

RAYTHEON MODEL UM-2133A	
TRADE NAME	Raytheon Models UC-2139A, UC-2141A, UC-2142A, UC-2144A, UC-2145A, UM-2133A, UM-2134A, UM-2135A, UM-2136A, (Ch. 21T8)
MANUFACTURER	Raytheon Manufacturing Co., Television & Radio Div., 5921 W. Dickens Ave., Chicago, Ill.
TYPE SET	Television Receiver
TUBES	Twenty-one
POWER SUPPLY	105-115 volts AC-60 cycle
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)
RATING 1.6 amp. @ 115 volts AC	
INDEX	
Alignment Instructions	5, 6, 7
Drive Cord Stringing	23
Disassembly Instructions	22
Horizontal Sweep Circuit Adjustments	13
Parts List and Descriptions	15 thru 18
Photographs	
Antenna Sub-Assembly	20
Cabinet-Rear View	13
Capacitor & Alignment Identification (RF-IF Chassis)	8
Capacitor & Alignment Identification (Sweep Chassis)	4
Chassis-Top View	3
Power Supply Chassis	21
Photographs (Cont)	
RF Tuner	14, 20
Resistor & Inductor Identification (RF-IF Chassis)	9
Resistor & Inductor Identification (Sweep Chassis)	11
Resistance Measurements	11
Servicing in the Field	22
Schematic	2
Trouble Shooting Aids	12, 21
Tube Failure Check Chart	10
Tube Placement Chart (Bottom View)	11
Tube Placement Chart (Top View)	10

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."

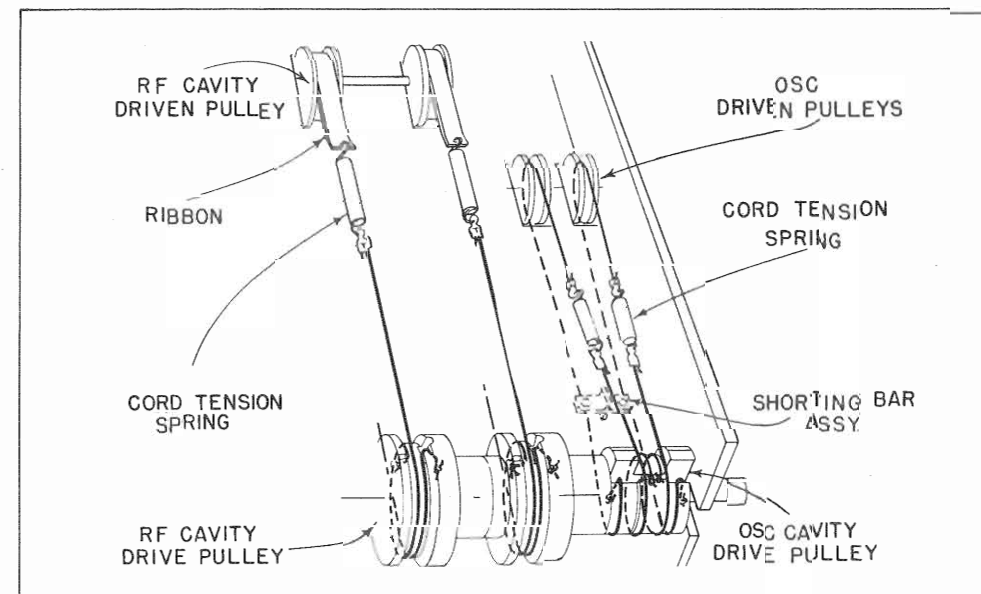
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1954 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 5-54

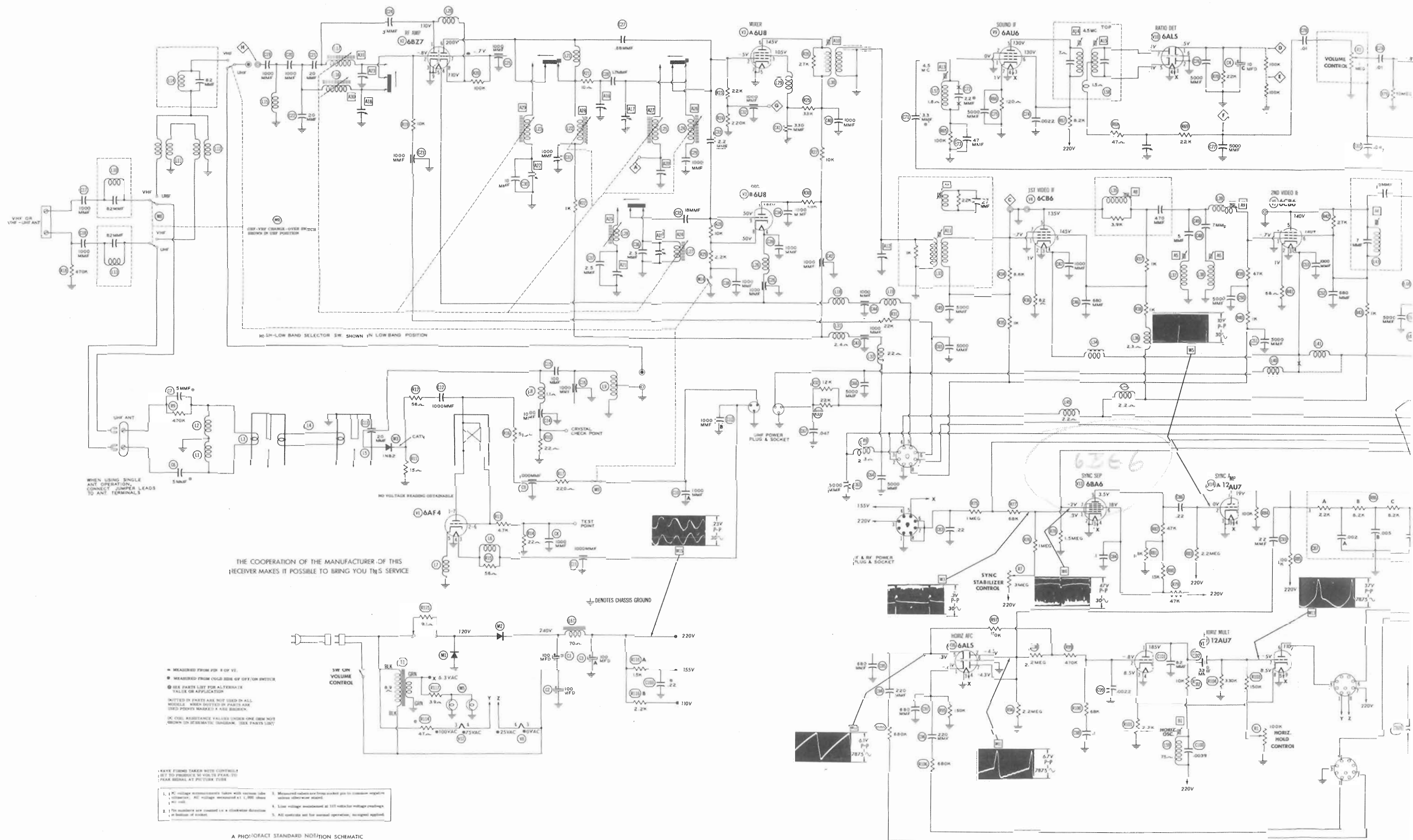
SET 2319

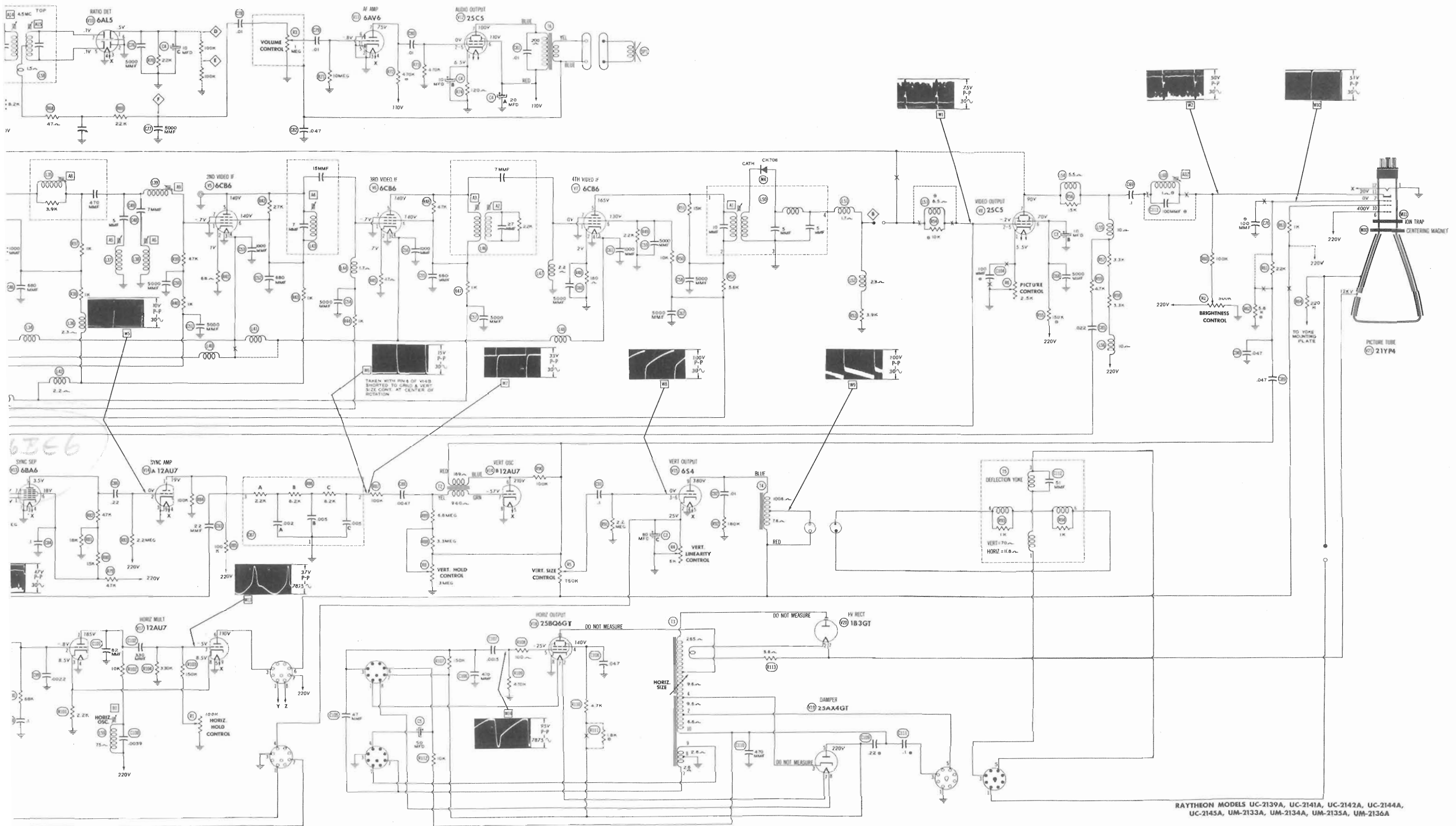
FOLDER 7

RAYTHEON MODELS UC-2139A, UC-2141A, UC-2142A, UC-2144A, UC-2145A, UM-2133A, UM-2134A, UM-2135A, UM-2136A

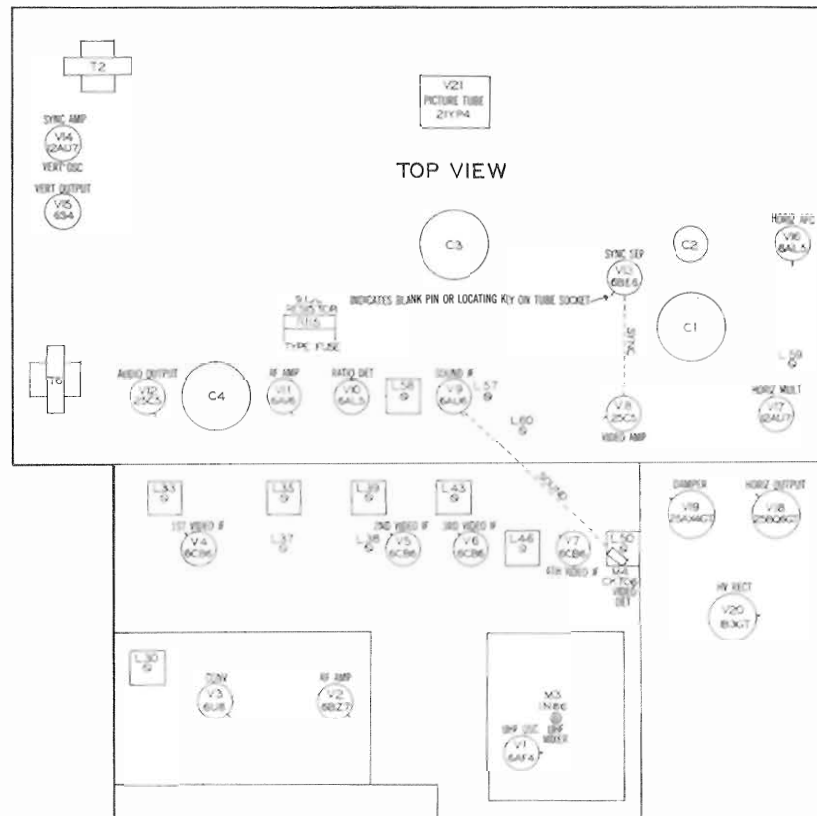


UHF DRIVE CORD STRINGING





TUBE PLACEMENT 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 - Selenium Rectifiers (M1, M2)

LOSS OF PICTURE OR SOUND

LOSS OF PICTURE OR SOUND

Loss of picture or sound
No pic, no sound, has raster - V3, V4, V5, V6, V7, V8, V12 (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V8, V21
Has pic, no sound - V9, V10, V11, V12

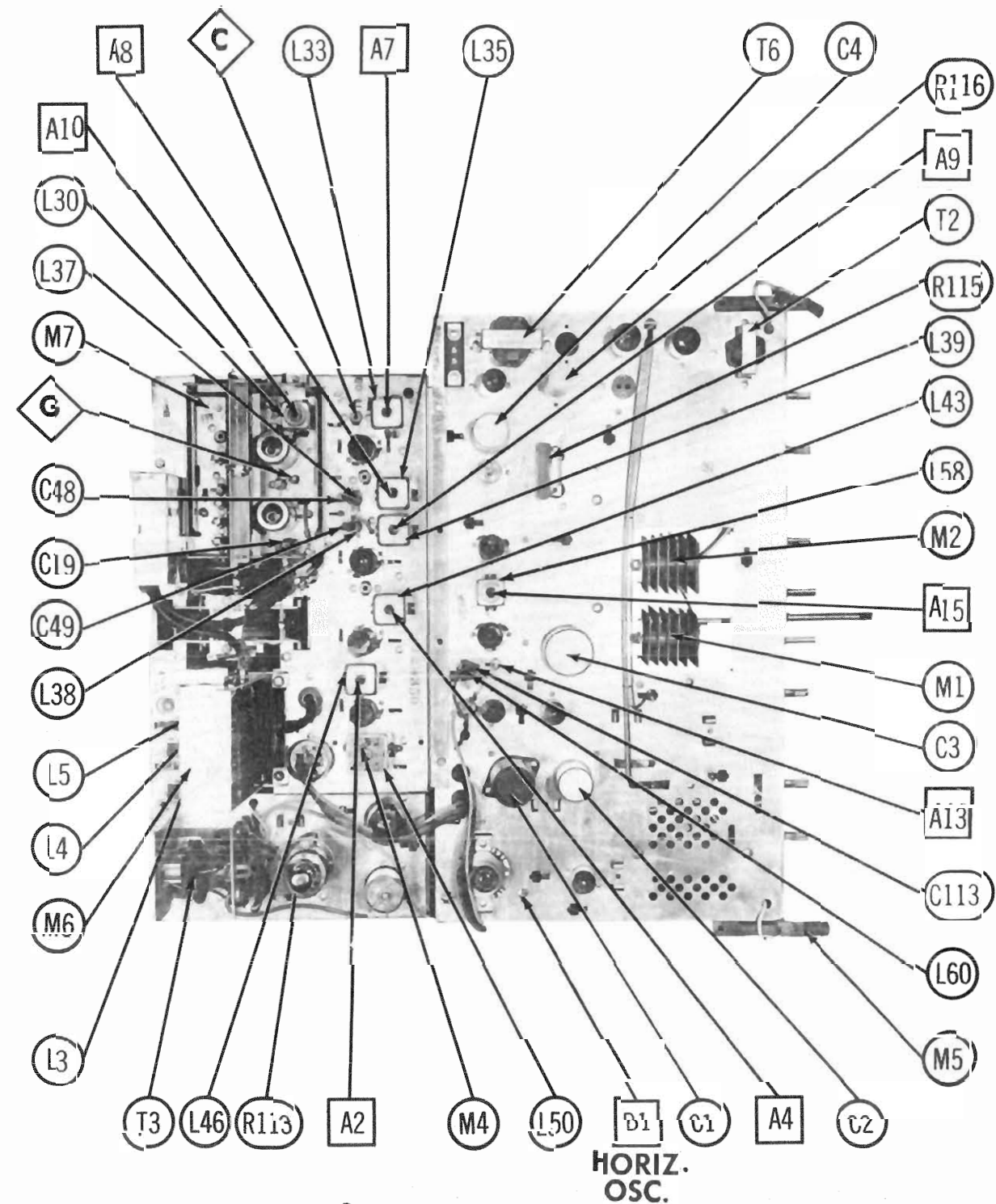
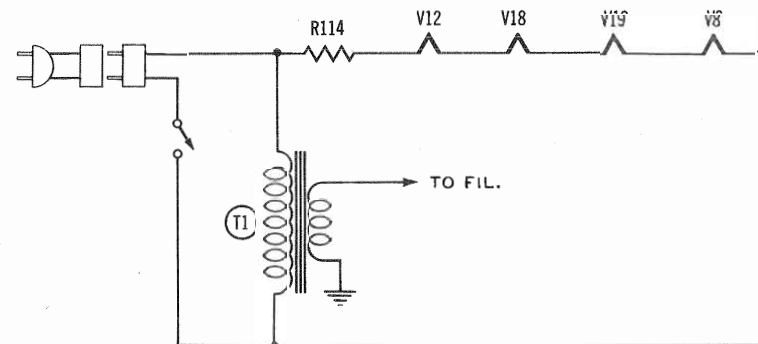
SYNC FAILURE

No vert. sync - VI4
No horiz. sync - VI4, VI6, VI7
No vert. or horiz. sync - VI3, VI4

SWEEP FAILURE

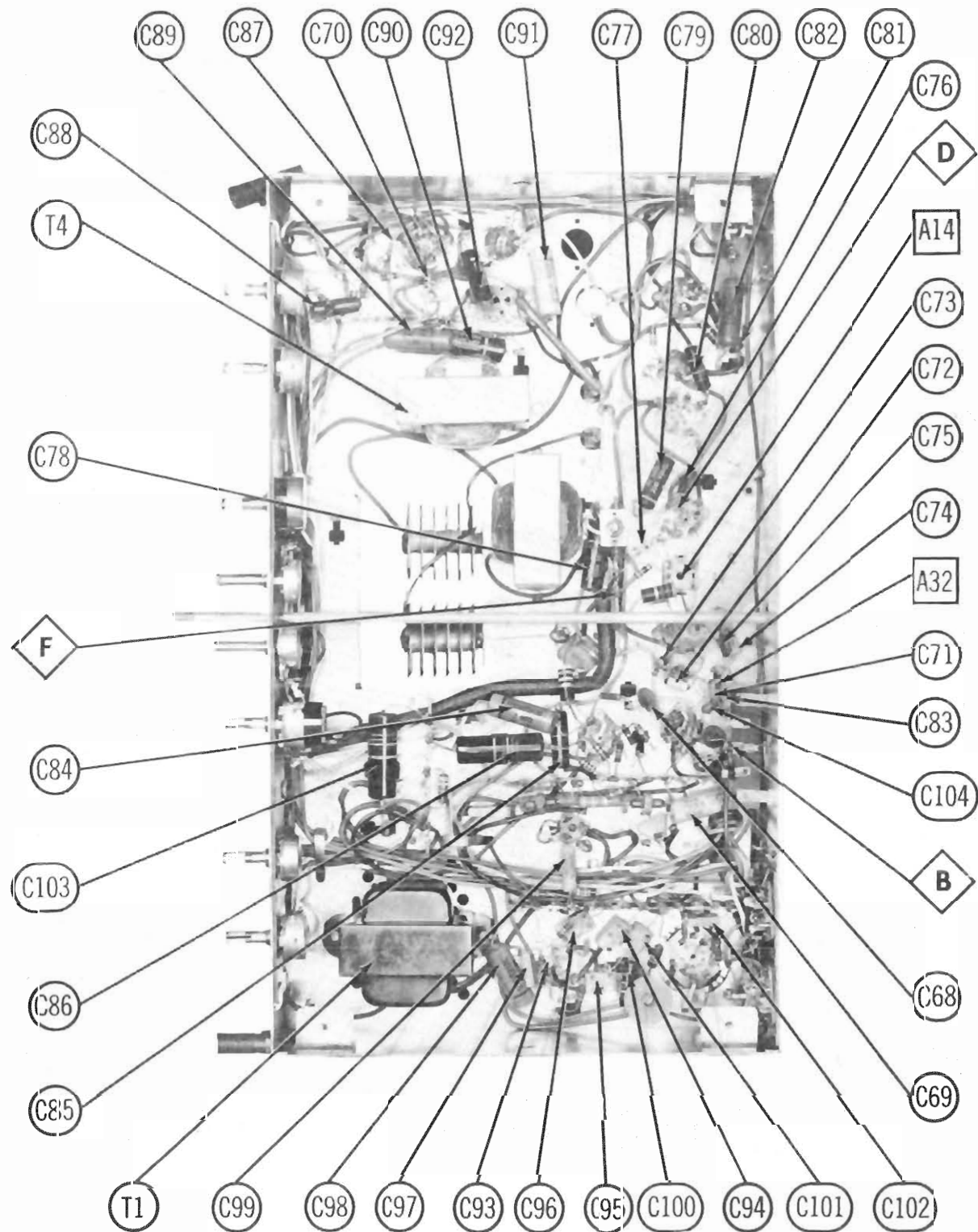
No raster, has sound - V17, V18, V19, V20
 No vertical deflection - V14, V15
 Poor vert. linearity or foldover - V14, V15
 Poor horiz. linearity or foldover - V17, V18, V19, V20, V21
 Narrow picture - V17, V18, V19, V20, M1, M2
 Vert. off freq. - V14
 Horiz. off freq. - V14, V16, V17

Since this receiver employs tubes used in series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative. (See circuit below.)

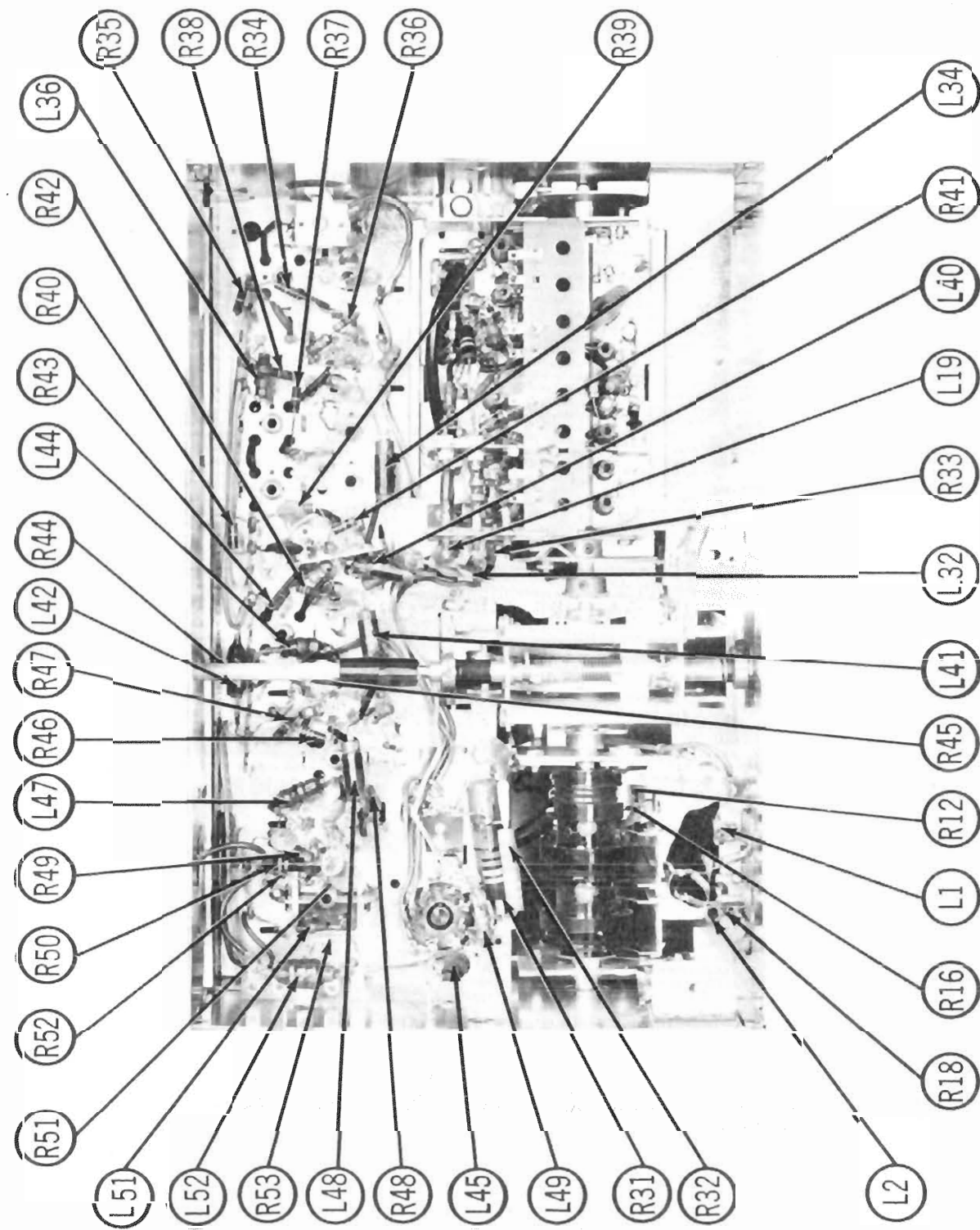


CHASSIS TOP VIEW

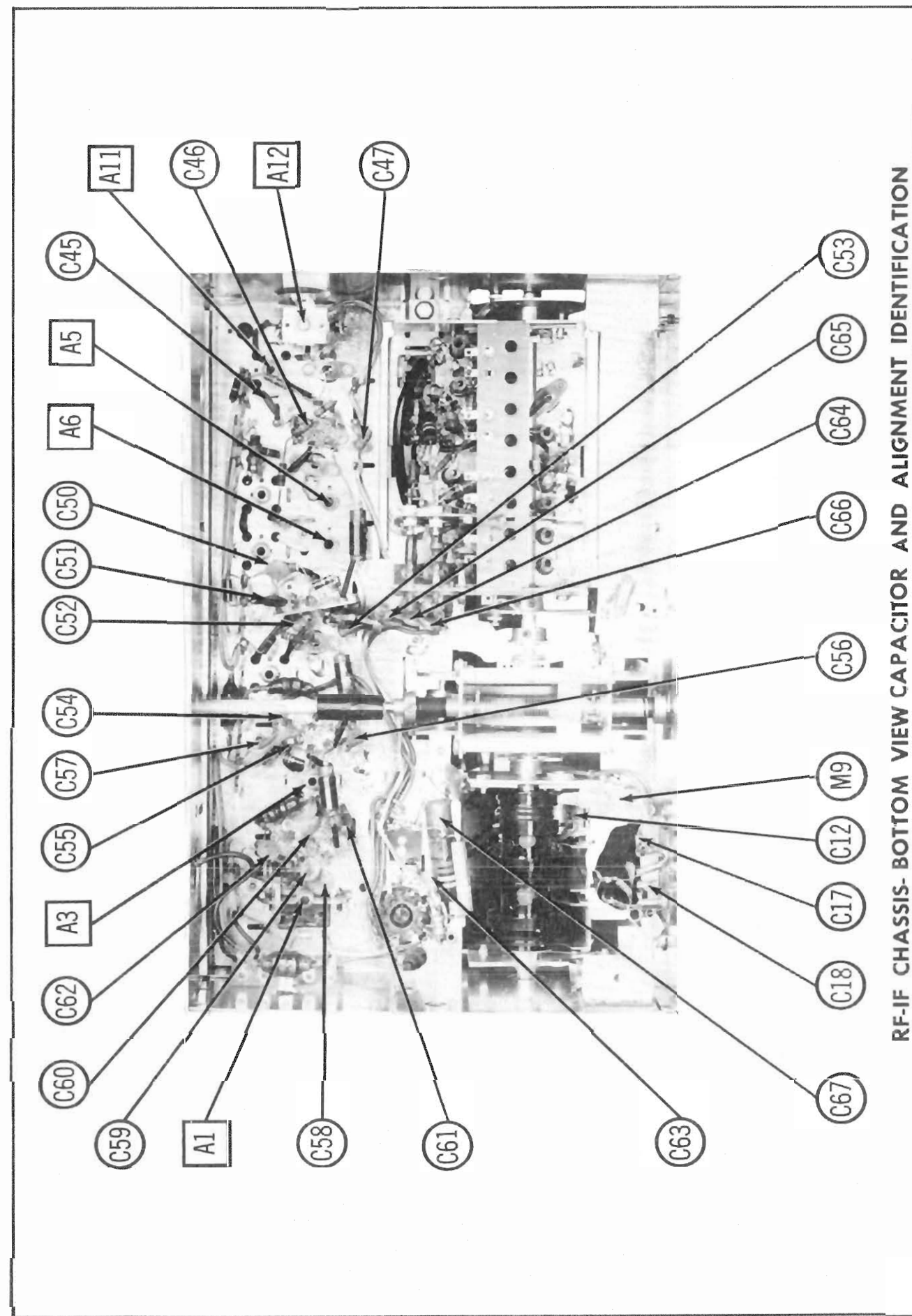
IRAYTHEON MODELS UC-2139A, UC-2141A, UC-2142A, UC-2144A,
UC-2145A, UM-2133A, UM-2134A, UM-2135A, UM-2136A



SWEEP CHASSIS-BOTTOM VIEW CAPACITOR AND ALIGNMENT IDENTIFICATION



RAYTHEON MODELS UC-2139A, UC-2141A, UC-2142A, UC-2144A,
UC-2145A, UM-2133A, UM-2134A, UM-2135A, UM-2136A
NOTIFICATION: ROTATION AND INDICATOR AND ROTATION MEASUREMENT - SSSVCHD JF-FR



ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal multivibrator tube (V17) to disable the high voltage.

Allow at least a 5 minute warm-up period for receiver and test equipment.

Use an isolation transformer to protect the test equipment.

VIDEO IF ALIGNMENT

Couple generator to alignment points \diamond and \diamond thru alignment plug (Fig. 1).

In adjusting A2, A3, A7 and A11, two peaks may be obtained. The correct peak occurs with the core furthest out of coil form.

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1. .001MFD	High side to point \diamond . Low side to chassis.	Not used	43.7MC (Unmod)	7 (Approx.)	Use VTVM. DC probe thru 10K Ω to point \diamond . Common to chassis.	A1	Adjust for maximum deflection. Attenuate generator to maintain approximately 2 volts at VTVM.
2. "	"	"	41.4MC	"	"	A2	Adjust for MINIMUM deflection.
3. "	"	"	45.15MC	"	"	A3	Adjust for maximum deflection. Attenuate generator to maintain approximately 2 volts at VTVM.
4. "	"	"	42.1MC	"	"	A4	"
5. "	"	"	41.25MC	"	"	A5	Adjust for MINIMUM deflection.
6. "	"	"	47.25MC	"	"	A6	"
7. "	"	"	41.4MC	"	"	A7	"
8. "	High side to point \diamond . Low side to chassis.	44MC (10MC Swp)	42.0MC 46.0MC	"	Vert. Amp. thru 10K Ω to point \diamond . Low side to chassis.	A8, A9	Adjust for maximum amplitude and proper bandwidth similar to Fig. 2. Attenuate generator to maintain 2 volts peak to peak on scope.
9. "	High side to point \diamond . Low side to chassis.	"	42.0MC 45.6MC	"	"	A10, A11, A12	Adjust for maximum amplitude and proper bandwidth similar to Fig. 3. Attenuate generator to maintain 2 volts peak to peak.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100K Ω (1%) resistors in series from point \diamond to chassis. The junction of these two resistors is alignment point \diamond as shown on the schematic.

Short antenna terminals to chassis.

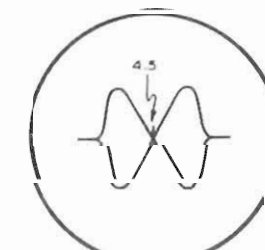
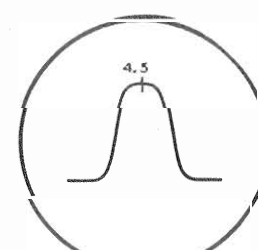
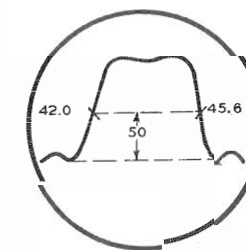
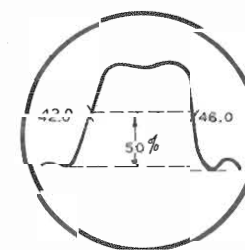
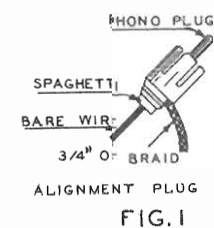
DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10. .001MFD	High side to point \diamond . Low side to chassis.	4.5MC Unmod	Any non-interfering channel	DC probe to point \diamond . Common to chassis.	A13, A14	Adjust for maximum deflection.
11. "	"	"	"	DC probe to point \diamond . Common to chassis.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Short antenna terminals to chassis.

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120V sawtooth voltage in scope for horizontal deflection.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10. .001MFD	High side to point \diamond . Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point \diamond . Low side to chassis.	A13, A14	Disconnect stabilizing capacitor C4C. Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
11. "	"	"	"	"	Vert. Amp. to point \diamond . Low side to chassis.	A15	Reconnect stabilizing capacitor C4C. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 5. SLIGHTLY retouch A14 for maximum amplitude and straightness of crossover lines.



ALIGNMENT INSTRUCTIONS (cont)

TUNER ALIGNMENT

Preset the trimmer screws (A16 thru A23 as in Fig. 5). Set the tuner treadle bar to the top of its stroke in low band position (cores furthest out of coil form). Adjust A26 thru A31 so that cores are 1" from end of coil form. Adjust A24 and A25 so that the cores are 15/8" from end of coil form.

LOW BAND RF ALIGNMENT

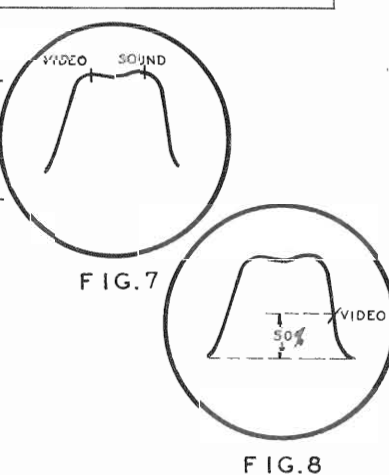
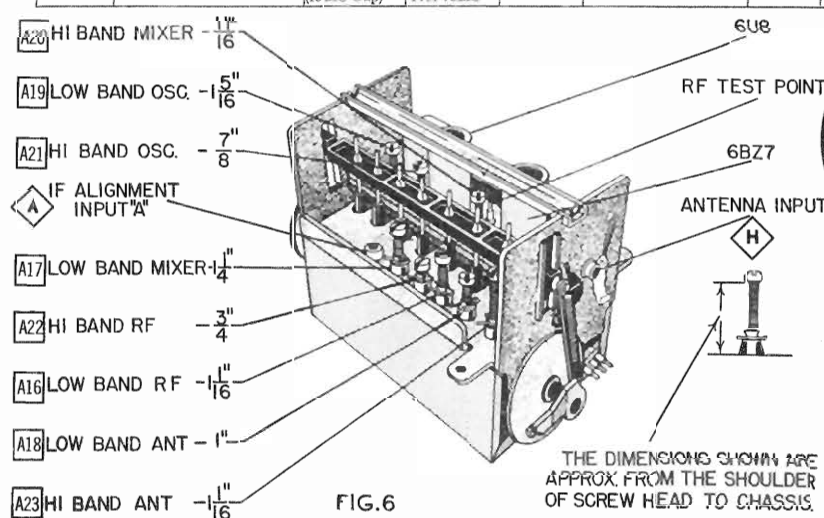
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance usually 50 ohms.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12. Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	85MC (15MC Swp)	83.25MC 87.75MC	6	Vert. Amp. to point (C). Low side to chassis.	A16, A17, A18	Adjust for maximum gain and response similar to Fig. 7. Adjust A18 for maximum gain between markers.
13. "	"	85MC (10MC Swp)	83.25MC	6 (See Remarks)	Vert. Amp. to point (B). Low side to chassis.	A19	Rotate tuning control until bottom of treadle bar is 1 3/4" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8.
14. "	"	85MC (15MC Swp)	83.25MC 87.75MC	"	Vert. Amp. to point (C). Low side to chassis.	A16, A17	Readjust for maximum gain and flat topped response similar to Fig. 7.
15. "	"	57MC (10MC Swp)	55.25MC	2 (See Remarks)	Vert. Amp. to point (B). Low side to chassis.	A24	Rotate tuning control until bottom of treadle bar is 1 1/8" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8. Repeat step 13.
16. Direct	High side to point (H). Low side to tuner chassis.	43MC (10MC Swp)	42.0MC 45.5MC	(See Remarks)	"	A18	Rotate tuning control until bottom of treadle bar is 5/8" from top of tuner chassis. Check overall IF response curve similar to Fig. 9. If necessary, retouch A18 to obtain desired response.
17. Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	79MC (10MC Swp)	77.25MC 81.75MC	5	"	"	Check each low band channel for response similar to Fig. 10.
		86MC (10MC Swp)	81.75MC 87.25MC	4			
		63MC (10MC Swp)	61.25MC 65.75MC	3			
		57MC (10MC Swp)	55.25MC 59.75MC	2			

HIGH BAND RF 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.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
18. Two 120Ω carbon resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (15MC Swp)	211.25MC 215.75MC	13	Vert. amp. to point (C). Low side to chassis.	A20, A22, A23	Adjust for maximum gain and flat topped response curve similar to Fig. 7. Adjust A23 for maximum gain between markers.
19. "	"	213MC (10MC Swp)	211.25MC	" (See remarks)	Vert. amp. to point (B). Low side to chassis.	A21	Rotate tuning control until bottom of treadle bar is 1 3/4" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8.
20. "	"	213MC (15MC Swp)	211.25MC 215.75MC	13	Vert. amp. to point (C). Low side to chassis.	A20, A22	Readjust for maximum gain and flat topped response similar to Fig. 7.
21. "	"	177MC (10MC Swp)	175.25MC 179.75MC	7 (See remarks)	Vert. amp. to point (B). Low side to chassis.	A25	Rotate tuning control until bottom of treadle bar is 7/8" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8. Repeat step 19. Check each high band channel for response similar to Fig. 10.
22. "	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"	"	Check each high band channel for response similar to Fig. 10.
		201MC (10MC Swp)	199.25MC 203.75MC	11			
		195MC (10MC Swp)	193.25MC 197.75MC	10			
		189MC (10MC Swp)	187.25MC 191.75MC	9			
		183MC (10MC Swp)	181.25MC 185.75MC	8			
		177MC (10MC Swp)	175.25MC 179.75MC	7			



ALIGNMENT INSTRUCTIONS (cont)

4.5 MC TRAP ALIGNMENT

Tune in a TV station and adjust the tuning control until sound bars just appear in the picture. Starting with A32 all the way out adjust clockwise for minimum sound bars in picture.

UHF TUNER ALIGNMENT

Do not remove UHF tuner from chassis. Check to see that 6AF4 (V1) is firmly seated in its socket and shield clip is seated in the tube shield notch. Check oscillator grid current by connecting a multimeter across R14 (22Ω). A reading of 10 to 30 microamperes should be obtained if oscillator is functioning normally. Both the oscillator and crystal detector may be checked by placing the multimeter across R20 (22Ω). A reading of 5 to 40 microamperes indicated oscillator and crystal are functioning normally.

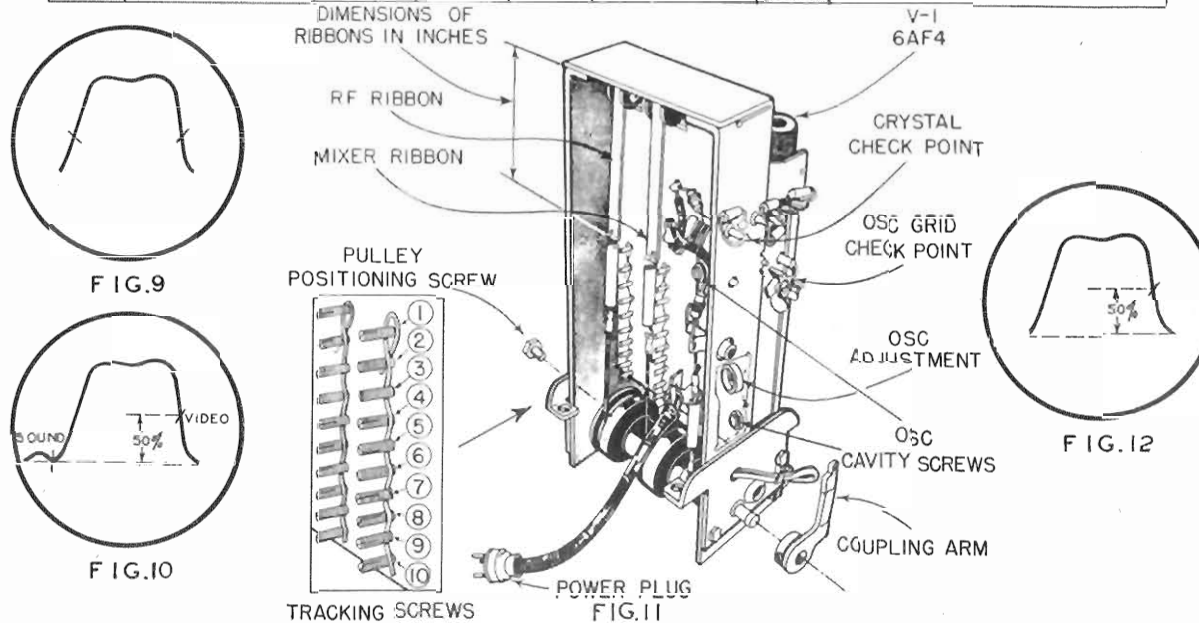
MECHANICAL ALIGNMENT OF RF AND MIXER RIBBONS

1. Remove spring and connecting bar on UHF tuner coupling arm.
2. Rotate UHF tuner coupling arm to its counter clockwise stop.
3. The RF and mixer ribbons should be 4 7/8" as indicated in Fig. 11.
4. If the ribbons are not 4 7/8" as indicated, loosen pulley positioning screw slightly and reposition by turning drive pulleys.
5. Replace spring and connecting bar on UHF tuner coupling arm.

UHF ALIGNMENT

Connect the negative lead of a 6 volt battery to Pin 8 of the RF power socket. Connect positive lead to chassis. Adjustment of tracking screws must be made from crystal side of tuner and in sequence from 1 through 10. To perform step 33 it may be necessary to remove the spring and connecting bar on the UHF tuner coupling arm and turn the UHF tuner coupling arm clockwise. 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.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
23. Two 120Ω Carbon Resistors	Across UHF antenna terminals with 120Ω in each lead.	890MC (10MC Swp)	895MC	(See Remarks)	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	"	Loosely couple marker generator to sweep generator leads. Loosen the two oscillator cavity screws and rotate oscillator adjustment (See Fig. 11) to obtain response curve similar to Fig. 12 with 895MC marker falling at 50%. Set RF and mixer ribbons to 4 3/4" as indicated in Fig. 11.
24. "	"	865MC (10MC Swp)	870.5MC	"	"	Tracking screws (Pair #1)	Set ribbons to 4 5/8" as indicated in Fig. 11. Adjust for response similar to Fig. 12.
25. "	"	775MC (10MC Swp)	780.5MC	"	"	Tracking screws (Pair #2)	Set ribbons to 4 3/16". Adjust for response similar to Fig. 12.
26. "	"	726MC (10MC Swp)	731MC	"	"	Tracking screws (Pair #3)	Set ribbons to 3 7/8". Adjust for response similar to Fig. 12.
27. "	"	671MC (10MC Swp)	676MC	"	"	Tracking screws (Pair #4)	Set ribbons to 3 7/16". Adjust for response similar to Fig. 12.
28. "	"	624MC (10MC Swp)	629.5MC	"	"	Tracking screws (Pair #5)	Set ribbons to 3 1/8". Adjust for response similar to Fig. 12.
29. "	"	585MC (10MC Swp)	590MC	"	"	Tracking screws (Pair #6)	Set ribbons to 2 3/4". Adjust for response similar to Fig. 12.
30. "	"	545MC (10MC Swp)	550MC	"	"	Tracking screws (Pair #7)	Set ribbons to 2 7/16". Adjust for response similar to Fig. 12.
31. "	"	507MC (10MC Swp)	512MC	"	"	Tracking screws (Pair #8)	Set ribbons to 2 1/16". Adjust for response similar to Fig. 12.
32. "	"	478MC (10MC Swp)	483.5MC	"	"	Tracking screws (Pair #9)	Set ribbons to 1 11/16". Adjust for response similar to Fig. 12.
33. "	"	455MC (10MC Swp)	460MC	"	"	Tracking screws (Pair #10)	Set ribbons to 1 3/8". Adjust for response similar to Fig. 12.



RAYTHEON MODELS UC-2139A, UC-2141A, UC-2142A, UC-2144A, UC-2145A, UM-2133A, UM-2134A, UM-2135A, UM-2136A

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustments of RF tuner oscillator adjustments, it is necessary to remove the chassis from the cabinet. (See Disassembly instructions).

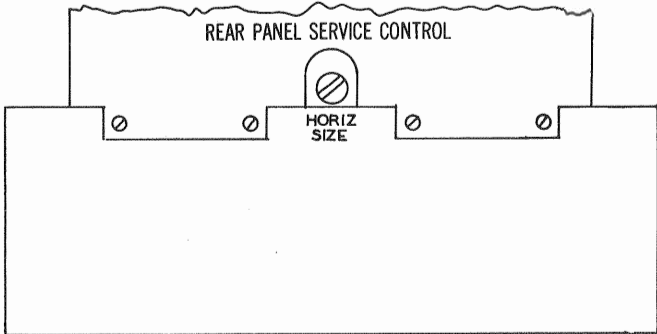
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove three (3) wood screws holding metal strip at the bottom of safety glass. Remove metal strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set.

Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal oscillator slug (L59) until picture synchronizes horizontally. (For location see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L58) located on top of chassis. (See tube placement chart).

FUSES

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

CENTERING

Centering is accomplished mechanically by adjusting a magnetic ring around the neck of the picture tube located flush against the yoke. Turn the disc-like knob and at the same time rotate the ring around the tube until picture is properly centered.

ANTI-PIN CUSHION ADJUSTMENT

Reduce the picture size so that the sides of the raster are visible, and position the magnets so that all sides are straight lines and the corners are at right angles.

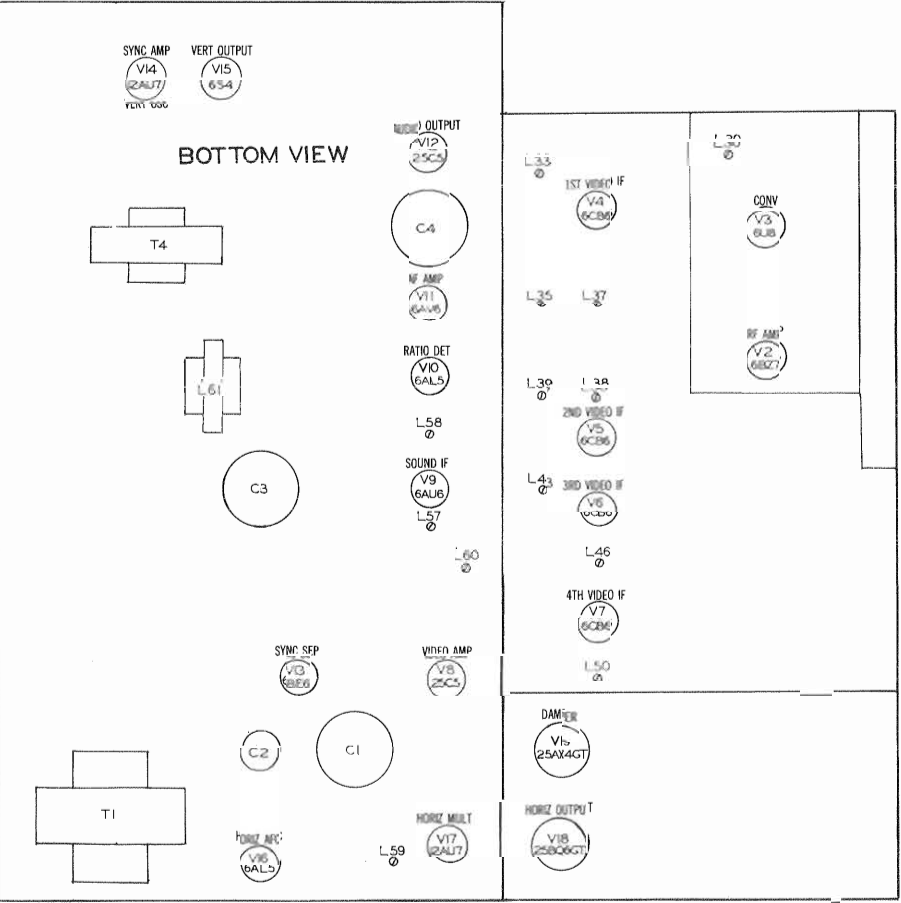
DISASSEMBLY INSTRUCTIONS

1. Remove 1 push on type control knob and 1 metal balance control knob from front panel.
2. Remove 4 metal screws from front dial assembly. Remove front dial assembly.
3. Remove 6 push on type control knobs from front of chassis.
4. Disconnect built-in antennas (VHF & UHF).
5. Remove 6 wood and 1 metal screws. Remove rear cover.
6. Disconnect speaker plug, yoke plug, CRT socket and HV plug.
7. Remove 8 chassis bolts. Remove chassis.
8. Remove 2 speaker nuts. Remove speaker.

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	†8KΩ	4.7KΩ	.1Ω	0Ω	0Ω	4.7KΩ	†8KΩ		
V 2	6BZ7	INF	1Meg	0Ω	.1Ω	0Ω	†1.1KΩ	INF	INF	0Ω
V 3	6U8	†1.6KΩ	240KΩ	†43KΩ	.1Ω	0Ω	†10KΩ	0Ω	2.2KΩ	12KΩ
V 4	6CB6	1Meg	82Ω	0Ω	.1Ω	†3.6KΩ	†2.6KΩ	0Ω		
V 5	6CB6	1Meg	68Ω	0Ω	.1Ω	†2.6KΩ	†2.6KΩ	0Ω		
V 6	6CB6	1Meg	47Ω	0Ω	.1Ω	†2.6KΩ	†2.6KΩ	0Ω		
V 7	6CB6	2.2Ω	180Ω	.1Ω	0Ω	†5.7KΩ	†10KΩ	0Ω		
V 8	25L5	280Ω	3.9KΩ	±0Ω	±25Ω	3.9KΩ	†150KΩ	†7.3KΩ		
V 9	6AU6	100KΩ	0Ω	.1Ω	0Ω	†8.3KΩ	†8.3KΩ	120Ω		
V 10	6AL5	22KΩ	0Ω	.1Ω	0Ω	INF	0Ω	INF		
V 11	6AV6	10Meg	0Ω	0Ω	.1Ω	0Ω	0Ω	†470KΩ		
V 12	25C5	120Ω	470KΩ	±75Ω	±100Ω	470KΩ	†2.5KΩ	†2.3KΩ		
V 13	6BE6	70KΩ	0Ω	0Ω	.1Ω	†70KΩ	†47KΩ	1.5Meg		
V 14	12AU7	†55KΩ	†2.2Meg	0Ω	.1Ω	.1Ω	±510KΩ	7.2Meg	0Ω	0Ω
V 15	6S4	INF	2.8KΩ	2.2Meg	0Ω	.1Ω	2.2Meg	INF	INF	±11KΩ
V 16	6AL5	150KΩ	2.2Meg	0Ω	.1Ω	4.5Meg	0Ω	2.2Meg		
V 17	12AU7	†10.1KΩ	4.9Meg	2.2KΩ	0Ω	0Ω	†150KΩ	200KΩ	2.2KΩ	.1Ω
V 18	25BQ6G	INF	±50Ω	2.5Ω	†4.8KΩ	470KΩ	470KΩ	±75Ω	0Ω	TOP CAP ±9.6Ω
V 19	25AX4GT	INF	INF	550KΩ	INF	†70Ω	INF	±50Ω	±25Ω	
V 20	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ±275Ω
V 21	21Y P4	0Ω	27.5KΩ	PIN 6 ±70Ω	PIN 10 ±11KΩ	PIN 11 †130KΩ	PIN 12 .1Ω			

† MEASURED FROM OUTPUT OF M1
± MEASURED IN UHF POSITION
± MEASURED FROM COLD SIDE OF OFF/ON SWITCH
▲ MEASURED FROM PIN 3 OF V19



TUBE PLACEMENT CHART
SET 239 FOLDER 7

RAYTHEON MODELS UC-2139A, UC-2141A, UC-2142A, UC-2144A,
UC-2145A, UM-2133A, UM-2134A, UM-2135A, UM-2136A

TROUBLE SHOOTING AIDS

CAUTION

Use a line isolation transformer to remove shock hazard and prevent damage to receiver and/or test equipment.

SWEEP

HORIZONTAL	VERTICAL								
<p><u>LOSS OF SWEEP</u></p> <p>Follow procedure outlined under "Loss of High Voltage".</p> <p><u>INSUFFICIENT SWEEP</u></p> <p>Check horizontal size adjustment. Check by substitution V18 and V19. Check waveform W14.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check R110, R111, C108, T3, T5A and other associated components.</td><td>Check R107, R109, C106, C107 and other associated components.</td></tr> </table> <p><u>DRIVE LINES</u></p> <p>Check horizontal size adjustment. Check by substitution V17, V18 and V19. Check R107, R109, R110, R111, C106, C107, C108, T3, T5A and other associated components. Check high voltage power plug for proper seating.</p> <p><u>COMPRESSED AT LEFT SIDE</u></p> <p>Check horizontal size adjustment. Check by substitution V18, V19 and V17. Check components associated with stages especially T3, and T5A.</p> <p><u>FOLDS</u></p> <p>Follow procedure outlined under "Drive Lines".</p> <p><u>PIE CRUST EFFECT</u></p> <p>Check by substitution V17, V18 and V19. Check C99 for open. Check T3, T5A and other associated components for high voltage ARC-over.</p> <p><u>XMAS TREE EFFECT</u></p> <p>Substitute V17. Check L59, C100, C101, C102 and other associated components for failure or change of value.</p>	If Satisfactory	If Unsatisfactory	Check R110, R111, C108, T3, T5A and other associated components.	Check R107, R109, C106, C107 and other associated components.	<p><u>LOSS OF SWEEP</u></p> <p>Check by substitution V14 and V15. Check waveform W8.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check T4, T5B, R4 and other associated circuit components.</td><td>Check T2, C91, R5, R91 and other associated circuit components.</td></tr> </table> <p><u>INSUFFICIENT SWEEP</u></p> <p>Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".</p> <p><u>COMPRESSED AT BOTTOM</u></p> <p>Check by substitution V14 and V15. Check T4, T5B, C3C and other associated circuit components.</p> <p><u>COMPRESSED AT TOP</u></p> <p>Check by substitution V14 and V15. Check C91, R91 and other associated components.</p> <p><u>FOLDS</u></p> <p>Substitute V14 and V15. Check components associated with V14B and V15 for failure or change of value.</p>	If Satisfactory	If Unsatisfactory	Check T4, T5B, R4 and other associated circuit components.	Check T2, C91, R5, R91 and other associated circuit components.
If Satisfactory	If Unsatisfactory								
Check R110, R111, C108, T3, T5A and other associated components.	Check R107, R109, C106, C107 and other associated components.								
If Satisfactory	If Unsatisfactory								
Check T4, T5B, R4 and other associated circuit components.	Check T2, C91, R5, R91 and other associated circuit components.								

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC	LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY				
<p>Check by substitution V13 and V14. Check adjustment of sync stabilizer control. Check components associated with V13 and V14A for failure or change of value.</p> <p><u>LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY</u></p> <p>Check by substitution V13 and V14. Check waveform W6.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check components associated with V14B.</td><td>Check vertical integrator and other associated components.</td></tr> </table>	If Satisfactory	If Unsatisfactory	Check components associated with V14B.	Check vertical integrator and other associated components.	<p>Check adjustment of sync stability control. Check by substitution V16 and V17. Check C98, C99, C100, C93, C102, C94, C96, R105, R106, R101, R102, R103, R107, R84, R85, L59 and other associated components.</p> <p><u>HORIZONTAL BENDING</u></p> <p>Check adjustment of sync stability control. Check by substitution V13, V14, V16 and V17. Check R112, R107, R105, R106, C94, C96, C98, C99, C5 and other associated components.</p>
If Satisfactory	If Unsatisfactory				
Check components associated with V14B.	Check vertical integrator and other associated components.				

VIDEO

LOSS OF VIDEO	OVERLOADED OR NEGATIVE PICTURE
<p>Substitute V8. Check picture tube and other associated components.</p> <p><u>SOUND BARS</u></p> <p>Adjust tuner, tuning control for best picture and sound. Check V4, V5, V6, V7, V2, V3, V8, V14 and V15 for microphonics.</p> <p><u>POOR CONTRAST</u></p> <p>Substitute V8. Check video detector assembly. Check picture tube and other associated components.</p>	<p>Check by substitution V4, V5, V6, V7, V8, video detector crystal and V2. Check associated circuit components including C45, C50, C65, C51, C54, C23, C83, R53, R75 and R6.</p> <p><u>SMEAR</u></p> <p>Check by substitution V8, V7, V6, V5 and V4. Check video detector crystal. Check R57, R58, R53, R6, C3B, C68, C69, L51, L52, L54, L55, L56, picture tube and other associated components.</p> <p><u>WIDE BLACK BAR ACROSS PICTURE</u></p> <p>Check V2, V4, V5, V6, V7 and V8 for heater to cathode leakage.</p>

AUDIO

WEAK OR NO SOUND	BUZZ				
<p>Check by substitution V9, V10, V11 and V12. Check stages of V11 and V12 using audio signal generator. Apply audio signal across R71.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check ratio detector and audio IF alignment and components.</td><td>Check components associated with V11 and V12 especially C80, and T6.</td></tr> </table>	If Satisfactory	If Unsatisfactory	Check ratio detector and audio IF alignment and components.	Check components associated with V11 and V12 especially C80, and T6.	<p>Adjust station tuning for best picture and sound. Adjust A15 for minimum buzz. If buzz is still objectionable, substitute V10 and realign audio IF and ratio detector stages.</p> <p><u>DISTORTED</u></p> <p>Follow procedure outlined under "Weak or No Sound".</p>
If Satisfactory	If Unsatisfactory				
Check ratio detector and audio IF alignment and components.	Check components associated with V11 and V12 especially C80, and T6.				

TROUBLE SHOOTING AIDS (cont)

POWER

DEAD SET	SMALL AND/OR DIM PICTURE
<p>If only V18, V19, V12 and V8 filaments light, check T1. If no filaments light, check AC interlock assembly and switch on volume control. If all filaments light, check R115, M1, M2 and other associated B+ filter components.</p>	<p>Check M1 and M2. Check C1, C2, C3A, and other B+ filter network components.</p>

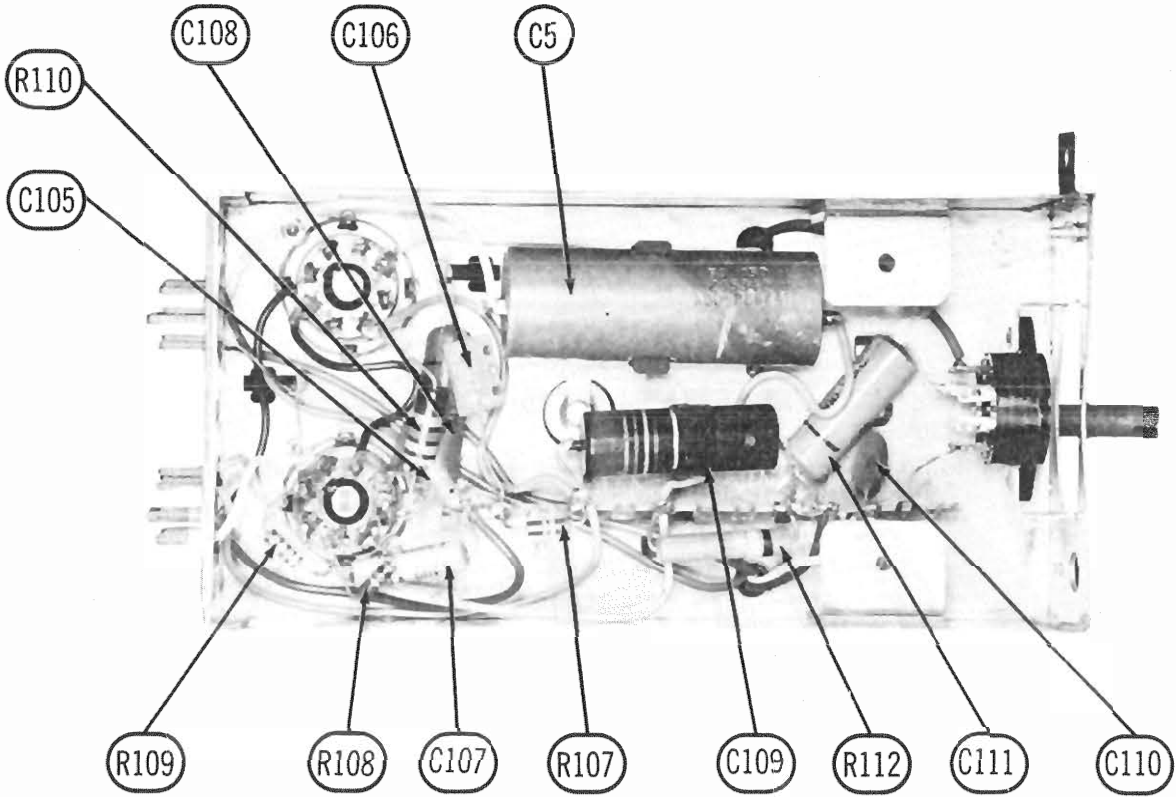
HIGH VOLTAGE

LOSS OF HIGH VOLTAGE	INSUFFICIENT HIGH VOLTAGE								
<p>Check by substitution V17, V18, V19 and V20. Check waveform W14.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check R113, T5A, T3 and other associated components.</td><td>Check C106, C107, R107, R109 and other associated components.</td></tr> </table>	If Satisfactory	If Unsatisfactory	Check R113, T5A, T3 and other associated components.	Check C106, C107, R107, R109 and other associated components.	<p>Check by substitution V17, V18, V19 and V20. Measure B+.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Follow procedure outlined under "Loss of High Voltage".</td><td>Follow procedure outlined under "Small and/or Dim Picture".</td></tr> </table> <p><u>BLOOMING</u></p> <p>Check by substitution V20, V19 and V18. Check R113, T3, T5A, C1, C2, C3A, M1, M2, C5, R112, picture tube and other associated components.</p>	If Satisfactory	If Unsatisfactory	Follow procedure outlined under "Loss of High Voltage".	Follow procedure outlined under "Small and/or Dim Picture".
If Satisfactory	If Unsatisfactory								
Check R113, T5A, T3 and other associated components.	Check C106, C107, R107, R109 and other associated components.								
If Satisfactory	If Unsatisfactory								
Follow procedure outlined under "Loss of High Voltage".	Follow procedure outlined under "Small and/or Dim Picture".								

GENERAL

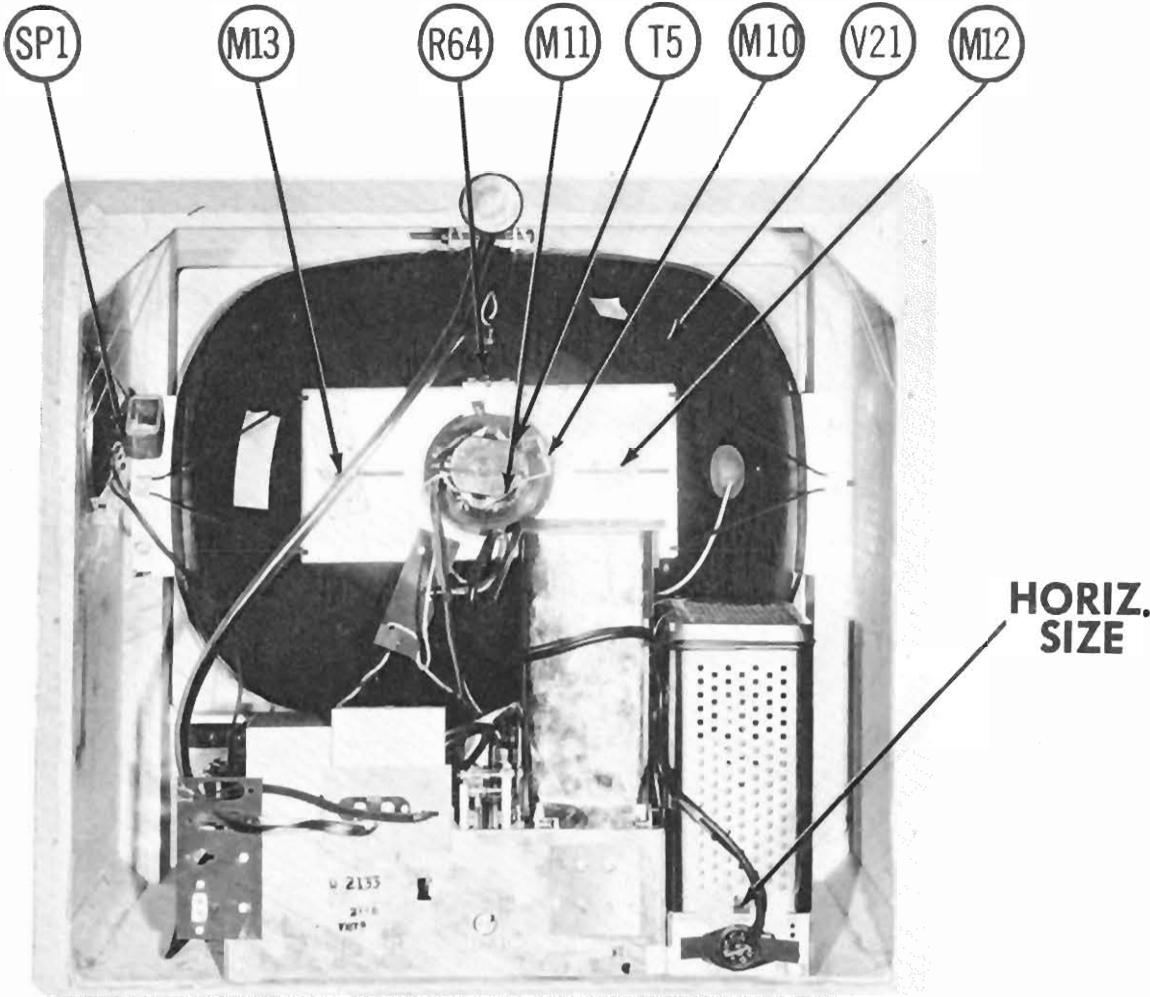
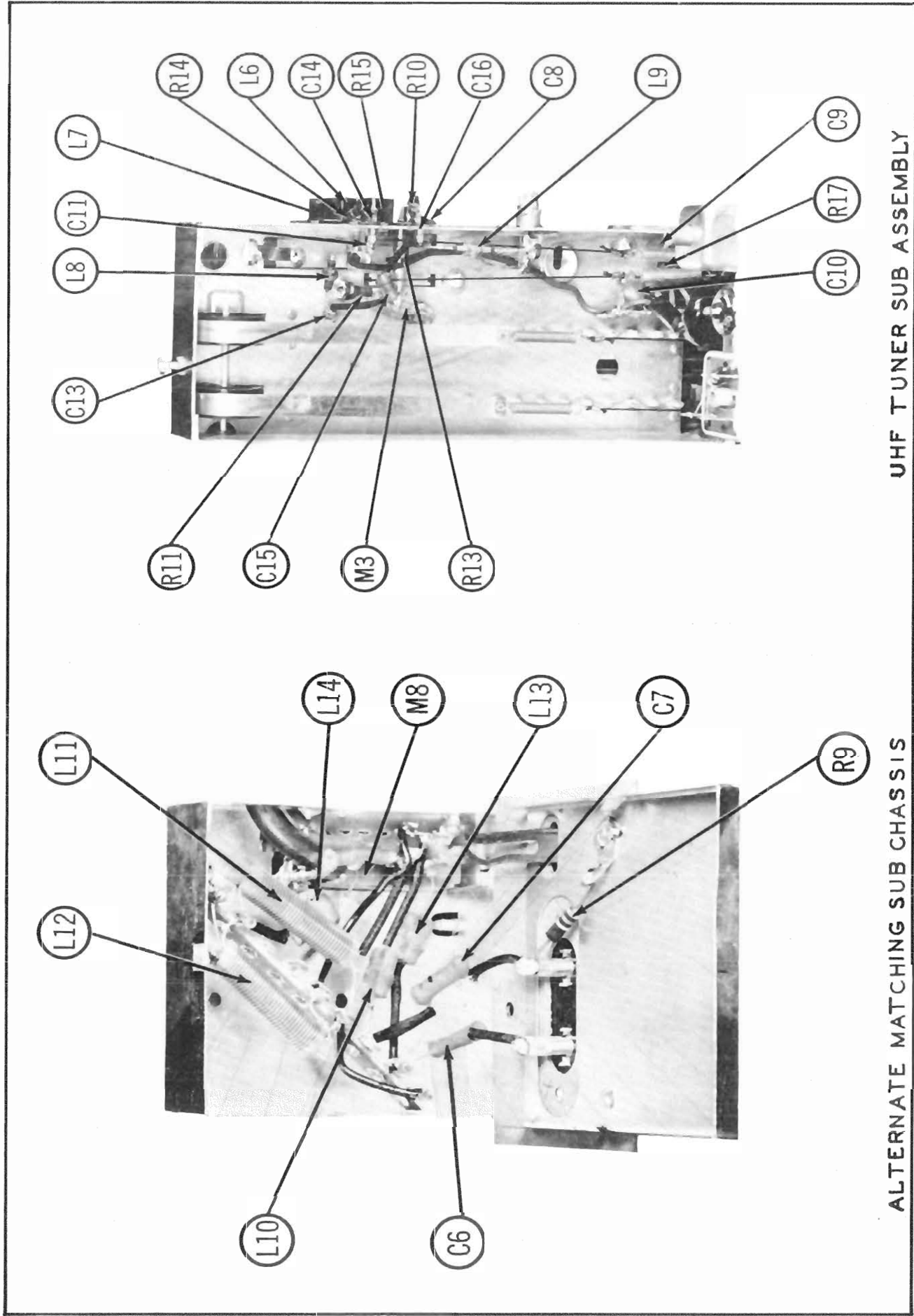
RASTER SOUND NO PICTURE	NO RASTER NO SOUND
<p>Follow procedure outlined under "Loss of Video".</p> <p><u>RASTER PICTURE NO SOUND</u></p> <p>Follow procedure outlined under "Weak or No Sound".</p> <p><u>RASTER NO PICTURE NO SOUND</u></p> <p>Check by substitution V2, V3, V4, V5, V6, V7 and V8. Check video detector assembly. Check components associated with the video IF and RF tuner.</p>	<p>Follow procedure outlined under "Dead Set".</p> <p><u>KEystone EFFECT</u></p> <p>Check T5, R93, R94 and C112.</p> <p><u>INTERMITTENT STREAKS</u></p> <p>Check video signal for interference pulses. Check high voltage section for corona discharge and arcing.</p>

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



POWER SUPPLY CHASSIS-BOTTOM VIEW

RAYTHEON MODELS UC-2139A, UC-2141A, UC-2142A, UC-2144A, UC-2145A, UM-2133A, UM-2134A, UM-2135A, UM-2136A



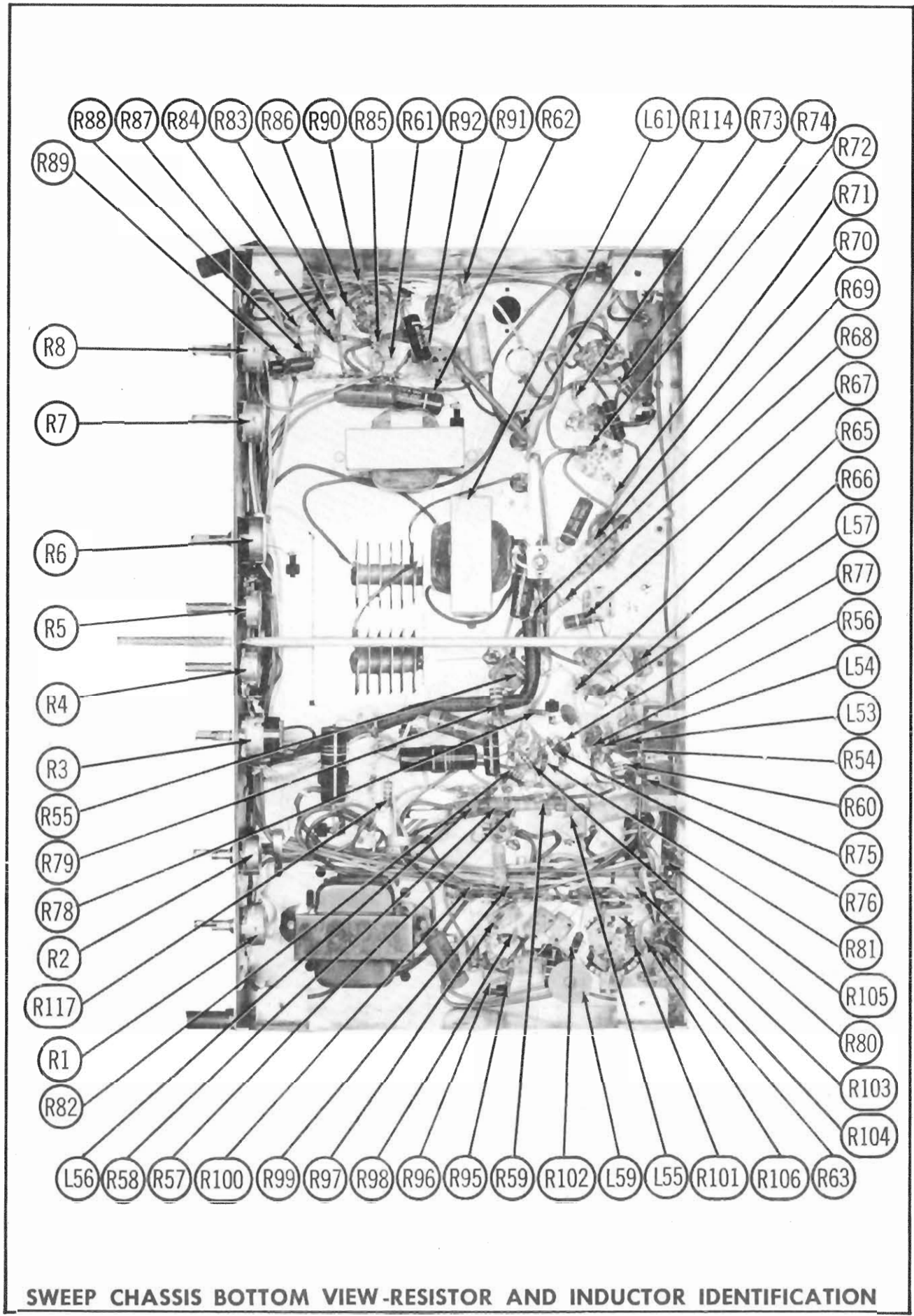
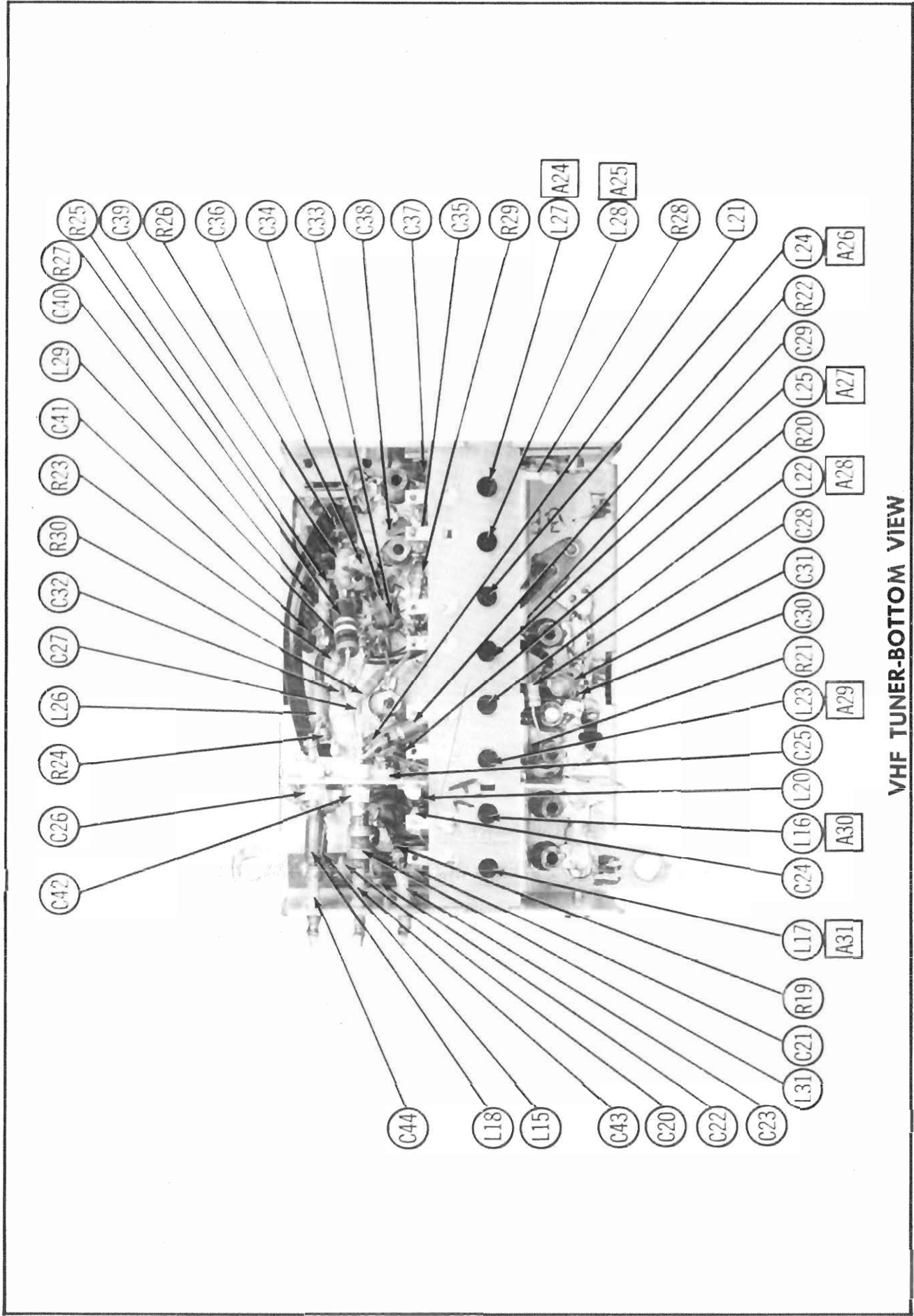
Turn the set on and tune in a TV station, preferably a test pattern.

Set the horizontal hold control to the center of its range. Adjust the horizontal oscillator slug (B1) until picture synchronizes. Continue turning B1 in same direction until picture just loses sync then back off to a point approximately in the center of the effective range of B1. Momentarily interrupt signal by switching off channel and back again. Picture should remain in sync. If necessary readjust B1 until this condition is obtained.

Adjust the horizontal size control for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the sync stabilizer control for the most stable picture.

RAYTHEON MODELS UC-2139A, UC-2141A, UC-2142A, UC-2144A, UC-2145A, UM-2133A, UM-2134A, UM-2135A, UM-2136A



RAYTHEON MODELS UC-2139A, UC-2141A, UC-2142A, UC-2144A, UC-2145A, UM-2133A, UM-2134A, UM-2135A, UM-2136A

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L58	Ratio Det.	7Ω	1.5ΩCT	13M-22303	17-3497	TV-115	6205	Tertiary winding - .75Ω Raytheon part number includes C100. Not used in all Models.
L59	Horiz. Osc.	75Ω		201-22302	19-1575	TV-163 †	6210 †	
L60	4.5MC Trap	1Ω			20-1004	TV-151	1470	

† Detune trap, add 3.9KΩ resistor & 470MMF Capacitor externally, cut out chassis hole and drill mounting holes.
 ** Use on winding only, add 3.9KΩ resistor & 470MMF Capacitor externally, cut out chassis hole and use clip mounting.
 ▲ Use one winding only, detune trap, add 15MMF capacitor externally, cut out chassis hole and use clip mounting.
 ■ Detune trap, add 15MMF capacitor externally, cut out chassis hole and drill mounting holes.
 ♦ Use primary and trap windings only, add 7MMF capacitor externally, cut out chassis hole and use clip mounting.
 * Add 7MMF capacitor externally, cut out chassis hole and drill mounting holes.
 † Enlarge mounting hole.
 ▲ Detune trap, cut out chassis hole and drill mounting holes.
 ** Use one winding only, cut out chassis hole and use clip mounting.
 † Add 1KΩ resistor across primary winding, disconnect R34, cut out chassis hole and drill mounting holes.
 § Add 1KΩ resistor across primary winding, cut out chassis hole and use clip mounting.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 CY)	RAYTHEON PART No.	Stancor PART No.	Merit PART No.	Triod PART No.	Holldorson PART No.	Thordarson PART No.
L61	.300A	70Ω	2.92HY	16A21214	C-2326		C-17X	C6037	

SELENIUM RECTIFIER

ITEM No.	RATING		REPLACEMENT DATA					NOTES
	CURRENT	RAYTHEON PART No.	SELETRON PART No.	FEDERAL PART No.	MALLORY PART No.	SARKIS PART No.	ARZIAN PART No.	
M1	.300ADC	21J20097		1023A	6S350	350		
M2	.300ADC	21J20097		1023A	6S350	350		

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		RAYTHEON PART No.	SYLVANIA PART No.	
M3	1N82	8M-22649	1N82 or 1N82A	UHF mixer (clip-in)
M4	CK706	8M-21959	1N60	Video detector (pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	RAYTHEON PART No.	NOTES
M5	Dial light		# 47 bayonet (2 used)
M6	Tuner	C2A-22118	UHF
M7	Tuner	C2C-22190	VHF
M8	Switch	20B-22422	UHF-VHF changeover (ANT)
M9	Switch	20M-22462	UHF Osc.
M10	Centering magnet	16M-20697	
M11	Ion trap	16M-19906	
M12	Correction magnet	16M-22602	Horiz. Linearity
M13	Correction magnet	16M-22607	Anti-pin-cushion
M14	Switch	20M-22462	UHF Osc.
	Trimmer cap	8E-22419	1st Video IF coupling
	Trimmer cap	8E-18508	Sound discriminator
	Cabinet	24D-22618	Model UM-2134
	Cabinet	24D-22619	Model UM-2135
	Cabinet	24D-22607	Model UM-2136
	Cabinet	24D-22608	Model UM-2136
	Cabinet	24D-22602	Model UC-2139
	Cabinet	24D-22603	Model UC-2141
	Cabinet	24D-22601	Model UC-2142
	Cabinet	24D-22610	Model UC-2144
	Cabinet	24D-22611	Model UC-2145
	Safety glass	30M-21485	
	Knob	5B-22637	Tuning
	Knob	5B-22613	(2) picture & volume
	Knob	5B-20755-29	Star knob (4 used)
	Escutcheon assy.	200-22558	

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		RAYTHEON PART No.	STANDARD REPLACEMENT		
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2	VHF RF Amp.	6BZ7	6BZ7	9AJ	
V3	Converter	6U8	6U8	9AE	
V4	1st. Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V7	4th. Video IF Amp.	6CB6	6CB6	7CM	
V8	Video Output	25C5	25C5	7CV	
V9	Sound IF Amp.	6AU6	6AU6	7BK	
V10	Ratio Detector	6AL5	6AL5	6BT	
V11	AF Amplifier	6AV6	6AV6	7BT	
V12	Audio Output	25C5	25C5	7CV	
V13	Sync Separator	6BE6	6BE6	7CH	
V14	Sync Amplifier-Vert. Oscillator	12AU7	12AU7	9A	
V15	Vert. Output	684	684	9AC	
V16	Horiz. AFC	6AL5	6AL5	6BT	
V17	Horiz. Mult.	12AU7	12AU7	9A	
V18	Horiz. Output	25BQ6GT	25BQ6GT	6AM	
V19	Damper	25AX4GT	25AX4GT	4CG	
V20	HV Rectifier	1B3GT	1B3GT	3C	

CATHODE-RAY TUBE

ITEM No.	RAYTHEON PART No.	REPLACEMENT DATA			RETMA BASE TYPE	NOTES
		SYLVANIA PART No.	GENERAL ELECTRIC PART No.	WESTINGHOUSE PART No.		
V21	21YP4	21YP4 21YP4A ①	21YP4 21YP4A ①	21YP4 21YP4A ①	12L 12L	① Aluminized

CAPACITORS

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

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	RAYTHEON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1	100	150	8C-22286	AFH51-69		XA-003		FP116	TVL-1423	
C2	100	150	8C-22285	AFH51-69		XA-003		FP116	TVL-1423	
C3A	100	300	8C-22523	AFH3-24		D002		FP335	TVL-3574	
C3B	100	300		PR500/50		BR505				
C3C	100	50								
C4A	20	300	8C-22524	AFH3-106		C026		FP330.3	TVL-3634	
C4B	20	25						TC30		
C4C	10	75								
C5	50	450	8C-22544	PR5450/50		PR545		TC78	TVA-1713	
C6	5			SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	STCCB-V47	Note 1
C7	5			SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	STCCB-V47	Note 1
C8	1000		8G-22383	BPD-001	D0-102	K069	801-001	DC-521	5HK-D1	
C9	1000		8G-20878	BPD-2X001	DD2-102	DK069	812-001	DCD-521	5HK-2D1	
C10A	1000		8G-19506							
C10B	1000									
C11	1000		8G-22120							
C12	1000		8G-22383	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C13	20		8G-21315							
C14	1000		8G-20878	SI100	D6-101	TP34	GPIK-101	UC-531	5GA-TI	
C15	100		201-22587							
C16	6		8G-20880							
C17	1000		8G-22656	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C18	1000		8G-22656	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C19	1000		8G-22656	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C20	100		8G-19562	SI100	D6-101	TP34	GPIK-101	UC-531	5GA-TI	
C21	20		8G-22276	SI20NP0	TCZ-20	TZ1.3	NP0K-200	ZT-542	STCC-Q2	
C22	20		8G-22276	SI20NP0	TCZ-20	TZ1.3	NP0K-200	ZT-542	STCC-Q2	
C23	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C24	3		8G-22772							
C25	1000									
C26	1000									
C27	.68		8G-12495-1		TCZ-.58	TZ02				
C28	1.7		8G-12495-8							
C29	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5GA-D1	
C30	10		8G-11789	SI10NP0	TCZ-10	TZ09	NP0K-100	TZ-541	STCC-Q1	
C31	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C32	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C33	2.2		8G-12495-4	SI2.2NP0	TCZ-2.2	TZ05	NP0K-2R2	ZT-555	STCCB-V22	
C34	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C35	18		8G-22227		TCZ-18	TZ-12	NP0K-180			
C36	2.5		8G-22367							
C37	2.5		8G-19568							
C38	1000		8G-22383	BPD-001	DD-102	K069	801-001	LC-521	5HK-D1	
C39	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C40	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C41	1000		8G-17349	SI330	D6-331	TP43	GP2K-.331	UC-5333	5GA-T33	
C42	1000									
C43	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C44	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C45	5000		8G-13962	BPD-005	DD-502	K080	811-005	DZ-525	5HK-D5	
C46	680		8G-21105	SI680	D6-681	TP50	GP2K-.681	UC-5368	5GA-T68	
C47	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C48	5		8G-12166	SI5NP0	TCZ-4.7	Z011	NP0K-831-050	ZT-555	STCCB-V47	
C49	7		8G-11790			Z014	NP0K-831-050			
C50	5000		8G-13962	BPD-005	DD-502	K080	811-005	DZ-525	5HK-D5	
C51	5000		8G-13962	BPD-005	DD-502	K080	811-005	DZ-525	5HK-D5	
C52	680		8G-21105	SI680	D6-681	TP50	GP2K-.681	UC-5368	5GA-T68	
C53	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C54	5000		8G-13962	BPD-005	DD-502	K080	811-005	DZ-525	5HK-D5	
C55	680		8G-21105	SI680	D6-681	TP50	GP2K-.681	UC-5368	5GA-T68	
C56	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	

RAYTHEON MODELS UC-2139A, UC-2141A, UC-2142A, UC-2144A, UC-2145A, UM-2133A, UM-2134A, UM-2135A, UM-2136A

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)									
ITEM No.	RATING CAP. VOLT	REPLACEMENT DATA							NOTES
		RAYTHEON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNEILL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C57	5000	8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C58	5000	8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C59	5000	8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C60	5000	8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C61	1000	8G-13201	SI000	DD-502	TP52	GP2L-102	UC-521	5HK-D1	
C62	5000	8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C63	5000	8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C64	5000	8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C65	5000	8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C66	5000	8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C67	.047	8J-16081	P488-047	DF-503	CUB4S47	PT4147	4TM-547	4TM-547	
C68	1000	8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C69	.1	400	8J-16083	P488-1	DF-104	CUB4P1	PT401	4TM-P1	
C70	100			SI000	DD-502	TP54	UC-531	5GA-T1	Note 2
C71	3.3			SI3.3NP0	TCZ-3.3	TCZ-3.3	5TCCB-V33	5TCCB-V33	Note 3
C72	22			SI22NP0	TCZ-22	TCZ-22	5TCC-Q22	5TCC-Q22	Note 2
C73	47			SI47N750	TCN-47	TCN-47	5TCU-Q47	5TCU-Q47	
C74	.0022	400	8J-20634	P688-0022	DD-502	CUB6D22	GP2-333-222	PT6222	
C75	5000		8G-13962	BPD-005	DD-502	K080	DC-525	5HK-D5	
C76	5000		8G-13962	BPD-005	DD-502	K080	DC-525	5HK-D5	
C77	5000		8G-22132	SI5000	DD-502	TP54	GP2-333-502	UC-525	
C78	.01	200	8J-20582	P488-01	DE-103	CUB4S1	GP2-333-103	PT411	
C79	.01	200	8J-20582	P488-01	DE-103	CUB4S1	GP2-333-103	PT411	
C80	.01	400	8J-16084	P488-01	DE-103	CUB4S1	GP2-333-103	PT411	
C81	.01	600	8G-21208	P688-01	DE-103	CUB6S1	GP2-333-103	PT611	
C82	.047	400	8J-16081	P488-047	DF-503	CUB4S47	PT4147	4TM-547	
C83	.22	200	8J-16082	P488-22	DF-104	CUB4P22	PT4022	4TM-P22	
C84	.1	200	8J-16085	P488-1	DF-104	CUB4P1	PT401	4TM-P1	
C85	.022	400	8J-19757	P488-022		CUB4S22	PT4122	4TM-S22	
C86	.22	400	8J-16095	P488-22		CUB4P22	PT4022	4TM-P22	
C87A	.002			4TA-22376	4PA-110	4PC-100	4LSTMI	4L405-01	
C87B	.005								
C87C	.0047	200	8J-20580	P688-0047	DE-472	CUB6D47	GP2-333-472	PT6247	
C88	.047	400	8J-16081	P488-047	DF-503	CUB4S47	PT4147	4TM-547	
C89	.047	200	8J-16096	P288-047	DF-503	CUB2S47	PT4147	2TM-547	
C90	.1	400	8J-16083	P488-1	DF-104	CUB4P1	PT401	4TM-P1	
C91	.01	600	8J-16097	P688-01	DE-103	CUB6S1	GP2-333-103	PT611	
C92	.22		8G-11892	SI22N750	TCN-22		N750K-220	NT-5422	
C93	220	500	8F3-117			22R5Q22			
C94	220	500	8F3-123			22R5Q22			
C95	220	500	8F3-117			22R5Q22			
C96	220	500	8F3-117			22R5Q22			
C97	.680	500	8F3-123			22R5Q22			
C98	.1	200							
C99	.0022	200	8J-20578	P288-0022		CUB4D22	GP2-333-222	PT4022	
C100	.0039	600	8J-20613	P488-0039		CUB4D39	GP2-333-222	PT4022	
C101	.82	500	8F3-112			22R5Q82			
C102	.330	500	8F3-119			22R5Q330			
C103	.22	400							
C104	100								
C105	.47								
C106	.470	500	8G-19863						
C107	.0015	400	8J-20589						
C108	.047	400	8J-16091						
C109	.22	400							
C110	.470	1000	8G-21440						
C111	.1	200							
C112	.51								
C113	100	500							

Note 1. Some Models use 100MMF in this application (part #8G-22657)

Note 2. Not used in all Models.

Note 3. Some Models use 5MMF in this application (part #8G-12166)

Note 4. Some Models use .22MFD in this application (part #8J-16082)

Note 5. Some Models use .47MFD in this application (part #8J-21505)

* Items C87A, C87B, C87C, R86A, R86B, R86C are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE WATTS	REPLACEMENT DATA						INSTALLATION NOTES
		RAYTHEON PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.		
R1A	100KΩ	B10B-17275	Q1-128	A47-100K-S	AK-40	U-41		Horiz. Hold
R2A	500KΩ	Not Req.	Not Req.	KSS-3	AK-4	Not Req.		Attach to R1A
R3A	1 Meg	B-10B-21456	Q1-133	A47-500K-S	AK-59	U-50		Brightness
R4A	1 Meg	Not Req.	Not Req.	KSS-3	AK-4	Not Req.		Attach to R2A
R5A	1 Meg	A-10A-22305	Q1-137	A47-1Meg-S	BSK-70-S	U-53		Volume
R6A	1 Meg	Not Req.	Not Req.	KSS-3	AK-4	Not Req.		Attach to R3A
R7A	1 Meg	Not Req.	Not Req.	KSS-3	AK-4	Not Req.		Attach to R4A
R8A	1 Meg	A-10B-22304	Q1-114	A47-5000-S	AB-10	U-14		Vert. Linearity - Note 1
R9A	1 Meg	Not Req.	Not Req.	RS-3	AK-4	Not Req.		Attach to R4A
R10A	1 Meg	A-10B-22307	Q1-133	A47-500K-S	AK-4	Not Req.		Vert. size - Note 2
R11A	1 Meg	Not Req.	Not Req.	RS-2	AK-4	Not Req.		Attach to R5A
R12A	1 Meg	Not Req.	Not Req.	RS-2	AK-4	Not Req.		Picture - wire wound
R13A	1 Meg	B10B-17318	Q1-140	A47-2.5Meg-S	AK-4	U-57		Sync stabilizer
R14A	1 Meg	Not Req.	Not Req.	KSS-3	AK-4	U-57		Attach to R7A
R15A	1 Meg	B10B-17318	Q1-140	A47-2.5Meg-S	AK-4	U-57		Vert. hold
R16A	1 Meg	Not Req.	Not Req.	KSS-3	AK-4	Not Req.		Attach to R8A

Note 1. Connect a 1000Ω resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down)

Note 2. Connect a 250KΩ resistor in series with the left hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down)

ITEM No.	RATING OHMS WATT	REPLACEMENT DATA		NOTES
		RAYTHEON PART No.	IRC PART No.	
R9	470 KΩ	9B1-29	BTS-470K	
R10	220	9B1-42	BTS-22	
R11	150	9B1-40	BTS-15	
R12	560	9B1-47	BTS-56	
R13	4700Ω	9B1-70	BTS-4700	
R14	220	9B1-42	BTS-22	
R15	560	9B1-47	BTS-56	
R16	560	9B1-47	BTS-56	
R17	220Ω	9B1-54	BTS-220	
R18	470KΩ	9B1-29	BTS-470K	
R19	100KΩ	9B1-74	BTS-10K	
R20	100KΩ	9B1-86	BTS-100K	
R21	100	9B1-38	BTS-10	
R22	1000Ω	9B1-62	BTS-1000	
R23	22KΩ	9B1-78	BTS-22K	
R24	220KΩ	9B1-27	BTS-220K	
R25	33KΩ	9B1-80	BTS-33K	
R26	27KΩ	9B1-79	BTS-27K	
R27	10KΩ	9B1-74	BTA-10K	
R28	10KΩ	9B1-74	BTS-10K	
R29	2200Ω	9B1-66	BTS-2200	
R30	1500Ω	9B1-14	BTS-1500	
R31	22KΩ	9B1-78	BTS-22K	
R32	12KΩ	9B1-45	BTS-12K	
R33	22KΩ	9B1-78	BTS-22K	
R34	6800Ω	9B1-72	BTS-6800	
R35	1000Ω	9B1-62	BTS-1000	
R36	820	9B1-49	BTS-82	
R37	1000Ω	9B1-62	BTS-1000	
R38	1000Ω	9B1-62	BTS-1000	
R39	47KΩ 5%	9B1-199	BTS-47K 5%	
R40	1000Ω	9B1-62	BTS-1000	
R41	680	9B1-48	BTS-68	
R42	27KΩ 5%	9B1-193	BTS-27K 5%	
R43	1000Ω	9B1-62	BTS-1000	
R44	1000Ω	9B1-62	BTS-1000	
R45	470	9B1-46	BTS-47	
R46	47KΩ 5%	9B1-199	BTS-47K 5%	
R47	1000Ω	9B1-62	BTS-1000	
R48	180Ω	9B1-53	BTS-180	
R49	22KΩ	9B1-78	BTA-22K	
R50	10KΩ	9B1-74	BTA-10K	
R51	15KΩ 5%	9B1-167	BTS-15K 5%	
R52	5600Ω	9B1-71	BTS-5600	
R53	3900Ω	9B1-69	BTS-3900	
R54	10KΩ	9B1-78	BTS-10K	
R55	150KΩ	9B1-88	BTS-150K	
R56	15KΩ	9B1-76	BTS-15K	
R57	3300Ω	9B1-68	BTS-3300	
R58	3300Ω	9B1-68	BTS-3300	
R59	4700Ω	9B1-70	BTS-4700	
R60	100KΩ	9B1-86	BTS-100K	
R61	22KΩ	9B1-62	BTS-22K	
R62	5600Ω	9B1-71	BTS-5600	
R63	1000Ω	9B1-62	BTS-1000	
R64	220KΩ	9B1-62	BTS-220K	

Note 1. Some models may use a 22KΩ resistor in this application.

Note 2. Some models may use a 47KΩ resistor in this application.

Note 3. Some models may use a 1800Ω resistor in this application.

Note 4. Some models may use a 3300Ω resistor in this application.

Note 5. Some models may use a 220KΩ resistor in this application.

Note 6. Not used in all models.

Note 7. Some models may use a 47KΩ resistor in this application.

Note 8. Models that use a 6AX4 as V19 may use a 150Ω resistor in this application.

* Items R86A, R86B, R86C, C87A, C87B, C87C are combined in one unit.

TRANSFORMER (FILAMENT)

ITEM No.	RATING PRI SEC 1 SEC 2	REPLACEMENT DATA					
		RAYTHEON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.
T1	117VAC ① 43A	12D21160-1		P-2947 ①	F-18X1 ②		

① Drill one new mounting hole.

② Tape center tap on 6.3V winding.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA					
		RAYTHEON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.
T2	Vert. Osc. Trans.	12M-18241	A-8125	A-3003	A-97X	209T1 ①	B8702
T3	Horiz. Output Trans.	201-22396-1					
T4	Vert. Output Trans.	201-22396-2					
T5A	Yoke-Horiz. (8-4MHz)	201-22697 ③	A-8141	A-3039	A-105X		Z1806
T5B	Yoke-Vert. (45MHz)		DY-8A ③	MDF-70 ③	Y-12 ③		DF601 ③

① Drill one new mounting hole.

② Alternate horizontal output trans.

③ Use original deflection coil network.

④ Includes C112, R93 and R94.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI SEC	REPLACEMENT DATA					
		RAYTHEON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.
T6	2.16KΩ 3.1Ω	12C22508	A-3876	A-2928	S-2X	Z1001	TS-24550

SPEAKER

ITEM No.	RATINGS SIZE FIELD V. C IMP	REPLACEMENT DATA			NOTES
		RAYTHEON PART No.	JENSEN PART No.	QUAM PART No.	
SP1	5" PM 3.1Ω	18A21216	ST-105 Mod PS-X	SA07	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI SEC		REPLACEMENT DATA	
----------	-----	-----------------	--	------------------	--