ICOM

SERVICE MANUAL

AIR BAND FM TRANSCEIVER

IC-A23
IC-A5

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the IC-A23/IC-A5 FM TRANSCEIVER at the time of publication.

MODEL	VERSION	SYMBOL
IC-A23	#01	A23-USA
	#11	USA-1
IC-A5	#21	A5-USA
	#31	USA-1

To upgrade quality, all electrical or mechanical parts and internal circuits are subject to change without notice or obligation.

IC-A5 IC-A23

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 16 V. Such a connection could cause a fire hazard and/or electric shock.

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	IC-A23	RF UNIT	1 piece
8810008990	Screw	FH BT 2 × 10 ZK	IC-A5	CHASSIS	6 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 or 50 dB attenuator between the transceiver and a deviation meter or spectrum analyser when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

TABLE OF CONTENTS

SECTION 1 SPECIFICATIONS

■ GENERAL

- Frequency coverage : TX 118.000–136.975 MHz
  RX 108.000–136.975 MHz *1
  WX 161.650–163.275 MHz *1
  *1: IC-A23 only, IC-A5; 118.000–136.975 MHz
  *2: U.S.A version only
- Type of emission : 6K00A3E, 16K0G3E (Weather channel; [USA] version only)
- Channel spacing : 25 kHz
- Memory channels : 20 channels × 10 banks
- Power supply requirement : 9.6 V DC (supplied battery pack)
- External power supply requirement : 9.6 V–12.0 V DC (negative ground)
- Current drain (at 9.6 V DC) : Transmit 1.8 A max.
  1.1 A typical
  Receive 500 mA max. (AF max.)
  70 mA typical (stand-by)
- Operating temperature range : –10˚C to +60˚C; +14˚F to +140˚F
- Frequency stability : ±17 ppm (–10˚C to +60˚C)
- Antenna connector : BNC type (50 Ω nominal)
- Dimensions (projections not included) : 58(W) × 107(H) × 28.5(D) mm; 2 5/16(W) × 4 7/32(H) × 1 1/8(D) in.
- Weight (with ant., BP-200L) : 340 g; 12 oz.

■ TRANSMITTER

- RF output power (at 9.6 V DC) (with supplied battery pack) : 5.0 W (PEP) typical, 1.5 W (CW) typical.
- Modulation system : Low level modulation
- Modulation limiting : 70–100% of max. deviation
- Audio harmonic distortion : Less than 10 % (at 60 % modulation)
- Hum and noise ratio : More than 35 dB
- Spurious emissions : More than 60 dB
- Microphone impedance (MIC) : 150 Ω

■ RECEIVER

- Receive system : Double conversion superheterodyne system
- Intermediate frequencies : 1st 30.05 MHz
  2nd 450 kHz
- Sensitivity : Less than 1.0 µV at 6 dB S/N (AM)
  Less than 1.0 µV at 12 dB S/N (FM)
- Threshold squelch sensitivity : Less than 0.71 µV (AM)
  Less than 0.22 µV (FM)
- Selectivity : More than 7.5 kHz/–6 dB
  Less than 25 kHz/–60 dB
- Spurious response rejection ratio : More than 60 dB
- Audio power output (at 9.6 V DC) : More than 500 mW at 10 % distortion with an 8 Ω load
- Hum and noise : More than 25 dB
- Audio output impedance : 8 Ω
- Ext. speaker connector : 3-conductor 3.5(d) mm (1/8")/8 Ω

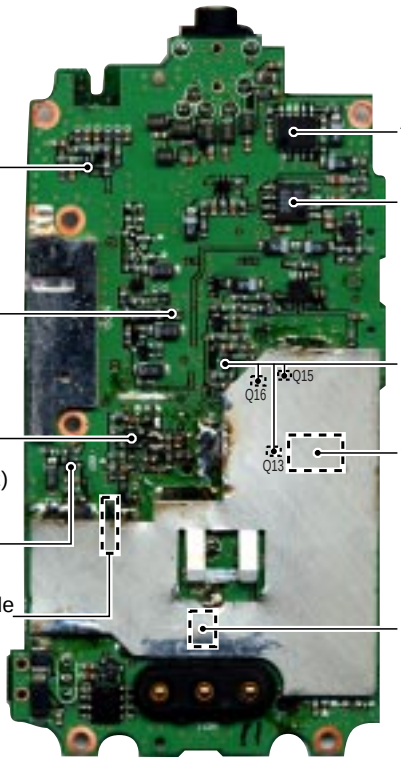
Specifications are measured in accordance with FCC Part87.

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

SECTION 2 INSIDE VIEWS

• RF UNIT

BOTTOM VIEW



ALC CTRL
(Q1: UMS1)

AF amplifier
(IC6: TA7368F)

Electric volume
(IC505: M52429FP)

VOR switching
(Q19: UN9210)
[IC-A23] only

IF amplifier
(Q13, Q15, Q16,
Q17: 2SC4215)

1st mixer
(Q12: 3SK151
30.05 MHz)

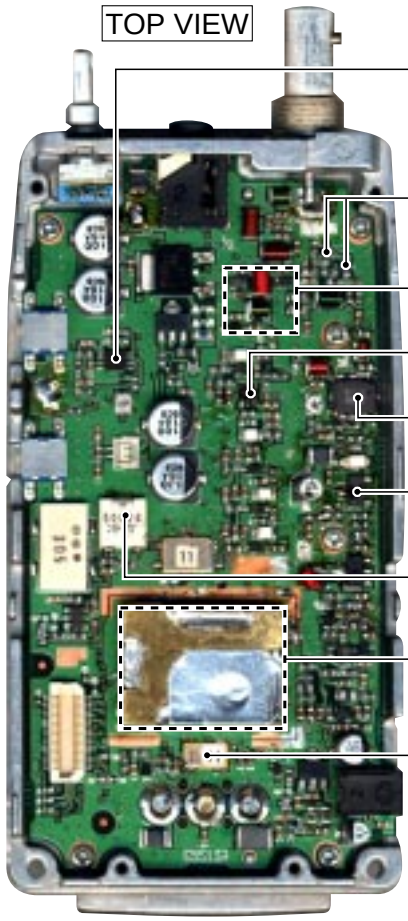
2nd mixer,
IF amplifier,
Noise detector
(IC1: TA31136FN)

ALC amplifier
(Q5: 2SC4211)

Lo switching diode
(D6, D17: MA77)

PLL IC
(IC3: TB31207FN)

TOP VIEW



AF amplifier/
Low-pass filter
(IC510: TC75W51F)

ALC detector
(D2, D3: MA728)

Antenna switching
circuit

RF amplifier
(Q11: 3SK230)

Power amplifier
(Q2: 2SK2994)

YGR amplifier
(Q3: 2SK2973)

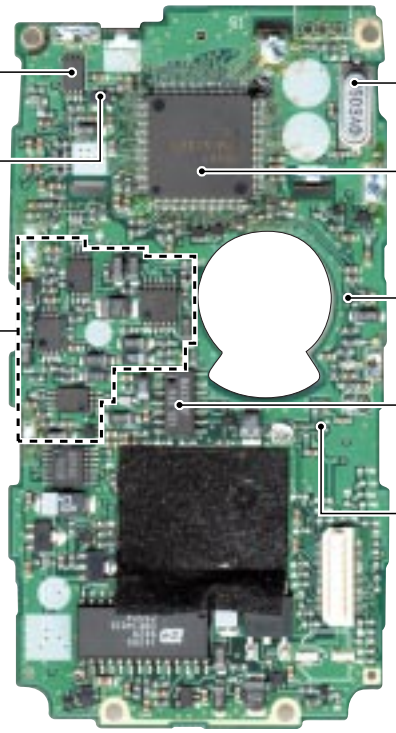
IF discreminator
crystal
(X1: CDBCA450CX24
450 kHz)

VCO circuit

Reference
oscillator
(X2: CR-683,
29.600 MHz)

• LOGIC UNIT

BOTTOM VIEW



EEPROM
(IC7: HN58X2432)

RESET
(IC2: S-80945ALMP)

VOR circuit
(IC-A23 only)

Clock oscillator
(X1: CR-534,
5.039 MHz)

CPU
(IC1: M38267M6L)

PTT detector
(Q10: 2SB1462)

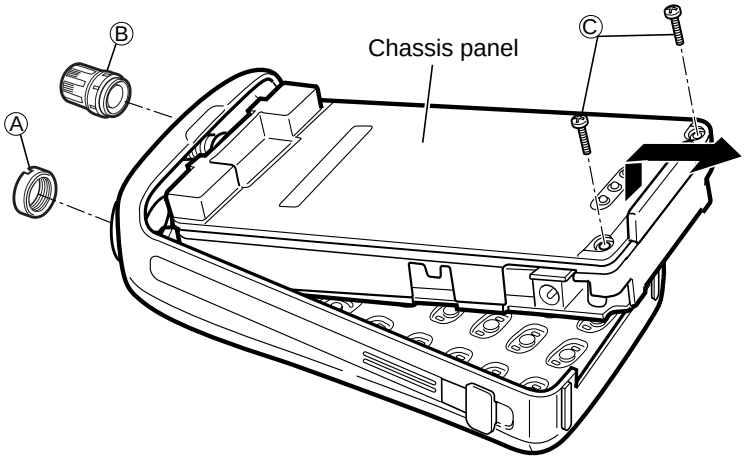
Microphone
amplifier
(IC9: BA3308F)

Microphone
mute
(Q12: UN9211)

SECTION 3 DISASSEMBLY INSTRUCTIONS

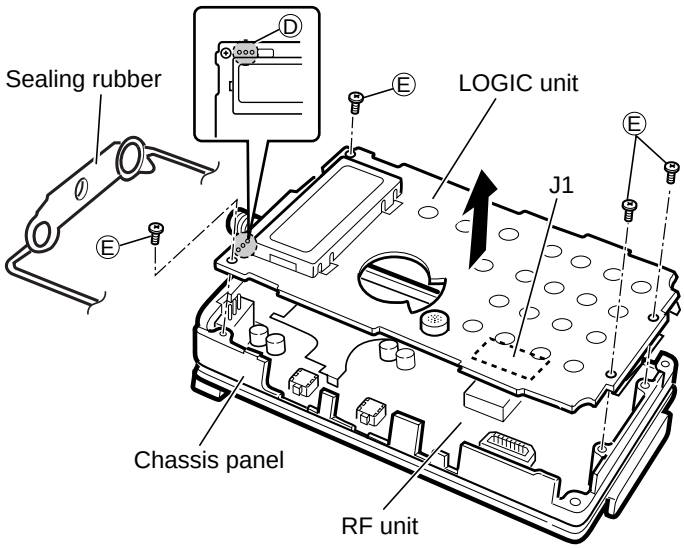
1 REMOVING THE CHASSIS PANEL

① Remove 1 knob, Ⓑ, and unscrew 1 nut, Ⓐ.
② Unscrew 2 screws Ⓒ (2 × 10 mm, black).
③ Remove the chassis panel in the direction of the arrow.



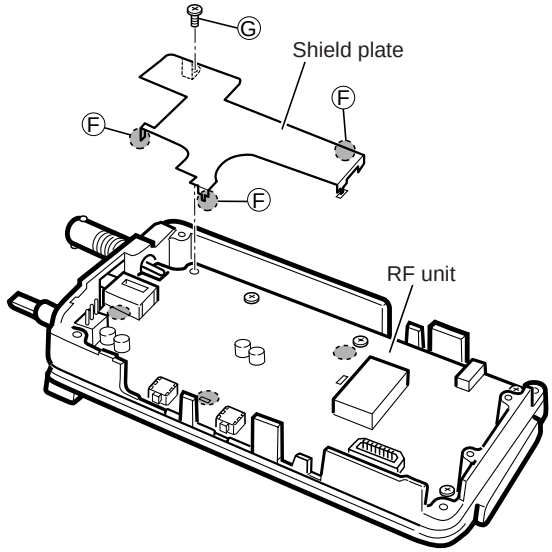
2 REMOVING THE LOGIC UNIT

① Remove the sealing rubber.
② Unsolder 1 point, Ⓓ, to separate a SENSOR control.
③ Unscrew 4 screws Ⓔ (2 × 4 mm, silver).
④ Unplug J1 to separate LOGIC unit and RF unit.
⑤ Remove the LOGIC unit in the direction of the arrow.



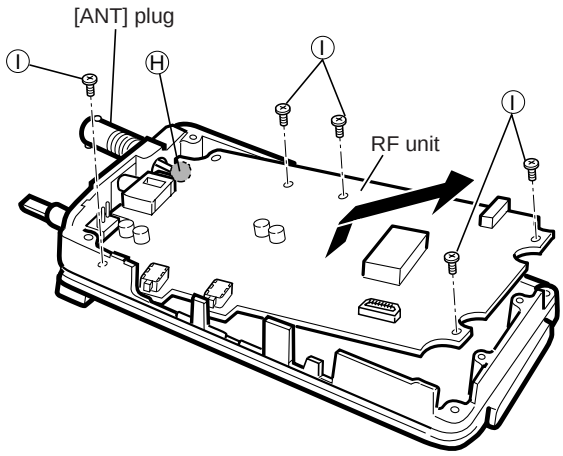
3 REMOVING THE SHIELD PLATE

① Unsolder 3 points, Ⓕ, to separate the shield plate and RF unit.
② Unscrew 1 screw Ⓖ (2 × 4 mm, silver).



4 REMOVING THE RF UNIT

① Unsolder 1 point, Ⓗ, to separate the [ANT] plug.
② Unscrew 5 screws Ⓘ (2 × 4 mm, silver), to separate the RF unit.
③ Remove the RF unit in the direction of the arrow.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT (RF UNIT)

The antenna switching circuit functions as a low-pass filter while receiving. However, its impedance becomes very high while D8 and D9 are turned ON. Thus transmit signals are blocked from entering the receiver circuits. The antenna switching circuit employs a λ/4 type diode switching system.

Received signals are passed through the low-pass filter (L1–L3, C3–C7). The filtered signals are applied to the λ/4 type antenna switching circuit (D8, D9).
The passed signals are then applied to the RF amplifier circuit.

4-1-2 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 are amplified at the RF amplifier (Q11) after passing through the tunable bandpass filter (D13, L18, C58, C60). The amplified signals are applied to the 1st mixer circuit (Q12) after out-of-band signals are suppressed at the tunable bandpass filter (D14–D16, L22, L23, C70–C79).

Varactor diodes are employed at the bandpass filters (D13–D16) that track the filters and are controlled by the CPU (LOGIC unit; IC1) via the expander IC (IC4) using bandpass filter control voltage. These diodes tune the center frequency of an RF passband for wide bandwidth receiving and good image response rejection.

4-1-3 1ST MIXER AND 1ST IF CIRCUITS (RF UNIT)

The 1st mixer circuit converts the received signal into a fixed frequency of the 1st IF signal with a PLL output frequency. By changing the PLL frequency, only the desired frequency will pass through a crystal filter at the next stage of the 1st mixer.

The signals from the RF circuit are mixed at the 1st mixer (Q12) with a 1st LO signal (AM; 78.85–107.825 MHz, FM; 132.45–134.125 MHz) coming from the VCO circuit to produce a 30.05 MHz 1st IF signal.

The 1st IF signal is applied to a crystal filter (FI1) to suppress out-of-band signals. The filtered 1st IF signal is applied to the 1st IF amplifier (Q13), then applied to the 2nd mixer circuit (IC1, pin 16).

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

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

The IF IC contains the 2nd local oscillator, 2nd mixer, limiter amplifier, guadrature detector and s-meter detector circuit, etc.

The 1st IF signal from the 1st IF amplifier is applied to the 2nd mixer section of the IF IC (IC1, pin 16), and is mixed with a 29.6 MHz 2nd LO signal generated at the PLL circuit using the reference frequency (29.6 MHz) to produce a 450 kHz 2nd IF signal.

The 2nd IF signal from the 2nd mixer (IC2, pin 3) passes through a ceramic filter (FI2) to remove unwanted heterodyned frequencies. The filtered signal is amplified at the IF amplifier (Q15), and is then applied to the AM detector circuit or FM detector circuit respectively.

(1) AM DETECTOR CIRCUIT

The amplified signal is then amplified at the 2nd IF amplifiers (Q16, Q17) and applied to the AM detector (Q18) to demodulate the 2nd IF signal into AF signals.

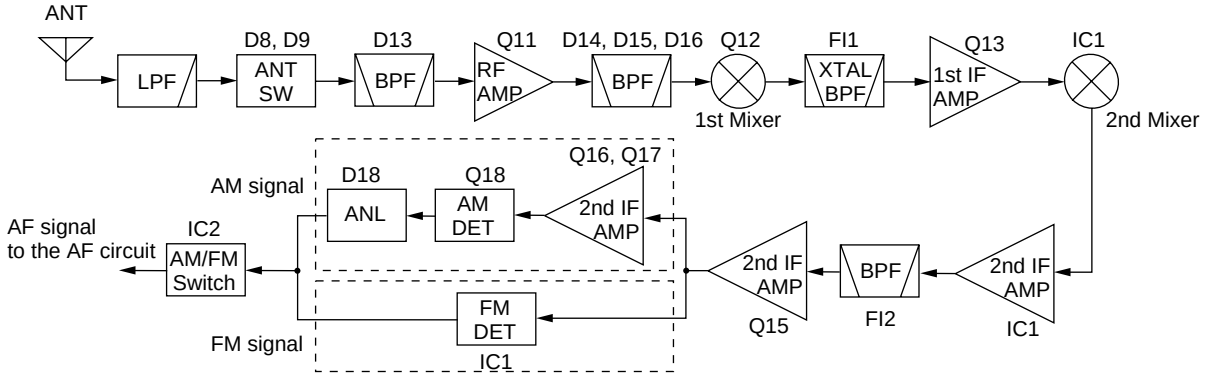
The demodulated AF signals are applied to the AM/FM switch (IC2, pin 6) via the ANL circuit (D18).

(2) FM DETECTOR CIRCUIT

The amplified signal is then amplified at the limiter amplifier (IC1, pin 5) and applied to the quadrature detector (IC1, pins 10, 11) to demodulate the 2nd IF signal into AF signals.

The demodulated AF signals are output from pin 9 of the IC1 and are applied to the AM/FM switch (IC2, pin 7).

• RF CIRCUIT



4-1-5 AF CIRCUIT (RF UNIT)

The AF amplifier circuit amplifies the demodulated AF signals to drive a speaker.

AF signals from the AM detector (Q18; While in AM mode) or IF IC (IC1, pin 9; While in FM mode) are applied to the AM/FM switch (IC2, pin 6 or 7). The output signals from pin 1 are applied to the AF amplifier (IC510, pin 6), and then pass through the low-pass filter (IC510, pins 2, 1). The filtered signals are amplified at the OP-amplifier (IC14), and are then applied to the power amplifier (IC6, pin 4) to obtain the specified audio level after being passed through the electric volume (IC505, pins 1, 2). The amplified AF signals are applied to the internal speaker (SP1) via the [EXT SP] jack (J2) when no plug is connected to the jack.

4-1-6 SQUELCH CIRCUIT (RF AND LOGIC UNITS)

A squelch circuit cuts out AF signals when no RF signals are received. By detecting noise components in the AF signals, the squelch switches the AF mute switch.

A portion of the 2nd IF signal from the 2nd IF amplifier (Q15) is fed back to the IF IC (IC1, pin 5). The IF signal is amplified at the IF amplifier section in the IC, which then detects the receiver signal strength at the RSSI section for conversion into DC voltage.

The DC voltage is applied to the CPU (LOGIC unit; IC1, pin 3) via the “RSSI” signal after being amplified at the RSSI amplifier (IC13).

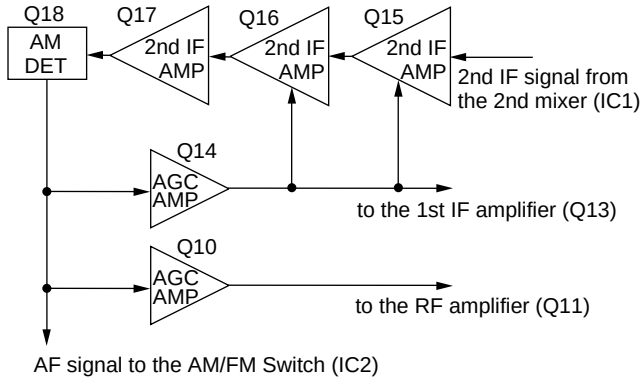
The CPU analyzes the noise condition and outputs the control signal to the shift resistor (IC5). The shift resistor (IC5, pin 14) outputs the squelch control signal via “AFC” line. The signal is applied to the AF out control circuit (Q36, Q35) to control the power amplifier (IC6) and cut the AF signal line.

4-1-7 AGC CIRCUIT (RF UNIT)

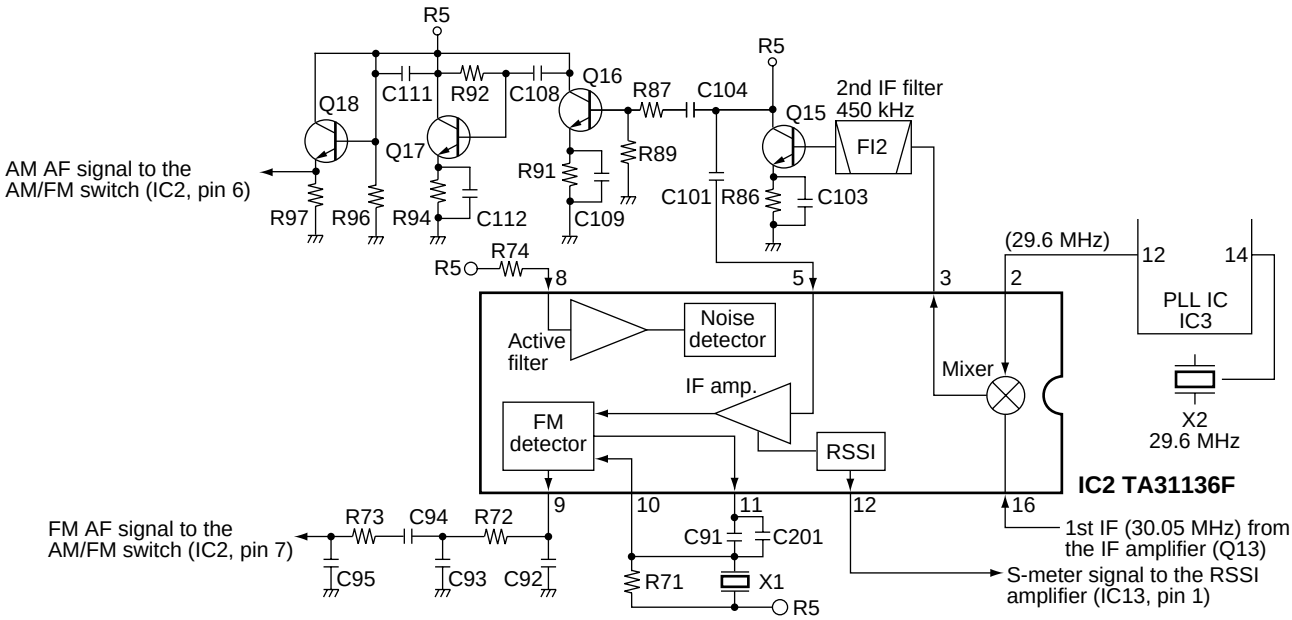
The AGC (Automatic Gain Control) circuit reduce signal fading and keeps the audio output level constant.

AF signals from the AM detector circuit (Q18) are converted into DC voltage at the AGC amplifier circuits (Q14; for 1st/2nd IF amplifiers, Q10; for RF amplifier) by detecting the driving current at the AM detector. The DC voltage from the AGC amplifiers is applied to the 1st/2nd IF amplifiers (Q13, Q15, Q16) and RF amplifier (Q11) to reduce the amplifier gain when strong signals are received.

• AGC CIRCUIT



• 2ND IF AND DEMODULATOR CIRCUITS



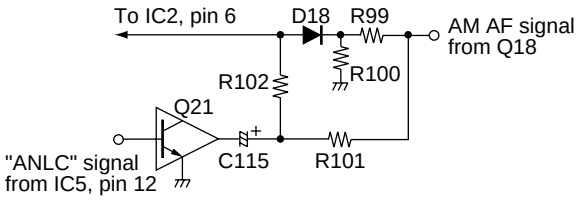
4-1-8 ANL CIRCUIT (RF UNIT)

The ANL (Automatic Noise Limiter) circuit (Q21, D18) reduces pulse noises.

The AM detector output signal from the Q18 is applied to the cathode of D18 passing through R99 where it is divided by R99 and R100. The signal is also applied to the anode of D18, passing through R101 and R102.

When the ANL function is activated (Q21 is ON), C115 is grounded. The detector output, including pulse noise, is applied to the cathode of D18 only. If pulse noises are received, the cathode voltage of D18 becomes higher than the anode voltage and D18 turns OFF. Thus, while pulse noises are received, the detected signal is not applied to IC2.

• ANL CIRCUIT



4-1-9 VOR NAVIGATION CIRCUIT (LOGIC UNIT) (IC-A23 ONLY)

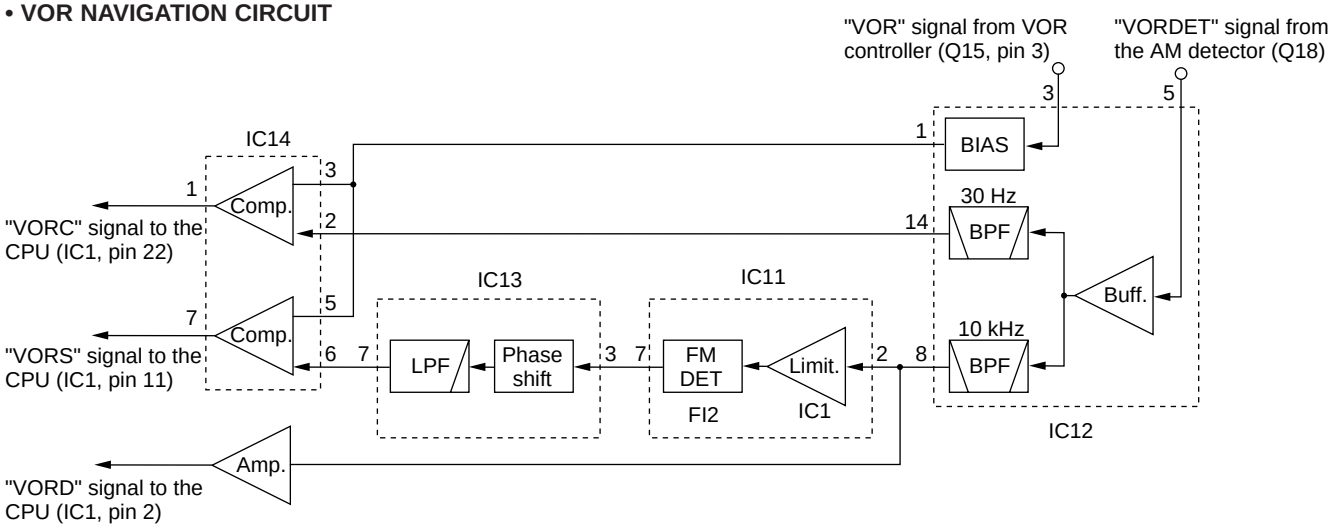
From the AF signal, the VOR circuit detects a variable signal (VORC) and reference signal (VORS) from a VOR station. The VOR circuit sends these signals to the CPU (IC1).

When the transceiver is set in the navigation band (108.000–117.975 MHz), the VORON port of shift resistor (IC8, pin 4) becomes “HIGH” turning the VOR circuit ON via Q15. Q15 controls a 5 V power source for the VOR circuit.

The signal from the AM detector (VORDET) is buffer amplified at the OP-AMP IC (IC12).

The “VORDET” signal includes 30 Hz variable phase components and 9960 Hz reference phase components.

• VOR NAVIGATION CIRCUIT



The 30 Hz component passes through the 30 Hz bandpass filter (IC12, R83, R85–R88, C112, C113), and is converted to a square-wave signal at the VORC comparator (IC14). The square-wave signal is then applied to the CPU (IC1, pin 22) as variable signal (VORC).

The 9960 Hz component passes through the 10 kHz bandpass filter (IC12, R79–R81, C108, C109). These components are FM modulated with 480 Hz deviation and 30 Hz modulation.

Signals are then amplified at a limiter amplifier (IC11), and detected at an FM detector (IC11) to obtain a 30 Hz reference signal.

The 30 Hz signal is compensated on phase at IC12. This signal is passed through the 30 Hz bandpass filter (IC12) and is converted to a square-wave signal at the VORS comparator (IC14). This signal is applied to the CPU (IC1, pin 11) as a reference signal (VORS).

A portion of output from the buffer amplifier (IC12) is applied to the amplifier (Q13). When VOR level is low or receiving the signal except VOR signal, output from Q13 is reduced. Q13 cannot be turned ON, then IC1 (pin 2) receives “HIGH” to indicate “OFF FLAG” indicator.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT (LOGIC AND RF UNITS)

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

AF signal from the internal/external microphone are applied to the microhone amplifier (LOGIC unit; IC9, pin 9) via the modulation depth adjustment pot (LOGIC unit; R41). The amplified signals are applied to the AF amplifier (RF unit; IC510, pin 6) and low-pass filter (RF unit; IC510, pin 3) after being passed through the voice rec/play IC (LOGIC unit; IC15). The filtered signals are applied to the modulation circuit.

4-2-2 MODULATION CIRCUIT (RF UNIT)

The modulation circuit modulates the TX LO signal from the VCO (RF signal) using the microphone audio signal.

While in transmission, the LO signal from the VCO circuit (Q31, Q32, D24) is amplified at the buffer amplifiers (Q30, Q27, Q28) and passed through the LO switch (D17). This signal is then applied to the AM modulator (D5).

The buffer amplifier (q6) amplifies the LO signal with a gain controlled by an AF signal to make low level modulation.

4-2-3 DRIVE/POWER AMPLIFIER CIRCUITS (RF UNIT)

The drive amplifier circuit amplifies the transmit signal to a level needed for the power amplifier circuit. The power amplifier circuit amplifies this to obtain a specified transmit output power.

The modulated RF signal from the buffer amplifier (Q6) is applied to the pre-drive amplifier (Q4) after being passed through the ALC attenuator (D4). The signal is amplified at the YGR (Q3) and power amplifier (Q2) to obtain 5 W of RF power (at 9.6 V DC). The amplified signal passes through the low-pass filter (L5, C11–C16). The filtered signal is applied to the antenna connector (CHASSIS unit; J1) via the antenna swtich (D1) and low-pass filter (L1–L3, C3–C7).

4-2-4 ALC CIRCUIT (RF UNIT)

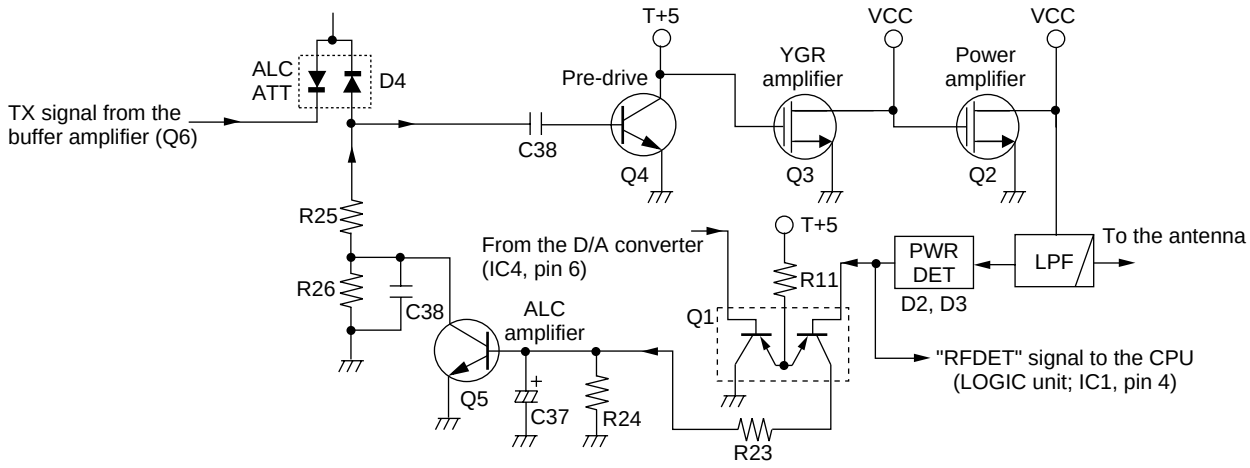
The ALC (Automatic Level Control) circuit protects the drive and power amplifiers from mismatched output loads, and selects HIGH or LOW output power.

The power detector circuit (D2, D3) detects forward and reflection signals 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 amplified at the ALC amplifier (Q5) after being passed through the ALC controller (Q1). The amplified signal is applied to the ALC attenuator (D4) to obtain stabilized output power.

When the antenna impedance is mismatched, the detected voltage exceeds the reference voltage. Thus, the bias voltage of the pre-driver is decreased.

• ALC CIRCUIT



4-3 PLL CIRCUIT (RF UNIT)

A PLL circuit provides stable oscillation of the transmit frequency and receive 1st LO frequency. The PLL output compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by the divided ratio (N-data) of a programmable divider.

The PLL circuit contains the VCO circuit (Q31, Q32, D27). The oscillated signal is amplified at the buffer-amplifiers (RF unit; Q30, Q29) and then applied to the PLL IC (IC1, pin 2).

The PLL IC contains a prescaler, programmable counter, programmable divider and phase detector, etc. The entered signal is divided at the prescaler and programmable counter section by the N-data ratio from the CPU. The divided signal is detected on phase at the phase detector using the reference frequency.

If the oscillated signal drifts, its phase changes from that of the reference frequency, causing a lock voltage change to compensate for the drift in the oscillated frequency.

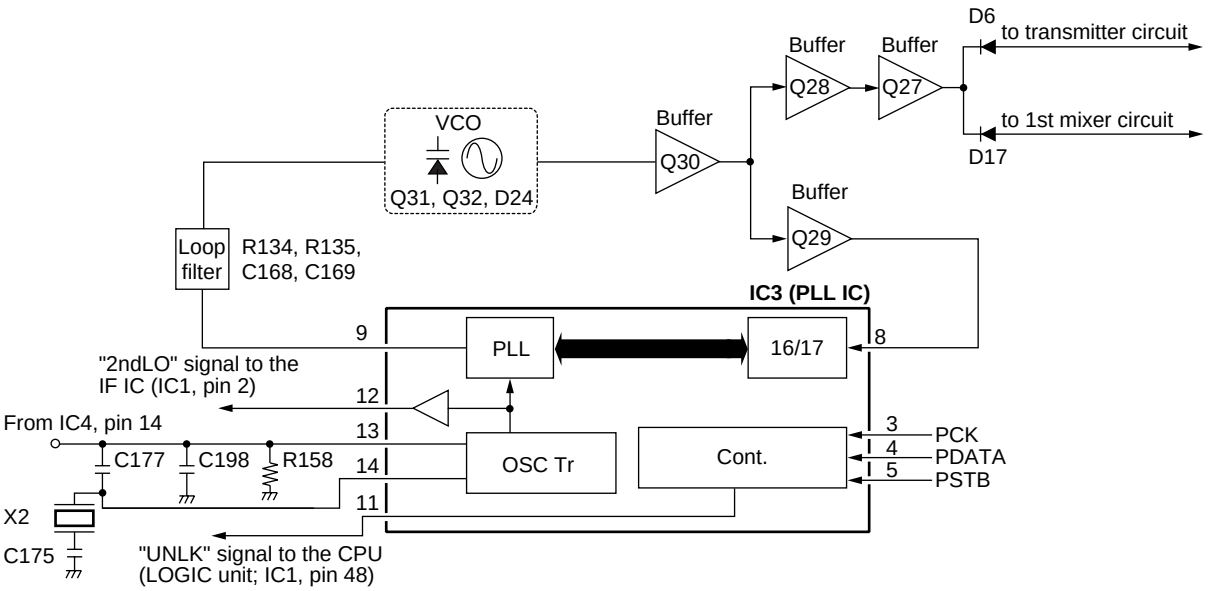
A portion of the VCO signal is amplified at the buffer-amplifier (Q27, Q28) and is then applied to the receive 1st mixer (Q12) or transmit buffer-amplifier circuit (Q6) via the T/R switching diode (D6, D17).

4-4 POWER SUPPLY CIRCUITS

VOLTAGE LINE

LINE	DESCRIPTION
HV	The voltage from the external power supply.
VCC	The same voltage as the HV line or battery voltage through the power switch (RF unit; Q24).
+5V	Common 5 V converted from the VCC line by the +5 V regulator circuit (LOGIC unit; IC16 or IC3, D9). The output voltage is applied to the CPU (LOGIC unit; IC1), reset circuit (LOGIC unit; IC2), and etc.
T+5	5 V for transmitter circuits regulated by the TX control circuit (RF unit; Q7, Q8, D7). The output voltage is applied to the LO switch (RF unit; D6), buffer amplifier (RF unit; Q6), pre-driver (RF unit; Q4) and etc.
R5	5 V for receiver circuits regulated by the RX control circuit (RF unit; Q20). The output voltage is applied to the LO switch (RF unit; D17), AM detector (RF unit; Q18), IF amplifiers (RF unit; Q17, Q16, Q15), IF IC (RF unit; IC1, pin 4) and etc.

• PLL CIRCUIT



4-5 PORT ALLOCATIONS

4-5-1 CPU (LOGIC UNIT; IC1)

Pin number	Port name	Description
1	VIN	Input port for the battely voltage detection.
2	VORD	Input port for the VOR signal detection.
3	RSSI	Input port for the receive signal level.
4	RFDETV	Input port for the power detection of power amplifier (RF unit; Q2).
5	THRMC	Input port for the transceiver's internal temperature.
6	SBATT	Input port for the battely type detection.
7	PDATA	Outputs data signals to the PLL IC (RF unit; IC3).
8	PCK	Outputs clock signal to the PLL IC.
9	PSTB	Outputs strobe signals to the PLL IC.
10	BEEP	Outputs beep audio signals.
11	VORS	Input port for the 30 Hz phase signal.
12, 21	DICK, DIUD	Input port for [DIAL].
17	LIGHT	Input port for [LIGHT] switch.
18	BPCPI	Outputs the bias control signal for a type of battery.
19	CLOUT	Outputs the cloning signal.
20	CLIN	Input port for the cloning signal.
22	VORC	Input port for the VOR 30 Hz standard signal.
23	POWER	Input port for [POWER] swtich.
24	PTT	Input port for the [PTT] swtich. High: While [PTT] switch is pushed.
25	JACKDET	Input port for the external SP jack connection detection. High: While the external SP jack is connected.
32	DCC	Input port for the external DC connection detection.
33	RESET	Input port for the CPU reset signal.
47	EDATA	• Input port for the data signals from the EEPROM (LOGIC unit; IC7). • Outputs data signals to the EEPROM IC.
48	UNLK	Input port for the PLL unlock signal. Low: PLL is unlocked.
54	PCON	Outputs control signal for the 5V regulator.
55	ECK	Outputs clock signal to the EEPROM IC (LOGIC unit; IC7).

4-5-2 SHIFT RESISTOR (RF UNIT; IC5)

Pin number	Port name	Description
5	DETMITE	Outputs detector mute signal to the AM/FM select switch (IC2, pin 2).
7	R5C	Outputs receiver 5V control signal to the RX controller (Q20).
11	WXC	Outputs AM/FM (WX ch) select signal to the RX shift circuit (Q34, D25) and AM/FM select switch (IC2, pin 5).
12	ANLC	Outputs control sigal to the ANL switch (Q21).
13	EMBI	Outputs control signal to the external microphone controller (Q25, Q26, D23, D27).
14	AFC	Outputs control signal to the AF out cotnroller (Q35, Q36) for the AF power amplifier (IC6).

4-5-3 SHIFT RESISTOR (LOGIC UNIT; IC8)

Pin number	Port name	Description
4	VORON	Outputs control signal to the VOR controller (Q15).
5	PLAYC	Outputs playback control signal to the voice rec/play IC (IC15, pin 23).
6	RECC	Outputs recording control signal to the voice rec/play IC (IC15, pin 27).
7	LIGHTC	Outputs LCD backlight control signal.
11	BLEDC	Outputs BUSY LED control signal.
12	MMUTE	Outputs control signal to the Mic mute switch (Q12) for internal microphone.
13	ALCC	Outputs control signal to the ALC controller (Q11).

SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

Most of adjustments must be adjusted on the adjustment mode after programmed adjustment frequency data into the transceiver's memory channel. When program adjustment frequency data into memory channels, the optional CS-A23 CLONING SOFTWARE (Rev. 1.0 or later) and OPC-478 CLONING CABLE are required.

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 12 V DC Current capacity : 5 A or more	Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV
RF power meter (terminated type)	Measuring range : 1–10 W Frequency range : 100–200 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Attenuator	Power attenuation : 40 or 50 dB Capacity : 10 W or more
		Standard signal generator (SSG)	Frequency range : 100–500 MHz Output level : 0.1 µV–32 mV (–127 to –17 dBm)
Frequency counter	Frequency range : 0.1–500 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	DC ammeter	Measurement capability: 1 A and 30 A
Modulation analyzer	Frequency range : At least 200 MHz Measuring range : 0–100 %	Distortion meter	Frequency range : 1 kHz ±5 % Measuring range : 1–100 %
Digital multimeter	Input impedance : 10 MΩ/V DC or better	AC millivoltmeter	Measuring range : 10 mV–10 V

■ SYSTEM REQUIREMENTS

- IBM PC compatible computer with an RS -232C serial port (38400 bps or faster).
- Microsoft Windows 95 or Windows 98
- Intel i486DX processor or faster (Pentium 100 MHz or faster recommended)
- At least 16 MB RAM and 10 MB of hard disk space
- 640×480 pixel display (800×600 pixel display recommended)

■ CLONING SOFTWARE INSTALLATION

① Boot up Windows.
 - Quit all applications when Windows is running.
② Insert the cloning software CD-ROM into the appropriate CD-ROM drive.
③ Select 'Run' from the [Start] menu.
④ Type the setup program name using the full path name, then push the [Enter] key. (For example; D:\ setup)
⑤ Follow the prompts.
⑥ Program group 'CS-A23' appears in the 'Programs' folder of the [Start] menu.

■ ADJUSTMENT FREQUENCY DATA

When program the adjustment frequency data into memory channel, back up the original memory data using the cloning software and OPC-478, and then reprogram it after adjustment.

CAUTION: When program the adjustment frequency data into the transceiver, the transceiver's memory channel will be overwritten the data and deleted original memory data at the same time.

■ ENTERING ADJUSTMENT MODE

① Turn transceiver's power off. Connect IC-A5/A23 and PC with the optional OPC-478.
② Push and hold [▲] and [▼], then turn the transceiver's power ON. (Displayed "CLONE" on the LCD)
③ Boot up Windows, click the program group 'CS-A23' in the 'Programs' folder of the [Start] menu, then CS-A23 window appeares.
④ Click the 'View' on the menu bar, and click the 'Common Setting', then 'Setting' window is appeares.
 Click the 'Advanced' tag on the 'Setting' window, then check the 'AdjustMode Enable' check box (see the illustration at page 5-2).
⑤ Cloning the adjustment frequency data at page 5-2 to the transceiver.
⑥ Turn power OFF. Disconnect OPC-478 from the transceiver.
⑦ Push and hold [MR], [CLR] and [SQL], then turn power ON.

■ OPERATING ON THE ADJUSTMENT MODE

Change the channel [UP]: [ENT]
Change the channel [DOWN]: [MR]

■ EXITING THE ADJUSTMENT MODE

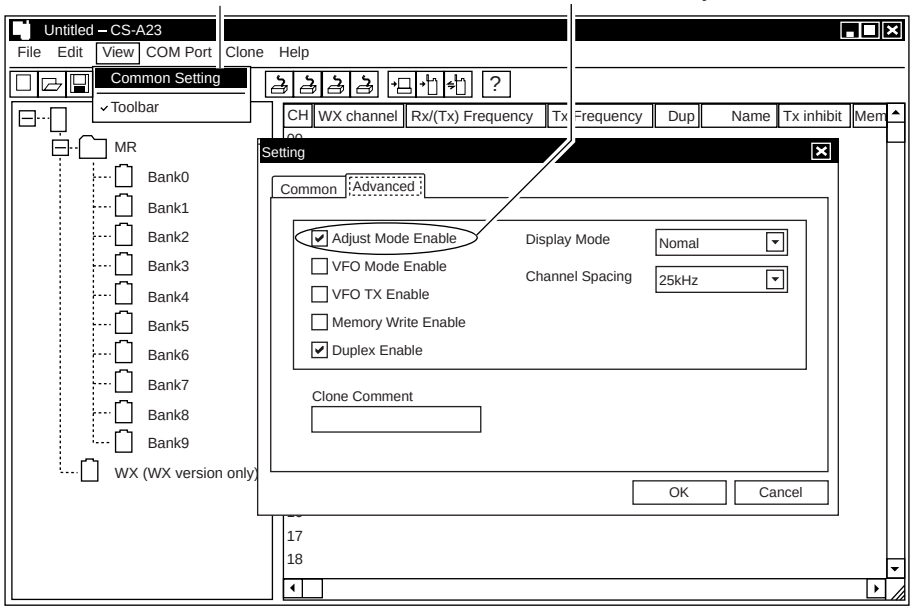
When the adjustment is finished, the transceiver must be cancelled adjustment mode to use nomal operation, otherwise the transceiver does not work properly.

① Turn transceiver's power OFF.
② Uncheck the 'AdjustMode Enable' check box on cloning software, and then cloning the original memory data.
③ Turn power OFF.

• CS-A23 SCREEN DISPLAY EXAMPLE

Click the 'View'–'Common Setting' on the menu bar.

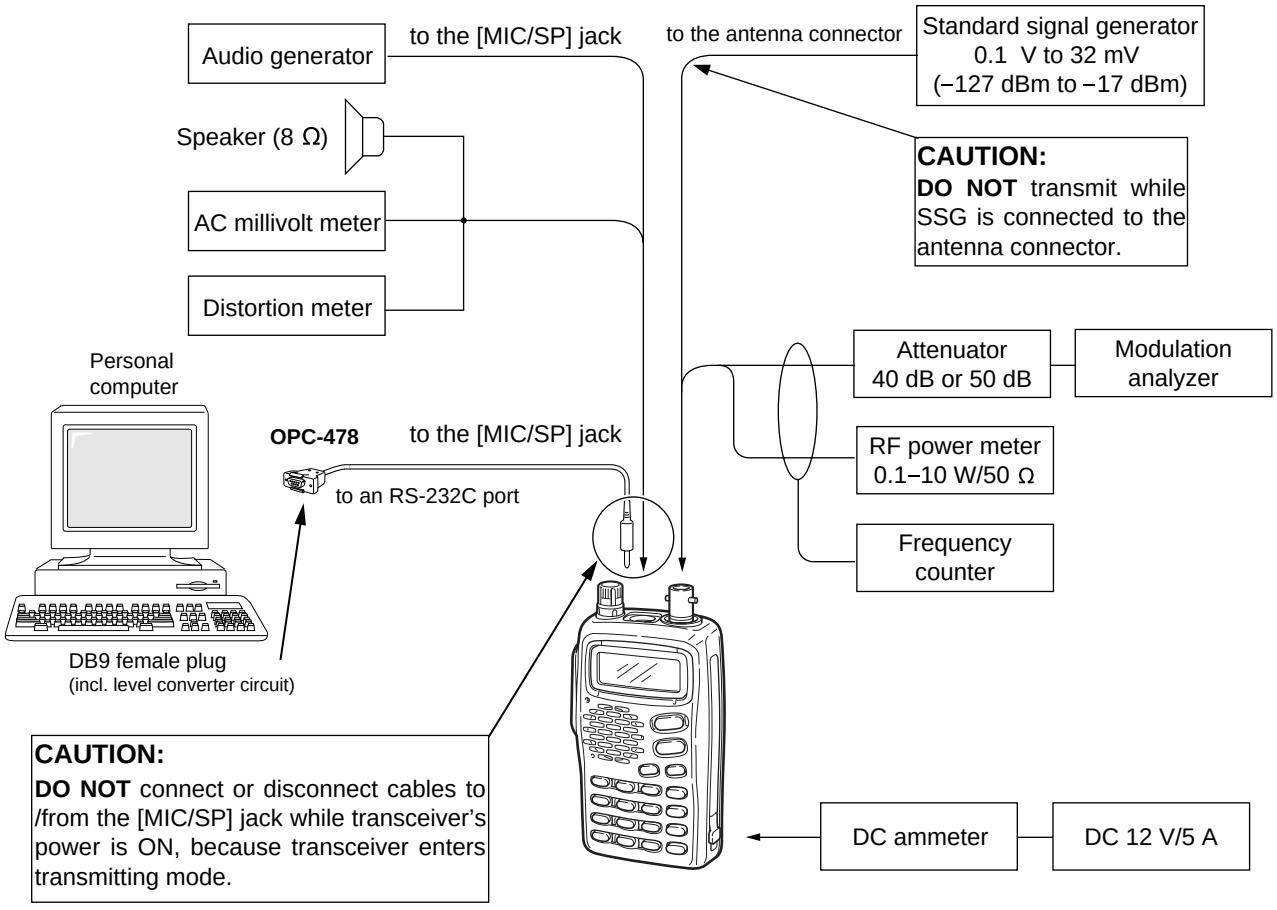
When entering adjustment mode, check the 'Adjust Mode Enable' check box.



ADJUSTMENT FREQUENCY LIST

CHANNEL	FREQUENCY (MHz)
00	136.975
01	136.975
02	136.975
07	118.000
08	136.975
11	113.000
12	113.000

• CONNECTION

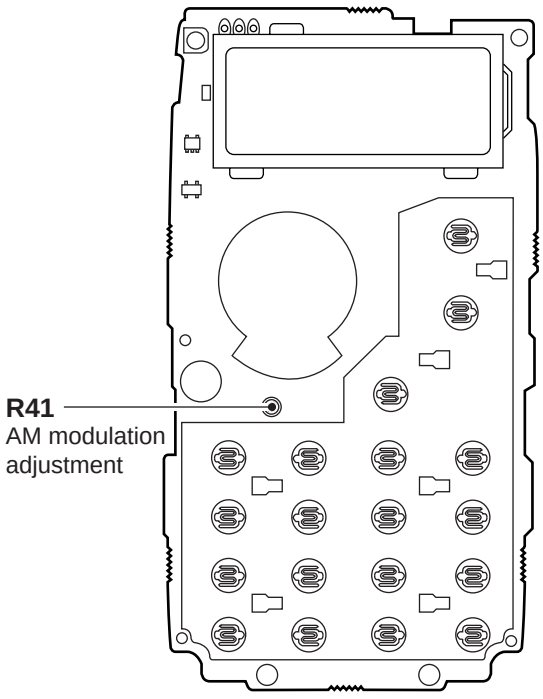


5-2 PLL AND TRANSMITTER ADJUSTMENTS

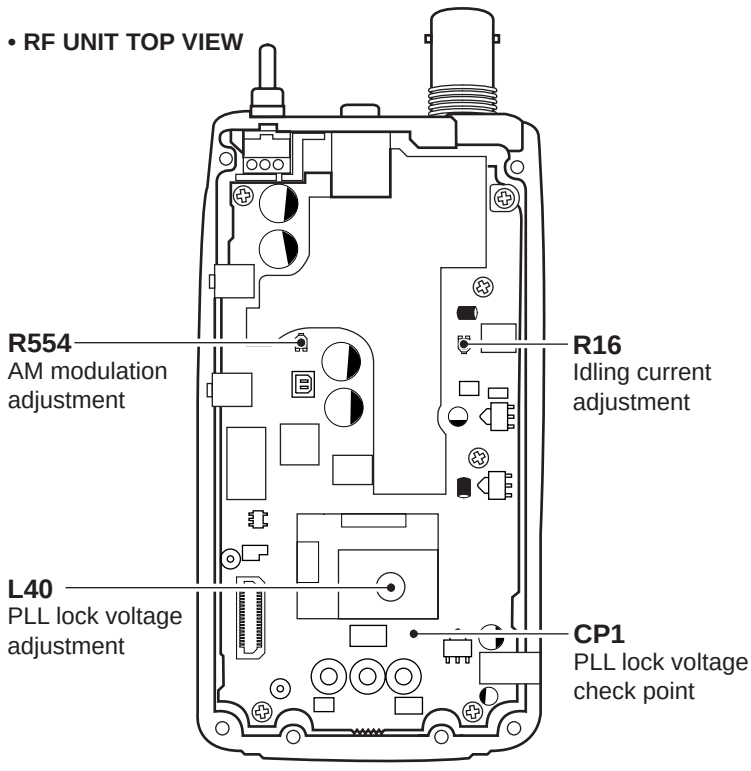
- The “PLL LOCK VOLTAGE” adjustment must be performed at the “NORMAL” mode.
- “REFERENCE FREQUENCY”, “IDLING CURRENT”, “OUTPUT POWER” AND ‘AM MODULATION” adjustments must be performed at the “ADJUSTMENT” mode.

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT	
			UNIT	LOCATION		UNIT	ADJUST
PLL LOCK VOLTAGE	1	• Operating frequency: 136.975 MHz • Receiving	RF	Connect a digital multi meter to the check point CP1.	3.7 V	RF	L40
REFERENCE FREQUENCY	1	• Operating channel : 0 ch [FREQADJ] (136.975 MHz) • 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.	136.9750 MHz	Top panel	[DIAL]
IDLING CURRENT	1	• Operating channel : 1 ch [PWR-1] (136.975 MHz) • Connect the RF power meter or a 50 Ω dummy load to the antenna connector. • Transmitting	Side panel	Connect a DC ammeter between the DC power supply and transceiver’s DC power jack.	600 mA	RF	R16
OUTPUT POWER	1	• Operating channel : 2 ch [PWRADJ] (136.975 MHz) • Transmitting	Top panel	Connect an RF power meter to the antenna connector.	1.5 W	Top panel	[DIAL]
AM MODULATION [PWRADJ]	1	• Operating channel : 2 ch [PWRADJ] (136.975 MHz) • Connect an audio generator to the [MIC] connector and set as : 1 kHz/200 mV • Set a modulation analyzer as : HPF : OFF LPF : OFF De-emphasis : OFF Detector : (P-P)/2 • Transmitting	Top panel	Connect a modulation analyzer to the antenna connector via an attenuator.	85 %	RF	R554
	2	• Connect an audio generator to [MIC] connector and set as : 1 kHz/20 mV • Transmitting			30 %	LOGIC	R41

• LOGIC UNIT TOP VIEW



• RF UNIT TOP VIEW



5-3 RECEIVER ADJUSTMENT

• The follow adjustment must be performed at the “ADJUSTMENT” mode, and turn [DIAL] to start each adjustment and finish automatically.

ADJUSTMENT		ADJUSTMENT CONDITIONS	ADJUSTMENT	
			UNIT	ADJUST
RECEIVER SENSITIVITY	1	• Operating channel : 3 ch [BF1ADJ] (108.200 MHz) • Connect a standard signal generator to the antenna connector and set as: Frequency : 108.200 MHz Level : 1.0 µV* (–107 dBm) Modulation : OFF • Connect a external speaker (8 Ω), AC millivoltmeter and distortion meter to the [MIC/SP] jack. • Receiving	Top panel	[DIAL]
	2	Same adjustment as step 1 for following channels. • 4 ch [BF2ADJ] (128.200 MHz) • 5 ch [BF3ADJ] (136.800 MHz) • 6 ch [BF4ADJ] (161.650 MHz) **NOTE: Tune the SSG’s frequency to adjustment frequencies.**		
SQELCH LEVEL	1	• Operating channel : 7 ch [ASADJS] (118.000 MHz) • Connect a standard signal generator to the antenna connector and set as: Frequency : 118.200 MHz Level : 0.5 µV* (–113 dBm) Modulation : OFF • Receiving	Top panel	[DIAL]
	2	Same adjustment as step 1 for following channels. • 8 ch [ASADJT] (136.975 MHz) • 9 ch [FSADJS] (161.650 MHz) • 10 ch [FSADJT] (161.650 MHz) **NOTE: Tune the SSG’s frequency to adjustment frequencies.**		
VOR PHASE (IC-A23 only)	1	• Operating channel : 11 ch [VORADJ] (113.000 MHz) • Connect a standard signal generator to the antenna connector and set as: Frequency : 113.000 MHz Level : 0.22 mV* (–60 dBm) Modulation : 9960 Hz, 30 % 30 Hz, 30 % Bearing : FROM, 90˚	Top panel	[DIAL]
VOR OFF (IC-A23 only)	1	• Operating channel : 12 ch [OFFADJ] (113.000 MHz) • Connect a standard signal generator to the antenna connector and set as: Frequency : 113.000 MHz Level : 7.1 µV* (–90 dBm) Modulation : 9960 Hz, 10 % 30 Hz, 30 % Bearing : FROM, 90˚	Top panel	[DIAL]

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

SECTION 6 PARTS LIST

[LOGIC UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
IC1	1140009230	S.IC	M38267M8L-266GP	
IC2	1110004750	S.IC	S-80945ALMP-DA9-T2	
IC3	1180000800	S.IC	S-81350HG-KD-T1	
IC7	1130009680	S.IC	HN58X2432TI	
IC8	1130007510	S.IC	BU4094BCFV-E1	
IC9	1110003670	S.IC	BA3308F-T1	
IC11	1110003790	S.IC	NJM2903V-TE1	[A23] only
IC12	1110003780	S.IC	NJM2902V-TE1	[A23] only
IC13	1110003800	S.IC	NJM2904V-TE1	[A23] only
IC14	1110003790	S.IC	NJM2903V-TE1	[A23] only
IC15	1190001360	S.IC	ISD1420S	
IC16	1180001170	S.IC	S-81250SG-QD-T1	
Q1	1520000460	S.TRANSISTOR	2SB1132 T100 R	
Q2	1530003280	S.TRANSISTOR	2SC4211-6-TL	
Q3	1540000350	S.TRANSISTOR	2SD2216-S (TX)	
Q4	1520000270	S.TRANSISTOR	2SB1182 TL Q	
Q5	1590001140	S.TRANSISTOR	UN9210 (TX)	
Q6	1590001470	S.TRANSISTOR	UN9213 (TX)	
Q7	1590001170	S.TRANSISTOR	XP1501-(TX) .AB	
Q8	1590002620	S.TRANSISTOR	XP1201 (TX)	
Q9	1590002620	S.TRANSISTOR	XP1201 (TX)	
Q10	1520000430	S.TRANSISTOR	2SB1462-R (TX)	
Q11	1590001980	S.TRANSISTOR	XP4315 (TX)	
Q12	1590001150	S.TRANSISTOR	UN9211 (TX)	
Q13	1530003280	S.TRANSISTOR	2SC4211-6-TL	[A23] only
Q15	1590001980	S.TRANSISTOR	XP4315 (TX)	[A23] only
Q16	1590000980	S.TRANSISTOR	DTB123EK T147	
Q17	1590001940	S.TRANSISTOR	DTC144EE TL	
D1	1790001250	S.DIODE	MA2S111-(TX)	
D2	1790001200	S.DIODE	MA6S121 (TX)	
D3	1160000050	S.DIODE	DAP202U T107	[A23]
	1750000220	S.DIODE	DA113W T107	[A5]
D4	1750000240	S.DIODE	DA112 T107	
D7	1730002330	S.ZENER	MA8100-M (TX)	
D8	1790001250	S.DIODE	MA2S111-(TX)	
D9	1790000660	S.DIODE	MA728 (TX)	
D10	1790001250	S.DIODE	MA2S111-(TX)	
D11	1790001250	S.DIODE	MA2S111-(TX)	
D12	1790001250	S.DIODE	MA2S111-(TX)	
D13	1790000990	S.ZENER	MA8051-H (TX)	
D14	1790001250	S.DIODE	MA2S111-(TX)	
D15	1790001330	S.ZENER	MA8036-L (TX)	
D16	1790001250	S.DIODE	MA2S111-(TX)	[A23] only
D17	1790001250	S.DIODE	MA2S111-(TX)	[A23] only
D18	1790000990	S.ZENER	MA8051-H (TX)	
X1	6050009620	S.XTAL	CR-534 (5.039 MHz)	
R1	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	
R2	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R3	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R4	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R5	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R6	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R7	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R8	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R9	7410000730	S.ARRAY	EXB-V8V 104JV (100 kΩ)	
R10	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R11	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)	
R12	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)	
R13	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)	
R14	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)	
R15	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)	
R16	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R17	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R18	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R19	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	
R20	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R21	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R22	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	

[LOGIC UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
R23	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)	
R24	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R25	7030003350	S.RESISTOR	ERJ3GEYJ 181 V (180 Ω)	
R26	7030003350	S.RESISTOR	ERJ3GEYJ 181 V (180 Ω)	
R27	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	
R28	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	
R30	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	
R31	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	
R32	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	
R33	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R34	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)	
R35	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	
R36	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	
R37	7510001160	S.THERMISTOR	NTCCM1608 4LH 473KC	
R38	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R39	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	
R40	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R41	7310004320	S.TRIMMER	RH03APAS4 47K	
R42	7030003270	S.RESISTOR	ERJ3GEYJ 390 V (39 Ω)	
R43	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R44	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	
R45	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	
R46	7510000960	S.THERMISTOR	TBPS1R104K475H5Q	
R47	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	
R48	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R52	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)	
R58	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R59	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R60	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)	[A23] only
R61	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	[A23] only
R62	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)	[A23] only
R63	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	[A23] only
R64	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	[A23] only
R65	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)	[A23] only
R66	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)	[A23] only
R67	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	[A23] only
R68	7030003730	S.RESISTOR	ERJ3GEYJ 274 V (270 kΩ)	[A23] only
R69	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)	[A23] only
R70	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)	[A23] only
R71	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)	[A23] only
R72	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	[A23] only
R73	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	[A23] only
R74	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)	[A23] only
R75	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)	[A23] only
R76	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	[A23] only
R77	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)	[A23] only
R78	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	[A23] only
R79	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)	[A23] only
R80	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)	[A23] only
R81	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)	[A23] only
R82	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	[A23] only
R83	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)	[A23] only

S.=Surface mount

[LOGIC UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
R84	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	[A23] only
R85	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)	[A23] only
R86	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	[A23] only
R87	7510000980	S.THERMISTOR	TBPS1R333K460H5Q	[A23] only
R88	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	[A23] only
R89	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	[A23] only
R90	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	[A23] only
R91	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)	[A23] only
R93	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)	[A23] only
R94	7030003790	S.RESISTOR	ERJ3GEYJ 824 V (820 kΩ)	[A23] only
R95	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	[A23] only
R96	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	[A23] only
R98	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	
R100	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	
R101	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	
R102	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	
R103	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	
R104	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	
R107	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	
R108	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	
R109	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R110	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)	
R111	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	
R112	7030003840	S.RESISTOR	ERJ3GEYJ 225 V (2.2 MΩ)	
R113	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)	
R558	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)	[A23] only
R559	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	[A5] only
R560	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	[A5] only
R561	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	
R562	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	
R563	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	
R564	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	
C1	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C2	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C4	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C5	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C6	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C7	4030009650	S.CERAMIC	C1608 CH 1H 240J-T-A	
C8	4030007060	S.CERAMIC	C1608 CH 1H 270J-T-A	
C9	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C10	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C11	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C12	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C13	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C18	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C19	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C20	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C22	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C23	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C24	4030008880	S.CERAMIC	C1608 JB 1C 223K-T-A	
C25	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C26	4550006690	S.TANTALUM	ECST1AC476R	
C27	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C28	4550006350	S.TANTALUM	TEMSVB2 1A 226M-8L	
C29	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C31	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C33	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C34	4550006690	S.TANTALUM	ECST1AC476R	
C35	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C37	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C42	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C43	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C44	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C45	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C47	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A	
C48	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C49	4550005980	S.TANTALUM	TEMSVA 1A 475M-8L	

[LOGIC UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
C50	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A	
C51	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C52	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C53	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C59	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C65	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C66	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C86	4030008860	S.CERAMIC	C1608 JB 1C 153K-T-A	
C87	4030006880	S.CERAMIC	C1608 JB 1H 472K-T-A	
C88	4550006310	S.TANTALUM	ECST1AX156R	
C89	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C90	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	
C91	4030006880	S.CERAMIC	C1608 JB 1H 472K-T-A	
C92	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C93	4030012600	S.CERAMIC	C2012 JB 1A 105M-T-A	
C98	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C99	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C100	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C101	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	[A23] only
C102	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A	[A23] only
C103	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	[A23] only
C104	4550006150	S.TANTALUM	ECST1CY105R	[A23] only
C105	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	[A23] only
C106	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	[A23] only
C107	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	[A23] only
C108	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	[A23] only
C109	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	[A23] only
C110	4550000530	S.TANTALUM	TESVA 1V 104M1-8L	[A23] only
C111	4550003080	S.TANTALUM	TEMSVA 1A 335M-8L	[A23] only
C112	4550000530	S.TANTALUM	TESVA 1V 104M1-8L	[A23] only
C113	4550000530	S.TANTALUM	TESVA 1V 104M1-8L	[A23] only
C114	4550000530	S.TANTALUM	TESVA 1V 104M1-8L	[A23] only
C115	4550000530	S.TANTALUM	TESVA 1V 104M1-8L	[A23] only
C116	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	[A23] only
C117	4550000530	S.TANTALUM	TESVA 1V 104M1-8L	[A23] only
C118	4030006880	S.CERAMIC	C1608 JB 1H 472K-T-A	[A23] only
C119	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	[A23] only
C120	4550006350	S.TANTALUM	TEMSVB2 1A 226M-8L	[A23] only
C121	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	[A23] only
C122	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	[A23] only
C123	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C125	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	[A23] only
C126	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C127	4550006140	S.TANTALUM	ECST1EY474R	
C128	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C129	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C130	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C131	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C135	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	
C136	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	
C137	4030012600	S.CERAMIC	C2012 JB 1A 105M-T-A	
C138	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C139	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C140	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	
C600	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	[A23] only
C601	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T-A	
J1	6510019860	S.CONNECTOR	AXK6S40645P	
DS1	5030001860	LCD	TTR3845-UPFDCN	
DS2	5010000160	S.LED	LNJ310M6URA	
DS3	5010000160	S.LED	LNJ310M6URA	
DS4	5010000150	S.LED	LT1EP53A	
DS5	5010000120	S.LED	LN1371G-(TR)	
DS6	5010000120	S.LED	LN1371G-(TR)	
DS7	5010000120	S.LED	LN1371G-(TR)	
DS8	5010000120	S.LED	LN1371G-(TR)	
DS9	5010000120	S.LED	LN1371G-(TR)	
DS10	5010000120	S.LED	LN1371G-(TR)	
MC1	7700002310	MICROPHONE	EM-140	
W10	7030003860	S.JUMPER	ERJ3GE JPW V	
EP1	0910052883	PCB	B 5512C	
EP2	8930052880	LCD CONTACT	SRCN-2378-SP-N-W	

S.=Surface mount

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
IC1	1110003490	S.IC	TA31136FN (D,EL)	
IC2	1130006220	S.IC	TC4W53FU (TE12L)	
IC3	1130008830	S.IC	TB31207AFN (EL)	
IC4	1110003690	S.IC	M62354GP 75EC	
IC5	1130007570	S.IC	BU4094BCFV-E2	
IC6	1110001810	S.IC	TA7368F (TP1)	
IC13	1110002400	S.IC	NJM2107F-TE1	
IC14	1110002400	S.IC	NJM2107F-TE1	
IC505	1110004490	S.IC	M62429FP 700C	
IC510	1130007650	S.IC	TC75W51FU (TE12L)	
Q1	1590001520	S.TRANSISTOR	UMS1 TL	
Q2	1560001050	S.FET	2SK2974	
Q3	1560001020	S.FET	2SK2973 (MTS101P)	
Q4	1530003340	S.TRANSISTOR	2SC3357-T2 RF	
Q5	1530003280	S.TRANSISTOR	2SC4211-6-TL	
Q6	1530002560	S.TRANSISTOR	2SC4403-3-TL	
Q7	1520000460	S.TRANSISTOR	2SB1132 T100 R	
Q8	1530003280	S.TRANSISTOR	2SC4211-6-TL	
Q10	1540000520	S.TRANSISTOR	2SD1819A (TX) R	
Q11	1580000650	S.FET	3SK230-T2 U1B	
Q12	1580000400	S.FET	3SK151-Y (TE85R)	
Q13	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)	
Q14	1540000520	S.TRANSISTOR	2SD1819A (TX) R	
Q15	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)	
Q16	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)	
Q17	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)	
Q18	1530003280	S.TRANSISTOR	2SC4211-6-TL	
Q19	1590001140	S.TRANSISTOR	UN9210 (TX)	[A23] only
Q20	1590001690	S.TRANSISTOR	UN9115 (TX)	
Q21	1590001140	S.TRANSISTOR	UN9210 (TX)	
Q22	1520000460	S.TRANSISTOR	2SB1132 T100 R	
Q23	1590001140	S.TRANSISTOR	UN9210 (TX)	
Q24	1590002580	S.FET	HAT1024R-EL	
Q25	1520000460	S.TRANSISTOR	2SB1132 T100 R	
Q26	1590001150	S.TRANSISTOR	UN9211 (TX)	
Q27	1530002560	S.TRANSISTOR	2SC4403-3-TL	
Q28	1530002560	S.TRANSISTOR	2SC4403-3-TL	
Q29	1530002560	S.TRANSISTOR	2SC4403-3-TL	
Q30	1530002920	S.TRANSISTOR	2SC4226-T2 R25	
Q31	1530002920	S.TRANSISTOR	2SC4226-T2 R25	
Q32	1530002920	S.TRANSISTOR	2SC4226-T2 R25	
Q33	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	
Q34	1590001140	S.TRANSISTOR	UN9210 (TX)	
Q35	1520000650	S.TRANSISTOR	2SB1201-S-TL	
Q36	1590001170	S.TRANSISTOR	XP1501-(TX) .AB	
D1	1790000620	S.DIODE	MA77 (TX)	
D2	1790000660	S.DIODE	MA728 (TX)	
D3	1790000660	S.DIODE	MA728 (TX)	
D4	1750000460	S.DIODE	1SV246-TL	
D5	1750000460	S.DIODE	1SV246-TL	
D6	1790000620	S.DIODE	MA77 (TX)	
D7	1790001280	S.DIODE	MA111 (TX)	
D8	1790000620	S.DIODE	MA77 (TX)	
D9	1790000620	S.DIODE	MA77 (TX)	
D13	1790001290	S.VARICAP	MA304 (TX)	
D14	1790001290	S.VARICAP	MA304 (TX)	
D15	1790001290	S.VARICAP	MA304 (TX)	
D16	1790001290	S.VARICAP	MA304 (TX)	
D17	1790000620	S.DIODE	MA77 (TX)	
D18	1790001280	S.DIODE	MA111 (TX)	
D19	1750000540	S.DIODE	RB060L-40 TE-25	
D20	1790000670	S.DIODE	SB07-03C-TB	
D21	1790000860	S.DIODE	MA133 (TX)	
D22	1790001240	S.DIODE	MA2S728-(TX)	
D23	1790000860	S.DIODE	MA133 (TX)	
D24	1790001290	S.VARICAP	MA304 (TX)	
D25	1790000620	S.DIODE	MA77 (TX)	
D26	1720000670	S.VARICAP	HVU17TRF	
D27	1790001280	S.DIODE	MA111 (TX)	
D100	1730002270	S.ZENER	MA8024 (TX)	
FI1	2030000090	S.MONOLITH	FL-325 (30.050 MHz)	
FI2	2020001780	S.CERAMIC	CFWC450E	
X1	6070000210	S.DISCRIMINATOR	CDBCA450CX24	
X2	6050011040	S.XTAL	CR-683 (29.600 MHz)	

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
L1	6200008280	S.COIL	0.30-1.7-7TL 50N
L2	6200008300	S.COIL	0.35-1.6-9TL 65N
L3	6200008300	S.COIL	0.35-1.6-9TL 65N
L4	6200001520	S.COIL	MLF2012D R82K-T
L5	6200008260	S.COIL	0.30-1.7-8TL 60N
L6	6200008340	S.COIL	0.26-1.1-5TR 19.5N
L7	6200008400	S.COIL	0.35-1.6-6TL 36N
L8	6200005710	S.COIL	ELJRE 27NG-F
L9	6200003590	S.COIL	EXCCL3225U1
L10	6200002370	S.COIL	LQN 1A 39NJ04
L11	6200006670	S.COIL	ELJRE 68NG-F
L12	6200008190	S.COIL	0.25-1.9-8TL 80N
L13	6200001630	S.COIL	ELJNC R10K-F
L14	6200002190	S.COIL	MLF2012A 4R7K-T
L15	6200008170	S.COIL	0.35-1.6-8TL 54N
L16	6200008280	S.COIL	0.30-1.7-7TL 50N
L18	6200007750	S.COIL	LQN21A 56NJ04
L21	6200008090	S.COIL	LQN21A 68NJ04
L22	6200007760	S.COIL	LQN21A 82NJ04
L23	6200008090	S.COIL	LQN21A 68NJ04
L24	6200002750	S.COIL	MLF2012A 2R2K-T
L25	6200003590	S.COIL	EXCCL3225U1
L26	6200008420	S.COIL	HF50ACC 453215P-T
L28	6200003590	S.COIL	EXCCL3225U1
L29	6200002240	S.COIL	ELJFC 2R2K-F
L31	6200002240	S.COIL	ELJFC 2R2K-F
L32	6200002240	S.COIL	ELJFC 2R2K-F
L33	6200002240	S.COIL	ELJFC 2R2K-F
L34	6200002240	S.COIL	ELJFC 2R2K-F
L35	6200003590	S.COIL	EXCCL3225U1
L36	6200002240	S.COIL	ELJFC 2R2K-F
L37	6200005510	S.COIL	ELJND R27J-F
L38	6200005510	S.COIL	ELJND R27J-F
L39	6200007000	S.COIL	ELJRE 82NG-F
L40	6130002950	S.COIL	LB-342
L41	6200004480	S.COIL	MLF1608D R82K-T
L42	6200002190	S.COIL	MLF2012A 4R7K-T
L43	6200003710	S.COIL	NL 252018T-2R7J
L44	6200001040	S.COIL	MLF2012E 6R8M-T
L300	6200003540	S.COIL	MLF1608D R22K-T
L301	6200003540	S.COIL	MLF1608D R22K-T
R2	7030000260	S.RESISTOR	MCR10EZHJ 47 Ω (470)
R3	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R4	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R5	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R6	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R7	7030003370	S.RESISTOR	ERJ3GEYJ 271 V (270 Ω)
R8	7030003370	S.RESISTOR	ERJ3GEYJ 271 V (270 Ω)
R9	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R10	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R11	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R12	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R13	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R14	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R15	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R16	7310003600	S.TRIMMER	EVM-1XSX50 B34 (303)
R17	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R18	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R19	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R20	7030003290	S.RESISTOR	ERJ3GEYJ 560 V (56 Ω)
R21	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R22	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R23	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R24	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R25	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R26	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R27	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R28	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R29	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R30	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R31	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R32	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R33	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R34	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R35	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R36	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R37	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R38	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R39	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R40	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)

S.=Surface mount

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R43	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R44	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R45	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R46	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R47	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R48	7030003770	S.RESISTOR	ERJ3GEYJ 564 V (560 kΩ)
R49	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R51	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R52	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R53	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R54	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R55	7030003730	S.RESISTOR	ERJ3GEYJ 274 V (270 kΩ)
R56	7510001000	S.THERMISTOR	TBPS1R154K475H5Q
R57	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R58	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R59	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R60	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R61	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R62	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R63	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R64	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R65	7030003290	S.RESISTOR	ERJ3GEYJ 560 V (56 Ω)
R66	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)
R68	7030003770	S.RESISTOR	ERJ3GEYJ 564 V (560 kΩ)
R69	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R70	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R71	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R72	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R73	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R74	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R75	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R76	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R77	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R78	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R79	7030003750	S.RESISTOR	ERJ3GEYJ 394 V (390 kΩ)
R80	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R81	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R82	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R83	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R84	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R85	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R86	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R87	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R88	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R89	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R90	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R91	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R92	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R93	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R94	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R95	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R96	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R97	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R98	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R99	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R100	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R101	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R102	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R103	7030000180	S.RESISTOR	MCR10EZHJ 22 Ω (220)
R104	7030000180	S.RESISTOR	MCR10EZHJ 22 Ω (220)
R105	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R106	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R107	7030000280	S.RESISTOR	MCR10EZHJ 150 Ω (151)
R108	7030000170	S.RESISTOR	MCR10EZHJ 18 Ω (180)
R109	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R110	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R111	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R112	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R113	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R114	7030003370	S.RESISTOR	ERJ3GEYJ 271 V (270 Ω)
R115	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R116	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R117	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R118	7030003220	S.RESISTOR	ERJ3GEYJ 150 V (15 Ω)
R119	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R120	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R121	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R123	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R124	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R125	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R126	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R127	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R128	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R129	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R130	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R131	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R133	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R134	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R135	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R137	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R138	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R139	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R140	7030003350	S.RESISTOR	ERJ3GEYJ 181 V (180 Ω)
R141	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R145	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R146	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R147	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R148	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R149	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R150	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R153	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R154	7030003820	S.RESISTOR	ERJ3GEYJ 155 V (1.5 MΩ)
R155	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R156	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R157	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R158	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R159	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R160	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R161	7030003730	S.RESISTOR	ERJ3GEYJ 274 V (270 kΩ)
R162	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R163	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R300	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R301	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)
R549	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R550	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R551	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R553	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R554	7310003660	S.TRIMMER	EVM-1XSX50 B55 (504)
R555	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R556	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R557	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
C3	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C4	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A
C5	4030007060	S.CERAMIC	C1608 CH 1H 270J-T-A
C6	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A
C7	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C8	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C9	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C10	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C11	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C12	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C13	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C14	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C15	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C16	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C17	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C18	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C19	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C20	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C21	4030007120	S.CERAMIC	C1608 CH 1H 820J-T-A
C22	4030007060	S.CERAMIC	C1608 CH 1H 270J-T-A
C23	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C24	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C25	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C26	4510006140	S.ELECTROLYTIC	ECEV1HS0R1SR
C27	4030007100	S.CERAMIC	C1608 CH 1H 560J-T-A
C28	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C29	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C30	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A
C31	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C32	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C33	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C34	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A
C35	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C36	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C37	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L
C38	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C39	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C40	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C41	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C42	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C43	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A

S.=Surface mount

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
C44	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C45	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C46	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C47	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C48	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C49	4550002980	S.TANTALUM	TEMSVA 1C 225M-8L	
C50	4510004440	S.ELECTROLYTIC	ECEV1HA010SR	
C51	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C52	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C53	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A	
C54	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A	
C55	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A	
C56	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C58	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A	
C60	4030007150	S.CERAMIC	C1608 CH 1H 151J-T-A	
C61	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C62	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C64	4550003250	S.TANTALUM	TEMSVA 1V 474M-8L	
C65	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C66	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A	
C67	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C68	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C69	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C70	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A	
C71	4030007120	S.CERAMIC	C1608 CH 1H 820J-T-A	
C72	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A	
C73	4030006930	S.CERAMIC	C1608 CH 1H 020C-T-A	
C74	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A	
C75	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A	
C76	4030006960	S.CERAMIC	C1608 CH 1H 050C-T-A	
C77	4030010780	S.CERAMIC	C1608 CH 1H 1R5C-T-A	
C78	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A	
C79	4030007120	S.CERAMIC	C1608 CH 1H 820J-T-A	
C80	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C81	4030011280	S.CERAMIC	C1608 CH 1H 271J-T-A	
C82	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C83	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C84	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C85	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A	
C87	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A	
C88	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C89	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C90	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C91	4030007110	S.CERAMIC	C1608 CH 1H 680J-T-A	
C92	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C93	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C94	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C95	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C96	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C97	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C98	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C99	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	
C100	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C101	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C102	4550003250	S.TANTALUM	TEMSVA 1V 474M-8L	
C103	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C104	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C106	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C107	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C108	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C109	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A	
C110	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C111	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C112	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C113	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	[A23] only
C114	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C115	4550006130	S.TANTALUM	ECST1VY224R	
C116	4030011810	S.CERAMIC	C1608 JB 1A 224K-T-N	
C117	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N	
C118	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A	
C119	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C120	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C121	4510005600	S.ELECTROLYTIC	ECEV1CS100SR	
C122	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C123	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C124	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C125	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C126	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C127	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C128	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	
C129	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	
C130	4510006220	S.ELECTROLYTIC	ECEV1CA101UP	

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C140	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C141	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C142	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C143	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C144	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C145	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C146	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C148	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C149	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C150	4030006990	S.CERAMIC	C1608 CH 1H 080D-T-A
C151	4030006860	S.CERAMIC	C1608 JB 1H 102K-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	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C156	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C157	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C158	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C159	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C160	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C161	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C162	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A
C163	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A
C164	4030006930	S.CERAMIC	C1608 CH 1H 020C-T-A
C165	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C166	4030007120	S.CERAMIC	C1608 CH 1H 820J-T-A
C167	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C168	4550006360	S.TANTALUM	ECST1VY104R
C169	4550006150	S.TANTALUM	ECST1CY105R
C170	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C171	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C172	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C173	4550006220	S.TANTALUM	TEMSVA 0J 156M-8L
C174	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C175	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C177	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C178	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C179	4030010740	S.CERAMIC	C1608 JB 1A 104K-T-A
C180	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C181	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C182	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C183	4550006540	S.TANTALUM	ECST1CY475R
C184	4510006220	S.ELECTROLYTIC	ECEV1CA101UP
C185	4550006540	S.TANTALUM	ECST1CY475R
C186	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C187	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C188	4550006540	S.TANTALUM	ECST1CY475R
C190	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C191	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C192	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C193	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C195	4510006220	S.ELECTROLYTIC	ECEV1CA101UP
C196	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C197	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C198	4030006930	S.CERAMIC	C1608 CH 1H 020C-T-A
C199	4030007110	S.CERAMIC	C1608 CH 1H 680J-T-A
C200	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C201	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C202	4030012600	S.CERAMIC	C2012 JB 1A 105M-T-A
C203	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C204	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C205	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A
C206	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C281	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C300	4030007120	S.CERAMIC	C1608 CH 1H 820J-T-A
C301	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A
C302	4030007150	S.CERAMIC	C1608 CH 1H 151J-T-A
C303	4030009650	S.CERAMIC	C1608 CH 1H 240J-T-A
C304	4030007110	S.CERAMIC	C1608 CH 1H 680J-T-A
C340	4510006220	S.ELECTROLYTIC	ECEV1CA101UP
C402	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C537	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C538	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C539	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C540	4550006540	S.TANTALUM	ECST1CY475R
C541	4550006540	S.TANTALUM	ECST1CY475R
C565	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C567	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C572	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C594	4030008470	S.CERAMIC	C1608 JB 1H 272K-T-A
C595	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C596	4030007150	S.CERAMIC	C1608 CH 1H 151J-T-A

S.=Surface mount

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C597	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C598	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C599	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
J1	6450000870	CONNECTOR	HEC2711-01-020
J2	6450002150	CONNECTOR	HSJ1594-010010
J3	6510019870	S.CONNECTOR	AXK5S40045P
J4	6510021900	S.CONNECTOR	BM02B-ASRS-TF
S1	2230001070	S.SWITCH	JPM1990-2711R
S2	2230001070	S.SWITCH	JPM1990-2711R
W12	7030003860	S.JUMPER	ERJ3GE JPW V
W14	7030003860	S.JUMPER	ERJ3GE JPW V
W15	7030000010	S.JUMPER	MCR10EZHJ JPW (000)
W16	7030003860	S.JUMPER	ERJ3GE JPW V
W17	7030003860	S.JUMPER	ERJ3GE JPW V
EP1	6910012350	S.BEAD	MMZ1608Y 102BT
EP2	0910052893	PCB	B 5513C

S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 CABINET PARTS

[CHASSIS PARTS]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510022390	ANT connector BNC-R159	1
S1	7600000210	Encoder TP70N00E20-15F-1903	1
SP1	2510000840	Speaker CS028014-12	1
MP1	8210016991	1903 front panel(C)-1 assembly [IC-A23]	1
	8210017131	1903 front panel(C)-1 assembly [IC-A5]	1
MP2	8010017151	1903 chassis-1	1
MP3	8930052580	2378 main seal	1
MP4	8930052601	1903 10-Key (A)-1	1
MP5	8930052650	2378 jack cap	1
MP9	8830001250	ANT connector-101 nut	1
MP11	8930046020	1123 sheet (A)-1	1
MP12	8930044460	1903 contact rubber	1
MP13	8930052620	2378 DC cap	1
MP14	8930044480	1903 lens	1
MP15	8830001340	1903 hexgon nut	1
MP16	8930053150	1903 rear sheet (K) [IC-A23]	1
	8930053160	1903 rear sheet (L) [IC-A5]	1
MP17	8930044530	1903 rubber sheet	1
MP19	8610010530	Knob N263	1
MP20	8810008990	Screw PH BT M2 ×10 ZK	2
MP21	8810009510	Screw BT M2 × 4 NI-ZU	10
MP22	8810009630	Screw FH No.0 M2 × 4.5 NI B	2
MP25	8310049350	2378 window plate	1
MP27	8930046000	1903 microphone sponge	1
MP28	8930045940	1903 bottom sheet	1
W1	8900009640	Cable OPC-963	1

Screw abbreviations: PH: Pan head FH: Flat head
NI: Nickel ZK: Black

[RF UNIT]

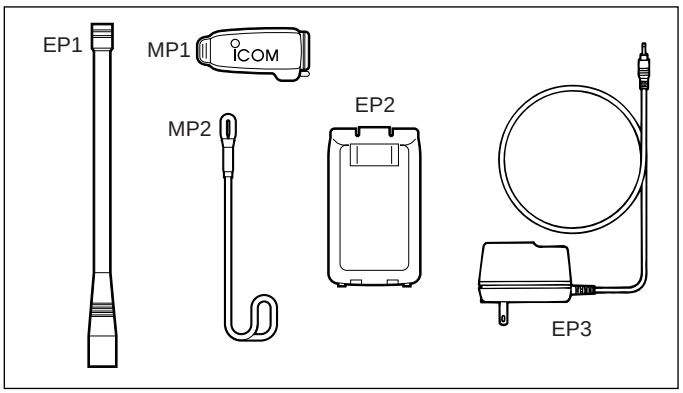
REF NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8950004800	1903 contact spring	1
MP2	8410002162	1903 PA heatsink-2	1
MP3	8510013200	2378 VCO case	1
MP4	8510013190	2378 VCO cover	1
MP5	8930053580	2378 RF sheet	1
MP6	8510013340	2378 RF shield	1
MP7	8510013350	2378 VCO shield	1
MP8	8510013450	2378 shield plate	1
MP9	8930041890	Aluminum sheet W	1

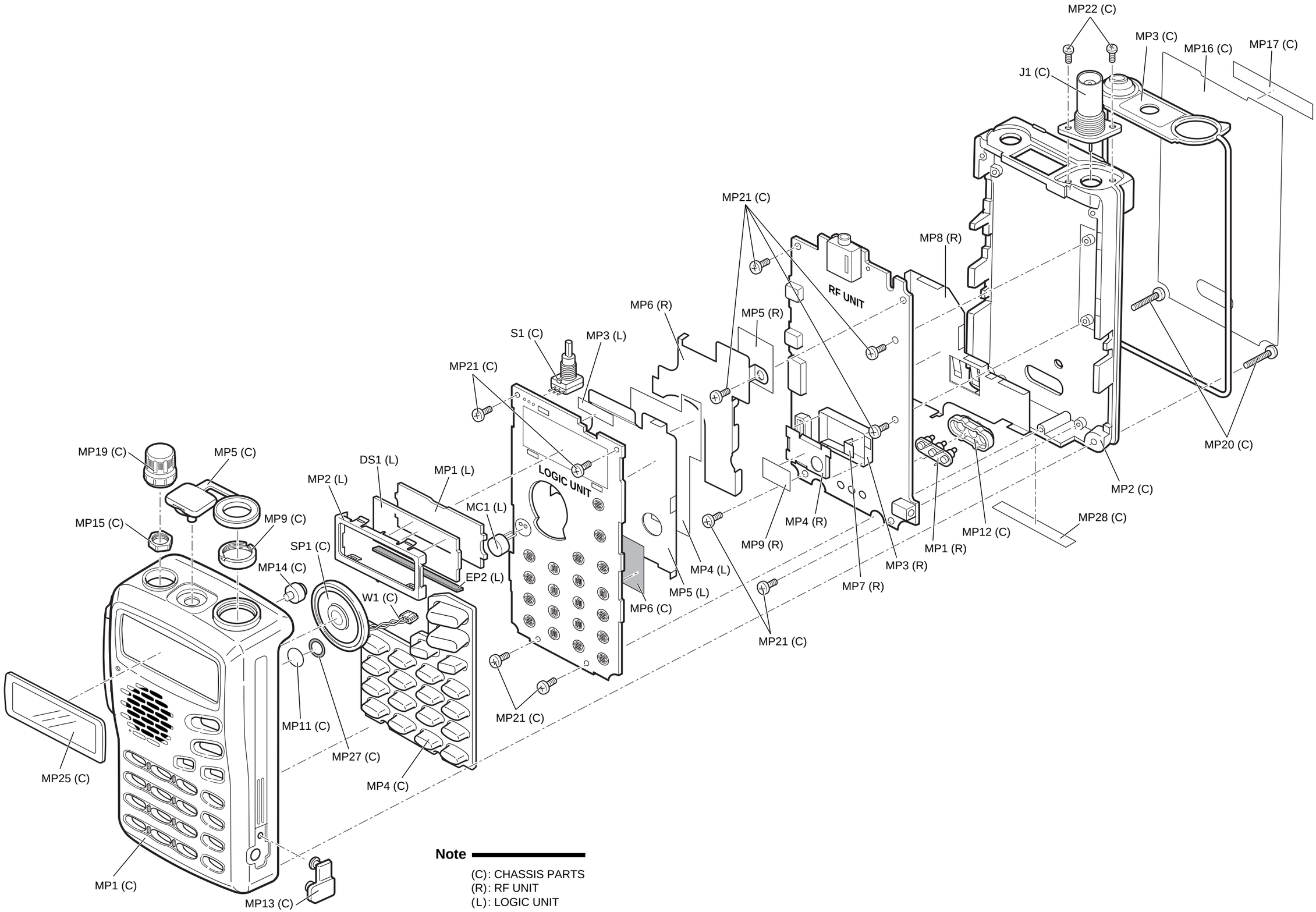
[LOGIC UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
DS1	5030001860	LCD TTR3845-UPFDCN	1
EP2	8930052880	LCD contact SRCN-2378-SP-N-W	1
MC1	7700002310	Microphone EM-140	1
MP1	8210017030	2378 reflector	1
MP2	8930052681	2378 LCD holder-1	1
MP3	8930053560	Insulation sheet	1
MP4	8930053570	2378 LOGIC sheet	1
MP5	8510013360	2378 LOGIC shield	1
MP6	8930045910	Non-woven sheet BS	1

7-2 ACCESSORIES

REF NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	Optional product	Antenna FA-B02AR	1
EP2	Optional product	Battery BP-200L ACC [A5-USA],[A23-USA]only	1
EP3	Optional product	Chager BC-110A [A5-USA],[A23-USA]only	1
MP1	8930044450	1903 belt clip	1
MP2	8010011960	Strap belt HK-005	1
W1	8900009980	Cable OPC-967 ACC [A23-USA]only	1
ZP1	0800005690	Lazer case LC-147 ACC [A23-USA]only	1



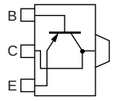
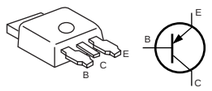
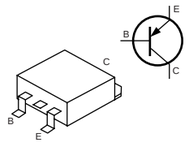
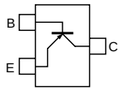
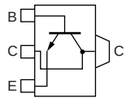
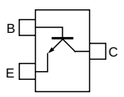
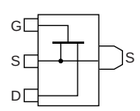
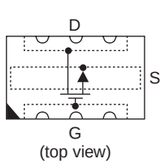


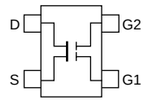
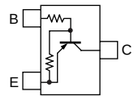
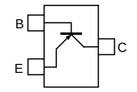
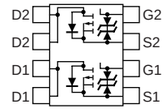
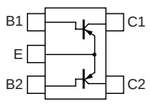
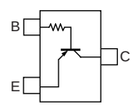
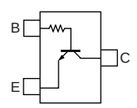
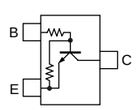
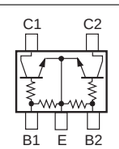
Note

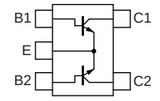
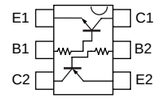
(C): CHASSIS PARTS
(R): RF UNIT
(L): LOGIC UNIT

SECTION 8 SEMI-CONDUCTOR INFORMATION

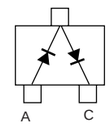
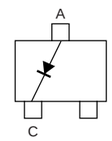
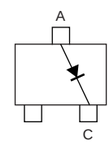
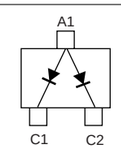
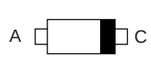
8 - 1 TRANSISTORS

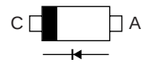
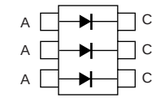
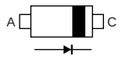
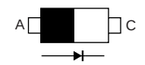
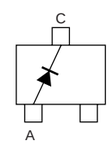
NAME	SYMBOL	INSIDE VIEW
2SB1132 R	BAR	
2SB1182 TL Q	B1182	
2SB1201-S-TL	B1201	
2SB1462-R	AR	
2SC3357-RF	RF	
2SC4116-BL 2SC4211-6-TL 2SC4215-O 2SC4226-R25 2SC4403-3-TL 2SD1819A R 2SD2216-S	LL L6 QO R25 LY3 LG Y	
2SK2973	K1	
2SK2974	K2974	

NAME	SYMBOL	INSIDE VIEW
3SK151-Y 3SK230-U1B	UH U1B	
DTB123EK T147	F12	
DTC144EE TL	24	
HAT1024R-EL	1024	
UMS1 TL	S1	
UN9115	6E	
UN9210	8L	
UN9211 UN9213	8A 8C	
XP1201	AI	

NAME	SYMBOL	INSIDE VIEW
XP1501-AB	5R	
XP4315	CB	

8 - 2 DIODES

NAME	SYMBOL	INSIDE VIEW
1SV246-TL MA133	CV MP	
DA112	AZ	
DA113W	AY	
DAP202U	P	
HVU17TRF	E	

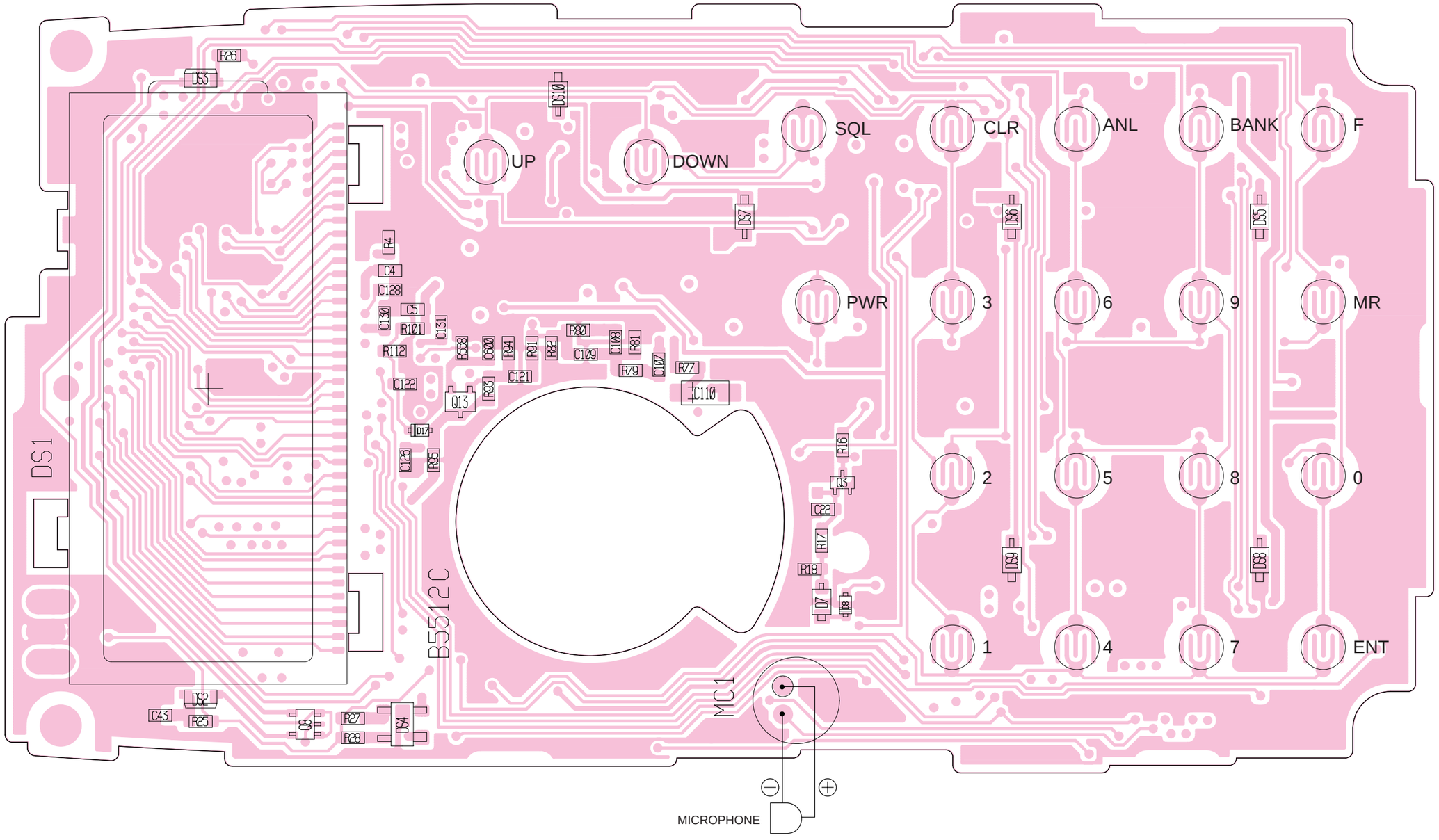
NAME	SYMBOL	INSIDE VIEW
MA111 MA2S111 MA2S728 RB060L-40	1B A B 36	
MA304	7R	
MA8024 MA8036-L MA8051-H MA8100	2.4 3_6 5^1 10-	
MA6S121	M2D	
MA728	2A	
MA77	4B	
SB07-03C-TB	J	

SECTION 9 BOARD LAYOUTS

9 - 1 LOGIC UNIT

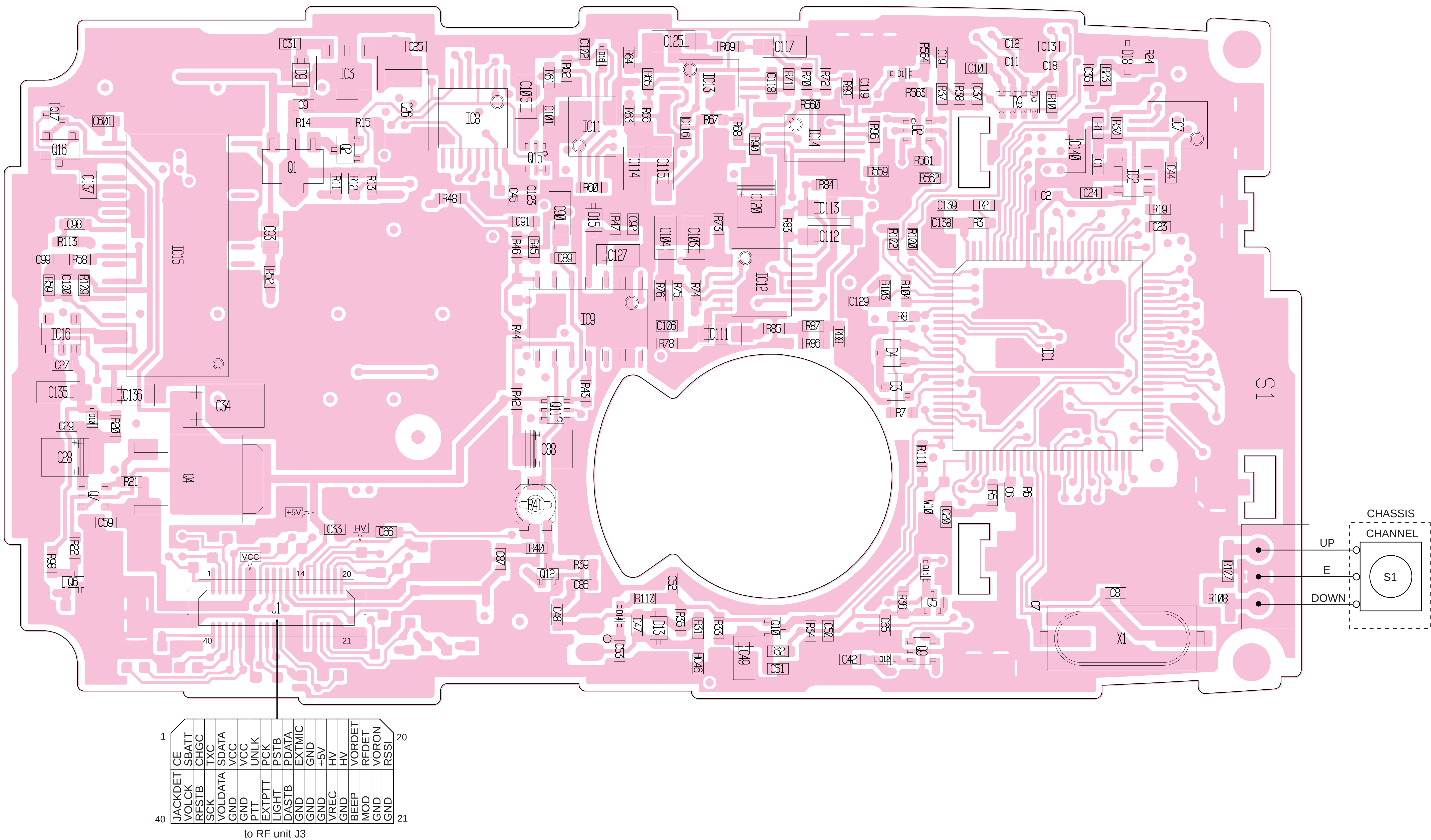
• **TOP VIEW**

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



• **BOTTOM VIEW**

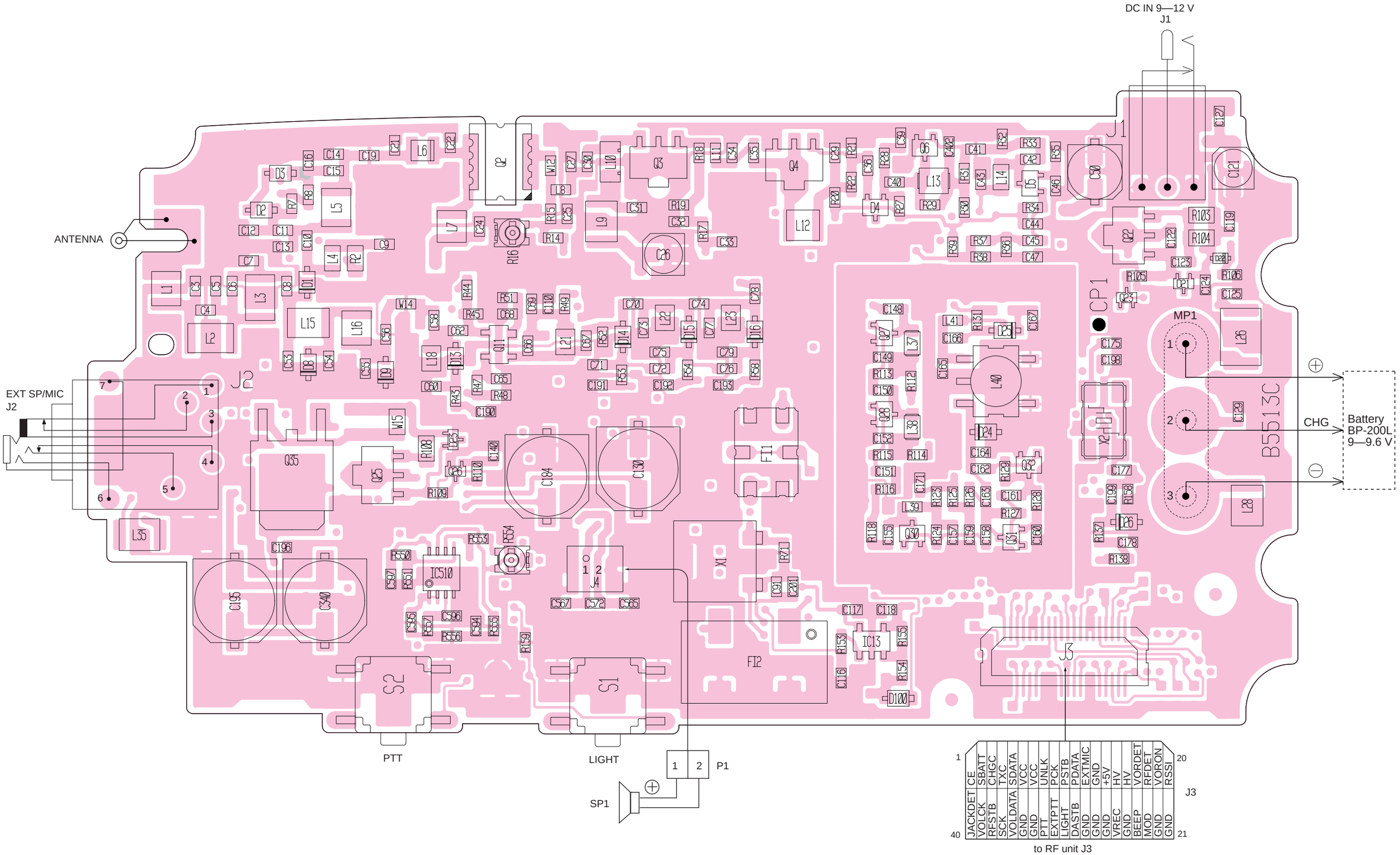
The combination of this page and the previous page shows the unit layout in the same configuration as the actual P.C. Board.



9 - 2 RF UNIT

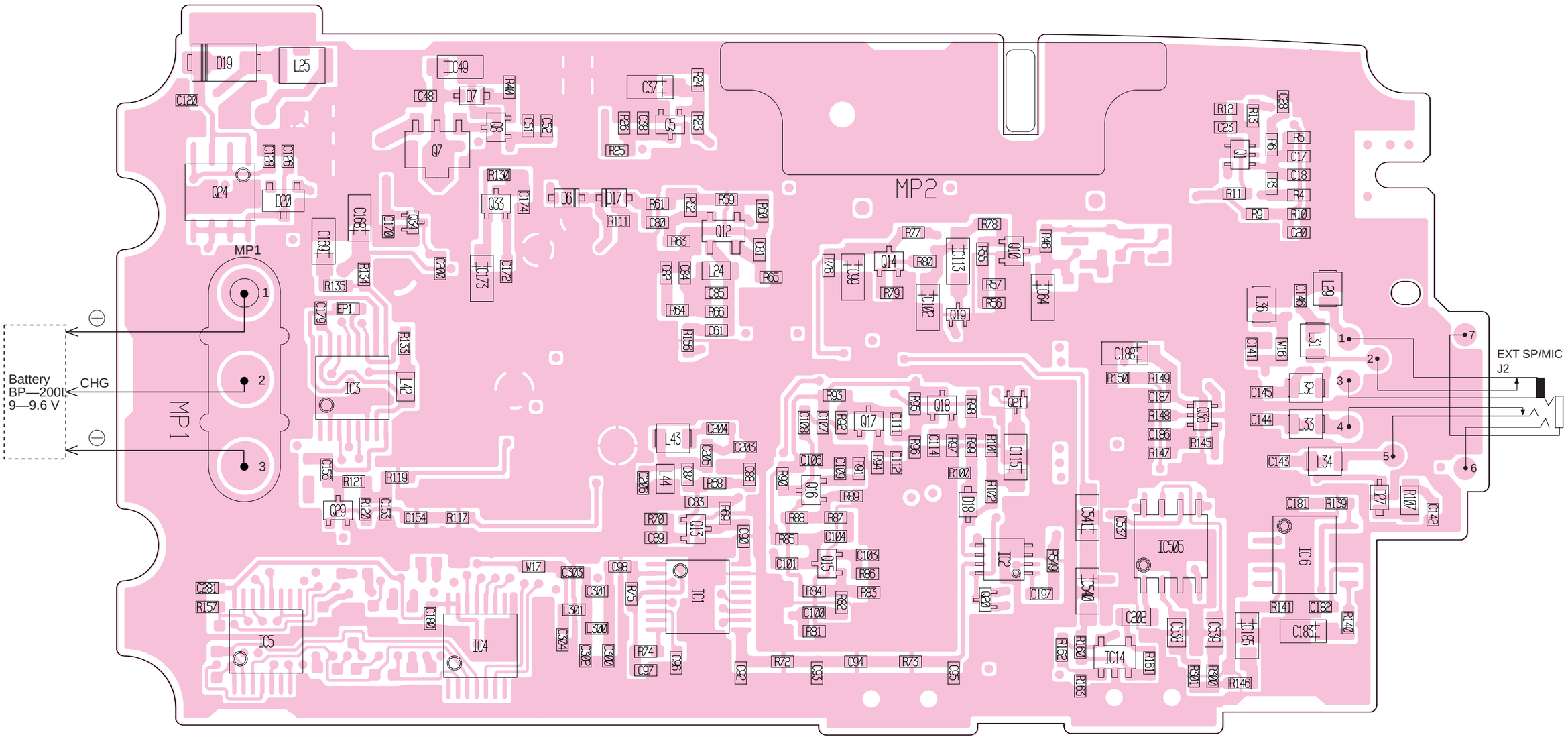
• TOP VIEW

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

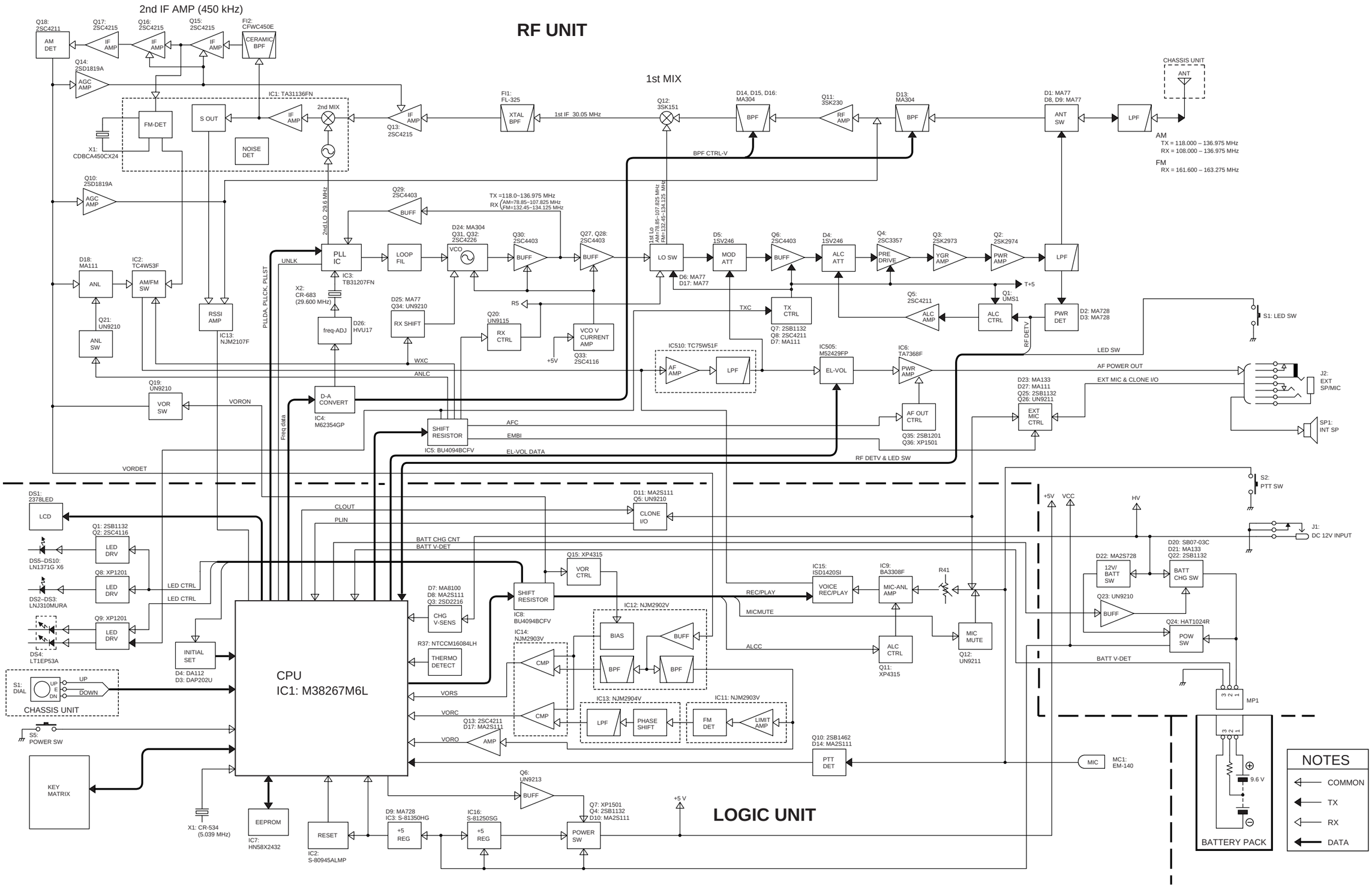


• **BOTTOM VIEW**

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

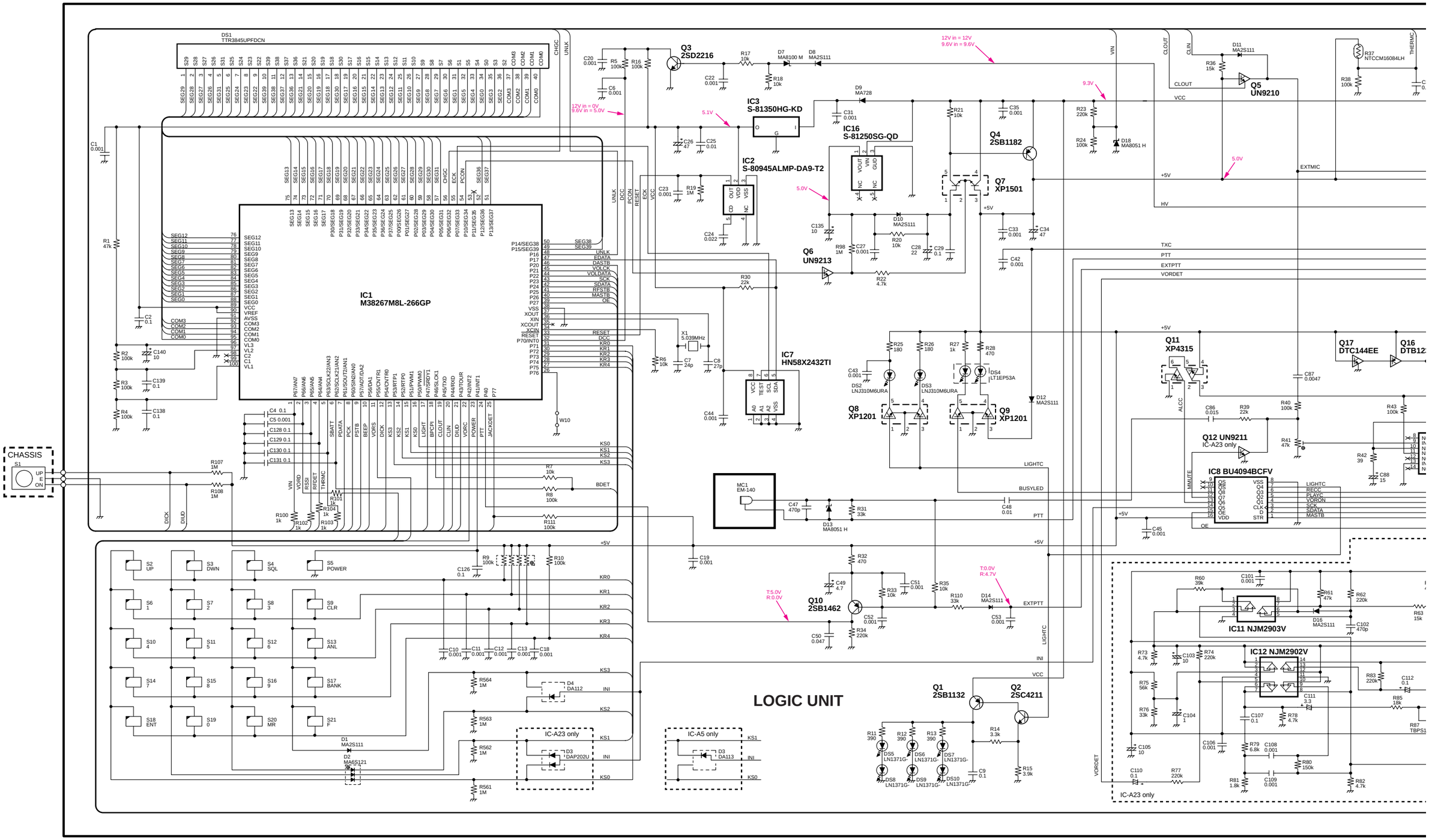


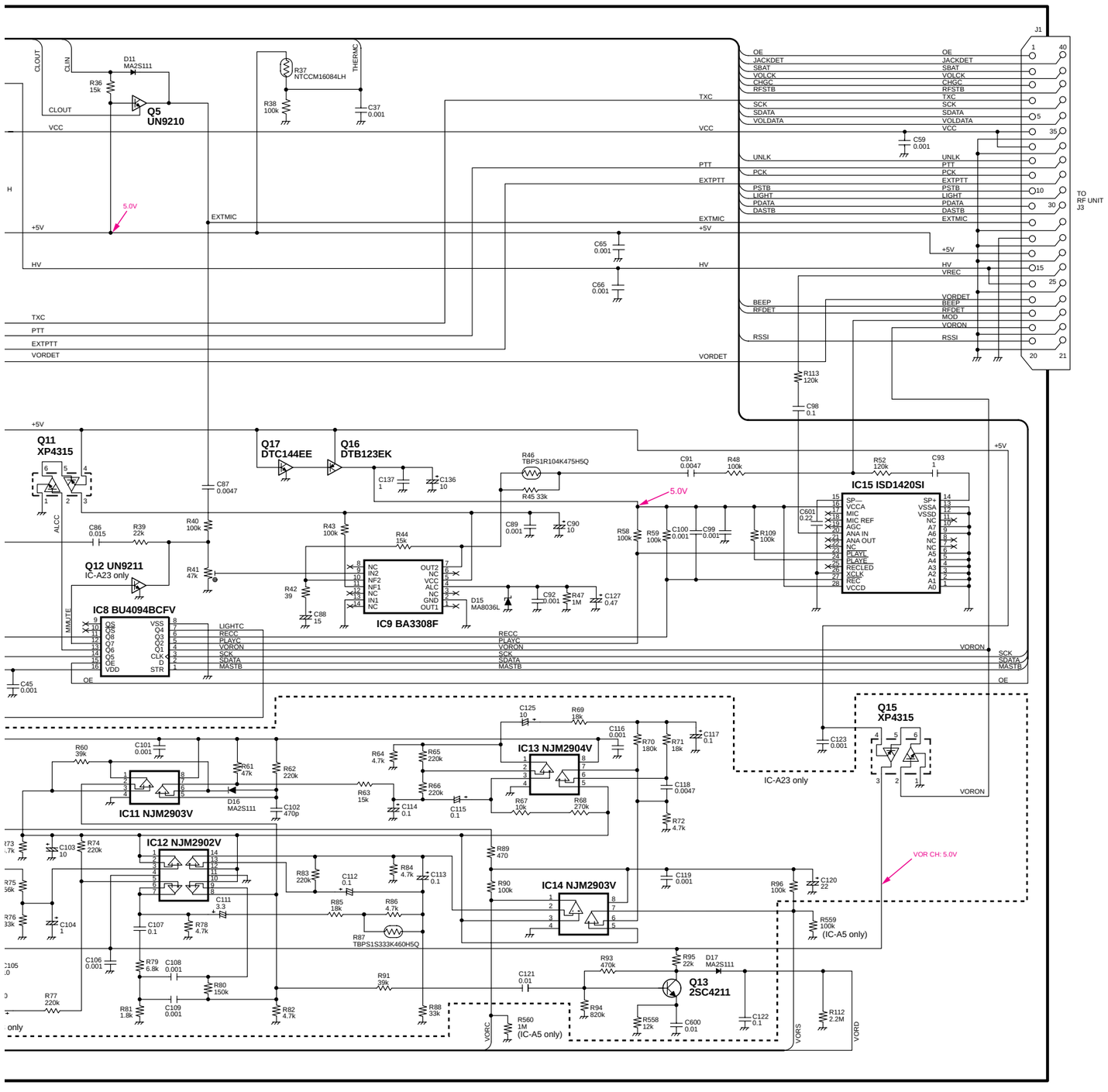
SECTION 10 BOARD LAYOUTS



SECTION 11 VOLTAGE DIAGRAM

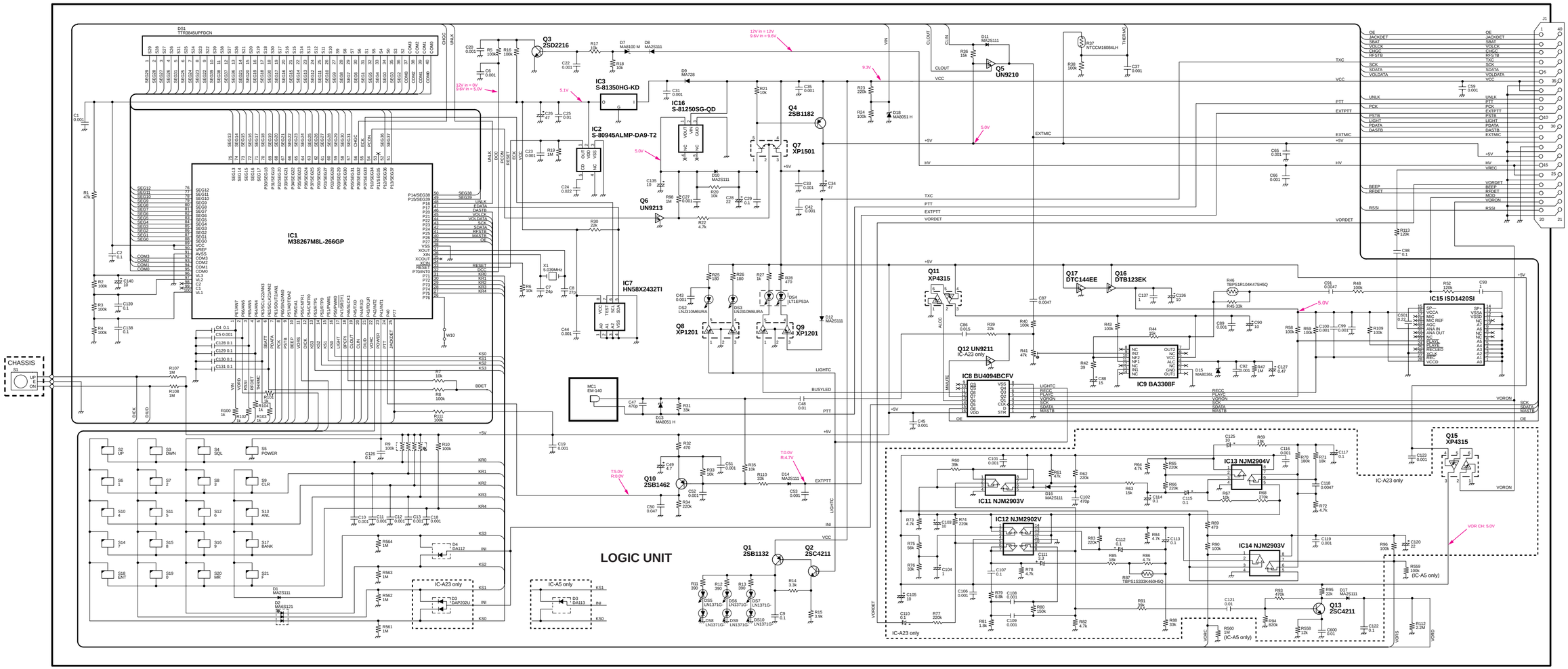
11 - 1 LOGIC UNIT



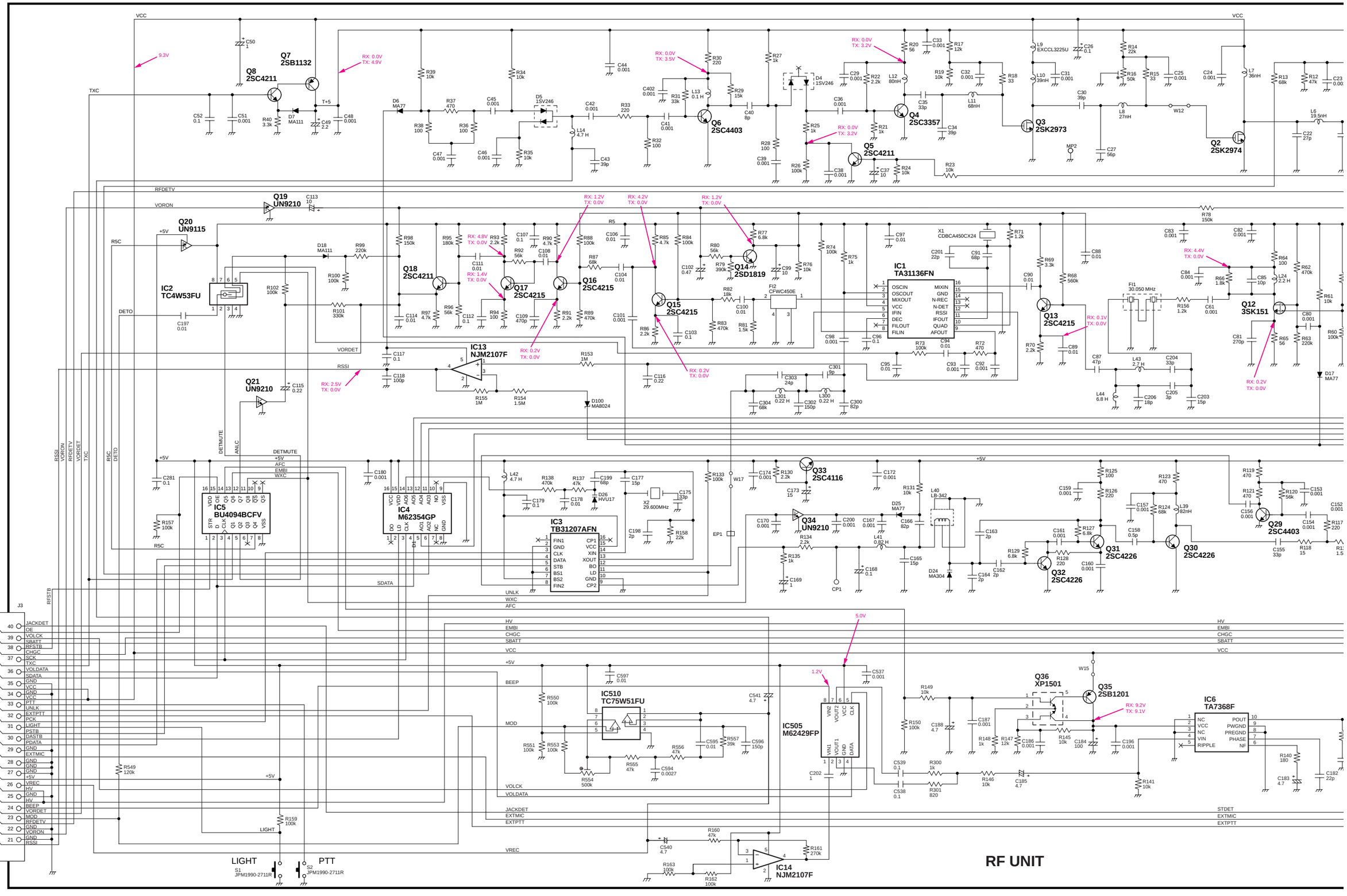


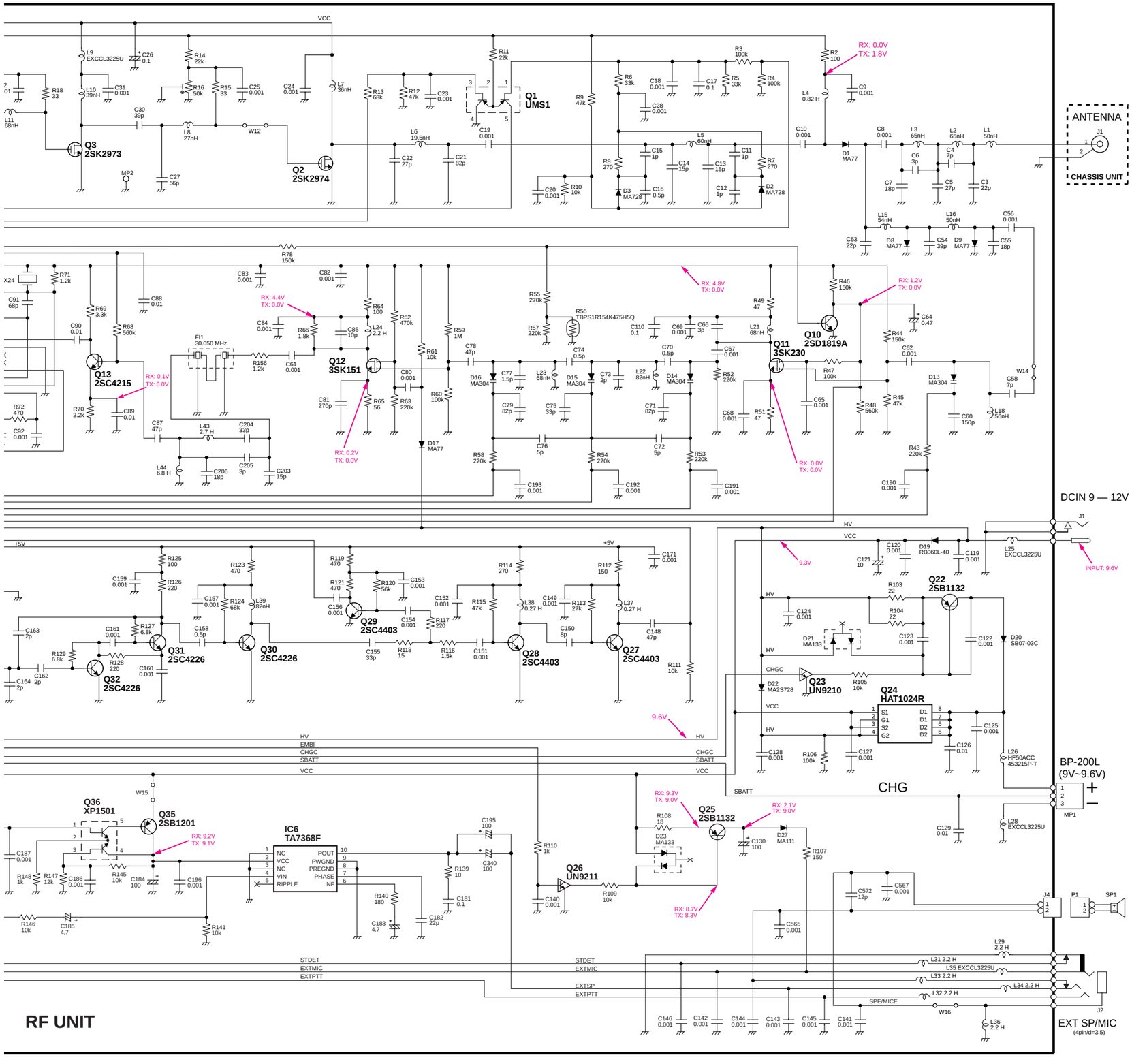
COMPLETE VIEW

11 - 1 LOGIC UNIT

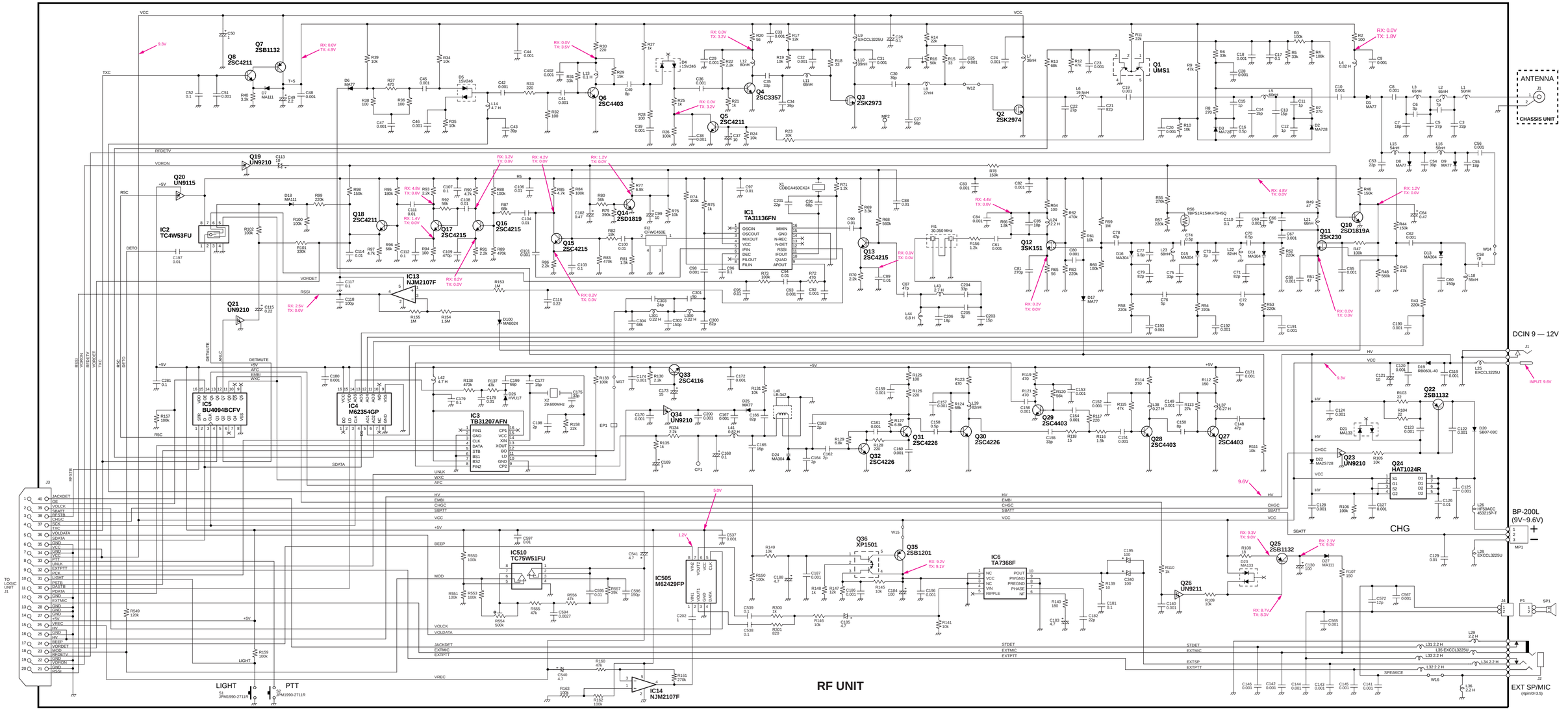


11 - 2 RF UNIT


VCC
9.3V
Q7 2SB1132
Q8 2SC4211
RX: 0.0V TX: 4.9V
TXC
T+5
Q6 2SC4403
RX: 0.0V TX: 3.5V
Q4 2SC3357
RX: 0.0V TX: 3.2V
Q5 2SC4211
Q3 2SK2973
Q2 2SK2974
L9 EXCCL3225U
W12
MP2
RFDETV
VORON
Q19 UN9210
Q20 UN9115
+5V
R5C
DETO
IC2 TC4W53FU
VORDET
RSSI
Q21 UN9210
Q18 2SC4211
Q17 2SC4215
Q16 2SC4215
Q15 2SC4215
Q14 2SD1819
IC1 TA31136FN
OSCIN
OSCOUT
MIXOUT
VCC
IFIN
DEC
FILOUT
FILIN
MIXIN
GND
N-REC
N-DET
RSSI
IFOUT
QUAD
AFOUT
X1 CDBCA450CX24
FI1 30.050 MHz
FI2 CFWC450E
Q13 2SC4215
Q12 3SK151
IC13 NJM2107F
D100 MA8024
DETMUTE
AFC
EMBI
WXC
ANLC
IC5 BU4094BCFV
IC4 M62354GP
IC3 TB31207AFN
FIN1
GND
CLK
DATA
STB
BS1
BS2
FIN2
CP1
VCC
XIN
XOUT
BO
LD
GND
CP2
SDATA
UNLK
WXC
AFC
Q33 2SC4116
Q34 UN9210
Q31 2SC4226
Q30 2SC4226
Q32 2SC4226
Q29 2SC4403
D25 MA77
D24 MA304
L40 LB-342
EP1
CP1
W17
J3
TO LOGIC UNIT J1
JACKDET
OE
VOLCK
SBATT
RESTB
CHGC
SCK
TXC
VOLDATA
SDATA
GND
VCC
PTT
UNLK
EXTPTT
PCK
LIGHT
PSTB
DASTB
PDATA
EXTMIC
VREC
HV
BEEP
VORDET
MOD
RFDETV
VORON
RSSI
LIGHT
PTT
S1 JPM1990-2711R
S2 JPM1990-2711R
BEEP
MOD
VOLCK
VOLDATA
JACKDET
EXTMIC
EXTPTT
VREC
IC510 TC75W51FU
IC505 M62429FP
IC14 NJM2107F
IC6 TA7368F
NC
VCC
NC
VIN
RIPPLE
POUT
PWGND
PREGND
PHASE
NF
Q36 XP1501
Q35 2SB1201
RX: 9.2V TX: 9.1V
5.0V
1.2V
HV
EMBI
CHGC
SBATT
VCC
STDET
EXTMIC
EXTPTT
RF UNIT


VCC
Q1 UMS1
Q2 2SK2974
Q3 2SK2973
RX: 0.0V
TX: 1.8V
ANTENNA
CHASSIS UNIT
Q10 2SD1819A
Q11 3SK230
Q12 3SK151
Q13 2SC4215
RX: 4.8V
TX: 0.0V
RX: 1.2V
TX: 0.0V
RX: 4.4V
TX: 0.0V
RX: 0.1V
TX: 0.0V
RX: 0.2V
TX: 0.0V
RX: 0.0V
TX: 0.0V
DCIN 9 — 12V
HV
VCC
9.3V
INPUT: 9.6V
Q22 2SB1132
Q23 UN9210
Q24 HAT1024R
9.6V
BP-200L
(9V~9.6V)
CHG
MP1
Q36 XP1501
Q35 2SB1201
IC6 TA7368F
RX: 9.2V
TX: 9.1V
Q25 2SB1132
Q26 UN9211
RX: 9.3V
TX: 9.0V
RX: 2.1V
TX: 9.0V
RX: 8.7V
TX: 8.3V
Q27 2SC4403
Q28 2SC4403
Q29 2SC4403
Q30 2SC4226
Q31 2SC4226
Q32 2SC4226
+5V
HV
EMBI
CHGC
SBATT
VCC
STDET
EXTMIC
EXTPTT
EXTSP
SPE/MICE
EXT SP/MIC
(4pin/d=3.5)
RF UNIT
COMPLETE VIEW

11 - 2 RF UNIT


RF UNIT
LEFT SIDE
RIGHT SIDE
11 - 2
ANTENNA
CHASSIS UNIT
DCIN 9 — 12V
INPUT: 9.6V
BP-200L
(9V~9.6V)
CHG
EXT SP/MIC
(4pin/d=3.5)
LIGHT
PTT
TO LOGIC UNIT J1
IC1 TA31136FN
IC2 TC4W53FU
IC3 TB31207AFN
IC4 M62354GP
IC5 BU4094BCFV
IC6 TA7368F
IC10 TC75W51FU
IC505 M62429FP
IC13 NJM2107F
IC14 NJM2107F
Q1 UMS1
Q2 2SK2974
Q3 2SK3973
Q4 2SC3357
Q5 2SC4211
Q6 2SC4403
Q7 2SB1132
Q8 2SC4211
Q10 2SD1819A
Q11 3SK230
Q12 3SK151
Q13 2SC4215
Q14 2SD1819
Q15 2SC4215
Q16 2SC4215
Q17 2SC4215
Q18 2SC4211
Q19 UN9210
Q20 UN9115
Q21 UN9210
Q22 2SB1132
Q23 UN9210
Q24 HAT1024R
Q25 2SB1132
Q26 UN9211
Q27 2SC4403
Q28 2SC4403
Q29 2SC4403
Q30 2SC4226
Q31 2SC4226
Q32 2SC4226
Q33 2SC4116
Q34 UN9210
Q35 2SB1201
Q36 XP1501
X1 CDBCA450CX24
F1 30.050 MHz
F2 CFWC450E
D100 MA8024
D1 MA77
D2 MA728
D3 MA728
D4 1SV246
D5 15V246
D6 MA77
D7 MA111
D8 MA77
D9 MA77
D10 MA304
D11 MA304
D12 MA304
D13 MA304
D14 MA304
D15 MA304
D16 MA304
D17 MA77
D18 MA111
D19 RB060L-40
D20 SB07-03C
D21 MA133
D22 MAZ5728
D23 MA133
D26 HVU17
D27 MA111
D100 MA8024
L1 50nH
L2 65nH
L3 65nH
L4 0.82 H
L5 65nH
L6 19.5nH
L7 36nH
L8 27nH
L9 EXCCL3225U
L10 39nH
L11 68nH
L12 80nH
L13 0.1 H
L14 4.7 H
L15 54nH
L16 50nH
L17 68nH
L18 56nH
L19 EXCCL3225U
L20 EXCCL3225U
L21 68nH
L22 82nH
L23 68nH
L24 2.2 H
L25 EXCCL3225U
L26 HF50ACC 453215F-T
L27 0.27 H
L28 EXCCL3225U
L29 2.2 H
L30 EXCCL3225U
L31 2.2 H
L32 2.2 H
L33 2.2 H
L34 2.2 H
L35 EXCCL3225U
L36 2.2 H
L40 LB-342
L41 0.82 H
L42 4.7 H
L43 2.7 H
L44 6.8 H
W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13 W14 W15 W16
J1 J2 J3 J4
P1 MP1 MP2
SP1
S1 JPM1990-2711R
S2 JPM1990-2711R
VCC
9.3V
5.0V
1.2V
+5V
HV
CHGC
SBATT
EMBI
RX: 0.0V TX: 4.9V
RX: 0.0V TX: 3.5V
RX: 0.0V TX: 3.2V
RX: 0.0V TX: 1.8V
RX: 4.8V TX: 0.0V
RX: 4.4V TX: 0.0V
RX: 1.2V TX: 0.0V
RX: 4.2V TX: 0.0V
RX: 1.4V TX: 0.0V
RX: 0.2V TX: 0.0V
RX: 2.5V TX: 0.0V
RX: 9.3V TX: 9.0V
RX: 9.2V TX: 9.1V
RX: 2.1V TX: 9.0V
RX: 8.7V TX: 8.3V

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