

SERVICE MANUAL

B R O W N I E

23 CHANNEL

SOLID STATE CITIZENS BAND

AM TRANSCEIVER

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1. TRANSMITTER ALIGNMENT

1.1 TX Oscillator performance check.

- A. Disconnect TP10 and connect a frequency counter to TP7-TP9.
- B. Press the mike button. Frequency should be 7.800 MHz  $\pm$ 400 Hz.

TABLE I

<u>Location</u>	<u>RF Voltage</u>	<u>DC Voltage</u>
Q9 Base	8.4V PP	2.6 V
Q9 Collector	-	8.2 V
Q9 Emitter	6.4V PP	3.0 V

1.2 Mixer Stage Alignment.

- A. Disconnect TP10 and connect oscilloscope TP8-TP9.
- B. Rotate the channel switch to channel 11.
- C. Press the mike button and adjust transformers T9, T10 and T11 for maximum indication on the oscilloscope.

TABLE II

<u>Location</u>	<u>RF Voltage</u>	<u>DC Voltage</u>
Q10 Base	0.2V PP	0.75 V
Q10 Collector	2.4V PP	9.4 V
TP8	0.25V PP	0.58 V

1.3 RF Amplifier Alignment

- A. Connect a 50 ohm wattmeter to antenna jack.
- B. Connect TP10.
- C. Press the mike button and adjust transformer and coils T12, L3, L5 for maximum output.

1. TRANSMITTER ALIGNMENTTABLE III

<u>Location</u>	<u>RF Voltage</u>	<u>DC VOLTAGE</u>
Q11 Base	0.25V PP	0.58V
Q11 Collector	4.8 V PP	11.6 V
Q12 Base	23V PP	0 V
Q12 Collector	0 PP	11.4 V
Q12 Emitter	20V PP	0.07V
Q13 Base	3.8 V PP	-0.6 V
Q13 Collector	50V PP	11.4 V

## 1.4 Modulation Performance Check

- A. Connect an oscilloscope across the 50 ohm dummy load.
- B. Connect an audio generator to the microphone input circuit. Inject the frequency of 1 KHz.
- C. Adjust the audio generator output level 1.5 millivolts modulation should be approx. 100%.

TABLE IV

<u>Location</u>	<u>AF Voltage</u>	<u>DC Voltage</u>
Mike jack	1.5mV PP	
Q16 Base	1.3mV PP	0.6V
Q16 Collector	18mV PP	6.8V
Q16 Emitter	0mV PP	0.03V
Q17 Base	1.6mV PP	0.6V
Q17 Collector	35mV PP	5.2V
Q18 Base	30mV PP	0.63V
Q18 Collector	4V PP	9.0V
Q19 20 Base	0.8V PP	0.58V
Q19 20 Collector	8.7V PP	13.5V
Q19 20 Emitter	0mV PP	0.01V

## 1.5 RF Meter Alignment

- A. Connect a 50 ohm wattmeter to the antenna jack.
- B. Press the mike button.
- C. Adjust R3 for 4 watts indication on RF meter.

2. RECEIVER ALIGNMENT

## 2.1 Receiver Performance Check

- A. Connect the RF signal generator to the antenna jack. Set the generator output at 1 microvolt, 1 KHz 30% modulation.
- B. Connect the 8 ohm load with audio wattmeter to external speaker jack.
- C. Rotate the volume control to the maximum clockwise position and the squelch control to the maximum counter-clockwise position.
- D. Set the channel selector switch to channel 11 and the signal generator to 27.085 MHz.
- E. Audio output power should be more than 1 watt.
- F. Adjust the volume control for 1W (or 0.775 volt) indication on the audio wattmeter. Remove the modulation from the signal generator. Indication on the audio wattmeter should drop 10 db. or more.

## 2.2 Receiver Alignment

The following TABLE V provided to aid the alignment of the receiver section.

TABLE V

<u>Alignment</u>	<u>Generator Frequency &amp; Output Level</u>	<u>Generator Connection</u>	<u>Adjustment</u>	<u>Voltmeter Connection</u>	<u>Adjust For</u>
2nd IF stage	455 KHz (10uV)	TP1 - to ground	T4, 5	EXT SP Jack	MAX
1st IF stage	7.8 MHz (3uV)	Q1 Base - to ground	T2, 3	EXT SP Jack	MAX
RF Stage	27 MHz (1uV)	Ant. jack	L4, T1	EXT SP Jack	MAX

## 2.3 Receiver Transistors Voltage

TABLE VI

	<u>Q1</u>	<u>Q2</u>	<u>Q3</u>	<u>Q4</u>
Base	1.85V	2.05V	0.65V	2.15V
Collector	8.0 V	8.2 V	2.15V	8.4 V
Emitter	1.4 V	1.65V	0 V	1.5 V

All voltages are measured with a 100K ohm voltmeter at no output of signal generator.

## 2.4 2nd Local Oscillator Performance Check

- A. Connect a frequency counter to TP1 and this frequency should be 7.345MHz  $\pm$ 500 Hz.

TABLE VII

<u>Location</u>	<u>RF Voltage</u>	<u>DC Voltage</u>
Q8 Base	10V PP	2.9V
Q8 Collector	-	7.8V
Q8 Emitter	7V PP	3.2V

## 2.5 AGC Performance Check

- A. Connect the signal generator to the unit select channel 11 and adjust the signal generator for 1 microvolt output signal modulated to 30%.
- B. Increase the signal generator output to 10 millivolts.
- C. Adjust the volume control for 1 (or 0.775 volt) indication on the signal generator to 10 microvolts. The audio wattmeter should not drop more than 12 db.

## 2.6 S-Meter Alignment

- A. Connect the unit as described in step 2.5 and adjust the signal generator for 100 microvolts.
- B. Adjust R17 for S9 indication.

## 2.7 Squelch Performance Check

- A. Connect the unit as described in step 2.1.
- B. Rotate the squelch control until the signal has been just muted.
- C. Advance the signal generator output level until the squelch is broken. It should take less than 1 microvolt increase on the signal generator output to break the squelch.
- D. Rotate the squelch control to maximum clockwise position. Advance the signal generator output. Adjust R51 to break the squelch between the output of 30 and 100 microvolts.

## 2.8 Squelch Troubleshooting

TABLE IX is to be used as an aid in locating and correcting the troubles in the squelch circuitry.

TABLE IX

<u>Stage</u>	<u>Unsquelch</u>	<u>Full Squelch</u>
Q14 Base	0.28V	0.62V
Q14 Collector	0.62V	0.02V
Q17 Collector	5.2 V	10.2 V

3. SYNTHESIZER ALIGNMENT

3.1 11 MHz Band Oscillator Performance Check.

- A. Connect a frequency counter to TP4-to ground.
- B. Rotate the channel switch to channel 1.
- C. Channel frequencies are listed in TABLE X.

TABLE X

<u>Channel</u>	<u>Frequency</u>
1	11.705 MHz
5	11.755 MHz
9	11.805 MHz
13	11.855 MHz
17	11.905 MHz
21	11.955 MHz

3.2 7 MHz Band Oscillator Performance Check.

- A. Connect a frequency counter to TP5 -to ground.
- B. Rotate the channel switch to channel 1.
- C. Channel frequencies are listed in TABLE XI.

TABLE XI

<u>Channel</u>	<u>Frequency</u>
1	7.460 MHz
2	7.470 MHz
3	7.480 MHz
4	7.500 MHz

3.3 Oscillator Troubleshooting

- A. Locating a problem in oscillator circuitry of the unit, use the measurement in TABLE XII.

TABLE XII

<u>Location</u>	<u>RF Voltage</u>	<u>DC Voltage</u>
Q5 Base	8V PP	3.8V
Q5 Collector	-	8.0V
Q5 Emitter	6V PP	3.8V
Q6 Base	11V PP	3.2V
Q6 Collector	-	8.0V
Q6 Emitter	8V PP	3.6V

### 3.4 Mixer Stage Alignment

- A. Connect oscilloscope to TP6-TP9. Set the channel switch at channel 11.
- B. Adjust transformer T6, T7 and T8 for maximum indication on the oscilloscope.

TABLE XIII

<u>Location</u>	<u>RF Voltage</u>	<u>DC Voltage</u>
Q7 Base	0.4V PP	0.58V
Q7 Collector	2.5V PP	10.4 V
TP6	0.6V PP	-

### 3.5 Frequency Synthesis.

- A. If there were no synthesizer output on some channel, refer to TABLE XIII.



TABLE XIV

CHANNEL	(FO) Frequency (MHz)											RX OSC	TX OSC
		X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
		11.705 MHz	11.755 MHz	11.805 MHz	11.855 MHz	11.905 MHz	11.955 MHz	7.460 MHz	7.470 MHz	7.480 MHz	7.500 MHz	7.345 MHz	7.800 MHz
1	26.965	0						0				0	0
2	26.975	0							0			0	0
3	26.985	0								0		0	0
4	27.005	0									0	0	0
5	27.015		0					0				0	0
6	27.025		0						0			0	0
7	27.035		0							0		0	0
8	27.055		0								0	0	0
9	27.065			0				0				0	0
10	27.075			0					0			0	0
11	27.085			0						0		0	0
12	27.105			0							0	0	0
13	27.115				0			0				0	0
14	27.125				0				0			0	0
15	27.135				0					0		0	0
16	27.155				0						0	0	0
17	27.165					0		0				0	0
18	27.175					0			0			0	0
19	27.185					0				0		0	0
20	27.205					0					0	0	0
21	27.215						0	0				0	0
22	27.225						0		0			0	0
23	27.255						0				0	0	0

4. SIGNAL FLOWRECEIVER SIGNAL FLOW

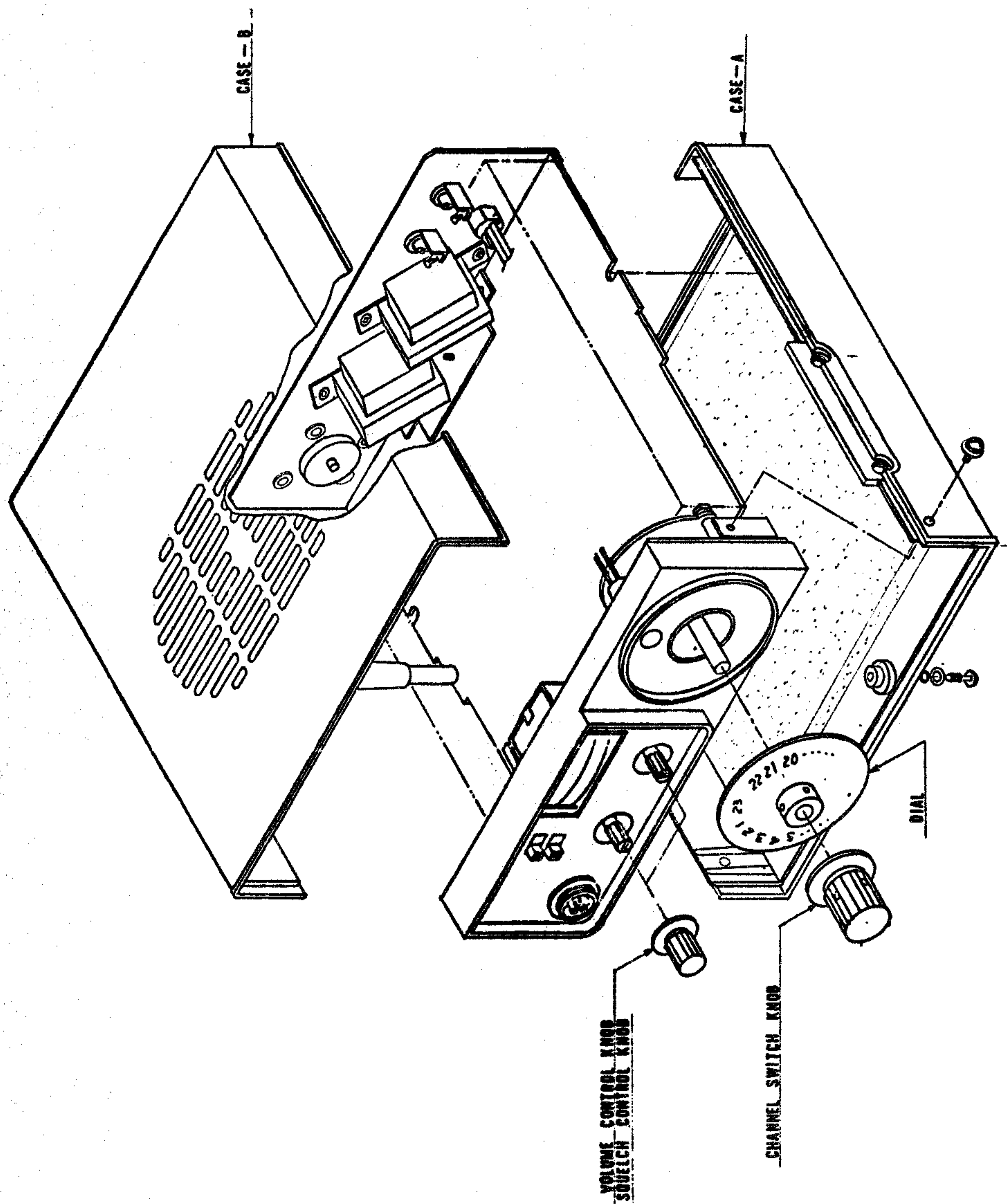
CD2, CD 3	RF Switch	27 MHz
Synthesizer	1st Local	19.2 MHz
Q1	1st Mixer	7.8 MHz
Q8	2nd Local	7.345 MHz
Q2	2nd Mixer	455 KHz
Q3	2nd IF Amp.	455 KHz
Q4	2nd IF Amp.	455 KHz
CD4	Detector	Audio
CD5	ANL	Audio
Q17	Audio Amp.	Audio
Q18	Audio Amp.	Audio
Q19, Q20	Audio PA	Audio
Q14	Squelch Amp.	DC

TRANSMITTER SIGNAL FLOW

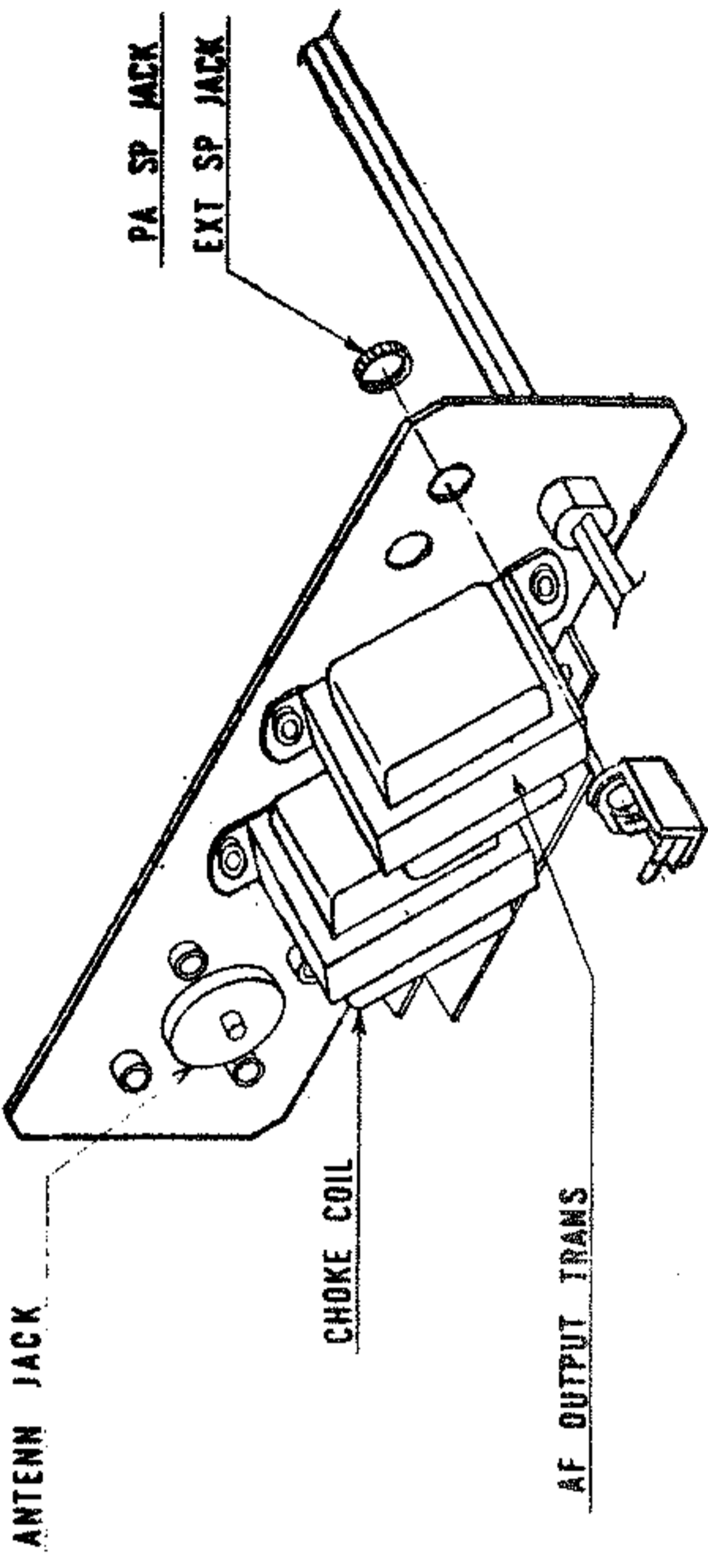
Q9	TX. Oscillator	7.8 MHz
Synthesizer	TX. Local	19.2 MHz
Q10	TX. Mixer	27 MHz
Q11	RF Amp.	27 MHz
Q12	RF Driver	27 MHz
Q13	RF PA	27 MHz
CD1	RF Meter det.	DC
Q16	Audio Amp.	Audio
Q17	Audio Amp.	Audio
Q18	Audio Amp.	Audio
Q19, Q20	Modulator	Audio

SYNTHESIZER SIGNAL FLOW

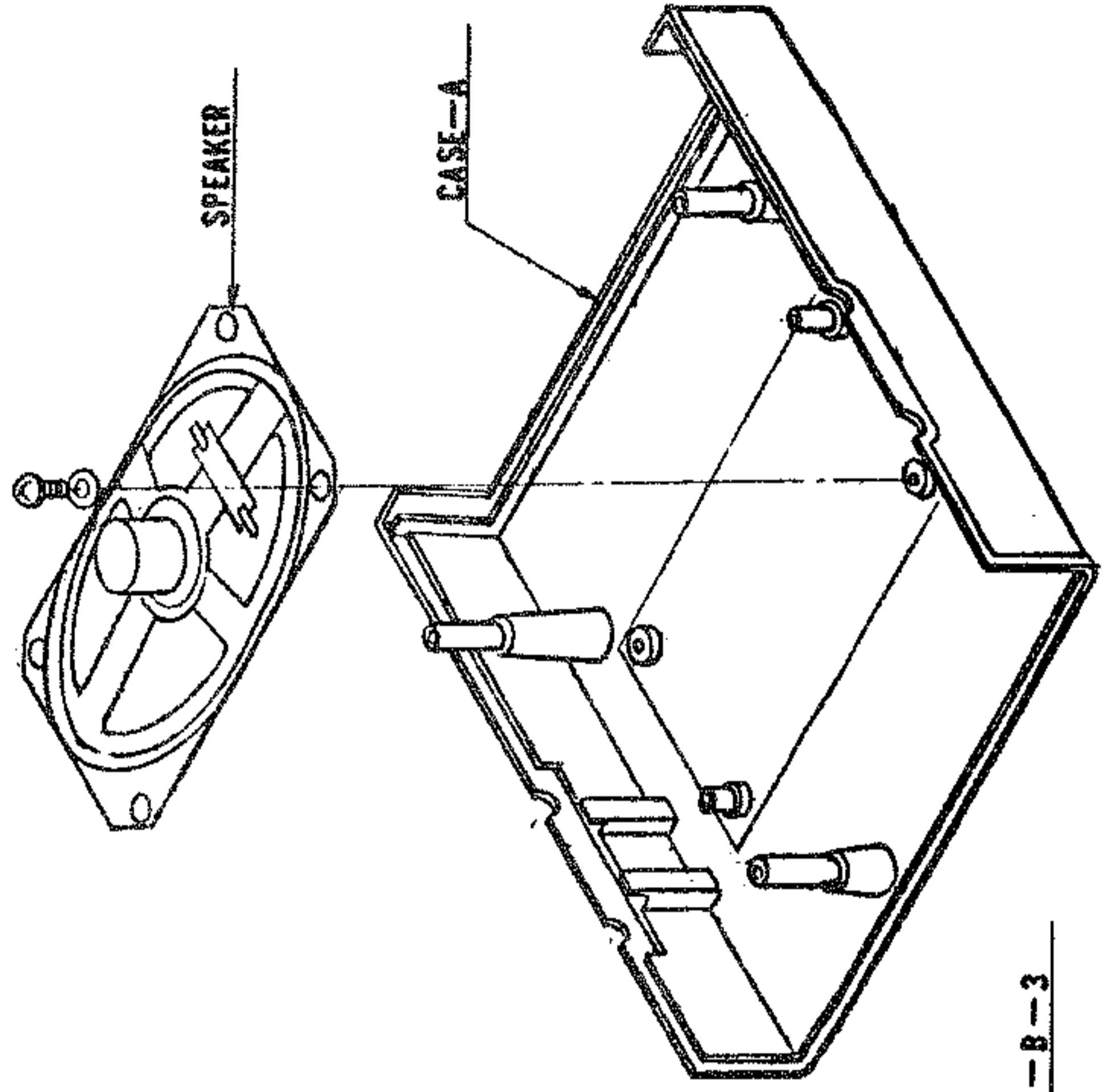
Q5	Oscillator	11 MHz
Q6	Oscillator	7 MHz
Q7	Mixer	19.2 MHz



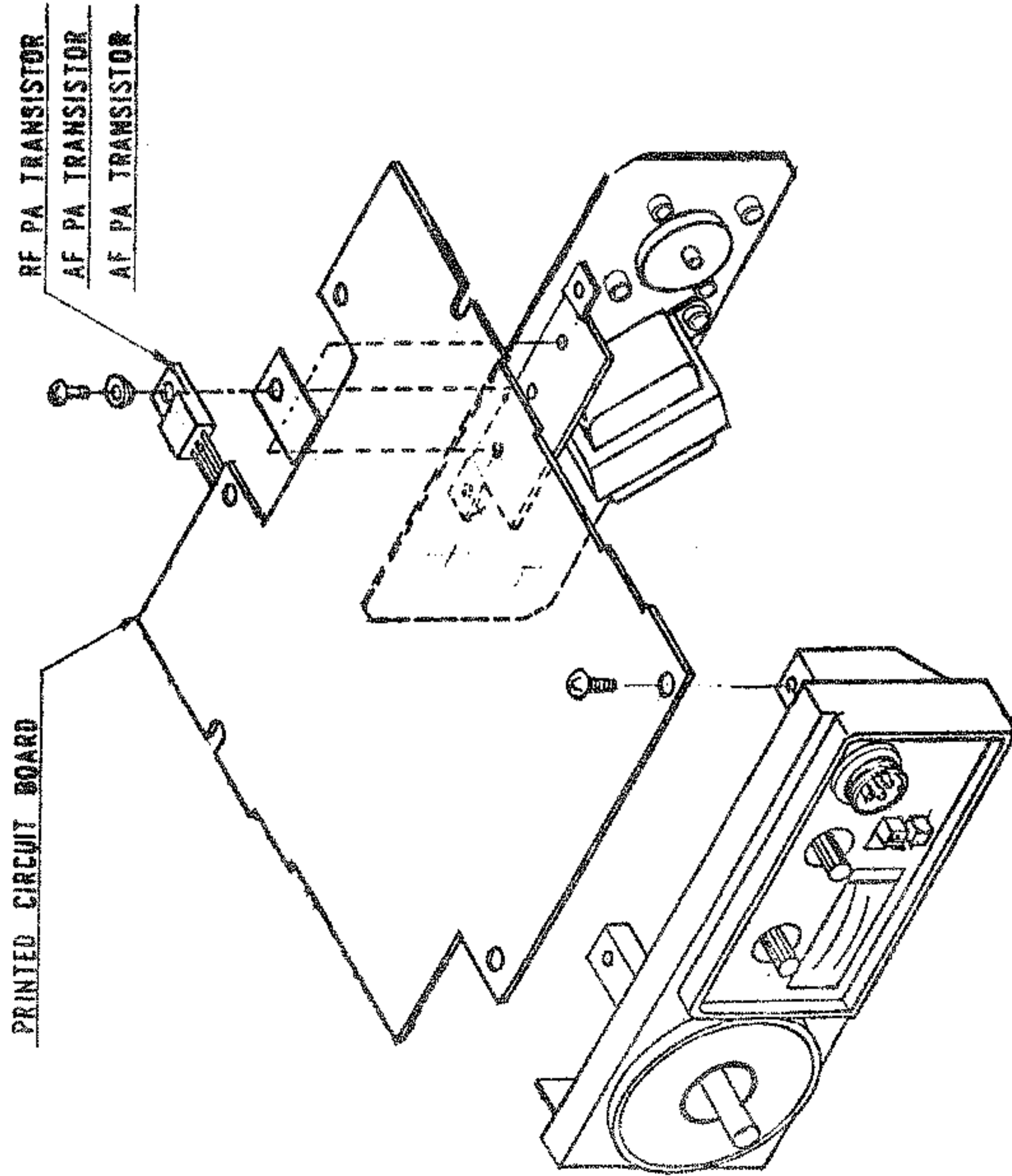
DISASSEMBLY -- A



DISASSEMBLY - B - 2

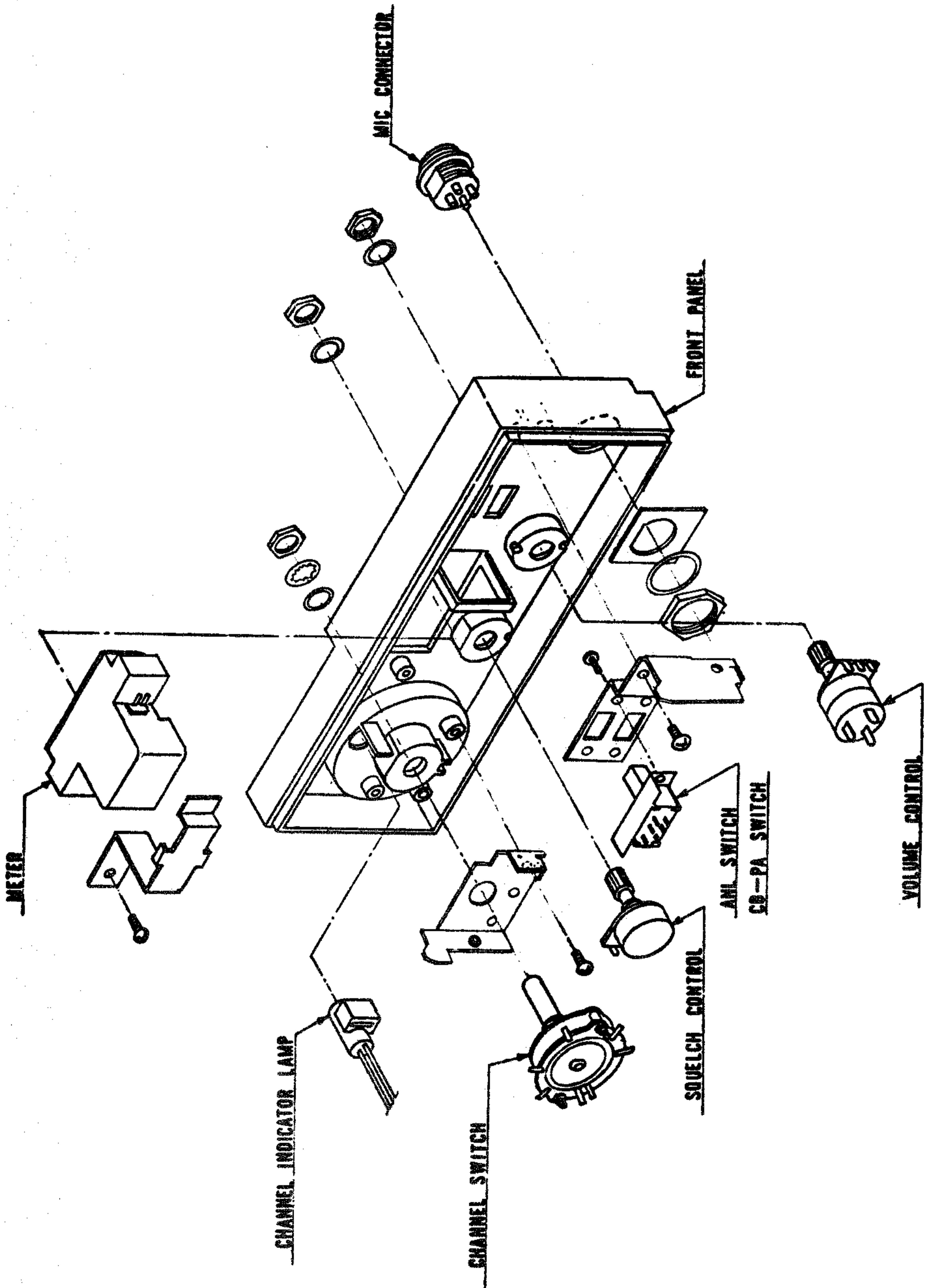


DISASSEMBLY - B - 3

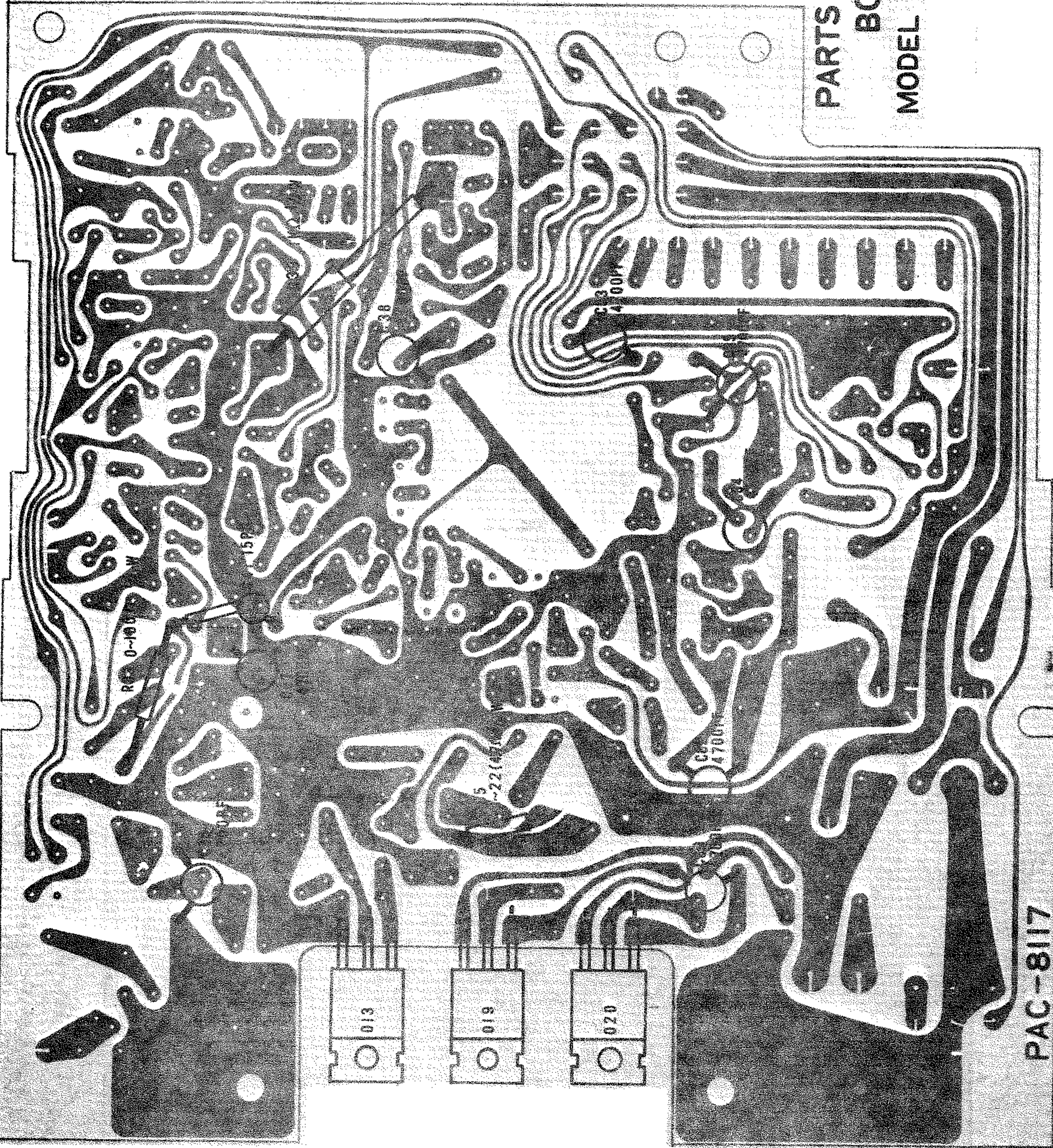


DISASSEMBLY - B - 1

DISASSEMBLY - B

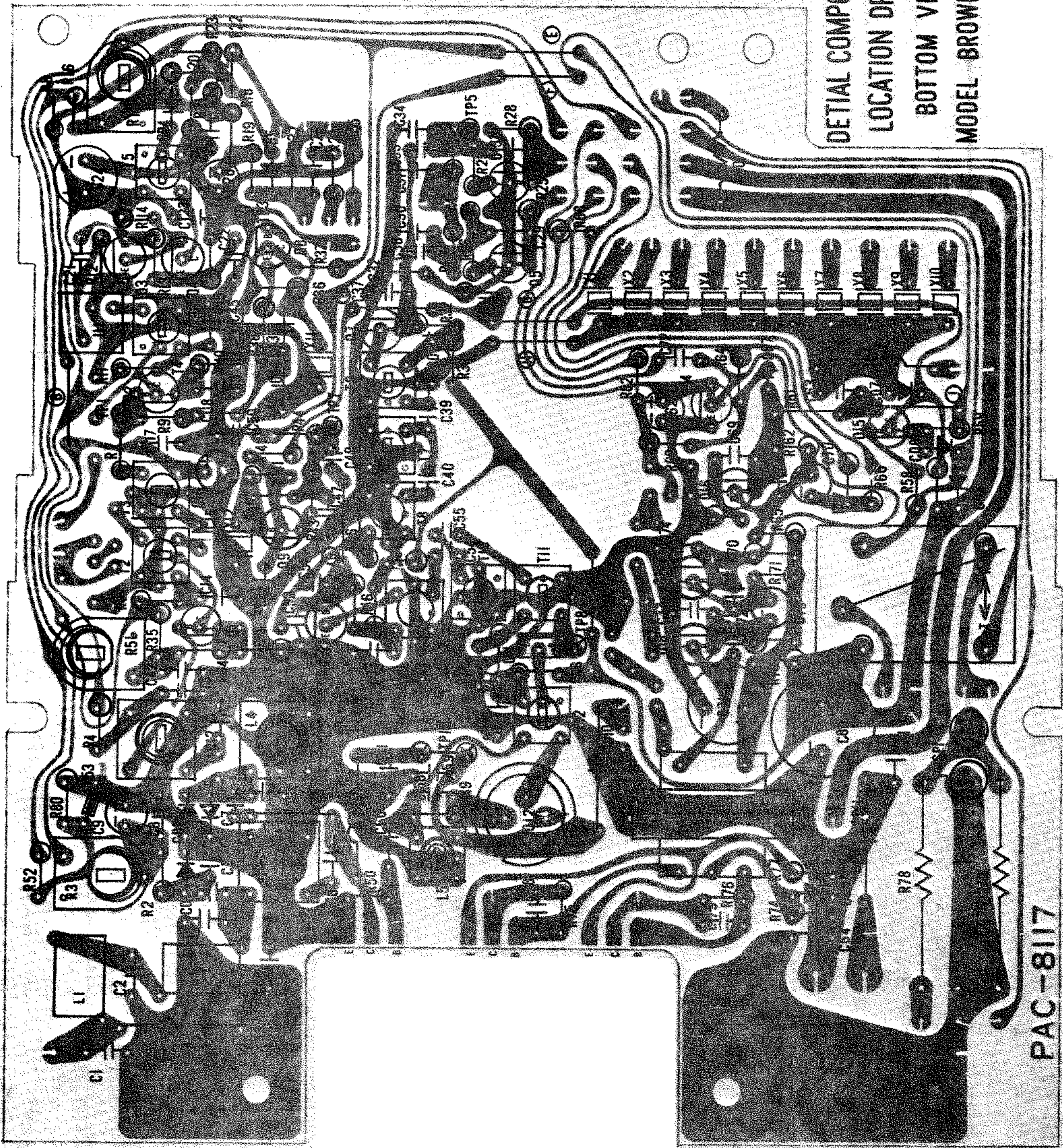


**DISASSEMBLY -- C**



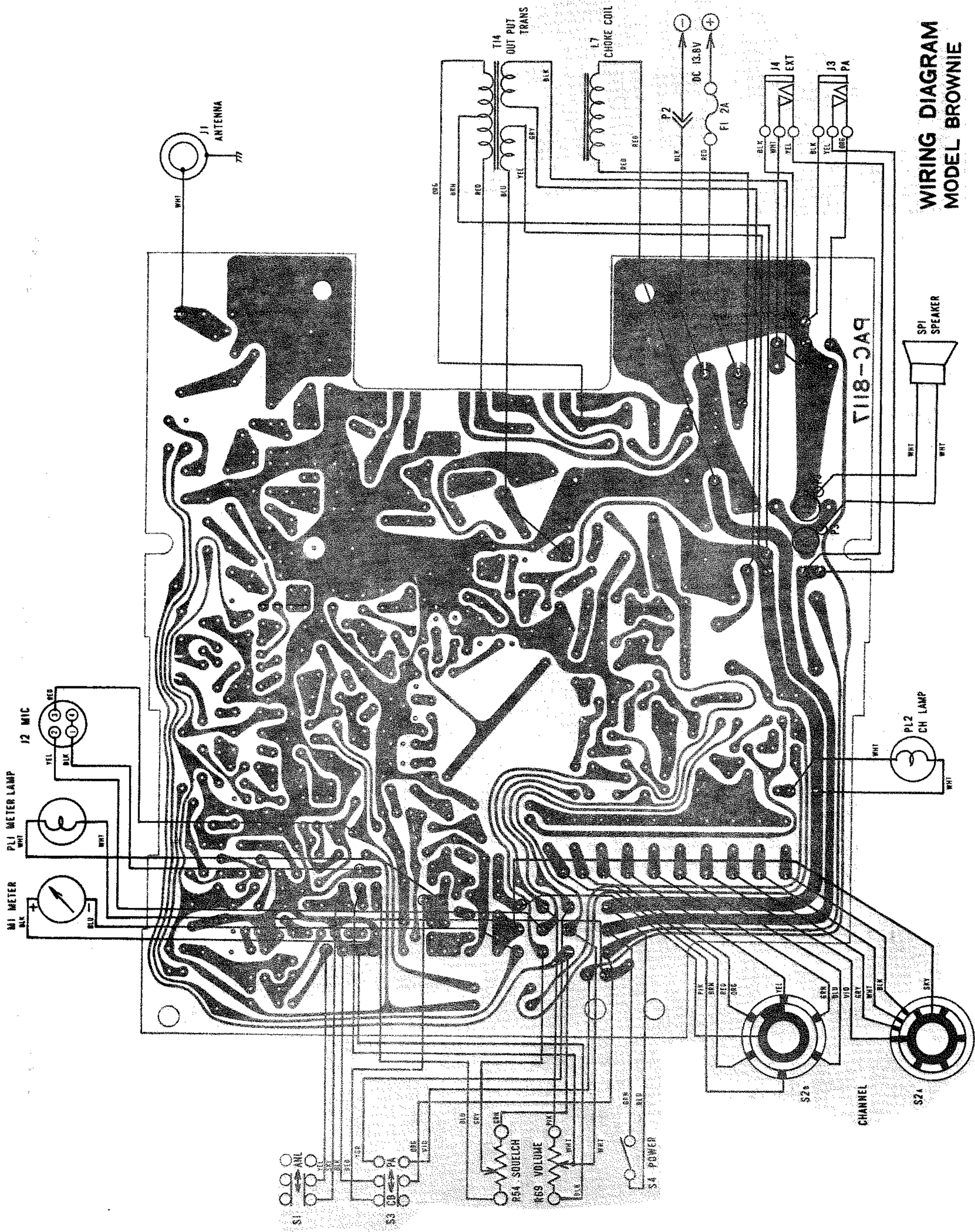
PARTS ON  
BOTTOM SIDE  
MODEL BROWNIE

PAC-8117



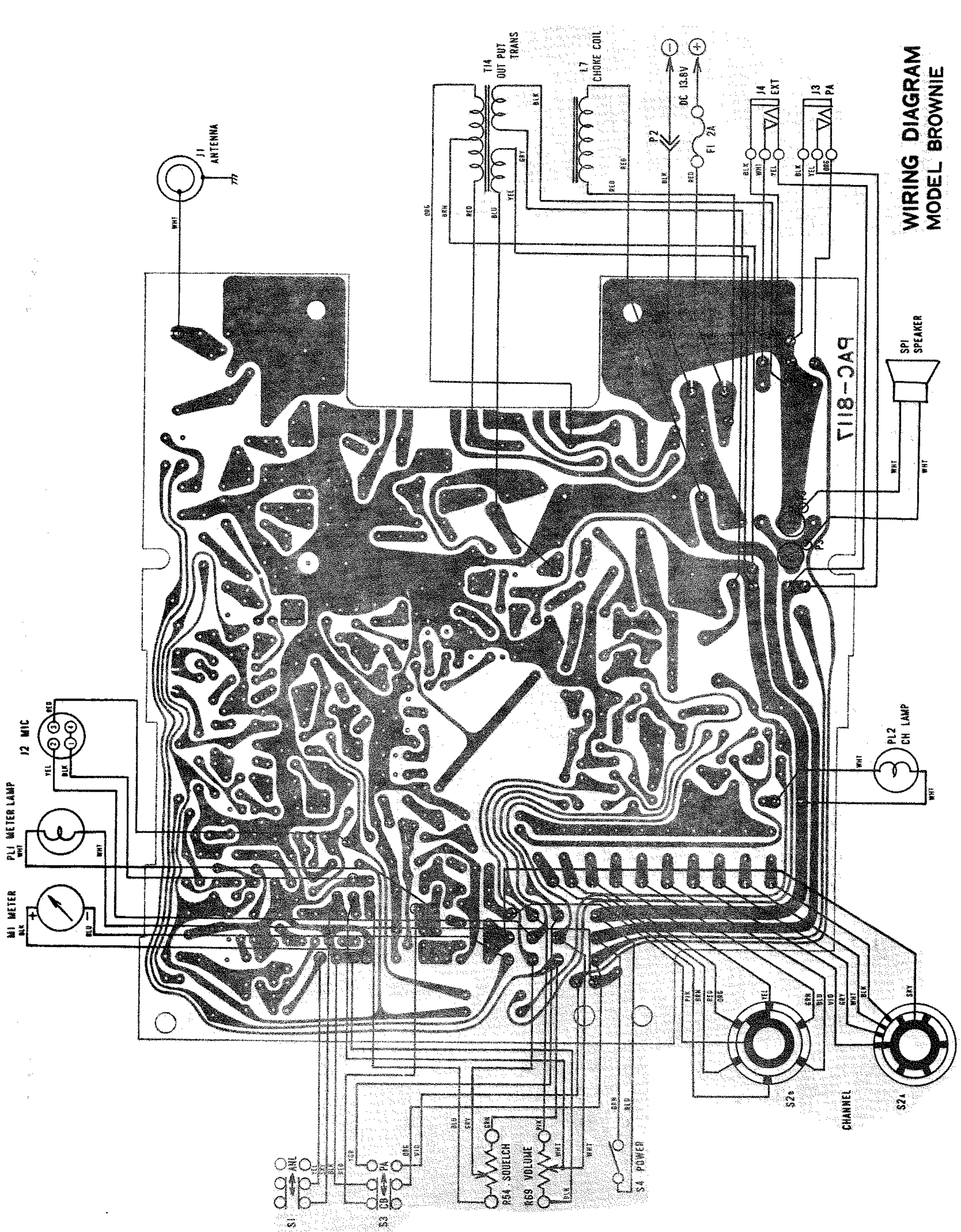
DETAIL COMPONENT  
LOCATION DRAWING  
BOTTOM VIEW  
MODEL BROWNIE

PAC-8117

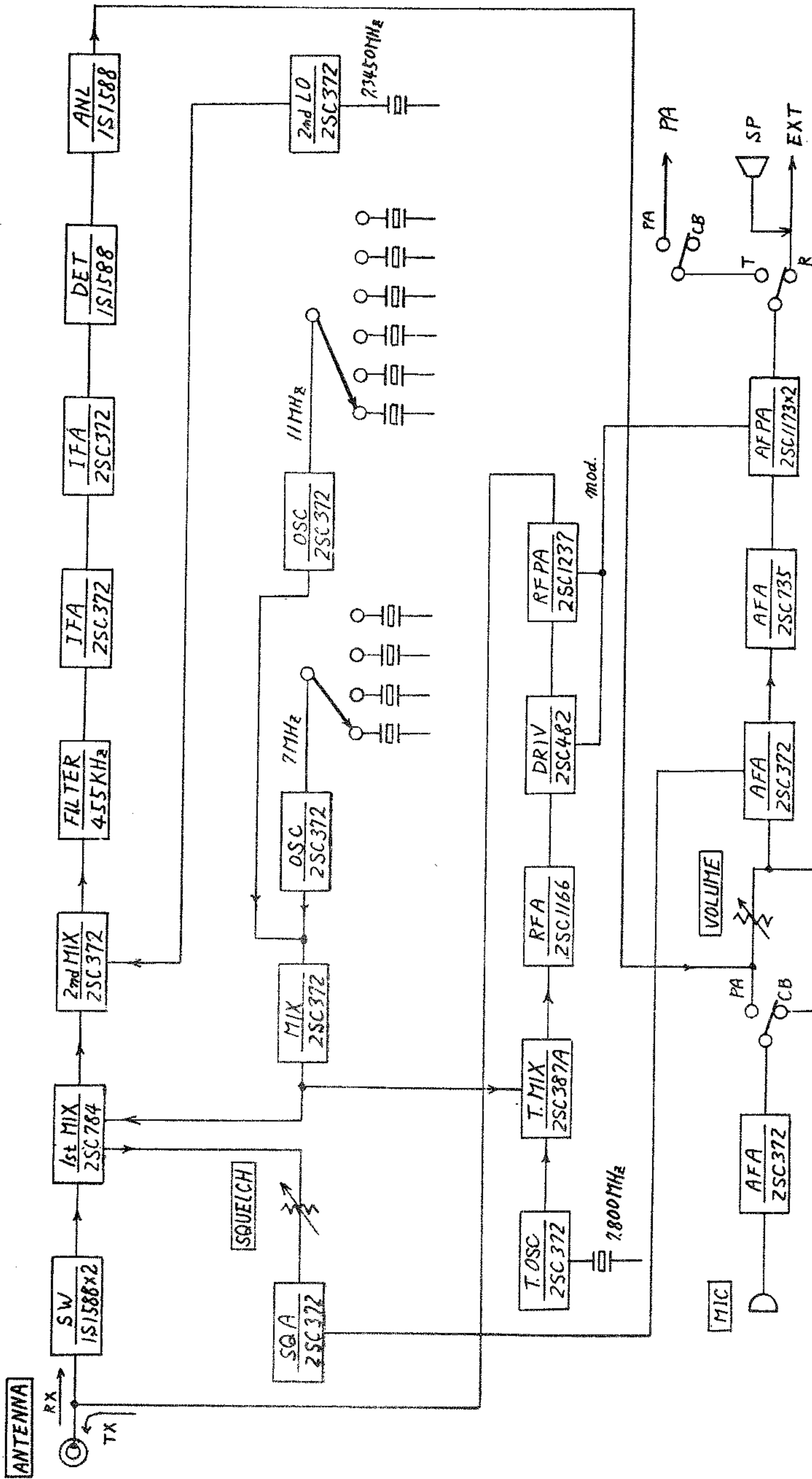


WIRING DIAGRAM  
MODEL BROWNIE





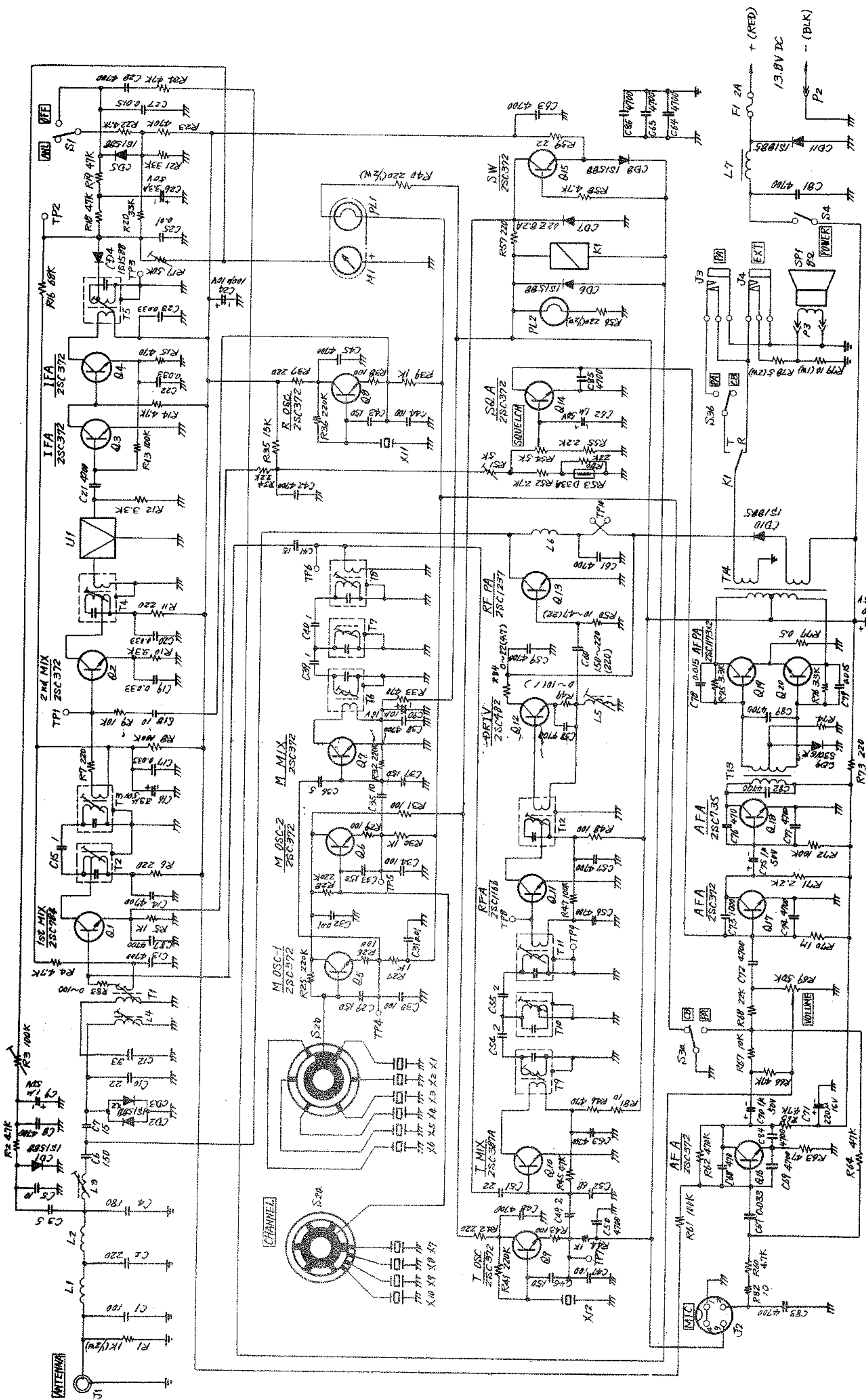
**WIRING DIAGRAM  
 MODEL BROWNIE**



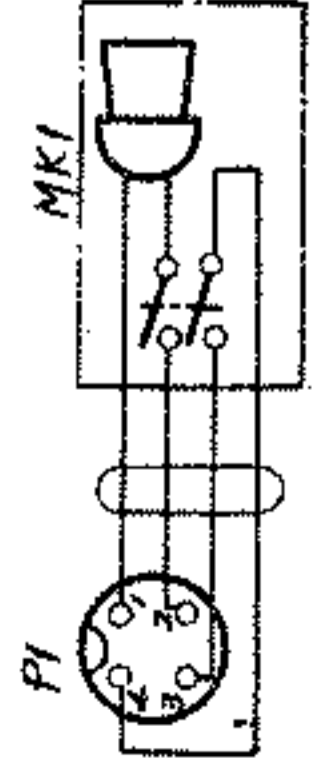
# BLOCK DIAGRAM

## MODEL BROWNIE

# SCHEMATIC DIAGRAM MODEL BROWNIE



**NOTE**  
 All resistors are in ohms and 1/4 W unless otherwise noted.  
 All ceramic capacitors indicated as 4700 etc. are in pF.  
 All mylar film capacitors indicated as 0.033, etc. are in pF.



BROWNING LABORATORIES, INC.

LACONIA, N. H.

BROWNIE PARTS AND PRICE LIST

<u>Schematic Location</u>	<u>Stock No.</u>	<u>Description</u>	<u>RETAIL</u>	<u>DEALER</u>
<u>CAPACITORS</u>				
All ceramic capacitors are <u>+10%</u> , 50V DC				
All mylar-film capacitors are <u>+20%</u> , 50V DC				
All Electrolytic capacitors are <u>+100, -10%</u>				
C15,39,40	26036023	Ceramic SL 1PF	\$ .20	\$ .12
C11,54,55	26036002	Ceramic SL 2PF	.20	.12
C49	26036003	Ceramic SL 3PF	.20	.12
C3,35,36	26036004	Ceramic SL 5PF	.20	.12
C5,18	26036030	Ceramic SL 10PF	.20	.12
C7	26036048	Ceramic N220 15PF	.20	.12
C51	26036005	Ceramic SL 22PF	.20	.12
C10	26036049	Ceramic N220 22PF	.20	.12
C12	26036024	Ceramic N220 33PF	.20	.12
C52	26036011	Ceramic SL 68PF	.20	.12
C1,30,34,44,47	26036006	Ceramic SL 100PF	.20	.12
C6,29,33,37, 43,46	26036025	Ceramic SL 150PF	.20	.12
C2,4,60	26036029	Ceramic SL 220PF	.20	.12
C68,73	26034022	Ceramic Y5R 470PF <u>+20%</u>	.20	.12
C76	26034024	Ceramic Y5R 1000PF <u>+20%</u>	.20	.12
C8,13,14,21, 28,38,41,42, 45,48,50,53, 56-59,61,63, 64,69,72,74, 77,81	26034021	Ceramic Y5R 4700PF <u>+20%</u>	.20	.12
C25,31,32	26037005	Mylar-film 0.01uF	.20	.12
C27,78,79	26037008	Mylar-film 0.015uF	.20	.12
C17,19,20, 22,23	26037001	Mylar-film 0.033uF	.20	.12
C9,62,67,70,75	26043027	Electrolytic 1u 50V	.23	.14
C16,26	26043028	Electrolytic 3.3u 50V	.30	.18
C24	26043036	Electrolytic 100u 10V	.37	.22
C71	26043035	Electrolytic 100u 16V	.47	.28
C80	26043045	Electrolytic 220u 25V	.77	.46

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Brownie parts and price list

<u>Schematic Location</u>	<u>Stock No.</u>	<u>Description</u>	<u>RETAIL</u>	<u>DEALER</u>
<u>RESISTORS</u>				
All resistors are 1/4W, <u>+10%</u> unless otherwise noted.				
R77	26054035	Carbon fixed 0.5ohm	\$ .20	\$.12
R49	26054090	Carbon fixed 4.7ohm	.20	.12
R81,82	26054087	Carbon fixed 10 ohm	.20	.12
R50,59	26054054	Carbon fixed 22 ohm	.20	.12
R63	26054055	Carbon fixed 47 ohm	.20	.12
R74	26054085	Carbon fixed 82 ohm	.20	.12
R26,29,31,38, 43,48	26054048	Carbon fixed 100 ohm	.20	.12
R6,7,11,37,42, 57,73	26054042	Carbon fixed 220 ohm	.20	.12
R15,33,46	26054065	Carbon fixed 470 ohm	.20	.12
R5,27,30,44	26054060	Carbon fixed 1K ohm	.20	.12
R34,55,71	26054068	Carbon fixed 2.2K ohm	.20	.12
R52	26054069	Carbon fixed 2.7K ohm	.20	.12
R10,12,75,76	26054070	Carbon fixed 3.3K ohm	.20	.12
R2,4,14,22,58, 60,65	26054071	Carbon fixed 4.7K ohm	.20	.12
R9,67	26054074	Carbon fixed 10K ohm	.20	.12
R35	26054075	Carbon fixed 15K ohm	.20	.12
R68,80	26054076	Carbon fixed 22K ohm	.20	.12
R20,21	26054077	Carbon fixed 33K ohm	.20	.12
R18,19,24,45, 47,64,66	26054078	Carbon fixed 47K ohm	.20	.12
R16	26054079	Carbon fixed 68K ohm	.20	.12
R8,13,32,61,72	26054080	Carbon fixed 100K ohm	.20	.12
R25,28,36,41	26054082	Carbon fixed 220K ohm	.20	.12
R23,62	26054084	Carbon fixed 470K ohm	.20	.12
R70	26054091	Carbon fixed 1M ohm	.20	.12
R78	26050001	Metal film 5 ohm 2W	.43	.26
R79	26050002	Metal film 10 ohm 1W	.43	.26
R40,56	26056016	Solid type 220 ohm 1/2W	.20	.12
R39	26056017	Solid type 1K ohm 1/4W	.20	.12
R1	26056010	Solid type 1K ohm 1/2W	.20	.12
R51	26061064	Semi-fixed (Pot.) 5K ohm	.93	.56
R17	26061078	Semi-fixed (Pot.) 50K ohm	.93	.56
R3	26061066	Semi-fixed (Pot.) 100K ohm	.93	.56
R54	26061085	Variable 5K ohm	1.60	.96
R69	26061086	Variable with IC-2P switch 50K ohm	2.97	1.78
R53	26069002	Thermistor D33A	.20	.12

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BROWNIE PARTS AND PRICE LIST

<u>Schematic Location</u>	<u>Stock No.</u>	<u>Description</u>	<u>RETAIL</u>	<u>DEALER</u>
<u>DIODES AND TRANSISTORS</u>				
CD1-6, 8	26010057	1S1588	\$ .35	\$ .20
CD7	26010044	02Z8.2A	1.10	.65
CD9	26010032	S3016R	.35	.20
CD10,11	26010033	1S1885	.75	.45
Q1	26010026	2SC784-R	1.00	.60
Q2-9,14-17	26010020	2SC372-Y	.65	.40
Q10	26010056	2SC387A	1.15	.70
Q11	26010041	2SC1166-Y	1.50	.90
Q12	26010058	2SC482-GR	2.15	1.30
Q13	26010043 <sup>53</sup>	2SC1237	5.40	3.25
Q18	26010021	2SC735-0	.85	.50
Q19,20	26010059	2SC1173-Y	2.15	1.30
<u>COILS, CHOKES AND TRANSFORMERS</u>				
L1,2	26025071	RF Coil L1904	1.33	.80
L3	26025051	RF Coil L1793	1.33	.80
L4	26025076	RF Coil L2038	1.33	.80
L5	26025074	RF Coil L2066	1.33	.80
L6	26025075	RF Choke L2067	1.33	.80
L7	26025073	AF Choke	3.58	2.15
T1	26025076	RF Transformer L2038	1.38	.80
T2	26025042	RF Transformer L1786	1.33	.80
T3	26025047	RF Transformer L1788	1.33	.80
T4	26027016	IF Transformer D10766	1.33	.80
T5	26027008	IF Transformer D10753	1.33	.80
T6	26025077	RF Transformer L2063	1.33	.80
T7,8	26025049	RF Transformer L1784	1.33	.80
T9	26025078	RF Transformer L2064	1.33	.80
T10-12	26025079	RF Transformer L2065	1.33	.80
T13	26022010	AF Driver Transformer	1.90	1.15
T14	26023016	AF Output Transformer	4.73	2.84
<u>CONNECTORS AND SWITCHES</u>				
J1	26016024	Antenna Jack SO239	4.73	2.84
J2	26016044	Microphone Jack	4.03	2.42
J3,4	26016013	SP and PA Jack	1.06	.64
J5	26016050	SP Pin	.20	.12
P1	26016045	Microphone plug	5.43	3.26
P3	26074095	SP Plug	.20	.12
S1,3	26014069	Slide Switch 2C-2P	1.57	.94
S2	26014071	Rotary Switch 24 step	11.57	6.94

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BROWNIE PARTS AND PRICE LIST

<u>Schematic Location</u>	<u>Stock No.</u>	<u>Description</u>	<u>RETAIL</u>	<u>DEALER</u>
<u>MISCELLANEOUS</u>				
F1	26014024	Fuse 2A	\$ .20	\$ .12
FS1	26016048	Fuse holder	1.23	.74
K1	26014070	Relay 1C-2P	5.97	3.58
M1	26019016	DC Ammeter 200uA	11.34	6.80
MK1	26015092	Dynamic microphone	15.00	8.00
MK1a	26081027	Microphone cabinet with PTT switch	6.53	3.92
MK1b	26015109	Microphone unit	8.87	5.32
MK1c	26017004	Microphone cord	2.10	1.26
MK1d	26086056	Microphone push button	.70	.42
PL2	26011010	Indicator lamp	2.10	1.26
SP1	26015280	Speaker 3.8" x 2.6" (8 ohm)	4.73	2.84
U1	26019007	Ceramic filter CFU455HA	8.40	5.04
W1	26017007	DC Power cord	2.30	1.38
X1	26015264	Crystal 11.705 MHz	6.65	4.00
X2	26015265	Crystal 11.755 "	6.65	4.00
X3	26015266	Crystal 11.805 "	6.65	4.00
X4	26015267	Crystal 11.855 "	6.65	4.00
X5	26015268	Crystal 11.905 "	6.65	4.00
X6	26015269	Crystal 11.955 "	6.65	4.00
X7	26015270	Crystal 7.460 "	6.65	4.00
X8	26015271	Crystal 7.470 "	6.65	4.00
X9	26015272	Crystal 7.480 "	6.65	4.00
X10	26015273	Crystal 7.500 "	6.65	4.00
X11	26015274	Crystal 7.345 "	6.65	4.00
X12	26015275	Crystal 7.800 "	6.65	4.00
	26086024	Knob for CH Sw.	3.20	1.92
	26086025	Knob for Vol. and SQ	2.06	1.24
	26082004	Dial (CH Ind.)	2.27	1.36
	26074097	Bracket	6.47	3.88