NOTE

Repair or adjustment of transmitter circuits must be under supervision of a person with first-or second-class radiotelephone license.
(Refer to FCC Rules and Regulations Part 95, Subpart 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.

MODEL CBH-990

MANUFACTURER'S SPECIFICATIONS

Frequency control:	PLL (Phase Locked Loop) synthesizer
Channels:	40 channels all installed
Mode of Operation:	AM
Receiving system:	Dual Conversion Superheterodyne
Sensitivity:	0.7 μV nom. at 10 dB S/N
Intermediate Frequency:	1st/ 10.695 MHz, 2nd/ 455 KHz
Frequency Tolerance:	0.005%
Spurious Rejection:	More than 60 dB down
RF Output Power:	4 watts, FCC max, at 117V AC 50/60 Hz or 13.8V DC
Squelch Range:	0.5 μV to 500 μV
Delta Tune Range:	±1 KHz
Audio Output Power:	3 watts at 8 ohms
Controls:	Volume Control/Power Switch, Tone/Hi-Lo switch, NB-OFF switch, ANL-OFF switch, Delta Tune switch, RF GAIN control, Squelch Control/PA switch, Channel Selector
Jacks and Connectors:	Microphone jack, Phone Jack, Antenna connector, PA speaker jack, External speaker jack, DC power connector, AC power connector
Other Facilities:	S/P-RF meter, Built-in Speaker, AC Fuse holder
Speaker:	3", dynamic type, 8 ohms
Microphone:	500–600 ohms, dynamic type with PTT switch
Power Source:	117V AC 50/60 Hz or 13.8V DC

Courtesy of the Manufacturer

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

 Printed in U. S. of America 8CE804

ALIGNMENT INSTRUCTIONS

CAUTION: Use isolation transformer or observe polarity when connecting test equipment.
Maintain line voltage at 120V AC. Allow a 15-minute warm-up period.
Adjustments made with 13.8-volt DC input.
Connect low sides of test equipment to ground unless specified otherwise.
Connect 50-ohm dummy load or antenna before keying transmitter.
Connect microphone.
Before adjustment or alignment, adjust RV1a for 13.8-volts at Pin 3 of power supply board.

Suggested Alignment Tools:	GC ELECTRONICS:
L14, T7 thru T10	5009, 8728A, 8728
L7, L11, L12	9304, 9300, 9302
L1, L2, L5, T1 thru T6	9440
CT1	5000, 8276

SYNTHESIZER ALIGNMENT

TEST EQUIPMENT	TRANSCEIVER	ADJUST	REMARKS
Input of frequency counter to TP1 (Q1, Emitter).	Ch. 19 Delta Tune 0	CT1	Adjust for 10.240MHz ±50Hz.
Input of RF VTVM to TP2 (T1, Secondary).	Ch. 19 Delta Tune 0	T1	Adjust for maximum.
Input of DC meter to TP8.	Ch. 1	L1	Adjust for 3.60V ±.1V.
Input of RF VTVM to TP4 (IC3, Pin 4).	Ch. 19	L2,T2	Adjust for maximum.
Input of frequency counter to TP4 (IC3, Pin 4).	Ch. 1		Check for 37.660MHz. Check all channels. (See Truth Chart for correct frequencies.)
Input of frequency counter to TP3 (IC3, Pin 1).	Ch. 19, XMT		Check for 10.695MHz.

RECEIVER ALIGNMENT

Connect an AC VTVM or AF wattmeter across speaker voice coil.
Adjust volume control to obtain a suitable indication.
Set generator output low enough to prevent AGC limiting.
Delta Tune 0, Squelch MINIMUM, RF Gain Maximum, ANL Switch Off, NB Switch Off.

TEST EQUIPMENT	TRANSCEIVER	ADJUST	REMARKS
Output of signal generator thru .01uF to TP10. 455kHz, 1000Hz @ 30% modulation.	Ch. 19	T10,T9,T8	Adjust for maximum output.
Output of signal generator thru .01uF to antenna jack. 27.185MHz, 1000Hz @ 30% modulation	Ch. 19	T7,L14,T6,T5	Adjust for maximum output. If necessary, readjust T8, T9 and T10.

RECEIVER ADJUSTMENTS

Connect an AC VTVM or AF wattmeter across speaker voice coil.
Adjust volume control to obtain a suitable indication.
Delta Tune 0, RF Gain Maximum, ANL Switch Off, NB Switch Off.

TEST EQUIPMENT	TRANSCEIVER	ADJUST	REMARKS
Output of signal generator thru .01uF to antenna jack. 27.185MHz, 1000Hz @ 30% modulation Output 1000uV.	Ch. 19	RV1b	SQUELCH RANGE Set squelch control VR2 fully clockwise. Adjust RV1b so that squelch just breaks.
Output of signal generator thru .01uF to antenna jack. 27.185MHz, 1000Hz @ 30% modulation Output 100uV	Ch. 19	RV3	S METER Adjust for 9 on S scale of meter.

TRANSMITTER ALIGNMENT

Connect an RF wattmeter and 50-ohm, 25-watt dummy load to antenna connector.
NOTE: Be sure to check transmit frequency and power on all active channels after alignment of transmitter.
See page 4 for channel frequencies.

TEST EQUIPMENT	TRANSCEIVER	ADJUST	REMARKS
	Ch. 19	L5,T3,T4, L7,L11,L12	Adjust for maximum.
	Ch. 19	L7	Adjust for 3.8 watts maximum.

TRANSMITTER ADJUSTMENTS

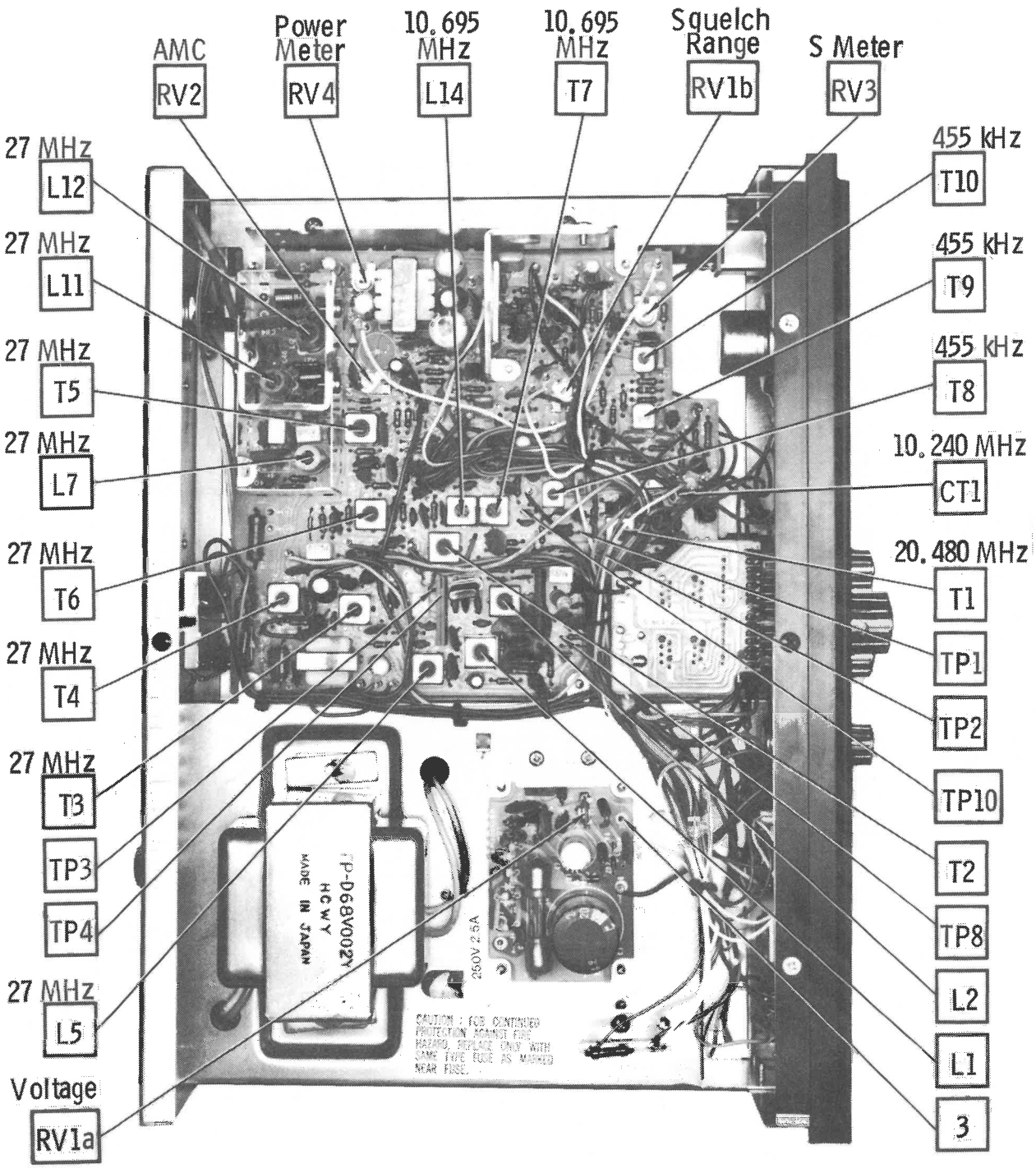
Connect an RF wattmeter and 50-ohm, 25-watt dummy load to antenna connector.
NOTE: Be sure to check transmit frequency and power on all active channels after adjustments of transmitter.
See page 4 for channel frequencies.

TEST EQUIPMENT	TRANSCEIVER	ADJUST	REMARKS
Input of DC meter to 3.	Ch. 19	RV1a	VOLT REG Adjust RV1a for 13.8 volts.
Modulation meter to antenna jack. Inject a 10mV, 1000Hz signal at Mic input.	Ch. 19	RV2	AMC Adjust for 80% modulation.
Connect an RF wattmeter and 50-ohm, 25 watt dummy load to antenna connector	Ch. 19	RV4	RF PANEL METER Adjust RV4 so that RF meter agrees with RF wattmeter.

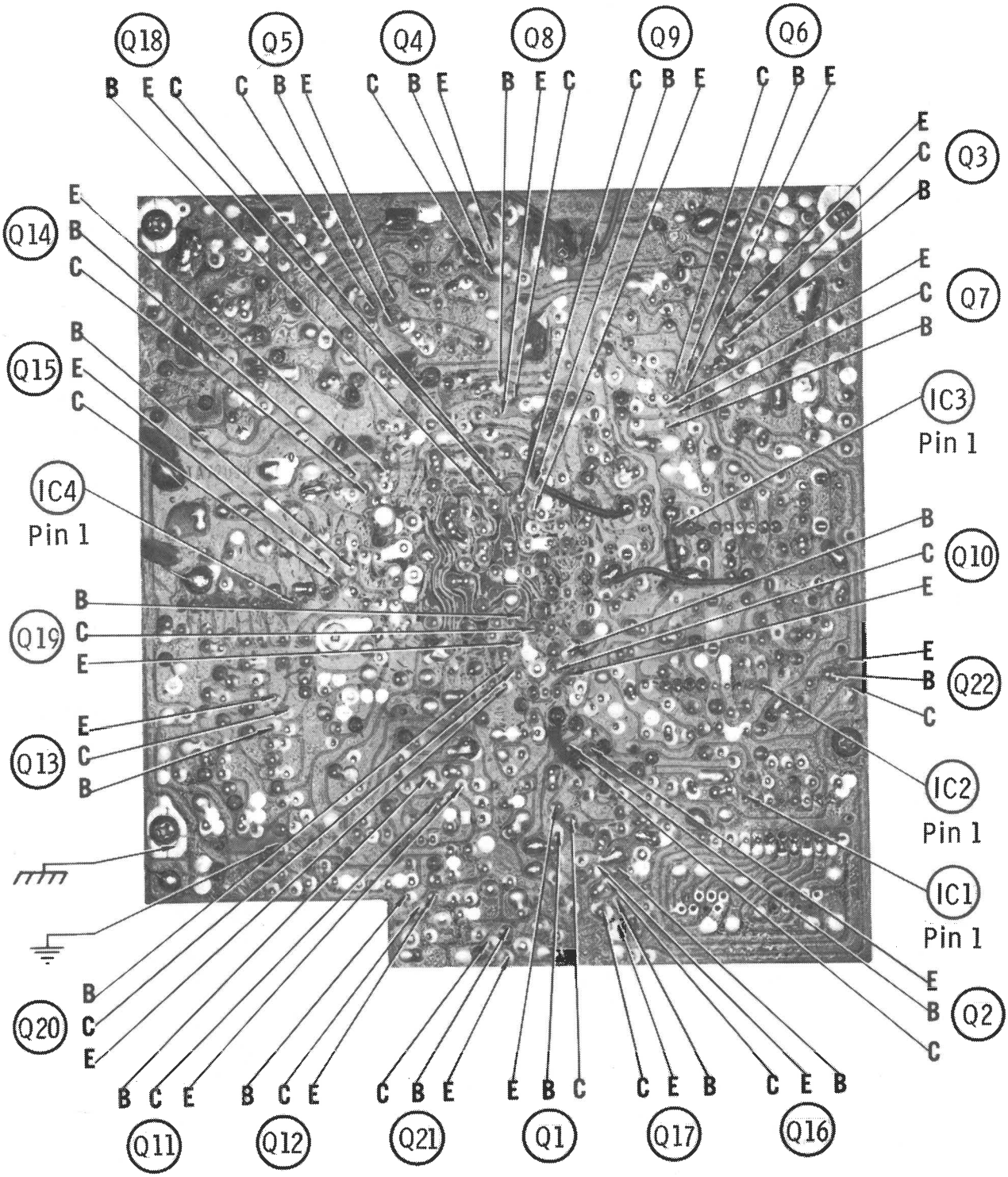
TRUTH CHART

1 = 5.33 Volts 0 = 0 Volts								
CHANNEL	IC1 PROGRAM DIVIDER PINS							REC & XMIT VCO OUTPUT IN MHz AT TP4
	9	10	11	12	13	14	15	
1	1	0	0	1	0	1	0	37.660
2	1	0	0	1	0	0	1	37.670
3	1	0	0	1	0	0	0	37.680
4	1	0	0	0	1	1	0	37.700
5	1	0	0	0	1	0	1	37.710
6	1	0	0	0	1	0	0	37.720
7	1	0	0	0	0	1	1	37.730
8	1	0	0	0	0	0	1	37.750
9	1	0	0	0	0	0	0	37.760
10	0	1	1	1	1	1	1	37.770
11	0	1	1	1	1	1	0	37.780
12	0	1	1	1	1	0	0	37.800
13	0	1	1	1	0	1	1	37.810
14	0	1	1	1	0	1	0	37.820
15	0	1	1	1	0	0	1	37.830
16	0	1	1	0	1	1	1	37.850
17	0	1	1	0	1	1	0	37.860
18	0	1	1	0	1	0	1	37.870
19	0	1	1	0	1	0	0	37.880
20	0	1	1	0	0	1	0	37.900

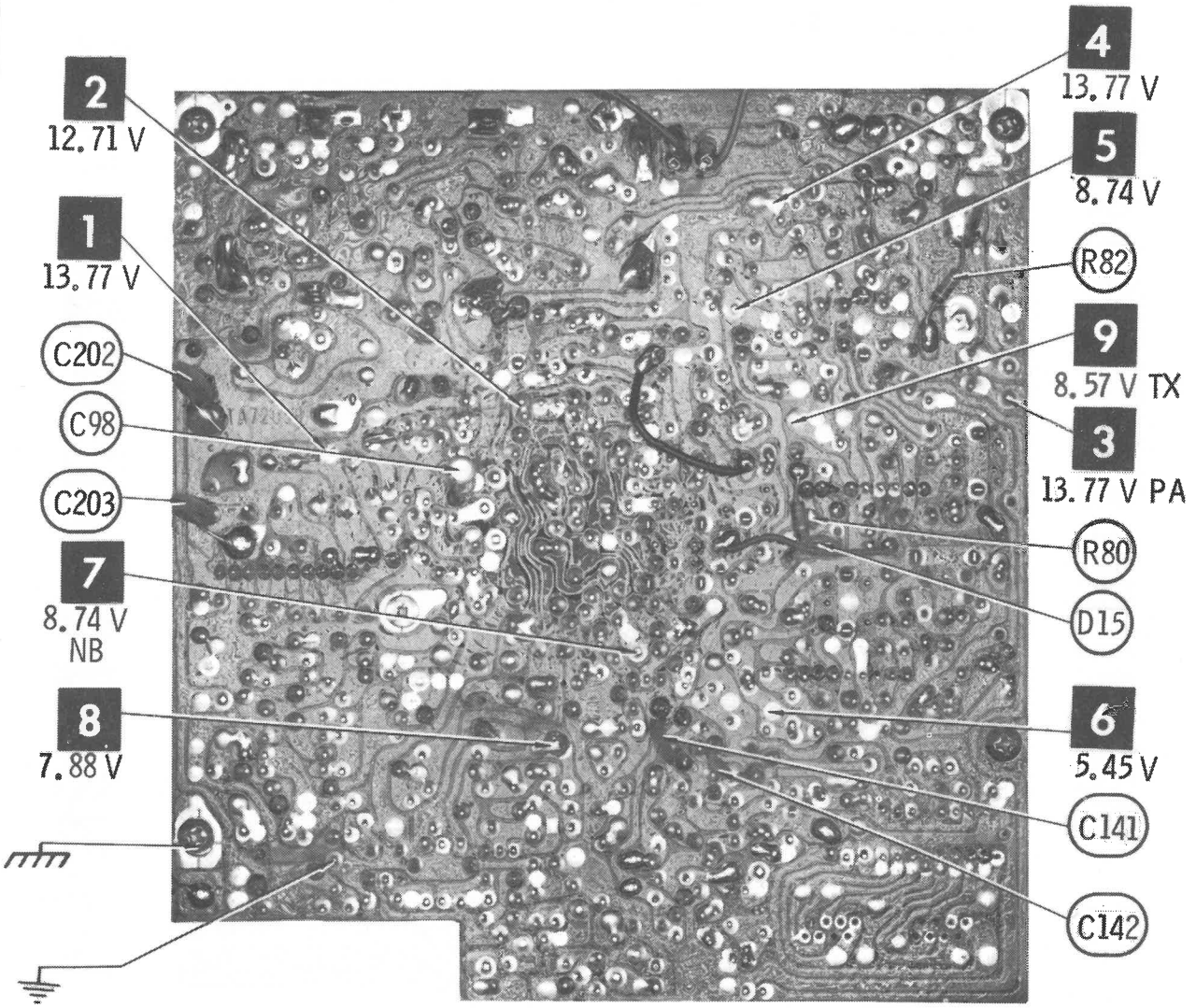
1 = 5.33 Volts 0 = 0 Volts								
CHANNEL	IC1 PROGRAM DIVIDER PINS							REC & XMIT VCO OUTPUT IN MHz AT TP4
	9	10	11	12	13	14	15	
21	0	1	1	0	0	0	1	37.910
22	0	1	1	0	0	0	0	37.920
23	0	1	0	1	1	0	1	37.950
24	0	1	0	1	1	1	1	37.930
25	0	1	0	1	1	1	0	37.940
26	0	1	0	1	1	0	0	37.960
27	0	1	0	1	0	1	1	37.970
28	0	1	0	1	0	1	0	37.980
29	0	1	0	1	0	0	1	37.990
30	0	1	0	1	0	0	0	38.000
31	0	1	0	0	1	1	1	38.010
32	0	1	0	0	1	1	0	38.020
33	0	1	0	0	1	0	1	38.030
34	0	1	0	0	1	0	0	38.040
35	0	1	0	0	0	1	1	38.050
36	0	1	0	0	0	1	0	38.060
37	0	1	0	0	0	0	1	38.070
38	0	1	0	0	0	0	0	38.080
39	0	0	1	1	1	1	1	38.090
40	0	0	1	1	1	1	0	38.100


AMC
RV2
Power Meter
RV4
10.695 MHz
L14
10.695 MHz
T7
Squelch Range
RV1b
S Meter
RV3
27 MHz
L12
27 MHz
L11
27 MHz
T5
27 MHz
L7
27 MHz
T6
27 MHz
T4
27 MHz
T3
TP3
TP4
27 MHz
L5
Voltage
RV1a
455 kHz
T10
455 kHz
T9
455 kHz
T8
10.240 MHz
CT1
20.480 MHz
T1
TP1
TP2
TP10
T2
TP8
L2
L1
3
MADE IN JAPAN
250V 2.5A

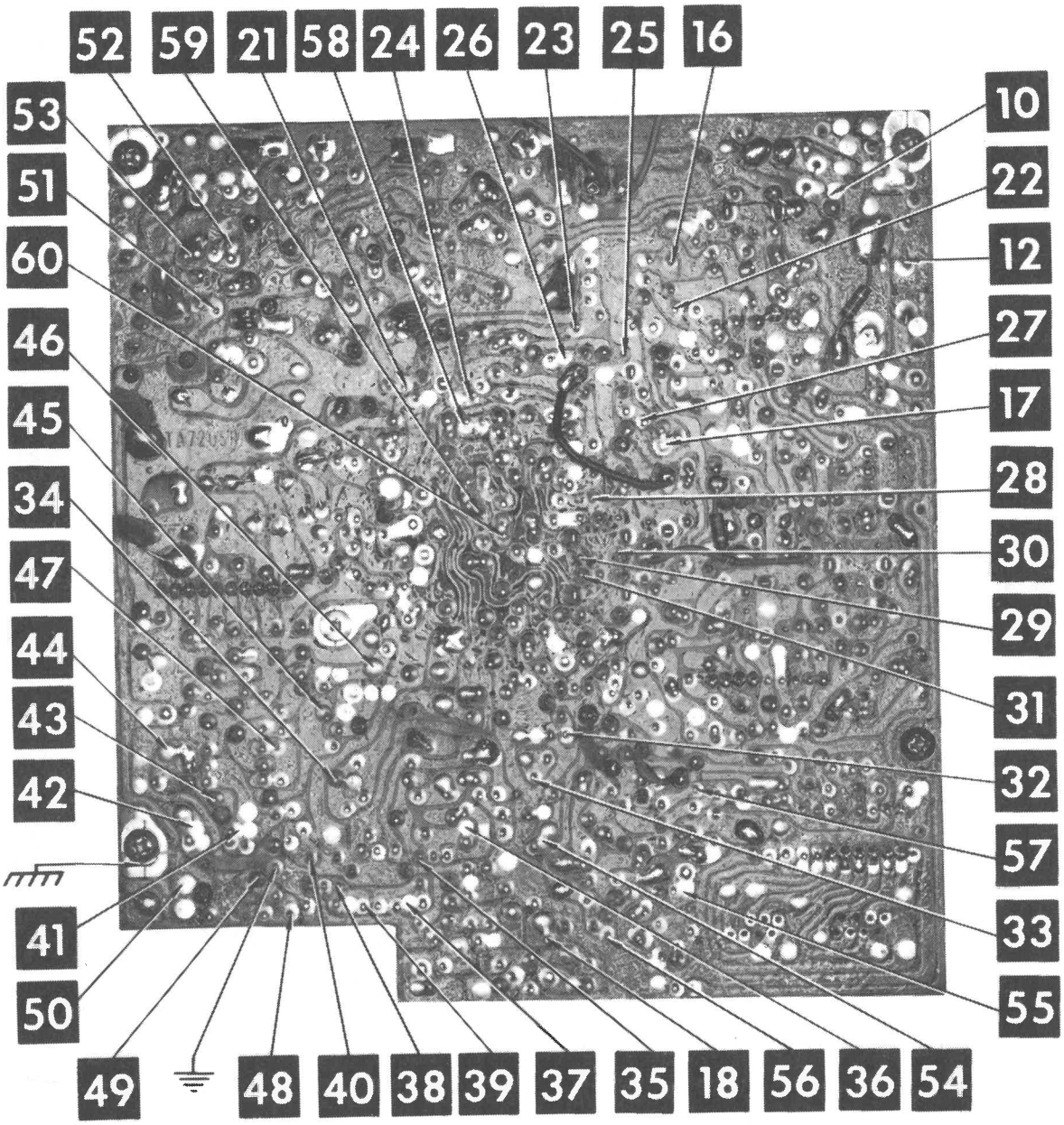
CHASSIS-TOP


Q18
B E C
Q5
C B E
Q4
C B E
Q8
B E C
Q9
C B E
Q6
C B E
Q3
E
C
B
Q14
E
B
C
Q7
E
C
B
Q15
B
E
C
IC3
Pin 1
IC4
Pin 1
Q10
B
C
E
Q19
B
C
E
Q22
E
B
C
Q13
E
C
B
IC2
Pin 1
IC1
Pin 1
Q20
B
C
E
Q2
E
B
C
B C E
Q11
B C E
Q12
C B E
Q21
E B C
Q1
C E B
Q17
C E B
Q16

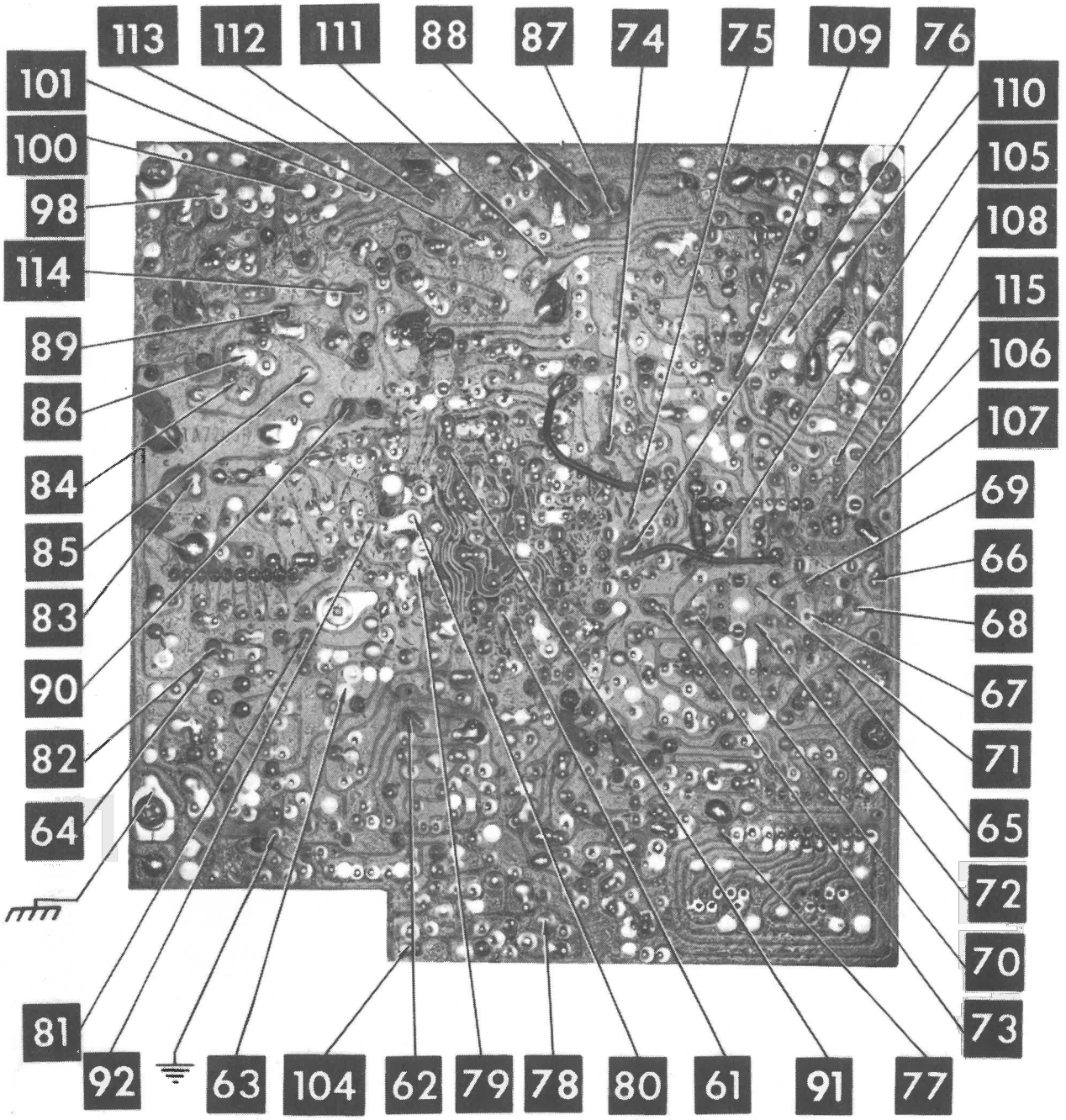
MAIN BOARD


2
12.71 V
1
13.77 V
C202
C98
C203
7
8.74 V
NB
8
7.88 V
4
13.77 V
5
8.74 V
R82
9
8.57 V TX
3
13.77 V PA
R80
D15
6
5.45 V
C141
C142

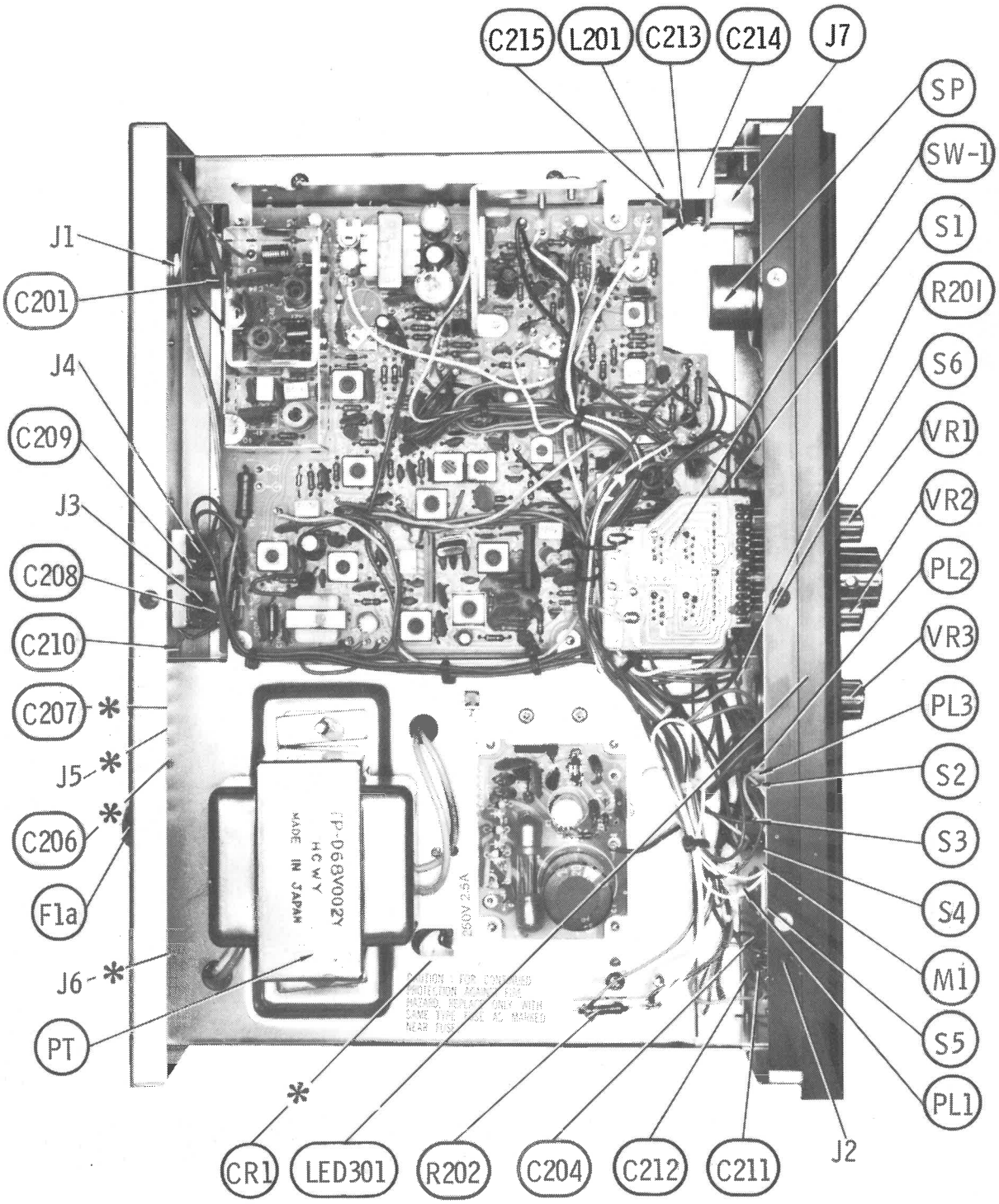
MAIN BOARD


52
59
21
58
24
26
23
25
16
53
51
60
46
45
34
47
44
43
42
41
50
49
48
40
38
39
37
35
18
56
36
54
55
33
57
32
31
29
30
28
17
27
12
22
10

MAIN BOARD

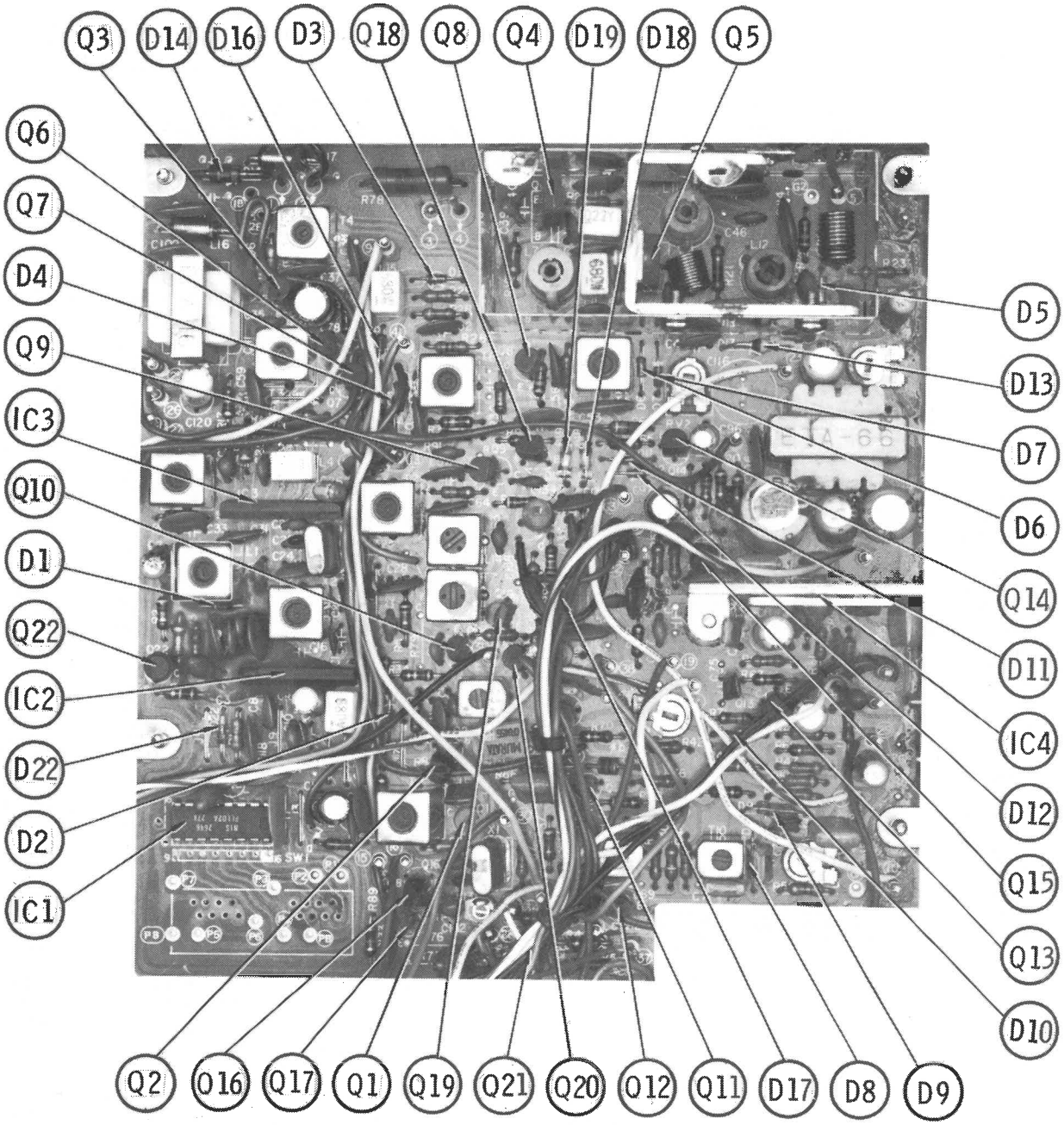

113
112
111
88
87
74
75
109
76
101
100
98
114
89
86
84
85
83
90
82
64
110
105
108
115
106
107
69
66
68
67
71
65
72
70
73
81
92
63
104
62
79
78
80
61
91
77

MAIN BOARD

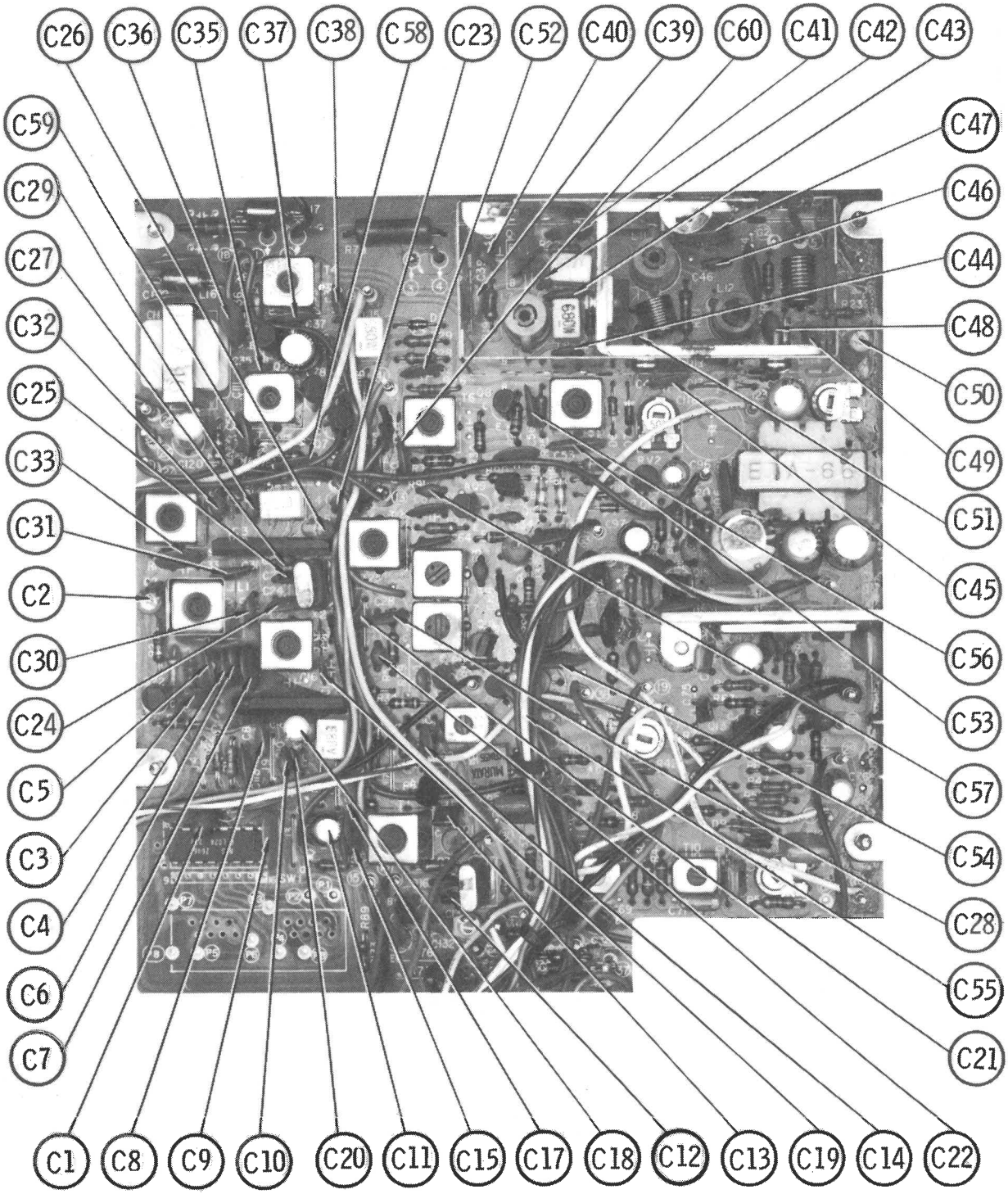


* Located on bottom of chassis

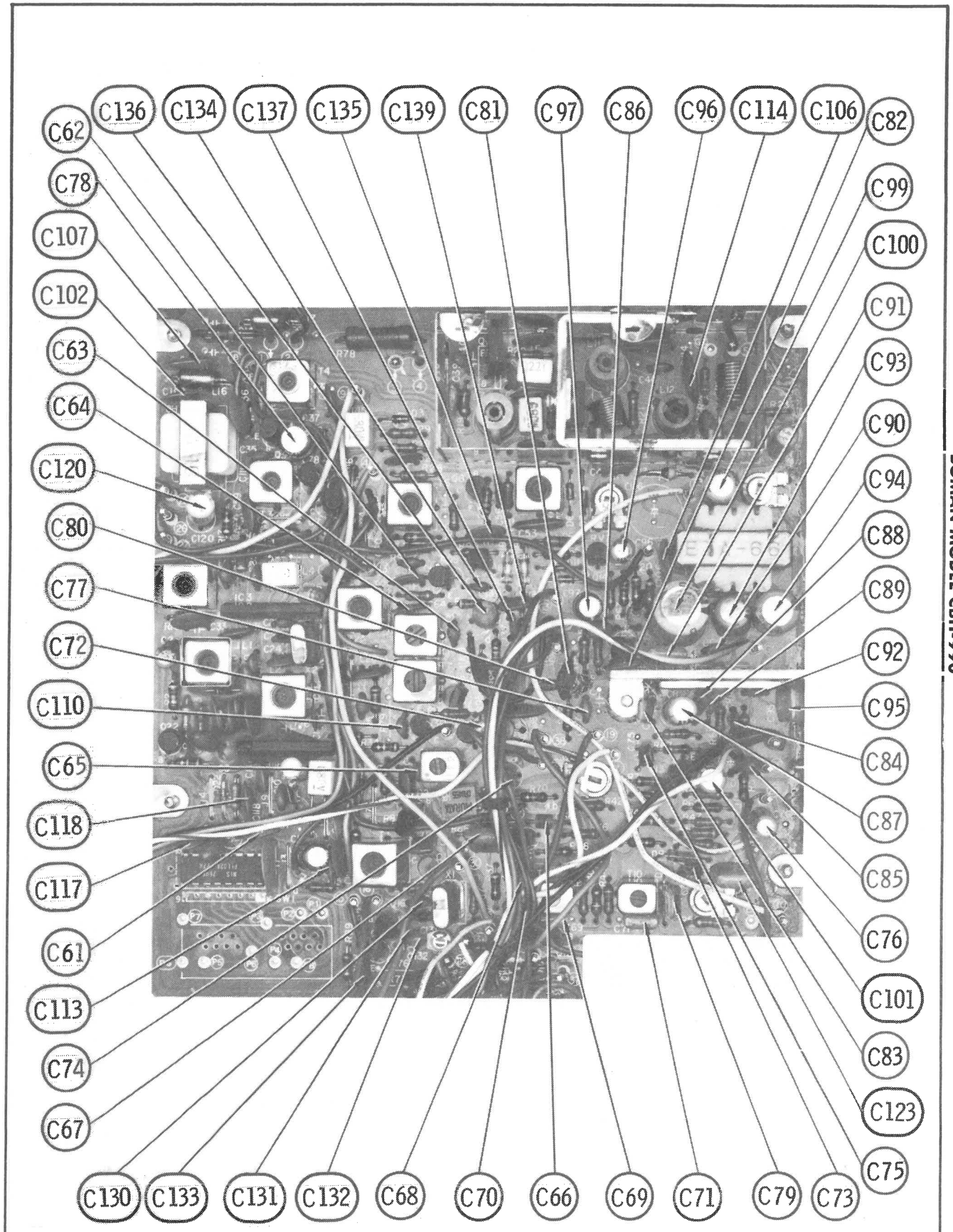
CHASSIS-TOP


Q3
D14
D16
D3
Q18
Q8
Q4
D19
D18
Q5
Q6
Q7
D4
Q9
IC3
Q10
D1
Q22
IC2
D22
D2
IC1
D5
D13
D7
D6
Q14
D11
IC4
D12
Q15
Q13
D10
Q2
Q16
Q17
Q1
Q19
Q21
Q20
Q12
Q11
D17
D8
D9

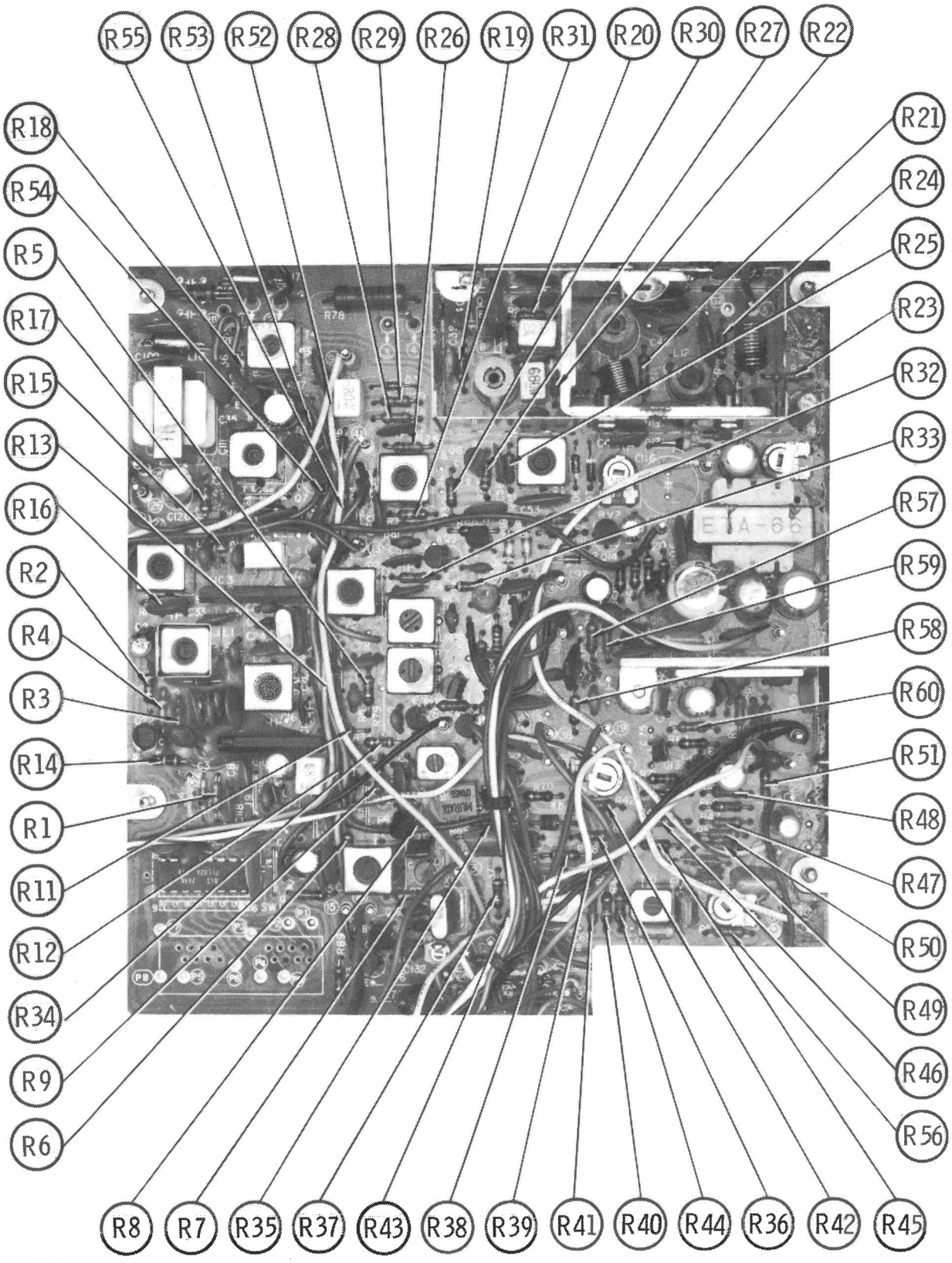
MAIN BOARD


C26
C36
C35
C37
C38
C58
C23
C52
C40
C39
C60
C41
C42
C43
C59
C47
C29
C46
C27
C44
C32
C48
C25
C50
C33
C49
C31
C51
C2
C45
C30
C56
C24
C53
C5
C57
C3
C54
C4
C28
C6
C55
C7
C21
C1
C8
C9
C10
C20
C11
C15
C17
C18
C12
C13
C19
C14
C22

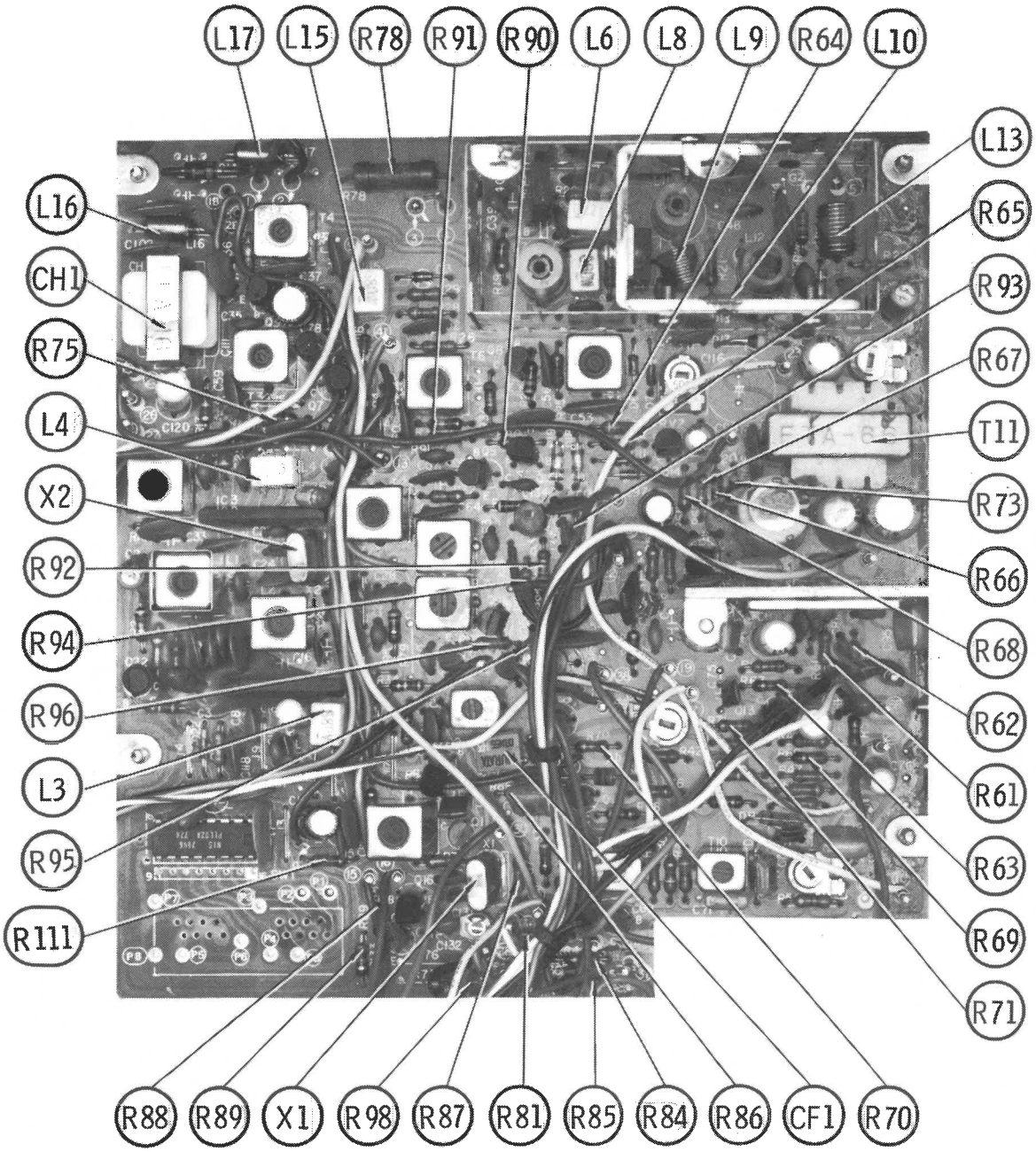
MAIN BOARD


C136
C134
C137
C135
C139
C81
C97
C86
C96
C114
C106
C82
C62
C78
C99
C107
C100
C102
C91
C63
C93
C64
C90
C120
C94
C80
C88
C77
C89
C72
C92
C110
C95
C65
C84
C118
C87
C117
C85
C61
C76
C113
C101
C74
C83
C67
C123
C75
C130
C133
C131
C132
C68
C70
C66
C69
C71
C79
C73

MAIN BOARD

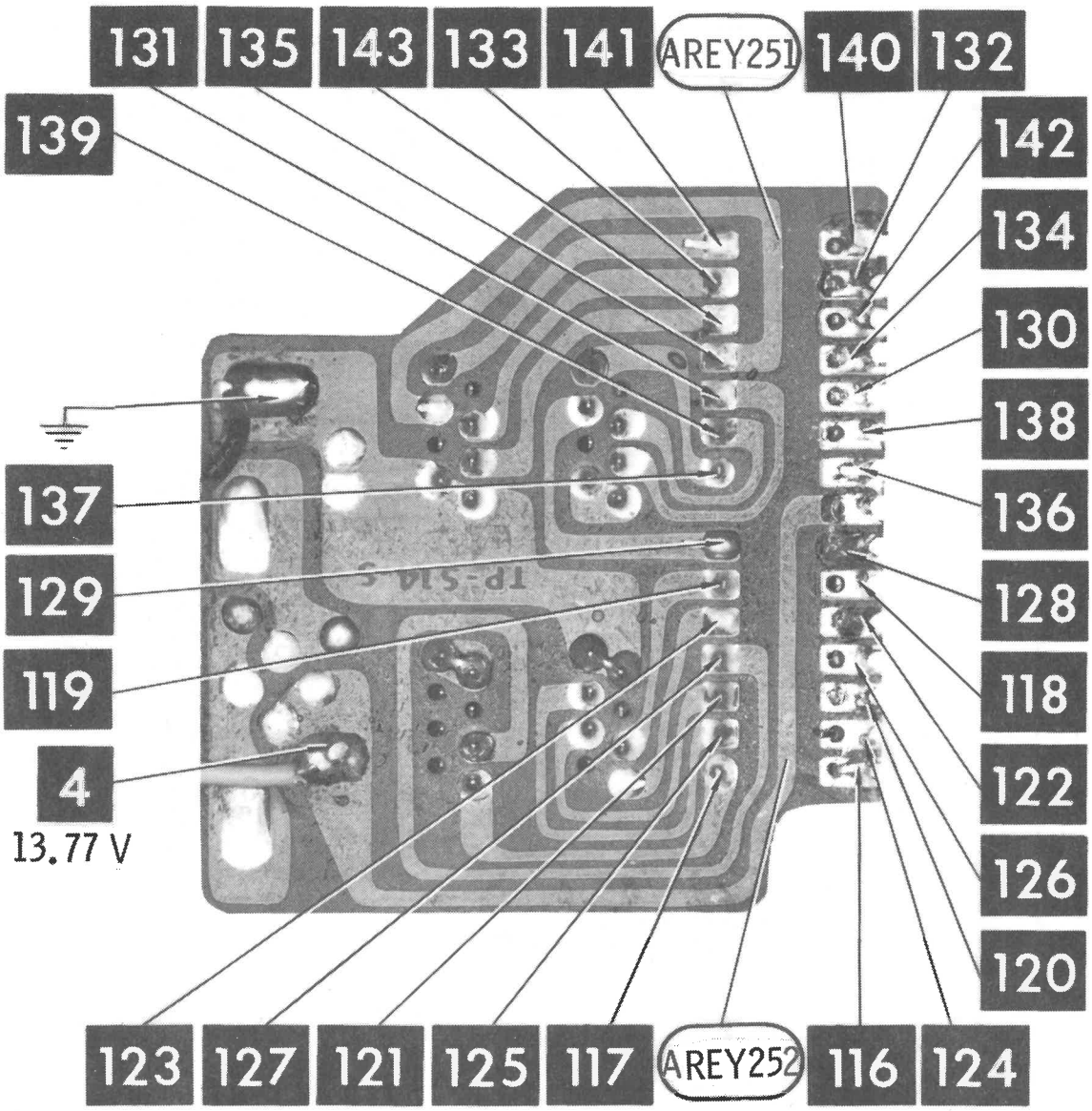

R55
R53
R52
R28
R29
R26
R19
R31
R20
R30
R27
R22
R18
R54
R5
R17
R15
R13
R16
R2
R4
R3
R14
R1
R11
R12
R34
R9
R6
R21
R24
R25
R23
R32
R33
R57
R59
R58
R60
R51
R48
R47
R50
R49
R46
R56
R8
R7
R35
R37
R43
R38
R39
R41
R40
R44
R36
R42
R45

MAIN BOARD

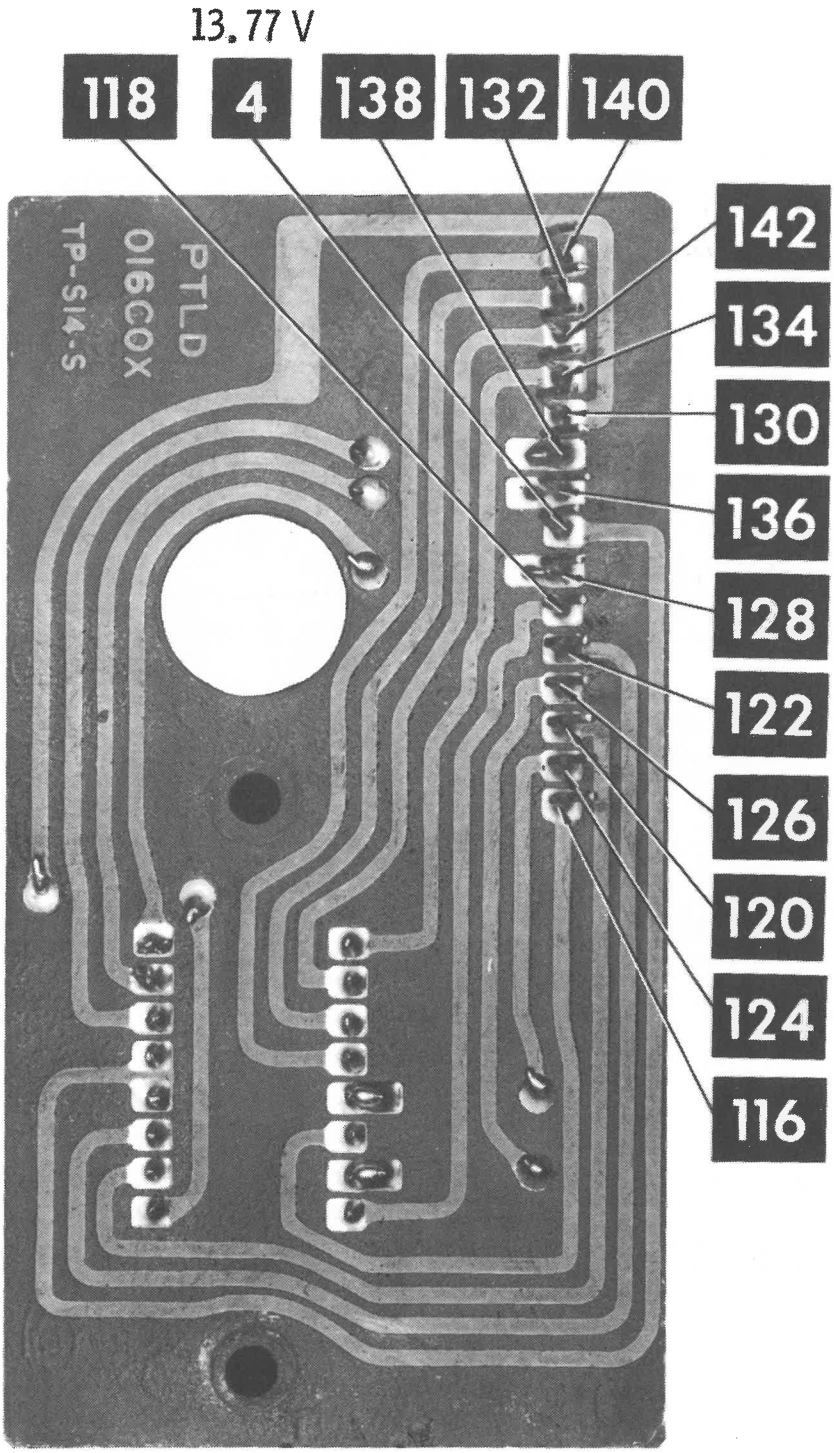

L17
L15
R78
R91
R90
L6
L8
L9
R64
L10
L13
L16
R65
CH1
R93
R75
R67
L4
T11
X2
R73
R92
R66
R94
R68
R96
R62
L3
R61
R95
R63
R111
R69
R71
R88
R89
X1
R98
R87
R81
R85
R84
R86
CF1
R70

MAIN BOARD

A Howard W. Sams CIRCUITRACE® Photo

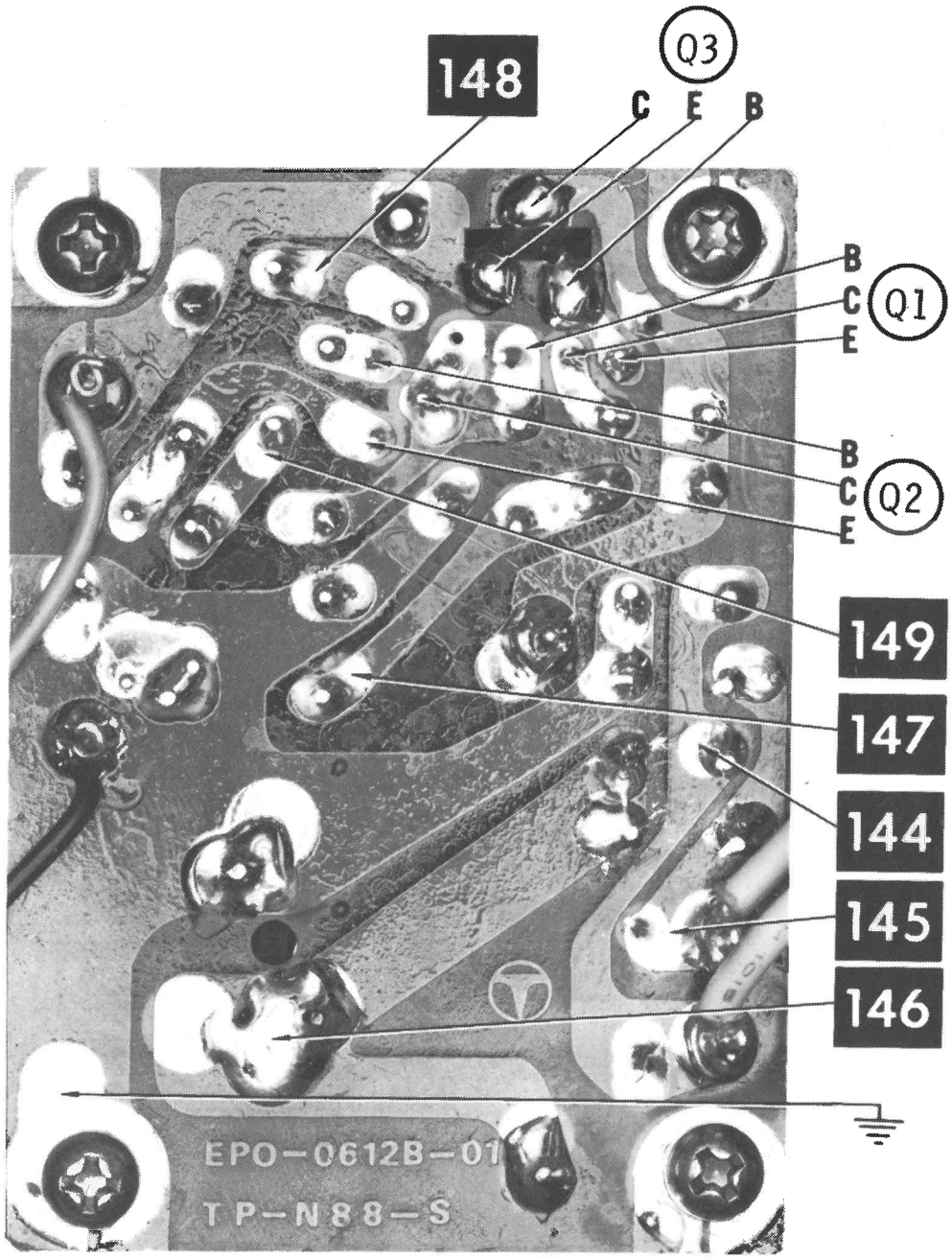


CH. SELECTOR BOARD

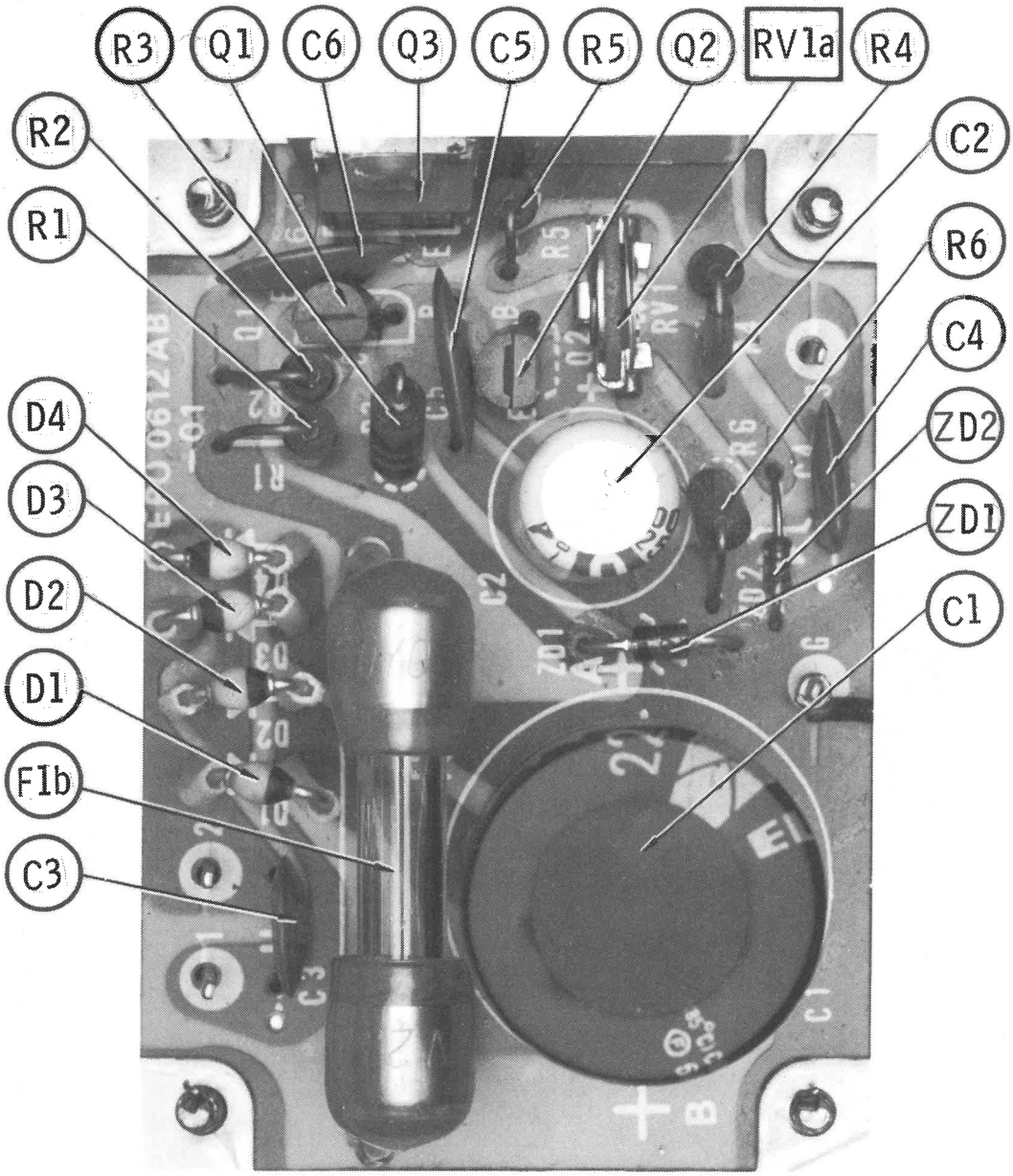

13.77 V
118
4
138
132
140
142
134
130
136
128
122
126
120
124
116
PTLD
016COX
TP-S14-S

LED BOARD

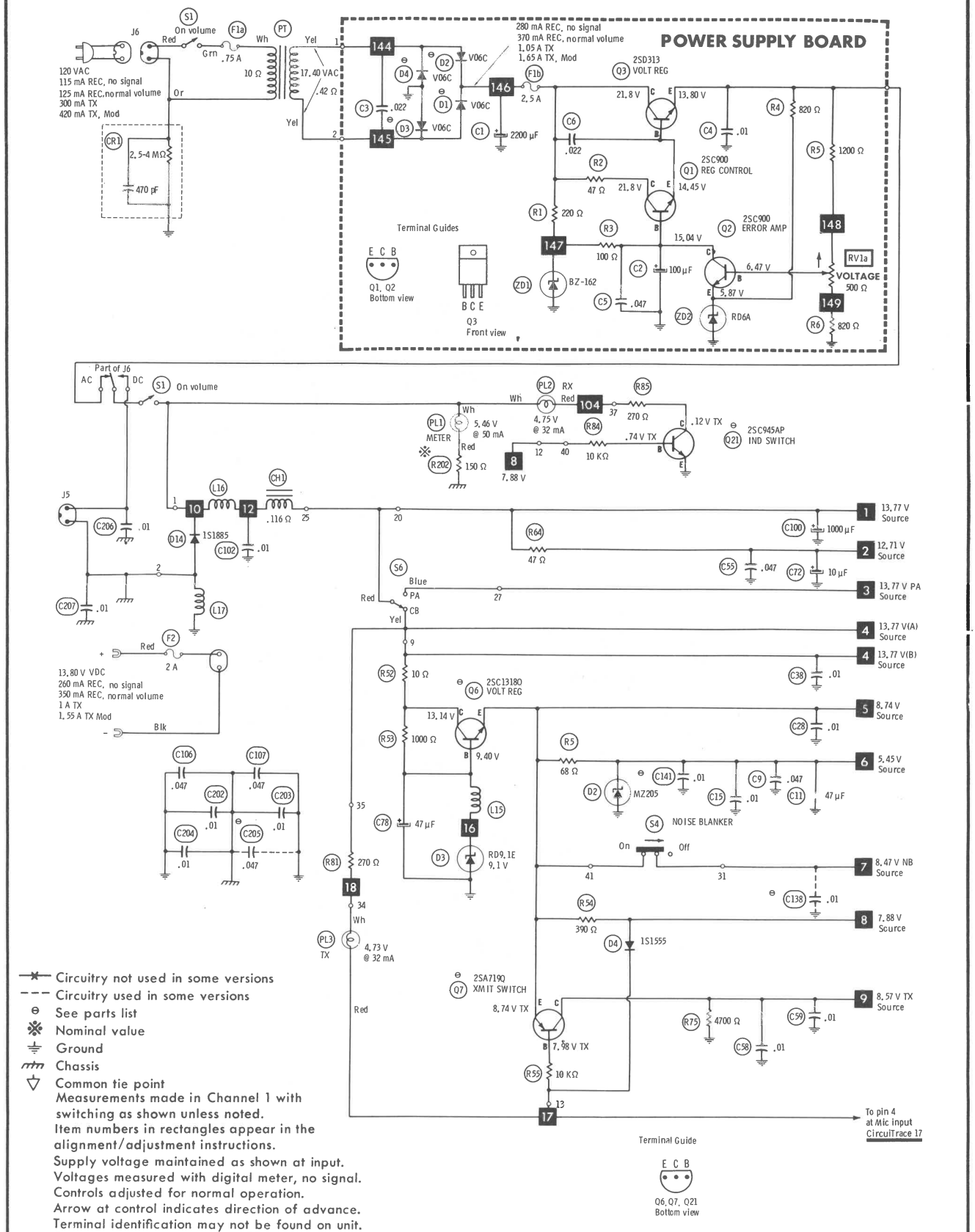
A Howard W. Sams CIRCUITRACE® Photo



POWER SUPPLY

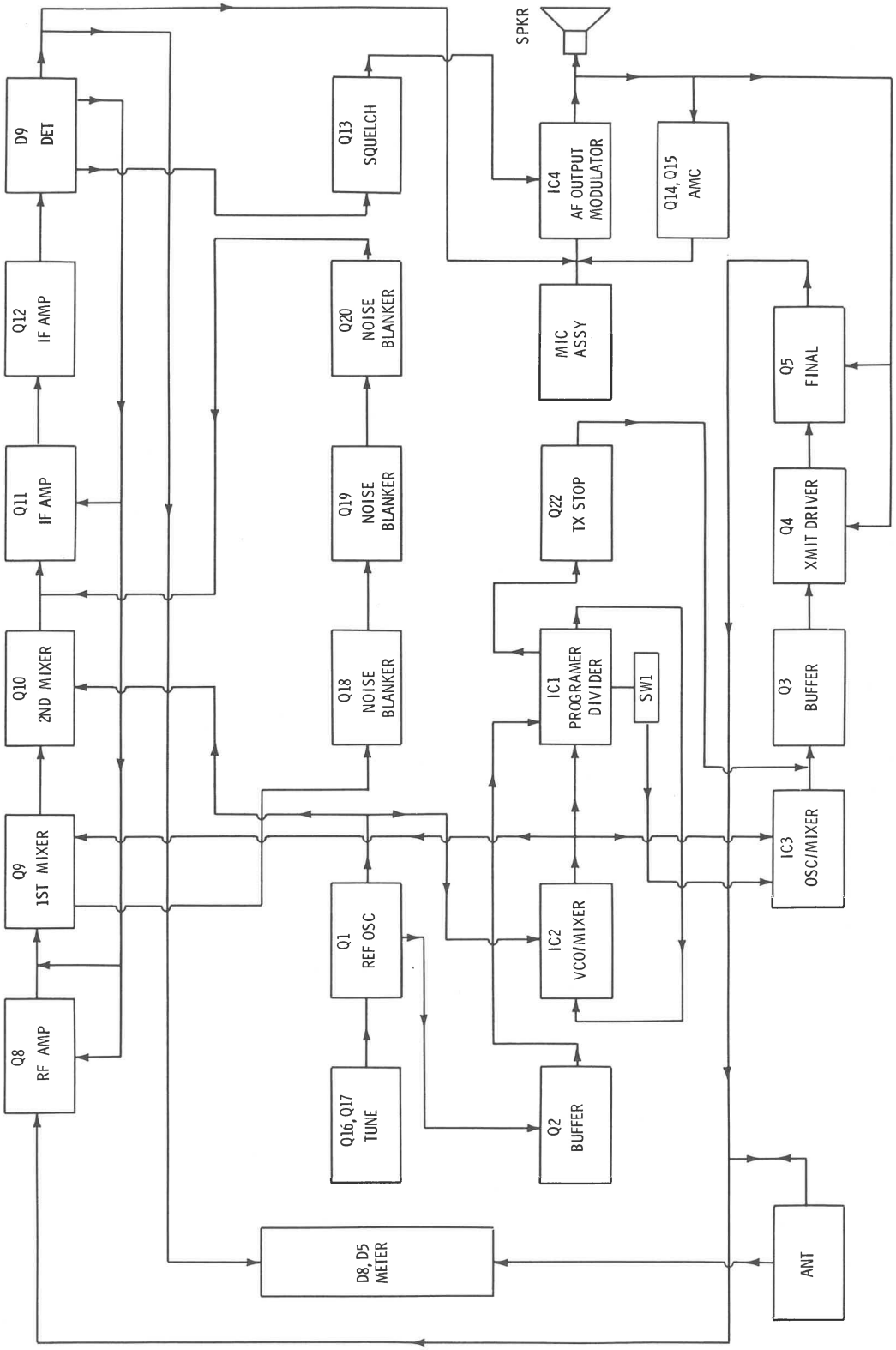


POWER SUPPLY

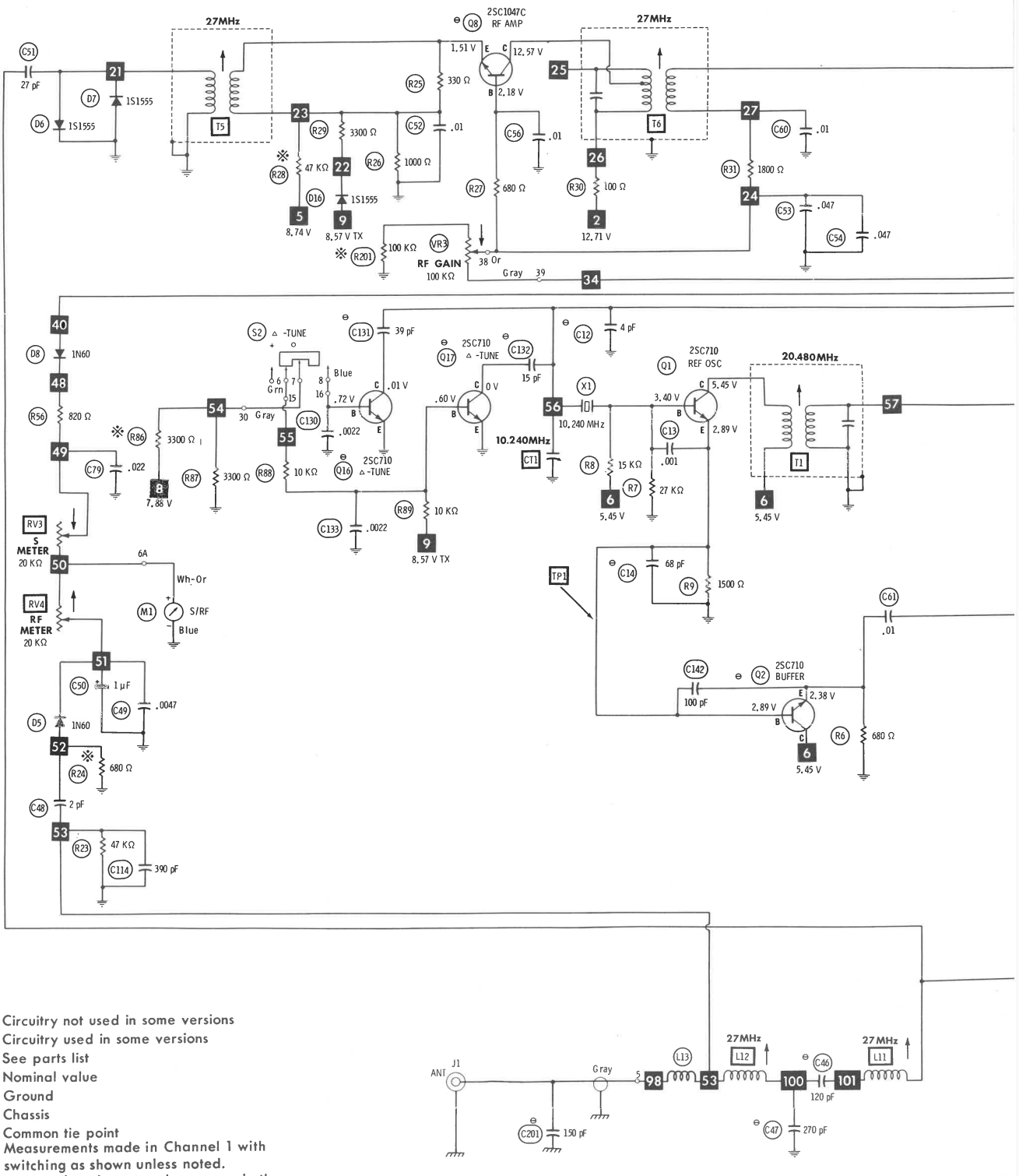


A PHOTOFACT STANDARD NOTATION SCHEMATIC WITH CIRCUITRACE®

BOMAN MODEL CBH-990



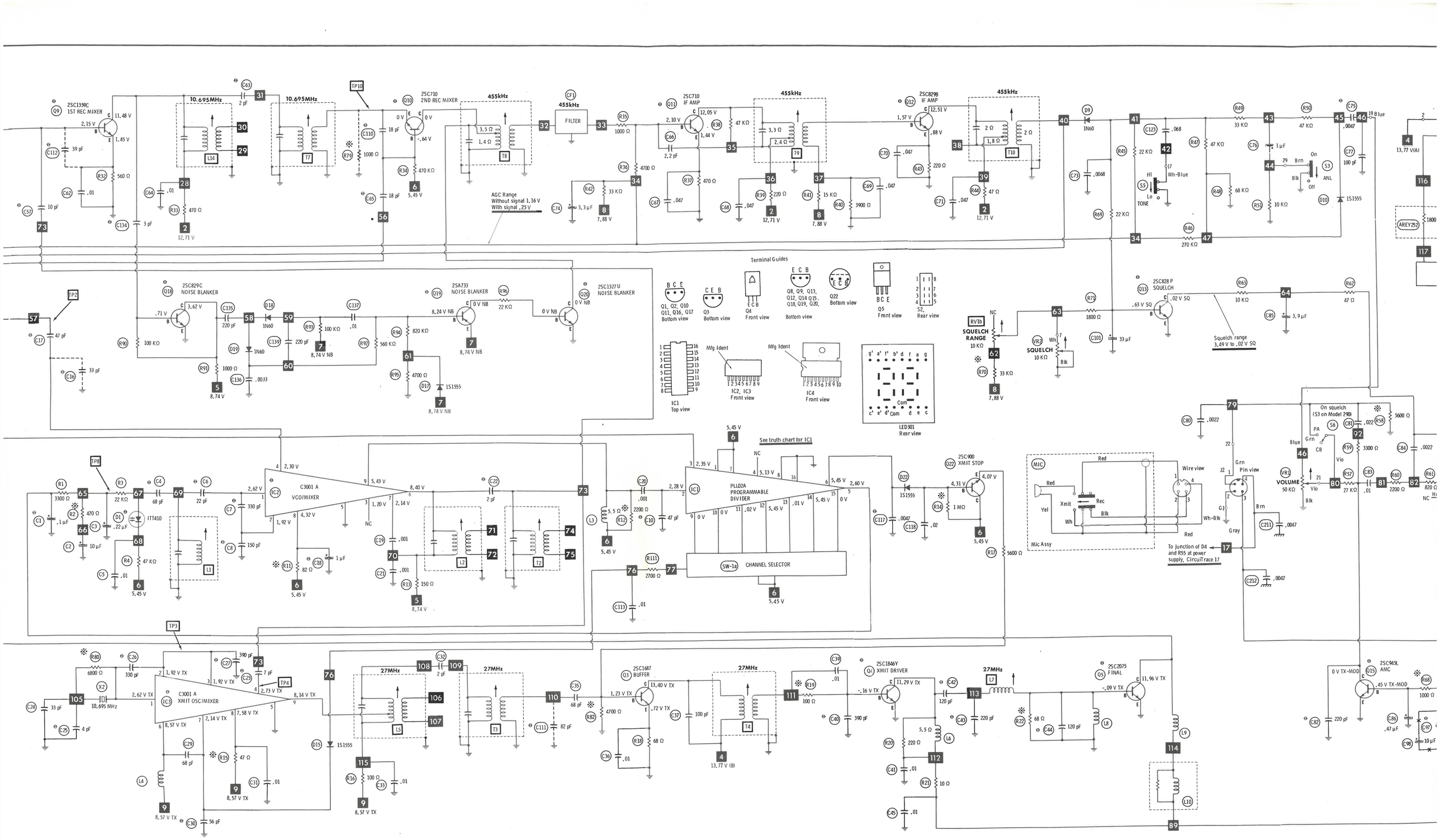
BLOCK DIAGRAM

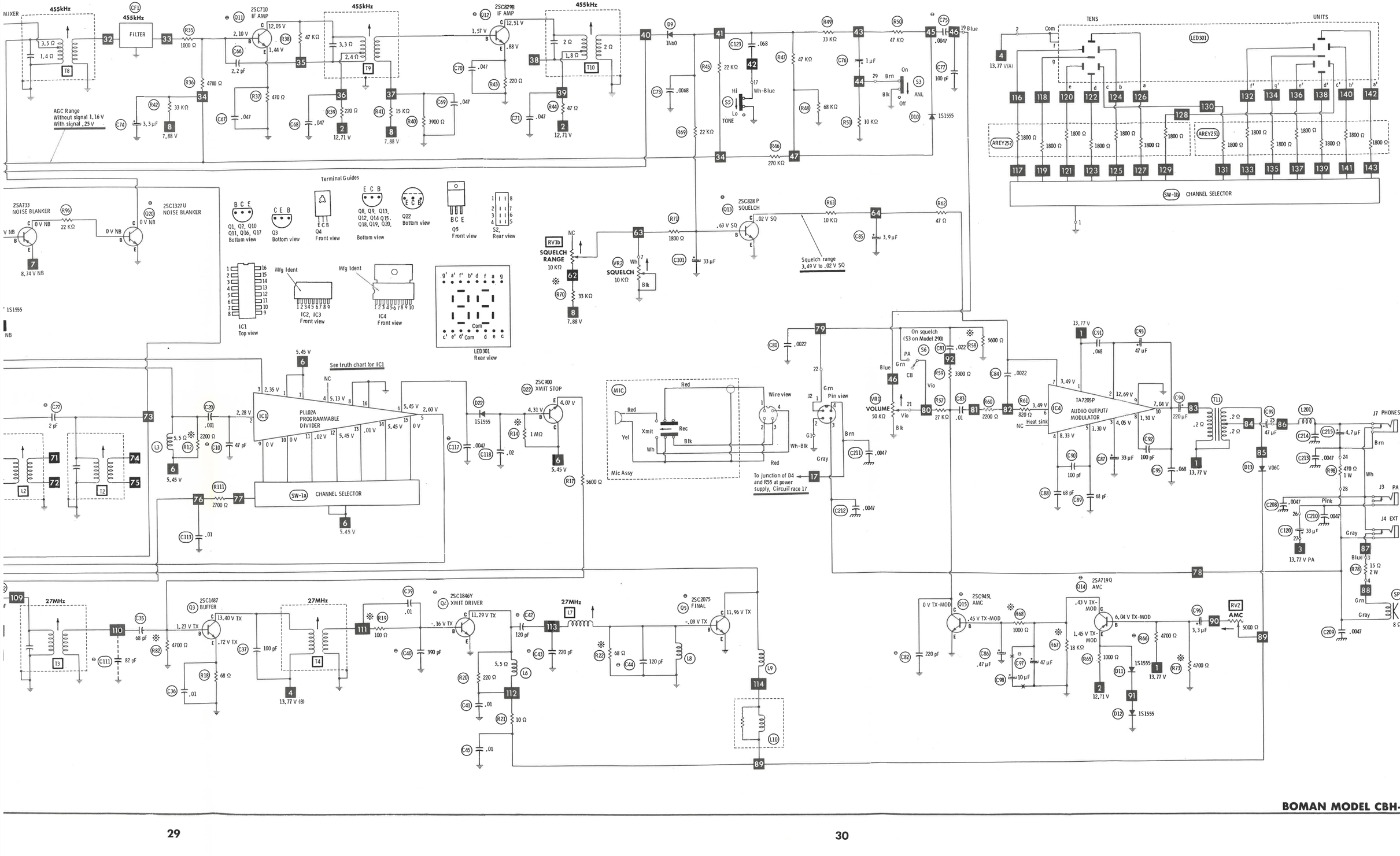


—✕— Circuitry not used in some versions
– – – Circuitry used in some versions
⊖ See parts list
※ Nominal value
⏚ Ground
Chassis
▽ Common tie point

Measurements made in Channel 1 with switching as shown unless noted.
Item numbers in rectangles appear in the alignment/adjustment instructions.
Supply voltage maintained as shown at input.
Voltages measured with digital meter, no signal.
Controls adjusted for normal operation.
Arrow at control indicates direction of advance.
Terminal identification may not be found on unit.
Resistors are 1/2W or less, 5% unless noted.
Value in ( ) used in some versions.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CIRCUITRACE®


Q9 2SC1359C 1ST REC MIXER
10.695MHz
10.695MHz
Q10 2SC710 2ND REC MIXER
455kHz
CF1 455kHz FILTER
Q11 2SC710 IF AMP
455kHz
Q12 2SC829B IF AMP
455kHz
AGC Range
Without signal 1.16 V
With signal .25 V
Terminal Guides
Q1, Q2, Q10 Q11, Q16, Q17 Bottom view
Q3 Bottom view
Q4 Front view
Q8, Q9, Q13, Q12, Q14 Q15, Q18, Q19, Q20, Bottom view
Q22 Bottom view
Q5 Front view
S2, Rear view
Q18 2SC829C NOISE BLANKER
Q19 2SA733 NOISE BLANKER
Q20 2SC1327U NOISE BLANKER
IC1 Top view
IC2, IC3 Front view
IC4 Front view
LED301 Rear view
Q13 2SC828 P SQUELCH
SQUELCH RANGE 10 KΩ
VR2 SQUELCH 10 KΩ
Squelch range 3.49 V to .02 V SQ
See truth chart for IC1
IC2 C3001 A VCO/MIXER
IC1 PLL02A PROGRAMMABLE DIVIDER
SW-1a CHANNEL SELECTOR
Q22 2SC900 XMIT STOP
MIC
Mic Assy
Wire view
To junction of D4 and R55 at power supply, CircuiTrace 17
VR1 VOLUME 50 KΩ
On squelch (S3 on Model 290)
IC3 C3001 A XMIT OSC/MIXER
10.695 MHz
Q3 2SC1687 BUFFER
Q4 2SC1846Y XMIT DRIVER
Q5 2SC2075 FINAL
27MHz
27MHz
27MHz
Q15 2SC945L AMC
0 V TX-MOD
.45 V TX-MOD
13.77 V (B)


MIXER
455kHz
3.5 Ω
1.4 Ω
T8
CF1
455kHz
FILTER
32
33
R35 1000 Ω
R36 4700 Ω
R42 33 KΩ
C74 3.3 µF
8
7.88 V
AGC Range
Without signal 1.16 V
With signal .25 V
Q11 2SC710 IF AMP
2.10 V
12.05 V
1.44 V
R38 47 KΩ
C66 2.2 pF
R37 470 Ω
C67 .047
455kHz
3.3 Ω
2.4 Ω
T9
35
36
37
R39 220 Ω
C68 .047
2
12.71 V
R41 15 KΩ
R40 3900 Ω
8
7.88 V
C69 .047
Q12 2SC829B IF AMP
1.57 V
12.51 V
.88 V
C70 .047
R43 220 Ω
C71 .047
455kHz
2 Ω
1.8 Ω
2 Ω
T10
38
39
R44 47 Ω
2
12.71 V
40
D9 1N60
C73 .0068
41
R45 22 KΩ
R69 22 KΩ
34
C123 .068
42
HI
17 Wh-Blue
S5
Lo
TONE
R47 47 KΩ
R48 68 KΩ
R49 33 KΩ
R50 47 KΩ
43
C76 1 µF
44
29 Brn
On
S3
ANL
Blk
Off
R51 10 KΩ
45
C75 .0047
46
19 Blue
C77 100 pF
D10 1S1555
R46 270 KΩ
47
TENS
UNITS
LED301
2
Com
f
g
4
13.77 V(A)
116 118 120 122 124 126
128
130
132 134 136 138 140 142
AREY252
AREY251
1800 Ω
117 119 121 123 125 127 129
131 133 135 137 139 141 143
SW-1b CHANNEL SELECTOR
1
2SA733
NOISE BLANKER
R96 22 KΩ
0 V NB
7
8.74 V NB
2SC1327U
NOISE BLANKER
Q20
0 V NB
1S1555
NB
Terminal Guides
Q1, Q2, Q10
Q11, Q16, Q17
Bottom view
Q3
Bottom view
Q4
Front view
Q8, Q9, Q13,
Q12, Q14 Q15,
Q18, Q19, Q20,
Bottom view
Q22
Bottom view
Q5
Front view
S2,
Rear view
IC1
Top view
Mfg Ident
IC2, IC3
Front view
Mfg Ident
IC4
Front view
LED301
Rear view
RV1b
SQUELCH
RANGE
10 KΩ
NC
62
R70 33 KΩ
8
7.88 V
VR2
SQUELCH
10 KΩ
Wh
Blk
63
R71 1800 Ω
C101 33 µF
Q13 2SC828 P
SQUELCH
.02 V SQ
.63 V SQ
Squelch range
3.49 V to .02 V SQ
R63 10 KΩ
64
C85 3.9 µF
R62 47 Ω
79
C80 .0022
22
Grn
Pin view
J2
G
Gray
Brn
C211 .0047
C212 .0047
To junction of D4
and R55 at power
supply, Circuit Trace 17
17
MIC
Red
Xmit
Rec
Blk
Yel
Wh
Mic Assy
Wire view
Red
Wh-Blk
On squelch
(S3 on Model 290)
PA
Grn
S6
CB
Blue
46
Vio
Blk
VR1
VOLUME
50 KΩ
21
80
R59 3300 Ω
C81 .022
92
R58 5600 Ω
C84 .0022
R57 27 KΩ
C83 .01
81
R60 2200 Ω
82
R61 820 Ω
NC
Heat sink
3.49 V
6
IC4
TA7205P
AUDIO OUTPUT/
MODULATOR
7
3.49 V
1
2
12.69 V
9
7.04 V
10
1.30 V
8
1.30 V
3
4.05 V
4
8.33 V
5
C94 220 µF
83
.2 Ω
.2 Ω
T11
84
C99 47 µF
86
L201
C214
C215 4.7 µF
J7 PHONES
Brn
C213 .0047
24
R98 470 Ω
1 W
Wh
28
J3 PA
C208 .0047
Pink
26
C210 .0047
J4 EXT SP
C120 33 µF
270
Gray
3
13.77 V PA
87
Blue
R78 15 Ω
2 W
4
88
Grn
Gray
SP
8 ΩZ
C209 .0047
C90 100 pF
C88 68 pF
C89 68 pF
C87 33 µF
C92 100 pF
C95 .068
1
13.77 V
D13 V06C
85
C91 .068
1
13.77 V
C93 47 µF
C82 220 pF
78
Q15 2SC945L
AMC
.45 V TX-MOD
0 V TX-MOD
R68 1000 Ω
C86 .47 µF
C97 47 µF
C98 10 µF
Q14 2SA719Q
AMC
.43 V TX-
MOD
18 KΩ
R67 47 µF
1.45 V TX-
MOD
6.04 V TX-MOD
R65 1000 Ω
D11 1S1555
2
12.71 V
D12 1S1555
91
R66 4700 Ω
1
13.77 V
R73 4700 Ω
C96 3.3 µF
90
RV2
AMC
5000 Ω
89
109
27MHz
T3
110
C35 68 pF
C111 82 pF
Q3 2SC1687
BUFFER
1.23 V TX
13.40 V TX
.72 V TX
R82 4700 Ω
R18 68 Ω
C36 .01
C37 100 pF
27MHz
T4
4
13.77 V (B)
111
C39 .01
R19 100 Ω
C40 390 pF
Q4 2SC1846Y
XMIT DRIVER
-.16 V TX
11.29 V TX
C42 120 pF
R20 220 Ω
5.5 Ω
L6
112
C41 .01
R21 10 Ω
C45 .01
27MHz
L7
113
C43 220 pF
R22 68 Ω
C44 120 pF
L8
Q5 2SC2075
FINAL
-.09 V TX
11.96 V TX
L9
114
L10
89
See truck chart for IC1
5.45 V
6
NC
2.35 V
5.13 V
5.45 V
2.60 V
0 V
IC1
PLL02A
PROGRAMMABLE
DIVIDER
C22 2 pF
73
C20 .001
2.28 V
2200 Ω
R12
C10 47 pF
L3
6
5.45 V
71
74
72
75
L2
T2
R111 2700 Ω
76
77
C113 .01
SW-1a CHANNEL SELECTOR
6
5.45 V
D22 1S1555
Q22 2SC900
XMIT STOP
4.31 V
4.07 V
R14 1 MΩ
C117 .0047
C118 .02
6
5.45 V
R17 5600 Ω

PARTS LIST AND DESCRIPTION
(When ordering parts, state Model, Part Number, and Description.)

WIRING DATA

General-use Hook-up Wire (available in 5 colors)	BELDEN No. 8523	Coiled Microphone Cable	
Shielded Hook-up Wire (spiral wrapped)	BELDEN No. 8421	3-conductor (1 shielded) 23AWG	BELDEN No. 9471 (5')
(braided)	BELDEN No. 8401		BELDEN No. 8497 (6')
Speaker Cable (available in 4 colors)	BELDEN No. 8782		BELDEN No. 9472 (7-1/2')
Bonding Strap	BELDEN No. 8672	28AWG	BELDEN No. 9466 (6')
AC Power Cord (6')	BELDEN No. 17106	31AWG	BELDEN No. 9468 (10')
(9')	BELDEN No. 17109	4-conductor (unshielded) 23AWG	BELDEN No. 8415 (6')
		5-conductor (1 shielded) 28AWG	BELDEN No. 9467 (6')
			BELDEN No. 9465 (7-1/2')

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	MALLORY PART No.	MOTOROLA PART No.	RAYTHEON PART No.	RCA PART No.	SPRAGUE PART No.	SYLVANIA PART No.	THORDARSON PART No.	WORKMAN PART No.	ZENITH PART No.
MAIN BOARD												
D1	ITT410				HEPR2502				ECG612			ZEN-452
	BB122				HEPR2502				ECG612			ZEN-452
	MV201				HEPR2502				ECG612			ZEN-452
D2	MZ205		GEZD-5.0			RE 105			ECG135			103-290
D3	RD9.1E		GEZD-9.1	ZM9.1B		RE 114	SK3060	RT-240	ECG5018	1N4739A	WEP1419	103-279-18
D4	1S1555		GE-300	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177		WEP1062	
D5	1N60		1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109	1N60	WEP134	ZEN-430
D6	1S1555		GE-300	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177		WEP1062	
D7	1S1555		GE-300	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177		WEP1062	
D8	1N60		1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109	1N60	WEP134	ZEN-430
D9	1N60		1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109	1N60	WEP134	ZEN-430
D10	1S1555		GE-300	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177		WEP1062	
D11	1S1555		GE-300	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177		WEP1062	
D12	1S1555		GE-300	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177		WEP1062	
D13	V06C		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
D14	1S1885		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
D15	1S1555		GE-300	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177		WEP1062	
D16	1S1555		GE-300	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177		WEP1062	
D17	1S1555		GE-300	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177		WEP1062	
D18	1N60		1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109	1N60	WEP134	ZEN-430
D19	1N60		1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109	1N60	WEP134	ZEN-430
D22	1S1555		GE-300	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177		WEP1062	
IC1	PLL02A											
	PLL02A											
IC2	C3001A		GEIC-181				SK3487		ECG1192			
	C3001		GEIC-181				SK3487		ECG1192			
	TA7310P		GEIC-181				SK3487		ECG1192			
IC3	C3001A		GEIC-181				SK3487		ECG1192			
	C3001		GEIC-181				SK3487		ECG1192			
	TA7310P		GEIC-181				SK3487		ECG1192			
IC4	TA7205P		GEIC-179	PTC780		RE 357-IC	SK3235	TVCM-81	ECG1155	TA7205P	WEP949	
Q1	2SC710		GE-211*	PTC132	HEPS0016*	RE 13*	SK3444*	RT-308*	ECG123A*	2SC710	WEP710	ZEN-114
Q2	2SC710		GE-211*	PTC132	HEPS0016*	RE 13*	SK3444*	RT-308*	ECG123A*	2SC710	WEP710	ZEN-114
Q3	2SC1687		GE-20*	PTC121*	HEPS0015*	RE 13*	SK3444*	RT-107A*	ECG123A*	2SC536*	WEP736*	
Q4	2SC1846-Y		GE-336	PTC180		RE 209	SK3253		ECG295	2SC496	WEP913	800-767
	2SC1846		GE-336	PTC180		RE 209	SK3253		ECG295	2SC496	WEP913	800-767
	2SC1760		GE-276	PTC180		RE 224	SK3197	RT-310	ECG306		WEP771	
	2SC2036		GE-46	PTC176		RE 202	SK3049	RT-307	ECG282		WEP224	
Q5	2SC2075	(12)	GE-215	PTC186		RE 203	SK3197	RT-146	ECG235		WEP785	
	2SC1306		GE-215	PTC186		RE 203	SK3197	RT-146	ECG235	2SC1306	WEP785	
	2SC1678		GE-322	PTC186		RE 203	SK3197	RT-146	ECG235	2SC1306	WEP785	
	2SC1974		GE-337	PTC186		RE 203	SK3197	RT-146	ECG235	2SC1306	WEP785	
Q6	2SC1318Q		GE-210*	PTC178	HEPS0015*	RE 17*	SK3137	RT-302	ECG297		WEP59*	121-722
	2SC1318		GE-210*	PTC178	HEPS0015*	RE 17*	SK3137	RT-302	ECG297		WEP59*	121-722
Q7	2SA719Q		GE-269	PTC103*	HEPS0019*	RE 26*	SK3114	RT-305	ECG290		WEP911	121-879
	2SA719		GE-269	PTC103*	HEPS0019*	RE 26*	SK3114	RT-305	ECG290		WEP911	121-879
	2SA720		GE-269	PTC103*	HEPS0019*	RE 26*	SK3114	RT-305	ECG290		WEP911	121-879
Q8	2SC1047C		GE-60*	PTC132*	HEPS0016*	RE 28*	SK3018*	RT-107	ECG229*	2SC784	WEP63*	ZEN-109
	2SC1047		GE-60*	PTC132*	HEPS0016*	RE 28*	SK3018*	RT-107	ECG229*	2SC784	WEP63*	ZEN-109
	2SC710		GE-211*	PTC132	HEPS0016*	RE 13*	SK3444*	RT-308*	ECG123A*	2SC710	WEP710	ZEN-114
	2SC460		GE-61*	PTC136*	HEPS0014*	RE 9	SK3122*	RT-134	ECG107	2SC460	WEP460	121-722
Q9	2SC1359C		GE-212	PTC121*	HEPS0014*	RE 192	SK3122*	RT-308	ECG229*	2SC710	WEP66	121-Z9000
	2SC1359		GE-212	PTC121*	HEPS0014*	RE 192	SK3122*	RT-308	ECG229*	2SC710	WEP66	121-Z9000
	2SC710		GE-211*	PTC132	HEPS0016*	RE 13*	SK3444*	RT-308*	ECG123A*	2SC710	WEP710	ZEN-114
Q10	2SC710		GE-211*	PTC132	HEPS0016*	RE 13*	SK3444*	RT-308*	ECG123A*	2SC710	WEP710	ZEN-114
	2SC829		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
	2SC839		GE-61*	PTC132*	HEPS0015*	RE 13*	SK3444*	RT-308	ECG123A*	2SC839	WEP736*	ZEN-120
Q11	2SC710		GE-211*	PTC132	HEPS0016*	RE 13*	SK3444*	RT-308*	ECG123A*	2SC710	WEP710	ZEN-114
	2SC829		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
Q12	2SC829B		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
	2SC829		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
	2SC710		GE-211*	PTC132	HEPS0016*	RE 13*	SK3444*	RT-308*	ECG123A*	2SC710	WEP710	ZEN-114
Q13	2SC828P		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
	2SC828		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
	2SC945		GE-212	PTC121*	HEPS0015*	RE 192	SK3124	RT-107A	ECG199	2SC945	WEP1945	121-Z9000
	2SC372		GE-61*	PTC121*	HEPS0015*	RE 13*	SK3444	RT-308	ECG123A*	2SC372	WEP372	ZEN-114
Q14	2SA719Q		GE-269	PTC103*	HEPS0019*	RE 26*	SK3114	RT-305	ECG290		WEP911	121-879
	2SA719		GE-269	PTC103*	HEPS0019*	RE 26*	SK3114	RT-305	ECG290		WEP911	121-879
	2SA720		GE-269	PTC103*	HEPS0019*	RE 26*	SK3114	RT-305	ECG290		WEP911	121-879
	2SA564		GE-65	PTC103*	HEPS0019*	RE 193	SK3114	RT-303	ECG234	2SA564	WEP564	121-879
Q15	2SC945L		GE-212	PTC121*	HEPS0015*	RE 192	SK3124	RT-107A	ECG199	2SC945	WEP1945	121-Z9000
	2SC945		GE-212	PTC121*	HEPS0015*	RE 192	SK3124	RT-107A	ECG199	2SC945	WEP1945	121-Z9000
	2SC900		GE-62	PTC139*	HEPS0015*	RE 192	SK3124	RT-302	ECG199	2SC900	WEP66	ZEN-119
Q16	2SC710		GE-211*	PTC132	HEPS0016*	RE 13*	SK3444*	RT-308*	ECG123A*	2SC710	WEP710	ZEN-114
	2SC829		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
	2SC839		GE-61*	PTC132*	HEPS0015*	RE 13*	SK3444*	RT-308	ECG123A*	2SC839	WEP736*	ZEN-120
Q17	2SC710		GE-211*	PTC132	HEPS0016*	RE 13*	SK3444*	RT-308*	ECG123A*	2SC710	WEP710	ZEN-114
	2SC829		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
	2SC839		GE-61*	PTC132*	HEPS0015*	RE 13*	SK3444*	RT-308	ECG123A*	2SC839	WEP736*	ZEN-120

PARTS LIST AND DESCRIPTION (CONTINUED)
(When ordering parts, state Model, Part Number, and Description.)

SEMICONDUCTORS (Select replacement transistor for best results) (cont)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	MALLORY PART No.	MOTOROLA PART No.	RAYTHEON PART No.	RCA PART No.	SPRAGUE PART No.	SYLVANIA PART No.	THORDARSON PART No.	WORKMAN PART No.	ZENITH PART No.
Q18	2SC829C		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
	2SC829		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
Q19	2SA733		GE-48	PTC103*	HEPS0019*	RE 219	SK3138	RT-303	ECG294	2SA733	WEP916	
Q20	2SC1327U		GE-85*	PTC139*	HEPS0024*	RE 192	SK3245	RT-107A	ECG199	2SC900	WEP66	121-972
	2SC1327		GE-85*	PTC139*	HEPS0024*	RE 192	SK3245	RT-107A	ECG199	2SC900	WEP66	121-972
	2SC900		GE-62	PTC139*	HEPS0015*	RE 192	SK3124	RT-302	ECG199	2SC900	WEP66	ZEN-119
Q21	2SC945AP		GE-212	PTC121*	HEPS0015*	RE 192	SK3124	RT-107A	ECG199	2SC945	WEP1945	121-Z9000
	2SC945		GE-212	PTC121*	HEPS0015*	RE 192	SK3124	RT-107A	ECG199	2SC945	WEP1945	121-Z9000
	2SC828		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
Q22	2SC900		GE-62	PTC139*	HEPS0015*	RE 192	SK3124	RT-302	ECG199	2SC900	WEP66	ZEN-119
POWER SUPPLY BOARD												
D1	V06C		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	F14A		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	1S1885		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
D2	V06C		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	F14A		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	1S1885		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
D3	V06C		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	F14A		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	1S1885		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
D4	V06C		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	F14A		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	1S1885		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
Q1	2SC900		GE-62	PTC139*	HEPS0015*	RE 192	SK3124	RT-302	ECG199	2SC900	WEP66	ZEN-119
Q2	2SC900		GE-62	PTC139*	HEPS0015*	RE 192	SK3124	RT-302	ECG199	2SC900	WEP66	ZEN-119
Q3	2SD313		GE-241	PTC154		RE 205	SK3054	RT-154	ECG196		WEP756	
ZD1	BZ-167		GEZD-16	ZB16B		RE 122		RT-246	ECG5075A	1N4745A	WEP1160	
ZD2	RD6A		GEZD-6.0			RE 108			ECG5070A		WEP1153	

* Lead configuration may vary from original.
(12) 10 WATTS @ 3 AMPS.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA: MFGR. PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.: Q-LINE	SPRAGUE PART No.: GENERAL LINE
MAIN BOARD						
C1	.1 10V			TDC104M050EL	QDT1-2	SD50-R109
C2	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C3	.22 10V			TDC224M050EL	QDT1-10	SD50-R229
C11	47 10V		PC50-16	VTT47D16	QV1-73	EV-1226
C18	1 50V		PC1-50	VTT1A50	QV1-11	EV-1615
C50	1 50V		PC1-50	VTT1A50	QV1-11	EV-1615
C72	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C74	3.3 25V		PC5-50	VTT3R3A50	QV1-23	EV-1318
C76	1 50V		PC1-50	VTT1A50	QV1-11	EV-1615
C78	47 16V		PC50-16	VTT47D16	QV1-73	EV-1226
C85	3.9 25V			TDC475M010EL	QDT1-48	SD10-4R79
C86	.47 10V			TDC474M050EL	QDT1-19	SD50-R479
C87	33 6.3V		PC30-25	VTT33B10	QV1-61	EV-1125
C93	47 16V		PC50-16	VTT47D16	QV1-73	EV-1226
C94	220 16V		PC250-25	VTT220H16	QV1-117	EV-1240
C96	3.3 25V		PC5-50	VTT3R3A50	QV1-23	EV-1318
C97	47 10V		PC50-16	VTT47D16	QV1-73	EV-1226
C98	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C99	47 25V		PC50-25	VTT47E25	QV1-75	EV-1326
C100	1000 16V		PC1000-16	VTT1000L16	QV1-183	EV-1260
C101	33 6.3V		PC30-25	VTT33B10	QV1-61	EV-1125
C120	33 16V		PC30-25	VTT33D25	QV1-63	EV-1325
C215	4.7 16V		PC5-50	VTT4R7B50	QV1-27	EV-1319
POWER SUPPLY BOARD						
C1	2200 25V		WBR2000-25	TC2520A	QE1-645	TVA-1213.5
C2	100 25V		PC100-25	VTT100G25	QV1-97	EV-1330

SD3-3R99

CAPACITORS

ITEM No.	RATING	MFGR. PART No.	REPLACEMENT DATA: CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.: Q-LINE	SPRAGUE PART No.: GENERAL LINE
MAIN BOARD							
C4	68 N150 10%				*		10TCP-Q68
C5	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C6	22 N150 10%				*		10TCP-Q22
C7	330		DD-331	GP330	GP333		10TS-T33
C8	150		DD-151		GP315		10TS-T15
C9	.047		DTX-151				10TCW-T15
C10	47		DTZ-47	NP047	CN0447		10TCC-Q47
C12	4 N150				*		10TCP-V47
C13	.001			DPMS6D1	EWF1A210	QF1-1	1PB-D10
C14	68 N150 10%				*		10TCP-Q68
C15	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C16	33		DTZ-33	NP033	CN0433		10TCC-Q33
C17	47 N150 10%				*		10TCP-Q47
C19	.001			DPMS6D1	EWF1A210	QF1-1	1PB-D10
C20	.001			DPMS6D1	EWF1A210	QF1-1	1PB-D10
C21	.001 100V			CD19FD102J03	SX210		MMC-102
C22	2 5%		DTZ-2R2	NP02P2	CN0522		10TCC-V22
C23	7				CN0439		10TCC-Q39
C24	33 N150 10%				*		10TCP-Q33
C25	4 NP0		DTZ-4R7	NP04P7	CN0547		10TCC-V47
C26	330 100V		DD-331	GP330	GP333		10TS-T33

PARTS LIST AND
(When ordering parts, stat

CAPACITORS (c

ITEM No.	RATING
C27	390
C28	.01
C29	68
C30	56
C31	.01
C32	2 5%
C33	.01
C35	68
C36	.01
C37	100 N150 10%
C38	.01
C39	.01
C40	390
C41	.01
C42	120
C43	220
C44	120
C45	.01
C46	120
C47	270 10% 500V
C48	2 500V
C49	.0047
C51	27
C52	.01
C53	.047
C54	.047
C55	.047
C56	.01
C57	10
C58	.01
C59	.01
C60	.01
C61	.01
C62	.01
C63	2 5%
C64	.01
C65	18 10% N150
C66	2.2 10% 500V
C67	.047
C68	.047
C69	.047
C70	.047
C71	.047
C73	.0068
C75	.0047
C77	100
C79	.022
C80	.0022
C81	.022
C82	220
C83	.01
C84	.0022
C88	68
C89	68
C90	100
C91	.068
C92	100
C95	.068
C102	.01
C106	.047
C107	.047
C110	18
C111	82
C112	39
C113	.01
C114	390 500V
C117	.0047
C118	.022
C123	.068
C130	.0022
C131	39 N150
C132	15 N150
C133	.0022
C134	3
C135	220
C136	.0033
C137	.01
C138	.01
C139	220
C141	.01
C142	100
C201	150
C202	.01
C203	.01

BELDEN No. 9471 (5')
BELDEN No. 8497 (6')
BELDEN No. 9472 (7-1/2')
BELDEN No. 9466 (6')
BELDEN No. 9468 (10')
BELDEN No. 8415 (6')
BELDEN No. 9467 (6')
BELDEN No. 9465 (7-1/2')

NIA No.	THORDARSON PART No.	WORKMAN PART No.	ZENITH PART No.
			ZEN-452
			ZEN-452
			ZEN-452
			103-290
3	1N4739A	WEP1419	103-279-18
		WEP1062	
	1N60	WEP134	ZEN-430
		WEP1062	
		WEP1062	
	1N60	WEP134	ZEN-430
	1N60	WEP134	ZEN-430
		WEP1062	
		WEP1062	
		WEP1062	
	1N4004	WEP156	212-76
	1N4004	WEP156	212-76
		WEP1062	
		WEP1062	
		WEP1062	
	1N60	WEP134	ZEN-430
	1N60	WEP134	ZEN-430
		WEP1062	
	TA7205P	WEP949	
1*	2SC710	WEP710	ZEN-114
1*	2SC710	WEP710	ZEN-114
1*	2SC536*	WEP736*	
	2SC496	WEP913	800-767
	2SC496	WEP913	800-767
		WEP771	
		WEP224	
		WEP785	
	2SC1306	WEP785	
	2SC1306	WEP785	
	2SC1306	WEP785	
		WEP59*	121-722
		WEP59*	121-722
		WEP911	121-879
		WEP911	121-879
		WEP911	121-879
*	2SC784	WEP63*	ZEN-109
*	2SC784	WEP63*	ZEN-109
1*	2SC710	WEP710	ZEN-114
	2SC460	WEP460	121-722
*	2SC710	WEP66	121-Z9000
*	2SC710	WEP66	121-Z9000
1*	2SC710	WEP710	ZEN-114
1*	2SC710	WEP710	ZEN-114
	2SC828	WEP828	ZEN-119
1*	2SC839	WEP736*	ZEN-120
1*	2SC710	WEP710	ZEN-114
	2SC828	WEP828	ZEN-119
	2SC828	WEP828	ZEN-119
	2SC828	WEP828	ZEN-119
1*	2SC710	WEP710	ZEN-114
	2SC828	WEP828	ZEN-119
	2SC828	WEP828	ZEN-119
	2SC945	WEP1945	121-Z9000
1*	2SC372	WEP372	ZEN-114
		WEP911	121-879
		WEP911	121-879
		WEP911	121-879
	2SA564	WEP564	121-879
	2SC945	WEP1945	121-Z9000
	2SC945	WEP1945	121-Z9000
	2SC900	WEP66	ZEN-119
1*	2SC710	WEP710	ZEN-114
1*	2SC828	WEP828	ZEN-119
1*	2SC839	WEP736*	ZEN-120
1*	2SC710	WEP710	ZEN-114
	2SC828	WEP828	ZEN-119
1*	2SC839	WEP736*	ZEN-120

PARTS LIST AND DESCRIPTION (CONTINUED)

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

SEMICONDUCTORS (Select replacement transistor for best results) (cont)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	MALLORY PART No.	MOTOROLA PART No.	RAYTHEON PART No.	RCA PART No.	SPRAGUE PART No.	SYLVANIA PART No.	THORDARSON PART No.	WORKMAN PART No.	ZENITH PART No.
Q18	2SC829C		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
	2SC829		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
Q19	2SA733		GE-48	PTC103*	HEPS0019*	RE 219	SK3138	RT-303	ECG294	2SA733	WEP916	
Q20	2SC1327U		GE-85*	PTC139*	HEPS0024*	RE 192	SK3245	RT-107A	ECG199	2SC900	WEP66	121-972
	2SC1327		GE-85*	PTC139*	HEPS0024*	RE 192	SK3245	RT-107A	ECG199	2SC900	WEP66	121-972
	2SC900		GE-62	PTC139*	HEPS0015*	RE 192	SK3124	RT-302	ECG199	2SC900	WEP66	ZEN-119
Q21	2SC945AP		GE-212	PTC121*	HEPS0015*	RE 192	SK3124	RT-107A	ECG199	2SC945	WEP1945	121-Z9000
	2SC945		GE-212	PTC121*	HEPS0015*	RE 192	SK3124	RT-107A	ECG199	2SC945	WEP1945	121-Z9000
	2SC828		GE-61*	PTC121*	HEPS0015*	RE 192	SK3444	RT-302	ECG199	2SC828	WEP828	ZEN-119
Q22	2SC900		GE-62	PTC139*	HEPS0015*	RE 192	SK3124	RT-302	ECG199	2SC900	WEP66	ZEN-119
POWER SUPPLY BOARD												
D1	V06C		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	F14A		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	1S1885		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
D2	V06C		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	F14A		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	1S1885		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
D3	V06C		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	F14A		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	1S1885		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
D4	V06C		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	F14A		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
	1S1885		GE-504A	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116	1N4004	WEP156	212-76
Q1	2SC900		GE-62	PTC139*	HEPS0015*	RE 192	SK3124	RT-302	ECG199	2SC900	WEP66	ZEN-119
Q2	2SC900		GE-62	PTC139*	HEPS0015*	RE 192	SK3124	RT-302	ECG199	2SC900	WEP66	ZEN-119
Q3	2SD313		GE-241	PTC154		RE 205	SK3054	RT-154	ECG196		WEP756	
ZD1	BZ-167		GEZD-16	ZB16B		RE 122		RT-246	ECG5075A	1N4745A	WEP1160	
ZD2	RD6A		GEZD-6.0			RE 108			ECG5070A		WEP1153	

* Lead configuration may vary from original.
(12) 10 WATTS @ 3 AMPS.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	MFGR. PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No. Q-LINE	SPRAGUE PART No. GENERAL LINE
MAIN BOARD						
C1	.1 10V			TDC104M050EL	QDT1-2	SD50-R109
C2	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C3	,22 10V			TDC224M050EL	QDT1-10	SD50-R229
C11	47 10V		PC50-16	VTT47D16	QV1-73	EV-1226
C18	1 50V		PC1-50	VTT1A50	QV1-11	EV-1615
C50	1 50V		PC1-50	VTT1A50	QV1-11	EV-1615
C72	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C74	3.3 25V		PC5-50	VTT3R3A50	QV1-23	EV-1318
C76	1 50V		PC1-50	VTT1A50	QV1-11	EV-1615
C78	47 16V		PC50-16	VTT47D16	QV1-73	EV-1226
C85	3.9 25V			TDC475M010EL	QDT1-48	SD10-4R79
C86	.47 10V			TDC474M050EL	QDT1-19	SD50-R479
C87	33 6.3V		PC30-25	VTT33B10	QV1-61	EV-1125
C93	47 16V		PC50-16	VTT47D16	QV1-73	EV-1226
C94	220 16V		PC250-25	VTT220H16	QV1-117	EV-1240
C96	3.3 25V		PC5-50	VTT3R3A50	QV1-23	EV-1318
C97	47 10V		PC50-16	VTT47D16	QV1-73	EV-1226
C98	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C99	47 25V		PC50-25	VTT47E25	QV1-75	EV-1326
C100	1000 16V		PC1000-16	VTT1000L16	QV1-183	EV-1260
C101	33 6.3V		PC30-25	VTT33B10	QV1-61	EV-1125
C120	33 16V		PC30-25	VTT33D25	QV1-63	EV-1325
C215	4.7 16V		PC5-50	VTT4R7B50	QV1-27	EV-1319
POWER SUPPLY BOARD						
C1	2200 25V		WBR2000-25	TC2520A	QE1-645	TVA-1213.5
C2	100 25V		PC100-25	VTT100G25	QV1-97	EV-1330

CAPACITORS

ITEM No.	RATING	MFGR. PART No.	REPLACEMENT DATA: CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No. Q-LINE	SPRAGUE PART No. GENERAL LINE
MAIN BOARD							
C4	68 N150 10%				*		10TCP-Q68
C5	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C6	22 N150 10%				*		10TCP-Q22
C7	330		DD-331	GP330	GP333		10TS-T33
C8	150		DD-151		GP315		10TS-T15
C9	.047		DTX-151				10TCM-T15
C10	47		DTZ-47	NP047	CN0447		10TCC-Q47
C12	4 N150				*		10TCP-V47
C13	.001			DPMS6D1	EWF1A210	QF1-1	1PB-D10
C14	68 N150 10%				*		10TCP-Q68
C15	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C16	33		DTZ-33	NP033	CN0433		10TCC-Q33
C17	47 N150 10%				*		10TCP-Q47
C19	.001			DPMS6D1	EWF1A210	QF1-1	1PB-D10
C20	.001			DPMS6D1	EWF1A210	QF1-1	1PB-D10
C21	.001 100V			CD19FD102J03	SX210		MWC-102
C22	2 5%		DTZ-2R2	NP02P2	CN0522		10TCC-V22
C23	7				CN0439		10TCC-Q39
C24	33 N150 10%				*		10TCP-Q33
C25	4 NP0		DTZ-4R7	NP04P7	CN0547		10TCC-V47
C26	330 100V		DD-331	GP330	GP333		10TS-T33

BOMAN MODEL CBH-990

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PARTS LIST AND DESCRIPTION (CONTINUED)

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

CAPACITORS (cont)

ITEM No.	RATING	MFGR. PART No.	REPLACEMENT DATA: CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No. Q-LINE	SPRAGUE PART No. GENERAL LINE
C27	390		DD-391	GP390	GP339		10TS-T39
C28	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C29	68		DD-680	GP68	GP468		10TS-Q68
C30	56		DD-560		GP456		10TS-Q56
C31	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C32	2 5%		DTZ-2R2	NP02P2	CN0522		10TCC-V22
C33	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C35	68		DD-680	GP68	GP468		10TS-Q68
C36	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C37	100 N150 10%				*		10TCP-T10
C38	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C39	.01			WMF1S1	EWF1A110	QF1-91	1PB-S10
C40	390		DD-391	GP390	GP339		10TS-T39
C41	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C42	120		DTZ-120		CN0312		10TCC-T12
C43	220		DD-221		GP322		10TS-T22
C44	120		DTZ-120		CN0312		10TCC-T12
C45	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C46	120		DTZ-120		CN0312		10TCC-T12
C47	270 10% 500V			CD15FD271J03	SX327	QW1-37	MWB-271
C48	2 500V		DTZ-2R2	NP02P2	CN0522		10TCC-V22
C49	.0047		DD-472	GP4700	GP247		5GA-D47
C51	27				CN0427		10TCC-Q27
C52	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C53	.047		UK50-503		MAG5015		
C54	.047		UK50-503		MAG5015		
C55	.047			DPMS2S47	EWF1A147	QF1-171	1PB-S47
C56	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C57	10		DTZ-10	NP010	CN0410		10TCC-Q10
C58	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C59	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C60	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C61	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C62	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C63	2 5%		DTZ-2R2	NP02P2	CN0522		10TCC-V22
C64	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C65	18 10% N150				*		10TCP-Q18
C66	2.2 10% 500V		DTZ-2R2	NP02P2	CN0522		10TCC-V22
C67	.047			DPMS2S47	EWF1A147	QF1-171	1PB-S47
C68	.047			DPMS2S47	EWF1A147	QF1-171	1PB-S47
C69	.047			DPMS2S47	EWF1A147	QF1-171	1PB-S47
C70	.047			DPMS2S47	EWF1A147	QF1-171	1PB-S47
C71	.047			DPMS2S47	EWF1A147	QF1-171	1PB-S47
C73	.0068			WMF1D68	EWF1A268	QF1-73	1PB-D68
C75	.0047			WMF1D47	EWF1A247	QF1-57	1PB-D47
C77	100		DD-101	GP100	GP310		10TS-T10
C79	.022			DPMS2S22	EWF1A122	QF1-127	1PB-S22
C80	.0022		DD-222		GP222	QC2-97	5GA-D22
C81	.022			DPMS2S22	EWF1A122	QF1-127	1PB-S22
C82	220		DD-221		GP322		10TS-T22
C83	.01			WMF1S1	EWF1A110	QF1-91	1PB-S10
C84	.0022		DD-222		GP222	QC2-97	5GA-D22
C88	68		DD-680	GP68	GP468		10TS-Q68
C89	68		DD-680	GP68	GP468		10TS-Q68
C90	100		DD-101	GP100	GP310		10TS-T10
C91	.068			WMF1S68	EWF1A168	QF1-195	1PB-S68
C92	100		DD-101	GP100	GP310		10TS-T10
C95	.068			WMF1S68	EWF1A168	QF1-195	1PB-S68
C102	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C106	.047		UK50-503		MAG5015		
C107	.047		UK50-503		MAG5015		
C110	18				CN0418		10TCC-Q18
C111	82		DD-820		GP482		10TS-Q82
C112	39				CN0439		10TCC-Q39
C113	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C114	390 500V		DD-391	GP390	GP339		10TS-T39
C117	.0047		DD-472	GP4700	GP247		5GA-D47
C118	.022		DC-253	MGP025	TA125		TG-S25
C123	.068			WMF1S68	EWF1A168	QF1-195	1PB-S68
C130	.0022		DD-222		GP222	QC2-97	5GA-D22
C131	39 N150				*		10TCP-Q39
C132	15 N150				*		10TCP-Q15
C133	.0022		DD-222		GP222	QC2-97	5GA-D22
C134	3		DTZ-3R3	NP03P3	CN0533		10TCC-V33
C135	220		DD-221		GP322		10TS-T22
C136	.0033			CD19FD332J03	SX233		MWC-332
C137	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C138	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C139	220		DD-221		GP322		10TS-T22
C141	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C142	100		DD-101	GP100	GP310		10TS-T10
C201	150			CD15FD151J03	SX315	QW1-31	MWA-151
C202	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C203	.01		DC-103	MGP01	TA110	QC2-141	TG-S10

PARTS LIST AND DESCRIPTION (CONTINUED)

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

CAPACITORS (cont)

ITEM No.	RATING	MFGR. PART No.	REPLACEMENT DATA				
			CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
						Q-LINE	GENERAL LINE
C204	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C205	.047		UK50-503		MAG5015		
C206	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C207	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C208	.0047		DD-472	GP4700	GP247		5GA-D47
C209	.0047		DD-472	GP4700	GP247		5GA-D47
C210	.0047		DD-472	GP4700	GP247		5GA-D47
C211	.0047		DD-472	GP4700	GP247		5GA-D47
C212	.0047		DD-472	GP4700	GP247		5GA-D47
C213	.0047		DD-472	GP4700	GP247		5GA-D47
C214	.0047		DD-472	GP4700	GP247		5GA-D47
CT1	20						
POWER SUPPLY BOARD							
C3	.022		DC-253	MGP025	TA125		TG-S25
C4	.01		DC-103	MGP01	TA110	QC2-141	TG-S10
C5	.047		UK50-503		MAG5015		
C6	.022		DC-253	MGP025	TA125		TG-S25

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

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

ITEM No.	FUNCTION	RESIST-ANCE	REPLACEMENT DATA			
			MFGR. PART No.	CENTRALAB PART No.	MALLORY PART No.	TRW PART No.
RV1a	Voltage	500		T-500	MTC52L1	X201R501B
RV1b	Squelch Range	10K		T-10K (3)	X201R103B (3)	MTC14L1 (3)
RV2	AMC	5000				U260R502B
RV3	S Meter	20K				U260R253B
RV4	RF Meter	20K				U260R253B
VR1	Volume/Power Switch	50K		F2-50K(1), SSK012,KR-2	RU54R,SL36,SL1500, US42,	BU1(1),CF63, SS1,WF
VR2	Squelch/PA Switch	10K				
VR3	RF Gain	100K				

(1) Enlarge mounting hole.
(3) For horizontal mounting, bend the two outside terminals to fit PC board. Use jumper to connect center terminal to PC board.

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA	
		WORKMAN PART No.	MFGR. PART No.
AREY251	Resistor Network		(1)

ITEM No.	RATING	REPLACEMENT DATA	
		WORKMAN PART No.	MFGR. PART No.
AREY252	Resistor Network		(1)

(1) Consists of seven 1800 Ohm Resistors.

COILS (RF-IF)

ITEM No.	FUNCTION	REPLACEMENT DATA			REMARKS
		PART No.	OTHER IDENTIFICATION	MILLER PART No.	
L1	VCO				
L2	VCO Mixer (38MHz)				
L3	RF Choke (68uH)				
L4	RF Choke (1uH)				
L5	XMT Osc. (27MHz)				
L6	RF Choke (2.2uH)				
L7	XMT Driver (27MHz)				
L8	RF Choke (68uH)				
L9	RF Choke (.55uH)				
L10	RF Choke (1uH)				
L11	Final (27MHz)				
L12	Pi Filter (27MHz)				
L13	RF Choke (.4uH)				
L14	IF (10.695MHz)				
L15	RF Choke (68uH)				
L16	RF Choke (.75uH)				
L17	RF Choke (.75uH)				
L201	RF Choke				
T1	Rec Osc (20.480MHz)				
T2	VCO Mixer (38MHz)				
T3	XMT Mixer (27MHz)				
T4	XMT Buffer (27MHz)				
T5	Rec Antenna (27MHz)				
T6	Rec RF (27MHz)				
T7	IF (10.695MHz)				
T8	IF (455kHz)				
T9	IF (455kHz)				
T10	IF (455kHz)				

PARTS LIST AND DESCRIPTION (CONTINUED)

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

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000~)	MFGR. PART No.	THORDARSON PART No.	TRIAD PART No.	
CH1	1.3A	.116	48mH	ELA-16 (1)	TR-523		(1) Number on unit.

TRANSFORMER (Power)

ITEM No.	RATING		REPLACEMENT DATA			NOTES
	PRI.	SEC. 1	MFGR. PART No.	THORDARSON PART No.	TRIAD PART No.	
PT	120V AC @ 420mA	17.40V AC @ 2.79A	TP-DP68V002Y(1)			(1) Number on unit.

TRANSFORMER (Audio Output)

ITEM No.	IMPEDANCE			REPLACEMENT DATA			NOTES
	PRI.	SEC.		MFGR. PART No.	THORDARSON PART No.	TRIAD PART No.	
T11	32	1 8	2 128	ETA-66(1)	TR723	MCB-16	(1) Number on unit.

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		MFGR. PART No.	QUAM PART No.	
SP	3" PM 8 Ohms		30A05Z8R	

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
F1a F1b F2	.75A 2.5A Pigtail 2A			AGC 3/4 GJV 2 1/2 AGC2	HKP HDJ	312.750 31802.5 312002	342001A 150145	 FG2-2

MICROPHONE

ITEM No.	REPLACEMENT DATA				CONNECTION DATA						
	MFGR. PART No.	GC PART No.	GC NOISE CANCEL	GC POWER	GC CONNECTOR	GC Red	GC Shield	GC Yellow	GC Blue	GC White	GC Black
Mic		18-032	18-034	18-010	18-092	1	2	4	3	NC	2

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
CF1	Ceramic Filter		455kHz
CR1	Component Combination		AC Isolation
LED301	LED		Channel Display
M1	Meter		S/RF
PL1	Lamp		Meter (5.46V @ 50mA)
PL2	Lamp		RX (4.75V @ 32mA)
PL3	Lamp		TX (4.73V @ 32mA)
S1	Switch		Power (Part of Volume Control)
S2	Switch		Delta Tune
S3	Switch		ANL
S4	Switch		NB
S5	Switch		Tone
S6	Switch		CB/PA
SW1	Switch		Channel Selector
X1	Crystal		10.240MHz
X2	Crystal		10.695MHz