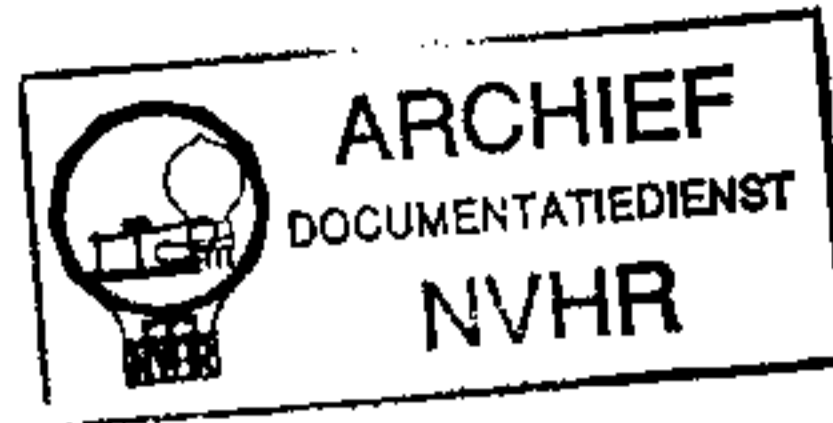
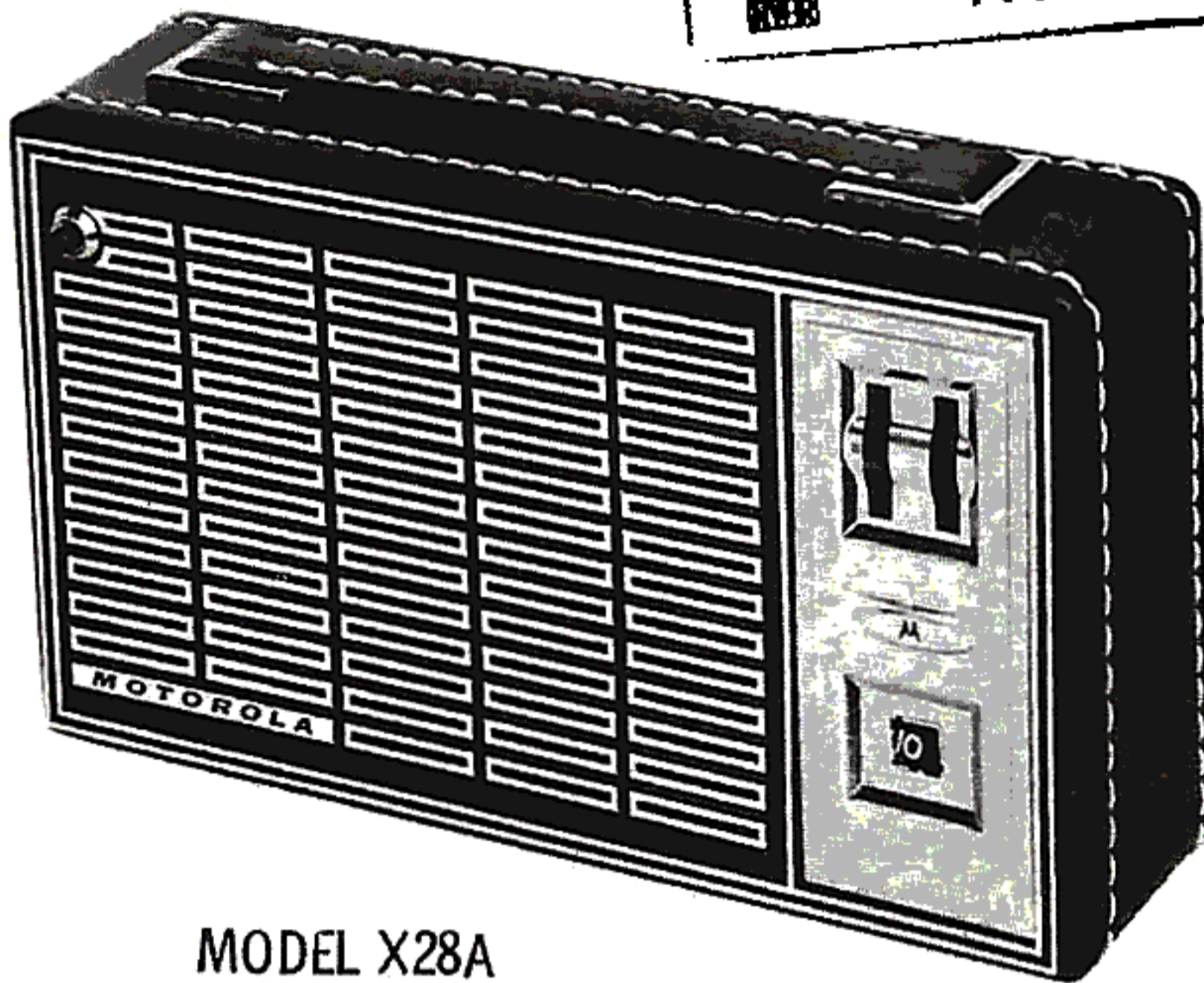


Ned. Ver. v. Historie v/d Radio

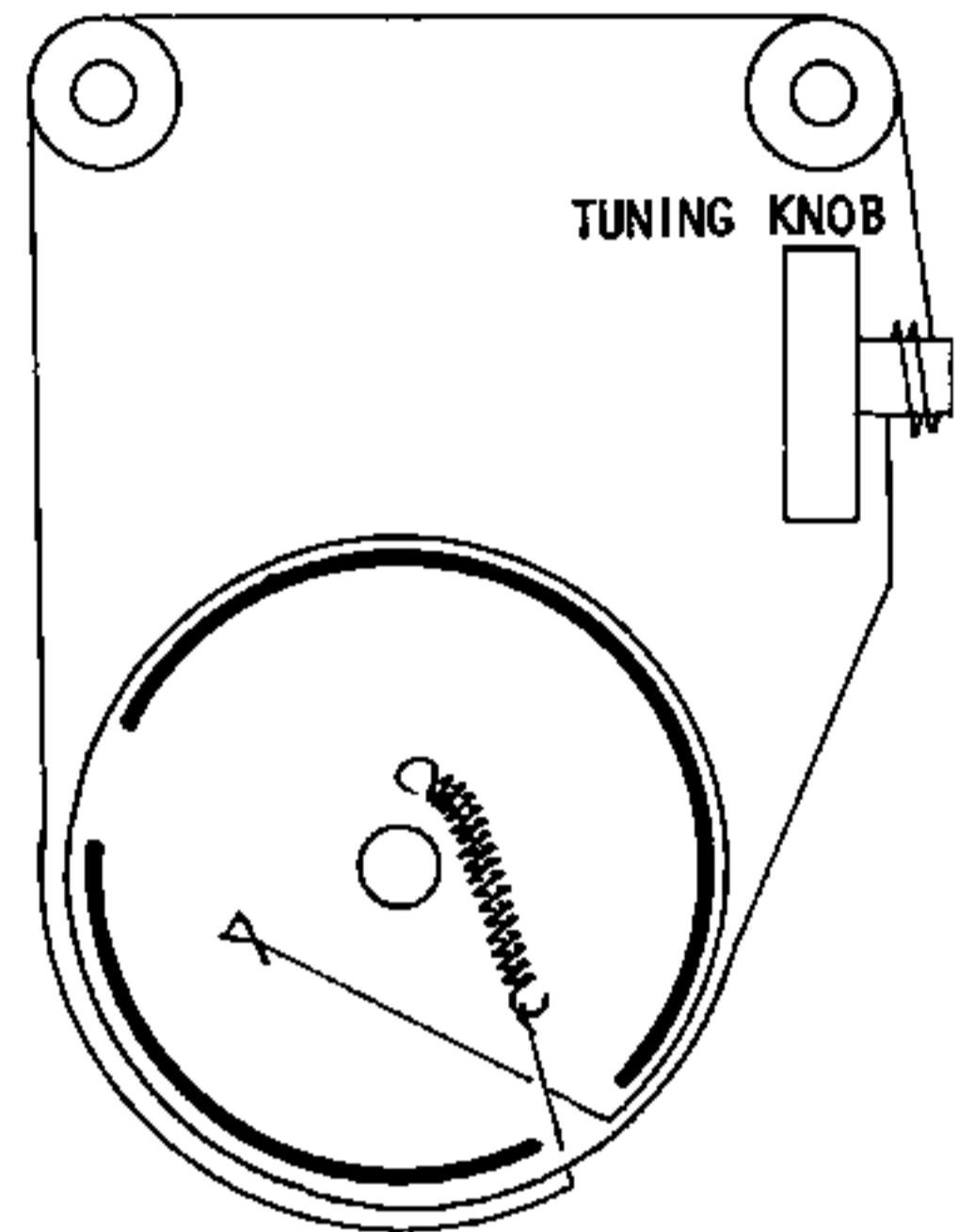


Met dank aan Jef Bos



MODEL X28A

FRONT VIEW



TUNING DRUM FULLY CLOCKWISE

TRADE NAME	Motorola Models X28A, X28N (CH. HS-884)
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Battery Operated Transistorized Portable AM Receiver
POWER SUPPLY	6 Volts DC
TUNING RANGE—BROADCAST	532 — 1620KC
	RATING 11MA@6 Volts DC (No Signal, Min. Volume) 25MA@6 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

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

Suggested alignment tools:

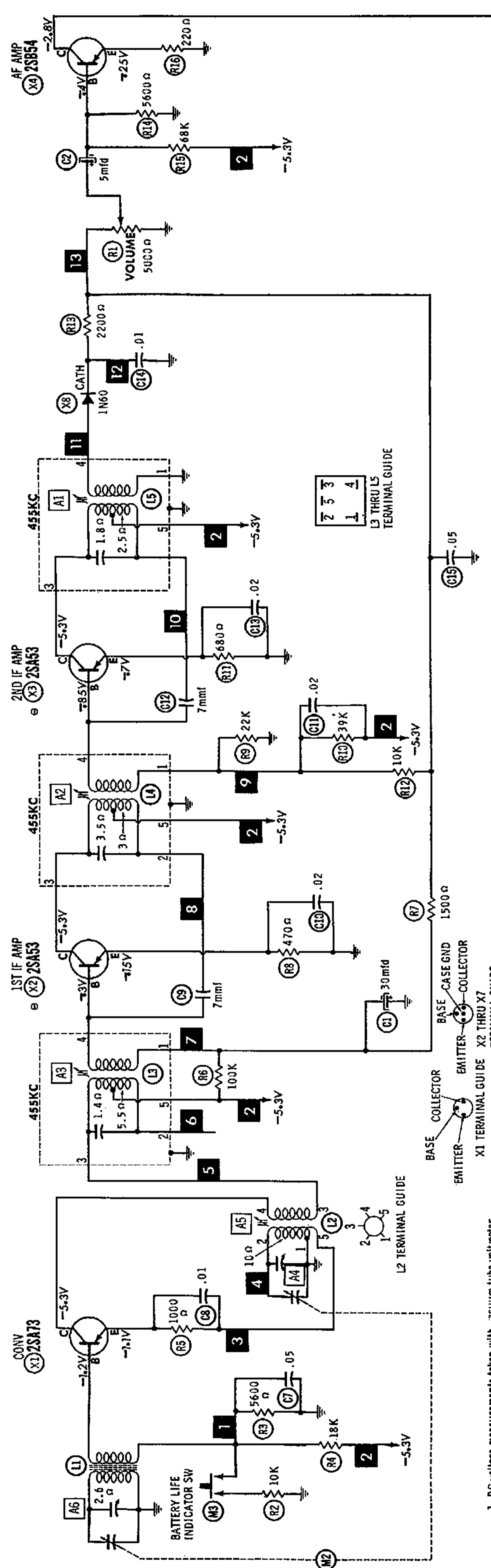
- A1, A2, A3..... GENERAL CEMENT #8607, 9291, 9294
WALSCO #2520, 2522, 2523, 2524, 2534, 2537
- A4, A6..... GENERAL CEMENT #5004, 5009, 8195, 8274, 8275, 8607, 8728, 8987, 8988, 8989, 9291
WALSCO #2515, 2520, 2522, 2523, 2531, 2532, 2534, 2537, 2538
- A5..... GENERAL CEMENT #9296, 9297
WALSCO #2546, 2547

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Fashion loop of several turns of wire and radiate signal into loop of receiver	455KC (400% Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Adjust for maximum output.
2.	"	1620KC	"	"	A4	"
3.	"	600KC	600KC	"	A5	Adjust for maximum output while rocking tuning gang.
4.	"	1400KC	1400KC Signal.	"	A6	Adjust for maximum output. Repeat steps 2, 3 and 4.

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 LF192

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. ©1962 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America



1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

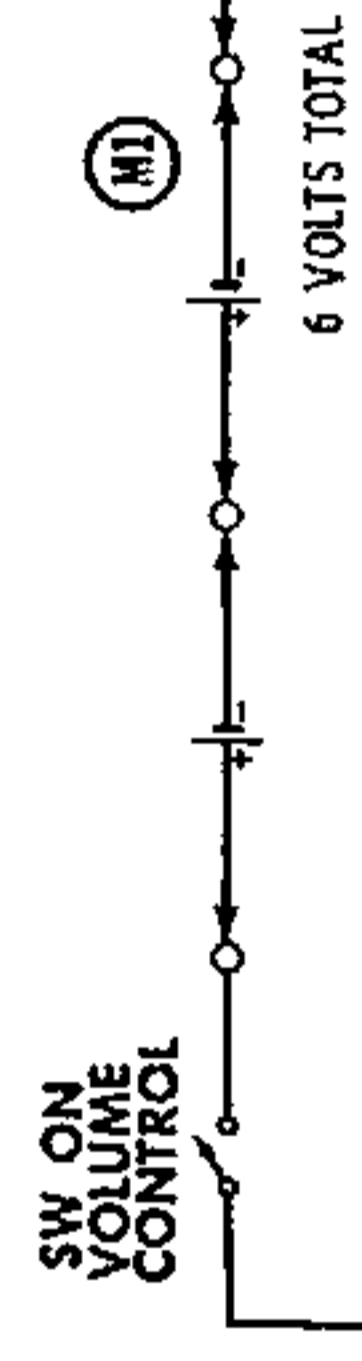
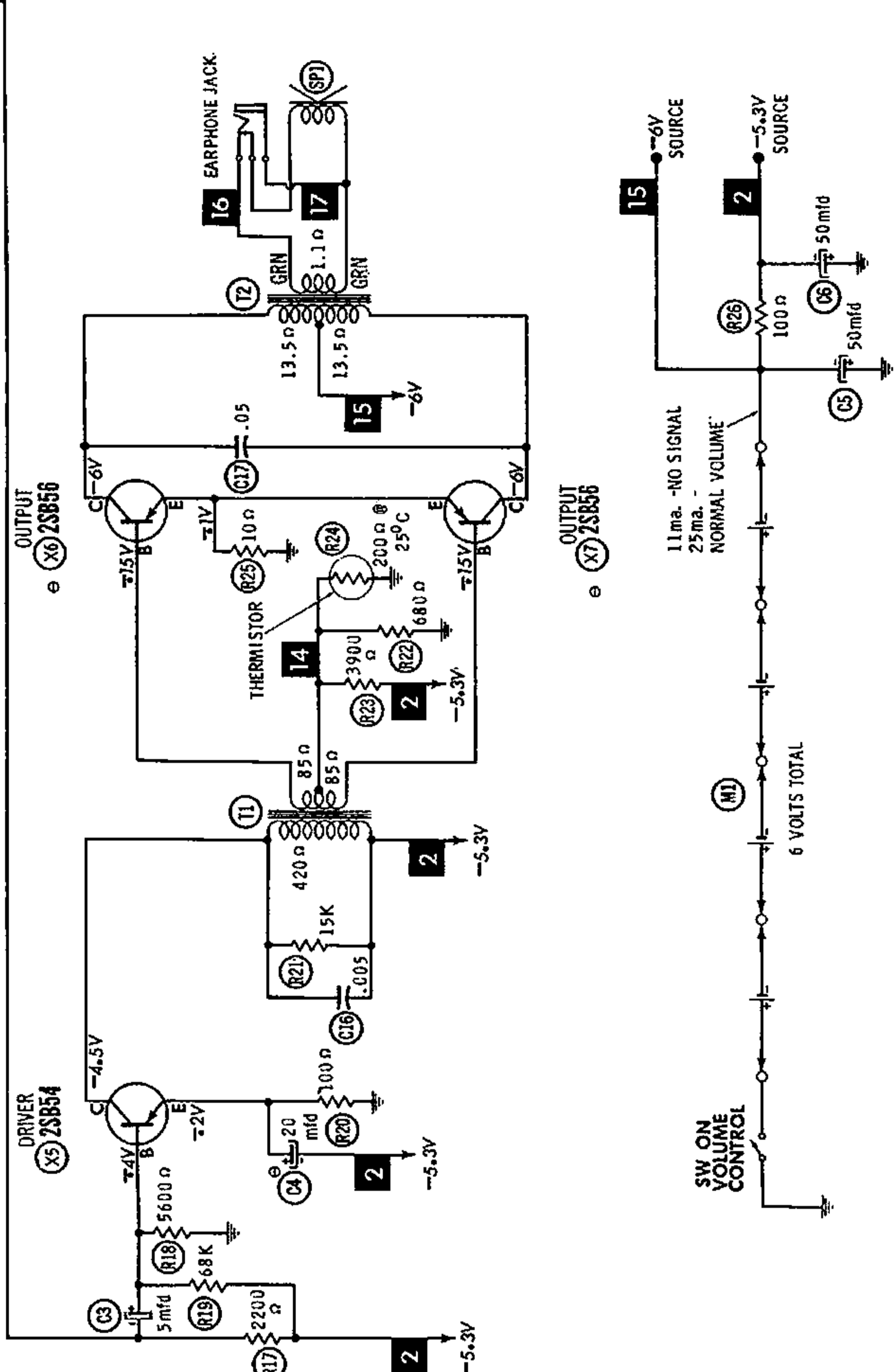
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

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

A PHOTOFACIT STANDARD NOTATION SCHEMATIC with CIRCUITRACE

Howard W. Sams & Co., Inc. 1962

MOTOROLA MODELS X28A, X28N (Ch. HS-884)



11 ma. - NO SIGNAL
25 ma. - NORMAL VOLUME

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA		NOTES
			RCA PART No.	RAYTHEON PART No.	
X1	2SA73	Converter	2N412	2N486	PNP
X2	2SA53*	1st IF Amplifier	2N410	2N483	PNP
X3	2SA53*	2nd IF Amplifier	2N410	2N483	PNP
X4	2SB54	AF Amplifier	2N408	2N362	PNP
X5	2SB54	Driver	2N408	2N362	PNP
X6	2SB58 †	Output	2N408	2N632	PNP
X7	2SB58 †	Output	2N408	2N632	PNP

* Type 2SA49 used for replacement.
† Type 2B58 used for replacement.

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	CURRENT RATING (Measured)	ORIGINAL Part or Type No.	RECTIFIERS		DIODES		NOTES
			RCA PART No.	SARKES TARZIAN PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	
X8		48K644681				1N60	Detector (1N60)

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		MOTOROLA PART No.	REPLACEMENT DATA					
	CAP.	VOLT.		AEROVOX PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.
C1	30	3	23K644668	PTT10	NLW30-8	MT1-13	TT6X30	MLV30-8	TE-1092
C2	5	3	23K644669	PTT4	NLW5-15	MT1-3	TT6X5	MLV5-3	TE-1052.2
C3	5	3	23K644689	PTT4	NLW5-15	MT1-3	TT6X5	MLV5-3	TE-1052.2
C4	20	12	23C60496A05 ①	PTT55	NLW20-15	MT1-10	PET1570	MLV20-12	TE-1130
C5	50	10	23C60496A04	BCD10050	NLW50-10	MT1-16	TT10X50	MLV50-10	TE-1119
C6	50	10	23C60496A04	BCD10050	NLW50-10	MT1-16	TT10X50	MLV50-10	TE-1119

① Some versions use 25mfd @ 10V in this application (Part #23K647209).

FIXED 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.
C7	.05			DA-503	H-05S5		TA-150	TG-S50
C8	.01			DM-103	H-05S1		TA-110	TG-S10
C9	7		NPO-DI 6.8	DTZ-6R8	C10V7C	CCTO-6R8	CNO-568	10TCC-V68
C10	.02			DA-203	H-05S2		TA-120	TG-S20
C11	.02			DA-203	H-05S2		TA-120	TG-S20
C12	7		NPO-DI 6.8	DTZ-6R8	C10V7C	CCTO-6R8	CNO-568	10TCC-V68
C13	.02			DA-203	H-05S2		TA-120	TG-S20
C14	.01			DM-103	H-05S1		TA-110	TG-S10
C15	.05			DA-503	H-05S5		TA-150	TG-S50
C16	.005		BPD-005	DM-502	H-05D5	CCD-502	TA-250	TG-D50
C17	.05			DA-503	H-05S5		TA-150	TG-S50

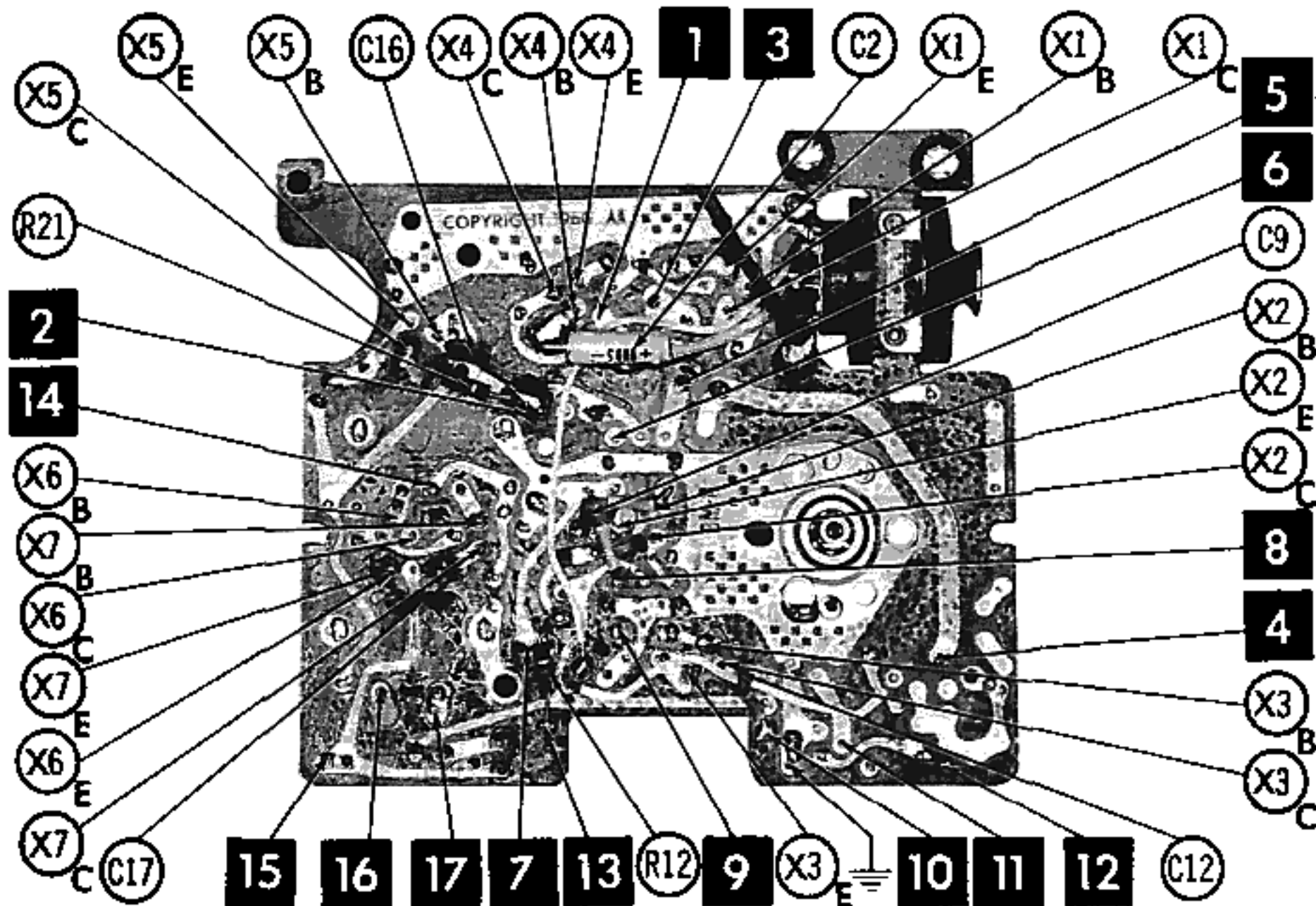
CONTROLS

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

ITEM No.	USE	RESISTANCE	REPLACEMENT DATA				
			MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1	Volume & Switch	5000Ω	18B80512A01				

PRINTED BOARD

A Howard W. Sems **CIRCUITRACE** Photo



B - BASE C - COLLECTOR E - EMITTER

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		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R2	10K				R15	68K			
R3	5600Ω				R16	220Ω			
R4	18K				R17	2200Ω			
R5	1000Ω				R18	5600Ω			
R6	100K				R19	68K			
R7	1500Ω				R20	100Ω			
R8	470Ω				R21	15K			
R9	22K				R22	680Ω			
R10	39K				R23	3900Ω			
R11	680Ω				R24	200Ω @ 25°C			#6B60519A01
R12	10K				R25	10Ω			
R13	2200Ω				R26	100Ω			
R14	5600Ω								

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		MOTOROLA PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L1	Loopstick	24B60712A01					
L2	Osc.	24C60741A01					
L3	1st IF	24K647238					
L4	2nd IF	24K646137					
L5	3rd IF	24K646138					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
			MOTOROLA PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
	PRI.	SEC.						
T1	1.2	1	25B60492A01					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
			MOTOROLA PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
	PRI.	SEC.						
T2	7Ω CT	6-8Ω	25B60499A01				TR-12	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
				MOTOROLA PART No.	QUAM PART No.	
	SIZE	FIELD	V. C. IMP.			
SP1	3 5/8"	PM	6-8Ω	60K647408		

BATTERIES

ITEM No.	VOLTAGE	MOTOROLA PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1 1/2V			930		1015		M-15R	4 Required

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M2	Tuning Cap.	19B60609A02	3 Gang Momentary, Pushbutton Type (Battery Life Indicator) Less All Components, Includes Printed Board Part #84C60590A03
M3	Switch	40K647229	
	Printed Board Ass'y.	1V60040A41	

CHASSIS—TOP VIEW

