

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 frequency.

Antenna Termination Impedance. 50 ohms.

TVI Suppression. Second Harmonic Trap Circuit.

Power Requirements. . . 0.22 amperes (Receive), 1.0 amperes (Transmit) with maximum modulation.

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 regulators.

CHASSIS REMOVAL

To remove the chassis from the cabinet, first remove 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 investigated. Alignment should not be required unless the unit has been tampered with or component parts have been replaced in the RF or IF stages. Alignment should be performed only by persons familiar with transistorized communications 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.

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).

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

3. 0.1 μ F, 200 v capacitor.

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).

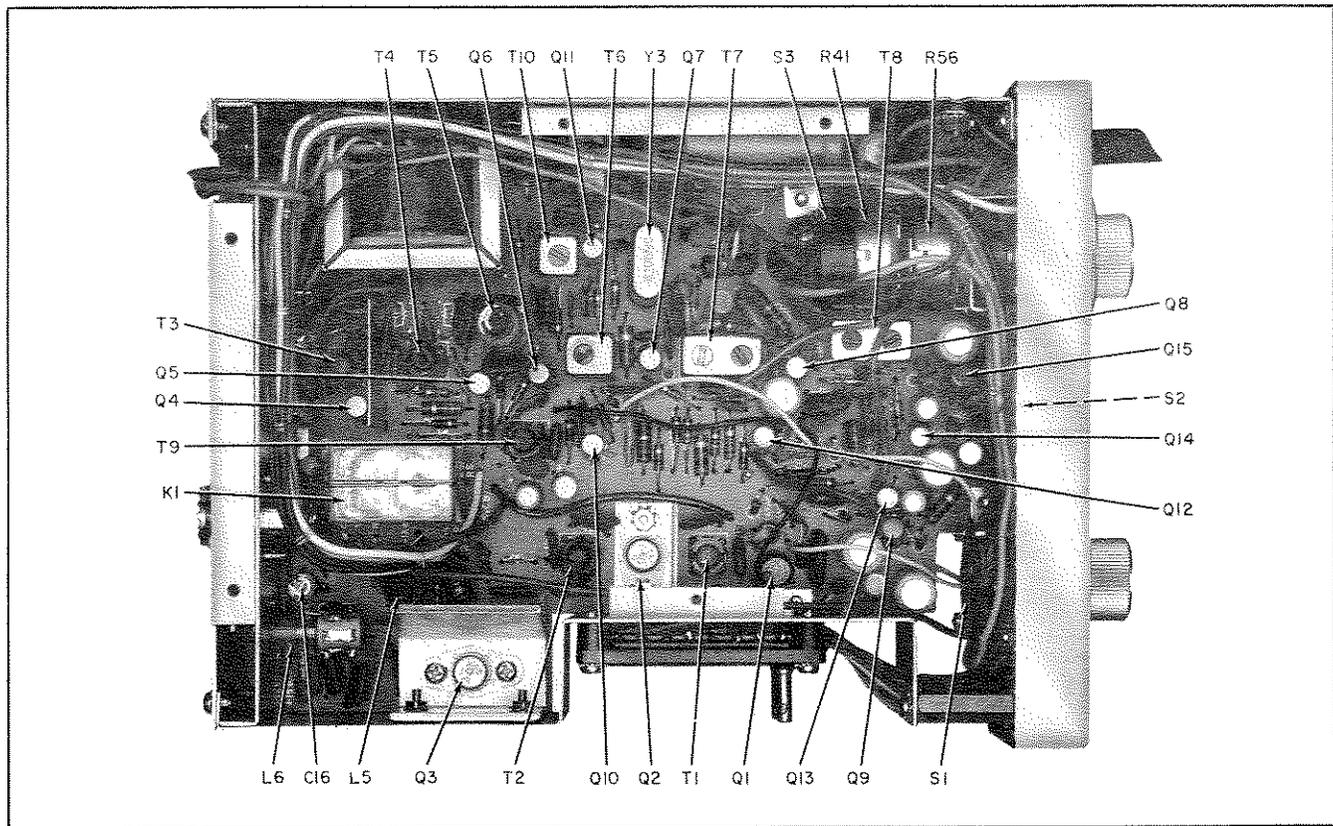
commercial radio-telephone operators, second class or higher, and that they have adequate frequency-measuring equipment. For proper on-frequency operation of this transceiver, use only standard military-type CR81/U, third-overtone, series-resonant crystals.

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).

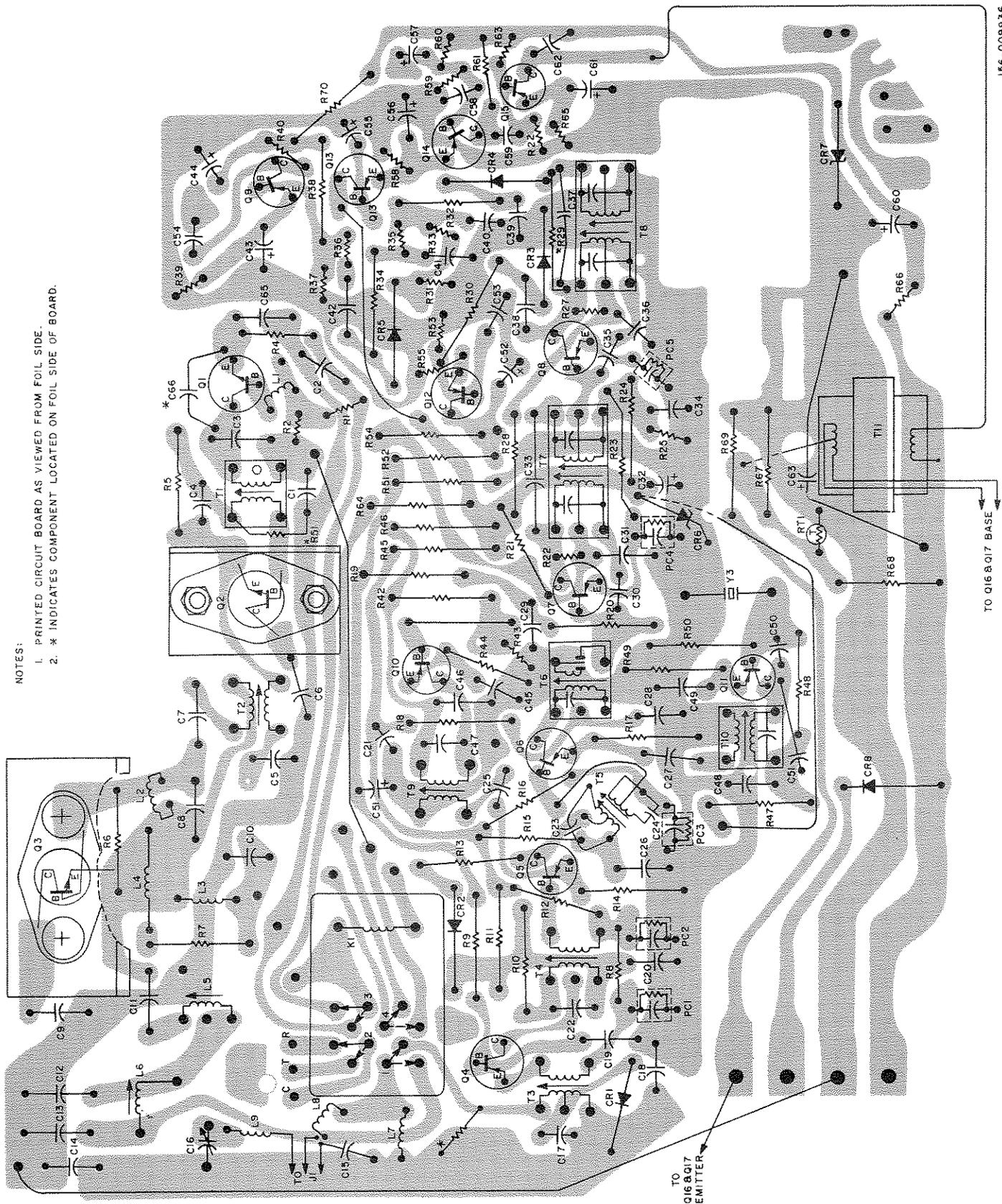
Coil L3 and capacitor C16 function as a trap circuit to suppress second harmonic radiation. Unless a receiver tuning the 54-55 MC range and having an S-meter is available, the setting of C16 should not be changed. If such a receiver is avail-

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.



156-009933

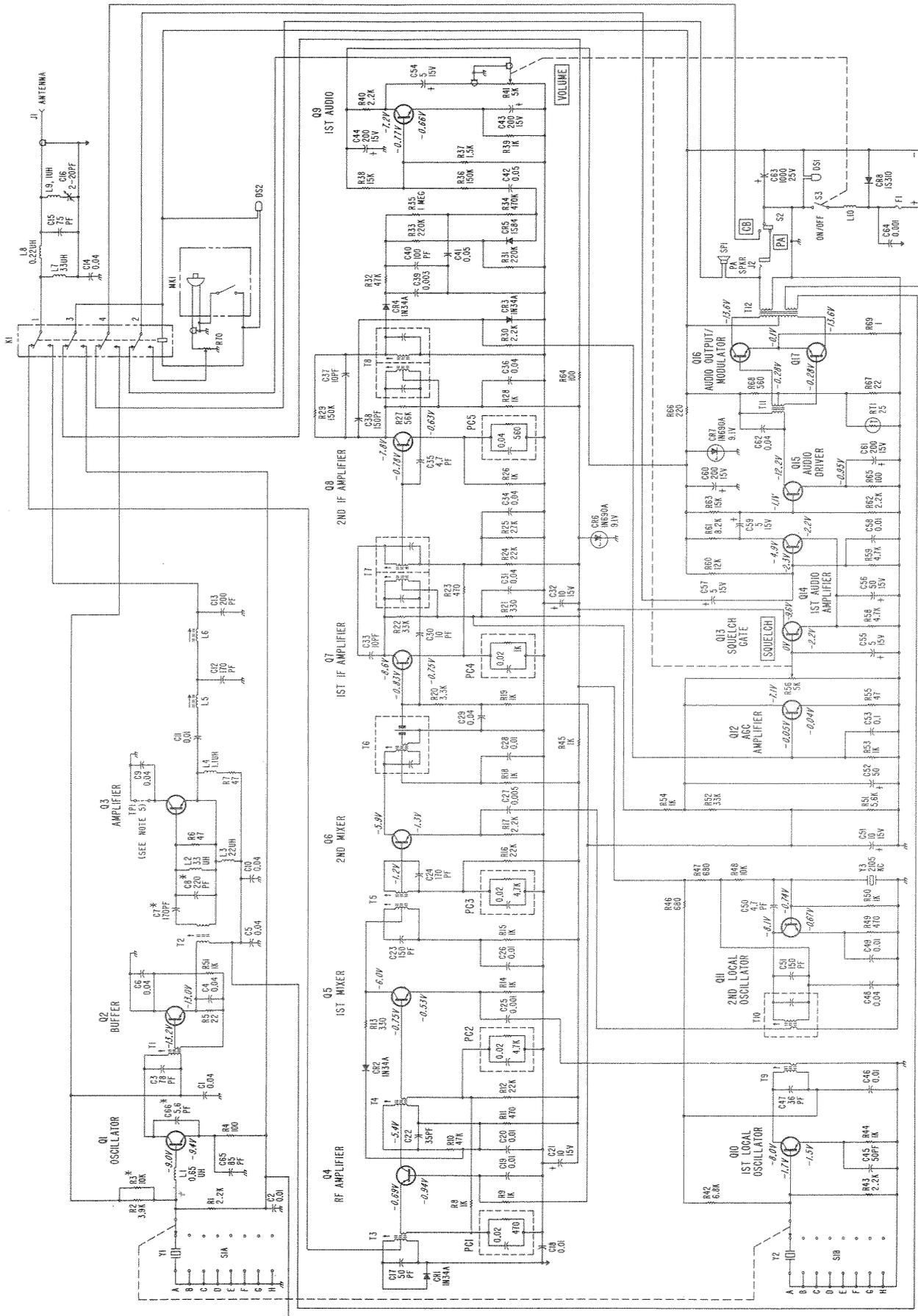
Figure 2. Bottom Chassis View.



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

156-009936

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.
R3 MAY NOT BE PRESENT IN SOME UNITS.
 3. VOLTAGE MEASUREMENTS ARE REFERENCED TO THE COMMON POSITIVE BIAS (+). INPUT VOLTAGE IS 16 VDC.
 4. ALL VOLTAGE MEASUREMENTS MADE WITH A 100M OHM IMPEDANCE LOAD CONNECTED TO ANTENNA CONNECTOR.
 5. REMOVE JUMPER FOR CURRENT MEASUREMENT.

Figure 4. Model CB-21 Schematic Diagram.

SERVICE REPAIR PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
CAPACITORS		
C1,4,5,6,9,10,14,29,31,34,36,48,62	0.04μF, +100%, -0%, 50V, Ceramic Disc	120-003066
C2,11,18,19,20,26,28,46,49,58	0.01μF, +100%, -0%, 50V, Ceramic Disc	120-003060
C3	78 PF, ±10%, 50V, Mica	120-003078
C7,12,24	170 PF, ±10%, 50V, Mica	120-003079
C8	220 PF, ±10%, 50V, Mica	120-003080
C13	200 PF, ±10%, 50V, Mica	120-003081
C15	75 PF, ±10%, 50V, Mica	120-003082
C16	2-20 PF, Variable, Ceramic Trimmer	120-003083
C17	50 PF, ±10%, 50V, Mica	120-003061
C21,32,31	10μF, +150%, -10%, 15V, Electrolytic	120-003065
C22	35 PF, ±10%, 50V, Mica	120-003062
C23,38	150 PF, ±10%, 50V, Mica	120-003067
C25	0.001μF, ±20%, 50V, Ceramic Disc	120-003063
C27	0.005μF, ±20%, 50V, Ceramic Disc	120-003064
C30,33,37	10 PF, ±1PF, 50V, Mica	120-003085
C35,50	4.7 PF, ±1PF, 50V, Mica	120-003086
C39	0.003μF, ±20%, 50V, Ceramic Disc	120-003069
C40	100 PF, ±10%, 50V, Mica	120-003070
C41,42	0.05μF, ±20%, 50V, Mylar	120-003071
C43,44,60,61	200μF, +150%, -10%, 15V, Electrolytic	120-003073
C45	50 PF, ±10% (N750)	120-003087
C47	36 PF, ±10%, 50V, Mica	120-003068
C52,56	50μF, +150%, -10%, 15V, Electrolytic	120-003075
C53	0.1μF, +100%, -0%, 50V, Ceramic Disc	120-003074
C54,55,57,59	5 μF, +150%, -10%, 15V, Electrolytic	120-003072
C63	1000μF, +100%, -10%, 25V, Electrolytic	120-003076
C64	1000 PF, +200%, -0%, 500V, Button	120-003084
C65	85 PF, ±10%, 50V, Mica	120-003077
C66	5.6 PF, 50V, Mica	120-003195
*RESISTORS		
R1,17,30,40,43,62	2.2K Ohm	120-003092
R2	3.9K Ohm	120-003114
R3	(May not be in all units, value will vary) Typical value 10K Ohm	120-003096
R4,64,65,70	100 Ohm	120-003106
R5,67	22 Ohm	120-003112
R6,7,55	47 Ohm	120-003115
R8,9,14,15,18,19,26,28,39,44,45,50,53,54	1K Ohm	120-003088
R10,32	47K Ohm	120-003097
R11,23,49	470 Ohm	120-003089
R12,16,24	22K Ohm	120-003090
R13,21	330 Ohm	120-003091
R20	3.3K Ohm	120-003093
R22,52	33K Ohm	120-003104
R25	2.7K Ohm	120-003116
R27	56K Ohm	120-003117
R29,36	150K Ohm	120-003101
R31,33	220K Ohm	120-003098
R34	470K Ohm	120-003100
R35	1 Megohm	120-003099
R37	1.5K Ohm	120-003103
R38,63	15K Ohm	120-003102
R41	5K Ohm, Variable, VOLUME (united with R56 and S3)	120-003118
R42	8.8K Ohm	120-003095
R46,47	680 Ohm	120-003094
R48	10K Ohm	120-003096
R51	5.6K Ohm	120-003105
R58,59	4.7K Ohm	120-003107
R60	12K Ohm	120-003108
R61	8.2K Ohm	120-003109
R66	220 Ohm	120-003110
R68	560 Ohm, 1/2 Watt	120-003111
R69	1 Ohm, 1 Watt, Wirewound	120-003113
R70	5K Ohm, Variable	120-003120
*ALL RESISTORS are solid type, ±10%, 1/4 Watt unless otherwise stated.		
COILS AND TRANSFORMERS		
L1	Choke, 0.65μH, ±10%	120-003126
L2,7	Choke, 33μH, ±10%	120-003127
L3	Choke, 22μH, ±10%	120-003128

Schematic Symbol	Description	Hallicrafters Part Number
COILS AND TRANSFORMERS (CONT.)		
L4	Choke, 1.1μH, ±10%	120-003129
L5	Coil, Final Amp.	120-003130
L6	Coil, Ant. Peaking	120-003131
L8	Choke, 0.22μH, ±10%	120-003132
L9	Choke, 1.0μH, ±10%	120-003133
L10	Choke, Line Filter	120-003134
T1	Transformer, RF Osc.	120-003145
T2	Transformer, RF Driver	120-003146
T3	Transformer, RF	120-003135
T4	Transformer, RF	120-003136
T5	Transformer, 1650KC	120-003138
T6	Transformer, 455KC (contains ceramic filter)	120-003140
T7	Transformer, 455KC	120-003141
T8	Transformer, 455KC	120-003142
T9	Transformer, 1st Local Osc.	120-003137
T10	Transformer, 2nd Local Osc.	120-003139
T11	Transformer, AF input	120-003143
T12	Transformer, AF output	120-003144
DIODES, TRANSISTORS, AND CRYSTALS		
CR1,2,3,4	Diode, Type 1N34A	019-001918
CR5	Diode, Type 1S84	120-003147
CR6,7	Diode, Zener, Type 1N690A	120-003149
CR8	Diode, Type 1S310	120-003148
Q1	Transistor, Type 2SC150T	120-003151
Q2	Transistor, Type 2SC608T	120-003152
Q3	Transistor, Type 2SC609T	120-003153
Q4,5,10	Transistor, Type 2SA234	120-002515
Q6,11	Transistor, Type 2SA350	120-001190
Q7,8	Transistor, Type 2SA12	120-002012
Q9,12,13,14	Transistor, Type 2SB75	120-002013
Q15	Transistor, Type 2SB77	120-002014
Q16,17	Transistor, Type 2SB367	120-003150
Y1	Crystal, CR-81/U (Transmit)	019-003484
Y2	Crystal, CR-81/U (Receive)	019-003483
Y3	Crystal, CR-19A/UW (2105KC)	120-003154
MISCELLANEOUS		
MK1	Microphone, Dynamic, 600 Ohm	120-003155
K1	Relay, 4P-2T	120-003156
SP1	Speaker, 8 Ohm	120-003157
S3	Switch, Power (united with R41 and R56)	120-003158
S2	Switch, 2P-2T, P.A.-C.B.	120-003159
S1	Switch, Rotary, Channel Selector	120-003160
DS1,2	Lamp, 16V, 40 MA	120-003161
J1	Jack, Antenna Connector	120-003162
J2	Jack, PA Speaker	120-003163
F1	Fuse, 1.5-2.0 Ampere	120-003164
	Front Panel	120-003165
	Back Panel	120-003167
	Bracket, Speaker	120-003168
	Bracket, Volume	120-003169
	Bracket, Circuit Board	120-003170
	Heat Sink (Q3)	120-003171
	Heat Sink (Q2)	120-003172
	Shield, Receiver Coil	120-003173
	Cabinet	120-003174
	Handle, Mounting	120-003175
	Stud, Chassis	120-003176
	Crystal Holder	120-003177
	Pilot Lamp Assembly	120-003178
	Channel Indicator	120-003179
	Microphone Cable	120-003155-01
	Microphone Element	120-003155-02
	Lock, Microphone Cable	120-003119
	Knob, Squelch	120-003180
	Knob, Volume	120-003181
	Knob, Channel Selector	120-003182
	Lock, Line Cable	120-003183
	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