



# SERVICE MANUAL

VHF TRANSCEIVER

# IC-H8

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## INTRODUCTION

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This service manual describes the latest service information for the **IC-H8** VHF TRANSCEIVER at the time of going to press.

VERSION NUMBER	VERSION	FREQUENCY COVERAGE
# 01	U.S.A.	150~162 MHz
# 02	U.S.A.	162~174 MHz
# 03	General	150~162 MHz
# 04	General	162~174 MHz

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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 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.

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## ORDERING PARTS

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Be sure to include the following 4 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>

1120001590	IC	M5236ML-73A	IC-H8 LOGIC UNIT	5 pieces
8810000740	Screw	OH A M2X 15ZK	IC-H8 Rear panel	10 pieces

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

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## REPAIR NOTE

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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.



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To program the operating frequency, tone frequency, etc., see the separately available EX-704 PROGRAMMING MANUAL (A-5069S-1EX).

# SECTION 1 SPECIFICATIONS

## GENERAL

- Frequency range : 150~174 MHz
- Type of emission : 16K0F3E
- Number of channels : Up to 6 channels
- Frequency stability :  $\pm 0.0005\%$
- Antenna impedance :  $50\ \Omega$  unbalanced
- Power supply requirement : Icom battery packs CM-79 or CM-80  
(Negative ground)
- Usable temperature range :  $-30\ ^\circ\text{C}\sim+60\ ^\circ\text{C}$  ( $-22\ ^\circ\text{F}\sim+140\ ^\circ\text{F}$ )
- Dimensions (with CM-80) : 58 mm(W) X 149 mm(H) X 29 mm(D)  
2.3" (W) X 5.9" (H) X 1.1" (D)
- Weight (with CM-80) : 440 g (15.5 oz)

## TRANSMITTER

- RF output power : 1.5 W
- Modulation system : Variable reactance frequency modulation
- Current drain (approx.) : 0.9 A
- Maximum frequency separation : 12 MHz
- Microphone impedance :  $1.2\ \text{K}\Omega$
- Maximum deviation :  $\pm 5\ \text{kHz}$
- Spurious emissions :  $-60\ \text{dB}$
- Noise and hum rejection : 40 dB
- Audio response :  $+1\ \text{dB}\sim-3\ \text{dB}$  of  $+6\ \text{dB/octave}$  from  
300 Hz~3000 Hz
- Limiting of modulator : 70%~ 100%

## RECEIVER

- Receive system : Double-conversion superheterodyne
- Sensitivity :  $0.28\ \mu\text{V}$  for 12 dB SINAD
- Squelch threshold sensitivity :  $0.28\ \mu\text{V}$
- Intermediate frequencies : 1st 21.8 MHz  
2nd 455 kHz
- Maximum frequency separation : 12 MHz
- Current drain (approx.) : Audio max. 250 mA  
Standby 70 mA
- Audio output power : 300 mW
- Audio output impedance :  $8\ \Omega$
- Adjacent selectivity : 65 dB
- Spurious frequency rejection : 60 dB
- Image rejection : 60 dB
- Intermodulation : 60 dB
- Noise and hum : 40 dB
- Audio response :  $+1\ \text{dB}\sim-3\ \text{dB}$  of  $-6\ \text{dB/octave}$  from  
300 Hz~3000 Hz

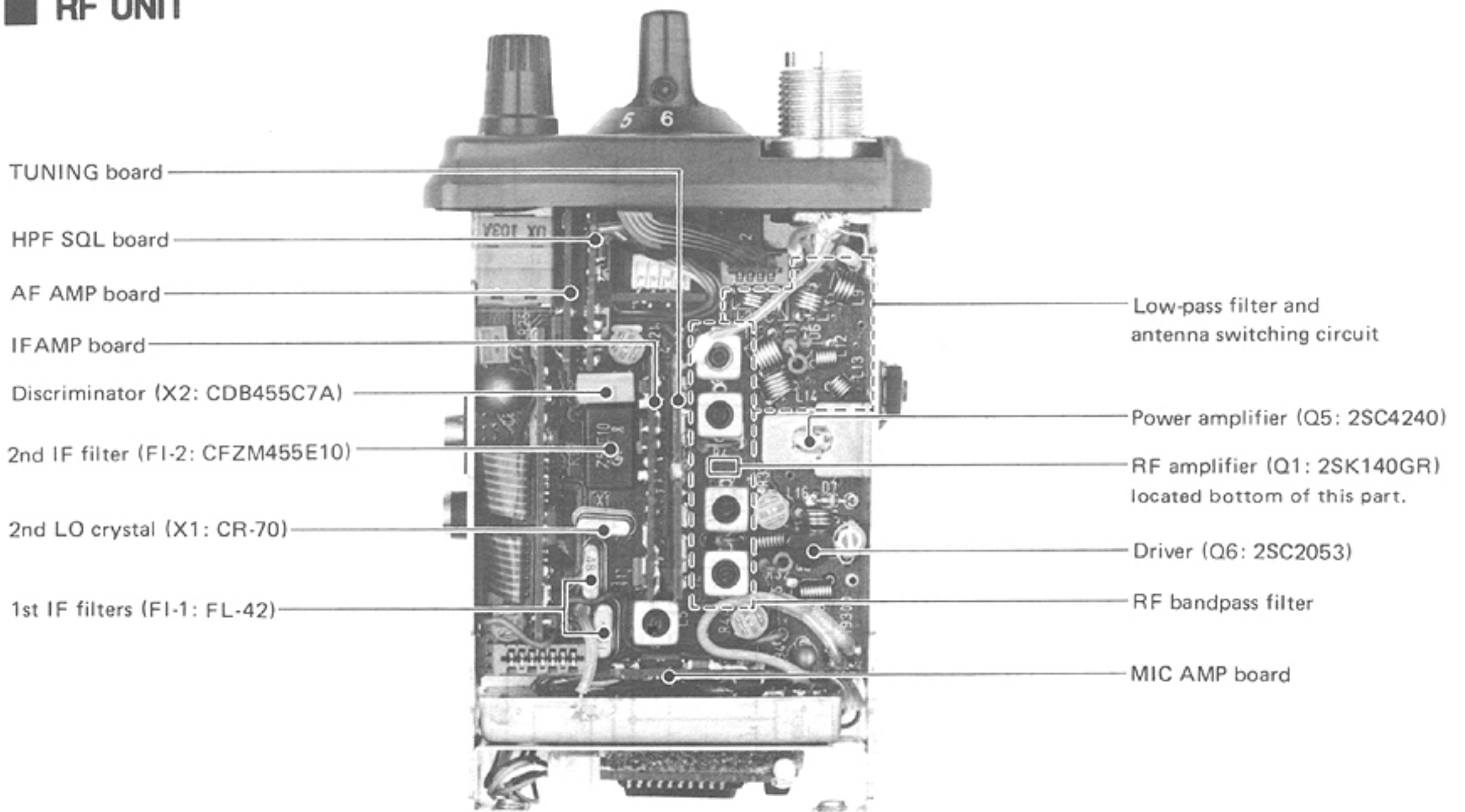
All specifications are per EIA RS316B (transmitter) and RS204C (receiver) procedures.

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

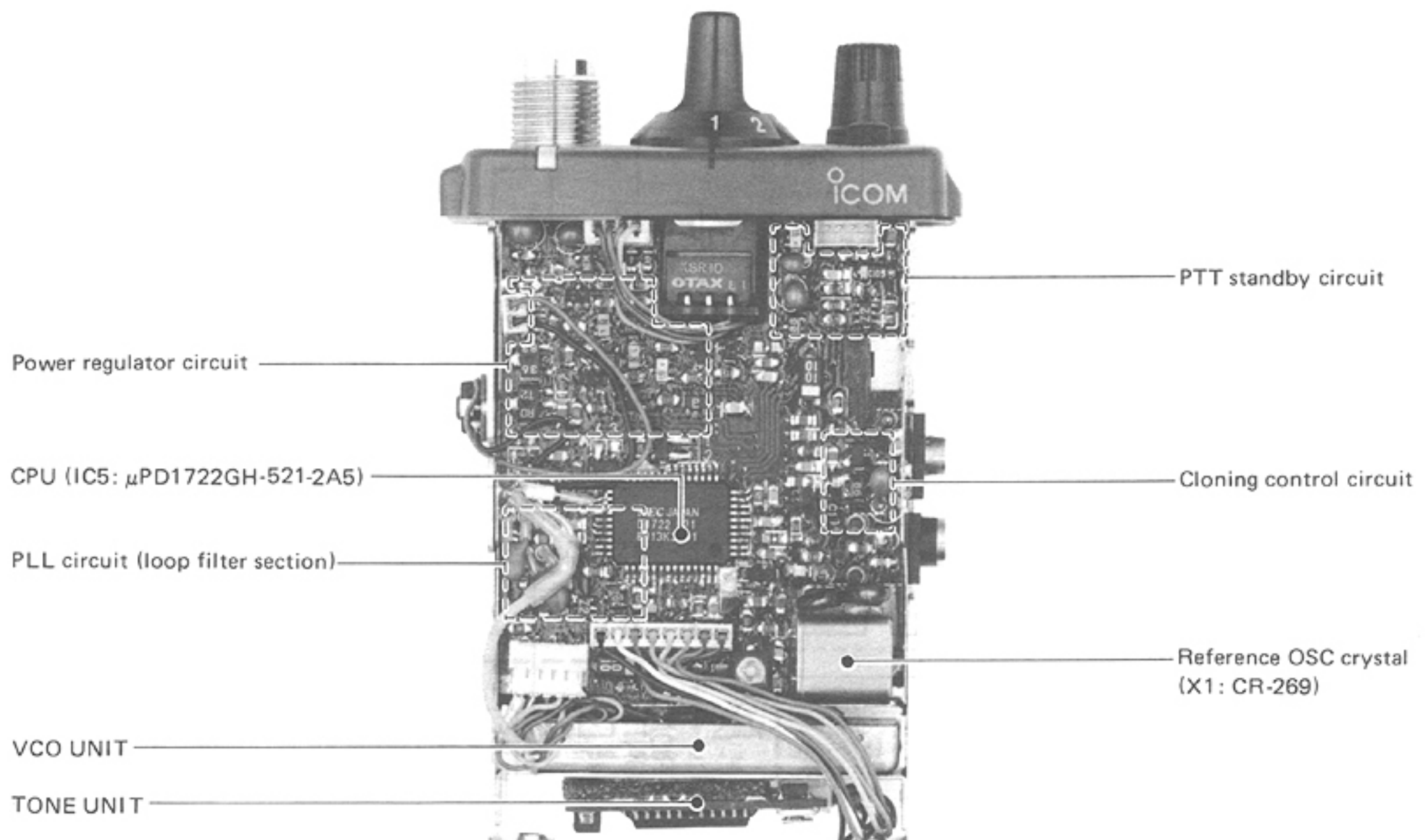


## SECTION 2 INSIDE VIEWS

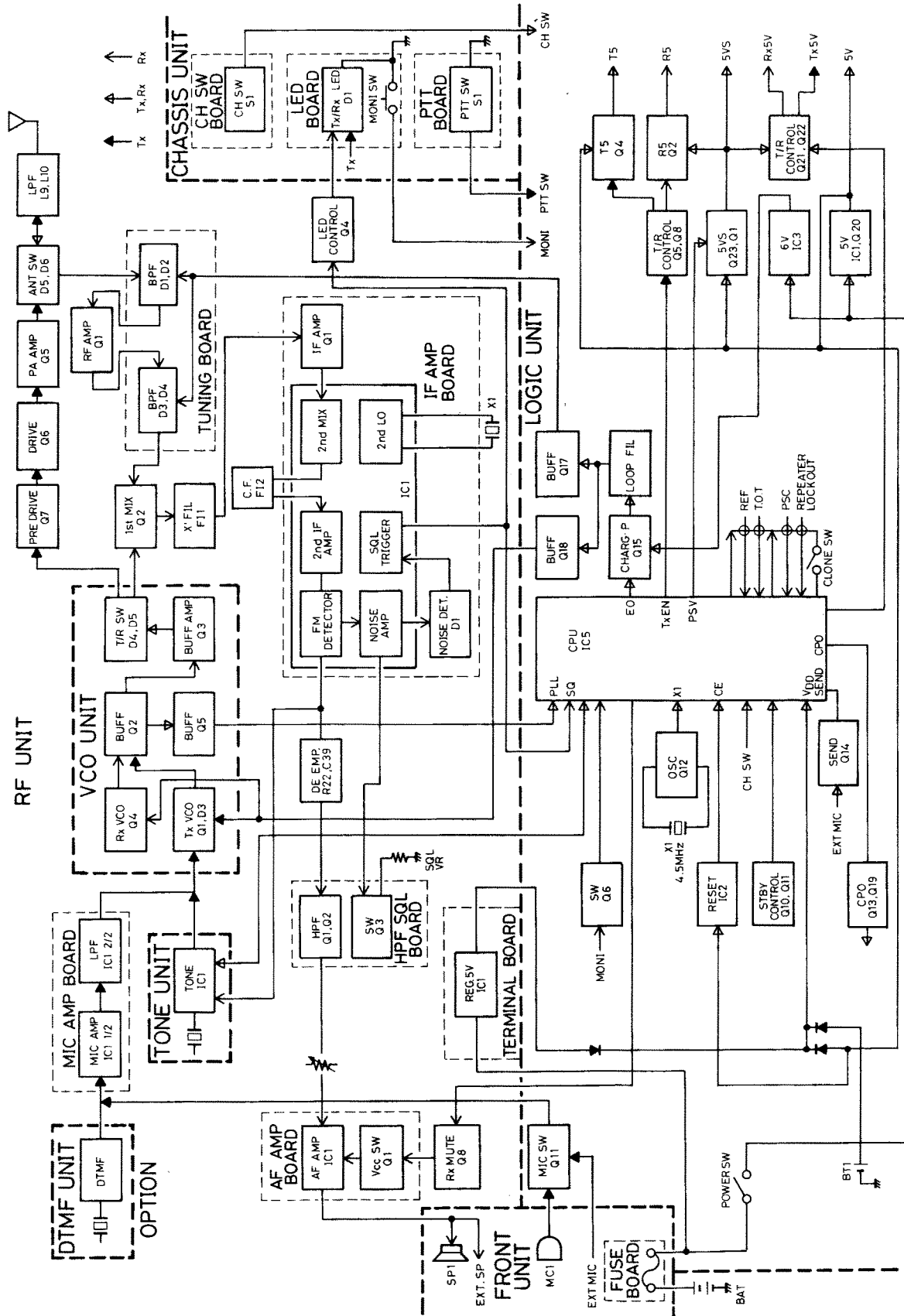
### RF UNIT



### LOGIC UNIT



# SECTION 3 BLOCK DIAGRAM



## SECTION 4 CIRCUIT DESCRIPTION

### 4-1 RECEIVER CIRCUITS

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

An antenna switching circuit functions as a low-pass filter while receiving and as a resonator circuit while transmitting.

Received signals enter the antenna connector and pass through a two-stage Chebyshev low-pass filter (L9, L10, C53~C57). The signals are applied to the antenna switching circuit (D5, D6, D7, L8, C50~C52), and then to the RF circuit. This antenna switching circuit employs a  $\lambda/4$ -type diode switching system.

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

The RF circuit amplifies signals within the range of frequency coverage, and filters out out-of-band signals.

Signals from the antenna switching circuit are passed through a two-stage bandpass filter (L1, L2, D1, D2), amplified at Q1 and then applied to another bandpass filter (L3, L4, D3, D4), to suppress out-of-band signals.

D1~D4 are varactor diodes that track the bandpass filters and are controlled by the lock voltage of the PLL circuit. These diodes turn the center frequency of the bandpass filters.

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

A 1st mixer circuit converts the received signal to a fixed frequency of 1st IF signals using a PLL output frequency. By changing a PLL frequency, only the desired frequency can be passed through a crystal filter located at the next stage of the 1st mixer.

Signals from the RF circuit are mixed with the 1st LO signal from the VCO circuit (PLL output) to produce a 21.8 MHz 1st IF signal.

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

The 1st IF circuit amplifies a signal which is converted in a 1st mixer circuit.

After passing through the matching transformers (L5), the 1st IF signal is applied to the crystal filter (F11) to suppress out-of-band signals. The filtered signal is amplified at Q1 in the IF AMP board, and is then applied to the 2nd IF circuit.

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

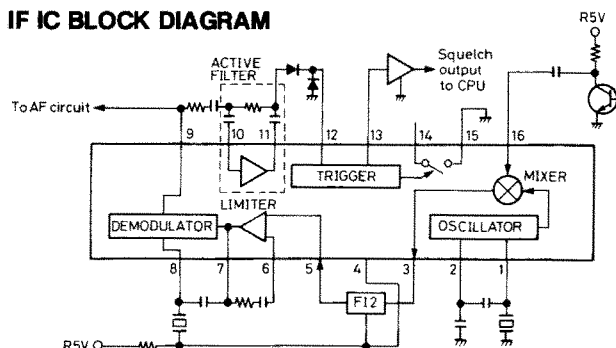
The 2nd mixer circuit converts a 1st IF signal to a 2nd IF signal. A double superheterodyne system (2 times conversion of a receive signal) improves the image rejection ratio and obtains stable receiver gain.

The amplified 1st IF signal enters to IC1 pin 16. IC1 contains a mixer, local oscillator, quadrature detector, op-amp, and a trigger circuit.

The entered signal is to be converted to a 2nd IF signal at the mixer section to obtain the 455 kHz 2nd IF frequency. The 2nd IF signal exits IC1 from pin 3 and passes through the ceramic filter (F12) where unwanted heterodyned signals are removed.

The signal re-enters IC1 pin 5 and is then amplified at the op-amp section that functions as a limiter amplifier. The amplified signal is detected at the quadrature detector section (pins 7, 8 and an external ceramic resonator X2) and is output from pin 9 as AF signals.

##### • IF IC BLOCK DIAGRAM



#### 4-1-6 AF CIRCUIT (HPF SQL BOARD AND AF AMP BOARD)

An AF circuit de-emphasizes a demodulated signal with  $-6\text{dB/oct}$  and power amplifies the signal to drive a speaker. The AF circuit includes a mute circuit to mute the signal with a noise squelch and a tone squelch.

The demodulated signal output from IC1 pin 9 in the IF AMP board is de-emphasized at R22 and C39 and is applied to active filters (high-pass filter), Q1 and Q2 in the HPF SQL board. The signal passes through the volume control (R25) and is applied to the AF AMP board to obtain 300 mW of speaker driving power.

Q8 in the RF unit and Q1 in the AF AMP board function as an AF mute switch when the noise squelch or tone squelch is closed.

### **4-1-7 SQUELCH CIRCUIT (HPF SQL BOARD AND IF AMP BOARD)**

A squelch circuit cuts out AF signals when no RF signal is received. By detecting noise components in the AF signal, the squelch circuit switches the AF power amplifier.

IC1 pin 9 in the IF AMP board outputs demodulated signals to the AF circuit. A portion of the demodulated signals re-enters IC1 pin 10 via R10, C12 and C13. IC1 pins 10 and 11 function as an active filter with CR connection (C5, C6 and R5).

Noise components above 20 kHz are amplified at the active filter and are then applied to a noise detector, D1. The detected signal (DC voltage) becomes a trigger in the trigger circuit section in IC1. The triggered signal is inverted at Q2. Q2 outputs "LOW" when the squelch opens.

### **4-1-8 TONE SQUELCH CIRCUIT (TONE UNIT)**

A tone squelch circuit is decoded whether the CTCSS tone is superimposed on the AF signal or not. Also the circuit encodes the tone while transmitting for the subaudible tone encoder.

A portion of AF signal output from the IF AMP board is applied to the TONE unit via the "Rx AF" line and enters tone encoder/decoder IC1. IC1 detects the signal superimposing a tone.

When the same tone as the programmed one is received, IC1 pin 23 outputs "HIG" to inform the decoding signal to the CPU (IC5 in the LOGIC unit). The CPU controls the AF mute switch using the "MUTE" signal.

## **4-2 TRANSMITTER CIRCUITS**

### **4-2-1 MICROPHONE AMPLIFIER (MIC AMP BOARD)**

The microphone amplifier circuit amplifies audio signals with 6 dB/oct pre-emphasis from the microphone to a level needed at the modulation circuit.

AF signals from the microphone enter the MIC AMP board via the LOGIC and RF units. IC1 on the MIC AMP board is a dual operational amplifier that functions as a low signal amplifier and limiter amplifier. IC1 also pre-emphasizes the signals using a C5 and R3 connection. Output signals from IC1 pin 1 pass through the splatter filter (R6, R9, R10 and C8~10) to filter out the audio components above 3 kHz. The signals amplified at IC1 pins 5~7 exit the MIC AMP board.

The output signals are level-adjusted at R45 on the MAIN unit and are then applied to the VCO unit to make a frequency modulation.

### **4-2-2 MODULATION CIRCUIT (VCO UNIT)**

The modulation circuit modulates the VCO oscillating signal (RF signal) using the microphone audio signal.

The entered signals at the VCO unit change the reactance of a diode, D3 to modulate the oscillated signal at VCO, Q1. The oscillated signal buffer-amplified at Q2 and Q3 exits from the VCO unit via the LO switching diode (D5).

### **4-2-3 DRIVE AND POWER AMPLIFIER CIRCUITS (RF UNIT)**

The drive and power amplifier circuits amplify the VCO oscillating signal to an output power level.

The output signal from the VCO unit is applied to the transmitter amplifier circuits in the RF unit. The transmitter amplifier circuits consist of a predriver Q7, driver Q6 and power amplifier Q5. The signal is amplified at this state up to 4 W maximum and is then applied to the antenna connector via the low-pass filters.

### **4-2-4 ANTENNA SWITCHING CIRCUIT (RF UNIT)**

The antenna switching circuit applies the received signal to the receiver circuits and the transmitter signal to the antenna connector.

The circuit employs a  $\lambda/4$ -type diode switching system consisting of 2 diodes and a low-pass filter. T5V switches the low-pass filter to a resonance or matching circuit using diodes.

When T5V are applied to D6 and D5, the diodes turn ON and L8 is seemingly grounded to an RF signal. The low-pass filter (L8, L7, C50 and C51) becomes a resonance circuit and has high impedance. The output signal from the power amplifier (Q5), therefore, is never applied to the receiver circuits.

## 4-3 PLL CIRCUITS

### 4-3-1 GENERAL DESCRIPTION

PLL circuits stably oscillate the transmit frequency and receive the local frequency comparing phase of the divided VCO frequency and reference frequency. The PLL output frequency is therefore controlled by the divided ratio (N-data) of the programmable divider.

### 4-3-2 VCO CIRCUITS (VCO UNIT)

The VCO circuits oscillate the PLL output frequency controlling varactor diodes.

The VCO unit has 2 VCO circuits, transmitter VCO (Q4) and receiver VCO (Q1). An oscillating circuit is selected with Rx 5V and Tx 5V. An oscillating frequency is controlled with varactor diodes, D1/D2 (when Q1 activates) or D6/D7 (when Q4 activates).

An oscillated signal passes through the switching diode (D4). The signal is buffer-amplified at Q2 and is then applied to the receiver or transmitter circuit via Q3 and fed back to the PLL circuit in the LOGIC unit via Q5.

### 4-3-3 PHASE DETECTOR CIRCUITS (LOGIC UNIT)

The phase detector circuit detects the off phase components of the VCO frequency using the stable reference frequency.

The CPU IC5 contains logic and PLL sections. The oscillated signal comes from the VCO unit, enters IC5 from pin 5 and is divided at a prescaler part and divided again at a programmed divider part. The divided signal is applied to a phase detector part to compare with the reference frequency. The detected signal exits from IC5 pins 1 and 3.

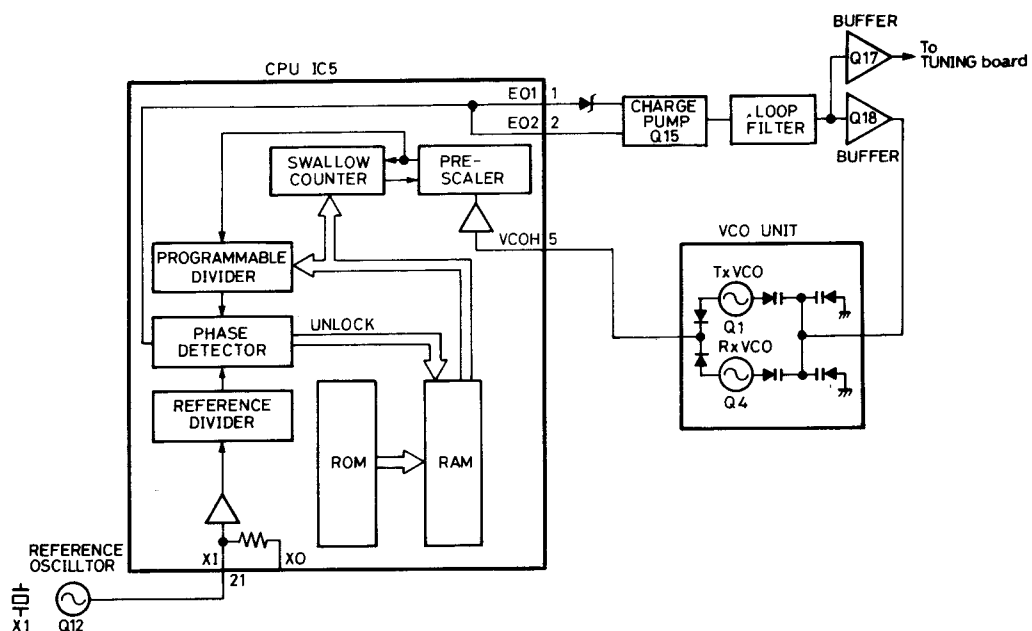
The reference frequency is obtained when the generated signal at an oscillator, Q1 with X1, is divided at a reference divider part inside IC5.

### 4-3-4 CHARGE PUMP AND LOOP FILTER (LOGIC UNIT)

A loop filter and a charge pump convert the phase-detected signal (pulse signal) to DC voltage to control the VCO oscillating signal. The DC voltage is also used for the receiver tune circuit.

The phase-detected signal output from the CPU is applied to the charge pump (Q15) and the lag-lead-type loop filter (R22, R23, R69, C20, C39) to convert the pulse signal to DC voltages (PLL lock voltage). This voltage determines the clarity characteristics of the PLL output signal.

The lock voltage is buffer-amplified at Q18 and is then applied to the VCO circuit. Another buffer amplifier, Q17, amplifies the lock voltage to use in the receive RF circuit.



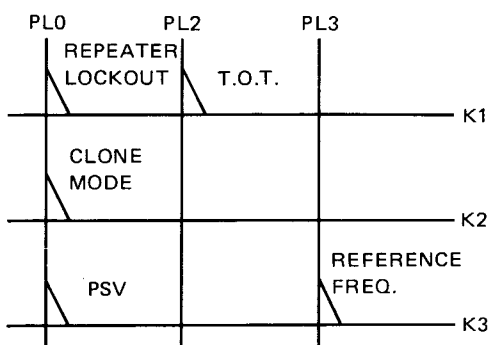
## 4-4 LOGIC CIRCUITS

### 4-4-1 CPU PORT ALLOCATIONS

The transceiver has only a few switches yet has many functions contained in a 4-bit CMOS CPU. All functions can be pre-programmed via cloning from another transceiver or a data programmer EX-704.

PIN NUMBER	PORT NAME	I/O	DESCRIPTION	PIN NUMBER	PORT NAME	I/O	DESCRIPTION
P01	E01	OUT	Output PLL phase-detected signal.	P17	PSV	OUT	Outputs the "circuit off" signal when the power saver function is activated.
P02	E02	OUT	The same signals are output at P01 and P02.	P18	MUTE	OUT	Outputs the mute signal (LOW) when: – Squelch closes. – Tone squelch closes. – Transmitting. – PLL is unlocked.
P03	VDD1	IN	Power voltage input port that requires 5 V for operation and 2.5 V for CPU standby.	P19	STB	OUT	Outputs the strobe signal for tone encoder/decoder.
P04	VCOL	IN	Not used.	P20	XO	OUT	Oscillator output port connected at inside parallel with the XI port.
P05	VCOH	IN	PLL prescaler input port that accepts 10~200 MHz (0.3 V <sub>p-p</sub> ).	P21	XI	IN	Oscillator input port used for PLL reference frequency and the CPU clock.
P06	CE	IN	Chip enable port for the CPU. When the port is "HIGH" the CPU is in normal operation; when "LOW" the CPU is in standby.	P22	GND	----	Ground
P07	VDD2	IN	Power voltage input port. Same as P03.	P23	TxEN	OUT	Outputs "HIGH" when transmitting.
P08	SQ	IN	Squelch input port. When the port is "LOW" the CPU detects that the squelch is open.	P24, P25, P27	PL2, PL3, PL0	OUT	Output a signal to the key matrix when power is ON.
P09 ~11	PC1 ~PC3	IN	Input ports for the channel selector.	P26	BEEP	OUT	Outputs beep signals.
P12	PTT	IN	PTT input port. When the port is "LOW" the CPU detects that the transceiver is transmitting.	P28 ~P31	TEST	OUT	Not used.
P13	DATA	OUT	Outputs serial data for the tone encoder/decoder.	P32 ~P42	NC	----	Not connected.
P14	SEND	IN	The same as the PTT input port. The port becomes "LOW" faster than the PTT input port. This port is also used as the cloning data input port.	P43 ~P45	K1 ~K3	IN	Input ports for the key matrix.
P15	CPO	OUT	Outputs the cloning data when the transceiver is in the clone output mode.	P46	DET	IN	Input port for the tone decoder. Receives "HIGH" when a tone is acknowledged.
P16	CK	OUT	Outputs the clock signal for the tone encoder/decoder.	P48	INT	IN	Interrupt port for CPU operation.

### 4-4-2 INITIAL MATRIX (LOGIC UNIT)



#### • REPEATER LOCKOUT

When the matrix is open the repeater lockout function is activated. This function inhibits transmitting on the receive tone programmed channel under the following conditions:

- When the channel is busy with a signal not including a correct tone. At this time, 5 beeps are emitted from the speaker.
- Transmitting is accepted when the channel is not busy, or when the channel is busy with a signal including a correct tone.

• **CLONE MODE**

While pushing the CLONING switch, power comes on, the transceiver enters the clone mode, then CPU pin 14 (SEND port) functions as the clone data input port. When the CLONING switch is pushed again, the transceiver becomes a master transceiver of clone transmit. The CPU pin 15 (CPO port) outputs clone data.

• **PSV (POWER SAVER) FUNCTION**

When the matrix is open, the power saver function activates 30 sec. after the squelch closes or a switch is released. When the function is activated the circuit in the transceiver operates with the following time ratio:  
 Circuit off : 1000 msec.  
 Standby : 250 msec.

• **T.O.T. (TIME-OUT TIMER) FUNCTION**

When the matrix is open, the time-out timer function is activated. The function inhibits continuous transmitting of more than 60 sec.

• **REFERENCE FREQUENCY**

When the matrix is open, 6.25 kHz is used for the reference frequency. When the matrix is shortened, 5.0 kHz is used for the reference frequency.

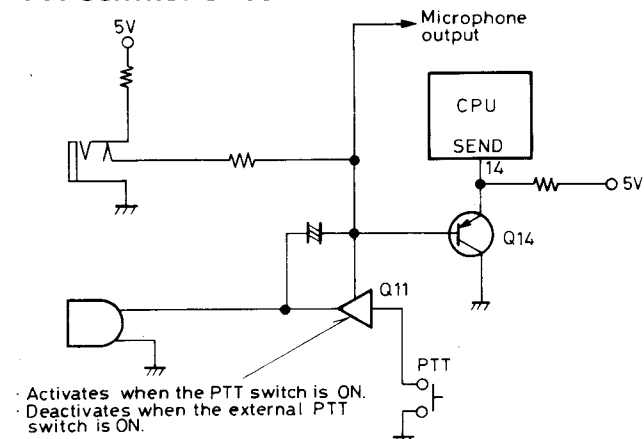
**4-5 OTHER CIRCUITS**

**4-5-1 PTT CONTROL CIRCUIT (LOGIC UNIT)**

When the PTT switch is pushed, Q11 is activated, hence voltage is applied to the microphone element. At this time, Q14 also is activated and a "LOW" SEND signal is applied to the CPU. CPU pin 23 outputs "HIGH" when the SEND signal is received and the PLL is not unlocked.

When the connected external microphone is used, a PTT line signal activates Q14 via R40. At this time, Q11 is deactivated, hence the internal microphone is not used.

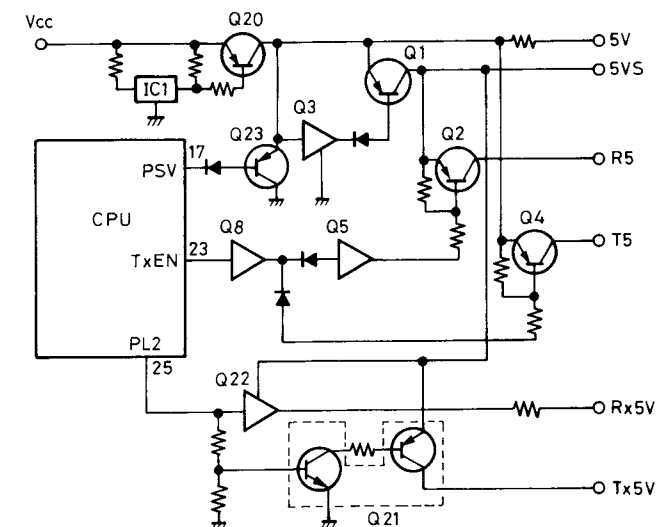
• **PTT CONTROL CIRCUIT**



**4-5-2 VOLTAGE LINES (RF UNIT)**

LINE	DESCRIPTION
Vcc	Battery pack voltage that passes through the fuse (F1), and the power switch (R25). Vcc is applied to the transmitter amplifier circuit and audio power amplifier circuit.
5VS	5 V controlled by the power saver function. Q1 produces the voltage from the 5 V line.
5V	Common 5 V produced at Q20 and IC1.
Rx 5V	5 V for receiver VCO. Q22 produces the voltage from 5VS line with the output of the CPU pin 25 (PL2 port).
Tx 5V	5 V for transmitter VCO. Q21 produces the voltage from 5VS line with the output of the CPU pin 25 (PL2 port).
R5	5 V for the receiver circuit. Q2 produces the voltage from 5VS line with the CPU pin 23 (TxEN port).
T5	5 V for the mic amplifier circuit and bias voltage for the transmitter amplifier circuit. Q4 produces the voltage from the 5 V line regardless of the power saver function.
6.0 V	Used for the charge pump and buffer amplifier in the PLL circuit. IC3 produces the voltage from the Vcc line.
CPU 5	Used for the CPU in the LOGIC unit. IC1 in the RF unit produces the voltage from the battery pack voltage. When the battery pack is removed, an internal lithium battery is used as a backup.

• **REGULATOR CIRCUIT**



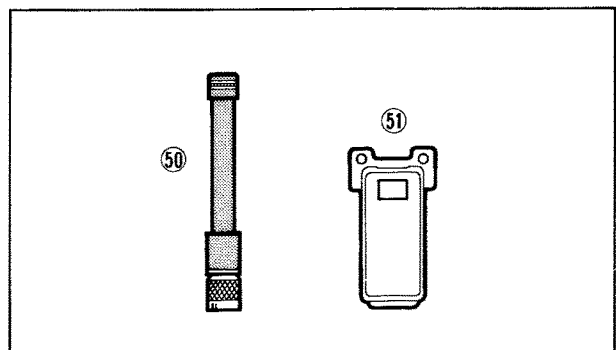
# SECTION 5 MECHANICAL PARTS AND DISASSEMBLY

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.	LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8210009830	Front panel (A)	1	②②	—	Nut (included ③①)	1
②	8930014440	Speaker seal	1	②③	8810000530	PH No. 0 M2×2.5 ZK	6
③	2510000460	Speaker SI003609	1	②④	8210004450	Top panel	1
④	7700000480	Microphone KUC2023-01-006	1	②⑤	8930014410	Top seal	1
⑤	8930012100	Speaker plate	1	②⑥	8810004870	PH No. 0 M2×2.5	1
⑥	8810006100	PH B0 No. 0 M2×3.5 Ni	4	②⑦	8310016470	Flont plate	1
⑦	8930014430	PTT switch rubber	1	②⑧	8930014180	VR plate	1
⑧	8930014391	PTT switch button-1	1	②⑨	8930014481	CPU Shield frame	1
⑨	8930014420	Side seal (assembled with metal plate)	1	③⑩	2260001160	Variable resistor KSR10-0-27	1
⑩	8930014380	Side plate	1	③①	6510008240	Antenna connector TNC-R109	1
⑪	8810004290	PH M2×5 ZK	2	③②	8010008380	Chassis	1
⑫	8850001080	Inner toothed washer M2.5	1	③③	7030000600	Rotary encoder MCR10EZHZ	1
⑬	8810006050	Icom screw E7	3	③④	8410001050	PA heat sink	1
⑭	8930014170	Contact terminal	2	③⑤	8810006060	FH B0 No. 0 M2×4	1
⑮	8930014160	Lock spring	1	③⑥	8930007330	Insulating plate AD	1
⑯	8930014370	Battery pack release button	1	③⑦	8930016680	Leaf copper sheet (B)	1
⑰	8010008180	Sliding guide plate	1	③⑧	8930016720	Sponge (BK)	1
⑱	8610004910	Knob N134	1	③⑨	8810005580	FH No. 0 M2×2.5	4
⑲	8830000550	VR nut (E)	1	④⑩	8930014450	Front seal	1
⑳	8610004290	Knob N135	1	④①	8010008170	Rear panel	1
㉑	—	Hexagon socket set screw (included ⑳)	1	④②	8810000740	OH A M2×15 ZK	4
				④③	8810003710	Icom screw B5	2

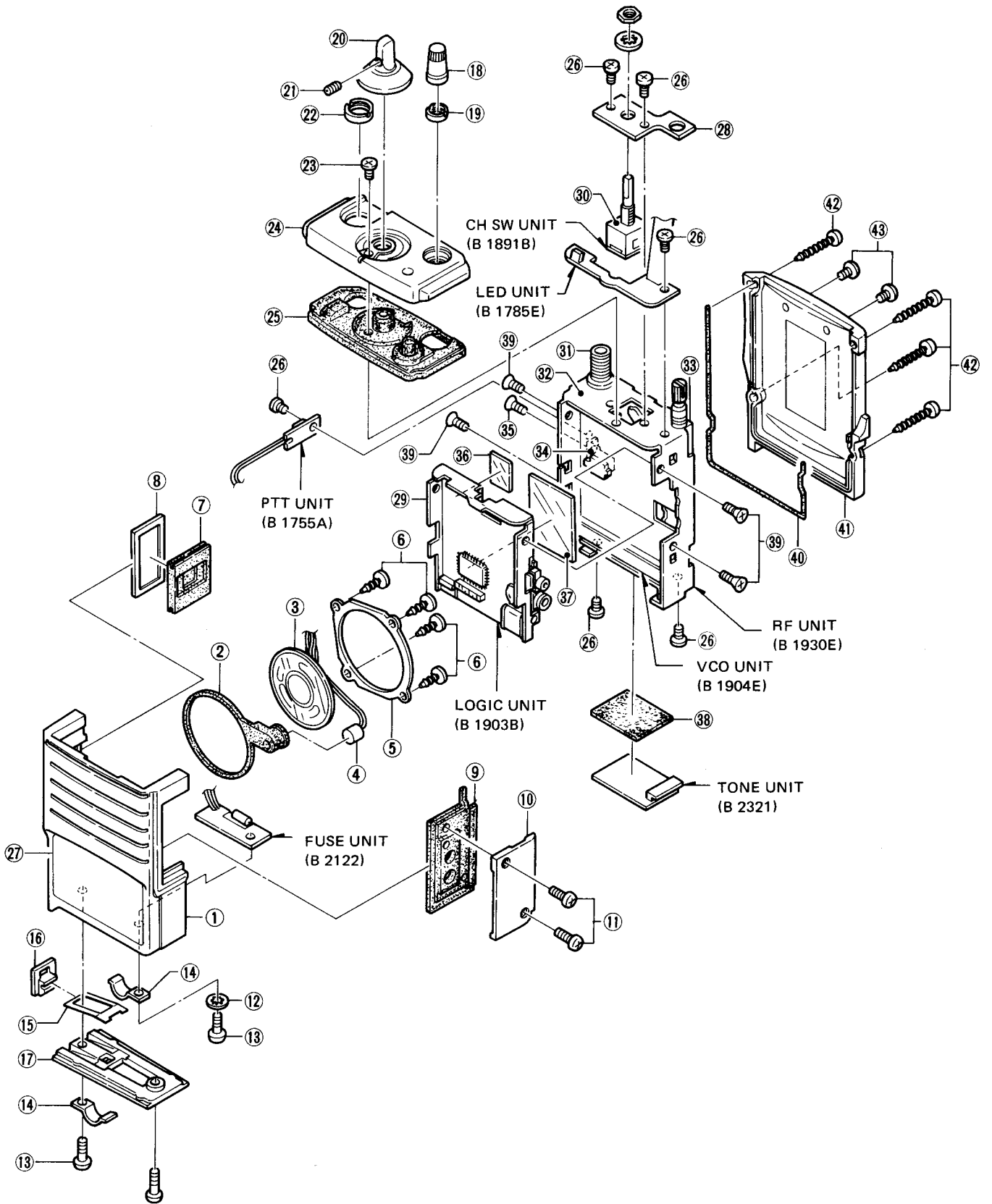
**Screw abbreviations**

PH: Pan head FH: Flat head OH: Oval countersunk head  
 B0: Self-tapping screw No. 0: Precision-type screw  
 ZK: Black Ni: Nickel

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
⑤⑩	Optional product	Flexible antenna	1
⑤①	Optional product	Alligator clip	1







# SECTION 6 ADJUSTMENT PROCEDURES

## PLL ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
REFERENCE FREQUENCY	1 <ul style="list-style-type: none"> <li>Operating frequency : Any</li> <li>Connect the power meter.</li> <li>Transmit.</li> </ul>	Top panel	Loose couple the frequency counter to the antenna connector.	Same frequency as the programmed one. To check the programmed frequency, use the EX-704.	LOGIC	C30
LOCK VOLTAGE	<b>NOTE:</b> To adjust the lock voltage, operating frequency must be set using the EX-704 DATA PROGRAMMER.					
	1 <ul style="list-style-type: none"> <li>Operating frequency: 174.00 MHz</li> <li>Receive.</li> </ul>	LOGIC unit	Connect the DC voltmeter to J5 pin 4.	5.3 V	VCO	L11
	2 <ul style="list-style-type: none"> <li>Operating frequency: 174.00 MHz</li> <li>Transmit.</li> </ul>			5.3 V	VCO	L4

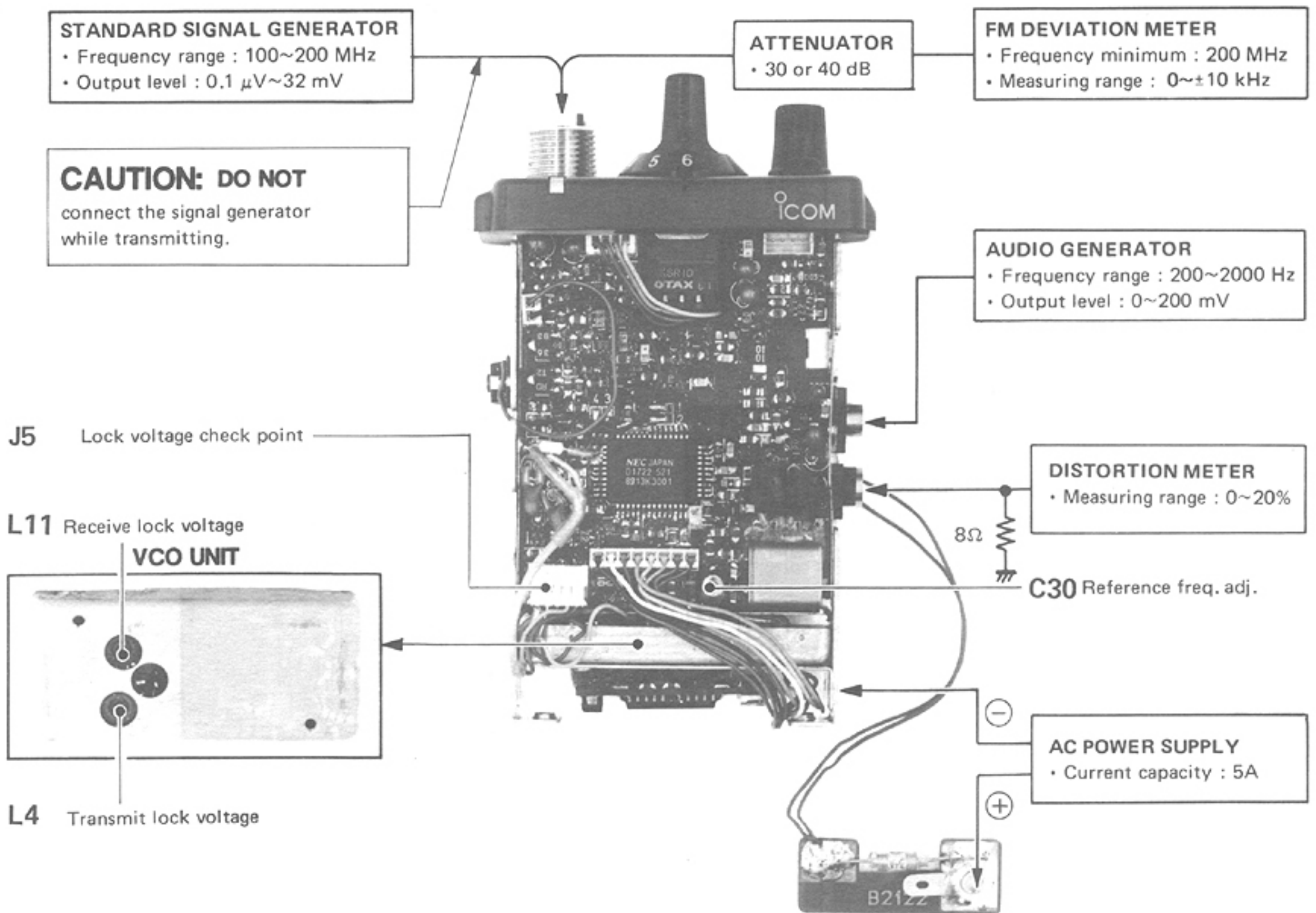
## RECEIVER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	1 <ul style="list-style-type: none"> <li>Operating frequency: Any</li> <li>Set the signal generator:               <ul style="list-style-type: none"> <li>Level : 0.28 <math>\mu</math>V</li> <li>Mod. : 1 kHz</li> <li>Dev. : <math>\pm</math>3.5 kHz</li> </ul> </li> <li>Push IN the [MONITOR] switch.</li> </ul>	Side panel	Connect the distortion meter to the external microphone jack.	Minimum distortion level.	RF	In sequence L1, L2, L3, L4, L5
SQUELCH THRESHOLD	<ul style="list-style-type: none"> <li>Set the signal generator:               <ul style="list-style-type: none"> <li>Level : 0.14 <math>\mu</math>V</li> </ul> </li> </ul>	Side panel	Connect a speaker to the [MIC] jack.	The point where noise is just disappearing.	RF	R21

## TRANSMITTER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER	1 <ul style="list-style-type: none"> <li>Operating frequency: Any</li> <li>Transmit.</li> <li>R33 in the RF unit:               <ul style="list-style-type: none"> <li>Rotate max. clockwise.</li> </ul> </li> </ul>	Top panel	Connect the RF power meter to the antenna connector.	Maximum output	RF	C73
	2 <ul style="list-style-type: none"> <li>Same as above.</li> </ul>			1.5 W	RF	R33
DEVIATION	1 <ul style="list-style-type: none"> <li>Operating frequency : Any</li> <li>Set the FM deviation meter:               <ul style="list-style-type: none"> <li>LPF: 20 kHz HPF: OFF</li> <li>Deemphasis : OFF</li> <li>Detector : (P-P)/2</li> </ul> </li> <li>Set the audio generator:               <ul style="list-style-type: none"> <li>1 kHz, 250 mV</li> </ul> </li> <li>Transmit</li> </ul>	Top panel	Connect the FM deviation meter to the antenna connector.	+4.2 kHz	RF	R45
	2 <ul style="list-style-type: none"> <li>Set the FM deviation meter:               <ul style="list-style-type: none"> <li>LPF : 20 kHz HPF : OFF</li> <li>Deemphasis : OFF</li> <li>Detector : P and -P</li> </ul> </li> </ul>			Same level on P and -P	RF	R44
CTCSS TONE	1 <ul style="list-style-type: none"> <li>Operating frequency : Any</li> <li>Set the FM deviation meter:               <ul style="list-style-type: none"> <li>LPF : OFF HPF : OFF</li> <li>Deemphasis: OFF</li> <li>Detector : (P-P)/2</li> </ul> </li> <li>Apply no signal to the mic connector.</li> <li>Transmit.</li> </ul>	Top panel	Connect the FM deviation meter to the antenna connector.	+0.75 kHz	TONE	R10

## CONNECTION AND PLL

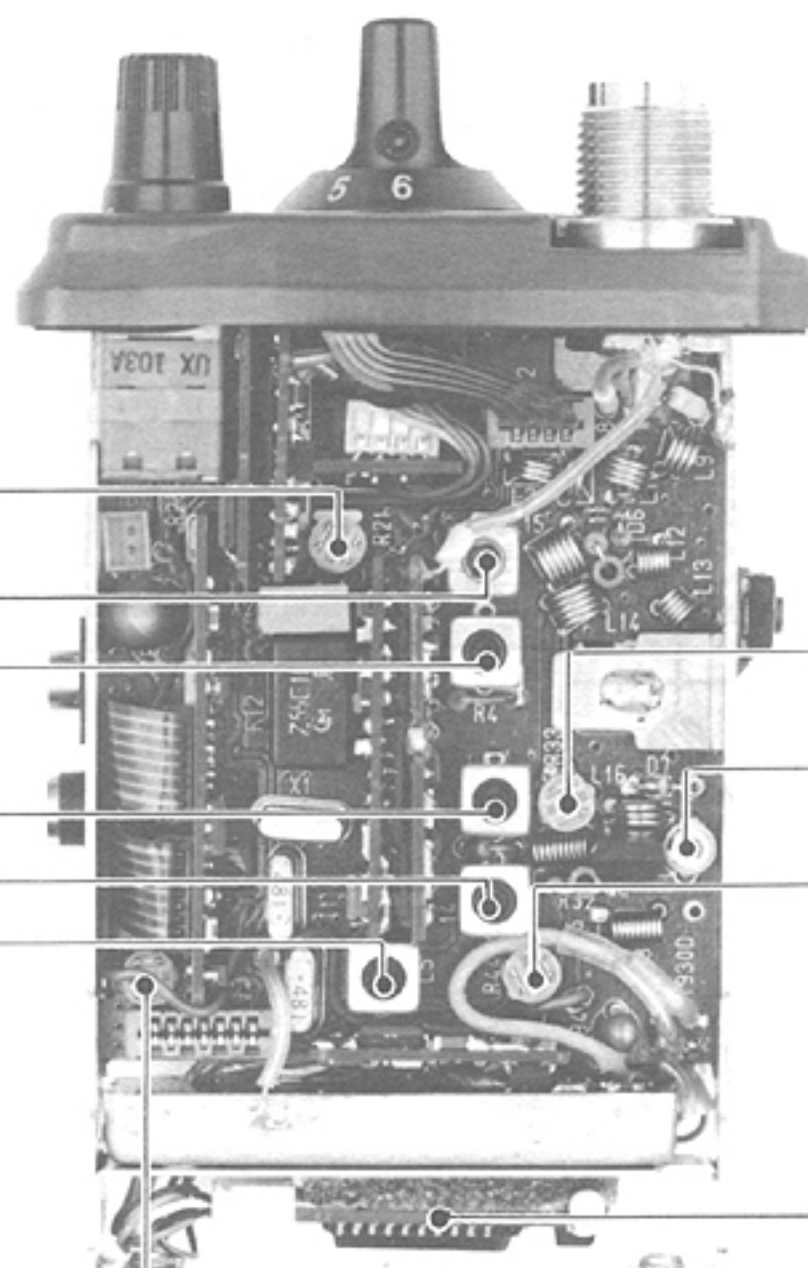


## RECEIVER

**R21** Squelch set

Sensitivity adjustment

- L1
- L2
- L3
- L4
- L5



**R45** Deviation set

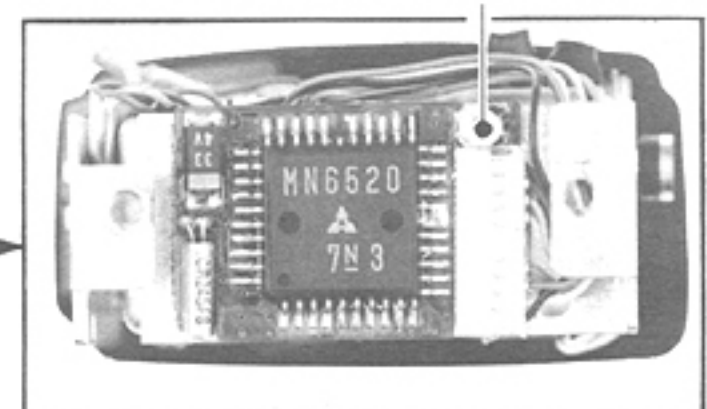
## TRANSMITTER

**R33** Power set

**C73** Maximum power

**R44** Deviation balance

**TONE UNIT R10** CTCSS deviation

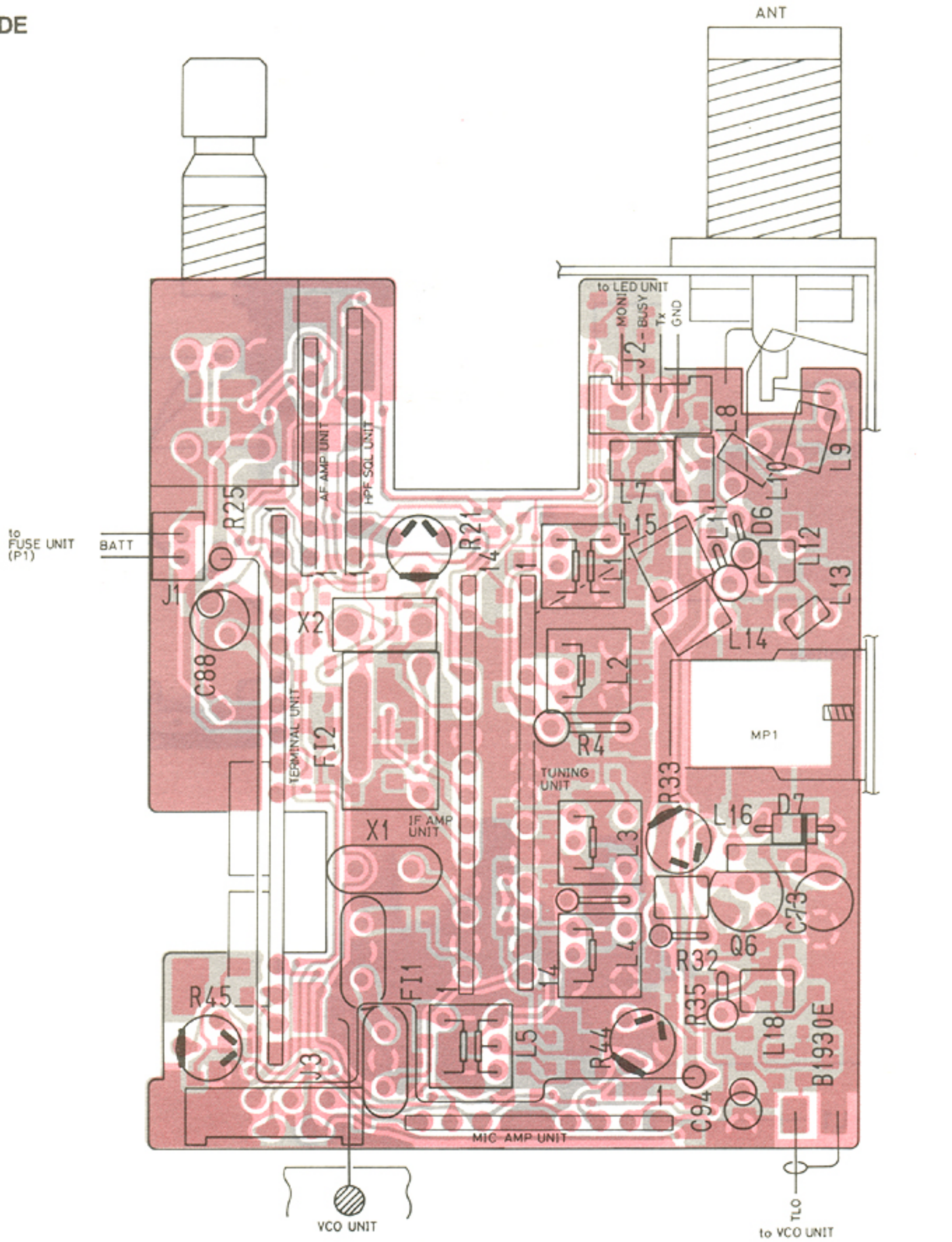




# SECTION 7 BOARD LAYOUTS

## 7-1 RF UNIT

COMPONENT SIDE



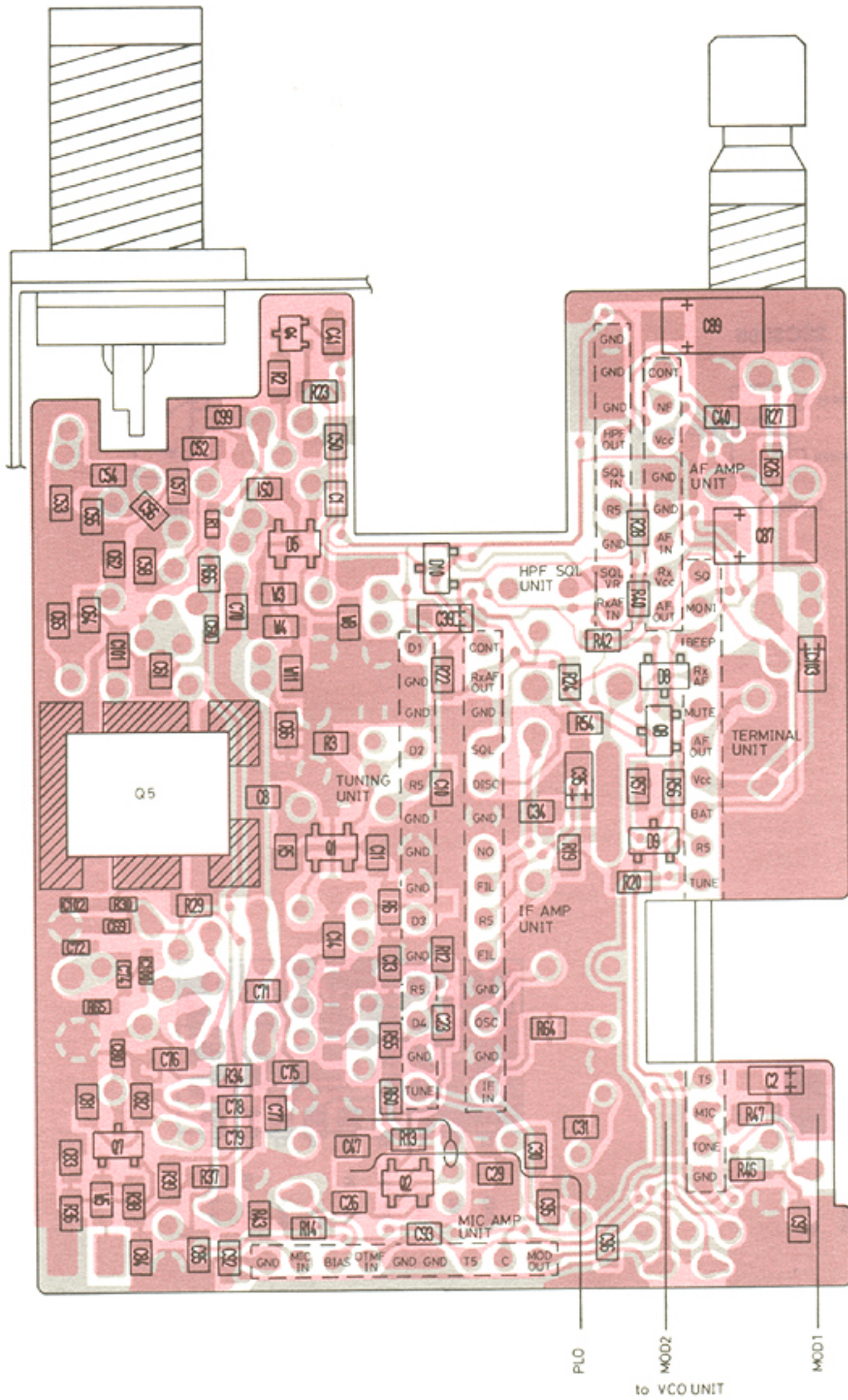
25C2053  
Q6



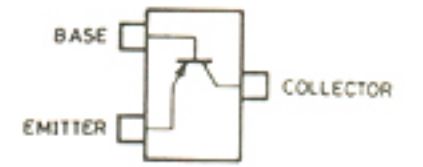
COMPONENT SIDE  
FOIL SIDE



**FOIL SIDE**



**2SA1576R**  
Q4



Symbol: FR

**2SC2712GR**  
Q8



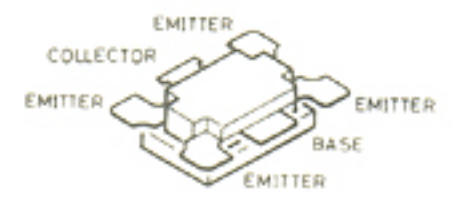
Symbol: LG

**2SC3772-3**  
Q7



Symbol: LY3

**2SC4240**  
Q5



**3SK131K**  
Q2



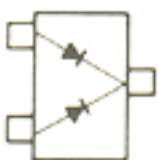
Symbol: V13

**3SK140GR**  
Q1



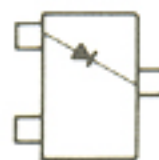
Symbol: UG

**1SS184**  
D8, D9



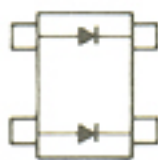
Symbol: B3

**1SS193**  
D10



Symbol: F3

**MA862**  
D5



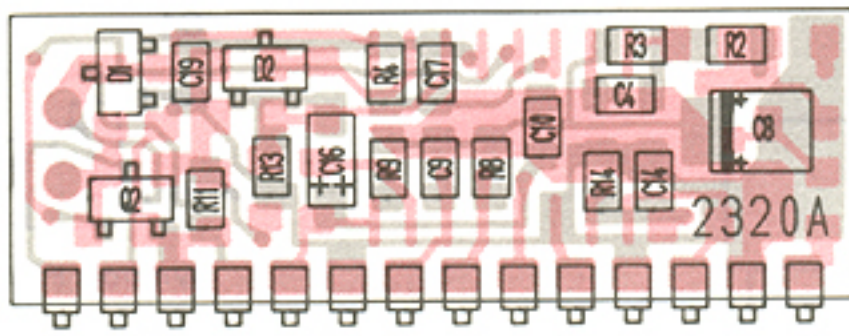
Symbol: M11

COMPONENT SIDE  
FOIL SIDE

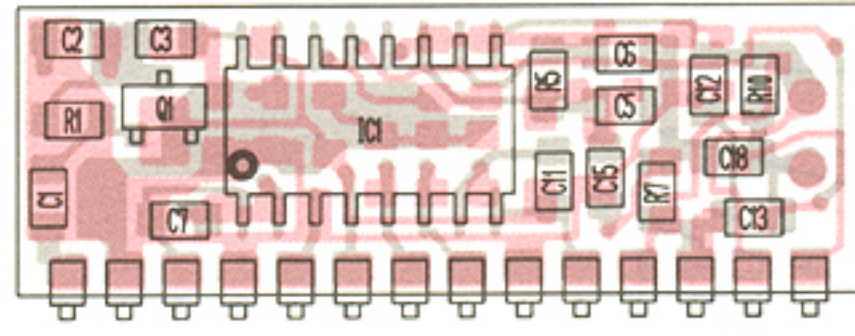


## 7-2 IF AMP AND HPF SQL UNITS

### • IF AMP UNIT

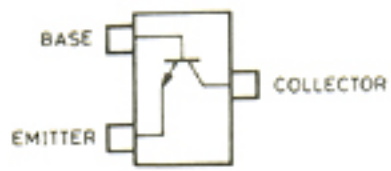


CONT  
Rx AF OUT  
GND  
SQL OUT  
DISC  
GND  
NC  
FIL  
R5  
FIL  
GND  
OSC  
GND  
IF IN



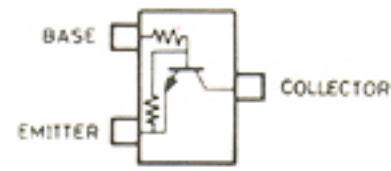
IF IN  
GND  
OSC  
GND  
FIL  
R5  
FIL  
NC  
GND  
DISC  
SQL OUT  
GND  
Rx AF OUT  
CONT

**2SC2620QB01**  
Q1



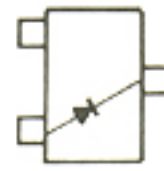
Symbol: QB

**2SC3395**  
Q2



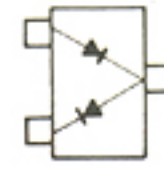
Symbol: BY

**1SS196**  
D2



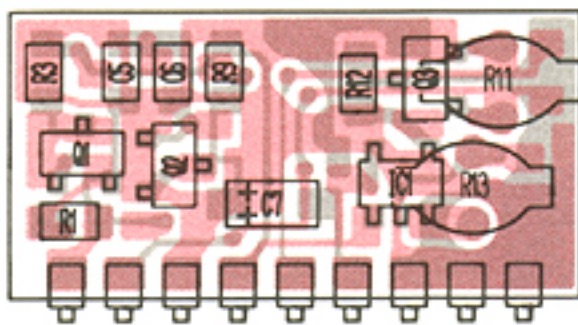
Symbol: G3

**HSM88AS**  
D1

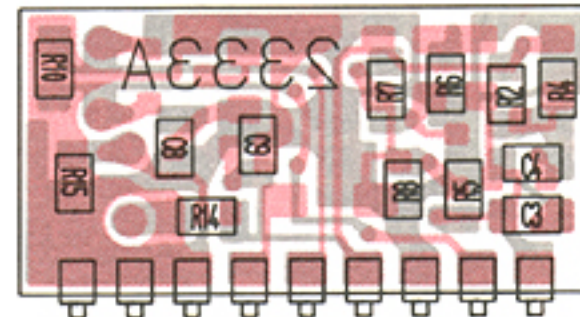


Symbol: C1

### • HPF SQL UNIT

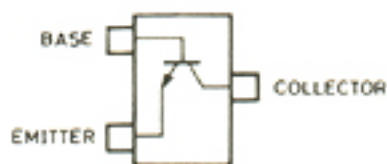


Rx AF IN  
SQL VR  
GND  
R5  
SQL IN  
HPF OUT  
GND  
GND  
GND



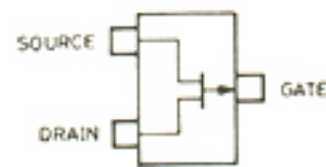
GND  
GND  
GND  
HPF OUT  
SQL IN  
R5  
GND  
SQL VR  
Rx AF IN

**2SC2712GR**  
Q1, Q2



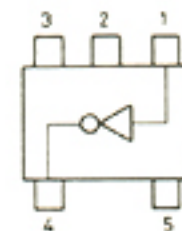
Symbol : LG

**2SJ106Y**  
Q3



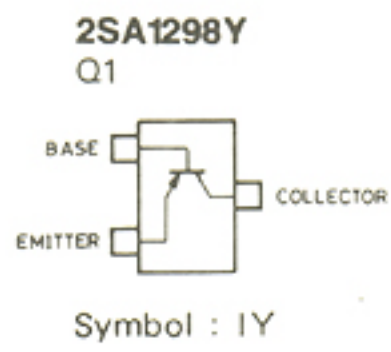
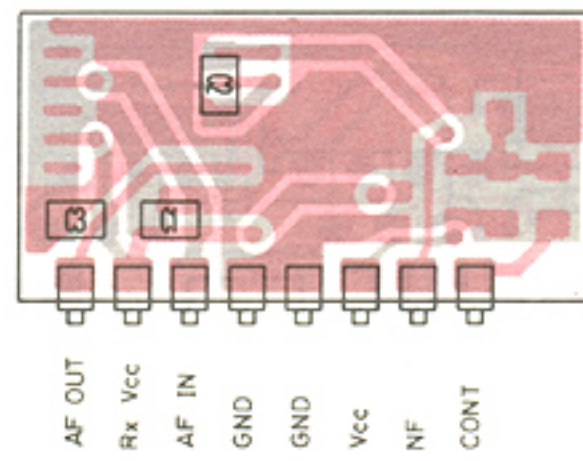
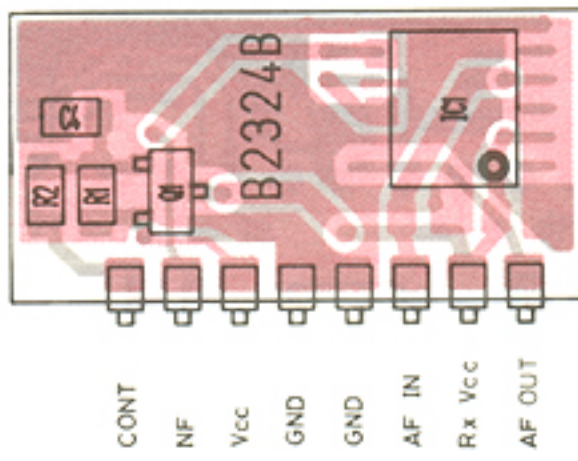
Symbol : VY

**TC4S69F**  
IC1

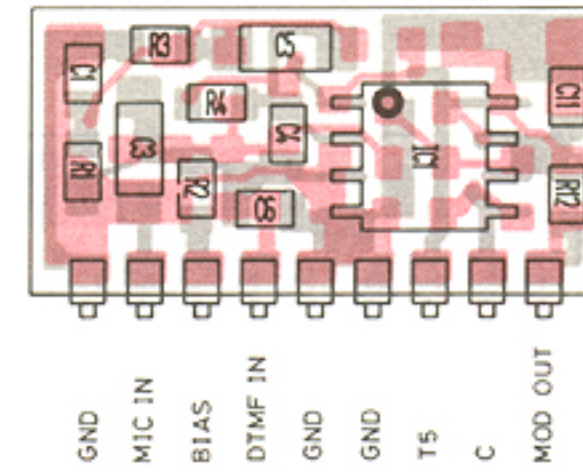
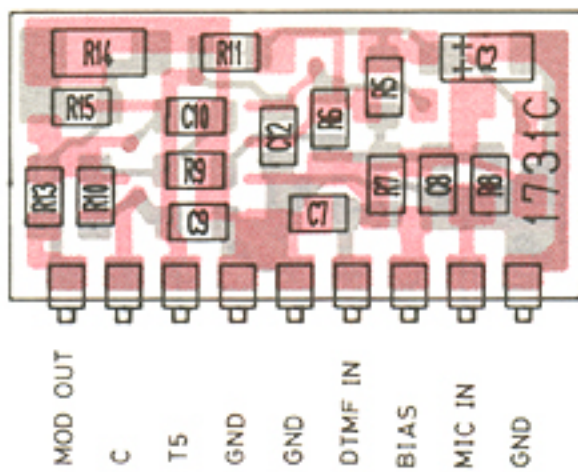


# 7-3 AF AMP MIC AMP AND TUNING UNITS

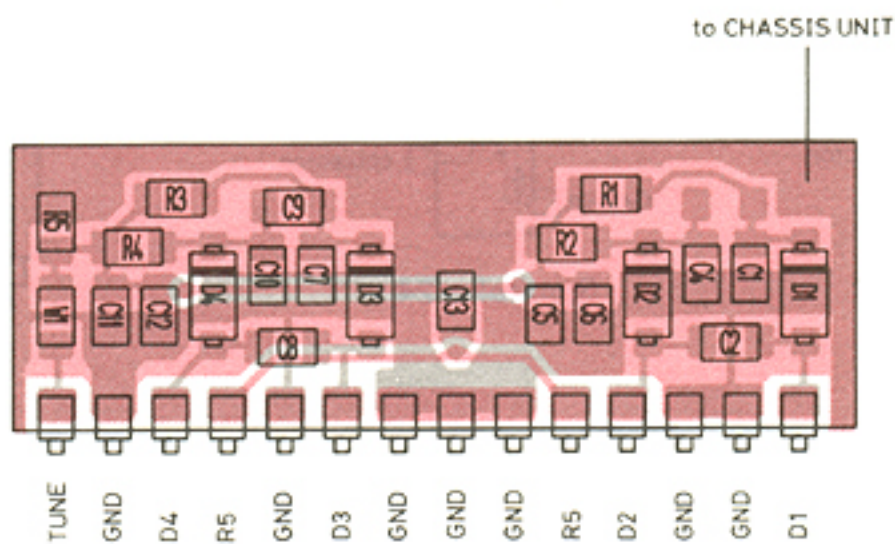
## • AF AMP UNIT



## • MIC AMP UNIT



## • TUNING UNIT

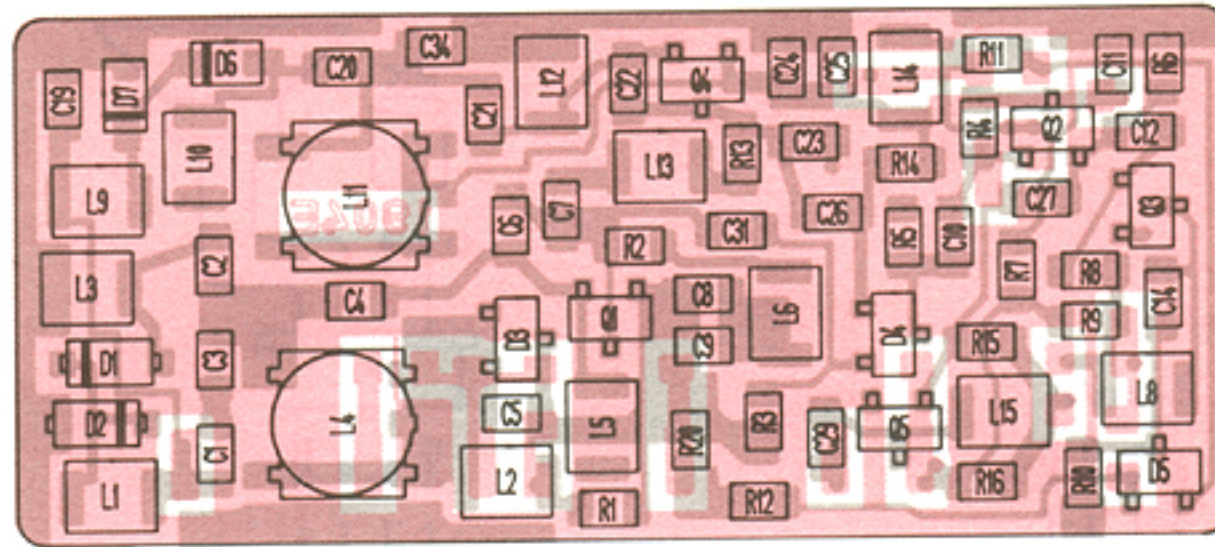








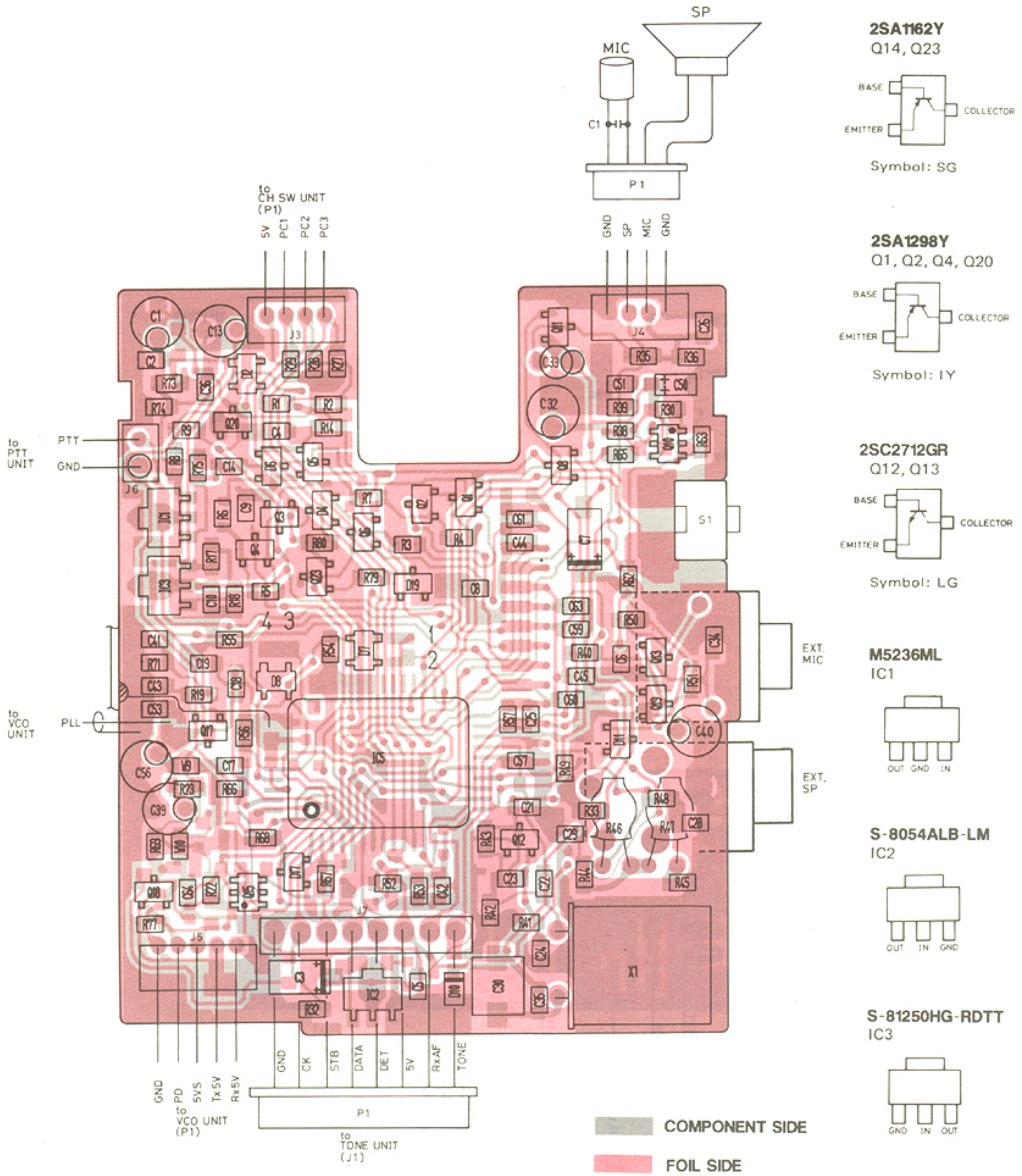
# 7-5 VCO UNIT



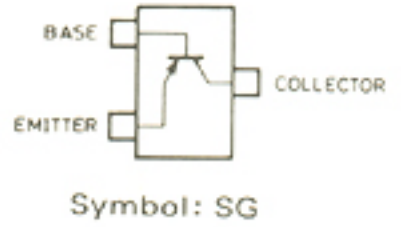


# 7-6 LOGIC UNIT

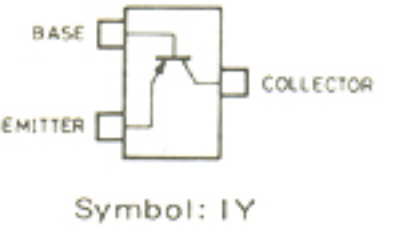
## COMPONENT SIDE



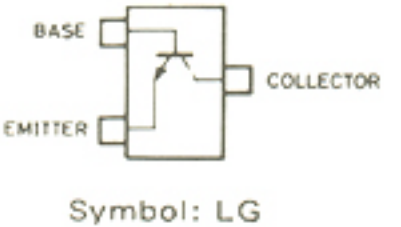
**2SA1162Y**  
Q14, Q23



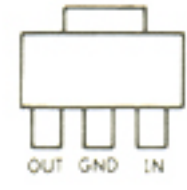
**2SA1298Y**  
Q1, Q2, Q4, Q20



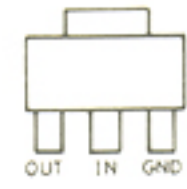
**2SC2712GR**  
Q12, Q13



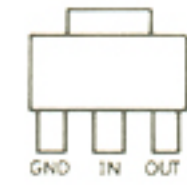
**M5236ML**  
IC1



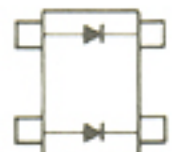
**S-8054ALB-LM**  
IC2



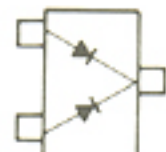
**S-81250HG-RD TT**  
IC3



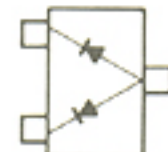
**1SS272**  
D7, D8



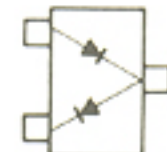
**DAN202K**  
D4, D6, D13



**DAP202K**  
D19



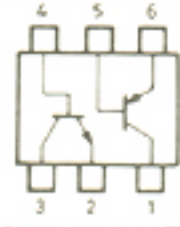
**HSM88AS**  
D1, D11





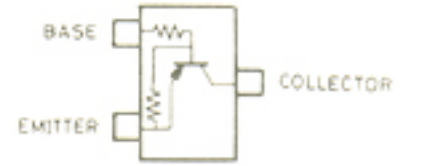
**FOIL SIDE**

**IMZ2**  
Q10, Q15, Q21



Symbol : Z2

**DTC144WK**  
Q3, Q5, Q8, Q19



Symbol : 86

**DTA144EK**  
Q6, Q11, Q22

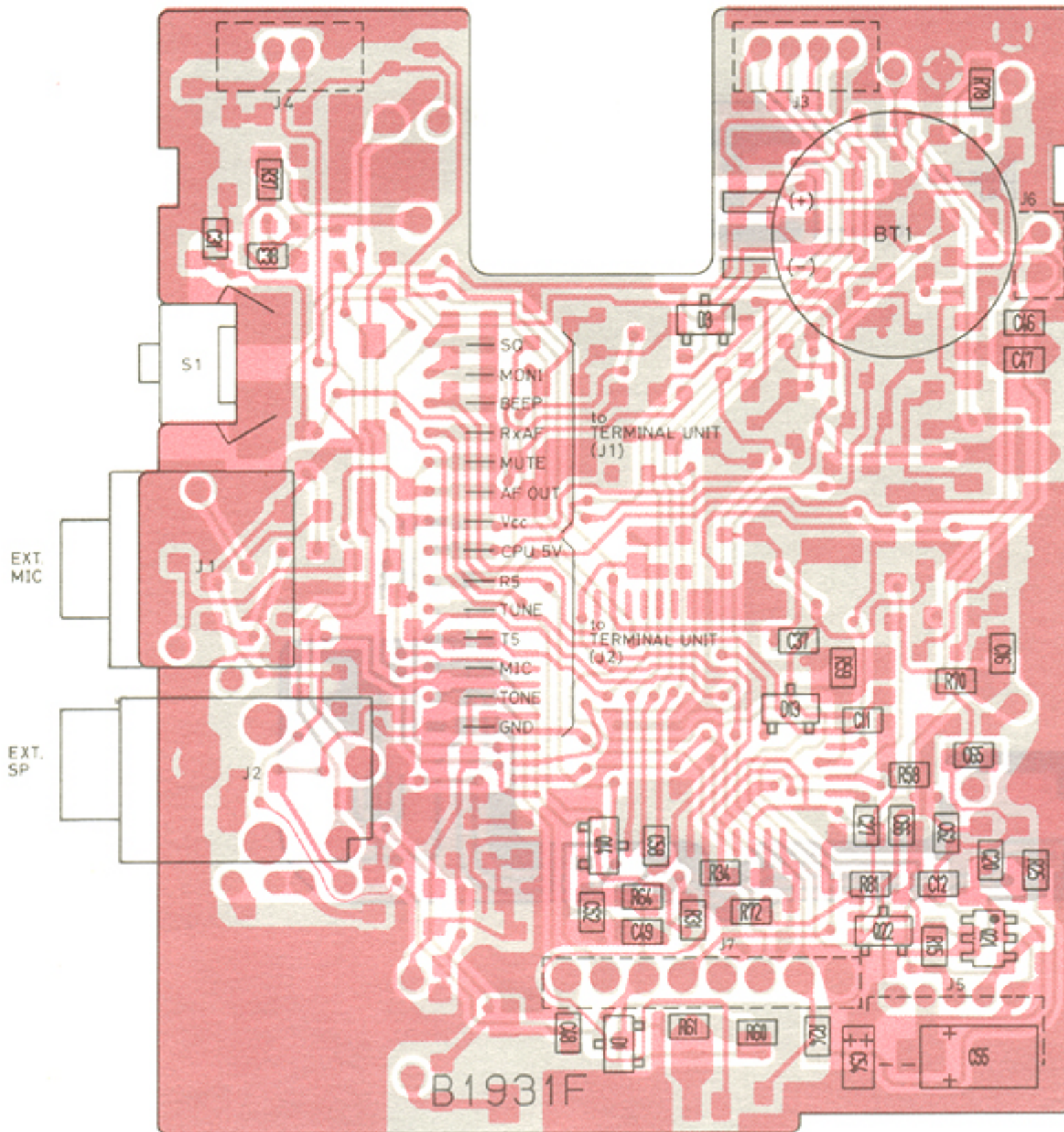


Symbol : 26

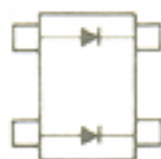
**2SK209Y**  
Q17, Q18



Symbol : XY

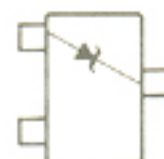


**MA713**  
D2



Symbol : M1N

**RD30MB2**  
D17

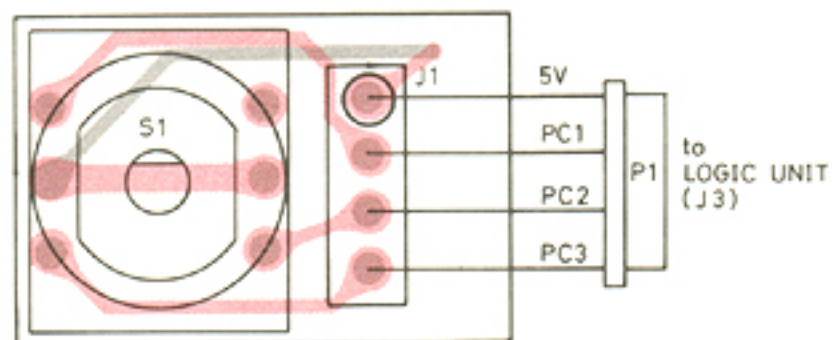


Symbol : 302

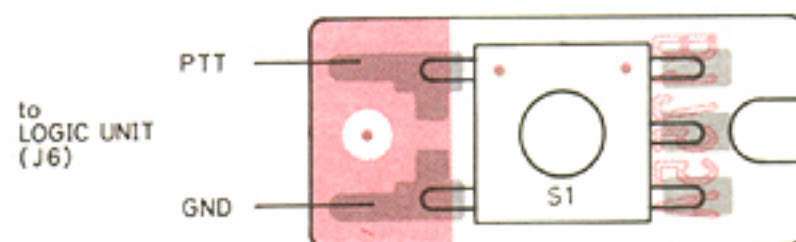


## 7-7 OTHER UNITS

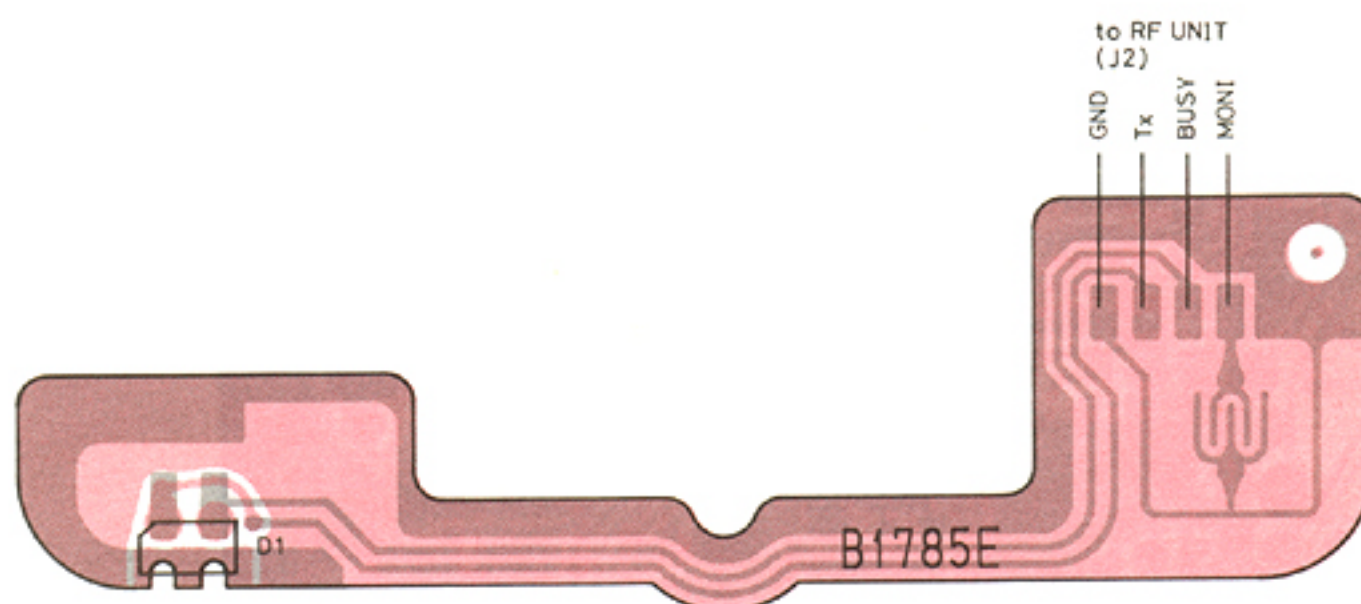
### • CH SW UNIT



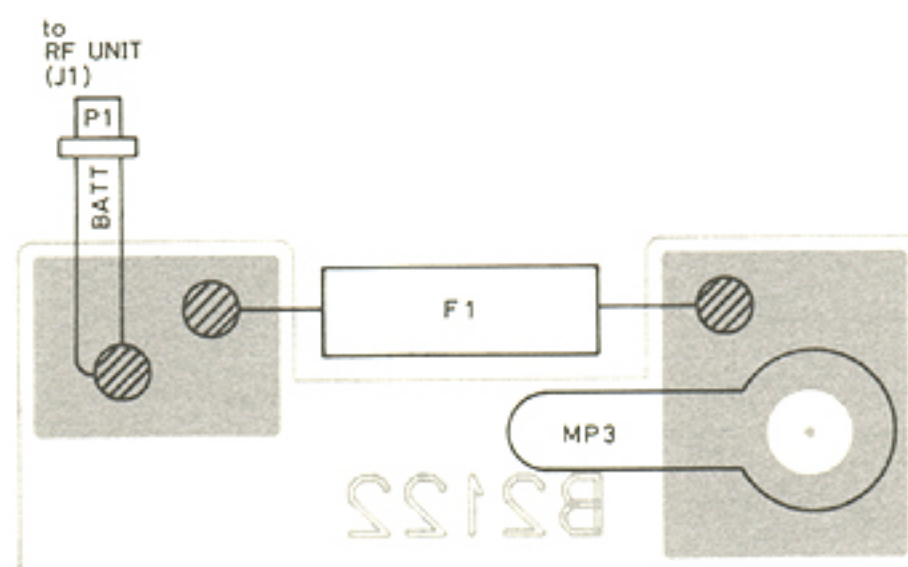
### • PTT UNIT



### • LED UNIT



### • FUSE UNIT



# SECTION 8 PARTS LIST

## [OTHER UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
<b>[CHASSIS UNIT]</b>			
J1	6510008240	Connector	TNC-R109
<b>[CH SW UNIT]</b>			
S1	2260001160	Switch	KSR10-0-27
EP2	0910019782	P.C. Board	B 1891B FX-677
<b>[PTT UNIT]</b>			
S1	2260000600	Switch	SKHMPD004A
EP1	0910018591	P.C. Board	B 1755A FX-677
<b>[LED UNIT]</b>			
D1	5040001120	LED	TLSG222
EP1	0910018675	P.C. Board	B 1785E FX-677
EP2	0910019710	P.C. Board	B 1902
<b>[FRONT UNIT]</b>			
C1	4030006860	Ceramic	C1608 B 1H 102K-T
MC1	7700000480	Microphone	KUC2023-01-006
SP1	2510000460	Speaker	SI003609 (VSP0036P-097B)
<b>[FUSE UNIT]</b>			
F1	5210000230	Fuse	MC 2 1/2
EP1	0910021370	P.C. Board	B 2122 FX-677

## [RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1580000340	FET	3SK140-GR (TE85R)
Q2	1580000390	FET	3SK131K-T1
Q4	1510000510	Transistor	2SA1576 T107 R
Q5	1530002540	Transistor	2SC4240
Q6	1530000810	Transistor	2SC2053
Q7	1530002030	Transistor	2SC3772-3-TA
Q8	1530001950	Transistor	2SC2712-GR (TE85R)
D5	1790000450	Diode	MA862(TX)
D6	1710000580	Diode	1SS265
D7	1710000600	Diode	1SS254
D8	1750000020	Diode	1SS184(TE85R)
D9	1750000020	Diode	1SS184(TE85R)
D10	1750000050	Diode	1SS193(TE85R)
L1	6150003510	Coil	LS-388
L2	6150003280	Coil	LS-355
L3	6150003440	Coil	LS-376
L4	6150003280	Coil	LS-355
L5	6150003140	Coil	LS-330
L7	6110001530	Coil	LA-233
L8	6110001530	Coil	LA-233
L9	6110001540	Coil	LA-234
L10	6110001040	Coil	LA-135
L11	6180000680	Coil	LAL 02NA 4R7K
L12	6110002000	Coil	LA-226
L13	6110002040	Coil	LA-225 (#01)
	6110002040	Coil	LA-225 (#03)
L14	6110001550	Coil	LA-235
L15	6110001560	Coil	LA-236
L16	6110001530	Coil	LA-233 (#01)
	6110001530	Coil	LA-233 (#03)
L17	6110002050	Coil	LA-229
L18	6110002050	Coil	LA-229
F11	2010000200	Filter	21M15B3 (FL-42)
F12	2020000490	Filter	CFZM55E10
X1	6050002000	Crystal	CR-70
X2	6070000010	Discriminator	CDB455C7A
R1	7030003420	Resistor	ERJ3GEYJ 681 V (680Ω)
R2	7030000360	Resistor	MCR10EZJH 680Ω (681)
R3	7030000580	Resistor	MCR10EZJH 47KΩ (473)
R4	7010003650	Resistor	ELR20J 82KΩ
R5	7030000620	Resistor	MCR10EZJH 100KΩ (104)
R6	7030000280	Resistor	MCR10EZJH 150Ω (151)
R7	7010003160	Resistor	ELR20J 10Ω
R12	7030000580	Resistor	MCR10EZJH 47KΩ (473)
R13	7030000580	Resistor	MCR10EZJH 47KΩ (473)
R14	7030000350	Resistor	MCR10EZJH 560Ω (561)
R19	7030000400	Resistor	MCR10EZJH 1.5KΩ (152)
R20	7030000260	Resistor	MCR10EZJH 100Ω (101)
R21	4610001230	Trimmer	EVMLGGA00B14
R22	7030000540	Resistor	MCR10EZJH 22KΩ (223)
R23	7030000500	Resistor	MCR10EZJH 10KΩ (103)
R24	7030000550	Resistor	MCR10EZJH 27KΩ (273)
R25	7210001500	Variable	RK097111102AA
R26	7030000540	Resistor	MCR10EZJH 22KΩ (223)
R27	7030000380	Resistor	MCR10EZJH 1KΩ (102)
R28	7030000140	Resistor	MCR10EZJH 10Ω (100)
R29	7030000300	Resistor	MCR10EZJH 220Ω (221)
R30	7030003240	Resistor	ERJ3GEYJ 220 V (22Ω)
R32	7010003160	Resistor	ELR20J 10Ω
R33	4610001310	Trimmer	EVMLGGA00B12

**(RF UNIT)**

REF. NO.	ORDER NO.	DESCRIPTION	
R34	703000220	Resistor	MCR10EZHJ 47Ω (470)
R35	7010003240	Resistor	ELR20J 47Ω
R36	703000220	Resistor	MCR10EZHJ 47Ω (470)
R37	7030000230	Resistor	MCR10EZHJ 56Ω (560)
R38	7030000340	Resistor	MCR10EZHJ 470Ω (471)
R39	7030000310	Resistor	MCR10EZHJ 270Ω (271)
R40	7030000360	Resistor	MCR10EZHJ 680Ω (681)
R42	7030000360	Resistor	MCR10EZHJ 680Ω (681)
R43	7030000460	Resistor	MCR10EZHJ 4.7KΩ (472)
R44	4610001250	Trimmer	EVMLGGA00B25
R45	4610001040	Trimmer	EVMLGGA00B54
R46	7030000460	Resistor	MCR10EZHJ 4.7KΩ (472)
R47	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R54	7030000400	Resistor	MCR10EZHJ 1.5KΩ (152)
R55	7030000240	Resistor	MCR10EZHJ 68Ω (680)
R56	7030000500	Resistor	MCR10EZHJ 10KΩ (103)
R57	7030000500	Resistor	MCR10EZHJ 10KΩ (103)
R60	7030000720	Resistor	MCR10EZHJ 680KΩ (684)
R64	7030000400	Resistor	MCR10EZHJ 1.5KΩ (152)
R65	7020003340	Resistor	ERJ3GEYJ 151 V (150Ω)
R66	7030000270	Resistor	MCR10EZHJ 120Ω (121)
C1	4030000720	Ceramic	GRM40 SL 680J 50PT
C2	4550002890	Tantalum	TESVA 1A 225M1-8L
C8	4030001100	Ceramic	GRM40 B 102K 50PT
C10	4030001100	Ceramic	GRM40 B 102K 50PT
C11	4030001100	Ceramic	GRM40 B 102K 50PT
C13	4030001100	Ceramic	GRM40 B 102K 50PT
C14	4030001100	Ceramic	GRM40 B 102K 50PT
C23	4030000620	Ceramic	GRM40 SL 080D 50PT
C26	4030001140	Ceramic	GRM40 F 103Z 50PT
C29	4030001100	Ceramic	GRM40 B 102K 50PT
C30	4030001140	Ceramic	GRM40 F 103Z 50PT
C31	4030000590	Ceramic	GRM40 SL 050C 50PT
C34	4030001140	Ceramic	GRM40 F 103Z 50PT
C35	4550003030	Tantalum	TEMSVA 0J 475M1-8L
C39	4550000530	Tantalum	TESVA 1V 102M1-8L
C40	4030000740	Ceramic	GRM40 SL 101J 50PT
C41	4030001100	Ceramic	GRM40 B 102K 50PT
C47	4030000670	Ceramic	GRM40 SL 220J 50PT
C50	4030000670	Ceramic	GRM40 SL 220J 50PT
C51	4030000960	Ceramic	GRM40 CH 390J 50PT
C52	4030000930	Ceramic	GRM40 CH 180J 50PT
C53	4030000910	Ceramic	GRM40 CH 120J 50PT
C54	4030000880	Ceramic	GRM40 CH 070D 50PT
C55	4030003580	Ceramic	GRM40 CH 270J 50PT
C56	4030000840	Ceramic	GRM40 CJ 030C 50PT
C57	4030000920	Ceramic	GRM40 CH 150J 50PT
C58	4030001100	Ceramic	GRM40 B 102K 50PT
C60	4030006860	Ceramic	C1608 B 1H 102K-T
C61	4030000930	Ceramic	GRM40 CH 180J 50PT
C62	4030000930	Ceramic	GRM40 CH 180J 50PT
C64	4030000960	Ceramic	GRM40 CH 390J 50PT
C65	4030000940	Ceramic	GRM40 CH 220J 50PT
C66	4030001100	Ceramic	GRM40 B 102K 50PT
C69	4030006860	Ceramic	C1068 B 1H 102K-T
C70	4030001100	Ceramic	GRM40B 102K 50PT
C71	4030001100	Ceramic	GRM40 B 102K 50PT
C72	4030006630	Ceramic	C1608 SL 1H 150J-T
C73	4610000380	Trimmer	ECRGA020E30
C74	4030006700	Ceramic	C1608 SL1H 390J-T
C75	4030001140	Ceramic	GRM40 F 103Z 50PT
C76	4030001100	Ceramic	GRM40 B 102K 50PT
C77	4030001100	Ceramic	GRM40 B 102K 50PT
C78	4030001140	Ceramic	GRM40 F 103Z 50PT
C79	4030001100	Ceramic	GRM40 B 102K 50PT
C80	4030006620	Ceramic	C1608 SL 1H 120J-T
C81	4030001140	Ceramic	GRM40 F 103Z 50PT
C82	4030001100	Ceramic	GRM40 B 102K 50PT
C83	4030001100	Ceramic	GRM40 B 102K 50PT
C84	4030001100	Ceramic	GRM40 B 102K 50PT
C85	4030001100	Ceramic	GRM40 B 102K 50PT
C87	4550003110	Tantalum	TEMSVC 1A 226M1-12L
C88	4550001950	Tantalum	DN 0J 101M
C89	4550003060	Tantalum	TEMSVC 0J 336M1-12L

**(RF UNIT)**

REF. NO.	ORDER NO.	DESCRIPTION	
C92	4030001150	Ceramic	GRM40 F 104Z 25PT
C93	4030001150	Ceramic	GRM40 F 104Z 25PT
C94	4550002010	Tantalum	DN 1A 6R8M
C95	4030003050	Ceramic	GRM40 SL 270J 50PT
C96	4030001090	Ceramic	GRM40 B 471K 50PT
C97	4030001090	Ceramic	GRM40 B 471K 50PT
C99	4030001100	Ceramic	GRM40 B 102K 50PT
C100	4030006700	Ceramic	C1608 SL 1H 390J-T
C101	4030000870	Ceramic	GRM40 CH 060D 50PT
C102	4030007070	Ceramic	C1608 CH 1H 330J-T
C103	4550002980	Tantalum	TEMSVA 1C 225M1-8L
W2	7120000380	Jumper	JPW 01 R-01
W3	7030000010	Jumper	MCR10EZHJ JPW (000)
W4	7030000010	Jumper	MCR10EZHJ JPW (000)
W5	7030000010	Jumper	MCR10EZHJ JPW (000)
W8	7030000010	Jumper	MCR10EZHJ JPW (000)
W9	7120000380	Jumper	JPW 01 R-01
W10	7120000380	Jumper	JPW 01 R-01
W11	7030000010	Jumper	MCR10EZHJ JPW (000)
J1	6510007080	Connector	PI28A-02M
J2	6510008310	Connector	IL-FPC-4S-S1-T1
J3	6510008320	Connector	IL-FPC-7S-S1-T1
EP1	0910020505	P.C. Board	B 1930E FX-677
EP3	6910000970	Lead Frame	DL 20P 2.6-3-1.2H

**(IF AMP UNIT)**

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110001020	IC	MC3357DR
Q1	1530002610	Transistor	2SC2620 QB-TR
Q2	1530000980	Transistor	2SC3395-TA
D1	1790000490	Diode	HSM88AS-TR
D2	1750000060	Diode	1SS196(TE85R)
R1	7030000610	Resistor	MCR10EZHJ 82KΩ (823)
R2	7030000380	Resistor	MCR10EZHJ 1KΩ (102)
R3	7030000260	Resistor	MCR10EZHJ 100Ω (101)
R4	7030000550	Resistor	MCR10EZHJ 27KΩ (273)
R5	7030000680	Resistor	MCR10EZHJ 330KΩ (334)
R7	7030000420	Resistor	MCR10EZHJ 2.2KΩ (222)
R8	7030000400	Resistor	MCR10EZHJ 1.5KΩ (152)
R9	7030000610	Resistor	MCR10EZHJ 82KΩ (823)
R10	7030000450	Resistor	MCR10EZHJ 3.9KΩ (392)
R11	7030000410	Resistor	MCR10EZHJ 1.8KΩ (182)
R13	7030000570	Resistor	MCR10EZHJ 39KΩ (393)
R14	7030000540	Resistor	MCR10EZHJ 22KΩ (223)
C1	4030001100	Ceramic	GRM40 B 102K 50PT
C2	4030000670	Ceramic	GRM40 SL 220J 50PT
C3	4030001100	Ceramic	GRM40 B 102K 50PT
C4	4030001140	Ceramic	GRM40 F 103Z 50PT
C5	4030000680	Ceramic	GRM40 SL 330J 50PT
C6	4030001100	Ceramic	GRM40 B 102K 50PT
C7	4030000750	Ceramic	GRM40 SL 121J 50PT
C8	4550000740	Tantalum	TESVB2 0J 685M-8L
C9	4030001150	Ceramic	GRM40 F 104Z 25PT
C10	4030001150	Ceramic	GRM40 F 104Z 25PT
C11	4030000730	Ceramic	GRM40 SL 820J 50PT
C12	4030001090	Ceramic	GRM40 B 471K 50PT

**(IF AMP UNIT)**

REF. NO.	ORDER NO.	DESCRIPTION	
C13	4030001100	Ceramic	GRM B 102K 50PT
C14	4030000720	Ceramic	GRM40 SL 680J 50PT
C15	4030001130	Ceramic	GRM40 B 103K 50PT
C16	4550000460	Tantalum	TESVA 1C 105M1-8L
C17	4030008530	Ceramic	GRM40 B 333K 50PT
C18	4030001100	Ceramic	GRM40 B 102K 50PT
C19	4030008530	Ceramic	GRM40 B 333K 50PT
EP1	0910024121	P.C. Board	B 2320A (#677-1)
EP4	6910003110	Lead Frame	HFB2.0-0.7-8 (N)

**(HPF SQL UNIT)**

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130003920	IC	TC4S69F (TE85R)
Q1	1530001950	Transistor	2SC2712-GR (TE85R)
Q2	1530001950	Transistor	2SC2712-GR (TE85R)
Q3	1590000380	Transistor	2SJ106-Y (TE85R)
R1	7030000520	Resistor	MCR10EZHZ 15KΩ (153)
R2	7030000720	Resistor	MCR10EZHZ 680KΩ (684)
R3	7030000460	Resistor	MCR10EZHZ 4.7KΩ (472)
R4	7030000680	Resistor	MCR10EZHZ 330KΩ (334)
R5	7030000410	Resistor	MCR10EZHZ 1.8KΩ (182)
R6	7030000600	Resistor	MCR10EZHZ 68KΩ (683)
R7	7030000720	Resistor	MCR10EZHZ 680KΩ (684)
R8	7030000390	Resistor	MCR10EZHZ 1.2KΩ (122)
R9	7030000480	Resistor	MCR10EZHZ 6.8KΩ (682)
R10	7030000490	Resistor	MCR10EZHZ 8.2KΩ (822)
R11	7510000100	Thermistor	ERT-D2FGL601S
R12	7030000740	Resistor	MCR10EZHZ 1MΩ (105)
R13	7510000090	Thermistor	ERT-D2FGL202S
R14	7030000480	Resistor	MCR10EZHZ 6.8KΩ (682)
R15	7030000510	Resistor	MCR10EXHJ 12KΩ (123)
C3	4030006490	Ceramic	GRM40 B 153K 50PT
C4	4030006490	Ceramic	GRM40 B 153K 50PT
C5	4030006490	Ceramic	GRM40 B 153K 50PT
C6	4030003360	Ceramic	GRM40 F 473Z 50PT
C7	4550000270	Tantalum	TESVA 1E 474M1-8L
C8	4030001100	Ceramic	GRM40 B 102K 50PT
C9	4030001100	Ceramic	GRM40 B 102K 50PT

**(AF AMP UNIT)**

REF. NO.	ORDER NO.	DESCRIPTION	
EP1	0910024131	P.C. Board	B 2333A (#677-1)
EP4	6910003110	Lead Frame	HFB2.0-0.7-8 (N)
IC1	1110001810	IC	TA7368F (TP1)
Q1	1510000600	Transistor	2SA1298-Y (TE85R)
R1	7030000580	Resistor	MCR10EZHZ 47KΩ (473)
R2	7030000380	Resistor	MCR10EZHZ 1KΩ (102)
C1	4030001110	Ceramic	GRM40 B 222K 50PT
C2	4030000700	Ceramic	GRM40 SL 470J 50PT
C3	4030001100	Ceramic	GRM40 B 102K 50PT
C4	4030000740	Ceramic	GRM40 SL 101J 50PT

**(AF AMP UNIT)**

REF. NO.	ORDER NO.	DESCRIPTION	
EP1	0910024052	P.C. Board	B 2324B (#677-1)
EP2	6910003110	Lead Frame	HFB2.0-0.7-8 (N)

**(MIC AMP UNIT)**

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110000960	IC	NJM4558M (T1)
R1	7030000650	Resistor	MCR10EZHZ 180KΩ (184)
R2	7030000650	Resistor	MCR10EZHZ 180KΩ (184)
R3	7030000350	Resistor	MCR10EZHZ 560Ω (561)
R4	7030000620	Resistor	MCR10EZHZ 100KΩ (104)
R5	7030000630	Resistor	MCR10EXHJ 120KΩ (124)
R6	7030000650	Resistor	MCR10EZHZ 180KΩ (184)
R7	7030000550	Resistor	MCR10EZHZ 27KΩ (273)
R8	7030000660	Resistor	MCR10EZHZ 220KΩ (224)
R9	7030000610	Resistor	MCR10EZHZ 82KΩ (823)
R10	7030000610	Resistor	MCR10EZHZ 82KΩ (823)
R11	7030000380	Resistor	MCR10EZHZ 1KΩ (102)
R12	7030000460	Resistor	MCR10EXHJ 4.7KΩ (472)
R13	7030000500	Resistor	MCR10EZHZ 10KΩ (103)
R14	7510000170	Thermistor	157-252-13013-TP
R15	7030000580	Resistor	MCR10EZHZ 47KΩ (473)
C1	4030001100	Ceramic	CRM40 B 102K 50PT
C2	4550002980	Tantalum	TEMSVA 1C 225M1-8L
C3	4030006480	Ceramic	CRM42-6 B 104K 50PT
C4	4030001090	Ceramic	GRM40 B 471K 50PT
C5	4030006480	Ceramic	GRM42-6 B 104K 50PT
C6	4030001090	Ceramic	GRM40 B 471K 50PT
C7	4030000740	Ceramic	GRM40 SL 101J 50PT
C8	4030001100	Ceramic	GRM40 B 102K 50PT
C9	4030000740	Ceramic	GRM40 SL 101J 50PT
C10	4030001110	Ceramic	GRM40 B 222K 50PT
C11	4030000740	Ceramic	GRM40 SL 101J 50PT
C12	4030001130	Ceramic	GRM40 B 103K 50PT
EP1	0910018413	P.C. Board	B 1731C (#677-1)
EP2	6910003110	Lead Frame	HFB2.0-0.7-8 (N)

**(TERMINAL UNIT)**

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1180000530	IC	S-81250HG-RD-T1
R1	7030000550	Resistor	MCR10EZHZ 27KΩ (273)
R2	7030000560	Resistor	MCR10EZHZ 33KΩ (333)
R3	7030000310	Resistor	MCR10EZHZ 270Ω (271)
R5	7030000620	Resistor	MCR10EZHZ 100KΩ (104)
C1	4030001150	Ceramic	GRM40 F 104Z 25PT
C2	4030003620	Ceramic	GRM40 B 103K 25PT
C3	4030001100	Ceramic	GRM40 B 102K 50PT
C5	4550002980	Tantalum	TEMSVA 1C 225M1-8L
C6	4030001090	Ceramic	GRM40 B 471K 50PT
C7	4550000460	Tantalum	TESVA 1C 105M1-8L
C8	4030001090	Ceramic	GRM40 B 471K 50PT
C10	4030001090	Ceramic	GRM40 B 471K 50PT
W1	7030000010	Jumper	MCR10EZHZ JPW (000)

**[TERMINAL UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
J1	6510008170	Connector	07FM-1.0ST
J2	6510008170	Connector	07FM-1.0ST
EP1	0910018576	P.C. Board	B 1754F (#677-1)
EP3	6910003110	Lead Frame	HFB2.0-0.7-8 (N)
EP4	6910003110	Lead Frame	HFB2.0-0.7-8 (N)

**[TUNING UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
D1	1790000460	Diode	MA334B (TX)
D2	1790000460	Diode	MA334B (TX)
D3	1790000460	Diode	MA334B (TX)
D4	1790000460	Diode	MA334B (TX)
R1	7030000660	Resistor	MCR10EZHZ 220KΩ (224)
R2	7030000660	Resistor	MCR10EZHZ 220KΩ (224)
R3	7030000660	Resistor	MCR10EZHZ 220KΩ (224)
R4	7030000660	Resistor	MCR10EZHZ 220KΩ (224)
R5	7030000580	Resistor	MCR10EZHZ 47KΩ (473)
C1	4030003050	Ceramic	GRM40 SL 270J 50PT
C2	4030000550	Ceramic	GRM40 SL 010C 50PT
C4	4030000690	Ceramic	GRM40 SL 390J 50PT
C5	4030001100	Ceramic	GRM40 B 102K 50PT
C6	4030001100	Ceramic	GRM40 B 102K 50PT
C7	4030000680	Ceramic	GRM40 SL 330J 50PT
C8	4030000540	Ceramic	GRM40 SL0R5C 50PT
C9	4030000550	Ceramic	GRM40 SL 010C 50PT
C10	4030000690	Ceramic	GRM40 SL 390J 50PT
C11	4030001100	Ceramic	GRM40 B 102K 50PT
C12	4030001100	Ceramic	GRM40 B 102K 50PT
C13	4030001100	Ceramic	GRM40 B 102K 50PT
W1	7030000010	Jumper	MCR10EZHZ JPW (000)
W2	7120000380	Jumper	JPW 01 R-01
EP1	0910020441	P.C. Board	B 1991A (#677-1)
EP3	6910003110	Lead Frame	HFB2.0-0.7-8 (N)

**[VCO UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1560000430	FET	2SK302-GR (TE85R)
Q2	1530002030	Transistor	2SC3772-3-TA
Q3	1530002030	Transistor	2SC3772-3-TA
Q4	1560000430	FET	2SK302-GR (TE85R)
Q5	1530002030	Transistor	2SC3772-3-TA
D1	1790000530	Diode	MA333 (TW)
D2	1790000530	Diode	MA333 (TW)
D3	1750000080	Diode	1S5153-T2
D4	1750000140	Diode	1S5268 (TE85R)
D5	1750000140	Diode	1S5268 (TE85R)
D6	1720000220	Diode	1SV166-T2B
D7	1720000220	Diode	1SV166-T2B
L1	6200000870	Coil	NL 322522T-2R2M
L2	6200000880	Coil	NL 322522T-4R7M
L3	6200000150	Coil	NL 322522T-1R0M
L4	6130002310	Coil	LB-253

**[VCO UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
L5	6200000870	Coil	NL 322522T-2R2M
L6	6200000870	Coil	NL 322522T-2R2M
L8	6200000890	Coil	NL 322522T-R15M
L9	6200000870	Coil	NL 322522T-2R2M
L10	6200000870	Coil	NL 322522T-2R2M
L11	6130002240	Coil	LB-247
L12	6200000870	Coil	NL 322522T-2R2M
L13	6200000870	Coil	NL 322522T-2R2M
L14	6200000880	Coil	NL 322522T-4R7M
L15	6200000890	Coil	NL 322522T-R15M
R1	7030000620	Resistor	MCR10EZHZ 100KΩ (104)
R2	7030000270	Resistor	MCR10EZHZ 120Ω (121)
R3	7030000500	Resistor	MCR10EZHZ 10KΩ (103)
R4	7030000530	Resistor	MCR10EZHZ 18KΩ (183)
R5	7030000540	Resistor	MCR10EZHZ 22KΩ (223)
R6	7030000390	Resistor	MCR10EZHZ 1.2KΩ (122)
R7	7030000140	Resistor	MCR10EZHZ 10Ω (100)
R8	7030000550	Resistor	MCR10EZHZ 27KΩ (273)
R9	7030000330	Resistor	MCR10EZHZ 390Ω (391)
R10	7030000540	Resistor	MCR10EZHZ 22KΩ (223)
R11	7030000500	Resistor	MCR10EZHZ 10KΩ (103)
R12	7030000500	Resistor	MCR10EZHZ 10KΩ (103)
R13	7030000260	Resistor	MCR10EZHZ 100Ω (101)
R14	7030000500	Resistor	MCR10EZHZ 10KΩ (103)
R15	7030000550	Resistor	MCR10EZHZ 27KΩ (273)
R16	7030000330	Resistor	MCR10EZHZ 390Ω (391)
R17	7030000580	Resistor	MCR10EZHZ 47KΩ (473)
R18	7030000620	Resistor	MCR10EZHZ 100KΩ (104)
R19	7030000740	Resistor	MCR10EZHZ 1MΩ (105)
R20	7030000300	Resistor	MCR10EZHZ 220Ω (221)
C1	4030001100	Ceramic	GRM40 B 102K 50PT
C2	4030000970	Ceramic	GRM40 CH 470J 50PT
C3	4030000850	Ceramic	GRM40 CH 040C 50PT
C4	4030000660	Ceramic	GRM40 SL 180J 50PT
C5	4030000960	Ceramic	GRM40 CH 390J 50PT
C6	4030002560	Ceramic	GRM40 UJ 030C 50PT
C7	4030002560	Ceramic	GRM40 UJ 030C 50PT
C8	4030001100	Ceramic	GRM40 B 102K 50PT
C9	4030001130	Ceramic	GRM40 B 103K 50PT
C10	4030000900	Ceramic	GRM40 CH 100D 50PT
C11	4030001100	Ceramic	GRM40 B 102K 50PT
C12	4030003580	Ceramic	GRM40 CH 270J 50PT
C13	4030001100	Ceramic	GRM40 B 102K 50PT
C14	4030000670	Ceramic	GRM40 SL 220J 50PT
C15	4030000680	Ceramic	GRM40 SL 330J 50PT
C16	4030000700	Ceramic	GRM40 SL 470J 50PT
C17	4030001100	Ceramic	GRM40 B 102K 50PT
C18	4030001100	Ceramic	GRM40 B 102K 50PT
C19	4030001100	Ceramic	GRM40 B 102K 50PT
C20	4030000720	Ceramic	GRM40 SL 680J 50PT
C21	4030000660	Ceramic	GRM40 SL 180J 50PT
C22	4030002560	Ceramic	GRM40 UJ 030C 50PT
C23	4030002560	Ceramic	GRM40 UJ 030C 50PT
C24	4030001100	Ceramic	GRM40 B 102K 50PT
C25	4030001100	Ceramic	GRM40 B 102K 50PT
C26	4030000550	Ceramic	GRM40 SL 010C 50PT
C27	4030000900	Ceramic	GRM40 CH 100D 50PT
C28	4030001100	Ceramic	GRM40 B 102K 50PT
C29	4030001100	Ceramic	GRM40 B 102K 50PT
C30	4030001100	Ceramic	GRM40 B 102K 50PT
C31	4030000540	Ceramic	GRM40 SL 0R5C 50PT
C32	4030001100	Ceramic	GRM40 B 102K 50PT
C33	4030001090	Ceramic	GRM40 B 47K 50PT
C34	4030000560	Ceramic	GRM40 SL 020C 50PT
EP1	0910019885	P.C. Board	B 1904E FX-677



[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1120001590	IC	M5236ML-73A
IC2	1110001550	IC	S-8054ALB-LM-T1
IC3	1180000530	IC	S-81250HG-RD-T1
IC5	1130004590	IC	μPD1722GH-521-2A5
Q1	1510000600	Transistor	2SA1298-Y (TE85R)
Q2	1510000600	Transistor	2SA1298-Y (TE85R)
Q3	1590000900	Transistor	DTC144WK T97
Q4	1510000600	Transistor	2SA1298-Y (TE85R)
Q5	1590000900	Transistor	DTC144WK T97
Q6	1590000930	Transistor	DTA144EK T97
Q8	1590000900	Transistor	DTC144WK T97
Q10	1590000910	Transistor	IMZ2 T108
Q11	1590000930	Transistor	DTA144EK T97
Q12	1530001950	Transistor	2SC2712-GR (TE85R)
Q13	1530001950	Transistor	2SC2712-GR (TE85R)
Q14	1510000110	Transistor	2SA1162-Y (TE85R)
Q15	1590000910	Transistor	IMZ2 T108
Q17	1560000360	FET	2SK209-Y (TE85R)
Q18	1560000360	FET	2SK209-Y (TE85R)
Q19	1590000900	Transistor	DTC144WK T97
Q20	1510000600	Transistor	2SA1298-Y (TE85R)
Q21	1590000910	Transistor	IMZ2 T108
Q22	1590000920	Transistor	DTA114EK T96
Q23	1510000110	Transistor	2SA1162-Y (TE85R)
D1	1790000490	Diode	HSM88AS-TR
D2	1790000650	Diode	MA713 (TX)
D3	1750000060	Diode	1SS196 (TE85R)
D4	1160000070	Diode	DAN202K T96
D6	1160000070	Diode	DAN202K T96
D7	1750000110	Diode	1SS272 (TE85R)
D8	1750000110	Diode	1SS272 (TE85R)
D10	1720000220	Diode	1SV166-T2B
D11	1790000490	Diode	HSM88AS-TR
D13	1160000070	Diode	DAN202K T96
D17	1730000590	Zener	RD3.0M-T2B2
D19	1160000080	Diode	DAP202K T96
X1	6050005550	Crystal	CR-269
R1	7030000460	Resistor	MCR10EZHJ 4.7KΩ (472)
R2	7030000460	Resistor	MCR10EZHJ 4.7KΩ (472)
R3	7030000420	Resistor	MCR10EZHJ 2.2KΩ (222)
R4	7030000580	Resistor	MCR10EZHJ 47KΩ (473)
R5	7030000580	Resistor	MCR10EZHJ 47KΩ (473)
R6	7030000420	Resistor	MCR10EZHJ 2.2KΩ (222)
R7	7030000420	Resistor	MCR10EZHJ 2.2KΩ (222)
R8	7030000260	Resistor	MCR10EZHJ 100Ω (101)
R9	7030000300	Resistor	MCR10EZHJ 220Ω (221)
R14	7030000540	Resistor	MCR10EZHJ 22KΩ (223)
R15	7030000500	Resistor	MCR10EZHJ 10KΩ (103)
R17	7030000500	Resistor	MCR10EZHJ 10KΩ (103)
R18	7030000420	Resistor	MCR10EZHJ 2.2KΩ (222)
R19	7030000360	Resistor	MCR10EZHJ 680Ω (681)
R22	7030000380	Resistor	MCR10EZHJ 1KΩ (102)
R23	7030000420	Resistor	MCR10EZHJ 2.2KΩ (222)
R24	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R25	7030000600	Resistor	MCR10EZHJ 68KΩ (683)
R27	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R28	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R29	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R30	7030000580	Resistor	MCR10EZHJ 47KΩ (473)
R31	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R32	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R33	7030000440	Resistor	MCR10EZHJ 3.3KΩ (332)
R34	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R35	7030000260	Resistor	MCR10EZHJ 100Ω (101)
R36	7030000560	Resistor	MCR10EZHJ 33KΩ (333)
R37	7030000390	Resistor	MCR10EZHJ 1.2KΩ (122)
R38	7030000500	Resistor	MCR10EZHJ 10KΩ (103)

[LOGIC UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R39	7030000580	Resistor	MCR10EZHJ 47KΩ (473)
R40	7030000260	Resistor	MCR10EZHJ 100Ω (101)
R41	7030000500	Resistor	MCR10EZHJ 10KΩ (103)
R42	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R43	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R44	7030000500	Resistor	MCR10EZHJ 10KΩ (103)
R45	7030000520	Resistor	MCR10EZHJ 15KΩ (153)
R46	7510000090	Thermistor	ERT-D2FGL202S
R47	7510000090	Thermistor	ERT-D2FGL202S
R48	7030000500	Resistor	MCR10EZHJ 10KΩ (103)
R49	7030000600	Resistor	MCR10EZHJ 68KΩ (683)
R50	7030000360	Resistor	MCR10EZHJ 680Ω (681)
R51	7030000580	Resistor	MCR10EZHJ 47KΩ (473)
R52	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R53	7030000740	Resistor	MCR10EZHJ 10KΩ (103)
R54	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R55	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R56	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R57	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R58	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R59	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R60	7030000740	Resistor	MCR10EZHJ 1MΩ (105)
R61	7030000500	Resistor	MCR10EZHJ 18KΩ (183)
R62	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R63	7030000740	Resistor	MCR10EZHJ 1MΩ (105)
R64	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R65	7030000340	Resistor	MCR10EZHJ 470Ω (471)
R66	7030000500	Resistor	MCR10EZHJ 10KΩ (103)
R67	7030000500	Resistor	MCR10EZHJ 10KΩ (103)
R68	7030000500	Resistor	MCR10EZHJ 10KΩ (103)
R69	7030000530	Resistor	MCR10EZHJ 18KΩ (183)
R70	7030000360	Resistor	MCR10EZHJ 680Ω (681)
R71	7030000620	Resistor	MCR10EZHJ 100KΩ (104)
R72	7030000440	Resistor	MCR10EZHJ 3.3KΩ (332)
R73	7030002810	Resistor	MCR10EZHFX 3.3KΩ (332)
R74	7030002750	Resistor	MCR10EZHFX 1KΩ (102)
R75	7030000520	Resistor	MCR10EZHJ 15KΩ (153)
R77	7030000660	Resistor	MCR10EZHJ 220KΩ (224)
R78	7030000260	Resistor	MCR10EZHJ 100Ω (101)
R79	7030000440	Resistor	MCR10EZHJ 3.3KΩ (332)
R80	7030000540	Resistor	MCR10EZHJ 22KΩ (223)
R81	7030000280	Resistor	MCR10EZHJ 150Ω (151)
C1	4550003490	Tantalum	DSB 0J 686M
C2	4030001100	Ceramic	GRM40 B 102K 50PT
C3	4550003100	Tantalum	TEMSVB 1A 106M1-12L
C4	4030001100	Ceramic	GRM40 B 102K 50PT
C5	4030001100	Ceramic	GRM40 B 102K 50PT
C6	4030001100	Ceramic	GRM40 B 102K 50PT
C7	4550003100	Tantalum	TEMSVB 1A 106M1-12L
C8	4030000740	Ceramic	GRM40 SL 101J 50PT
C9	4030001100	Ceramic	GRM40 B 102K 50PT
C10	4030001100	Ceramic	GRM40 B 102K 50PT
C11	4030000740	Ceramic	GRM40 SL 101J 50PT
C12	4030001100	Ceramic	GRM40 B 102K 50PT
C13	4550000010	Tantalum	DN 1C 4R7M
C14	4030001140	Ceramic	GRM40 F 103Z 50PT
C16	4030001100	Ceramic	GRM40 B 102K 50PT
C17	4030000630	Ceramic	GRM40 SL 100D 50PT
C18	4030001100	Ceramic	GRM40 B 102K 50PT
C19	4030000740	Ceramic	GRM40 SL 101J 50PT
C20	4030001130	Ceramic	GRM40 B 103K 50PT
C21	4030001140	Ceramic	GRM40 F 103Z 50PT
C22	4030001100	Ceramic	GRM40 B 102K 50PT
C23	4030002770	Ceramic	GRM40 UJ 121J 50PT
C24	4030002770	Ceramic	GRM40 UJ 121J 50PT
C25	4030000740	Ceramic	GRM40 SL 101J 50PT
C26	4030000740	Ceramic	GRM40 SL 101J 50PT
C27	4030001140	Ceramic	GRM40 F 103Z 50PT
C28	4030001100	Ceramic	GRM40 B 102K 50PT
C29	4030000580	Ceramic	GRM40 SL 040C 50PT
C30	4610000520	Trimmer	TZB04N100BA006
C31	4030000740	Ceramic	GRM40 SL 101J 50PT
C32	4550000380	Tantalum	DN 1A 100M

**[LOGIC UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
C33	455000350	Tantalum	DN 1V 010M
C34	4030000710	Ceramic	GRM40 SL 560J 50PT
C35	4030000960	Ceramic	GRM40 CH 390J 50PT
C36	4030001100	Ceramic	GRM40 B 102K 50PT
C37	4030000740	Ceramic	GRM40 SL 101J 50PT
C38	4030000740	Ceramic	GRM40 SL 101J 50PT
C39	4550000400	Tantalum	DN 1C 2R2M
C40	4550002010	Tantalum	DN 1A 6R8M
C41	4030001100	Ceramic	GRM40 B 102K 50PT
C42	4030000740	Ceramic	GRM40 SL 101J 50PT
C43	4030001100	Ceramic	GRM40 B 102K 50PT
C44	4030000740	Ceramic	GRM40 SL 101J 50PT
C45	4030000740	Ceramic	GRM40 SL 101J 50PT
C46	4030000740	Ceramic	GRM40 SL 101J 50PT
C47	4030000740	Ceramic	GRM40 SL 101J 50PT
C48	4030000740	Ceramic	GRM40 SL 101J 50PT
C49	4030000740	Ceramic	GRM40 SL 101J 50PT
C50	4550000460	Tantalum	TESVA 1C 105M1-8L
C51	4030000740	Ceramic	GRM40 SL 101J 50PT
C52	4030000740	Ceramic	GRM40 SL 101J 50PT
C53	4030000570	Ceramic	GRM40 SL 030C 50PT
C54	4550003030	Tantalum	TEMSVA 0J 475M1-8L
C55	4550003110	Tantalum	TEMSVC 1A 226M1-12L
C56	4550000010	Tantalum	DN 1C 4R4M
C57	4030003580	Ceramic	GRM40 CH 270J 50PT
C58	4030001100	Ceramic	GRM40 B 102K 50PT
C59	4030001100	Ceramic	CRM40 B 102K 50PT
C60	4030001100	Ceramic	GRM40 B 102K 50PT
C61	4030001100	Ceramic	GRM40 B 102K 50PT
C62	4030001100	Ceramic	GRM40 B 102K 50PT
C63	4030001100	Ceramic	GRM40 B 102K 50PT
C64	4030001150	Ceramic	GRM40 F 104Z 25PT
C65	4030001150	Ceramic	GRM40 F 104Z 25PT
C66	4030001100	Ceramic	GRM40 B 102K 50PT
S1	2260000580	Switch	SKHLAD035A
BT1	3020000060	Lithium Battery	CR1220-1VF
W9	7030000010	Jumper	MCR10EZHZ JPW (000)
W10	7030000010	Jumper	MCR10EZHZ JPW (000)
W13	7120000380	Jumper	JPW 01 R-01
J1	6450000130	Connector	HSJ1102-01-540
J2	6450000110	Connector	HSJ0836-01-010
J3	6510009370	Connector	B4B-ZR
J4	6510009370	Connector	B4B-ZR
J5	6510008270	Connector	PI28B-05M
EP1	0910020956	P.C. Board	B 1931F FX-677
EP5	0910019722	P.C. Board	B 1903B

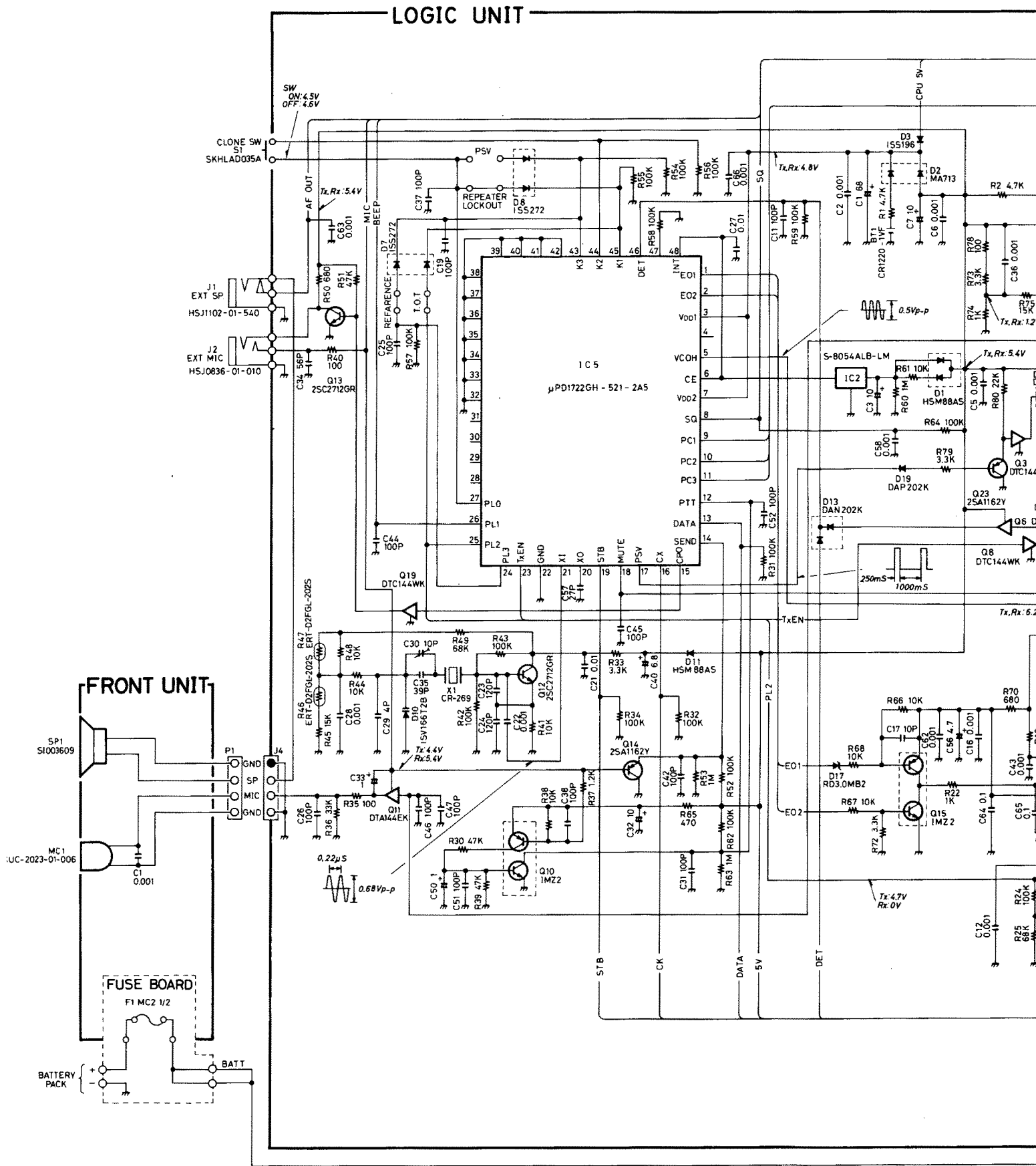
**[TONE UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION	
D1	1750000130	Diode	DA204U T107
D2	1750000050	Diode	1SS193 (TE85R)
X1	6050005090	Crystal	CR-245
R1	7030002280	Resistor	MCR03EZHZ 10KΩ (103)
R2	7030002300	Resistor	MCR03EZHZ 15KΩ (153)
R3	7030002440	Resistor	MCR03EZHZ 150KΩ (154)
R4	7030002200	Resistor	MCR03EZHZ 2.2KΩ (222)
R5	7030002280	Resistor	MCR03EZHZ 10KΩ (103)
R6	7030002280	Resistor	MCR03EZHZ 10KΩ (103)
R7	7030002420	Resistor	MCR03EZHZ 100KΩ (104)
R8	7030002360	Resistor	MCR03EZHZ 47KΩ (473)
R9	7030002320	Resistor	MCR03EZHZ 22KΩ (223)
R10	7310001410	Trimmer	RH04A3AJ4J01A (223)
R11	7030002420	Resistor	MCR03EZHZ 100KΩ (104)
R12	7030002420	Resistor	MCR03EZHZ 100KΩ (104)
R13	7030002550	Resistor	MCR03EZHZ 1MΩ (105)
R14	7030002240	Resistor	MCR03EZHZ 4.7KΩ (472)
R15	7030002590	Resistor	MCR03EZHZ 2.2MΩ (225)
C1	4030001150	Ceramic	GRM40 F 104Z 25PT
C2	4030001150	Ceramic	GRM40 F 104Z 25PT
C3	4030003880	Ceramic	GRM39 SL 180J 50PT
C4	4030003880	Ceramic	GRM39 SL 180J 50PT
C5	4550000700	Tantalum	TESVC 0G 336M-12L
C6	4030003890	Ceramic	GRM39 B 471K 50PT
C7	4550000460	Tantalum	TESVA 1C 105M1-8L
C8	4550000460	Tantalum	TESVA 1C 105M1-8L
C9	4030001150	Ceramic	GRM40 F 104Z 25PT
J1	6510007110	Connector	PI28A-10M
EP1	0910024040	P.C. Board	B 2321 FX-677

**[TONE UNIT]**

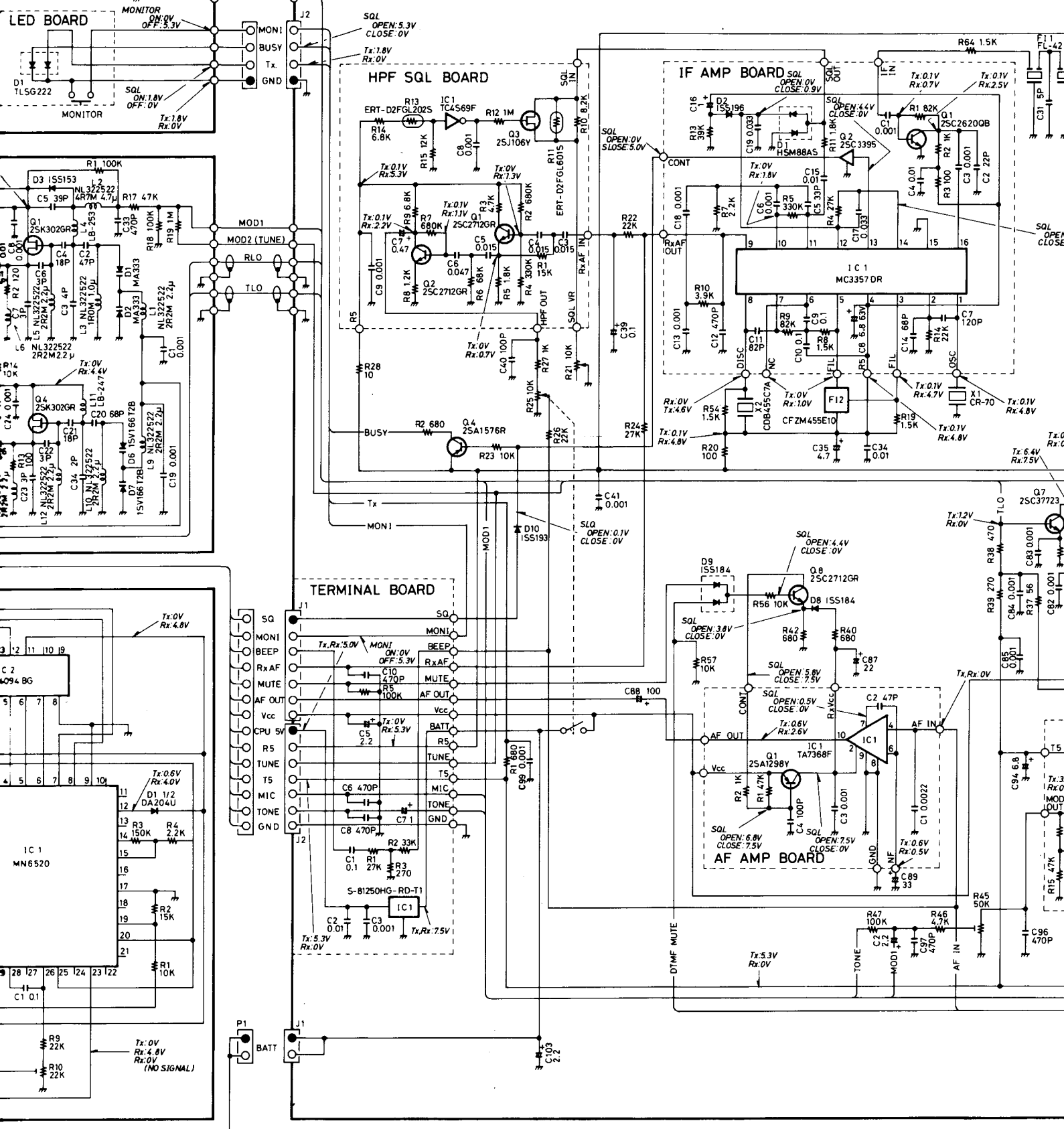
REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130001830	IC	MN6520
IC2	1130000830	IC	μPD4094BG-T1
IC3	1130003760	IC	TC4S81F (TE85R)
IC4	1130003760	IC	TC4S81F (TE85R)
Q1	1590000720	Transistor	DTA144EU T107
Q2	1590000720	Transistor	DTA144EU T107
Q3	1590000430	Transistor	DTC144EU T107
Q4	1530002060	Transistor	2SC4081 T107 R

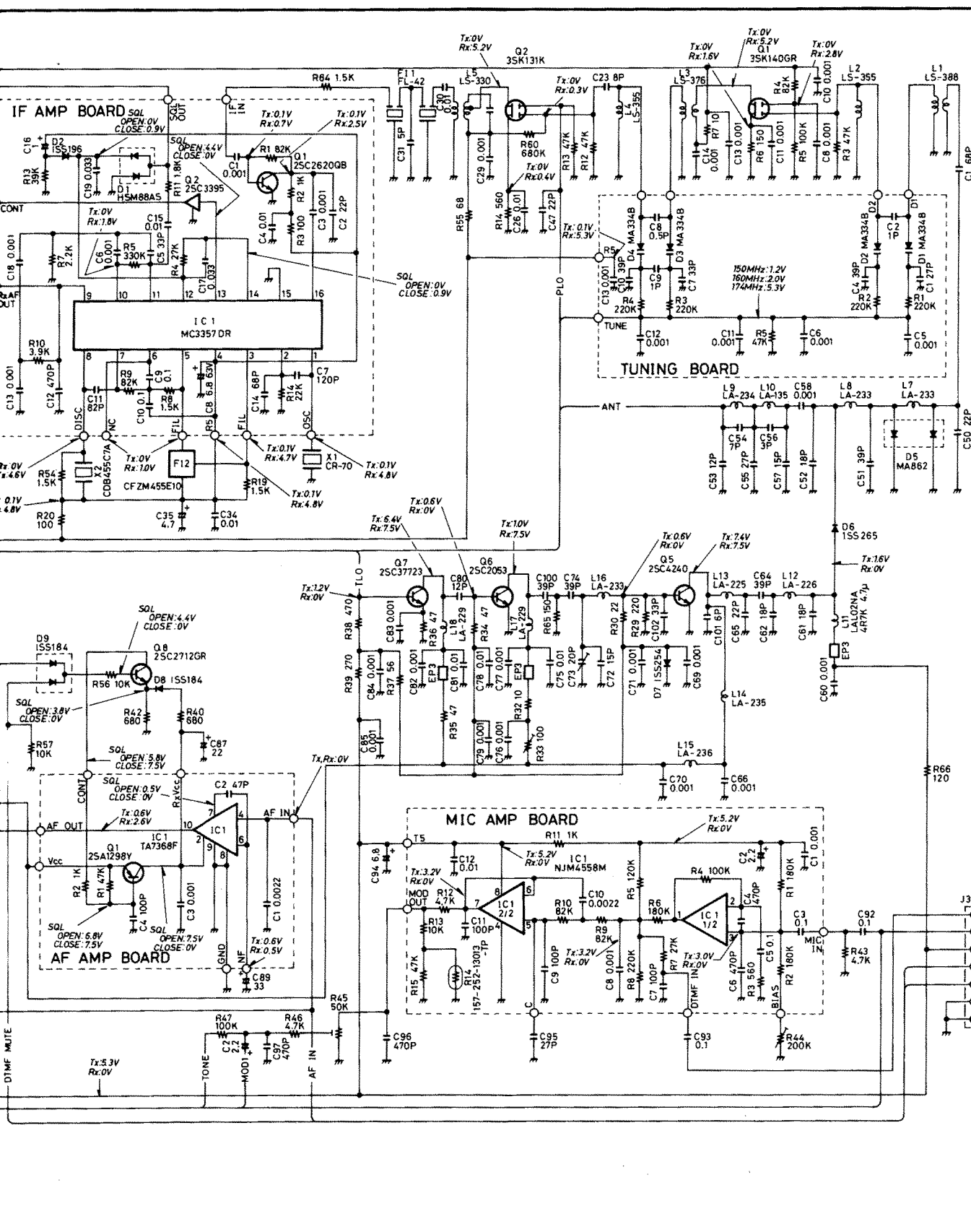
# SECTION 9 VOLTAGE DIAGRAM





# RF UNIT





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