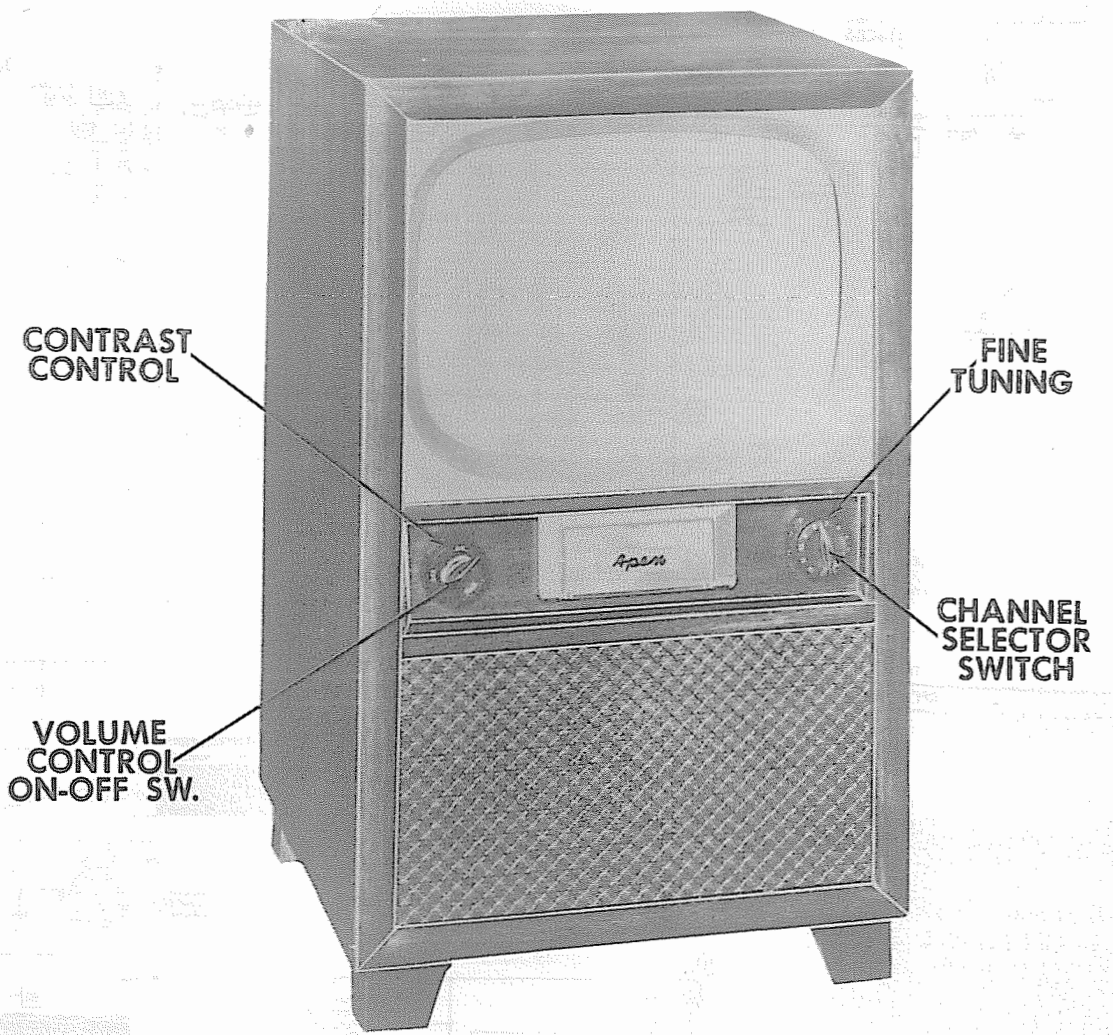


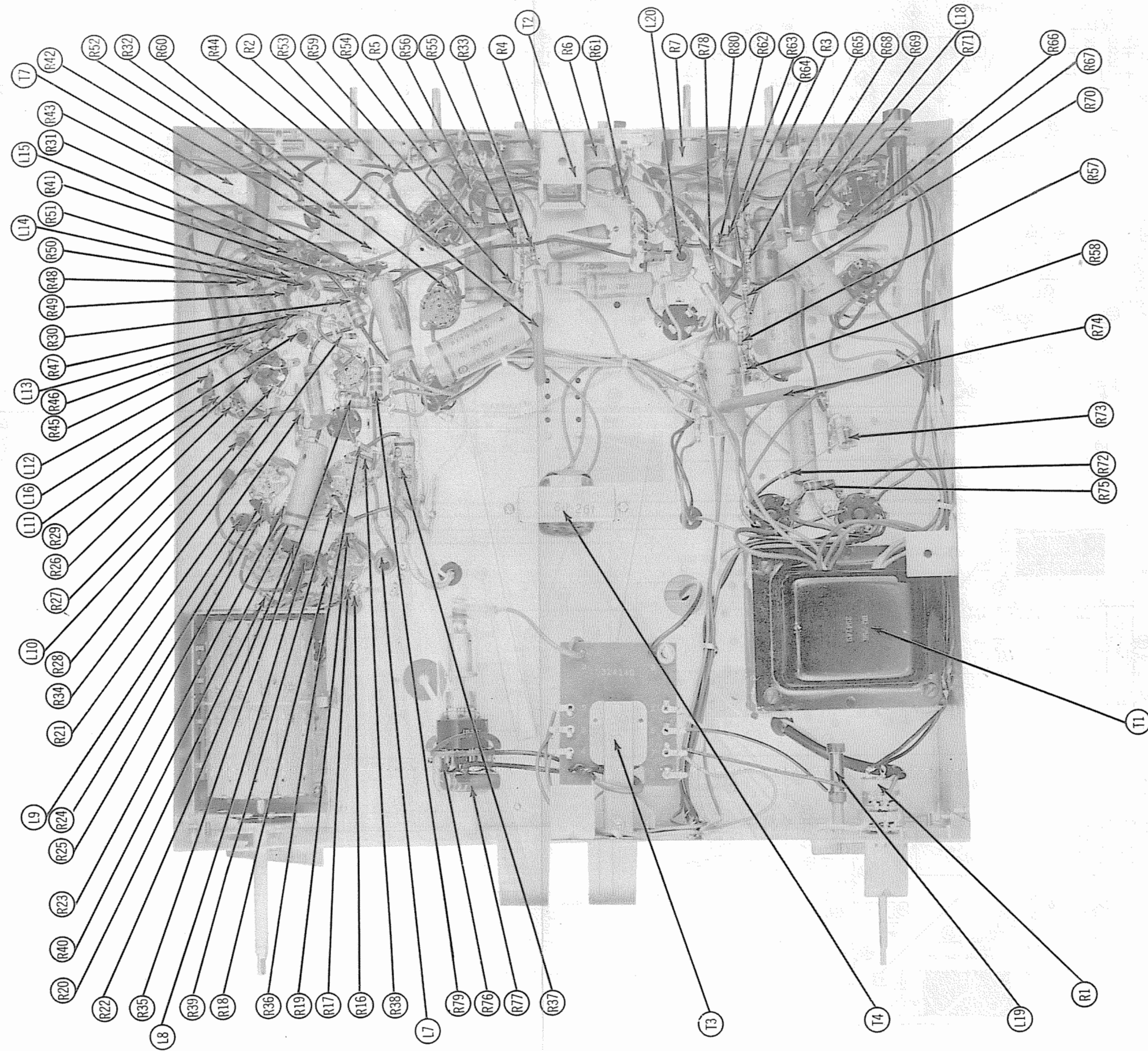
18pg



APEX 9120	
TRADE NAME	APEX Models 817, 920, 924, 9120, 9121, 9820, 9820B, 9821.
MANUFACTURER	APEX Television Corp., 1926 Broadway, New York, N. Y.
TYPE SET	Television Receiver
TUBES	Nineteen
POWER SUPPLY	110-120 Volts AC - 60 Cycle
TUNING RANGE	Channels 2 thru 13
	RATING 1.94 Amp. @ 117 Volts AC
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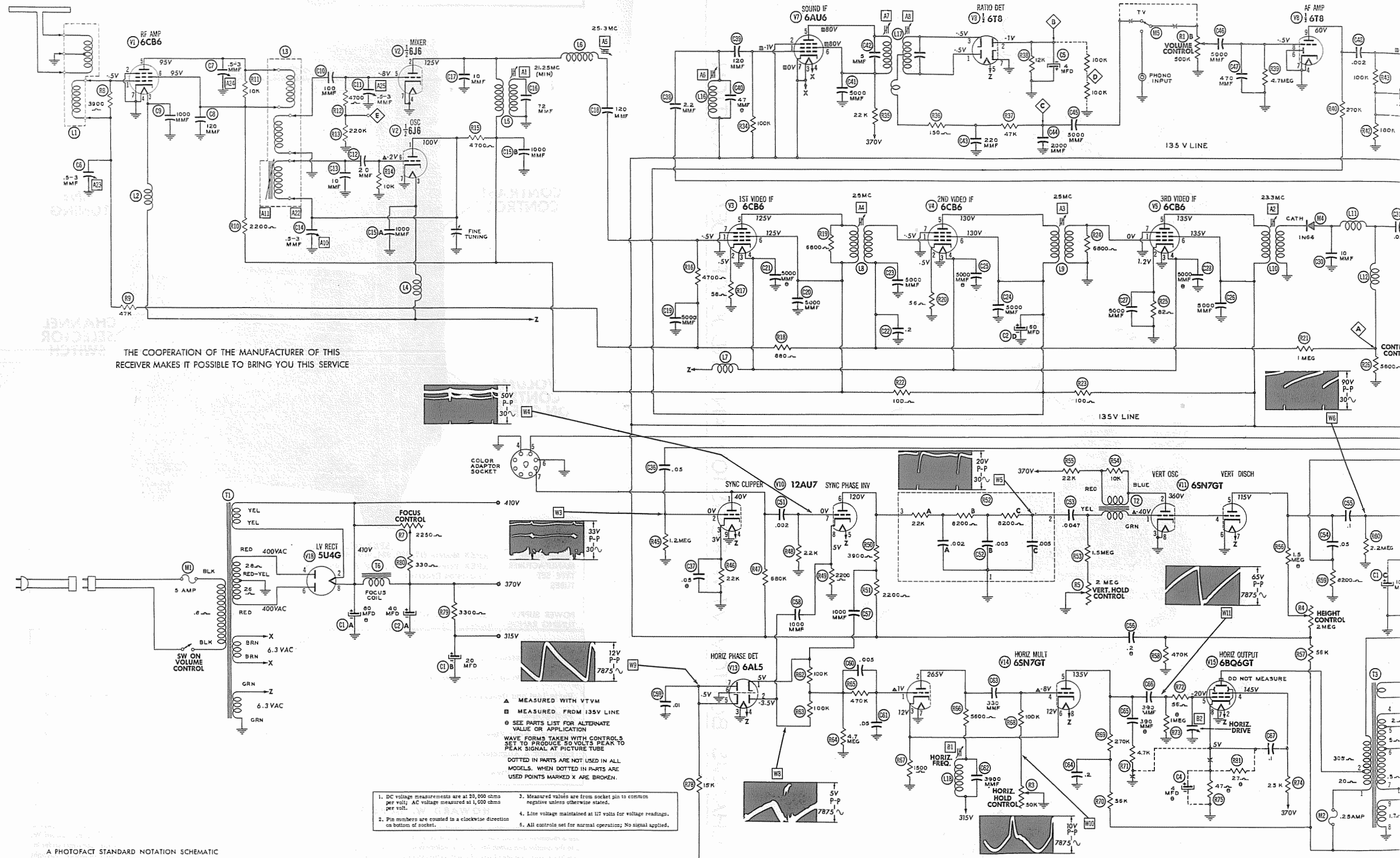
APEX MODELS 817, 920, 924, 9120, 9121, 9820, 9820B, 9821

22240M X394  
1540 00584 0280 J119 OC10 010 000 X10

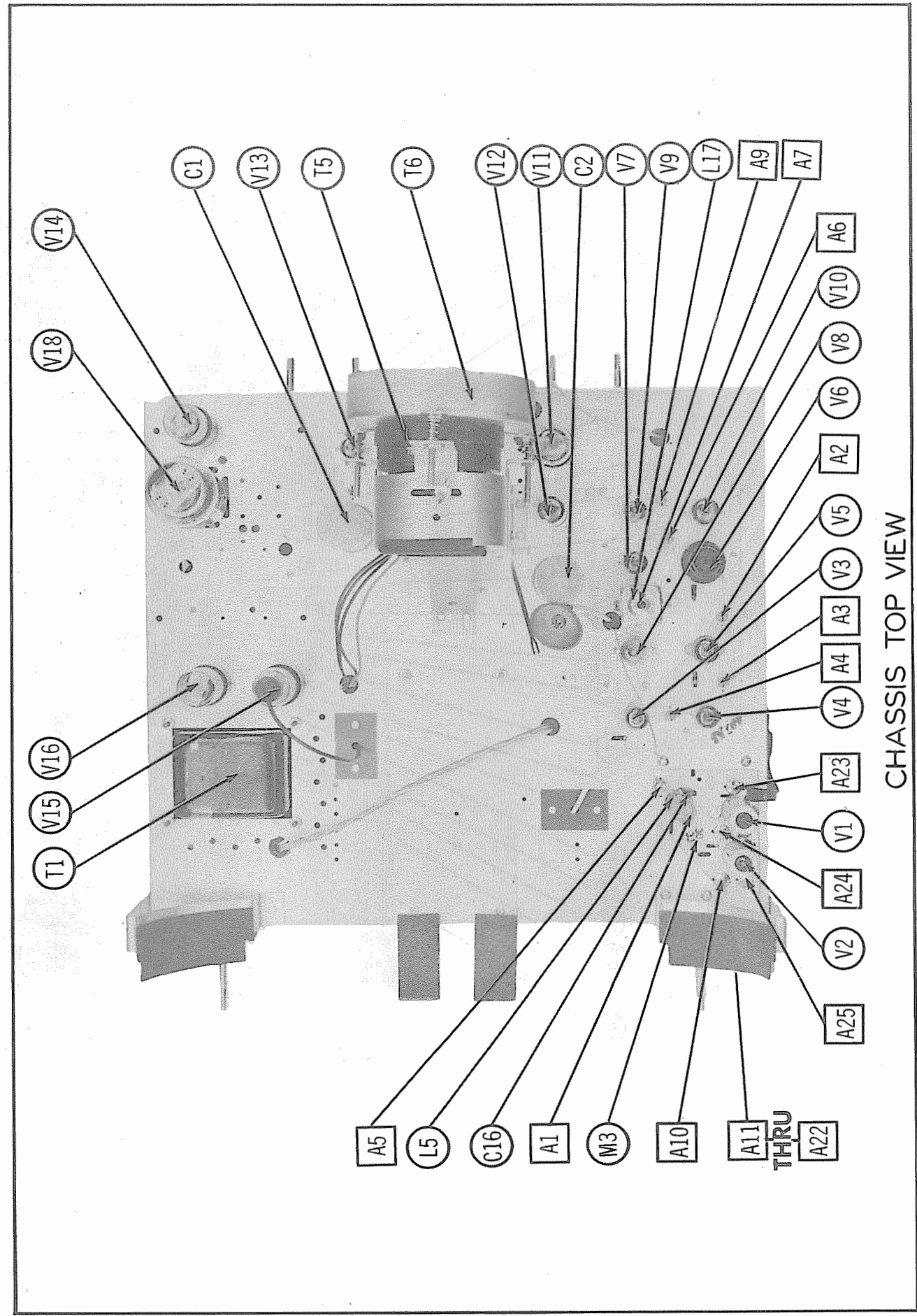
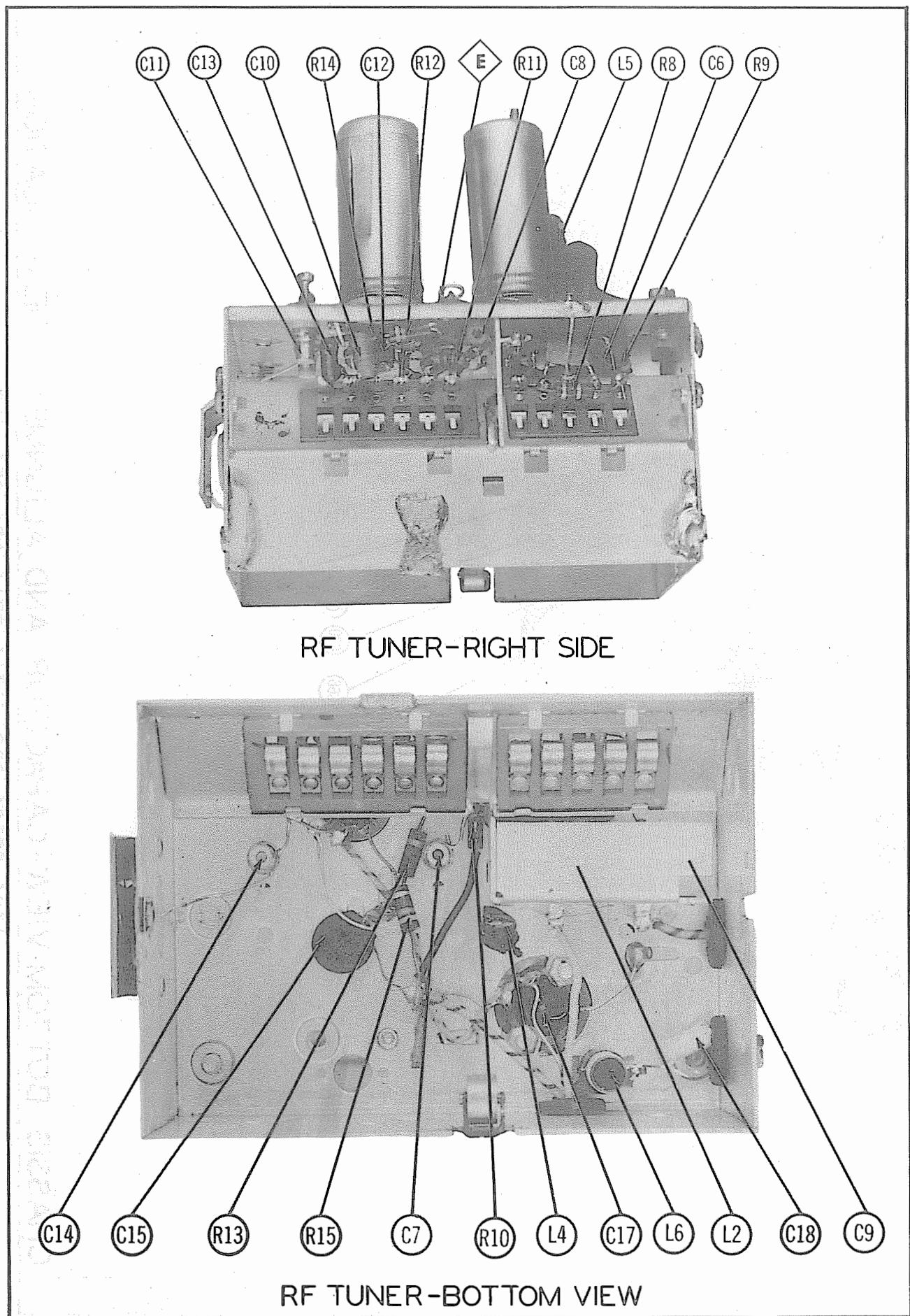


CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION







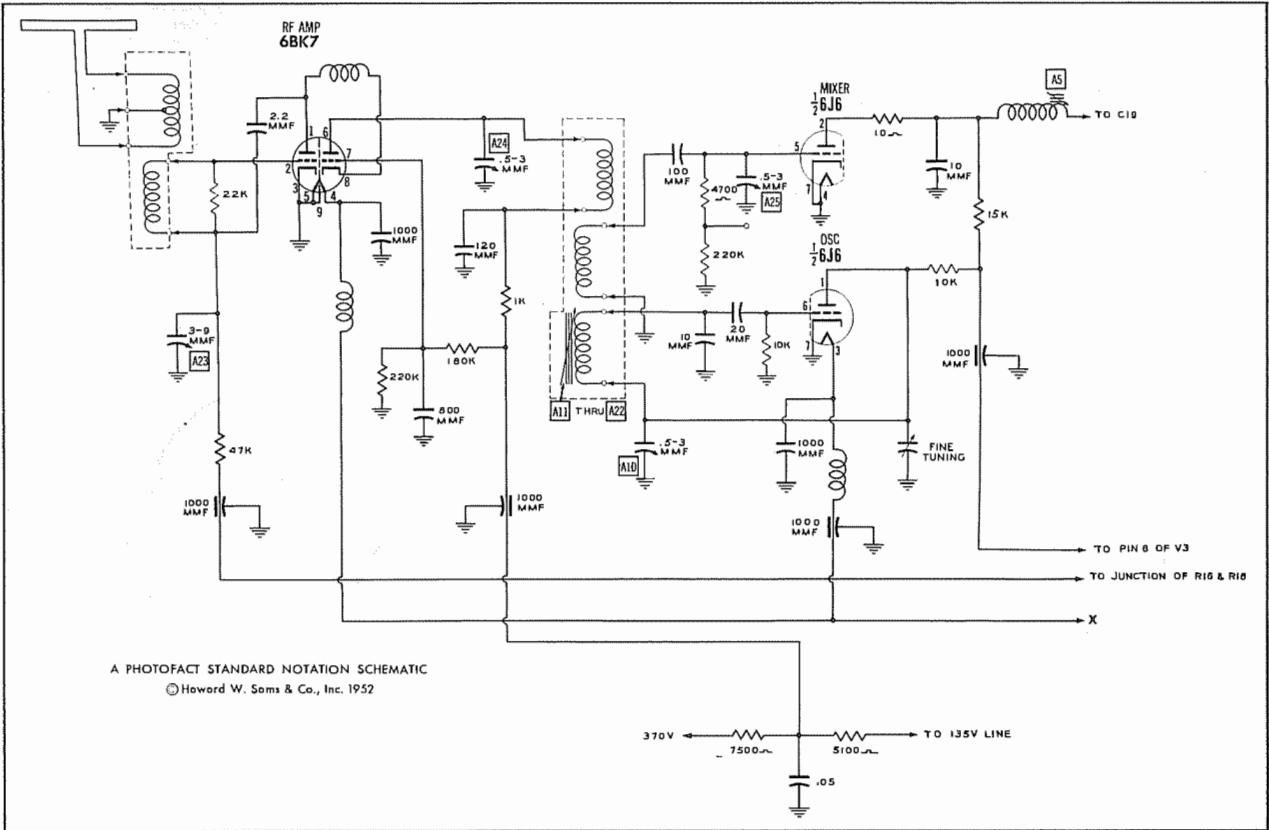




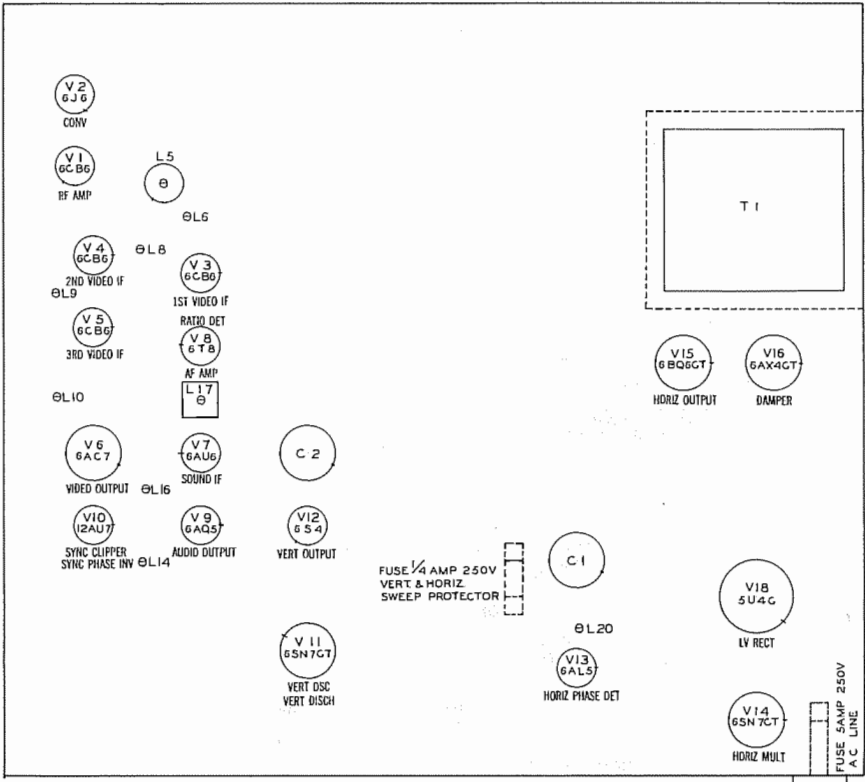
RESISTANCE MEASUREMENTS

Item	Tubo	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6CB6	1Meg	0Ω	.1Ω	0Ω	±2.4KΩ	±2.4KΩ	0Ω		
V 2	6J6	±4.9KΩ	±200Ω	.1Ω	0Ω	220KΩ	10KΩ	0Ω		
V 3	6CB6	1Meg	56Ω	0Ω	.1Ω	±200Ω	±200Ω	0Ω		
V 4	6CB6	1Meg	56Ω	0Ω	.1Ω	±100Ω	±100Ω	0Ω		
V 5	6CB6	.2Ω	82Ω	0Ω	.1Ω	±0Ω	±0Ω	0Ω		
V 6	6AC7	0Ω	0Ω	0Ω	470KΩ	390Ω	±0Ω	.1Ω	†10KΩ	
V 7	6AU6	±100KΩ	±0Ω	±0Ω	±.1Ω	†22KΩ	†22KΩ	±0Ω		
V 8	6T8	INF	12KΩ	INF	0Ω	.1Ω	0Ω	0Ω	4.7MEG	±270KΩ
V 9	6AQ5	240KΩ	40KΩ	±0Ω	±.1Ω	†1.1KΩ	†800Ω	240KΩ		
V 10	12AU7	±680KΩ	1.2Meg	22KΩ	.1Ω	.1Ω	±6.1KΩ	22KΩ	2.2KΩ	0Ω
V 11	6SN7GT	2.8Meg	†22KΩ	0Ω	2.8Meg	±2.5Meg	0Ω	.1Ω	0Ω	
V 12	6S4	INF	1.6KΩ	2.2Meg	0Ω	.1Ω	2.2Meg	INF	INF	†1.4KΩ
V 13	6AL5	4.8Meg	4.8Meg	0Ω	.1Ω	15KΩ	0Ω	15KΩ		
V 14	6SN7GT	5.1Meg	†9.1KΩ	1.5KΩ	140KΩ	±325KΩ	1.5KΩ	0Ω	.1Ω	
V 15	6BQ6GT	INF	.1Ω	INF	†25KΩ	1Meg	INF	0Ω	47Ω	TOP CAP #42Ω
V 16	6AX4GT	†230Ω	INF	480KΩ	INF	†232Ω	INF	0Ω	.1Ω	
V 17	1B3GT	PINS 1 - 8	HAVE	INF	RESISTANCE					TOP CAP #347Ω
V 18	5U4G	INF	45KΩ	INF	28Ω	INF	26Ω	INF	45KΩ	
V 19	20DP4A	0Ω	8.2KΩ	PIN 10 #10KΩ	PIN 11 110KΩ	PIN 12 .1Ω				

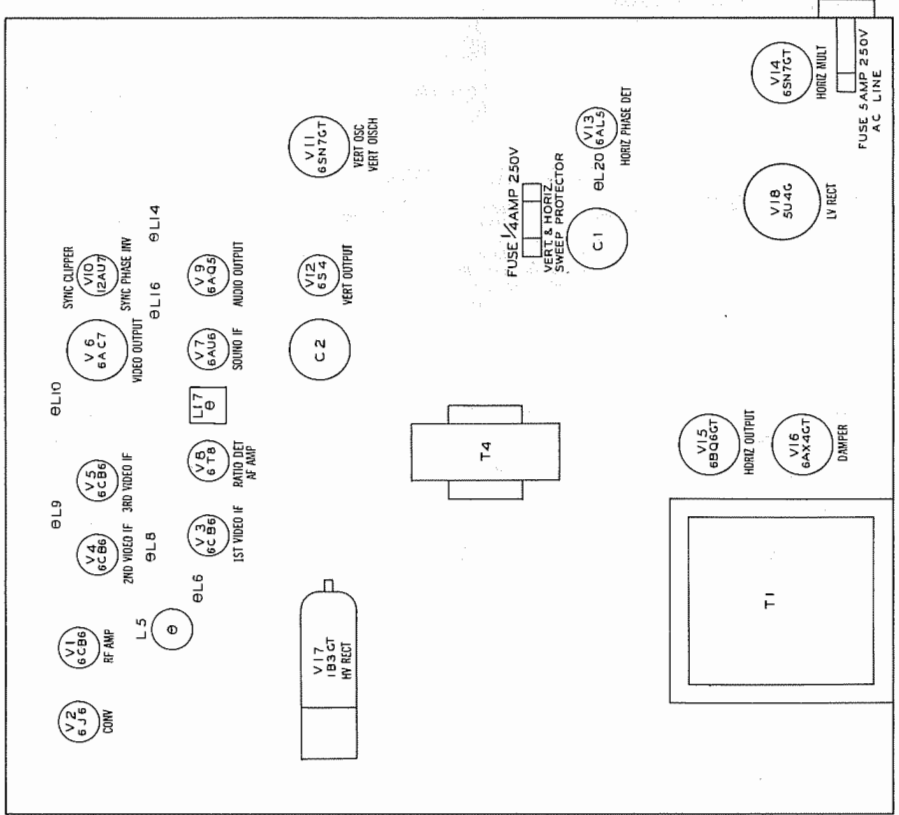
ALL CONTROLS SET FOR NORMAL OPERATION, NO SIGNAL APPLIED  
† MEASURED FROM PIN 8 OF V10  
± MEASURED FROM 135 VDC LINE



ALTERNATE TUNER SCHEMATIC



TOP VIEW



BOTTOM VIEW

TUBE PLACEMENT CHART

817, 920, 924, 9120, 9121, 9820, 9820B, 9821  
APEX MODELS

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	APEX PART No.	MERIT PART No.	
L1	Ant. Coil	0Ω				
L2	Fil. Choke	0Ω				
L3	RF, Mixer					
L4	Grid & Osc.	0Ω				
L5	Fil. Choke	0Ω				
L6	Conv. Plate & IF Trap	1.6Ω	0Ω			
L7	1st. Video IF	1Ω				
L8	Fil. Choke	0Ω				
L9	2nd. Video IF	.2Ω	.2Ω			
L10	3rd. Video IF	.2Ω	.2Ω			
L11	4th. Video IF	.2Ω	.2Ω			
L12	Peaking Coil	2.4Ω		TV-180		White, 36 Microhenries
L13	Peaking Coil	9.5Ω		*TV-185		Red, 375 Microhenries
L14	Peaking Coil	6.8Ω		TV-151		Blue, 225 Microhenries, Wound on 10K resistor
L15	4.5MC Trap	1.8Ω				
L16	Peaking Coil	11Ω				Green, 510 Microhenries
L17	Sound IF	1.8Ω		TV-151		
L18	Ratio Det.	4.2Ω	.2Ω	TV-110		
L19	Horiz. Osc.	47Ω		TV-163		Tertiary Winding .7Ω
L20	Width Coil	.45Ω				
L21	Horiz. Lin.	22Ω		MWC-1		

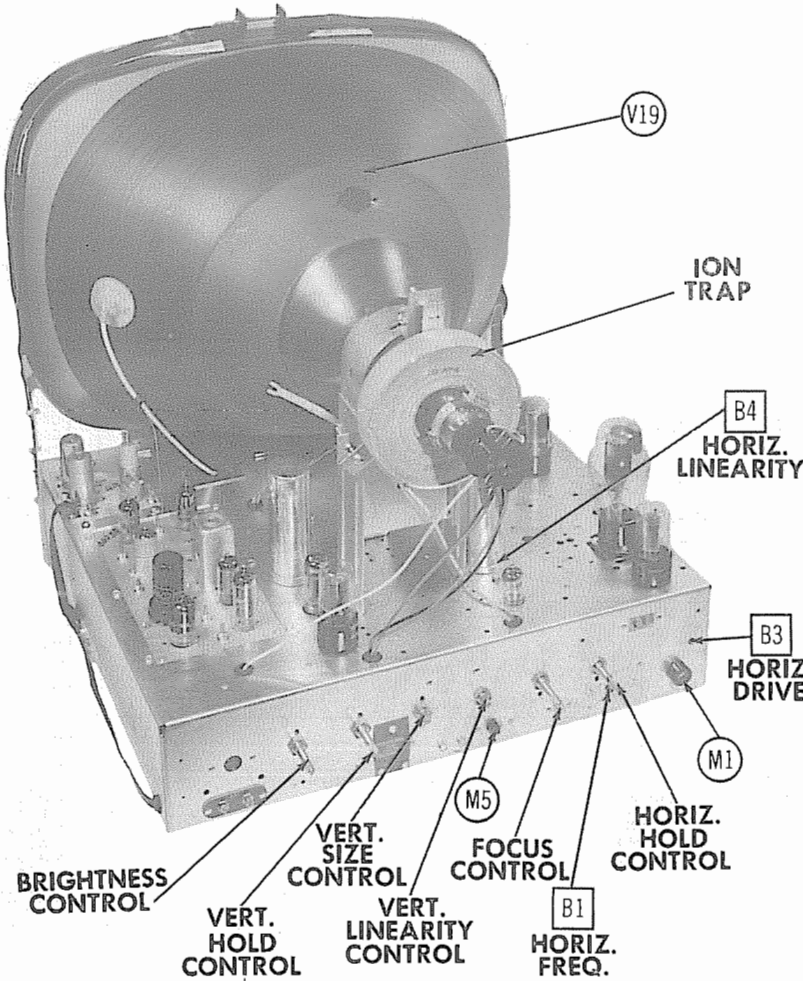
\*Parallel with 10K resistor

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA			
			APEX PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER
M1	3AG	5A. 250V.			312005	341001
M2	3AG Pigtail	1/4A. 250V.			318.250	

MISCELLANEOUS

ITEM No.	PART NAME	APEX PART No.	NOTES
M3	RF tuner		
M4	Crystal		IN64
M5	Switch		TV-Phono



CHASSIS-REAR VIEW  
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

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

Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.

Adjust the horizontal drive trimmer (B2) counterclockwise to the point just before the picture starts to compress in the center.

Adjust the width slug (B3) for a picture slightly wider than enough to fill the picture mask.

Adjust the horizontal linearity slug (B4) for a picture that is symmetrical from left to right.

817, 920, 924, 9120, 9121, 9820, 9820B, 9821  
APEX MODELS

## PARTS LIST AND DESCRIPTIONS

## CAPACITORS (CONT.)

ITEM No.		RATING CAP. VOLT		REPLACEMENT DATA							NOTES
				APEX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL- DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C50	.2	400		684-2			PTE4P22		PT4025	4TM-P22	Note 2
C51	.062	600		P688-002	D6-202		PTE6D2	GP2-333-202	PT622	6TM-D2	
C52A	.002			P688-002	*PC-100		PTE6D2	GP2-333-202	PT622		
B	.005			P688-005			PTE6D5	GP2-333-502	PT625	* 10IC1	
C	.005			P688-005			PTE6D5	GP2-333-502	PT625		
C53	.0047	600		P688-0047	D6-472		PTE6D47	GP2-333-472	PT6247	6TM-D47	
C54	.05	600		P688-05	DF-503		PTE6S5		PT615	6TM-S5	
C55	.1	600		P688-1	DF-104		PTE6P1		PT601	6TM-P1	
C56	.2	600		684-2							
C57	1000			SI1000	D6-102		TM5D1	GP2L-102	UC-521	5HK-D1	
C58	1000			SI1000	D6-102		TM5D1	GP2L-102	UC-521	5HK-D1	
C59	.01	600		P688-01	D6-103		PTE6S1	GP2-333-103	PT611	6TM-S1	
C60	.005	600		P688-005	D6-502		PTE6D5	GP2-333-502	PT625	6TM-D5	
C61	.05	600		P688-05	DF-503		PTE6S5		PT615	6TM-S5	
C62	3900	500		1464-004			IDR5D4		MCB463		
C63	330	500		1469-00035							
C64	.2	600		684-2							
C65	390	500		1469-0004			5R5T4		MCB243	MS-34	
C66	390	500		1469-0004			5R5T4		MCB243	MS-34	
C67	.1	600		P688-1	DF-104		PTE6P1		PT601	6TM-P1	
C68	.05	1000		P1088-05					PT1615	MB-S5	
C69	.03	1000		P1088-03			PTE16S3		PT1613	MB-S3	
Note 6											

Note 1. Some models use two 40MFD in this application.

Note 2. Not used in all models.

Note 3. Some models use 120MMF in this application.

Note 4. Some models use 40MFD @ 50V. in this application.

Note 5. Some models use 75MMF in this application.

Note 6. Some models use 470MMF in this application.

\* Items C52A, C52B, C52C, R52A, R52B, R52C are combined in one unit.

## CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	APEX PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1000Ω		P24-190A	QJ-326*			UF18R	Contrast -See Note
B	500KΩ						UR55A	Volume-Rear
C	Switch						US-26	Attach to R1B
R2A	50KΩ		P25-16	Q11-123	AG-44-S	AB-31	U-35	Brightness
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A
R3A	50KΩ		P25-16	Q11-123	AG-44-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A
R4A	2Meg		P25-15	Q11-130	AG-83-S	AB-75	SU-56	Height
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	2Meg		P25-20	Q11-139	AG-83-S	AB-75	U-56	Vert. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R5A
R6A	2500Ω		P25-13	Q11-112	AG-15-S	AB-7	U-8	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7	2250Ω	4	P25-19	RTV-319			TVF143	Focus-Wire Wound

NOTE: Connect 1800Ω resistor between center terminal and maximum clockwise terminal

(Control viewed from shaft end, terminals down).

\* CONCENTRIK EQUIVALENT - KIT K-2, BASE ELEMENTS &amp; SHAFTS B17-110 &amp; P1-224 (Panel)

B19-133 &amp; R2-306 (Rear) &amp; Switch 76-1.

## RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	APEX PART No.	IRC PART No.	
R6	3900Ω			BTS-3900	Antenna Coil Shunt
R9	47KΩ	20%			RF Amp. Grid
R10	2200Ω	20%		BTS-2200	RF Amp. Decoupling
R11	10KΩ				RF Coil Shunt
R12	4700Ω			BTS-4700	Mixer Grid
R13	220KΩ	20%			Mixer Grid
R14	10KΩ			BTS-4700	Oscillator Grid
R15	4700Ω			BTS-4700	Oscillator Plate
R16	4700Ω				1st Video IF Grid
R17	56Ω				1st Video IF Cathode
R18	680Ω				AGC Network
R19	6800Ω			BTS-6800	2nd Video IF Coil Shunt
R20	56Ω				2nd Video IF Cathode
R21	1Meg	20%		BTS-1Meg	AGC Network
R22	100Ω			BTS-100	Decoupling
R23	100Ω			BTS-100	Decoupling
R24	6800Ω				3rd Video IF Coil Shunt
R25	82Ω			BTS-5600	Video Detector Diode Load
R26	5600Ω			BTS-470K	Video Output Grid
R27	470KΩ			BTS-47	Video Output Cathode
R28	82Ω			BTS-1000	Contrast Network
R29	1000Ω			BTS-1000	Video Output Plate
R30	8800Ω			BTS-10K	Isolation
R31	10KΩ			BTS-10K	Picture Tube Cathode
R32	100KΩ			BTS-100K	Acc. Anode Load
R33	10KΩ			BTS-10K	Sound IF Grid
R34	100KΩ			BTS-100K	Sound IF Decoupling
R35	22KΩ			BTS-150	Balancing
R36	150Ω			BTS-47K	De-emphasis
R37	47KΩ	20%		BTS-12K	Ratio Det. Diode Load
R38	12KΩ			BTS-4.7Meg	AF Amp. Grid
R39	4.7Meg			BTS-270K	AF Amp. Plate
R40	270KΩ			BTS-330K 5%	Voltage Divider
R41	330KΩ 5%			BTS-180K 5%	Voltage Divider
R42	180KΩ 5%			BTS-100K	AF Output Grid
R43	100KΩ			1 3/4A-800	AF Output Decoupling - Wire Wound
R44	800Ω			BTS-1.2Meg	Sync Clipper Grid
R45	1.2Meg			BTS-22K	Sync Clipper Cathode
R46	22KΩ			BTS-680K	Sync Clipper Plate
R47	680KΩ			BTS-22K	Sync Ph. Inv. Grid
R48	22KΩ			BTS-2200	Sync Ph. Inv. Cathode
R49	2200Ω			BTS-3900	Sync Ph. Inv. Plate
R50	3900Ω			BTS-2200	Sync Ph. Inv. Plate
R51	2200Ω				

## RESISTORS (CONT.)

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	APEX PART No.	IRC PART No.	
R52A	22KΩ			BTS-22K	Integrator Network
B	8200Ω			BTS-8200	Integrator Network
C	8200Ω			BTS-8200	Integrator Network
R53	1.5Meg			BTS-1.5M	Vert. Osc. Grid
R54	10KΩ			BTS-10K	Vert. Osc. Trans. Shunt
R55	22KΩ			BTS-22K	Vert. Osc. Plate
R56	1.5 Meg			BTS-1.5Meg	Vert. Discharge Plate - See Note 1
R57	56KΩ			BTS-56K	Vert. Discharge Plate Decoupling
R58	470KΩ			BTS-470K	Voltage Divider
R59	8200Ω			BTS-8200	Vert. Peaking
R60	2.2Meg			BTS-2.2Meg	Vert. Output Grid
R61	680Ω			BTS-680	Vert. Output Cathode
R62	100KΩ			BTS-100K	Horiz. Ph.Det. Diode Load
R63	180KΩ			BTS-100K	Horiz. Ph.Det. Diode Load
R64	4.7Meg			BTS-4.7Meg	Horiz. Ph.Det. Diode Load
R65	470KΩ			BTS-470K	Horiz. AFC Filter
R66	5600Ω			BTS-5600	Horiz. M.V. Plate
R67	1500Ω			BTS-1500	Horiz. M.V. Cathode
R68	100KΩ			BTS-100K	Horiz. M.V. Grid
R69	270KΩ			BTS-270K	Horiz. M.V. Plate
R70	56KΩ			BTS-56K	Horiz. M.V. Plate Dec.
R71	4700Ω			BTS-4700	Horiz. Peaking
R72	56Ω				Parasitic Suppressor
R73	1Meg			BTS-1Meg	Horiz. Output Grid - See Note 2
R74	25KΩ	10		1 3/4A-25K	Horiz. Output Screen - Wire Wound
R75	47Ω	1			Horiz. Output Cathode - See Note 3
R76	3.3Ω	2			H.V. Rect. Filament
R77	470KΩ	2			H.V. Filter
R78	15KΩ			BTS-15K	Horiz. Feedback
R79	330Ω	2		BTB-3300	Voltage Divider
R80	330Ω	20%		BTB-330	Focus Coil Shunt
R81	27Ω	1			Horiz. Output Cathode - See Note 4

Note 1. Some Models may use a 2.7Meg Resistor in this application

\* Items C52A, C52B, C52C, R52A, R52B and R52C are combined in one unit

Note 2. Some Models may use a 470KΩ Resistor in this application

Note 3. Some Models may use a 120Ω Resistor in this application

Note 4. Not used in all Models

## TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA				
	PRI.	SEC. 1	SEC. 2	SEC. 3	APEX PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.
T1	117V AC @ 1.94A	600V CT @ 220ADC	5V AC @ 3A	5.3V AC @ 7.8A SEC. 4 6.3V AC @ .75A			P-3067		

## TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING		REPLACEMENT DATA					NOTES
	DC RESISTANCE		APEX PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	
T2	170Ω			A-8111 ②	A-3000 ②	TBO-2 ②	A-97X	Vert. Osc. Trans. Horiz. Output Trans.
T3	325Ω Tap @ 20Ω	1000Ω 7.5Ω Tap @ .5Ω, 5.5Ω SEC. 2 1.7Ω SEC. 3						
T4	1230Ω Tap @ 10Ω			A-8123	A-3037	TSO-8	A-102X	Vert. Output Trans.
T5	8.5Ω 45Ω			DY-8	MDF-70	TY-2	Y-12	Horiz. Deflection coils. Vert. Deflection Coils. Focus Coil.
T6	400Ω			FC-11			B-470-R	

② Drill one new mtg. hole.

## TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING		REPLACEMENT DATA					NOTES
	IMPEDANCE		APEX PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	
T7	7.6KΩ	3.2Ω 365Ω .7Ω		A-3849	A3020	RO-201	S-9X	

## TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	NOTES
		APEX PART No.	STANDARD REPLACEMENT		
V1A	RF Amplifier	6CB6	6CB6	7CH	
B	RF Amplifier	6AQ5	6AQ5	7BD	
C	RF Amplifier	6BC5	6BC5	7BD	
V2	Converter	6J6	6J6	7BF	
V3	1st Video IF Amp	6CB6	6CB6	7CH	
V4	2nd Video IF Amp	6CB6	6CB6	7CH	
V5	3rd Video IF Amp	6CB6	6CB6	7CH	
V6	Video Output	6AC7	6AC7	8N	
V7	Sound IF Amp.	6AU6	6AU6	7BK	
V8	Ratio Detector - AF Amp.			9E	
V9	Audio Output	6T8	6T8	7BZ	
V10	Sync Clipper - Sync Phase Inv.	6AQ5	6AQ5		
V11	Vert. Oscillator	12AU7	12AU7	9A	
V12	Vert. Discharge	6SN7GT	6SN7GT	8BD	
V13	Vert. Output	6S4	6S4	8AC	
V14	Horiz. Phase Det.	6AL5	6AL5	8BT	
V15	Horiz. Mult.	6SN7GT	6SN7GT	8BD	
V16	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V17	Damper	6AX4GT	6AX4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	
V19	LV Rectifier	5U4G	5U4G	5T	

## CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA			RTMA BASE TYPE	NOTES
	APEX PART No.	SYLVANIA PART No.			
V19A	20DP4A	20DP4A 20DP4 ① 20CP4 ① ② 20CP4A ① ② 20HP4A ① 20HP4A ① ②		12D 12D 12D 12D 12C 12C	① Circuit changes necessary ② 3/8" shorter
V19B	24AP4, A	24AP4, A		12D	Used in Model 924

## 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	APEX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	.80	450		AFH4-87		UPT62245		FP245.3	TVL-2777	Note 1
C	.20	450				BRH501		TC350Q1	TVA-1310	
C2A	.100	50								
B	.40	450		AFH3-159				FP375	TVL-3764	Note 2
C	.40	450		PRS200/30-30				TC68	TVA-1613	
D	.100	200								
C3	.60	200								Note 2
C4	40	350		PRS450/40		BR4035		TC78	TVA-1611	
C5	4	50		PRS150/4		BR550		TC30	TVA-1303	
C6	.5-3			PRS150/4		BR550		TC30	TVA-1303	Note 2
C7	.5-3				829-3			CT565A		
C8	120				829-3			CT565A		
C9	1000			SI120	D6-121	TM5T12	GP2K-121	UC-5312	5GA-T12	Note 2
C10	100			SI1000	D6-102	TM5D1	GP2L-102	UC-521	5HK-D1	
C11	.5-3			SI100	D6-101	TM5T1	GPIK-101	UC-531	5GA-T1	
C12	20				829-3			CT565A		Note 2
C13	10			SI20NP0	TCZ-20		NP0K-200	ZT-542		
C14	.5-3			SI10N750	TCN-10		NT-541	NT-541	5TCU-Q1	
C15A	1000				828-3		NP750K-100	CT565A		Note 2
B	1000			BPD-2X001	DD-2-102	TM5DD1	812-001	CTD-521	5HK-D1	
C16	72	500								
C17	10			1469-000075				MCB230		Note 2
C18	120	500		SI10NP0	TCZ-10		NP0K-100	ZT-541	5TCQ-Q1	
C19	5000			1469-00015		5R5T15		MCB236		
C20	5000			BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	Note 2
C21	5000			BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C22	.2	400		BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C23	5000			684-2	DD-502	PTE4P22		4TM-P22		Note 2
C24	5000			BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C25	5000			BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C26	5000			BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	Note 2
C27	5000			BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C28	5000			BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C29	5000			BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	Note 2
C30	.2	600		684-2						
C31	.05	400		1469-00001	TCZ-10	5R5Q1	NP0K-100	MCB215	MS-41	
C32	220			P488-05	DF-503	PTE455		PT415	4TM-85	Note 2
C33	.7	400		SI220	D6-221	5R5T25	GP2K-221	UC-5322	5GA-T22	
C34	.42	400		SI47	D6-470	5R5Q5	GPIK-470	UC-5447	5GA-Q47	
C35	.02	1000				PTE4P22		PT4025	4TM-P22	Note 3
C36	.05	400		684-2		PTE16S2		PT1612	MB-S2	
C37	.05	400		P1088-02		PTE455		PT415	4TM-S5	
C38	2.2			P488-05	DF-503	PTE455		PT415	4TM-S5	Note 4
C39	120			P488-05	DF-503	PTE455		PT415	4TM-S5	
C40	47	500		TCZ-2.2			NP0K-2R2			
C41	5000			SI120	D6-121	TM5T12	GP2K-121	UC-5312	5GA-T12	Note 5
C42	500			SI47	D6-470	5R5Q5	GPIK-470	UC-5447	5GA-Q47	
C43	220	500		BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C44	2000			1469-000005		5R5V5		MCB205	MS-55	Note 5
C45	5000			5		5R5T25	GP2K-221	MCB40	1FM-325	
C46	5000			1469-00025	D6-221	TM5D2	GP2-333-202	UC-522	1FM-325	
C47	470	500		SI2000	D6-202	TM5D2	811-005	DC-525	5HK-D5	Note 5
C48	.002	600		BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C49	.01	600		BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C49	.01	600		1468-00005	D6-471	5W5T5	GP2K-471	MC245	1FM-35	Note 5
C49	.01	600		P688-002	D6-202	PTE68D2	GP2-333-202	PT622	6TM-D2	
C49	.01	600		P688-01	D6-103	PTE68D1	GP2-333-103	PT611	6TM-S1	



# ALIGNMENT INSTRUCTIONS

# ALIGNMENT INSTRUCTIONS (CONT.)

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

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

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.  
Connect the negative side of a 3 volt battery to the ungrounded side of C23. Connect the positive lead to chassis.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1. Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	21.25MC	Any	DC probe to Point $\Delta$ Low side to chassis.	A1	Adjust for MINIMUM deflection.
2. "	"	23.3MC	"	"	A2	Adjust for maximum deflection.
3. "	"	25MC	"	"	A3, A4	"
4. "	"	25.3MC	"	"	A5	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection. Leave the 3 volt battery connected as before.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5. Direct	High side to an ungrounded tube shield floating over dummy converter tube.	24MC (10MC swp.)	21.25MC 25.75MC	Any	Vert. amp. to Point $\Delta$ Low side to chassis.		Check for response curve similar to fig. 1 with video marker at 50%. If necessary re-adjust A2 thru A5 for proper response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100K $\Omega$  ( $\pm 1\%$ ) resistors in series from Point  $\Delta$  to chassis. The junction of these two resistors is alignment Point  $\Delta$  as shown on the schematic.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
6. .01MFD	High side to Point $\Delta$ Low side to chassis.	4.5MC (unmod.)	Any	DC probe to Point $\Delta$ Common to chassis.	A6, A7	Adjust for maximum deflection.
7. "	"	"	"	DC probe to Point $\Delta$ Common to Point $\Delta$	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

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

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6. .01MFD	High side to Point $\Delta$ Low side to chassis.	4.5MC (450KC swp.)	4.5MC	Any	Vert. amp. to Point $\Delta$ Low side to chassis.	A6, A7	Disconnect stabilizer capacitor C5. Adjust for maximum amplitude and symmetry as per fig. 2.
7. "	"	"	"	"	Vert. amp. to Point $\Delta$ Low side to chassis.	A8	Reconnect capacitor C5. Adjust so that 4.5MC occurs at center of crossover lines as per fig. 3. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ADJUSTMENT

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8. .01MFD	High side to Point $\Delta$ Low side to chassis.	4.5MC (unmod.)	Any	DC probe thru crystal diode detector (fig. 4) to pin 11 of picture tube. Common to chassis.	A9	Adjust for MINIMUM deflection.

# OSCILLATOR ALIGNMENT

Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A10. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If adjustment of A10 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment for each channel that is off frequency. The channel adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.

Connect the synchronized sweep voltage from the signal 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.

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

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC swp.)	211.25MC	13	Vert. amp. to Point A Low side to chassis.	A11	Adjust to place sound marker in 21.25MC trap notch as in fig. 5. Video marker should be at 50% response.
		207MC (10MC swp.)	215.75MC	12		A12	
		201MC (10MC swp.)	205.25MC	11		A13	
		195MC (10MC swp.)	209.75MC	10		A14	
		189MC (10MC swp.)	199.25MC	9		A15	
		183MC (10MC swp.)	203.75MC	8		A16	
		177MC (10MC swp.)	193.25MC	7		A17	
		85MC (10MC swp.)	197.75MC	6		A18	
		79MC (10MC swp.)	187.25MC	5		A19	
		69MC (10MC swp.)	191.75MC	4		A20	
		63MC (10MC swp.)	181.25MC	3		A21	
		57MC (10MC swp.)	185.75MC	2		A22	

## RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the signal 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
10.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC swp.)	205.25MC 209.75MC	12	Vert. amp. thru 47KΩ to Point E Low side to chassis.	A23, A24 A25	Adjust for response curve of maximum amplitude and symmetry as per fig. 6 with markers above 90% response.
11.	"	"	213MC (10MC swp.) 201MC (10MC swp.) 195MC (10MC swp.) 189MC (10MC swp.) 183MC (10MC swp.) 177MC (10MC swp.) 85MC (10MC swp.) 79MC (10MC swp.) 69MC (10MC swp.) 63MC (10MC swp.) 57MC (10MC swp.)	211.25MC 215.75MC 199.25MC 203.75MC 193.25MC 197.75MC 187.25MC 191.75MC 181.25MC 185.75MC 175.25MC 179.75MC 83.25MC 87.75MC 77.25MC 81.75MC 71.75MC 75.75MC 65.75MC 69.75MC 59.75MC	13 11 10 9 8 7 6 5 4 3 2	"		Check all channels for proper response. If markers fall below 10% on any channel make slight compromise adjustments of A23, A24 and A25 on that channel then recheck all other channels to see that they have not been seriously affected.

817, 920, 924, 9120, 9121, 9820, 9820B, 9821  
APEX MODELS

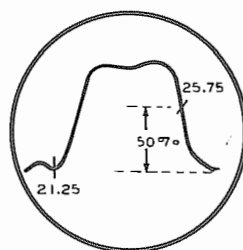


FIG. 1

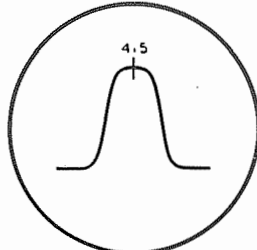


FIG. 2

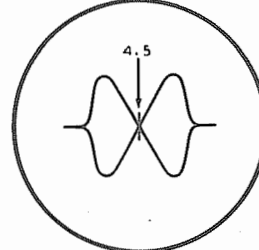


FIG. 3

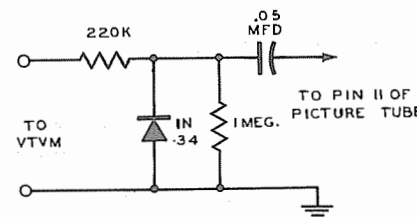


FIG. 4

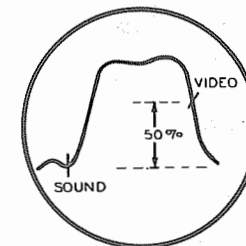


FIG. 5

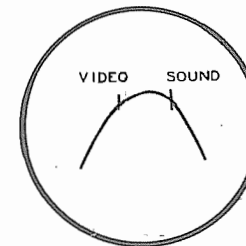
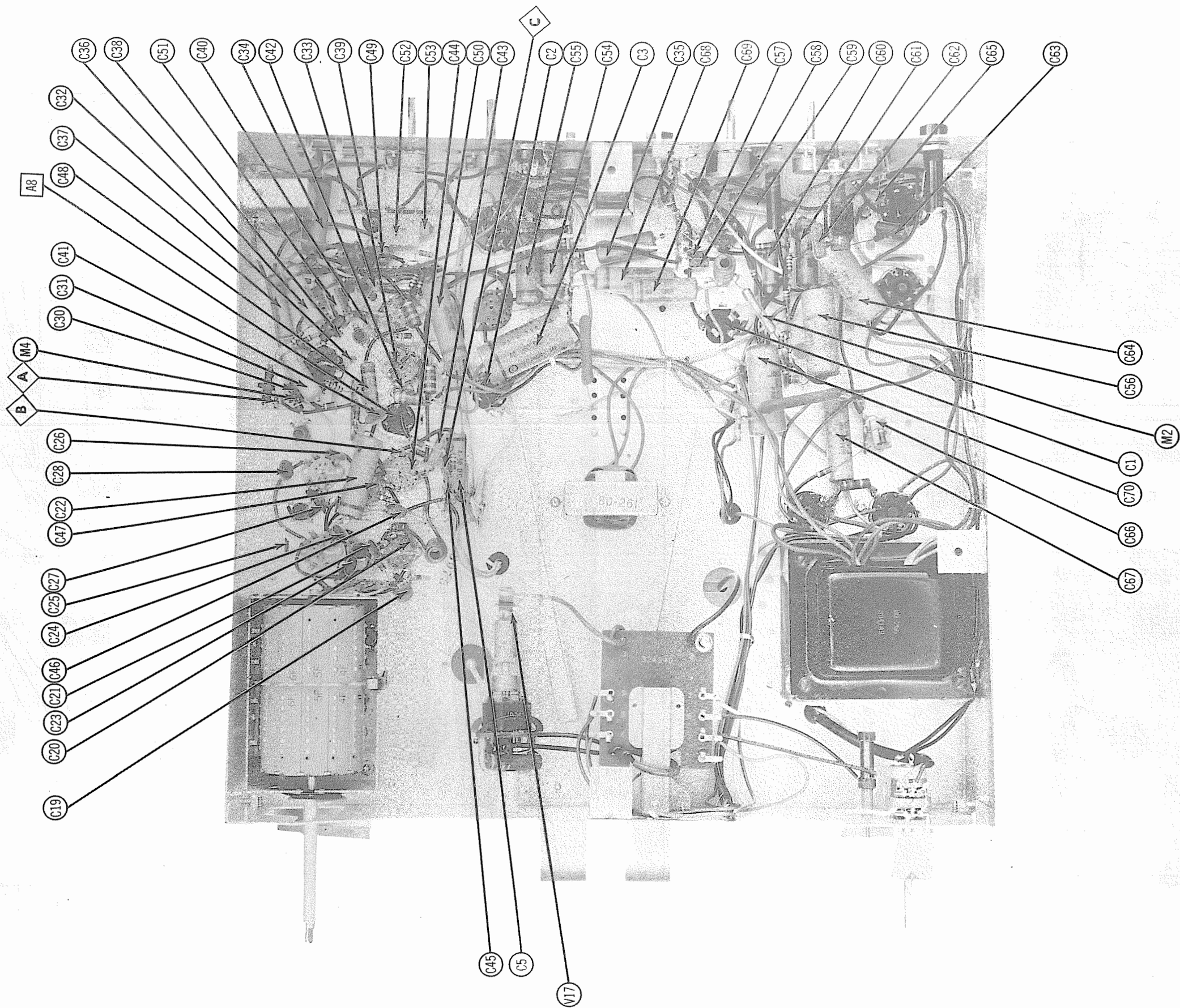


FIG. 6



# CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

817, 920, 924, 9120, 9121, 9820, 9820B, 9821  
APEX MODELS