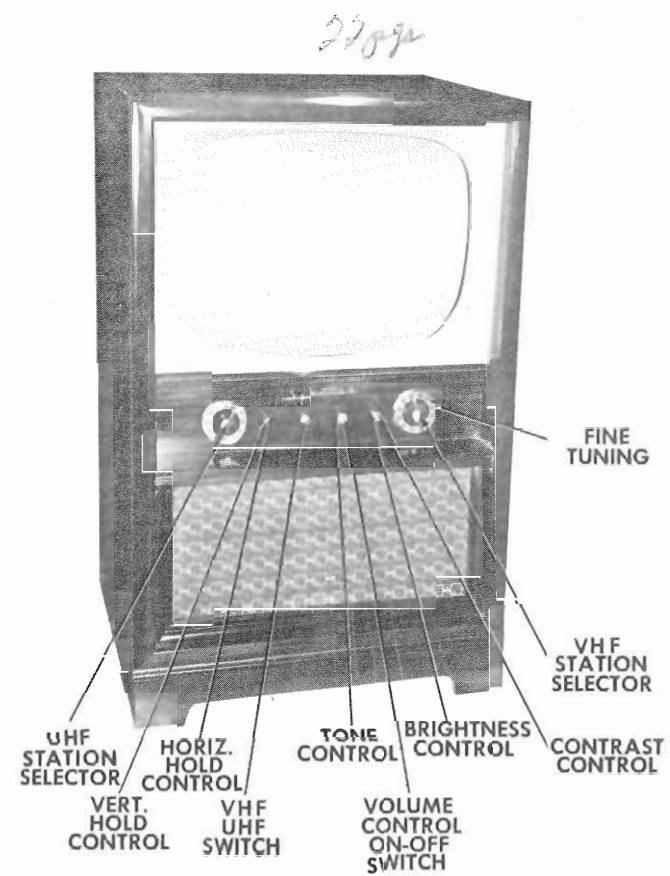


RESISTOR IDENTIFICATION



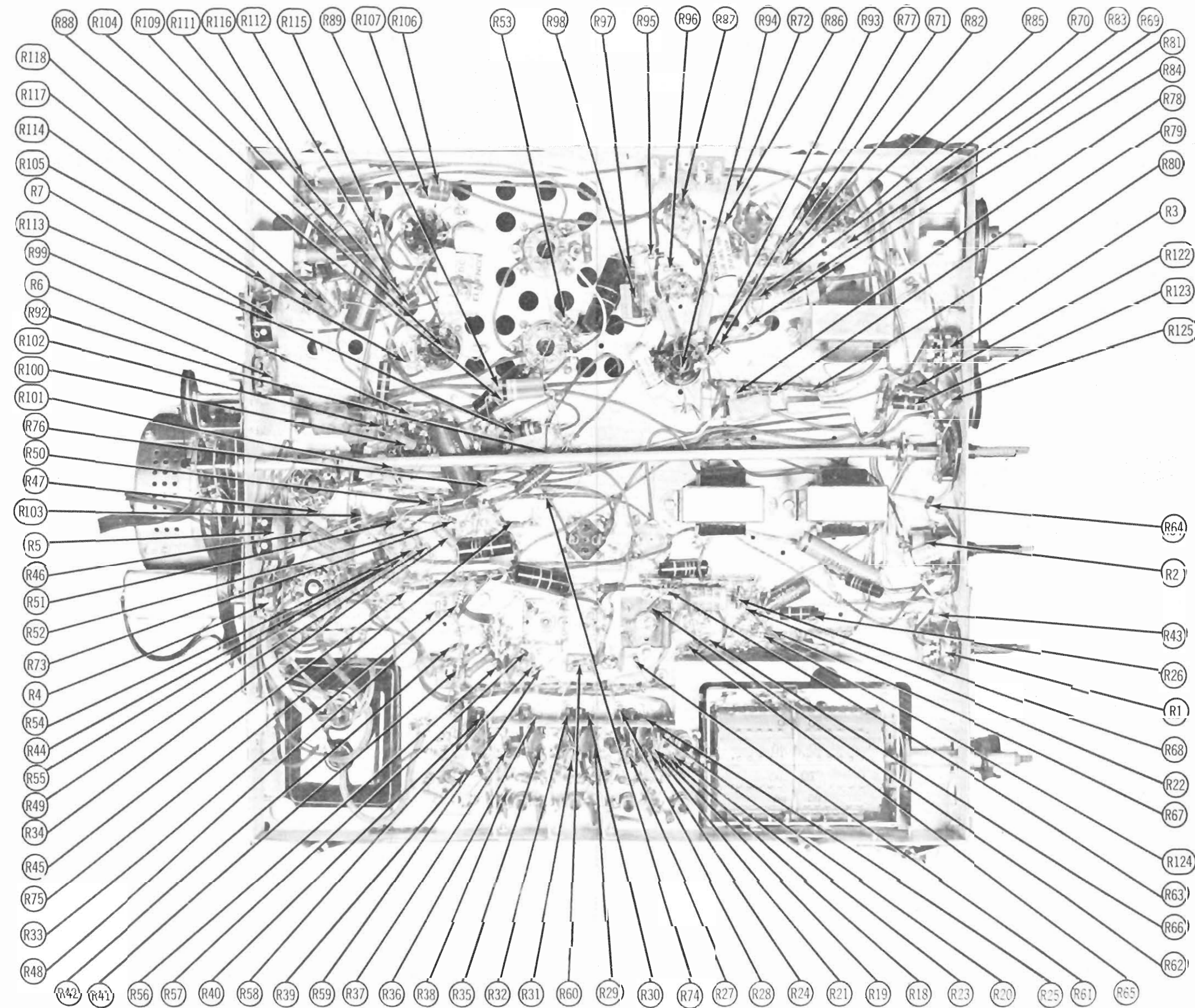
SPARTON MODEL 23322	
TRADE NAME	Sparton Models 22312, 22313, 23322, 23323 (Ch. 29U213)
MANUFACTURER	Sparks-Withington Co., Jackson, Mich.
TYPE SET	Television Receiver
TUBES	Twenty-nine
POWER SUPPLY	110-120 Volts AC-60 cycle
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 26.25MC, Sound IF 21.75MC (Intercarrier)
RATING	2.36Amp. @ 117 Volts
INDEX	
Alignment Instructions	5, 7
Drive Cord Stringing (UHF)	17
Disassembly Instructions	18
Horizontal Sweep Circuit Adjustments	11
Parts List and Descriptions	13 thru 16
Photographs	
Cabinet-Rear View	11
Capacitor Identification	4, 9
Chassis-Top View	3
RF Tuner	10
Photographs (Cont)	
Resistor Identification	19, 20
Trans., Inductor & Alignment Identification	16
Resistance Measurements	8
Servicing in the Field	18
Schematic	2
Trouble Shooting Aids	12, 17
Tube Failure Check Chart	5
Tube Placement Chart (Bottom View)	8
Tube Placement Chart (Top View)	5

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

SPARTON MODELS 22312, 22313, 23322, 23323 (Ch. 29U213)

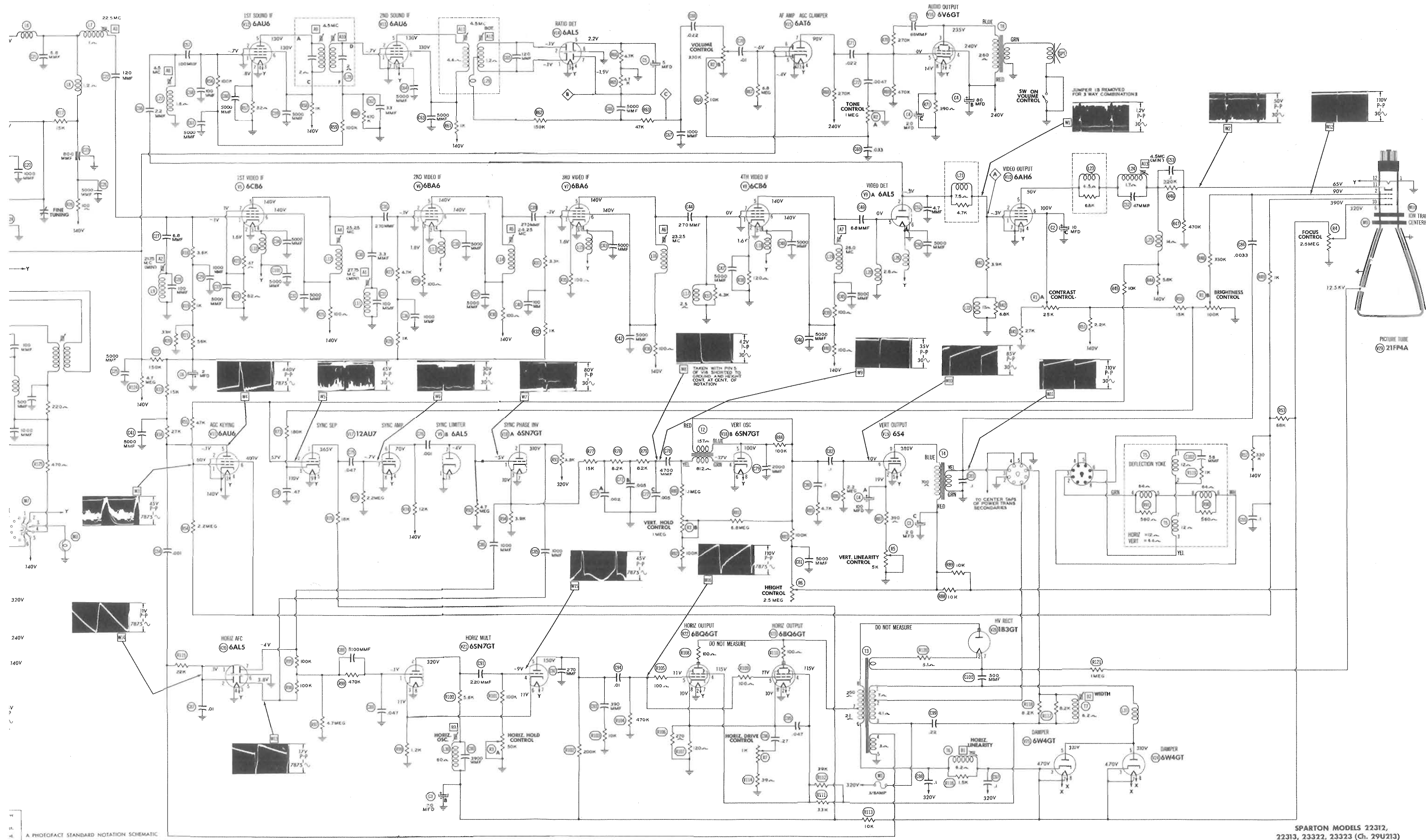


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

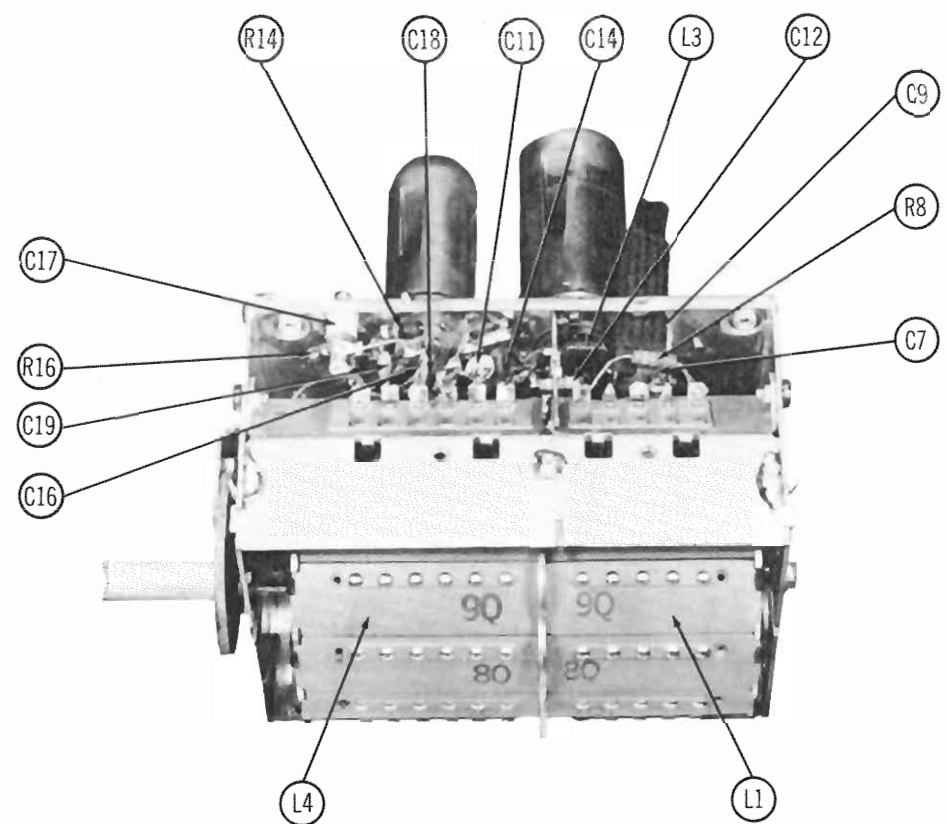
TRADE NAME	Spark
MANUFACTURER	Spark
TYPE SET	Telev
TUBES	Twent
POWER SUPPLY	110-12
TUNING RANGE	Chan
Alignment Instructions	
Drive Cord Stringing (UH	
Disassembly Instructions	
Horizontal Sweep Circuit	
Parts List and Descriptio	
Photographs	
Cabinet-Rear View ..	
Capacitor Identification	
Chassis-Top View ...	
RF Tuner	

HO

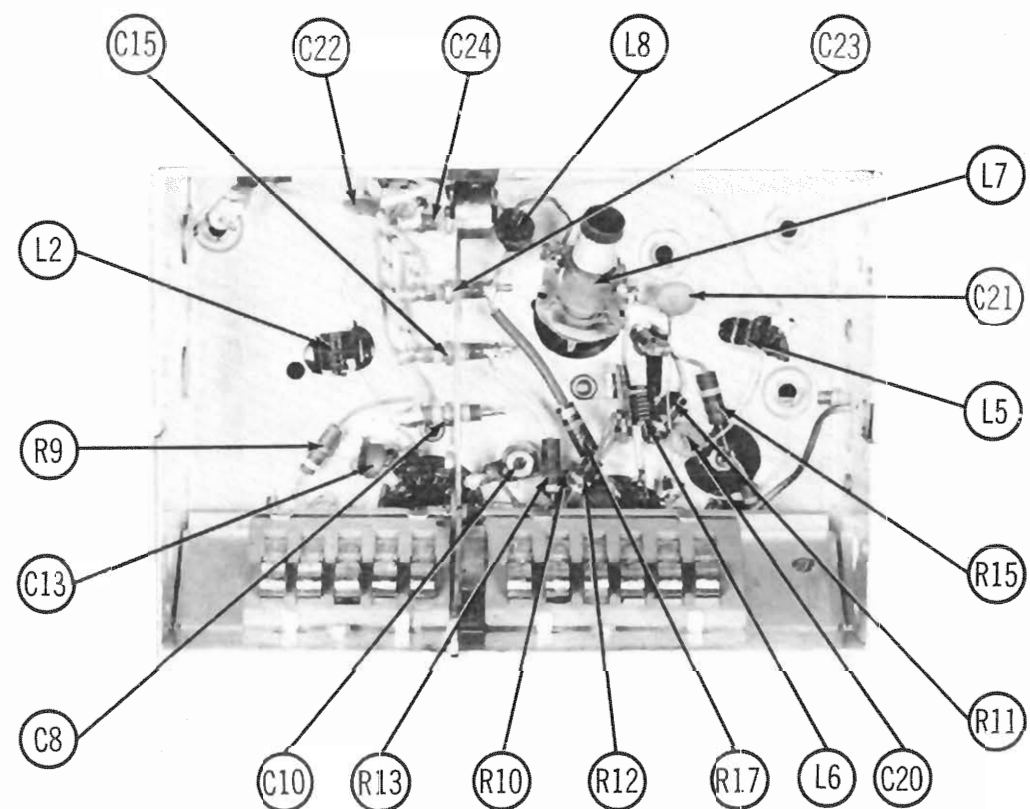
"The listing of any available repla
case a recommendation, warranty
as to the quality and suitability of
parts have been compiled from info
Inc., by the manufacturers of the
"Reproduction or use, without exp



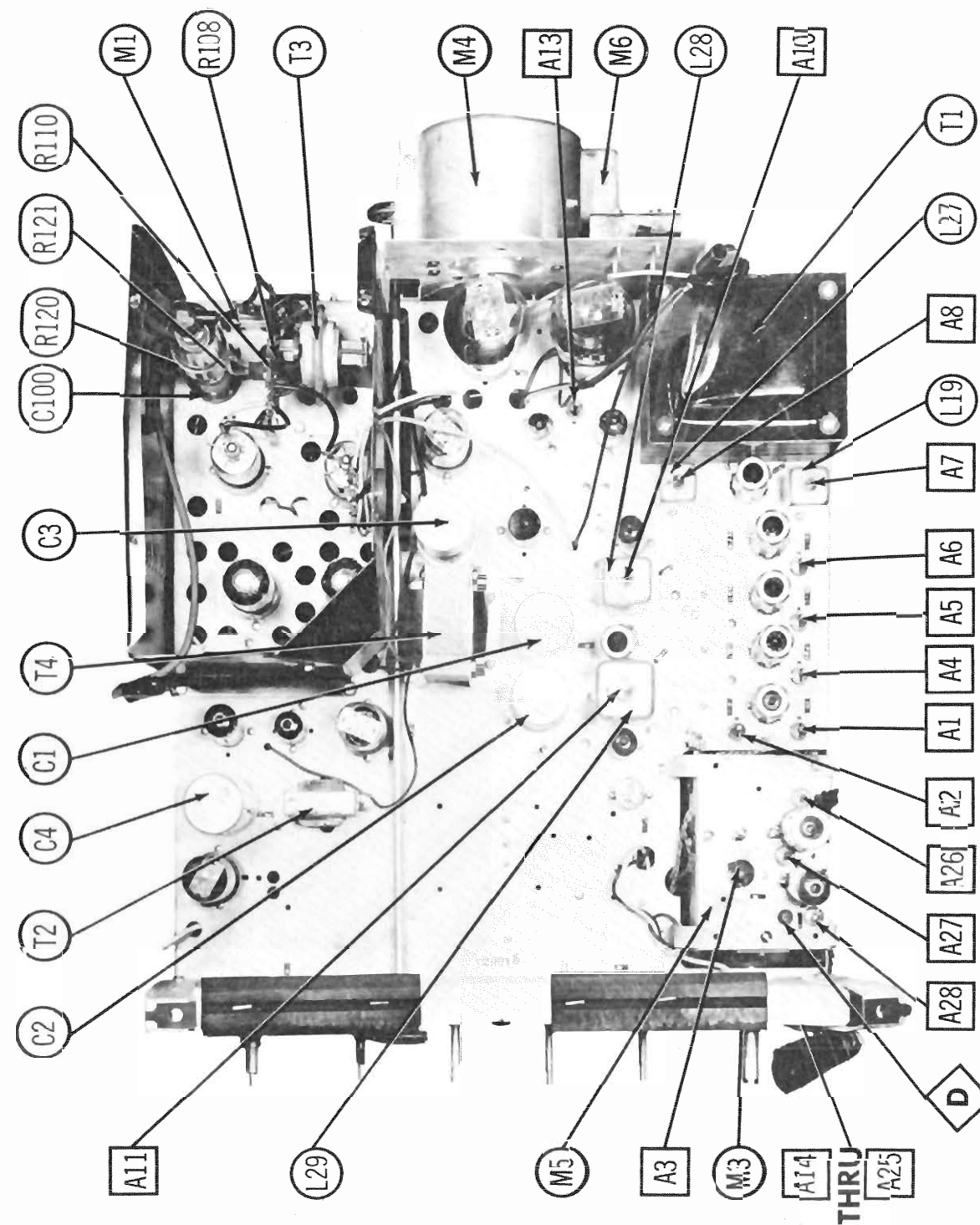
SPARTON MODELS 22312,
22313, 23322, 23323 (Ch. 29U213)



VHF TUNER-RIGHT SIDE

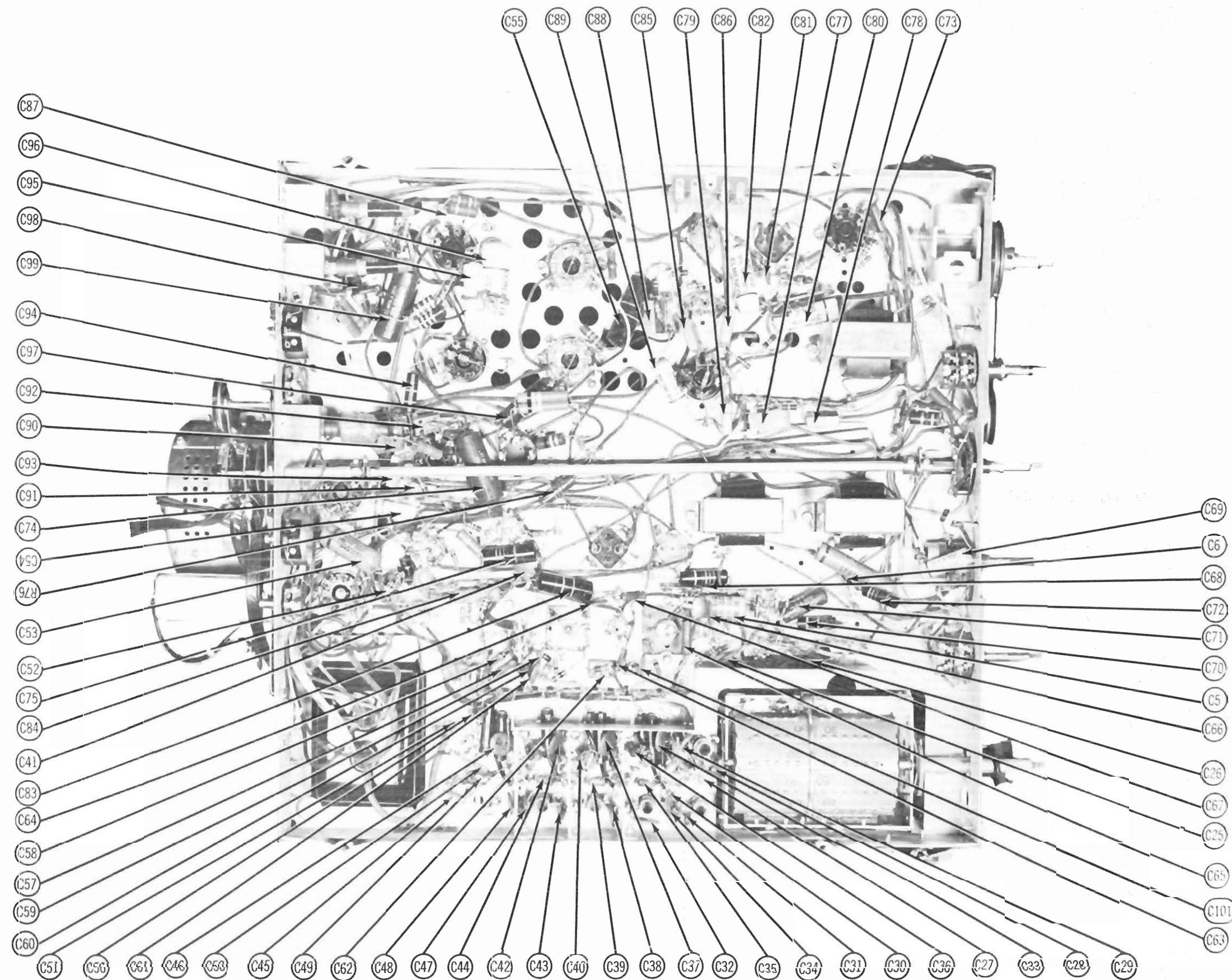


VHF TUNER-BOTTOM VIEW



For tube location see tube placement chart page 5.

**SPARTON MODELS 22312,
22313, 23322, 23323 (Ch. 29U213)**



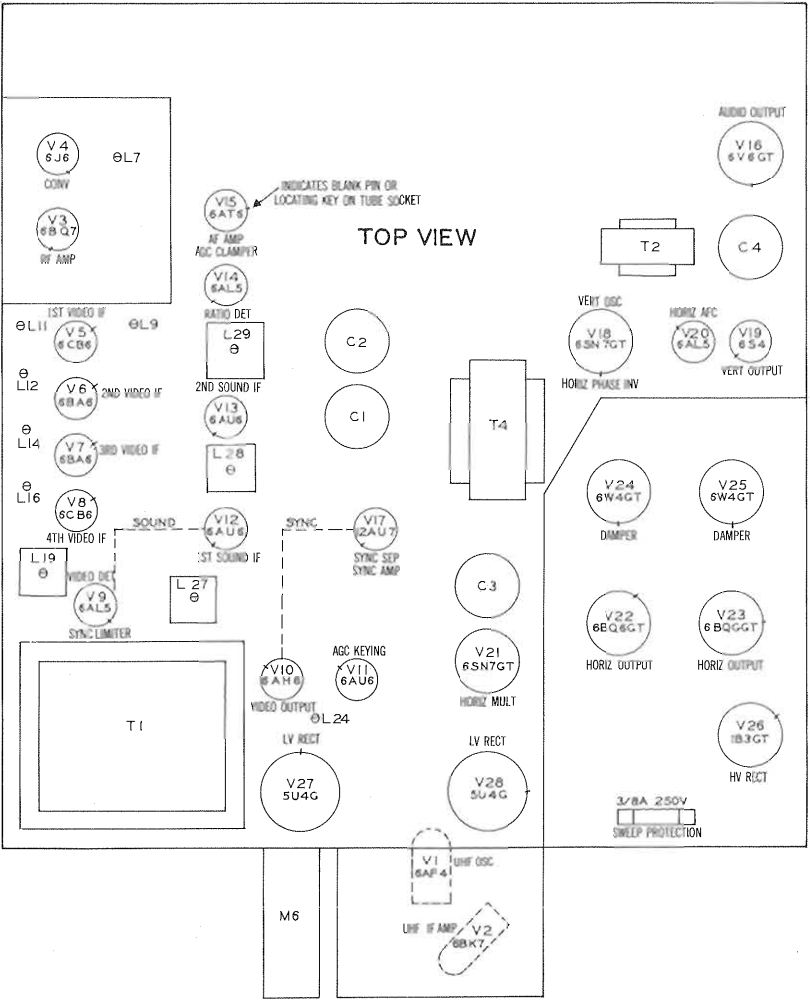
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 3	6BQ7A	INF	260KΩ	0Ω	.1Ω	0Ω	# 3.1KΩ	180KΩ	INF	0Ω
V 4	6J6	↑ 15.3KΩ	↑ 200Ω	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 5	6CB6	38KΩ	130Ω	0Ω	.1Ω	↑ 350Ω	↑ 350Ω	82Ω		
V 6	6BA6	95KΩ	0Ω	0Ω	.1Ω	↑ 350Ω	↑ 350Ω	100Ω		
V 7	6BA6	93KΩ	0Ω	0Ω	.1Ω	↑ 350Ω	↑ 350Ω	100Ω		
V 8	6CB6	2.5Ω	120Ω	0Ω	.1Ω	↑ 450Ω	↑ 350Ω	0Ω		
V 9	6AL5	0Ω	3.9KΩ	0Ω	.1Ω	3Ω	0Ω	4.7Meg		
V 10	6AH6	3.9KΩ	0Ω	0Ω	.1Ω	↑ 5.8KΩ	↑ 502KΩ	0Ω		
V 11	6AU6	↑ 63KΩ	↑ 250Ω	0Ω	.1Ω	130KΩ	▲ 68KΩ	↑ 250Ω		
V 12	6AU6	670KΩ	0Ω	.1Ω	0Ω	↑ 1.2KΩ	↑ 1.2KΩ	82Ω		
V 13	6AU6	470KΩ	0Ω	0Ω	.1Ω	↑ 1.2KΩ	↑ 12. KΩ	0Ω		
V 14	6AL5	INF	INF	0Ω	.1Ω	4.7KΩ	0Ω	4.7KΩ		
V 15	6AT6	6.8Meg	0Ω	0Ω	.1Ω	240KΩ	240KΩ	# 270KΩ		
V 16	6V6GT	INF	.1Ω	# 1.9KΩ	↑ 1.6KΩ	470KΩ	740KΩ	0Ω	390Ω	
V 17	12AU7	▲ 28KΩ	↑ 16KΩ	↑ 200KΩ	.1Ω	.1Ω	# 12KΩ	2.2Meg	0Ω	0Ω-
V 18	6SN7GT	4.7Meg	# 3.4KΩ	3.9KΩ	1.5Meg	↑ 1.4Meg	0Ω	0Ω	.1Ω	
V 19	6S4	INF	1.5KΩ	2.2Meg	.1Ω	0Ω	2.2Meg	INF	INF	▲ 6KΩ
V 20	6AL5	22KΩ	22KΩ	.1Ω	0Ω	4.8Meg	0Ω	4.8Meg		
V 21	6SN7GT	5.2Meg	▲ 16KΩ	1.2KΩ	120KΩ	▲ 210KΩ	1.2KΩ	0Ω	.1Ω	
V 22	6BQ6GT	INF	0Ω	INF	# 20KΩ	470KΩ	470KΩ	.1Ω	90Ω	TOP CAP ▲ 135Ω
V 23	6BQ6GT	INF	0Ω	1.2KΩ	# 20KΩ	470KΩ	INF	.1Ω	90Ω	TOP CAP ▲ 135Ω
V 24	6W4GT	INF	INF	300KΩ	▲ 68KΩ	# 125Ω	INF	300KΩ	300KΩ	
V 25	6W4GT	INF	INF	300KΩ	# 125Ω	# 125Ω	INF	300KΩ	300KΩ	
V 26	1B3GT			PINS 1-8 HAVE INF. RESISTANCE						TOP CAP ▲ 285Ω
V 27	5U4G	0Ω	30KΩ	INF	17Ω	INF	17Ω	INF	30KΩ	
V 28	5U4G	INF	120KΩ	3Ω	26Ω	470KΩ	25Ω	INF	120KΩ	
V 29	21FP4A	0Ω	↑ 380KΩ	PIN 6 ▲ 300KΩ	PIN 10 ▲ 69KΩ	PIN 11 ↑ 180KΩ	PIN 12 .1Ω			

↑ MEASURED FROM PIN 8 OF V27.
MEASURED FROM PIN 2 OF V28.
▲ MEASURED FROM PIN 3 OF V24.
NO RESISTANCE READING OBTAINABLE ON UHF TUNER.

TUBE PLACEMENT CHART



SPARTON MODELS 22312,
22313, 23322, 23323 (Ch. 29U213)

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.

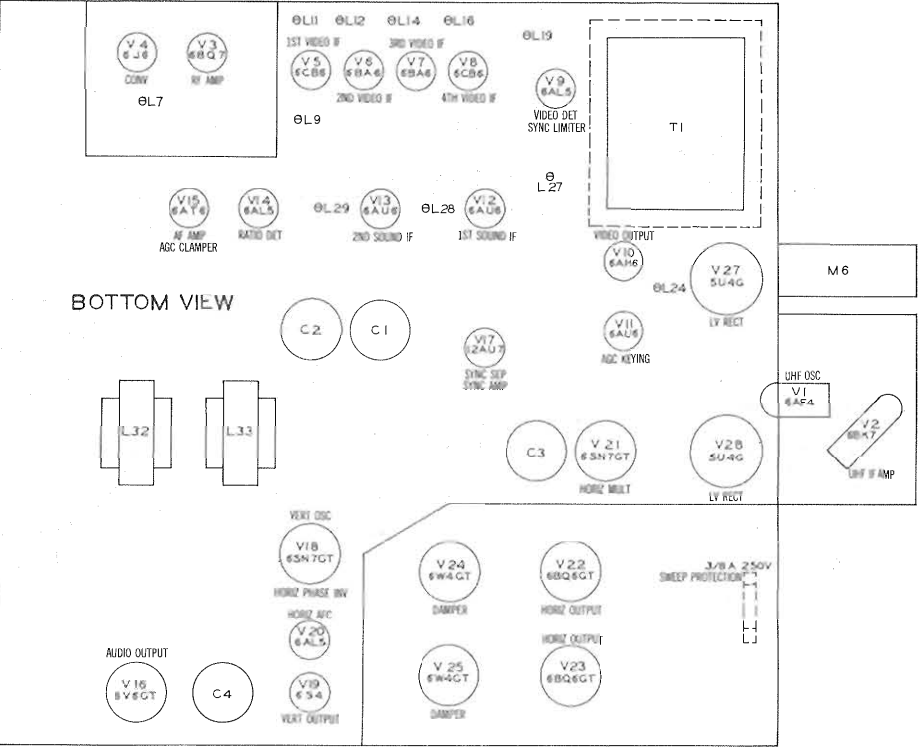
POWER SUPPLY FAILURE
No raster, no sound - V27, V28

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V4, V5, V6, V7, V8, V9 (V1, V2 UHF only)
No pic, no sound, has snow - V3, V4, V5
No pic, has sound, has raster - V10, V29
Has pic, no sound - V12, V13, V14, V15, V16
Overloaded picture - V11, V15

SYNC FAILURE
No vert. sync - V18
No horiz. sync - V18, V20, V21
No vert. or horiz. sync - V9, V17, V18

SWEEP FAILURE
No raster, has sound - V21, V22, V23, V24, V25, V26, V29, Fuse (M1)
No vertical deflection - V18, V19
Poor vert. linearity or foldover - V18, V19
Poor horiz. linearity or foldover - V21, V22, V23, V24, V25
Narrow picture - V21, V22, V23, V24, V25, V26, V27, V28
Vert. off freq. - V18
Horiz. off freq. - V18, V20, V21

TUBE PLACEMENT CHART



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 oscillator tube to disable the high voltage.							
VIDEO IF ALIGNMENT							
Remove the converter tube (V4) from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications. Remove 6AU6 (V11) from its socket. Connect the negative lead of a 4.5 volt bias supply to the ungrounded side of C6. 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.	27.75MC (Unmod)	Any	DC probe to point Δ A. Common to chassis.	A1	Adjust for MINIMUM deflection.	
2. "	"	21.75MC	"	"	A2	"	
3. "	"	22.5MC	"	"	A3	Adjust for maximum deflection.	
4. "	"	25.25MC	"	"	A4	"	
5. "	"	24.25MC	"	"	A5	"	
6. "	"	23.25MC	"	"	A6	"	
7. "	"	26.0MC	"	"	A7	"	
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
8. Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24.0MC (10MC Swp)	22.7MC 25.5MC 26.25MC	Any	Vert. Amp. thru 47K Ω to point Δ A. Low side to chassis.		Check for response similar to Fig.1. If necessary, retouch A3 thru A7 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	
9. .001MFD	High side to point Δ A. Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point Δ B. Common to chassis.	A8, A9 A10, A11	Adjust for maximum deflection.	
10. "	"	"	"	DC probe to point Δ C. Common to chassis.	A12	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 120% sawtooth voltage in scope for horizontal deflection.							
DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9. .001MFD	High side to point Δ A. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point Δ B. Low side to chassis.	A8, A9, A10, A11	Disconnect stabilizer capacitor C5. Adjust for curve of maximum amplitude and symmetry as in Fig. 2.
10. "	"	"	"	"	Vert. Amp. to point Δ C. Low side to chassis.	A12	Reconnect stabilizer capacitor C5. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. SLIGHTLY retouch A11 for maximum amplitude and straightness of crossover lines.
4.5MC TRAP ALIGNMENT							
DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS	
11. .001MFD	High side to point Δ A. Low side to chassis.	4.5MC (Unmod)	"	DC probe thru detector (Fig. 4) to pin 11 of picture tube. Common to chassis.	A13	Adjust for minimum deflection.	

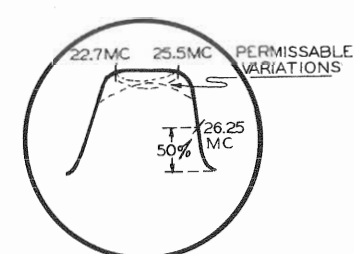


FIG. 1

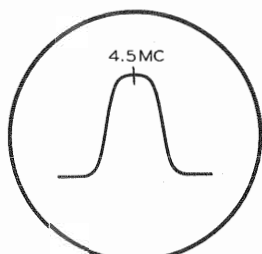


FIG. 2

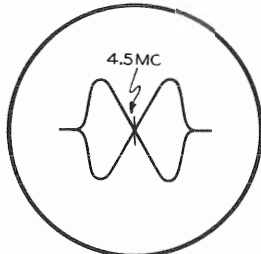


FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Remove dummy converter tube and replace original 6J6 in its socket.

The channel oscillator adjustment screws 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 negative lead of a 3 volt bias supply to the ungrounded side of C25. Connect the positive lead 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.

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
12. Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47KΩ to point A . Low side to chassis.	A14	Adjust to place sound marker in trap notch as in Fig. 5. Video marker should be at 50%.
		207MC (10MC Swp)	205.25MC 209.75MC	12		A15	
		201MC (10MC Swp)	199.25MC 203.75MC	11		A16	
		195MC (10MC Swp)	193.25MC 197.75MC	10		A17	
		189MC (10MC Swp)	187.25MC 191.75MC	9		A18	
		183MC (10MC Swp)	181.25MC 185.75MC	8		A19	
		177MC (10MC Swp)	175.25MC 179.75MC	7		A20	
		85MC (10MC Swp)	83.25MC 87.75MC	6		A21	
		79MC (10MC Swp)	77.25MC 81.75MC	5		A22	
		69MC (10MC Swp)	67.25MC 71.75MC	4		A23	
		63MC (10MC Swp)	61.25MC 65.75MC	3		A24	
		57MC (10MC Swp)	55.25MC 59.75MC	2		A25	

RF AND MIXER ALIGNMENT

Leave bias connected as under Oscillator 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	
13. Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47KΩ to point A . Low side to chassis.	A26, A27 A28	Adjust for response curve similar to Fig. 6 with markers above 90%.	
14. "	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"		Adjust for response curve similar to Fig. 6. If markers fall below 70% on any channel make compromise adjustment of A26, A27 and A28 with channel switch set to that channel then check all other channels to see that they have not been seriously affected.	
		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				
		85MC (10MC Swp)	83.25MC 87.75MC	6				
		79MC (10MC Swp)	77.25MC 81.75MC	5				
		69MC (10MC Swp)	67.25MC 71.75MC	4				
		63MC (10MC Swp)	61.25MC 65.75MC	3				
		57MC (10MC Swp)	55.25MC 59.75MC	2				

UHF CONVERTER ALIGNMENT

The UHF converter portion of this receiver has been properly aligned at the factory and is very stable. If realignment should become necessary the entire UHF converter unit (with tubes) should be returned to the factory service department.

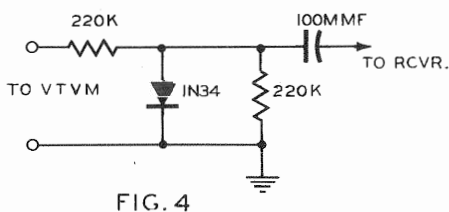


FIG. 4

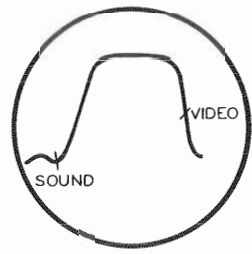


FIG. 5

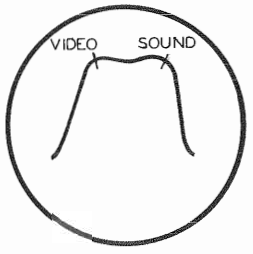


FIG. 6

SPARTON MODELS 22312, 22313, 23322, 23323 (Ch. 29U213)

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.

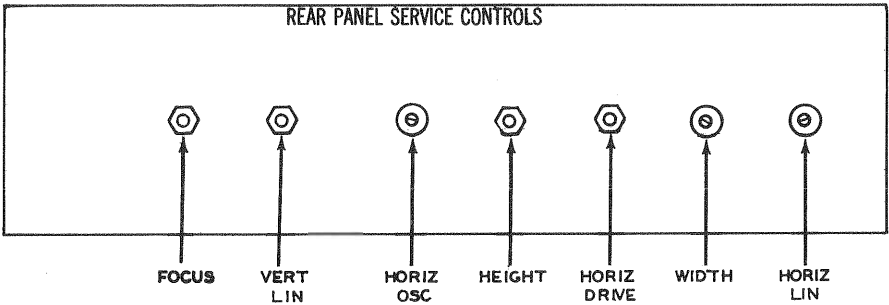
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove four wood screws holding metal strip at bottom of 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

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 oscillator slug (L30) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L29) located on the bottom of chassis. (Screen removable from bottom) (See tube placement chart).

FUSES

One fuse is used for horizontal sweep circuit protection. (For location, see tube placement chart.

CENTERING

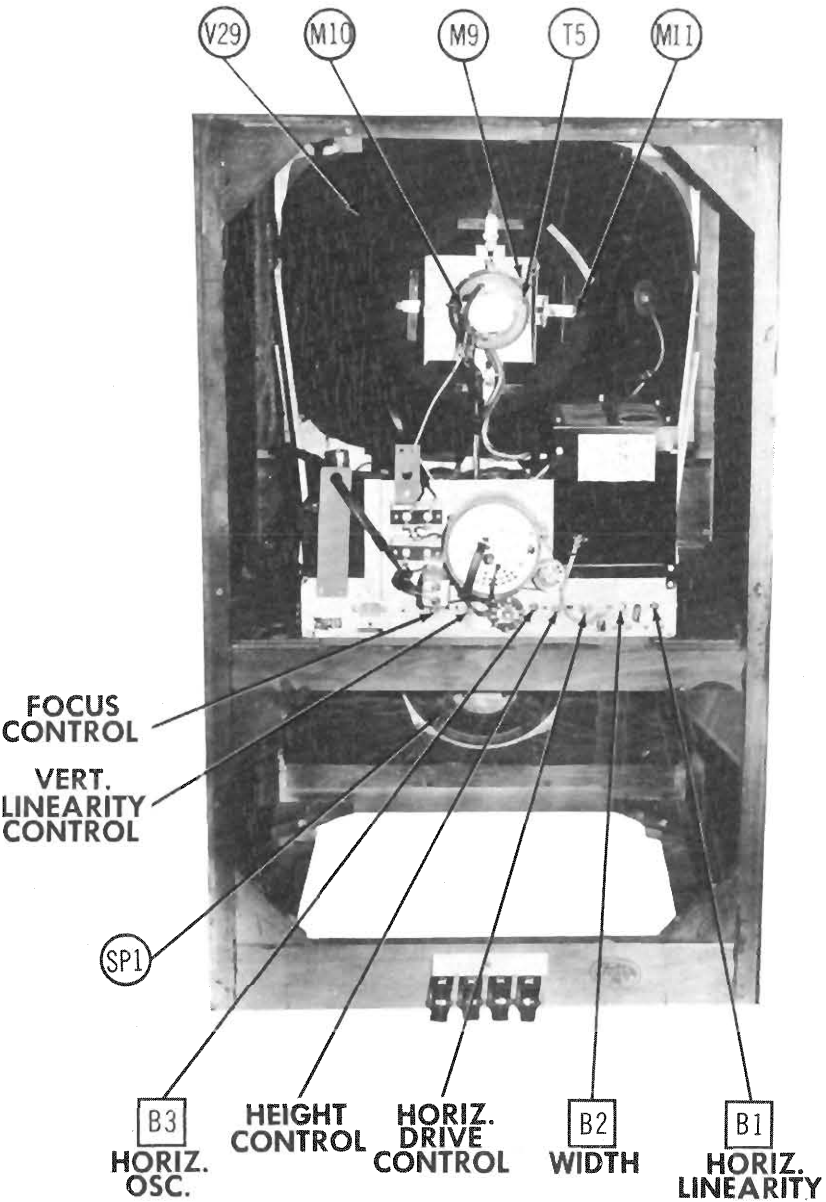
Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke . Rotate the two raings around the neck of the tube until the picture is properly centered.

ANTI-PIN CUSHION ADJUSTMENT

With the height and width controls reduce the size of the picture until the sides of the raster are visible. Adjust the corrector magnets until the ppposite sides of the picture are straight and parallel.

DISASSEMBLY INSTRUCTIONS

1. Remove 4 push on type control knobs from front panel.
2. Disconnect built-in antennas, speaker leads,.
3. Remove 6 wood and 1 metal screws. Remove rear cover.
4. Remove 4 chassis bolts. Remove chassis.
5. Remove 4 speaker nuts. Remove speaker.



CABINET-REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

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

Adjust the horizontal linearity slug (B1) for a picture that is symmetrical from left to right.

Adjust the width slug (B2) for a picture slightly wider than necessary to fill the picture mask horizontally.

Set the horizontal hold control fully counter clockwise. Adjust the horizontal drive control clockwise as far as possible without the presence of vertical white lines or compression near the center of the picture.

Set the horizontal hold control at mid position and adjust the horizontal oscillator slug (B3) for synchronization with approximately zero volts as measured with a VTVM from pin 1 (grid) of 6SN7 (V21) to chassis.

SPARTON MODELS 22312,
22313, 23322, 23323 (Ch. 29U213)

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL	VERTICAL								
<p>LOSS OF SWEEP</p> <p>Follow procedure outlined under "Loss of High Voltage".</p> <p>INSUFFICIENT SWEEP</p> <p>Check by substitution V21, V22, V23, V24, V25 and V28. Check adjustment of horizontal drive control, B1 and B2. Check waveform W16.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check R111, R112, R116, C95, C97, C98, R117, R118, T3, T5A and other associated circuit components.</td><td>Check R99, R100, R102, R104, R113, C91, C92, C93, C94 and other associated circuit components.</td></tr> </table> <p>DRIVE LINES</p> <p>Check adjustment of horizontal drive control. Check by substitution V21, V22, V23, V24 and V25. Check T3, T5A, C92, C93, C94, C97, C98 and other associated circuit components for failure or change of value.</p> <p>COMPRESSED LEFT SIDE</p> <p>Check by substitution V21, V22, V23, V24 and V25. Check horizontal output and damper components especially T3 and T5A. Proceed as outlined under "Insufficient Sweep".</p> <p>PIE CRUST EFFECT</p> <p>Check by substitution V22, V23, V24 and V25. Check C89 for open.</p> <p>FOLDS</p> <p>Follow procedure outlined under "Drive Lines".</p> <p>XMAS TREE EFFECT</p> <p>Substitute V21. Check C90, C91, C92, L30 and other associated circuit components.</p>	If Satisfactory	If Unsatisfactory	Check R111, R112, R116, C95, C97, C98, R117, R118, T3, T5A and other associated circuit components.	Check R99, R100, R102, R104, R113, C91, C92, C93, C94 and other associated circuit components.	<p>LOSS OF SWEEP</p> <p>Check by substitution V18 and V19. Check waveform W10.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check T4, T5B, R87, R5 and other associated circuit components.</td><td>Check R83, R86, R88, R89, R6, C80, C82 and other associated components.</td></tr> </table> <p>INSUFFICIENT SWEEP</p> <p>Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".</p> <p>COMPRESSED AT BOTTOM</p> <p>Check by substitution V18 and V19. Check C4A, T4 and T5B. Check other associated circuit components.</p> <p>COMPRESSED AT TOP</p> <p>Check by substitution V18 and V19. Check C79, C80, C82, R85, R86 and other associated circuit components.</p> <p>FOLDS</p> <p>Substitute V18 and V19. Check components associated with V18B and V19 for failure or change of value.</p>	If Satisfactory	If Unsatisfactory	Check T4, T5B, R87, R5 and other associated circuit components.	Check R83, R86, R88, R89, R6, C80, C82 and other associated components.
If Satisfactory	If Unsatisfactory								
Check R111, R112, R116, C95, C97, C98, R117, R118, T3, T5A and other associated circuit components.	Check R99, R100, R102, R104, R113, C91, C92, C93, C94 and other associated circuit components.								
If Satisfactory	If Unsatisfactory								
Check T4, T5B, R87, R5 and other associated circuit components.	Check R83, R86, R88, R89, R6, C80, C82 and other associated components.								

SYNC

<p>LOSS OF VERTICAL AND HORIZONTAL SYNC</p> <p>Check by substitution V17 and V18. Check components associated with V17 and V18A for failure or change of value.</p> <p>LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY</p> <p>Check by substitution V17 and V18. Check waveform W8.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check components associated with V18B.</td><td>Check components associated with V17 and V18A.</td></tr> </table>	If Satisfactory	If Unsatisfactory	Check components associated with V18B.	Check components associated with V17 and V18A.	<p>LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY</p> <p>Check by substitution V20 and V21. Check waveform W14.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check C85, C86, R95, R96 and other associated components.</td><td>Check components associated with V21 especially C90, C91 and C92.</td></tr> </table> <p>HORIZONTAL BENDING</p> <p>Check by substitution V20, V21, V22 and V23. Check circuit near these stages for filament shorts. Check horizontal AFC filter network (R97, R98, C88, C89) components for failure or change of value.</p>	If Satisfactory	If Unsatisfactory	Check C85, C86, R95, R96 and other associated components.	Check components associated with V21 especially C90, C91 and C92.
If Satisfactory	If Unsatisfactory								
Check components associated with V18B.	Check components associated with V17 and V18A.								
If Satisfactory	If Unsatisfactory								
Check C85, C86, R95, R96 and other associated components.	Check components associated with V21 especially C90, C91 and C92.								

VIDEO

<p>LOSS OF VIDEO</p> <p>Substitute V10. Check picture tube and other associated components.</p> <p>SOUND BARS (4.5MC BEAT)</p> <p>Check adjustment of fine tuning. Check adjustment A13. Check video IF alignment.</p> <p>POOR CONTRAST</p> <p>Check by substitution V9 and V10. Check picture tube and other associated components.</p>	<p>NEGATIVE PIX</p> <p>Check by substitution V9, V10 and V11. Check AGC network components. Check picture tube.</p> <p>SMEAR</p> <p>Substitute V9 and V10. Check C53, R44, R47, R48, L21, L23, picture tube and other associated circuit components for failure or change of value.</p> <p>WIDE BLACK BAR ACROSS PIX</p> <p>Check V3, V4, V5, V6, V7, V8, V9 and V10 for heater to cathode leakage. Check B+ filter capacitors for open. In case of UHF check V1 and V2.</p>
---	---

AUDIO

<p>WEAK OR NO SOUND</p> <p>Check by substitution V12, V13, V14, V15 and V16. Check stages V15 and V16 using audio signal generator. Apply signal across R67.</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 V15 and V16.</td></tr> </table>	If Satisfactory	If Unsatisfactory	Check ratio detector and audio IF alignment and components.	Check components associated with V15 and V16.	<p>BUZZ</p> <p>Check adjustment of the fine tuning. Adjust A12 for minimum buzz. If buzz is still objectionable, substitute V14 and realign audio IF and ratio detector stages.</p> <p>DISTORTED</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 V15 and V16.				

TROUBLE SHOOTING AIDS (cont)

POWER

<p>DEAD SET</p> <p>If filaments fail to light, check AC interlock assembly, switch on volume control and T1. If filaments light, substitute V27 and V28. Check B+ filter and decoupling network components.</p>	<p>SMALL AND/ OR DIM PIX</p> <p>Substitute V27 and V28. Check B+ filter and decoupling components.</p>
--	---

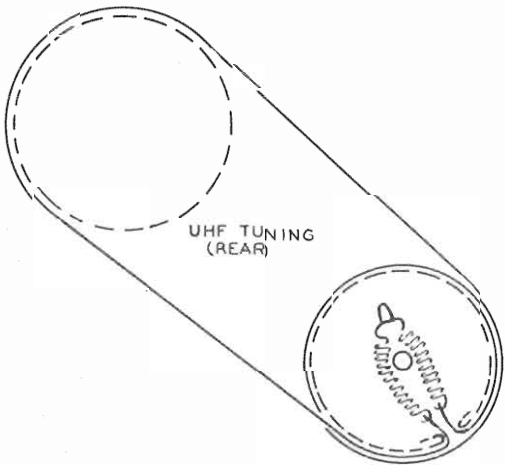
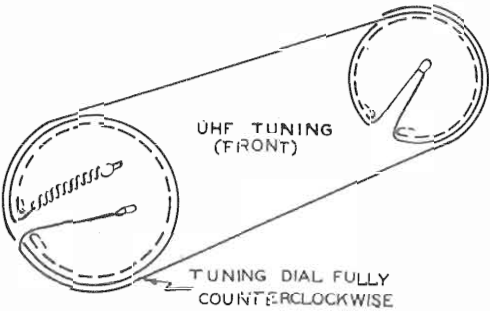
HIGH VOLTAGE

<p>LOSS OF HIGH VOLTAGE</p> <p>Check fuse M1. Check by substitution V21, V22, V23, V24, V25, and V26. Check waveform W16.</p> <table> <tr> <td>If Satisfactory</td><td>If Unsatisfactory</td></tr> <tr> <td>Check R120, R121, C100, C95, R111, R112, T3, T5A and other associated components.</td><td>Check C91, C92, C93, C94, R99, R100, R102, R104, L30 and associated components.</td></tr> </table>	If Satisfactory	If Unsatisfactory	Check R120, R121, C100, C95, R111, R112, T3, T5A and other associated components.	Check C91, C92, C93, C94, R99, R100, R102, R104, L30 and associated components.	<p>INSUFFICIENT HIGH VOLTAGE</p> <p>Check by substitution V21, V22, V23, V24, V25, V26, and V28. Check picture tube. Proceed as outlined under "Loss of High Voltage".</p> <p>BLOOMING</p> <p>Check by substitution V21, V22, V23, V24, V25 and V26. Check R120, R121, C100, C95, R111, R112, T3, T5A, picture tube and other associated circuit components for failure or change of value.</p>
If Satisfactory	If Unsatisfactory				
Check R120, R121, C100, C95, R111, R112, T3, T5A and other associated components.	Check C91, C92, C93, C94, R99, R100, R102, R104, L30 and associated components.				

GENERAL

<p>RASTER SOUND NO PIX</p> <p>Follow procedure outlined under "Loss of Video".</p> <p>RASTER NO SOUND NO PIX (VHF)</p> <p>Check by substitution V3, V4, V5, V6, V7, V8 and V9. Check associated components.</p>	<p>RASTER NO SOUND NO PIX (UHF)</p> <p>Check UHF-VHF switch position. Check V1 and V2 by substitution.</p> <p>INTERMITTENT STREAKS</p> <p>Check high voltage section for corona discharge and arcing. Check video signal for interference pulses.</p>
---	---

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

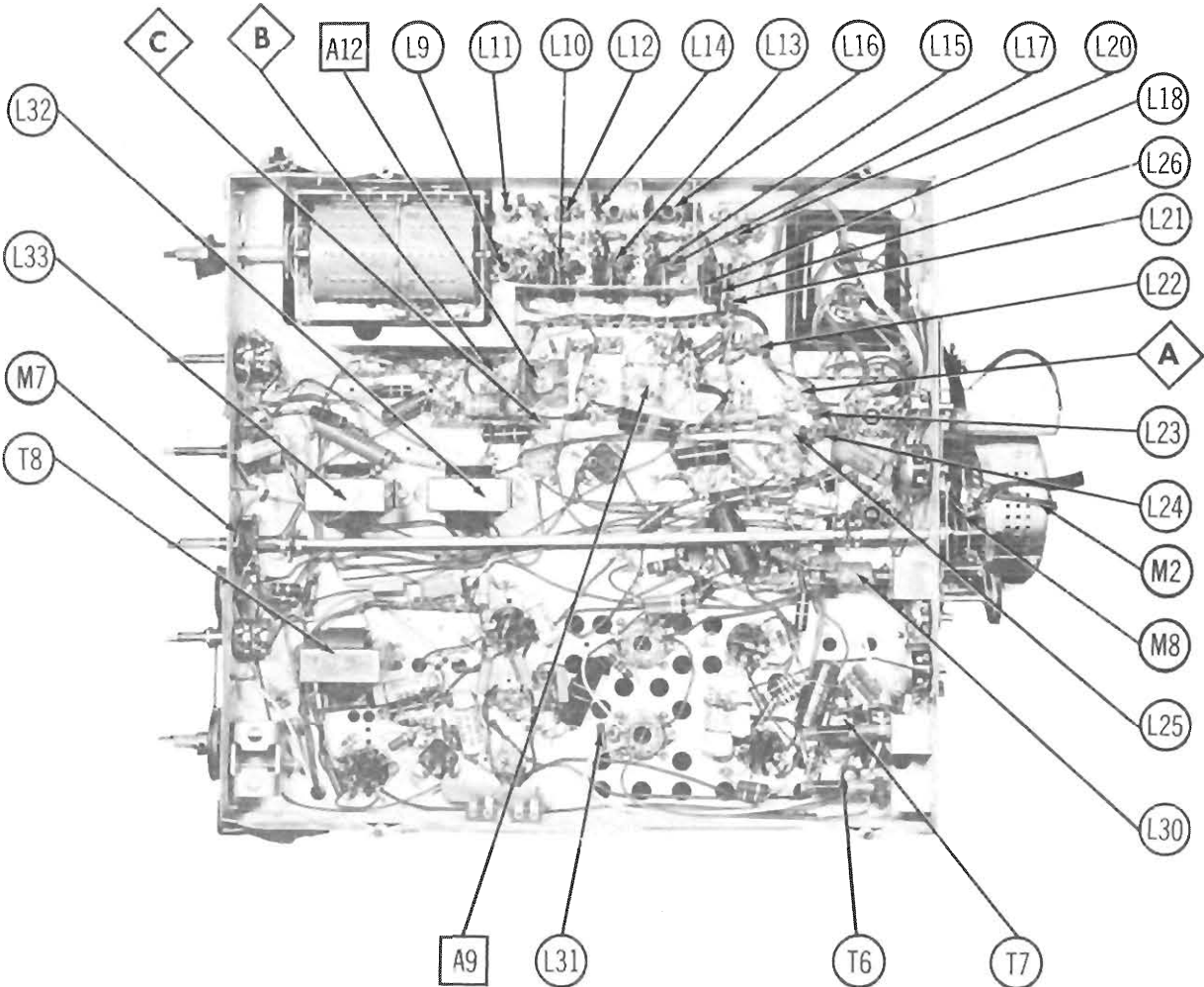


UHF DRIVE CORD STRINGING

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	SPARTON PART No.	NOTES
M3	Dial Light	PC70021	VHF Indicator #47 bayonet
M4	Tuner	PD93174-5	UHF
M5	Tuner	PA5352	VHF
M6	Trap	PD42013	Antenna filter
M7	Switch	PD42014	UHF-VHF changeover front
M8	Switch	PA1270	UHF-VHF changeover rear
M9	Centering Magnet	PA1248-3	
M10	Ion Trap	PA63119	
M11	Correction Magnet	PA5669-1	(4) used
	Knob	PA5669-2	Vert. hold (inner shaft) Models 22312, 23322
	Knob	PA5670-1	Vert. hold (inner shaft) Models 22313, 23323
	Knob	PA5670-2	Brightness (inner shaft) Models 22312, 23322
	Knob	PA5671-1	Brightness (inner shaft) Models 22313, 23323
	Knob	PA5671-2	Off/On/Volume (inner shaft) Models 22312, 23322
	Knob	PA5660-1	Off/On/Volume (inner shaft) Models 22313, 23323
	Knob	PA5660-2	(3) horiz. hold, contrast, tone (outer shaft) Models 22312, 23322
	Knob	PA5672-1	(3) horiz. hold, contrast, tone (outer shaft) Models 22313, 23323
	Knob	PA5672-2	UHF-VHF selector Models 22312, 23322
	Knob	AB43085-1	UHF-VHF selector Models 22313, 23323
	Knob	AB43085-2	UHF fine tuning Models 22312, 23322
	Knob	PB40363-1	UHF fine tuning Models 22313, 23323
	Knob	PB40363-2	VHF fine tuning Models 22312, 23322
	Knob	AB43086-1	VHF fine tuning Models 22313, 23323
	Knob	AB43086-2	UHF channel indicator Models 22312, 23322
	Knob	AB43593-1	UHF channel indicator Models 22313, 23323
	Knob	AB43593-2	VHF channel indicator Models 22312, 23322
	Knob	AB43593-3	VHF channel indicator Models 22313, 23323
	Safety glass	PE40354-3	



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

PARTS LIST AND DESCRIPTIONS
TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		SPARTON PART No.	STANDARD REPLACEMENT		
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2	UHF IF Amplifier	6BK7	6BK7	9AJ	
V3	RF Amplifier	6BQ7	6BQ7	9AJ	
V4	Converter	6J6	6J6	7BF	
V5	1st Video IF Amp.	6CB6	6CB6	7CM	
V6	2nd Video IF Amp.	6BA6	6BA6	7BK	
V7	3rd Video IF Amp.	6BA6	6BA6	7BK	
V8	4th Video IF Amp.	6CB6	6CB6	7CM	
V9	Video Det. -				
	Sync Limiter	6AL5	6AL5	6BT	
V10	Video Output	6AH6	6AH6	7BK	
V11	AGC Keying	6AU6	6AU6	7BK	
V12	1st Sound IF Amp.	6AU6	6AU6	7BK	
V13	2nd Sound IF Amp.	6AU6	6AU6	7BK	
V14	Ratio Detector	6AL5	6AL5	6BT	
V15	AF Amp. -				
	AGC Clamper	6AT6	6AT6	7BT	
V16	Audio Output	6V6GT	6V6GT	7S	
V17	Sync Separator -				
	Sync Amplifier	12AU7	12AU7	8BE	
V18	Sync Phase Inv. -				
	Vert. Oscillator	6SN7GT	6SN7GT	8BD	
V19	Vert. Output	6S4	6S4	9AC	
V20	Horiz. AFC	6AL5	6AL5	6AT	
V21	Horiz. Mult.	6SN7GT	6SN7GT	8BD	
V22	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V23	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V24	Damper	6W4GT	6W4GT	4CG	
V25	Damper	6W4GT	6W4GT	4CG	
V26	HV Rectifier	1B3GT	1B3GT	3C	
V27	LV Rectifier	5U4G	5U4G	5T	
V28	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA				RETMA BASE TYPE	NOTES
	SPARTON PART No.	SYLVANIA PART No.	GENERAL ELECTRIC PART No.	WESTINGHOUSE PART No.		
V29	21FP4A	21FP4A 21FP4 ①	21FP4A 21FP4 ①	21FP4A	12L 12M	① Add high voltage filter cap

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	SPARTON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	.440	475	PA4307-13	AFH2-72		BO53		FP262	TVL-2830	
B	.440	475								
C2A	.440	250	PA4307-21	AFH3-43		CO34		FP376.8	TVL-3785	
B	.440	250								
C	.410	200								
C3A	.440	475	PA4307-22	AFH4-94		DO17		FP444	TVL-4840	
B	.420	450								
C	.420	450								
C4A	.4100	50	PA4307-23	AFH4-87		C109 BR205		FP375 TC36	TVL-3704	
B	.480	450								
C	.420	50								
C5	5	50	PA4308-2	PR8150/4		BR550		TC30	TVA-1303	
C6	2	50	PA4309-14	PR8150/4		BR2-50T		TC302	TVA-1301	
C7	3-9				829-10					
C8	800			EF-001	MFT-1000				503C-D1	
C9	3									
C10	.5-3				829-3			CT566A		
C11	47			BPD-000047	D6-470		GPIK-470	UC-5447	5GA-Q47	
C12	800			EF-001	MFT-1000				503C-D1	
C13	1000			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C14	1.5			SI1.5NP0	TCZ-1.5		NP0K-IR5	ZT-5515	5TCCB-V15	
C15	800			EF-001	MFT-1000				503C-D1	
C16	47			BPD-000047	D6-470		GPIK-470	UC-5447	5GA-Q47	
C17	.5-3				829-3			CT566A		
C18	10			SI10NP0	TCZ-10		NP0K-100	ZT-541	5TCC-Q1	
C19	5									
C20	1000			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C21	6.8			SI6.8NP0	TCZ-6.8		NP0K-6R8	ZT-5568	5TCCB-V68	
C22	120			SI120	D6-121	TM5T12	GP2K-121	UC-5312	5GA-T12	
C23	800			EF-001	MFT-1000				503C-D1	
C24	800			EF-001	MFT-1000				503C-D1	
C25	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C26	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C27	6.8		PA4334-13	SI6.8NP0	TCZ-6.8		NP0K-6R8	ZT-5568	5TCCB-V68	
C28	100		PA4332-3	SI100NP0	TCZ-100		NP0-333-101	ZT-531	5TCC-T1	
C29	1000		HK36M-102	SI1000	D6-102	TM5D1	GP2L-102	UC-521	5HK-D1	
C30	3.3		PA4334-4	SI3.3NP0	TCZ-3.3		NP0K-3R3	ZT-5533	5TCCB-V33	
C31	100		PA4334-3	SI100NP0	TCZ-100		NP0-333-101	ZT-531	5TCC-T1	
C32	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C33	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C34	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C35	270		HK36M-271	SI270	D6-271		GP2K-271	UC-5327	5GA-T27	
C36	1000		HK36M-102	SI1000	D6-102	TM5D1	GP2L-102	UC-521	5HK-D1	
C37	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C38	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C39	270		HK36M-271	SI270	D6-271		GP2K-271	UC-5327	5GA-T27	
C40	1000		HK36M-102	SI1000	D6-102	TM5D1	GP2L-102	UC-521	5HK-D1	
C41	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C42	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C43	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C44	270		HK36M-271	SI270	D6-271		GP2K-271	UC-5327	5GA-T27	
C45	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C46	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	

CAPACITORS (cont)											
ITEM No.	RATING		REPLACEMENT DATA							NOTES	
	CAP.	VOLT	SPARTON PART No.	AEROVOX PART No.	CENTRALRA PART No.	CORNELL-DUBIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.		
C47	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5		
C48	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5		
C49	6.8		PA4332-13	S16-8NP0	TCZ-6.8		NP0K-68R	ZT-5558	5TCCB-V68		
C50	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5		
C51	4.7		PA4332-11	S15NP0	TCZ-4.7		NP0K-47T	ZT-555	5TCCB-V47		
C52	47		CC30A-470F	S147NP0	TCZ-47		NP0K-470	ZT-5447	5TCC-Q47		
C53	1	400	PC42GM-104	P488-1	DF-104	PTE4P1		PT401	4TM-P1		
C54	.001	600	PC42GM-102	P688-001	D6-102	PTE6D1	GP2L-102	PT621	6TM-D1		
C55	.1	600	PC42GM-104	P688-1	DF-104	PTE6P1		PT601	6TM-P1		
C56	2.2		PA4332-1	S12-2NP0	TCZ-2.2		NP0K-22R	ZT-531	5TCCB-V22		
C57	100		PA4332-3	SI100NP0	TCZ-100		NP0-333-101	ZT-531	5TCC-T1		
C58	100		PA4332-3	SI100NP0	TCZ-100		NP0-333-101	ZT-531	5TCC-T1		
C59	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5		
C60	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5		
C61	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5		
C62	33	500	MC60R-330								
C63	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5		
C64	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5		
C65	120		PA4332-1	SI120NP0	TCZ-120		NP0-333-121	ZT-531	5TCC-T12		
C66	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5		
C67	1000		HK36M-102	SI1000	D6-102	TM5D1	GP2L-102	UC-521	5HK-D1		
C68	.022	400	PC42GL-223	P488-022	DF-203	PTE4S22					
C69	.033	200	PC42GL-333	P488-033							
C70	.01	400	PC42GL-103	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1		
C71	.022	600	PC42GM-223	P688-022	DF-203	PTE6S22		PT6122	6TM-S22		
C72	.0047	600	PC42GM-472	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47		
C73	68	500	MC60E-680	1469-00007		5R5Q7		MS-47			
C74	.47	200	PC42DK-474	P288-47		PJ2P5		PT4047	2TM-P47		
C75	.047	600	PC42GM-473	P688-047	DF-503	PTE6S47	GP2L-102	PT6147	6TM-S47		
C76	.001	600	PC42GM-102	P688-001		PTE6D1	GP2L-102	PT621	6TM-D1		
C77A	.002				D6-202	PTE4D2	GP2-333-202	PT622			
C77B	.005		PA4339-4	PA109	D6-502	PTE6D5	GP2-333-502	PT625	34C17		
C77C	.005				D6-502	PTE6D5	GP2-333-502	PT625			
C78	4700	500	MC61F-472	1464-005		1DR5D5		MCB405	MS-25		
C79	2000	500	MC61E-202	1464-002		1DR5D2		MCB457			
C80	.1	400	PC42GL-104	P488-1	DF-104	PTE4P1		PT401	4TM-P1		
C81	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5		
C82	.1	400	PC42GL-104	P488-1	DF-104	PTE4P1		PT401	4TM-P1		
C83	.1	400	PC42GL-104	P488-1	DF-104	PTE4P1		PT401	4TM-P1		
C84	.0033	600	PC42GM-332	P688-0033	D6-332	PTE6D33	GP2-333-332	PT6233	6TM-D33		
C85	1000	500	MC61E-102	1470-001		2R5D1		MCB255	MS-21		
C86	1000	500	MC61E-102	1470-001		2R5D1		MCB255	MS-21		
C87	.01	400	PC42FL-103	P488-01		PTE4S1		PT411	4TM-S1		
C88	5100	500	MC61E-512								
C89	.047	200	PC42GL-473	P488-047	DF-503	PTE4S47		PT4147	4TM-S47		
C90	3900	500	MC63F-392	1464-004		1DR5D4		MCB463	MS-24		
C91	220	500	MC60K-221								
C92	270	500	MC60E-271	1469-0003		5R5T3		MCB231	MS-33		
C93	390	500	MC60E-391	1469-0004		5R5T4		MCB243	MS-34		
C94	.01	400	PC42GL-103	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1		
C95	.047	400	PC42GL-473	P488-047	DF-503	PTE4S47		PT4147	4TM-S47		
C96	.27	200	PC42GL-274								
C97	.1	400	PC42GL-104	P488-1		PTE4P1		PT401	4TM-P1		
C98	.1	400	PC42GL-104	P488-1		PTE4P1		PT401	4TM-P1		
C99	.22	400	PC42GL-224	P488-22		PTE4P22		PT4025	4TM-P22		
C100	500	20000	PA4342-2	HV20C	TV3-502	MM-C20T5	413-501	HV20035A	20DK-T5		
C101	5000		PA4334-1	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5		
C102	56	2000	PA4334-5						20GA-Q56		

CONTROLS

ITEM No.	RATING RESISTANCE	WATTS	REPLACEMENT DATA					INSTALLATION NOTES
			SPARTON PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	25KΩ		PA-4457	* QJ-469	RTV-411		UF253L †	Contrast-panel Brightness-control
R2A	1MΩ		PA-4450-2	* QJ-468	RTV-412		UF16L	Volume-panel Note
R3A	50KΩ		PA-4456	* QJ-470	RTV-410		UF54L	Volume-panel tapped at 60K
R4A	1MΩ		PA-4454				UF54L	Horiz. Hold-panel
R5A	5000Ω	2	PA-4411	QJ1-239	AG-84-S	AB-83	SU-565	Vert. Hold-rear
R6A	2.5MΩ		PA-4454	QJ1-239	AG-84-S	AB-83	SU-565	Focus
R7A	1000Ω	2	PA-4448	WK-1000	FKS-1/4	AK-1	RU00L	Attach to R4A
R8A	1000Ω	2	PA-4448	WK-1000	FKS-1/4	AK-1	RU00L	Vert. Linearity wire wound
R9A	1000Ω	2	PA-4448	WK-1000	FKS-1/4	AK-1	RU00L	Attach to R5A
R10A	1000Ω	2	PA-4448	WK-1000	FKS-1/4	AK-1	RU00L	Height
R11A	1000Ω	2	PA-4448	WK-1000	FKS-1/4	AK-1	RU00L	Attach to R6A
R12A	1000Ω	2	PA-4448	WK-1000	FKS-1/4	AK-1	RU00L	Horiz. Drive wire wound
R13A	1000Ω	2	PA-4448	WK-1000	FKS-1/4	AK-1	RU00L	Attach to R7A

Note: Some models may use alternate control Part No. PA-4450-4.

* CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS B11-120 & P1-112 (Panel)

† Universal replacement (Mallory Exact duplicate Part No. UE814).

‡ Universal replacement (Mallory Exact duplicate Part No. UE1003).

▲ Universal replacement (Mallory exact duplicate Part No. UE16645).

RESISTORS

ITEM No.	RATING OHMS	WATT	REPLACEMENT DATA		NOTES
			SPARTON PART No.	IRC PART No.	
R8	15KΩ		BTS-15K		
R9	47KΩ		BTS-47K		
R10	100KΩ		BTS-100K		
R11	160KΩ		BTS-160K		
R12	100KΩ		BTS-100K		
R13	1500Ω		BTS-1500		
R14	10KΩ		BTS-10K		
R15	220KΩ		BTS-220K		
R16	10KΩ		BTS-10K		
R17	15KΩ		BTS-15K		
R18	3000Ω 5%		BR12G-362	BTS-3600 5%	
R19	1000Ω		BR12N-102	BTS-1000	
R20	33KΩ		BR12S-333	BTS-33K	
R21	56KΩ		BR12S-563	BTS-56K	
R22	150KΩ		BR12S-154	BTS-150K	
R23	470 5%		BR12G-470	BTS-47 5%	
R24	820 5%		BR12G-820	BTS-82 5%	
R25	100Ω		BR12N-101	BTS-100	
R26	100Ω		BR12N-101	BTS-100	
R27	4700Ω		BR12G-472	BTS-4700	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	WATT	REPLACEMENT DATA		NOTES
			SPARTON PART No.	IRC PART No.	
R28	1000Ω		BR12N-102	BTS-1000	
R29	100Ω 5%		BR12G-101	BTS-100 5%	
R30	100Ω		BR12N-101	BTS-100	
R31	3300Ω 5%		BR12G-332	BTS-3300 5%	
R32	1000Ω		BR12N-102	BTS-1000	
R33	15KΩ 5%		BR12G-153	BTS-15K 5%	
R34	27KΩ		CR12S-273	BTA-27K	
R35	100Ω 5%		BR12G-101	BTS-100 5%	
R36	100Ω		BR12N-101	BTS-100	
R37	4300Ω 5%		BR12G-432	BTS-4300 5%	
R38	120Ω 5%		BR12S-121	BTS-120 5%	
R39	100Ω		BR12N-101	BTS-100	
R40	100Ω		BR12N-101	BTS-100	
R41	3900Ω 5%		BR12G-392	BTS-3900 5%	
R42	6800Ω		BR12S-682	BTS-6800	
R43	27KΩ		BR12S-273	BTS-27K	
R44	5600Ω 5%		DR12G-562	BTB-5600 5%	
R45	10KΩ		BR12S-103	BTS-10K	
R46	220KΩ		BR12S-224	BTS-220K	
R47	470KΩ		BR12S-474	BTS-470K	
R48	330KΩ		BR12N-334	BTS-330K	
R49	1000Ω		BR12N-102	BTS-1000	
R50	15KΩ		BR12S-153	BTS-15K	
R51	2200Ω		BR12G-222	BTS-2200	
R52	330KΩ		BR12S-334	BTS-330K	
R53	68KΩ		CR12S-683	BTA-68K	
R54	2.2Meg		BR12S-225	BTS-2.2Meg	
R55	47KΩ		BR12S-473	BTS-47K	
R56	100KΩ		BR12S-104	BTS-100K	
R57	820 5%		CR12G-820	BTS-82 5%	
R58	1000Ω		BR12N-102	BTS-1000	
R59	100KΩ		BR12N-104	BTS-100K	
R60	470KΩ		BR12S-474	BTS-470K	
R61	1000Ω		BR12N-102	BTS-1000	
R62	1500 5%		BR12G-151	BTS-150 5%	
R63	47KΩ		BR12S-473	BTS-47K	
R64	10KΩ		BR12S-103	BTS-10K	
R65	4700Ω 5%		BR12G-472	BTS-4700 5%	
R66	4700Ω 5%		BR12G-472	BTS-4700 5%	
R67	6.8Meg		BR12N-685	BTS-6.8Meg	
R68	270KΩ		BR12S-274	BTS-270K	
R69	470KΩ		BR12N-474	BTS-470K	
R70	270KΩ		BR12S-274	BTS-270K	
R71	390Ω		CR12S-391	BTA-390	
R72	1500Ω		PA4200-19	1 3/4A-1500	
R73	180KΩ		BR12S-184	BTS-180K	
R74	12KΩ		BR12S-123	BTS-12K	
R75	2.2Meg		BR12N-225	BTS-2.2Meg	
R76	18KΩ		BR12S-183	BTS-18K	

TRANSFORMER (POWER)

ITEM No.	RATING	REPLACEMENT DATA					
		SPARTON PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	RCA TYPE No.
T1	117VAC @2.36A	AB-44035-1					