

**ICOM**

**SERVICE  
MANUAL**

SECURE VHF TRANSCEIVER

**IC-H10SR**

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## INTRODUCTION

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The IC-H10SR VHF transceiver is an extended case version of the standard IC-H10 for use with the DM8000 Digital Encryption Module. The transceiver is supplied with a linking plug which allow it to be used in standard analog mode. To convert to secure mode, the linking plug is removed and the DM8000 module is fitted in its place.

This service manual describes the latest service information for the **IC-H10SR** VHF TRANSCEIVER at the time of publication.

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## DANGER

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**NEVER** connect the transceiver to an AC outlet or to a DC power supply that uses more than 14 V. This will ruin the transceiver.

**DO NOT** expose the transceiver to rain, snow or any liquids.

**DO NOT** reverse the polarities of the battery pack when connecting the transceiver.

**DO NOT** apply an RF signal of more than 20 dBm (100 mW) to the antenna connector. This could damage the transceiver's front end.

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## ORDERING PARTS

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Be sure to include the following four points when ordering replacement parts:

1. 10-digit order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

### <SAMPLE ORDER>

1150000780	IC	SC1106	IC-H10SR MAIN UNIT	5 pieces
8810005360	Screw	PH No. 0-1 M2×3 ZK	IC-H10SR Rear plate	10 pieces

Addresses are provided on the inside back cover for your convenience.

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## REPAIR NOTES

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1. The transceiver should always be serviced with the DM8000 module removed and the linking plug fitted.
2. Make sure a problem is internal before disassembling the transceiver.
3. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
4. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
5. **DO NOT** short any circuits or electric parts. An insulated tuning tool **MUST** be used for all adjustments.
6. **DO NOT** keep power ON for a long time if the transceiver is defective.
7. **DO NOT** transmit power into a signal generator or a sweep generator.
8. **ALWAYS** connect a 30 dB~40 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
9. **READ** the instructions for test equipment thoroughly before connecting equipment to the transceiver.



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To program the operating frequency, etc., see the separately available EX-704 PROGRAMMING MANUAL (A-5108S-1EX).

# SECTION 1 SPECIFICATIONS

## ■ GENERAL

- Frequency coverage : 150~174 MHz
- Mode : 16K0F3E (clear mode)  
16K0F1D [with DM8000 in (secure mode)]
- Number of channels : Up to 10 operating channels
- Channel spacing : 25 kHz
- Usable battery pack : Icom battery packs  
CM-23, CM-24, CM-87
- Antenna impedance : 50  $\Omega$  (unbalanced)
- Usable temperature range :  $-14\text{ }^{\circ}\text{C}\sim+55\text{ }^{\circ}\text{C}$  ( $+14\text{ }^{\circ}\text{F}\sim+131\text{ }^{\circ}\text{F}$ )
- Frequency stability :  $\pm 0.0005\%$
- Dimensions (with CM-87) : 58 (W) $\times$ 246.5 (H) $\times$ 29.5 (D) mm; 2.3 (W) $\times$ 9.7 (H) $\times$ 1.2 (D) in  
(Projections not included)
- Weight (without battery) : 322 g (11.4 oz)

## ■ TRANSMITTER

- Output power : High: 1.5 W (with CM-87)  
2.5 W (with CM-23)  
Low: 1.0 W (with CM-23)
- Modulation system : Variable reactance frequency modulation
- Current drain (at 12.5 V DC) : High: 1.4 A  
Low: 1.0 A
- Maximum deviation :  $\pm 5$  kHz
- Spurious emissions :  $-60$  dB
- Harmonic emissions :  $-60$  dB
- FM hum and noise :  $-40$  dB
- Microphone impedance : 2 k $\Omega$
- Audio response :  $+1\text{ dB}\sim-3\text{ dB}$  of  $+6\text{ dB/octave}$  300 Hz~3000 Hz

## ■ RECEIVER

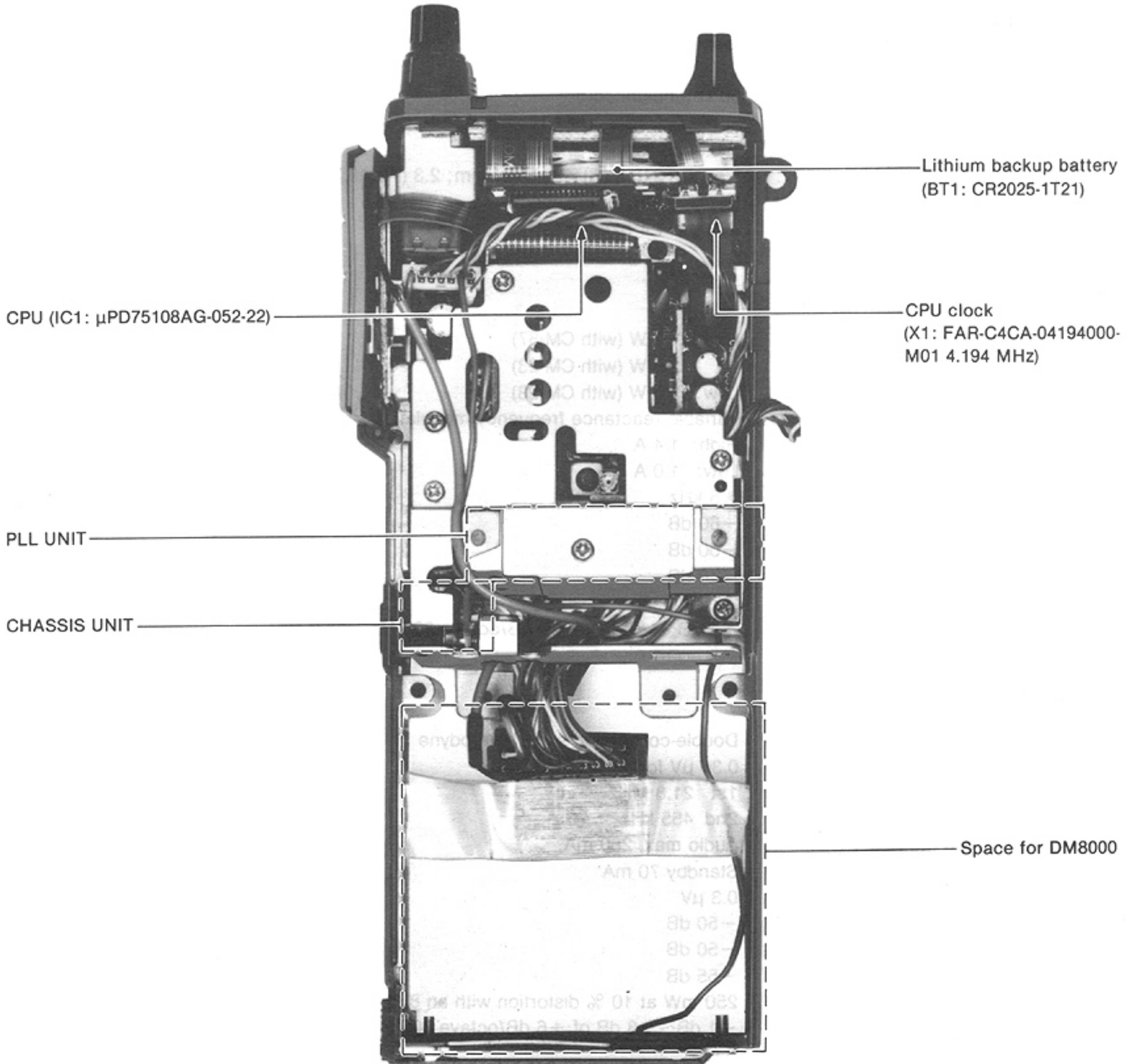
- Receive system : Double-conversion superheterodyne
- Sensitivity : 0.36  $\mu\text{V}$  for 12 dB SINAD
- Intermediate frequencies : 1st 21.8 MHz  
2nd 455 kHz
- Current drain (at 12.5 V DC) : Audio max. 250 mA  
Standby 70 mA
- Squelch threshold sensitivity : 0.3  $\mu\text{V}$
- Adjacent channel selectivity :  $-50$  dB
- Intermodulation rejection :  $-50$  dB
- Spurious rejection :  $-55$  dB
- Audio output power : 250 mW at 10 % distortion with an 8  $\Omega$  load
- Audio response :  $+1\text{ dB}\sim-3\text{ dB}$  of  $+6\text{ dB/octave}$  300 Hz~3000 Hz
- Audio output impedance : 8  $\Omega$
- Noise and hum :  $-40$  dB

All specifications follow EIA RS-316B and RS-204C measurement procedures.  
All stated specifications are subject to change without notice or obligation.

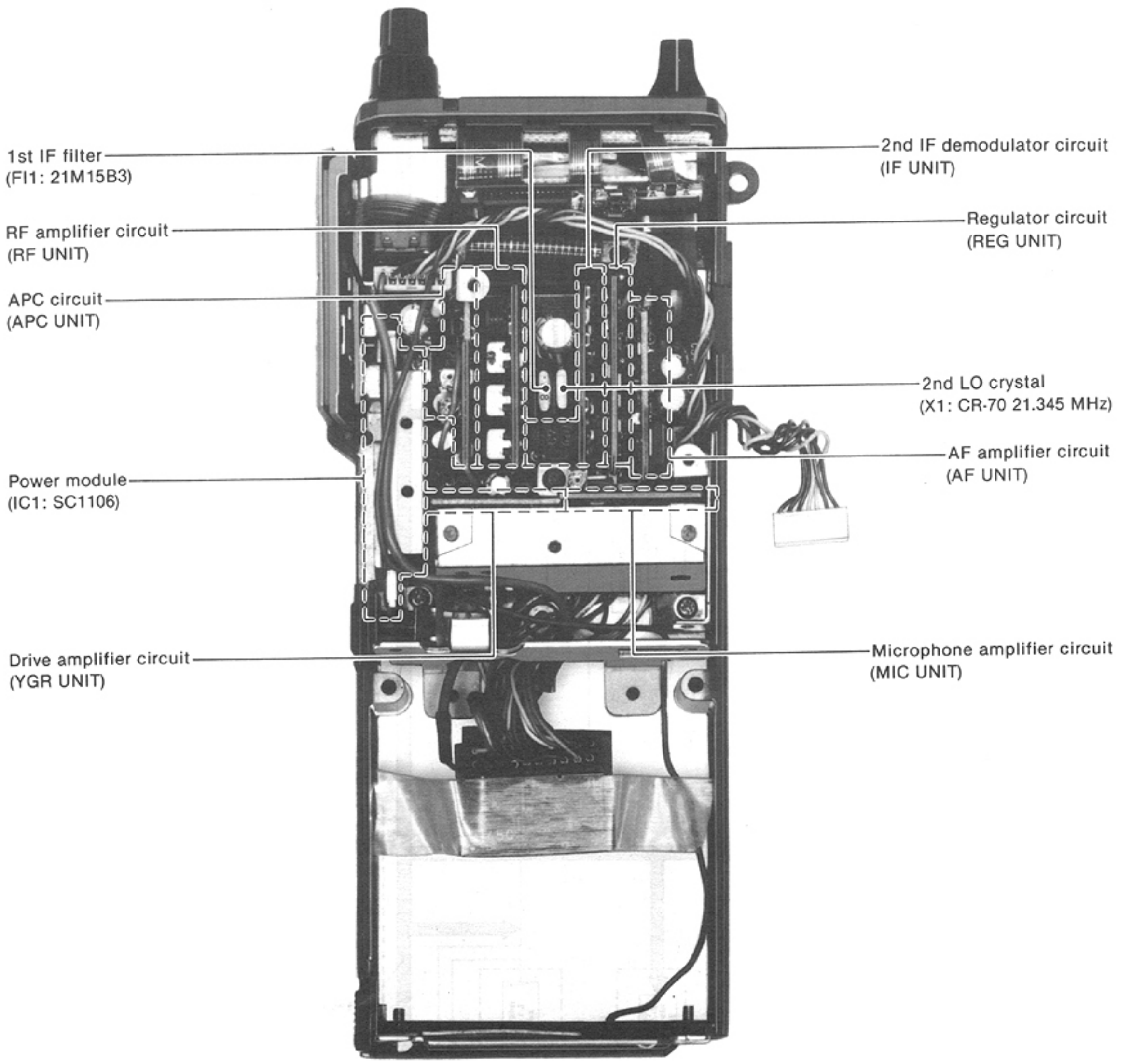


## SECTION 2 INSIDE VIEWS

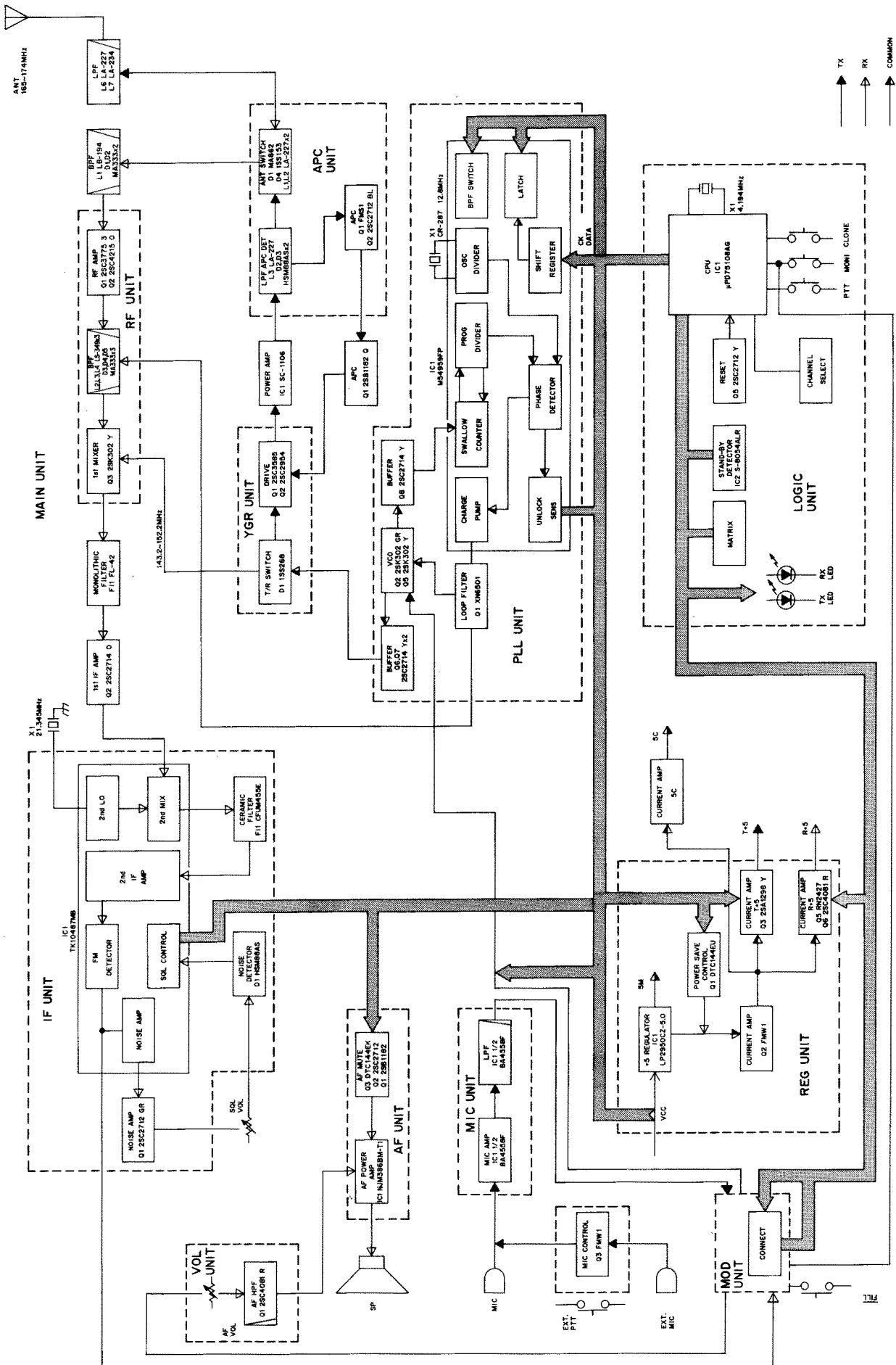
### • REAR UNIT



• MAIN UNIT



# SECTION 3 BLOCK DIAGRAM



## SECTION 4 CIRCUIT DESCRIPTION

### 4-1 RECEIVER CIRCUITS

#### 4-1-1 ANTENNA SWITCHING CIRCUIT (MAIN AND APC UNITS)

Received signals enter the antenna connector and pass through a low-pass filter (L6~L8, C19~C23). The signals are applied to the antenna switching circuit (D1, D4) on the APC UNIT, and then to the RF circuit. The antenna switching circuit employs a  $\lambda/4$ -type diode switching system. The signals are applied to the RF UNIT via the ARX signal line.

#### 4-1-2 RF CIRCUIT (RF UNIT)

The signals from the antenna switching circuit pass through a one-stage bandpass filter (L1, D1, D2), and are applied to the RF amplifier (Q1, Q2).

Amplified signals are re-applied to the three-stage bandpass filter (L2~L4, D3~D5) to suppress unwanted signals. The signals are then applied to the 1st mixer circuit (Q3).

D1~D5 are varactor diodes that track the bandpass filters and are controlled by the lock voltage of the PLL. These diodes tune the center frequency of the bandpass filters for wide bandwidth reception and good image response rejection.

#### 4-1-3 1ST MIXER CIRCUIT (RF UNIT)

The signals from the RF circuit are mixed with the 1st LO signal from the YGR UNIT to produce a 21.8 MHz 1st IF signal.

#### 4-1-4 1ST IF CIRCUIT (MAIN UNIT)

After passing through the matching circuit (L9), the 1st IF signal is applied to a pair of crystal filters (F11) to suppress out-of-band signals. The 1st IF signal is amplified at the IF amplifier (Q2) and then applied to the 2nd mixer circuit on the IF UNIT.

#### 4-1-5 2ND IF AND DEMODULATOR CIRCUITS (IF UNIT)

The 1st IF signal, from Q2 on the MAIN UNIT, is applied to the 2nd mixer section of IC1; then mixed with the 2nd LO signal to be converted to a 455 kHz 2nd IF signal.

IC1 contains the 2nd mixer, local oscillator, limiter amplifier and quadrature detector circuits. The local oscillator section and X1 on the MAIN UNIT generate 21.345 MHz for the 2nd LO signal.

The 2nd IF signal from the 2nd mixer (IC1, pin 4) passes through the ceramic filter, F11, where unwanted signals are suppressed. It is then amplified at the limiter amplifier section (IC1, pin 6) and applied to the quadrature detector section (IC1, pin 10 and ceramic discriminator X1) to demodulate the 2nd IF signal into an AF signal.

AF signal output from pin 11 of IC1 is applied to the squelch circuit and de-emphasis circuit (R10, C12). This de-emphasis circuit is an integrated circuit with frequency characteristics of  $-6$  dB/octave. The resulting signal is applied to the AF and MOD UNITS.

#### • RECEIVER CIRCUIT BLOCK DIAGRAM

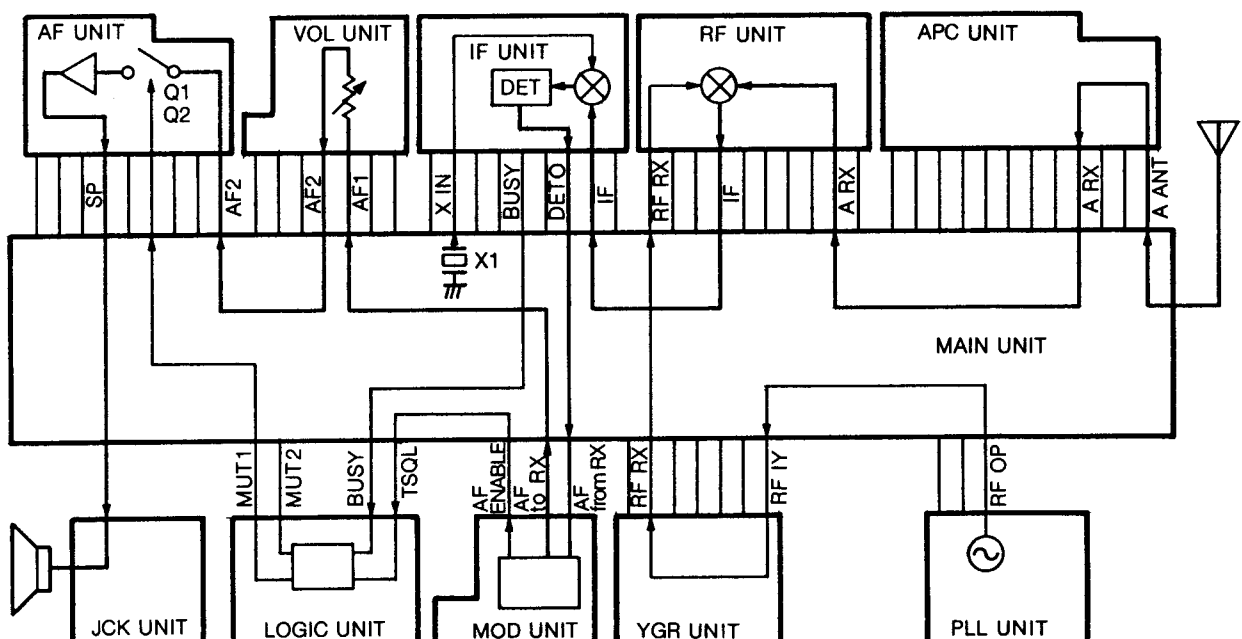


Fig. 1

#### 4-1-6 AF CIRCUIT (VOL, MOD AND AF UNITS)

The AF signal is applied to Q1 on the VOL UNIT via the AF control circuit (Q1) on the MOD UNIT. Q1 is an active filter that functions as a high-pass filter to suppress tone signals for the tone squelch operation. When the squelch is closed, Q3 on the MOD UNIT cuts the AF signal as the AF mute switch (MOD UNIT).

The filtered signal is applied to the AF UNIT via the [VOL] control (R5). The AF signal is power-amplified at the AF power amplifier (IC1) on the AF UNIT to drive the speaker.

The AF voltage regulator (Q1, Q2) supplies power to the AF power amplifier. The MUT1 signal from the CPU controls Q3 on the MOD UNIT and mutes AF output while receiving no signal or no specified tone signal.

#### 4-1-7 SQUELCH CIRCUIT (IF UNIT)

Some of the noise components in the AF signal from pin 11 of IC1 are applied to pin 13 of IC1 via R8, R9 and C9.

The active filter section in IC1 amplifies noise components of frequencies 20 kHz and higher; then outputs the resulting signals from pin 14. Output signals are amplified at Q1, rectified by D1, and converted to DC voltage. This voltage is applied to the squelch trigger circuit (pin 15). The [SQL] control (R5) on the VOL UNIT is also connected to pin 15 to adjust the DC voltage.

The DC voltage triggers the squelch circuit in IC1. Pin 16 of IC1 outputs the squelch signal. The signal is applied to the CPU (IC1, pin 58) on the LOGIC UNIT through the BUSY signal line. The CPU outputs the MUT1 and MUT2 signals. The MUT1 signal deactivates the AF voltage regulator (Q1, Q2) on the AF UNIT.

## 4-2 TRANSMITTER CIRCUITS

### 4-2-1 MICROPHONE AMPLIFIER (MIC UNIT)

AF signals from the built-in condenser microphone or from the [MIC] jack are applied to IC1 (pin 3), and are pre-emphasized to +6 dB/octave through C7 and R2 connected to pin 2. IC1 functions as the microphone amplifier and the limiter.

The output signals from IC1 (pin 1) pass through the splatter filter circuit (IC1, pins 5 and 6) where signals of 3 kHz and higher are attenuated. IC1 (pin 7) then outputs the signals. The signals are applied to the connector circuit (MOD UNIT) and then the modulation circuit in the VCO to produce an FM signal.

The VCO circuit (Q5, D2, D3) on the PLL UNIT oscillates the transmit frequency with AF signal modulation.

### 4-2-2 DRIVE AMPLIFIER (YGR UNIT)

The VCO output, buffer-amplified at Q7 on the PLL UNIT, is applied to the transmit/receive switching circuit (D1) on the YGR UNIT. The VCO output is then amplified at the predrive amplifier (Q1) and the drive amplifier (Q2).

The voltage controlled by the APC circuit is applied to the collector of Q2 to protect the RF power module from damage by an antenna mismatch.

### 4-2-3 RF POWER AMPLIFIER (MAIN UNIT)

IC1 is a power module which provides a stable 1.5 W of output power (with CM-87).

An RF signal from the drive amplifier (Q2) on the YGR UNIT is applied to pin 1 of IC1. The amplified signal is output from pin 4, and applied to the antenna connector through the diode switching and low-pass filter circuits.

#### • TRANSMITTER CIRCUIT BLOCK DIAGRAM

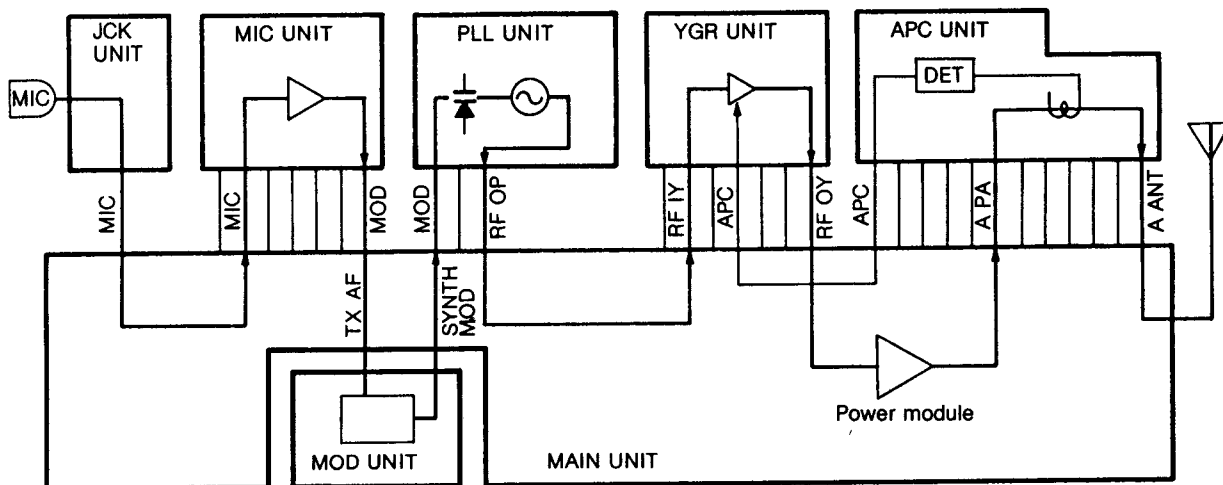


Fig. 2

#### 4-2-4 APC CIRCUIT (MAIN AND APC UNITS)

The APC circuit protects the power module (IC1) from a mismatched output load and selects HIGH or LOW output power.

The output power level from the power module (IC1) is detected at the APC detector (D2, D3) on the APC UNIT. When antenna impedance is matched at 50 Ω, the detected level is at its minimum. However, when antenna impedance is mismatched, the detected voltage is higher than when matched.

When the antenna impedance is mismatched, the base voltage of Q1 is higher than the other base voltage of Q1 (reference voltage). Q1 decreases the collector current of Q1 on the MAIN UNIT using Q2. The collector current of Q1, on the MAIN UNIT, is used at the drive amplifier (Q2) on the YGR UNIT. Hence, when the antenna impedance is mismatched, the output power is decreased.

The output power selecting circuit uses the APC circuit. The [HIGH/LOW] switch selects the reference voltage, changing the output power to HIGH or LOW.

#### 4-2-5 ANTENNA SWITCHING CIRCUIT (APC UNIT)

When transmitting, D1 and D4 are turned ON. The RF output signal is not applied to the receiver circuit, passing through D4 and C10, the low-pass filter (L6~L8, C19~C23) on the MAIN UNIT and then to the antenna connector. The low-pass filter suppresses high harmonic components.

### 4-3 PLL CIRCUITS

#### 4-3-1 GENERAL (PLL UNIT)

The PLL circuit, using a one chip modulus prescaler (IC1), directly generates the transmit frequency with the Tx VCO (Q5) and the 1st LO frequency with the Rx VCO (Q2).

The modulus prescaler (IC1) sets the dividing ratio based on serial data from the CPU, and compares the phases of a VCO signal and the reference oscillator frequency. It detects the out-of-step phase and outputs it. The reference frequency oscillated at X1 is applied to the PLL IC (IC1 pin 23).

#### 4-3-2 REFERENCE OSCILLATOR CIRCUIT (PLL UNIT)

A reference frequency is produced by the oscillator (Q9) and X1. D4, R29 and R32 provide frequency control. Thus, the output frequency of this circuit is stable over a wide temperature range.

#### 4-3-3 LOOP FILTER CIRCUIT (PLL UNIT)

Phase-detected signals from pin 13 are converted to DC voltage by a loop filter consisting of an active filter (Q1).

The frequency at which the VCO oscillates is controlled by varactor diodes (D1, D2). DC voltage (PLL lock voltage) is provided through the integrator circuit (R7, C17).

#### 4-3-4 VCO CIRCUIT (PLL UNIT)

IC-H10SR has two VCO circuits for transmitting and receiving. IC1 (pin 10) outputs a control signal for selecting the receive VCO circuit (Q2, L1, D1) or transmit VCO circuit (Q5, L3, D2). Varactor diodes (D1, D2) provide frequency control. The buffer amplifiers (Q6 ~Q8) do not affect the PLL output signal from VCO oscillation. Q3 and Q4 select the transmit or receive VCO circuit.

#### 4-3-5 UNLOCK SENSOR CIRCUIT (PLL UNIT)

When the PLL circuit is unlocked, IC1 (pin 14) is "HIGH" and a "HIGH" signal is applied to the CPU (pin 60) as an unlock signal.

#### • PLL CIRCUIT BLOCK DIAGRAM

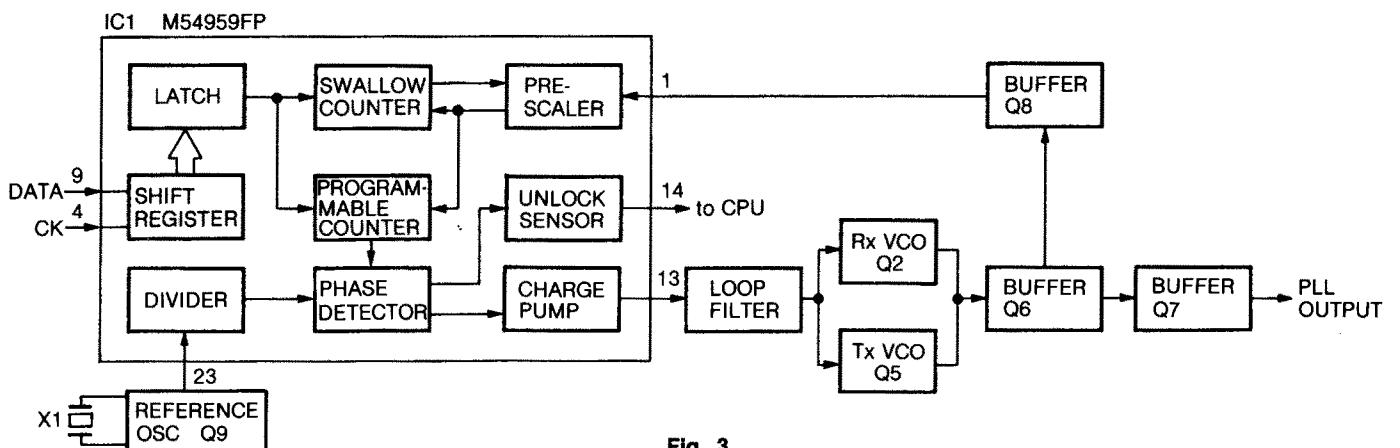


Fig. 3

## 4-4 OTHER CIRCUITS

### 4-4-1 RESET CIRCUIT (LOGIC UNIT)

The CPU (IC1) is reset when the  $\overline{\text{RESET}}$  port changes from "HIGH" to "LOW" and then becomes "HIGH." The  $\overline{\text{RESET}}$  port remains "HIGH" except when the CPU is reset.

### 4-4-2 CPU POWER SUPPLY CIRCUIT (LOGIC UNIT)

When the power switch is turned OFF, a voltage is applied to the CPU (IC1, pin 41) via D3 from the lithium backup battery. The lithium battery provides backup for the memory contents.

#### • RESET AND POWER SUPPLY CIRCUITS

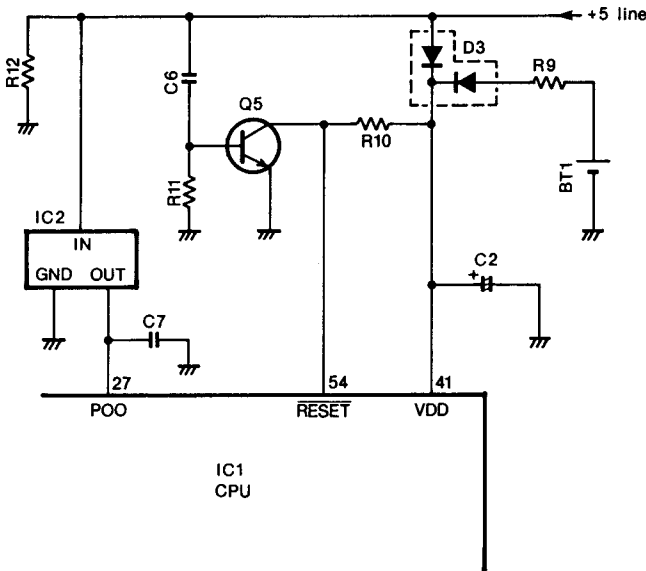


Fig. 4

### 4-4-3 CONNECTOR CIRCUIT (MOD UNIT)

This circuit checks the signal and connector lines from the MAIN UNIT.

#### • CONNECTOR SIGNAL LINES

MAIN UNIT	MOD UNIT
T/R	$\overline{\text{TX-KEY}}$
TX AF	SYNTH MOD
AF FROM RX	AF TO RX
T+5	MIC ENABLE

#### • CHECKED CONNECTOR LINE

LINE	DESCRIPTION
VCC	This line controls Q1 and AF signal output.
$\overline{\text{MONITOR}}$	When an AF signal is output and the [MONITOR] switch is ON, Q3 is "ON." The AF signal is then cut off.
FILL DATA	This line connects to the [FILL] switch (FILL line). When the [FILL] switch is pushed, transmitter mode is activated.
CLR/SEC	This line connects to the H/L line. The [CLR/SEC] switch [CLR] side activates High power. The [CLR/SEC] switch [SEC] side activates Low power.
BUSY	This line connects to the emitter of Q3. When the squelch is open and the [MONITOR] switch is pushed, the AF signal is cut off.
MUT1	This line is applied to D1 and connects to the AF ENABLE line. The AF ENABLE line mutes AF and SQL.

### 4-4-4 VOLTAGE LINES

LINE	DESCRIPTION
Vcc	The connected battery pack voltage passed through the power switch.
+5	A common 5 V is regulated from Vcc at IC1 on the REG UNIT.
+5S	5 V is controlled by the power saver function. This voltage is regulated from Vcc at Q3 on the MAIN UNIT.
R+5	The receive 5 V is supplied from +5S. This voltage is switched by Q5 and Q6 on the REG UNIT using the "T/R" line from the CPU.
T+5	The transmit 5 V is supplied from +5S. This voltage is switched by Q3 and Q4 on the REG UNIT using the "T/R" line from the CPU.

## 4-5 CPU PORT ALLOCATIONS (LOGIC UNIT)

### • MATRIX

NAME	DESCRIPTION
[BEEP]	Selects a 1 kHz beep tone or 500 Hz/1 kHz beep tone.
[VHF/UHF]	Selects the VHF program when the matrix is OFF.
[PSAV]	Activates the power saver function when the matrix is OFF.

### • INPUT PORT

PORT NUMBER	PIN NUMBER	DESCRIPTION
P00 [INT4]	27	Detects a signal for the standby mode of the CPU. The CPU enters the standby mode when the port becomes "LOW."
P10~P13	10~13	These are input ports for the channel selector.
P60 [UL]	60	Detects a PLL unlock signal. When the signal is "HIGH," the PLL is unlocked.
P62 [BUSY]	58	Detects a squelch signal. The signal is "HIGH" when the squelch opens.
P140 [PTT]	39	Inputs a signal on the PTT line. This port becomes "LOW" when the [PTT] switch is pushed. This port is also used for cloning input.
P142 [MONI]	37	This is an input port for the [MONITOR] switch. This port becomes "LOW" when the [MONITOR] switch is pushed.
P143 [CLON]	36	This is an input port for the clone switch. The transceiver enters the cloning mode when this port and the MONI port are "LOW."

### • OUTPUT PORT

PORT NUMBER	PIN NUMBER	DESCRIPTION
P20 [BEEP]	23	Outputs 500 Hz or 1 kHz beep tones.
P21	22	This port becomes "HIGH" when the single tone is turned ON.
P30	45	Outputs a strobe signal for serial data to the initial matrix.
P70 [TSTB]	64	Outputs a strobe signal for serial data to the subaudible tone IC.
P71 [STB]	63	Outputs a strobe signal for serial data to the PLL IC.
P72 [CK]	62	Outputs clock signals for serial data.
P73 [DATA]	61	Outputs serial data synchronized with the CK signal.
P80 [CPO]	4	Outputs cloning data.
P81 [PSV]	3	This port becomes "HIGH" while the power saver function is activated.
P82 [MUT1]	2	Outputs an AF mute signal for the MOD UNIT and the AF power amplifier.
P120	31	Outputs a strobe signal for serial data to the channel selector.
P121 [TX LED]	30	Outputs a signal to light the [TX/BUSY] indicator red. This port becomes "LOW" while transmitting.
P122 [BUSY LED]	29	Outputs a signal to light the [TX/BUSY] indicator green. This port becomes "LOW" while receiving. (squelch opens)
P123 [T/R]	28	Outputs transmit/receive switching signals. This port becomes "LOW" while transmitting.



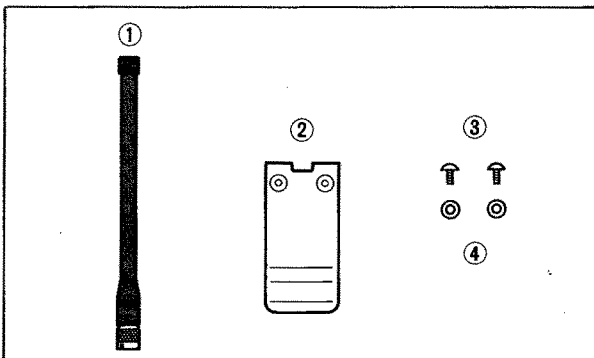
# SECTION 5 MECHANICAL PARTS AND DISASSEMBLY

## • CHASSIS UNIT

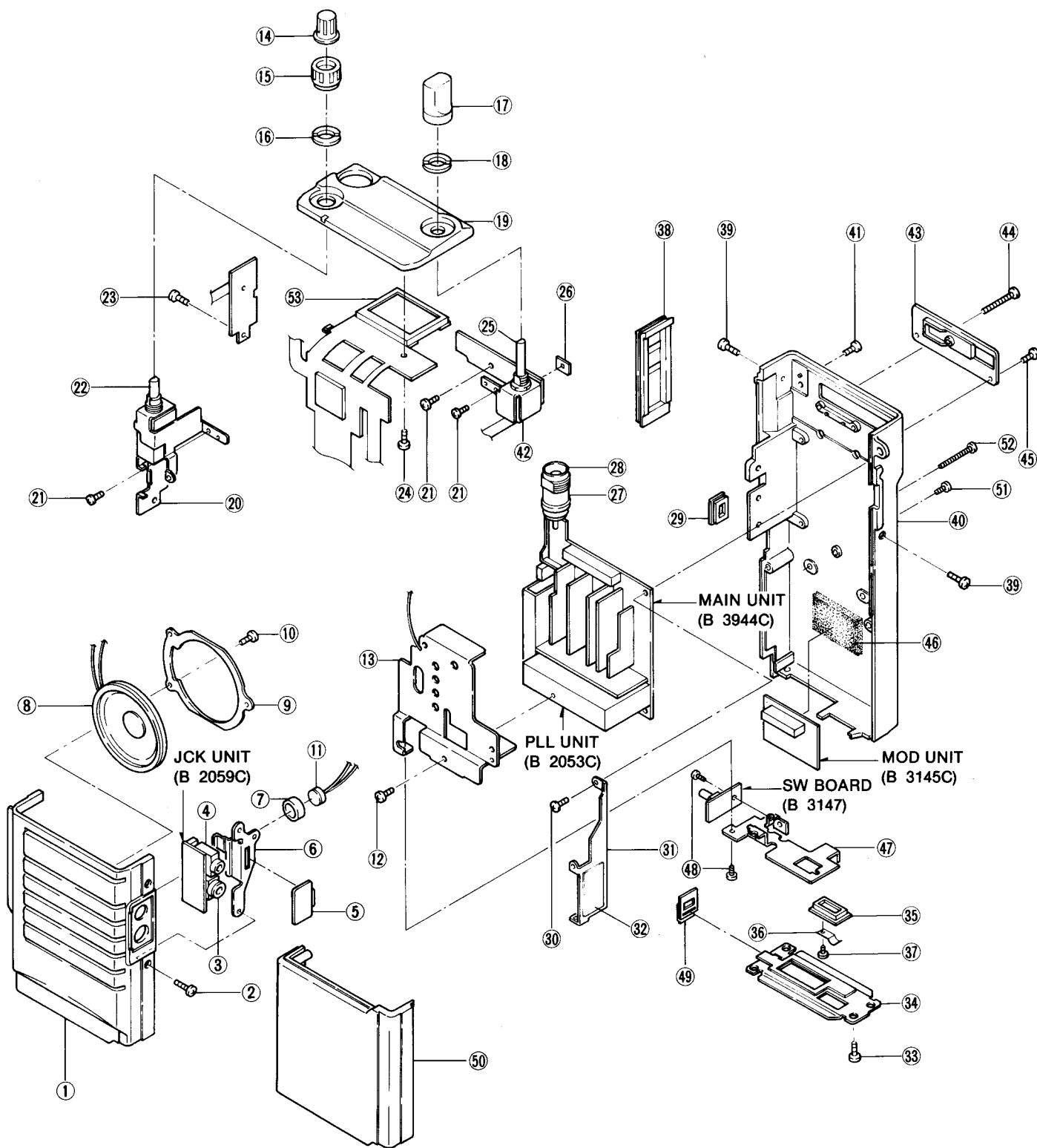
LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.	LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8210006480	Front panel (B)-1	1	②⑧	6510008930	Antenna connector TNC-R108	1
②	8810005360	Screw PH No. 0 M2 × 3 ZK	2	②⑨	8930021770	Side switch rubber [FILL/ERASE]	1
③	6450000110	HSJ0836-01-010 [EXT SP]	1	③⑩	8810005320	Screw PH M2 × 4 NI FE	4
④	6450000130	HSJ1102-01-540 [MIC]	1	③①	8930013740	Side plate	1
⑤	8930013680	Jack cap	1	③②	8930013570	Side shield plate	1
⑥	8930013711	Connector plate-1	1	③③	8810002330	Screw FH M2 × 6 NI BS	4
⑦	8930013760	Microphone holder	1	③④	8010011300	Sliding plate	1
⑧	2510000450	Speaker EAS-3P123D	1	③⑤	8930009690	Contact holder	1
⑨	8930013700	Speaker plate	1	③⑥	8930009660	(+) terminal	1
⑩	8810005830	Screw PH B0 No. 0 M2 × 3	3	③⑦	8810001710	Screw PH B0 No. 0-3 M1.4 × 3.5 ZK	1
⑪	7700000860	Microphone WM-62A	1	③⑧	8930016360	643 PTT switch rubber	1
⑫	8810004210	Screw PH M2 × 3	6	③⑨	8810005360	Screw PH No. 0 M2 × 3 ZK	2
⑬	8510005381	MAIN shield plate-1	1	④⑩	8010011460	Rear panel	1
⑭	8610004601	Knob N138-1 [PWR/VOL]	1	④①	8810004290	Screw PH M2 × 5 ZK	1
⑮	8610004590	Knob N137 [SQL]	1	④②	8930013731	MD plate-1	1
⑯	8830000570	Nut (A)	1	④③	8930021780	643 Rear plate (A)-1	1
⑰	8610007410	Knob N172 [CHANNEL]	1	④④	8810000740	Screw PH A M2 × 15 ZK	1
⑱	8830000590	VR nut (F)	1	④⑤	8810005360	Screw PH No. 0 M2 × 3 ZK	2
⑲	8210005202	Top panel-2	1	④⑥	8930012200	Sponge (BC)	1
⑳	8930013721	VR plate-1	1	④⑦	8930021500	Switch angle	1
㉑	8810005360	Screw PH No. 0 M2 × 3 ZK	2	④⑧	8810005360	Screw PH No. 0 M2 × 3 ZK	3
㉒	7210001510	Variable resistor RK0972211007A [PWR/VOL]	1	④⑨	8930010570	Release button (A)	1
㉓	8810004850	Screw PH No. 0 M2 × 4	1	⑤⑩	8210006470	1091 Front panel	1
㉔	8810004040	Screw PH B0 No. 0 M2 × 5 ZU	1	⑤①	8810000030	Screw PH M2 × 6	2
㉕	2250000040	Switch KSR16-0-20 [CHANNEL]	1	⑤②	8810006780	Screw PH M2 × 18 ZK	2
㉖	8610004610	Knob K124 [CLR/SEC]	1	⑤③	8930013790	Holder	1
㉗	8930013780	Antenna ring	1				

**Screw abbreviations** PH: Pan head FH: Flat head OH: Oval countersunk head B0: Self-tapping screw  
No. 0: Precision-type screw ZK: Black NI: Nickel BS: Brass

## • ACCESSORIES



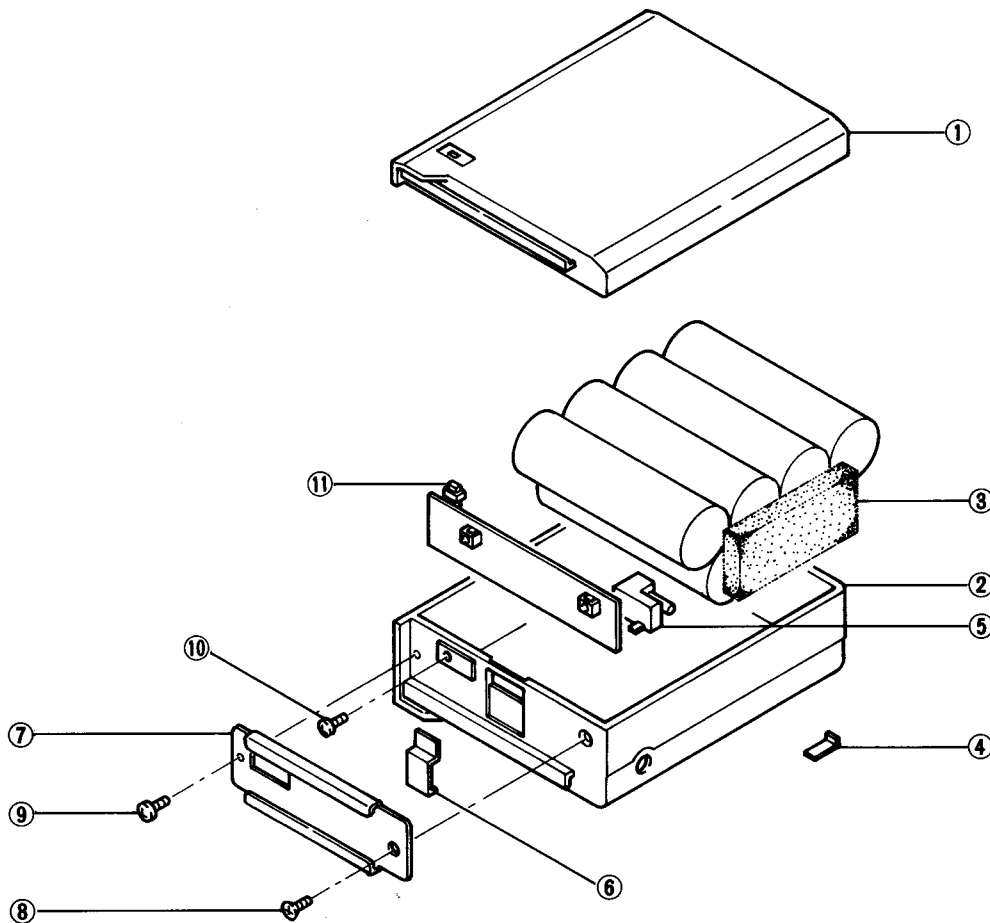
LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	Optional product	Flexible antenna	1
②	Optional product	Belt clip	1
③	8810003650	Icom screw A4	2
④	8850000640	Nylon washer B M3	2



## 5-2 BATTERY PACKS

### • CM-23, CM-24

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8010005950	Front case (4) C-1 (CM-23)	1
	8010005970	Front case (5) C (CM-24)	1
②	8010008080	Rear case (4) H-2 (CM-23)	1
	8010008090	Rear case (5) H-1 (CM-24)	1
③	8930001920	Sponge (G)	1
④	8930009590	Charging terminal	2
⑤	8930009600	Charging jack	1
⑥	8930010110	Case metal latch	1
⑦	8010005491	Sliding guide plate (C)-1	1
⑧	8810002310	FH M2 × 4 NI BS	1
⑨	8810000980	PH B0 M2 × 4	1
⑩	8810004671	FFH with looseness stopper M2 × 4 NI	1
⑪	5040000390	LED SLB-23VR 5F	1



The CM-87 cannot be disassembled.

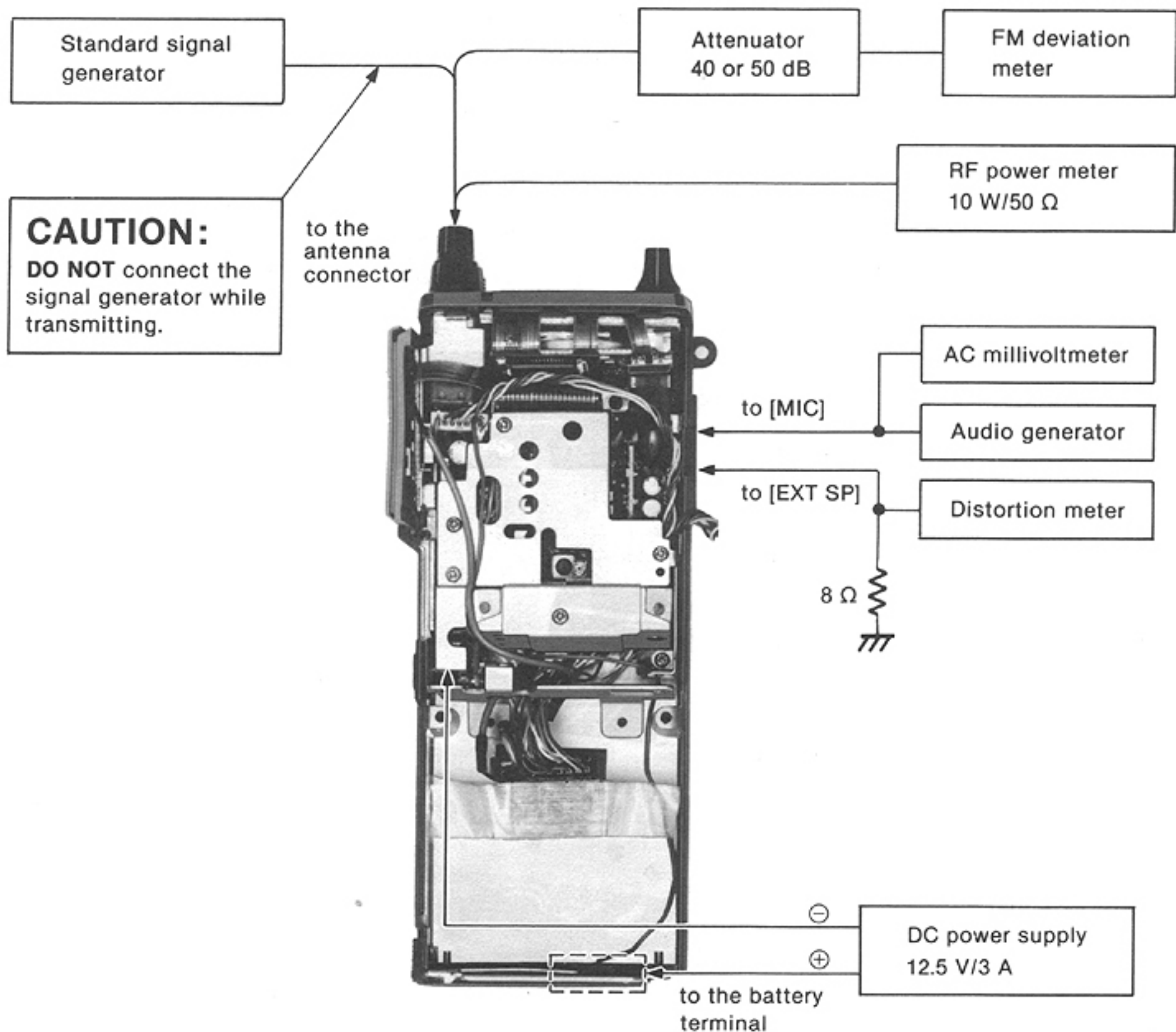
## SECTION 6 ADJUSTMENT PROCEDURES

### 6-1 PREPARATION BEFORE SERVICING

#### ■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 12.5 V DC Current capacity : 3 A or more	Standard signal generator (SSG)	Frequency range : 0.1~200 MHz Output level : -127~-17 dBm (0.1 $\mu$ V~32 mV)
RF power meter (terminated type)	Measuring range : 1~10 W Frequency range : 0.1~200 MHz Impedance : 50 $\Omega$ SWR : Less than 1.2 : 1	DC voltmeter	Input impedance : 50 k $\Omega$ /DC or better
		Audio generator	Frequency range : 300~3000 Hz Output level : 1~200 mV
Frequency counter	Frequency range : 0.1~200 MHz Frequency accuracy : $\pm$ 1 ppm or better Sensitivity : 100 mV or better	FM deviation meter	Frequency minimum : 200 MHz Measuring range : 0~10 kHz
Distortion meter	Frequency range : 1 kHz $\pm$ 10 Hz Measuring range : 0~20 %	Attenuator	Power attenuation : 40 or 50 dB Capacity : 10 W or more
AC millivoltmeter	Measuring range : 10 mV~3 V		

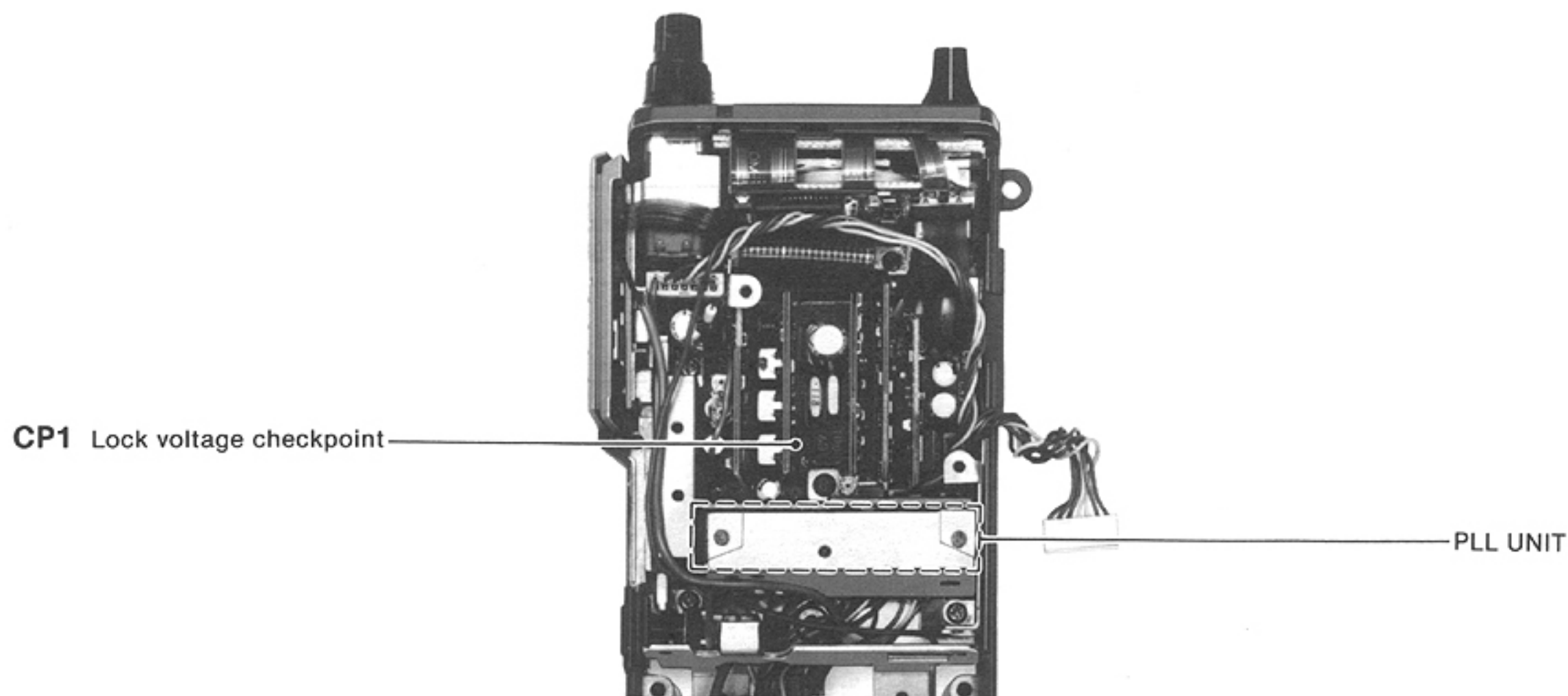
#### ■ CONNECTION



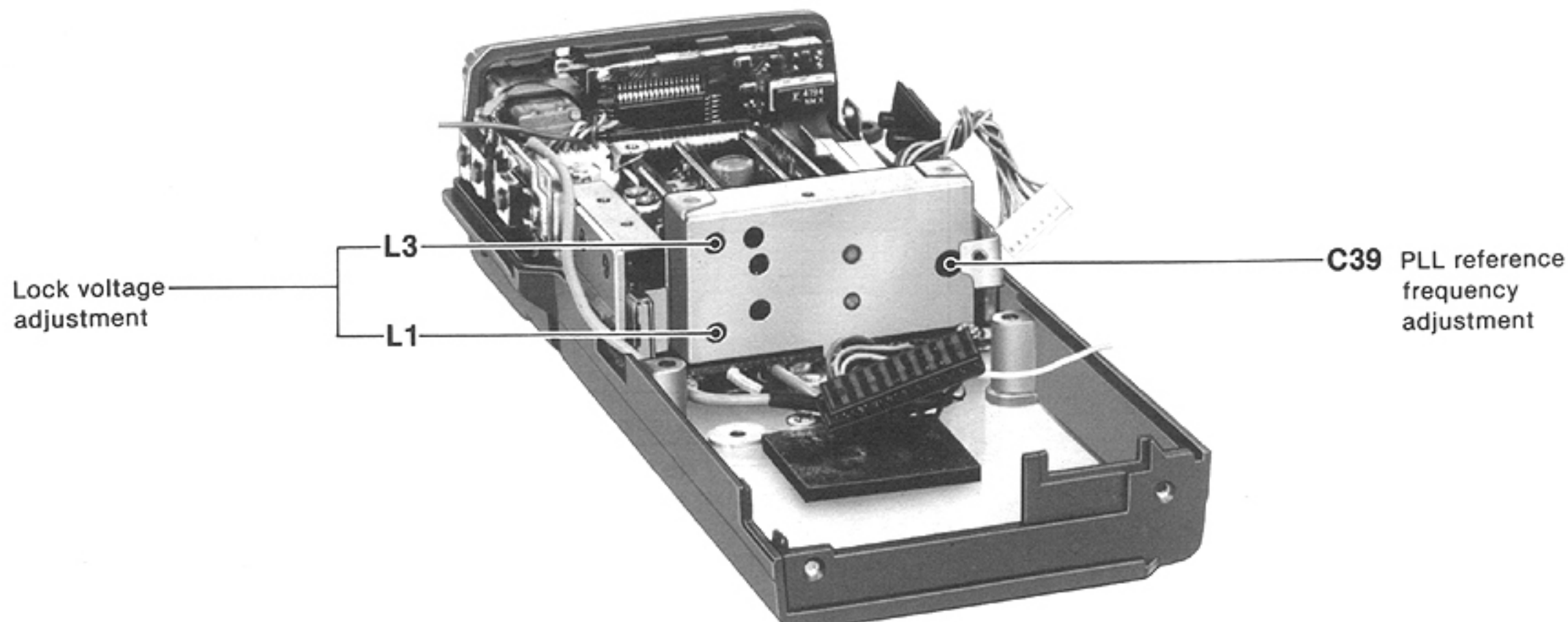
## 6-2 PLL ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
PLL REFERENCE FREQUENCY	1 <ul style="list-style-type: none"> <li>• Select any channel.</li> <li>• Connect the RF power meter or a 50 <math>\Omega</math> dummy load to the antenna connector.</li> <li>• Transmitting</li> </ul>	Top panel	Loosely couple the frequency counter to the antenna connector.	Same frequency as the programmed one. To check the programmed frequency, use the EX-704.	MAIN (PLL UNIT)	C39
LOCK VOLTAGE	NOTE: Lock voltage affects the C/N ratio. If you adjust the lock voltage, set the frequency with the EX-704.					
	1 <ul style="list-style-type: none"> <li>• Operating frequency: 174.000 MHz</li> <li>• Receiving</li> </ul>	MAIN	Connect the DC voltmeter to CP1.	4.5 V	MAIN (PLL UNIT)	L1
2 <ul style="list-style-type: none"> <li>• Transmitting</li> </ul>			5.5 V	L3		

### • MAIN UNIT



### • PLL UNIT

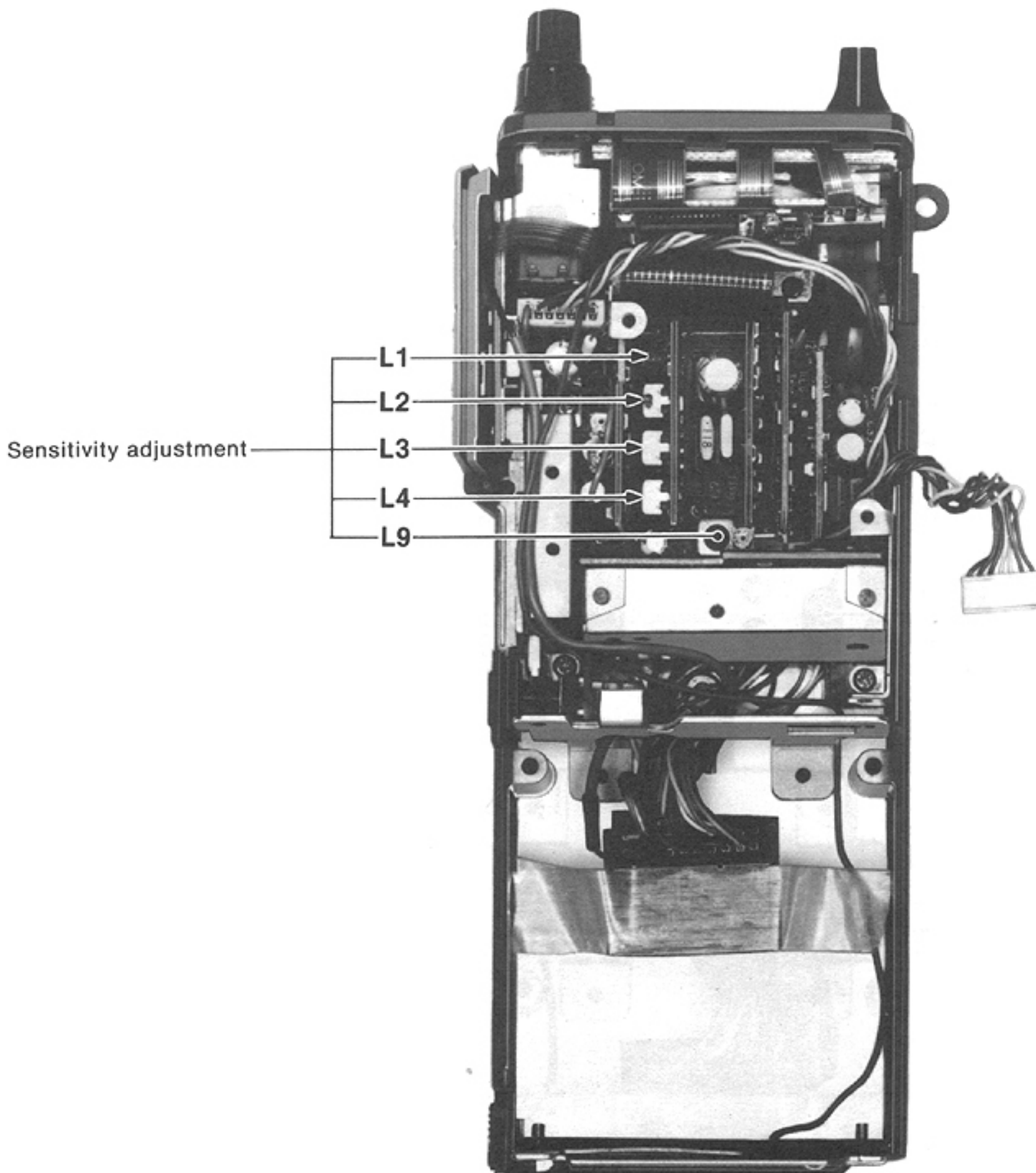


## 6-3 RECEIVER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	NOTE: When the sensitivity is less than $0.36 \mu\text{V}$ (12 dB SINAD) on every channel, the following sensitivity adjustment is not necessary. Skip to 6-4 STANDARD TRANSMITTER ADJUSTMENT.					
	1	<ul style="list-style-type: none"> <li>Operating frequency: Center of the frequency edge</li> <li>Connect the SSG to the antenna connector and set as: Level : <math>0.36 \mu\text{V}^*</math> (<math>-115 \text{ dBm}</math>) Modulation: 1 kHz Deviation : <math>\pm 3.5 \text{ kHz}</math></li> <li>[MONITOR] switch: ON</li> <li>Receiving</li> </ul>	Side panel	Connect the distortion meter to the [EXP SP] jack with an $8 \Omega$ load.	Minimum distortion level	MAIN (RF UNIT)  MAIN

\*This output level of the standard signal generator (SSG) is indicated as the SSG's open circuit.

### • MAIN UNIT

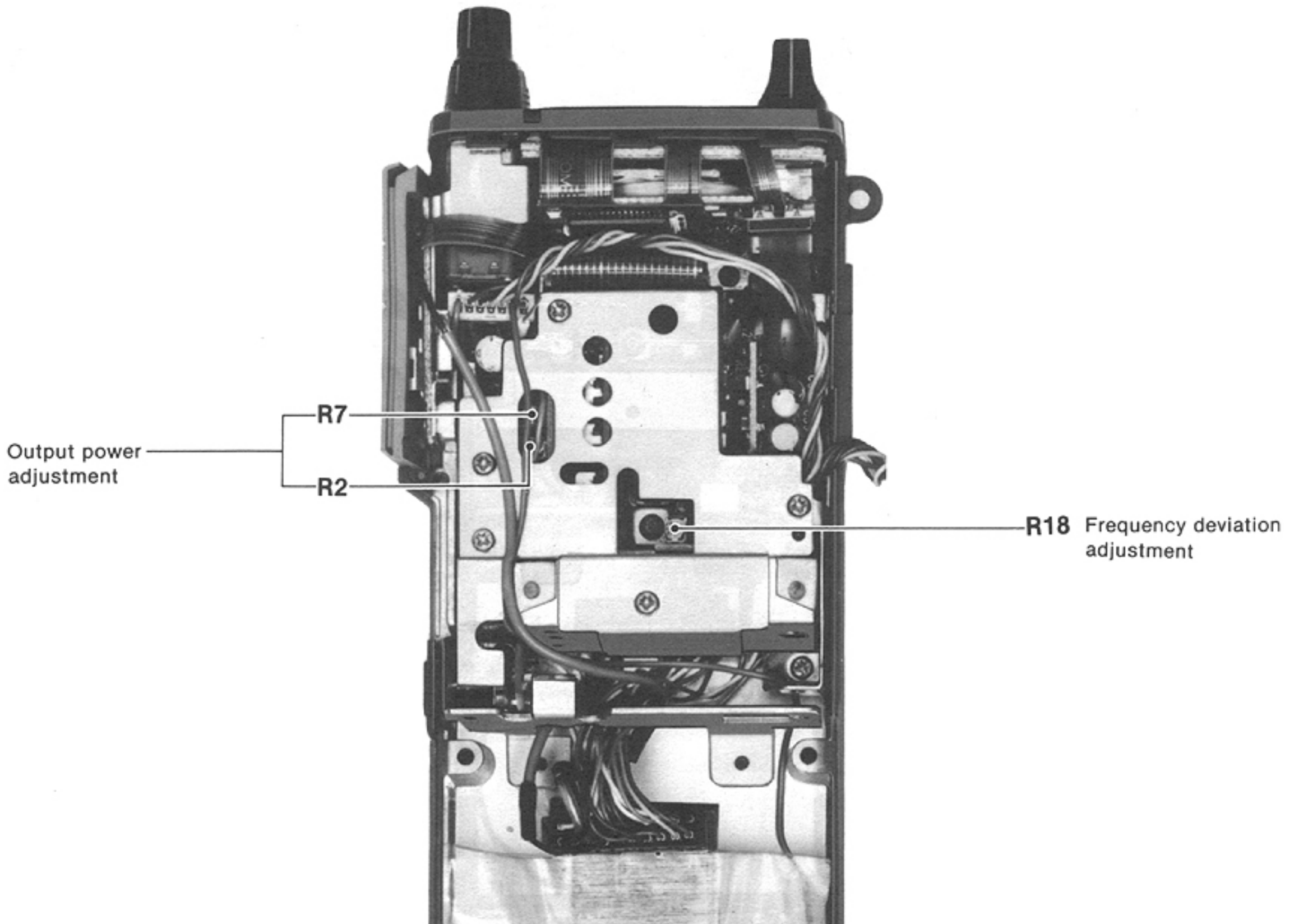




## 6-4 STANDARD TRANSMITTER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER	1 <ul style="list-style-type: none"> <li>• Select any channel.</li> <li>• [HIGH/LOW] switch: HIGH</li> <li>• Transmitting</li> </ul>	Top panel	Connect the RF power meter to the antenna connector.	4.0 W	MAIN (APC UNIT)	R2
	2 <ul style="list-style-type: none"> <li>• [HIGH/LOW] switch: LOW</li> </ul>					1.0 W
FREQUENCY DEVIATION	1 <ul style="list-style-type: none"> <li>• Select any channel.</li> <li>• Apply an AF signal to the [MIC] jack.: 1 kHz/250 mV</li> <li>• Set the FM deviation meter.</li> <li>HPF : OFF</li> <li>LPF : 20 kHz</li> <li>De-emphasis: OFF</li> <li>Detector : (P-P)/2</li> <li>• Transmitting</li> </ul>	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	$\pm 4.3$ kHz	MAIN (MIC UNIT)	R18
	2 <ul style="list-style-type: none"> <li>• Apply an AF signal to the [MIC] jack.: 1 kHz/25 mV</li> </ul>					$\pm 4.0 \sim 5.0$ kHz

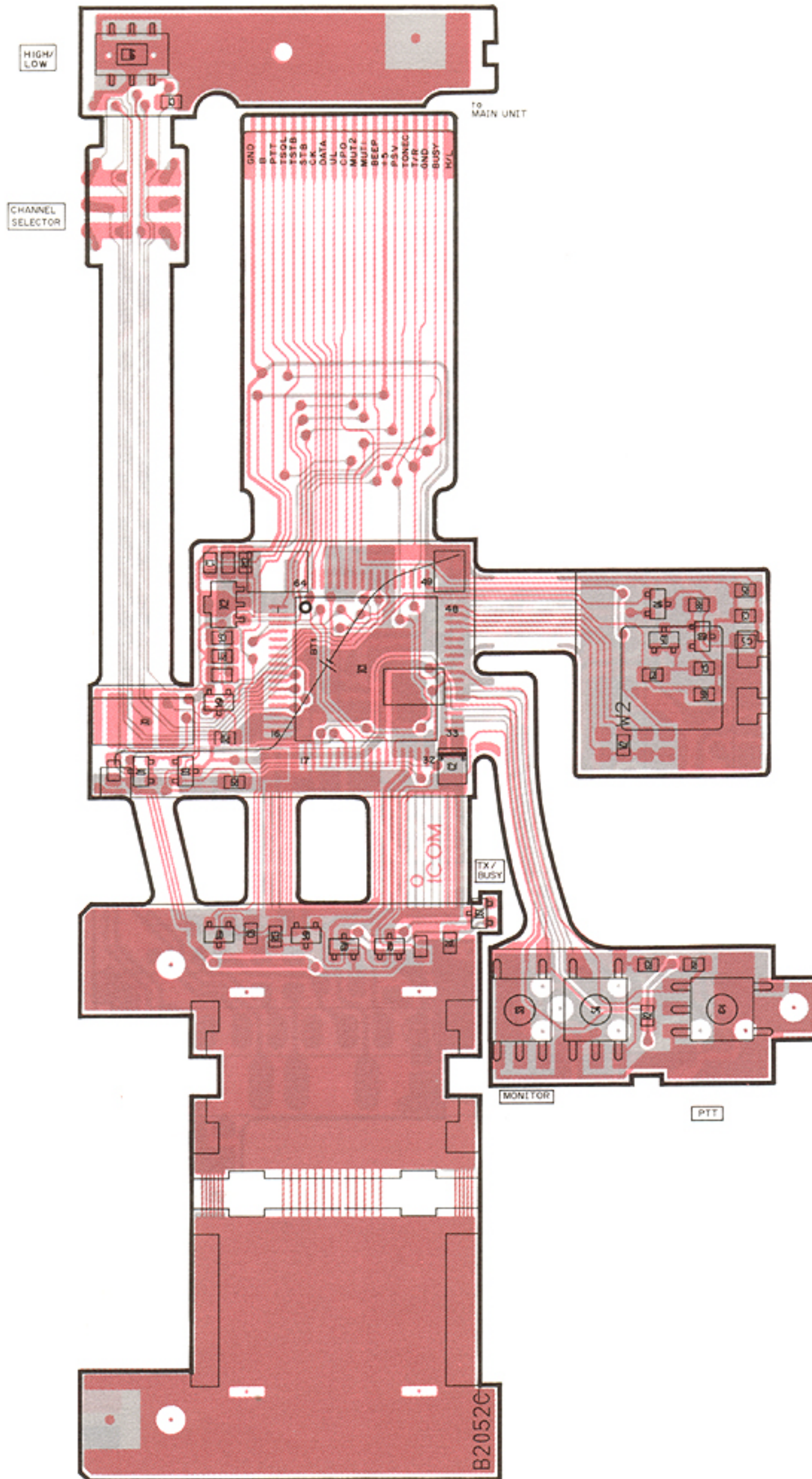
### • MAIN UNIT



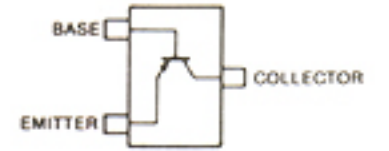


# SECTION 7 BOARD LAYOUTS

## 7-1 LOGIC UNIT

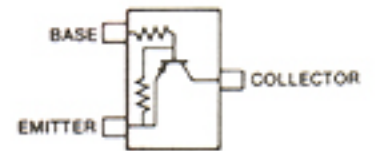


**2SA1162 GR**  
Q3, Q7



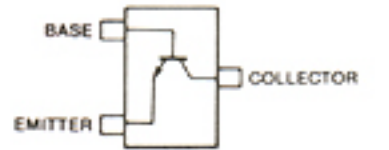
Symbol: SG

**2SA1344**  
Q1, Q2



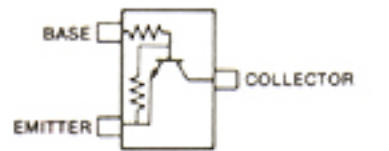
Symbol: EL

**2SC2712 Y**  
Q5



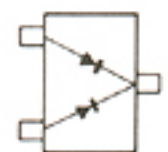
Symbol: LY

**DTC144EK**  
Q4, Q6



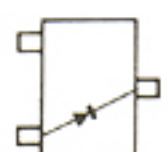
Symbol: 26

**1SS184**  
D3



Symbol: B3

**1SS196**  
D1, D5

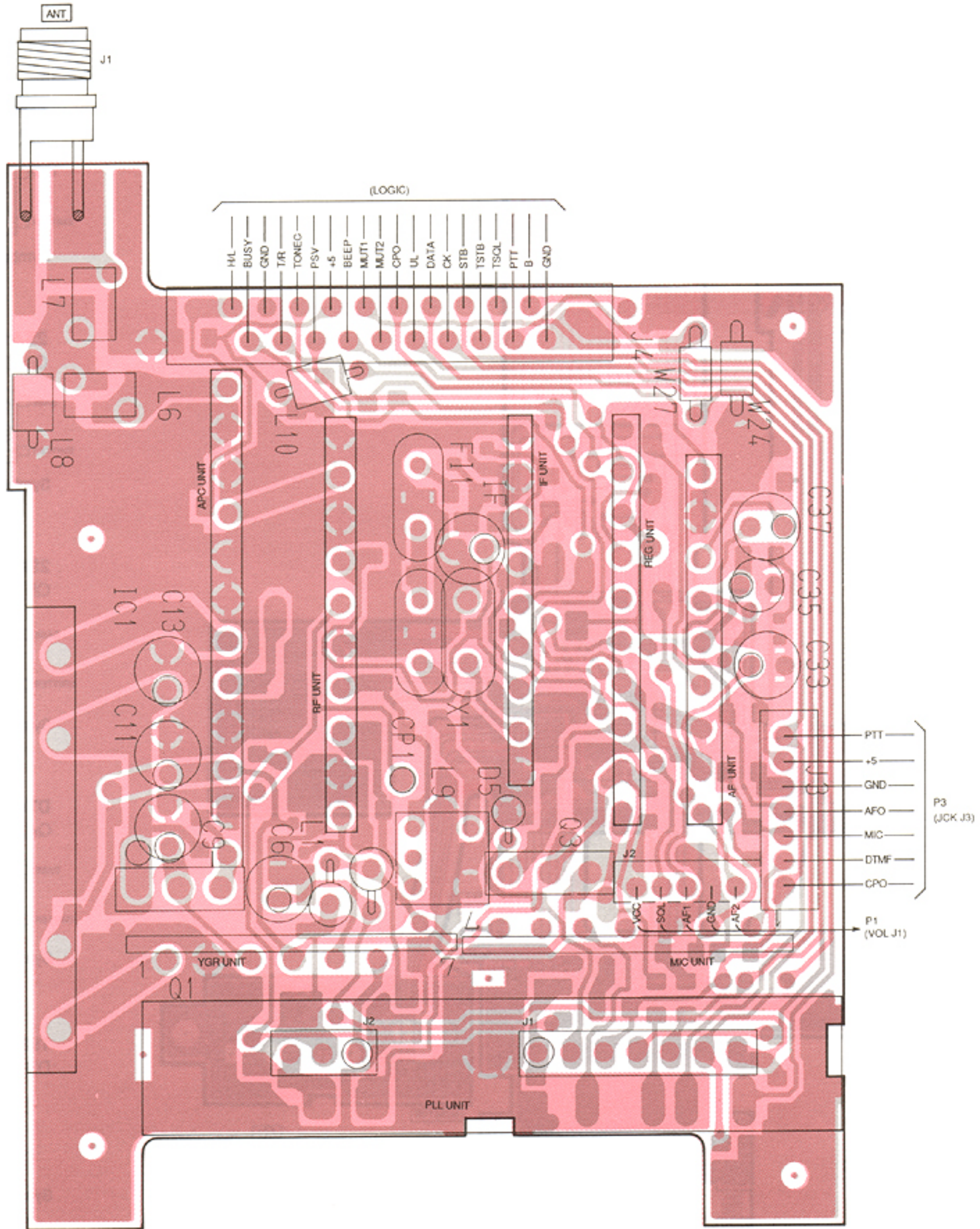


Symbol: G3

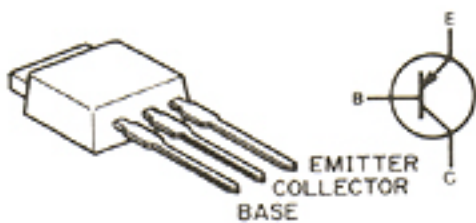


# 7-2 MAIN UNIT

## COMPONENT SIDE



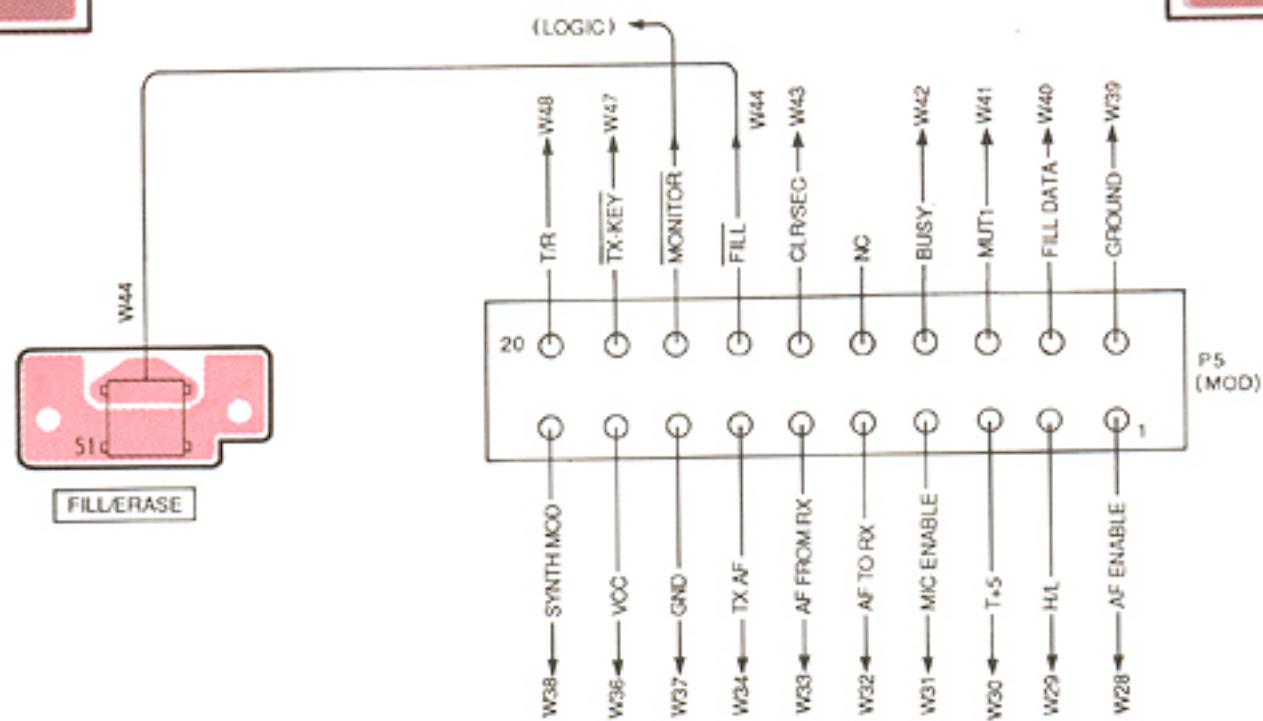
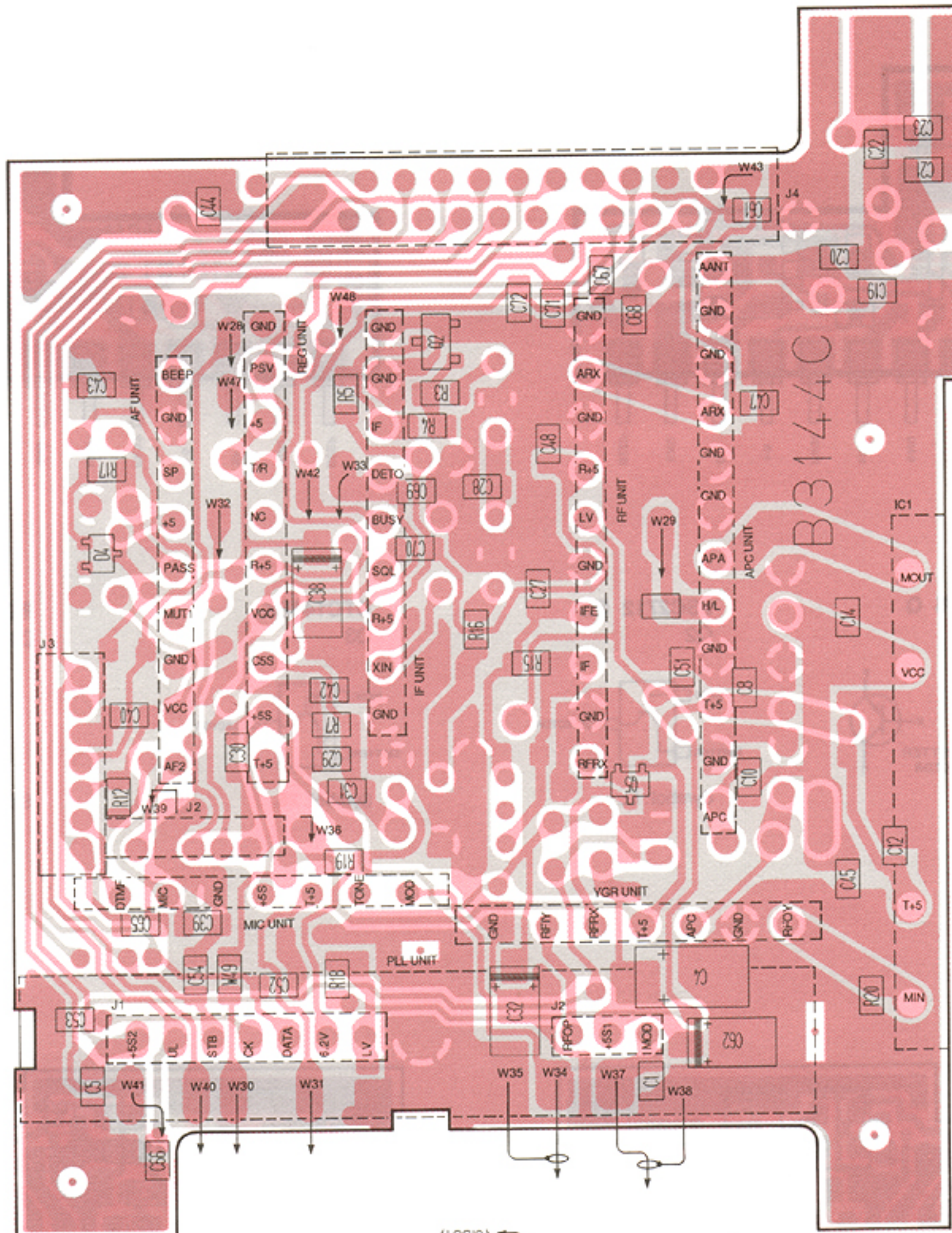
2SB1182 Q  
Q1, Q3



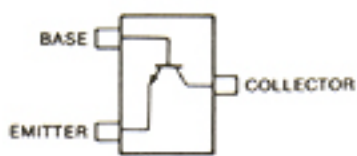
FOIL SIDE  
COMPONENT SIDE



**FOIL SIDE**

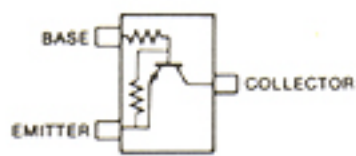


**2SC2714 O**  
Q2



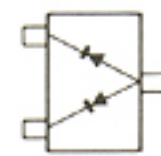
Symbol: QO

**DTC114EU**  
Q5



Symbol: 24

**DAP202U**  
D4



Symbol: P

**FOIL SIDE**  
**COMPONENT SIDE**

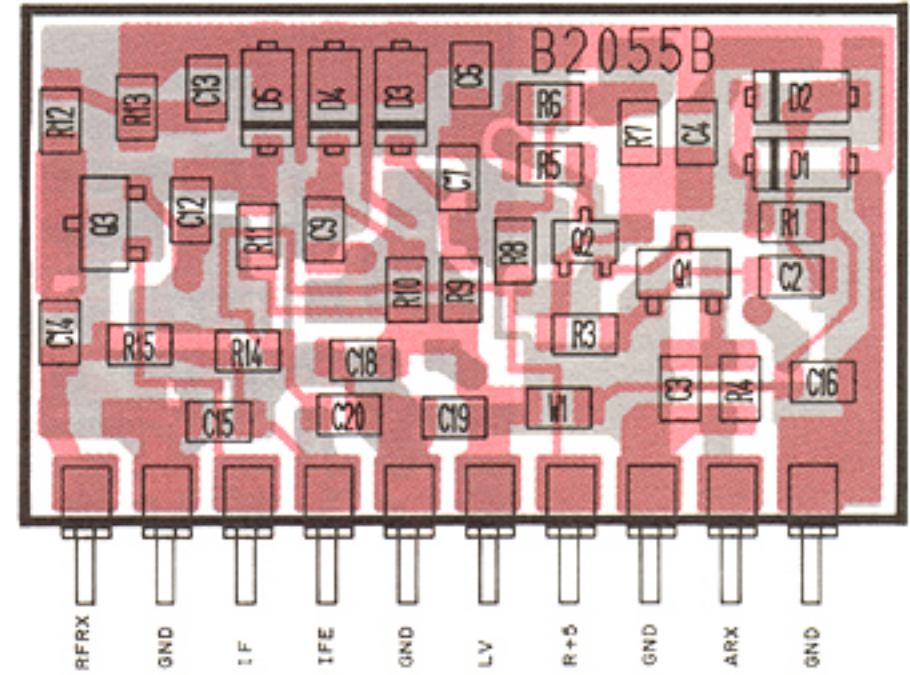
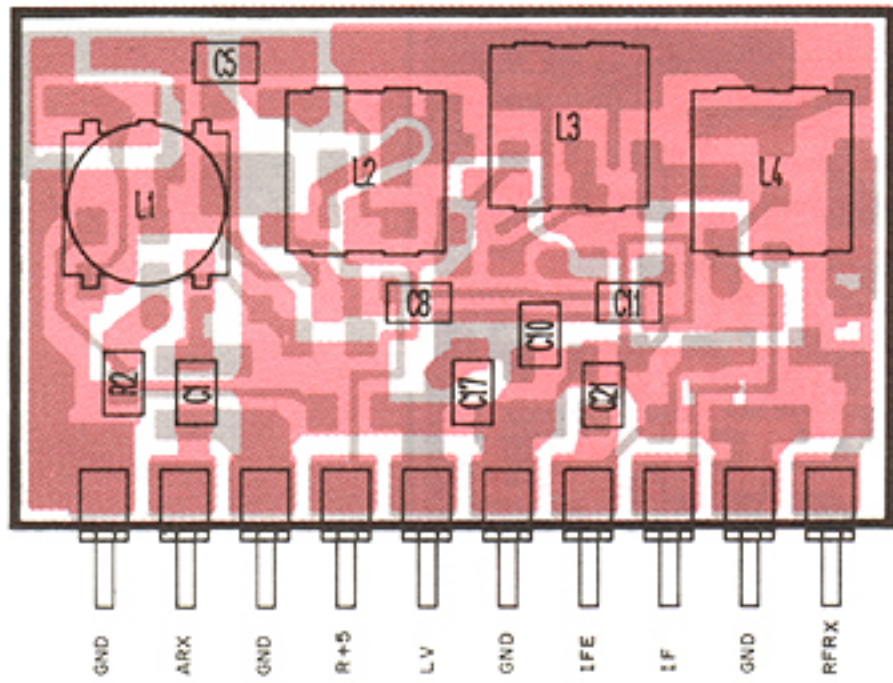




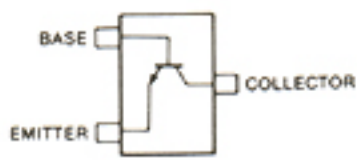


# 7-4 RF AND YGR UNITS

## • RF UNIT

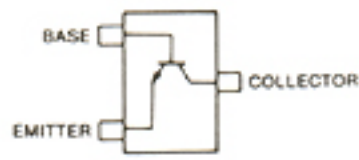


**2SC3775 3**  
Q1



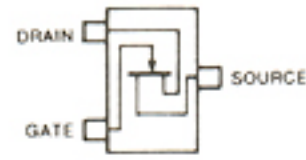
Symbol: OY3

**2SC4215 O**  
Q2



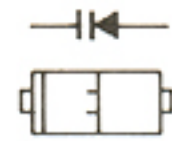
Symbol: QO

**2SK302 Y**  
Q3



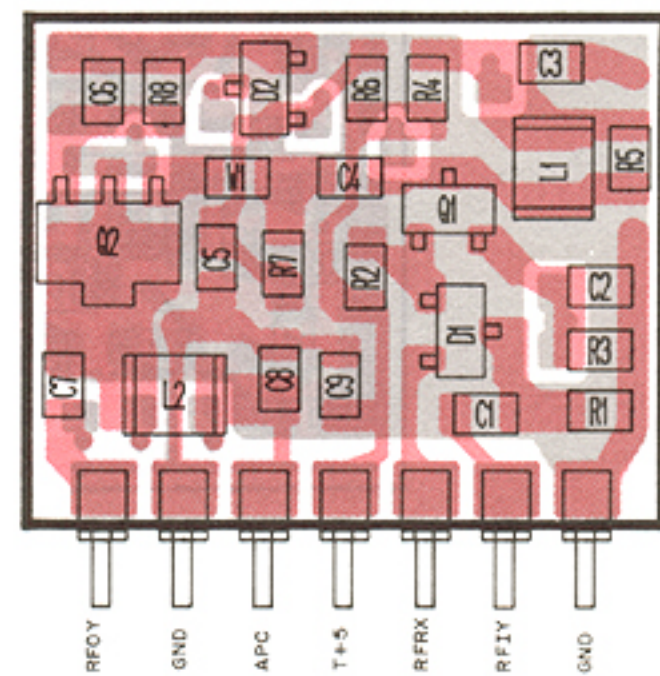
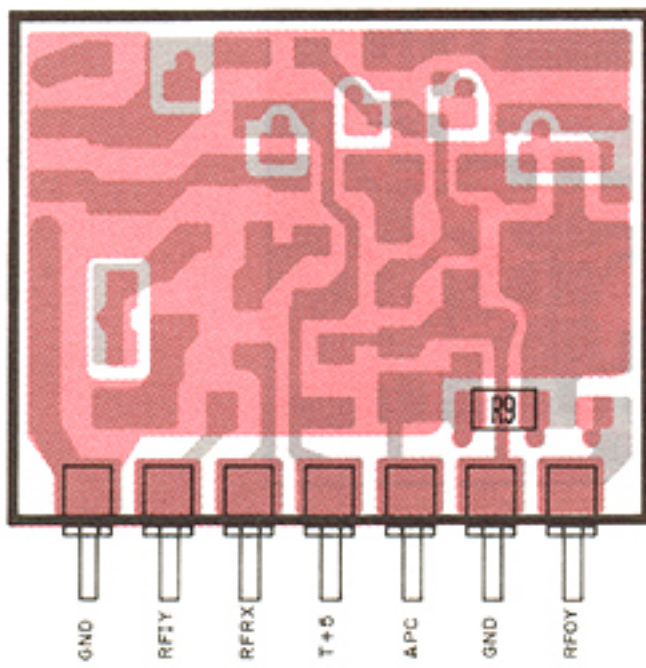
Symbol: TY

**MA333**  
D1, D2, D3,  
D4, D5

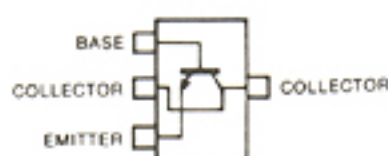


Symbol: 6C83

## • YGR UNIT

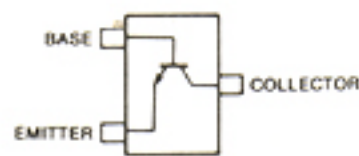


**2SC2954**  
Q2



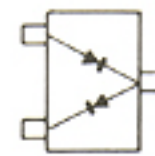
Symbol: QK

**2SC3585**  
Q1



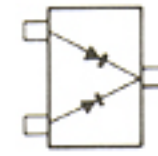
Symbol: R42

**1SS226**  
D2



Symbol: C3

**1SS268**  
D1

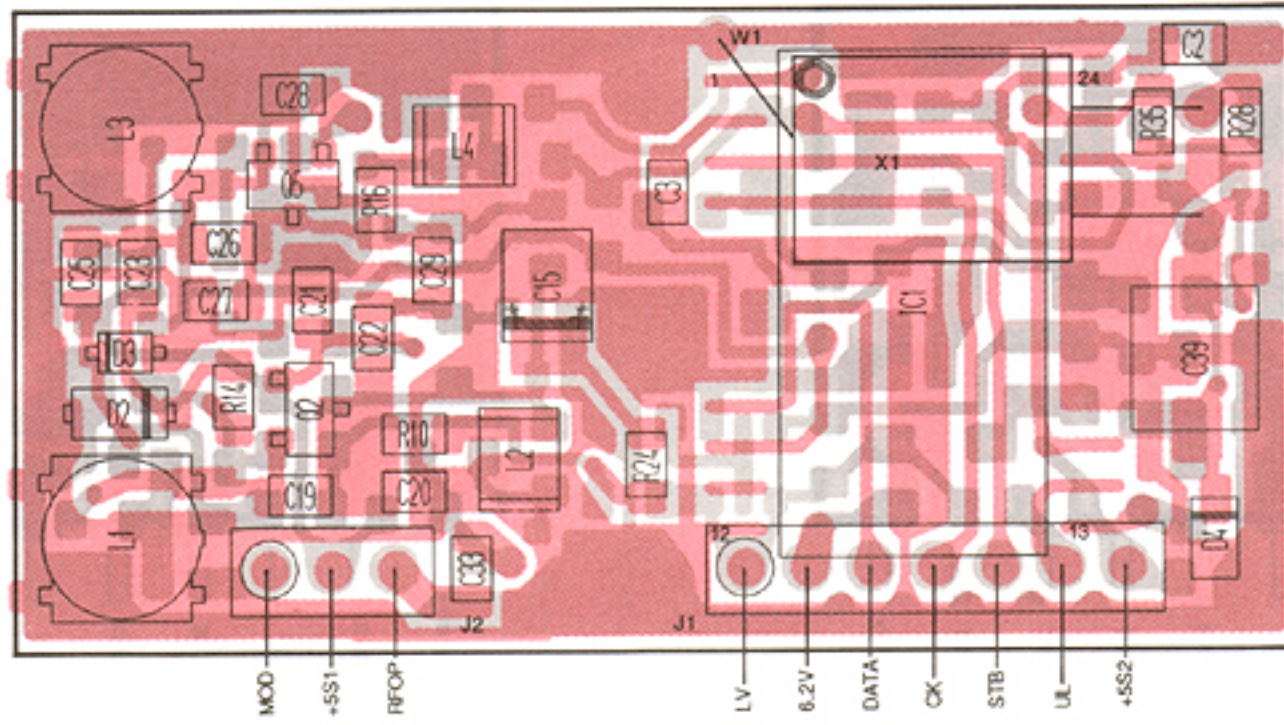


Symbol: BF

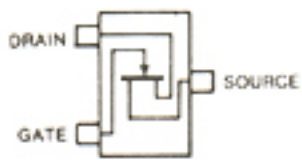


# 7-5 PLL UNIT

## • PLL UNIT

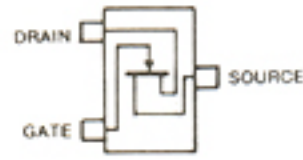


**2SK302 GR**  
Q2



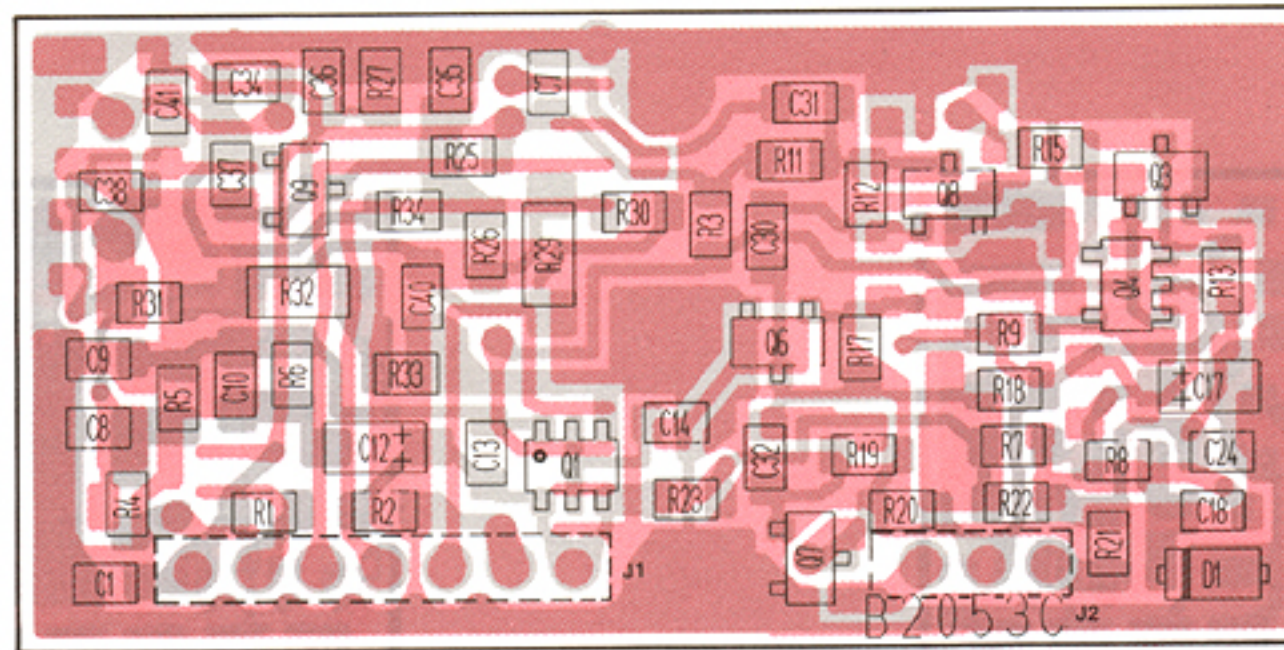
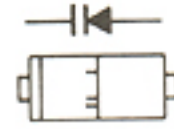
Symbol: TG

**2SK302 Y**  
Q5

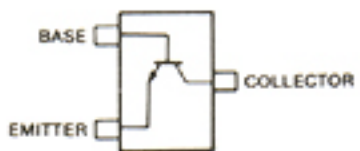


Symbol: TY

**MA334B**  
D2

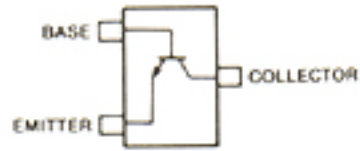


**2SC2712 Y**  
Q9



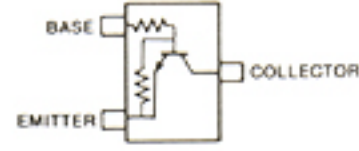
Symbol: LY

**2SC2714 Y**  
Q6, Q7, Q8



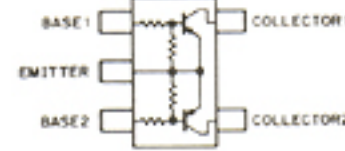
Symbol: QY

**DTC144EK**  
Q3



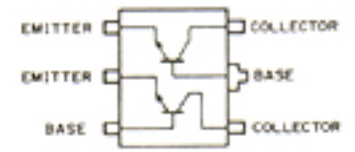
Symbol: 26

**FMA1**  
Q4



Symbol: A1

**XN6501**  
Q1

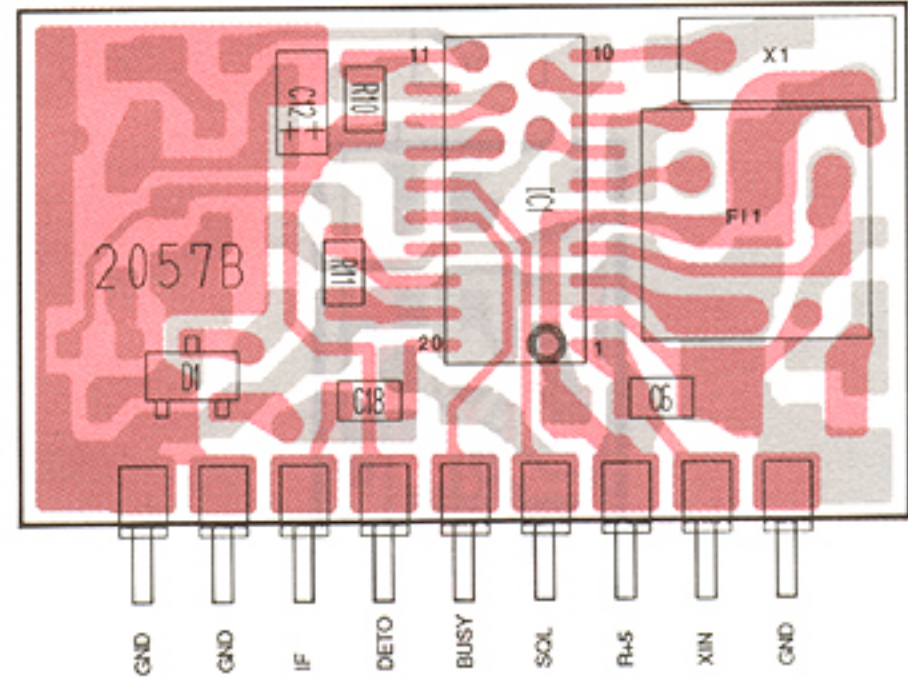
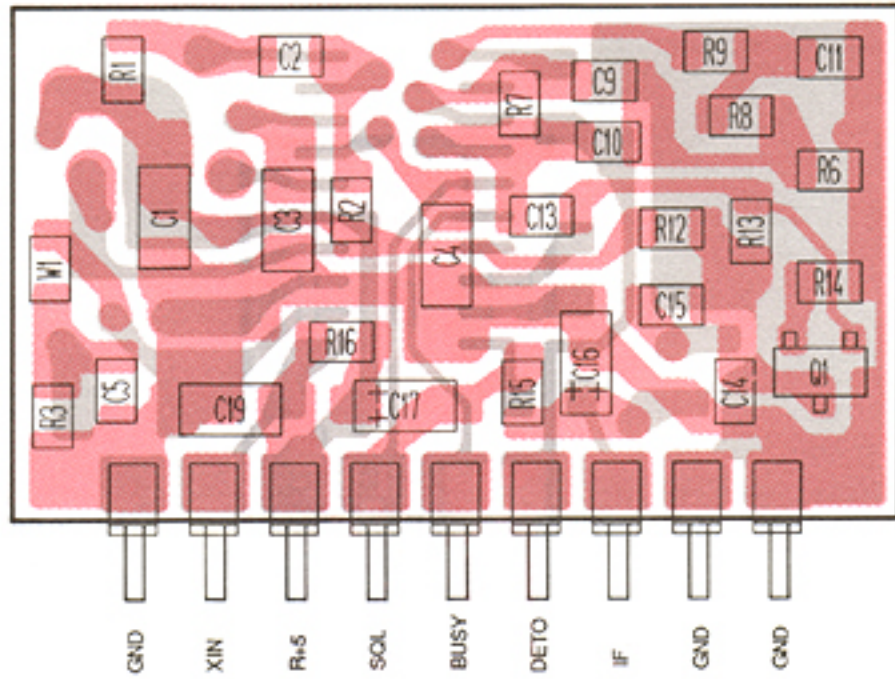


Symbol: 5N

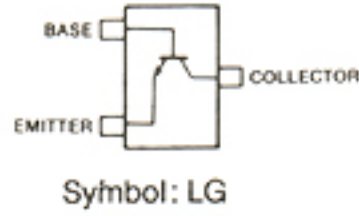


# 7-6 IF AND REG UNITS

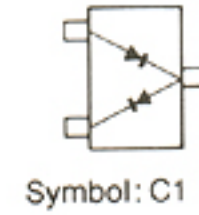
## • IF UNIT



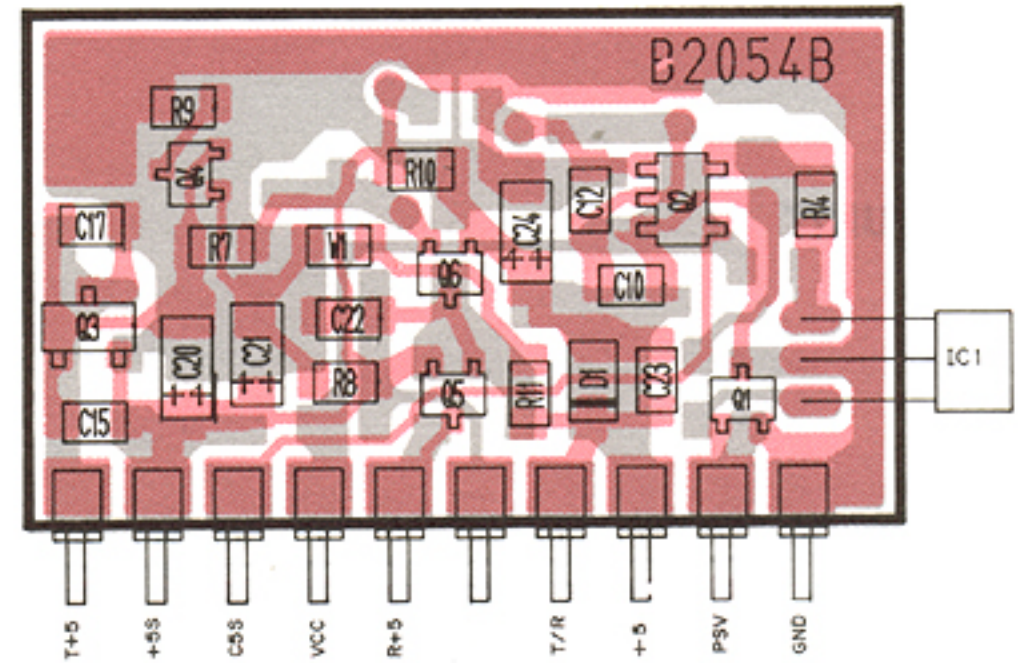
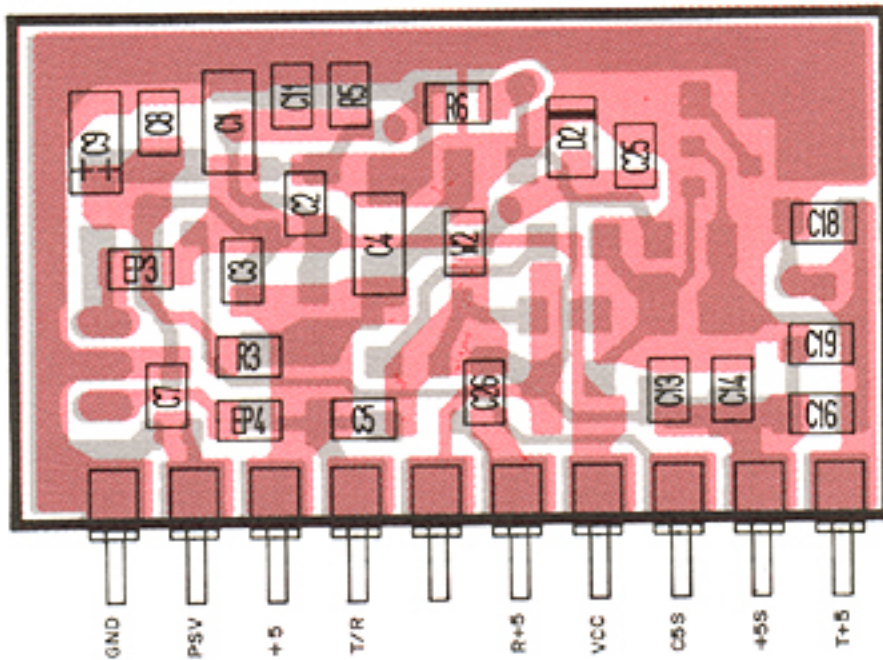
**2SC2712 GR**  
Q1



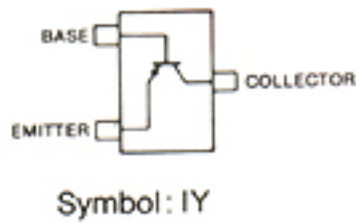
**HSM88AS**  
D1



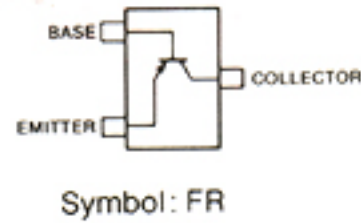
## • REG UNIT



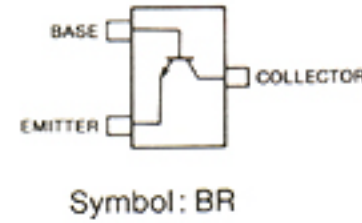
**2SA1298 Y**  
Q3



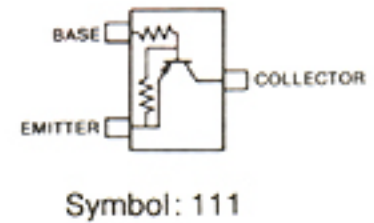
**2SA1576 R**  
Q4



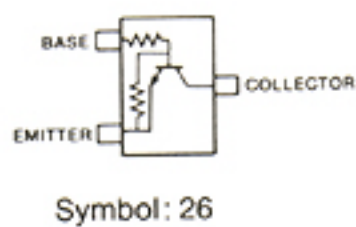
**2SC4081 R**  
Q6



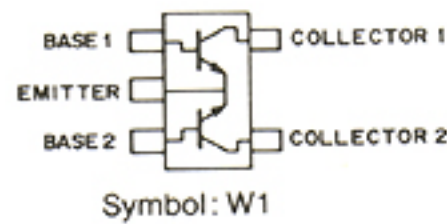
**DTA113ZU**  
Q5



**DTC144EU**  
Q1



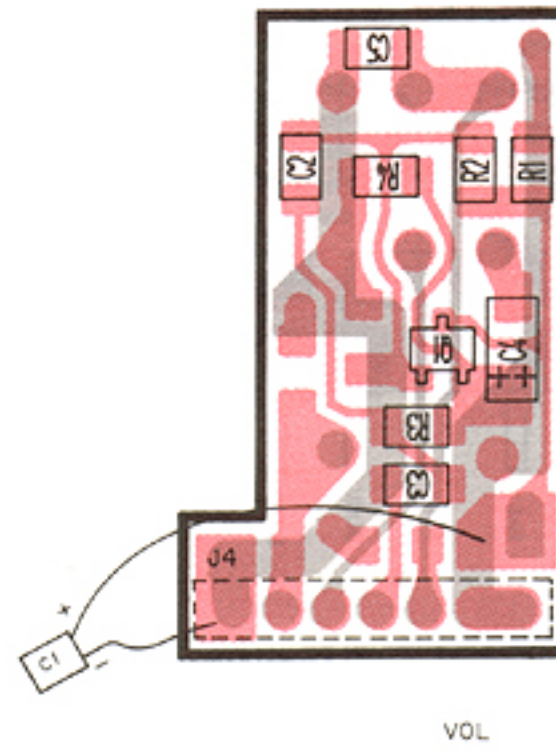
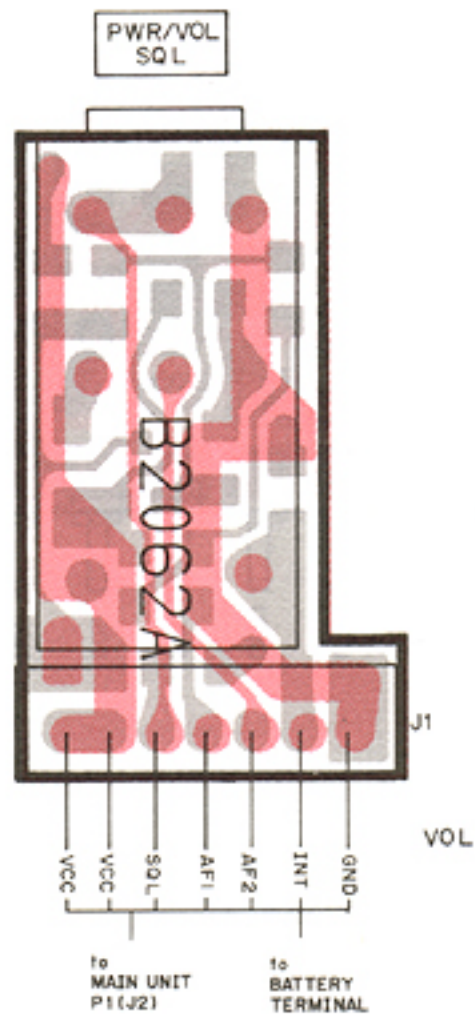
**FMW1**  
Q2



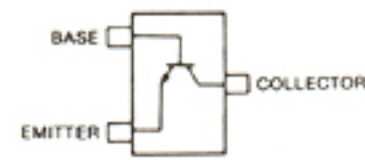


## 7-7 VOL AND MIC UNITS

### • VOL UNIT

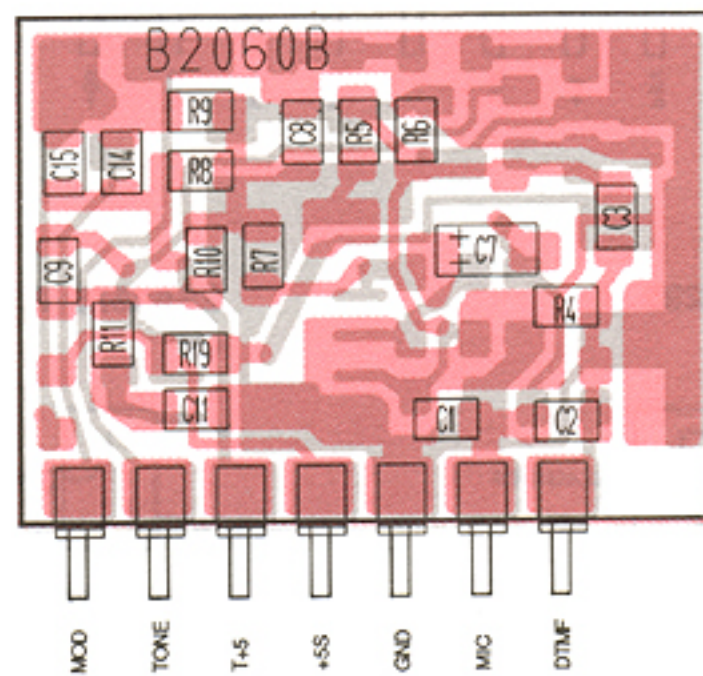
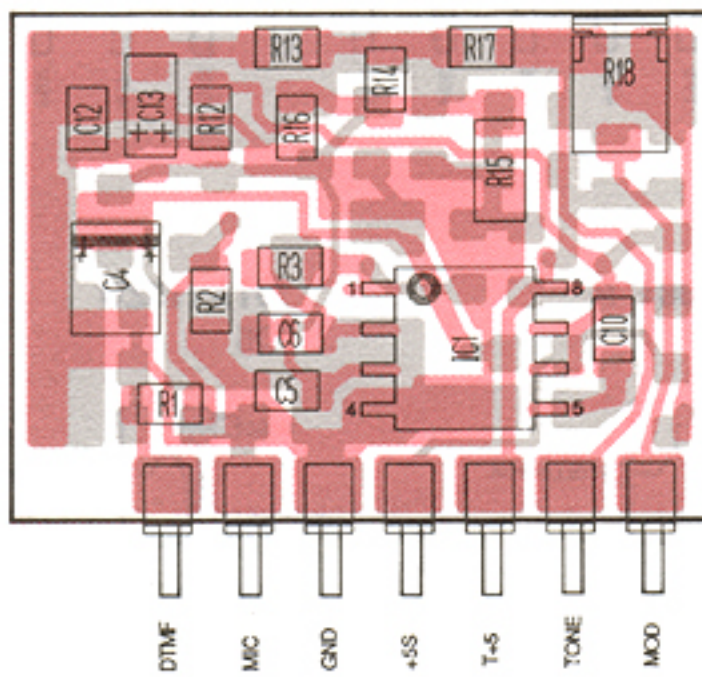


**2SC4081 R**  
Q1



Symbol : BR

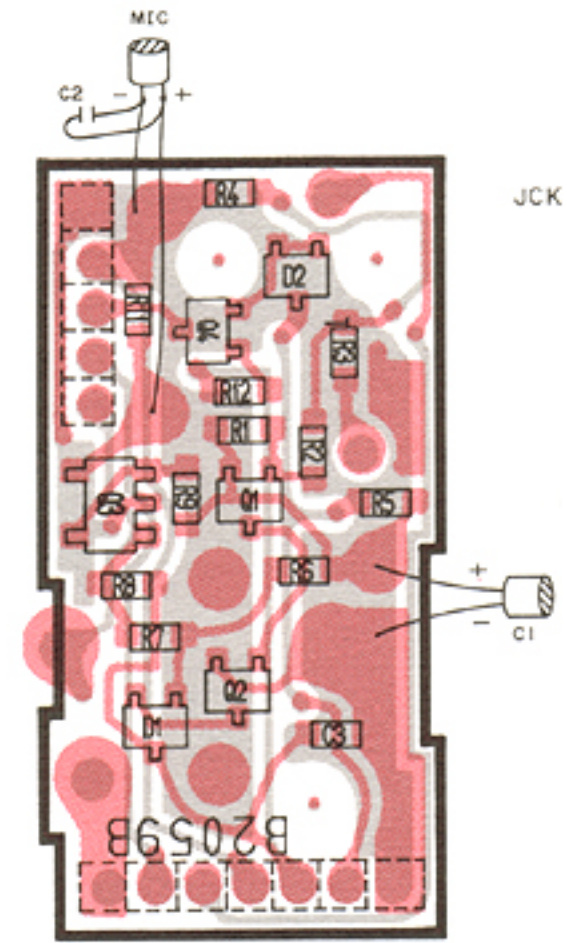
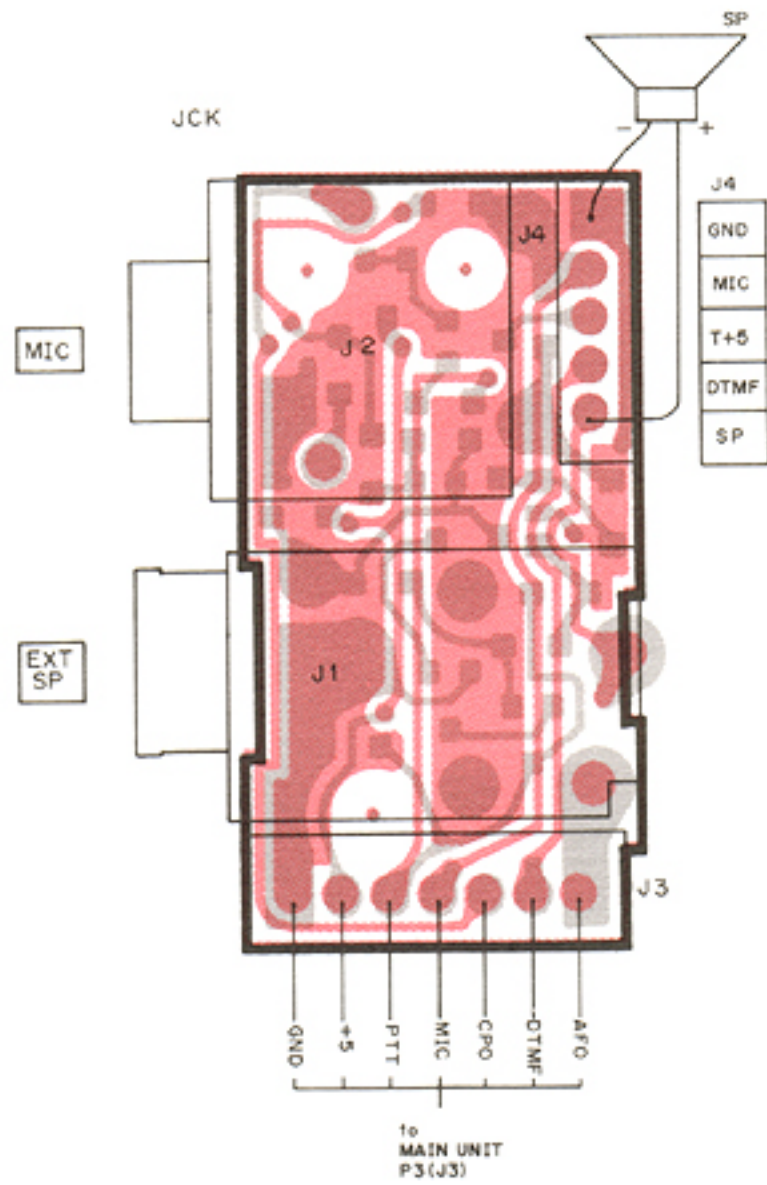
### • MIC UNIT



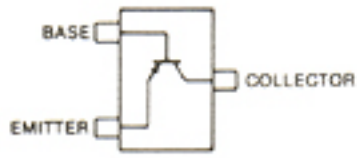


# 7-8 JCK AND MOD UNITS

## • JCK UNIT

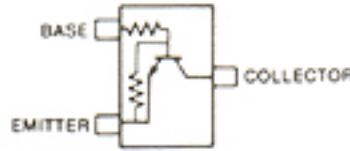


**2SA1576 R**  
Q1, Q4



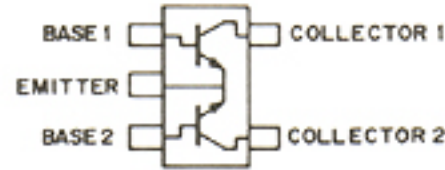
Symbol: FR

**DTC144EU**  
Q2



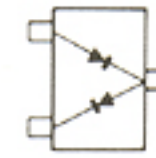
Symbol: 26

**FMW1**  
Q3



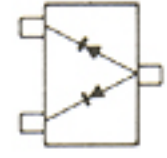
Symbol: W1

**DA204U**  
D1



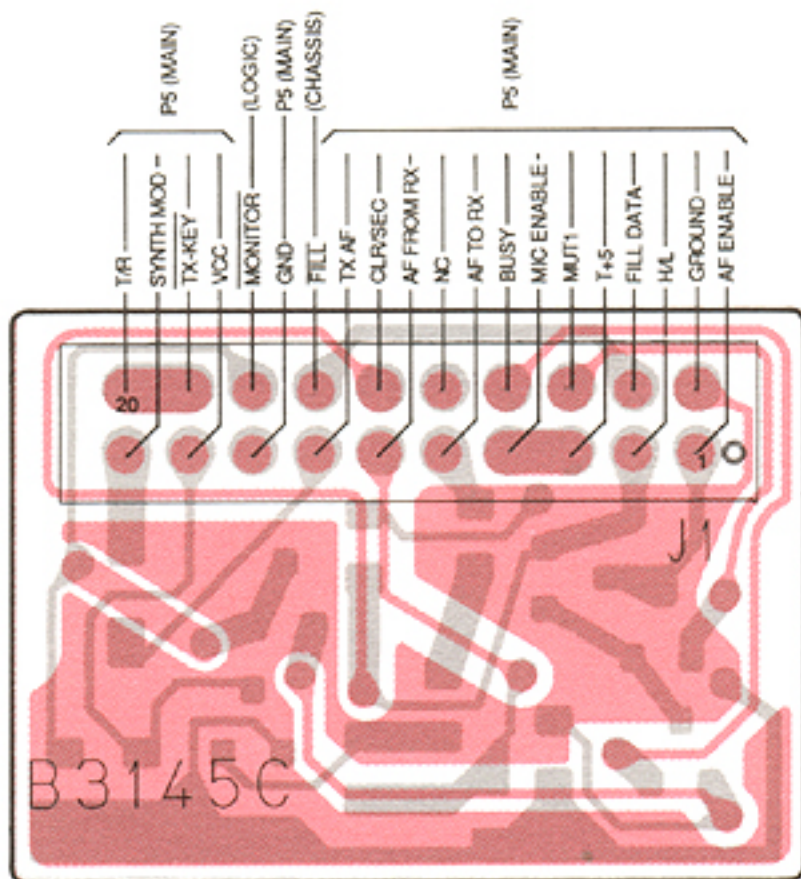
Symbol: K

**DAP202U**  
D2



Symbol: P

## • MOD UNIT

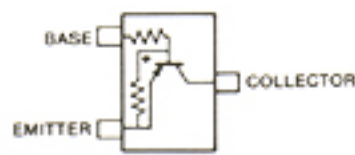


**2SJ106 Y**  
Q1



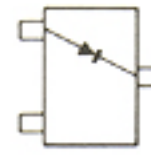
(Symbol: VY)

**DTA114EK**  
Q3



(Symbol: ??)

**1SS153**  
D1, D2, D3



(Symbol: A9)



# SECTION 5 PARTS LIST

## [CHASSIS UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
S1	2260000840	Switch	SKHHAN044A
SP1	2510000450	Speaker	EAS-3P123D [FILL/ERASE]
EP1	0910031090	P.C. Board	B 3147 (CHASSIS)

## [MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1150000780	IC	SC1106
Q1	1520000350	Transistor	2SB1182 Q
Q2	1530002370	Transistor	2SC2714-O (TE85R)
Q3	1520000350	Transistor	2SB1182 Q
Q5	1590000680	Transistor	DTC114EU T107
D4	1160000050	Diode	DAP202U T107
D5	1730001210	Zener	RD6.2JS B2
X1	6050002000	Crystal	CR-70
FI1	2010000200	Filter	21M15B3 (FL-42)
L1	6180000960	Coil	LAL 03NA 102K
L2	6180000960	Coil	LAL 03NA 102K
L6	6110002070	Coil	LA-227
L7	6110001540	Coil	LA-234
L8	6180001730	Coil	LAL 02NA 1R8K
L9	6150003140	Coil	LS-330
L10	6180001490	Coil	LAL 02KR 101K
R3	7030000400	Resistor	MCR10EZHZ 1.5 kΩ (152)
R4	7030000720	Resistor	MCR10EZHZ 680 kΩ (684)
R5	7030000400	Resistor	MCR10EZHZ 1.5 kΩ (152)
R7	7030000440	Resistor	MCR10EZHZ 3.3 kΩ (332)
R12	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R15	7030000430	Resistor	MCR10EZHZ 2.7 kΩ (272)
R16	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R17	7030000520	Resistor	MCR10EZHZ 15 kΩ (153)
R18	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R19	7030000400	Resistor	MCR10EZHZ 1.5 kΩ (152)
R20	7030000300	Resistor	MCR10EZHZ 220 Ω (221)
C1	4030004610	Ceramic	C2012 SL 1H 101J-T-A
C4	4550003060	Tantalum	TEMSVC 0J 336M-12 L
C5	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C6	4510003190	Electrolytic	6.3 RC2 47 μF (D=4.0)
C8	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C9	4550000010	Tantalum	DN 1C 4R7M
C10	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C11	4510003350	Electrolytic	6 SC 6R8 μF M
C12	4030004720	Ceramic	C2012 JB*1H 102K-T-A

## [MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C13	4510003260	Electrolytic	16 SC 6R8 μF M
C14	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C19	4030004470	Ceramic	C2012 SL 1H 100D-T-A
C20	4030004400	Ceramic	C2012 SL 1H 030C-T-A
C21	4030008480	Ceramic	C2012 SL 1H 240J-T-A
C22	4030004440	Ceramic	C2012 SL 1H 070D-T-A
C23	4030004460	Ceramic	C2012 SL 1H 090D-T-A
C27	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C28	4030004410	Ceramic	C2012 SL 1H 040C-T-A
C29	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C30	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C31	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C32	4550003050	Tantalum	TEMSVB 0J 156M-12 L
C33	4510003260	Electrolytic	16 SC 6R8 μF M
C34	4510003300	Electrolytic	6 SC 33 μF M
C35	4510003190	Electrolytic	6.3 RC2 47 μF (D=4.0)
C37	4550001950	Tantalum	DN 0J 101M
C38	4550003050	Tantalum	TEMSVB 0J 156M-12 L
C39	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C40	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C42	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C43	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C44	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C45	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C47	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C48	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C51	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C52	4030004610	Ceramic	C2012 SL 1H 101J-T-A
C53	4030004610	Ceramic	C2012 SL 1H 101J-T-A
C54	4030004610	Ceramic	C2012 SL 1H 101J-T-A
C61	4030004570	Ceramic	C2012 SL 1H 470J-T-A
C62	4550003050	Tantalum	TEMSVB 0J 156M-12 L
C65	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C66	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C67	4030004570	Ceramic	C2012 SL 1H 470J-T-A
C68	4030004570	Ceramic	C2012 SL 1H 470J-T-A
C69	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C70	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C71	4030004570	Ceramic	C2012 SL 1H 470J-T-A
C72	4030004710	Ceramic	C2012 JB 1H 471K-T-A
CP1	6510003080	Check Point	RT01T-1.0B
EP5	0910031063	P.C. Board	B 3144C (MAIN)

## [PLL UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1120001550	IC	M54959FP
Q1	1590000810	Transistor	XN6501 (TX)
Q2	1560000430	FET	2SK302-GR (TE85R)
Q3	1590000700	Transistor	DTC144EK T147
Q4	1590001360	Transistor	FMA1 T148
Q5	1560000270	FET	2SK302-Y (TE85R)
Q6	1530002360	Transistor	2SC2714-Y (TE85R)
Q7	1530002360	Transistor	2SC2714-Y (TE85R)
Q8	1530002360	Transistor	2SC2714-Y (TE85R)

[PLL UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q9	1530000160	Transistor	2SC2712-Y (TE85RTEM)
D1	1790000540	Diode	MA338 (TX)
D2	1790000460	Diode	MA334B (TX)
D3	1790000640	Diode	MA363B (TX)
D4	1720000220	Varicap	1SV166-T2B
X1	6050005970	Crystal	CR-287
L1	6130002000	Coil	LB-204
L2	6200000860	Coil	LQH 3N 1R8M
L3	6130002000	Coil	LB-204
L4	6200000860	Coil	LQH 3N 1R8M
R1	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R2	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R3	7030000540	Resistor	MCR10EZHZ 22 kΩ (223)
R4	7030000430	Resistor	MCR10EZHZ 2.7 kΩ (272)
R5	7030000430	Resistor	MCR10EZHZ 2.7 kΩ (272)
R6	7030000520	Resistor	MCR10EZHZ 15 kΩ (153)
R7	7030000470	Resistor	MCR10EZHZ 5.6 kΩ (562)
R8	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R9	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R10	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R11	7030000360	Resistor	MCR10EZHZ 680 Ω (681)
R12	7030000600	Resistor	MCR10EZHZ 68 kΩ (683)
R13	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R14	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R15	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R16	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R17	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R18	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R19	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R20	7030000340	Resistor	MCR10EZHZ 470 Ω (471)
R21	7030000650	Resistor	MCR10EZHZ 180 kΩ (184)
R22	7030000710	Resistor	MCR10EZHZ 560 kΩ (564)
R23	7030000390	Resistor	MCR10EZHZ 1.2 kΩ (122)
R24	7030000360	Resistor	MCR10EZHZ 680 Ω (681)
R25	7030000230	Resistor	MCR10EZHZ 56 Ω (560)
R26	7030000480	Resistor	MCR10EZHZ 6.8 kΩ (682)
R27	7030000400	Resistor	MCR10EZHZ 1.5 kΩ (152)
R28	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R29	7510000170	Thermistor	157-252-13013-TP
R30	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R31	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R32	7510000170	Thermistor	157-252-13013-TP
R33	7030000520	Resistor	MCR10EZHZ 15 kΩ (153)
R34	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R35	7030000640	Resistor	MCR10EZHZ 150 kΩ (154)
C1	4030004750	Ceramic	C2012 JB 1H 103K-T-A
C2	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C3	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C7	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C8	4030005090	Ceramic	C2012 JB 1H 223K-T-A
C9	4030004610	Ceramic	C2012 SL 1H 101J-T-A
C10	4030004750	Ceramic	C2012 JB 1H 103K-T-A
C12	4550000420	Tantalum	TESVA 1A 105M1-8L
C13	4030004750	Ceramic	C2012 JB 1H 103K-T-A
C14	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C15	4550000280	Tantalum	TESVB2 1A 475M-8L
C17	4550002850	Tantalum	TESVA 1V 104K1-8L
C18	4030004610	Ceramic	C2012 SL 1H 101J-T-A
C19	4030004870	Ceramic	C2012 CH 1H 100D-T-A
C20	4030004850	Ceramic	C2012 CH 1H 080D-T-A
C21	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C22	4030004370	Ceramic	C2012 SL 1H 0R5C-T-A
C23	4030004620	Ceramic	C2012 SL 1H 121J-T-A
C24	4030004820	Ceramic	C2012 CH 1H 050C-T-A
C25	4030004800	Ceramic	C2012 CH 1H 030C-T-A

[PLL UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C26	4030004880	Ceramic	C2012 CH 1H 120J-T-A
C27	4030004820	Ceramic	C2012 CH 1H 050C-T-A
C28	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C29	4030004370	Ceramic	C2012 SL 1H 0R5C-T-A
C30	4030004410	Ceramic	C2012 SL 1H 040C-T-A
C31	4030004440	Ceramic	C2012 SL 1H 070D-T-A
C32	4030004470	Ceramic	C2012 SL 1H 100D-T-A
C33	4030004500	Ceramic	C2012 SL 1H 180J-T-A
C34	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C35	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C36	4030004610	Ceramic	C2012 SL 1H 101J-T-A
C37	4030004660	Ceramic	C2012 SL 1H 221J-T-A
C38	4030004930	Ceramic	C2012 CH 1H 330J-T-A
C39	4610001260	Trimmer	ECRJA020E12W
C40	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C41	4030004810	Ceramic	C2012 CH 1H 040C-T-A
EP1	0910021223	P.C. Board	B 2053C (PLL)

[APC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1590000620	Transistor	FMS1 T148
Q2	1530001940	Transistor	2SC2712-BL (TE85R)
D1	1790000450	Diode	MA862 (TX)
D2	1790000490	Diode	HSM88AS-TR
D3	1790000490	Diode	HSM88AS-TR
D4	1750000080	Diode	1SS153-T2
L1	6110002070	Coil	LA-227
L2	6110002070	Coil	LA-227
L3	6110002070	Coil	LA-227
L4	6200000060	Coil	LQH 3N 1R5M
R1	7030000610	Resistor	MCR10EZHZ 82 kΩ (823)
R2	7310003520	Trimmer	RV-224 (RH03 AVA15J) 104
R3	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R4	7030000540	Resistor	MCR10EZHZ 22 kΩ (223)
R5	7030000620	Resistor	MCR10EZHZ 100 kΩ (104)
R6	7030000540	Resistor	MCR10EZHZ 22 kΩ (223)
R7	7310003560	Trimmer	RV-220 (RH03 AVAJ4J) 223
R8	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R9	7030000710	Resistor	MCR10EZHZ 560 kΩ (564)
R10	7030000470	Resistor	MCR10EZHZ 5.6 kΩ (562)
R11	7030000510	Resistor	MCR10EZHZ 12 kΩ (123)
R12	7030000410	Resistor	MCR10EZHZ 1.8 kΩ (182)
R13	7030000410	Resistor	MCR10EZHZ 1.8 kΩ (182)
R14	7030000510	Resistor	MCR10EZHZ 12 kΩ (123)
R15	7030000270	Resistor	MCR10EZHZ 120 Ω (121)
C1	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C2	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C3	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C4	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C5	4550000450	Tantalum	TESVC 1C 106M-12L
C7	4030004520	Ceramic	C2012 SL 1H 220J-T-A
C8	4030004560	Ceramic	C2012 SL 1H 390J-T-A
C9	4030004520	Ceramic	C2012 SL 1H 220J-T-A

**[APC UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
C10	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C11	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C12	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C13	4030004480	Ceramic	C2012 SL 1H 120J-T-A
C14	4030004480	Ceramic	C2012 SL 1H 120J-T-A
EP1	0910022384	P.C. Board	B 2056D (APC)
EP2	6910002720	Lead Frame	HFB2.54-0.9-8 (N)

**[YGR UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1530001750	Transistor	2SC3585-T2B
Q2	1530002340	Transistor	2SC2954-T2B
D1	1750000140	Diode	1SS268 (TE85R)
D2	1750000070	Diode	1SS226 (TE85R)
L1	6200000770	Coil	LQN 2A 68NM
L2	6200000770	Coil	LQN 2A 68NM
R1	7030000420	Resistor	MCR10EZHJ 2.2 kΩ (222)
R2	7030000500	Resistor	MCR10EZHJ 10 kΩ (103)
R3	7030000220	Resistor	MCR10EZHJ 47 Ω (470)
R4	7030000230	Resistor	MCR10EZHJ 56 Ω (560)
R5	7030000420	Resistor	MCR10EZHJ 2.2 kΩ (222)
R6	7030000380	Resistor	MCR10EZHJ 1 kΩ (102)
R7	7030000220	Resistor	MCR10EZHJ 47 Ω (470)
R8	7030000140	Resistor	MCR10EZHJ 10 Ω (100)
R9	7030000420	Resistor	MCR10EZHJ 2.2 kΩ (222)
C1	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C2	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C3	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C4	4030004480	Ceramic	C2012 SL 1H 120J-T-A
C5	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C6	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C7	4030004500	Ceramic	C2012 SL 1H 180J-T-A
C8	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C9	4030004710	Ceramic	C2012 JB 1H 471K-T-A
EP1	0910022402	P.C. Board	B 2058B (YGR)
EP2	6910002720	Lead Frame	HFB2.54-0.9-8 (N)

**[IF UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1120001650	IC	TK10487MTR
Q1	1530001950	Transistor	2SC2712-GR (TE85R)

**[IF UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
D1	1790000490	Diode	HSM88AS-TR
X1	6070000060	Discriminator	CDBM455C7
F11	2020000550	Ceramic Filter	CFUM455E
R1	7030000480	Resistor	MCR10EZHJ 6.8 kΩ (682)
R2	7030000390	Resistor	MCR10EZHJ 1.2 kΩ (122)
R3	7030000620	Resistor	MCR10EZHJ 100 kΩ (104)
R6	7030000420	Resistor	MCR10EZHJ 2.2 kΩ (222)
R7	7030000610	Resistor	MCR10EZHJ 82 kΩ (823)
R8	7030000360	Resistor	MCR10EZHJ 680 Ω (681)
R9	7030000440	Resistor	MCR10EZHJ 3.3 kΩ (332)
R10	7030000480	Resistor	MCR10EZHJ 6.8 kΩ (682)
R11	7030000340	Resistor	MCR10EZHJ 470 Ω (471)
R12	7030000440	Resistor	MCR10EZHJ 3.3 kΩ (332)
R13	7030000670	Resistor	MCR10EZHJ 270 kΩ (274)
R14	7030000380	Resistor	MCR10EZHJ 1 kΩ (102)
R15	7030000550	Resistor	MCR10EZHJ 27 kΩ (273)
R16	7030000260	Resistor	MCR10EZHJ 100 Ω (101)
C1	4030005140	Ceramic	C3216 JB 1E 104K-T-A
C2	4030004600	Ceramic	C2012 SL 1H 820J-T-A
C3	4030005140	Ceramic	C3216 JB 1E 104K-T-A
C4	4030005140	Ceramic	C3216 JB 1E 104K-T-A
C5	4030004590	Ceramic	C2012 SL 1H 680J-T-A
C6	4030004610	Ceramic	C2012 SL 1H 101J-T-A
C9	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C10	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C11	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C13	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C14	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C15	4030005090	Ceramic	C2012 JB 1H 223K-T-A
C16	4550002960	Tantalum	TESVA 1C 155M1-8L
C17	4550000460	Tantalum	TESVA 1C 105M1-8L
C18	4030005090	Ceramic	C2012 JB 1H 223K-T-A
C19	4030005140	Ceramic	C3216 JB 1E 104K-T-A
EP1	0910022392	P.C. Board	B 2057B (IF)
EP2	6910002720	Lead Frame	HFB2.54-0.9-8 (N)

**[REG UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1180000510	IC	LP2950CZ-5.0
Q1	1590000430	Transistor	DTC144EU T107
Q2	1590000670	Transistor	FMW1 T148
Q3	1510000600	Transistor	2SA1298-Y (TE85R)
Q4	1510000510	Transistor	2SA1576 T107 R
Q5	1590001040	Transistor	DTA113ZU T107
Q6	1530002060	Transistor	2SC4081 T107 R
D1	1790000590	Diode	MA110 (TW)
D2	1790000590	Diode	MA110 (TW)
R3	7030000460	Resistor	MCR10EZHJ 4.7 kΩ (472)
R4	7030000380	Resistor	MCR10EZHJ 1 kΩ (102)

[REG UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R5	7030000430	Resistor	MCR10EZHZ 2.7 kΩ (272)
R6	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R7	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R8	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R9	7030000430	Resistor	MCR10EZHZ 2.7 kΩ (272)
R10	7030000540	Resistor	MCR10EZHZ 22 kΩ (223)
R11	7030000530	Resistor	MCR10EZHZ 18 kΩ (183)
C1	4030005140	Ceramic	C3216 JB 1E 104K-T-A
C2	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C3	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C4	4030005140	Ceramic	C3216 JB 1E 104K-T-A
C5	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C7	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C8	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C9	4550000460	Tantalum	TESVA 1C 105M1-8L
C10	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C11	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C12	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C13	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C14	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C15	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C16	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C17	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C18	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C19	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C20	4550000460	Tantalum	TESVA 1C 105M1-8L
C21	4550002960	Tantalum	TESVA 1C 155M1-8L
C22	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C23	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C24	4550003290	Tantalum	TESVA 0G 475M1-8L
C25	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C26	4030004710	Ceramic	C2012 JB 1H 471K-T-A
EP1	0910022373	P.C. Board	B 2054C (REG)
EP2	6910002720	Lead Frame	HFB2.54-0.9-8 (N)

[MIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C1	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C2	4030005090	Ceramic	C2012 JB 1H 223K-T-A
C3	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C4	4550000280	Tantalum	TESVB2 1A 475M-8L
C5	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C6	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C7	4550002850	Tantalum	TESVA 1V 104K1-8L
C8	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C9	4030004730	Ceramic	C2012 JB 1H 222K-T-A
C10	4030004710	Ceramic	C2012 JB 1H 471K-T-A
C11	4030004610	Ceramic	C2012 SL 1H 101J-T-A
C12	4030004750	Ceramic	C2012 JB 1H 103K-T-A
C13	4550003290	Tantalum	TESVA 0G 475M1-8L
C14	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C15	4030004710	Ceramic	C2012 JB 1H 471K-T-A
EP1	0910023882	P.C. Board	B 2060B (MIC)
EP2	6910002720	Lead Frame	HFB2.54-0.9-8 (N)

[AF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110001720	IC	NJM386BM (T1)
Q1	1520000270	Transistor	2SB1182 TL Q
Q2	1530001940	Transistor	2SC2712-BL (TE85R)
Q3	1590000700	Transistor	DTC144EK T147
D1	1730000010	Zener	RD4.7M-T2B3
R1	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R2	7030000320	Resistor	MCR10EZHZ 330 Ω (331)
R3	7030000140	Resistor	MCR10EZHZ 10 Ω (100)
R4	7030000570	Resistor	MCR10EZHZ 39 kΩ (393)
R5	7030000320	Resistor	MCR10EZHZ 330 Ω (331)
R6	7030000520	Resistor	MCR10EZHZ 15 kΩ (153)
R7	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R8	7030000340	Resistor	MCR10EZHZ 470 Ω (471)
R10	7030000520	Resistor	MCR10EZHZ 15 kΩ (153)
C2	4030008490	Ceramic	C2012 JB 1H 682K-T-A
C3	4030005110	Ceramic	C2012 JB 1E 473K-T-A
C4	4550002960	Tantalum	TESVA 1C 155M1-8L
C5	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C7	4550003250	Tantalum	TEMSVA 1V 474M-8L
C8	4550003150	Tantalum	TEMSVC 1C 156M-12 L
EP1	0910022412	P.C. Board	B 2061B (AF)
EP2	6910002720	Lead Frame	HFB2.54-0.9-8 (N)

[MIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110001220	IC	BA4558F T1
R1	7030000540	Resistor	MCR10EZHZ 22 kΩ (223)
R2	7030000350	Resistor	MCR10EZHZ 560 Ω (561)
R3	7030000640	Resistor	MCR10EZHZ 150 kΩ (154)
R4	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R5	7030000650	Resistor	MCR10EZHZ 180 kΩ (184)
R6	7030001750	Resistor	MCR10EZHZ 240 kΩ (244)
R7	7030000630	Resistor	MCR10EZHZ 120 kΩ (124)
R8	7030000630	Resistor	MCR10EZHZ 120 kΩ (124)
R9	7030000660	Resistor	MCR10EZHZ 220 kΩ (224)
R10	7030000610	Resistor	MCR10EZHZ 82 kΩ (823)
R11	7030000610	Resistor	MCR10EZHZ 82 kΩ (823)
R12	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R13	7030000470	Resistor	MCR10EZHZ 5.6 kΩ (562)
R14	7030000440	Resistor	MCR10EZHZ 3.3 kΩ (332)
R15	7510000170	Thermistor	157-252-13013-TP
R16	7030000420	Resistor	MCR10EZHZ 2.2 kΩ (222)
R17	7030000590	Resistor	MCR10EZHZ 56 kΩ (563)
R18	7310003570	Trimmer	RV-228 (RH03 AVAS5J) 474
R19	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1530002240	Transistor	2SC3775-3-TA
Q2	1530002600	Transistor	2SC4215-O (TE85R)
Q3	1560000270	FET	2SK302-Y (TE85R)
D1	1790000530	Diode	MA333 (TW)
D2	1790000530	Diode	MA333 (TW)
D3	1790000530	Diode	MA333 (TW)
D4	1790000530	Diode	MA333 (TW)
D5	1790000530	Diode	MA333 (TW)
L1	6130001900	Coil	LB-194
L2	6150003420	Coil	LS-349
L3	6150003420	Coil	LS-349
L4	6150003420	Coil	LS-349
R1	7030000630	Resistor	MCR10EZHZ 120 kΩ (124)
R2	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R3	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R4	7030000300	Resistor	MCR10EZHZ 220 Ω (221)
R5	7030000260	Resistor	MCR10EZHZ 100 Ω (101)
R6	7030000380	Resistor	MCR10EZHZ 1 kΩ (102)
R7	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
R8	7030000220	Resistor	MCR10EZHZ 47 Ω (470)
R9	7030000630	Resistor	MCR10EZHZ 120 kΩ (124)
R10	7030000630	Resistor	MCR10EZHZ 120 kΩ (124)
R11	7030000630	Resistor	MCR10EZHZ 120 kΩ (124)
R12	7030000220	Resistor	MCR10EZHZ 47 Ω (470)
R13	7030000310	Resistor	MCR10EZHZ 270 Ω (271)
R14	7030000220	Resistor	MCR10EZHZ 47 Ω (470)
R15	7030000500	Resistor	MCR10EZHZ 10 kΩ (103)
C1	4030004590	Ceramic	C2012 SL 1H 680J-T-A
C2	4030004450	Ceramic	C2012 SL 1H 080D-T-A
C3	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C4	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C5	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C6	4030004380	Ceramic	C2012 SL 1H 010C-T-A
C7	4030004460	Ceramic	C2012 SL 1H 090D-T-A
C8	4030004370	Ceramic	C2012 SL 1H 0R5C-T-A
C9	4030004470	Ceramic	C2012 SL 1H 100D-T-A
C10	4030004390	Ceramic	C2012 SL 1H 020C-T-A
C11	4030004370	Ceramic	C2012 SL 1H 0R5C-T-A
C12	4030004470	Ceramic	C2012 SL 1H 100D-T-A
C13	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C14	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C15	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C16	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C17	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C18	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C19	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C20	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C21	4030004710	Ceramic	C2012 JB 1H 471K-T-A
EP1	0910021763	P.C. Board	B 2055C (RF)
EP2	6910002720	Lead Frame	HFB2.54-0.9-8 (N)

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1140001080	IC	μPD75108AG-052-22
IC2	1110001500	IC	S-8054ALR-LN-T1
Q1	1510000660	Transistor	2SA1344-TA
Q2	1510000660	Transistor	2SA1344-TA
Q3	1510000500	Transistor	2SA1162-GR (TE85R)
Q4	1590000700	Transistor	DTC144EK T147
Q5	1530000160	Transistor	2SC2712-Y (TE85RTEM)
Q6	1590000700	Transistor	DTC144EK T147
Q7	1510000500	Transistor	2SA1162-GR (TE85R)
D1	1750000060	Diode	1SS196 (TE85R)
D3	1750000020	Diode	1SS184 (TE85R)
D5	1750000060	Diode	1SS196 (TE85R)
X1	6060000230	Crystal	FAR-C4CA-04194000 -M01
R1	7030000460	Resistor	MCR10EZHZ 4.7 kΩ (472)
R2	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R3	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R4	7030000290	Resistor	MCR10EZHZ 180 Ω (181)
R5	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R6	7030000190	Resistor	MCR10EZHZ 27 Ω (270)
R7	7030000470	Resistor	MCR10EZHZ 5.6 kΩ (562)
R8	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R9	7030000560	Resistor	MCR10EZHZ 33 kΩ (333)
R10	7030000580	Resistor	MCR10EZHZ 47 kΩ (473)
R11	7030000590	Resistor	MCR10EZHZ 56 kΩ (563)
R12	7030000530	Resistor	MCR10EZHZ 18 kΩ (183)
R13	7030000540	Resistor	MCR10EZHZ 22 kΩ (223)
C1	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C2	4550000740	Tantalum	TESVB2 0J 685M-8L
C3	4030004570	Ceramic	C2012 SL 1H 470J-T-A
C4	4030004570	Ceramic	C2012 SL 1H 470J-T-A
C5	4030004570	Ceramic	C2012 SL 1H 470J-T-A
C6	4030005090	Ceramic	C2012 JB 1H 223K-T-A
C7	4030006450	Ceramic	C2012 JF 1H 103Z-T-A
C8	4030004720	Ceramic	C2012 JB 1H 102K-T-A
DS1	5040001110	LED	SLM-23VMWS T97B [TX/BUSY]
S1	2220000330	Switch	HSW0880-01-210 [CLR/SEC]
S2	2260000600	Switch	SKHMPD004A [PTT]
S3	2260000600	Switch	SKHMPD004A [MONITOR]
S4	2260000600	Switch	SKHMPD004A
S5	2250000040	Switch	KSR16-0-20 [CHANNEL SELECTOR]
BT1	3020000100	Lithium Battery	CR2025-1T21
EP1	0910021584	P.C. Board	B 2052D (LOGIC)

[JCK UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1510000510	Transistor	2SA1576 T107 R
Q2	1590000430	Transistor	DTC144EU T107
Q3	1590000670	Transistor	FMW1 T148
Q4	1510000510	Transistor	2SA1576 T107 R
D1	1750000130	Diode	DA204U T107
D2	1160000050	Diode	DAP202U T107
R1	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R2	7030003450	Resistor	ERJ3GEYJ 122 V (1.2 kΩ)
R3	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R4	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R5	7030003400	Resistor	ERJ3GEYJ 471 V (470 Ω)
R6	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R7	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R8	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R9	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R11	7030003620	Resistor	ERJ3GEYJ 333 V (33 kΩ)
R12	7030003470	Resistor	ERJ3GEYJ 182 V (1.8 kΩ)
C1	4510001350	Electrolytic	16 MS5 10 μF
C2	4030004560	Ceramic	C2012 SL 1H 390J-T-A
C3	4030003890	Ceramic	GRM39 B 471K 50PT
MC1	7700000860	Microphone	WM-62A
EP1	0910021233	P.C. Board	B 2059C (JCK)

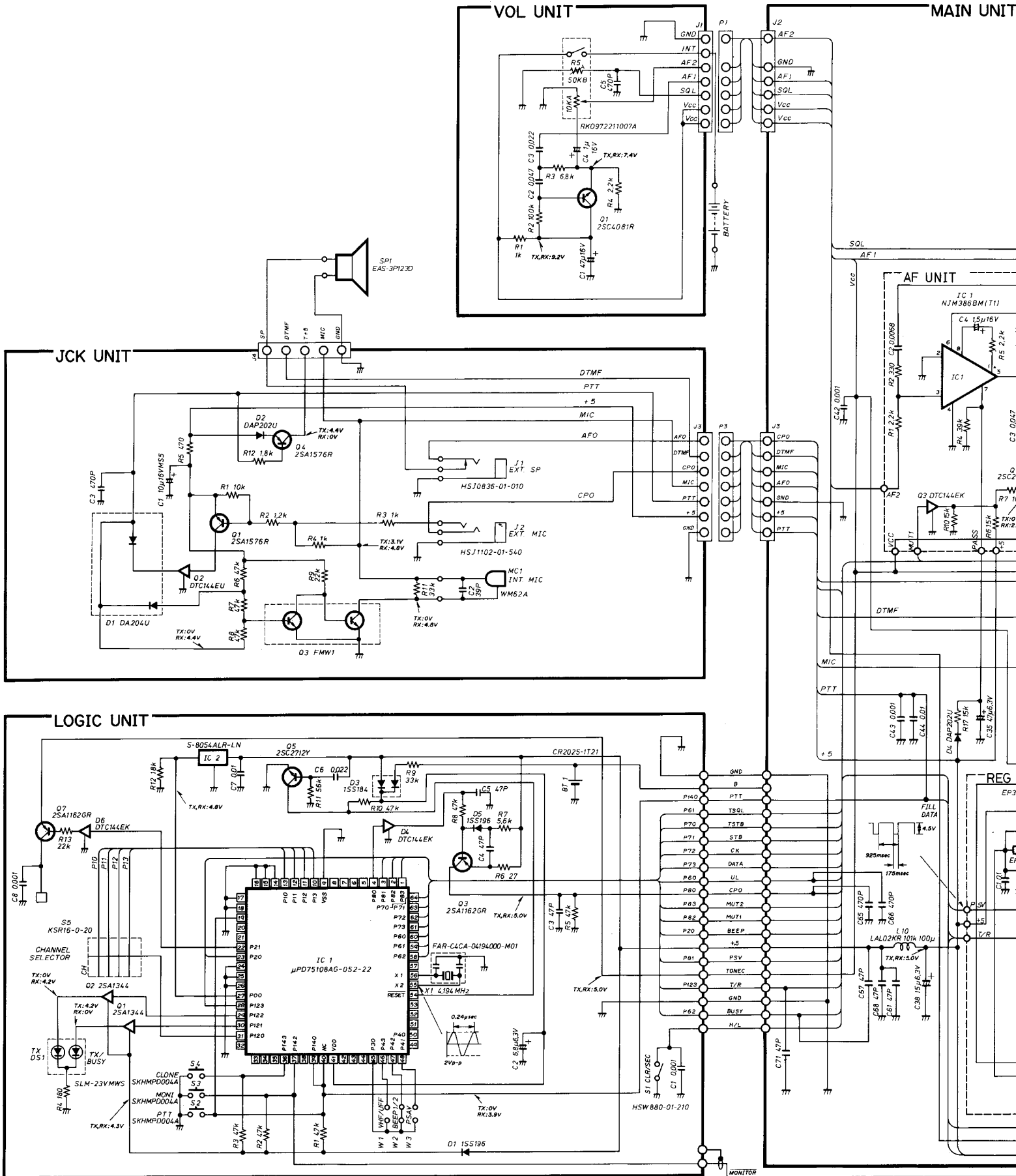
[MOD UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1590000380	FET	2SJ106-Y (TE85R)
Q3	1590000920	Transistor	DTA114EK T146
D1	1750000080	Diode	1SS153-T2
D2	1750000080	Diode	1SS153-T2
D3	1750000080	Diode	1SS153-T2
R1	7030000440	Resistor	MCR10EZHZJ 3.3 kΩ (332)
R2	7030000500	Resistor	MCR10EZHZJ 10 kΩ (103)
C1	4550002890	Tantalum	TESVA 1A 225M1-8L
C2	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C3	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C4	4030004760	Ceramic	C2012 JF 1E 104Z-T-A
C5	4030004720	Ceramic	C2012 JB 1H 102K-T-A
C6	4030004720	Ceramic	C2012 JB 1H 102K-T-A
EP1	0910031073	P.C. Board	B 3145C (MOD)

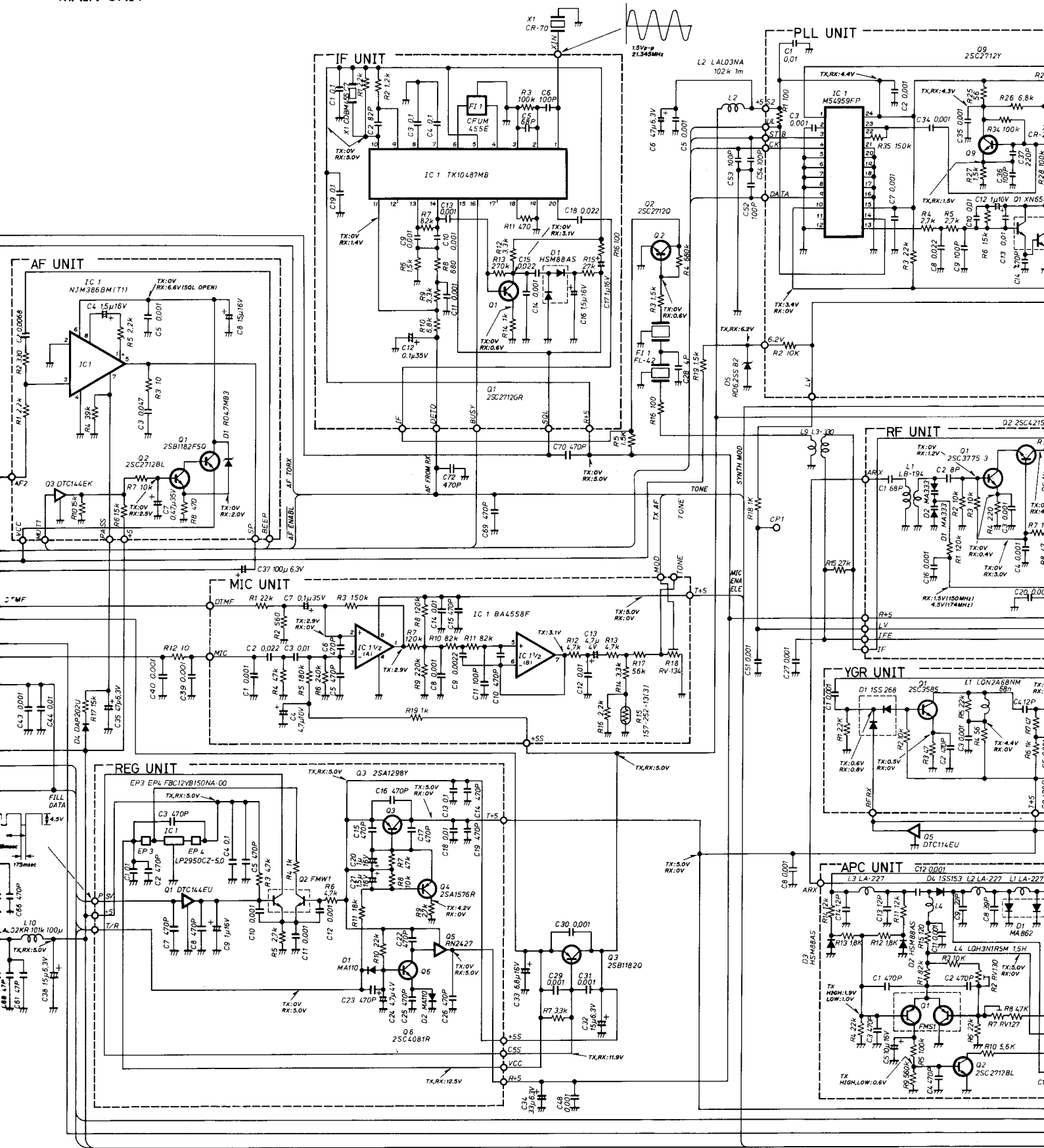
[VOL UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1530002060	Transistor	2SC4081 T107 R
R1	7030000380	Resistor	MCR10EZHZJ 1 kΩ (102)
R2	7030000620	Resistor	MCR10EZHZJ 100 kΩ (104)
R3	7030000480	Resistor	MCR10EZHZJ 6.8 kΩ (682)
R4	7030000420	Resistor	MCR10EZHZJ 2.2 kΩ (222)
R5	7210001510	Variable Resistor	RK0972211007A (50KB/10KA) [PWR/VOL] [SQL]
C1	4510003170	Electrolytic	16 RC2 47 μF (D=5.0)
C2	4030005110	Ceramic	C2012 JB 1E 473K-T-A
C3	4030005090	Ceramic	C2012 JB 1H 223K-T-A
C4	4550000460	Tantalum	TESVA 1C 105M1-8L
C5	4030004710	Ceramic	C2012 JB 1H 471K-T-A
EP1	0910022621	P.C. Board	B 2062A (VOL)

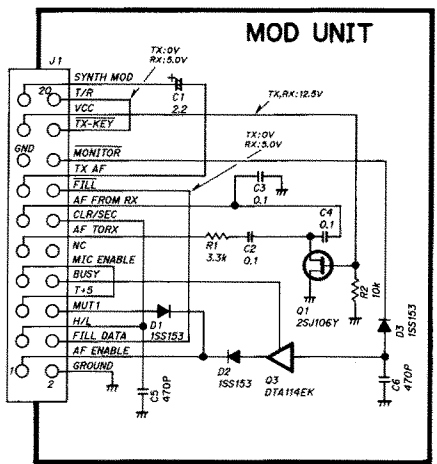
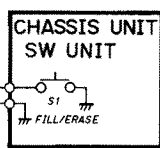
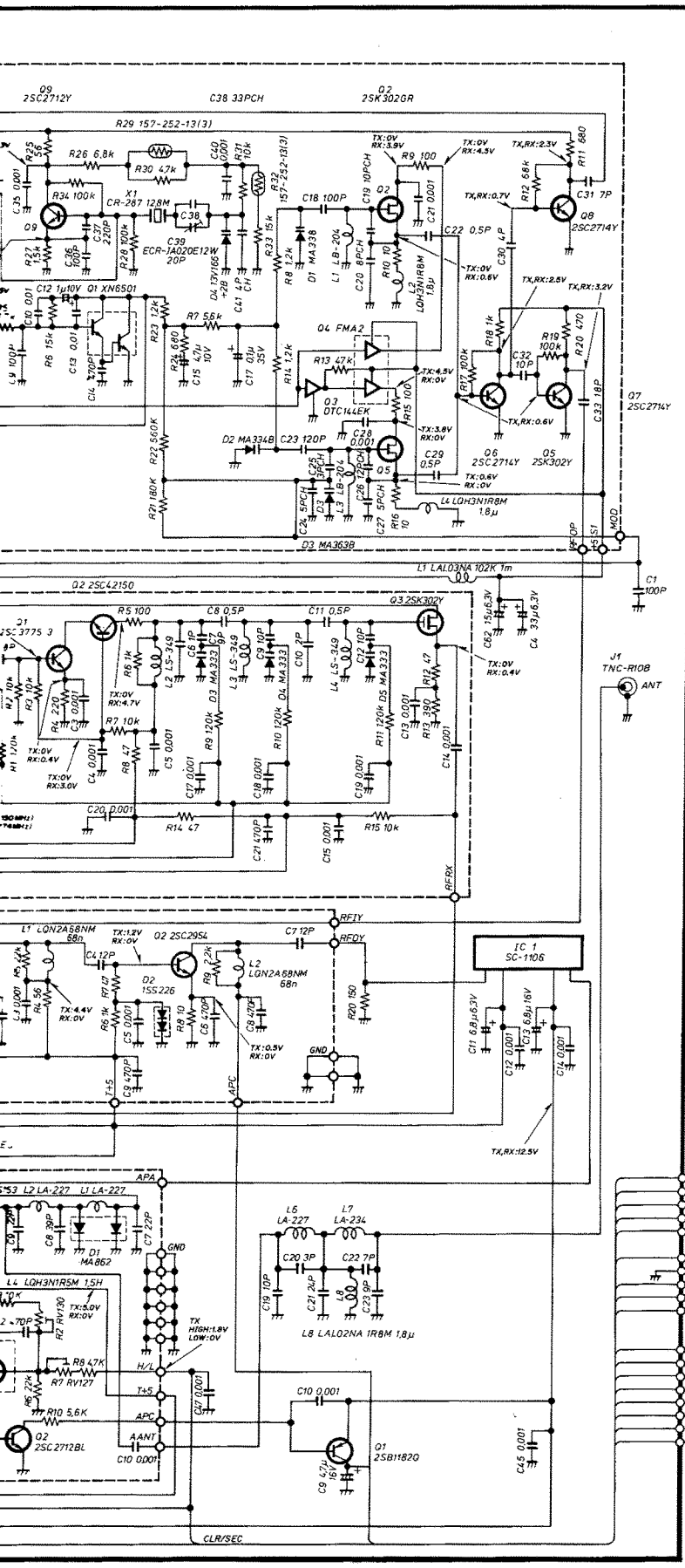
# SECTION 9 VOLTAGE DIAGRAM



# MAIN UNIT







## 10-1 INSTALLATION OF DM8000

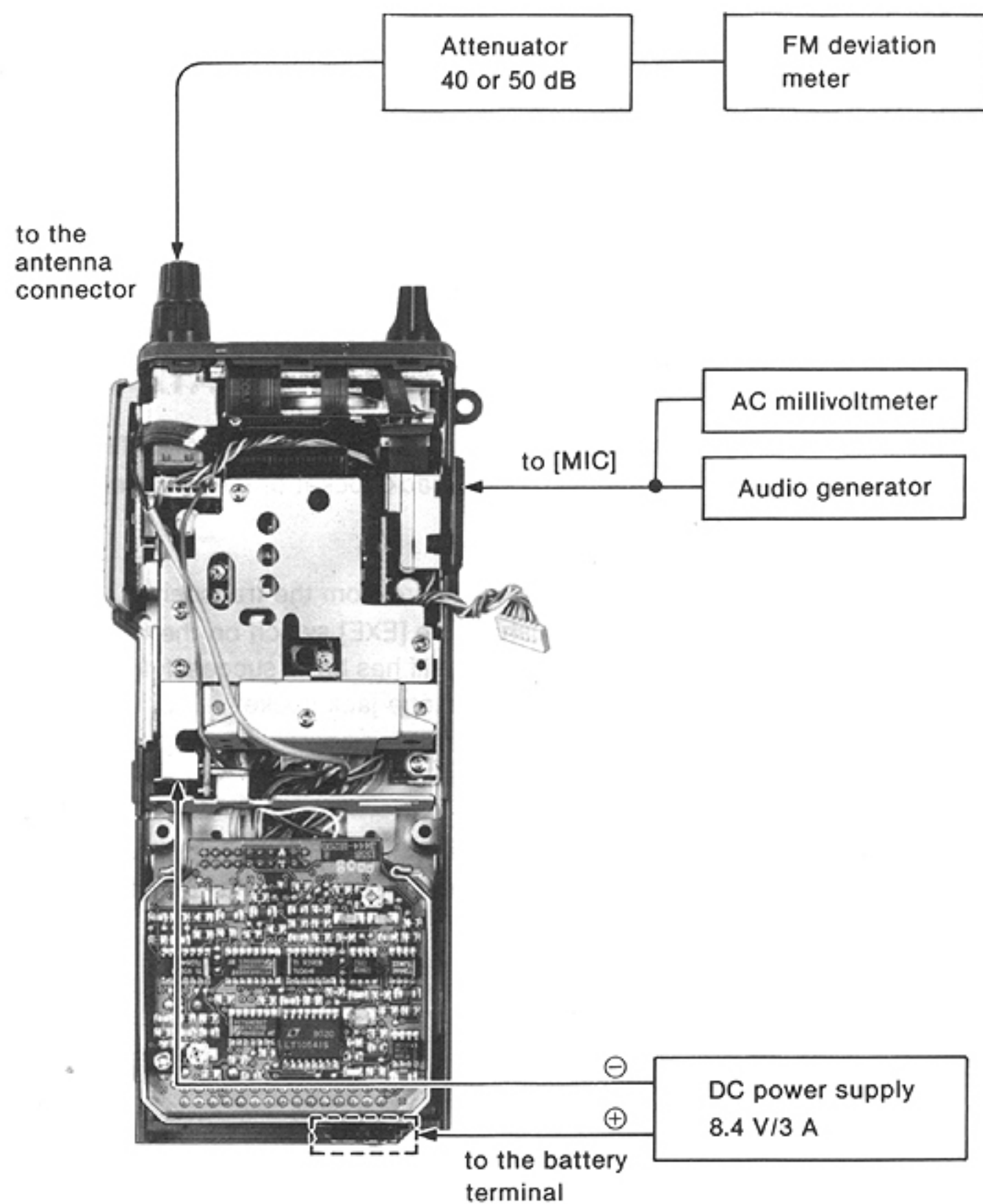
For Digital Secure Working remove the MOD UNIT and replace it with the DM8000 module.

## 10-2 PREPARATION BEFORE SERVICING

### ■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 8.4 V DC Current capacity : 3 A or more	FM deviation meter	Frequency minimum : 200 MHz Measuring range : 0~±10 kHz
AC millivoltmeter	Measuring range : 10 mV~3 V	Attenuator	Power attenuation : 40 or 50 dB Capacity : 10 W or more
Audio generator	Frequency range : 300~3000 Hz Output level : 0~200 mV	Oscilloscope	Measuring range : 10 mV~10 V

### ■ CONNECTION



### 10-3 TRANSMITTER ADJUSTMENT WITH DM8000

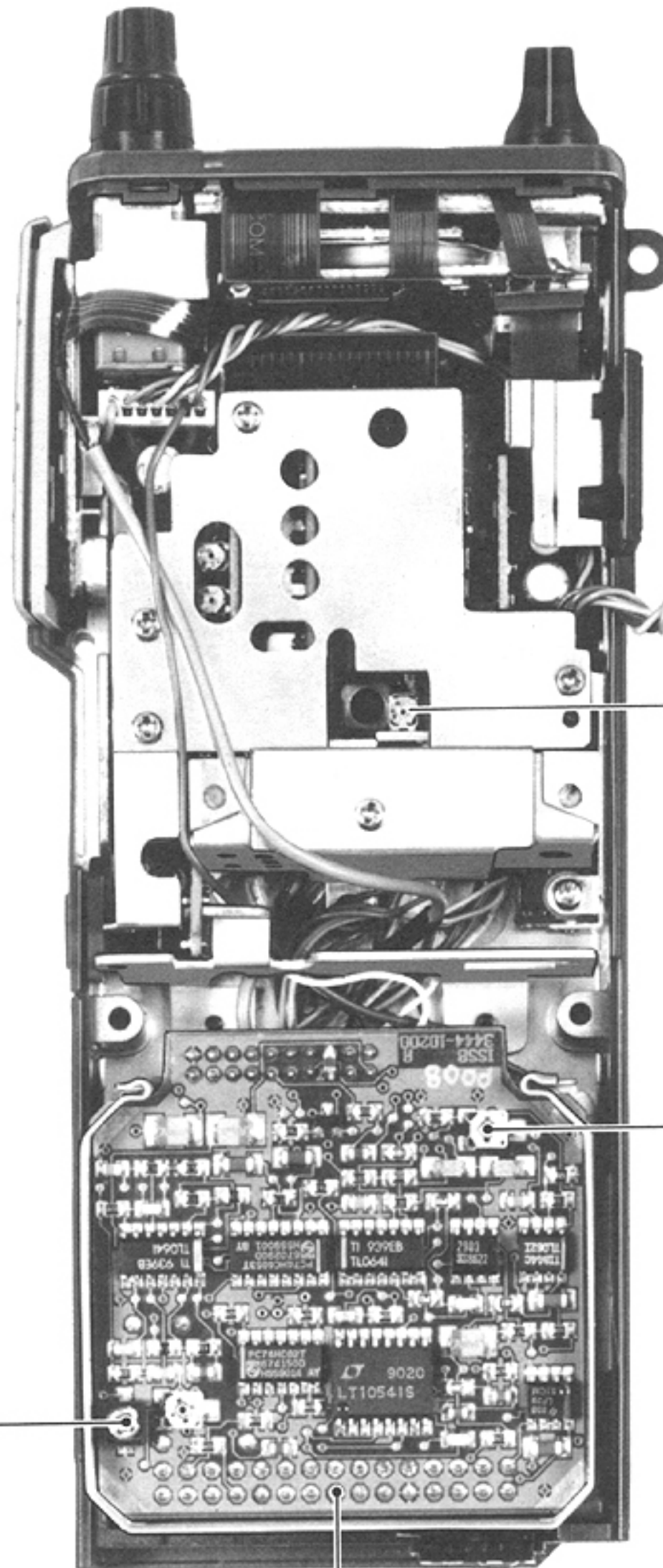
ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
CODER AUDIO INPUT	1 <ul style="list-style-type: none"> <li>• Select channel.</li> <li>• [CLR/SEC] switch: CLR</li> <li>• Connect the audio generator to the [MIC] jack and set as: Level : 250 mV Modulation: 1 kHz</li> <li>• Transmitting</li> </ul>	DM8000	Connect the oscilloscope to PLA-16.	4.0 Vp-p	MAIN (MIC UNIT)	R18
FREQUENCY DEVIATION	1 <ul style="list-style-type: none"> <li>• Select any channel.</li> <li>• [CLR/SEC] switch: CLR</li> <li>• Connect the audio generator to the [MIC] jack and set as: Level : 250 mV Modulation: 1 kHz</li> <li>• Transmitting</li> </ul>	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	±4.2 kHz	DM8000 (INTER FACE UNIT)	R14
	2 <ul style="list-style-type: none"> <li>• Set the audio generator as: Level : 25 mV Modulation: 1 kHz</li> </ul>			±2.4~3.6 kHz		Verify
	3 <ul style="list-style-type: none"> <li>• [CLR/SEC] switch: SEC</li> </ul>			±2.7~3.3 kHz (For random data)  ±2.0 kHz (For reversals)		R4

### 10-4 PROGRAMMING ENCRYPTION FILL DATA with DM8000

1. Prepare the Portable Programming Unit (PPU) to transmit the encryption fill as specified in the PPU user instructions.
2. Plug the programming lead into the microphone jack socket of the transceiver.
3. Set the channel switch to channel 10.
4. Turn on the transceiver.
5. Push the [FILL] switch until a single "beep" is heard from the transceiver.
6. Initiate fill data into the transceiver by pushing the [EXE] switch on the PPU.
7. The transceiver will emit two "beeps" when the fill has been successfully loaded.
8. Remove the programming lead from the microphone jack socket.
9. Select the required channel.
10. The transceiver is now ready to use.

NOTE: To erase the stored fill, push the [FILL] switch and [PTT] switch simultaneously. The transceiver will be prevented from entering transmit and a continuous tone will be emitted when the [PTT] is pressed.

• MAIN AND DM8000 UNITS



**R18** Coder audio input adjustment

**R14** Frequency deviation adjustment

**R4** Frequency deviation adjustment

**PLA-16** Coder audio input checkpoint

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