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**Craig Model 4101 and 4102 Service Manual**

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# SERVICE MANUAL

# CRAIG

# 4101 4102

## MOBILE CITIZENS BAND TRANSCEIVER

### S P E C I F I C A T I O N S

#### GENERAL

Channels.....	23
Frequency Range.....	26.965 to 27.255 MHz
Frequency Tolerance.....	$\pm$ 0.005% from -30C to +50C
Power Source.....	13.8V DC $\pm$ Ground
Semiconductors.....	20 Transistors & 20 Diodes

#### RECEIVER

Sensitivity.....	Better than 0.6uV for 10dB (s+n)/n
Adjacent Channel Rejection.....	Better than 50dB @ $\pm$ 10kHz
Selectivity.....	BW $\pm$ 3kHz @ -6dB
Squelch.....	Adjustable threshold less than 1uV
Audio Output.....	3.5 Watts
Automatic Noise Limiter.....	Series Gate

#### TRANSMITTER

RF Output.....	4.0 Watts
Modulation Capability.....	100%
Output Impedance.....	50 Ohm
Spurious Attenuation.....	59dB Minimum

### **WARNING**

FCC Rules require that ALL transmitter section adjustments, other than those supplied by CRAIG as front panel operating controls, be made by or under the supervision of the holder of an FCC First or Second Class Radio-Telephone Operator License.

Replacement or substitution of crystals, transistors, regulator diodes, or any other part of a specialized nature with parts other than recommended by CRAIG may cause the operator to be in violation of the technical regulations of Part 95 of the FCC Rules, or in violation of the Type Acceptance requirements of Part 2 of the rules.

**A PRODUCT OF CRAIG CORPORATION**

## TRANSMITTER ALIGNMENT

### GENERAL ALIGNMENT CONDITIONS:

1. WARM UP THE UNIT AND TEST EQUIPMENT AT LEAST 15 MINUTES BEFORE STARTING ALIGNMENT.
2. RF OUTPUT METER OR 50 OHM DUMMY LOAD SHOULD BE CONNECTED TO ANTENNA CONNECTOR.
3. COUPLING TO FREQUENCY COUNTER SHOULD BE AS LOOSE AS POSSIBLE.
4. ALL ADJUSTMENTS ARE MADE WITH 14.4 VOLT DC INPUT.

### INSTRUMENTS REQUIRED:

1. RF OUTPUT POWER METER (50 OHM, 5 WATTS)
2. FREQUENCY COUNTER
3. POWER SUPPLY (14.4V DC)
4. RF VTVM

STEP	SET TRANSMITTER TO -	CONNECT OUTPUT INDICATOR TO -	SET CHANNEL SELECTOR TO -	ADJUST	ADJUST FOR -
1	Transmit with no Modulation	RF VTVM between base of Q15 and ground.	CH. 13	L4, T8	Maximum
2		RF Power meter to antenna connector		L8,L10 T9,T10,L6	4.0 Watts Output
3 (4102 Only)				VR6	Needle of meter on the unit comes between 3 and 4 as calibrated on RF power meter.
4		Frequency counter to antenna connector through a suitable attenuator			Check frequency of all channels.

### CAUTION

\* Damage to other components may result if transmitter is adjusted for more than 4.0 Watts output.

## RECEIVER ALIGNMENT

### GENERAL ALIGNMENT CONDITIONS:

1. SIGNAL INPUT MUST BE KEPT AS LOW AS POSSIBLE TO AVOID OVERLOAD AND CLIPPING.
2. STANDARD MODULATION IS 400Hz at 30% AMPLITUDE.
3. A NON-METALLIC ALIGNMENT TOOL SHOULD BE USED FOR ALL ADJUSTMENTS.
4. SQUELCH CONTROL KNOB SHOULD BE SET AT EXTREME COUNTER-CLOCKWISE, UNLESS OTHERWISE SPECIFIED.

### INSTRUMENTS REQUIRED

#### SIGNAL SOURCE:

1. RF SIGNAL GENERATOR

#### OUTPUT INDICATORS:

1. AUDIO VTVM
2. OSCILLOSCOPE

STEP	CONNECT SIGNAL SOURCE TO -	CONNECT OUTPUT INDICATOR TO -	SET SIGNAL TO -	SET CHANNEL SELECTOR TO -	ADJUST	ADJUST FOR -	
1	RF signal generator to base of Q6 (2nd mixer) through 0.01uF.	Audio VTVM across speaker voice coil.	455 kHz (Modulated)	Any channel	T3	2nd IF1	Maximum
					T4	2nd IF2	
					T5	2nd IF3	
2	RF signal generator to antenna connector	Audio VTVM across speaker voice coil.	27.115 MHz (channel 13, modulated)	Channel 13	L1	1st IF1	Maximum
					L2	1st IF2	
					T1	RF	
					T2	RF	
3	RF signal generator with output level of 300uV to Ant. connector.				VR3 (NOTE: SQ control knob should be set at extreme clockwise.)	Adjust for open SQ point	
4	RF signal generator with output level of 100uV to antenna connector.				VR6	Adjust for "S-9" on "S" meter.	
5	REPEAT ABOVE STEPS TO OBTAIN MAXIMUM SENSITIVITY.						

P A R T S P R I C E L I S T

SUBJECT TO CHANGE WITHOUT NOTICE, USE ALL AVAILABLE  
NUMBERS AND COMPLETE DESCRIPTION WHEN ORDERING, INCLUDING MODEL NUMBER.

\* \* \* "THESE PRICES HAVE BEEN REVISED AS OF 10-3-75." \* \* \*

Ref. No.	Craig Key No.	Description	Mfr's Sugg Ret. Price	Ref. No.	Craig Key No.	Description	Mfr's Sugg Ret. Price
<u>P A C K A G I N G</u>							
	4101001	Individual Carton	2.95		4101012	Mtg Bracket	2.95
	4101002	Styrofoam	1.95		4101033	Power Plug	2.65
	4101003	Microphone	16.00		4102001	Individual Carton	2.95
		Fuse, 2A	.35		4102002	Styrofoam	1.95
	4101004	Bkt, Mic Mtg	.65		C4932	Slide Mtg Bkt	9.95

<u>E X P L O D E D V I E W P A R T S</u>							
1	NSP	Main Chassis	**	32	4101031	Plate, Mtg Bkt	.65
2	4101010	Cabinet, Top	4.45	33	4101032	Mtg Screw, Mtg Bkt	.35
3	4101011	Cabinet, Bottom	4.30	34	4101033	Plug, W/Power Cord	2.65
4	4101012	Mounting Bracket	2.95	35	4101034	Phone Jack, Ext Sp	1.45
5	4101013	Front Grille	4.75	36		Fiber Washer, M7	.25
6,7,8,9	4103009	Ass'y, CH Select Knob	3.95	37		Washer, M7	.25
10	4101014	Knob, Vol/Squelch	.95	38		Toothed Nut, M7 (round)	.25
11	4101015	"ON AIR" Modulation LED Mtg	3.95	39,42		Scr, PH M3x6	.25
12	4101016	Plate, Modulation Sign	.50	40		Cushion Washer, M3	.25
13	4101017	Rotary Sw, CH Select (Sw2)	8.95	41		Blk Scr, PH M3x6	.25
14	4101018	Cont W/Sw, Vol (VR1,Sw1)	3.15	43		Plastic Scr, PH M3x6	.25
15	4101019	Cont, Squelch (VR2)	3.15	44		Scr, PH M3x6	.25
16	4101020	6P Mic Connector	4.15	45		Toothed Washer, M3	.25
17	SR106D	Modulation L.E.D.	1.45	46		Hex Nut, M3	.25
18	4101022	Lense, CH Indicator	.25	47		Hex Nut, M9	.25
19	4101023	Cap, Knob Support	.25	48		Toothed Washer, M9	.25
20	4101024	Bkt, Meter Mtg	.55	49		Hex Nut, M7	.25
21	4101025	Speaker, 8 Ohm 0.5 W	3.95	50		Plain Washer, M7	.25
22	4101026	Speaker Grille	.35	51	4101035	Mtg, CH Select Sw	.30
23	4101027	Connector Jack, Power	1.75	104	C4932	Slide Mounting Bracket	9.95
24	4101028	Lamp, 14V 75mA	1.35	111	4102010	Modulation Meter	4.95
25	4101029	Bushing, Lamp	.30	112	4102011	Cabinet, Top	4.45
26	NSP	Heat Sink	**	114	NSP	Plate Spr, Mtg Bkt	**
27	NSP	Insulator, Transistors	**	115	4102012	Plate, Jacks & PCB Mtg	.95
28		Transistors	**	126	4102013	Bkt, Power So Mtg	.35
29	NSP	Heat Sink	**	127	4102014	Pin Connector Socket	2.95
30	4101030	Ass'y, Main P.C.B. W/Comp	72.95	130	3135017	Slide Rail	.60
31	4350017	Coaxial Ant. Socket	3.95	139	4102015	PCB Connector, Power	3.45
	4101100	Mic Plug	3.95				

<u>S E M I C O N D U C T O R S</u>							
D1,7	WG713	Diode	.55	D20	SR106D	L.E.D.	1.45
D2,3,4,	1N60	"	.95	Q1,2,3,	2SC710	Transistor	1.15
5,6,9,14,	"	"	"	4,5,6,7,	"	"	"
15,16,19	"	"	"	8,15,16	"	"	"
D8,10	BZ090	Zener Diode	1.50	Q9,10,12,	2SC711	"	.95
D11	1S1211	Diode	.85	19,20	"	"	.95
D12	1S2473	"	1.85	Q11	2SD187	Transistor	2.10
D13,17	1N4002	"	.95	Q13,14	2SC1014	"	1.65
D18	VD1211	Diode	.50	Q17	2SC495	"	1.50
Q18	2SC1816	Transistor	4.00				

<u>C H O K E S C O I L S &amp; T R A N S F O R M E R S</u>							
L1,2	4101036	IFT, 42K10	1.95	L16	4101047	Choke Coil, K-58	1.40
L3,14	4101037	Choke Coil, 22uH	.65	T1	4101048	HF Coil, C294DD	1.90
L4,T8	4101038	HF Coil, 507SYI	.75	T2	4101049	HF Coil, C337BD	1.90
L5	4101039	Choke Coil, 2.5uH	.65	T3	4101050	IFT, AD86AD	1.85
L6	4101040	Violet HF Coil, S-18	.95	T4	4101051	IFT, EA227B	1.85
L7	4101041	Choke Coil, 0.65uH	.65	T5	4101052	IFT, EA146D	1.85
L8,10	4101042	White HF Coil, S-18	.95	T6	4101053	Input Transformer	3.85
L9	4101043	HF Coil, Z343QD	.95	T7	4101054	Output Transformer	4.85
L11	4101044	Choke Coil, 0.22uH	.65	T9	4101055	HF Coil, C305BD	1.90
L12	4101045	Choke Coil, 0.85uH	.65	T10	4101056	HF Coil, CO42DD	1.85
L13	4101046	Choke Coil, K-10	1.45				

<u>V A R I A B L E R E S I S T O R S</u>							
VR1	4101018	Vol Cont W/Sw1 10k	3.15	VR5	4101060	Semi-Fixed Res, 50k	.75
VR2	4101019	Squelch Cont, 10k	3.15	VR6	4101061	Semi-Fixed Res, 100k	.75
VR3,4	4101059	Semi-Fixed Res, 10k	.75				

<u>C R Y S T A L S</u>							
X1	4101062	Crystal, 9.545MHz	6.00	X8	4101069	Crystal, 17.115MHz	6.00
X2	4101063	" 9.555MHz	6.00	X9	4101070	" 17.165MHz	6.00
X3	4101064	" 9.565MHz	6.00	X10	4101071	" 17.215MHz	6.00
X4	4101065	" 9.585MHz	6.00	X11	4101072	" 10.000MHz	6.00
X5	4101066	" 16.965MHz	6.00	X12	4101073	" 10.010MHz	6.00
X6	4101067	" 17.015MHz	6.00	X13	4101074	" 10.020MHz	6.00
X7	4101068	" 17.065MHz	6.00	X14	4101075	" 10.040MHz	6.00

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F I L T E R S & V A R I A B L E C A P A C I T O R S

VC1	4101057	Variable Cap, 10pF	1.95	FL1	4101058	Ceramic Filter, LF-A8	2.95
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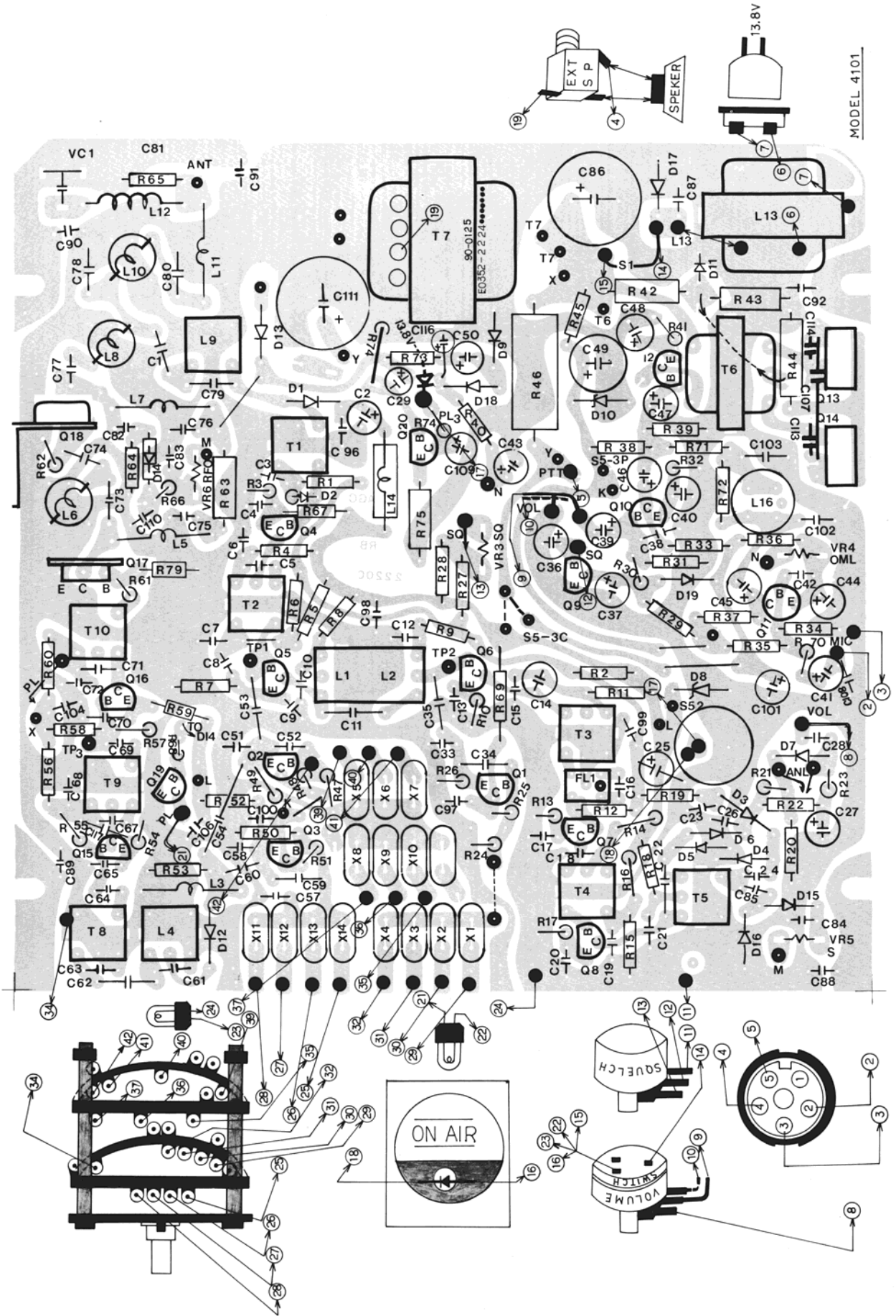
C A P A C I T O R S

Ref. No.	Description	Mfr's Sugg Ret. Price	Ref. No.	Description	Mfr's Sugg Ret. Price
C1,63	Mica, 30pF/50V	.45	C34,59	Mica, 500pF/50V	.45
C2,25,40,44,116	Electrolytic, 10uF/16V	.50	C35	" 5.6pF/50V	"
C3,4,6,7,8	Ceramic, 0.01uF/50V	.45	C36,43,50	Electrolytic, 4.7uF/25V	.50
9,10,38,42,56,65,68,70,72,75,76,96,97,99,100,105,106,107,108,110,117	" " "	"	C37,39,45,46,109	" 1uF/50V	"
C5,73,67	Mica, 24pF/50V	.45	C41,47	" 0.47uF/50V	.50
C11	" 1pF/50V	"	C48	" 100uF/16V	.60
C12,83,88,89,90,91,92,93,98,118,119,120,121	Ceramic, .047uF/50V	"	C49,101	" 220uF/16V	.65
C13,17,18,19,20,21,23,84	Mylar, 0.04uF/50V	"	C51	Mica, 330pF/50V	.45
C14	Plastic Film, 1500pF/50V	.60	C53,54	" 5pF/50V	.45
C15	Ceramic, 0.04uF/50V	.45	C60	" 20pF/50V	"
C22,58,74	Mica, 100pF/50V	.45	C61	" 10pF/50V	"
C24,26,64,69,77,85,87,122	Ceramic, .001uF/50V	"	C62	Ceramic, 1pF/50V	.45
C27	Electrolytic, 0.22uF/50V	.50	C71	Mica, 150pF/50V	"
C28	Mylar, 0.01uF/50V	.45	C78	" 140pF/50V	"
C29	Mylar, 0.03uF/50V	"	C79	" 300pF/50V	"
			C80	" 130pF/50V	"
			C81	" 75pF/50V	"
			C82	" 3pF/50V	"
			C86,111	Electrolytic, 1000uF/16V	1.65
			C94	" 33uF/16V	.65
			C102	Mylar, 0.05uF/50V	.45
			C103	" 0.1uF/50V	"
			C113,114	Mylar, 0.02uF/50V	.45
			C32,33,52,57	Mica, 35pF/50V	.45

R E S I S T O R S, CARBON, OHMS, ± 10%, ¼W, 0.25¢ EACH, OR NOTED

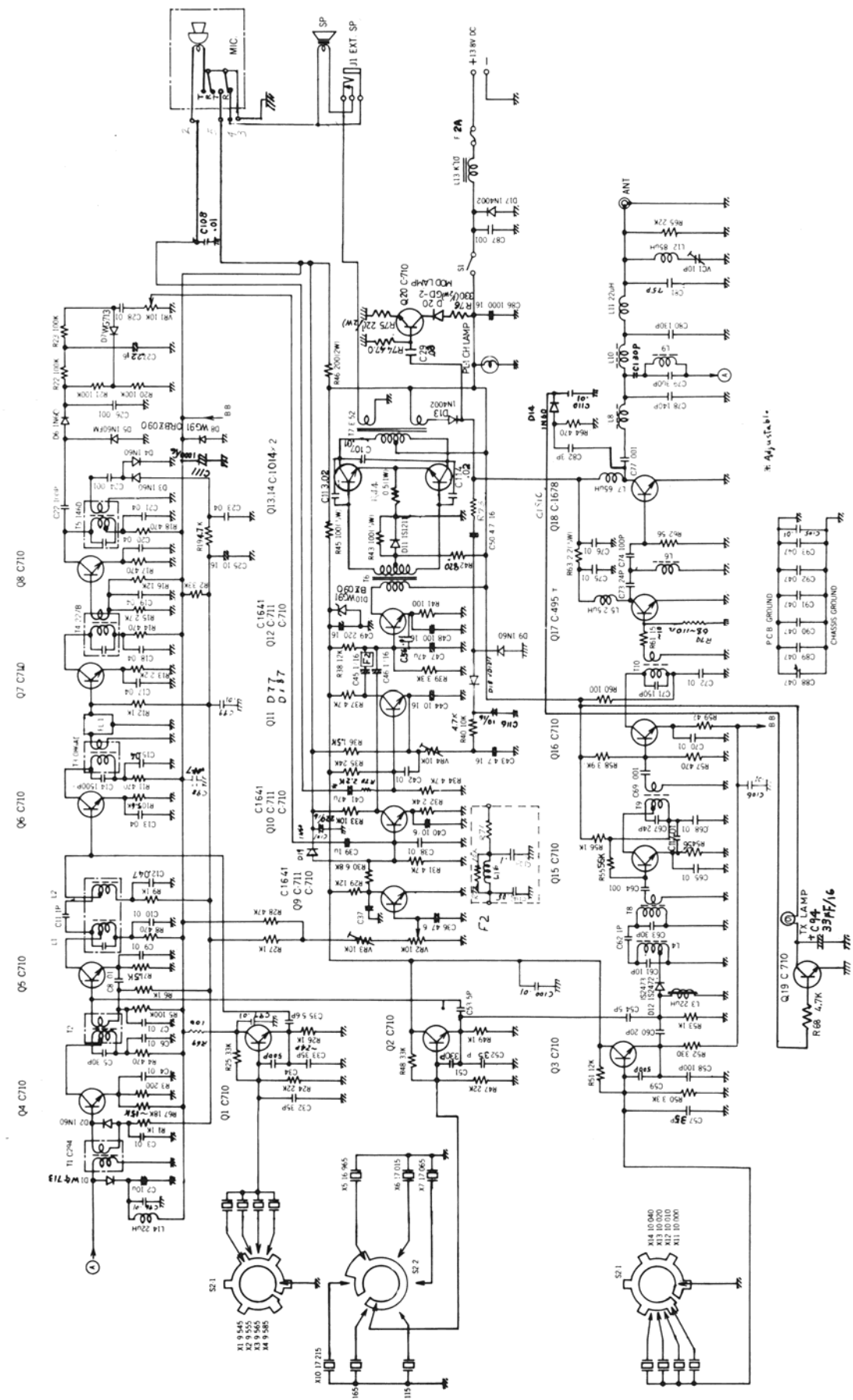
Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
R1,6,9,12,26,27,49,53,56	1k Ohms, ¼ Watt	R24,47,65	22k Ohms, ¼ Watt	R52	330 Ohms, ¼ Watt
R2, 25,48	33k " " "	R28	47k " " "	R54,62	56 " " "
R3	200 Ohms " " "	R30	6.8k " " "	R55	56k " " "
R4,8,11,14,17,18,57,64,71,74	470 " " "	R32	2.4k " " "	R58	3.9k " " "
R5,20,21,22,23	100k " " "	R33,40	10k " " "	R59	47 " " "
R7,36,66	1.5k " " "	R35	24k " " "	R61	10 " " "
R10	5.6k " " "	R38,51	12k " " "	R63	Solid Res, 2.2 " ½ Watt
R13,70	2.2k " " "	R39,50	3.3k " " "	R67	15k Ohms, ¼ Watt
R15	2.7k " " "	R41,60,69,79	100 " " "	R68	4.7 " " "
R16,29	12k " " "	R42	Solid, 820 ½W	R72	10k " " "
R19,31,34,37	4.7k " " "	R43,45	" 100 ½W	R73	680 " " "
		R44	Oxide Film, 0.5 1W	R75	Solid Res, 22 Ohms, ½ Watt
		R46	200 Ohms, 2 Watt	R76	" " 330 Ohms, ½ Watt

4101 P.C.B. LAYOUT

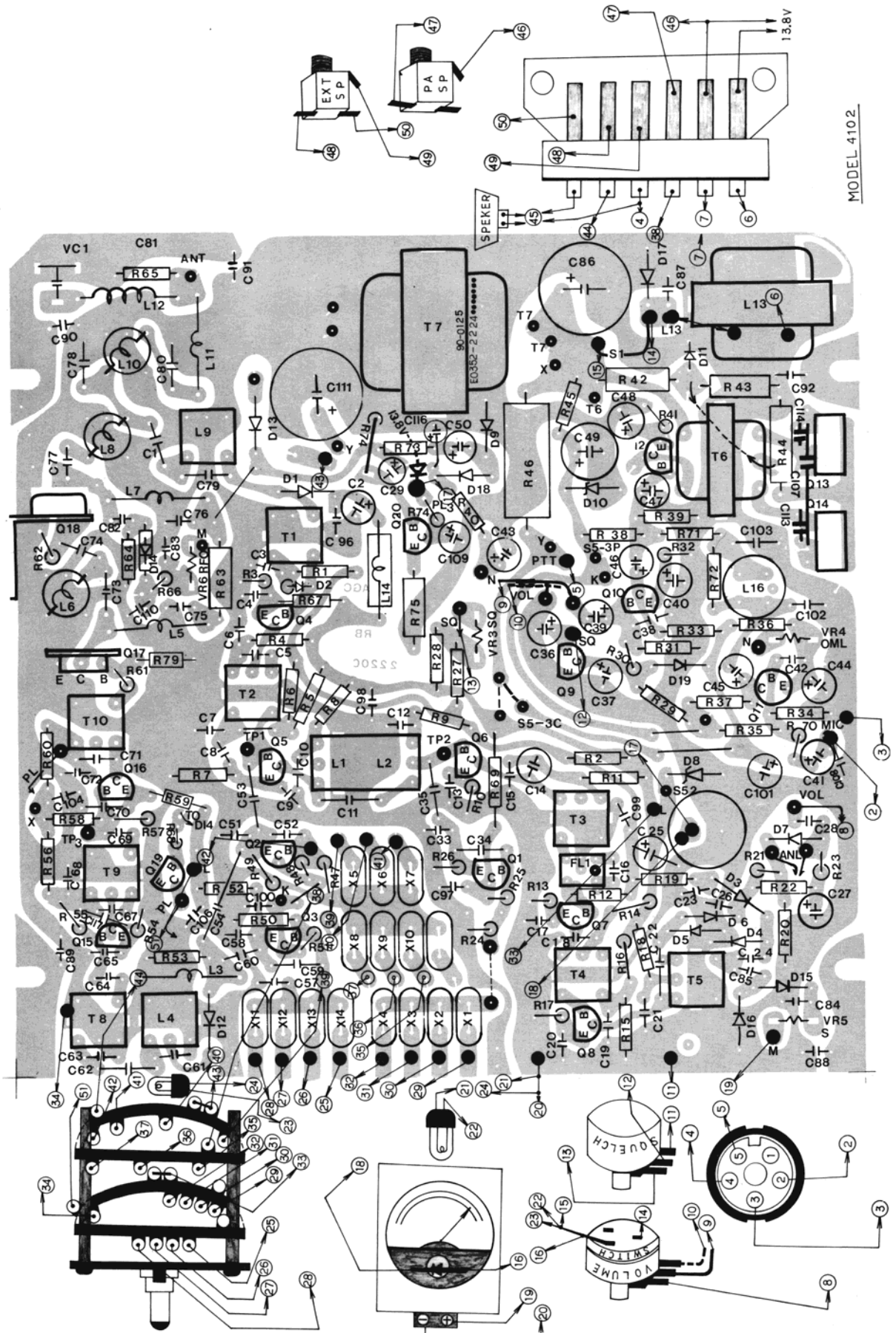


MODEL 4101

# 4101 SCHEMATIC DIAGRAM



4102 P.C.B. LAYOUT

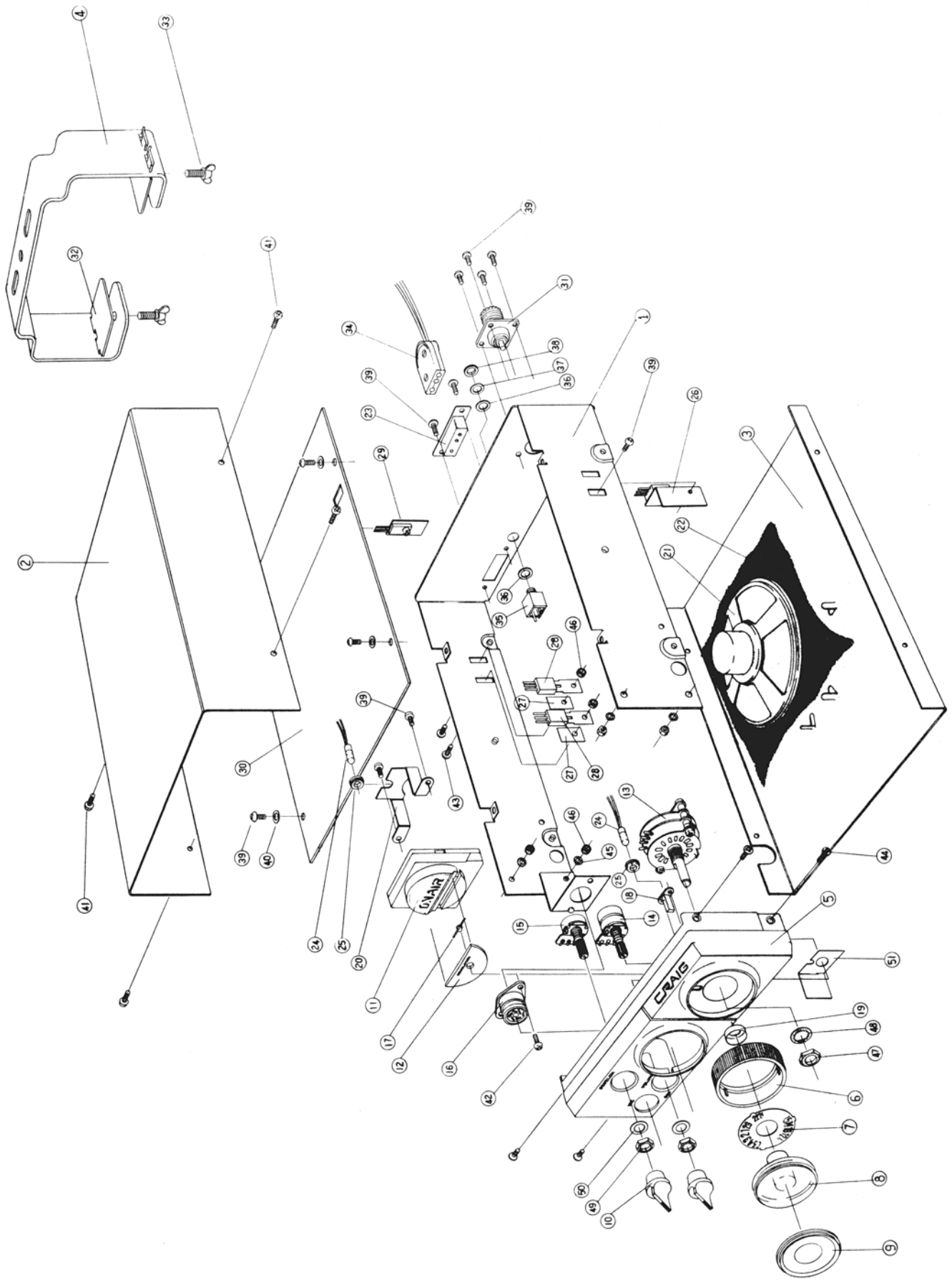


MODEL 4102





4101 EXPLODED VIEW



4102 EXPLODED VIEW

