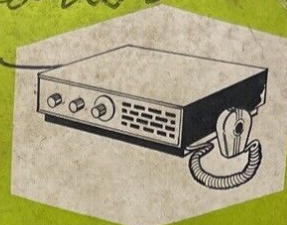


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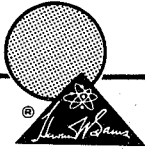
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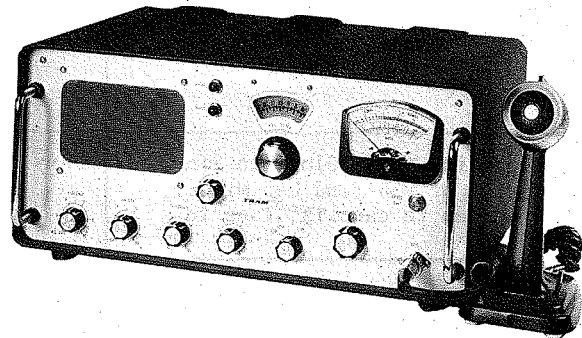
NOTE

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 95, SUBPARTS C & D.)

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.

Connect either 50-ohm dummy load or the normally used antenna system.



TRAM MODEL TITAN II

ALIGNMENT INSTRUCTIONS

Suggested Alignment Tools:

A1,A2,A3,A4,A8,A10 thru A13,A15,A16,A22,A23,A24..GENERAL CEMENT #8606,8869,9295

WALSCO #2543, 2544, 2588

A5,A6,A7,A9,A14,A17 thru A21..GENERAL CEMENT #8868,9089....WALSCO #2541, 2587

RECEIVER

Connect a DC VTVM from point **A** to chassis. Set to indicate negative voltage. Set Fine Tuning R6 to midrange. Set volume control fully clockwise. Set Squelch control fully counterclockwise. Set RF gain control fully clockwise. Check mechanical dial setting on last mark above Channel 23.

	SIGNAL GENERATOR	CHANNEL	ADJUST	REMARKS
1.		Any	A10	Connect a DC VTVM to Pin 7 (Grid), V2B (1st Rec. Osc.). Adjust for approximately -5 Volts.
2.	High side thru .01mfd to pin 7 (Grid) of V3A (2nd Rec.Mixer), low side to chassis. Tune to 455KC.	Any	A1 thru A6	Set Mode switch to M. Adjust for maximum.
3.	High side thru .01mfd to antenna receptacle, low side to chassis. Tune to 26.975MC (Channel 2).	2	A7	Set mode switch to M. Set Dial to channel 2. Adjust for maximum then disconnect signal generator. (Press Spot switch. Output indication should be observed on S meter and DC VTVM.)
4.	High side thru .01mfd to antenna receptacle, low side to chassis. Tune to 27.085MC (Channel 11).	11	A11,A12, A13	Set mode switch to M. Tune dial to Channel 11. Detune A12 SLIGHTLY. Adjust A11, A13 for maximum. Check Spot-switch operation as explained in Step 3.
5.	High side thru .01mfd to Antenna Receptacle, low side to chassis. Tune to 26.965MC (Channel 1).	1	A9,A12	Set mode switch to M. Tune dial to Channel 1. Adjust for maximum. Check Spot-switch operation as explained in Step 3.
6.	High side thru .01 to Antenna Receptacle, low side to chassis. Tune to 27.225MC (Channel 22).	22	A8	Set Mode switch to M. Tune dial to Channel 22. Adjust for maximum. Check Spot-switch operation as explained in Step 3. Tune thru all channels. Output should be equal on all channels; if not, repeat above step.

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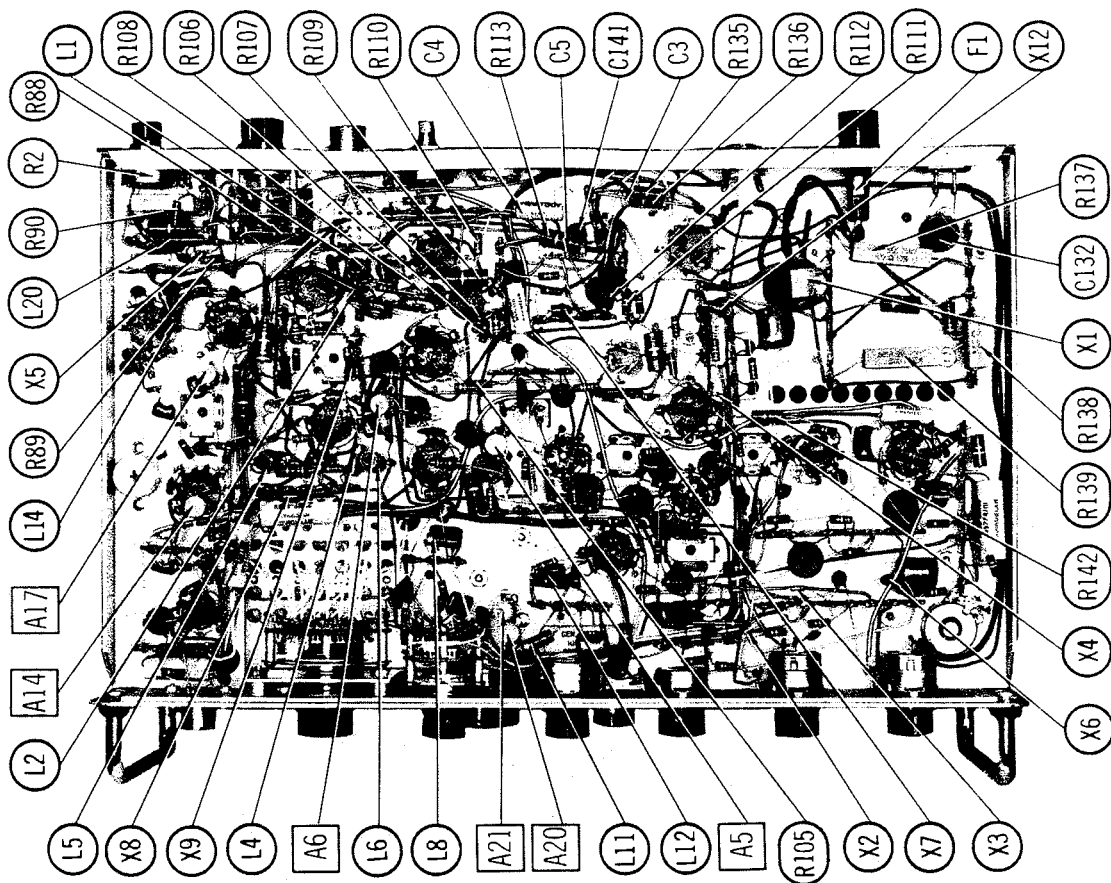
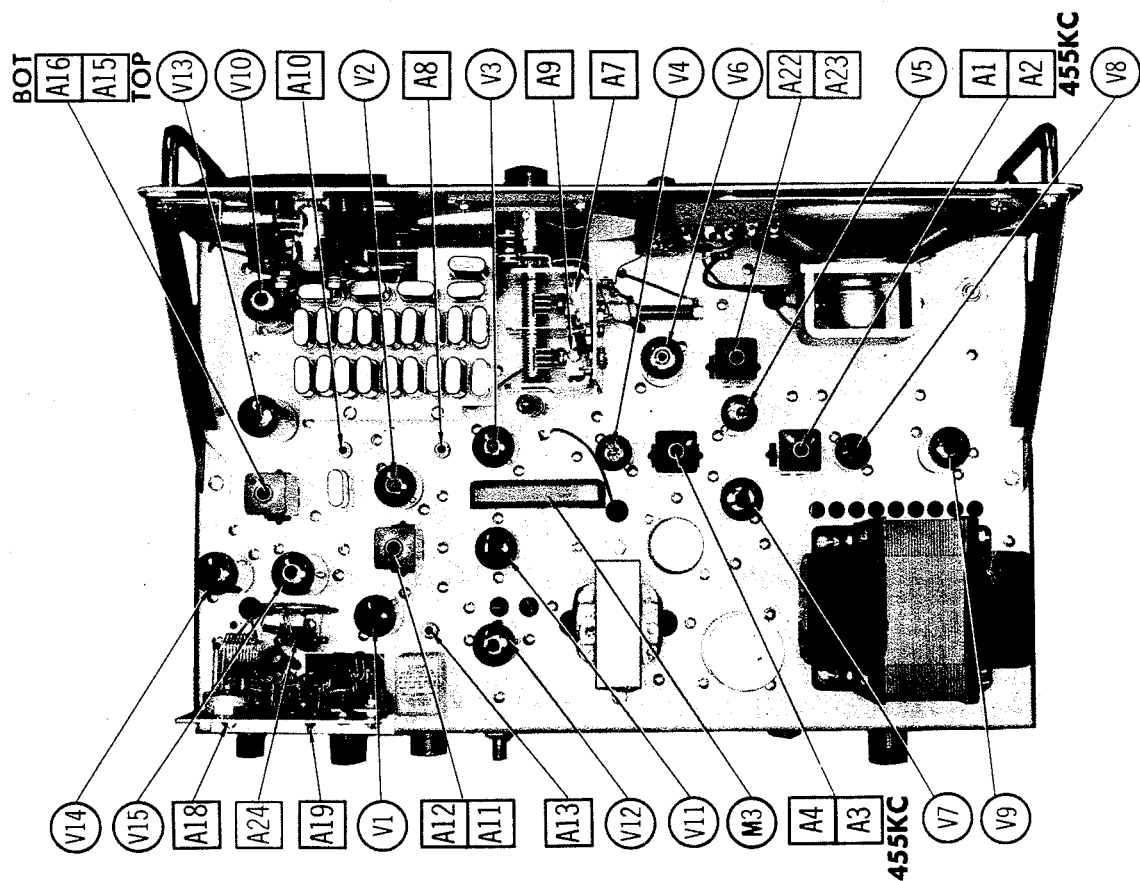
TRAM MODEL TITAN II

ALIGNMENT INSTRUCTIONS (Continued)

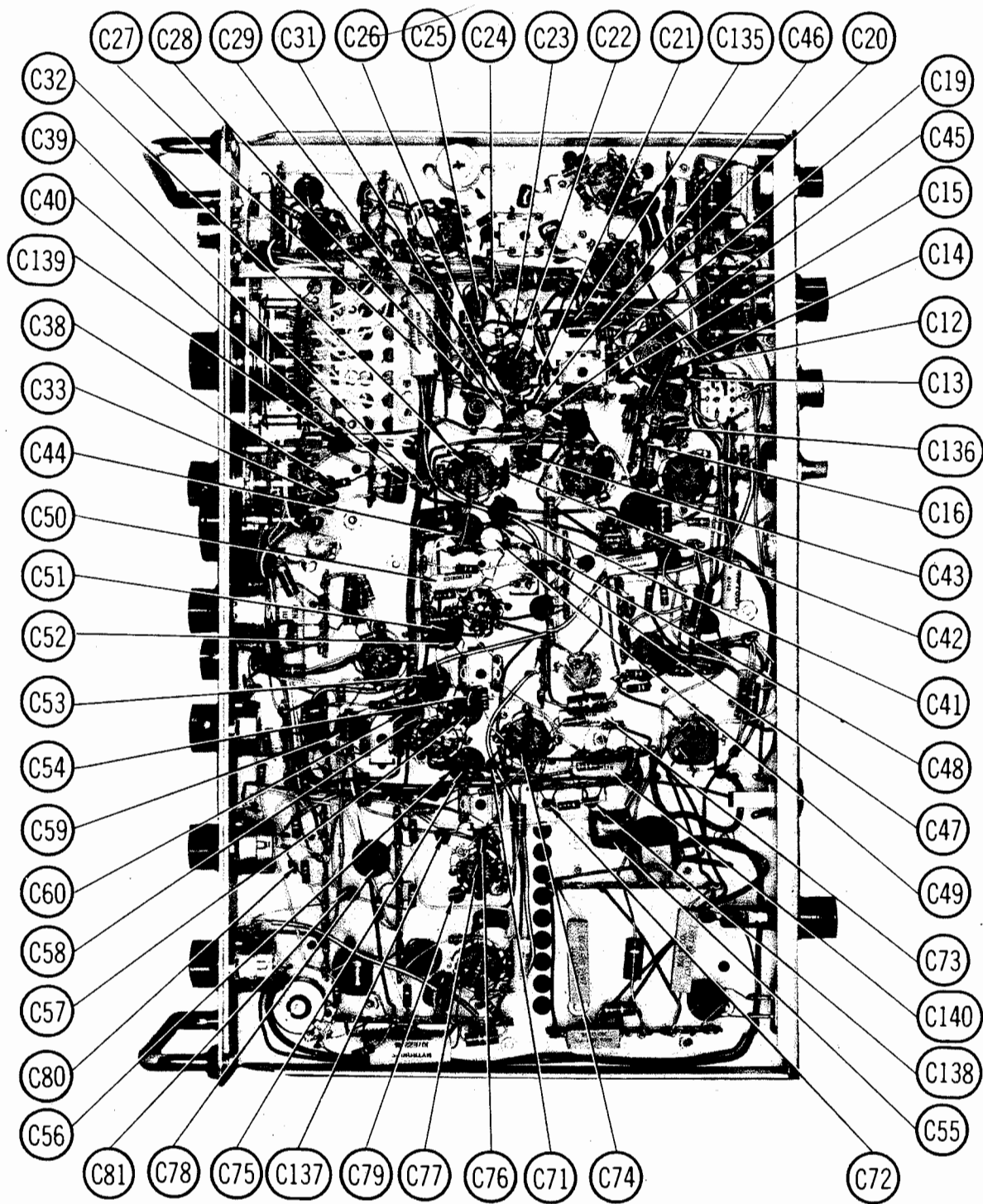
	SIGNAL GENERATOR	CHANNEL	ADJUST	REMARKS
7.		Any	R11	Adjust so S meter reads zero with no signal.
8.	High side thru .01mfd to antenna receptacle, low side to chassis. Tune to 27.085MC (Channel 11) (50 microvolts output).	11	R3,R10	Set Mode switch to M. Tune dial to Channel 11. Adjust R3 for S9 indication on S meter. Increase the signal 40db and adjust R10 for 40db over S-9. Repeat as required until no further improvement is noted.
9.	High side thru .01mfd to Pin 7 (Grid) of V3A (2nd Rec.Mixer), low side to chassis. Tune to 456KC.	Any	A20	Set Mode Switch to LSB. Adjust A20 for zero beat.
10	High side thru .01mfd to Pin 7 (Grid) of V3A (2nd Rec.Mixer), low side to chassis. Tune to 454KC.		A21	Set Mode Switch to USB. Adjust A21 for zero beat.
11		Any	A22,A23	Set Mode switch to USB. Tune generator to produce a 1000-cycle beat. Adjust for maximum audio output. Set Mode switch to LSB and retune generator for a 1000-cps beat. The audio level should be approximately equal to the audio level received on USB. If not, retune A22,A23 so that the 1000-cycle audio beats are equal.

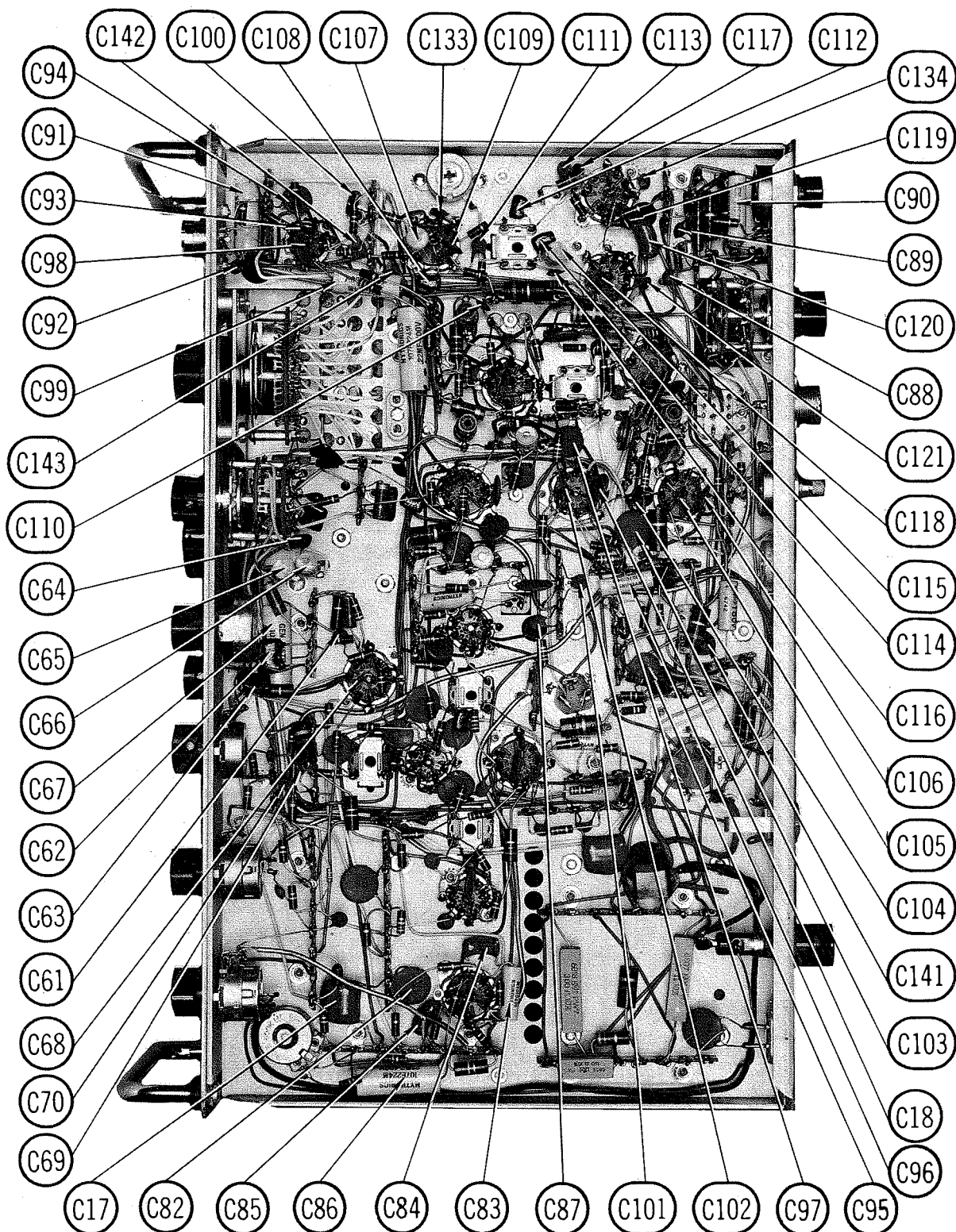
TRANSMITTER

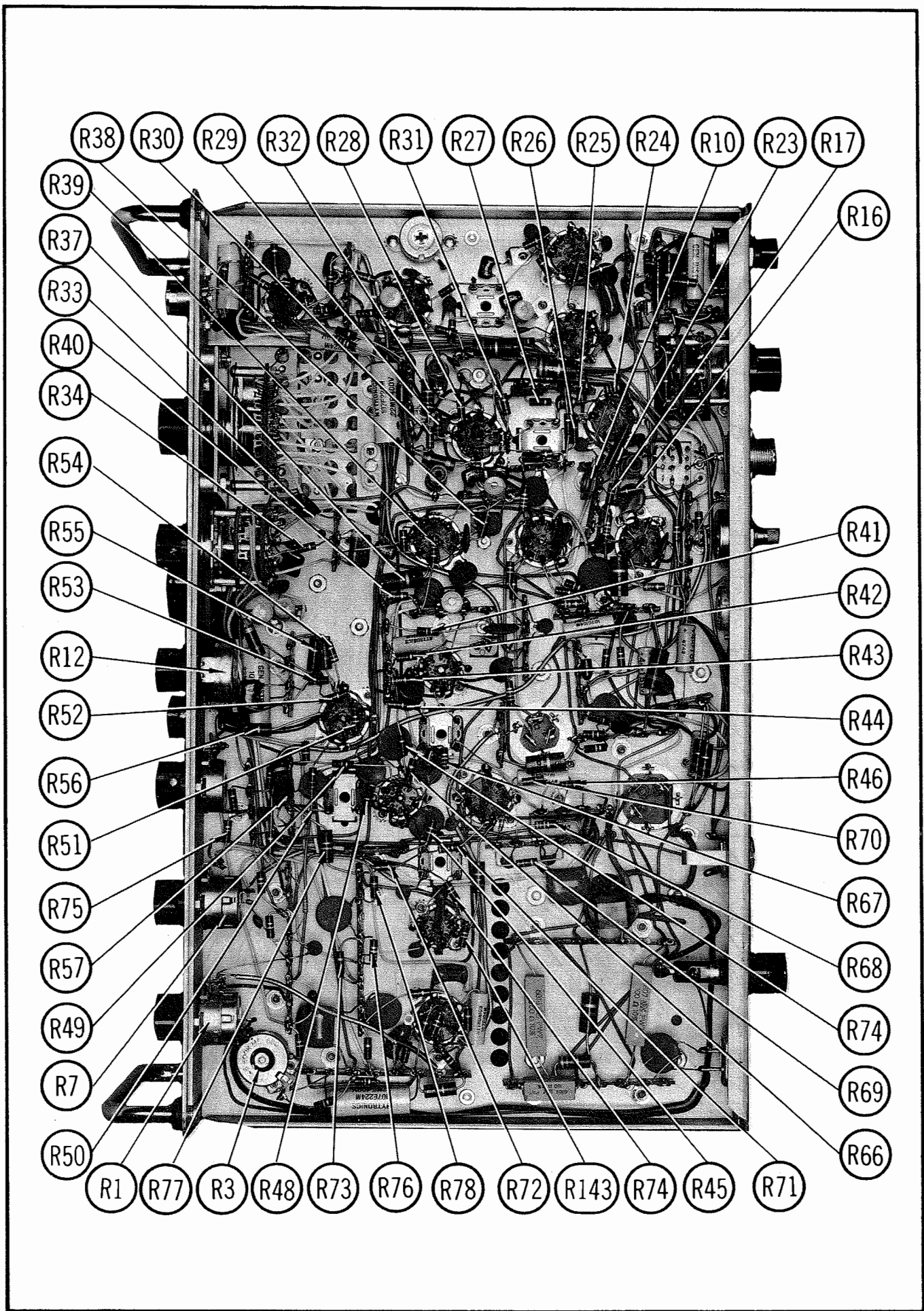
	INDICATOR	ADJUST	REMARKS
12	DC VTVM connected to Pin 2 of V14 (Final Amp), common to ground.	A15,A16, A17	Set S3 (Meter Switch) to PWR INT. LOAD. Set Channel selector to Channel 12. Key Transmitter. Adjust A17 for maximum. Detune A16 and tune A15 for maximum. Adjust A16 for maximum.
13	RF Wattmeter or Field Strength Meter or Power Meter on front panel.	A18,A19, A24	Key Transmitter. Adjust for maximum.
14	Accurate frequency meter	A14	Check for on -frequency operation. If all channels are off in the same direction A14 may be used for correction. Individual channel variations are usually a result of defective crystals.
15	DC VTVM connected to Pin 2 (Suppressor Grid) of V10 (Mic. Preamp) and Modulation Indicator lamp on front panel.		Observe 12 to 15 volt meter fluctuation on loud passages while speaking into microphone, indicating compression circuitry is operating properly.
16	DC VTVM	R9	Set Mode switch to LSB or USB and adjust R9 for equal voltages on Pin 1 (cathodes) of V14 and V15 (Final Amp).
17	Accurate RF Wattmeter or Field Strength meter.	R5	Set S2 Meter Switch to PWR ANT. Key transmitter. Adjust R5 (Pwr.Cal.) control so that Panel meter reads the same as the external wattmeter. Then switch S3 meter switch to PWR. INT. LOAD. This reading should be the same as above within $\pm 5\%$ of 3.5 to 4 watts.
18	Front Panel Meter	R4	Set S3 Meter switch to SWR Cal. Tune to clear channel. Key transmitter. Adjust R4 so that meter needle is on line marked SWR Cal. on front meter scale, then set S2 Meter switch to SWR and read the SWR on the middle of the meter. Release Transmitter Key. Return S2 meter switch to S Meter for normal operation. A reading of 1.5 to 1 is optimum efficiency.

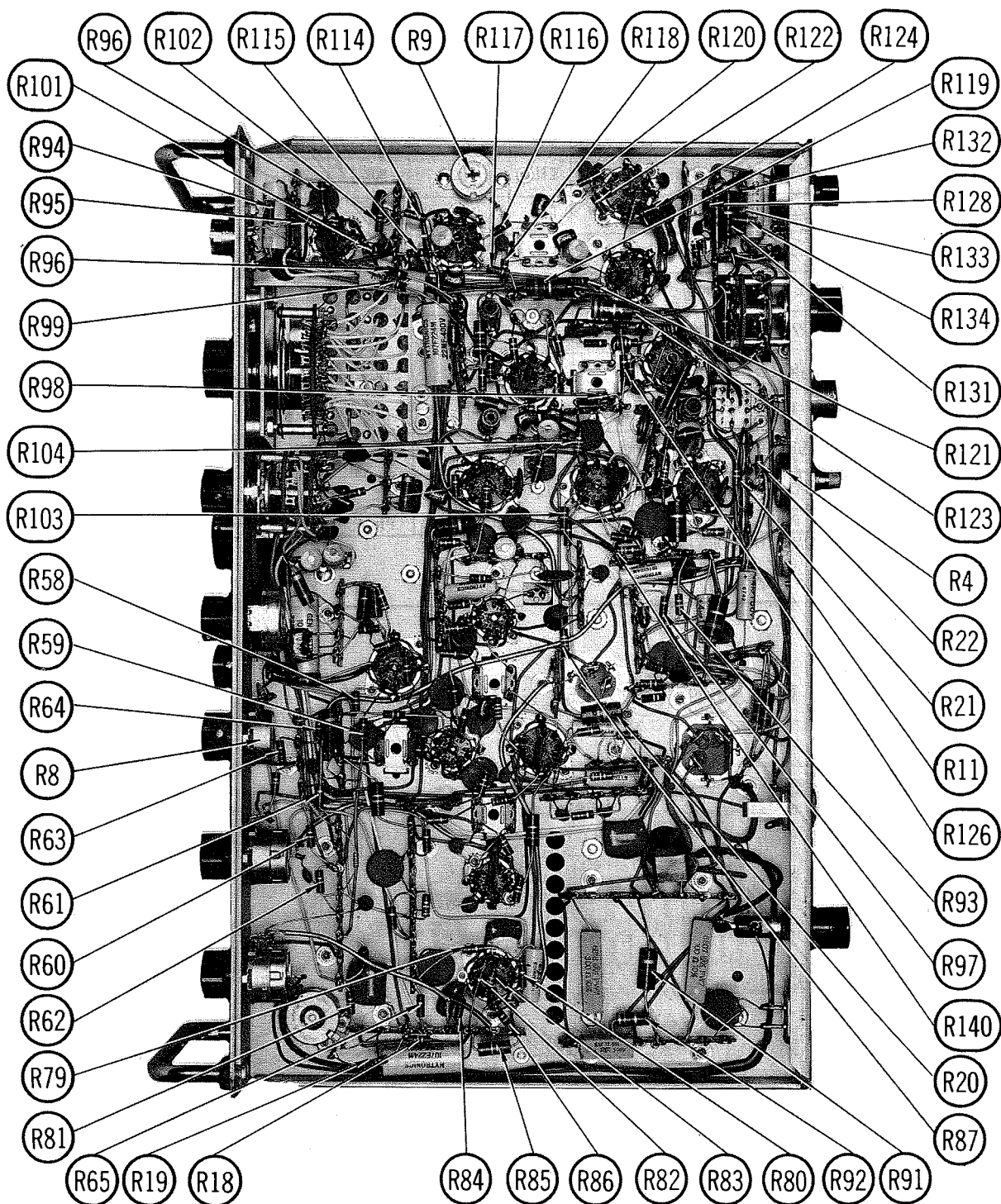


TRAM MODEL TITAN II





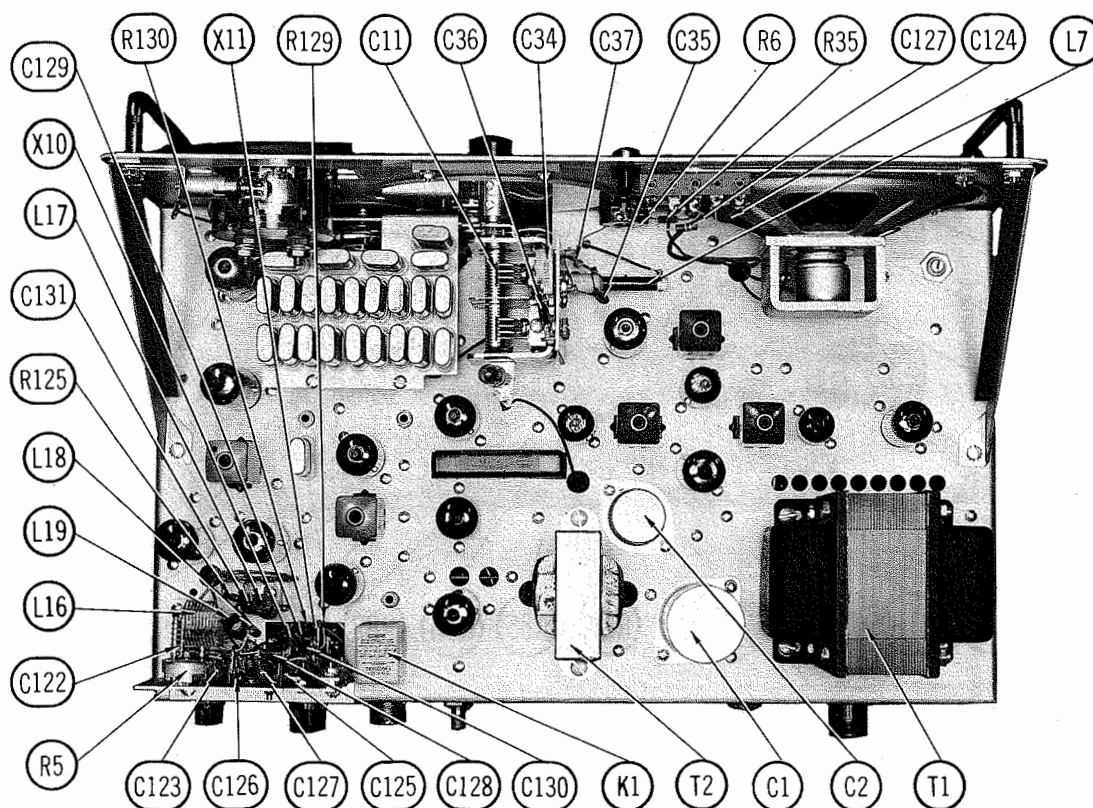




RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BQ7A	2000Ω †	280K	INF	FIL	FIL	INF	460K	220Ω	0Ω
V2	6BK7	70K †	100K	6800Ω	FIL	FIL	50K †	68K	0Ω	0Ω
V3	6BK7	24K †	22K	26Ω	FIL	FIL	55K †	.8Ω	1500Ω	0Ω
V4	6BA6	460K	0Ω	FIL	FIL	3200Ω †	48K †	100Ω		
V5	6BA6	420K	0Ω	FIL	FIL	3300Ω †	100K †	100Ω		
V6	6BA7	15K †	22K	176Ω	FIL	FIL	0Ω	100K	0Ω	115K †
V7	6EQ7	0Ω	600K	220Ω	FIL	FIL	50K †	3200Ω †	560K	0Ω
V8	6AL5	22K	120K	FIL	FIL	120K	0Ω	200K		
V9	12AX7	100K †	1.6meg	220K	FIL	FIL	1.2meg	1meg	8K	FIL
V10	6AU6	1.2meg	2meg	FIL	FIL	330K †	730K	0Ω		
V11	6BR8	220K	22K †	310Ω	FIL	FIL	100K †	1meg †	2200Ω	2.2meg
V12	6GK6	150Ω	470K	0Ω	FIL	FIL	NC	340 †	550Ω †	0Ω
V13	12BY7	INF	68K	0Ω	FIL	FIL	FIL	3450Ω†	24K †	0Ω
V14	6GK6	100Ω	33K	0Ω	FIL	FIL	NC	2200Ω†	24K †	0Ω
V15	6GK6	0Ω	33K	0Ω	FIL	FIL	NC	2500Ω†	24K †	0Ω
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

† MEASURED FROM OUTPUT OF X1.



PARTS LIST AND DESCRIPTION

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

TUBES

AMPEREX			GENERAL ELECTRIC		RCA		SYLVANIA	
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	RF Amp	6BQ7	V9	Squelch Amp - AF Amp	12AX7			
V2	1st Rec. Mixer-Osc	6BK7	V10	Mic Preamp	6AU6			
V3	2nd Rec. Mixer-Osc	6BK7	V11	AF Amp - "S" Meter Amp	6BR8			
V4	1st IF Amp	6BA6	V12	AF Output - Modulator	6GK6			
V5	2nd SB IF Amp	6BA6	V13	Transmit Osc	12BY7			
V6	Product Detector	6BA7	V14	RF Final	6GK6			
V7	2nd AM IF Amp - AGC	6EQ7	V15	RF Final	6GK6			
V8	Detector - ANL	6AL5						

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MFR. PART OR TYPE No.	REPLACEMENT RECTIFIERS & DIODES			REPLACEMENT RECTIFIERS	NOTES
		GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	SYLVANIA PART No.	RCA PART No.	
X1	A-0205, SBR-260	GE-504A	18DB8A or 8D6	ECG 116 or ECG 117	SK3017A or SK3032	4 Required
X2	1N3064					
X3	1N3064					
X4	1N67	26 1N34AS	1N34A	ECG 109		
X5	1N67	26 1N34AS	1N34A	ECG 109		
X6	SI-600	GE-504A	8D6	ECG 116		
X7	SI-600	GE-504A	8D6	ECG 116		
X8	SI-600	GE-504A	8D6	ECG 116		
X9	SI-600	GE-504A	8D6	ECG 116		
X10	1N67	26 1N34AS	1N34A	ECG 109		
X11	1N67	26 1N34AS	1N34A	ECG 109		
X12	SI-600	GE-504A	8D6	ECG 116		

ELECTROLYTIC CAPACITORS

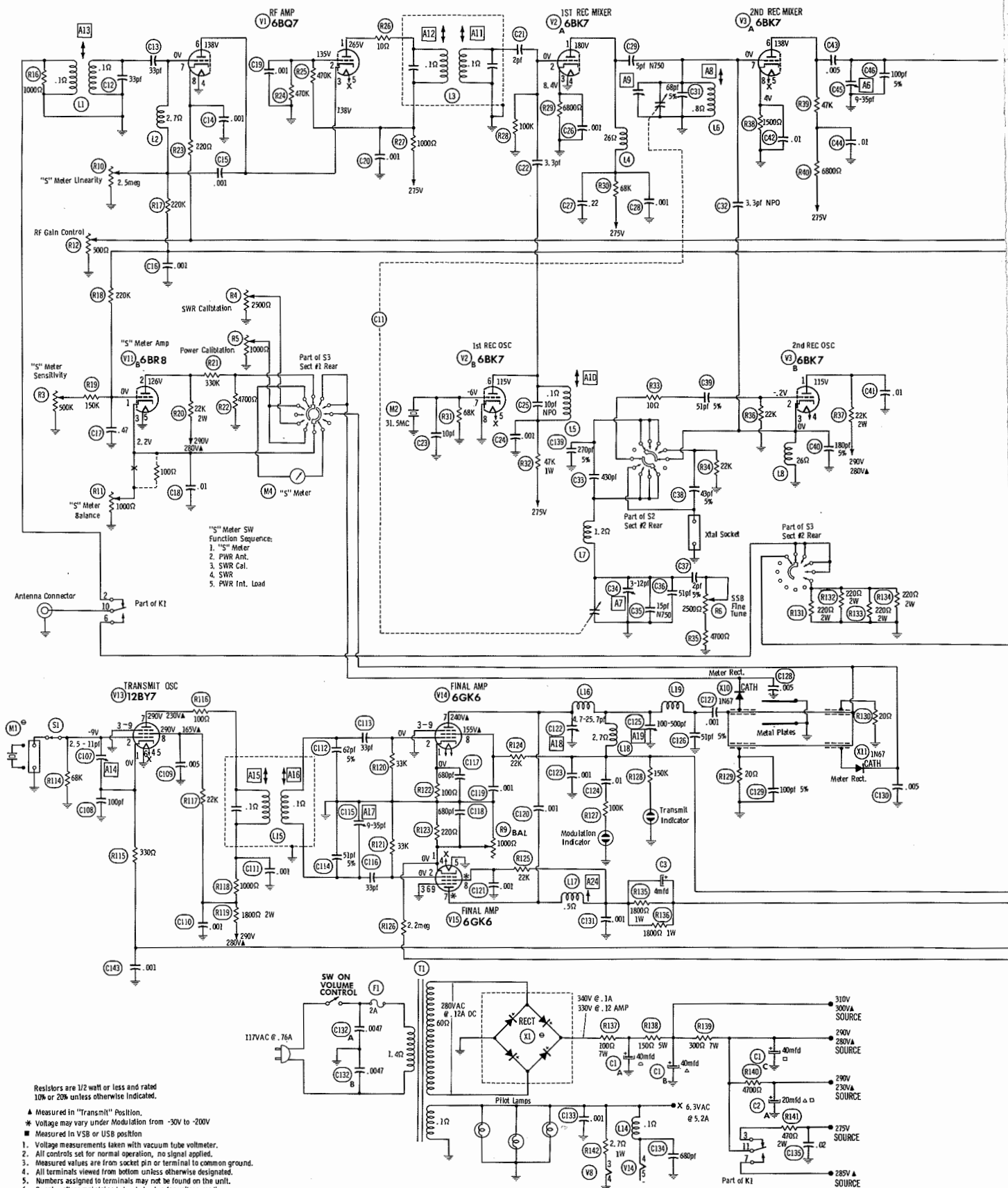
ITEM No.	RATING	REPLACEMENT DATA						
		PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	40 450V		AFH3-44		CC0260A	XC3-40	FP377.1A	TVL-3787
B	40 450V							
C	40 450V							
C2A	20 450V						FP345.2	TVL-3731
B	20 25V							
C3	4 150V		CRE953A		AL5-150	MT1-4	TT150X4	TE-1503
C4	4 150V		CRE953A		AL5-150	MT1-4	TT150X4	TE-1503
C5	4 150V		CRE953A		AL5-150	MT1-4	TT150X4	TE-1503

CAPACITORS

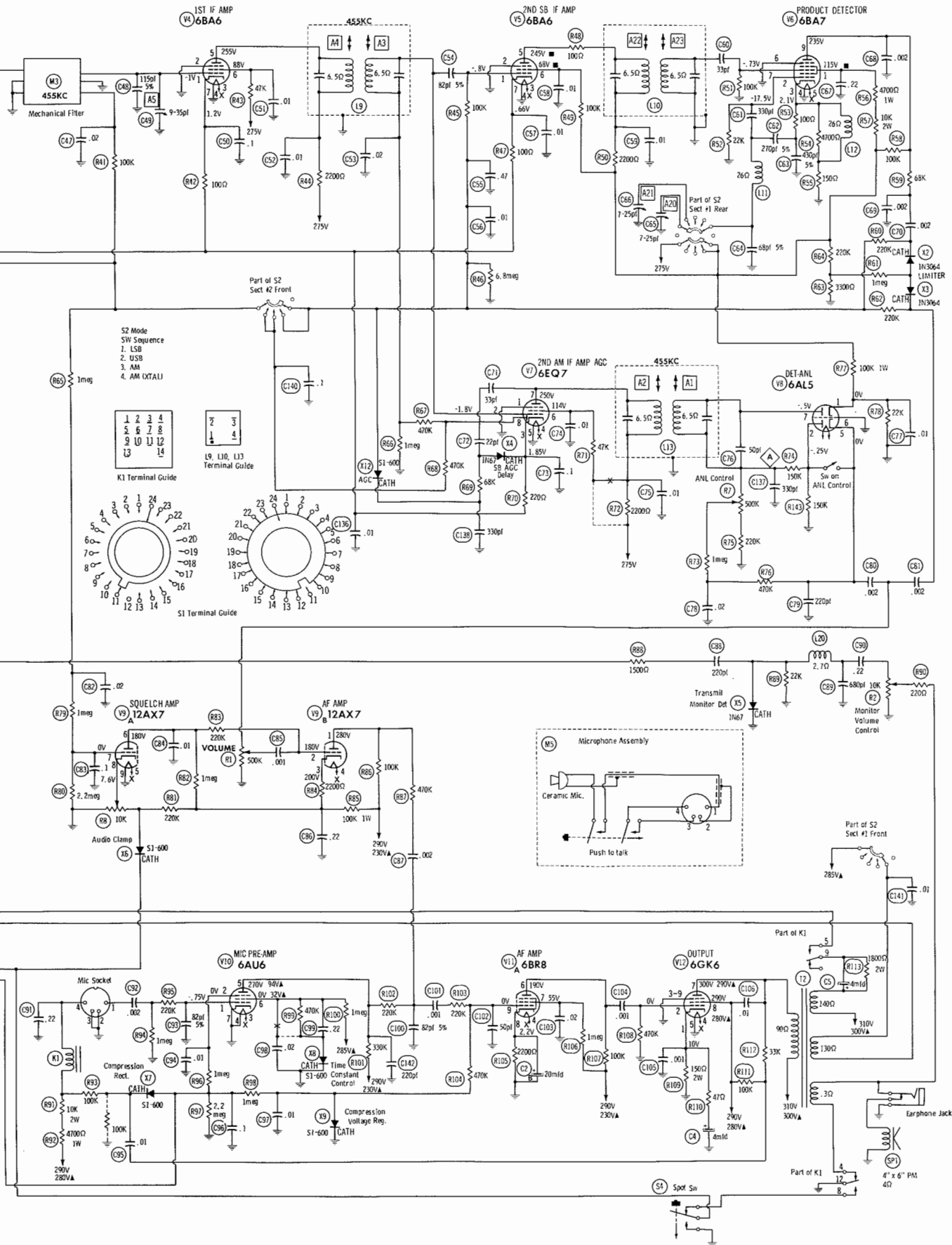
ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENC0 PART No.	MALLORY PART No.	SPRAGUE PART No.
C11								
C12	33		18 NPO-DI 33	DTZ-33	CS601C6330K	CCT0-330	CN0433	10TCC-Q33
C13	33		18 NPO-DI 33	DTZ-33	CS601C6330K	CCT0-330	CN0433	10TCC-Q33
C14	.001		36 GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C15	.001		36 GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C16	.001		36 GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C17	.47 75V		DBE2P47		DMF1P47	1DP-4-474	PVC1047	2PS-P47
C18	.01		46 GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C19	.001		36 GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C20	.001		36 GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C21	2		3 NPO-DI 2.2	DTZ-2R2	CZ601CJ2R2D		CN0522	10TCC-V22
C22	3.3		5 NPO-DI 3.3	DTZ-3R3			CN0533	10TCC-V33
C23	10		12 NPO-DI 10	DTZ-10	CZ601C6100J	CCT0-100	CN0410	10TCC-Q10
C24	.001		36 GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C25	10 NPO		12 NPO-DI 10	DTZ-10	CZ601C6100J	CCT0-100	CN0410	10TCC-Q10
C26	.001		36 GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C27	.22 400V		77 DBE6P22		DMF4P22	4DP-5-224	PVC4022	4PS-P22
C28	.001		36 GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C29	5 N750			DTN-5	CZ601UJ5R0D	CCTN-050	CN7550	10TCU-V50
C31	68 5%		ADM-15-680	CPR-68J	CD15E680J500	DM-15-680J	SX468	424MC680J501
C32	3.3 NPO		5 NPO-DI 3.3	DTZ-3R3			CN0533	10TCC-V33
C33	430		ADM-15-431	CPR-430J	CD15F431J500	DM-16-431J	SX343	424ME4300J501
C34	3-12							
C35	15 N750		N750-DI 15	DTN-15	CZ601UJ150J	CCTN-150	CN7415	10TCU-Q15
C36	51 5%		ADM-15-510		CD15E510J500	DM-15-510J		424MC510J501
C37	2		3 NPO-DI 2.2	DTZ-2R2	CZ601CJ2R2D		CN0522	10TCC-V22
C38	43 5%		ADM-15-430	CPR-43J	CD15E430J500	DM-15-430J	SX443	MS443
C39	51 5%		ADM-15-510		CD15E510J500	DM-15-510J		424MC510J501
C40	180 5%		ADM-15-181	CPR-180J	CD15F181J500	DM-15-181J	SX318	424ME1800J501
C41	.01		46 GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10

(CONTINUED ON PAGE 124)

TRAM MODEL TITAN II



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TRAM MODEL TITAN II

PARTS LIST AND DESCRIPTION (CONTINUED)

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

CAPACITORS (cont)

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.
C42	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C43	.005	44	GPD X5R502K	DD-502	JBT601YP502K	CCD-502	JF250	10TS-D50
C44	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C45	9-35							
C46	100 5%		ADM-15-101	CPR-100J	CD15F101J500	DM-15-101J	SX310	424MC1000J501
C82	.02	48	GPD Z5U203P	DD-203	BYT601ZU203Z	CCD-203	GP120	10TS-S20
C83	.1	73	DBE2P1		DMF2P1	2DP-3-104	PVC201	2PS-P10
C84	.01	59	V1614S1	CPR-10000J	DMF4S1	4DP-1-103	PVC411	4PS-S10
C85	.001	54	DBE6D1	DD-102	DMF6D1	6DP-1-102	PVC621	6PS-D10
C86	.22	77	DBE6P22		DMF4P22	4DP-5-224	PVC4022	4PS-P22
C87	.002	39	GPD X5F202K	DD-202	JBX601YP202K	CCD-202	GP220	10TS-D20
C88	.220	28	GPD X5F221K	DD-221	JBZ601YP221K	CCD-221	GP322	10TS-T22
C89	.680	39	GPD X5F681K	DD-681	JBY601YP681K	CCD-681	GP368	10TS-T68
C90	.22	77	DBE6P22		DMF4P22	4DP-5-224	PVC4022	4PS-P22
C91	.22	77	DBE6P22		DMF4P22	4DP-5-224	PVC4022	4PS-P22
C92	.002	39	GPD X5F202K	DD-202	JBX601YP202K	CCD-202	GP220	10TS-D20
C93	82 5%		ADM-15-820	CPR-82J	CD15E820J500	DM-15-820J	SX482	424MC82R0J501
C94	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C95	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C96	.1	73	DBE2P1		DMF2P1	2DP-3-104	PVC201	2PS-P10
C97	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C98	.02	48	GPD Z5U203P	DD-203	BYT601ZU203Z	CCD-203	GP120	10TS-S20
C99	.22	77	DBE6P22		DMF4P22	4DP-5-224	PVC4022	4PS-P22
C100	82 5%		ADM-15-820	CPR-82J	CD15E820J500	DM-15-820J	SX482	424MC82R0J501
C101	.001	36	GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C102	.50	19	NPO-DI 50	DTZ-50	CX601CG470K	CCTO-510	CN0450	10TCC-Q50
C103	.02	48	GPD Z5U203P	DD-203	BYT601ZU203Z	CCD-203	GP120	10TS-S20
C104	.001	36	GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C105	.001	36	GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C106	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C107	2.5-11							
C108	100 5%		ADM-15-101	CPR-100J	CD15F101J500	DM-15-101J	SX310	424MC1000J501
C109	.005	44	GPD X5R502K	DD-502	JBT601YP502K	CCD-502	JF250	10TS-D50
C110	.001	36	GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C111	.001	36	GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C112	62 5%		ADM-15-620	CPR-62J	CD15E620J500	DM-15-620J	SX462	424MC62R0J501
C113	.33	18	NPO-DI 33	DTZ-33	CS601CG330K	CCTO-330	CN0433	10TCC-Q33
C114	.51 5%		ADM-15-510		CD15E510J500	DM-15-510J		424MC51R0J501
C115	9-35							
C116	.33	18	NPO-DI 33	DTZ-33	CS601CG330K	CCTO-330	CN0433	10TCC-Q33
C47	.02	48	GPD Z5U203P	DD-203	BYT601ZU203Z	CCD-203	GP120	10TS-S20
C48	115 5%							
C49	9-35							
C50	.1 200V	73	DBE2P1		DMF2P1	2DP-3-104	PVC201	2PS-P10
C51	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C52	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C53	.02	48	GPD Z5U203P	DD-203	BYT601ZU203Z	CCD-203	GP120	10TS-S20
C54	82 5%		ADM-15-820	CPR-82J	CD15E820J500	DM-15-820J	SX482	424MC82R0J501
C55	.47							
C56	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C57	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C58	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C59	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C60	.33	18	NPO-DI 33	DTZ-33	CS601CG330K	CCTO-330	CN0433	10TCC-Q33
C61	.330	30	GPD X5F331K	DD-331	JBZ601YP331K	CCD-331	GP333	10TS-T33
C62	270 5%		ADM-15-271	CPR-270J	CD15F271J500	DM-15-271J	SX327	424ME2700J501
C63	430 5%		ADM-15-431	CPR-430J	CD15F431J500	DM-16-431J	SX343	424ME4300J501
C64	68 5%		ADM-15-680	CPR-68J	CD15E680J500	DM-15-680J	SX468	424MC68R0J501
C65	7-25							
C66	7-25							
C67	.22	77	DBE6P22		DMF4P22	4DP-5-224	PVC4022	4PS-P22
C68	.002	39	GPD X5F202K	DD-202	JBX601YP202K	CCD-202	GP220	10TS-D20
C69	.002	39	GPD X5F202K	DD-202	JBX601YP202K	CCD-202	GP220	10TS-D20
C70	.002	39	GPD X5F202K	DD-202	JBX601YP202K	CCD-202	GP220	10TS-D20
C71	.33	18	NPO-DI 33	DTZ-33	CS601CG330K	CCTO-330	CN0433	10TCC-Q33
C72	.22	15	NPO-DI 20	DTZ-20		CCTO-200	CN0420	10TCC-Q20
C73	.1	73	DBE2P1		DMF2P1	2DP-3-104	PVC201	2PS-P10
C74	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C75	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C76	.50	19	NPO-DI 50	DTZ-50	CX601CG470K	CCTO-510	CN0450	10TCC-Q50
C77	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C78	.02	48	GPD Z5U203P	DD-203	BYT601ZU203Z	CCD-203	GP120	10TS-S20
C79	.220	28	GPD X5F221K	DD-221	JBZ601YP221K	CCD-221	GP322	10TS-T22
C80	.002	39	GPD X5F202K	DD-202	JBX601YP202K	CCD-202	GP220	10TS-D20
C81	.002	39	GPD X5F202K	DD-202	JBX601YP202K	CCD-202	GP220	10TS-D20
C117	.680		GPD X5F681K	DD-681	JBY601YP681K	CCD-681	GP368	10TS-T68
C118	.680		GPD X5F681K	DD-681	JBY601YP681K	CCD-681	GP368	10TS-T68
C119	.001	36	GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C120	.001	54	DBE6D1	DD-102	DMF6D1	6DP-1-102	PVC621	6PS-D10
C121	.001	36	GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C122	4.7-25.7							
C123	.001	54	DBE6D1	DD-102	DMF6D1	6DP-1-102	PVC621	6PS-D10
C124	.01	46	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C125	100-500							
C126	51 5%		ADM-15-510		CD15E510J500	DM-15-510J		424MC51R0J501
C127	.001	54	DBE6D1	DD-102	DMF6D1	6DP-1-102	PVC621	6PS-D10
C128	.005	44	GPD X5R502K	DD-502	JBT601YP502K	CCD-502	JF250	10TS-D50
C129	100 5%		ADM-15-101	CPR-100J	CD15F101J500	DM-15-101J	SX310	424MC1000J501
C130	.005	44	GPD X5R502K	DD-502	JBT601YP502K	CCD-502	JF250	10TS-D50
C131	.001	54	DBE6D1	DD-102	DMF6D1	6DP-1-102	PVC621	6PS-D10

PARTS LIST AND DESCRIPTION (CONTINUED)

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

CAPACITORS (cont)

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.
C132A	.0047	44	GPD X5R502K	DD-502	JBT601YP502K	CCD-502	JF250	10TS-D50
B	.0047	44	GPD X5R502K	DD-502	JBT601YP502K	CCD-502	JF250	10TS-D50
C133	.001	36	GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C134	680	48	GPD X5F681K	DD-681	JBY601YP681K	CCD-681	GP368	10TS-T68
C135	.02	46	GPD Z5U203P	DD-203	BYT601ZU203Z	CCD-203	GP120	10TS-S20
C136	.01	30	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C137	330	30	GPD X5F331K	DD-331	JBZ601YP331K	CCD-331	GP333	10TS-T33
C138	330	30	GPD X5F331K	DD-331	JBZ601YP331K	CCD-331	GP333	10TS-T33
C139	270 5%	73	ADM-15-271	CPR-270J	CD15F271J500	DM-15-271J	SK327	424ME2700J501
C140	.1	46	DBE2P1		DMF2P1	2DP-3-104	PVC201	2PS-P10
C141	.01	28	GPD X5S103K	DD-103	BYX601ZU103P	CCD-103	JF110	10TS-S10
C142	220	36	GPD X5F221K	DD-221	JBZ601YP221K	CCD-221	GP322	10TS-T22
C143	.001		GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10

CONTROLS (All wattages 1/2 watt, or less, unless listed)

ITEM No.	FUNCTION	RESIST-ANCE	REPLACEMENT DATA				
			MFGR. PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1	Volume/Switch	500K	A-0093-1 (LF4422)	F2-500K,SRS010, KR-4	A47-500K-S,RS-2, SWE-13 or [NP-500K-S, UP-A-400,NWE-13]	B13-133,SK3,76-1 or [BU2,CF9,SS3,GC]*	UA55A,SL2500, US41 or [RU55A, SL38,SL2500, US41] or [U48, US26]
R2	Monitor Volume	10K	A-0133-5 (RA3633)	F1-10K,SRS010	A47-10K-S,RS-2 or [NP-10K-S, UP-A-400]	B11-116,SK3 or [BU1,CF9,SS3, DC1]*	UA14L,SL2500, or [RU14L,SL38, SL2500] or U20
R3	"S" Meter Sensitivity	500K	A-0133-3 (MW9045)	F1-500K,SRS004	A47-500K-S, FKS-1/4 or [NP-500K-S, UP-S-010]	B11-133,SK2 or [BU2,CF16,SS2, DC1]*	UA55L,SK750 or [RU55L,SL38, SK750] or U8
R4	"SWR" Calibration	2500	A-0133-4 (RA3251)	F1-2500,SRS010	A47-2500-S,RS-2 or [NP-2500-S, UP-A-400]	B11-111,SK3 or [BU1,CF9,SS2, DC1]*	UA33L,SK750 or [RU252L,SL38, SK750] or U8
R5	Power Calibration	1000, 2W	A-0092 (BE23374)	V-1000	U39-1000	112-1000 or 117R102A	MR1000F
R6	Fine Tune	2500	A-0133-1 (LH4424)	F1-2500,SRS010	A47-2500-S,RS-2 or [NP-2500-S, UP-A-400]	B11-111,SK3 or [BU2,CF9,SS3, DC1]*	UA33L,SL2500 or [RU252L,SL38, SL2500] or U8
R7	Limiters/ANL Switch	500K	A-0093-2 (LH5378)	F1-500K,SRS010, KR-1	A47-500K-S,RS-2, SWE-12 or [NP-500K-S, UP-A-400,NWE-12]	B11-133,SK3,76-1 or [BU2,CF16,SS3, GC]*	UA55L,SL2500, US41 or [RU55L, SL38,SL2500, US41] or [U50, US26]
RB	Squelch	10K	A-0133-5 (RA3633)	F1-10K,SRS010	A47-10K-S,RS-2 or [NP-10K-S, UP-A-400]	B11-116,SK3 or [BU1,CF9,SS3, DC1]*	UA14L,SL2500 or [RU14L,SL38, SL2500] or U20
R9	DC Balance	1000, 2W	A-0092 (BE23374)	V-1000	U39-1000	112-1000 or 117R102A	MR1000F
R10	"S" Meter Linearity	2.5meg	A-0221 (SL7504)	T-2meg (1)			
R11	"S" Meter Balance	1000, 2W	A-0092 (BE23374)	V-1000	U39-1000	112-1000 or 117R102A	MR1000F
R12	RF Gain	500, 2W	A-0184 (CM34698)	WW501 or WN501	A43-500,RS-2 or [NPW-500, NML-A-300]	AW500 or WPK500 or [BU1,WF20, SS6]*	MR500B or VW500 or R500L

* "SNAPTROL"

(1) Cut off one of the end terminals.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			
		PART No.	MEISSNER PART No.	MILLER PART No.	WORKMAN PART No.
L1	Receiver Antenna	A-0030			
L2	RF Choke (15uh)	A-0095-4	19-2018	72F155AP	T862
L3	Receiver RF	A-0191			
L4	RF Choke (2.2mh)	A-0095-5		4666	T876
L5	Receiver Osc	A-0029		4202	
L6	Input IF	A-0052			
L7	RF Choke (17uh)	A-0109		72F1B5AP	
L8	RF Choke (2.2mh)	A-0095-5		4666	T876
L9	Interstage IF	A-0144-1		12-C30	
L10	Interstage IF	A-0144-1		12-C30	
L11	RF Choke (2.2mh)	A-0095-5		4666	T876
L12	RF Choke (2.2mh)	A-0095-5		4666	T876
L13	Output IF	A-0144-1		12-C31	
L14	Filament Choke (4.7uh)	A-0095-2			T819
L15	Trans. Osc				
L16	Trans. Output (16uh) (8 turns)	A-0219			
L17	Trans. Output (Tunable)	A-0127			
L18	RF Choke (15uh)	A-0095-4	19-2018	72F155AP	T862
L19	TVI Filter (13 turns)	A-0126			
L20	RF Choke (15uh)	A-0095-4	19-2018	72F155AP	T862

TRAM MODEL TITAN II

PARTS LIST AND DESCRIPTION (CONTINUED)

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

TRANSFORMER (Power)

ITEM No.	RATING		REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	MFGR. PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	117VAC @ .76A	280VAC @ .12A DC*	A-0002					*Transmit
	SEC. 2	SEC. 3						
	6.3VAC @ 5.2A							

TRANSFORMER (Audio Output)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	MFGR. PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T2	4800	4	A-0226					
		SEC. 2						
		130 DC Resistance						
		SEC. 3						
		140 DC Resistance						

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		MFGR. PART No.	QUAM PART No.	
SP1	4" x 6" PM 4 ohms	A-0182	46A15	

FUSE DEVICES

ITEM No.	DESCRIPTION	REPLACEMENT DATA						
		PART No.		BUSS PART No.		LITTELFUSE PART No.		WORKMAN PART No.
		DEVICE	HOLDER	DEVICE	HOLDER	DEVICE	HOLDER	DEVICE
F1	2 A AGC			AGC 2	HDJ	312002	342001	

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
K1	Relay	A-0135	4PDT
M1	Transmitter Crystal	A-0194-*	* Insert Channel Number
	Receiver Crystal	A-0187-*	
M2	1st Rec. Osc Crystal	A-0178	31.5MC
M3	Mechanical Filter	A-0186	455KC
M4	"S" Meter	A-0233	
M5	Microphone Assembly		
S1	Switch Channel	A-0201	
S2	Switch, Mode	A-0229	
S3	Switch, Meter	A-0171	
S4	Switch, Spot	A-0192	

WIRING DATA

General-use Hook-up Wire Use BELDEN No. 8530 (Solid) Available in 12 Colors
8524 (Stranded) Available in 12 Colors
Shielded Antenna Lead Use BELDEN No. 8214 Lowest-loss (RG-8/U Type)
8237 Low-loss (RG-8/U)
8240 (Solid) Miniature (RG-58/U)
8259 (Stranded) Miniature (RG-58A/U)
Coiled Microphone Cable Use BELDEN No. 8497 3-Conductor, 1 Shielded, for Press-to-Talk (Neoprene)
8496 3-Conductor, 1 Shielded, for Press-to-Talk (Vinyl)
Ignition Noise Suppression Use BELDEN No. 7300-Series Spark-Plug Sets
Bonding Strap Use BELDEN No. 8661 (3/8 In.)



PHOTOFACT[®] with

CIRCUITRACE[®]

For Supplier Address See PHOTOFACT Index

NOTE

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 95, SUBPARTS C & D.)

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.

Connect either 50-ohm dummy load or the normally used antenna system.



JOHNSON MODEL MESSENGER 123 (242-0123B)

ALIGNMENT INSTRUCTIONS

Suggested Alignment Tools: A1 thru A18.....GENERAL CEMENT #9296, 9297, 9300
WALSCO #2510, 2546, 2547

RECEIVER

Connect AC VTVM across speaker terminals. Set Volume control to midrange. Set Squelch control fully counterclockwise.

SIGNAL GENERATOR	CHANNEL	ADJUST	REMARKS
High side thru .01mfd to Base of Q2 (Rec. Mixer), low side to ground. Tune to 455KC (Mod.).	Blank Channel	A1 thru A6	Adjust for maximum.
	23	A7	Connect RF probe of AC VTVM from CircuitTrace [51] to ground. Adjust until Oscillator starts then adjust for peak output.
	12	A8,A9	Connect RF probe of AC VTVM from CircuitTrace [51] to ground. Adjust for maximum. (Approx. 200MV MINIMUM). Check channels 1, 6, 11, 16, 20, and 23 for output.
High side thru .01 to Antenna Connector, low side to chassis. Tune to 27.085MC.	11	A10,A11, A12	Adjust for maximum.

TRANSMITTER

INDICATOR	ADJUST	REMARKS
RF Millivoltmeter	A13,A14	Connect meter from base of Q16 to CircuitTrace [1]. Adjust for maximum.
RF Wattmeter or Field Strength Meter and a 0-500 ma current meter.	A15 thru A18	Connect 0-500 ma meter in Q16 Emitter Circuit at TP1. Adjust for maximum. Meter current must not exceed 410ma.

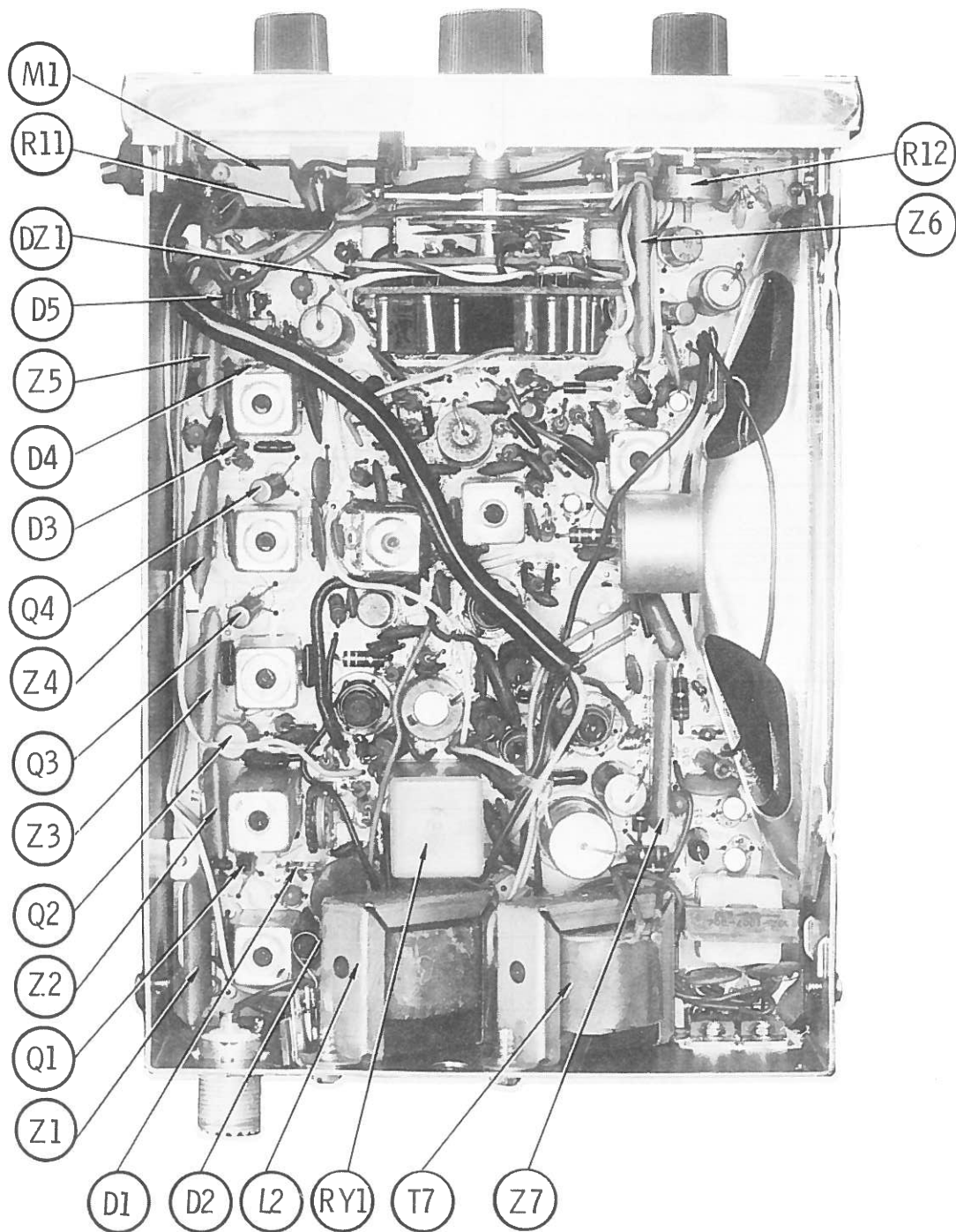
METER ADJUSTMENT

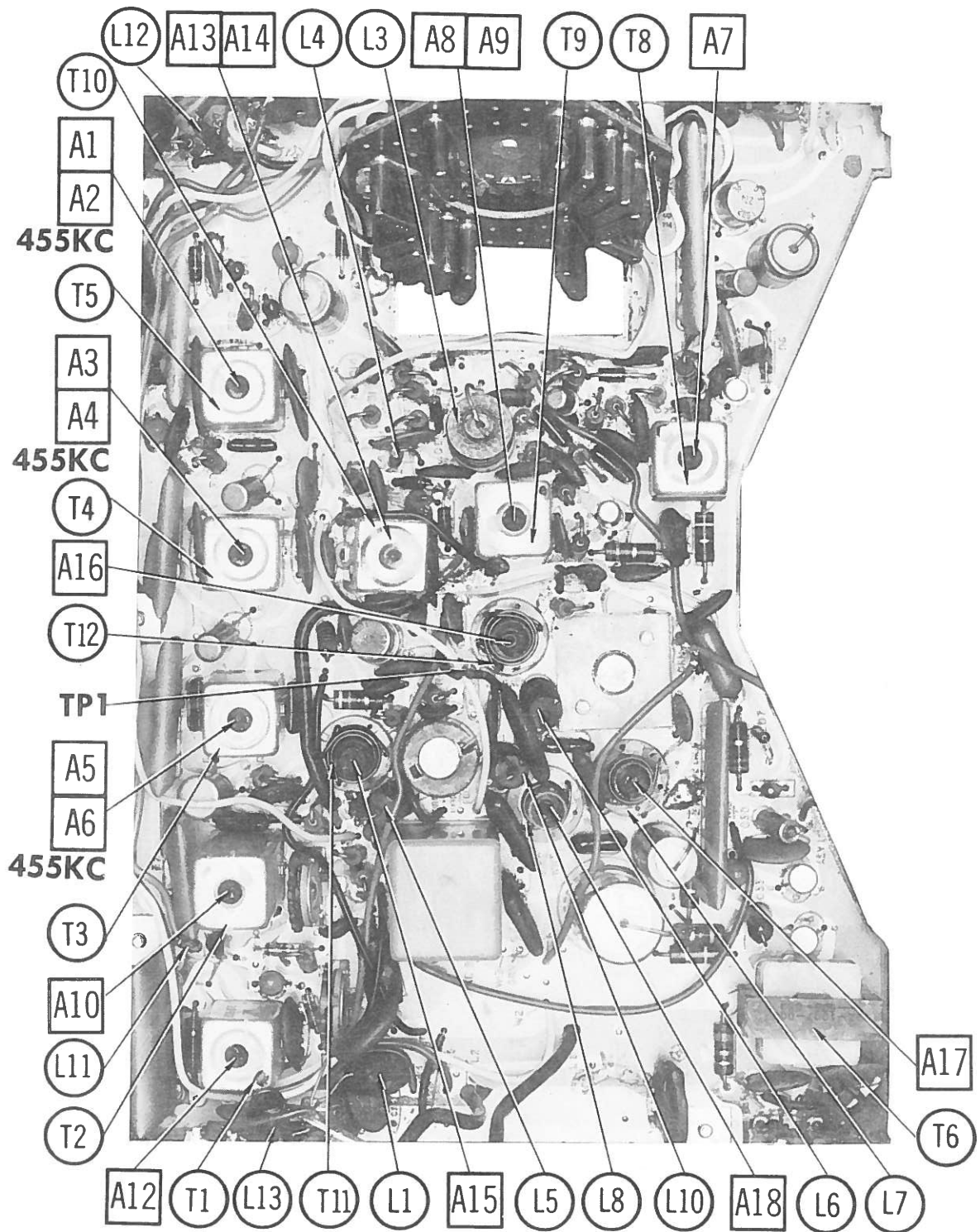
SIGNAL GENERATOR	CHANNEL	ADJUST	REMARKS
	Blank Channel	R4	Adjust for a zero reading with 13.8V DC input to transceiver.
	"	R5	Key the transceiver and adjust for a zero reading.

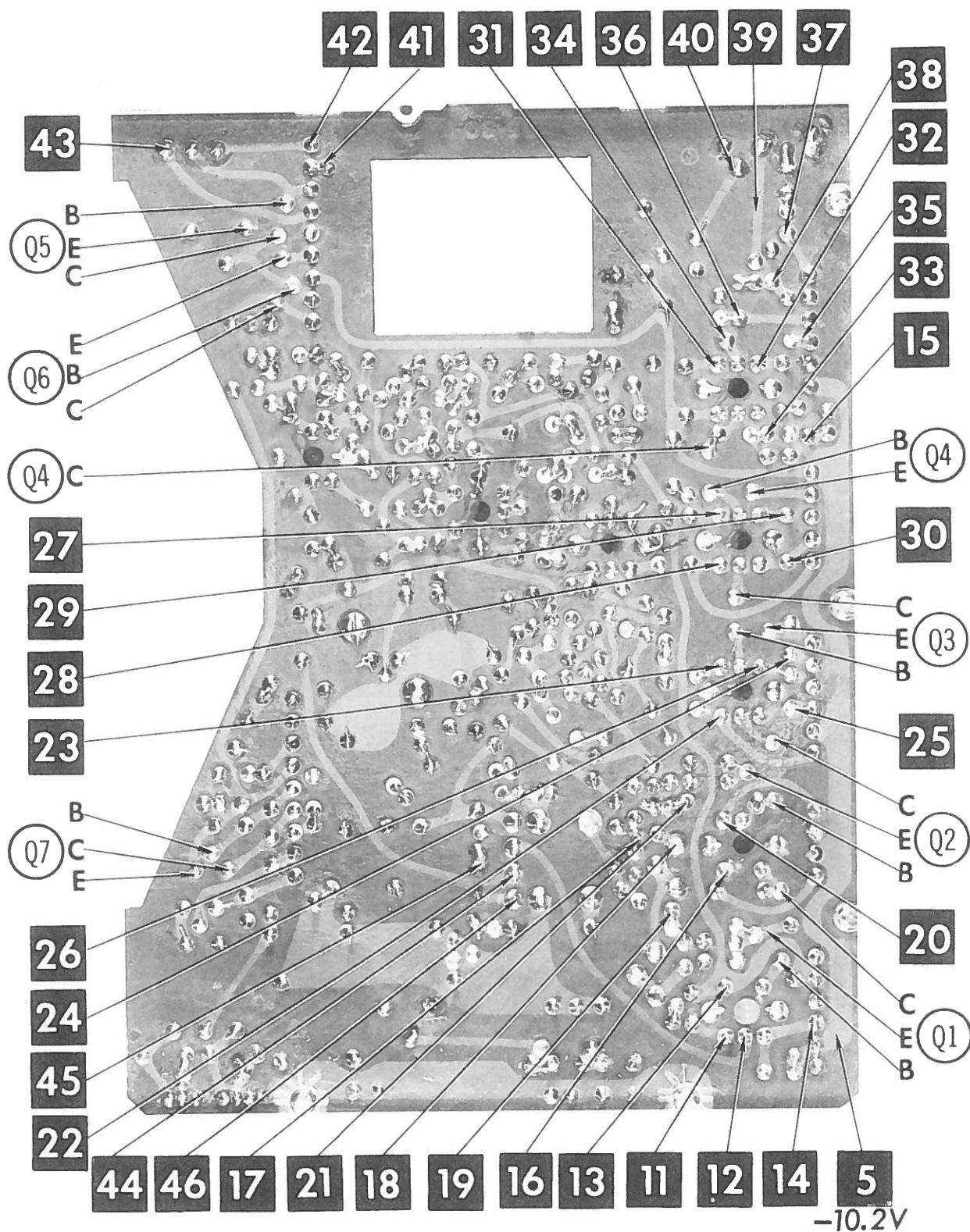
HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206

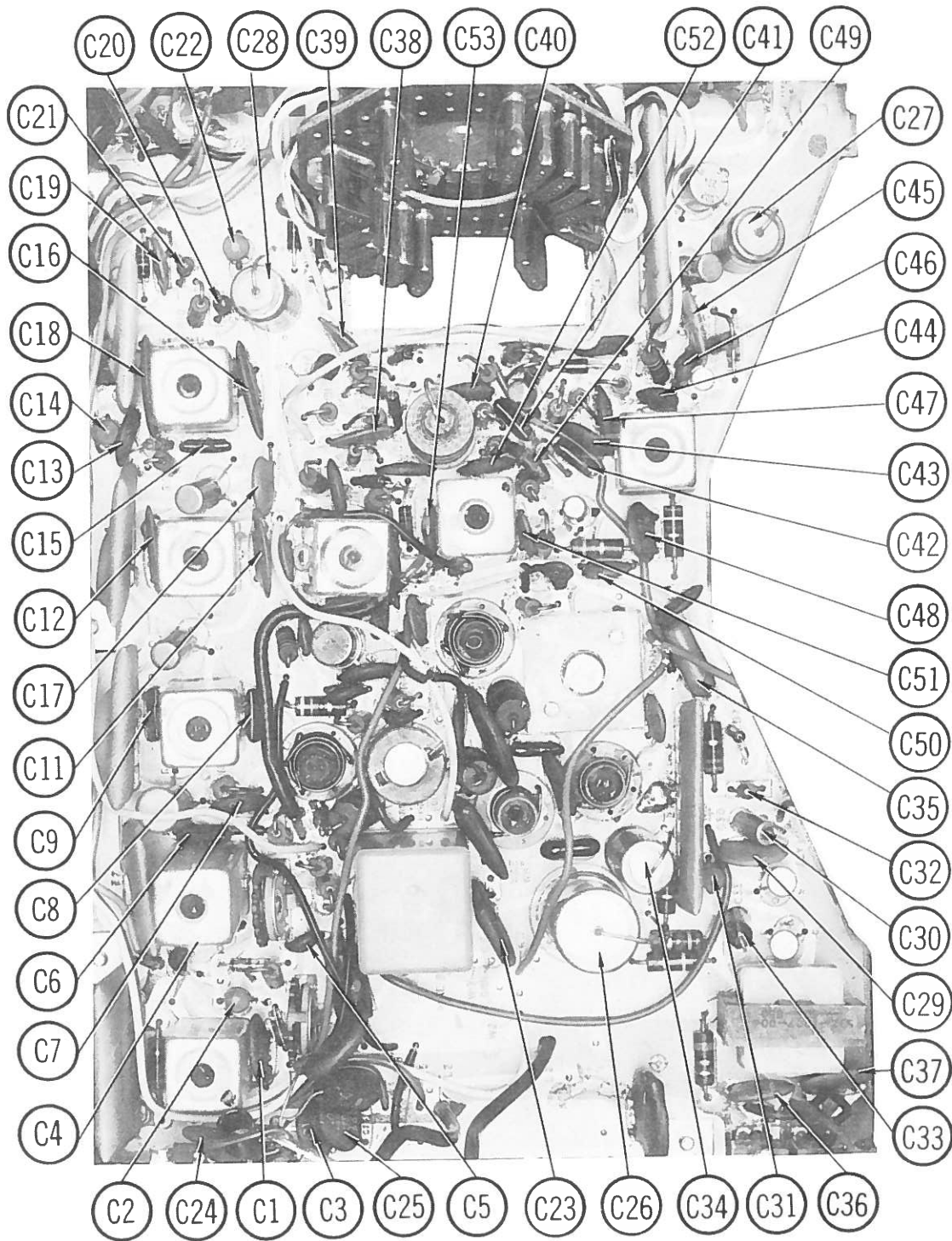
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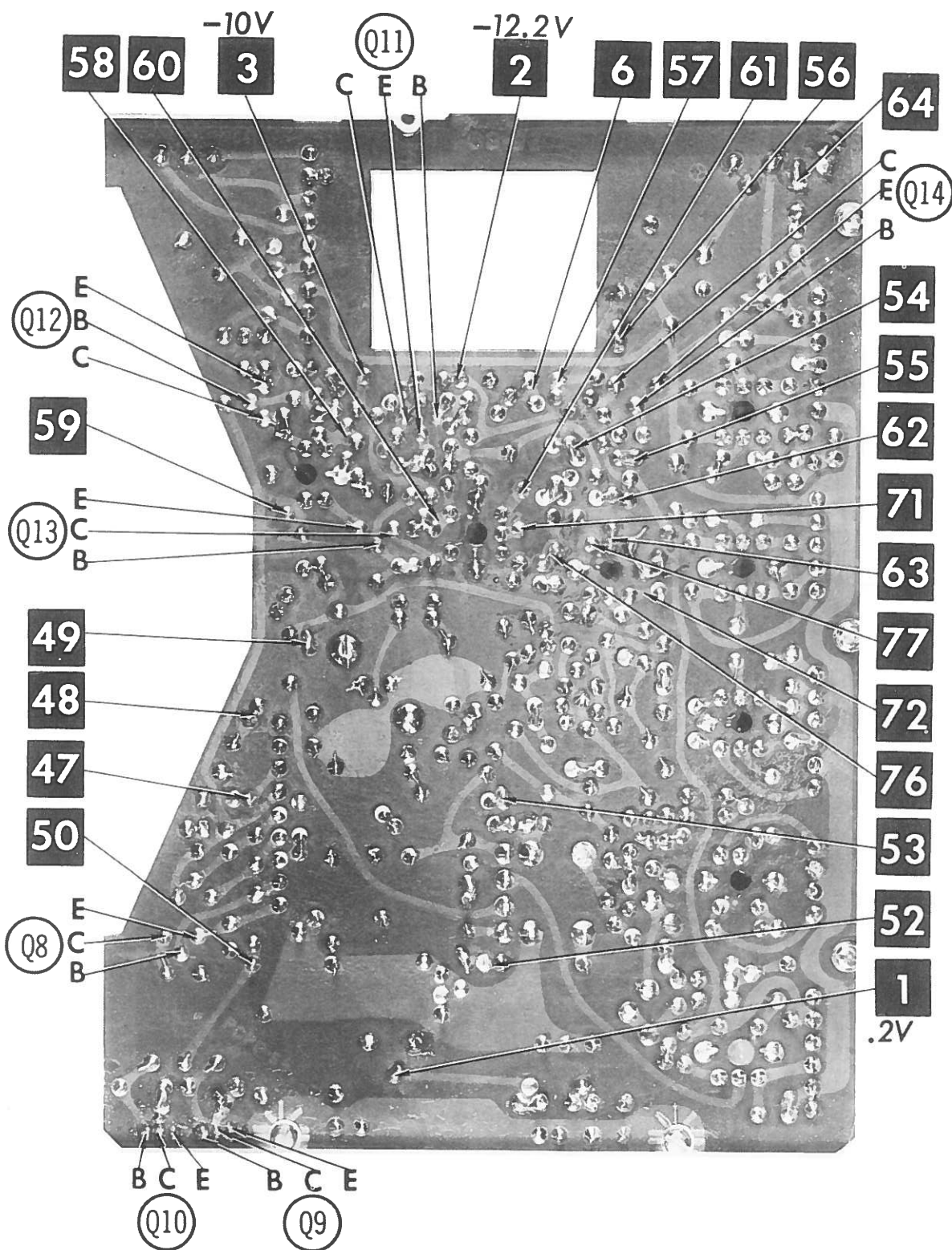
JOHNSON MODEL MESSENGER 123

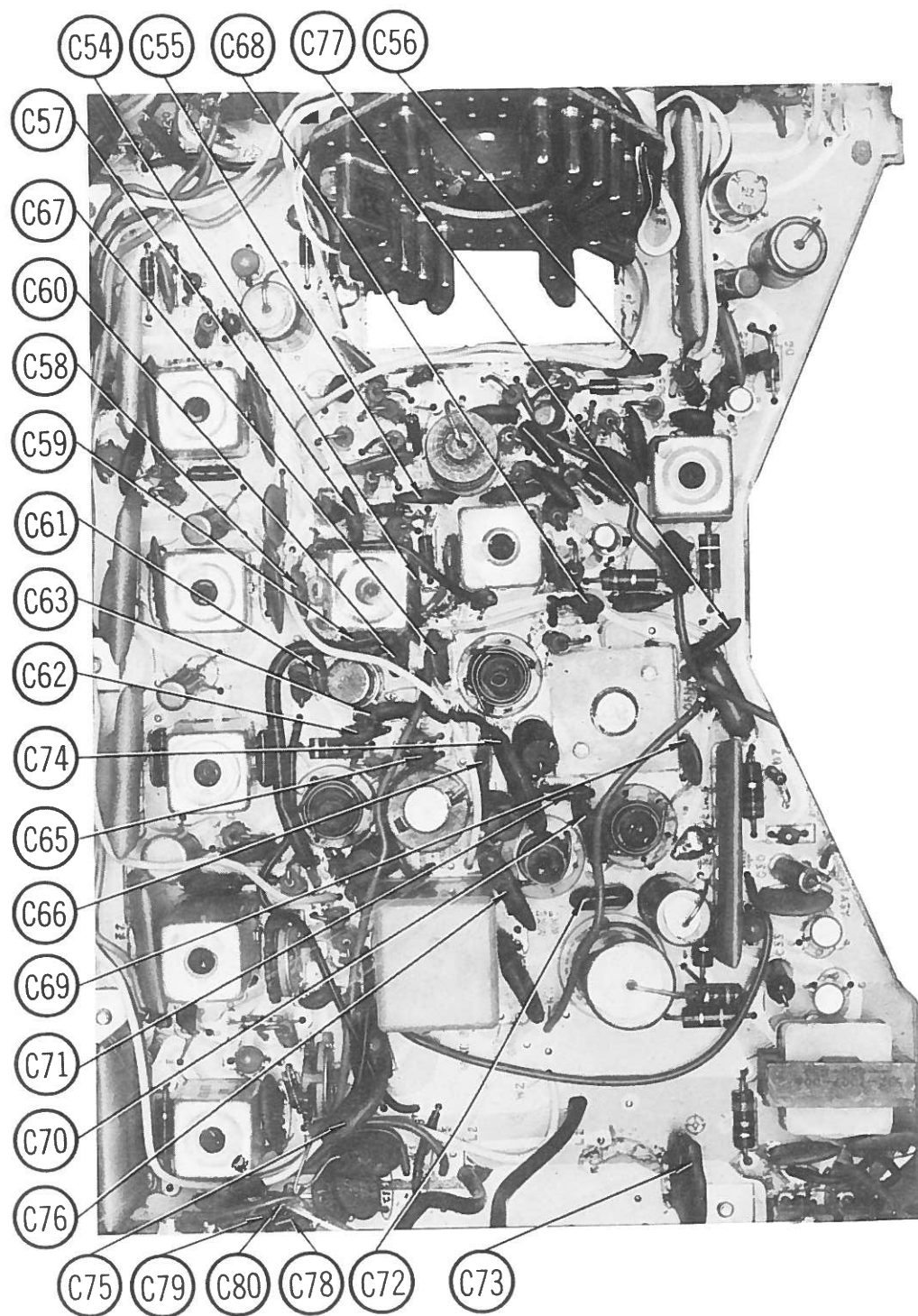


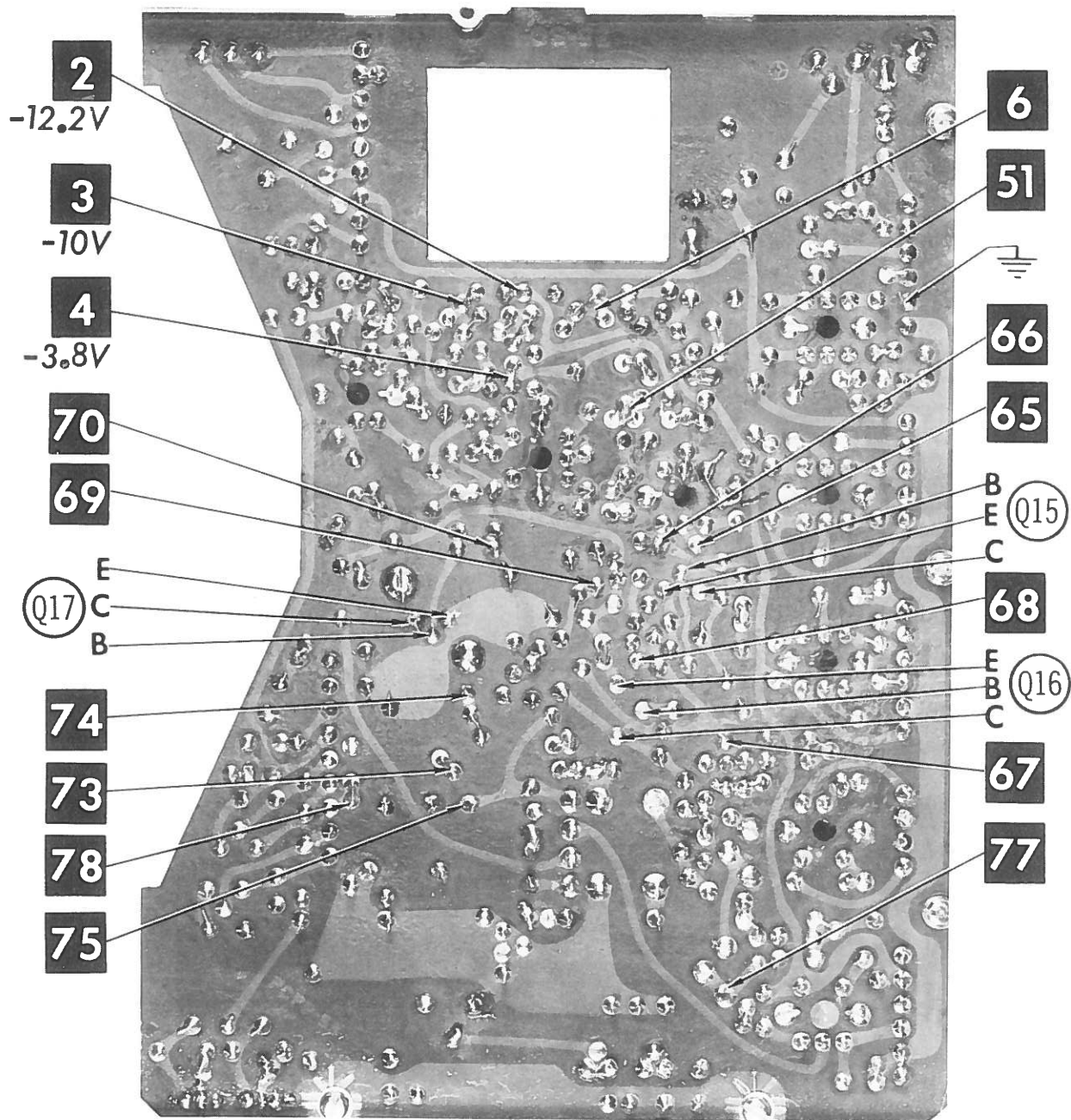


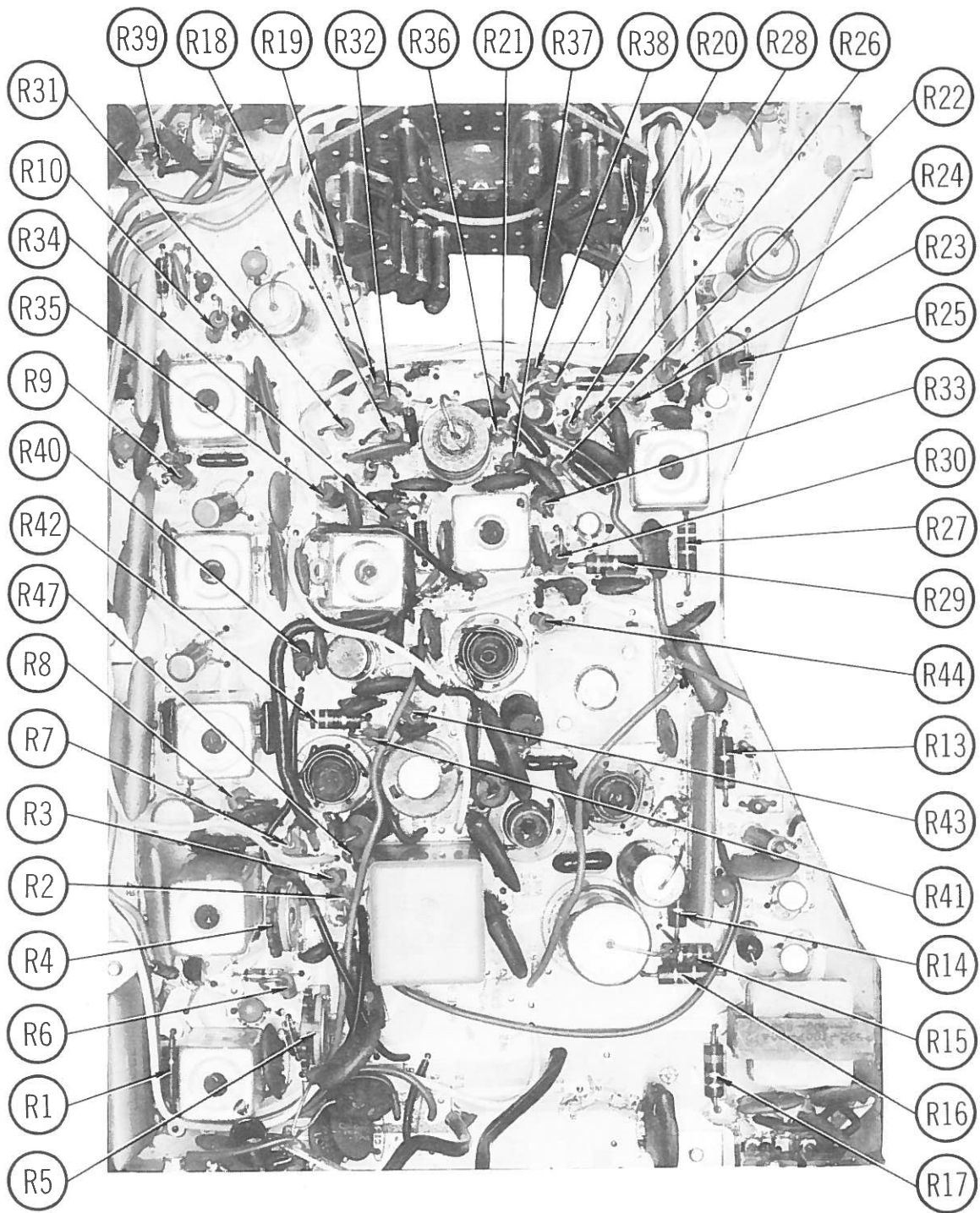


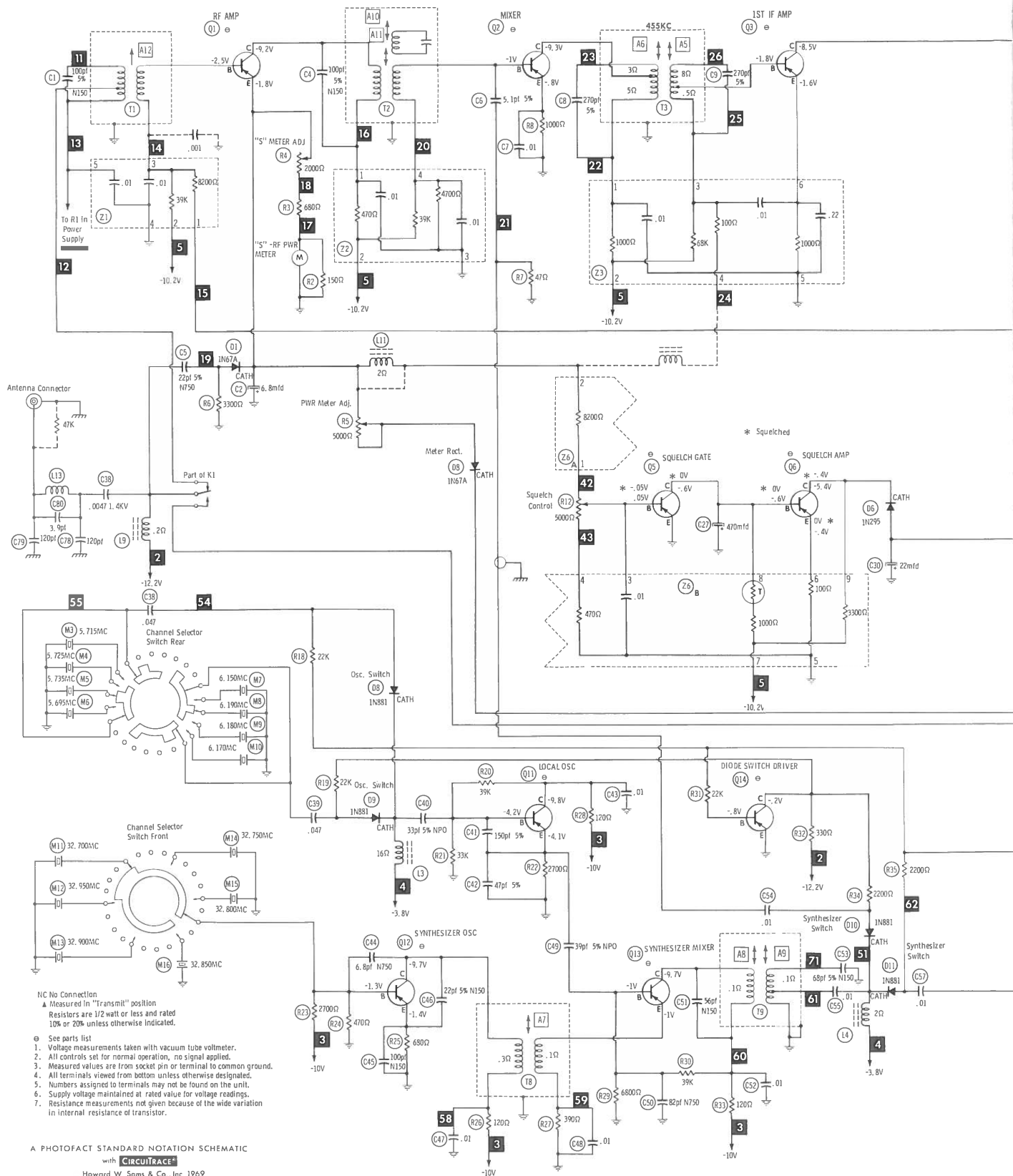


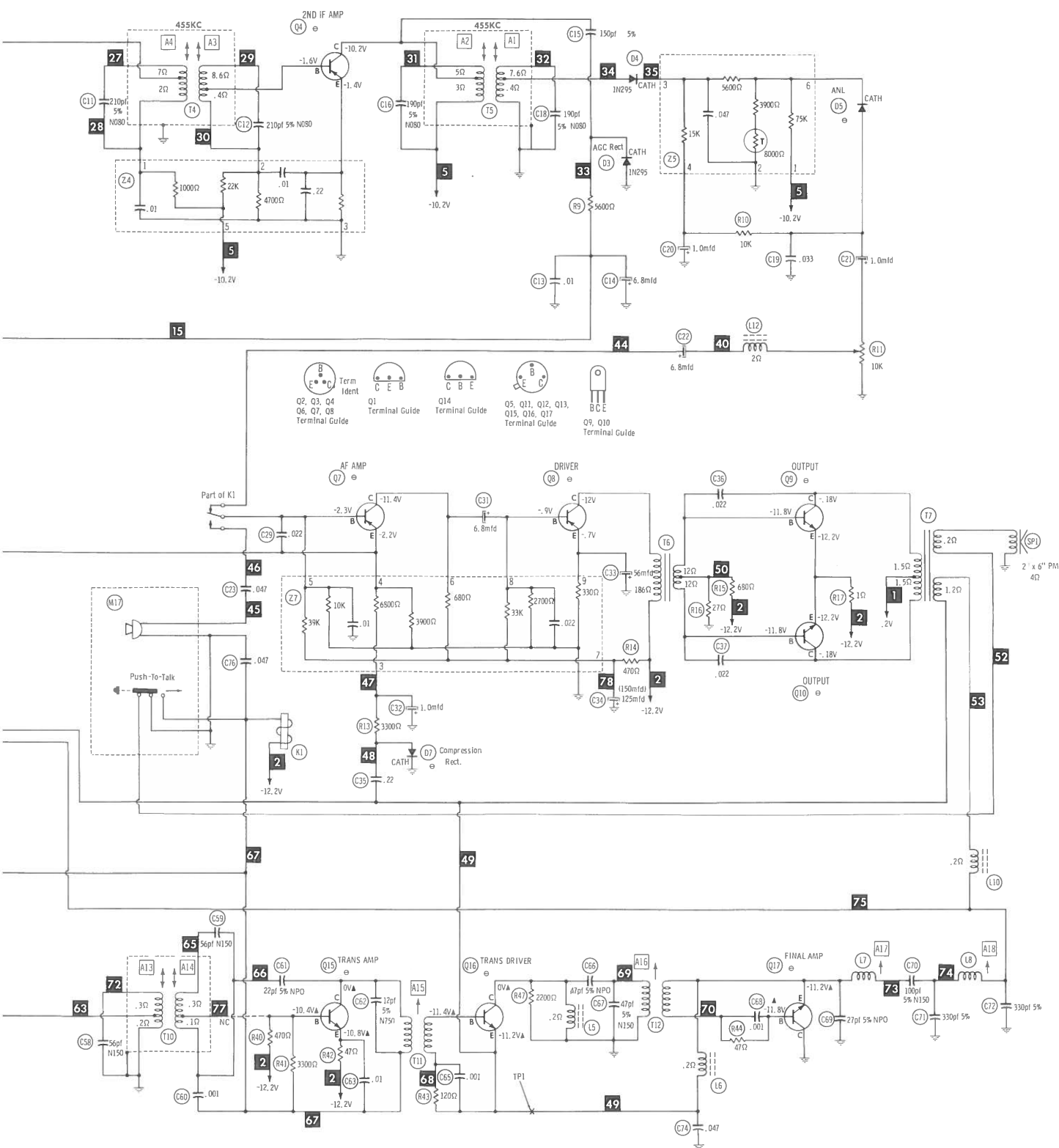




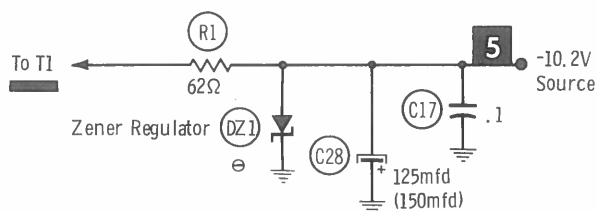
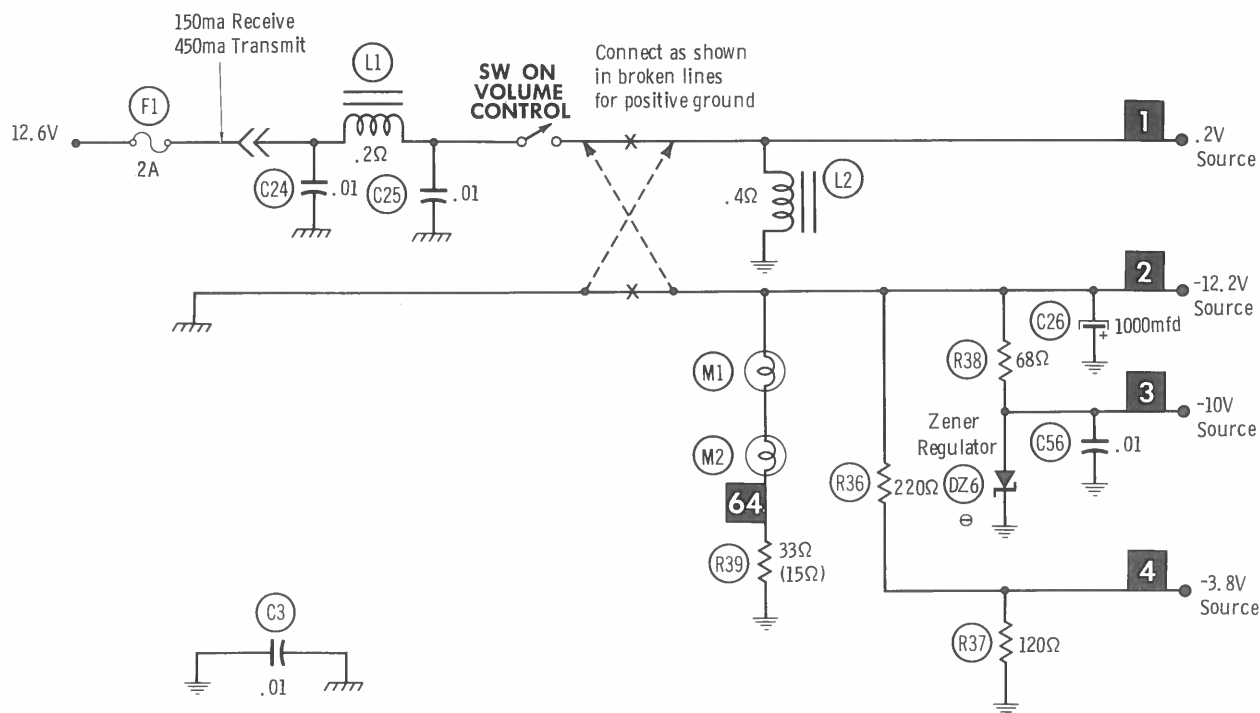








JOHNSON MODEL MESSENGER 123



Resistors are 1/2 watt or less and rated 10% or 20% unless otherwise indicated.

⊖ See parts list

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 PHOTOFAC STANDARD NOTATION SCHEMATIC

with **CIRCUITRACE®**

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JOHNSON MODEL MESSENGER 123

PARTS LIST AND DESCRIPTION

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

TRANSISTORS

ITEM No.	TYPE No.	FUNCTION	REPLACEMENT DATA						
			MFGR. PART No.	DELCO PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	MOTOROLA PART No.	RCA PART No.	SYLVANIA PART No.
Q1	3012	RF Amp	576-0003-012		GE-22	TR-19	HEP52	SK3006	ECG 106
Q2	3009	Mixer	576-0003-009	DS-41	GE-9	TR-17	HEP3		ECG 126
Q3	3010	1st IF Amp	576-0003-010	DS-25	GE-1	TR-11	HEP636	SK3008	ECG 126
Q4	3010	2nd IF Amp	576-0003-010	DS-25	GE-1	TR-11	HEP636	SK3008	ECG 126
Q5	1002	Squelch Gate	576-0001-002	DS-26	GE-2	TR-14	HEP739	SK3004	ECG 102
Q6	1003	Squelch Amp	576-0001-003	DS-26	GE-2	TR-14	HEP636	SK3004	ECG 102
Q7	1003	AF Amp	576-0001-003	DS-26	GE-2	TR-14	HEP636	SK3004	ECG 102
Q8	1009	Driver	576-0001-009	DS-26	GE-2	TR-14	HEP254	SK3004	ECG 102
Q9	2N5296	Output	576-0002-001				HEP245	SK3041	ECG 152
Q10	2N5296	Output	576-0002-001				HEP245	SK3041	ECG 152
Q11	3008	Local Oscillator	576-0003-024	DS-41	GE-9	TR-17	HEP3	SK3006	ECG 126
Q12	3008	Synthesizer Osc.	576-0003-024	DS-41	GE-9	TR-17	HEP3	SK3006	ECG 126
Q13	3008	Synthesizer Mixer	576-0003-024	DS-41	GE-9	TR-17	HEP3	SK3006	ECG 126
Q14	MPS404	Diode Switch Driver	576-0001-013				HEP739		ECG 129
Q15	4004	Trans. Amp.	576-0004-004				HEP243		
Q16	4004	Trans. Driver	576-0004-004				HEP243		
Q17	4005	Final Amp.	576-0004-005						

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MFGR. PART OR TYPE No.	REPLACEMENT RECTIFIERS & DIODES			REPLACEMENT RECTIFIERS	NOTES
		GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	SYLVANIA PART No.	RCA PART No.	
D1	1N67A	1N34AS	1N67A	ECG 109		Silicon - 50V
D2	1N67A	1N34AS	1N67A	ECG 109		
D3	1N295	1N295	1N295	ECG 109		
D4	1N295	1N295	1N295	ECG 109		
D5	523-1000-001					
D6	1N295	1N295	1N295	ECG 109		Silicon - 50V
D7	523-1000-001					
D8	1N881	GE-504A	8D4	ECG 116		
D9	1N881	GE-504A	8D4	ECG 116		
D10	1N881	GE-504A	8D4	ECG 116		
D11	1N881	GE-504A	8D4	ECG 116		Zener - 10V Zener - 10V
DZ1	523-2003-100	GEZD-10-4	Z-1012	ECG 140		
DZ2	523-2003-100	GEZD-10-4	Z-1012	ECG 140		

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA						
		PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	6.8 35V	510-2045-689			TYR13B-F685K		TAS685K035POC	196D685X00 35FB
C14	6.8 35V	510-2045-689			TYR13B-F685K		TAS685K035POC	196D685X00 35FB
C20	1.0 35V	510-2045-109			TYR13B-F105K		TAS105K035POA	196D105X00 35DB
C21	1.0 35V	510-2045-109			TYR13B-F105K		TAS105K035POA	196D105X00 35DB
C22	6.8 35V	510-2045-689			TYR13B-F685K		TAS685K035POC	196D685X00 35FB
C26	1000 16V	510-4006-005	PRS1230	EA15-1000	WBR1000-16	QT1-32	TC1501A	TL-1166.5
C27	470 4V	510-4001-006	PRS1120	EA6-500	BR500-6	QT1-30A	MTA500F6	TL-1108
C28	125 16V	(1)	CRE478A	EA15-150	WBR125-50	MT1-21.5	MTA125F35	TE-1162.5
C30	22 15V	510-2003-220	CRE461A	EA15-25	AL20-16	MT1-13.5	MTA20D30	TE-1157
C31	6.8 35V	510-2045-689			TYR13B-F685K		TAS685K035POC	196D685X00 35FB
C32	1.0 35V	510-2045-109			TYR13B-F105K		TAS105K035POA	196D105X00 35DB
C33	56 6V	510-2001-560	CRE418A	EA6-50	AL50-16	MT1-19	MTA50D6	TL-1100
C34	125 16V	(1)	CRE478A	EA15-150	WBR125-50	MT1-21.5	MTA125F35	TE-1162.5

(1) Some versions may use 150mfd @ 25 Volts. Part #510-4006-006.

PARTS LIST AND DESCRIPTION (CONTINUED)

(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.
C1	100 5% N150	#510-3016-101				*	*	10TCP-T10
C3	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C4	100 5% N150	#510-3016-101				*	*	10TCP-T10
C5	22 5% N750 200V		N750-DI 22	DTN-22	CZ601UJ220K	CCTN-220	CN7422	10TCU-Q22
C6	5.1 5%		ADM-15-050				SX550	MS-55
C7	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C8	270 5%		ADM-15-271	CPR-270J	CD15F271J500	DM-15-271J	SX327	424ME2700J501
C9	270 5%		ADM-15-271	CPR-270J	CD15F271J500	DM-15-271J	SX327	424ME2700J501
C11	210 5% N080	#510-3015-211				*		
C12	210 5% N080	#510-3015-211				*		
C13	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C15	150 5%		ADM-15-151	CPR-150J	CD15F151J500	DM-15-151J	SX315	424MC1500J501
C16	190 5% N080	#510-3015-191				*		
C17	.1 16V		TTP-1	CK-104	HOV101ZV104Z		TA010	TG-P10
C18	190 5% N080	#510-3015-191				*		
C19	.033 16V		TTP-03	CK-303		CCD-303	GP130	TG-S30
C23	.047 50V		TTP-05	CK-503	HOV101ZV503Z	CCD-503	TA150	TGL-S50
C24	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C25	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C29	.022 50V		TTP-02	CK-203	HOR101ZV203P	CCD-203	TA120	TG-S20
C35	.22 200V		V1612P22		DMF2P22	2DP-4-224	PVC2022	2PS-P22
C36	.022 50V		TTP-02	CK-203	HOR101ZV203P	CCD-203	TA120	TG-S20
C37	.022 50V		TTP-02	CK-203	HOR101ZV203P	CCD-203	TA120	TG-S20
C38	.047 16V		TTP-05	CK-503	HOV101ZV503Z	CCD-503	TA150	TGL-S50
C39	.047 16V		TTP-05	CK-503	HOV101ZV503Z	CCD-503	TA150	TGL-S50
C40	33 5% NPO		NPO-DI 33	DTZ-33	CS601CG330K	CCTO-330	CN0433	10TCC-Q33
C41	150 5%		ADM-15-151	CPR-150J	CD15F151J500	DM-15-151J	SX315	424MC1500J501
C42	47 5%		ADM-15-470	CPR-47J	CD15E470J500	DM-15-470J	SX447	424MC470J501
C43	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C44	6.8 N750				CZ601UJ680D		CN7568	10TCU-V68
C45	100 N150 200V					*	*	10TCP-T10
C46	22 5% N150	#510-3016-220				*	*	10TCP-Q22
C47	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C48	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C49	39 5% NPO			TCN-39		CCTO-390	CN0439	10TCC-Q39
C50	82 N750			TCN-82	CS601UJ820K	CCTN-820	CN7482	10TCU-Q82
C51	56 N150	#510-3016-560				*	*	10TCP-Q56
C52	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C53	68 5% N150 200V	#510-3016-680				*	*	10TCP-Q68
C54	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C55	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C56	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C57	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C58	56 N150	#510-3016-560				*	*	10TCP-Q56
C59	56 N150	#510-3016-560				*	*	10TCP-Q56
C60	.001 50V		GPD X5F102K	DM-102	JBS601YP102K	CCD-102	SM210	2SS-D10
C61	22 5% NPO		NPO-DI 22	DTZ-22	CY601CG220K	CCTO-220	CN0422	10TCC-Q22
C62	12 5% N750			TCN-12	CZ601UJ120J		CN7412	10TCU-Q12
C63	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C65	.001 50V		GPD X5F102K	DM-102	JBS601YP102K	CCD-102	SM210	2SS-D10
C66	47 5% NPO		NPO-DI 47	DTZ-47	CX601CG470K	CCTO-470	CN0447	10TCC-Q47
C67	47 5% N150	#510-3016-470				*	*	10TCP-Q47
C68	.001 50V		GPD X5F102K	DM-102	JBS601YP102K	CCD-102	SM210	2SS-D10
C69	27 5% NPO			TCZ-27		CCTO-270	CN0427	10TCC-Q27
C70	100 5% N150	#510-3016-101				*	*	10TCP-T10
C71	330 5%		ADM-15-331	CPR-330J	CD15F331J500	DM-15-331J	SX333	424ME3000J501
C72	330 5%		ADM-15-331	CPR-330J	CD15F331J500	DM-15-331J	SX333	424ME3000J501
C73	.047 50V		TTP-05	CK-503	HOV101ZV503Z	CCD-503	TA150	TGL-S50
C74	.047 50V		TTP-05	CK-503	HOV101ZV503Z	CCD-503	TA150	TGL-S50
C75	.0047 1.4KV	#510-3001-472						
C76	.047 50V		TTP-05	CK-503	HOV101ZV503Z	CCD-503	TA150	TGL-S50
C77	.01 50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C78	120		ADM-15-121	CPR-120J	CD15F121J500	DM-15-121J	SX312	424MC1200J501
C79	120		ADM-15-121	CPR-120J	CD15F121J500	DM-15-121J	SX312	424MC1200J501
C80	3.9		ADM-15-390	CPR-39J	CD15E390J500	DM-15-390J	SX439	MS-439

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
Johnson Part Number.

CONTROLS (All wattages 1/2 watt, or less, unless listed)

ITEM No.	FUNCTION	RESIST-ANCE	REPLACEMENT DATA				
			MFGR. PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R4	"S" Meter Adjust	2000	562-0004-202	T-2500			
R5	Meter Adjust	5000	562-0004-502	T-5000			
R11	Volume/Switch	10K	562-0016-0049			X201R252B	MTC23L1
	Volume/Switch	10K	562-0016-004			X201R10502B	MTC53L1
			(1)				
R12	Squelch	5000	562-0016-003				
	Squelch	5000	562-0002-011				
			(1)				

(1) May be used in some versions.

PARTS LIST AND DESCRIPTION (CONTINUED)

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

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			
		PART No.	MEISSNER PART No.	MILLER PART No.	WORKMAN PART No.
L1	RF Choke (13uh)	542-3003-001	19-1002	72F125AP	T857 TA311
L3	Oscillator	022-1193-001			
L4	RF Choke (20uh)	542-3002-002	19-6022	74F22SAI	TA311
L5	RF Choke (13uh)	542-3003-001		72F125AP	
L6	RF Choke (13uh)	542-3003-001		72F125AP	TA311 TA311
L7	Loading	542-1005-010			
L8	Loading	542-1005-004			TA311 TA311
L9	RF Choke (13uh)	542-3003-001		72F125AP	
L10	RF Choke (13uh)	542-3003-001		72F125AP	TA311 TA311
L11	RF Choke (20uh)	542-3002-002	19-6022	74F22SAI	
L12	RF Choke (20uh)	543-3002-002	19-6022	74F22SAI	TA311 TA311
T1	Antenna Input	592-5016-001			
T2	RF Amp	592-5006-002			TA311 TA311
T3	Input IF	592-5016-005			
T4	Interstage IF	592-5016-006			TA311 TA311
T5	Output IF	592-5016-007			
T8	Synthesizer Osc	592-5010-011			TA311 TA311
T9	Synthesizer Mixer	592-5008-011			
T10	Xmtr Amp	592-5023-001			TA311 TA311
T11	Xmtr Amp	592-5014-001			
T12	Xmtr Driver	592-5014-002			

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					NOTES
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000~)	PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
L2	450ma (1)	.4	18mh	542-5007-001					(1) Transmit

TRANSFORMER (Driver)

ITEM No.	TURNS RATIO			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	MFGR. PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T6	186	24		592-1007-004					

TRANSFORMER (Audio Output)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	MFGR. PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T7	22 CT	4						
		SEC. 2						
		1.2 DC Resistance						

PARTS LIST AND DESCRIPTION (CONTINUED)

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

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		MFR. PART No.	QUAM PART No.	
SP1	2" x 6" PM 4 ohms	589-1002-002	26A07	

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
M1	Meter	554-0015-002	
M2	Pilot Lights	549-3001-007	
M3	Crystal	519-0023-002	5.715MC Channels 3,7,11,15,19
M4	Crystal	519-0023-003	5.725MC Channels 2,6,10,14,18,22
M5	Crystal	519-0023-004	5.735MC Channels 1,5,9,13,17,21
M6	Crystal	519-0023-001	5.695MC Channels 4,8,12,16,19,23
M7	Crystal	519-0023-005	6.150MC Channel 4,8,12,16,20,23
M8	Crystal	519-0023-008	6.190MC Channels 1,5,9,13,17,21
M9	Crystal	519-0023-007	6.180MC Channels 2,6,10,14,18,22
M10	Crystal	519-0023-006	6.170MC Channels 3,7,11,15,19
M11	Crystal	519-0024-001	32.700MC Channels 1,2,3,4
M12	Crystal	519-0024-006	32.950MC Channels 21,22,23
M13	Crystal	519-0024-005	32.900MC Channels 17,18,19,20
M14	Crystal	519-0024-002	32.750MC Channels, 5,6,7,8
M15	Crystal	519-0024-003	32.800MC Channels 9,10,11,12
M16	Crystal	519-0024-004	32.850MC Channels 13,14,15,16
M17	Microphone Assembly	589-0006-001	
S1	Switch, Selector	583-2029-101	
Z1	Component Combination	544-0003-001	RF Amp
Z2	Component Combination	544-0002-001	Mixer
Z3	Component Combination	544-0003-003	1st IF
Z4	Component Combination	544-0002-004	2nd IF
Z5	Component Combination	544-0002-015	Noise Limiter
Z6	Component Combination	544-0002-008	Squelch
Z7	Component Combination	544-0002-006	Audio

CABINETS & CABINET PARTS (When ordering specify model, chassis & color)

ITEM	PART No.	ITEM	PART No.
Cabinet	023-2201-002	Overlay, Lower	559-2032-001
Panel Assembly, Front	023-2618-001	Knob, Channel Indicator	547-0008-004
Panel, Front	015-0799-002	Knob, Volume & Squelch	547-0008-001
Overlay, Upper	559-2032-001	Dial, Channel Indicator	032-0154-101

WIRING DATA

General-use Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 12 Colors
	8524 (Stranded) Available in 12 Colors
Shielded Antenna Lead	Use BELDEN No. 8214 Lowest-loss (RG-8/U Type)
	8237 Low-loss (RG-8/U)
	8240 (Solid) Miniature (RG-58/U)
	8259 (Stranded) Miniature (RG-58A/U)
Coiled Microphone Cable	Use BELDEN No. 8497 3-Conductor, 1 Shielded, for Press-to-Talk (Neoprene)
	8496 3-Conductor, 1 Shielded, for Press-to-Talk (Vinyl)
Ignition Noise Suppression	Use BELDEN No. 7300-Series Spark-Plug Sets
Bonding Strap	Use BELDEN No. 8661 (3/8 In.)

