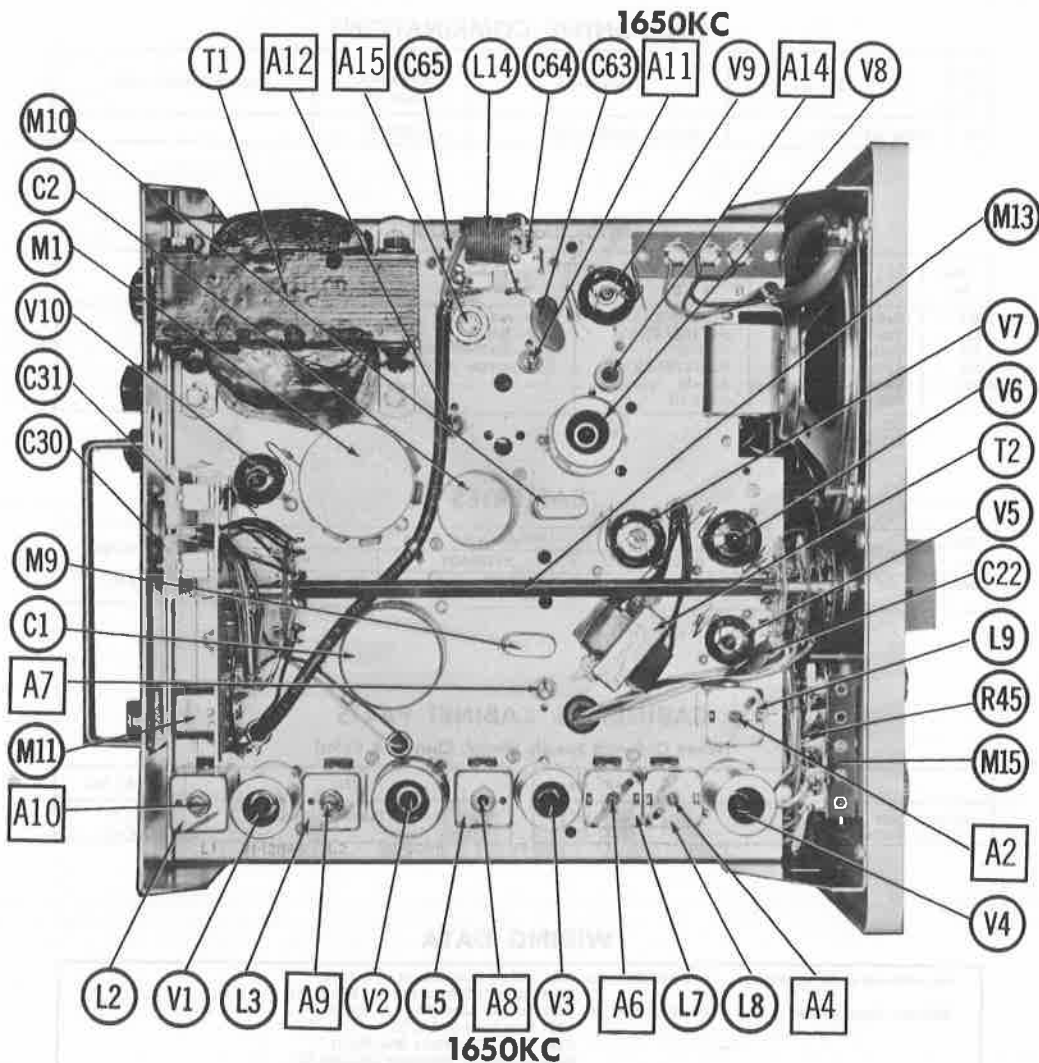


PHOTOFACT[®]



TRADE NAME : Raytheon Model Ray-Tel TWR-3
 SUPPLIER : Raytheon Co., Distributor Products Div.
 411 Providence Turnpike, Westwood, Mass.
 TYPE SET : 10 Tube Transceiver
 POWER SUPPLY : 110 - 120 Volts AC, 60 Cycles (or)
 12 Volt Storage Battery
 RATING : 65 Watts, .65 Amp. @117VAC (Rec.)
 69 Watts, .69 Amp. @117VAC (Trans.)
 TUNING RANGE : Channel 11 and any 9 CB Channels thru 23
 Receiver may be continuously variable.

RAYTHEON MODEL RAY-TEL TWR-3



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

ALIGNMENT INSTRUCTIONS

Suggested Alignment Tools:

A1 thru A6.....GENERAL CEMENT #5907, 8607, 8727
 WALSCO #2515
 A8, A13, A14..... GENERAL CEMENT #8606, 9295, 8282
 WALSCO # 2526, 2543, 2544, 2545
 A7, A9, A10, A11, A12... GENERAL CEMENT #8196, 8722, 8272
 WALSCO #2515, 2516, 2518, 2519, 2525
 Trimmers C30A, B, C, D, E and C31A, B, C, D, E are used for precise adjustment of channel crystals.

RECEIVER ALIGNMENT

Set volume at **MINIMUM**. Set squelch for maximum sensitivity.
 Output of signal generator should be no higher than necessary to obtain a usable indication.

SIGNAL GENERATOR	CHANNEL	ADJUST	REMARKS
High side thru .01mfd to pin 7 (grid) of V3 (2nd Mixer), low side to ground. Tune to 250KC, 400v Mod.	Any	A1 thru A6	Adjust for maximum deflection on "S" meter.
Across antenna jack. Tune to channel frequency.	Center Channel Used.	A7	Set selector switch (M13) to maximum counterclock-wise (Tune), and tuning dial to center channel used. Adjust for maximum deflection on "S" meter.
"	"	A8, A9, A10	Set selector switch (M13) to channel "A". Adjust for maximum indication on "S" meter.

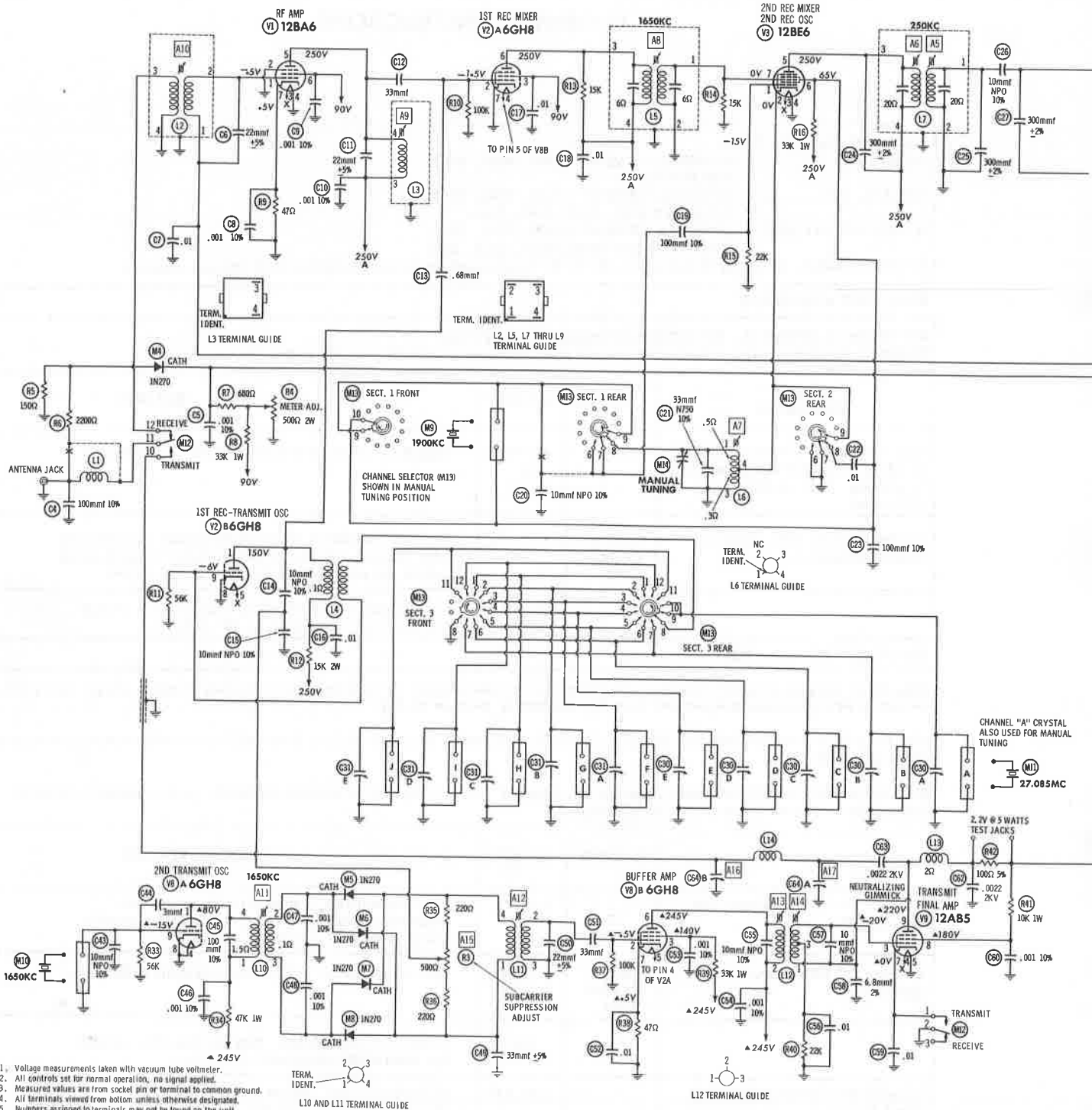
TRANSMITTER ALIGNMENT

Only those persons properly licensed are permitted to make repairs or adjustments which may result in illegal operation. (Refer to FCC rules and regulations Part 19, Subpart D, Section 19. 71).

The frequency of the transmitter should be checked periodically with a secondary frequency standard to insure proper and legal operation.

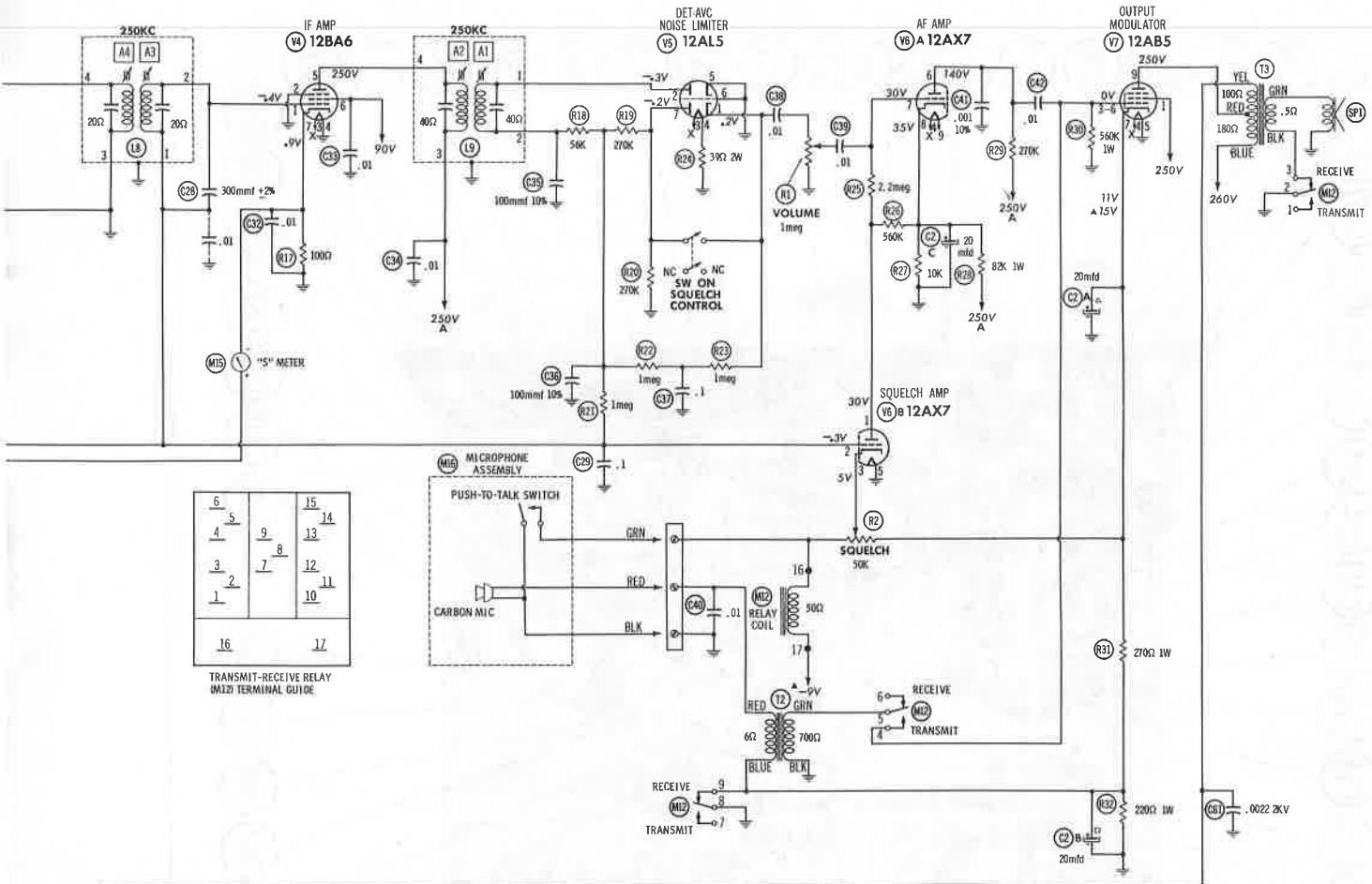
Best results will be obtained when adjusting the final RF output circuit if the antenna normally used is connected and the chassis is as nearly in the cabinet as possible.

SIGNAL GENERATOR	CHANNEL	ADJUST	REMARKS
Connect DC VTVM across R33 (Pin 9, V8).		A11	Key transmitter. Adjust A11 for maximum deflection. Back off 1 turn. Check all channels used, to be sure oscillator starts.
Connect DC VTVM across R40 (grid V9).	Center Channel Used.	A12, A13, A14	Key transmitter. Adjust for maximum deflection.
"	"	A15	Remove crystal (M10). Key transmitter. Adjust for MINIMUM indication (.2 Volt).
Connect DC VTVM across R42 (Test Jacks).	"	A16, A17	Key transmitter. Adjust A17 for MINIMUM deflection. Adjust A16 For maximum deflection. Repeat adjustments until an indication of 2.2 Volts (22ma) is obtained.



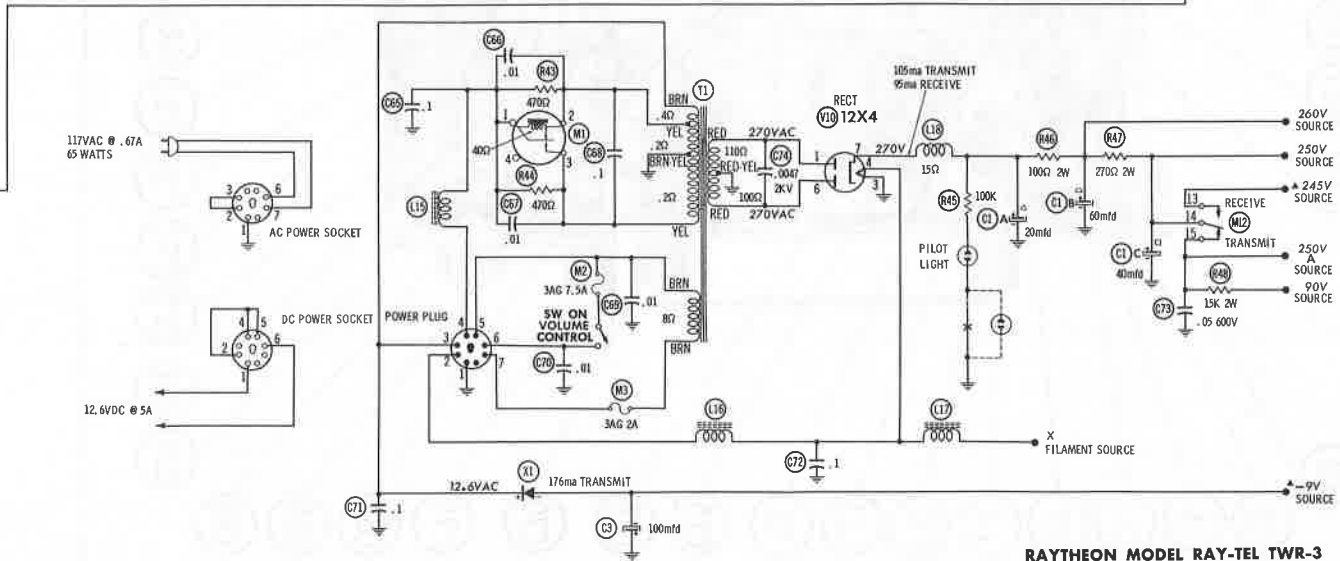
1. Voltage measurements taken with vacuum tube voltmeter.
2. All controls set for normal operation, no signal applied.
3. Measured values are from socket pin or terminal to common ground.
4. All terminals viewed from bottom unless otherwise designated.
5. Numbers assigned to terminals may not be found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

A PHOTOFAC STANDARD NOTATION SCHEMATIC
 ©Howard W. Sams & Co., Inc. 1964

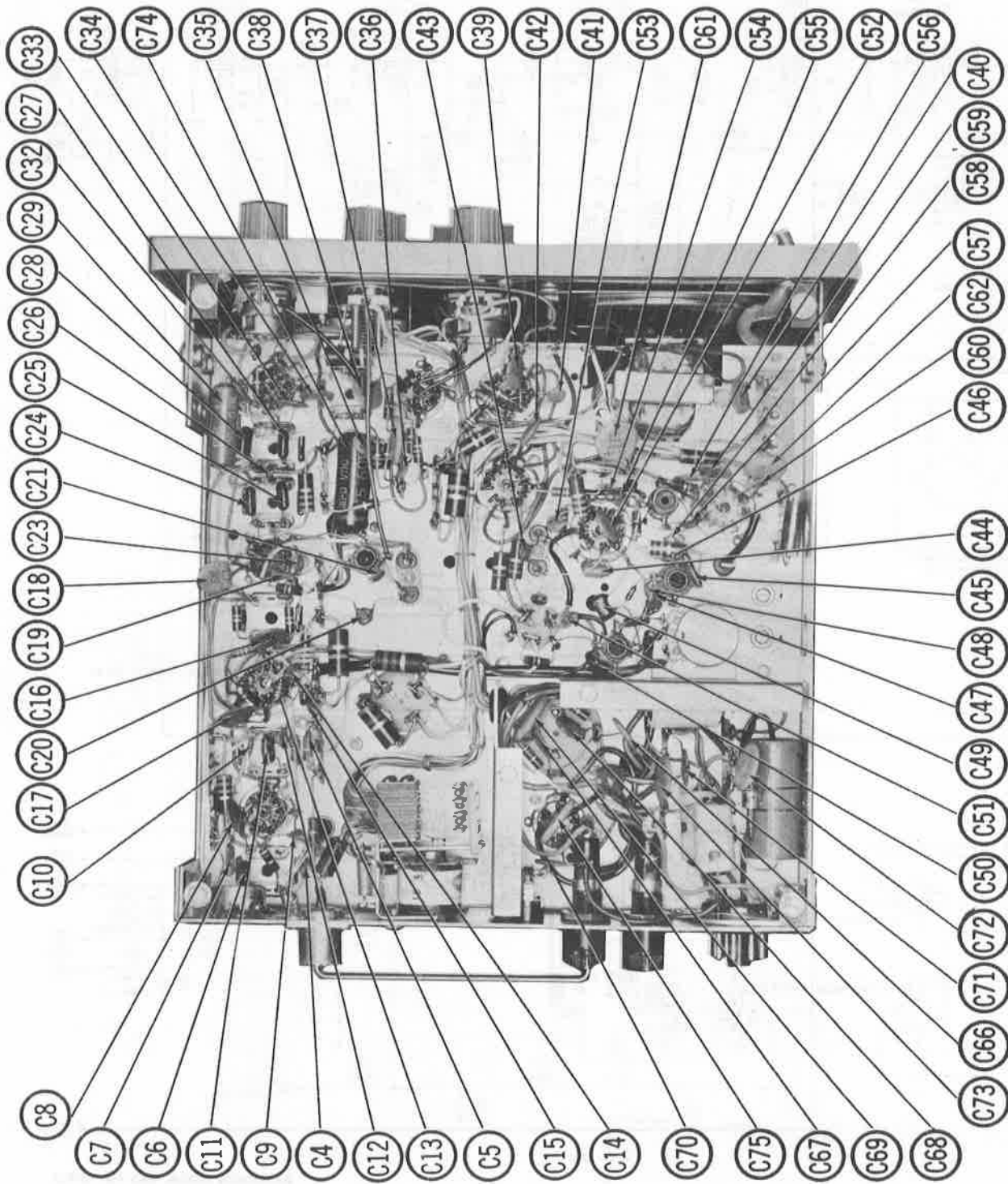


6	5	15	14
4	9	13	
3	7	12	
2		11	
1		10	
16		17	

TRANSMIT-RECEIVE RELAY (M12) TERMINAL GUIDE



RAYTHEON MODEL RAY-TEL TWR-3



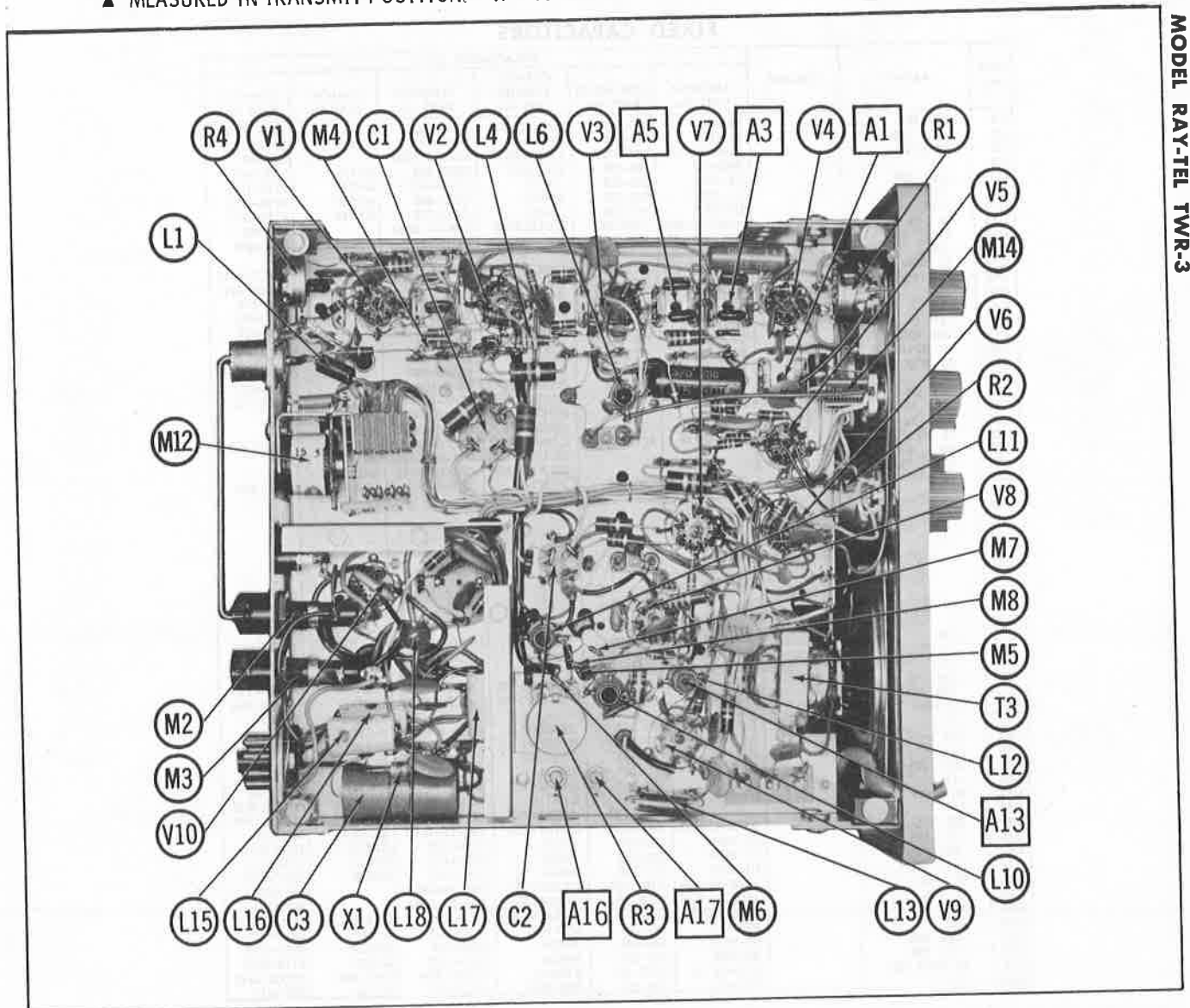
RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BA6	1.5meg	0Ω	FIL	FIL	†385Ω	†15K	47Ω		
V2	6GH8	†15K	100K	† 15K	FIL	FIL	†385Ω	0Ω	0Ω	56K
V3	12BE6	22K	.3Ω	FIL	FIL	†385Ω	†33K	5Ω		
V4	12BA6	1.5meg	0Ω	FIL	FIL	†385Ω	† 15K	95Ω		
V5	12AL5	2.6meg	596K	FIL	FIL	0Ω	0Ω	270K		
V6	12AX7	†600K	1.5meg	12K	FIL	FIL	†285K	2.7meg	9500Ω	NC
V7	12AB5	†385Ω	TP	▲ 700Ω 560K	FIL	FIL	▲700Ω 560K	▲490Ω 270Ω	NC	†295Ω
V8	6GH8	†▲47K	100K	†▲33K	FIL	FIL	†▲385Ω	47Ω	0Ω	56K
V9	12AB5	NC	NC	22K	FIL	FIL	NC	▲0Ω	†▲10K	†▲495Ω
V10	12X4	110Ω	NC	FIL	FIL	NC	100Ω	150K		

ALL MEASUREMENTS MADE IN RECEIVE POSITION UNLESS OTHERWISE DESIGNATED.

† MEASURED FROM PIN 7 OF V10 NC NO CONNECTION

▲ MEASURED IN TRANSMIT POSITION. TP TIE POINT



RAYTHEON MODEL RAY-TEL TWR-3

PARTS LIST AND DESCRIPTION

TUBES

◆ AMPEREX ◆		GENERAL ELECTRIC ◆		RCA ◆		RAYTHEON ◆		SYLVANIA ◆	
ITEM No.	USE	TYPE		ITEM No.	USE	TYPE			
V1	RF Amp.	12BA6		V6	AF Amp. -Squelch Amp	12AX7			
V2	1st Rec. Mixer-	6GH8		V7	Output-Modulator	12AB5			
V3	2nd Rec. Mixer-Osc.	12BE6		V8	2nd Transmit Osc. -	6GH8			
V4	IF Amp.	12BA6		V9	Buffer Amp.	12AB5			
V5	Det. -AVC-Noise Limiter	12AL5		V10	Transmit Final Amp. Rectifier	12AX4			

POWER RECTIFIERS

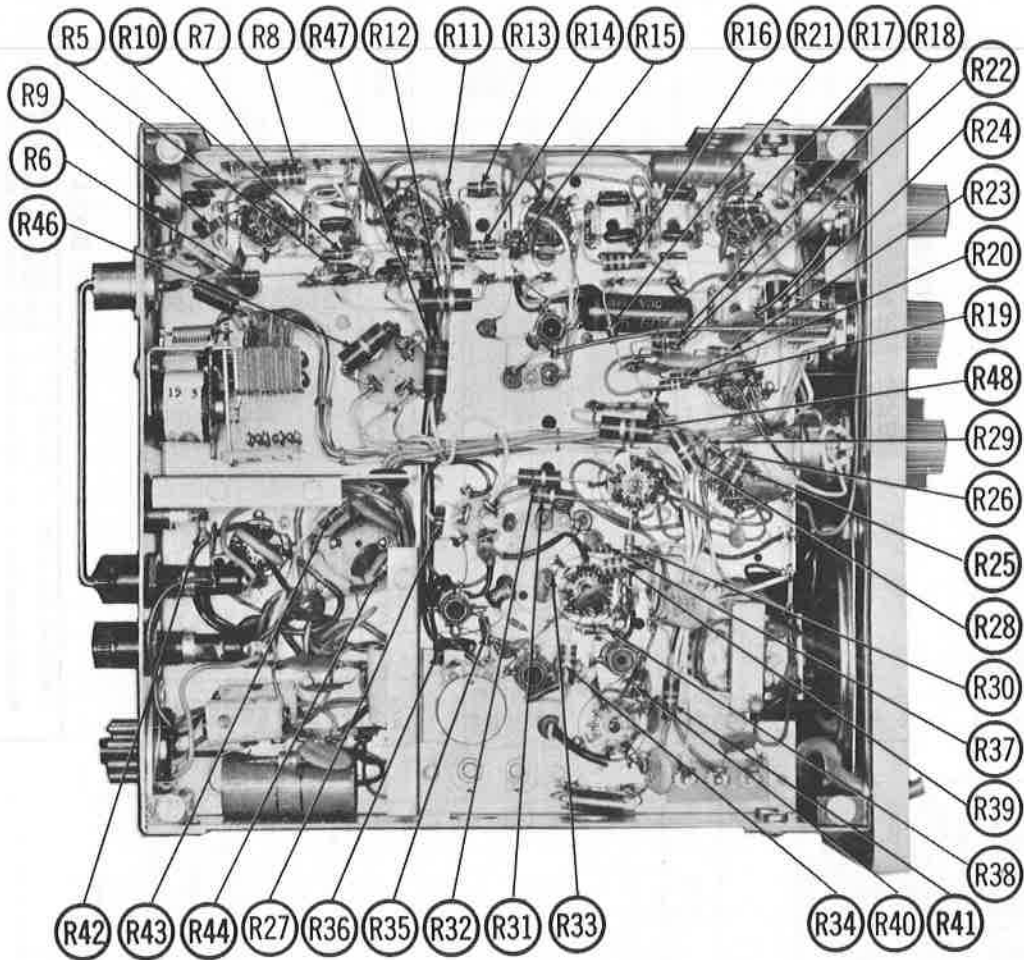
ITEM No.	MEASURED CURRENT	ORIGINAL Part or Type No.	RECTIFIERS		
			MALLORY PART No.	RCA PART No.	SARKES TARZIAN PART No.
X1	.178A	PT-505	IN537 or A100 or D100	1N2859	10H or F-1

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		RAYTHEON PART No.	REPLACEMENT DATA					
	CAP.	VOLT.		AEROVOX PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	GENERAL INSTRUMENT PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	▲ 20	300	0544	AFH3-29	C0230	XC3-30	TMT-3435	FP333.7	TVL-3688
B	▲ 60	300							
C	■ 40	300							
D	50	25							
C2A	▲ 20	150	0540	AFH3-05	XC0041	XC3-23	TMT-3112	FP311.2A	TVL-3433
B	■ 20	150							
C	20	150							
C3	100	50		PRS1360	BR100-50	QT1-23	TD-100-50	TC3501	TVA-1310

FIXED CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRAL LAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	100 10%		DI-100	DD-101	LA10T1-S3	CCD-101	GP310	10TS-T10
C5	.001 10%		DI-1000	DD-102	JB6D1	CCD-102	GP210	10TS-D10
C6	22 ±5%		ADM-15-220	CPR-22J	CD15E220J	DM-15-220J		MS-422
C7	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C8	.001 10%		DI-1000	DD-102	JB6D1	CCD-102	GP210	10TS-D10
C9	.001 10%		DI-1000	DD-102	JB6D1	CCD-102	GP210	10TS-D10
C10	.001 10%		DI-1000	DD-102	JB6D1	CCD-102	GP210	10TS-D10
C11	22 ±5%		ADM-15-220	CPR-22J	CD15E220J	DM-15-220J		MS-422
C12	33		BPD-000033	DD-330	LA10Q33-SL	CCD-330	GP433	5GA-Q33
C13	.68							
C14	10 NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C15	10 NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C16	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C17	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C18	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C19	100 10%		DI-100	DD-101	LA10T1-S3	CCD-101	GP310	10TS-T10
C20	10 NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C21	33 N750 10%		N750-DI 33	DTN-33	C10Q33U	CCTN-330	CN7-433	10TCC-Q33
C22	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C23	100 10%		DI-100	DD-101	LA10T1-S3	CCD-101	GP310	10TS-T10
C24	300 ±2%				CD15F301G	DM-15-301G	MCE241	
C25	300 ±2%				CD15F301G	DM-15-301G	MCE241	
C26	10 NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C27	300 ±2%				CD15F301G	DM-15-301G	MCE241	
C28	300 ±2%				CD15F301G	DM-15-301G	MCE241	
C29	.1 200V				PKM2P1	2DP-3-104	GEM-201	2TM-P10
C30A		#DP-305						
B								
C								
D								
E								
C31A		#DP-305						
B								
C								
D								
E								
C32	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C33	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C34	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C35	100 10%		DI-100	DD-101	LA10T1-S3	CCD-101	GP310	10TS-T10
C36	100 10%		DI-100	DD-101	LA10T1-S3	CCD-101	GP310	10TS-T10
C37	.1 100V		TTD-1				TA-010	TH-P10
C38	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C39	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C40	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C41	.001 10%		DI-1000	DD-102	JB6D1	CCD-102	GP210	10TS-D10
C42	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C43	10 NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C44	3				TCZ-3R3	CCTO-3R3	CNO-533	10TCC-V30
C45	100 10%		ADM-15-101	CPR-100J	CD15F101K	DM-15-101K	MCB235	MS-310
C46	.001 10%		DI-1000	DD-102	JB6D1	CCD-102	GP210	10TS-D10
C47	.001 10%		DI-1000	DD-102	JB6D1	CCD-102	GP210	10TS-D10
C48	.001 10%		DI-1000	DD-102	JB6D1	CCD-102	GP210	10TS-D10
C49	33 ±5%		ADM-15-330	CPR-33J	CD15E330J	DM-15-330J		MS-433
C50	22 ±5%		ADM-15-220	CPR-22J	CD15E220J	DM-15-220J		MS-422
C51	33		BPD-000033	DD-330	LA10Q33-SL	CCD-330	GP433	5GA-Q33
C52	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C53	.001 10%		DI-1000	DD-102	JB6D1	CCD-102	GP210	10TS-D10
C54	.001 10%		DI-1000	DD-102	JB6D1	CCD-102	GP210	10TS-D10
C55	10 NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C56	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10



PARTS LIST AND DESCRIPTION (CONTINUED)

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.
C57	10 NPO 10%	#DP-120	NPO-DI 10	DTZ-10	C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C58	6.8 2%		BPD-01	DD-103	BYA 10S1	CCD-103	B-110	5HK-S10
C59	.01		DI-1000	DD-102	JB6D1	CCD-102	GP210	10TS-D10
C60	.001 10%		HVD-30-2200	DD30-222	HVC20D2	3CCD-202	2HV-222	30GA-D22
C61	.0022 2KV		HVD-30-2200	DD30-222	HVC20D2	3CCD-202	2HV-222	30GA-D22
C62	.0022 2KV		HVD-30-2200	DD30-222	HVC20D2	3CCD-202	2HV-222	30GA-D22
C63	.0022 2KV		HVD-30-2200	DD30-222	HVC20D2	3CCD-202	2HV-222	30GA-D22
C64A								
C65	.1 100V		TTD-1	DD-103	BYA 10S1	CCD-103	TA-010	TH-P10
C66	.01		BPD-01	DD-103	BYA 10S1	CCD-103	B-110	5HK-S10
C67	.01		BPD-01	DD-103	BYA 10S1	CCD-103	B-110	5HK-S10
C68	.1		DF-104	DD-103	BYA 10S1	CCD-103	B-110	5HK-P10
C69	.01		BPD-01	DD-103	BYA 10S1	CCD-103	B-110	5HK-S10
C70	.01		BPD-01	DD-103	BYA 10S1	CCD-103	B-110	5HK-S10
C71	.1 100V		TTD-1				TA-010	TH-P10
C72	.1 100V		TTD-1				TA-010	TH-P10
C73	.05 800V		P688N-05	DD-503	PM6S5	6DP-3-503	GEM-615	6TM-S50
C74	.0047 2KV			DD30-472	HVC20D5	3CCD-502	2HV-247	30GA-D47

Raytheon Part Number.

PARTS LIST AND DESCRIPTION (CONTINUED)

CONTROLS

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

ITEM No.	USE	REPLACEMENT DATA				
		RAYTHEON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-HRC PART No.	MALLOY PART No.
R1	Volume & Switch	DP-172 (0868-02)	F2-1meg, SU204, KR-1 or (B-70-S)	A47-1meg-Z, RS-2, SWB-12	Q19-137, PQ, 76-1 or (BU2, CF26, SS5, GC)*	UA16A, SL2500, US-41 or (RU16A, SL38, SL2500, US-41) or (U53, US-26)
R2	Squelch & ANL Switch	DP-179 (0953)	F1-50K, SU204, (B-31, KR-2)	A47-50K-S, FS-3, SWB-20	Q11-123, 76-2, or (BU2, CFI2, SSI, WF)*	UA54L, SF1000, US-42 or (U55, US-27)
R3	Subcarrier Suppression Adjust	(0941-20)	F1-500, SK010, or (B-4)	A47-500-S, FKS-1/2	B11-103, SK2, or (BU1, CF4, SS2, DC1)*	UA52L, SK1000, or SK1000 or (U2)
R4	Meter Adjust	500022W	(63-15)	U39-500	110-600	PFL-600

* "SNAPTROL"

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		RAYTHEON PART No.	MILLER PART No.	STANCOR PART No.	WORKMAN PART No.		
L1	Ant. Load(14 Turns)	DP-166					
L2	Antenna	DP-167					
L3	Receiver RF						
L4	Rec.-Trans. Osc.						
L5	1650KC IF						
L6	2nd Rec. Osc.	DP-168					
L7	1st 250KC IF	DP-171	12-H1	RTC-8638	T604		
L8	2nd 250KC IF	DP-171	12-H1	RTC-8638	T604		
L9	3rd 250KC IF	DP-171	12-H2	RTC-8639	T605		
L10	2nd Trans. Osc.	DP-169					
L11	Buffer Input	DP-178					
L12	Trans. Amp.	DP-165					
L13	Final RF Choke	DP-109					
L14	Ant. Load						
L15	Hash Choke	DP-106					
L16	Hash Choke	DP-106					
L17	Hash Choke	DP-106					
L18	RF Choke(500uh)	DP-106	6174	RTC-8592	T324		

TRANSFORMER (POWER)

ITEM No.	RATING	REPLACEMENT DATA					NOTES
		RAYTHEON PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	117V @ .69A 12.6V 530VCT CT @ .105A 3.1A DC	DP-112					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO	REPLACEMENT DATA					NOTES
		RAYTHEON PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T2	1: 34.5	DP-176	A-2929①	A-4706①	MI-T85 ①	A-1X①	① Drill New Mounting Hole (s).

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE	REPLACEMENT DATA					NOTES	
		PRL	SEC.	RAYTHEON PART No.	MERIT PART No.	STANCOR PART No.		THORDARSON PART No.
T3	5900Ω Tap @ 2700Ω		3-4Ω	DP-177				

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		RAYTHEON PART No.	QUAM PART No.	
SP1	4" PM 3-4Ω	DP-114	4A07	

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA		NOTES
				RAYTHEON PART No.	CORNELL-DUBILIER PART No.	
M1	Interrupter	12V	115 ϕ	DP-137	G1601	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA				
			RAYTHEON PART No.	FUSE	HOLDER	LITTELFUSE PART No.	BUSS PART No.
M2	3AG	7.5A					
M3	3AG	2A					

MISCELLANEOUS

ITEM No.	PART NAME	RAYTHEON PART No.	REPLACEMENT DATA				
			RAYTHEON PART No.	FUSE	HOLDER	LITTELFUSE PART No.	BUSS PART No.
M4	Meter Rectifier						
M5	Ring Modulator Diode						
M6	Ring Modulator Diode						
M7	Ring Modulator Diode						
M8	Ring Modulator Diode						
M9	Crystal						
M10	Crystal						
M11	Relay						
M12	Switch						
M13	Tuning Cap.						
M14	"S" Meter						
M15	Microphone Ass'y.						
M16	Microphone Ass'y.						

WIRING DATA

General-use Hook-up Wire Use BELDEN No. 8530 (Solid) Available in 12 Colors
 Shielded Antenna Lead Use BELDEN No. 8524 (Stranded) Available in 12 Colors
 Coiled Microphone Cable Use BELDEN No. 8214 Low Loss (RG-8/U Type)
 Ignition Noise Suppression Use BELDEN No. 8237 Low Loss (RG-8/U Type)
 Bonding Strap Use BELDEN No. 8240 (Solid) Miniature (RG-58/U)
 8259 (Stranded) Miniature (RG-58/U)
 8496 3 Conductor-1 Shielded for Press-to-Talk (Neoprene)
 7300-Series Spark-Plug Sets
 8661 (3/8 In.)