

## PHOTOFACT® Folder

with CIRCUITRACE™

ULTRATONE MODELS  
4202, 4204, 4205, 4206, 4207

TRADE NAME: Ultratone Models 4202, 4204, 4205, 4206, 4207

SUPPLIER: For Current Address, See Annual Index.

TYPE SET: 21 Transistor AM-FM-FM Stereo Receiver W/4 Speed Automatic Record Changer

POWER SUPPLY: 110-120 Volts AC, 60 Cycles

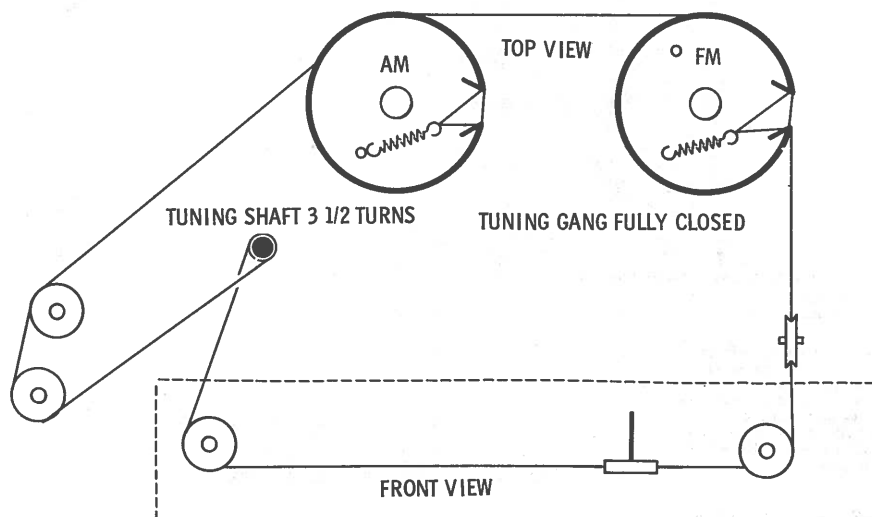
RATING: 12 Watts, .19 Amp. @ 117 Volts AC (Less Motor)

TUNING RANGE: BROADCAST 540-1620KC

FREQ. MOD: 88-108MC

FOR SERVICE INFORMATION ON RECORD CHANGER VM-1297—SEE PHOTOFACT SET 797,  
FOLDER 7. VM-B1267—SEE PHOTOFACT SET 748, FOLDER 11.

## DIAL CORD STRINGING



HOWARD W. SAMS &amp; CO., INC. Indianapolis, Indiana 46206

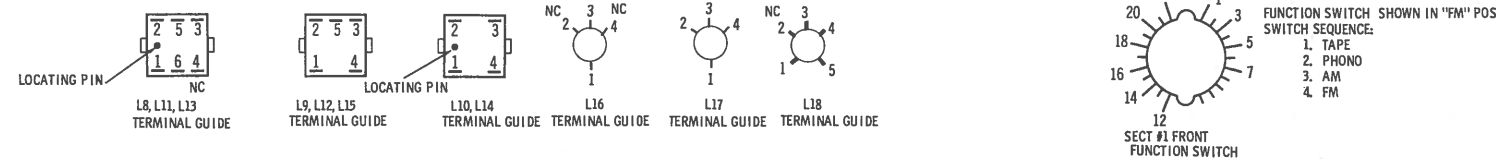
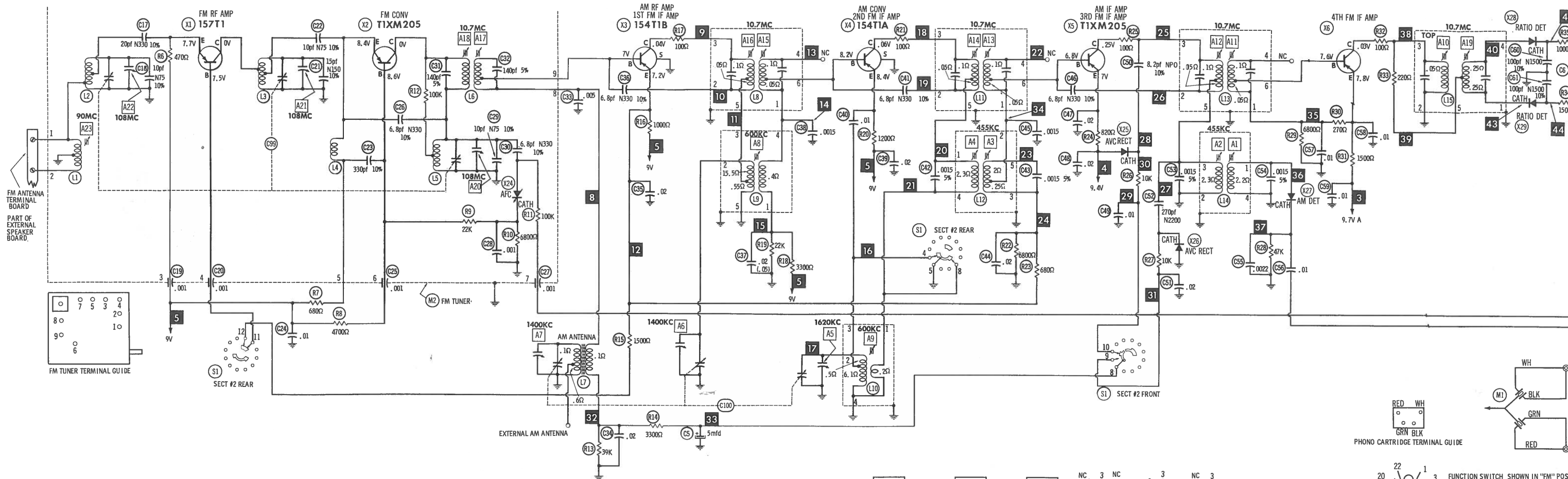
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. **NN717R**

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DATE 7 -67

SET 895 FOLDER 8

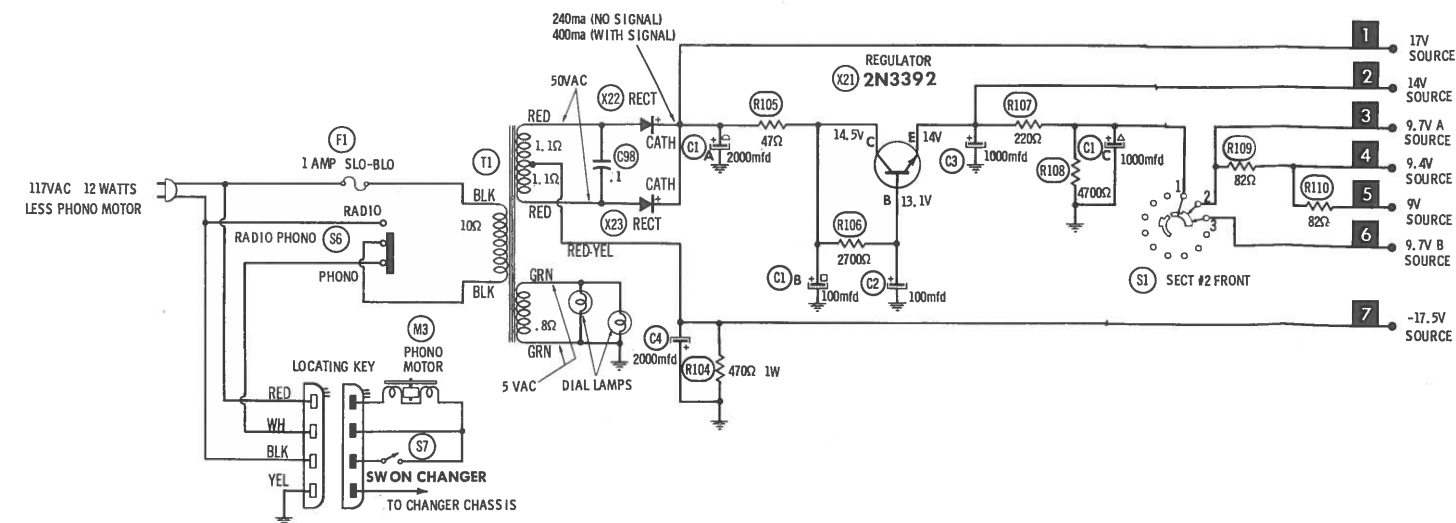
ULTRATONE MODELS  
4202, 4204, 4205, 4206, 4207

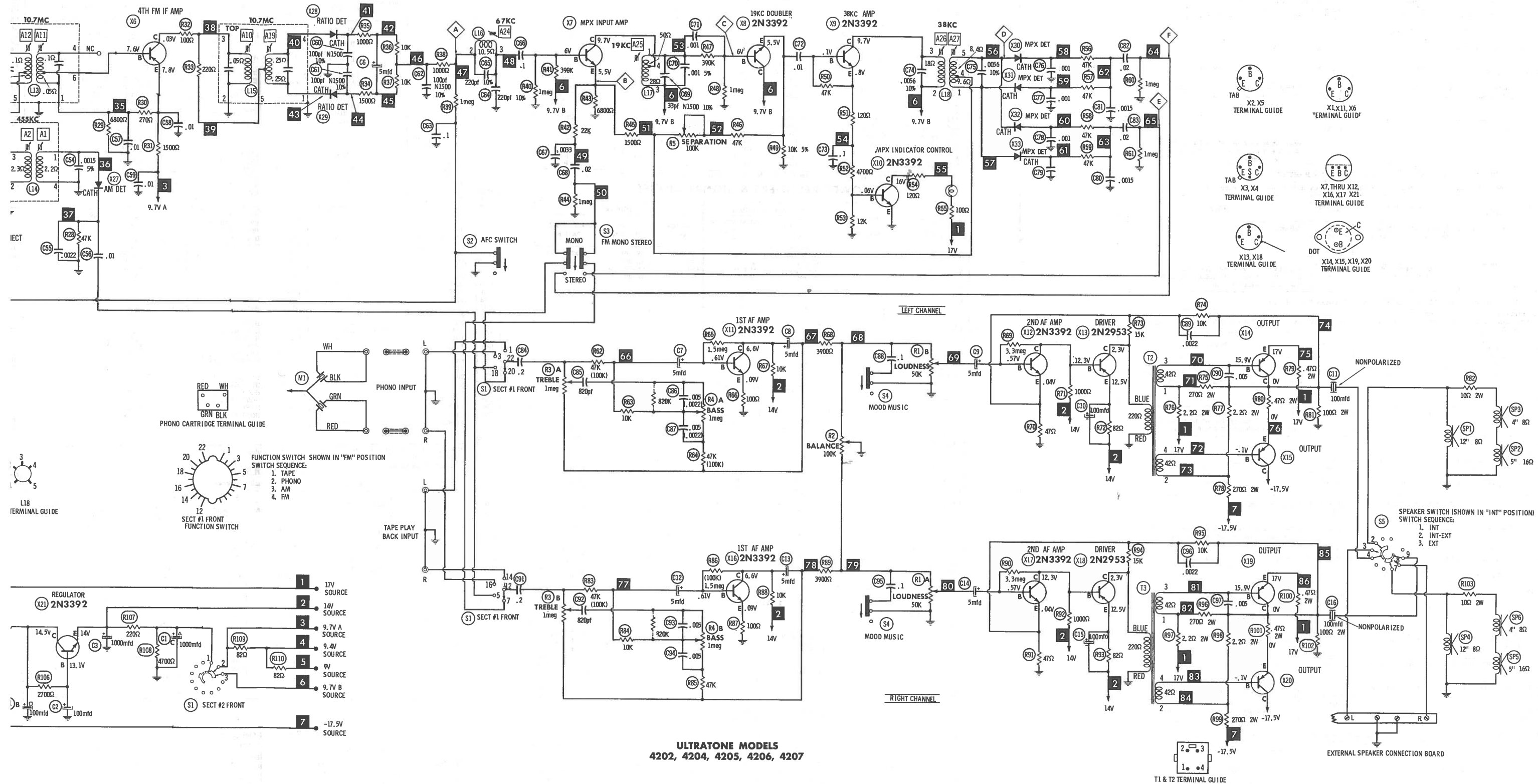


ALL VOLTAGES MEASURED IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.  
Resistors are 1/2 watt or less and rated  
10% or 20% unless otherwise indicated.

- See parts  
1. Voltage measurements taken with vacuum tube voltmeter.  
2. All controls set for normal operation, no signal applied.  
3. Measured values are from socket pin or terminal to common ground.  
4. All terminals viewed from bottom unless otherwise designated.  
5. Numbers assigned to terminals may not be found on the unit.  
6. Supply voltage maintained at rated value for voltage readings.  
7. Resistance measurements not given because of the wide variation in internal resistance of transistor.

A PHOTOFACT STANDARD NOTATION SCHEMATIC  
with CIRCUITRACE  
© Howard W. Sams & Co., Inc. 1967

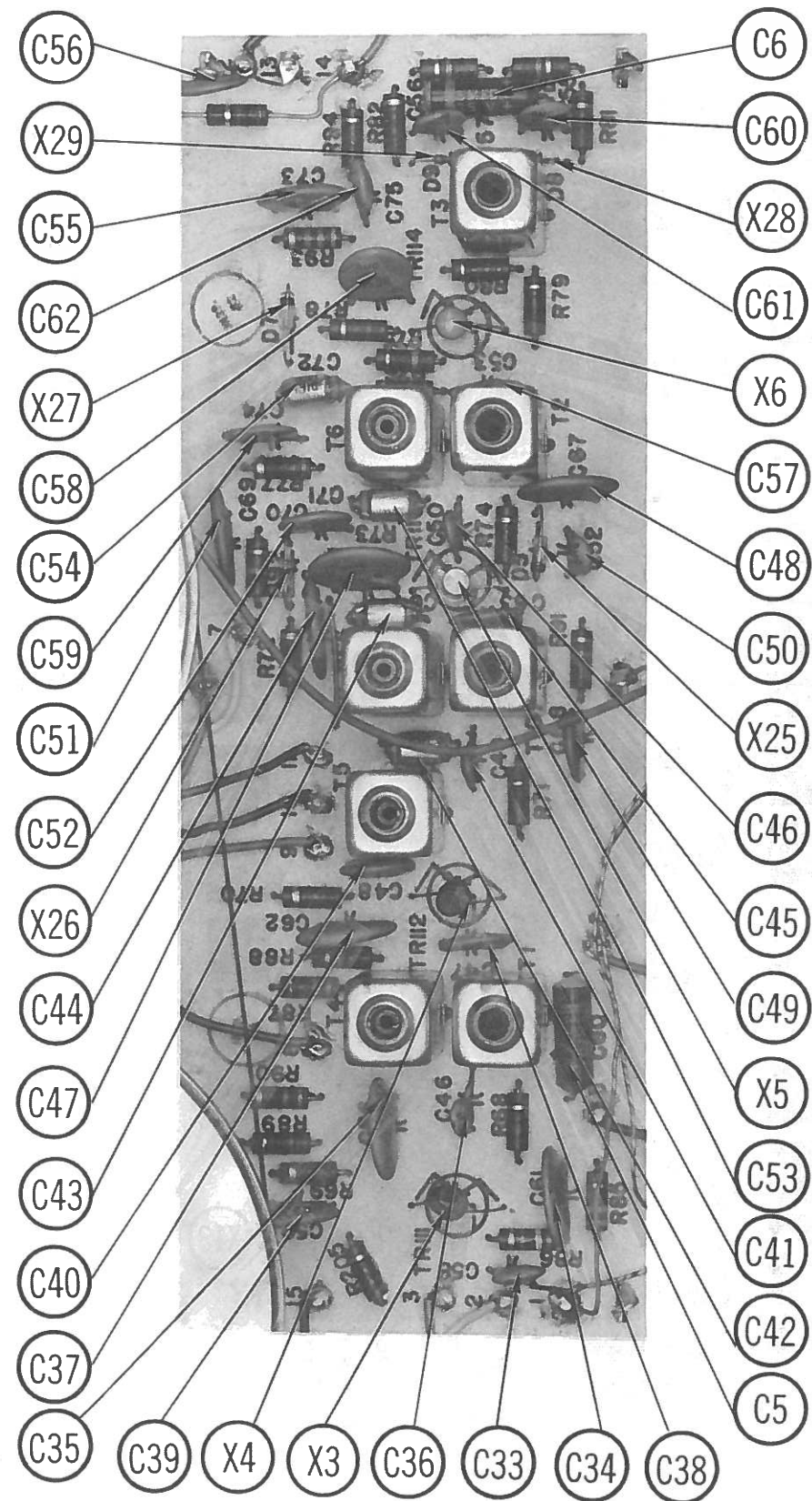
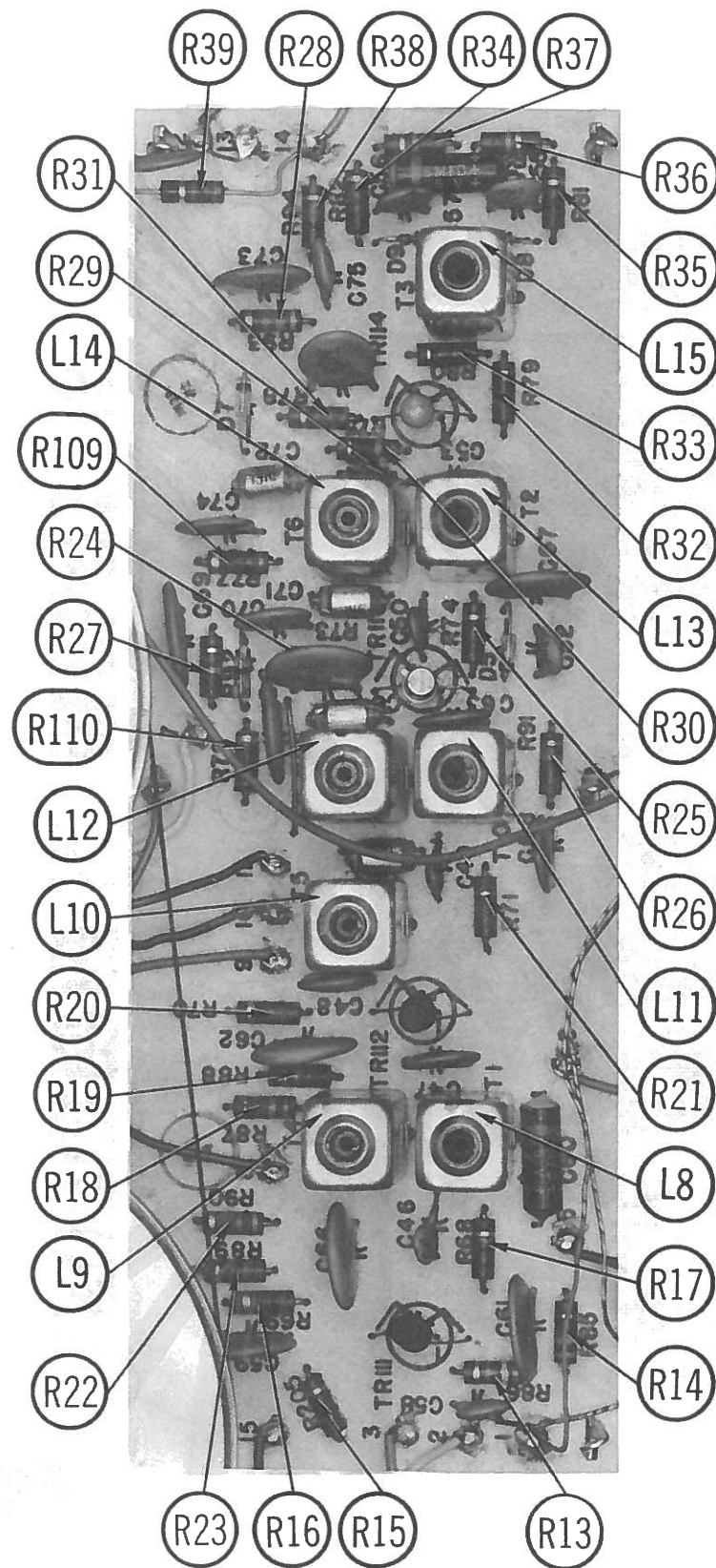
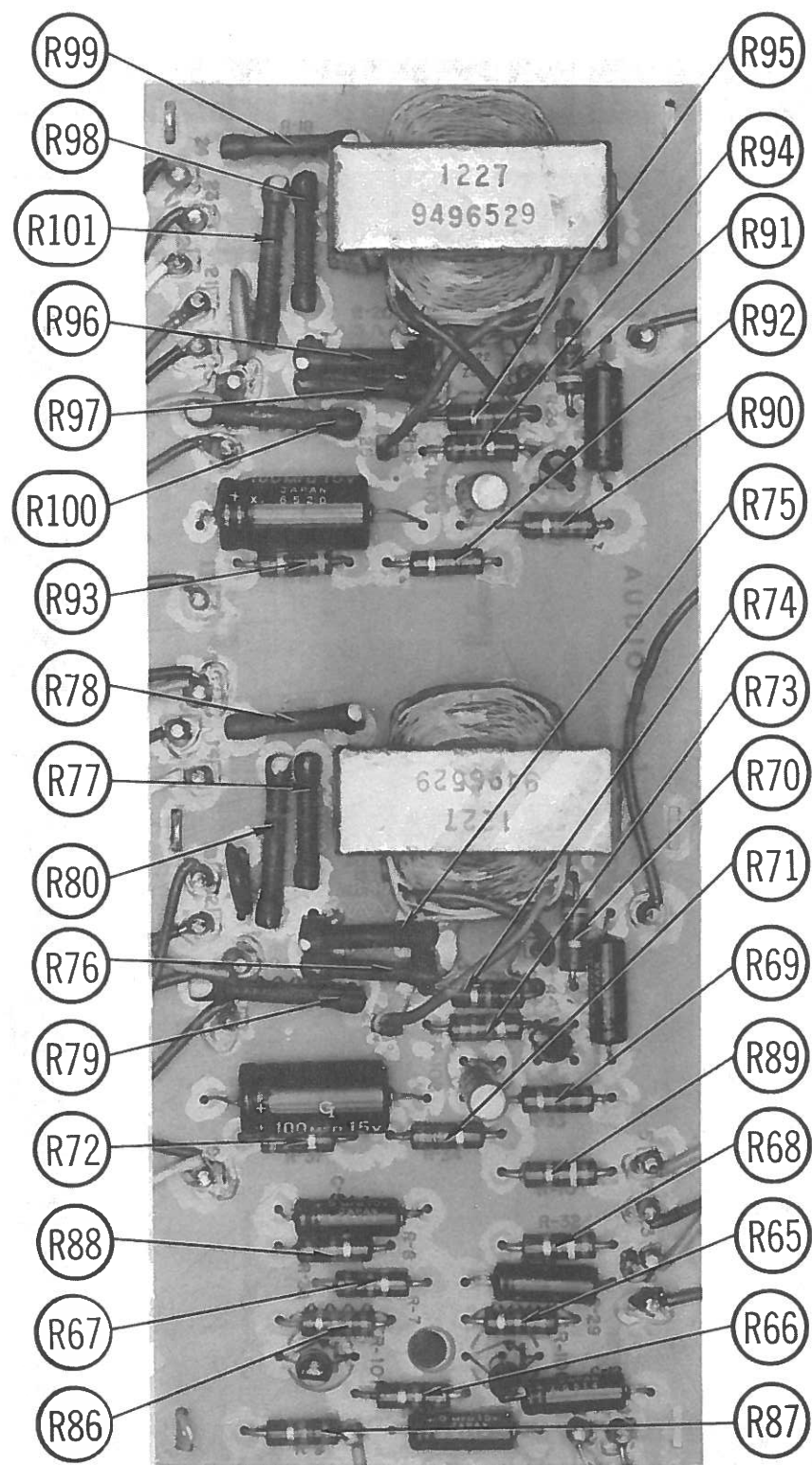


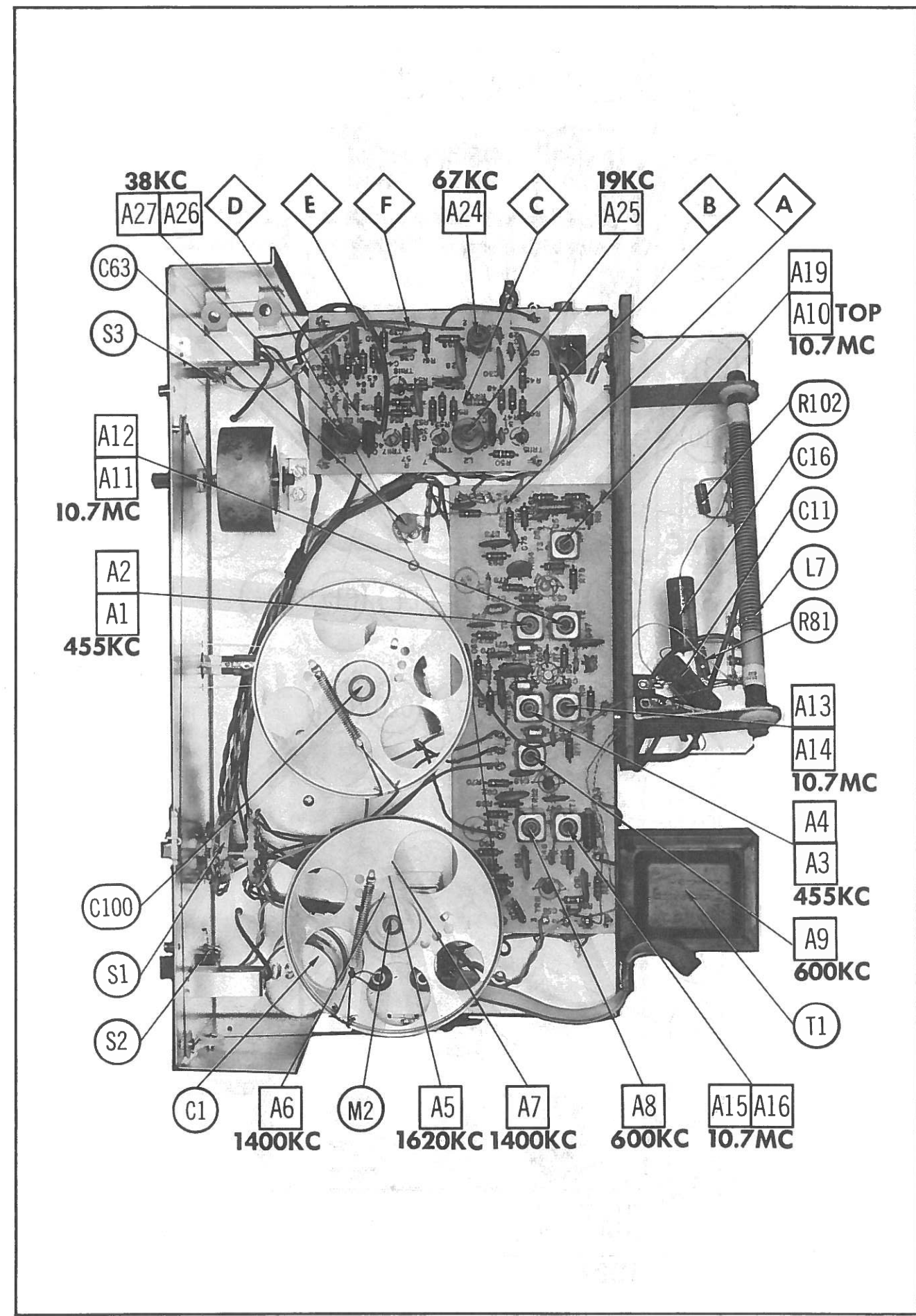
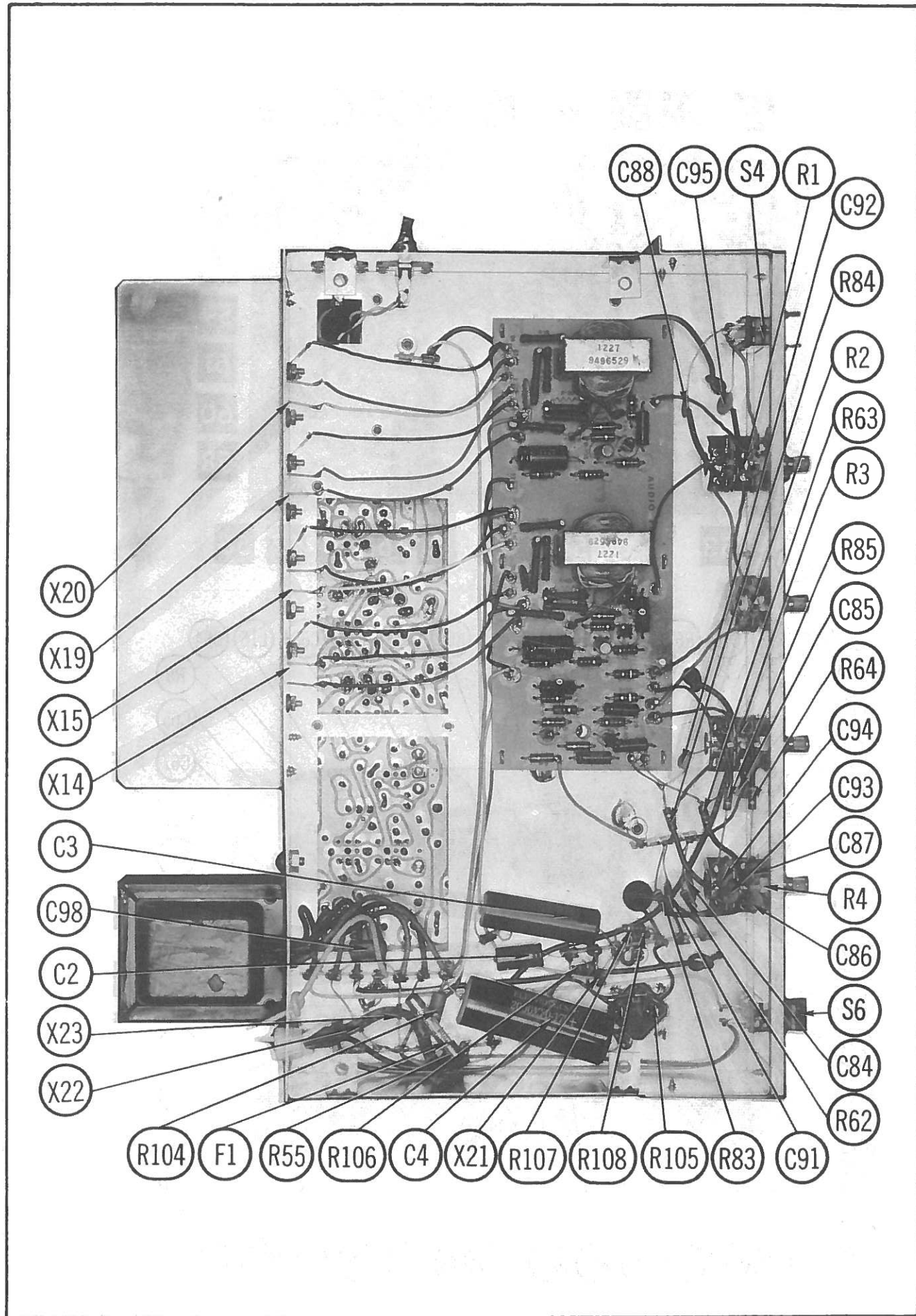


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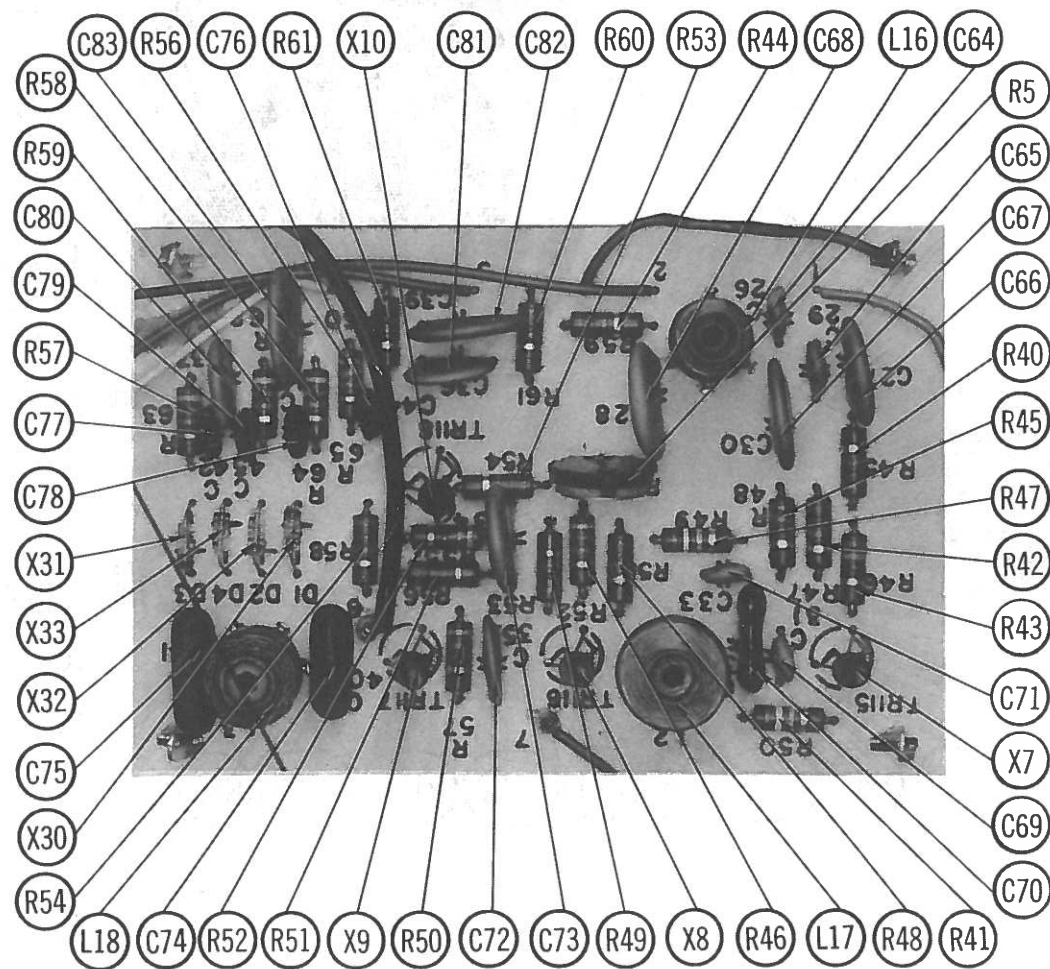
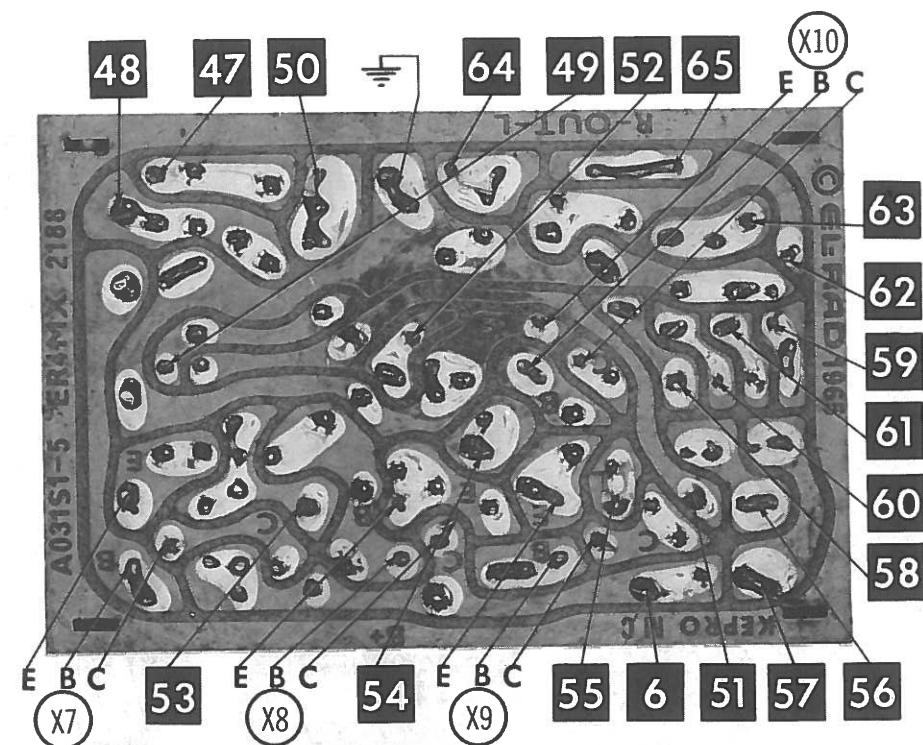
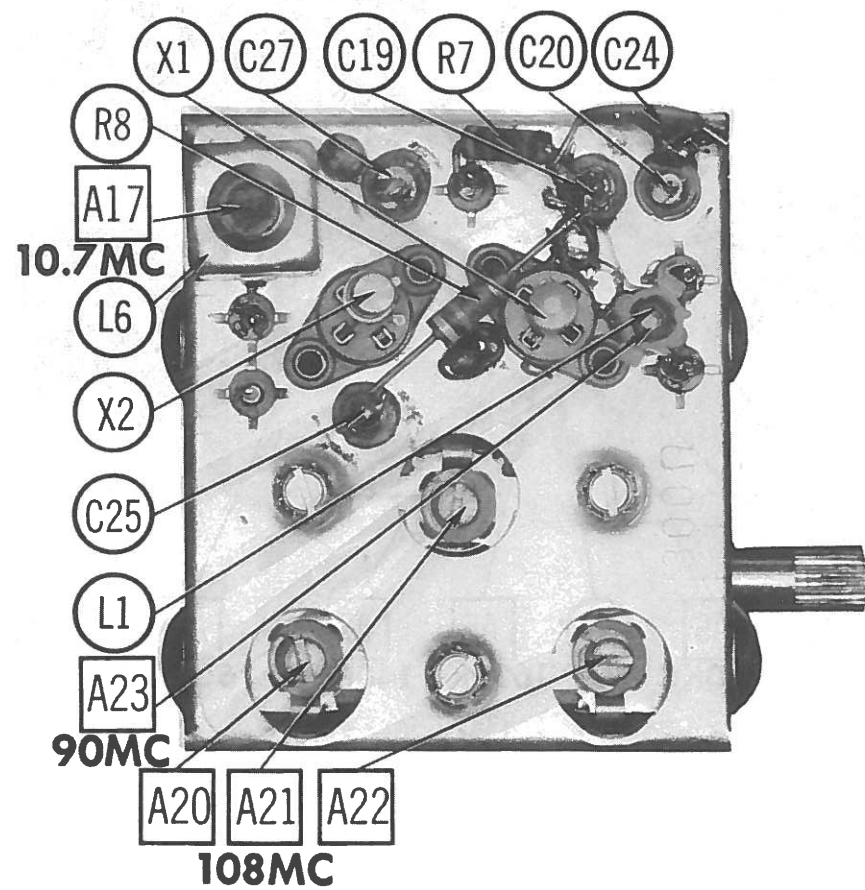
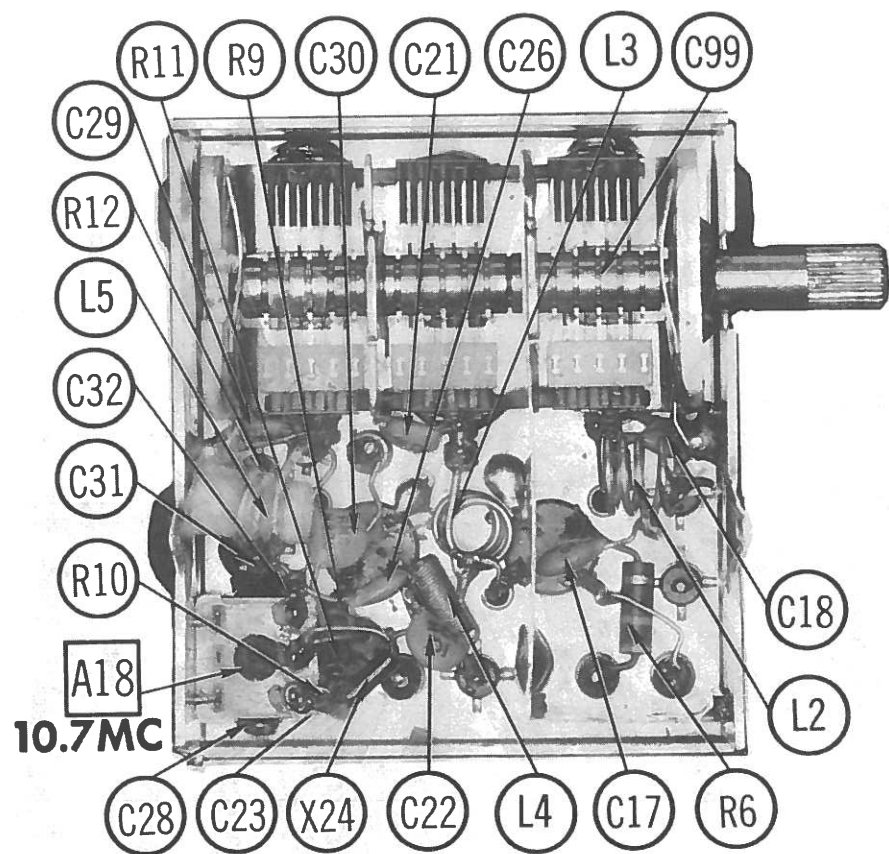












# ALIGNMENT INSTRUCTIONS

Maintain line voltage at 117 volts. Use only enough generator output to obtain a suitable indication. Allow a 15 minute warmup for receiver and equipment.  
**CAUTION:** Use isolation transformer, if available. If not, observe polarity when connecting test equipment.  
**Suggested Alignment Tools:**  
 A1 thru A4, A8 thru A19, A23.....GENERAL CEMENT #9296, 9300, 9302... WALSCO #2510, 2511, 2547  
 A24 thru A27.....GENERAL CEMENT #8608, 8869, 9302... WALSCO #2511, 2543, 2588  
 A5, A6, A7, A20, A21, A22.....GENERAL CEMENT #8868, 8987, 9089... WALSCO #2531-X, 2541, 2587



## AM ALIGNMENT — SELECTOR IN AM POSITION

Fashion loop of several turns of wire and connect generator across loop. Set volume control at maximum.

GENERATOR FREQUENCY	DIAL SETTING	INDICATOR	ADJUST	REMARKS
1. 455KC (400v Mod.)	Tuning gang fully open.	Output Meter across Voice coil.	A1, A2, A3, A4	Adjust for maximum. Repeat until no further improvement can be made.
2. 1620KC	"	"	A5	Adjust for maximum.
3. 1400KC	Tune to signal.	"	A6, A7	"
4. 600KC	"	"	A8, A9	Rock tuning gang and adjust for maximum. Repeat steps 2 thru 4 until no further improvement can be made.



## FM ALIGNMENT USING AM SIGNAL GENERATOR — SELECTOR IN FM POSITION

Connect generator across antenna terminals with 120Ω carbon resistors in series with each lead.

GENERATOR FREQUENCY	DIAL SETTING	INDICATOR	ADJUST	REMARKS
5. 10.7MC (Unmod.)	Point of non-interference.	DC probe of VTVM to point  ; common to ground.	A10 thru A18	Adjust for maximum.
6. "	"	DC probe to point  ; common to ground.	A19	Adjust for zero reading. A positive or negative reading will be obtained on either side of the correct setting.


## FM IF ALIGNMENT USING FM SIGNAL GENERATOR — SELECTOR IN FM POSITION

Connect generator across antenna terminals with 120Ω carbon resistors in series with each lead. Use only enough marker signal to obtain indication. Use 60% frequency modulated signal with 450KC sweep. Use 120v sawtooth voltage in scope for horizontal deflection.


GENERATOR FREQUENCY	DIAL SETTING	INDICATOR	ADJUST	REMARKS
5. 10.7MC (450KC Swp.)	Point of non-interference	Vert. amp. of Scope to point  ; low side to ground.	A10 thru A18	Disconnect stabilizing capacitor C 6. Adjust for maximum gain and symmetry of response similar to Fig. 1 with marker as shown. Reconnect C 6.
6. "	"	Vert. amp. to point  ; low side to ground.	A19	Adjust A19(Secondary) to place marker at center of crossover lines similar to Fig. 2. Adjust A10 (Primary) for maximum amplitude and straightness of crossover lines.






## FM RF ALIGNMENT

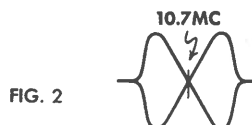
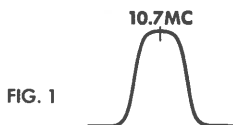
Connect generator across antenna terminals with 120Ω carbon resistors in series with each lead.

GENERATOR FREQUENCY	DIAL SETTING	INDICATOR	ADJUST	REMARKS
7. 108MC	Set at high end.	DC probe of VTVM to point  ; common to ground.	A20, A21, A22	Adjust for maximum.
8. 90MC	Tune to signal.	"	A23	Rock tuning and adjust for maximum. Repeat steps 7 and 8 until no further improvement can be made.

## FM STEREO MULTIPLEX ALIGNMENT USING FM STEREO SIGNAL GENERATOR (± .0001%) ACCURACY

Connect high side of generator to point ; low side to ground.

GENERATOR FREQUENCY	INDICATOR	ADJUST	REMARKS
9. 67KC	Vert. amp. of Scope thru a 1 meg to point  ; low side to ground.	A24	Adjust for MINIMUM.
10. 19KC	Vert. amp. thru 47K to point  ; low side to ground.	A25	Adjust for maximum.
11. "	Vert. amp. thru 47K to point  ; low side to ground.	A26, A27	Adjust maximum for 38KC response.
12. Modulated Left Channel	Vert. amp. to point  ; low side to ground.	A25, A26, A27 and R5	Adjust for MINIMUM. This step should require only slight adjustment.
13. Modulated Right Channel	Vert. amp. to point  ; low side to ground.		Check for MINIMUM. Make compromise adjustment of A25, A26, A27 and R5 if necessary.
To align multiplex section using an air signal, first make sure FM section is properly aligned. Tune in a strong FM stereo signal. Follow steps 9 thru 13 above except in step 9 adjust to eliminate whistle or interference.			





## PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

## CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C47	.02		BPD-02	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C48	.02		BPD-02	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C49	.01		BPD-01	DD-103	BYV102ZU103M	CCD-103	B110	5HK-S10
C50	8.2pf NPO 10%		NPO-D1 8.2	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C51	.02		BPD-02	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C52	270 N2200							
C53	.0015 125V 5%		ADM-20-152	CPR-1500J	CD19F152J500	DM-19-152	SX215	MS-215
C54	.0015 125V 5%		ADM-20-152	CPR-1500J	CD19F152J500	DM-19-152	SX215	MS-215
C55	.0022		DI-2200	CF-222	JBZ601YP222K	CCD-222	JF222	10TS-D22
C56	.01		BPD-01	DD-103	BYV102ZU103M	CCD-103	B110	5HK-S10
C57	.01		BPD-01	DD-103	BYV102ZU103M	CCD-103	B110	5HK-S10
C58	.01		BPD-01	DD-103	BYV102ZU103M	CCD-103	B110	5HK-S10
C59	.01		BPD-01	DD-103	BYV102ZU103M	CCD-103	B110	5HK-S10
C60	100 N1500 10%						2HV310	
C61	100 N1500 10%						2HV310	
C62	100 N1500 10%						2HV310	
C63	.1 10V		TTD-1	CK-104	HOV101ZV104Z	CCD-221	TA010	TG-P10
C64	220 10%		DI-220	DD-221	JBZ601YP221K	CCD-221	JF322	10TS-T22
C65	220 10%		DI-220	DD-221	JBZ601YP221K	CCD-221	JF322	10TS-T22
C66	.1 16V		TTD-1	CK-104	HOV101ZV104Z	CCD-221	TA010	TG-P10
C67	.0033		BPD-0033	DD-332	BYV102ZU332P	CCD-332	B233	5HK-D33
C68	.02		BPD-02	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C69	33 N1500 10%			TCL-33				
C70	.001 5%		ADM-20-102	CPR-1000J	CD19F102J500	DM-19-102	SX210	MS-210
C71	.001		BPD-01	DD-102	BYV102ZU103M	CCD-102	B210	5HK-D10
C72	.01		BPD-01	DD-102	BYV102ZU103M	CCD-102	B210	5HK-D10
C73	.01		TTD-1	CK-104	HOV101ZV104Z	CCD-102	TA010	TG-P10
C74	.0056 100V 10%		DSE6D56	CPR5600J	DPMS6D56	6DP-1-562	PVC6256	6PS-D56
C75	.0056 100V 10%		DSE6D56	CPR5600J	DPMS6D56	6DP-1-562	PVC6256	6PS-D56
C76	.001		EF-001	MFT-1000	CF-102	CCF-102	CT280A	
C77	.001		EF-001	MFT-1000	CF-102	CCF-102	CT280A	
C78	.001		EF-001	MFT-1000	CF-102	CCF-102	CT280A	
C79	.001		EF-001	MFT-1000	CF-102	CCF-102	CT280A	
C80	.0015		BPD-0015	DD-152	BYT601ZU203Z	CCD-152	B215	5HK-D15
C81	.0015		BPD-0015	DD-152	BYT601ZU203Z	CCD-152	B215	5HK-D15
C82	.02		BPD-02	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C83	.02		BPD-02	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C84	.2			UK20-204			MAG25022	HY-325
C85	820		DI-820	DD-821	BYZ601ZU821P	CCD-821	B382	5GA-T82
C86	.005		TTD-005	CK-502	HOY101ZV502P	CCD-821	TA250	TG-D50
C87	.005		TTD-005	CK-502	HOY101ZV502P	CCD-821	TA250	TG-D50
C88	.1 10V		TTD-1	CK-104	HOV101ZV104Z	CCD-222	TA010	TG-P10
C89	.0022		BPD-0022	DD-222	BYV601ZU222P	CCD-222	B222	5HK-D22
C90	.005		TTD-005	CK-502	HOY101ZV502P	CCD-222	TA250	TG-D50
C91	.2		DI-820	DD-821	BYZ601ZU821P	CCD-821	MAG25022	HY-325
C92	820		TTD-005	CK-502	HOY101ZV502P	CCD-821	B382	5GA-T82
C93	.005		TTD-005	CK-502	HOY101ZV502P	CCD-821	TA250	TG-D50
C94	.005		TTD-005	CK-502	HOY101ZV502P	CCD-821	TA250	TG-D50
C95	.1		TTD-1	CK-104	HOV101ZV104Z	CCD-222	TA010	TG-P10
C96	.0022		BPD-0022	DD-222	BYV601ZU222P	CCD-222	B222	5HK-D22
C97	.005		TTD-005	CK-502	HOY101ZV502P	CCD-222	TA250	TG-D50
C98	.1 200V		TTD-1	CK-104	HOV101ZV104Z	CCD-222	TA010	TG-P10
C99								
C100								

\* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

† Alternate Value

\* Ultratone Part Number.

## CONTROLS

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

ITEM No.	USE	RESIST-ANCE	REPLACEMENT DATA				
			Ultratone PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1A	Loudness, Right	50K	471	F2-50K, R2-50K, SSK014, CPL-2	NP-50K-Z, NR-50K-Z, UP-C-400 DC-2	B13-123, B13-123, SK1, QCM or (BU2, CF12, CR1, SS1, S87A, DC1)*	FB54A, RU54A, CS3500
B	Loudness, Left	50K					
R2	Balance	100K	470	F1-100K, SSK014	A47-100K-S, KSS-3 or (NP-100K-S, UP-C-400)	Q11-128 or (BU2, CF13, SS8)*	UA15L, SK750 or (RU15L, SL38, SK750) or (U41)
R3A	Treble, Left	1meg	453	F1-1meg, R1-1meg, SSK014, CPL-2	NP-1meg-S, NR-1meg-S, UP-C-400, DC-2	B11-137, B11-137, SK1, QCM or (BU2, CF17, CR12, SS1, S87A, DC1)*	FA16L, RU16L, CS3500
B	Treble, Right						
R4A	Bass, Left	1meg	453	F1-1meg, R1-1meg, SSK014, CPL-2	NP-1meg-S, NR-1meg-S, UP-C-400, DC-2	B11-137, B11-137, SK1, QCM or (BU2, CF17, CR12, SS1, S87A, DC1)*	FA16L, RU16L, CS3500
B	Bass, Right						
R5	Separation	100K	476			X201R104B	MTC15L1

\* "SNAPTROL"

## RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN PART No.	Ultratone PART No.			IRC PART No.	WORKMAN PART No.	Ultratone PART No.
R76	2.2Ω 2W	BWH-2.2	WS-2.2	694	R97	2.2Ω 2W	BWH-2.2	WS-2.2	694
R77	2.2Ω 2W	BWH-2.2	WS-2.2	694	R98	2.2Ω 2W	BWH-2.2	WS-2.2	694
R79	.47Ω 2W	BWH-.47	WS-.47	693	R100	.47Ω 2W	BWH-.47	WS-.47	693
R80	.47Ω 2W	BWH-.47	WS-.47	693	R101	.47Ω 2W	BWH-.47	WS-.47	693

## TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			Ultratone PART No.	NOTES
			DELCO PART No.	GENERAL ELECTRIC PART No.	RCA PART No.		
X1	157T1	RF Amp.	DS-41	GE-9	SK-3006	2761	PNP
X2	157T1	FM Converter	DS-41	GE-9	SK-3006	2762	PNP
X3	154T1B	AM RF - 1st FM IF	DS-56	GE-9	SK-3006	2700	PNP
X4	154T1A	AM Conv. - 2nd FM IF	DS-56	GE-9	SK-3006	2700	PNP
X5	154T1A	1st AM - 3rd FM IF	DS-56	GE-9	SK-3006	2700	PNP
X6	154T1A	4th FM IF	DS-56	GE-9	SK-3006	2700	PNP
X7	2N3392	MPX Input	DS-66	GE-10	SK-3020	2787	NPN
X8	2N3392	19KC Doubler	DS-66	GE-10	SK-3020	2787	NPN
X9	2N3392	38KC Amp.	DS-66	GE-10	SK-3020	2787	NPN
X10	2N3392	MPX Indicator Control	DS-66	GE-10	SK-3020	2787	NPN
X11	2N3392	AF Amp.	DS-66	GE-10	SK-3020	2787	NPN
X12	2N3392	AF Amp.	DS-66	GE-10	SK-3020	2787	NPN
X13	2N2953	Driver	DS-26	GE-2	SK-3004	2781	PNP
X14	2N2953	Output	DS-520	GE-3		2780-4 ①	PNP
X15	2N2953	Output	DS-520	GE-3		2780-4 ①	PNP
X16	2N3392	AF Amp.	DS-66	GE-10	SK-3020	2787	NPN
X17	2N3392	AF Amp.	DS-66	GE-10	SK-3020	2787	NPN
X18	2N2953	Driver	DS-26	GE-2	SK-3004	2781	PNP
X19	2N2953	Output	DS-520	GE-3		2780-4 ①	PNP
X20	2N2953	Output	DS-520	GE-3		2780-4 ①	PNP
X21	2N3392	Regulator	DS-66	GE-10	SK-3020	2787	NPN

① When replacing, apply silicone grease to both sides of insulator. Tighten mounting screws securely.

## POWER RECTIFIERS &amp; SIGNAL DIODES

ITEM No.	MEASURED CURRENT	ORIGINAL Part or Type No.	RECTIFIERS & DIODES		RECTIFIERS		
			GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	MALLORY PART No.	RCA PART No.	SARKES TARZIAN PART No.
X22	.240A	2784	GE-505 or GE-504A	8D4 or 5A4-D	A50 or CTP50①	SK-3016 or SK-3017	40C or F-4
X23	.400A Max	2784	GE-505 or GE-504A	8D4 or 5A4-D	A50 or CTP50①	SK-3016 or SK-3017	40C or F-4
X24	.400A Max	2784	GE-505 or GE-504A	8D4 or 5A4-D	A50 or CTP50①	SK-3016 or SK-3017	40C or F-4
X25		2789	1N60	1N60			
X26		2789	1N60	1N60			
X27		2789	1N60	1N60			
X28		2789	1N60	1N60			
X29		2789	1N60	1N60			
X30		2789	1N60	1N60			
X31		2789	1N60	1N60			
X32		2789	1N60	1N60			
X33		2789	1N60	1N60			

① A single Unit replacement for X22 and X23.

## ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				
	CAP.	VOLT.	Ultratone PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.
C1A	.2000	20	1069				
B	.100	15					
C	.1000	15					
C2	100	15	931	CRE473A	NLW100-15	MT1-19	TT15X100
C3	1000	17	943	PR51295	BR1000-25		TE-1162
C4	2000	17	933	PR51243	BR2000-35		TVA-1211
C5	5	25		CRE604A	NLW5-50	MT1-3	TL-1193
C6	5	25		CRE604A	NLW5-50	MT1-3	TE-1202
C7	5	15	932	CRE404A	NLW5-15	MT1-3	TE-1202
C8	5	15	932	CRE404A	NLW5-15	MT1-3	TE-1152
C9	5	15	932	CRE404A	NLW5-15	MT1-3	TE-1152
C10	100	15	931	CRE473A	NLW100-15	MT1-19	TE-1162
C11	100	15NP	924	PR57340	NPQT-5.2	TCN425	TVANS-1207.1*
C12	5	15	932	CRE404A	NLW5-15	MT1-3	
C13	5	15	932	CRE404A	NLW5-15	MT1-3	
C14	5	15	932	CRE404A	NLW5-15	MT1-3	
C15	100	15	931	CRE473A	NLW100-15	MT1-19	TE-1162
C16	100	15NP	924	PR57340	NPQT-5.2	TCN425	TVANS-1207.1*

\* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

## CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL- DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C17	20 N330 10%	#896		TCA-22		*	*	10TCS-Q20
C18	10 N75 10%						*	10TCN-Q1
C19	.001		EF-001	MFT-1000		CCF-102	CT280A	
C20	.001		EF-001	MFT-1000		CCF-102	CT280A	
C21	15 N150 10%	#906				*	*	10TCP-Q15
C22	10 N75 10%					*	*	10TCP-Q15
C23	330 10%		DI-330	DD-331	JBZ601YP331K	CCD-331	JF333	10T8-T33
C24	.01		BPD-01	DD-103	BYV102ZU103M	CCD-103	B110	5HK-S10
C25	.001		EF-001	MFT-1000		CCF-102	CT280A	
C26	6.8 N330 10%		EF-001	MFT-1000		CCF-102	CT280A	10TCS-V68
C27	.001		BPD-001	DD-102	HVX162XP102M	CCD-102	B210	5HK-D10
C28	.001	#691				*	*	10TCN-Q10
C29	10 N75 10%					*	*	10TCS-V68
C30	6.8 N330 10%					*	*	MS-315
C31	140 5% 100V		ADM-15-151	CPR-150J	CD15F151J500	DM-15-151	SX315	MS-315
C32	140 5% 100V		ADM-15-151	CPR-150J	CD15F151J500	DM-15-151	SX315	MS-315
C33	.005		BPD-005	DD-502	BYX801ZU502P	CCD-502	B250	5HK-D50
C34	.02		BPD-02	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C35	.02		BPD-02	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C36	6.8pf N330 10%					*	*	10TCS-V68
C37	.02		BPD-02	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C38	.0015		BPD-0015	DD-152	BYX162XP102M	CCD-152	B215	5HK-D15
C39	.02		BPD-02	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C40	.01		BPD-01	DD-103	BYV102ZU103M	CCD-103	B110	5HK-S10
C41	6.8pf N330 10%					*	*	10TCS-V68
C42	.0015 125V 5%			ADM-20-152	CPR-1500J	CD19F152J500	DM-19-152	MS-215
C43	.0015 125V 5%		ADM-20-152	CPR-1500J	CD19F152J500	DM-19-152	MS-215	
C44	.02		BPD-02	DD-203	BYT601ZU203Z	CCD-203	B120	5HK-S20
C45	.0015		BPD-0015	DD-152		CCD-152	B215	5HK-D15
C46	6.8pf N330 10%					*	*	10TCS-V68