

ICOM

**SERVICE  
MANUAL**

220MHz FM TRANSCEIVER

**IC-3SAT**

---

---

---

---

---

Icom Inc.

---

## INTRODUCTION

This service manual describes the latest service information for the **IC-3SAT** 220 MHz FM TRANSCEIVER at the time of publication.

To upgrade quality, any electric or mechanical part and internal circuits are subject to change without notice or obligation.

## DANGER

**NEVER** connect the transceiver to an AC outlet or to a DC power supply that uses more than 16 V. This will ruin the transceiver.

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

**DO NOT** reverse the polarities of the power supply 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.

## ORDERING PARTS

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>

1150000800	IC	SC1107	IC-3SAT MAIN UNIT	5 pieces
8610005720	Screw	PH B0 M2 x 20 ZK	IC-3SAT Rear panel	10 pieces

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

## 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.



# TABLE OF CONTENTS

<b>SECTION</b>	<b>1</b>	<b>SPECIFICATIONS</b> .....	<b>1 — 1</b>
<b>SECTION</b>	<b>2</b>	<b>INSIDE VIEWS</b> .....	<b>2 — 1</b>
<b>SECTION</b>	<b>3</b>	<b>BLOCK DIAGRAM</b> .....	<b>3 — 1</b>
<b>SECTION</b>	<b>4</b>	<b>CIRCUIT DESCRIPTION</b> .....	<b>4 — 1 ~ 6</b>
	4-1	RECEIVER CIRCUITS .....	4 — 1
	4-2	TRANSMITTER CIRCUITS .....	4 — 2
	4-3	PLL CIRCUITS .....	4 — 3
	4-4	POWER SUPPLY CIRCUITS .....	4 — 4
	4-5	OTHER CIRCUITS .....	4 — 4
	4-6	CPU PORT ALLOCATIONS (LOGIC UNIT) .....	4 — 5
<b>SECTION</b>	<b>5</b>	<b>MECHANICAL PARTS AND DISASSEMBLY</b> .....	<b>5 — 1 ~ 2</b>
	5-1	FRONT PARTS .....	5 — 1
	5-2	CHASSIS PARTS .....	5 — 2
<b>SECTION</b>	<b>6</b>	<b>ADJUSTMENT PROCEDURES</b> .....	<b>6 — 1 ~ 5</b>
	6-1	PREPARATION BEFORE SERVICING .....	6 — 1
	6-2	PLL ADJUSTMENT .....	6 — 2
	6-3	RECEIVER ADJUSTMENT .....	6 — 3
	6-4	TRANSMITTER ADJUSTMENT .....	6 — 4
<b>SECTION</b>	<b>7</b>	<b>BOARD LAYOUTS</b> .....	<b>7 — 1 ~ 10</b>
	7-1	LOGIC DAUGHTER UNITS .....	7 — 1
	7-2	LOGIC (LGC) UNIT .....	7 — 2
	7-3	MAIN UNIT .....	7 — 4
	7-4	MAIN DAUGHTER UNITS .....	7 — 6
<b>SECTION</b>	<b>8</b>	<b>PARTS LIST</b> .....	<b>8 — 1 ~ 7</b>
<b>SECTION</b>	<b>9</b>	<b>OPTIONAL UNITS</b> .....	<b>9 — 1 ~ 3</b>
	9-1	UT-50 TONE SQUELCH UNIT .....	9 — 1
	9-2	UT-51 TONE ENCODER UNIT .....	9 — 2
	9-3	UT-49 DTMF DECODER UNIT .....	9 — 3
<b>SECTION</b>	<b>10</b>	<b>VOLTAGE DIAGRAM</b> .....	<b>10 — 1</b>

## GENERAL

- Frequency coverage : 220.000~225.000 MHz
- Mode : F3 (FM)
- Selectable tuning step : 5, 10, 12.5, 15, 20, 25, 50, 100 kHz or 1 MHz
- Memory channels : 48 plus a call channel
- Antenna impedance : 50  $\Omega$
- Power supply requirement : 6~16 V DC negative ground or battery packs BP-81~BP-85 or battery case BP-90
- Current drain (at 13.8 V DC) : Receive 16 mA (power saved)  
250 mA (max. audio output)  
Transmit 550 mA (LOW 1)  
1400 mA (HIGH)
- Usable temperature range : -10 °C~+60 °C (+14 °F~+140 °F)
- Frequency stability :  $\pm 15$  ppm (-10 °C~+60 °C) (+14 °F~+140 °F)
- Dimensions : 49 (W)  $\times$  102.5 (H)  $\times$  35 (D) mm  
1.9 (W)  $\times$  4.0 (H)  $\times$  1.4 (D) in  
(Projections not included)
- Weight : 280 g (9.9 oz)

## TRANSMITTER

- Output power (at 13.8 V DC) : High More than 5.0 W  
Low 3.5/1.5/0.5 W (selectable)
- Modulation system : Variable reactance frequency modulation
- Max. frequency deviation :  $\pm 5$  kHz
- Spurious emissions : Less than -60 dB
- Microphone impedance : 2 k $\Omega$

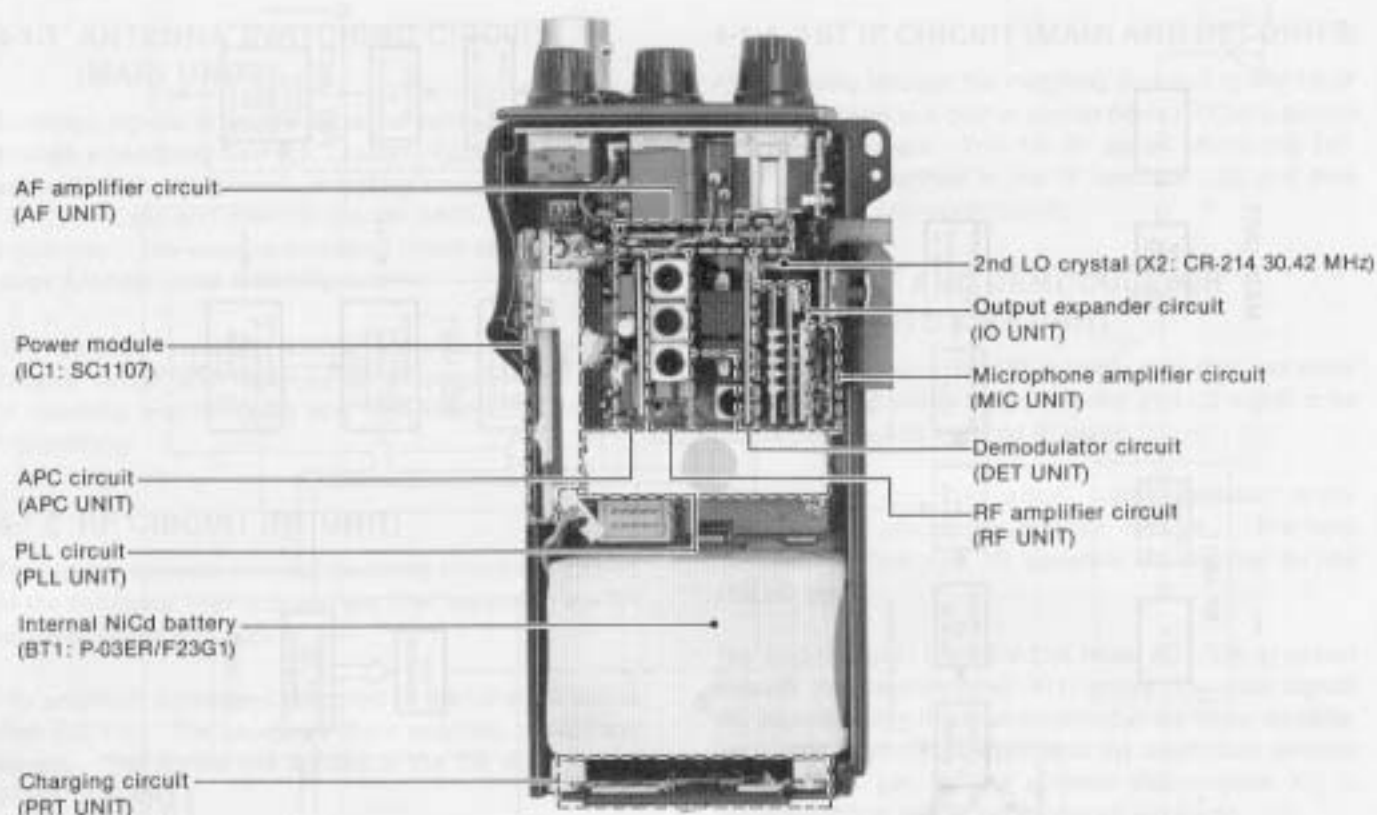
## RECEIVER

- Receive system : Double-conversion superheterodyne
- Intermediate frequencies : 1st 30,875 MHz  
2nd 455 kHz
- Sensitivity : 0.22  $\mu$ V for 12 dB SINAD
- Selectivity : More than 15 kHz/-6 dB  
Less than 30 kHz/-60 dB
- Spurious rejection ratio : More than 60 dB
- Audio output power : More than 200 mW at 10 % distortion with an 8  $\Omega$  load
- Audio output impedance : 8  $\Omega$

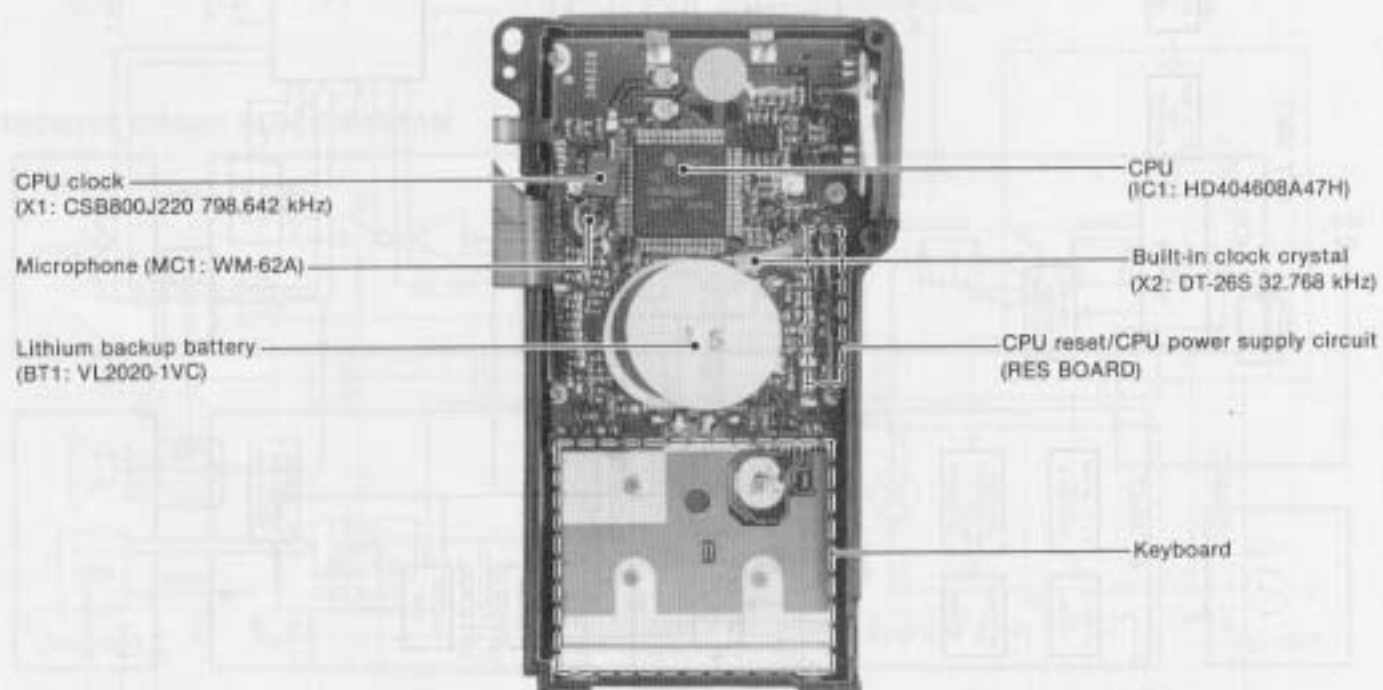
All stated specifications are subject to change without notice or obligation.

## SECTION 2 INSIDE VIEWS

### • MAIN UNIT



### • LOGIC UNIT





## 4-1 RECEIVER CIRCUITS

## 4-1-1 ANTENNA SWITCHING CIRCUIT (MAIN UNIT)

Received signals enter the antenna connector and pass through a bandpass filter (L3, L4, C21~C25). The signals are applied to the antenna switching circuit (D7, D9, L5, L6, C26~C28) and then to the RF UNIT via the RF IN signal line. The antenna switching circuit employs a two-stage  $\lambda/4$ -type diode switching system.

The antenna switching circuit switches the transmit/receive circuit and functions as a low-pass filter while in receiving and becomes very high impedance while in transmitting.

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

The signals from the antenna switching circuit are applied to the bandpass filter (L1) and are then applied to the RF amplifier circuit (Q1, Q2).

The amplified signals are reapplied to the other bandpass filter (L2, L3). The bandpass filters suppress out-of-band signals. The signals are applied to the 1st mixer circuit (MAIN UNIT Q1).

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

The signals from the RF circuit are mixed with the 1st LO signal from the PLL UNIT to produce a 30.875 MHz 1st IF signal.

## 4-1-4 1ST IF CIRCUIT (MAIN AND DET UNITS)

After passing through the matching circuit (L1), the 1st IF signal is applied to a pair of crystal filters (F11) to suppress out-of-band signals. The 1st IF signal enters the DET UNIT and is amplified at the IF amplifier (Q2) and then applied to the 2nd mixer circuit.

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

The 1st IF signal from Q2 is applied to the 2nd mixer section of IC1, and is 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 X2 generate 30.42 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 IC1 pin 11 is applied to the squelch circuit and de-emphasis circuit (R7, C24, C25). This de-emphasis circuit is an integrated circuit with frequency characteristics of  $-6$  dB/octave. The resulting signal is applied to the AF amp, optional tone squelch and optional DTMF decoder circuits.

## RECEIVER CIRCUIT BLOCK DIAGRAM

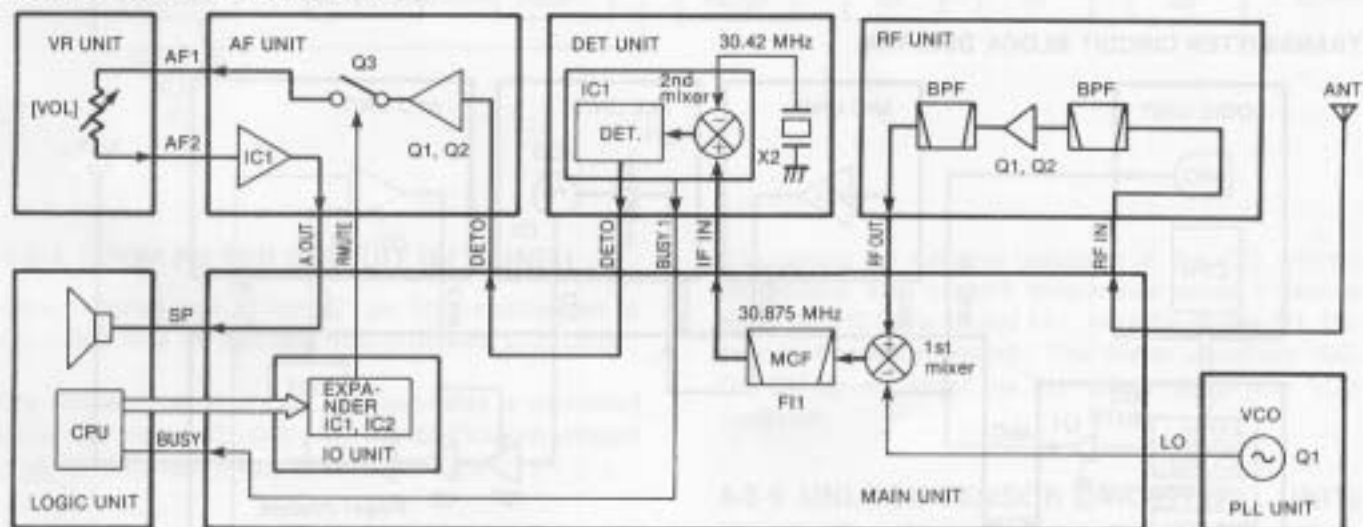


Fig. 1

#### 4-1-6 AF AMP CIRCUIT (AF AND VR UNITS)

The AF signal is applied to Q1 and Q2 on the AF UNIT. Q1 is an active filter that functions as a high-pass filter to suppress tone signals for the tone squelch operation. Q2 is also an active filter that functions as a low-pass filter to suppress higher noise signals.

The filtered signal is applied to the [VOL] control (R1) on the VR UNIT via the AF mute circuit (Q3). When the squelch is closed, Q3 cuts the AF signal as the AF mute switch. The AF signal is power-amplified at the AF power amplifier (IC1) to drive the speaker.

The AF voltage regulator (Q4~Q6) supplies power to the AF power amplifier. The AFS signal from the MAIN UNIT controls Q6 and mutes AF output while receiving no signal or no specified tone/DTMF signal.

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

Some of the noise components in the AF signal from IC1 pin 11 are applied to IC1 pin 13 via C11, R8, C13 and C14. The [SQL] control (R2) on the VR UNIT adjusts the pin 13 input level.

The active filter section in IC1 amplifies noise components of frequencies of 20 kHz and above, and outputs the resulting signals from pin 14. Output signals are rectified by D1 and are converted to DC voltage.

The rectified voltage triggers the squelch switch (Q1). The collector of Q1 outputs the squelch signal. The signal is applied to the CPU (IC1, pin 27) on the LOGIC UNIT through the BUSY signal line. The CPU outputs the RMUTE and BUSY LED signals.

The RMUTE signal, decoded at the output expander (IC1) on the IO UNIT, activates the AF mute circuit (Q3) on the AF UNIT to cut the AF signal. The BUSY LED signal is applied to Q1 on the LOGIC UNIT, turning OFF the receive indicator.

## 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 C6 and R4 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 above are attenuated. IC1 pin 7 then outputs the signals. The signals are applied to the modulation circuit (PLL UNIT, D4) to produce an FM signal.

The VCO circuit (Q1, D1, D2) oscillates the transmit frequency with AF signal modulation as a PLL output.

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

The PLL output (LO signal line), buffer-amplified at Q3 on the PLL UNIT, is applied to the transmit/receive switching circuit (D14). The PLL output is then amplified at the predrive amplifier (Q7) and the drive amplifier (Q6).

The voltage controlled by the APC circuit is applied to the collector of Q6 and Q7 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 stable 5 W output power.

An RF signal from the drive amplifier (Q6) is applied to IC1 pin 1. The amplified signal is output from pin 4, and applied to the antenna connector through the diode switching and bandpass filter circuits.

## TRANSMITTER CIRCUIT BLOCK DIAGRAM

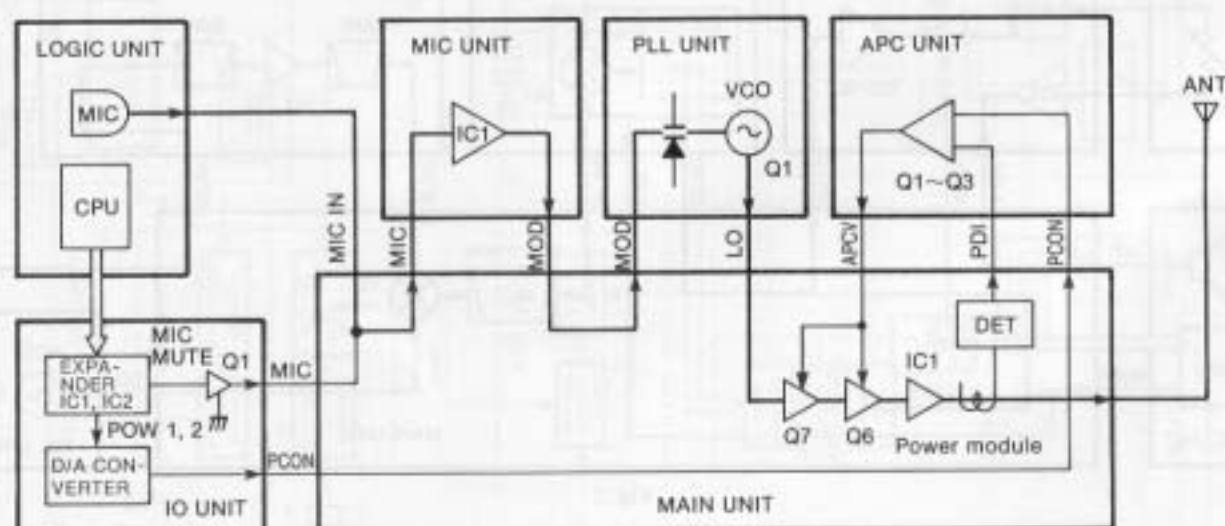


Fig. 2



#### 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 and LOW output power.

The output power level from the power module (IC1) is detected at the APC detector (D10~D12). When antenna impedance is matched at 50  $\Omega$ , the detected level is at a minimum. However, when antenna impedance is mismatched, the detected voltage is higher than when it is matched.

When the antenna impedance is mismatched, the base voltage of Q3b (APC UNIT) is higher than the other base voltage of Q3a (reference voltage). Q3b decreases the collector current of Q1 using Q2. Collector current of Q1 is used at the drive amplifiers (Q6, Q7) on the MAIN UNIT. Hence, when the antenna impedance is mismatched, the output power is decreased.

The circuit which selects output power uses the APC circuit. The PCON voltage from the IO UNIT shifts the reference voltage, changing the output power to HIGH or LOW 1~3.

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

When transmitting, D7 and D9 are turned ON. The RF output signal is not applied to the receiver circuit, passing through D9 and C60, the bandpass filter (L3, L4, C21~C25) and then to the antenna. The bandpass 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 and 1st LO frequencies with the VCO (Q1). 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 is oscillated at X1.

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

A reference frequency is produced by the local oscillator section of IC1 and X1. C21 provides frequency control.

#### PLL CIRCUIT

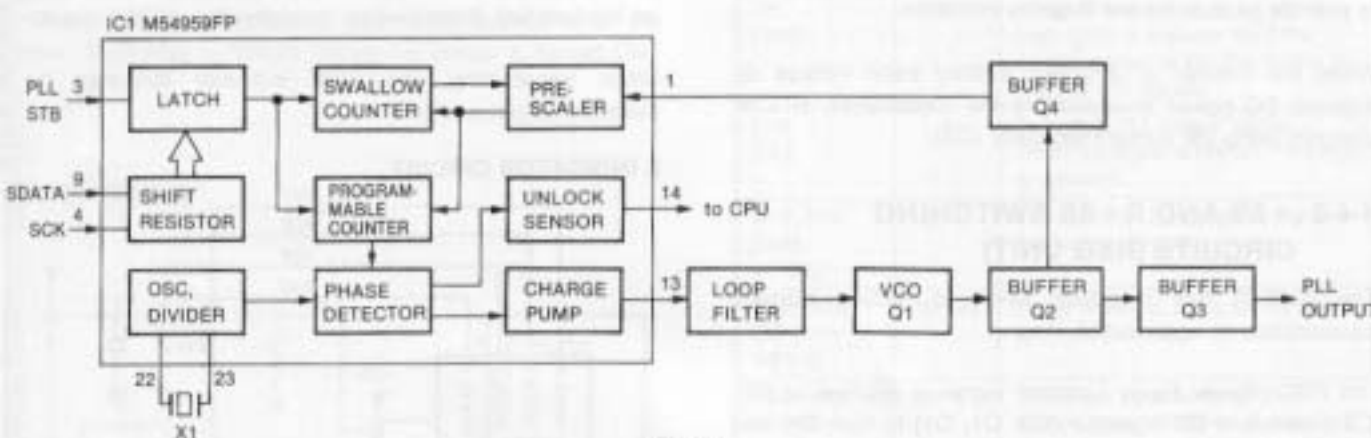


Fig. 3

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

Phase-detected signals from IC1 pin 13 are converted to DC voltage by a lag-lead loop filter (R10, R20, C12, C13).

The frequency at which the VCO oscillates is controlled by varactor diodes (D1, D2). DC voltage (PLL lock voltage) is provided through the buffer amplifier (Q7).

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

The VCO circuit (Q1) generates the receive and transmit frequencies and makes an FM modulation.

D3 changes the inductive reactance of the VCO, shifting the receive and transmit frequencies using a control signal from IC1 pins 10 and 11. Varactor diodes (D1, D2) provide frequency control. The buffer amplifiers (Q2, Q3, Q4) do not affect the PLL output signal from VCO oscillation.

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

When the PLL circuit is unlocked, IC1 pin 14 is "HIGH" and the "HIGH" signal is applied to the CPU pin 7 as an unlock signal.

## 4-4 POWER SUPPLY CIRCUITS

### 4-4-1 VOLTAGE LINES

LINE	DESCRIPTION
Vcc	The internal or attached battery pack voltage or external DC power passed through the power switch.
+5	Common 5 V converted from the Vcc line at Q1 and Q2 on the REG UNIT using IC1 output as the reference voltage.
+5S	5 V controlled by the power saver function. This voltage is converted from Vcc line at Q3 and Q4 on the REG UNIT using IC2 output as the reference voltage.
R+5S	Receive 5 V controlled by the power saver function and SEND signal line. This voltage is converted from Vcc line at Q5 and Q6 on the REG UNIT using IC3 output as the reference voltage.
T+5	Transmit 5 V controlled by the TMUTE signal line. This voltage is converted from Vcc line at Q4 and Q5 on the APC UNIT.
AF 7 V	AF amp power source controlled by the AFS signal line. R14/R15 provides reference voltage.

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

When the internal or attached battery pack is discharged, voltage is applied to the CPU (IC1) pin 73 via R29 from the lithium backup battery (BT1) installed in the transceiver to provide backup for the memory contents.

When the internal or attached battery pack voltage or external DC power is applied to the transceiver, BT1 is charged using the current regulator (Q3).

### 4-4-3 +5S AND R+5S SWITCHING CIRCUITS (REG UNIT)

The IC-3SAT has a power saver to reduce current consumption to approx. 1/4.

The PSC (Power Saver Control) signal is applied to IC2. IC2 controls +5S regulator (Q3, Q4, D1) to turn ON and OFF +5S voltage.

PSC and SEND signals are applied to IC3. IC3 controls R+5S regulator (Q5, Q6, D2). R+5S turns OFF during power saved period or transmitting.

### 4-4-4 CHARGING CIRCUIT (PRT UNIT)

Voltage from the [DC 13.8V] jack is applied to current control circuit (Q1, Q2, D5, D6) to charge an internal or attached battery pack (except the BP-85).

When the external battery pack is attached, the current from D2 charges the attached battery pack. When the external battery pack is removed, the current from D2 charges the internal battery pack.

The IC-3SAT has an external battery switch. When a battery pack is attached, this switch connects the external battery to the charging circuit.

Over voltage protector (D4) decreases the transceiver circuit damage from over voltage and reverse polarity connections of the power supply.

## 4-5 OTHER CIRCUITS

### 4-5-1 S/RF INDICATOR CIRCUIT (DET, MAIN AND LOGIC UNITS)

A portion of the 2nd IF signal is output from IC1 pin 12 on the DET UNIT via the SD signal line. The signal is rectified at D1 on the MAIN UNIT to obtain an S-indicator signal. The S-indicator signal is applied to IC2b pin 5 on the LOGIC UNIT.

IC2b pin 6 receives an S-indicator reference signal from the CPU KEYS0~3 terminals via the D/A converter (R11, R37~R40). The CPU terminals increase the reference signal level.

When the D/A converted level becomes greater than the S-indicator level, IC2b pin 7 becomes "LOW." The CPU detects the signal strength level using the KEYS0~3 terminal outputs and indicates the signal strength level on the function display when receiving the "LOW" signal.

While transmitting, the S/RF indicator indicates the selected output power.

#### S INDICATOR CIRCUIT

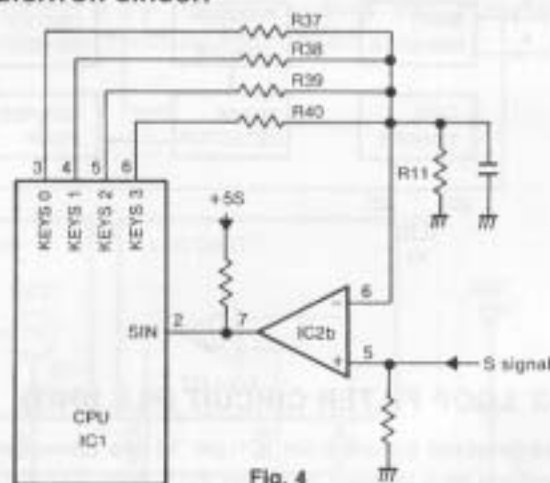


Fig. 4

### 4-5-2 DISPLAY BACKLIGHT CIRCUIT (LOGIC UNIT)

When the [LIGHT] switch is pushed, pin 77 of the CPU outputs "HIGH." The signal is applied to Q1 to light up the backlight LEDs (DS2, DS3).

#### 4-5-3 SUBAUDIBLE TONE ENCODER CIRCUIT

This function can be activated only when an optional UT-50 TONE SQUELCH UNIT or UT-51 PROGRAMMABLE TONE ENCODER UNIT is installed.

A tone signal is applied to the splatter filter circuit on the MIC UNIT via the TONE signal line. R10 on the UT-50 and R5 on the UT-51 adjust the subaudible tone deviation.

#### 4-5-4 DTMF ENCODER CIRCUIT (LOGIC UNIT)

This function can be activated only when the matrix KEYS1→KEY11 is OPEN. (an optional UT-49 DTMF DECODER UNIT is installed.)

Pins 70 and 71 of the CPU (TONEC/TONER) output a DTMF code signal. R16 adjusts the DTMF code signal deviation. The signal is also output to the AF UNIT via R17.

#### 4-5-5 CPU RESET CIRCUIT (LOGIC UNIT)

IC3 detects +5 voltage. When the +5 voltage line becomes 5 V, IC3 turns INTO "HIGH" and the CPU (IC1) restarts operation.

The CPU is reset when IC1 pin 76 becomes "HIGH." The AND gate IC (IC4) outputs a reset signal when both input terminals are "HIGH." One terminal is "HIGH" when the [MONI] switch is pushed and the other (INT0 line) is "HIGH" when the power is turned ON.

#### RESET CIRCUIT

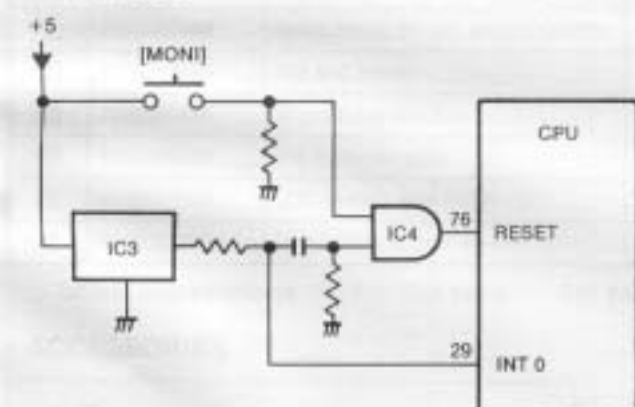


Fig. 5

#### 4-5-6 TRANSMIT/RECEIVE INDICATOR CIRCUIT (LOGIC UNIT)

The transmit/receive indicator (DS4) uses a 2-input LED and lights up in red or green.

The indicator lights up in red as the transmit indicator while transmitting using the T+5 voltage.

The indicator lights up in green as the busy indicator while the squelch opens using CPU pin 78 output via the inverter (Q2).

#### 4-5-7 CLOCK OSCILLATOR CIRCUIT (LOGIC UNIT)

IC1 oscillates the 798.642 kHz CPU system clock signal using X1. IC1 oscillates the 32.768 kHz clock signal for the built-in clock using X2.

### 4-6 CPU PORT ALLOCATIONS (LOGIC UNIT)

#### • INPUT PORT

PORT NUMBER	PIN NUMBER	DESCRIPTION
D4 [PTT]	1	Inputs a signal on the PTT line. This port becomes "LOW" when the PTT switch is pushed.
D5 [SIN]	2	Inputs S-meter-compared signal from IC2b to indicate the CPU counting level to the S-indicator in the function display.
D10 [UL]	7	Detects a PLL unlock signal. When the signal is "HIGH," the PLL is unlocked.
D12, D13 [DIAL UP/DN]	9, 10	Input port for the up/down signal of the tuning control.
R10~R13 [KEY10~KEY13]	19~22	These are input ports for the initial and key matrices.
R20~R23 [KEYR0~KEYR3]	23~26	These are input ports for the keyboard and DTMF code from the UT-49.
R30 [BUSY]	27	Detects a squelch signal. The signal is "HIGH" when the squelch opens.
R31 [OPT]	28	Input port for an optional unit. This port becomes "HIGH" when the tone squelch opens. (UT-50) This port becomes "LOW" when the UT-51 is installed.
R32 [INT0]	29	Detects a signal for the standby mode of the CPU. The CPU enters the standby mode when the port becomes "LOW."
R33 [INT1]	30	The CPU decodes received DTMF code when this port becomes "LOW."

• OUTPUT PORT

PORT NUMBER	PIN NUMBER	DESCRIPTION
D0 [LAMP0]	77	Becomes "HIGH" when the backlight LEDs light up.
D1 [BUSY LED]	78	Outputs a signal for lighting up in green the transmit/receive indicator. This port becomes "LOW" while receiving. (squelch opens)
D3 [TOE]	80	Outputs an enable signal for the UT-49.
D6—D9 [KEYS0—KEYS3]	3—6	Outputs a strobe signal for the keyboard, initial and key matrices and D/A converter counting signal alternately in an interval.
R00 [SCK]	15	Outputs clock signals for serial data.
R01 [IO STB]	16	Outputs a strobe signal for serial data to the expander ICs.
R02 [SDATA]	17	Outputs serial data synchronized with the SCK signal.
R03 [PLL STB]	18	Outputs a strobe signal for serial data to the PLL IC.

• OUTPUT EXPANDER (IO UNIT, IC1)

PORT NUMBER	PIN NUMBER	DESCRIPTION
Q1 [AF ON]	4	Outputs an AF mute signal for AF power amplifier.
Q2 [MIC MUTE]	5	Outputs a microphone mute signal. When transmitting a tone signal, the MIC signal line goes to ground.
Q3 [RMUTE]	6	Outputs a receive mute signal for the AF mute circuit. When emitting a beep tone, this port outputs the mute signal and the AF ON port does not output it.
Q4 [TMUTE]	7	Outputs a control signal for T+5 V regulator.
Q5 [SEND]	14	Outputs transmit/receive switching signals. This port becomes "HIGH" while transmitting.
Q6 [PSC]	13	This port becomes "HIGH" while the power saver function is activated.
Q7 [CPC]	12	Outputs a control signal to cut off the loop filter while the power saver function is activated.

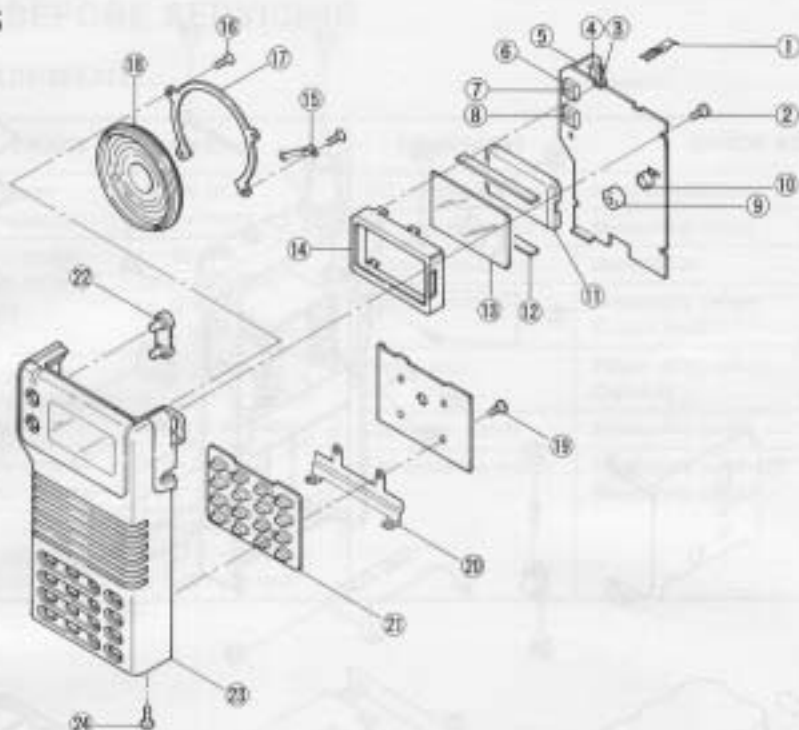
• OUTPUT EXPANDER (IO UNIT, IC2)

PORT NUMBER	PIN NUMBER	DESCRIPTION
Q5, Q6 [POW 1, POW 2]	13, 14	Outputs a control signal for the output power selecting circuit. This signal is converted into PCON voltage (APC reference voltage) using the D/A converter (R2—R6).



## SECTION 5 MECHANICAL PARTS AND DISASSEMBLY

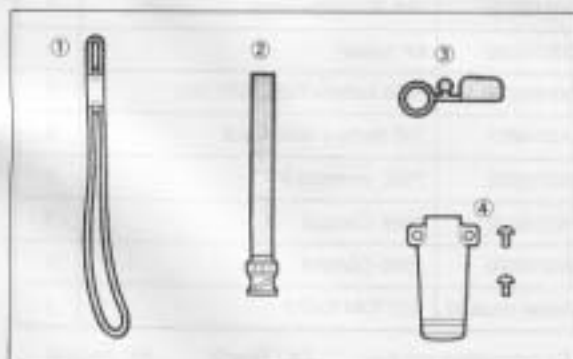
### 5-1 FRONT PARTS



LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.	LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8930016400	756 LOGIC Ground spring plate	2	⑭	8930015960	756 LCD holder	1
②	8810001700	Screw PH B0 No. 0-3 M1.4 × 3	4	⑮	8930016410	756 Speaker ground lag	1
③	8930015790	PTT Ground spring plate	1	⑯	8810005740	Screw FH B0 No. 0 M2 × 3	4
④	8930014880	752 P.C. Board holder	1	⑰	8930014810	752 Speaker plate	1
⑤	2230000770	Switch [F] SW-104 (SKHUPE004B)	1	⑱	2510000450	Speaker EAS-3P123D	1
⑥	2230000770	Switch [PTT] SW-104 (SKHUPE004B)	1	⑲	8810001700	Screw PH B0 No. 0-3 M1.4 × 3	4
⑦	2260001150	Switch [H/L/DTMF] SW-103 (SKHUPC007B)	1	⑳	8510006050	Key shield	1
⑧	2260001150	Switch [MONI] SW-103 (SKHUPC007B)	1	㉑	8010009080	756 Keyboard	1
⑨	8930014940	752 MIC holder	1	㉒	8610005970	Knob K138 [H/L/DTMF], [MONI]	2
⑩	7700000660	Microphone WM-62A	1	㉓	8210005171	756 Front panel (F)-1 (incl. Front plate and 756 lens)	1
⑪	8010009070	756 Reflector plate	1	㉔	8810005890	Screw FH M2 × 4 ZK	2
⑫	8930015920	LCD contact strip SRCN-756	2				
⑬	6910003910	LCD LCD2439 (incl. shield)	1				

**Screw abbreviations** PH: Pan head B0: Self-tapping screw ZK: Black

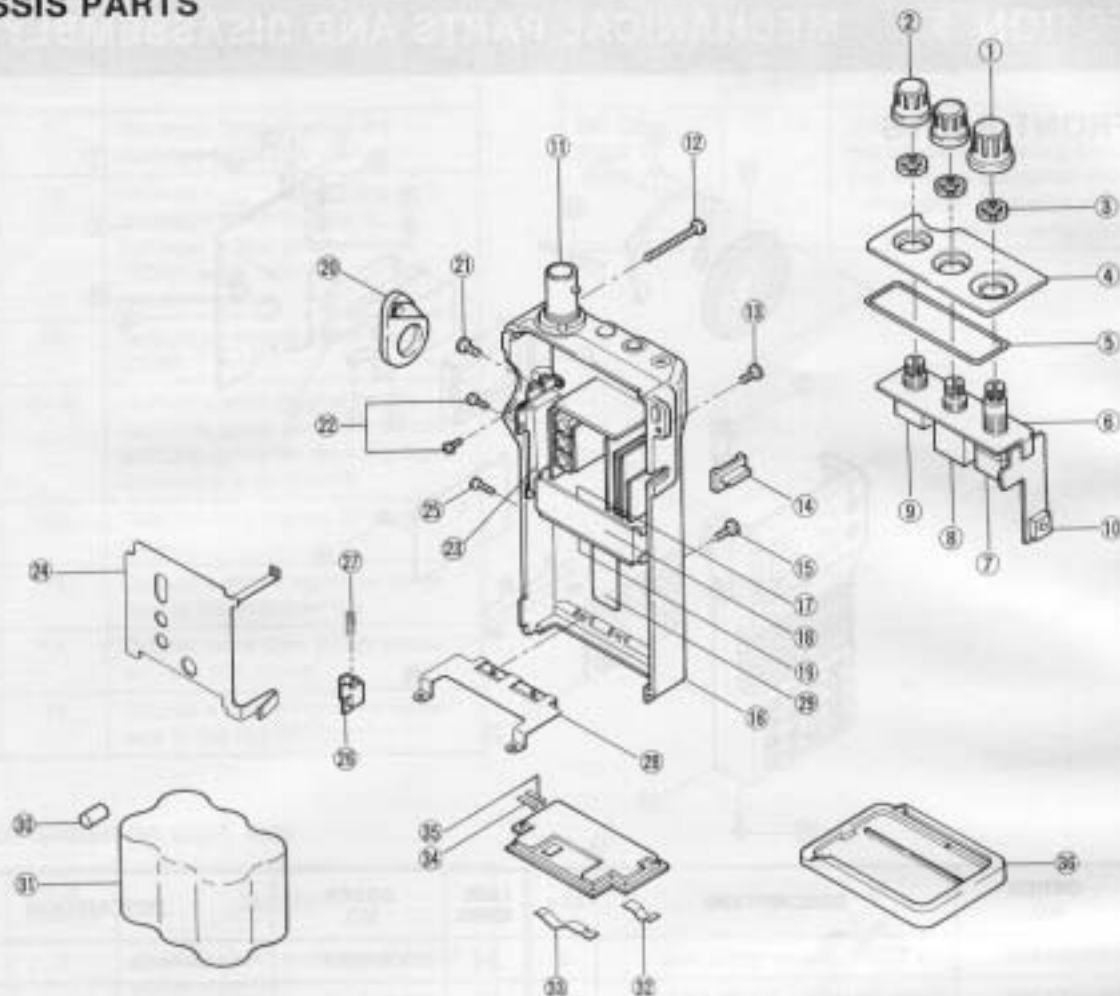
### • ACCESSORIES



LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8010008970	Handstrap HK-002	1
②	Optional product	FA-215BA FLEXIBLE ANTENNA	1
③	8930014961	752 Rainproof cap-1	1
④	8010008620	752 Belt clip	1
⑤	8810005730	Screw BuH M3 × 3 ZK BS	2

**Screw abbreviations** BuH: Button head BS: Brass ZK: Black

# 5-2 CHASSIS PARTS



LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.	LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8510005790	Knob N147 [TUNING]	1	⑮	8510005850	752 PLL case	1
②	8510005780	Knob N146 [SQUELCH], [PWR/VOL]	2	⑰	8510006170	755 PLL cover	1
③	8830000550	VR nut (E)	3	⑳	8930015940	756 PTT switch rubber	1
④	8210005071	756 TOP panel-1	1	㉑	8810000120	Screw PH M2.6 × 3	1
⑤	8930014950	752 TOP seal	1	㉒	8810005860	Screw PH No. 0 M2 × 3 Ni	5
⑥	8930014801	752 VR plate-1	1	㉓	8930014840	752 Module shield plate	1
⑦	2260000890	Rotary switch [TUNING] SRBM1L040A	1	㉔	8510006180	755 MAIN shield plate	1
⑧	7210001440	Variable resistor [PWR/VOL] RK097111101NA (10KA)	1	㉕	8810005700	Screw PH No. 0 M2 × 4 ZK	1
				㉖	8930014922	752 Release button-2	1
⑨	7210001450	Variable resistor [SQUELCH] RK0971110051A (10KB)	1	㉗	8930014820	Release spring (M)	1
				㉘	8930015980	Joint plate	1
⑩	2260001150	Switch [LIGHT] SW-103 (SKHUPC007B)	1	㉙	8930016570	756 BP holder plate	1
⑪	6510008620	Antenna connector BNC-RM-F	1	㉚	8930016580	BP rubber	1
⑫	8810005720	Screw PH B0 M2 × 20 ZK	2	㉛	3030000270	NiCd battery P-03ER/F23G1	1
⑬	8810000100	Screw PH M2 × 4 ZK	1	㉜	8930014852	752 Battery terminal-2	3
⑭	8930014911	Light switch-1 rubber	1	㉝	8930016583	756C terminal-3	1
⑮	8810005890	Screw FH M2 × 4 ZK	2	㉞	8930016970	756A Contact	1
⑯	8010009064	756 Rear panel-4	1	㉟	8930016980	756B Contact	1
⑰	8510005830	CO-PLL cover	1	㊱	Optional product	BOTTOM CAP-2	1

### Screw abbreviations

PH: Pan head

FH: Flat head

B0: Self-tapping screw

ZK: Black

Ni: Nickel

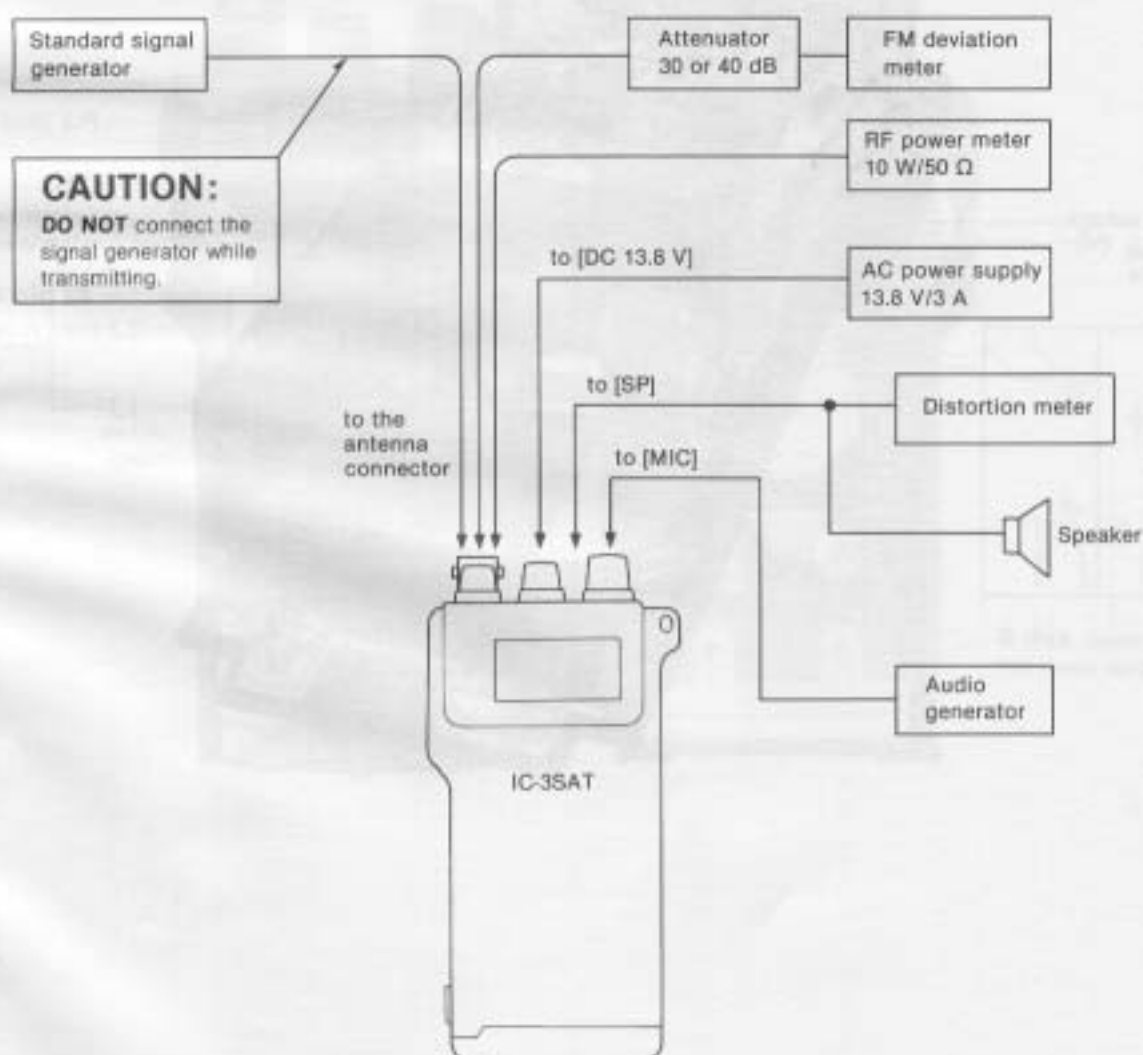
## SECTION 6 ADJUSTMENT PROCEDURES

### 6-1 PREPARATION BEFORE SERVICING

#### ■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
AC power supply	Output voltage : 13.8 V DC	DC voltmeter	Input impedance : 50 k $\Omega$ /DC or better
	Current capacity : 3 A or more		AC milli-voltmeter
RF power meter (terminated type)	Measuring range : 1~10 W	External speaker	Impedance : 8 $\Omega$
	Frequency range : 220~250 MHz		Audio generator
	Impedance : 50 $\Omega$	Output level : 1~500 mV	
	SWR : Less than 1.2 : 1	Attenuator	Power attenuation : 30 or 40 dB
Frequency counter	Frequency range : 0.1~250 MHz		Capacity : 10 W or more
	Frequency accuracy : $\pm 1$ ppm or better	Distortion meter	Measuring range : 0.1~20 %
Sensitivity : 100 mV or better	FM deviation meter		Frequency minimum : 250 MHz
Oscilloscope		Frequency range : DC~20 MHz	Measuring range : 0~ $\pm 10$ kHz
	Measuring range : 0.01~10 V		
Standard signal generator (SSG)	Frequency range : 0.1~250 MHz		
	Output level : -127~-17 dBm (0.1 $\mu$ V~32 mV)		

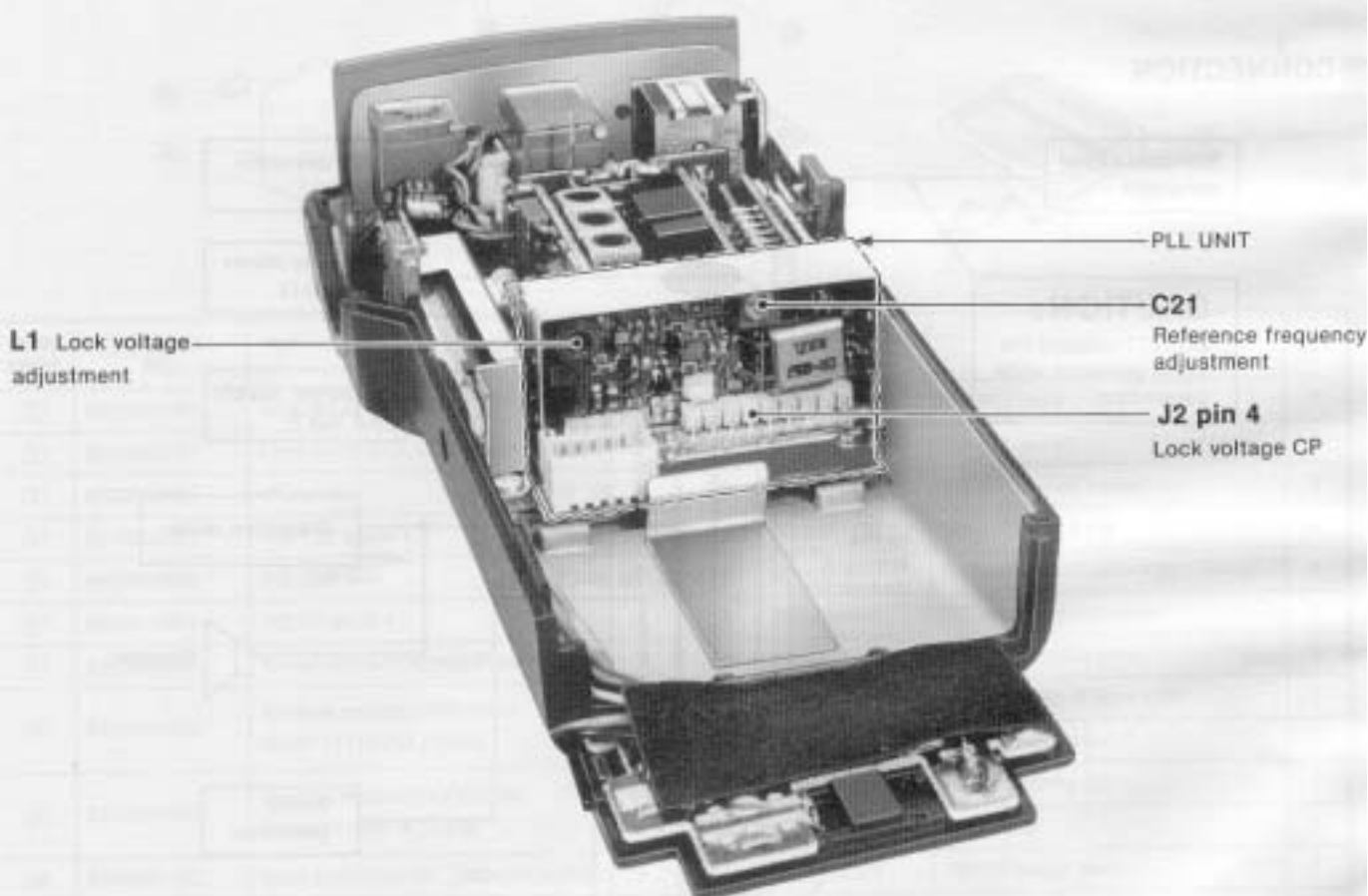
#### ■ CONNECTION



## 6-2 PLL ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
LOCK VOLTAGE	1 <ul style="list-style-type: none"> <li>• Displayed frequency: 220.00 MHz</li> <li>• Simplex</li> <li>• Receiving</li> </ul>	PLL	Connect the oscilloscope to J2 pin 4.	1.6 V DC	PLL	L2
	2 <ul style="list-style-type: none"> <li>• Transmitting</li> </ul>					1.6 V ± 0.5 V DC
REFERENCE FREQUENCY	1 <ul style="list-style-type: none"> <li>• Displayed frequency: 222.50 MHz</li> <li>• Connect the RF power meter or a 50 Ω dummy load.</li> <li>• Transmitting</li> </ul>	Top panel	Loosely couple the frequency counter to the antenna connector.	222.5000 MHz	PLL	C21

### PLL UNIT

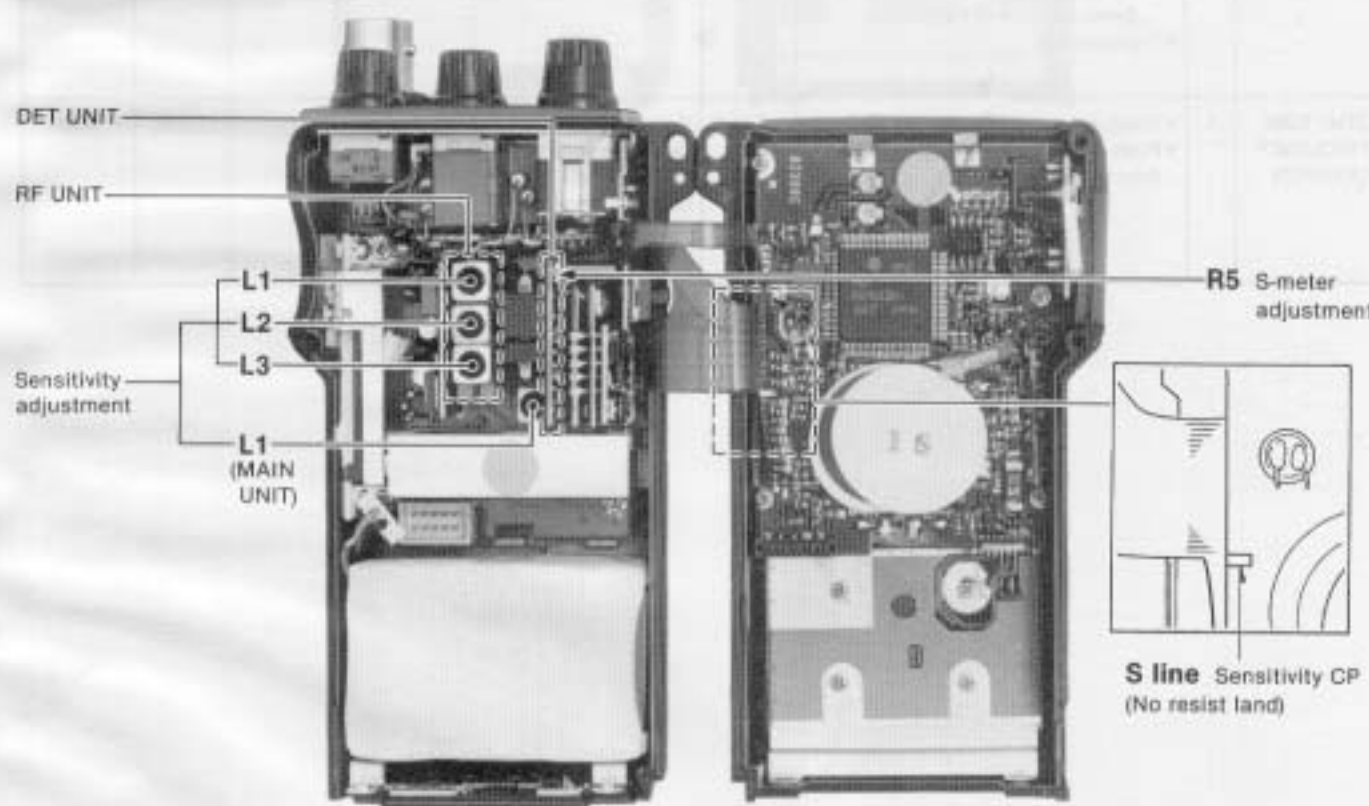




## 6-3 RECEIVER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	<ul style="list-style-type: none"> <li>• Displayed frequency: 222.50 MHz</li> <li>• [SQL] control : Max. CCW</li> <li>• Set the signal generator;                             <ul style="list-style-type: none"> <li>Level : 0.32 <math>\mu</math>V (-117 dBm)</li> <li>Modulation: 1 kHz</li> <li>Deviation : <math>\pm</math>3.5 kHz</li> </ul> </li> <li>• Receiving</li> </ul>	LOGIC	Connect the DC voltmeter to the land of the S line.	Maximum	RF	L1, L2, L3
					MAIN	L1
S-METER	<ul style="list-style-type: none"> <li>• Displayed frequency: 222.50 MHz</li> <li>• Set the signal generator;                             <ul style="list-style-type: none"> <li>Level : 0.32 <math>\mu</math>V (-117 dBm)</li> <li>Modulation: 1 kHz</li> <li>Deviation : <math>\pm</math>3.5 kHz</li> </ul> </li> <li>• Receiving</li> </ul>	Function display	S/RF indicator	2 bars (S2)	DET	R5

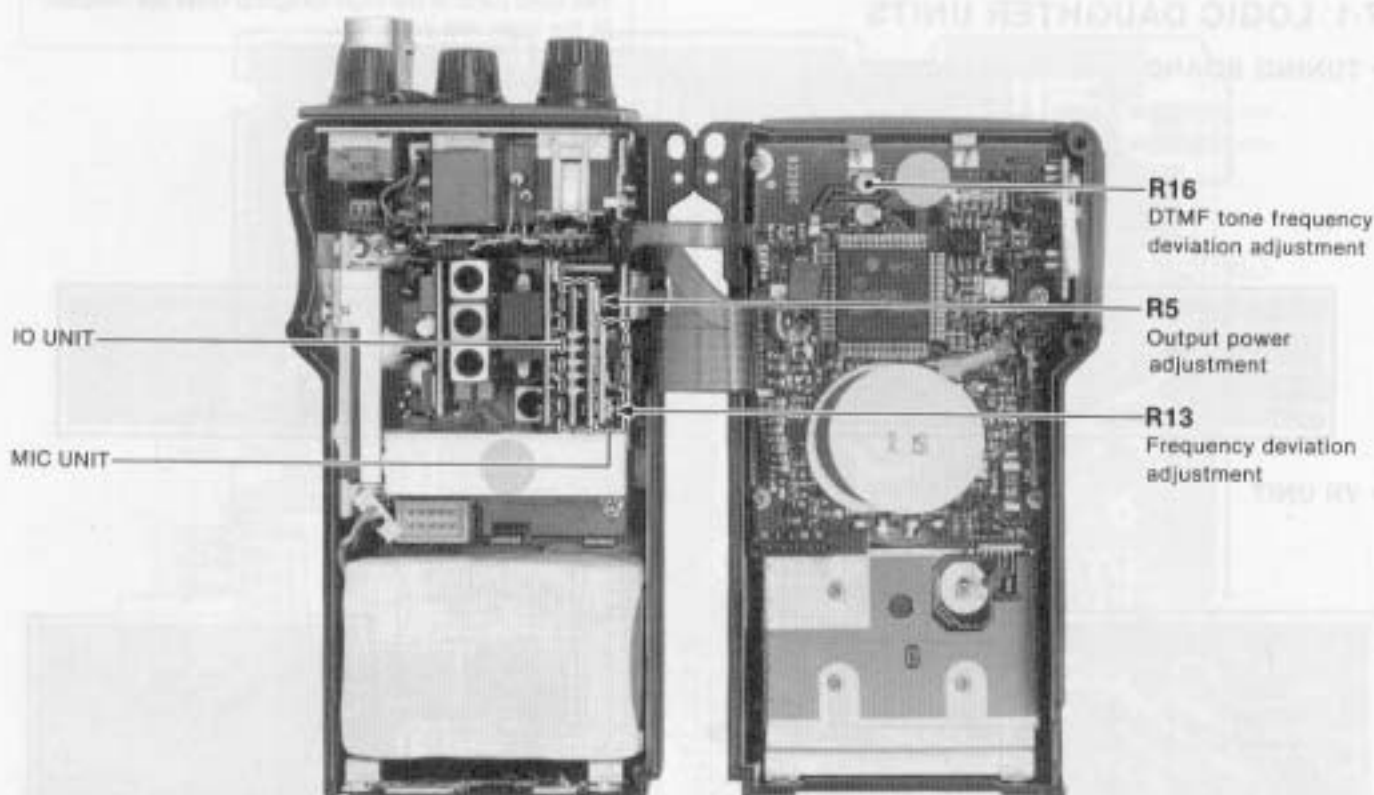
### LOGIC, RF, MAIN AND DET UNITS



## 6-4 TRANSMITTER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT			
		UNIT	LOCATION		UNIT	ADJUST		
OUTPUT POWER	1	<ul style="list-style-type: none"> <li>Displayed frequency: 222.50 MHz</li> <li>Output power : HIGH</li> <li>Simplex</li> <li>Transmitting</li> </ul>	Top panel	Connect the RF power meter to the antenna connector.	5.0 W	IO	R5	
	2	<ul style="list-style-type: none"> <li>Output power : LOW 1</li> </ul>					0.25~1.0 W	Verify
	3	<ul style="list-style-type: none"> <li>Output power : LOW 2</li> </ul>					Approx. 1.5 W	Verify
	4	<ul style="list-style-type: none"> <li>Output power : LOW 3</li> </ul>					Approx. 3.5 W	Verify
FREQUENCY DEVIATION	1	<ul style="list-style-type: none"> <li>Displayed frequency: 222.50 MHz</li> <li>Output power : HIGH</li> <li>Apply an AF signal to the [MIC] jack. 170 mV/1 kHz</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.	$\pm 4.8$ kHz	MIC	R13	
DTMF TONE FREQUENCY DEVIATION	1	<ul style="list-style-type: none"> <li>Displayed frequency: 222.50 MHz</li> <li>Push and hold the [PTT] switch and then push the [D] key.</li> </ul>	Top panel	Connect the deviation meter to the antenna connector via the attenuator.	$\pm 3.5$ kHz	LOGIC	R16	

## IO, MIC AND LOGIC UNITS

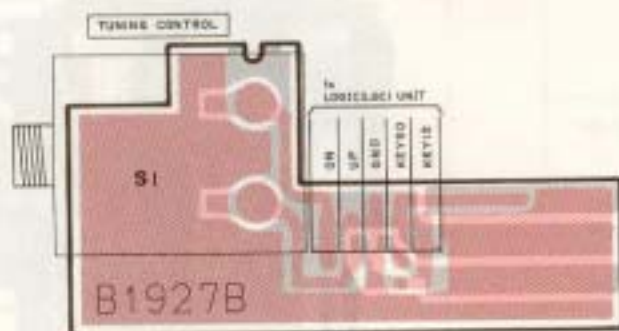
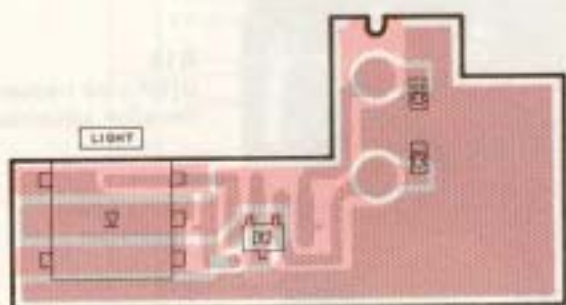


# SECTION 7 BOARD LAYOUTS

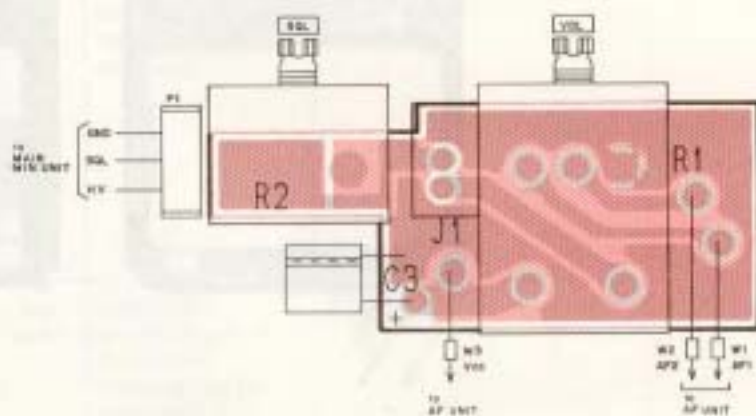
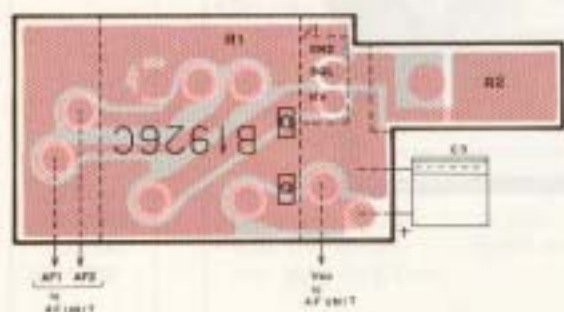
## 7-1 LOGIC DAUGHTER UNITS

The used parts in the logic daughter units are included in the logic unit parts list.

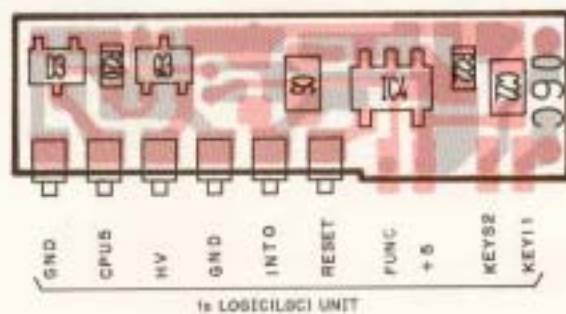
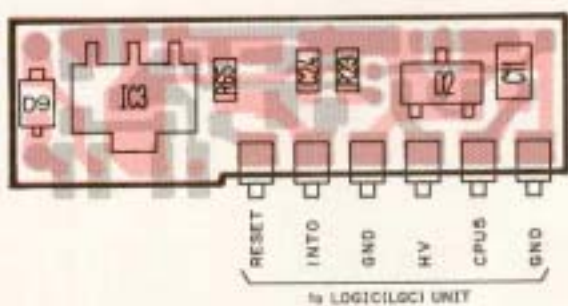
### • TUNING BOARD



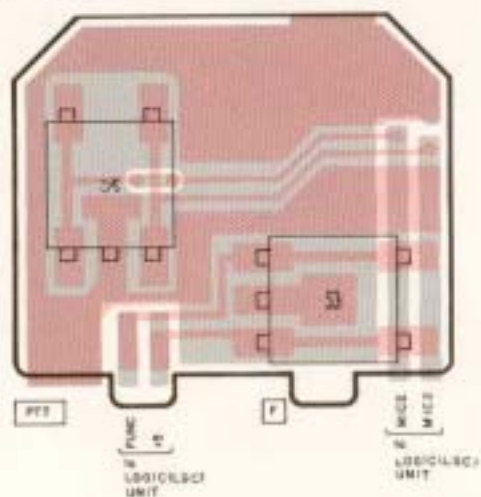
### • VR UNIT



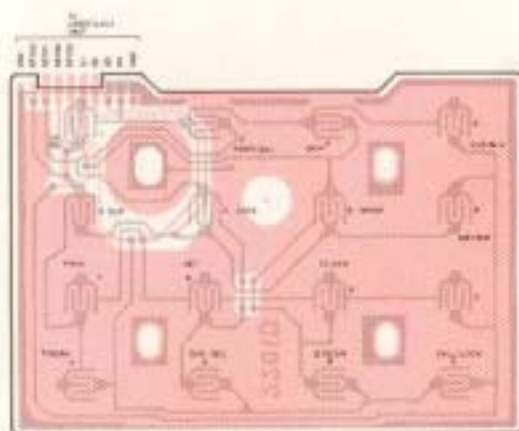
### • RES BOARD



### • PTT BOARD



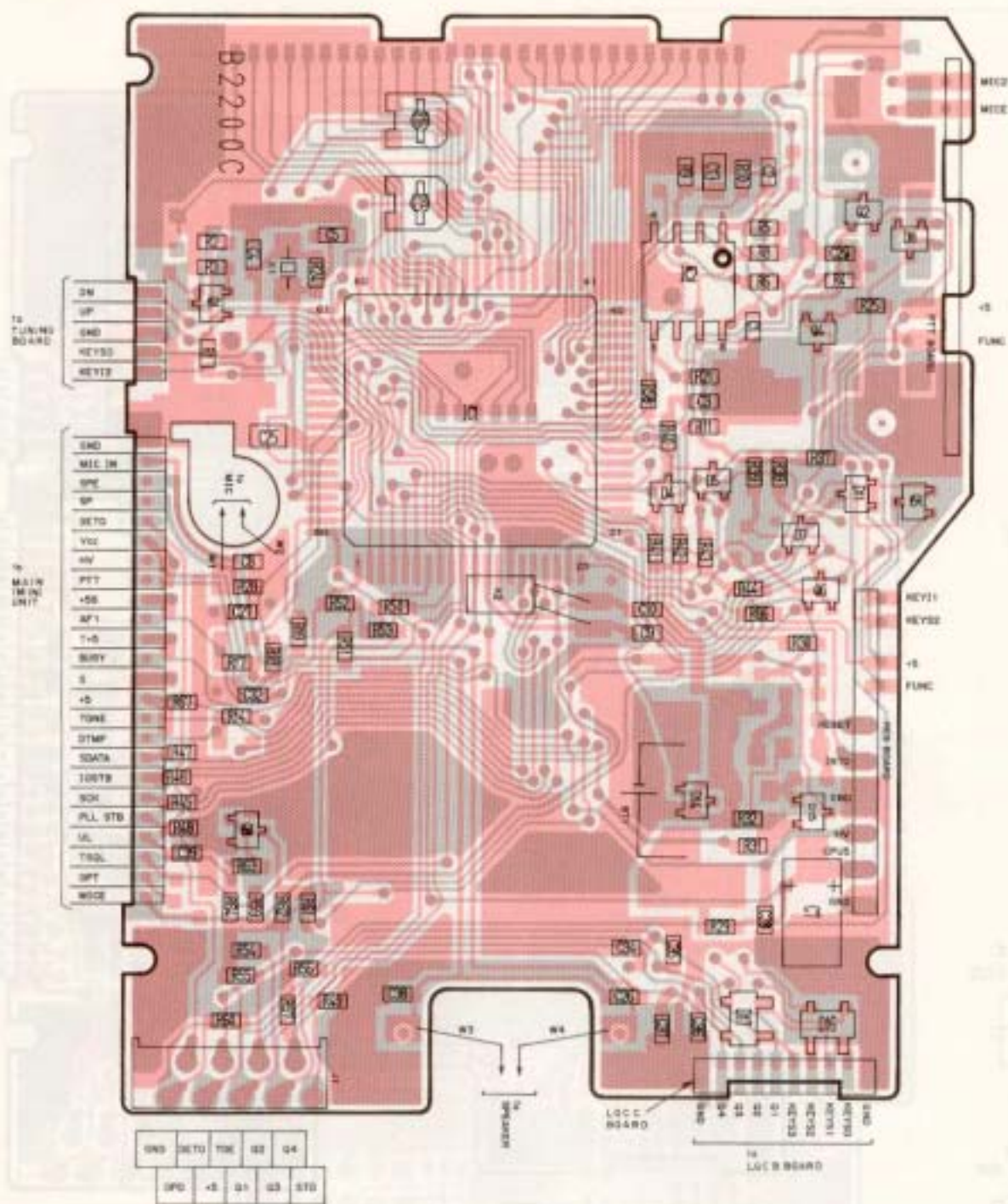
### • LGC B BOARD



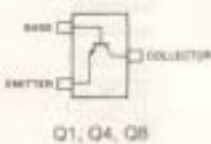
# 2 LOGIC (LGC) UNIT

## LOGIC UNIT (TOP VIEW)

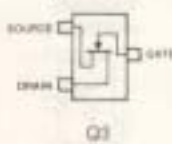
The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.



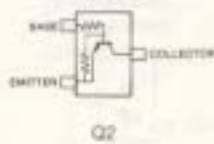
**2SC4081 R**  
(Symbol: BR)



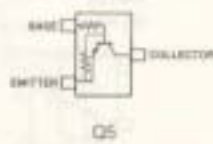
**2SK880 Y**  
(Symbol: XY)



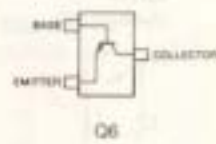
**DTA144EU**  
(Symbol: 16)



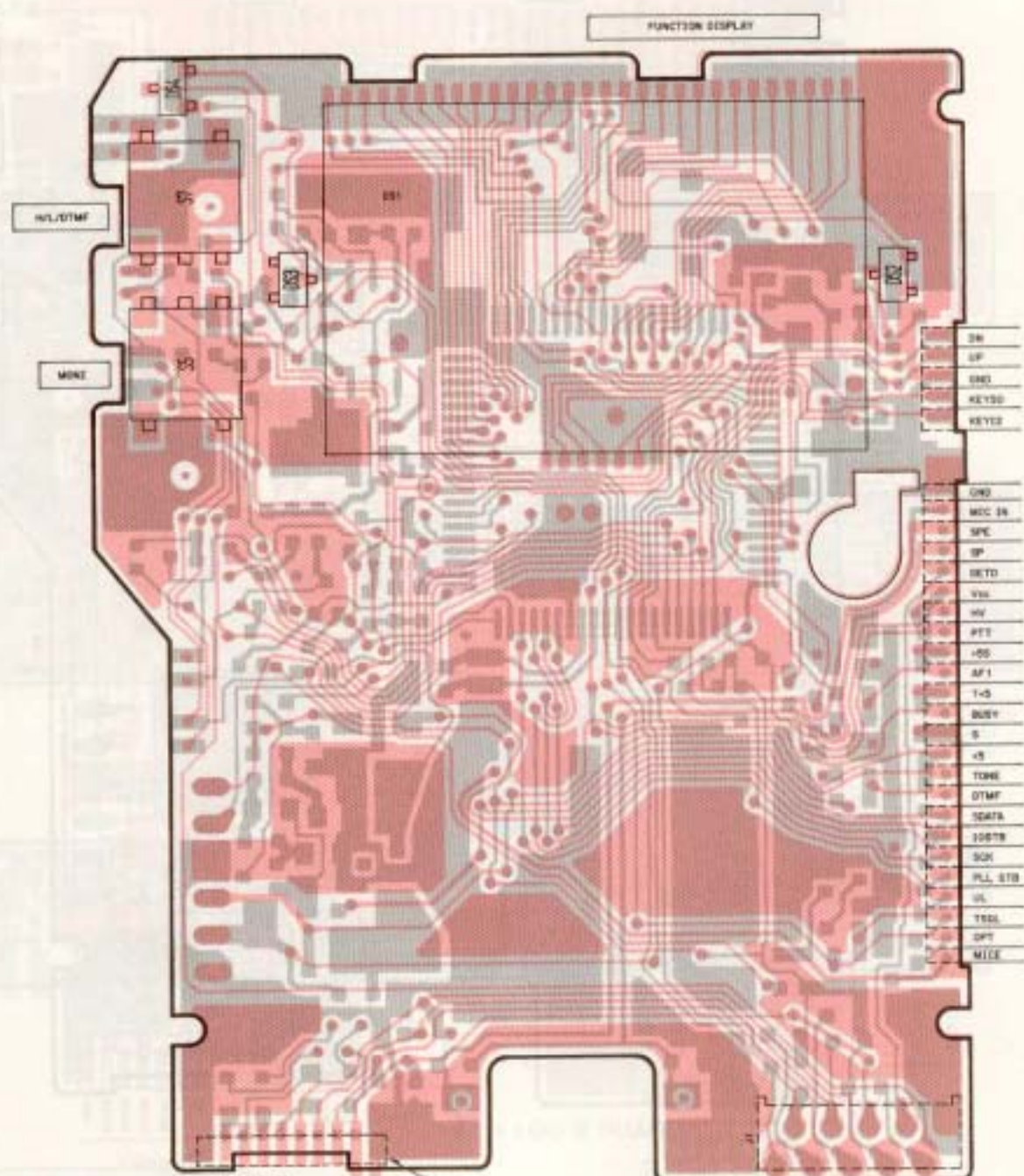
**DTC144TU**  
(Symbol: 06)



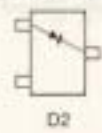
**2SA1576R**  
(Symbol: FR)



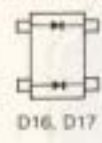
LOGIC DAUGHTER UNITS



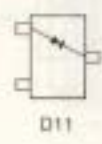
02C25.1-Z  
(Symbol: 5.1Z)



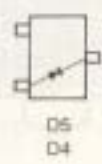
DWA010  
(Symbol: BM)



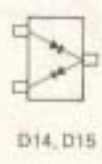
DA114  
(Symbol: AV)



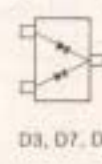
DA115  
(Symbol: AU)



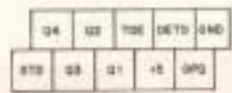
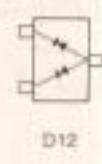
DA204U  
(Symbol: K)



DAN202U  
(Symbol: N)



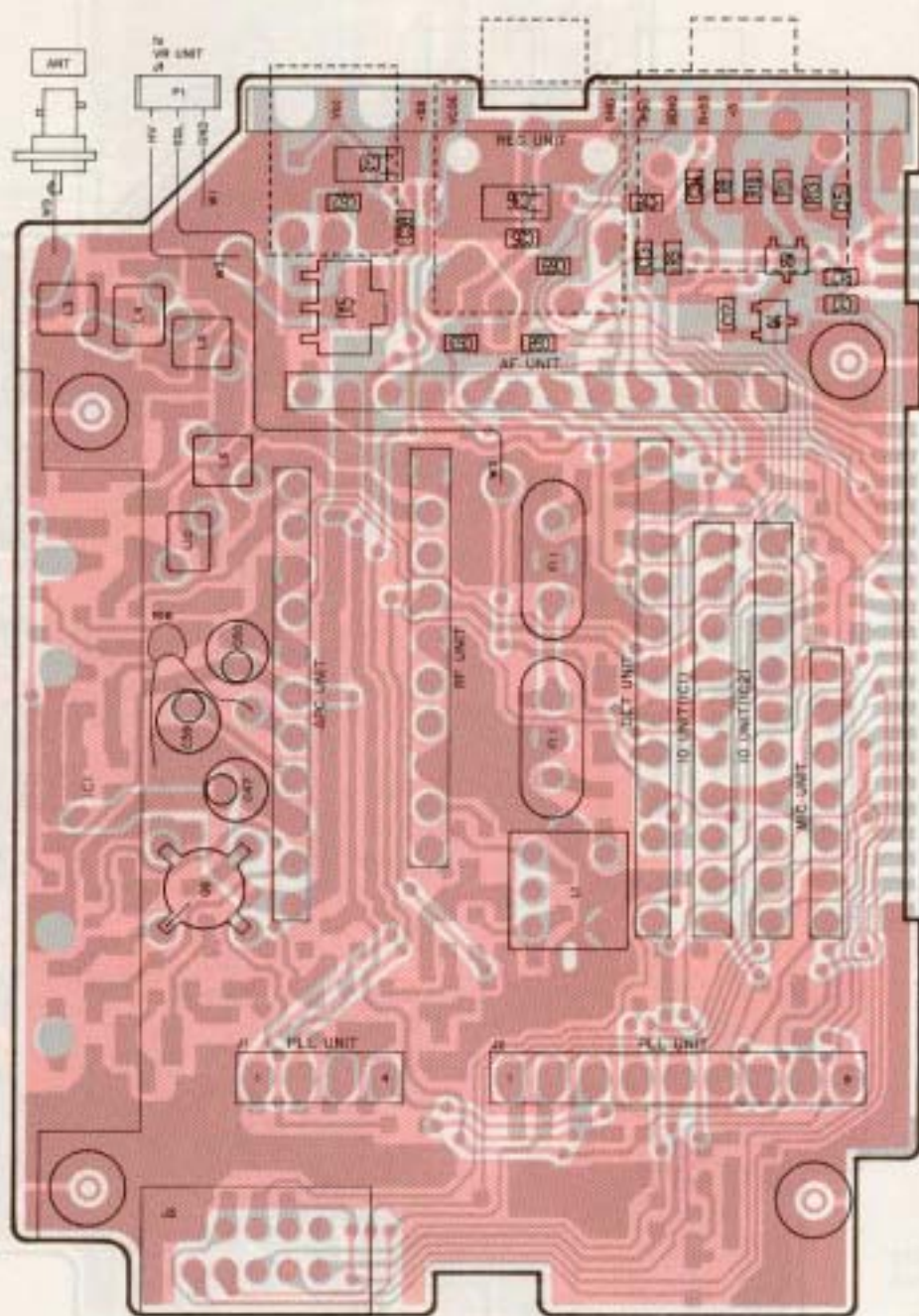
DAP202U  
(Symbol: P)



## 7-3 MAIN UNIT

### • MAIN UNIT (TOP VIEW)

The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

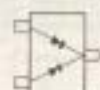


**15S153**  
(Symbol: A9)



D9

**DAN202U**  
(Symbol: N)



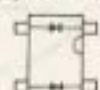
D8

**HSM88AS**  
(Symbol: C1)  
**DA204U**  
(Symbol: K)



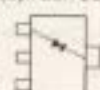
HSM88AS: D10, D11  
DA204U: D13, D2

**MA862**  
(Symbol: M11)



D14, D7

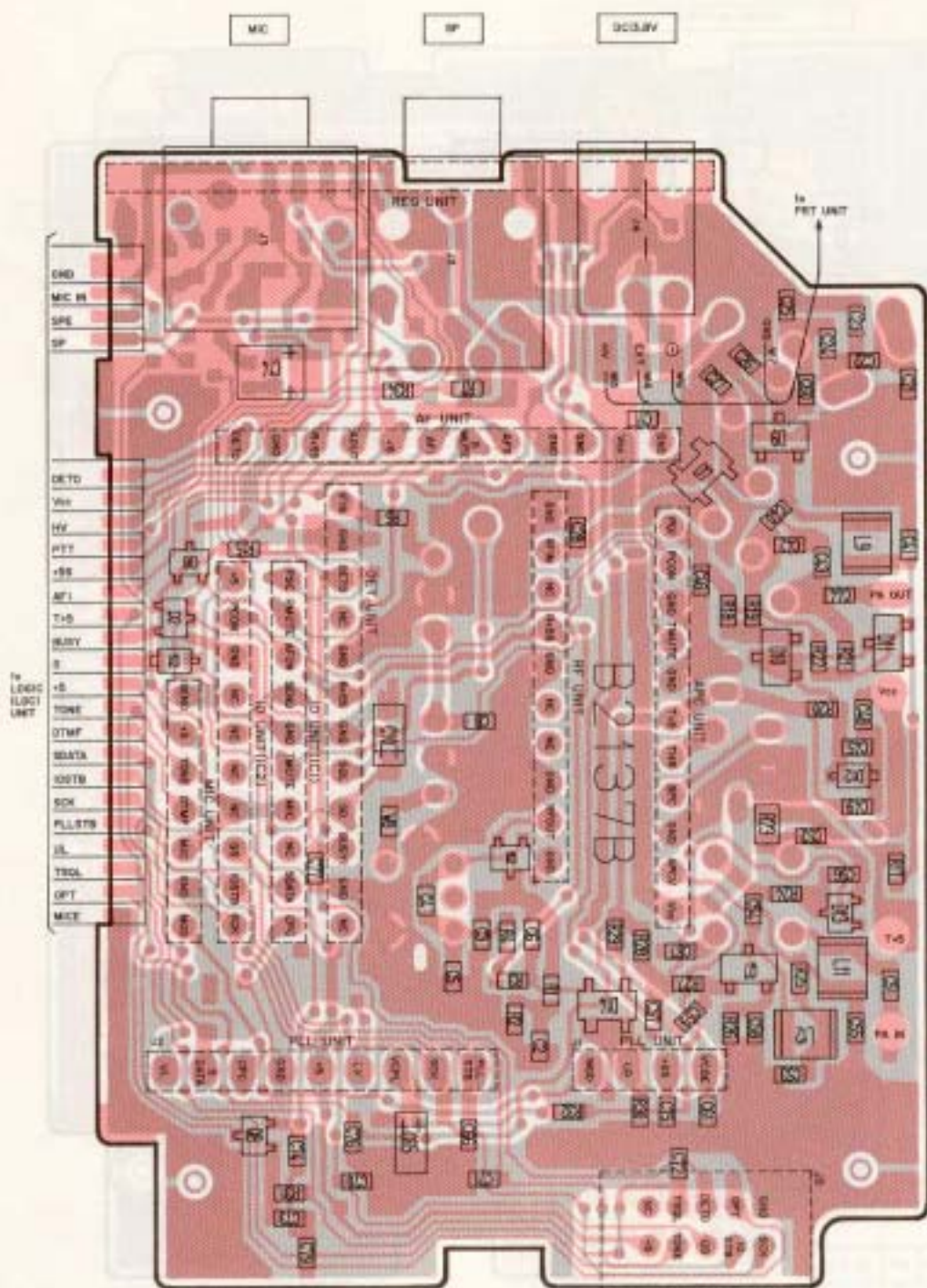
**SB20-03P-TD**  
(Symbol: SC)



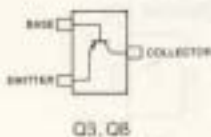
D15

• MAIN UNIT (BOTTOM VIEW)

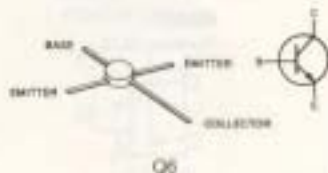
THIS DIAGRAM  
 SHOWS THE MAIN UNIT



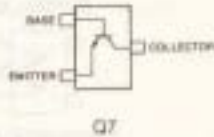
2SA1576 R  
 (Symbol: FR)



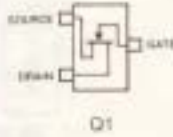
2SC3019



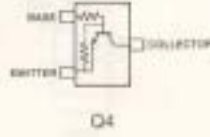
2SC3772 3  
 (Symbol: LY3)



2SK882 Y  
 (Symbol: TY)



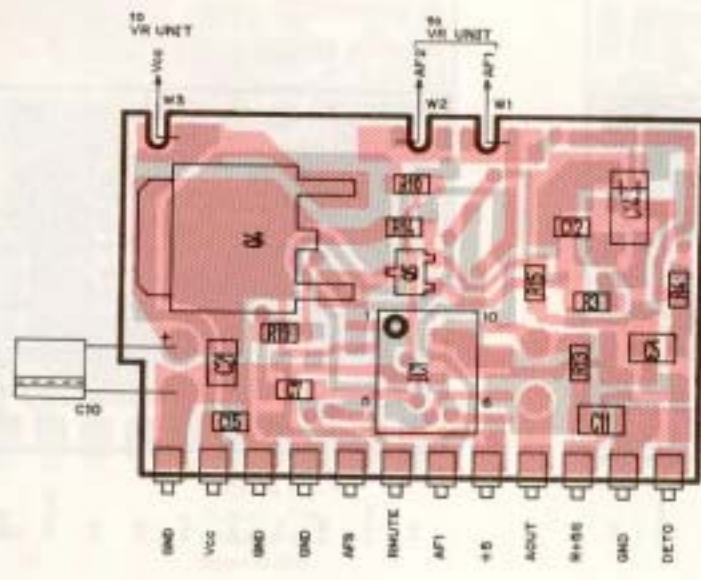
DTC144EU  
 (Symbol: 26)





# 7-4 MAIN DAUGHTER UNITS

## • AF UNIT



**DAP202U**  
(Symbol: P)

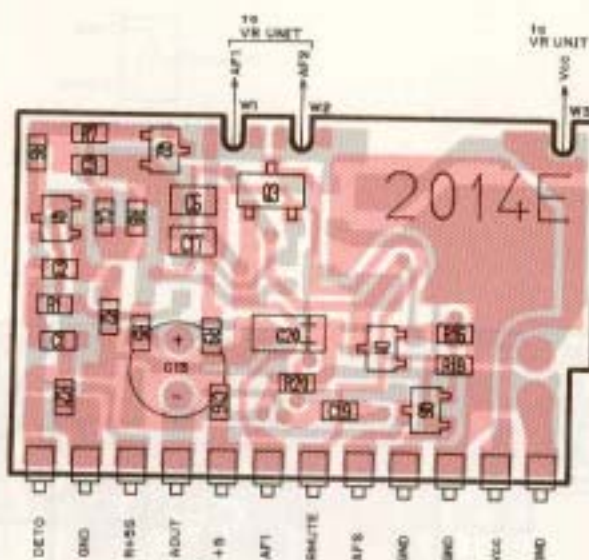


D1

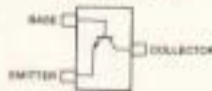
**25B1182 Q**



Q4

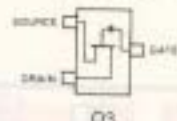


**2SC4081 R**  
(Symbol: BR)



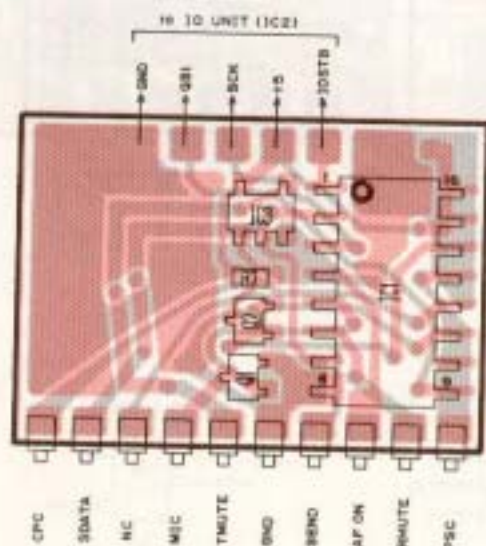
Q1, Q2, Q5, Q6

**2SJ106-GR**  
(Symbol: VG)

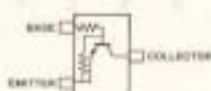


Q3

## • IO UNIT (IC1)

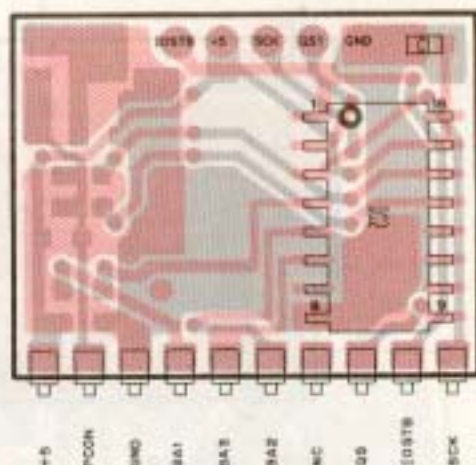
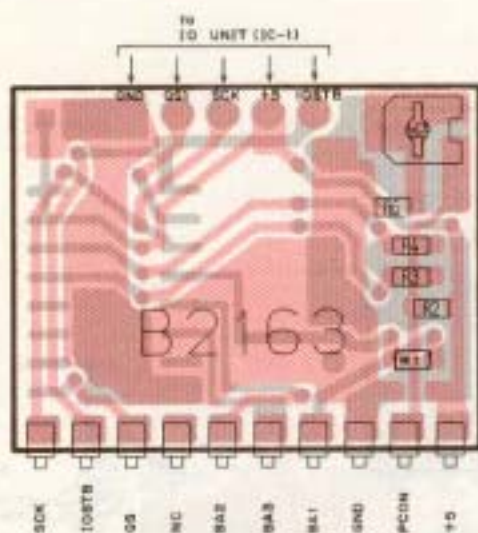


**DTC144EU**  
(Symbol: 2G)

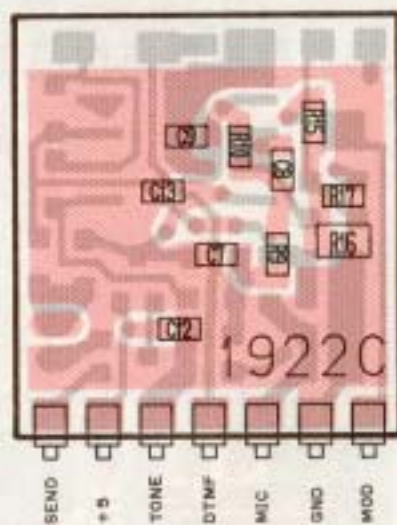
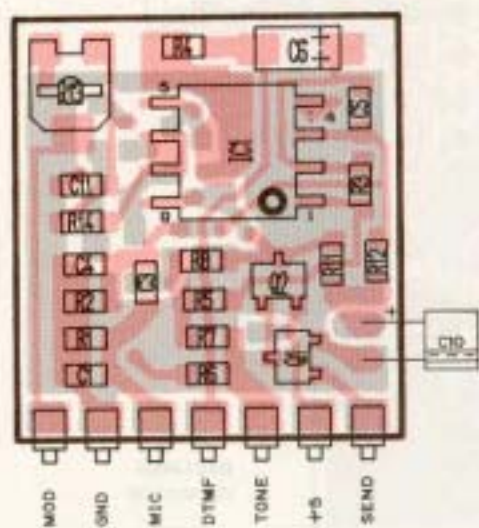


Q1, Q2

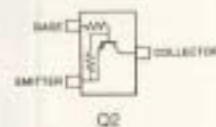
• IO UNIT (IC2)



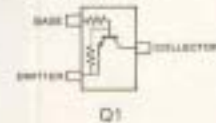
• MIC UNIT



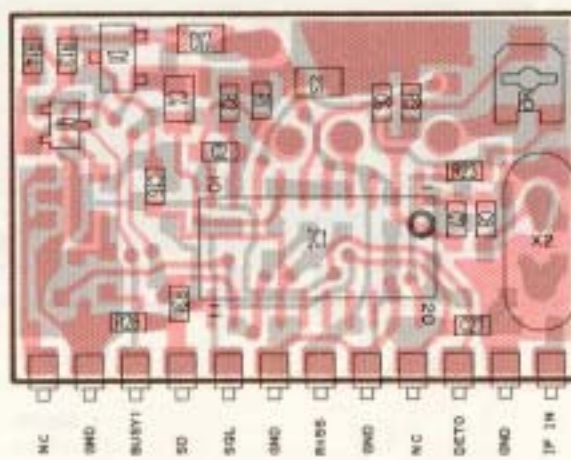
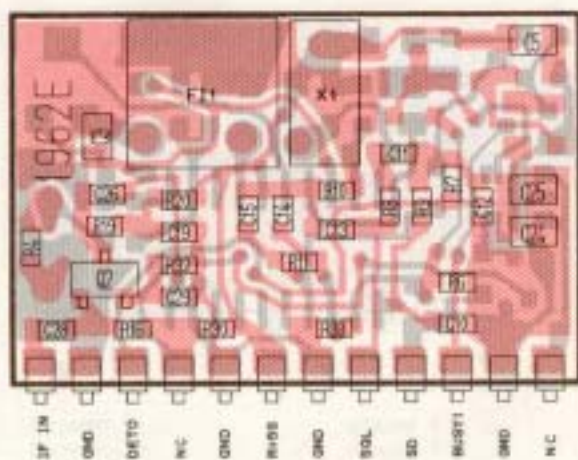
DTA144EU  
(Symbol: 16)



DTC144EU  
(Symbol: 26)



• DET UNIT



HSM88A5  
(Symbol: C1)



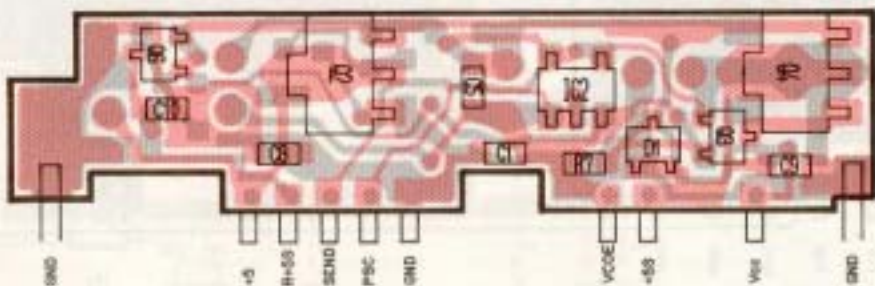
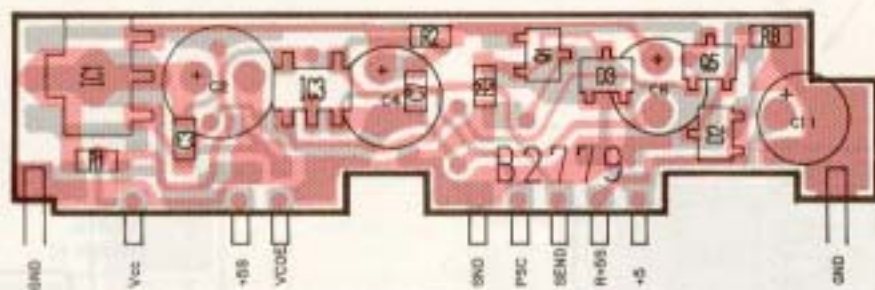
D1

25C3770 3  
(Symbol: JY3)  
25C4081 S  
(Symbol: BS)



25C3770 3 : Q2  
25C4081 S : Q1

• REG UNIT



DA114  
(Symbol: AV)



D1, D2, D3

25A1576  
(Symbol: FR)



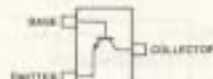
Q6

25B798  
(Symbol: DK)



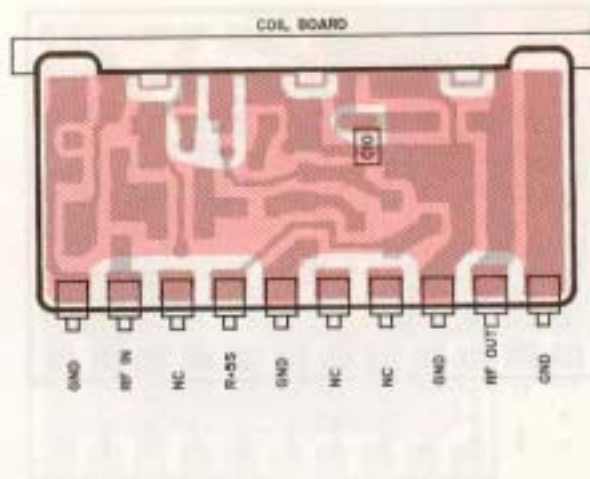
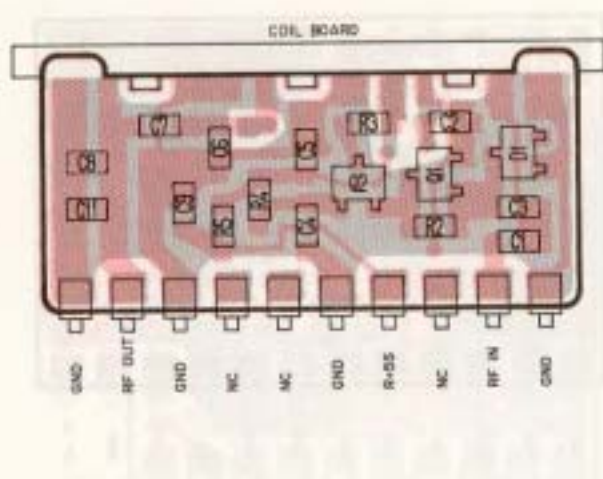
Q2, Q4

25C4081 S  
(Symbol: BS)



O1, Q3, Q5

• RF UNIT



COIL BOARD



DAN202U  
(Symbol: N)



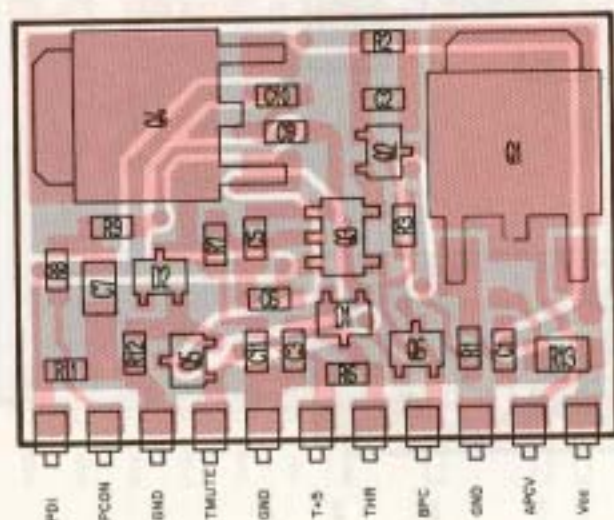
D1

25C4403 3  
(Symbol: LY3)  
25C4405 3  
(Symbol: OY3)



25C4403 3 : Q2  
25C4405 3 : Q1

• APC UNIT



DA204U  
(Symbol: K)



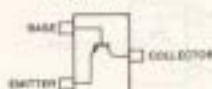
D1

DAP202U  
(Symbol: P)



D2

25A1576 R  
(Symbol: RF)



Q6

25B1182 Q



Q1, Q4

25C4081 S  
(Symbol: BS)



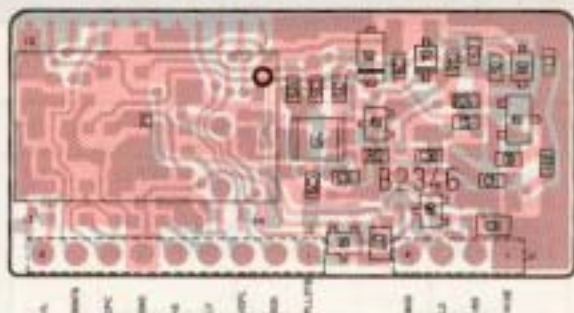
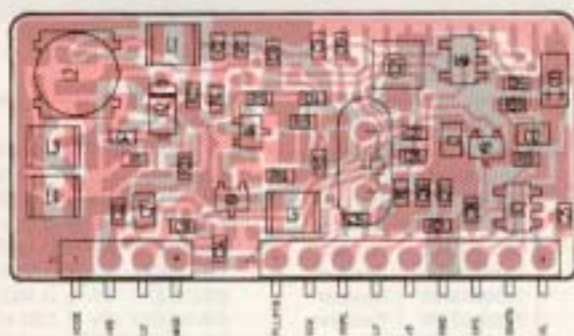
Q2, Q5

FMS1  
(Symbol: S1)

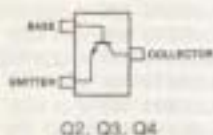


Q3

• PLL UNIT

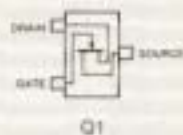


**2SC4403 3**  
(Symbol: LY3)



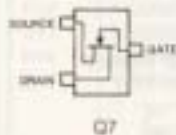
Q2, Q3, Q4

**2SK302 Y**  
(Symbol: TY)



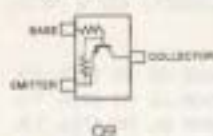
Q1

**2SK880 Y**  
(Symbol: XY)



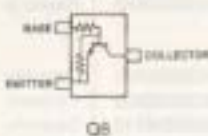
Q7

**DTA1432U**  
(Symbol: 113)



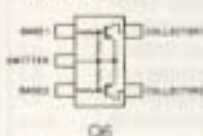
Q5

**DTC144EU**  
(Symbol: 20)



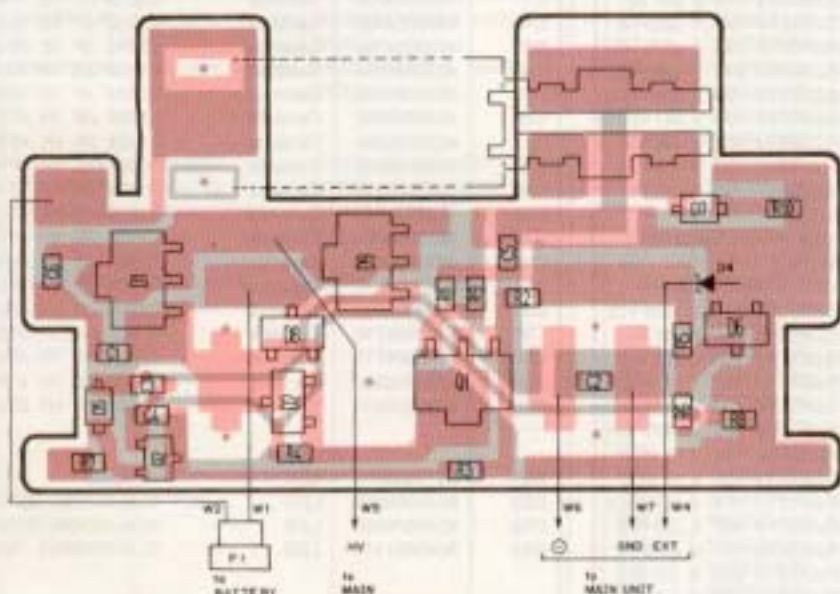
Q6

**FMA2**  
(Symbol: A2)

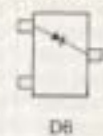


Q6

• PRT UNIT



**02C25.1-Z**  
(Symbol: 5.1Z)



D6

**5B07-03C-TA**  
(Symbol: J)



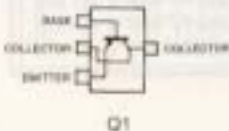
Q2, D8

**5B20-03P-TD**  
(Symbol: SC)



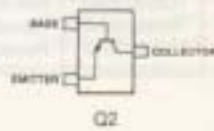
D1, D9

**2SB798**  
(Symbol: DK)



Q1

**2SC4081 S**  
(Symbol: BS)



Q2

## SECTION 8

## PARTS LIST

## [LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1140001420	IC	HD40406A47H
IC2	1120000430	IC	LA6393M-TP-T1
IC3	1180000550	IC	RH5VA37CA-T1
IC4	1130003760	IC	TC48B1F (TE85R)
Q1	1530002060	Transistor	2SC4081 T107 R
Q2	1590000720	Transistor	DTA144EU T107
Q3	1560000540	FET	2SK880-Y (TE85R)
Q4	1530002060	Transistor	2SC4081 T107 R
Q5	1590000660	Transistor	DTC144TU T107
Q6	1510000510	Transistor	2SA1576 T107 R
Q8	1530002060	Transistor	2SC4081 T107 R
D2	1730002160	Zener	02CZ5.1-Z (TE85R)
D3	1160000060	Diode	DAN202U T107
D4	1750000170	Diode	DA115 T107
D5	1750000170	Diode	DA115 T107
D7	1160000060	Diode	DAN202U T107
D8	1160000060	Diode	DAN202U T107
D9	1710000600	Diode	1SS254
D11	1750000160	Diode	DA114 T107
D12	1160000050	Diode	DAP202U T107
D14	1750000130	Diode	DA204U T107
D15	1750000130	Diode	DA204U T107
D16	1750000120	Diode	DWA010-TE
D17	1750000120	Diode	DWA010-TE
X1	6060000260	Ceralock	CSB800J220
X2	6050005800	Crystal	DT-26S 32.768KHZ
R1	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R2	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R3	7030003280	Resistor	ERJ3GEYJ 470 V (47 Ω)
R4	7030003380	Resistor	ERJ3GEYJ 221 V (220 Ω)
R5	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R6	7030003880	Resistor	ERJ3GEYJ 244 V (240 kΩ)
R8	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R9	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R10	7030003650	Resistor	ERJ3GEYJ 563 V (56 kΩ)
R11	7030003580	Resistor	ERJ3GEYJ 153 V (15 kΩ)
R14	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R15	7310002740	Trimmer	RV-150 (RH03 A3A14X0FC)103
R16	7310002600	Trimmer	RV-110 (RH03 A3AS4X0AA)473
R17	7030003760	Resistor	ERJ3GEYJ 474 V (470 kΩ)
R18	7030003580	Resistor	ERJ3GEYJ 153 V (15 kΩ)
R19	7030003580	Resistor	ERJ3GEYJ 153 V (15 kΩ)
R20	7030003460	Resistor	ERJ3GEYJ 152 V (1.5 kΩ)
R21	7030003760	Resistor	ERJ3GEYJ 474 V (470 kΩ)
R22	7030003760	Resistor	ERJ3GEYJ 474 V (470 kΩ)
R23	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R24	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R25	7030003760	Resistor	ERJ3GEYJ 474 V (470 kΩ)
R28	7030003620	Resistor	ERJ3GEYJ 333 V (33 kΩ)
R29	7030003380	Resistor	ERJ3GEYJ 331 V (330 Ω)
R30	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R31	7030003580	Resistor	ERJ3GEYJ 153 V (15 kΩ)
R32	7030003610	Resistor	ERJ3GEYJ 273 V (27 kΩ)
R37	7030003790	Resistor	ERJ3GEYJ 824 V (820 kΩ)
R38	7030003750	Resistor	ERJ3GEYJ 394 V (390 kΩ)
R39	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R40	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R41	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R42	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R43	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)

## [LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R44	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R45	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R46	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R47	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R48	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R49	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R50	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R51	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R52	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R53	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R54	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R55	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R56	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R57	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R58	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R59	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R60	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R61	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R62	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R63	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R64	7030003640	Resistor	ERJ3GEYJ 473 V (47 kΩ)
R65	7030003200	Resistor	ERJ3GEYJ 100 V (10 Ω)
R66	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R67	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
C1	4030006860	Ceramic	C1608 JB 1H 102K T-A
C2	4030006850	Ceramic	C1608 JB 1H 471K T-A
C3	4030006710	Ceramic	C1608 SL 1H 470J T-A
C4	4030006800	Ceramic	C1608 SL 1H 221J T-A
C5	4030006800	Ceramic	C1608 SL 1H 221J T-A
C6	4030004760	Ceramic	C2012 JF 1E 104Z T-A
C7	4550000770	Tantalum	TESVC 0J 226M-12L
C8	4030006850	Ceramic	C1608 JB 1H 471K T-A
C9	4030007030	Ceramic	C1608 CH 1H 150J T-A
C10	4030007030	Ceramic	C1608 CH 1H 150J T-A
C11	4030004760	Ceramic	C2012 JF 1E 104Z T-A
C13	4030004760	Ceramic	C2012 JF 1E 104Z T-A
C22	4030004760	Ceramic	C2012 JF 1E 104Z T-A
C24	4030006860	Ceramic	C1608 JB 1H 102K T-A
C25	4030004760	Ceramic	C2012 JF 1E 104Z T-A
C26	4030006850	Ceramic	C1608 JB 1H 471K T-A
C27	4030006850	Ceramic	C1608 JB 1H 471K T-A
C28	4030006850	Ceramic	C1608 JB 1H 471K T-A
C29	4030006850	Ceramic	C1608 JB 1H 471K T-A
C30	4030006850	Ceramic	C1608 JB 1H 471K T-A
C31	4030006850	Ceramic	C1608 JB 1H 471K T-A
C32	4030006850	Ceramic	C1608 JB 1H 471K T-A
C34	4030006710	Ceramic	C1608 SL 1H 470J T-A
C35	4030006710	Ceramic	C1608 SL 1H 470J T-A
C36	4030006710	Ceramic	C1608 SL 1H 470J T-A
C37	4030006710	Ceramic	C1608 SL 1H 470J T-A
C38	4030006850	Ceramic	C1608 JB 1H 471K T-A
C39	4030008430	Ceramic	C1608 JF 1H 223Z T-A
DS1	6910003910	LCD	LCD2439
DS2	5040000950	LED	SLM-13DWS T97B
DS3	5040000950	LED	SLM-13DWS T97B
DS4	5040001110	LED	SLM-23VMWS T97B
MC1	7700000860	Microphone	WM-62A
BT1	3020000160	Lithium Battery	VL2020-1VC
S1	2260000890	Encoder	SRBM1L340A [TUNING]

## [LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
S2	2260001150	Switch	SW-103 (SKHUPC007B) [LIGHT]
S3	2230000770	Switch	SW-104 (SKHUPE004B) [F]
S4	2230000770	Switch	SW-104 (SKHUPE004B) [PTT]
S5	2260001150	Switch	SW-103 (SKHUPC007B) [MONI]
S7	2260001150	Switch	SW-103 (SKHUPC007B) [H/L/DTMF]
SP1	2510000450	Speaker	EAS-3P123D
EP1	0910022773	P.C. Board	B 2200C (LOGIC)
EP2	0910024633	P.C. Board	B 1927C (ENC)
EP3	0910024674	P.C. Board	B 2106D (RES)
EP4	0910023222	P.C. Board	B 2276B (PTT)
EP5	0910021322	P.C. Board	B 2108B
EP6	0910021912	P.C. Board	B 2111B
EP7	0910022754	P.C. Board	B 2201D (LGCB)
EP8	0910023513	P.C. Board	B 2291C
EP9	6910003110	Lead Frame	HFB2.0-0.7-B (N)
EP10	8930019700	LCD Contact Strip	SRCN754

## [MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1150000800	IC	SC1107
Q1	1560000550	FET	2SK882-Y (TE85R)
Q3	1510000510	Transistor	2SA1576 T107 R
Q4	1590000430	Transistor	DTC144EU T107
Q6	1530000900	Transistor	2SC3019
Q7	1530002030	Transistor	2SC3772-3-TA
Q8	1510000510	Transistor	2SA1576 T107 R
D1	1790000590	Diode	MA110(TW)
D2	1750000130	Diode	DA204U T107
D7	1790000450	Diode	MA862(TX)
D8	1160000060	Diode	DAN202U T107
D9	1750000080	Diode	1SS153-T2
D10	1790000490	Diode	HSM88AS-TR
D11	1790000490	Diode	HSM88AS-TR
D12	1790000590	Diode	MA110(TW)
D13	1750000130	Diode	DA204U T107
D14	1790000450	Diode	MA862(TX)
D15	1790000580	Diode	SB20-03P-TD
F11	2010000230	Filter	30M15B (FL-76)
L1	6150003210	Coil	LS-319
L3	6110002000	Coil	LA-226
L4	6110002000	Coil	LA-226
L5	6110002000	Coil	LA-226
L6	6110002000	Coil	LA-226
L9	6200000260	Coil	LQN 2A R10K
L10	6110002040	Coil	LA-225
L11	6200000110	Coil	LQN 2A 33NM
L12	6200000760	Coil	LQN 2A 56NM
R1	7030003290	Resistor	ERJ3GEYJ 560 V (56 Ω)
R2	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R3	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R4	7030003400	Resistor	ERJ3GEYJ 471 V (470 Ω)
R6	7030003410	Resistor	ERJ3GEYJ 561 V (560 Ω)
R7	7030003760	Resistor	ERJ3GEYJ 474 V (470 kΩ)
R8	7030003400	Resistor	ERJ3GEYJ 471 V (470 Ω)
R9	7030003400	Resistor	ERJ3GEYJ 471 V (470 Ω)
R10	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R11	7030003450	Resistor	ERJ3GEYJ 122 V (1.2 kΩ)
R12	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R13	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R15	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R16	7510000070	Thermistor	ERT-02FHL503S
R17	7030003340	Resistor	ERJ3GEYJ 151 V (150 Ω)
R18	7030003380	Resistor	ERJ3GEYJ 331 V (330 Ω)
R19	7030003470	Resistor	ERJ3GEYJ 182 V (1.8 kΩ)
R20	7030003550	Resistor	ERJ3GEYJ 822 V (8.2 kΩ)
R21	7030003490	Resistor	ERJ3GEYJ 272 V (2.7 kΩ)
R22	7030003390	Resistor	ERJ3GEYJ 391 V (390 Ω)
R23	7030000100	Resistor	MCR10EZHZ 4.7 Ω (4R7)
R24	7030003320	Resistor	ERJ3GEYJ 101 V (100 Ω)
R25	7030003200	Resistor	ERJ3GEYJ 100 V (10 Ω)
R26	7030003260	Resistor	ERJ3GEYJ 330 V (33 Ω)
R27	7030003410	Resistor	ERJ3GEYJ 561 V (560 Ω)
R28	7030003410	Resistor	ERJ3GEYJ 561 V (560 Ω)
R29	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R30	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R31	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R32	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R34	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
C2	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C3	4030006710	Ceramic	C1608 SL 1H 470J- T-A
C4	4030006670	Ceramic	C1608 SL 1H 270J- T-A
C5	4030006860	Ceramic	C1608 JB 1H 102K- T-A

## [VR UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7210001440	Variable Resistor	RK097111101NA (10KA) [VOL]
R2	7210001450	Variable Resistor	RK0971110051A (10KB) [SQL]
C1	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C2	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C3	4510002650	Electrolytic	16 MS7 100 μF
EP1	0910024624	P.C. Board	B 1926D

## [MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C6	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C8	4030006820	Ceramic	C1608 SL 1H 120J- T-A
C10	4550000460	Tantalum	TESVA 1C 105M1-8L
C11	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C12	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C13	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C14	4550003040	Tantalum	TEMSVB2 0J 106M-8 L
C15	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C16	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C17	4030006900	Ceramic	C1608 JB 1E 103K- T-A
C21	4030006620	Ceramic	C1608 SL 1H 120J- T-A
C22	4030006520	Ceramic	C1608 SL 1H 010C- T-A
C23	4030006660	Ceramic	C1608 SL 1H 220J- T-A
C24	4030008440	Ceramic	C1608 SL 1H 1R5C- T-A
C25	4030006620	Ceramic	C1608 SL 1H 120J- T-A
C26	4030006630	Ceramic	C1608 SL 1H 150J- T-A
C27	4030006660	Ceramic	C1608 SL 1H 220J- T-A
C28	4030006610	Ceramic	C1608 SL 1H 100D- T-A
C34	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C35	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C36	4550002890	Tantalum	TESVA 1A 225M1-SL
C37	4550002890	Tantalum	TESVA 1A 225M1-SL
C38	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C39	4510001380	Electrolytic	25 M55 4R7 $\mu$ F
C40	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C41	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C42	4030006630	Ceramic	C1608 SL 1H 150J- T-A
C43	4030006630	Ceramic	C1608 SL 1H 150J- T-A
C44	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C45	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C46	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C47	4510003160	Electrolytic	16 RC2 22 $\mu$ F (D = 4.0)
C48	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C49	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C50	4510001350	Electrolytic	16 M55 10 $\mu$ F
C51	4030006590	Ceramic	C1608 SL 1H 080D- T-A
C52	4030006890	Ceramic	C1608 JF 1H 103Z- T-A
C53	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C54	4030006610	Ceramic	C1608 SL 1H 100D- T-A
C55	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C56	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C57	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C58	4030006890	Ceramic	C1608 JF 1H 103Z- T-A
C59	4030006670	Ceramic	C1608 SL 1H 270J- T-A
C60	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C61	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C62	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C63	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C65	4550000460	Tantalum	TESVA 1C 105M1-8L
C66	4030006760	Ceramic	C1608 SL 1H 121J- T-A
C67	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C68	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C69	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C70	4030006750	Ceramic	C1608 SL 1H 101J- T-A
C71	4030006750	Ceramic	C1608 SL 1H 101J- T-A
C72	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C73	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C74	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C75	4030006750	Ceramic	C1608 SL 1H 101J- T-A
C76	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C77	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C79	4030006750	Ceramic	C1608 SL 1H 101J- T-A
EP1	0910022142	P.C. Board	B 2137B (MAIN)

## [AF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110001810	IC	TA7368F(TP1)
Q1	1530002060	Transistor	2SC4081 T107 R
Q2	1530002060	Transistor	2SC4081 T107 R
Q3	1500000520	FET	2SJ106-GR (TE85R)
Q4	1520000270	Transistor	2SB1182 T201 Q
Q5	1530002060	Transistor	2SC4081 T107 R
Q6	1530002060	Transistor	2SC4081 T107 R
D1	1160000050	Diode	DAP202U T107
R1	7030003580	Resistor	ERJ3GEYJ 153 V (15 k $\Omega$ )
R2	7030003700	Resistor	ERJ3GEYJ 154 V (150 k $\Omega$ )
R3	7030003760	Resistor	ERJ3GEYJ 474 V (470 k $\Omega$ )
R4	7030003560	Resistor	ERJ3GEYJ 103 V (10 k $\Omega$ )
R5	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 k $\Omega$ )
R6	7030003630	Resistor	ERJ3GEYJ 393 V (39 k $\Omega$ )
R7	7030003630	Resistor	ERJ3GEYJ 393 V (39 k $\Omega$ )
R8	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 k $\Omega$ )
R9	7030003800	Resistor	ERJ3GEYJ 105 V (1 M $\Omega$ )
R10	7030003320	Resistor	ERJ3GEYJ 101 V (100 $\Omega$ )
R13	7030003200	Resistor	ERJ3GEYJ 100 V (10 $\Omega$ )
R14	7030003420	Resistor	ERJ3GEYJ 681 V (680 $\Omega$ )
R15	7030003420	Resistor	ERJ3GEYJ 681 V (680 $\Omega$ )
R16	7030003600	Resistor	ERJ3GEYJ 223 V (22 k $\Omega$ )
R18	7030003760	Resistor	ERJ3GEYJ 474 V (470 k $\Omega$ )
R19	7030003560	Resistor	ERJ3GEYJ 103 V (10 k $\Omega$ )
R20	7030003340	Resistor	ERJ3GEYJ 151 V (150 $\Omega$ )
R21	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 k $\Omega$ )
C1	4030006900	Ceramic	C1608 JB 1E 103K- T-A
C2	4030006900	Ceramic	C1608 JB 1E 103K- T-A
C3	4030006870	Ceramic	C1608 JB 1H 222K- T-A
C4	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C5	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
C6	4030005110	Ceramic	C2012 JB 1E 473K- T-A
C7	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C10	4510001340	Electrolytic	10 M55 33 $\mu$ F
C11	4030005110	Ceramic	C2012 JB 1E 473K- T-A
C12	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C13	4510003180	Electrolytic	6.3 RC2 100 $\mu$ F (D = 5.0)
C14	4550003290	Tantalum	TESVA 0G 475M1-8L
C15	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C16	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C17	4030005110	Ceramic	C2012 JB 1E 473K- T-A
C19	4030006710	Ceramic	C1608 SL 1H 470J- T-A
C20	4550002950	Tantalum	TESVA 0J 335M1-8L
C21	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
EP1	0910024656	P.C. Board	B 2014F (AF)
EP2	0910003110	Lead Frame	HFB2.0-0.7-8 (N)



## [IO UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130000830	IC	$\mu$ PD4094BG-T1
IC2	1130000830	IC	$\mu$ PD4094BG-T1
IC3	1130004170	IC	TC4501F (TE85R)
Q1	1590000430	Transistor	DTC144EU T107
Q2	1590000430	Transistor	DTC144EU T107
R2	7030003700	Resistor	ERJ3GEYJ 154 V (150 k $\Omega$ )
R3	7030003680	Resistor	ERJ3GEYJ 104 V (100 k $\Omega$ )
R4	7030003720	Resistor	ERJ3GEYJ 224 V (220 k $\Omega$ )
R5	7310002580	Trimmer	RV-106 (RH03 A3A15X05A)104
R6	7030003620	Resistor	ERJ3GEYJ 333 V (33 k $\Omega$ )
R7	7030003720	Resistor	ERJ3GEYJ 224 V (220 k $\Omega$ )
C1	4030006860	Ceramic	C1608 JB 1H 102K- T-A
EP1	0910024663	P.C. Board	B 2070D (IC1)
EP2	0910024680	P.C. Board	B 2163A (IC2)

## [MIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110001540	IC	M5218FP-71A
Q1	1590000430	Transistor	DTC144EU T107
Q2	1590000720	Transistor	DTA144EU T107
R1	7030003640	Resistor	ERJ3GEYJ 473 V (47 k $\Omega$ )
R2	7030003680	Resistor	ERJ3GEYJ 244 V (240 k $\Omega$ )
R3	7030003710	Resistor	ERJ3GEYJ 184 V (180 k $\Omega$ )
R4	7030003370	Resistor	ERJ3GEYJ 271 V (270 $\Omega$ )
R5	7030003670	Resistor	ERJ3GEYJ 823 V (82 k $\Omega$ )
R6	7030003720	Resistor	ERJ3GEYJ 224 V (220 k $\Omega$ )
R7	7030003680	Resistor	ERJ3GEYJ 104 V (100 k $\Omega$ )
R8	7030003740	Resistor	ERJ3GEYJ 334 V (330 k $\Omega$ )
R9	7030003630	Resistor	ERJ3GEYJ 393 V (39 k $\Omega$ )
R10	7030003630	Resistor	ERJ3GEYJ 393 V (39 k $\Omega$ )
R11	7030003440	Resistor	ERJ3GEYJ 102 V (1 k $\Omega$ )
R12	7030003710	Resistor	ERJ3GEYJ 184 V (180 k $\Omega$ )
R13	7310002600	Trimmer	RV-110 (RH03 A3A54X0AA)473
R14	7030003560	Resistor	ERJ3GEYJ 103 V (10 k $\Omega$ )
R15	7030003540	Resistor	ERJ3GEYJ 682 V (6.8 k $\Omega$ )
R16	7510000180	Thermistor	DTN-T203S223LS(T)
R17	7030003570	Resistor	ERJ3GEYJ 123 V (12 k $\Omega$ )
C1	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C3	4030006880	Ceramic	C1608 JB 1H 472K- T-A
C4	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C5	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C6	4550000530	Tantalum	TESVA-1V 104M1-8L
C7	4030006470	Ceramic	C1608 JB 1H 272K- T-A
C8	4030006900	Ceramic	C1608 JB 1E 103K- T-A

## [MIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C9	4030006760	Ceramic	C1608 SL 1H 121J- T-A
C10	4510001850	Electrolytic	16 M55 4R7 $\mu$ F
C11	4030006900	Ceramic	C1608 JB 1E 103K- T-A
C12	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C13	4030006850	Ceramic	C1608 JB 1H 471K- T-A
EP1	0910024614	P.C. Board	B 1922D (MIC)
EP2	6910003110	Lead Frame	HFB2.0-0.7-8 (N)

## [DET UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1120001650	IC	TK10487MT1
Q1	1530002280	Transistor	2SC4081 T107 S
Q2	1530002020	Transistor	2SC3770-3-TA
D1	1790000490	Diode	HSM88AS-TR
F11	2020000550	Ceramic Filter	CFUM458E
X1	6070000060	Discriminator	CDBM455C7
X2	6050000510	Crystal	CR-214
R1	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 k $\Omega$ )
R2	7030003440	Resistor	ERJ3GEYJ 102 V (1 k $\Omega$ )
R3	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 k $\Omega$ )
R4	7030003460	Resistor	ERJ3GEYJ 152 V (1.5 k $\Omega$ )
R5	7310002590	Trimmer	RV-109 (RH03 A3AJ3X0BA)222
R6	7030003550	Resistor	ERJ3GEYJ 822 V (8.2 k $\Omega$ )
R7	7030003560	Resistor	ERJ3GEYJ 103 V (10 k $\Omega$ )
R8	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 k $\Omega$ )
R9	7030003400	Resistor	ERJ3GEYJ 471 V (470 $\Omega$ )
R10	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 k $\Omega$ )
R11	7030003730	Resistor	ERJ3GEYJ 274 V (270 k $\Omega$ )
R13	7030003680	Resistor	ERJ3GEYJ 104 V (100 k $\Omega$ )
R14	7030003800	Resistor	ERJ3GEYJ 105 V (1 M $\Omega$ )
R16	7030003630	Resistor	ERJ3GEYJ 393 V (39 k $\Omega$ )
R19	7030003400	Resistor	ERJ3GEYJ 471 V (470 $\Omega$ )
R20	7030003400	Resistor	ERJ3GEYJ 471 V (470 $\Omega$ )
R23	7030003320	Resistor	ERJ3GEYJ 101 V (100 $\Omega$ )
R28	7030003710	Resistor	ERJ3GEYJ 184 V (180 k $\Omega$ )
R30	7030003640	Resistor	ERJ3GEYJ 473 V (47 k $\Omega$ )
R31	7030003640	Resistor	ERJ3GEYJ 473 V (47 k $\Omega$ )
R32	7030003460	Resistor	ERJ3GEYJ 152 V (1.5 k $\Omega$ )
R33	7030003730	Resistor	ERJ3GEYJ 274 V (270 k $\Omega$ )
C1	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
C2	4030006740	Ceramic	C1608 SL 1H 820J- T-A
C3	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
C4	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
C5	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
C6	4030006640	Ceramic	C1608 SL 1H 180J- T-A
C7	4030006720	Ceramic	C1608 SL 1H 560J- T-A

## [DET UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C8	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C10	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C11	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C12	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C13	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C14	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C15	4030006890	Ceramic	C1608 SL 1H 330J- T-A
C16	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C17	4030004760	Ceramic	G2012 JF 1E 104Z- T-A
C19	4030006890	Ceramic	C1608 JF 1H 103Z- T-A
C24	4030005110	Ceramic	G2012 JB 1E 473K- T-A
C25	4030005110	Ceramic	G2012 JB 1E 473K- T-A
C26	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C27	4030006890	Ceramic	C1608 JF 1H 103Z- T-A
C28	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C29	4030006890	Ceramic	C1608 JF 1H 103Z- T-A
EP1	0910024646	P.C. Board	B 1962F (DET)
EP2	6910003110	Lead Frame	HFB2.0-0.7-8 (N)

## [REG UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1180000530	IC	S-81250HG-RD-T1
IC2	1130004170	IC	TC4901F (TE85R)
IC3	1130004170	IC	TC4901F (TE85R)
Q1	1530002280	Transistor	2SC4081 T107 S
Q2	1520000200	Transistor	2SB798-T2 DK
Q3	1530002280	Transistor	2SC4081 T107 S
Q4	1520000200	Transistor	2SB798-T2 DK
Q5	1530002280	Transistor	2SC4081 T107 S
Q6	1510000510	Transistor	2SA1576 T107 R
D1	1750000160	Diode	DA114 T107
D2	1750000160	Diode	DA114 T107
D3	1750000160	Diode	DA114 T107
R1	7030003400	Resistor	ERJ3GEYJ 471 V (470 Ω)
R2	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R3	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R7	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R8	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
C1	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C2	4510003160	Electrolytic	16 RC2 22 μF (D -4.0)
C3	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C4	4510001320	Electrolytic	6R3 M55 47 μF
C5	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C6	4510003190	Electrolytic	6.3 RC2 47 μF (D -4.0)
C7	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C8	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C9	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C10	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C11	4510003190	Electrolytic	6.3 RC2 47 μF (D -4.0)

## [REG UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
EP1	0910024705	P.C. Board	B 2779 (REG)
EP2	6910003110	Lead Frame	HFB2.0-0.7-8 (N)

## [RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1530002570	Transistor	2SC4405-3-TR
Q2	1530002560	Transistor	2SC4403-3-TR
D1	1160000060	Diode	DAN202U T107
L1	6150002970	Coil	LS-308
L2	6150002970	Coil	LS-308
L3	6150002970	Coil	LS-308
R2	7030003570	Resistor	ERJ3GEYJ 123 V (12 kΩ)
R3	7030003240	Resistor	ERJ3GEYJ 220 V (22 Ω)
R4	7030003570	Resistor	ERJ3GEYJ 123 V (12 kΩ)
R5	7030003370	Resistor	ERJ3GEYJ 271 V (270 Ω)
C1	4030006590	Ceramic	C1608 SL 1H 080D- T-A
C2	4030006590	Ceramic	C1608 SL 1H 080D- T-A
C3	4030006640	Ceramic	C1608 SL 1H 180J- T-A
C4	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C5	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C6	4030006610	Ceramic	C1608 SL 1H 100D- T-A
C7	4030006510	Ceramic	C1608 SL 1H 0R5C- T-A
C8	4030006610	Ceramic	C1608 SL 1H 100D- T-A
C9	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C10	4030006520	Ceramic	C1608 SL 1H 010C- T-A
C11	4030006520	Ceramic	C1608 SL 1H 010C- T-A
EP1	0910022162	P.C. Board	B 2174B (RF)
EP2	0910020185	P.C. Board	B 1946E (COIL)
EP3	6910003110	Lead Frame	HFB2.0-0.7-8 (N)

## [APC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1520000270	Transistor	2SB1182 T201 Q
Q2	1530002280	Transistor	2SC4081 T107 S
Q3	1590000620	Transistor	FMS1 T14B
Q4	1520000270	Transistor	2SB1182 T201 Q

## [APC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q5	1530002280	Transistor	2SC4081 T107 S
Q6	1510000510	Transistor	2SA1576 T107 R
D1	1750000130	Diode	DA204U T107
D2	1160000050	Diode	DAP202U T107
R1	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R2	7030003770	Resistor	ERJ3GEYJ 564 V (560 kΩ)
R3	7030003720	Resistor	ERJ3GEYJ 224 V (220 kΩ)
R6	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R7	7030003670	Resistor	ERJ3GEYJ 823 V (82 kΩ)
R8	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R9	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R11	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R12	7030003480	Resistor	ERJ3GEYJ 222 V (2.2 kΩ)
R13	7030000440	Resistor	MCR10EZHU 3.3 kΩ (332)
C1	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C2	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C3	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C5	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C6	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C7	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
C9	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C10	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C11	4030006850	Ceramic	C1608 JB 1H 471K- T-A
EP1	0910024691	P.C. Board	B 2361A (APC)
EP2	6910003110	Lead Frame	HFB2.0-0.7-8 (N)

## [PLL UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
L5	6200000910	Coil	LQN 2A 82NM
L6	6200000910	Coil	LQN 2A 82NM
R4	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R5	7030003550	Resistor	ERJ3GEYJ 822 V (8.2 kΩ)
R6	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R7	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R10	7030003550	Resistor	ERJ3GEYJ 822 V (8.2 kΩ)
R11	7030003240	Resistor	ERJ3GEYJ 220 V (22 Ω)
R12	7030003660	Resistor	ERJ3GEYJ 683 V (68 kΩ)
R13	7030003420	Resistor	ERJ3GEYJ 681 V (68 Ω)
R14	7030003650	Resistor	ERJ3GEYJ 563 V (56 kΩ)
R15	7030003390	Resistor	ERJ3GEYJ 391 V (390 Ω)
R18	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R19	7030003400	Resistor	ERJ3GEYJ 471 V (470 Ω)
R20	7030003500	Resistor	ERJ3GEYJ 332 V (3.3 kΩ)
R21	7030003800	Resistor	ERJ3GEYJ 105 V (1 MΩ)
R22	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
R23	7030003560	Resistor	ERJ3GEYJ 103 V (10 kΩ)
R24	7030003680	Resistor	ERJ3GEYJ 104 V (100 kΩ)
C1	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
C2	4030006900	Ceramic	C1608 JB 1E 103K- T-A
C3	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C4	4030006670	Ceramic	C1608 SL 1H 270J- T-A
C5	4030006690	Ceramic	C1608 SL 1H 330J- T-A
C6	4030006710	Ceramic	C1608 SL 1H 470J- T-A
C7	4030006540	Ceramic	C1608 SL 1H 030C- T-A
C8	4030006560	Ceramic	C1608 SL 1H 050C- T-A
C9	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C10	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C11	4030008440	Ceramic	C1608 SL 1H 1R5C- T-A
C12	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
C13	4550000460	Tantalum	TESVA 1C 105M1-8L
C14	4030006620	Ceramic	C1608 SL 1H 120J- T-A
C15	4030006560	Ceramic	C1608 SL 1H 050C- T-A
C16	4030006560	Ceramic	C1608 SL 1H 050C- T-A
C17	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
C18	4030006610	Ceramic	C1608 SL 1H 100D- T-A
C19	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C20	4030007080	Ceramic	C1608 CH 1H 390J- T-A
C21	4610001260	Trimmer	ECRJA020E12W
C22	4030007030	Ceramic	C1608 CH 1H 150J- T-A
C25	4030006850	Ceramic	C1608 JB 1H 471K- T-A
C27	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
C28	4030006530	Ceramic	C1608 SL 1H 020C- T-A
C29	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C30	4030006560	Ceramic	C1608 SL 1H 050C- T-A
C31	4030004760	Ceramic	C2012 JF 1E 104Z- T-A
C32	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C33	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C34	4030006750	Ceramic	C1608 SL 1H 101J- T-A
C35	4030006750	Ceramic	C1608 SL 1H 101J- T-A
C36	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C37	4030006750	Ceramic	C1608 SL 1H 101J- T-A
C38	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C39	4030006750	Ceramic	C1608 SL 1H 101J- T-A
C40	4030006580	Ceramic	C1608 SL 1H 070D- T-A
EP1	0910024411	P.C. Board	B 2346A (PLL)

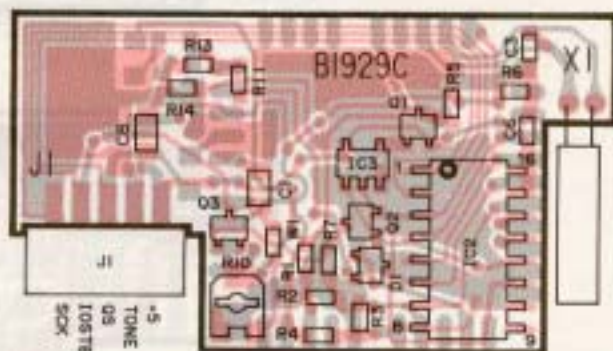
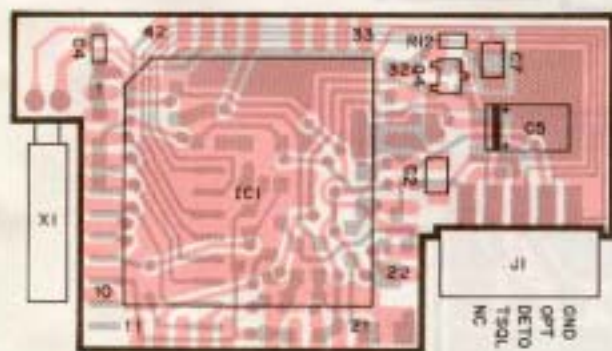
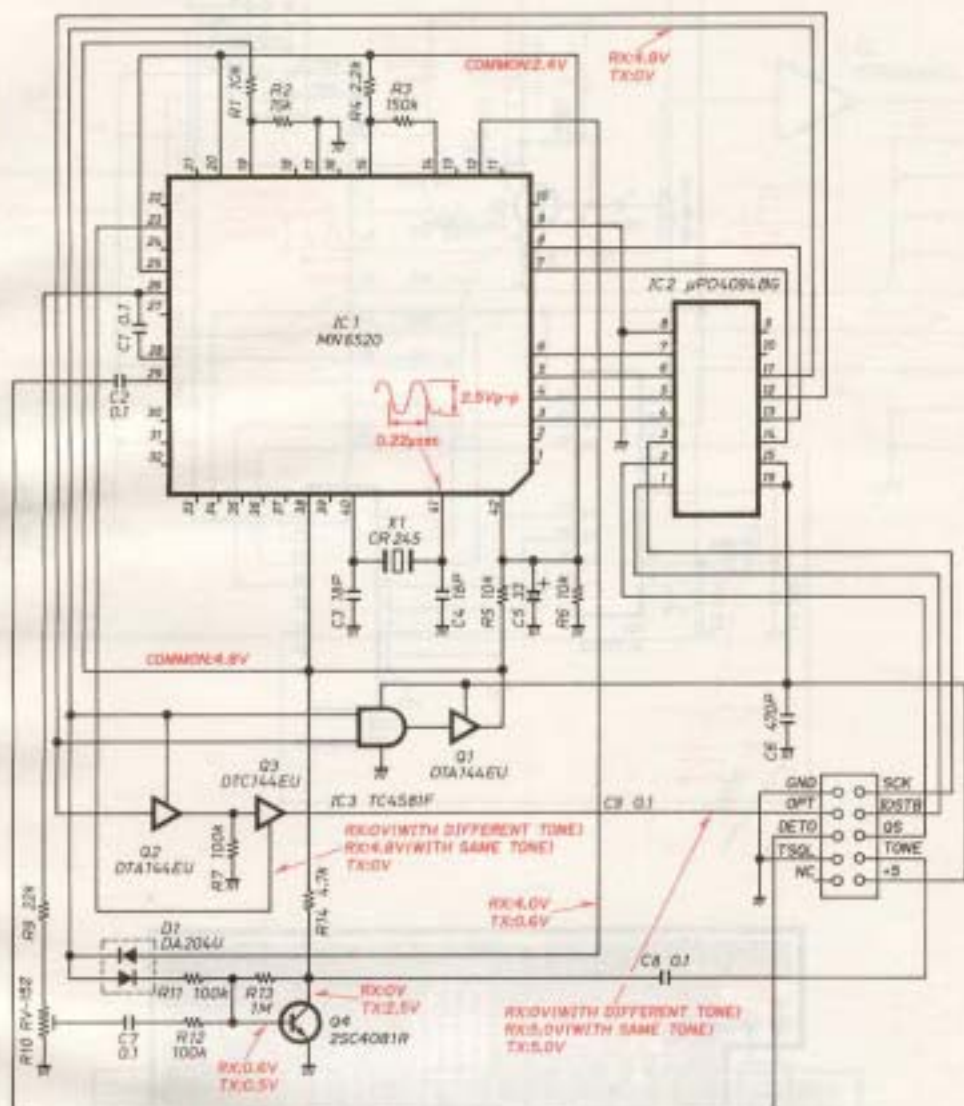
## [PLL UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1120001550	IC	M54959FP
IC2	1130004200	IC	TC4586F (TE85R)
Q1	1560000270	FET	2SK302-Y (TE85R)
Q2	1530002560	Transistor	2SC4403-3-TR
Q3	1530002560	Transistor	2SC4403-3-TR
Q4	1530002560	Transistor	2SC4403-3-TR
Q5	1590000970	Transistor	FMA2 T148
Q7	1560000540	FET	2SK880-Y (TE85R)
Q8	1590000430	Transistor	DTC144EU T107
Q9	1590000440	Transistor	DTA143ZU T107
D1	1790000460	Varicap	MA334B(TX)
D2	1790000530	Varicap	MA333(TW)
D3	1790000520	Diode	MA77(TW)
D4	1790000640	Varicap	MA363B(TX)
X1	6050005790	Crystal	CR-257
L1	6200000240	Coil	LQH 3N R68M
L2	6130002000	Coil	LB-204
L3	6200000750	Coil	LQH 3N 4R7M
L4	6200000750	Coil	LQH 3N 4R7M

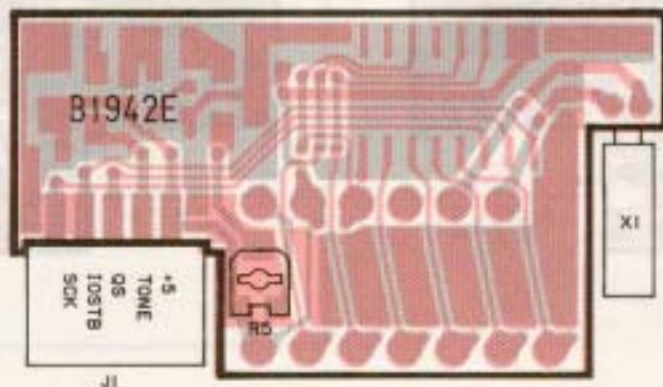
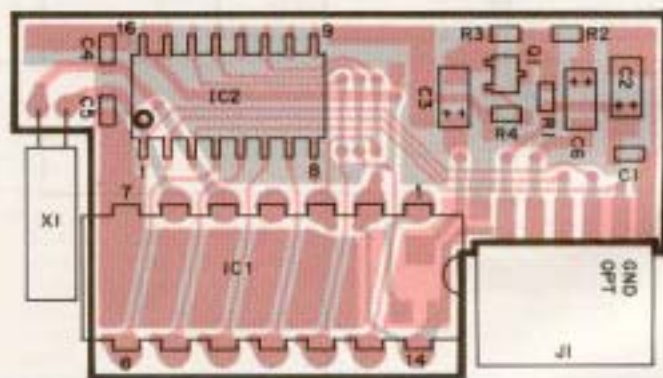
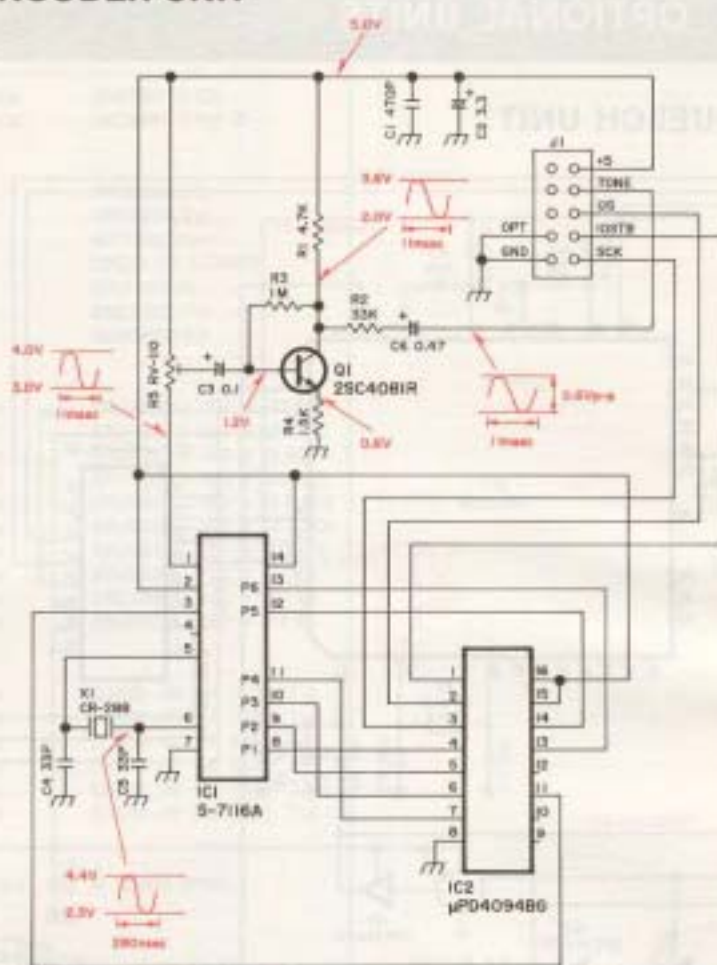
## [PRT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1520000200	Transistor	2SB796-T2 DK
Q2	1530002280	Transistor	2SC4081 T107 S
D1	1790000680	Diode	SB20-03P-TD
D2	1790000670	Diode	SB07-03C-TA
D5	1790000590	Diode	MA110(TW)
D6	1730002180	Zener	02C25.1-Z (TE85R)
D7	1790000590	Diode	MA110(TW)
D8	1790000670	Diode	SB07-03C-TA
D9	1790000680	Diode	SB20-03P-TD
R1	7030003250	Resistor	ERJ3GEYJ 270 V (27 Ω)
R2	7030003380	Resistor	ERJ3GEYJ 331 V (330 Ω)
R3	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R4	7030003600	Resistor	ERJ3GEYJ 223 V (22 kΩ)
R5	7030003470	Resistor	ERJ3GEYJ 182 V (1.8 kΩ)
R6	7030003520	Resistor	ERJ3GEYJ 472 V (4.7 kΩ)
R7	7030003320	Resistor	ERJ3GEYJ 101 V (100 Ω)
R8	7030003440	Resistor	ERJ3GEYJ 102 V (1 kΩ)
R9	7030003250	Resistor	ERJ3GEYJ 270 V (27 Ω)
R10	7030003230	Resistor	ERJ3GEYJ 180 V (18 Ω)
C1	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C2	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C3	4030006710	Ceramic	C1608 SL 1H 470J- T-A
C4	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C5	4030006860	Ceramic	C1608 JB 1H 102K- T-A
C6	4030006860	Ceramic	C1608 JB 1H 102K- T-A
EP1	0910023862	P.C. Board	B 2278B (PRT)

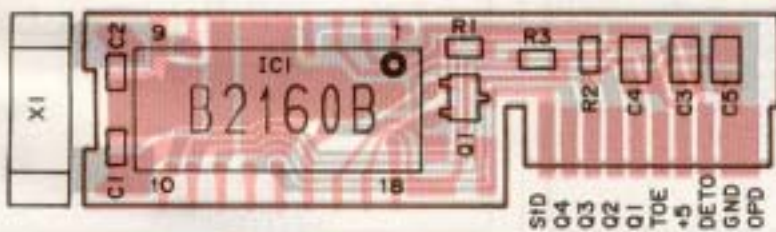
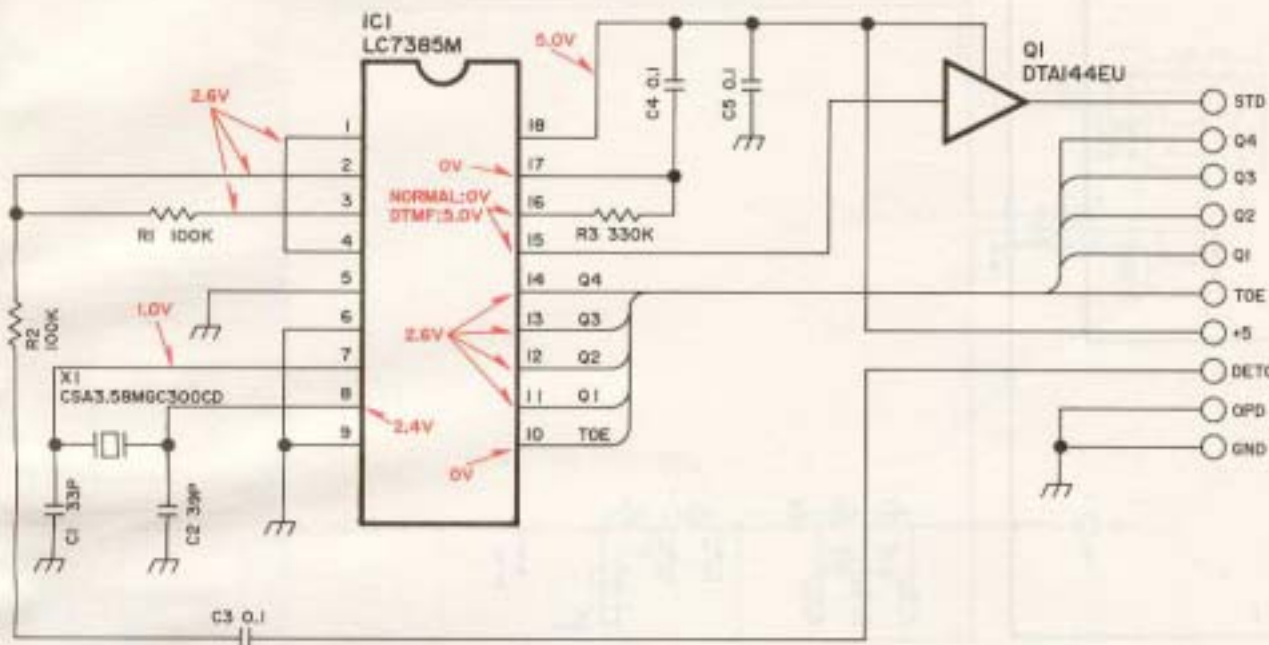
## 9-1 UT-50 TONE SQUELCH UNIT



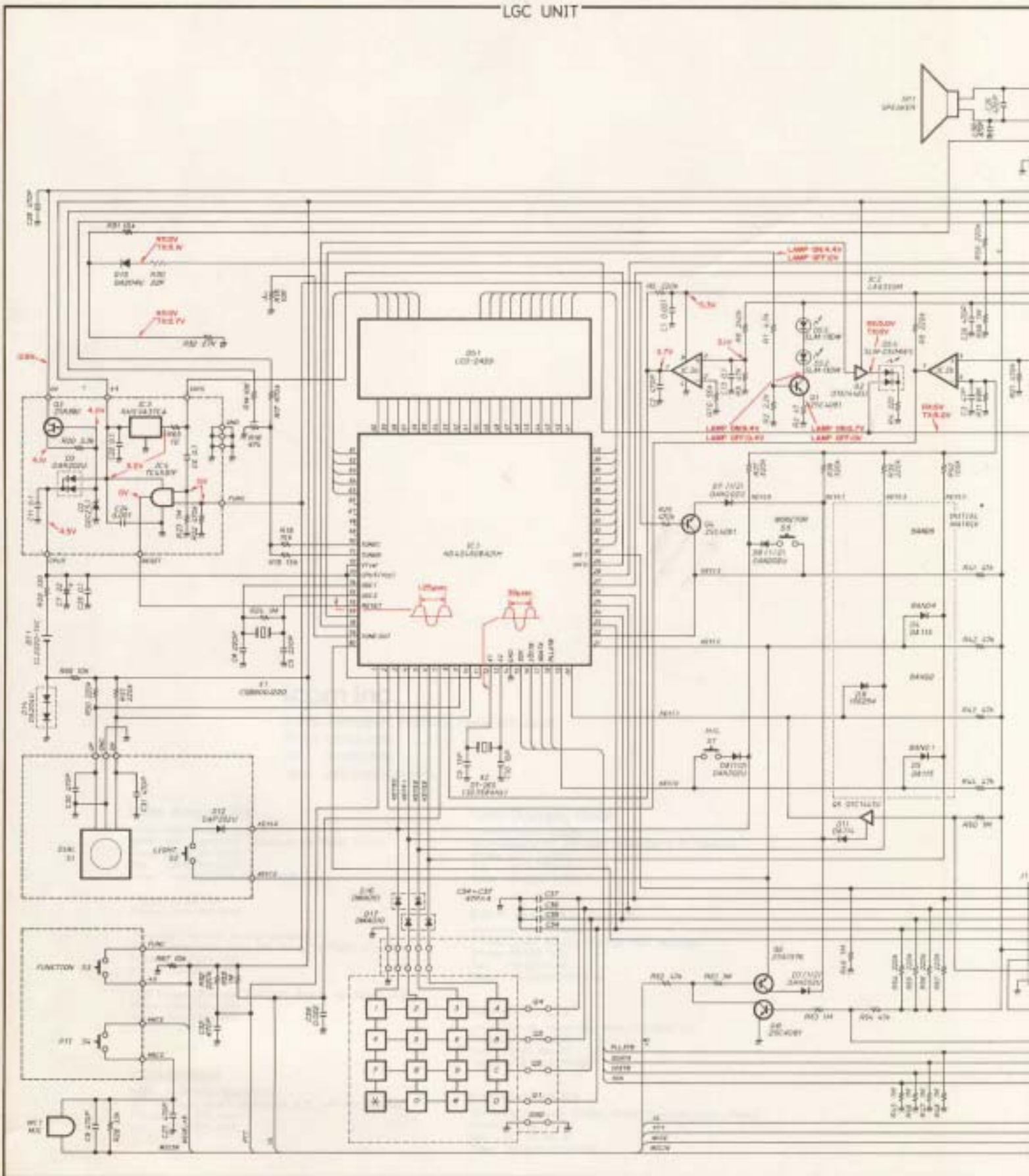
# 9-2 UT-51 TONE ENCODER UNIT



# 9-3 UT-49 DTMF DECODER UNIT



LGC UNIT



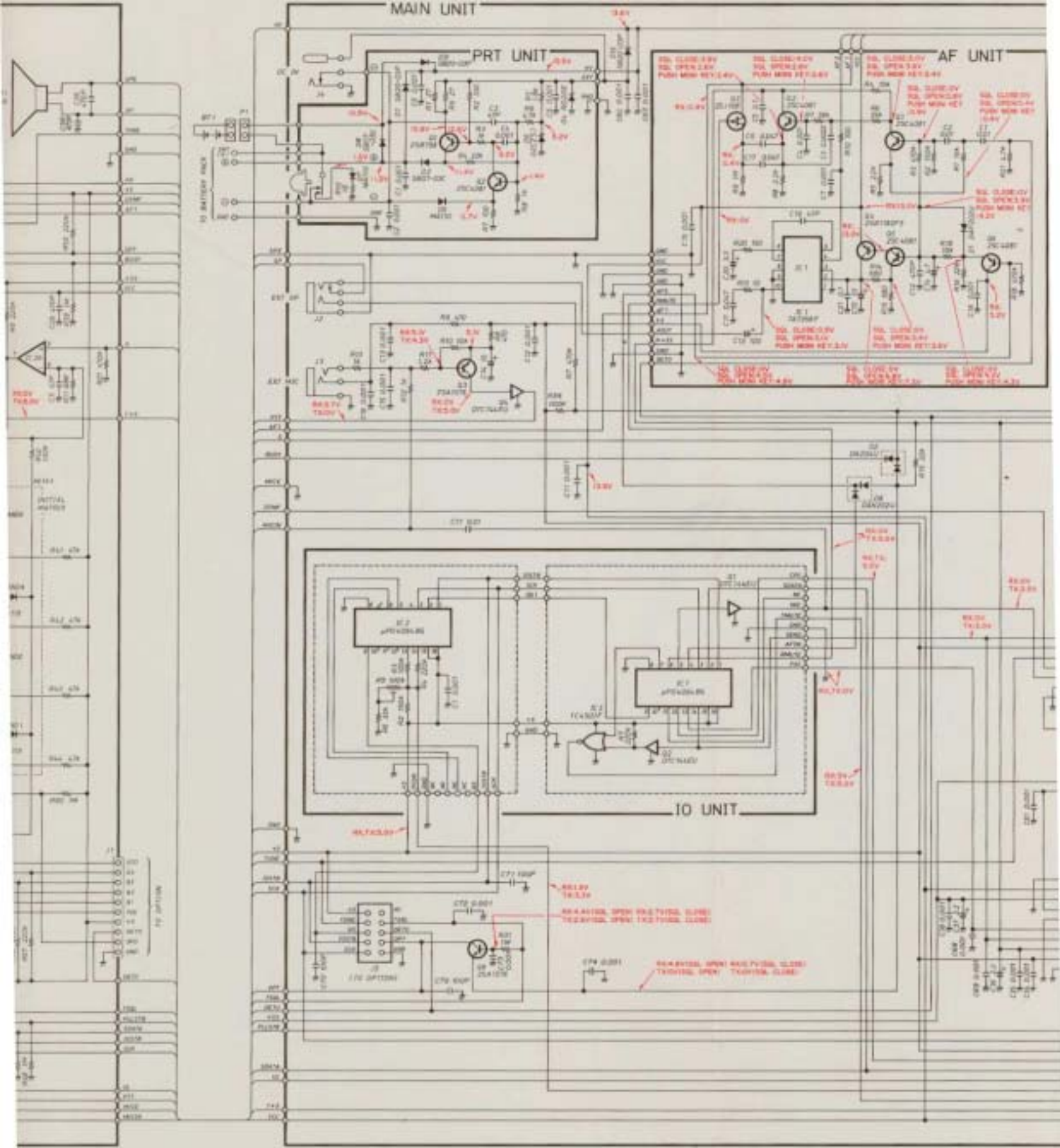


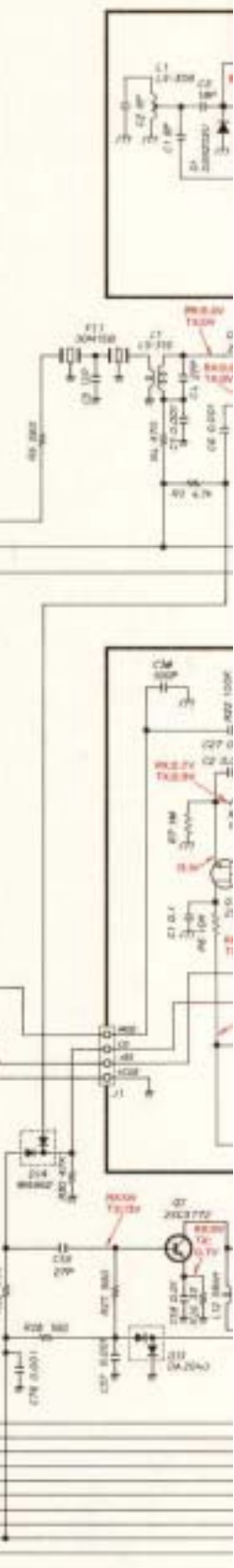
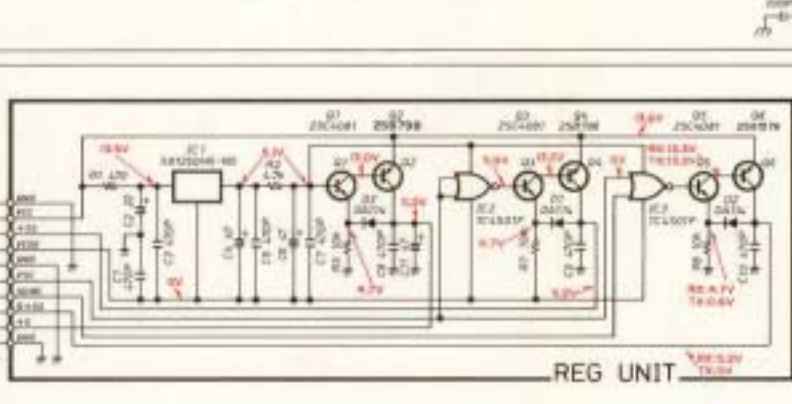
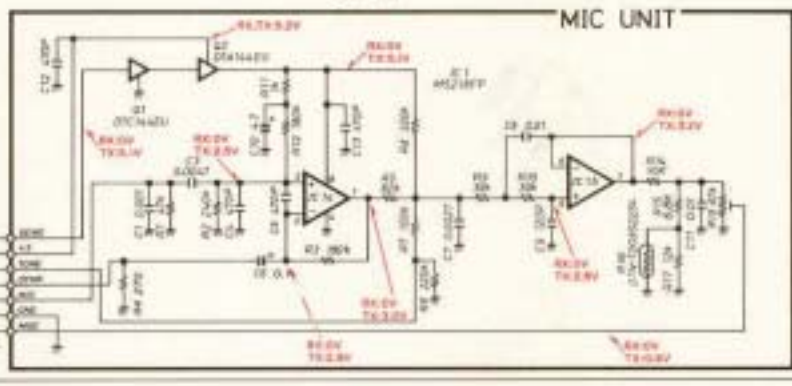
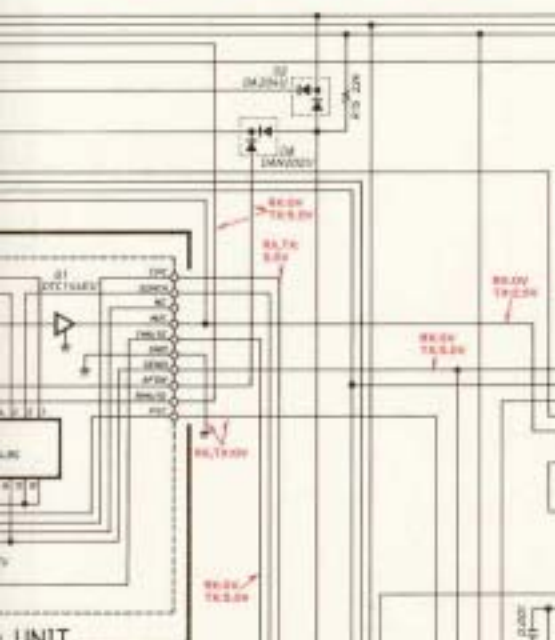
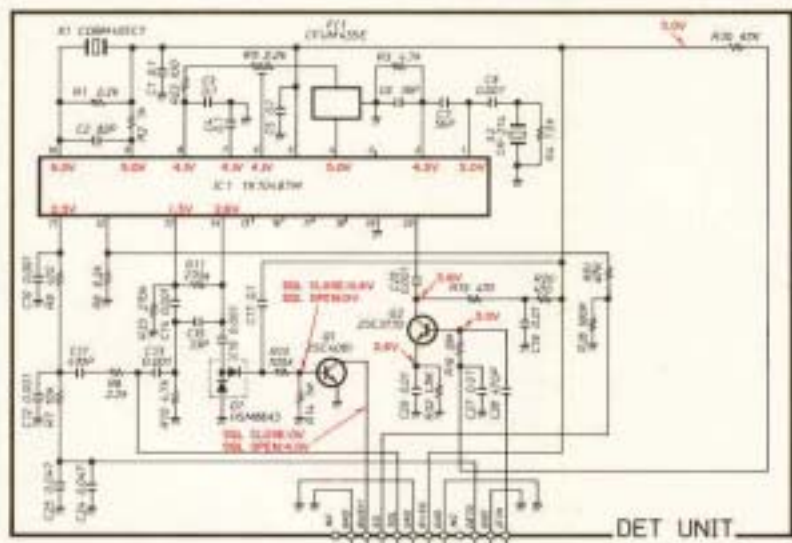
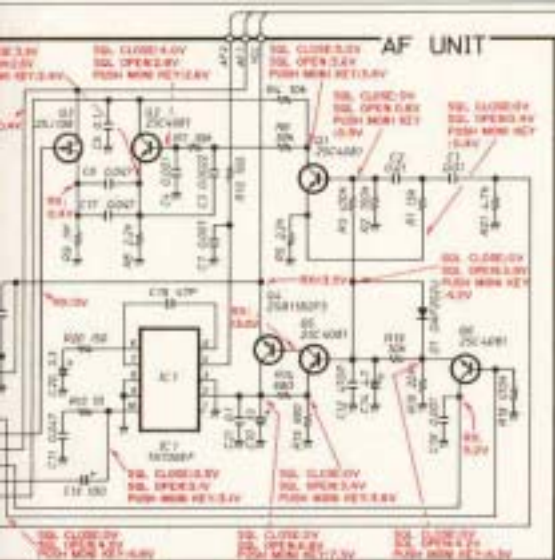
# MAIN UNIT

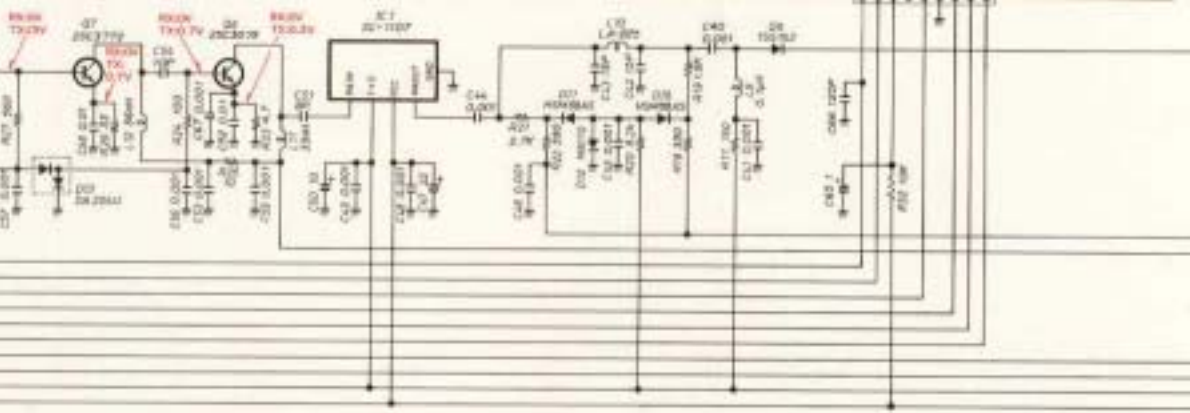
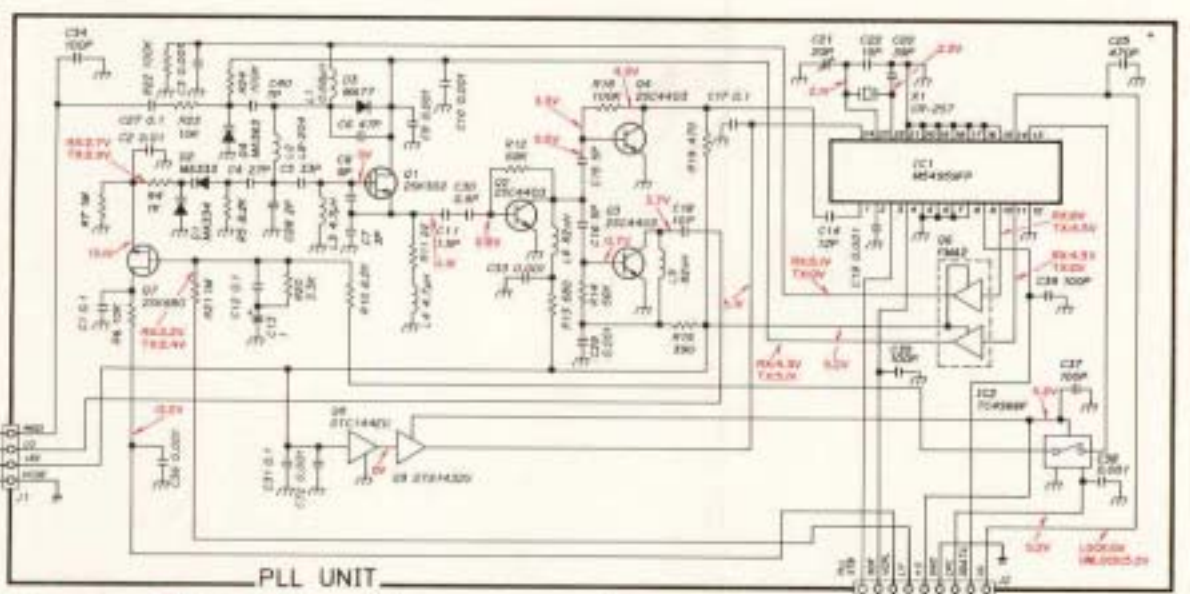
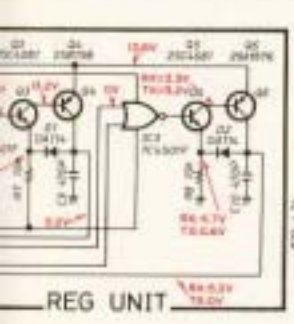
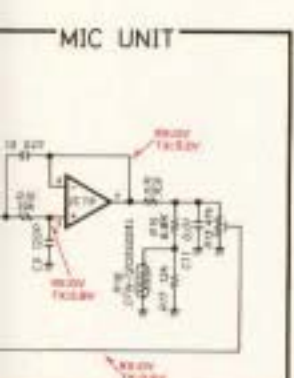
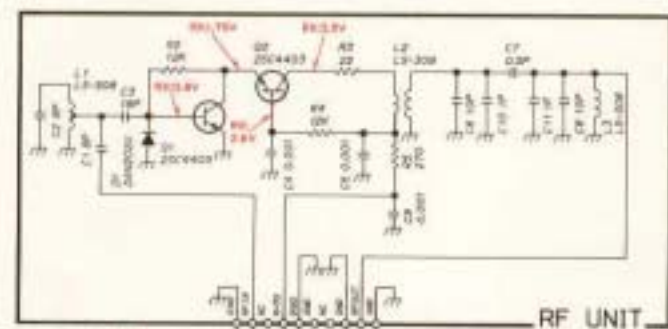
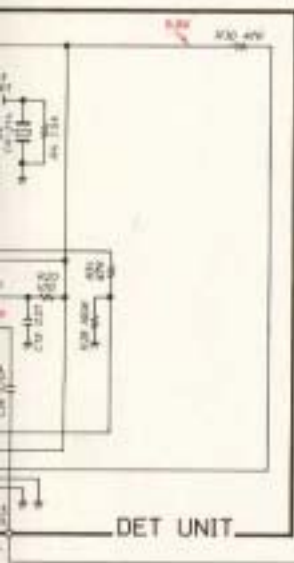
## PRT UNIT

## AF UNIT

## IO UNIT









## Icom Inc.

6-9-16, Kamihigashi, Hirano-ku, Osaka 547, Japan

Phone: 06 793 5301

Fax : 06 793 0013

Telex : 05277822 ICOMTR J

### Icom America Inc.

(Corporate Headquarters)

2350 116th Avenue N.E., Bellevue, WA 98004, U.S.A.

Phone: (206) 454-8155

Fax : (206) 454-1509

Telex : 152210 ICOM AMER BYUE

(Customer Service)

Phone: (206) 454-7619

(Regional Customer Service Centers)

3150 Premier Drive, Suite 126, Irving, TX 75063, U.S.A.

Phone: (214) 550-7625

Fax : (214) 550-7433

1777 Phoenix Parkway, Suite 201, Atlanta, GA 30549, U.S.A.

Phone: (404) 991-6166

Fax : (404) 991-6327

### Icom Canada

A Division of Icom America Inc.

3071 #5 Road, Unit B, Richmond, B.C., V6X 2T4, Canada

Phone: (604) 273-7400

Fax : (604) 273-1900

### Icom (Europe) GmbH

Communication Equipment

Himmelgeister Str. 100, 4000 Düsseldorf 1, W. Germany

Phone: 0211 346047

Fax : 0211 330638

Telex : 8588082 ICOM D

### Icom (Australia) Pty. Ltd.

Incorporated in Victoria

7 Duke Street, Windsor, Victoria, 3181, Australia

Phone: 03 529 7582

Fax : 03 529 8485

Telex : AA 35521 ICOM AS

### Icom (UK) Ltd.

Unit B, Sea St., Heme Bay, Kent, CT6 6LD, U.K.

Phone: 0227 363859

Fax : 0227 360155

Telex : 965179 ICOM G

### Icom France S.a

120 Route de Revel, BP4063, 31029 Toulouse Cedex, France

Phone: 61.20.31.49

Fax : 61.34.05.91

Telex : 521515 ICOM FRA

Count on us!