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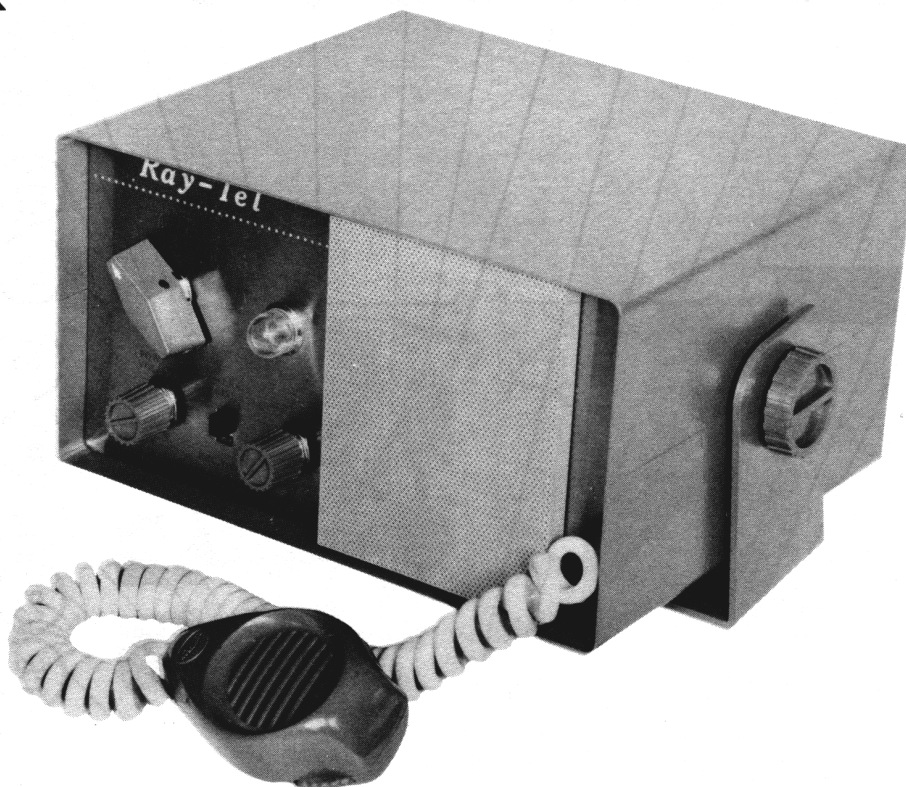
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RAYTHEON MODEL
RAY-TEL (TWR-1)



RAYTHEON MODEL
RAY-TEL (TWR-1)

TRADE NAME	Raytheon Model Ray-Tel (TWR-1)
MANUFACTURER	Raytheon Co., Distributor Products Div., 411 Providence Turnpike, Westwood, Mass.
TYPE SET	AC-Battery Operated 8 Tube Crystal Controlled Citizens Band Transmitter - Receiver
POWER SUPPLY	110-120 Volts AC, 60 Cycles (or) 12 Volt Storage Battery
RATING	65 Watts, .6 Amp. @117 Volts AC (or) 5 Amp. @12.6 Volts DC
TUNING RANGE	Any 4 of Citizens Band Channels 1 thru 23

NOTICE

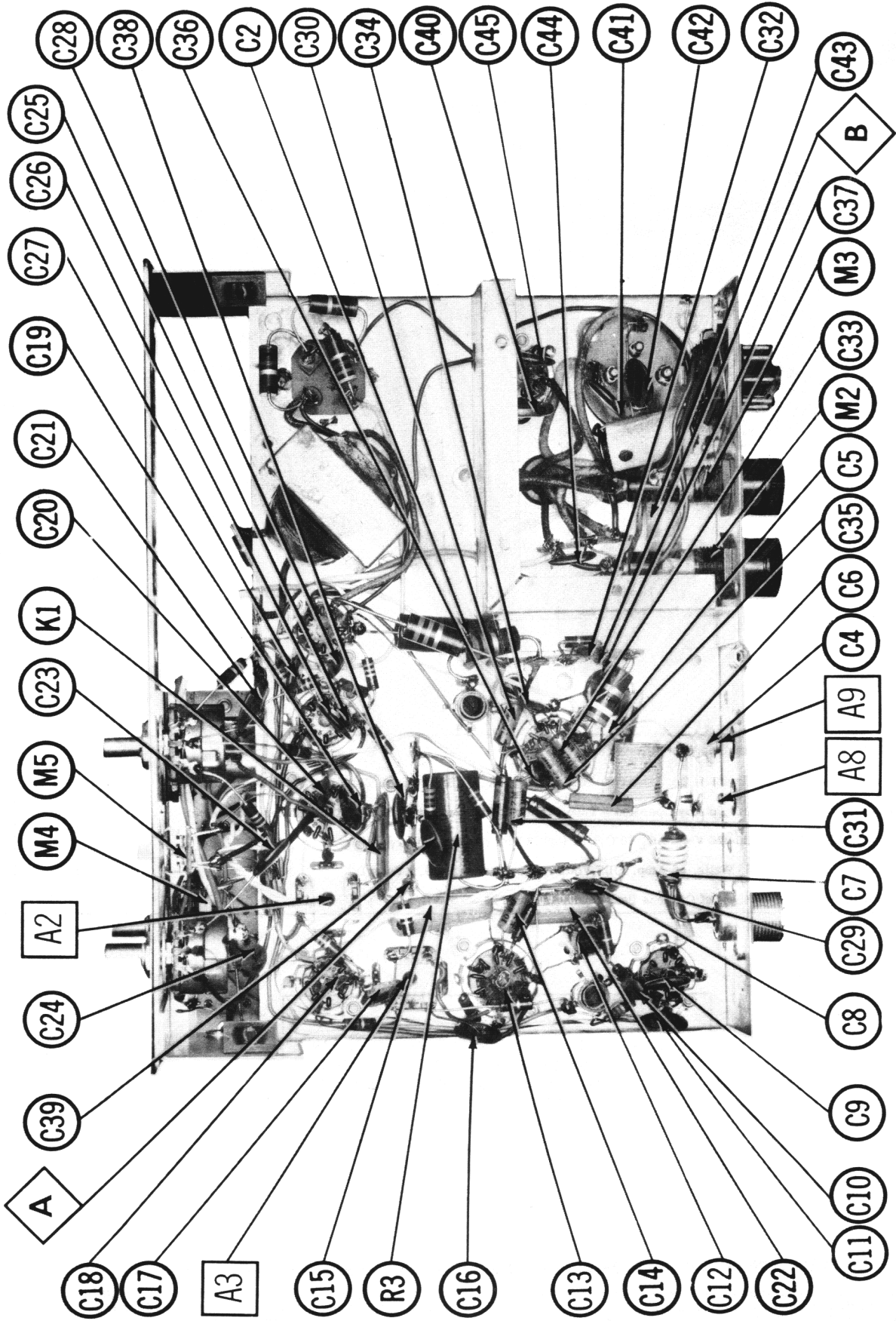
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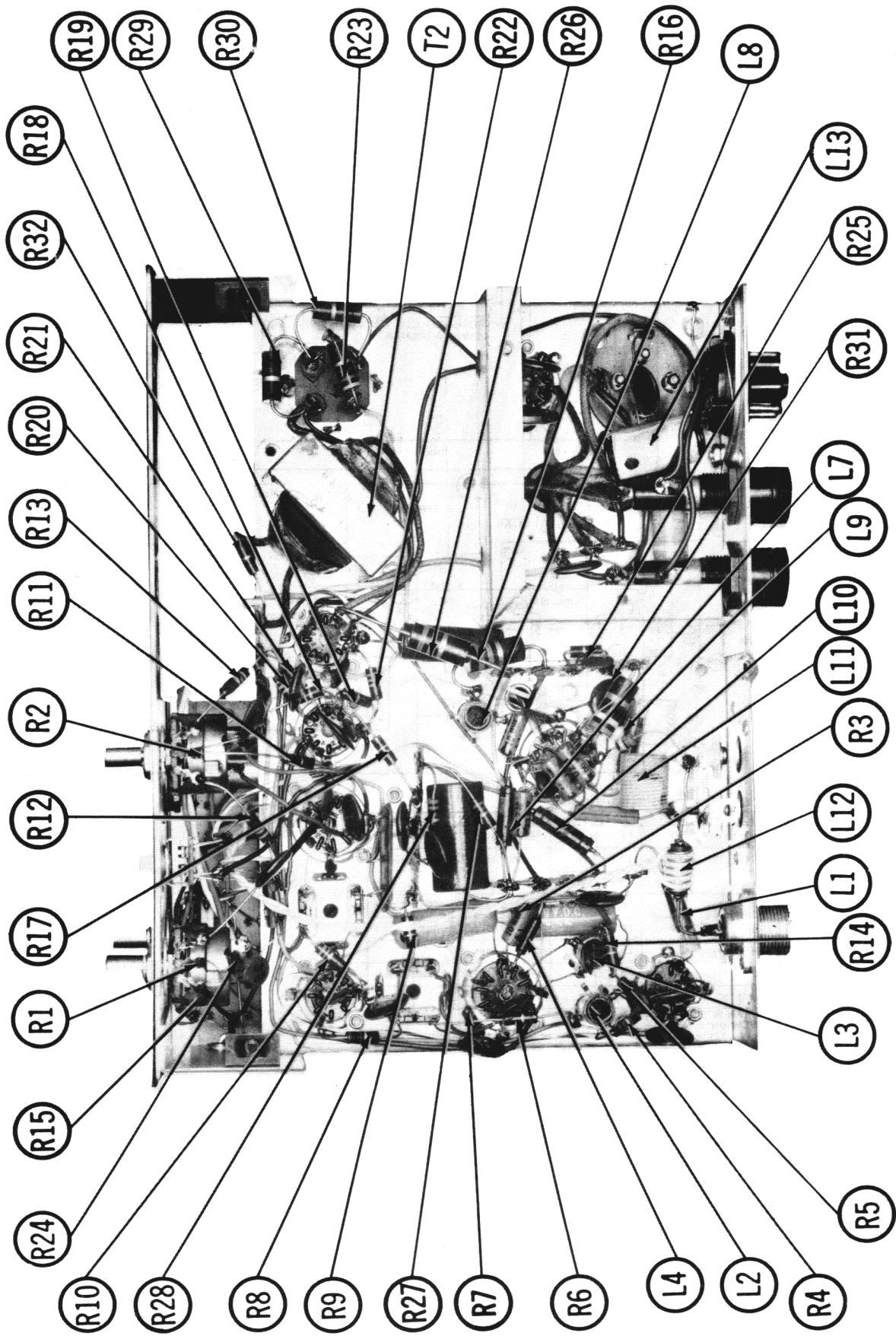


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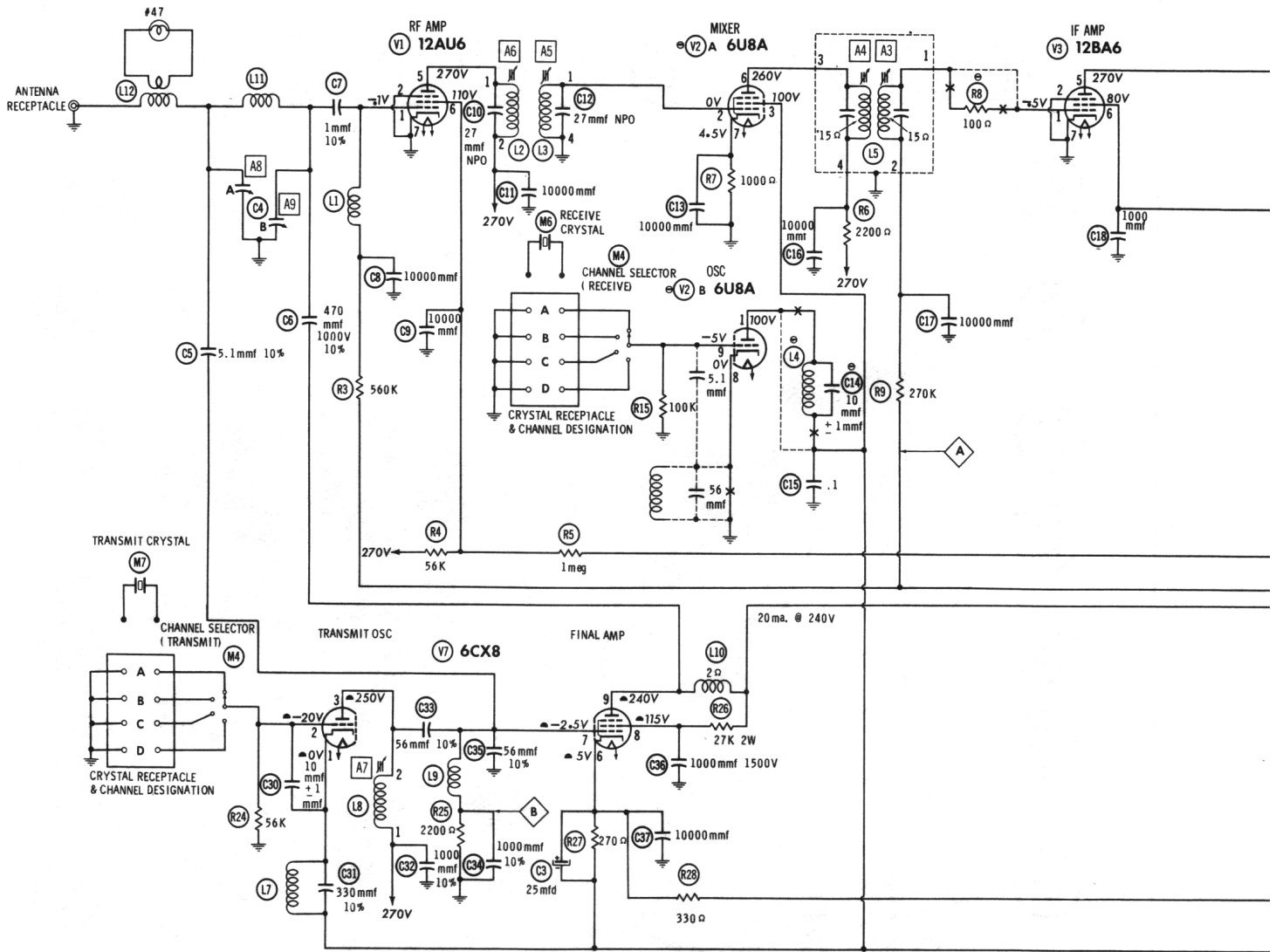
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CHASSIS BOTTOM VIEW-ALIGNMENT, CAPACITOR & MISC. IDENT.



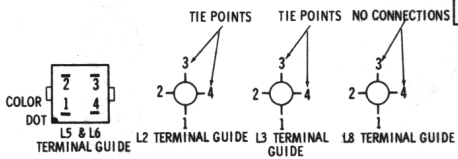
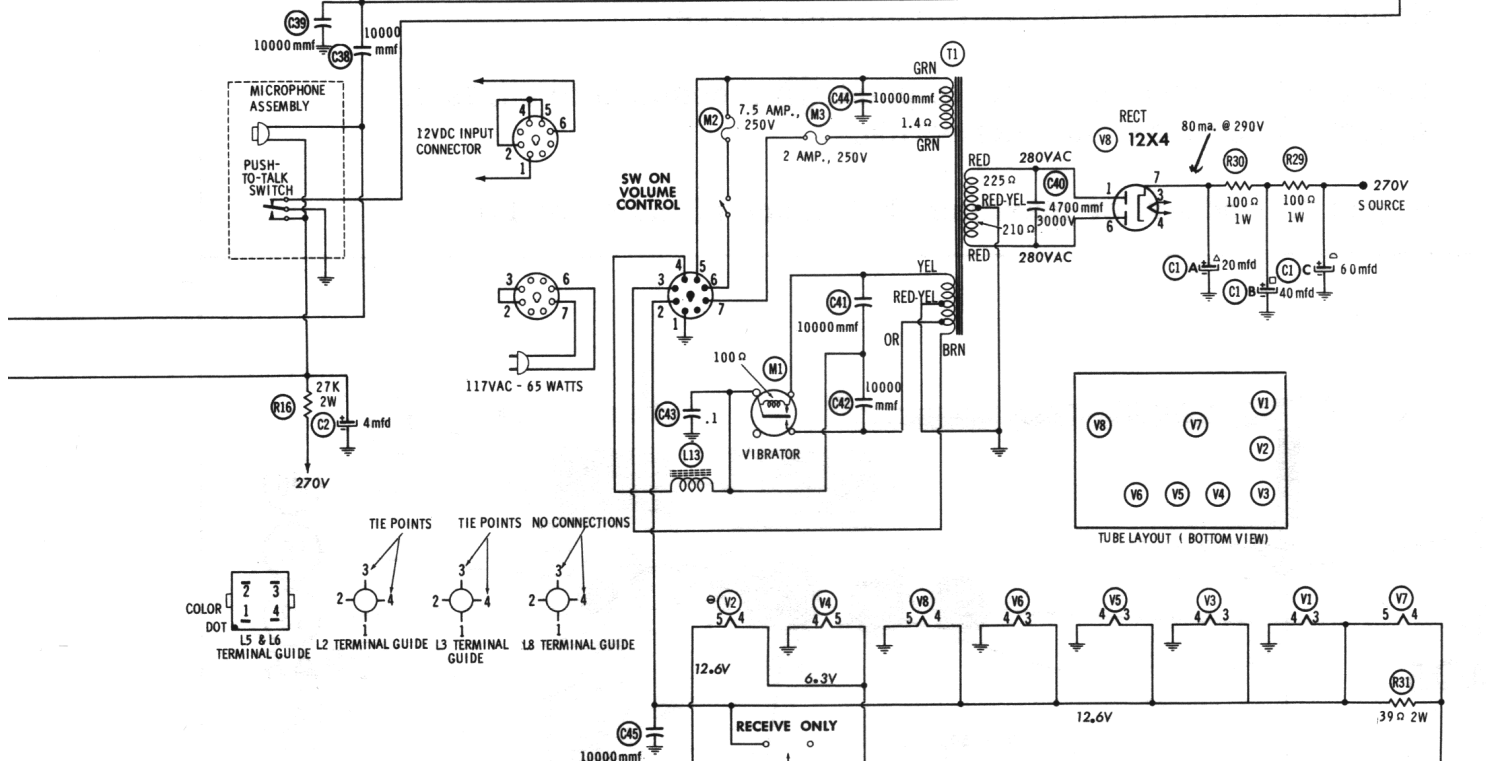
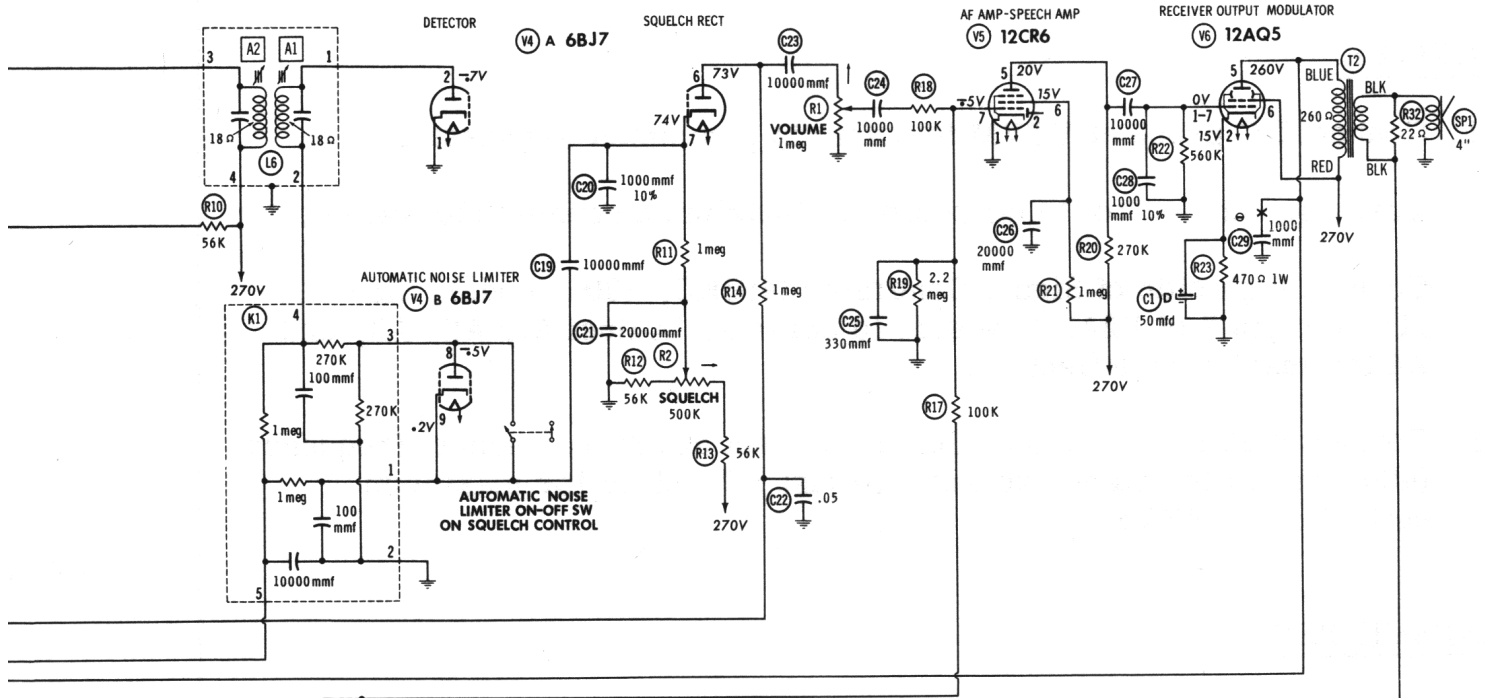
CHASSIS BOTTOM VIEW-RESISTOR & INDUCTOR IDENT.



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AU6	2.1 meg	0 Ω	0 Ω	.1 Ω	†200 Ω	†56K	0 Ω		
V2	6U8A	†27K	.1 Ω	†27K	.1 Ω	.1 Ω	†2400 Ω	1000 Ω	0 Ω	100K
V3	12BA6	1.5 meg	0 Ω	0 Ω	.1 Ω	†200 Ω	†56K	0 Ω		
V4	6BJ7	0 Ω	550K	0 Ω	.1 Ω	0 Ω	†2 meg	†1.1 meg	270K	2.6 meg
V5	12CR6	0 Ω	NC	0 Ω	.1 Ω	†270K	†1 meg	2.2 meg		
V6	12AQ5	560K	470 Ω	0 Ω	.1 Ω	†460 Ω	†200 Ω	560K		
V7	6CX8	∞ Ω	56K	∞200 Ω	.1 Ω	.1 Ω	∞270 Ω	2200 Ω	†27K	†460 Ω
V8	12X4	225 Ω	NC	.1 Ω	0 Ω	NC	210 Ω	†		

ALL MEASUREMENTS MADE IN "RECEIVE" POSITION UNLESS OTHERWISE DESIGNATED.
 ∞ MEASURED IN "TRANSMIT" POSITION.
 † MEASURED FROM PIN 7 OF V8.
 † THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELEC TROLYTIC IN THE CIRCUIT.



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.

- DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
- Socket connections are shown as bottom views.
- Measured values are from socket pin to common ground.
- Line voltage maintained at 117 volts for voltage readings.
- Nominal tolerance on component values makes possible a variation of ±1% in voltage and resistance readings.
- Volume control at maximum, no signal applied for voltage measurements.

SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

RAYTHEON MODEL RAY-TEL (TWR-1)

ALIGNMENT INSTRUCTIONS

RECEIVER

1. Connect DC probe of VTVM to point $\diamond A$, common to chassis.

Turn squelch control to off position, (maximum counter clockwise).

Connect high side of Signal Generator (455KC, 400 ν mod.), thru .1mfd to pin 2 of V2A, Low side to chassis. Adjust A1, A2, A3, and A4 for maximum deflection.

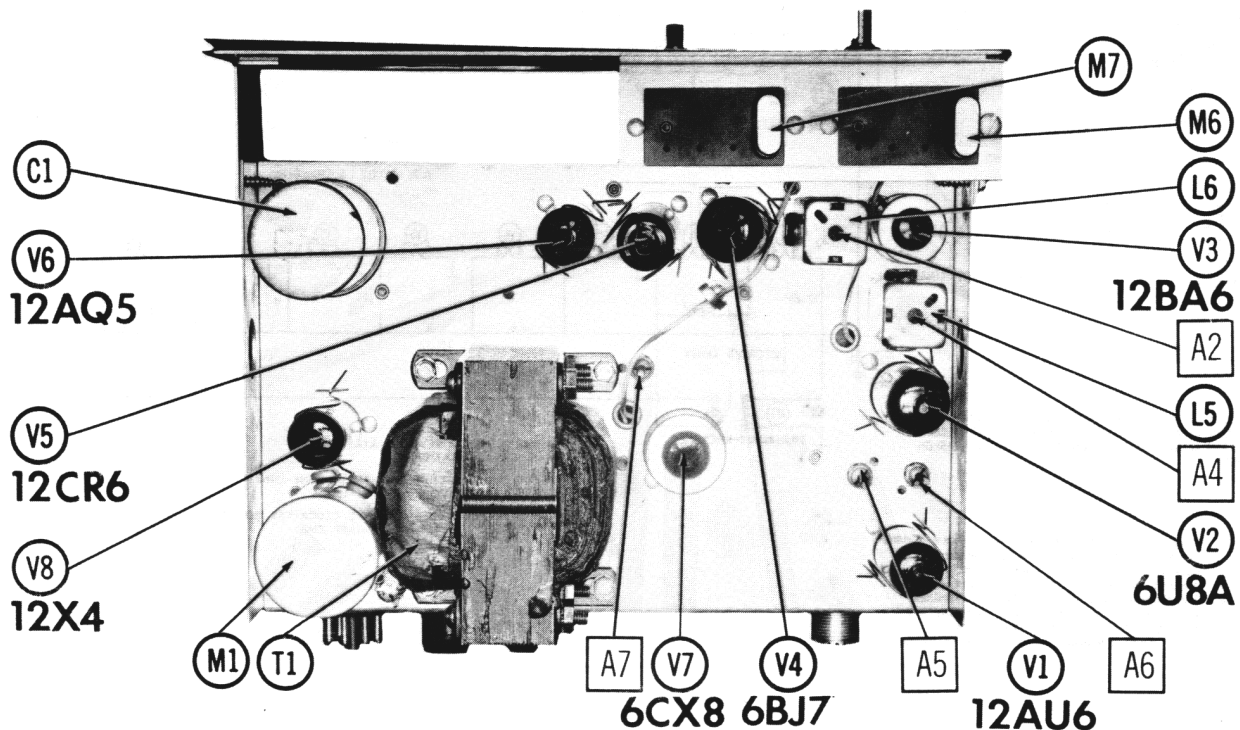
2. Connect high side of Signal Generator, set at proper channel frequency (400 ν mod.) to antenna socket. Adjust A5 and A6 for maximum deflection on VTVM.

TRANSMITTER

1. Connect 50 ohm dummy load to antenna socket.

Connect DC probe of VTVM to point $\diamond B$, common to chassis. Adjust A7 for maximum deflection.

Adjust A8 and A9 for maximum brilliance of indicator lamp.



CHASSIS TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

GENERAL ELECTRIC		RAYTHEON		SYLVANIA	
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	RF Amplifier	12A108	V5	AF Amp. - Speech Amp.	12CR8
V2	Mixer - Osc.	6U6A (6U8) *	V6	Receiver Output-Modulator	12A05
V3	IF Amplifier	12BA6	V7	Trans. Osc. - Final Amp.	6CX8
V4	Det. -ANL-Squelch Rect.	6BJ7	V8	Rectifier	12X4

* Alternate

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA				INSTALLATION NOTES
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	
C42	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110 5HK-S10
C43	.1 200V		P288N-1	CUB2P1	BYA10S1	2DP-3-104	GEM-201 B-110 5HK-S10
C44	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110 5HK-S10
C45	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110 5HK-S10

Raytheon Part Number.
Note 1. Not used in some versions.

ELECTROLYTIC CAPACITORS

RATING		REPLACEMENT DATA				NOTES
ITEM No.	CAP. VOLT.	RAYTHEON PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	420		FPA19.7	TMQ-4140	TVL-4631	
C1B	440					
C1C	460					
C1D	50					
C1E	4					
C1F	25					
C1G	150					
C1H	50					
C1I	300					
C1J	300					
C1K	300					
C1L	25					
C1M	25					
C1N	10 + 10mfd					
C1O	10 + 10mfd					
C1P	10000					
C1Q	10000					
C1R	10000					
C1S	10000					
C1T	10000					
C1U	10000					
C1V	10000					
C1W	10000					
C1X	10000					
C1Y	10000					
C1Z	10000					
C20	10000					
C21	10000					
C22	10000					
C23	10000					
C24	10000					
C25	10000					
C26	10000					
C27	10000					
C28	10000					
C29	10000					
C30	10000					
C31	10000					
C32	10000					
C33	10000					
C34	10000					
C35	10000					
C36	10000					
C37	10000					
C38	10000					
C39	10000					
C40	4700 3000V					
C41	10000					

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				SPRAGUE PART No.
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	
C4A	5.1 10%	#461-466	C10V5C	TCZ-4R7	C10V5C	CCTO-050	10TCC-V50
C5	470 1000V 10%	#VCM20B471M	NPO-SI 5.0		VCM-20-471M	VCM-20-471M	10TCC-V10
C6	1 10%		NPO-SI 1.0	TCZ-1		CCD-103	5HK-S10
C7	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C8	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C9	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C10	27 NPO		BPD-01 25	TCZ-27	BYA10S1	CCD-103	5HK-S10
C11	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C12	27 NPO		BPD-01 25	TCZ-27	BYA10S1	CCD-103	5HK-S10
C13	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C14	10 + 10mfd		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C15	1 200V	Note 1	NPO-SI 1.0	TCZ-10	BYA10S1	CCD-103	5HK-S10
C16	10000		P288N-1	DF-104	CUB2P1	2DP-3-104	5HK-S10
C17	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C18	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C19	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C20	10000 10%		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C21	20000		BPD-02	DD-102	5R5D1	CCD-102	5HK-S10
C22	.05 200V		BPD-02	DD-102	5R5D1	CCD-102	5HK-S10
C23	10000		CUB2S5	DD-503	CUB2S5	4DP-3-503	5HK-S10
C24	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C25	330		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C26	20000		BPD-02	DD-102	5R5D1	CCD-102	5HK-S10
C27	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C28	10000 10%		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C29	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C30	10 + 10mfd		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C31	330 10%		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C32	56 10%		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C33	56 10%		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C34	10000 1500V		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C35	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C36	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C37	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C38	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C39	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C40	4700 3000V		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10
C41	10000		BPD-01	DD-103	BYA10S1	CCD-103	5HK-S10

CONTROLS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA				INSTALLATION NOTES
			RAYTHEON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	
R1A	Imeg		G-45	B-70-S	A47-Imeg-S	QJ3-137	U53
R1B	Shaft			Not Req.	FS-3	76-1	Not Req.
R1C	Switch			Not Req.	SWE-12	76-1	US-26
R2A	500K		VF-45	Not Req.	A47-500K-S	QJ1-133	U50
R2B	500K			Not Req.	FS-3	76-2	Not Req.
R2C	Switch			Not Req.	SWE-20	76-2	US-27

RESISTORS

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

ITEM No.	RATING	REMARKS	REPLACEMENT DATA		RATING	ITEM No.	REPLACEMENT DATA	
			WORKMAN TV PART No.	IRC PART No.			WORKMAN TV PART No.	IRC PART No.
R3	560K				100K	R18		
R4	56K				2.2meg	R19		
R5	Imeg				270K	R20		
R6	22000				Imeg	R21		
R7	10000				560K	R22		
R8	1000				4700 1W	R23		
R9	1000				56K	R24		
R10	56K				22000	R25		
R11	Imeg				27K 2W	R26		
R12	56K				2700	R27		
R13	56K				3300	R28		
R14	Imeg				1000 1W	R29		
R15	100K				1000 1W	R30		
R16	27K 2W				39K 2W	R31		
R17	100K				220	R32		

Note 1. Not used in some versions.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		RAYTHEON PART No.	Meritt PART No.	Miller PART No.	Stancor PART No.	
L1	RF Choke (5. 6uh)	TL-70	SW-631	4609	RTC-8519	T959
L2	RF Pri	TL-91	TV-118	6171-A	RTC-8609	T216
L3	RF Sec	TL-91	BC-562	4804	RTC-8609	T216
L4	RF Input IF	TL-94	BC-562	4804	RTC-8616	T856
L5	Output IF	TL-94	BC-562	4804	RTC-8632	T807
L6	Osc. Plate	TL-95	BC-563	4609	RTC-8653	T808
L7	RF Choke (5. 6uh)	TL-70	SW-631	4609	RTC-8619	T959
L8	RF Choke (5. 6uh)	TL-70	SW-631	4609	RTC-8609	T216
L9	RF Choke (5. 6uh)	TL-70	SW-631	4609	RTC-8619	T959
L10	RF Choke (5uh)	TL-98	SW-631	4624	RTC-8619	T959
L11	Final Plate	TL-98	SW-631	4624	RTC-8624	T862
L12	Ant. Loading	TL-98				
L13	Hash Choke (6uh)	TL-72		7825-8		

⊕ Not used in some versions.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	PRI.	SEC. 1	RAYTHEON PART No.	Meritt PART No.	Stancor PART No.	Thordarson PART No.	
T1	117V @ 1.6A (AC) 12.6VCT @ 3A (DC)	12.6V @ 1.6A (AC)	ST-102				

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA				NOTES
	PRI.	SEC.	RAYTHEON PART No.	Meritt PART No.	Stancor PART No.	Thordarson PART No.	
T2	62000	3-40	ST-19		24805	S-43X	

SPEAKER

ITEM No.	TYPE		REPLACEMENT DATA		NOTES
	SIZE	FIELD	RAYTHEON PART No.	QUAM PART No.	
SP1	4"	PM	P4VA-NW	4A1	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	RAYTHEON PART No.	REPLACEMENT DATA
K1	ANL-Squelch Network	(2) 100mmf, 10000mmf, (2) 270K, (2) 1meg	59-4719	

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS/FREQUENCY	REPLACEMENT DATA			NOTES
			RAYTHEON PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	
M1	Interrupter	12.6 115v	G-1601	6301	G1601	6301

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			RAYTHEON PART No.	HOLDER	LITTELFUSE PART No.	BUSS PART No.		
M2	SAG	7.5A 250V 2A	AGC 7 1/2		31207.5 (SAG 7 1/2A 250V)	342001	AGC 7 1/2	HOLDER
M3	SAG	250V	AGC 2		312003 (SAG 2A 250V)	942001	AGC 2	HKP

MISCELLANEOUS

ITEM No.	PART NAME	RAYTHEON PART No.	NOTES
M4	Switch	F-49	Channel Selector (Rotary Wafer) Receive-Transmit (DPDT Slide Type) Receive Transmit
M5	Switch	SW-726	
M6	Crystal		
M7	Crystal		

CABINETS & CABINET PARTS

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

NAME	PART NO.	DESCRIPTION
Lens Knob	147-10	Clear Lucite
Knob	101TB270	Channel Selector
Knob	105P-T3270	Volume, Squeich

WIRING DATA

General-use Unshielded Hook-up Wire Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7 1/2 Ft. Length)