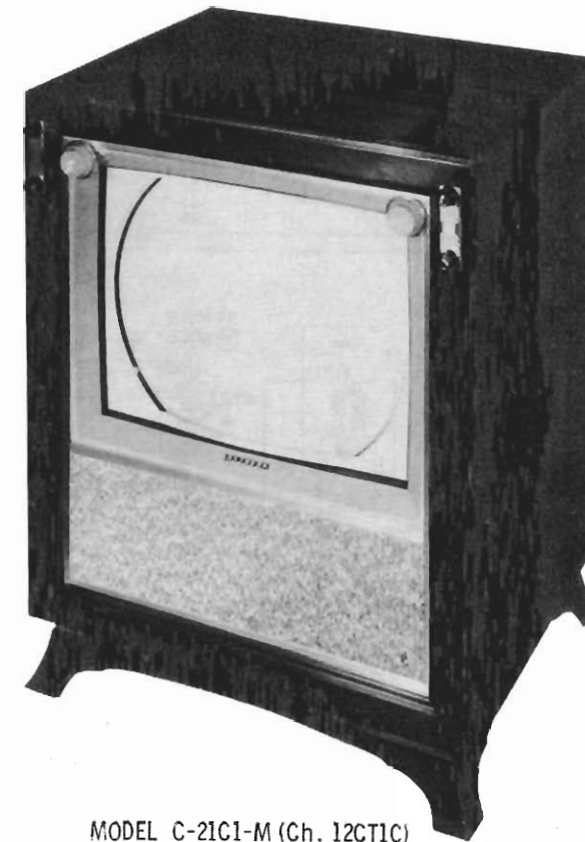




3/22/57



MODEL C-21C1-M (Ch. 12CT1C)

RAYTHEON MODELS C-21C1-B, -M, M-21C0-B, -M (Ch. 21CT1C)

TRADE NAME	Raytheon	MODELS	CHASSIS
		C-21C1-B, C-21C1-M, M-21C0-B, M-21C0-M	21CT1C
MANUFACTURER	Raytheon Manufacturing Co., 5921 W. Dickens Ave., Chicago 39, Illinois		
TYPE SET	Color Television Receiver		
TUBES	Twenty-seven		
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING	350 Watts, 4 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

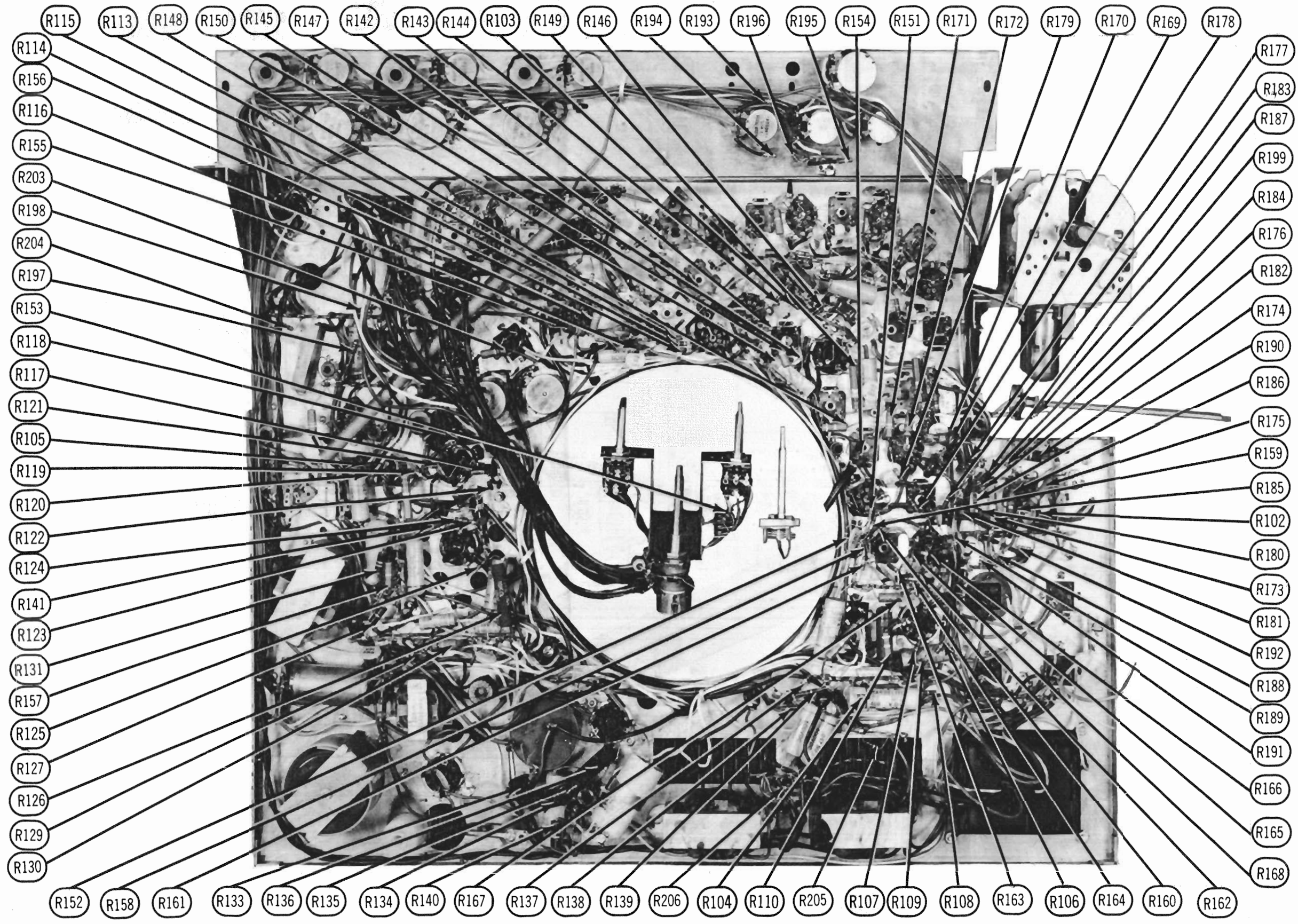
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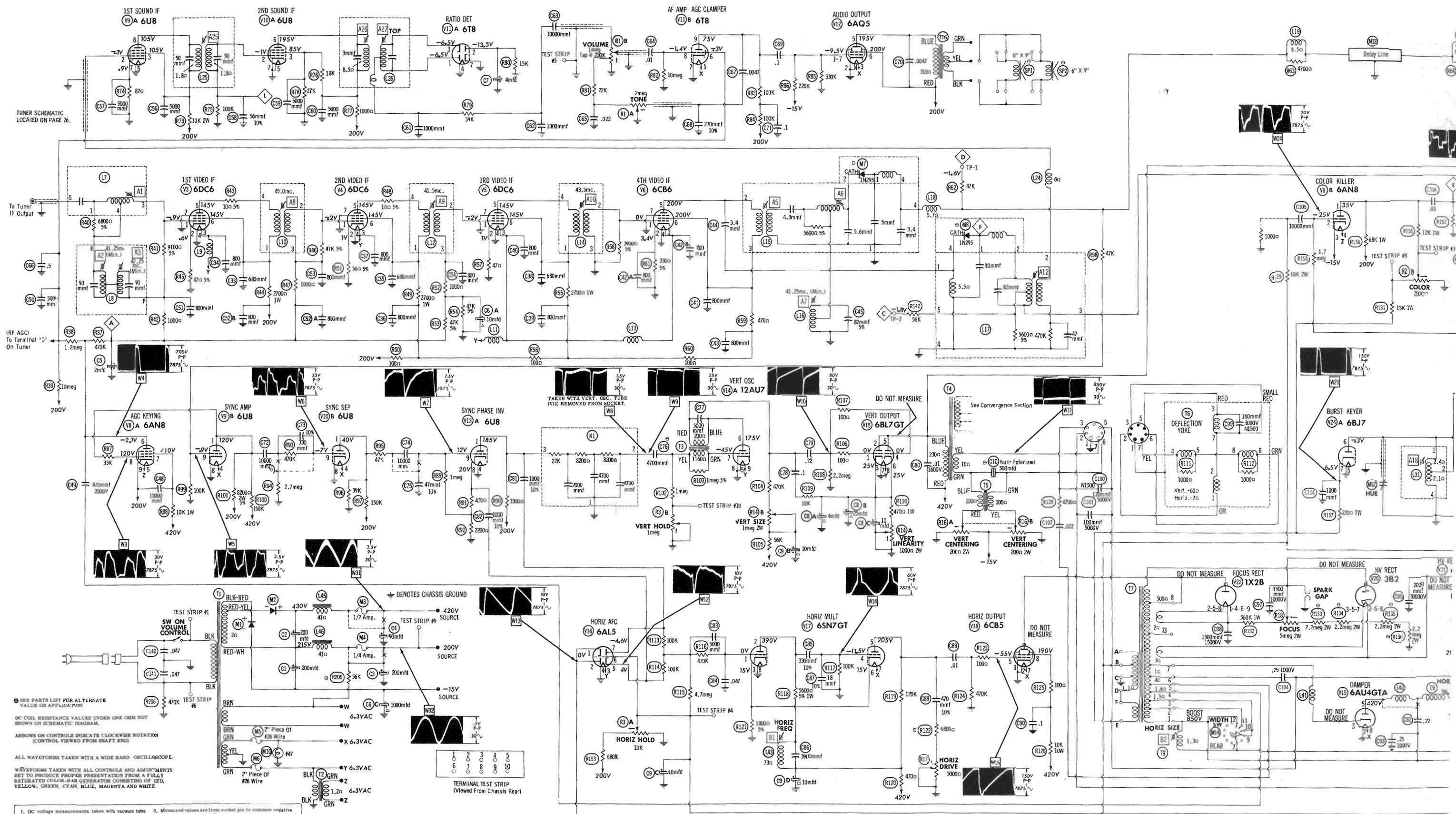
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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 H12

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. © 1957 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America



CHASSIS BOTTOM - RESISTOR IDENTIFICATION (R102 THRU R206)



SEE PARTS LIST FOR ALTERNATE VALUES OR APPLICATIONS.

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

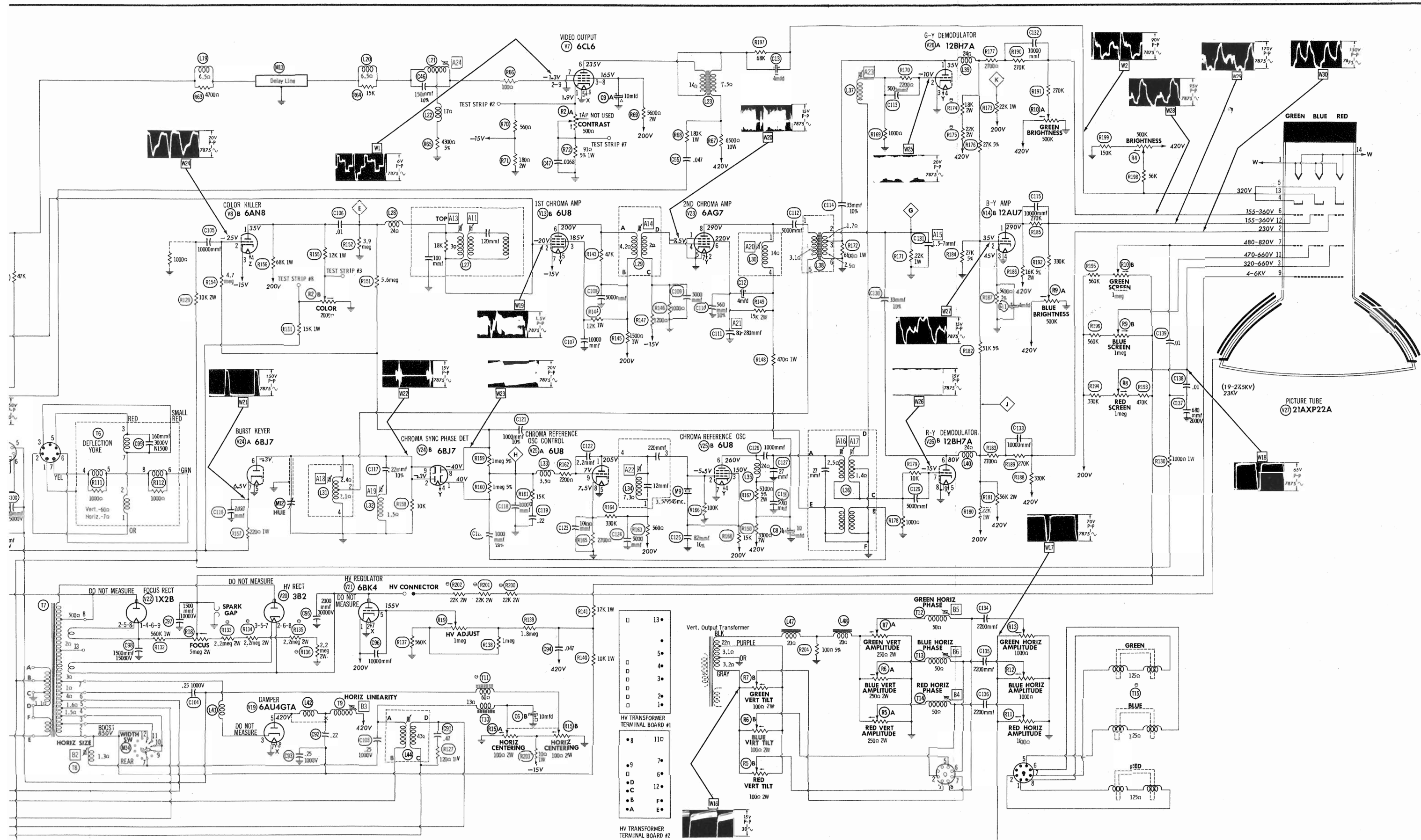
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

ALL WAVEFORMS TAKEN WITH A WIDE BAND OSCILLOSCOPE.

WAVEFORMS TAKEN WITH ALL CONTROLS AND ADJUSTMENTS SET TO PRODUCE PROPER PRESENTATION FROM A FULLY SATURATED COLOR-BAR GENERATOR CONSISTING OF RED, YELLOW, GREEN, CYAN, BLUE, MAGENTA AND WHITE.

- DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.
- Pir numbers are oriented in a clockwise direction on bottom of socket.
- Measured values are from socket pin to common negative unless otherwise stated.
- Line voltage maintained at 117 volts for voltage readings.
- All controls set for normal operation; no signal applied.

A PHOTOFAC STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957



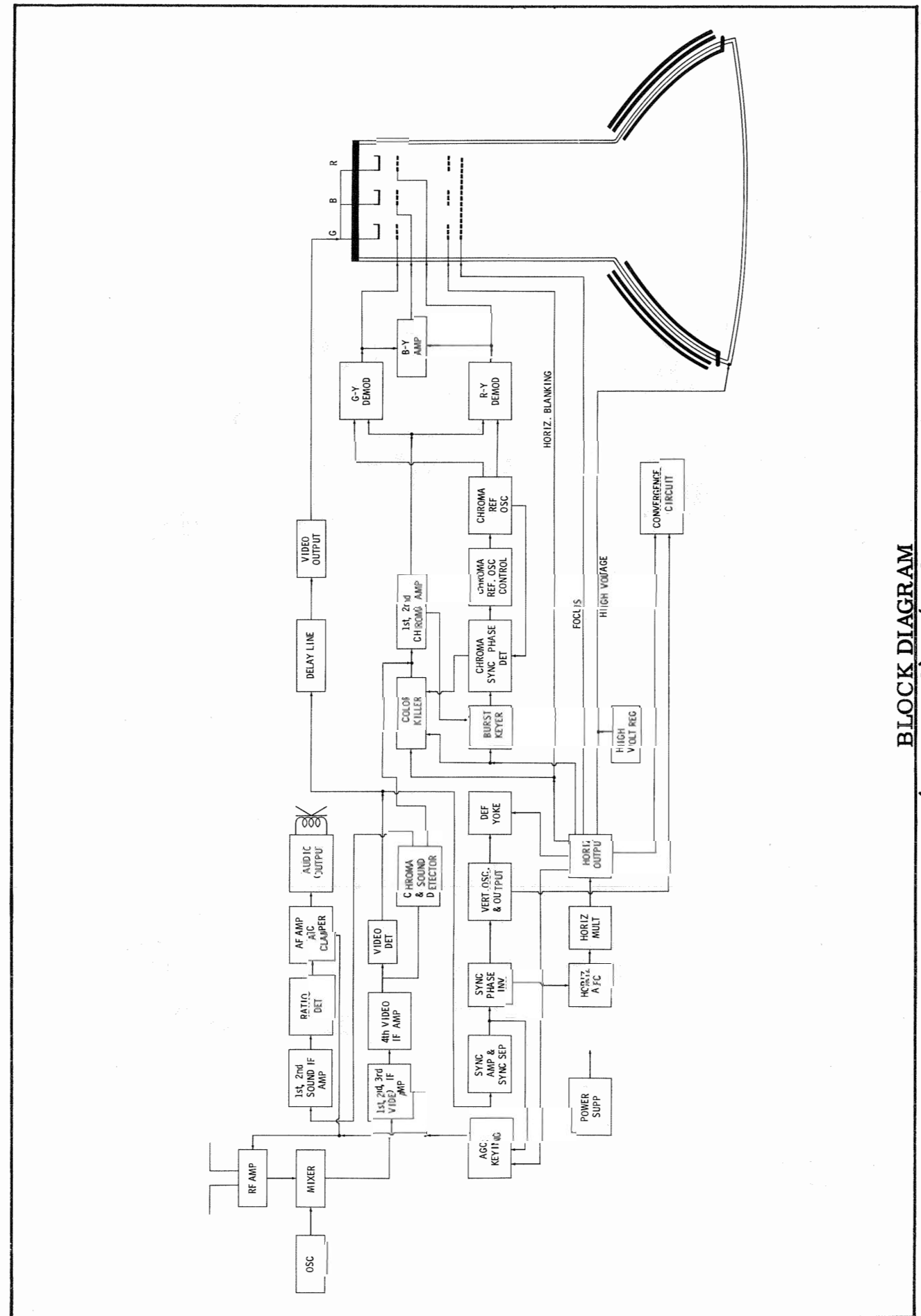
RAYTHEON MODELS C-21C1-B, -M, M-21C0-B, -M (Ch. 21CTIC)

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ7	§ 470Ω	300K	INF	0Ω	.1Ω	INF	1.5Meg	22Ω	0Ω
V2	6U8	§ 10K	200K	§ 108K	.1Ω	0Ω	§ 8200Ω	0Ω	0Ω	10K
V3	6DC6	75K	47Ω	.1Ω	0Ω	§ 2700Ω	§ 2700Ω	0Ω		
V4	6DC6	75K	56Ω	.1Ω	0Ω	§ 2800Ω	§ 2800Ω	0Ω		
V5	6DC6	35K	47Ω	.1Ω	0Ω	§ 2900Ω	§ 2900Ω	0Ω		
V6	6CB6	.1Ω	330Ω	.1Ω	0Ω	§ 800Ω	§ 800Ω	0Ω		
V7	6CL6	• 180Ω	4400Ω	§ 5600Ω	.1Ω	0Ω	† 6500Ω	0Ω	§ 5600Ω	4400Ω
V8	6AN8	§ 32K	14Meg	▲ 0Ω	INF	INF	500K	† 10K	§ 40K	§ 0Ω
V9	6U8	§ 7300Ω	470K	§ 10K	.1Ω	0Ω	§ 10K	82Ω	0Ω	40K
V10	6U8	§ 35K	100K	§ 12K	.1Ω	0Ω	§ 1000Ω	0Ω	0Ω	3.2Meg
V11	6T8	INF	15K	INF	0Ω	.1Ω	1.5Meg	0Ω	10Meg	§ 200K
V12	6AQ5	120K	0Ω	.1Ω	0Ω	§ 310Ω	§ 0Ω	120K		
V13	6U8	§ 3300Ω	3.5Meg	§ 13K	0Ω	.1Ω	§ 1500Ω	▲ 0Ω	2700Ω	1Meg
V14	12AU7	† 16K	16K	5600Ω	0Ω	0Ω	• † 870K	• 1.2Meg	0Ω	.1Ω
V15	6BL7GT	2.2Meg	† 230Ω	• 600Ω	2.2Meg	† 230Ω	• 600Ω	0Ω	.1Ω	
V16	6AL5	• 45Ω	• 45Ω	.1Ω	0Ω	4.8Meg	TP	4.8Meg		
V17	6SN7GT	5.2Meg	† 6100Ω	1800Ω	100K	† 120K	1800Ω	.1Ω	0Ω	
V18	6CB5	NC	0Ω	0Ω	NC	470K	NC	.1Ω	† 10K	TOP CAP ‡ 5.5Ω
V19	6AU4GT	NC	NC	‡	NC	† 3.5Ω	NC	0Ω	.1Ω	
V20	3B2		PINS 1 THRU 8	HAVE	INFINITE	RESISTANCE				TOP CAP ‡ 500Ω
V21	6BK4	§ 0Ω	0Ω	NC	NC	• † 450K	NC	.1Ω	NC	TOP CAP INF
V22	1X2B	15Meg	15Meg	NC	15Meg	15Meg	15Meg	NC	15Meg	15Meg
V23	6AG7	0Ω	.1Ω	NC	500Ω	0Ω	† 18K	0Ω	† 3800Ω	
V24	6BJ7	11Meg	4.4Ω	0Ω	.1Ω	0Ω	4.4Ω	220Ω	10Meg	4.4Ω
V25	6U8	§ 600Ω	100K	§ 15K	.1Ω	0Ω	† 8500Ω	0Ω	2700Ω	10Meg
V26	12BH7A	§ 13K	2.2Ω	0Ω	.1Ω	.1Ω	§ 13K	11K	0Ω	0Ω
V27	21AXP22A	§ 56K	† 150K	• 530K	• † 55K	• † 55K	• 150K	• § 530K	NC	• 11Meg
		PIN 10 NC	PIN 11 • § 480K	PIN 12 • 170K	PIN 13 • † 55K	PIN 14 § 56K				

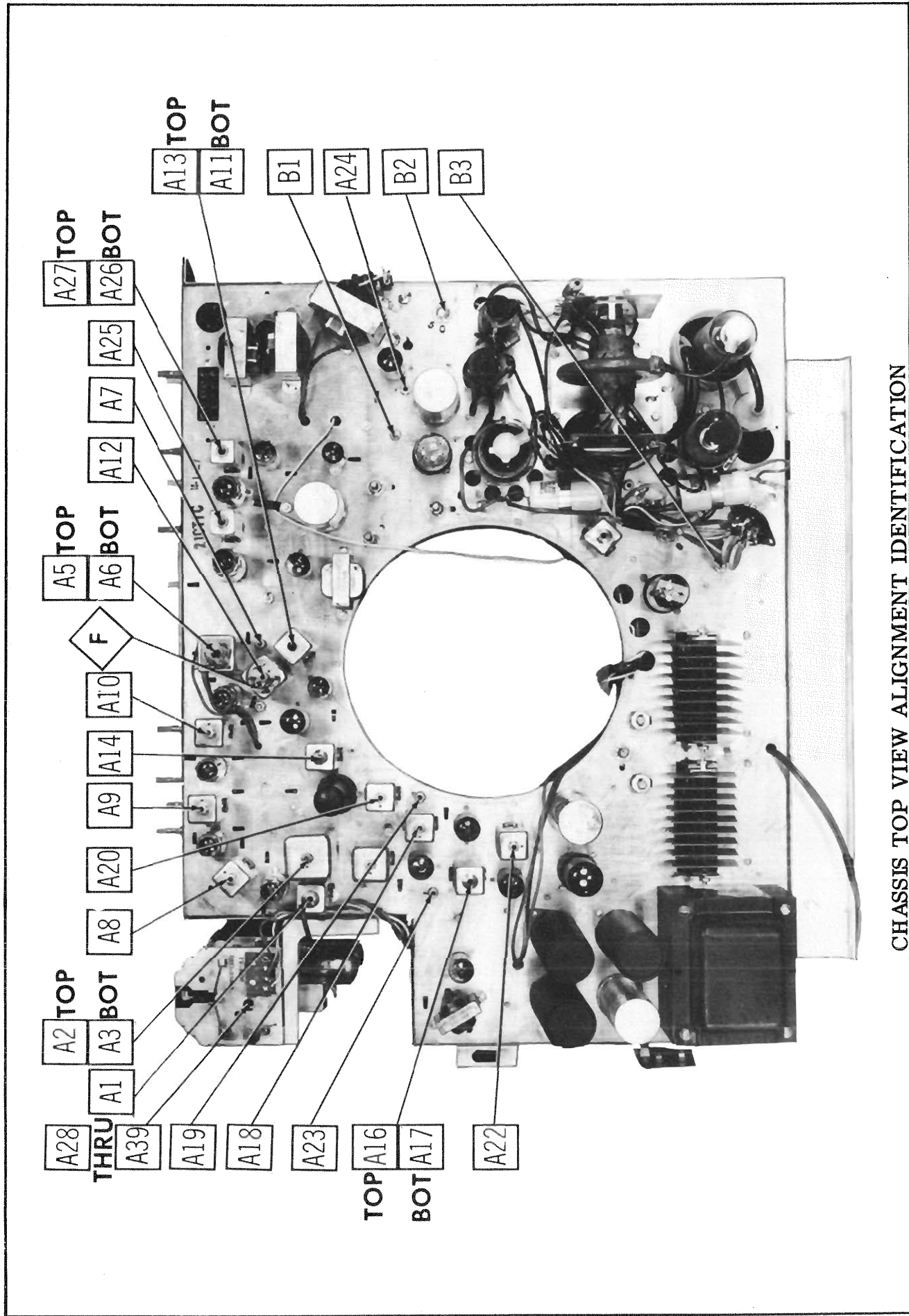
† MEASURED FROM 420V SOURCE.
 ‡ MEASURED FROM PIN 3 OF V19.
 § MEASURED FROM 200V SOURCE.
 ▲ MEASURED FROM -15V SOURCE.
 • THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
 † THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
 NC NO CONNECTION.
 TP TIE POINT.

TOP CAP
‡ 5.5Ω

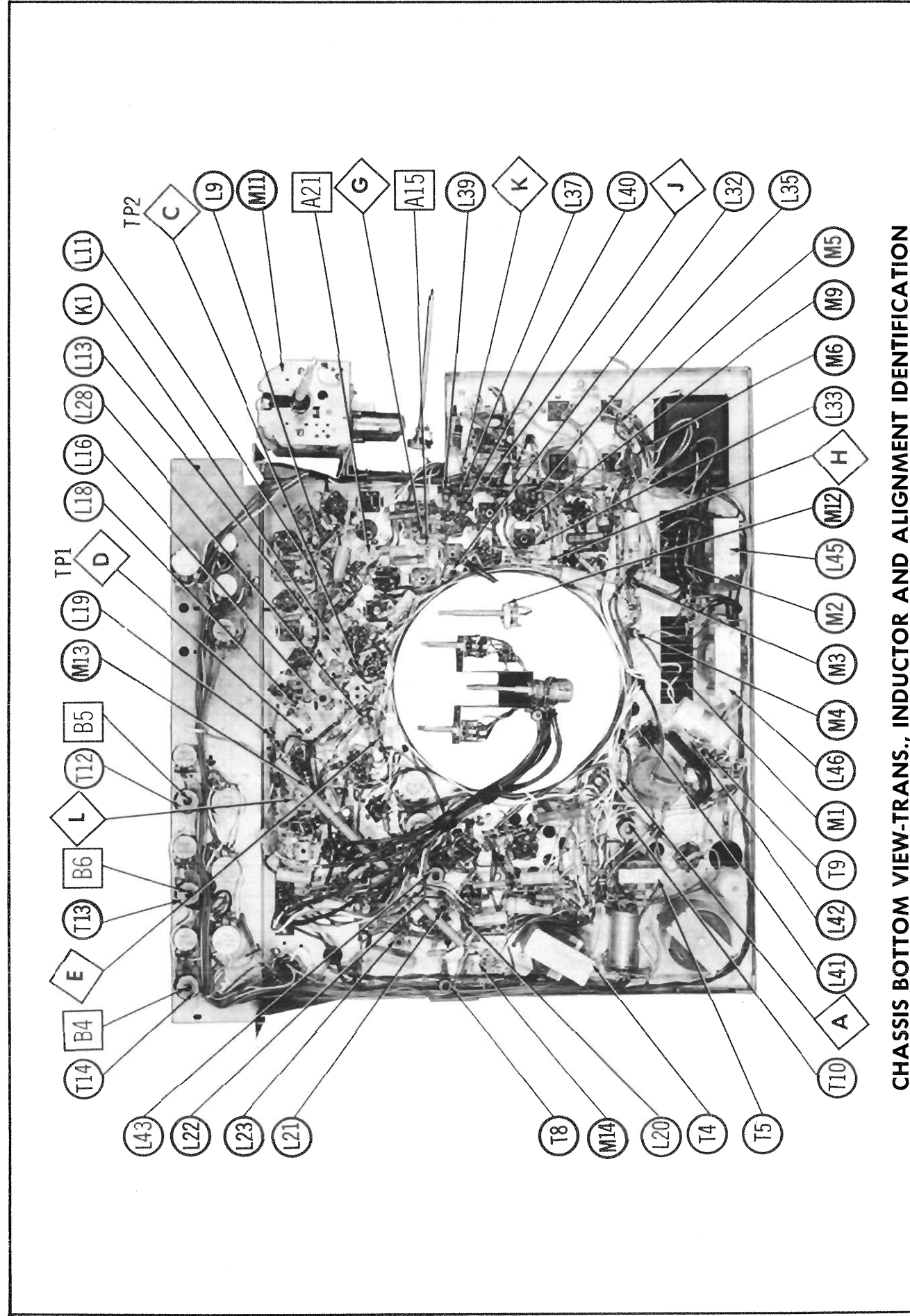


RAYTHEON MODELS C-21C1-B, -M,
 M-21CO-B, -M (Ch. 21CT1C)
 WIRING DIAGRAM

FOLDER 4



CHASSIS TOP VIEW ALIGNMENT IDENTIFICATION



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

RAYTHEON MODELS C-21C1-B, -M,
M-21CO-B, -M (Ch. 21CT1C)

MISCELLANEOUS ADJUSTMENTS

HORIZONTAL SWEEP CIRCUIT ADJUSTMENT

Turn the set on and tune in a monochrome signal. Adjust front controls for a normal picture. Set the horizontal hold control to the center of its range. Adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally. Set B1 to the center of the range in which the picture remains in sync.

Adjust horizontal size switch and horizontal size plug (B2) for a picture SLIGHTLY wider than necessary to fill the picture mask horizontally. Connect the DC probe of a VTVM to pin 8 (grid) of 6CB5 (V18). Connect common to chassis. Adjust horizontal linearity slug (B3) for MINIMUM voltage. Rotate the horizontal drive control (R17) until drive lines (white vertical line or lines) disappear. Turn the brightness control down until the picture is just visible. Connect the high voltage probe to the plate cap of the high voltage regulator tube (V21) and adjust the high voltage adj. control (R19) for 25 KV.

PRELIMINARY ADJUSTMENTS

Check adjustment of horizontal and vertical centering, focus, vertical linearity and vertical size controls.
Check position and location of the blue beam positioning magnet. (The magnet should be directly centered on the flange of the blue gun of the picture tube).
Check position and location of the purity magnet. (The purity magnet should be centered directly over the break in the gun structure, which is located SLIGHTLY forward of the blue beam positioning magnet).
Check the position and location of the convergence yoke assembly. (The assembly should be located approximately 1/4" back from the deflection yoke, and positioned so that the blue convergence coil is directly over the blue gun. (This coil may be identified by means of a colored lead.)

INITIAL CONVERGENCE ADJUSTMENT

Convergence must be set in the center area of the picture tube before attempting purity adjustments.
Adjust the brightness, blue and green brightness, and red, blue and green screen controls to produce an apparent black and white picture. If necessary, readjust the focus control.
Set the red, blue and green horizontal and vertical convergence amplitude controls fully counter clockwise. Set red, blue and green vertical convergence tilt controls to the center of their range.
Connect a dot generator to the antenna terminals and tune them in on the receiver. Check the contrast control setting.
Adjust the red, blue and green convergence magnets (part of the convergence yoke assembly) and the blue beam positioning magnet to produce good convergence in the center of the screen.
Remove the dot generator.

PURITY ADJUSTMENTS

1. Turn the brightness and contrast controls fully counter clockwise.
2. Turn blue and green brightness controls and blue and green screen controls fully counter clockwise.
3. Turn the channel selector to an unused channel.
4. Advance the red screen control fully clockwise.
5. Turn the brightness control slowly clockwise until a raster appears.
6. Pull all field equalizing magnets (edge magnets) to their maximum outward position. (There are three magnets on each side of the picture tube).
7. Adjust the purity magnets for MINIMUM effect which is when the two red tabs are together.
8. Adjust the purity magnet for best red field by rotating either or both tabs around the neck of the picture tube.
9. Loosen yoke positioning bolts and move the yoke backward and forward until the position is found that produces the maximum red over the entire face of the picture tube.

NOTE: It may be necessary to repeat steps 8 and 9 until optimum results are obtained.
10. Check for pure blue field by turning the red screen control fully counter clockwise and advancing the blue screen and blue brightness controls fully clockwise. Readjust the brightness control for a sufficient blue raster.
11. Check for a pure green field by turning the blue screen and the blue brightness controls fully counter clockwise and advancing the green screen and the green brightness controls fully clockwise. Readjust the brightness control for sufficient green raster.

NOTE: It may be necessary to repeat steps 8 and 9 while compromising on purity of red, blue and green raster so that a good average will be obtained on all fields. Good judgement will be matter of experience when purity is concerned. Any correction on one field effects the other two, therefore, each field must be checked if either the yoke or the purity magnets are changed.
12. Adjust the red, blue and green screen and blue and green brightness controls to produce a white raster with a low brightness level. If color contamination is visible at the edge of the screen, adjust the field equalizing magnets nearest the area of contamination to produce the most uniform white field over the entire screen.

VERTICAL CONVERGENCE

Connect a dot generator to the antenna terminals and tune in the dot pattern

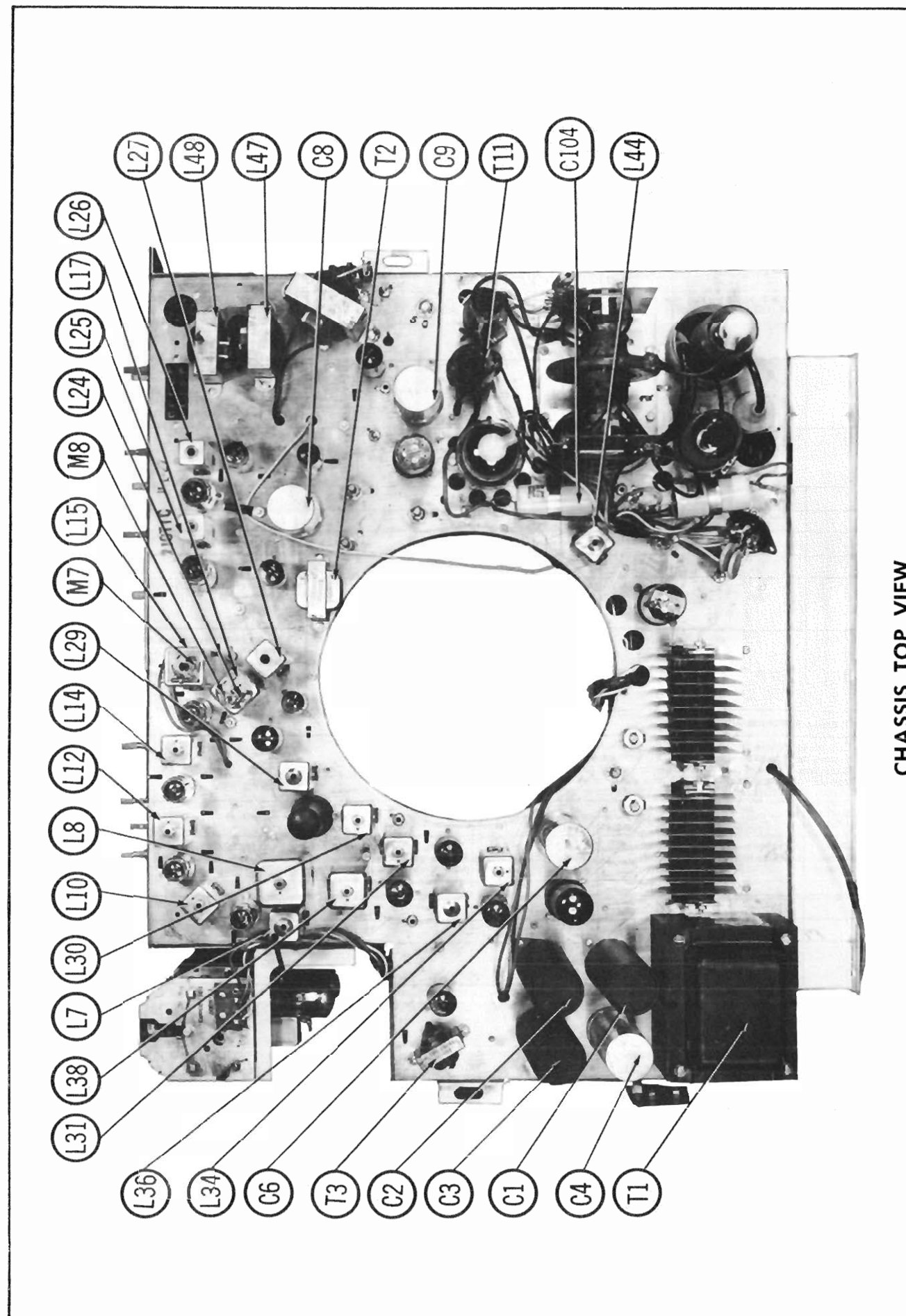
on the receiver. Set the brightness and contrast controls for a suitable dot pattern.
Adjust the red, blue and green convergence magnets and the blue beam positioning magnet to provide good convergence in the center of the screen.
As an aid to performing the vertical convergence adjustments, it is advisable to block off all but one center vertical row of dots with cardboard or some other material.
Turn the blue brightness and blue screen controls fully counter clockwise. Adjust the red screen, green screen and green brightness controls for equal size red and green dots.
Adjust the green and red vertical amplitude and tilt controls until the red and green dots are equally spaced from each other in the same direction. Adjust the red and green convergence magnets to overlap the red and green dots to obtain yellow dots.
If necessary, readjust the red and green vertical amplitude and tilt controls until the dots overlap evenly from one end of the vertical center row to the other, thereby producing a vertical row of yellow dots.
Turn the green screen and green brightness controls fully counter clockwise. Advance the blue screen and blue brightness controls until blue dots appear equal in size to the red dots.
Adjust the blue vertical amplitude and tilt controls until the blue dots are equally spaced in the same direction from the red dots.
Adjust the blue convergence magnet and the blue beam positioning magnet until the blue dots overlap the red dots, thereby producing magenta dots. Readjust the blue vertical amplitude and tilt controls until all the dots in the center vertical row are magenta and no evidence of red or blue is visible. Turn the red screen control fully counter clockwise. Advance the green screen and green brightness controls until the green dots are the same size as the blue dots.
Adjust the green vertical amplitude and tilt controls until green dots overlap the blue dots, thereby producing cyan dots. If necessary, readjust the green convergence magnet.
Advance the red screen control until white dots are observed.
Readjust the red, blue and green vertical amplitude and tilt controls as well as the red, blue and green convergence magnets, if necessary, until only white dots appear and there is no color fringing visible.

HORIZONTAL CONVERGENCE

If a covering was used in the above steps to show only a vertical row of dots, rearrange so that only the center horizontal row of dots are visible.
Turn blue screen and blue brightness controls fully counter clockwise.
Adjust green and red horizontal amplitude controls, red horizontal phase slug (B4) and the green horizontal phase (B5) until the red and green dots are equally spaced from each other in the same direction.
Adjust the red and green convergence magnets until the red and green dots coincide to produce yellow dots.
Readjust if necessary, red and green horizontal amplitude controls and phase slugs until the dots overlap evenly and only yellow dots are visible.
Turn the green screen and green brightness control fully counter clockwise. Advance the blue screen and blue brightness controls until the blue dots reappear equal in size to the red dots.
Adjust the blue convergence and the blue beam positioning magnets until the blue and red dots coincide to form magenta dots.
Readjust the red and blue horizontal amplitude controls and phase slugs until all the dots are magenta in color with no evidence of red or blue visible.
Turn the red screen control fully counter clockwise. Advance the green screen and the green brightness controls until the green dots appear equal in size to the blue dots.
Adjust the green horizontal amplitude control and the green horizontal phase slug until the green dots overlap the blue dots, thereby producing cyan dots. Readjust the green convergence magnet, if necessary.
Advance the red screen control until the dots appear white.
Readjust red, blue and green horizontal amplitude controls and phase slugs as well as the red, blue and green convergence magnets, if necessary, until only white dots appear and there is no visible color fringing of any of the dots.
Observe the entire face of the picture tube and make any convergence touch-up adjustments necessary to produce white dots over the entire screen.

BLACK AND WHITE ADJUSTMENTS (GRAY SCALE ADJUSTMENTS)

1. Set the contrast control at approximately one-third of its rotation. Turn the brightness control fully clockwise. Turn the channel selector to an active monochrome channel.
2. Adjust the blue and green brightness controls for a satisfactory black and white picture.
3. Reduce the brightness control to the lowest usable level.
4. Adjust the red, blue and green screen controls for a black and white picture.
5. Turn the brightness control fully clockwise and repeat step 2.
6. Rotate the brightness control from maximum to minimum and check the black and white picture. If a color change is observed in the picture, repeat the above procedure until a black and white picture is obtained at all settings of the brightness control.



RAYTHEON MODELS C-21C1-B, -M,
M-21CO-B, -M (Ch. 21CT1C)
MAIN DOT SISSVH

FOLDER 4

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

To eliminate interference to the response curves during alignment, disable the high voltage circuit by removing the damper tube (V19). Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 4.5 volt bias supply to point \diamond . Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms. Use only enough sweep generator output to provide a usable pattern on scope. Use 10MC sweep unless otherwise noted.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1. Direct	High side to point \diamond (thru hole in top of tuner). Low side to chassis.	44.5MC	41.25MC	10	Vert. Amp. thru detector probe to pin 5 (plate) of 6DC6 (V3). Low side to chassis.	A1, A2, A3, A4	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown. Correct settings for A2 and A3 are with slugs farthest clockwise when adjusting both from top.
2. 1500MMF	High side to pin 1 (grid) of 6CB6 (V6). Low side to chassis.	"	41.7MC 42.17MC 42.7MC 45.75MC	"	Vert. Amp. thru 10K to point \diamond . Low side to chassis.	A5, A6, A7	Adjust for maximum gain and symmetry of response similar to Fig. 2 with markers as shown. Start adjustment with slugs A5 and A6 at the outer most ends of coil forms and A7 nearest chassis.
3. "	"	"	41.25MC 42.7MC 45.75MC	"	Vert. Amp. thru 10K to point \diamond . Low side to chassis.	"	Check for response curve similar to Fig. 3. If necessary, retouch A5, A6 and A7 for desired response. Repeat steps 2 and 3 until best curves are obtained similar to Fig. 2 and Fig. 3. Repeat step 1.
4. "	High side to point \diamond . Low side to chassis.	Not used	45.0MC (Unmod)	"	USE VTVM. DC probe thru 10K to point \diamond . Low side to chassis.	A8	Adjust for maximum deflection.
5. "	"	"	41.5MC	"	"	A9	"
6. "	"	"	43.5MC	"	"	A10	"
7. "	"	"	41.25MC	"	"	A2, A7	Adjust for MINIMUM deflection.
8. "	"	"	47.25MC	"	"	A3	"
9. "	"	44MC	42.17MC 42.7MC 44.75MC 45.75MC	"	Vert. Amp. thru 10K to point \diamond . Low side to chassis.	"	Check for response curve similar to Fig. 4. Check next step.
10. "	"	"	41.25MC 42.7MC 42.17MC 42.7MC 44.75MC 45.75MC	"	Vert. Amp. thru 10K to point \diamond . Low side to chassis.	"	Check for response curve similar to Fig. 5. If necessary, retouch A7, A8 and A9 while switching scope connection between point \diamond and point \diamond until desired response is obtained in both positions.

CHROMA BANDPASS ALIGNMENT

Turn the brightness control fully counter clockwise. Remove the chroma reference tube (V25) from its socket. Disconnect one end of the chroma detector crystal (M8). Connect the negative lead of a 16 volt bias supply to point \diamond . Positive to chassis. Connect a 1MMF capacitor in series with the detector probe in the following steps.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11. 3300 Ω Carbon Resistor	High side to point \diamond . Low side to chassis.	Not used	4.5MC (400% 30% AM Mod)	Any non-interfering channel	Vert. Amp. thru a detector probe to point \diamond . Low side to chassis.	A11, A12	Adjust for MINIMUM deflection.
12. "	"	"	4.1MC	"	"	A13	Adjust for maximum deflection.
13. "	"	"	3.1MC	"	"	A14	"
14. "	"	3.58MC (2MC Swp)	3.1MC 4.1MC 4.5MC	"	"	A15	Adjust for symmetrical response similar to Fig. 6 with markers as indicated.

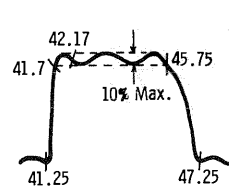


FIG. 1

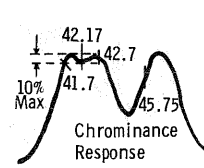


FIG. 2

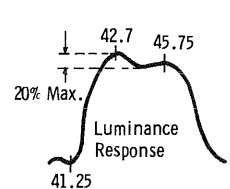


FIG. 3

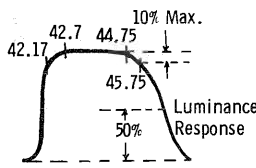


FIG. 4

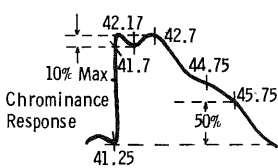


FIG. 5

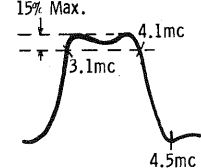


FIG. 6

ALIGNMENT INSTRUCTIONS (cont)

CHROMA REFERENCE OSCILLATOR ALIGNMENT

- Set the color control to the center of its range.
- Set the vertical and horizontal hold controls for correct frequency.
- Turn brightness and contrast controls fully counter clockwise.
- Remove the 1st. chroma amplifier tube (V13) from its socket.
- Connect the DC probe of a VTVM to pin 7 (grid) of the 12BH7 (V26). Connect common to chassis. Set the VTVM to -30 volt scale.
- Adjust A18 and A17 for maximum deflection.
- Remove the VTVM connection and connect the vertical amplifier lead of a wide band scope thru a low capacity probe to pin 6 (plate) of the 6BJ7 (V24). Low side to chassis.
- Adjust the "Hue" and A18 for maximum apparent burst on the scope.
- Adjust A19, A20 and A21 for MINIMUM apparent burst on the scope.
- Replace the 1st. chroma amplifier tube (V13) and reconnect the chroma detector crystal (M8).
- Connect a color bar generator to the antenna terminals and adjust the fine tuning for the proper picture.
- Remove the scope and connect the DC probe of the VTVM to point \diamond . Common to chassis.
- Set the "Hue" to 50% mesh.
- Adjust A18 for maximum negative voltage on the VTVM.
- Move the DC probe of the VTVM from point \diamond to point \diamond .
- Adjust A22 for zero voltage.
- Remove the VTVM connection and connect the vertical amplifier of the scope to point \diamond . Low side to chassis.
- Adjust A18 for correct R-Y response for the color bar generator being used. (See Fig. 7).
- Move scope connection to point \diamond .
- Adjust A23 for correct G-Y response for the color bar generator being used.

3.58 MC TRAP ADJUSTMENT

- Connect a color bar generator to the antenna terminals and adjust the fine tuning for the proper picture.
- Connect the vertical amplifier lead of a wide band scope thru a low capacity probe to pin 6 (plate) of the 6CL6 (video output, V7). Low side to chassis.
- Adjust A24 for MINIMUM sub-carrier response.

SOUND IF ALIGNMENT

Tune in a monochrome signal and adjust the fine tuning for best picture. Connect the DC probe of a VTVM to point \diamond . Common to chassis. Adjust A25 for maximum deflection. Move the DC probe from point \diamond to pin 2 (plate) of the 6T8 (V11). Adjust A26 and A27 for maximum deflection. A27 will be found to have a broad peak, so adjust very carefully to highest peak.

TUNER OSCILLATOR ALIGNMENT

Connect bias as under "Video IF Alignment". Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms. Set the fine tuning to the center of its range. Use only enough sweep generator output to provide a usable pattern on scope. Use 10MC sweep unless otherwise noted.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15. Two 120 Ω Carbon Resistors	Across antenna terminals with 120 Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point \diamond . Low side to chassis.	A28	Adjust to place sound marker in trap notch as in Fig. 8. Video marker should fall at 50%.
		207MC	205.25MC 209.75MC	12		A29	
		201MC	199.25MC 203.75MC	11		A30	
		195MC	193.25MC 197.75MC	10		A31	
		189MC	187.25MC 191.75MC	9		A32	
		183MC	181.25MC 185.75MC	8		A33	
		177MC	175.25MC 179.75MC	7		A34	
		85MC	83.25MC 87.75MC	6		A35	
		79MC	77.25MC 81.75MC	5		A36	
		69MC	67.25MC 71.75MC	4		A37	
		63MC	61.25MC 65.75MC	3		A38	
		57MC	55.25MC 59.75MC	2		A39	

RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

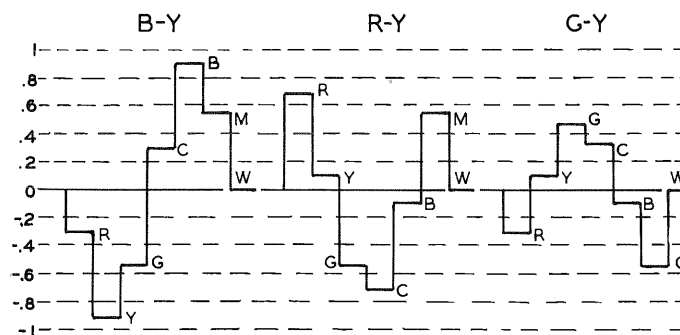


FIG. 7

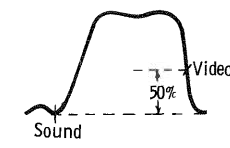
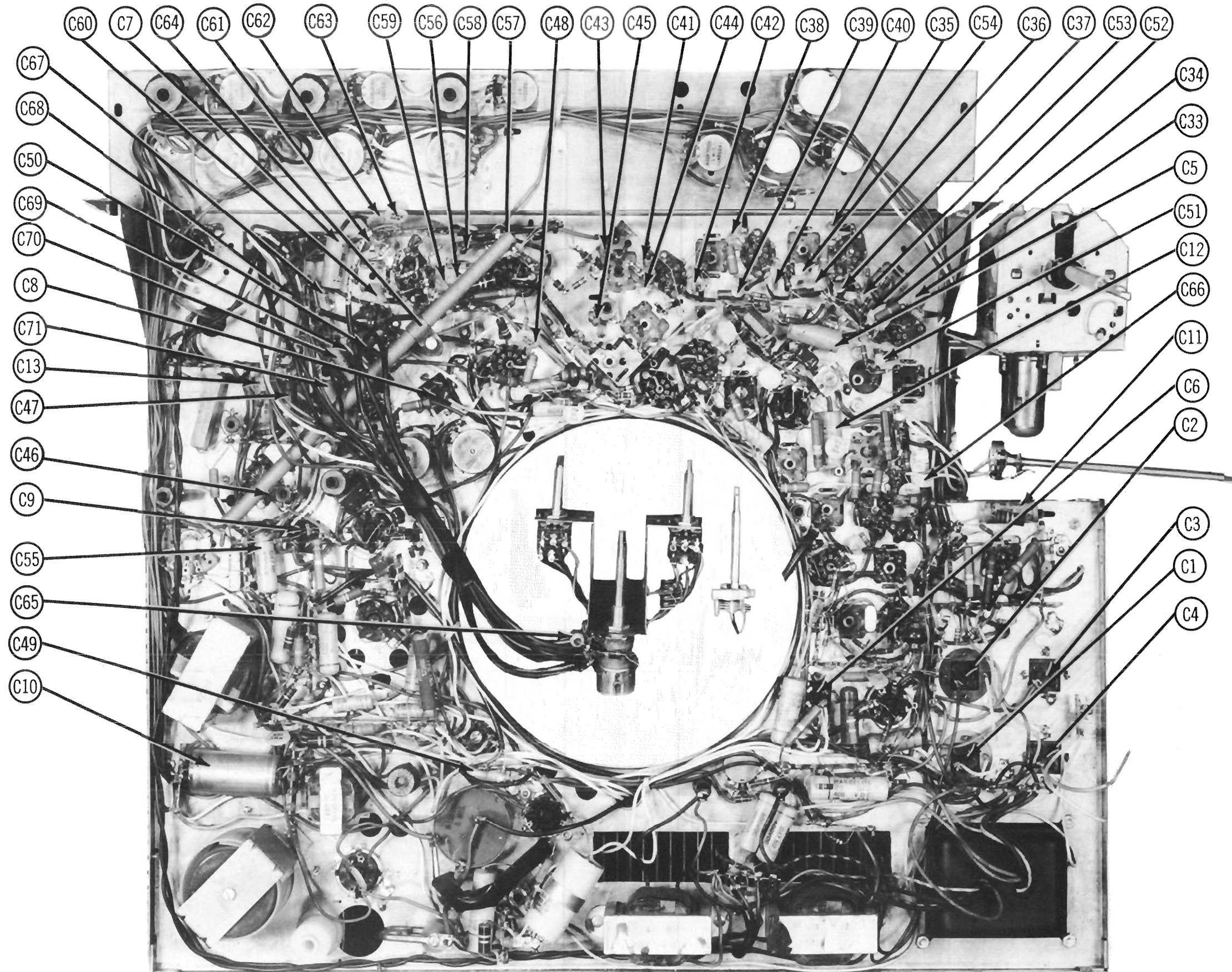


FIG. 8

RAYTHEON MODELS C-21C1-B, -M, M-21CO-B, -M (Ch. 21CTTC)

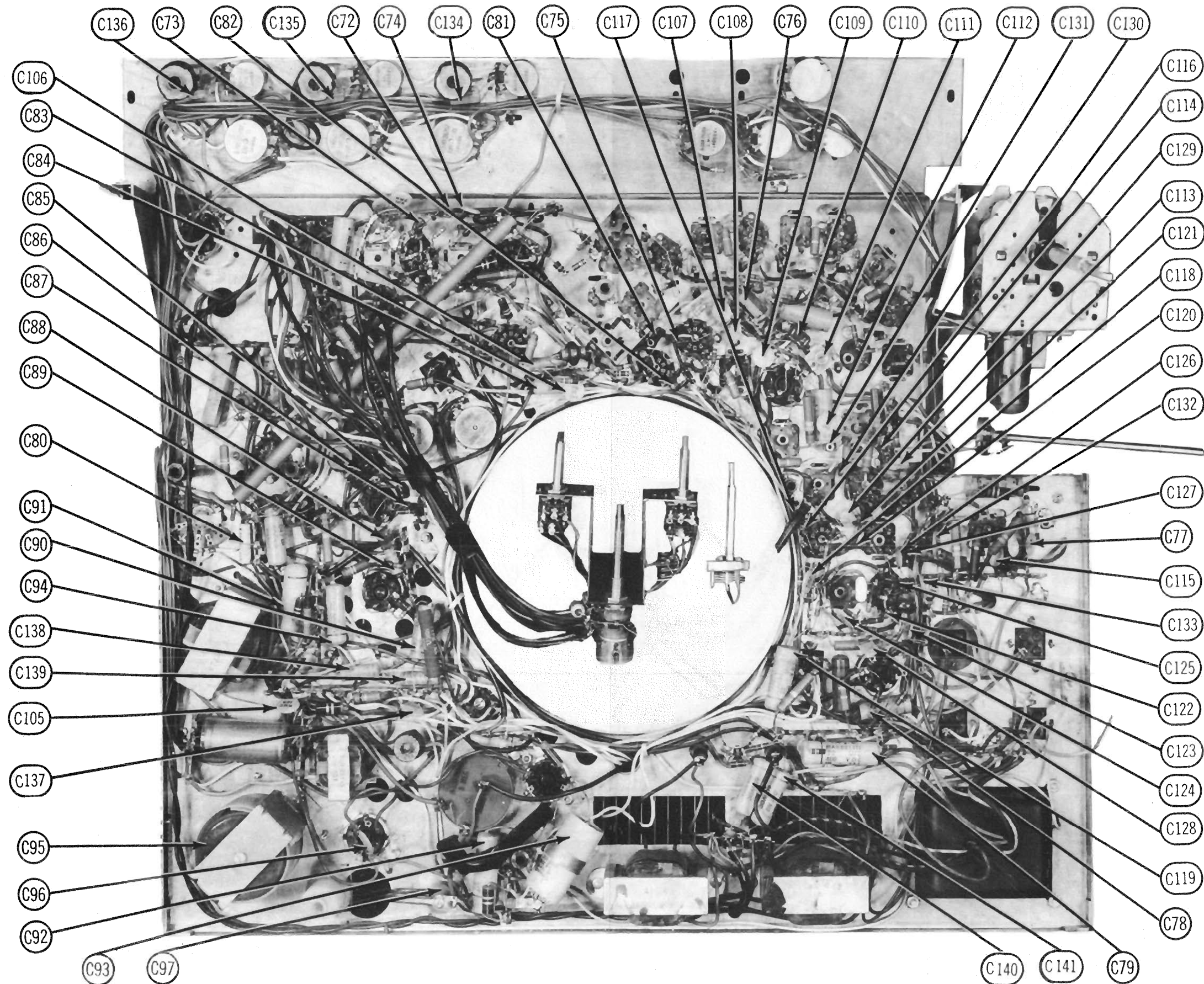
FOLDER 4



CHASSIS BOTTOM - CAPACITOR IDENTIFICATION (C1 THRU C71)

RAYTHEON MODELS C-21C1-B, -M,
M-21CO-B, -M (Ch. 21CT1C)

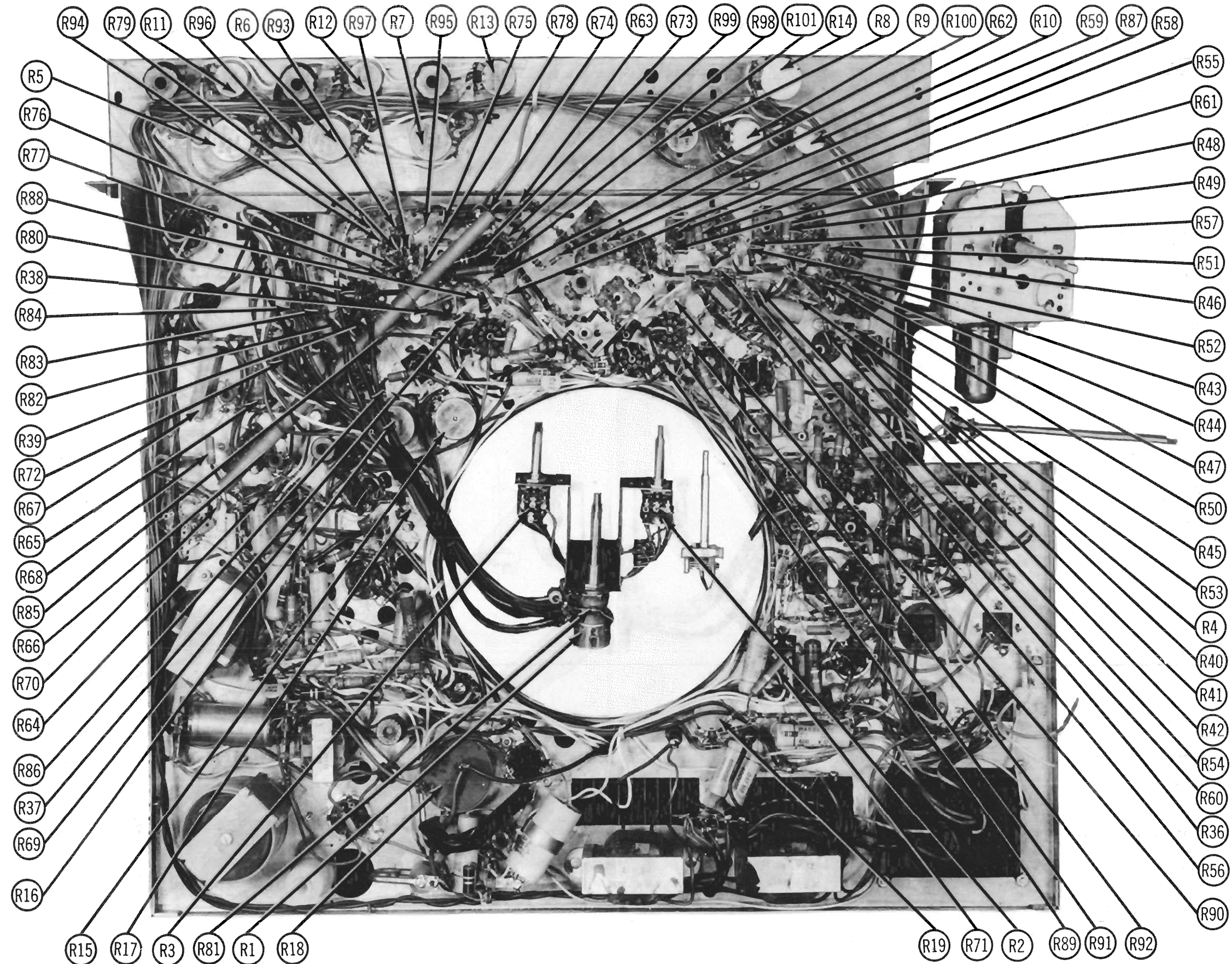
FOLDER 4



CHASSIS BOTTOM - CAPACITOR IDENTIFICATION (C72 THRU C141)

RAYTHEON MODELS C-21C1-B, -M,
M-21CO-B, -M (Ch. 21CT1C)

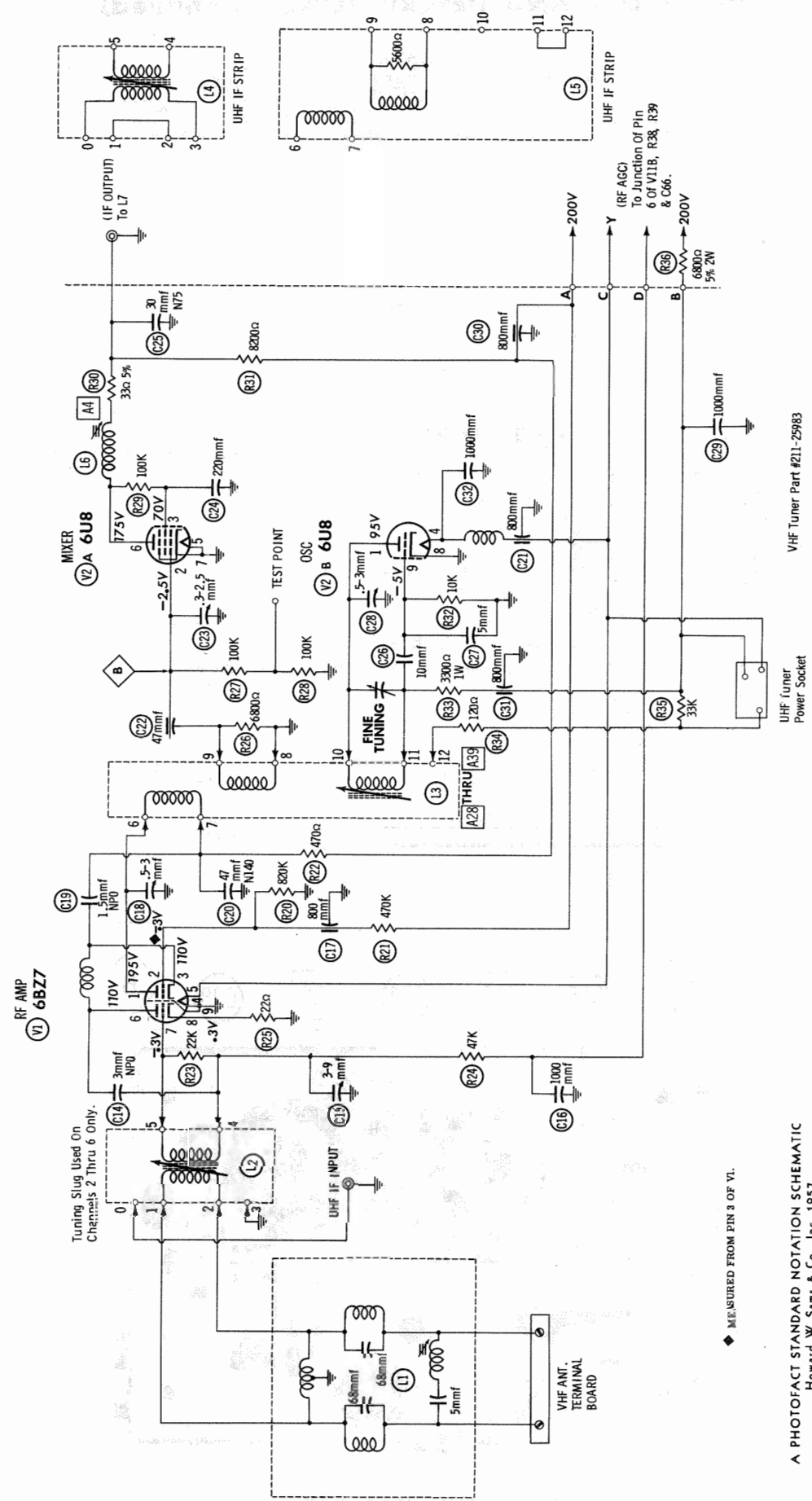
FOLDER 4



CHASSIS BOTTOM - RESISTOR IDENTIFICATION (R1 THRU R101)

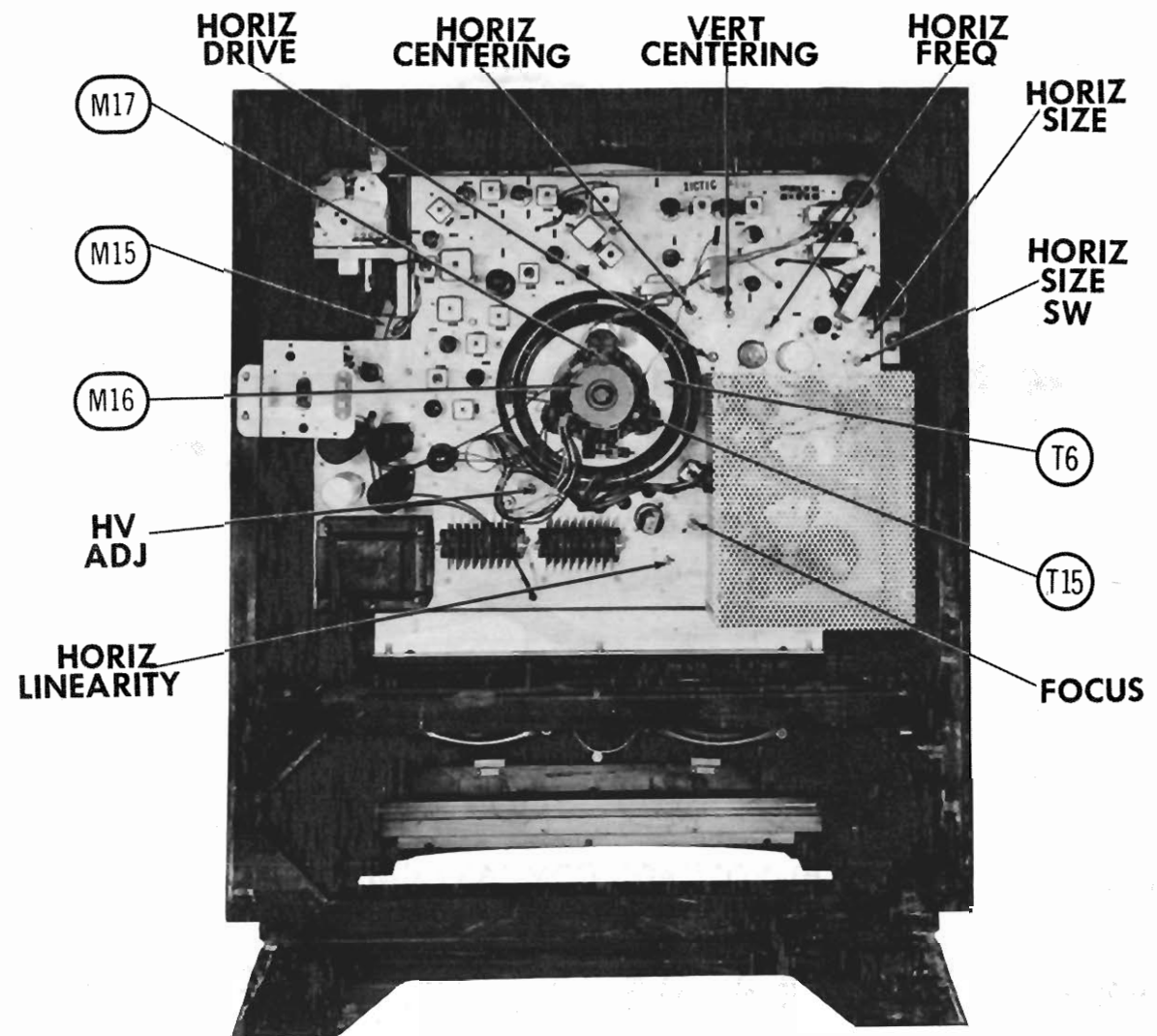
RAYTHEON MODELS C-21C1-B, -M,
M-21CO-B, -M (Ch. 21CT1C)

FOLDER 4



A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

TUNER SCHEMATIC



CABINET-REAR VIEW

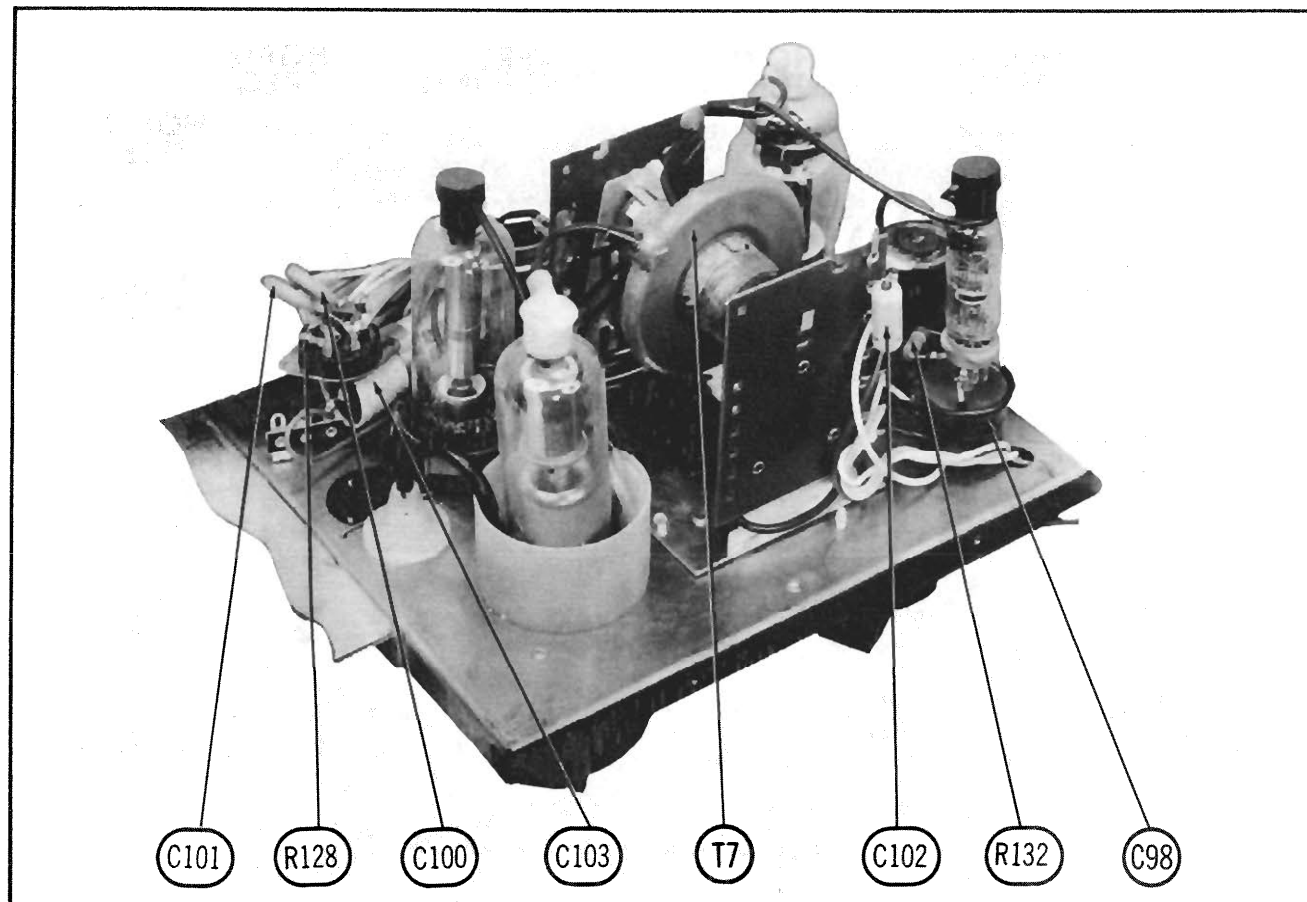
DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

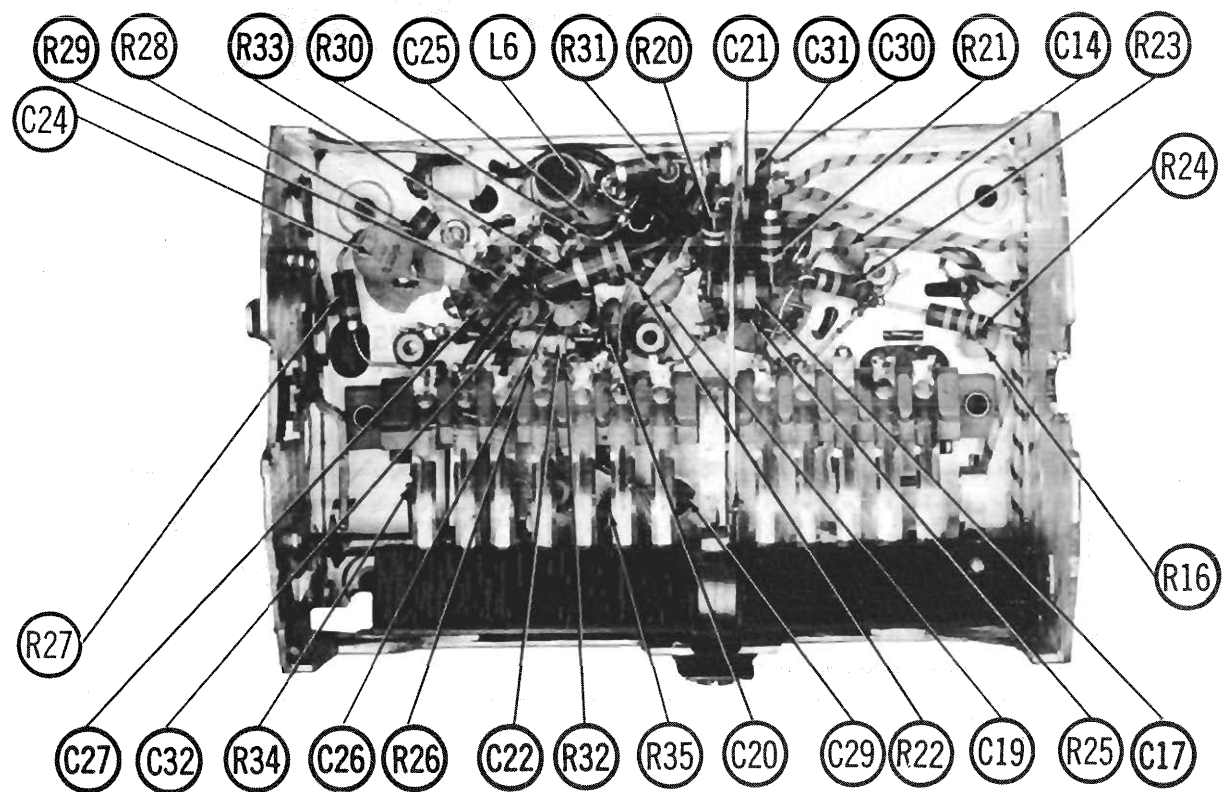
1. Remove 9 push-on type knobs from the front.
2. Remove 4 wood screws holding 2 knob escutcheons.
3. Remove 10 wood screws and the rear cover.
4. Remove 2 bolts from the upper rear corners of the cabinet, and remove the top.
5. Remove 2 wood screws and the AC interlock.
6. Remove the control mounting brackets by removing 2 wood screws and 2 metal screws accessible under the removed escutcheons.
7. Remove 2 wood screws holding the rear support bracket.
8. Remove 2 speaker leads.
9. Remove 3 bottom and 2 side chassis bolts.
10. Remove the ground spring from chassis to neutralizing magnet.
11. Remove the picture tube socket, convergence yoke plug, yoke plug, purity magnet, blue beam positioning magnet, convergence yoke, deflection yoke.
12. Partially remove the chassis and remove the HV lead connector. NOTE: Discharge HV to picture tube harness.
13. Remove the chassis.

RAYTHEON MODELS C-21C1-B,
-M, M-21C0-B, -M (Ch. 21CT1C)

FOLDER 4



HI-VOLTAGE COMPARTMENT



RF TUNER-BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS (Continued)
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			RAYTHEON PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M3	N	1/2A 125V S/B	46B-26275	55F-26273	333, 500 (N 1/2A 125V S/B)	346009	N 1/2	HN 3/10 to 1/2
M4	N	1/4A 125V S/B	46B-26276	55F-26274	333, 250 (N 1/4A 125V S/B)	346008	N 1/4	HN 0 to 3/10
M5		2" length #26 wire						
M6		2" length #26 wire						

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		RAYTHEON PART No.	CBS PART No.	SYLVANIA PART No.	
M7	1N295 *		1N60	1N60	Video Detector (PT)
M8	1N295 *		1N60	1N60	Chroma & Sound IF Detector (PT)

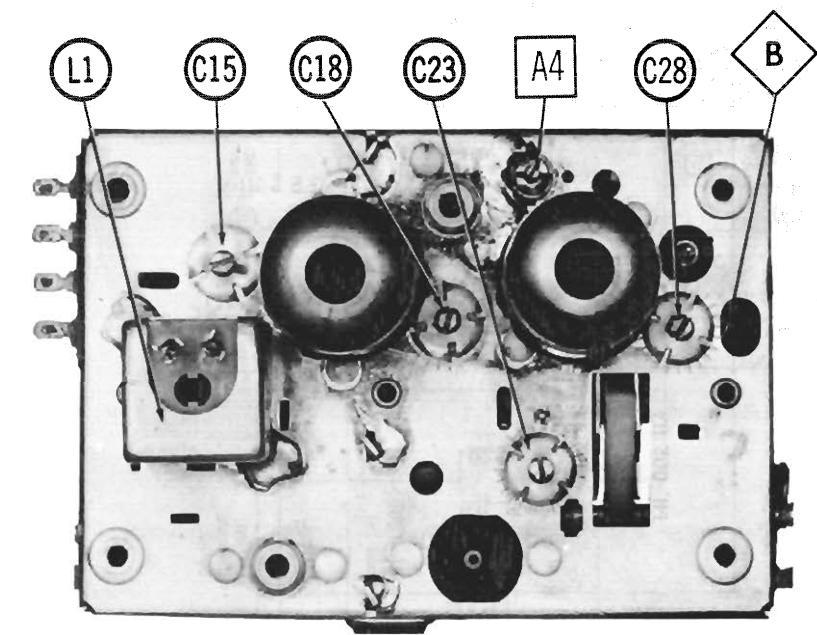
MISCELLANEOUS

ITEM No.	PART NAME	RAYTHEON PART No.	NOTES
M9	Crystal	8M-26102	3.579545MC
M10	Pilot Light	46A-10793	Type #47
M11	Tuner	211-25983	VHF
M12	Hue Adjust	8E-26255	
M13	Delay Line	13M-26093	
M14	Switch	20A-26123	Horiz. Size (Rotary wafer type)
M15	Magnet		Field Equalizing (6 used)
M16	Magnet	55P-26098	Purity
M17	Magnet	55P-26099	Blue Beam Positioner

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	30M-26240	
Mask	25M-26351	
Knob	5B-26323-A201	Tuning knob assy.
Knob	5B-19794-A74	Fine tuning, color, horiz. hold (Models C-21C1-M, M-21C0-M)
Knob	5B-19794-A201	Fine tuning, color, horiz. hold (Models M-21C0-B, C-21C1-B)
Knob	5B-25899-A201	On-off-volume
Knob	5B-25897-A29	Brightness
Knob	5B-19795-A74	Tone, contrast, vert. hold (Models C-21C1-M, M-21C0-M)
Knob	5B-19795A-201	Tone, contrast, vert. hold (Models M-21C0-B, C-21C1-B)
Knob	5B-26325-A74	Hue - Models C-21C1-M, M-21C0-M
Knob	5B-26325-A201	Hue - Models M-21C0-B, C-21C1-B
Cabinet	24D-26183	Model C-21C1-M
Cabinet	24D-26184	Model C-21C1-B
Cabinet	24D-26181	Model M-21C0-M
Cabinet	24D-26182	Model M-21C0-B



RF TUNER TOP VIEW

RAYTHEON MODELS C-21C1-B, -M, M-21C0-B, -M (Ch. 21CT1C)

FOLDER 4

PARTS LIST AND DESCRIPTIONS (Continued)
COILS (cont)

ITEM No.	USE	RAYTHEON PART No.	NOTES	ITEM No.	USE	RAYTHEON PART No.	NOTES
K	"	31M-013-12	Channel 12	L5	UHF IF Coils	31M-113-.1U	
L	"	31M-013-13	Channel 13	L6	Mixer Plate Coil	31K-970	
L3A	VHF RF & Osc. Coils	31M-113-2	Channel 2				
B	"	31M-113-3	Channel 3				
REPLACEMENT DATA							
ITEM No.	USE	RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES	
L7	1st. Video IF	13A-28081					
L8A	4l. 25MC Trap	13A-28086					
L9	4l. 25MC Trap						
L10	1st. Video IF	16A-25688	19-1001	BC-562	4604	1.5 Microhenries	
L11	2nd. Video IF	13M-26083	17-5004	TV-155	6234	Use adaptor plate	
L12	3rd. Video IF	16A-25688	19-1001	BC-562	4604	1.5 Microhenries	
L13	4th. Video IF	13M-26083	17-5004	TV-155	6234	Use adaptor plate	
L14	Video Det. Assy.	16A-25688	19-1001	BC-562	4604	1.5 Microhenries	
L15	4l. 25MC Trap	13B-28080-1	17-5004	TV-155	6234	Use adaptor plate	
L16	4l. 25MC Trap	13M-26267					
L17	Chroma & Sound Det. Assy.	13B-28087					
L18	Series Peaking Coil	16A-26156	19-1005	BC-566	4612	10 Microhenries	
L19	Series Peaking Coil	16A-26417	19-3100	TV-194	6112	102 Microhenries	
L20	Series Peaking Coil	16A-26417	19-3100	TV-194	6112	102 Microhenries	
L21	3. 58MC Trap	13M-26082					
L22	Shunt Peaking Coil	16A-26416	19-3500	TV-188	6144	560 Microhenries	
L23A	Series Peaking Coil	16A-26412					
L23B	Shunt Peaking Coil						
L24	RF Choke	16A-26156	19-1005	BC-566	4612	10 Microhenries	
L25	Sound IF	13M-26242	17-3495	TV-113	6203		
L26	Ratio Det.	13M-26243	17-3497	TV-115	6205	Tertiary winding - .7Ω	
L27	Chroma Input Coil	13A-26088				Includes 4.5MC trap	
L28	RF Choke	16A-26151	19-5100	BC-513	4652	1 Millihenry	
L29	1st. Chroma Amp. Plate Coil	13M-26260					
L30	2nd. Chroma Amp. Plate Coil	13M-26411				Tapped @ 2.1Ω	
L31	Burst Take-off Coil	13B-26264					
L32	7. 2MC Trap	13M-26265					
L33	RF Choke	16A-26161	19-3036	TV-180	6176	39 Microhenries	
L34	Chroma Reference Osc. Coil	13M-26263					
L35	RF Choke	16A-26151	19-5100	BC-513	4652	1 Millihenry	
L36	Chroma Reference Osc. Plate Coil	13D-26262					
L37	Demodulator Grid Coil	13D-26259					
L38	Demodulator Driver Trans.	13M-26261					
L39	Series Peaking Coil	16A-26151	19-5100	BC-513	4652	1 Millihenry	
L40	Series Peaking Coil	16A-26151	19-5100	BC-513	4652	1 Millihenry	
L41	RF Choke	16A-26162				8 Microhenries	
L42	RF Choke	16A-26155	19-6033			30 Microhenries	

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA							NOTES	
	PRI.	SEC.	RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.		
L43	73Ω		13M-26310	19-1576	TV-165	6210				HS-7	Horiz. Freq.
L44	.2Ω	43Ω	13M-26258								Horiz. Phase

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 Ω)	RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
L45	.330A	4Ω	1.5 HY.	16B-26052	C5037	C-2996	C-2328	26C93	C-17X	
L46	.200A	4Ω	1.5 HY.	16B-26052	C5037	C-2996	C-2328	26C93	C-17X	

VERT. CONVERGENCE CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 Ω)	RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
L47	0MA	20Ω	.2 HY.	16M-26704						
L48	0MA	20Ω	.3 HY.	16M-26705						

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	RAYTHEON PART No.	REPLACEMENT DATA
K1	Vert. Integrator	2000MMF, 4700MMF, 4700MMF, 22K, 8200Ω, 8200Ω	17A-22376	Aerovox Centralab Cornell-Dubilier Erie Sprague
				PA-110 PC-100 115TM1 1405-01 V-1

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT (Measured)	RAYTHEON PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.		
M1	.530A	21J26079 ①	1207AH ①		R5660MBL ①	600 ①	① Selenium type.	
M2	.530A	21J26079 ①	1207AH ①		R5660MBL ①	600 ①		

PARTS LIST AND DESCRIPTIONS
TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES	ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	6BZ7		V15	Vert. Output	6BL7GT	
V2	Mixer-Oscillator	6U8		V16	Horiz. AFC	6AL5	
V3	1st. Video IF Amp.	6DC6		V17	Horiz. Mult.	6SN7GT	
V4	2nd. Video IF Amp.	6DC6		V18	Horiz. Output	6CB5	
V5	3rd. Video IF Amp.	6DC6		V19	Damper	6AU4GTA	
V6	4th. Video IF Amp.	6CB6		V20	HV Rectifier	3B2	
V7	Video Output	6CL6		V21	HV Regulator	6BK4	
V8	AGC Keying-Color Killer	6AN8		V22	Focus Rectifier	1X2B	
V9	1st. Sound IF - Sync Sep.	6U8		V23	2nd. Chroma Amp.	6AG7	
V10	2nd. Sound IF - Sync Sep.	6U8		V24	Burst Keying- Chroma Sync Phase Det.	6BJ7	
V11	Ratio Det. -AF Amp. - AGC Clamper	6T8		V25	Chroma Ref. Osc. Control- Chroma Ref. Osc.	6U8	
V12	Audio Output	6AQ5		V26	G-Y Demodulator- R-Y Demodulator	12BH7A	
V13	Sync Phase Inverter- 1st. Chroma Amp.	6U8					
V14	Vert. Osc. - B-Y Amp.	12AU7					

PICTURE TUBE

ITEM No.	REPLACEMENT DATA			NOTES
	RAYTHEON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V27	21AXP22A	21AXP22A	21AXP22A	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA							
	CAP.	VOLT.	RAYTHEON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.	
C1	200	250	8C-26120	AFH51-37-30	XA0318	FP126	TMS-75	S-160	TVL-1547	
C2	200	250	8C-26120	AFH51-37-30	XA0318	FP126	TMS-75	MT-2540	TVL-1547	
C3	200	250	8C-26120	AFH51-37-30	XA0318	FP126	TMS-75	S-160	TVL-1547	
C4	90	475	8C-26117	AFH1-57	A0570	FP187	TMS-71	S-305	TVL-1850	
C5	2	25	8C-26299	PRS50V2	BBR2-50	TC302	TD-2-25	FM-0502	TVA-1202	
C6A	.10	25	8C-26121					D-015	R2436 *	
C6B	.10	25						MTD-0210		
C6C	.1000	15								
C7	4	75	8C-26297	PRSI50V4	BBR4-150	TC40	TD-4-150	FM-1504	TVA-1402	
C8A	.4	50	8C-26119	AFH4-60		FP376.6		Q-035	R2435 *	
C8B	.25	25				TC30		MT-0504		
C8C	.10	25								
C8D	.10	450								
C9A	.10	350	8C-26118	AFH4-10	DO480	FP434	TMQ-80	Q-330	TVL-4750	
C9B	.10	450								
C9C	.10	25								
C9D	.10	450								
C10	500	6	8C-26070 ①	PRS6VNP500	BRI000-6	TC610	TD-1000-6	MTH-06100	R2434*	
C11	4	75	8C-26297	PRSI50V4	BRI000-6	TC610	TD-1000-6	MTH-06100		
C12	4	150	8C-26298	PRSI50V4	BBR4-150	TC40	TD-4-150	FM-1504	TVA-1402	
C13	4	150	8C-26298	PRSI50V4	BBR4-150	TC40	TD-4-150	FM-1504	TVA-1402	

* Non-catalog item.

† Connect negative leads together.

① Non-polarized unit.

FIXED CAPACITORS

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

ITEM No.	RATING		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.		
C14	3			NP0-SI 3.0	TCZ-3.3	C10V3C	TCO-3	ZT-553	5TCCB-V3	NP0	
C15	3-9				829-10		532-B				
C16	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-DI		
C17	800										
C18	.5-3				829-3		3115-D	CT565A			
C19	1.5			NP0-SI 1.5	TCZ-1R5	C10V15C	TCO-1.5	ZT-5515	5TCCB-V15	NP0	
C20	47									N140	
C21	800										
C22	47										
C23	.3-2.5										
C24	220			BPD-00022	DD-221	L10T22	ED-220	UC-5322	5GA-T22		
C25	30										
C26	10			NP0-SI 10	TCZ-10	L10Q	ED-10	UC-541	5GA-Q1	N75	
C27	5			NP0-SI 5	TCZ-5	L10V5	ED-5	ZT-555			
C28	.5-3				829-3		3115-D	CT565A			
C29	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-DI		
C30	800										
C31	800										
C32	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-DI		
C33	680			BPD-00068	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68		
C34	800			BPD-008	DD-801	L10T8	ED-800		5GA-T8		
C35	680			BPD-00068	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68		
C36	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8		
C37	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8		
C38	680			BPD-00068	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68		
C39	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8		
C40	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8		
C41	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8		
C42A	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8		

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

Table with columns: ITEM No., RATING CAP., VOLT, RAYTHEON PART No., AEROVOX PART No., CENTRALAB PART No., CORNELL DUBILIER PART No., ERIE PART No., MALLORY PART No., SPRAGUE PART No., NOTES. Lists various capacitor models and their specifications.

CONTROLS (cont)

Table with columns: ITEM No., RATING RESIST-ANCE, WATTS, RAYTHEON PART No., CENTRALAB PART No., CLAROSTAT PART No., IRC PART No., MALLORY PART No., INSTALLATION NOTES. Lists control components like potentiometers and switches.

RESISTORS (cont)

Table with columns: ITEM No., RATING RESIST-ANCE, WATTS, RAYTHEON PART No., CENTRALAB PART No., CLAROSTAT PART No., IRC PART No., MALLORY PART No., INSTALLATION NOTES. Lists various resistor models.

Concentrikrit Equivalent K-4 Kit, Base Elements & Shafts B11-139, P1-210 (Panel) B13-137, R1-223 (Rear) 78-1 (Switch) ...

RESISTORS

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

Table with columns: ITEM No., RATING OHMS, WATT, RAYTHEON PART No., IRC PART No., NOTES. Lists various resistor models and their specifications.

Table with columns: ITEM No., RATING OHMS, WATT, RAYTHEON PART No., IRC PART No., NOTES. Lists various resistor models.

Note 1. Some versions may use a 10K in this application. Note 2. Some versions may use a single 8.8Meg, 2W to replace R133, R134, R135 and R136. ...

TRANSFORMER (POWER)

Table with columns: ITEM No., RATING PRI, SEC. 1, SEC. 2, SEC. 3, RAYTHEON PART No., Halldorson PART No., Merit PART No., Stancor PART No., Thordarson PART No., Triad PART No., NOTES.

TRANSFORMER (FILAMENT)

Table with columns: ITEM No., RATING PRI, SEC. 1, SEC. 2, SEC. 3, RAYTHEON PART No., Halldorson PART No., Merit PART No., Stancor PART No., Thordarson PART No., Triad PART No., NOTES.

TRANSFORMERS (SWEEP CIRCUITS)

Table with columns: ITEM No., USE, RAYTHEON PART No., Halldorson PART No., Merit PART No., Ram PART No., Stancor PART No., Thordarson PART No., Triad PART No., NOTES.

TRANSFORMER (AUDIO OUTPUT)

Table with columns: ITEM No., IMPEDANCE, RAYTHEON PART No., Halldorson PART No., Merit PART No., Stancor PART No., Thordarson PART No., Triad PART No., NOTES.

SPEAKER

Table with columns: ITEM No., TYPE, SIZE, FIELD, V. C. IMP., RAYTHEON PART No., QUAM PART No., NOTES.

COILS (RF-IF)

Table with columns: ITEM No., USE, RAYTHEON PART No., NOTES. Lists various coil models and their applications.

RAYTHEON MODELS C-21C1-B, M-21C0-B, M (Ch. 21C1T)B

FOLDER 4