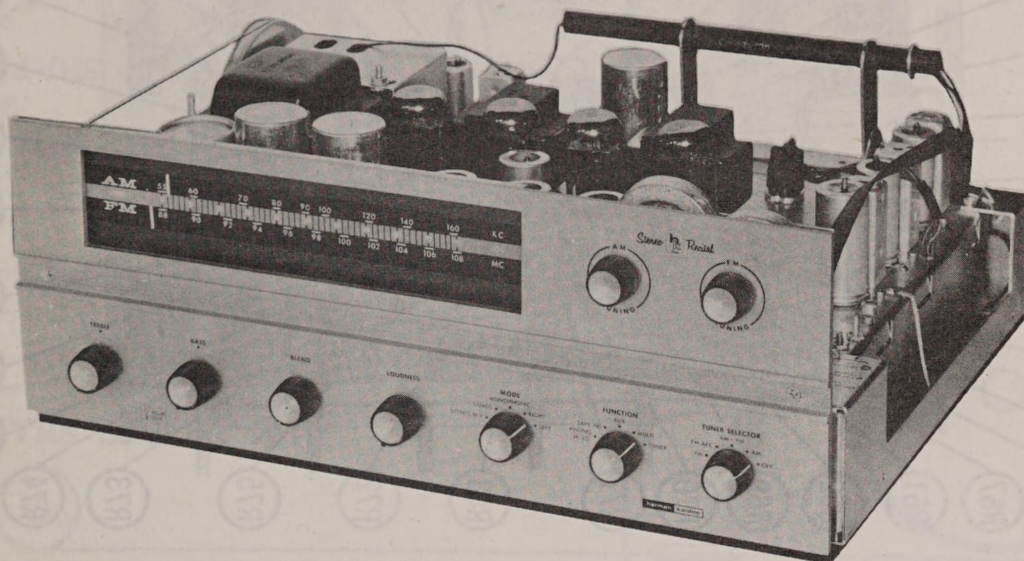


PHOTOFACT® Folder

HARMAN-KARDON
MODEL TA224HARMAN-KARDON
MODEL TA224HARMAN-KARDON
MODEL TA224

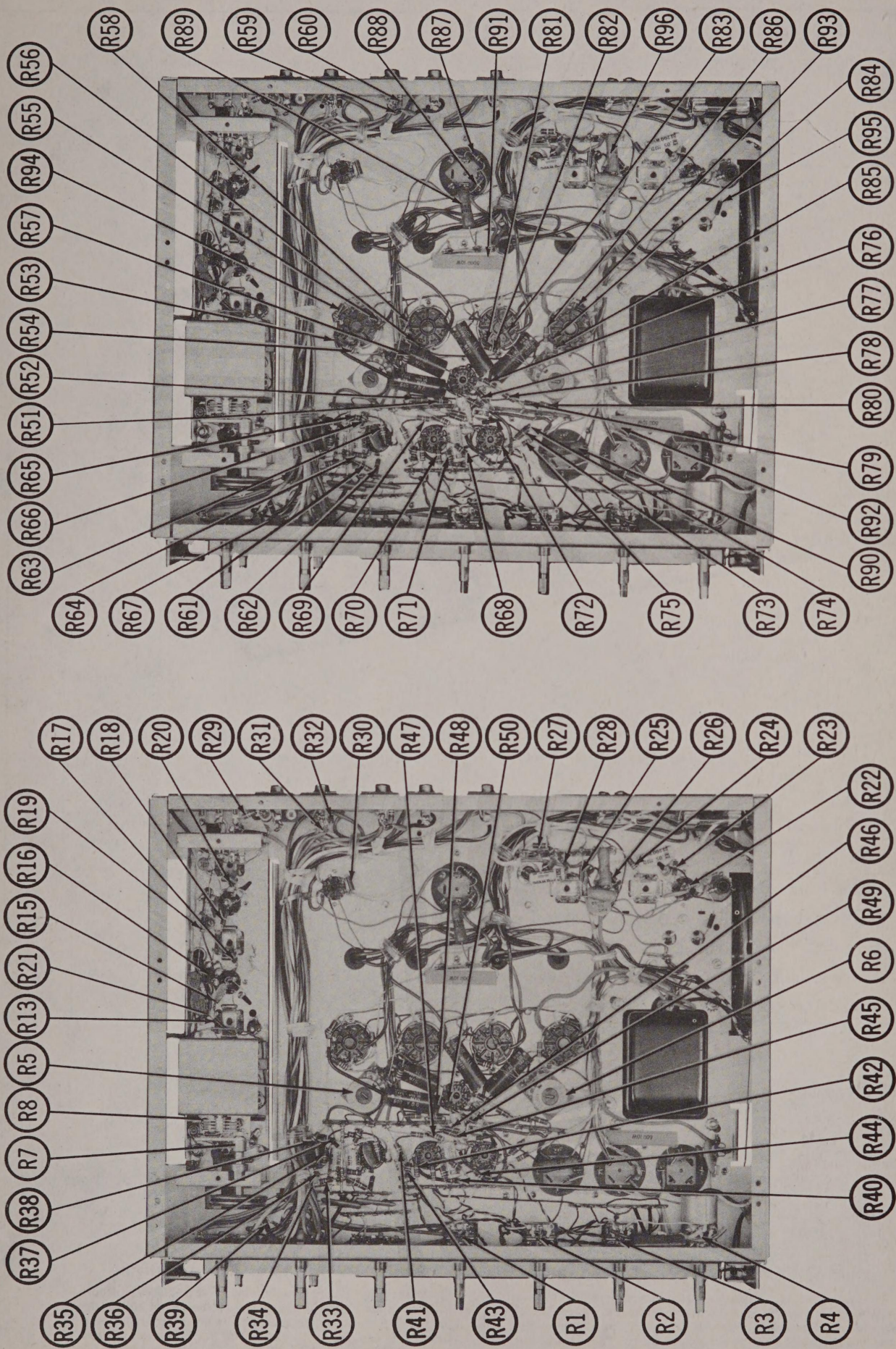
TRADE NAME	Harman-Kardon Model TA224 (Stereo Recital)		
MANUFACTURER	Harman-Kardon, Inc., 520 Main Street, Westbury, L. I., N. Y.		
TYPE SET	AC Operated 15 Tube FM-AM Receiver With Stereo Amplifier		
POWER SUPPLY	105 - 125 Volts AC, 60 Cycles	RATING	120 Watts, 1.25 Amp. @ 117 Volts AC
TUNING RANGE - BROADCAST	530 - 1640 KC	FREQ. MOD.	88-108 MC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

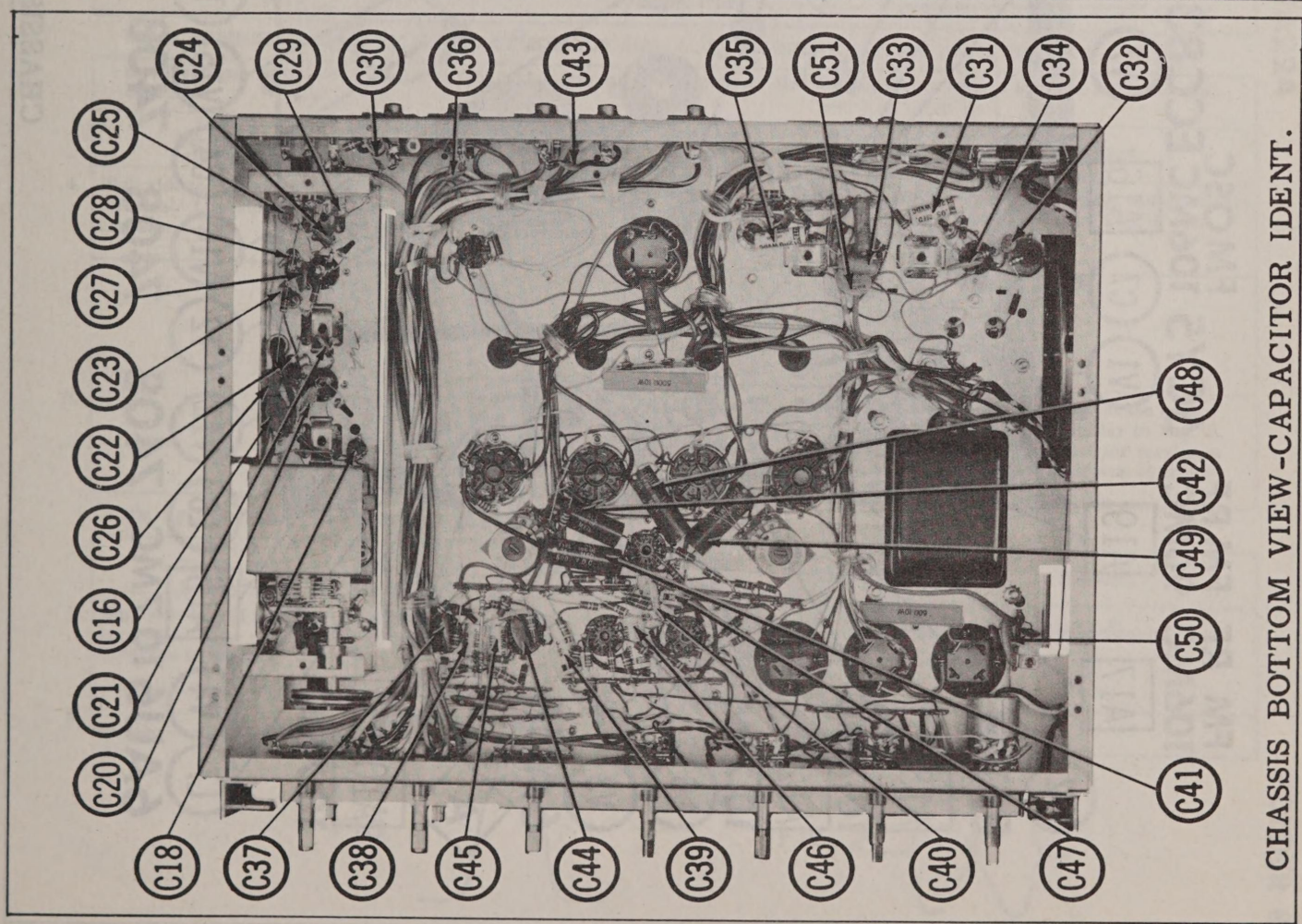


The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of KK344

the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1961 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

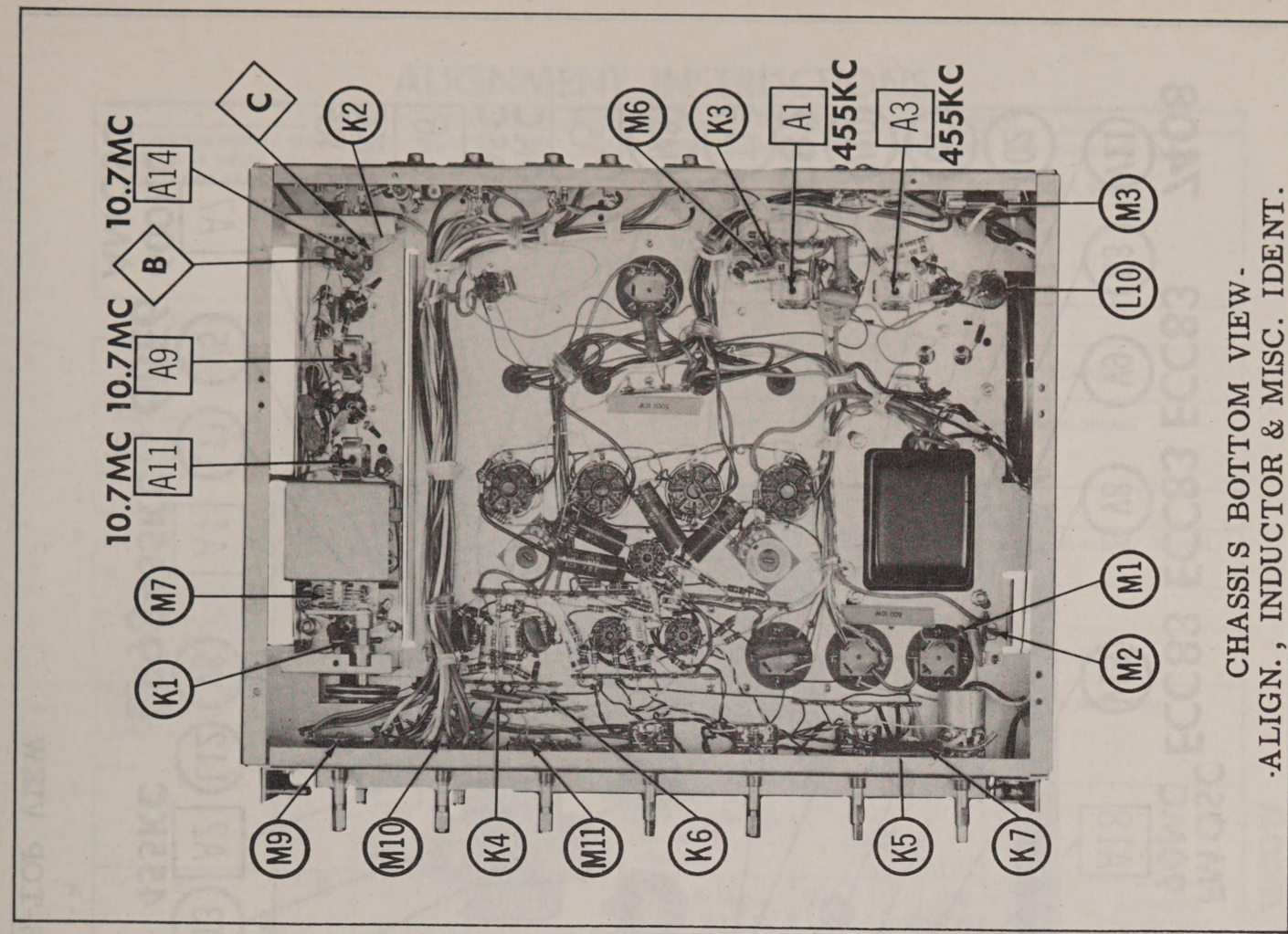


CHASSIS BOTTOM VIEW-RESISTOR IDENT.



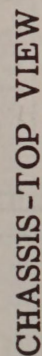
CHASSIS BOTTOM VIEW-CAPACITOR IDENT.

FOLDER 8



CHASSIS BOTTOM VIEW.
-ALIGN., INDUCTOR & MISC. IDENT.

HARMAN-KARDON
MODEL TA-224



ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Loudness control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1 thru A4, A7, A9 thru A15. . . GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440

	WALSCO #2526, 2543, 2544, 2545
A5, A6....	GENERAL CEMENT #5004, 5008, 5009
	WALSCO #2520

Al6 thru Al9.... GENERAL CEMENT #8721, 8722
WALSCO #2519

AM ALIGNMENT — SELECTOR IN AM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side to AM antenna terminal. Low side to chassis.	455KC (400 μ AM Mod.)	(AM) Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	"	1400KC	1400KC	"	A5, A6	"
3.	"	600KC	600KC	"	A7, A8	Adjust for maximum output. Repeat Steps 2 and 3.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM—SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	High side to FM antenna terminal. Low side to chassis.	10.7MC (Unmod.)	(FM) Point of non-interference.	DC probe thru 1meg to point $\diamond A$. Common to chassis.	A9, A10, A11, A12, A13	Adjust for maximum deflection.
5.	"	"	"	DC probe thru 1meg to point $\diamond B$. Common to chassis.	A14	"
6.	"	"	"	DC probe to point $\diamond C$. Common to chassis.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE—SELECTOR IN FM POSITION

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

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	High side to FM antenna terminal. Low side to chassis.	10.7 MC (450 KC Swp)	(FM) Point of non-interference.	Vert. amp. thru 47K to point $\diamond A$. Low side to chassis.	A9, A10, A11, A12, A13	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown.
5.	"	"	"	Vert. amp. thru 47K to point $\diamond B$. Low side to chassis.	A14	"
6.	"	"	"	Vert. amp. to point $\diamond C$. Low side to chassis.	A15	Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A14 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT — SELECTOR IN FM POSITION

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.	High side to FM antenna terminal. Low side to chassis.	106MC (Unmod.)	(FM) 106MC	DC probe thru 1meg to point A Common to chassis.	A16, A17	Adjust for maximum deflection.
8.	"	90MC	90MC	"	A18, A19	"

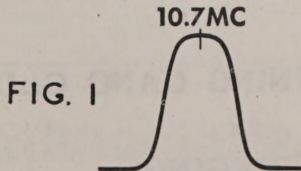


FIG. 1

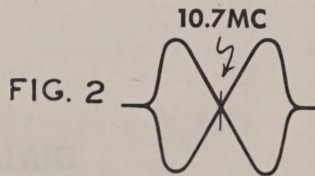
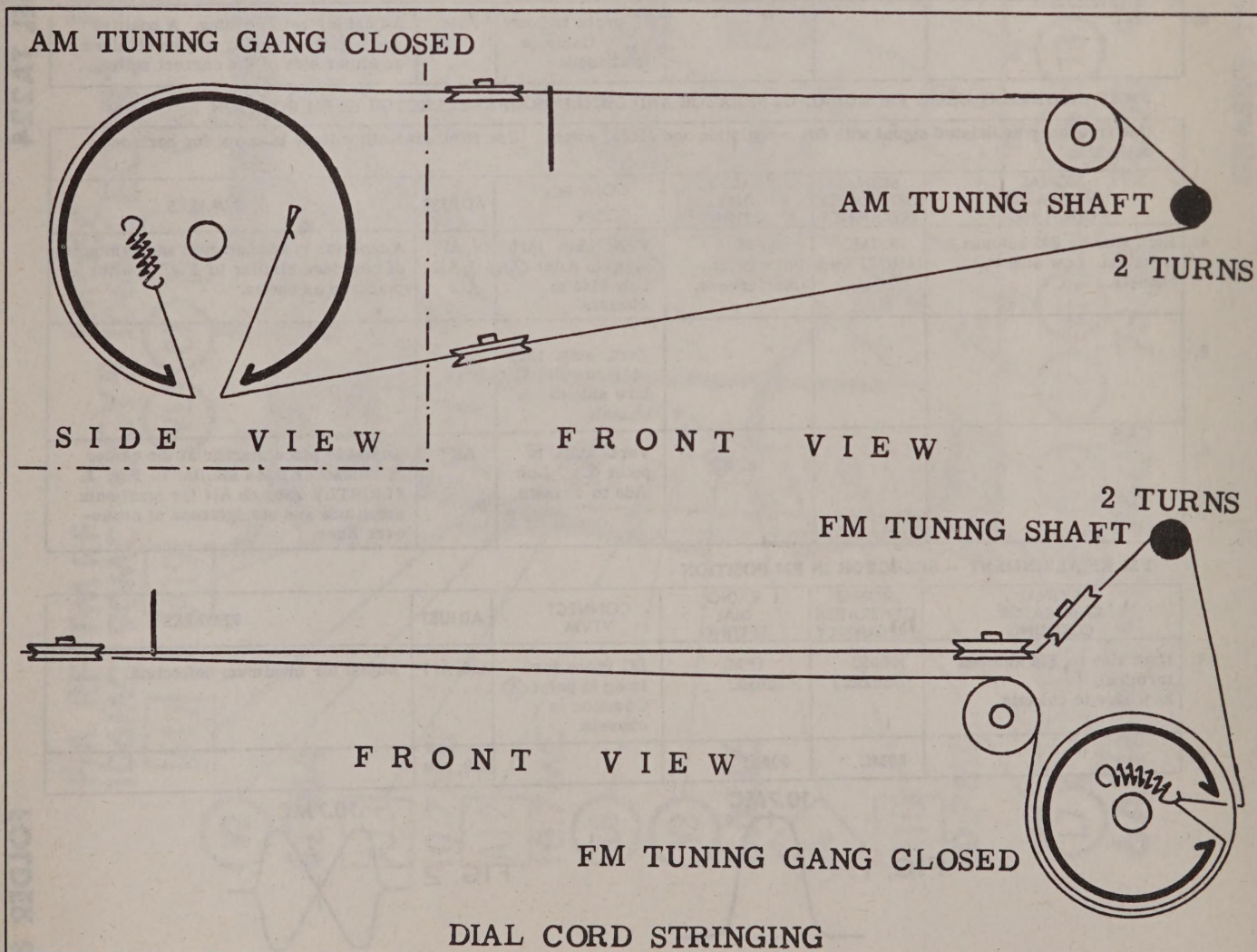
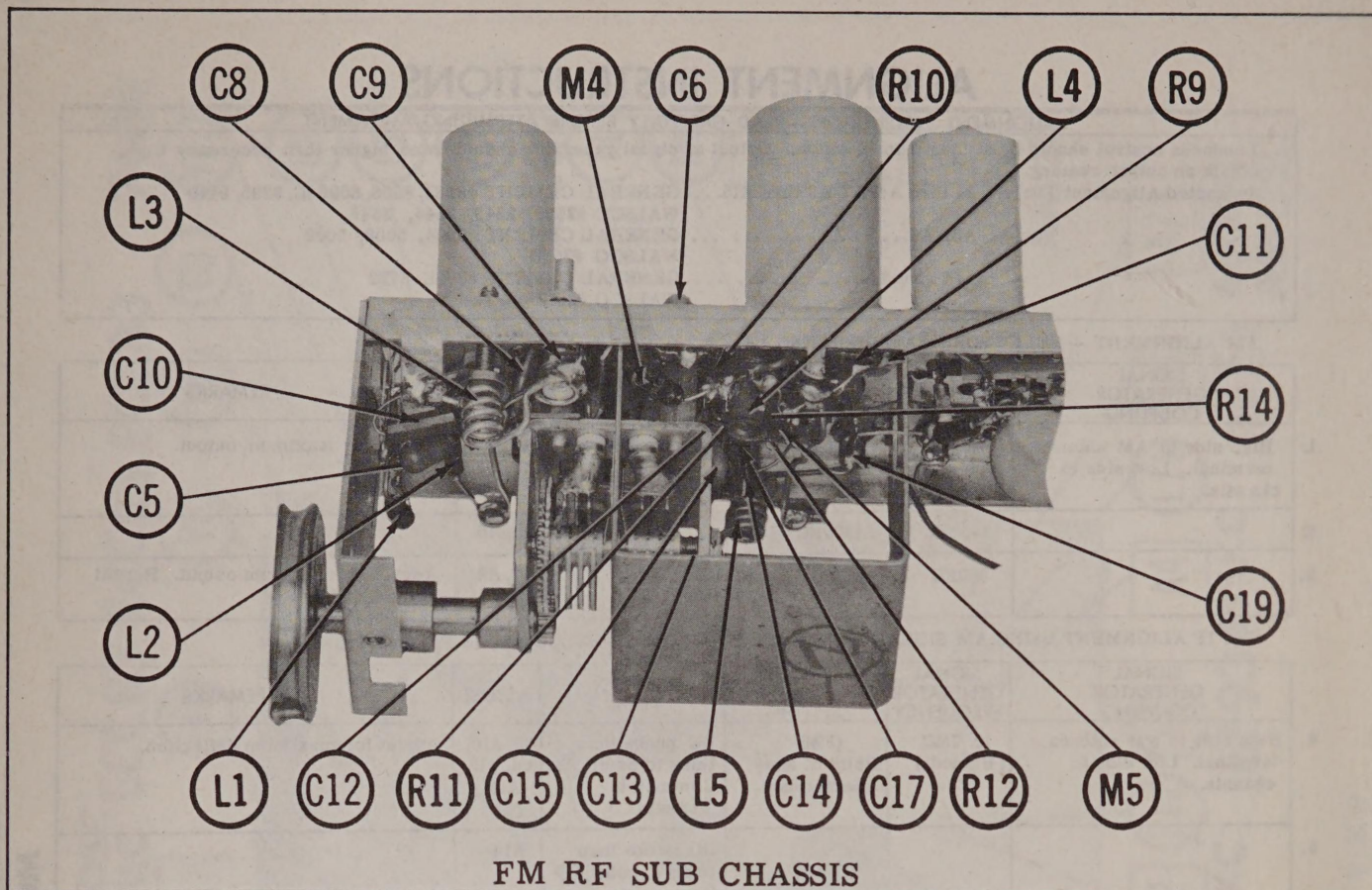
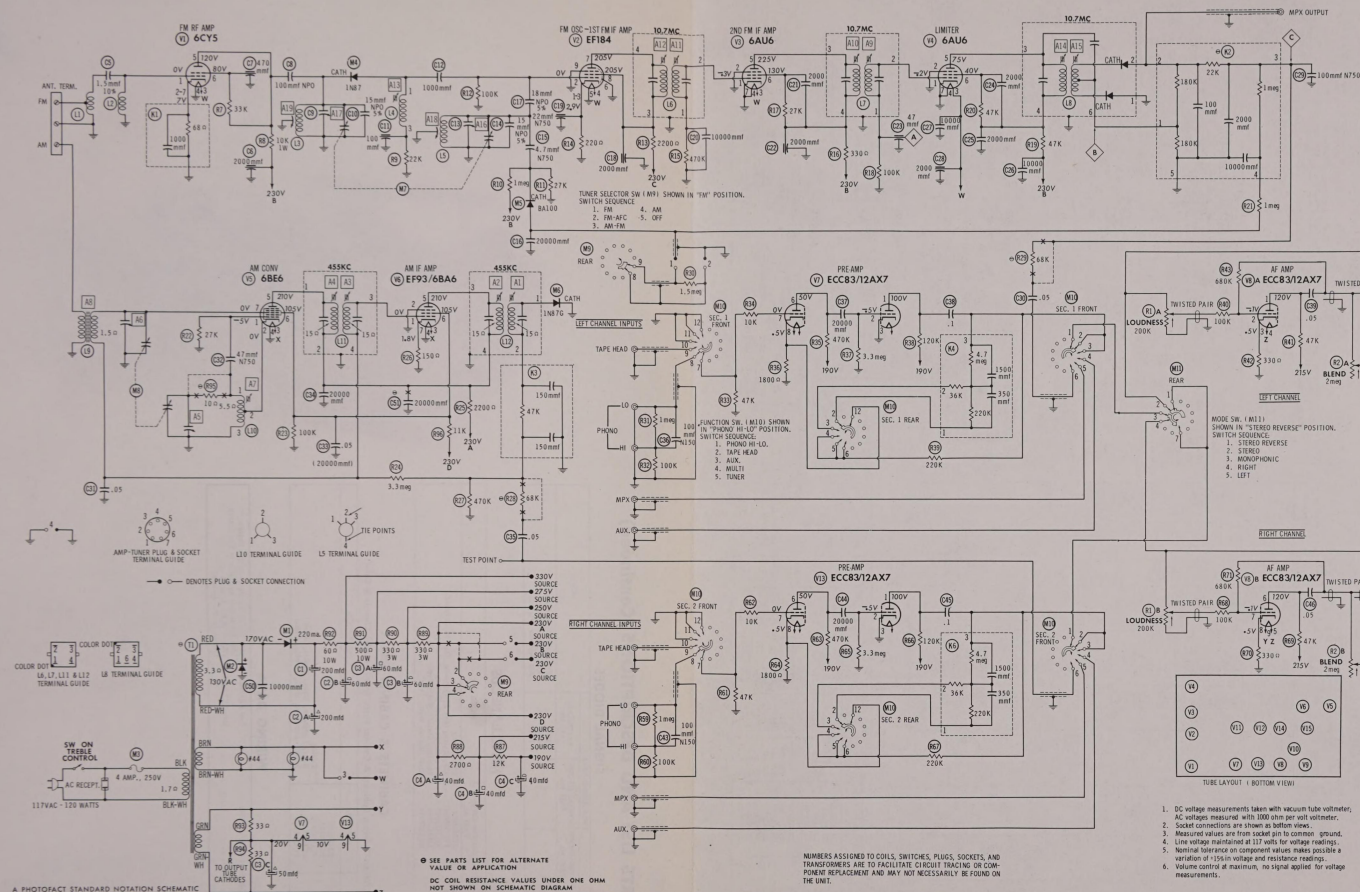


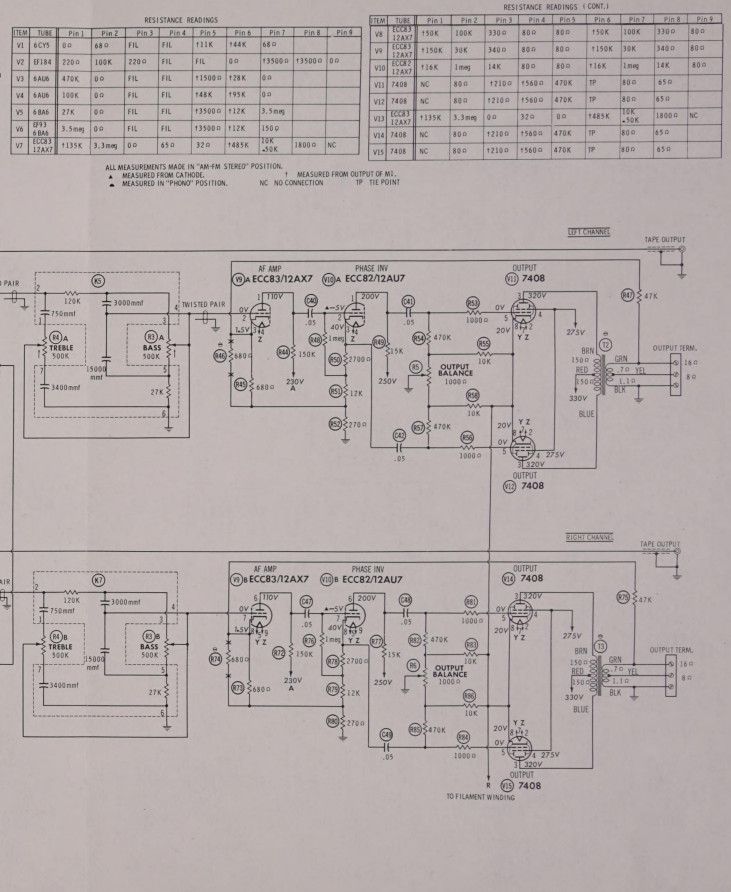
FIG. 2





A PHOTOFAC STANDARD NOTATION SCHEMATIC

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A PHOTOFAC STANDARD NOTATION SCHEMATIC

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TUBES

FIXED CAPACITORS (cont)

♦ GENERAL ELECTRIC ♦			♦ RAYTHEON ♦		♦ SYLVANIA ♦	
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE	
V1	FM RF Amplifier	6CY5	V9	Left Channel AF Amp. - Right Channel AF Amp.	ECC83/12AX7	
V2	FM Osc. - 1st FM IF Amp.	EF184	V10	Left Channel Phase Inv. - Right Channel Phase Inv.	ECC82/12AU7	
V3	2nd FM IF Amplifier	6AU6	V11	Left Channel Output	7408	
V4	FM Limiter	6AU6	V12	Left Channel Output	7408	
V5	FM Converter	6B56	V13	Right Channel Preamp.	ECC83/12AX7	
V6	AM IF Amplifier	EF33/6BA6	V14	Right Channel Output	7408	
V7	Left Channel Preamp.	ECC83/12AX7	V15	Right Channel Output	7408	
V8	Left Channel AF Amp. - Right Channel AF Amp.	ECC83/12AX7				

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		Harman-Kardon PART No.	REPLACEMENT DATA						PYRAMID PART No.	SPRAGUE PART No.
	CAP.	VOLT.		AEROVOX	CORNELL- DUBILIER	GENERAL ELECTRIC	MALLORY				
C1	200	200	JE3163839	AFH28-24-20	XA0318	XC1-21	FP126				
C2A	200	200	JE3163905	AFH3-114-80	XA0318	XC1-21	FP126				
B	350	350			BR6035	QTI-18	TC68				
C3A	60	350	JE3423997	AFH4-102-50	B0720	XC2-33	FP244	TMD-2545	TVL-2710		
B	60	350			BR6035	QTI-15	TC68	TD-40-350	TVA-1613		
C	50	25									
C4A	40	350	JE3163841	AFH4-53		XC3-40	FP238	TMD-2390	TVL-2764		
B	40	350					TC78	TD-40-350	TVA-1611		
C	40	350									

FIXED CAPACITORS

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

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCOT PART No.	MALLORY PART No.	SPRAGUE PART No.
C5	1.5	10%	NPO-SI 1.5	TCZ-IR5	C10V15C		CNO-515	10TCC-V15
C6	2000							
C7	470							
C8	100 NPO							
C9								
C10	15 NPO	5%	NPO-DI 100	DTZ-100	C10T1C	CCTO-101	CNO-310	10TCC-T10
C11	100		1469-000015	TCZ-15	22R5Q15	CM-19B-150J	CNO-415	MS-415
C12	1000		EF-0001	MFT-100				
C13			BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C14	15 NPO	5%	1468-000015	TCZ-15	22R5Q15	CM-19B-150J	CNO-415	MS-415
C15	4.7 N750			DTN-5	C10V15C	CCTN-050	CNT-547	10TCU-V50
C16	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C17	18 NPO	5%	1469-000018	TCZ-18	22R5Q18	CM-19B-180J	CNO-418	MS-418
C18	2000							
C19	22 N750		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C20	10000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C21	2000							
C22	2000							
C23	47							
C24	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C25	2000		BPD-002	DD-202	BYA10D2	CCD-202	B-220	5HK-D20
C26	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C27	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C28	2000							
C29	100 N750		N750-DI 100	DTN-100	C10T1U	CCTN-101	CNT-310	10TCU-T10

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-CUMBLER PART No.	ELEMCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C30	.05 200V	(20000) †	P288N-.05	DD-503	CUB285	4DP-3-503	GEM-415	2TM-S50
C31	.05 200V		P288N-.05	DD-503	CUB285	4DP-3-503	GEM-415	10TCU-S50
C32	47 N750		N750-DI 47	DTN-47	CIOQ47U	CCTN-470	CN7-447	2TM-S50
C33	.05 200V		P288N-.05	DD-503	CUB285	4DP-3-503	GEM-415	5HK-S20
C34	20000		BPD-.02	DD-203	BYB6S2	CCD-203	B-120	2TM-S50
C35	.05 200V		P288N-.05	DD-503	CUB285	4DP-3-503	GEM-415	10TCP-T10
C36	100 N150					*		5HK-S20
C37	20000		BPD-.02	DD-203	BYB6S2	CCD-203	B-120	2TM-P10
C38	.1 200V		P288N-.1	DF-104	CUB2P1	2DP-3-104	GEM-201	4TM-S50
C39	.05 400V		P488N-.05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C40	.05 400V		P488N-.05	DD-503	CUB4S5	4DP-3-503	GEM-415	6TM-S50
C41	.05 600V		P688N-.05	DD-503	CUB6S5	6DP-3-503	GEM-615	6TM-S50
C42	.05 600V		P688N-.05	DD-503	CUB6S5	6DP-3-503	GEM-615	6TM-S50
C43	100 N150					*		10TCP-T10
C44	20000		BPD-.02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C45	.1 200V		P288N-.1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C46	.05 400V		P488N-.05	DD-503	CUB4S5	4DP-3-503	GEM-415	4TM-S50
C47	.05 400V		P488N-.05	DD-503	CUB4S5	4DP-3-503	GEM-415	6TM-S50
C48	.05 600V		P688N-.05	DD-503	CUB6S5	6DP-3-503	GEM-615	6TM-S50
C49	.05 600V		P688N-.05	DD-503	CUB6S5	6DP-3-503	GEM-615	6TM-S50
C50	10000 1400V		DAC-27	DDG-103	HYE16S1	16DP-3-103	UAC-110	BL-S10
C51	20000	Note 1	BPD-.02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20

† Alternate Value.
Note 1. Not used in some versions.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESIST-ANCE	WATTS	Harman-Kardon PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A	200K	—	RV3424045	F1-35	QJ-1515R	UE4189	Loudness, Left Channel	
B	200K		R2-35					
R2A	2meg	—	RV3424165	B-75	AD47-2meg-S	FA28L	Loudness, Right Channel	
B	2meg		SR-75					
R3A	500K	—	RV3424044	Not Req.	KSS-3	CS3500	Blend, Left Channel	
B	500K		F1-42					
R4A	500K	—	RV3424166	F1-42	QJ-1516R	UE4190	Blend, Right Channel	
B	500K		R2-42					
R5A	1000Q	—	RV2783331	KR-1	QJ-1517R	UE4192-S	Bass, Left Channel	
B	1000Q							
R6A	1000Q	—	RV2783331		BU-108	TA13L	Bass, Right Channel	
B	1000Q							
	1000Q	—			BU-108	TA13L	Treble, Left Channel	
	1000Q							
	1000Q	—			TM4	TA13L	Treble, Right Channel	
	1000Q							
	1000Q	—			TM4	TA13L	Power Off-On	
	1000Q							
	1000Q	—			TM4	TA13L	Output Balance, Left Channel	
	1000Q							
	1000Q	—			TM4	TA13L	Output Balance, Right Channel	
	1000Q							

† "CENTRITRIKIT" Equivalent: K-6 Kit with Base Elements and Shafts: B13-130, P17-102 (Panel)
(Not available as a factory assembled unit).
‡ "CENTRITRIKIT" Equivalent: K-6 Kit with Base Elements and Shafts: B13-130, R9-110 (Rear)
§ "CENTRITRIKIT" Equivalent: K-6 Kit with Base Elements and Shafts: B13-133, P17-102 (Panel)
(Not available as a factory assembled unit).
¶ "CENTRITRIKIT" Equivalent: K-6 Kit with Base Elements and Shafts: B13-133, R9-110 (Rear)
(Not available as a factory assembled unit).
76-1 (Switch)

■ "STA-10C" Equivalent: FA254L RU254L OF1062, ISI375.

A "STA-LOC" Equivalent: FA55A, RU55A, OF1062, ISI375.

"STA-LOC" Equivalent: FA55A, RU55A, OF1062, ISI375, US41.

.....

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

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

ITEM No.	RATING	REPLACEMENT DATA		ITEM No.	RATING	REPLACEMENT DATA		REMARKS
		IRC PART No.	WORKMAN TV PART No.			IRC PART No.	WORKMAN TV PART No.	
R7	33K			R52	270Ω			
R8	10K 1W			R53	1000Ω			
R9	22K			R54	470K			
R10	1meg			R55	10K			
R11	27K			R56	1000Ω			
R12	100K			R57	470K			
R13	2200Ω			R58	10K			
R14	220Ω			R59	1meg			
R15	470K			R60	100K			
R16	330Ω			R61	47K			
R17	27K			R62	10K			
R18	100K			R63	470K			
R19	47K			R64	1800Ω			
R20	47K			R65	3.3meg			
R21	1meg			R66	120K			
R22	27K			R67	220K			
R23	100K			R68	100K			
R24	3.3meg			R69	47K			
R25	2200Ω			R70	330Ω			
R26	150Ω			R71	680K			
R27	470K			R72	150K			
R28	68K			R73	680Ω			
R29	68K			R74	680Ω			
R30	1.5meg			R75	47K			
R31	1meg			R76	1meg			
R32	100K			R77	15K			
R33	47K			R78	2700Ω			
R34	10K			R79	12K			
R35	470K			R80	270Ω			
R36	1800Ω			R81	100Ω			
R37	3.3meg			R82	470K			
R38	120K			R83	10K			
R39	220K			R84	1000Ω			
R40	100K			R85	470K			
R41	47K			R86	10K			
R42	330Ω			R87	12K			
R43	680K			R88	2700Ω			
R44	150K			R89	330Ω 3W			
R45	680Ω			R90	330Ω 3W			
R46	680Ω			R91	500Ω 10W			
R47	47K			R92	60Ω 10W			
R48	1meg			R93	33Ω			
R49	15K			R94	33Ω			
R50	2700Ω			R95	10Ω			
R51	12K			R96	11K			

Note 1

Note 1
Note 1

* Some versions may use Alternate Unit (Part #PCCOM4043) in this application.

Note 1. Not used in some versions.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			NOTES
		Harman-Kardon PART No.	Merit PART No.	Stancor PART No.	
L1	FM Ant.	GLCOM3082			
L2	RF Choke	GLCOM3083			
L3	FM RF	GL3414014			
L4	1st FM IF	GL3414010			
L5	FM Osc.	GL3414015			
L6	2nd FM IF	GT3414011			
L7	3rd FM IF	GT3414012			
L8	Discriminator	GT3414013			
L9	Loopstick	BC-418			
L10	AM Osc.	GL3424083			
L11	1st AM IF	GTCOM4152			
L12	2nd AM IF	GTCOM4153			
			FM-254	RTC-8599	
			FM-254	RTC-8599	
			FM-253 *	RTC-8665 *	
			705-A	RTC-8647	
			BC-393	RTC-8632	
			BC-352	RTC-8633	
			BC-353		
			1463	T633	
			1463	T634 *	
			705-A	T532	
			BC-393	T512	
			BC-352	T607	
			BC-353	T608	

* Connect two crystals externally.

TRANSFORMER (POWER)

ITEM No.	RATING	REPLACEMENT DATA				NOTES
		Harman-Kardon PART No.	Merit PART No.	Stancor PART No.	Thorderson PART No.	
T1	PRI. SEC. 1 SEC. 2 117V @ 130V @ 6.3V 1.25A .750A @ 2.1A DC SEC. 3 SEC. 4 SEC. 5 6.3V @ 2.8A	FT3423995D ①				① Alternate Part #FT3423995

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE	REPLACEMENT DATA				NOTES
		Harman-Kardon PART No.	Merit PART No.	Stancor PART No.	Thorderson PART No.	
T2	PRI. SEC. 6200Ω CT 16Ω Tap @ 8Ω	FT3423996A ①				① Alternate Part #FT3423996
T3	6200Ω CT 16Ω Tap @ 8Ω	FT3423996A ①				

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Harman-Kardon PART No.	REPLACEMENT DATA
K1	FM RF Cath.	1000mmf, 68Ω	STCOM4018	C-8 PA-98 PC-51 IUTM2 D-2
K2	Ratio Detector Network	100mmf, 2000mmf, 10000mmf, 22K, 180K, 180K, 1meg, 150mmf, 150mmf, 47K	PCCOM3081A *	
K3	AM Diode Filter		PC781599	
K4	Function Switch Comp.	350mmf, 1500mmf, 36K, 220K, 4.7meg	PCCOM4151	TC-22
K5	Tone Comp.	750mmf, 3000mmf, 3400mmf, 15000mmf, 27K, 120K	PC2492902	
K6	Function Switch Comp.	350mmf, 1500mmf, 36K, 220K, 4.7meg	PCCOM4151	TC-22
K7	Tone Comp.	750mmf, 3000mmf, 3400mmf, 15000mmf, 27K, 120K	PC2492902	

POWER RECTIFIERS

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA			NOTES
		Harman-Kardon PART No.	RCA PART No.	SARVES TAZIAN PART No.	
M1	.220A	Z3424114 *	1N1763 *	40H *	* Silicon
M2	.220A	Z3424114 *	1N1763 *	40H *	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA			
			Harman-Kardon PART No.	LITTELFUSE PART No.	FUSE	HOLDER
M3	3AG	4A 250V	FUSE ZCOM3299	P1142116	313004	357001
					MT H4	4405

PARTS LIST AND DESCRIPTIONS (Continued)

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		Harman-Kardon PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	
M4	IN87			IN87	FM Mixer Diode (Pigtail) AFC Diode (Pigtail) AM Detector (Pigtail)
M5	BA100			IN80	
M6	IN87G			IN87	

MISCELLANEOUS

ITEM No.	PART NAME	Harman-Kardon PART No.	NOTES
M7	Tuning Cap.	JV3413983	FM, 2 Gang AM, 2 Gang (Ant. 25-394mmf, Osc. 26-139mmf) RF Selector Switch (Rotary Wafer Type) Function (Rotary Wafer Type) Mode (Rotary Wafer Type)
M8	Tuning Cap.	JVCOM4041	
M9	Switch	ER3423999	
M10	Switch	ER3423998	
M11	Switch	ER3424035	

CABINETS & CABINET PARTS

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

NAME	PART NO.	DESCRIPTION
Dial Glass	P3424089	Tuning Rear; Loudness, Bass, Treble, Blend Front; Loudness, Bass, Treble, Blend
Dial Pointer	P3424093	
Knob	PCOM3576	
Knob	PCOM3250	
Knob	PCOM3575	

WIRING DATA

General-use Unshielded Hook-up Wire Use BELDEN No. 8530 (Solid) Available in Ten Colors
Power Cord Use BELDEN No. 8524 (Stranded) Available in Ten Colors
..... Use BELDEN No. 1765-B (6 Ft. Length)
..... Use BELDEN No. 1725-K (7½ Ft. Length)