

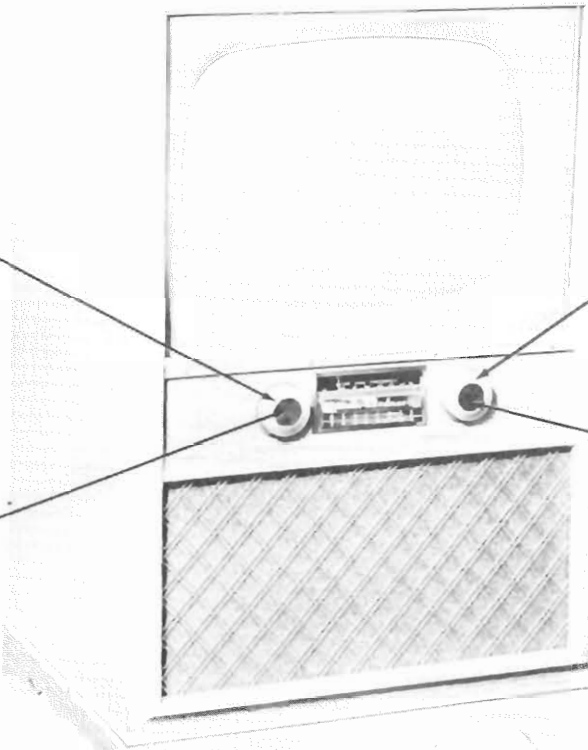
V-RESISTOR IDENTIFICATION

CONTRAST
CONT.

FINE
TUNING

ON-OFF
VOLUME
CONTROL

CHANNEL
SELECTOR
SWITCH



WELLS-GARDNER MODEL 2321MS39-396-1

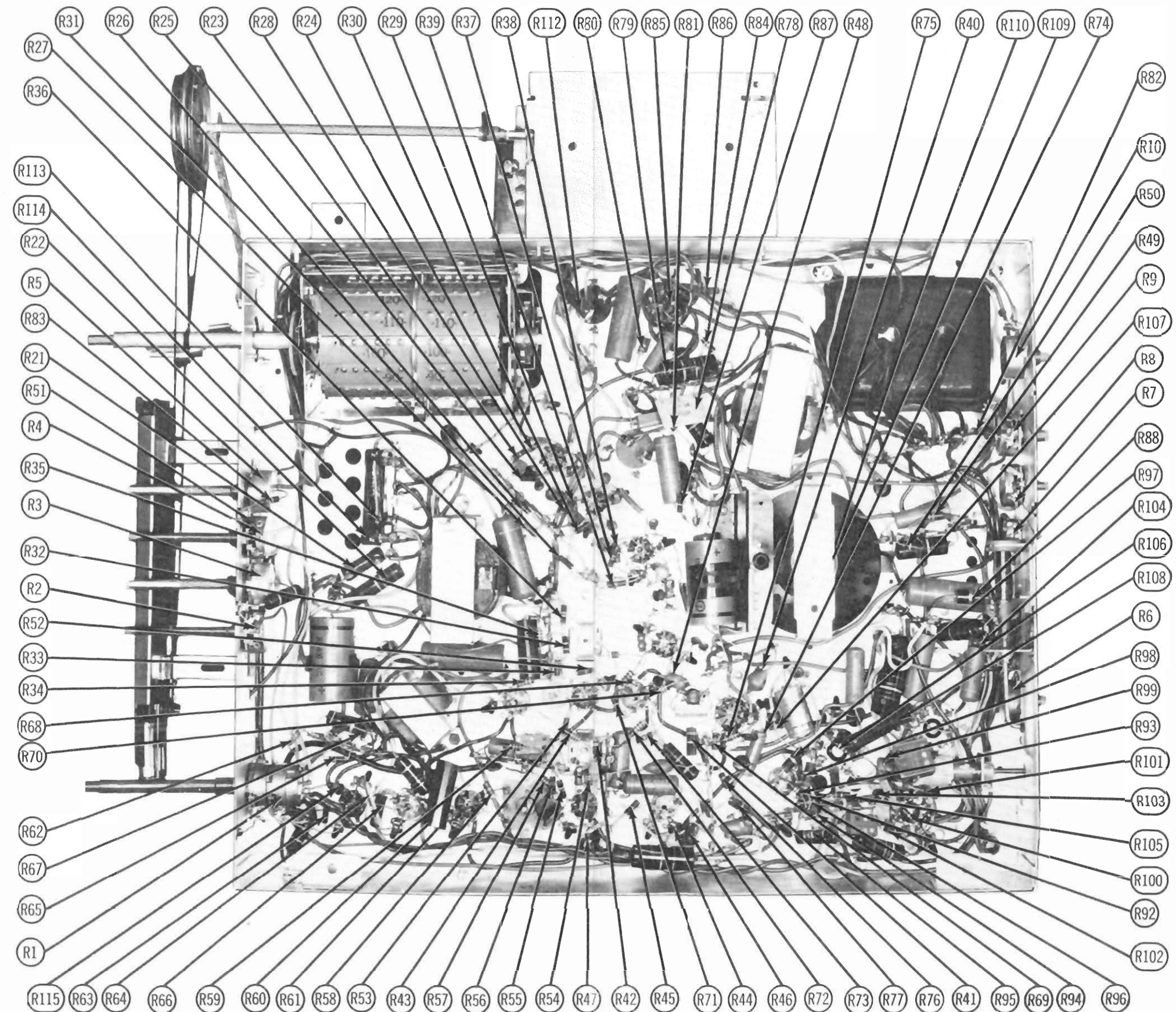
TRADE NAME	Wells-Gardner Models 321MS39-322, -372-2, -376-1, 2321MS39-324, -370, -396-1		
MANUFACTURER	Wells-Gardner Co., 2701 N. Kildare Ave., Chicago 39, Ill.		
TYPE SET	Television Receiver		
TUBES	Twenty-Five		
POWER SUPPLY	110-120 Volts AC-60 Cycle	RATING	2 Amp. @ 117 Volts AC
TUNING RANGE-	Channels 2 thru 13 VHF, 14 thru 83UHF, Video IF 26.2MC, Sound IF 21.7MC (Intercarrier)		
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WELLS GARDNER
MODELS 321MS39-322, -372-2,
-376-1, 2321MS39-324, -370, -396-1



CONTRAST
CONT.

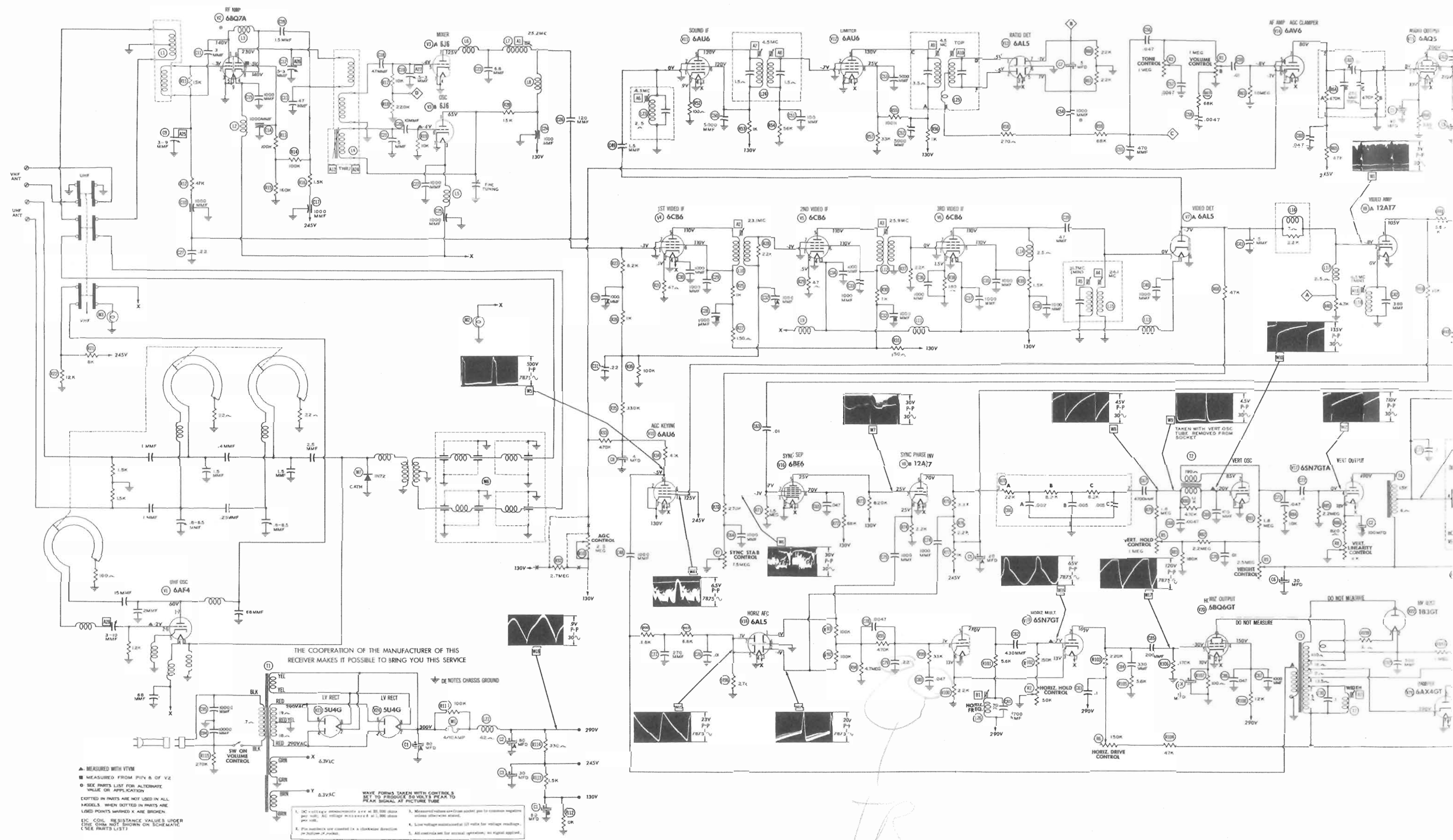
ON-OFF
VOLUME
CONTROL

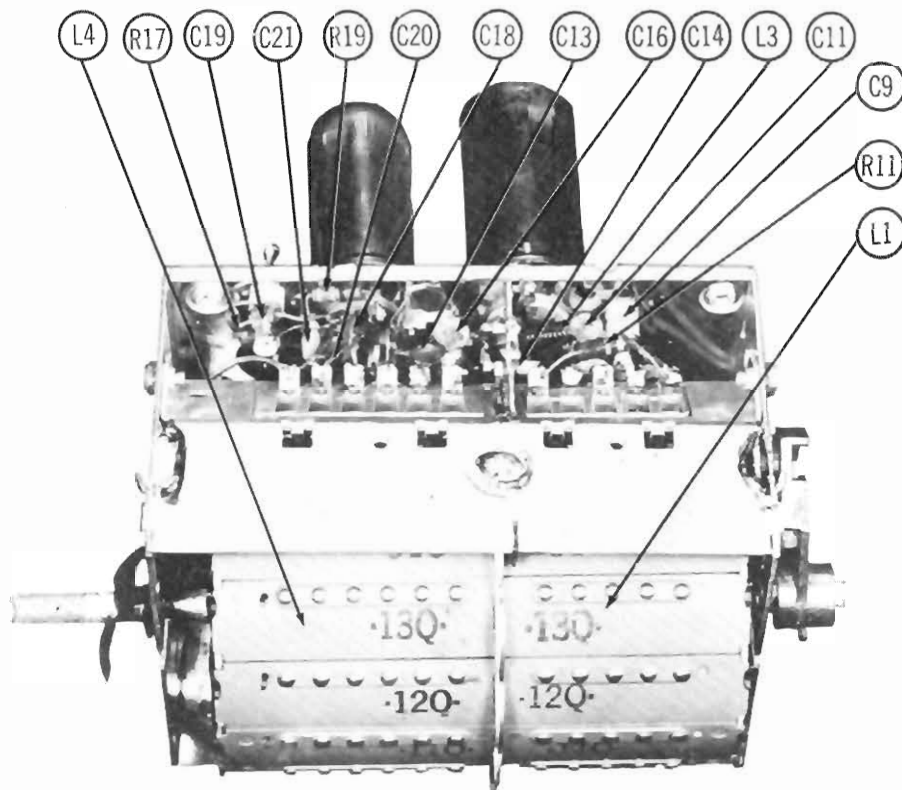
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MANUFACTURER	Wells
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TUBES	Twen
POWER SUPPLY	110-120
TUNING RANGE-	Channe
Alignment Instructions	...
Drive Cord Stringing
Disassembly Instructions	
Horizontal Sweep Circuit Ac	
Parts List and Descriptions	
Photographs	
Cabinet-Rear View	...
Capacitor Identification	
Chassis - Top View	..
RF Tuner

HOW

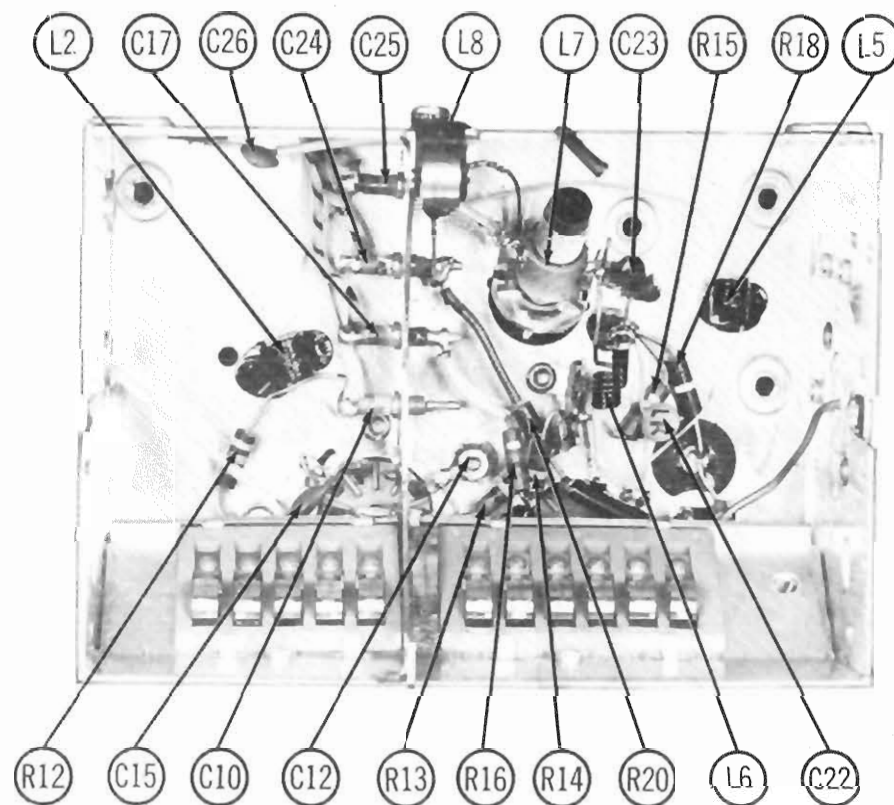
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CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

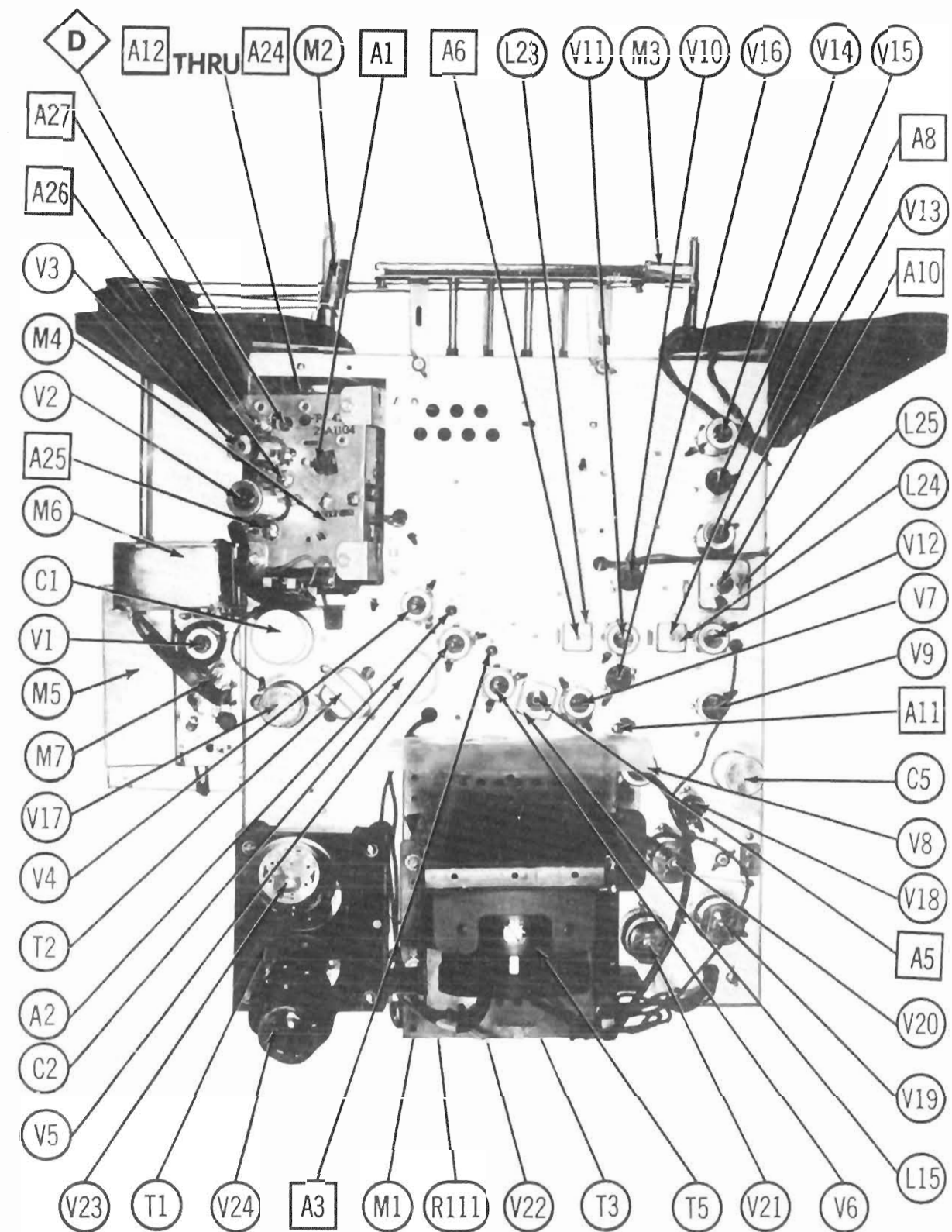




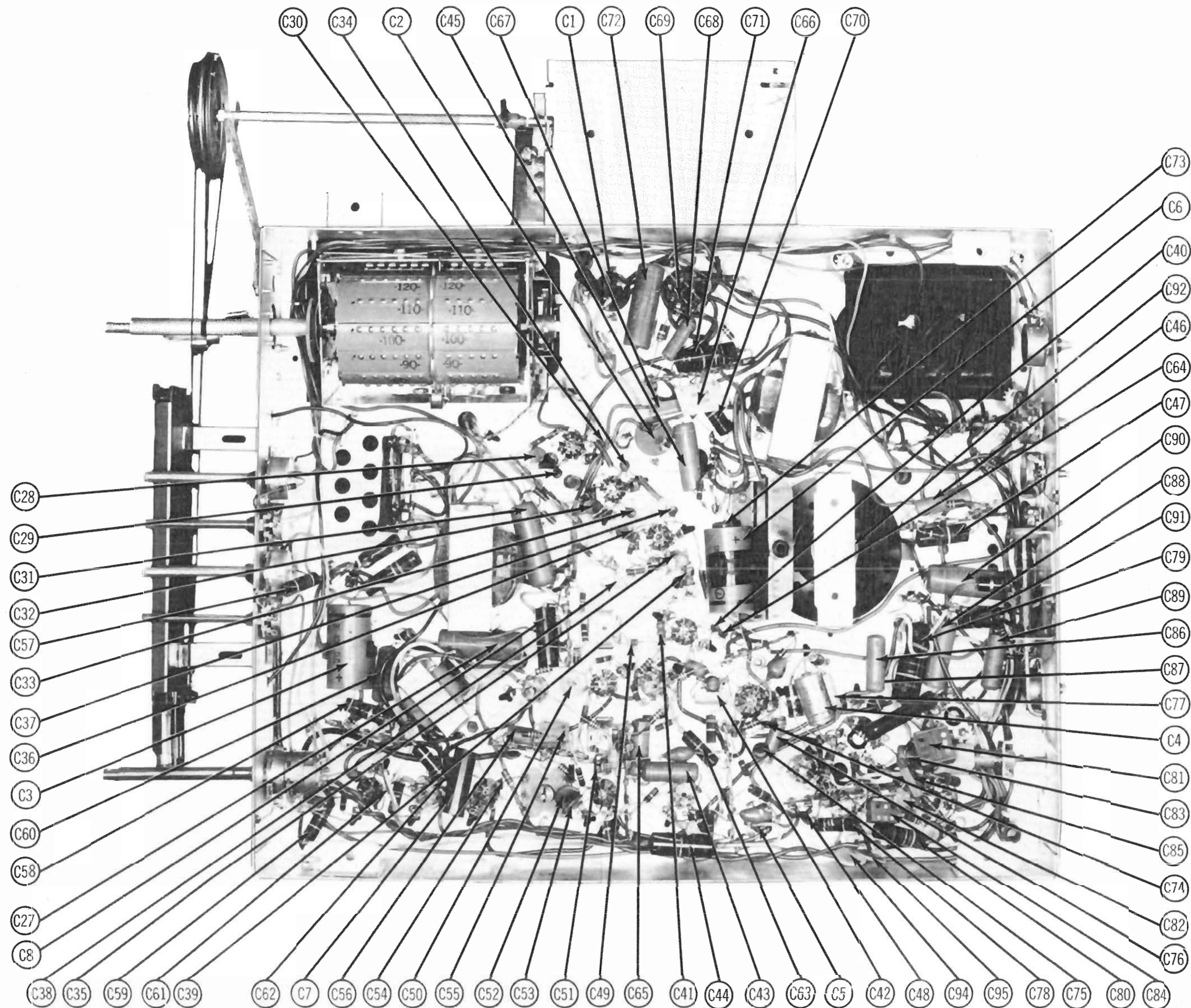
RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

MODELS 321MS39-322, -372-2, -376-2, 2321MS39-324, -370, -396-1

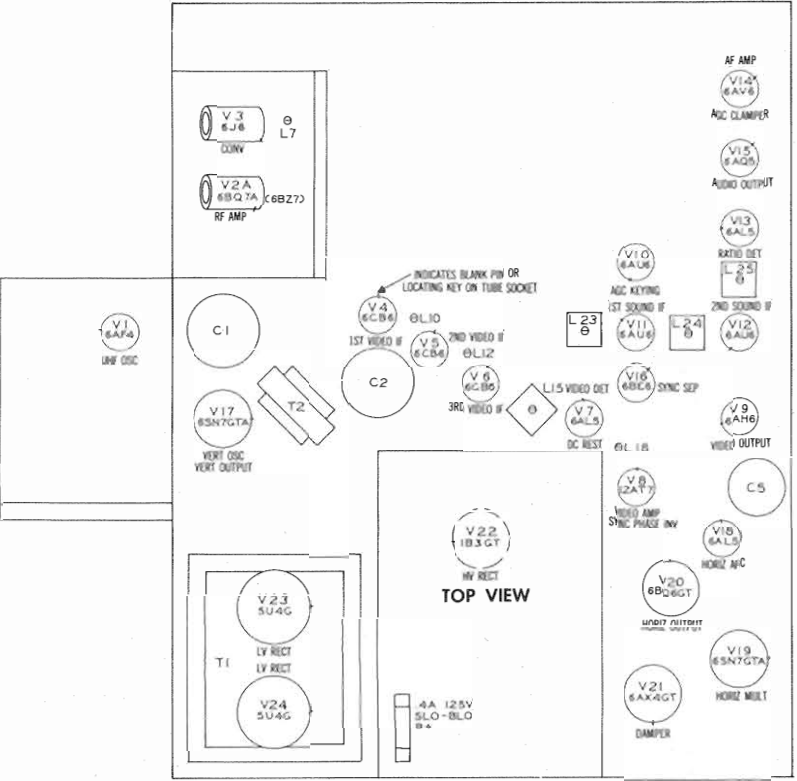
WELLS GARDNER

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	■6KΩ	12KΩ	.1Ω	.2Ω	.1Ω	12KΩ	■6KΩ		
V 2	6BQ7A	INF	680KΩ	0Ω	.1Ω	0Ω	■2KΩ	160KΩ	INF	0Ω
V 3	6J6	17KΩ	■2KΩ	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 4	6CB6	110KΩ	47Ω	.1Ω	0Ω	■2.8KΩ	■2.8KΩ	0Ω		
V 5	6CB6	100KΩ	47Ω	.1Ω	0Ω	■2.8KΩ	■2.8KΩ	0Ω		
V 6	6CB6	.3Ω	180Ω	.1Ω	0Ω	■3KΩ	■3KΩ	0Ω		
V 7	6AL5	.7Ω	0Ω	.1Ω	0Ω	1Meg	0Ω	4.7KΩ		
V 8	12AT7	■8.5KΩ	4.7KΩ	.2Ω	0Ω	0Ω	■7.5KΩ	■820KΩ	2.2KΩ	.1Ω
V 9	6AH6	1Meg	0Ω	.1Ω	0Ω	■6.2KΩ	■1.8KΩ	500Ω		
V 10	6AU6	■36.5K	■1.8KΩ	.1Ω	0Ω	470KΩ	■400Ω	■1.8KΩ		
V 11	6AU6	.1Ω	0Ω	.1Ω	0Ω	■2.6KΩ	■2.6KΩ	100Ω		
V 12	6AU6	56KΩ	0Ω	.1Ω	0Ω	■2.6KΩ	■24KΩ	0Ω		
V 13	6AL5	INF	INF	0Ω	.1Ω	22KΩ	INF	22KΩ		
V 14	6AV6	10Meg	0Ω	.1Ω	0Ω	680KΩ	680KΩ	■520KΩ		
V 15	6AQ5	470KΩ	330Ω	0Ω	.1Ω	■1.7KΩ	■1.3KΩ	470KΩ		
V 16	6BE6	40KΩ	0Ω	.1Ω	0Ω	■820KΩ	■70KΩ	1.5Meg		
V 17	6SN7GT	2Meg	▲1.7Meg	0Ω	2.2Meg	▲7KΩ	2KΩ	.1Ω	0Ω	
V 18	6AL5	4.8Meg	4.8Meg	.1Ω	0Ω	9KΩ	INF	9KΩ		
V 19	6SN7GT	170KΩ	▲340KΩ	2.2KΩ	5Meg	■5.6KΩ	2.2KΩ	.1Ω	0Ω	
V 20	6BQ6GT	5.6KΩ	0Ω	INF	■12KΩ	470KΩ	420KΩ	.1Ω	100Ω	TOP CAP ▲18Ω
V 21	6AX4GT	6.3KΩ	INF	440KΩ	4.5Meg	■50Ω	6.3KΩ	0Ω	.1Ω	TOP CAP ▲446Ω
V 22	1B3GT	PINS 1-8 HAVE INF. RESISTANCE								
V 23	5U4G	INF	10KΩ	INF	18Ω	INF	19.5Ω	INF	10KΩ	
V 24	5U4G	INF	10KΩ	INF	18Ω	INF	19.5Ω	INF	10KΩ	
V 25	21MP4	0Ω	1.1Meg	PIN 6 ■50Ω	PIN 10 ▲6.8KΩ	PIN 11 ■180KΩ	PIN 12 .1Ω			

■ MEASURED FROM PIN 2 OF V24.
▲ MEASURED FROM PIN 3 OF V21.

TUBE PLACEMENT CHART



ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT							
The high voltage shock hazard may be eliminated by removing the horizontal oscillator tube, V19.							
VIDEO IF ALIGNMENT							
Remove the converter tube, V2, and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications. Connect the negative lead of a 4.5Volt bias supply to the ungrounded side of C31. Connect the positive lead to chassis.							
DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS	
1. Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	25.2MC (Unmod.)	Any	DC probe thru decoupling filter (Fig.1) to point A. Common to chassis.	A1	Adjust for maximum deflection.	
2. "	"	23.1MC	"	"	A2	"	
3. "	"	25.9MC	"	"	A3	"	
4. "	"	24.1MC	"	"	A4	"	
5. "	"	21.7MC	"	"	A5	Adjust for MINIMUM deflection.	
OVERALL VIDEO IF RESPONSE CHECK							
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
6. Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.7MC 23.0MC 23.5MC 25.25MC 26.2MC	Any	Vert. Amp. thru decoupling filter (Fig. 1) to point A. Low side to chassis.		Check for response curve similar to Fig.3. If necessary retouch A1 thru A4 for desired response.
SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM							
DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS	
7. .01MFD	High side to pin 1 (cathode) of 6AL5 (V7A). Low side to chassis.	4.5MC (Unmod.)	Any	DC probe to point B. Common to chassis.	A6, A7, A8, A9	Adjust for maximum deflection.	
8. "	"	"	"	DC probe to point C. Common to chassis.	A10	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							
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
7. .01MFD	High side to pin 1 (cathode) of 6AL5 (V7A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru decoupler (Fig.1) to point B. Low side to chassis.	A6, A7, A8, A9	Disconnect stabilizer capacitor C7. Adjust for curve of maximum amplitude and symmetry as in Fig. 3.
8. "	"	"	"	"	Vert. Amp. thru decoupler (Fig.1) to point C. Low side to chassis.	A10	Reconnect stabilizer capacitor C7. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.
4.5MC TRAP ALIGNMENT							
Turn contrast control to maximum clockwise position.							
DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9. Direct	High side to pin 7 of 6AL5 (V7A). Low side to chassis.	Not used	4.5MC (400VMod)	Any	Vert. amp. thru decoupler (Fig.1) to pin 2 of picture tube. Low side to chassis.	A 11	Adjust for minimum 400% indication on scope

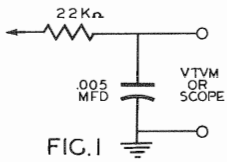


FIG.1

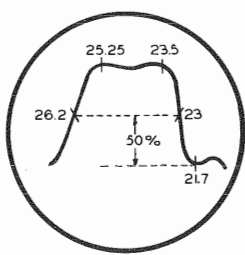


FIG.2

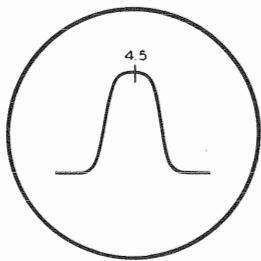


FIG.3

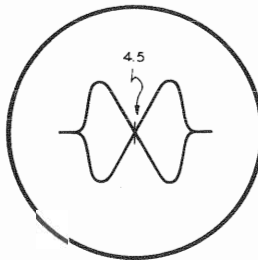


FIG.4

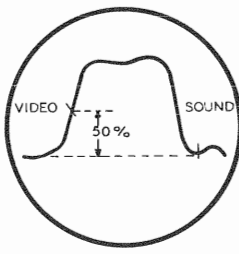


FIG.5

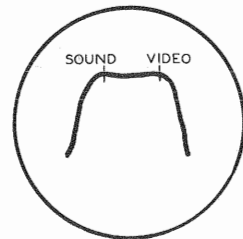


FIG.6

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT							
Remove the dummy converter tube and replace the original 6J6 in its socket. The oscillator adjustment screws for each channel are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel. 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.							
DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10. Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω 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 215.75MC 205.25MC 209.75MC 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 12 11 10 9 8 7 6 5 4 3 2	Vert. Amp. thru decoupler (Fig.1) to point A. Low side to chassis.	A12 A13 A14 A15 A16 A17 A18 A19 A20 A21 A22 A23	Adjust to place sound marker in notch as in Fig. 5. Video marker should be at 50%.
11. "	Across output of UHF tuner	124MC (10MC Swp)	121.75MC 126.25MC	UHF		A24	
RF AND MIXER 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 antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru decoupler (Fig.1) to point D. Low side to chassis.	A25, A26 A27	Adjust for response curve similar to Fig.6. with markers above 90%.
13. "	"	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) 124MC (10MC Swp)	211.25MC 215.75MC 205.25MC 209.75MC 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 21.75MC 26.25MC	13 11 10 9 8 7 6 5 4 3 2 UHF	"		Check for response similar to Fig.6. If markers fall below 70% on any channel make slight compromise adjustment of A24, A25, and A26 with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
UHF TUNER ALIGNMENT							
Due to circuit complexity of the UHF tuner, alignment in the field should not be attempted. Service should also be limited to the replacement of oscillator tube (V3) and crystal IN72/IN82. If either crystal or oscillator is replaced, adjustment of the UHF oscillator trimmer, A28, maybe necessary. If necessary, adjust A28 for tuner range of below 470MC to above 890MC. If the UHF tuner does not operate properly after tube or crystal replacement and adjustment of A28 the tuner should be returned to the factory.							

MODELS 321MS39-322, -372-2, -376-2, 2321MS39-324, -370, -396-1
WELLS GARDNER

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

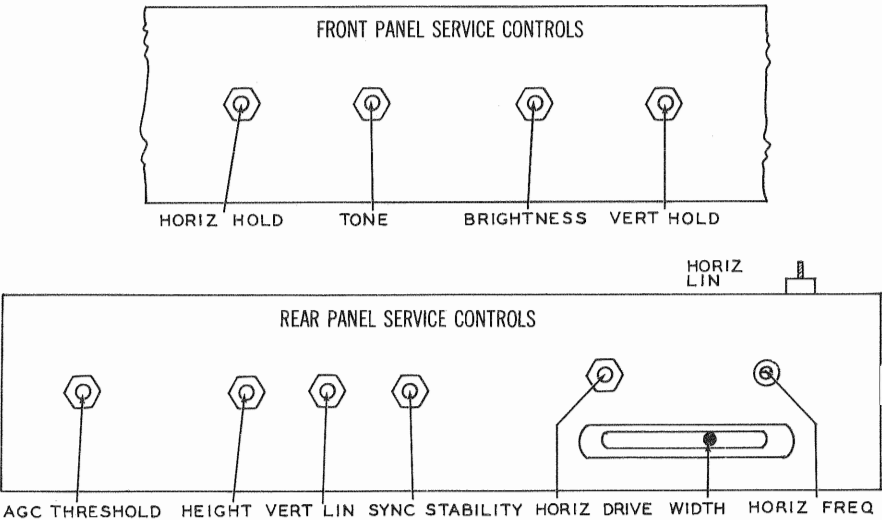
Touch-up adjustments of the RF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 4 wood screws holding wood strip at bottom of safety glass. Remove wood 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).



SPECIAL ADJUSTMENTS - SYNC STABILITY CONTROL

Tune set to strongest TV signal available turn the sync stability control clockwise until bending of the picture occurs at the top, then turn counter clockwise until the bending just disappears.

AGC THRESHOLD CONTROL - Tune in strongest TV signal. Turn the control clockwise until overloading appears. turn control counter clockwise until overloading disappears.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal frequency slug (L26) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF detector buzz, adjust the ratio detector secondary (L25) located on top of chassis, (See tube placement chart).

FUSES

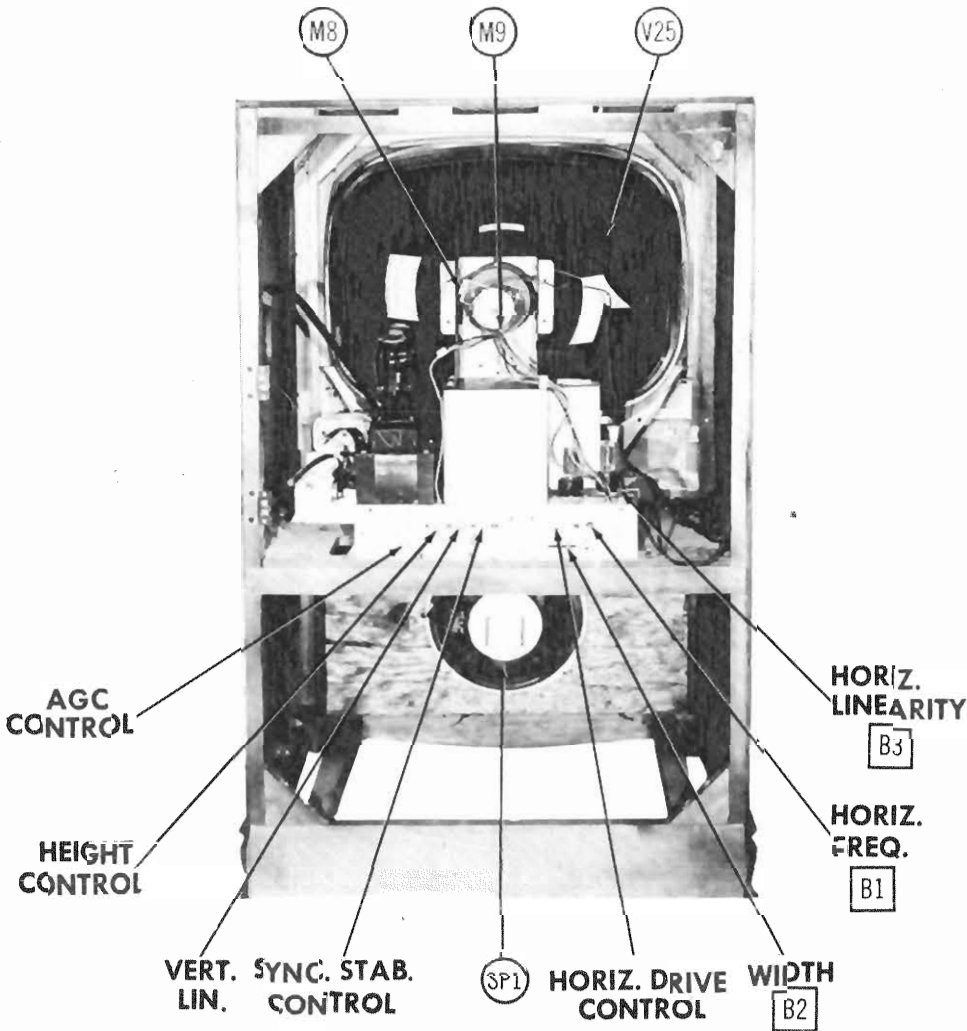
One fuse is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

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

DISASSEMBLY INSTRUCTIONS

1. Remove 4 push on type control knobs from front panel.
2. Remove 2 wood and 2 metal screws. Remove rear cover.
3. Disconnect VHF built-in antenna. Loosen 4 wood screw. Remove VHF and UHF antenna bracket.
4. Disconnect speaker. Remove 4 speaker nuts. Remove speaker.
5. Remove 5 chassis bolts. Remove chassis.



CABINET-REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

- Turn the set on and tune in a TV station, preferably a test pattern.
- Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until the picture falls into sync.
- Adjust the horizontal drive control for the best compromise between brightness and linearity.
- Adjust the width slug (B2) for a picture slightly wider than necessary to fill the picture mask horizontally.
- Adjust the horizontal linearity slug (B3) for a picture that is symmetrical from left to right.

MODILS 321MS39-322, -372-2, -376-2, 2321MS39-324, -370, -396-1
WELLS GARDNER

TROUBLE SHOOTING AIDS

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 by substitution V19, V20, V21, V23 and V24. Check adjustment of horiz. drive control, B2 and B3. Check waveform W17.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check C86, C87, C90, C91, T3, T5A, R108 and other associated components.</td><td>Check C82, C83, C84, C85, R103, R104, R106, R101, R100, R6 and other associated components.</td></tr> </table> <p><u>DRIVE LINES</u></p> <p>Check adjustment of horiz. drive control. Check by substitution V19, V20 and V21. Check C83, C84, C85, C88, C89, T3, T5A and other associated circuit components.</p> <p><u>COMPRESSED LEFT SIDE</u></p> <p>Check horiz. drive adjustment. Check adjustment of B2 and B3. Check by substitution V19, V20 and V21. Check T3, T5A, C86, C87 and other associated components.</p> <p><u>FOLDS</u></p> <p>Check by substitution V19, V20 and V21. Check T3, T5A and other associated components.</p> <p><u>XMAS TREE EFFECT</u></p> <p>Substitute V19. Check C81, C83 and other components associated with V19.</p>	If Satisfactory	If Unsatisfactory	Check C86, C87, C90, C91, T3, T5A, R108 and other associated components.	Check C82, C83, C84, C85, R103, R104, R106, R101, R100, R6 and other associated components.	<p><u>LOSS OF SWEEP</u></p> <p>Substitute V17. Check waveform W11.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check T4 and T5B.</td><td>Check C71, C72, C68, C69, R88, R81 and other associated components.</td></tr> </table> <p><u>INSUFFICIENT SWEEP</u></p> <p>Substitute V17. Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".</p> <p><u>COMPRESSED AT BOTTOM</u></p> <p>Substitute V17. Check R81, R9, C70, R85, C72 and other associated circuit components.</p> <p><u>COMPRESSED AT TOP</u></p> <p>Substitute V17. Check C2B, T4, T5B, R8 and other associated components.</p> <p><u>FOLDS</u></p> <p>Substitute V17. Check associated circuit components.</p>	If Satisfactory	If Unsatisfactory	Check T4 and T5B.	Check C71, C72, C68, C69, R88, R81 and other associated components.
If Satisfactory	If Unsatisfactory								
Check C86, C87, C90, C91, T3, T5A, R108 and other associated components.	Check C82, C83, C84, C85, R103, R104, R106, R101, R100, R6 and other associated components.								
If Satisfactory	If Unsatisfactory								
Check T4 and T5B.	Check C71, C72, C68, C69, R88, R81 and other associated components.								

SYNC

HORIZONTAL	VERTICAL								
<p><u>LOSS OF SYNC</u></p> <p>Check by substitution V18 and V19. Check waveform W14.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check components associated with V18 and V19 especially R98, R97, R95, R99, C76, C77, C79 and C80.</td><td>Check C74, C75, R92 and R93.</td></tr> </table> <p><u>CRITICAL HOLD</u></p> <p>Check by substitution V18 and V19. Check adjustment of B1. Follow procedure outlined under "Loss of Sync".</p> <p><u>HORIZONTAL BENDING OR S-ING</u></p> <p>Check by substitution V19, V20, V16 and V8. Check adjustment of sync stability and AGC threshold controls. Check C1A and C2A.</p>	If Satisfactory	If Unsatisfactory	Check components associated with V18 and V19 especially R98, R97, R95, R99, C76, C77, C79 and C80.	Check C74, C75, R92 and R93.	<p><u>LOSS OF SYNC</u></p> <p>Check by substitution V16, V8 and V17. Check waveform W9.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check components associated with V17 especially C68 and T2.</td><td>Check vert. integrator network C67, C63 and other components associated with V16 and V8.</td></tr> </table> <p><u>CRITICAL HOLD</u></p> <p>Substitute V17, V16 and V8. Check adjustment of sync stability and AGC threshold controls. Proceed as outlined under "Loss of Sync".</p> <p><u>TRIGGERING</u></p> <p>Check by substitution V17, V16 and V8. Check circuit near these stages for filament lead dress.</p>	If Satisfactory	If Unsatisfactory	Check components associated with V17 especially C68 and T2.	Check vert. integrator network C67, C63 and other components associated with V16 and V8.
If Satisfactory	If Unsatisfactory								
Check components associated with V18 and V19 especially R98, R97, R95, R99, C76, C77, C79 and C80.	Check C74, C75, R92 and R93.								
If Satisfactory	If Unsatisfactory								
Check components associated with V17 especially C68 and T2.	Check vert. integrator network C67, C63 and other components associated with V16 and V8.								

VIDEO

<p><u>LOSS OF VIDEO</u></p> <p>Check by substitution V7, V8 and V9. Check picture tube and other associated components especially coupling capacitors and plate load resistors.</p> <p><u>SOUND BARS (4.5 MC BEAT)</u></p> <p>Check alignment of local oscillator. Check adjustment of 4.5 MC trap (A11). Check video IF alignment.</p> <p><u>NEGATIVE PIX</u></p> <p>Check by substitution V7, V8, V9 and V10. Check setting of the AGC threshold control. Check picture tube and other associated circuit components.</p>	<p><u>POOR CONTRAST</u></p> <p>Check by substitution V1, V4, V5, V6, V7, V8 and V9. Check associated circuit components. Check picture tube.</p> <p><u>SMEAR</u></p> <p>Check by substitution V7, V8 and V9. Check L16, L20 and L21. Check C41, C43 and C44. Check R41, R42, R44 and R45 for change of value. Check picture tube and other associated components.</p> <p><u>WIDE BLACK BAR ACROSS PIX</u></p> <p>Check tuner, video IF, video detector and video amplifier tubes for heater to cathode leakage.</p>
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AUDIO

<p><u>WEAK OR NO SOUND</u></p> <p>Check by substitution V11, V12, V13, V14 and V15. Check stages of V14 and V15 using audio signed generator. Apply signal across R63.</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 V14 and V15 especially C61.</td></tr> </table>	If Satisfactory	If Unsatisfactory	Check ratio detector and audio IF alignment and components.	Check components associated with V14 and V15 especially C61.	<p><u>BUZZ</u></p> <p>Realign audio IF and ratio detector following procedure outlined in the alignment section. If buzz is still objectionable substitute V13 and readjust A9 and A10. Check C54 and C7.</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 V14 and V15 especially C61.				

TROUBLE SHOOTING AIDS (cont)

POWER

<p><u>DEAD SET</u></p> <p>If filaments fail to light check AC interlock assembly, switch on volume control and T1. If filaments light check M1, V23, V24 and B+ filter and decoupling network components.</p>	<p><u>SMALL PIX AND / OR DIM RASTER</u></p> <p>Substitute V23 and V24. Check B+ filter and decoupling network components.</p>
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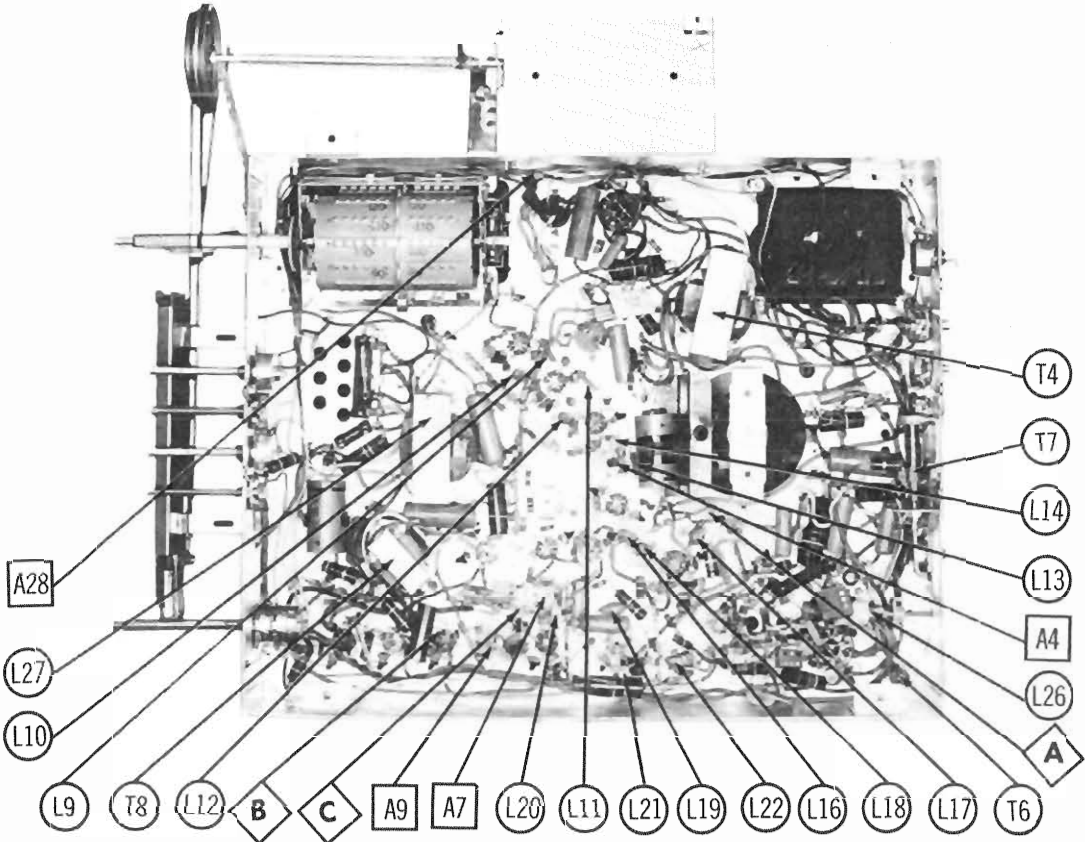
HIGH VOLTAGE

<p><u>LOSS OF HIGH VOLTAGE</u></p> <p>Check by substitution V19, V20, V21 and V22. Check waveform W17.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check R109, R110, C92, T3, T5A and other associated components.</td><td>Check C82, C84, C85, R103, R104, R106 and other associated components.</td></tr> </table>	If Satisfactory	If Unsatisfactory	Check R109, R110, C92, T3, T5A and other associated components.	Check C82, C84, C85, R103, R104, R106 and other associated components.	<p><u>INSUFFICIENT HIGH VOLTAGE</u></p> <p>Check by substitution V19, V20, V21, V22, V23 and V24. Check picture tube and associated components.</p> <p><u>BLOOMING</u></p> <p>Check by substitution V19, V20, V21, V22, V23 and V24. Check R109, R110, C92, T3, T5A, picture tube and other associated components.</p>
If Satisfactory	If Unsatisfactory				
Check R109, R110, C92, T3, T5A and other associated components.	Check C82, C84, C85, R103, R104, R106 and other associated components.				

GENERAL

<p><u>RASTER SOUND NO PIX</u></p> <p>See "Loss of Video".</p> <p><u>RASTER NO SOUND NO PIX (VHF)</u></p> <p>Substitute V1, V2, V4, V5, V6 and V7. Check associated components.</p> <p><u>RASTER NO SOUND NO PIX (UHF)</u></p> <p>Substitute V1, V2, V3, V4, V5, V6 and V7. Check associated components. NOTE! It may be necessary to try several tubes in the UHF tuner to find one that will operate satisfactory.</p>	<p><u>NO RASTER NO SOUND</u></p> <p>See "Dead Set".</p> <p><u>TOTAL LOSS OF SYNC</u></p> <p>Check by substitution V16 and V8. Check associated components.</p> <p><u>INTERMITTENT STREAKS</u></p> <p>Check high voltage section for corona discharge and arcing.</p>
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Symptoms shown are assumed and are not indicative of the quality and workmanship of this receiving equipment.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

MODELS 321MS39-322, -372-2, -376-1, 2321MS39-324, -370, -396-1

WELLS GARDNER

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 C)	Wells-Gardner PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.
L27	.270ADC	42Ω	1.68 Hy.	52X91	C-2326 ①	C-2996 ①	TR-1733 ①	C-17X ①

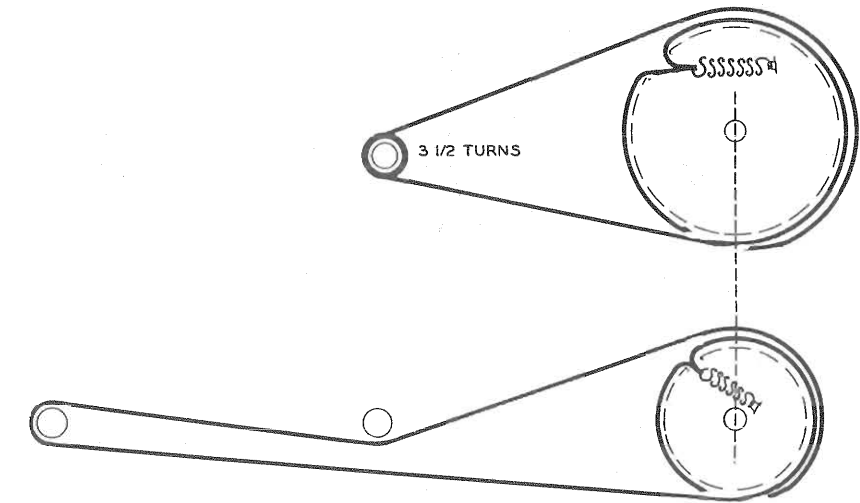
① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Wells-Gardner PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	4/10A 125V	16X147-3	16X146	313.400 (4/10A-125V)	357001	MDL4/10	4405

MISCELLANEOUS

ITEM No.	PART NAME	Wells-Gardner PART No.	NOTES
M2	Dial Light	7A32	Type #51 - Channel Indicator
M3	Dial Light	7A32	Type #51 - UHF Dial
M4	VHF Tuner	25A-1104	
M5	UHF Tuner	25A-1105	
M6	Trap, UHF Filter		
M7	Crystal		IN72 (IN82 may be used) UHF tuner
M8	Magnet	2A426	Focus and centering
M9	Magnet	2A407	Ion Trap
	Back Cover	S-14X69	
	Dial Glass	58X768	
	Knob	10A820-1	UHF
	Knob	10A821-1	Fine tuning (Maroon)
	Knob	10A822-1	Contrast (Maroon)
	Knob	10A779	Channel Selector (Maroon)
	Knob	10A820-2	Volume (Maroon)
	Knob	10A821-3	Fine tuning (Beige)
	Knob	10A822-3	Contrast (Beige)
	Knob	10A822-3	Channel Selector (Beige)
	Knob	10A812-4	Volume (Beige)



UHF DIAL CORD STRINGING

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RTMA BASE TYPE	NOTES
		Wells-Gardner PART No.	STANDARD REPLACEMENT		
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2A	RF Amplifier	6BQ7A	6BQ7A	9AJ	
B	RF Amplifier	6BZ7	6BZ7	9AJ	
V3	Converter	6J6	6J6	7BF	
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	Video Detector-DC Restorer	6AL5	6AL5	6BT	
V8	Video Amplifier	12AT7	12AT7	9A	
V9	Sync Phase Inv.	6AH6	6AH6	7BK	
V10	Video Output	6AU6	6AU6	7BK	
V11	AGC Keying	6AU6	6AU6	7BK	
V12	1st. Sound IF Amp.	6AU6	6AU6	7BK	
V13	Limiter	6AL5	6AL5	6BT	
V14	Ratio Detector	6AL5	6AL5	6BT	
V15	AF Amplifier	6AV6	6AV6	7BT	
V16	AGC Clamper	6AQ5	6AQ5	7BZ	
V17	Audio Output	6BE6	6BE6	7CH	
V18	Sync Separator	6SN7GTA	6SN7GTA	8BD	
V19	Vert. Oscillator - Vert. Output	6AL5	6AL5	6BT	
V20	Horiz. AFC	6SN7GTA	6SN7GTA	8BD	
V21	Horiz. Mult.	6BQ6GT	6BQ6GT	6AM	
V22	Horiz. Output	6AX4GT	6AX4GT	4CG	
V23	Damper	1B3GT	1B3GT	3C	
V24	HV Rectifier	5U4G	5U4G	5T	
V25	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA			RTMA BASE TYPE	NOTES
	Wells-Gardner PART No.	SYLVANIA PART No.	GENERAL ELECTRIC PART No.		
V25	21MP4	21MP4	21MP4	12C	

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	Wells-Gardner PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	.80	400	45X390	AFH3-46		CO37		FP378	R1341	
B	.60	400								
C2A	.80	400	45X391	AFH3-142		C109		FP375	TVL-3764	
B	.100	50								
C3	.30	400	45X393	PRS450/30		BR3045A		TC77	TVA-1711	
C4	.5	25	45X378	PRS150/4		BR550		TC30	TVA-1203	
C5A	.20	400	45X392	AFH3-137		CO97		FP366	TVL-3751	
B	.10	400								
C	.40	50								
C6	.30	400	45X393	PRS450/30		BR3045A		TC77	TVA-1711	
C7	.5	25	45X378	PRS150/4		BR550		TC30	TVA-1203	
C8	.4	100	45X361	PRS150/4		BR415		TC40	TVA-1402	
C9	3-9		31B-207		829-10					
C10	1000		13D-153	EF-001	MFT-1000					
C11	.3		CD8C3R6C	SI3NP0						
C12	.5-3		31B-206		829-3					
C13	.47		CD8Q470K	BPD-000047	D6-470		GPIK-470	CT565A	UC-5447	5GA-Q47
C14	1000		13D-196	EF-001	MFT-1000					
C15	1000		CD8X102Z	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C16	1.5		CD8CIR5M	SHL5NP0	TCZ-1.5		NP0K-IR5	ZT-5515	5TCCB-V15	
C17	1000		13D-153	EF-001	MFT-1000					
C18	.47		CD8Q470K	BPD-000047	D6-470		GPIK-470	CT565A	UC-5447	5GA-Q47
C19	.5-3		31B-206		829-3					
C20	.10		CD10C100K	SH0NP0	TCZ-10		NP0K-100	ZT-541	5TCC-Q1	
C21	.5		CD8U050C	ST5N750	TCN-5		N750K-050		5TCUB-V5	
C22	1000		CD8X102Z	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C23	.6.8		CD8C8R6C	SH6.8NP0	TCZ-6.8		NP0K-6R8	ZT-5568	5TCCB-V68	
C24	1000		13D-153	EF-001	MFT-1000					
C25	1000		13D-153	EF-001	MFT-1000					
C26	120		13D-055	BPD-00012	D6-121	TM5T12	GP2K-121	UC-5312	5GA-T12	
C27	.22	200	RCPI0M2224M	P488-22		PTE4P22		PT4025	2TM-P22	
C28A	1000		80X3	BPD-2X001	DD2-102	TM5DD1	812-001	DCD-521	5HK-2D1	
B	1000									
C29	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C30	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C31	.22	200	RCI0M2224M	P488-22		PTE4P22		PT 4025	2TM-P22	
C32A	1000		80X3	BPD-2X001	DD2-102	TM5DD1	812-001	DCD-521	5HK-2D1	
B	1000									
C33	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C34	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C35	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C36	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C37	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C38	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C39	.47		47X603	SH47	D6-470		GPIK-470	CT565A	UC-5447	5GA-Q47
C40	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C41	.5		47X562	SH5NP0	TCZ-4.7		NP0K-050	ZT-555	5TCCB-V47	
C42	.360	500	47X568							
C43	.047	400	RCPI0M4473M	P488-047	DF-503	PTE4847		PT4147	4TM-547	
C44	.1	400	RCPI0M4104M	P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C45	.047	600	RCPI0M6473M	P668-047	DF-503	PTE6847		PT6147	6TM-547	
C46	.015	600	RCPI0M6153M	P668-015		PTE6815		PT6115	6TM-515	
C47	.1	200	RCPI0M2104M	P288-1	DF-104	P12P1		PT401	2TM-P1	
C48	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	

MODELS 321MS39-322, -372-2, -376-2, 2321MS39-324, -370, -396-1

WELLS GARDNER

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING	REPLACEMENT DATA							NOTES
		Wells-Gardner PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C49	1.5	47X584	SIL 5NP0	TCZ-1.5	TM5D5	NPUK-IR5	2T-5815	5TCCB-V18	Note 1
C50	5000	47X507	BPD-005	MD-502	TM5D5	81L-005	5HK-D5	5HK-D5	
C51	100	47X604	SIL100	D8-101	TM5T1	GPIK-101	UC-531	5GA-T1	
C52	5000	47X507	BPD-005	MD-502	TM5D5	81L-005	5HK-D5	5HK-D5	
C53	5000	47X507	BPD-005	MD-502	TM5D5	81L-005	5HK-D5	5HK-D5	
C54	1000	80X1	BPD-001	DD-102	TM5D1	80L-001	5HK-D1	5HK-D1	
C55	470	47X525	1469-0005	DF-503	5R5T5	MCB245	MS-35	MS-35	
C56	.047	600	RCPI0M2473M	P688-047	D6-472	PTE6D47	PT6147	6TM-547	
C57	.0047	400	RCPI0M4472M	P688-0047	D6-472	PTE6D47	PT6147	6TM-547	
C58	.0047	400	RCPI0M4472M	P688-0047	D6-472	PTE6D47	PT6147	6TM-547	
C59	.01	400	RCPI0M4103M	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	Note 1
C60	.047	400	RCPI0M4473M	P488-047	DF-503	PTE4S47	PT4147	4TM-547	
C61A	.01	250	76X5	7PA-112-3	7PC-80	71404-01	7102C1		
C62	.0047	600	RCPI0M6472M	P688-0047	D6-472	PTE6D47	PT6147	6TM-547	
C63	.01	400	RCPI0M4103M	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	
C64	1000	80X1	BPD-001	DD-102	TM5D1	80L-001	5HK-D1	5HK-D1	
C65	.047	400	RCPI0M4473M	P488-047	DF-503	PTE4S47	PT4147	4TM-547	
C66A	.005	400	76X7	7PA-110	7PC-100	71405-01	7101C1		
C67	4700	500	47X543	1464-005	D6-472	PTE6D47	PT6147	6TM-547	
C68	.0047	400	RCPI0M4472M	P688-0047	D6-472	PTE6D47	PT6147	6TM-547	
C69	100	600	47X604	SIL100	D6-101	TM5T1	UC-531	5GA-T1	Note 1
C70	.01	600	RCPI0M6103M	P688-01	D6-103	PTE4S1	GP2-333-103	PT411	
C71	.047	600	RCPI0M6473M	P688-047	DF-104	PTE6P1	PT6147	6TM-547	
C72	.1	600	RCPI0M6104M	P688-1	DF-104	PTE6P1	PT6147	6TM-547	
C73	.1	600	RCPI0M6104M	P688-1	DF-104	PTE6P1	PT6147	6TM-547	
C74	1000	80X1	BPD-001	DD-102	TM5D1	80L-001	5HK-D1	5HK-D1	
C75	1000	80X1	BPD-001	DD-102	TM5D1	80L-001	5HK-D1	5HK-D1	
C76	.01	400	RCPI0M4103M	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	
C77	270	500	RCM20A271K	P488-0047	D6-472	PTE6D47	PT6147	6TM-547	
C78	.0047	400	RCPI0M4472M	P688-0047	D6-472	PTE6D47	PT6147	6TM-547	
C79	22	200	RCPI0M2224M	P488-22	DF-503	PTE4S47	PT4147	4TM-547	Note 1
C80	.047	200	RCPI0M2473M	P288-047	DF-503	PTE4S47	PT4147	4TM-547	
C81	4700	500	47X543	1464-005	DF-104	PTE4P1	PT401	4TM-P1	
C82	430	500	RCM20B431K	P488-1	DF-104	PTE4P1	PT401	4TM-P1	
C83	.1	400	RCPI0M4104M	P488-1	DF-104	PTE4P1	PT401	4TM-P1	
C84	330	500	47X570	1469-00035	DF-104	PTE4P1	PT401	4TM-P1	
C85	200	500	RCM20A201K	P488-0002	DF-104	PTE4P1	PT401	4TM-P1	
C86	.047	400	RCPI0M4473M	P488-047	DF-503	PTE4S47	PT4147	4TM-547	
C87	1000	80X1	BPD-001	DD-102	TM5D1	80L-001	5HK-D1	5HK-D1	
C88	.1	400	RCPI0M4104M	P488-1	DF-104	PTE4P1	PT401	4TM-P1	
C89	.047	400	RCPI0M4473M	P488-047	DF-503	PTE4S47	PT4147	4TM-547	
C90	.15	400	RCPI0M4154M	P488-1	DF-104	PTE4P1	PT401	4TM-P1	Note 1
C91	.1	200	RCPI0M4104M	P288-1	DF-104	PTE4P1	PT401	4TM-P1	
C92	500	20000	47X560	HV20C	MM-C20T5	413-501	HV20035A		
C93	56	1500	47X581	DD-103	TM5S1	81L-01	DC-511	5HK-S1	
C94	10000	47X61	BPD-01	DD-103	TM5S1	81L-01	DC-511	5HK-S1	
C95	10000	47X61	BPD-01	DD-103	TM5S1	81L-01	DC-511	5HK-S1	

Note 1: When using Ratio Det. Transformer part #9A2295, C54 is 3700MFM (part #47X570)

† Items C61A, C61B, C61C, R64A, R64B are combined in one unit.

‡ When replacing items separately C61B and C61C should total 250MFM.

* Items C66A, C66B, C66C, R78A, R78B, R78C are combined in one unit.

RESISTORS (cont)

ITEM No.	RATING	REPLACEMENT DATA		NOTES
		Wells-Gardner PART No.	IRC PART No.	
R39	1500Ω	B84152	BTS-1500	5%
R40	4700Ω	B83472	BTS-4700	
R41	5000Ω	C84562	BTA-5600	
R42	1500Ω	B84152	BTS-1500	
R43	33KΩ	B84333	BTS-33K	
R44	1Meg	B84105	BTS-1Meg	
R45	100Ω	B84101	BTS-100	
R46	4700Ω	C83472	BTA-4700	
R47	100KΩ	B85104	BTS-100K	
R48	1Meg	B84105	BTS-1Meg	
R49	22KΩ	B84223	BTS-22K	5%
R50	100KΩ	B85104	BTS-100K	
R51	47KΩ	B84573	BTS-47K	
R52	100Ω	B84101	BTS-100	
R53	1000Ω	B85102	BTS-1000	
R54	56KΩ	B84563	BTS-56K	
R55	100KΩ	B84104	BTS-100K	
R56	1000Ω	B85102	BTS-1000	
R57	33KΩ	B84333	BTS-33K	
R58	270Ω	B84271	BTS-270	
R59	68KΩ	B84683	BTS-68K	
R60	22KΩ	B84223	BTS-22K	
R61	22KΩ	B84223	BTS-22K	
R62	68KΩ	B84683	BTS-68K	
R63	10Meg	B85106	BTS-10Meg	
R64A	470KΩ	B76X5	BTS-470K	
B	470KΩ		BTS-470K	
R65	47KΩ	B84573	BTS-47K	
R66	330Ω	C84331	BTA-330	
R67	1000Ω	B84102	BTS-1000	
R68	47KΩ	B84473	BTS-47K	
R69	10KΩ	B84103	BTS-10K	
R70	270KΩ	B84274	BTS-270K	
R71	1.5Meg	B84155	BTS-1.5Meg	
R72	68KΩ	B84683	BTS-68K	
R73	820KΩ	B84824	BTS-820K	
R74	2200Ω	B83222	BTS-2200	
R75	3300Ω	B84332	BTS-3300	
R76	2200Ω	B83222	BTS-2200	
R77	1000Ω	C84102	BTA-1000	

ITEM No.	RATING	REPLACEMENT DATA		NOTES
		Wells-Gardner PART No.	IRC PART No.	
R78A	22KΩ		BTS-22K	
B	8200Ω	J76X7	BTS-8200	
	8200Ω		BTS-8200	
R79	1.8Meg	B84185	BTS-1.8Meg	
R80	470KΩ	B84474	BTS-470K	
R81	1.8Meg	B84185	BTS-1.8Meg	
R82	2.2Meg	B84225	BTS-2.2Meg	
R83	180KΩ	B84184	BTS-180K	
R84	10KΩ	B84103	BTS-10K	
R85	2.2Meg	B84225	BTS-2.2Meg	
R86	820Ω	B84821	BTS-820	
R87	2200Ω	B84222	BTS-2200	
R88	6800Ω	B84682	BTS-6800	
R89	560Ω	B84561	BTS-560	
R90	560Ω	B84561	BTS-560	
R91	1000Ω	B85102	BTS-1000	
R92	100KΩ	B84104	BTS-100K	
R93	100KΩ	B84104	BTS-100K	
R94	4.7Meg	B84475	BTS-4.7Meg	
R95	470KΩ	B84474	BTS-470K	
R96	27KΩ	B84273	BTS-2700	
R97	6800Ω	C84682	BTA-6800	
R98	6800Ω	C84682	BTA-6800	
R99	33KΩ	B84333	BTS-33K	
R100	2200Ω	B83222	BTS-2200	
R101	5600Ω	C83562	BTA-5600	
R102	150KΩ	B83154	BTS-150K	
R103	220KΩ	B83224	BTS-220K	
R104	47KΩ	B84473	BTS-47K	
R105	5600Ω	B84562	BTS-5600	
R106	470KΩ	B84473	BTS-470K	
R107	100Ω	D84101	BW-2400	
R108	12KΩ	543X276	1 3/4A-12K	
R109	5.1Ω	47X239		
R110	1Meg	C85105		
R111	100KΩ	D85104	BTA-100K	
R112	10KΩ	543X272	1 3/4A-10K	
R113	1500Ω	15 43X275	2D-1500	
R114	330Ω	10 43X273	1 3/4A-350	
R115	270KΩ	B85274	BTS-270K	

† Items R64A, R64B, C61A, C61B, C61C are combined in one unit.

‡ Items R78A, R78B, R78C, C66A, C66B, C66C are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	Wells-Gardner PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	RCA TYPE No.
T1	117VAC ④ 2A	582VCT .279ADC	5VAC ④ 6A	6.3VAC ④ 1.2A SEC. 4 6.3VAC ④ 0.5A	53X333					

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING		REPLACEMENT DATA						NOTES	
	DC RESISTANCE		Wells-Gardner Part No.	STANCOR Part No.	MERIT Part No.	CHICAGO Part No.	TRIAD Part No.	RCA TYPE No.		
	PRI.	SEC.								
T2	150Ω	1100Ω	54X8 53X330	A-8125	A-3003 HVO-91 (2) & MWC-1	TBO-5 TFB-181 (3) & TW-6	A-97X D-2211 (4) & WC-11	209T1 (5) 232T1 (6) & 212R1	Vert. Osc. Trans. Horiz. Output Trans.	
T3	469Ω tap (1), 5Ω, 70, 140, 215Ω, 390 1500Ω tap (4), 4.4Ω	50								51X156
T4	232Ω 47Ω									
T5	232Ω 47Ω		9A2262 9A2183							
T6	15Ω	WC-4 (10) MWC-2 (10) (11) TW-7 TW-2 (10) (11)								
T7	5Ω			WC-12 (5) 213R1 201R4 (11)						
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