

SERVICE DATA

MODEL CB-21



156-009882

Figure 1. Model CB-21 Transceiver.

SPECIFICATIONS

Transmitter Power Input 5 watts.

Frequency Range 26.965 MC to 27.255 MC.

Receiver Sensitivity . . . Less than one microvolt
for a 10-DB signal-to-
signal plus noise ratio.

Receiver Audio Power
Output 3.5 watts.

Transmitting Crystals. Third overtone CR-81/U,
0.005% tolerance.

Receiving Crystals . . . As in transmitter, except
1650 KC higher in fre-
quency.

Antenna Termination
Impedance. 50 ohms.

TVI Suppression. Second Harmonic Trap
Circuit.

Power Requirements. . . 0.22 amperes (Receive),
1.0 amperes (Transmit)
with maximum modula-
tion.

Overall Dimensions

(HWD) 2-1/4 inches by 6 inches
by 8-1/4 inches.

Transistor

Complement 17 transistors, plus 5 diodes
and two zener voltage regu-
lators.

CHASSIS REMOVAL

To remove the chassis from the cabinet, first re-
move the mounting handle. Then, remove the four
screws on the bottom holding the chassis to the
cabinet and carefully slide the chassis out from
the front.

ALIGNMENT

The Model CB-21 Transceiver has been carefully
aligned and adjusted at the factory by specially
trained personnel using precision equipment.
Alignment should not be attempted until all other
possible causes of faulty operation have been in-
vestigated. Alignment should not be required
unless the unit has been tampered with or compo-
nent parts have been replaced in the RF or IF
stages. Alignment should be performed only by
persons familiar with transistorized communica-
tions equipment and experienced in its alignment.

NOTE

All alignment and performance specifications stipulated in this manual were performed at the EIA STANDARD DC input of 13.8 volts.

3. 0.1 μ F, 200 v capacitor.

EQUIPMENT REQUIRED

RECEIVER

1. Standard, AM-type signal generator covering the frequency range of at least 455 KC to 27.255 MC, modulated 30% with either 400 or 1000 CPS. Generator should be capable of being accurately adjusted to 1650 KC.
2. Output meter (or AC vacuum tube voltmeter) connected across speaker terminals (or 8.0 ohm termination).

TRANSMITTER

1. 50-ohm non-reactive dummy load (two 100-ohm, 2-watt resistors in parallel).
2. RF power output indicator connected across above load.
3. 0-500 milliamperere DC meter.

GENERAL

1. Plastic screwdriver, 1/8-inch tip.
2. Hexagonal alignment tool (GC NO. 8606 or equivalent).

RECEIVER ALIGNMENT

RECEIVER AND IF ALIGNMENT

ALIGNMENT	CONNECTIONS	GENERATOR FREQUENCY	CHANNEL CRYSTAL	ADJUST
455 KC IF Transformer	Signal generator to 2nd mixer base through 0.1 μ F capacitor.	455 KC $\pm 0.2\%$	None	Top of T6, the top and bottom of T7 and T8. Keep reducing the generator output to maintain the output level below 1/2 watt (volume control fully clockwise).
1650 KC IF Transformer	Signal generator to 1st mixer base through 0.1 μ F capacitor.	Tune for peak at 1650 KC	None	Top and bottom of T5 with a low-level signal generator input for maximum output.
RF and Antenna Coil	Signal generator to Antenna input connector.	Tune for peak at 27.085 MC	11 (27.085 MC)	Top of T3 and T4 with a low level signal generator input for maximum output.

NOTE: T9 slug is adjusted for best oscillator starting using a minimum activity channel 22 crystal. Top of T10 is adjusted for best oscillator starting.

TRANSMITTER ALIGNMENT

The transmitter oscillator coil T1, has been adjusted at the factory for series-resonant crystal operation. This coil should not be tampered with as off-frequency illegal operation may result. The FCC requires that persons making transmitter frequency adjustments be licensed

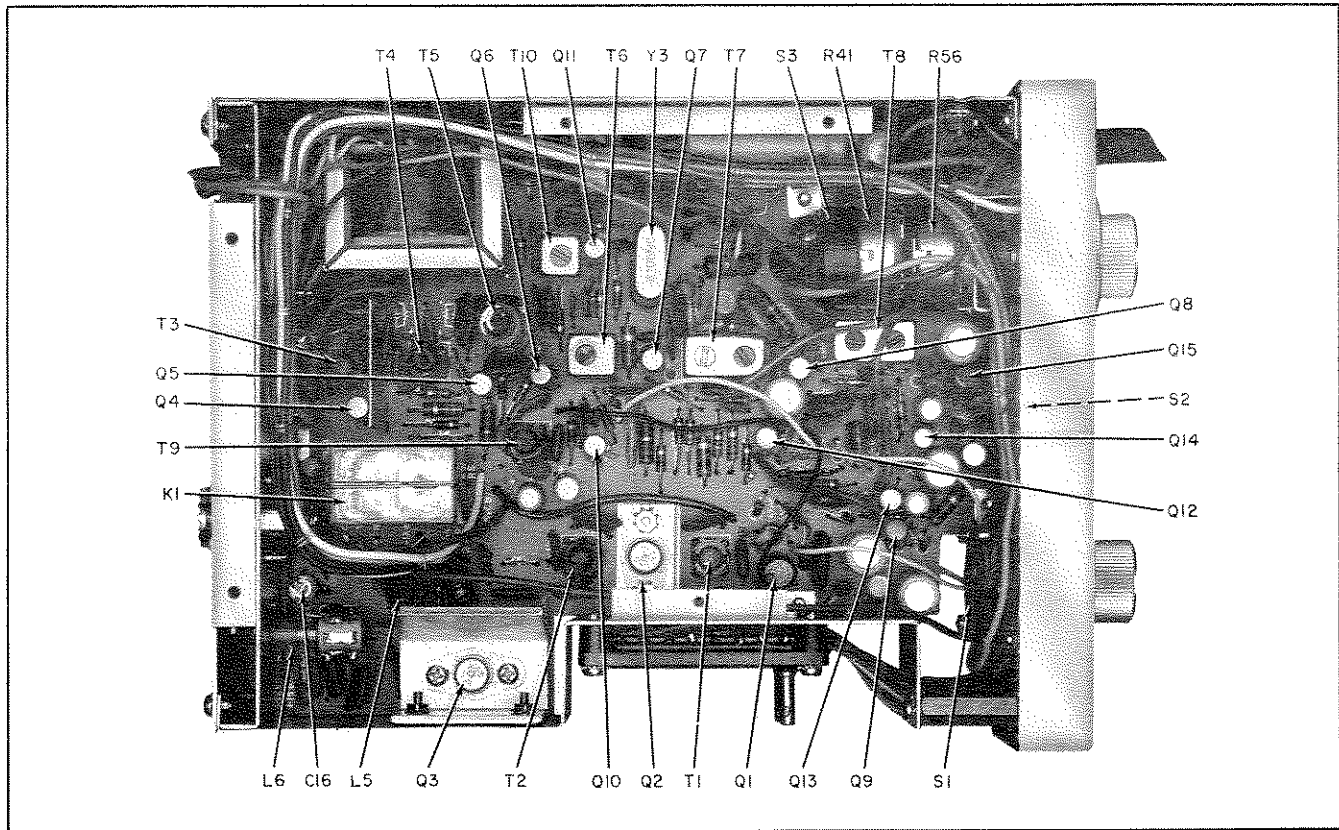
commercial radio-telephone operators, second class or higher, and that they have adequate frequency-measuring equipment. For proper on-frequency operation of this transceiver, use only standard military-type CR81/U, third-overtone, series-resonant crystals.

TRANSMITTER RF ADJUSTMENT

ADJUSTMENT	CONNECTION	CHANNEL CRYSTAL	ADJUSTMENT
Power output	Dummy load to antenna socket, power output indicator across load. 500-milliampere DC meter to TP1 (with jumper removed).	11 (27.085 MC)	Tune T2, L5 and L6 for maximum output (below 5 watts) and final input (below 350 milliamperes at TP1).

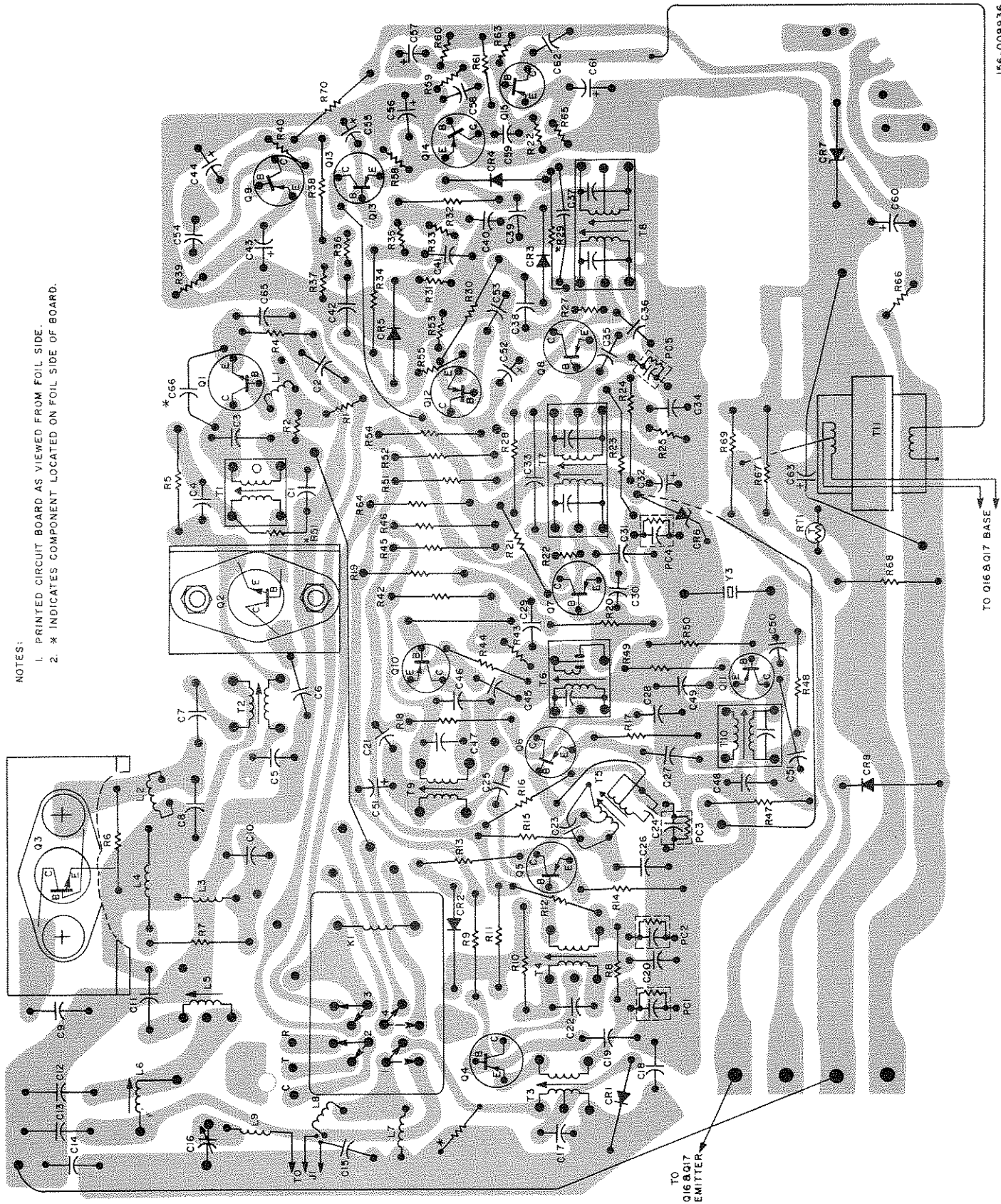
Coil L3 and capacitor C16 function as a trap circuit to suppress second harmonic radiation. Unless a receiver tuning the 54-55 MC range and having an S-meter is available, the setting of C16 should not be changed. If such a receiver is avail-

able, the receiver should be tuned to the second harmonic of the CB-21 (2 x operating frequency). With the CB-21 in transmit, C16 should be adjusted for minimum indication on the receiver.



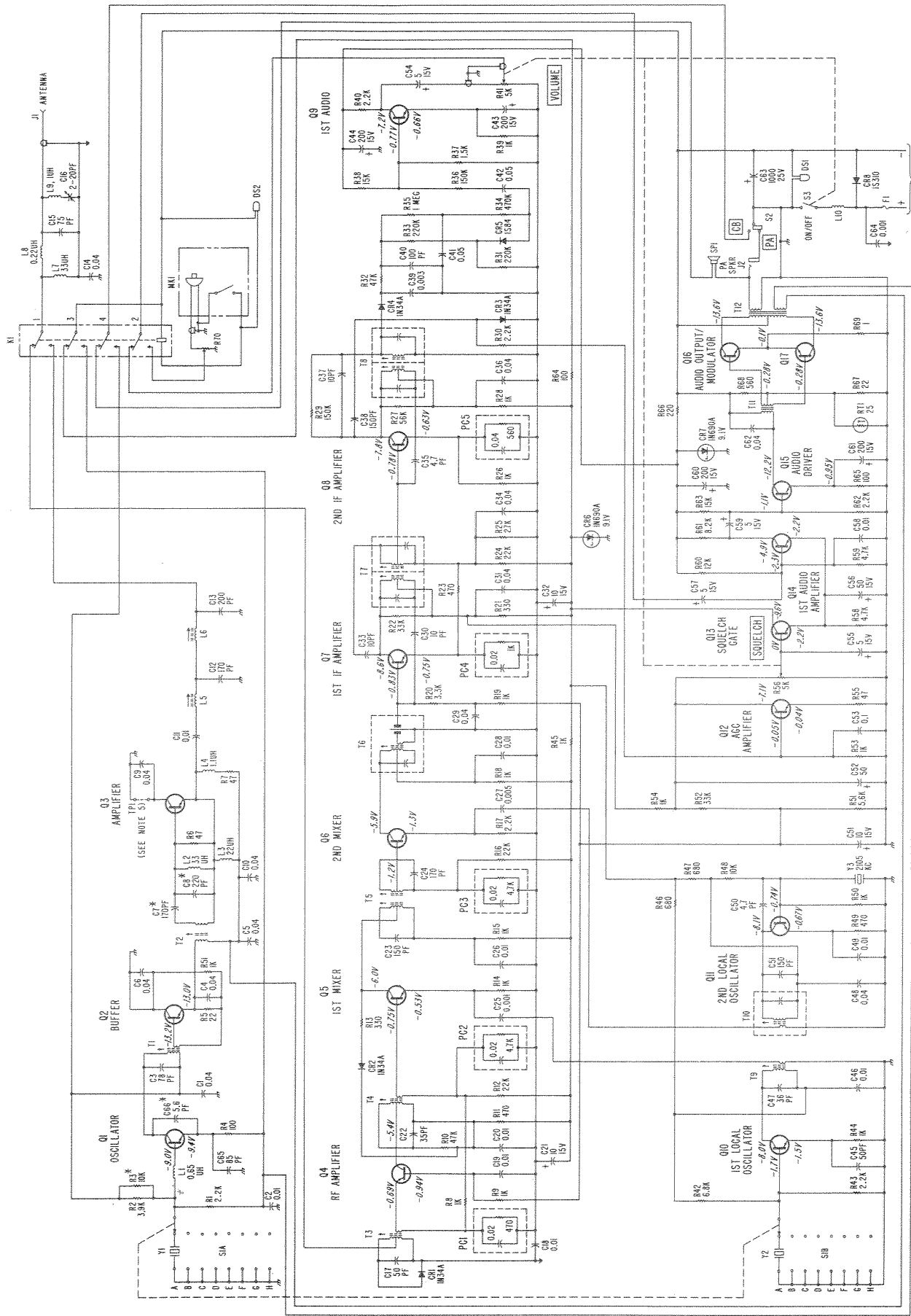
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Figure 2. Bottom Chassis View.



- NOTES:
1. PRINTED CIRCUIT BOARD AS VIEWED FROM FOIL SIDE.
 2. * INDICATES COMPONENT LOCATED ON FOIL SIDE OF BOARD.

Figure 3. Printed Circuit Board Diagram



- NOTES:
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTORS ARE IN OHMS ±10%, 1/4 WATT. ALL CAPACITORS ARE IN UF.
 2. * INDICATES FACTORY SELECTED VALUE, PROGRAMMABLE VALUE SHOWN. RS MAY NOT BE PRESENT IN SOME UNITS.
 3. VOLTAGE MEASUREMENTS ARE REFERENCED TO THE COMMON POSITIVE BUSS (+A). INPUT VOLTAGE IS 116 VDC.
 4. ALL VOLTAGE MEASUREMENTS MADE WITH A 100M OHM UNDER NO SIGNAL CONDITIONS. VOLUME AND SQUELCH CONTROLS FULL CCW.
 5. REMOVE JUMPER FOR CURRENT MEASUREMENT.
 6. ALL VOLTAGE MEASUREMENTS MADE IN RECEIVE MODE EXCEPT THOSE SHOWN FOR Q1 AND Q2 WHICH ARE MADE IN THE TRANSMIT MODE WITH 50 OHM RESISTIVE LOAD CONNECTED TO ANTENNA CONNECTOR.

Figure 4. Model CB-21 Schematic Diagram.

SERVICE REPAIR PARTS LIST

Schematic Symbol	Description	Hallcrafters Part Number	Schematic Symbol	Description	Hallcrafters Part Number
CAPACITORS			COILS AND TRANSFORMERS (CONT.)		
C1,4,5,6,9,10,14,29,31,34,36,48,62	0.04μF, +100%, -0%, 50V, Ceramic Disc	120-003066	L4	Choke, 1.1μH, ±10%	120-003129
C2,11,18,19,20,26,28,46,49,58	0.01μF, +100%, -0%, 50V, Ceramic Disc	120-003060	L5	Coil, Final Amp.	120-003130
C3	78 PF, ±10%, 50V, Mica	120-003078	L6	Coil, Ant. Peaking	120-003131
C7,12,24	170 PF, ±10%, 50V, Mica	120-003079	L8	Choke, 0.22μH, ±10%	120-003132
C8	220 PF, ±10%, 50V, Mica	120-003080	L9	Choke, 1.0μH, ±10%	120-003133
C13	200 PF, ±10%, 50V, Mica	120-003081	L10	Choke, Line Filter	120-003134
C15	75 PF, ±10%, 50V, Mica	120-003082	T1	Transformer, RF Osc.	120-003145
C16	2-20 PF, Variable, Ceramic Trimmer	120-003083	T2	Transformer, RF Driver	120-003146
C17	50 PF, ±10%, 50V, Mica	120-003061	T3	Transformer, RF	120-003135
C21,32,31	10μF, +150%, -10%, 15V, Electrolytic	120-003065	T4	Transformer, RF	120-003136
C22	35 PF, ±10%, 50V, Mica	120-003062	T5	Transformer, 1650KC	120-003138
C23,38	150 PF, ±10%, 50V, Mica	120-003067	T6	Transformer, 455KC (contains ceramic filter)	120-003140
C25	0.001μF, ±20%, 50V, Ceramic Disc	120-003063	T7	Transformer, 455KC	120-003141
C27	0.005μF, ±20%, 50V, Ceramic Disc	120-003064	T8	Transformer, 455KC	120-003142
C30,33,37	10 PF, ±1PF, 50V, Mica	120-003085	T9	Transformer, 1st Local Osc.	120-003137
C35,50	4.7 PF, ±1PF, 50V, Mica	120-003086	T10	Transformer, 2nd Local Osc.	120-003139
C39	0.003μF, ±20%, 50V, Ceramic Disc	120-003069	T11	Transformer, AF input	120-003143
C40	100 PF, ±10%, 50V, Mica	120-003070	T12	Transformer, AF output	120-003144
C41,42	0.05μF, ±20%, 50V, Mylar	120-003071	DIODES, TRANSISTORS, AND CRYSTALS		
C43,44,60,61	200μF, +150%, -10%, 15V, Electrolytic	120-003073	CR1,2,3,4	Diode, Type 1N34A	019-001918
C45	50 PF, ±10% (N750)	120-003087	CR5	Diode, Type 1S84	120-003147
C47	36 PF, ±10%, 50V, Mica	120-003068	CR6,7	Diode, Zener, Type 1N690A	120-003149
C52,56	50μF, +150%, -10%, 15V, Electrolytic	120-003075	CR8	Diode, Type 1S310	120-003148
C53	0.1μF, +100%, -0%, 50V, Ceramic Disc	120-003074	Q1	Transistor, Type 2SC150T	120-003151
C54,55,57,59	5 μF, +150%, -10%, 15V, Electrolytic	120-003072	Q2	Transistor, Type 2SC608T	120-003152
C63	1000μF, +100%, -10%, 25V, Electrolytic	120-003076	Q3	Transistor, Type 2SC609T	120-003153
C64	1000 PF, +200%, -0%, 500V, Button	120-003084	Q4,5,10	Transistor, Type 2SA234	120-002515
C65	85 PF, ±10%, 50V, Mica	120-003077	Q6,11	Transistor, Type 2SA350	120-001190
C66	5.6 PF, 50V, Mica	120-003195	Q7,8	Transistor, Type 2SA12	120-002012
*RESISTORS			Q9, 12, 13,14	Transistor, Type 2SB75	120-002013
R1,17,30,40,43,62	2.2K Ohm	120-003092	Q15	Transistor, Type 2SB77	120-002014
R2	3.9K Ohm	120-003114	Q16,17	Transistor, Type 2SB367	120-003150
R3	(May not be in all units, value will vary)	120-003096	Y1	Crystal, CR-81/U (Transmit)	019-003484
R4,64,65,70	Typical value 10K Ohm	120-003106	Y2	Crystal, CR-81/U (Receive)	019-003483
R5,67	22 Ohm	120-003112	Y3	Crystal, CR-19A/UW (2105KC)	120-003154
R6,7,55	47 Ohm	120-003115	MISCELLANEOUS		
R8,9,14,15,18,19,26,28,39,44,45,50,53,54	1K Ohm	120-003088	MK1	Microphone, Dynamic, 600 Ohm	120-003155
R10,32	47K Ohm	120-003097	K1	Relay, 4P-2T	120-003156
R11,23,49	470 Ohm	120-003089	SP1	Speaker, 8 Ohm	120-003157
R12,16,24	22K Ohm	120-003090	S3	Switch, Power (united with R41 and R56)	120-003158
R13,21	330 Ohm	120-003091	S2	Switch, 2P-2T, P.A.-C.B.	120-003159
R20	3.3K Ohm	120-003093	S1	Switch, Rotary, Channel Selector	120-003160
R22,52	33K Ohm	120-003104	DS1,2	Lamp, 16V, 40 MA	120-003161
R25	2.7K Ohm	120-003116	J1	Jack, Antenna Connector	120-003162
R27	56K Ohm	120-003117	J2	Jack, PA Speaker	120-003163
R29,36	150K Ohm	120-003101	F1	Fuse, 1.5-2.0 Ampere	120-003164
R31,33	220K Ohm	120-003098		Front Panel	120-003165
R34	470K Ohm	120-003100		Back Panel	120-003167
R35	1 Megohm	120-003099		Bracket, Speaker	120-003168
R37	1.5K Ohm	120-003103		Bracket, Volume	120-003169
R38,63	15K Ohm	120-003102		Bracket, Circuit Board	120-003170
R41	5K Ohm, Variable, VOLUME (united with R56 and S3)	120-003118		Heat Sink (Q3)	120-003171
R42	8.8K Ohm	120-003095		Heat Sink (Q2)	120-003172
R46,47	680 Ohm	120-003094		Shield, Receiver Coil	120-003173
R48	10K Ohm	120-003096		Cabinet	120-003174
R51	5.6K Ohm	120-003105		Handle, Mounting	120-003175
R58,59	4.7K Ohm	120-003107		Stud, Chassis	120-003176
R60	12K Ohm	120-003108		Crystal Holder	120-003177
R61	8.2K Ohm	120-003109		Pilot Lamp Assembly	120-003178
R66	220 Ohm	120-003110		Channel Indicator	120-003179
R68	560 Ohm, 1/2 Watt	120-003111		Microphone Cable	120-003155-01
R69	1 Ohm, 1 Watt, Wirewound	120-003113		Microphone Element	120-003155-02
R70	5K Ohm, Variable	120-003120		Lock, Microphone Cable	120-003119
*ALL RESISTORS are solid type, ±10% 1/4 Watt unless otherwise stated.				Knob, Squelch	120-003180
COILS AND TRANSFORMERS				Knob, Volume	120-003181
L1	Choke, 0.65μH, ±10%	120-003126		Knob, Channel Selector	120-003182
L2,7	Choke, 33μH, ±10%	120-003127		Lock, Line Cable	120-003183
L3	Choke, 22μH, ±10%	120-003128		Fuse Holder, In-line	120-003184
				Hardware for mounting bracket	120-003186
				Microphone Hanger	120-003187
				Metal piece to support transformer core	120-003190
				Holder, Pilot Lamp for Channel Selector Switch	120-003191
				Set of Hardware (screws, nuts, washers)	120-003192
				DC Cable Assembly	120-003193
			PC1	Couplet (470 Ohm, 0.02μF)	120-003121
			PC2,3	Couplet (4.7K Ohm, 0.02μF)	120-003122
			PC4	Couplet (1K Ohm, 0.02μF)	120-003123
			PC5	Couplet (560 Ohm, 0.02μF)	120-003124
			RT1	Thermistor, 25 Ohm at 25°C	120-003125