	42-3	6=1-20
H2352RQZ, H2352RZ, Ch. 23H22Z	42-3	6=1-20
H2353E, Ch. 23H22, Meredith	42-3	6=1-20
H2353EQ, Ch. 23H22	42-3	6=1-20
H2353EQZ, H2353EZ, Ch. 23H22Z	42-3	6=1-20
H2437E, Ch. 24H20, Fielding	42-3	6=1-20
H2437EQ, Ch. 24H20	42-3	6=1-20
H2437R, Ch. 24H20, Irving	42-3	6=1-20
H2437RQ, Ch. 24H20	42-3	6=1-20
H2438R, Ch. 24H20, Aldrich	42-3	6=1-20
H2439R, Ch. 24H20, Coleridge	42-3	6=1-20
H2438RQ, Ch. 24H20	42-3	6=1-20
H2445R, Ch. 24H21, Tennyson	42-3	6=1-20
H2445RQ, Ch. 24H21	42-3	6=1-20
H2447R, Ch. 24H21, Byron	42-3	6=1-20
H2447RQ, Ch. 24H21	42-3	6=1-20
H2449E, Ch. 24H20, Churchill	42-3	6=1-20
H-2868R, Ch. 20H20	15-1	8=1-8
H-3074R, Ch. 20H20	15-1	8=1-8
H3267, Ch. 24H20, Hawthorne	42-3	6=1-20
H3267R, H3267RQ, Ch. 24H20	42-3	6=1-20
H3469E, Ch. 24H20, Wordsworth	42-3	6=1-20
H3469EQ, Ch. 24H20	42-3	6=1-20
H3475R, Ch. 24H20, Kilmer	42-3	6=1-20
H3475RQ, Ch.24H20	42-3	6=1-20
H3477R. Ch. 24H21, Thackeray	42-3	6=1-20
H3477RQ, Ch. 24H21	42-3	6=1-20
H3478E, Ch. 24H21, Shelley	42-3	6=1-20
H3478EQ. Ch. 24H21	42-3	6=1-20
J2026R, Ch. 20J22, Hawthorne	21-2	9=1-16
J2027E, Ch. 20J21, Barrett	21-2	9=1-16
J2027R, Ch. 20J21	21-2	9=1-16
J2029E, J2029R, Ch. 20J21, Markham	21-2	9=1-16
J2030E, Ch. 20J21	21-2	9=1-16
J2030R, Ch. 20J21, Fielding	21-2	9=1-16
J2040E, Ch. 20J21, Conrad	21-2	9=1-16
J2042R, Ch. 20J21, Galsworthy	21-2	9=1-16
J2043R, Ch. 20J21, Wordsworth	21-2	9=1-16
J2044E, Ch. 20J21	21-2	9=1-16
J2044R, Ch. 20J21, Walton	21-2	9=1-16
J2051E, Ch. 20J22, Coleridge	21-2	9=1-16
J2053R, Ch. 20J22, Chesterton	21-2	9=1-16
J2054R, Ch. 20J22, Thackeray	21-2	9=1-16
J2055R, Ch. 20J22, Carlyle	21-2	9=1-16
J2126R, Ch. 21J21	21-2	9=1-16
J2127E, J2127R, Ch. 21J20	21-2	9=1-16
J2129E, J2129R, Ch. 21J20	21-2	9=1-16
J2130E, J2130R, Ch. 21J20	21-2	9=1-16
J2140E, J2142R, J2143R, Ch. 21J20	21-2	9=1-16
J2144E, J2144R, Ch. 21J20	21-2	9=1-16
J2151E, J2153R, J2154R, J2155R, Ch. 21J21	21-2	9=1-16
J2868R, Ch. 20J21, Kipling Record Changer ZENITH S14029	21-RC1	RCH21=9-24

MODEL	PACK-FILE	PAGES
ZENITH RADIO CORP. (Cont'd)		
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	21-RC1	RCH21=9-24
J3069E, Ch. 20J21, Barrie Record Changer ZENITH S14029	21-2	9=1-16
	21-RC1	RCH21=9-24
J3169E, Ch. 21J20 Record Changer ZENITH S14029	21-2	9=1-16
	21-RC1	RCH21=9-24
K1812E, K1812R, Ch. 19K22	77-4	10=1-19
K1815E, K1815R, Ch. 19K20	77-4	10=1-19
K1820E, K1820R, Ch. 19K20	77-4	10=1-19
K1846E, K1846R, Ch. 19K20	77-4	10=1-19
K1850E, K1850R, K1880R, Ch. 19K20	77-4	10=1-19
K2229R, Ch. 19K23	77-4	10=1-19
K2230E, K2230R, Ch. 21K20	77-4	10=1-19
K2240E, K2240R, Ch. 21K20	77-4	10=1-19
K2258R, Ch. 19K23	77-4	10=1-19
K2260R, K2263E, Ch. 21K20	77-4	10=1-19
K2266, K2266R, Ch. 21K20	77-4	10=1-19
K2267E, K2268R, Ch. 21K20	77-4	10=1-19
K2270H, K2270R, Ch. 21K20	77-4	10=1-19
K2286R, K2288E, Ch. 19K23	77-4	10=1-19
K2290R, K2291E, Ch. 21K20	77-4	10=1-19
19K20, 19K22, 19K23, Ch.	77-4	10=1-19
20H20, Ch.	15-1	8=1-8
20J21, 20J22, 21J20, 21J21, Ch.	21-2	9=1-16
21K20, Ch.	77-4	10=1-19
22H20, 23H22, 23H22Z, Ch.	42-3	6=1-20
24H20, 24H21, Ch.	42-3	6=1-20

ALL RANGES WITH THIS ONE CONTROL

Model 630

Just *one* knob—extra large—easy to turn—flush with the panel, controls all ranges. This one knob saves your time—minimizes the chances of "burn-outs" because you don't have to remember to set another control. You can work fast with Model 630 with your eyes as well as your hands. Look at that scale—wide open—easy to read, accurately. Yes, this is a *smooth TV* tester. Fast, safe, no projecting knobs, or jacks, or meter case. Get your hand on that single control and you'll see why thousands of "Model 630's" are already in use in almost every kind of electrical testing

ONLY $39.50 AT YOUR DISTRIBUTOR

Prices Subject to Change

FOR THE MAN WHO TAKES PRIDE IN HIS WORK

Triplett

TRIPLETT ELECTRICAL INSTRUMENT COMPANY · BLUFFTON, OHIO, U.S.A.

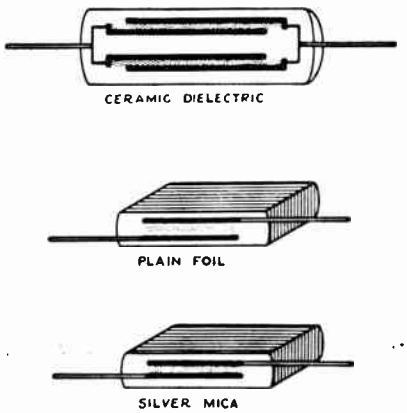
Replacement Parts in TV Receivers

(Continued from page 7)

mica type almost completely. It is interesting to note the rapid rise in the use of negative temperature coefficient ceramic capacitors in television receivers. In these, the capacity decreases with increase in temperature. They are very prominent in the front-ends and are used more and more in other parts of a tv receiver where it is desired to maintain constant circuit behavior under varying temperatures.

The ceramic dielectric capacitor offers high insulation resistance; therefore, it is used for d-c blocking, bypassing, and coupling, especially in those circuits that operate at frequencies above the audio range. Its behavior under varying conditions of frequency (including UHF), temperature, and humidity is excellent.

Another feature of the ceramic dielectric unit is the ease with which it can be produced in very low values of capacitance, with the result that the wide variety of low values of capacitance used in television receivers are prominently available in this kind of capacitor.



Construction of fixed mica and ceramic capacitors.

A high order of interchangeability between mica and ceramic capacitors exists, especially between certain ceramics and silver micas. Since the subject is somewhat elaborate, the discussion will be held in abeyance until the subject of substitution is treated.

Paper Dielectric Tubulars. Paper dielectric tubulars follow two patterns of construction. One utilizes alternate layers of foil (the active surface) and paper dielectric between. The foil and paper are wound concentrically; by making proper electrical connections to the active surfaces, non-inductive behavior is accomplished to a highly satisfactory degree. Also, any desired capacitance value and voltage rating within certain limits is achieved.

The usual limit on the minimum capacitance produced in this manner, and also on the maximum, is a low of about .001 μf and a high limit of about 50 μf. However, the upper capacitance limit of paper dielectric capacitors used in tv receivers is about .25 μf.

A second form of construction uses metallized paper, that is, metal is sprayed on the paper dielectric. The metallized strip then is rolled concentrically and the connections made to the active surfaces.

An important part of the construction of both varieties of capacitors is the impregnation. All air is drawn out of the assembly and all spaces within are filled with an impregnant that also penetrates the paper dielectric. It may be any one of a variety of substances such as mineral oil, castor oil, wax, or a synthetic substance. The impregnant ascribes certain electrical characteristics to the capacitor. Only some of the highlights can be treated here because the subject is extremely broad.

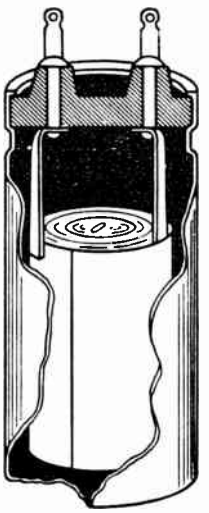
The impregnant influences the capacitance of the capacitor — whether it is going to increase or decrease relative to the nominal value with changing temperatures, and by what amount. It determines the variation in electrical losses within the capacitor with changes in operating temperature, thereby determining the suitability of the component for use at various operating temperatures. Insulation resistance on the other hand always decreases with increase in temperature.

These details are a matter of concern to the tv receiver designer, although his problem revolves more around what happens with increasing temperatures than for the opposite temperature variation. That is why design engineers specify the operating temperature of fixed capacitors used in the equipment they conceive. Fortunately, the service technician's problem is greatly simplified, in that the vast majority of paper dielectric capacitors used in television receivers bear one of two operating temperature ratings, 65° C or 85° C. Judging by specifications, the tendency is toward the higher rating. These needs are being satisfied by replacement components, but it still behooves the responsible tv service technician to make certain that he is procuring the proper part. This is one reason why the use of surplus capacitors for replacements is a very bad practice, and suggestions for replacement must be based on the original specifications.

The casing or housing used for the capacitor has a bearing on its operation with different conditions of temperature and humidity. There was a time when all these capacitors were contained in wax impregnated cardboard tubes and wax sealed. The tendency is away from these to molded plastic casings in order to improve operation under high humidity conditions. Hermetically sealed metal cases also are available, but these seldom are used as original equipment or for replacement in tv receivers.

Electrolytic Capacitors. Although the electrolytic capacitor is in a class by itself, it still conforms with the basic requirement of a capacitor; namely two conducting surfaces between which a dielectric exists. The essential difference between the electrolytic capacitor and the ordinary fixed capacitor is that the dielectric in the form is an exceedingly thin oxide film which is deposited on the metal surfaces of the capacitor. The film displays unilateral conductivity properties, that is, when the applied voltage is of one polarity, the film displays very high resistance, and relatively little current flows through the dielectric, and when the voltage is of the opposite polarity a high current would flow through the capacitor. In spite of this, the unit is still capable of storing electricity.

In view of this behavior relative to the polarity of the applied voltage, electrolytic capacitors are polarized. By this is meant the capacitor terminals bear polarity designations which must be adhered to when the d-c or pulsating voltage is applied to the capacitor. Otherwise, the unit may be damaged.



Cutaway view of an electrolytic capacitor.

The three types of electrolytics — etched foil, plain foil and fabricated — refer to the manner in which the basic metal surface is treated so as to afford maximum surface for contact with the oxide film. The plain foil presents a smooth surface and affords a unit surface area, hence a unit value of capacitance. When the metal is etched by a chemical process, the surface area is increased. This occurs because the etching process causes microscopic cavities in the surface, all of which tends to increase the surface area in contact with the film. Substantial increase in capacitance is obtained in this fashion, perhaps from 5 to 8 or more times the capacitance which is obtainable with the plain foil. In the fabricated plate type, the anode material is made by deposit-

(Continued on page 34)

Notice to All Purchasers of:

RIDER'S TV 10

We have always prided ourselves on the accurate information we have made available to the servicing industry. To live up to this tradition we wish to correct certain discrepancies that crept into the replacement parts listings published in TV 10. Because we are anxious to give you thoroughly accurate replacement parts listings, which include additions that arrived after the publication of TV 10, we ask you to do the following:

Please fill in the registration coupon on the first page of your Rider TV 10 Manual and send it to us. We will forward the replacements parts listing corrections direct to your address. Also, by returning this coupon to us, you will be assured of having your name on our mailing list for exclusive information that will be available to TV 10 owners. Do Not send us the replacement parts pages!

Look to future issues of SUCCESSFUL SERVICING for the newest additional replacement parts listings.

John F. Rider,
Publisher

DEALERS GETTING WESTINGHOUSE TUBES PROFIT FROM HEAVY LOCAL ADVERTISING AT NO COST

Service dealers are getting powerful local advertising support from new Westinghouse RELIATRON™ Tube Distributors. In cities now served by Westinghouse Distributors, dealers get local newspaper advertising, a complete kit of store display and imprinted mailing material.

All of it—local ads and kits—are designed to build TV-radio service business in the dealer's local area.

Best of all, none of it costs the dealer a penny!

You can get your store listed in two local newspaper ads at no charge, and get a kit to boot. If Westinghouse Tubes are now sold in your area, see your Westinghouse Distributor and take advantage of this $900-worth-of-advertising-at-no-cost offer.

NEWSPAPER ADS

COMING YOUR WAY

If Westinghouse Tubes are not yet distributed in your area, be patient. Distributors are being established in all market areas as fast as product availability and good service permit.

You'll soon have the chance to buy RELIATRON Tubes. Keep this tremendous opportunity in mind: you'll get newspaper advertising at no cost! Imprinted material for mailings! Imprinted signs for your window! All of it is local advertising which sells your service in your own area where it counts.

For the name of your Westinghouse Distributor, or the approximate date when Westinghouse Tubes will be available in your area, drop a postal card to Dept. M-201 or have your regular distributor contact Dept. M-201 for information on how he can better serve you.

RELIATRON™ TUBES

ELECTRONIC TUBE DIVISION

Westinghouse Electric Corporation
Box 284, Elmira, N. Y.

YOU CAN BE SURE...IF IT'S Westinghouse

ET-95013

The Quick Diagnosis

(Continued from page 9)

used to this poor reception? Or am *I* going to be blamed? Nothing on their faces . . lucky. The times I've been blamed for *all* the ghosts and everything else after just putting in one tube . . . !

Hey! What's that noise? Picture, too? Yeh. Streaks, and flashes, once in a while. Is it aerial? Bang the cabinet! Yeh, something's loose . . . here we go again! Tap. Where's that long handled fibre screw driver? No good for alignment anymore, but swell for tapping. Watch out for that picture tube! Don't put your hand near it! Oh. This one's glass. Got so I react against any picture tube . . . got banged so hard by the metal ones without a plastic shield. Imagine, expecting a man to work on a set without that protection . . .

Boy! Like a toothache . . . this one hurts all over. Uh. Tuner? Not more sensitive than most . . . just normal oscillator response to a bang. First i.f.? No. Second . . . um . . . gee . . . everything around that tube is sensitive. Can I work without a mirror? Yeh. The flashes when I hit show through the edge of the picture tube . . . hear and see at the same time. Is it *this* tube? Doubt it . . . but, *have* to try a new one . . . I wonder . . . try another . . . Wow! Hotter'n the devil! What is it? Mmm. Oh, here it is . . . 6CB6. Where's that tube kit? The load I carry! Can't keep 'em in order . . . swell . . . here it is. They are really watching me now! Sure that I'm putting in more than necessary. Alright . . . she's hot now . . . no use banging till they are hot . . . same thing! Alright! Pull out the new one . . . put back the old. Darn these tiny pin tubes!

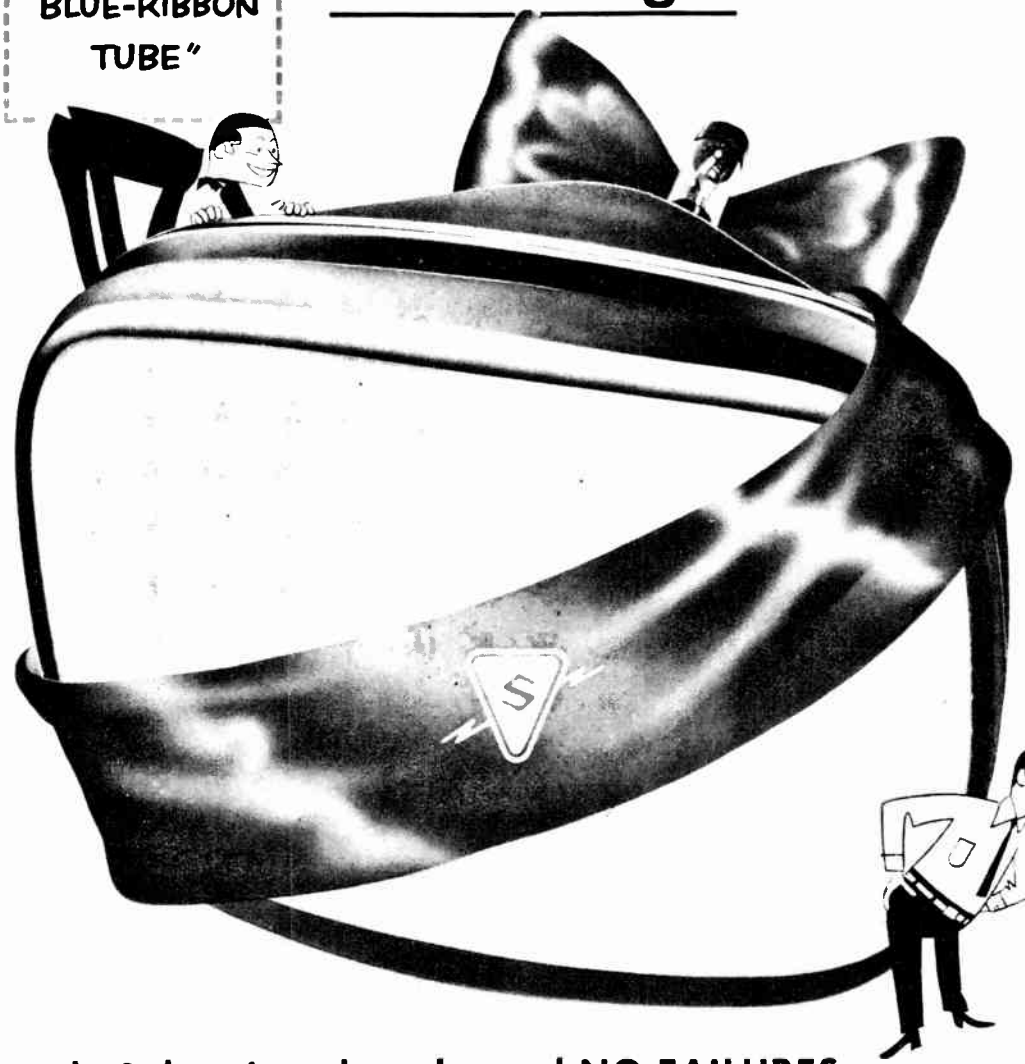
Ugh, ugh . . . got to be a contortionist . . . geez it's hot in here . . . O.K., turn her on again. Tap some more . . . that's the spot alright. Just like an unsoldered connection. Wonder if they had been bothered by this . . . ?

What's that? Yeh, the trouble for which you called me is fixed . . . but what I just found is another trouble which may not bother you, if you are lucky. It is apparently a loose connection under the chassis, but if the set is not jarred too much, it may hang on and you can get it fixed when the set does have to have a major repair . . .

SYLVANIA PICTURE TUBES

Lasted Longer than others tested!

"IT'S A TRUE BLUE-RIBBON TUBE"



BEST IN OVER-ALL POINT QUALITY!

SYLVANIA OUTLASTED ALL TUBES TESTED

Only Sylvania tubes showed NO FAILURES after 1400 hours . . . *at accelerated voltages*

Exhaustive tests conducted under the supervision of an outside impartial laboratory, the United States Testing Company, showed Sylvania Picture Tubes lasted longer than any others tested.

These tests included the picture tubes of nine leading manufacturers. All tubes were placed in identical test racks and tested under identical accelerated voltages. At the end of 1400 hours, only the Sylvania Picture Tubes showed *no failures.*

These tests definitely establish the outstanding dependability of Sylvania Picture Tubes. They prove that these tubes will best uphold your reputation for fine performance in the sets you manufacture, sell or service. Send today for complete details about Sylvania Picture Tubes. Sylvania Electric Products Inc., Dept. 3R-1801, 1740 Broadway, New York 19, New York.

TESTS CONDUCTED BY U.S. TESTING COMPANY

SYLVANIA

RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; FLUORESCENT TUBES, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; PHOTOLAMPS; TELEVISION SETS

Additional literature on each of the products described in these columns may be obtained from SUCCESSFUL SERVICING. See the coupon in column three.

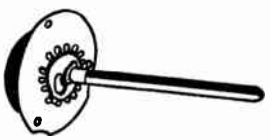
New Tester for Mobile Radio Systems

This new general purpose test meter, RCA Model 6X-7A, will measure current, voltage, and radiated power — all the electrical measurement necessary to install and service two-way radio communications systems. Tester is designed so that several related functions can be checked with a single arrangement of test leads.

Item 1

Sturdy-Tune Detents

Telematic Industries has broadened its line of Sturdy-Tune Detents so that it now includes eleven different detents to handle the replacement needs of nearly every brand TV receiver on the market.



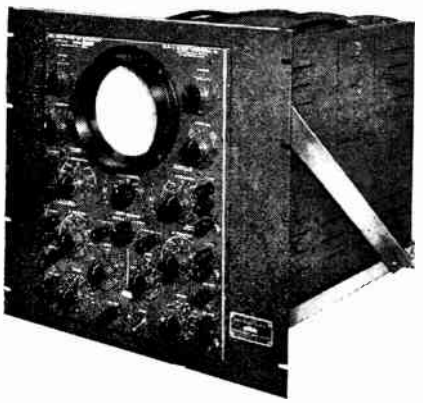
Item 2

The detents are available with or without a back plate. The availability of the Sturdy-Tune Detents without a back plate, if so desired by the serviceman, serves to cut the replacement cost.

Rack Mounting Adapter for Cathode-Ray Oscillographs

Allen B. DuMont Laboratories announces the availability of a new Rack Mounting Adapter, Type 2598, for use with DuMont Types 303, 303-A, 303-AH and 322 cathode-ray oscillographs.

Shipped dis-assembled, the Adapter provides a rigid mount for the instrument in standard 19 inch relay racks; the front opening is large enough to permit all but the front panel of the oscillograph to pass through. The Adapter has been designed so that the entire relay rack may be moved with the instrument in place.



Item 3

Standard Voltage Rated Power Supplies

Kepco Laboratories has released a new group of voltage regulated power supplies, the Model 700 series. Model 700 feature one regulated d-c voltage supply, a high voltage supply continuously variable from 0 to 350 volts and a delivery of from 0 to 750 milliamperes; Model 710 delivers 1.5 amperes, 720 delivers 2.25 and Model 730 delivers 3 amperes. In the range of 30-350 volts, output voltage variation is less than ½% for line fluctuations from 105-125 volts and load variation from minimum to maximum current. Ripple voltage is less than 10 millivolts P-P.

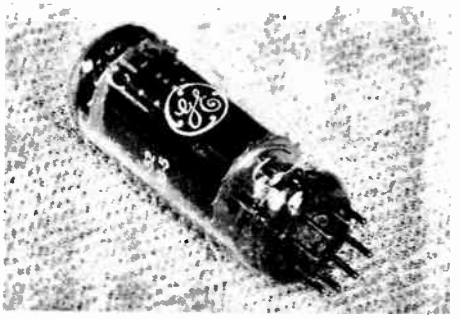
The gray cabinet is 22¾ inches high, 21¾ inches wide and 15¼ inches deep.

Item 4

Video Output Tube

General Electric has added a new power pentode, type 6CL6, for use in the video output stage of tv receivers.

The tube provides a high plate current at low plate voltage, giving a 40 to 45 voltage gain in wide band video circuits and being capable of supplying 132 volts peak-to-peak output across a load resistor of 3,900 ohms. This new nine-pin miniature may also be used as a wide-band amplifier in industrial and laboratory equipment.



Item 5

Low Resistance—High Accuracy Instrument Resistor

Type 245S, a new 1-watt precision wirewound resistor for decades and other applications requiring low resistance values with close tolerances, low temperature rise, and low inductance, has been announced by the Shallcross Mfg. Co. The new resistor can be calibrated to a tolerance of ±0.1% or better and is available in values from 0.1 ohm to 1000 ohms. A single layer bifilar winding protected by a moisture resistant lacquer coating is used for all values. The Steatite bobbin and axial wire leads are at the same end for ease in mounting the resistor directly on decade switch decks or other similar equipment. Size is 1⅛ inches long by ⅜ inch diameter.

Item 6

To obtain additional literature on any of the items described in this section encircle the number of the product (number appears under picture) on the coupon below, cut the coupon out and mail it to SUCCESSFUL SERVICING, 480 Canal Street, New York 13, N. Y.

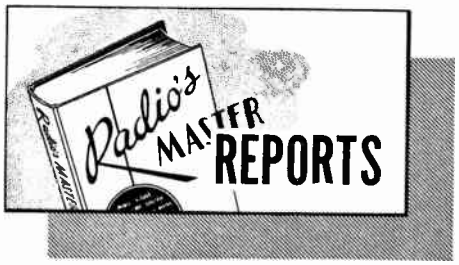
Cut Here

SUCCESSFUL SERVICING
480 Canal Street, New York 13, N. Y.

Please send me additional literature on the items circled below appearing in the NEW PRODUCTS column of the January, 1953 issue of SUCCESSFUL SERVICING:

1 2 3
4 5 6

Name.....
Address.....
City.....Zone....State.....
Company.....



A monthly summary of product developments and price changes supplied by RADIO'S MASTER, the Industry's Official Buying Guide, available through local parts distributors.

COMMENT: With more manufacturers reporting changes for this period, a continued emphasis is being placed on the introduction of new products, especially by manufacturers of antennas, capacitors and controls. Also evident is the continued tendency toward increased prices by the leading TV tube manufacturers.

New Items

AEROVOX—Added 3 new values to their series CP 2, 2 watt carbofilm resistors.

ASSEMBLY PRODUCTS — Added No. 2056-1, thermocouple at $2.90 net and Model C, portable pyrometer case at $1.75 net.

BAKER MFG. — Added No. 2 FM at $2.37 net to their line of TV antenna towers.

BLILEY ELECTRIC — Added TV service crystal MC9, 13,627.5 kc. at $5.50 net.

BOGEN CO. — Introduced Model R701, high fidelity FM-AM receiver at $145.20 net . . . Model DO10, high fidelity power amplifier at $37.95 net and Model RCPR, remote controller-preamplifier at $78.85 net.

CLAROSTAT — Added TV replacement controls RTV 356 to 383 inclusive.

EITEL-McCULLOUGH — Added No. HR-10 at $1.60 net to their series of heat dissipating connectors.

ELECTRONIC MEASUREMENT—Added Model 600, oscilloscope at $99.50 net, to their test equipment line.

FEDERAL TEL. & RADIO — Added kit No. 3, all purpose selenium rectifier assembly at $19.95 net.

GENERAL ELECTRIC — Added No. RPX-052 at $38.95 list and No. RPX-053 at $57.90 list to their triple play variable reluctance cartridge series. Also added 20DP4A, rectangular all-glass picture tube for TV receiver applications at $39.35 net.

GON-SET — Introduced FM radarray No. 1517 at $28.50 net . . . No. 1529, rhombic UHF antenna with 8 foot mast at $7.77 net . . . No. 1531, parabolic with 9 foot mast at $5.18 net and 5 other UHF antennas.

GREAT EASTERN MFG. — Added Model CRT, luxor emission booster at $1.95 net.

HYTRON — Introduced No. SH27, test adapter at $1.45 net. Also added special purpose tubes OA2WA at $4.50 list and OB2WA at $4.90 list.

JENSEN INDUSTRIES — Introduced a number of diamond replacement needles for the following manufacturers: Astatic, Audak, Columbia, Crosley, Electro-Voice, General Electric, Magnavox, Philco, RCA, Seeburg, Shure. Sonotone, Webster Electric and Webster-Chicago

MALLORY & CO. — Added No. PS54010, motor starting capacitor at $4.89 net . . . No. FF45052, photoflash capacitor at $13.50 net . . . No. U-67, 5 meg. carbon control at $.75 net and WF252-T23, 2500 ohm wire wound control at $1.50 net.

MERIT TRANSFORMER — Added No. A-3100, high fidelity output transformer at $10.80 net.

MINNESSOTA MINING & MFG.—Added sound recording tape No. 111AP, plastic prof. reel, ¼" x 1200 feet.

PACIFIC TRANSDUCER — Added Model 201D at $33.00 net This model is the same as Model 201, a wide range variable reluctance cartridge with a frequency response to above 12,000 cps. with an output of 60 millivolts, with a diamond stylus instead of a standard sapphire stylus.

PERMOFLUX — Added No DHS-31B at $50.00 net to their line of monaural dynamic headsets and No. PHA-6 at $8.00 net and No. PHA-8 at $13.00 net to their line of headbands.

PREMAX PRODUCTS—Added mobile mounting CA at $6.00 net.

PREMIER METAL PRODUCTS — Introduced new series ARP, aluminum rack panels.

R.C.A. — Added 12BF6 at $1.70 list, a multi-unit minature tube of the heater-cathode type containing two diodes and one medium-mu triode in one envelope, intended primarily for use as a detector or an amplifier in auto radio receivers operating from a 12-volt storage battery. Also added 12V6-GT at $2.00 list, a beam power tube of the

(Continued on page 35)

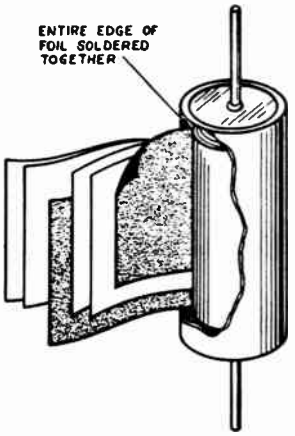
Replacement Parts, etc.

(Continued from page 26)

ing small particles of molten metal (aluminum) on a suitable carrier. This construction also provides increased surface area over that of plain foil, hence greater capacitance per unit size. This type is said to have as much as 10 times the capacitance as the plain foil type.

The varieties of foils also affect the operating capabilities of the electrolytic capacitor. Since a certain amount of current leakage is permitted in an electrolytic unit (although definite limits are set on it), and since each electrolytic capacitor is associated with a value of equivalent series resistance, power loss occurs inside the unit. This raises the operating temperature of the device, which in turn, is a limiting agency on the proper functioning of the unit and on its operating life. The plain foil type of electrolytic is capable of withstanding higher operating temperatures than the etched variety. Also, the plain foil electolytic is capable of withstanding much higher a-c ripple components than is the etched foil type.

As a general rule, electrolytic capacitors used in television receivers for a variety of



Construction of a paper tubular capacitor.

filtering and bypassing duties are of the etched foil kind. This derives from the fact that it affords the maximum capacity per unit size and per unit price, and also because the temperatures prevailing in a tv receiver are within its ratings. On occasion the tv receiver makes use of plain foil units.

The references to tubular and can electrolytics apply to the physicial types. Both are contained in metal housings, except that the tubular variety has an insulating cardboard sleeve around the metal container. These are mounted in place by means of the connecting wires, or a mounting bracket. The can type is intended for above chassis mounting, to be screwed into a socket, or to be locked in place by means of twist lugs.

Like the paper dielectric capacitor, the electrolytic variety also is affected in its operation by temperature. This is especially true of the leakage current. This leakage increases with operating temperature inasmuch as heat tends to deteriorate the oxide film. Any action which tends to destroy the effectiveness of the film naturally displays an adverse effect on the capacitance of the unit. Also, high operating temperatures tend to dry out the electrolyte and so effect the capacitance and performance of the device.

Radio's Master Reports

(Continued from page 33)

heater-cathode type intended primarily for use in the output amplifier of auto radio receivers operating from a 12-volt storage battery.

RADIO MFG. ENGINEERS—Added mobile converters No. MC-55 at $69.50 net and MC-57 at $64.50 net.

REGENCY — Added UHF converter, Model RC-600 at $37.46 net.

RIDER, JOHN F. — Added No. 2010, Rider's Television Manual, Volume 10, at $24.00 net.

STANDARD TRANSFORMER — Added deflection yokes (with leads and networks added) No. DY-1A at $4.74 net . . . No. DY-7A at $5.37 net . . . No. DY-8A at $6.60 net . . . No. DY-9A at $6.60 net and No. DY-10A at $6.60 net.

SUPERIOR INSTR.—Added Model 660-A, signal tracer generator at $42.95 net.

SUPREME INC.—Added a number of "vest pocket" testing instruments; Model 402, voltmeter at $10.65 net . . . Model 403. voltmeter at $10.65 net . . . Model 404. voltmeter at $10.65 net . . . Model 410, milliammeter at $10.65 net . . . Model 411, milliammeter at $10.65 net . . . Model 420, ammeter at $10.65 net . . . Model 430, microammeter at $14.50 net and Model 440, ohmmeter at $11.50 net.

TABET—Added Model NT10, 10 foot antenna top section with guy rings at $15.38 net and Model NRB, rigid mounting base with hardware at $5.67 net.

TERADO CO.—Introduced Model 6-71160 at $37.50 list and Model 12-71160 at $42.95 list, both in the Trav-Electric super series, portable dc to ac converters designed for car use to operate other electrical devices.

UTAH RADIO PRODUCTS — Added Model SP15R at $41.70 net to their series of wide range and pa group loudspeakers.

VIDEO INDUSTRIES—Added 5 element Yagi antenna for channel three at $6.83 net.

WINCHARGER CORP.—Added Model 3095 at $11.75 net to their guyed tower series and Model 2406 at $2.97 net, screw anchor for guyed towers.

Discontinued Items

ASTATIC CORP.—Discontinued Model S-8, crystal pickup arm.

AUDIO DEVELOPMENT — Discontinued No. 111A, microphone cable.

BOGEN CO. — Discontinued Model DB10, high fidelity 10 watt amplifier . . . Model PH10, 10 watt multi-range photo-amplifier and Model PX15, 15 watt phono-amplifier.

CHICAGO INDUSTRIAL INSTR.—Discontinued Model 453, featherweight miniature volt-ohm-milliammeter.

HUBBELL, HARVEY—No. 408B32, straight plug and No. 412B42, connector are discontinued.

LENK MFG.—Discontinued Models 201 and 205, heavy duty industrial soldering irons.

RADIART CORP. — Discontinued TV booster, Model TVB-1.

R.C.A.—Discontinued No. 202S1 from their electronic components speaker (PM type) series.

RADIO MFG. ENGINEERS—Discontinued mobile converter MC-H4.

RADIO MERCHANDISE SALES—Discontinued No. STYL8-2H, 8 element Yagi antenna.

SARKES TARZIAN—Advises that their line of TV picture tubes is discontinued.

SUPERIOR INSTR. — Discontinued Model 660, ac signal generator and CA-12, signal tracer.

SYLVANIA — Discontinued subminiature tubes 6BF7 and 6BG7.

TALK-A-PHONE — Discontinued Models C-5912 and C-5920 in their "chief" universal series.

UNIVERSAL METAL PRODUCTS—Model EM-2 in their series of universal mounts is discontinued.

Price Increases

ARGOS PRODUCTS — Increased price on Model TC-2, tube caddy "junior", to $7.75 net.

BOGEN CO.—Increased price on Model CH18P-1 to $92.50 net and Model CH30P-1 to $108.80 net in their challenger sound equipment series.

BURLINGTON INSTR.—Increased price of No. A70x32 to $11.50 net in their current transformer series.

HAMMARLUND MFG. — Increased price on HQ129X, receiver without speaker to $239.50 net.

LITTELFUSE — Increased price on No. 342008, dust-proof, drip-proof in their 3 AG fuse extractor post series to $.75 list.

MERIT TRANSFORMER—Increased No. A-3080, vertical output transformer to $3.60 net and No. A-4003, vertical blocking oscillator transformer to $1.80 net.

PENN BOILER & BURNER—Increased price of the universal adaptor in their tenna-mast hardware series to $.50 net.

RADIO MERCHANDISE SALES — Increased price on the TYL8 series of 8 element Yagi antennas.

(Continued on next page)

Radio's Master Reports

(Continued from page 35)

SIMPSON ELECTRIC—Increased price on Model 476, mirroscope to $197.00 net. This oscilloscope employs a 5" cathode ray tube mounted in a vertical position, with the image reflected from a high grade mirror mounted in the adjustable cover at the top of the cabinet, bringing the viewing surface near eye level when used on work benches of normal height.

SYLVANIA—Increased price on 1N82, UHF detector crystal to $1.15 net.

VIDEO INDUSTRIES—Increased price on No. 103, fan antenna to $3.68 net and No. 106, in-line folded di-pole antenna to $4.75 net.

Price Decreases

BURLINGTON INSTR.—Decreased price on No. A70x8 to $7.80 net in their current transformer series.

CLAROSTAT—Decreased prices on their series of 160 watt adjustable wire-wound resistors, series K-160-WA.

GENERAL ELECTRIC — Decreased prices on a number of items in their Alnico 5 loudspeaker line.

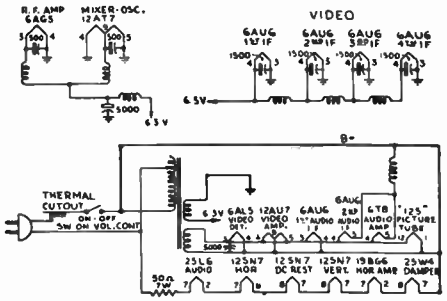
NATIONAL UNION RADIO—Decreased prices on videotron TV picture tubes NU-16DP4 to $30.00 net . . . NU-10BP4 to $21.00 net and NU-10BP4A to $21.00 net.

R.C.A.—Decreased price on portable "AB" pack VSO64 to $3.68 net.

TV Filament Circuits

(Continued from page 1)

These examples, which are representative, show the serviceman that, in troubleshooting a receiver, filament circuits cannot be taken for granted but must be checked with the wiring diagram. The fact that chokes are used in the r-f tuning and video i-f units must not be forgotten. Suppose, for instance, in Fig. 3, that the choke between the first and second i-f amplifiers should burn out, or there should be a bad connection. This means that the second, third, and fourth amplifiers would fail to function. Or, if a filament bypass capacitor should short, the heating current would no longer pass through the filament. More important than this is the fact that the transformer winding is shorted and will be damaged. An understanding, therefore, of why and how chokes and capacitors are used in the filament circuits is necessary for successful servicing.



After Capehart-Farnsworth

Fig. 3. The schematic diagram of Capehart-Farnsworth Model 300-1B filament circuits showing the use of r-f blocking chokes, bypass capacitors, series and parallel combinations, and several transformer windings.

contain many chokes and capacitors. The r-f amplifier and the mixer-oscillator have 500-$\mu\mu$f capacitors in parallel with their filaments. These bypass any high-frequency signals. There is also an r-f choke directly in series with each filament to block the r-f signals. In addition, there is a 5,000-$\mu\mu$f capacitor which is across the two-tube parallel network. This, of course, further and more completely bypasses the r-f voltage. And finally there is another r-f choke in series with the circuit across the supply which even further removes any r-f signal. Again, this is done to prevent these signals from reaching the video stages of the receiver and causing interference in the picture.

The video i-f amplifiers are also across this filament winding to ground. Each has a 1,500-$\mu\mu$f capacitor across it to bypass signals. These elements are three times the size of those across the r-f tuning unit tubes. This is so since the frequencies in the video i-f stages are reduced from the incoming carrier frequency which the r-f stages use. The r-f chokes are again used to block the r-f signals. Note also the use the filament choke used to isolate the audio amplifier and the 2nd audio i-f tube as well as the use of the 5,000-$\mu\mu$f capacitor for video and audio bypassing.

Arnold J. Unger

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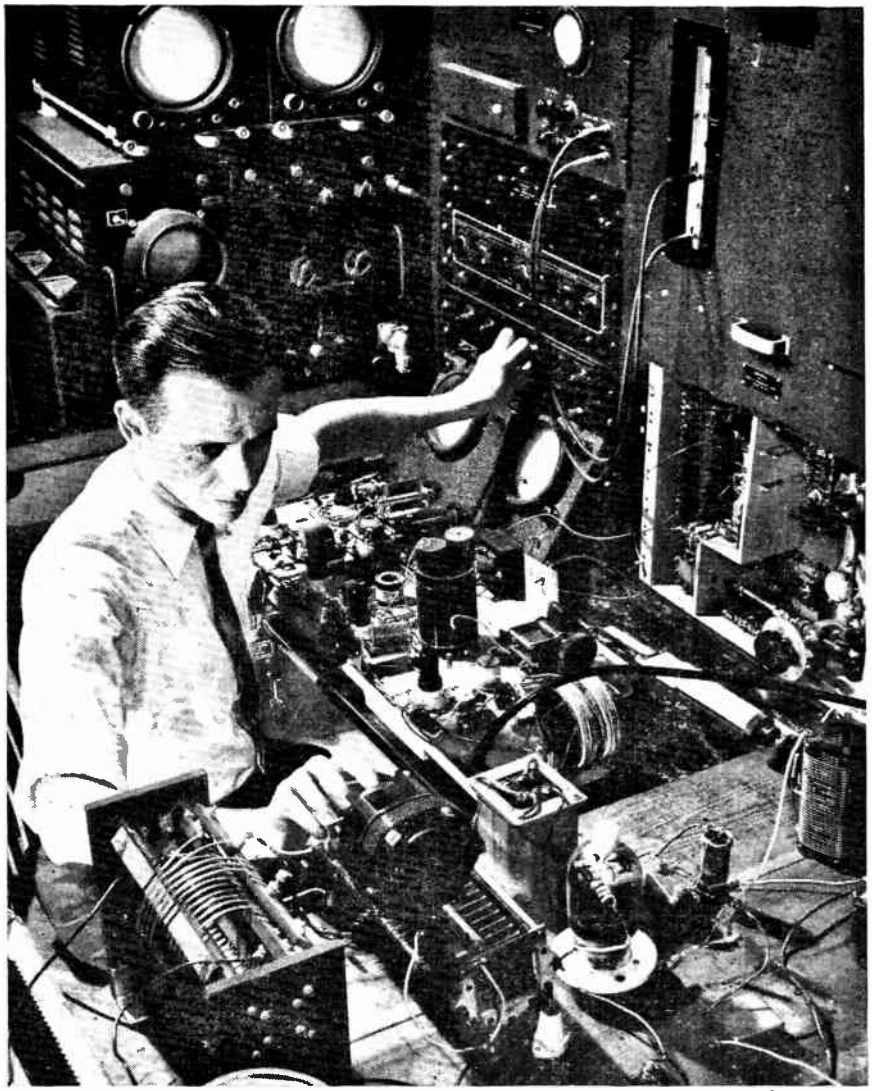
JUNE, 1949

TV MEASUREMENTS

By Henry Chanes



Official U.S. Navy Photograph

THIS is the second of a series of three articles on Measurements. This material is reprinted from the "How It Works" book that accompanied Rider's TV Manual Volume 2 because of the importance of the material and the fact that the distribution of this "How It Works" book is limited esentially to those areas where TV exists.

Almost all voltmeters in use today are of the multi-range type. That is, they have more than one scale in order to handle a large range of voltages. It is important for us to consider the effect that using the instrument on different scales has on the reading. Let us compare the 20,000 ohm-per-volt meter and the VTVM in this respect. We showed in the previous issue that using a 1,000 ohm-per-volt meter results in large errors in most circuits, and as a general rule, we can say that the 1,000 ohm-per-volt meter should not be used at all for d-c measurements in television receivers.

By referring to Table I in the previous issue, the 20,000 ohm-per-volt meter is seen to have an input resistance that varies from 60,000 ohms on the 3-volt scale to 6 megohms on the 300-volt scale, while the VTVM has a constant input resistance of 11 megohms on all scales. The VTVM should, therefore, have the same effect on the circuit regardless of to which scale the meter is set, and the meter reading should be the same on all scales. On the other hand, the effect of the 20,000 ohm-per-volt-meter on the circuit will vary depending on which scale the meter is set.

To illustrate this effect, the voltage at C in Fig. 3 (shown in the May 1949 issue of SUCCESSFUL SERVICING) was measured with both the VTVM and the 20,000 ohm-per-K-volt meter on all scales which would give a readable voltage. Point C was chosen instead of the other two points in order to eliminate the effect of the input capacitance of the meters. This effect will be discussed in detail later. The results of these measurements are as shown in Table III.

TABLE III

VTVM	20,000 ohms/volt
10-volt range, -5.3 volts	1-volt range, -34 volts
30-volt range, -5.3 volts	10-volt range, -2 volts
100-volt range, -5.3 volts	100-volt range, -5 volts

As expected, the readings obtained with the VTVM were the same on all ranges. The 20,000 ohm-per-volt meter, on the other hand, gave readings which varied considerably on the different range settings. An examination of these results shows that the 20,000 ohm-per-volt meter will be more accurate on its higher ranges since its input resistance is higher. In fact, on the higher ranges, the input resistance of the 20,000 ohm-per-volt meter becomes comparable to and even larger than the input resistance of the VTVM. For example, on the 300-volt range, the input resistance is 6 megohms and on the 1000-volt range, the input resistance is 20 megs.

This would seem to indicate that when measuring voltages in high-resistance circuits with a 20,000 ohm-per-volt meter, the highest possible scale should be used. This is true within limits; if the meter is set on too high a scale, it is not possible to read a small voltage. Using this 20,000 ohm-per-volt meter, it was not possible to read 5 volts on any range higher than the 100-volt range. The reading on this scale was, therefore, the best that could be obtained.

When comparing voltage measurements on a television receiver taken with a 20,000 ohm-per-volt meter with the voltages

Please turn to page 6

RCA 612V1, 612V3, 612V4, Ch. RK-121, RS-123

Models 612V1 and 612V3 appear on *pages 17-31 through 17-43 of Rider's Volume XVII.* Model 612V4 is the same except for the cabinet. Some of these receivers have developed a howl when operating on the f-m band. Howl of this nature is generally a result of vibration from the speaker being transmitted to some component, or series of components, in the oscillator circuit. This vibration causes the oscillator frequency to become modulated, resulting in a howl being emitted from the speaker.

The following are possible causes:

1. Loose elements in the oscillator tube.
2. Loose plates or unequal spacing of rotor and stator plates in the f-m oscillator section.
3. Capacitor C88 should be placed adjacent to the side wall of the r-f shelf and held firmly in place. This may be accomplished by melting wax against the capacitor and the chassis.
4. All oscillator, r-f, and ant. leads should be well separated and arranged to produce the least capacitance change if set breaks into vibration.

When searching for the cause of the trouble, an alignment tool having a high dielectric constant and without a metal tip can be used to probe in the circuit. It is important that the position of the wires and components be changed as little as possible during realignment. During such probing, the air column of the speaker in relation to the chassis must be as near as possible to normal operating position. Failure to maintain such relation may result in false indications of either excessive howl or no howl.

On the RK-121 chassis, starting with serial number 25,000, a 10-ohm carbon resistor has been added between C16 (100 $\mu\mu$f) and terminal number 1 of S4 Front. This resistor has been inserted to eliminate dead spots between 1400 and 1600 kc on the "A" band. This resistor should be added to any early model set developing dead spots, but make certain that the over-all lead length, including the resistor remains the same as before.

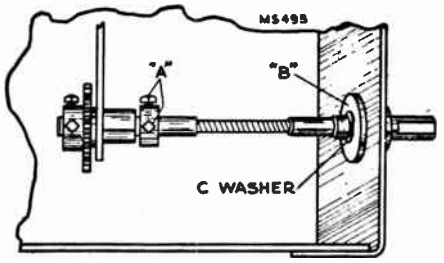


Fig. 1. The early production coupling shaft of the RCA 612V series.

The range switch coupling shaft on the early and late productions differ. To remove the early production coupling shaft, refer to Fig. 1 and the following directions. Loosen square head set screws "A" in collar of shaft, remove "C" washer from shaft at inside of bushing "B", push shaft through bushing to permit removal of "C" washer normally recessed inside bushing. Pull shaft through bushing to inside of chassis.

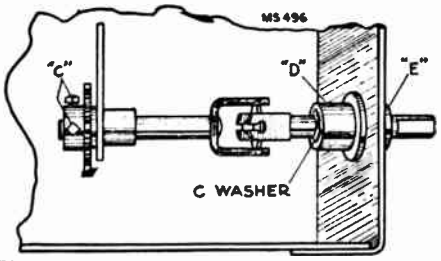


Fig. 2. The late production range switch coupling shaft of the RCA 612V series.

Refer to Fig. 2 for the late production range switch coupling shaft. Loosen square head set screws "C" in collar of gear. Remove nut "E" (on front apron of chassis) from bushing "D". Push shaft and bushing to the rear so that shaft and bushing are clear of the chassis apron. Flex the shaft and pull forward. To remove bushing from shaft, use procedure described for early type shaft.

The brown lead of the dial lamp for phono. operation is at present dressed to contact #3 of S-1 Front, then through the space between the switch rotor and through the bolt spacer. This lead should be dressed between the spacer and the shelf cradle. The bus wire from the "C" band antenna coil to contact #9 of S-1 Rear is to be dressed a distance of ¼ inch from the loop load coil antenna lead (yellow). The f-m antenna lead (yellow) is to be dressed between the switch spacer through the bolt and the switch rotor shaft, keeping clear of the shelf and cradle.

The changes indicated should be made in the parts list. The entire listing of Miscellaneous parts is given for convenience.

STOCK No.	DESCRIPTION
	RADIO CHASSIS ASSEMBLIES RK-121
Add:	
72986	Bushing—Threaded bushing for knob end of selector switch coupling shaft (late production).
72984	Plate—Connecting plate for selector switch coupling shafts (late production).
34761	Resistor—10 ohms, ½ watt (R54).
72982	Shaft—Selector switch coupling shaft—switch end (late production).
72983	Shaft—Selector switch coupling shaft—knob end—less threaded bushing (late production).
72951	Shield—Lead tube shield (for V3).
Delete:	
71791	Cable—
Change in Stock No.:	
45233	Capacitor—to 39396 Capacitor—(C16, C21, C83).
33789	Capacitor—(C60) to 35223 Capacitor—(C60).
32634	Cord—to 72987 Cord—
	AMPLIFIER ASSEMBLIES RS-123
Add:	
72955	Capacitor—Electrolytic comprising 1 section of 30 mfd., 450 volts, 1 section of 50 mfd., 400 volts, and 1 section of 40 mfd., 25 volts (C1A, C1B, C1C).
Delete:	
36599	Capacitor—
Change in Stock No.:	
72596	Capacitor—to 71551 Capacitor—(C7).
	MISCELLANEOUS
71864	Antenna—Di-pole antenna
72599	Back—Cabinet back for 612V1—for center
72598	Back—Cabinet back for 612V1—sides (2 required)
72590	Back—Cabinet back for 612V3—for center
72579	Back—Cabinet back for 612V3—sides (2 required)
70160	Back—Cabinet back—mahogany—for sides (2 required)—for 612V4
70162	Back—Cabinet back—mahogany—for center—for 612V4
70161	Back—Cabinet back—walnut—for sides (2 required)—for 612V4
70163	Back—Cabinet back—walnut—for center—for 612V4
71888	Bottom—Bottom cover (pan) for rollout mechanism
36639	Bracket—Pilot lamp bracket
71874	Bushing—Bushing and washer for large knobs (4 required)
72899	Button—Plug button for rollout assembly sides (2 required)
71884	Button—Push button
72447	Cable—Shielded audio cable complete with plugs
71863	Cable—5 wire moulded antenna lead-in cable
38684	Capacitor—Mica trimmer, on loop, 2-20 mmf. (C1)
X1617	Cloth—Grille cloth for 612V1—wal. or mahog. cabinets
X1624	Cloth—Grille cloth for 612V1—blonde cabinets
X1620	Cloth—Grille cloth—upper—for 612V3—wal. or mahog. cabinet
X1621	Cloth—Grille cloth—lower—for 612V3—wal. or mahog. cabinets
X1628	Cloth—Grille cloth—uoper—for 612V3—blonde cabinet
X1629	Cloth—Grille cloth—lower—for 612V3—blonde cabinet
X1667	Cloth—Grille cloth for 612V4
71906	Decal—Trade mark decal (Victrola)
71910	Decal—Trade mark decal (RCA-Victor)
71876	Escutcheon—Escutcheon only less screen, window and marker strips for walnut instruments
71877	Escutcheon—Escutcheon only less screen, window and marker strips for mahogany instruments
71868	Frame—Mounting frame and bracket
71943	Grille—Metal grille—upper—for 612V3
71944	Grille—Metal grille—lower—for 612V3
70165	Grille—Metal grille for 612V4
72069	Grommet—Rubber grommet for mounting loop brackets—part of loop (2 required)
72763	Handle—Pull handle for rollout mechanism

STOCK No.	DESCRIPTION
73031	Hinge—Door hinge L.H. for 612V1 (2 required)
73032	Hinge—Door hinge R.H. for 612V1 (2 required)
71945	Hinge—Door hinge for 612V3—wal. or mahog. cabinets and 612V4 record storage compartment doors (4 required)
73004	Hinge—Door hinge for 612V3—blonde cabinet (4 required)
71764	Hinge—Drop door hinge for 612V1 and wal. or mahog. 612V3 cabinets (2 required)
73001	Hinge—Drop door hinge for 612V3 blonde cabinet (2 required)
73024	Hinge—Drop door hinge for 612V4 (2 required)
70167	Hinge—Speaker compartment door hinge L.H. for 612V4 (2 required)
70166	Hinge—Speaker compartment door hinge R.H. for 612V4 (2 required)
13103	Jewel—Pilot lamp cap
71883	Knob—Tone control knob for wal. or mahog. cabinets
72761	Knob—Tone control knob for blonde cabinet
71821	Knob—Volume control, power switch, selector switch or tuning knob for wal. or mahog. cabinets
72118	Knob—Volume control, power switch, selector switch or tuning knob for blonde cabinets
11765	Lamp—Pilot lamp
71862	Loop—Antenna loop complete (L1, L15, C1)
71969	Marker—Call letter markers
72765	Nut—Speed nut to fasten transparent screen to escutcheon (2 required)
71879	Plate—Backing plate for transparent screen
71881	Plate—Call letter marker plate
72764	Plate—Backing plates (1 set) for pullout handle
30868	Plug—2 contact female plug for power cable
71967	Plug—9 contact female plug for power cable
32641	Plug—3 prong male plug for loop cable
71968	Plug—9 prong male plug for power cable
31048	Plug—Pin plug for audio cable (2 required)
71890	Pull—Door pull for 612V1 (2 required)
71946	Pull—Door pull for 612V3
73034	Pull—Door pull for 612V4
71891	Pull—Drop door pull for 612V1
71873	Retainer—Rubber retainer to mount record changer (2 required)
71878	Screen—Transparent screen
30422	Socket—3 contact female socket for loop cable
38873	Spring—Conical spring to mount record changer (4 required)
71867	Spring—Retaining spring for push button
30900	Spring—Retaining spring for knobs
71869	Spring—Braking spring for right rear wheel (612V1 and 612V3 early prod.)
71870	Spring—Braking spring for left rear wheel (612V1 and 612V3 early prod.)
71865	Spring—Spring to hold flexible cable from mechanism
71866	Stop—Rollout carriage stop consisting of disc, rubber sleeve and spacer
73069	Stop—Drop door fall supports metal stop for 612V4
70164	Stop—Stop for drop door for 612V4
72396	Stop—Stop for speaker compartment doors for 612V4
71892	Strike—Cabinet doors strike and catch
71880	Strip—Backing strip for call letter marker plate
71889	Support—Drop door fall support—for 612V1 (2 required)
72999	Support—Drop door fall support—R.H.—for 612V3 wal. or mahog. cabinets
73000	Support—Drop door fall support—L.H.—for 612V3 wal. or mahog. cabinets
73002	Support—Drop door fall support—R.H.—for 612V3 blonde cabinet
73003	Support—Drop door fall support—L.H.—for 612V3 blonde cabinet
*72940	Support—Drop door fall suoport—L.H. for 612V4
*72939	Support—Drop door fall support—R.H. for 612V4
71872	Tire—Rubber tire for front rollout wheels
71871	Tire—Rubber tire for rear rollout wheels
*2917	Washer—"C" washer for rubber retainer (2 required)
71875	Washer—Spring washer for fastening front wheels and late production rear wheels
71887	Wheel—Front wheel and tire assembly (2 required)
72858	Wheel—Rear wheel and tire assembly (2 required)—late production only
71886	Wheel—Left rear wheel complete with braking mechanism, less braking spring #71870
71885	Wheel—Right rear wheel complete with braking mechanism, less braking spring #71869
71882	Window—Window for call letter markers

Parts list of the RCA 612V1, 612V3, 612V4

Pull shaft through bushing to inside of chassis.

Western Auto D4832-B

This model appears on *pages 18-69 through 18-72 of Rider's Volume XVIII.* The "B" chassis of this model differ from the "A" chassis by a change in the value of resistor R-4 from 220,000 ohms to 10,000 ohms.

The new part number and description are as follows:
R-4 B-85103 10,000 ohms, 0.5 w.

●

Federal 1028TB, 1029

These models are the same as Model 1024TB, appearing on *pages 17-1 through 17-3 of Rider's Volume XVII,* except for the following changes. A 12SK7 tube is used as the i-f amplifier instead of the 6SS7. The cathode resistor (R2) of the i-f amplifier can be either 1500 ohms or 750 ohms. C17 can be either 470 $\mu\mu$f or 1000 $\mu\mu$f. R13 (in filament lead) has been eliminated, and pin 2 of the 50L6GT tube connected to pin 7 of the 35Z5GT tube.

●

General Electric 250, 260

Model 250 appears on *pages 15-32 through 15-36 of Rider's Volume XV.* Model 260 appears on *pages 16-6 through 16-12 of Rider's Volume XVI.* The following should be added to the parts list for both models: Hinge pin for cover, catalog number RMP-011.

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Farnsworth GK-266, K-699, Chassis C-152, GK-267, K-267 Chassis C-153

These models are the same as Models EK-263 and EK-264, which appear on *pages 15-7 through 15-9 of Rider's Volume XV*, except for the cabinets. The parts list should be amended to include the following:

Ref. No.	*Part No.*	*Description*
39	94235	Output transformer, GK-266, GK-267, K-267, K-669
41	38533	Loop antenna, EK-264, GK-267, K-267
41	38997	Loop antenna assembly, K-669
41	38894	Loop antenna assembly, GK-266
47	81169	Speaker, K-669
47	81170	Speaker, GK-266, GK-267, K-267
	31318	Dial glass, EK-264, GK-267, K-267
	31280	Dial glass, EK-263, EK-265, GK-266, K-669
	59211	Dial escutcheon, EK-264, GK-267, K-669, K-267
	59199	Dial escutcheon, EK-263, EK-265, GK-266
	58587	Dial background, GK-266, K-669
	58586	Dial background, GK-267, K-267
	H-278-1	Cabinet and packing, GK-267, walnut
	H-278-2	Cabinet and packing, GK-267, blonde
	H-277-1	Cabinet and packing, GK-266, walnut
	H-277-2	Cabinet and packing, GK-266, blonde
	H-317	Cabinet and packing, K-669
	59134	Knob for walnut cabinets
	59450	Knobs for GK-266, GK-267, blonde

●

Federal 1024TB

This model appears on pages *17-1 through 17-3 of Rider's Volume XVII*. Some sets have been equipped with a 12SK7 tube as an i-f amplifier instead of the 6SS7. This gives better performance.

General Electric 376, 377, 378

These models appear on *pages 19-36 through 19-41 of Rider's Volume XIX*. The f-m choke, L8, in the cathode circuit of the 6BE6 oscillator converter tube, V2, was listed under catalog number RLF-007. Due to a production change, this choke now becomes RLF-012.

Delete URD-033, R12, Resistor—220 ohms, ½ w., carbon. Add URD-037, R12, Resistor—330 ohms, ½ w., carbon. Add RCW-3009, C37, Capacitor—20.5 $\mu\mu$f. ±5%, ceramic. Delete UCW-2011, C37, Capacitor—20 $\mu\mu$f, ceramic. Add symbol number P4 to RJP-003. Delete P3 and P4 (Plug—preamplifier power plug) from RJP-004. Add RJP-005, P3, Plug—preamplifier power plug.

●

Air King A400, Minstrel; Ch. 470

This model appears on *page 16-1 of Rider's Volume XVI*. The following material should be added to that which appears in the Manual. The voltage and resistance measurements follow.

TUBE	PIN	VTVM	20,000 OHM/V	1,000 OHM/V	RESISTANCE
	1	0	0	0	0
12SA7	2	AC	AC	AC	25
Converter	3	+76	+76	+76	OVER 500K
	4	+76	+76	+76	OVER 500K
	5				
OSC.	550 KC	-3.1	-3.2	-0.3	17K
VOLTAGE	1600 KC	-3.9	-5.2	-0.3	17K
	6	0	0	0	0.6
	6	AC	AC	AC	14
	8	-1.5	-0.7	0	6.5 MEG
	1	0	0	0	0
12SQ7	2	-1.3	-0.8	-0.6	5.2 MEG
DET. AVC	3	0	0	0	0
1st AF	4	-1.0	-0.6	-0.3	2 MEG
	5	-1.6	-0.8	-0.4	6.5 MEG
	6	+48	+48	+23	OVER 500K
	7	AC	AC	AC	14
	8	0	0	0	0
	1	0	0	0	0
50L6	2	AC	AC	AC	26 OHM
AUDIO	3	+110	+110	+110	OVER 500K
OUTPUT	4	+75	+75	+75	OVER 500K
	5	-3.8	-1.1	-0.4	340K
	6	---	---	---	---
	7	AC	AC	AC	80
	8	0	0	0	0
1	1	+1.6	+1.6	+1.6	6.5 MEG
35Z5	2	AC	AC	AC	140
RECT.	3	---	---	---	130
	4	---	---	---	---
	5	AC	AC	AC	155
	6	AC	AC	AC	80
	7	AC	AC	AC	105
	8	+122	+122	+122	OVER 500K

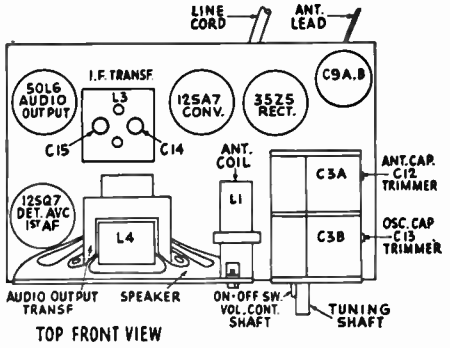
ALL RESISTANCES IN OHMS UNLESS OTHERWISE NOTED.
ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND WITH 166 V AC LINE V VOLTAGE.

I-F Alignment

Connect an output meter across the voice coil. Connect the signal generator to the primary of the antenna transformer through a 100-$\mu\mu$f capacitor.

Set the signal generator to 455 kc and fully mesh the receiver tuning capacitor.

Keep the receiver volume control at maximum and the output of the signal generator sufficient to give a readable deflection on the output meter and adjust i-f trimmers C15 and C14 for maximum.



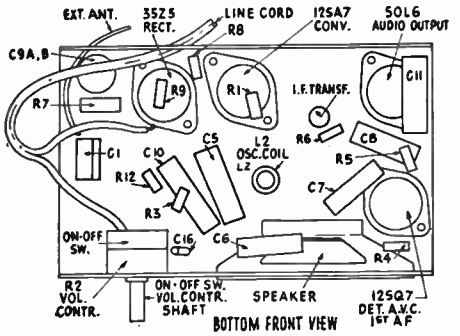
The top front view of the Air King A400, showing tubes and trimmer locations.

R-F Oscillator Adjustment

Keeping the same setup as used for i-f alignment, set the signal generator for 1600 kc and adjust oscillator trimmer C13 for maximum output.

Set signal generator and receiver for 1400 kc and adjust antenna trimmer C12 for maximum output.

The parts layout and alignment points are shown in the accompanying diagrams.



The bottom front view of the Air King A400, showing parts layout.

●

RCA 710V2, Ch. RC-613A

These models appear on *pages 18-55 through 18-60 of Rider's Volume XVIII*. Resistor R15 in the cathode circuit of the type 6AU6 f-m driver stage has been changed from 68 ohms to 120 ohms. This change was made because certain 6AU6 tubes were found to draw grid current at the bias value produced by 68 ohms, which resulted in a decrease in f-m sensitivity.

●

Westinghouse H-188, Ch. V-2133

This model appears on *pages 19-18 and 19-19 of Rider's Volume XIX*. Short wave interference may be cured by replacing the 0.05-μf resonant capacitor (C7) with a 0.1-μf standard paper capacitor of 200 volts or higher rating.

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

Vol. 10 JUNE, 1949 No. 8

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

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JOHN F. RIDER, Editor R. I. LATZER, Associate Editor

CURTAIN TIME

It's the Weather

This being golfing weather, we can't help repeating waht we think is a very excellent golfing story. Mrs. C. had just made her seventh shot and she was about 50 yards from the green. After consultation with her caddy, they decided that she would hit an 8 iron to the green. Thereupon with extreme politeness he handed her the club. She measured the shot several times, took a half-dozen practice swings and finally took a mighty swat at the ball. It was a bad shot and dribbled about 2 feet. She turned towards the caddy and very sweetly murmured, "I think you're underclubbing me again"...

The Service Shop Window

We noted a very significant detail during the past few months while traveling around the country. It is only natural that when we hit a town we should be interested in servicing activities. Among these interests is what is done by the service shop owner to *attract* business. This is somewhat different from the various means of getting business. In the long run the end product is the same—money in the till, but a distinct lack of activity to attract business exists.

Everyone knows the importance of properly dressing a window so that it will be attractive to the passing eye. The idea is to STOP the passerby. That is why window dressing is a special activity—something which receives much attention from all of the big selling outfits. Now, it is not our idea that the service shop owner should hire a window dresser to do his work—but most certainly a need for an attractive window exists in every service shop. An eye stopper is essential!

Needing an eye stopper and getting one are two different things. We admit that. But even in the absence of an eye stopper, 99 out of every 100 radio service shops have cluttered-up windows. To many different objects and signs are to be found in the average shop window. Space in the window is not intended to be filled with a haphazard collection of objects. Leave a little air. Let the viewer see what he is looking at. Remove some of the distracting influences. Leave space around objects.

The shop window is not a storage place. It must convey a message! It must have eye appeal. It must have a focal point of interest. Devote a little thought to what is put into the window. It is a means of getting business. Neatness is imperative because it creates the impression of what is inside the store—of what happens inside the store—of what will happen to the customer's set, if you service it.

Neatness and efficiency go hand-in-hand in the customer's mind. If a window is seedy in appearance—if it is slipshod in arrangement—if the objects are covered with dust—it conveys the impression that the workmanship is of similar character. If the window is neat and clean and well-dressed, the impression is that of an efficient, successful shop. People judge a shop by the appearance of its windows. Electric power is cheap. Use it plentifully to illuminate the window.

We have given much though to the subject and will shortly announce "eye-stoppers" for every service shop window. These will be available through our jobbers. They will be free for the asking. But to make them effective, they will require a good background. **WATCH FOR THE ANNOUNCEMENT IN THE JULY ISSUE OF SUCCESSFUL SERVICING!**

The Pattern Is Set

There is no doubt about the price pattern being set for TV receivers. It is downward and it means that everybody is shooting for the mass market. What will happen to TV receiver sales during the coming Summer months is not yet known—but everyone is in agreement that TV set sales during the coming Fall and Winter will be telific! Whether the 10-inch receiver will be stabilized at $169 or $189 is not of moment—the important thing is that set prices are getting to that level where people who wanted TV but could not afford it will have their receivers this Christmas.

Licensing

This ogre is raising its head in different parts of the country. Everything which can be done, should be done to stop it. Neither the public nor the servicing industry requires licensing for the installation of TV antennas or for the servicing of TV receivers. Licensing never cured anything. Look around you and see the many licensed activities which are taking advantage of the public whenever they can do so. A dishonest man is not made honest just because he must pay a fee to operate. If anything, he will start thinking about ways and means of stealing and not getting caught. The nation has many jails and the threat of incarceration has not stopped the activities of thieves.

If malpractice exists among some of the men who do TV servicing, it will not be stopped by licensing. If some oldtime servicemen fear competition from newcomers—it will not be stopped by licensing. The competent will win out. If city governments are needlessly afraid of lightning, it will not be stopped by licensing. If servicemen think that licensing is a TEMPORARY measure to cure an evil, it is erroneous thinking. First of all, it will not cure anything. Second, it is *not* a temporary measure—it is permanent—a PERMANENT TAX—from which neither the public nor the industry will benefit.

Serviceman-Ham

We have an idea which might be of interest to those service shop owners who have ham tickets. We know that among the 46,000-odd people who receive this publication, there are thousands with such licenses. Won't you drop us a postcard identifying yourself? Also let us know if any airport is near you — and if the answer is yes, how far you are from it. Thanks.

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Vacation Time

The office of John F. Rider Publisher, Inc. will be closed for vacations during the last two weeks of July. Please try and anticipate your needs and send your orders and requests for schematics in to us before July 15 or after July 30. We'll be back all sunburned on August 1, ready to serve you again.

TV Measurements

(Continued from page 1)

given for the receiver, this characteristic of the meter should be kept in mind. Of course, if the voltage in a low-resistance circuit is being checked, it will not make any difference which scale on the meter is used. In this case, for best accuracy, a scale that will place the reading somewhere around the middle of the scale should be chosen.

Unless the range used is specifically given with the measurements of high-resistance circuits, the safest procedure is to use the highest scale that will allow an accurate reading. If the meter range is mentioned, the same range should be used if the meter being used has this range. Not all 20,000 ohm-per-volt meters have the same ranges, however. If this situation occurs, the nearest range should be used.

Input Capitance

In determining the effect of a voltmeter on the circuit to which it is connected, we have considered that the meter has a definite input resistance which places a load on the circuit. In addition to this input resistance, the meter also has an input capacitance, and under some conditions this may influence the readings obtained. The equivalent input circuit of

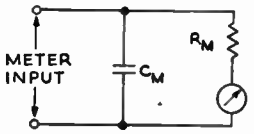

Fig. 4. Meter equivalent input circuit which consists of an input capacitance and an input resistance.

any meter can be represented as shown in Fig. 4, where R_M is the input resistance of the meter and C_M is the input capacitance.

This input capacitance is due to several factors, among which are the meter leads, the internal wiring in the meter, series resistors, and the meter movement itself. To reduce the effect of the meter on the circuit, this input capacitance should be made as small as possible. Perhaps the best method of reducing this capacitance is to isolate it from the end of the lead

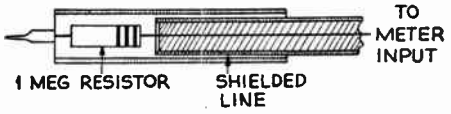

Fig. 5. VTVM d-c probe containing an isolating resistor to reduce the input capacitance.

that is actually connected to the circuit. This is done in the "VoltOhmyst" type of VTVM by building an isolating resistor into the d-c probe, as shown in Fig. 5.

The equivalent circuit of the meter input then appears as shown in Fig. 6.

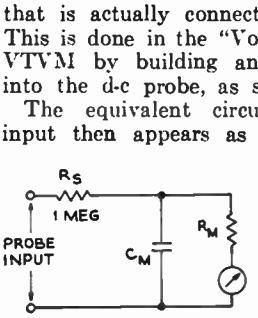

Fig. 6. Equivalent input circuit of a VTVM which employs an isolating resistor in the probe.

Note that the isolating resistance R_S is in series with the parallel combination of C_M and R_M. This makes the capacitance at the tip of the probe much less than the actual capacitance C_M. Since the resistor is placed right at the probe tip, it is possible to use a shielded lead to the meter without appreciably increasing the input capacitance.

Since the input resistance of this type of VTVM is 11 megohms and 1 megohm is used as an isolating resistor in the probe, the meter unit itself must have a resistance of 10 megohms. As this input resistance is constant, the addition of the isolating resistor does not effect the use of the meter on different ranges.

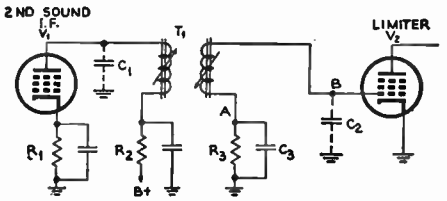

Fig. 7. Coupling circuit used in the sound section of a television receiver.

The 20,000 ohm-per-volt meter does not lend itself to the use of this device for reducing input capacitance when making low-voltage d-c measurements. Obviously the isolating resistance can not be any higher than the input resistance of the meter, as the isolating resistance is part of the total meter input resistance. This, therefore, limits the value of an isolating resistor to the lowest value of meter input resistance. The usual 20,000 ohm-per-volt meter has a low range of 3 volts. The meter resistance on this range is 60,000 ohms, which is also the maximum possible resistance that could be used for isolation and yet enable the meter to be used on the 3-volt range. However, 60,000 ohms is too low a value to be used for effective isolation of the input capacitance, as this resistance should be of the order of 1 megohm.

Let us examine several examples to observe the possible effect of the input capacitance. In Fig. 1 (shown in the May 1949 issue of Successful Servicing) where the output voltage of the power supply was being measured, the input capacitance of the meter will have no effect at all on the circuit. Point A is already bypassed to ground by capacitor C_2 which may be as high as 40 or 80 μf. The addition of a few micro-microfarads due to the meter will not make any difference. In Fig. 2 (also shown in the May 1949 issue of Successful Servicing) which is a plate circuit of an R-C coupled amplifier, the effect of the input capacitance will also be negligible.

However, if the meter is placed across a tuned circuit, the effect of the added capacitance, especially at high frequencies, may be appreciable where the original capacitance in the circuit may have been only a few micro-microfarads to begin with.

Fig. 7 illustrates the type of circuit where this effect may be appreciable. This figure shows a coupling circuit between a second sound i-f amplifier and the following limiter stages. The primary of transformer $T1$ is tuned by the output

Please turn to page 9

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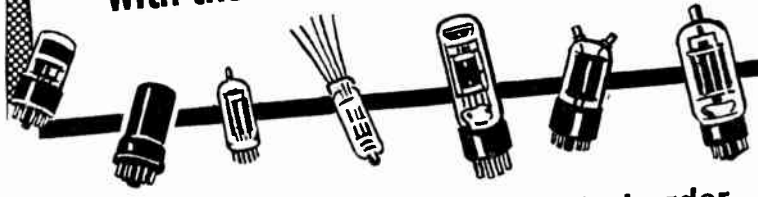

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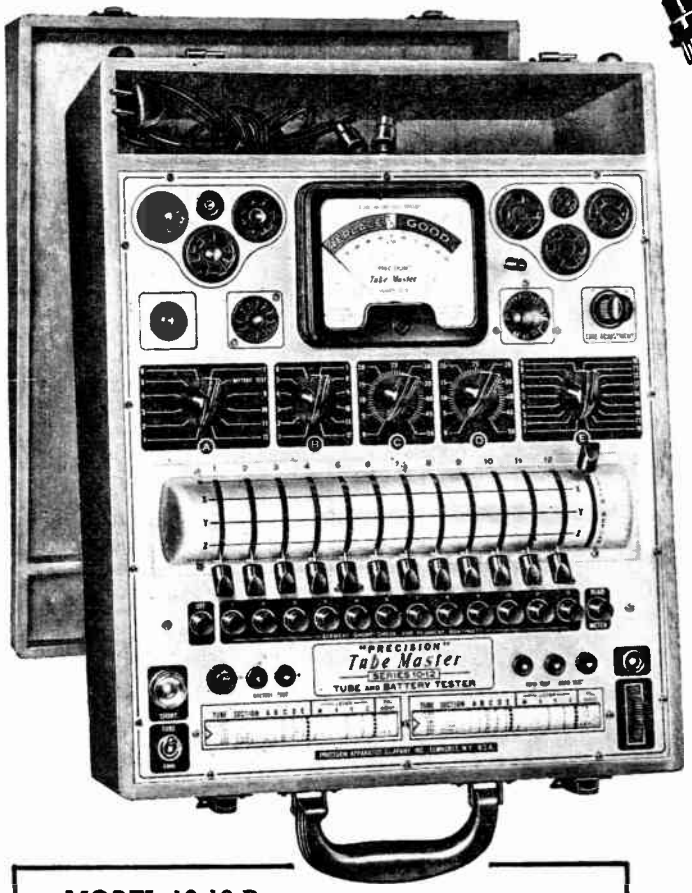

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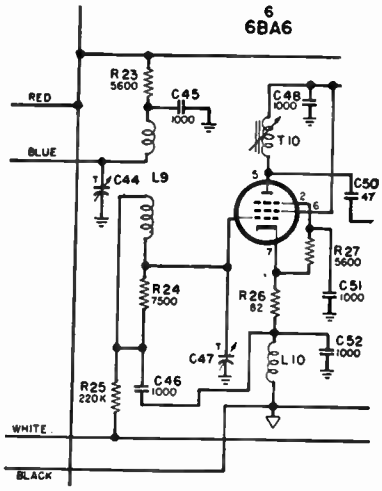
Television Changes

Belmont 18DX21

This model is the same as Model 18DX21A, appearing on *pages 2-11 through 2-25 of Rider's TV Manual Volume 2*, except for the following changes.

In the tuner chassis, capacitors C117 and C118 (5 $\mu\mu$f) and resistor R109 (5600 ohms) have been omitted. Capacitor C6 has been changed in value from 1.0 $\mu\mu$f to 0.5 $\mu\mu$f. The lower side of capacitor C10 is connected directly to ground instead of to the lower part of coil L6.



The coupling circuits associated with the first 6BA6 tube in the main chassis of the Belmont 18DX21.

The coupling circuit to the grid of the first 6BA6 tube in the main chassis (tube 6) has been changed. See the accompanying diagram. Resistor R28, the grid resistor of the second 6BA6 tube (tube 7) has been changed in value from 47,000 ohms to 18,000 ohms. Resistor R31 (the plate resistor of the same tube) has also been changed in value from 47,000 ohms to 18,000 ohms. Capacitor C119 (1000 $\mu\mu$f) has been omitted. Resistors R87, R88, R89, and R90 have all been changed in value from 2.2 megohms to 1.0 megohm.

Capacitor C92 has been connected from the grid (pin 1) of the 12SN7 tube (tube 12) to the plate (pin 2) of the same tube. Capacitors C93 and C94, which were formerly connected to this plate, have been connected to the plate of the other half of the tube (pin 5). Resistor R112 is used only when ballast resistor R55 is 104 ohms. When 5R5 is 40 ohms, the container is marked with a yellow dot.

Capacitor C116 (1000 $\mu\mu$f), choke coil L9, resistor R108 (33,000 ohms), and capacitor C115 (10 μf) have all been omitted. The diode plate (pin 6) of the 19T8 tube is now connected to its cathode (pin 7) instead of to the bottom of the parallel combination of C115 and R108.

Delete the following from the parts list.

Ref. Symbol	*Part No.*	*Description*
C6	A-8G-12495-2	1.0 $\mu\mu$f
C117-118	A-8G-12495-7	0.5 $\mu\mu$f
R109	C-9B1-71	5600 ohms, 10%, ½ watt
L-4-5-6-7-8	A-16A-16637	R-f choke
C115	A-8C-11495	Electrolytic, 10 μf, 150 v.
C116-119	C-8G-13201	100 $\mu\mu$f, ceramic
C44	C-8F3-109	47 $\mu\mu$f, 10%, 500 v.
R23	C-9B1-13	1000 ohms, 20%, ½ watt
R24	C-9B1-19	10,000 ohms, 20%, ½ watt
R28-34	C-9B1-82	47,000 ohms, 10%, ½ watt
R87-88-89-90	C-9B1-102	2.2 megohms, 10%, ½ watt
L9	A-201-16379	Choke coil
L10-11-14-18-22-23	A-16A-16637	Filament choke coil
T15	B-201-15612	Stagger tuned coil assembly
	A-200-15732	Strap assembly for front of picture tube
	B-200-16300	Strap assembly for rear of picture tube
	A-51A-16693	Iron core for stagger tuned coil assembly (part number B-201-15612)
R61	C-9B2-66	2200 ohms, 10%, 1 watt

Add the following to the parts list:

Ref. Symbol	*Part No.*	
C6	A-8G-12495-7	0.5 $\mu\mu$f
L4-5-6-7-8	A-201-15677	R-f choke
C44-47	B-201-15142	Trimmer capacitor
R23	C-9B1-71	5600 ohms, 10%, ½ watt
R24	C-9B1-180	7500 ohms, 5%, ½ watt
R28-31	C-9B1-77	18,000 ohms, 10%, ½ watt
R87-88-89-90	C-9B1-31	1 megohm, 20%, ½ watt
L9	B-201-15611	Converter coil
L10-11-14-18-22-23	A-201-15609	Filament choke coil
	A-2C-156-15654	Retainer strap for rear of picture tube
	A-49A-15616	Spring for rear tube strap
	A-51A-11761	Iron core for stagger tuned coil assemby (part number B-201-15612)
R61	C-9B2-64	1500 ohms, 10%, 1 watt

Pilot TV-42, TV-952

These models are the same as Model TV-40, TV-950 on *pages 2-14 through 2-53, 54 of Rider's TV Volume 2.*

●

Correction

RCA page 2-28 in Rider's TV Manual Volume 2 should be labelled Model 8TS30 instead of Models 8PCS41, 8PCS41-B, 8PCS41-C.

Andrea T-VK12, BT-VK12, Ch. VK12

These models appear on *pages 2-9,10 through 2-37 of Rider's TV Manual Volume 2.* The following corrections should be made on the schematic diagram.

Part No.	*Error*	*Correction*
R14	Connected to +150 v. bus	Connect to +300 v. bus
C35A	HCE-1313	HCE-1318
C68	50 $\mu\mu$f ± 10%	60 $\mu\mu$f ± 10%
C74	5 $\mu\mu$f ± 10%	50 $\mu\mu$f ± 10%
C102	Connected across R109	Connect across R110
C112A, C112B, C113, C118	Connected to B- bus ground	Connect to

●

Hallicrafters T-54 and 505

These models appear in *Rider's TV Manual Volume 1 on pages 1-1 through 1-29, 30.* The following should be tried if trouble is encountered with picture synchronization.

If the picture moves up and will not center with the vertical centering control, replace capacitor C20. If the picture moves down and will not center with the vertical centering control, replace capacitor C21.

If the picture moves to the right and will not center with the horizontal centering control, replace capacitor C28. If the picture moves to the left and will not center with the horizontal centering control, replace capacitor C29.

●

Farnsworth 651-P, 661-P

These models appear on *pages 2-11,12 through 2-25 of Rider's TV Manual Volume 2.* Certain bypass capacitors may be a possible source of trouble in case of horizontal sync failure or instability in these models. Recent reports have indicated instances of breakdown of the 6SN7 cathode bypass capacitor (0.02 μf, 200 v.). This breakdown results from the use of capacitors which did not come up to the required heat specifications. The recommended replacement for this capacitor is either Aerovox Duranite type P-88 (0.022 μf, 400 v.) or Solar type ST (0.02 μf, 400 v.).

●

Transvision Service Hints

If a remote control installation should result with weak signal symptoms, the following check should be made. Shunt the co-ax cable and feed the signal directly to the input of the tuner with a separate lead. It has been found that careless soldering of the co-ax fittings may result in a partial short at these points with symptoms that direct suspicion to the tuner.

It is suggested that two leads be used where high-frequency and low-frequency elements are both used. They can be switched by means of an anti-capacity switch. The leads should not come down from the antenna to the set less than 10 inches apart.

TV Measurements

Continued from page 6

capacitance of V1 which is indicated by the capacitance C_1. The secondary of the transformer is tuned by the input capacitance of V2, represented by C_2. These capacitances are small, in the order of 5 $\mu\mu$f. Both primary and secondary circuits are tuned to the sound i.f., which in this case is 21.25 mc.

The grid-leak resistor and capacitor combination (R_3-C_3) develop a negative bias at point *A*, which is necessary for proper limiting of the i-f signal in order to remove any amplitude modulation that might be present. This voltage is developed only when a signal is present. Therefore, any change in the circuit that will affect the signal at the grid of V2 will affect the voltage developed across the combination of R_3 and C_3. From the circuit, it can be seen that the d-c voltage at point *A* should be the same as the d-c voltage at point *B*, which is at the grid of the limiter. This is because the grid current that flows is very small, and the resistance of the transformer is also very small, usually about 0.1 ohm. Therefore the d-c drop accross the secondary winding will be negligible.

This, of course, suggests the idea, that if the d-c voltages are the same, and the grid voltage was desired, it would be advantageous to measure it at point *A* instead of at point *B*. This is true, since placing the meter at point *B* places it across the tuned circuit, whereas placing it at point A shunts it only across the grid-leak resistor and capacitor combination.

To determine the effect of the meter in this circuit, several measurement were made. First, the VTVM was connected to point *A*, and sufficient signal was fed into the grid of the first sound i-f amplifier to produce a voltage reading of -3 volts on the VTVM. To eliminate the possibility of the VTVM loading the circuit and changing the voltage that would normally appear at point *A*, another VTVM was connected at point *A* while observing the first VTVM to see if the voltage changed. The voltage remained constant, showing that the second VTVM did not add any additional loading. Since the two VTVM's are identical, it is fairly safe to assume that the first VTVM did not load the circuit either. This meter was, therefore, left at this point to serve as a reference indicator, keeping in mind that the d-c voltage at point *B* is the same as point *A*.

The next step was to determine the effect of the input capacitance of both the VTVM and the 20,000 ohm-per-volt meter at both points *A* and *B*. To eliminate the effect of the input resistance of the meter, since we are now primarily concerned with the input capacitance, a fairly large capacitance (1500 $\mu\mu$f) was placed in series with the lead of each meter. This completely removed the resistance of the meter from the probe. Of course the meters could not read the d-c voltage while connected in this manner, but d-c voltage could be observed on the first VTVM which was left connected to point *A* as the reference indicator.

Table IV shows the effect of connecting the VTVM and the 20,000 ohm-per-volt meter to points *A* and *B* on the d-c voltage. These measurements were all repeated without the series capacitor, which indicated the combined effect of the input capacitance and resistance.

TABLE IV

METER CONNECTED TO		POINT A	POINT B
with series capacitor	VTVM	-3 v	-1.2 v
	20,000 /v	-2.9 v	-.7 v
without series capacitor	VTVM	-3 v	-1.2 v
	20,000 /v	-2.8 v	-.5 v

Considering the readings obtained when the meters were used with series capacitors, the input capacitance of the VTVM had no effect on the circuit at point *A*, but when connected across the tuned circuit at point *B* it detuned the circuit sufficiently to cause the voltage to drop from -3 to -1.2 v. The input capacitance of the 20,000 ohm-per-volt meter, on the other hand, affected the circuit slightly at point *A*, causing the voltage to drop to -2.9 v and had more detuning affect than the VTVM at point *B*, where it caused the voltage to drop to -.7 v. It can be said, therefore, that neither meter is entirely satisfactory in this respect, although the VTVM is somewhat better than the 20,000 ohm-per-volt meter.

In the particular circuit used for these measurements, all of the error due to the input capacitance of the VTVM, and most of the error due to the input capacitance of the 20,000 ohm-per-volt meter could have been eliminated by taking the voltage measurement at point *A* and assuming that the voltage at point *B* was the same. However, with different circuit configurations, especially where the grid-leak resistor is connected from grid to ground, this method is not applicable and the voltage must be measured at the grid.

The second part of Table IV is interesting in that it shows the additional loading effect caused by the input resistance of the meters. Note that there is no loading for the VTVM, and only a little for the 20,000 ohm-per-volt meter, which was used on the 10 volt scale. The input resistance of this meter was, therefore, 200,000 ohms. The VTVM, as before, had an input resistance of 11 megohms.

High D-C Voltage Measurements

Cautions

The high voltages used for the picture tubes in television receivers vary from 5,000 to 15,000 volts for direct-view tubes and as high as 30,000 volts for projection tubes. It is important that the serviceman keep these high voltages in mind when working on television receivers. Accidental contact can cause severe burns and even death under some conditions. The following general procedure is suggested as a safe method in making high-voltage measurements of any kind.

1. Turn off the receiver. If one side of the line is connected to the receiver chassis, remove the line cord.

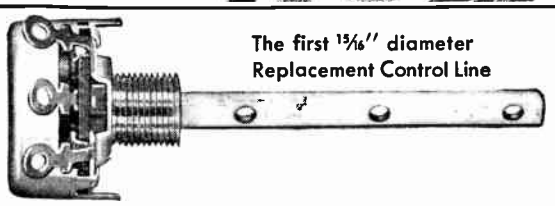
2. Discharge the high-voltage capacitors.

3. Connect the low side of the meter to chassis ground. Connect the high side

Please turn to page 13

Kills Two Birds with One Stone

The Mallory Midgetrol



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

These models appear on *pages 19-5 through 19-9 of Rider's Volume XIX*. The position of the battery pack in these models affects the loop inductance. When the battery is removed, the loop inductance will increase and the sensitivity will decrease because of improper electrical tracking of the loop circuit with the oscillator.

When a battery is temporarily unavailable, a sheet of aluminum 8½" long by 3-5/8" wide and from 0.020" to 0.050" thick may be placed in the position occupied by the battery so that it is lying flat on the bottom of the cabinet. This sheet of aluminum has an effect on the loop inductance similar to the effect caused by the battery and will, therefore, return the performance of the loop to approximately the same as obtained when a battery is installed. If aluminum is not available, brass may be substituted with approximately the same performance. DO NOT USE STEEL OR IRON since the performance will be adversely affected. If desired, the sheet of aluminum may be waxed to the inside bottom of the case. DO NOT PLACE ANY WAX, CEMENT, OR OTHER MATERIAL ON THE LOOP WINDINGS.

For the reasons mentioned, the battery as well as the chassis must be properly installed in the case when realigning the oscillator and antenna circuits. Failure to do this will result in extremely poor performance because of improper tracking. It is, of course, necessary to remove the chassis from the case for i-f alignment.

Since the first i-f stage employs neutralization by means of capacitor C7, incorrect alignment of the primary of transformer T2 will result if stage-by-stage alignment procedure is employed. Follow the alignment procedure on *page 19-5* to assure correct alignment.

The following changes have been made in the parts list.

Delete:
73144 Hinge—
Add:
74180 Hinge—cabinet hinge (2 required)

It has been found that the detent used on the original hinge (73144) caused strain on the cabinet which might result in breakage of the cabinet or back if roughly handled. The new hinge (74180) does not have this detent.

●

General Electric 230, Kaiser-Frazer

This model appears on *pages 18-26 through 18-28 of Rider's Volume XVIII*. When rough manual tuning action is experienced, it is usually traced to insufficient spacing between the end of the center shaft of the turret assembly and the guide rod bracket near the tuning shaft. Production requirements call for one or more (as required) brass shim washers at this point for smooth tuning action. Where rough tuning is experienced, a thin "C" washer slipped onto the end of the center shaft of the turret in addition to the brass shim washers will relieve binding and result in smoother tuning action.

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TV Measurements

Continued from page 9

of the meter to the point at which the voltage is being measured.

4. Stand clear of the meter and the connecting leads. Turn on the receiver and observe the voltage reading.

5. Turn off the receiver. Discharge the high-voltage capacitors.

6. Remove the meter leads.

High-Voltage Meters

As in measuring low-voltage d.c., the effect of the meter on the circuit has to be considered. For this reason, almost all high-voltage measurements are made at points which are bypassed to ground. The input capacitance of the meter, therefore, will have very little effect on the circuit at these points and can be neglected. The input resistance, on the other hand, if not high enough, can result in large errors, and has to be taken into consideration.

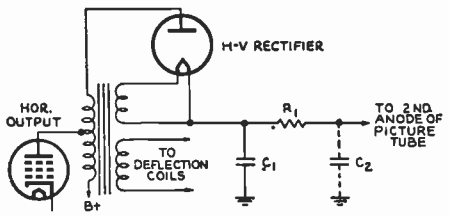

Fig. 8. Simplified schematic of a high-voltage power supply of the "kickback" type.

Fig. 8 shows a simplified schematic of a typical high-voltage supply. The high-voltage pulse developed in the primary of the transformer during the flyback period is rectified by the high-voltage rectifier tube. Resistor R_1 and capacitors C_1 and C_2 make up a filter to remove the a-c ripple and supply a substantially pure d-c voltage to the 2nd anode of the picture tube. C_1 is usually about 500 $\mu\mu$f and R_1 about 1 megohm. C_2 may be an actual capacitor but is more likely to be the capacitance between the 2nd anode and the external coating on the tube, which is grounded. In the case of a tube such as the 10BP3, this may vary from 500 to 2,500 $\mu\mu$f.

One of the reasons that such a comparatively small value of capacitance can be used is the high frequency of the a.c. being rectified, in this case, 15,750-cycle pulses. Another factor that allows the use of small capacitors and high resistances in the filter circuit is the small amount of current drawn by the picture tube. This current usually averages only about 100 microamperes.

The current drawn by the meter should not be so large as to cause the voltage across the filter capacitors to drop appreciably because of the increased load. About 50 microamperes should be the maximum current that the meter is allowed to draw from the circuit. Even this small amount of current will cause the output voltage to drop somewhat, but not so much as to make the measurements insignificant. This immediately eliminates the 1,000 ohm-per-volt meter as this type of meter will draw 1 milliampere (1,000 microamperes) for full-scale readings. The 20,000 ohm-per-volt meter will draw 50 microamperes on a full-scale reading and is, therefore, satisfactory for high-voltage measurements. By the use of suitable multipliers, the VTVM can also be used for measuring high voltages without drawing excessive current.

The voltmeter used to measure high voltages can be either a commercially-made instrument specifically designed for high-voltage measurement or an already available voltmeter which is adapted for high-voltage measurement by the use of multipliers. If a commercial instrument is used, it should have the following characteristics:

1. High enough range to handle the voltages encountered in television receivers. This is about 30 kilowatts in modern television receivers.

2. Low current drain, 50 microamperes or less, as discussed above.

3. High-voltage insulation in meter and leads, sufficient to handle the voltage range of the instrument.

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1. 35 cents is the charge for all the available data on any radio receiver model up to and including six pages. Each page thereafter will cost 10 cents.

2. If additional money is required to cover the data requested, you will be notified. We cannot forward data without receiving your remittance.

3. Service data on television receivers may be obtained at costs varying from 35 cents to $1.50. It is suggested that you inquire the cost before sending us a remittance for television data.

4. Be sure to enclose a self-addressed envelope bearing a 3-cent stamp.

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Be sure to send in your requests for diagrams so that we receive them before July 15 or after July 31. The office will be closed for vacation between those dates.

●

The Cover

On page 1 is shown a technician at one of the Naval Research Laboratories engaged in a chemical reduction experiment. Electronic equipment is used to control these experiments correctly. The Navy is now one of the nation's largest research agencies.

Industrial Television IT-11R, IT-13R

Model IT-11R appears on *pages 2-1,2,3 of Rider's TV Manual Volume 2* and Model IT-13R appears on *pages 2-4,5,6* of the same volume. Due to recurrent internal shorts in the 6BG6-G horizontal sweep output tubes, it has been found necessary to devise a means to protect the horizontal output transformer from being damaged by excessive current. A Mazda #47, brown bead, 6-8-volt, 0.150-ampere pilot bulb is inserted in the B+ feed to terminal #1 of the horizontal output transformer, T102, serving as a fuse in case of a shorted 6BG6-G tube. This change has been made in production and may readily be made in the field.

A special pilot light socket with good insulation to ground is available. The part number of this socket is 4A-235. The socket clips onto the assembly strap of transformer T102.

●

General Electric 118, 119

These models appear on *pages 19-8 through 19-10 of Rider's Volume XIX*. The green grid lead and blue plate lead of the first i-f transformer must be dressed as far as possible to the rear of the chassis and against the chassis. Coupling capacitor C24 should never lie against either of these leads. This will eliminate any possibility of r-f leakage into the phono-preamplifier which causes stations to be heard while operating the phonograph.

The following changes should be made in the parts list. Add P2 under symbol for RJP-003. Delete: RCN-014, C26, Capacitor—phenolic, for Model 118. Add to UCC-045: C26, Capacitor, 0.05 μf, 600 v., paper, for Model 118.

●

Magnavox AMP-101C

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

Ref. No.	*Description*	*Part. No.*
2-1	Capacitor, paper, 0.1 μf 600 v.	250152G33
2-2	Capacitor, paper, 0.1 μf, 600 v.	250152G33
8	Resistor, composition, 15,000 ohms, ±10%, ½ w.	230084G76
9	Resistor, composition, 100,000 ohms, 10%, ½ w.	230084G86

●

General Electric 210, 211, 212

These models appear on *pages 18-21 through 18-25 of Rider's Volume XVIII*. In the tube and trimmer location shown on page 18-25, the secondary tuning slug of T6 is available through the top of the can, while the primary tuning slug of T6 is available through the holes in the bottom of the can.

●

General Electric 356, 357, 358

These models appear on *pages 18-40 through 18-44 of Rider's Volume XVIII*. The following changes should be made in the parts list. Under UCC-025, remove symbols C43, C65, C70. Add to UCC-026, symbols C43, C65, C70.

RCA 8R71, 8R72, 8R74, 8R75, 8R76; Ch. RC-1060, RC-1060A

These models appear on *pages 19-10 through 19-15 of Rider's Volume XIX*. The second i-f transformer (T3) used in these receivers may be stamped 970435-2 or 970435-5. The d-c resistance (8.2 ohms) of the windings indicated on the schematic is for transformer 970435-2. The d-c resistance of the same windings in transformer 970435-5 is 12 ohms.

The number of turns of dial drive cord on the tuning knob shaft has been changed from 3½ turns to 4½ turns.

The following changes have been made in the parts list.

Delete:

73363 Transformer
71033 Washer
71034 Washer

Add:

74019 Transformer—second i-f transformer, dual (T3)
73333 Washer — insulating washer — extruded — for mounting output transformer (2 required)
73332 Washer—insulating washer—flat—for mounting output transformer (2 required)

●

Westinghouse H-210, H-211; Ch. V-2144, V-2144-1

These models appear on *pages 19-33 through 19-35 of Rider's Volume XIX*. If the dial pointer has a tendency to bind, lubricate the two dial pulleys with record changer lubricant and move the dial cord tension spring to another hole in the drum to increase the tension.

If the dial pointer rattles, glue a piece of bumper material (cork and rubber composition) 1/8" thick and about ½" square between the right-hand pulley rivet on the dial background and the front of the chassis.

●

Crosley 9-212B

This model is the same as Model 9-209 appearing on *pages 19-19 through 19-21 of Rider's Volume XIX*.

●

RCA 610V1, Ch. RC-610C; 610V2, Ch. RC-610

These models appear on *pages 19-56 through 19-60 of Rider's Volume XIX*. A small quantity of these receivers were shipped with the incorrect loop antennas. The incorrect loops contain approximately 14 turns instead of 17 turns. This reduced inductance causes low sensitivity and poor selectivity, particularly below 900 kc.

Complaint cases of poor sensitivity, poor selectivity, or interference in the form of local station(s) repeating at one or several places on the "A" band (except response at the image frequency) should have the loop checked as one possible cause.

The incorrect loop may peak at the high end of the "A" band but will not peak at lower frequencies. This may be checked by varying the oscillator coil inductance. The correct loop tracks normally across the band.

The stock number of the antenna terminal board is 72058. It was listed incorrectly as 70258.

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Farnsworth K-084, K-086, K-289

The first two models appear on *pages 18-6 through 18-12 of Rider's Volume XVIII.* The following changes have been made in production. Model K-289 incorporates these changes.

A 3-gang tuning capacitor is used, necessitating changes in the r-f amplifier circuit. The 100,000-ohm resistor connected to the grid (pin 1) of the 6AG5 r-f amplifier has been changed in value to 1 megohm. The lead which was formerly connected from the bottom of this resistor to the junction of resistors 7 and 8 (1 megohm and 4.7 megohms, respectively) is now connected directly to resistor 4 (100,000 ohms) and to D5 of switch section 2 rear. Resistors 7 and 8 have been eliminated.

The band-pass coil and the 470-$\mu\mu$f capacitor which were connected between the plate (pin 5) of the 6AG5 tube and the third grid (pin 8) of the 6SB7Y oscillator convertor tube have been removed. A connection has been made from the plate of the 6AG5 tube through a 100-$\mu\mu$f capacitor to D3 of switch section 2 rear. The third grid of the 6SB7Y is still connected to D2 of switch section 2 rear. The 100,000-ohm resistor, which was formerly connected between D1 of switch section 2 rear and the junction of D4 of the same switch section and the 1000-ohm resistor, has been removed. There is a connection from D1 of switch section 2 rear and C1 of switch section 2 front, indicated on the schematic by the black dot on these connections.

The 0.005-μf capacitor connected to C7 of switch section 2 front has been removed, as has the wave trap and 100-$\mu\mu$f capacitor connected to C1 of the same switch section. The third section of the ganged tuning capacitor is connected between C1 and ground, and is shunted by the f-m converter trimmer, and also by a band-pass coil (49) in series with a 0.05-μf capacitor. A 100,000-ohm resistor is connected from the junction of this capacitor and coil to D4 of switch section 2 rear. A 0.01-μf capacitor in series with a coil is connected from this common ground point to the junction of the 4700-ohm resistor and the r-f choke in the plate circuit of the 6AG5 r-f amplifier. A 47,000-ohm resistor has been connected in the line going between A3 of switch section 1 front and the junction of the 47,000-ohm resistor, the 470,000-ohm resistor, and the 100-$\mu\mu$f capacitor in the filter circuit of the a-m detector.

The following step should be included in the a-m alignment table on *page 18-1* between steps 6 and 7.

Step	*Connect Generator*	*Set generator At*	*Set Gang At*
6A	Ex. Ant. Binding Post	1500 kc.	1500 kc.

Adjust	*To Obtain*
BC R-F Trimmer	Maximum Output

The following additions should be made to the parts list.

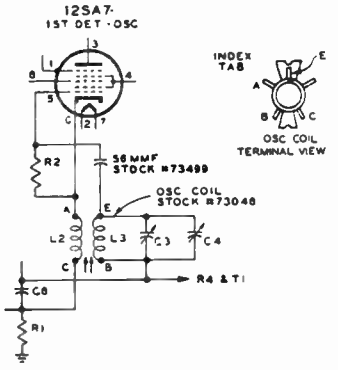
Ref. No.	Part No.	Description
27	25456	60-$\mu\mu$f ceramic capacitor
34	25182	0.1-μf tubular capacitor, 200 volts
39	26277	Tuning capacitor
46	13766	Loop antenna (GK-084, -088; K-084)
46	13784	Loop antenna (GK-086, -087; K-086, -289)
47	38932	F-m antenna coil
50	25181	0.05-μf tubular capacitor, 200 volts
51	38933	F-m converter coil
52	38934	F-m oscillator coil
69	81175	Speaker
73	42185	Pilot lamp, 250 ma (K-084, -086)
73	42187	Pilot lamp, Mazda 55 (K-289)
	22147	Pickup cable (GK-084, -088; K-084)
	22150	Pickup cable (GK-085, -086, -087; K-086, -289)
	31421	A-m dial glass (K-084, -086)
	31422	F-m dial glass (K-084, -086)
	31453	A-m dial glass (K-289)
	31454	F-m dial glass (K-289)
	31431	Dial escutcheon (K-084, -086)
	31452	Dial escutcheon (K-289)
	92192	Dial drive cord (45 inches)
	17014	Drive drum
	54091	Band switch lever (K-084, -086)
	54310	Band switch lever (K-289)
	59451	Knobs (K-084, -086)
	92228	Dial background (K-084)
	60665	Escutcheon backing (K-289)
H-283-1		Cabinet and carton for K-084 (walnut)
H-283-2		Cabinet and carton for K-084 (blonde)
H-285-1		Cabinet and carton for K-086 (walnut)
H-285-2		Cabinet and carton for K-086 (blonde)
H-315		Cabinet and carton for K-289

●

RCA 77U, Ch. RC-1057A

This model appears on *pages 18-53 and 18-54 of Rider's Volume XVIII.* The following voltage and current measurements apply to this model. A selenium rectifier is used. The oscillator grid voltage (pin 5 of the 12SA7) is —10 volts at 600 kc and —11 volts at 1600 kc. Voltages are measured with Chanalyst or VoltOhmyst to common insulated wiring —B). The voltages and currents should hold to within ± 20% with a 117-volt, 60-cycle power supply.

Tube	Plate Voltage	Screen Voltage	Cathode Voltage	Cathode Current
(1) 12SA7 1st det. osc.	92.	32.	—	9.4 ma.
(2) 12SK7 I.F. Amp.	92.	92.	—	13.3 ma.
(3) 6C4 A.F. Amp.	15.	—	—	0.32 ma.
(4) 6AQ6 2nd Det.—AVC—Ph. Inv.	50.	—	—	0.18 ma.
(5) 35L6GT Output	121.	92.	5.6	31.7 ma.
(6) 35L6GT Output	121.	92.	5.6	31.7 ma.



Oscillator coil 73048 is connected into the circuit of the RCA 77U as shown.

In some chassis capacitor C18 is 0.027 μf instead of 0.025 μf as shown on the schematic. In some instruments a substitute oscillator coil has been used. The original coil (70477) uses a capacitive winding (L4) for coupling the oscillator circuit to the oscillator grid (pin 5) of the 12SA7 tube. The substitute coil uses a 56-$\mu\mu$f ceramic capacitor for the same purpose. (L4 is not used.) The accompanying figure shows how this coil is connected into the circuit.

The following changes should be made in the parts list.

Delete:
73007 Condenser—

Add:
73007 Condenser — variable tuning condenser (C3, C4, C6, C7)

RADIO OPERATOR'S LICENSE Q & A MANUAL

A book that will prove a boon to everyone studying for a radio operator's license examination is Rider's newest text, RADIO OPERATOR'S LICENSE Q & A MANUAL. Written by Milton Kaufman, lecturer in the Department of Radio Operating at RCA Institutes, this up-to-the-minute text includes the questions used on the FCC examinations given in April, 949

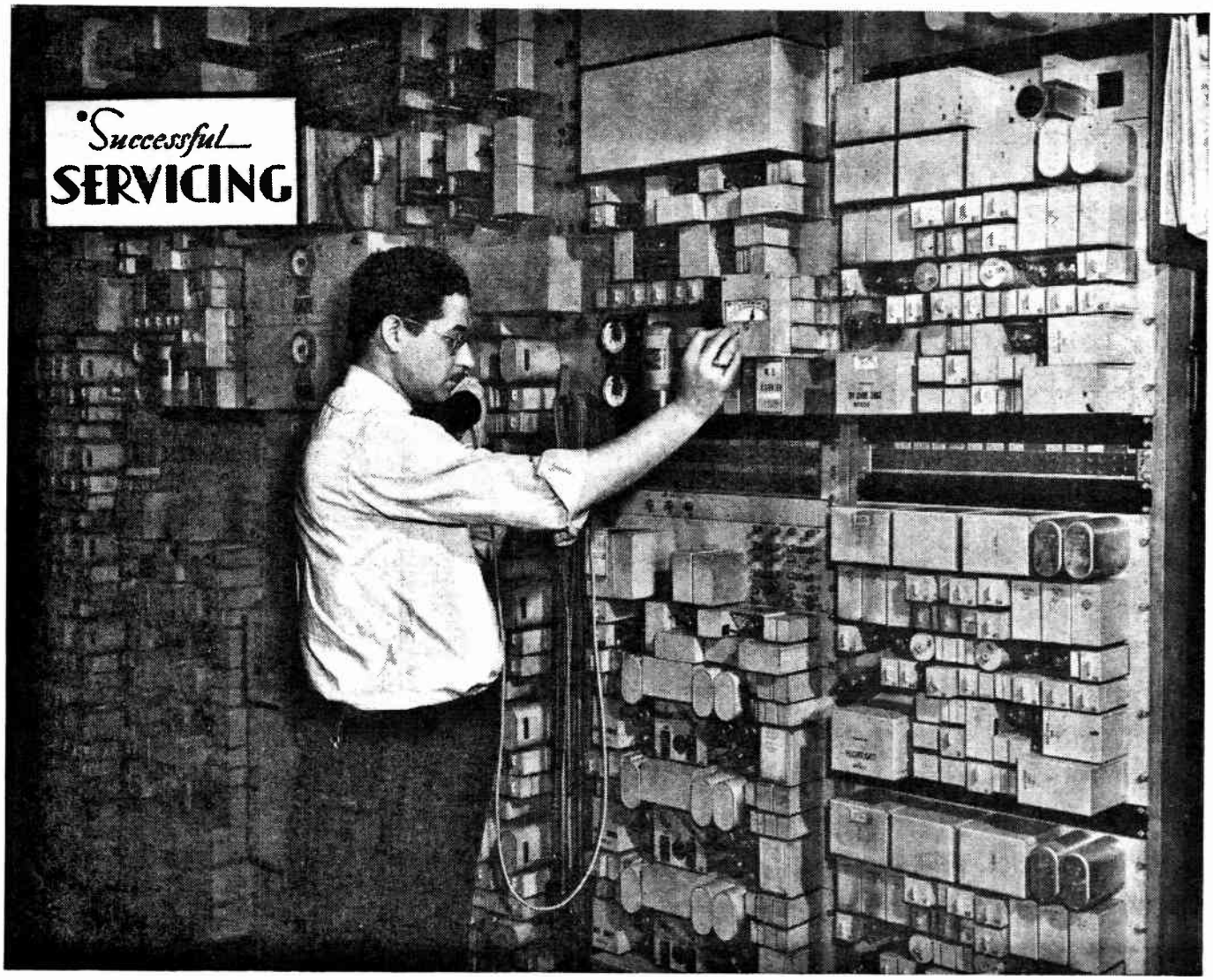
Covering all six elements, the questions and answers are numbered to agree with the Study Guide and Reference Material for Commercial Radio Operator's Exams. A section is devoted to the questions and answers for the amateur operator's exams. Part 12 of the FCC rules and regulations pertaining to amateur radio service is also included in this section.

The outstanding feature of this book is the discussion that follows each answer. All the necessary information for a complete understanding of each answer makes this a valuable text for selfstudy. There is a copious use of illustrations in the discussions. These discussions and the accompanying illustrations make this book a useful reference work for those who have already passed the FCC examinations.

In addition to this complete coverage on the questions and answers, five separate appendices are included, covering: Direction Finding Equipment; Auto Alarm Equipment; the Q code, International Morse Code, and miscellaneous abbreviations; excerpts from Part 2 (General Rules and Regulations) of the FCC regulations; and excerpts from Part 13 (Rules for Commercial Radio Operators) of the FCC regulations.

Containing more than 500 pages RADIO OPERATOR'S LICENSE Q & A MANUAL will be available in September.

Distribution of This Issue—46,500 Copies



Courtesy New York Central

AUGUST, 1949

EYE STOPPER FOR SERVICE SHOPS' WINDOWS

By John F. Rider

Do you have a service shop with a street front window — one before which people can gather? If the answer is "yes," then here is a service which you can use. It is intended for use by service shops with street front windows and the sole purpose is to stop the passerby and make him go to your window. Once there he will look at what you have on display in the window.

It is said that more than 10,000,000 people in the United States are philatelists—that is, interested in postage stamp collection. So we have conceived the idea of illustrating postage stamps — the genuine and the counterfeit, with identifications to show the points of difference between the two. The stamps should be of interest to young and old and it matters not who stops in front of your windows. If it is the youngster and he tells his dad what he has seen and where he saw it, you receive free advertising. If it is the grownup who is the collector of stamps — he'll look closely at what you have on display and will remember where he saw it. And don't be surprised if he will come in and ask for a copy or a small reproduction. If so, write to us and we'll be glad to supply them *to you* so that *you* will have direct personal contact with your prospective customer.

The displays are 14 x 17 inches and printed in color. They are intended to be attached to the INSIDE of your window facing outwards by means of small gum stickers or tiny pieces of Scotch Tape. Each of the displays shows two stamps and it carries a message to the public that your file of service data on the receivers brought into your shop is found in your library of Rider's Manuals.

The displays, with full instructions, are contained in an envelope which you can pick up from your jobber without any charge to you. Each envelope contains two displays. Use one for two weeks and then replace it with the other. Then on October 10 go to your jobber and he will have new displays for you. Each of the displays will show different stamps; in this way collectors of all types of stamps will be interested.

The first two displays cover two issues of Chile. You will be interested in learning that the information your window will disclose has *never* been disclosed before. This is brand new information which we personally discovered. It so happens that we specialize in the stamps of Chile. The October displays will concern another country, and so on each month.

The first of the two posters for September shows the Corrientes issue of 1867, and is shown on pg. 4 in small size. These

(Please turn to page 4)

Stewart-Warner A61C and A61CR Series

The following models are the same as Model A61CR1, appearing on *pages 17-3 and 17-7 and 17-8 of Rider's Volume XVII*, except for the record changers and cabinets. The parts list for these models appears on *page 17-3*. This information was inadvertently left out of the index and should be inserted.

The parts list appearing on *page 17-3* should be amended to include the following:

PART NO.		DESCRIPTION
		OTHER ELECTRICAL PARTS
28	505273	Motor—for type "VM"-505339 record changer, 115 volt 60 cycle
	505758	Motor—for type "A"-505650 record changer 115 volt 60 cycle
	507403	Motor—for type "W"-506910 record changer 115 volt 60 cycle
	507409	Motor—for type "VM"-506911 record changer 115 volt 60 cycle
29	505100	Crystal cartridge for standard records (used on "A"-505650 & "VM"-505339 record changers)
	507400	Crystal cartridge for standard and "LP" records (used on "W"-506910 record changer)
	507405	Crystal cartridge for standard and "LP" records (used on "VM"-506911 record changer)
30	505269	Switch—"ON-OFF" for type "VM"-505339 & "VM"-506911 record record changers
	505759	Switch—"ON-OFF" for type "A"-505650 record changer
	507402	Switch—"ON-OFF" for type "W"-506910 record changer
60	505342	Speaker P.M. dynamic (8 inch) (used on all models)
	506657	Speaker P.M. dynamic (6 inch) This is an additional speaker used only on models A61CR5, A61CR6, A61CR7, A61CR7X, A61CR7LPW, A61CR7LPWX, A61CR12, A61CR12LP, A61CR13, A61CR13LP, A61CR14, A61CR14LP, A61CR15, A61CR15LP, A61CR16, A61CR16LP, A61CR17 & A61CR17LP
61	507662	Switch—"ON-OFF" for type "R"-507556 record changer
62	507746	Crystal cartridge (used on "R"-507556 record changer)
63	507747	Motor—for type "R"-507556 record changer 115 volt 60 cycle
		MISCELLANEOUS PARTS
	160832	Clip—mts. escutcheon
	505465	Door (less hardware) for Models A61CR1 & A61CR1LP
	506412	Door—left hand (less hardware) for Model A61CR5
	506413	Door—right hand (less hardware) for Model A61CR5
	506414	Door—left hand (less hardware) for Models A61CR6, A61CR7, A61CR7X, A61CR7LPW & A61CR7LPWX
	506415	Door—right hand (less hardware) for Models A61CR6, A61CR7 A61CR7X, A61CR7LPW & A61CR7LPWX
	506075	Door (less hardware) for Models A61CR17 & A61CR17LP
	507184	Door—left hand (less hardware) for Models A61CR12 & A61CR12LP
	507185	Door—left hand (less hardware) for Models A61CR13 & A61CR13LP
	507186	Door—left hand (less hardware) for Models A61CR14 & A61CR14LP
	507187	Door—left hand (less hardware) for Models A61CR15 & A61CR15LP
	507188	Door—right hand (less hardware) for Models A61CR12 & A61CR12LP
	507189	Door—right hand (less hardware) for Models A61CR13 & A61CR13LP
	507190	Door—right hand (less hardware) for Models A61CR14 & A61CR14LP
	507191	Door—right hand (less hardware) for Models A61CR15 & A61CR15LP
	505488	Drawer—record changer; for Model A61CR3
	507480	Drawer—record changer; for Model A61CR21
	505666	Emblem, plastic
	505333	Escutcheon—dial
	505466	Handle—door; for Models A61CR1 & A61CR1LP
	506077	Handle—door; for Models A61CR17 & A61CR17LP
	506416	Handle—door; for Models A61CR5, A61CR12, A61CR12LP, A61CR13, A61CR13LP, A61CR14, A61CR14LP, A61CR15 & A61CR15LP
	506417	Handle—door; for Models A61CR6, A61CR7 A61CR7X, A61CR7LPW & A61CR7LPWX
	505486	Handle—drawer; for Model A61CR3
	506265	Handle for Models A61CR8, A61CR9 & A61CR10
	507481	Handle—drawer; for Model A61CR21
	505467	Hinge—door (supplied in pairs) for Models A61CR1 & A61CR1LP
	506076	Hinge—door (supplied in pairs) for Models A61CR17 & A61CR17LP
	506421	Hinge—door (supplied in pairs) for Models A61CR5, A61CR6, A61CR7, A61CR7X, A61CR7LPW, A61CR7LPWX, A61CR12, A61CR12LP, A61CR13, A61CR13LP, A61CR14, A61CR14LP, A61CR15 & A61CR15LP

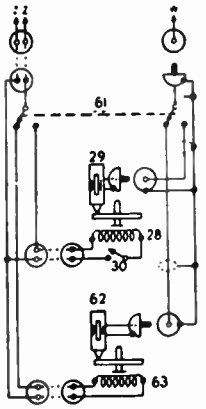
Model numbers and code numbers:

Model No.	*Code No.*
A61C20	9034-P
A61CR1	9034-C
A61CR1LP	9034-CLPW
A61CR2	9034-D
A61CR2LP	9034-DLP
A61CR3	9034-E
A61CR4	9034-F
A61CR4X	9034-FX
A61CR4LP	9034-FLP
A61CR4LPX	9034-FLPX
A61CR5	9034-G
A61CR6	9034-H
A61CR7	9034-J
A61CR7X	9034-JX
A61CR7LPW	9034-JLPW
A61CR7LPWX	9034-JLPWX
A61CR8	9034-K
A61CR9	9034-L
A61CR10	9034-M
A61CR11	9034-N
A61CR12	9034-GR
A61CR12LP	9034-GRLP
A61CR13	9034-GL
A61CR13LP	9034-GLLP
A61CR14	9034-GM
A61CR14LP	9034-GMLP
A61CR15	9034-GT
A61CR15LP	9034-GTLP
AC1CR16	9034-FH
A61CR16LP	9034-FHLP
A61CR17	9034-CM
A61CR17LP	9034-CMLP
A61CR21	9034-R

PART NO.		DESCRIPTION
		MISCELLANEOUS PARTS (Cont.)
	505457	Hinge—lid (supplied in pairs) for Models A61CR2, A61CR2LP, A61CR5, A61CR6, A61CR7, A61CR7X, A61CR7LPW, A61CR7LPWX, A61CR8; A61CR9, A61CR10, A61CR11, A61CR12, A61CR12LP, A61CR13, A61CR13LP, A61CR14, A61CR14LP, A61CR15; A61CR15LP, A61CR16 & A61CR16LP
	505464	Hinge—lid (supplied in pairs) for Models A61CR1, A61CR1LP, A61CR4, A61CR4X, A61CR4LP, A61CR4LPX A61CR17 & A61CR17LP
	505344	Knob—tuning (clear plastic)
	505345	Knob—"VOLUME" (clear plastic)
	505346	Knob—"RADIO-PHONO" (clear plastic)
	506262	Knob—tuning (black plastic)
	506263	Knob—"VOLUME" (black plastic)
	506264	Knob—"RADIO-PHONO" (black plastic)
	505455	Lid (less hardware) for Models A61CR2 & A61CR2LP
	505462	Lid (less hardware) for Models A61CR1 & A61CR1LP
	505669	Lid (less hardware) for Models A61CR4, A61CR4X, A61CR4LP, A61CR4LPX, A61CR17 & A61CR17LP
	506160	Lid (less hardware) for Model A61CR11
	506268	Lid (less hardware) for Model A61CR8
	506269	Lid (less hardware) for Model A61CR9
	506270	Lid less hardware) for Model A61CR10
	506418	Lid (less hardware) for Model A61CR5
	506419	Lid (less hardware) for Models A61CR6, A61CR7, A61CR7X, A61CR7LPW & A61CR7LPWX
	507179	Lid (less hardware) for Models A61CR16 & A61CR16LP
	507180	Lid (less hardware) for Models A61CR12 & A61CR12LP
	507181	Lid (less hardware) for Models A61CR13 & A61CR13LP
	507182	Lid (less hardware) for Models A61CR14 & A61CR14LP
	507183	Lid (less hardware) for Models A61CR15 & A61CR15LP
	505456	Lid support for Models A61CR2, A61CR2LP, A61CR8, A61CR9, A61CR10, A61CR11, A61CR16 & A61CR16LP
	505463	Lid support for Models A61CR1, A61CR1LP, A61CR4, A61CR4X, A61CR4LP & A61CR4LPX
	506074	Lid support for Models A61CR17 & A61CR17LP
	506422	Lid support for Models A61CR5, A61CR6 A61CR7, A61CR7LPA, A61CR12, A61CR12LP, A61CR13, A61CR13LP, A61CR14, A61CR14LP, A61CR15 & A61CR15LP
	505469	Light diffusing strip
	505717	Needle—phonograph; for standard record (used on "A"-505650, & "VM"-505339 record changers)
	507401	Needle—phonograph; for standard and "LP" records (used on "W"-506910 record changer)
	507406	Needle—phonograph; for standard and "LP" records (used on "VM"-506911 record changer)
	507748	Needle—phonograph (used on "R"-507556 record changer)
	507749	Nut—retains needle (used on "R"-507556 record changer)
	500966	Plug—phono. pick-up cable
	501031	Plug for phono. motor cable
	505686	Pointer
	505487	Rail for drawer; Model A61CR3 (supplied in sets)
	506234	Rail for drawer; Model A61CR21 (supplied in sets)
	119087	Ring for dial cord
	113463	Rubber pad for mtg. chassis
	79905	Screw—#8x1½" for loop mounting
	79993	Screw—#8x1¼" for mtg. chassis
	505716	Screw—set for phono needle (used on "VM"-505339 & "A"-505650 record changers)
	507404	Screw—set for phono. needle (used on "W"-506910 record changer)
	503588	Shaft & Drum for dial
	505313	Shaft—tuning
	505653	Shield for phono. pick-up cable Connector
	505722	Shield—light
	116690	Socket—octal base
	160039	Socket—phono. plug
	160392	Socket—octal (rectifier)
	505307	Socket & phono. motor cable
	505459	Socket—dial lamp
	505654	Socket for phono. pick-up cable Connector
	505161	Spring—tension
	506276	Stop for door; Models A61CR17 & A61CR17LP
	111456	Washer—spring washer for tuning shaft

The parts list of the Stewart Warner A61C and A61CR series.

The phonograph connections for some of these models are shown in the accompanying diagram.



PHONO CONNECTIONS FOR MODELS A61CR4X, A61CR4LPX, A61CR7X & A61CR7LPWX.

General Electric 145

This model appears on *pages 19-13 through 19-16 of Rider's Volume XIX*. The B battery minus connection is made to the dummy lug 5 on the switch shown in Fig. 2.

●

Zenith 9H881, 9H882, 9H885, 9H888, Ch. 9E21

These models appear on *pages 19-22 through 19-29,30 of Rider's Volume XIX*. If capacitor C-4, 0.05 μf, in series with the wavemagnet is open, the signals will be weak and the addition of an external antenna will not appreciably improve the signal strength. The replacement of this capacitor with a new 0.05 μf capacitor usually clears up the trouble.

If the phonograph is dead, check resistor R-14, 10,000 ohms, ½ watt, for intermittent operation. Due to movement of the r-f shelf when the band switch is operated, this resistor sometimes becomes intermittent, thus opening the phono circuit.

In most cases when aligning these models, it is not necessary to change or make any alterations in the i-f or discriminator trimmers. These trimmers are quite stable, and the only change recommended in alignment is that of the r-f section.

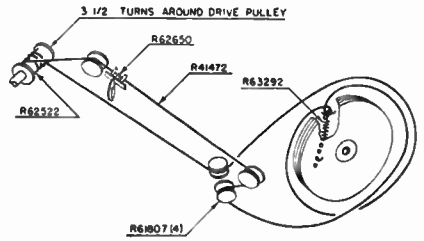
Be very sure to dress the tone control wires away from the pulley and dial cord. If these are not dressed away, binding and dial slipping will result.

If static is present when tuning in a station, check and see if the silver foil on the paper tube shield is tightly wrapped on the cardboard form. Sometimes this foil unwraps from the cardboard form and lies against the gang plates, creating static.

Sears 101.809 Series

These chassis are all the same as Model 7080, Ch. 101.809, appearing on *pages 16-1, 16-4, 16-5, and 16-8 of Rider's Volume XVI,* except for the following changes.

Models 8083, 8083A, Ch. 101.809-1A. Pushbuttons have been added. The record changers used in these models are all different. Resistor R5, 330,000 ohms, formerly across the phono pickup socket, has been removed. The dial drive hookup is as shown in the accompanying diagram.

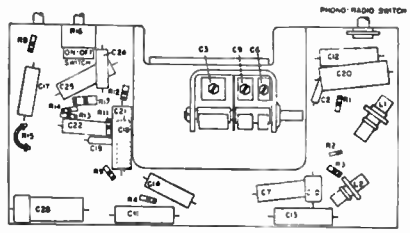


The dial drive hookup for the Sears Chassis 101.809-1A.

All resistors which were 1/3 watt are now ½ watt. All capacitors, except C23, C26, and C27, now have a voltage rating of 600 volts. A 6-by-9-inch p-m speaker (R62658) is used, requiring cone and voice coil R62659, and output transformer R62660.

Models 8084, 8084A, Ch. 101.809-1B. Same as Chassis 101.809-1A, except for the record changers.

Models 7080, 7080A, Ch. 101.809-2. Same as Chassis 101.809, except for a new type tone control circuit. A 0.001-μf capacitor (C24) is connected from the plate (pin 2) of the 7C6 tube to the variable arm of the 2-megohm tone control (R16). The other end of this tone control is connected to the B-line. The parts layout for this chassis is shown in the accompanying diagram.



The parts layout for the Sears Chassis 101.809-2.

Models 8101, 8101A, 8101B, 8101C, 9101, Ch. 101.809-3C. These models are the same as chassis 101.809-2 except for differences in the cabinets, and the fact that different record changers are used.

●

Westinghouse H-164, H-166, H-166A, H-167

These models appear on *pages 18-12 through 18-19 of Rider's Volume XVIII.*

To reduce hum in later production of these models, a de-coupling network was inserted in the plate circuit of the 6AT6 a-m detector, avc and a-f amplifier tube. This network consists of a 100,000-ohm ½ watt resistor (RC20AE104K) and a 0.1 μf 400 volt resonant type capacitor (V-5442-1). The resistor is inserted between the plate load resistor (R11) and the B plus line, and the capacitor is connected from the junction of R11 and the new resistor to ground.

●

RCA 8R71, 8R72, 8R74, 8R75, 8R76, Ch. RC-1060, RC-1060A

These models appear on *pages 19-10 through 19-15 of Rider's Volume XIX.* In some instruments, speakers stamped 92572-4W have been used as a substitute for the specified speaker (92572-2W). For replacement use the specified speaker (stock number 72201).

In some chassis, two 3300-ohm resistors are connected in parallel as a substitute for the 1500-ohm resistor, R22. In other chassis, two 820-ohm resistors are connected in series as a substitute for this resistor.

Western Auto D2718 Series B, Serial No. 137000 Up

This model is the same as Model D2718, appearing on *pages 17-20 through 17-23 of Rider's Volume XVII,* except for the following changes. Capacitor C30, formerly connected from the junction of R-16, C-29, and pin 8 of the 12SQ7 tube to pin 2 of the 35Z5GT rectifier tube, is connected from the same junction to the center tap (pin 3) of the filament of the 35Z5GT rectifier tube.

The part number of capacitor C16 and C20 should be changed from 47X446 to 47X466. The value remains the same. Part number 17X96, celluloid crystal, should be added to the parts list.

●

Correction

Fada Model P-80 Late appears on *pages 18-5 through 18-7 of Rider's Volume XVIII.* Page 18-5 was erroneously labelled Farnsworth Television and Radio Corp. instead of Fada Radio & Electric Co., Inc.

EYE STOPPERS

(*Continued from page 1*)

First poster in the Rider Eye-Stopper Series, showing Corrientes issue of 1867.

posters, and the other display for September will be available at your jobber on September 10.

Each of the displays is printed in a different color, although not necessarily the exact color in which the stamp was issued. The matter of counterfeiting is more important relative to the design than the color, because departures from the correct color are easily detected, whereas forgery of the design is much more difficult to detect.

To make this program effective — keep the window glass clear of all signs other than the stamp display. Naturally this statement does not apply to the name of the establishment — it means signs which are hung or attached to the window. If other signs must be shown, keep them away from the stamp display. Make certain that the location of the stamp display is at eye level for the average individual so that he will be able to examine the enlargements of the stamps easily and note the points of difference between the genuine and the forgery.

Originally we intended that these displays be changed every week. After consultation with experts on the subject, it was decided that a better plan is to change them every two weeks; thus leaving the display on the window for two week periods. Therefore your first display package will contain two window displays instead of the four originally mentioned.

We deliberated a long time before selecting philately as the basis of the campaign. We considered many different types of items, and it was this one which possessed the greatest possibilities in making people — young and old — speak about the service shop where they saw the information. Philately is a hobby of a hundred years standing — the kind of hobby which places shipping clerks and bank presidents in the same category. Once a philatelist — always a philatelist!

Get behind this program. It is for mutual benefit — yours and ours. Make the public recognize that you have a good shop — a competent shop — a neat shop. Put up these displays and get them talking about you. When they come into your shop — show them your equipment — your Rider Manuals. This is a campaign which is original in concept and can be profitable to you.

Westinghouse H-186, H-187

These models appear on *pages 18-26 through 18-30 of Rider's Volume XVIII.*

To reduce hum in later production of these models, a de-coupling network was inserted in the plate circuit of the 6AT6 AM detector, AVC and A-F amplifier tube. This network consists of a 100,000 ohm ½ watt resistor (RC20AE104K) and a 0.05 μf 400 volt capacitor (RCP10W4503A). The resistor is inserted between the plate load resistor (R13) and the B plus line, and the capacitor is connected from the junction of R13 and the new resistor to ground.

●

RCA 77U

This model appear on *pages 18-53 and 18-54 of Rider's Volume XVIII.* The following parts should be added to the parts list.

73109 Nut—Tee nut to mount record changer—3 required.

73110 Screw—¼-20 x 1¾" fillister head machine screw to mount record changer.

The service data previously issued for this model also apply to instruments using blonde mahogany cabinets, except for the following parts which are used with such cabinets.

73631 Knob—power, radio and phono switch knob—tan—for blonde instruments.

73629 Knob—tuning knob —tan— for blonde instruments.

73630 Knob—volume control knob—tan —for blonde instruments.

●

Sears 8020

This model appears on *pages 18-56 through 18-60 of Rider's Volume XVIII.* If excessive hum is encountered, try disconnecting the low-voltage section of the electrolytic capacitor, part number N21744, which is the cathode bypass capacitor on the 50L6GT output tube. Substitute a separate 20-μf, 25-v. capacitor for this section.

Some of the original electrolytic capacitors had the sections wound in improper sequence, so there was capacitive coupling between the input high-voltage section and the low-voltage cathode bypass section. This condition would cause excessive hum in the receiver output. It is probable that this condition will be found only on the later production sets of this model.

Title Change

The title of the antenna book now in preparation has been changed to: Theory and Practice of 30-1000 MC Receiving Antennas. This book was formerly known as: Theory and Practice of High Frequency Antennas.

Correction

In the article "Measurements" appearing in the June, 1949 issue, on page 13, column 2, the statement reading "This is about 30 kilowatts in modern television receivers" should have read 30 kilovolts.

●

Cover

A maintenance man for the New York Central's electronic telephone carrier system adjusts the voltage output. The high frequency telephone system is used for the line's telephone network.

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

Vol. 10 AUGUST, 1949 No. 10

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

Published by
JOHN F. RIDER PUBLISHER, INC.
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JOHN F. RIDER, Editor R. I. LATZER, Associate Editor

CURTAIN TIME

Service Assoc. Activities

A new association of TV servicemen has been formed in New Jersey. It is known as the Allied TV Technicians. Their zone of operation will be in Southern New Jersey. If you desire to contact the chairman, he is Frank Basler, 135 Sixth Ave., Mt. Ephraim, N. J. We hope either that this group eventually embraces all of New Jersey, or that other organizations come into being and then form a statewide federation.

ORCHIDS TO THE DALLAS RADIO SALES AND SERVICE ASSOCIATION.

The store, stock, and equipment of one of their members was washed out on the evening of June 13 by a Texas storm. Ten inches of rain fell in a short time. Everything in the store was topsy-turvy and the owner was sure that he was ruined. To make a long story short, within 48 hours after the incident the members of the association pitched in and with the aid of local jobbers had the service shop running, complete with parts, test equipment, and new receiving equipment. The members of the association *donated* parts and test equipment to the unfortunate victim of the storm. Such cooperation—spirit of friendship and willingness to help a fellow man, with a total disregard of the fact that he is a competitor, is worthy of the highest tribute.

New FCC Ruling

Attention all TV Servicemen... The FCC has issued a new ruling which prohibits the transmission of music simultaneously with TV test patterns. Since it is the general concensus of opinion that the adjustment of TV receivers is better accomplished with music and the test pattern than with a constant tone and the test pattern, it is suggested that all servicemen interested in the adjustment of TV receivers, and for that matter, all who eventually will be participating in such activities and desire music rather than the constant tone, write to Jack Poppele, President of the Television Broadcasters Association, 500 Fifth Ave., New York, N. Y.

The TBA intends to request the FCC for a reversal of the ruling and all letters requesting musical accompaniment to the test pattern will strengthen their position.

Infra-Red Pickup of Hot Spots

Have you ever noticed that the TV camera shows beards which don't exist? It is due to infra-red sensitivity, which tends to penetrate part way into the skin and show hairs on a clean-shaven individual. According to RCA the same phenomenon is now being put to use to check hot-spots in metals before they become visible to the naked eye. A series of experiments were undertaken in association with engineers of the Wright Aeronautical Corp. to assess the applicability of monochromatic television for continuous gross evaluation of the performance of ram jet engines by remote observation of their exhaust flames. When checking heated metals, the television system showed gray spots well before the eye could detect any red coloring on the metal itself. Each of the gray spots showed the location of a hot spot.

Death Takes A Test Equipment Manufacturer

Murray Mentzer, founder and president of Precision Apparatus Company, passed away on July 23rd. I knew Murray well and the radio industry has lost a progressive leader. He was a good man—a charitable individual who started his business right from the bottom and guided it to its present high standing. A reputation for honesty meant a great deal to him, from the very days when he first started modernizing old test equipment, to the last minute of his mortal life. Peace be with you, Murray.

Canadian Town Meeting

The Town Meetings for Radio Technicians, five of which were conducted in the United States during the Fall and Winter of 1948-1949, have been picked up in Canada. One such meeting was conducted under the auspices of Canadian manufacturers and jobbers during March 28-30 in Toronto and the second will be run during October 17-19 in Montreal.

The U. S. meetings are now in the planning stage and we hear that five will be run during the Fall and Winter of 1949-1950. As before, we expect to participate in some of these meetings.

Preventative Maintenance Month

With all the attention focused on television, it is very easy to lose sight of that which has been standby for the radio servicing industry during its twenty odd years of life. We mean the everyday a-m or f-m radio receiver. Many of these receivers are inoperative and stored in attics and closets. The many a-m and f-m broadcasters know this and recognize that they have lost listeners for any one of a number of reasons associated with completely or partially defective receivers.

Progressive servicemen in two states have taken the bull by the horns and have initiated a program of a Preventative Maintenance Month—the month of October, 1949. During this period, service shops, parts jobbers, several parts manufacturers, and a-m and f-m broadcast stations in two states will endeavour to get these defective receivers into operation for the mutual benefit of all concerned—including the public.

The Federation of Radio Servicemen of Pennsylvania carried out such an effort in Harrisburg last year and found it to be effective beyond their fondest expectations (see SUCCESSFUL SERVICING, April, 1949). This year it will be statewide throughout Pennsylvania. The Empire State Federation of Electronic Technicians is going to do the same thing in New York State at the same time... Every radio serviceman should participate in this activity. It is definitely to *your* benefit. To get full details communicate at once with the following individuals. In Pennsylvania, it is John Rader. 704 Walnut Street, Reading, Pa., and in New York State, it is Max Liebowitz, Mecca Radio, 101 West 53 Street, New York City.

Preventative Maintenance Month will be October, 1949. Participation is open to every radio serviceman, and should be actively engaged in by every man. It is a proven activity — something which will pay off for every bit of effort expended. Write today for information.

HIWYNI

Have It When You Need It. We are speaking about Rider Manuals — the regular AM and FM receiver Manuals — the PA Manual and the TV Manuals. Don't hunt for service data when the need arises. Have it at your finger tips. Think back on the number of times you have referred to Rider Manuals. Do you realize how you would have been inconvenienced if you did not have them when you needed them? Remember — they are a capital investment in your business. The owners of Volume I have been profiting on its contents for almost 20 years!

JOHN F. RIDER

Television Changes

DuMont RA-103, RA-105, RA-106

Model RA-103 appears on *pages 1-58 through 1-80 of Rider's TV Manual Volume 1.* Model RA-105 appears on *pages 2-5 through 2-56 of Rider's TV Manual Volume 2* and Model RA-006 is on *pages 2-57 and 2-58* of the same volume. The following change has been made on the inputuners, which are the same on all these models.

The screen bypass capacitor, C110, on the 6AK5 mixer has been changed to 5000 $\mu\mu$f, minimum. The purpose of this change is to improve the strong signal handling capabilities.

The new capacitor is described as follows:

03016760 F CE 500 $\mu\mu$f min, 600 v.

●

Farnsworth 651-P

This model appears on *pages 2-11,12 through 2-25 of Rider's TV Manual Volume 2.* If the top of the picture is below the limits of the mask, even though the height control is at its maximum upward position, use the following procedure:

Rotate the focus coil. This may move the picture upward.

If this is insufficient, modify the wiring of the vertical centering control by removing the lead attached to the tap (not the movable arm) and re-connect to the control terminal to which is attached the 3.3-ohm resistor.

●

Belmont 7DX21, Series B

This model is the same as Model 7DX21, *appearing on pages 2-11 through 2-25 of Rider's TV Manual Volume 2,* except for the following. The vertical multivibrator and vertical sweep circuits were modified, as shown in the accompanying diagram, to improve the vertical linearity and to provide greater vertical capabilities.

The following components have been changed:

Resistor R80 from 10 megohms to 4.7 megohms.

Resistor R81 from 4.7 megohms to 10 megohms.

Resistor R82 from 3.9 megohms to 5.6 megohms.

Resistor R85 from 4.7 megohms to 10 megohms.

Resistor R97 from 10 megohms to 6.8 megohms.

Resistor R113 (10 megohms) added.

Capacitor C101 from 0.03 μf, 600 volts, to 0.02 μf, 1600 volts.

Capacitor C104 from 0.05 μf, 6000 volts, to 0.005 μf, 6000 volts.

Capacitor C105 from 0.05 μf, 6000 volts, to 0.005 μf, 6000 volts.

Capacitor C106 from 1000 to 1600 volts.

Capacitor C107 from 0.1 μf, 600 volts, to 0.02 μf, 1600 volts.

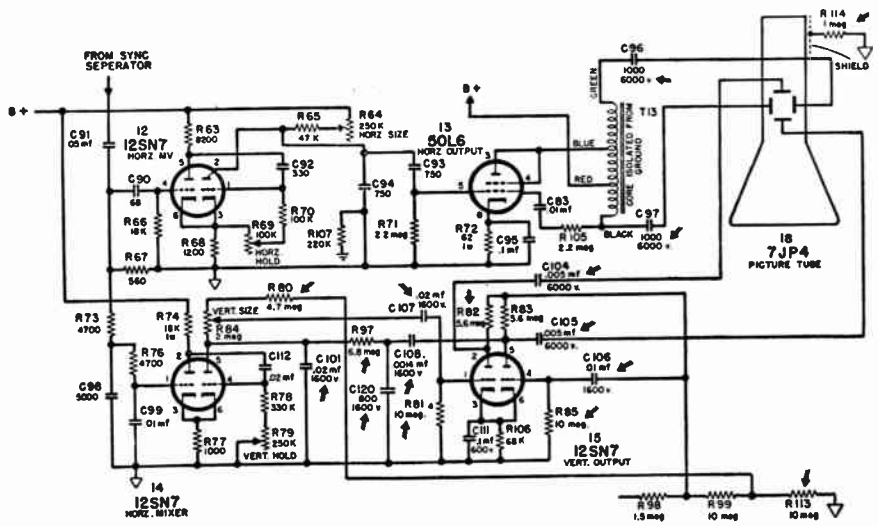
Capacitor C108 from 220 $\mu\mu$f to 0.0014 μf.

Capacitor C120 (800 $\mu\mu$f, 1600 volts) added.

The parts list should be changed to agree with the following:

Ref. No.	*Cat. No.*	*Description*
R80	C-9B1-35	Resistor, 4.7 megohms, ±20%, ½ w.
R81-85-113	C-9B1-37	Resistor, 10 megohms, ±20%, ½ w.
R82	C-9B1-249	Resistor, 5.6 megohms, ±5%, ½ w.
C101-107	B-8D-16578	Capacitor, 0.02 μf, 1600 volts
C104-105	B-8D-16574	Capacitor, 0.005 μf, 6000 volts
C106	B-8D-16577	Capacitor, 0.01 μf, 1600 volts
C108	B-8D-16576	Capacitor, 0.0014 μf, 1600 volts
C120	B-8D-16575	Capacitor, 800 $\mu\mu$f, 1600 volts

The following changes have also been incorporated in the "Series B" chassis. R43 was changed from 150,000 ohms to 47,000 ohms (part C-9B1-82) to improve the video response. R114 (1 megohm, part C-9B1-31) has been added between the picture-tube shield and B— to bleed off static charges.



The vertical multivibrator and vertical sweep circuits of the Belmont Model 7DX21, Series B.

●

DuMont RA-105, RA-106

Model RA-105 appears on *pages 2-5 through 2-56 of Rider's TV Manual Volume 2.* Model RA-106 appears on *pages 2-57 and 2-58* of the same volume. Capacitor C213 (1-3.5 $\mu\mu$f, 500 v.) is changed to 2.6 $\mu\mu$f ±10%. This new capacitor is made from a piece of twinex transmission line. The capacity may be varied by separating or squeezing together the two wires. In alignment, the greater the capacity, the broader will be the response of the stage.

The part number of this new capacitor is 03016891.

RIDER TV MANUALS VOLUMES 1 and 2

RCA 68R1, 68R2, 68R3, 68R4, Ch. RC-608; 610V1, Ch. RC-610; 610V2, Ch. RC-610C

The 68R series appear on *pages 16-39 through 16-43 of Rider's Volume XVI.* The 610 series appear on *pages 19-56 through 19-64 of Rider's Volume XIX.*

In locations where 10.7-mc i-f interference (not tunable) is encountered on the f-m band of these receivers, the following may eliminate the condition:

1. Check lead dress (and correct if necessary) to minimize antenna coupling into the i-f amplifier input. Resistor R1 (located on the antenna terminal board) should be dressed on the side of the terminal board away from the 6BE6 1st detector socket, V1.

2. Dress the 6BE6 1st detector plate lead along the shelf base and under C2 (330 $\mu\mu$f) using C2 as a partial shield for this lead.

3. Ground one f-m antenna terminal to the chassis at the terminal board. (Dipole still connects normally.) This is generally more effective than connecting a 10.7-mc series-tuned trap from the f-m antenna terminal to the chassis.

4. Place a tube shield over the 6BE6 1st detector tube, grounding the shield to chassis using as short a ground as possible. Correct for any detuning caused by this method.

5. Correct realignment of circuits is suggested to provide maximum sensitivity, since step 3 may reduce sensitivity slightly.

●

Correction

The Pilot model shown as 160 in *TV Manual Volume 2* and in the index on *pages 2-14 through 2-20* is not a separate model, but actually is an integral part of Models TV-40 and TV-950.

Sound Advice From One Serviceman To Another!

MAC'S *Radio* REPAIR
BOX 638 Choteau, Montana PHONE 7-1

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

Rumors are running around financial circles to the effect that a good many ex G.I. radiomen who have gone into business for themselves are practically starving to death. I can well believe such rumors since I am an ex G.I., and after a year and a half I am just beginning to pull away from the deep part of that red ink pool. I think Dun & Bradstreet, Inc. still list me as a good cash-on-the-line customer. Since the above-mentioned rumors are probably true, I would like to take advantage of your advertising department to pass on some tips to ex G.I.'s who are now in or who contemplate entering the radio repair business.

A man entering radio repair must have some working capital, a good working knowledge of radio, adequate test equipment, and a GOOD REFERENCE LIBRARY. That good reference library cannot be stressed too much, because the big jobs, the mean jobs, and the tough jobs are dependent on that library.

Unfortunately there are quite a few radio wreckers operating, and the only complete key that I have found for setting those radios right is the use of Rider's manuals. If the manufacturer has made changes in the set, those changes are included in Rider's. In most cases all other changes should be discarded and the radio re-assembled according to schematic.

The SPEED with which repair work is completed has much to do with income. In the interest of speedy repair I recommend Rider's. A customer who is PLEASED with the work done on his radio doesn't mind paying a good price for it. Rider's manuals give you the information on nearly every radio made and if used will mean pleased customers. REPEAT BUSINESS and word-of-mouth advertising means extra money in your pocket. By doing conscientious work that proves satisfactory you will get both repeat business and good advertising.

There are many shops operating without Rider manuals, and that is especially true of newcomers to the business. I am sure that many of the newcomers will find that an investment in a complete set of Rider's manuals will mean the difference between success and failure in their business.

I have written this with the hope that it will help some of the boys who are busy pulling out what little hair is left in their heads, and also with the hope that it will serve to help a lot of men improve their work and thus give a better name to our business.

Yours truly,
A. E. McCorkle
A. E. McCORKLE

"HIWYNI"

This is not a code. It is simply an abbreviation of a very important condition in the operating life of a service shop. HIWYNI means HAVE IT WHEN YOU NEED IT. It applies to many things, but especially to RIDER MANUALS. Make sure that you have a complete library of RIDER MANUALS on hand at all times.

NOTE: Are you receiving your copy of "Successful Servicing"? It's Rider's own publication of interest to every serviceman. In it you will find all of the circuit changes in sets . . . as soon as they are released. It's **FREE!**

NOTE: The Mallory Radio Service Encyclopedia, 6th edition, makes reference to only one source of radio receiver schematics — Rider Manuals. ANOTHER NOTE: The C-D Capacitor Manual for Radio Servicing, 1948 edition No. 4, makes reference to only one source of receiver schematics—Rider Manuals.

These RIDER books are the result of twenty years of specialized publishing for the Radio Servicing Industry

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Volume XVI ..... $ 8.40
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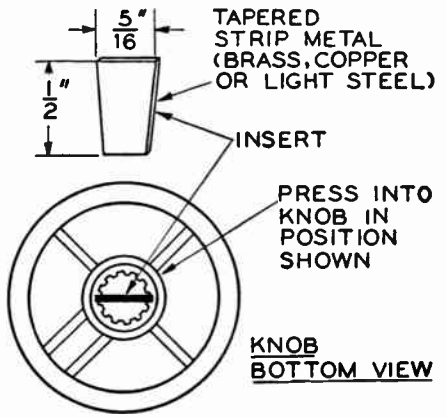
RIDER MANUALS *mean Successful Servicing!*

Farnsworth P7, P9, P10, Capehart

These models appear on *pages 19-19 through 19-33 of Rider's Volume XIX.* The program control knob on these models turns a switch with detent contacts. If this knob is not pushed down to grip a substantial portion of the knurled shaft, the inside of the knob may become reamed out and in time lose its ability to grip the shaft sufficiently to actuate the switch.



Method of wedging the program control knobs of the Farnsworth P7, P9, P10, so they grip the shaft.

If such a condition occurs and there is no replacement knob handy, refer to the accompanying diagram and the following:

A piece of metal strip 5/16" × ⅜" or ½" should be wedged tightly into the center of the knob. When the knob is placed over the shaft, the metal insert will engage the shaft slot.

Improved knob gripping can sometimes be obtained by slightly spreading the shaft slot. Care must be exercised in doing this however. If the shaft slot is spread too far, it is likely to break or be spread unevenly, thereby imparting an undesirable "wobbly motion" when turned.

●

Stewart-Warner 61T Series; 9022-T

These models are the same as Model 61T16, appearing on *pages 15-7 and 15-8 of Rider's Volume XV*, except for some changes. The code listings for these models are:

Model	*Code*
61T16	9022-A
61T16W	9022-AW
61T26	9022-B

A 0.01-μf capacitor (45) has been added from the black lead (center tap) of the loop antenna to ground. A 0.05-μf capacitor (46) has been connected from the cathode of the 12SF7 tube to the AVC line. A 390-ohm resistor (44) has been connected in shunt with the pilot lamp.

The following should be added to the parts list:

Diagram No.	*Part No.*	*Description*
45	502151	Capacitor—0.01 μf, 400 v.
46	502153	Capacitor—0.05 μf, 200 v.
44	502140	Resistor—carbon 390 ohms, ¼ w.
37	504756	Transf.—output, for speaker with prefix Y.
	504758	Transf.—output, for speaker with prefix Z.
	504781	Transf.—output, for speaker with prefix C.
42	502208	Speaker—p.m., dynamic, 5-inch
	502298	Speaker—p.m., dynamic, 5-inch
41	504757	Cone and voice coil, spkr. with prefix Y.
	504759	Cone and voice coil, spkr. with prefix Z.
	504782	Cone and voice coil, spkr. with prefix C.
	502502	Back for cabinet, Model 9022T
	500385	Cabinet—ivory, Model 61T16W
	502476	Cabinet—ivory, Model 9022T
	502506	Clamp—dial scale mtg., Model 9022T
	502553	Knob—ivory, Model 61T16W
	502564	Knob—ivory, Model 9022-T

General Electric 150

This model appears in *Rider's Manual Volume XIX on pages 19-10 through 19-12.*

If a condition of parasitic oscillation with strong signals and high volume setting, characterized by whistles and distorted output is reported on late production models in the gray cabinet the following change will correct the condition:

Change the grid return of the i-f amplifier by moving bus wire lead on #2 lug of first i-f transformer to pin #5 of the r-f amplifier (1T4), instead of pin #5 of the i-f tube. This changes the bias of the i-f amplifier from zero volts to minus 1.4 volts.

The following replacements should be made in the catalogue numbers:

Delete the following parts:

Old Cat. No.	*New Cat. No.*	*Symbol*	*Description*
URD-009	URE-009	R1	Resistor - 330 ohms, 1 w., carbon*
RCE-069	RCE-087	C2A,B,C	Capacitor - Electrolytic capacitor
RCW-3013	RCW-3015	C11	Capacitor - Electrolytic capacitor*
RHB-004	RHB-009		Monogram Button**
RLL-029	RLL-034		Loop - Antenna loop
SJS-068	RJC-016		Speaker Contact and Lead
	RAB-080		Cabinet Back - Plastic (ivory)
	RAU-041		Cabinet - Plastic (ivory)

Add the following parts:

RAB-081		Cabinet Back - Plastic (gray)
URD-045	R5	Resistor - 680 ohms, ½ w., carbon*
RHS-010		Tube shield*
UCC-625	C12	Capacitor - 0.005 μf, 600 v., paper*
UCC-635	C9	Capacitor - 0.05 μf, 600 v., paper*
RHM-052		Clip - Clip for loop antenna

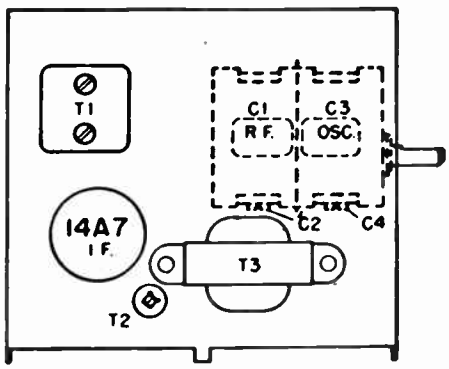
*Applies to receivers with chassis number greater than 100,000.
**The new button is attached to the cabinet by means of glue.

●

Sears 8070, Ch. 101.817-1A; 8070A, Ch. 101.817-2A

These Models are the same as Model 7070, appearing on *pages 17-2, 17-3, and 17-15 of Rider's Volume XVII*, except for the following changes. The appearance only of the parts have been changed in Ch. 101-817-1A.

In Ch. 101.817-2A, capacitor C17 has been changed in value from 0.05 μf to 0.01 μf. Resistor R8 has been changed in value from 100 ohms to 150 ohms. The second i-f transformer has been changed from capacitor tuning to slug tuning. The new parts number is R65374. The location of the trimmers is shown in the accompanying diagram.



The trimmer locations of the Sears Chassis 101.817-1A and 101.817-2A.

●

Stewart-Warner A41T1, Code 9032-A

This is the same as Model A41T1 appearing on *pages 17-1 through 17-3 of Rider's Volume XVII.*

Distribution of This Issue—47,000 Copies

Courtesy Official U.S. Navy Photo

SEPTEMBER, 1949

ALL PAGES IN PLACE IN RIDER TV MANUAL VOLUME 3

The production of Rider Manuals has been faced with a problem for a number of years, as is well known to every customer who was called upon to insert unbound pages into their allotted places. Time and again we stated that we were forced to do what was done in order to satisfy the needs of the servicing industry and still offer the Rider Manuals at the lowest possible price. Every buyer of Rider Manuals knows that during the past 20 years we have crammed each volume full to the hilt. Time and again the finished manual contained far more pages than were promised in our advertisements released during the production of manuals. Nevertheless we never denied that it was wrong to call on the customer to place pages in their proper places.

It never was too much of a task to properly insert pages in the regular AM-FM series of Rider Manuals, because the so-called unbound pages were comparatively few in number. But with the advent of television and its 25 to 50-tube receivers, related service data assumed much greater proportions—greater in the number of pages, larger in the dimensions of the diagrams and chassis charts, triple spreads with two folds and giant pages with as many as eight folds. The handling of these pages also created a difficult situation.

We were aware that multiple folds on a page were difficult to handle. The average man who unfolds a map and tries to refold it properly frequently gives up. Yet there was no alternative in the presentation of the information. It had to be complete and it had to be readable. Above all, it was needed in the hands of the servicing industry because TV receiver sales advanced by leaps and bounds.

Taking everything into account, the situation was distasteful all around. Please understand that as a publishing organization we must satisfy our customers. We have always realized our responsibility and will continue to do so. We were very much concerned with finding a solution to this problem with many facets. We are happy to be able to say that it has been solved!

Beginning with Rider TV Manual Volume 3, *all pages will be in place* when the Manual is received by the customer. As far as TV service data is concerned, with its large diagrams and chassis layouts, this means a new type of manual—a binder which is larger in dimensions than those produced during the past 20 years. This large-size binder, specifically 12″ x 15″, will be used for TV manuals only. The AM-FM series of Rider Manuals will be continued in the regular size, and when Volume 20 appears, all the pages will be in their proper places.

The larger-sized TV manual binder means larger pages. This will afford a number of very important advantages. The basic page size will be 12″ x 15″, or the equivalent of the previous double-spread page, and *there will be no fold.* It will be perfectly flat like the conventional page.

The triple spreads will be printed in pairs on the giant-size page and there will be only one—we repeat, only one—fold. The giant page will be 360 square inches in area—and only *one fold* will be used in place of the previous multiple folds. Thus we will maintain the original high order of readability and still afford the utmost in ease of use.

The entire manual will be easier to use for the following reasons. The manu-

(*Please turn to page 13*)

Television Changes

Meissner 24TV, Serial Higher Than 1500

This receiver is the same as Model 24TV, appearing on *pages 2-1 through 2-12 of Rider's TV Manual Volume 2*, except for the following changes. The 100-ohm resistor connected between the contrast control and the 100-ohm cathode resistor of the first video i-f stage has been removed. A 0.00025-μf capacitor in parallel with a 100-ohm resistor has been connected between the cathode (pin 5) of the 6AC7 first video amplifier and ground. The choke in the plate circuit of the second video amplifier has been changed in value from 250 μh to 125 μh. The new part number is 05654.

The 0.25-μf capacitor connected between the brightness control and the choke in the plate circuit of the second video amplifier has been removed. A 6AL5 diode

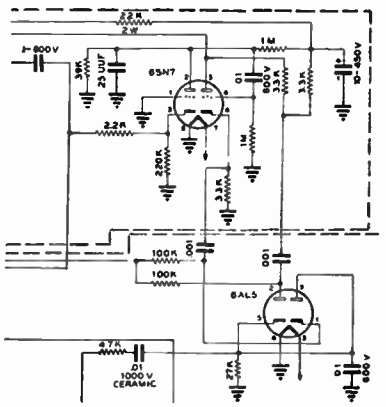


Fig. 1. The 6SN7 sync separator circuit for Meissner 24TV showing recent changes.

has been added to the circuit as the horizontal phase detector. This new tube necessitated changes in the 6SN7 sync separator circuit, as may be seen in Fig. 1.

The resistor in the arm of the brightness control has been changed in value from 220,000 ohms to 680,000 ohms, and a 0.25-μf, 600-volt capacitor connected from the top side of this resistor to ground. The 22-ohm resistor connected to the horizontal deflection coil has been replaced by a 0.5-μf, 400-volt capacitor. The 0.02-μf, 600-volt capacitor connected from the junction of the horizontal linearity control and the primary of transformer 29445 to the bottom of the grid-leak combination of the 6BG6G tube has been changed to a 0.03-μf, 1000-volt capacitor.

A corona ring has been added between the 1-megohm resistor and the filament (pin 7) of the 1B3GT high-voltage rectifier. A variable choke (05845) is used as a horizontal size control and connected from a tap to the bottom of the secondary of transformer 29445. A connection has been made from this tap to the 0.5-μf, 400-volt capacitor mentioned formerly. The 6SN7 horizontal oscillator circuit has been changed as shown in Fig. 2.

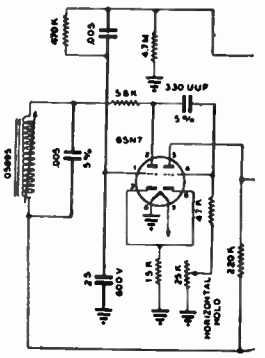


Fig. 2. Changes in 6SN7 horizontal oscillator circuit for Meissner 24 TV.

A 0.002-μf capacitor has replaced the 100,000-ohm resistor in the CR network in the primary of transformer 29443. A 22,000-ohm resistor has replaced the 0.005-μf capacitor in the line leading from the sync separator The 0.05-μf, 600-volt capacitor connected from the bottom of transformer 29443 to ground has been changed in value to 0.25μf. The connections to the elements of the 6SN7 vertical oscillator tube have been reversed; that is, the connections to pins 1 and 4 have been reversed, as have those of 2 and 5, 3 and 6, and 7 and 8. No other change has been made in the circuit. The 4700-ohm resistor connected between the cathode (pin 3) of the 6SN7 vertical amplifier and the 0.06-μf capacitor has been removed.

The voltage readings of the sync separator and the horizontal phase detector are:

Pin #	1	2	3	4	5	6	7	8
6SN7	0	7	3	0	210	8.8	6.3AC	0
6AL5	0.8	-0.5	6.3AC	0	0	0	0	0

The resistance readings for the sync separator and the horizontal phase discriminator are:

Pin #	1	2	3	4	5	6	7	8
6SN7	0	39K	220K	1Meg	32K	3.3K	0	0
6AL5	∞	∞	0	0	27K	∞	2.7K	0

●

Farnsworth 651-P

This model appears on *pages 2-11,12 through 2-25 of Rider's TV Manual Volume 2*. If low signal or noisy reception is encountered, it is suggested that the following be checked. Make sure that the connection at the antenna terminal lead plug has not been pulled loose. A good soldered connection is important. Make sure that the antenna terminal lead plug has not been inserted backwards into connector on side of chassis. Note: If the large prong has been forced into the small clip, the chances are that it has sprung this connector. This allows the small prong to float in the connector and may result in loss of signal energy or noise.

●

General Electric Television Receivers

Effective immediately, General Electric will make available stock replacement coils instead of complete horizontal sweep output transformers for all television receivers.

The core laminations are not interleaved and come apart as two sections, thus it is only necessary to remove the support clamping bolts, take apart the two halves of the assembled core, and then slip off the defective coils. The replacement coils consist of all windings assembled together with the necessary resistors and plate caps. Reassemble the new coils on the core sections and bolt the cores together. Where the two core sections are butted together, they must be squeezed during assembly so that as small an air space as possible is obtained. This can be best accomplished by clamping the two core sections together in a vise, then tightening the mounting bracket bolts.

The following stock parts have been added:

Cat. No.	Description	Receiver Model
RLT-002	Coils for Hor. Sweep Transformer (includes R126 and plate caps)	802, 803
RLT-003	Coils for Hor. Sweep Transformer (includes R67, R62, C103, and plate caps)	810, 811, 835
RLT-004	Coils for Hor. Sweep Transformer (includes R67, R62, C103, and plate caps)	814, 820, 830, 840
RLT-005	Coils for Hor. Sweep Transformer (includes R331 and plate caps)	805, 806, 807, 809

Coils listed for Models 820, 830, 805, 806, 807, and 809 will replace only coils used on early production receivers.

●

General Electric 150

This model appears on *pages 19-10 through 19-12 of Rider's Manual Volume XIX*. The following replacement has been made in the parts list:

Connecting pin SJS-008 for the loop antenna has been changed to RJC-001.

●

RCA 75X11, 75X12, 75X14, 75X15, 75X16

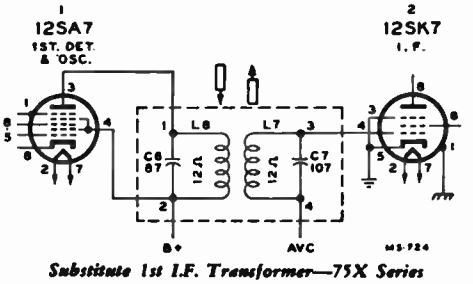
These models appear in *Rider's Manual Volume XVIII on pages 18-49 and 18-50.*

In some chassis a substitute i-f transformer has been used in these models. An adapter plate is riveted to the chassis for mounting purposes. A mounting clip is used to secure the transformer to the mounting plate. The accompanying diagram illustrates the revised schematic.

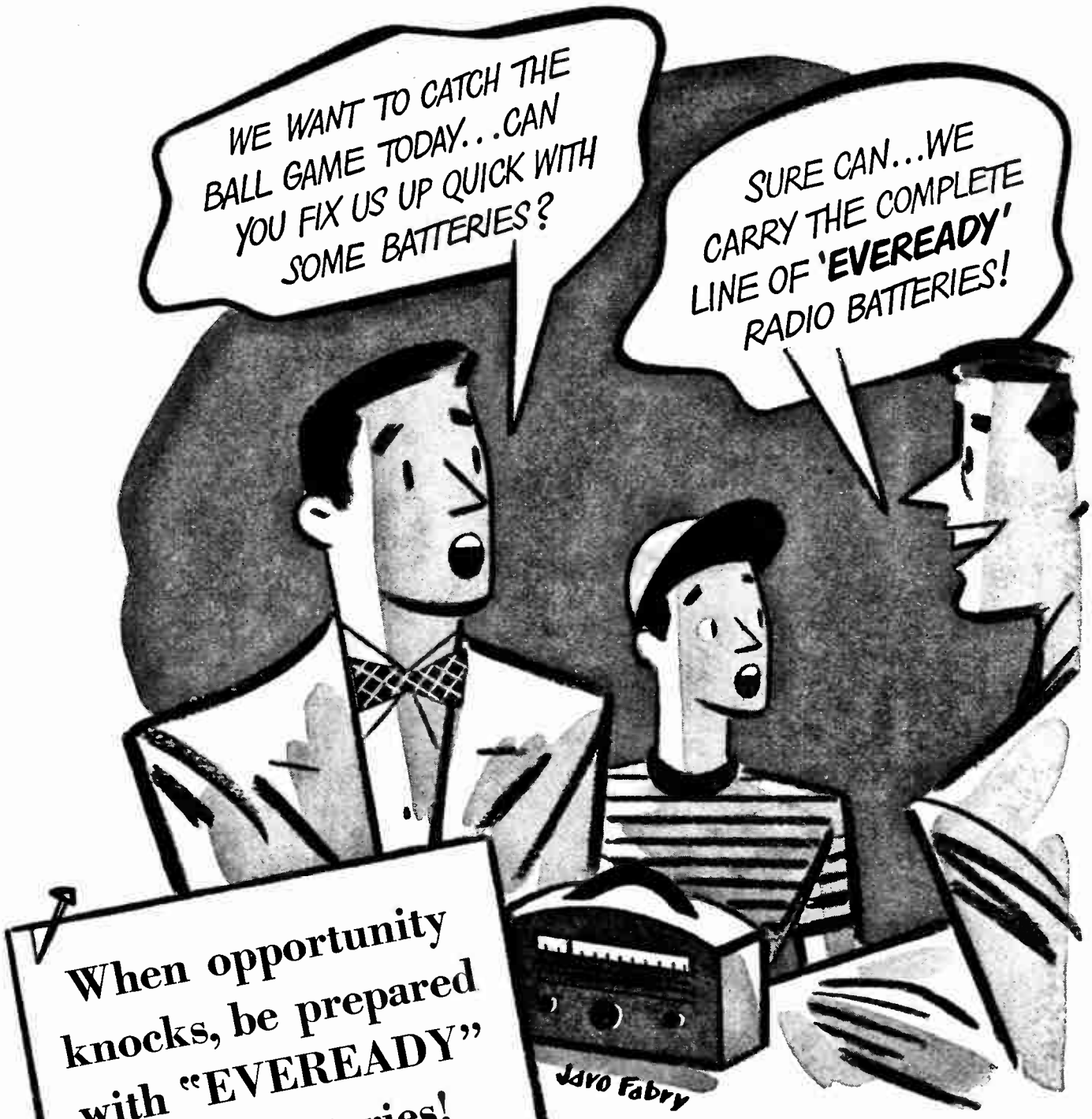
The following have been added to the Parts List:

73935 Clip—Spring clip for mounting i-f transformers, type 970441

93036 Transformer — First i-f transformer, stamped 970441-1 (C6, C7, L6, L7)



Substitute 1st I.F. Transformer—75X Series



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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 our files. We will pay $1.50 per copy. For the 1947 Volume of Transactions AIEE we will pay a reasonable figure — make us an offer. Send to John F. Rider Publisher, Inc., 480 Canal St., New York 13, N. Y.

NAME OF MAGAZINES	MISSING ISSUES
Radio	Jan. 1922 Aug., Sept., Oct. 1932 Feb., March, Apr., May 1933
Proceedings of The Physical Society	Vol. 51 Part 4, 1939
Transactions AIEE	1947 (Bound Annual Volume)
Journal Research of National Bureau Standards	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
ATE Journal Now (Broadcast Engineers Journal)	Feb. and March 1941
Engineers Digest	Jan. and Feb. 1949
The Engineer	Dec. 13, 1946 — Dec. 27, 1946
Electrical Communication	July 1922 — Oct. 1933 Oct. 1922 — Jan. 1934 Jan. 1923 — Apr. 1934 July 1924 — July 1934 July 1925 — Apr. 1935 Oct. 1925 — July 1935 Jan. 1926 — Oct. 1936 Oct. 1926 — July 1937 Jan. 1928 — Apr. 1938 Oct. 1929 — Oct. 1938 Jan. 1932 — Jan. 1939 Oct. 1932 — Apr. 1939

The Eye-Stopper

By the time you receive this issue of SUCCESSFUL SERVICING, you no doubt have displayed the eye-stopper in your shop window. To make this program effective, you should dress your window properly. Make it look neat—but above all, place in the window such items as are indicative of not only what you do—but how.

The number of articles in the window should be dependent on the scope of your activities and what you wish to stress. Select several items to push—or at least to attract the eye after the passerby has been drawn to the window by the stamp display. Use your window to associate ideas. It's impossible to put your entire stock on display and even if you did—there would be so much there that it would confuse the eye. If it's radio receivers you wish to push —tie one or two of them into some featured program, for which you can get publicity pictures.

If it's service you wish to sell show the bottom of an elaborate chassis and indicate the work you did—that it is like the original—that it can't be told from the original. Naturally you will select a chassis in which the wiring is most orderly. Give the public an idea of how many resistors, condensers—connections exist in a chassis—the possible number of places where faults may develop. Seldom if ever does a set owner see the inside of his receiver.

Compare a large set with a small one. Give statistics. Tell the public the different kinds of substances which go to make up the parts in a receiver. The manufacturers of the components can furnish such information—in fact the tube manufacturers have released such data. Make the window interesting—but don't crowd it. ●

Rider Manual Volume 20

This manual now is in preparation and will be released with all pages in place sometime during the month of November 1949. Watch for more detailed announcements. ●

Farnsworth 661-P

This model appears on *pages 2-11,12 through 2-25 of Rider's TV Manual Volume 2.* In the late production of these receivers, the width control has been removed. It was decided that removal of this control would not affect the operation of the receiver, since the control was operated at maximum width in all cases. The width is now a fixed value and the height as varied to obtain the correct aspect ratio. The over-all size of the picture can be varied by the tap adjustment on the power transformer.

High-Voltage Multipliers

By HENRY CHANES

If a 20,000 ohms-per-volt meter or VTVM is available, it can be adapted for measuring high voltages by the addition of high-voltage multipliers. These multipliers are large-value resistors which extend the range of the instrument by reducing the actual voltage that appears at the meter.

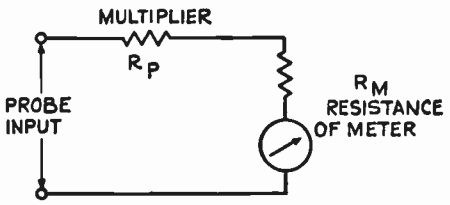

Fig. 1. Circuit showing the use of a multiplier resistance to extend the range of a d-c voltmeter.

This is shown in Fig. 1 where R_M is the input resistance of the meter and R_P is the resistance used to extend the range of the meter.

The physical position of the multiplier may be either inside the meter unit itself or outside the meter, usually built into a probe. The outside position of the multiplier is to be recommended since, in this case, only a small fraction of the high voltage being measured will be applied to the meter. No additional insulation problems will be introduced, as the voltage at the voltage at the meter itself will never exceed the voltage for which it was designed.

The proper value of resistance to be used for the multiplier depends on the particular meter used and the voltage range desired. The calculation involved in determining this resistance can best be shown by considering several typical cases.

First, let us consider the 20,000 ohms-per-volt meter. Most meters of this type have a high-voltage scale of 5,000 or 6,000 volts. It will be most convenient if the multiplier is designed so that a scale on the meter is multiplied by 10 or 100 rather than some odd number. When a reading is made, it will then merely be necessary to add one or two zeros to the reading obtained on the original meter scale. In the case of the meter with a 6,000-volt scale, a multiplication factor of 10 will provide for high-voltage readings up to 60,000 volts. Although television sets at present do not use voltages higher than 30,000 volts, a 60,000-volt range on the meter means that the meter will draw only 25 microamperes for a 30,000-volt reading and less for smaller voltages. This is an advantage because more accurate readings are obtained with less loading of the circuit.

There is a limit to which the range of the meter can be extended in order to obtain a small current drain. This is the amount of deflection of the meter that is obtained for low values of high voltage. For example, if the meter range has been extended to 60,000 volts and the meter is used to check a voltage of only 9,000 volts, there will still be sufficient deflection to provide a satisfactory reading. If voltages lower than 6,000 volts have to be measured, the original 6,000-volt range on the meter can be used.

Coming back to the evaluation of the multiplier resistance, R_P in Fig. 1, we will assume a 20,000 ohms-per-volt meter with a range of 6,000 volts which is to be extended by a factor of 10 to read 60,000 volts full scale. The input resistance of the meter without the multiplier, R_M, is equal to 20,000 × 6,000 or 120 megohms. Similarly the input resistance of the meter with the multiplier, $R_P + R_M$ will be 20,000 × 60,000, or 1,200 megohms. The multiplier resistance, R_P, is the difference between these two values and is equal to 1,200 − 120 or 1,080 megohms.

It should be noted that since the input resistance of the 20,000 ohms-per-volt meter changes with the different ranges of the instrument, the multiplier will provide the desired multiplying factor only on the range for which it was designed. This limitation does not apply to the VTVM type of meter, since the VTVM has a constant input resistance on all ranges.

In the case of a typical VTVM which has a high range of 1,000 volts, a multiplying factor of 10 will enable voltages up to 10,000 volts to be measured. To enable voltages up to 30,000 volts to be measured a multiplying factor of 100 should be used. Since this factor is good for all ranges of the VTVM, a meter that has ranges of 30, 100, 300, and 1,000 volts before the multiplier is added will provide ranges of 3,000, 10,000, 30,000, and 100,000 volts with the multiplier added. Together with the 1,000-volt range in the VTVM itself a tremendous range of voltages can be measured with the addition of only one multiplier.

The evaluation of the multiplier resistance for the VTVM is similar to that of the 20,000 ohms-per-volt meter except that the isolating resistor already in the low-voltage probe has to be considered. The high-voltage probe containing the multiplier resistance will usually replace the low-voltage probe so that the 1-megohm isolating resistor is no longer in the circuit. This will affect the calculation of the multiplier resistance as will be shown. The exact value of the input resistance and the probe isolating resistor for the VTVM must be known before the value of the multiplier resistance can be determined.

Let us consider a VTVM with a total input resistance of 11 megohms which includes the 1-megohm isolating resistance in the low-voltage probe. For a multiplying factor of 100, the total input resistance, $R_P + R_M$, has to be increased by this same factor. This will mean a total input resistance of 11 × 100 or 1,100 megohms. To find the value of the multiplier resistance, R_S, we subtract the meter resistance, R_M from the total input resistance of 1,100 megohms. If we are not going to use the low-voltage probe, we subtract only 10 megohms from this figure, since this is the resistance of the meter with the isolating resistor removed. This gives a value of 1,100 − 10 or 1,090 megohms for the multiplier resistance. If we are going to use the low-voltage probe in series with the multiplier resistance, we subtract 11 megohms from the total $R_P + R_M$. This gives a value of 1,100 − 11 or 1,089 megohms for the multiplier resistance. The current drawn at 30,000 volts will be 30,000 divided by 1,090 × 10^6 or 27.5 microamperes which is within the allowable current drain.

For the meter to have the same accuracy on high voltages as on low voltages, the multiplier resistance should have the same tolerance as the resistances used inside the meter itself. These are usually 1% resistors. That is, their actual value is ± 1% of their rated value. However, it may not be possible to obtain 1% resistors at the very high value required for the high-voltage multiplier. In this case a 2% resistor can be used without introducing objectionable error. If very accurate readings are not required, 5% resistors will do.

Another important characteristic of the voltage multiplier is its voltage rating. Since all but a small fraction of the high voltage appears across the multiplier, this resistor must be capable of withstanding this high voltage without breaking down. For television high voltages, this resistor will, therefore, have to be rated at 30,000 volts or better. A resistor of this kind is usually quite large and will probably have a high enough wattage rating. If desired, the power dissipated in the resistor can be calculated and compared with the power rating of available resistors. In the last example given, that of the VTVM, if we assume that all the voltage appears across the multiplier (actually, all but 1% does), the power dissipated at the highest voltage to be measured, 30,000 volts, will be equal to 30,000 squared divided by 1,090 × 10^6 or about 0.83 watts.

Various high-voltage probes are commercially available which are specifically designed for most of the voltmeters in current use. These probes have the multiplier resistance built into the probe and have plugs that fit the meter for which they are designed.

RCA Q109, Q109X, Ch. RC-602, RC-602A

These models appear on *pages 18-3 through 18-10 of Rider's Volume XVIII.* The following should be added to the parts list under Chassis Assemblies.

72996 Capacitor—molded paper, 0.05μf, 600 v. (C53)

30787 Resistor—fixed composition, 47,000 ohms, ½ w. (R26)

VERSATILITY... Another Big Feature of

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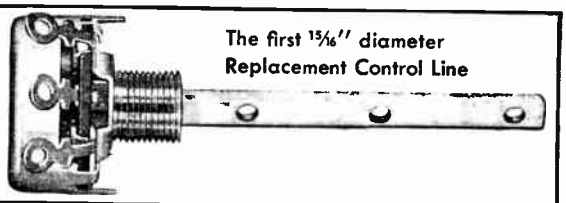

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Vol. 10 SEPTEMBER, 1949 No. 11

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

Published by
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JOHN F. RIDER, Editor

CURTAIN TIME

Summer's End

Well, Labor Day has passed and with it the many activities of the summer, especially the week-end trips by drivers who care little for the lives of others and even less for their own. Many an innocent man, woman and child no longer is here because some madman decided to cut across a highway to buy peaches at a stand. If you get the feeling that we are voicing a personal grudge, you're right because we were forced off the highway on two occasions. We don't travel much on week-ends in the summer, limiting our trips to a suburb of New York City, about 18 miles distant.

TV Receivers

Looks like the 10" tube receiver is on the way out. More than likely it will be supplanted by the 12" tube. Quite a few manufacturers have dropped the smaller tube from their lines. Everybody looks towards high TV receiver sales this fall—and suprising enough the sales of receivers during the summer months were not too bad. They were spotty as far as areas are concerned, but they were being sold just the same. This color business has stirred up a hornet's nest. Looks like the FCC will approve color, but we think that after that happens, the public will be advised that several years will elapse before color television will be *available* to the public. This is something you might bear in mind and get across to the public. If the public decides not to shave until color TV is available, the United States will be a land of flowing beards.

Intermission

There is a word we are learning to detest more and more each day. It is appearing three and four times during the video presentation of a movie, and it's beginning to get our goat. What makes it worse is that we like to watch cow operas and other movies, but these %$#&")' intermissions are a pain in the neck. We understand that TV transmission cannot be free of commercialism—but is it necessary to interrupt a movie every 15 minutes or so! We can understand intermission periods during a three act play, or even an intermission at the middle of a movie—just when it looks as if the hero is being wounded (we know he will not be killed), but not three or four and *even five times* within 60 minutes! Please, Mr. TV broadcaster, have a heart! Isn't a commercial at the beginning, the mid-point and the end sufficient?

New Cathode-Ray-Tube Book

We're seeing daylight in the revision of the CATHODE-RAY TUBE AT WORK. Only a chapter or two remain to be completed, and then the new book is going to the printer. It's been a long grind, but I'm certain that everyone will feel that it has been worth waiting for. We can tell you that it will contain around 800 pages—maybe 900—each approximately 8 x 10 inches. This makes the new book about five times as large in contents as the old one. It is right up to the minute and has been written with certain specific aims in mind. It is intended to make every scope owner familiar with the equipment he owns, if it was manufactured at any time during the past 10 years. It is intended to show every scope user how to get the most out of his equipment, whether the device is in a service shop, school laboratory, or even research laboratory, because the chapters covering radio, scientific, and industrial applications total several hundred pages.

The fundamental theory of the cathode-ray tube embraces hundreds of pages, so that every student, no matter what type of school he attends—whether college, commercial, or Armed Forces, will find data on the tubes and equipment he will handle explained in detail.

For the engineer, the chapter describing every scope and synchroscope made during the past 10 years, complete with schematic data and circuit analysis, as well as the applications of the devices in scientific and industrial applications, will prove a boon. The chapter on complex waveforms and their composition contains around 1,500 individual traces, each pattern individually identified with respect to amplitude and phase of the components.

It's an all-around book which will be found timesaving, informative and useful to every user of the scope. And last but by far not the least, the coverage of the tube and its related circuits embraces television too. Watch for the final announcement next month.

The TV Antenna Book

Every so often an individual relatively unknown to an industry writes a text book for that field which proves to be a classic. Such is the man, Arnold Bailey, who is preparing a manuscript on 30-1000 Mc antenna practice and design. While it is broad in its coverage, it emphasises the television antenna. Most of the chapters are in the house and the writing and editing will be completed by the end of September. We say with pardonable pride that the answers to questions posed by the servicing industry in fringe and local areas relative to television antennas, will be found in this book. Believe us when we say that we are impatient to see it in final form, because we feel that it will take the servicing industry and the radio school fields by storm. There never has been a book like this one. The man who wrote it has 21 years of high-frequency antenna design and practice in back of him. Above all, he possesses the faculty of making himself understood when he explains a point. It's a wow! We know you'll agree that every one of the 400-odd pages is packed full of valuable and useful theory and practice.

HIWYNI

Have It When You Need It. This applies to every Rider Manual—TV, AM-FM, and PA. It's your capital investment in your servicing business—just like your test equipment. Why fret and fume because data you need is not on hand? Get it now—don't wait. You can't go wrong with a Rider Manual.

Master TV Antennas

Master antennas for TV seem to be the thing among the apartments house owners. More and more of these system are receiving a favorable reaction from tenants. The general plan of charges is that a fee of from 50 to 75 dollars is charged each user during the first year after installation; then an annual maintenance fee of from 10 to 15 dollars per year is added to the rent as long as the TV antenna-outlet-equipped apartment is occupied; that is, if the outlet is used.

JOHN F. RIDER

Cover Picture

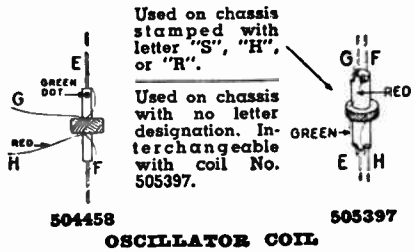
Illustrated on the front page is the mechanical calculator being installed by the Navy for use in guided missile computations. This calculator is capable of solving in one second a multiplication problem running into millions. A special building has been erected to house the 25-ton machine which fills a room 50 by 80 feet. As many as 70 men were employed at a time on the complicated wiring and assembly of the machine which contains more than a million feet of wiring.

Stewart-Warner A51T Series

These models are the same as Model A51T1, appearing on *pages 17-4 through 17-6 of Rider's Volume XVII.* The code listings for these models are:

Model	*Code*
A51T1	9020-A
A51T2	9020-B
A51T3	9020-C
A51T4	9020-D

On chassis which have the letters H or R stamped on the rear surface adjacent to the model numbers, the rotor of the gang tuning capacitor is grounded instead of being connected to the AVC line. Oscillator coil 505397 (see accompanying diagram) is used on chassis which are stamped with the letters "S", "H", or "R".

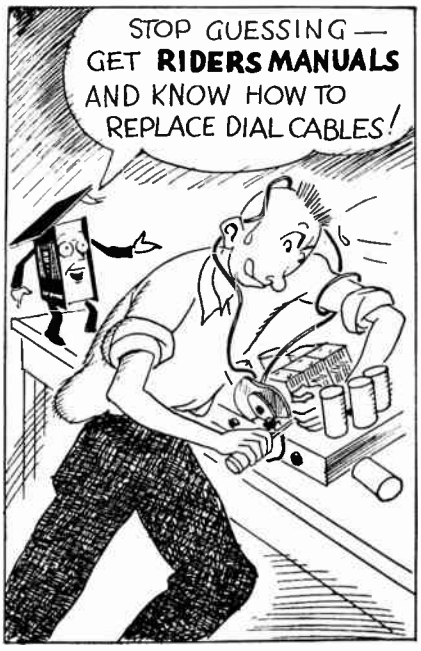


Oscillator coil for Stewart-Warner A51T series.

●

Sears 8133

This model appears on *pages 2-1 through 2-22,23,24 of Rider's TV Manual Volume 2.* A limited number of these models were shipped from the factory with loose deflection yoke caps. This cap protects the high-voltage terminals of the deflection coil and it is important that it be securely fastened to the deflection yoke housing. A good grade of paper cement can be used to fasten the cap securely. It is recommended that all deflection yoke caps be checked for proper bonding to the housing before servicing.



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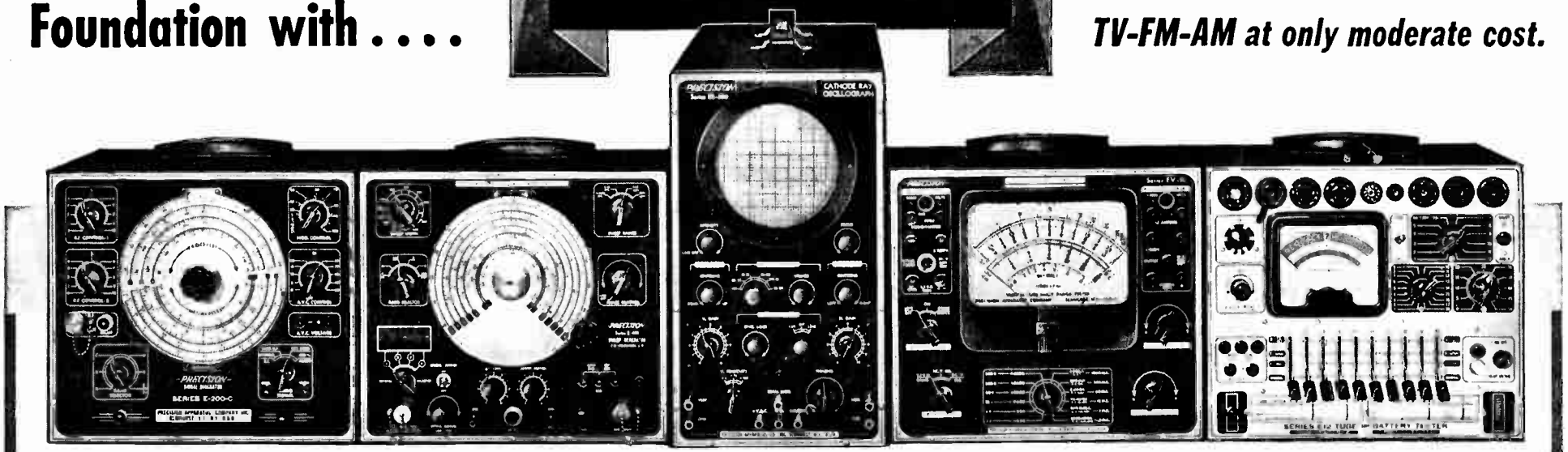

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Net Price:—$67.25

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".

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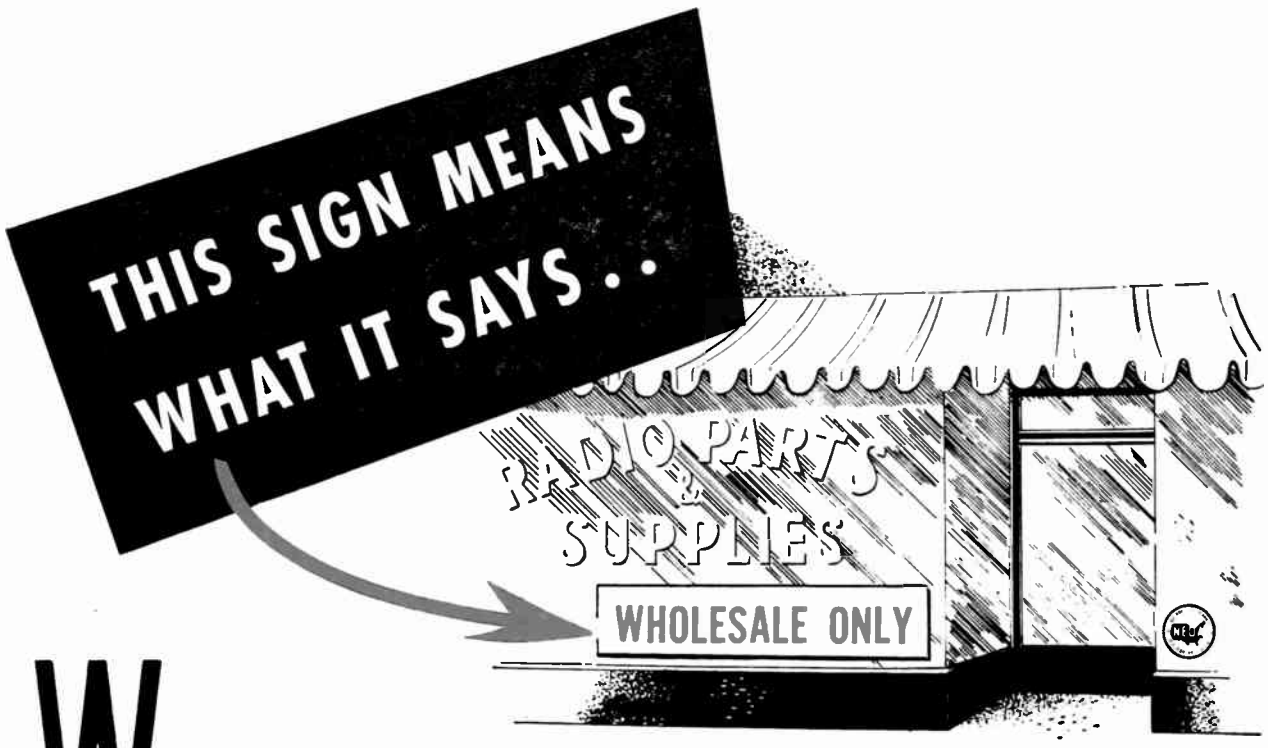

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Philco 48-1001 Code 122

This model is similar to the Philco 48-1001 Code 121 appearing on *pages 2-81, 82 through 2-86 of Rider's TV Manual Volume 2.* It also incorporates the changes given on page 14 of the April, 1949 issue of SUCCESSFUL SERVICING and page 8 of the May, 1949 issue.

The following changes have been made in Code 122:

Section 1

The a-c power line has been connected directly to transformer T100 instead of to pins 4 and 10 of the a-c interlock.

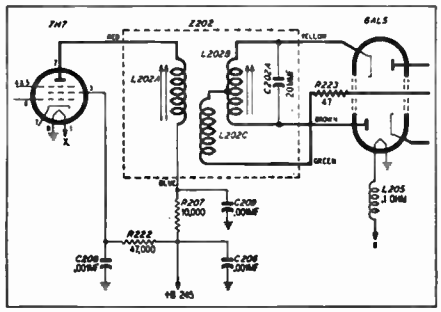


Fig. 1. New discriminator transformer and associated circuit for Philco 48-1001.

Section 2

Refer to Fig. 1. Z202 has been replaced by a new discriminator transformer, part number 32-4317. Balancing choke, L204, part number 32-4143-1, has been removed. The 5-$\mu\mu$f capacitor, connected from the plate of the second a-i-f* tube (7H7) to ground, has been removed.

Capacitor C208, 0.001 μf, part number 45-3500-5, has been added between pin 3 of the second a-i-f tube and ground. L202C, part of Z202, has been added. C202A, 100 $\mu\mu$f, part of Z202, has been removed. Balancing capacitor, C202C, part of Z202, has been removed. C202B, 10 $\mu\mu$f, part of Z202, has been changed to 20 $\mu\mu$f, and resymbolized C202A.

C206, 0.001 μf, part number 45-3500-5, was removed from the cathode (pin 7) of the second a-i-f tube, and connected as shown in Fig. 1. R222, 47,000 ohms, part number 66-3473340, was added. See Fig. 1. R223, 47 ohms, part number 66-0473340, was added. See Fig. 1.

R219, 3,300 ohms, part number 66-2333340, was changed to 1,200 ohms, part number 66-2123340. R209, 27,000 ohms, part number 66-3273340, was changed to 10,000 ohms, part number 66-3103340. R210, 27,000 ohms, part number 66-3273340, was changed to 10,000 ohms, part number 66-3103340.

Section 5

See Fig. 2. C509, coupling capacitor, 0.25 μf, part number 61-0125, was changed to 0.1 μf, part number 61-0113. The connection of the vertical deflection yoke, P9 and P3, were changed to 4 and 5, respectively. R549, linearity-control limiting resistor, 6,200 ohms, was changed to 33,000 ohms, part number 66-3333340. R545 and R546, horizontal linearity controls No. 2 and No. 3 were removed. The circuit was rewired as shown in Fig. 2.

R548, beam-bender control, was removed.

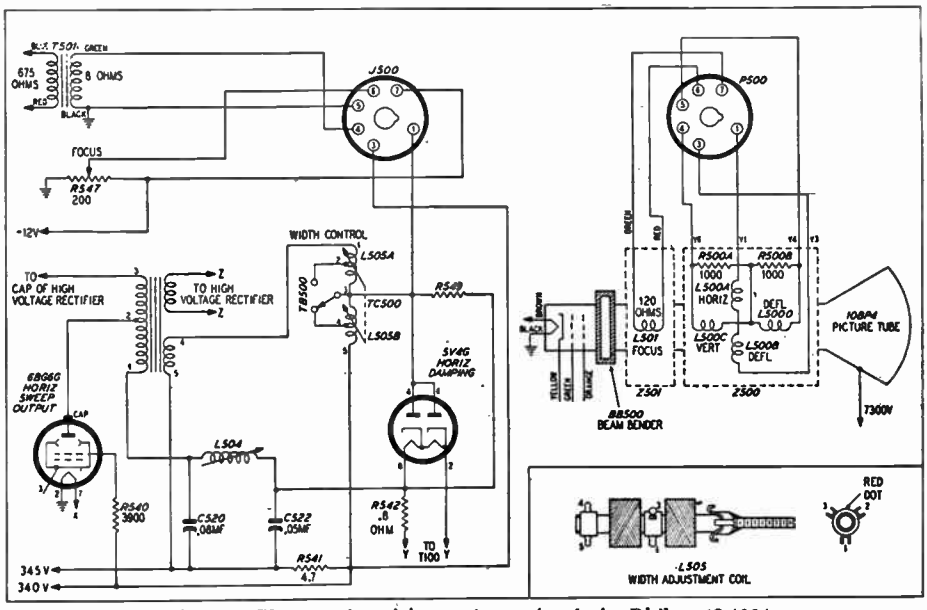


Fig. 2. Changes in wiring output circuit in Philco 48-1001.

Z502, beam-bending coil assembly (including L502A and L502B) was removed. A permanent-magnet type of beam bender (BB500), part number 76-3913, was added.

J500, chassis receptacle (deflection-yoke-cable connector) 11 pins, part number 27-6229, was changed to 8 pins, part number 27-6174-4. P500, deflection-yoke-plug connector and cable, 11 pins, part number 41-3764-1, was changed to 8 pins, part number 41-3860.

*a-i-f means audio i-f.

Rider Diagram Service

Are you taking full advantage of the Rider Diagram Service?

If you require service data on a new receiver, you can obtain the information from us. Naturally, a time lag exists between the publication of the volumes of Rider Manuals and it is to fill this gap that we have this service, so that you may have whatever you need in the way of service data as yet unpublished. The charges for this service are as follows:

1. 35 cents is the charge for all the available data on any radio receiver model up to and including six pages. Each page thereafter will cost 10 cents.

2. If additional money is required to cover the data requested, you will be notified. We cannot forward data without receiving your remittance.

3. Service data on television receivers may be obtained at costs varying from 35 cents to $1.50. It is suggested that you inquire the cost before sending us a remittance for television data.

4. Be sure to enclose a self-addressed envelope bearing a 3-cent stamp.

If you will follow these rules, it will simplify matters for both of us and you will receive the data you need with a minimum of delay.

Zenith 6R886Z, Chassis 6E02Z

Model 6R886Z is the same as Model 6R886 which appears in *Rider's Manual Volume XVII, pages 17-16 and 17-17,* except that a tone control has been added, as illustrated in the accompanying diagram.

The following parts were added:

S-14667	Dial pointer and pulley assy.
S-14670	Tone control brkt. and lug assy.
12-1490	Cover plate support
22-827	0.1 μf 200 v.
46-688	Tone control knob
57-1398	Escutcheon
63-1653	Tone control
78-793	Socket-octal tube
85-438	Phono-Radio switch
125-66	Rubber grommet
166-41	Rubber bumper
188-34	Retaining ring.

•

3 Minutes of TV for a Nickel

According to GE, a luncheonette in Hoboken will furnish 3 minutes of TV viewing for five cents. Individual coin operated TV receivers are located in the booths. Each machine will accommodate up to a quarter, which means fifteen minutes of viewing.

Just a matter of opinion—

Rider TV Manual Volume 3

(*Continued from page 1*)

facturer's name will appear next to the page number, which will be located on the top of the pages, thus making it easy to find the required page. Because each printed page contains the equivalent of two of the regular-size pages used in TV Volumes 1 and 2, it will be easier to follow the text instructions and there will occur less frequent need for turning pages in order to correlate text and diagrams.

The use of a single fold for giant-size pages will make the handling of the manual very much easier. Because the multiple-fold pages have been eliminated, the other pages will lie better within the binder. By making the binder slightly larger in capacity than is required to accomodate the number of pages, the opened manual will lie substantially flat.

The increased size will be no inconvenience on the service bench. This has been surveyed and the response was 100% for the new size among service shop owners. It means of course that shelf dimensions will have to be increased to accommodate the new TV series, but since it is only for the TV manuals, that will impose no hardship on the service shop owner. The regular series of AM-FM and PA Rider Manuals will be in the same size as heretofore.

So we have finally solved the unbound page problem in Rider Manuals. Naturally we cannot effect a change in all existing manuals at one time. It will be a progressive change as time passes. Please bear with us on the existing Rider TV Manuals Volumes 1 and 2. They contain unbound pages which must be put in place. They are not too numerous, and at first glance the task appears much greater than it really is. At any rate, you now know that henceforth, beginning with TV Volume 3, all pages will be in place. Thanks for your consideration in the past and you can rest assured that Rider Manuals will continue rendering service.

The new TV Volume 3 will be ready for publication in November, perhaps sooner. The exact publication date will be announced in the October issues of SUCCESSFUL SERVICING and other publications. The AM-FM Rider Manual Volume 20 will also be ready around November, 1949. Watch for announcements.

●

RCA 8X53, 65X1, 65X2, RC-1064

Model 8X53 appears on *pages 18-41 and 18-42 of Rider's Volume XVIII* and Models 65X1 and 65X2 appear on *pages 15-61 and 15-62 of Rider's Volume XV*.

The number of turns of dial cord on the tuning shaft has been increased from 2-¼ turns to 3-¼ turns.

●

RCA Radiola 75ZU (Blonde)

This model appears in *Rider's Manual Volume XIX on pages 19-45 and 19-46.*

The following have been added to the parts list for instruments using blonde mahogany cabinets:

73722 Knob—Power—Phono—radio switch knob—for blonde instruments
73629 Knob—Tuning Knob—for blonde instruments
73630 Knob—Volume Control Knob—for blonde instruments

●

Sears 8133, Serial Less Than BO8T-3378

This model appears on *pages 2-1 through 2-22,23,24 of Rider's TV Manual Volume 2.* For a time these models were produced with less than normal sensitivity, because the alignment and checking equipment at the source had drifted, and the drifting was unnoticed. This drifting caused a slight misalignment of all chassis produced at that time.

Complete realignment of the receiver is not recommended, since it is not necessary. A slight retouching of the i-f trimmers on both the video and sound channels is all that is necessary. Since the bandwidth was not affected by the drifting of the alignment equipment, this misalignment is not detrimental where the receiver is located within approximately 15 miles of the transmitting station.

●

General Electric 233, Kaiser-Frazer

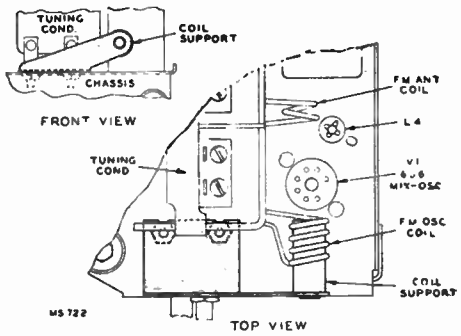
This model appears on *pages 18-29 through 18-36 of Rider's Manual Volume XVIII.* The following changes in production wiring should be noted in the schematic diagram:

Capacitor C28 has been changed to the left side of switch, S1, at the junction of C27 and the switch connection. The ground lead of C28 is connected to chassis ground.

RCA 8R71, 8R72, 8R74, 8R75, 8R76, 8V90, 8V91

Models 8R71, 8R72, 8R74, 8R75, and 8R76 appear in *Rider's Manual Volume XIX on pages 19-10 through 19-15* and Models 8V90 and 8V91 appear in the same Volume on *pages 19-16 through 19-25.*

To insure greater oscillator stability a support has been added for the f-m oscillator coil as illustrated in the accompanying diagram. Adjustment of the coil is



Coil Support

A support has been added to insure greater oscillator stability for the f-m oscillator coil for the RCA Models 8R71, 8R72, 8R74, 8R75, 8R76, 8V90, 8V91.

made as described in the Service Data. After adjustment the coil is cemented to the coil support.

The following is added to the parts list:
74202 Support—Polystyrene coil support complete with mounting bracket.

●

Hoffman C501 and C511, Chassis 108

These models are the same as Model A501, Chassis 108S, appearing on *pages 15-6 through 15-10 of Rider's Volume XV*, except that four 6K6 beam-power tubes are used in push-pull parallel in the output stage instead of the two push-pull 6V6's. The change is indicated in the accompanying diagrams. The alignment is still the same as given on *page 15-9.*

The parts list should be changed to read as follows:

Symbol
C47, C23, C24
C28, C32
C29, C30
C41, C46
C42, C44
R2, R17
R3, R27
R11
R12, R18
R23
R28
R13, R14, R24

Rider TV Manual Volume 3

This manual now is in preparation and will be released in the new enlarged size with all pages in place sometime during November, 1949. Watch for more detailed announcements.

Sound Advice From One Serviceman To Another!

MAC'S *Radio* REPAIR
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John F. Rider Publisher, Inc.
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New York 13, N. Y.

Rumors are running around financial circles to the effect that a good many ex G.I. radiomen who have gone into business for themselves are practically starving to death. I can well believe such rumors since I am an ex G.I., and after a year and a half I am just beginning to pull away from the deep part of that red ink pool. I think Dun & Bradstreet, Inc. still list me as a good cash-on-the-line customer. Since the above-mentioned rumors are probably true, I would like to take advantage of your advertising department to pass on some tips to ex G.I.'s who are now in or who contemplate entering the radio repair business.

A man entering radio repair must have some working capital, a good working knowledge of radio, adequate test equipment, and a GOOD REFERENCE LIBRARY. That good reference library cannot be stressed too much, because the big jobs, the mean jobs, and the tough jobs are dependent on that library.

Unfortunately there are quite a few radio wreckers operating, and the only complete key that I have found for setting those radios right is the use of Rider's manuals. If the manufacturer has made changes in the set, those changes are included in Rider's. In most cases all other changes should be discarded and the radio re-assembled according to schematic.

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I have written this with the hope that it will help some of the boys who are busy pulling out what little hair is left in their heads, and also with the hope that it will serve to help a lot of men improve their work and thus give a better name to our business.

Yours truly,
A. E. McCorkle
A. E. McCORKLE

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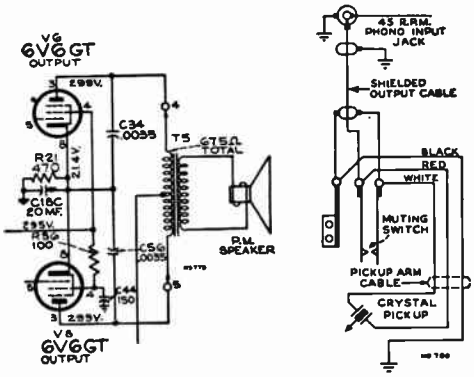
RIDER MANUALS *mean Successful Servicing!*

RCA 9W101, 9W103, 9W105

These models appear on *pages 19-35 through 19-44 of Rider's Manual Volume XIX.*

A capacitor (150 $\mu\mu$f-C44) has been added between the screen grid terminal of V8 (6V6GT) socket and chassis as shown in the accompanying illustration. This was



Output Tubes Circuit Pickup Arm Cable Models 9W101, 9W103, 9W105

done to eliminate spurious audio oscillation.

The simplified schematic diagrams (phono position) on page *19-39* show C34 and C56 connected to ground. They should be shown connected to the cathodes of the 6V6GT tubes as shown in the accompanying illustration.

To improve f-m stability one dial lamp is now connected to pin #2 of V9 (6X5GT). Previously both were connected to pin #2 of V8 (6V6GT).

Speakers stamped 92569-1WX have been used as a substitute for 92569-5W speakers in Model 9W101; 92569-1WX speakers have a 2.2-ohm voice coil; 92569-5W speakers have a 3.2-ohm voice coil.

The following additions have been made to the parts list:

48125 Capacitor—Ceramic, 150 $\mu\mu$f (C44) Same as C7, C19, C38, C50, C53
13867 Cap—Dust cap
36145 Cone—Cone and voice coil assembly
5039 Plug—4 prong male plug for speaker
71145 Suspension—Metal cone suspension
37899 Transformer—Output transformer (T3)

Note: When replacing complete speaker order Stock No. 73635 (92569-5W).

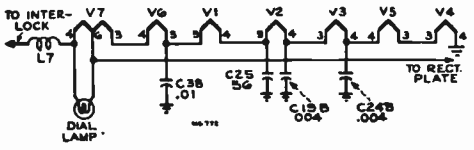
37396 Grommet—Rubber grommet for mounting speaker (3 required)—for Model 9W103
73896 Loop—Loop antenna complete for Models 9W101 and 9W103 (previously listed for 9W101 and 9W105).

The RP-168A-1 record changer pickup arm cable now being used is a three wire cable (RED-WHITE-BLACK). In some instruments the black wire is omitted or a shielded wire may be used as shown in 9W101, 9W103, 9W105 Service Data. The latest connection diagram is shown in the accompanying illustration.

●

RCA 8X71, 8X72

These models appear on *pages 19-30 through 19-34 of Rider's Manual Volume XIX.* A capacitor (0.01 μf-C38) has been added between pin #3 of V6 (35C5) and chassis. The revised heater connection



Heater Connections—Models 8X71, 8X72

schematic diagram is illustrated in the accompanying diagram.

The following have been added to the parts list:

71923 Capacitor—Tubular, 0.01 μf, 200 v. (C38) same as C23, C36.

●

RCA 612V1, 612V3, 612V4

These models *appear in Rider's Manual Volume XVII on pages 17-31 through 17-43.*

Add the following to the parts list:

72119 Escutcheon—Escutcheon only — less screen, window and marker strips—for blonde instruments.

Change 71868 Frame in the parts list to read

71868 Frame—Rollout carriage frame with brackets—less wheels.

The parts list for these models applies to Model 612V4 also except for the following miscellaneous parts:

73719 Back—Cabinet back — blonde — for sides—2 required
73720 Back—Cabinet back — blonde — for center
X1825 Cloth—Grille cloth—for 612V4 blonde

The RP-176A record changer is used.

●

General Electric 810, 814

Model 810 appears on *pages 2-22 through 2-43 of Rider's TV Manual Volume 2* and Model 814 on pages *2-44 through 2-57,58* of the same Volume.

The color code shown on the horizontal sweep output transformer, T17, on Model 810 was shown in error on the schematic diagram of the service notes. No replacement transformers have been shipped having the code shown. The Model 814 service notes do not show the color code on the service note schematic.

The following is the correct color code as it appears for all replacement sweep transformers as used in these models:

Primary Winding	*Color Code*
B+ Return	Red Dot
Secondary Winding	
5V4G Plate	White Dot
Junction of B+ and L18	Blue Dot

All other leads are identified physically, either by the tube caps assembled thereon, or by their lead length.

Audio clicks heard when the volume control is moved past the tap or at maximum volume setting when operating in a high channel can be cured by redress of the audio shielded leads and placement of components. To make these changes proceed as follows:

Remove the two shielded audio leads from under the cable clamp which is located on the side chassis apron above the 2nd audio i-f transformer. These audio leads are then dressed out of this clamp so they will be spaced approximately 1/8-inch away from the chassis side apron.

The three paper capacitors (C87-0.01 μf, C74-0.01 μf, and C76-0.02 μf) mounted on the left apron terminal board must be dressed down close to the side apron, as far away as possible from the head-end unit.

●

General Electric 233, Kaiser-Frazer

This model appears on *pages 18-29 through 18-36 of Rider's Manual Volume XVIII.* In cases where the volume and tuning control shafts appear too short to accomodate the shaft parts and knobs, a formed lip which is bent forward in the escutcheon opening of the instrument panel will be found to obstruct receiver installation. This lip may be removed by either filing or bending it back.

In instances where the hole for the receiver mounting bracket has not been accurately located, it is possible that the receiver is positioned a bit too far toward the front of the car to allow the receiver control shafts to come through instrument panel holes to their maximum extent. If the "knock out" hole for the mounting brackets screw must be drilled, make certain it is accurately positioned.

In case of pushbutton sticking, check for and remove any burrs from the bottom of the cast grille for pushbutton openings. A binding tuning shaft will also cause the pushbottons to stick or fail to return to their normal positions. To clear shaft from binding, enlarge the tuning shaft opening using a reamer, or a rat tail file.

If the receiver is dead, check installation wiring to make certain the correct lead is connected to the ignition and instrument light switch respectively. If the receiver lead that should go to the instrument light control is connected to the ignition switch, the receiver will not operate though pilot lamps will light.

Check the loudspeaker plug connection. Though the plug pin receptacles in the speaker lead connector are arranged in such a manner to be polarized, it is often that the operator neglects to align the receptacles with respect to the male plug pins at the speaker. Forcing together of the incorrectly aligned parts is liable to cause the male pins to break through into the thin walls of the non-conducting adjacent holes of the speaker plug, resulting in open circuit wiring to the loudspeaker.

Exposure of the radio receiver to such dampness as water drain-leaks upon the receiver components and wiring, results in voltage breakdown at tube sockets (especially the 6V6 output tubes), or the shorting of capacitors and resistors. The r-f trimmer strip at the center of the receiver will also be affected, causing the radio to become weak or dead. Water leaks around the windshield, and screw head holding the set mounting bracket to the cowl should be well sealed against water draining upon the receiver. A thorough check for probable leaks and the necessary steps taken to prevent their occurrence should be taken at the time of the initial radio receiver installation.

A lower than normal battery voltage can be the cause of the radio to be weak or fail to operate. The receiver will not function properly if the battery voltage measures less than 5.8 volts.

Magnavox CT 214 B

This model is the same as CT 214 A, appearing on *pages 2-1 through 2-37,38 of Rider's TV Manual Volume 2*, except for the following modifications. A green-colored peaking coil, part number 360332G10, has been inserted between the 2,000-ohm plate load resistor (138) of V14A and the +135-volt bus. This extends the h-f response of this video amplifier stage.

An iron-slug coil, part number 360346G1, has been inserted as the horizontal oscillator frequency control (speed), replacing the 120-$\mu\mu$f capacitor (25) used previously. If it is desired to install this unit for improved stability of horizontal deflection. the following should be done:

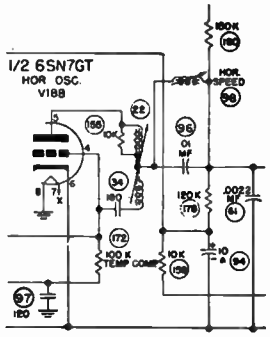
(1) Remove the 120-$\mu\mu$f capacitor (33) and replace with mica capacitor, 180-$\mu\mu$f $\pm$10%, 500-volt, part number 250159G85. Note: The capacitor which is removed may be used in step (3).

(2) Remove the horizontal speed capacitor. This is the center capacitor of the three-gang trimmer (25).

(3) Connect a 120-$\mu\mu$f $\pm$10%, 500 volts, part number 250159G83, from the tie lug at the junction of the 100,000-ohm resistor (172) and the 180,000-ohm resistor (181) to the grounded terminal of V18 (pin 8).

(4) Mount the horizontal speed coil, part number 360346G1, with mounting bracket part number 633750G2 directly above the gang trimmer (25). The tuning slug of th coil should be accessible through the opening marked HORIZONTAL SPEED.

(5) The horizontal speed coil should be connected as shown in the accompanying diagram.



Horizontal speed coil in the Magnavox TV set model number CT 214 B.

(6) Connect one side of the coil to the second lug from the end of the strip nearest horizontal linearity coil (13). Remove the 10,000-ohm resistor (155) and retain for use in step (8).

(7) Connect the opposite side of the coil to the center tap of Magnalok transformer (22). Dress the lead so that it will follow the contour of the wires leading to the tie lug strip mounted between the Magnalok transformer (22) and the 6V6GT audio output stage. Connection should be made from the opposite terminal of the horizontal speed coil to the second tie lug from the end of the tie lug strip nearest the front of the chassis.

(8) Connect resistor 55 removed in step (6) across terminals 1 and 2 of the tie lug (across one-half of the coil).

(9) Connect a 0.01-μf, 300-volt capacitor,

(*Please turn to page 20*)

THE BUSINESS HELPER

The Business Helper is a new book which will be released to the trade in September. It was written by one of the nation's best known radio and electronic parts jobbers, Les Rucker, of Rucker Radio Wholesalers of Washington, D. C. It describes just what he did to build his business which started about 25 or so years ago on very much limited and borrowed capital ($500.) to its present level of a main store in Washington, D.C. proper and a number of branch stores in the suburbs of the nation's capitol.

It is the story of what a small businessman should do about selling, purchasing, credit, advertising, dealing with his bank—his suppliers—every phase of a small business activity. It explains how to build a sound business—and the man who wrote it can prove every one of the statements he makes—because he did what he says and found it successful. He does not theorize. He speaks in understandable language and talks turkey. He is practical—and tells how to avoid the pitfalls which always are there to trip up the man who is not careful.

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Ask your jobber for *The Business Helper*. It's only $2.00. Get it today—Now!

Magnavox CT 214 B

(*Continued from page 19*)

part number 250161G53, across the coil. The connection should be made across the tie lug points 2 and 3.

Note: Some models do not incorporate the tie lug described in step (7). For these models, steps (8) and (9) should be done as follows:

a. Mount resistor 155 directly across the Magnalok transformer coil terminals.

b. Mount the 0.01-μf capacitor directly across the terminals of the horizontal speed coil.

Connect a 4.7-megohm resistor between lug F on the discriminator transformer (4) and the open lug of the terminal strip mounted directly under the 6AU6 tube socket (V6). Then connect a lead from this lug to pin 1 of the Sync Clipper 6SN7 tube socket (V16).

Rider On The Move Again

The Fall and Winter of 1949 will see John F. Rider speaking at various service meetings. The present schedule for the month of September covers New York City on the 7th for the Associated Radio Servicemen of New York, the 13th in Kingston, N.Y. for the Kingston Radio Servicemen's Assoc., the 14th in Poughkeepsie, the 19th in Philly at Town Hall for the Philadelphia Radio Servicemen's Assoc., the 21st in Binghampton, N.Y. under the auspices of the Empire State Federation of Electronic Technicians Associations and on the 27th in Rochester, N.Y., also under the auspices of ESFETA. All of the talks will be related to different aspects of television.

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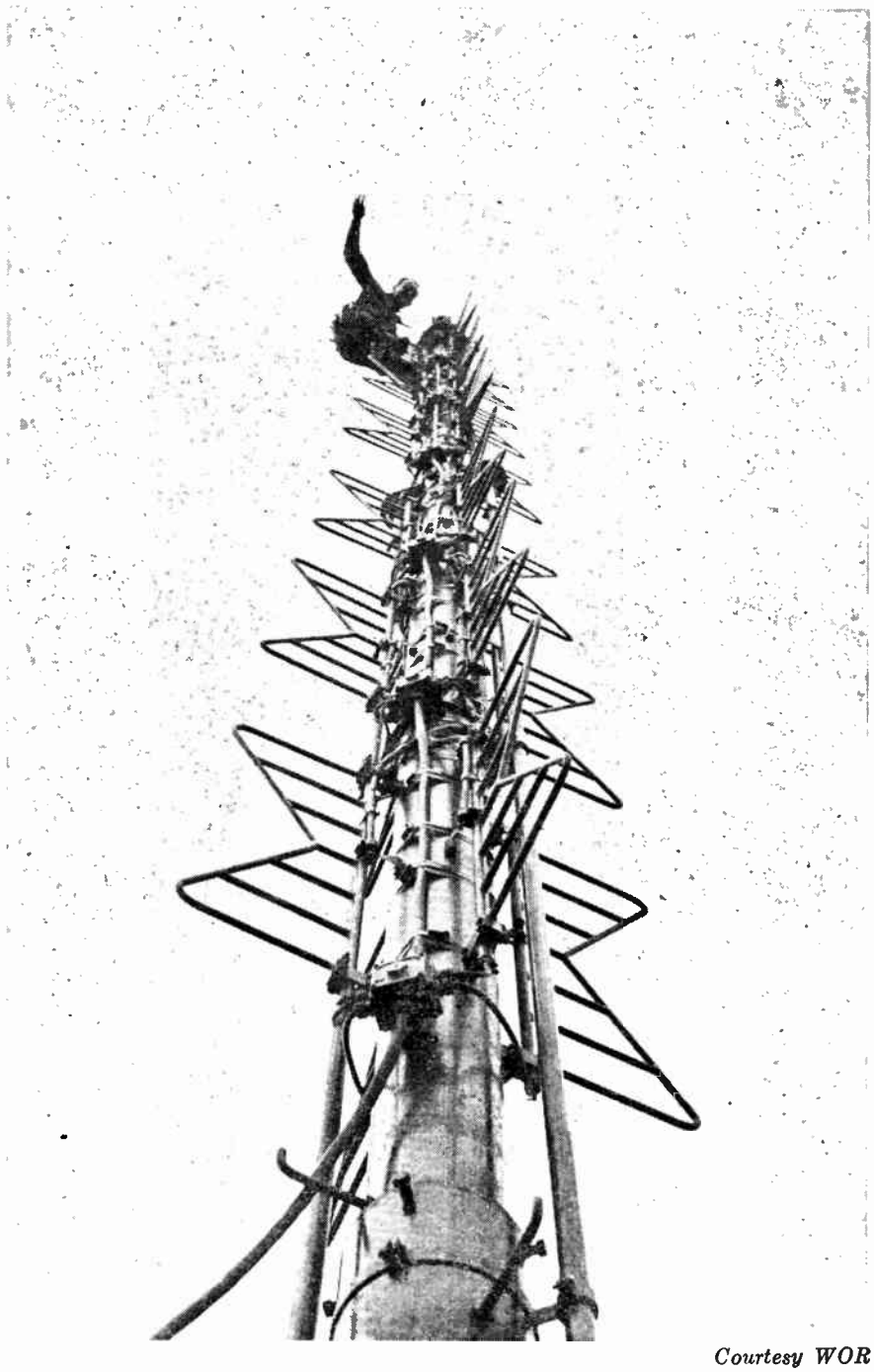
OCTOBER, 1949

SAWTOOTH SWEEP LINEARIZATION

By

Seymour D. Uslan



Courtesy WOR

One of the simplest and cheapest methods of linearizing a sawtooth sweep is to employ some form of additional time-constant network in the sweep circuit. In most cases, a resistance-capacitance network is the type of time constant employed. This new circuit is designed to operate in such a manner that it will offer a correcting voltage to the usual exponential rise time of the sawtooth wave so that the resulting sawtooth will be linear. Numerous different types of circuit arrangements are possible but only two will be considered here. These two, however, will give us a fair idea of how such new time constants should operate.

Let us first study the circuit of Figure 1. This figure is a simplified form of the usual type of sweep circuit where *V1* represents the discharge tube. This tube can be part of a thyratron relaxation oscillator, multivibrator, or blocking oscillator in which its period of conduction is very short compared to its period of cutoff. Thus, the plate current in this tube flows in pulses of short time duration. Capacitor *C* charges up from the B supply through *R1* during the periods that *V1* is cut off, and during the periods of *V1* conduction, *C* discharges through the tube because the plate resistance of this tube is quite low compared to *R1*. The charge of *C* represents the rise time or trace of the resultant sawtooth and the discharge of *C* represents the retrace or flyback of the sawtooth. The sawtooth output is taken across *C* and is not very linear because its rise is exponential in shape.

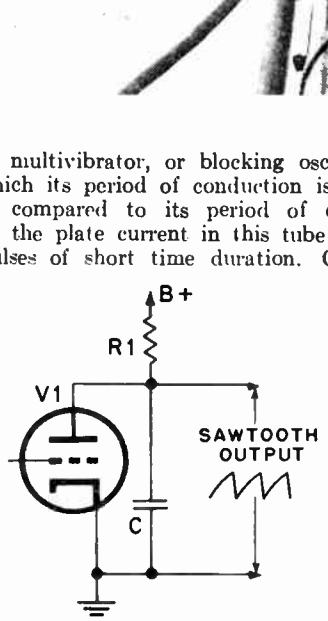


Fig. 1. Simplified sweep circuit.

Figure 2 is the new circuit for improving the linearity of the sawtooth, where resistor *R2* and capacitor *C2* are the additional circuit elements. Capacitor *C* of Figure 1 is effectively split in two and is represented by *C1* and *C3* in Figure 2. Capacitors *C1* and *C2* are approximately of the same value and resistor *R2* is about

(*Please turn to page 12*)

Television Changes

Stewart-Warner T-711, Ch. 9031-A; T-711-M, Ch. 9031-AM; T-712, Ch. 9031-B; TRC-721, Ch. 9037-A

These models appear on *pages 2-1 through 2-21, 22 of Rider's TV Manual Volume 2.* The following changes occurred during production:

Capacitor C88, 0.006 μf, was removed from a position between the junction of R99 and R100 and ground, and relocated between the junction of R92 and R99 and ground.

Capacitor C51, 0.01 μf, was removed from a position between the junction of R92 and R99 and ground and relocated between the junction of R99 and R100 and ground.

R-f transformers T21, T30, T31, and T32, were redesigned to use polystyrene coil forms, and a copper tuning ring was placed on the form whenever required to obtain correct alignment. See Figure 1.

Video peaking coil and resistor combination L3 and R98, located in the plate circuit of tube V7 (6AC7) video amplifier stage, was redesigned to improve high-frequency response. Latest type assembly appears in chassis with serial numbers above 10,600 and utilizes a new coil plus a parallel-connected 68,000-ohm resistor, instead of a 22,000-ohm resistor for R98.

The following changes occurred on chassis with serial numbers above 4,450:

Capacitor C21, 10 μμf, originally connected across the 21.9-Mc trap coil on the 4th video i-f transformer T4, was removed from the circuit.

1st video i-f transformer T1, was replaced by a new type. The original transformer used trimmer capacitor C8 for primary tuning, and the 27.9Mc trap consisted of a separate parallel tuned circuit including a coil, fixed capacitor C118, and trimmer capacitor C10; one side of the trap circuit was connected to ground. On the latest type transformer, trimmer capacitor C8 is omitted and primary tuning is accomplished by positioning a copper ring on the coil form. The winding for the 27.9-Mc trap was rearranged and connections were revised as shown in the accompanying schematic diagram. See Figure 1.

sistor R116, 3,300 ohms, was added to the circuit and connected in series with pin 3 of switch section S1H and capacitor C41, in the grid circuit of tube V21B (6AQ7GT) audio amplifier stage, as shown in Figure 2.

Resistor R117, 3,300 ohms, was added to the circuit, in place of R113, and inserted between R70 and pin 1 of switch section S1H, in the grid circuit of tube V21B (6AQ7GT) audio amplifier stage. See Figure 2.

Resistor R54, 470,000 ohms, originally connected from grid pin 5 of tube V22 (6V6GT) audio output stage to ground, was removed from the circuit.

Horizontal output transformer, T9, was modified to increase horizontal sweep width and high voltage for the picture tube. The latest type transformer can be readily recognized by their white polyethylene coated leads and the molded polyethylene coating on both windings. Identification of leads is accomplished by continuity measurements and by the fact that certain leads are grouped for connection to the 1B3/8016 and 6BG6G tube caps.

Resistor R118, 3,900 ohms, was added to the circuit and connected in series with the orange lead from T9 to R47. 6,800 ohms. This change is incorporated in chassis which use the late type horizontal output transformer T9.

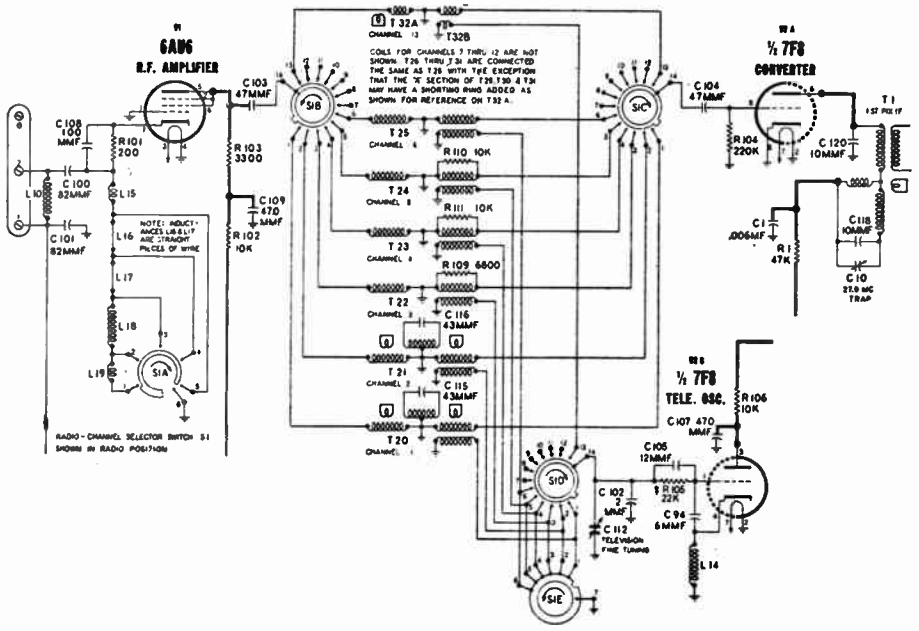


Fig. 1. Stewart-Warner T-711, Ch. 9031-A; T-711-M, Ch. 9031-AM; T-712, Ch. 9031-B; TRC-721, Ch. 9037-A.

The following phonograph circuit parts are used only on Model TRC-721, Ch. 9037-A. These components may be identified on Figure 2, by the † notation which precedes the symbol number.

R113	Resistor 68,000 ohms
R114	Resistor 220,000 ohms
C121	Capacitor 0.01 μf
S3	Switch—"Radio-Phono"
S4	Switch—"On-Off" for record changer
505100	Crystal cartridge
505273	Motor for record changer
505492	Socket—Phono motor cable
501031	Plug—Phono motor cable
505654	Socket—Phono pick-up cable
500966	Plug—Phono pick-up cable.

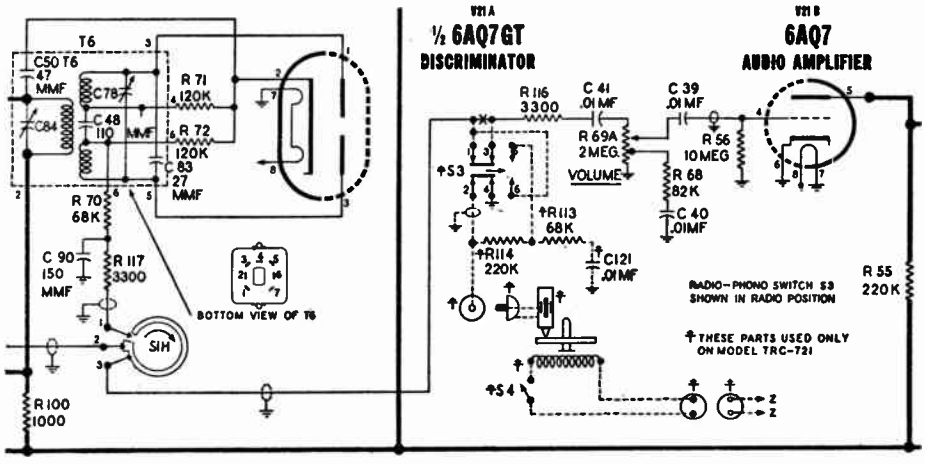


Fig. 2. Stewart-Warner T-711, Ch. 9031-A; T-711-M, Ch. 9031-AM; T-712, Ch. 9031-B; TRC-721, Ch. 9037-A.

Television Changes

Bendix 235M1, 235B1

These models appear on *pages 2-1 through 2-18 of Rider's TV Manual Volume 2.* The following production changes have been made. The antenna wave traps, consisting of C141, C142, L50, and L51, were deleted in some receivers. Cathode resistor, R4, of V1 was in some units deleted and the cathodes connected directly to chassis ground; in other units it was either 47 ohms or 180 ohms, ½ watt. A 100-μμf capacitor, C7, paralleled C6 and C70 in units prior to the use of a shielded r-f bias lead to terminal "S" of the r-f i-f chassis. Damping resistor, R3, was changed from across C9 to switch contacts S1 and S2, thus paralleling either C8 or C9, depending on the position of range switch S1 and S2.

The plate (V1) load dropping resistor, R5, was changed from a ½-watt, 680-ohm resistor to a 1 watt of the same resistance and, at the same time, R9 was changed from 220 ohms to 4,700 ohms paralleled by R34, also 4,700 ohms. Grid-bias resistor for V3, R10, was changed from 33,000 ohms, connected to pin 5 of V2, to 220,000 ohms, connected directly to chassis ground.

Grid resistor R38 in the grid circuit of the first i-f amplifier, V8, replaced an r-f choke, L53, used in early models.

A clamper tube V18, 6AL5, was added, preceding the sync clipper and amplifier tube V14. Early units used two 7A5 tubes in parallel, shown as V18 and V19, in the horizontal output circuit. When a single 6BG6G was incorporated in this circuit, it was listed as V19. Therefore, the number V18 was later assigned to the added 6AL5 clamper tube.

Belmont 18DX21A, 7DX21

These models appear on *pages 2-11 through 2-25 of Rider's TV Manual Volume 2.* The dynamic limiter circuit used in these models was designed to reduce noise, external interference, and other objectionable effects expected in television reception. It was later discovered that the noise and other effects were not as noticeable as expected, and the dynamic limiter circuit could be eliminated. Since the dynamic limiter introduces a loss, an increase of audio sensitivity of approximately three times is now obtainable. To make this change, remove the 1,000-μμf capacitor, C116, that is connected between terminal 2 of transformer T8 and pin 6 of tube 4, 19T8. If it is not convenient to realign transformer T8, a 10-μμf capacitor may be added between terminal 1 and terminal 2 of T8. Addition of the 10-μμf capacitor will compensate for the disturbance of the alignment of the ratio detector transformer, T8, caused by the removal of C116.

●

Bendix 235M1, 235B1

These models appear on *pages 2-1 through 2-18 of Rider's TV Manual Volume 2.* The following corrections should be noted on the schematic diagram. The primary of T3 should be labelled as coil L28. The lead from pin 6 of tube V10 should connect to the junction of R37 and R35, instead of to the r-f bias string.

●

Bud TAB-81-G

This model is the same as Model TAB-98-A, appearing on *page 2-2 of Rider's TV Manual Volume 2,* except that the 50-μμf capacitor connected from the 20-μf capacitor to ground has been removed.

●

General Electric 810, 814

Model 810 appears on *pages 2-22 through 2-43 of Rider's TV Manual Volume 2* and Model 814 on *pages 2-44 through 2-57, 58* of the same Volume. The switch wafers used to make up the channel selector switch, S1, are available for replacement and should be added to the parts list:

RSC-001 Front wafer, RSC-002 Center wafer, RSC-003 Rear wafer.
The front wafer is located nearest the chassis front apron.

●

General Electric 814

This model appears in *Rider's TV Manual Volume 2 on pages 2-44 through 2-57, 58.* In step 1 of video i-f alignment, under signal-generator frequency, 26.4 should be changed to 26.3 Mc, and in step 2, 22.8 Mc should be changed to 22.9 Mc.

Under sound i-f alignment in alignment suggestions, the L5 audio i-f coil has been changed to a transformer T21 on which the primary and secondary are both adjusted.

The oscilloscope should be connected to the junction of L16 and C27 to get the response curves of Figure 11 instead of as shown.

●

Rembrandt 1950

This model appears on *pages 2-1, 2, 3 through 2-4, 5, 6 of Rider's TV Manual Volume 2.* The damper tube VT 23, should be listed as a 6W4. This also applies to Model 721, 1606 and 1606-15.

Hallicrafters T-54 and 505

These models appear on *pages 1-1 through 1-29,30 of Rider's TV Manual Volume 1,* and *pages C2-2, through C2-3 of Rider's TV Manual Volume 2.* If insufficient height is encountered, the following operation is suggested: Check the value of R78, 1.5-megohm, ½-watt resistor. If the value of R78 has increased, replace it with two 680,000-ohm, ½-watt resistors in series. The resistors are small and need no tie point at the junction if they are wired together close to the resistor bodies.

●

Hallicrafters T-67

This model appears on *pages 2-1 through 2-15 of Rider's TV Manual Volume 2.* If horizontal instability is encountered, it is suggested that the horizontal oscillator plate load, resistor R83, 5,600-ohm, ½-watt, Part. No. RC20AE562K, be changed to a 1-watt unit of the same value, Part No. RC30AE562K.

●

DuMont RA-105

This model appears on *pages 2-5 through 2-56 of Rider's TV Manual Volume 2.* The wattage rating of the horizontal drive control R405 in the flyback power supply has been changed from ¼ w. to 2 w. This new part is described as follows:

R405, 01018500, 25,000 ohms, 2 w., ± 20%.

National NC-TV-7

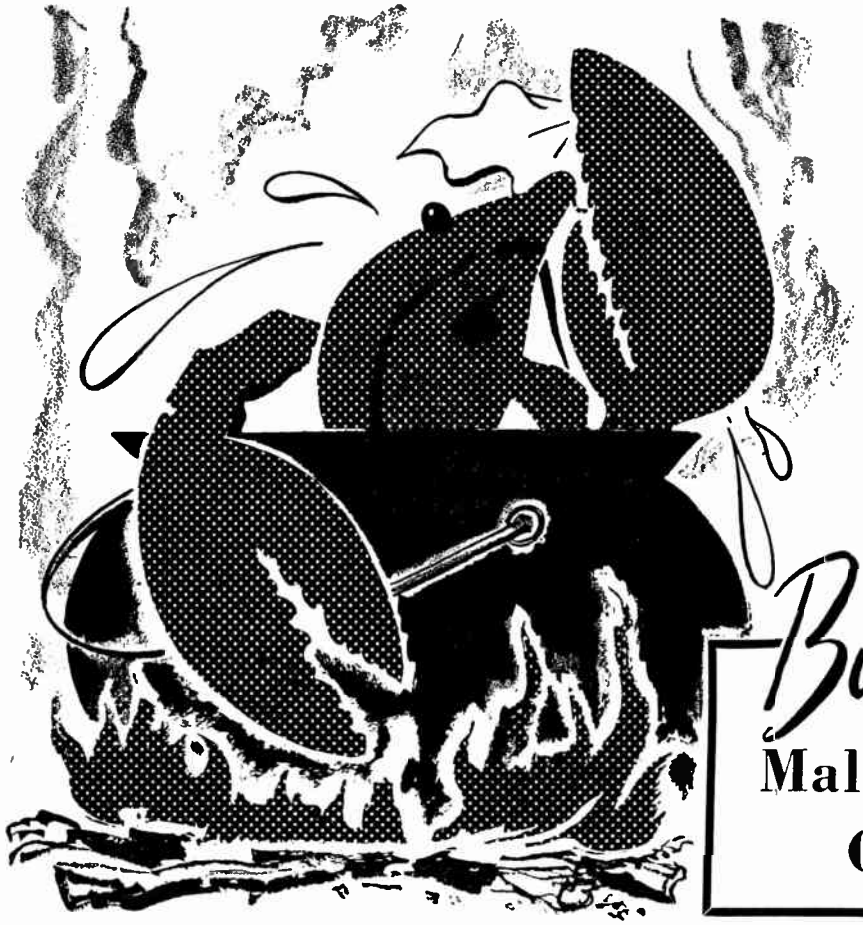
This model appears on *pages 2-1 through 2-28 of Rider's TV Manual Volume 2.* In the NC-TV-7 receivers, Series 249, the current surge, that occurs when the receiver is first turned on, sometimes blows the 2-ampere fuse. It is suggested that a 3-ampere fuse be used.

●

Farnsworth 504P16, Ch. U-12

This model is similar to the U-12A Capehart that appears on *pages 2-1 through 2-9, 10 of Rider's TV Manual Volume 2.* The vertical output tube has been changed from 6K6-GT to 6V6-GT. The 1,800-ohm resistor in the cathode circuit of the vertical output stage has been shunted by a 4,700-ohm resistor.

●



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JOHN F. RIDER, Editor

CURTAIN TIME

TV

About 82 stations are now in operation. The number is growing and that 100 number which seemed so distant a year ago is fast approaching. We understand that a well-known electronics engineer by the name of Dana Griffin has presented the FCC with an entirely new plan for the allocation of channels in the uhf band. The idea is to minimize interference. Good luck, Dana! We have seen an example of microwave relaying of TV pictures which were picked up on a receiver, then scanned by a TV camera and retransmitted to a local TV station — there reradiated for local consumption. It wasn't bad at all.

TV Antennas

The RMA has appointed a committee (now functioning) whose job it will be to set standards of measurements which will set the basis of antenna performance claims to be used in advertising. As we understand it, when these standards exist, TV antenna manufacturers will be in a position to state that their antennas have such and such performance capabilities, measured according to the RMA requirements. A swell idea.

While on the subject of antennas, what is the status of noise generated by the antenna system as the result of the use of dissimilar metals — aluminum tubing, brass screws, and the like, and corrosion in salt air? Seems like a very good battery! We're leading up to the matter of *welding antenna connections and joints*, as a means of keeping the noise to a minimum. The difficulty of packing makes welding at the manufacturing plant a problem. This leads to the possibility of some sort of portable welding equipment which can be used after an antenna has been assembled for erection. Any ideas on the subject?

Help for the TV Serviceman

We recently witnessed a preview of 22 shorts (1 minute and 20 seconds) intended to make the public understand their TV receiver sets better. These movies, to be put on the air for viewing on home TV receivers, should relieve the problems of nuisance calls received by many service organizations operating on contracts. When the services of a serviceman are indicated, the sound accompaniment suggests that he be called. The program is sponsored by RMA and it is indeed meritorious.

In The News

TV is used for teaching surgery at the University of Kansas Medical Center. Two operations were televised on September 21, and were viewed by the student body under conditions most conducive to mass appreciation. A recent article in the *N.Y. Herald Tribune* announced a new type of book called a "Dutch-book", consisting of two parts separated from each other. The top part contained the illustrations and the bottom part contained the text pages. Each could be handled separately, thus making for most convenient reading and correlation between text and illustration. We notified both the feature writer and the publisher of the book in question that our book *"The Meter at Work"*, published in 1940, employed just that type of construction. Do you recall it?

About Manufacturers' Changes

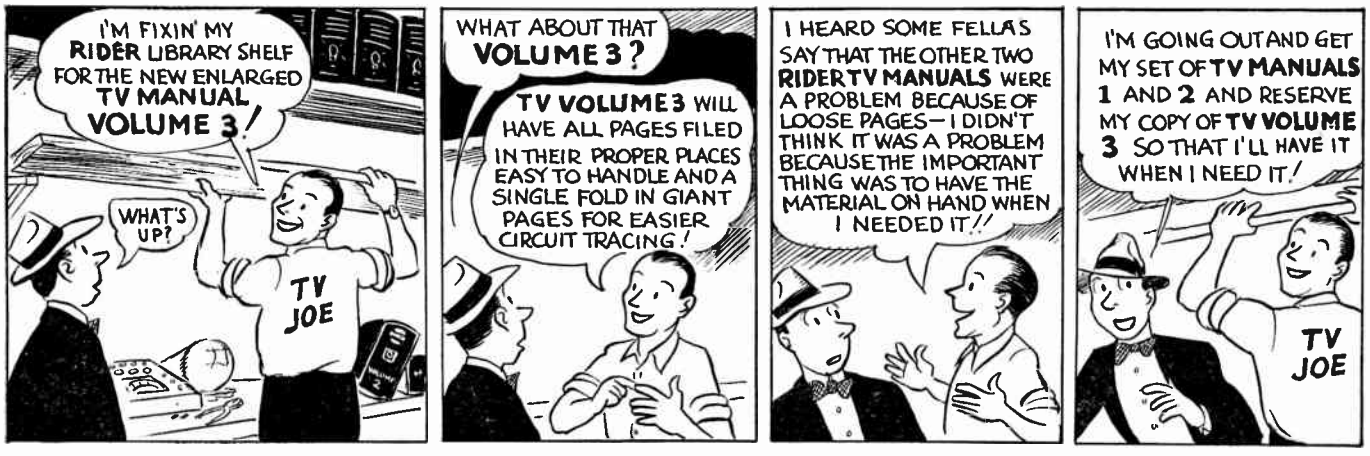
We try very hard not to back up changes with changes. Occasionally a slip is made, for after all, all of us are human. Really we are and we're trying continually to "get there fustest with the mostest". The size of SUCCESSFUL SERVICING is becoming a problem. We're running 16 pages per issue, with an exception here and there, but it looks like more pages per issue during 1950 in order to accomodate the technical material we have on hand and the manufacturers' changes. These are very important and they should be in your possession. That's why service data which originate in the receiver manufacturer's plant are the most authentic, and valuable to the servicing industry.

The Prices of Things

Wherever we've gone during the past two months, especially during the month of September, the story was the same—things are firming up. We're not speaking about Rider publications at the moment—rather about other items of all kinds. People have been expecting reductions in prices. Some have taken place, but it does not look like a continuation of falling prices; the reverse seems to be in the offing, despite the cut-price sales of TV receivers. If you're holding off

(Please turn to page 10)

TV JOE — ON THE BEAM



Radio Changes

Magnavox CR-202 Series

These models appear on *pages 18-16 through 18-25,26 of Rider's Manual Volume XVIII.* Two resistors, R143 and R144, have been added to Ch. CR-202C. R143 is connected between C41 and the junction of R118 and C64. R144 is located between the junction of R142, R113, and C40, and the rotary band switch 153.

The parts list should be amended to include the following:

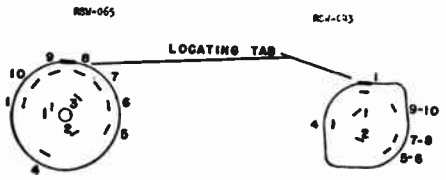
Ref. No.	CR-202A	Part No.
34	Capacitor, mica 510 $\mu\mu$f, $\pm$ 5%	250159G64
40	Capacitor, mica 300 $\mu\mu$f, $\pm$ 10%	250159G88
41	Capacitor, mica, 510 $\mu\mu$f, $\pm$ 5%	250159G64
113	Resistor, comp, 82,000 ohms, ½ w, $\pm$10%	230084G85
124	Resistor, comp, 220,000 ohms, ½ w, $\pm$10%	230084G27
142	Omitted	
143	Omitted	
144	Omitted	
	CR-202B	
142	Resistor, comp, 3.3 megohm, ½ w	230084G34
	CR-202C	
40	Capacitor, mica, 0.002 μf, $\pm$10%	250160G68
41	Capacitor, mica, 0.0015 μf, $\pm$10%	250160G66
124	Resistor, comp, 470,000 ohms, ½ w	230084G94
143	Resistor, comp, 33,000 ohms, ½w, $\pm$10%	230084G80
144	Resistor, comp, 150,000 ohms, ½w	230084G26
	CR-202D	
124	Resistor, comp, 470,000 ohms, ½ w	230084G94

●

General Electric 118, 119M, 119W

These models appear on *pages 19-8 through 19-10 of Rider's Manual Volume XIX.* The phono radio switch S1, catalogue number RSW-043 has been changed to RSW-065 and the new switch is wired as follows:

Connect terminals 1 and 3 together. Connect terminals 5 and 6 together. Connect terminals 7 and 8 together and then connect terminals 9 and 10 together. The leads may then be transferred from the old switch to the corresponding terminals on the new switch RSW-065, as shown in the accompanying diagram.



General Electric 118, 119.

●

Ketay RP570T

This model appears in the *Miscellaneous section, page 15-8 of Rider's Manual Volume XV.* This model is listed in the Indexes as RP507T. It should read RP570T.

General Electric 150

This model appears in *Rider's Manual Volume XIX on pages 19-10 through 19-12.* For chassis numbers up to 55,000 the capacitors C10, 100 $\mu\mu$f, and C12, 0.005 μf, were not connected according to the schematic diagram. Their B- connections were made to the left side of the switch S1B, together with the capacitors C2A and C2B. This was done to prevent a howling sound when the power switch S1 is turned off.

For chassis numbers from 60,000 to 70,000 the capacitors C10 and C12 were wired according to the schematic diagram. However, the wiring of the capacitors C2A and C2B has been changed. It was found that, under certain circumstances, these capacitors added their charge to the peak of the line voltage, causing a current surge which was capable of damaging any tube. Therefore, the negative sides of the two capacitors (C2A and C2B) were connected to the right side of the switch S1B (B- line) and the positive side of C2B was connected to the terminal of the S2A switch which is connected to the B+ line of the receiver. Now the charge can leak off after the set is disconnected from the power supply.

●

74 MANUFACTURERS IN RIDER'S TV MANUAL VOLUME 3

●

Westinghouse H-210, H-211

These models appear on *pages 19-33 through 19-35 of Rider's Manual Volume XIX.* In later production models, the resistance of the 12BA6 i-f amplifier cathode resistor, R3, was changed to 668 ohms. The part number of the new resistor is RC20AD680J. In addition, the resistor, R12, in the lead from pin 5 of the 35W4 was deleted from the circuit, and a direct connection was made in lieu of the resistor.

The tuning shafts used in later production have a wider groove for the dial cord. With these shafts, there are 3¼ turns of dial cord around the shaft rather than 2¼ turns as indicated on the dial-drive drawing.

●

Stewart-Warner A41T1, Code 9023-A

This is the same as Model A41T1 appearing on *pages 17-1 through 17-3 of Rider's Manual Volume XVII,* except for the following change. Resistor 40, formerly 270 ohms, has been changed to 560 ohms to minimize "B" supply drain. Chassis which incorporate this change have a letter "S" stamped on the rear surface. The new resistor is described as follows:

502127 Resistor—carbon—560 ohms, ¼ w.

Transvision Service Hints

In some cases where difficulty is encountered in obtaining sufficient right-hand leg length (flat pattern on right side), the addition of a 0.1 capacitor in parallel with capacitor VV which is also a 0.1 should produce an improvement. Capacitor VV goes from pin 3 of X4 to pin 2 of X6.

When changing a 7EP4 socket to a 7JP4, note the extra thin orange lead coming from the latter socket. This is merely connected to the yellow filament lead in the set which is lug #1 of terminal strip Z. On the 7EP4 socket, this connection was made internally in the socket.

●

Bendix 69 Series

This model appears on *pages 19-1 through 19-8 of Rider's Manual Volume XIX.* The location of trimmer C3c on gang capacitor in Figure 8, Trimmer Location Diagram, should be on terminal 4, rather than terminal 3.

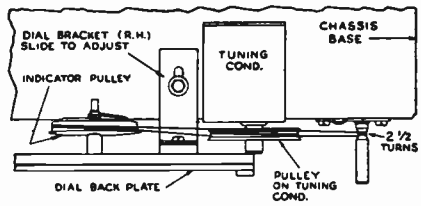
●

RCA 75ZU, Ch. RC-1063A

This model appears on *pages 19-45 and 19-46 of Rider's Manual Volume XIX.* A groove approximately 1/16 inch deep by ⅛ inch wide is now included on the outer rim of the bakelite station selector indicator pulley, Stock No. 73060.

If trouble is encountered with the drive cord coming off this pulley, either of the following corrections may be applied:

(a) Position the pulley in relation to the gang drum by the adjustment provided on the long support bracket for the dial back plate assembly so that the drive cord occupies the position indicated in the accompanying illustration.



Dial Drive Cord of RCA 75ZU.

(b) Replace the pulley with one incorporating the groove indicated above.

The service data for the 50-cycle version of Radiola 75ZU will apply to this instrument except:

RP-178 record changer only is used.

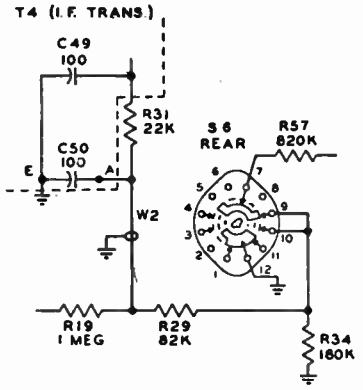
A conversion spring (Stock No. 73158) is added to the motor spindle shaft for 50-cycle operation.

A decal ("RCA Victor" Stock No. 71984) is added to the front of the cabinet.

These changes apply to the RC-1063B also.

RCA 8V151, Ch. RK-121C

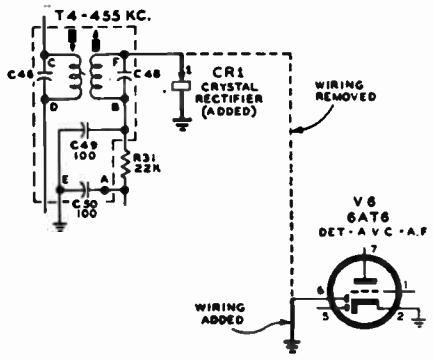
This model appears on *pages 18-25 through 18-40 of Rider's Manual Volume XVIII.* In the diode load circuit, R29 (270,000) should be deleted—R20 (82,000) and R34 (180,000) should be added, as shown in the accompanying diagram.



Diode Load Circuit for RK-121C.

The wiring diagram is incorrect in the wiring of the range switch. The illustration below shows the changes which should be made.

Late production models of Chassis No. RK-121C use a crystal rectifier for a-m detection instead of the diode plate (pin 6 of V8) of 6AT6 as shown.



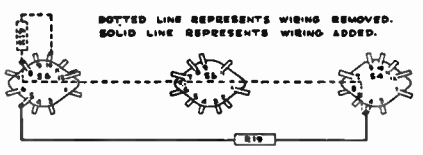
Crystal Rectifier for RK-121C.

Service Caution: (1) Maintain a minimum lead length of ¾ inch on the crystal leads. Excess heat from a soldering iron will damage the crystal, (2) the normal voltage existing in this circuit should never be exceeded when testing or trouble shooting, and (3) maintain polarity of crystal.

The following change has been made in the parts list.

Add:

54374 Rectifier—crystal rectifier (CR1)



Change in Wiring of RCA 8V151.

RCA 8R71 to 8R76, Ch. RC-1060, RC-1060A; 9W101, 9W103, Ch. RC-618B

Models 8R71 to 8R76 appear on *pages 19-10 through 19-15 of Rider's Manual Volume XIX* and Models 9W101 and 9W103 appear on *pages 19-35 through 19-44* of the same Volume.

Some ceramic capacitors C11 (5 $\mu\mu$f) have been used which have a color code of black-green-black. The capacitor is correct, but the color code is incorrect. The normal color code of this capacitor is green-black-white.

●

Sears 8011, Ch. 132.840

This model is the same as Model 8010, Ch. 132.840, appearing on *page 19-26 of Rider's Manual Volume XIX*, except for the following changes. Model 8010 has a brown cabinet and knobs, while Model 8011 has an ivory cabinet and knobs. Parts which are different from the 8010 are as follows: N21092-1 Cabinet less front trim assembly N21204-3 Knob, control, volume and tuning.

●

United Motors 982421

This model appears on *pages 19-44 through 19-49 of Rider's Manual Volume XIX*. The following service parts have been changed after serial #1-38500.

Illus. No.	*Production Part No.*	*Service Part No.*	*Description*
6	1219508	1219508	1st i-f coil assy.
7	1219509	1219509	2nd i-f coil assy.
25	7240724	M908	Electrolytic
25A			20 μf, 25 v.
25B			20 μf, 400 v.
25C			20 μf, 400 v.
28	7237836	E202	0.002 μf, 600 v. tubular
48	1213217	A101	100 ohms, ½ w.
	1218107	5233	6SR7
	1213793	5241	6V6GT
	7237751	5229	6SK7
	7237752	5222	6SA7

●

Correction

In the change notice that appeared in the January issue of SUCCESSFUL SERVICING for Hallicrafters T-54 and 505 picture synchronization, C71 should read C29, C72 should read C28, C73 should read C20, and C74 should read C21.

●

RCA 66BX, Ch. RC-1040, RC-1040A, RC-1040B; 8BX5, 8BX54, 8BX55, Ch. RC-1059, RC-1059A; 8BX65, Ch. RC-1040C, RC-1040D; 9BX5, Ch. RC-1059B

Model 66BX appears on *pages 15-87 through 15-88 of Rider's Manual Volume XV* and on *page C17-7 of Rider's Manual Volume XVII.* Models 8BX5, 8BX54, and 8BX55 appear on *pages 19-5 through 19-9 of Rider's Manual Volume XIX.* Models 8BX6 and 8BX65 appear on *pages 18-11 through 18-14 of Rider's Manual Volume XVIII.*

The line-battery switch used in these receivers is of the "slide" type. The actual switch does not have numbered terminals, although the schematic diagrams have numbers indicated. The numbers on the schematic diagrams do not indicate the actual sequence of the terminals on the switch. The accompanying illustrations show the actual sequence of the switch terminals and the corresponding numbers which appear on the schematic diagrams. Figure 1 is the diagram for the 8BX5,

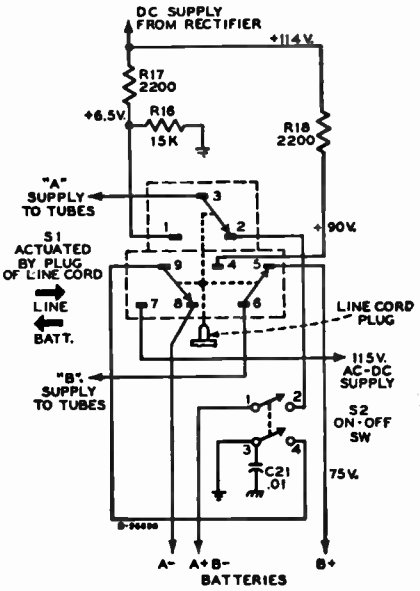


Fig. 1. Line-battery switch for RCA 8BX5.

first production, Ch. RC-1059. Figure 2 applies to models 8BX5, 8BX54, 8BX55, second production, Ch. RC-1059A; 9BX5, first production, Ch. RC-1059B; 9BX5, second production, Ch. RC-1059C. For models 8BX6 and 66BX, the circuit is as shown in Figure 2, except for different resistor numbers and values.

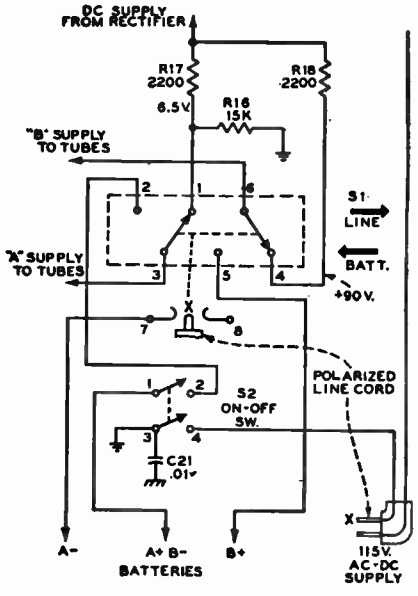
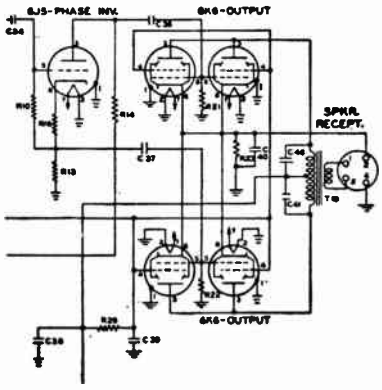


Fig. 2. Line-battery switch for RCA 8BX5, 8BX54, 8BX55, 9BX5, 8BX6, and 66BX.

Hoffman C501 and C511, Chassis 108

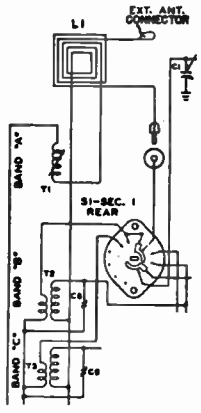
These models are the same as Model A501, Ch. 108S, appearing on *pages 15-6 through 15-10 of Rider's Manual Volume XV*, except that four 6K6 beam-power tubes are used in push-pull parallel in the output stage instead of the two push-pull 6V6's. The change is indicated in the accompanying diagrams. The alignment is still the same as given on *page 15-9*.



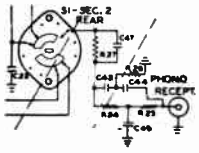
6K6 tubes for Hoffman C501 and C511.

The parts list should be changed to read as follows:

Symbol	Description	Hoffman Number
C47, C23, C24, C25	100$\mu\mu$f, $\pm$ 20%, mica	4000
C28, C32	0.005μf, 600 volt, tubular paper	4102
C29, C30	10μf, 450 volt, tubular electrolytic	4203
C31, C33, C34	0.01μf, 400 volt, tubular paper	4112
C41, C46	0.001μf, 600 volt, tubular paper	4104
C43	0.01μf, 600 volt, tubular	4103
C42, C44	330$\mu\mu$f, $\pm$ 10%, mica or ceramic	4010
C45	650$\mu\mu$f, $\pm$ 10%, mica or ceramic	4011
L1	Loop antenna	55210
LS	12" speaker, electrodynamic	9044
R2, R17	22,000 ohm, $\pm$ 20%, ½ w	4501
R3, R27	2.2 megohm, $\pm$ 20%, ½ w	4502
R4	10,000 ohm, $\pm$ 10%, 2 w	4503
R11	4,700 ohm, $\pm$ 20%, ½ w	4543
R12, R18	47,000 ohm, $\pm$ 20%, ½ w	4504
R23	500 ohm, $\pm$ 20%, 3 w	4550
R28	1,500 ohm, $\pm$ 5%, 6 ½ w	4701
R13, R14, R24, R25	47,000 ohm, $\pm$ 5%, ½ w	4537
R26	22,000 ohm, $\pm$ 5%, ½ w	4538
T10	Output transformer	5108



Antenna connection changes for Hoffman C501 and C511.



Circuit changes for Hoffman C501 and C511.

•

Westinghouse H-183, H-183A

These models appear on *pages 19-15 through 19-17 of Rider's Manual Volume XIX*. An error exists in the schematic diagram. The value of R9 in the converter circuit should be 3,300 ohms instead of 300 ohms.

The position of C20 in the circuit has been changed. On some chassis this capacitor was connected across the primary of the output transformer as shown on the schematic diagram. In later production, the capacitor is connected from the plates to the cathodes of the parallel 25L6GT output tubes.

Valco Mfg. Co.

This company was formerly National Dobro Corp. The name was changed to Valco in 1942. The manufacturer suggests that any public address equipment which cannot be located in *Rider's PA Manual Volume 1* under one name be looked up under the other.

Curtain Time

(*Continued from page 5*)

buying test equipment, parts, books, and the like—waiting for reduced prices—you may be unpleasantly surprised. Perhaps prices will not rise much—but it does not look as if they will fall. The index of business is on the way up. The inventories which were responsible for certain declines have been exhausted. We understand that, even in TV receivers, the output of some manufacturers is sold far into January, 1950, with allocations to jobbers.

TV Contracts and Insurance Departments

It seems that the bone of contention concerning TV service contracts being insurance policies, is the replacement of parts. As we understand it, a contract which covers free replacement of parts is construed as an insurance policy. Isn't it strange that the part of a TV set which gave the most mental concern at the outset gave the least concern actually? We're talking about the picture tube. Everybody was worried about the failure of that part of the TV receiver—by and large, it gave very little trouble. Looks like the know-how of cathode-ray-tube manufacturing, gained during the war years, did a lot of good.

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If you are running a small business—you need *The Business Helper* advertised elsewhere in this issue. Take our word for it, it's worth every penny of the two bucks. Bringing just one of the very many ideas contained in this book to fruition will repay you a hundred-fold. The man who wrote that book can prove everything he says.

HIWYNI

Some TV service shops are operating without TV sweep generators. In the face of that condition, we say it can't be done. Stop kidding yourself! You can't run a profitable business without equipment. Equipment is a capital investment of the most important kind. Time is money. Lack of suitable equipment wastes time—therefore, money. That goes for marker signal sources, vacuum-tube voltmeters, and Rider Manuals, too. Every model of a TV receiver contains special features—special instructions developed by the TV receiver manufacturer. Let him tell you how. These are shown in Rider's TV Manuals. HIWYNI. Have It When You Need It. This goes for equipment and service data. You need them both!!

JOHN F. RIDER

•

Cover

An electrician makes final adjustments on the uppermost "bat-wing" of the television antenna which tops WOR-TV's 760-foot tower in North Bergen, N. J. The transmitter, which beams out WOR-TV's television programs on Channel 9, is situated on the Palisades overlooking Manhattan.

Crosley 9-407, 9-407M, 9-407M1, 9-407M2

These models appear on *pages 2-1 through 2-22, 23 of Rider's TV Manual Volume 2*. A Comparison Parts List and a Picture Tube Interchangeability Chart are given below. All other information and parts are identical for each model. This also applies to Model 9-407M3.

PICTURE TUBE INTERCHANGEABILITY CHART
Models 9-407, 9-407M, 9-407M1, 9-907M2, 9-407M3

PROCEDURE	From 9-407,407M (12JP4) TO			From 9-407M1 (12LP4) TO			From 9-407M2 (12KP4) TO			From 9-407M3 (12QP4) TO		
	9-407M1 (12LP4)	9-407M2 (12KP4)	9-407M3 (12QP4)	9-407, 9-407M (12JP4)	9-407M2 (12KP4)	9-407M3 (12QP4)	9-407, 9-407M (12JP4)	9-407M1 (12LP4)	9-407M3 (12QP4)	9-407, 9-407M (12JP4)	9-407M1 (12LP4)	9-407M2 (12KP4)
Resistor (R324, Part No. 138201-6). Refer to Schematic Diagram	× (Add)	× (Add)		× (Remove)		× (Remove)	× (Remove)		× (Remove)		× (Add)	× (Add)
Resistor (R325, Part No. 39374-41). Refer to Schematic Diagram	× (Add)			× (Remove)	× (Remove)	× (Remove)		× (Add)			× (Add)	
Replace High Voltage Cable Clip with Connector (Part No. 138488)	×	×									×	×
Replace High Voltage Cable Connector with Clip (Part No. 160058)				×			×					
Adjust Bottom Tube Support and remove one cushion from center of support				×			×			×		
Adjust Bottom Tube Support and place one cushion (Part No. 160128-4) in center of support	×	×	×									
Early Production only—Replace the 10" rubber strip from bottom Tube Support with a 10" strip approximately 1/8" thick	×	×	×									
Replace the two screws that secure the Tube Clamp, with screws 1/4" longer	×	×	×									
Form a bulge approximately 3/4" deep in cabinet back directly in rear of tube socket, or replace Back with Back Assembly (Part No. 160504)	×							×			×	
Place Ion Trap (Part No. 144315) on neck of tube and adjust	×							×			×	
Place Ion Trap (Part No. 145592) on neck of tube and adjust			×			×			×			
Replace Mask with a Mask (Part No. 160473)	×	×	×									
Replace Mask with a Mask (Part No. 160050-2)				×			×			×		

COMPARISON PARTS LIST
Models 9-407, 9-407-M, 9-407M1, 9-407M2, 9-407M3

Symbol No.	Part No.	DESCRIPTION	9-407 (12JP4)	9-407M (12JP4)	9-407M1 (12LP4)	9-407M2 (12KP4)	9-407M3 (12QP4)
R-324	138201-6	Resistor, 1250 ohm, ±10%, 10 w., wire wound, Ceramic			×	×	
R-325	39374-41	Resistor, 22,000 ohm, ± 10%, 1/2 w.			×		
	160473	Mask, Picture Tube			×	×	×
	160050-2	Mask, Picture Tube	×	×			
	160177	Clamp, Picture Tube	×	×			
	160475	Clamp, Picture Tube			×	×	×
	160497	Support, Picture Tube (Bottom, 2 used)	×	×	×	×	×
	160172	Support, Picture Tube (Bottom, Early Production only)	×	×			
	160128-4	Cushion, 2 1/4" x 1 1/2" Rubber (used on 160497)	× (4 used)	× (4 used)	× (5 used)	× (5 used)	× (5 used)
	160128-3	Cushion, 27 1/2" x 3", Rubber (Picture Tube Clamp)	×	×	×	×	×
	160128-1	Cushion, 10" x 1 1/2", Rubber (used on 160172)	×	×			
	160058	Clip, High Voltage Cable	×	×			
	138488	Connector, High Voltage Cable			×	×	
	144315	Trap, Ion			×		
	145592	Trap, Ion					×
	160392	Back Panel and Cable Assembly	×	×		×	×
	160504	Back Panel and Cable Assembly			×		

Sawtooth Sweep Linearization

(*Continued from page 1*)

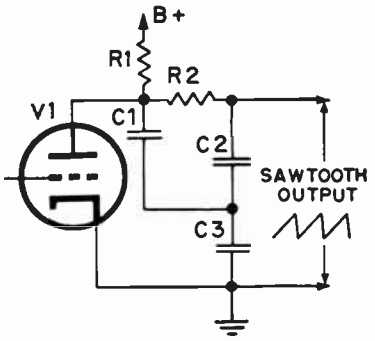

Fig. 2. New circuit for improving linearity.

½ megohm. Let us examine the operation of this circuit to see how it makes the sawtooth more linear.

Assume a starting point with all the capacitors charged up from the power supply. Capacitors *C1* and *C3* charge up through resistor *R1* and capacitor *C2* charges up through resistors *R1* and *R2*. When *V1* starts conducting, all the capacitors start to discharge through the tube. Capacitors *C1* and *C3* discharge very rapidly but *C2* discharges slowly because of the high value of *R2*. In other words, the time constant of discharge for capacitor *C2* is much higher than for the other capacitors. By the time *V1* becomes cut off *C1* and *C3* are almost completely discharged, whereas capacitor *C2* has only lost a small quantity of its charge. *C1* and *C3* start to charge up again from the B supply. The voltage across *C2* is, however, still very high so that it continues to discharge through *R2* because the voltage across *C1* is very low. As *C2* continues to discharge, its electrons pile up on *C1*. Thus *C1* is charging up from two sources — from the B supply and also from *C2*. As the voltage across *C1* increases and that across *C2* decreases, a point will be reached where the voltages across each will be equal and *C2* will stop discharging. Therefore, immediately after this period is reached, the voltage across *C1* will be greater than that across *C2* and the latter capacitor will start to charge again.

From the circuit of Figure 2, we see that the output signal is taken across capacitors *C2* and *C3*. The voltage wave across capacitor *C3* is the nonlinear sawtooth with an exponential rising characteristic. The voltage wave across *C2* is, however, much different. During part of the cycle of capacitor *C3* charge, capacitor *C2* is discharging. The amount of discharging that *C2* undergoes results in a somewhat semicircular or parabolic waveshape across *C2*. Thus, while the exponential voltage across *C3* is convex, that across *C2* is concave. The time constants of the circuits are so arranged that the resulting waveform of the addition of the voltages across *C2* and *C3* is a fairly linear sawtooth.

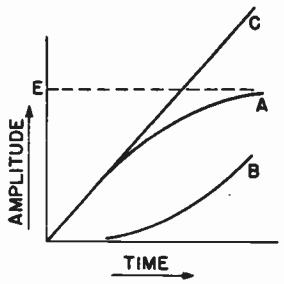

Fig. 3. A is the normal exponential charging curve, curve B represents the discharge of capacitor C2, and curve C is the combination of A and B.

The curves of Figure 3 fundamentally illustrate the operation of the circuit of Figure 2. In this graph, curve *A* is a normal exponential charging curve (where *E* is the maximum charging voltage) and, therefore, represents that of capacitor *C3*. Curve *B* represents the discharge of capacitor *C2*. The time of *C2* discharge is so arranged that when curves *A* and *B* are added together, they produce a linear rising resultant curve as indicated by curve *C* in the drawing.

The circuit of Figure 4 illustrates another very simple method of linearizing a sawtooth wave by the addition of a new time-constant network. Tube *V1* serves the same purpose as in the other circuits. Resistor *R2* and capacitor *C2* are the added components. Nothing else in the circuit is changed from the conventional type of Figure 1. This new circuit operates upon the same basic principles as that just discussed whereby the linear trace of the resulting sawtooth depends upon the charging of one capacitor and the discharging of another. The circuit operates as follows:

Let us assume a starting point with capacitors *C1* and *C2* fully charged up from the B supply, and the input signal biases the tube above cutoff thereby making it conduct. The moment that plate current begins to flow, *C1* and *C2* both start to discharge through the tube. Capacitor *C1* discharges very rapidly as compared to capacitor *C2* because resistor *R1* is included in the discharge path of

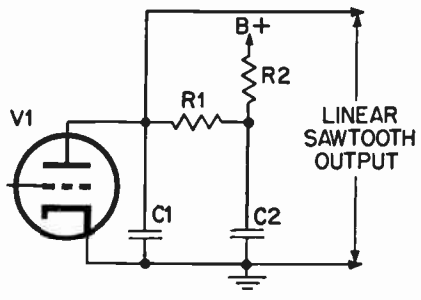

Fig. 4. Another method of linearizing a sawtooth wave by means of a new time-constant network.

(*Please turn to page 14*)

Sawtooth Sweep Linearization

(*Continued from page 12*)

C2. As a result of this, by the time the tube becomes nonconducting (i.e. cutoff), capacitor *C2* has only discharged a small portion of its voltage whereas capacitor *C1* is almost completely discharged. Once the tube becomes cut off, *C1* charges up again from the B supply through *R1* and *R2*. However, the voltage across *C2* is much greater than that across *C1*, so *C2* still continues to discharge, its discharging current piling up electrons on *C2* and, therefore, further charging this capacitor. A point will soon be reached where the voltage across *C1* and *C2* will be equal, *C2* will stop discharging and then begin charging through *R2* from the B supply. Thus both capacitors are again in a state of charge, and when the tube becomes conducting once more, the cycle of operation starts all over again.

With the output sawtooth signal, as you will note from Figure 4 taken across *only* capacitor *C1*, the reader may at first wonder how the operation of this circuit will linearize the sawtooth signal. The answer to this is easily explained if we carefully consider the two charging actions on *C1*. We said that *C1* charges up from the B supply and for a certain period of time also charged up as a result of the discharging of *C2* through *R1*. The charging of *C1* from the constant voltage B plus source is the normal rising exponential curve. The discharging voltage of *C2* is exponentially decreasing and part of this voltage is used to charge *C1*. Therefore, across *C1* we effectively have two charging voltages, that from the B supply having a convex shape and that from capacitor *C2* having a concave shape. The time constants of the circuit are so arranged that the superposition of these two curves produces a fairly linear sawtooth signal across *C1*, similar to that of Figure 3.

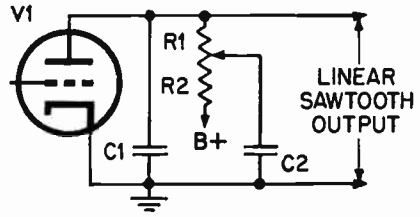

Fig. 5. Adjustment of the potentiometer regulates the time constants of the circuit and, is, therefore, called a linearity control.

The circuit of Figure 5 is a rearrangement of Figure 4. In this new circuit, resistors *R1* and *R2* are replaced by a potentiometer where the arm represents the junction point of these two resistors to which capacitor *C2* is connected. By the use of such a potentiometer, it is easy to adjust the time constants of the circuit for the best possible linear sawtooth signal. The potentiometer in a circuit such as this is known as a *linearity control.*

References:

"Television Time Base Linearization", by A. W. Keen, p. 195, *Electronic Engineering*, June, 1949.

"Linear Sawtooth Oscillators", *Wireless World*, p. 425, May 4, 1939.

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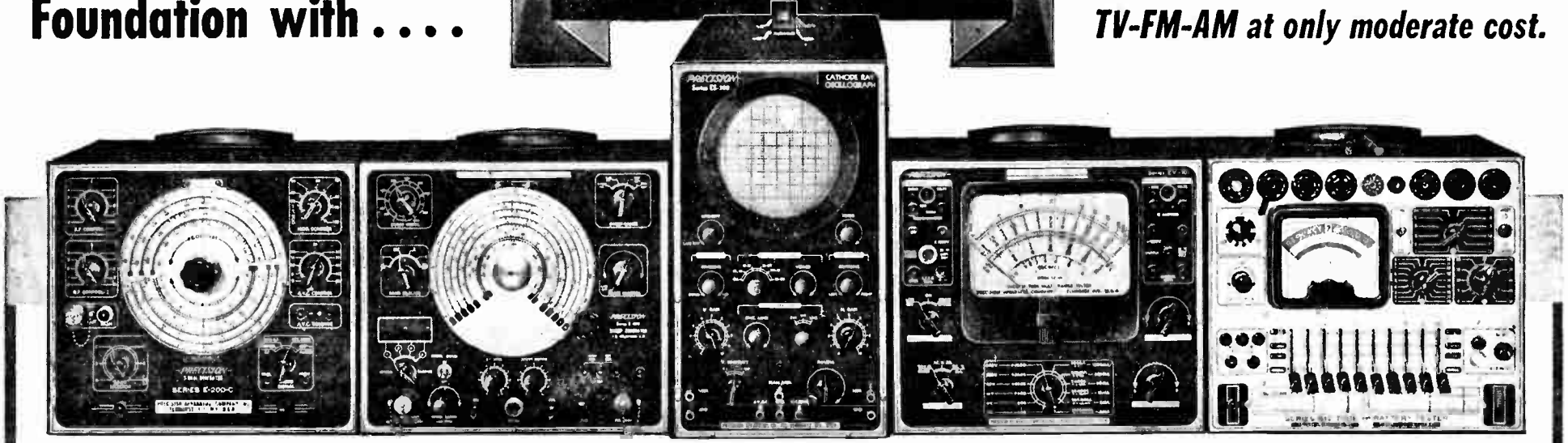

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Check-Up Month

Attention: All Servicemen. This is your month. October is Radio Check-up Month, sponsored by Associated Radio-Television Servicemen N. Y., Inc., Members of National Association Broadcasters, and National Electronic Distributors. What should you do about it? You should urge your customers to bring in their old sets to be fixed, or for a check-up (and of course you can use your Rider Radio and Television Manuals to get all of the information you will need). The idea is to drum up more trade than ever, to bring to your customer's attention that the hum or distortion that they considered insignificant can and should be eliminated. You can point out to them that you have the information, thanks to Rider's Manuals, and the equipment that you have kept in top-notch form, — you have the tools to satisfy their needs.

●

Rider Receives Honorary Membership

At a recent meeting of the Philadelphia Radio Service Men's Association, Inc., the proposal was made to award John F. Rider an Honorary Membership in that organization. The vote of approval was unanimous and Mr. David Krantz, president of PRSMA made the presentation.

●

Current Meetings

John F. Rider will be busy making speeches at service meetings again this month. The present schedule for the month of October covers Montreal, Canada, on the 19th, for the Town Meeting of Radio Technicians, sponsored by the Canadian Radio Industry; Fort Wayne on the 26th, for the meeting sponsored by Warren Radio Company and Pembleton Laboratories; Battle Creek on the 27th, and for the meeting sponsored by the Electronic Supply Corp. On November 3rd, he will be in Washington, D. C., for the Town Meeting of Radio Technicians, sponsored by the Radio Manufacturers Association. All of the talks will be related to good business management and different aspects of television.

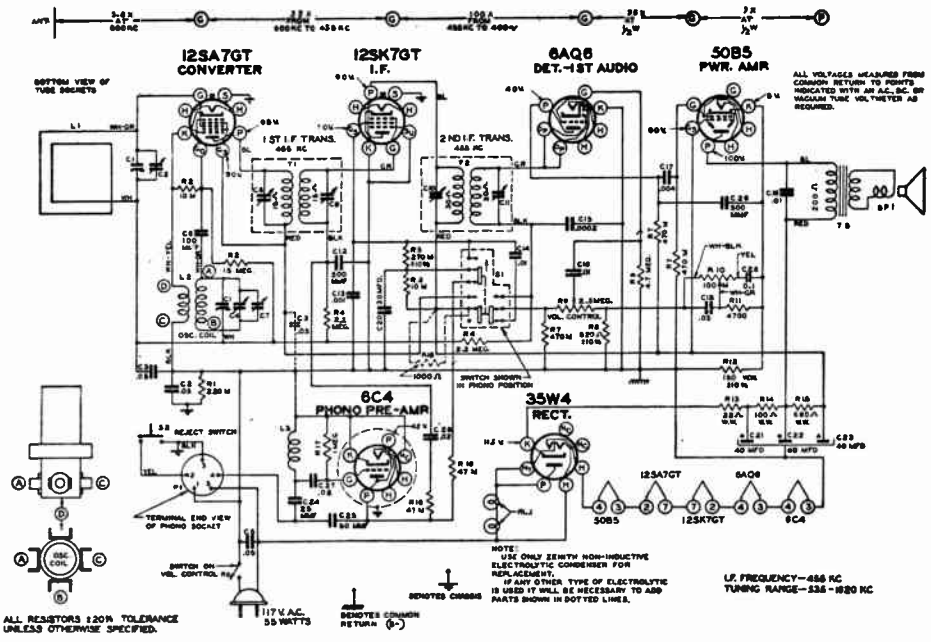
●

Zenith 6R886Z, Chassis 6E02Z

Model 6R886Z is the same as Model 6R886 which appears in *Rider's Manual Volume XVII, pages 17-16 and 17-17*, except that a tone control has been added, as illustrated in the accompanying diagram.

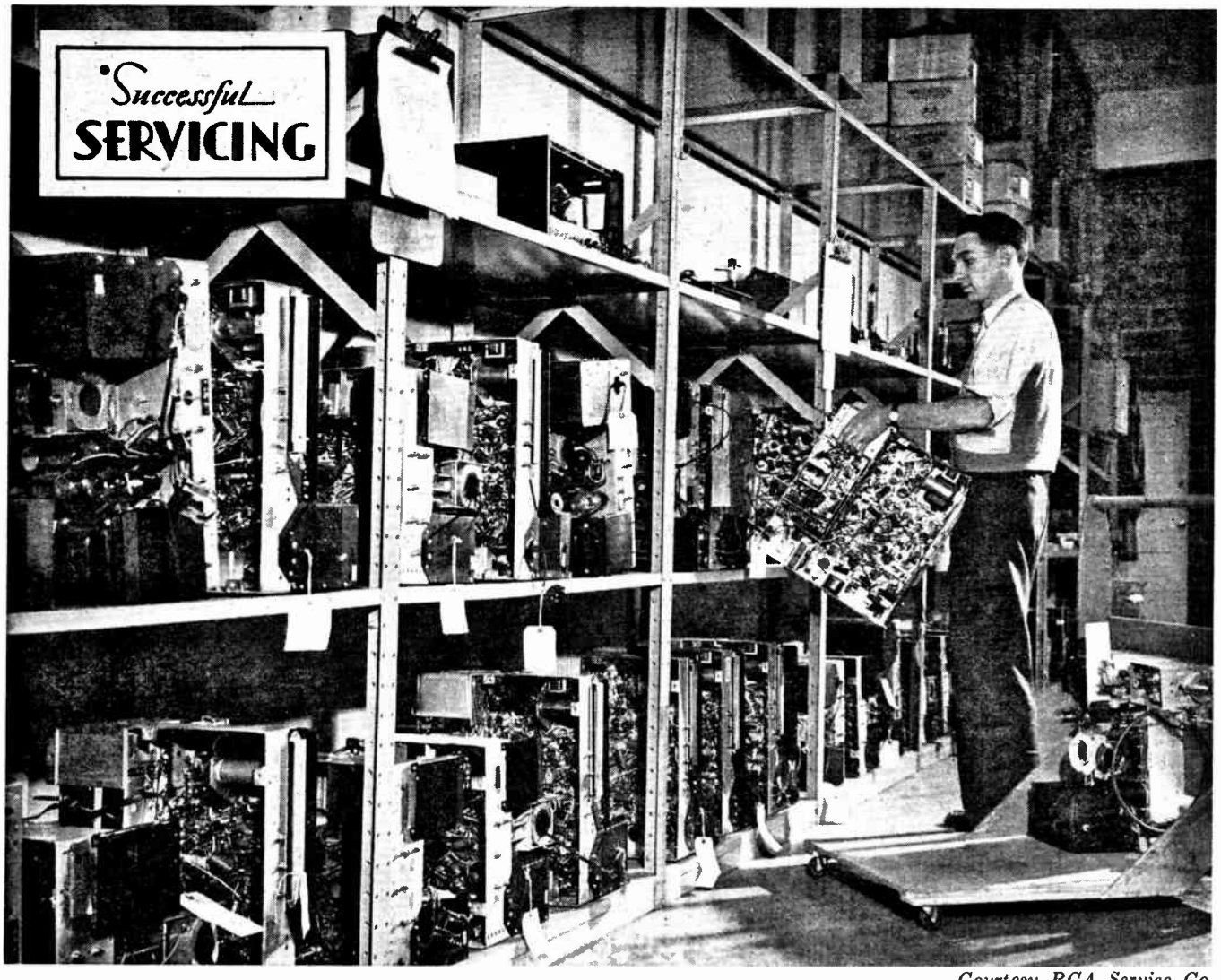
The following parts were added:

S-14667	Dial pointer and pulley assy.	63-1653	Tone control
S-14670	Tone control brkt. and lug assy.	78-793	Socket-octal tube
12-1490	Cover plate support	85-438	Phono-Radio switch
22-827	0.1 μf 200 v.	125-66	Rubber grommet
46-688	Tone control knob	166-41	Rubber bumper
57-1398	Escutcheon	188-34	Retaining ring.



Changes in the Zenith 6R886Z.

Distribution of This Issue—48,000 Copies



Courtesy RCA Service Co.

NOVEMBER, 1949

MATCHING A GENERATOR TO ITS LOAD

By ARNOLD B. BAILEY

(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 subject of the proper matching of an antenna to its transmission line, and in turn the matching of the line to its load presented by the receiver input circuit, is frequently a cause of confusion and misapprehension concerning the seriousness of possible mismatches.)

Nonresonant circuits, be they antennas or coils and capacitors have one common characteristic. The power which flows into them is reflected back again at an adverse part of the radio cycle. This adverse timing can be easily expressed in terms of the radio cycle. If the power is not reflected back to the point of application, the generator will deliver its maximum power and will inherently see a load circuit which looks like a resistance having a value in ohms equal to the number of unit volts required to produce one unit of current. This is the definition of resistance. Volts divided by amperes *is* the resistance in ohms, provided that we measure the voltage and current either at their peak value, or their rms value, and have a single sine-wave voltage generator as the source. When maximum power is delivered, we say the generator and its load are matched, indicating that one-half of the generated energy is usefully delivered to the load. *No more than one-half of generated power may be delivered to any load.* At this optimum condition, the generator resistance equals the load resistance. The power is smoothly transferred from generator to load, since no reflection of power takes place.

The next case of interest is when the load resistance does not equal the antenna resistance. For instance, the load resistance may be too small in value. If so, excess current is required to maintain power, since power is I^2R. If R is too small, I must increase, for the same amount of power. This cannot be supplied, but can be approached, since the generator must also carry this excess current; in trying to do so, more power will be used up by the generator resistance. A balance will be reached, when the generator takes some excess current, and thus uses up more than one-half of the total generated power, leaving less than one-half for the load.

If the load has too high a resistance value for the generator, it tends to share more than one-half of the generated voltage, but cannot pull sufficient current for normal power output. The result is that the generator again takes more than one-half of the total power, leaving less to the load.

In general then, for any given generator, the load must be so proportioned that it absorbs exactly one-half of the generated power. If it does not, the residual power is "reflected" back into the generator, and there is lost in the internal generator resistance.

Another way of looking at this same problem, is to realize that a generator can

(*Please turn to page 18*)

Television Changes

Farnsworth 651P, 661P

These models appear on *pages 2-11, 12 through 2-25 of Rider's TV Manual Volume 2.* Figures 1 and 2 show circuit changes that have been made. The focus circuit has been revised, and its position on the schematic has been changed as shown in these illustrations. In addition to these, the following changes should be noted:

The lead shown in Figure 1 from the 470,000-ohm resistor goes to the connection from the radio transformer to the input of the 1st i-f stage.

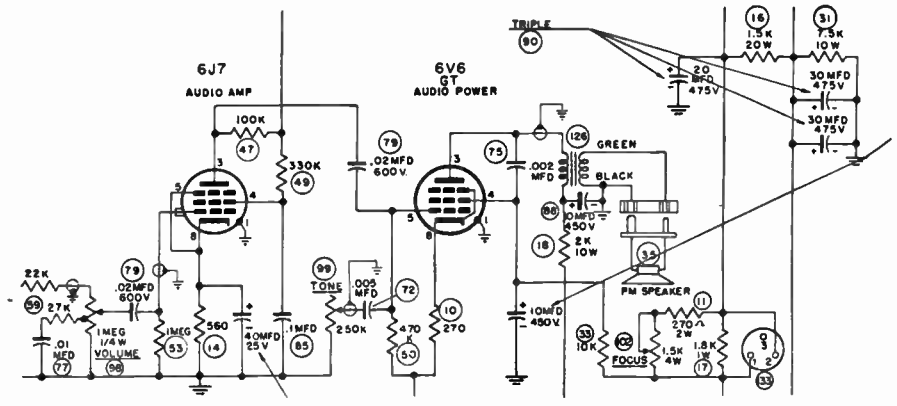


Fig. 1. Circuit changes for the Farnsworth 651P and 661P.

A 270-ohm resistor has been added between pin 8 and pin 2 of the adapter socket.

The 68-ohm resistor in the framing circuit has been deleted, and the value of the variable resistor in that circuit has been changed from 250,000 ohms, ¼ watt to 50,000 ohms, ¼ watt.

A 1,200-$\mu\mu$f capacitor, N2100, has been added in parallel to the one already shown in the horizontal AFC circuit.

The 100-ohm, 10-watt resistor in the 1st i-f stage has been changed to 130 ohms, 5 watts.

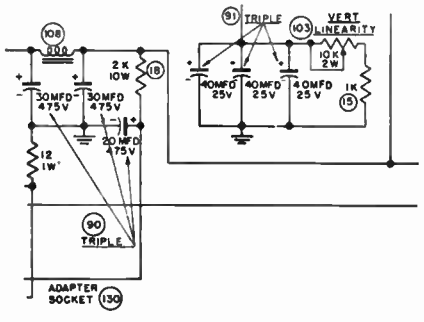


Fig. 2. Circuit changes for the Farnsworth 651P and 661P.

●

Tele-King 510, 712

Model 510 is the same as Model 410 which appears on *pages 3-1 through 3-8 of Rider's TV Manual Volume 3.* Model 712 is the same as Model 512 which appears on *pages 3-1 through 3-8 of the same Volume.*

General Electric 810

This model appears on *pages 2-22 through 2-43 of Rider's TV Manual Volume 2.* When replacing the speaker on Model 810 with speaker UOP-577, two speaker contact clips, RJC-002, should be soldered to the speaker to adapt this speaker to the speaker leads of this model.

In late production, the block oscillator coil, T16, was mounted below the chassis rather than on top of the chassis. This change materially reduced the amount of horizontal oscillator drift.

Allied Purchasing Ambassador Models 912, 712

These models are the same as Tele-King's Model 712 which appears on *pages 3-1 through 3-8 of Rider's TV Manual Volume 3.*

●

Belmont 10DX21

This model appears in *Rider's TV Manual Volume 2 on pages 2-1 through 2-10.* Modification kits are now available to reduce the tendency toward picture drift and improve picture resolution in low-signal areas. Modification Kit EF can be used only with 10DX21, 10DX24, and 10AXF43, Series A Chassis No-Code or Code B. Modification Kit F may be used with 10DX, 10DX22, and 10AXF43 Chassis, Series A, Code C or D, and with Series B, No Code. Code 51, 52, and 53 sets had this modification incorporated at the factory. Modification Kit G pertains to areas where only 25-cycle power lines are available. Since all B. R. C. 10DX Series Chassis television receivers were designed to operate on 50 to 60 cycles, this modification kit will enable operation on 25 cycles.

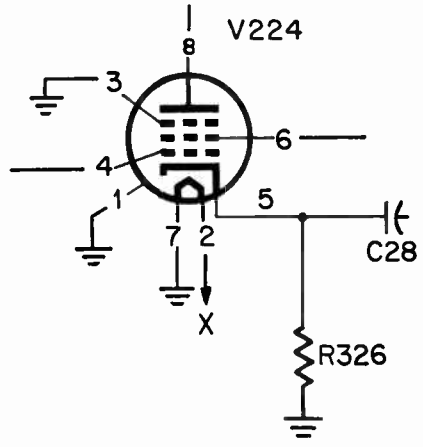
Allied Purchasing Ambassador Models 910, 410

These models are the same as Tele-King's Model 410 which appears on *pages 3-1 through 3-8 of Rider's TV Manual Volume 3.*

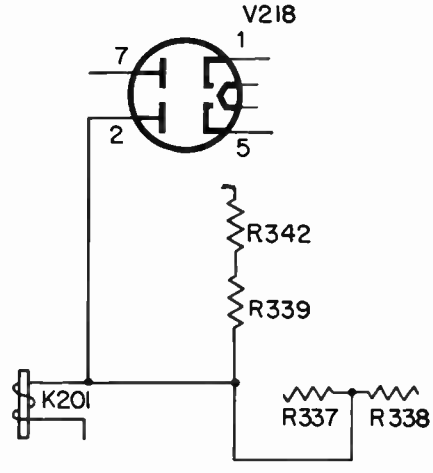
●

DuMont RA-105, RA-106

Model RA-105 appears on *pages 2-5 through 2-56 of Rider's TV Manual Volume 2;* Model RA-106 appears on *pages 2-57 through 2-58 of the same Volume.* Changes have been made to eliminate the horizontal displacement or "hook" in the top of the picture. The changes are shown in the accompanying diagrams. The list of



Circuit Changes for the DuMont RA105 and RA106.



Circuit Changes for the DuMont RA105 and RA106.

changes follows:

R327, 150 ohms, connected from R326 to ground, is deleted, and R326 is connected to ground.

C289, the 25-μf, 25-volt capacitor connected from the junction of V224-3 and R326 to ground, is deleted.

The connection from pin 2 of V218 to ground is removed.

Pin 2 of V218 is connected to the junction of K201, R339, R338, and R337.

Pin 3 of V224 is connected to pin 1 of V224.

R299 is disconnected from pin 2 of V218 and reconnected to pin 1 of V219, which is at ground potential.

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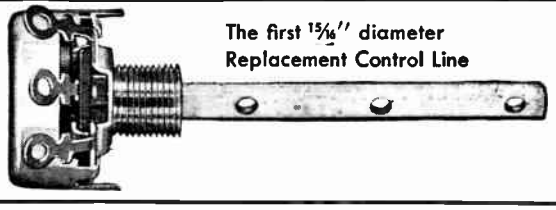

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Vol. 11 NOVEMBER, 1949 No. 1

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JOHN F. RIDER, Editor

CURTAIN TIME

American Town Meetings

We understand that the 7th Town Meeting for Radio Technicians, recently completed in Washington, D.C., is the last one contemplated in the United States. It is possible that they were expensive—that the RMA in the United States feels that it cannot afford a continuation of the series, and that those electronic parts distributors who were called upon to locally support each of the meetings also feel that the expense was not warranted. Although it is only one man's expression, backed however, by conversation with those in attendance, we feel that they should be continued. Perhaps they were somewhat late in starting, but having been started, they are a sufficiently important activity and should be continued on several counts.

First, it establishes close, cordial relations between the servicing industry and the jobbers and manufacturers; for the first group, the serviceman is its livelihood, for the second, the serviceman is its liason with the public. It is admitted that the set manufacturer could sell equipment to the public regardless of the feeling of the servicing industry, but it must also be recognized that the servicing industry can, by helping to create a satisfied public, make the business life of the set manufacturer much happier.

Second, the usefulness of these Town Meetings as the means of spreading technical information, business information, and other pertinent facts which help the service industry, and in the final analysis, the manufacturer too, is extremely important.

Third, it has always been recognized that the servicing industry as a whole was reluctant to devote its efforts to study, even though it felt the need for better and better technical background. These Town Meetings cannot help but serve as a means of creating interest in the study of technical methods, theory, business administration—all the details pertinent to the serviceman's business. The efforts carried on by individual manufacturers and others, through the medium of technical meetings, also bear fruit. Sometimes it is not immediately evident, but in the long run, these activities produce the desired effects.

Those who are actively engaged in the operations of Radio Town Meetings, experimenting with the different sessions, especially with the program material, learn a great deal. Some of the attendances were remarkably high, and indicated an ever-growing interest on the part of the servicing industry not only to participate in the effort, but also to take advantage of what it offers.

To say the least, these Meetings serve to show the servicing industry the many benefits which can be derived from a well-defined, well-planned technical program. Such thinking should be encouraged, and there is no doubt that there is no one better equipped to do that in this nation, than the RMA.

Canadian Meeting

On the 19th of October, I had the privilege of addressing the closing session of the Town Meeting of Radio Technicians in Montreal. This gathering, which lasted three days, was sponsored by the Canadian RMA, and the various jobber and dealer associations existing in Canada. The attendance of several hundred people for each of the three sessions, with approximately 400 and some odd on the closing night, is without question living testimony of the value of such a program for the dissemination of knowledge to the radio servicing industry of Canada.

The enthusiasm and thirst for information displayed by those in attendance was indeed most gratifying, and if I may be permitted to say so, it would be most advantageous for the radio industry of Canada, if such a program of Town Meetings were continued for a long time to come.

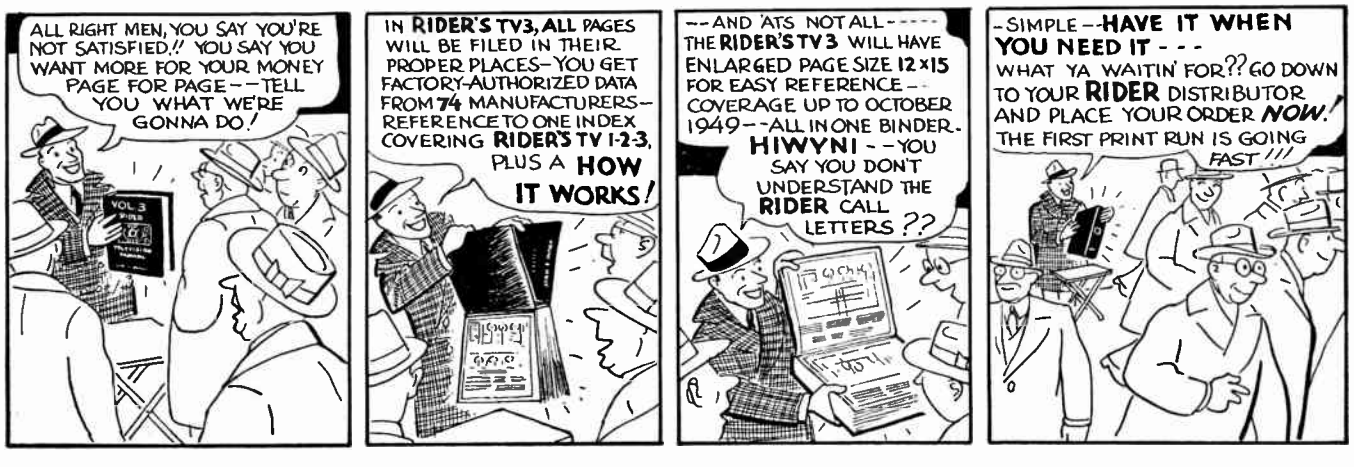
The scope of the Canadian radio industry, including the manufacturers, dealers, and servicemen, is not as expansive as in the States. This may be fortunate, because it tends to foster closer relationships between the segments of the industry.

Be that as it may, the fact remains that the servicemen of Canada, like the servicemen of the United States, are hungry and thirsty for knowledge. Such Town Meetings are mediums whereby, by cooperative effort, vital information can be spread far and wide among those who, in the final analysis, are the direct liason between the manufacturer and the public.

The problems of television, as encountered in the United States, will no doubt

(Please turn to page 20)

TV JOE—THE RIDER PITCHMAN



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Radio Service Dealer
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The Engineer
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The Iron Age
Vol. 163, Nos. 21, 22, May 26 and June 2, 1949

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Farnsworth GV260, 651P, 661P

Model GV260 appears on *pages 1-1 through 1-25, 26 of Rider's TV Manual Volume* 1. Models 651P and 661P appear on *pages 2-11, 12 through 2-25 of Rider's TV Manual Volume 2.* Sync. chassis as used in the 651P—661P physically appear to be identical to those of the GV260 receiver. There is, however, a difference in some component parts and in wiring, so that the two are not directly interchangeable. The procedure for converting a GV260 sync. chassis for use in the 651P and 661P receiver is given on *page 2-20 of Rider's TV Manual Volume 2.* While some of the sync. chassis were produced without code marking, it has been arranged to stamp "650" on those of recent production, to indicate the necessary wiring changes.

Comparing the two, by way of identification, the following is noted:

1. Pin 2 of the adapter plug is grounded in the GV260, but connects to pin 6 of the 6SN7 in the 651P. In the GV260 instrument, there are two shielded cables, while in the 651P—661P there are three cables in the sync. chassis connection.
2. The grid circuit of the input section of the 6SN7 has a resistor of 22,000 ohms in the GV260, 1 megohm in the 651P—661P. The input capacitor of the same circuit is 0.05 μf instead of 1,500 $\mu\mu$f.

●

DuMont RA-105, RA-106

Model RA-105 appears in *Rider's TV Manual Volume 2 on pages 2-5 through 2-56* and Model RA-106 appears on *pages 2-57 and 2-58 of the same Volume.* In the May issue of Successful Servicing, cable #50014180 was listed as having a ring of red paint on the male plug. The new method of identifying this cable is by using a red tracer through the entire length of the cord, thus making it much easier to identify. The part number remains the same.

Olympic 10-, 12 ½-, 16-inch Models

To improve linearity, increase vertical and horizontal deflection, and improve horizontal stability in all 10-, 12 ½-, and 16-inch models, the following changes are suggested:

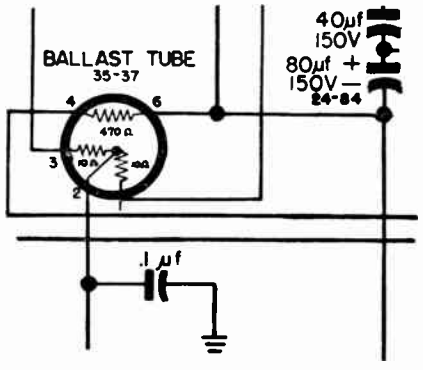
1. Change the red load of the vertical output transformer from B+ to +300 volts. This red lead may be removed from the lug on the electrolytic capacitor and placed on the opposite lug.
2. Change R88, 120,000 ohms, ½ watt, to 3,300 ohms, 1 watt. This is the resistor attached to the horizontal linearity coil.
3. Change R82, 120,000-ohm, 1-watt resistor, to 68,000 ohms, 1 watt. This resistor is located at terminal C of the horizontal oscillator coil.

These modifications were incorporated in all sets starting with production of October 22, 1949.

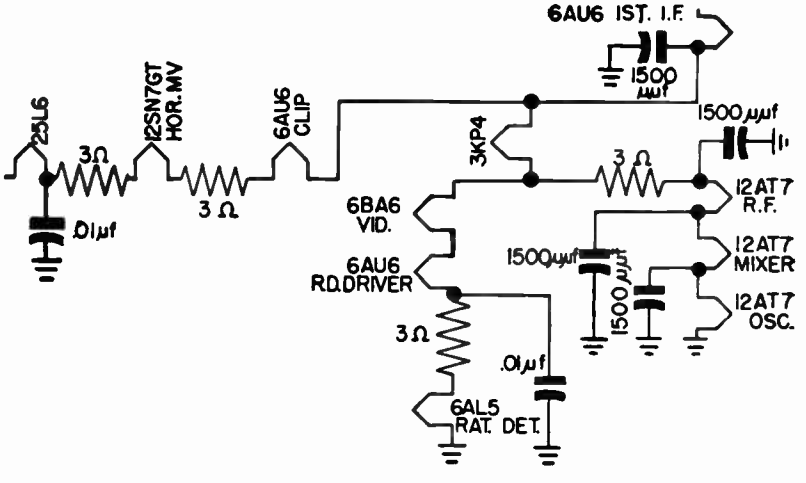
●

Pilot TV-37U

This is similar to Model TV-37 that appears on *pages 2-1, 2 through 2-13 of Rider's TV Manual Volume 2.* The following circuit changes have been made in the schematic diagram. The 100-$\mu\mu$f capacitor connected to the junction of S2 and C1 has been changed to a 250-$\mu\mu$f capacitor. The 180,000-ohm resistor connected to the grid of the 12SN7GT, vertical amplifier, has been changed to a 120,000-ohm resistor. The accompanying diagrams show the other circuit changes that have been made.



Circuit changes in the 35W4 negative rectifier tube circuit of the Pilot TV-37U.



Circuit changes for the Pilot TV-37U.

Magnavox CT218, CT221

These chassis are identical to CT214A and CT214B which appear on *pages 2-1 through 2-37, 38 of Rider's TV Manual Volume 2,* and on *page C3 of Rider's TV Manual Volume 3,* except for the r-f unit assembly.

Chassis CT218 is a 12-channel r-f unit, with coil-selection of channels, and incorporates the adjustment of coils in the upper channels by compression of the coils. The underside of the unit is enclosed by a metallic shield. The schematic for the CT218 r-f tuner is shown in Figure 1.

Chassis CT221 is a 12-channel r-f unit with continuous condenser-tuning between channels in either group. The schematic for the CT221 r-f tuner is shown in Figure 2.

CT218, CT221 A Chassis are a mechanical modification to the chassis, wherein a cutout is made behind the r-f tuner position, and a bracket inserted. This also applies to the CT214 C Chassis.

For reduction of possible hum that might be encountered in the CT218, CT221 B Chassis, the following modifications, shown in Figure 3, are incorporated:

(1) Remove the black wire joining the 20-μf, 50-volt section of capacitor C91, and 6V6, V9, cathode pin 8. This removes the 20-μf section of the capacitor which is not to be used.

(2) Add a 20-μf, 150-volt electrolytic capacitor from pin 8, the cathode of the 6V6, to chassis ground. Be sure to connect the positive terminal of the capacitor to ground as the cathode of the tube is at 85 volts potential.

(3) Remove yellow wires which tie together at the negative terminal of capacitor C91, and splice together, solder and tape. Connect this negative capacitor terminal to the chassis ground. Use the nearest ground lance opposite capacitor C91 as a ground point.

(4) Remove the grey wire from the 10-μf section of capacitor C91. Tie the 10-μf section of capacitor C91 to the 25-μf section of capacitor C91.

(5) Remove the jumper connection from the 10-μf section of capacitor C92 and the 30-μf section of the same capacitor. In the CT218 chassis the B-lead to the r-f unit will use the 10-μf section of capacitor C92 as a tie-in point. It will be necessary to remove this lead and connect it to the 30-μf section of this capacitor and then remove the jumper between the 10- and 30-μf sections.

(6) Tie the grey wire, referenced in step 4, to the 10-μf section of capacitor C92.

(7) Remove the red wire, pin 1 of the speaker cable, from one end of the 1,500-ohm, 2-watt resistor, R137, and connect this wire to the other end of this resistor. These modifications also apply to the CT214 D chassis.

Another change involves relocating a part to eliminate 60-cycle vertical synchronizing pulse interference. Unsolder one end of the resistor connected to the sync clipper V16B and wire it to the open lug, 2nd from end, on the terminal strip located between the vertical output transformer and the rear of the chassis. Then connect a jumper wire between the lug to which this resistor is connected and pin 1 of V16B.

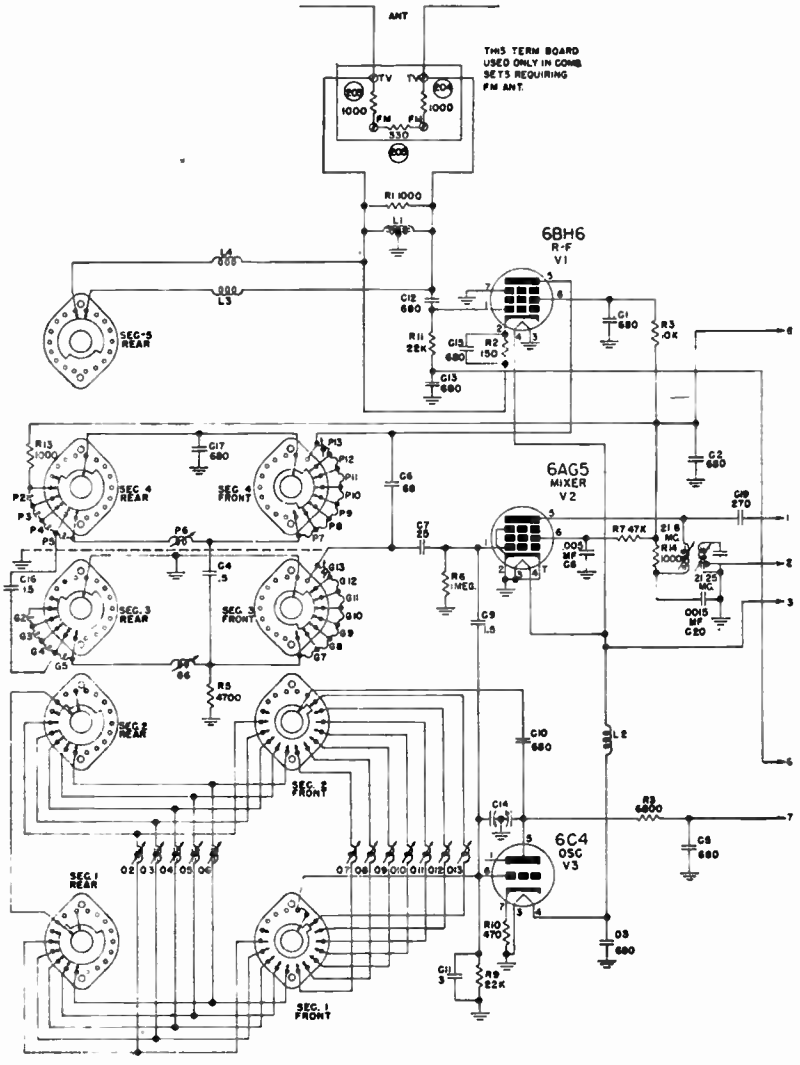


Fig. 1. R-f tuner for Magnavox CT218.

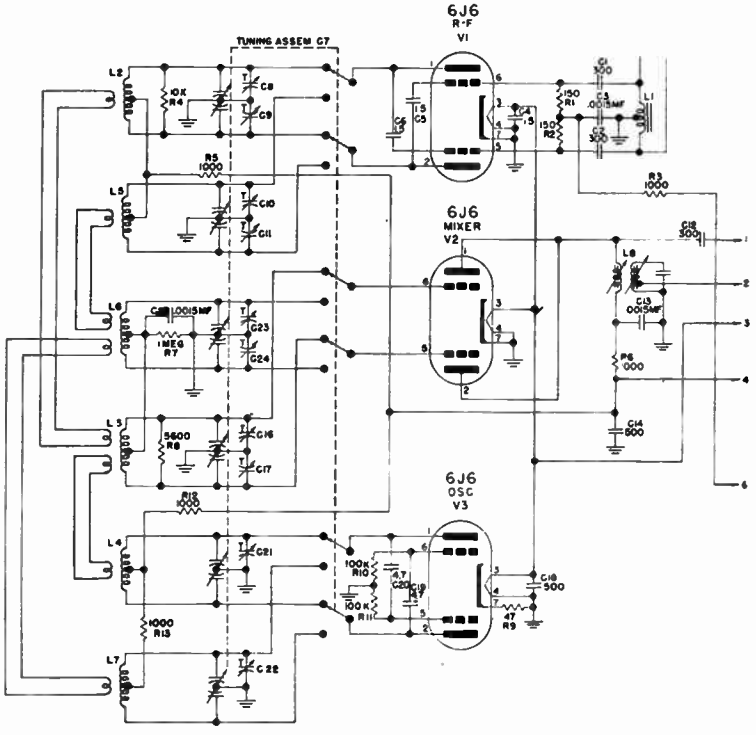


Fig. 2. R-f tuner for Magnavox CT221.

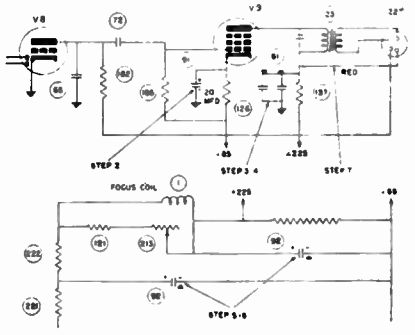


Fig. 3. Modifications for Magnavox CT218, CT221 B Chassis.

The change in parts list is as follows:

Part No.	*Description*	
96	Capacitor, molded mica, 0.01 μf, 150 v	250161-53
97	Capacitor, molded mica, 120 μμf, ±10%, 500 v	250159-83
98	Coil, horizontal speed	360346-1
99	Peaking coil, green	360332-10
100	Capacitor, electrolytic, 20 μf, 150 v	270027-6
105	Resistor, carbon, 120 ohms, ±10%, 2 w	230086-51
125	Resistor, wire wound, 520-520 ohms	240044-1
136	Resistor, wire wound, 800 ohms, 11 w	240035-8
173	Resistor, carbon, 150,000 ohms, 1 w	230085-211
223	CT218 tuner unit, r-f	700320-1
229	Socket, external input	180060-1
	CT214 r-f tuner	700317
	CT221 r-f tuner	700318

Farnsworth U-12, Capehart

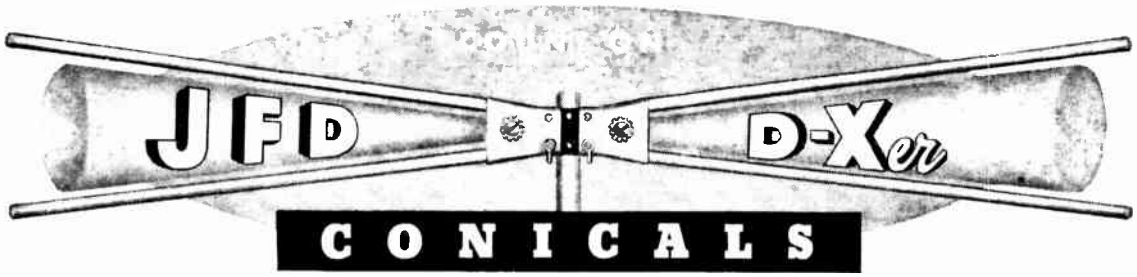
This model appears on *pages 2-1 through 2-9, 10 of Rider's TV Manual Volume 2.* A production change has been made which specifies that a 6AG5 tube be used as the 4th picture i-f amplifier in place of a 6AH6 previously used. All U-12 chassis recently produced incorporate this change. No wiring changes are required for this replacement. The 6AG5 tends to increase the gain of the 4th stage. This replacement can be made in the field, however not without checking the picture i-f alignment.

●

General Electric 814

This model appears on *pages 2-44 through 2-57, 58 of Rider's TV Manual Volume 2.* Audio regeneration which causes a click in the speaker as the tuning control is tuned through the station can be eliminated by the use of a 5,000-μμf capacitor across the audio i-f B lead. This capacitor is connected between the B and ground terminals at the terminal board located between the limiter tube socket, V18, and the discriminator transformer, T19. The new capacitor is identified as Stock No. RCW-3014, ceramic capacitor.

This also applies to Models 811, 820, 830, and 835.



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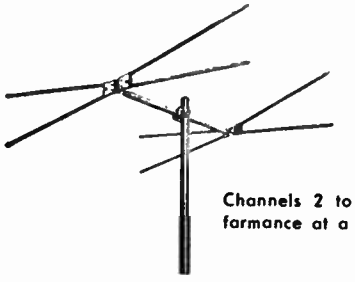

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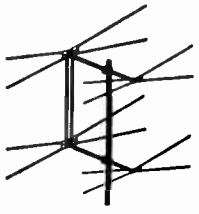

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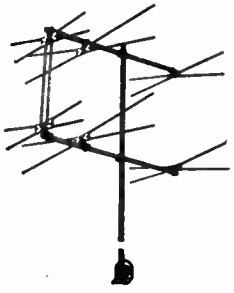

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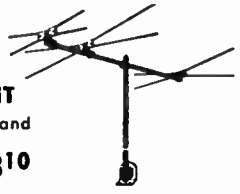

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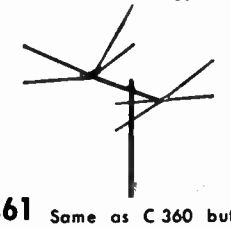

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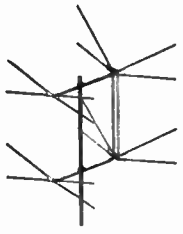

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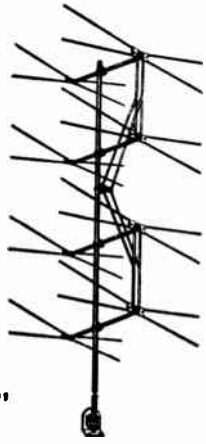

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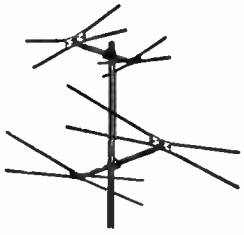

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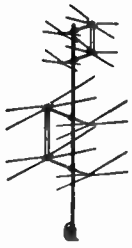
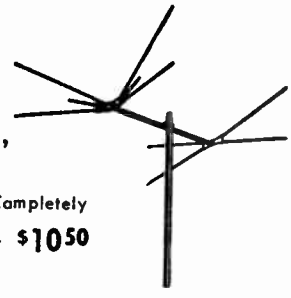


TA 170 Same as TA 169 but ¼ wavelength stacked far extra gain in weak signal areas. .....Less Mast, LIST **$49.40**



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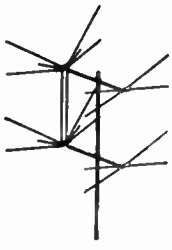

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Radio Changes

Magnavox CR198 Series

Chassis CR198, CR198A, and CR198B appear on *pages 16-5 through 16-11 of Rider's Manual Volume XVI*. The schematic diagrams and the parts lists for Chassis CR198C, CR198D, CR198E, CR198F, CR198H, and CR198J are the same as those for CR198, CR198A, and CR198B except for the changes that are noted below.

Item No. 13 has been changed from 20 $\mu\mu$f to 13 $\mu\mu$f.

Section 1 front of item 99 is the same for all models except for J. This wafer is shown in Figure 1.

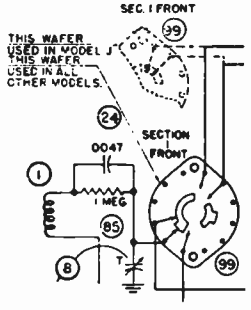

Fig. 1. Wafer used in Magnavox CR198 Series.

The position of item 12 has been changed for model J only. Capacitor 12 for model J has been removed from across item 4 and inserted in the wafer lead to the junction of items 4 and 43. In all other models, it remains in parallel with item 4.

Resistor 91 has been inserted from the tap of item 97 to item 91. Its value is shown in the accompanying table.

Table of electrical values for Magnavox CR198 Series.

ITEM NO	ELECTRICAL VALUES						
	CR 198A	CR 198B	CR198D	CR198E	CR198F	CR198H	CR198J
16	000068	0001	0001	.0001	0001	OMIT	OMIT
26	01	005	005	005	005	005	005
31	02	015	015	015	015	015	015
21	00033	00068	00068	00068	00068	OMIT	OMIT
83	OMITTED	680K	680K	680K	680K	820K	820K
72	4700	22K	22K	22K	22K	22K	22K
89	OMITTED	OMITTED	150K	150K	150K	OMIT	OMIT
106	OMITTED	OMITTED	OMITTED	USED	USED	USED	USED
62	2200	2200	OMITTED: SEE AUXILIARY CIRCUIT				
90	OMITTED	OMITTED	OMITTED	OMITTED	6.8 MEG	330K	330K
91	OMIT -	OMIT	OMIT	OMIT	OMIT	10K	10K

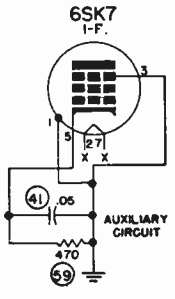

Fig. 2. Auxiliary Circuit for Magnavox CR198 Series.

Resistor 62 has been deleted from all models except CR198A, CR198B, and CR198C. The auxiliary circuit is shown in Figure 2.

The connection from item 99, section 2 rear, to the cathode and grid leads of the 6J5, 1st a-f stage, has been deleted. Resistor 83 is now connected between pins 1 and 5 of the 6J5, in all models except CR198A. The values are given in the accompanying table.

Items 48, 90, and 89 have been added as shown in Figure 3. Item 48 appears

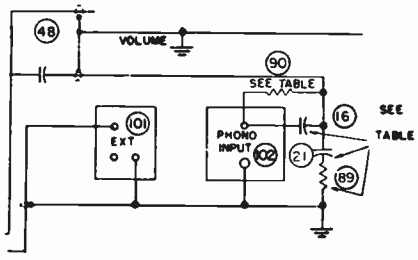

Fig. 3. Circuit changes for Magnavox CR198 Series.

in Models CR198H and CR198J only. Its value is 0.001 μf.

The 6-volt socket, item 106, has been inserted across the filament leads in models CR198E, CR198F, CR198H, and CR198J.

The positions of items 8 and 9 for all models have been changed from the transformer side of the *R-C* filter to ground, to the wafer side and to ground.

Farnsworth P71, P72, P73

Model P71 appears on *pages RCD. CH. 19-1 through 19-10 of Rider's Manual Volume XIX*, and Models P72 and P73 appear on *pages RCD. CH. 18-1 through 18-9 of Rider's Manual Volume XVIII*. There appears to be some misunderstanding concerning the correct nomenclature of parts numbers 58854 and 64467. Part 58854 is correctly titled "Starting Lever Spring". The function of this part is to exert the proper amount of tension on part 58853, starting reset lever, which in turn performs the dual purpose of transmitting the motion of the trip mechanism to the starting lever, thus setting the starting lever in the proper position for starting the change cycle and also resetting the starting and reject levers, after the change cycle has started, to their proper positions. Part 64467 performs the operation of transmitting the motion from the reject button mechanism to the reject lever, thus starting the change cycle. Part 64467 is referred to in the parts list as the "Trip Spring". In order to avoid future misunderstanding, the nomenclature of this part has been changed to read—Part #64467, Reject lever spring.

●

Westinghouse H-202, H-204

These models appear on *pages 19-24 through 19-28 of Rider's Manual Volume XIX*. The schematic diagram shows C12 and R17 in series between the a-m antenna terminal and the top of L17. R17 should connect to the bottom of L17 rather than to the top of L17.

Farnsworth P71

This model appears on *pages RCD. CH. 19-1 through 19-10 of Rider's Manual Volume XIX*. The following changes should be noted in the parts list:

Part No.

07594 Turntable assembly, changed to 15241

64437 Tone arm counterbalance spring, changed to 64343.

Part number 44064, phono motor, has been deleted. This is shown on *pages RCD. CH. 19-5*. It is available as Part Number 11437 only. Motor parts, Numbers 15237, 37241, 54308, 64471, and 92335, are no longer available as separate parts. If any of these are required, a complete motor assembly, No. 11437, must be ordered.

●

Majestic 6FM769, 6FM783, Ch. 6C14D

Model 6FM783 is a 1949 styled, 6-tube, using Oak and Milwaukee record changers, console combination using a cabinet similar to Model 8FM783, which appears on *pages 17-17, 18 through 17-22 of Rider's Manual Volume XVII* and on *page C18-4 of Rider's Manual Volume XVIII*. Model 6FM769 is a 1949 styled, 6-tube, console combination using the Aero record changer.

For voltages, alignment, and chassis parts refer to data on Model 6FM773 which appears on *pages 18-3 through 18-4 of Rider's Manual Volume XVIII*. The output transformer, T3, is located on the speaker instead of on the chassis. The parts list remains the same except for the following changes:

Symbol	*Part No.*	*Description*
L1	S-2017	Loop antenna assembly (BC only)
	117-108	Dial scale, glass
	117-109	Dial scale, background
	129-65	Dial scale clips, (6 req'd)
	133-34	Dial pointer
	15-91	Socket, speaker
	115-61	Cabinet, console-Model 6FM783
	115-70	Cabinet, console-Model 6FM769-mahogany
	21-24	Oak record changer (6FM783)
	21-31	Milwaukee record changer (6FM783)
	21-36	Aero record changer (6FM769)
	22-63	Speaker, 8" PM
	122-57	Escutcheon plate
	128-63	Knob, tuning
	128-68	Knob, tone
	128-69	Knob, volume
	128-80	Knob, bandswitch
	120-60	Spring, for knobs
	123-39	Cabinet back Model 6FM783
	123-40	Cabinet back Model 6FM769

●

Bendix 1217B, 1217D

Model 1217B appears on *pages 19-9 through 19-19 of Rider's Manual Volume XIX* and Model 1217D appears on *pages 19-20 through 19-33 of Rider's Manual Volume XIX*. Hum can be corrected by removing the shielded lead between the two chassis from the plug assembly and running it in through a separate connector. All of the hum pickup is taking place at the eight-prong plug on the radio chassis. With the cable running in through the chassis about two inches away from the plug assembly, the hum level is so low as to be almost unmeasurable.

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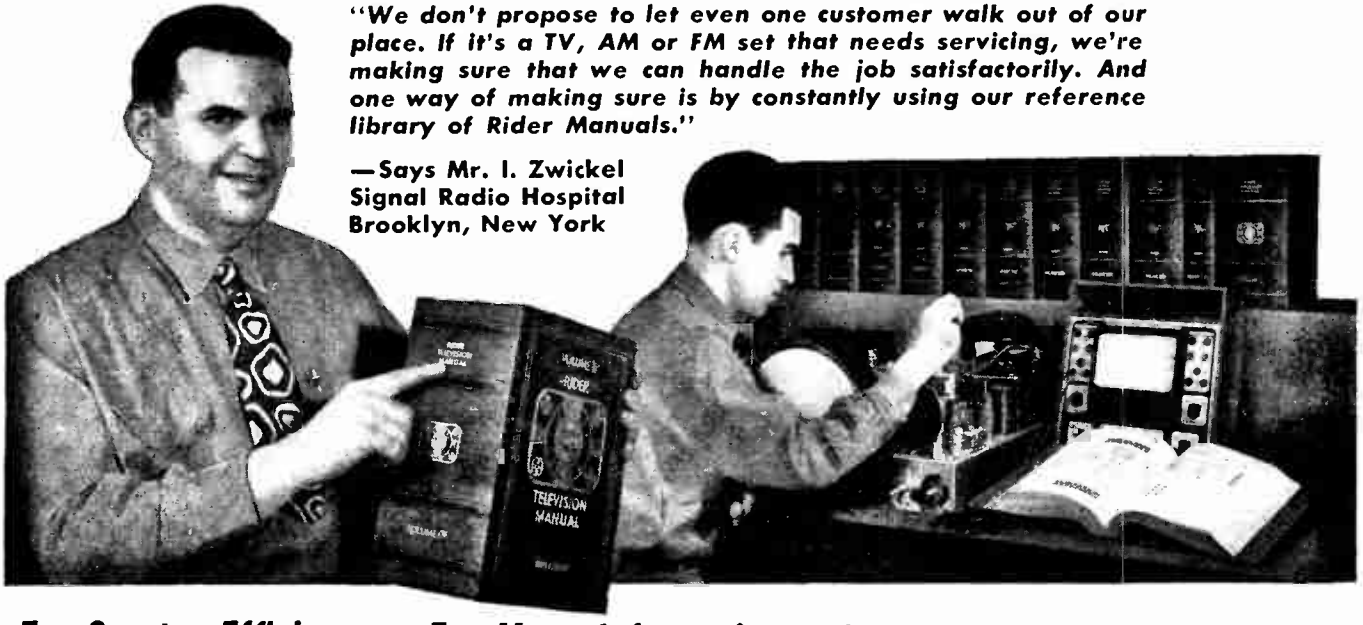

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NOTE: The Mallory TV Service Encyclopedia, 1st TV Edition, makes reference to only one source of TV receiver schematics—Rider TV Manuals.
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NOTE: The C-D Capacitor Manual for Radio Servicing, 1948 Edition No. 4, makes reference to only one source of receiver schematics—Rider Manuals.

Westinghouse H-188

This model appears on *pages 19-18 through 19-19 of Rider's Manual Volume XIX*. The 220,000-ohm resistor, R11, which was previously connected between the common negative line and the chassis, is not being used on late chassis.

The switch, SW1, is incorrectly shown on the schematic diagram and parts list as a D.P.S.T. switch. Actually, it is a S.P.S.T. switch, and it interrupts only one side of the a-c line, the side which connects to the common negative line.

In later production, a V-6199-2 2nd i-f transformer was used in place of the V-5686 2nd i-f transformer listed. Although the new transformer is smaller than the original one, it is directly interchangeable through the use of a V-5426 mounting clip. The new transformer is slug-tuned and has one adjustment hole in the top of the can and one in the bottom of the can. The terminals are marked by numbers which are equivalent to the colors on the old transformer as follows: 1 equals green, 2 equals white, 3 equals blue, and 4 equals red. For replacement purposes, order the V-6199-2 2nd i-f transformer and V-5426 mounting clip.

Some chassis may use a V-5686 i-f transformer in place of the V-5685 1st i-f transformer; however, the V-5685 transformer as listed in the parts list should be ordered for replacement of the 1st i-f.

The following items should be added to the parts list:

Part No.	*Description*
V-6199-2	Transformer, 2nd i-f, (L6, L7, C19, C20)
V-5426	Clip, i-f mounting
V-1160-2	Cabinet, ivory
V-5778-2	Baffle and grille cloth assembly for ivory cabinet
V-5779-2	Grille, for ivory or black cabinet

Note: The V-1160-1 cabinet listed in the parts list is a black cabinet, and the V-5778-1 baffle and grille cloth assembly is for use with the black cabinet.

Farnsworth P7, P9, P10, Capehart

These models appear on *pages 19-19 through 19-33 of Rider's Manual Volume XIX*. If hum is encountered in the 35P7 or in any instrument using the P7, P9, or P10 chassis, it may be due to either a gaseous or aged 6T8 that is used as the 1st audio amplifier, or a signal that is being picked up on the power line because of a faulty 0.005-μf, 600-volt capacitor, Part No. 25031, located between the unbuffered side of the line and ground.

●

Westinghouse H-204A

This model appears on *pages 19-24 through 19-28 of Rider's Manual Volume XIX*. On some chassis, V-5595 "HI-KAP" capacitors are substituted for V-5040-13 (C51, C52, C53, C54, C55, C56, C57) capacitors. The substitution was made for convenience in production, and the receiver operation is not affected.

Magnavox CR197 Series

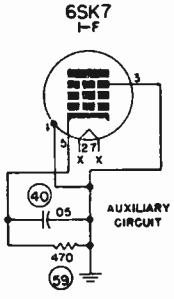
Models CR197, CR197A, and CR197B appear on *pages 16-1, 2 through 16-7 of Rider's Manual Volume XVI*. The schematics and parts lists for Models CR197C, CR197D, and CR197E are similar to those listed above except for the following changes:

Part No. 8 is now connected from ground to the junction of 24, 83, and 99, in all models.

Part No. 9 is now connected from ground to the junction of 25, 85, and 99, in all models.

The value of Part No. 13 has been changed from 20 $\mu\mu$f to 13 $\mu\mu$f in all models.

Resistor 61 has been deleted in Models CR197D and CR197E, as shown in the accompanying diagram.



Circuit changes for the Magnavox CR197D and CR197E.

Part No. 106, a 6-volt socket, has been added between the filament connections and the lamps in Model CR197E only.

The supplement to the parts list is as follows:

Part No.		*Magnavox Part No.*
	CR197A	
32	Capacitor, paper, 0.02 μf, 600 v	250152G37
49	Omitted	
61	Resistor, composition, 2,200 ohms, ½ w	230084G15
65	Resistor, composition, 10,000 ohms, ½ w	230084G19
88, 89, 90,91	Omitted	
99	Switch, rotary band selector	160172G1
106	Omitted	
	CR197B	
32	Capacitor, paper, 0.02 μf, 600 v	250152G37
49, 88, 89, 90, 91, 106	Omitted	
	CR197C	
19	Capacitor, molded mica, 680 $\mu\mu$f, $\pm$10%	250159G131
32, 49, 65	Omitted	
88	Resistor, composition, 680,000 ohms, $\pm$10%, ½ w	230084G90
99	Switch, rotary band selector	160172G1
106	Omitted	
	CR197D	
19	Capacitor, molded mica, 680 $\mu\mu$f, $\pm$10%	250159G131
32, 49, 61, 65	Omitted	
88	Resistor, composition, 680,000 ohms, $\pm$10%, ½ w	230084G90
89	Resistor, composition, 150,000 ohms, $\pm$10%, ½ w	230084G88
90, 91, 106	Omitted	
	CR197E	
19	Capacitor, molded mica, 680 $\mu\mu$f, $\pm$10%	250159G131
32, 61, 65	Omitted	
88	Resistor, composition, 680,000 ohms, $\pm$10%, ½ w	230084G90
89	Resistor, composition, 150,000 ohms, $\pm$10%, ½ w	230084G88
90, 91	Omitted	
106	Socket, 6 volt	189788G1

Meck Chassis 4D7

Chassis 4D7 is used in models DA-601, DB-602. This chassis is similar to Chassis 6B8 which appears on *page 19-5 of Rider's Manual Volume XIX*. The 4D7 differs from the 6B8 in the following ways: Capacitors C1, C2 and C7 have been deleted. A capacitor, designated as C2, has been inserted in place of C7. Resistor R1 has been removed from across the junctions of R2 and R3, and L1 and C2, and is now located in the cathode lead of the pentode (12BA6, 12SG7). Capacitor C5 is connected from the plate lead of the tetrode (50B5, 50L6) to ground. The parts list is given below, with the exception of those parts that are identical to those for the 6B8.

Symbol	*Part No.*	*Description*
C2	CP-14203	Capacitor, paper, tubular, 0.02μf, 400v
R1	RC-10680	Resistor, carbon, 68 ohms, ⅓w
R2	RC-11003	Resistor, carbon, 100,000 ohms, ⅓w
R4	RC-11005	Resistor, carbon, 10 megohms, ⅓w
R5, R6	RC-14703	Resistor, carbon, 470,000 ohms, ⅓w
R7	RC-11500	Resistor, carbon, 150 ohms, ⅓w
R8	RC-32001	Resistor, carbon, 2,000 ohms, ⅓w
L1	TRF10017-A	Antenna coil
C4	CP-12502	Condenser, paper, tubular, 0.005μf, 200v.
C3	CP-12202	Condenser, paper, tubular, 0.002μf, 200v.

●

General Electric 160

This model appears on *pages 19-17 through 19-21 of Rider's Manual Volume XIX*. The following change in parts list should be noted:

Change catalogue number RTO-003 to read RTC-003 T5 Transformer-charging transformer.

Westinghouse H-190, H-191, H-191A

These models appear on *pages 19-20 through 19-23 of Rider's Manual Volume XIX*. In later production, the cathode resistor, R3, for the 6BA6 1st i-f amplifier was removed and the cathode connected directly to ground. In addition, a 0.0022-μf mica capacitor (RCM30B222M) was connected across the 6BA6 2nd i-f amplifier cathode resistor, R4.

On some chassis, V-5596 "HI-KAP" capacitors are substituted for the following capacitors:

V-5040-15 (C7, C8, C9, C10, C11)
V-5040-11 (C19, C20, C21).

In the parts list, the part number of "Pull, door, phono (H-191 and H-191A)" should be changed to V-5877-1 and the part number of "Pull, door, record compartment (H-191 and H-191A)" should be changed to V-5877-2. These part numbers were reversed. Also, the part number of "Hinge, L.H." should be changed to V-6603-1, and the part number of "Hinge, R.H." should be changed to V-6603-2.

HIGH A-C VOLTAGE MEASUREMENTS

By Henry Chanes

Very high values of a-c voltage, up to 10,000 volts will be found in the high-voltage supplies of television receivers. It should be remembered that high a-c voltages are dangerous, just as high d-c voltages are, and it would be well to review all the safety precautions listed under High D-C Voltage Measurements* before attempting to make high-voltage measurements of any kind. In the normal servicing of television receivers, it is necessary to make high a-c voltage measurements only occasionally. In most cases measurement of the high d-c voltage, with perhaps a few resistance measurements, is sufficient to determine the defect in the high-voltage supply. For this reason, the measurement of high a-c voltages will not be discussed in as much detail as were high d-c voltages.

The waveform and frequency of the high a-c voltages depend on the type of high-voltage power supply. In the 60-cycle type of power supply, the frequency, of course, is 60 cycles, and the wave is a sine wave. In the r-f type of supply, the waveform is also a sine wave but the frequency is in the range of 50 to 500 kc. In the "kickback" type of supply, the frequency is the horizontal-line frequency, or 15,750 cycles per second, and the waveform will be sharp pulses rather than sine waves. The "kickback" high-voltage supply will be used to illustrate a method for measuring high a-c voltages, but this method is also applicable to the other types of supplies.

Fig. 8* shows a simplified circuit of "kickback" high-voltage supply. As mentioned previously, a high-voltage pulse is developed in the primary during flyback and is rectified to produce the high d-c voltage for the picture tube. From the circuit, it can be seen that this high-voltage pulse will appear at the plate of the high-voltage rectifier and also at the plate of the horizontal output tube. This pulse will have a greater amplitude at the plate of the rectifier tube than at the horizontal output tube since the horizontal output tube is connected to a tap on the primary.

As previously discussed, the oscilloscope has many advantages for measuring sync and sweep signals and can also be used for measuring high a-c voltages. In this particular type of power supply, the a-c voltages to be measured are very much like the sync and sweep voltages in the rest of the receiver but at much higher amplitudes. Therefore, it is necessary to extend the voltage range of the oscilloscope by means of a multiplier. The resistance type of multiplier will not work satisfactorily in this case since the distributed capacitance of the resistors themselves will cause large errors in the measurement.

A capacitance type of voltage divider as shown in Fig. 1 will enable fairly accurate measurements to be made of high a-c voltages. This particular voltage divider will extend the voltage range of the oscilloscope by 100 times. The 10-$\mu\mu$f, 10,000-volt capacitor can be a single capacitor or a series combination if a single capacitor with these characteristics is not available. For example, five 50-$\mu\mu$f capacitors each rated at 2,000 volts or ten 100-$\mu\mu$f capacitors each rated at 1,000 volts will be the equivalent of a 10-$\mu\mu$f capacitor rated at 10,000 volts. The other capacitance in the divider, a 1,000-$\mu\mu$f capacitor at 500 volts, is, of course, readily available.

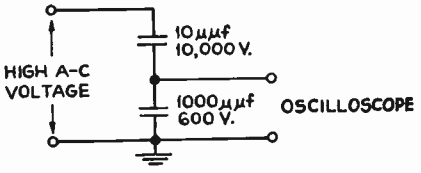


Fig. 1. Voltage-divider circuit which extends the range of an oscilloscope for the measurement of high a-c voltages.

When connecting this divider, see that the lead from the test point to the 10-$\mu\mu$f capacitor, and the 10-$\mu\mu$f capacitor itself (or series combination), is not close to the chassis of the television receiver so as not to introduce any additional capacitance to ground. The oscilloscope is used to measure the signal in the same manner as described previously and then the reading obtained is multiplied by 100 to obtain the peak-to-peak voltage across the entire divider. An example of the waveform obtained at the plates of the horizontal output tube and the high-voltage rectifier is shown in Fig. 2.

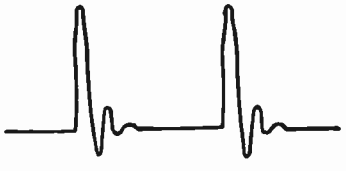


Fig. 2. High-voltage pulse obtained at the plate of the horizontal output tube and the plate of the high-voltage rectifier in a television receiver that employs a "kickback" type of high-voltage supply.

The effect of loading on the circuit when using this type of divider was checked by metering the high d-c voltage output at the same time the high a-c voltages were being measured. For a circuit of the type shown in Fig. 8 where the primary is tapped, it was found that connecting the capacitance divider to the plate of the horizontal output tube had only little effect on the d-c output voltage, in one case, causing it to drop from 7,650 volts to 7,200 volts. The a-c voltage measured at this point was 4,200 volts peak-to-peak.

Connecting the capacitance divider at the plate of the high-voltage rectifier caused a greater drop in the d-c output voltage, this time, from 7,650 volts to 6,300 volts. The a-c voltage measured at this point was 6,200 volts peak-to-peak. Correcting for the effect of loading by the same percentage as the drop in d-c voltage would make the actual a-c voltage at the plate of the rectifier about 7,500 volts peak-to-peak. In most cases, this correction will not be necessary to determine if a defect exists if it is kept in mind that some loading effect takes place at the plate of the high-voltage rectifier, and the voltages measured will be about 10 to 15 per cent lower than the actual voltage. Another point worth mentioning is that the voltages given above are for only one particular receiver and are given as examples, rather than as reference values for all types of television receivers.

Presence of High-Voltage Pulse

Referring to the circuit of the "kickback" power supply shown in Fig. 8, it can be seen that measuring the d-c voltage on the plate of the horizontal output tube will be complicated by the presence of the high a-c voltage (or pulse) present at the same point. This d-c voltage is not very high, not more than 400 volts in most cases, but, as noticed before, the 15,750-cycle pulse at this point may be used as high as 5,000 volts. If a meter were applied directly to this point, there is a good chance of damaging the meter. In order to prevent this, it is necessary to first filter out the a.c., so that only the d.c. is applied to the meter.

The *R-C* filter shown in Fig. 3 will do this. The total resistance in this case is 11 megohms. This value was chosen because the VTVM used had an input resistance of 11 megohms; the reading of the meter then has to be multiplied by 2 instead of by some odd number. This can also be done with a 20,000 ohms-per-volt meter. If the 500-volt scale on a 20,000 ohms-per-volt meter is used, the input resistance is 10 megohms and using a 10-megohm resistance in the filter will multiply the meter reading by two. The resistors used for this purpose should be carbon, not wire-wound. A series string of resistors should be used rather than one resistor, so that the a-c voltage across any one resistor is not excessive.

This arrangement can also be used to measure the d-c voltage on the plate of the high-voltage rectifier (see Fig. 8). Normally, the d-c voltage at this point is the same as the d-c voltage at the plate of the horizontal output tube, since the d.c. that flows through the high-voltage rectifier is very small.

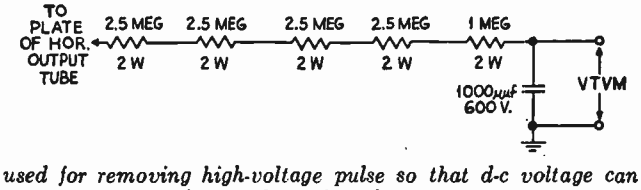


Fig. 3. Filter used for removing high-voltage pulse so that d-c voltage can be measured without damaging the meter.

*See June 1949, issue of SUCCESSFUL SERVICING.

—PRECISION— TESTIPS

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.

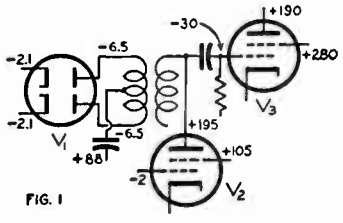


FIG. 1

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.

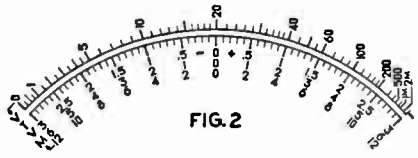


FIG. 2

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.**

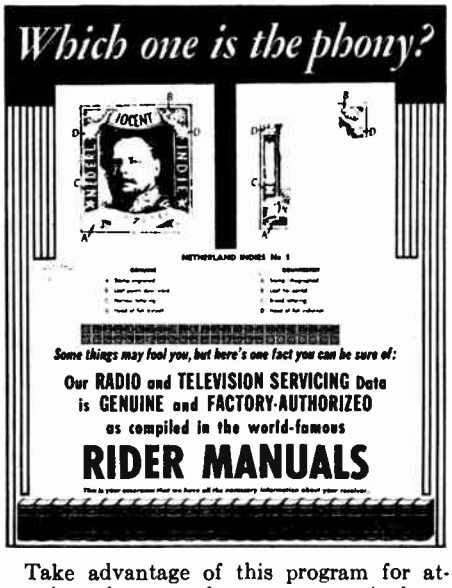
The direct-reading zero-center scale puts extra hours into every service day, and is one of the keys to high-speed profitable servicing.

R.G. "Bob" Middleton

Engineering Division

NOVEMBER EYE STOPPERS

The Rider Eye Stopper campaign is in its second month. Have you picked up your window displays? Here are the two streamers... They illustrate a Nova Scotia stamp and one from the Netherlands Indies. Each shows the genuine and the characteristics of the forgeries. Both are of great interest to stamp collectors the world over. This is the kind of information that philatelists desire very much.



Take advantage of this program for attracting the passerby to your window. One out of every 14 individuals in the United States is a stamp collector. Records show that more than 10,000,000 stamp collectors are active in the United States. Each of these owns or operates a radio receiver, a car radio — maybe more than one. Many of them are TV receiver owners. Get them to your window! Let them see that you are in business.

The November series, Numbers 3 and 4 are now at your Rider jobber. Pick up your copy today. It costs you nothing and can do you a great deal of good which you can turn into dollars. Don't miss this opportunity of cashing in on a brand-new — entirely different type of sales promotion program.

INSIDE THE VACUUM TUBE

"The preface states: 'Throughout this book, which covers diodes, triodes, tetrodes, and pentodes, the aim is to present a clear physical picture of what is occurring in a vacuum tube, inclusive of the development of characteristic curves, load lines, dynamic transfer characteristics,' etc.

This is an adequate summary of the book, and the author has admirably succeeded in his aim. There is a thoroughness about Mr. Rider's textbooks which might well be emulated by other American authors who set out to explain elementary principles of radio engineering by leaving out all the hard bits. Mr. Rider uses actual examples of characteristics and refers to them quantitatively, there is a sketch on nearly every page, and there is no shirking of difficult points in the theory.

It is the sketches which will probably rouse antagonism in the die-hard formal text-book school. Mr. Rider's electrons have legs and wings and arms, and the early sketches show them cavorting in the style of a comic strip. In fact, when they hit an anode, one expects to see the word 'SPLAT!'

This style may help the beginner to visualise the happenings inside a valve, but the same effect might have been achieved by just dismembering the electrons. The chapter headings are a welcome relief from the drier diagrams, however.

Also, there are three stereoscopic anaglyphs with a red and blue filter provided at the back of the book. Here again, one may question whether the advantage of this method of presentation is not outweighed by the expense, but that is not the reviewer's business. Certainly, far more questionable stunts have been resorted to in order to attract the student's attention, and there is no doubt that anyone who has gone to the trouble of using the filters will remember what he has used them for.

For the text matter there is nothing but praise. This is just the book for the practical man in allied fields who has never been able to study valve theory from the conventional textbook, and even experienced radio engineers will find some of the explanations refreshing and interesting.

Mr. Rider's last chapter, which mentions the origin of the American valve nomenclature, has an illuminating comment on the fatuity of trying to standardise prematurely. After giving the rules—first digit for heater volts, letter(s) for type of valve, the final digit for number of electrodes, each example is followed by a string of exceptions! What does the reader make of this: 'The letters from U to Z inclusive are used for rectifiers, but the following are exceptions: 6U5, 6U7, 6V6, 6V7, 6W7, 6Y6, 6Y7, 6Z7, 7V7, 7W7, 14W7!' Also, if the last digit is the number of electrodes, what is the 2D21?"—*Journal of The Television Society.*

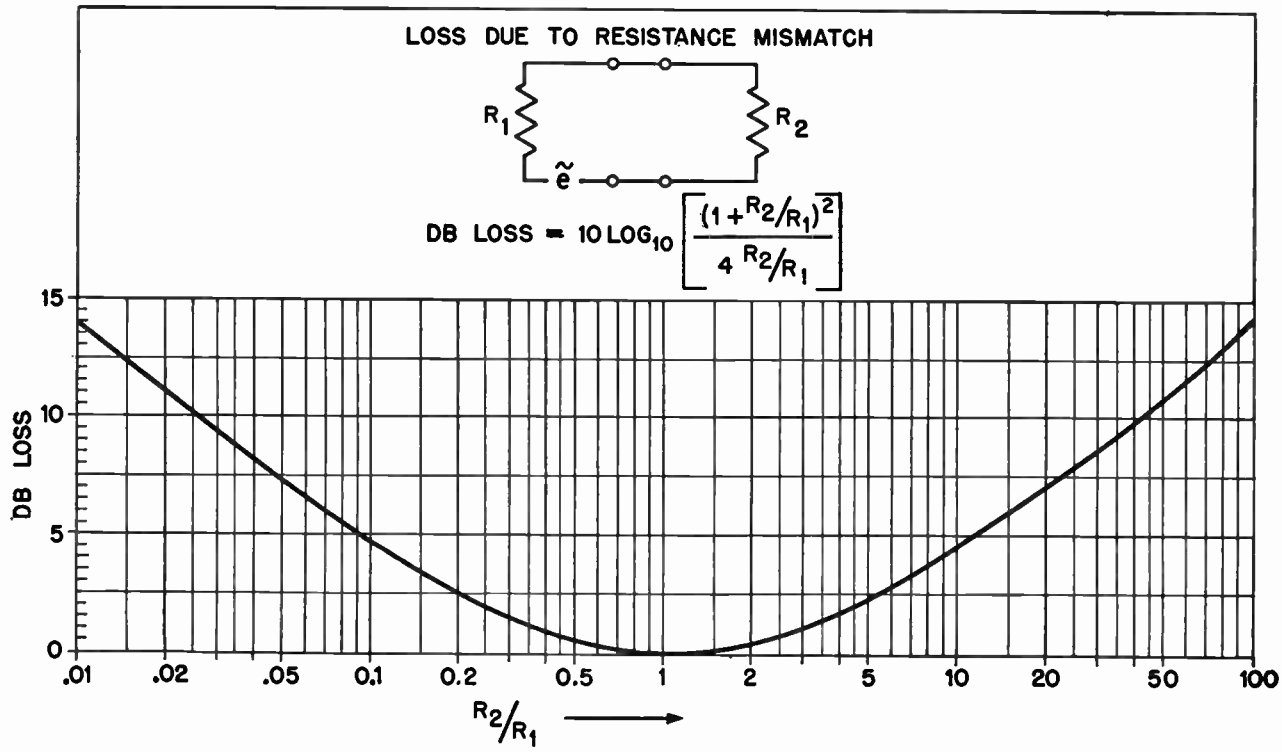


Fig. 1. Power loss for a given mismatch. It can be applied equally well to matching TV antennas to transmission lines and receiver input, and to matching a d-c resistance load to its power generator.

Matching A Generator to Its Load

(*Continued from page 1*)

only deliver energy if some current is taken by the load. If the current is too low, the generator is unable to produce energy at the same rate, which is identical to saying the power will be too low. If the load pulls too high a current, the generator is being asked to deliver energy at too fast a rate (or too high a power). Since the generator has only one optimum rate, at which it can deliver energy best, the load must take the exact amount of current corresponding to this rate of energy flow.

The loss incurred by not matching a generator or antenna to its load from the standpoint of equalizing their resistances is shown in Fig. 1. It will be seen that the losses are not serious until a mismatch of 2.5 to 1 is present. Even then the mismatch loss is only about one db. A three db loss indicates a 2 to 1 reduction in power, a loss which will not be incurred until the ratio of resistances exceeds about 6 to 1. It is evident that, for most practical purposes, resistance mismatches must be excessive before *power losses* are serious. As we will see later, although the power loss is not serious in magnitude, other effects caused by the reflection of the power may be far more serious, such as allowing signal energy to traverse a circuit in the reverse direction. What appears to be a mere 10 per cent loss in power, may show up as delayed signal energy in another part of the antenna system and arrive at the receiver at a later instant, thus contaminating the direct signal. It is important to note that a mismatch to the flow of signal power in one direction, may also be a mismatch to the flow of power in the reverse direction. If other parts of the antenna system at the radio receiver end are mismatched, the reversed power flow will tend to come back to the antenna terminals, and there possibly again suffer reflection. Such double reflection sends delayed signal energy back down the system again toward the receiver. A good match at the antenna will preclude this secondary reflection of energy, as well as the direct reflection. A good match may be looked upon as presenting *no discontinuity of power flow,* and hence a valuable asset for freely passing direct energy to the radio receiving system.

A Christmas Gift Suggestion

To the Wife, Mother, Sweetheart of the Radio Service Technician:

The giving of a gift is not merely a material token of esteem and affection, it carries with it the thought that the giver wishes to be remembered all year round, not just one day or one week of the year.

Just about this time of the year your thoughts are centered upon your Christmas gift list, and as always, it's a mighty difficult job preparing it.

We can help you to some extent in making your selection for your Radio Service Technician (husband, son, fiance).

Here's a gift that will be faithfully used every day of the year; a gift that is practical and useful to him in his everyday work; a gift that helps him to do his job quicker and more profitably— A Rider Manual.

He knows Rider Manuals, and uses them in his work. Probably he has a complete or partial set of them (there are nineteen volumes, including those on Television and Public Address Equipment).

Sound him out concerning those volume numbers he wants, and then surprise him on Christmas Day with an individual volume, or those he needs to make his set complete.

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Curtain Time

(*Continued from page 6*)

be repeated in Canada, when that Dominian starts telecasting. Anything which can be done to make the serviceman or the installation man cognizant of his responsibility to the public and to the vendor of the receiver, will in the long run be of mutual benefit to the industry as a whole.

One detail of this Town Meeting, and considered of significance, was the arrangement employed to teach those in attendance the mechanics of record changers, and to make them acquainted with certain specialized types of test equipment. Not only was it conducted in an orderly manner — as a tribute to the ingenuity of those responsible for the planning — but the consensus of opinion among those who had attended, was that they benefited greatly. In every respect, orchids to the Canadian RMA, and to the various associations who sponsored the Meeting, and especially to those men who were actively engaged in the planning and accomplishment of the program.

Test Equipment

A very interesting condition was noted during our recent journeys through TV areas. TV service shops are not sold on TV sweep generators. They're ready to buy scopes of VTVM devices and 20,000 ohms-per-volt voltmeters but not sweep generators.

You may have many reasons why every TV shop should have a sweep generator. We agree, but the shop owners think otherwise. The weak link seems to be that misalignment is not such a problem as anticipated — that simple "touch-up" is ample in very many cases. Technically that is correct, but no matter how infrequent the need for a sweep generator, the TV shop should have one when it is needed.

So, Mr. Manufacturer, you still have a selling job to do.

The Rider Eye Stoppers

Mr. Service Shop Owner:

Have you picked up your Rider Eye Stoppers from your jobber? They are in his possession and available for you. Take advantage of this opportunity to attract people to your shop window. Remember, one out of every fourteen people in the United States is interested in philately; stamp collecting is becoming more popular.

The November series now is being packed for shipment during the third week of November. In the meantime, the first series should be on display.

Snapshots

In TV areas, it is the TV service shops who are getting more and more a-m, f-m, and car radio servicing business. FCC hearings on color TV have been put over until February, 1950. About 40 million a-m, f-m, and car radio receivers have been produced since the beginning of 1946. These will require servicing; in other words, radio is far from being dead.

The best-liked serviceman in the nation is the individual who works for the telephone company. He keeps his promise, and cleans up after the job is done. One of the gripes of the public, relative to TV, is that the promise to call at a specified time is seldom lived up to by the small shop owner, but it is fulfilled by large organizations.

The dissemination of technical knowledge has been the function of many branches of the radio industry. Manufacturers, jobbers, and publishers have participated. In proportion to the number which exist, the radio broadcasters have been the weakest link. Some have co-operated by giving spot announcement time, for which the servicing industry thanks them wholeheartedly, but very many, entirely too many, have done nothing to keep their audience at the largest figure, by aiding the servicing industry in their various projects.

Arnold B. Bailey, the author of the antenna book described elsewhere in this issue, spent 21 years with Bell Telephone Laboratories, designing and installing uhf and vhf antennas. He is the inventor of the coaxial antenna used in virtually all vhf communication systems where vertically polarized, single-frequency signals are radiated. Such are police systems, point-to-point communication systems, ground-to-plane systems, etc. Mr. Bailey is one of the co-inventors of the omni-directional aircraft beacon system used internationally by the CAA. As publishers, we are indeed happy to number him as one of our authors, and we are certain that every reader of his first text book will recognize him as a teacher and writer of unqualified ability. He is blessed with the faculty of dissecting a difficult technical subject, and describing it in completely understandable language, without sacrificing the technical truth.

HIWYNI

Have It When You Need It... People do not use everything they own each day. Sometimes some things are not put to work except on rare occasions — but it is good to have what you want when you need it. That's the reasoning behind the ownership of Rider Manuals and Texts. You never know what set will be referred to in the next phone call — or what receiver the next customer will bring into the store. With 85,000,000 receivers in the hands of the public — every one of the Rider Manuals — AM — FM — Record Changers — PA — TV — sees use month after month and year after year. Make sure your Rider Manual Library is complete. Have It When You Need It! Each manual will serve you for years. Ask the man who purchased his first Rider Manual 20 years ago!

Cover

The photograph on the cover shows the orderly manner in which sets at RCA Service Company are sorted on the assembly rack before and after servicing. The cards hanging from each set enable a person to tell at a glance what work is to be or has been done.

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Successful SERVICING

JANUARY, 1949

1948 IN RETROSPECT

BY

JOHN F. RIDER

Courtesy United Air Lines

1948 is finished. Taking all things into account, it hasn't been such a bad year, in fact from the viewpoint of the servicing industry, it has been a good one. Let's review some of the happenings.

Mandatory TV Service

The general idea of mandatory TV service tied in with the sale of TV receivers has for the most part come to an end. Not that factory service on TV receivers, or for that matter other equipment, is no longer available; — it still is, which is alright, but the general philosophy of mandatory service has been discarded. That too is alright! . . . Relative to factory service no one can pick a bone with that because it still permits free enterprise, which in the final analysis is America.

TV Education Among Servicemen

The enthusiasm displayed by the radio repairing industry to learn TV equipment operating theory during 1948 is without question a highlight of that year. It is living testimony that the members of that fraternity are going all out to do a good job. The manufacturers of TV equipment can rest assured that given the opportunity — their equipment in the homes of the American public will receive competent and just treatment. There can be no doubt in anybody's mind that the zeal demonstrated by the radio servicing industry's personnel to acquire a background in TV theory is honest and far reaching. We have been in close touch with the radio servicemen of America for more than 25 years and can truthfully say that never in all our years of public speaking at service association meetings, have we witnessed the avid interest — the undivided attention and the effort to assimilate the spoken and written word, as during 1948. Mention of TV is the open sesame to the mind of the electronic maintenance man. Given the opportunity, the servicing industry will not let the receiver manufacturer down.

Licensing

The defeat of the effort by the City Council in New York City to foist licensing on the radio industry in that metropolis by the formation of a well knit, well-administered, progressive local radio servicemen's association is in our estimation a highlight of 1948 as far as radio servicing is concerned. The enactment of regulations of this type in the world's largest city would have had far reaching effects in other communities within the United States. But more important than that, is the fact that staving off the program was accomplished by association effort. The plan of following up every consumer complaint and seeing that it was remedied was the most powerful weapon which a radio service association could create to defeat such regulation.

Admittedly the threat was beneficial for it did knit into a group many men who otherwise were lackadaisical about the need for mutual cooperation and recognition of the urgency to clean the house of those comparative few who did so much harm to the many. In commenting about what happened in New York City we are by no means forgetting about the existence of many outstanding organizations such as the PRSMA in Philadelphia, others in Harrisburg, Wilkes Barre, and Reading in Pennsylvania, still others in New York State as for example Rochester, still others in the Middle West and on the West Coast. All of these have either successfully warded off licensing programs, or at least developed such relationships between themselves and the public as to make unnecessary any discussion of municipal licensing.

State Federations

The program of forming state federations of radio servicemen's associations

(*Please turn to page 10*)

General Electric P4

This model appears on *RCD. CH. Pages 17-5 through 17-9 of Rider's Volume XVII.* The sound of a metallic click and audible thump through the receiver speaker is usually traced to the operation of the velocity trip mechanism. This is caused by too much tension of the Clutch Tension Spring (reference 29 in Fig. 3 on *RCD. CH. Page 17-7*) binding the velocity trip lever. Adjustment may be made, reducing spring tension to prevent binding and still maintain normal operation.

In earlier production, a limited quantity of record changers employed a flat spring type clip fitted over the pickup arm pivot shaft. The clip was brought to bear upon the clutch tension spring, compressing the spring to the proper friction upon the velocity trip lever as was necessary for proper changer operation. To provide a more positive adjustment, later productions use a Clutch Spring Tension Collar, in lieu of the original clip, which makes a more convenient, accurate, and more permanent adjustment.

If extreme difficulty is experienced in proper adjustment of the earlier production changers. the spring clip may be replaced with the collar, Cat. No. RMX-080. A detailed view of the later version of record adjustment is shown in Fig. 6 on *RCD. CH. 17-8.*

●

Hoffman C502 and C512, Chassis 113

These models are the same as Model B502, Chassis 113, appearing on *pages 17-1 to 17-6 of Rider's Volume XVII*, except for the following changes. Four 6K6-GT tubes are used in push-pull parallel in the output stage instead of the 6V6 tubes in push-pull.

An "entertainment panel" has been wired into the tuner chassis to provide microphone input, a speaker off-on switch, a pillow speaker plug, and an auxiliary phono input to be used either for television sound or wire recorder input. See Fig. 1.

A resistance-capacity filter R111 and C110, has been inserted in the B-plus line of the phase inverter stage in order to reduce the inherent hum level of the receiver, as shown in Fig. 2.

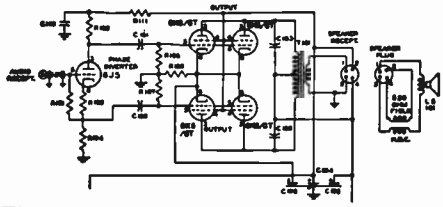

Fig. 2. The resistance-capacity filter in the Hoffman models C502 and C512.

The following changes should be made in the parts list:

Symbol	Description	Hoff. No.
C60	0.005 μf. 600 V, tubular, paper	4102
R16, R20, R50	100,000 ohms ± 20%, ½ watt	4511
R21, R18	47,000 ohms, ± 20%, ½ watt	4504
R49	10 megohms, ± 20%, ½ watt	4506
R27, R46	0.22 megohm, ± 20%, ½ watt	4500
R47, R51	0.47 megohm, ± 20%, ½ watt	4506
C110	10 μf, 450 V, electrolytic	4203
R111	10,000 ohms, ± 20%, ½ watt	4515

●

General Electric YRB 92-2

This model is the same as Model YRB 67-1 appearing on *pages 15-53 and 15-54 of Rider's Volume XV*, except for the cabinet.

●

RCA 54B5

This model appears on *pages 16-28 through 16-30 of Rider's Volume XVI.* The following addition should be made to the parts list.

70708 Lead—battery lead assembly

●

Westinghouse H-165

This model appears on *pages 17-12 through 17-14 of Rider's Volume XVII.* The switch for this model was listed as a complete assembly including a wafer section (SW1) and an a-c switch section (SW2). In cases where the a-c switch is defective, but the remainder of the switch is not damaged, repairs can most easily be made by replacing the a-c section only. For this reason, the a-c section of the switch assembly is listed below as an addition to the parts list.

Part No.	Description
V-4803-1	Switch, a-c (SW2) and mounting plate

●

RCA 67V1, Chassis RC-606C

This model appears on *pages 16-35 through 16-39 of Rider's Volume XVI.* Resistor R18 which was originally 470,000 ohms, appears in some chassis as 330,000 ohms and in some chassis as 220,000 ohms.

Hallicrafters SX-42

This model appears on *pages 17-8 through 17-13 of Rider's Volume XVII.* The following service hints apply to the S-Meter operation.

SYMPTOM NO. 1:

Meter fails to zero on AM.

ANALYSIS:

Assuming that all connections and other circuits, including AVC, are normal . . .

1) The line voltage is low, or
2) The first RF tube is weak

SYMPTOM NO. 2:

Zero adjustment appears too critical. Does not hold.

ANALYSIS:

The leads to the outside terminals of the "Zero Set" potentiometer should be disconnected, reversed, and reconnected.

SYMPTOM NO. 3:

Meter fails to zero on FM

ANALYSIS:

1) Adjust meter indicator mechanically with zero set on the meter.
2) Replace 7A4 tube
3) Replace R-68 with lower resistance if indicator remains on right side of FM zero
4) Replace R-68 with higher resistance if indicator remains on left side of FM zero

REMARKS:

The internal resistance of the meters is not specified, and depends on the supplier. The resistance ranges from 12 to 50 ohms.

The meter has a range of 5 ma. on a linear scale. The FM zero is arbitrarily calibrated at 1.4 ma.

An arbitrary figure of 60 m.v. to the antenna terminal was used for S-9 on the 20 meter band. Each S-unit represents 6 db variation.

60 m.v. to the antenna terminal of the receiver represents roughly a field strength of 15 m.v. per meter.

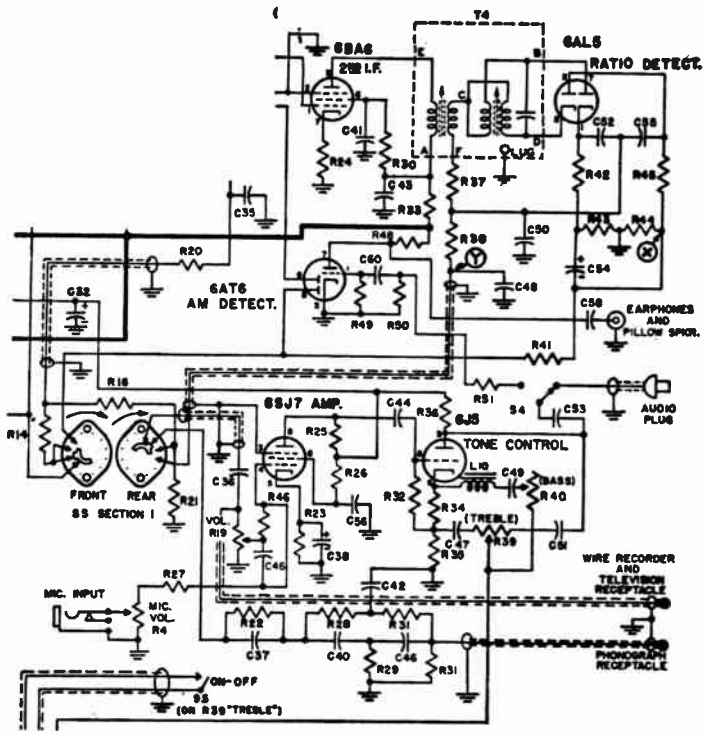

Fig. 1. The entertainment panel that is wired into the Hoffman models C502 and C512.

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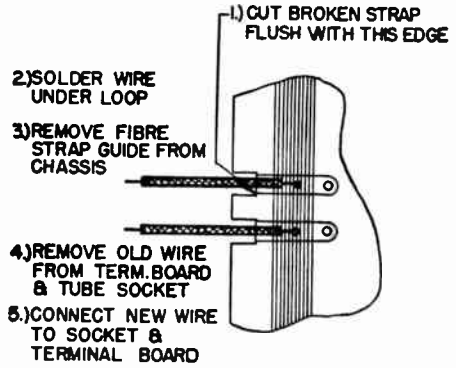
General Electric 140

This model appears on *pages 17-21 through 17-23 of Rider's Volume XVII.* The following procedure is recommended for repairing broken antenna loop connecting straps.

The broken straps should be cut back flush with the inside edge of the notch on the loop. The flexible wire is then used to make connections from the loop to the inside of the receiver. Consult the accompanying diagrams for loop connecting details and wire specifications. Carefully lift the section of the loop to allow connecting the specified pieces of wire and solder



Above, the loop connecting details of the General Electric Model 140. The wire details for the antenna loop connections are shown in the lower figure.

wires to remainder of loose straps. Remove the fibre strap guide which originally insulated the loop straps within the cabinet. Remove original wire leads and pieces of loop strap connected inside the cabinet to the chassis terminal strip and pin 6 of the 1R5 oscillator-converter tube socket. Solder the new leads from the antenna loop directly to the terminal board and tube socket. Make certain that the inside of the loop is connected to pin 6 of the 1R5 tube socket.

RCA QU-62

This model appears on *pages 17-13,14 through 17-20 of Rider's Volume XVII.* In some instruments the speakers listed following have been used as alternates for the speakers listed in the parts list.

Speaker Assemblies 92520-1K

70574	Cone—cone and voice coil assembly
5118	Plug — 3 prong male plug for speaker
70686	Speaker—12" PM speaker complete with cone and voice coil less plug

(Used as alternate for PM speaker stamped 92469-4W)

Speaker Assemblies 92516-2K

70574	Cone—cone and voice coil assembly
5119	Plug—3 contact female plug for speaker
31539	Plug — 5 prong male plug for speaker
70573	Speaker—12" EM speaker complete with cone and voice coil less output transformer and plugs
70688	Transformer—output transformer (T4)

(Used as alternate for EM speaker stamped 92566-3W)

The alternate speakers will not fit on the mounting bolts used with the original speakers. If a replacement which differs from the original equipment speaker becomes necessary, it is suggested that the mounting bolts be cut off and the replacement speaker mounted using rubber grommets, spacers, and wood screws.

●

Westinghouse H-124

This model is the same as Model H-125 which appears on *pages 15-8 through 15-10 of Rider's Volume XV,* except that the side panels of the H-124 cabinet are a darker shade of green. The following items have been added to the parts list:

Part No.	Description
V-3461-3	Cover, left hand
V-3459-3	Cover, right hand

●

Zenith S 13200

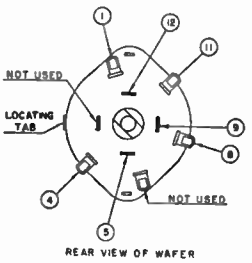
This model is the same as Model S-11468 on *R.C.D. CH. Pages 15-1 through 15-8 of Rider's Volume XV,* except that the Model S 13200 has a Cobra tone arm and a muting switch.

Sears Roebuck 7054, 8052, 8053

Models 8052 and 8053 are similar to Model 7054, but include the change shown on page 3 of the September issue of *Successful Servicing.* Model 7054 appears on *pages 16-1 through 16-3 of Rider's Volume XVI.* It has been found that some of the failures of the 35Y4 rectifier tube in these models can be prevented by adding a shunt resistor of 270 ohms across pins number 1 and 4 of the 35Y4 tube. This change was not made in production, so it is suggested that it be made in service when this type of failure is encountered.

GE 250

This model appears on *pages 15-32 through 15-36 of Rider's Volume XV.* The switch that is supplied under the number RSW-009 is of a different construction than the original flat-wafer switch. The accompanying figure shows the numbers which correspond to those in the schematic diagram.



Construction of the wafer switch replacement for the General Electric 250.

RCA 66X11, 66X12, 66X13

These models appear on *pages 17-29 through 17-30 of Rider's Volume XVII.* Some oscillator coils which were specified for the first production (RC-1046A, RC-1046, RC-1046B) of these models have been used on the second production (RC-1046C, RC-1046D, RC-1046E).

Some oscillator coils and associated coupling capacitors (C19) which were specified for the second production have been used on the first production.

If replacement is necessary — use the specified parts — the range of inductance adjustment may be insufficient if used otherwise.

●

Firestone R3157A

This model is the same as Model S7427-2 appearing on *pages 12-19,20, 12-21, 12-6, and C.S. 12-4 and C.S. 12-5 of Rider's Volume XII.*

●

Montgomery Ward 64WG-1050C

This model is the same as Model 64WG-1050A on *pages 15-75 to 15-77 of Rider's Volume XV,* except for the following changes. The 1500-ohm resistor R-3 is now connected from the center tap of the filament of the 3S4 output tube to the common negative circuit, lug 4 on the changeover switch, instead of to the positive filament lead (pin 7) of the 1S5 oscillator-detector tube, lug 9 of the changeover switch.

A 100-ohm resistor R-12 has been connected between R-11 and the selenium rectifier.

Ref. No.	Part No.	Description
R-12	D84101	100 ohms, 2.0 watt, carbon

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

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JOHN F. RIDER, Editor

CURTAIN TIME

TV Antennas

Pay a visit to some TV fringe areas? . . . You'll be surprised . . . TV antennas of the most elaborate variety, mounted atop 40 to 80 ft. poles and towers are serving receivers which cost just a bit more than the antenna installation! The public in TV fringe areas *wants* TV and the servicing industry is giving it to them — and doing a GRAND job . . . And to make the cheese more binding — cheap antennas are not easy to sell in those places . . . The men realize that certain areas require wide-band systems, whereas other places need high-gain single frequency systems . . . They are picky and choosey about what system they select . . . THEY'RE EXPERIMENTING . . . Then they buy in accordance with the PERFORMANCE in that area.

Speaking about performance, we've personally viewed TV pictures around Harrisburg, Pa., which were accomplished with *two* boosters operated in a series! . . . One such booster wasn't enough . . . In the mountainous areas of Eastern Pa., TV viewers are watching pictures on receivers which have their video i-f systems *peaked* instead of the usual wide bandpass . . . Performing this change is the DIFFERENCE between pictures and no pictures . . . Were it not for this modification in alignment by the competent serviceman, TV receivers *would not be sold there!* . . . The Mfgr's engineers may not approve — but since it is a MEANS of satisfying the public demand — and in *no way does it damage the receiver* for realignment in the future; it can't help but reflect credit on the servicing industry for demonstrating the necessary ingenuity to accomplish public satisfaction.

Service Associations

We have just completed a speaking tour among the affiliates of the Federation of Radio Servicemens Associations of Pennsylvania — At present this group includes servicemen in Philly, Wilkes Barre, Allentown, Bethlehem, Easton-Phillipsburg, Scranton, Harrisburg, Williamsport. and Reading; each of which cities has its own local group . . . The co-op spirit is terrific and the attendance, as well as the attention, is to be commended to the fullest . . . Orchids to the group . . . Such organized activities are of very great importance to a manufacturer because it assures his travelling speaker of an audience . . .

ESFETA is the name of the New York State federation of associations of radio servicing personnel. When fully identified it is Empire State Federation of Electronic Technicians Associations . . . Let's hope that they get into full swing soon and set up their lecturers' bureau . . . Right now the headquarters is in Binghampton. Membership is open to accredited service associations . . . For information write to Wayne Shaw, 392 Chenango Street, Binghampton, N. Y. . . . This is a grand step and we hope that the movement will spread across the entire nation. Each state should have its own federation . . . *After* this has been accomplished, *then it* is time to think of a national organization . . . Such procedure will result in a service organization of national scope with the necessary substance to make its efforts and benefits of tremendous value to all the men associated with this branch of the radio and television industry . . . To think about a national organization BEFORE the state organizations have been placed on a solid footing is not only *putting the cart before the horse,* but is actually jeopardizing the local organizations, where in the final analysis the main strength should be found, because virtually all servicemen problems are local issues.

We Are Just Wondering . . .

Will it ever end? . . . Every newspaper talks about the fourth round of price increases . . . In 1941 a 1600 page Rider Manual sold for $12.50 . . . Today it sells for $16.50 . . . That's an increase of about 33 percent . . . Since 1941 paper has gone up 80 percent . . . the binder has increased about 160 percent . . . The binding operation has increased just under 100 percent . . . Editorial makeup cost has gone up about 100 percent . . Printing has increased more than 100 percent . . . When is it going to end? . . . Peace — it's wonderful! . . .

False Rumors . . . Here and there one hears rumors that changes in TV operating frequencies are imminent. These rumors started as the result of the recent FCC freeze on TV frequency allocations . . . Sometimes the comments get back to the public and, like the usual quotations, have been so distorted as to create doubt in the mind of the public about the normal useful life of their equipment . . . Spike these rumors! . . . At least set them right . . . If there are any changes in the near future, they MAY be changes in the allocations made to some of the large cities — like shifting a station from channel 10 to channel 3 — or from channel 11 to channel 10, etc. — Such changes will NOT limit the utility of the present day TV receivers . . .

Admittedly there is a demand for more channels than can be allocated under the present system . . . So there is talk about opening higher frequency channels, perhaps in the region between 475 and 800 mc — But there is one question which must be answered before this can be done . . . Where are the high powered transmitting tubes for sustained operation at these frequencies? . . . To afford coverage like that presently available at today's TV operating frequencies, higher frequency operation will require radiated power of from 20 to perhaps 100 times more — and this is average power — not peak power, such as was used for a fraction of a millionth of a second in radar operations . . . To make the cheese more binding, what broad knowledge is available concerning the behaviour of such high-frequency waves in metropolitan areas? . . . Very little to say the least . . . Allay the fears of the public if you ever hear such comments . . . A television receiver purchased today will have years of useful life . . .

For The Record . . .

At this moment the number of TV receiver manufacturers in *Rider's TV Manual, Volume 2* approximates the 50 mark . . . There will be boosters in the manual. That should answer some questions . . . If the industry thought that our *TV Manual Volume 1* was good — and they did because they said so — then *Volume 2* will be a revelation! . . . Not only double spreads and GIANT PAGES — but TRIPLE SPREADS too . . . And add such names as Belmont, Fada, Andrea, Templetone, Air-King, Tele King, Farnsworth, Capehart, Bace, Magnavox, National — and others to the list of mfgrs. in *Rider's TV Manual, Volume 2.*

JOHN F. RIDER

Effective with this issue, John F. Rider Publisher, Inc. is accepting advertising in *Successful Servicing,* purely as a means of making this publication bigger and of greater service to those who read it. That this advertising is limited is simply the result of there being a definite limit to the number of pages which can be devoted to advertising.

General Electric 41, 42, 43, 44, 45

These models appear on *pages 17-1,2 through 17-15 of Rider's Volume XVII.* A sliding type switch has been added in series with R67 (8200 ohms) connecting the resistor to the phonograph pickup input jack, J3. This switch is on the receiver chassis back apron with its respective label indicating High Fidelity and Normal, the open and closed positions, respectively.

In the replacement parts list under Cat. No. RSS-003, add the item: High Fidelity-Normal switch. ●

Montgomery Ward 64WG-1050B, 1050D, 74WG-1050D

These models are the same as Model 64WG-1050A on *pages 15-75 to 15-77 of Rider's Volume XV,* except for the following changes. The 0.1-μf capacitor C-11, is connected between pin 1 of the 1R5 oscillator-detector tube and the common negative circuit instead of the chassis ground.

In the D models, a 1000-ohm resistor, R-13, is connected between pin 7 of the 3S4 output tube and the common negative circuit. The following should be added to the parts list.

Ref. No.	Part No.	Description
R-13	B84102	100 ohms, 0.05 watt, carbon

Majestic 7BK758

This model is the same as Model 7JK777R appearing on *pages 17-5 and 17-6 of Rider's Volume XVII,* except for the dial scale. The dial scale used is part no. 117-78.

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General Electric 140

This model appears on *pages 17-21 to 17-23 of Rider's Volume XVII.* The following procedure is recommended to replace a speaker in this model.

1—Unsolder leads on speaker, using small tip iron.
2—Unsolder 90-μf capacitor (C14) at terminal strip.
3—Without unsoldering, remove dual 40-μf capacitor (C20) from mounting clip.
4—Using long screwdriver (8 inches or longer) loosen screws holding speaker to chassis.
5—Remove nuts holding speaker to front panel.
6—Lift up left end of resistor mounting plate and then lift out speaker.

If the antenna straps which interconnect the antenna in the receiver cover with the radio chassis circuit break, the following replacement procedure is recommended:

1—Bend up insulating material covering set end of antenna strips by inserting the tip of a long-nose pliers and twisting gently so as not to tear material.
2—Unsolder wires from loop strips in receiver.
3—Remove screws holding door cover.
4—Lift loop at point midway between hinges to expose strip rivets and unsolder loop from loop strips.
5—Remove rivet or rivets as needed, taking care not to damage loop or loop back.
6—Replace broken straps by new members, Cat. No. RCE-002, and rivet it in place with eyelets, Cat. No. RHE-003.

In order to replace the rectifier disc assembly, SR, proceed as follows:

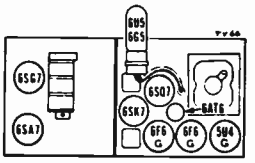
1—Remove two mounting screws from the power switch, S1 (door switch).
2—Dress power switch away from mounting plate, providing more access to underside of top chassis deck.
3—Unsolder leads to rectifier disc assembly.
4—Push aside components underneath rectifier assembly mounting screw until screw can be loosened. ●

RCA QU-62

The top view of this model is shown on *page 17-18 of Rider's Volume XVII.* The tuning capacitor has six sections—C1 and C2 Ant, C14 and C15 R.F., and C11 and C31 Osc. The tube and trimmer location view shows only C1, C14 and C31, which are used on the "A" and "B" bands only.

The following change should be made in the parts list on *page 17-20.* Replace Stock No. 31970 spring with Stock No. 31418 spring—Drive or indicator cord spring.

The instrument label used on some instruments is incorrect in showing tube locations. The r-f shelf assembly should be turned 90° clockwise. The correct tube locations are illustrated in the accompanying diagram.



The correct tube locations for the RCA Model QU-62. ●

RCA QB55X Chassis RC-563-K

This model appears on *pages 17-9 through 17-11 of Rider's Volume XVII.* In some chassis two 2000-μμf capacitors in parallel are used in place of the specified 3900-μμf capacitor C7. ●

The Cover

A radio technician at United Air Lines' San Francisco maintenance base in one of the eight special test cells where radio sets are repaired and calibrated. The aluminum cells are insulated with special copper screening on the top and have every kind of a device to enable thorough testing under a variety of conditions.

Television Changes

Garod 3915 TVFMP

Rider's TV Manual Volume 1 pages 1-1 through 1-7,8 contains the preliminary service data covering the Garod 3912 TVFMP. The television receiver for the Garod 3915 TVFMP is the same as in the Model 3912 TVFMP. The difference between the two models is found in the radio receiver. The Model 3915 TVFMP employs a 9 tube receiver identified as Model 9FMT. The final service data for all these receivers will appear in *Rider's TV Manual Volume 2*

●

Crosley Models 9-408, 9-408(50)

These receivers are substantially the same as Models 307TA and 307TA(50) which appear in *Rider's TV Manual Volume 1 on pages 1-1 through 1-17,18*. They differ in certain parts of the over-all circuit. In the speaker circuit, models 9-408 and 9-408(50) employ a three-prong plug and cabled socket to connect the speaker to the output transformer. Also the hum bucking coil has been omitted. See Fig. 1.

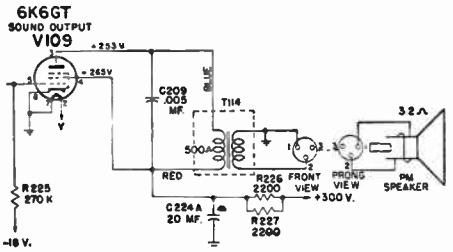


Fig. 1. The speaker circuit of the Crosley Models 9-408 and 9-408(50).

In models 9-408 and 9-408(50) video i-f transformer T102 (two winding) replaces the single-tuned circuit L183 in the grid circuit of the 4th video i-f stage. This introduces a change in the picture i-f and trap adjustments as given in the alignment table on *Crosley TV Page 1-10 in Rider's TV Manual, Volume 1*. Step 9 in the "Adjust" column should read "T102 (top of chassis) adjust for minimum." In addition, the presence of the second winding on this transformer requires an operation which is not necessary in models 307TA and 307TA(50). This operation is done when step 5 in the aforementioned alignment table is performed. The frequency is 27.25 mc and the bottom trimmer on T102 is adjusted for minimum signal on the indicator. See Fig. 2.

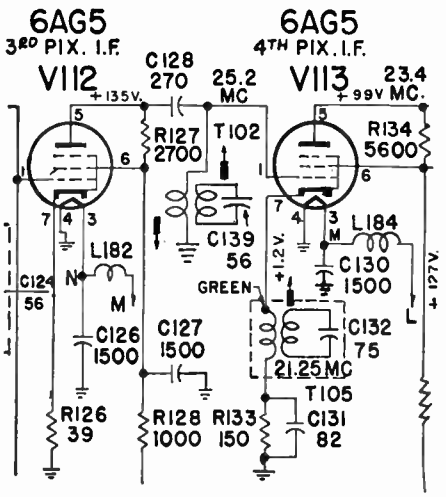


Fig. 2. The third and fourth video i-f stages of the 9-408 and 9-408(50).

Another change in models 9-408 and 9-408(50) is found in the voltage distribution system of the low-voltage power supply units. The two ion trap coils L202 and L203 connected across R232 are removed, including the resistor. See Fig. 3.

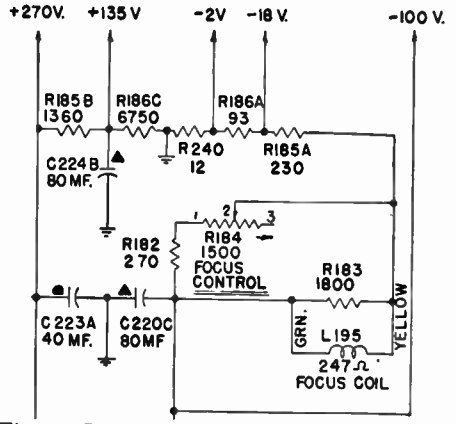


Fig. 3. Low-voltage power supply of the 9-408 and 9-408(50).

A final difference between these two groups of receivers is the use of two f-m traps L81 and L82 in the 9-408 and 9-408(50) series. These are connected as shown in Fig. 4. See trap adjustment data elsewhere in this issue of *Successful Servicing*.

The complete schematic of models 9-408 and 9-408(50) will appear in *Rider's TV Manual, Volume 2*.

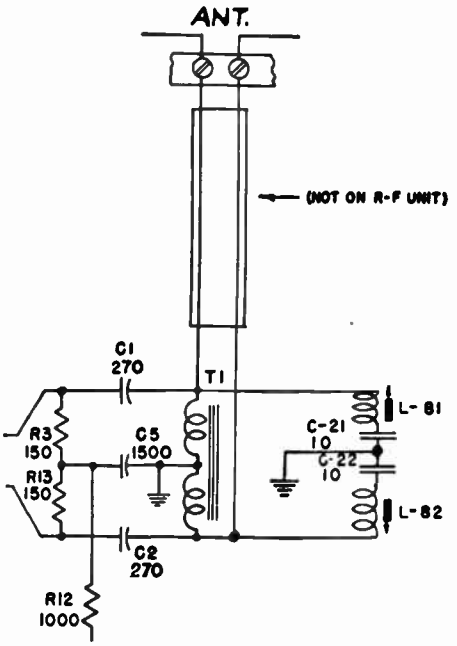


Fig. 4. The f-m traps used in the 9-408 and 9-408(50).

General Electric 802

Refer to *Rider's TV Manual, Volume 1 General Electric TV Page 1-68* and change designation V18A to V18B in Fig. 48 and designation V18A to V18B in Fig. 49. In the paragraph on "Ion Trap Adjustment" on *General Electric TV Page 1-63 in Rider's TV Manual, Volume 1*, the vertical multivibrator tube is referred to as V16 in steps 1 and 3. Change this tube designation to V19.

●

Industrial Television IT-1R Series 2

Realignment for higher gain. It is possible to increase the gain of the video i-f in the IT-1R Series 2 control unit by narrowing the band pass to approximately 3 mc. In marginal areas where low signal levels result in poor pictures, this change is recommended.

The reference schematic will be found in *Rider's TV Manual, Volume 1, IT TV pages 1-3 and 1-4*. The video i-f is realigned according to the instructions given, except that the following frequencies are used:

Stage	Frequency
5	25.7 mc
4	23.4 mc
3	26.4 mc
2	24.3 mc
1	26.0 mc
Sound Trap	21.9 mc

Two turns must be removed from coupling coil L2 in the input of the first video i-f stage, tube V1. Then L3 the output inductance of the input network is retuned for maximum signal output.

The reduction in band pass is not recommended where adequate signal strength is available since the picture quality will be impaired. All possibilities of improving picture reception by adjustment of the antenna installation should be exhausted before such realignment is attempted.

●

U. S. Television Model 15 Inch

The following changes in circuitry have been made since the appearance of *Rider's TV Manual Volume 1*, wherein this receiver is covered on pages *U. S. Tel 1-39* to *1-40*. Resistor R162 (1.5 meg) associated with tube V17 has been replaced by R210 (750K ohms) and R211 (750K ohms). C163 associated with V21 was changed from 0.1 μf to 0.05 μf and capacitor C151 (0.00012 μf) associated with tube V18 has been removed.

●

Hallicrafters T-54 and 505 Picture Synchronization

If the picture moves up and will not center with vertical centering control, replace C73.

If the picture moves down and will not center with the vertical centering control, replace C74.

If the picture moves to the right and will not center with the horizontal centering control, replace C72.

If the picture moves to the left and will not center with the horizontal centering control, replace C71.

The diagnosis by the manufacturer is that leaky capacitors in these locations cause the aforementioned actions.

Television Changes

Crosley Models 9-408, 9-408(50), 307TA(50) Antenna Traps

This model appears on *pages 1-1 through 1-17,18 of Rider's TV Manual, Volume 1.* When the receiver is aligned in the shop, the antenna trap should be adjusted to reject the type of interference which might be encountered at the customer's home. It can be adjusted by actual observation of the interference on the air, or by the use of a signal generator. Two methods of adjustment are possible if a signal generator is used. Select the type of interference and the method to suit the test equipment involved.

Method 1 for channel 6-10 interference. Connect the VT voltmeter to the junction of L188 and R137 (in plate circuit of video detector). Turn the picture control to the maximum clockwise direction. Connect the signal generator to the antenna terminals through a balance network shown on *page 1-5 of Rider's TV Manual, Volume 1.* Tune the receiver oscillator to 109 megacycles with the fine tuning control as determined by the method described for the r-f oscillator adjustment on *page 1-6 of Rider's TV Manual, Volume 1.* Feed in the channel 10 picture carrier of 193.25 mc from the signal generator. Adjust L81 and L82, the two antenna traps, for minimum reading on the VT voltmeter, keeping both cores in about the same position. For final touches, adjust L81 about one-half turn clockwise and readjust L82 for minimum indication of the voltmeter. If this minimum is lower than the previous indication, repeat the operation until the lowest minimum is obtained. If this minimum is higher, adjust L81 one-half turn counter-clockwise and readjust L82. Repeat for lowest minimum.

Method 2 for channel 6-10 interference. With the same setup as before, switch the receiver to channel 3 and tune the receiver oscillator to 87 mc. Feed in a signal of 109 mc from the signal generator and adjust the traps as previously described.

Method 1 for channel 5-7 interference. With the same setup as before, switch the receiver to channel 5 and tune the receiver oscillator to 103 mc. Feed in the channel 7 picture carrier of 179.25 mc from the signal generator and adjust the traps as previously described.

Method 2 for channel 5-7 interference. With the same setup as before, switch the receiver to channel 2 and tune the receiver oscillator to 81 mc. Feed in a signal of 103 mc from the signal generator and adjust traps as previously described.

Method for F-M image interference. With the same setup as before, switch the receiver to channel 2 and tune the receiver oscillator to 81 mc. Feed in a signal of the frequency of the interfering f-m station and adjust the traps as previously described. To adjust the traps by observation of the picture under actual operating conditions, connect an antenna to the receiver and tune in the station on which the interference is observed. Adjust the trap as above for minimum interference in the picture. Since the customer's home antenna will affect these adjustments slightly, in cases of severe interference it may be necessary to retouch the trap adjustments when the receiver is installed in the home.

Transvision Electromagnetic Deflection Receivers

In some cases on the newer models of these receivers which have interchangable CRT saddles, it has been found that the machine screw holding this saddle on the side opposite the tuner sometimes may short to one of the lugs on the adjacent terminal strip. If this happens the brightness potentiometer control will become ineffective.

●

Correction

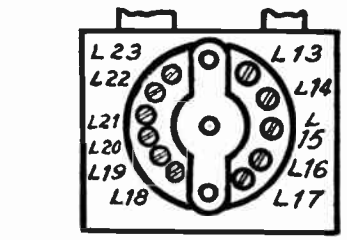
The change notice that appeared in the October-November issue of *Successful Servicing* for the Transvision 12-inch kit should read: In cases where the picture width is not sufficient and replacement of the sweep tubes has not corrected this condition, the 680,000-ohm resistor connected from pin #2 of the 6SN7 horizontal oscillator X-6 to B plus should be checked and replaced if necessary.

The resistor was indicated as going from the horizontal oscillator to ground.

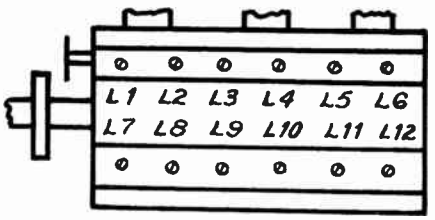
●

Garod 3912 and 3915 TVFMP

Fig. 1 and Fig. 2 give the locations of the alignment adjustments for the TV tuner used in these receivers and shown in *Rider's TV Manual, Volume 1.* The notations conform with the alignment references given on *pages 1-2 through 1-3.*



TUNER FRONT VIEW



TUNER SIDE VIEW

Fig. 1, above. The alignment adjustments reached from the front of the tuner of the 3912 and 3915 TVFMP. Fig. 2, below, shows adjustments reached from the side.

Garod 3912 and 3915 TVFMP Revisions

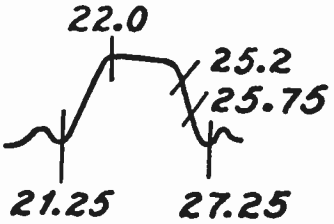
Model 3912 is shown on *pages 1-1 through 1-7,8 of Rider's TV Manual, Volume 1.* Inability to sync the Vertical Hold Potentiometer after the receiver has been on for about an hour can be corrected by making the following changes:

(1) Remove R110 (4.7 meg) resistor from pin 1 to ground of the 6SN7 vertical blocking oscillator tube V24.
(2) Remove R109 (3.3 meg) resistor and replace it with a 1-meg, ¼-watt resistor. The Vertical Hold control should operate through both sides of the "hold" position.

In case of Horizontal Sync troubles, check items R78-R79, R80, R83, C70 and C71 for correct match.

In case of failure of capacitors C51, C72 and C75, all of which are rated at 400 volts working voltage, replace them with 600 volt working voltage capacitors of like capacity rating. Failure of C75 will impair the vertical sweep.

In the event that an examination of the receiver is being made, look for charring of resistors R81 and R82 (10 k, ½ watt). If these are charred or have changed value, replace them. Both are associated with the Hor. Dect. tube, V18.



The over-all i-f response curve of the Garod Models 3912 and 3915 TVFMP.

The input circuit of the R-F tuner contains two F-M traps. These may be tuned within the band of 88 to 110 megacycles to eliminate f-m interference.

6BG6G failure . . . High current flowing in the plate circuit of the 6BG6G may under defective tube conditions cause trouble in the Horiz. Sweep Output Trans. primary circuit. A bad tube may cause the plate current to rise from 250 to 300 milliamperes. After the defective parts have been replaced, protection against such a condition may be attained by connecting a 125-milliampere fuse in series with the 100-ohm resistor in the cathode circuit of the 6BG6G tube. This fuse should preferably be located between the resistor and its connection to the chassis.

The over-all i-f response curve for these receivers is given herewith.

●

Hallicrafters T-54 and 505

The alignment frequencies shown in the top view on *Hallicrafters TV page 1-1 of Rider's TV Manual, Volume 1* have been changed. The 25.5 mc i-f adjustment should read 25.0 mc and the 23.5 mc i-f adjustment should read 23.3 mc.

In Retrospect

(*Continued from page 2*)

received added impetus during 1948. One such federation was formed in New York State and discussions with associations in other states who are interested in forming federations in their states was carried on by representatives of the New York and Pennsylvania organizations. In this connection, a very progressive step indicative of sound thinking was demonstrated when these federations opposed the formation of a national association of radio servicemen, because they felt that the time was not yet propitious for such a venture. They were unanimous in their opinions that national activity should not procede until statewide federations had made sufficient headway. They felt that national associations based upon individual man membership would conflict with the growth of local and statewide groups. In our estimation — and we have observed the various movements which have developed over the past 20 years, the judgement of the state leaders is well grounded.

Supply and Demand of Servicemen

There can be no denial of the fact that more servicemen are active today than ever before. The year 1948 — a period sufficiently far removed from VE and VJ Days to permit a conclusion — can be said to have proved that the frequently quoted threat of competition from armed-forces trained GI's or those who enrolled in the numerous technical educational institutions has not come to pass. In fact it is safe to say that such a threat does not exist and if we can use 1948 as a barometer of events, the possibility of such a threat developing in the next few years is very remote.

Admittedly many schools have graduated many technicians; but it is also true that many enrollees never completed their courses of instruction. The tremendous expansion of technical production facilities of all varieties, not necessarily associated with radio or television although in the electronic field, has absorbed a comparatively great number of personnel. Then along came the expansion of television with its demand for personnel. Unlike conventional blind radio equipment, TV receivers require installation, an activity heretofore productive of negligible demands on personnel. In fact an installation demands the services of two. people. Add to this the need for technical servicing people, and finally the definite limitation in time allowed for the accomplishment of a repair and it is very easy to see why there should be an actual shortage, rather than an overbundance of service facilities. This despite the fact that the ranks have been augmented by technical school graduates.

Recognizing that the distribution of TV receivers is still at the very bottom of the hill of sales, the likelihood is that for the next five years at least, there will be a continual demand for competent servicemen. As a matter of fact, if the recently announced (Dec. 1948) TV carrier synchronization development of RCA becomes a reality by being used nationwide, as it now is used between stations WNBT in New York City and WNBW in Washington D.C., the expansion of TV facilities will receive a tremendous push. This development enables two or more stations on the same channel to operate with synchronized carriers, thereby eliminating interference at receiving points between the two stations. Moreover it will permit the erection of many more stations within the present structure of channel allocation. Today the number of channels are limited in any one area because of possible interference from other stations operating on the same frequencies at locations not too far distant. With this new plan, stations on the same frequency could be located closer together, thus enabling the erection of stations on identical channels within areas now prohibited by virtue of interference.

Of course the problem of receiver manufacturing still exists — that is, the production of sufficient glass blanks for the picture tube, but like every other production problem in this nation, this one too will be solved. The net result will be a tremendous increase in the sale of receivers, for the necessary transmission stations will become available in many locations which are shy TV facilities today. All in all, it is a safe guess to say that if anything will happen, it will be a shortage of servicemen.

AM-FM

1948 can be said to be the year when public discussion relative to the destiny of AM and FM took place. That it should occur is not strange in the light of TV. It would be silly to deny that the latter has had an effect upon the former; advertising revenue at the AM stations is being threatened, whereas advertising revenue at the TV station is on the upswing. Artistwise, more and more of the top artists of show business and the movies are getting on the band-wagon of TV. Of course the sledding of the TV station is not always smooth; they too have their problems, but there are few if any people who envision anything but forward motion.

But back to the AM and FM situation — that is, receivers for the reception of such blind broadcasting. At the outset the TV set owner sits in front of the screen every waking hour, but after a while, at least the grown ups become rational and more selective of the programs. The result is that the conventional receiver again begins to see some use. As a matter of fact the human eye requires a rest from the TV screen image. Inasmuch as the commentary accompanying a video transmission is of necessity much less than that in the usual type of programming for blind radio where the speech and the sound effects must create the illusion of the action, it is not so simple to just turn down the video and listen to the sound. Maybe it will be someday but it isn't so now. So, the old standby receiver still sees much use in the daytime —in the bedroom or the kitchen or the living room.

Then we must recognize that new cars are being made each year and that each of these requires a car radio . . . Also that replacement of existing car sets is still necessary . . . Then there is the usual sale of radio receivers to those people who have TV but still listen — or to those people who are still far removed from TV facilities. After all, no matter how rapid the expansion of transmitting facilities, years will elapse before the nation will be blanketed by TV broadcasting. Nationwide TV coverage will undoubtedly require chain type of broadcasting, especially if synchronization of carriers is accomplished. Finally the human being does not change too rapidly, twenty eight years of blind radio broadcasting has created habits of life which will remain for quite awhile . . . There may be a reduc-

(*Please turn to page 16*)

Television Carrier Synchronization

A recent news release from RCA announces that after extensive engineering, they have accomplished synchronization of the television carriers of stations WNBT in New York City and WNBW in Washington. Operation of these two TV stations now is being carried on in this way, with the result that localities which may have experienced interference from TV stations operated on the same frequency now are due to receive pictures free from such interference. According to the release this also enhances the possibility of operating a greater number of stations on the same channel, which would certainly be a boon to all those people who desired television, but were destined to be denied that service for a long time because they lived in remote areas.

●

Hallicrafters T-54 and 505 Run 2

Run #1 of these receivers is contained in *Rider's TV Manual Volume 1 on pages 1-1 through 1-29,30*. The following differences are to be found in Run #2 of this receiver. Resistor R58 associated with the oscillator tube V14 now is 3300 ohms and rated at 10 watts. R116 originally used has been removed.

R83 associated with V18 the vertical oscillator now is 560,000 ohms instead of the original 680,000 ohms.

C73 and C74 in the output circuit of the vertical amplifier V20 now are 0.03 μf each instead of the original 0.05 μf each.

R108 connected across the heater of V2 now is 120 ohms instead of the original 68 ohms.

C17, the video output capacitor, now is 0.1 μf instead of the original 0.25 μf.

R40 the grid leak for V9 now is 18,000 ohms instead of the original 27,000 ohms.

R33 the grid leak for V7 now is 18,000 ohms instead of the original 27,000 ohms.

R39 the grid leak for V8 now is 12,000 ohms instead of the original 27,000 ohms.

The circuits of V3 and V4 the 1st and output audio stages have been modified to circuits shown herein. The greatest change is found in V3, where the tube now used is a duo-diode triode instead of the original pentode. In the case of the output stage V4, the only difference is the addition of a 10-μf electrolytic capacitor, C98, rated at 25 volts across the cathode resistor R25. The change to the duo-diode triode for V3 results in discarding capacitor C24 and resistor R22. Naturally there is no screen voltage to be measured. This should be remembered when using the reference voltage table for these receivers.

Identification of Run 2 of this receiver, and other runs as well, is on the chassis.

●

GE 41, 42, 43

These models appear on *pages 17-1,2 through 17-15 of Rider's Volume XVII*. The following changes should be made. Add Cat. No. REF-003, line fuse F201, 3AG, 5 amp., 250 volts, to the parts list and add this to the schematic diagram of the Special Power Unit on *page 17-3*. The fuse should be placed in series with the power transformer primary and the power cord. Besides the addition of a fuse, the safety will be further increased by placing a sheet of asbestos underneath the power unit to cover the ventilation slots. Thus, even in the case of overload, the hot tar of the over-heated transformer is prevented from dropping on the floor.

Add Cat. No. RSV-001, Switch—power ON-OFF switch to the parts list. Replacement is readily made by merely bending the mounting taps.

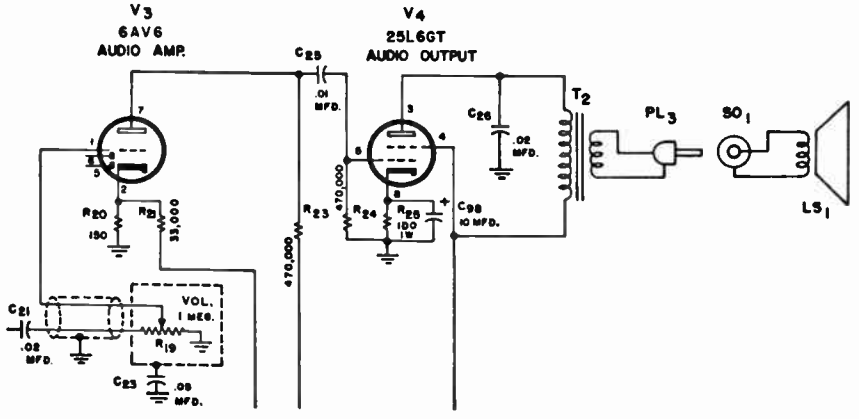
To adjust for minimum hum level, turn the volume control until the audio output is zero and vary resistor R201 (which is parallel to the filaments and center-tapped to the chassis, forming an effective hum balancing circuit).

GE 140

●

This model appears on *pages 17-21 through 17-23 of Rider's Volume XVII*. The following changes should be made in the parts list: From Cat. No. RAD-027 remove the statement "(with loop connecting strips only)." Change Cat. No. RCC-075 to read RCC-080. Delete Cat. Nos. RDK-098, RHC-008, and RMX-103. Add the following parts.

RDK-106	Knob—door catch knob
RCE-002	Strap—loop contact strap
RHE-002	Eyelets—spacer eyelets for escutcheon screws RHS-016
RHE-003	Eyelet—used for loop contact strap
RHR-002	Rivets—door hinge rivets (power cord access)
RHS-015	Screw—self tapping (used for cabinet door cover)
RHS-016	Screw—Phillips, flat-head, mounts bottom of escutcheon



The audio stages of Run 2 of Hallicrafters T54 and 505.

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Television Changes

Industrial Television Receiver Service Hint

Correction of grid-cathode shorts in CRT. Some cathode-ray tubes after a period develop grid-cathode leakage, as evidenced by an apparent lack of d-c restoration and poor or no control of brightness. This is usually caused by a small piece of semi-conducting material dropping into the gap between the grid cylinder and the cathode shield.

This condition can be cured in many cases by gently tapping the tube neck with a very light rubber-headed tapper, such as an ordinary pencil with a rubber grommet forced over one end of it. In cases where tapping is ineffective, another method has been found to be practical. This is as follows:

1. Set the brightness control at about the midway position.
2. Ground the grid of the cathode-ray tube.
3. Connect an insulated wire to the vertical B-plus supply, available at the vertical positioning control.
4. *Very carefully momentarily touch* the B-plus wire on the arm of the brightness control.
5. Check operations of the brightness control.
6. Remove the wire from the B-plus connection. remove the ground from the grid of the cathode-ray tube and reset the controls.

If one application of this suggestion fails to clear the trouble repeat steps 1 through 5 until the brightness control operates properly. The B-plus lead must NOT be left on the arm of the brightness control for more than a fraction of a second, or the control may be burned out or the cathode-ray tube damaged. This procedure has been used successfully in several cases by the test and service department of Industrial Television and saved replacement of the cathode-ray tube.

A-M interference on IT Receivers . . . Amplitude modulation interference is characterized by clearly defined straight diagonal or vertical bars or lines across the picture. There are two possible sources of a-m interference in TV receivers located close to an a-m station. The first and foremost, easily corrected, is cross-modulation in the input stage, due to overload of this stage by the a-m signal picked up by the antenna or lead-in. The second one is picked up by the interconnecting cables between the control and picture units.

The first step is to determine the cause of the interference. If the trouble is cross-modulation in the r-f system, the interference will be a constant percentage of the video signal and will change equally with the picture as the control unit contrast control is operated. If the interference is being picked up on the interconnecting cables. its intensity will not vary with the rotation of the control unit contrast control.

In the case of cross-modulation in the input stages, a simple high-pass filter is usually effective. This filter is installed in the antenna lead-in, as close to the control as possible, and must be shielded. A suggested circuit is shown in Fig. A.

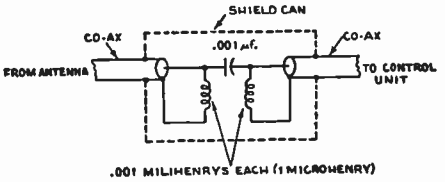
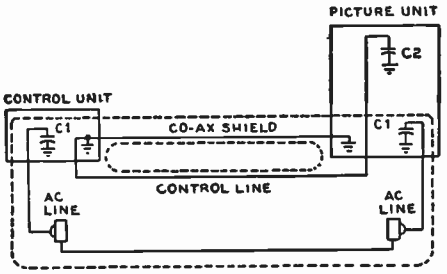


FIGURE A

High-pass filter to correct cross-modulation.

Where the interference is being picked up by the interconnecting cables the cure may be more involved and difficult. The cause of this interference may be from direct pickup of the interfering a-m signal by the shield of the co-ax cable, or it may be introduced by a "pickup loop" type of circuit, as shown in Fig. B. The alleviation of the interference may require trying several different techniques. Here are a few which should be tried.

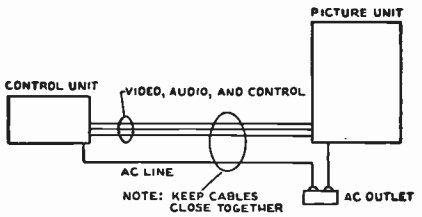


WHERE C1 IS PRIMARY-TO-GROUND CAPACITANCE OF POWER TRANSFORMER, AND C2 IS COIL-TO-GROUND CAPACITANCE OF CONTROL RELAY. LOOPS ARE INDICATED BY DOTTED LINES.

FIGURE B

"Pickup loop" circuit shown may introduce interference.

1. If the installation is close to an a-m station, keep the control unit and picture units as close together as possible and the interconnecting cables as short as possible.
2. The simplest method, which can be used only where relatively strong TV signals prevail, is to reduce the contrast control in the picture unit and bring up the contrast control in the control unit to compensate. This increases the level of the video signal on the co-ax cable and increases the signal-to-interference ratio.
3. Bypass the a-c line to ground at either the control unit or the picture unit, or both.
4. Ground the control unit, the picture unit, or both to the nearest cold water pipe, using heavy wire or flexible braid. Keep the ground lead as short as possible.
5. Run a heavy (#00) armored ground wire from the control to the picture unit, bonding carefully at each unit.
6. Operate both picture and control units from the same a-c outlet, keeping the a-c line as close to the co-ax as possible. See Fig. C.

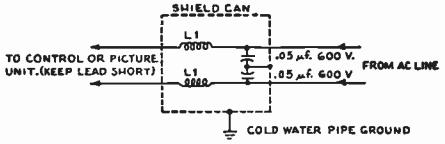


NOTE: THIS MAY BE REVERSED, FEEDING AC FROM OUTLET NEAR CONTROL UNIT.

FIGURE C

This connection may reduce interference from the interconnecting cables.

7. Isolate the control and/or the picture unit from the a-c line. See Fig. D.



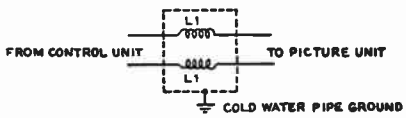
L1 - 100 TURNS # 14 DOUBLE COTTON COVERED WIRE, LAYER WOUND ON ½" DIA. WOOD OR BAKELITE FORM (ABOUT 5 LAYERS, 1½ LONG), VARNISH OR WAX IMPREGNATED.

FIGURE D

Control unit may be isolated as shown here.

8. Isolate the relay control line as in Fig. E, by inserting an isolation unit in series with the control line near the control unit.
9. Use a double shielded co-ax, such as RG-6U or RG-42U between the control and picture units in place of the RG-59U. Ground the inner shield to both units, and ground the outer shield to either the control unit or the picture unit.

(Signed) Charles M. Puckette, Jr.
Svc. Mgr.



L1 - SAME AS IN FIGURE D

FIGURE E

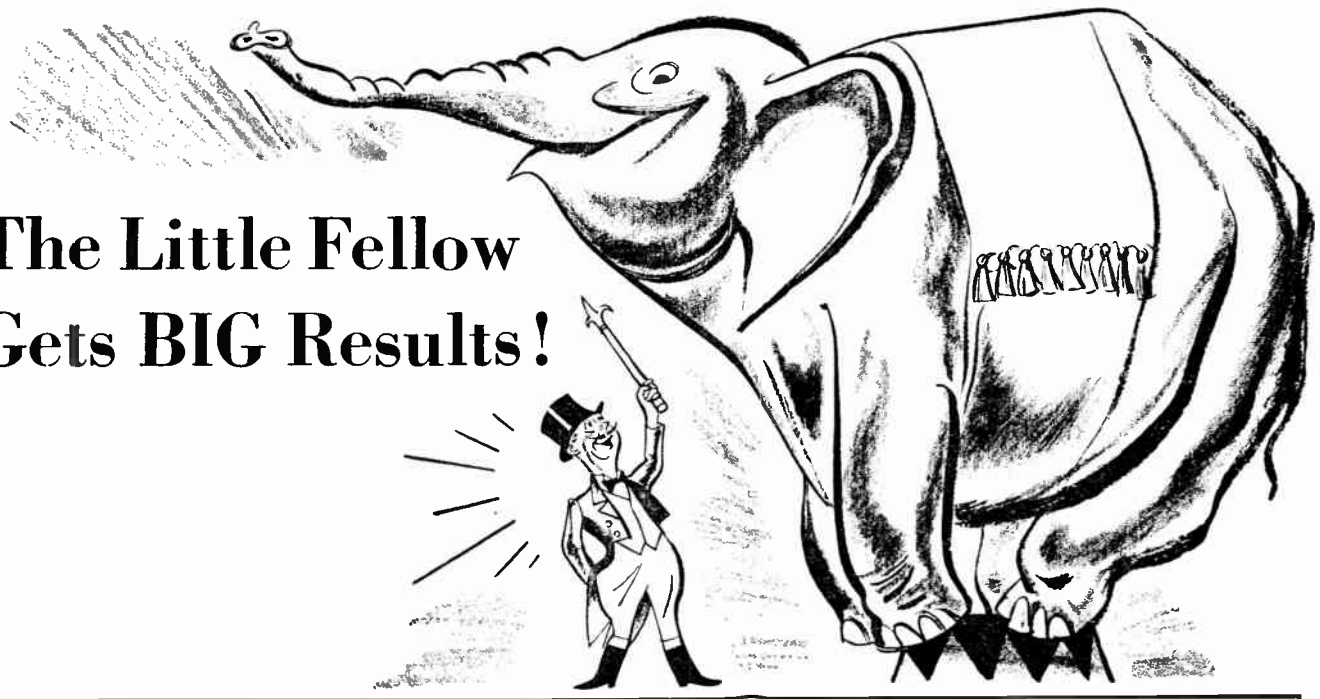
The relay control line may be isolated in this manner.

●

Hallicrafters T-54 and 505

This model appears in *Rider's TV Manual, Volume 1, pages 1-1 through 1-30.* Poor 7JP4 Kinescope brightness is usually the result of low anode voltage. Adjustment of the anode voltage to the recommended 4700 volts is described in the service data; however this may result in the observed picture being "folded-over" horizontally, particularly on the left hand edge. When increasing the anode voltage, set the width control to just fill the screen along the horizontal direction and increase the high voltage until a fold-over occurs. Then readjust the width control and repeat the voltage adjustment until maximum voltage is applied without a fold-over.

The fold-over indicates that the horizontal sweep limits have been reached. Changing horizontal oscillator or amplifier tube or tubes may provide higher sweep limits, allowing a higher kinescope anode voltage to be used.



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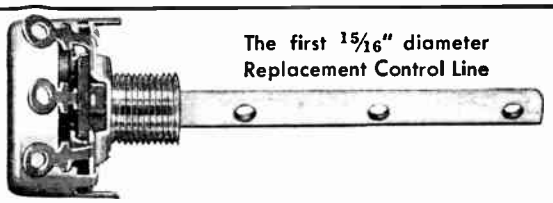

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Television Changes

General Electric 502

This model appears on *pages 17-39, 40 to 17-47 and 17-4 to 17-7 of Rider's Volume XVII.* To increase the sensitivity at certain points on the broadcast and short wave bands, a 470-$\mu\mu$f capacitor, C137, Cat. No. UCU-544, has been added between terminals 3 and 5 of the first i-f transformer.

Early production sets without this capacitor may be changed as follows. This capacitor should be added between terminals 9 and 10 of wafer number 6 on the band switch. The orange, green, and black leads from terminals 5, 3, and 8, respectively, from the first i-f transformer to the band switch should be grouped together and pressed to the chassis. The ground end of C108, a 0.02-μf bypass capacitor should be removed and grounded under the mounting lug of the first i-f plate coil.

●

Authentic Manufacturers' Data is Vital

It has always been our claim that service data concerning a product should be prepared in accordance with the producing manufacturer's requirements. He built the unit — knows what changes were affected in circuitry between the different production runs — can quote average figures for operating voltages — knows the exact operating procedure for alignment — in fact, knows the product. *Rider Manuals* have consistently reproduced the manufacturer's OWN data, therefore supplying to the servicing fraternity, the OFFICIAL — AUTHENTIC information . . . This is one of the many reasons why *Rider's Manuals* have proved so valuable and profitable to the radio servicing industry during the past 18 years.

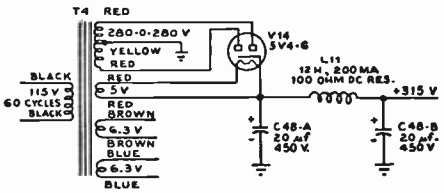
Now with television booming at a terrific rate — this is MORE IMPORTANT THAN EVER! . . . Many, many conditions have contributed to great numbers of CHANGES in television chassis . . . The extent of these changes is an unknown quantity — yet every change is vital to the radio servicing industry . . . For example in the forthcoming *Rider's TV Manual Volume 2,* we show SEVEN DIFFERENT CHASSIS FOR THE SAME MODEL NUMBER — each of these chassis representing changes in circuitry and values made by the manufacturer during the production runs . . .

Other manufacturers may show three and four different schematics for the same model number or for different production runs . . . No matter how you look at it — there is ONLY ONE source of reliable service data — the original equipment manufacturer's service manuals as they appear in *Rider's Manuals!* . . . Remember It's Factory Authorized!

●

Industrial Television IT-1R Series 2

Modification of Power Supply. This change should be noted in your *Rider's TV Manual, Volume 1 pages 1-3 and 1-4,* in connection with this receiver which is shown therein. The change shown herewith has been made in production, but it should not be made in the field unless it is found necessary. If performance is satisfactory, do not make the change.



Modification of the power supply of the Industrial Television IT-1R Series 2.

Change in Video detector Circuit to improve gain. This change has been made in production. In the 5th video i-f stage the shunt peaking coil L9 should be replaced by a 6.8k-ohm, 1.0-watt resistor and R27 should be replaced by L9. In other words, this change is a simple transposition of L9 and R27. However it is necessary to realign the 5th video i-f stage at 25 mc.

●

Hallicrafters T-54 and 505

These models appear on *pages 1-1 through 1-29,30 of Rider's TV Manual, Volume 1. Type 6C4 tube failures . . .* It has been found that the probable cause of type 6C4 tube failures in this model receiver is that the tubes made prior to this year were made with filaments which were incapable of withstanding the surge voltage in a series filament circuit. Accordingly all T-54 and 505 receivers made since September 24, 1948 employed recently manufactured tubes. The major part of the Hallicrafters stock of recently made tubes were purchased from RCA, therefore any RCA tube made since March 1948 is supposed to be able to withstand the surge in such a series filament circuit.

The date of manufacture on RCA tubes can be identified by the RMA data number which appears under the "Made in USA" label. The first of these numbers indicates the year, the second the week; for example 8-35 means that the tube was made during the 35th week of 1948. It is recommended that each T-54 and 505 receiver received for service be checked to see that the type 6C4 tubes are of the later type. If they are not, then they should be changed immediately. Only new types of tubes will be shipped from the Hallicrafters Service Department ,if the orders are sent there, and reference to "New Type" will not be required.

Since the old type 6C4 tubes removed from such receivers are suitable for use in the conventionally-wired parallel circuits, such replaced tubes can be put into regular use in other receivers with parallel wired filament circuits or in other positions in the TV receiver where such type tubes are used.

●

Industrial Television IT-3R

This receiver is shown in *Rider's TV Manual, Volume 1, pages IT 1-13 and 1-14.* The first audio amplifier, originally a 6SN7GT has been changed to a 6SL7GT. This modification affords increased gain and higher level of undistorted output; however it should not be made unless the audio output using the original tube is considered insufficient. No wiring changes are required for the substitution of these tubes.

Starting with serial number 420, the 1Y2 high-voltage rectifier tubes have been replaced by 1B3-GT/8016 tubes. In addition, the two filament resistors R166 and R167 were changed to 3.3 ohms each. When it becomes necessary to replace the 1Y2 tube now in service, the replacement should be a 1B3/8016. The new production utilizing the 1B3/8016 will contain octal sockets instead of the 4 prong used previously. Some sets have been shipped with adaptors to make the aforementioned socket change.

●

Hallicrafters T-54 and 505

The service data on this receiver will be found in *Rider's TV Manual Volume 1 on pages Hallicrafters 1-1 through 1-29,30.* The following changes should be made on all T-54 and 505 receivers received for service.

Change oscillator injection capacitor C75 from 0.68 $\mu\mu$f to 1.5 $\mu\mu$f, Part No. 47A160-3. This effectively raises the r-f gain with a considerable improvement on channel 7. Realignment may be necessary.

All Micamold or Industrial 6000-volt, high-voltage capacitors should be removed and replaced with Cornell-Dubilier or Chicago Television types.

Resistors R58 and R116 should be changed to a single 3300-ohm, 10-watt wire wound resistor, Part No. 24BG332E, and mounted on the top of the chassis, using a two terminal tie lug, Part No. 88B291. There is a convenient hole for mounting this tie lug on top of the chassis directly under the neck of the picture tube.

Change resistor R73 from 18 ohms 2 watts, to 18 ohms, 10 watts, Part No. 24BG180E. If this resistor is not on top of the chassis, it should be mounted behind the selenium rectifier bracket using one terminal of tie lug Part No. 88B291.

If resistor R107, 10 ohms, 10 watts, is not on top of the chassis, it should be placed there by mounting it in back of the selenium rectifier bracket across the two terminals of tie lug Part No. 88B291, which was added previously.

A 10-μf, 25-volt electrolytic capacitor. Part No. 45A121, should be added as a cathode bypass for the 25L6 (V4) audio output tube. This raises the audio gain by 6 db and should be made only on sets which use a type 6AV6 audio amplifier tube.

It is possible that some of these changes already exist in the receivers which may come in for service, having been made at the factory. The action then is obvious.

●

Hallicrafters T-54 and 505 Weak Channels 2, 7 and 8

Change C35 the oscillator coupling capacitor from 0.68 $\mu\mu$f to 1.5 $\mu\mu$f. See note elsewhere in this issue relative to the correct part number.

In Retrospect

(*Continued from page 10*)

tion in the price levels of the AM and FM receivers which will be purchased by the public, but they'll still buy them.

Taking all these things into account, the servicing industry will still be called upon to service such equipment. The year 1948 in New York City where six TV stations are operating, one of them starting at 7:00 AM (heaven knows why) has demonstrated to the servicing facilities that AM and FM receivers are still failing and still being repaired.

Such are the highlights for 1948 as we see them influencing the servicing industry. If we've omitted any items which you may think were important and deserved comments, our sincere apologies. Anyway the space was limited; receiver changes still remain the most important part of *Successful Servicing* . . . Before closing **Happy New Year!**

●

Rider's Volume XVIII To Bed Volume XIX is Next

Volume XVIII now is rolling on the presses. The last form was put to bed several weeks ago and when the run comes off about 30,000,000 pages will have been printed for this manual. Completed it contains the products of over 110 manufacturers in its 2036 pages. These products are a-m receivers, f-m receivers, auto radio receivers, and record changers . . . The makeup of this volume posed quite a problem. The amount of material on hand was tremendous. Even with *Volume XVIII* crammed as much as possible, we still have on hand almost 2000 pages of factory authorized service data.

Now that *Volume XVIII* is on the way, we shall soon announce *Volume XIX*, which will contain between 1500 and 2000 pages of a-m, f-m, auto radio and associated equipment data . . . Watch for announcement next month. With the issuance of this manual, we will have released to the radio repairing industry the world over, approximately 31,000 pages of service information . . . No other single source of American radio and allied industry service information can even remotely approach this tremendous coverage.

Rider Manuals now are divided into three groups — the regular *Manuals* — the *TV Manuals* and the *PA Manuals* . . . Each of these embraces a different classification of servicing data so as to serve the needs of the radio repairing industry . . . No purchaser is burdened with material he does not need. If your area does not yet have television, you can buy the regular *Rider Manuals* with the full realization that it does not contain TV data which you cannot use.

If you are interested in TV only, there is *Rider's TV Manual Volume 1* with *Volume 2* now in the process of production . . . If you are interested in PA operations, you now have available in *Rider's PA Equipment Manual Volume 1* service data on PA equipment manufactured in the past 10 years. Whatever classification of service you may be doing—*Rider's Manuals* are ready to service you just as they have done for the past 19 years . . . Keep your files up to date — remember, all of the information is factory authorized.

Part of the audience at Harrisburg, Penna., who heard John F. Rider deliver a lecture on Nov. 15 under the auspices of the Mid-State Radio Servicemen of Central Penna.

●

Understanding Vectors and Phase

Sometime ago we introduced this book to the servicing industry and to the educational field as a whole. If we talk about it, we'll be blowing our own horn — so, here are the comments of two representative organizations — a school and the reviewer of a highly representative monthly magazine . . . We have many more like these.

From the *General Electric Review*—May 1948

"The authors of this short book have sought to describe in simple, monmathematical language the methods and basis for representing the relationships between sine wave currents and voltages in electrical and electronic networks in terms of rotating vectors: and in this respect, they have done an admirable job of presentation . . ." (K.O. Straney) — and from Hardin College School of Radio and Electronics, Wichita Falls, Texas —

"Your handling of these two subjects which are of tremendous importance to the working knowledge of radio is unique, basic and well prepared. The fact this book can be used profitably if studied by men in the field does not detract from its use as a text in service schools. It's adoption in our school has strengthened the presentation of a mathematical background so essential to success in any phase of radio."

(Signed James H. Sligar
Director of the School of Radio and Electronics—Hardin College)

●

RCA QU-62 Chassis RC-602B

This model appears on *pages 17-13.14 through 17-20 of Rider's Volume XVII.* It has been found in some cases that the shielded wire (green) connecting to terminal 12 of S-5 Front has been making intermittent contact with other terminals, resulting in a "noisy when tapped" condition. To prevent future cases of such trouble, a piece of insulated sleeving is added to this shielded wire.

To reduce the tendency to howl on short wave, a viscoloid damper is cemented midway and across the two exposed stator plates (rear) of the oscillator tuning capacitor (C11) and to the frame of the tuning capacitor.

To correct the physical alignment of the tuning capacitor, two spring lockwashers are added under the rear mounting foot of the tuning capacitor.

Courtesy General Electric Co.

CONTRACT TV SERVICE

By John F. Rider

Although the comments made herein are born of conditions around New York City, there is no doubt in our minds that equivalent situations do, or will, exist in other communities where TV transmitters operate.

The picture is, simply, this. TV manufacturers are being forced to deal with the user because independent TV service stations are very reluctant to handle contract TV service. On one hand, the set dealer sells the service contract, while, on the other hand, the service facility is unhappy about handling the work. The contention of the servicemen is that the fixed annual fees which prevail are not sufficiently high to ensure a profit. Although most people have learned to like the service insurance idea, they are rebelling against paying much higher annual fees. Finally, because some receiver manufacturers feel that such annual trouble insurance contracts should exist, the other manufacturers are very hesitant about instituting any contrary program. This attitude is very understandable.

What can be done about this situation? That is the 64-dollar question. To us, it seems that the main difficulty is the open sesame the contract gives the consumer for calls on the service station. If these calls were reduced in number over the year, the annual contract fee might become sufficient. We are told that service calls due to actual failures in the receiver are in the minority. Under the circumstances, the solution revolves around the installation and the receiver owner.

Installation of TV Receivers

Let us first tackle the problem of installation. There is no valid reason for the tie-in sale of an antenna installation and the annual service contract. To us it seems as if these two should be divorced. It is true that both can be handled at the same time, but they should be distinctly different deals. The antenna installation can be contracted for at the time of the receiver sale—but service insurance should be a separate contract. The same individual can handle both, of course, but the contracts should be kept apart.

If the contracts are handled in this manner, the over-all psychological effect will be better. Moreover, this system affords greater latitude for change in antenna costs dictated by location requirements or increased antenna prices. It is entirely conceivable that the antenna installation costs be far greater than the normal over-all annual fee. From our conversations with prospective purchasers, as well as TV receiver owners, they can readily understand a breakdown between in-

(Please turn to page 13)

RCA 711V2

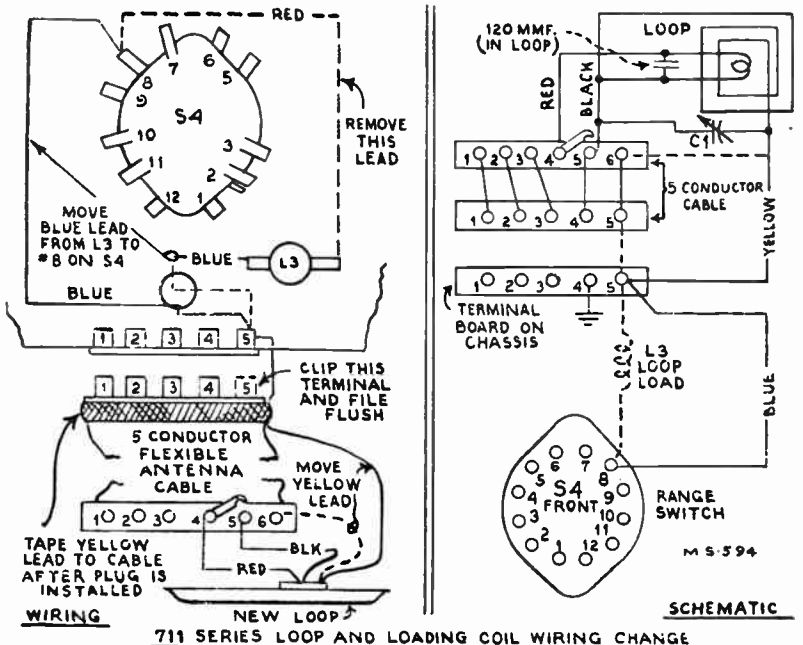
This model appears on *pages 17-44 to 17-55 of Rider's Volume XVII.* Interference has been noted on the broadcast band in certain localities. This interference appears in the background of certain stations or between stations, and generally takes the form of code or amateur voice. An abnormal quantity of whistles when tuning across the band is also present. Connecting an external antenna to the set merely makes the condition worse.

A production change has been made to overcome this condition. Receivers having this change may be identified by the letter L following the serial number on the radio chassis. The antenna coil L3 has been removed and a different loop antenna installed. These changes may be made as follows.

1. Remove radio chassis.
2. Refer to illustration and remove the red lead connected from the loop loading coil L3 to terminal 8 of S4.
3. Unsolder the blue lead from loop loading coil L3 and connect this lead to terminal 8 of S4. L3 may be left in the chassis without leads connected to it.
4. Remove the loop cable from loop and from the terminal board on the rear of the cabinet.
5. Remove the lug from the end of the yellow loop lead and solder this lead to terminal 5 on the antenna terminal board on the radio chassis.
6. Re-install the radio chassis.
7. Clip off pin 5 on chassis end of the five-conductor flexible antenna cable and file the remainder of the pin smoth with surface of plug.
8. Plug the five-conductor cable into the antenna terminal board on chassis (see sketch). Note that with one pin removed, the plug can be moved one pin to the right and plugged in, making incorrect contact.
9. Carefully pull the yellow lead downward along the five-conductor cable far enough to permit taping it to the plug portion of this cable to prevent the yellow lead from breaking at the soldered joint at terminal 5 when flexed by opening of the radio door.
10. Connect the red and black loop leads to the rear terminals 4 and 5 respectively from which they were originally removed. Close link from 4 to 5 if an external antenna is not used. If an external antenna is used, it may be connected as described on *page 17-54 of Rider's Volume XVII.*
11. Remove the screw from terminal 6 in the antenna board on rear of cabinet to avoid improper connection in the future.
12. Remove the old loop and install the new loop in its place.
13. Plug the loop cable into the new loop.
14. Peak the loop trimmer on a weak station around 1400 kc.
15. If a test oscillator is available, the low-frequency oscillator core (L12) adjustment should be made while rocking the gang through 600 kc, to obtain maximum output. Repeak loop trimmer again at 1400 kc.
16. Grounding one of the the f-m antenna terminals (connect terminal 1 to 5) on the board on the rear of the cabinet may prove advantageous to reduce excess signals if an external f-m antenna is used.

NOTE: The new loop referred to above may be identified by a green paint dot on one metal mounting bracket. Also, the large coil has 20 turns of wire with only a few turns, or no turns, visible through the holes near the edge of the loop frame. The original loop contains 13 turns, all of which are visible through the holes near the edge.

The leads which are not shown in the accompanying diagrams need no change.



711 SERIES LOOP AND LOADING COIL WIRING CHANGE
(BROKEN LINES INDICATE ORIGINAL WIRING REMOVED)

Necessary connections for the new loop for the RCA model 711V2

Delete 71863 cable from the parts list and add the following.

73250 Cable—five-conductor molded antenna lead in cable
71614 Capacitor—120 μμf, ceramic — in shunt with the loop primary
73480 Loop—antenna loop complete. For receivers without loop loading coil.

RIDER MANUALS *Mean* SUCCESSFUL SERVICING

Sears Roebuck 6362, 6363, 6364, Chassis 101.581

These models appear on *pages 11-64, 11-80, and 11-82 of Rider's Volume XI.* If frequency shift in the a-m band occurs, the following should be done. Remove the screw and mica and bend up the leaf of the capacitor shunted across the a-m oscillator trimmer capacitor C23. Replace this part with a 15-μμf, 10% ceramic capacitor. Then realign the a-m band as outlined on *page 11-82 of Rider's Volume XI.* This change is being incorporated in the present production of these models.

●

Majestic 12FM782, Chassis 12C20E

This model is the same as Model 12FM778, Chassis 12B26E, appearing on *pages 17-27, 28 to 17-33 of Rider's Volume* XVII, except that it does not have push-buttons and indicator lights for "Records and "F.M."

The following additions should be made to the parts list.

Part #	Description
115-45-2	Cabinet—console combination
21-32	Changer, oak
22-43	Speaker, 12" including output transformer
20-27	A-m loop antenna (less cover)
122-20	Escutcheon glass (large)
122-44	Dial grill
128-37	Knob (vol-tuning-tone)
128-85	Knob (band switch)
128-46	Spring insert for above knob

●

Automatic Projection 215

This model appears on *pages 1-1 through 1-14 of Rider's PA Manual, Volume 1.* The corner cards and index erroneously read model 315.

●

General Electric 230 Kaiser-Frazer

This model appears on *pages 18-27 through 18-28 of Rider's Volume XVIII.* The change involves a substitution of catalog numbers in the replacement parts list as follows:

Cat. No. URE-035 and URF-055 are catalogued for carbon-type resistors. These numbers are to be replaced for numbers specifying wirewound resistors, RRW-037 becoming the Cat. No. for R13 and RRW-036 the number for R18.

●

Sears 6230A, Ch. 101.802-1

This model is the same as model 6230, ch. 101.802, which appears on *pages 15-16 through 15-18 of Rider's Volume XV*, except for the following change.

A phono jack has been added to the circuit. This phono jack is connected to the control grid (pin 6) of the 1LB4 output tube. Physically, the jack is located on the top of the chassis in the rear left corner near transformer T3.

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Arvin 182TFM Service Hints

This model appears in *Rider's Volume XVII, pages 17-9,10 through 17-15.*

FADING . . . If fading occurs, check the shielded audio leads. One lead should be connected from the center lug of the volume control to the audio coupling capacitor on the stand-off insulator. The other lead should be connected from the right-hand terminal of the control to the band-change switch. If these two leads are reversed, the AVC will be ineffective.

ANTENNA . . . On some of the first sets produced, the primary and secondary windings of the antenna-coupling transformers T1, were shorted together, causing the antenna terminals on the back of the set to be grounded to the chassis. This should be carefully checked before connecting an external antenna to the set, because one position of the a-c plug in the outlet will place 110 volts between the antenna and any grounded object. This would be a shock hazard, and if the antenna became grounded the r-f choke in the a-c leads in the set would burn out.

OSCILLATION . . . If oscillation is encountered, try dressing the yellow filament leads, in the i-f section of the receiver, down against the chassis and away from the tube sockets. Also, see that all grounded leads on the variable capacitor are soldered and not broken.

Some cases of regeneration in the FM i-f circuit have been encountered. This can be detected by a high discriminator voltage, and also a high avc voltage with no signal input. Replacing the 0.005-μf 2nd i-f cathode-bypass capacitor, C32, with a 0.002-μf 350-volt ceramic capacitor will correct this in most cases.

22-OHM RESISTOR BURNS . . . Some receivers have a ¼-watt 22-ohm fusing resistor in the B-plus circuit. If this resistor burns, replace it with a 1-watt resistor. CAUTION . . . First check the B-plus current to see that it does not exceed approximately 100 milliamperes. If the current is greater than this value, some other trouble exists in the receiver and this must be corrected in order to prevent damage to other parts in the receiver.

FLOATING R-F UNIT . . . On some sets the complete r-f assembly is mounted on rubber to prevent microphonics. When servicing these sets, be sure that the ground leads between the r-f assembly and the chassis are securely soldered.

INSULATING CONTROL SHAFTS . . . Some sets have been found with the flat metal washer under the insulating fibre washer on the tone control, volume control and band switch. This would be a shock hazard if a knob was left off the shaft and should be corrected by removing the metal washer and placing it on top of the fibre washer.

●

Bendix 626

This model appears on *pages 16-1 through 16-3 of Rider's Volume XVI.* Either of two coils may be found in this model. In some, an r-f coil making use of a small capacitor (3.3 $\mu\mu$f) between the start of the secondary winding and the finish of the primary winding is used, while in others an r-f coil with an added tertiary winding is used in lieu of the capacitor. These coils, when properly used, are interchangeable, and in the future only r-f coils with the tertiary winding will be provided as replacements.

If, in the receiver to be repaired, the coil requiring the 3.3-$\mu\mu$f capacitor is replaced with the other type, eliminate the 3.3-$\mu\mu$f capacitor from the circuit.

●

Majestic 5AK781

This model is the same as model 5AK731 found on *pages 17-3 and 17-4 of Rider's Volume XVII,* except for the following changes in the parts list.

Part No.	Description
S-1441	Dial cord assembly
S-1448	Output transformer
21-29	Aero record changer
115-49-1	Cabinet, (Aero cut out) Blonde, walnut, or mahogany
122-47	Escutcheon plate, metal
128-62	Knobs, tuning and volume
128-80	Knob, phono - radio
101-485	Screw, mounting chassis
106-124	Washer, mounting chassis

●

RCA QU-61

This was published in *Rider's Manual Volume 15, page 15-55.* The following pertains to the power-supply ratings for this receiver.

Only one power-supply rating (Symbol Rating D) is applicable to QU-61. As manufactured it may be operated on 100 to 260 volts, 50-60 cycles. A universal type of transformer having five voltage ranges is used. The desired range may be selected by the proper positioning of a link beneath a cover on the top of the power transformer as follows:

110 position	100 to 115 volts
125 position	115 to 135 volts
150 position	135 to 165 volts
210 position	165 to 230 volts
240 position	230 to 260 volts

The receiver is shipped with this link in the 240-volt position.

CAUTION . . . Remove the power cord from the line receptacle before changing the position of the link.

The record changer is made for operation on a 60-cycle power supply but may be converted to 50-cycle operation by the addition of a conversion spring to the motor shaft.

Change in Replacement Parts:

Stock No. 34183 Transformer

Delete "For Specification Ratings A and C"

Add "For Specification Rating "D"

Stock No. 39786 Transformer

(No phonograph motors are available to permit operation of this instrument on 25-cycle current. However, this transformer may be used for operation on 105 to 125 volts, 50-60 cycles.)

●

Westinghouse H-185 and H-195

These models appear on *pages 18-23 through 18-25 of Rider's Volume XVIII.* The changes are as follows:

The value of R3 on the schematic diagram should read 220 ohms instead of 220K ohms as shown.

The 220K resistor, R7, which was previously connected between the common negative line and the chassis, is not being used in late production chassis. Also in later production chassis, the value of R9 was changed from 3,300 ohms to 1,800 ohms.

In later production receivers, an adjustment hole was provided in the right side of the model H-185 cabinet. It is recommended that the r-f trimmer (C6) be adjusted with the chassis in the cabinet and the rear cover closed. The plug that fits this hole is listed below.

The following items should be added to the parts lists:

RC20AE182K	Resistor, 1,800 ohms, ½ w. (R9)
V-1157-4	Cabinet, plastic (H-185 grey)
V-4836-6	Plug, button (H-185 grey cabinet)
V-4836-5	Plug, button (H-185 maroon cabinet)

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JOHN F. RIDER, Editor

CURTAIN TIME

TV

Looks like all comments made about the Dome intercarrier TV receiver system will have to be *changed to the Parker system.* According to Volume 614 (Sept. 7th, 1948) of the Patent Gazette, a patent, filed July 13, 1944 and issued Sept. 7th. 1948 in the name of L. W. Parker, number 2,448,908, is the intercarrier TV receiver system . . . Whichever way this situation resolves itself, rumor has it that the intercarrier type of TV receiver circuit will receive much greater attention among manufacturers.

Back in 1915 we listened to the Paris-Honolulu-Arlington broadcasts of speech and music. Naturally we can't recall the exact thrill experienced at that time, but we know that we got a big bang out of it. *But the tie-in between the Midwestern and Eastern TV Networks during the evening of January 11 was something we'll never forget.* We're sure proud to be associated with an industry which can do such things for the human race!

What can be done about the problem of watching two competing TV programs on the same receiver? *It's leading to "afussin' and afuedin'" in my home.* I'm going to compromise by getting another receiver and I'm sure that I'll be watching the smaller screen. How about you? If you think you're the master in your house, you've got another think coming . . . The more you imagine so, the less it is so!

Did You Know That

Slightly more than 2 ounces of whiskey on an empty stomach of a 150-pound man creates a concentration of 0.05 percent of alcohol in the blood . . . with a concentration of 0.2 percent, *you're really plastered!* The same authorities, the Yale Laboratory of Applied Physiology, contend that the general impression of liquor being a stimulant is wrong. They say that it does not pep one up — in fact does the reverse. So there! The Gettysburg speech by Lincoln lasted about 5 minutes — that's all! *It isn't a matter of how long you speak, but what you say.*

Isn't It Time

For the setting of minimum standards concerning test equipment sold to the servicing industry—or for that matter, wherever they are sold? More than a generation has passed since the introduction of such equipment — without any standards of performance being developed. It is true that the user determines the final effectiveness of the equipment, but any manufacturer can make almost any claim without fear of contradiction. *It just doesn't seem right.* We realize that the capabilities of an equipment need be only as good as the customer desires, but there should exist certain minimum standards, especially when many different brands of equipment are offered for the same purpose.

For example, what should be the minimum bandwith of the vertical amplifier of a scope offered for checking waveforms in a television receiver? Should it be 100 kc, 300 kc, 1.0 mc, 5.0 mc, or higher? Admittedly the answer involves many factors, but one thing cannot be denied—the serviceman reads many ads, each stating similar utility for the equipment, yet each equipment is possessed of different characteristics. What should be the sensitivity? . . . What should be the spot size? . . . What should be the minimum loading effect of voltmeters for checking TV power-supply systems? . . . What should be the minimum output of signal sources of various kinds? . . . What should be the degree of accuracy of the frequency calibration? . . . What should be the amount of linearity in f-m signal outputs?

It isn't a matter of selecting the best circuitry. There are numerous ways of accomplishing the same thing, but certainly some standards should be set to be met by all the different systems — as long as they are being offered for like application . . . Once the minimum exists, then from that point the manufacturers can employ their specialized techniques to offer the most for the money . . . Don't get us wrong, we're not suggesting standardization of equipment — all we're talking about is the setting of minimum standards of performance and manufacture . . . *Today its a case of "caveat emptor."*

Just Wondering

Have you read "Man Does Not Stand Alone" by A. Cressy Morrison? It helps a person develop faith in a Creator no matter what the individual creed . . . Why an orderly atomic table? . . . Why is the earth just far enough away from the sun so that people thrive, food grows — we have tolerable amounts of cold and heat? . . . How did the earth become tilted so that we have seasons? . . . Who is responsible for the fact that different elements exist which enable greater and greater progress by civilization? . . . That birds and fish and other animals migrate over tremendous distances . . . that rivers flow within oceans so as to warm vast areas on the globe? . . . *Life just didn't happen!*

About the LP records turning at 33 and those turning at 45 . . . How soon crosshatch generators and dot-dash generators for checking linearity in TV receivers will receive as much attention as alignment generators? . . . They merit equal attention to say the least . . . Why TV set dealers are cutting prices when there exists a definite shortage of picture tubes? . . . What happened to Citizen's Radio? . . . *When cowboys kiss their sweethearts?* . . . Has television killed off facsimile in the home? . . . If General Sarnoff's forecast of nationwide coverage of TV by 1953 (18,000,000 TV receivers) will be speeded up? . . . If the Navy's use of TV for education will show the way to the schools of the Nation? . . .

Interesting Reading

The work being done with microwaves . . . We don't mean radio links — rather the sterilization of bacteria — absorption of microwave energy by different gases — using gases as frequency standards — determining molecular dimensions by means of microwaves, etc. . . . . It's really hot stuff!

Of course, some of the new books we'll be announcing next month also will be interesting reading.

Rider's Manuals

In addition to being the servicing reference source for the radio servicing industry the world over — they are without question the world's best history of American radio receiver circuitry.

Serviceman Licensing Rears Head Again

We have just received a letter about radio serviceman licensing in New York City. The sponsor of the legislation is the same man, Councilman Stanley Isaacs. As yet no meeting has been called, but it will happen soon. In the meantime, it would be well if everyone who reads these lines and has an expression concerning more regimentation — (God knows we have enough) — will drop a line to the aforementioned gentleman at City Hall, New York City.

Recognizing the numerous problems TV servicing is placing in the lap of the radio servicing industry — annual service contracts, multiple signal paths to receivers, the public's demand for the lowest possible antenna installation charge, insufficient men to handle the demand — licensing of the activity would break the camel's back. That's all we have room for at the moment. A full report next month.

JOHN F. RIDER

RCA 66BX, Chassis RC-1040B

This model is the same as model 66BX, Chassis RC-1040 appearing *on pages 15-87 and 15-88 of Rider's Volume XV*, except for the following changes:

Chassis RC-1040B uses a 3V4 output tube and a selenium rectifier. Resistor R3 and capacitor C8 in the converter stage are omitted.

Resistor R17 in the power supply has been changed in value to 2650 ohms. Resistor R20 (2700 ohms) replaces resistor R18 in the power-supply circuit. A 33-ohm resistor (R31) has been added between the selenium rectifier and the "hot" side of capacitor C33. Capacitor C33 is now grounded. See Fig. 1.

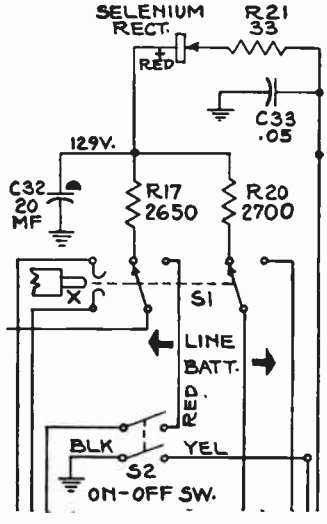
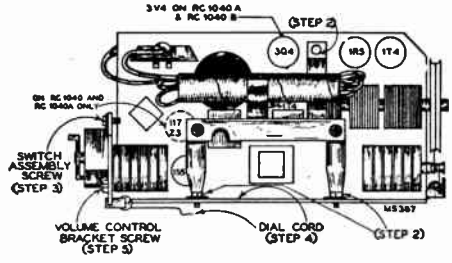


Fig. 1. Power supply of the RCA Chassis RC-1040B.

If the volume control needs replacement, the following steps should be followed. See Figs. 2 and 3.

1. Remove the 3V4 power output tube.
2. Remove the three screws holding the power cord bracket assembly. (Do not damage insulating washers.)
3. Remove the screw holding the switch assembly and remove the switch.
4. Remove the dial cord from the pulley.
5. Remove the screw holding the volume control bracket assembly.
6. Loosen the screw which maintains pressure on the expansion assembly.
7. Remove the drum.
8. Remove the expansion assembly from the volume control shaft.



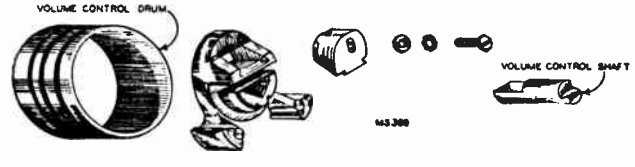


Fig. 2, above. Parts layout of RCA chassis RC-1040B. Fig. 3, left. Volume control dissassembly.

9. Remove the nut holding the volume control to the bracket.

The following changes should be made in the parts list. Delete the following:

Stock No.	Description
38875	Resistor—1800 ohms, 1 watt (R18)
71038	Resistor — ballast resistor, 2300 ohms, 6 watt (R17)
30649	Resistor — 2.2 megohms, ¼ watt (R3)
70392	Cord — power cord
31709	Capacitor — ceramic 6.8-μμf (C7)

Add the following parts to the parts list.

Stock No.	Description
39043	Capacitor—Ceramic, 6.8-μμf (C7)
70022	Cord — power cord
72283	Grommet — rubber grommet to mount tuning capacitor (4 required)
72543	Rectifier — selenium rectifier
71290	Resistor—33 ohms, 1 watt (R21)
30930	Resistor — 1800 ohms, ¼ watt (R6, R15)
72760	Resistor — ballast resistor, 2650 ohms, 7 watt (R17)
14421	Resistor—2700 ohms, 1 watt (R20)
72541	Socket — tube socket - miniature - 7 prong bottom mounted with shield
72980	Side — case side — l.h. with decorative ribs at top, bottom, and both sides.
72979	Side — case side — r.h. (loop side) less capacitor assembly with decorative ribs at top, bottom, and both sides.

Bendix Par 80

This model appears on *pages 18-1 through 18-5 of Rider's Volume XVIII*. On late production model PAR 80 receivers, a rubber grommet has been added over the battery switch lead at the metal shield to prevent eventual wear and shorting of the lead. If servicing of this receiver indicates excessive wear of the battery switch lead, a small standard grommet of suitable size may be added at point where the lead enters the switch shield.

●

General Electric 502

This model appears on *pages 17-4 through 17-8 and pages 17-39,40 through 17-47 of Rider's Volume XVII*. The changes involve a schematic correcton and a correction in the value of a component in the replacement parts list.

The schematic diagram which shows an open circuit in the screen grids of the 6V6 tubes, V10 and V11, should be corrected to show the screen grids connected to the 260-volt B-plus line.

In the listing of Cat. No. RCW-1028, the capacitor value was mistakenly given as 22-μμf. The capacitors listed are actually 100-μμf and RCW-1028 should be changed to read 100-μμf.

Arvin 182TFM (Chassis RE-237)

This appeared in *Rider's Manual Volume 17, pages 17-9,10 through 17-15*. Arvin is the trade name of Noblitt-Sparks. The following changes should be made on the schematic diagram:

1. A B- connection was added between R10 and L15.
2. A 220-ohm resistor, R15, has been added across the antenna terminals.
3. Antenna coil L4 has been relocated. In the original schematic it was in series with C1, and the series combination was shunted by C1A. The modification consists of placing C1 and C1A in shunt with each other. and placing L4 in series with this shunt combination and the top connection of L1, the point which is connected to the AM terminal of the selector switch.

The following changes should be made in the parts list:

1. R5 should be C20060-221 resistor, 220 ohms, ¼ watt
2. P.S. — A21709 parasitic suppressor should be added
3. C10 should be C20204-500 capacitor, 0.00005-μf., 500 V, ceramic
4. R8, 22-ohm fusing resistor should be 1 watt, C20103-220
5. A19328-4 grommet, rubber, Mtg., RF Assy.
6. A19138-3 eyelet spacer, Mtg., RF Assy.

●

Crosley 9-101

This model appears on *pages 18-1 through 18-3 of Rider's Volume XVIII*. Recently it was discovered that in some areas, the oscillator coil (Part No. 142975) developed trouble due to corrosive tape. To avoid possible complaints in the field, it is recommended that the coil be replaced with a new coil (Part No. 145105).

●

Federal 1034

This model is essentially the same as model 1024 which appears on *pages 16-1 through 16-4 of Rider's Volume XVI*. The only modification has been in the cabinet.

●

Sears 7100, Ch. 101.811-1

Model 7100, Ch. 101.811, appears on *pages 16-1, 16-4, 16-5, and 16-8 of Rider's Volume XVI*. A change has been made in the circuit as follows:

A tone-control network consisting of resistor R16 and capacitor C24 has been connected from the plate (pin 2) to the cathode (pin 7) of the 7C6 tube. In order to accommodate this added circuit, some rearrangement has been made in the position of parts on the bottom of the chassis.

●

Bendix 847B

This model appears on *pages 17-7 through 17-14 of Rider's Volume XVII*. The replacement parts list on *page 17-13* should be revised as follows:

The r-f oscillator chassis assembly bearing the stock number AR0B00 is no longer stocked as a complete replacement assembly. This chassis can be repaired satisfactorily in the field and the necessary component parts may be obtained as separate stock items, when desired.

Federal 1027, 1035

Basically, these models are the same both in chassis and cabinet as model 1025 which appears on *pages 16-1 through 16-4 of Rider's Volume XVI*. However, differences exist in the exterior cabinet finish and color of these models.

●

General Electric 50

This model will be found on *pages 15-1 through 15-4 of Rider's Volume XV*. This change covers a correction to the original parts list in the model 50 where Cat. No. RHS-001 was changed to RMX-006 for a tuning assembly and spacer.

A further correction is necessary in the item description since only the tuning shaft and drive pulley (assembled) is supplied under RMX-006. The spacer is the tuning shaft bearing, and is catalogued as a separate item under RHJ-001. The original parts listing of the drive pulley under this number has been deleted.

●

Bendix 110, 110W, 111, 111W, 112, 114, and 115

These models appear on *pages 18-6 through 18-8 of Rider's Volume XVIII*. On recent models of this series a circuit change has been made which adds a coupling plate, stock number AC0C00, between the first audio tube, 12SQ7, and the output tube, 50L6, in lieu of the following components used on earlier receivers:

Plate-load resistor, R5, stock no. RC1H54; grid resistor, R7, stock no. RC1H58; Plate r-f bypass capacitor, C8, stock CP4T20.

These parts are eliminated when coupling plate, stock no. AC0C00 is used, although installation is otherwise interchangeable. To use the coupling plate may cause a slight increase in the plate voltage of the 12SQ7 tube, but no adverse effect is made on the receiver. The resistance measured from the grid of the 50L6 tube to common B- is approximately 450K. while the resistance measured from the plate of the 12SQ7 tube to common B- will give a reading which increases approximately 10 megohms in magnitude, caused by the charging of the filter capacitors since the receivers have no d-c return to ground.

●

RCA 67V1, 67AV1

These models appear on *pages 16-35 to 16-39 of Rider's Volume XVI*. In late production models, resistor R18 connected from the phono jack to ground has been changed from 120,000 ohms to 330,000 ohms.

●

Bendix 646A

This model appears on *pages 15-5 and 15-6 of Rider's Volume XV*. The change involves a revision in the replacement parts list as follows:

In the cabinet components section of the parts list on *page 15-6*, substitute the stock number HZ0S04 for the existing stock number HZ0L01 which is incorrect. The nomenclature and identification of the component part is correct as listed.

Television Changes

Spot Speed and Ghosts*

Sometimes it is well to know the approximate location of a reflecting surface which is responsible for a ghost in a television picture. Of course, if there are many ghosts, it's a different matter. At any rate, knowing what to look for may help.

Ordinarily one would say that the small difference in time involved when a wave is traveling at 186,000 miles per second would be negligible, but some practical figures will show that comparatively very small distances of travel of a radio wave are important when considering the effect of multiple signal paths on a television-receiver picture tube.

For example, a conventional 10-inch receiver which produces a picture eight inches wide has the following properties: the spot size is about 0.025 inch in diameter and will require about 60 microseconds to advance across the eight inches of picture space. While moving across this space, it will traverse one inch each 7.5 microseconds or 0.133 inch per microsecond. In turn, the speed of the radio wave is 982 feet per microsecond.

Using these figures, it can be seen that 0.19 microsecond will be required for a spot to move a distance equal to its own diameter. This is an extremely small amount of time — yet in this extremely small amount of time a television wave will travel through 187 feet of space. This means that if two signal paths to a receiver exist and one is 187 feet longer than the other, the picture will be blurred. Naturally a certain amount of diffusion of a line is tolerable, but to meet good reproduction requirements this diffusion should not exceed that caused by a difference of 70 feet in traveling distance, or the arrival of a second wave 0.071 microsecond later.

If two pictures are received displaced by one inch, it means a time difference of 7.5 microseconds which, interpreted in distance traveled by the lagging television wave, would be 982 x 7.5 or 7355 feet. Thus by interpreting the picture displacement in time differential, it is possible to approximate the location of the reflecting surface.

Such calculations are of necessity different for different size tube faces. For example, if the picture size is five inches across, each inch of excursion of the spot requires 60/5 microseconds or 12 microseconds. Since the speed of the radio wave is a constant at 982 feet per microsecond, a one-inch displacement of the picture in this case would mean a distance of 982 x 12 or 11,784 feet, whereas in the case of the 10-inch tube, it means a distance of only 7,355 feet.

In the case of magnified or projected pictures, the determination of possible location of the reflecting surface should be made after compensation for the amount of magnification. Thus if a horizontal dimension is magnified eight times, the picture displacement on the picture tube is only ⅛ of that on the screen. Moreover the dimensions to be considered should be the picture size on the tube, rather than the diameter of the tube face; then the time of spot travel is determined for that particular tube size.

*Based upon material appearing in the *Crosley Television Receiving Antenna Bulletin*, No. 378, Crosley Div. AVCO Mfg. Corp.

●

Stromberg-Carlson TV-12LM, 12M5M, 12PGM, 1220T, TV12H1M, 12H2M, 12H2A

This receiver is shown in *Rider's TV Manual Volume 1 pages 1-29 and 1-30.* Terminal 5 of the horizontal-output transformer returns to plus 400 volts.

Resistor R258 is 33K instead of 3.3K.

Resistor R309 is 100K instead of 10K.

On recent models the relay contacts of K201 break the B-plus lead instead of the B-minus lead. This is between the junction of R316 and L217, and the cathodes (pin 8) of V218 and V219.

●

General Electric 802

Refer to the waveform diagrams on *Page 1-68 of Rider's TV Manual Volume 1.* The captions on some of these drawings should be altered as follows:

Fig. 48: the caption should read "Grid (4) V18B"

Fig. 49: the caption should read "cathode (6) of V18B"

Transvision

A condition has been noted where some 12JP4 picture tubes occasionally become electrically leaky between cathode and grid. This is usually evidenced by horizontal tearing, loss of horizontal sync which cannot be corrected by the usual circuit procedure. The best and most conclusive test is made by trying another tube in the set. This condition occurs after the tube has been in operation for several months. Voltage from an induction-type spark coil which has been touched momentarily to the cathode and grid pins of the picture tube usually corrects this condition. (See IT Service Hint page 13 *Successful Servicing*, January, 1949.)

●

Hallicrafters T61-T67

Reduction of noise in picture . . . Certain parts of the Boston area, having lower-than-normal TV signal strength, experience an accentuation of noise on the screen. An investigation revealed that this condition is improved by shielding the leads to the contrast control. Ordinary braid shielding may be used to encase the two leads, shielding that portion which appears above the chassis. The braid should be grounded to the chassis. This information applies to the receiver shown on *Hallicrafters pages 1-1 and 1-2 in Rider's TV Manual Volume 2.*

Transvision, All Models

Models 7-inch kit, early, late; 7-inch kit, early; 7-inch kit, late; and 12-inch kit appear on *page 1-1 through page 1-53 of Rider's Television Manual Volume 1.* The following notes and change notices apply to all models:

Several cases have been reported where the house line-fuse was blown when the metal mast of the antenna was grounded. This was due to an error in the primary circuit of the power transformer. A short circuit in the primary of the transformer could also blow the fuse.

The picture should be held in horizontal sync when the horizontal hold control is in approximately the midposition. If the potentiometer must be turned to the end in order to obtain proper sync, the 56,000-ohm resistor on pin #4 of the 6SN7 horizontal oscillator tube (X-6) should be removed to permit centering the control.

In some cases it has been found that running the tuner lead (co-axial on deluxe or Amphenol on standard models) in between the i.f.'s causes some interference in the picture. Keep this lead as far as possible from the i-f section, merely allowing it to bridge over from the tuner to the terminal strip on the rear of the chassis.

If the self-tapping screw that holds the high-voltage shield to the chassis is omitted alongside tube socket X-6, there is always an existing danger of the flange sliding under the base of the tube and causing a short in the filament line.

Occasionally, a wavering effect, similar to a flag waving, may be noticed in the picture. This is due to phase differences existing in the a-c power sources when the transmitter and receiver are located in different power service areas. To minimize this, connect a 1,000-μf capacitor across the 10-ohm parasitic resistor which is connected between the junction of the horizontal linearity control, the secondary tap of the horizontal output transformer, and the 680K-ohm resistor in the horizontal discharge circuit and the junction of one side of capacitor CF-1, terminal 3 of the horizontal winding of the yoke, and one side of the focus coil.

As a safety precaution, the manufacturer strongly suggests the following check-out procedure on all Transvision receivers, particularly the electromagnetic models:

1. Picture tube firmly strapped down.
2. Picture-tube neck well cushioned with corrugated paper, inside of the focus coil.
3. High-voltage cover firmly screwed in place.
4. Bottom cover firmly screwed in place.
5. A-c line cord neatly wrapped around low-voltage transformer.
6. All elements—deflection yoke, focus-coil support assembly — firmly screwed in place.

●

Teletone 149, 157

These models are the same as model 135 which appears on *page Misc. 16-11 of Rider's Volume XVI.*

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"TV How It Works" Corrections

In the event that you are an owner of Rider's TV Manual Volume 1, with which we furnished a copy of *TV How It Works*, or if you purchased this volume separately, the following corrections should be noted.

On page 4, second column, reference is made to the number of elements found in a TV picture. The figure of 367,500 is closer to the figure than the 224,000 quoted.

On page 45, line 7 of the second column, the statement is made that the use of a reflector will increase the impedance of a dipole. There are conditions of design where this can be accomplished, but in the usual manner of application the use of a reflector will, if anything, reduce the impedance at the center of the driven element at the resonant frequency.

On page 145, the caption "vert. sync pulses to horiz. mult." should read "vert. sync pulses to vert. mult." We realize that this correction may be obvious, but since we found it, we make it.

●

Sears 6686, Chassis 101.851

This model appears on *page 17-1 of Rider's Volume XVII*. If frequency shift occurs, the following change is recommended to correct the condition:

1. Remove the screw and mica and bend up the leaf of the capacitor shunted across the a-m oscillator trimmer capacitor, C23.
2. Replace this part with a 15-$\mu\mu$f ± 10% ceramic capacitor.
3. Realign the a-m band of the radio receiver.

This change is being incorporated in production and will be effective on all sets shipped after September 30, 1948.

●

General Electric 210, 211, 212

These models appear on *pages 18-21 through 18-25 of Rider's Volume XVIII*. Change the third column (Signal Input Point) of the alignment charts on *page 18-23* to read: 12BE6 grid (pin 7 of V2). See note 7.

The parts list on *page 18-25* should be changed as follows: Change catalogue number UOP-557 to UOP-558 for Speaker 5¼-inch PM. Add the reference symbol R32 to Cat. No. URD-141—Resistor—6.8 meg., ½w., carbon.

The following changes have been made in the schematic diagram on *page 18-21*. Where capacitor C38 is shown terminating at ground on this schematic, later model receivers have this ground connection removed and the capacitor is terminated at the junction of the antenna input and capacitor C14. Capacitor C36 should be added and connected from the junction point of R29, pilot lamp I1, and pin 4 of V7 to ground. Resistor R32, which has been added to replacement parts list above, is connected from the junction of R8 and C4 (AVC filter) to the cathode, pin 2, of output tube V6.

This resistor, R32, has been added to increase the converter stage gain when operating in the A-M position because of a change in performance characteristics relative to grid cut-off of the 12BE6 tube.

TV Service

(*Continued from page 1*)

stallation and insurance. Antenna installation costs should have no connection with service insurance; the two operations are entirely different. In fact, if the customer so desires, he should be able to buy his antenna installation and worry about service later.

Service Insurance Charges

Such a system would enable service charges to seek their own level, which they must eventually do. To our way of thinking, the contract system of selling service insurance will run into a snag during the third year of life of the receiver. Although the value of the receiver has decreased due to depreciation, the *possibility* of troubles has *increased*. This in no way reflects upon the receiver — the older the individual who seeks insurance, the greater is the premium! The same principle applies to TV receivers.

Let us return to the matter of reducing service calls when a contract exists . . . How about the following plan, which assumes that the antenna installation is dealt with separately. Why not issue with each service insurance contract a number of free service coupons? For the sake of illustration, suppose these coupons were five in number. These five coupons entitle the owner to five free-of-charge service calls, with part and tube replacements being handled as heretofore. In addition, the customer would receive five other coupons, each of which entitles him to a call with a charge, say $3.00, to cover traveling time. The fee asked in connection with these coupons could be based upon a zoning arrangement — that is, the distance to be traveled by the repair man. Most certainly, it is unfair to expect a service facility to send its men ten or fifteen miles for the same charge as when a mile or two is traveled.

To say the least, such a coupon arrangement would have a good effect all around. It would tend to restrict the number of nuisance calls because the customer will be cautious about expending his free coupons when he knows that there is a charge for all calls above five. Today, the customer calls the service shop on the least provacation. It is distinctly unfair to the service facility and this practice should be stopped if at all possible.

Our selections for the number of free coupons and the charge for the "pay" coupons is solely for the sake of illustration. Some organizations may decide to issue fewer, or more, free coupons and to charge more, or less, for the "pay" coupons. That is for the individual manufacturer — dealer — service organization setup to decide.

Such factors as the number of chassis found in the equipment, or whether it includes an a-m or f-m receiver, a record changer, etc., should play a part in determining the charge. The immediate future will, undoubtedly, see TV receivers with more than one record player. This condition is introduced by the existence of 33, 45, and 78 rpm equipment. It does not seem difficult to this writer to organize a system of charges based upon the number of basic components within the receiver.

Whichever way it is handled, something must be done to make the over-all service insurance operation more attractive to the servicing organizations — at least to protect them against loss. Perhaps what we have suggested is the answer. We would certainly like to receive comments.

Next month we will discuss another item which is receiving much attention.

●

The Cover

On page 1 is shown the interior of the television studio at the U. S. Navy Special Devices Center at Sands Point, Long Island, N. Y., during a broadcast of a lecture using a cut-away jet engine. These lectures can be relayed to naval bases or to units of the fleet. In the foreground are the control and monitoring panels which were supplied by the General Electric Company.

These Navy experiments in the mass training of personnel by means of television presage the time when television will be used by schools, colleges, and professional societies as a mass training medium.

RIDER MANUALS *Mean* SUCCESSFUL SERVICING

RCA 76ZX12

This receiver is in *Rider's Manual Volume 18, pages RCA 18-51, 18-52.* The following corrections are made in the parts lists. Under the miscellaneous heading

Delete No. 36886 Knob and
Add No. 70414 Knob—control knob ivory for 76ZX12

●

Westinghouse H-186, H-187

This model appears on *pages 18-26 through 18-30 of Rider's Volume XVIII.* The 0.1-μf resonant-type capacitor (C33) is not used on late production chassis. This capacitor is shown connected between the B-plus line and ground in the schematic diagram on *page 18-26.*

●

RCA Q10, Q10A, Q10A2, Q10-2, Q10-3, Q110

This material appears in *Rider's Manual Volume 15, pages 15-5 through 15-7.* In the event that regeneration develops in the receiver, it may be due to a resonant condition due to electrolytic capacitor C21 being parallel with capacitor C11 (0.1-μf). Three methods have been used at the factory to correct this condition. These are:

(1) C11 may be 0.05-μf instead of 0.1-μf
(2) An additional 0.1-μf capacitor may be added in parallel with C11
(3) The RED and GREEN leads of the electrolytic capacitor (C21 and C22) may be interchanged

In some chassis, R1 may be 2.0 megohms instead of 2.2 megohms.

●

Crosley 9-201, 9-202M, 9-303B

These models appear on *pages 18-14 through 18-19 of Rider's Volume XVIII.* The part number of item 83 (volume control) was shown on *page 18-19* as 39368-14. This number should be 39368-18. To use the No. 39368-18 control on these models, it will be necessary also to use a No. 39-370-2 plug-in type knurled shaft.

Ham Interference In Amplifiers

(Editor's Note: This material strikes a responsive chord because we faced the problem of being picked up by the amplifiers in a nearby motion picture theater. We understand that the audience was quite surprised to hear a singing cabellero, guitar in hand, who appeared on the screen calling T12RC in Costa Rica and signing W2RID. The cure was proper shielding and grounding of the photo-cell heads.)

It is difficult to pin down the exact manner in which interference from radio amateur stations reaches various types of audio amplifiers, record players, and wire recorders. Therefore, it is almost impossible to state specific remedies applicable to all equipments. Sometimes a cure will be effective in many cases — then again it will work only in isolated instances, despite the fact that the equipments are used in similar manner and in like locations. Here are some ideas on the subject.

Three places in the amplifier usually are the vulnerable spots. One of these is the first stage grid circuit, including the microphone input system. The second is the output circuit of the final power-

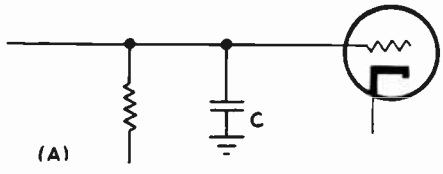


Fig. 1(B). A series grid resistor and a of the first stage may correct ham interference.

amplifier stage, and the third is the power-supply system.

In both the first and second locations, the problem seems to be pickup of r-f signals and rectification in these circuits. Remedies are probable, and it is a fairly safe gamble that at least one will be effective. For example, in the input circuit of the very first amplifier stage, the use of a small value of bypass capacitance, C, say between 50 and 100 $\mu\mu$f between the grid and ground may prove effective. This is shown in Fig. 1(A). Sometimes this alone does not do the job, it then becomes necessary to add a series grid resistor of from 50,000 to 100,000 ohms, shown as *R* in Fig. 1(B), between the grid and the usual grid-leak resistor. The high side of the bypass capacitor is connected to the grid end of the series grid resistor.

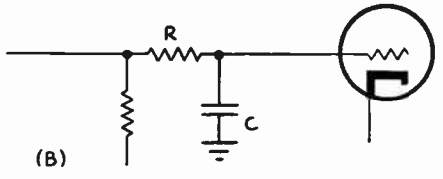


Fig. 1(B). A series of grid resistor and a bypass capacitor may be used to cut out interference.

In place of the series grid resistor, an r-f choke of from 1.0 to about 2.5 millihenry is sometimes used, connected to the r-f bypass capacitor, as shown in Fig. 1(C). One of the Sears Roebuck service notes recommends placing the ca-

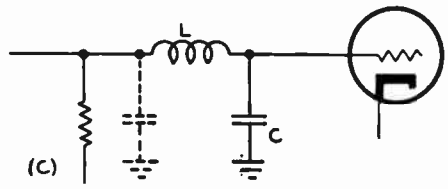


Fig. 1(C). A choke may be used in place of the resistor shown in Fig. 1(B).

pacitor as shown by the dotted line.

Sometimes such pickup comes about as the result of corroded connections or ground loops in the grounded input circuits — that is ground connections at two points along the input cable. Sometimes, especially when such ground loops exist or the ground contact is poor, and the length of the microphone cable may correspond to a half wavelength of the frequency at which the interference signal is being radiated, the trouble is quite severe. Increasing or decreasing the length of the cable so as to destroy this resonance may be of aid.

The trouble is less prevalent when metal tubes are used than when the input tube is of the glass variety. Placing a shield around the tube and grounding it properly has been found to work in some cases, although such interference troubles do not, as a rule, originate there.

Shielding the "hot" grid lead between the input jack and the grid of the tube has frequently helped. Making certain that all supposedly grounded jacks really are grounded was found to be of aid. Sometimes these remedies were partially successful; that is, the intensity of the interference was reduced, although the signal was not completely eliminated.

When the interference occurs in the output stage, the most useful remedy is bypassing from the plate to cathode, or plate to ground, circuit as shown in Fig. 1(D). An average value of this capacitor is about 0.001 μf, although in some cases lower values function properly and in a few cases higher values are required. Frankly, the determining condition is the degree of distortion which can be tolerated, since the addition of such bypassing must, of necessity, affect the frequency response at the high-frequency end of the audio bandwidth of the system.

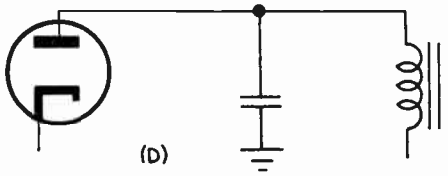
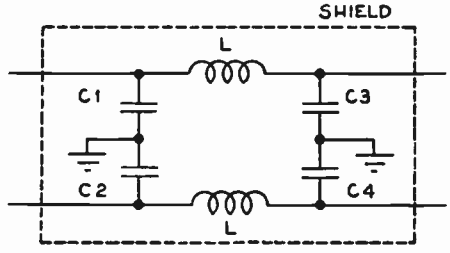


Fig. 1(D). Bypassing from plate to cathode (only these two elements are shown here) in the last stage clears up interference.

Relative to grounding of bypass capacitors, two possible return points exist; one of these is the chassis and the other is the cathode. Which of these should be used is best determined by experiment.

Finally we reach the power-supply circuit. Sometimes, due to proximity of the transmitting station, modulated r-f energy from the transmitter gets into the power line and finds its way into the equipment power supply. One way of keeping it out is by means of a conventional power supply r-f filter as shown in Fig. 2. However, in order that this filter be effective, it must be shielded and it is best located near the point where the power line feeds into the equipment, whether this point be at the power transformer in an a-c unit, or at the rectifier tube in an ac-dc unit.



C 1,-2,-3,-4 = 0.002 μf EACH
L = 100 TURNS OF #16 WIRE ON 1" TUBE

Fig. 2. Filter for use either at the amplifier or at the transmitter.

Sometimes due to overloading of the power line during modulation, the power supply becomes modulated at the audio frequency. The remedy lies at the transmitter, and is usually reduced power output and reduction of the power-line drain, making this drain within the capabilities of the line. The use of an r-f filter between the transmitter power input and the local power line, as shown in Fig. 2, is sometimes effective. However, the current-carrying capacity of the r-f chokes must be sufficient to accomodate the input current requirements of the transmitter at full power. Finally, the remedy may be simply a good ground at the transmitter.

Having said all of this in connection with amplifiers — it would not be out of order to say that these instructions also are useful in eliminating such interference in the so called "midget" ac-dc receivers.

●

Westinghouse H-164, H-166, H-166A, H-167

These models appear on *pages 18-17 through 18-19 of Rider's Volume XVIII*. The changes are as follows:

The notes under Figs. 1 and 4 should be revised to read: "All V-2119 chassis have 1st and 2nd i-f transformer adjustments as shown by the dotted line." The dotted-line adjusting points apply to current production chassis as well as to early models. The adjusting points shown in Fig. 3 apply to the V-2119-1 chassis which was also used in the above models.

Early models of the V-2119 chassis used a V-3295 power transformer which required a voltage-dropping resistor (R50) between the rectifier tube and the filter input to provide the correct voltage at the input to the filter. The V-2119-1 chassis and late models of the V-2119 chassis use a different power transformer (stock numbered V-4761) and the voltage-dropping resistor, R50, is no longer required.

Capacitor C76, which is shown connected between the B-plus line and ground in the schematic diagram on page 18-13, is not being used on late production chassis.

The items listed below are incorrectly listed in the replacement parts list. They should be changed to read as follows:

RC30AE332K Resistor, 3,300 ohms, 1 w. (R31)

V-4886-1 Choke, filament (L2, L3)

RCA 75X11, 75X12 (RC-1050)

The following changes have been made in the wiring. The circuit appears in *Rider's Manual Volume 18 pages RCA 18-49 and 18-50.*

Capacitor C18 is now connected between pin #3 and pin #8 of the 35Z5GT rectifier. The service data indicates that it is connected between pin #3 of the above rectifier tube and the junction of R17 and C19.

Add to the parts list the following; under the heading of Chassis Assemblies:

39632 Capacitor-Mica 150-$\mu\mu$f (C13)

•

RCA Radiola 61-10 (RC-1023A and RC-1023C)

This material appears in *Rider's Manual Volume 15, pages 15-33, 15-51, and 15-52.* In some of the 1023A chassis, two 10-$\mu\mu$f capacitors are used in parallel in place of the specified 22-$\mu\mu$f capacitor, C-15.

In the case of the 1023C chassis, service data given for the 1023A chassis will apply in toto.

•

NEDA and Licensing of Servicemen

We have been taken to task for omitting mention of the National Electronic Distributors Association (NEDA) as having done its part to ward off radio-repair licensing in New York City. The complaint voiced by L. W. Hatry, president of the organization, is justified, that is, if we take into account all of the individuals and organizations who participated in the discussions which took place then. Frankly, we were thinking solely of the part played by ARSNY, the local radio service association. However, since we have brought to the fore the participation by NEDA, they, too, are entitled to much credit for the pressure they exerted.

As a matter of fact, it might be well to quote from Lou Hatry's letter:

"Further, you may not know that the NEDA Board of Directors has gone on record as opposed to any and all licensing legislation of any kind for the radio repairman, on the basis that every licensing law founded on licensing "ability" has always ended in political maneuvering in being "licensing of business". The end product is a restriction upon free enterprise, little dictatorships and baby cartels where the established in hand with politicians prevent new businesses from even opening. I think that this is forward looking, intelligent and in the American tradition and I am proud that NEDA undertook such a stand on a National basis and in the National interest of all repairman and all small business."

NEDA helped very much and we are very happy to make this belated acknowledgement. While we are on this subject, the nation-wide Rider Survey of 1947,* covering the operations of the radio servicing industry of the nation also was used during that discussion to prove in actual figures that the industry was anything but a rackeetering group. In fact, we know that Councilman Isaacs who sponsored the original legislation placed much credence in the figures.

*See *Radio Retailing,* Nov.-Dec. 1947.

Sears-Roebuck Date Coding

The source, Colonial Radio Corporation has established a new code dating system which will allow the serviceman to determine more closely the date of manufacture.

Under the old dating system, three numbers were stamped on the chassis. The first two numbers represented the week of production, and the third number represented the day of the week.

The new dating system will also contain three numbers. The first two numbers will again represent the week of production. However the third number will represent the year of production. Last year (1948), for example, was represented by the number 8. Thus the code date number 438 indicates the 43rd week in 1948.

The new system for home receivers started on August 30, 1948. For auto sets, the new system started November 19, 1948. These numbers are stamped above or below the metal identification tag on the chassis.

RCA Q109 (RC-602), Q109X (RC-602A)

The following voltage - current table should be added to the service data appearing in *Rider's Manual Volume 18, pages RCA 18-3 through 18-10.*

Socket Voltages — Cathode Currents
Local-Phono-Distant Switch in Distant Position.

Tube		Plate Volts	Screen Volts	Cathode Volts	Cathode Current
1	6SG7	137	112	0	13.1 ma
2	6SA7	260	103	0	12.2
3	6SK7	235	103	1.3	13.3
4	6SQ7	86*	.....	0	0.4
5	6F6G	257	260	19.2	23.5
6	6F6G	257	260	19.2	23.5
7	6AT6	90*	.....	0	0.7
8	6U5	260	21*	0	2.1
9	5Y3G	.....	.....	355.	90.0

*Measured with Chanalyst or Voltohmyst

In LOCAL position the cathode circuit of the 6SG7, the RF amplifier, is opened ("A" Band only) and the voltages are correspondingly higher due to the absence of cathode current in this tube.

The stock number of the speaker cone should be changed to read:

No. 70972 Cone — Cone and voice coil assembly

Facts About Rider's TV Manual Volume 2

Here are some facts about the contents of the forthcoming *Rider's TV Manual Volume 2.* As you can appreciate, we cannot describe in *Successful Servicing* the contents of every page in this volume, therefore we have picked some highlights that we feel will be of interest to you.

We have talked frequently about the coverage of *Rider Manuals.* Here is a tabulation of some of the most important items:

66 manufacturers of TV receivers and TV boosters!

Originally we advertised 50 manufacturers, but as you can see the actual number contained in the manual is greater by more than 25 percent. The number of manufacturers would have been greater, but the closing date forced us to omit several names. Information on those sets omitted will either be given in *Successful Servicing* in the future, or will be included in the next TV volume.

So that you will have an idea of how extensive the coverage of models and data in *Rider's TV Manual Volume 2* really is, here is a tabulation of the actual pages for SOME OF THE MANUFACTURERS by name . . .

Name	*Single Pages*	*Double Spreads*	*Triple Spreads*	*Giant Pages*
Admiral	40		1	
Andrea	32			3
Belmont	18		1	1
Bendix	14	1		
Crosley	62	1		3
DuMont	50			4
Emerson	14	1		3
Farnsworth	22			2
General Electric	76	2	1	1
Hallicrafters	10			1
Howard	10	1		
Magnavox	32	1		1
Motorola	162			11
Philco	170	5	1	
Pilot	50			2
RCA	92	5		
Scott	24	1		1
Sentinel	12			1
Stewart-Warner	16	1		1
United Motors	14			2
Zenith	26			1

Remember if you please, this is only a partial list — there are 66 manufacturers represented in the manual! Especially significant is the fact that the changes made by manufacturers in their TV receivers have received special attention. For example, in the case of Motorola, one receiver model was identified with a number of chassis; each of these is shown complete . . . There are many more like this!

It is in this connection that having the manufacturer's OWN service data in your possession is so tremendously important. The manufacturer makes changes in his product's circuitry and only he knows what changes he made and WHEN he made them. Invariably he indicates the different runs on the chassis. The information contained in *Rider's Manuals* is the manufacturer's data; you always have the latest and most accurate information at your finger tips when you own *Rider's Manuals!*

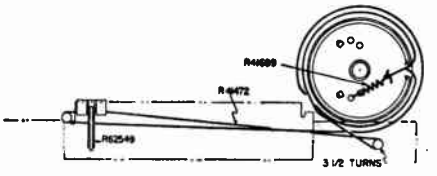
We are sure that you will be interested to learn that *Rider's TV Manual Volume 2* contains about 350 pages more than were furnished in *TV Volume 1* — in fact about this number of pages more than we originally advertised. Foremost in our thinking is to give the service industry the utmost accurate service data at the most economical price. We believe in Gen. Forrest's philosophy of "git thar fustest with the mostest."

We appreciate that reading diagrams can be a problem if the type is too small. What with the number of tubes in a TV receiver, we use as many double, triple, and GIANT pages as the material dictates . . . Remember that in comparison with the usual 80 square inches on the ordinary pages, a double-spread page in *Rider Manuals* affords 140 square inches of reading space; a triple-spread page affords 215 square inches of reading space and a GIANT page affords 440 square inches of reading space . . . This is for your convenience and to make the *Rider TV Manual* easiest to use.

PLACE YOUR ORDER FOR RIDER'S TV MANUAL VOLUME 2 TODAY!!

Sears 6686, Chassis 101.851

This model appears on *page 17-1 of Rider's Volume XVII.* It has been found that the dial cord slips on some of these models. To help correct this condition, it will be necessary to replace the present dial cord with a longer dial cord to change the pointer hookup. The new cord should be cut about 40 inches long and should measure 16¾ inches folded after assembly to the dial string tension spring. See the accompanying diagram for correct hookup.

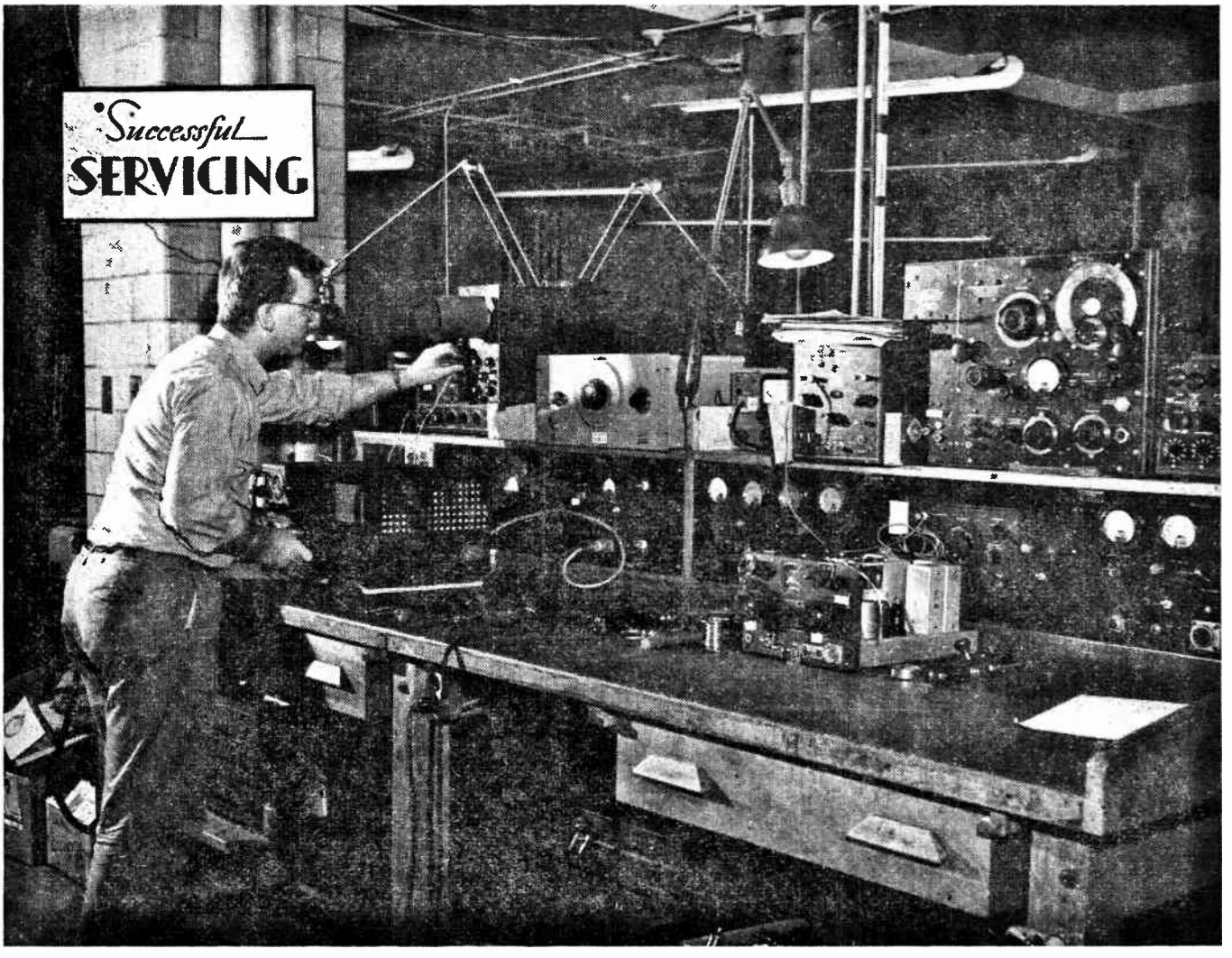


Dial cord hookup for Sears chassis 101.831.

Fig. 1. Power supply of the RCA chassis RC-1040B.

Dial slippage may be due to a tight ganged tuning capacitor. If light lubrication does not correct the condition, the thrust adjusting screw on the rear of the tuning gang may be backed off very slightly and securely locked in the new adjustment. Use great care to avoid excessive loosening as the rotor and stator plates may short. The set may require realignment after this adjustment.

Distribution of This Issue—44,500 Copies



April, 1949

Courtesy American Airlines

PREVENTIVE MAINTENANCE

By John F. Rider

Frequently significant things happen without enough fanfare to bring the results to the attention of all those who should know about them. We believe that the "Preventive Radio Maintenance Month" conducted by the Mid-State Radio Servicemen's Association of Harrisburg, Pa., was such an event. This organization is affiliated with the Federation of Radio Servicemen's Associations of Pennsylvania, a group who in their own right have demonstrated upon numerous occasions the ability to take progressive steps for the benefit of members.

Here is the background before we present the results. We are certain that every radio servicemen's organization in every state of our nation will find this interesting reading. In fact, even those communities which do not have radio servicemen's organizations can benefit by application of such a program on a cooperative basis, if not after they have formed a local association.

In June 1948 the Federation of Radio Servicemen's Associations of Pennsylvania met in Philadelphia and discussed the possibility for the success of a "Preventive Radio Maintenance Month" to be held throughout the State of Pennsylvania. At the suggestion of representatives from different branches of the radio industry, it was proposed that the program be presented to one chapter of the State Federation as an experiment in order to develop information and data necessary for a statewide program during 1949. The Harrisburg Chapter instituted such an experiment during the period of 1 November to 1 December 1948.

Although hampered by lack of time in setting up the program, as well as for coordination, the plan was put into operation through the efforts of local members, the parts distributors they deal with, and, in this particular case, with the cooperation of three manufacturers of parts, Philco, Raytheon, and Sprague. The office of the Secretary of the State Federation acted as coordinator and these manufacturers furnished window displays, streamers, blotters, envelope stuffers, and give-aways. The local chapter of the servicemen's association was supplied with cooperative advertising funds by their local distributors.

Arrangements were made for dealer newspaper advertising, direct mail advertising, and through the cooperation of the local a-m and f-m broadcast stations, spot announcements were made to the public advising them of the need for periodic checkups on their radio receivers. This type of spot advertising was very powerful in keeping the public aware of the program as a whole, the need for periodic checkups of the receivers, as well as the benefits of keeping every receiver in good repair.

The Mid-State Radio Servicemen's Association had the full support of its membership. They also subscribed to a large ad-

(Please turn to page 12)

GE 210, 211, 212

These models appear in *Rider's Volume XVIII, pages 18-21 through 18-25.* In the schematic diagram C12 is shown as 22 μμf. This should be corrected to read 20 μμf. C12 is listed correctly in the replacement parts list as Cat. No. RCW-3016, 20 μμf.

The following items should be added to the replacement parts list:

RII-021—Insulator — Textolite (to insulate the volume control from chassis)

RII-022—Insulator — Textolite (to insulate the band switch from chassis)

●

Magnavox AMP 111D, AMP 111E

These models are the same as Model AMP 111, appearing in *Rider's Volume XVIII, pages 18-4 through 18-7*, except for the following parts value changes:

Ref. No.	*Description*	*Part. No.*
9	Capacitor, paper, 0.03 μf, 400 V	250152G25
22	Resistor, composition, 22,000 ohms, ±10%, ½W	230984G78

●

Zenith 8H023, 8H034, Chassis 8C01

These models appear on *pages 15-71 to 15-74 of Rider's Volume XV.* The rushing noise that occurs when the volume control is turned to minimum is caused by a poor connection from the grid element to the grid cap of the 6S8GT tube. A hot iron and a little flux on the grid cap will remove the high-resistance solder joint.

If the f-m oscillator drifts, check for a red dot on the oscillator tuning-slug wire. If the wire is unmarked, replace with one which has a red dot. If the receiver flutters on f.m., this may be cured by installing a 22-1635, 20-μf, 150-V capacitor and two 1/4-watt resistors, 63-583, 1000 ohms, and 63-600, 2.2 Megohms, as indicated in the accompanying diagram.

RCA 8X544, 8X545, 8X546, Chassis RC-1065, RC-1065A

These models are the same as Model 8X541, on *pages 18-45 and 18-46 of Rider's Volume XVIII*, except for the color of the cabinets and the parts noted here.

The parts are the same, except for:

73486	Loop — loop and back cover assembly for Models 8X544 and 8X545
73487	Loop — loop and back cover assembly for Model 8X546
Y2096	Cabinet — plastic cabinet — mahogany — complete with station indicator and dial backing disc — for Model 8X544
Y2097	Cabinet — plastic cabinet — walnut — complete with station indicator and dial backing disc — for Model 8X545
Y2098	Cabinet — plastic cabinet — blonde — complete with station indicator and backing disc — for Model 8X546
70429	Grommet — rubber grommet to mount speaker (4 required). This part has been added to Models 8X541, 8X542, 8X543, 8X544, 8X545, 8X546, and 8X547. To reduce microphonics, the speaker is now mounted to the chassis and to the cabinet using rubber grommets. The screws through the grommets should be tightened only enough to obtain a secure assembly.

●

Farnsworth Chassis C-170, C-194, C-216, C-201

These chassis are used in Models GK-100, GK-102, GK-103, and GK-104, appearing on *pages 17-3 through 17-10 of Rider's Volume XVII.* These chassis are listed as follows:

Model	*Chassis*
GK-100	C-170
GK-102	C-194
GK-103	C-216
GK-104	C-201

Zenith 5DO and 5RO Series, Chassis 5C01, 5C02, and 5C04

These models appear on *pages 15-8 and 15-9 of Rider's Volume XV.*

Alternate tubes are used in the 5C01 chassis. A single chassis may contain octal, lock-in, and miniature button tubes. The alternate lineups are as follows.

Original	*Alternate*	*Alternate*
12SA7GT	12BE6	14Q7
35Z5GT	35W4	
12SK7	12BA6	
12SQ7	12AT6	
50L6GT	50B5	

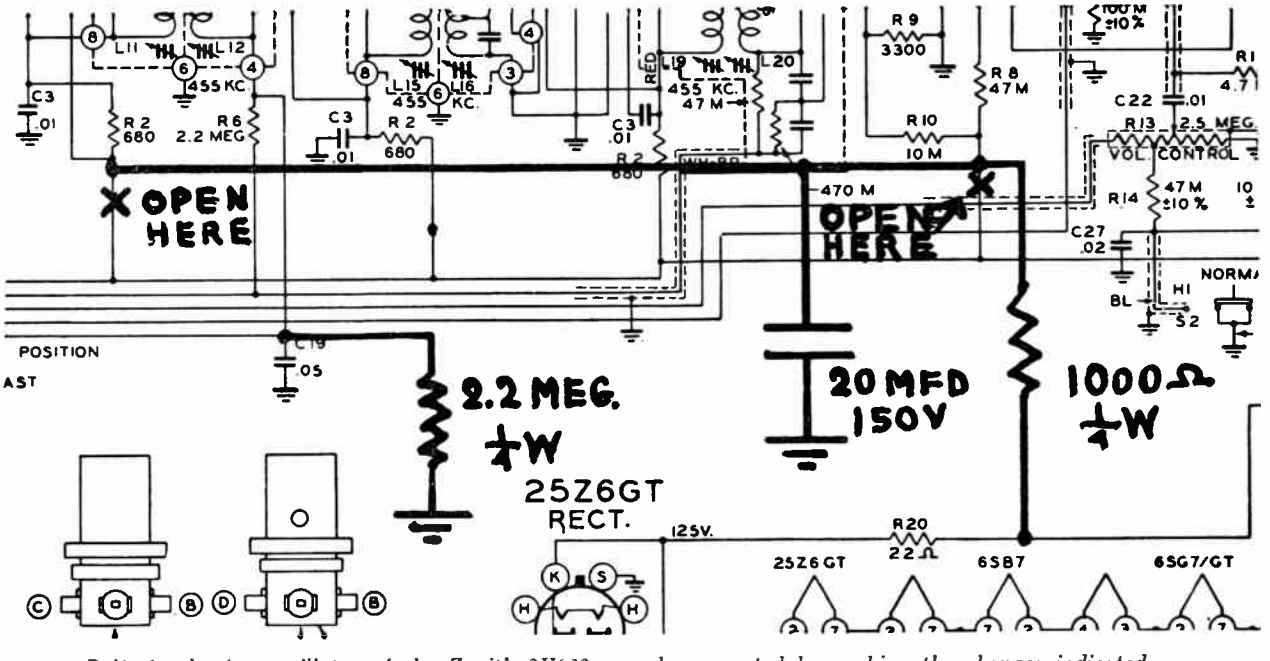
If the oscillator should shift, replace the 220-ohm oscillator coupling resistor (R8) with a 1000-ohm resistor. When the oscillator drops out at the low end of the band, remove the 10,000-ohm grid leak resistor (R1) from the common return (B—) and connect it instead to the cathode of the converter. If audio oscillation occurs in the early model, disconnect the 0.0005-μf capacitor (C13) from the common return and connect it to the cathode of the 50L6GT output tube, as shown in the late model schematic on *page 15-8.* Remove the 250-μμf capacitor (C20) that is connected from the plate to the cathode of the 50L6GT output tube. When hum and microphonics appear, check for a grounded tuning capacitor frame to the cabinet ventilator plate.

The letter "V" after a chassis number indicates that an aluminum chassis is used.

●

RCA 8BX6, Chassis RC-1040D

This model is the same as the model using Chassis No. RC-1040C, appearing in *Rider's Volume XVIII on pages 18-11 through 18-14*, except that the external loop antenna socket is omitted on RC-1040D.



Drift in the f-m oscillator of the Zenith 8H023 may be corrected by making the changes indicated.

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Chairman Wayne Coy of the FCC estimates there will be 400 TV stations on the air within two years—and 1,000 in eight or nine years. David Sarnoff, chairman of the board of RCA, predicts about 18 million TV sets will be in use by the end of 1953. FM figures are equally impressive, with about 4,000,000 more radios with FM forecast in 1949. There can be no doubt about the importance of, and the need for, experienced TV-FM servicemen. Are *you* going to be qualified for the increased earnings that lie ahead?

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The "How It Works" books which have been supplied with most of the Rider Manuals since Volume VIII and with Volumes 1 and 2 of Rider's Television Manuals, have been published with the sole purpose of providing Manual users with a closer union between the theoretical and the practical—that extra knowledge which is so necessary for successful radio servicing.

Every Rider Manual ever published has had the latest servicing data on the newest receivers that we have been able to include. This has meant—and your experience will bear this out—innovations in the way of new tubes—new components —new circuits—new mechanical "gadgets" all new and generally unfamiliar to the average serviceman and so a time-consuming factor when such sets come into his shop. It is to eliminate this unfamiliarity that the "How It Works" book came into being and from thousands of radio repairmen throughout the world for the past eleven years have come acknowledgements of how much help they have had from these free extra Rider Manual dividends.

Besides these explanations of circuit and mechanical innovations, which are, of course, referred to actual models in the Rider Manual which the "How It Works" book accompanies giving you concrete examples, there are discussions of servicing procedures and the reasons they are employed. Consider the matter of alignment, for example; its general aspects, reasons, and procedures are covered in the "How It Works" books of Volumes VIII and IX; an article about image frequency is contained in "How It Works" of Volume XI; the alignment of ordinary and double superheterodynes and f-m sets are in the Volume XV "How It Works," and one on the latest ideas on general alignment with Volume XVII.

For example, the "How It Works" book of Volume VIII contains a discussion of audio degeneration, avc and afc circuits, the beam power tube, etc.; among other subjects meter and shadow-type indicators and saturable-core tuning indicators are covered in the "extra" that accompanied Volume IX. The Volume X "How It Works" contained a description of the television receiver and f-m sets as they were in 1939 (compare them with the sets of today!) and negative feedback and phase-inverter circuits are covered in the Volume XI book.

The numerous innovations that appeared in the post-war receivers demanded an extra large "How It Works" book with Volume XV. Here were described those war-born developments such as intricate tuning assemblies, "gimmicks", new arrangements of i-f transformers, home recorders, etc., as well as many new circuit features for both f-m and a-m sets. And while on the subject of this particular "How It Works" book, there are still quite a few purchasers of Volume XV who were sent a temporary Index which contained a post card with which they could obtain their copy of the "How It Works" book and index by sending us the card. This they have failed to do and we are still holding their copies. So, if you have not already done so, please mail us that card—we pay the postage—and we will send at no cost to you, your copy of the Volume XV "How It Works" book. You'll find it invaluable!

The first article in the Volume XVI "How It Works" is on f-m receiving antennas which is followed by articles on the selenium rectifier, the nature of pre-emphasis and de-emphasis, tuning indicators for f-m receivers, battery charging circuits, television high-voltage power supplies, etc., while in the Volume XVII book magnetic wire recording is discussed at length; then f-m tuners, and new tuning indicators as well as other f-m features.

The "How It Works" book for Rider's Volume XVIII contains chapters on the detector circuits in AM-FM receivers, the locked-in oscillator detector, unusual I-F amplifier circuits, oscillators for F-M sets, grounded-grid input circuits, application of the printed circuit, and audio noise suppression, discussed in 30 informative pages.

"The How It Works" book which accompanied Rider's Television Manual, Volume 1 has as its opening chapter a general over-all description of the transmission and reception of television signals and then follows a detailed explanation of each portion of a receiver. (For the Table of Contents of this 203-page book, see page 4 of the March, April, May, 1948 issue of *SUCCESSFUL SERVICING*.) The last chapter deals with the trouble shooting and servicing of television receivers. Incidentally, this book has been adopted by three television receiver manufacturers as a text for the training of their service personnel and that of their distributors and is being considered by several other manufacturers for the same purpose.

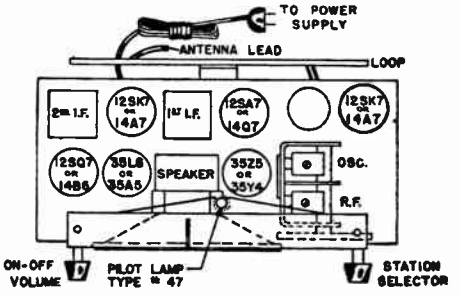
In the "How It Works" book supplementing Rider's Television Manual, Volume 2, television receiver controls, the intercarrier sound system, measurements, and the television receiving antenna are discussed at length. These subjects are fully developed and explained in the 50 pages in this book.

Counting the 253 pages of the Television "How It Works" books, the total number of pages in all these extra books that have accompanied Rider Manuals is 713 which means more than 60,500 words and illustrations in the ten "How It Works" books that have been given to you at no extra cost when you bought your copies of Rider Manuals. . . These books have assisted thousands of radio repairmen throughout the world in gaining a thorough knowledge of the new things in radio and will help you too. We urge you to make good use of this source of information, especially the one accompanying the first television manual, which you can get either from your jobber or directly from us. . . Here is information you need—use it wisely—it will pay you profits.

●

Regal W800

This model is the same as Model 800 which appears on *page 16-1 of Rider's Volume XVI*. The socket layout for both models is shown in the accompanying diagram.



The socket layout of the Regal Models W800 and 800.

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

Vol. 10 APRIL, 1949 No. 6

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

Published by
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JOHN F. RIDER, Editor R. I. LATZER, Associate Editor

CURTAIN TIME

1 Buck and 2 People

There is no doubt about the American public being unique in this hectic world. We face tremendous problems of all kinds — international — political — labor — individual — yet things like the Pyramid Clubs can spread across the nation. We don't know their classification from the viewpoint of the jurist — whether they are lotteries, a form of escapism, or just a means of getting "easy" money. Whatever they may be, they are an illuminating commentary on our mental attitude — especially that of the American woman. She plays her part in domestic affairs — she worries about the family — takes care of the children — yet she can still find the time to stay on the phone for ten hours a day to keep the chain unbroken. Marvelous woman — the American woman! Whatever it is, it is wonderful that ideas can spring up, consume the attention of our womenfolk in the main, and mask so many mental aches and pains.

Radio Bargains

Looking at the daily papers these days, we see that radio receivers are being slashed in price. Maybe that is not good from the viewpoint of the vendor who may be taking a loss on his inventory — but if the receivers are being sold at those low prices, it does no harm to the servicing industry. Just the contrary — it is putting more receivers into active use. In time, service will be needed. Some of the owners may not be willing to spend the necessary money for the service job — especially if they paid $9.45 for the receiver. But many of these receivers are being sold for higher sums — amounts which will justify service. So there is no ill wind which does not blow someone some good.

A New Day?

Is it true that in TV areas, at least those which are on the existing TV nets, the days of the week are to be changed? We understand that a recommendation has been made to change the days to Monday, Berleday, Kraftday, and so on!

N. Y. C. Licensing

After a delegation from the Associated Radio Servicemen of New York visited Councilman Stanley Isaacs, who recently raised the question of licensing radio servicemen in N. Y. C., the issue was dropped. Congrats to the men for being able to show that the existence of the local association during the past year has done much to clean up whatever unwholesome condition existed. We are certain that an effort was made to develop public satisfaction and will be continued at an undiminished pace. So once again the issue of licensing is at rest.

Such results should be of interest to service associations throughout the nation. They show that if the desire is there and the men are willing to put in effort, things can be accomplished.

The Insurance Dept.

We understand that the N. Y. State Insurance Dept. is raising a question about annual service contracts between the public and the serviceman. They contend that if such contracts include a year's replacement of parts, the contract is tantamount to an insurance policy, THEREFORE COMING UNDER THE JURISDICTION of the State Insurance Dept. The basis for this contention is that such a contract is no different from one which covers a plate glass window. There are many sides to this question and opinions should not be formed hastily. At the present moment the RMA legal division is investigating the situation. The decision will be important because what is decided in this specific instance may influence the action of insurance control agencies in other states.

Capehart Data

Capehart record changer data has been scarce as hen's teeth for all these years. You'll find a goodly amount in *Rider's Volume XVIII* and the remainder will be in our *Volume XIX*. In those two volumes you will find all the data they have released so far, all with the approval of the equipment manufacturer!

The FCC Speaks

Wayne Coy, chairman of the FCC, speaking before the Advertising Club of Baltimore on 23 March, said, "...the present television sets available on the market will get service from these channels continuously." He was talking about the present 12 television broadcasting channels.

Saving Money Dept.

The purchasers of our *TV Manual Volume 2* will find that double, triple, and GIANT pages must be put in their place. We have timed this operation on numerous occasions. Following the guide sheet to be found in each volume, the operation consumes between 30 and 45 minutes. Our bindery feels that the operation carried out by their people requires 2 hours. (Remember they are paid by the hour.) If we paid the bindery its actual labor cost and the necessary profit, the list price of the manual would have to be increased about 6 bucks. That's too much money and we feel certain that each buyer of this volume is happy to save this amount of money for a maximum of 45 minutes' work.

The Inquiring Reporter

We've been making some inquires among people during the past few months and are coming to the conclusion that maybe conventional radio still has a great deal of life left in it. Generally speaking, TV programs cease around 11 PM, sometimes earlier. But people don't go to bed that early. Maybe they don't like to be called on the phone that time of night, but they're still awake and listening to RADIO. Perhaps their habits may change during the earlier hours when TV is on, but eventually they get back to listening. Ladies and Gentlemen — radio ain't being dethroned so easily.

The Gripe Dept.

We have a gripe against the guy who asks us our opinion about something and then says that he does not agree. Did we ask him or did he ask us for an opinion?

JOHN F. RIDER

The Cover

Illustrated on page 1 is a mechanic of American Airlines servicing and adjusting a Collins 17H2 transmitter. The test panels below the shelf were all built by American Airlines mechanics and are used to test and align radio equipment, particularly that used in American Overseas aircraft.

Tell Your Friends

We would like your friends to know about *Successful Servicing*. Please tell them about this free magazine for we would like to add their names to the mailing list. A postcard with their names and addresses is all that is necessary. Receiving *Successful Servicing* every month is the easiest way of keeping up with the changes the manufacturers make in their receivers.

Zenith 6G001, 6G001YX, Chassis 6C40, 8G005, 8G005YX, Chassis 8C40

Model 6G001 appears on *pages 15-30 and 15-31 of Rider's Volume XV*. Model 8G005 appears on *pages 15-63 through 15-70 of Rider's Volume XV*. The On-Off switch must be in the Off position whenever the line plug is inserted into the changeover switch on the rear of the chassis. Failure to do this may cause flashing and possible burn-out of the output tubes.

Intermittent operation may be caused by the wavemagnet snap connectors being sprung, causing a poor contact. Poor wavemagnet contact is made through the cabinet hinge.

The letter "X" after the model number (6G001YX, 8G005YX) indicates that an aluminum cabinet is used.

●

Watterson RC-4581

This model is the same as Model 4581 appearing on *page 15-1 of Rider's Volume XV*.

●

GE 230, 233

Model 230 appears in *Rider's Volume XVIII on pages 18-26 through 18-28* and Model 233 in the same Volume, *pages 18-29 through 18-36*. To the replacement parts list for these two models add RMX-120, Coil Cap Retaining Spring and Screw.

A quantity of these are used to service the antenna r-f or oscillator-converter coil and shield assemblies where the tabs have been broken. The spring is placed upon the assembly to form a bridge. Bearing upon the coil and held by the small self-tapping screw through the hole in the shield, the bridge retains the coil within its shield in lieu of tabs.

While early production receivers of Model 233 were wired as shown in the schematic, late production changes revise the power supply circuit as follows:

R24 has been deleted and the circuit for C30 is completed by connecting its free end to the secondary winding lead going to pin 5 of the rectifier, V8, so that C30 appears across the secondary of T4. Resistors R26 and R27 are connected in series with one another and across the primary winding of T4. The junction of the resistors is grounded.

To conform with these production changes, Cat. Part URE-073, R24 is deleted from the replacement parts list and item URD-023, R26 and R27, 82 ohms, ½ w., carbon resistor is added.

Cat. No. RMX-123, pushbutton locking screw is also added. This screw locks the pushbutton device for automatic station tuning and has a knurled head and threaded end.

Cat. No. RCY-028 for C1 has been changed for an improved antenna trimmer, 8-480 $\mu\mu$f, used in late production, listed RCY-052. This item allows knob adjustment of the antenna trimmer for which a knob is available under Cat. No. RDK-158.

●

Motorola CR7

This model is the same as Model CR6, appearing on *pages 15-9 and 15-10 of Rider's Volume XV* and *pages 16-1 through 16-8 of Rider's Volume XVI*.

Zenith Chassis 6C01, 6D0 Series

Chassis 6C01, 6D0 Series, which appears on *page 15-26 of Rider's Volume XV*, will contain variations in the tube line-up. A single chassis may contain octal, lock-in, and miniature button tubes. If an original tube is replaced with an alternate, the socket must also be replaced.

Original	*Alternate*
35Z5G/GT	35W4
12SQ7GT	12AT6

When replacing speakers, use a speaker with the same code letter (49U, AG etc.) as the original otherwise a low-pitch hum may be produced. If a speaker with a different code is used, R10 (feedback resistor) may have to be changed. With 49U, H, or AG speakers, R10 is 390,000 ohms. When using a 49CS549 speaker, R10 must be 680,000 ohms. R10 is 330,000 ohms for all other speakers.

To repair this set when it produces a howl, change the 14C7 tube, which is probably microphonic.

For oscillation, hum, and poor sensitivity, check for grounded tuning capacitor frame. Correct by inserting a rubber pad between the capacitor frame and chassis. Cement in place.

●

Federal 1021, 1031, 1032, and 1540

These models are the same as Model 1030T, appearing on *pages 16-5 through 16-8 of Rider's Volume XVI*, except for the cabinets.

●

Tele-Tone Chassis A

Models 123, 125, 127, and 131 are the same as Model 100, Chassis A, which appears on *page 15-2 of Rider's Volume XV*.

●

Zenith Chassis 6C05, 6D0 Series

This chassis appears in *Rider's Volume XV, pages 15-2, 15-28, and 15-29.*

There will be variations in the tube line-up for different 6C05 chassis. A single chassis may contain octal, lock-in, and miniature button tubes. If an original tube is replaced with an alternate, the socket must also be replaced.

Original	*Alternate*	*Alternate*
12SJ7GT		
12SA7GT	12BE6	14Q7
12BA6		
12SQ7GT	12AT6	
35L6GT		
35Z5GT	35W5	

If the oscillator shifts, replace R3 (220 ohms) with a 1,000-ohm resistor.

If the oscillator drops out at the low end of the band, disconnect R1 (10,000 ohms) from the negative return and connect to the cathode of the converter tube.

For audio oscillation, disconnect C14 from the negative return and connect to the cathode of the 35L6GT. Take out C21 (connected from the plate to cathode of the 35L6GT).

If there is oscillation at 910 kc, change C5 (negative return to chassis) from 0.05 to 0.1 μf.

Check for grounded tuning capacitor frame in case of oscillation, hum, and poor sensitivity. Correct by inserting cork or rubber pad between rear capacitor frame and chassis. Cement in place.

The letter "V" as in Chassis number 6C05V, indicates that an aluminum chassis is used.

Television Changes

Admiral Chassis 30A1

This chassis appears on *pages 2-1 through 2-46 of Rider's TV Manual Volume 2.* Type 6AG5 tubes were used for V302 and V303. Future production will use type 6AU6 tubes as a substitute for these two type 6AG5 tubes. Due to differences in interelectrode capacitances, video i-f transformers T301 and T302 must be changed when the type 6AU6 tubes are used. When 6AU6 tubes are used, T301 will be part number 72A81 and T302 will be part number 72A82. The connections to the substitute transformers are identical to those used with transformers 72B40 and 72B41 (used with the 6AG5 tubes).

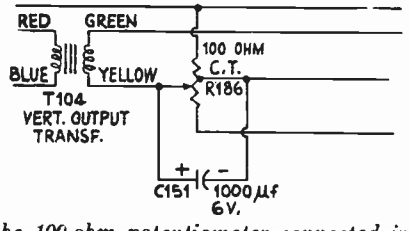
When the 6AU6 tubes are used for V302 and V303, the chassis will be identified by "-E" after the chassis type number. For example, such a chassis would be marked "30A1S-E." Replacement tubes and transformers should be of the type specified for a particular chassis. For example, 6AU6 tubes must be used for V302 and V303 in a 30A1S-E chassis. Type 6AG5 tubes must not be substituted.

●

Industrial Television IT-11R

This model appears on *pages 2-1,2,3 of Rider's TV Manual Volume 2.* The following changes have been incorporated in current production. It is not recommended that these changes be made in the field. except in the case of the noise limiter change. This change may be made if conditions of high noise are encountered.

In the vertical positioning circuit, the 100-ohm potentiometer, R186. and the 47-ohm resistors, R187 and R188, have been replaced by a 100-ohm center-tapped potentiometer. This change is shown in the accompanying diagram.



The 100-ohm potentiometer connected into the vertical positioning circuit of the Industrial Television Model IT-11R.

Resistor R180 in the vertical sawtooth generator has been changed to 180,000 ohms, one watt from 270,000 ohms, one watt. This change improved the range of the vertical size control.

Resistor R1100, (470,000 ohms, one watt) has been added between the plate and cathode of V103 to stabilize the action of the noise limiter circuit.

●

Hallicrafters T-67

This model appears on *pages 2-1 through 2-15 of Rider's TV Manual Volume 2.* There have been some reports that the bosses on the plastic escutcheon are breaking, allowing the safety glass to drop out of position. To prevent this, additional clips, part number 76A446, have been fastened with round head screws directly to the inside of the cabinet. These six clips are installed around the safety glass in a manner to hold it in position independent of the bosses on the escutcheon. It is no longer necessary to replace the entire escutcheon because of broken bosses. The clips may be obtained from the Service Parts Department.

●

Farnsworth 651-P

This model appears on *pages 2-11,12 through 2-25 of Rider's TV Manual Volume 2.* A scratching or barking sound sometimes eminates from the r-f unit of Model 651-P when the 12-channel tuner is used. This may be noticeable after a period of service, when switching channels or in operating the Fine Tuning Control.

The present run of 12-channel units (which use a separate variable capacitor for fine tuning, rather than the former system of varying the main tuning capacitor by a gearing system) use a glass detent ball instead of a metal ball as originally used. This glass ball is used to preclude the possibility of scratch caused by friction between the metal ball and the metal detent cam. It is suggested that the metal ball be replaced with a glass ball if scratch is encountered. This will provide quieter operation over a long period of time.

These glass detent balls are now available in lots of ten only, from the Parts Department of Farnsworth. The part number is 450191-A.

●

Stromberg-Carlson TS-10

Because of the limited supply of twelve-inch picture tubes, it has been necessary to substitute the ten-inch 10BP4 for the 12JP4 in some of the TV-12 table model receivers. The receiver with the ten-inch tube is known as the TS-10. Service data *on pages 1-17 to 1-29,30 of TV Volume 1* applies to the TS-10 when the following changes are made.

R-286 (250 ohms) has been shorted out to provide adequate focus range. C-287 (220 µµf) has been omitted to give the correct horizontal sweep for the ten-inch tube.

The following parts have been added:

111055	40 µf, 475 v, capacitor C-264(A) to replace 111040
111056	40 µf, 400 v, capacitor C-264(B)
113047	10-inch tube clamp
114635	Ion trap
154053	Mask
162024	10BP4 picture tube
165009	Anode connector

In most cases when installing a Model TS-10 receiver, the ion trap will have to be adjusted. Move the ion trap back and forth on the neck of the tube, at the same time rotating it until the brightest raster is obtained on the screen of the picture tube.

●

DuMont RA-105

This model appears on *pages 2-5 through 2-55,56 of Rider's TV Manual Volume 2.* A defective 6AT6 tube in the AGC amplifier may result in "drift" of the AGC setting which would become apparent as a change in sensitivity of the receiver as it operates. In such cases the 6AT6 tube should be replaced and the AGC readjusted as described on *page 2-24.* An accidental change in the AGC setting during shipment might result in low sensitivity, also necessitating readjustment of the control.

It is possible to adjust the AGC using the "meter" method wthout removing the main chassis from the cabinet. This can be accomplished by removing either the first or second video i-f tube, V201 or V202, and inserting a sharp-pointed test prod into pin #1 of the tube socket involved. (Remember that when the tube socket is viewed from the top, the pins are counted in the counter-clockwise direction.) Once the meter connection has been made, the procedure is the same as that outlined on *page 2-24* under the heading "Procedure for Adjustment in the Shop."

●

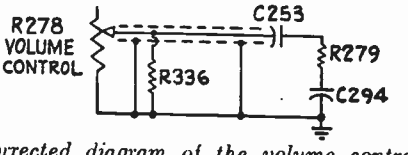
DuMont RA-105

This model appears on *pages 2-5 through 2-55,56 of Rider's TV Manual Volume 2.* The following corrections should be made in the service data.

On the detailed block diagram on *page 2-7,* in the block for V401-A, the abbreviation Amp. should be changed to "Maker."

In the voltage measurement chart on *page 2-52,* the measurement for pin #2 of V220 should be 135 volts instead of 13.5 volts.

In the schematic on *pages 2-55,56,* in the volume control circuit, R336 is shown shorted out and the "hot" wire of the shielded lead is shown grounded. The accompanying diagram shows the correct connections.



Corrected diagram of the volume control circuit of the DuMont Model RA-105.

Hallicrafters T-54 and 505

These models appear on *pages 1-1 through 1-29,31 of Rider's TV Manual, Volume 1.* Remove all dark brown 3.3-µµf capacitors C96 and C97 and replace with 6-µµf mica unit, Part No. CM20A060M. The light tan colored 3.3-µµf capacitors used for C96 and C97 in some receivers are okeh and need not be changed.

Resistors R67 and R68 should be 47,000 ohms rated at 2 watts.

Change the 7JP4 filament wiring so that it is in series with the 6X5GT filament on the ground end of the filament circuit.

Add a 1000-µµf ceramic capacitor from the filter capacitor side of the R57 filament to ground, and from the 6X5GT filament, Pin 2 to ground.

Resistor R-29 found in some plate circuits of V-5 should be removed and discarded entirely. This results in additional gain.

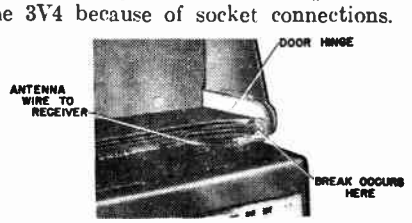
Zenith 4G800 Chassis 4E41

This model appears in *Volume XVII of Rider's Manuals, pages 17-1 and 17-2.* The On-Off switch #85-433 does not completely break contact on some receivers when the lid is closed, causing battery drain. To correct this condition, saw one plastic switch knob 46-736 into 1/16" lengths and place a length on the switch shaft, and then replace the knob. This will force the switch down far enough when the lid is closed to break contact and disconnect the batteries.

In some cases the calibration pointer touches the metal front of the cabinet, thus putting the gang at an a-c potential and causing a hum. To correct this condition place a fibre washer #93-323 between the pointer and the metal dial front. This fibre washer between the metal front panel and the dial pointer, completely prevents this "shorting" condition.

In very rare cases, when hum is encountered and cannot be corrected in any other manner, changing the 1S5 tube is suggested.

On later production runs the 3Q4 tube was replaced with a 3V4 tube. The circuit remains the same in this case. However, the wiring to the tube base has been altered. The 3Q4 is not interchangeable with the 3V4 because of socket connections.



Enough extra lead length should be left when replacing the wavemagnet lead on the Zenith 4G800 so that a break does not occur at the point indicated.

In some cases when the front lid of the receiver is open. the receiver will cut in and out or sometimes be entirely dead. The wire from the wavemagnet to the front door hinge may break at the hinge connection. To correct this condition, remove the handle and resolder these leads, being quite certain that solder is not allowed to run back on the antenna lead and that enough extra antenna lead is allowed for flexing to prevent breakage when the door is open as illustrated in the accompanying diagram.

●

Noblitt-Sparks Chassis RE-202, RE-231

These chassis are used in Models 555, 555A, 552N, and 552AN, appearing on *pages 16-1 through 16-4 of Rider's Volume XVI.*

●

Farnsworth U-12A Capehart

This model appears on *pages 2-1 through 2-9,10 of Rider's TV Manual Volume 2.* Horizontal output transformer 750002-A is now being supplied as a replacement for transformer 94276. The parts are identical with the following exception. The secondary of transformer 94276 is tapped twice and these leads are numbered 5 and 6, while the secondary of transformer 750002-A has only one tap. numbered 5. When using transformer 750002-A as a replacement, therefore, leads 5 and 6 must be connected to the points previously connected to leads 6 and 7.

Preventive Maintenance

(*Continued from page 1*)

vertising program which was carried on in local newspapers and amusement digests circulating in the area. Supplementing such advertising was the advertising of parts and set distributors who bought space on the radio pages of local dailies, calling attention to the program for "Preventive Maintenance." The continuous bombardment of the public through newspapers, broadcasts, mailing pieces, and other forms of publicity aroused the interest of everyone in and around Harrisburg, so much so, that members of the local radio servicemen's association developed new lights in their eyes. Moreover, the association became the focal point of interest in the local servicing industry as well, with the result that many requests for membership were received and numerous unsolicited offers of cooperation were forthcoming.

The results of the program were beyond expectations. It was felt that such an effort would have beneficial effects in all directions, but they were far in excess of even the fondest hopes. Not only did the members of the servicing industry and their jobbers, consequently the parts vendors who sell these jobbers, note increased sales, but even the radio broadcast stations gained listeners. In this respect, it is only natural that stations located on a portion of the tuning scale where reception, for one reason or another, is not very good, suffer a falling-off of listener interest. Many of these conditions are associated with imperfect receiver operation. Therefore, restoration of the receiver condition to that which will afford equal efficiency all across the tuning dial, will add listeners to the stations located along the improved portion of the tuning scale.

As to direct results, the radio servicemen in that community noted that receivers which had been up in attics for long periods were being brought in for check-up and repair. As frequently as they came in single units, they were brought in pairs. Many men reported that when they called at the customer's home, they were requested to inspect as many as two and three additional receivers! All along the line it was a revelation!

In a survey taken among the members after the program was completed, it was found that business had increased from 25% to 30% OVER THE EQUIVALENT PERIOD IN 1947, when the servicing business was still riding fairly high — higher than normal.

Here are some other data for serious consideration. Among the members who participated in advertising and kept records, 70% reported an increase in business of the aforementioned 25% to 30%. Of these receivers, fully 65% were pre-war and 35% were post-war. Even among the 10% of the members who did not participate in the advertising, the increase in business was about 15%!

From the viewpoint of the parts jobbers and the manufacturers, the following figures are highly significant. They show the *increase* over an equivalent period in 1947, in servicemen purchases of three types of parts, namely tubes, capacitors, and volume controls.

Percent of Members	Tubes	Parts Capacitors	Controls
10% - 15%	35%	15%	12%
20% - 30%	25%	10%	10%
40% - 60%	20%	10%	5%
Rest	10%	5%	5%

Recognizing the fact that only three local broadcast stations, two a-m and one f-m station, participated in this program, and that it carried the weight of only three of the many nationally prominent parts manufacturers, although these were important, the showing is remarkable. Congratulations to all the participants.

It is significant to remember that tremendous improvement in public relations between the servicing industry and the public was also attained. This is important to every branch of the radio industry because the servicing group are of vital importance in the successful sale of every electronic device made available to the public. It is not sufficient to sell it. It must be serviced so that it will stay sold!

From what we are given to understand, the State Federation plans to institute such a program sometime during 1949 with every one of its chapters in Pennsylvania. Without question it will benefit every parts vendor in the state and through the parts jobbers, every manufacturer of parts who sells in the area. Most certainly it will benefit the servicing industry and now is the time to formulate such plans in all the states of the nation. Anyone interested in communicating with the Secretary of the Federation of Radio Servicemen's Associations of Pennsylvania for additional details, can write to John G. Rader, 704 Walnut Street, Reading, Pa.

Town Meetings

The Town Meetings of Radio Technicians that have proved so popular elsewhere have been carried to Toledo, Ohio, and to Anderson and Evansville in Indiana. On March 14, John F. Rider spoke to the local servicemen's association at Toledo, Ohio, at a meeting sponsored by the Warren Radio Co. His subjects were: TV Antennas, Transmission Lines, and Impedance Matching. A Question and Answer period followed the talks.

The servicemen of Anderson, Indiana, and vicinity gathered at a Town Meeting on April 5. This meeting was sponsored by Seybert's Radio Supply Co., and the local radio servicemen's association. The meeting was held at Seybert's new store. Rider spoke on the same topics that had proved so popular in Toledo, with a Q and A period again following the lectures.

On the evening of April 6, the radio servicemen of Evansville, Indiana, and vicinity gathered in the Knights of Columbus Auditorium in Evansville. This meeting was jointly sponsored by Ohio Valley Sound Service and Wesco Radio Parts Co. Rider spoke on the same subjects as at the Toledo and Anderson meetings, with a Q and A period again following.

Notice

On page 14 of the March issue of *Successful Servicing* a listing of chassis numbers versus model numbers was given. The caption was inadvertently omitted. The listing should have been captioned: A Listing of RCA Chassis Numbers versus Model Numbers.

●

Old Receivers Still Being Repaired

Every so often people discuss the status of radio receivers in the hands of the public. Each year a number of very old receivers are discarded but surprisingly enough, receivers 10 to 15 years old still find their way into the service shops — and not just now and then with major time lapses in between, but almost as a regular daily diet. As a matter of fact there has been a jump in this activity during the last few weeks, even in TV areas.

The 70,000,000 receivers said to be in the hands of the public, in homes and cars, embraces the production of more than 20 years. Yet no one year's production can be said to have disappeared completely from use. Each time something happens which limits the sale of new equipment, many of these old-timers crop up. Many a receiver owner still feels that his "Homodyne" of 1931 is still the best thing out!

●

Reviewers Praise "Understanding Vectors and Phase."

"A book for the radio serviceman, this is an excellent example of what can be done by the practical writer for the practical reader. The authors realized that vectors are inherently far simpler than much of the mathematics traditionally taught as preparation to their study, and have produced a book which can be understood by any radioman with a knowledge of arithmetic and simple geometry.

"Methods of handling vectors and calculating impedance, reactance, and resistance in circuits containing various combinations of resistors and reactors are clearly explained. Incidentally, many radio servicemen will find in this book their first understandable exposition of the FM discriminator."—*Radio Craft.*

"This new book has been written as an aid to understanding new technical developments in the radio and electronic field. The text is prepared especially for the radioman without technical training, electronic engineering students, and servicemen. A minimum of mathematics has been used in presenting the material, thus any person with a simple knowledge of electronics should have no difficulty in grasping the subject.

"Since more and more technical publications use vectorial representation in discussing radio and electronic circuits, a working knowledge of this method of presentation is worth while for those in the industry.

"The book is clearly written and diagrams have been used freely to illustrate the points under discussion. The book is recommended for home study."—*Radio News.*

Television Changes

Philco 48-1001, Code 121

This model appears on *pages 2-81,82 through 2-86 of Rider's TV Manual Volume 2.* All model 48-1001 receivers are Code 121 unless a different code number is stamped next to the model number on the rear of the chassis. To determine the run number of a set, examine the series of numbers stamped in ink on the rear of the chassis. The last digit of the series gives the run number. For example, if the number is 1111374, the set is run 4.

Run 4

All paper capacitors were changed to paper-molded capacitors. When replacing parts, the parts number given in TV Manual Volume 2 should be used with, the following exceptions.

Section 2

C210 should be Part No. 45-3502
C211 should be Part No. 45-3502
C217 should be Part No. 45-3502

Section 3

C304 should be Part No. 45-3502
C305 should be Part No. 45-3502
C306 should be Part No. 45-3502
C307 should be Part No. 45-3502
C308 should be Part No. 45-3502
C310 should be Part No. 45-3502
C311 should be Part No. 45-3502
C312 should be Part No. 45-3502
C314 should be Part No. 45-3502
C315 should be Part No. 45-3502
C317 should be Part No. 45-3502

Section 5

C509 should be Part No. 45-3500-3

Run 5

Z202, the discriminator transformer, Part No. 32-4214, was replaced by Part No. 32-4214-3 to reduce frequency drift.

Run 6

R547, Part No. 33-5547-2, was replaced by Part No. 33-5546-12. This involved a change only in rating.

Run 7

To reduce modulation hum of high-frequency channels, a choke, Part No. 32-4112-2, was added between the junction of R400, C402, and L402 and the junction of C409 and R405.

●

Industrial Television IT-1R Series 2

This model appears on *pages 1-3,4 of Rider's Television Manual Volume 1.* The gear assembly on the r-f tuning assembly may be adjusted in the following manner.

With the chassis removed from the cabinet and placed on the bench facing the mechanic:

Loosen screw in left-hand bottom corner of the dial assembly. (This screw holds the idler gear bracket.)

Move the idler gear out of mesh with the rest of the assembly.

Rotate tuner clockwise to stop.

With pointer held at the right-hand edge of the 7-13 television box, gently mesh idler gear and tighten the screw holding same to the rear assembly.

Pointer should now be in the correct position, and indicate correctly over the range of the tuner.

●

Remington 1950

This model is the same as Models 80 and 130, appearing on *pages 1-1 through 1-9,10 of Rider's Television Manual Volume 1,* except for the following changes.

The B-supply voltages are all supplied by one power transformer and a 5U4G rectifier. Both the centering controls are wired in series with the common supply. Only one filter choke is used in the common supply, instead of two as in Models 80 and 130.

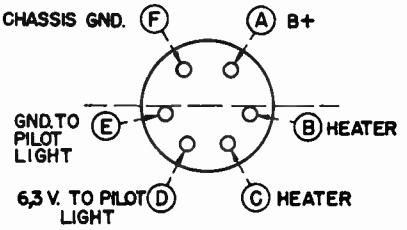
"How It Works" TV Volume 2

On page 13 of the *"How It Works"* Book of TV Volume 2, the diagrams of Fig. 6 and Fig. 7 should be interchanged.

General Electric 417, 417A

Model 417 appears on *pages 16-16 through 16-19,* and *pages 16-21 through 16-24 of Rider's Volume XVI.* Model 417A appears on *pages 17-27,28 through 17-38 of Rider's Volume XVII.* These changes are in reference to the wiring of Phono Preamp Plug RJP-005.

Since some of the plugs supplied are inconsistent with specifications regarding the identification notch often referred to in wiring guides, this notch must be disregarded for indentification purposes to avoid confusion. While in some receiver productions the position of this key notch will differ from others, nevertheless, all receiver productions are wired the same in respect to the polarized system of prong arrangement.



Phone Preamp Plug RJP-005 in the GE 417, 417A should be wired as shown.

When replacing the plug RJP-005, it is only necessary to follow the simple wiring rule as used in all receiver production where the cluster of four prongs is first located within one-half the area of the plug base as determined by the imaginary center line. Next, locate the two remaining prongs as viewed from the prong end of the plug and begin the wiring in a clockwise direction as indicated by the letter designations in the accompanying diagram. The letters A, B, C, etc., in the diagram, are keys to wiring points, as referred to in the various published receiver circuit diagrams.

●

RCA RP-176 Record Changer

This record changer appears on *pages RCD.CH. 17-1 through RCD.CH. 17-12 of Rider's Volume XVII.* The method of attaching the pivot arm spring (Ref. #75) has been changed. The stud (Ref. #74) is no longer being used. A curved spring which clips into the inside rear of the tone arm is used in its place. The timing notch originally in the rim of the main cam and gear is no longer used. A small metal projection has been added to the inside of the rim of the main cam and gear for the same purpose. The indention in the hub of the main cam and gear into which a projection on the ratchet lever fits may also be used for timing purposes.

Add the following stock number to the parts list: 73198—Curved spring for anchoring pivot arm spring.

●

RCA 8V151

This model appears in *Volume XVIII of Rider's Manuals, pages 18-25 through 18-40.* An addition to the Parts List under Miscellaneous is:

74312 Ornament — Wood fibre ornament for front of cabinet.

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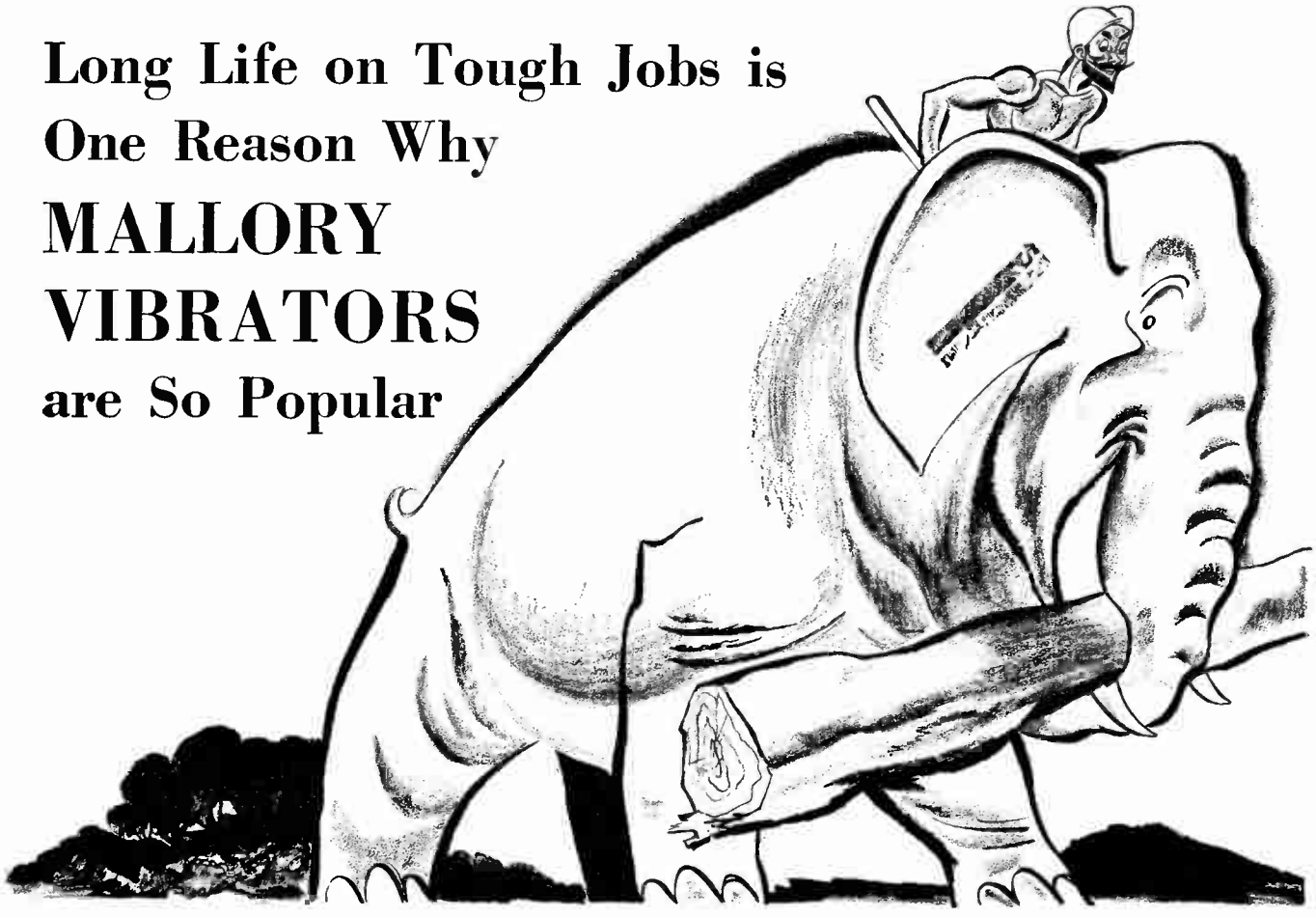

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Zenith 6G801, Chassis 6E40

This model appears in *Rider's Volume XVIII, pages 18-7, 18-8, and 18-10.* In some cases when microphonics are encountered they can be eliminated by replacing one or more of the tubes. The offending tube can be located by turning the set on with the volume advanced and the set tuned to an off-station position. Then gently tap each tube, the one emitting the loudest "ping" is the defective item.

●

Tele-Tone Chassis W

Models 154, 155, 173, and 177 are the same as Model 152, Chassis W, which appears on *pages 17-2 and 17-3 of Rider's Volume XVII.*

●

Westinghouse H-125, H-126, H-127

Models H-125 and H-126 appear in *Rider's Volume XV, pages 15-8 through 15-10.* Several changes were made in the chassis of these two models in late production. A 35L6GT output tube replaces the 35A5. The electrical characteristics of the tubes are similar except for a difference in tube bases and connections. An isolating network consisting of a 470-ohm resistor (44) and a 0.02-μf capacitor (14) has been inserted in the plate and screen voltage supply line for the r-f and converter stages. In the circuit, the rotor plates of the tuning and trimmer capacitors are now connected directly to chassis ground rather than to the AVC line.

Model H-127 is the same as the previous models with a burgundy and gold cabinet. The following items should be added to the parts lists for these models:

14	RCP10W2203A	Capacitor, 0.02 μf
44	RC20AE471M	Resistor, 470 ohms 0.5 watt
	V-3711-2	Case Assembly, center (H-126 and H-127)
	V-3991	Cover, left hand (H-127)
	V-3992	Cover, right hand (H-127)
	V-3498-2	Handle Assembly (H-127)
	V-3481-2	Knob (H-127)
	V-3333-2	Medallion (H-127)
	V-3455-2	Dial (H-127)

●

Zenith S-11468

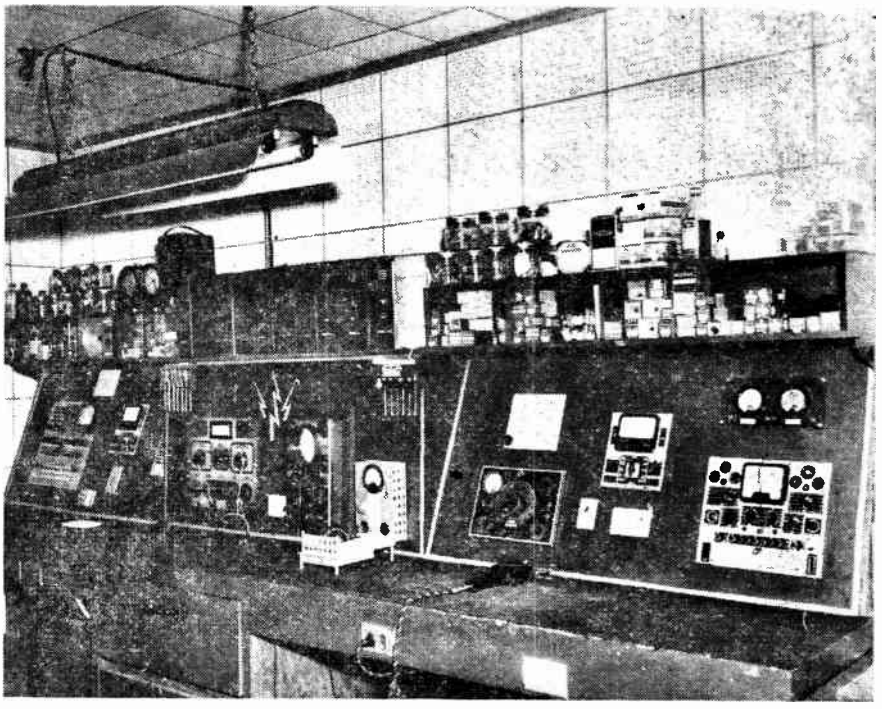
Model S-11468 may be found in the Record Changer section of *Rider's Volume XV, pages RCD.CH. 15-1 through RCD. CH. 15-9.*

The following instructions deal with repairing erratic landing of the needle of Model S-11468. In the first production of this non-intermixer record changer, a neoprene cork-tipped lift pin, Part No. S-13056, was used to stabilize the set down or landing of the needle on the run-in groove of the record. The weight of the tone arm and the friction plate, riding on the neoprene tip of the lift pin was relied on to provide effective braking action. Grease or oil on the neoprene tip of the lift pin will cause erratic landing of the tone arm on the record. To remove the oil or grease, clean the pin tip and friction plate with carbon tetrachloride and roughen with fine sandpaper.

Later production S-11468 changers have a spring type brake on the tone arm shaft and use an all metal lift pin, Part No. S-13086. Erratic landing, where the arm swings sharply to the center of the record or beyond, may be caused by an incorrect locating bushing. Replace with a 94-415 bushing.

If the tone arm skips grooves and repeats, the vertical hinge on the tone arm may be too tight, causing the arm to hang slightly. This prevents the needle from exerting enough pressure on the record to follow the record grooves. To free the hinge, use a pair of long nose pliers and bend the horizontal spring "U" bracket until it pivots freely, Be certain that the connecting lead to the crystal cartridge is dressed so that it does not interfere with either the vertical or horizontal movement of the tone arm. *This is important.*

Excessive center hole wear on records is caused by a sharp edge or burrs on the spindle shelf. The edge of the record shelf must be perfectly smooth and slightly rounded. Check the edge, and if sharp, smooth out with fine sandpaper.



Courtesy Sears Roebuck

The service bench of the Sears Roebuck Service Shop at Durham, North Carolina. Perhaps this will give ideas to those of you who are planning to renovate your shop. Incidentally, notice the Rider Manuals above the work bench where they can be reached quickly and easily.

GE 201, 202

Since there are electrically identical, these models have been added to the listing for Models 200, 203, and 205 which appears in *Rider's Volume XVIII, pages 18-19 and 18-20.*

The following items have been added to the parts list:

RAU-001 Cabinet—ivory (plastic), model 201

RAU-023 Cabinet—brown (plastic), model 202

The Beam-a-Scope cabinet back listed as RAB-003 also applies to models 201 and 202

●

Tele-Tone Chassis D

Models 110, 119, 124, 126, and 132 are the same as Model 117, Chassis D, appearing in *Rider's Volume XV, page 15-4.*

Distribution of This Issue—45,000 Copies

MAY, 1949

Air Force Photograph

TV MEASUREMENTS

by Henry Chanes

IN the servicing of television receivers, observation of the picture and sound will very often yield sufficient information so that the defect can be isolated to a certain part of the receiver. However, in order to determine the stage or circuit in which the defect exists and then the defective part itself, it is usually necessary to make various measurements in the television receiver. Many of these measurements are the same as those used in servicing radio receivers. These include d-c and a-c voltage and resistance measurements. Other measurements such as high-voltage and waveforms, are peculiar to television receivers. By high voltage is meant the voltage used on the anode of the picture tube, which may be anywhere between 5,000 and 30,000 volts.

The measurement of low d-c voltages in television receivers includes that of B-plus supply voltages, bias voltages, plate, screen, and cathode voltages, and the control voltages used in the afc or age systems. These voltages vary from a small fraction of a volt to perhaps as high as 400 volts. These will all be referred to as low d-c voltages to distinguish them from the high voltages mentioned above.

THIS is the first of a series of three articles on Measurements. This material is reprinted from the "How It Works" book that accompanied Rider's TV Manual Volume 2 because of the importance of the material and the fact that the distribution of this "How It Works" book is limited essentially to those areas where TV exists.

The measurement of a-c voltages in a television receiver may involve power line voltages, which are usually 60 cycles, audio voltages which may range from 40 to 10,000 cycles, and video voltages which may be as high as 4 mc. In addition there are the sync and sweep voltages, which only go up to 15,750 cycles in frequency, but due to their irregular waveform require some special care in measuring. In some cases it may be necessary to measure i-f or r-f voltages. In this case the frequencies range from 4.5 mc to as high as 216 mc.

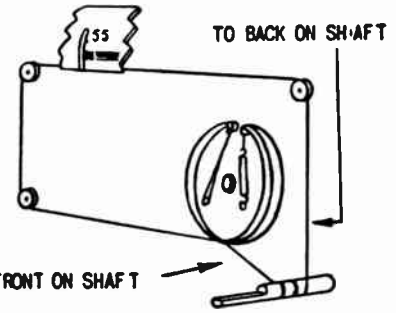
From this brief description, it can be seen that the voltages encountered in a modern television receiver have a tremendous variety with regard to frequency, amplitude, and waveform. Because of this, it is necessary to know which instrument should be used to make any necessary measurement. It is important for the serviceman to know how to take full advantage of the instruments he has at hand, at the same time realizing the limitations of each. In many cases the serviceman can improvise in order to obtain measurements that he ordinarily could not make with his existing test equipment.

(Please turn to page 11)

Sears 8020, Chassis 132.841

This model appears on *pages 18-56 through 18-60 of Rider's Volume XVIII.* It has been discovered that the dial cord on some of these receivers binds. If the dial cord is strung as shown on *page 18-58,* continued turning of the tuning knob in a clockwise direction, after the pointer has reached the right-hand end of the dial, will cause the tuning shaft to turn in the cord and the cord will slide back on the shaft toward the chassis. Then, when the knob is turned in the counterclockwise direction, the cord will travel farther back on the shaft and have a tendency to come in contact with the chassis and bind on the shaft.

If the cord is wound from back to front on the tuning shaft, as shown in the accompanying figure, it will travel away from the chassis when the knob is turned in a counterclockwise direction and the binding will not occur.



When the dial cord of the Sears 8020 is wound from back to front on the tuning shaft, the cord will not bind on the chassis.

●

Federal 1034

This model is the same as Model 1024TB, appearing on *pages 17-1 through 17-3 of Rider's Volume XVII,* except for the cabinet.

●

RCA 8V112, Chassis RC-616, RC-616F

The schematic diagram for this model, which is contained in *pages 18-17 through 18-24 of Rider's Volume XVIII,* is in error in showing the connection of R22. It should be shown connected to C18A instead of to the RED lead of the output transformer.

In order to provide adequate lead length, resistor R10 (56,000 ohms) has been changed from ½ watt to 1 watt.

Chassis RC-616F, used in the second production of these instruments, is very similar to Chassis RC-616 except for the following:

First Production RC-616
Four position selector switch
M.M.—PHONO—AM—FM
Aux. input jack is not used

Second Production RC-616F
Five position selector switch
AUX.—M.M.—PHONO—AM—FM
Aux. input jack is used

Except for the following replacement parts, all parts are identical.

74163 Selector switch is used in place of 73608 (switch S1, S2)

74164 Control panel decal for mahogany or walnut instruments is used in place of 73764 decal

74354 Control panel decal for blonde instruments is used in place of 73765 decal

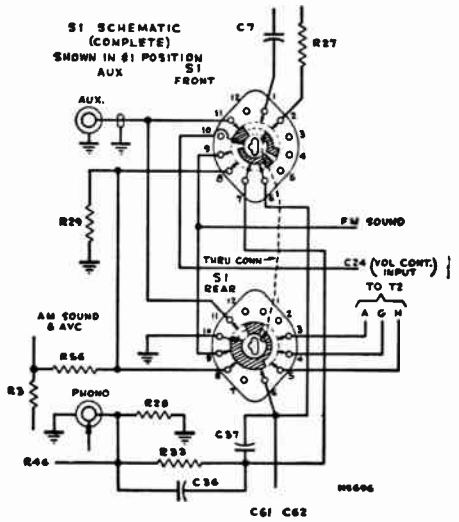
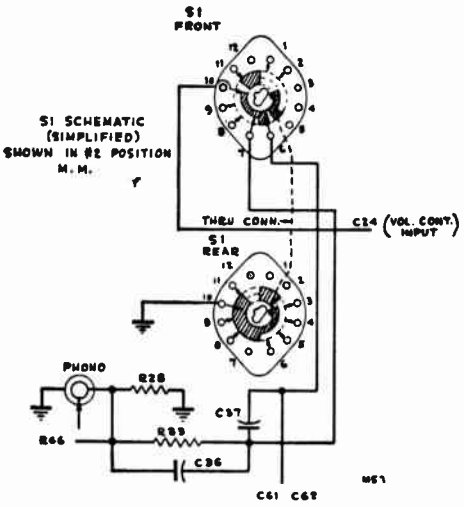


Fig. 1. (Above) shows the selector switch used in RCA Chassis RC-616F. Fig. 2. (Below) The simplified circuit of the selector switch in the #2 position.



Figs. 1 and 2 show the selector switch S1 used in Chassis No. RC-616F. The connections to S2 are identical in both chassis. Note that position #2 (M.M.) of RC-616F corresponds to position #1 (M.M.) of RC-616. No connections are made through S2 in AUX. position.

●

Espey 509

This model is the same as Model 7B1, appearing on *pages 18-1,2 of Rider's Volume XVIII,* except for the following changes. Capacitor C55 (10 $\mu\mu$f) connected from pin 1 of the 7F8 tube to ground has been removed. The 0.003-μf capacitor C9 has been changed to 1500 $\mu\mu$f.

The position of the trimmers has been changed. Looking at the front of the set, they are: C49 (broadcast trimmer), C51 (f-m oscillator), C50 (broadcast oscillator), and C52 (f-m r-f trimmer).

A coil has been placed in the cathode lead of the 7Q7 tube before this lead is connected to C50. Capacitor C53 (15 $\mu\mu$f) has been changed to a variable capacitor and is now connected between L5 and ground, instead of across L5. The junction of C50 and the cathode lead of the 7Q7 tube is connected to the ground side of this capacitor.

The 22,000-ohm resistor, R51, connected between R13 and ground has been eliminated. The side of C19 that is not connected to R13 is grounded directly. The side of the tone control, R14, previously connected to C19 has been left open. R20 has been changed from a 470,000-ohm resistor to a 1-megohm variable resistor. The movable arm of R20 is now connected to pin 5 of the 7F7 tube, and one side of R20 is connected to the junction of C21, C22, and C23. C56, the 1500-$\mu\mu$f capacitor across the filaments of the 6BA6 tube, has been removed.

●

Federal 1027, 1035

These models are the same as Model E1025TB, appearing on *pages 16-1 through 16-4 of Rider's Volume XVI,* except for the cabinets.

●

General Electric 802, 803

Model 802 appears on *pages 1-52 through 1-72 of Rider's TV Manual 1* and Model 803 appears in *TV Volume 2 on pages 2-1 through 2-21.*

A sharp low-frequency audio buzz which sounds similar to 60 cycle sync pulse reproduction has been isolated to the filament lead that connects to the head-end switch wafer of these models. This hum was noted particularly on Channel 13 reception but possibly exists on some of the other high-frequency channels. It is apparent only when tuned to the station. Make the following corrections:

Disconnect the supply filament lead at the point where it connects to the r-f head-end switch wafer (2nd from rear). This filament lead runs between V20 and the r-f head-end switch, S1. Wind a choke out of self-supporting #18 insulated wire by close winding 8 turns around a ¼-inch rod. Slip the choke off the rod and connect it in series with the filament lead and the point of the switch where the lead was originally connected. Connect a 5,000 $\mu\mu$f ceramic capacitor between the junction of the choke and filament supply lead, to the lug on which C147 is grounded. Attach the ground end of this capacitor as close as possible to the ground end of the lug where it assembles to switch back plate. Leads on choke and capacitor must be short.

The following new parts are to be added to the Parts Lists:

1 Choke—8 turns #18 wire closewound, ¼-inch inside diameter.

1 5,000 $\mu\mu$f ceramic capacitor, Cat. No. RCW-3014.

●

Templetone H-127

This model is the same as Model G-725, appearing on *pages 17-3 through 17-6 of Rider's Volume XVII.*

General Electric 41, 42, 43

These models appear on *pages 17-12 through 17-15 of Rider's Volume XVII.* To increase the sensitivity at certain points on the broadcast and shortwave bands, a 470-$\mu\mu$f capacitor, C111, catalog number UCU-544, has been added between terminals 3 and 5 on the first i-f transformer. On early production sets without this capacitor, the following should be done:

1. This capacitor should be added between terminals 9 and 10 of wafer #6 on the band switch.
2. The orange, green, and black leads from terminals 5, 3, and 8 of the first i-f transformer to the band switch should be grouped together and pressed to chassis.
3. C108, a 0.02-μf bypass capacitor, ground end, should be removed and grounded under the mounting lug of the first i-f plate coil.

●

RCA 8BX6, 8BX65, Chassis RC-1040C

These models appear on *pages 18-11 through 18-14 of Rider's Volume XVIII.* The parts list should be changed as follows:

Add: 71040 Socket—2 contact female socket for external loop

Delete: Speaker assembly 92577-3.
73123 Speaker—4" PM Speaker

Use Stock No. 71058 Speaker (4" x 6") as replacement.

General Electric 219, 220, 221

These models appear on *pages 15-28 through 15-31 of Rider's Volume XV.* In the parts list, catalog number RLL-003 should be identified as a replacement loop assembly only for Models 219 and 220. Catalog number RLL-025 should be added as the loop assembly for Model 221.

Magnavox AMP-109B, AMP-109C, AMP-109D

These are the same as Model AMP-109 on *pages 18-1,2 through 18-3 of Rider's Volume XVIII,* except for the following changes. In Model AMP-109D, only, the 4-ampere, 250-volt fuse has been removed from the a-c line. Pin number 1 of the changer motor receptacle is now connected to the bottom of the primary of the a-c transformer. A 4-ampere, 250-volt fuse is connected from the bottom of the primary of the a-c power transformer to the high side of the a-c power socket. This side of the a-c power socket is also connected to pin 1 of the speaker socket.

The following parts have been substituted:

Ref. No.	*Part No.*	*Description*
3	250152G33	Capacitor, tubular, 0.1 μf, 600 v.
4	250152G33	Capacitor, tubular, 0.1 μf, 600 v.
22	230084G21	Resistor, composition, 22,000 ohms, ½ w. (AMP-109B only)
22	230084G18	Resistor, composition, 6,800 ohms, ½ w. (AMP-109C & D only)

●

Farnsworth P72 Record Changer

This record changer may be found on *pages RCD.CH. 18-25 through RCD.CH. 18-9 of Rider's Volume XVIII.* A production change has been made in the Surfa-Sonic Control. The 0.02-μf capacitor has been changed to 0.1 μf. The 3,300-ohm resistor has been changed to 2,200 ohms.

The following have been deleted from the parts list:

Part No.	*Description*
25276	0.02 μf, 200 v
77240	3,300 ohms, ½ w

The following have been added to the parts list:

25182	0.1 μf, 200 v
77184	2,200 ohms, ½ w

Just a matter of opinion—

●

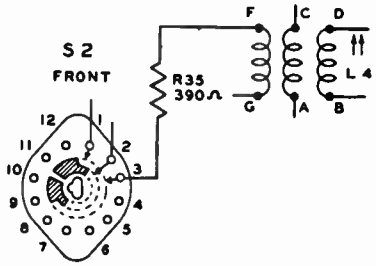
General Electric 321A

This model is the same as Model 321 Late, appearing on *pages 15-46 and 15-52 of Rider's Volume XV.*

●

RCA 8V112, Chassis RC-616

This model appears on *pages 18-17 through 18-24 of Rider's Volume XVIII.* To minimize the possibility of "A" band oscillation and to reduce interference, a resistor (R35) has been added in the mixer grid circuit as shown in the accompanying diagram.



A 390-ohm resistor has been added in the mixer grid circuit of the RCA 8V112 to reduce interference.

In late production sets C42 has been changed from 22 $\mu\mu$f to 15 $\mu\mu$f and R18 has been changed from 22,000 ohms to 18,000 ohms. This change was made to prevent oscillation at the high end of the f-m band.

Add the following to the parts list:

Resistor — fixed composition, 390 ohms, ±10%, ½ watt (R35)

●

General Electric 50

This model appears on *pages 15-1 through 15-4 of Rider's Volume XV.* Add to the description of catalog number RAU-009 Cabinet—plastic cabinet, the color "Brown Mottle." Also, add the following to the parts list:

Cat. No.	*Description*
RAU-017	Cabinet—plastic cabinet (black)
RAU-018	Cabinet—plastic cabinet (dark ivory)
RAU-019	Cabinet—plastic cabinet (ivory and red)
RAU-024	Cabinet—plastic cabinet (white urea)

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

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CURTAIN TIME

Safety Is No Accident

We see by the papers that Colonial Airlines has just completed 20 years of flying without a single death or serious injury to either passenger or crew member. This period of activity represents about 251,000,000 passenger miles. Quite a record to say the least — but what is more interesting is that the company has adopted a symbol which expresses the attitude of all concerned. It is a safety pin — which is being worn by all personnel.

The use of some such reminder by radio servicemen who are working on TV receivers is not beyond the realm of possibility. It is a habit of the human being gradually to become contemptuous of anything with which — he or she — becomes familiar. A reminder which would tend to alter this contempt to respect would be a very good idea — especially when working with the high-voltage units in TV receivers.

It is said time and again that these voltages will not kill because the current is too low... but we have heard of numerous instances when the physical damage was the result of involuntary motion in consesquence of the shock. To put it simply, men have been injured because they jumped when shocked and during that moment of involuntary activity, their motions were completely out of control.

Safety interlocks are put on TV receivers for a definite purpose to safeguard life and limb. The time saved by shorting the interlock during service inspection or probing of the receiver is too little to gamble with the unpleasant possibilities... It just isn't worth it!... Rubber gloves of the kind which will withstand high voltages should be a must in every TV serviceman's kit. Sleeves should be rolled down, thus covering the skin of the forearm. Operating in this fashion is not too clumsy... If the surgeon can operate with gloves on, the serviceman can make measurements and handle tools with gloves on.

On Ice

According to the Video Newsletter there are about 310 TV station applications under the freeze. Close to 600 FM stations are operative... The requests for FM station construction permits amount to about one-half of those requested for TV.

What's The Market?

It is reported that as of about the middle of April almost 1,400,000 TV receivers were in use in about 34 cities of this nation. Four cities, N. Y., Philly, Chi., and LA have more than 100,000 receivers each. New York City leads the roster with almost 540,000 TV receivers.

Thanks

Just a public thanks to the different antenna manufacturers who wrote us letters concerning the recent CURTAIN TIME editorial relative to TV antennas; especially the comments that our points were well taken and that more and more performance data will be forthcoming.

Pardon our Pride

Maybe you recall an earlier issue of SUCCESSFUL SERVICING wherein we talked about the forthcoming "Cathode-Ray Tube at Work". This book is being completely rewritten and we just reviewed the pictures for that text. We're certain that you will be happy to see this book. It will have in it just about everything which every user of cathode-ray tube equipment desires — material of the type which never has appeared in any reference or text book heretofore. The publication date will be announced in the June issue of SS — with all the details.

Just for the record, the Simmons people have been advertising their electronic blanket for a long time. They feel that its repair should be within the scope of the independent radio serviceman — hence the data on this electronic device will appear in *Rider's Volume XIX* (19) out during the last week in May.

During the past week we examined the pages being prepared for a new TV antenna book which we shall soon announce. It made our heart happy to see the wealth of practical data — the kind of information which the servicing industry has been seeking. The book is being authored by an individual who has spent *more than 20 years* in the development and design of high-frequency antennas. This guy really knows his stuff and his ability to put theoretical information into practical, useful language is marvelous. The facts and figures and charts will astound you. The coverage of local and fringe requirements will be *COMPLETE* ... and we mean *COMPLETE!*

HIWYNI

This is not code. It is simply an abbreviation of a very important condition in the operating life of a service shop. **HAVE IT WHEN YOU NEED IT.** It applies to many things, but especially to Rider Manuals. Remember, your Rider library is a capital investment. It is like having a signal source or a voltmeter. It is your tool in trade. The means of making servicing profitable... **HIWYNI.**

JOHN F. RIDER

The Rider Diagram Service

Are you taking full advantage of the Rider Diagram Service?

If you require service data on a new receiver, you can obtain the information from us. Naturally, a time lag exists between the publication of the volumes of Rider Manuals and it is to fill this gap that we have this service, so that you may have whatever you need in the way of service data as yet unpublished. The charges for this service are as follows:

1. 35 cents is the charge for all the available data on any radio receiver model up to and including six pages. Each page thereafter will cost 10 cents.

2. If additional money is required to cover the data requested, you will be notified. We cannot forward data without receiving your remittance.

3. Service data on television receivers may be obtained at costs varying from 35 cents to $1.50. It is suggested that you inquire the cost before sending us a remittance for television data.

4. Be sure to enclose a self-addressed envelope bearing a 3-cent stamp.

If you will follow these rules, it will simplify matters for both of us and you will receive the data you need with a minimum of delay.

Farnsworth 41E Capehart Record Changer

This record changer may be found on *pages RCD.CH. 18-25 through RCD.CH. 18-46 of Rider's Volume XVIII.* The change cycle is placed into operation when the trip finger releases the mercury switch dog (part number 561222). If, for any reason, a changer should fail to cycle properly and, upon checking. the trip mechanism is found to be operating normally, it is suggested that the top of the mercury switch Reset Lever (part number 561221) be examined to make sure that it is smooth. Many hours of operation may tend to wear a groove in the top of the Reset Lever which would tend to hold the dog in place, thus resisting the action of the trip mechanism. This condition is caused by normal wear due to friction between the two parts.

When this condition is found, it is recommended that the mercury switch Reset Lever be replaced by a new one. The new stock has been hardened to provide longer operating life.

In an early production run, a mercury switch with a metal shell or housing was used. Due to the slow action and greater angle of drop necessary to actuate this switch, it has since been replaced by one using a glass housing or bulb. Changers employing the metal-housed mercury switch should be checked for positive switch action, especially if it has been reported that the changer cycles continuously, or more than once for a single tripping action.

In such cases, it is recommended that the metal switch be replaced with the more positive glass bulb type (part number 90147). ●

Tele-Tone Chassis U

Models 172 and 176 are the same as Model 156, Chassis U, which appears on *page 17-4 of Rider's Volume XVII.* ●

Magnavox CR-208C

This model is the same as Model CR-208 appearing on *pages 17-13 and 17-25,26 through 17-31 of Rider's Volume XVII,* except for the following changes. Capacitor 15 has been changed in value from 510 $\mu\mu$f to 150 $\mu\mu$f. A 150,000-ohm resistor (80) has been connected in series with capacitor 15. Capacitor 16 and resistor 72 in series with it have both been omitted. Capacitor 17 has been changed from 510 μf to 150 μf. A 33,000-ohm resistor (79) has been connected in series with capacitor 17. Resistor 71 has been changed from 220,000 ohms to 470,000 ohms.

The following changes have been made in the parts list:

Ref. No.	*Description*	*Part No.*
15	Capacitor, fixed mica, 220 $\mu\mu$f, 500 v	250160G68
16	Omitted	
17	Capacitor, fixed mica, 1500 $\mu\mu$f, 500 v	250160G66
71	Resistor, composition, 470,000 ohms, ±10% ½ w.	230084G94
72	Omitted	
79	Resistor, composition, 33,000 ohms, ±10%, ½ w.	230084G80
80	Resistor, composition, 150,000 ohms, ±10%, ½ w.	230084G88

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Television Changes

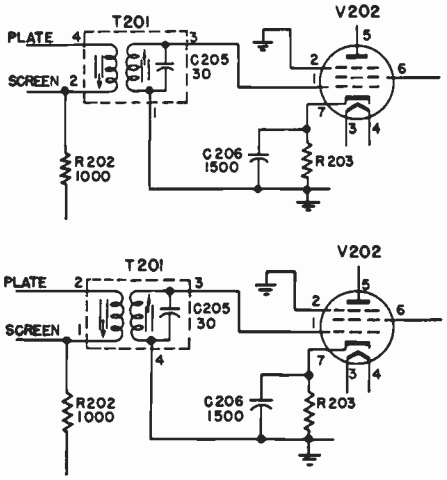
Admiral Chassis 30A1

This chassis appears on *pages 2-1 through 2-46 of Rider's TV Manual Volume 2.* Transformer 72B44 was used for T201 (the first audio i-f transformer) in early production. Transformer 72B58 was used in place of 72B44 in later production. Since transformer 72B58 can be detuned by vibration during shipment, the slug in these units was sealed with glyptal.

In the event that alignment adjustment is necessary, a few drops of solvent should be applied to the glyptal around the slug. The slug will be free a short time after application of a solvent. Alignment adjustment can then be made in the usual manner. Lacquer thinner or amyl acetate (banana oil) are among the solvents for glyptal.

Replacements for T201 should always be ordered by part number 72B44 even though part number 72B58 was originally used in the chassis being serviced. Future production will also use part number 72B44 for T201.

The terminal numbers of transformer 72B58 are different from those of transformer 72B44. Wiring diagrams for both transformers are shown in the accompanying figures.



Wiring diagram for transformer 72B44 in the Admiral Chassis 30A1 is shown above, and that for transformer 72B58 is shown below it.

Philco 48-1001 Code 121

This model appears on *pages 2-81,82 through 2-86 of Rider's TV Manual Volume 2.* All model 48-1001 receivers are code 121, unless marked otherwise. The last digit of the serial number gives the run number of the set.

Run 8

The width coil, L505, part number 32-4163-2 was replaced by a new width coil, part number 32-4318. In conjunction with this new coil, a bracket and panel assembly, part number 76-4239 (symbolized TB500), was added. This assembly is mounted vertically in the left rear corner, inside the cage containing the high-voltage assembly.

To obtain maximum width, set the link in a downward position; this shorts part of the series winding. The tuning core, TC500, then acts as a vernier for fine adjustment.

Run 9

Due to a temporary shortage of 10,000-ohm resistors for R204 and R207, part number 66-3105340, a substitution for each was made by using two pairs of 22,000-ohm resistors, each pair being connected in parallel. The part number of each 22,000-ohm resistor is 66-3224340.

●

DuMont RA-105, RA-106

Model RA-105 appears in *Rider's Television Manual Volume 2 on pages 2-5 through 2-56* and Model RA-106 appears on *pages 2-57 and 2-58 of the same Volume.*

Extension cables, designed to allow the main chassis or power supply chassis of these telesets to be serviced outside the cabinet while leaving the tube or other chassis in the cabinet, are now available.

These cables are 6 feet long, permitting the serviceman to work on the chassis in front of the set and view the action on the face of the CRT while making any checks.

The following description of these cables should be added to the parts lists:

Part No.	*Where Used*
34001281	Between CRT base and main Chassis (J206).
50014161	Between yoke focus assembly (P6Q4) and main chassis (J204).
50014171	Between main chassis (P201) and power supply (J702) on RA-106.
50014180	Between main chassis (P202) and power supply (J402) on RA-105. Between main chassis (P202) and power supply (J701) on RA-106.

When servicing the a-m tuner or the audio amplifier in the new Colony or in the Manchu, it is possible to use cable #50014171 as the extension. The use of this cable will introduce hum in the output since the signal lead of either unit should be shielded. The serviceman should take this into consideration when using this cable.

Cables #50014161 and #50014180 are exactly the same as far as external appearances are concerned. However, cable #50014180 contains the sync line between the main chassis and the power supply chassis and this line is a shielded lead.

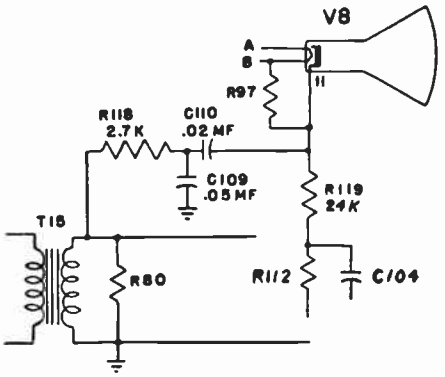
To identify this cable, it has been color coded with a ring of red paint near the male plug.

A complete set consists of the 4 cables and will permit removal of both chassis simultaneously if necessary. However, for the high-voltage connections if the power supply is removed, an improvised cable can be made up in the field. This cable consists of a suitable length of high-voltage cable with an alligator clip on each end. Obviously, the serviceman should be careful how he "dresses" this lead to prevent "arcing."

●

GE 810

This model appears on *pages 2-22 through 2-43 of Rider's TV Manual Volume 2.* The circuit shown in the accompanying diagram has been added in late production to remove the vertical retrace lines which appear when the contrast control is used at a low setting or the brightness control is used at a high setting.



The circuit will remove the vertical retrace lines in the GE810 television receiver.

The following additions should be made to the parts list:

Ref. No.	*Cat. No.*	*Description*
C109	UCC-635	Capacitor, 0.05 μf, 600 volts
C110	UCC-631	Capacitor, 0.02 μf. 600 volts
R118	URD-059	Resistor, 2,700 ohms, ½ w.
R119	URD-1082	Resistor, 24,000 ohms, ½ w.

Admiral 8C11, 8C12, 8C13, 30A15, 30A16; Ch. 30A1

Models 8C11, 8C12, 8C13 appear in *Rider's Television Manual Volume 2 on pages 2-1 through 2-46.* Models 30A15 and 30A16 appear on *pp. 1-1 through 1-11,12 of Rider's Television Manual 1.*

Complaints have been reported concerning pulling at the top of the picture, extending approximately one inch down from the top of the picture. It can be noticed when there are vertical lines running to the top of the picture or pattern. These lines will pull to the right or left for a distance of one inch from the top of the picture.

The trouble is caused by a portion of the vertical synchronization pulses riding through the horizontal sync discriminator circuit and upsetting the horizontal oscillator momentarily. As the vertical sync pulses occur 60 times per second, this out-of-phase condition would exist immediately after the vertical blanking pulses and therefore show up in the top portion of the picture only. The low-frequency response of the horizontal sync discriminator can be reduced to overcome this problem. It is recommended that Resistors R413 and R414 be changed from 470,000 ohms each to 180,000 ohms each. It will then be necessary to re-adjust the horizontal oscillator as described in the service notes. This change is now being made in production.

Television Changes

Admiral 8C11, 8C12, 30A15, 30A16; Ch. 30A1

Models 8C11, 8C12, 8C13 appear in *Rider's Television Manual Volume 2 on pages 2-1 through 2-46.* Models 30A15 and 30A16 appear on *pages 1-1 through 1-11,12 of Rider's Television Manual 1.*

Original production of these sets incorporating the Standard Coil Tuner (part number 94C8-2) employed a detent spring which did not have adequate tension. Production, subsequent to August, used a spring of greater tension and slightly modified shape, assuring more positive positioning of the turret assembly. In addition, the detent roller has been made smaller. When replacing the detent spring and roller, it will also be necessary to replace the channel selector knob with the new lever-type knob.

The procedure for making these changes involves no difficulties if the following instructions are utilized:

Remove the metal spider which serves as a front bearing for the fine tuning and channel selector shafts.

Remove the rear turret spring and front turret spring and retaining plate. This will allow the turret assembly to be removed, releasing the tension on the detent spring.

Loosen the screw holding the detent spring and replace with the new, heavier spring, making certain that the lips of the spring are fully seated. Failure to observe this will cause the individual channel sections to line up improperly with the contact plate.

Tighten the screw holding the detent spring and replace the turret assembly and its front and rear retaining springs. Replace the metal spider front bearing.

Replace the existing channel selector knob with the new lever-type knob. This is necessary since with the increased spring tension it will be extremely difficult to rotate the turret assembly by using the older knob.

These changes should be made whenever a chassis is brought in for major repairs. The replacement may be ordered under the following part numbers:

Detent Spring	#98A45-37
Detent Roller	#98A45-32
Channel Selector Knob	
For Wood Escutcheon	#33C28-1, Type #5
For Plastic Escutcheon	#33C28-9, Type #5

Sears 8133, Ch. 101.846, 101.829-1

This model appears on *pages 2-1 through 2-22,23,24 of Rider's TV Manual Volume 2.* Late production of television chassis 101.846 have incorporated a 4.5-mc trap off the plate of the first video amplifier tube 6AU6, as shown in the accompanying diagram. This trap is necessary to remove the heterodyne beat caused by the 26.4-mc picture i-f signal at the video detector beating against the very low, but still present, 21.9-mc sound i-f signal. This sound i-f signal tends to pass through the sound traps when the receiver is slightly detuned. This beat will show up on the picture tube as sound bars or a small herringbone pattern across the entire screen.

To install this 4.5-mc trap, proceed as follows:

1. Place the chassis on the bench in an upside down position.
2. Remove the #6 machine screw located midway between the first video amplifier 6AU6 tube socket and capacitors C109 and C110.
3. Install the trap coil (L30) on the chassis by placing the screw through the hole in the coil bracket and replacing the screw in the chassis. Before tightening the screw, rotate the trap coil so that the side with the soldering lugs faces the front of the chassis.
4. Tighten the machine screw.
5. Solder a wire from the coil lug nearest the chassis to ground.
6. Connect a 4.7-$\mu\mu$f ceramic capacitor to the top lug on the trap coil and the plate (pin 2) of the 6AU6 first video amplifier.

Due to the addition of this trap, the following information should be added after Television Alignment Procedure High Band Alignment on *page 2-11.*

1. With the chassis completely adjusted and connected for operation, tune in a test pattern.
2. Turn the contrast control to its full-on position and the brightness control to a low level (so that contrast is still noticeable).
3. Detune the fine tuning control so that sound bars are just visible. A 4.5-mc beat is now readily visible on the screen.
4. Rotate the 4.5-mc trap coil adjustment screw counterclockwise to its full-out position (about 1" of screw showing).
5. Turn the adjustment screw in (clockwise) until the 4.5-mc beat on the screen just disappears. *Do not go beyond this point.*

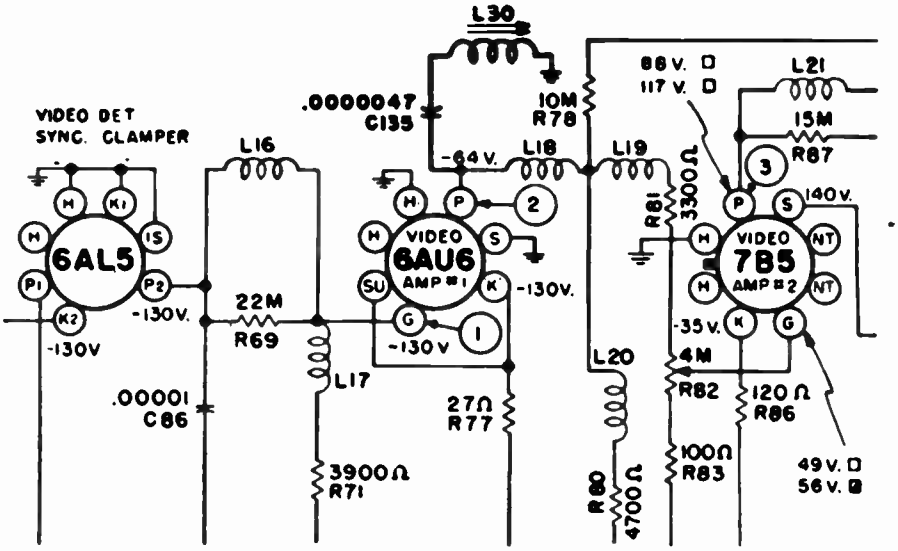
Radio chassis 101.829-1 used in these sets, beginning with serial number 2001, have had a phono switch bracket assembly installed for phono operation. The switch is connected between the high side of resistor R202 (2.2 megohms) and the high side of volume control R205 (500,000 ohms). The high side of R205 no longer is connected to the junction of R203 and C213.

The following deletions have been made in the parts list:

Schematic Location	*Part Number*	*Description*
C24		Capacitor—1.0 $\mu\mu$f—ceramic
C4		Capacitor—1.5 $\mu\mu$f—ceramic
C131		Capacitor—100 $\mu\mu$f—ceramic
	R70015	Damper—trimmer
	R70017	Damper—tube
	R63476	Insulator—capacitor
	R63477	Insulator—capacitor
	R65491	Line ass'y.—transmission—high
	R65492	Line ass'y.—transmission—low
R9		Resistor—5,600 ohms—½ w.
R207		Resistor—4.7 megohms—½ w.

The following should be added to the parts list:

Schematic Location	*Part Number*	*Description*
C24		Capacitor—1.5 $\mu\mu$f—ceramic
C4		Capacitor—2.2 $\mu\mu$f—ceramic
C135		Capacitor—4.7 $\mu\mu$f—ceramic
C131		Capacitor—50 $\mu\mu$f—ceramic
L30	R70077	Coil—4.5-mc trap
	R70090	Damper—tube
	R70057	Insulator—capacitor
R9	Resistor	Resistor—2,700 ohms—½ w.
R207		Resistor—15 megohms—½ w.
	R70140	Phono switch bracket assembly (chassis serial number 2001 and up)



A 4.5-mc trap has been incorporated into the Sears television chassis 101.846.

TV Measurements

(Continued from page 1)

Accuracy of Measurement

In general, the accuracy of a measurement will depend on two factors:

1. The accuracy of the calibration of the instrument.

2. The effect of connecting the instrument in the circuit where the measurement is made.

The calibration accuracy of the meter is specified by the manufacturer as plus or minus a definite percentage. A fairly good meter has an accuracy of ± 2 or 3 percent on d.c. and from ±3 to ± 5 percent on a.c. For service work a meter with an accuracy of ± 5 percent on either a.c. or d.c. is sufficient as far as calibration accuracy is concerned.

It should be remembered that the voltage and resistance measurements given in the service data for a television receiver are *representative* of that particular model and are not the exact values for every receiver of that type manufactured. In most of the circuits in a receiver, the resistor and capacitors used have a tolerance of ± 10%. In addition, each tube of a particular type has somewhat different characteristics due to manufacturing tolerances. In the design of a television receiver, the maximum allowable tolerance for any part in the receiver receives careful consideration. For the purpose of economy, it is impractical to use parts with a lower tolerance than necessary. For example, if a circuit design required a 1000-ohm resistor and the circuit worked equally well with a resistance as high as 1100 ohms or as low as 900 ohms, then a 10% resistor would be used. On the other hand, if the circuit did not operate properly when the resistance was increased above 1050 ohms or below 950 ohms, then a 5% resistor would have to be used.

These manufacturing tolerances must be remembered when comparing the voltage or resistance measurements made on a set with the measurements given for that set by the manufacturer. A 20% tolerance should be allowed in almost all voltage or resistance measurements. In other words, unless a voltage or resistance measurement is more than 20% off the value given by the manufacturer, it will usually not be significant in isolating a defective circuit.

Thus far in our discussion of the accuracy of a measurement, we have neglected the second determining factor, which is by far the more important. The problem is briefly this: While the meter may be accurately measuring the voltage at a certain point, is this the same voltage that existed at this point before the meter was connected to it? Very often it is not. When using an oscilloscope to observe the waveform of a signal, the question arises as to whether the waveform seen on the scope is the same waveform that existed before the scope was connected. This problem is a basic one in taking any type of measurement and must always be considered.

There are two solutions to this problem. The ideal solution, of course, would be to build test equipment that has no effect on the circuit at all, or if this is not possible, only a negligible effect. The other solution is not really a solution at all, but rather a way of getting around this problem. That is to simulate the conditions under which the original measurements on the receiver were made and to compare these readings with the reading obtained on the receiver under test.

For example, if a voltage reading was originally taken with a 1,000 ohms-per-volt meter, it should be possible to obtain the same reading on another receiver with another 1,000 ohms-per-volt meter. Even if this reading is not the actual voltage present before the meter was inserted in the circuit, it provides a means of comparison. This method, however, is not infallible and may still introduce errors under certain conditions, as will be discussed in more detail.

Low D-C Voltage Measurements

As previously mentioned, low d-c voltages include all the d-c voltages encountered in the television receiver with the exception of the high d-c voltages used on the picture tube. Three types of meters are commonly used today to measure d-c voltages. These are the 1,000 ohms-per-volt meter, the 20,000 ohms-per-volt meter and the vacuum tube voltmeter. There are a few other types with sensitivities between 1,000 and 20,000 ohms-per-volt and some with sensitivities even greater than 20,000 ohms-per-volts, but these meters are not as common as the three groups mentioned previously. For simplicity we will limit the discussion to these three types, although most of it will also apply to any other type of meter.

Input Resistance

The input resistance of 1,000 and 20,000 ohms-per-volt meters is equal to the product of the maximum scale reading and the sensitivity. Let us consider a 1,000 ohms-per-volt meter and a 20,000 ohms-per-volt meter, each with scales of 3, 10, 100, and 300 volts. For comparison, we will consider a vacuum tube voltmeter of the "Voltohmyst" type which has an input resistance of 11 megohms. The VTVM has a constant input resistance for all scales on the meter. The input resistance of these three meters on their various scales are shown in Table I.

TABLE I

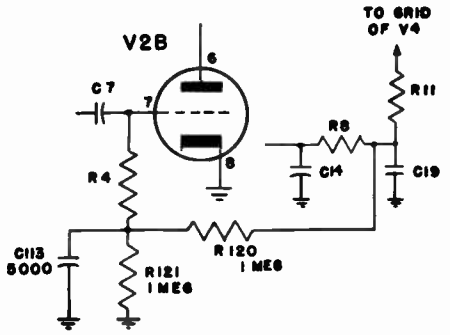
Scale	1,000Ω/v	20,000Ω/v	VTVM
3 v	3 K	60 K	11 meg
10 v	10 K	200 K	11 meg
30 v	30 K	600 K	11 meg
100 v	100 K	2 meg	11 meg
300 v	300 K	6 meg	11 meg

From this table we can see the limitations of the three instruments as far as input resistance is concerned. Theoretically, each meter will always have some effect on the circuit across which the meter is applied. Practically, it is possible to

(Please turn to page 14)

General Electric 810, 814

Model 810 appears on *pages 2-22 through 2-43* and Model 814 on *pages 2-44 through 2-57,58 of Rider's TV Manual Volume 2.* Bias has been added to the converter grid (pin 7 of V2-B)' by the addition of R120, R121, and C113, as shown in the accompanying figure. This addition of bias is sometimes necessary when the receiver is used in areas of strong signal strength, especially on the high-frequency channels. The peaks of the signal, which are the vertical pulses, were causing the grid to draw grid current which, in turn, frequency-modulated the oscillator voltage at the vertical pulse rate (60 cps). This modulation appeared in the audio as a buzzing sound.



Bias is added to the converter grid of the GE 810 and 814 in the manner shown.

Add a terminal board to the underside of the main chassis near the r-f unit. The board should be mounted so that short leads can be used. Remove R4 from ground under the oscillator trimmer C80 and connect to the junction of R120 and R121 on the new terminal board. Connect C113 from the junction of R120 and R121 to the ground point on the r-f chassis under oscillator trimmer C80.

NOTE: Dress C113 as far away as possible from the oscillator trimmer C80.

The following should be added to the parts list:

Part No.	*Cat. No.*	*Description*
R120, R121	URD-121	Resistor, 1 megohm, ½ w.
C113	RCW-3014	Capacitor, ceramic, 5000 μμf

General Electric 901, 910

These models appear in *Rider's TV Manual Volume 2 on pages 2-59 through 2-94.* No picture in these sets may be caused by an inoperative horizontal sweep generator tube, V14, which results in no high voltage on the 5TP4 picture tube anode. In this sweep oscillator, feedback is provided through the common cathode resistor, R40, in the two triode sections of V14. This resistor has a value of 1,000 ohms. However, where low line voltage exists, this may not provide sufficient feedback to maintain oscillation and it is suggested that the value of R40 be increased to 1,200 ohms in all receivers to cure this trouble or insure against a possible service complaint.

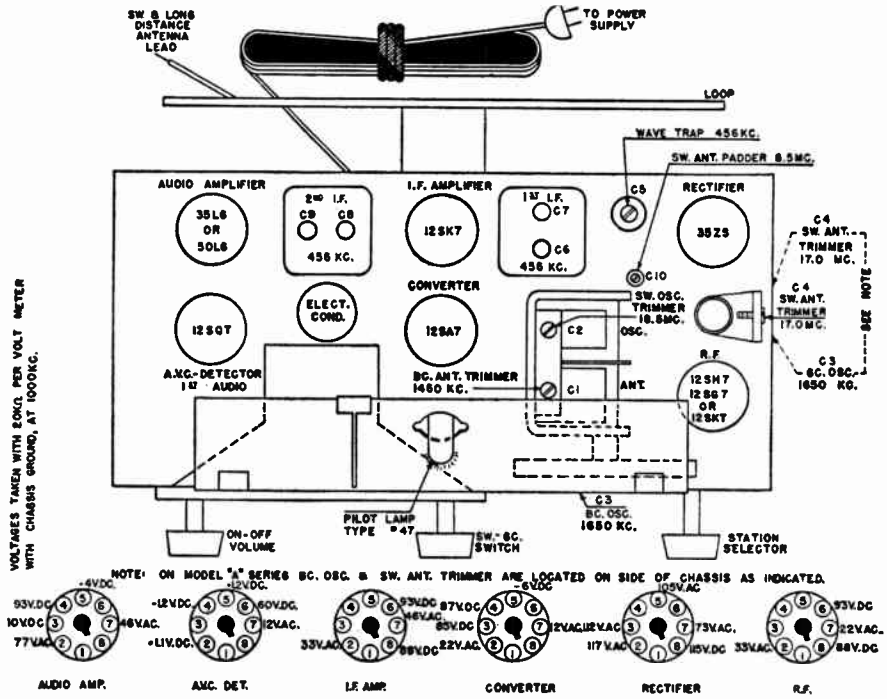
When insufficient picture height is experienced with the vertical size control, the range may be extended about four inches by shunting R118 (2.2 megohms) with another 2.2-megohm resistor or replacing R118 by a 1.0-megohm resistor. R118 is one of the plate charging resistors in the vertical sweep generator tube, V11B, circuit located at the rear of the television chassis.

Add the following parts to the Parts List:

R40	Cat. No. URD-051	1200 ohms, ½ w., carbon
	Cat. No. URD-129	2.2 megohm, ½ w., carbon or
	Cat. No. URD-121	1.0 megohm, ½ w., carbon

Regal W900

This model is the same as Model 900 which appears on *pages 16-2 and 16-3 of Rider's Volume XVI.* The socket layout and voltages for both models are shown in the accompanying diagram.



Tube layout, trimmer locations, and voltages of the Regal W900.

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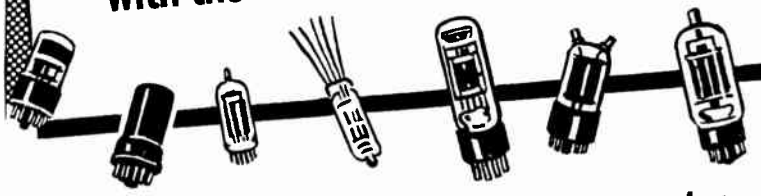

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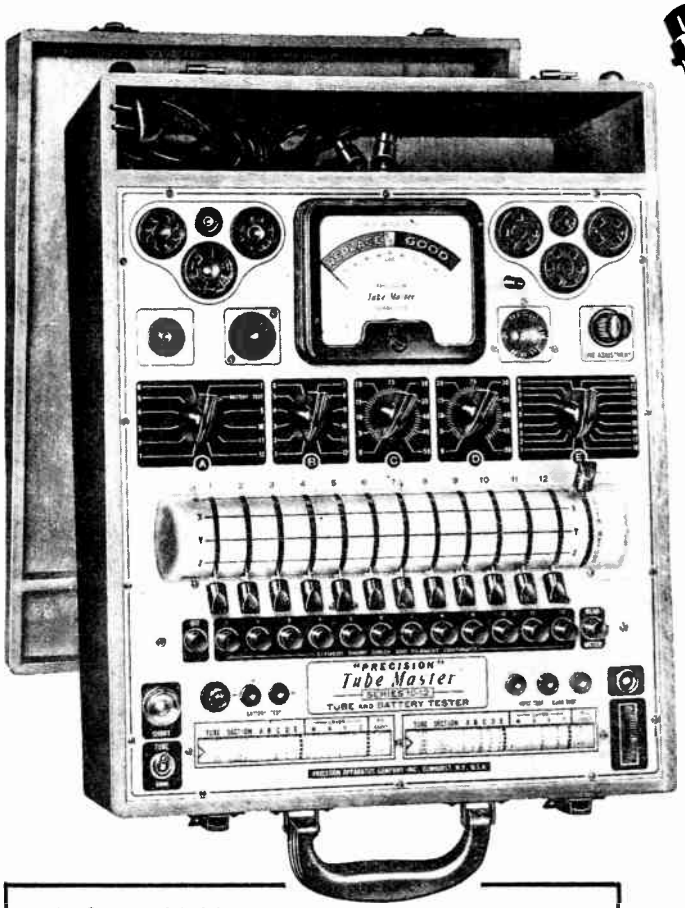

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TV Measurements

(Continued from page 11)

make this effect negligible by making the meter resistance high enough. To determine how much the meter will effect the circuit, it is necessary to consider the resistance of the voltage supply at the point being measured, the load already across this point, and the additional load supplied by the resistance of the meter.

In the ideal case where the voltage supply has no internal or series resistance at all, there would be no difference in the meter readings. While this ideal condition never actually exists since all generators and power supplies have some resistance, it is possible to approach it in some cases. For instance, the internal resistance of a large d-c generator, such as those used by the power companies, is only a small fraction of an ohm. Therefore, any meter could be used to measure the line voltage of a d-c power line since the resistance of the meter is so great compared to the resistance of the generator that the effect of the meter would be negligible. For all practical purposes the voltage at the line terminals after the meter is connected would be the same as before.

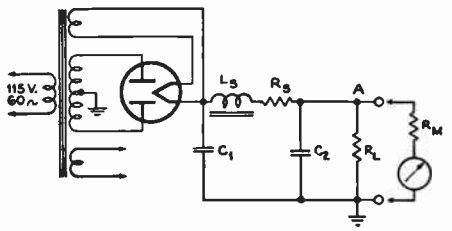


Fig. 1. A conventional low-voltage power supply circuit. The meter resistance is in shunt with the load resistance.

Fig. 1 illustrates a conventional power supply such as may be used in a television receiver to supply B-plus voltages. The resistance R_S is equal to the sum of the resistance of the choke, the rectifier tube, and the transformer winding. Since these resistances are all in series they can be replaced by one resistance, R_S. Let us assume that R_S is 500 ohms. The load on the power supply has been replaced in Fig. 1 by the shunt resistor R_L. The value of this resistance is equal to the voltage at point A divided by the load current. For example, if the voltage at A equals 275 volts and the load currernt equals 100 ma, R_L would be equal to 2750 ohms.

If we connect a voltmeter from point A to ground, the resistance of the meter would be in parallel with the load resistance R_L. The load R_L causes a voltage drop in resistor R_S. In this case the voltage drop is equal to 500 times 0.1 or 50 volts. When the meter is connected, the total load resistance decreases and the current through R_S increases, causing a greater voltage drop across it.

However, the resistance of even the least sensitive meter, the 1,000 ohms-per-volt meter, is equal to 300,000 ohms on the 300-volt scale, which is the scale that would be used to measure the voltage at point A. This 300,000 ohms resistance, represented by R_M, in parallel with the 2750 ohms of R_L would give a parallel resistance equal to approximately 2730 ohms. The change in load resistance from 2750 ohms to 2730 is very small, and will have a negligible effect on the voltage at point A.

The 20,000 ohms-per-volt meter and the vacuum tube voltmeter will have even less effect on the voltage being measured. For a measurement of this type, therefore, any one of the three meters would do equally well.

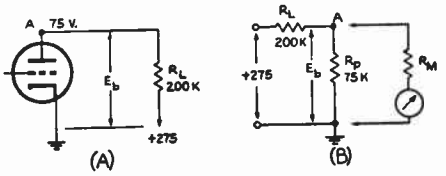


Fig. 2. (A) The plate circuit of a triode amplifier. The meter reduces the voltage at the plate of the tube, the amount of reduction depending on the resistance of the meter. (B) Equivalent d-c circuit.

The plate circuit of a triode amplifier is shown in part (A) of Fig. 2. The 275-volt B-plus voltage is obtained from a power supply as shown in Fig. 1. Assuming that the tube draws 1 ma plate current, the drop in the plate resistor will be 200 volts and the d-c voltage on the plate of the tube will be 75 volts.

The equivalent d-c circuit is shown in part (B) of Fig. 2. The plate circuit of the tube is replaced by the resistance which is equal to the voltage on the plate divided by the current, or 75,000 ohms. To measure the plate voltage, the meter is connected from point A to ground. As before, the input resistance of the meter is represented by R_M.

First, let us consider the effect of using the 1,000 ohm-per-volt meter, whose resistance on the 100 volt range is equal to 100,000 ohms. This resistance R_M is in parallel with R_P. The resistance of the parallel combination is equal to approximately 42,800 ohms. The voltage at point A *is now*: $E_b = 275 \times \frac{42{,}800}{42{,}800 + 200{,}000}$ = 48.5 volts. The 1,000 ohms-per-volt meter, therefore, changes the voltage at the plate from 75 to 48.5 volts.

Similarly, we can determine the effect of connecting the other two meters. The 20,000 ohms-per-volt meter has a resistance of 2 megohms on the 100-volt scale and will cause the voltage at the plate to drop to 73 volts. The VTVM has an input resistance of 11 megohms, and when connected to the plate will cause the voltage to drop to 74.6 volts.

In this particular circuit then, it can be seen that the 1,000 ohms-per-volt meter would introduce a large error, the 20,000 ohms-per-volt meter a small error, and the VTVM practically no error at all.

Bias voltage measurements are another type of voltage measurement often made in television receivers. These measurements include those of grid-leak bias, fixed bias, cathode bias, and automatic gain control (agc) voltages. Fig. 3 is an

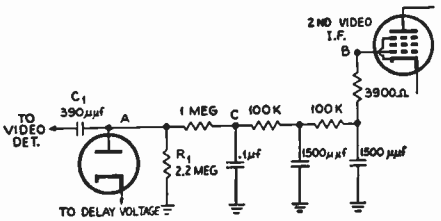


Fig. 3. A typical automatic gain control (agc) system used in television receivers. Only one controlled stage is shown, usually there are more than one.

example of an agc system used in a typical television receiver. The a.g.c. usually controls more than one stage in the receiver, but for the purpose of illustration we have chosen the second video i-f stage.

First, let us briefly consider the operation of this circuit. The i-f signal from the video detector is applied through capacitor C_1 to the diode. If the i-f signal exceeds the delay voltage, this signal will be rectified and charge capacitor C_1 so that a negative voltage appears at point A to ground. Resistor R_1 enables capacitor C_1 to discharge so that the voltage at A can change in accordance with the strength of the i-f signal. Following R_1 there are three stages of R-C filters which filter out the a-f and r-f components and allow only the d-c control voltage to be applied to the grid of the second video i-f stage.

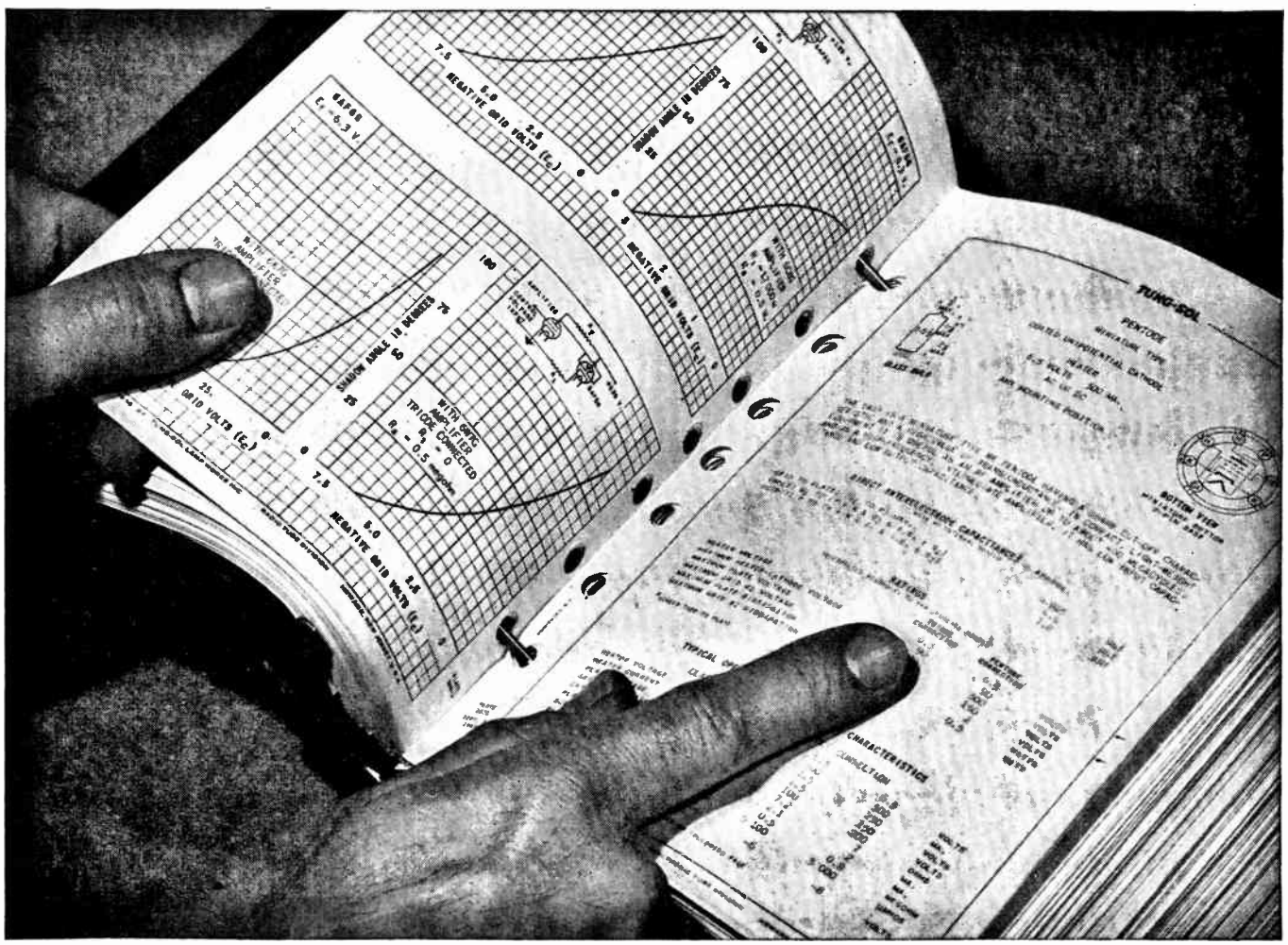
When a voltmeter is connected from point A to ground, the resistance of the meter is in parallel with that of R_1 which is 2.2 megohms. The total parallel resistance from point A to ground will then be smaller that it was. The time constant of R_1C_1 will then be smaller and the charge on capacitor C_1 will leak off faster than it normally should, resulting in a smaller d-c voltage at point A. It is possible to calculate the effect of the meter being inserted at this point, but this is rather laborious due to the rectifier circuit, so instead we will consider the results of actual measurements made in this circuit.

To make these measurements, all three meters were set on the 10 volt scale. From Table I, the 1,000 ohms-per-volt meter, the 20,000 ohms-per-volt meter, and the VTVM have input resistances on this scale of 10,000 ohms, 200,000 ohms, and 11 megohms respectively. Table II, shows the results of measurements made on points A and B in the circuit of Fig. 3 with three different voltmeters.

TABLE II

Meter	Point A	Point B
VTVM	—5.2 v	—5 v
20,000Ω/v	—0.2 v	—0.8 v
1,000Ω/v	0 v	—0.1 v

An examination of this table shows that the 1,000 ohms-per-volt meter is worthless for this type of measurement and that the 20,000 ohms-per-volt meter is not much better. The VTVM, therefore, is the only meter of the three types investigated which will give a reliable reading in this type of circuit.



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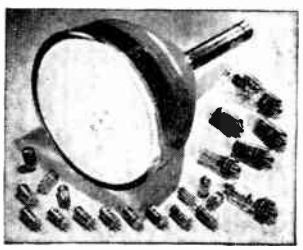

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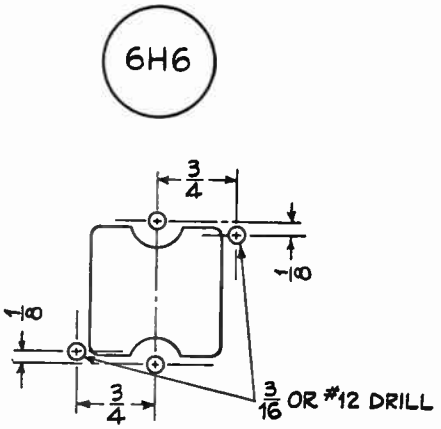
Farnsworth GK140 Series

This model appears in *Rider's Manual XVI, pages 16-6 through 16-11.* The following procedure is conducive to increased sensitivity, noise rejection, broader tuning, and reduced thermal drift of the f-m section of the GK140 series combination instrument.

To reduce drift, change the oscillator grid coupling capacitor (grid of 6C4 to the oscillator coil) from 50 $\mu\mu$f zero temperature coefficient to 40 $\mu\mu$f N-1400 temperature coefficient. The part number of this replacement is 25442. Change the oscillator padder capacitor (oscillator coil to f-m gang section) from 55 $\mu\mu$f N-330 to 55 $\mu\mu$f zero temperature coefficient. This new part number is 25441. These changes will necessitate slight realignment of the f-m converter and oscillator. To make these modifications, use the following procedure:

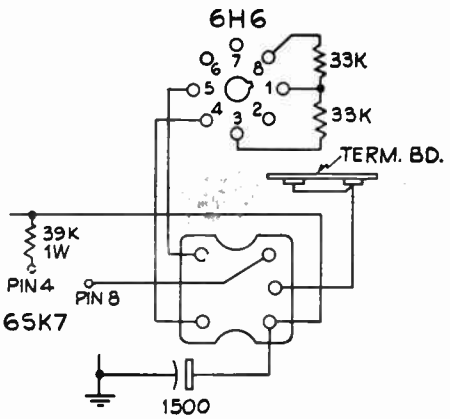
Clip out two 330,000-ohm, ½-watt resistors connected between the ratio detector transformer (next to the 6H6 socket) and the terminal board. one 5,000-$\mu\mu$f mica capacitor between the B-supply for the transformer and ground and two 6,000-ohm, ½-watt resistors connected to the 6H6 socket. Clip four leads connected to the transformer. Remove the ratio detector transformer and replace with the transformer No. 38879. To do this, it is necessary to drill two new holes as shown in the accompanying diagrams.

After the transformer is connected (make leads as short as possible) connect two 33,000-ohm, ½-watt resistors. Part No. 77183, one between pin No. 8 on the 6H6 socket and ground, and the other between Pin No. 3 and ground (short leads). Connect a 1,500-$\mu\mu$f capacitor, No. 25273, between the B-supply to the transformer and ground. Connect a 0.002-μf. 600-volt capacitor, No. 25185, between ground and the point where the 22,000-ohm, ½-watt resistor connects to the shielded lead on the terminal board by the 6H6 socket.



The 3/16-inch holes pointed out here must be drilled to accomodate transformer 38879 in the Farnsworth GK140 series.

This completes the changes. It is now necessary to align the i.f.'s on f.m. Connect a voltohmyst on the AVC line (Pin 3 on 6H6 socket through a 1-megohm resistor).



The circuit of the Farnsworth GK140 series as it appears after modification.

Connect the a-m signal generator, set at 10.7 mc, to the grid of the 6SK7 which feeds the diode transformer. Connect the output meter across the voice coil of the speaker. Turn the bottom slug next to the chassis of the diode transformer out as far as possible. Tune the top slug for maximum output (negative voltage) on the voltohymst. Move the generator to the grid of the second i-f amplifier. Detune the slug under the chassis by turning it out as far as possible. Tune the top slug for maximum voltage, next tune the bottom slug for maximum voltage. In each step do not use an input greater than necessary to give three volts AVC. Move the signal generator to the grid of the first i-f amplifier. Detune the bottom f-m slug (nearest corner of can) by turning it out as far as possible. Tune the top slug (nearest corner of can) for maximum voltage, next tune the bottom slug for maximum voltage. Move the signal generator to the 6AG5 converter grid and tune the first i-f transformer as described previously. With the generator still hooked to the 6AG5 grid and modulated with 400 cycles and with about 200 microvolts input, adjust the slug next to the chassis on the diode transformer for maximum output voltage on output meter, which is across the voice coil.

Association Libraries

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The Cover

The picture on page 1 shows a two-way communications system which enables maintenance trucks of the United States Air Force to have direct contact with the maintenance shop. This system was designed by S/Sgt. David A. Baty, Des Moines, Iowa, at the Avon Park, Florida AAF. This system eliminates the necessity of relaying messages through the control tower and saves time and gasoline by cutting down on the number of trips necessary between the flight line and the shops. The switch box was constructed from scrap metal and spare parts, while the antenna was made out of alloy steel tubing. A safety switch controls the entire mechanism.