Service Manual

for **RCA CB Co-Pilot**

Model 14T302

40 Channel Single Sideband Citizen's Band Transceiver

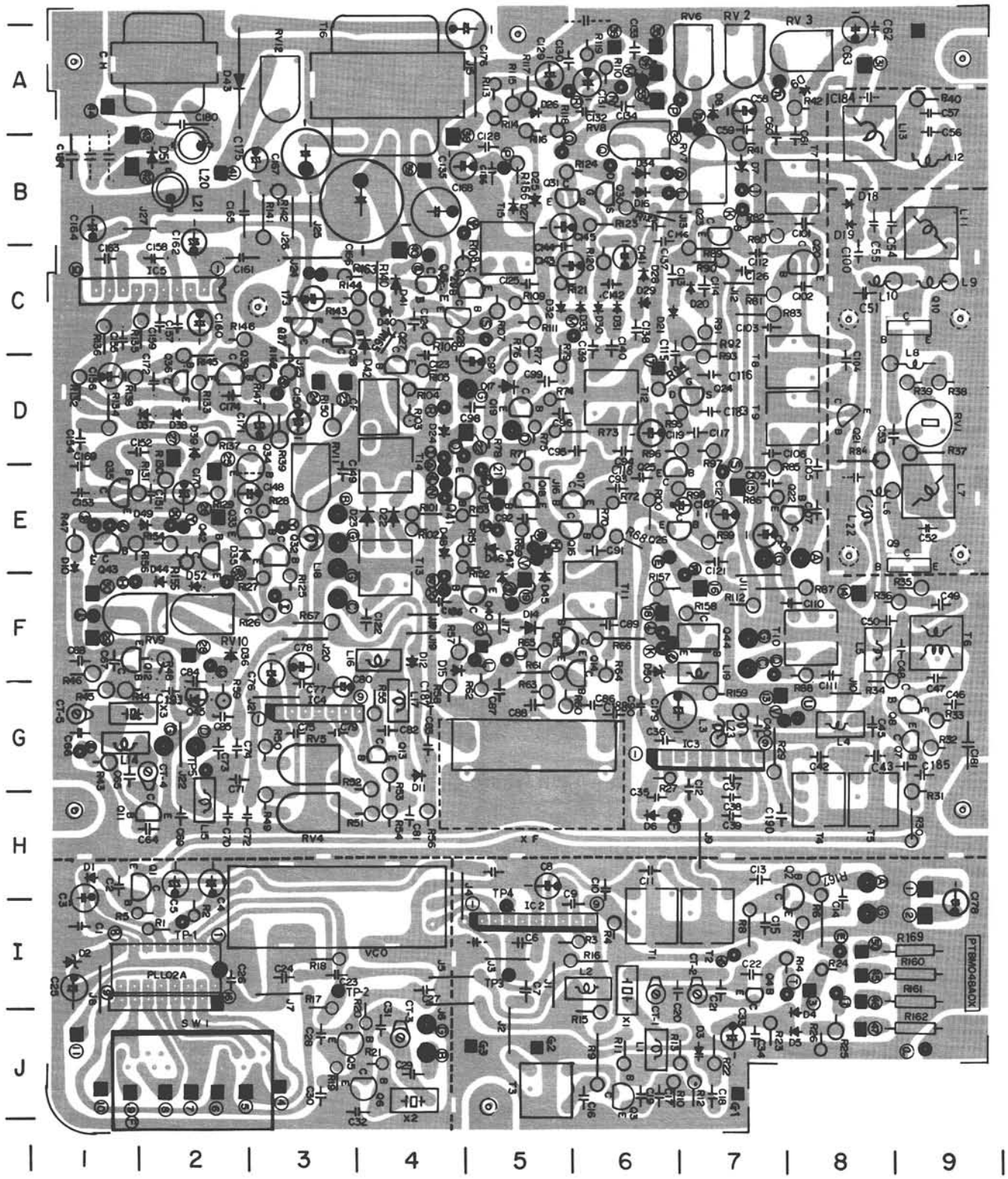


Figure 13 – Main Printed Circuit Board

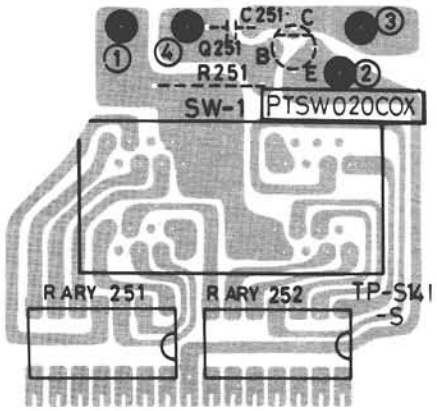


Figure 14 – Channel Selector Printed Circuit Board

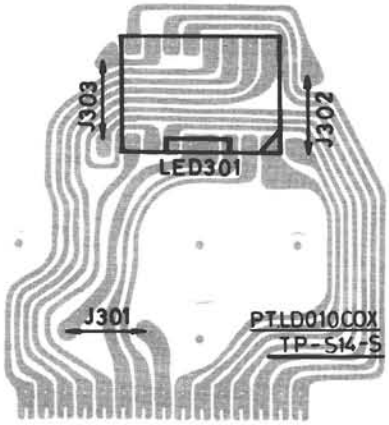


Figure 15 – LED Printed Circuit Board

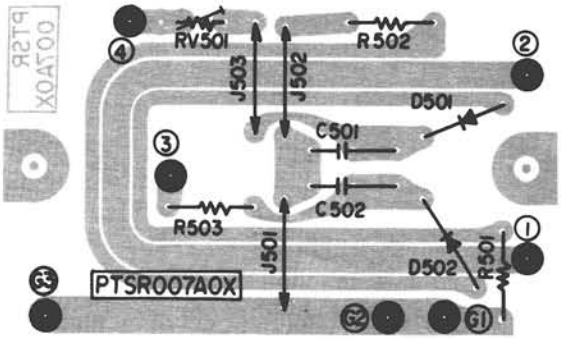
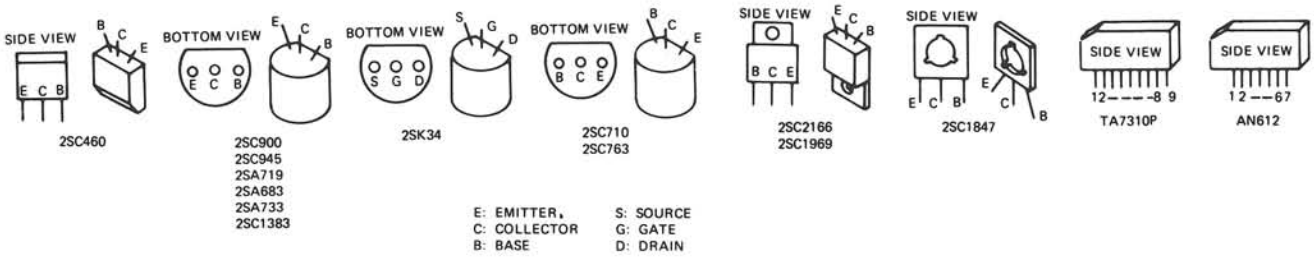


Figure 16 – SWR Printed Circuit Board

TRANSISTOR BASE INFORMATION



Replacement Parts

NOTE: Location column pertains to grid coordinates shown in printed board diagram Figure 13 on Page 17.

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCATION
		CAPACITORS	
C1	142075	.0047 uF, 50 v, Film Mylar	I1
C2	437396	.022 uF, 10%, 50 v, Mylar Film	H1
C3	742598	.1 uF, 35 v, Tantalum	H1
C4	742599	.22 uF, 35 v, Tant	H2
C5	742596	10 uF, 16 v, Tant	H2
C6	741781	33 pf, 10%, 50 v, Ceramic	I5
C7	741766	12 pf, 10%, 50 v, Ceramic	I5
C8	742076	1 uF, 20%, 50 v, Cer. Plate	H5
C9	741754	.001 uF, 10%, 50 v, Film Mylar	I6
C10	742592	1200 pf, 50 v, Film (Mylar)	H6
C11	423295	2 pf, 5%, 50 v, Cer Disc	H6
C12	741781	33 pf, 10%, 50 v, Ceramic	G7
C13	741781	33 pf, 10%, 50 v, Ceramic	H7
C14	422014	10 pf, 5%, 75 v, Cer. Plate	I8
C15	741755	.01 uF, 10%, 50 v, Film Mylar	I7
C16	741755	.01 uF, 10%, 50 v, Film Mylar	J6
C17	741781	33 pf, 10%, 50 v, Ceramic	J6
C18	741754	.001 uF, 10%, 50 v, Film Mylar	J7
C19	437367	220 pf, 5%, 50 v, Ceramic	J6
C20	437371	22 pf, 5%, 50 v, Ceramic	I6
C21	742582	15 pf, 50 v, Cer	I7
C22	741755	.01 uF, 10%, 50 v, Film Mylar	I7
C23	741754	.001 uF, 10%, 50 v, Film Mylar	I3
C24	741788	68 pf, 50 v, Cer	I3
C25	168471	47 uF, 6.3 v, Elect	I1
C26	741780	.047 uF, 10%, 50 v, Film Mylar	I2
C27	741755	.01 uF, 10%, 50 v, Film Mylar	I4
C28	741754	.001 uF, 10%, 50 v, Film Mylar	J3
C29	742580	5 pf, 50 v, Cer	J4
C30	741788	68 pf, 50 v, Cer	J3
C31	437390	27 pf, 5%, 50 v, Ceramic	J4
C32	421640	560 pf, 50 v, Cer	J4
C33	742076	1 uF, 20%, 50 v, Cer. Plate	J7
C34	741755	.01 uF, 10%, 50 v, Film Mylar	J7
C35	741755	.01 uF, 10%, 50 v, Film Mylar	G6
C36	427831	15 pf, 50 v, 10%, Cer. Plate	G6
C37	741768	82 pf, 10%, 50 v, Ceramic	G7
C38	426475	120 pf, 10%, 50 v, Cer.	G7
C39	741755	.01 uF, 10%, 50 v, Film Mylar	H7
C40	741755	.01 uF, 10%, 50 v, Film Mylar	H7
C42	742579	3 pf, 50 v, Cer	G8
C43	245245	47 pf, 5%, 75 v, Cer. Plate	G8
C45	741755	.01 uF, 10%, 50 v, Film Mylar	G8
C46	741755	.01 uF, 10%, 50 v, Film Mylar	G9
C47	245245	47 pf, 5%, 75 v, Cer. Plate	G9
C48	741755	.01 uF, 10%, 50 v, Film Mylar	F9
C49	423555	330 pf, 50 v, Cer	F9
C50	741755	.01 uF, 10%, 50 v, Film Mylar	F9
C51	741780	.047 uF, 10%, 50 v, Film Mylar	C8
C52	741768	82 pf, 10%, 50 v, Ceramic	E9
C53	248646	180 pf, 5%, 75 v, Cer. Plate	D9
C54	427831	150 pf, 50 v, 10%, Cer. Plate	B9
C55	421640	560 pf, 50 v, Cer	B9
C56	245245	47 pf, 5%, 75 v, Cer. Plate	A9
C57	426384	470 pf, 50 v, Cer	A9
C58	742599	.22 uF, 35 v, Tant	A7
C59	741755	.01 uF, 10%, 50 v, Film Mylar	A7
C60	742580	5 pf, 50 v, Cer	B8
C61	423295	2 pf, 5%, 50 v, Cer Disc	B8
C62	741755	.01 uF, 10%, 50 v, Film Mylar	A8
C63	742076	1 uF, 20%, 50 v, Cer. Plate	A8
C64	741755	.01 uF, 10%, 50 v, Film Mylar	H2
C65	245245	47 pf, 5%, 75 v, Cer. Plate	G1
C66	422014	10 pf, 5%, 75 v, Cer. Plate	G1
C67	741754	.001 uF, 10%, 50 v, Film Mylar	F1
C68	741807	22 pf, 10%, 50 v, Ceramic	F1
C69	437367	220 pf, 5%, 50 v, Ceramic	H2
C70	437367	220 pf, 5%, 50 v, Ceramic	H2
C71	742581	8 pf, 50 v, Cer	G2
C72	741763	100 pf, 10%, 50 v, Ceramic	H3
C73	741781	33 pf, 10%, 50 v, Ceramic	G2
C74	741807	22 pf, 10%, 50 v, Ceramic	G2
C75	741755	.01 uF, 10%, 50 v, Film Mylar	G3
C76	742587	4.7 uF, 25 v, Elyt	F3
C77	741755	.01 uF, 10%, 50 v, Film Mylar	G3
C78	742068	10 uF, 16 v, Elyt	F3
C79	741755	.01 uF, 10%, 50 v, Film Mylar	G3
C80	742068	10 uF, 16 v, Elyt	F3
C81	741755	.01 uF, 10%, 50 v, Film Mylar	H4
C82	741755	.01 uF, 10%, 50 v, Film Mylar	G4
C83	741755	.01 uF, 10%, 50 v, Film Mylar	G4
C84	741755	.01 uF, 10%, 50 v, Film Mylar	F2
C85	741755	.01 uF, 10%, 50 v, Film Mylar	G2
C86	741755	.01 uF, 10%, 50 v, Film Mylar	G6
C87	742599	.22 uF, 35 v, Tant	G5
C88	741755	.01 uF, 10%, 50 v, Film Mylar	G5
C89	741755	.01 uF, 10%, 50 v, Film Mylar	F6
C90	741755	.01 uF, 10%, 50 v, Film Mylar	G6
C91	741755	.01 uF, 10%, 50 v, Film Mylar	E5
C92	741755	.01 uF, 10%, 50 v, Film Mylar	E5
C93	741755	.01 uF, 10%, 50 v, Film Mylar	E5
C94	741755	.01 uF, 10%, 50 v, Film Mylar	D6
C95	742579	3 pf, 50 v, Cer	D6
C96	741781	33 pf, 10%, 50 v, Ceramic	D6
C97	741794	33 uF, 6.3 v, Elyt	D5
C98	741754	.001 uF, 10%, 50 v, Film Mylar	D5
C99	741755	.01 uF, 10%, 50 v, Film Mylar	D5
C100	741781	33 pf, 10%, 50 v, Ceramic	C8
C101	741755	.01 uF, 10%, 50 v, Film Mylar	B8
C102	741755	.01 uF, 10%, 50 v, Film Mylar	C8
C103	741755	.01 uF, 10%, 50 v, Film Mylar	C8
C104	742579	3 pf, 50 v, Cer	D8
C105	741755	.01 uF, 10%, 50 v, Film Mylar	D8
C106	741755	.01 uF, 10%, 50 v, Film Mylar	D8
C107	741761	39 pf, 10%, 50 v, Ceramic	E8
C108	742076	1 uF, 20%, 50 v, Cer. Plate	E7
C109	741755	.01 uF, 10%, 50 v, Film Mylar	E8
C110	741755	.01 uF, 10%, 50 v, Film Mylar	F8
C111	741755	.01 uF, 10%, 50 v, Film Mylar	F8
C112	742580	5 pf, 50 v, Cer	C7
C113	437367	220 pf, 5%, 50 v, Ceramic	C7
C114	742075	.0047 uF, 50 v, Film Mylar	C7
C115	741754	.001 uF, 10%, 50 v, Film Mylar	C7
C116	742593	.033 uF, 50 v, Film Mylar	D7
C117	742075	.0047 uF, 50 v, Film Mylar	D7
C118	741755	.01 uF, 10%, 50 v, Film Mylar	E6

(Continued on Page 22)

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCATION
C119	742068	10 uF, 16 v, Elyt	D7
C121	741754	.001 uF, 10%, 50 v, Film Mylar	E7
C122	437390	27 pf, 5%, 50 v, Ceramic	F4
C123	742593	.033 uF, 50 v, Film (Mylar)	D4
C124	741755	.01 uF, 10%, 50 v, Film Mylar	C1
C125	742593	.033 uF, 50 v, Film (Mylar)	C5
C126	741755	.01 uF, 10%, 50 v, Film Mylar	C7
C127	742068	10 uF, 16 v, Elyt	E7
C128	742075	.0047 uF, 50 v, Film Mylar	B5
C129	742074	3.3 uF, 25 v, Elyt	A5
C130	742593	.033, uF, 50 v, Mylar	A5
C131	742068	10 uF, 16 v, Elyt	A6
C132	742075	.0047 uF, 50 v, Film Mylar	A6
C133	741775	220 pf, 50 v, Cer	A6
C134	742594	8200 pf, 50 v, Film (Mylar)	A6
C135	742076	1 uF, 20%, 50 v, Cer. Plate	B5
C136	741755	.01 uF, 10%, 50 v, Film Mylar	B5
C137	741755	.01 uF, 10%, 50 v, Film Mylar	C7
C138	741763	100 pf, 10%, 50 v, Ceramic	C6
C139	741807	22 pf, 10%, 50 v, Ceramic	C6
C140	742580	5 pf, 50 v, Cer	C6
C141	742597	1 uF, 25 v, Tant	C6
C142	742074	3.3 uF, 25 v, Elyt.	C6
C143	742597	1 uF, 25 v, Tant	C6
C144	741755	.01 uF, 10%, 50 v, Film Mylar	C6
C145	437391	10 uF, 16 v, Elect (Radial)	B6
C146	741755	.01 uF, 10%, 50 v, Film Mylar	B7
C148	742068	10 uF, 16 v, Elyt	E3
C149	741755	.01 uF, 10%, 50 v, Film Mylar	E3
C150	742068	10 uF, 16 v, Elyt	D3
C151	741786	2200 pf, 50 v, Film Mylar	E2
C152	437396	.022 uF, 10%, 50 v, Mylar Film	D2
C153	741775	220 pf, 50 v, Cer	E1
C154	741755	.01 uF, 10%, 50 v, Film Mylar	D1
C155	741786	2200 pf, 50 v, Film Mylar	C1
C156	742595	3.9 uF, 10 v, Tant	D1
C157	741772	68 pf, 50 v, Cer	C2
C158	427831	15 pf, 50 v, 10%, Cer. Plate	C2
C159	741772	68 pf, 50 v, Cer	C2
C160	741794	33 uF, 6.3 v, Elyt	C2
C161	741795	.068 uF, 50 v, Film Mylar	C3
C162	742079	47 uF, 16 v, Elyt	B2
C163	741763	100 pf, 50 v, Cer	C1
C164	742076	1 uF, 20%, 50 v, Cer. Plate	B1
C165	741779	.047 uF, 50 v, Cer	B3
C166	742585	2200 uF, 16 v, Elyt	B4
C167	129625	330 uF, 16 v, Elyt	B3
C168	437377	100 uF, 16 v, Elect (Radial)	B4
C169	741755	.01 uF, 10%, 50 v, Film Mylar	E1
C170	742068	10 uF, 16 v, Elyt	E2
C171	168471	47 uF, 6.3 v, Elect	D3
C172	741755	.01 uF, 10%, 50 v, Film Mylar	D2
C173	741781	33 pf, 10%, 50 v, Ceramic	C3
C174	741755	.01 uF, 10%, 50 v, Film Mylar	D2
C175	742586	2.2 uF, 25 v, Elyt	B3
C176	742079	47 uF, 16 v, Elyt	A5
C178	742085	33 uF, 16 v, Elyt	I9
C179	742079	47 uF, 16 v, Elyt	G7
C180	741779	.047 uF, 50 v, Cer	A2
C181	741779	.047 uF, 50 v, Cer	G9
C182	742588	.47 uF, 50 v, Elyt	E7
C183	741754	.001 uF, 10%, 50 v, Film Mylar	D7
C184	742583	270 pf, 50 v, Cer	A8
C185	741761	39 pf, 10%, 50 v, Ceramic	G9
C186	437367	220 pf, 5%, 50 v, Ceramic	F5
C187	742525	18 pf, 50 v, Cer	G4
C186	742525	18 pf, 50 v, Cer	G6
C189	741779	.047 uF, 50 v, Cer	B1
C190	741755	.01 uF, 10%, 50 v, Film Mylar	H8
C191	741755	.01 uF, 10%, 50 v, Film Mylar	G2
C192	741780	.047 uF, 10%, 50 v, Film Mylar	
C193	742068	10 uF, 16 v, Elyt	
C194	245245	47 pf, 5%, 75 v, Cer. Plate	
C201	741761	39 pf, 50 v, Cer	RP
C202	742087	.01 uF, 50 v, Cer	RP
C203	742087	.01 uF, 50 v, Cer	RP
C204	742589	.001 uF, 50 v, Cer	RP
C205	742569	.047 uF, 50 v, Cer	RP
C206	742569	.047 uF, 50 v, Cer	RP
C207	742087	.01 uF, 50 v, Cer	FP
C208	742589	.001 uF, 50 v, Cer	FP
C209	742087	.01 uF, 50 v, Cer	FP
C210	742569	.047 uF, 50 v, Cer	†
C212	742569	.047 uF, 50 v, Cer	†
C251	742070	.01 uF, 50 v, Cer	LC1
C501	426027	.01 uF, 50 v, Cer	SWR
C502	426027	.01 uF, 50 v, Cer	SWR
CF1	142600	Filter - Ceramic	D4
CH1	742611	Coil—Choke	A2
CT1	741721	Capacitor—Trimmer	I6
CT2	741721	Capacitor—Trimmer	I7
CT3	741721	Capacitor—Trimmer	J4
CT4	741721	Capacitor—Trimmer	G2
CT5	741721	Capacitor—Trimmer	G1
D1	742617	Diode - Type MA150	H1
D2	741738	Diode - Type ZMZ205	I1
D3	742616	Diode - Type ITT310	J7
D4	742617	Diode - Type MA150	J8
D5	742617	Diode - Type MA150	J8
D6	742617	Diode - Type MA150	H6
D7	741738	Diode - Type ZMZ205	B7
D8	742617	Diode - Type MA150	A7
D9	112524	Diode - Type 1N60	A8
D10	742617	Diode - Type MA150	E1
D11	742617	Diode - Type MA150	G4
D12	742617	Diode - Type MA150	F4
D14	742617	Diode - Type MA150	F5
D15	742617	Diode - Type MA150	F5
D16	742617	Diode - Type MA150	B6
D17	742617	Diode - Type MA150	D5
D18	742617	Diode - Type MA150	B9
D19	742617	Diode - Type MA150	B9
D20	112524	Diode - Type 1N60	C7
D21	112524	Diode - Type 1N60	C7
D22	112524	Diode - Type 1N60	E4
D23	112524	Diode - Type 1N60	E4
D24	742716	Diode - Type 1S32	D5
D25	112524	Diode - Type 1N60	B5
D26	742617	Diode - Type MA150	A5
D27	112524	Diode - Type 1N60	B5
D28	112524	Diode - Type 1N60	C6
D29	112524	Diode - Type 1N60	C6
D30	742617	Diode - Type MA150	C6

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SYMB. NO.	STOCK NO.	DESCRIPTION	LOCA-TION
D31	112524	Diode - Type 1N60	C6
D32	742617	Diode - Type MA150	C6
D33	112524	Diode - Type 1N60	C6
D34	742716	Diode - Type 1S32	B6
D35	742617	Diode - Type MA150	E3
D36	742617	Diode - Type MA150	F2
D37	742617	Diode - Type MA150	D2
D38	742617	Diode - Type MA150	D2
D39	742617	Diode - Type MA150	D2
D40	742617	Diode - Type MA150	C4
D41	742617	Diode - Type MA150	C4
D42	742617	Diode - Type MA150	C4
D43	742717	Diode - Type GP25G	A3
D44	742617	Diode - Type MA150	F2
D45	742617	Diode - Type MA150	F5
D46	742617	Diode - Type MA150	E5
D47	742617	Diode - Type MA150	E5
D48	742617	Diode - Type MA150	E4
D49	742617	Diode - Type MA150	E2
D50	742718	Diode - Type MZ310 (Zener)	F6
D51	741740	Diode - Type 1S1885	B2
D52	742617	Diode - Type MA150	F2
D501	112524	Diode - Type 1N60	SWR
D502	112524	Diode - Type 1N60	SWR
IC1	741686	IC - Type PLL02A	I2
IC2	742510	IC - Type TA7310P	I5
IC3	742510	IC - Type TA7310P	G7
IC4	742620	IC - Type AN612	G3
IC5	741687	I.C. - Type TA7205P	C2
J1	742497	Connector-Jack-Ant	RP
J2	741816	Connector Jack (PA)	RP
J3	741816	Connector-Jack P.A.	RP
J4	741819	Connector - Jack DC	RP
J5	741815	Connector - Jack Microphone	FP
L1	741695	Coil - R. F.	J6
L2	741697	Coil - R. F.	I6
L3	742606	Coil-RF	G7
L4	741695	Coil - R. F.	G8
L5	741695	Coil - R. F.	F8
L6	742605	Coil - RF	E9
L7	742652	Coil-RF	E9
L8	742608	Coil-RF	D9
L9	741702	Coil - R. F.	C9
L10	742608	Coil-RF	C9
L11	742654	Coil-RF	B9
L12	742602	Coil-RF	B9
L13	742653	Coil-RF	A8
L14	742609	Coil-RF	G1
L15	741695	Coil- R. F.	H2
L16	742515	Coil - Peaking - 1 uH	F4
L17	741697	Coil - R. F.	G4
L18	742610	Coil-RF	E3
L19	741697	Coil - R. F.	F7
L20	742604	Coil-RF	B2
L21	742604	Coil-RF	B2
L22	741702	Coil - R. F.	E8
L23	741702	Coil - R. F.	G7
L24	741697	Coil - R. F.	D5
L201	742603	Coil-RF	RP
LED	742568	Diode - Type LED SL1221C	FP

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCA-TION
M	742674	Meter-500 UA-S/RF/SWR	FP
MXF	742601	Filter-Metal-10.6935 MHZ	H5
PL1		Lamp -- Part of item 12—Meter	FP
PL2	742678	Lamp	FP
Q1	742691	Transistor - Type 2SC900 (F)	H1
Q2	742705	Transistor - Type 2SC710 (C)	H8
Q3	741726	Transistor - Type 2SC710D	J6
Q4	741726	Transistor - Type 2SC710D	I7
Q5	741726	Transistor - Type 2SC710D	J4
Q6	741726	Transistor - Type 2SC710D	J4
Q7	741726	Transistor - Type 2SC710D	G9
Q8	742706	Transistor - Type 2SC460 (A)	G9
Q9	742707	Transistor - Type 2SC2166	E9
Q10	742708	Transistor - Type 2SC1969	C9
Q11	741726	Transistor - Type 2SC710D	H2
Q12	741726	Transistor - Type 2SC710D	F1
Q13	742705	Transistor - Type 2SC710 (C)	G4
Q14	742705	Transistor - Type 2SC710 (C)	F6
Q15	742705	Transistor - Type 2SC710 (C)	F6
Q16	742705	Transistor - Type 2SC710 (C)	E6
Q17	742705	Transistor - Type 2SC710 (C)	E6
Q18	741726	Transistor - Type 2SC710D	E5
Q19	742709	Transistor - Type 2SC945 (A-Q)	D5
Q20	742705	Transistor - Type 2SC710 (C)	C8
Q21	741726	Transistor - Type 2SC710D	D8
Q22	742705	Transistor - Type 2SC710 (C)	E8
Q23	742710	Transistor - Type 2SC763 (D)	B7
Q24	742711	Transistor - Type 2SK34 (D)	D7
Q25	742712	Transistor - Type 2SA733 (Q)	D7
Q26	742710	Transistor - Type 2SC763 (D)	E7
Q27	742705	Transistor - Type 2SC710 (C)	D4
Q28	742705	Transistor - Type 2SC710 (C)	C5
Q29	741726	Transistor - Type 2SC710D	C5
Q30	742711	Transistor - Type 2SK34 (D)	B6
Q31	742709	Transistor - Type 2SC945 (A-Q)	B6
Q32	742712	Transistor - Type 2SA733 (Q)	E3
Q33	742709	Transistor - Type 2SC945 (A-Q)	E3
Q34	742709	Transistor - Type 2SC945 (A-Q)	E3
Q35	741806	Transistor - Type 2SC900U	E1
Q36	742709	Transistor - Type 2SC945 (A-Q)	D2
Q37	741729	Transistor - Type 2SA719Q	C3
Q38	741729	Transistor - Type 2SA719Q	C4
Q39	742709	Transistor - Type 2SC945 (A-Q)	D2
Q40	742713	Transistor - Type 2SA683 (R)	F5
Q41	742714	Transistor - Type 2SC1383 (R)	E5
Q42	742713	Transistor - Type 2SA683 (R)	E2
Q43	742714	Transistor - Type 2SC1383 (R)	E1
Q44	742715	Transistor - Type 2SC1847 (Q)	F7
Q45	742705	Transistor - Type 2SC710 (C)	G2
Q46	742709	Transistor - Type 2SC945 (A-Q)	C4
	742567	Transistor - Type 2SC1383	LCI
		All Resistors fixed carbon 1/4 watt unless otherwise noted	
R1	107972	3300 Ohm, 5%, 1/4 w, Comp	I2
R2	426215	680 Ohms, 1;4 w, 5%, Comp	I2
R3	227959	82 Ohm, 5%, 1/4 w, Comp	I6
R4	108864	470 Ohm, 5%, 1/4 w, Comp	I6

(Continued on Page 24)

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCA-TION
R5	218762	1000000 Ohm, 5%, 1/4 w, Comp	I2
R6	245896	15000000 Ohm, 5%, 1/4 w, Comp	I8
R7	239455	1200 Ohm, 5%, 1/4 w, Comp	I8
R8	108861	100 Ohm, 5%, 1/4 w, Comp	I7
R9	108861	100 Ohm, 5%, 1/4 w, Comp	J6
R10	227741	560 Ohm, 5%, 1/4 w, Comp	J6
R11	239954	5600 Ohm, 2%, 1/4 w, Film	J6
R12	108866	2200 Ohm, 5%, 1/4 w, Comp	J7
R13	108865	1000 Ohm, 5%, 1/4 w, Comp	J7
R14	107972	3300 Ohm, 5%, 1/4 w, Comp	I7
R15	108866	2200 Ohm, 5%, 1/4 w, Comp	J6
R16	227959	82 Ohm, 5%, 1/4 w, Comp	I6
R17	232389	470000 Ohm, 5%, 1/4 w, Comp	I3
R18	232389	470000 Ohm, 5%, 1/4 w, Comp	I3
R19	108864	470 Ohm, 5%, 1/4 w, Comp	J3
R20	107972	3300 Ohm, 5%, 1/4 w, Comp	J4
R21	223769	100000 Ohm, 5%, 1/4 w, Comp	J4
R22	223769	100000 Ohm, 5%, 1/4 w, Comp	J7
R23	426219	33000 Ohm, 5%, 1/4 w, Comp	J7
R24	108870	18000 Ohm, 5%, 1/4 w, Comp	I8
R25	108870	18000 Ohm, 5%, 1/4 w, Comp	J8
R26	218499	10000 Ohm, 5%, 1/4 w, Comp	J8
R27	219459	1500 Ohm, 5%, 1/4 w, Comp	G6
R29	108861	100 Ohm, 5%, 1/4 w, Comp	G7
R30	219465	8200 Ohm, 5%, 1/4 w, Comp	H9
R31	218499	10000 Ohm, 5%, 1/4 w, Comp	H9
R32	218758	220 Ohm, 5%, 1/4 w, Comp	G9
R33	426216	68 Ohm, 5%, 1/4 w, Comp	G9
R34	426232	10 Ohm, 5%, 1/4 w, Comp	F9
R35	233931	33 Ohm, 5%, 1/4 w, Comp	F9
R36	108863	270 Ohm, 5%, 1/4 w, Comp	F9
R37	224252	560 Ohm, 1/2 w, Comp	D9
R38	426232	10 Ohm, 5%, 1/4 w, Comp	D9
R39	108861	100 Ohm, 5%, 1/4 w, Comp	D9
R40	426213	4700 Ohm, 5%, 1/4 w, Comp	A9
R41	223769	100000 Ohm, 5%, 1/4 w, Comp	B7
R42	219459	1500 Ohm, 5%, 1/4 w, Comp	A8
R43	107972	3300 Ohm, 5%, 1/4 w, Comp	G1
R44	108870	18000 Ohm, 5%, 1/4 w, Comp	G1
R45	218499	10000 Ohm, 5%, 1/4 w, Comp	G1
R46	227741	560 Ohm, 5%, 1/4 w, Comp	F1
R47	108865	1000 Ohm, 5%, 1/4 w, Comp	E1
R48	219458	330 Ohm, 5%, 1/4 w, Comp	F2
R49	108871	47000 Ohm, 5%, 1/4 w, Comp	H3
R50	223769	100000 Ohm, 5%, 1/4 w, Comp	G3
R51	219458	330 Ohm, 5%, 1/4 w, Comp	H4
R52	107972	3300 Ohm, 5%, 1/4 w, Comp	G4
R53	227465	120 Ohm, 5%, 1/4 w, Comp	G4
R54	108865	1000 Ohm, 5%, 1/4 w, Comp	H4
R55	227741	560 Ohm, 5%, 1/4 w, Comp	G4
R56	239954	5600 Ohm, 2%, 1/4 w, Film	H4
R57	108868	12000 Ohm, 5%, 1/4 w, Comp	F5
R58	107972	3300 Ohm, 5%, 1/4 w, Comp	G4
R59	107972	3300 Ohm, 5%, 1/4 w, Comp	G2
R60	227744	150 Ohm, 5%, 1/4 w, Comp	G5
R61	426234	820 Ohms, 10%, 1/4 w, Fixed Comp	F6
R62	426213	4700 Ohm, 5%, 1/4 w, Comp	G5
R63	227741	560 Ohm, 5%, 1/4 w, Comp	G5
R64	218758	220 Ohm, 5%, 1/4 w, Comp	F6
R65	426213	4700 Ohm, 5%, 1/4 w, Comp	F5
R66	108864	470 Ohm, 5%, 1/4 w, Comp	F6
R67	108870	18000 Ohm, 5%, 1/4 w, Comp	F3
R68	108861	100 Ohm, 5%, 1/4 w, Comp	E6
R69	107972	3300 Ohm, 5%, 1/4 w, Comp	E5
R70	108869	15000 Ohm, 5%, 1/4 w, Comp	E6
R71	219459	1500 Ohm, 5%, 1/4 w, Comp	D5
R72	227744	150 Ohm, 5%, 1/4 w, Comp	E6
R73	108861	100 Ohm, 5%, 1/4 w, Comp	D5
R74	108869	15000 Ohm, 5%, 1/4 w, Comp	D6
R75	223769	100000 Ohm, 5%, 1/4 w, Comp	D5
R77	108865	1000 Ohm, 5%, 1/4 w, Comp	C5
R78	107972	3300 Ohm, 5%, 1/4 w, Comp	D5
R79		Not used	D6
R80	108865	1000 Ohm, 5%, 1/4 w, Comp	B8
R81	426213	4700 Ohm, 5%, 1/4 w, Comp	C8
R82	108871	47000 Ohm, 5%, 1/4 w, Comp	B7
R83	218758	220 Ohm, 5%, 1/4 w, Comp	C8
R84	107972	3300 Ohm, 5%, 1/4 w, Comp	D9
R85	426213	4700 Ohm, 5%, 1/4 w, Comp	D8
R86	108864	470 Ohm, 5%, 1/4 w, Comp	E7
R87	218758	220 Ohm, 5%, 1/4 w, Comp	F8
R88	107972	3300 Ohm, 5%, 1/4 w, Comp	F8
R89	223769	100000 Ohm, 5%, 1/4 w, Comp	C7
R90	108865	1000 Ohm, 5%, 1/4 w, Comp	C7
R91	232389	470000 Ohm, 5%, 1/4 w, Comp	C7
R92	218499	10000 Ohm, 5%, 1/4 w, Comp	C7
R93	231315	1500000 Ohm, 5%, 1/4 w, Comp	D7
R94	239954	5600 Ohm, 2%, 1/4 w, Film	D7
R95	239954	5600 Ohm, 2%, 1/4 w, Film	D7
R96	223769	100000 Ohm, 5%, 1/4 w, Comp	D7
R97	218762	1000000 Ohm, 5%, 1/4 w, Comp	D7
R98	218499	10000 Ohm, 5%, 1/4 w, Comp	E7
R99	239954	5600 Ohm, 2%, 1/4 w, Film	E7
R100	219458	330 Ohm, 5%, 1/4 w, Comp	E6
R101	426199	56000 Ohm, 5%, 1/4 w, Comp	E4
R102	239954	5600 Ohm, 2%, 1/4 w, Film	E4
R103	108865	1000 Ohm, 5%, 1/4 w, Comp	D4
R104	108871	47000 Ohm, 5%, 1/4 w, Comp	D4
R105	433018	390 Ohms, 5%, 1/4 w, Comp	D4
R106	107972	3300 Ohm, 5%, 1/4 w, Comp	C4
R107	218500	39000 Ohm, 5%, 1/4 w, Comp	C5
R108	218499	10000 Ohm, 5%, 1/4 w, Comp	C5
R109	227744	150 Ohm, 5%, 1/4 w, Comp	C5
R110	426219	33000 Ohm, 5%, 1/4 w, Comp	A6
R111	108860	47 Ohm, 5%, 1/4 w, Comp	C5
R112	108860	47 Ohm, 5%, 1/4 w, Comp	F7
R113	426112	22000 Ohm, 5%, 1/4 w, Comp	A5
R114	108871	47000 Ohm, 5%, 1/4 w, Comp	A5
R115	232687	270000 Ohm, 5%, 1/4 w, Comp	A5
R116	426219	33000 Ohm, 5° 1/4 w, Comp	A5
R117	427566	68,000 Ohm, 1/4 w, 5%, Comp	A5
R118	108871	47000 Ohm, 5%, 1/4 w, Comp	A5
R119		Not used	A6
R120	108865	1000 Ohm, 5%, 1/4 w, Comp	C6
R121	218762	1000000 Ohm, 5%, 1/4 w, Comp	C6
R122	426215	680 Ohms, 1/4 w, 5%, Comp	B6
R123	108865	1000 Ohm, 5%, 1/4 w, Comp	B6
R124	218499	10000 Ohm, 5%, 1/4 w, Comp	B6
R125	218499	10000 Ohm, 5%, 1/4 w, Comp	F3
R126	108866	2200 Ohm, 5%, 1/4 w, Comp	F3
R127	108865	1000 Ohm, 5%, 1/4 w, Comp	F3
R128	426112	22000 Ohm, 5%, 1/4 w, Comp	E3
R129	219467	27000 Ohm, 5%, 1/4 w, Comp	E2
R130	239954	5600 Oh m, 2%, 1/4 w, Film	E2
R131	239954	5600 Ohm, 2%, 1/4 w, Film	E2
R132	218499	10000 Ohm, 5%, 1/4 w, Comp	D1
R133	426213	4700 Ohm, 5%, 1/4 w, Comp	D2
R134	227741	560 Ohm, 5%, 1/4 w, Comp	D1
R135	426234	820 Ohms, 10%, 1/4 w, Fixed Comp	C2
R136	108860	47 Ohm, 5%, 1/4 w, Comp	C1
R137	108865	1000 Ohm, 5%, 1/4 w, Comp	D2

(Continued on Page 25)

SYMB. NO.	STOCK NO.	DESCRIPTION	LOCA-TION
R138	227744	150 Ohm, 5%, 1/4 w, Comp	D2
R139	218499	10000 Ohm, 5%, 1/4 w, Comp	D3
R140	108865	1000 Ohm, 5%, 1/4 w, Comp	C4
R141	426213	4700 Ohm, 5%, 1/4 w, Comp	B3
R142	108866	2200 Ohm, 5%, 1/4 w, Comp	B3
R143	108866	2200 Ohm, 5%, 1/4 w, Comp	C4
R144	426213	4700 Ohm, 5%, 1/4 w, Comp	C4
R145	107972	3300 Ohm, 5%, 1/4 w, Comp	D2
R146	108865	1000 Ohm, 5%, 1/4 w, Comp	C3
R147	107972	3300 Ohm, 5%, 1/4 w, Comp	D3
R150	742721	18 Ohm, 2 w, Film - Metal Oxide	D3
R151	113524	2700 Ohm, 1/4 w, Comp	E5
R152	113524	2700 Ohm, 1/4 w, Comp	E5
R153	113524	2700 Ohm, 1/4 w, Comp	E5
R154	113524	1700 Ohm, 1/4 w, Comp	E2
R155	113524	2700 Ohm, 1/4 w, Comp	E2
R156	113524	2700 Ohm, 1/4 w, Comp	E2
R157	228913	390 Ohm, 1/2 w, Film Metal Oxide	F6
R158	742722	10 Ohm, 2 w, Film Metal Oxide	F7
R159	108864	470 Ohm, 5%, 1/4 w, Comp	G7
R160	431134	270 Ohm, 2%, 1/2 w, Film	I9
R161	742626	150 Ohm, 1 w, Film	I9
R162	742626	150 Ohm, 1 w, Film	J9
R163	108869	15000 Ohm, 5%, 1/4 w, Comp	C4
R165	227755	220000 Ohm, 5%, 1/4 w, Comp	C4
R166	108865	1000 Ohm, 5%, 1/4 w, Comp	B5
R167	107972	3300 Ohm, 5%, 1/4 w, Comp	H8
R168	239954	5600 Ohm, 2%, 1/4 w, Film	D3
R169	426199	56000 Ohm, 5%, 1/4 w, Comp	I9
R201	426199	56000 Ohm, 5%, 1/4 w, Comp	FP
R202	433018	390 Ohm, 5%, 1/4 w, Comp	FP
R501	108861	100 Ohm, 5%, 1/4 w, Comp	SWR
R502	108861	100 Ohm, 5%, 1/4 w, Comp	SWR
R503	108865	1000 Ohm, 5%, 1/4 w, Comp	SWR
	239954	5600 Ohm, 5%, 1/4 w, Comp	LC1
	742566	RES Array, 1800 Ohm x 7 1/4 w Comp	LC1
RV1	742634	100 Ohm, Var (Semi)	D9
RV2	742508	5000 Ohm, Var (Semi)	A7
RV3	741709	20,000 Ohm, Var	A8
RV4	742629	1000 Ohm, Var (Semi)	H3
RV5	741707	10,000 Ohm, Var	G3
RV6	741707	10,000 Ohm, Var	A7
RV7	741707	10,000 Ohm, Var	B7
RV8	742508	5000 Ohm, Var (Semi)	B6
RV9	741709	20,000 Ohm, Var	F1
RV10	742630	200000 Ohm, Var (Semi)	F2
RV11	742632	500 Ohm, Var (Semi)	E3
RV12	741708	2,000 Ohm, Var	A3
RV501	742631	5000 Ohm, Var (Semi)	SWR
S1	742495	50000 Ohm, Var Linear	FP
S2	742646	Switch-Rotary-Snap	FP
S3	742642	50000 Ohm, Var-Linear	FP
S4	741817	Switch - Slide	FP
S5	741817	Switch - Slide	FP
S6	742645	Switch	FP
SP	741845	Speaker	CB
SW1	742571	Switch - Rotary - CH	J2
T1	741720	Transformer - RF	I6
T2	742519	Transformer - RF	I7
T3	742518	Transformer - IF	J5
T4	742649	Transformer - RF	H8
T5	742650	Transformer - RF	H8
T6	742651	Transformer - RF	F9
T7	741714	Transformer - RF	B8
T8	742649	Transformer - RF	D8
T9	741712	Transformer - RF	D8
T10	742657	Transformer - IF	F8
T11	742659	Transformer - IF	F6
T12	742659	Transformer - IF	D6
T13	742658	Transformer - IF	E4
T14	742655	Transformer - IF	D4
T15	742656	Transformer - IF	C5
T16	742835	Transformer-Audio	A4
VCO	742680	Oscillator Block-17 MHZ	I3
VR1	742495	50000 Ohm, Var Linear	FP
VR2	742642	50000 Ohm, Var-Linear	FP
VR3	742641	50000 Ohm, Var Linear	FP
VR4	742640	10 Ohm, 10 w, Pwr Wirewound	FP
VR5	742559	200 Ohm, Var (Dual)	FP
VR6	742559	200 Ohm, Var (Dual)	FP
VR7	742496	10000 Ohm, Var Linear	FP
X1	742660	Crystal - 10.0525 MHZ	I6
X2	742506	Crystal - 10.24000 MHZ	J4
X3	742661	Crystal - 10.692 MHZ	G1

MECHANICAL PARTS
(See Figure 11, Page 15)

1	742612	Panel-Front	FP
2	741824	Holder - Lamp CH/TX	FP
3	742678	Lamp	FP
4	742559	200 Ohm, Var (Dual)	FP
5	742496	10000 Ohm, Var Linear	FP
6	742641	50000 Ohm, Var Linear	FP
7	742642	50000 Ohm, Var-Linear	FP
8	742495	50000 Ohm, Var Linear	FP
9	742646	Switch-Rotary-Snap	FP
10	741817	Switch - Slide	FP
11	742645	Switch	FP
12	742674	Meter-500 UA-S/RF/SWR	FP
13	742615	Bracket-Meter MTG	FP
16	742640	10 Ohm, 10 w, Pwr Wirewound	SP
18	741815	Connector - Jack Microphone	SP
19	742504	Washer-Mike Jack	SP
21	742497	Connector-Jack-Ant	RP
23	741816	Connector-Jack P.A.	RP
26	742686	Terminal-Jack	RP
27	741819	Connector - Jack DC	RP
28	742719	Terminal - DC Jack	RP
36	742576	Escutcheon Assem	FP
37	742542	Knob Assem - CH	FP
38	742720	Washer-Buffer CH Knob	FP
39	741823	Knob - VR	FP
42	741845	Speaker	CB
43	742013	Bracket - Speaker MTG	CB
	742614	Bracket-Unit MTG	
	742572	Cord Assem-DC	
	742671	Fuse-3A 250 v	
	741825	Holder - Microphone	
	741745	Insulator Mylar Sheet	
	741826	Microphone - CB	
	741813	Spacer Crystal	

IMPORTANT NOTICE

The transmitter section of this transceiver may only be serviced by, or under the direct supervision of a qualified technician having a valid First or Second Class FCC Radiotelephone license. This includes internal adjustments or replacement of crystals, transistors, or any other components which can affect the performance of the transmitter. Servicing should only be done by a licensed, capable technician using suitable equipment and having complete knowledge of proper CB servicing techniques.

14T302-5/
Printed in U.S.A.

Table of Contents

List of Illustrations

General Description

RCA CB Co-Pilot Citizen's Band Transceiver Model 14T302, is a fully transistorized, FCC type approved, 40 channel Single Sideband CB unit designed for two-way AM and SSB radio communication in the 26.965 to 27.405 MHz Class D citizen's band. It is a mobile unit and operates on 12-15 volts DC (13.8 V Nominal) with either positive or negative ground and is fused in the input power cable. Operation on all 40 CB channels is provided through use of three built-in crystals operating in a highly stable PLL (phase-lock-loop) design. All receiver and transmitter crystal controlled frequencies are synthesized in the PLL circuitry.

The unit features clarifier and squelch controls and built in RF gain control to optimize receiver sensitivity. External PA and speaker jacks are provided. Noise Blanker switch, and a LOCAL/DISTANT switch with an RF/CAL/SWR switch and meter for adjusting antenna SWR ratio. A front panel dimmer control and digital channel readout are also featured.

Typical Specifications

General

Channels	40
Mode of Operation	LSB, USB and AM
Frequency Range	26.965-27.405 MHz PLL (Phase Lock Loop) Synthesizer
Operating Temperature Range	$-30^{o}C$ to $+50^{o}C$ ($-22^{o}F$ to $+112^{o}F$)
Power source	12 to 15v dc (13.8v nominal)
Current Drain	Transmit 2.3A max Receive 0.4A nom.
Dimensions	7.5"W x 2.5"H x 10-1/4"D (190mm W x 65mm H x 259mm D)
Weight	1 lb. 15 oz. (3.13 kg)

AM Transmitter

Emission	6A3
RF Power Output	4W
Modulation Type	AM
Modulation Level	100% max. AM (limited to FCC specs)
Harmonic and Spurious Suppression	60 dB or greater
Antenna Impedance	for 50-ohm Antenna Systems

SSB Transmitter

Generation Method	Double balanced modulator with crystal lattice filter
RF Output	12W PEP, FCC maximum, at 13.8V
Carrier Suppression	40 dB down
Unwanted sideband suppression	60 dB or greater
Harmonic and Spurious Suppression	More than 60 dB down

Receiver

System	SSB – Single conversion superheterodyne AM – Dual conversion superheterodyne
Sensitivity	SSB – 0.25 uV for 10 dB S/N AM – 0.7 uV for 10 dB S/N
Selectivity	SSB – 2.5 KHz at 6 dB down AM – 6 KHz at 6 dB down
Clarifier	±600 Hz Min
Audio Output	3 watts
Squelch Range	SSB – 0.7 uV to 20 uV AM – 1 uV to 500 uV
IF	SSB – 10.695 MHz AM – 1st: 10.695 MHz 2nd: 455 KHz

Circuit Description

General

Transceiver Model 14T302 is a 40 channel CB unit which use a Phase Locked Loop (PLL) system of frequency synthesization to produce the crystal controlled channel and IF signals used in operation of the transmitter and receiver sections of the transceiver. The basic PLL system is comprised of a free-running voltage controlled oscillator (Part of IC2), a phase detector, a reference crystal oscillator Q3 and a programmable divider 1C1, as seen in block diagram Figure 1.

The VCO operates in the frequency range of 17.555 to 17.995 MHz for AM and USB (17.5535 to 17.9935 for LSB) and is used to produce two output signals; one at 37.66 to 38.10 MHz for AM and USB (37.657 to 38.097 for LSB) a second at 2.11 to 2.55 MHz. Reference oscillator Q3, which is crystal controlled, operates at a frequency of 10.525 AM and USB (10.05175 LSB) MHz. Its output is fed through a BPF/doubler resulting in an output signal of 20.105 MHz for AM and USB (20.1035 MHz LSB). This signal beats with the VCO 17 MHz free running signal producing a 37.66 to 38.10 MHz or 37.657 to 38.097 MHz on LSB) output which is fed to the receiver RF amplifier and also to IC3, the transmitter Mixer/Buffer. The second VCO output signal, at 2.11 to 2.55 MHz is fed to the programmable divider in IC1. Simultaneously the 10.24 MHz output of Q2 (through buffer Q5) is applied to the programmable divider in IC1 and is divided down in 10 kHz steps producing signals in the 2.11 to 2.55 MHz range. As a channel is chosen by the channel selector, an "N" code signal (see Frequency table on page 14) is applied to the terminals of the programmable divider in IC1, to preset the divider. The two signals, the crystal signal from Osc 2 Q6, and the signal from the VCO via the LPF and buffer, are compared in the phase detector of IC1 and the phase detector produces a DC output voltage derived from the phase difference in the signals fed to it – i.e., the 2.11 to 2.55 MHz signal from the VCO and the divided down signal from reference OSC (Q6). This DC output is applied through an LPF and VCO OSC

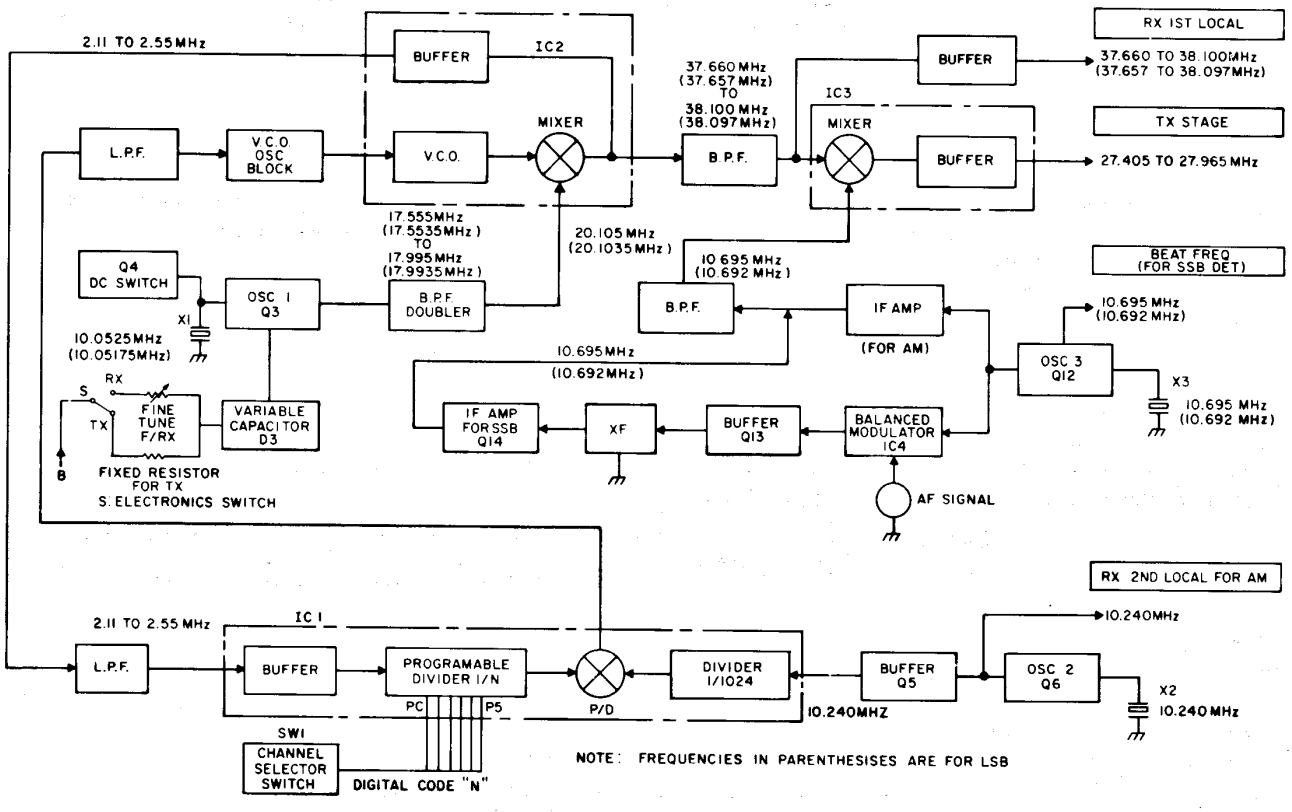

Figure 1 – PLL Block Diagram

block to the VCO, forming the phase loop. This DC voltage applied to the VCO causes it to shift frequency until its output signal locks up with the count-down frequency provided from reference oscillator Q2 (when the two signals are in phase) at which point no DC output is produced in the phase detector, and the VCO remains "locked" on frequency. When a new channel is selected a new "N" code is applied to the programmable divider. The VCO is no longer locked because of the resulting phase difference in the phase detector, and it again shifts frequency to a locked condition, in turn producing 37 MHz output signals corresponding to the new channel programmed by the new "N" code.

In summary, it will be seen that a range of stable VCO frequencies in the 17 MHz range will be produced, each specific frequency being determined by the "N" code selected by the channel selector. As previously outlined one of the VCO outputs, that at 37.66 to 38.10 MHz, for AM and USB (37.657 to 38.097 MHz for LSB) is fed to the receiver and transmitter sections. Its function is described in the separate sections which follow.

(Note – The preceeding paragraph referred primarily to AM and USB frequency information. In LSB, the frequency of Oscillator 1, Q3, is shifted by 1.5 kHz by switch Q4 circuit. This results in an output signal of 37.657 MHz to 38.097 MHz, 3 kHz below the USB signal).

Transmitter

AM (Refer to Figure 3).

The transmitter crystal oscillator, OSC3 Q12 is operating at 10.695 MHz, controlled by crystal X3. This signal amplified by Q15 is beat in the mixer section of IC3 with the 37 MHz signal output from the VCO IC2, the exact frequency of which was determined by channel selection and the PLL circuitry, as previously outlined. The resultant signal, therefore, that is fed to the RF preamplifier Q7/Q8, is the channel frequency of the channel selected (channel 1–40 between 26.965 and 27.405 MHz), see Frequency Chart on Page 14.

SSB (Refer to Figure 5).

Oscillator 3, Q12, operates at 10.695 MHz on AM or USB (or at 10.692 MHz on LSB controlled by DC Switch Q11) controlled by crystal X3. On SSB its output is fed to a balanced modulator circuit in IC4. The IC circuit produces suppressed-carrier double sideband output signals when an audio signal is also applied to the IC. The DSB output is applied to crystal filter XF (through buffer Q13) where the desired sideband is separated. The output of filter XF at either 10.695 MHz (USB) or 10.692 MHz (LSB) is amplified in Q14, fed through the bandpass filter BPF and then to the mixer in IC3. This signal mixes with the 37 MHz signal from IC2, resulting in a 27 MHz upper or lower SSB output from IC3 corresponding to the channel selected. This output is then fed to RF preamplifier Q7/Q8 through T4 and T5.

AM and SSB (Refer to Figures 3 and 5).

The 27 MHz RF pre-amplifier output is coupled to RF driver transistor Q through T and C49. The driver serves to isolate the oscillator and mixer stages from the output, and at the same time provide a certain amount of power gain. Q9 output is applied to the base input of Q10, the RF output stage of the transmitter. This stage amplifies the 27 MHz RF signal resulting in an output at L11 of 4 watts on AM (12 watts PEP on SSB).

In the AM transmit mode, (see Figure 3) the microphone fees audio through IC5 to the output transformer T15 and to the collectors of Q9 and Q10 thereby modulating the transmitter. This modulating audio is applied to both the driver and output stages to provide carrier modulation up to 100%. An ALC voltage derived from the audio signal at Q37 is fed to Q35 to control the output of T15 and prevent over-modulation. Factory adjustment of 90% modulation is achieved by adjustment of RV12 at Q37 input.

In the SSB transmit mode (see Figure 5), the microphone feeds audio through IC5, then through RV11 to pin 1 of the balanced modulator IC4. An ALC circuit composed of Q38 and Q35 controls the audio level to avoid modulation distortion. RF ALC is also provided by Q14 to reduce distortion in the RF stages. Transistors Q36 and Q39 operate as switching circuits to control IC5 for SSB operation.

The low pass filter between the antenna and receiver and transmitter inputs serves to pass the 27 MHz signals, attenuating higher frequency signals. It also serves to match the antenna impedance to the output impedance of the transmitter output transistor stage Q10.

Receiver

AM (see Figure 2).

The rf signal, at a frequency between 26.965 and 27.405 MHz, feeds from the antenna through L13, L12, L11 and T7 to the 27 MHz Neutralized RF Amp Q20. Then the amplified output signal from Q20 is coupled through T8 and T9 to Mixer Q22 where it is beat with an injection signal from the VCO in IC2 via Buffer Q2.

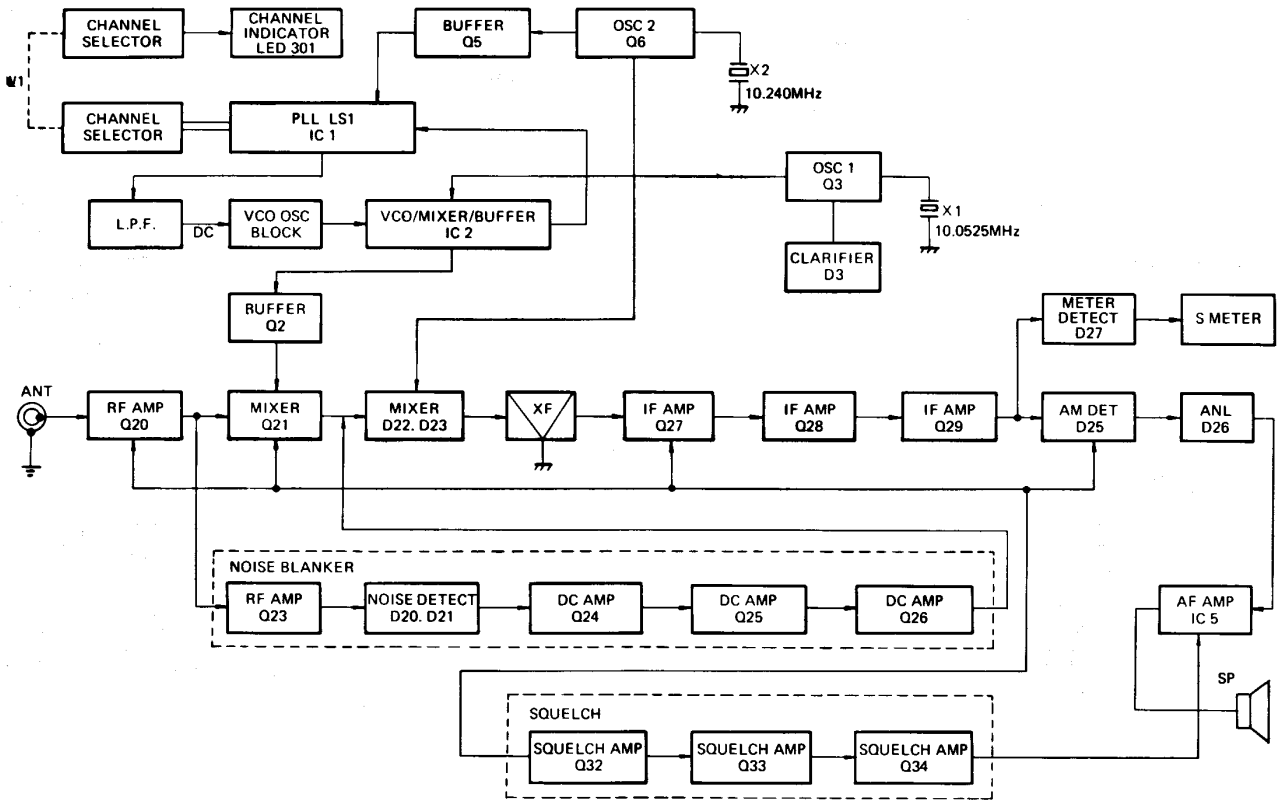

Figure 2 – Block Diagram – AM Receive

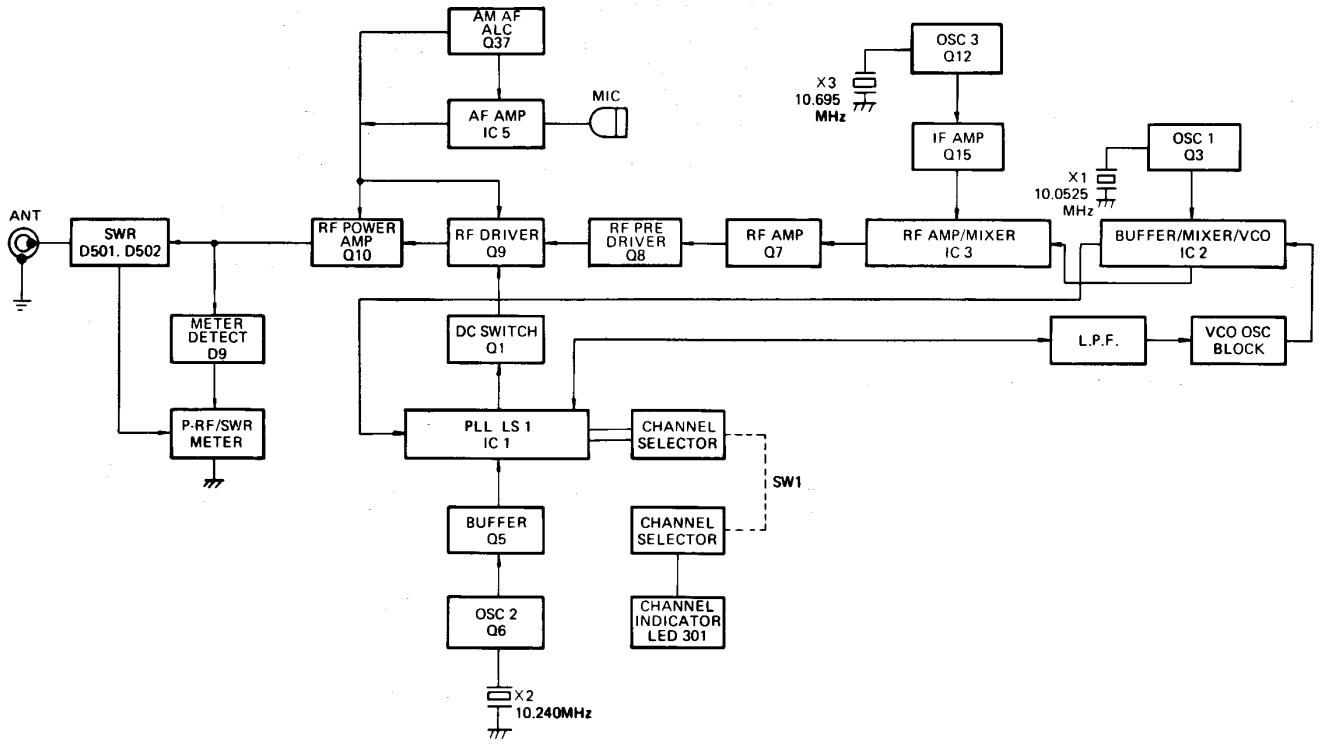

Figure 3 – Block Diagram – AM Transmit

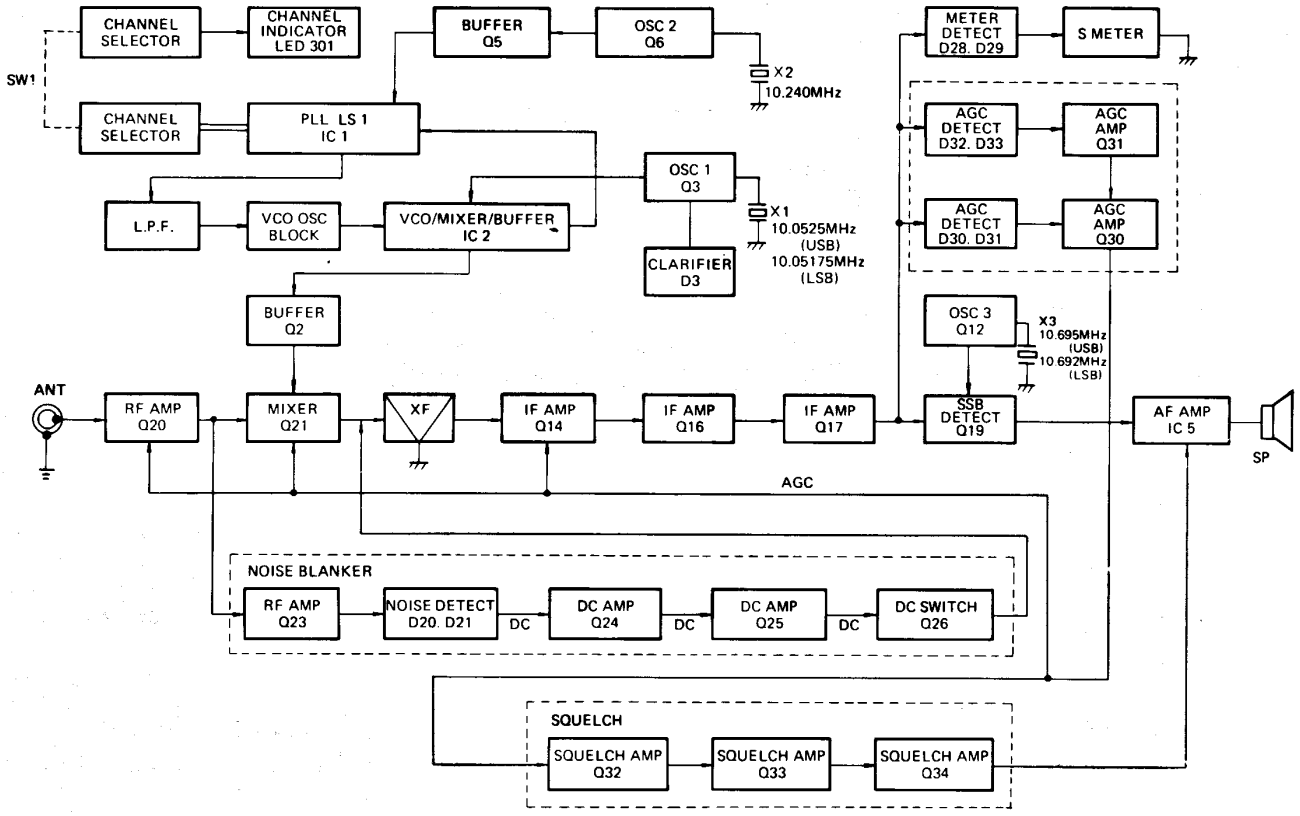

Figure 4 – Block Diagram – SSB Receive

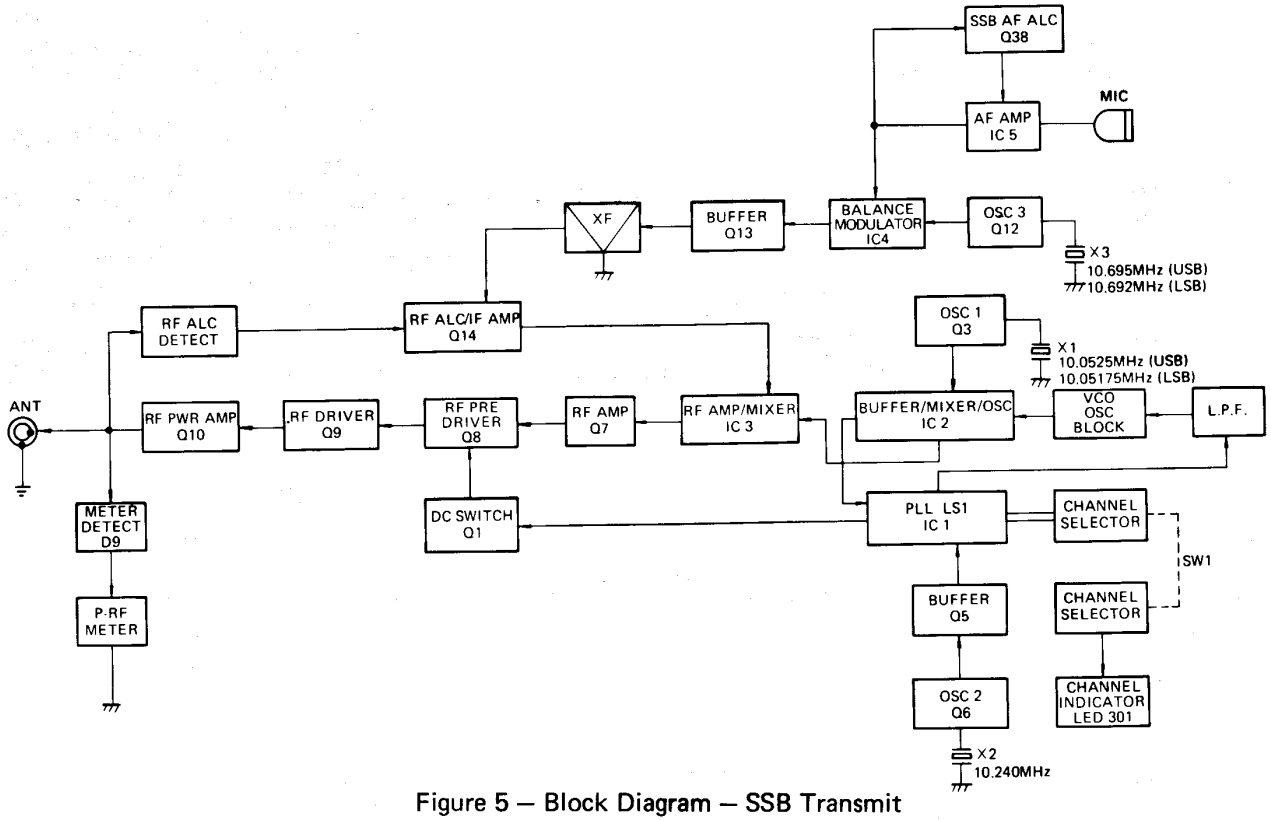

Figure 5 – Block Diagram – SSB Transmit

The frequency of the injection signal from IC2 depends on the channel being received, as a signal in the 37 MHz range is programmed by the channel selector. The output of Mixer Q22 is therefore 10.695 MHz, the first IF frequency, and is the result of the RF input and mixing of IC2 VCO signals. (see Frequency Chart on Page 14).

This 10.695 MHz 1st IF signal is then fed to the balanced mixer D22/D23. Also fed to the 2nd Mixer is a second signal from Q6, Oscillator No. 2. This oscillator signal is at 10.24 MHz. Mixing of these two signals results in a signal in the T14 output from the 2nd Mixer of 455 kHz, the second IF frequency.

The 455 kHz second IF signal passes through the ceramic bandpass filter CF, and feeds the 455 kHz signal to AM IF amplifiers Q27, Q28 and Q29 which includes IF transformer T15. The output of Q29 is applied to D25 the diode detector.

SSB (see Figure 4).

The rf signal, at a frequency between 26.965 and 27.405 MHz, feeds from the antenna through T7 to the 27 MHz RF Amp Q20. The amplified Q20 output feeds through T8 and T9 to Mixer Q22. In the mixer the 27 MHz signal beats with an injection signal from IC2. The frequency of this signal will depend on the channel being received and the mode of operation (upper or lower sideband) resulting in an IF signal of 10.695 MHz (USB) or 10.692 MHz (LSB).

The 10 MHz SSB IF signal is passed through crystal filter T10 to IF amplifiers Q14, Q16 and Q17 and detected in the product detector Q19.

The rectified audio signal from the AM or SSB detector is passed through the volume control VR1 to the input of the audio circuit IC5. The audio output is transformer coupled to the internal speaker, and to an external speaker if used. DC switch Q21 is used to short-circuit the primary circuit of T9 during transmit to disable the receiver.

Q32, Q33 and Q34 are the squelch amplifier transistors. At low or no signal levels Q32 and Q33 conduct and turn off Q34. This changes the bias on IC5 resulting in no signal output from the audio section. As the incoming RF signal increases it results in cutting off Q32 and Q33. This results in opening up the AF amplifier and output is achieved. The point at which Q32 and Q33 cut off is determined by setting the SQUELCH control VR2.

Noise Blanker

Placing the Noise Blanker switch to "ON" activates the noise blanker circuitry. The noise signals contained in the signal at Q23 output, feed through C113 to D21 base of Q24. The resulting rectified DC voltage turns on Q24 which in turn turns on Q25 and Q26. This causes the IF signal at T10 to be shorted to ground through Q26 during the presence of the noise impulses, blanking out the noise at the receiver output.

Public Address

Switching provision is made in the audio input circuit of the transceiver to provide a PA function by switching the microphone output. The audio output is also switched to an external PA speaker jack. This switching occurs when the CB/PA switch is set to the PA position.

In the PA mode, the transceiver serves as a public address amplifier providing 3 watts output to an external PA speaker. The other functions of the transceiver are deactivated in the PA mode per FCC Rules & Regulations.

Servicing

General

Model 14T302 RCA Co-Pilot Citizen's Band Transceiver performance depends upon the high quality of components employed and proper servicing techniques performed by licensed fully qualified technical personnel. Only use of the replacement parts given in the parts list on pages 21 through 25 should be employed.

Illustrations to aid in servicing and adjustment; such as top and bottom views, exploded views and superimposed printed board views, are provided to assist in proper and competent servicing. Block diagrams are shown in Figures 2 through 5. The schematic diagram is shown in Figure 17.

Figure 13 of the main printed circuit board shows map grid coordinates at the sides of the illustration. These co-ordinates are keyed to corresponding key numbers in the replacement parts list, for instant location of smaller parts. Major components, not shown in Figure 13 are shown in Figure 12. The exploded view identifies all mechanical parts by means of balloon callouts. These balloons key to corresponding balloons shown in the mechanical parts list section.

Simple removal of the four Phillips screws at each side of the transceiver case permits removal of both halves of the case.

Electronic switching is used in the unit making it inoperable when the microphone is disconnected from the front of the unit. In order to activate a unit only for receiver service, a dummy plug must be used in place of the microphone plug. Use of this plug is HIGHLY RECOMMENDED TO ACTIVATE THE RECEIVER WHEN PERFORMING SERVICE. IF THE MICROPHONE IS USED ACCIDENTAL DEPRESSION OF THE TRANSMIT BUTTON COULD RESULT IN DAMAGE TO VALUABLE TEST EQUIPMENT. See Figure 6 for view and information on dummy plug.

Note – Crystals appear to be plug-in units. What appear to be sockets are spacers for thermal isolation, crystals are soldered to board.

Test Equipment

The following test equipment is required and recommended for servicing the 14T302 Transceiver.

1. A 50 ohm resistive antenna load with a power capability of 15 watts or more, such as Bird Model 43 "thru line" wattmeter with a 15A Element and a Model 8053 RF Coaxial Load Resistor, or equivalent.
2. A frequency counter operable in the required CB range, such as Hewlett-Packard Model HP 5283A or suitable equivalent.
3. A HF Signal Generator which operates in the 50 kHz to 65 MHz frequency range with +1% accuracy, such as Hewlett-Packard HP-606B, Wavetek Model 3000 or equivalent.
4. A high input impedance oscilloscope capable of accurate monitoring of 27 MHz range AM and SSB signals.
5. Audio Output meter capable of reading 1mV.
6. Dummy plug to activate transmitter without using microphone, see Figure 6.
7. Dummy mike plug for receiver servicing, with jumper between pins 2 and 3 as seen in Figure 6.
8. An 8 ohm 5 watt resistive dummy speaker load.
9. An Audio Signal Generator with two outputs in the 10 Hz to 20 kHz range with mixer pad for dual output, or two separate Audio Generators in above range with appropriate matching pad. (For 2 tone SSB test).
10. An RF Voltmeter. (WV-500B with WG-301A Probe)
11. A regulated bench DC power supply capable of supplying 0 - 20 DC @ at least 3 amperes.
12. DC Ammeter with 0 – 3 amp scale.
13. DC Voltmeter with 20k ohms/V rating.

Tune Up and Alignment

Before performing any adjustments, check visually all jacks, plugs and solder joints for good connection. Shown in the schematic are nominal test voltage values for the transceiver transistors. In addition, certain other pertinent voltages are shown on the schematic.

Transmitter Alignment

Connect test equipment to the transceiver as shown in the block diagram below, Figure 7. To activate the transmitter without using the microphone, use the dummy microphone plug wired as shown in Figure 6A. This plug is also used to introduce a modulating audio signal to the microphone input circuit as described in the following procedure.

A. PLL ALIGNMENT.

Before performing the VCO alignment make the following frequency adjustments:

a. Connect frequency counter to TP2 in series with a 1000 pf capacitor set transceiver to channel 19, mode switch to USB position. Adjust trimmer CT3 for reading of 10.240000 MHz ±50 Hz.

b. Connect both frequency counter and oscilloscope to TP3 (see Figure 12). With mode switch still in USB position, adjust T3 for maximum amplitude

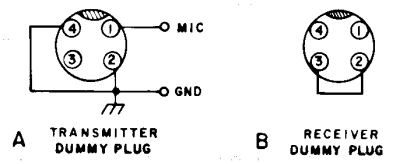

Figure 6 — Dummy Microphone Plugs

on the scope (10.0525 MHz X2), then adjust trimmer CT1 for reading of 20.105 MHz ±40 Hz on counter. Switch mode to LSB and adjust CT2 for reading of 20.1035 MHz ±40 Hz on counter.

c. Connect frequency counter to TP5 (see Figure 12) and adjust trimmer CT5 for reading of 10.695 MHz ±50 Hz on the counter with mode switch in USB position. Then switch mode switch to LSB and adjust CT4 for reading of 10.692 MHz ±50 Hz.

VCO Alignment

To more readily follow the frequencies involved during the alignment, refer to block diagram, Figure 1.

a. Set channel selector to channel 1.

b. Connect DC Voltmeter, set to 12 V range, between ground and TP4, see Figure 12. (Meter input impedance should be 20k ohm/volt or higher).

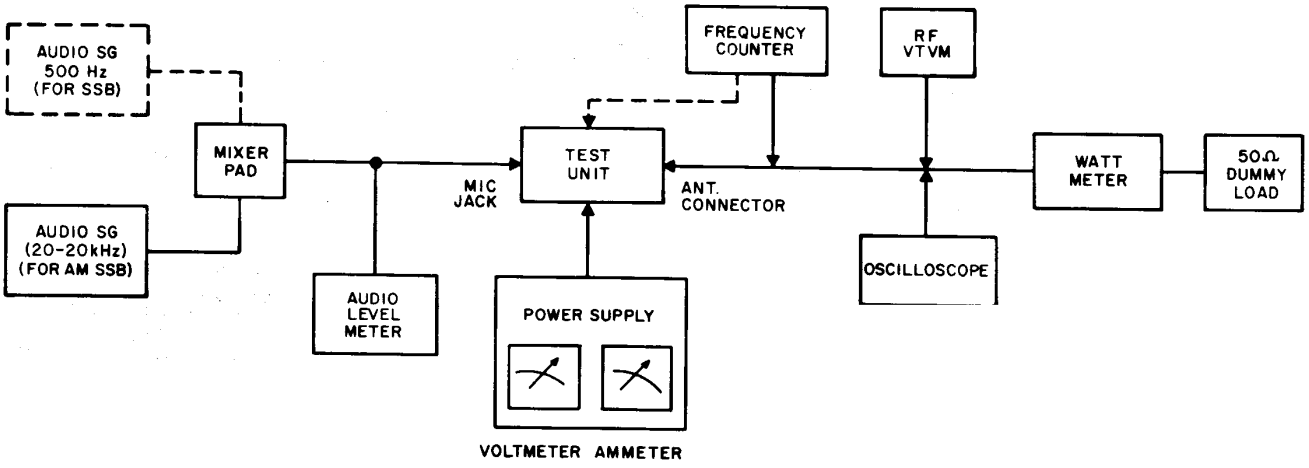

Figure 7 — Test Equipment Hook-Up — Transmitter

c. Adjust core in VCO block clockwise to obtain 3.6 volts +0.1 volt on meter. (Start with core at top of form).

d. Set channel selector to channel 40 position. A reading between 1.4 and 2.3 volts should be obtained.

B. ALIGNMENT OF DRIVER Q9.

a. Apply a 2.5 mV signal at 2.4 kHz to MIC input, see Figure 6A.

b. Set channel selector to channel 40 position, mode switch to USB position.

c. Connect oscilloscope and 50 ohm dummy load across ANT connector, see Figure 7.

d. Adjust T1 for maximum amplitude on scope.

e. Switch to channel 1 and adjust T2 for maximum amplitude.

f. Open the circuit and connect the ammeter between the emitter of Q9 and ground. Adjust RV1 for emitter current of 35mA ± 10mA.

g. Set channel selector to channel 40 and adjust T4 for maximum amplitude on scope.

h. Set channel selector to channel 1 and adjust T5 for maximum amplitude on scope.

C. SSB ALIGNMENT OF RF POWER AMPLIFIER.

a. Set channel selector to channel 19. Set mode switch to USB.

b. Feed 2.4 kHz, 25 mV signal to microphone input.

c. Connect oscilloscope to the emitter of Q7.

d. Adjust T11 for maximum amplitude on scope display.

e. Turn core of T6 to top of form, then adjust RV11 for reading of 150 mV P-P on the oscilloscope.

f. Connect oscilloscope to ANT in parallel with the Wattmeter.

g. Temporarily set RV2 fully counterclockwise and set the core of L13 so it is flush with top of coil form.

h. Adjust T6, T11, L7 and L11 for maximum power output on wattmeter and scope.

i. Decrease 2.4 kHz audio input signal to zero and adjust RV4 and RV5 for minimum amplitude of carrier leakage on the oscilloscope.

j. Feed two 25 mV signals, one at 500 Hz, the second at 2400 Hz (see Figure 7) into MIC input Adjust RV2 for PEP of 10 watts. Check on each channel that PEP is between 9 and 11 W. Also check that scope display conforms to "A" in Figure 8. (For additional reference see FCC Bulletin OCE43 of 4/77 and EIA Standard RS424).

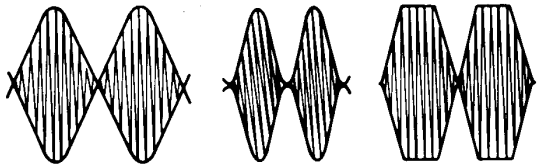

Figure 8 – Modulation Envelope

k. Change mode switch to LSB and check that similar results to those above are obtained.

D. AM RF POWER AMPLIFIER ADJUSTMENT

a. Set mode switch to AM and channel selector to channel 19.

b. Adjust VR4 for RF power output of 3.7 W on wattmeter.

E. AM MODULATION ADJUSTMENT

a. Feed a 25 mV 2.5 kHz audio signal to MIC input.

b. Adjust RV12 for modulation depth of 80–95%.

c. Decrease input to 2.5 mV and check that modulation depth is maintained at 30% or higher.

F. RF POWER METER ADJUSTMENT (AM)

a. Adjust RV3 so that P-RF meter reading is the same wattage as obtained in step D.(b)

G. TRANSMITTER FREQUENCY CHECK

a. Set mode switch to AM (no modulation).

b. Connect counter to antenna input and check frequency on each channel (see Table on

Page 14). Frequency should be within ±800 Hz on each channel.

H. SWR METER BRIDGE ADJUSTMENT

a. Connect a 100 ohm non-inductive resistor across antenna connector.

b. Activate transmitter and adjust SWR CAL control so meter pointer is exactly on "SET" mark on meter.

c. Move SWR/CAL to "SWR" and adjust RV501 so meter indicates exactly "2" on scale.

Receiver Alignment

Connect test equipment to the trasceiver as shown in Figure 9. Unless noted otherwise, keep Clarifier control at "12 o'clock" position and Noise Blanker switch to "OFF" position.

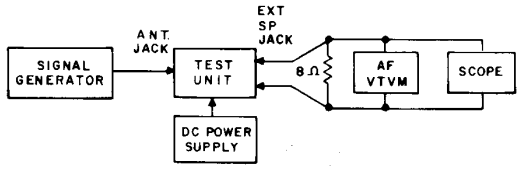

Figure 9 – Test Equipment Hook-Up – Receiver

To activate the receiver without using the microphone, connect the dummy microphone plug shown in Figure 6B in place of the microphone (jumper on plug between pins 2 and 3).

A. AGC ALIGNMENT

a. Connect the VOM to terminal 15 on the main printed circuit board (see Figure 13).

b. Set the mode switch to AM position with no input signal.

c. Adjust RV8 for a reading of 2V.

B. RECEIVER SENSITIVITY ALIGNMENT (AM Mode)

a. Set the signal generator output to 27.185 MHz with 1 kHz 30% modulation, use a minimum readable signal on meter.

b. Set the transceiver on channel 19.

c. Refer to Figure 13 and adjust T7, T8 and T15, in this order, for maximum audio output across the 8 ohm dummy speaker load. Keep reducing the generator input signal as adjustment is made to avoid inaccuracy due to AGC action. Make final adjustments at low input level. Repeat adjustment to achieve maximum alignment accuracy at low level, signal level at 1 uV or less.

d. After completion of step c., turn T7 core to decrease output by 2 dB.

C. SQUELCH CIRCUIT ADJUSTMENT

a. Set mode switch to AM position.

b. With signal generator and transceiver set to channel 19, 27.185 MHz, feed a 100 uV, 1 kHz signal modulated 30% into the RF input jack.

c. Rotate the SQUELCH control fully clockwise.

d. Adjust RV9, see Figure 13 so that audio output just appears on oscilloscope.

e. Set mode switch to USB position and adjust RV10 in same manner as RV9 in step c.

D. S-METER ADJUSTMENT

a. Set signal generator to produce a 100 uV signal to the RF input.

b. Adjust RV7, see Figure 13, so that "S" meter pointer reads "9" on the meter.

c. Change mode switch to AM position and readjust signal generator slightly for maximum output on scope.

d. Adjust RV6 so that "S" meter reads "9".

CHANNEL NO.	CHANNEL FREQ. (MHz)	"N" CODES	VCO FREQ. (MHz)		CHANNEL SW. OUTPUT						RX 1st LOCAL FREQ. (MHz)	
			AM/USB	LSB	P0	P1	P2	P3	P4	P5	AM/USB	LSB
1	26.965	255	17.555	17.5535	1	1	1	1	1	1	37.660	37.657
2	26.975	254	17.565	17.5635	0	1	1	1	1	1	37.670	37.667
3	26.985	253	17.575	17.5735	1	0	1	1	1	1	37.680	37.677
4	27.005	251	17.595	17.5935	1	1	0	1	1	1	37.700	37.697
5	27.015	250	17.605	17.6035	0	1	0	1	1	1	37.710	37.707
6	27.025	249	17.615	17.6135	1	0	0	1	1	1	37.720	37.717
7	27.035	248	17.625	17.6235	0	0	0	1	1	1	37.730	37.727
8	27.055	246	17.645	17.6435	0	1	1	0	1	1	37.750	37.747
9	27.065	245	17.655	17.6535	1	0	1	0	1	1	37.760	37.757
10	27.075	244	17.665	17.6635	0	0	1	0	1	1	37.770	37.767
11	27.085	243	17.675	17.6735	1	1	0	0	1	1	37.780	37.777
12	27.105	241	17.695	17.6935	1	0	0	0	1	1	37.800	37.797
13	27.115	240	17.705	17.7035	0	0	0	0	1	1	37.810	37.807
14	27.125	239	17.715	17.7135	1	1	1	1	0	1	37.820	37.817
15	27.135	238	17.725	17.7235	0	1	1	1	0	1	37.830	37.827
16	27.155	236	17.745	17.7435	0	0	1	1	0	1	37.850	37.847
17	27.165	235	17.755	17.7535	1	1	0	1	0	1	37.860	37.857
18	27.175	234	17.765	17.7635	0	1	0	1	0	1	37.870	37.867
19	27.185	233	17.775	17.7735	1	0	0	1	0	1	37.880	37.877
20	27.205	231	17.795	17.7935	1	1	1	0	0	1	37.900	37.897
21	27.215	230	17.805	17.8035	0	1	1	0	0	1	37.910	37.907
22	27.225	229	17.815	17.8135	1	0	1	0	0	1	37.920	37.917
23	27.255	226	17.845	17.8435	0	1	0	0	0	1	37.950	37.947
24	27.235	228	17.825	17.8235	0	0	1	0	0	1	37.930	37.927
25	27.245	227	17.835	17.8335	1	1	0	0	0	1	37.940	37.937
26	27.265	225	17.855	17.8535	1	0	0	0	0	1	37.960	37.957
27	27.275	224	17.865	17.8635	0	0	0	0	0	1	37.970	37.967
28	27.285	223	17.875	17.8735	1	1	1	1	1	0	37.980	37.977
29	27.295	222	17.885	17.8835	0	1	1	1	1	0	37.990	37.987
30	27.305	221	17.895	17.8935	1	0	1	1	1	0	38.000	37.997
31	27.315	220	17.905	17.9035	0	0	1	1	1	0	38.010	38.007
32	27.325	219	17.915	17.9135	1	1	0	1	1	0	38.020	38.017
33	27.335	218	17.925	17.9235	0	1	0	1	1	0	38.030	38.027
34	27.345	217	17.935	17.9335	1	0	0	1	1	0	38.040	38.037
35	27.355	216	17.945	17.9435	0	0	0	1	1	0	38.050	38.047
36	27.365	215	17.955	17.9535	1	1	1	0	1	0	38.060	38.057
37	27.375	214	17.965	17.9635	0	1	1	0	1	0	38.070	38.067
38	27.385	213	17.975	17.9735	1	0	1	0	1	0	38.080	38.077
39	27.395	212	17.985	17.9835	0	0	1	0	1	0	38.090	38.087
40	27.405	211	17.995	17.9935	1	1	0	0	1	0	38.100	38.097

1 = H Level (4.5 – 5.5 V)
0 = L Level (0.05 – 0.4 V)

Figure 10 – Channel Frequency Table

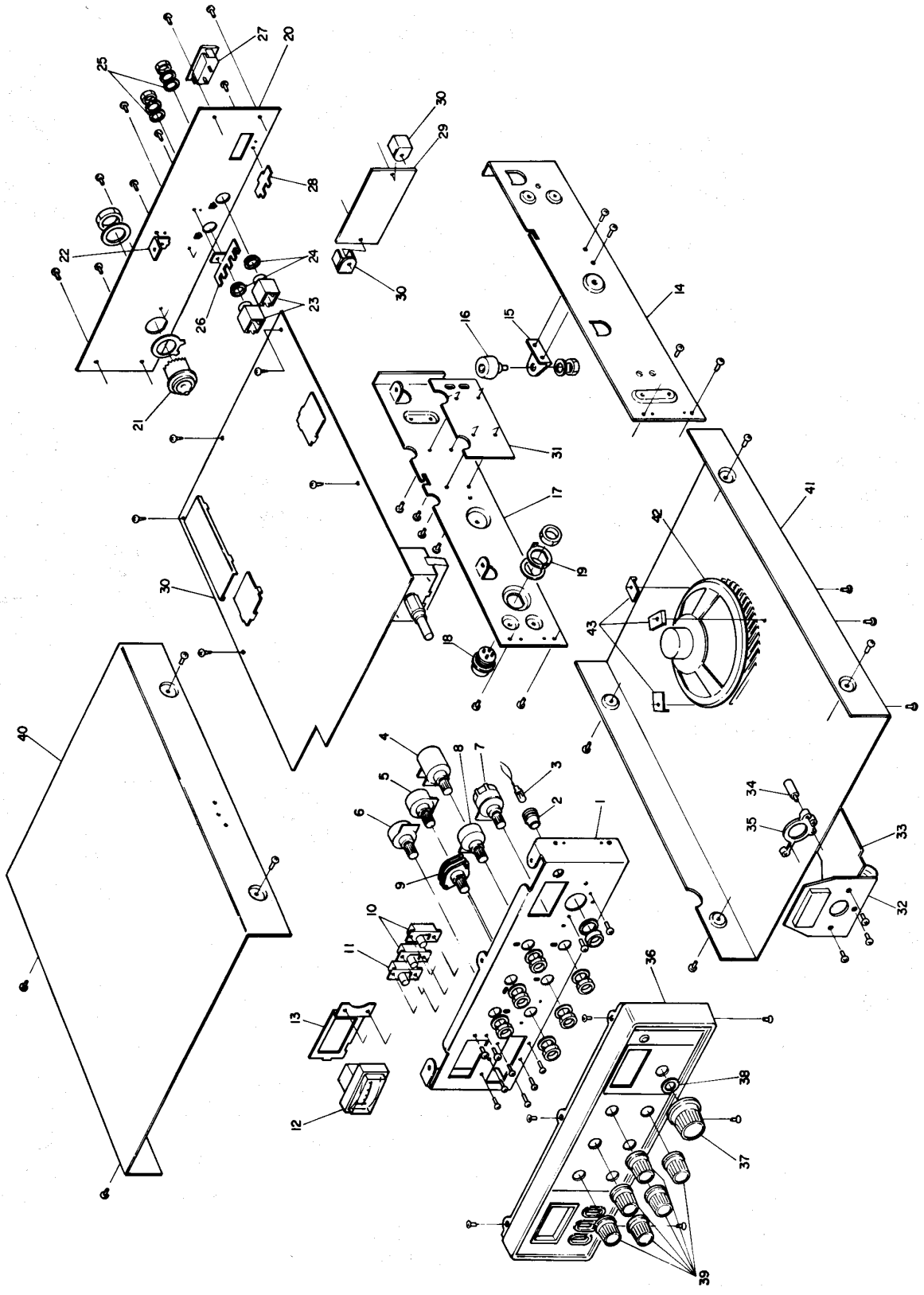

Figure 11 – Exploded View

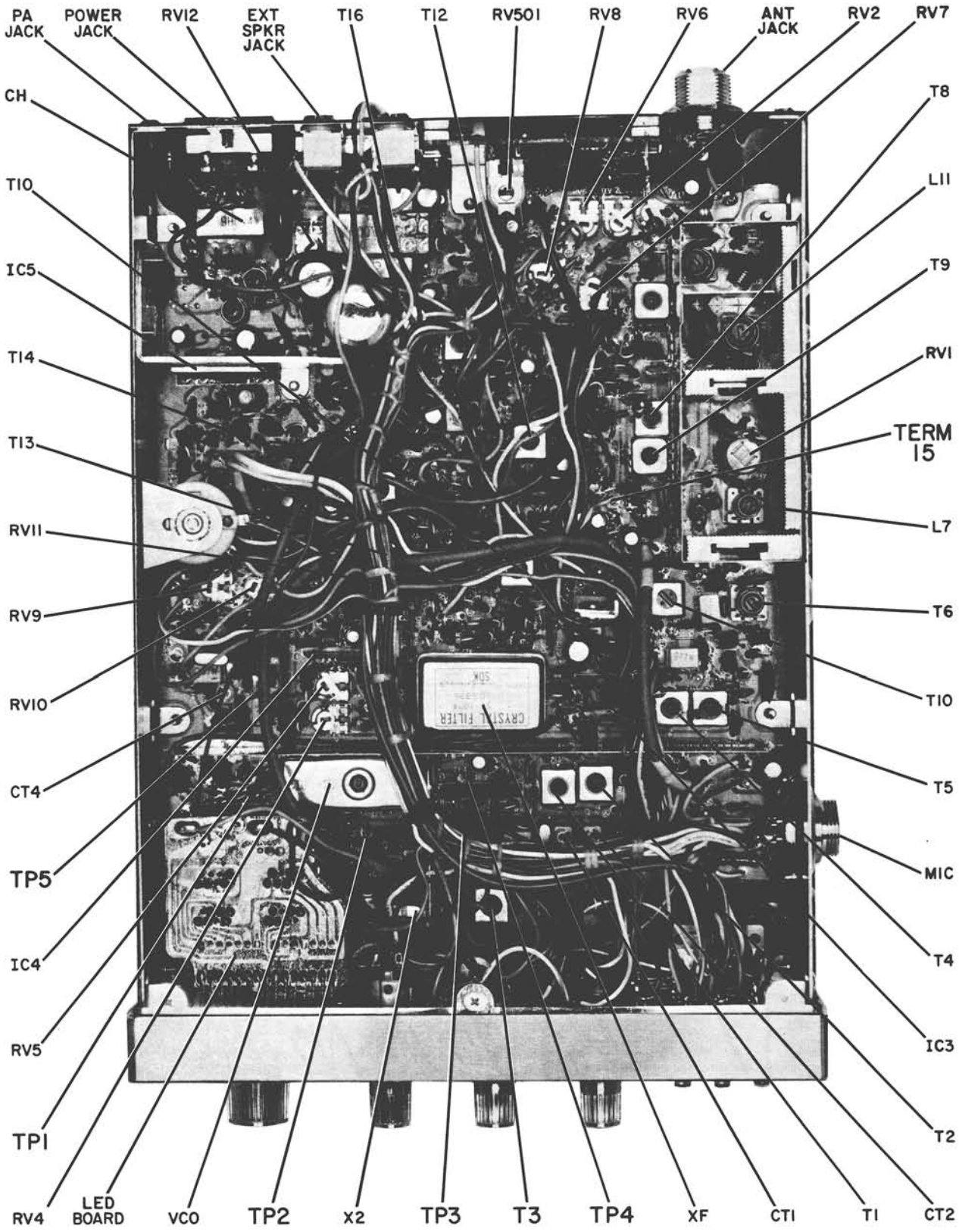

Figure 12 – Bottom (Component) View – 14T302