



**SERVICE  
MANUAL**

1200MHz FM TRANSCEIVER

**IC-12GAT  
IC-12GE**

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## INTRODUCTION

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This service manual describes the latest service information for the **IC-12GAT/GE 1200MHz FM TRANSCEIVER** at the time of going to press.

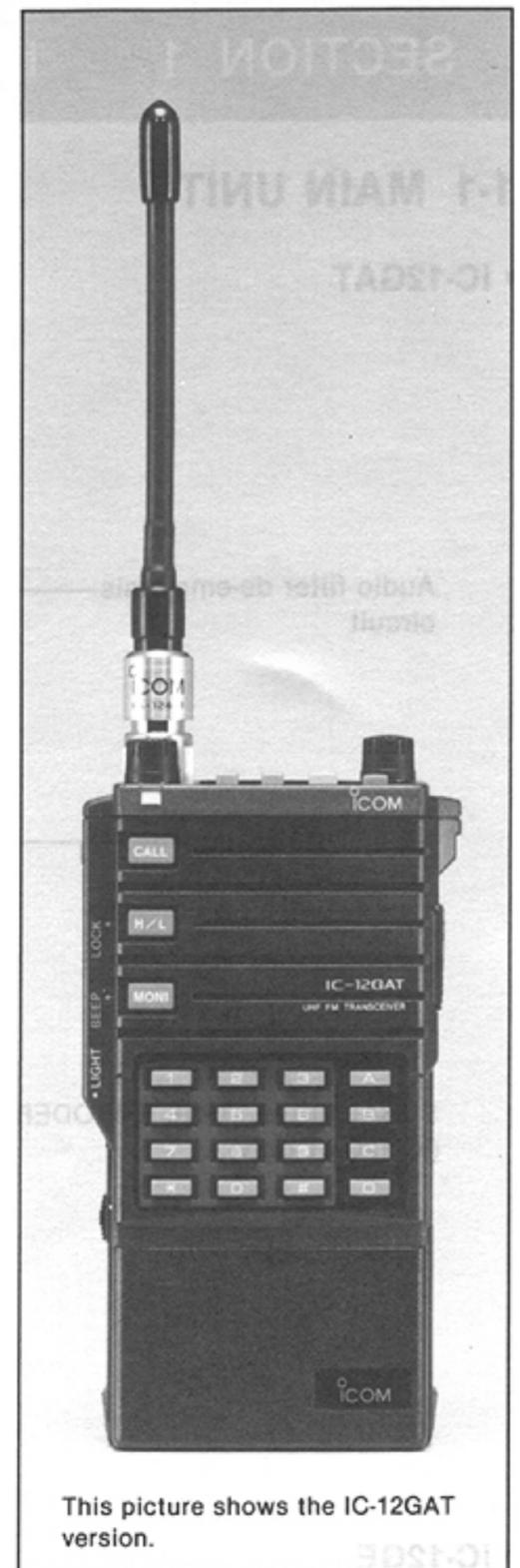
This service manual covers both the **IC-12GAT** and **IC-12GE**.

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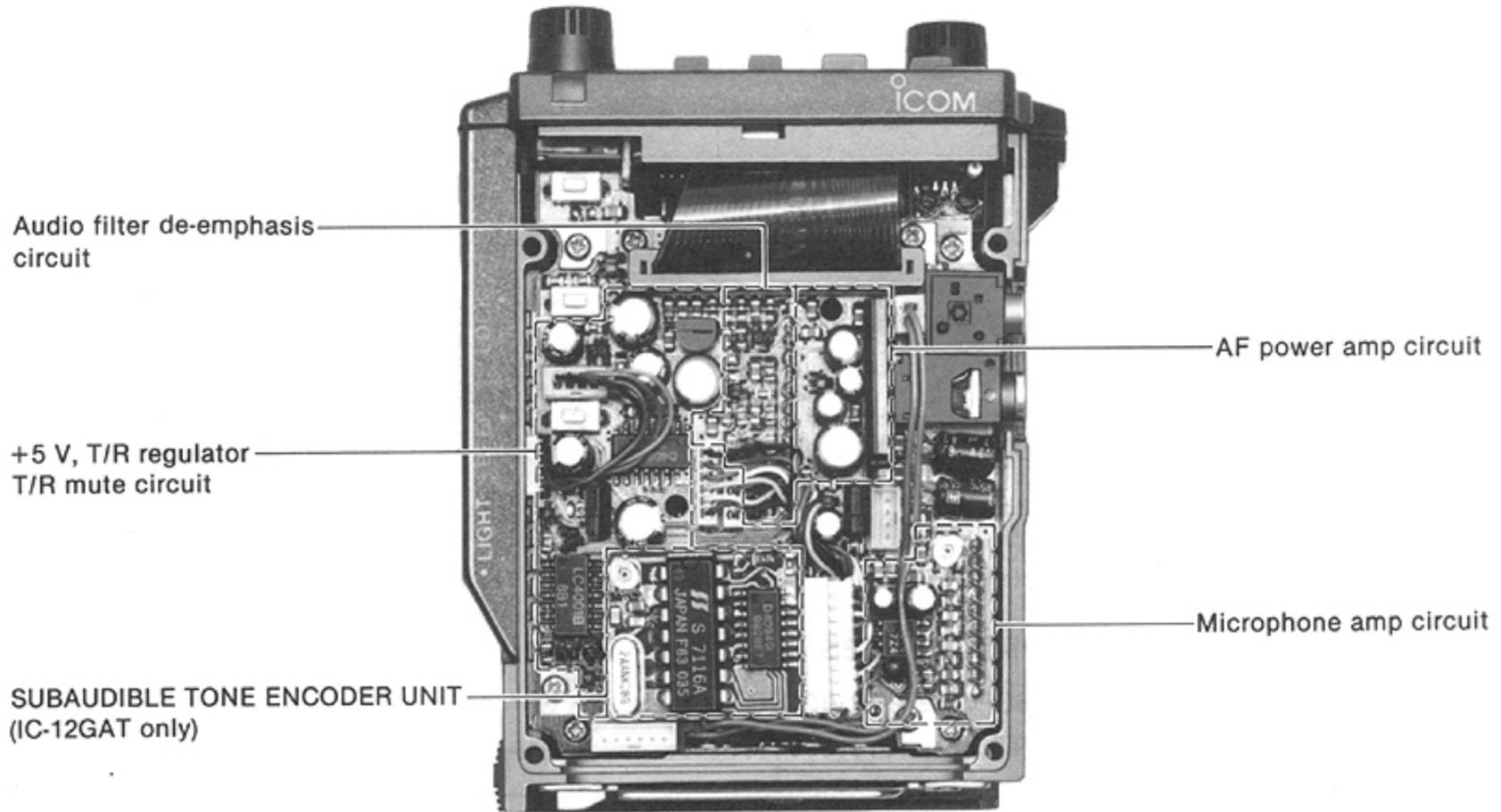


This picture shows the IC-12GAT version.

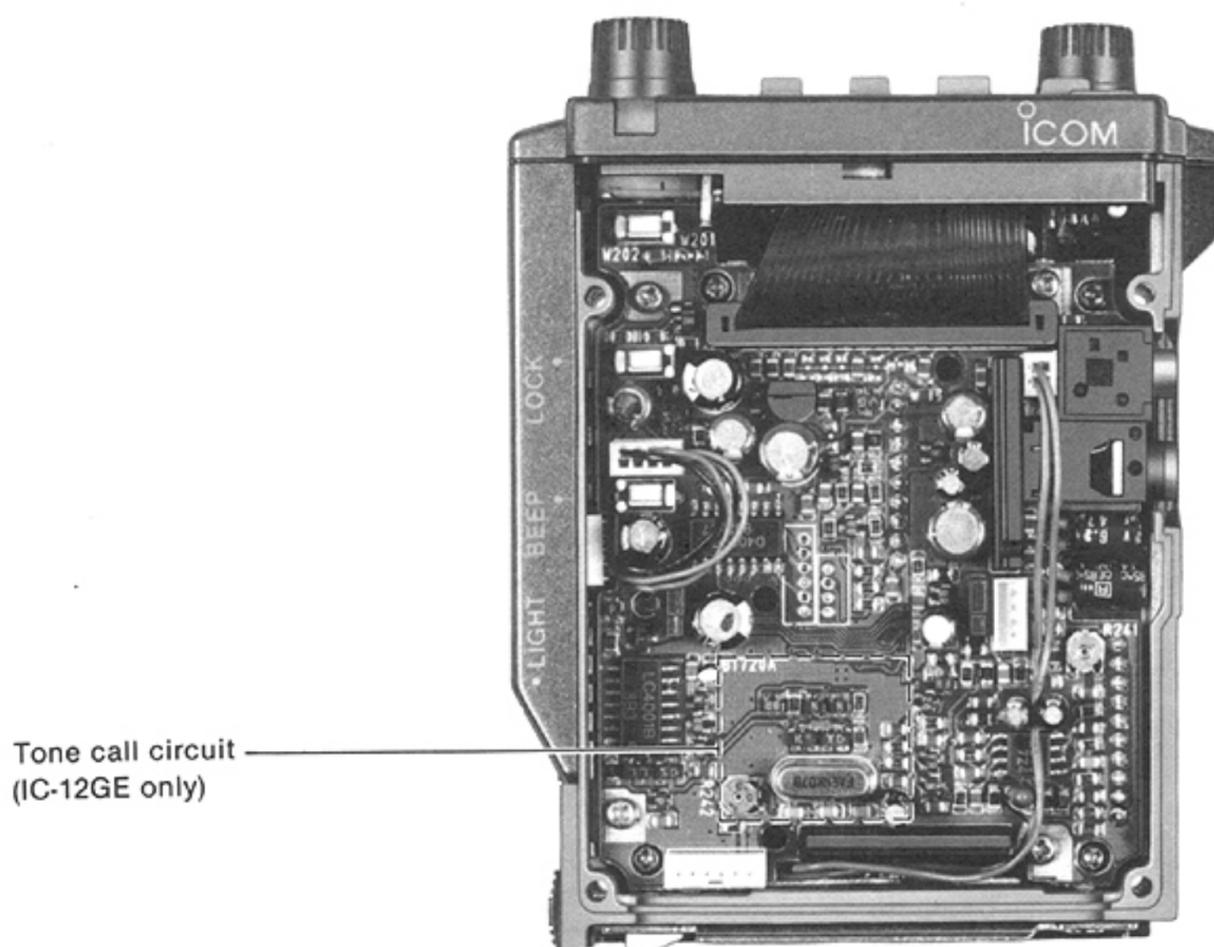
## SECTION 1 INSIDE VIEWS

### 1-1 MAIN UNIT

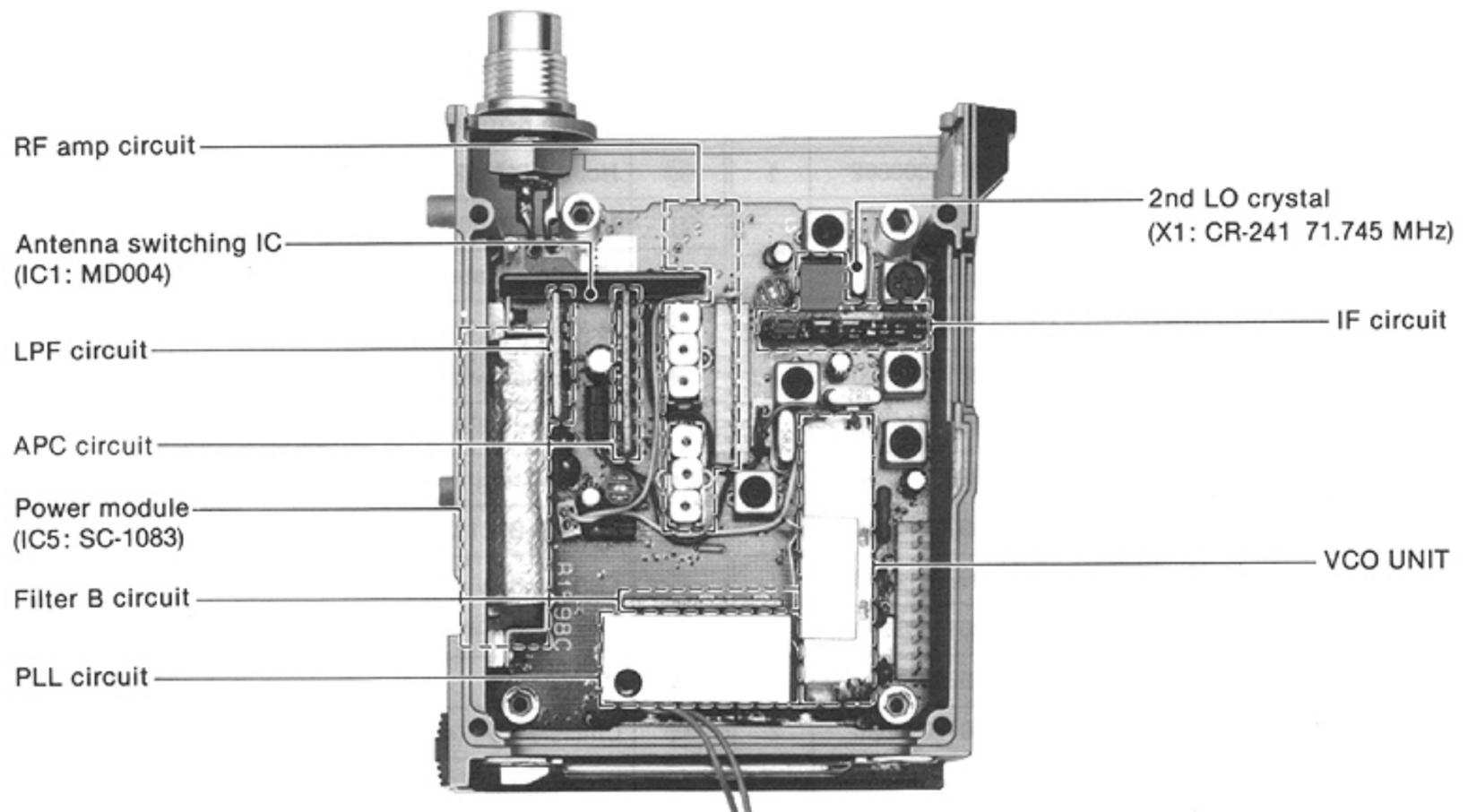
#### • IC-12GAT



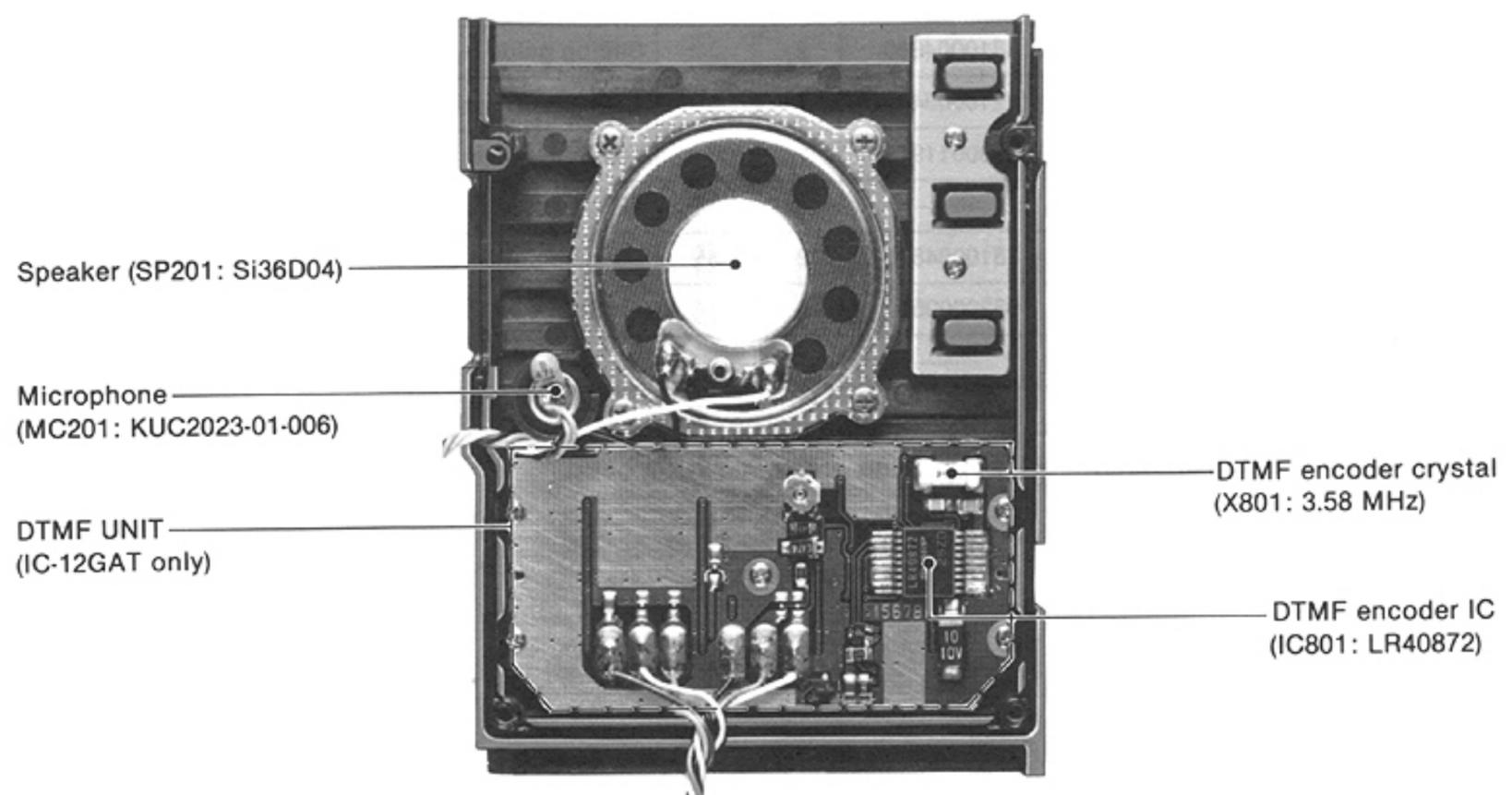
#### • IC-12GE



## 1-2 RF UNIT



## 1-3 SPEAKER AND DTMF UNITS



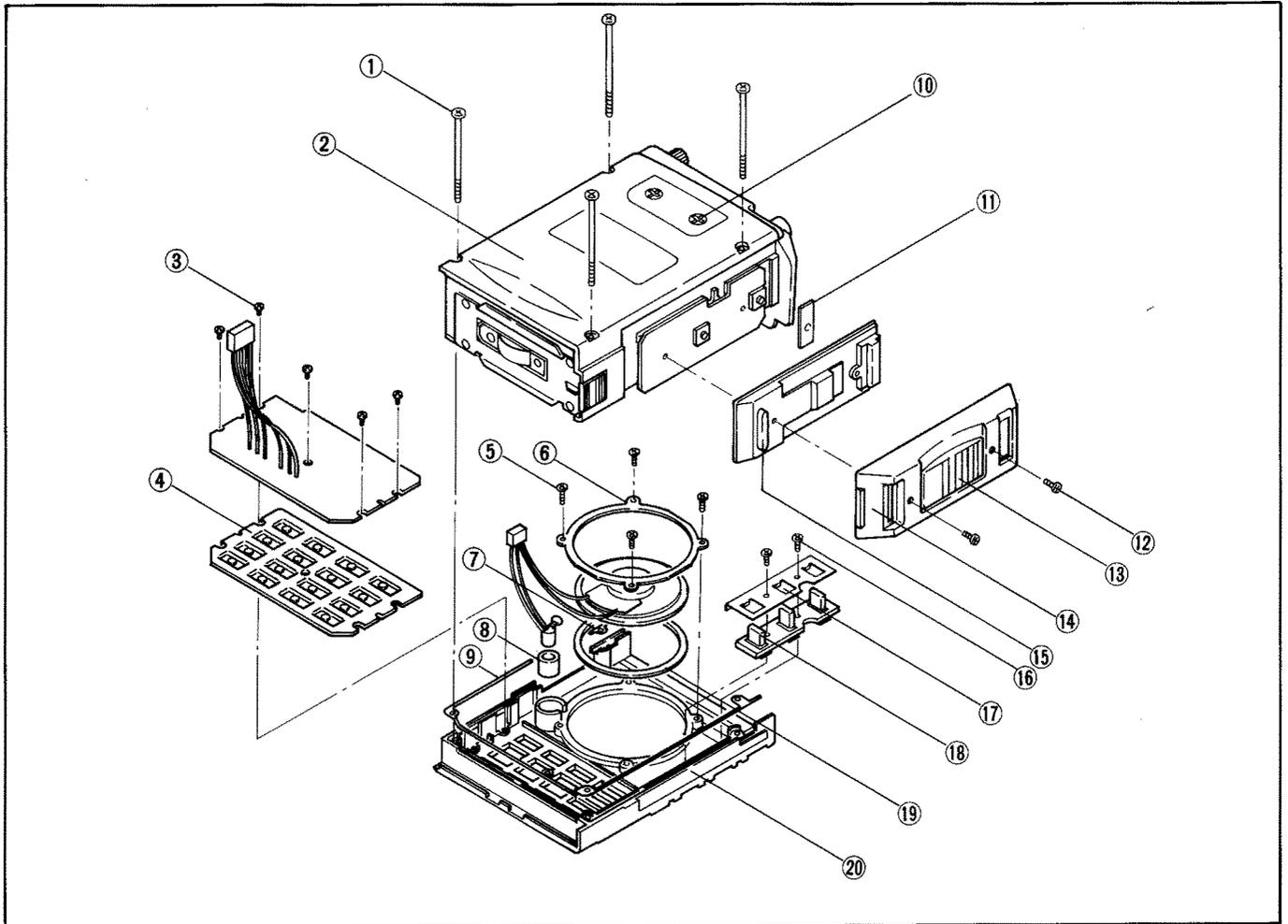
## SECTION 2 MECHANICAL PARTS AND DISASSEMBLY

LABEL NUMBER	DESCRIPTION	ORDERING NUMBER	QTY.	LABEL NUMBER	DESCRIPTION	ORDERING NUMBER	QTY.
①	PH B0 2×31.5 ZK	8810004000	4	⑳	Button K-107 (assembled with ㉓)	—	—
②	Rear panel-2	8010006862	1	㉑	No. 0-1 PH M2×2.5	8810004870	3
③	No. 0-3 PH B0 1.4×2.5 Ni (IC-12GAT)	8810003850	5	㉒	No. 0-3 PH B0 1.4×4.5 Ni	8810004980	6
				㉓	VR angle plate	8930012120	1
④	573 keyboard (IC-12GAT)	8010006870	1	㉔	Space plate-1	8930012141	1
⑤	No. 0-1 PH B0 2×4	8810004800	4	㉕	Top panel switch seal	8930011960	1
⑥	Speaker plate	8930012100	1	㉖	LCD contact strip SRCN573	8930012090	2
⑦	Casing seal (side)	8930011990	1	㉗	LCD reflector	8010006980	1
⑧	Mic holder	8930011930	1	㉘	LCD LD-B9213J	5030000280	1
⑨	Casing seal (center)	8930011870	1	㉙	LCD window plate (assembled with ㉓)	—	—
⑩	Hole bushing (A)	8010007600	2				
⑪	PTT plate	8930011600	1	㉚	PH M2×4	8810000010	4
⑫	No. 0-1 PH M2×5 ZK	8810000530	2	㉛	Chassis (C)-1 (shielding plate)	8010007371	1
⑬	PTT button (assembled with ⑭)	—	—	㉜	PH M2×3	8810004210	4
⑭	PTT holder-1	8930011920	1	㉝	Jack cover flap	8930011980	1
⑮	PTT switch rubber	8930011950	1	㉞	573 standoff-1	8930012081	4
⑯	No. 0-3 PH B0 1.4×2.5 Ni	8810003850	2	㉟	No. 0-1 PH M2×8 ZK	8810004840	2
⑰	Front switch plate	8930012130	1	㊱	Icom washer (O)	8850001010	1
⑱	Switch seal (IC-12GAT)	8310011820	1	㊲	Antenna connector TNC-R106 (includes nut)	6510007120	1
	Switch seal (B) (IC-12GE)	8310011920	1				
⑲	Speaker seal	8930011580	1	㊳	Screw lug M2	8860000010	2
⑳	Front panel (D) (IC-12GAT)	8210002920	1	㊴	Contact holder	8930011880	1
	Front panel (H) (IC-12GE)	8210003020	1	㊵	BuH M2×5.5 Ni	8810005020	1
㉑	Knobs N-126 [OFF/VOL], [SQL]	8610004230	2	㊶	Latch plate (A)-1	8930008601	1
㉒	PH M2×6 ZK	8810004860	2	㊷	Sliding guide	8010006990	1
㉓	Top panel	8210003440	1	㊸	Connection spring	8930005980	1
㉔	Top panel seal	8930011970	1	㊹	Washer M2 Ni	8850000110	1
㉕	Lens (assembled with ㉓)	—	—	㊺	PH M2×5 Ni	8810005310	1
㉖	No. 0-1 PH M2×2.5	8810004870	2	㊻	Release button (A)	8930008610	1
㉗	VR nut (E)	8830000550	2	㊼	FH M2×4 NI	8810002310	4
㉘	Button K-106 (assembled with ㉓)	—	—				

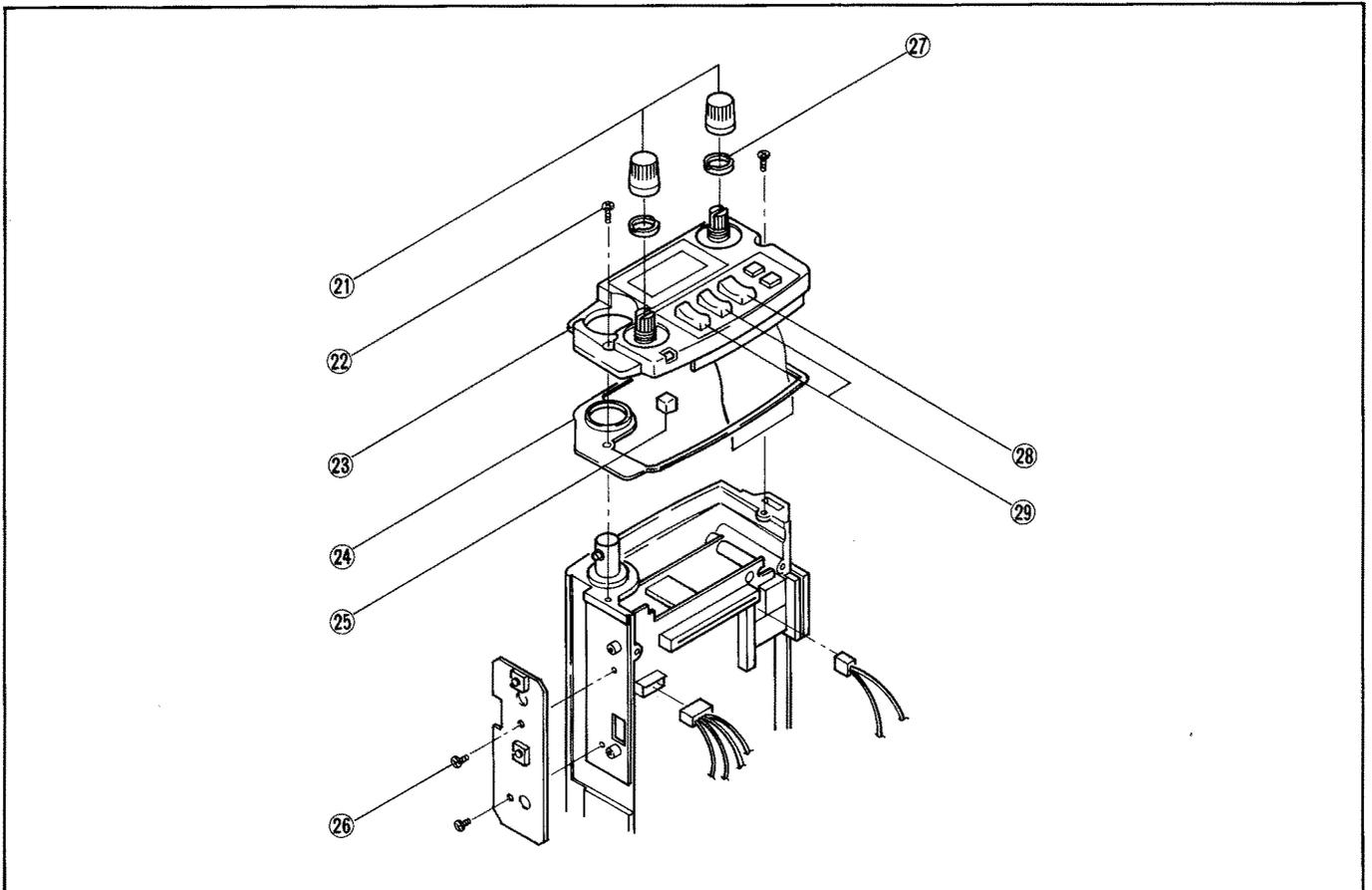
\* Screw type      Screw: M2×5, etc.      Self-tapping screw: B0 2×31.5, etc.      Precision type screw: No. 0-3, etc.

Screw head style      PH: Pan head      FH: Flat head      BuH: Button head

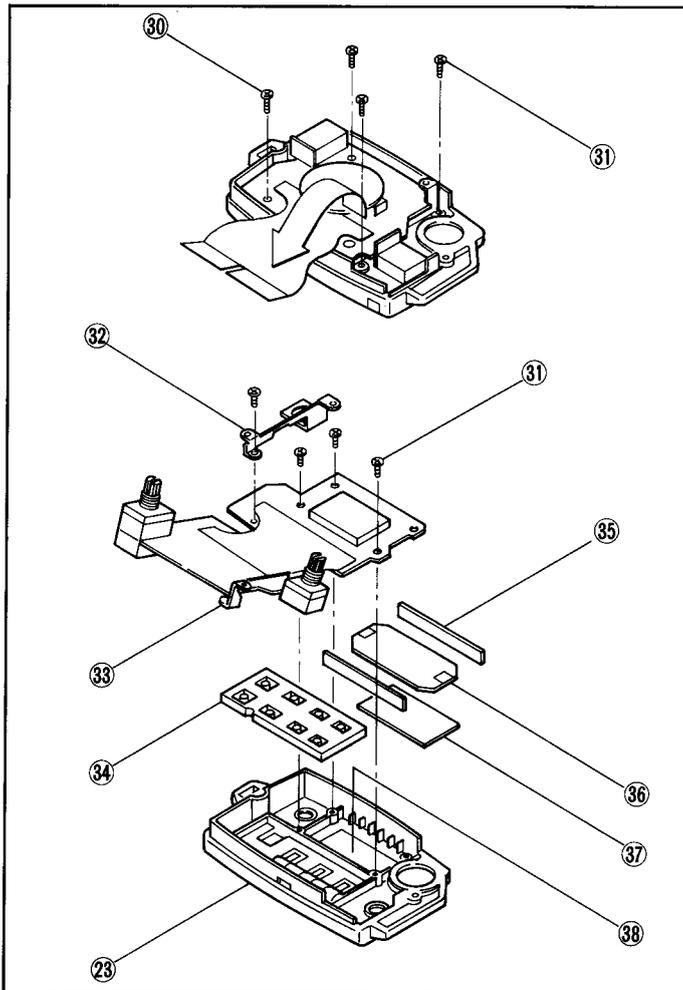
• CASE AND FRONT PANELS



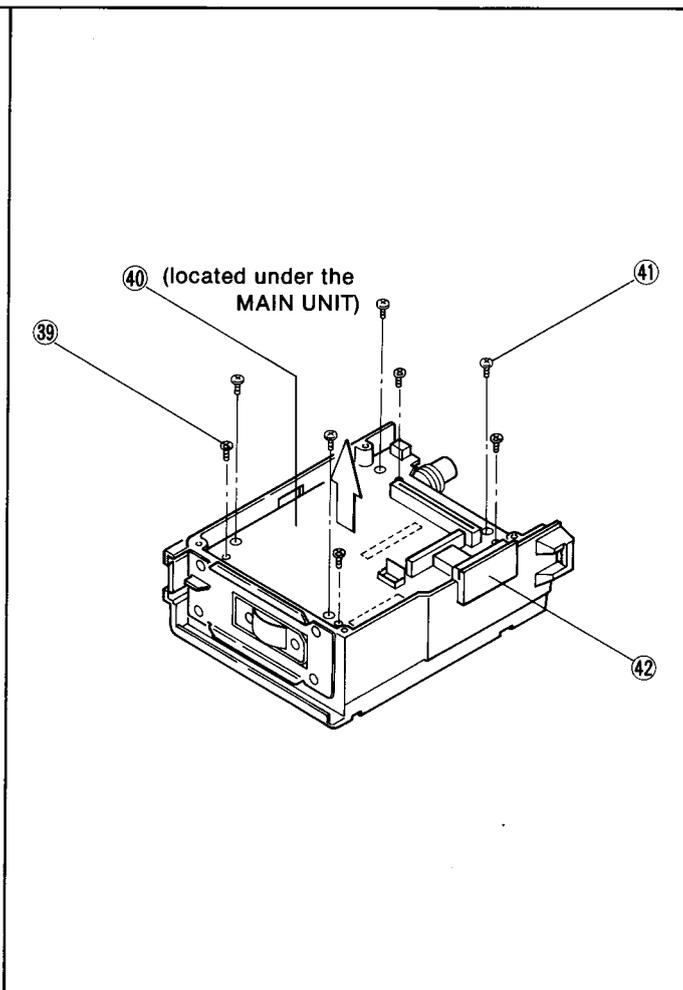
• TOP PANEL



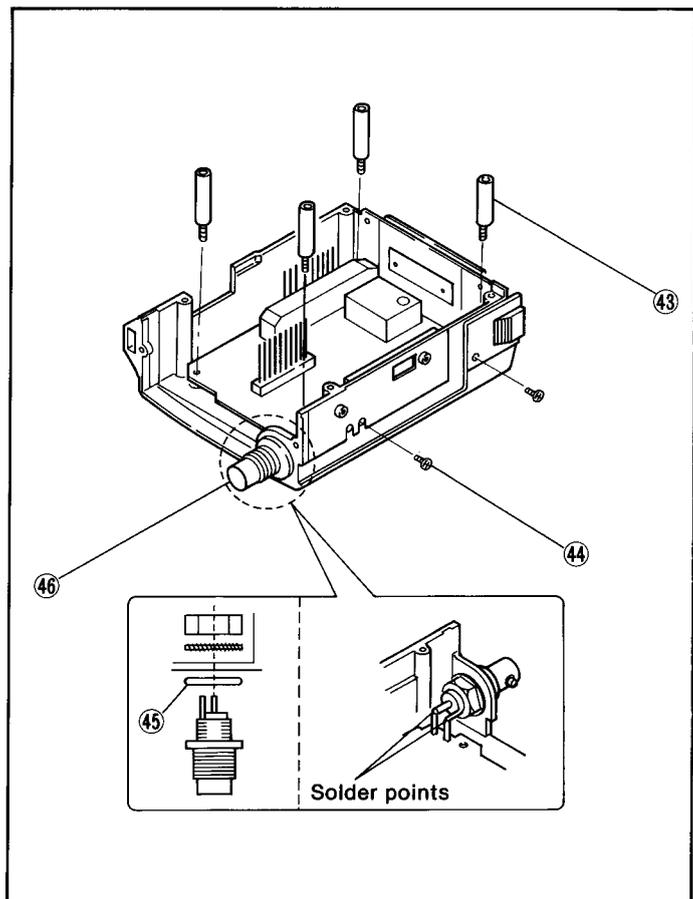
• LOGIC-A AND LOGIC-B UNITS



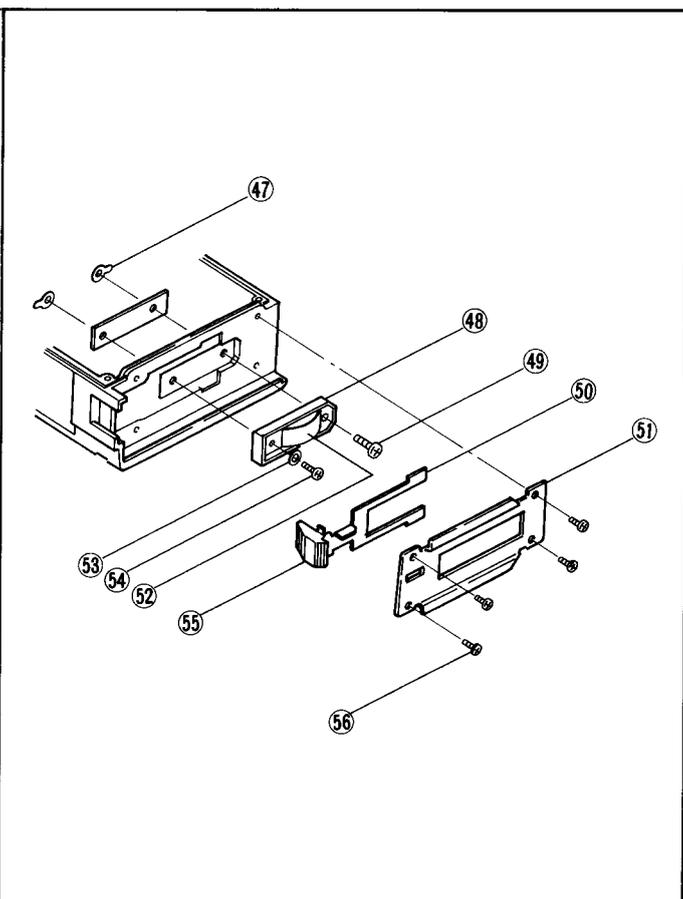
• MAIN UNIT



• RF UNIT



• CONTACT HOLDER



## SECTION 3 ADJUSTMENT PROCEDURES

### 3-1 PREPARATION BEFORE SERVICING

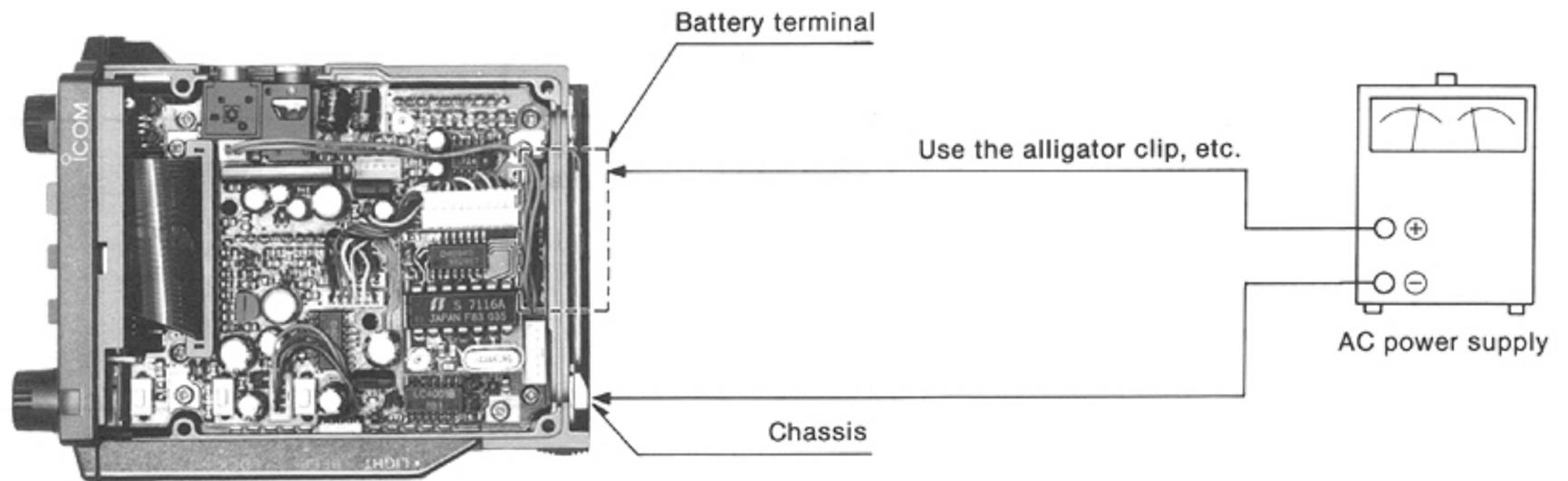
#### ■ REPAIR NOTE

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from a power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 30 dB~40 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.
9. There are different versions of this transceiver. Adjustment procedures and results may differ for each version. Be sure to follow the correct procedure for the transceiver you adjust.

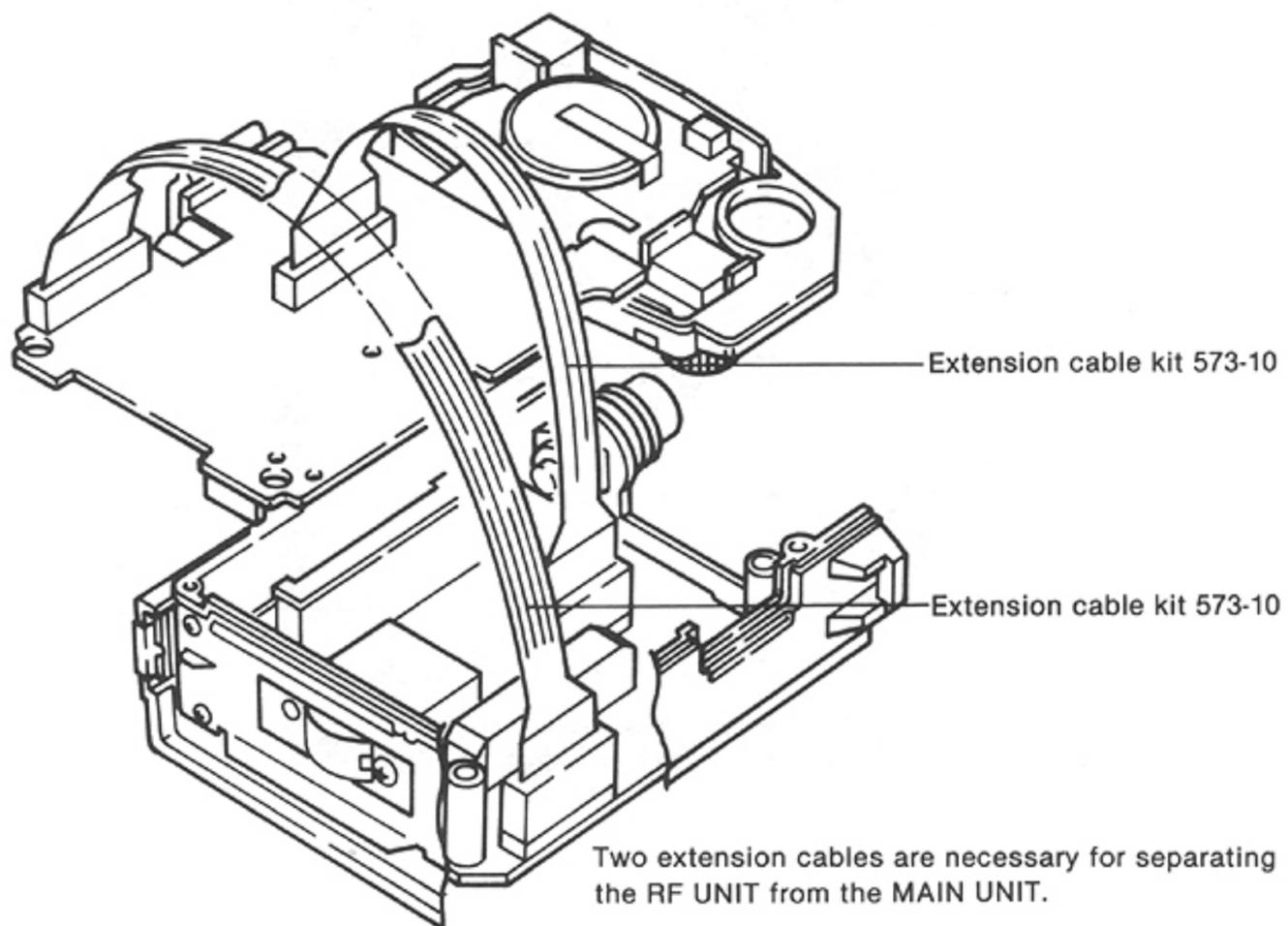
#### ■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
AC power supply	Output voltage : 9.0 V DC Current capacity : 2 A or more	Oscilloscope	Frequency range : DC~20 MHz Measuring range : 0.01~10 V
RF power meter (terminated type)	Measuring range : 0.1~2 W Frequency range : 1200~1400 MHz Impedance : 50 Ω SWR : Less than 1.2: 1	External speaker	Impedance : 8 Ω
		Audio generator	Frequency range : 200~2000 Hz Output level : 0~200 mV
Frequency counter	Frequency range : 1200~1400 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	FM deviation meter	Frequency minimum : 1300 MHz Measuring range : 0~±5 kHz
		Attenuator	Power attenuation : 30 or 40 dB Capacity : 2 W or more
DC voltmeter	Input impedance : 50 kΩ/DC or better		
Standard signal generator (SSG)	Frequency range : 1200~1400 MHz Output level : -127~-17 dBm (0.1 μV~32 mV)		

## ■ POWER SUPPLY CONNECTION



## ■ SEPARATING THE RF UNIT FROM THE MAIN UNIT

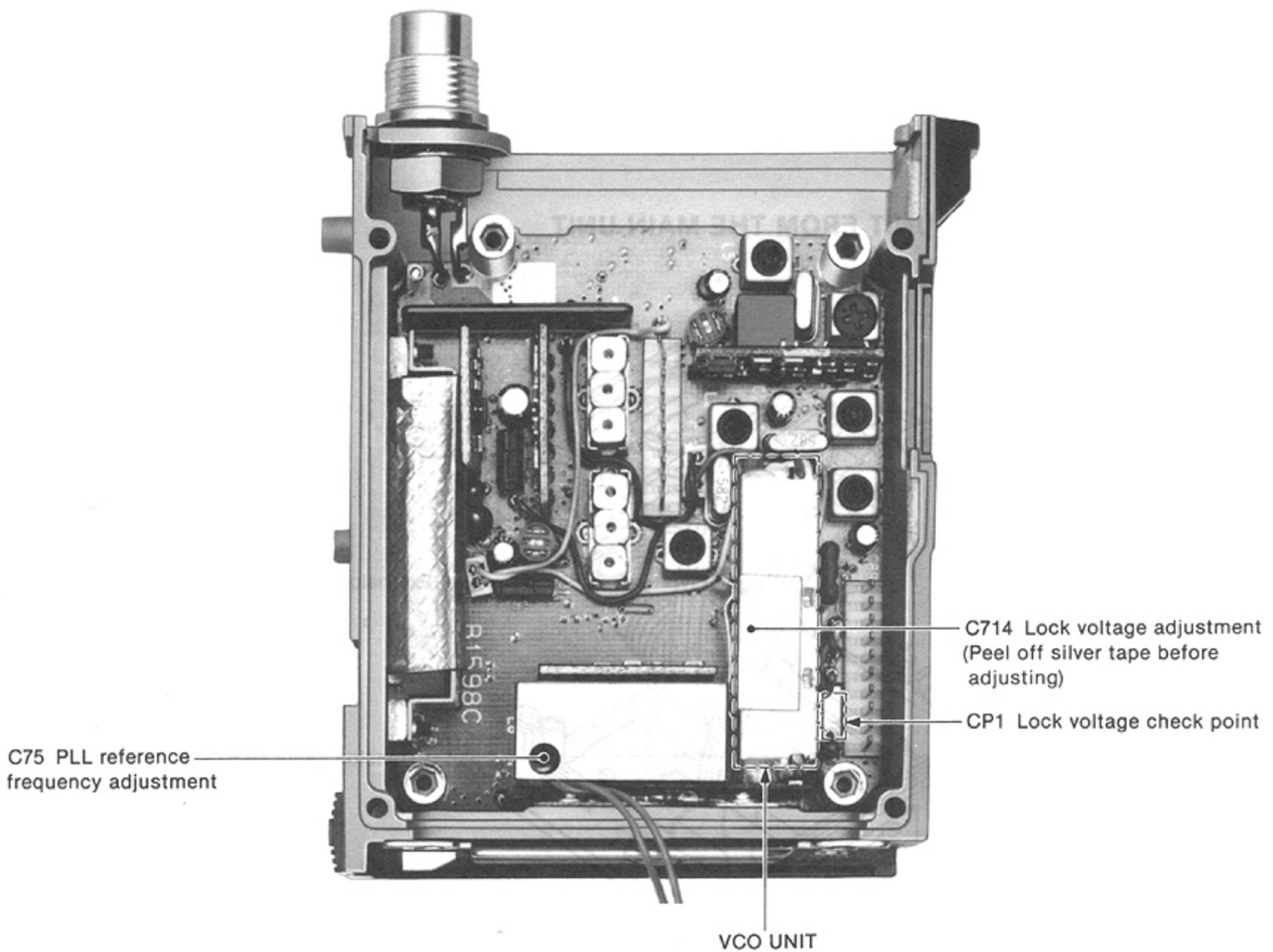


Order the extension cable kits from an authorized Icom Dealer.

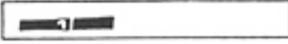
## 3-2 PLL ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
LOCK VOLTAGE	1 <ul style="list-style-type: none"> <li>• Operating frequency: 1260.00 MHz</li> <li>• Receiving</li> </ul>	RF	Connect the DC voltmeter to CP1.	1.5 V	VCO	C714
PLL REFERENCE FREQUENCY	1 <ul style="list-style-type: none"> <li>• Operating frequency: 1300.00 MHz</li> <li>• Simplex mode</li> <li>• RIT/VXO indicator: OFF</li> <li>• Connect the RF power meter or a 50 <math>\Omega</math> dummy load.</li> <li>• Transmitting</li> </ul>	Top panel	Loose couple the frequency counter to the antenna connector.	1300.000 MHz	RF	C75

### RF UNIT

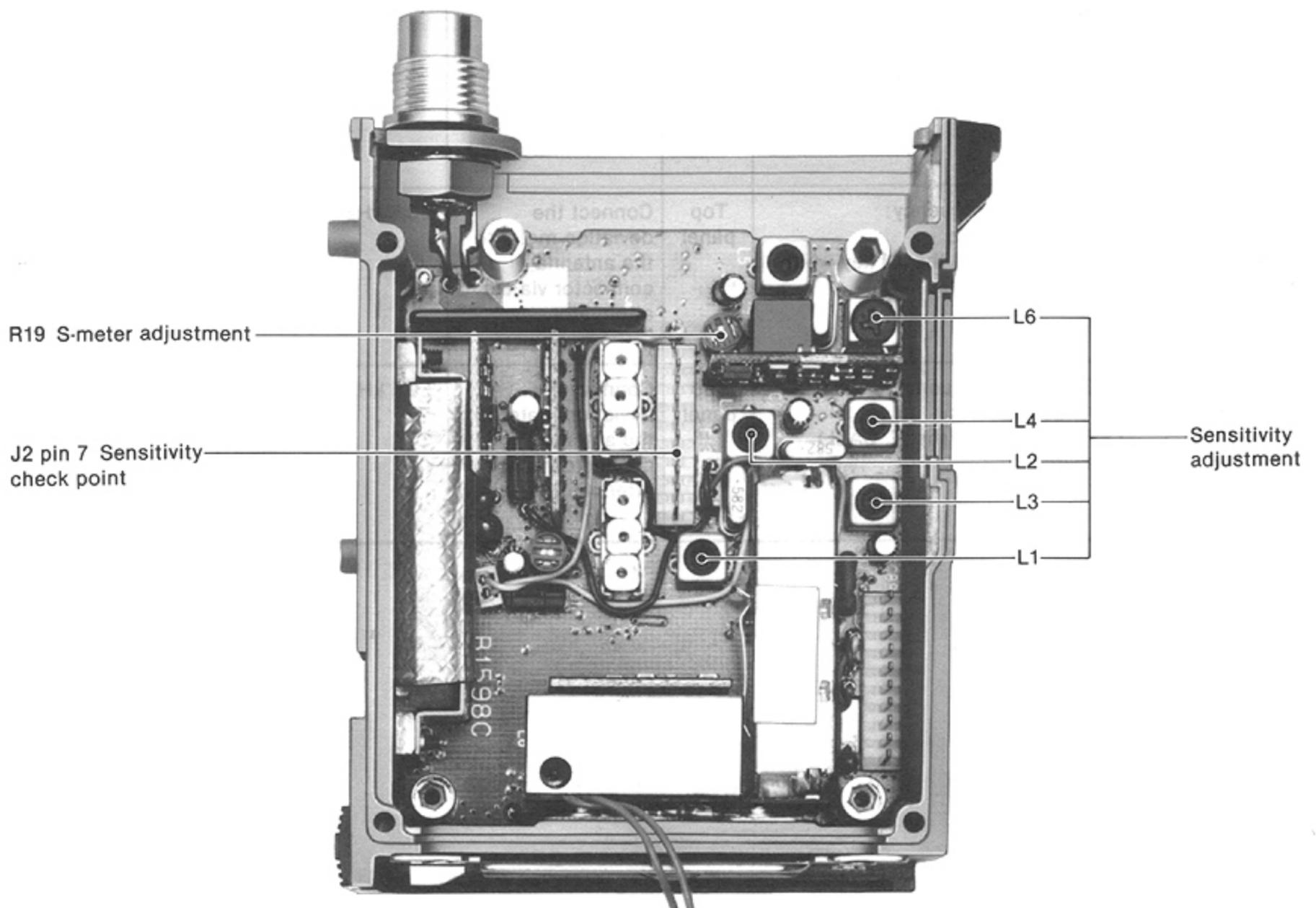


### 3-3 RECEIVER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	1	RF	Connect the DC voltmeter to J2 pin 7.	Maximum	RF	L4, L3, L2, L1
	2	Side panel	Connect the oscilloscope with an 8 $\Omega$ speaker to the [EXT SP] jack.		Maximum horizontal noise waveform	
S-METER	1	Function display	S/RF indicator	2 bars (S3) 	RF	R19

\* CCW: Counterclockwise

#### RF UNIT

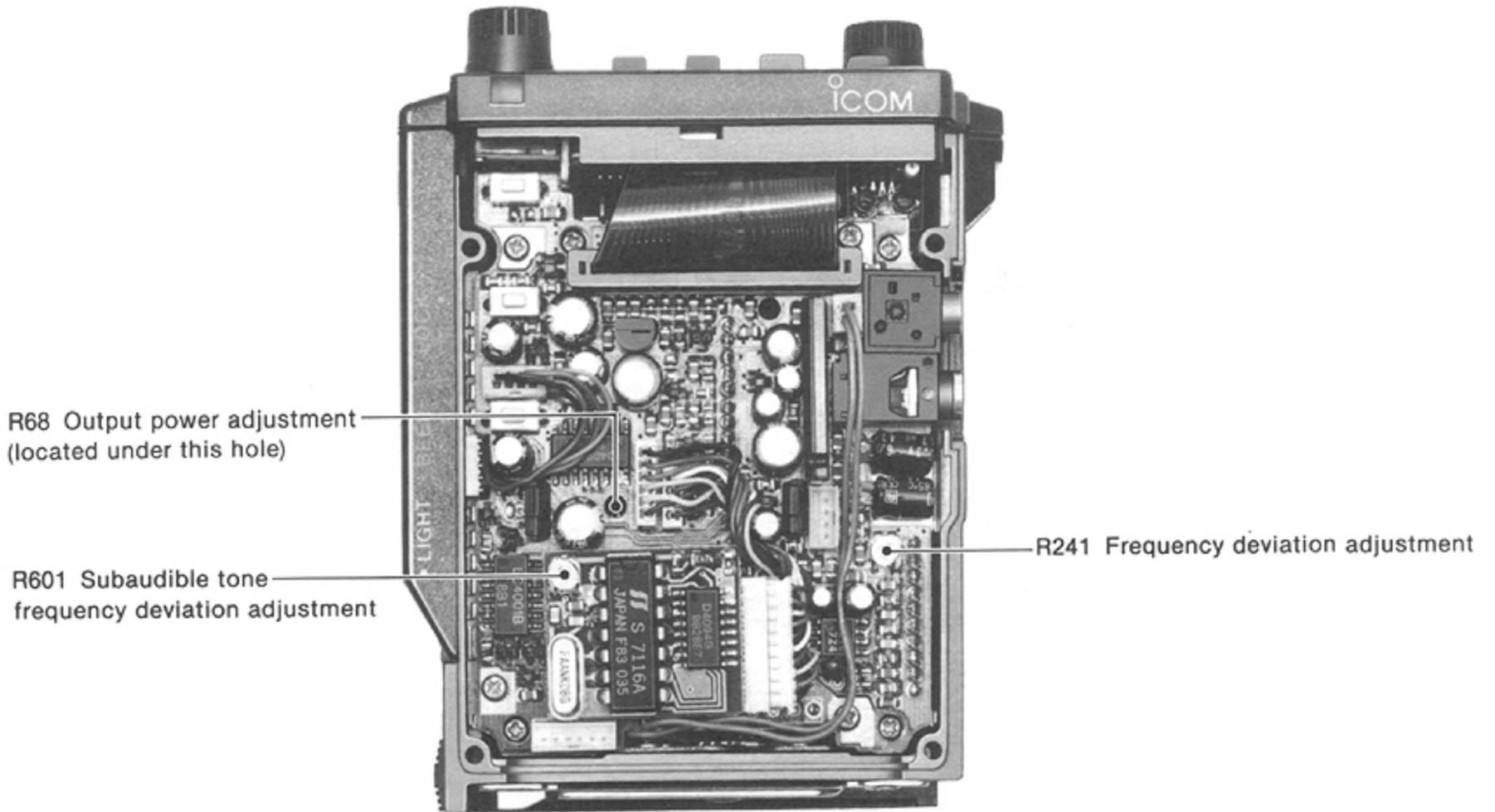


## 3-4 TRANSMITTER ADJUSTMENT

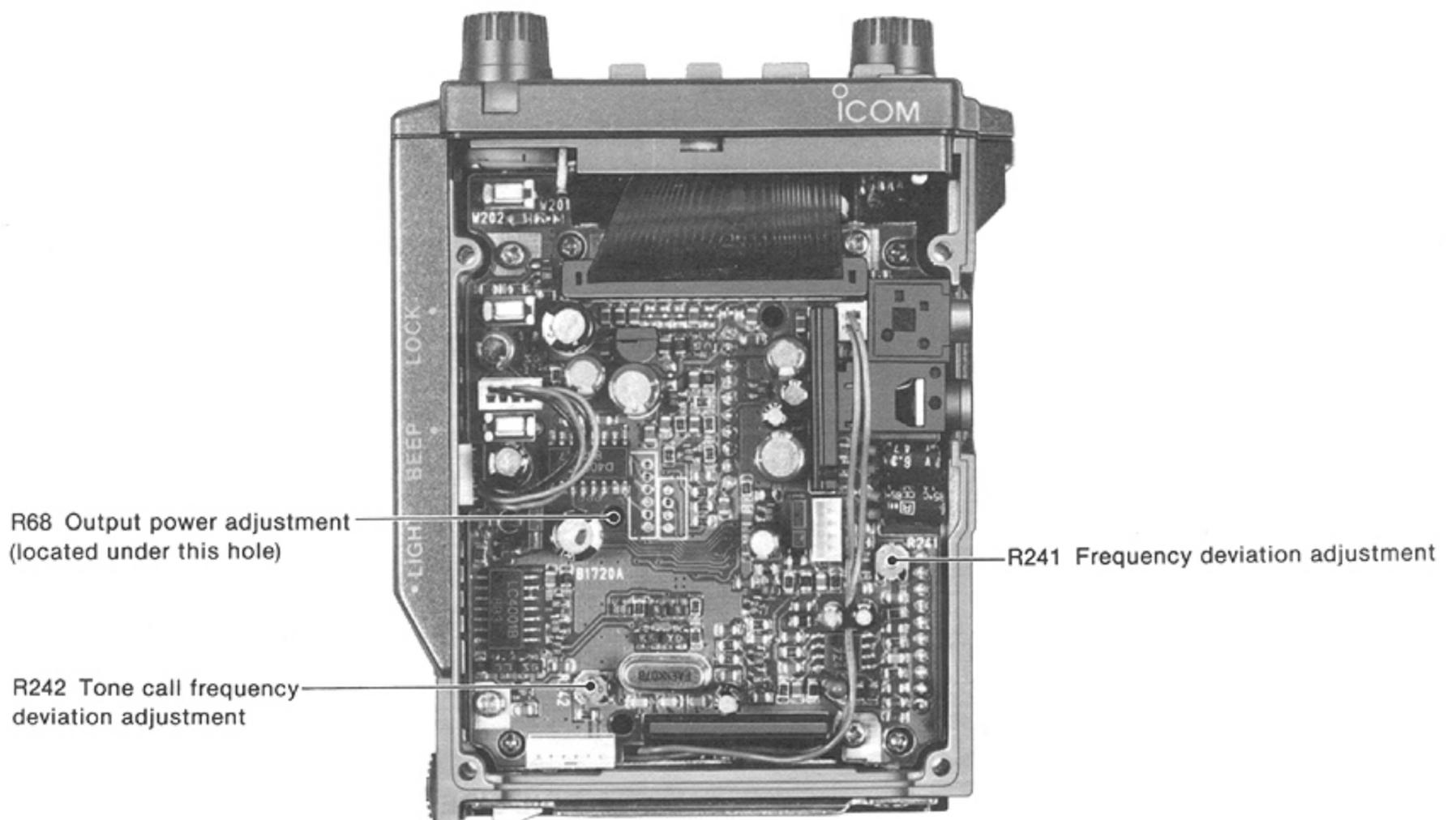
ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER	1	<ul style="list-style-type: none"> <li>Operating frequency: 1280.00 MHz</li> <li>[H/L] switch: HIGH</li> <li>Simplex mode</li> <li>RIT/VXO indicator: OFF</li> <li>Transmitting</li> </ul>	Top panel	Connect the RF power meter to the antenna connector.	1.0 W	RF	R68
	2	<ul style="list-style-type: none"> <li>[H/L] switch: LOW</li> </ul>					50~200 mW
FREQUENCY DEVIATION	1	<ul style="list-style-type: none"> <li>Operating frequency: 1280.00 MHz</li> <li>Tone: OFF</li> <li>[H/L] switch: HIGH</li> <li>Apply an AF signal to the [MIC] jack. 170 mV/1 kHz (IC-12GAT) 75 mV/1 kHz (IC-12GE)</li> <li>Set the FM deviation meter. HPF : 50 Hz LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2</li> <li>Transmitting</li> </ul>	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	±4.8 kHz	MAIN	R241
SUBAUDIBLE TONE FREQUENCY DEVIATION (IC-12GAT only)	1	<ul style="list-style-type: none"> <li>Operating frequency: 1280.00 MHz</li> <li>Set the tone frequency to 88.5 Hz.</li> <li>Set the FM deviation meter. HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2</li> <li>Apply no signal to the [MIC] jack.</li> <li>Transmitting</li> </ul>	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	±0.75 kHz	TONE	R601
DTMF TONE FREQUENCY DEVIATION (IC-12GAT only)	1	<ul style="list-style-type: none"> <li>Operating frequency: 1280.00 MHz</li> <li>Push and hold the [D] key while transmitting.</li> </ul>	Top panel	Connect the deviation meter to the antenna connector via the attenuator.	±3.5 kHz	DTMF	R801
TONE CALL FREQUENCY DEVIATION (IC-12GE only)	1	<ul style="list-style-type: none"> <li>Operating frequency: 1280.00 MHz</li> <li>Push and hold the [T. CALL] switch.</li> </ul>	Top panel	Connect the deviation meter to the antenna connector via the attenuator.	±3.5 kHz	MAIN	R242

## MAIN AND TONE UNITS

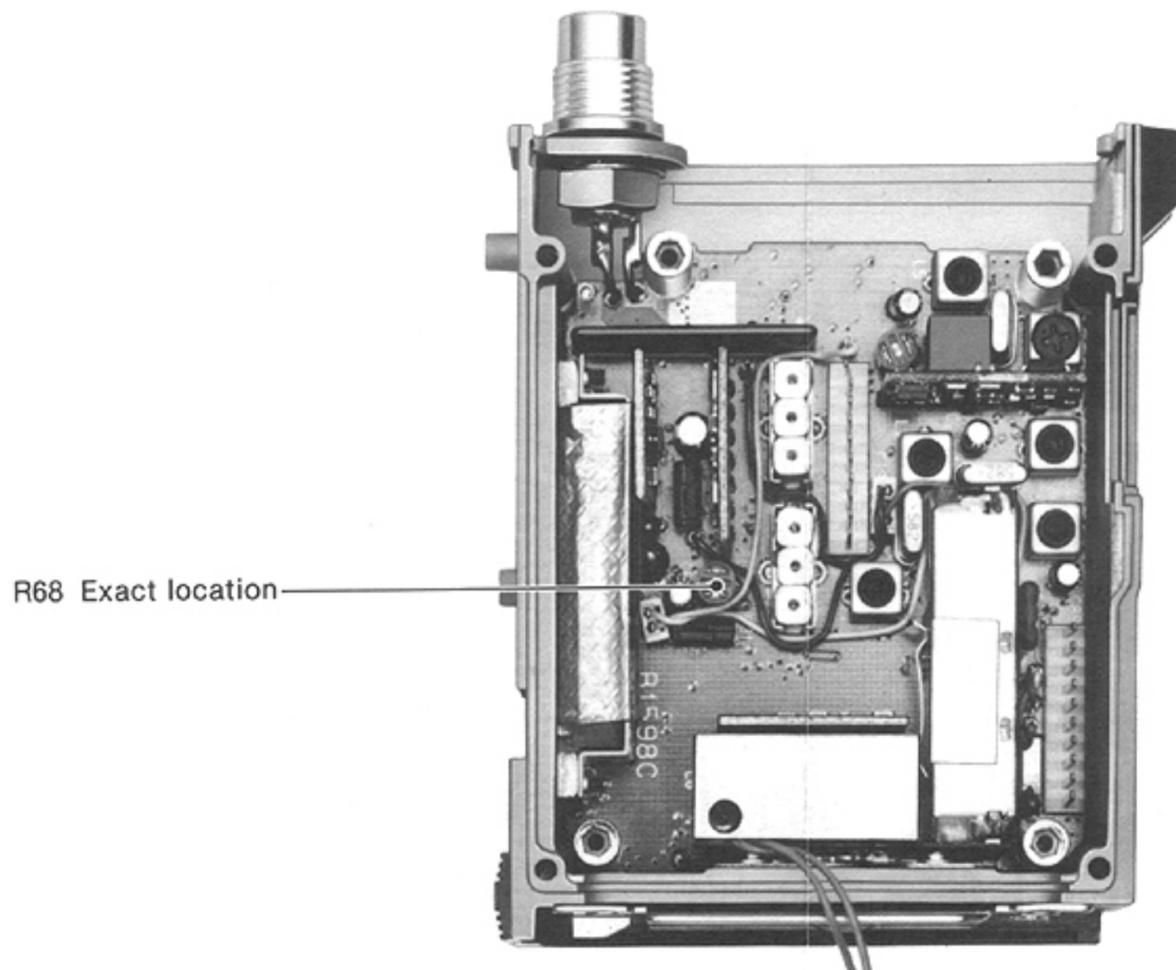
### • IC-12GAT



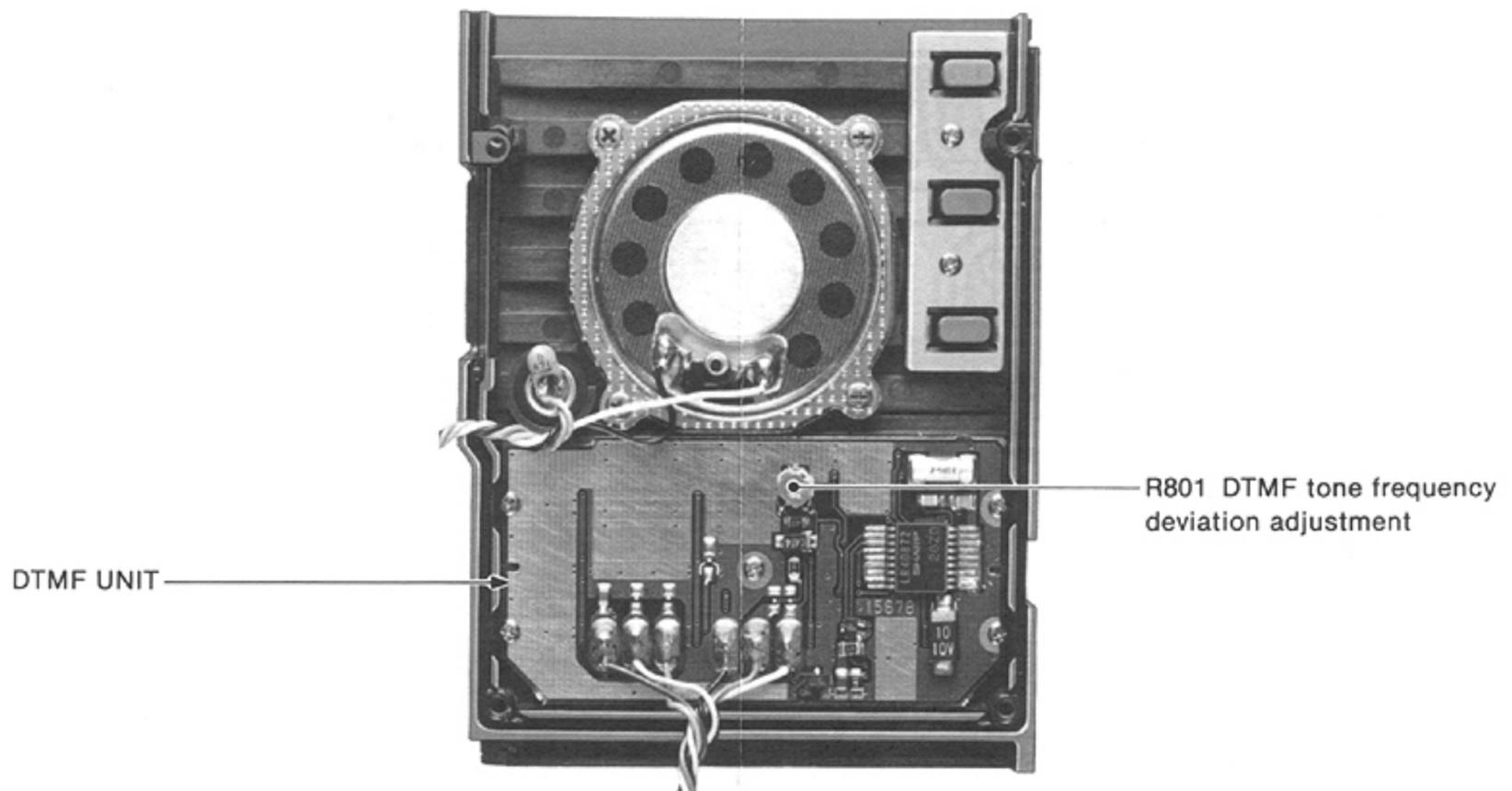
### • IC-12GE



RF UNIT



DTMF UNIT

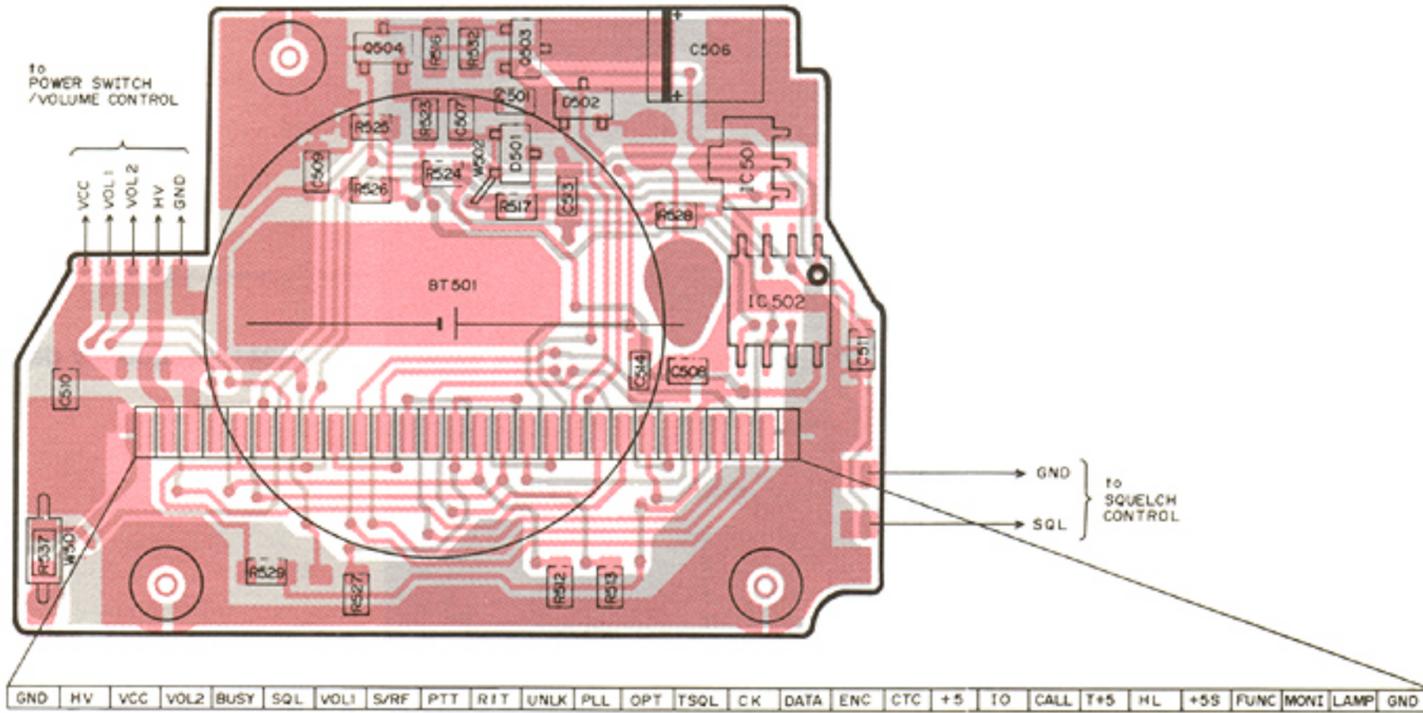


# SECTION 4 BOARD LAYOUTS

## 4-1 LOGIC UNIT

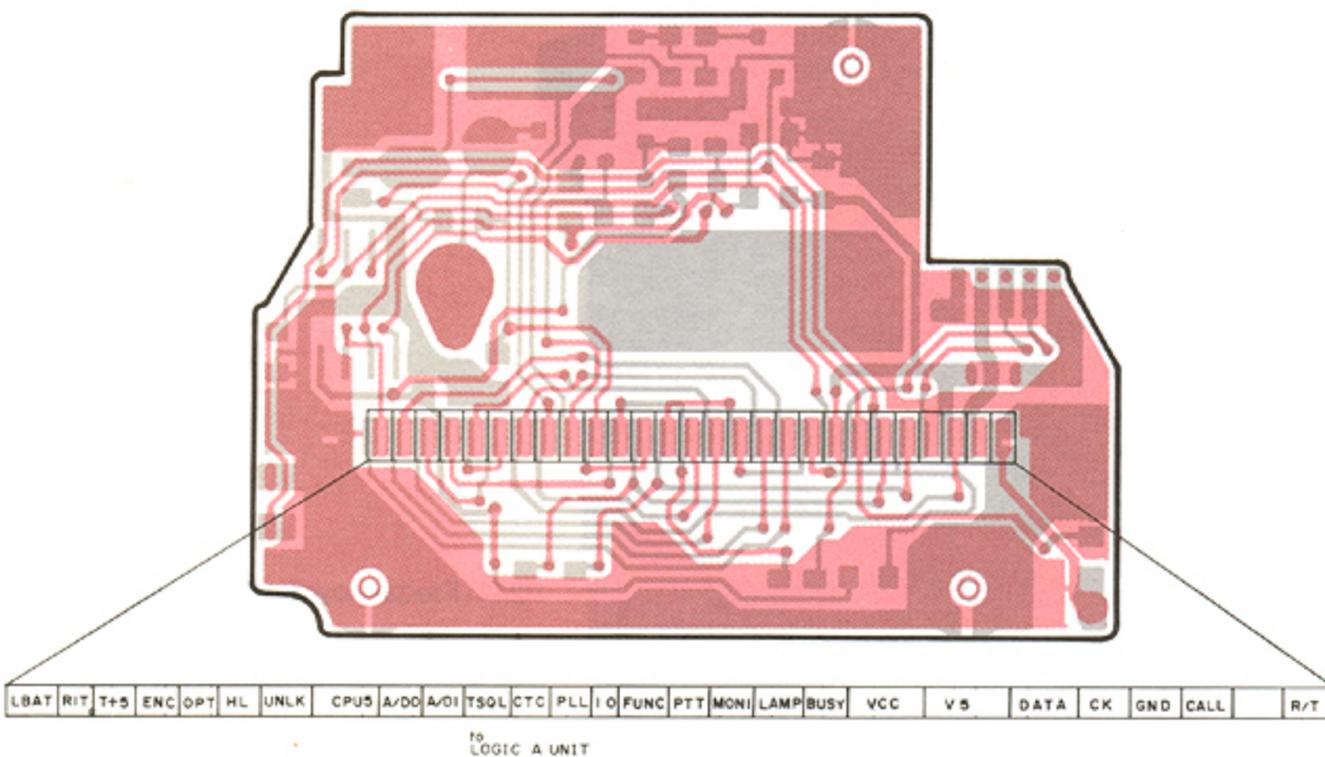
### • LOGIC-B UNIT

#### COMPONENT SIDE

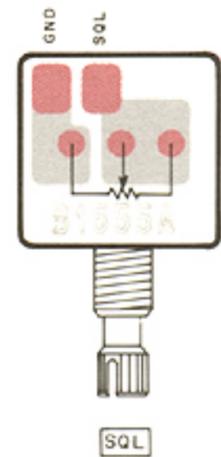


FOIL SIDE  
COMPONENT SIDE

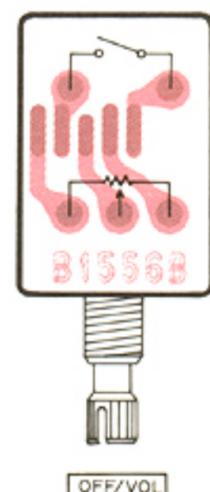
#### FOIL SIDE



### • SQUELCH UNIT

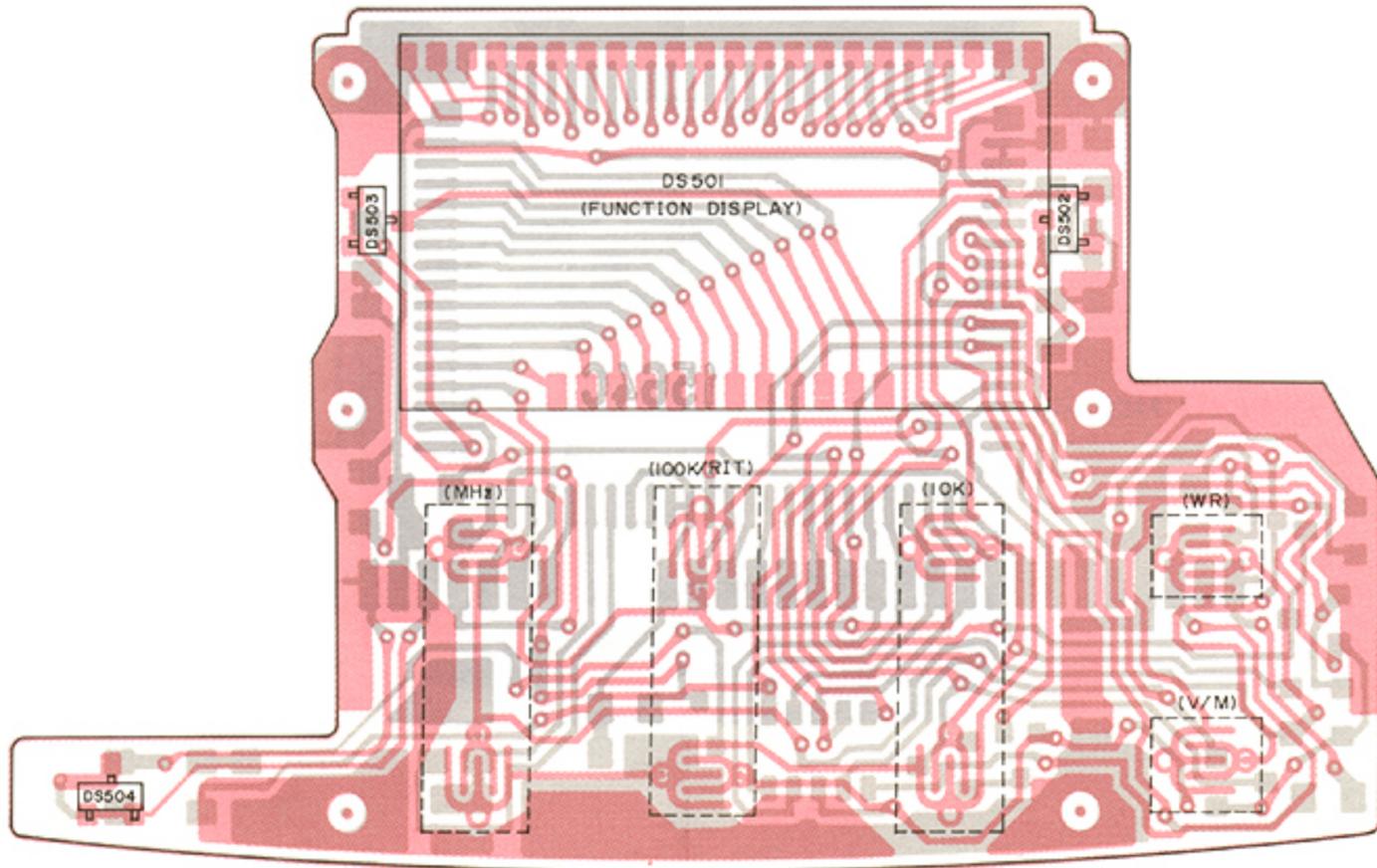


### • POWER SWITCH/ VOLUME CONTROL



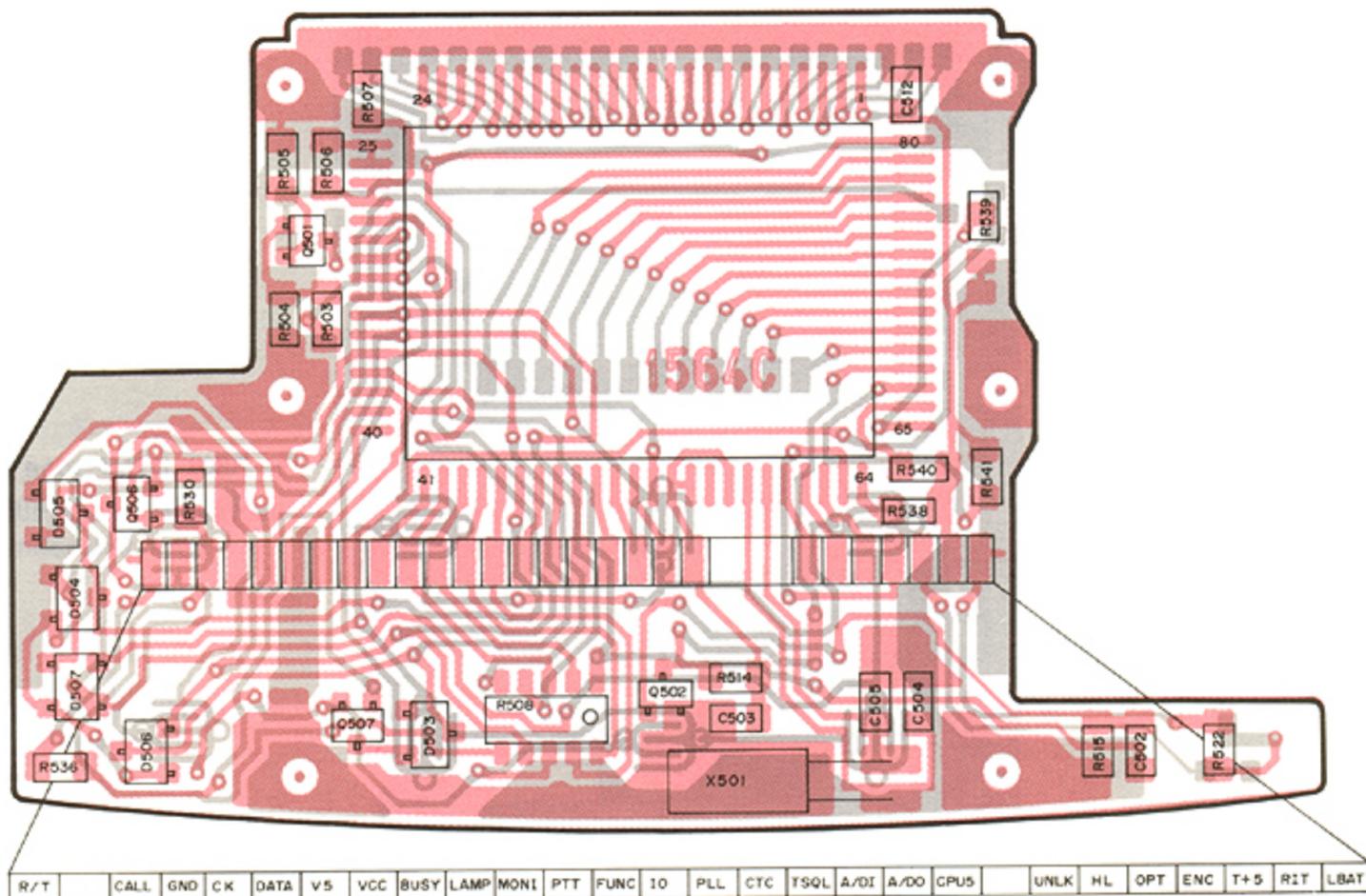
FOIL SIDE  
COMPONENT SIDE

• LOGIC-A UNIT  
COMPONENT SIDE



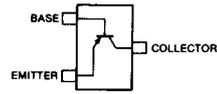
FOIL SIDE  
COMPONENT SIDE

FOIL SIDE



FOIL SIDE  
COMPONENT SIDE

**2SA1362 GR**  
Q503



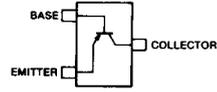
Symbol: AEG

**MA159**  
D507



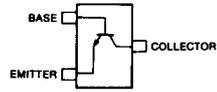
Symbol: M1A

**2SA1576 R**  
Q506, Q507



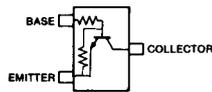
Symbol: FR

**2SC4081 R**  
Q501, Q502



Symbol: BR

**RN1404**  
Q504



Symbol: XD

**1SS184**  
D502, D504 (IC-12GE only)  
D505



Symbol: B3

**1SS193**  
D501, D504 (IC-12GAT only)



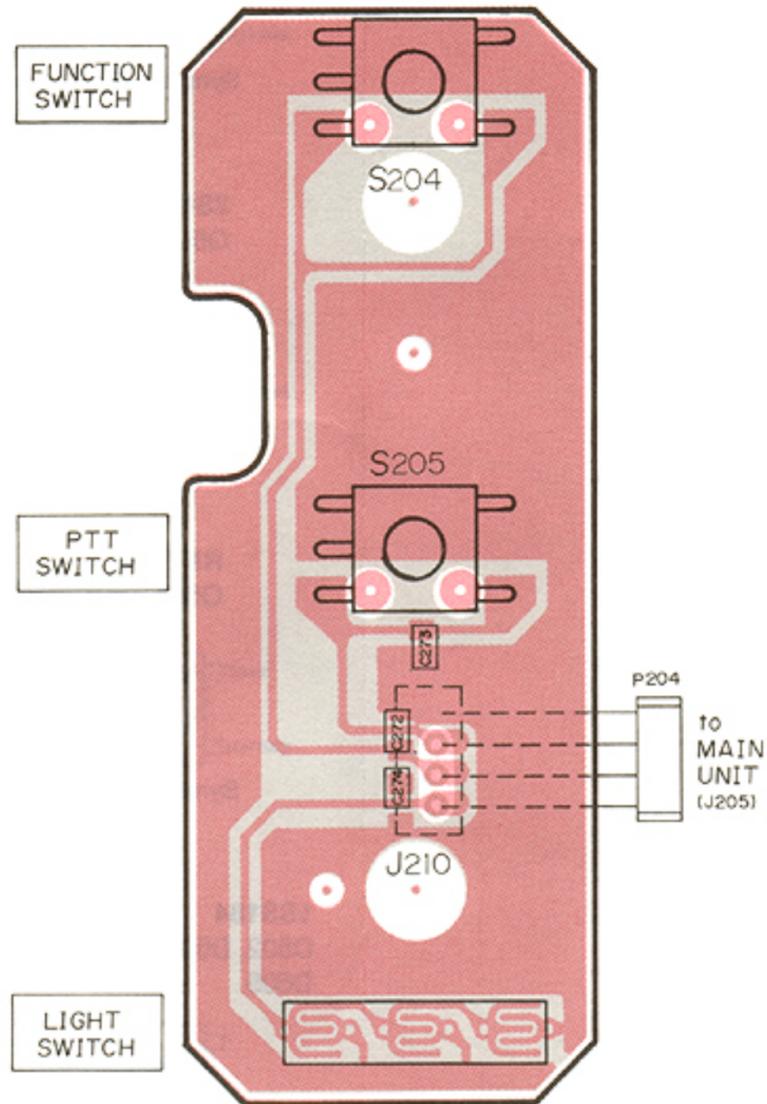
Symbol: F3

**1SS196**  
D503, D506

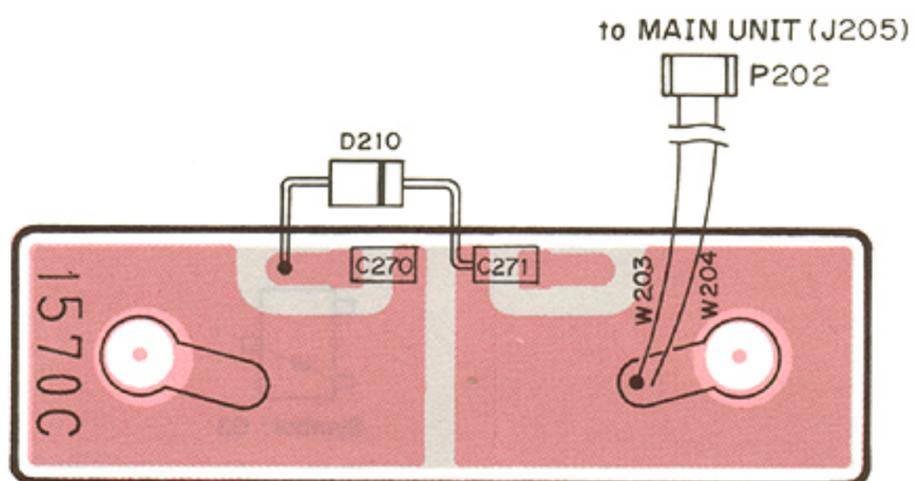


Symbol: G3

• PTT

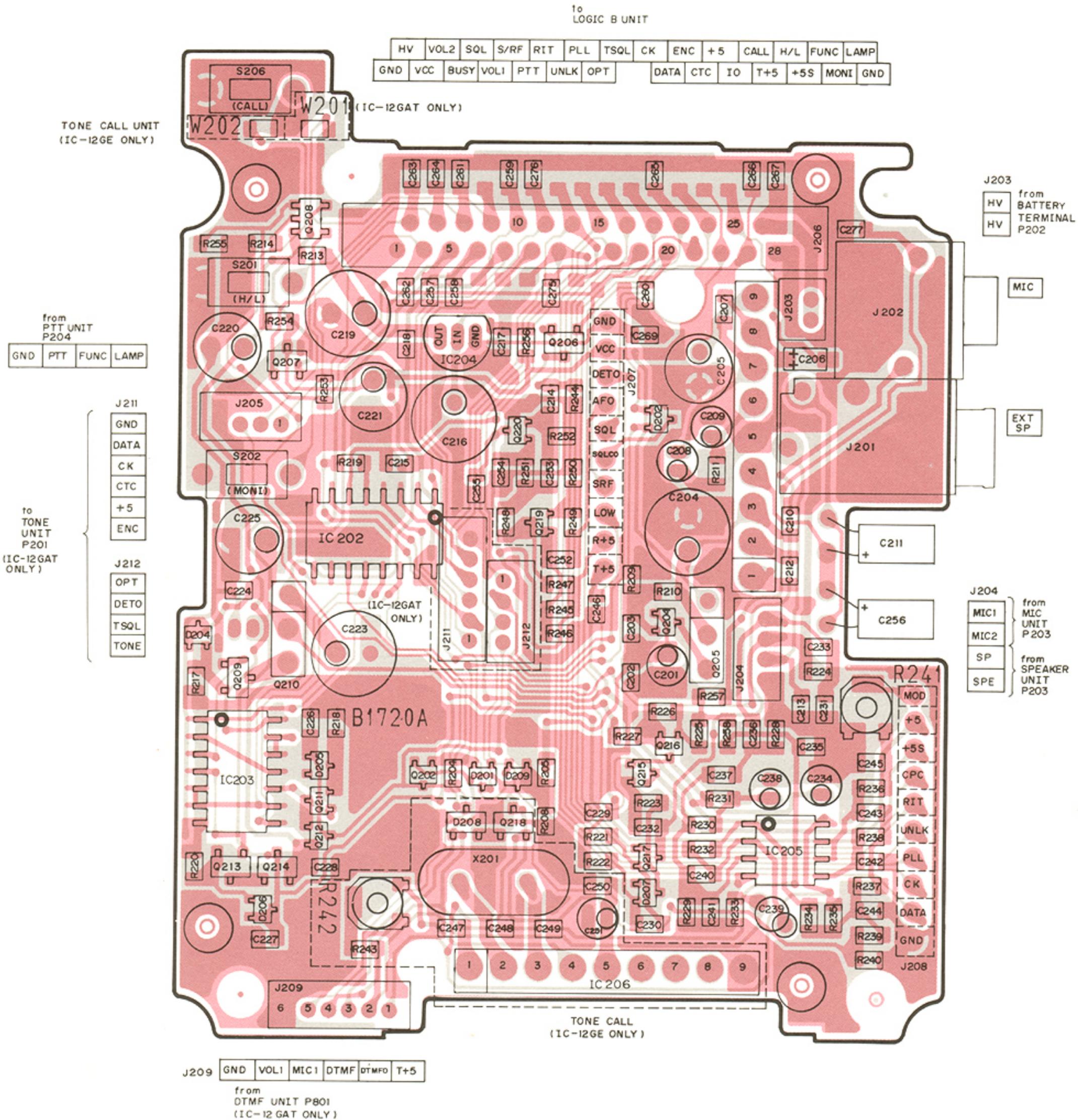


• JUNCTION UNIT

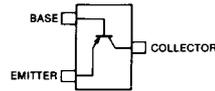


## 4-2 MAIN UNIT

### • MAIN UNIT

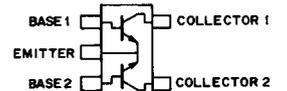


**2SA1162 GR**  
Q207, Q214



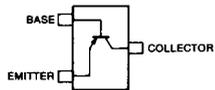
Symbol: SG

**FMW1**  
Q208



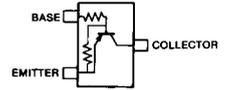
Symbol: WI

**2SA1576 R**  
Q212, Q216, Q217



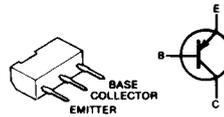
Symbol: FR

**RN2404**  
Q218 (IC-12GE only)



Symbol: YD

**2SB909M Q/R**  
Q205, Q210

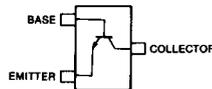


**1SS184**  
D208 (IC-12GE only)



Symbol: B3

**2SC2712 BL**  
Q209, Q213



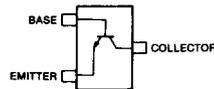
Symbol: LL

**DAN202U**  
D201, D202, D205  
D207, D209



Symbol: N

**2SC4081 R**  
Q202, Q204, Q211  
Q219, Q220



Symbol: BR

**DAP202U**  
D204, D206



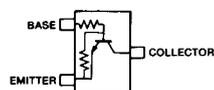
Symbol: P

**2SJ106 GR**  
Q206



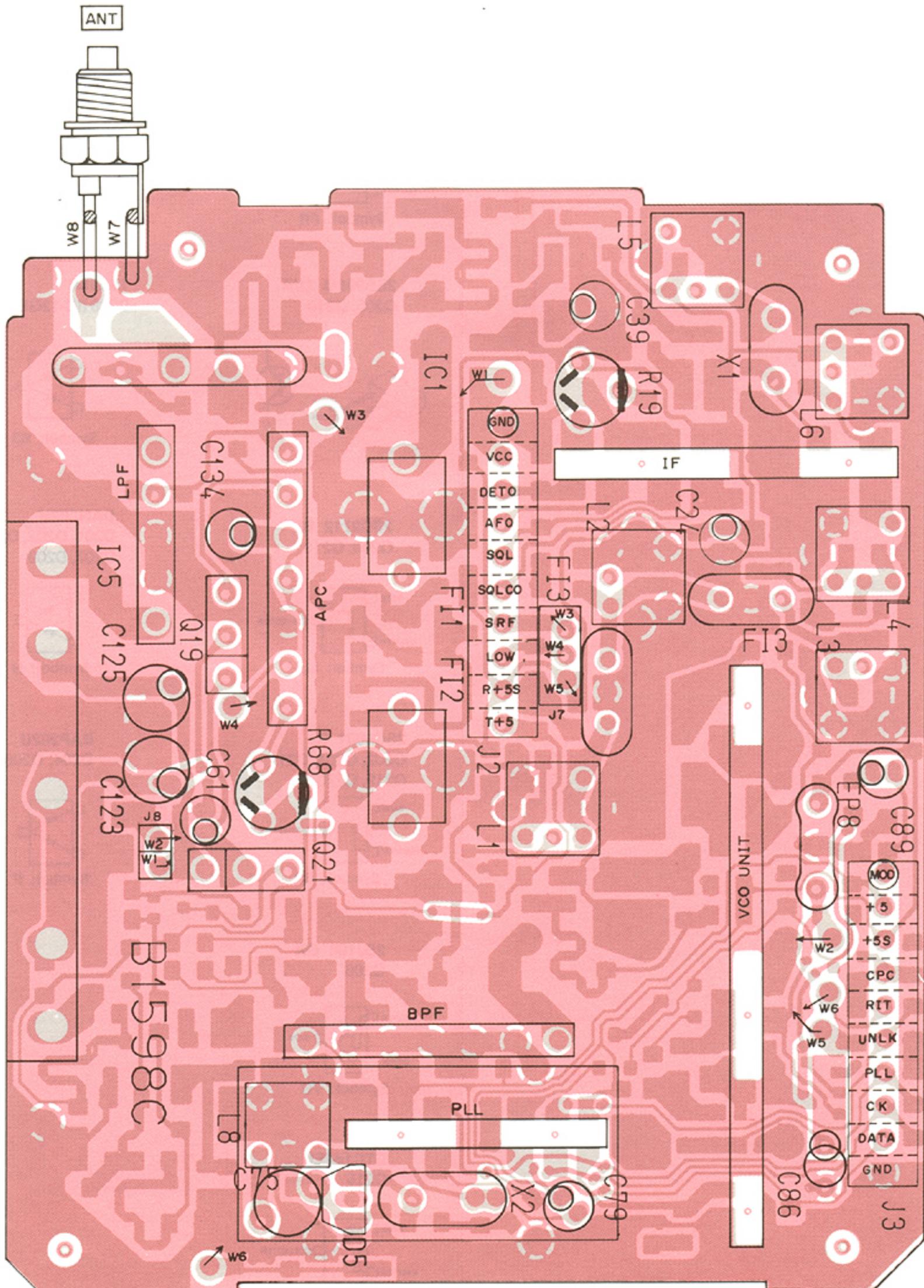
Symbol: VG

**DTC144EU**  
Q215



Symbol: 26

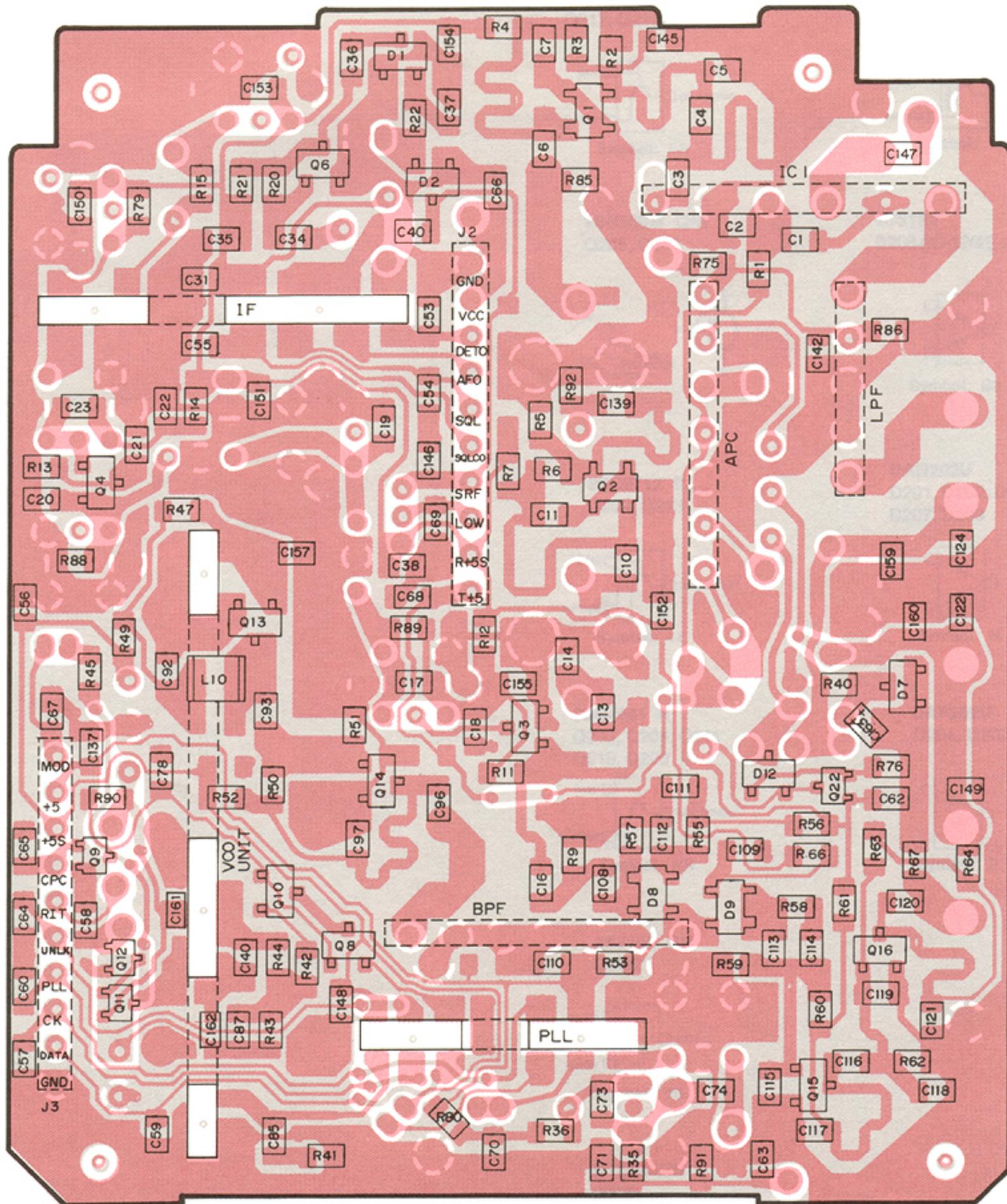
COMPONENT SIDE



FOIL SIDE  
COMPONENT SIDE

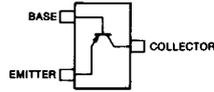
### 4-3 RF UNIT

FOIL SIDE



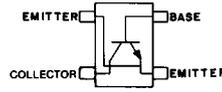
FOIL SIDE  
 COMPONENT SIDE

**2SA1162 GR**  
Q23, Q24



Symbol: SG

**2SC4095**  
Q1, Q2



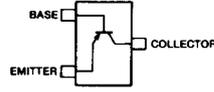
Symbol: R47

**1SS193**  
D11



Symbol: F3

**2SA1576 R**  
Q25



Symbol: FR

**2SK302 Y**  
Q4



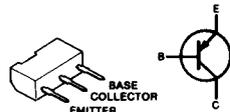
Symbol: TY

**1SS196**  
D2

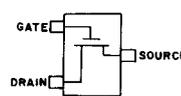


Symbol: G3

**2SB909M Q/R**  
Q19, Q21



**2SK536**  
Q8, Q10



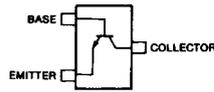
Symbol: BJ

**DAP202U**  
D13



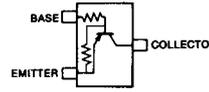
Symbol: P

**2SC2712 BL**  
Q7, Q20



Symbol: LL

**DTA143ZU**  
Q27



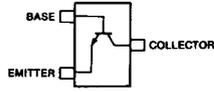
Symbol: E13

**HSM88AS**  
D1, D3, D10



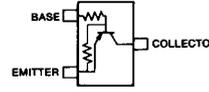
Symbol: C1

**2SC3356**  
Q14, Q15, Q16



Symbol: R22

**DTA144EU**  
Q11



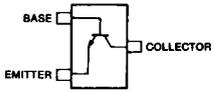
Symbol: 16

**MA862**  
D8, D9



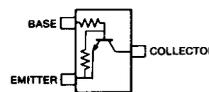
Symbol: M11

**2SC3356 R24**  
Q3, Q13



Symbol: R24

**DTC144EU**  
Q9, Q12, Q18  
Q26



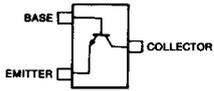
Symbol: 26

**RD3.3M B1**  
D12



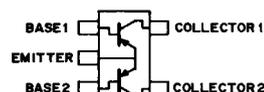
Symbol: 331

**2SC3770 3**  
Q5, Q6



Symbol: JY3

**FMS1**  
Q17



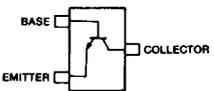
Symbol: SI

**RD9.1M B2**  
D7



Symbol: 912

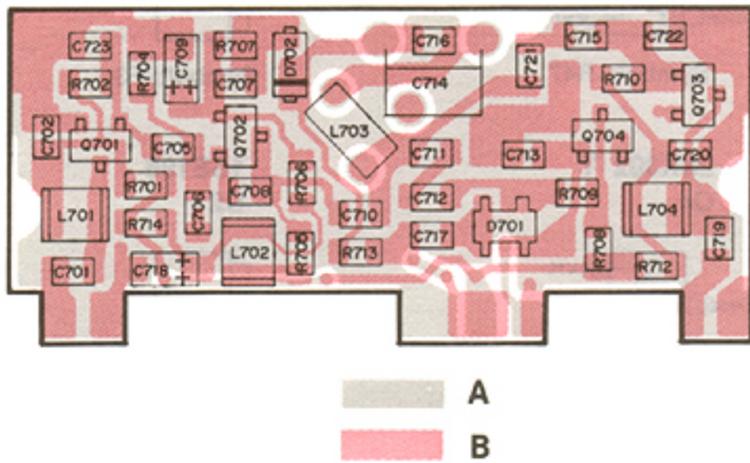
**2SC4081 R**  
Q22



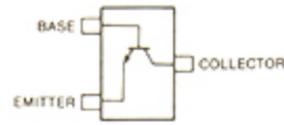
Symbol: BR

### 4-4 ATTACHED UNITS (RF UNIT)

• VCO UNIT

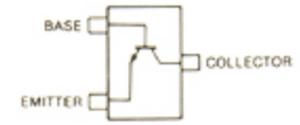


2SC3356 R24  
Q701, Q703



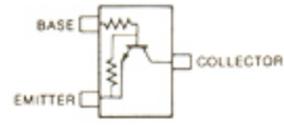
Symbol: R24

2SC3585  
Q702



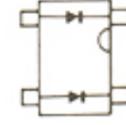
Symbol: R42

RN1403  
Q704



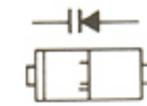
Symbol: XC

MA862  
D701



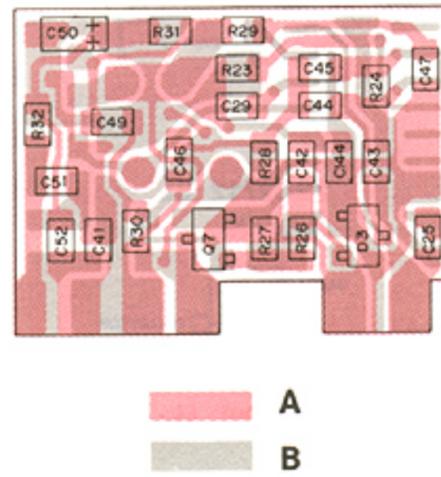
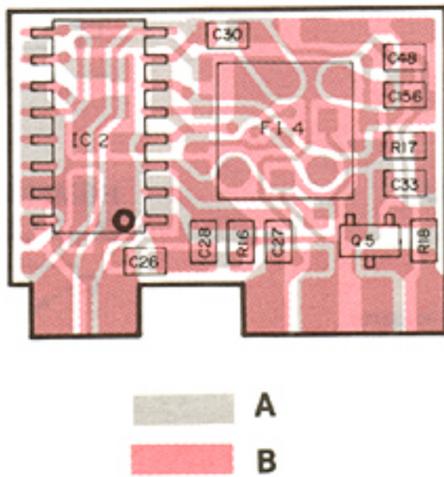
Symbol: M11

MA334 B  
D702

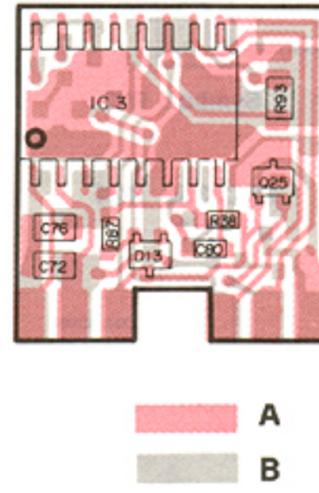
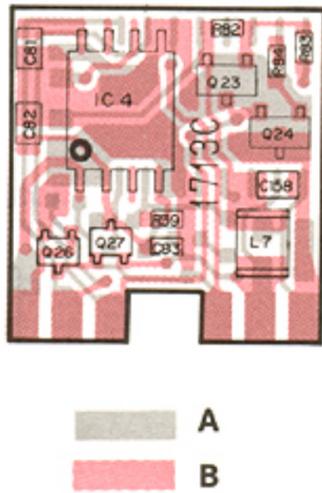


Symbol: 6D82

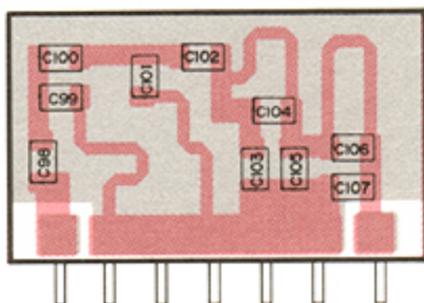
• IF



• PLL

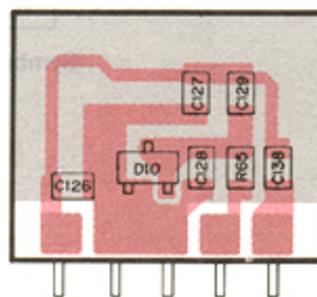


• BPF



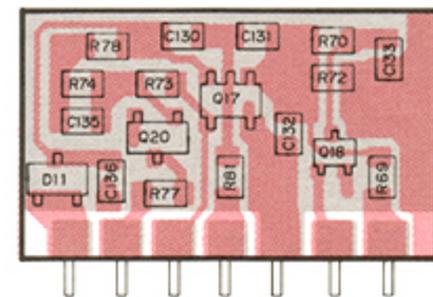
A  
B

• LPF



A  
B

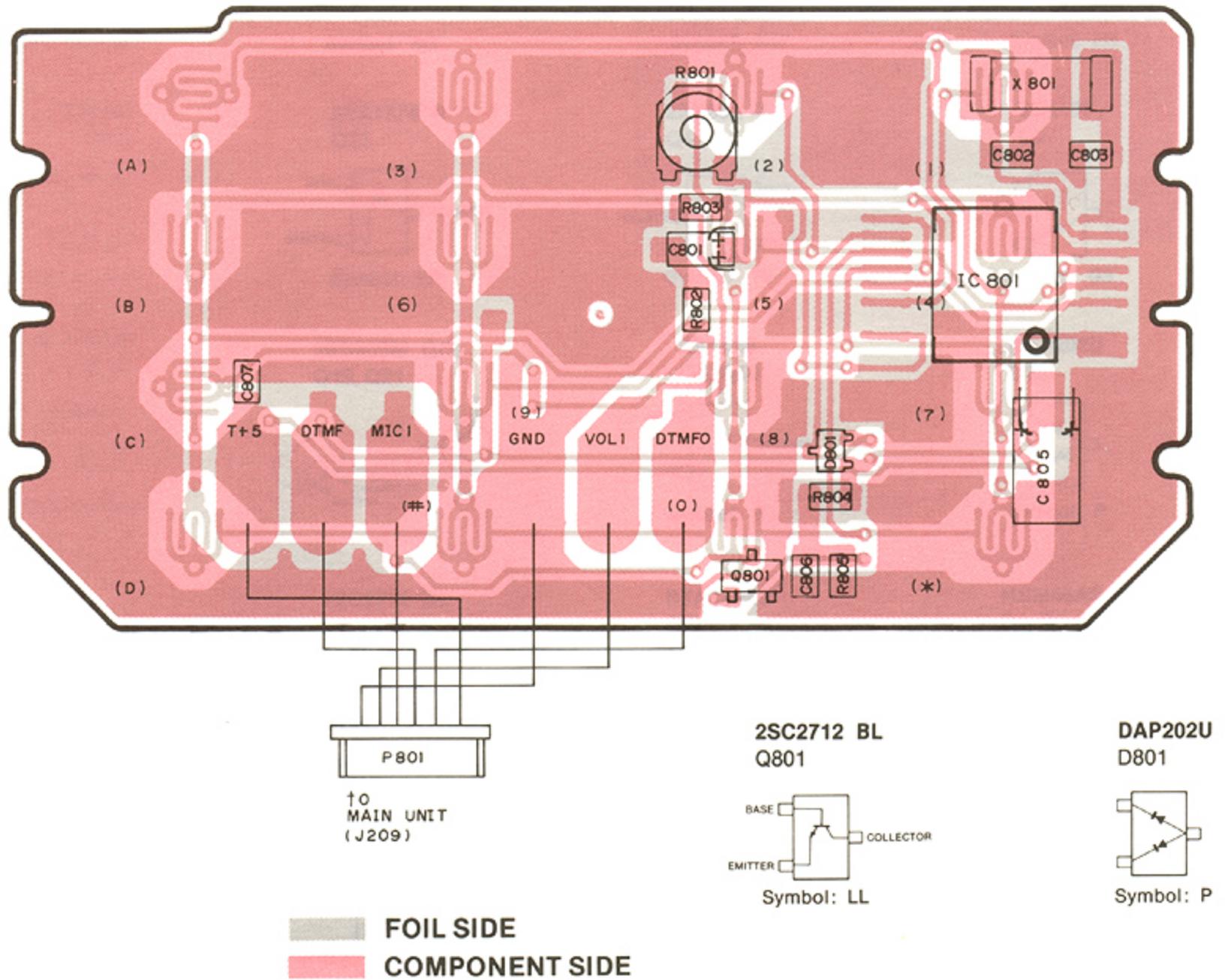
• APC



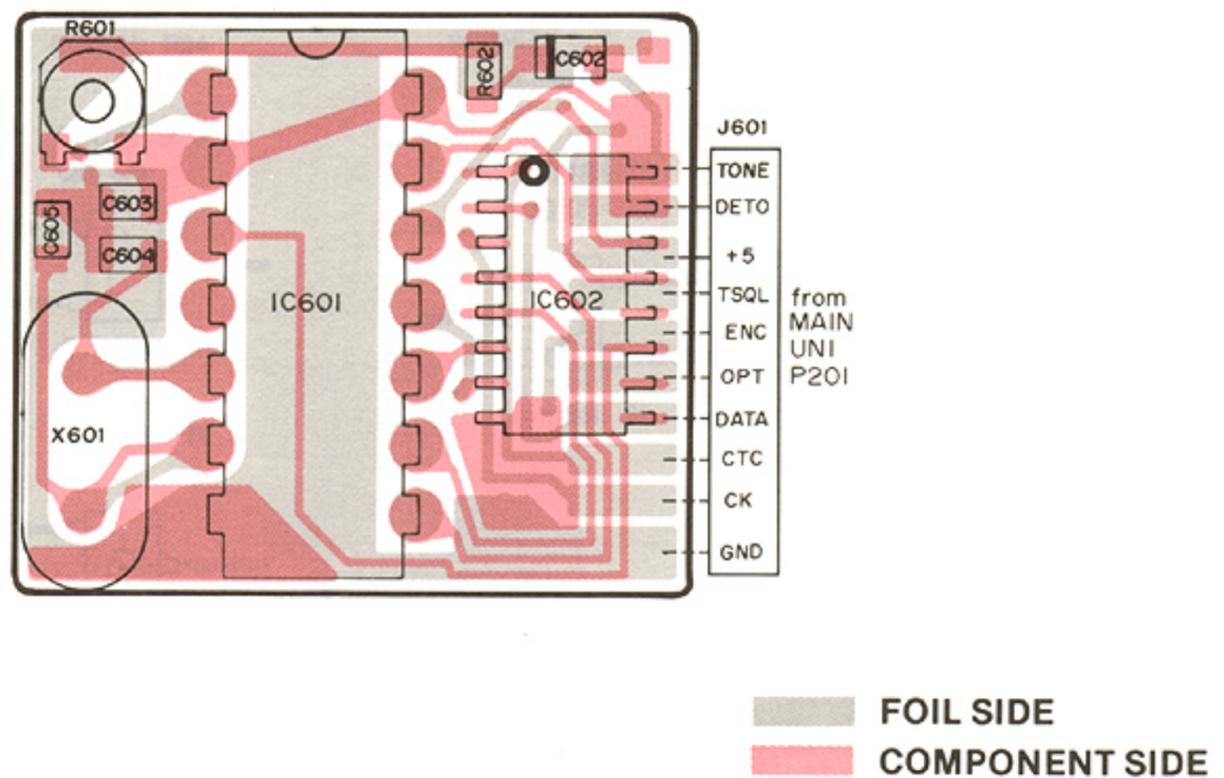
A  
B

### 4-5 DTMF AND TONE UNITS (IC-12GAT ONLY)

• DTMF UNIT



• TONE UNIT



## SECTION 5 PARTS LIST

## [LOGIC UNIT]

REF. NO.	DESCRIPTION	PART NO.
IC501	IC	S-8054ALB-LM
IC502	IC	LA6393M
IC503	IC	μPD75308GF-034-3B9
Q501	Transistor	2SC4081 R
Q502	Transistor	2SC4081 R
Q503	Transistor	2SA1362 GR
Q504	Transistor	RN1404
Q506	Transistor	2SA1576 R
Q507	Transistor	2SA1576 R
D501	Diode	1SS193
D502	Diode	1SS184
D503	Diode	1SS196
D504	Diode	1SS184 (IC-12GE)
	Diode	1SS193 (IC-12GAT)
D505	Diode	1SS184
D506	Diode	1SS196
D507	Diode	MA159
X501	Crystal	CR-227
R501	Variable Resistor	10 kΩ B RK0971110051A [SQL]
R502	Variable Resistor	10 kΩ A RK097111101NA [VOL]
R503	Resistor	4.7 kΩ MCR10
R504	Resistor	2.2 kΩ MCR10
R505	Resistor	47 Ω MCR10
R506	Resistor	47 kΩ MCR10
R507	Resistor	47 kΩ MCR10
R508	Array	MA5025 F 09 224 J
R512	Resistor	1 MΩ MCR10
R513	Resistor	1 MΩ MCR10
R514	Resistor	100 kΩ MCR10
R515	Resistor	100 kΩ MCR10
R516	Resistor	47 kΩ MCR10
R517	Resistor	1.2 MΩ MCR10
R522	Resistor	220 Ω MCR10
R523	Resistor	100 kΩ MCR10
R524	Resistor	330 kΩ MCR10
R525	Resistor	100 kΩ MCR10
R526	Resistor	390 kΩ MCR10
R527	Resistor	1 MΩ MCR10
R528	Resistor	220 kΩ MCR10
R529	Resistor	1 MΩ MCR10
R530	Resistor	1 MΩ MCR10
R532	Resistor	1 MΩ MCR10
R536	Resistor	1 MΩ MCR10
R537	Resistor	220 kΩ MCR10
R538	Resistor	820 kΩ MCR10
R539	Resistor	390 kΩ MCR10
R540	Resistor	220 kΩ MCR10
R541	Resistor	100 kΩ MCR10
C501	Ceramic	0.1 μF GRM40 F
C502	Ceramic	0.01 μF GRM40 F
C503	Ceramic	0.001 μF GRM40
C504	Ceramic	15 pF GRM40
C505	Ceramic	15 pF GRM40
C506	Tantalum	47 μF 6.3 V SV
C507	Ceramic	330 pF GRM40 CH
C508	Ceramic	0.001 μF GRM40
C509	Ceramic	0.1 μF GRM40 F
C510	Ceramic	0.001 μF GRM40

## [LOGIC UNIT]

REF. NO.	DESCRIPTION	PART NO.
C511	Ceramic	470 pF GRM40
C512	Ceramic	0.1 μF GRM40 F
C513	Ceramic	0.1 μF GRM40 F
C514	Ceramic	47 pF GRM40
DS501	LCD	LD-B9212J
DS502	LED	SLM-13MW
DS503	LED	SLM-13MW
DS504	LED	SLM-13VW
BT501	Lithium Battery	BR2325-1HC
W501	Jumper	JPW-01 R01
EP501	P.C. Board	B-1564C (LOGIC-A)
EP502	P.C. Board	B-1765 (LOGIC-B)
EP503	P.C. Board	B-1555A (SQL)
EP504	P.C. Board	B-1556B (VOL)
EP505	F.P.C. Board	B-1568A (MAIN~LOGIC-B)
EP506	F.P.C. Board	B-1569A (LOGIC-A~LOGIC-B)
EP507	Rubber Conductor	SRCN573

## [MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
IC201	IC	BA526
IC202	IC	μPD4094BG
IC203	IC	LC4001BM
IC204	IC	S81250HG
IC205	IC	M5218FP
IC206	IC	TC5082P-G (IC-12GE only)
Q202	Transistor	2SC4081 R
Q204	Transistor	2SC4081 R
Q205	Transistor	2SB909M Q/R
Q206	FET	2SJ106 GR
Q207	Transistor	2SA1162 GR
Q208	Transistor	FMW1
Q209	Transistor	2SC2712 BL
Q210	Transistor	2SB909M Q/R
Q211	Transistor	2SC4081 R
Q212	Transistor	2SA1576 R
Q213	Transistor	2SC2712 BL
Q214	Transistor	2SA1162 GR
Q215	Transistor	DTC144EU
Q216	Transistor	2SA1576 R
Q217	Transistor	2SA1576 R
Q218	Transistor	RN2404 (IC-12GE only)
Q219	Transistor	2SC4081 R
Q220	Transistor	2SC4081 R
D201	Diode	DAN202U
D202	Diode	DAN202U
D204	Diode	DAP202U
D205	Diode	DAN202U

## [MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.	
D206	Diode	DAP202U	
D207	Diode	DAN202U	
D208	Diode	1SS184	
		(IC-12GE only)	
D209	Diode	DAN202U	
D210	Zener	RD20E B2	
X201	Crystal	RF4A3 FAE	
R204	Resistor	47 kΩ	MCR10
R205	Resistor	4.7 kΩ	MCR10
R208	Resistor	22 kΩ	MCR10
R209	Resistor	680 Ω	MCR10
R210	Resistor	1 kΩ	MCR10
R211	Resistor	680 Ω	MCR10
R213	Resistor	4.7 kΩ	MCR10
R214	Resistor	4.7 kΩ	MCR10
R217	Resistor	2.2 kΩ	MCR10
R218	Resistor	10 kΩ	MCR10
R219	Resistor	100 kΩ	MCR10
R220	Resistor	10 kΩ	MCR10
R221	Resistor	27 Ω	MCR10
R222	Resistor	5.6 kΩ	MCR10
R223	Resistor	47 kΩ	MCR10
R224	Resistor	33 kΩ	MCR10
R225	Resistor	1.2 kΩ	MCR10
R226	Resistor	10 kΩ	MCR10
R227	Resistor	470 Ω	MCR10
R228	Resistor	47 kΩ	MCR10
R229	Resistor	330 kΩ	MCR10
R230	Resistor	240 kΩ	MCR10
R231	Resistor	1 kΩ	MCR10
R232	Resistor	180 kΩ	MCR10
R233	Resistor	120 Ω	MCR10
		(IC-12GE)	
	Resistor	270 Ω	MCR10
		(IC-12GAT)	
R234	Resistor	270 kΩ	MCR10
R235	Resistor	220 kΩ	MCR10
R236	Resistor	12 kΩ	MCR10
R237	Resistor	82 kΩ	MCR10
R238	Resistor	82 kΩ	MCR10
R239	Resistor	220 kΩ	MCR10
R240	Resistor	68 kΩ	MCR10
R241	Trimmer	47 kΩ	RH04A1AS4X
		(IC-12GE only)	
R242	Trimmer	10 kΩ	RH04A1A14X
		(IC-12GE only)	
R243	Resistor	47 kΩ	MCR10
R244	Resistor	1 MΩ	MCR10
R245	Resistor	330 kΩ	MCR10
R246	Resistor	150 kΩ	MCR10
R247	Resistor	4.7 kΩ	MCR10
R248	Resistor	39 kΩ	MCR10
R249	Resistor	15 kΩ	MCR10
R250	Resistor	2.2 kΩ	MCR10
R251	Resistor	39 kΩ	MCR10
R252	Resistor	4.7 kΩ	MCR10
R253	Resistor	3.3 kΩ	MCR10
R254	Resistor	560 Ω	MCR10
R255	Resistor	22 kΩ	MCR10
R256	Resistor	470 Ω	MCR10
R257	Resistor	1 kΩ	MCR10
R258	Resistor	1 kΩ	MCR10
C201	Electrolytic	2.2 μF	50 V MS5
C202	Ceramic	470 pF	GRM40
C203	Ceramic	470 pF	GRM40
C204	Electrolytic	47 μF	10 V RC3
C205	Electrolytic	33 μF	10 V RC3
C206	Tantalum	0.47 μF	25 V SV
C207	Ceramic	0.001 μF	GRM40

## [MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.		
C208	Electrolytic	1 μF	50 V	RC3
C209	Electrolytic	10 μF	10 V	RC3
C210	Ceramic	0.001 μF	GRM40	
C211	Electrolytic	47 μF	6.3 V	MS7
C212	Ceramic	0.01 μF	GRM40 F	
C213	Ceramic	47 pF	GRM40	
C214	Ceramic	0.1 μF	GRM40 F	
C215	Ceramic	0.001 μF	GRM40	
C216	Electrolytic	33 μF	16 V	RC3
C217	Ceramic	470 pF	GRM40	
C218	Ceramic	470 pF	GRM40	
C219	Electrolytic	100 μF	6.3 V	MS5
C220	Electrolytic	47 μF	6.3 V	MS5
C221	Electrolytic	47 μF	6.3 V	MS5
C223	Electrolytic	47 μF	16 V	MS5
C224	Ceramic	470 pF	GRM40	
C225	Electrolytic	22 μF	16 V	MS5
C226	Ceramic	470 pF	GRM40	
C227	Ceramic	0.1 μF	GRM40 F	
C228	Ceramic	470 pF	GRM40	
C229	Ceramic	470 pF	GRM40	
C230	Ceramic	470 pF	GRM40	
C231	Ceramic	470 pF	GRM40	
C232	Ceramic	470 pF	GRM40	
C233	Ceramic	470 pF	GRM40	
C234	Electrolytic	1 μF	50 V	MS5
C235	Ceramic	0.001 μF	GRM40	
C236	Ceramic	GRM40 B 103K 25PT		
C237	Ceramic	0.0047 μF	GRM40	
C238	Electrolytic	4.7 μF	16 V	MS5
		(IC-12GE only)		
C239	Tantalum	0.22 μF	35 V	DN
		(IC-12GAT only)		
C239	Tantalum	0.1 μF	35 V	DN
C240	Ceramic	470 pF	GRM40	
C241	Ceramic	470 pF	GRM40	
C242	Ceramic	120 pF	GRM40	
C243	Ceramic	GRM40 B 222K 50PT		
C244	Ceramic	0.001 μF	GRM40	
C245	Ceramic	GRM40 B 222K 50PT		
C246	Ceramic	0.1 μF	GRM40 F	
C247	Ceramic	47 pF	GRM40	
		(IC-12GE only)		
C248	Ceramic	10 pF	GRM40	
		(IC-12GE only)		
C249	Ceramic	10 pF	GRM40	
		(IC-12GE only)		
C250	Ceramic	0.001 μF	GRM40	
		(IC-12GE only)		
C251	Electrolytic	0.1 μF	50 V	MS5
		(IC-12GE only)		
C252	Ceramic	GRM40 B 103K 25PT		
C253	Ceramic	GRM40 B 222K 50PT		
C254	Ceramic	0.001 μF	GRM40	
C255	Ceramic	0.1 μF	GRM40 F	
C256	Electrolytic	47 μF	6.3 V	MS7
C257	Ceramic	470 pF	GRM40	
C258	Ceramic	470 pF	GRM40	
C259	Ceramic	470 pF	GRM40	
C260	Ceramic	470 pF	GRM40	
C261	Ceramic	470 pF	GRM40	
C262	Ceramic	470 pF	GRM40	
C263	Ceramic	470 pF	GRM40	
C264	Ceramic	470 pF	GRM40	
C265	Ceramic	470 pF	GRM40	
C266	Ceramic	470 pF	GRM40	
C267	Ceramic	470 pF	GRM40	
C268	Ceramic	470 pF	50 V	
C269	Ceramic	470 pF	GRM40	
C270	Ceramic	470 pF	GRM40	
C271	Ceramic	470 pF	GRM40	
C272	Ceramic	470 pF	GRM40	
C273	Ceramic	470 pF	GRM40	
C274	Ceramic	470 pF	GRM40	
C275	Ceramic	470 pF	GRM40	

## [MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
C276	Ceramic	470 pF GRM40
C277	Ceramic	470 pF GRM40
J201	Connector	HSJ0836-01-010
J202	Connector	HSJ1102-01-540
J203	Connector	PI28A02M
J204	Connector	PI28A04M
J205	Connector	PI28A04M
J206	Connector	CFP4128-0121
J207	Connector	BB04A 10F
J208	Connector	BB04A 10F
J209	Connector	PI28A06M
J210	Connector	TZB-P04H-A1
J211	Connector	TZB-P06H-A1 (IC-12GAT only)
J212	Connector	TZB-P04H-A1 (IC-12GAT only)
P201	Connector	PI28A10F (IC-12GAT only)
P202	Connector	PI28A02F
P203	Connector	PI28A04F
P204	Connector	PI28A04F
MC201	Microphone	KUC2023-01-006
S201	Switch	SKHLAD035A [HI/LOW]
S202	Switch	SKHLAD035A [MONI]
S204	Switch	SKHMPD004A [FUNC]
S205	Switch	SKHMPD004A [PTT]
S206	Switch	SKHLAD035A [CALL/TONE CALL]
SP201	Speaker	Si36D04
W201	Jumper	MCR10-JPW (IC-12GAT only)
W202	Jumper	MCR10-JPW (IC-12GE only)
EP201	P.C. Board	B-1720A (MAIN)
EP202	P.C. Board	B-1552C (PTT)
EP203	P.C. Board	B-1570C (JUNCTION)

## [RF UNIT]

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	MD004
IC2	IC	MC3361D
IC3	IC	MB87006APF-G-BND
IC4	IC	MB501LPF-G-BND
IC5	IC	SC-1083
Q1	Transistor	2SC4095
Q2	Transistor	2SC4095
Q3	Transistor	2SC3356 R24
Q4	FET	2SK302 Y
Q5	Transistor	2SC3770 3
Q6	Transistor	2SC3770 3
Q7	Transistor	2SC2712 BL

## [RF UNIT]

REF. NO.	DESCRIPTION	PART NO.
Q8	FET	2SK536
Q9	Transistor	DTC144EU
Q10	FET	2SK536
Q11	Transistor	DTA144EU
Q12	Transistor	DTC144EU
Q13	Transistor	2SC3356 R24
Q14	Transistor	2SC3356
Q15	Transistor	2SC3356
Q16	Transistor	2SC3356
Q17	Transistor	FMS1
Q18	Transistor	DTC144EU
Q19	Transistor	2SB909M Q/R
Q20	Transistor	2SC2712 BL
Q21	Transistor	2SB909M Q/R
Q22	Transistor	2SC4081 R
Q23	Transistor	2SA1162 GR
Q24	Transistor	2SA1162 GR
Q25	Transistor	2SA1576 R
Q26	Transistor	DTC144EU
Q27	Transistor	DTA143ZU
D1	Diode	HSM88AS
D2	Diode	1SS196
D3	Diode	HSM88AS
D5	Varicap	1SV149C
D7	Zener	RD9.1M B2
D8	Diode	MA862
D9	Diode	MA862
D10	Diode	HSM88AS
D11	Diode	1SS193
D12	Zener	RD3.3M B1
D13	Diode	DAP202U
F11	Dielectric	EZF-MC70BT12
F12	Dielectric	EZF-MC70BT12
F13	Monolithic	72M15B
F14	Ceramic	CFUM455E
X1	Crystal	CR-241
X2	Crystal	CR-242
L1	Coil	LS-285
L2	Coil	LS-287
L3	Coil	LS-285
L4	Coil	LS-289
L5	Coil	LS-299
L6	Coil	LS-293
L7	Coil	LQH3N 100K
L8	Coil	LB-185
L10	Coil	LQN2A 18NM
R1	Resistor	100 Ω MCR10
R2	Resistor	8.2 kΩ MCR10
R3	Resistor	22 kΩ MCR10
R4	Resistor	330 Ω MCR10
R5	Resistor	8.2 kΩ MCR10
R6	Resistor	27 kΩ MCR10
R7	Resistor	330 Ω MCR10
R9	Resistor	47 Ω MCR10
R11	Resistor	100 kΩ MCR10
R12	Resistor	680 Ω MCR10
R13	Resistor	100 Ω MCR10
R14	Resistor	100 Ω MCR10
R15	Resistor	1.5 kΩ MCR10
R16	Resistor	8.2 kΩ MCR10
R17	Resistor	4.7 kΩ MCR10
R18	Resistor	560 kΩ MCR10
R19	Trimmer	20 kΩ EVM-LGG A00 B24
R20	Resistor	680 kΩ MCR10
R21	Resistor	10 kΩ MCR10

## [RF UNIT]

REF. NO.	DESCRIPTION	PART NO.
R22	Resistor	330 kΩ MCR10
R23	Resistor	47 kΩ MCR10
R24	Resistor	470 kΩ MCR10
R26	Resistor	100 kΩ MCR10
R27	Resistor	1 MΩ MCR10
R28	Resistor	5.6 kΩ MCR10
R29	Resistor	470 Ω MCR10
R30	Resistor	2.2 kΩ MCR10
R31	Resistor	2.7 kΩ MCR10
R32	Resistor	27 kΩ MCR10
R35	Resistor	56 kΩ MCR10
R36	Resistor	100 kΩ MCR10
R38	Resistor	MCR03 EZO J 474E
R39	Resistor	MCR03 EZH J 332E
R40	Resistor	10 kΩ MCR10
R41	Resistor	47 Ω MCR10
R42	Resistor	1.5 kΩ MCR10
R43	Resistor	2.7 kΩ MCR10
R44	Resistor	8.2 kΩ MCR10
R45	Resistor	330 kΩ MCR10
R47	Resistor	68 kΩ MCR10
R49	Resistor	330 Ω MCR10
R50	Resistor	6.8 kΩ MCR10
R51	Resistor	1.8 kΩ MCR10
R52	Resistor	330 Ω MCR10
R53	Resistor	10 kΩ MCR10
R55	Resistor	1 kΩ MCR10
R56	Resistor	220 Ω MCR10
R57	Resistor	10 kΩ MCR10
R58	Resistor	10 kΩ MCR10
R59	Resistor	1 kΩ MCR10
R60	Resistor	3.3 kΩ MCR10
R61	Resistor	100 Ω MCR10
R62	Resistor	1 kΩ MCR10
R63	Resistor	2.7 kΩ MCR10
R64	Resistor	180 Ω MCR10
R65	Resistor	22 kΩ MCR10
R66	Resistor	1 kΩ MCR10
R67	Resistor	47 Ω MCR10
R68	Trimmer	50 kΩ EVM-LGG A00 B54
R69	Resistor	2.7 kΩ MCR10
R70	Resistor	3.3 kΩ MCR10
R72	Resistor	22 kΩ MCR10
R73	Resistor	22 kΩ MCR10
R74	Resistor	220 kΩ MCR10
R75	Resistor	1 MΩ MCR10
R76	Resistor	1.2 kΩ MCR10
R77	Resistor	3.3 kΩ MCR10
R78	Resistor	22 kΩ MCR10
R79	Resistor	22 kΩ MCR10
R80	Resistor	100 kΩ MCR10
R81	Resistor	82 kΩ MCR10
R82	Resistor	MCR03 EZO J 103E
R83	Resistor	MCR03 EZO J 103E
R84	Resistor	MCR03 EZO J 103E
R85	Resistor	470 Ω MCR10
R86	Resistor	22 kΩ MCR10
R87	Resistor	MCR03 EZO J 104E
R88	Resistor	3.9 kΩ MCR10
R89	Resistor	3.9 kΩ MCR10
R90	Resistor	100 kΩ MCR10
R91	Resistor	33 kΩ MCR10
R92	Resistor	100 Ω MCR10
R93	Resistor	4.7 kΩ MCR10
C1	Ceramic	470 pF GRM40
C2	Ceramic	470 pF GRM40
C3	Ceramic	4 pF GRM40
C4	Ceramic	4 pF GRM40
C5	Ceramic	3 pF GRM40
C6	Ceramic	SL 1R5C 50PT GRM40
C7	Ceramic	470 pF GRM40
C10	Ceramic	SL 1R5C 50PT GRM40
C11	Ceramic	470 pF GRM40

## [RF UNIT]

REF. NO.	DESCRIPTION	PART NO.
C13	Ceramic	39 pF GRM40
C14	Ceramic	4 pF GRM40
C16	Ceramic	SL 1R5C 50PT GRM40
C17	Ceramic	22 pF GRM40
C18	Ceramic	470 pF GRM40
C19	Ceramic	4 pF GRM40
C20	Ceramic	22 pF GRM40
C21	Ceramic	0.001 μF GRM40
C22	Ceramic	470 pF GRM40
C23	Ceramic	7 pF GRM40
C24	Electrolytic	0.1 μF 50 V MS5
C25	Ceramic	0.001 μF GRM40
C26	Ceramic	0.001 μF GRM40
C27	Ceramic	5 pF GRM40
C28	Ceramic	5 pF GRM40
C29	Ceramic	0.1 μF GRM40 F
C30	Ceramic	0.1 μF GRM40 F
C31	Ceramic	0.001 μF GRM40
C33	Ceramic	22 pF GRM40
C34	Ceramic	470 pF GRM40
C35	Ceramic	0.1 μF GRM40 F
C36	Ceramic	470 pF GRM40
C37	Ceramic	0.1 μF GRM40 F
C38	Ceramic	470 pF GRM40
C39	Electrolytic	0.22 μF 50 V MS5
C40	Ceramic	470 pF GRM40
C41	Ceramic	470 pF GRM40
C42	Ceramic	0.1 μF GRM40 F
C43	Ceramic	0.001 μF GRM40
C44	Ceramic	27 pF GRM40
C45	Ceramic	0.001 μF GRM40
C46	Ceramic	470 pF GRM40
C47	Ceramic	0.001 μF GRM40
C48	Ceramic	0.001 μF GRM40
C49	Ceramic	470 pF GRM40
C50	Tantalum	0.1 μF 35 V SV
C51	Ceramic	0.01 μF GRM40 F
C52	Ceramic	0.001 μF GRM40 B
C53	Ceramic	470 pF GRM40
C54	Ceramic	47 pF GRM40
C55	Ceramic	470 pF GRM40
C56	Ceramic	470 pF GRM40
C57	Ceramic	47 pF GRM40
C58	Ceramic	470 pF GRM40
C59	Ceramic	47 pF GRM40
C60	Ceramic	47 pF GRM40
C61	Electrolytic	4.7 μF 25 V MS5
C62	Ceramic	470 pF GRM40
C63	Ceramic	470 pF GRM40
C64	Ceramic	470 pF GRM40
C65	Ceramic	470 pF GRM40
C66	Ceramic	470 pF GRM40
C67	Ceramic	470 pF GRM40
C68	Ceramic	470 pF GRM40
C69	Ceramic	470 pF GRM40
C70	Ceramic	0.01 μF GRM40 F
C71	Ceramic	470 pF GRM40
C72	Ceramic	47 pF GRM40 CH
C73	Ceramic	47 pF GRM40 CH
C74	Ceramic	39 pF GRM40 CH
C75	Trimmer	35 pF ECRGA035M30
C76	Ceramic	56 pF GRM40 SH
C78	Ceramic	470 pF GRM40
C79	Electrolytic	4.7 μF 25 V MS5
C80	Ceramic	GRM39 B 102K 50PT
C81	Ceramic	0.001 μF GRM40
C82	Ceramic	0.1 μF GRM40 F
C83	Ceramic	GRM39 B 471K 50PT
C85	Ceramic	0.001 μF GRM40
C86	Tantalum	3.3 μF 16 V DN
C87	Ceramic	0.1 μF GRM40 F
C89	Electrolytic	0.47 μF 50 V MS5
C92	Ceramic	470 pF GRM40
C93	Ceramic	6 pF GRM40
C96	Ceramic	2 pF GRM40

## [RF UNIT]

REF. NO.	DESCRIPTION	PART NO.	
C97	Ceramic	470 pF	GRM40
C98	Ceramic	3 pF	GRM40
C99	Ceramic	47 pF	GRM40
C100	Ceramic	SL 1R5C 50PT	GRM40
C101	Ceramic	33 pF	GRM40
C102	Ceramic	3 pF	GRM40
C103	Ceramic	2 pF	GRM40
C104	Ceramic	1 pF	GRM40
C105	Ceramic	4 pF	GRM40
C106	Ceramic	0.5 pF	GRM40
C107	Ceramic	2 pF	GRM40
C108	Ceramic	10 pF	GRM40
C109	Ceramic	3 pF	GRM40
C110	Ceramic	470 pF	GRM40
C111	Ceramic	470 pF	GRM40
C112	Ceramic	4 pF	GRM40
C113	Ceramic	470 pF	GRM40
C114	Ceramic	2 pF	GRM40
C115	Ceramic	2 pF	GRM40
C116	Ceramic	2 pF	GRM40
C117	Ceramic	470 pF	GRM40
C118	Ceramic	2 pF	GRM40
C119	Ceramic	2 pF	GRM40
C120	Ceramic	4 pF	GRM40
C121	Ceramic	470 pF	GRM40
C122	Ceramic	470 pF	GRM40
C123	Tantalum	10 $\mu$ F	16 V DN
C124	Ceramic	470 pF	GRM40
C125	Tantalum	4.7 $\mu$ F	16 V DN
C126	Ceramic	3 pF	GRM40
C127	Ceramic	2 pF	GRM40
C128	Ceramic	SL 1R5C 50PT	GRM40
C129	Ceramic	4 pF	GRM40
C130	Ceramic	470 pF	GRM40
C131	Ceramic	470 pF	GRM40
C132	Ceramic	470 pF	GRM40
C133	Ceramic	470 pF	GRM40
C134	Electrolytic	10 $\mu$ F	16 V MS5
C135	Ceramic	470 pF	GRM40
C136	Ceramic	470 pF	GRM40
C137	Ceramic	470 pF	GRM40
C138	Ceramic	SL 3R5NC 50-500	GRM40
C139	Ceramic	3 pF	GRM40
C140	Ceramic	0.01 $\mu$ F	GRM40 F
C142	Ceramic	470 pF	GRM40
C144	Ceramic	0.001 $\mu$ F	GRM40
C145	Ceramic	2 pF	GRM40
C146	Ceramic	470 pF	GRM40
C147	Ceramic	4 pF	GRM40
C148	Ceramic	470 pF	GRM40
C149	Ceramic	470 pF	GRM40
C150	Ceramic	470 pF	GRM40
C151	Ceramic	470 pF	GRM40
C152	Ceramic	470 pF	GRM40
C153	Ceramic	470 pF	GRM40
C154	Ceramic	470 pF	GRM40
C155	Ceramic	470 pF	GRM40
C156	Ceramic	0.1 $\mu$ F	GRM40 F
C157	Ceramic	8 pF	GRM40
C158	Ceramic	0.1 $\mu$ F	GRM40 F
C159	Ceramic	100 pF	GRM40
C160	Ceramic	100 pF	GRM40
C161	Ceramic	100 pF	GRM40
C162	Ceramic	100 pF	GRM40
C163	Tantalum	1 $\mu$ F	16 V SV
J1	Connector	TNC-R106	
J2	Connector	BB04G 10M	
J3	Connector	BB04G 10M	
EP1	P.C. Board	B-1598C (RF)	
EP2	P.C. Board	B-1599D (APC)	
EP3	P.C. Board	B-1600B (LPF)	

## [RF UNIT]

REF. NO.	DESCRIPTION	PART NO.
EP4	P.C. Board	B-1601B (BPF)
EP5	P.C. Board	B-1602A (IF)
EP9	P.C. Board	B-1713C (PLL)

## [VCO UNIT]

REF. NO.	DESCRIPTION	PART NO.	
Q701	Transistor	2SC3356	R24
Q702	Transistor	2SC3585	
Q703	Transistor	2SC3356	R24
Q704	Transistor	RN1403	
D701	Diode	MA862	
D702	Varicap	MA334	B
L701	Coil	LQN2A	18NM
L702	Coil	LQH3N	R39M
L703	Coil	LA-232	
L704	Coil	LQN2A	18NM
R701	Resistor	330 $\Omega$	MCR10
R702	Resistor	68 k $\Omega$	MCR10
R704	Resistor	150 $\Omega$	MCR10
R705	Resistor	47 $\Omega$	MCR10
R706	Resistor	6.8 k $\Omega$	MCR10
R707	Resistor	4.7 k $\Omega$	MCR10
R708	Resistor	47 k $\Omega$	MCR10
R709	Resistor	4.7 k $\Omega$	MCR10
R710	Resistor	68 k $\Omega$	MCR10
R712	Resistor	330 $\Omega$	MCR10
R713	Resistor	1 k $\Omega$	MCR10
R714	Resistor	100 $\Omega$	MCR10
C701	Ceramic	6 pF	GRM40
C702	Ceramic	470 pF	GRM40
C705	Ceramic	SL 0R75C 50PT	GRM40
C706	Ceramic	5 pF	GRM40
C707	Ceramic	470 pF	GRM40
C708	Ceramic	4 pF	GRM40
C709	Tantalum	1 $\mu$ F	16 V SV
C710	Ceramic	7 pF	GRM40
C711	Ceramic	6 pF	GRM40
C712	Ceramic	4 pF	GRM40
C713	Ceramic	470 pF	GRM40
C714	Trimmer	ECR-LB003A12	
C715	Ceramic	SL 0R3B 50PT	GRM40
C716	Ceramic	8 pF	GRM40
C717	Ceramic	0.01 $\mu$ F	GRM40 F
C718	Tantalum	1 $\mu$ F	16 V SV
C719	Ceramic	4 pF	GRM40
C720	Ceramic	470 pF	GRM40
C721	Ceramic	SL 0R3B 50PT	GRM40
C722	Ceramic	8 pF	GRM40
C723	Ceramic	8 pF	GRM40
EP701	P.C. Board	B-1563C	

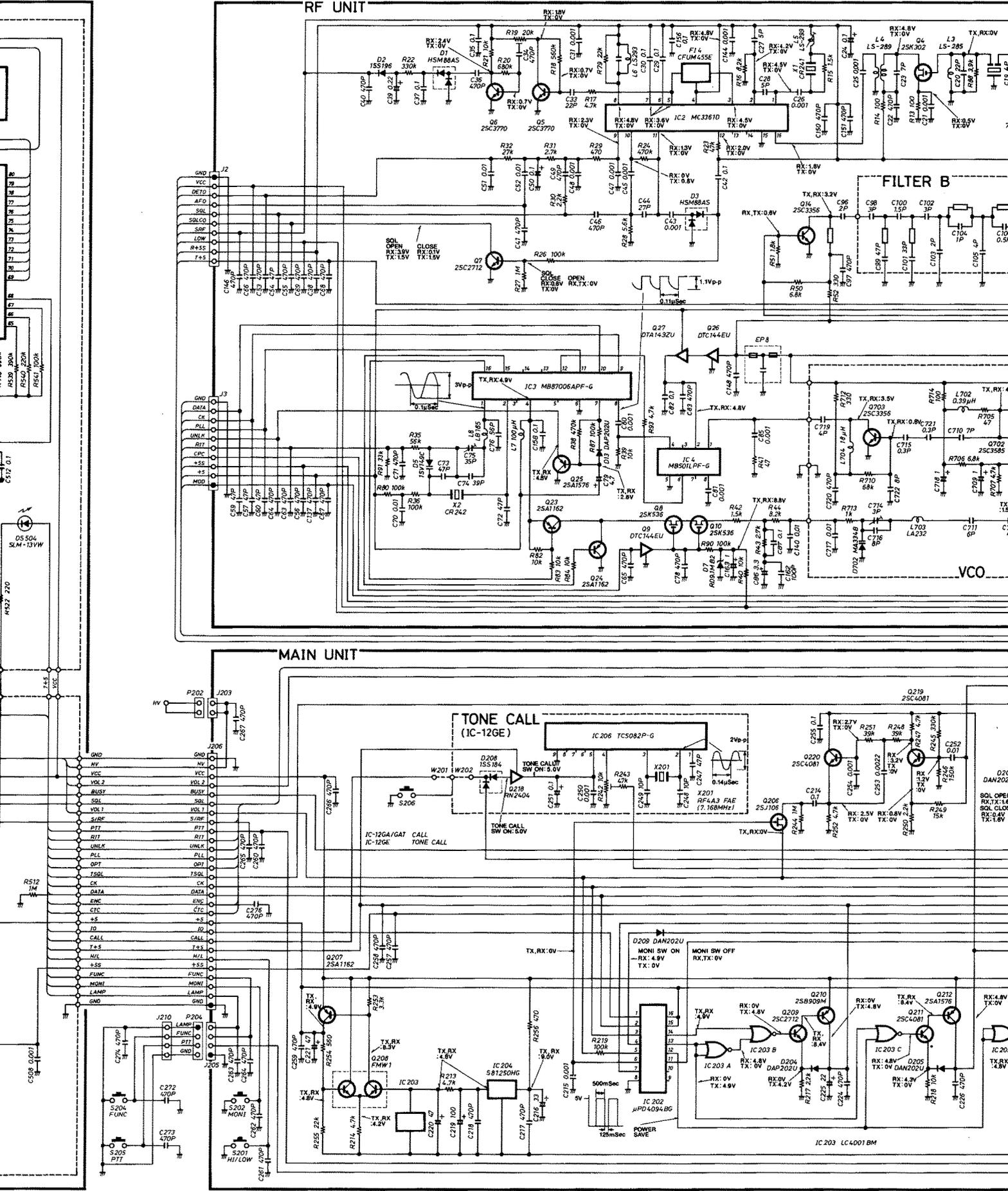
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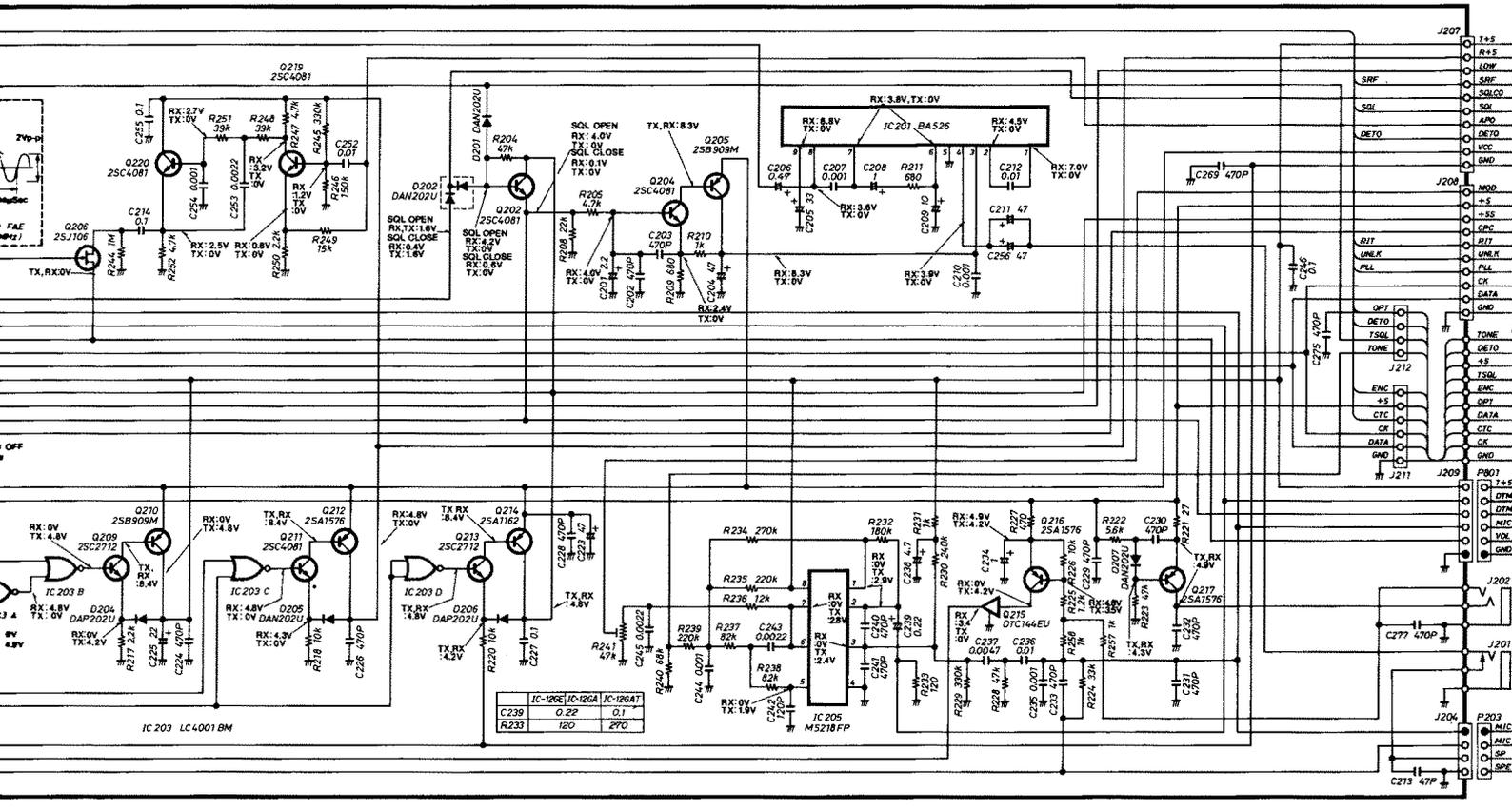
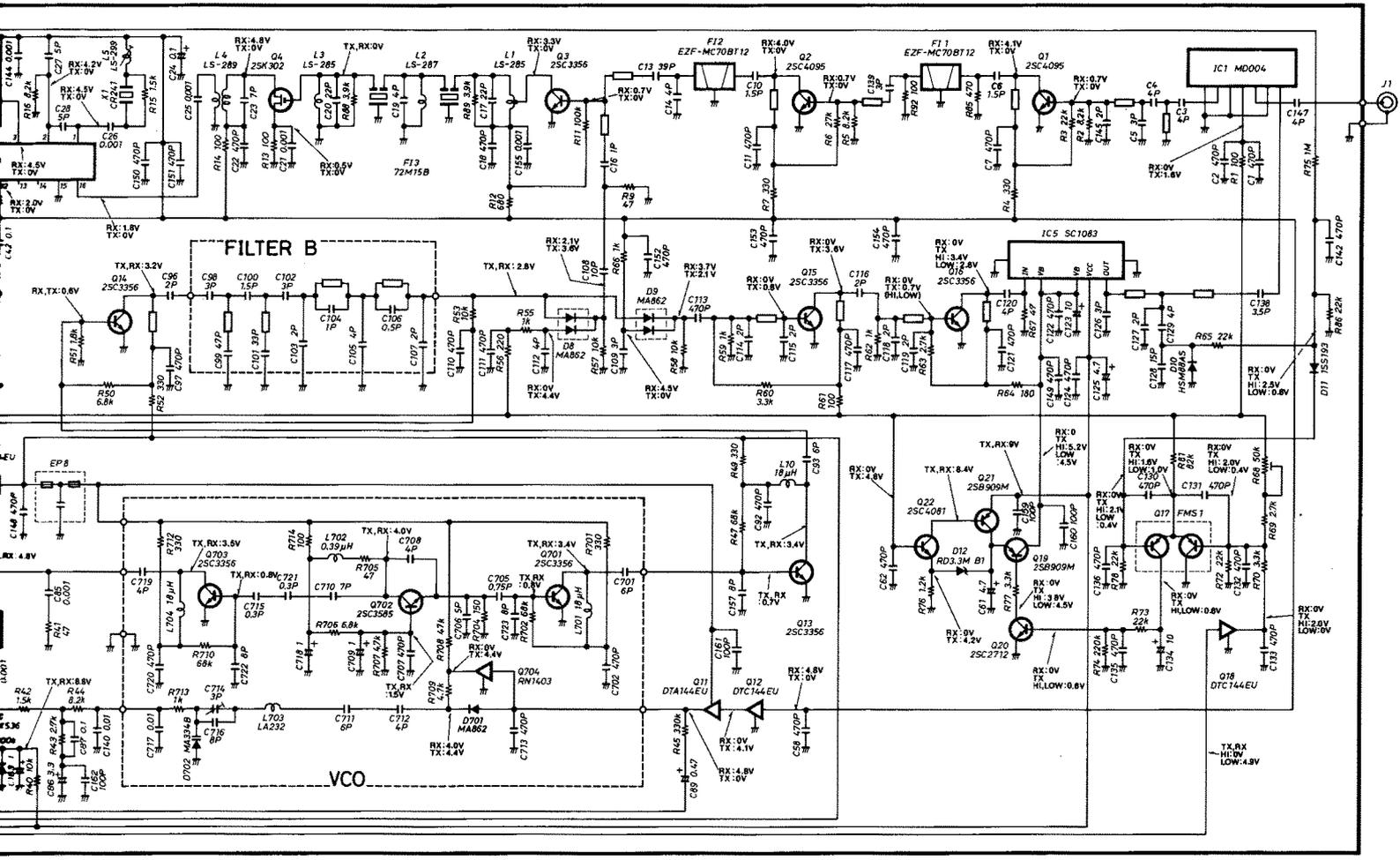
REF. NO.	DESCRIPTION	PART NO.	
IC801	IC	LR40872	
Q801	Transistor	2SC2712 BL	
D801	Diode	DAP202U	
X801	Ceramic Resonator	CSAC3.58MGC300CD	
R801	Trimmer	10 k $\Omega$	RH04A1A14X
R802	Resistor	33 k $\Omega$	MCR10
R803	Resistor	22 k $\Omega$	MCR10
R804	Resistor	47 k $\Omega$	MCR10
R805	Resistor	68 k $\Omega$	MCR10
C801	Tantalum	0.47 $\mu$ F	25 V SV
C802	Ceramic	SL 300J	50PT GRM40
C803	Ceramic	SL 300J	50PT GRM40
C805	Tantalum	TESVC1A106M12L	
C806	Ceramic	470 pF	GRM40
C807	Ceramic	470 pF	GRM40
P801	Connector	PI28A06F	
EP801	P.C. Board	B-1567B	

**[TONE UNIT] (IC-12GAT ONLY)**

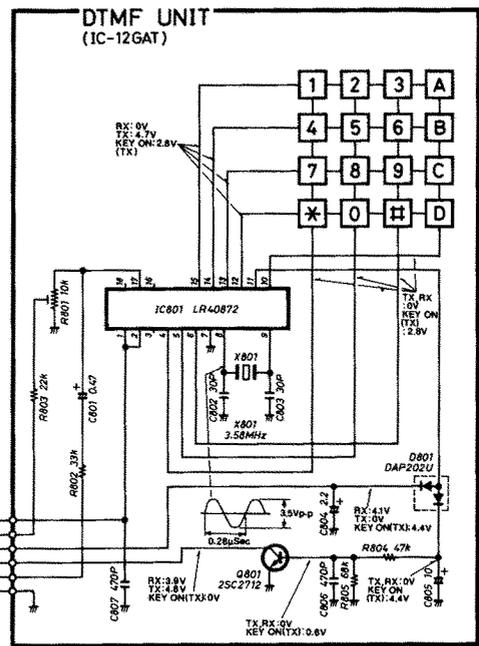
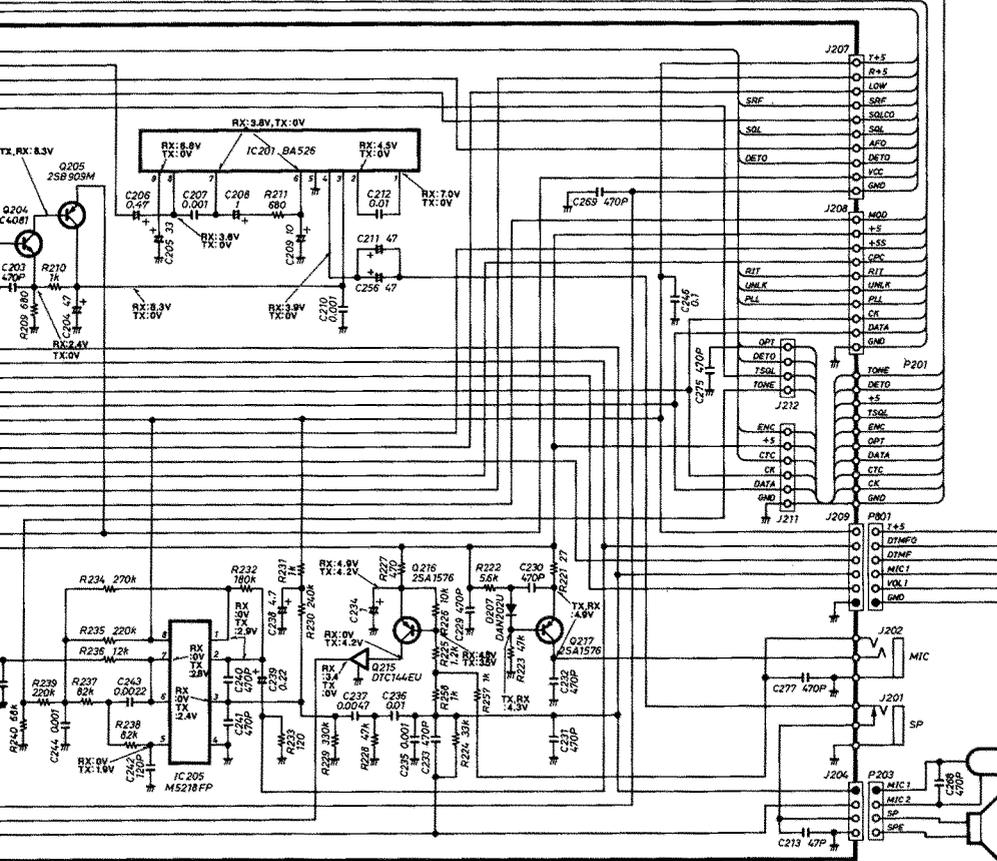
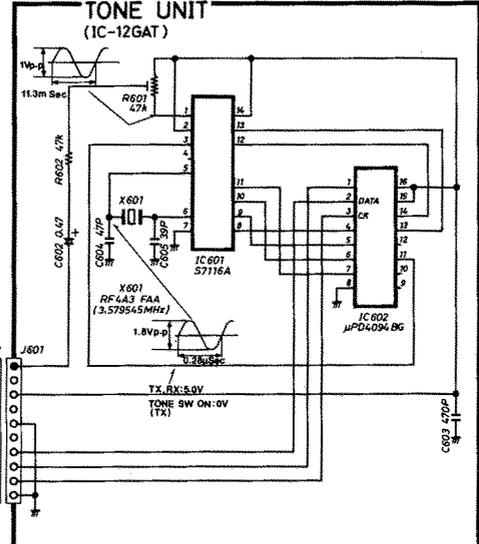
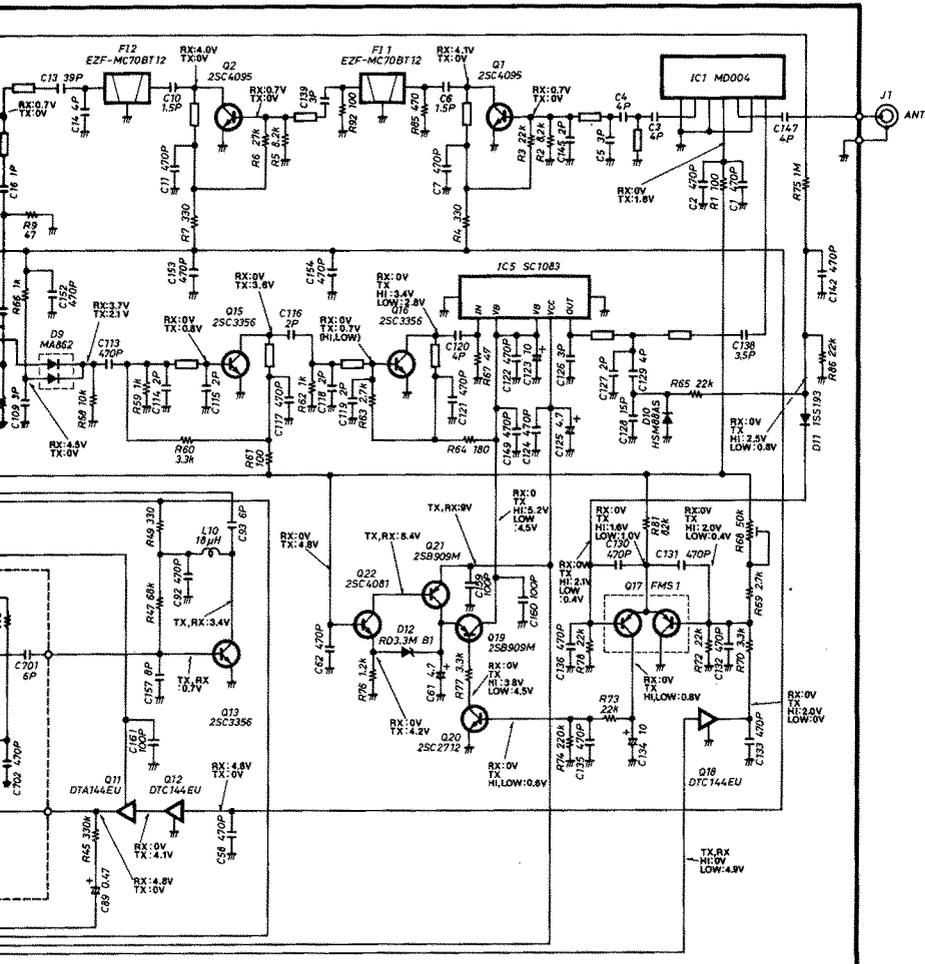
REF. NO.	DESCRIPTION	PART NO.	
IC601	IC	S7116A	
IC602	IC	$\mu$ PD4094BG	
X601	Crystal	RF4A3 FAA (3.579545 MHz)	
R601	Trimmer	47 k $\Omega$	RH04A1AS4X
R602	Resistor	47 k $\Omega$	MCR10
C602	Tantalum	0.47 $\mu$ F	25 V SV
C603	Ceramic	470 pF	GRM40
C604	Ceramic	47 pF	GRM40
C605	Ceramic	39 pF	GRM40
J601	Connector	PI28A10M	
EP601	P.C. Board	B-1566B	







	IC-126E	IC-126A	IC-126A1
C239	0.22	0.1	
R233	120	270	



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