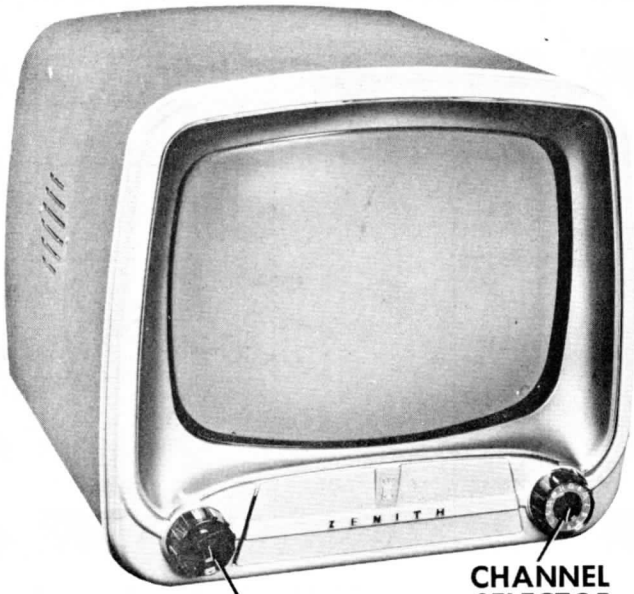
ZENITH CHASSIS
19M20, U, Z, 19M21, U, UZ, Z



ZENITH MODEL M1800R

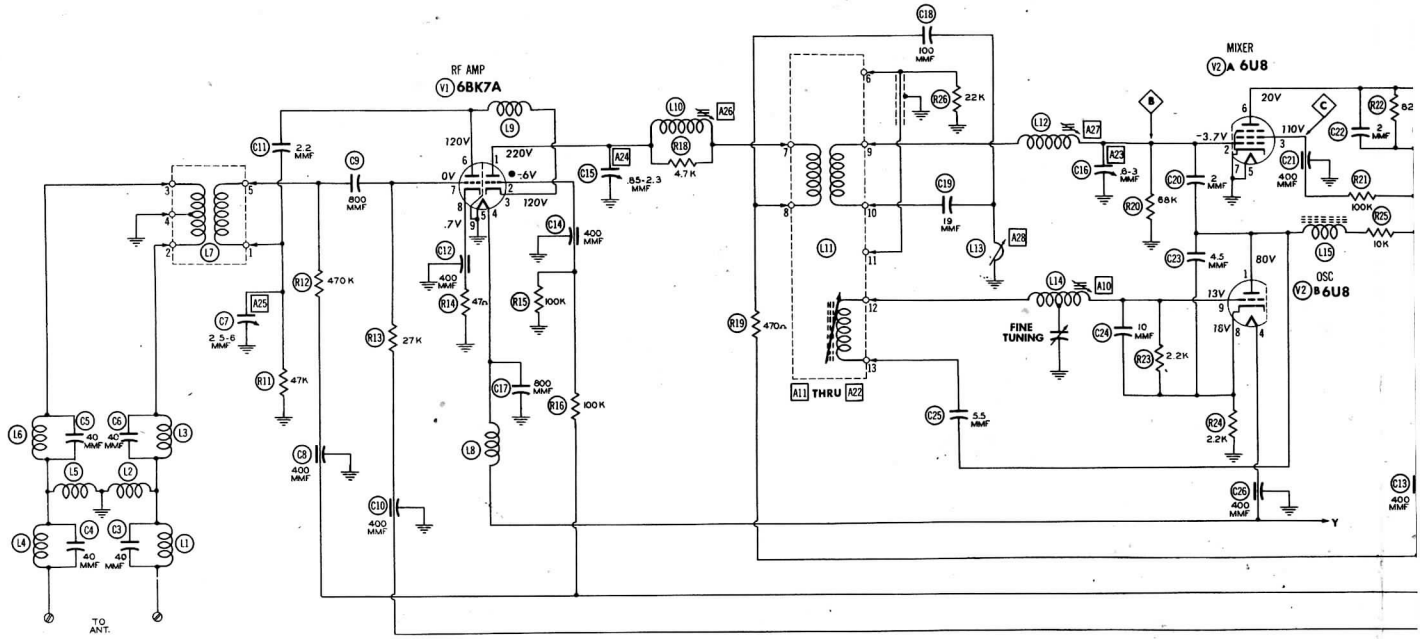
TRADE NAME	Zenith	MODELS	CHASSIS
		M1800E, M1800R, R1800EZ, R1800RZ, R1812EZ, R1812RZ.	19M20
		M1800EU, M1800RU, R1800EUZ, R1800RUZ, R1812EUZ, R1812RUZ.	19M20U
		M1800EZ, M1800RZ.	19M20Z
		M2228R, M2229E, M2229R, M2230E, M2230R, M2230RZ2, M2249E, M2249R, M2250E, M2250R, M2252E, M2252R, R2229EZ, R2229RZ, R2230EZ, R2230RZ, R2249EZ, R2249RZ, R2250EZ, R2250RZ, R2257EZ, R2257RZ, R2258EZ, R2258RZ.	19M21
		M2228RU, M2229EU, M2229RU, M2230EU, M2230RU, M2249EU, M2249RU, M2250EU, M2250RU, M2252EU, M2252RU, R2229EUZ, R2229RUZ, R2230EUZ, R2230RUZ, R2249EUZ, R2249RUZ, R2250EUZ, R2250RUZ, R2257EUZ, R2257RUZ, R2258EUZ, R2258RUZ.	19M21U
		M228RZ, M2229EZ, M2229RZ, M2230EZ, M2230RZ, M2249EZ, M2249RZ, M2250EZ, M2250RZ, M2252EZ, M2252RZ.	19M21Z
		M2250RUZ.	19M21UZ

MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Illinois
TYPE SET	Television Receiver
TUBES	Nineteen
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.6 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75 MC, Sound IF 41.25 MC (Intercarrier)

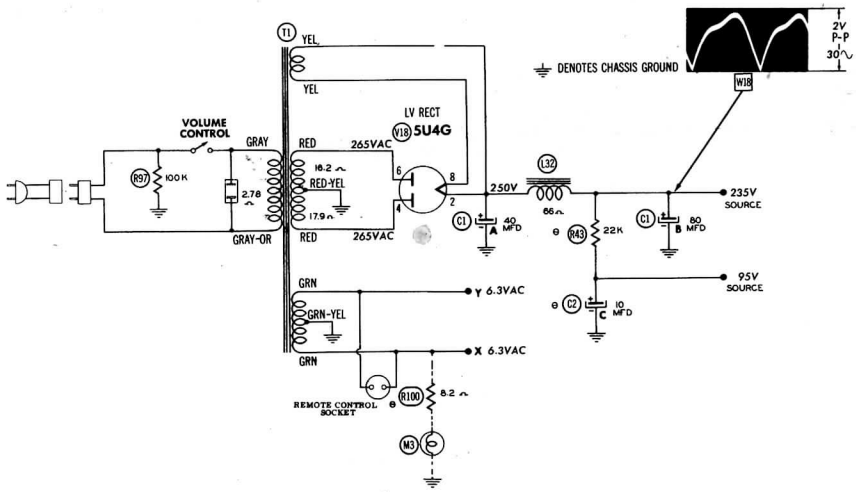
INDEX

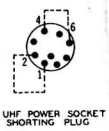
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

ZENITH CHASSIS
19M20, U, Z, 19M21, U, UZ, Z



THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE





● MEASURED FROM PIN 3 OF V1

▲ MEASURED FROM PIN 7 OF V4

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DOTTED IN PARTS ARE NOT USED IN ALL MODELS. WHEN DOTTED IN PARTS ARE USED POINTS MARKED X ARE BROKEN.

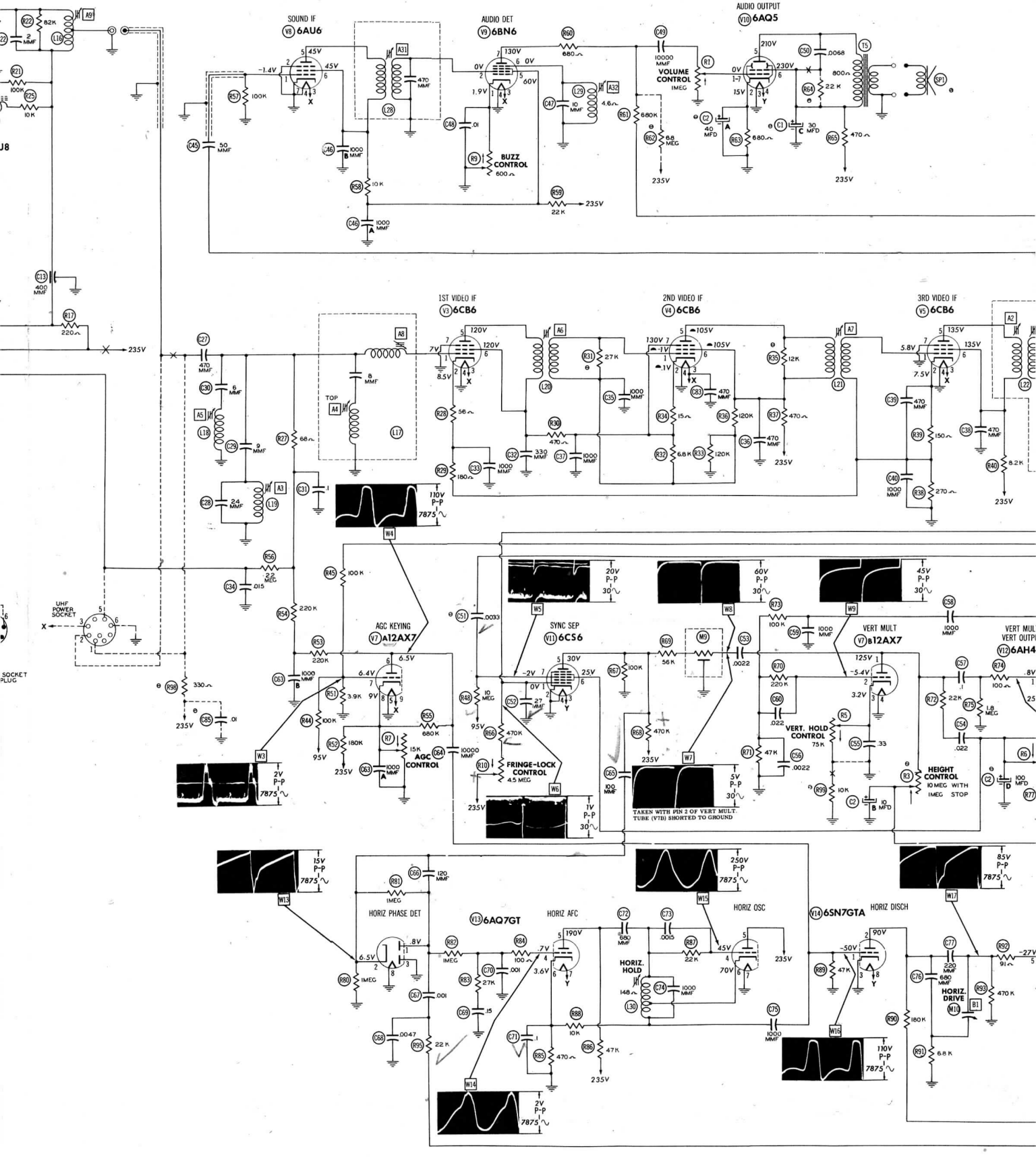
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)

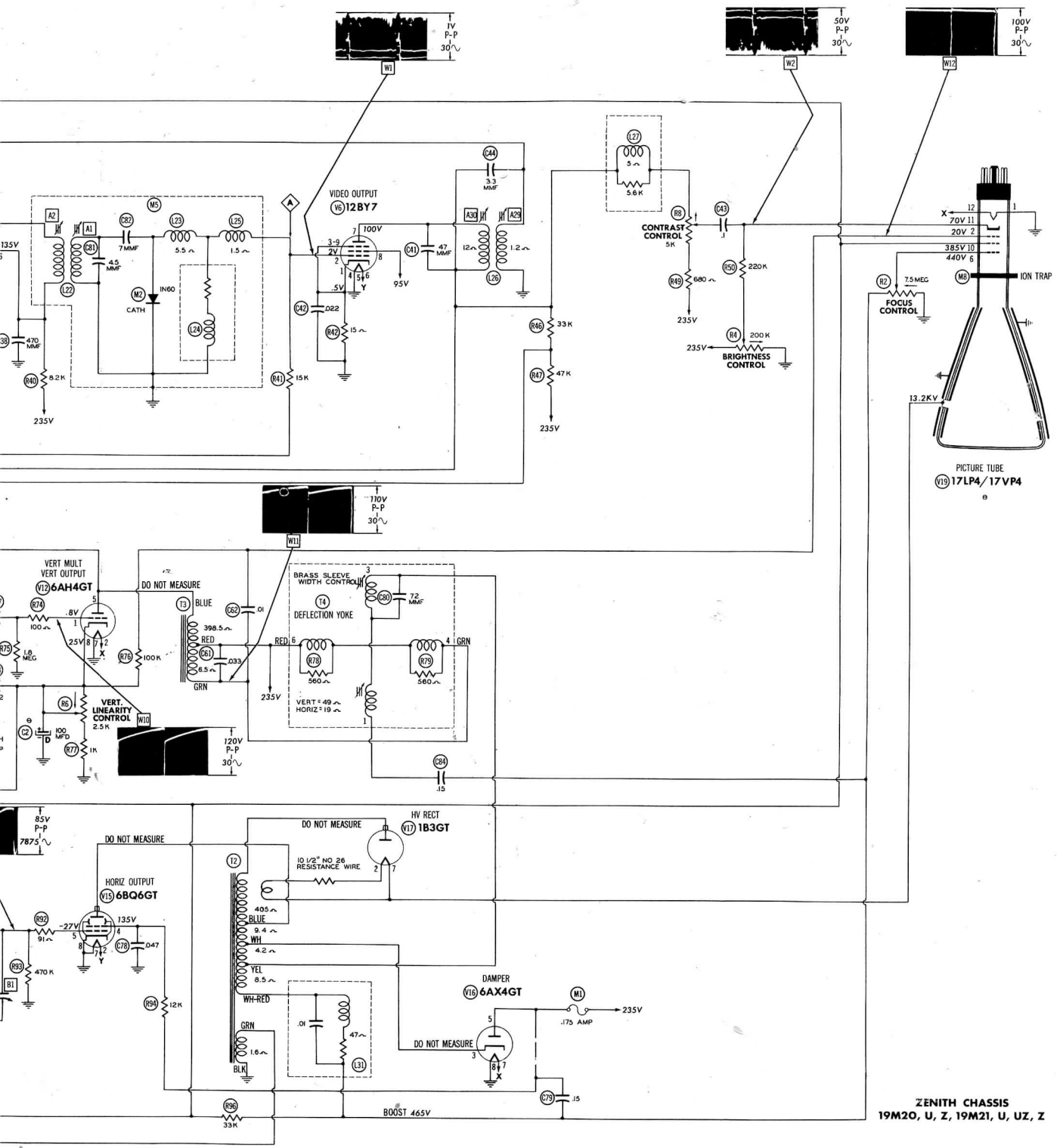
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

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

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

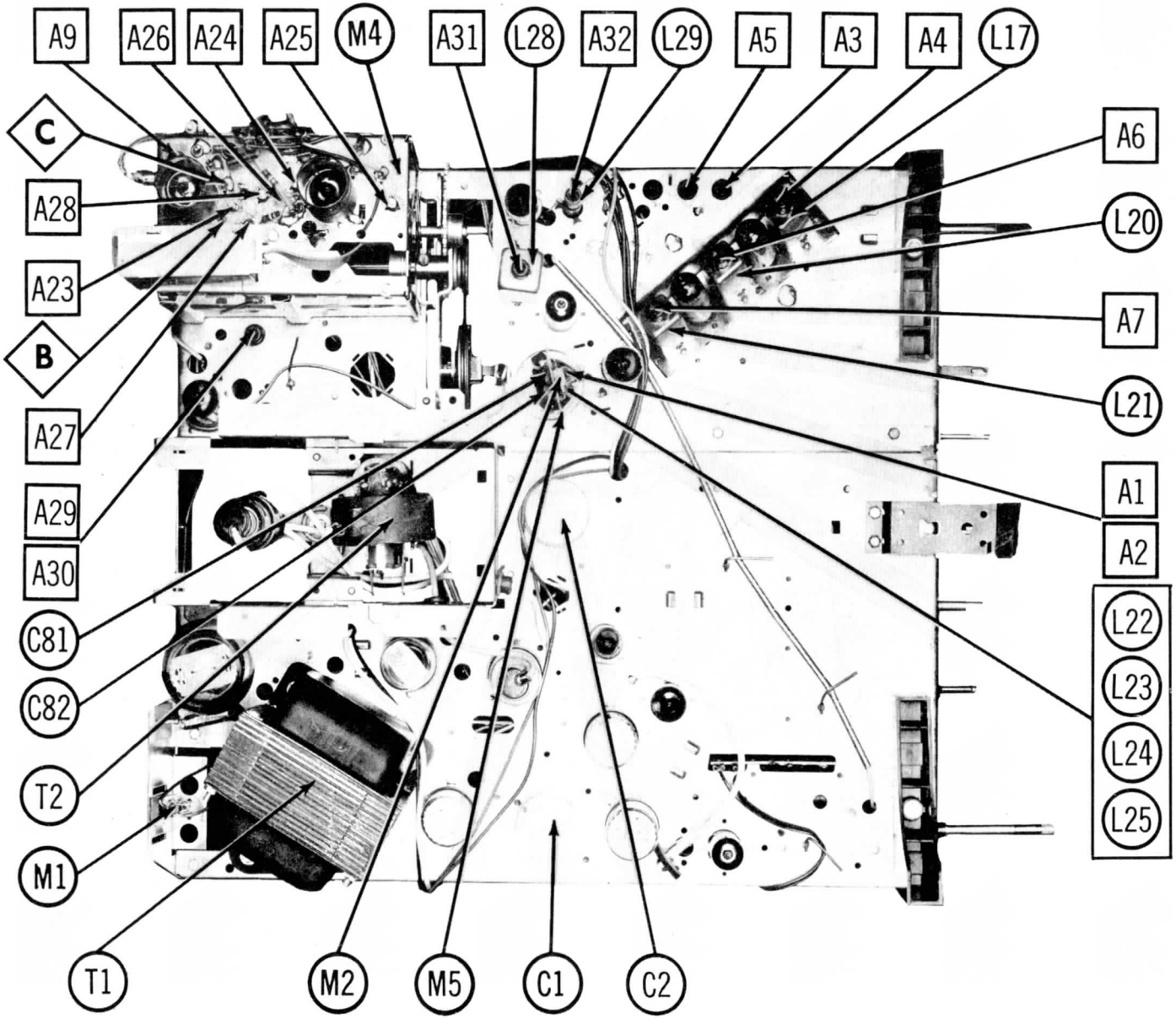
A PHOTOFACT STANDARD NOTATION SCHEMATIC


SOUND IF
V8 6AU6
AUDIO DET
V9 6BN6
AUDIO OUTPUT
V10 6AQ5
VOLUME CONTROL
1MEG
BUZZ CONTROL
600Ω
1ST VIDEO IF
V3 6CB6
2ND VIDEO IF
V4 6CB6
3RD VIDEO IF
V5 6CB6
AGC KEYING
V7 A12AX7
SYNC SEP
V11 6CS6
VERT MULT
V7 B12AX7
VERT OUTP
V12 6AH4
VERT. HOLD CONTROL
75K
HEIGHT CONTROL
10 MEG WITH
1MEG STOP
FRINGE-LOCK CONTROL
4.5 MEG
AGC CONTROL
15K
UHF POWER SOCKET
TAKEN WITH PIN 2 OF VERT MULT TUBE (V7B) SHORTED TO GROUND
HORIZ PHASE DET
V13 6AQ7GT
HORIZ AFC
HORIZ OSC
V14 6SN7GTA
HORIZ DISCH
HORIZ. HOLD
HORIZ. DRIVE
TOP
235V



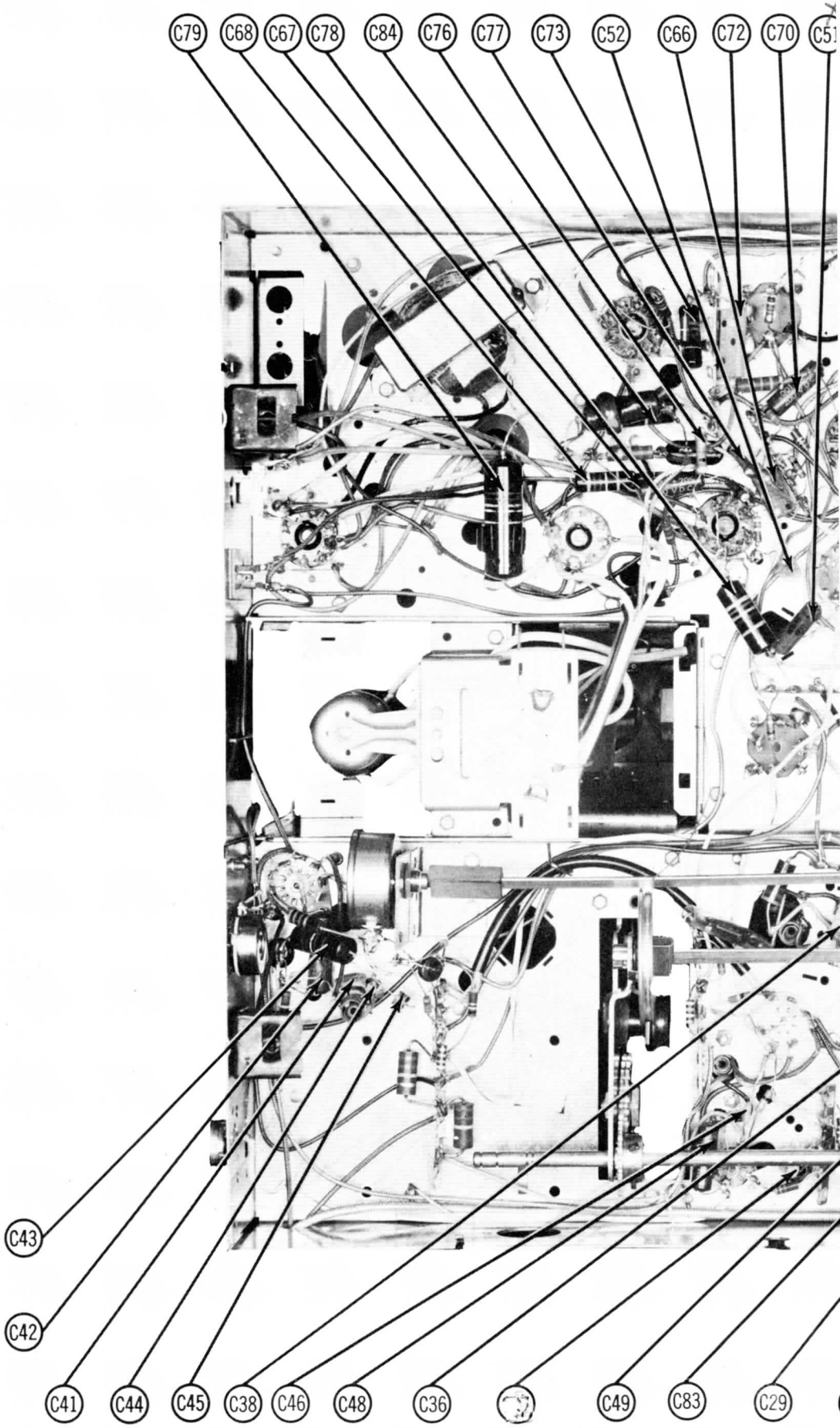
ZENITH CHASSIS 19M20, U, Z, 19M21, U, UZ, Z

ZENITH CHASSIS 19M20, U, Z, 19M21, U, UZ, Z

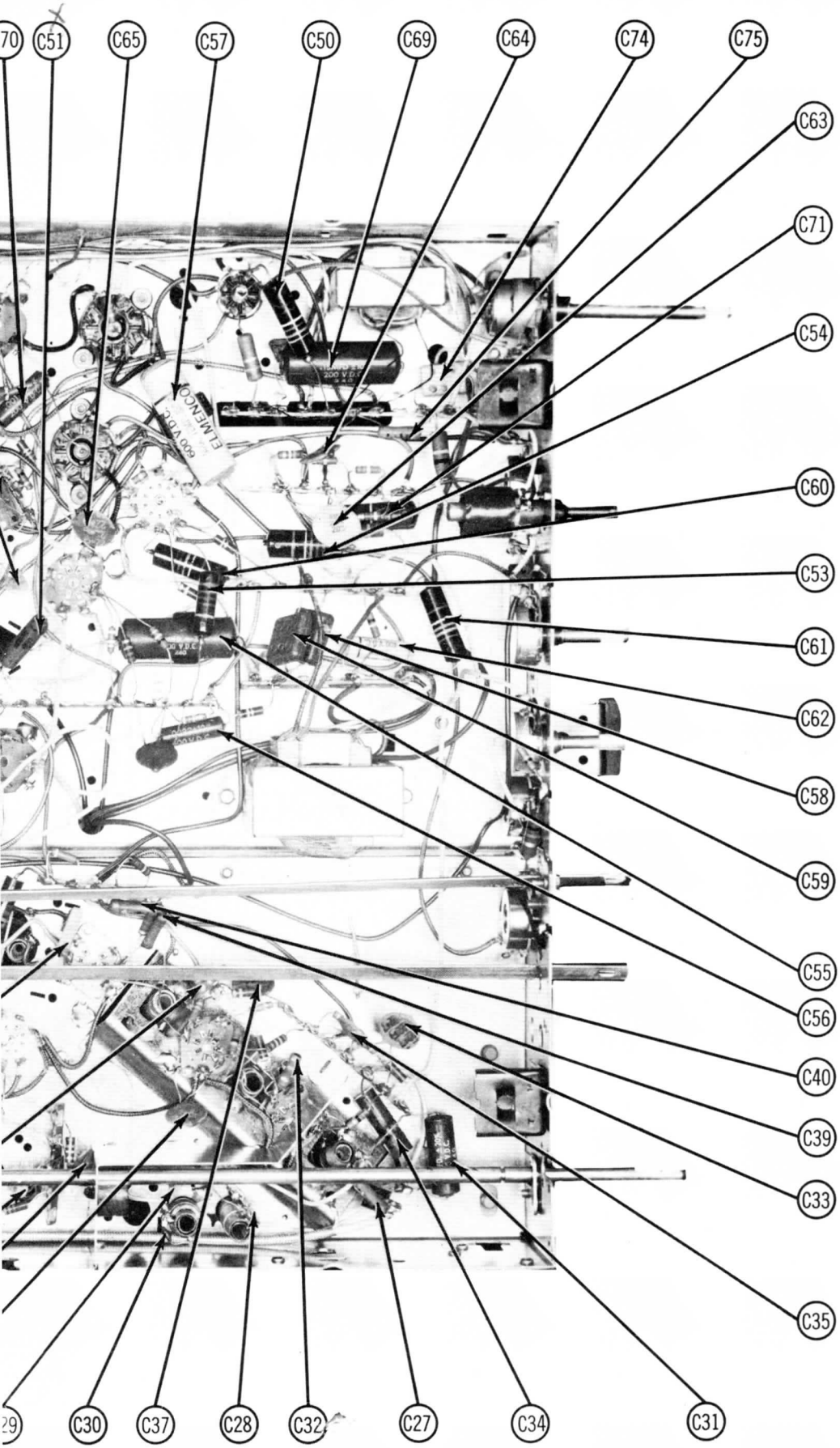


CHASSIS TOP VIEW

CHASSIS 19M20, U, Z, 19M21, U, UZ, Z
ZENITH

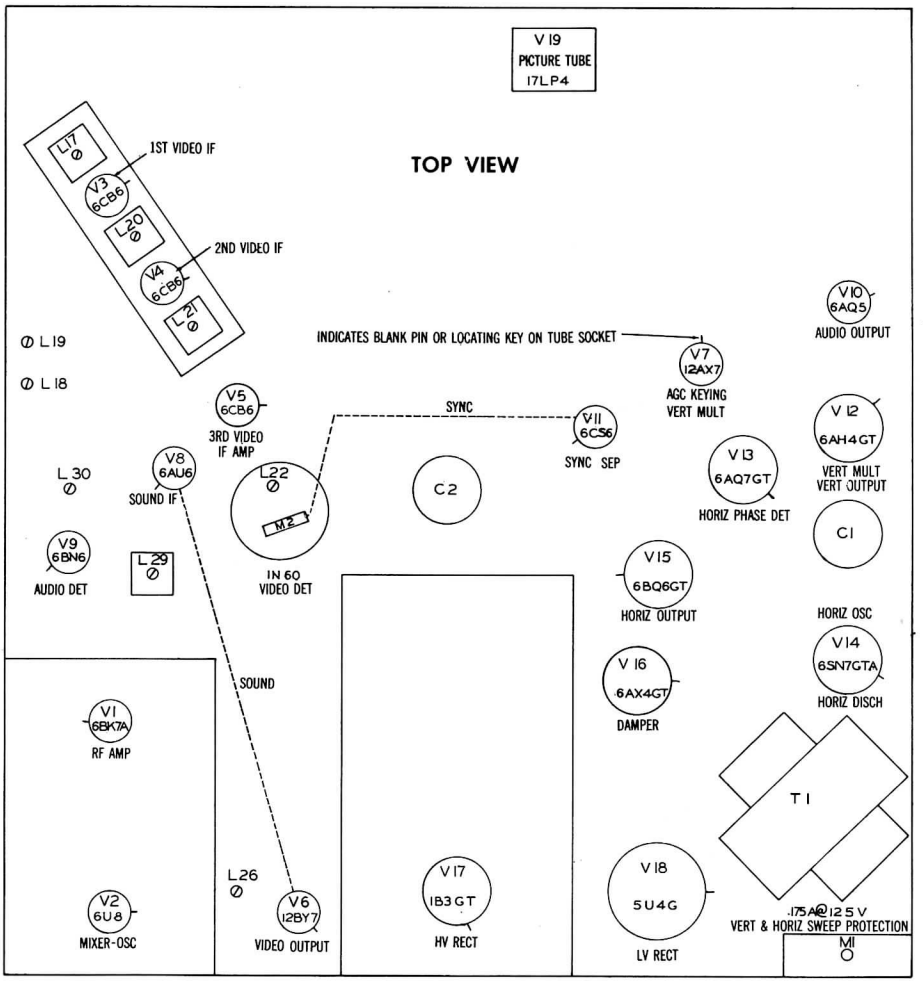


CHASSIS BOTTOM VIEW-CA



W-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

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

POWER SUPPLY FAILURE
No raster, no sound - V18

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V7, V19
Has pic, no sound - V8, V9, V10
Overloaded picture - V7

SYNC FAILURE
No vert. sync - V7, V11
No horiz. sync - V11, V13, V14
No vert. or horiz. sync - V11

SWEEP FAILURE
No raster, has sound - V14, V15, V16, V17, V19, Fuse (M1)
No vertical deflection - V7, V12
Poor vert. linearity or foldover - V7, V12
Poor horiz. linearity or foldover - V14, V15, V16
Narrow picture - V14, V16, V17, V18
Vert. off freq. - V7, V11
Horiz. off freq. - V11, V13, V14

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 (V14) to disable the high voltage.

VIDEO IF ALIGNMENT

Connect the negative lead of a 2 volt bias supply to the ungrounded side of C31.
Connect the positive side to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	470MMF	High side to pin 1 (grid) of 6CB6 (V5). Low side to chassis.	43MC (10MC Swp)	39.75MC 45.75MC	Any non-interfering channel	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A1, A2	Attenuate generator output for 3 volts peak to peak on scope. Adjust for response curve of maximum amplitude and symmetry similar to Fig. 1.
2.	"	High side to point (B). Low side to chassis.	"	39.75MC 41.25MC 47.25MC	"	"	A3, A4, A5	Remove bias battery. Use maximum scope gain to amplify trap region of response curve as in Fig. 2. Adjust for MINIMUM marker amplitude. Reconnect bias supply.
3.	"	"	"	42.75MC 45.0MC 45.75MC	"	"	A6, A7, A8, A9	Attenuate sweep generator output to maintain not more than 3 volts peak to peak on scope. Alternately adjust A6 thru A9 to obtain response similar to Fig. 3. A6 affects the high side and A7 affects the low side of the response curve.

OSCILLATOR ALIGNMENT

The master oscillator adjustment, A10, is to be made only if the individual channel oscillator adjustment fails to bring the channel within the range of the fine tuning control. If channels 2 thru 6 fall within the range of the fine tuning control but the higher channels do not, slight adjustment of A10 may be necessary to bring in the higher channels.
Connect the negative lead of the bias supply to the ungrounded side of C31. Connect the positive lead to chassis. Adjust for -1 volt at C31.
Turn up the scope gain so that the sound trap notch in the response curve becomes visible.
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
4.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	57MC (10MC Swp)	59.75MC	2	Vert. Amp. thru 10KΩ to point (A). Low side to chassis	A11	Adjust to place sound marker in trap notch as in Fig. 4.
			63MC (10MC Swp)	65.75MC	3		A12	
			69MC (10MC Swp)	71.75MC	4		A13	
			79MC (10MC Swp)	81.75MC	5		A14	
			85MC (10MC Swp)	87.75MC	6		A15	
			177MC (10MC Swp)	179.75MC	7		A16	
			183MC (10MC Swp)	185.75MC	8		A17	
			189MC (10MC Swp)	191.75MC	9		A18	
			195MC (10MC Swp)	197.75MC	10		A19	
			201MC (10MC Swp)	203.75MC	11		A20	
			207MC (10MC Swp)	209.75MC	12		A21	
			213MC (10MC Swp)	215.75MC	13		A22	

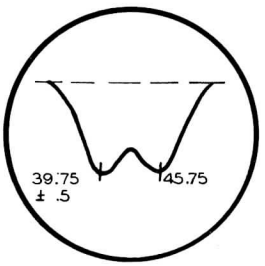


FIG. 1

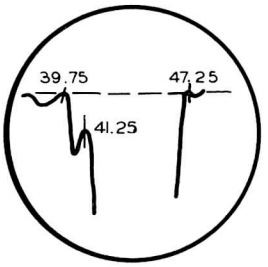


FIG. 2

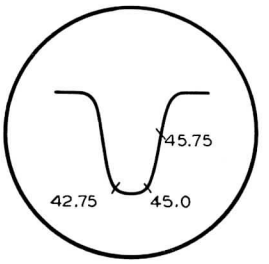


FIG. 3

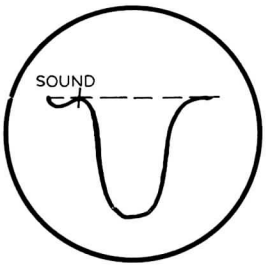


FIG. 4

ALIGNMENT INSTRUCTIONS (cont)

RF AND MIXER ALIGNMENT

Remove the bias supply from C31 and connect a jumper from the tuner AGC lead (yellow) 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.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	69MC (10MC Swp)	67.25MC 71.75MC	4	Vert. Amp. thru 10KΩ to point Ⓒ. Low side to chassis.	A23, A24, A25	Adjust for response similar to Fig. 5.
6.	"	"	201MC (10MC Swp)	199.25MC 203.75MC	11	"	A26, A27, A28	Adjust A26 and A27 for symmetrical response similar to Fig. 6. Adjust A28 for proper band width. Repeat steps 5 and 6 until best overall symmetrical response is obtained. Remove jumper from tuner AGC terminal to chassis.

SOUND IF ALIGNMENT

Connect an attenuator (Zenith part #S-17203 or equivalent) in series with the receiver antenna.
Tune in a tone modulated TV signal and adjust the attenuator until the signal falls below the limiting level of the 6BN6 limiter detector, as evidenced by a hiss similar to superregeneration.
Adjust the sound take-off transformer (A29, A30) the sound IF transformer (A31) and the quadrature coil (A32) for maximum sound of best quality.
Adjust the buzz control (R9) for minimum intercarrier buzz.
If the intercarrier buzz cannot be eliminated with the buzz control check the setting of the AGC delay control adjustment.
If during the sound IF alignment the signal rises above the limiting level (hiss disappears) increase the attenuation until the hiss returns.

UHF TUNER ALIGNMENT

Alignment of the UHF tuner should not be attempted unless proper test equipment is available.
Switch the receiver to the UHF position.
Connect the negative lead of a 2 volt bias supply to the ungrounded side of C31. Connect the positive lead to chassis.
Adjust the sweep generator output to provide 3 volts peak to peak on scope.
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
7.	Fig. 8	Across UHF antenna terminals thru matching network (Fig. 8).	713MC (10MC Swp)	711.25MC	54	Vert. Amp. thru 10KΩ to point Ⓐ. Low side to chassis.	A33, A34, A35	Tuner rocket arm should be in the horizontal position. If necessary, loosen set screw and adjust tuner shaft so that rocker arm is horizontal when the channel indicator is set to channel 54. Do not adjust A33 unless oscillator calibration is off more than three channels. If necessary, adjust A33 to place video market at 50% on response curve as in Fig. 7. The image (weaker response) will appear also. The response toward the counter clockwise position of A33 is the correct response. Adjust A34 and A35 for maximum amplitude and symmetry of response similar to Fig. 7.
8.	"	"	473MC	471.25MC	14	"		Check for response similar to Fig. 7. If oscillator is off more than 3 channels adjust the oscillator travel (osc., mixer and ant. travel adjustments are the three round thumb screws on top of tuner) adjustment to scale. Care must be used in making this adjustment so as not to move the rocker arm out of its bearing. Set the mixer and antenna travel adjustments for maximum response on scope.
9.	"	"	887MC (10MC Swp)	885.25MC	83	"	A36, A37, A38	Adjust A36 to place video marker at 50% as in Fig. 7. Adjust A37 and A38 for maximum amplitude and symmetry of response similar to Fig. 7.

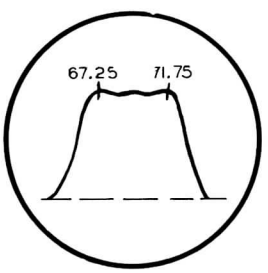


FIG. 5

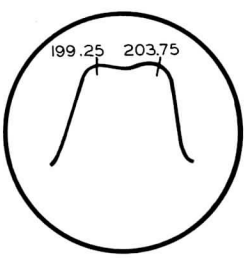


FIG. 6

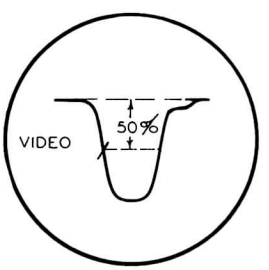


FIG. 7

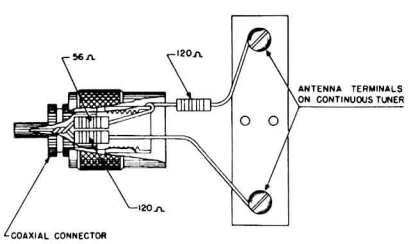
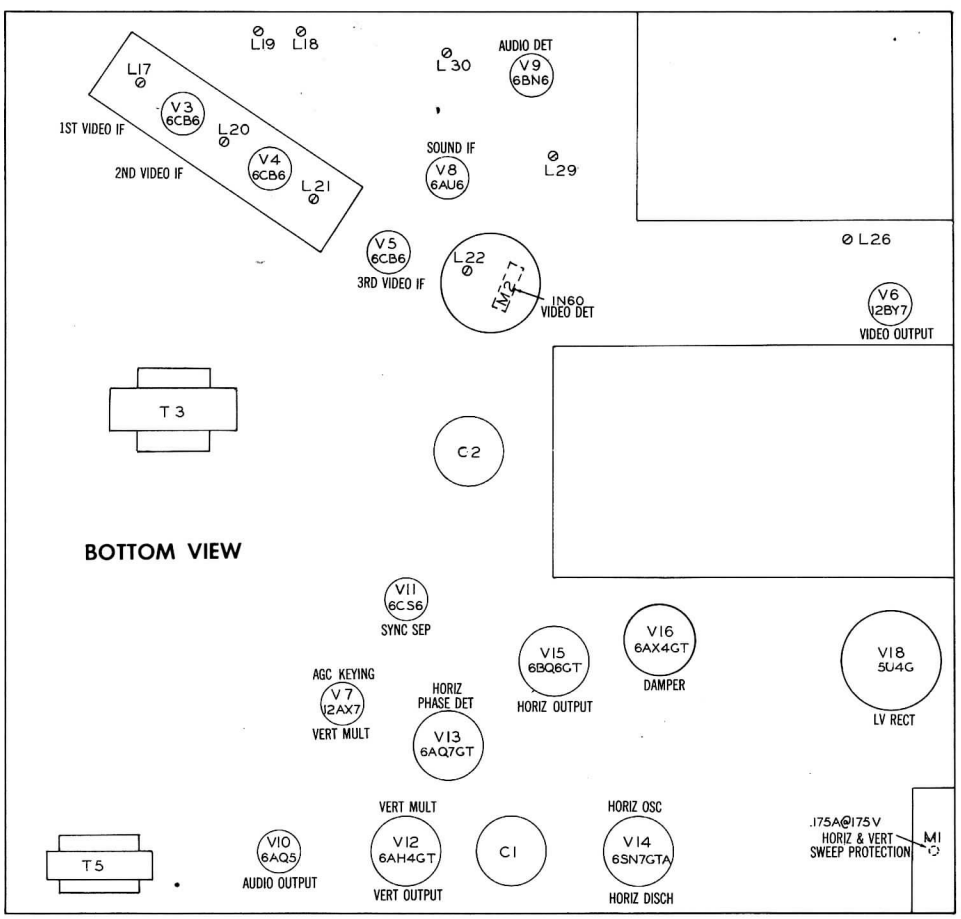


FIG. 8

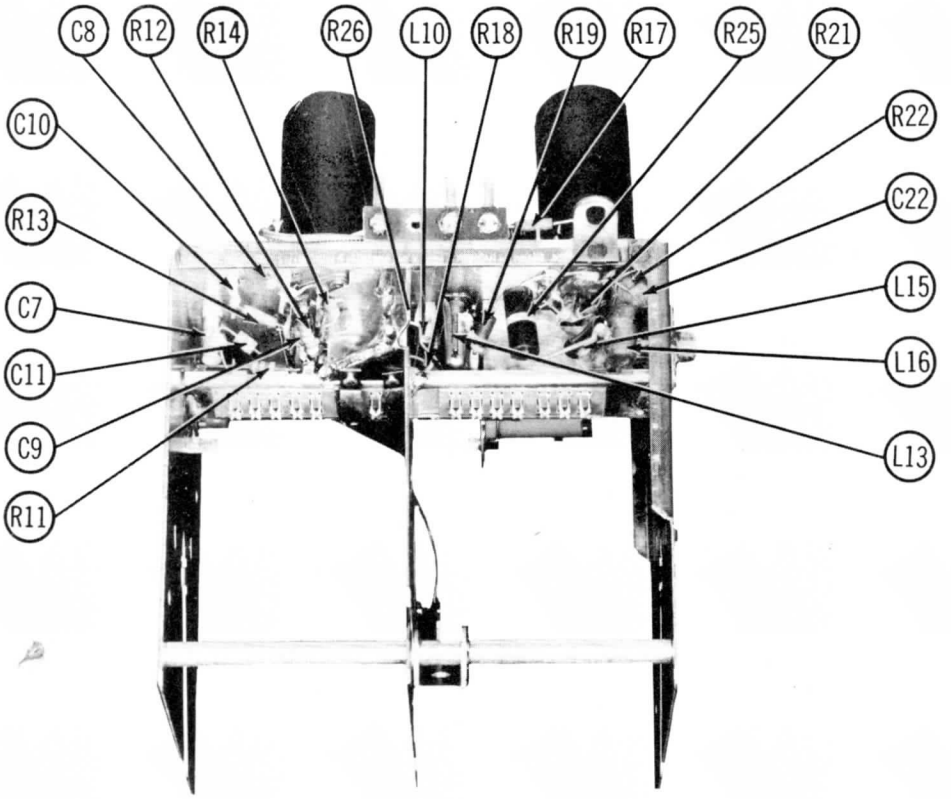
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BK7A	†750Ω	60KΩ	INF	. 1Ω	0Ω	INF	3. 3Meg	47Ω	0Ω
V 2	6U8	†10. 3KΩ	68KΩ	†100KΩ	. 1Ω	0Ω	†300Ω	0Ω	2. 2KΩ	4. 4KΩ
V 3	6CB6	1. 1Meg	500Ω	. 1Ω	0Ω	▲470Ω	▲470Ω	0Ω		
V 4	6CB6	80KΩ	80KΩ	. 1Ω	0Ω	†500Ω	†500Ω	80KΩ		
V 5	6CB6	270Ω	420Ω	. 1Ω	0Ω	†8. 2KΩ	†8. 2KΩ	0Ω		
V 6	12BY7	15Ω	3KΩ	15Ω	0Ω	0Ω	. 1Ω	†5KΩ	†22KΩ	15Ω
V 7	12AX7	■5Meg	270KΩ	40KΩ	0Ω	0Ω	†800KΩ	3. 9KΩ	7. 5KΩ	. 1Ω
V 8	6AU6	100KΩ	0Ω	. 1Ω	0Ω	†32KΩ	†32KΩ	0Ω		
V 9	6BN6	350Ω	. 3Ω	. 1Ω	0Ω	†22KΩ	4. 6Ω	■680KΩ		
V 10	6AQ5	350KΩ	680Ω	0Ω	. 1Ω	1. 4KΩ	†500Ω	350KΩ		
V 11	6CS6	19KΩ	0Ω	. 1Ω	0Ω	†100KΩ	1. 8KΩ	†10Meg		
V 12	6AH4GT	1. 8Meg	. 1Ω	1. 8Meg	INF	†460Ω	INF	0Ω	1. 8KΩ	
V 13	6AQ7GT	2Meg	1Meg	0Ω	3Meg	†47KΩ	470Ω	. 1Ω	0Ω	
V 14	6SN7GTA	47KΩ	■215KΩ	0Ω	32KΩ	†66Ω	10KΩ	0Ω	. 1Ω	
V 15	6BQ6GT	†12KΩ	. 1Ω	6. 8KΩ	†12KΩ	470KΩ	470KΩ	0Ω	0Ω	TOP CAP ■9. 4Ω
V 16	6AX4GT	INF	INF	700KΩ	INF	†70Ω	■4. 2Ω	. 1Ω	0Ω	
V 17	1B3GT	PINS	1 - 8	HAVE	INFINITE	RESISTANCE				TOP CAP ■414Ω
V 18	5U4G	INF	30KΩ	†66Ω	16Ω	INF	18Ω	INF	30KΩ	
V 19	17LP4	0Ω	100KΩ	PIN 6 ■250KΩ	PIN 10 ■33KΩ	PIN 11 †300KΩ	PIN 12 . 1Ω			

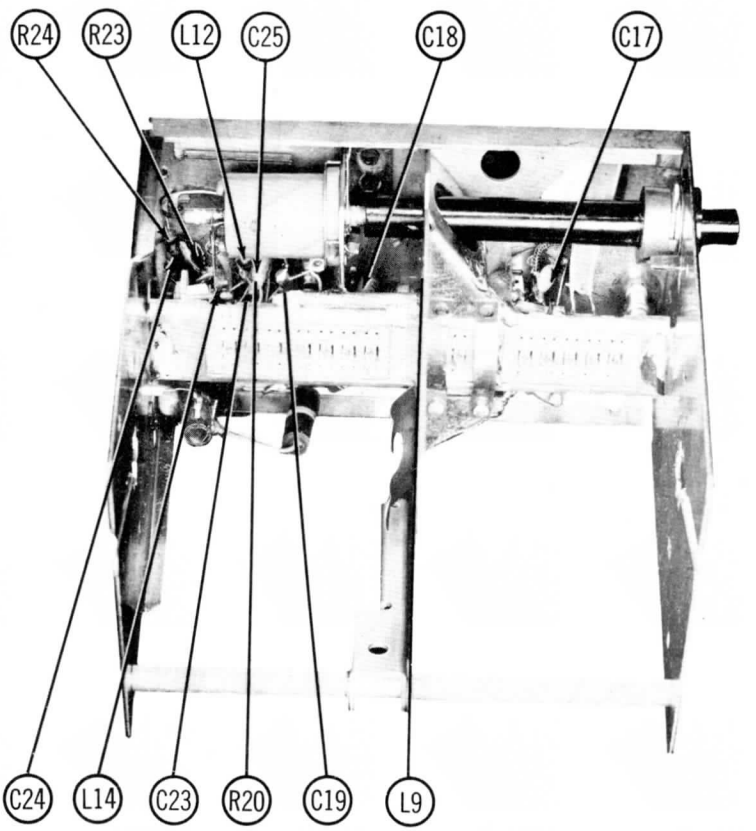
† MEASURED FROM PIN 2 OF V18
▲ MEASURED FROM PIN 7 OF V4
■ MEASURED FROM PIN 3 OF V16



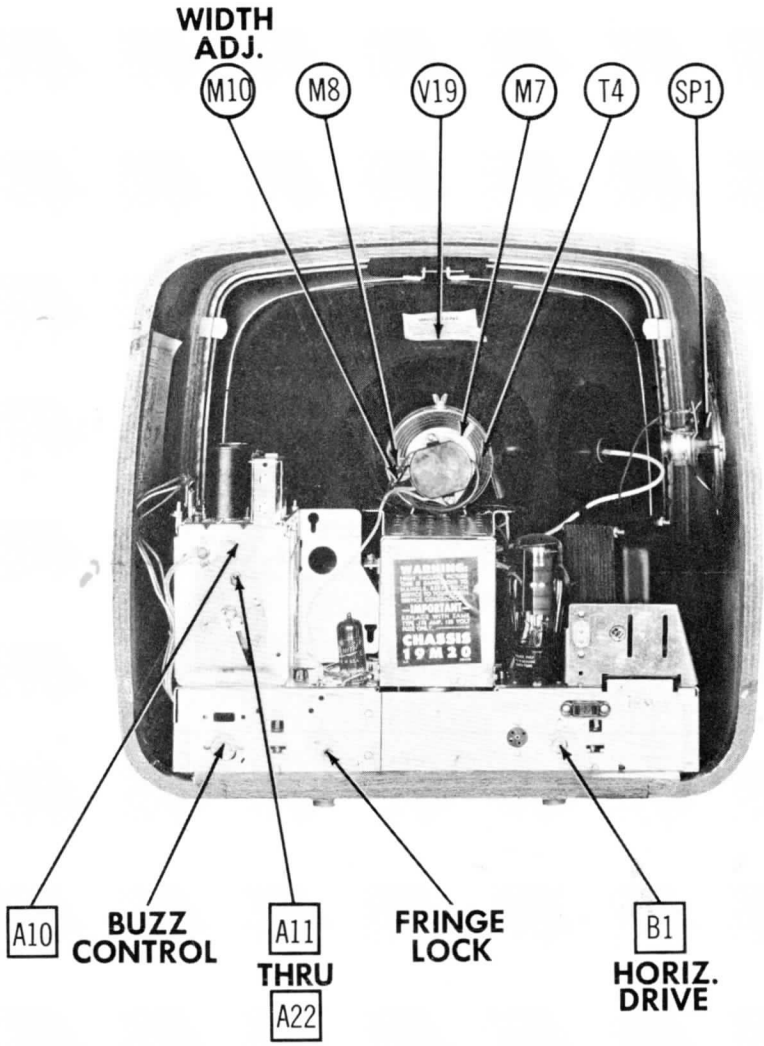
TUBE PLACEMENT CHART



VHF TUNER-RIGHT SIDE



VHF TUNER-LEFT SIDE



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 adjustment until the picture synchronizes horizontally.

Adjust the horizontal Drive trimmer (B1) counter clockwise for maximum width.

Adjust the width for a picture slightly wider than necessary to fill the picture mask horizontally by sliding and turning the brass sleeve on the neck of the picture tube.

AGC DELAY CONTROL ADJUSTMENT

Connect the vertical amplifier of an oscilloscope through a 10KΩ resistor to point Ⓐ . Low side to chassis.

Select the strongest TV signal available and adjust the AGC delay control for 2. 75 volts peak output.

Satisfactory adjustment may also be obtained by turning the AGC delay control fully clockwise then counter clockwise until picture distorts and buzz is heard in the sound. Turn the AGC delay control slowly clockwise until a stable picture with clear sound is obtained.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V15 and V16. Check adjustment B1. Check T2, T4A, R94, C77, C76 and other associated components.

DRIVE LINES

Check by substitution V14, V15 and V16. Check T2, T4A, R90, R94, C77 and C79. Check adjustment B1 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V15 and V16. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V13, V14, V15 and V16. Check C70 for open. Check L30 and other associated components.

XMAS TREE EFFECT

Check by substitution V13, V14, V15, and V16. Check L30, C74, C75, C76 C77, R86, R90, R88 and R87. Check T2 and T4A for internal arcing.

VERTICAL

LOSS OF SWEEP

Check by substitution V7 and V12. Check R3, R72, R6, R77, C57, C54, C2D, T3, T4B and other associated components.

INSUFFICIENT SWEEP

Check by substitution V7 and V12. Check height and vertical linearity controls for proper operation. Check T3 and T4B.

COMPRESSED AT BOTTOM

Check by substitution V7 and V12. Check R3, R75, C57 and other associated components.

COMPRESSED AT TOP

Check by substitution V7 and V12. Check R6, R77, C2D and other associated components.

FOLDS

Check by substitution V7 and V12. Check R72, C54, T3, T4B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V11. Check C51, C52, R10, R68, R66 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V7. Check vertical integator network, check R5, R99, C55 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V13. Check horizontal AFC network. Check R80, C65, C70 and other associated components.

HORIZONTAL BENDING

Check by substitution V7, V11 and V13. Check components associated with V13.

VIDEO

LOSS OF VIDEO

Substitute V6. Check R43, L27, R8, R49, C43 and other associated components.

SOUND BARS (4.5 MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A30. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check contrast control, picture tube, C43, L27 and C41. Check video detector crystal network.

NEGATIVE PICTURE

Substitute V6. Check video detector crystal network, picture tube, C43, C2C and R49. Check video IF alignment.

SMEAR

Substitute V6. Check video detector crystal network. Check C43, C41, L27, R49 and other associated component.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9 and V10. Check stages V9 and V10 using audio signal genator. Apply audio signal across R1.

If Satisfactory	If Unsatisfactory
Check audio IF and audio detector stages for component failure or change of value.	Check C49, C50, C1C, R65, R60, R63, speaker, T5 and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustments R9 and A32 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

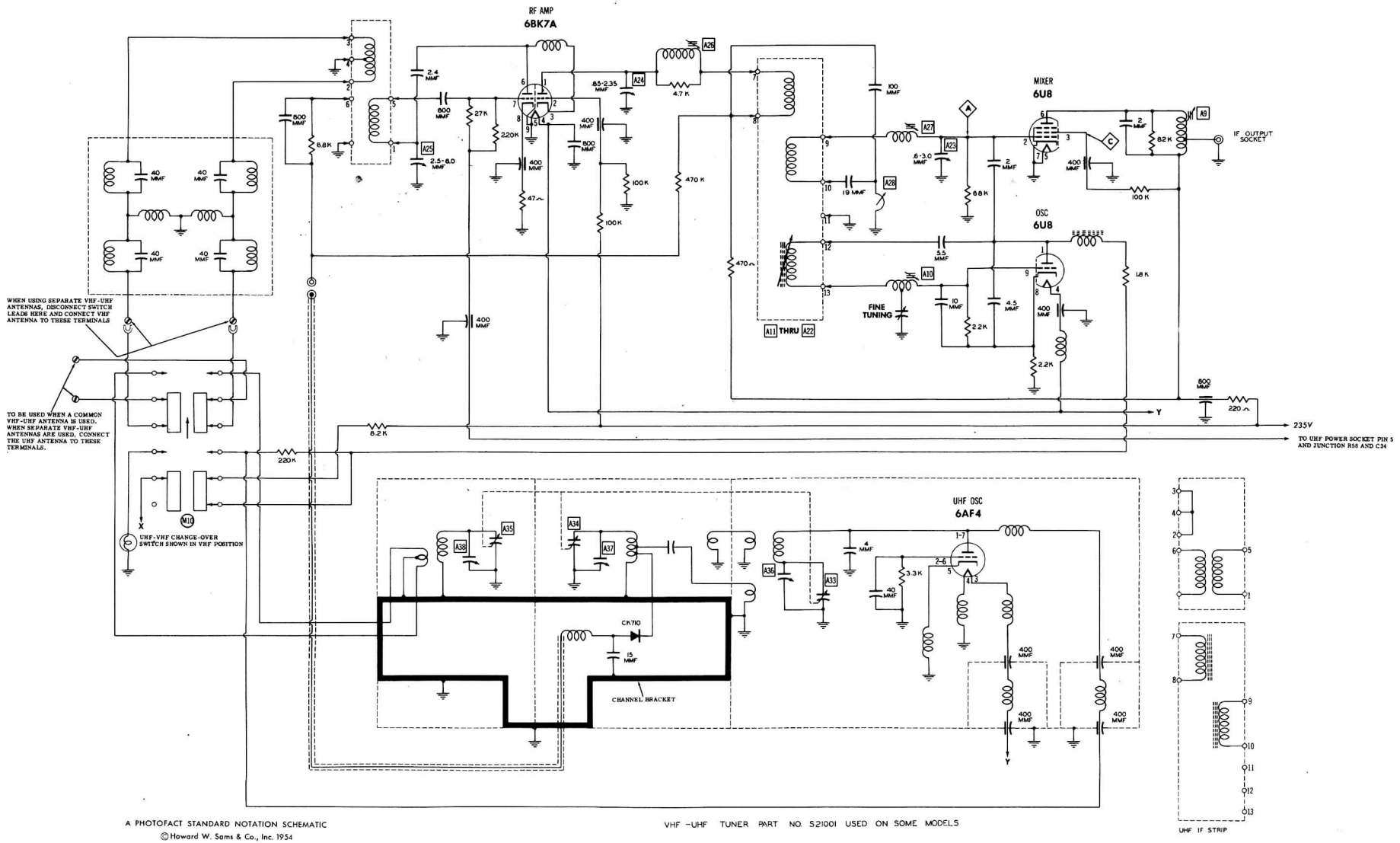
POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V18. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V18. Check B+ filter and decoupling network.

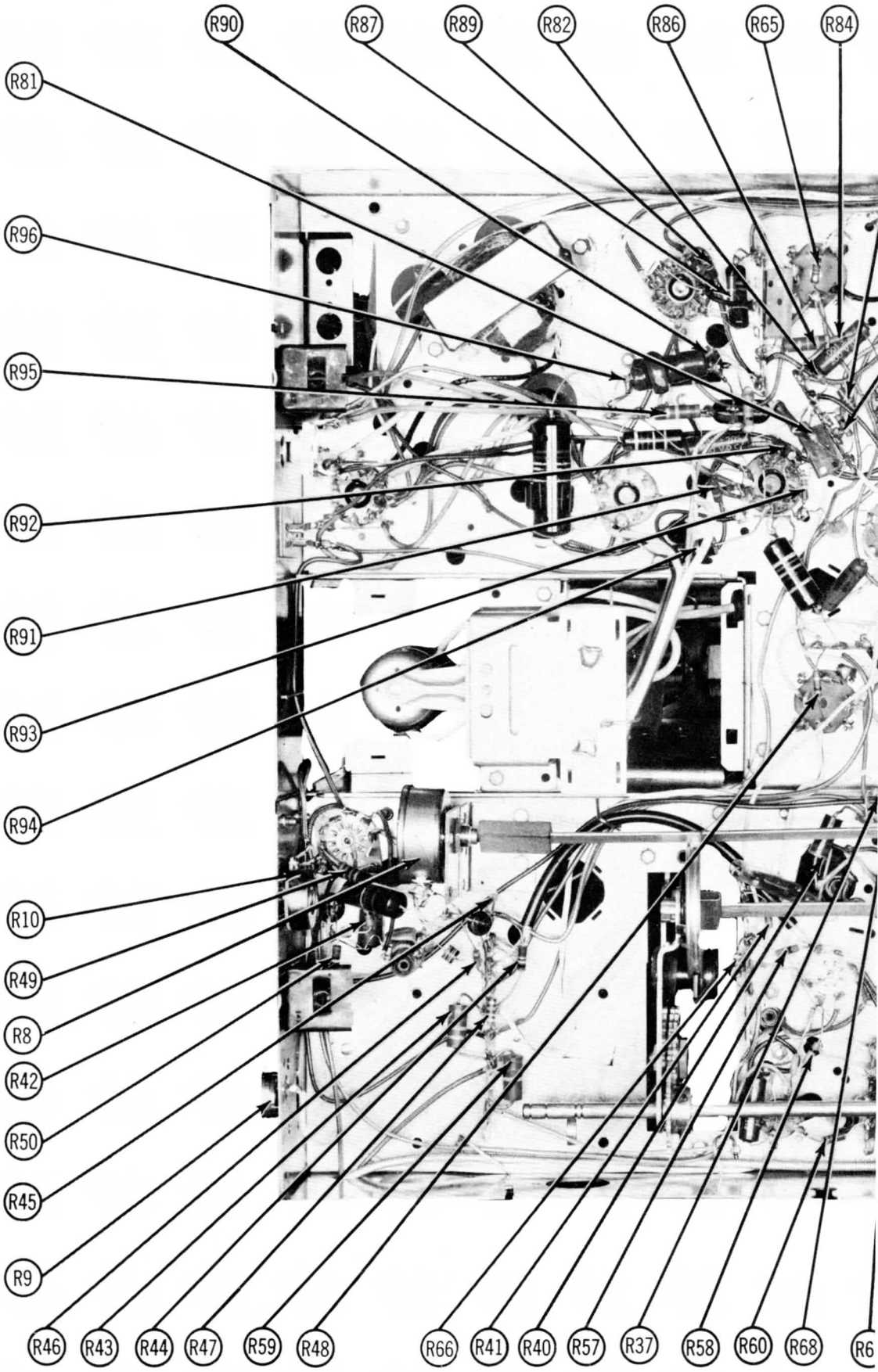


A PHOTOFACT STANDARD NOTATION SCHEMATIC

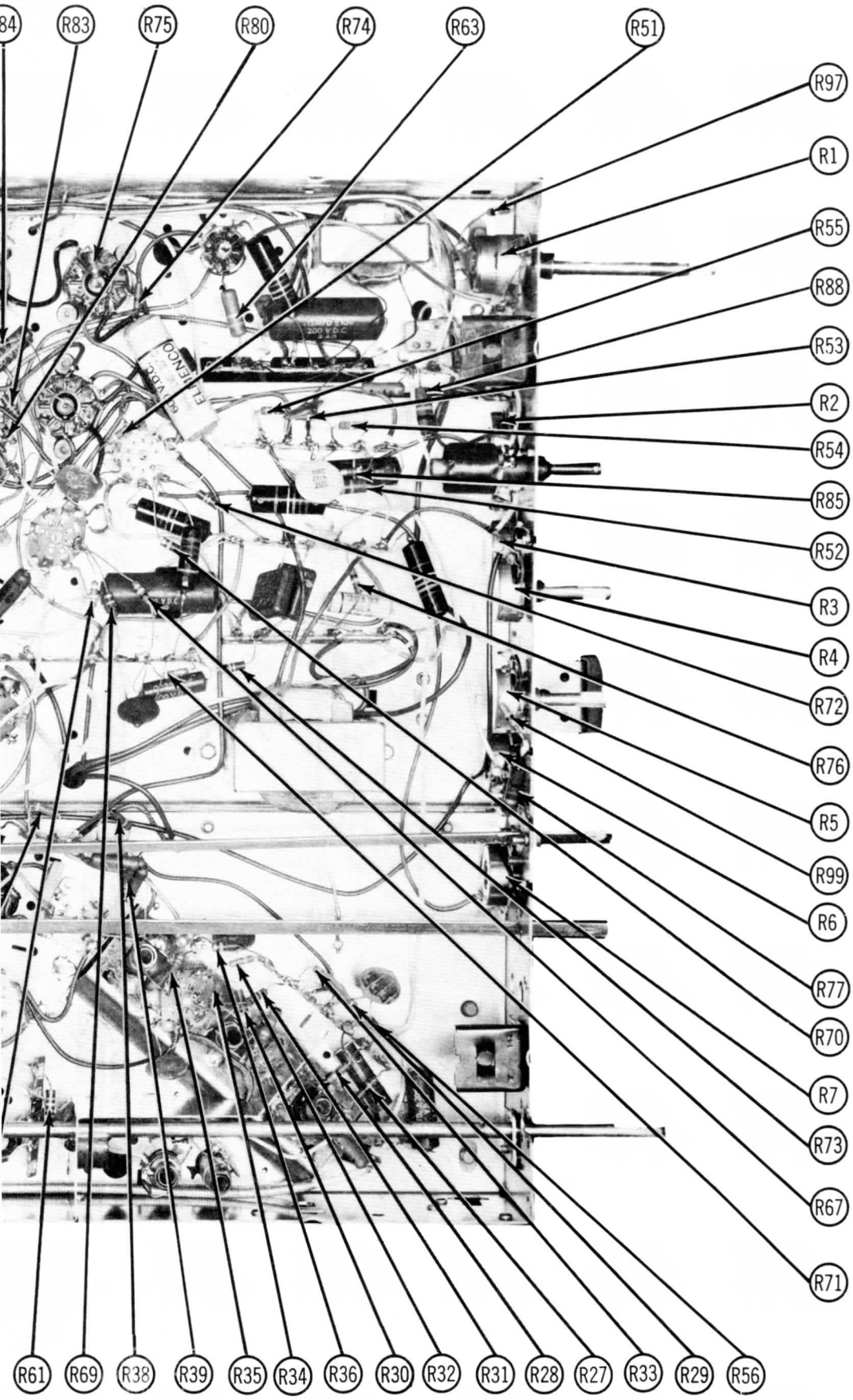
VHF-UHF TUNER PART NO. S21001 USED ON SOME MODELS

ALTERNATE TUNER SCHEMATIC

ZENITH
CHASSIS 19M20, U, Z, 19M21, U, UZ, Z



CHASSIS BOTTOM VIEW-RI



/-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ZENITH PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BK7A	6BK7A	9AJ	
V2	Mixer - Osc.	6U8	6U8	9AE	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Output	12BY7	12BY7	9BF	
V7	AGC Keying-Vert. Mult.	12AX7	12AX7	9A	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Audio Detector	6BN6	6BN6	7DF	
V10	Audio Output	6AQ5	6AQ5	7BZ	
V11	Sync Separator	6CS6	6CS6	7CH	
V12	Vert. Mult. - Vert. Output	6AH4GT	6AH4GT	8EL	
V13	Horiz. AFC	6AQ7GT	6AQ7GT	8CK	
V14	Horiz. Oscillator-Horiz. Discharge	6SN7GTA	6SN7GTA	8BD	
V15	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V16	Damper	6AX4GT	6AX4GT	4CG	
V17	HV Rectifier	1B3GT	1B3GT	3C	
V18	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	ZENITH PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V19	17LP4 / 17VP4	17LP4	17LP4 / 17VP4	17LP4 / 17VP4	17LP4	12L	① Aluminized ② Circuit change necessary
	21YP4	21YP4	21YP4	21YP4	12YP4	12L	
	21YP4A ①	21YP4A ①	21YP4A ①	21YP4A ① 21AFP4②	21YP4A ①	12L 12M	

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	ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	■40	400	22-2437	AFH3-46		C154		FP378	TVL-4670	
B	▰80	400						TC72		
C	▲30	400								Note 1
C2A	▰40	450								Note 2
B	■10	450	22-2483	AFH4-83		C032		FP396.2	TVL-3762	
C	▲10	400				BRH501		TC3501	TVA-1705	Note 3
D	100	50								Note 4
C3	40		22-2519							
C4	40		22-2519							
C5	40		22-2519							
C6	40		22-2519							
C7	2.5-6		22-2221							
C8	400		22-2401							
C9	800		22-2331	BPD-0008	DD-801	K067	801-0008	UC-538	5GA-T8	
C10	400		22-2401							
C11	2.2		22-2468	SI2.2NP0	TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C12	400		22-2401							
C13	400		22-2401							
C14	400		22-2401							
C15	.85-2.3		22-2453							
C16	.6-3		22-2504							
C17	800		22-2331	BPD-0008	DD-801	K067	801-0008	UC-538	5GA-T8	
C18	100		22-2407	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C19	19		22-2406							
C20	2		22-2536	SI2.2NP0	TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C21	400		22-2557							
C22	2		22-2536							
C23	4.5		22-2500							
C24	10		22-2411	SI10NP0	TCZ-10	TP09	NP0K-100	ZT-541	5TCC-Q1	
C25	5.5		22-2449							
C26	400		22-2557							
C27	470		22-2217	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C28	24									
C29	9									
C30	6									
C31	.1	400	22-1777	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C32	330		22-2309		TCZ-331					
C33	1000		22-7	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C34	.015	200		P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C35	1000		22-7	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C36	470		22-2302	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C37	1000		22-7	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C38	470		22-2524	1469-0005		5R5T47		MCE245	MS-35	
C39	470		22-2217	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C40	1000		22-2112							
C41	47		22-2467							
C42	.022	200	22-1781							
C43	.1	200	22-1777	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C44	3.3		22-2343			TZ06				
C45	50		22-2460			TP30				
C46A	1000		22-2553	BPD-2X001	DD2-102	DK069	812-001	DCD-521	5HK-2D1	
B	1000									
C47	10		22-2378							
C48	.01	200	22-3	P288-01	D6-103	PJ2S1		PT411	2TM-S1	
C49	10000		22-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C50	.0068	1000	22-2495							
C51	.0033	600	22-1785	P688-0033	D6-332	CUB6D33	GP2-333-332	PT6233	6TM-D33	Note 5
C52	27		22-2396							
C53	.0022	600	22-1845	P688-0022	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C54	.022	600	22-2129							
C55	.33	200	22-2159	P288-33		PJ2P33		PT4033	2TM-P33	
C56	.0022	600	22-2161							

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C57	.1	600	22-1841	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C58	1000	500	22-2545	1464-001		1R5D1		MCE-255	MS-21	
C59	1000	500	22-2545	1464-001		1R5D1		MCE-255	MS-21	
C60	.022	200	22-1781							
C61	.033	200	22-1840							
C62	.01	400	22-1846	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C63A	1000		22-2545	BPD-2X001	DD2-102	DK069	812-001	DCD-521	5HK-2D1	
B	1000									
C64	10000		22-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C65	100		22-9	BPD-0001	DD-101	G042	801-0001	UC-531	5GA-T1	
C66	120	500	22-2505	1469-0001		22R5T12		MCE235	MS-31	
C67	.001	200	22-1839	P688-001	D6-102	CUB6D1	GP2-333-102	PT621	6TM-D1	
C68	.0047	400	22-1842							
C69	.15	200	22-2166							
C70	.001	200	22-1839	P688-001	D6-102	CUB6D1	GP2-333-102	PT621	6TM-D1	
C71	.1	200	22-1777	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C72	680	500	22-2340	1469-0007		1R5T68			MS-37	
C73	.0015	400	22-1785	P488-0015	D6-152	CUB4D15	GP2-333-152	PT4215	4TM-D15	
C74	1000	500	22-2163	1468-001		1R5D1		MCE255	MS-21	
C75	1000		22-2112							
C76	680	500	22-2387							
C77	220		22-2458							
C78	.047	400	22-1775	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C79	.15	400	22-2341							
C80	72	2000								
C81	4.5		22-2522							
C82	7		22-2375							
C83	470			SI470	D6-471		GP1K-471	UC-5347	5GA-Q47	
C84	.15	200		P288-15		PJ2P15		PT4015	2TM-P15	
C85	.01	200	22-3	P288-01	D6-103	PJ2S1		PT411	2TM-S1	Note 6

Note 1. Some versions may use a 10MFD @ 400V in this application.
Note 2. Some versions may use a 20MFD @ 25V in this application.
Note 3. Some versions may use a 4MFD @ 350V in this application.
Note 4. Some versions may use a 40MFD @ 50V in this application.
Note 5. Some versions may use a .0015MFD @ 600V in this application.
Note 6. Used in versions using UHF tuners.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	1/2	63-3199	Q13-137	A47-1Meg-Z	AB-70	U-53	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	KB-1	U-26	Attach to R1A
R2A	7.5Meg	1/2	63-2919	Q11-142	A47-7.5Meg-S	AB-98	U-82	Focus
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R2A
R3A	10Meg with 1Meg stop	1/2	63-2946	Q11-143	A47-10Meg-S	AB-98	U-826	Height - Note
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R3A
R4A	200KΩ	1/2	63-2837	Q11-129	A47-200K-S	AB-46	U-430	Brightness
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R4A
R5A	75KΩ	1/2	63-2896	Q11-125	A47-75K-S	AB-35	U-41	Vert. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-1	Not Req.	Attach to R5A
R6A	2500Ω	1/2	63-2971	Q11-112	A47-3000-S	AB-7	SU-8	Vert. Linearity
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	15KΩ		63-2976	Q11-119	A47-15K-S	AB-20	SU-29	AGC
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R7A
R8	5000Ω	4	63-3201			SUP-999	M5MPK	Contrast -wire wound
R9	600Ω	1	63-3167		39-600			Buzz - wire wound
R10A	4.5Meg	1/2	63-3208	Q11-141	A47-5Meg-S	AB-87	SU-67	Fringe lock
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R10A

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

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ZENITH PART No.	IRC PART No.	NOTES
R11	47KΩ	1/2	63-1856	BTS-47K	
R12	470KΩ	1/2	63-1897	BTS-470K	
R13	27KΩ	1/2	63-1845	BTS-27K	
R14	47Ω	1/2	63-1729	BTS-47	
R15	100KΩ	1/2	63-1869	BTS-100K	
R16	100KΩ	1/2	63-1869	BTS-100K	
R17	220Ω	1/2	63-1758	BTS-220	
R18	4700Ω	1/2	63-1813	BTS-4700	
R19	470Ω	1/2	63-1772	BTS-470	
R20	68KΩ	1/2	63-1862	BTS-68K	
R21	100KΩ	1/2	63-1869	BTS-100K	
R22	82KΩ	1/2	63-1866	BTS-82K	
R23	2200Ω	1/2	63-1799	BTS-2200	
R24	2200Ω	1/2	63-1799	BTS-2200	
R25	10KΩ	2	63-3170	BTB-10K	
R26	22KΩ	1/2	63-1729	BTS-22K	
R27	68Ω	1/2	63-1737	BTS-68	
R28	56Ω	1/2	63-1733	BTS-56	
R29	180Ω	1/2	63-1754	BTS-180	
R30	470Ω	1/2	63-1772	BTS-470	
R31	27KΩ	1/2	63-1841	BTS-27K	Note 1
R32	6800Ω	1/2	63-1821	BTS-6800	
R33	120KΩ	1/2	63-1873	BTS-120K	
R34	15Ω	1/2	63-1708	BTS-15	
R35	12KΩ	1/2	63-1827	BTS-12K	Note 2
R36	120KΩ	1/2	63-1873	BTS-120K	
R37	470Ω	1/2	63-1772	BTS-470	
R38	270Ω 5%	1/2	63-1760	BTS-270	
R39	150Ω	1/2	63-1750	BTS-150	
R40	8200Ω	2	63-1101	BTB-8200	
R41	15KΩ	1/2	63-1834	BTS-15K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ZENITH PART No.	IRC PART No.	NOTES
R42	15Ω	1/2	63-1708	BTS-15	
R43	22KΩ	2	63-942	BTB-22K	Note 3
R44	100KΩ	1/2	63-1869	BTS-100K	
R45	100KΩ	1/2	63-1869	BTS-100K	
R46	33KΩ	1/2	63-1848	BTS-33K	
R47	47KΩ	1/2	63-1855	BTS-47K	
R48	10 Meg	1/2	63-1961	BTS-10 Meg	
R49	680Ω	1	63-2290	BTA-680	
R50	220KΩ	1/2	63-1884	BTS-220K	
R51	3900Ω	1/2	63-1810	BTS-3900	
R52	180KΩ	1	63-2313	BTA-180K	
R53	220KΩ	1/2	63-1884	BTS-220K	
R54	220KΩ	1/2	63-1884	BTS-220K	
R55	680KΩ	1/2	63-1904	BTS-680K	
R56	2.2Meg	1/2	63-1926	BTS-2.2Meg	
R57	100KΩ	1/2	63-1870	BTS-100K	
R58	10KΩ	1/2	63-1827	BTS-10K	
R59	22KΩ	2	63-2141	BTB-22K	
R60	680Ω	1/2	63-1779	BTS-680	
R61	680KΩ	1/2	63-1904	BTS-680K	
R62	6.8Meg	1/2	63-1947	BTS-6.8Meg	Note 4
R63	680Ω	1	63-2290	BTA-680	
R64	22KΩ	1/2	63-1842	BTS-22K	Note 5
R65	470Ω	1/2	63-1771	BTS-470	
R66	470KΩ	1/2	63-1897	BTS-470K	
R67	100KΩ	1/2	63-1869	BTS-100K	
R68	470KΩ	1/2	63-1897	BTS-470K	
R69	56KΩ	1/2	63-1859	BTS-56K	
R70	220KΩ	1/2	63-1883	BTS-220K	
R71	47KΩ	1/2	63-1855	BTS-47K	
R72	22KΩ	1/2	63-1841	BTS-22K	

PARTS LIST AND DES

RESISTO

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ZENITH PART No.	IRC PART No.	NOTES
R73	100KΩ	1/2	63-1869	BTS-100K	
R74	100Ω	1/2	63-1744	BTS-100	
R75	1.8Meg	1/2	63-1922	BTS-1.8Meg	
R76	100KΩ	1/2	63-1870	BTS-100K	
R77	1000Ω	1	63-965	BTA-1000	
R78	560Ω	1/2	63-1775	BTS-560	
R79	560Ω	1/2	63-1775	BTS-560	
R80	1 Meg	1/2	63-1911	BTS-1 Meg	
R81	1 Meg	1/2	63-1911	BTS-1 Meg	
R82	1 Meg	1/2	63-1911	BTS-1 Meg	
R83	27KΩ	1/2	63-1845	BTS-27K	
R84	100Ω	1/2	63-1744	BTS-100	
R85	470Ω	1/2	63-1771	BTS-470	
R86	47KΩ	1	63-1194	BTA-47K	

Note 1. Some versions may use 22K
Note 2. Some versions may use 10K
Note 3. Some versions may use 15K
Note 4. Not used in all versions.
Note 5. Add this resistor for combin

TRANSFORMER

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	ZENITH PART No.	Stancor PART No.
T1	117VAC @1.6A	524VCT .250ADC	5VAC @3A	95-1375	
	SEC. 3	SEC. 4	SEC. 5		
	12.6VCT @4.4A				

① Use only one 5V winding.
② Series 6.3V windings for 12.6VCT.
③ Use universal mounting brackets.

TRANSFORMERS (SV

ITEM No.	USE	ZENITH PART No.	Stancor PART No.
T2	Horiz. Output Trans.	S-20993 ①	
T3	Vert. Output Trans.	95-1377	A-8148
T4A	Yoke-Horiz. (13MH)	95-1378	DY-9A ③
B	Vert. (42MH)	S-19898 ②	

① Winding and terminal assembly part #S-21078.
② Centering device and yoke cover.
③ Use original yoke cover and positioning device.
④ See instruction sheet packed with unit for replacement proced
⑤ Connect as auto transformer.
⑥ Drill one new mounting hole.

TRANSFORMER (AU

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DAT. ZENITH PART No.	Stancor PART No.	Merit PART No.	Tri PART
T5	9.4KΩ	4.2Ω	95-1379	A-3879	A-2932	S-5

SPEAKI

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA ZENITH PART No.	REPLACEMENT DATA VIKING PART No.
SP1	4"	PM	4.2Ω	49-750	4J6
	5 1/4"	PM	4.2Ω	49-751 ①	525J4
	10"	PM	4.2Ω	49-752 ②	10J11

COILS (R

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLA ZENITH PART No.	MEISSN PART
L1	Series Police Trap	0Ω		20-490	
L2	Shunt Police Trap	0Ω		20-505	
L3	Series Police Trap	0Ω		20-490	
L4	Series Police Trap	0Ω		20-490	
L5	Shunt Police Trap	0Ω		20-505	
L6	Series Police Trap	0Ω		20-490	
L7A	Ant., RF Grid Coil	0Ω		S-21192	
B	Ant., RF Grid Coil	0Ω		S-21193	
C	Ant., RF Grid Coil	0Ω		S-21194	
D	Ant., RF Grid Coil	0Ω		S-21195	
E	Ant., RF Grid Coil	0Ω		S-21196	
F	Ant., RF Grid Coil	0Ω		S-19847	
G	Ant., RF Grid Coil	0Ω		S-19848	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ZENITH PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R73	100KΩ	1/2	63-1869	BTS-100K	
R74	100Ω	1/2	63-1744	BTS-100	
R75	1. 8Meg	1/2	63-1922	BTS-1. 8Meg	
R76	100KΩ	1/2	63-1870	BTS-100K	
R77	1000Ω	1	63-965	BTA-1000	
R78	560Ω	1/2	63-1775	BTS-560	
R79	560Ω	1/2	63-1775	BTS-560	
R80	1 Meg	1/2	63-1911	BTS-1 Meg	
R81	1 Meg	1/2	63-1911	BTS-1 Meg	
R82	1 Meg	1/2	63-1911	BTS-1 Meg	
R83	27KΩ	1/2	63-1845	BTS-27K	
R84	100Ω	1/2	63-1744	BTS-100	
R85	470Ω	1/2	63-1771	BTS-470	
R86	47KΩ	1	63-1194	BTA-47K	
R87	22KΩ	1/2	63-1842	BTS-22K	
R88	10KΩ	2	63-2145	BTB-10K	
R89	47KΩ	1/2	63-1856	BTS-47K	
R90	180KΩ	1	63-2313	BTA-180K	
R91	6800Ω	1/2	63-1820	BTS-6800	
R92	91Ω 5%	1/2	63-1744	BTS-91	
R93	470KΩ	1/2	63-1898	BTS-470K	
R94	12KΩ	2	63-1091	BTB-12K	
R95	22KΩ	1	63-958	BTA-22K	
R96	33KΩ	1	63-1849	BTA-33K	
R97	100KΩ	1	63-1870	BTA-100K	
R98	330Ω	1	63-3162	BTA-330	Note 4
R99	10KΩ	1/2		BTS-10K	Note 4
R100	8. 2Ω	1/2			Note 4

Note 1. Some versions may use 22KΩ resistor in this application.
Note 2. Some versions may use 10KΩ resistor in this application.
Note 3. Some versions may use 15KΩ resistor in this application.
Note 4. Not used in all versions.
Note 5. Add this resistor for combination units only.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	ZENITH PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @1.6A	524VCT .250ADC	5VAC @3A	95-1375						26R33 ①②③
	SEC. 3	SEC. 4	SEC. 5							
	12.6VCT @4.4A									

① Use only one 5V winding.
② Series 6.3V windings for 12.6VCT.
③ Use universal mounting brackets.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	ZENITH PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T2	Horiz. Output Trans.	S-20993 ①			DA-36 ④			
T3	Vert. Output Trans.	95-1377	A-8148		A-108X ⑤ ⑥			
T4A	Yoke-Horiz. (13MH)	95-1378	DY-9A ③	MDF-72③	Y-17-1③	211D2 ③	DF602 ③	Y-7 ③
B	Vert. (42MH)	S-19898 ②						

① Winding and terminal assembly part #S-21078.
② Centering device and yoke cover.
③ Use original yoke cover and positioning device.
④ See instruction sheet packed with unit for replacement procedure.
⑤ Connect as auto transformer.
⑥ Drill one new mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	ZENITH PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T5	9. 4KΩ	4. 2Ω	95-1379	A-3879	A-2932	S-51X	Z1117	24S60	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	ZENITH PART No.	VIKING PART No.	QUAM PART No.	NOTES
SP1	4"	PM	4. 2Ω	49-750	4J6	4A07	① Used in Models M2228RZ, M2229RZ, and M2229EZ ② Used in Models M2250RZ, M2250EZ, M2250RU, M2250EU, M2252RZ, and M2252EZ
	5 1/4"	PM	4. 2Ω	49-751 ①	525J4	52A1	
	10"	PM	4. 2Ω	49-752 ②	10J11	10A31	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Series Police Trap	0Ω		20-490				
L2	Shunt Police Trap	0Ω		20-505				
L3	Series Police Trap	0Ω		20-490				
L4	Series Police Trap	0Ω		20-490				
L5	Shunt Police Trap	0Ω		20-505				
L6	Series Police Trap	0Ω		20-490				
L7A	Ant., RF Grid Coil	0Ω		S-21192				Channel 2
B	Ant., RF Grid Coil	0Ω		S-21193				Channel 3
C	Ant., RF Grid Coil	0Ω		S-21194				Channel 4
D	Ant., RF Grid Coil	0Ω		S-21195				Channel 5
E	Ant., RF Grid Coil	0Ω		S-21196				Channel 6
F	Ant., RF Grid Coil	0Ω		S-19847				Channel 7
G	Ant., RF Grid Coil	0Ω		S-19848				Channel 8

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.
H	Ant., RF Grid Coil	0Ω	
I	Ant., RF Grid Coil	0Ω	
J	Ant., RF Grid Coil	0Ω	
K	Ant., RF Grid Coil	0Ω	
L	Ant., RF Grid Coil	0Ω	
L8	Fil. Choke	0Ω	
L9	Neut. Coil	0Ω	
L10	RF Coil	0Ω	
L11A	RF, Mixer Grid, Osc. Coil	0Ω	
B	RF, Mixer Grid, Osc. Coil	0Ω	
C	RF, Mixer Grid, Osc. Coil	0Ω	
D	RF, Mixer Grid, Osc. Coil	0Ω	
E	RF, Mixer Grid, Osc. Coil	0Ω	
F	RF, Mixer Grid, Osc. Coil	0Ω	
G	RF, Mixer Grid, Osc. Coil	0Ω	
H	RF, Mixer Grid, Osc. Coil	0Ω	
I	RF, Mixer Grid, Osc. Coil	0Ω	
J	RF, Mixer Grid, Osc. Coil	0Ω	
K	RF, Mixer Grid, Osc. Coil	0Ω	
L	RF, Mixer Grid, Osc. Coil	0Ω	
L12	Mixer Grid Coil	0Ω	
L13	Mixer Coil	0Ω	
L14	Osc. Trimmer Coil	0Ω	
L15	IF Coil	0Ω	
L16	Conv. Plate	0Ω	
L17	1st Video IF	. 1Ω	
L18	Adj. Sound IF	. 1Ω	
L19	39. 75MC Trap	0Ω	
L20	2nd Video IF	. 1Ω	. 1Ω
L21	3rd Video IF	. 1Ω	. 1Ω
L22	4th Video IF	. 2Ω	. 2Ω
L23	Series Peaking Coil	5. 5Ω	
L24	Shunt Peaking Coil	5. 5Ω	
L25	Series Peaking Coil	1. 5Ω	
L26	4. 5MC Trap	12Ω	1. 2Ω
L27	Series Peaking Coil	5Ω	
L28	Sound IF	. 3Ω	. 3Ω
L29	Quadrature Coil	4. 6Ω	
L30	Horiz. Osc.	148Ω	
L31	Anti-ringing coil	47Ω	

* Use trap winding and drill mounting
■ Detune trap.
♦ Series with a 5. 6KΩ resistor.
† Parallel with a 5. 6KΩ resistor.
▰ Parallel with a . 01 capacitor.

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	INDUC (0 CU 1000
L32	.250ADC	66Ω	1. 7

① Drill one new mounting hole.

LORY T No.	SPRAGUE PART No.	NOTES
1	6TM-P1	
-255	MS-21	
-255	MS-21	
1	4TM-S1	
-521	5HK-2D1	
11	5HK-S1	
31	5GA-T1	
235	MS-31	
21	6TM-D1	
21	6TM-D1	
01	2TM-P1	
	MS-37	
215	4TM-D15	
E255	MS-21	
147	4TM-S47	
5347	5GA-Q47	
015	2TM-P15	
11	2TM-S1	Note 6

INSTALLATION NOTES
Volume
Attach to R1A
Attach to R1A
Focus
Attach to R2A
Height - Note
Attach to R3A
Brightness
Attach to R4A
Vert. Hold
Attach to R5A
Vert. Linearity
Attach to R6A
AGC
Attach to R7A
Contrast -wire wound
Buzz - wire wound
Fringe lock
Attach to R10A

ACEMENT DATA TH No.	IRC PART No.	NOTES
	BTS-15	
	BTB-22K	Note 3
	BTS-100K	
	BTS-100K	
	BTS-33K	
	BTS-47K	
	BTS-10 Meg	
	BTA-680	
	BTS-220K	
	BTS-3900	
	BTA-180K	
	BTS-220K	
	BTS-220K	
	BTS-680K	
	BTS-2. 2Meg	
	BTS-100K	
	BTS-10K	
	BTB-22K	
	BTS-680	
	BTS-680K	
	BTS-6. 8Meg	Note 4
	BTA-680	
	BTS-22K	Note 5
	BTS-470	
	BTS-470K	
	BTS-100K	
	BTS-470K	
	BTS-56K	
	BTS-220K	
	BTS-47K	
	BTS-22K	

PTIONS (Continued)

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RATING		REPLACEMENT DATA		NOTES
OHMS	WATT	ZENITH PART No.	IRC PART No.	
22KΩ	½	63-1842	BTS-22K	
10KΩ	2	63-2145	BTB-10K	
47KΩ	½	63-1856	BTS-47K	
180KΩ	1	63-2313	BTA-180K	
6800Ω	½	63-1820	BTS-6800	
91Ω 5%	½	63-1744	BTS-91	
470KΩ	½	63-1898	BTS-470K	
12KΩ	2	63-1091	BTB-12K	
22KΩ	1	63-958	BTA-22K	
33KΩ	1	63-1849	BTA-33K	
100KΩ	1	63-1870	BTA-100K	
330Ω	1	63-3162	BTA-330	Note 4
10KΩ	½		BTS-10K	Note 4
8. 2Ω	½			Note 4

r in this application.
r in this application.
r in this application.

its only.

WER)

LACEMENT DATA				
o.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
				26R33 ①②③

CIRCUITS)

ACEMENT DATA				
o.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
	DA-36 ④ A-108X ⑤ ⑥			
2③	Y-17-1③	211D2 ③	DF602 ③	Y-7 ③

OUTPUT)

Halldorson PART No.	Thordarson PART No.	NOTES
Z1117	24S60	

M No.	NOTES
	① Used in Models M2228RZ, M2229RZ, and M2229EZ ② Used in Models M2250RZ, M2250EZ, M2250RU, M2250EU, M2252RZ, and M2252EZ

DATA		
MERIT PART No.	MILLER PART No.	NOTES
		Channel 2
		Channel 3
		Channel 4
		Channel 5
		Channel 6
		Channel 7
		Channel 8

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
H	Ant., RF Grid Coil	0Ω		S-19849				Channel 9
I	Ant., RF Grid Coil	0Ω		S-19850				Channel 10
J	Ant., RF Grid Coil	0Ω		S-19851				Channel 11
K	Ant., RF Grid Coil	0Ω		S-19852				Channel 12
L	Ant., RF Grid Coil	0Ω		S-19853				Channel 13
L8	Fil. Choke	0Ω		20-391				
L9	Neut. Coil	0Ω		20-431				
L10	RF Coil	0Ω		20-484				
L11A	RF, Mixer Grid, Osc. Coil	0Ω		S-19862				Channel 2
B	RF, Mixer Grid, Osc. Coil	0Ω		S-19863				Channel 3
C	RF, Mixer Grid, Osc. Coil	0Ω		S-19864				Channel 4
D	RF, Mixer Grid, Osc. Coil	0Ω		S-19865				Channel 5
E	RF, Mixer Grid, Osc. Coil	0Ω		S-19866				Channel 6
F	RF, Mixer Grid, Osc. Coil	0Ω		S-19867				Channel 7
G	RF, Mixer Grid, Osc. Coil	0Ω		S-19868				Channel 8
H	RF, Mixer Grid, Osc. Coil	0Ω		S-19869				Channel 9
I	RF, Mixer Grid, Osc. Coil	0Ω		S-19870				Channel 10
J	RF, Mixer Grid, Osc. Coil	0Ω		S-19871				Channel 11
K	RF, Mixer Grid, Osc. Coil	0Ω		S-19872				Channel 12
L	RF, Mixer Grid, Osc. Coil	0Ω		S-19873				Channel 13
L12	Mixer Grid Coil	0Ω		20-485				
L13	Mixer Coil	0Ω		S-20181				
L14	Osc. Trimmer Coil	0Ω		20-447				
L15	IF Coil	0Ω		S-18859				
L16	Conv. Plate	0Ω		S-20902				
L17	1st Video IF	.1Ω		S-21019			6232	Includes trap
L18	Adj. Sound IF	.1Ω		S-18210	17-4502			
L19	39. 75MC Trap	0Ω		S-20622	17-4501 *			
L20	2nd Video IF	.1Ω	.1Ω	S-17907			6232 ■	
L21	3rd Video IF	.1Ω	.1Ω	S-19952			6233 ■	
L22	4th Video IF	.2Ω	.2Ω	S-20623			6219	
L23	Series Peaking Coil	5.5Ω		S-17912	19-3160	TV-184	4644	145 Microhenries
L24	Shunt Peaking Coil	5.5Ω		S-21562	19-3160 ♦	TV-184 ♦	4644 ♦	159 Microhenries; wound on 2.7KΩ resistor
L25	Series Peaking Coil	1.5Ω		5-15128	19-1005		4612	12 Microhenries
L26	4.5MC Trap	12Ω	1.2Ω	S-21492				
L27	Series Peaking Coil	5Ω		S-21563	19-3125 †		6153 †	136 Microhenries; wound on 5.6KΩ resistor
L28	Sound IF	.3Ω	.3Ω	S-20219	16-3445			
L29	Quadrature Coil	4.6Ω		S-19020	20-1004	TV-151	1470	
L30	Horiz. Osc.	148Ω		S-19743	19-1577			Tapped ③ 58Ω
L31	Anti-ringing coil	47Ω		S-21012	19-3160 ▲	TV-184 ▲	6180 ▲	163 Microhenries; wound on .01 cap; used in chassis 19M20Z, 19M21Z, 19M20UZ, 19M21UZ, 19M20, 19M21, 19M20U, 19M21U, 20M21, 20M21U, 20M21Z

* Use trap winding and drill mounting hole.
■ Detune trap.
♦ Series with a 5.6KΩ resistor.
† Parallel with a 5.6KΩ resistor.
▲ Parallel with a .01 capacitor.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA ZENITH PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L32	.250ADC	66Ω	1.7 Hy.	95-1376	C-2326 ①	C-2996 ①	C-23X	C5037 ①	26C44

① Drill one new mounting hole.

PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

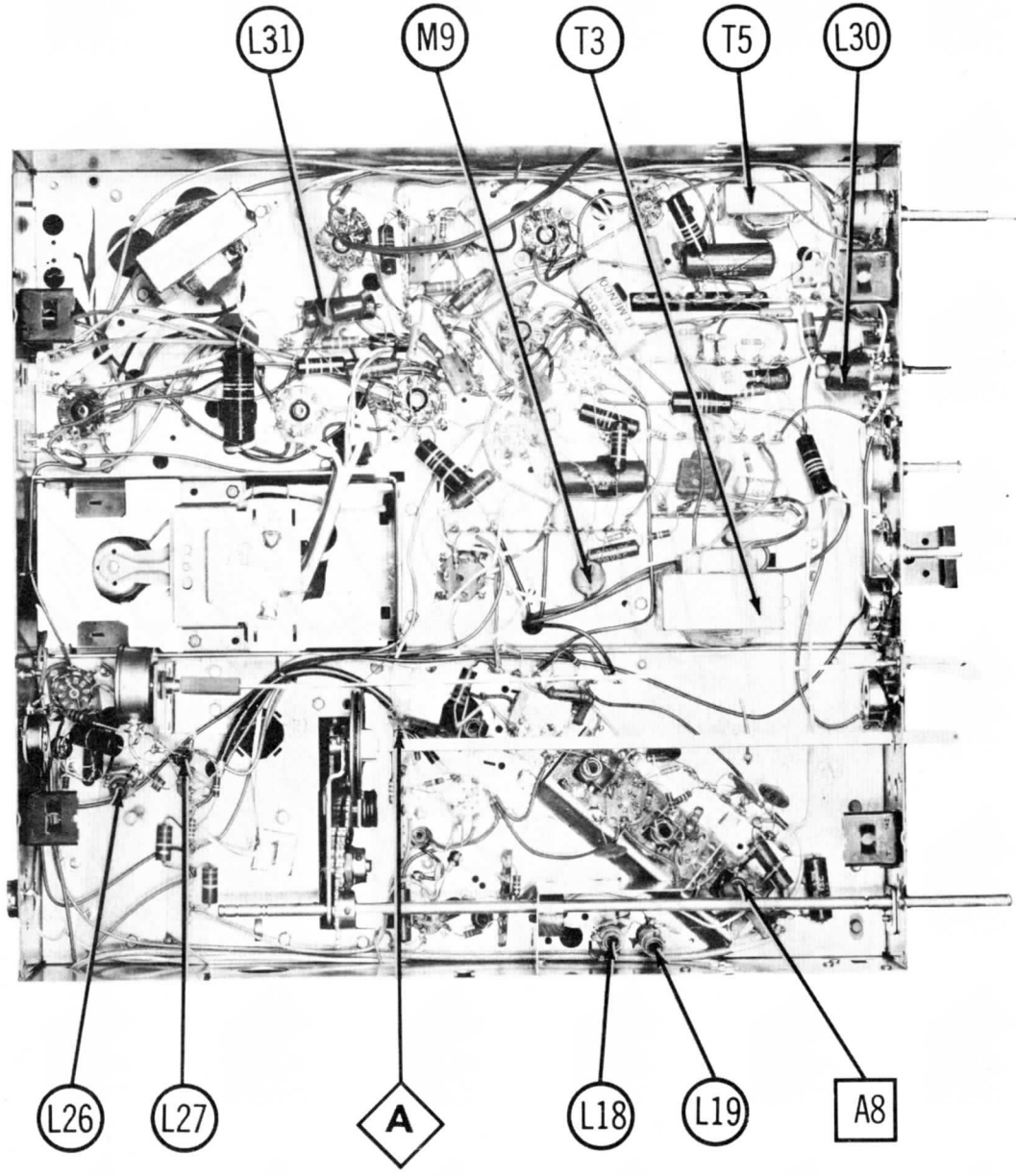
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ZENITH PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG Slo-Blo	.175A 125V	136-21	83-1883	313.175 (175MA-3AG Slo-Blo)	357001	MDL 175/1000	4405

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		ZENITH PART No.	SYLVANIA PART No.	FEDERAL PART No.	
M2	1N60	103-1	1N60 or 1N132	1N60 or 1N64A	Video Detector

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Dial Light	100-166	Not used in all models.
M4	Tuner	S-21060	VHF-UHF - Chassis 19M20, 19M21
	Tuner	S-20989	VHF- Chassis 19M20U, 19M21U
	Tuner	S-19970	VHF-UHF - Chassis 19M20Z, 19M21Z, 19M21UZ
	Tuner	S-21000	UHF - Chassis 19M20U, 19M21U
	Tuner	S-19670	UHF - Chassis 19M21UZ
M5	Video Det. Assy.	S-21042	Includes M2, L22, L23, L24, C81, C82
M6	Switch	85-546	UHF-VHF changeover - Chassis 19M20U, 19M21U
M7	Centering Device	S-19898	Includes yoke cover
M8	Ion Trap	S-17164	
M9	Integrator	87-1	
M10	Width Adjustment		
B1	Trimmer Cap.	22-2398	Horiz. Drive
	Cabinet	14-1648E	Blonde - Models M1800EZ, M1800E, M1800EU, R1800EZ, R1800EUZ, M2229E, M2230E, M2249E, M2250E, M2252E
	Cabinet	14-1648R	Mahogany - Models M1800RZ, M1800R, M1800RU, R1800RZ, R1800RUZ, M2228R, M2229R, M2230R, M2249R, M2250R, M2252R
	Cabinet	14-1650R	Mahogany - Models M2228RZ, M2228RU
	Cabinet	14-1651E	Blonde - Models M2229EZ, M2229EU, M2230EZ, M2230EU
	Cabinet	14-1651R	Mahogany - Models M2229RZ, M2229RU, M2230RZ, M2230RU
	Cabinet	14-1652R	Mahogany - Models M2250RZ, M2250RUZ, M2250RU, M2249RZ, M2249RU
	Cabinet	14-1652E	Blonde - Models M2250EZ, M2250EU, M2249EZ, M2249EU
	Cabinet	14-1655E	Blonde - Models M2252EZ, M2252EU
	Cabinet	14-1655R	Mahogany - Models M2252RZ, M2252RU
	Cabinet	14-1710R	Mahogany - Model M2230RZ2
	Cabinet	14-1740E	Blonde - Models R2258EUZ, R2258EZ
	Cabinet	14-1740R	Mahogany - Models R2258RUZ, R2258RZ
	Cabinet	14-1773E	Blonde - Models R2257EZ, R2257EUZ
	Cabinet	14-1773R	Mahogany - Models R2257RZ, R2257RUZ
	Cabinet	14-1742E	Blonde - Models R1812EZ, R1812EUZ
	Cabinet	14-1742R	Mahogany - Models R1812RZ, R1812RUZ
	Cabinet	14-1729	Metal - Models R2229RZ, R2229RUZ
	Cabinet	14-1730	Metal - Models R2229EZ, R2229EUZ
	Cabinet	14-1731	Metal - Models R2230RZ, R2230RUZ
	Cabinet	14-1732	Metal - Models R2230EZ, R2230EUZ
	Cabinet	14-1750	Models R2249RZ, R2249RUZ
	Cabinet	14-1751	Models R2249EZ, R2249EUZ
	Cabinet	14-1741E	Blonde - Models R2250EZ, R2250EUZ
	Cabinet	14-1741R	Mahogany - Models R2250RZ, R2250RUZ
	Safety Glass	192-176	Models M1800E, M1800R, M1800RZ, M1800EZ, M1800RU, M1800EU, R1800EZ, R1800EUZ, R1800RZ, R1800RUZ
	Safety Glass	192-168	Models M2228R, M2228RZ, M2229E, M2229R, M2229RZ, M2229EZ, M2228RU, M2229RU, M2229EU, R2229EZ, R2229RZ, R2230EZ, R2230RZ, R2249EZ, R2249RZ, R2229RUZ, R2229EUZ, R2230RUZ, R2230EUZ, R2249RUZ, R2249EUZ
	Safety Glass	192-175	Models M2250RZ, M2250EZ, M2250RU, M2250EU, M2252E, M2252R, M2252RZ, M2252EZ, M2252RU, M2252EU
	Safety Glass	192-178	Models M2230RZ2, M2230E, M2230R, M2250E, M2250R, M2230RZ, M2230EZ, M2230RU, M2230EU
	Safety Glass	192-154	Models M2249E, M2249R, M2249RZ, M2249EZ, M2249RU, M2249EU
	Safety Glass	192-91 or 192-77	Models R1812EZ, RZ, R1812RUZ, EUZ
	Safety Glass	192-188	Models R2250EZ, RZ, R2258EZ, RZ, R2258RUZ, EUZ
	Safety Glass	192-190	Models R2257EZ, RZ, EUZ, RUZ
	Mask	196-248	Models R2250EZ, RZ, R2258EZ, RZ, R2230RUZ, EUZ, R2258RUZ, EUZ
	Mask	196-259	Models R2257RZ, RUZ
	Mask	196-261	Models R2257EZ, EUZ



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V13, V14, V15, V16 and V17. Check waveform W17. Check M1 fuse.

If Satisfactory	If UnSatisfactory
Check T2, T4A, R2, R94, R95, C78, C79 and other associated components.	Check L30, C74, C72, C73 C78, C77, C71, R86 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V14, V15, V16 and V18. Check C77, R94 and other associated components.

BLOOMING

Check by substitution V15, V16, V17 and V18. Check resistance wire to V17 filament. Check R94 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5 and V6. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

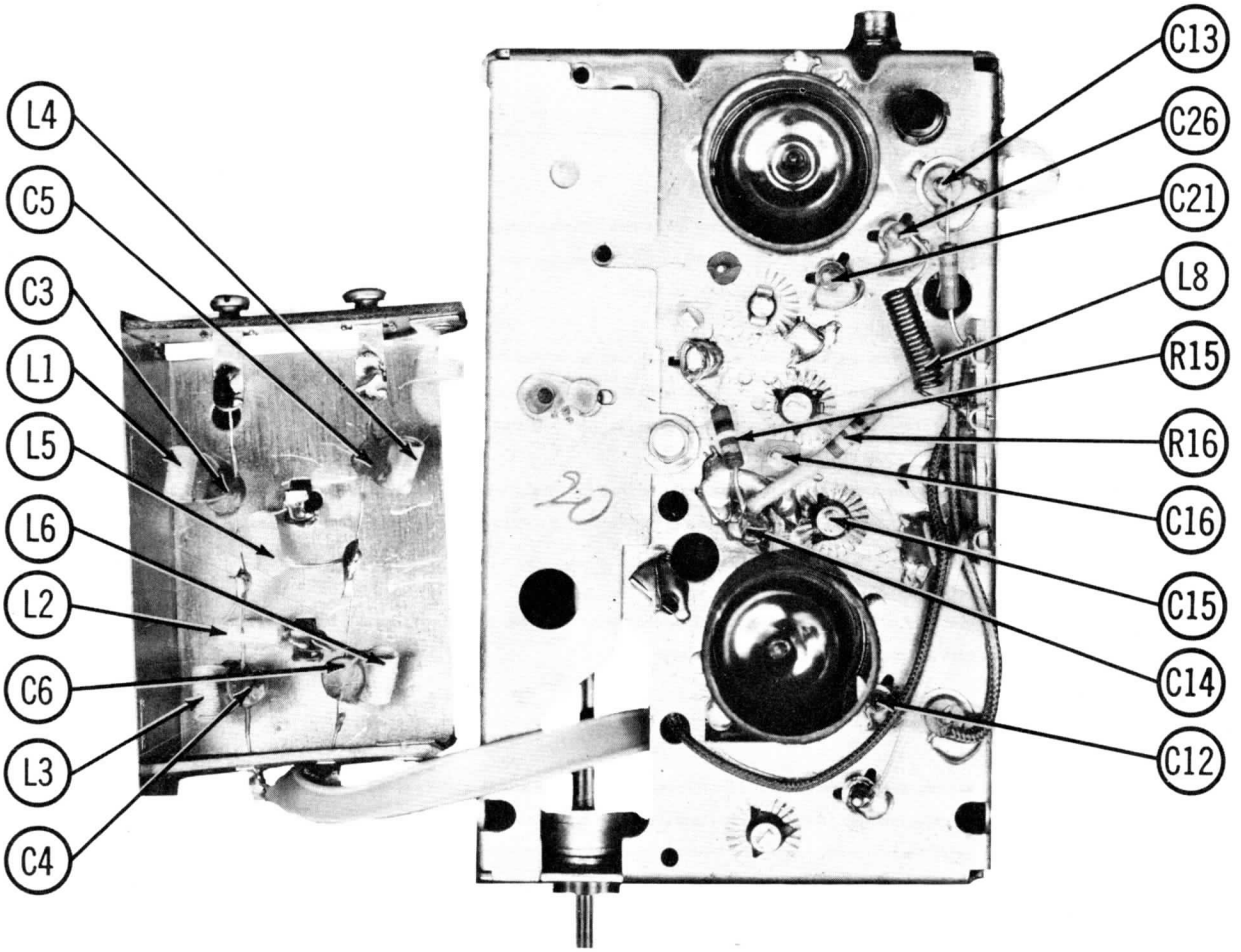
KEYSTONE EFFECT

Check T4 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

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



VHF TUNER TOP VIEW

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustment of the VHF tuner oscillator circuit, it is necessary to remove rear cover supply power to set. Adjustments are made thru the hole marked "Bull's Eye Adjustment" and are accessible one at a time as the selector switch is turned to each channel. (Fine tuning control must be set to its center of its range before making adjustments). Use alignment wrench 68-21 for adjustments.

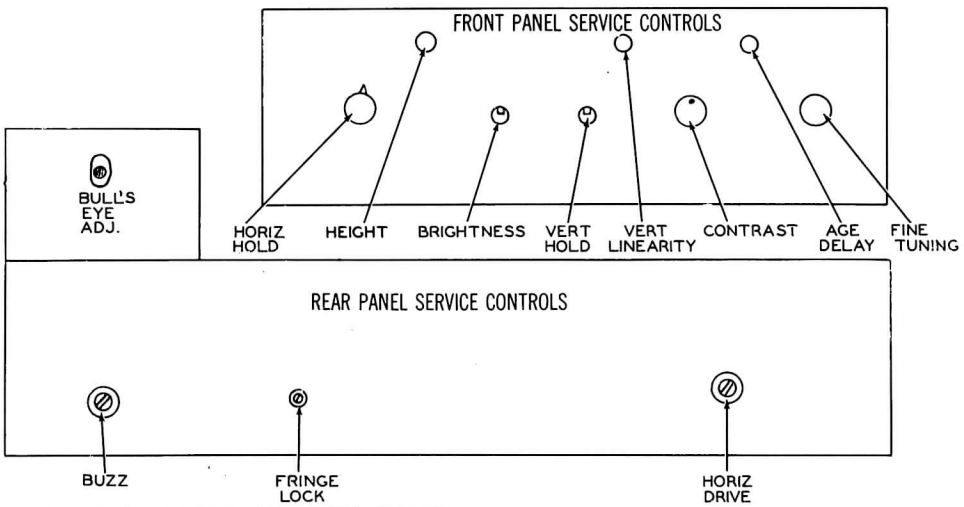
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 2 control knobs from each side of front panel. Remove 2 screws located under each knob. Remove both rings, then remove safety glass.

PICTURE TUBE REMOVAL

To remove picture tube it is necessary to remove safety glass, rear cover, tube socket, HV lead, ion trap and centering magnet. Remove 1 screw from top front of tube mount. Remove tube.

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS - AGC DELAY ADJUSTMENT

Turn the set on and tune in a TV signal and observe the picture. Starting from the full clockwise position turn the AGC delay control slowly counter clockwise until picture distorts and buzz is heard in the sound. Then turn control clockwise for clearest picture and best sound.

FRINGE LOCK ADJUSTMENT

Turn the fringe lock control to 1/4 turn from full clockwise position. Adjust the vertical and horizontal hold for picture synchronization and check stability by switching off channel and back again.

Slightly retouch the fringe lock control adjustment, if necessary, for maximum stability while testing as above.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the front panel service control. Adjust the horizontal hold control (L30) until picture synchronizes horizontally. If results cannot be obtained see horizontal sweep circuit adjustments on page 11.

SOUND IF DETECTOR BUZZ ADJUSTMENT

Adjust the buzz control located on the rear apron of the chassis for maximum volume and minimum buzz. If results are unsatisfactory see alignment instructions on pages 6 and 7.

FUSES

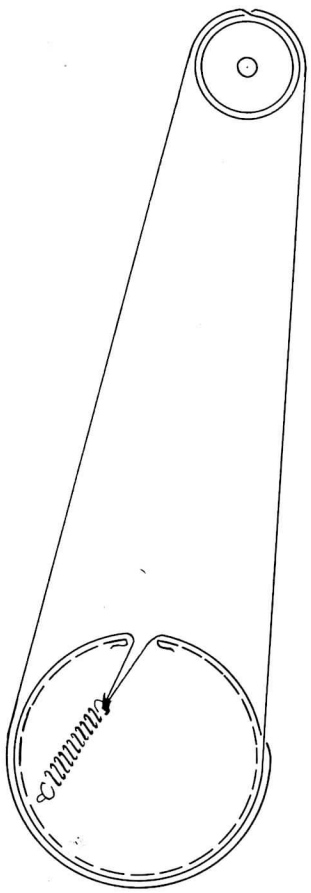
One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

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 rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

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



SHAFT IN MAXIMUM COUNTER CLOCKWISE POSITION.

DRIVE CORD STRINGING