ICOM

SERVICE MANUAL

UHF TRANSCEIVER

IC-F20

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **IC-F20** UHF TRANSCEIVER at the time of publication.

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 15 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**〉

1110003490	S. IC	TA31136FN(D)	IC-F20	RF UNIT	5 pieces
8810008620	Screw	PH BT M2×20 ZK	IC-F20	Rear panel	10 pieces

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

REPAIR NOTES

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its 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 40 dB to 50 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.

EXPLICIT DEFINITIONS

VERSIONS

LMR (Land Mobile Radio)	U.S.A. version
PMR (Private Mobile Radio)	Other versions

FREQUENCY COVERAGE

[400] band	400–430 MHz
[440] band	440–470 MHz
[470] band	470–490 MHz
[490] band	490–520 MHz
[#09] band	425–432 MHz (TX), 440–450 MHz (RX)

CHANNEL SPACING

Narrow-type	12.5 kHz
Middle-type	20 kHz
Wide-type	25 kHz

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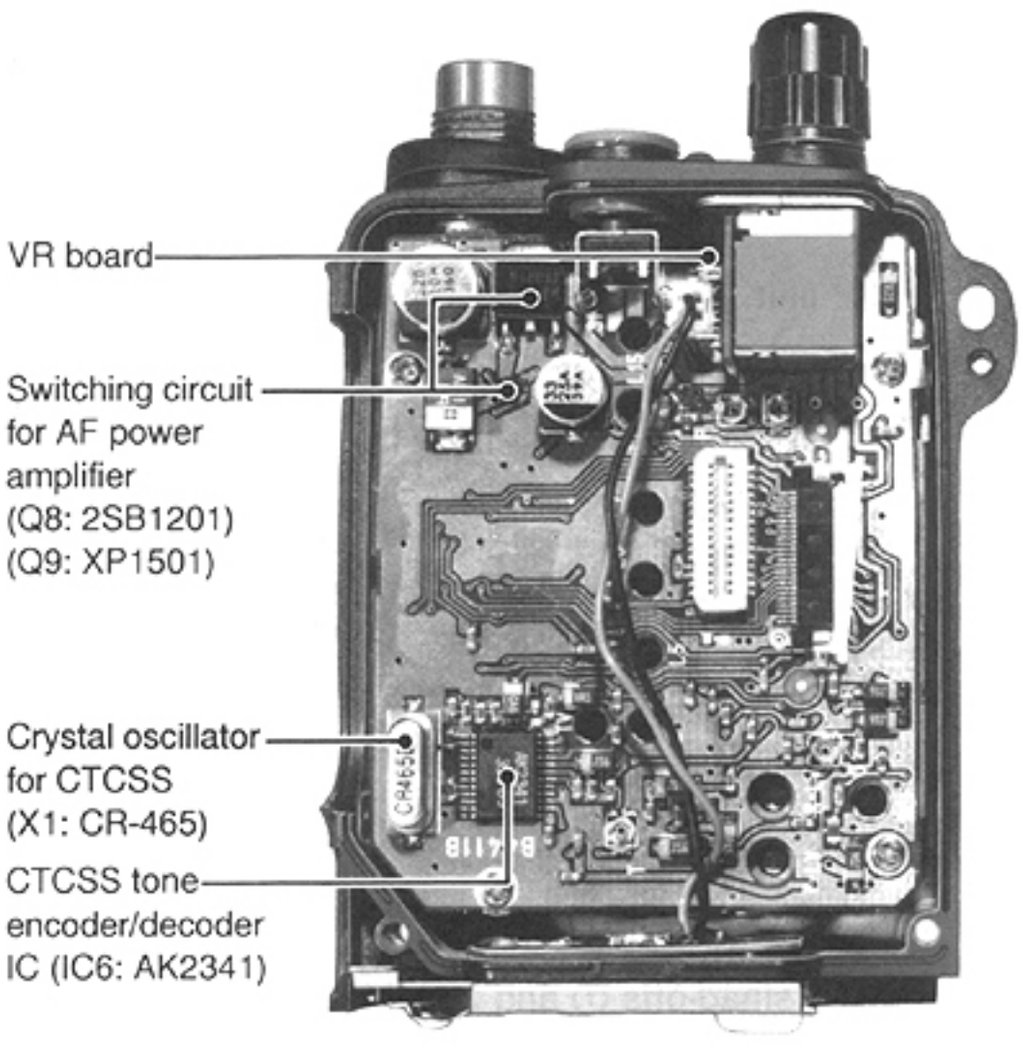
SECTION 1 SPECIFICATIONS

		LMR	PMR
GENERAL	Frequency coverage	400–430 MHz [400] band 440–470 MHz [440] band 470–490 MHz [470] band 490–512 MHz [490] band	400–430 MHz [400] band 440–470 MHz [440] band 470–490 MHz [470] band 490–520 MHz [490] band Tx: 425–432 MHz, Rx: 440–450 MHz [#09] band
	Mode	16K0F3E	16K0F3E (Wide-type) 14K0F3E (Middle-type) 8K50F3E (Narrow-type)
	Number of memory channels	24 channels	
	Antenna impedance	50 Ω (nominal)	
	Usable temperature range	−30°C to +60°C [−22°F to +140°F]	−25°C to +55°C
	Channel spacing	25 kHz	25 kHz (Wide-type) 20 kHz (Middle-type) 12.5 kHz (Narrow-type)
	Power supply requirement	7.2–12.0 V DC (acceptable BP-157A, BP-160, BP-174)	
	Current drain (at 12 V)	Receive standby: 70 mA max. audio output: 250 mA Transmit high: 2.5 A low: 1.0 A	
	Dimensions (with BP-160)	57 (W)×35 (D)×125 (H) mm; 2 1/4 (W)×1 3/8 (D)×4 15/16 (H) in	
	Weight (incl. antenna, BP-130A)	340 g/12 oz	
RECEIVER	Measurement method	EIA/TIA-316C	ETS300 086 or CEPT T/R24
	Receive system	Double-conversion superheterodyne	
	Intermediate frequency	1st: 45.15 MHz 2nd: 455 kHz	
	Sensitivity	0.35 µV for 12 dB SINAD	0.71 µV for 20 dB SINAD
	Squelch threshold sensitivity	0.35 µV	0.71 µV
	Adjacent channel selectivity	70 dB	70 dB (Wide-type, Middle-type) 60 dB (Narrow-type)
	Spurious response	70 dB	70 dB
	Image rejection	70 dB	—
	Intermodulation rejection	65 dB	65 dB
	Blocking or desensitization	—	84 dB
	Frequency tolerance	±0.0005%	±1.5 kHz
	Audio output power	350 mW with an 8 Ω load	
	Audio frequency response	−3 dB to +1 dB in a 6 dB/octave range	
	Noise and hum	40 dB	40 dB
TRANSMITTER	Measurement method	EIA/TIA-316C	ETS300 086 or CEPT T/R24
	RF output power (at 12.0 V)	4 W (high); 1 W (low)	
	Modulation system	Variable reactance frequency modulation	
	Maximum frequency deviation	±5.0 kHz	±5.0 kHz (Wide-type) ±4.0 kHz (Middle-type) ±2.5 kHz (Narrow-type)
	Spurious emissions	−70 dB	0.25 µW
	Frequency tolerance	±0.0005%	±1.5 kHz
	Adjacent channel power	—	−70 dB (Wide-type, Middle-type) −60 dB (Narrow-type)
	Noise and hum	40 dB	40 dB
	Limiting of modulator	70% to 100% deviation	

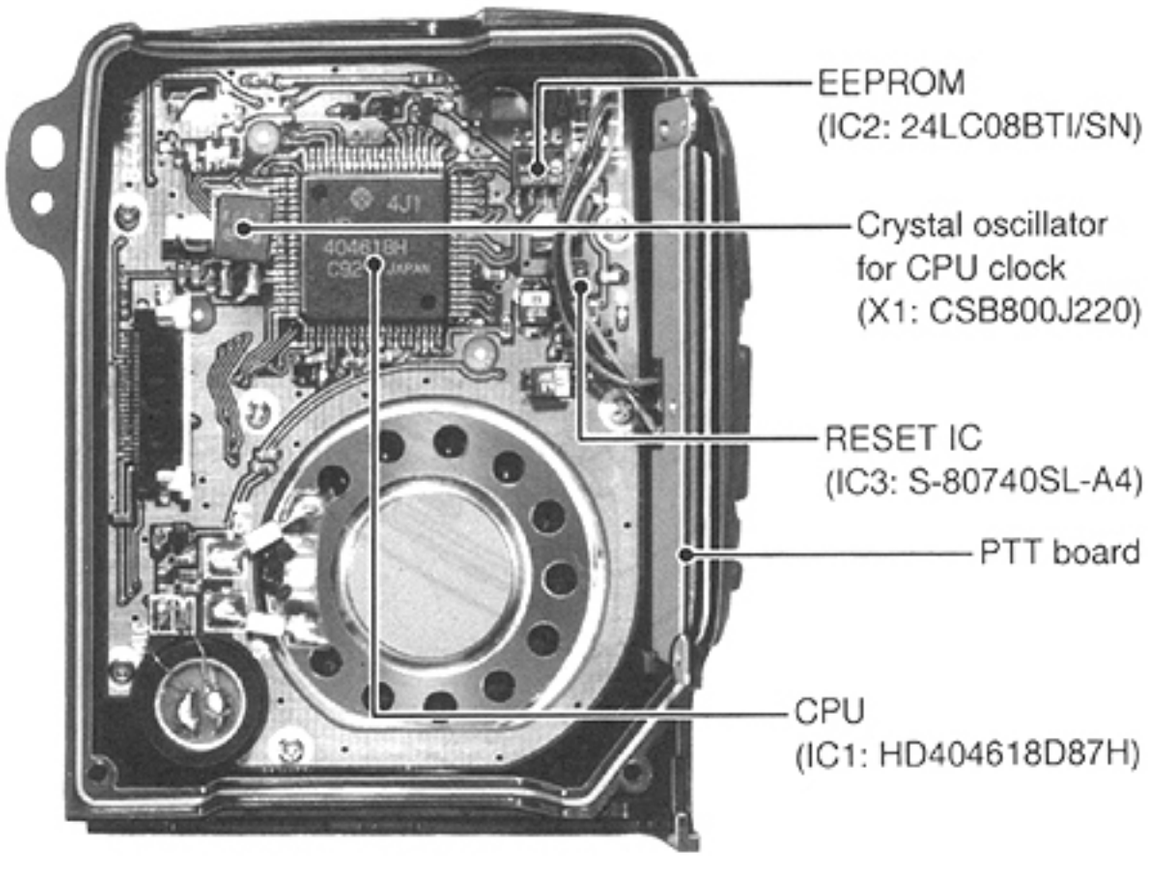
All stated specifications are subject to change without notice or obligation.

SECTION 2 INSIDE VIEWS

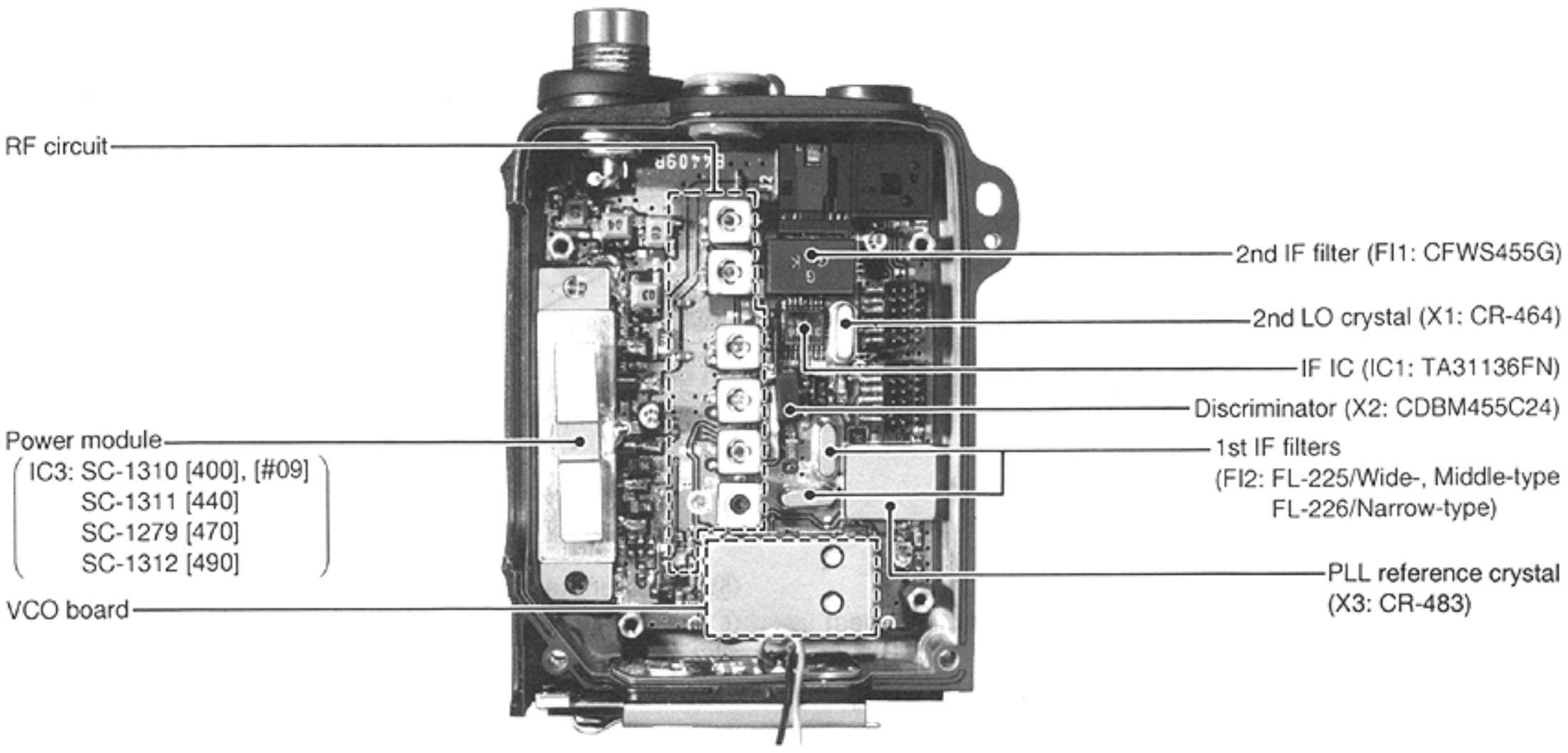
• MAIN UNIT



• LOGIC-A UNIT

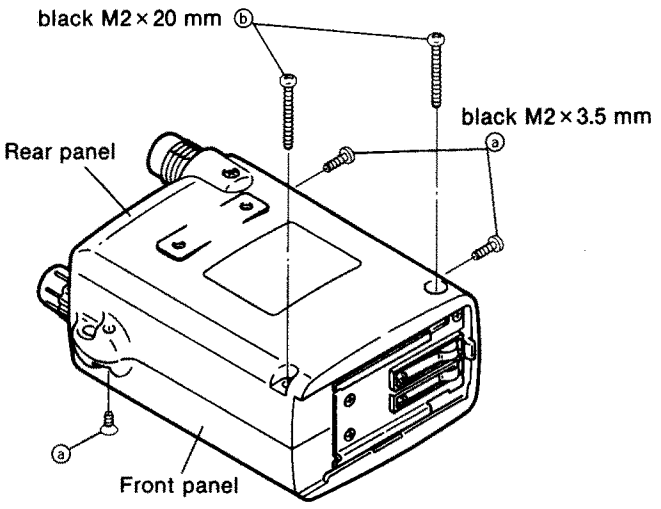


• RF UNIT



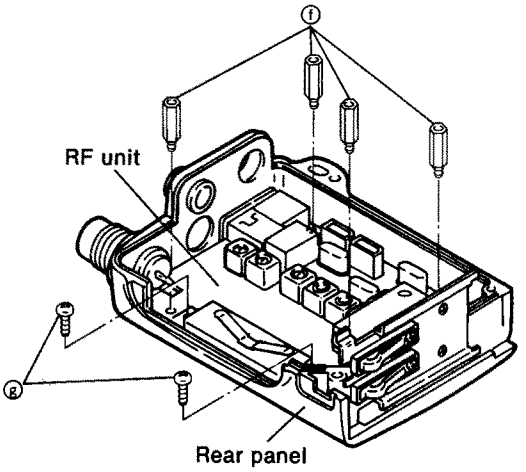
SECTION 3 DISASSEMBLY INSTRUCTIONS

• SEPARATING THE FRONT PANEL AND REAR PANEL



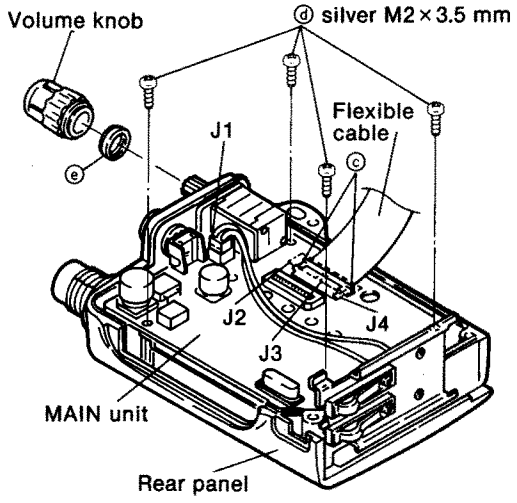
① Remove 3 screws ⓐ and 2 screws ⓑ to separate the front panel and the rear panel.

• REMOVING THE RF UNIT



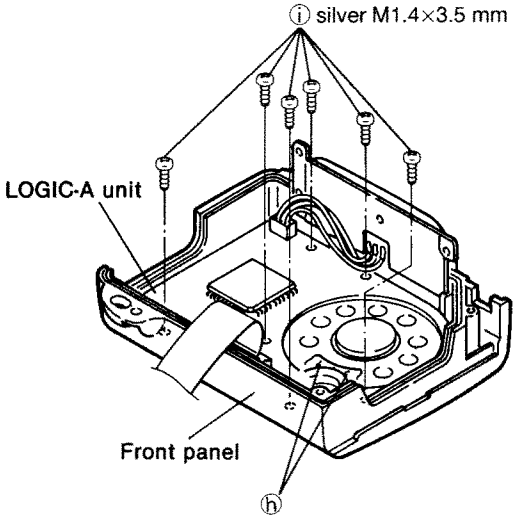
④ Remove 4 stnad-offs ⓕ and 2 screws ⓖ.

• REMOVING THE MAIN UNIT



② Unplug the connector J1.
Pull the points ⓒ of the connector J4, and disconnect the flexible cable.
③ Remove 4 screws ⓓ, pull the volume knob off and remove the VR nut ⓔ. Unplug connectors J2 and J3 at reversed side of the MAIN unit to remove it.

• REMOVING THE LOGIC-A UNIT

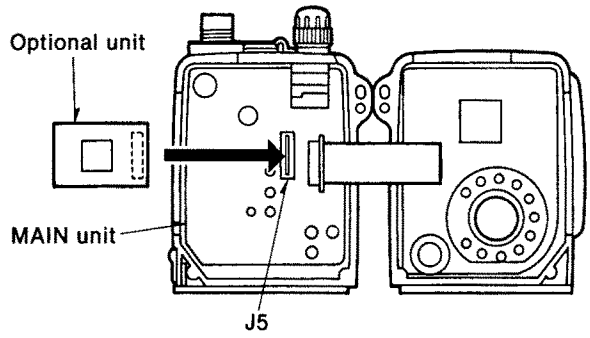


⑤ Unsolder the speaker ⓗ (2 points).
⑥ Remove 6 screws ⓘ.
And then lift up the LOGIC-A unit.

SECTION 4 OPTION INSTALLATIONS

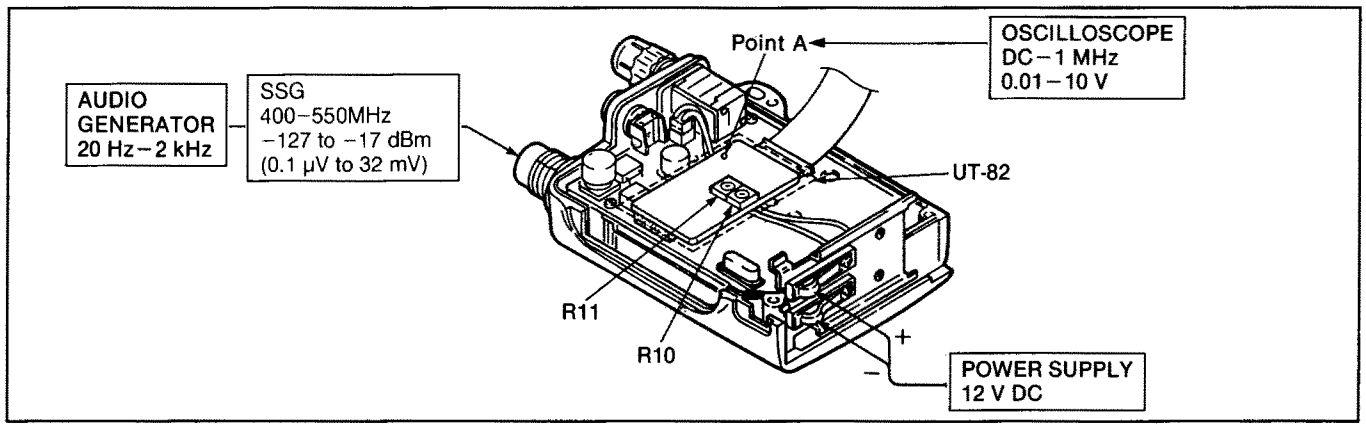
4-1 OPTION INSTALLATIONS

① Separate the front and rear panels as described in Section 3.
② Install one of optional units, UT-80, UT-96 or UT-97, to the connector (J5) as shown at right.



4-2 UT-80 2-TONE UNIT ADJUSTMENT

CONNECTION



	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT	
		UNIT	LOCATION		UNIT	ADJUST
1	• Operating channel: 2-tone decoder function programmed channel • Connect an SSG to the antenna connector and set as: Level : 1 mV (–47 dBm) Deviation : ±3.5 kHz (Wide-type) ±2.8 kHz (Middle-type) ±1.75 kHz (Narrow-type) Modulation: desired 1st tone frequency (refer to standard group below) • Receiving	UT-80	Connect an oscilloscope to the point A.	Maximum wave form	UT-80	R11
2	• Connect the SSG to the antenna connector and set as: Modulation: desired 2nd tone frequency					R10

STANDARD GROUPS FOR 2-TONE SEQUENTIAL SIGNALING

Group	0	1	2	3	4	5	6	7	8	9	DG
Group 1	330.5	349.0	368.5	389.0	410.8	433.7	457.9	483.5	510.5	539.0	569.1
Group 2	569.1	600.9	634.5	669.9	707.3	746.8	788.5	832.5	879.0	928.1	979.9
Group 3	1092.4	288.5	296.5	304.7	313.0	953.7	979.9	1006.9	1034.7	1063.2	569.1
Group 4	321.7	339.6	358.6	378.6	399.8	422.1	445.7	470.5	496.8	524.6	569.1
Group 5	553.9	584.8	617.4	651.9	688.3	726.8	767.4	810.2	855.5	903.2	979.9

4-3 UT-96 5-TONE UNIT/UT-97 DTCS UNIT ADJUSTMENT

Refer to page 6-3 transmitter adjustment.

SECTION 5 CIRCUIT DESCRIPTION

5-1 RECEIVER CIRCUITS

5-1-1 ANTENNA SWITCHING CIRCUIT (RF UNIT)

Received signals pass through a low-pass filter (L12—L14). The filtered signals are applied to the $\lambda/4$ type antenna switching circuit (D8, L10, L11, C56—C58).

The antenna switching circuit functions as a low-pass filter while receiving. However, its impedance becomes very high while D8 is turned ON. Thus, transmit signals are blocked from entering the receiver circuits. The antenna switching circuit employs a $\lambda/4$ type diode switching system. The passed signals are then applied to the RF circuit.

5-1-2 RF CIRCUIT (RF UNIT)

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

The signals from the antenna switching circuit pass through the tunable bandpass filter (D6, D16), and are then applied to the RF amplifier (Q4). The amplified signals are passed through the tunable bandpass filter (D3—D5) to suppress unwanted signals.

D3—D6 and D16 employ varactor diodes that track the bandpass filters and are controlled by the PLL lock voltage. These diodes tune the center frequency of an RF passband for wide bandwidth receiving and good image response rejection.

5-1-3 1ST MIXER AND 1ST IF CIRCUITS (RF UNIT)

The 1st mixer circuit converts the received signal to fixed frequency of the 1st IF signal with the PLL output frequency. By changing the PLL frequency, only the desired frequency will be passed through a pair of crystal filters at the next stage of the 1st mixer.

The signals from the RF circuit are mixed at Q2 with a 1st LO signal coming from the VCO board to produce a 45.15 MHz 1st IF signal.

After passing through the matching circuit (L2), the 1st IF signal is applied to a pair of crystal filters (FI2) to suppress out-of-band signals. The 1st IF signal is amplified at the IF amplifier (Q1) and applied to the 2nd mixer circuit (IC1, pin 16).

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

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

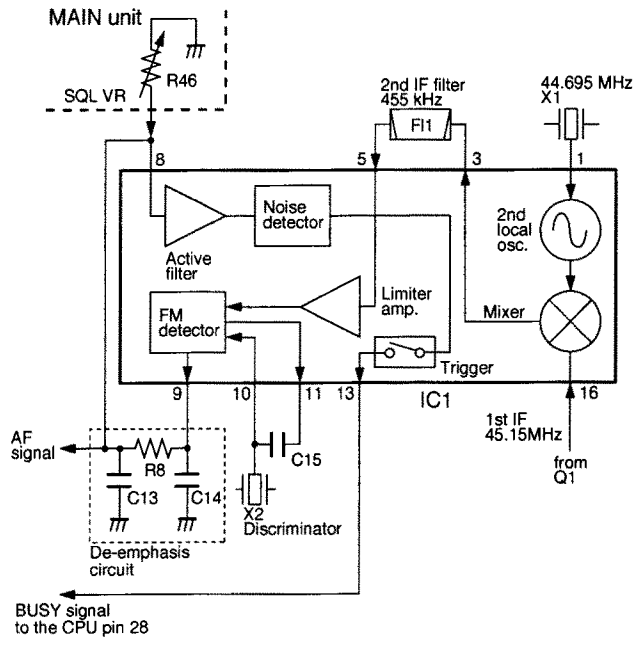
The 1st IF signal from Q1 is applied to the 2nd mixer section of IC1 (pin 16), and is mixed with the 2nd LO signal to be converted to a 455 kHz 2nd IF signal.

IC1 contains the 2nd mixer, 2nd local oscillator, limiter amplifier and quadrature detector circuits. The 2nd local oscillator section and X1 generate 44.695 MHz for the 2nd LO signal.

The 2nd IF signal (455 kHz) from the 2nd mixer (IC1, pin 3) passes through the ceramic filter (FI1) where unwanted signals are suppressed. It is then amplified at the limiter amplifier section (IC1, pin 5) and applied to the quadrature detector section (IC1, pins 10, 11 and ceramic discriminator X2) to demodulate the 2nd IF signal into AF signals.

AF signals output from IC1 (pin 9) passes through the CTCSS encoder/decoder IC (IC6, pins 1, 5) on the MAIN unit. When the CTCSS squelch is in use, the tone decoded signal ("Low" when matched) is applied to the CPU (LOGIC-A unit IC1, pin 27) via the pin 14. The AF signals are also applied to the connector for an optional unit. The noise detect (BUSY) signal output from IC1 (pin 13) is applied to the CPU (pin 28).

• 2ND IF AND DEMODULATOR CIRCUITS



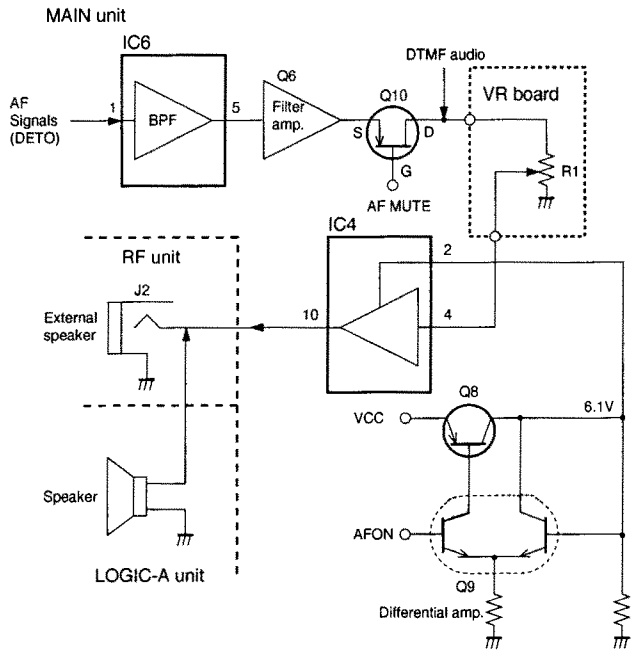
5-1-5 AF AMPLIFIER CIRCUIT (MAIN UNIT)

The AF amplifier circuit, including an AF mute switch, amplifies the demodulated signal to drive a speaker.

The filtered signals pass through the AF mute switch (Q10) via the filter amplifier (Q6) and [VOL] control (VR board R1) and are then applied to the AF power amplifier (IC4, pin 4). AF signals are power-amplified at the AF power amplifier (IC4) to drive the speaker.

The AF amplifier regulator (Q8, Q9) supplies sufficient voltage to drive the AF power amplifier. The AFON signal from the data expander (IC3) controls Q9 to reduce the current drain while the squelch is closed.

• AF AMPLIFIER CIRCUIT



5-1-6 SQUELCH CIRCUIT (RF UNIT)

The noise 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 mute switch.

Some of noise components in the AF signals from the 2nd IF IC (IC1, pin 9) are applied to the pin 8 via C12. The SQL control (MAIN unit R46) adjusts the pin 8 input level.

The active filter section in IC1 amplifies noise components of frequency 20 kHz or higher. Output signals are rectified and are converted to DC voltage in the noise detector section. And detected signals are output from the pin 13.

The signal is applied to the CPU (LOGIC-A unit IC1, pin 28) through the BUSY signal line. The CPU outputs the AF mute signal via the data expander (MAIN unit IC3) to activate the AF mute switch (MAIN unit Q10).

5-2 TRANSMITTER CIRCUITS

5-2-1 MICROPHONE AMPLIFIER (MAIN UNIT)

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

The AF signals from the built-in microphone (LOGIC-A unit), or from the [MIC] jack (RF unit), are applied to IC1 (pin 16) via the mic mute switch (Q1), and are pre-emphasized to +6 dB/octave. IC1 functions as the microphone amplifier and the limiter.

The output signals from IC1 (pin 8) pass through the FM deviation adjuster (R8) and are applied to the modulation circuit on the VCO board via the low-pass filter and AF amplifier.

Q6 on the LOGIC unit is the PTT control circuit, and outputs "High" to the CPU when transmitting.

5-2-2 MODULATION CIRCUIT (VCO BOARD)

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

The "VMOD" signal changes the reactance of D3 to modulate the oscillated signal at the T-VCO circuit (Q5, D2). The oscillated signal is buffer-amplified at Q3, and Q11 on the RF unit. The amplified signal passes through the transmit/receive switching circuit (D13, D12) on the RF unit and is then applied to the drive amplifier circuit.

5-2-3 DRIVE AMPLIFIER CIRCUIT (RF UNIT)

The drive amplifier circuit amplifies the VCO oscillating signal to the needed level at the power amplifier.

The signal from the transmit/receive switching circuit (D13) is amplified at the pre-drive amplifier (Q13) and is then amplified again at the drive amplifier (Q14).

5-2-4 RF POWER AMPLIFIER (RF UNIT)

IC3 is a power module which provides a stable 4 W (at 12.0 V DC) of output power.

The RF signal from the drive amplifier (Q14) is applied to the power amplifier (IC3, pin 1). The amplifier signal is output from IC3 (pin 5). The output signal is applied to the antenna connector through the APC detector circuit, the antenna switching circuit and the low-pass filter circuit.

5-2-5 APC CIRCUIT (RF UNIT)

The APC circuit protects the power module (IC5) from a mismatched output load and selects HIGH and LOW output power.

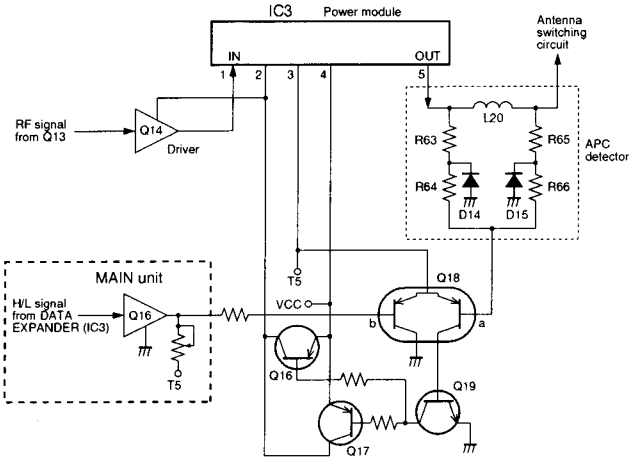
The APC detector circuit (D14, D15, L20) detects forward signals and reflection signals at D14 and D15 respectively. The combined voltage is at a minimum level when the antenna is matched at 50 Ω and is increased when it is mismatched.

The detected voltage is applied to the differential amplifier circuit (Q18a). The APC reference voltage is determined by the power output control circuit (MAIN unit Q16). The APC reference voltage is applied to the base of Q18b.

When the antenna impedance is mismatched, the base voltage of Q18a exceeds the reference voltage. The collector voltage of Q18a decreases.

The current from the differential amplifier circuit (Q18a, Q18b) is amplified at Q19, then controls the bias voltage of the power module (IC3) and drive amplifier (Q14) until the base voltage of Q18a reaches the same level as the voltage of Q18b.

• APC CIRCUIT



5-3 PLL CIRCUITS

5-3-1 GENERAL

A PLL circuit provides stable oscillation of the transmit frequency and the receive local frequency. The PLL circuit compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by a crystal oscillator and the divided ratio (N-data) of a programmable divider.

5-3-2 PLL CIRCUIT (RF UNIT)

The PLL circuit, using a one chip PLL IC (IC2), directly generates the transmit frequency and receive 1st LO frequency with a VCO. The PLL IC sets the divided ratio based on serial data from the CPU on the LOGIC unit and compares the phases of the VCO signal and the reference oscillator frequency. The PLL IC detects the out-of-step phase and outputs it from pin 7.

5-3-3 REFERENCE OSCILLATOR CIRCUIT (RF UNIT)

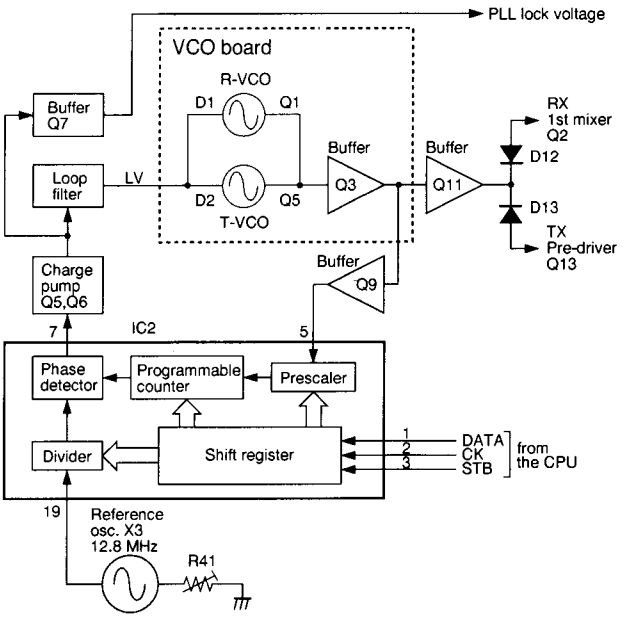
A 12.8 MHz stable frequency is oscillated at X3. The frequency is adjusted with R41. The frequency is divided by 2560 or 2048 to obtain the PLL reference frequency (5 kHz or 6.25 kHz).

5-3-4 PROGRAMMABLE DIVIDER AND PHASE DETECTOR CIRCUITS (RF UNIT)

The VCO generated signal (PLL LO signal) is amplified at Q9, and is applied to the PLL IC (IC2, pin 5). The PLL LO signal is divided at the programmable divider section and is then applied to the phase detector section.

The phase detector compares the input signal and the reference frequency, and outputs the out of phase signal (pulse signal) from pin 7.

• PLL CIRCUIT



5-3-5 CHARGE PUMP AND LOOP FILTER CIRCUITS (RF UNIT)

The phase detected signal is applied to the charge pump (Q5, Q6) and the lag-lead loop filter (R35, C76). The loop filter converts the pulse signal to DC voltage while increasing the DC voltage range.

5-3-6 VCO CIRCUIT (VCO BOARD)

The VCO circuit, which contains separate receive (Q1, D1) and transmit (Q5, D2) VCOs, generates the receive 1st LO frequency and the transmit frequency respectively. The varactor diodes (D1, D2) provide frequency control. The output signal from Q1 or Q5 is buffer-amplified at Q3 and is then applied to the PLL IC (RF unit IC2, pin 5) through Q9.

On the other hand, the output signal from the collector of Q3 is buffer-amplified at Q11 on the RF unit. These buffer amplifiers amplify VCO oscillation and do not permit subsequent circuits to affect the VCO oscillation. The amplified signal is applied to the transmit/receive switching circuit (RF unit D13, D12).

5-4 POWER SUPPLY CIRCUITS

5-4-1 VOLTAGE LINES

LINE	DESCRIPTION
HV	This voltage is supplied from the battery pack (CONNECT unit).
VCC	This voltage passes through the power switch with [VOL] control (R1) on the VR board and is then applied to the 5 V regulator circuit (MAIN unit). This VCC is used for the transmitter circuit.
+5	Common 5 V converted from the VCC line by the 5 V regulator circuit (Q4, Q5) using the reference regulator (IC2) on the MAIN unit.
R5S	Receive 5 V controlled at Q7 using the "R5SC" signal from IC3 on the MAIN unit. This voltage is used for power saver control in the receiver circuit.
T5	5V for transmitter circuit controlled by the "T5C" signal from the CPU (LOGIC-A unit). The "T5" regulator is located on the MAIN unit and consists of Q11, Q12 and D5.

5-5 PORT ALLOCATIONS

5-5-1 CPU (LOGIC-A UNIT IC1)

PIN NO.	PORT NAME	DESCRIPTION
1	PSTB	Outputs strobe signals for serial data to the PLL IC (IC2) on the RF unit.
2	ISTB	Outputs strobe signals for serial data to the data expander IC (IC3) and the CTCSS IC (IC6) on the MAIN unit.
3	LMPO	Output port for the LCD backlight
4	CLOT	Outputs cloning signal.
5	T5C	Outputs transmit/receive switching control signal. "High": Transmit
7	PTT	Input port for the [PTT] switch "High": Switch is pushed
8	VC REF	Reference voltage input terminal
9	S SW	Input port for [S] switch "Low": Switch is pushed
10	KEY	Input port for [F], [LIGHT] and [MONI] switches with different voltage
22, 23–26	K03, KI0–KI3	Input ports for key return signal from the [P0] to [P3] switches
27	TSQL	This port receives "Low" when CTCSS IC (MAIN unit IC6) detect the tone.
28	BUSY/ UNLK	Input port for busy signal while receiving and unlock signal while transmitting Note that R5SC is at "High" while transmitting. Squelch open during Rx: "Low" Squelch close during Rx: "High" PLL unlocked during Tx: "High" PLL locked during Tx: "Low"
30	CLIN	Input port for cloning signal
31–69	—	Outputs LCD drive signals.
70, 71	TONEC, TONER	Outputs DTMF code signals.
76	RESET	Input port for reset signal "Low" to "High": CPU reset
77	EECK	Outputs clock signal to the EEPROM (IC2).
78	EEDT	Data bus line for the EEPROM (IC2)
79	CK	Outputs clock signal for data expander (MAIN unit IC3) and CTCSS IC (MAIN unit IC6).

5-5-2 DATA EXPANDER (MAIN UNIT IC3)

PIN NO.	PORT NAME	DESCRIPTION
1	STRB	Input port for a strobe signal from the CPU
2	DATA	Input port for serial data from the CPU
3	CLK	Input port for the clock signal from the CPU
5	MMUTE	Outputs a microphone mute signal. "High": Microphone mute
6	AFON	Outputs the AF power amplifier control signal. "High": AF amplifier activates "Low": AF amplifier deactivates
7	AFMUTE	Output port for the receive muting signal to cut the audio line
10	SDATA	Outputs serial data for the tone encoder.
12	R5SC	Outputs an R5S control signal. Outputs "Low" while receiving and the power saver does not function.
13	+5SC	Outputs a power save control signal. Outputs "Low" while the power saver idles circuits.
14	LOW	Outputs a transmit high/low switching signal. "High" for low power

SECTION 6 ADJUSTMENT PROCEDURES

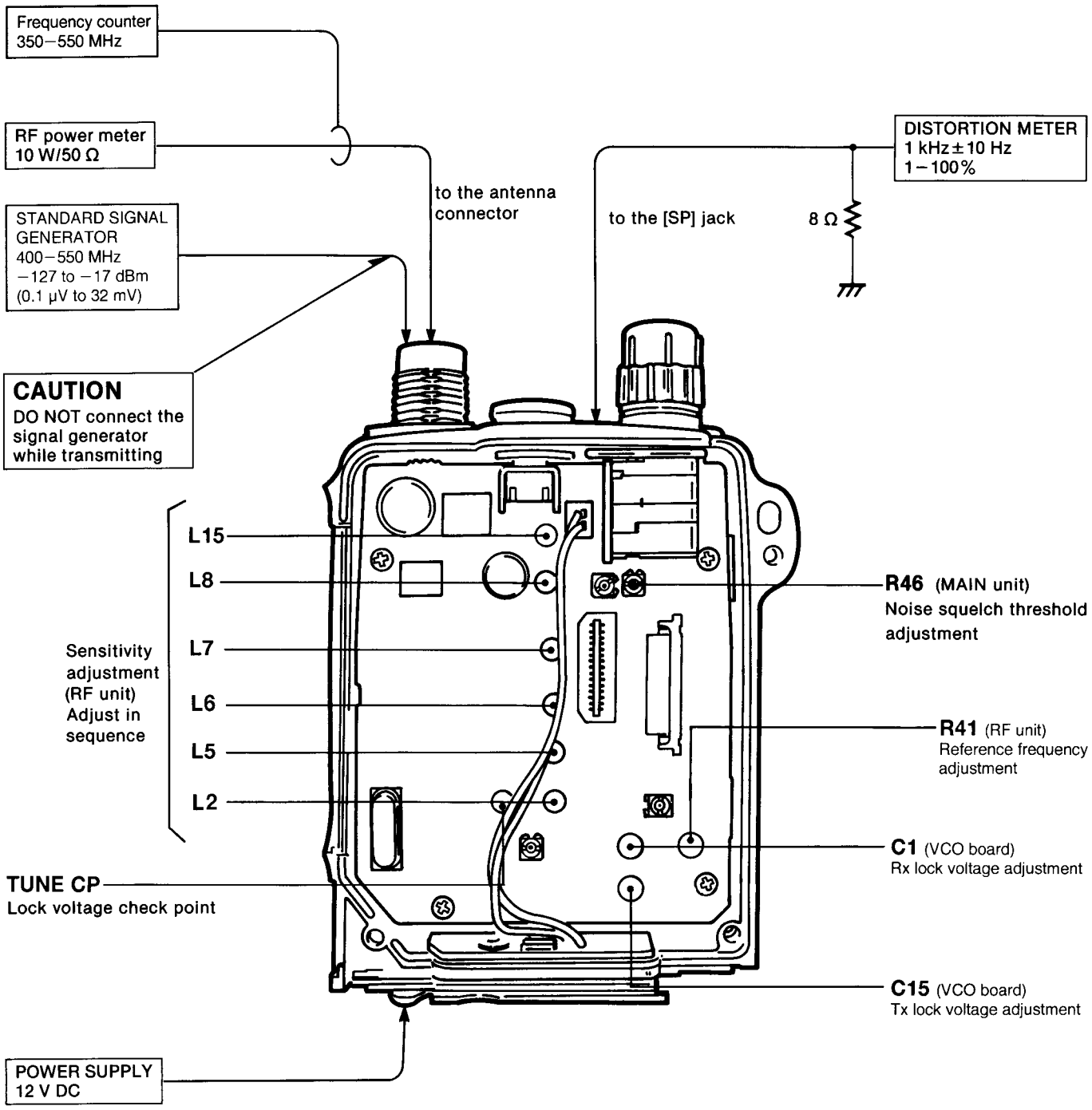
6-1 PLL ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
LOCK VOLTAGE	1	• Operating frequency: 400.0 MHz [400] band 440.0 MHz [440] and [#09] bands 470.0 MHz [470] band 490.0 MHz [490] band • Receiving	RF	Connect the digital multimeter or oscilloscope to TUNE CP.	1.2 V	VCO	C1
	2	• Operating frequency: 400.0 MHz [400] band 425.0 MHz [#09] band 440.0 MHz [440] band 470.0 MHz [470] band 490.0 MHz [490] band • Transmitting			1.2 V	VCO	C15
REFERENCE FREQUENCY	1	• Operating frequency: 430.0 MHz [400] band 432.0 MHz [#09] band 470.0 MHz [440] band 490.0 MHz [470] band 520.0 MHz [490] band • Connect the RF power meter or a 50 Ω dummy load to the antenna connector. • Transmitting	Top panel	Loosely couple the frequency counter to the antenna connector.	Same as the operating frequency	RF	R41

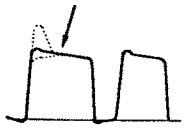
6-2 RECEIVER ADJUSTMENT

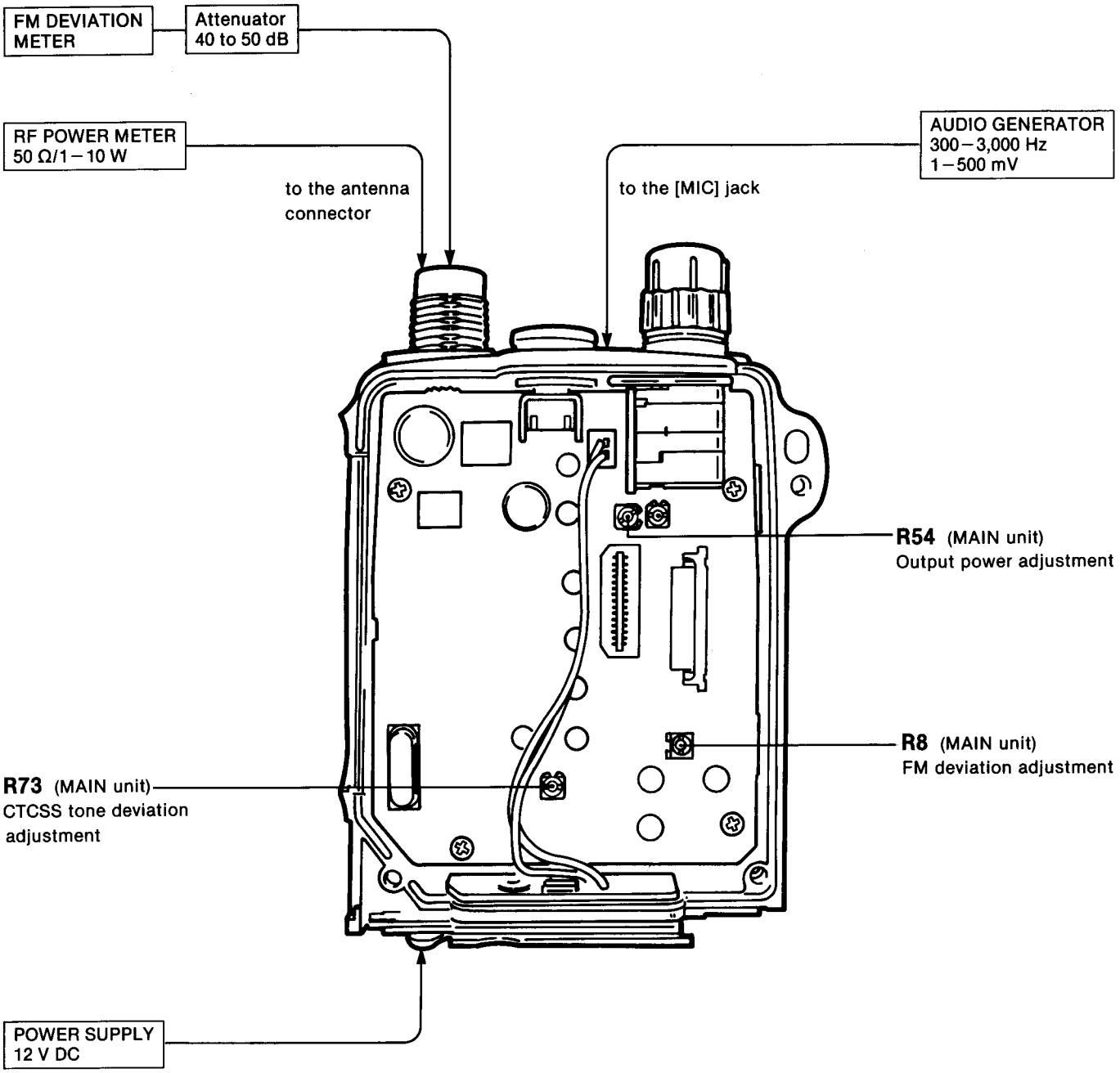
ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	1	• Operating frequency: 400.0 MHz [400] band 440.0 MHz [440] and [#09] bands 470.0 MHz [470] band 490.0 MHz [490] band • Connect the SSG to the antenna connector and set as: Level : 0.35 μV* (−116 dBm) Deviation : ±3.5 kHz (Wide-type) ±2.8 kHz (Middle-type) ±1.75 kHz (Narrow-type) Modulation: 1 kHz • Squelch : OFF	Top panel	Connect the distortion meter to the [SP] jack with an 8 Ω dummy load.	Minimum distortion level	RF	Adjust in sequence L15, L8, L7, L6, L5
	2	• Set the SSG as: Level: 1.0 mV* (−47 dB)				RF	L2
NOISE SQUELCH	1	• Connect the SSG to the antenna connector and set as: Deviation : ±3.5 kHz (Wide-type) ±2.8 kHz (Middle-type) ±1.75 kHz (Narrow-type) Modulation: 1 kHz • R46 (MAIN unit): Max. counterclockwise • Receiving	Top panel	Connect the SINAD meter to the [SP] jack with an 8 Ω dummy load.	8 dB SINAD	Top panel	SSG output
			Front panel	Speaker	Squelch just opens.	MAIN	R46

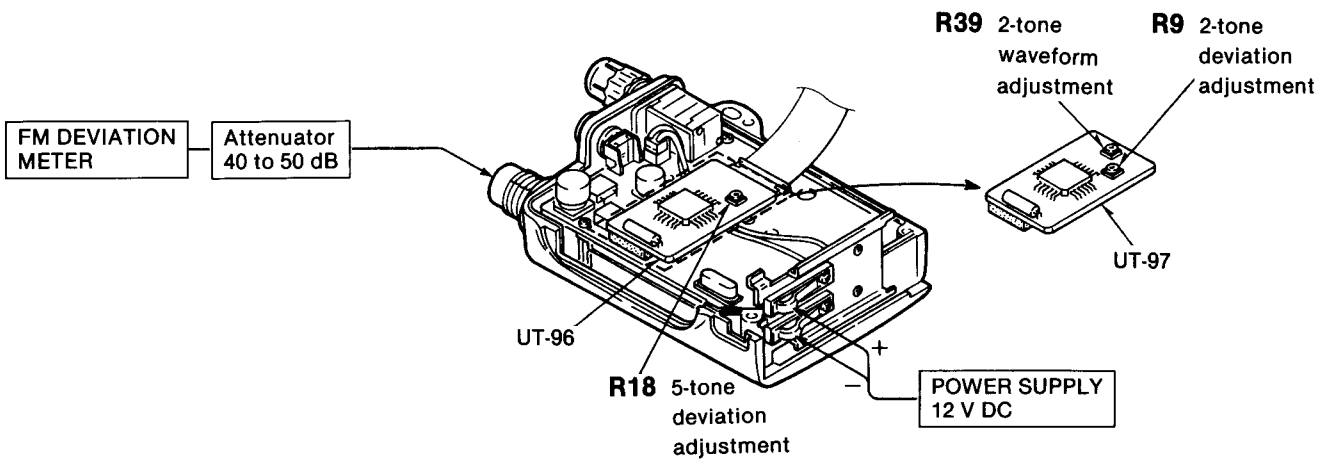
*This output level of the standard signal generator (SSG) is indicated as SSG's open circuit.


Frequency counter
350–550 MHz
RF power meter
10 W/50 Ω
STANDARD SIGNAL GENERATOR
400–550 MHz
–127 to –17 dBm
(0.1 μV to 32 mV)
CAUTION
DO NOT connect the signal generator while transmitting
to the antenna connector
to the [SP] jack
8 Ω
DISTORTION METER
1 kHz ± 10 Hz
1–100%
L15
L8
L7
L6
L5
L2
Sensitivity adjustment (RF unit) Adjust in sequence
R46 (MAIN unit)
Noise squelch threshold adjustment
R41 (RF unit)
Reference frequency adjustment
C1 (VCO board)
Rx lock voltage adjustment
C15 (VCO board)
Tx lock voltage adjustment
TUNE CP
Lock voltage check point
POWER SUPPLY
12 V DC

6-3 TRANSMITTER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER	1	• Operating frequency: 415.0 MHz [400] band 428.5 MHz [#09] band 455.0 MHz [440] band 480.0 MHz [470] band 500.0 MHz [490] band • Transmitting • Output power : High	Top panel	Connect the RF power meter to the antenna connector.	4.0 W	MAIN	R54
FM DEVIATION	1	• Operating frequency: 400.0 MHz [400] band 425.0 MHz [#09] band 440.0 MHz [440] band 470.0 MHz [470] band 490.0 MHz [490] band • Connect the FM deviation meter to the antenna connector and set as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 • Apply an AF signal to the [MIC] jack. 1 kHz/170 mV (LMR) 1 kHz/120 mV (PMR) • Transmitting	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	Wide-type: ±4.2 kHz Middle-type: ±3.3 kHz Narrow-type: ±2.1 kHz	MAIN	R8
CTCSS TONE DEVIATION	1	• Operating frequency: 400.0 MHz [400] band 425.0 MHz [#09] band 440.0 MHz [440] band 470.0 MHz [470] band 490.0 MHz [490] band • No signal applied to the [MIC] jack. • CTCSS tone frequency: 67.0 Hz	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	Wide-type: ±0.60 kHz Middle-type: ±0.50 kHz Narrow-type: ±0.30 kHz	MAIN	R73
2-TONE DEVIATION (UT-97 is required)	1	• Operating frequency: 415.0 MHz [400] band 428.5 MHz [#09] band 455.0 MHz [440] band 480.0 MHz [470] band 500.0 MHz [490] band • Clone and set the DTCS code: "007". • Connect the FM deviation meter to the antenna connector via the attenuator and set as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 • Transmitting	Top panel	Connect the oscilloscope to the FM deviation meter.	Set the flat waveform 	UT-97	R39
	2			Connect the FM deviation meter to the antenna connector via the attenuator.	±0.75 kHz	UT-97	R9
5-TONE DEVIATION (UT-96 is required)	1	• Operating frequency: 415.0 MHz [400] band 428.5 MHz [#09] band 455.0 MHz [440] band 480.0 MHz [470] band 500.0 MHz [490] band • Connect the FM deviation meter to the antenna connector via the attenuator and set as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 • Transmitting	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	Wide-type: ±3.5 kHz Middle-type: ±2.8 kHz Narrow-type: ±1.75 kHz	UT-96	R18


FM DEVIATION METER
Attenuator 40 to 50 dB
RF POWER METER 50 Ω/1 – 10 W
to the antenna connector
AUDIO GENERATOR 300 – 3,000 Hz 1 – 500 mV
to the [MIC] jack
R54 (MAIN unit) Output power adjustment
R8 (MAIN unit) FM deviation adjustment
R73 (MAIN unit) CTCSS tone deviation adjustment
POWER SUPPLY 12 V DC


FM DEVIATION METER
Attenuator 40 to 50 dB
R39 2-tone waveform adjustment
R9 2-tone deviation adjustment
UT-97
UT-96
R18 5-tone deviation adjustment
+
–
POWER SUPPLY 12 V DC

SECTION 7 PARTS LIST

[LOGIC-A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1140005560	S.IC	HD404618D87H
IC2	1190000260	S.IC	24LC08BTI/SN
IC3	1110003240	S.IC	S-80740SL-A4-T1
Q1	1590001330	S.TRANSISTOR	DTA114EU T107
Q2	1590000680	S.TRANSISTOR	DTC114EU T107
Q3	1530003280	S.TRANSISTOR	2SC4211-6-TR
Q4	1590000680	S.TRANSISTOR	DTC114EU T107
Q6	1510000880	S.TRANSISTOR	2SA1622-6-TR
D1	1750000390	S.DIODE	1SS353 TE-17
D2	1790001280	S.DIODE	MA111(TX)
X1	6060000280	CERAMIC	CSB800J220
R1	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R2	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R3	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R4	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R5	7030003370	S.RESISTOR	ERJ3GEYJ 271 V (270 Ω)
R6	7030003370	S.RESISTOR	ERJ3GEYJ 271 V (270 Ω)
R8	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R9	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R10	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R12	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R14	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R16	7030005470	S.RESISTOR	RR0816R-244-D (240 kΩ)
R17	7030005470	S.RESISTOR	RR0816R-244-D (240 kΩ)
R18	7030005460	S.RESISTOR	RR0816R-204-D (200 kΩ)
R19	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R20	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R22	7030005470	S.RESISTOR	RR0816R-244-D (240 kΩ)
R27	7030005470	S.RESISTOR	RR0816R-244-D (240 kΩ)
R28	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R29	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R30	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R31	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R32	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R33	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R36	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R37	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R38	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)
R39	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R40	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R41	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R42	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R43	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R44	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
C1	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C2	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C3	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C4	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C7	4550006210	S.TANTALUM	ECST1CX106R
C8	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C9	4550006210	S.TANTALUM	ECST1CX106R
C10	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C11	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C13	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C14	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A

[LOGIC-A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C15	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C16	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C17	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C18	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C19	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C20	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C21	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C22	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C23	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C24	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C25	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C26	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C27	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C28	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C29	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C30	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C31	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C32	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C33	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C34	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C35	4550006610	S.TANTALUM	ECST1CX685R
C36	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
W1	7030003860	S.JUMPER	ERJ3GE JPW V
W2	7120000380	JUMPER	JPW 01 R-01
W3	9015170010	WIRE	71/98/015/X98/X98
W7	7120000380	JUMPER	JPW 01 R-01
W8	8900005430	CABLE	OPC-535
DS1	5030000990	LCD	LD-BU5703J
DS2	5040001920	S.LED	SML-110MT T86
DS3	5040001920	S.LED	SML-110MT T86
SP1	2510000770	SPEAKER	SV-36W08020G
MC1	7700001600	MICROPHONE	KUC2123-030245
J2	6510017970	S.CONNECTOR	IL-FPR-U24S-HF-E3000
WS1	8600034050		FX1557 J01LO-A
EP1	0910043911	PCB	B 4413A
EP3	8930034750	LCD CONTACT	SRCN-1556 ZSS

S.=Surface mount

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110003410	S.IC	μPC5023GR-043-GJG-T2
IC2	1180001210	S.IC	S-81252PG-PL-T1
IC3	1130007700	S.IC	BU4094BCF-T1
IC4	1110001810	S.IC	TA7368F(TP1)
IC6	1130007220	S.IC	AK2341-T
IC7	1110002750	S.IC	TA75S01F (TE85R)
Q1	1590001450	S.FET	2SJ144-GR (TE85R)
Q2	1590000720	S.TRANSISTOR	DTA144EU T107
Q3	1590000660	S.TRANSISTOR	DTC144TU T107
Q4	1590001170	S.TRANSISTOR	XP1501-(TX).AB
Q5	1520000450	S.TRANSISTOR	2SB1132 T100 Q
Q6	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q7	1590001060	S.TRANSISTOR	DTA114TU T107
Q8	1520000650	S.TRANSISTOR	2SB1201-S-TL
Q9	1590001170	S.TRANSISTOR	XP1501-(TX).AB
Q10	1590001390	S.FET	2SJ144-Y (TE85R)
Q11	1530003280	S.TRANSISTOR	2SC4211-6-TR
Q12	1520000450	S.TRANSISTOR	2SB1132 T100 Q
Q14	1590000660	S.TRANSISTOR	DTC144TU T107
Q16	1590000430	S.TRANSISTOR	DTC144EU T107
D1	1750000340	S.DIODE	1SS357 (TPHR3)
D2	1750000390	S.DIODE	1SS353 TE-17
D3	1750000390	S.DIODE	1SS353 TE-17
D4	1750000390	S.DIODE	1SS353 TE-17
D5	1750000390	S.DIODE	1SS353 TE-17
X1	6050008860	S.XTAL	CR-465 (3.6864MHz)
R5	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ) [Wide]
	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ) [Mid]
	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ) [Nar]
R6	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R7	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R8	7310003550	S.TRIMMER	MVR32HXBR N473
R9	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R10	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R11	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R12	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R13	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ) [USA]
	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ) [Other]
R14	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R15	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R18	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R19	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R20	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R21	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R23	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R24	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R25	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R26	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R27	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R28	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)
R29	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R34	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R35	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R36	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R37	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω) [Wide]
	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω) [Mid]
	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ) [Nar]
R38	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R39	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R40	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R46	7310003650	S.TRIMMER	MVR32HXBR N103
R49	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R51	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R52	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R54	7310003550	S.TRIMMER	MVR32HXBR N473
R55	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ) [400]
	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ) [440]
	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 kΩ) [470]
	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ) [490]
	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ) [#09]
R56	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R61	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R65	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R66	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R67	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R68	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R69	7030003730	S.RESISTOR	ERJ3GEYJ 274 V (270 kΩ)
R70	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 kΩ)
R71	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R72	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)
R73	7310003550	S.TRIMMER	MVR32HXBR N473
R74	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ) [Wide]
	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ) [Mid]
	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ) [Nar]
R75	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R76	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R77	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R78	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R79	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R80	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R81	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R82	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R83	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ) [Wide]
	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ) [Mid]
	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ) [Nar]
R84	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R85	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R86	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R87	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
C1	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C2	4550006320	S.TANTALUM	ECST0JY475R
C3	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A [Wide]
	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A [Mid]
	4030010770	S.CERAMIC	C1608 JB 1H 392K-T-A [Nar]
C4	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C5	4030007120	S.CERAMIC	C1608 CH 1H 820J-T-A [Wide]
	4030007120	S.CERAMIC	C1608 CH 1H 820J-T-A [Mid]
	4030007140	S.CERAMIC	C1608 CH 1H 121J-T-A [Nar]
C6	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C7	4550006140	S.TANTALUM	ECST1EY474R
C8	4030007150	S.CERAMIC	C1608 CH 1H 151J-T-A
C9	4030008880	S.CERAMIC	C1608 JB 1C 223K-T-A
C10	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C11	4030008880	S.CERAMIC	C1608 JB 1C 223K-T-A
C12	4550006320	S.TANTALUM	ECST0JY475R
C13	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C14	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C15	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C16	4510005630	S.Electrolitic	ECEV1EA330SP

S.=Surface mount

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
C17	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A	
C18	4550006150	S.TANTALUM ECST1CY105R	
C19	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A	
C20	4550006150	S.TANTALUM ECST1CY105R	
C21	4550000510	S.TANTALUM TESVA 1V 473M1-8L	
C22	4510005370	S.Electrolitic ECEV1AA221P	
C23	4550006320	S.TANTALUM ECST0JY475R	
C24	4030008920	S.CERAMIC C1608 JB 1C 473K-T-A	
C25	4550006200	S.TANTALUM ECST0JY106R	
C26	4550006340	S.TANTALUM ECST1AY335R	
C27	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A	
C28	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A	
C29	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A	
C30	4550006580	S.TANTALUM ECST1AV686R	
C31	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A	
C32	4550006360	S.TANTALUM ECST1VY104R	
C33	4550006320	S.TANTALUM ECST0JY475R	
C34	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A	
C35	4550006360	S.TANTALUM ECST1VY104R	
C36	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A	
C37	4030008920	S.CERAMIC C1608 JB 1C 473K-T-A	
C38	4550006320	S.TANTALUM ECST0JY475R	
C39	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A	
C40	4550006130	S.TANTALUM ECST1VY224R	
C41	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A	
C42	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A	
C43	4030008920	S.CERAMIC C1608 JB 1C 473K-T-A	
C44	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A	
C45	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A	
C46	4550006320	S.TANTALUM ECST0JY475R	
C47	4550006200	S.TANTALUM ECST0JY106R	
C50	4030007050	S.CERAMIC C1608 CH 1H 220J-T-A	
C51	4030007050	S.CERAMIC C1608 CH 1H 220J-T-A	
C52	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A	
C53	4550006200	S.TANTALUM ECST0JY106R	
C54	4030007150	S.CERAMIC C1608 CH 1H 151J-T-A	
C55	4030007130	S.CERAMIC C1608 CH 1H 101J-T-A	
C56	4550006320	S.TANTALUM ECST0JY475R	
C57	4550006150	S.TANTALUM ECST1CY105R	
C58	4550006150	S.TANTALUM ECST1CY105R	
C59	4030008900	S.CERAMIC C1608 JB 1C 333K-T-A	[Wide]
	4030008900	S.CERAMIC C1608 JB 1C 333K-T-A	[Mid]
	4030008890	S.CERAMIC C1608 JB 1C 273K-T-A	[Nar]
C61	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A	
C64	4550006150	S.TANTALUM ECST1CY105R	
C65	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C72	4030008890	S.CERAMIC C1608 JB 1C 273K-T-A	
C73	4550006320	S.TANTALUM ECST0JY475R	
C74	4550006320	S.TANTALUM ECST0JY475R	
C75	4030010040	S.CERAMIC C1608 JB 1H 561K-T-A	[Wide]
	4030010040	S.CERAMIC C1608 JB 1H 561K-T-A	[Mid]
	4030006870	S.CERAMIC C1608 JB 1H 222K-T-A	[Nar]
C76	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C77	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A	
C78	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A	
C79	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C80	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C81	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C82	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C83	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C84	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C85	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A	
C86	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C87	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A	
C88	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C89	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C90	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C91	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C92	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A	
C93	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A	
C94	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	
C95	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A	

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
C96	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C97	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C98	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C99	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C100	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C101	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C102	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C103	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C104	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C105	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C106	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C107	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C108	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C109	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C110	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C111	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C112	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C113	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C114	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C115	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C116	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C117	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C118	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C119	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C120	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C121	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
W1	7030003860	S.JUMPER ERJ3GE JPW V
W3	7030003860	S.JUMPER ERJ3GE JPW V
W4	7030003860	S.JUMPER ERJ3GE JPW V
W5	7030000010	S.JUMPER MCR10EZHJ JPW (000)
W6	7030003860	S.JUMPER ERJ3GE JPW V
S1	2260000980	SWITCH SKHHLP014A
J1	6510007080	CONNECTOR PI28A-02M
J2	6510016420	S.CONNECTOR 4-175638-2
J3	6510016420	S.CONNECTOR 4-175638-2
J4	6510017980	S.CONNECTOR IL-FPR-24S-HF-E3000
J5	6510018430	S.CONNECTOR AXN330C038P
EP1	0910043892	PCB B 4411B

S.=Surface mount

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION		
IC1	1110003490	S.IC	TA31136FN(D,EL)	
IC2	1110003420	S.IC	M64073GP 600G	
IC3	1150001560	IC	SC-1310	[400]
	1150001570	IC	SC-1311	[440]
	1150001520	IC	SC-1279	[470]
	1150001580	IC	SC-1312	[490]
	1150001560	IC	SC-1310	[#09]
Q1	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)	
Q2	1580000550	S.FET	3SK241-(TX)	
Q4	1580000610	S.FET	3SK239XR-TL	
Q5	1580000540	S.FET	2SK880-Y (TE85R)	
Q6	1530003010	S.TRANSISTOR	2SC4117-GR (TE85R)	
Q7	1580000540	S.FET	2SK880-Y (TE85R)	
Q9	1530003170	S.TRANSISTOR	2SC4863-4-TR	
Q10	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	
Q11	1530003170	S.TRANSISTOR	2SC4863-4-TR	
Q12	1590000430	S.TRANSISTOR	DTC144EU T107	
Q13	1530003170	S.TRANSISTOR	2SC4863-4-TR	[400]
	1530003170	S.TRANSISTOR	2SC4863-4-TR	[440]
	1530003170	S.TRANSISTOR	2SC4863-4-TR	[470]
	1530002940	S.TRANSISTOR	2SC4228-T2	[490]
	1530003170	S.TRANSISTOR	2SC4863-4-TR	[#09]
Q14	1530002680	S.TRANSISTOR	2SC3357-T2	
Q15	1590001060	S.TRANSISTOR	DTA114TU T107	
Q16	1520000450	S.TRANSISTOR	2SB1132 T100 Q	
Q17	1520000450	S.TRANSISTOR	2SB1132 T100 Q	
Q18	1590000620	S.TRANSISTOR	FMS1 T148	
Q19	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	
D1	1790001210	S.DIODE	1SS375-TR	
D2	1720000360	S.DIODE	HSU88TRF	
D3	1720000370	S.VARICAP	HVU350TRF	
D4	1720000370	S.VARICAP	HVU350TRF	
D5	1720000370	S.VARICAP	HVU350TRF	
D6	1720000370	S.VARICAP	HVU350TRF	
D7	1790001210	S.DIODE	1SS375-TR	
D8	1790000450	S.DIODE	MA862(TX)	
D9	1790000620	S.DIODE	MA77(TW)	
D10	1790000590	S.DIODE	MA110(TW)	
D11	1720000360	S.DIODE	HSU88TRF	
D12	1790000620	S.DIODE	MA77(TW)	
D13	1790000620	S.DIODE	MA77(TW)	
D14	1720000360	S.DIODE	HSU88TRF	
D15	1720000360	S.DIODE	HSU88TRF	
D16	1720000370	S.VARICAP	HVU350TRF	
FI1	2020001030	CERAMIC	CFWS455G	
FI2	2010001800	XTAL	FL-225	[Wide]
	2010001800	XTAL	FL-225	[Middle]
	2010001810	XTAL	FL-226	[Narrow]
X1	6050008850	XTAL	CR-464 (44.695MHz)	
X2	6070000130	Discriminator	CDBM455C24	
X3	6050009140	S.XTAL	CR-483 (12.8MHz)	
L1	6200001260	S.COIL	MLF2012A 1R8M-T	
L2	6150003210	COIL	LS-319	
L3	6200004510	S.COIL	MLR1608M 47NJ-T	
L4	6200002690	S.COIL	MLF1608A 1R0M-T	
L5	6200003690	S.COIL	MC152-E558ANA-100051=P3	
L6	6200003690	S.COIL	MC152-E558ANA-100051=P3	
L7	6200003690	S.COIL	MC152-E558ANA-100051=P3	
L8	6200003690	S.COIL	MC152-E558ANA-100051=P3	
L9	6200003540	S.COIL	MLF1608D R22K-T	

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
L10	6200003870	S.COIL	NL 252018T-015J
L11	6200003870	S.COIL	NL 252018T-015J
L12	6200002540	S.COIL	33CS-655LY-03K=P3
L13	6200003360	S.COIL	33CS-655LY-04K=P3
L14	6200002540	S.COIL	33CS-655LY-03K=P3
L15	6200003690	S.COIL	MC152-E558ANA-100051=P3
L16	6200002450	S.COIL	LL2012-F15NK
L17	6200002230	S.COIL	LL2012-F22NK
L18	6200003880	S.COIL	NL 252018T-022J
L19	6200003890	S.COIL	NL 252018T-027J
L20	6200002540	S.COIL	33CS-655LY-03K=P3
L21	6200001700	S.COIL	MLF2012D R47K-T
R1	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R2	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R3	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R4	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R5	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R6	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R7	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R8	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R9	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ) [Wide]
	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ) [Mid]
	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ) [Nar]
R10	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R11	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R12	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω) [Wide]
	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω) [Mid]
	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω) [Nar]
R13	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R14	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R15	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R16	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R17	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R18	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R19	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R20	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R21	7030004030	S.RESISTOR	ERJ3GEYJ 5R6 V (5.6 Ω)
R22	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R23	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)
R24	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R25	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R26	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R27	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R28	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R29	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R30	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R31	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R32	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R33	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R34	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R35	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R36	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)
R37	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R38	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R39	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R40	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R41	7310002760	S.TRIMMER	RV-152 (RH03A3AJ4X0HA) 223
R42	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R43	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R44	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R45	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R46	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R47	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R48	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R49	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R50	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R51	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R52	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R53	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)

S.=Surface mount

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
R54	7030003210	S.RESISTOR ERJ3GEYJ 120 V (12 Ω) [400]
	7030003210	S.RESISTOR ERJ3GEYJ 120 V (12 Ω) [440]
	7030003210	S.RESISTOR ERJ3GEYJ 120 V (12 Ω) [470]
	7030004030	S.RESISTOR ERJ3GEYJ 5R6 V (5.6 Ω) [490]
	7030003210	S.RESISTOR ERJ3GEYJ 120 V (12 Ω) [#09]
R55	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [400]
	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [440]
	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [470]
	7030003430	S.RESISTOR ERJ3GEYJ 821 V (820 Ω) [490]
	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [#09]
R56	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R57	7030003320	S.RESISTOR ERJ3GEYJ 101 V (100 Ω)
R58	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R59	7030003260	S.RESISTOR ERJ3GEYJ 330 V (33 Ω) [400]
	7030003260	S.RESISTOR ERJ3GEYJ 330 V (33 Ω) [440]
	7030003220	S.RESISTOR ERJ3GEYJ 150 V (15 Ω) [470]
	7030003220	S.RESISTOR ERJ3GEYJ 150 V (15 Ω) [490]
	7030003260	S.RESISTOR ERJ3GEYJ 330 V (33 Ω) [#09]
R60	7030003490	S.RESISTOR ERJ3GEYJ 272 V (2.7 kΩ)
R61	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ) [400]
	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ) [440]
	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ) [470]
	7030003450	S.RESISTOR ERJ3GEYJ 122 V (1.2 kΩ) [490]
	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ) [#09]
R62	7030003230	S.RESISTOR ERJ3GEYJ 180 V (18 Ω) [400]
	7030003230	S.RESISTOR ERJ3GEYJ 180 V (18 Ω) [440]
	7030003230	S.RESISTOR ERJ3GEYJ 180 V (18 Ω) [470]
	7030003200	S.RESISTOR ERJ3GEYJ 100 V (10 Ω) [490]
	7030003230	S.RESISTOR ERJ3GEYJ 180 V (18 Ω) [#09]
R63	7030003570	S.RESISTOR ERJ3GEYJ 123 V (12 kΩ)
R64	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω)
R65	7030003570	S.RESISTOR ERJ3GEYJ 123 V (12 kΩ)
R66	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω)
R67	7030000260	S.RESISTOR MCR10EZHJ 100 Ω (101)
R68	7030003460	S.RESISTOR ERJ3GEYJ 152 V (1.5 kΩ)
R69	7030003460	S.RESISTOR ERJ3GEYJ 152 V (1.5 kΩ)
R70	7030003670	S.RESISTOR ERJ3GEYJ 823 V (82 kΩ)
R71	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R72	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R73	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R74	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R75	7030003770	S.RESISTOR ERJ3GEYJ 564 V (560 kΩ)
R76	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [400]
	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [440]
	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [470]
	7030003430	S.RESISTOR ERJ3GEYJ 821 V (820 Ω) [490]
	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [#09]
R77	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)
R78	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R79	7030000340	S.RESISTOR MCR10EZHJ 470 Ω (471)
R80	7030004050	S.RESISTOR ERJ3GEYJ 1R0 V (1 Ω)
R81	7030003200	S.RESISTOR ERJ3GEYJ 100 V (10 Ω)
R82	7030003200	S.RESISTOR ERJ3GEYJ 100 V (10 Ω)
R83	7030003380	S.RESISTOR ERJ3GEYJ 331 V (330 Ω) [Wide 400]
	7030003380	S.RESISTOR ERJ3GEYJ 331 V (330 Ω) [Wide 440]
	7030003340	S.RESISTOR ERJ3GEYJ 151 V (150 Ω) [Wide 470]
	7030003340	S.RESISTOR ERJ3GEYJ 151 V (150 Ω) [Wide 490]
	7030003380	S.RESISTOR ERJ3GEYJ 331 V (330 Ω) [Mid 440]
	7030003340	S.RESISTOR ERJ3GEYJ 151 V (150 Ω) [Nar]

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
R84	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)
R86	7030003800	S.RESISTOR ERJ3GEYJ 105 V (1 MΩ) [400]
	7030003810	S.RESISTOR ERJ3GEYJ 125 V (1.2 MΩ) [440]
	7030003810	S.RESISTOR ERJ3GEYJ 125 V (1.2 MΩ) [470]
	7030003810	S.RESISTOR ERJ3GEYJ 125 V (1.2 MΩ) [490]
	7030003800	S.RESISTOR ERJ3GEYJ 105 V (1 MΩ) [#09]
R87	7030003460	S.RESISTOR ERJ3GEYJ 152 V (1.5 kΩ)
R88	7030003450	S.RESISTOR ERJ3GEYJ 122 V (1.2 kΩ)
R89	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ) [400]
	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ) [440]
	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ) [470]
	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ) [490]
	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ) [#09]
R90	7030003410	S.RESISTOR ERJ3GEYJ 561 V (560 Ω)
R91	7030003370	S.RESISTOR ERJ3GEYJ 271 V (270 Ω)
R92	7030003230	S.RESISTOR ERJ3GEYJ 180 V (18 Ω)
R93	7030003370	S.RESISTOR ERJ3GEYJ 271 V (270 Ω)
R94	7510000890	S.Thermistor NTCCS2012 3BH 102KC-T
R95	7030003470	S.RESISTOR ERJ3GEYJ 182 V (1.8 kΩ)
C1	4030007160	S.CERAMIC C1608 CH 1H 181J-T-A
C2	4030007160	S.CERAMIC C1608 CH 1H 181J-T-A
C3	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C4	4030006980	S.CERAMIC C1608 CH 1H 070D-T-A
C5	4030007030	S.CERAMIC C1608 CH 1H 150J-T-A
C6	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C7	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C8	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C9	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C10	4030007130	S.CERAMIC C1608 CH 1H 101J-T-A
C11	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C12	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C13	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C14	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C15	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A [Wide]
	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A [Mid]
	4030007130	S.CERAMIC C1608 CH 1H 101J-T-A [Nar]
C16	4550006250	S.TANTALUM TEMSVA 1A 106M-8L
C17	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C18	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C19	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C20	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C21	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C22	4030007010	S.CERAMIC C1608 CH 1H 100D-T-A
C23	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C24	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
C25	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C26	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C27	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C28	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C29	4030009530	S.CERAMIC C1608 CH 1H 030B-T-A [400]
	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A [440]
	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A [470]
	4030009350	S.CERAMIC C1608 CH 1H 3R5B-T-A [490]
	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A [#09]
C30	4030006970	S.CERAMIC C1608 CH 1H 080D-T-A [400]
	4030009920	S.CERAMIC C1608 CH 1H 050B-T-A [440]
	4030009920	S.CERAMIC C1608 CH 1H 050B-T-A [470]
	4030009350	S.CERAMIC C1608 CH 1H 3R5B-T-A [490]
	4030009920	S.CERAMIC C1608 CH 1H 050B-T-A [#09]
C31	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A [400]
	4030009510	S.CERAMIC C1608 CH 1H 010B-T-A [440]
	----	---- --- [470]
	4030009570	S.CERAMIC C1608 CH 1H 0R3B-T-A [490]
	4030009510	S.CERAMIC C1608 CH 1H 010B-T-A [#09]

S.=Surface mount

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION		
C32	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C33	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A	
C34	4030006970	S.CERAMIC	C1608 CH 1H 060D-T-A	[400]
	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	[440]
	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	[470]
	4030009350	S.CERAMIC	C1608 CH 1H 3R5B-T-A	[490]
	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	[#09]
C35	4030009350	S.CERAMIC	C1608 CH 1H 3R5B-T-A	[400]
	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A	[440]
	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A	[470]
	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A	[490]
	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A	[#09]
C36	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C37	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C38	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C39	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A	
C40	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A	
C41	4030006970	S.CERAMIC	C1608 CH 1H 060D-T-A	[400]
	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	[440]
	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	[470]
	4030009350	S.CERAMIC	C1608 CH 1H 3R5B-T-A	[490]
	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	[#09]
C42	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A	[400]
	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A	[440]
	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A	[470]
	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A	[490]
	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A	[#09]
C43	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C44	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A	
C45	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C46	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A	
C47	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A	
C48	4030006970	S.CERAMIC	C1608 CH 1H 060D-T-A	[400]
	4030006970	S.CERAMIC	C1608 CH 1H 060D-T-A	[440]
	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A	[470]
	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A	[490]
	4030006970	S.CERAMIC	C1608 CH 1H 060D-T-A	[#09]
C49	4030006970	S.CERAMIC	C1608 CH 1H 060D-T-A	[400]
	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	[440]
	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	[470]
	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A	[490]
	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	[#09]
C50	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A	[400]
	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A	[440]
	----	-----	----	[470]
	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A	[490]
	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A	[#09]
C51	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C52	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A	[400]
	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A	[440]
	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A	[470]
	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A	[490]
	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A	[#09]
C53	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A	
C54	4030007100	S.CERAMIC	C1608 CH 1H 560J-T-A	
C55	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A	
C56	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	
C57	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A	
C58	4030009550	S.CERAMIC	C1608 CH 1H 2R5B-T-A	[400]
	4030009550	S.CERAMIC	C1608 CH 1H 2R5B-T-A	[440]
	4030009550	S.CERAMIC	C1608 CH 1H 2R5B-T-A	[470]
	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A	[490]
	4030009550	S.CERAMIC	C1608 CH 1H 2R5B-T-A	[#09]

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION		
C59	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C60	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A	
C61	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	[400]
	4030009550	S.CERAMIC	C1608 CH 1H 2R5B-T-A	[440]
	4030009530	S.CERAMIC	C1608 CH 1H 030B-T-A	[470]
	4030009530	S.CERAMIC	C1608 CH 1H 030B-T-A	[490]
	4030009550	S.CERAMIC	C1608 CH 1H 2R5B-T-A	[#09]
C62	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A	
C63	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A	
C64	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A	[400]
	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A	[440]
	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A	[470]
	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A	[490]
	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A	[#09]
C65	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A	
C66	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A	
C67	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C68	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C70	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C71	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C72	4550006320	S.TANTALUM	ECST0JY475R	
C73	4550006320	S.TANTALUM	ECST0JY475R	
C74	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A	
C75	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C76	4550006360	S.TANTALUM	ECST1VY104R	
C77	4550006270	S.TANTALUM	TESVSP 1A 105M-8L	
C78	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C79	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C80	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C81	4030006970	S.CERAMIC	C1608 CH 1H 060D-T-A	
C82	4030006970	S.CERAMIC	C1608 CH 1H 060D-T-A	
C83	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C84	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C85	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	
C86	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C87	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	
C89	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C90	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	
C91	4030009650	S.CERAMIC	C1608 CH 1H 240J-T-A	
C92	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C93	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C94	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C96	4550006540	S.TANTALUM	ECST1CY475R	
C97	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A	
C98	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A	
C99	4030006970	S.CERAMIC	C1608 CH 1H 060D-T-A	
C100	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C101	4550006540	S.TANTALUM	ECST1CY475R	
C102	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C103	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C104	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C105	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C106	4510005600	S.Electrolitic	ECEV1CS100SR	
C107	4510005600	S.Electrolitic	ECEV1CS100SR	
C108	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C109	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	
C110	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A	
C111	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C112	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C113	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C114	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A	
C115	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C116	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A	
C117	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C118	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C119	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C120	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C121	4550006260	S.TANTALUM	TESVSP 1C 474M-8L	
C122	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C123	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	
C124	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C125	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C126	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	

S.=Surface mount

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
C127	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C128	4550006150	S.TANTALUM ECST1CY105R
C129	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C130	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C131	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C132	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
C133	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
C134	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C135	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C136	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C137	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C138	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C139	4030011560	S.CERAMIC C1608 JB 0J 154K-T-A
C140	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C141	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C142	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C143	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C144	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C145	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C146	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C147	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C148	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C149	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C150	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C151	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C152	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C153	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C154	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C155	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C156	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C157	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C158	4030006970	S.CERAMIC C1608 CH 1H 060D-T-A [400]
	4030009920	S.CERAMIC C1608 CH 1H 050B-T-A [440]
	4030009920	S.CERAMIC C1608 CH 1H 050B-T-A [470]
	4030009350	S.CERAMIC C1608 CH 1H 3R5B-T-A [490]
	4030009920	S.CERAMIC C1608 CH 1H 050B-T-A [#09]
C159	4030009530	S.CERAMIC C1608 CH 1H 030B-T-A [400]
	4030009540	S.CERAMIC C1608 CH 1H 1R5B-T-A [440]
	4030009500	S.CERAMIC C1608 CH 1H 0R5B-T-A [470]
	4030009540	S.CERAMIC C1608 CH 1H 1R5B-T-A [490]
	4030009540	S.CERAMIC C1608 CH 1H 1R5B-T-A [#09]
C160	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A
C161	4030009510	S.CERAMIC C1608 CH 1H 010B-T-A
C162	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A
C163	4030009650	S.CERAMIC C1608 CH 1H 240J-T-A
C165	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A
C166	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C167	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C168	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C169	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C170	4030008560	S.CERAMIC C1608 CH 1H 300J-T-A
C171	4030009530	S.CERAMIC C1608 CH 1H 030B-T-A [490 oly]
C172	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
W1	7030003860	S.JUMPER ERJ3GE JPW V
W2	7030003860	S.JUMPER ERJ3GE JPW V [490 only]
W3	7120000380	JUMPER JPW 01 R-01
J1	6450000130	CONNECTOR HSJ1102-01-540
J2	6450001060	CONNECTOR HSJ1493-01-010
J3	6510016410	S.CONNECTOR 4-176756-2
J4	6510016410	S.CONNECTOR 4-176756-2
J5	6910008140	CONNECTOR IPS-1324-03A
EP1	0910044921	PCB B 4543A
EP2	6910000970	BEAD DL 2OP 2.6-3-1.2H

[VCO BOARD]

REF. NO.	ORDER NO.	DESCRIPTION
Q1	1530002920	S.TRANSISTOR 2SC4226-T2 R25
Q2	1590000710	S.TRANSISTOR DTC124EU T107
Q3	1530002920	S.TRANSISTOR 2SC4226-T2 R25
Q4	1590000710	S.TRANSISTOR DTC124EU T107
Q5	1530002920	S.TRANSISTOR 2SC4226-T2 R25
Q6	1530002850	S.TRANSISTOR 2SC4116-BL (TE85R)
D1	1720000370	S.VARICAP HVU350TRF
D2	1720000550	S.VARICAP HVU352TRF
D3	1720000360	S.DIODE HSU88TRF
L1	6200001980	S.COIL NL 252018T-1R0J
L2	6200002390	S.COIL LQN 1A 64NJ04 [400]
	6200002380	S.COIL LQN 1A 56NJ04 [440]
	6200002820	S.COIL LQN 1A 47NJ04 [470]
	6200002820	S.COIL LQN 1A 47NJ04 [490]
	6200002380	S.COIL LQN 1A 56NJ04 [#09]
L3	6200002690	S.COIL MLF1608A 1R0M-T
L4	6200002690	S.COIL MLF1608A 1R0M-T
L5	6200002690	S.COIL MLF1608A 1R0M-T
L6	6200001980	S.COIL NL 252018T-1R0J
L7	6200002390	S.COIL LQN 1A 64NJ04 [400]
	6200002380	S.COIL LQN 1A 56NJ04 [440]
	6200002820	S.COIL LQN 1A 47NJ04 [470]
	6200002820	S.COIL LQN 1A 47NJ04 [490]
	6200002390	S.COIL LQN 1A 64NJ04 [#09]
L8	6200002690	S.COIL MLF1608A 1R0M-T
L9	6200002690	S.COIL MLF1608A 1R0M-T
R1	7030003280	S.RESISTOR ERJ3GEYJ 470 V (47 Ω)
R2	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R3	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R4	7030004040	S.RESISTOR ERJ3GEYJ 4R7 V (4.7 Ω)
R5	7030003410	S.RESISTOR ERJ3GEYJ 561 V (560 Ω) [400]
	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [440]
	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [470]
	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [490]
	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [#09]
R6	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R7	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω)
R8	7030003220	S.RESISTOR ERJ3GEYJ 150 V (15 Ω)
R9	7030003220	S.RESISTOR ERJ3GEYJ 150 V (15 Ω)
R10	7030003220	S.RESISTOR ERJ3GEYJ 150 V (15 Ω)
R11	7030003280	S.RESISTOR ERJ3GEYJ 470 V (47 Ω)
R12	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R14	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)
R15	7030003550	S.RESISTOR ERJ3GEYJ 822 V (8.2 kΩ)
R16	7030004040	S.RESISTOR ERJ3GEYJ 4R7 V (4.7 Ω)
R17	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω)
R18	7030003200	S.RESISTOR ERJ3GEYJ 100 V (10 Ω)
R19	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R21	7030003750	S.RESISTOR ERJ3GEYJ 394 V (390 kΩ)
C1	4610001910	S.TRIMMER CTZ3E-10A-W1
C2	4030007030	S.CERAMIC C1608 CH 1H 150J-T-A [400]
	4030007000	S.CERAMIC C1608 CH 1H 090D-T-A [440]
	4030007010	S.CERAMIC C1608 CH 1H 100D-T-A [470]
	4030006970	S.CERAMIC C1608 CH 1H 060D-T-A [490]
	4030007000	S.CERAMIC C1608 CH 1H 090D-T-A [#09]

*=Safety critical components S.=Surface mount

[VCO BOARD]

REF. NO.	ORDER NO.	DESCRIPTION		
C3	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C4	4030006950	S.CERAMIC	C1608 CH 1H 040C-T-A	[400]
	4030006950	S.CERAMIC	C1608 CH 1H 040C-T-A	[440]
	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A	[470]
	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A	[490]
	4030006950	S.CERAMIC	C1608 CH 1H 040C-T-A	[#09]
C5	4030006950	S.CERAMIC	C1608 CH 1H 040C-T-A	[400]
	4030006950	S.CERAMIC	C1608 CH 1H 040C-T-A	[440]
	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A	[470]
	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A	[490]
	4030006950	S.CERAMIC	C1608 CH 1H 040C-T-A	[#09]
C6	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C7	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C8	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A	
C9	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C10	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A	
C11	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A	
C12	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C13	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C15	4610001910	S.TRIMMER	CTZ3E-10A-W1	
C16	4030008220	S.CERAMIC	C1608 UJ 1H 070D-T-A	
C17	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C18	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A	[400]
	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A	[440]
	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A	[470]
	4030009350	S.CERAMIC	C1608 CH 1H 3R5B-T-A	[490]
	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A	[#09]
C19	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A	
C20	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C21	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C22	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A	
C23	4550006270	S.TANTALUM	TESVSP 1A 105M-8L	
C24	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C25	4030008210	S.CERAMIC	C1608 UJ 1H 060D-T-A	[400]
	4030008210	S.CERAMIC	C1608 UJ 1H 060D-T-A	[440]
	4030008210	S.CERAMIC	C1608 UJ 1H 060D-T-A	[470]
	4030008230	S.CERAMIC	C1608 UJ 1H 080D-T-A	[490]
	4030008210	S.CERAMIC	C1608 UJ 1H 060D-T-A	[#09]
C26	4030008190	S.CERAMIC	C1608 UJ 1H 040C-T-A	[400]
	4030008190	S.CERAMIC	C1608 UJ 1H 040C-T-A	[440]
	4030008180	S.CERAMIC	C1608 UJ 1H 030C-T-A	[470]
	4030008180	S.CERAMIC	C1608 UJ 1H 030C-T-A	[490]
	4030008190	S.CERAMIC	C1608 UJ 1H 040C-T-A	[#09]
C27	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A	
C28	4030007900	S.CERAMIC	C1608 TH 1H 0R5C-T-A	
J1	6910008020	CONNECTOR	IPS-1323	
EP1	0910044911	PCB	B 4544A	

[CONNECT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
FI1	2040000810	S.LC	NFM41P11C204
FI2	2040000810	S.LC	NFM41P11C204
C1	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C2	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
WS1	8600034040	FX1557 P01CO	
EP1	0910045741	PCB	B 4410A

[VR UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7210001440	VARIABLE	RK097111101NA (10KA)
EP1	0910043901	PCB	B 4412A

[PTT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	
R1	7030005520	S.RESISTOR	RR0816R-334-D (330 kΩ)
R2	7030005500	S.RESISTOR	RR0816R-124-D (120 kΩ)
S1	2260001680	S.SWITCH	SKQDPB
S2	2260001990	S.SWITCH	SOP-112HST
S3	2260001990	S.SWITCH	SOP-112HST
S4	2260001990	S.SWITCH	SOP-112HST
EP1	0910043931	PCB	B 4415A

S.=Surface mount

SECTION 8 MECHANICAL PARTS

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510017740	Antenna connector TNC-R131 (incl. nut)	1
MP1	8210012510	1556 rear panel	1
MP2	8810006790	Screw PH No.0 M2×3.5 ZK	1
MP3	8930036580	1557 connector seal	1
MP4	8930033640	1556 jack seal	1
MP5	8010014982	Hole bush (B) -2	2
MP6	8810006620	Screw PH No.0 M2×3.5 NI	2
MP7	8930030200	Stand-off (BK)	4
MP8	8930034210	1557 main shield	1
MP9	8810006620	Screw PH No.0 M2×3.5 NI	4
MP10	8830000570	VR nut (A)	1
MP13	8610008750	Knob N200 (A) black	1
MP14	8930029821	1452 contact base -1	1
MP15	8930030041	1452 contact spring -1	2
MP16	8810006920	Screw PH No.0 M2 x 5 NI	2
MP18	8930029121	1257 release button (A) -1	1
MP19	8310031302	1452 bottom plate -2	1
MP20	8810006980	Screw FH No.0 M2×3.5 NI	3
MP21	8810008620	Screw PH BT M2×20 ZK	2
MP22	8810006790	Screw PH No.0 M2×3.5 ZK	3
MP24	8510008720	1451 module plate	1
MP25	8510008730	1451 module shield	1
MP28	8930033630	1556 switch cover	1
MP29	8310034130	1556 switch plate	1
MP31	8510009680	1557 module shield	1
MP32	8930036330	1557 sheet	1
MP34	8930014140	Ground spring (D)	1
MP35	8930037250	1557 plate	1

[RF UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8930005320	Filter spacer	3
MP2	8930020980	Shield plate	1
MP3	8930020980	Shield plate	1
MP4	8930023680	858 VCO shield plate	1

[VCO BOARD]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP2	8510009601	1557 VCO case -1	1
MP3	8510009590	1557 VCO shield	1

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
S1	2260000980	Switch SKHHLP014A [S]	1
MP1	8930030870	Insulation sheet DA	1

[VR BOARD]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
R1	7210001440	Switch/Variable resistor RK097111101NA (10kA) [VOL]	1

[LOGIC-A UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
W8	8900005430	Flexible cable OPC-535 (N: 24, L: 60)	1
DS1	5030000990	LCD LD-BU5703J	1
EP3	8930034750	LCD contact SRCN-1556 ZSS	1
MC1	7700001600	Microphone KUC2123-030245	1
MP1	8210011760	1556 S-front panel (A)	1
MP4	8310034380	1327 window plate (D)	1
MP7	8810005900	Screw PH B0 No.0-3 M1.4×3.5 NI	6
MP8	8930033660	1556 LCD holder	1
MP9	8930031000	1332 LCD sheet	1
MP10	8930033620	1556 S-keyboard	1
MP13	8930033730	1452 PTT rubber (A)	1
MP14	8310031320	1452 PTT plate	1
MP16	8810006980	Screw FH No.0 M2×3.5 NI	1
MP17	8930030030	1452 center seal	1
MP19	8930031030	1452 MIC sheet	1
MP20	8930033650	1556 MIC seal	1
MP25	8810007190	Screw FH No.0 M2×2.2 NI	1
MP26	8930031750	1452 PTT rubber sheet	1
SP1	2510000770	Speaker SV-36W08020G	1

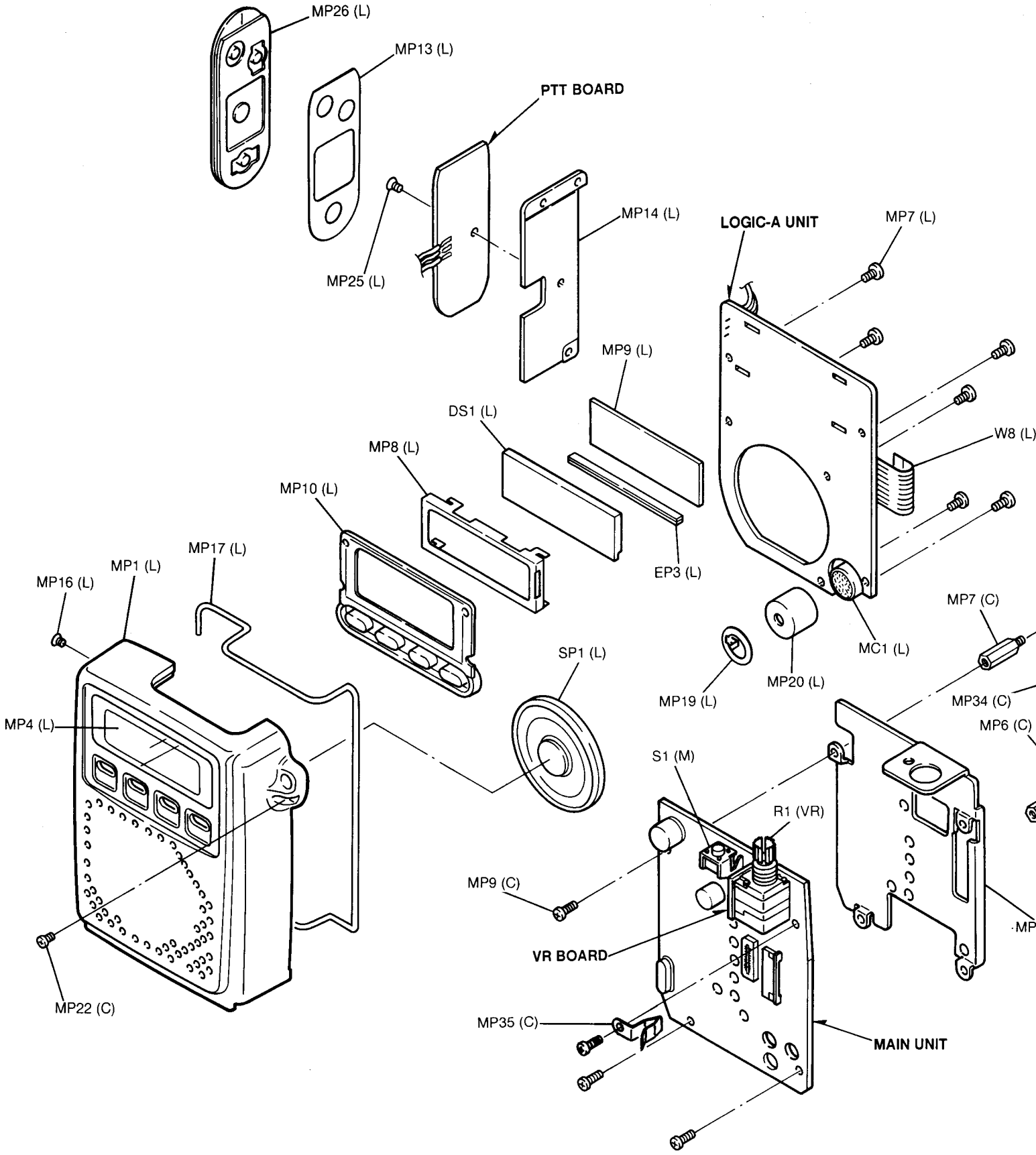
[CONNECT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8860000010	Screw lug M2	2

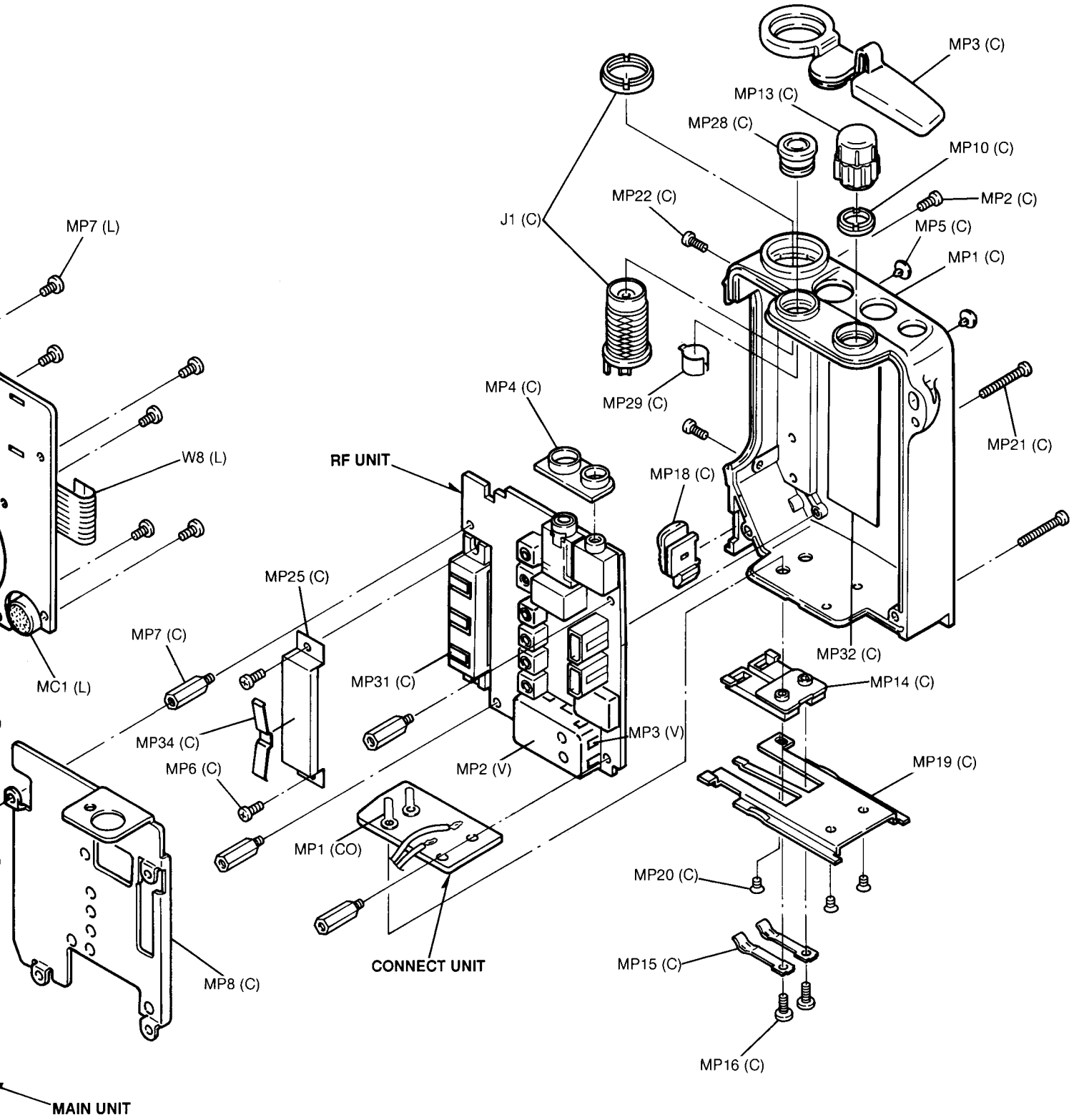
[UNPACKING]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	3310000120	Antenna #208-8 [440], [470] and [490] bands	1
	3310000650	Antenna FA-400TA [400] and [#09] bands	1
EP2	Optional product	BP-160 BATTERY PACK	1
MP1	8010011960	Handstrap HK-005	1
MP2	8010008620	752 belt clip	1

Screw abbreviations B0, BT: Self-tapping PH: Pan head
FH: Flat head BuH: Button head
NI: Nickel BS: Brass ZK: Black

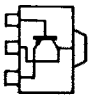
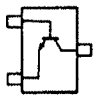
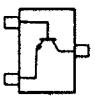
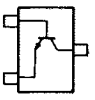
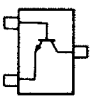
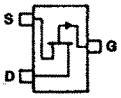
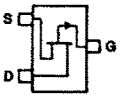
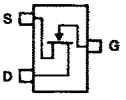
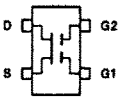
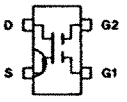
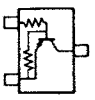
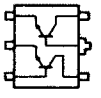


Unit abbreviations (C): CHASSIS PARTS (R): RF UNIT (V): VCO BOARD (M): MAIN UNIT (VR): VR UNIT
(L): LOGIC-A UNIT (CO): CONNECT UNIT

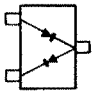
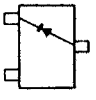
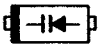
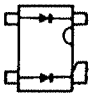

MP3 (C)
MP13 (C)
MP28 (C)
MP10 (C)
MP22 (C)
MP2 (C)
J1 (C)
MP5 (C)
MP1 (C)
MP7 (L)
MP4 (C)
MP29 (C)
MP21 (C)
W8 (L)
RF UNIT
MP18 (C)
MP25 (C)
MP7 (C)
MP31 (C)
MP32 (C)
MP14 (C)
MC1 (L)
MP34 (C)
MP3 (V)
MP19 (C)
MP6 (C)
MP2 (V)
MP1 (CO)
MP20 (C)
MP15 (C)
MP8 (C)
CONNECT UNIT
MP16 (C)
MAIN UNIT

SECTION 9 SEMI-CONDUCTOR INFORMATION

• TRANSISTORS AND FET'S

2SA1622 6 (Symbol: M6) 	**2SB1132 Q** (Symbol: BA) 	**2SC1863 4** (Symbol: FN4) 	**2SC3357** (Symbol: RK) 	**2SC4081 R** (Symbol: BR) 
2SC4116 BL (Symbol: LL) 	**2SC4117 GR** (Symbol: DG) 	**2SC4215 O** (Symbol: QO) 	**2SC4226 R25** (Symbol: R25) 	**2SC4228 R44** (Symbol: R44) 
2SJ144 GR (Symbol: VG) 	**2SJ144 Y** (Symbol: VY) 	**2SK880 Y** (Symbol: XY) 	**3SK239XR** (Symbol: XR) 	**3SK241** (Symbol: DU) 
DTA114EU (Symbol: 14) 	**DTA114TU** (Symbol: 94) 	**DTA144EU** (Symbol: 16) 	**DTC114EU** (Symbol: 24) 	**DTC124EU** (Symbol: 25) 
DTC114EU (Symbol: 26) 	**DTA144TU** (Symbol: 06) 	**FMS1** (Symbol: S1) 	**XP1501** (Symbol: 5R) 	

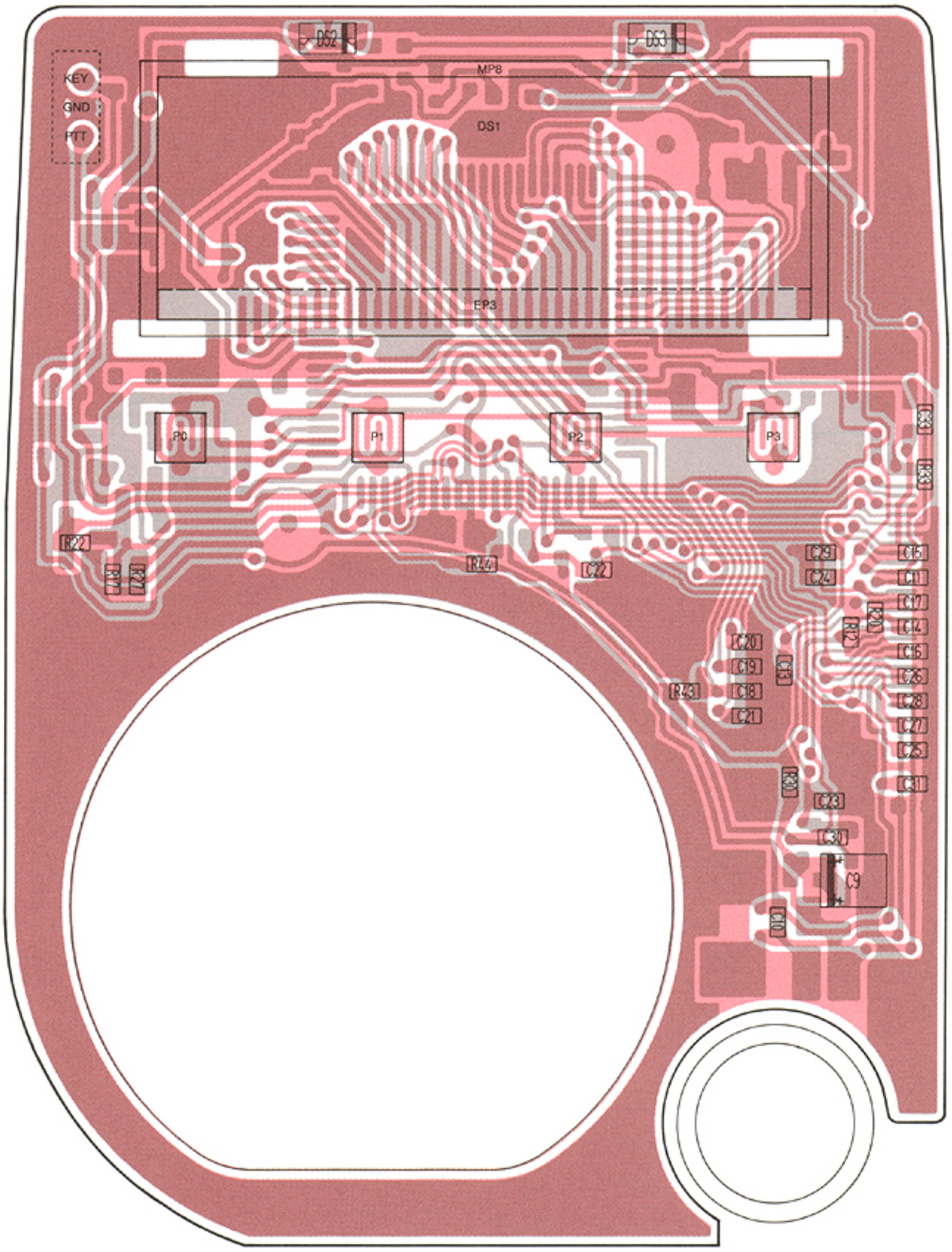
• DIODES

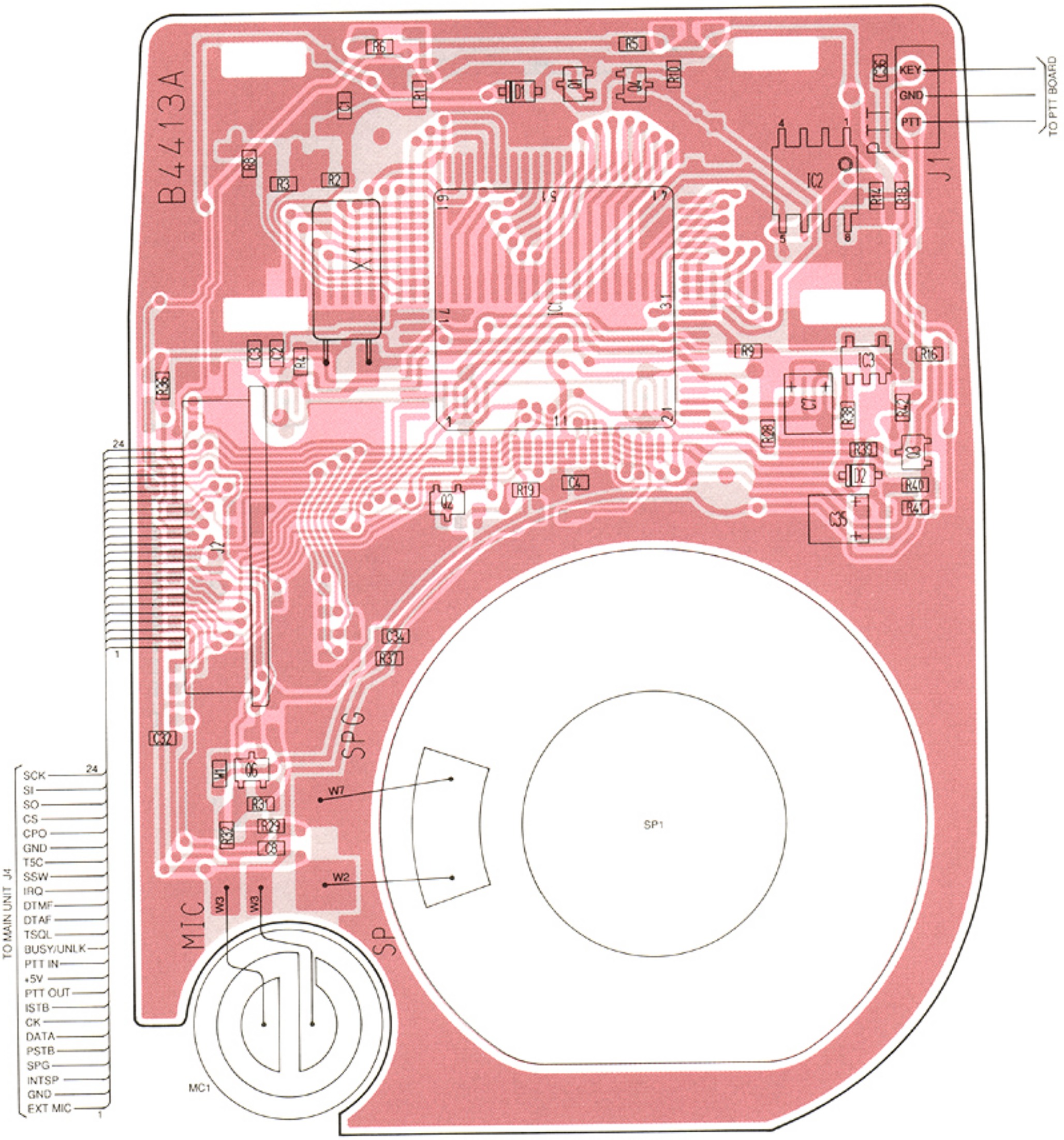
1SS375 (Symbol: FH) 	**HSU88TRF** (Symbol: 9) 	**HVU350TRF** (Symbol: 4) 	**HVU352TRF** (Symbol: F) 	**MA862** (Symbol: M1I) 

SECTION 10 BOARD LAYOUTS

10-1 LOGIC-A UNIT

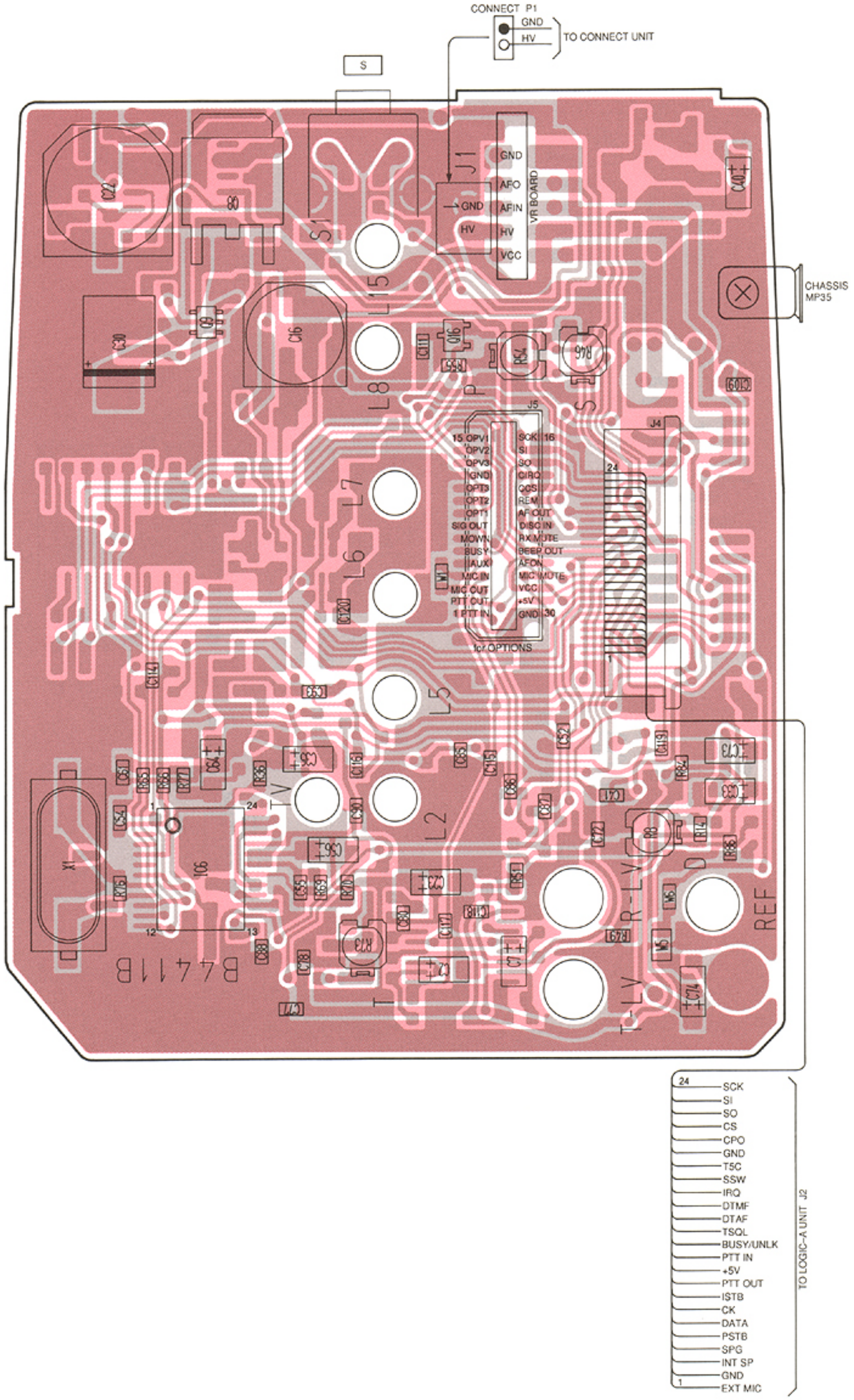
The combination of this page and the next page show the unit layout in the same configuration as the actual P.C. Board.

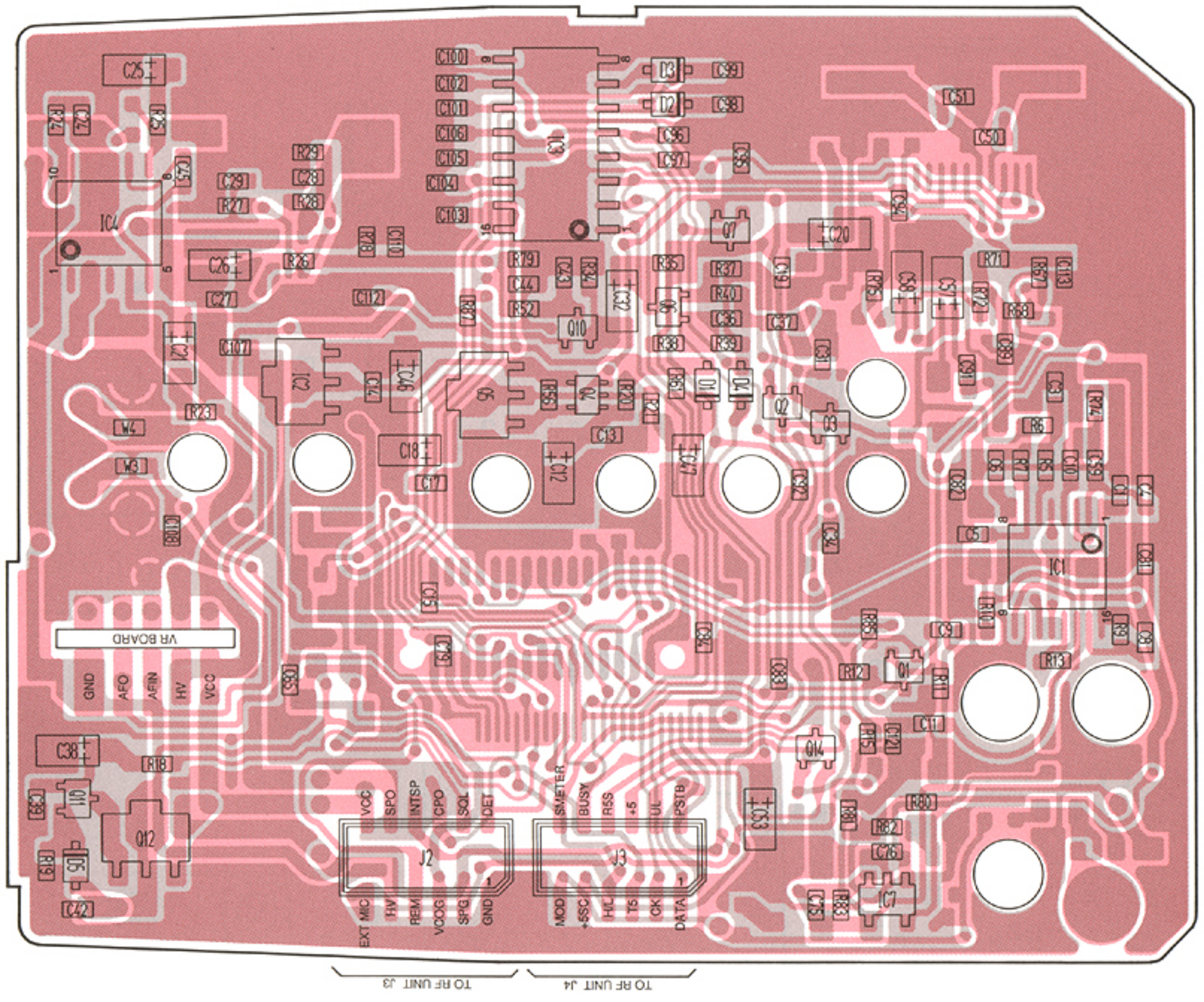



B4413A
KEY
GND
PTT
TO PTT BOARD
J1
IC2
IC1
X1
IC3
C7
C35
D2
Q3
Q2
Q6
W1
W7
W2
W3
R31
R29
C8
C32
C34
R37
SPG
SP
MIC
SP1
MC1
TO MAIN UNIT J4
SCK
SI
SO
CS
CPO
GND
T5C
SSW
IRQ
DTMF
DTAF
TSQL
BUSY/UNLK
PTT IN
+5V
PTT OUT
ISTB
CK
DATA
PSTB
SPG
INTSP
GND
EXT MIC

10-2 MAIN UNIT

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

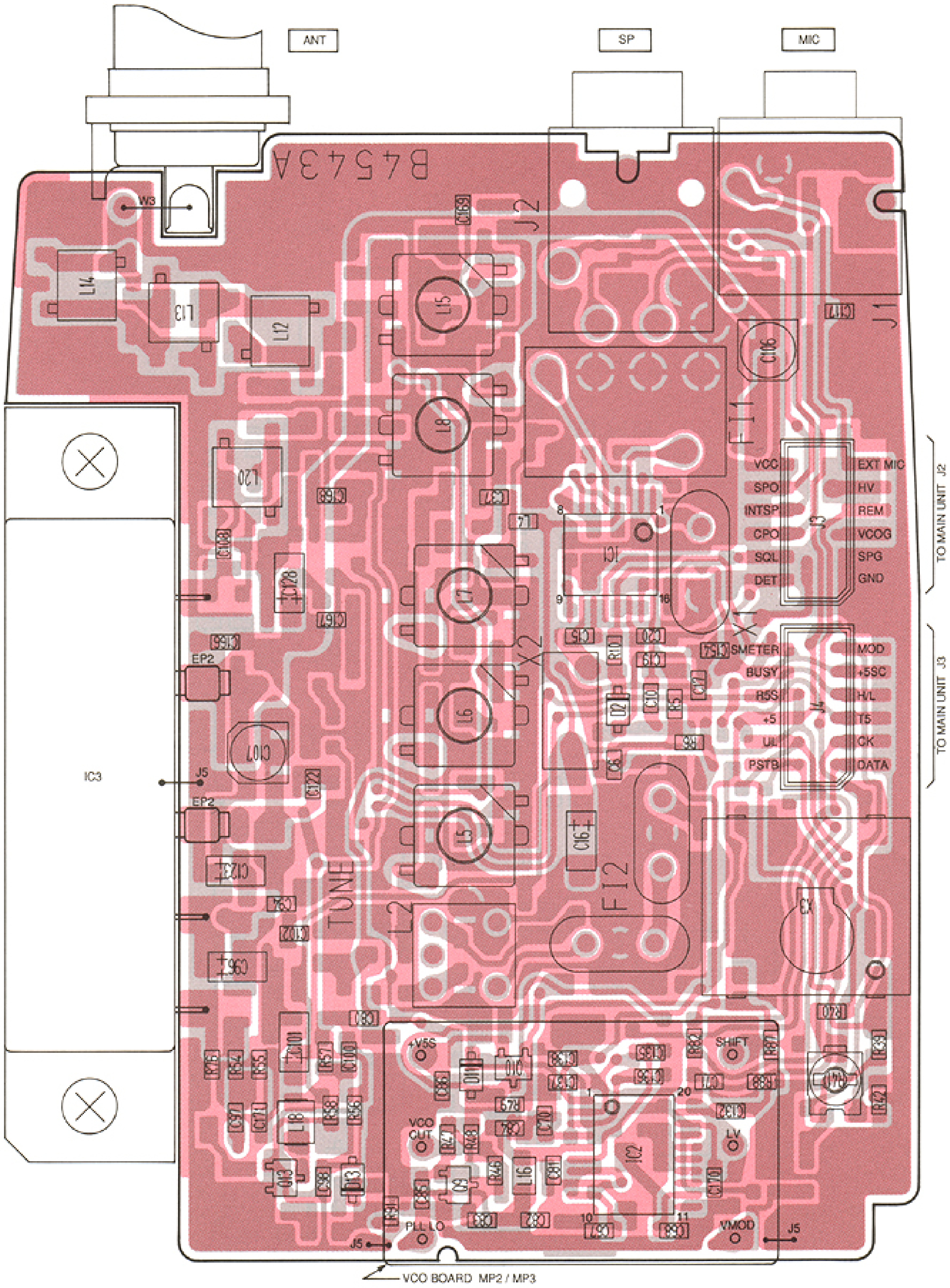



VR BOARD
GND
AFO
AFIN
HV
VCC
J2
VCC
SPO
INTSP
CPO
SQL
DET
EXT MIC
HV
REM
VOOG
SPG
GND
J3
SMETER
BUSY
R5S
+5
UL
PSTB
MOD
+5SC
H/L
T5
CK
DATA
TO RF UNIT J3
TO RF UNIT J4

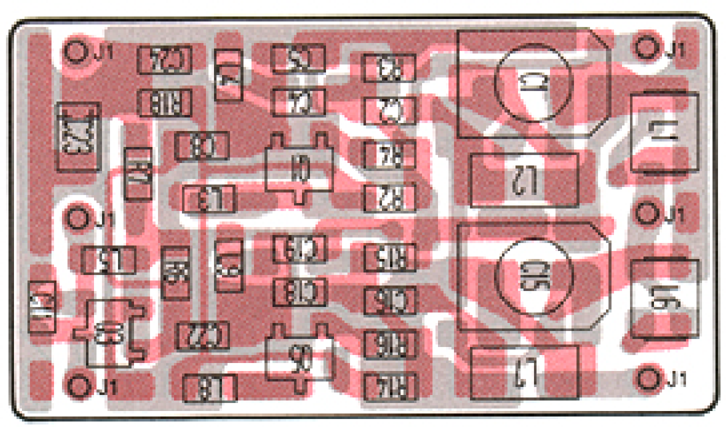
10-3 RF UNIT

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

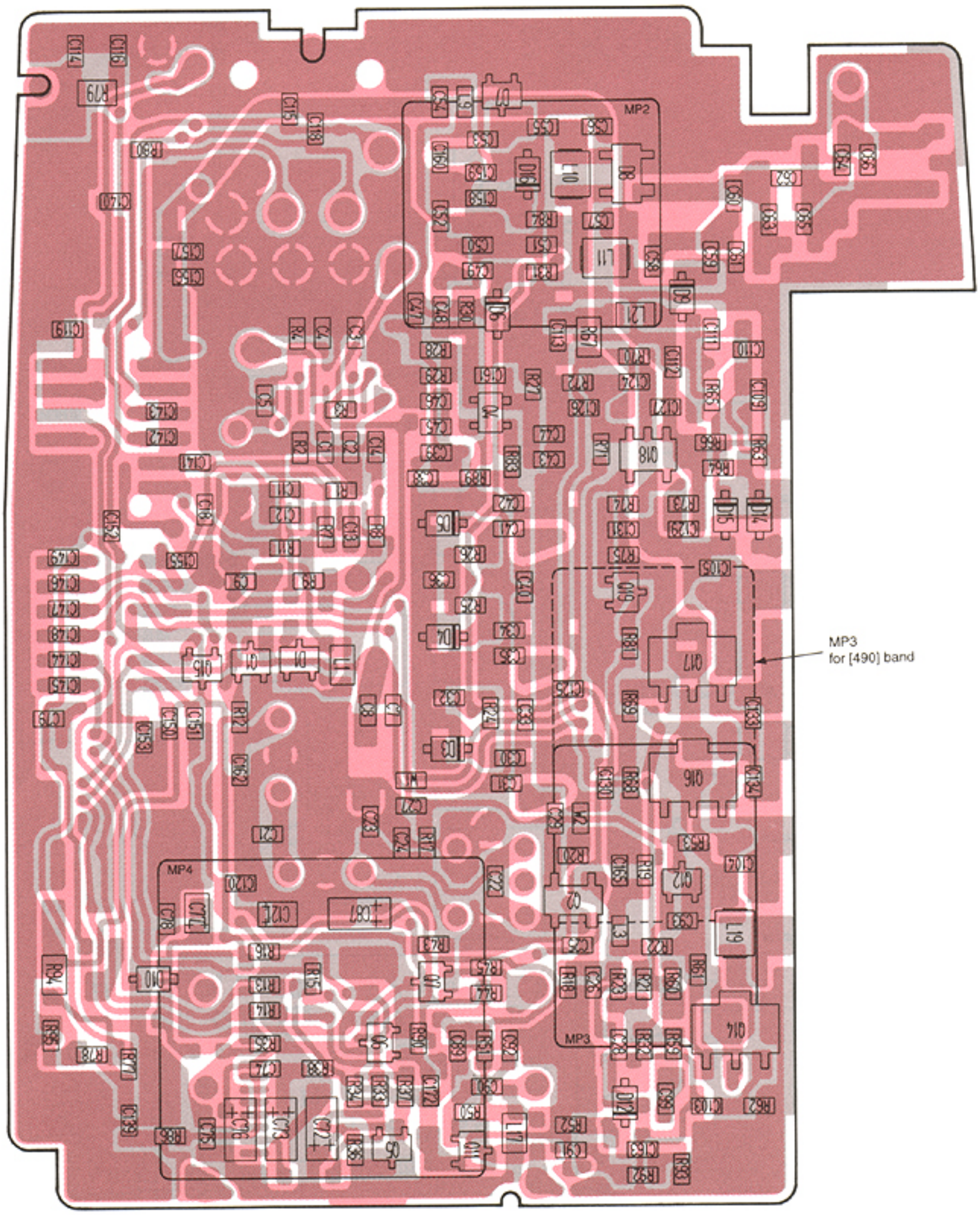
● SENSOR UNIT



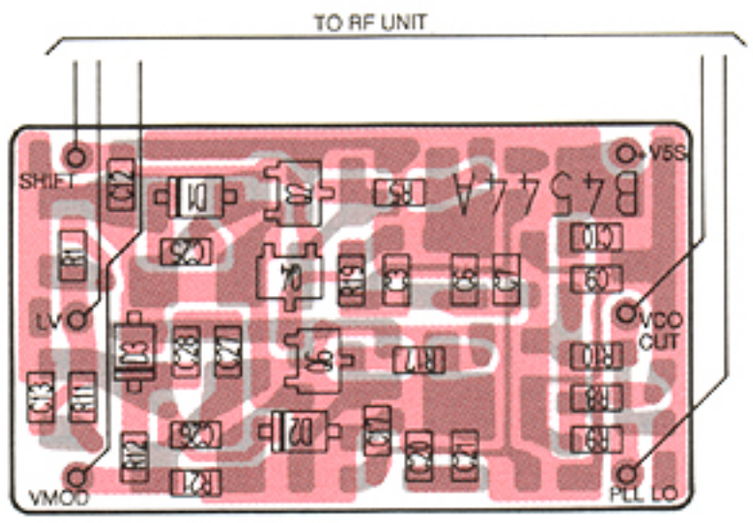
● VCO BOARD



● RF UNIT

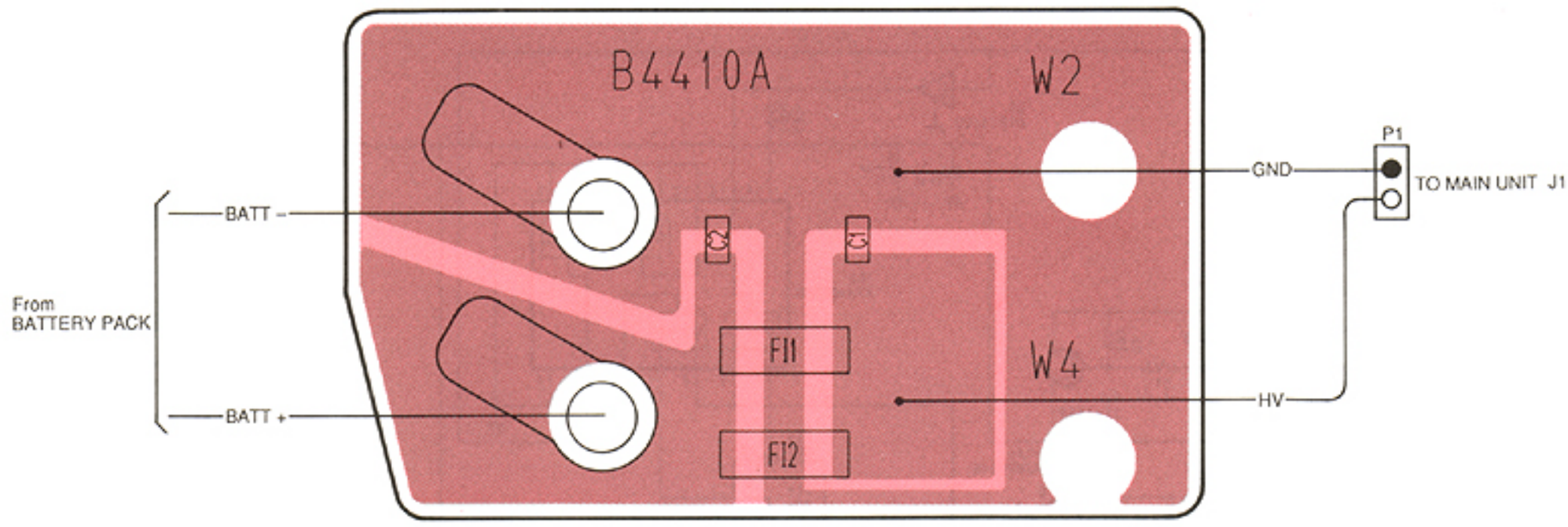


● VCO BOARD

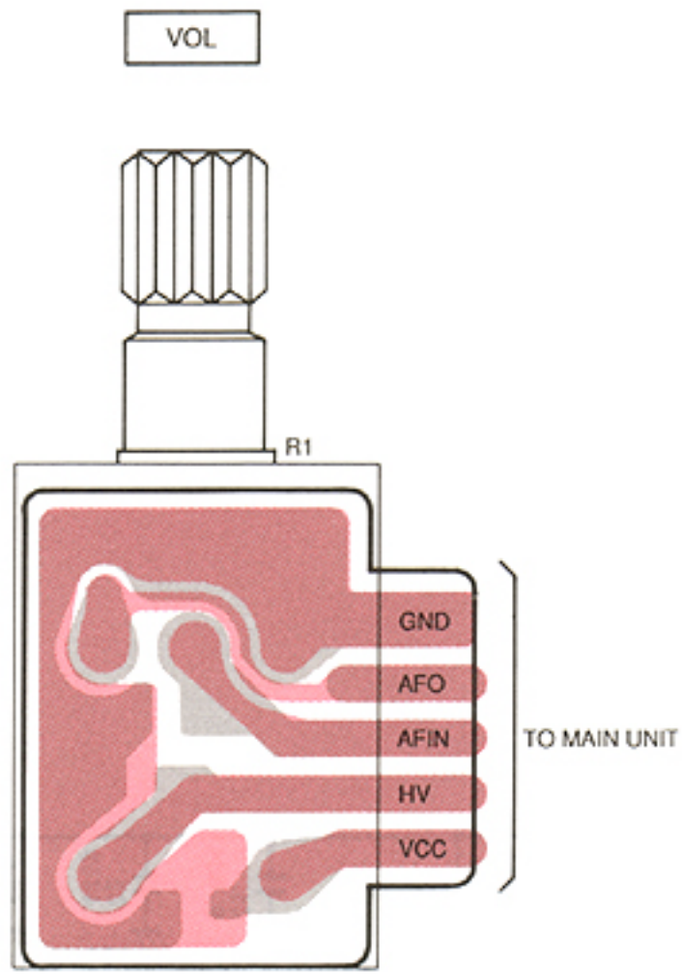


10-4 CONNECT UNIT, VR AND PTT BOARDS

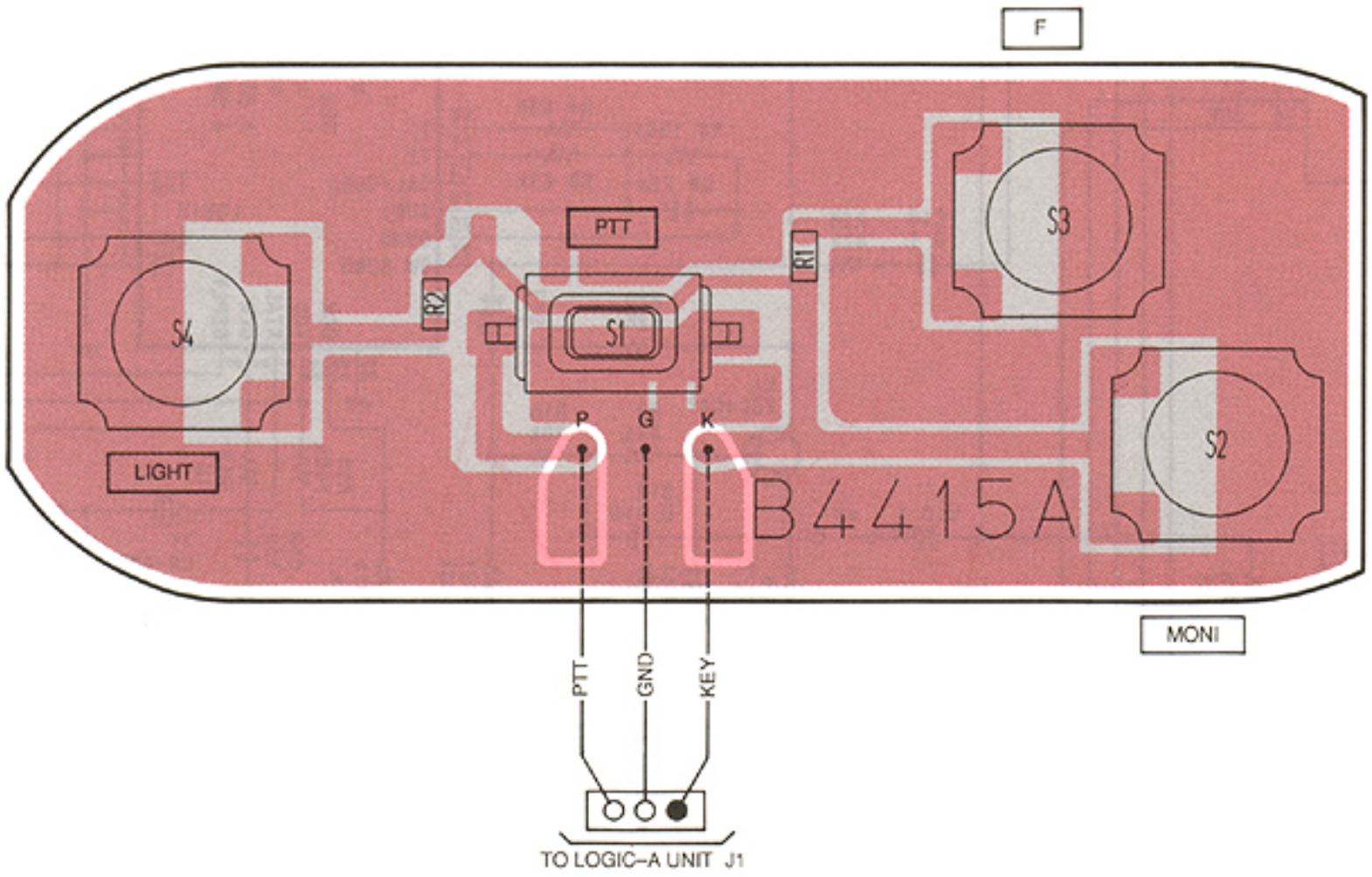
● CONNECT UNIT



● VR BOARD

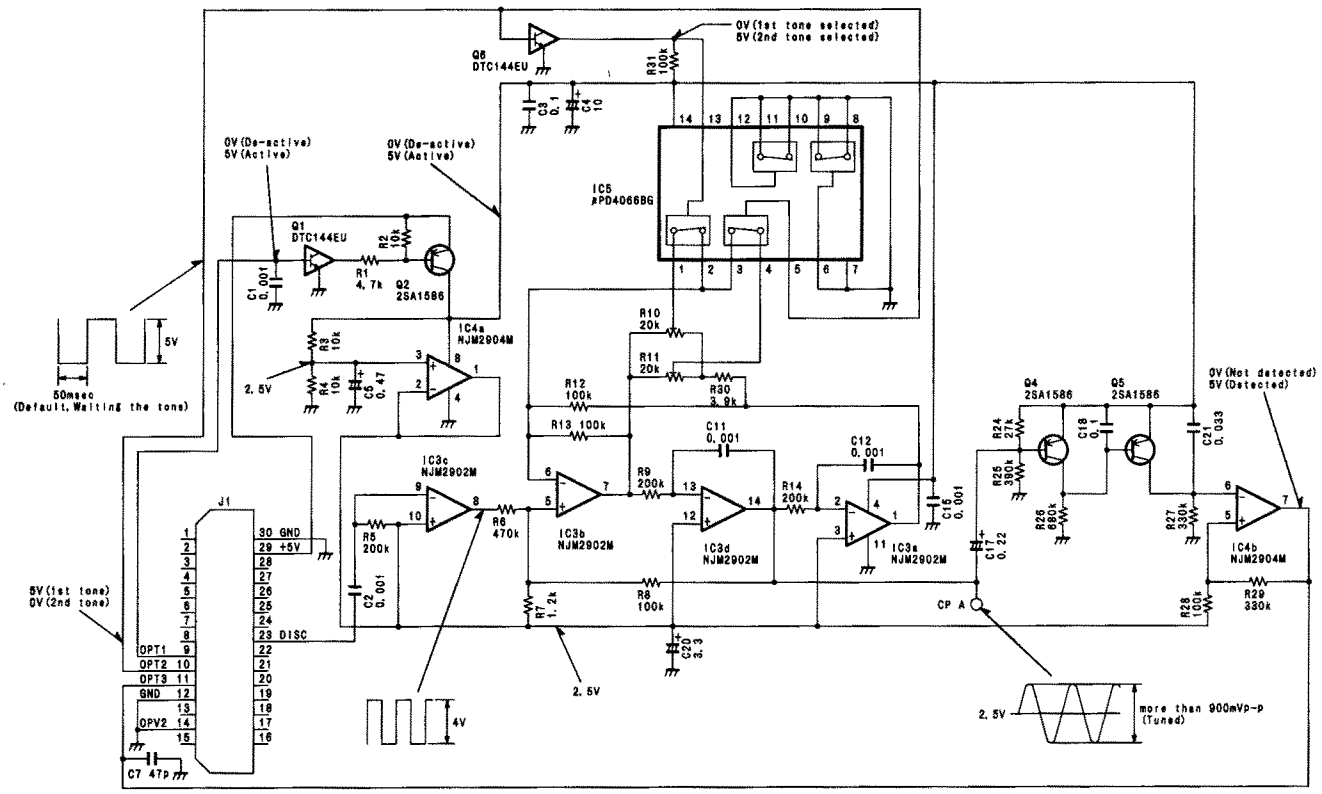


● PTT BOARD

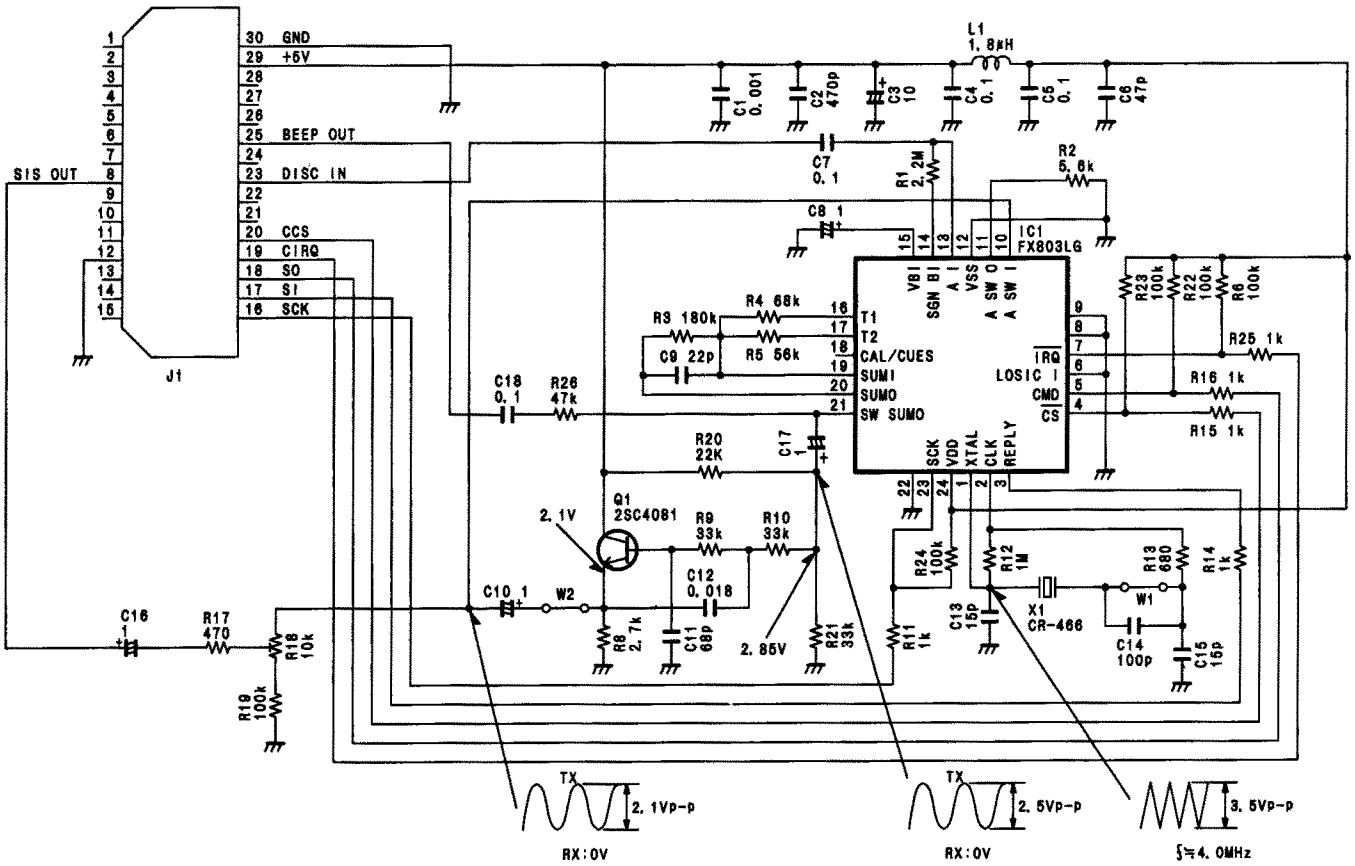


SECTION 11 OPTIONAL UNITS

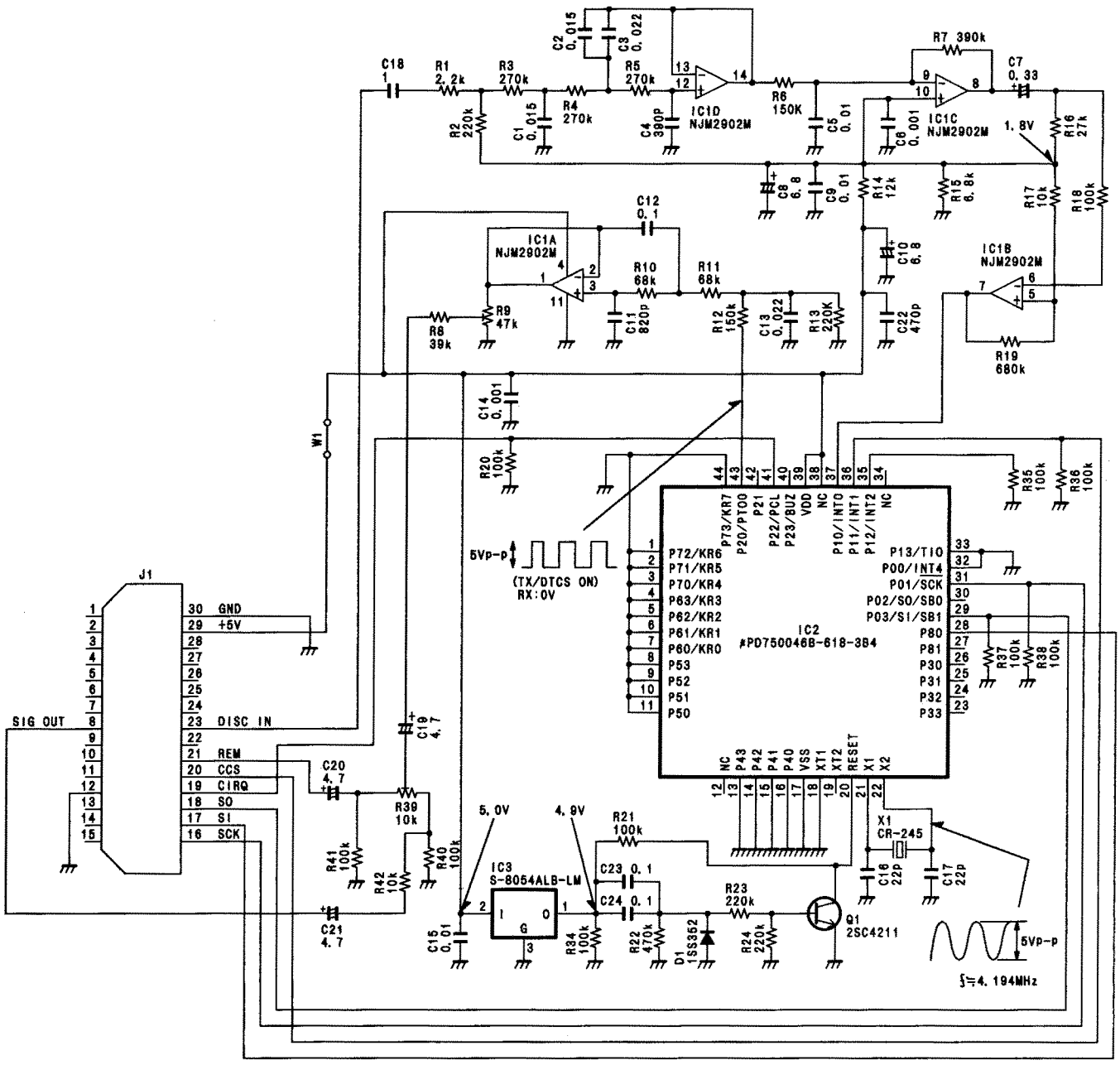
11-1 UT-80 2-TONE UNIT



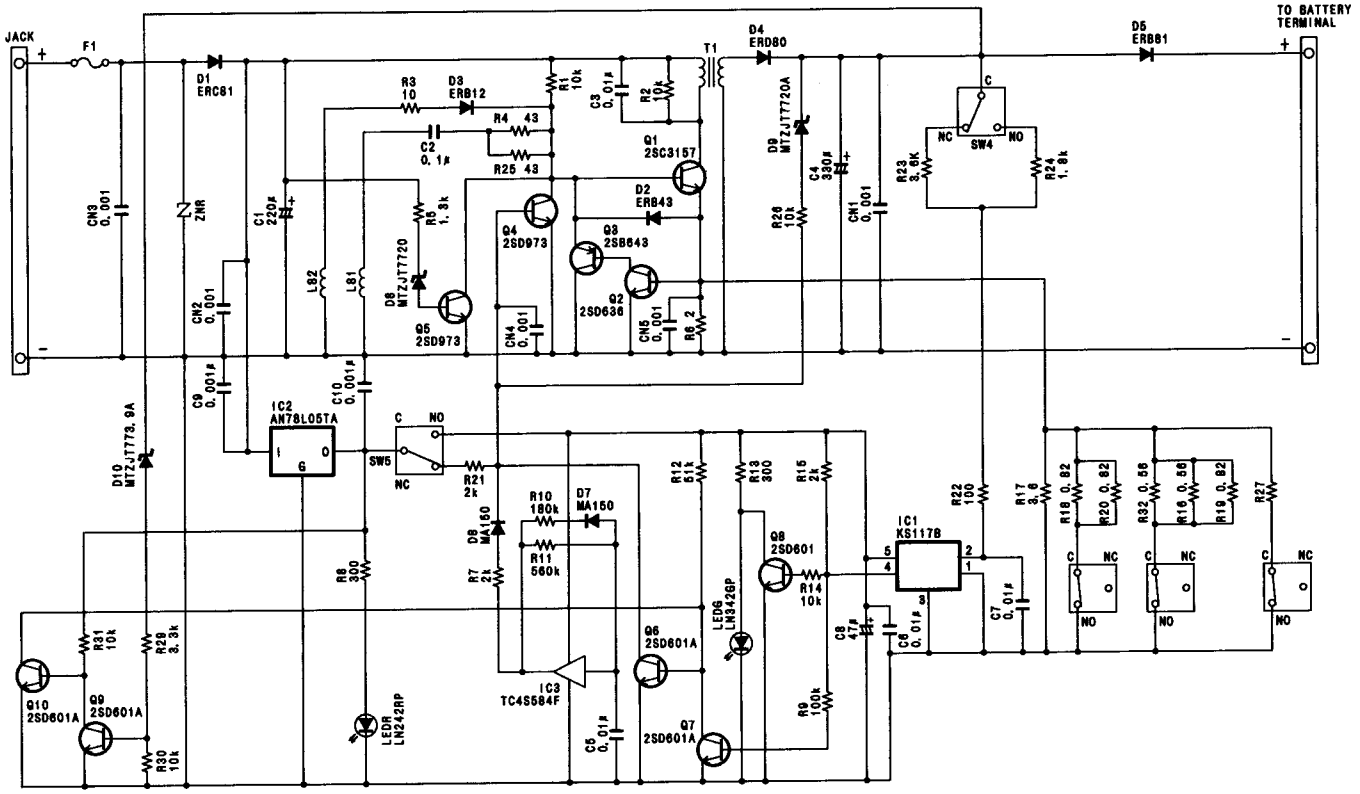
11-2 UT-96 5-TONE UNIT



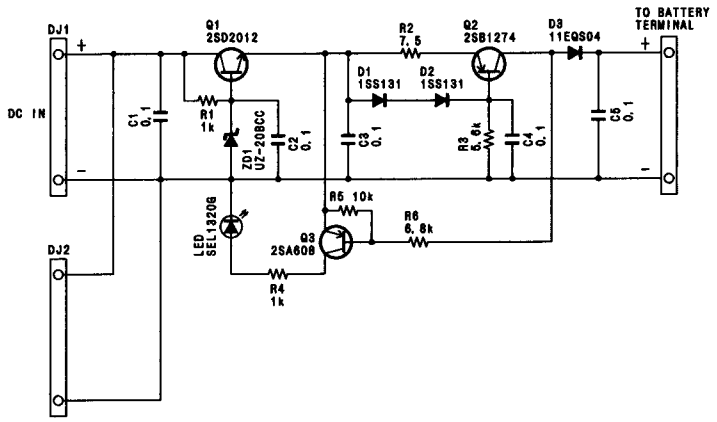
11-3 UT-97 DTCS UNIT



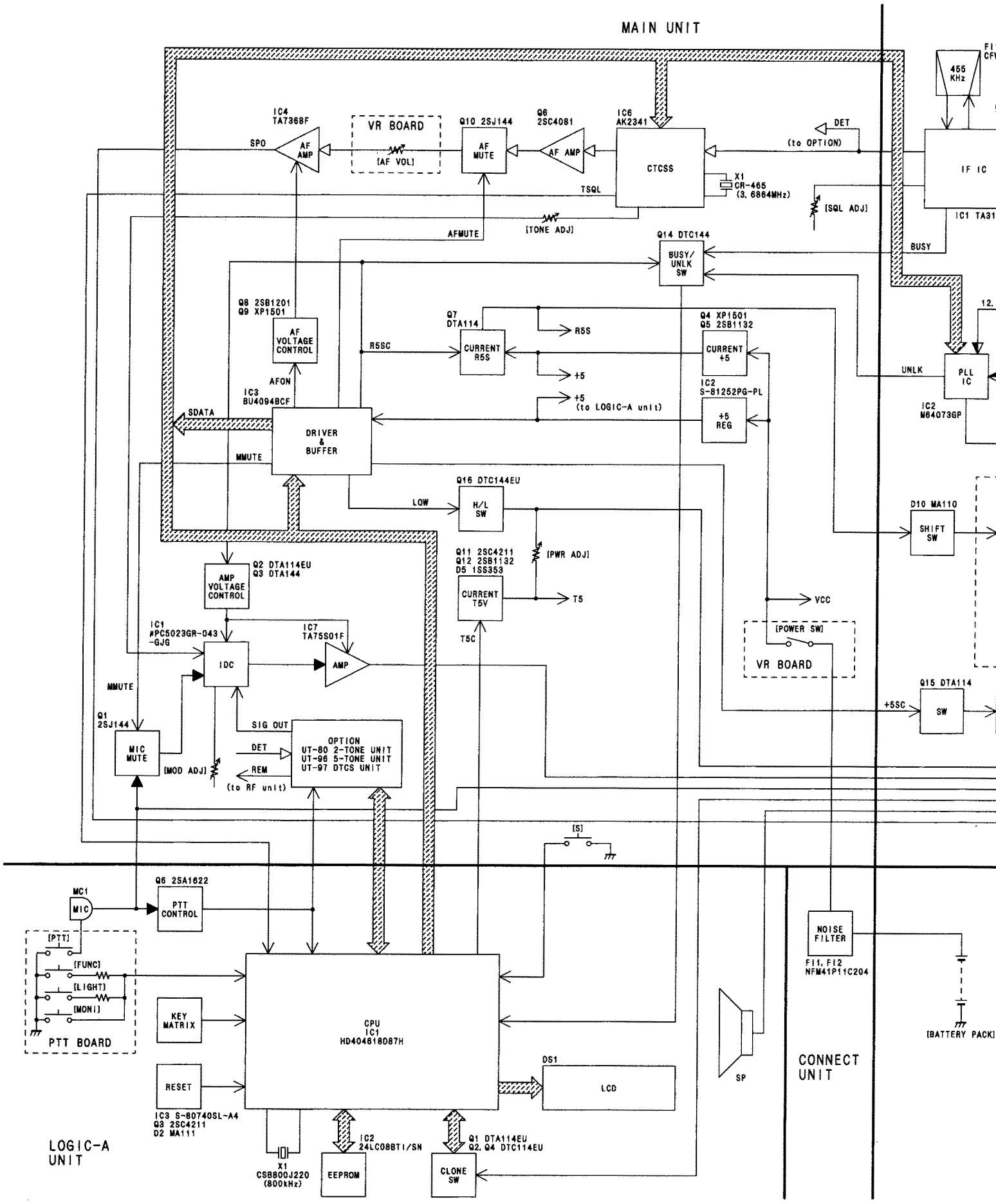
11-4 BC-79 DESKTOP CHARGER

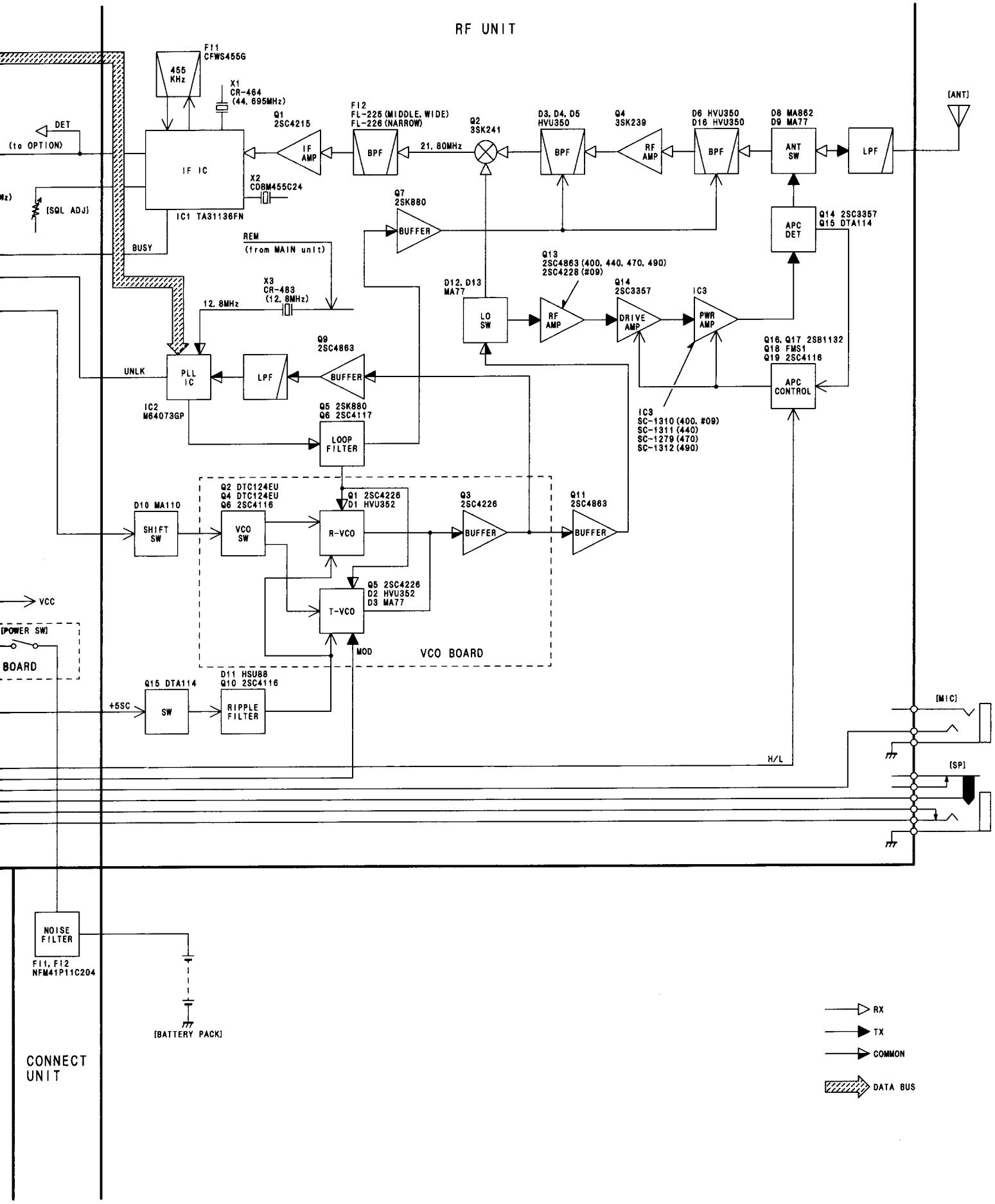


11-5 AD-54 BATTERY CHARGER

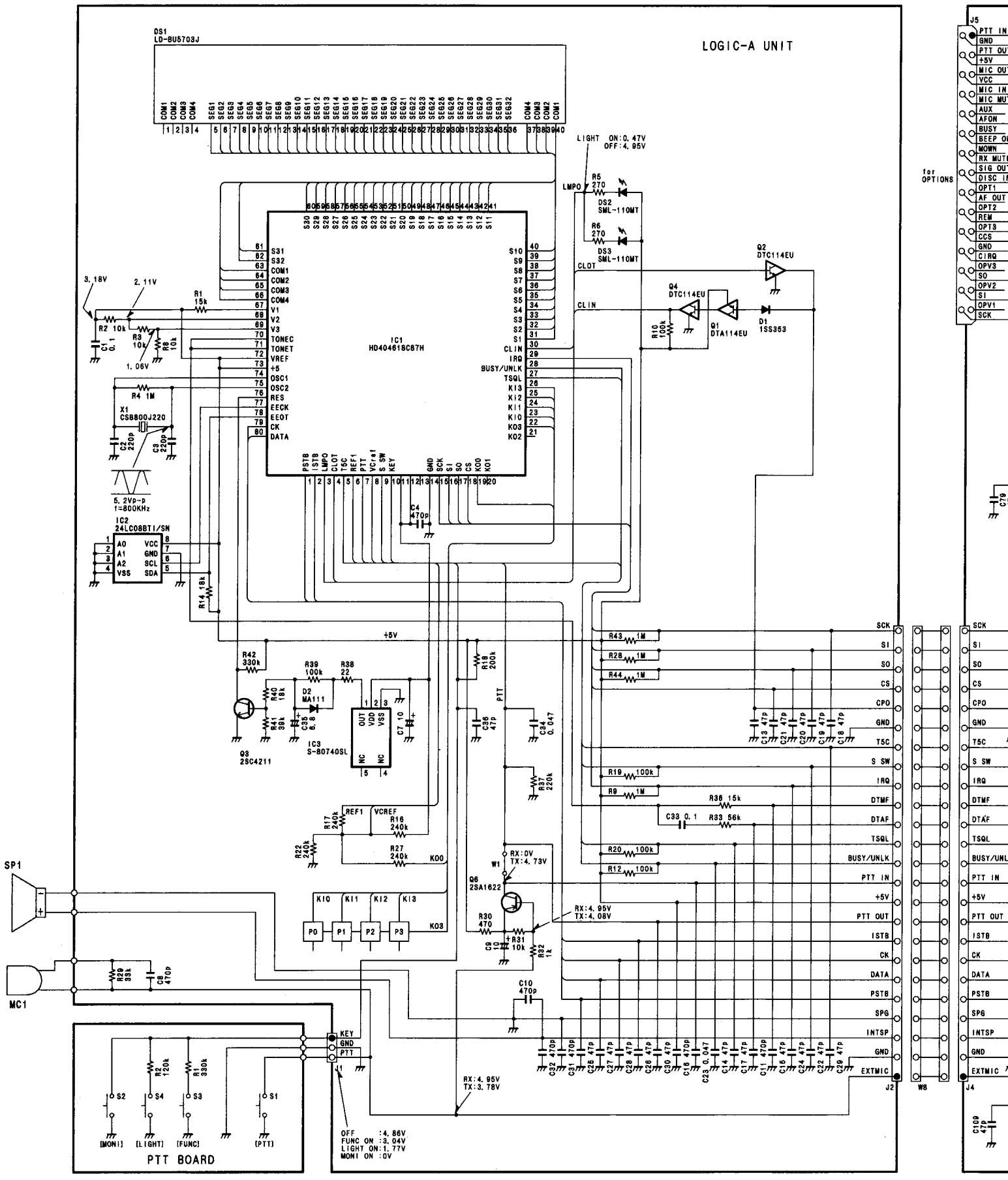


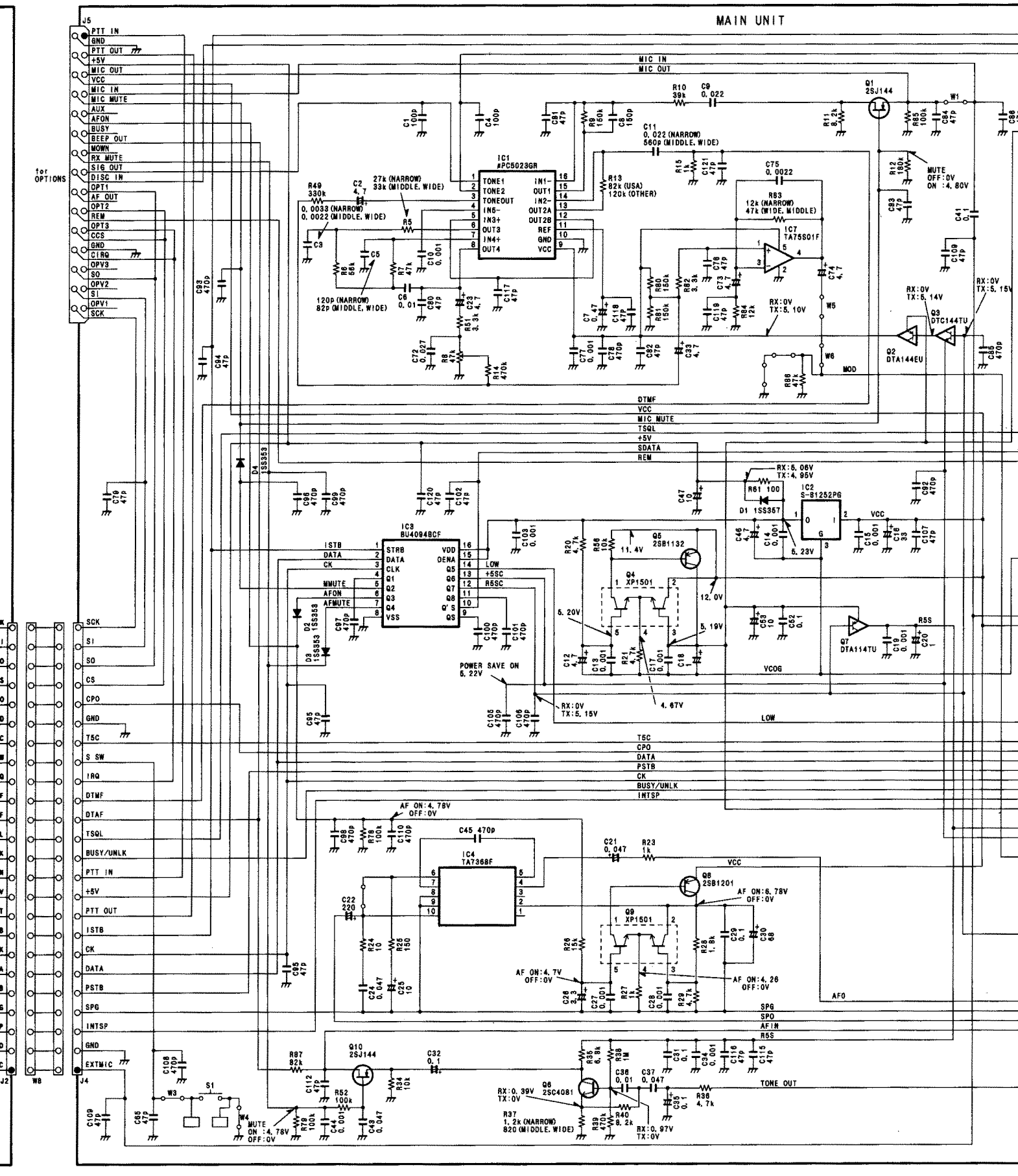
SECTION 12 BLOCK DIAGRAM

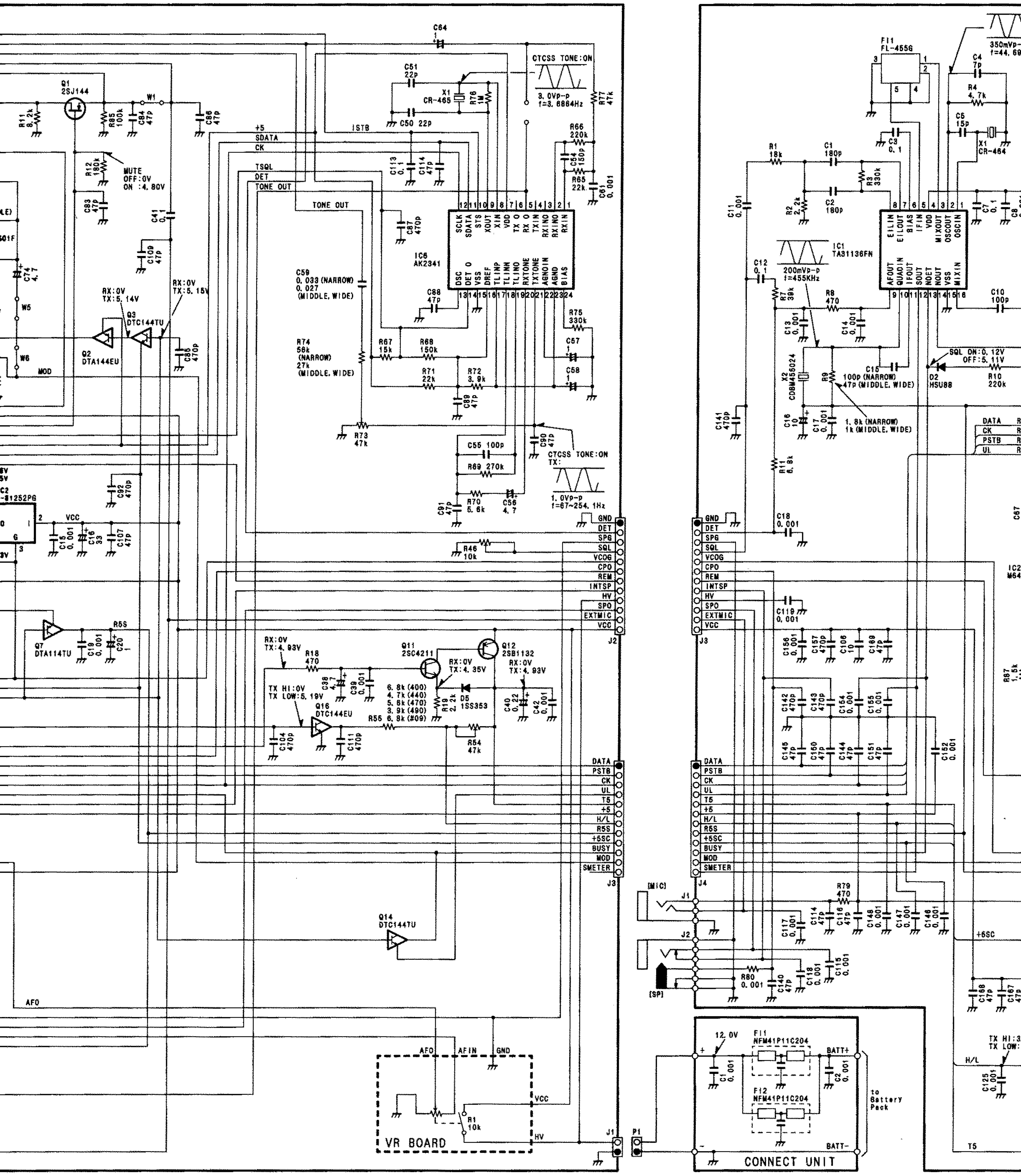


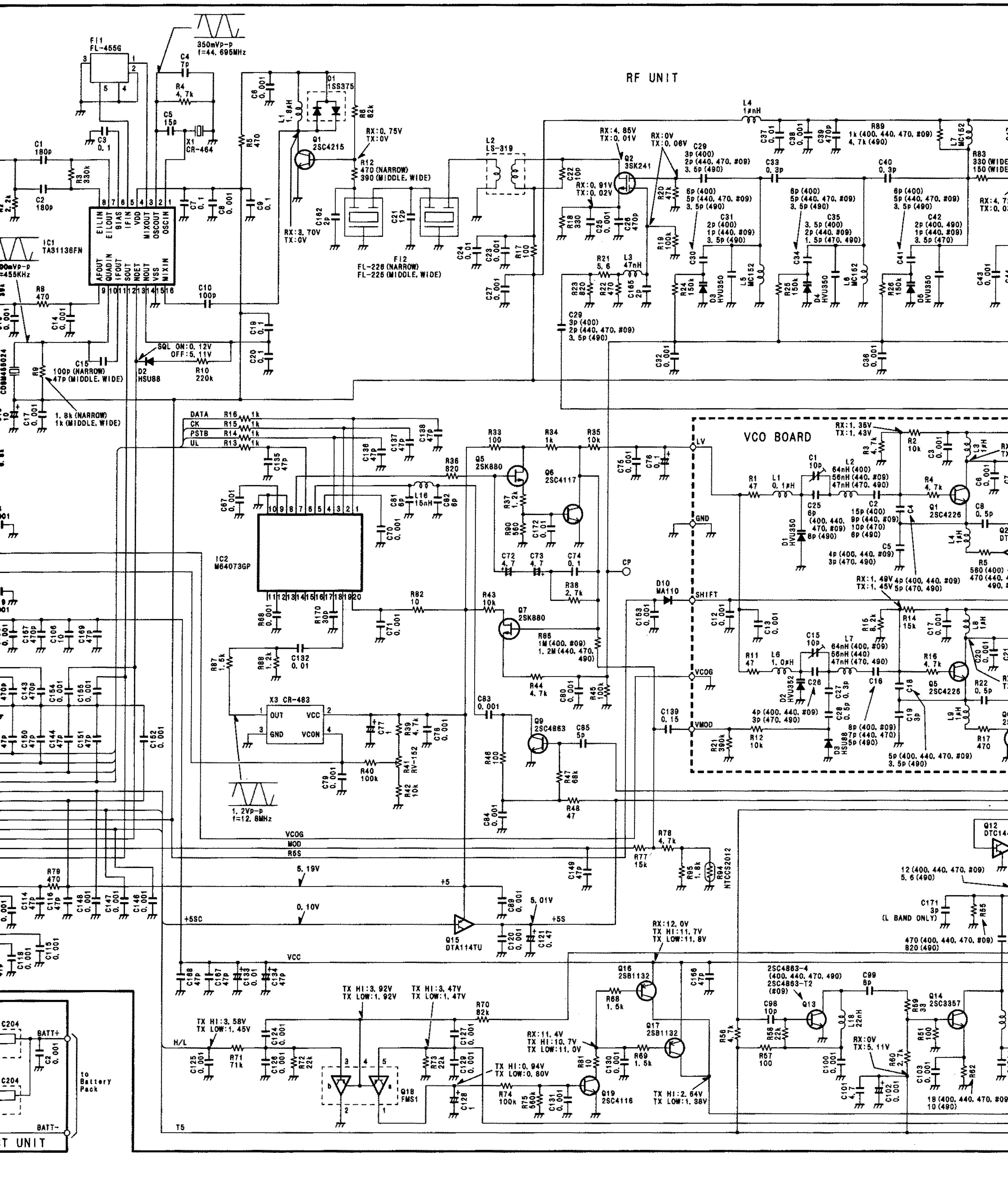

RF UNIT
F11
CFWS455G
455 KHz
X1
CR-464
(44.695MHz)
DET
(to OPTION)
Q1
2SC4215
IF AMP
F12
FL-225 (MIDDLE, WIDE)
FL-226 (NARROW)
BPF
Q2
3SK241
21.80MHz
D3, D4, D5
HVU350
BPF
Q4
3SK239
RF AMP
D6 HVU350
D16 HVU350
BPF
D8 MA862
D9 MA77
ANT SW
LPF
[ANT]
IF IC
X2
CDBM455C24
IC1 TA31136FN
[SQL ADJ]
BUSY
Q7
2SK880
BUFFER
APC DET
Q14 2SC3357
Q15 DTA114
REM
(from MAIN unit)
Q13
2SC4863 (400, 440, 470, 490)
2SC4228 (#09)
D12, D13
MA77
LO SW
RF AMP
Q14
2SC3357
DRIVE AMP
IC3
PWR AMP
X3
CR-483
(12.8MHz)
12.8MHz
Q9
2SC4863
Q16, Q17 2SB1132
Q18 FMS1
Q19 2SC4116
UNLK
PLL IC
LPF
BUFFER
APC CONTROL
IC2
M64073GP
Q5 2SK880
Q6 2SC4117
LOOP FILTER
IC3
SC-1310 (400, #09)
SC-1311 (440)
SC-1279 (470)
SC-1312 (490)
Q2 DTC124EU
Q4 DTC124EU
Q6 2SC4116
Q1 2SC4226
D1 HVU352
Q3
2SC4226
Q11
2SC4863
D10 MA110
SHIFT SW
VCO SW
R-VCO
BUFFER
BUFFER
Q5 2SC4226
D2 HVU352
D3 MA77
T-VCO
MOD
VCO BOARD
VCC
[POWER SW]
BOARD
Q15 DTA114
D11 HSU88
Q10 2SC4116
+5SC
SW
RIPPLE FILTER
[MIC]
[SP]
H/L
NOISE FILTER
F11, F12
NFM41P11C204
[BATTERY PACK]
CONNECT UNIT
RX
TX
COMMON
DATA BUS

SECTION 13 VOLTAGE DIAGRAM

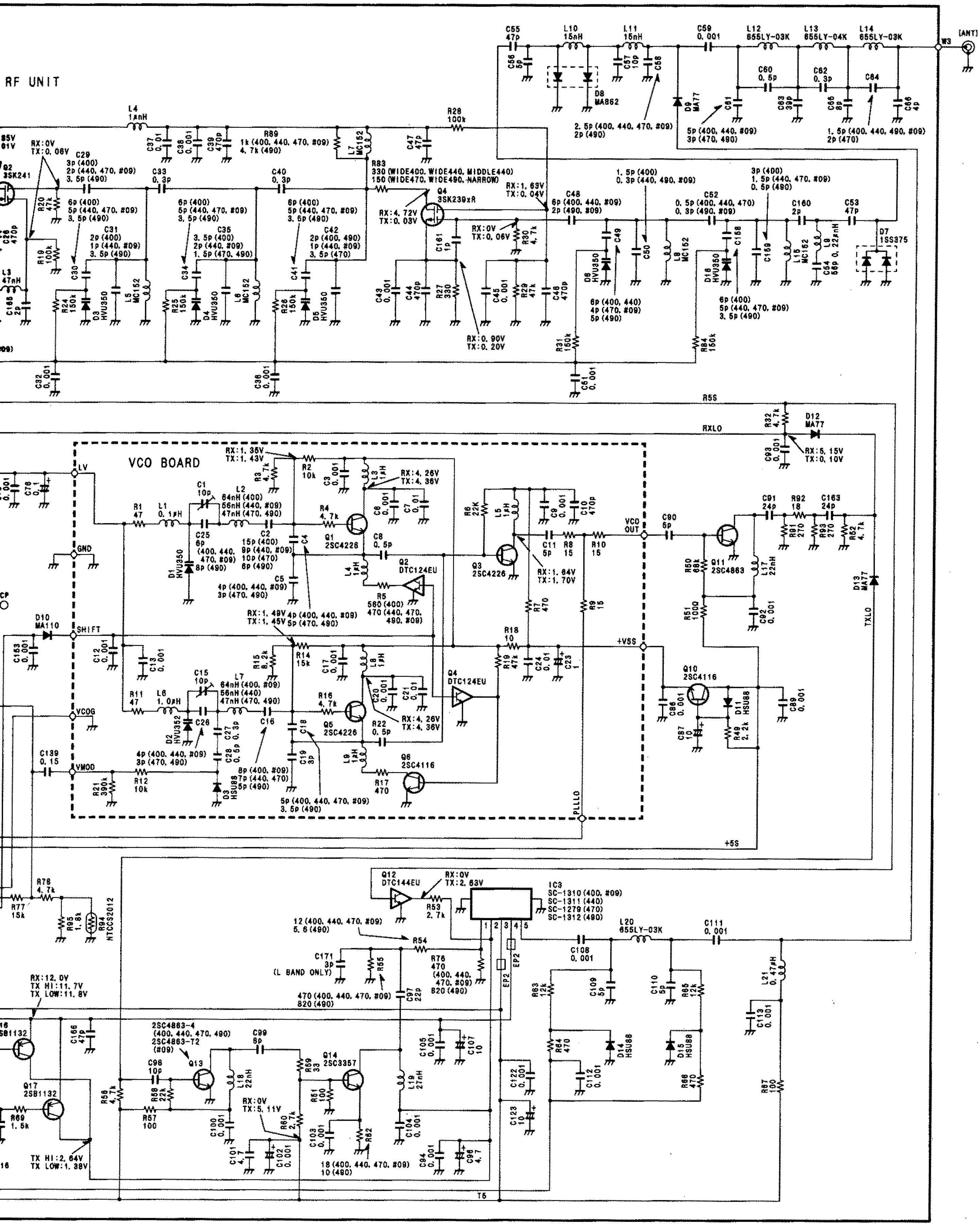



MAIN UNIT
J5
PTT IN
GND
PTT OUT
+5V
MIC OUT
VCC
MIC IN
MIC MUTE
AUX
AFON
BUSY
BEEP OUT
MOWN
RX MUTE
SIG OUT
DISC IN
OPT1
AF OUT
OPT2
REM
OPT3
CCS
GND
CIRQ
OPV3
SO
OPV2
SI
OPV1
SCK
for OPTIONS
MIC IN
MIC OUT
IC1 #PC5023GR
TONE1
TONE2
TONEOUT
IN6-
IN3+
OUT3
IN4+
OUT4
IN1-
OUT1
IN2-
OUT2A
OUT2B
REF
GND
VCC
27k (NARROW) 33k (MIDDLE, WIDE)
0.0033 (NARROW) 0.0022 (MIDDLE, WIDE)
120p (NARROW) 82p (MIDDLE, WIDE)
C11 0.022 (NARROW) 560p (MIDDLE, WIDE)
R13 82k (USA) 120k (OTHER)
R83 12k (NARROW) 47k (WIDE, MIDDLE)
IC7 TA75S01F
MUTE OFF:0V ON :4.80V
RX:0V TX:5.14V
RX:0V TX:5.15V
RX:0V TX:5.10V
Q1 2SJ144
Q2 DTA144EU
Q3 DTC144TU
MOD
DTMF
VCC
MIC MUTE
TSQL
+5V
SDATA
REM
IC2 S-81252PG
RX:5.06V TX:4.95V
IC3 BU4094BCF
ISTB
DATA
CK
MMUTE
AFON
AFMUTE
STRB
DATA
CLK
Q1
Q2
Q3
Q4
VSS
VDD
OENA
Q5
Q6
Q7
Q8
Q'5
Q5
LOW
+5SC
R5SC
Q5 2SB1132
11.4V
Q4 XP1501
12.0V
5.20V
5.19V
5.23V
POWER SAVE ON 5.22V
RX:0V TX:5.15V
4.67V
VCOG
Q7 DTA114TU
R5S
LOW
T5C
CPO
DATA
PSTB
CK
BUSY/UNLK
INTSP
SCK
SI
SO
CS
CPO
GND
T5C
S SW
IRQ
DTMF
DTAF
TSQL
BUSY/UNLK
PTT IN
+5V
PTT OUT
ISTB
CK
DATA
PSTB
SPG
INTSP
GND
EXTMIC
W8
J2
J4
AF ON:4.78V OFF:0V
IC4 TA7368F
C45 470p
Q8 2SB1201
AF ON:6.78V OFF:0V
Q9 XP1501
AF ON:4.7V OFF:0V
AF ON:4.26 OFF:0V
AFO
SPG
SPO
AFIN
R5S
Q10 2SJ144
W3
S1
W4
MUTE ON :4.78V OFF:0V
Q6 2SC4081
RX:0.39V TX:0V
RX:0.97V TX:0V
R37 1.2k (NARROW) 820 (MIDDLE, WIDE)
TONE OUT


CTCSS TONE:ON
3.0Vp-p
f=3.6864Hz
IC6
AK2341
Q1
2SJ144
MUTE
OFF:0V
ON :4.80V
TONE OUT
Q2
DTA144EU
Q3
DTC144TU
CTCSS TONE:ON
TX:
1.0Vp-p
f=67~254.1Hz
Q7
DTA114TU
Q11
2SC4211
Q12
2SB1132
Q16
DTC144EU
Q14
DTC144TU
D5
1SS353
VR BOARD
AFO
AFIN
GND
VCC
HV
J1
J2
J3
J4
P1
FI1
FL-455G
IC1
TA31136FN
200mVp-p
f=455KHz
X2
CDBM455024
D2
HSU88
SQL ON:0.12V
OFF:5.11V
[MIC]
[SP]
CONNECT UNIT
12.0V
NFM41P11C204
BATT+
BATT-
to
Battery
Pack
GND
DET
SPG
SQL
VCOG
CPO
REM
INTSP
HV
SPO
EXTMIC
VCC
DATA
PSTB
CK
UL
T5
+5
H/L
R5S
+5SC
BUSY
MOD
SMETER



RF UNIT
VCO BOARD
FI1 FL-455G
IC1 TA31136FN
IC2 M64073GP
X1 CR-464
X3 CR-483
FI2 FL-226 (NARROW) FL-225 (MIDDLE, WIDE)
L2 LS-319
Q1 2SC4215
Q2 3SK241
Q5 2SK880
Q6 2SC4117
Q7 2SK880
Q9 2SC4863
Q13
Q14 2SC3357
Q15 DTA114TU
Q16 2SB1132
Q17 2SB1132
Q18 FMS1
Q19 2SC4116
D1 1SS375
D2 HSU88
D10 MA110
350mVp-p f=44.695MHz
1.2Vp-p f=12.8MHz
DATA
CK
PSTB
UL
VCOG
MOD
R6S
VCC
+5SC
+5S
H/L
T5
BATT+
BATT-
to Battery Pack


RF UNIT
VCO BOARD
[ANT]
IC3
SC-1310 (400, #09)
SC-1311 (440)
SC-1279 (470)
SC-1312 (490)

Icom Inc.

6-9-16, Kamihigashi, Hirano-ku, Osaka 547, Japan
Phone : 06 793 5302
Fax : 06 793 0013

Icom America Inc.

<Corporate Headquarters>
2380 116th Avenue N.E., Bellevue, WA 98004, U.S.A.
Phone : (425) 454-8155
Fax : (425) 454-1509
Telex : 152210 ICOM AMER BVUE

<Customer Service>
Phone : (206) 454-7619

Icom Canada

A Division of Icom America Inc.
3071 #5 Road, Unit 9, Richmond, B.C., V6X 2T4, Canada
Phone : (604) 273-7400
Fax : (604) 273-1900

Icom (Australia) Pty. Ltd.

A.C.N. 006 092 575
290-294 Albert Street, Brunswick, Victoria, 3056, Australia
Phone : 03 9387 0666
Fax : 03 9387 0022

Icom (Europe) GmbH

Communication Equipment
Himmelgeister Str. 100, D-40225 Düsseldorf, Germany
Phone : 0211 346047
Fax : 0211 333639

Icom Telecomunicaciones s.l.

"Edificio Can Castanyer" Crta. Gracia a Manresa km. 14,750
08190 Sant Cugat Del Valles Barcerona, SPAIN
Phone : (3) 589 46 82
Fax : (3) 589 04 46

Icom (UK) Ltd.

Unit 9, Sea St., Herne Bay, Kent, CT6 8LD, U.K.
Phone : 01227 741741
Fax : 01227 741742
Telex : 317210 BUREAU G

Icom France S.a

Zac de la Plaine, Rue Brindejonc des Moulinais
BP 5804, 31505 Toulouse Cedex, France
Phone : 561 36 03 03
Fax : 561 36 03 00
Telex : 521515 ICOM FRA

Count on us!

Icom Inc.
6-9-16, Kamihigashi, Hirano-ku, Osaka 547, Japan

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