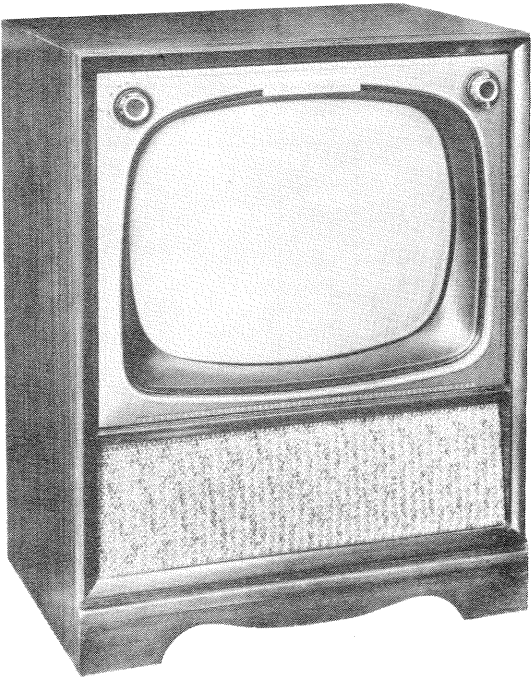




DISASSEMBLY
INSTRUCTIONS

CHASSIS REMOVAL

- 1. Remove 9 push-on type control knobs.
- 2. Remove 6 wood screws. Remove rear cover.
- 3. Loosen 4 wood screws holding 2 antenna terminal boards. Remove terminal boards.
- 4. Remove wood screw holding side chassis brace.
- 5. Remove 4 speaker wires.
- 6. Remove 6 speed nuts. Remove 2 speakers.
- 7. Remove 4 metal screws holding chassis to rear of cabinet.
- 8. Remove chassis.



MODELS
321A63-B-622, 321A63-B-678, 2321A63-B-680
321A63U-B-622, 321A63U-B-678, 2321A63U-B-680

WELLS-GARDNER MODELS 321A63/U-B-622,
321A63/U-B-678, 2321A63/U-B-680

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

PICTURE TUBE SAFETY GLASS CLEANING

Remove nameplate by pulling outward. Remove 2 metal screws holding retainer. Remove safety glass.

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

FOCUS

Adjust ion trap for best focus consistent with maximum brightness.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Turn the horizontal hold fully clockwise and adjust the

horizontal frequency slug (B1) until the picture is just about to tear out of sync at the top. The picture should then be in good sync with the horizontal hold at center of its rotation. If not, continue to turn the slug until it starts to lose sync in the other direction.

SOUND IF DETECTOR BUZZ ADJUSTMENT

Adjust the buzz control for maximum volume and MINIMUM buzz.

FUSES

One fuse is used for LV power supply protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

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CHASSIS REMOV

1. Remove 9 push
2. Remove 6 wood
3. Loosen 4 wood boards. Remove
4. Remove wood
5. Remove 4 spe
6. Remove 6 spe
7. Remove 4 met cabinet.
8. Remove chass

TUNER OSCILLA

Touch-up adjustme
may be accompli
and fine tuning kno

PICTURE TUBE S

Remove nameplate
screws holding re

SERVICE ADJUST

See tube placemen

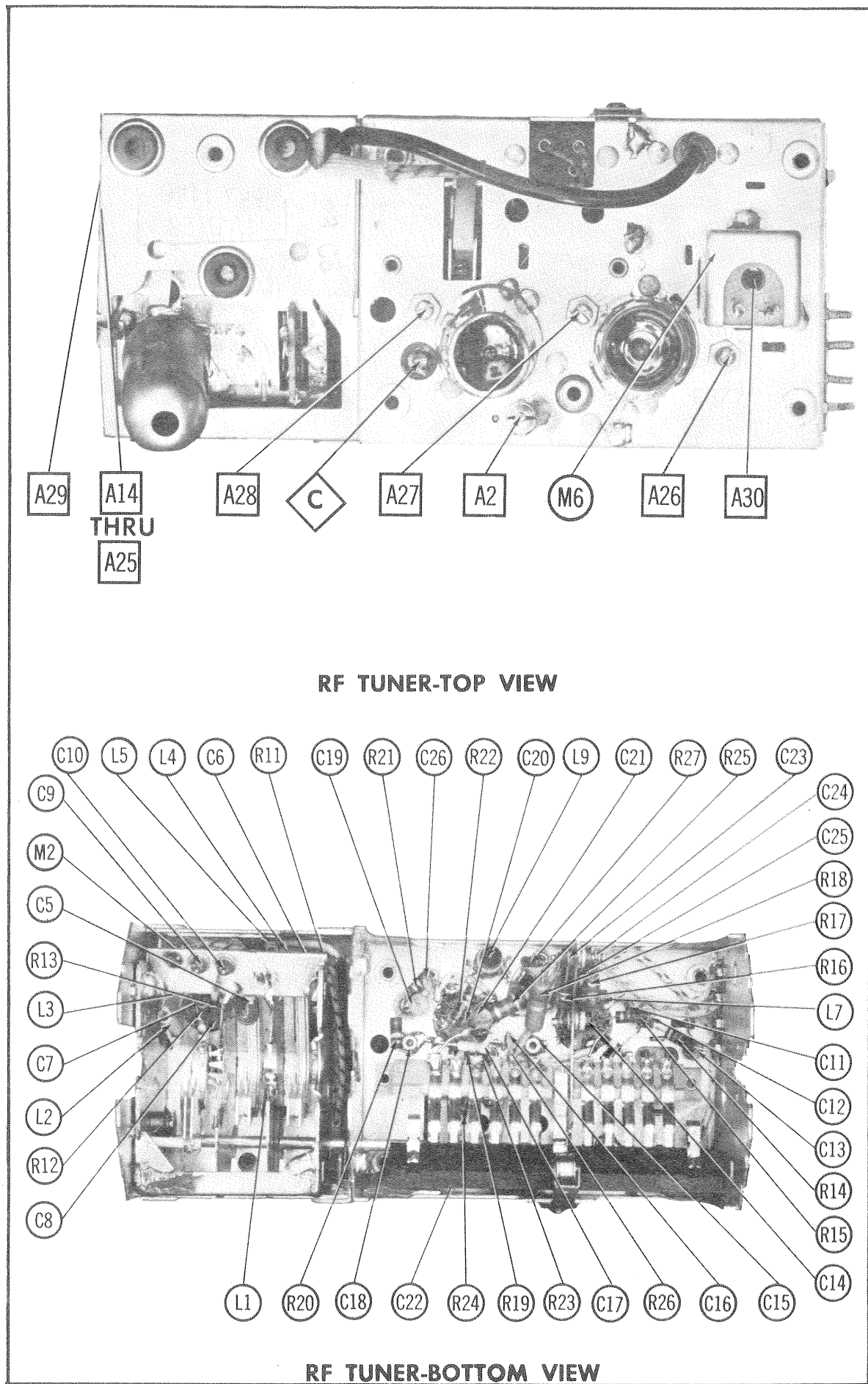
FOCUS

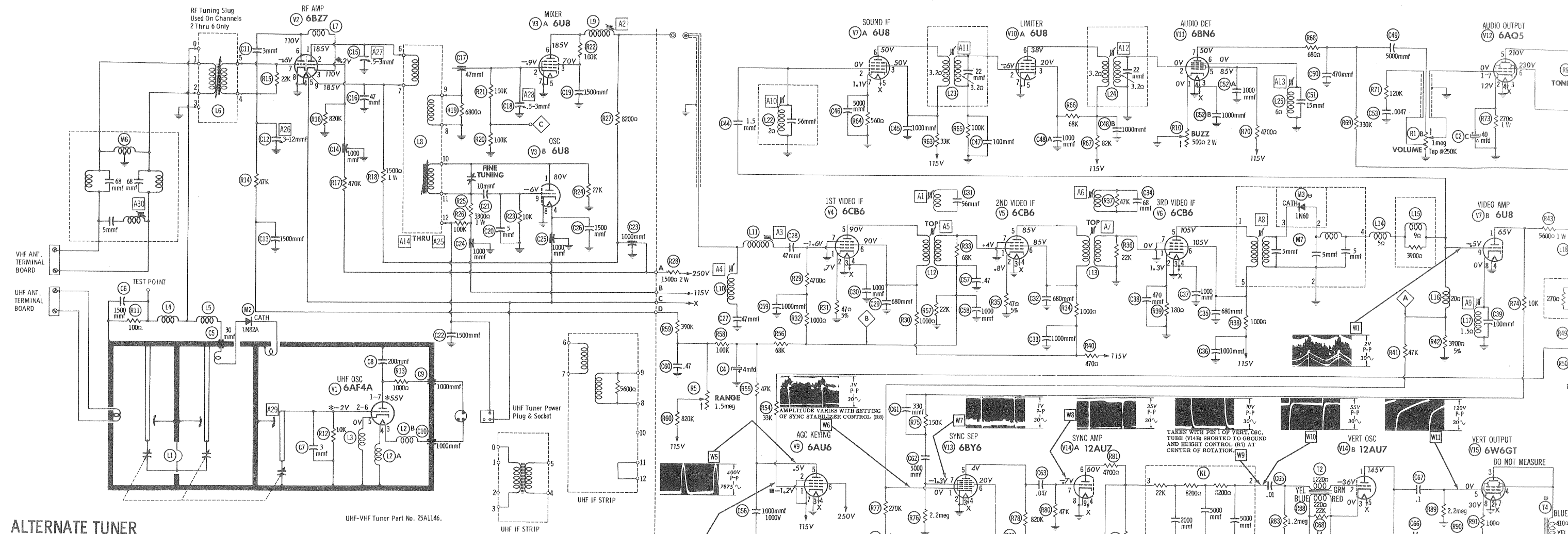
Adjust ion trap for
brightness.

HORIZONTAL OSC

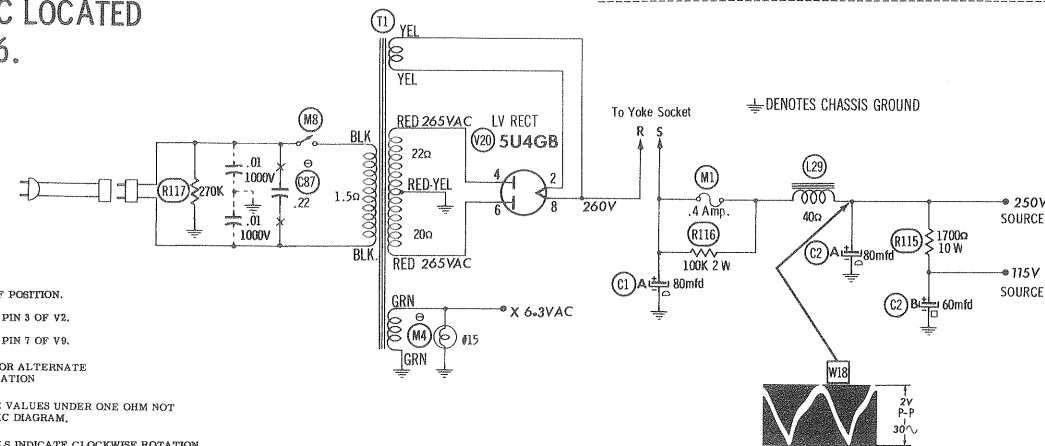
Turn the horizonta

"The listing of any availab
case a recommendation, w
as to the quality and suitat
parts have been compiled f
Inc., by the manufacturers
"Reproduction or use, with
G871R





ALTERNATE TUNER
SCHEMATIC LOCATED
ON PAGE 16.



* MEASURED IN UHF POSITION.

◆ MEASURED FROM PIN 3 OF V2.

■ MEASURED FROM PIN 7 OF V3.

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.

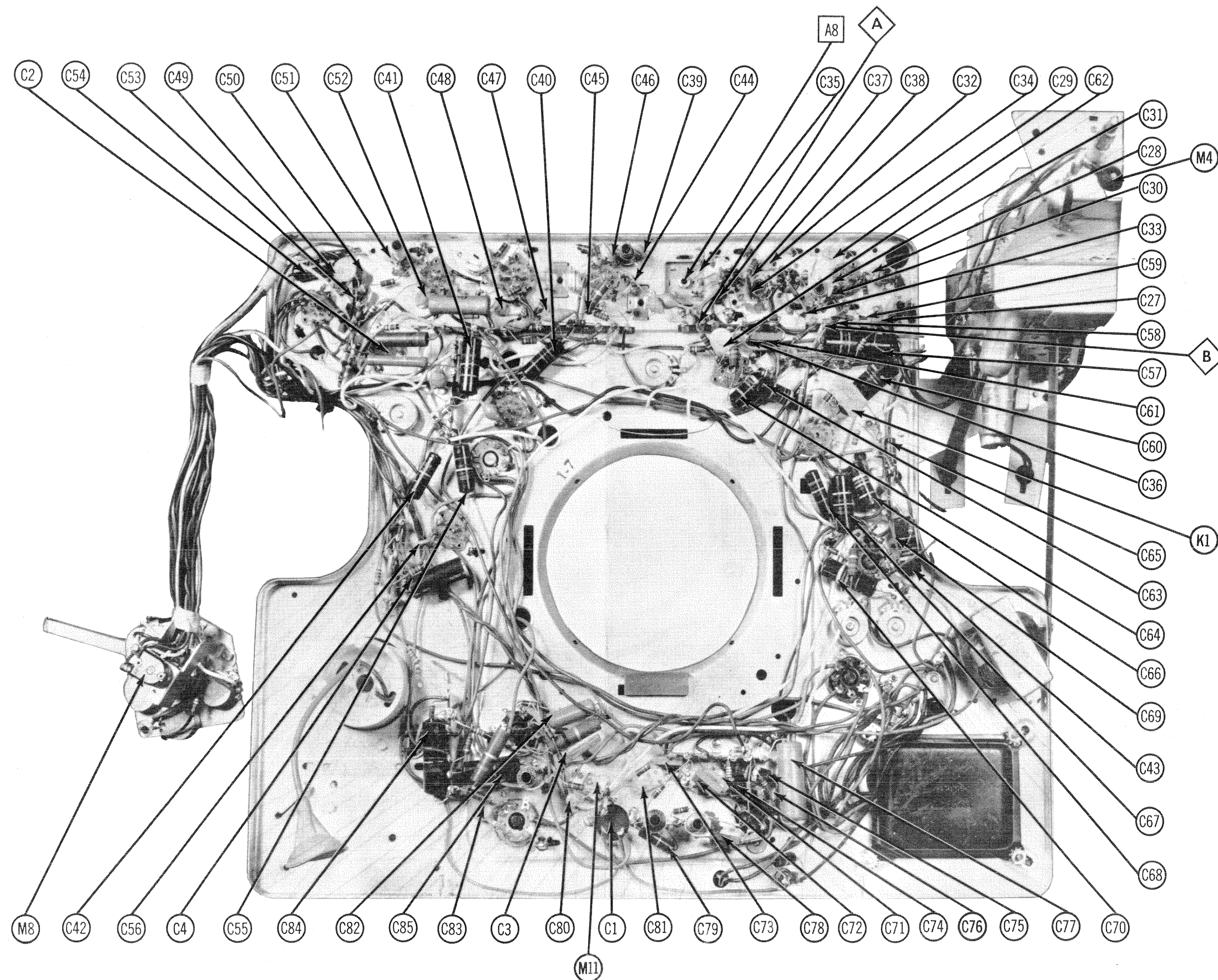
2. Pin numbers are counted in a clockwise direction on bottom of socket.

3. Measured values are from socket pin to common negative unless otherwise stated.

4. Line voltage maintained at 117 volts for voltage readings.

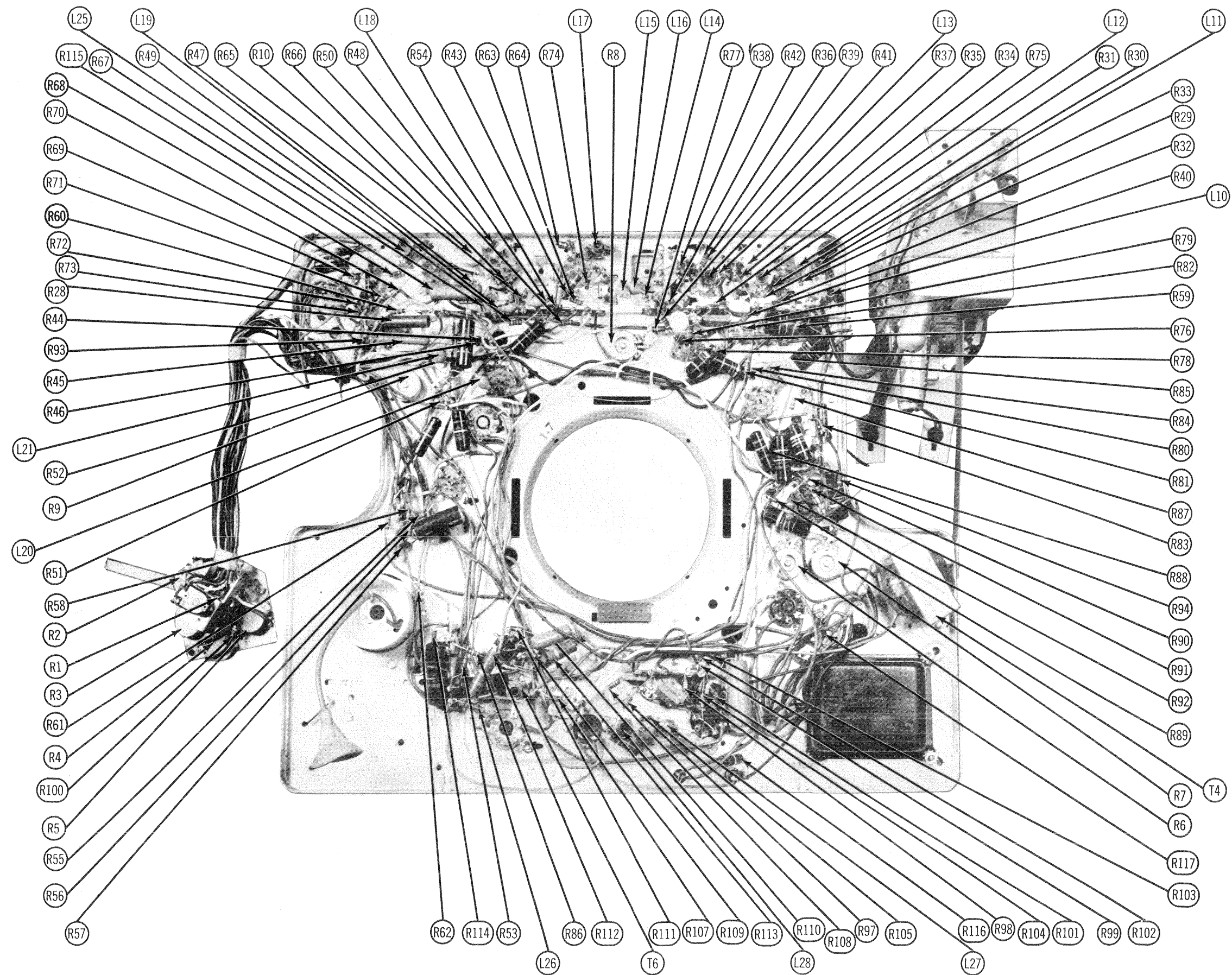
5. All controls set for normal operation; no signal applied.

A PHOTOFACIT STANDARD NOTATION SCHEMATIC
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CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

WELLS-GARDNER MODELS 321A63/U-B-622,
321A63/U-B-678, 2321A63/U-B-680



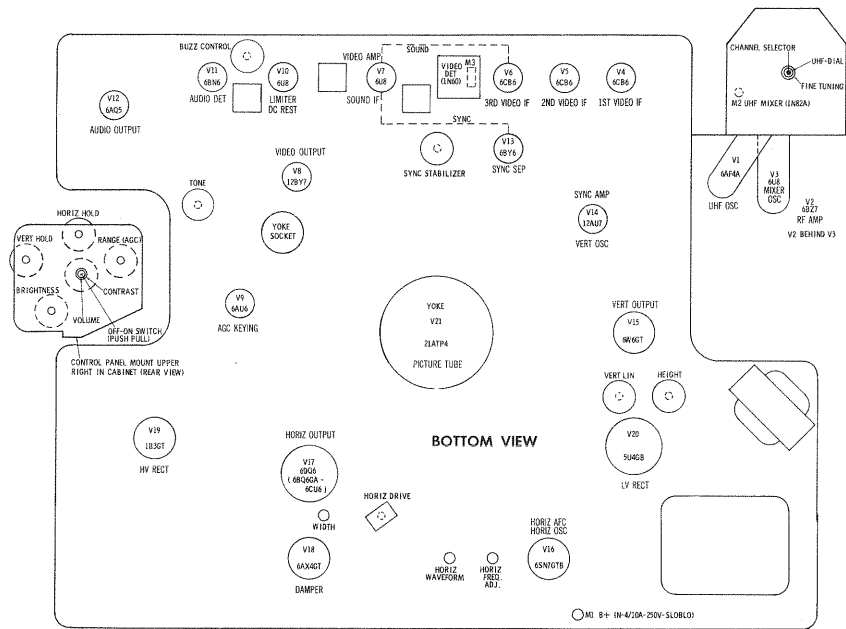
CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

WELLS-GARDNER MODELS 321A63/U-B-622,
321A63/U-B-678, 2321A63/U-B-680

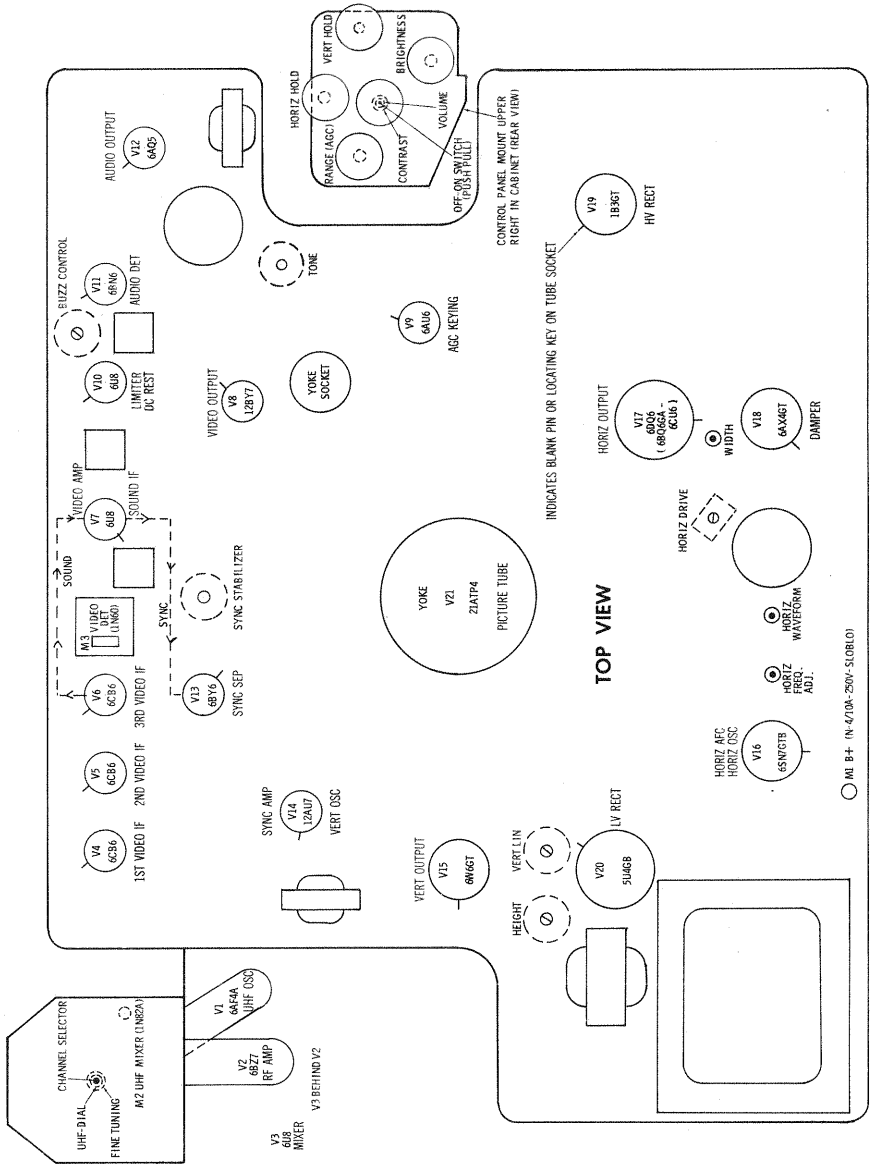
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AF4	† *6000Ω	10K	.1Ω	0Ω	.1Ω	10K	† *6000Ω		
V2	6BZ7	† 3000Ω	290K	1NF	0Ω	.1Ω	1NF	570K	0Ω	† 3000Ω
V3	6U8	† 5000Ω	200K	† 100K	.1Ω	0Ω	† 9700Ω	0Ω	0Ω	10K
V4	6CB6	27K	47Ω	0Ω	.1Ω	† 3200Ω	† 3200Ω	0Ω		
V5	6CB6	22K	47Ω	0Ω	.1Ω	† 3200Ω	† 3200Ω	0Ω		
V6	6CB6	.1Ω	180Ω	0Ω	.1Ω	† 2700Ω	† 2700Ω	0Ω		
V7	6U8	† 8800Ω	2Ω	† 35K	0Ω	.1Ω	† 35K	560Ω	1.5Ω	3900Ω
V8	12BY7	• 85Ω	1Meg	0Ω	0Ω	0Ω	.1Ω	† 3600Ω	† 1700Ω	0Ω
V9	6AU6	† 35K	† 1700Ω	0Ω	.1Ω	140K	† 40Ω	† 1700Ω		
V10	6U8	0Ω	100K	† 150K	.1Ω	0Ω	† 82K	0Ω	1Meg	0Ω
V11	6BN6	• 2Ω	3.2Ω	.1Ω	0Ω	† 6500Ω	6Ω	† 330K		
V12	6AQ5	1Meg	270Ω	.1Ω	0Ω	† 1000Ω	† 510Ω	1Meg		
V13	6BY6	30K	0Ω	0Ω	.1Ω	† 820K	† 29K	2.2Meg		
V14	12AU7	• † 1.3Meg	• 1.8Meg	220Ω	.1Ω	.1Ω	† 13K	47K	0Ω	0Ω
V15	6W6GT	TP	0Ω	† 450Ω	† 450Ω	2.2Meg	TP	.1Ω	• 1400Ω	
V16	6SN7GTB	410K	† 56K	0Ω	1.5Meg	• † 400Ω	410K	.1Ω	0Ω	
V17	6DQ6	TP	0Ω	NC	† 6800Ω	470K	TP	.1Ω	100Ω	TOP CAP † 10Ω
V18	6AX4GT	NC	NC	650K	NC	† 40Ω	NC	.1Ω	0Ω	
V19	1B3GT		PINS	1 THRU 8	HAVE	INFINITE	RESISTANCE			TOP CAP † 335Ω
V20	5U4GB	NC	90K	NC	22Ω	NC	20Ω	NC	90K	
V21	21ATP4	0Ω	1.1Meg	Pin 6 † 100K	Pin 10 † 470K	Pin 11 • 360K	Pin 12 1Ω			

- THIS READING WILL VARY, CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM PIN 3 OF V18.
† MEASURED FROM PIN 8 OF V20.
• MEASURED IN "UHF" POSITION.
TP TIE POINT
NC NO CONNECTION



TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE

No raster, no sound - Fuse (M1), V20

LOSS OF PICTURE OR SOUND

No pic, no sound, has raster - V4, V5, V6, Diode (M3), V9
No pic, no sound, has snow - V1 (UHF), V2, V3, V4
No pic, has sound, has raster - V7, V8, V10, V21
Has pic, no sound - V7, V10, V11, V12
Overloaded picture - V9

SYNC FAILURE

No raster, sync - V13, V14
No horiz. sync - V13, V14, V16
No vert. or horiz. sync - V13, V14

SWEEP FAILURE

No raster, has sound - V16, V17, V18, V19, V21
No vertical deflection - V14, V15
Poor vert. linearity or foldover - V14, V15
Poor horiz. linearity or foldover - V16, V17, V18
Narrow picture - V16, V17, V18, V20
Vert. off freq. - V13, V14
Horiz. off freq. - V13, V14, V16

TUBE PLACEMENT CHART

WELLS-GARDNER MODELS 321A63/U-B-622,
321A63/U-B-678, 2321A63/U-B-680

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT							
The high voltage lead should be taped and kept away from the chassis.							
VIDEO IF ALIGNMENT							
When aligning receivers employing tuner #25A1147 (Neutrode); connect the sweep generator with very short leads through 1000MMF disc ceramic to pin 9 (grid, accessible thru a hole located between the two tuner tubes) of the 6CG8 (mixer) tube. Low side to chassis. When aligning other receiver, connect the high side of the generator to an ungrounded tube shield floating over the converter tube. Low side to chassis. For all receivers, connect the negative lead of a 1.5 volt bias supply to ⊕ . Positive to chassis.							
DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1. See instructions above.		44MC (10MC Swp)	47.25MC	Any non-interfering channel.	Vert. amp. thru detector (Fig. 1) to pin 5 (Plate) of 6CB6 (V4). Low side to chassis.	A1	Adjust to place marker in trap notch as shown in Fig. 2.
2. "	"	"	41.25MC 45.75MC	"	"	A2, A3, A4	Adjust A2 & A3 to shape top of response curve as in Fig. 2. Adjust A4 to correctly place 41.25MC marker at 40% as in Fig. 2. The 45.75MC marker must be correctly positioned or later adjustments will be incorrect. After desired response curve is obtained, do not change these adjustments.
3. "	"	Not Used.	42.8MC (400% 30% AM Mod.)	"	Vert. amp. thru 10K to point ⊕ . Low side to chassis.	A5	Increase bias to -4.5 volts. Connect VTVM between point A and chassis and adjust generator output to produce -2 volts DC on meter. Remove VTVM. Adjust for maximum indication on scope.
4. "	"	"	41.25MC	"	"	A6	Adjust for MINIMUM.
5. "	"	"	45.3MC	"	"	A7	Adjust for maximum indication on scope.
6. "	"	"	44.0MC	"	"	A8	"
7. "	"	44MC (10MC Swp)	41.25MC 42.4MC 42.8MC 44.0MC 44.5MC 45.3MC 45.75MC 47.25MC	"	"		Check for response curve similar to Fig. 3. A8 controls the symmetry of top of curve. A7 will position 45.75MC marker. A5 is used to position 42.4MC marker. Retouch these adjustments only if necessary.

4.5MC TRAP ALIGNMENT
Connect the high side of the 4.5MC signal generator to point ⊕ . Low side to chassis. Connect the AC probe of the VTVM to the cathode (pin 11) of the picture tube. Adjust A9 for MINIMUM deflection. This adjustment may also be made by observing a picture from a station and adjusting A9 for MINIMUM 4.5MC beat interference in the picture.

SOUND IF ALIGNMENT
1. Tune in a TV station and reduce the signal with an attenuator between the antenna and the antenna terminals until a hiss accompanies the sound.
2. Adjust A10, A11, A12, A13 and the buzz control (R10) for maximum undistorted sound and MINIMUM buzz.
3. If hiss disappears during alignment, further reduce signal strength until the hiss returns.

VHF OSCILLATOR ALIGNMENT
Leave 4.5 volt bias connected as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms. Set the fine tuning control to the mid-position of its range. Use only enough sweep generator output to provide usable pattern on scope.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8. Two 120 Ω carbon resistors	Across antenna terminals with 120 Ω in each lead.	213MC (10MC Swp) 207MC (10MC Swp) 201MC (10MC Swp) 195MC (10MC Swp) 189MC (10MC Swp) 183MC (10MC Swp) 177MC (10MC Swp) 85MC (10MC Swp) 79MC (10MC Swp) 69MC (10MC Swp) 63MC (10MC Swp) 57MC (10MC Swp)	211.25MC 205.25MC 203.75MC 193.25MC 191.75MC 181.25MC 185.75MC 175.25MC 179.75MC 83.25MC 87.75MC 77.25MC 81.75MC 67.25MC 71.75MC 61.25MC 65.75MC 55.25MC 59.75MC	13 12 11 10 9 8 7 6 5 4 3 2	Vert. amp. thru 47K to point ⊕ . Low side to chassis.	A14 A15 A16 A17 A18 A19 A20 A21 A22 A23 A24 A25	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should fall at 50%.

ALIGNMENT INSTRUCTIONS (cont)

VHF RF AND MIXER ALIGNMENT FOR TUNERS #25A1144 and #25A1146

Connect the negative lead of a 3 volt bias supply to AGC terminal (terminal "D" on tuner #25A1146 or terminal "A" on tuner #25A1144) on tuner terminal strip. Positive to chassis. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms. Use only enough sweep generator output to provide usable pattern on scope.							
DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9. Two 120 Ω carbon resistors	Across antenna terminals with 120 Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. amp. thru 10K to point ⊕ . Low side to chassis.	A26, A27, A28	Adjust for response curve similar to Fig. 5 with markers above 90%.
10. "	"	213MC (10MC Swp) 201MC (10MC Swp) 195MC (10MC Swp) 189MC (10MC Swp) 183MC (10MC Swp) 177MC (10MC Swp) 85MC (10MC Swp) 79MC (10MC Swp) 69MC (10MC Swp) 63MC (10MC Swp) 57MC (10MC Swp)	211.25MC 215.75MC 199.25MC 203.75MC 193.25MC 197.75MC 187.25MC 191.75MC 181.25MC 185.75MC 175.25MC 179.75MC 83.25MC 87.75MC 77.25MC 81.75MC 67.25MC 71.75MC 61.25MC 65.75MC 55.25MC 59.75MC	13 11 10 9 8 7 6 5 4 3 2	"		Check for response similar to Fig. 5. If markers fall below 70% on any channel, make compromise adjustments of A26, A27 and A28 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.

UHF OSCILLATOR ALIGNMENT
Adjust UHF oscillator trimmer (A29) for best uniform tracking over UHF band. Note: This does not necessarily mean that each UHF channel will appear at indicated number on knob.

INTERFERENCE TRAP ADJUSTMENT
Antenna trap (A30) should be adjusted for MINIMUM interference in the picture while receiver is tuned to channel where interference occurs.

VHF RF AND MIXER ALIGNMENT FOR TUNER #25A1147
Connect the negative lead of a 2.5 volt bias supply through 10K to the AGC terminal of tuner. Positive to chassis. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms. Use only enough sweep generator output to provide usable pattern on scope.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11. Two 120 Ω carbon resistors	Across antenna terminals with 120 Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. amp. thru 10K to point ⊕ . Low side to chassis.	A31, A32	Adjust for maximum response similar to Fig. 5.
12. "	"	"	"	"	"	A33	Adjust A33 (RF coil on channel 10 tuner strip) by expanding or compressing coil turns for maximum height between carriers. Retouch A31 and A32 for symmetrical response.
13. "	"	"	"	"	Vert. amp. thru detector (Fig. 1) to pin 5 (plate) of 6CB6 (V4). Low side to chassis.	A34	Connect negative lead of 1.5 volt bias supply to point ⊕ . Positive to chassis. Adjust A34 for MINIMUM response curve amplitude. Remove bias and test equipment.

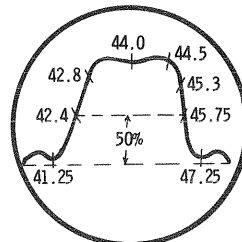


FIG. 3

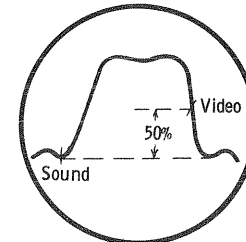


FIG. 4

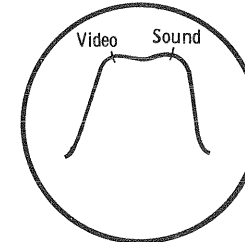


FIG. 5

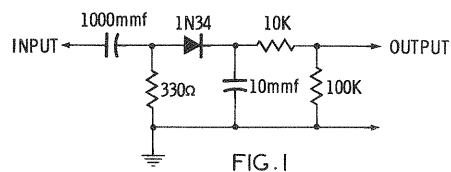


FIG. 1

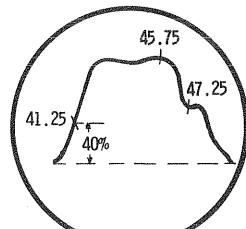
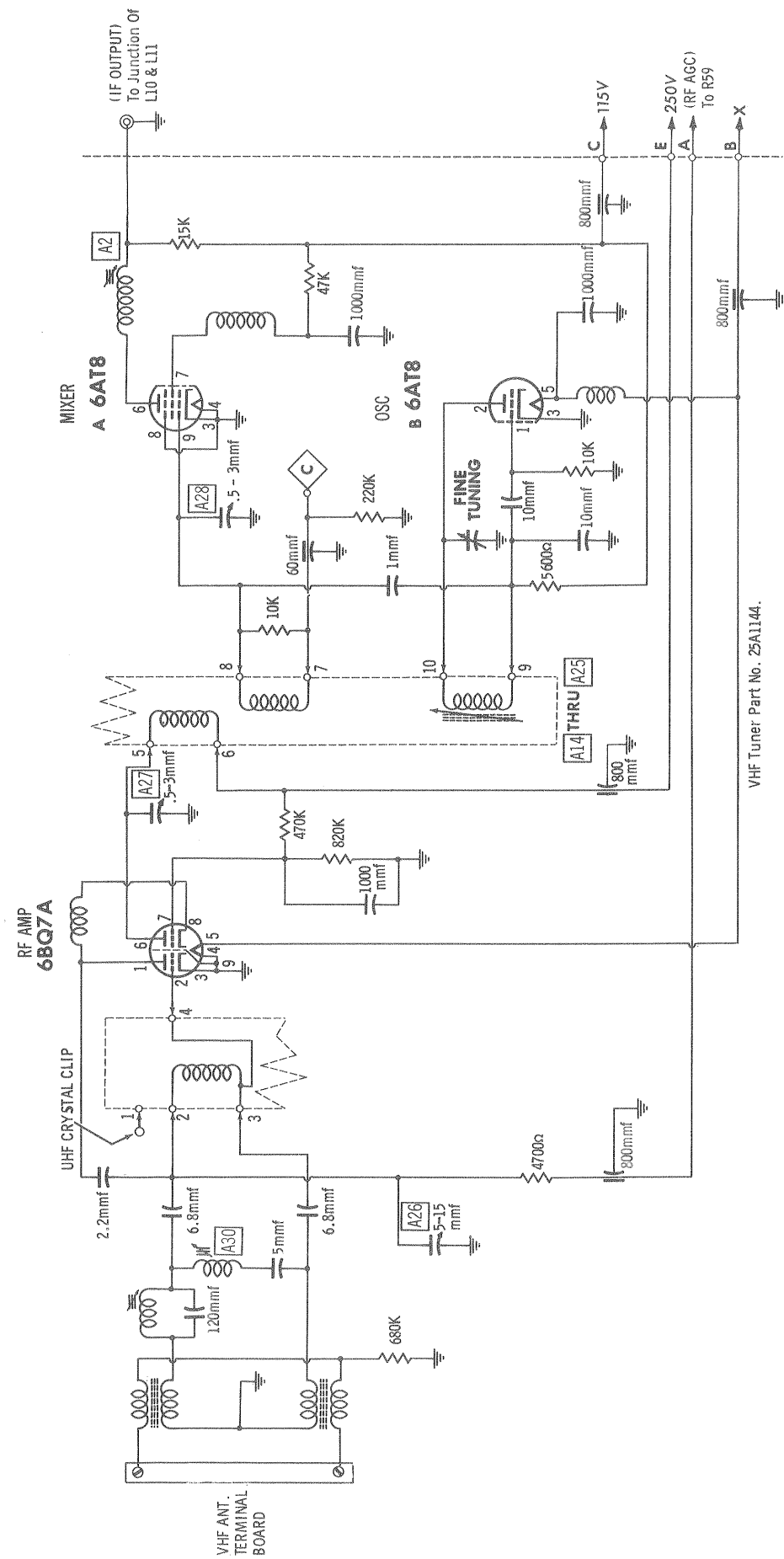
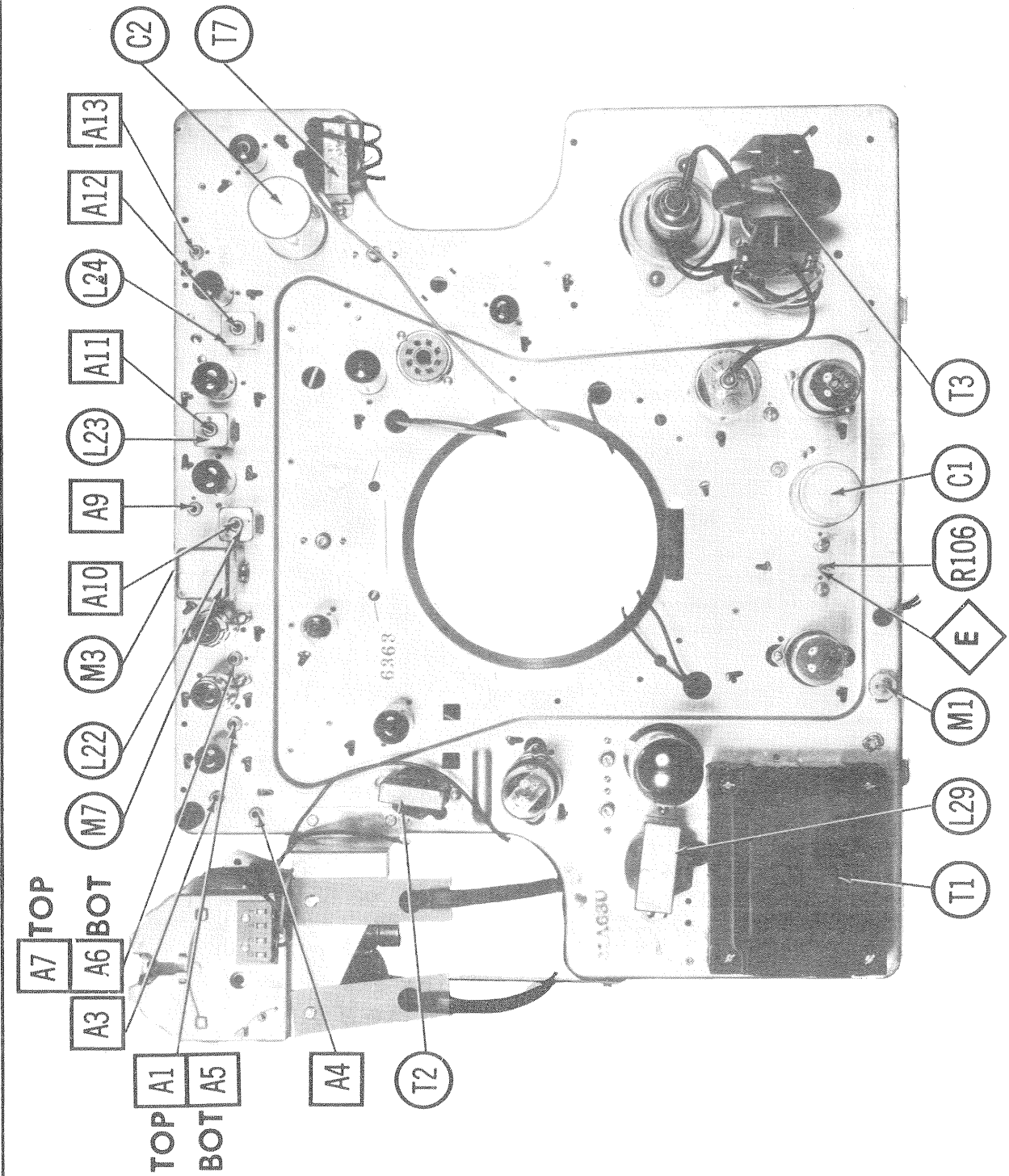


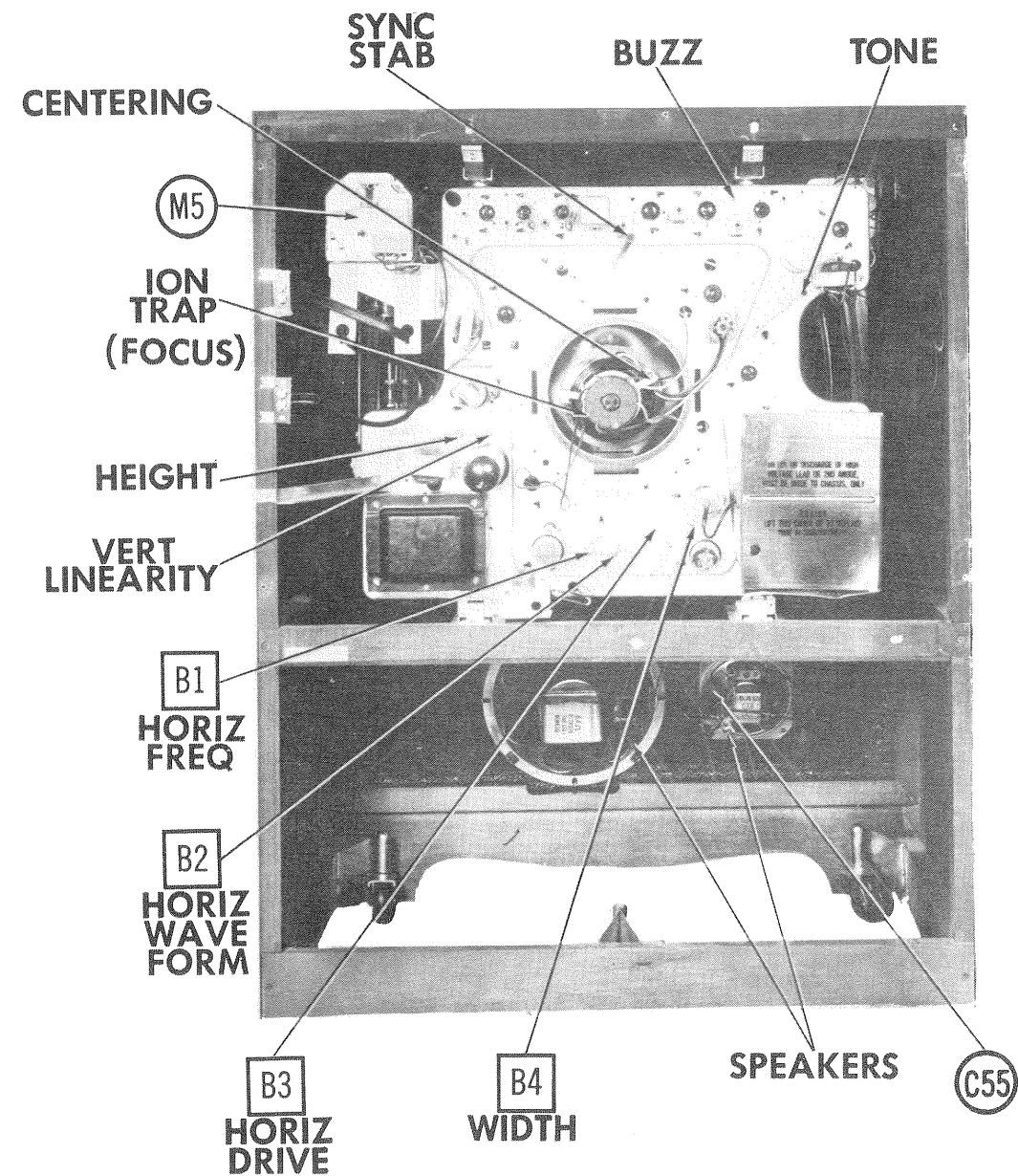
FIG. 2

WELLS-GARDNER MODELS 321A63/U-B-622,
321A63/U-B-678, 2321A63/U-B-680



ALTERNATE VHF TUNER SCHEMATIC





CABINET-REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and turn the horizontal hold control fully clockwise. Tune in a TV station and adjust the horizontal frequency slug (B1) until the picture is just about to tear out of sync at the top of the picture.

Connect the vertical amplifier of the scope to point \diamond . Low side to chassis. With the picture in sync adjust B2 for equal peaks of the waveform as in Fig. 6. Turn the horizontal drive trimmer (B3)

clockwise until white vertical lines appear in the left center of the screen and then turn counter clockwise until the white vertical lines disappear.

Adjust the width slug (B4) for a picture slightly wider than necessary to fill the picture mask horizontally.

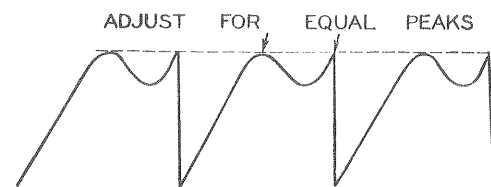
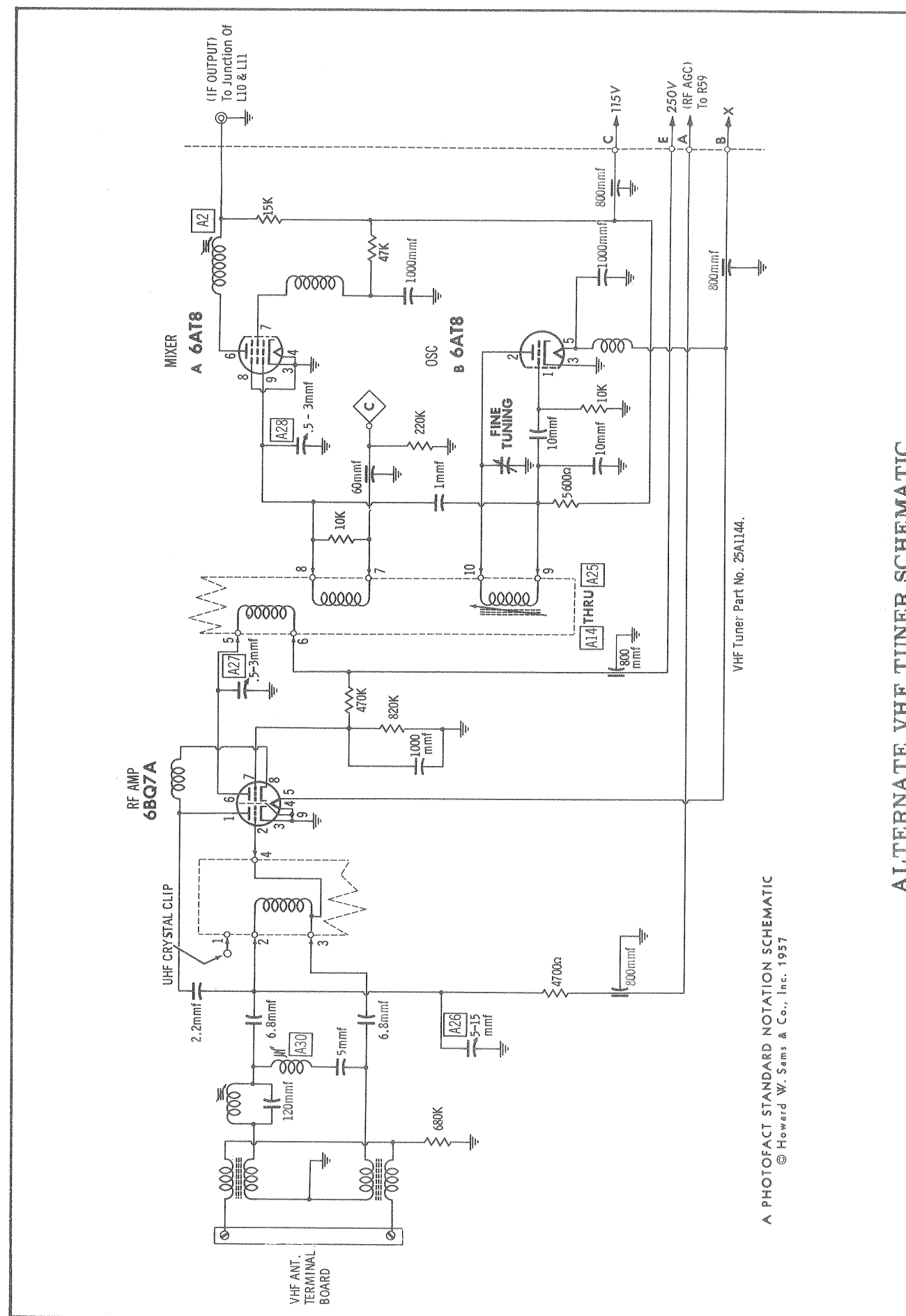
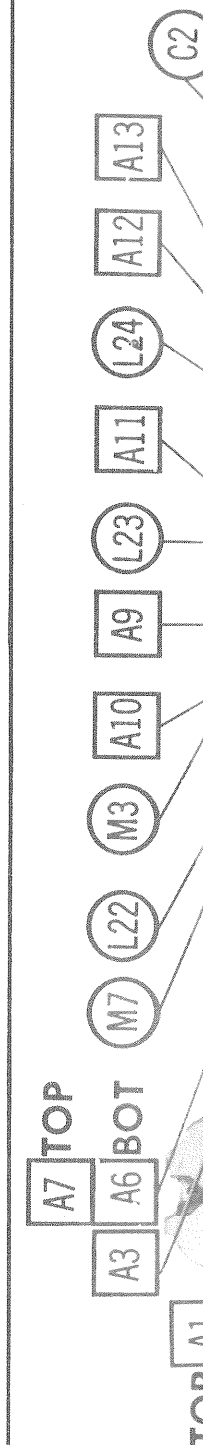


FIG. 6



A PHOTOFACT STANDARD NOTATION SCHEMATIC
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ALTERNATE VHF TUNER SCHEMATIC



TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES	ITEM No.	USE	TYPE	NOTES
V1	UHF Osc.	6AF4		V11	Audio Det.	6BN6	
V2	RF Amp.	6BZ7		V12	Audio Output	6AQ5	
V3	Mixer-Osc.	6U8		V13	Sync Sep.	6BY6	
V4	1st Video IF Amplifier	6CB6		V14	Sync Amp. -Vert. Osc.	12AU7	
V5	2nd Video IF Amplifier	6CB6		V15	Vert. Output	6V6GT	
V6	3rd Video IF Amplifier	6CB6		V16	Horiz. AFC-Horiz. Osc.	6SN7GTB	
V7	Video Amp. -Sound IF Amp.	6U8		V17	Horiz. Output	6DQ6	
V8	Video Output	12BY7		V18	Damper	6AX4GT	
V9	AGC Keying	6AU6		V19	HV Rectifier	1B3GT	
V10	Limiter-DC Restorer	6U8		V20	LV Rectifier	5U4GB	

Note 1: Some versions may use 6CU6 or 6BQ6GA in this application.

PICTURE TUBE

ITEM No.	REPLACEMENT DATA	REPLACEMENT DATA	REPLACEMENT DATA	REPLACEMENT DATA	NOTES
ITEM No.	Wells-Gardner PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V21	21ATP4	21ATP4 ①	21ATP4A/21ATP4 ①	21ATP4A/21ATP4 ② 21ATP4A/21BTP4	① Aluminized ② Silver Screen "85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	Wells-Gardner PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	1000	45X428	AFH4-07	DO050	FP-235	TMT-25	Q-010	R2203*
B	200			BBR20-50	TC-36	TD-10-50	MT-0510	
C	50							
C2A	1000	45X429	AFH3-29-50	BO354	FP227.5		T-180	R2204*
B	50			BR4015	TC68		MT-0550	
C	50							
C3	40	45X418	PRSI50V4	BBR-4-50	TC30	TD-4-50	MMT-0505	TVA-1303
C4	40	45X418	PRSI50V4	BBR-5-40	TC30	TD-4-50	MMT-0505	TVA-1303

* Non catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	Wells-Gardner PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	30	13M20GP300KN02	BPD-0015	DD-152	BYA10D15	ED-0015	DC5215	5HK-D15
C6	1500	13L8XA152Z						
C7	3							
C8	200							
C9	1000	13M320EA102Z-01	EF-001	MFT-1000				503C-D1
C10	1000	13M320EA102Z-01	EF-001	MFT-1000				503C-D1
C11	3	13L8C030H	NP0-S13	TCZ-3R3	C10V3C	TCO-3	ZT-553	
C12	3-12	31B901						
C13	1500	13L8XA152Z	BPD-0015		BYA10D15	ED-0015	DC5215	5HK-D15
C14	1000	13M28N102Z	EF-001	MFT-1000				503C-D1
C15	5-3	31B902						
C16	47	13L8Q470K						
C17	47	13M20U470K-R						
C18	5-3	31B902						
C19	1500	13L8XA152Z	BPD-0015		BYA10D15	ED-0015	DC5215	5HK-D15
C20	5	13L8U4050C						
C21	10	13L8U100F						
C22	1500	13L8XA152Z	BPD-0015	DD-152	BYA10D15	ED-0015	DC5215	5HK-D15
C23	1000	13M28N102Z	EF-001	MFT-1000				503C-D1
C24	1000	13M28N102Z	EF-001	MFT-1000				503C-D1
C25	1000	13M28N102Z	EF-001	MFT-1000				503C-D1
C26	1500	13L8XA152Z	BPD-0015					
C27	47	13L8Q470K						
C28	47	13L8Q470K						
C29	680	BPD-00068						
C30	1000	BPD-001						
C31	56	NP0-S156						
C32	680	BPD-00068						
C33	1000	BPD-001						
C34	68	NP0-S168						
C35	680	BPD-00068						
C36	1000	BPD-001						
C37	1000	BPD-001						
C38	470	BPD-00047						
C39	100	DI-100						
C40	0.047	400	RCPI0M4473M					
C41	0.047	400	RCPI0M4473M					
C42	0.015	600	RCPI0M6153M					
C43	0.047	600	RCPI0M6473M					
C44	1.5							
C45	1000							
C46	5000							
C47	100							
C48A	1000	80X3	BPD-2X001	DD2-102	BYC6DD1	ED-1000	DCD521	5HK-2D1
C49	5000							
C50	4700	80X4	BPD-00047	DD-471	BYA10T47	ED-470	DC525	5HK-D5
C51	15							
C52A	1000	80X3	BPD-000015	DD-150	LIQ01	ED-15	UC-5415	5GA-Q15
C53	0.0047	400	RCPI0M4472M	DD-472	CUB4D47	ED-0047	GEM-4247	4TM-D47
C54	0.022	600	RCPI0M6223M	BPD-02	CUB6S22	ED-02	GEM-6222	8TM-S22
C55	0.47	200	RCPI0M2474M	P288N-47	CUB2P47		GEM-2047	2TM-P47
C56	1000	1000	47X753	HVD-15-1000	BYA10D1M		GRM-2047	2TM-P47
C57	0.47	200	RCPI0M2474M	P288N-47	CUB2P47		GEM-2047	2TM-P47
C58	1000							
C59	1000							
C60	0.47	200	RCPI0M2474M	P288N-47	CUB2P47		GEM-2047	2TM-P47
C61	330		47X570	4469-00033	5R5T33		MS-333	
C62	5000							
C63	0.047	400	RCPI0M4473M	BPD-05	DF-503	CUB4S47	GEM-4147	4TM-S47
C64	0.047	400	RCPI0M4473M	BPD-05	DF-503	CUB4S47	GEM-4147	4TM-S47
C65	0.047	400						
C66	0.047	400	RCPI0M4473M	BPD-05	DF-503	CUB4S47	GEM-4147	4TM-S47
C67	1	400						
C68	0.022	200	RCPI0M2223M	BPD-02	DF-203	CUB2S22	GEM-2122	2TM-S22
C69	0.047	200	RCPI0M2473M	BPD-05	DF-503	CUB2S47	GEM-2147	2TM-S47

Note 1

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING	Wells-Gardner PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C70	0.047	800	RCPI0M6473M	BPD-05	DF-503	CUB4S47	GEM-6147	6TM-S47
C71	18		RCM20B180K	1469-000018		22R5Q18	MS-418	
C72	82		RCM20B820K	1469-000082		22R5Q82	MS-482	
C73	100					22R5T1	MS-31	
C74	0.047	400	RCPI0M4473M	BPD-05	DF-503	CUB4S47	GEM-4147	4TM-S47
C75	0.047	200	RCPI0M2473M	BPD-05	DF-503	CUB2S47	GEM-2147	2TM-S47
C76	0.022	200	RCPI0M2223M	BPD-02	DF-203	CUB2S22	GEM-2122	2TM-S22
C77	0.47	200	RCPI0M2474M	P288N-47		CUB2P47	GEM-2047	2TM-P47
C78	220					22R5T22	MS-322	
C79	0.01	400				BPD-01	4TM-S1	
C80	680					CUB4S1	5GA-T68	
C81	820		RCM20B821K	1464-00082	DD-681	BYA10T68	MS-382	
C82	0.047	400	RCPI0M4473M	BPD-05	DF-503	CUB4S47	GEM-4147	4TM-S47
C83	39	5000				HVA20Q39		
C84	1	600				CUB6P1	6TM-P1	
C85	15	200	RCPI0M2154M	P288N-15	DF-104	CUB2P15	2TM-P15	
C86	1	200				CUB2P1	2TM-P1	
C87	22	400				CUB4P22	GEM-4022	4TM-P22

Note 1: Not used in some versions.

CONTROLS

ITEM No.	RATING	Wells-Gardner PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
R1A	1000Ω	78X27					Contrast
B	1Meg						Volume - Tap @ 250K
R2A	500K	40X416	AB-59	A47-500K-S	Q11-133	U50	Brightness
B	Shaft		AK-8	RS-3/16	NQ	DS-37	
R3A	1.5Meg	40X415	AB-742	A47-1.5Meg-S	Q11-138	U155	Vert. Hold
B	Shaft		AK-8	RS-3/16	NQ	DS-37	
R4A	50K	40X414	AB-31	A47-50K-S	Q11-123	U35	Horiz. Hold
B	Shaft		AK-8	RS-3/16	NQ	DS-37	
R5A	1.5Meg	40X415	AB-742	A47-1.5Meg-S	Q11-138	U155	Range
B	Shaft		AK-8	RS-3/16	NQ	DS-37	
R6A	1500Ω	40X410	AB-6	A47-1500-S	Q11-109	PTA152L	Vert. Ltn.
B	Shaft		AK-4	FKS-1/2	RQ	Not Req.	
R7A	2.5Meg	40X405	AB-83	A47-2.5Meg-S	Q11-239	TA255L	Height
B	Shaft		AK-4	FKS-1/2	RQ	Not Req.	
R8A	2.5Meg	40X405	AB-83	A47-2.5Meg-S	Q11-239	TA255L	Sync Stab.
B	Shaft		AK-4	FKS-1/4	RQ	Not Req.	
R9A	100K	40X407	AB-40	A47-100K-S	Q11-128	TA15L	Tone
B	Shaft		AK-4	FKS-1/4	RQ	Not Req.	
R10	500Ω	2	40X397	89-500	FL-600		Buzz (Wire-wound)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	Wells-Gardner PART No.	ERIE PART No.	NOTES
R11	100Ω	12TAE100K	BTS-100	
R12	10K	12TAE103K	BTS-10K	
R13	1000Ω	31S-563	BTS-1000	
R14	47K	12TAE473M	BTS-47K	
R15	22K	12TAE223K	BTS-22K	
R16	820K	12TAE824K	BTS-820K	
R17	470K	12TAE470K	BTS-470K	
R18	1500Ω	12SAE152K	BTA-1500	
R19	6800Ω	12TAE682K	BTS-6800	
R20	100K	12TAE104K	BTS-100K	
R21	100K	12TAE104K	BTS-100K	
R22	100K	12TAE104K	BTS-100K	
R23	10K	12TAE103M	BTS-10K	
R24	27K	12TAE273K	BTS-27K	
R25	3300Ω	12SAE332K	BTA-3300	
R26	100K	12TAE104K	BTS-100K	
R27	8200Ω		BTS-8200	
R28	1500Ω		BTB-1500	
R29	4700Ω			
R30	1000Ω	31S-563	BTS-1000	
R31	47Ω 5%		BTS-47 5%	
R32	1000Ω			
R33	68K			
R34	1000Ω	31S-563	BTS-1000	
R35	47Ω 5%		BTS-47 5%	
R36	22K		BTS-22K	
R37	47K			
R38	1000Ω		BTS-1000	
R39	180Ω		BTS-180	
R40	470Ω		BTS-470	
R41	47K			
R42	3900Ω 5%			
R43	5600Ω		BTA-5600	
R44	1Meg			
R45	3600Ω 5%	43X331		
R46	68Ω		BTS-68	
R47	100K		BTS-100K	
R48	1Meg		BTS-1Meg	
R49	680Ω		BTS-680	
R50	820Ω		BTS-820	
R51	22K		BTS-22K	
R52	100K		BTS-100K	
R53	1.8Meg		BTS-1.8Meg	
R54	33K		BTS-33K	
R55	47K		BTS-47K	
R56	68K		BTS-68K	
R57	22K		BTS-22K	
R58	100K		BTS-100K	
R59	390K		BTS-390K	
R60	820K		BTS-820K	
R61	47K		BTS-47K	
R62	47K		BTS-47K	
R63	33K		BTS-33K	
R64	560Ω		BTS-560	

CAPACITORS (cont)							
		REPLACEMENT DATA					NOTES
NG VOLT	Wells-Gardner PART No.	AEROVOX PART No.	CENTRALB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	
100	RCPI0M6473M RCM20B180K RCM20B820K	BPD-05 1469-000018 1469-000082 1469-0001	DF-503	CUB6S47 22R5Q18 22R5Q82 22R5T1		GEM-6147 MC235 GEM-4147 GEM-2147 GEM-2122 GEM-2047	6TM-847 MS-418 MS-482 MS-31 4TM-847 2TM-847 2TM-822 2TM-474 MS-322
400	RCPI0M4473M	BPD-05	DF-503	CUB4S47			
200	RCPI0M2473M	BPD-05	DF-503	CUB2S47			
200	RCPI0M2223M	BPD-02	DF-203	CUB2S22	ED-02		
200	RCPI0M2474M	P268N-47 1469-00022		CUB2P47 22R5T22			
400		BPD-01 1464-00068		CUB4S1		GEM-411	4TM-51
	RCM20B821K	BPD-01 1464-00082	DD-681	BYA10T68 1R5T82	ED-680	UC-5368 MS-382	5GA-T68 MS-382
400	RCPI0M4473M	BPD-05	DF-503	CUB4S47 HVA20Q39		GEM-4147	4TM-847
5000							
300		P688N-1	DF-104	CUB6P1		GEM-601	6TM-P1
300		P268N-15		CUB2P15		GEM-2015	2TM-P15
300		P268N-1	DF-104	CUB2P1		GEM-201	2TM-P1
100	RCPI0M2154M	P488N-22		CUB4P22		GEM-4022	4TM-P22

Note 1

NG	REPLACEMENT DATA					INSTALLATION NOTES
	Wells-Gardner PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
1	78X27					Contrast Volume - Tap @ 250K Brightness
1	40X416	AB-59 AK-8	A47-500K-S RS-3/16	Q11-133 NQ	U50 DS-37	
1	40X415	AB-742 AK-8	A47-1.5Meg-S RS-3/16	Q11-138 NQ	U155 DS-37	Vert. Hold
1	40X414	AB-31 AK-8	A47-50K-S RS-3/16	Q11-123 NQ	U35 DS-37	Horiz. Hold
1	40X415	AB-742 AK-8	A47-1.5Meg-S RS-3/16	Q11-138 NQ	U155 DS-37	Range
1	40X410	AB-6 AK-4	A47-1500-S FKS-1/2	Q11-109 RQ	PTA152L Not Req.	Vert. Lin.
1	40X405	AB-83 AK-4	A47-2.5Meg-S FKS-1/2	Q11-239 RQ	TA255L Not Req.	Height
1	40X405	AB-83 AK-4	A47-2.5Meg-S FKS-1/4	Q11-239 RQ	TA255L Not Req.	Sync Stab.
1	40X407	AB-40 AK-4	A47-100K-S FKS-1/4	Q11-128 RQ	TA15L Not Req.	Tone
2	40X397		39-500		FL-600	Buzz (Wire-wound)

All wattages 1/2 watt, or less, unless otherwise listed.										
IG	REPLACEMENT DATA			NOTES	ITEM No.	RATING		REPLACEMENT DATA		NOTES
	Watts	Wells-Gardner PART No.	IRC PART No.			OHMS	WATT	Wells-Gardner PART No.	IRC PART No.	
1		12TAE100K	BTS-100		R65	100K			BTS-100K	
		12TAE103K	BTS-10K		R66	68K			BTS-68K	
		31S-563	BTS-1000		R67	82K			BTS-82K	
		12TAE473M	BTS-47K		R68	680Ω			BTS-680	
		12TAE223K	BTS-22K		R69	330K			BTS-330K	
		12TAE624K	BTS-620K		R70	4700Ω			BTS-4700	
		12TAE474K	BTS-470K		R71	120K			BTS-120K	
		12SAE152K	BTA-1500		R72	470Ω	1		BTA-270	
		12TAE682K	BTS-6800		R73	270Ω			BTA-270	
		12TAE104K	BTS-100K		R74	10K			BTS-10K	
1		12TAE104K	BTS-100K		R75	150K			BTS-150K	
		12TAE104K	BTS-100K		R76	2.2Meg			BTS-2.2Meg	
		12TAE103M	BTS-10K		R77	270K			BTS-270K	
		12TAE273K	BTS-27K		R78	820K			BTS-820K	
		12SAE332K	BTA-3300		R79	27K	1		BTA-27K	
		12TAE104K	BTS-100K		R80	47K			BTS-47K	
			BTS-8200		R81	4700Ω			BTS-4700	
			BTB-1500		R82	6800Ω			BTS-6800	
		31S-563	BTS-1000		R83	1.2Meg			BTS-1.2Meg	
			BTS-47 5%		R84	180K			BTS-180K	
2			BTS-47 5%		R85	2.2Meg			BTS-2.2Meg	
			BTS-22K		R86	470K			BTS-470K	
		31S-563	BTS-1000		R87	470K			BTS-470K	
			BTS-47 5%		R88	22K			BTS-22K	
			BTS-22K		R89	2.2Meg			BTS-2.2Meg	
			BTS-1000		R90	12K 5%			BTS-12K 5%	
			BTS-180		R91	100Ω			BTS-100	
			BTS-470		R92	680Ω	1		BTA-680	
			BTA-5600		R93	100K			BTS-100K	
					R94	2200Ω			BTS-2200	
1					R95	580Ω				
					R96	560Ω				
					R97	220K				
					R98	330K				
					R99	820K				
					R100	120K				
					R101	82K				
					R102	330K				
					R103	3900Ω				
					R104	82K				
4					R105	22K				
					R106	10K				
					R107	1Meg				
					R108	56K				
					R109	68Ω			BTS-68	
					R110	470K			BTS-470K	
					R111	68Ω			BTS-68	
					R112	6800Ω	2		BTB-6800	
					R113	100Ω	2		BTB-100	
					R114	470				

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	Wells-Gardner PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
TI	117VAC ② 1.74A	525VCT ② .270A	5V ② 9A	6.3V ② 9.6A	53X354-A		P-2830 ②	P-8332 ③	26R68 ① ④	R-61BC ① ④

① Parallel & phase 6.3V, 6A filament windings.
 ② Tape 6.3V, 1.25A filament winding.
 ③ Parallel & phase 6.3V filament windings.
 ④ Tape 6.3V, 1.2A filament winding.

ITEM No.	USE	REPLACEMENT DATA							
		Wells-Gardner PART No.	Hallardon PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordardon PART No.	Triad PART No.
T2	Vert. Osc. Trans.	54X10	B6702	A-3003	209T1 ①	V405	A-8125	26A03	A-97X
T3	Horiz. Output Trans.	53X355	FB419 & RF800*§①	HVO-36 & MWC-11*§ ①	235T1 & 212R1*§①	X094 & 201R16*§①	A-8253 * ① §	FLY-16 & WC-18*§①	D-50 & WC-12*§①
T4	Vert. Output Trans.	51X173A	Z1900③④	A-2823① ④		V302①④	A-8148⑤	26S72①④	A-108X① ④
		51X173 ②	Z1900③④	A-2823① ④		V302①④	A-8148⑤	26S72①④	A-108X① ④
T5A	Yoke(90°) Horiz.(20MH)	9A2388-1B⑥	DF607⑦⑧	MDF-92⑦	235D1⑦⑧	Y90F19/43	DY-16A⑦	Y-16⑦ ⑧	Y-41-1⑦
B	Vert.(30MH)	9A2388 ②			⑦ ⑧		⑦		⑧
T6	Width Coll (1-9MH)	9A2381	RF802 ⑩	MWC-6	211R1	201R16	WC-8	WC-22	WC-12 ⑪

① Drill new mounting hole(s).
 ② Alternate part number.
 ③ Use 8 to 1 turns.
 ④ Connect as auto transformer.
 ⑤ Cut and tape green lead.
 ⑥ Includes resistor R95 and R96.
 ⑦ Use original rear cover and centering device.
 ⑧ Use original horiz. yoke damping network.
 ⑨ Yoke rear cover and centering device.
 ⑩ Do not use tap.
 ⑪ Connect to coded red and blue terms.
 § This part may be superseded by Parts Manufacturer's introduction of special unit for this application.

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stanco Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	8	9	9	9	9	8	9	9
	4	7	7	7	7	1	7	7
	3	7	7	7	7	1	7	7
	2	Note ⑫	Note ⑫	Note ⑫	Note ⑫	Note ⑫	Note ⑫	Note ⑫
	1	3	3	3	3	3	3	3
	5	1	1	1	1	4	1	1
Connect Width Coil Across →	1 & 5	Terms #1 & #2 of RF800 Across 3 & 1	MWC-11 Across 3 & 1	212R1 Across 3 & 1	201R16 Across 3 & 1	6 & 7	WC-18 Across 3 & 1	Red & Blue Terms of WC-12 Across 3 & 1
Special Notes →		⑫ ⑬	⑫ ⑬	⑫ ⑬	⑫ ⑬	⑫ ⑬ ⑭	⑫ ⑬	⑫ ⑬

⑫ Connect approx. 100-150MMF @ 2KV in series with resistor R114 & connect across horiz. yoke terms #3 & #7.
 ⑬ Change values of resistor R61 & R62 as necessary to obtain required peak to peak pulse voltage at plate of V9, AGC keyer tube.
 ⑭ Ground either term #6 or term #7.

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
			Wells-Gardner	Hallderson	Merit	Stancor	Thordarson	Triod	
	PRI.	SEC.	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.	
T7	6300Ω	6-8Ω	5LX181	Z1000 ①	A-2900 ①	A-3856 ①	24S80 ①	S-51X ①	① Tape center tap on primary winding.

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
				Wells-Gardner	QUAM	
	SIZE	FIELD	V. C. IMP.	PART No.	PART No.	
SP1	8"	PM	6-8Q	12A539 ①	8A4Z6 ②	① Used in console models.
	6"	PM	3-4Q	12A538 ②		② Used in table models.
SP2	4"	PM	6-8Q	12A537 ①	4A07Z6 ③	③ Connect in parallel and phase.

ITEM No.	USE	Wells-Gardner PART No.	NOTES
L1	UHF RF Coupling Coll	31S-092	Channel 1 - Includes com- plete 41MC coll board assembly.
L2	Fil. Choke	31K-137-019	
L3	Cath. Choke	31K-137-019	
L4	RF Choke	31K-137-015	
L5	RF Choke	31K-137-014	
L6A	Ant. Colls	31M-013.1U	
B	Ant. Colls	31M-013.2U	
C	Ant. Colls	31M-013.3U	
D	Ant. Colls	31M-013.4U	
E	Ant. Colls	31M-013.5U	
F	Ant. Colls	31M-013.6U	Channel 2
G	Ant. Colls	31M-013.7U	Channel 3
H	Ant. Colls	31M-013.8U	Channel 4
I	Ant. Colls	31M-013.9U	Channel 5
J	Ant. Colls	31M-013.10U	Channel 6
K	Ant. Colls	31M-013.11U	Channel 7
L	Ant. Colls	31M-013.12U	Channel 8
M	Ant. Colls	31M-013.13U	Channel 9
L7	Cath. Choke	31D-727	Channel 10

COILS (cont)							
ITEM No.	USE	Wells-Gardner PART No.	NOTES	ITEM No.	USE	Wells-Gardner PART No.	NOTES
L8A	RF & Osc. Coils	31M-113, 1U	Channel 1 - Includes complete 41MC coil board assembly.	L9	Converter Plate Coil	31K-264	

ITEM No.	USE	REPLACEMENT DATA				NOTES
		Wells-Gardner PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L10	39MC Trap	9A2369		TV-152	6225	Includes 47.25MC trap. Includes 41.25MC trap. 30 Microhenries 82 Microhenries; Wound on 3900Ω resistor. 360 Microhenries
L11	1st Video IF	9A2365		TV-131	6225	
L12	2nd Video IF	9A2363			6222	
L13	3rd Video IF	9A2364			6221	
L14	Series Peaking Coil	9A2375	19-3036	TV-180	6176	
L15	Series Peaking Coil	36A35	19-3093■	TV-181■	6177■	
L16	Shunt Peaking Coil	36A34	19-4400	TV-190	6134	
L17	4.5MC Trap	9A2382				
L18	Shunt Peaking Coil	36A36	19-3100	TV-181	6177	
L19	Shunt Peaking Coil	36A1	19-3100▲	TV-181▲	6177▲	
L20	Series Peaking Coil	36A12	19-4160♦	TV-184♦	6120♦	
L21	Shunt Peaking Coil	36A37	19-3250▲	TV-185▲	6181▲	
L22	1st Sound IF	9A2383				
L23	2nd Sound IF	9A2368	17-3495	TV-113	6203	
L24	3rd Sound IF	9A2368	17-3495	TV-113	6203	
L25	Quadrature Coil	9A2367	20-1005		1480	
L26	RF Choke	9A2380	19-1001		4604	

■ Parallel with 3900Ω resistor.
 ▲ Parallel with 2700Ω resistor.
 ♦ Parallel with 22K resistor.
 ▲ Parallel with 8200Ω resistor.

ITEM No.	DC RES.		REPLACEMENT DATA							NOTES
			Wells-Gardner PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	
	PRI.	SEC.								
L27	79Ω		9A237I			6211*				Horiz. Freq. - Tap @ 55Ω Horiz. Waveform
L28	58Ω		9A2372							

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 \sim)	Wells-Gardner PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L29	.270A	40 Ω	.9HY	52X95-5	C5037 ①	C-2996①	C-2326①	26C44 ①	C-23X ①

① Drill one new mounting hole.

COMPONENT COMBINATIONS					
ITEM No.	USE	DESCRIPTION	Wells-Gardner PART No.	REPLACEMENT DATA	
K1	Vertical Intergrator	2000MMF, 5000MMF, 5000MMF, 22K, 8200Ω, 8200Ω	76X7	Aerovox Centralab Cornell-Dubilier Erie Sprague	PA-110 PC-100 11STMI 1405-01 V-1

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Wells-Gardner PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	N	. 4A 125V	16X162	16X163	333. 400 (N - . 4A)	346009	N 4/10	HN 3/10 to 1/2

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		Wells-Gardner PART No.	SYLVANIA PART No.	
M2 M3	1N82A 1N60*	31K-111	1N82A 1N60	UHF Mixer (Clip In) Video Detector (Pigtail)

* CK706A may be used in some versions.

ITEM No.	PART NAME	Wells-Gardner PART No.	NOTES
M4	Pilot Light		#15
M5	Tuner	25A1146	UHF/VHF
	Tuner	25A1147	VHF
M6	Ant. Matching Network	31K-225-03	Includes Coils and Caps.
M7	Video Det. Ass'y.	9A2370	Includes 4th Video IF, Series Peaking Coil, M4 and Caps.
M8	Switch	2A464	On-Off, Push Type.
M9	Centering Device	2A435	Includes Yoke Rear Cover.
M10	Ion Trap	2A421	
M11	Trimmer Cap.	17A271	Horiz. Drive (170-700MMF)
	Yoke Clamp	30X611	
	Safety Glass	17X193-1	Tinted, All Models.