



SERVICE MANUAL

VHF/UHF FM TRANSCEIVER

IC-208H

INTRODUCTION

This service manual describes the latest service information for the **IC-208H** VHF/UHF FM TRANSCEIVER at the time of publication.

MODEL	VERSION	SYMBOL
IC-208H	Taiwan	TPE
	U.S.A.	USA
	Korea	KOR
	Australia	AUS
	Export	EXP

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

DANGER

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

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

DO NOT reverse the polarities of the power supply when connecting the transceiver.

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



ORDERING PARTS

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

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

<SAMPLE ORDER>

1140005990 S.IC MB15A02PFV-1 IC-208H MAIN UNIT 5 pieces
8810009610 Screw FH M2.6x6 ZKIC-208H Bottom cover 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 50 dB to 60 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

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SECTION 1 SPECIFICATIONS

GENERAL

- Frequency range :

VERSION	RX (MHz)	TX (MHz)
[KOR]	144.000–146.000, 430.000–440.000	144.000–146.000 ^{*2} , 430.000–440.000
[USA]	118.000–173.995 ^{*2} , 230.000–549.995 ^{*4} 810.000–824.000 ^{*5} , 849.000–869.000 ^{*5} 894.000–999.990 ^{*5}	144.000–148.000, 420.000–450.000 ^{*4}
[AUS]	118–173.995 ^{*2} , 230.000–549.995 ^{*3} , 810.000–999.990 ^{*6}	144.000–148.000, 420.000–450.000 ^{*3}
[TPE]	144.000–146.000, 430.000–432.000	144.000–146.000, 430.000–432.000
[EXP]	118–173.995 ^{*2} , 230.000–549.995 ^{*3} , 810.000–999.990 ^{*6}	136.000–173.995 ^{*2} , 400.000–478.995 ^{*3}

^{*1}Guaranteed 144.000 – 146.000 MHz only, ^{*2}Guaranteed 144.000 – 148.000 MHz only,

^{*3}Guaranteed 430.000 – 440.000 MHz only; ^{*4}Guaranteed 440.000 – 450.000 MHz only

^{*5}Guaranteed 430.000 – 434.000 MHz, 435.000 – 438.000 MHz only; ^{*6}Not guaranteed range

- Mode : FM, AM (AM range is 118.0 – 135.995 MHz and Rx only for [USA] and [EXP].)
- Number of memory channel : 502 (including 2 call channels)
- Usable temperature range : –10°C to +60°C; +14°F to +140°F
- Frequency resolution : 5, 10, 12.5, 15, 20, 25, 30, 50, 100 and 200 kHz
- Scan mode : Full, Program, Priority, Memory channel, Bank, Skip and Tone
- Frequency stability : ±10 ppm (–10°C to +60°C; +14°F to +140°F)
- Power supply requirement : 13.8 V DC ±15 % (negative ground)
- Current drain (at 13.8 V DC) :

		VHF	UHF
TX	High: 55 W ^{*1} /50 W/25 W ^{*2}	12 A ^{*1} /11.5 A/8 A ^{*2}	11.5 A/8 A
	Middle: 15 W (Approx.)	7.5 A	
	Low: 5 W (Approx)	5.5 A	5.0 A
RX	Standby	0.8 A	
	Maximum output power	1.0 A	

^{*1}VHF only (except [KOR]), ^{*2}[TPE] only

- Antenna connector : SO-239 (50 Ω)
- DATA connector : Mini DIN 6 pin
- Dimensions : 141(W)×40(H)×185.4(D) mm; 5⁹/₁₆(W)×1⁹/₁₆(H)×7⁹/₃₂(D) inch (projections not included)
- Weight : 1.2 kg; 2 lb 10 oz

TRANSMITTER

- Output power : VHF 55 W (50 W: [KOR], 25W: [TPE])/15 W/5 W (selectable)
UHF 50 W/15 W/5 W (selectable)
- Modulation system : Variable reactance frequency
- Maximum frequency deviation: ±5.0 kHz
- Spurious emissions : Less than –60 dB
- Microphone connector : 8-pin modular jack (600 Ω)

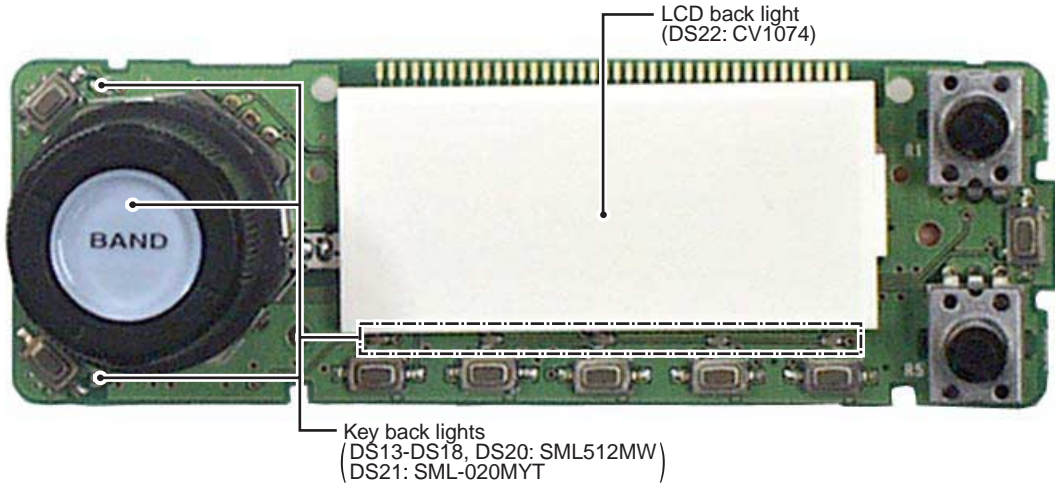
RECEIVER

- Receive system : Double-conversion superheterodyne
- Intermediate frequency : 1st IF 46.05 MHz
2nd IF 450 kHz
- Sensitivity : Less than 0.18 μV (at 12 dB SINAD)
- Squelch sensitivity : Less than 0.13 μV (at threshold)
- Selectivity : More than 12 kHz/–6 dB (Wide); More than 6 kHz/–6 dB (Narrow)
Less than 30 kHz/–60 dB (Wide); Less than 20 kHz/–60 dB (Narrow)
- Spurious and image rejection : More than 60 dB
- Audio output power (at 13.8 V) : More than 2.0 W at 10% distortion with an 8 Ω load
- External speaker connector : 2-conductor 3.5(d) mm (1/8")/8 Ω

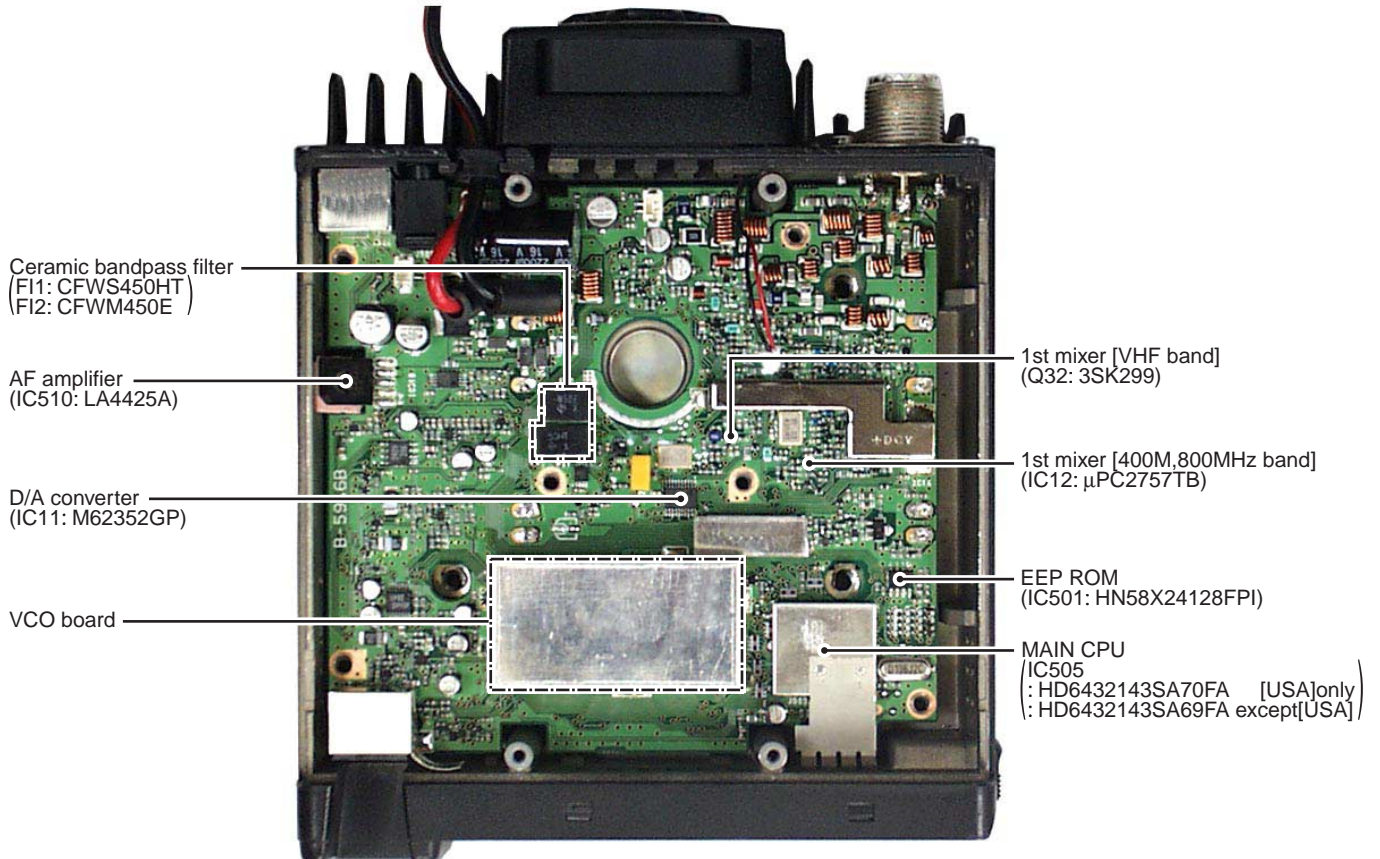
All stated specifications are subject to change without notice or obligation.

SECTION 2 INSIDE VIEWS

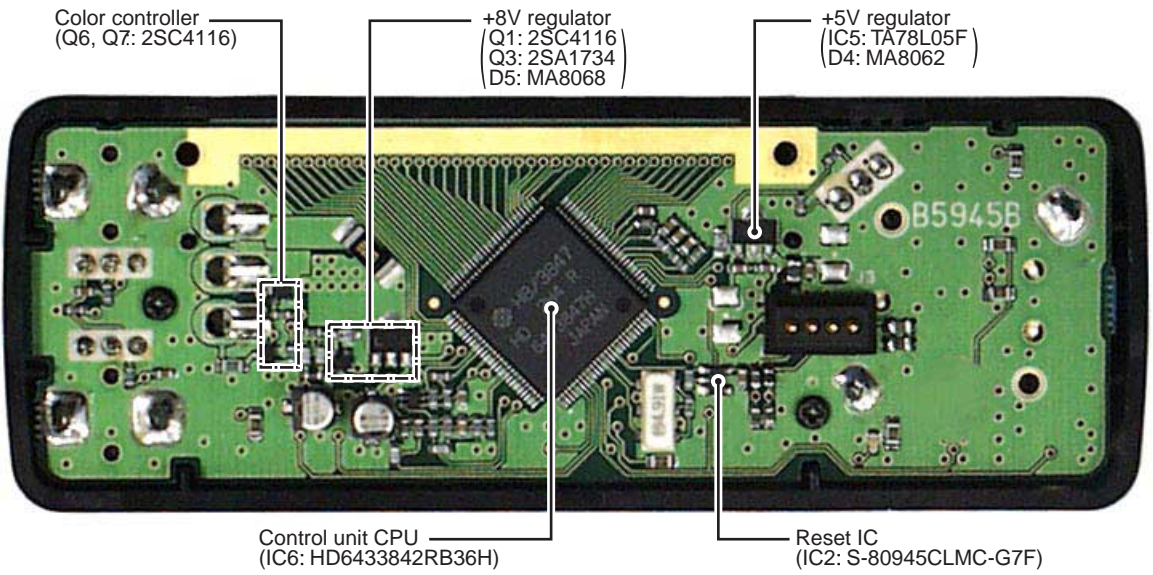
• CONTROL UNIT (TOP VIEW)



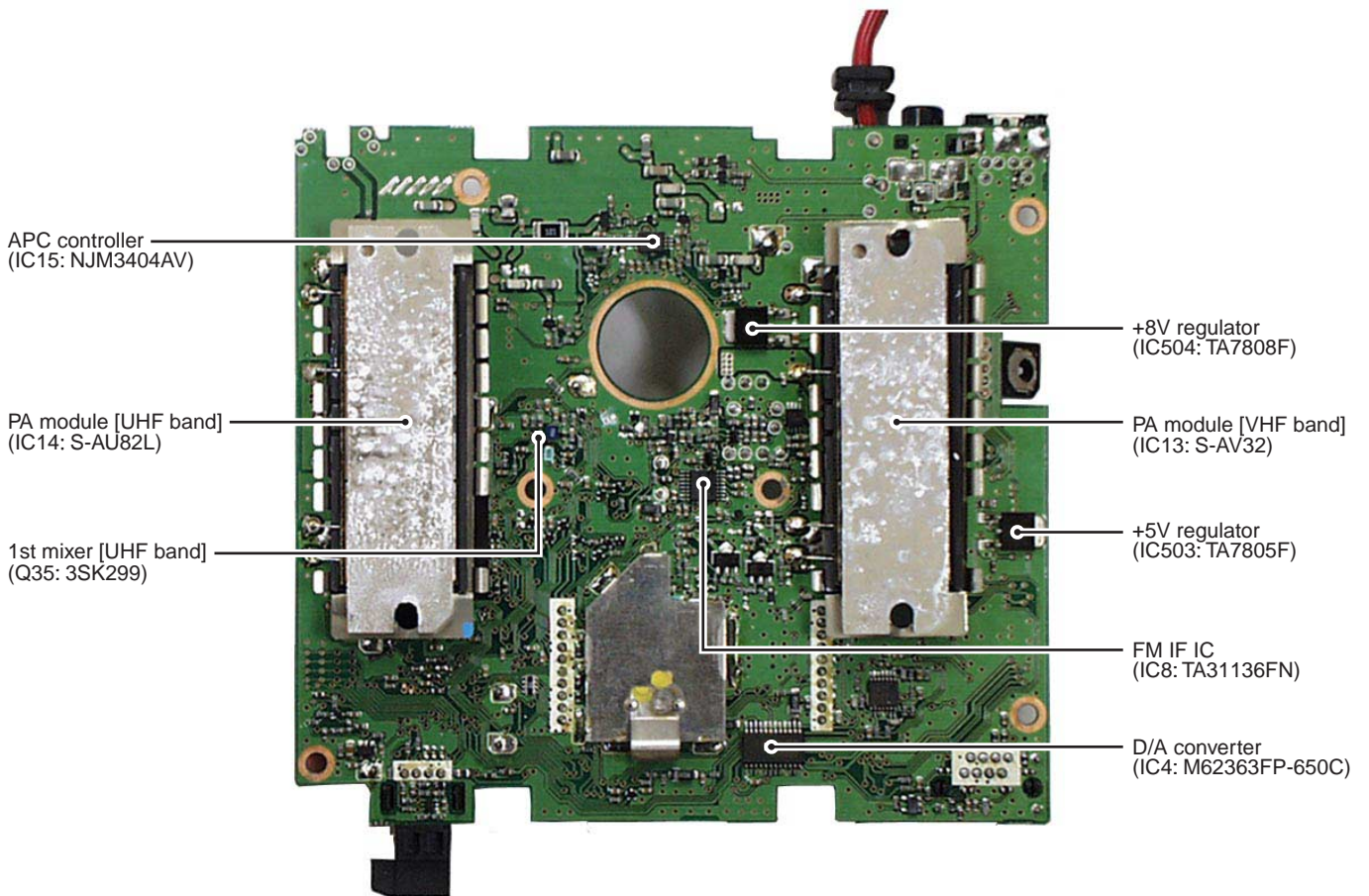
• MAIN UNIT (TOP VIEW)



• CONTROL UNIT (BOTTOM VIEW)



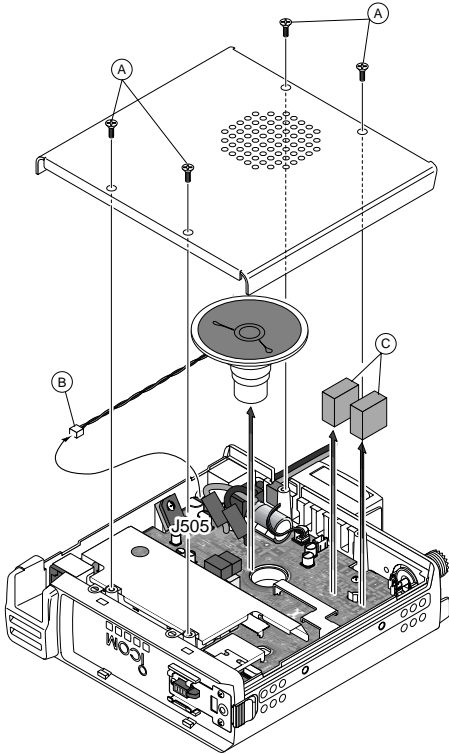
• MAIN UNIT (BOTTOM VIEW)



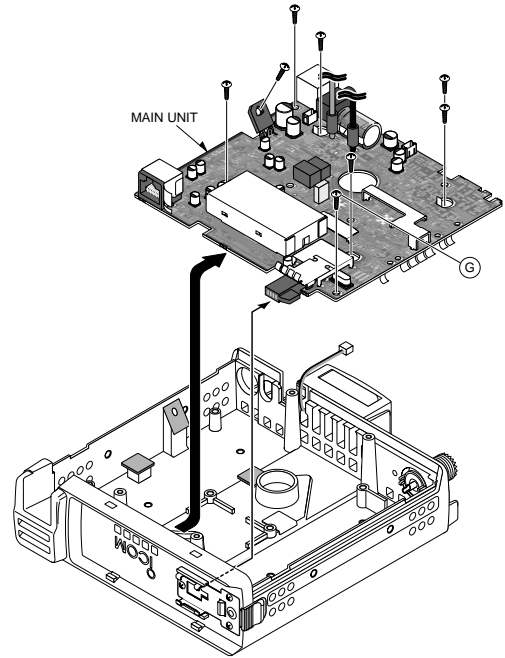
SECTION 3 DISASSEMBLY INSTRUCTIONS

• Removing the MAIN unit

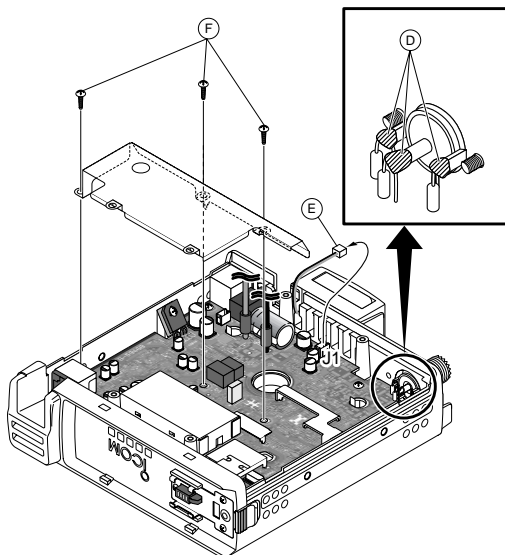
- ① Unscrew 4 screws (A), and remove the cover.
- ② Disconnect the cable (B) from J505, and remove the speaker.
- ③ Remove 2 sheets (C).



- ⑦ Unscrew 8 screws (G), and remove the MAIN unit.

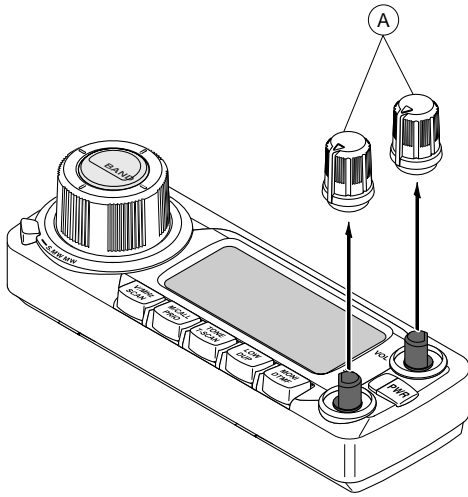


- ④ Unsolder 3 points (D).
- ⑤ Disconnect the cable (E) from J1.
- ⑥ Unscrew 3 screws (F), and remove the cover.

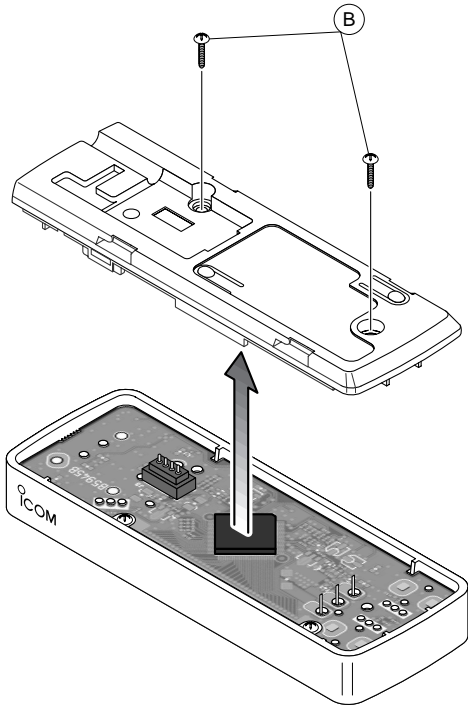


• **Removing the CONTROL unit**

① Remove 2 knobs (A).

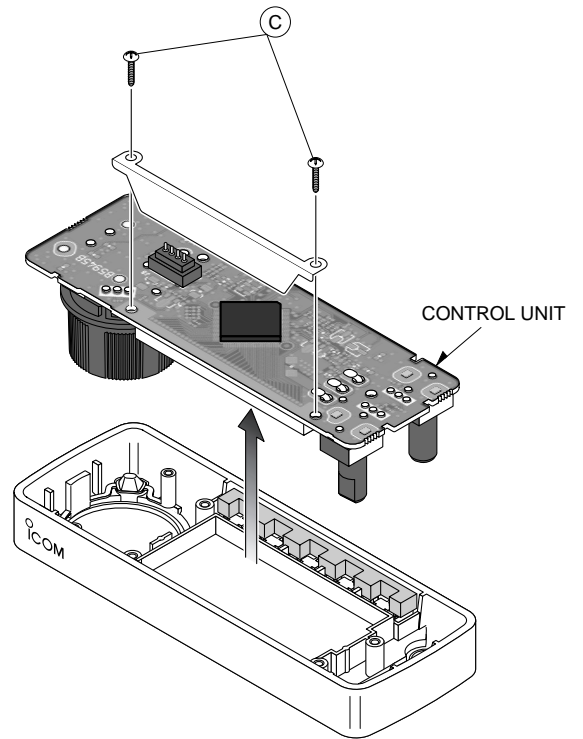


② Unscrew 2 screws (B), and remove the cover.



③ Unscrew 2 screws (C), and remove the LCD plate.

④ Remove the CONTROL unit.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 DUPLEXER CIRCUIT (MAIN UNIT)

The transceiver has a duplexer (low-pass and high-pass filters) on the first stage from the antenna connector to separate the signals into VHF, UHF and above 800 MHz signals.

The 2 of low-pass filters (L51, L52, L56, C295, C299 and L45, L46, L49, C282, C285, C289) are for VHF signals, the low-pass (L51, L52, L56, C295, C299) and high-pass (L47, L50, C284, C288, C292, C586) filters are for UHF signals and high-pass filter (L55, L58, C298, C302, C304) is for above 800 MHz signals.

The separated signals are applied to each antenna switching circuits (except SHF signals).

4-1-2 ANTENNA SWITCHING CIRCUITS (MAIN UNIT)

The antenna switching circuit functions as a low-pass filter while receiving. However, its impedance becomes very high while transmitting by turning ON diode (VHF: D47, D49, D50; UHF: D46, D48, D51). Thus transmit signals are blocked from entering the receiver circuits. The antenna switching circuit employs a $1/4\lambda$ type diode switching system.

SHF signals pass through the RX switching circuit (D44).

The passed signals are then applied to the each attenuator circuits.

4-1-3 ATTENUATOR CIRCUITS (MAIN UNIT)

The attenuator circuit attenuates the signal strength to a maximum of 10 dB to protect the RF amplifier from distortion when excessively strong signals are received.

The signals from the antenna switching circuit pass through the each attenuator circuit (for VHF is D49 and D50, for UHF is D46 and D48, for SHF is D39).

The D/A converter outputs "ATT" signal (IC11, pin 6), and is then applied to the attenuator controller circuit (Q44). The circuit output attenuator control signals to each attenuator circuits.

The attenuated signals are applied to the each RF circuits.

4-1-4 RF CIRCUITS (MAIN UNIT)

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

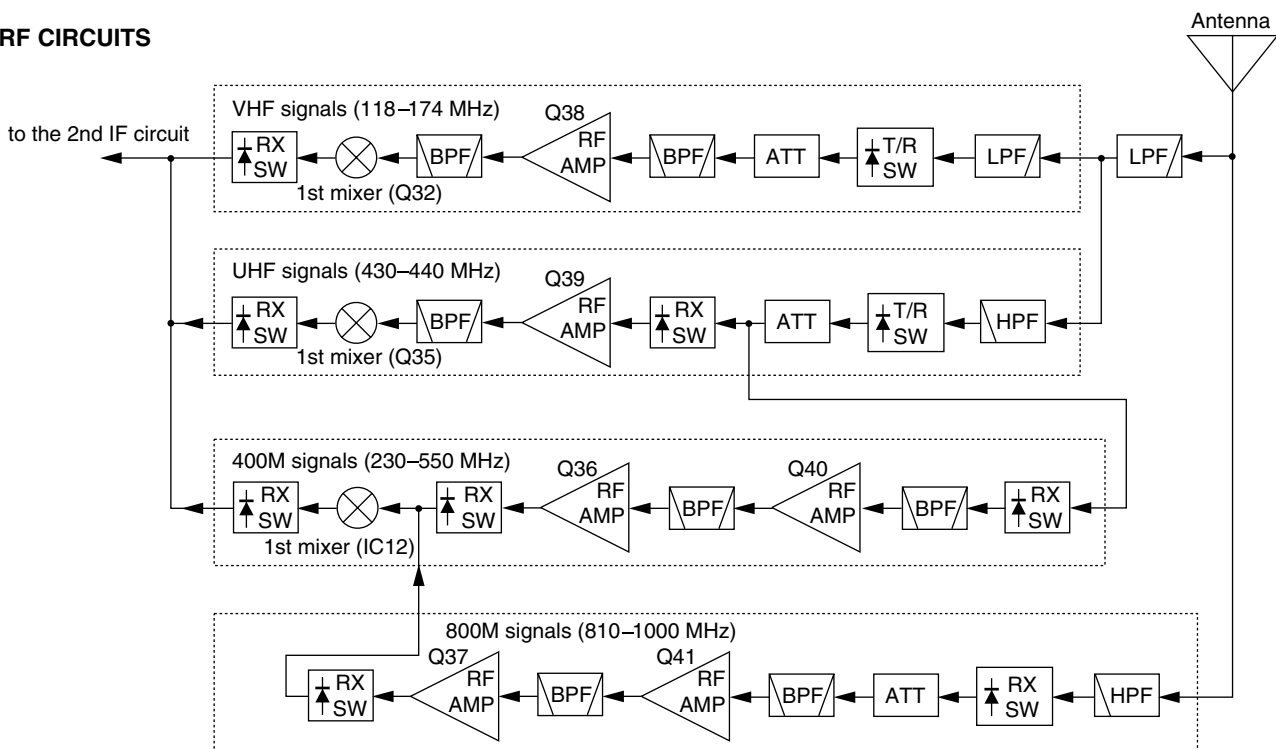
• VHF RF CIRCUIT (118 MHz–174 MHz)

The signals from the attenuator circuit pass through the tunable bandpass filter (D41, L40, L44, C273, C280). The filtered signals are amplified at the VHF RF amplifier (Q38) and are then enter another 3-stage tunable bandpass filter (D22, D23, D29, L28, C171, C174, C176, C177, C181, C185, C191, C198, C204, C208) to suppress unwanted signals and improve the selectivity. The filtered signals are applied to the VHF 1st mixer circuit (Q32).

• UHF RF CIRCUIT (430 MHz–440 MHz)

The signals from the attenuator circuit are applied to the UHF RX switching circuit (D42). The signals are amplified at the UHF RF amplifier (Q39) and are then enter bandpass filter (F14) to suppress unwanted signals. The filtered signals are applied to the UHF 1st mixer circuit (Q35).

• RF CIRCUITS



• ABOVE 230 MHz RF CIRCUIT

(230 MHz–550 MHz, EXCEPT 430 MHz–440 MHz)

The signals from the attenuator circuit pass through the tunable bandpass filter (D36, L37, L38, C242, C253, C261). The filtered signals are amplified at the above 230MHz RF amplifier (Q40) and are then enter another 2-stage tunable bandpass filter (D25, D30, C205, C212) to suppress unwanted signals and improve the selectivity. The filtered signals are applied to the RF amplifier (Q36). The amplified signals pass through the 400 MHz RX switching circuit (D17), and then applied to the 400 MHz 1st mixer circuit (IC12).

• ABOVE 800 MHz RF CIRCUIT (810 MHz–1000 MHz)

The signals from the attenuator circuit pass through the tunable bandpass filter (D37, L39, C243, C254, C260, C269). The filtered signals are amplified at the above 800 MHz RF amplifier (Q41) and are then enter another tunable bandpass filter (D26, D31, L27, L31, C188, C197, C206, C213, C223) to suppress unwanted signals and improve the selectivity. The filtered signals are applied to the RF amplifier (Q37). The amplified signals pass through the 400 MHz RX switching circuit (D18), and then applied to the 1st mixer circuit (IC12) same as 400 MHz RF circuit.

The tunable bandpass filters (D11–D13, D15) employ varactor diodes to tune the center frequency of the RF pass-band for wide bandwidth receiving and good image response rejection.

4-1-5 VHF 1ST MIXER CIRCUIT (MAIN UNIT)

The 1st mixer circuit converts the received signal to a fixed frequency of the 1st IF signal with a 1st LO frequency.

• VHF 1ST MIXER CIRCUIT

The signals from the VHF RF circuit are mixed with the 1st LO signal at the 1st mixer circuit (Q32) to produce a 46.05 MHz 1st IF signal. The 1st IF signal passes through the RX switching circuit (D8), and are then applied to the 1st IF circuit.

• UHF (430 MHz–440 MHz) 1ST MIXER CIRCUIT

The signals from the UHF RF circuit are mixed with the 1st LO signal at the 1st mixer circuit (Q35) to produce a 46.05 MHz 1st IF signal. The 1st IF signal passes through the RX switching circuit (D9), and are then applied to the 1st IF circuit.

• ABOVE 230 MHz (EXCEPT 430 MHz–440 MHz) 1ST MIXER CIRCUIT

The signals from the above 230 MHz and above 800 MHz RF circuit are mixed with the 1st LO signal at the 1st mixer circuit (IC12) to produce a 46.05 MHz 1st IF signal. The 1st IF signal passes through the RX switching circuit (D10), and are then applied to the 1st IF circuit.

The output 46.05 MHz 1st IF signals from the each RX switching circuits is applied to the crystal bandpass filter (F13), and then passed through the limiter circuit (D6). The signal is amplified at the IF amplifier (Q18), and then applied to the 2nd mixer circuit (IC8).

4-1-7 2ND IF AND DEMODULATOR CIRCUITS (MAIN UNIT)

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

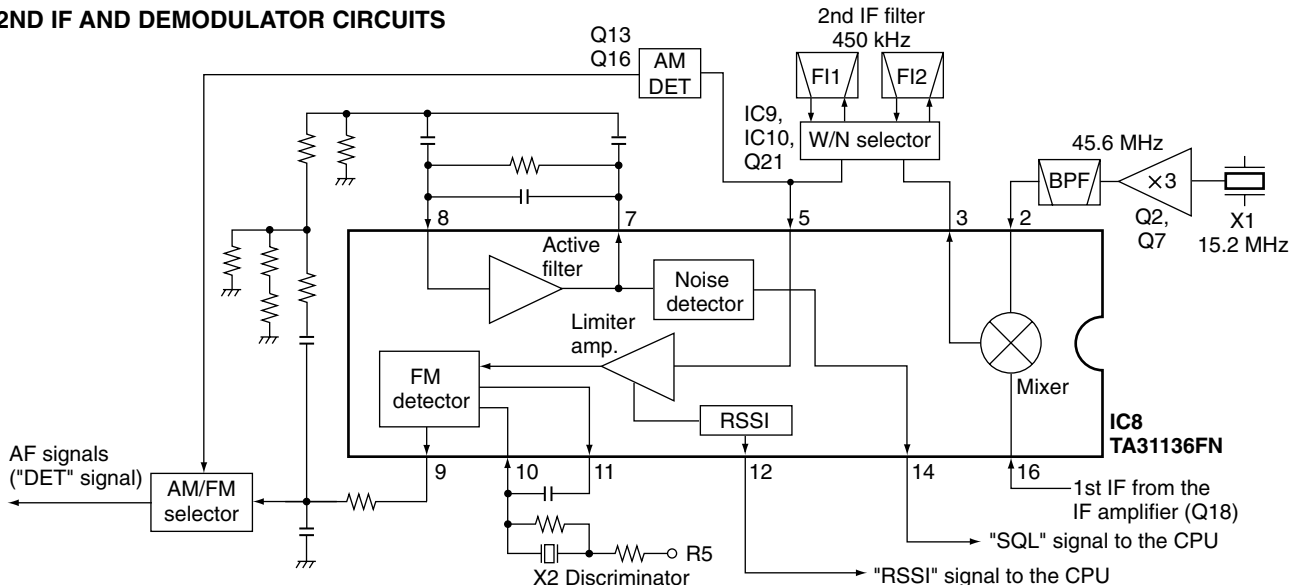
The FM IF IC (IC8) contains the 2nd local oscillator, 2nd mixer, limiter amplifier, quadrature detector, and noise detector circuits, etc.

The 1st IF signal from the IF amplifier is applied to the 2nd mixer section of IC8 (pin 16), and is mixed with a 45.6 MHz 2nd LO signal generated by the reference oscillator circuit (Q2, Q3, D1, X1) to produce a 450 kHz 2nd IF signal.

The 2nd IF signal from the 2nd mixer passes through the ceramic bandpass filter (passes through F12 during wide channel spacing selection, or passes through F11 during narrow channel spacing selection), where unwanted signals are suppressed. The ceramic filters (F11, F12) are switched by IC9 and IC10 that is controlled by "WN_SEL" signal from the MAIN CPU (IC505, pin 99).

The filtered signal is applied to the AM or FM detector circuit separately.

• 2ND IF AND DEMODULATOR CIRCUITS



• IN CASE OF FM SIGNAL RECEIVING

The signal is then amplified at the limiter amplifier section (IC5, pin 5) and applied to the FM detector section (X2, IC5, pins 10, 11) for demodulation the 2nd IF signal into AF signals.

The FM detector circuit employs a quadrature detection method (liner phase detection), which uses a ceramic discriminator (X2) for phase delay to obtain a non-adjusting circuit. The detected signal from IC5 (pin 9) passes through the AM/FM selector circuit (IC5, pins 7, 1), and is then applied to the AF circuit.

• IN CASE OF AM SIGNAL RECEIVING

The signal is amplified at the amplifier (Q16), and is then applied to the AM detector circuit (Q13) for demodulation the 2nd IF signal into AF signals.

The detected signal from Q13 passes through the AM/FM selector circuit (IC5, pins 6, 1), and is then applied to the AF circuit.

4-1-8 AF AMPLIFIER CIRCUIT (MAIN UNIT)

The AF amplifier circuit amplifies the detected signals to drive a speaker. The AF circuit includes an AF mute circuit for the squelch.

The detected AM or FM AF signals are applied to AF mute circuit (Q14). The output signals pass through the low-pass filter (Q5), and are then applied to the electric volume circuit (IC508, pin 1). The signals are applied to the other AF mute circuit (Q512). The signals are level adjusted at the volume control IC (IC508), and are amplified at the AF power amplifier (IC510, pin 1) after being passed through the other AF mute circuit (Q512).

The output signal from IC510 (pin 4) drives the external or internal speaker.

A part of signals from the AM/FM selector circuit (IC5, pin 1) pass through low-pass filters.

When the signal passes through the low-pass filter (Q3), the filtered signal is applied to the MAIN CPU (IC505, pin 39) via the "DTCS_IN" signal to analyze the DTCS signal.

When the signal passes through the other low-pass filter (C52, C53, R46, R52), the filtered signal is applied to the MAIN CPU (IC505, pin 42) via the "WXALT" signal to detect WX alert signal.

A part of signals from the AF mute circuit (Q14) is applied to the 6-pins data jack as data signal via the "DATAOUT" signal.

4-1-9 SQUELCH CIRCUIT (MAIN UNIT)

• NOISE SQUELCH

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

Some of the noise components in the AF signals from the FM IF IC (IC8, pin 9) are passed through the active filter section (IC8, pins 8, 7), and then applied to the noise detector section. The detected noise signals are applied to the MAIN CPU (IC505, pin 38) via the "SQL" line.

Even when the squelch is closed, the AF mute switch (Q512) opens at the moment of emitting beep tone.

• TONE SQUELCH

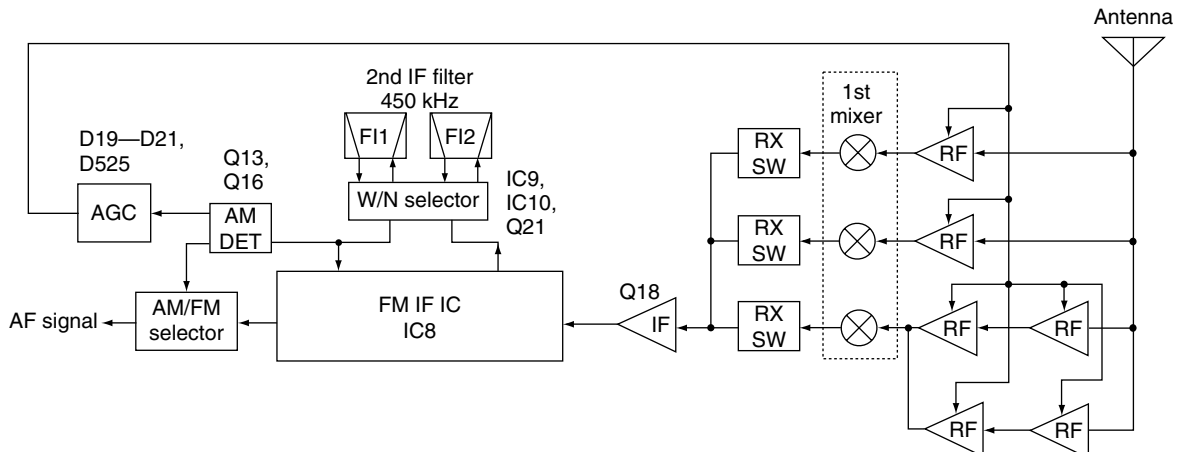
The tone squelch circuit detects AF signals and opens the squelch only when receiving a signal containing a matching subaudible tone (CTCSS). When tone squelch is in use, and a signal with a mismatched or no subaudible tone is received, the tone squelch circuit mutes the AF signals even when noise squelch is open.

A portion of the AF signals from the FM IF IC (IC8, pin 9) passes through the low-pass filter (Q3) to remove AF (voice) signals via the AM/FM AF selector (IC5, pins 7, 1), and is then applied to the CTCSS decoder inside the CPU (IC505, pin 39) via the "DTCS_IN" line to control the AF mute switch.

4-1-10 AGC CIRCUIT (MAIN UNIT)

The AGC (Automatic Gain Control) circuit reduces IF amplifier gain to keep the audio output at a constant level. The receiver gain is determined by the voltage on the AGC line (Q13 collector).

• AGC CIRCUIT



The signal from the AM detector circuit (Q13) is detected at the AGC detector circuit (D19–D21). When receiving strong signals, the detected voltage increases and the AGC voltage decreases via the AGC circuit. The AGC voltage is used for the bias voltage of the receive switching PIN diodes to attenuate the received signals. Therefore, this transceiver keeps the audio output at a constant level.

4-1-11 S-METER CIRCUIT (MAIN UNIT)

The S-meter circuit indicates the relative received signal strength while receiving by utilizing the AGC voltage which changes depending on the received signal strength.

The FM S-meter signal from the FM IF IC (IC8, pin 12) is applied to the main CPU (IC505, pin 40) as an S-meter signal via the "RSSI" signal line.

The S-meter signal is applied to the sub CPU and is then displayed on the LCD.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT (MAIN UNIT)

The microphone amplifier circuit amplifies audio signals from the microphone to a level needed at the modulation circuit. The microphone amplifier circuit is commonly used for both the VHF and UHF bands.

• AUDIO SIGNALS

The AF signals from the microphone are amplified at the microphone amplifier (Q505, IC506), and are then applied to the analog switch (IC509, pin 2). The signals from analog switch (pin 1) are applied to the IDC amplifier (IC3A, pin 3) via the "MODIN" line, and then pass through the low-pass filter (IC3D, pins 13, 14) to suppress unwanted components. IC3A composes limiter amplifier and pre-emphasis circuits.

The signals are amplified at the buffer amplifier (IC3C, pins 9, 8), and are then applied to the D/A converter IC (IC4, pin 13) to adjust modulation level. The signals from the D/A converter (IC4, pin 23) pass through the reference controller (D1, X1), and are then applied to the VHF or UHF modulation circuits separately.

• DATA SIGNALS

The data signals from the 6-pins jack (J504, pin 1) pass through the limiter circuit (D524) to limit the level. When setting to 9600 bps mode, The signals pass through the analog switch (IC509, pins 4, 3), and then pass through the switch again (pins 9, 8). The signals are amplified at the buffer amplifier (IC3c, pins 9, 8) via the "DATAMOD" line, and are then applied to the same line as audio signals (applied to the D/A converter IC's pin 13).

When setting to 1200 bps mode, The signals pass through the analog switch (IC509, pins 4, 3), and then pass through the switch again (pins 10, 11). The signals are then applied to the same line as "MODIN" (applied to the IDC amplifier; IC3A, pin 3).

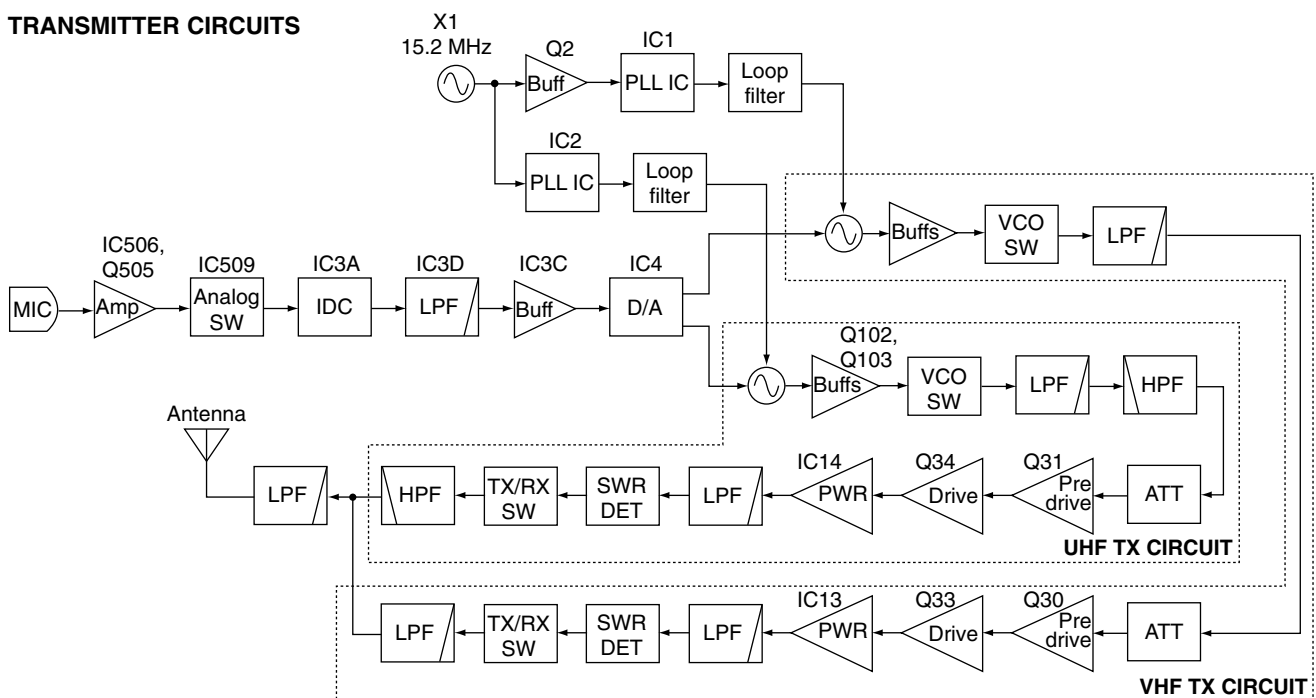
4-2-2 VHF MODULATION CIRCUIT (MAIN UNIT AND VCO BOARD)

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

The audio or data signals from the reference controller (D1, X1) are amplified at the buffer amplifier (Q2), and then pass through the VHF PLL IC (IC1, pins 1,15) and VHF loop filter (IC6, Q9, Q10, D4). The filtered signals are applied to the V-VCO circuit (VCO board).

The signals change the reactance of D1 (VCO board) to modulate the oscillated signal at the V-VCO circuit (VCO board; Q3, D1, D2). The modulated signals are amplified at the buffer amplifiers (VCO board; Q4, Q5), and then passed through the Tx/Rx switching circuit (VCO board; D5) and low-pass filter (L6, C32, C33). The filtered signals are applied to the drive amplifier circuit on the MAIN unit.

• TRANSMITTER CIRCUITS



4-2-3 VHF DRIVE AMPLIFIER CIRCUIT (MAIN UNIT)

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

The RF signals from the low-pass filter (VCO board) pass through the attenuator (R133, R134, R137), and are then amplified at the pre-drive (Q30) and drive (Q33, D13) amplifiers to obtain power that IC13 can operate. The amplified signal is then applied to the RF power amplifier (IC1).

4-2-4 VHF POWER AMPLIFIER CIRCUIT (MAIN UNIT)

The power amplifier circuit amplifies the driver signal to an output power level.

IC13 is a power module which has amplification output capabilities of about 55 W. The RF signal from the drive amplifier (Q33) is applied to IC13 (pin 1).

The amplified signals from the power amplifier (IC13, pin 4) pass through the low-pass filter (L22, C193, C189) and SWR detector (D27, D33), antenna switching circuit (D45) and other low-pass filter (L45, L46, L49, C279, C282, C285, C289). The filtered signals are passed through the low-pass filter (L51, L52, L56, C295, C299) to suppress unwanted signals, and are then applied to the antenna connector (CHASSIS unit J2).

Control voltage for the power amplifier (IC13, pin 2) are controlled by the APC circuit to protect the power module from a mismatched condition as well as to stabilise the output power.

4-2-5 VHF APC CIRCUIT (MAIN UNIT)

The APC circuit protects the power amplifier from a mismatched output load and stabilises transmit output power.

The SWR detector circuit (D27, D33, L29) detects forward signals and reflection signals at D27 and D33 respectively. The combined voltage is at a minimum level when the antenna impedance is matched at 50 Ω and is increased when it is mismatched.

The detected voltage is applied to the APC amplifier (IC15, pin 6) and compared with a reference voltage which is supplied from the CPU (IC505) as a "PCON_V" D/A control signal.

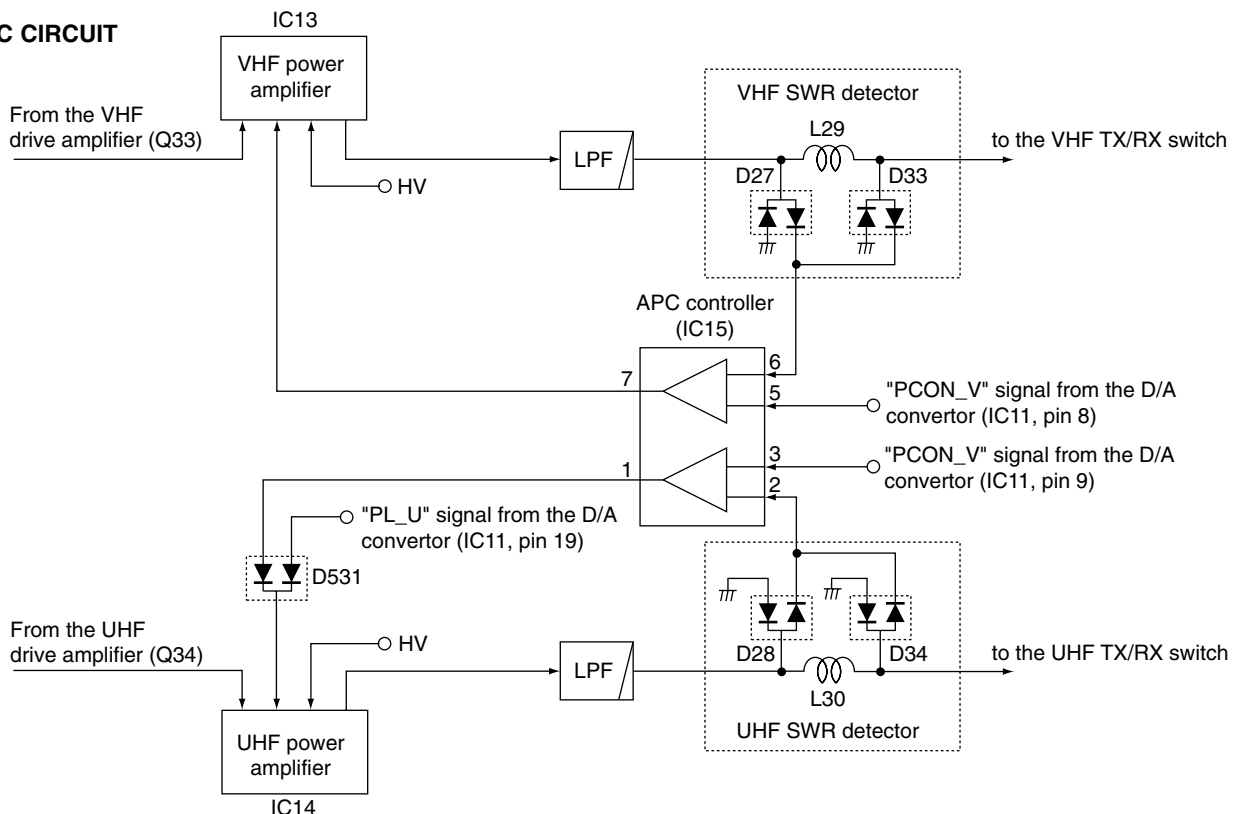
When antenna impedance is mismatched, the detected voltage exceeds the reference voltage. The output voltage of the APC amplifier (IC15, pin 7) controls the bias voltage of the power module (IC13) to reduce the output power via the APC controller (IC15,).

4-2-6 UHF MODULATION CIRCUIT (MAIN UNIT AND VCO BOARD)

The audio or data signals from the reference controller (D1, X1) pass through the UHF PLL IC (IC2, pins 1,15) and UHF loop filter (IC6, Q9, Q10, D4), and are then applied to the U-VCO circuit (VCO board).

The signals change the reactance of D100 (VCO board) to modulate the oscillated signal at the U-VCO circuit (VCO board; Q101, D101, D102). The modulated signals are amplified at the buffer amplifiers (VCO board; Q102, Q103), and then passed through the Tx/Rx switching circuit (VCO board; D103) and low-pass filter (L104, C122, C124). The filtered signals are applied to the drive amplifier circuit on the MAIN unit.

• APC CIRCUIT



4-2-7 UHF DRIVE AMPLIFIER CIRCUIT (MAIN UNIT)

The RF signals from the low-pass filter (VCO board) pass through the high-pass filter (L69, C119) and attenuator (R135, R136, R138), and are then amplified at the pre-drive (Q31) and drive (Q34, D14) amplifiers to obtain power that IC14 can operate. The amplified signal is then applied to the RF power amplifier (IC4).

4-2-8 UHF POWER AMPLIFIER CIRCUIT (MAIN UNIT)

IC14 is a power module which has amplification output capabilities of about 50 W. The RF signal from the drive amplifier (Q34) is applied to IC14 (pin 1).

The amplified signals from the power amplifier (IC14, pin 4) pass through the low-pass filter (L23, C190) and SWR detector (D28, D34), antenna switching circuit (D40) and high-pass filter (L47, L50, C284, C288, C292). The filtered signals are passed through the low-pass filter (L51, L52, L56, C295, C299) to suppress unwanted signals, and are then applied to the antenna connector (CHASSIS unit J2).

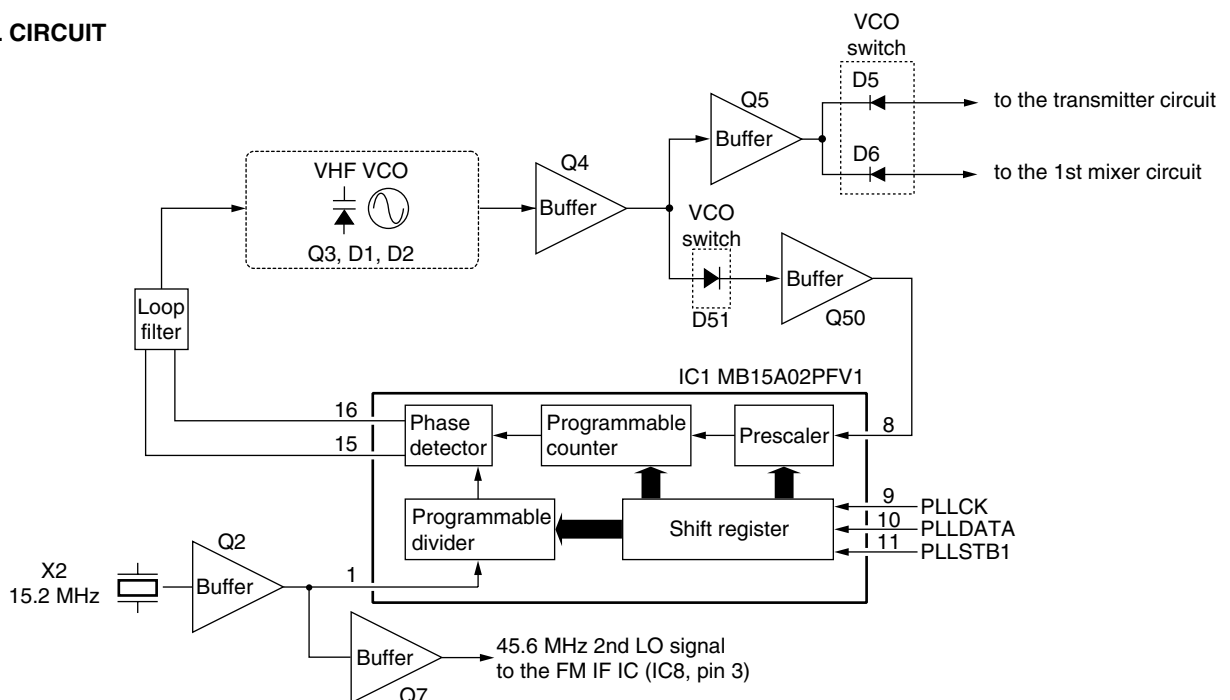
Control voltage for the power amplifier (IC14, pin 2) are controlled by the APC circuit to protect the power module from a mismatched condition as well as to stabilise the output power.

4-2-9 UHF APC CIRCUIT (MAIN UNIT)

The SWR detector circuit (D28, D34, L30) detects forward signals and reflection signals at D28 and D34 respectively. The combined voltage is at a minimum level when the antenna impedance is matched at 50 Ω and is increased when it is mismatched.

The detected voltage is applied to the APC amplifier (IC15, pin 3) and compared with a reference voltage which is supplied from the CPU (IC505) as a "PCON_U" D/A control signal.

• VHF PLL CIRCUIT



When antenna impedance is mismatched, the detected voltage exceeds the reference voltage. The output voltage of the APC amplifier (IC15, pin 1) controls the bias voltage of the power module (IC14) to reduce the output power via the APC controller (IC15, D531).

4-3 PLL CIRCUITS

4-3-1 GENERAL (MAIN UNIT)

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 of the programmable divider. IC1 and IC2 are dual PLL ICs that control both VCO circuits for VHF and UHF.

4-3-2 VHF LOOP (VCO BOARD AND MAIN UNIT)

The generated signal at the V-VCO (Q3, D1, D2) enters the PLL IC (MAIN unit; IC1, pin 8) via buffer-amplifiers (Q6, Q8) and VCO switching circuit (D50) and is divided at the programmable divider section and is then applied to the phase detector section.

The phase detector compares the input signal with a reference frequency, and then outputs the out-of-phase signal (pulse-type signal) from pin 15 (MAIN unit).

The pulse-type signal is converted into DC voltage (lock voltage) at the loop filter (MAIN unit; IC5, Q9, Q10, D4), and then applied to the V-VCO to stabilise the oscillated frequency.

4-3-3 UHF LOOP (VCO BOARD AND MAIN UNIT)

The generated signal at the U-VCO (Q101, D100, D101) enters the PLL IC (MAIN unit; IC2, pin 8) via buffer-amplifiers (Q102, Q50) and VCO switching circuit (D51) and is divided at the programmable divider section and is then applied to the phase detector section.

The phase detector compares the input signal with a reference frequency, and then outputs the out-of-phase signal (pulse-type signal) from pin 15 (MAIN unit).

The pulse-type signal is converted into DC voltage (lock voltage) at the loop filter (MAIN unit; IC7, Q11, Q12, D5), and then applied to the U-VCO to stabilise the oscillated frequency.

4-3-4 1ST LO CIRCUIT (VCO BOARD AND MAIN UNIT)

The 1st VCO circuit contains a separate V-VCO (Q3, D1, D2) and U-VCO (Q101, D100, D101).

• WHILE RECEIVING VHF BAND

The oscillated signal at the V-VCO circuit is amplified at the buffer amplifier (Q4), and is then applied to the VCO switching circuit (D6). The signal passes through the attenuator (C34, R24–R26) and low-pass filter (L7, L8, C36–C38), and is then applied to the LO switching circuit.

(1) RECEIVING 118MHz–174 MHz

The signal is applied to the LO switching circuit (MAIN unit; D528) as “V_RXLO” signal, and is applied to the 1st mixer circuit (MAIN unit; Q32), then mixed with the 1st IF signal.

(2) RECEIVING 230 MHz–550 MHz

The signal is applied to the LO switching circuit (MAIN unit; D15, D529, D530) as “V_RXLO” signal, and is applied to the 1st mixer circuit (MAIN unit; Q35), then mixed with the 1st IF signal.

A portion of the RF signal from the buffer amplifier (Q4) is amplified at the buffer amplifier (Q50), and is then fed back to the PLL IC (MAIN unit; IC1, pin 8) as the comparison signal.

• WHILE RECEIVING UHF BAND OR 800 MHz BAND

The oscillated signal at the U-VCO circuit is amplified at the buffer amplifiers (Q102, Q103), and is then applied to the VCO switching circuit (for UHF band; D104, for 800 MHz; D105).

While receiving UHF band, the signal passes through the attenuator (C125, R117, R119, R120) and low-pass filter (Q105, L7, L8, C36–C38), and is then applied to the VCO switching circuit (D106).

While receiving 800 MHz band, the signal is doubled at the doubler amplifier (Q104), and passes through the bandpass filter (L108–L110, C127, C129, C132, C133, C135) and attenuator (R127, R128). The signal is applied to the VCO switching circuit (D107).

(1) RECEIVING UHF BAND

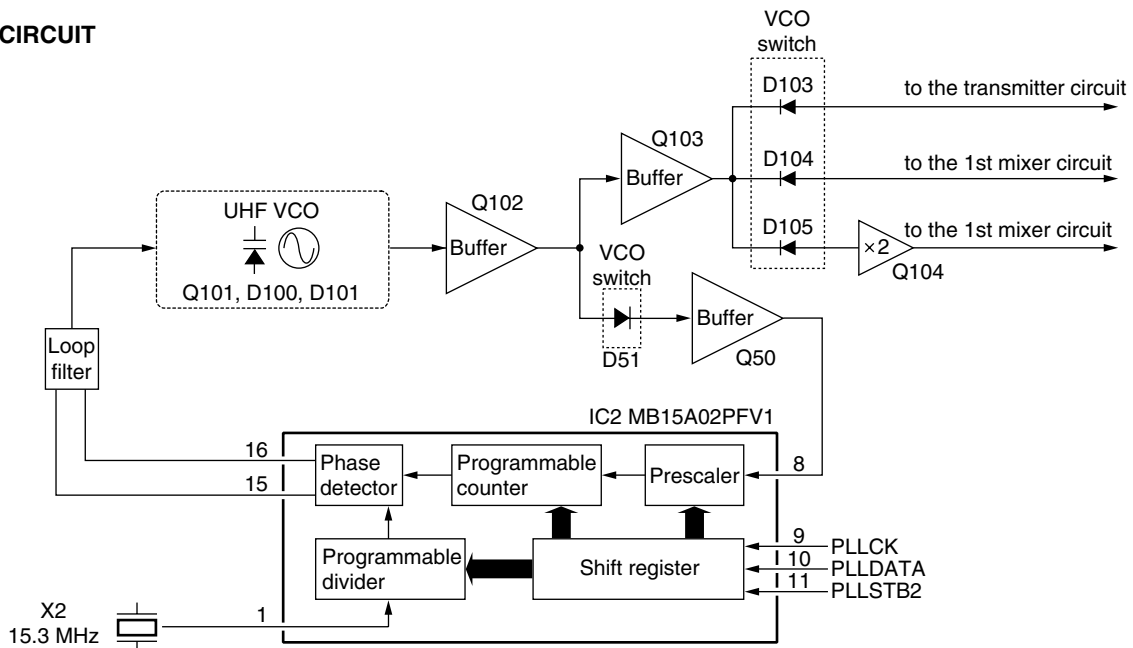
The signal is applied to the LO switching circuit (MAIN unit; D9) as “U_RXLO” signal, and is applied to the 1st mixer circuit (MAIN unit; Q35), then mixed with the 1st IF signal.

(2) RECEIVING 800 MHz BAND

The signal is applied to the LO switching circuit (MAIN unit; D10) as “U_RXLO” signal, and is applied to the 1st mixer circuit (MAIN unit; IC12, pin 6), then mixed with the 1st IF signal.

A portion of the RF signal from the buffer amplifier (Q102) is amplified at the buffer amplifier (Q50) via the VCO switching circuit (D51), and is then fed back to the PLL IC (MAIN unit; IC1, pin 8) as the comparison signal.

• UHF PLL CIRCUIT



4-4 OTHER CIRCUITS

4-4-1 SUB-CPU RESET CIRCUIT (CONTROL UNIT)

IC2 is the reset voltage detecting circuit. The output voltage from the +5 regulator circuit (IC5) is applied to the VDD terminal (IC2, pin 2). IC2 outputs "H" (high) signal to the sub-CPU (IC6, pin 15) when the VDD terminal's voltage is higher than detecting voltage. IC6 employs the 8-bit CPU.

4-4-2 LCD DISPLAY CIRCUIT (CONTROL UNIT)

The transceiver's LCD display employs 1/4 duty custom LCD which displays frequency, S-meter, TX power level, etc. The LCD display is controlled by the sub-CPU (IC6, pins 41-78) directly.

4-4-3 LCD AND KEY BACK LIGHT CIRCUIT (CONTROL UNIT)

The sub-CPU (IC6) outputs +8 regulator circuit (Q1, Q3, D5) control signal from pin 2. The voltage from +8 regulator circuit is applied to the key back light circuit (DS13-DS18, DS20, DS23) and LCD back light circuit (DS22).

The back light color is also controlled by the sub-CPU via the color control circuit (Q6, Q7). The back light has 3 colors (Umber, Green and Yellow).

4-5 POWER SUPPLY CIRCUITS

4-5-1 CONTROL UNIT VOLTAGE LINES

Line	Description
8V	Common 8 V converted from the HV line by the +8 regulator circuit (Q1, Q3, D5). The output voltage is applied to the LCD back light (DS22) and key back light (DS13-DS18, DS20, DS21, DS23) circuits.
CPU5V	Common 5 V converted from the HV line by the +5 regulator circuit (IC5, D4). The output voltage is applied to the reset circuit (IC2) and buffer amplifier (Q2).

4-5-2 MAIN UNIT VOLTAGE LINES

Line	Description
HV	The voltage from the external power supply via the W501 (OPC-465).
VCC	The same voltage as the HV line which is controlled by the VCC regulator circuit (Q501). The circuit is controlled by the power switch controller (Q502).
8V	Common 8 V converted from the VCC line by the +8 regulator circuit (IC504).
VT8	Transmit 8 V for VHF band which is the same voltage as the 8V line controlled by the VT8 regulator circuit (Q19, Q22) using the "VTXC" line.
UT8	Transmit 8 V for UHF band which is the same voltage as the 8V line controlled by the UT8 regulator circuit (Q20, Q23) using the "UTXC" line.
5V	Common 5 V converted from the HV line by the +5 regulator circuit (IC503).
5VS	Common 5 V converted from the 5V line by the +5 regulator circuit(Q503, D504). The circuit is controlled by the power switch controller (Q502).
VCO8	Common 8 V converted from the 8 V line by the +8 regulator circuit (Q4).
V_VCO8	Common 8 V line which is selected by the SEL_SW circuit (Q6, Q8). The voltage is applied to the VHF VCO (VCO board; Q3, D1, D2) and buffer amplifiers (VCO board; Q4, Q5).
U_VCO8	Common 8 V line which is selected by the SEL_SW circuit (Q6, Q8). The voltage is applied to the UHF VCO (VCO board; Q101, D100, D101) and buffer amplifiers (VCO board; Q102, Q103).
R5	Receive 5 V line converted from the 5VS line by the R5 regulator circuit (Q24). The circuit is controlled by the "R5CTRL" signal from the CPU (IC505, pin 78).
AM5	Receive 5 V line for AM circuit converted from the 5VS line by the AM5 regulator circuit (Q25). The circuit is controlled by the "AM" signal from the CPU (IC505, pin 69).
VHF_R5	Receive 5 V line for VHF circuit converted from the 5VS line by the VHF_R5 regulator circuit (Q26). The circuit is controlled by the "RXVHF" signal from the CPU (IC505, pin 73).
UHF_R5	Receive 5 V line for UHF circuit converted from the 5VS line by the UHF_R5 regulator circuit (Q27). The circuit is controlled by the "RXUHF" signal from the CPU (IC505, pin 74).
400_R5	Receive 5 V line for 400 MHz circuit converted from the 5VS line by the 400_R5 regulator circuit (Q28). The circuit is controlled by the "RX400" signal from the CPU (IC505, pin 67).
800_R5	Receive 5 V line for 800 MHz circuit converted from the 5VS line by the 800_R5 regulator circuit (Q29). The circuit is controlled by the "RX800" signal from the CPU (IC505, pin 66).

4-6 PORT ALLOCATIONS

4-6-1 MAIN CPU PORT ALLOCATIONS (MAIN UNIT; IC505)

Pin number	Port name	Description
16	TX_MUTE	Outputs the transmit mute signal. High : While transmit is muting.
17	MIC_PTT	Input port for the microphone PTT signal. High : While PTT switch is pushed.
20	UTXC	Outputs the UHF transmitting power supply circuit control signal. High : While transmitting (400–479 MHz)
21	VTXC	Outputs the VHF transmitting power supply circuit control signal. High : While transmitting (136–174 MHz)
22	DTCS_SEL	Outputs the DTCS filter select signal. High : While the DTCS signal is transmitting.
24	ES_DATA	I/O port for the serial data to the EEPROM (IC501, pin 5).
25	ES_CK	Outputs the clock signal to the EEPROM (IC501, pin 6).
26	P-PTT	Input port for the packet [PTT] switch. Low : While the packet [PTT] switch is ON
27	P_MOD_MUTE	Outputs the packet modulation muting signal. Low : While muting.
28	98_DATA	Input port for the HM-98's data signal.
31	MIC_SEL	Input port for the connecting microphone detect signal. Low : While the HM-98 is connected.
38	SQL	Input port for the squelch level signal.
40	RSSI	Input port for the RSSI signal from the FM IF IC (IC8, pin 12) to detect receiving signal strength.
41	TEMP	Input port for the transceiver's internal temperature signal.
42	WXALT	Input port for the WX alert (1050 Hz) signal.
44	DTMF	Outputs DTMF, E-TONE and BEEP signals.
45	DTCS	Outputs CTCSS and DTCS signals.
47	P_SQL	Outputs the packet squelch control signal. High : While the squelch is opened.
48	FAN_CTRL	Outputs the cooling fan control signal. High : While the cooling fan is worked.
49	CLONE_OUT	Outputs the cloning signal.

(MAIN unit; IC505)–Continued

Pin number	Port name	Description
50	CLONE_IN	Input port for the cloning signal.
51	DA_DATA	Outputs the data signal to the D/A CONVERTER (IC11, pin 17).
52	DA_CK	Outputs the clock signal to the D/A CONVERTER (IC11, pin 16).
53	DA_STB	Outputs the strobe signal to the D/A CONVERTER (IC1, pin 15).
55	AF_MUTE	Outputs the AF mute control signal. High : While AF signal is muting.
56	PLLSTB2	Outputs the strobe signal to the UHF PLL IC (IC2, pin 11)
57	PLLSTB1	Outputs the strobe signal to the VHF PLL IC (IC1, pin 11)
58	DET_MUTE	Outputs the detector circuit mute signal. High : While the detector circuit is muting.
62	MIC_SENS	Outputs microphone sensitivity control signal. High : The sensitivity is high.
63	U_VCO	Outputs the UHF VCO control signal. High : The VCO circuit oscillates 320–999.99 MHz signal.
65	1200_9600SEL	Outputs packet baud rate select signal. Low : 9600 bps is selected.
66	RX800	Outputs the 800_R5 regulator (Q29) control signal. High : While receiving 630–999 MHz.
67	RX400	Outputs the 400_R5 regulator (Q28) control signal. High : While receiving 230–630 MHz.
72	RXUHF	Outputs the UHF_R5 regulator (Q27) control signal. High : While receiving 430–450 MHz.
73	RXVHF	Outputs the VHF_R5 regulator (Q26) control signal. High : While receiving 118–174 MHz.
74	MMUTE	Outputs modulation mute control signal to the VCO circuits. High : While modulation is muting.
77	MIC_MUTE	Outputs the microphone muting control signal. Low : While the microphone is muted.
78	R5CTRL	Outputs the R5 regulator (Q24) control signal. Low : While receiving.

(MAIN unit; IC505)–Continued

Pin number	Port name	Description
79	VCO_SHIFT	Outputs the VCO circuit select signal. High : The VCO circuit oscillates 203.95–263.945 MHz signal.
81	V_VCO	Outputs the VHF VCO select signal. High : The VHF VCO's power supply (Q6, Q8) is ON.
83	PLLSW	Outputs the PLL loop control signal.
84	UNLK	Input port for the PLL unlock signal. High : While the loop is unlocked.
86–89	MATRIX_IN1–IN4	Input ports for the initial matrix signals.
90	PLLDATA	Outputs the PLL data signal to the PLL ICs (IC1, IC2).
91	PLLCK	Outputs the PLL clock signal to the PLL ICs (IC1, IC2).
93–96	OUT1–OUT4	Output the initial matrix strobe signals
99	WN_SEL	Outputs the wide/narrow FM select signal. Low : While selected narrow FM.

4-6-2 D/A CONVERTER IC PORT ALLOCATIONS (MAIN UNIT; IC11)

Pin number	Port name	Description
2–4	TUNE_V1–V3	Output the VHF bandpass filter tracking signals.
5	TUNE_U	Outputs the UHF bandpass filter tracking signal.
6	ATT	Outputs the receiving attenuator control signal.
7	BSHIFT	Outputs the bandpass filter shift control signal. Low : While receiving 450–629.995 MHz.
8	PCON_V	Outputs the VHF output power control signal.
9	PCON_U	Outputs the UHF output power control signal.
12	TUNE_8	Outputs the 800 MHz bandpass filter tracking signal.
13	REF_CON	Outputs the reference frequency control signal.
18	REF_V	Outputs the excess current detecting signal.

4-6-3 FRONT CPU PORT ALLOCATIONS (CONTROL UNIT; IC6)

Pin number	Port name	Description
1	BAND	Input port for the [BAND] key. Low : The [BAND] key is pushed.
3	A_LED	Outputs the amber LED control signal. High : The LED lights ON.
4	SMW	Input port for the [S.MW] key. Low : The [S.MW] key is pushed.
5	TONE	Input port for the [TONE] key. Low : The [TONE] key is pushed.
6	LOW	Input port for the [LOW] key. Low : The [LOW] key is pushed.
7	MONI	Input port for the [MONI] key. Low : The [MONI] key is pushed.
8	SET	Input port for the [SET] key. Low : The [SET] key is pushed.
24	M/CALL	Input port for the [M/CALL] key Low : The [M/CALL] key is pushed.
25	VMHz	Input port for the [V/MHz] key. Low : The [V/MHz] key is pushed.
30	DIAL_A	Input port for the main dial's A phase signal.
31	DIAL_B	Input port for the main dial's B phase signal.
39–42	COM4–COM1	Output the common signals to the LCD (DS1).
43–78	SEG1–SEG36	Output the segment signals to the LCD (DS1).
83	G_LED	Outputs the green LED control signal. High : The LED lights ON.
86	PWR	Input port for the [PWR] key. Low : The [PWR] key is pushed.
88	VOL	Input port for the [VOL] controller.
89	SQL	Input port for the [SQL] controller.

SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

Need to enter the adjustment mode, and the JIG cable as shown the page 5-2 is required when adjusting the IC-208H.

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GREDE AND RANGE	EQUIPMENT	GREDE AND RENGE
DC power supply	Output voltage : 13.8 V DC Current capacity : 12 A or more	FM deviation meter	Frequency range : 0–600 MHz Measuring range : 0 to ±5 kHz
RF power meter (terminated type)	Measuring range : 0.1–100 W Frequency range : 1.8–600 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Oscilloscope	Frequency range : DC–600 MHz Measuring range : 0.01–10 V
Frequency counter	Frequency range : 0.1–600 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Audio generator	Frequency range : 300–3000 Hz Measuring range : 1–500 mV
Standard signal generator (SSG)	Frequency range : 0.1–1200 MHz Output level : 0.1 μV–32 mV (–127 to –17 dBm)	Attenuator	Power attenuation : 50 or 60 dB Capacity : 150 W or more

■ ENTERING THE ADJUSTMENT MODE

- ① Turn the transceiver's power OFF.
- ② Connect the JIG cable to the [MIC] jack.
- ③ Push and hold the [SET] and [BAND] keys, and then turn power ON.

NOTE: Exiting from the adjustment mode when the transceiver's power is OFF.

■ OPERATING ON THE ADJUSTMENT MODE

- Change the adjustment value : [DIAL]
- Verifying the adjustment value : [M/CALL] key
- Forward the adjustment item : [SET/LOCK] key
- Go back the adjustment item : [S.MW/MW] key
- Store the adjustment value in the memory : [BAND] key

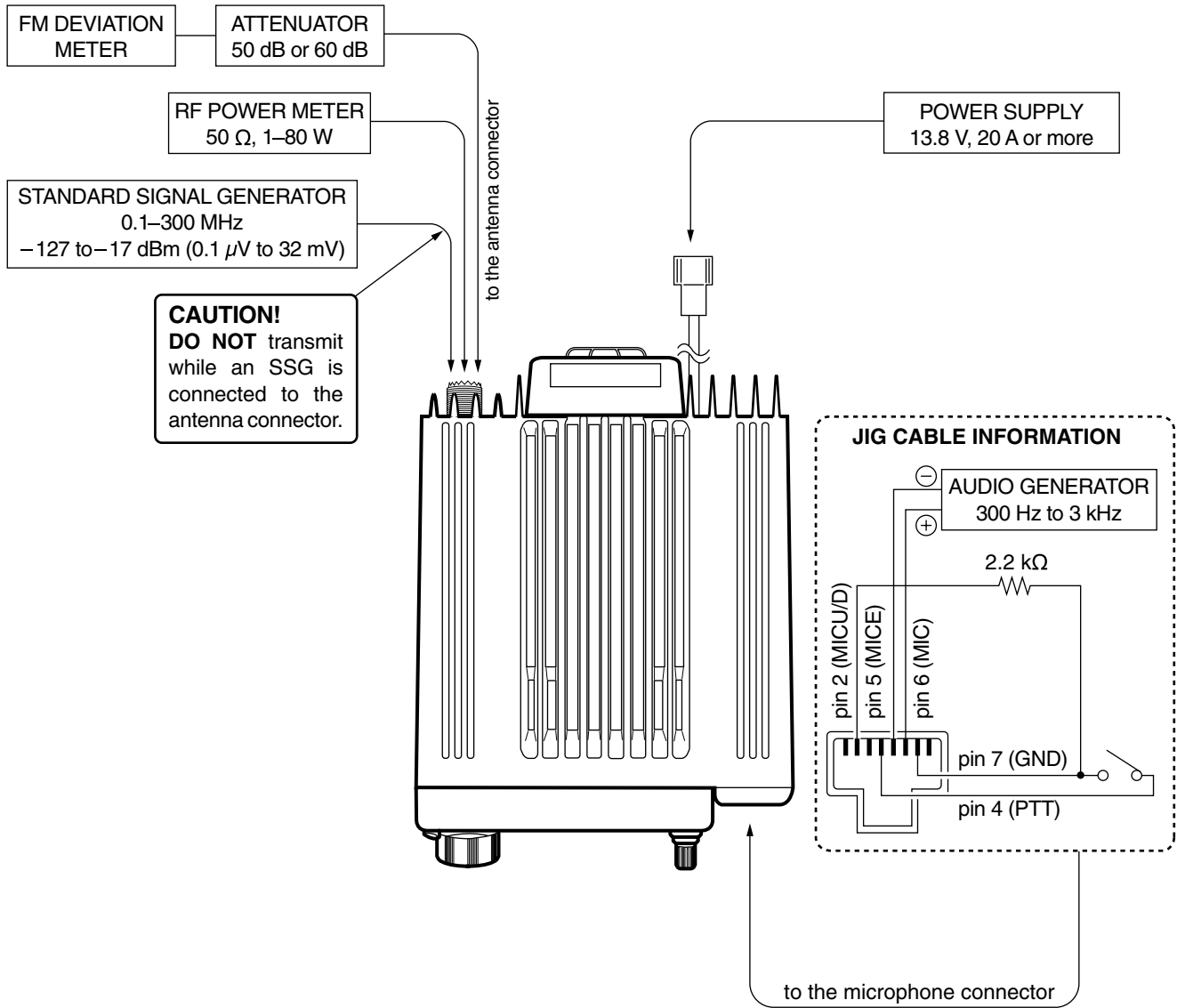
CAUTION: Need to push the [BAND] key when storing the adjustment value in the memory. Otherwise, the transceiver is not adjusted properly.

ATTENTION!: DO NOT adjust following adjusment items (Because they are adjusted automatically when other adjustment items are adjusted). Otherwise, the transceiver do not work properly. Refer to the next page in detail.

DISPLAY	ADJUSTMENT ITEMS
[Fr1]–[Fr8]	Reference frequency's temp. correction
[rE–], [rE+]	Reference voltage
[PT]	Protect time
[PCV], [PCU]	Protect temperature
[FT]	Cooling fan temperature
[DTA], [DTB]	DTCS wave form
[DT], [CT]	DTCS/CTCSS amplitude
[SL]	*S-Meter
[SqW]	*Squelch level (Wide)
[SqN]	*Squelch level (Narrow)

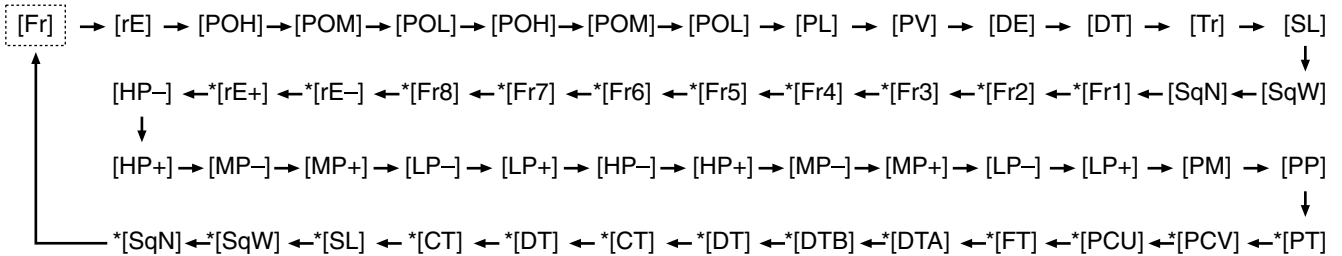
NOTE: *Need to adjust about manually adjustment items.

■ CONNECTIONS



• ADJUSTMENT ITEM EXPLANATION

Starting item



DISPLAY	ADJUSTMENT ITEMS	DISPLAY	ADJUSTMENT ITEMS
[Fr]	Reference frequency	*[rE-], *[rE+]	Reference voltage
[rF]	Reference voltage	[HP-], [HP+], [MP-], [MP+], [LP-], [LP+]	Temperature correction
[POH], [POM], [POL]	VHF/UHF output power	[PM]	Protect scale
[PL]	Transmit minimum voltage	[PP]	Protect power
[PV]	Protect voltage	*[PT]	Protect time
[DE]	Frequency deviation	*[PCV], *[PCU]	Protect temperature
[DT]	DTCS wave form	*[FT]	Cooling fan temperature
[Tr]	Tracking	*[DTA], *[DTB]	DTCS wave form
[SL]	S-Meter	*[DT], *[CT]	DTCS/CTCSS amplitude
[SqW]	Squelch level (Wide)	*[SL]	S-Meter
[SqN]	Squelch level (Narrow)	*[SqW]	Squelch level (Wide)
*[Fr1], *[Fr2], *[Fr3], *[Fr4], *[Fr5], *[Fr6], *[Fr7], *[Fr8]	Reference frequency's temperature correction	*[SqN]	Squelch level (Narrow)

*Not adjust items

5-2 SOFTWARE ADJUSTMENTS (TRANSMITTING)

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION
REFERENCE FREQUENCY [Fr]	1 <ul style="list-style-type: none"> Operating frequency : 445.0 MHz Loosely couple a frequency counter to the antenna connector on the rear panel. Transmitting 	<ul style="list-style-type: none"> Turn the [DIAL] to set to 445.0000 MHz. Push the [BAND] key.
REFERENCE VOLTAGE [rE]	1 <ul style="list-style-type: none"> Operating frequency : 445.0 MHz Receiving 	<ul style="list-style-type: none"> Push the [BAND] key.
VHF OUTPUT POWER (High) [POH]	1 <ul style="list-style-type: none"> Operating frequency : 146.0 MHz Connect an RF power meter to the antenna connector. Transmitting 	<ul style="list-style-type: none"> Turn the [DIAL] to set the VHF high power to 55 W. Push the [BAND] key.
(Middle) [POM]	2 <ul style="list-style-type: none"> Transmitting 	<ul style="list-style-type: none"> Turn the [DIAL] to set the VHF middle power to 15 W. Push the [BAND] key.
(Low) [POL]	3 <ul style="list-style-type: none"> Transmitting 	<ul style="list-style-type: none"> Turn the [DIAL] to set the VHF low power to 5 W. Push the [BAND] key.
UHF OUTPUT POWER (High) [POH]	1 <ul style="list-style-type: none"> Operating frequency : 445.0 MHz Connect an RF power meter to the antenna connector. Transmitting 	<ul style="list-style-type: none"> Turn the [DIAL] to set the UHF high power to 50 W. Push the [BAND] key.
(Middle) [POM]	2 <ul style="list-style-type: none"> Transmitting 	<ul style="list-style-type: none"> Turn the [DIAL] to set the UHF middle power to 15 W. Push the [BAND] key.
(Low) [POL]	3 <ul style="list-style-type: none"> Transmitting 	<ul style="list-style-type: none"> Turn the [DIAL] to set the UHF low power to 5 W. Push the [BAND] key.
TRANSMIT MINIMUM VOLTAGE [PL]	1 <ul style="list-style-type: none"> Operating frequency : 440.0 MHz Connect an RF power meter to the antenna connector. Transmitting 	<ul style="list-style-type: none"> Turn the [DIAL] to set to 1 W. Push the [BAND] key.
	2 <ul style="list-style-type: none"> Operating frequency : 445.0 MHz Transmitting 	<ul style="list-style-type: none"> Turn the [DIAL] to set to 1 W. Push the [BAND] key.
	3 <ul style="list-style-type: none"> Operating frequency : 450.0 MHz Transmitting 	<ul style="list-style-type: none"> Turn the [DIAL] to set to 1 W. Push the [BAND] key.
PROTECT VOLTAGE [PV]	1 <ul style="list-style-type: none"> Operating frequency : 146.0 MHz [High]/[Middle]/[Low] switch : High Connect an RF power meter to the antenna connector. Transmitting 	<ul style="list-style-type: none"> Push the [BAND] key.
	2 <ul style="list-style-type: none"> Operating frequency : 445.0 MHz Transmitting 	<ul style="list-style-type: none"> Push the [BAND] key.

SOFTWARE ADJUSTMENTS (TRANSMITTING AND RECEIVING)–Continued

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION
FREQUENCY DEVIATION (VHF band) [DE]	1 <ul style="list-style-type: none"> • Operating frequency : 144.0 MHz • Connect an audio generator to the [MIC] jack and set as : +20 dB • Connect an FM deviation meter to the antenna connector and set as : <ul style="list-style-type: none"> HPF : 50 Hz LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • Transmitting 	<ul style="list-style-type: none"> • Turn the [DIAL] to set to ± 4.6 kHz. • Push the [BAND] key.
	2 <ul style="list-style-type: none"> • Operating frequency : 148.0 MHz • Transmitting 	<ul style="list-style-type: none"> • Turn the [DIAL] to set to ± 4.6 kHz. • Push the [BAND] key.
(UHF band) [DE]	3 <ul style="list-style-type: none"> • Operating frequency : 440.0 MHz • Transmitting 	<ul style="list-style-type: none"> • Turn the [DIAL] to set to ± 4.6 kHz. • Push the [BAND] key.
	4 <ul style="list-style-type: none"> • Operating frequency : 450.0 MHz • Transmitting 	<ul style="list-style-type: none"> • Turn the [DIAL] to set to ± 4.6 kHz. • Push the [BAND] key.
DTCS WAVE FORM (VHF band) [DE]	1 <ul style="list-style-type: none"> • Operating frequency : 146.0 MHz • No audio signal is applied to the [MIC] jack. • DTCS code : 007 • Set an FM deviation meter as: <ul style="list-style-type: none"> HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2 • Transmitting 	<ul style="list-style-type: none"> • Turn the [DIAL] to set to flat wave form as shown below. • Push the [BAND] key. <div style="text-align: center;"> <p>Set to flat wave form</p> </div>
(UHF band) [DE]	2 <ul style="list-style-type: none"> • Operating frequency : 445.0 MHz • Transmitting 	<ul style="list-style-type: none"> • Turn the [DIAL] to set to flat wave form as same as VHF band. • Push the [BAND] key.
TRACKING (Low band) [Tr]	1 <ul style="list-style-type: none"> • Operating frequency : 118.1 MHz • Connect an SSG to the antenna connector and set as <ul style="list-style-type: none"> Level : 1 μV* (-107 dBm) Modulation : 1 kHz Deviation : ± 3.5 kHz • Receiving 	<ul style="list-style-type: none"> • Push the [BAND] key.
	2 <ul style="list-style-type: none"> • Operating frequency : 146.1 MHz • Receiving 	<ul style="list-style-type: none"> • Push the [BAND] key.
	3 <ul style="list-style-type: none"> • Operating frequency : 160.1 MHz • Receiving 	<ul style="list-style-type: none"> • Push the [BAND] key.
	4 <ul style="list-style-type: none"> • Operating frequency : 173.9 MHz • Receiving 	<ul style="list-style-type: none"> • Push the [BAND] key.
(Middle1 band) [Tr]	5 <ul style="list-style-type: none"> • Operating frequency : 230.1 MHz • Connect an SSG to the antenna connector and set as <ul style="list-style-type: none"> Level : 1 μV* (-107 dBm) Modulation : 1 kHz Deviation : ± 3.5 kHz • Receiving 	<ul style="list-style-type: none"> • Push the [BAND] key.
	6 <ul style="list-style-type: none"> • Operating frequency : 260.1 MHz • Receiving 	<ul style="list-style-type: none"> • Push the [BAND] key.
	7 <ul style="list-style-type: none"> • Operating frequency : 380.1 MHz • Receiving 	<ul style="list-style-type: none"> • Push the [BAND] key.
	8 <ul style="list-style-type: none"> • Operating frequency : 399.9 MHz • Receiving 	<ul style="list-style-type: none"> • Push the [BAND] key.

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

SOFTWARE ADJUSTMENT (RECEIVING)–Continued

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION
TRACKING (Middle2 band) [Tr]	9 <ul style="list-style-type: none"> • Operating frequency : 400.1 MHz • Connect an SSG to the antenna connector and set as <ul style="list-style-type: none"> Level : 1 μV* (–107 dBm) Modulation : 1 kHz Deviation : \pm 3.5 kHz • Receiving 	• Push the [BAND] key.
	10 <ul style="list-style-type: none"> • Operating frequency : 429.9 MHz • Receiving 	• Push the [BAND] key.
	11 <ul style="list-style-type: none"> • Operating frequency : 480.1 MHz • Receiving 	• Push the [BAND] key.
	12 <ul style="list-style-type: none"> • Operating frequency : 549.9 MHz • Receiving 	• Push the [BAND] key.
(High band) [Tr]	13 <ul style="list-style-type: none"> • Operating frequency : 810.1 MHz • Connect an SSG to the antenna connector and set as <ul style="list-style-type: none"> Level : 1 μV* (–107 dBm) Modulation : 1 kHz Deviation : \pm 3.5 kHz • Receiving 	• Push the [BAND] key.
	14 <ul style="list-style-type: none"> • Operating frequency : 905.1 MHz • Receiving 	• Push the [BAND] key.
	15 <ul style="list-style-type: none"> • Operating frequency : 999.9 MHz • Receiving 	• Push the [BAND] key.
S-METER [SL]	1 <ul style="list-style-type: none"> • Operating frequency : 146.1 MHz • Connect an SSG to the antenna connector and set as <ul style="list-style-type: none"> Level : 1 μV* (–107 dBm) Modulation : 1 kHz Deviation : \pm 3.5 kHz • Receiving 	• Push the [BAND] key.
	2 <ul style="list-style-type: none"> • Operating frequency : 445.1 MHz • Receiving 	• Push the [BAND] key.
	3 <ul style="list-style-type: none"> • Operating frequency : 435.9 MHz • Receiving 	• Push the [BAND] key.
	4 <ul style="list-style-type: none"> • Operating frequency : 810.1 MHz • Set an SSG as <ul style="list-style-type: none"> Level : 5.6 μV* (–92 dBm) Modulation : 1 kHz Deviation : \pm 3.5 kHz • Receiving 	• Push the [BAND] key.

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

SOFTWARE ADJUSTMENT (RECEIVING)–Continued

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION
SQUELCH LEVEL (Wide) [SqW]	1 <ul style="list-style-type: none"> • Operating frequency : 146.1 MHz • Connect an SSG to the antenna connector and set as <ul style="list-style-type: none"> Level : 0.079 μV* (–129 dBm) Modulation : 1 kHz Deviation : \pm 3.5 kHz • Receiving 	• Push the [BAND] key.
	2 <ul style="list-style-type: none"> • Operating frequency : 445.1 MHz • Receiving 	• Push the [BAND] key.
	3 <ul style="list-style-type: none"> • Operating frequency : 435.1 MHz • Set an SSG as: <ul style="list-style-type: none"> Level : 0.1 μV* (–127 dBm) • Receiving 	• Push the [BAND] key.
	4 <ul style="list-style-type: none"> • Operating frequency : 810.1 MHz • Set an SSG as: <ul style="list-style-type: none"> Level : 0.25 μV* (–119 dBm) • Receiving 	• Push the [BAND] key.
(Narrow) [SqN]	5 <ul style="list-style-type: none"> • Operating frequency : 146.1 MHz • Connect an SSG to the antenna connector and set as <ul style="list-style-type: none"> Level : 0.071 μV* (–130 dBm) Modulation : 1 kHz Deviation : \pm 3.5 kHz • Receiving 	• Push the [BAND] key.
	6 <ul style="list-style-type: none"> • Operating frequency : 445.1 MHz • Receiving 	• Push the [BAND] key.
	7 <ul style="list-style-type: none"> • Operating frequency : 435.1 MHz • Set an SSG as: <ul style="list-style-type: none"> Level : 0.1 μV* (–127 dBm) • Receiving 	• Push the [BAND] key.
	8 <ul style="list-style-type: none"> • Operating frequency : 810.1 MHz • Set an SSG as: <ul style="list-style-type: none"> Level : 0.25 μV* (–119 dBm) • Receiving 	• Push the [BAND] key.
TEMP. CORRECTION <High power> (VHF –10°C) [HP–]	1 <ul style="list-style-type: none"> • Operating frequency : 146.0 MHz • Receiving 	• Turn the [DIAL] to set to “F9” on the display. • Push the [BAND] key.
(VHF +60°C) [HP–]	2 <ul style="list-style-type: none"> • Operating frequency : 146.0 MHz • Receiving 	• Turn the [DIAL] to set to “F9” on the display. • Push the [BAND] key.
<Mid. power> (VHF –10°C) [MP–]	3 <ul style="list-style-type: none"> • Operating frequency : 146.0 MHz • Receiving 	• Turn the [DIAL] to set to “F9” on the display. • Push the [BAND] key.
(VHF +60°C) [MP–]	4 <ul style="list-style-type: none"> • Operating frequency : 146.0 MHz • Receiving 	• Turn the [DIAL] to set to “F9” on the display. • Push the [BAND] key.
<Low power> (VHF –10°C) [LP–]	5 <ul style="list-style-type: none"> • Operating frequency : 146.0 MHz • Receiving 	• Turn the [DIAL] to set to “F9” on the display. • Push the [BAND] key.
(VHF +60°C) [LP–]	6 <ul style="list-style-type: none"> • Operating frequency : 146.0 MHz • Receiving 	• Turn the [DIAL] to set to “F9” on the display. • Push the [BAND] key.

SOFTWARE ADJUSTMENT (RECEIVING)–Continued

ADJUSTMENT		ADJUSTMENT CONDITION	OPERATION
TEMP. CORRECTION <High power> (UHF –10°C) [HP–]	1	• Operating frequency : 445.0 MHz • Receiving	• Turn the [DIAL] to set to “F9” on the display. • Push the [BAND] key.
(UHF +60°C) [HP–]	2	• Operating frequency : 445.0 MHz • Receiving	• Turn the [DIAL] to set to “07” on the display. • Push the [BAND] key.
<Mid. power> (UHF –10°C) [MP–]	3	• Operating frequency : 445.0 MHz • Receiving	• Turn the [DIAL] to set to “00” on the display. • Push the [BAND] key.
(UHF +60°C) [MP–]	4	• Operating frequency : 445.0 MHz • Receiving	• Turn the [DIAL] to set to “00” on the display. • Push the [BAND] key.
<Low power> (UHF –10°C) [LP–]	5	• Operating frequency : 445.0 MHz • Receiving	• Turn the [DIAL] to set to “00” on the display. • Push the [BAND] key.
(UHF +60°C) [LP–]	6	• Operating frequency : 445.0 MHz • Receiving	• Turn the [DIAL] to set to “00” on the display. • Push the [BAND] key.
PROTECT SCALE (VHF) [PM]	1	• Operating frequency : 146.0 MHz • Receiving	• Turn the [DIAL] to set to 130 % on the display. • Push the [BAND] key.
(UHF) [PM]	2	• Operating frequency : 445.0 MHz • Receiving	• Turn the [DIAL] to set to 140 % on the display. • Push the [BAND] key.
PROTECT POWER (VHF) [PP]	1	• Operating frequency : 146.0 MHz • Receiving	• Turn the [DIAL] to set to 5 W on the display. • Push the [BAND] key.
(UHF) [PP]	2	• Operating frequency : 445.0 MHz • Receiving	• Turn the [DIAL] to set to 5 W on the display. • Push the [BAND] key.

SECTION 6 PARTS LIST

[CONTROL UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
IC2	1110005780	S.IC	S-80945CLMC-G7F-T2	B
IC5	1180000420	S.IC	TA78L05F (TE12R)	B
IC6	1140011370	S.IC	HD6433842RD36H (FX2633D)	B
Q1	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)	B
Q2	1590001650	S.TRANSISTOR	XP4601 (TX)	B
Q3	1510000690	S.TRANSISTOR	2SA1734 (TE12R)	B
Q6	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)	B
Q7	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)	B
D4	1790001000	S.ZENER	MA8062-L (TX)	B
D5	1790001170	S.ZENER	MA8068-M (TX)	B
X1	6060000610	S.CERAMIC	EFOS4914E3	B
R1	7210002920	VARIABLE	EVU-F2AF20B55 (560K)	T
R2	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R5	7210002920	VARIABLE	EVU-F2AF20B55 (560K)	T
R6	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R9	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	B
R11	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	B
R13	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	B
R14	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	B
R21	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R22	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)	B
R23	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	B
R24	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	B
R25	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	B
R26	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	B
R28	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	B
R29	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	B
R41	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)	B
R42	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	B
R43	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	B
R44	7030001120	S.RESISTOR	MCR50JZHJ 82 Ω (820)	B
R58	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R59	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R60	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	B
R61	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	B
R65	7030000360	S.RESISTOR	MCR10EZHZJ 680 Ω (681)	B
R74	7030000360	S.RESISTOR	MCR10EZHZJ 680 Ω (681)	B
R75	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	B
R76	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	B
R77	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)	B
R79	7030000380	S.RESISTOR	MCR10EZHZJ 1 kΩ	B
R80	7030000380	S.RESISTOR	MCR10EZHZJ 1 kΩ	B
R81	7030000360	S.RESISTOR	MCR10EZHZJ 680 Ω (681)	B
R82	7030000360	S.RESISTOR	MCR10EZHZJ 680 Ω (681)	B
R84	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	B
C1	4030006880	S.CERAMIC	C1608 JB 1H 472K-T	B
C3	4030006880	S.CERAMIC	C1608 JB 1H 472K-T	B
C5	4030007130	S.CERAMIC	C1608 CH 1H 101J-T	B
C7	4030007130	S.CERAMIC	C1608 CH 1H 101J-T	B
C8	4030007130	S.CERAMIC	C1608 CH 1H 101J-T	B
C10	4030007130	S.CERAMIC	C1608 CH 1H 101J-T	B
C25	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C26	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	B
C27	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C29	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C30	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C31	4030007090	S.CERAMIC	C1608 CH 1H 470J-T	B
C34	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	B
C35	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C36	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C37	4030011600	S.CERAMIC	C1608 JB 1E 104K-T	B
C46	4510007310	S.ELECTROLYTIC	16 CV 10 BS	B
C49	4030006900	S.CERAMIC	C1608 JB 1H 103K-T	B
C50	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C51	4510007310	S.ELECTROLYTIC	16 CV 10 BS	B

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

[CONTROL UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
J3	6510023680	CONNECTOR	2633 FRONT CONNECTOR	B
DS1	5030002580	LCD	L2-0736TAY	T
DS13	5040002930	S.LED	SML-512MW T86P	T
DS14	5040002930	S.LED	SML-512MW T86P	T
DS15	5040002930	S.LED	SML-512MW T86P	T
DS16	5040002930	S.LED	SML-512MW T86P	T
DS17	5040002930	S.LED	SML-512MW T86P	T
DS18	5040002930	S.LED	SML-512MW T86P	T
DS20	5040002930	S.LED	SML-512MW T86P	T
DS21	5040002910	S.LED	SML-020MYT	T
DS22	5040002920	LED	CV1074	T
DS23	5040002930	S.LED	SML-512MW T86P	B
S1	2240000150	SWITCH	JRS0000-1401	T
S3	2260001890	S.SWITCH	SKQDPA	T
S4	2260001890	S.SWITCH	SKQDPA	T
S5	2260001890	S.SWITCH	SKQDPA	T
S6	2260001890	S.SWITCH	SKQDPA	T
S7	2260001890	S.SWITCH	SKQDPA	T
S8	2260001890	S.SWITCH	SKQDPA	T
S9	2260001890	S.SWITCH	SKQDPA	T
S10	2260001890	S.SWITCH	SKQDPA	T
S11	2260001890	S.SWITCH	SKQDPA	T
W1	7030000010	S.JUMPER	MCR10EZHZ JPW (000)	B
EP9	6910015120	S.BEAD	MMZ2012D 301BT	B
EP10	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP11	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP12	6910015120	S.BEAD	MMZ2012D 301BT	B
EP17	6910015120	S.BEAD	MMZ2012D 301BT	B
EP18	8930060040	LCD CONTACT	SRCN-2633-SP-N-W	T
EP19	0910056472	PCB	B 5945B	T

[VCO UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
Q1	1590003290	S.TRANSISTOR	UN9213J-(TX)	B
Q2	1590003300	S.TRANSISTOR	UN921NJ-(TX)	T
Q3	1530003580	S.TRANSISTOR	2SC5231C8-TL	T
Q4	1530003580	S.TRANSISTOR	2SC5231C8-TL	T
Q5	1530003580	S.TRANSISTOR	2SC5231C8-TL	T
Q50	1530002560	S.TRANSISTOR	2SC4403-3-TL	T
Q100	1590003290	S.TRANSISTOR	UN9213J-(TX)	T
Q101	1530003580	S.TRANSISTOR	2SC5231C8-TL	T
Q102	1530003580	S.TRANSISTOR	2SC5231C8-TL	T
Q103	1530003580	S.TRANSISTOR	2SC5231C8-TL	T
Q104	1530003580	S.TRANSISTOR	2SC5231C8-TL	T
Q105	1590003290	S.TRANSISTOR	UN9213J-(TX)	T
D1	1720000650	S.VARICAP	1SV286 (TPH3)	T
D2	1720000730	S.VARICAP	MA2S30400L	T
D3	1720000730	S.VARICAP	MA2S30400L	T
D4	1790001260	S.DIODE	MA2S077-(TX)	T
D5	1790001620	S.DIODE	1SV308 (TPL3)	T
D6	1790001260	S.DIODE	MA2S077-(TX)	T
D50	1790001260	S.DIODE	MA2S077-(TX)	T
D51	1790001260	S.DIODE	MA2S077-(TX)	T
D100	1720000650	S.VARICAP	1SV286 (TPH3)	T
D101	1750000720	S.VARICAP	HVC375BTRF	T
D102	1750000720	S.VARICAP	HVC375BTRF	T
D103	1790001620	S.DIODE	1SV308 (TPL3)	T
D104	1790001260	S.DIODE	MA2S077-(TX)	T
D105	1790001260	S.DIODE	MA2S077-(TX)	T

S.=Surface mount

[VCO UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
C124	4030006980	S.CERAMIC	C1608 CH 1H 070D-T	T
C125	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C126	4030006950	S.CERAMIC	C1608 CH 1H 040C-T	T
C127	4030009520	S.CERAMIC	C1608 CH 1H 020B-T	T
C128	4030007130	S.CERAMIC	C1608 CH 1H 101J-T	T
C129	4030009510	S.CERAMIC	C1608 CH 1H 010B-T	T
C130	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C131	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	B
C132	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T	T
C133	4030006950	S.CERAMIC	C1608 CH 1H 040C-T	T
C134	4030006860	S.CERAMIC	C1608 JB 1H 102K-T	T
C135	4030006950	S.CERAMIC	C1608 CH 1H 040C-T	T
C136	4550000540	S.TANTALUM	TESVA 1V 154M1-8L	B
C137	4550000530	S.TANTALUM	TESVA 1V 104M1-8L	B
C138	4030006930	S.CERAMIC	C1608 CH 1H 020C-T	B
J1	6910006810	CONNECTOR	IMSA-9210B-1-10Z204-T	B
J2	6910006810	CONNECTOR	IMSA-9210B-1-10Z204-T	B
W1	7030003860	S.JUMPER	ERJ3GE JPW V except [USA]	T
W2	7030003860	S.JUMPER	ERJ3GE JPW V except [USA]	B
EP1	0910056492	PCB	B 5947B	

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
Q15	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	B
Q16	1590001190	S.TRANSISTOR	XP6501-(TX) .AB	B
Q17	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	B
Q18	1530002920	S.TRANSISTOR	2SC4226-T1 R25	B
Q19	1590003290	S.TRANSISTOR	UN9213J-(TX)	T
Q20	1590003290	S.TRANSISTOR	UN9213J-(TX)	B
Q21	1590003290	S.TRANSISTOR	UN9213J-(TX)	T
Q22	1510000580	S.TRANSISTOR	2SA1362-GR (TE85R)	T
Q23	1510000580	S.TRANSISTOR	2SA1362-GR (TE85R)	B
Q24	1590003240	S.TRANSISTOR	UN9114J-(TX)	B
Q25	1590003260	S.TRANSISTOR	UN911NJ-(TX)	B
Q26	1590003240	S.TRANSISTOR	UN9114J-(TX)	B
Q27	1590003240	S.TRANSISTOR	UN9114J-(TX)	B
Q28	1590003240	S.TRANSISTOR	UN9114J-(TX)	B
Q29	1590003240	S.TRANSISTOR	UN9114J-(TX)	B
Q30	1530002680	S.TRANSISTOR	2SC3357-T1	B
Q31	1530003230	S.TRANSISTOR	2SC5085-Y (TE85R)	T
Q32	1580000760	S.FET	3SK299-T1 U73	T
Q33	1530002340	S.TRANSISTOR	2SC2954-T1	B
Q34	1530002680	S.TRANSISTOR	2SC3357-T1	T
Q35	1580000760	S.FET	3SK299-T1 U73	B
Q36	1530003260	S.TRANSISTOR	2SC5006-T1	T
Q37	1530003810	S.TRANSISTOR	2SC5008-T1	T
Q38	1580000760	S.FET	3SK299-T1 U73	T
Q39	1580000760	S.FET	3SK299-T1 U73	T
Q40	1530003810	S.TRANSISTOR	2SC5008-T1	T
Q41	1530003780	S.TRANSISTOR	2SC5624VH-TL	T
Q42	1590003230	S.TRANSISTOR	UN9113J-(TX)	T
Q43	1590003250	S.TRANSISTOR	UN9115J-(TX)	T
Q44	1530002060	S.TRANSISTOR	2SC4081 T106 R	T
Q45	1590003230	S.TRANSISTOR	UN9113J-(TX)	T
Q501	1520000270	S.TRANSISTOR	2SB1182 TL Q	T
Q502	1590003290	S.TRANSISTOR	UN9213J-(TX)	T
Q503	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)	T
Q504	1590001650	S.TRANSISTOR	XP4601 (TX)	B
Q505	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)	T
Q506	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	T
Q507	1590003230	S.TRANSISTOR	UN9113J-(TX)	T
Q508	1590003290	S.TRANSISTOR	UN9213J-(TX)	T
Q509	1590003290	S.TRANSISTOR	UN9213J-(TX)	T
Q510	1590003270	S.TRANSISTOR	UN9210J-(TX)	T
Q511	1590003290	S.TRANSISTOR	UN9213J-(TX)	T
Q512	1530003090	S.TRANSISTOR	2SC4213-B (TE85R)	T
Q513	1590003230	S.TRANSISTOR	UN9113J-(TX)	B
Q514	1590003290	S.TRANSISTOR	UN9213J-(TX)	B
Q515	1590003240	S.TRANSISTOR	UN9114J-(TX)	B
Q516	1590003290	S.TRANSISTOR	UN9213J-(TX)	B
D1	1750000770	S.VARICAP	HVC376BTRF	T
D2	1750000940	S.DIODE	ISS400 TE61	T
D3	1750000940	S.DIODE	ISS400 TE61	T
D4	1750000370	S.DIODE	DA221 TL	T
D5	1750000370	S.DIODE	DA221 TL	T
D6	1750000370	S.DIODE	DA221 TL	B
D7	1750000520	S.DIODE	DAN222TL	B
D8	1750000800	S.DIODE	HVC136TRF	T
D9	1750000800	S.DIODE	HVC136TRF	B
D10	1750000800	S.DIODE	HVC136TRF	T
D12	1750000520	S.DIODE	DAN222TL	T
D13	1750000550	S.DIODE	1SS355 TE-17	B
D14	1750000550	S.DIODE	1SS355 TE-17	T
D15	1750000800	S.DIODE	HVC136TRF	B
D16	1750000800	S.DIODE	HVC136TRF	T
D17	1750000800	S.DIODE	HVC136TRF	T
D18	1750000800	S.DIODE	HVC136TRF	T
D19	1790001240	S.DIODE	MA2S728-(TX)	T
D20	1790001240	S.DIODE	MA2S728-(TX)	T
D21	1790001240	S.DIODE	MA2S728-(TX)	T
D22	1750000710	S.VARICAP	HVC350BTRF	T
D23	1750000710	S.VARICAP	HVC350BTRF	T
D24	1790001260	S.DIODE	MA2S077-(TX)	T
D25	1750000610	S.VARICAP	MA2SV0500L	T
D26	1720000700	S.VARICAP	1SV305 (TPL3)	T
D27	1790000980	S.DIODE	MA742 (TX)	B
D28	1790000980	S.DIODE	MA742 (TX)	T
D29	1750000710	S.VARICAP	HVC350BTRF	T
D30	1750000610	S.VARICAP	MA2SV0500L	T
D31	1720000700	S.VARICAP	1SV305 (TPL3)	T
D32	1790001260	S.DIODE	MA2S077-(TX)	T
D33	1790000980	S.DIODE	MA742 (TX)	B

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
IC1	1140005990	S.IC	MB15A02PFV1-G-BND-ER	T
IC2	1140005990	S.IC	MB15A02PFV1-G-BND-ER	T
IC3	1110005340	S.IC	NJM12902V-TE1	B
IC4	1190000350	S.IC	M62363FP-650C	B
IC5	1130006220	S.IC	TC4W53FU (TE12L)	B
IC6	1130004200	S.IC	TC4S66F (TE85R)	T
IC7	1130004200	S.IC	TC4S66F (TE85R)	T
IC8	1110003200	S.IC	TA31136FN (EL)	B
IC9	1130006220	S.IC	TC4W53FU (TE12L)	T
IC10	1130006220	S.IC	TC4W53FU (TE12L)	T
IC11	1110004310	S.IC	M62352GP 75EC	T
IC12	1110005230	S.IC	μPC2757TB-E3	T
IC13	1150002160	IC	S-AV32 (I2)	B
IC14	1150002120	IC	S-AU82L (I)	B
IC15	1110004050	S.IC	NJM3404AV-TE1	T
IC501	1140009240	S.IC	HN58X24128FPI	B
IC502	1110005780	S.IC	S-80945CLMC-G7F-T2	B
IC503	1180001070	S.IC	TA7805F (TE16L)	B
IC504	1180001250	S.IC	TA7808F (TE16L)	B
IC505	1140011350	S.IC	HD6432143SA69FA (FX-2633B)	T
			except [USA]	
	1140011360	S.IC	HD6432143SA70FA (FX2633C)	T
			[USA] only	
IC506	1130007370	S.IC	TA75S58F (TE85L)	T
IC507	1110002750	S.IC	TA75S01F (TE85R)	B
IC508	1110004490	S.IC	M62429FP 700C	T
IC509	1130008090	S.IC	BU4066BCFV-E1	T
IC510	1110003090	IC	LA4425A	T
IC511	1110004050	S.IC	NJM3404AV-TE1	T
Q1	1590003290	S.TRANSISTOR	UN9213J-(TX)	B
Q2	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	T
Q3	1590001650	S.TRANSISTOR	XP4601 (TX)	T
Q4	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)	T
Q5	1590001190	S.TRANSISTOR	XP6501-(TX) .AB	T
Q6	1590002270	S.TRANSISTOR	UMG9N TL	T
Q7	1530002380	S.TRANSISTOR	2SC4215-Y (TE85R)	B
Q8	1590002380	S.TRANSISTOR	XP1115 (TX)	T
Q9	1510000770	S.TRANSISTOR	2SA1586-GR (TE85R)	T
Q10	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)	T
Q11	1510000770	S.TRANSISTOR	2SA1586-GR (TE85R)	T
Q12	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)	T
Q13	1590001190	S.TRANSISTOR	XP6501-(TX) .AB	B
Q14	1590001450	S.FET	2SJ144-GR (TE85R)	T

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
D34	1790000980	S.DIODE	MA742 (TX)	B
D36	1750000610	S.VARICAP	MA2SV0500L	T
D37	1720000700	S.VARICAP	1SV305 (TPL3)	T
D38	1790001260	S.DIODE	MA2S077-(TX)	T
D39	1790001160	S.DIODE	1SS362 (TE85R)	T
D40	1750000510	S.DIODE	UM9401F	T
D41	1750000720	S.VARICAP	HVC375BTRF	T
D42	1790001620	S.DIODE	1SV308 (TPL3)	T
D43	1790001620	S.DIODE	1SV308 (TPL3)	T
D44	1790001620	S.DIODE	1SV308 (TPL3)	T
D45	1750000510	S.DIODE	UM9401F	T
D46	1750000940	S.DIODE	ISS400 TE61	T
D47	1750000940	S.DIODE	ISS400 TE61	T
D48	1710000870	S.DIODE	HVU131TRF	T
D49	1710000870	S.DIODE	HVU131TRF	T
D50	1750000510	S.DIODE	UM9401F	T
D51	1750000510	S.DIODE	UM9401F	B
D501	1730000520	ZENER	RD20E B2	T
D502	1790000700	DIODE	DSA3A1	T
D503	1790001260	S.DIODE	MA2S077-(TX)	B
D504	1750000940	S.DIODE	ISS400 TE61	T
D505	1750000940	S.DIODE	ISS400 TE61	T
D506	1730002340	S.ZENER	MA8047-M (TX)	B
D507	1750000940	S.DIODE	ISS400 TE61	[TPE], [EXP] only
D508	1750000940	S.DIODE	ISS400 TE61	[TPE], [KOR], [AUS] only
D510	1750000940	S.DIODE	ISS400 TE61	[TPE], [KOR] only
D511	1750000940	S.DIODE	ISS400 TE61	[TPE], [KOR] only
D512	1750000940	S.DIODE	ISS400 TE61	[TPE], [KOR] only
D513	1750000940	S.DIODE	ISS400 TE61	[TPE], [KOR] only
D514	1750000940	S.DIODE	ISS400 TE61	[TPE], [KOR] only
D516	1750000940	S.DIODE	ISS400 TE61	[TPE], [KOR] only
D517	1750000940	S.DIODE	ISS400 TE61	[TPE], [KOR] only
D518	1750000940	S.DIODE	ISS400 TE61	[TPE], [KOR] only
D519	1750000940	S.DIODE	ISS400 TE61	[TPE], [KOR] only
D521	1750000940	S.DIODE	ISS400 TE61	except [EXP]
D522	1750000940	S.DIODE	ISS400 TE61	except [EXP]
D523	1790000980	S.DIODE	MA742 (TX)	T
D524	1750000370	S.DIODE	DA221 TL	T
D525	1750000940	S.DIODE	ISS400 TE61	B
D526	1750000940	S.DIODE	ISS400 TE61	T
D527	1750000940	S.DIODE	ISS400 TE61	T
D528	1750000800	S.DIODE	HVC136TRF	T
D529	1750000800	S.DIODE	HVC136TRF	B
D530	1750000800	S.DIODE	HVC136TRF	B
D531	1750000520	S.DIODE	DAN222TL	T
FI1	2020001460	CERAMIC	CFWLA450KHFA-B0 (CFWS450HT)	T
FI2	2020001270	CERAMIC	CFWLB450KE2A-B0 (CFWM450E)	T
FI3	2010002560	S.MONOLITH	FL-344 (46.05 MHz)	T
FI4	2040001000	S.SAW	EFCH435MWNP1	except [USA]
	2040001020	S.SAW	EFCH445MWNP1	[USA] only
X1	6050011650	S.XTAL	CR-719 (15.2 MHz)	T
X2	6070000200	DISCRIMINATOR	CDBLA450KAY24-B0	T
X501	6050009520	S.XTAL	CR-520 (19.6608 MHz+)	T
L1	6200007620	S.COIL	LL1608-FH47NJ	T
L2	6200004480	S.COIL	MLF1608D R82K-T	B
L3	6200010450	S.COIL	C2520C-R82G (0.82U)	B
L4	6200005690	S.COIL	ELJRE 18NG-F	B
L5	6200006670	S.COIL	ELJRE 68NG-F	B
L6	6200005720	S.COIL	ELJRE 33NG-F	T
L7	6200005690	S.COIL	ELJRE 18NG-F	T
L9	6200005660	S.COIL	ELJRE 10NG-F	T
L10	6200003270	S.COIL	NL 252018T-R56J	T
L11	6200006980	S.COIL	ELJRE R10G-F	B
L12	6200005700	S.COIL	ELJRE 22NG-F	T
L13	6200010380	S.COIL	ELJRE R15J-F3	T
L15	6200005680	S.COIL	ELJRE 15NG-F	T
L17	6200009890	S.COIL	C2012C-82NG	T
L18	6200003270	S.COIL	NL 252018T-R56J	B
L19	6200005700	S.COIL	ELJRE 22NG-F	T
L20	6200005640	S.COIL	ELJRE 6N8Z-F	T
L21	6200009930	S.COIL	C2012C-68NG	B
L22	6200010060	S.COIL	AS080647-56N	T
L23	6200010040	S.COIL	AS100340-10N	T
L24	6200010210	S.COIL	C2012C-22NG	T
L25	6200010130	S.COIL	LQW18AN6N8C00	T

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
L26	6200010630	S.COIL	LQW18AN8N2D00D	T
L27	6200005590	S.COIL	ELJRE 2N7Z-F	T
L28	6200009890	S.COIL	C2012C-82NG	T
L29	6200010060	S.COIL	AS080647-56N	T
L30	6200010160	S.COIL	AS080440-22N	T
L31	6200005590	S.COIL	ELJRE 2N7Z-F	T
L32	6200009930	S.COIL	C2012C-68NG	T
L33	6200010540	S.COIL	C2012C-47NG	T
L34	6200010630	S.COIL	LQW18AN8N2D00D	T
L35	6200010130	S.COIL	LQW18AN6N8C00	T
L36	6200006980	S.COIL	ELJRE R10G-F	T
L37	6200010130	S.COIL	LQW18AN6N8C00	T
L38	6200010130	S.COIL	LQW18AN6N8C00	T
L39	6200005590	S.COIL	ELJRE 2N7Z-F	T
L40	6200010330	S.COIL	C2012C-R18G	T
L41	6200010000	S.COIL	C2012C-56NG	T
L42	6200010420	S.COIL	FHW1210HC 1R0JGT	T
L43	6200010420	S.COIL	FHW1210HC 1R0JGT	T
L44	6200009750	S.COIL	0.30-2.0-7TL 68N	T
L45	6200010060	S.COIL	AS080647-56N	T
L46	6200010050	S.COIL	AS080547-47N	T
L47	6200010160	S.COIL	AS080440-22N	T
L49	6200010050	S.COIL	AS080547-47N	T
L50	6200010160	S.COIL	AS080440-22N	T
L51	6200010040	S.COIL	AS100340-10N	T
L52	6200010160	S.COIL	AS080440-22N	T
L53	6200008170	S.COIL	0.35-1.6-8TL 54N	T
L54	6200008330	S.COIL	0.45-1.4-4TL 15N	T
L55	6200005670	S.COIL	ELJRE 12NG-F	B
L56	6200010150	S.COIL	AS080340-15N	T
L57	6200010070	S.COIL	AS080747-68N	T
L58	6200005660	S.COIL	ELJRE 10NG-F	B
L59	6200010160	S.COIL	AS080440-22N	T
L60	6190001520	S.COIL	ZBFS5101-PT	T
L61	6190001520	S.COIL	ZBFS5101-PT	T
L62	6190001520	S.COIL	ZBFS5101-PT	T
L63	6190001520	S.COIL	ZBFS5101-PT	T
L64	6200005140	S.COIL	MLF1608D R33K-T	T
L65	6200005190	S.COIL	MLF1608D R56K-T	B
L66	6200004480	S.COIL	MLF1608D R82K-T	B
L67	6200003540	S.COIL	MLF1608D R22K-T	B
L68	6200003640	S.COIL	MLF1608E 100K-T	T
L69	6200005730	S.COIL	ELJRE 39NG-F	T
R1	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R2	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	B
R3	7030003840	S.RESISTOR	ERJ3GEYJ 225 V (2.2 MΩ)	T
R4	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R5	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)	T
R6	7030003820	S.RESISTOR	ERJ3GEYJ 155 V (1.5 MΩ)	T
R7	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	B
R8	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	T
R9	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	T
R10	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)	T
R11	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)	B
R12	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)	B
R13	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	T
R14	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R15	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R16	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)	T
R17	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)	B
R18	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	T
R19	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)	B
R20	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	T
R21	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	T
R22	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	T
R23	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	T
R24	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 kΩ)	T
R25	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)	B
R28	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	T
R29	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T
R30	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	T
R31	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	B
R32	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)	T
R33	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)	T
R34	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)	T
R35	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	T
R36	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	T
R37	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)	T
R38	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	T

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.
C512	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C513	4030011600	S.CERAMIC C1608 JB 1E 104K-T	T
C514	4030009910	S.CERAMIC C1608 CH 1H 040B-T	B
C515	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C516	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C517	4030007090	S.CERAMIC C1608 CH 1H 470J-T	T
C519	4030008900	S.CERAMIC C1608 JB 1H 333K-T	B
C520	4030007050	S.CERAMIC C1608 CH 1H 220J-T	B
C521	4030011600	S.CERAMIC C1608 JB 1E 104K-T	B
C522	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C523	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C524	4030007090	S.CERAMIC C1608 CH 1H 470J-T	B
C525	4550006210	S.TANTALUM ECST1CX106R	T
C526	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C527	4030012610	S.CERAMIC C2012 JB 1C 474K-T	B
C528	4030007090	S.CERAMIC C1608 CH 1H 470J-T	B
C529	4510007310	S.ELECTROLYTIC 16 CV 10 BS	T
C531	4550006210	S.TANTALUM ECST1CX106R	T
C532	4550006210	S.TANTALUM ECST1CX106R	T
C533	4030008910	S.CERAMIC C1608 JB 1H 393K-T	T
C534	4030008910	S.CERAMIC C1608 JB 1H 393K-T	T
C535	4030011600	S.CERAMIC C1608 JB 1E 104K-T	T
C536	4030011600	S.CERAMIC C1608 JB 1E 104K-T	T
C537	4030012600	S.CERAMIC C2012 JB 1A 105M-T	T
C538	4510007280	S.ELECTROLYTIC 50 CV 2R2 BS	T
C539	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C540	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C542	4030011600	S.CERAMIC C1608 JB 1E 104K-T	B
C544	4030011600	S.CERAMIC C1608 JB 1E 104K-T	T
C545	4030006900	S.CERAMIC C1608 JB 1H 103K-T	B
C546	4550006760	S.TANTALUM TEMSVB2 1A 336M-8R	T
C547	4030008680	S.CERAMIC C2012 JF 1C 105Z-T	T
C548	4030008890	S.CERAMIC C1608 JB 1H 273K-T	T
C549	4510007310	S.ELECTROLYTIC 16 CV 10 BS	T
C550	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C551	4030011600	S.CERAMIC C1608 JB 1E 104K-T	T
C552	4030006900	S.CERAMIC C1608 JB 1H 103K-T	T
C553	4030008680	S.CERAMIC C2012 JF 1C 105Z-T	T
C554	4030011600	S.CERAMIC C1608 JB 1E 104K-T	T
C555	4030008880	S.CERAMIC C1608 JB 1H 223K-T	T
C556	4030011600	S.CERAMIC C1608 JB 1E 104K-T	T
C557	4030008650	S.CERAMIC C1608 JB 1H 332K-T	T
C558	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C559	4030008650	S.CERAMIC C1608 JB 1H 332K-T	T
C560	4030012610	S.CERAMIC C2012 JB 1C 474K-T	T
C561	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C562	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C563	4030008920	S.CERAMIC C1608 JB 1H 473K-T	T
C564	4030011810	S.CERAMIC C1608 JB 1A 224K-T	T
C566	4510007310	S.ELECTROLYTIC 16 CV 10 BS	T
C567	4510008130	S.ELECTROLYTIC 16 CV 220 BS	T
C568	4510008140	S.ELECTROLYTIC 10 CV 470 BS	T
C569	4030011600	S.CERAMIC C1608 JB 1E 104K-T	T
C570	4030011600	S.CERAMIC C1608 JB 1E 104K-T	T
C571	4030011600	S.CERAMIC C1608 JB 1E 104K-T	B
C572	4030007090	S.CERAMIC C1608 CH 1H 470J-T	B
C573	4030008680	S.CERAMIC C2012 JF 1C 105Z-T	T
C574	4510007310	S.ELECTROLYTIC 16 CV 10 BS	T
C575	4510007310	S.ELECTROLYTIC 16 CV 10 BS	T
C577	4550006170	S.TANTALUM ECST1AY225R	B
C579	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C580	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C581	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C582	4550006170	S.TANTALUM ECST1AY225R	T
C584	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C585	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C586	4030011730	S.CERAMIC GRM31M2C2H101JV01L (GRM42-6 CH)	B
C587	4030011600	S.CERAMIC C1608 JB 1E 104K-T	T
C589	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C590	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C591	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C592	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C593	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C594	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C595	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C596	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C597	4030007060	S.CERAMIC C1608 CH 1H 270J-T	T
C598	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C599	4030006950	S.CERAMIC C1608 CH 1H 040C-T	T
C600	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C601	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.
C602	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C603	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C604	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C605	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C606	4030007130	S.CERAMIC C1608 CH 1H 101J-T	T
C607	4030007130	S.CERAMIC C1608 CH 1H 101J-T	T
C608	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C609	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C610	4030006980	S.CERAMIC C1608 CH 1H 070D-T	B
C611	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C612	4030006900	S.CERAMIC C1608 JB 1H 103K-T	B
C616	4030007090	S.CERAMIC C1608 CH 1H 470J-T	B
C617	4030007090	S.CERAMIC C1608 CH 1H 470J-T	B
C618	4030007090	S.CERAMIC C1608 CH 1H 470J-T	B
C619	4030007090	S.CERAMIC C1608 CH 1H 470J-T	B
C620	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C621	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C623	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C624	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C625	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C626	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C627	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C628	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C629	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C630	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C632	4030007090	S.CERAMIC C1608 CH 1H 470J-T	T
C633	4030007140	S.CERAMIC C1608 CH 1H 121J-T	B
C634	4030007140	S.CERAMIC C1608 CH 1H 121J-T	B
C635	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C636	4030011810	S.CERAMIC C1608 JB 1A 224K-T	B
C637	4030011810	S.CERAMIC C1608 JB 1A 224K-T	B
C638	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C639	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C640	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C641	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C642	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C643	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C644	4030011810	S.CERAMIC C1608 JB 1A 224K-T	B
C645	4030011810	S.CERAMIC C1608 JB 1A 224K-T	B
C646	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C647	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C648	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C649	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C650	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C651	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C652	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C654	4030007090	S.CERAMIC C1608 CH 1H 470J-T	T
C655	4030007090	S.CERAMIC C1608 CH 1H 470J-T	T
C656	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C657	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C658	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C659	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C660	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C661	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C662	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C663	4030006860	S.CERAMIC C1608 JB 1H 102K-T	B
C664	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C665	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
C666	4030007010	S.CERAMIC C1608 CH 1H 100D-T	B
C667	4030007010	S.CERAMIC C1608 CH 1H 100D-T	B
C668	4030007010	S.CERAMIC C1608 CH 1H 100D-T	B
C669	4030007010	S.CERAMIC C1608 CH 1H 100D-T	B
C670	4030006860	S.CERAMIC C1608 JB 1H 102K-T	T
J1	6510014960	S.CONNECTOR B2B-ZR-SM3-TF	T
J502	6510023110	CONNECTOR 3008L-8P8C <KIN>	T
J503	6510019321	CONNECTOR 1729 REAR CONNECTOR-1	T
J504	6510023160	CONNECTOR DN-508B-6 <KJOU>	T
J505	6510014960	S.CONNECTOR B2B-ZR-SM3-TF	T
J506	6510023590	CONNECTOR HSJ2000-01-010	T
W1	7120000470	JUMPER ERDS2T0	T
W2	7120000470	JUMPER ERDS2T0	T
W3	7120000470	JUMPER ERDS2T0	T
W501	8900004880	CABLE OPC-465	T
W502	7030003860	S.JUMPER ERJ3GE JPW V	B
W503	7030003860	S.JUMPER ERJ3GE JPW V	B
W504	7030003860	S.JUMPER ERJ3GE JPW V	T
W505	7030000010	S.JUMPER MCR10EZHZ JPW (000)	T

[USA] only

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
W506	7030000010	S.JUMPER	MCR10EZHZ JPW (000)	T
W507	7030003860	S.JUMPER	ERJ3GE JPW V	T
W508	7030003860	S.JUMPER	ERJ3GE JPW V	T
W509	7030000010	S.JUMPER	MCR10EZHZ JPW (000)	T
W510	7030003860	S.JUMPER	ERJ3GE JPW V	T
W511	7030003860	S.JUMPER	ERJ3GE JPW V	B
W512	7030003860	S.JUMPER	ERJ3GE JPW V	B
W513	7030003860	S.JUMPER	ERJ3GE JPW V	B
W514	7030003860	S.JUMPER	ERJ3GE JPW V	T
W515	7030000010	S.JUMPER	MCR10EZHZ JPW (000)	T
W518	7030000010	S.JUMPER	MCR10EZHZ JPW (000)	B
W519	7030000010	S.JUMPER	MCR10EZHZ JPW (000)	B
W520	7030003860	S.JUMPER	ERJ3GE JPW V	B
W521	7030003860	S.JUMPER	ERJ3GE JPW V	T
W522	7030003860	S.JUMPER	ERJ3GE JPW V	T
W523	7030003860	S.JUMPER	ERJ3GE JPW V	T
W524	7030003860	S.JUMPER	ERJ3GE JPW V	T
W525	7030003860	S.JUMPER	ERJ3GE JPW V	T
W526	7030003860	S.JUMPER	ERJ3GE JPW V	T
W527	7030003860	S.JUMPER	ERJ3GE JPW V	T
W528	7030003860	S.JUMPER	ERJ3GE JPW V	B
W529	7030003860	S.JUMPER	ERJ3GE JPW V	B
W530	7030003860	S.JUMPER	ERJ3GE JPW V	B
W531	7030003860	S.JUMPER	ERJ3GE JPW V	B
W532	7030003860	S.JUMPER	ERJ3GE JPW V	B
W533	7030003860	S.JUMPER	ERJ3GE JPW V	B
W534	7030003860	S.JUMPER	ERJ3GE JPW V	B
W535	7030003860	S.JUMPER	ERJ3GE JPW V	B
W536	7030003860	S.JUMPER	ERJ3GE JPW V	B
W537	7030003860	S.JUMPER	ERJ3GE JPW V	B
W538	7030003860	S.JUMPER	ERJ3GE JPW V	B
W539	7030003860	S.JUMPER	ERJ3GE JPW V	B
W540	7030003860	S.JUMPER	ERJ3GE JPW V	B
W541	7030003860	S.JUMPER	ERJ3GE JPW V	B
W542	7030003860	S.JUMPER	ERJ3GE JPW V	B
W543	7030003860	S.JUMPER	ERJ3GE JPW V	B
W544	7030003860	S.JUMPER	ERJ3GE JPW V	T
W545	7030000010	S.JUMPER	MCR10EZHZ JPW (000)	T
W546	7030000010	S.JUMPER	MCR10EZHZ JPW (000)	T
W548	7030003860	S.JUMPER	ERJ3GE JPW V	B
EP1	6910012350	S.BEAD	MMZ1608Y 102BT	T
EP2	6910012350	S.BEAD	MMZ1608Y 102BT	T
EP10	6910000660	BEAD	FSRH082149RL000B (FSOH082RL)	T
EP11	6910000660	BEAD	FSRH082149RL000B (FSOH082RL)	T
EP501	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP502	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP503	6910012350	S.BEAD	MMZ1608Y 102BT	T
EP504	6910012350	S.BEAD	MMZ1608Y 102BT	T
EP505	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP506	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP507	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP508	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP509	6910015120	S.BEAD	MMZ2012D 301BT	B
EP510	6910015130	S.BEAD	MMZ1608D 301BT	B
EP511	6910015120	S.BEAD	MMZ2012D 301BT	T
EP512	6910012350	S.BEAD	MMZ1608Y 102BT	T
EP513	6910012350	S.BEAD	MMZ1608Y 102BT	T
EP514	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP515	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP517	6910012350	S.BEAD	MMZ1608Y 102BT	T
EP518	6910012350	S.BEAD	MMZ1608Y 102BT	T
EP519	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP520	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP521	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP522	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP523	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP524	6910012350	S.BEAD	MMZ1608Y 102BT	T
EP525	6910012350	S.BEAD	MMZ1608Y 102BT	T
EP526	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP527	0910056483	PCB	B 5946C	
EP528	6910012350	S.BEAD	MMZ1608Y 102BT	B

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

[CHASSIS PART]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510004880	Connector MR-DS-E 01	1
SP1	2510001160	Speaker 057P0802	1
MF1	2710000760	Fan FD1240107B-1N	1
MP1	8010019240	2633 chassis	1
MP2	8930059790	2633 SP rubber	1
MP3	8930041552	1893 OPC plate-2	1
MP4	8930041560	1893 release button	1
MP5	8810008660	Screw PH BT M3 × 8 NI-ZU	1
MP6	8810008660	Screw PH BT M3 × 8 NI-ZU	2
MP7	8810008660	Screw PH BT M3 × 8 NI-ZU	4
MP8	8810008660	Screw PH BT M3 × 8 NI-ZU	6
MP9	8810009610	Screw FH M2.6 × 6 ZK	4
MP10	8110005751	1729 fan cover-1	1
MP11	8810009110	Screw PH M2.6 × 16 ZK	4
MP12	8810009560	Screw PH BT M2 × 6 ZK	3
MP13	8110007950	2633 cover	1
MP14	8930003170	60 saran net	1
MP17	8930041870	Spring (AC)	1
MP19	8930039610	Thermally sheet (C)	1
MP20	8930039610	Thermally sheet (C)	1
MP21	8930043010	1893 sheet	1
MP24	8510015370	2633 shield cover	1
MP26	8930060350	Thermally sheet (AK)	1
MP27	8930060350	Thermally sheet (AK)	1
WS1	8600036880	SP cable	1

[CONTROL UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
R1	7210002920	Variable resistor EVU-F2AF20B55	1
R5	7210002920	Variable resistor EVU-F2AF20B55	1
S1	2240000150	Switch JRS0000-1401	1
DS1	5030002580	LCD L2-0736TAY	1
DS22	5040002920	LED CV1074	1
EP18	8930060040	LCD contact SRCN-2633-SP-N-W	1
MP1	8210019850	2633 front panel (B)	1
MP2	8210019540	2633 rear panel	1
MP3	8610011290	Knob N297	1
MP4	8610011300	Knob N298	1
MP5	8610011280	Knob N299	1
MP6	8310057030	2633 key-top	1
MP7	8210019550	2633 D-reflector	1
MP8	8930059740	2633 power button	1
MP9	8930059730	2633 2-key	1
MP10	8610011310	Knob K299	1
MP11	8610011350	Knob K299 (A)	1
MP12	8610011340	Knob K299 (B)	1
MP13	8610011330	Knob K299 (C)	1
MP14	8610011320	Knob K299 (D)	1
MP15	8310057020	2633 window plate	1
MP16	8930060050	2633 window sheet	1
MP17	8930060060	2633 D-filter	1
MP18	8930060070	2633 jog sheet	1
MP19	8930060080	2633 A-sheet	1
MP20	8930060090	2633 key sponge	1
MP21	8930059780	2633 LCD plate	1
MP22	8930064440	Spring (F)	1
MP25	8810009220	Screw PH B0 M2 × 8 ZK	2
MP26	8810008990	Screw PH BT M2 × 10 ZK	2

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J502	6510023110	Connector 3008L-8P8C	1
J503	6510019321	1729 rear connector-1	1
J504	6510023160	Connector DN-508B-6	1
J506	6510023590	Connector HSJ2000-01-010	1
W501	8900004880	Cable OPC-465	1
EP10	6910000660	Bead FS0H082RL	1
EP11	6910000660	Bead FS0H082RL	1
MP1	8930059770	2633 M-holder	2
MP2	8510011290	1893 A-CPU plate	1
MP3	8510011300	1893 moduler plate	1
MP4	8930059750	2633 H.V. plate	1
MP5	8930060270	2633 M-sheet	1
MP6	8510015470	2633 C-shield plate	1
	8510015410	2633 A-shield plate	1
MP7	8930060260	2633 spring	1
MP8	8510015460	2633 B-shield plate	1
MP9	8510015440	2633 connector plate	1
MP10	8930060260	2633 spring	1

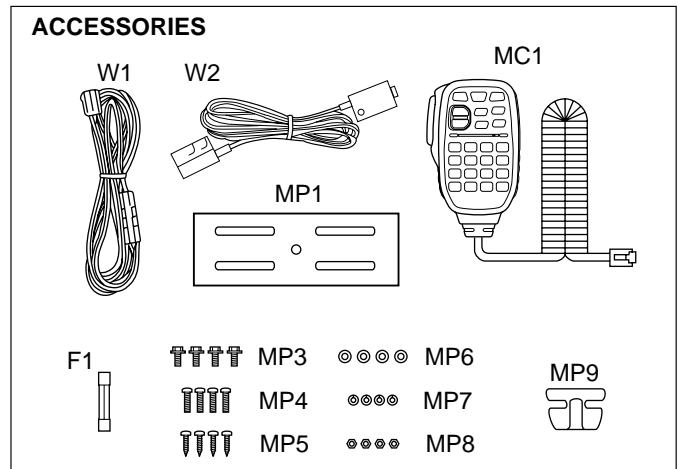
[VCO BOARD]

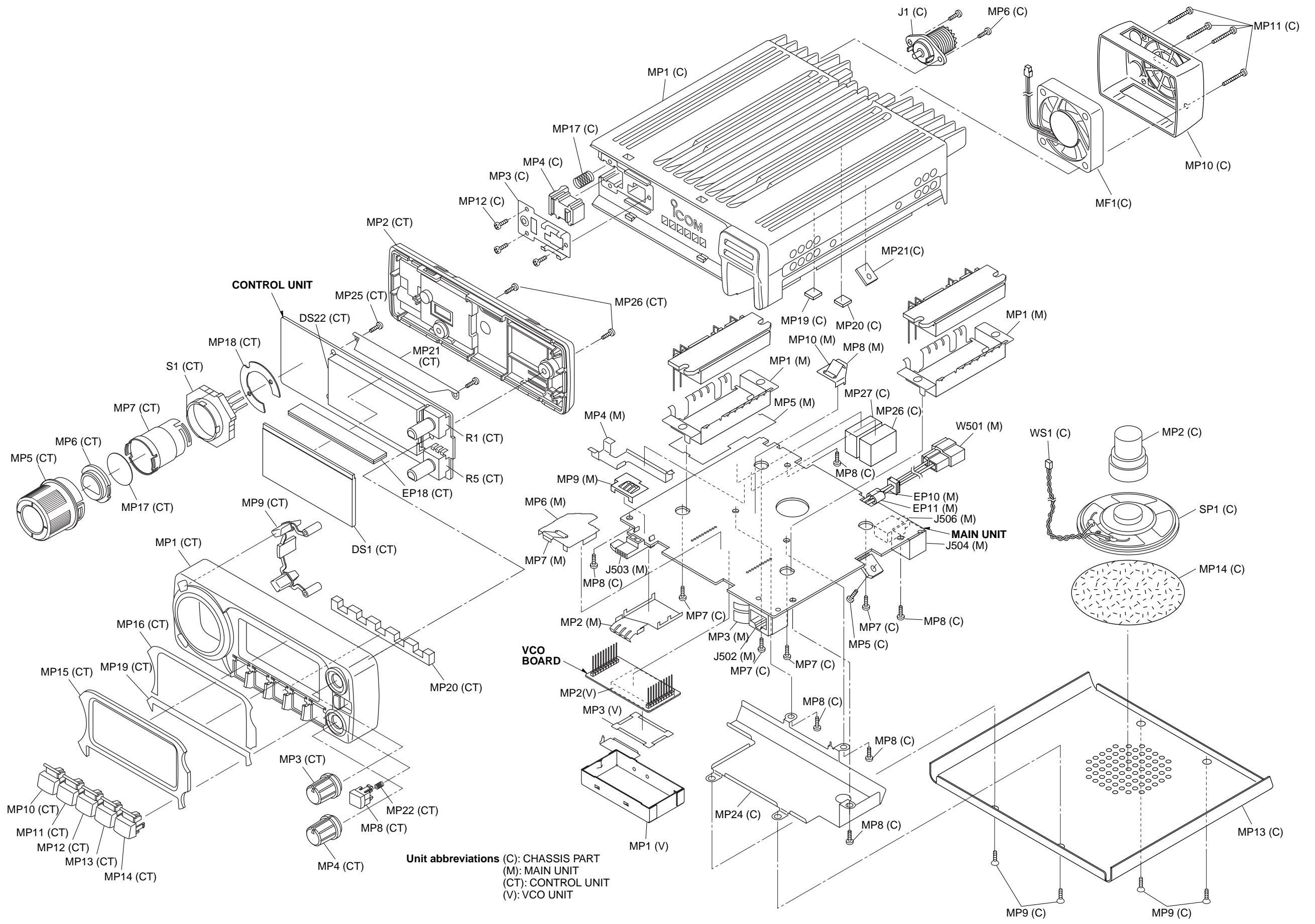
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8510015420	2633 shield case assembly	1
MP2	8510015270	2633 VCO case	1
MP3	8510015280	2633 VCO cover	1

[ACCESSORIES]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
F1	5210000080	Fuse FGB 20A	1
MC1	0880000980	Microphone HM-133	1
W1	8900010990	Cable OPC-1132	1
W2	8900012250	Cable OPC-600R	1
	8900007490	Cable OPC-600	1
MP1	8010019260	2633 mobile bracket	1
MP3	8820000530	Flange bolt M4 × 8 NI	4
MP4	8810000470	Screw PH M5 × 12 (+-)	4
MP5	8810000950	Screw A M5 × 16	4
MP6	8850000150	Flat washer M5 NI BS	4
MP7	8850000390	Spring washer M5	4
MP8	8830000120	Nut M5	4
MP9	8930007300	Mic hanger	1

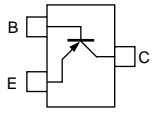
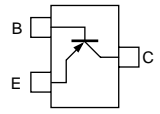
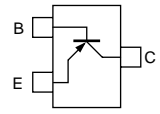
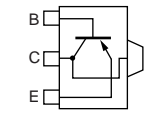
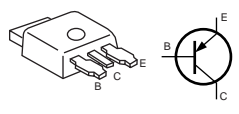
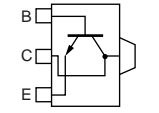
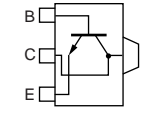
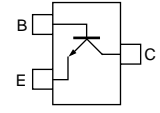
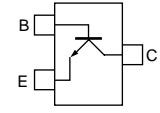
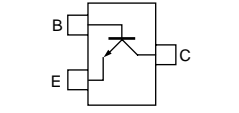
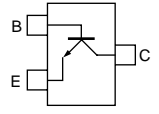
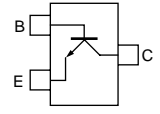
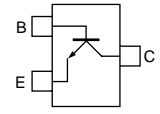
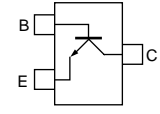
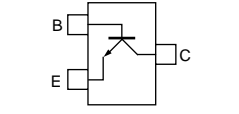
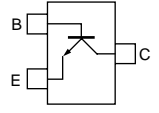
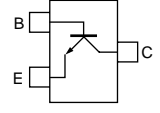
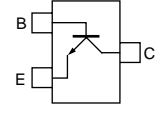
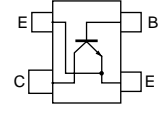
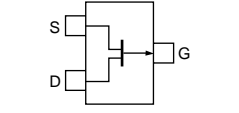
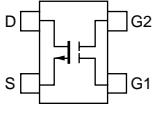
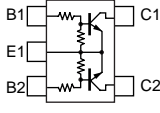
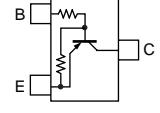
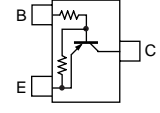
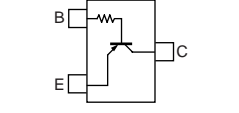
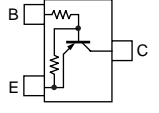
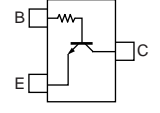
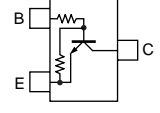
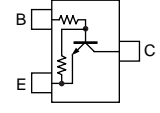
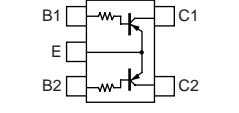
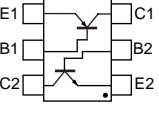
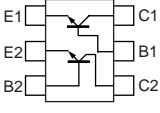
Screw abbreviations BT,B0: Self-tapping
 PH: Pan head FH: Flat head
 ZK: Black BS: Brass
 NI: Nickel NI-ZU: Nickel-Zinc



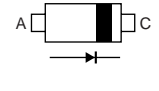
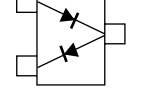
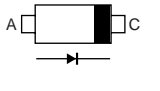
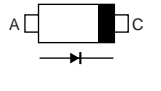
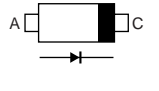
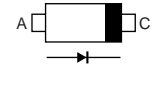
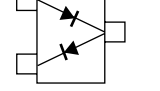
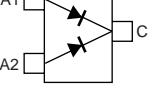
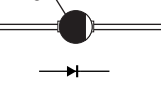
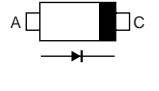
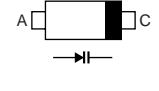
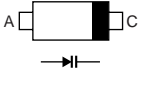
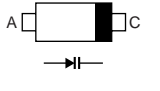
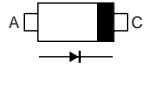
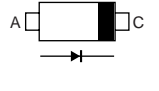
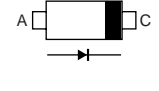
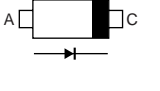
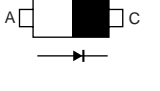
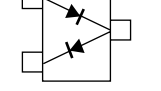
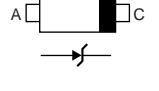
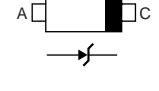
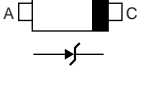
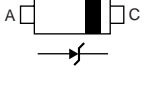
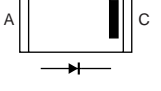


SECTION 8 SEMI-CONDUCTOR INFORMATION

• TRANSISTORS AND FET'S

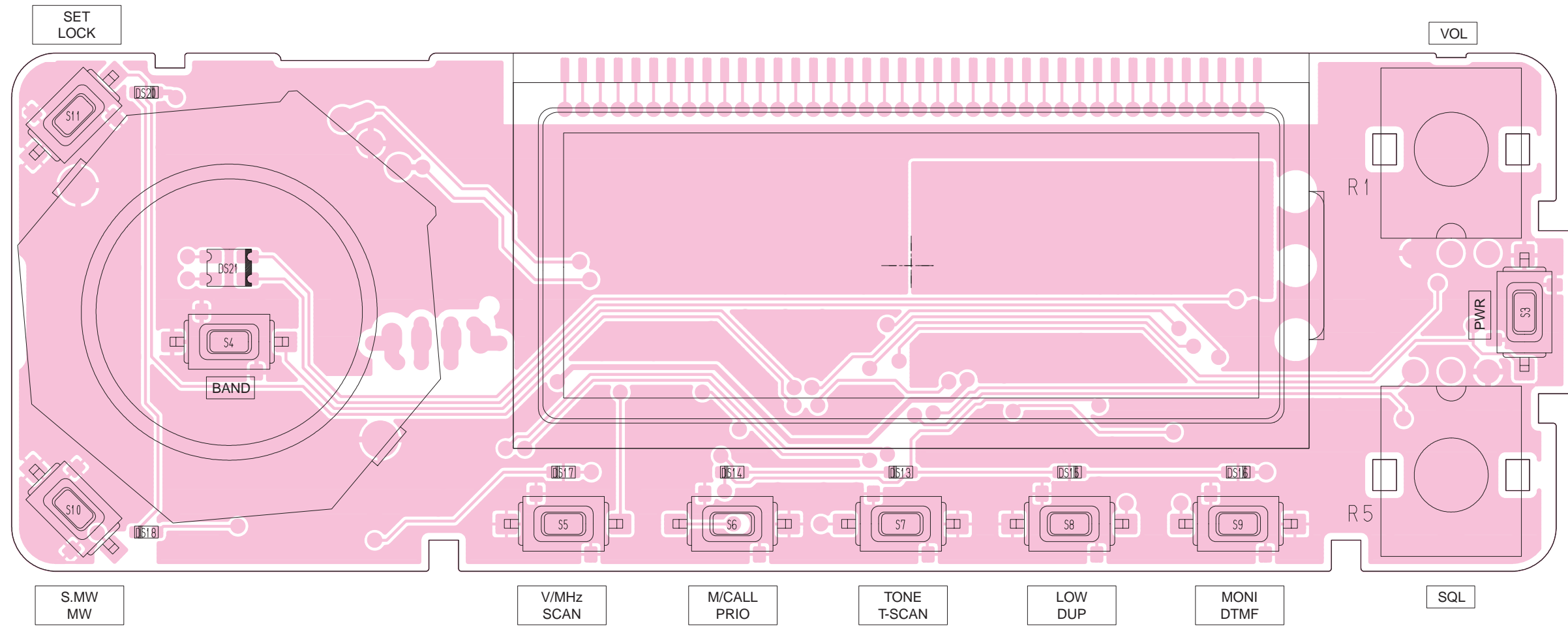
2SA1362 GR (Symbol: AEG) 	2SA1586 GR (Symbol: SG) 	2SA1588 GR (Symbol: ZG) 	2SA1734 (Symbol: LB) 	2SB1182 TL Q (Symbol: None) 
2SC2954 T1 (Symbol: QK) 	2SC3357 T1 (Symbol: RK) 	2SC4081 T106 R (Symbol: BR) 	2SC4116 BL (Symbol: LL) 	2SC4116 GR (Symbol: LG) 
2SC4213 B (Symbol: AB) 	2SC4215 Y (Symbol: QY) 	2SC4226 T1 R25 (Symbol: R25) 	2SC4403 3 TL (Symbol: LY3) 	2SC5006 T1 (Symbol: 24) 
2SC5008 T1 (Symbol: 44) 	2SC5085 Y (Symbol: MCY) 	2SC5231 C8 (Symbol: C8) 	2SC5624 (Symbol: VH-) 	2SJ144 GR (Symbol: VG) 
3SK299 T1 U73 (Symbol: U73) 	UMG9N TL (Symbol: G9) 	UN9113J (Symbol: 6C) 	UN9114J (Symbol: 6D) 	UN9115J (Symbol: 6E) 
UN911NJ (Symbol: EW) 	UN9210J (Symbol: 8L) 	UN9213J (Symbol: 8C) 	UN921NJ (Symbol: EX) 	XP1115 (Symbol: 9L) 
XP4601 (Symbol: 5C) 	XP6501 AB (Symbol: 5N) 			

• DIODES

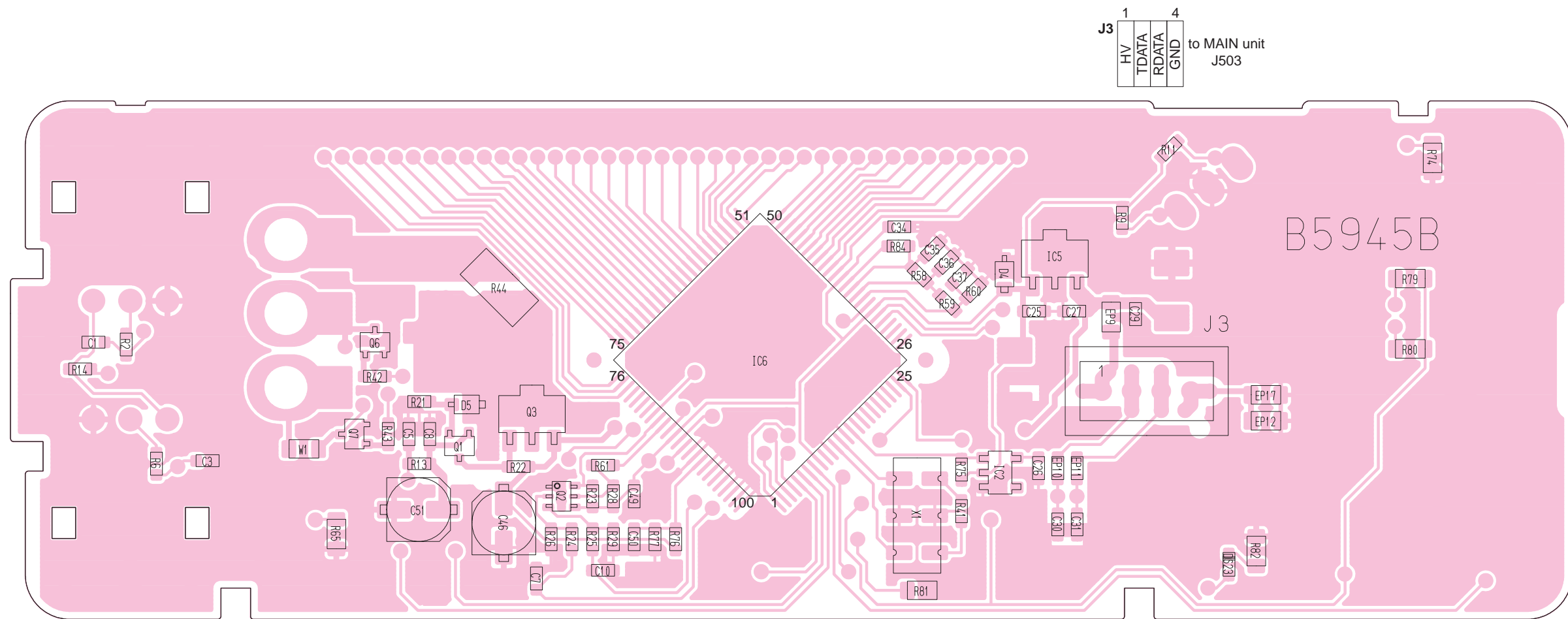
1SS355 (Symbol: A) 	1SS362 (Symbol: C3) 	1SS400 (Symbol: A) 	1SV286 (Symbol: T7) 	1SV305 (Symbol: TV) 
1SV308 (Symbol: TX) 	DA221 TL (Symbol: K) 	DAN222TL (Symbol: N) 	DSA3A1 (Color: Green) 	HVC136 (Symbol: P6) 
HVC350B (Symbol: B0) 	HVC375B (Symbol: B8) 	HVC376B (Symbol: B9) 	HVU131 TRF (Symbol: P1) 	MA2S077 (Symbol: S) 
MA2S30400 L (Symbol: K) 	MA2S728 (Symbol: B) 	MA2SV0550 L (Symbol: 3A) 	MA742 (Symbol: M1U) 	MA8047 M (Symbol: 4-7) 
MA8062 L (Symbol: 6_2) 	MA8068 M (Symbol: 6-8) 	RD20E B2 (Symbol: 20 B2) 	UM9401F (Symbol: none) 	

SECTION 9 BOARD LAYOUTS

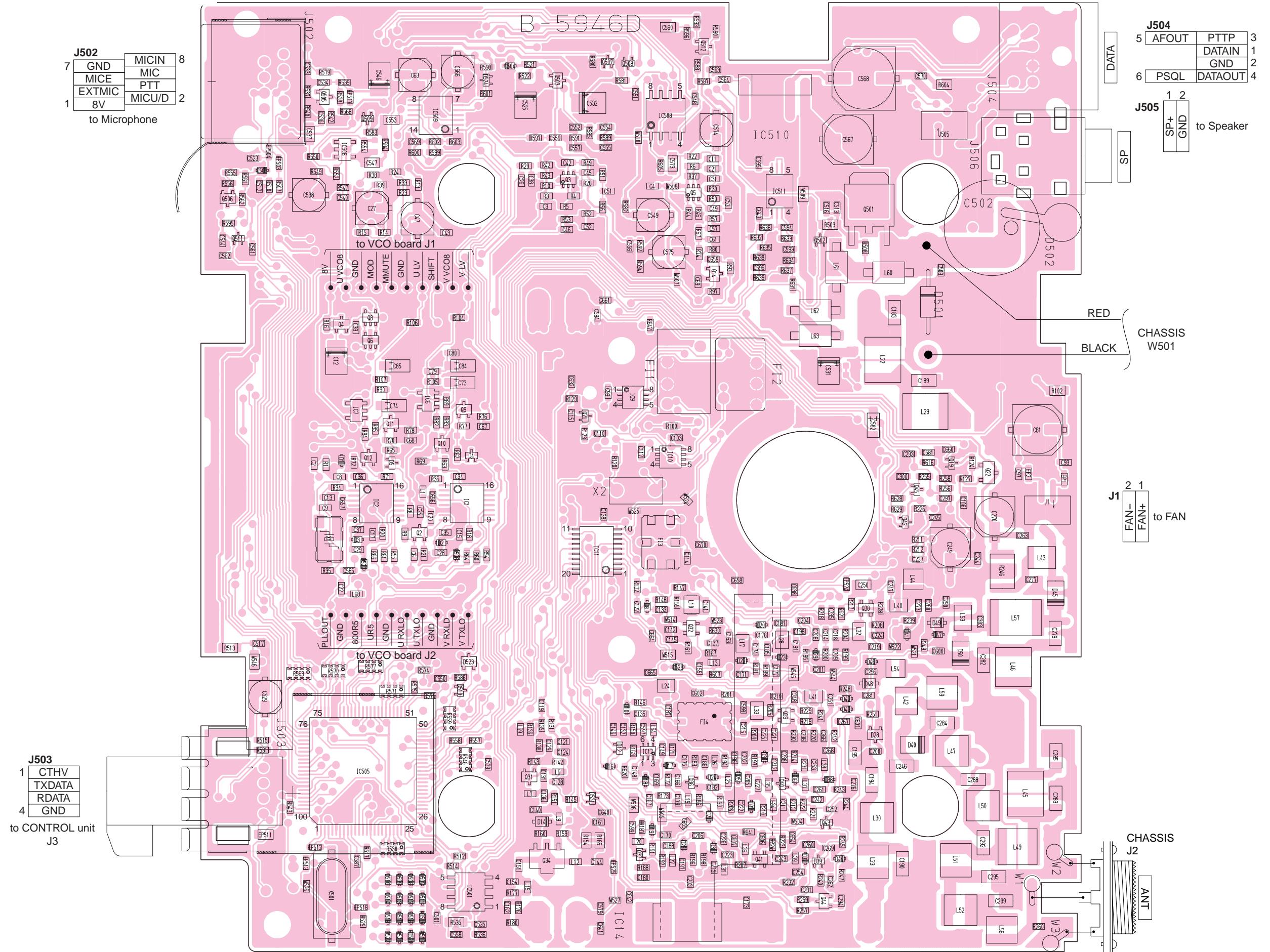
9-1 CONTROL UNIT • TOP VIEW



• BOTTOM VIEW (CONTROL UNIT)



9-2 MAIN UNIT
• TOP VIEW



J502

7	GND	MICIN	8
	MICE	MIC	
	EXTMIC	PTT	
1	8V	MICU/D	2

to Microphone

J504

5	AFOUT	PTTP	3
		DATAIN	1
		GND	2
6	PSQL	DATAOUT	4

J505

1	SP+	
2	GND	

to Speaker

RED
BLACK
CHASSIS
W501

J1

2	FAN-	
1	FAN+	

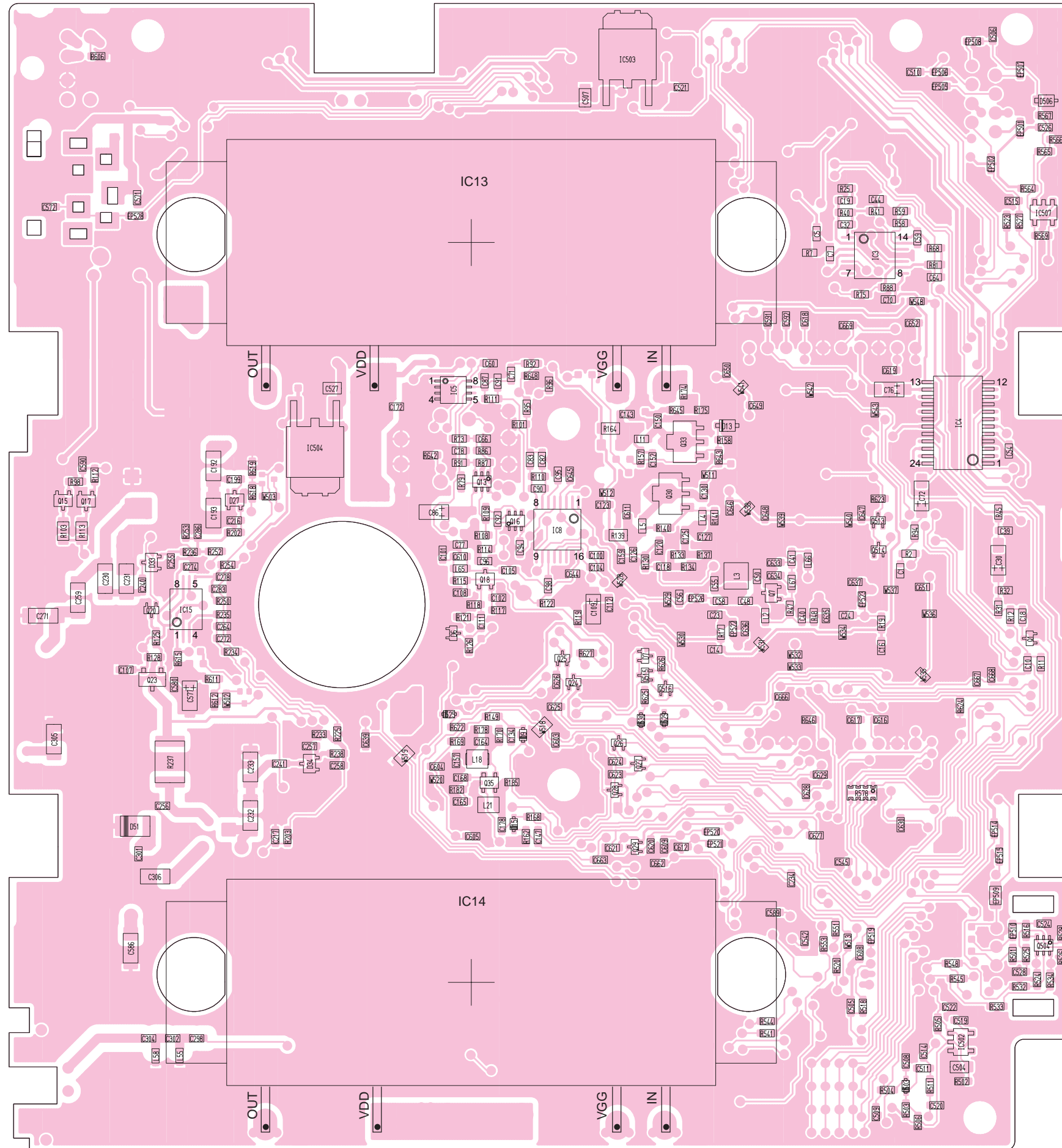
to FAN

J503

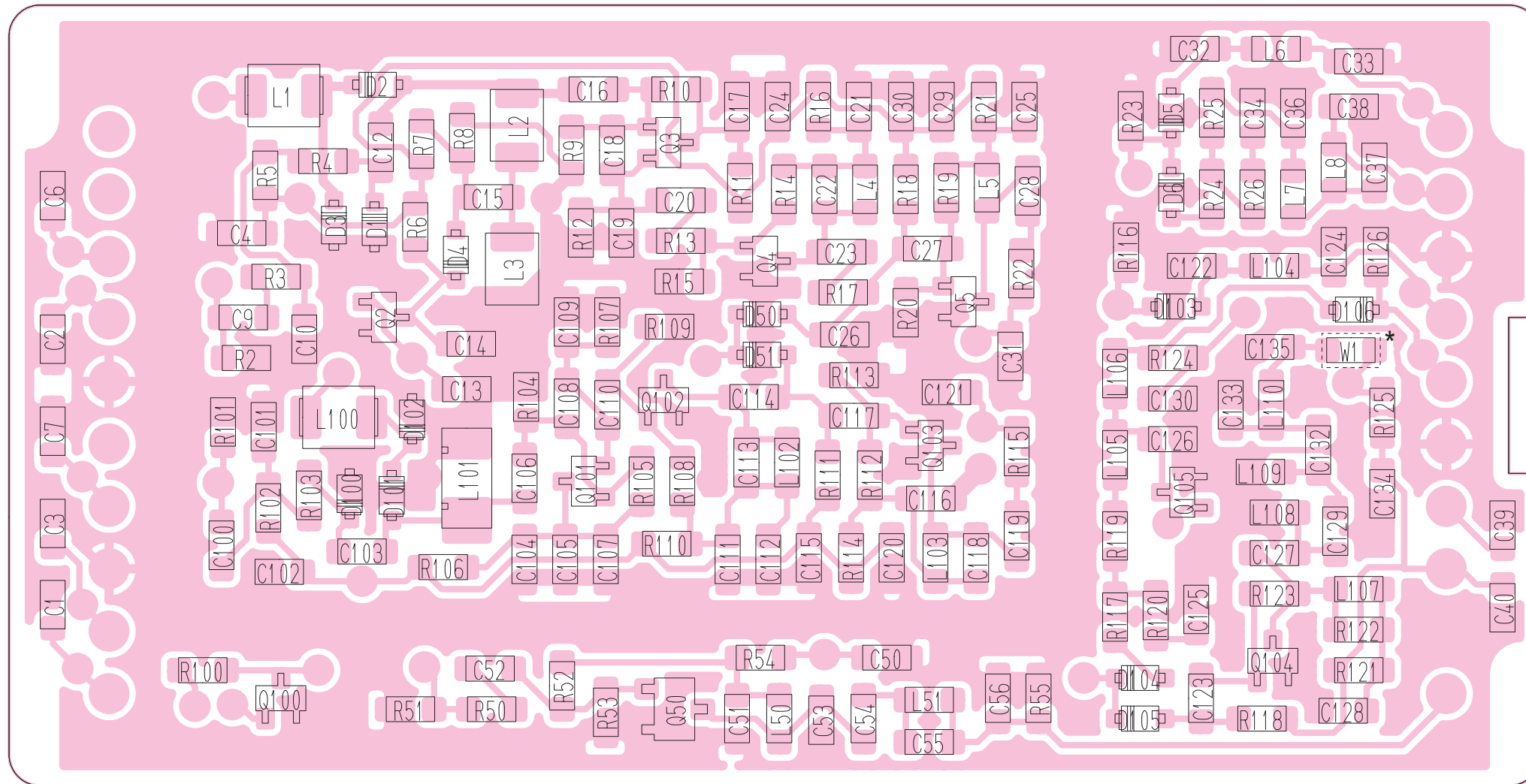
1	CTHV
	TXDATA
	RDATA
4	GND

to CONTROL unit
J3

• BOTTOM VIEW (MAIN UNIT)

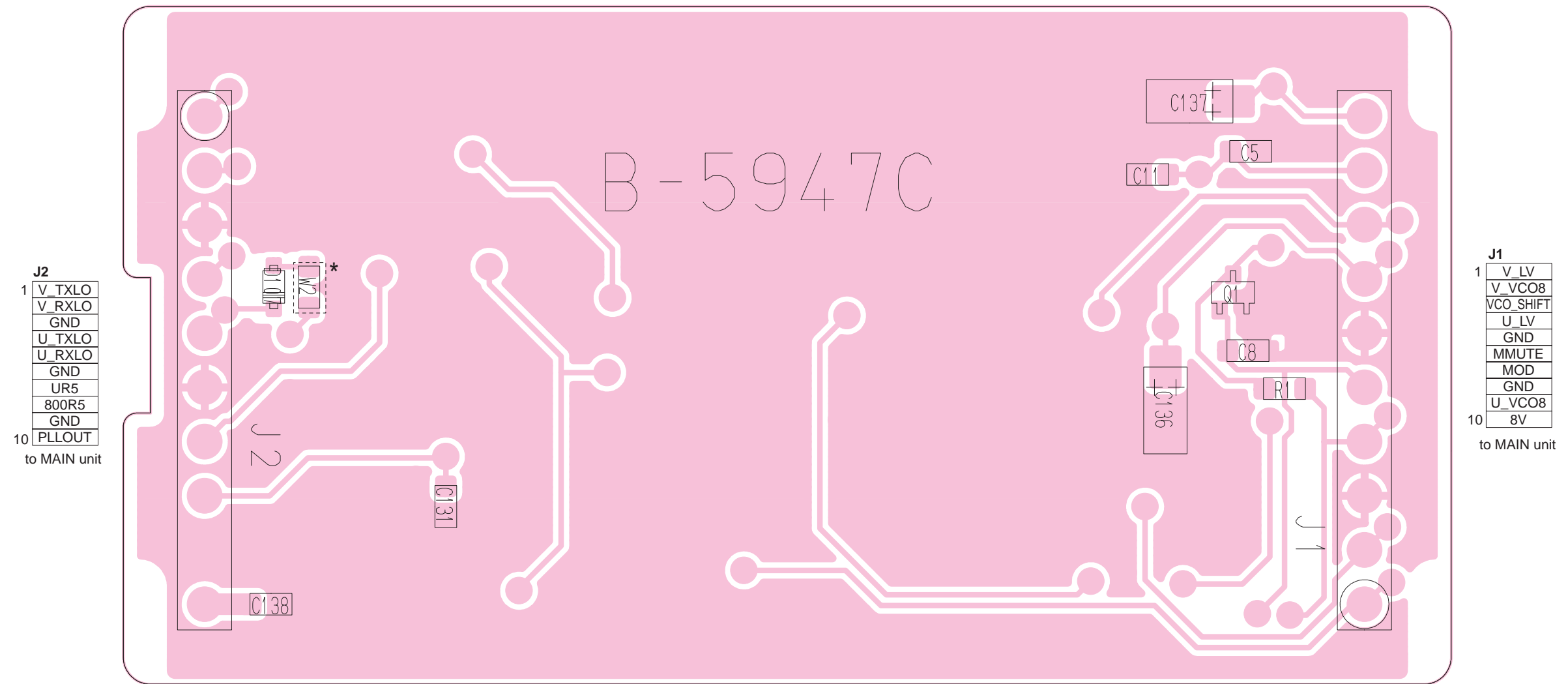


9-3 VCO BOARD
• TOP VIEW



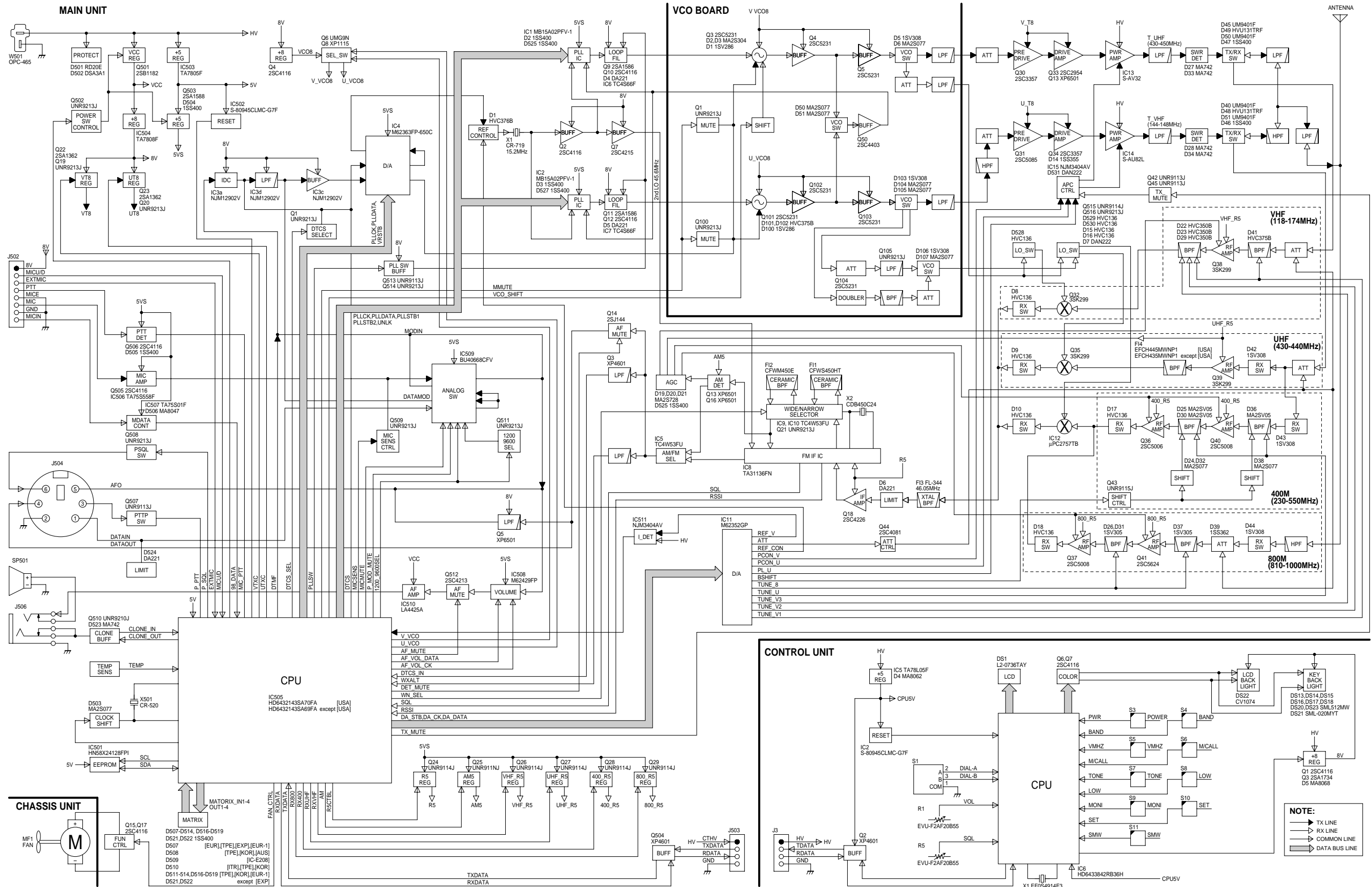
* Mounted R127 in place of W1 ([USA], [E208] only)

• BOTTOM VIEW (VCO BOARD)



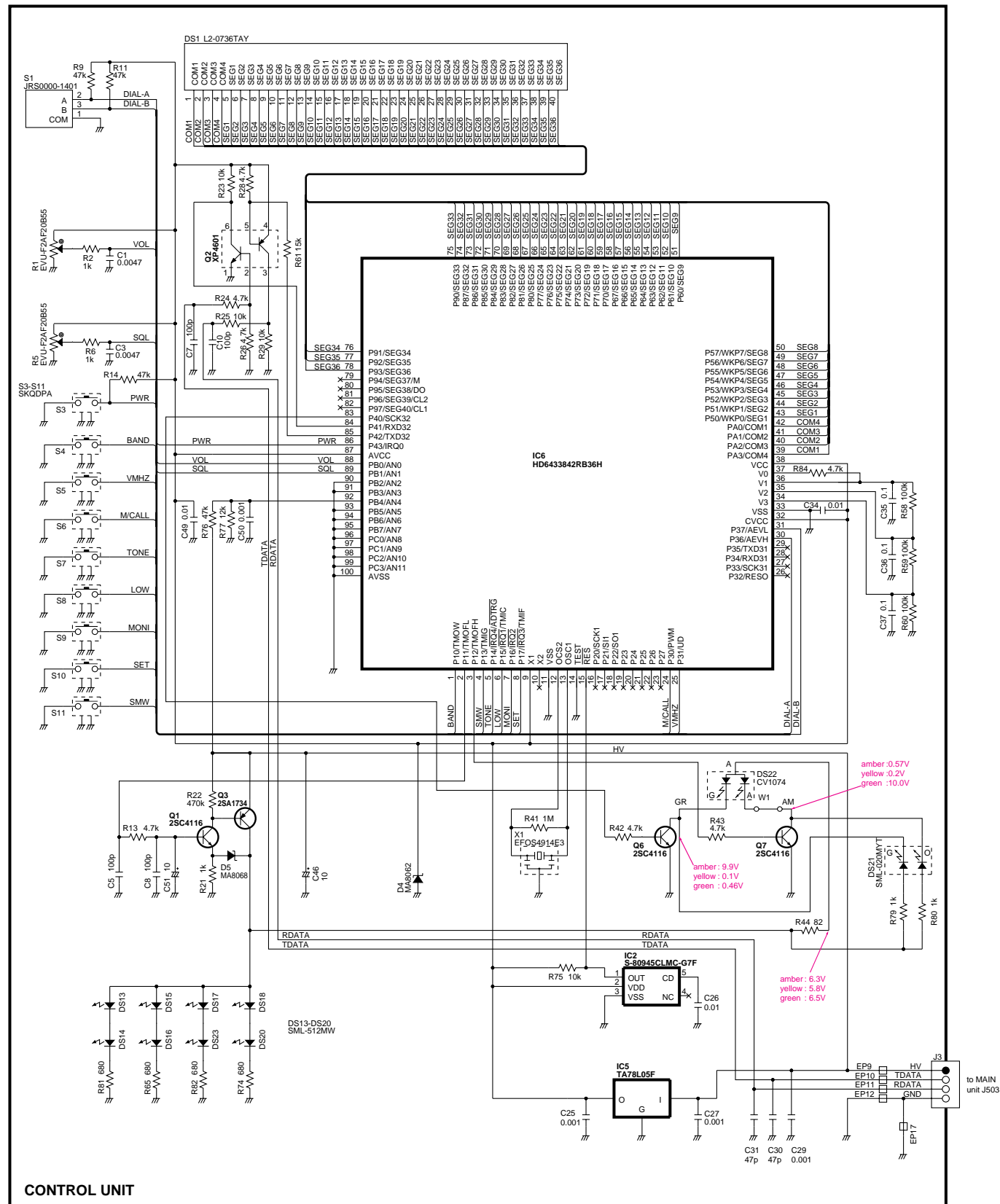
*Mounted R128 in place of W2 ([USA], [E208] only)

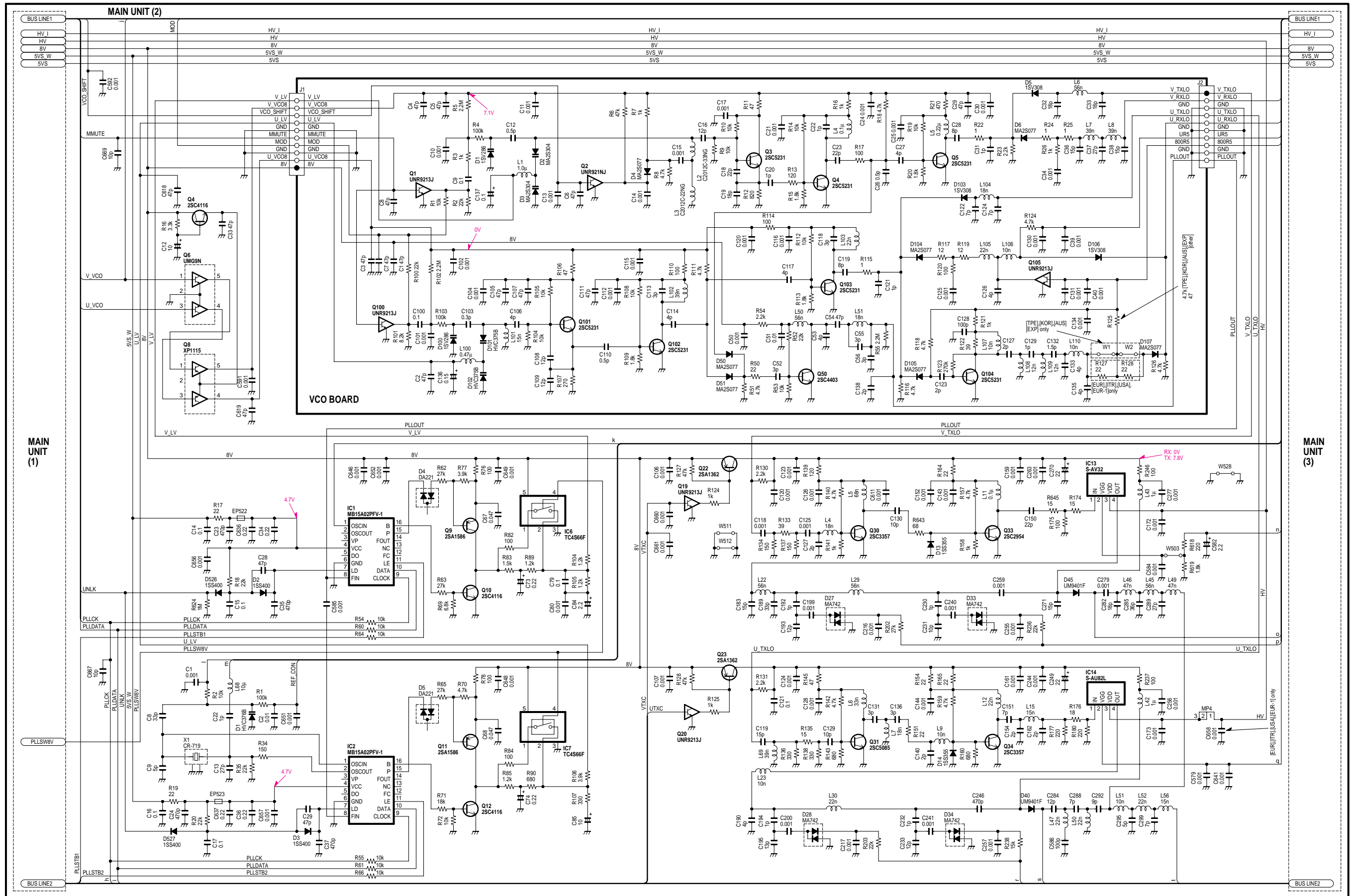
SECTION 10 BLOCK DIAGRAM

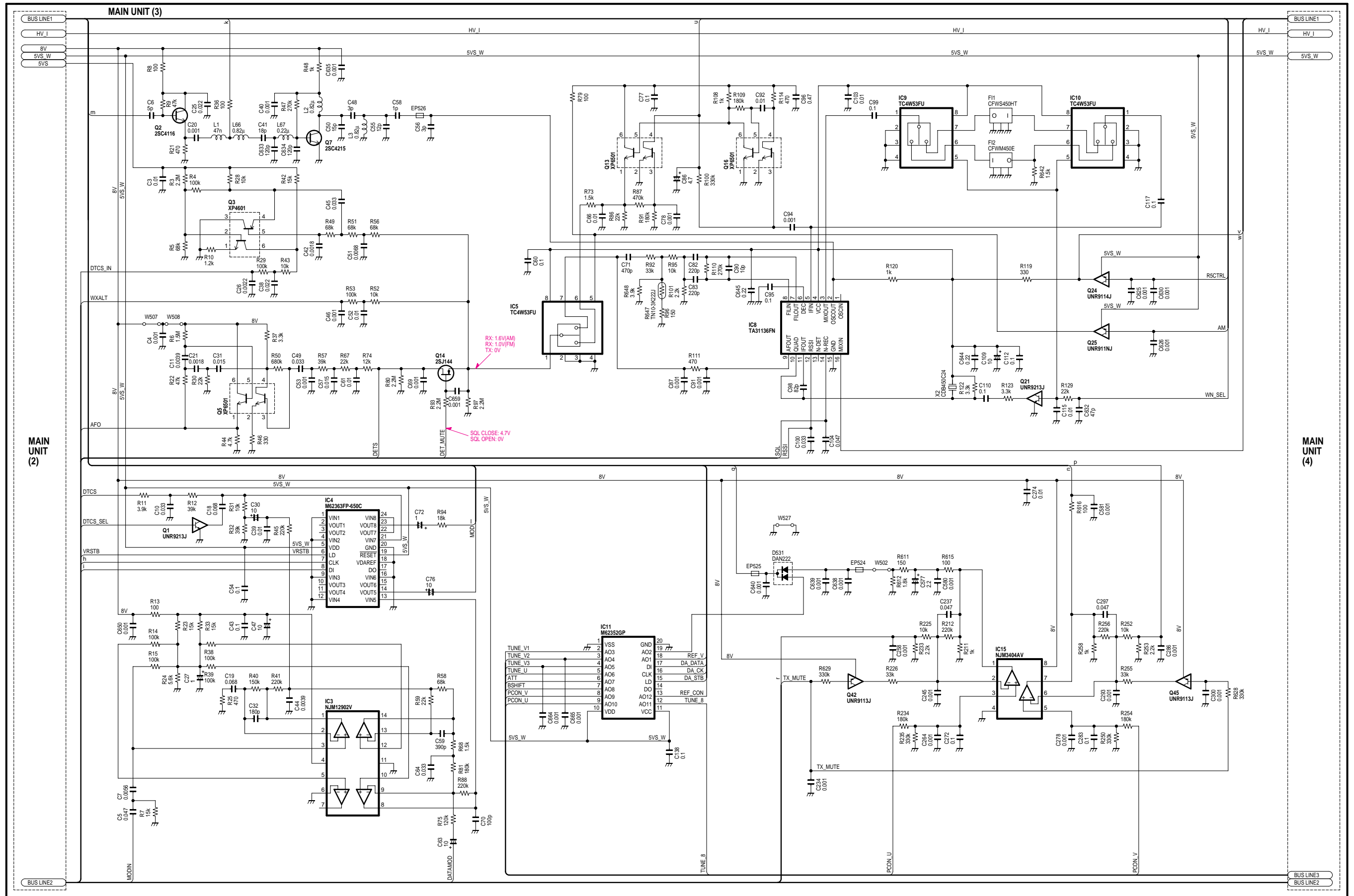


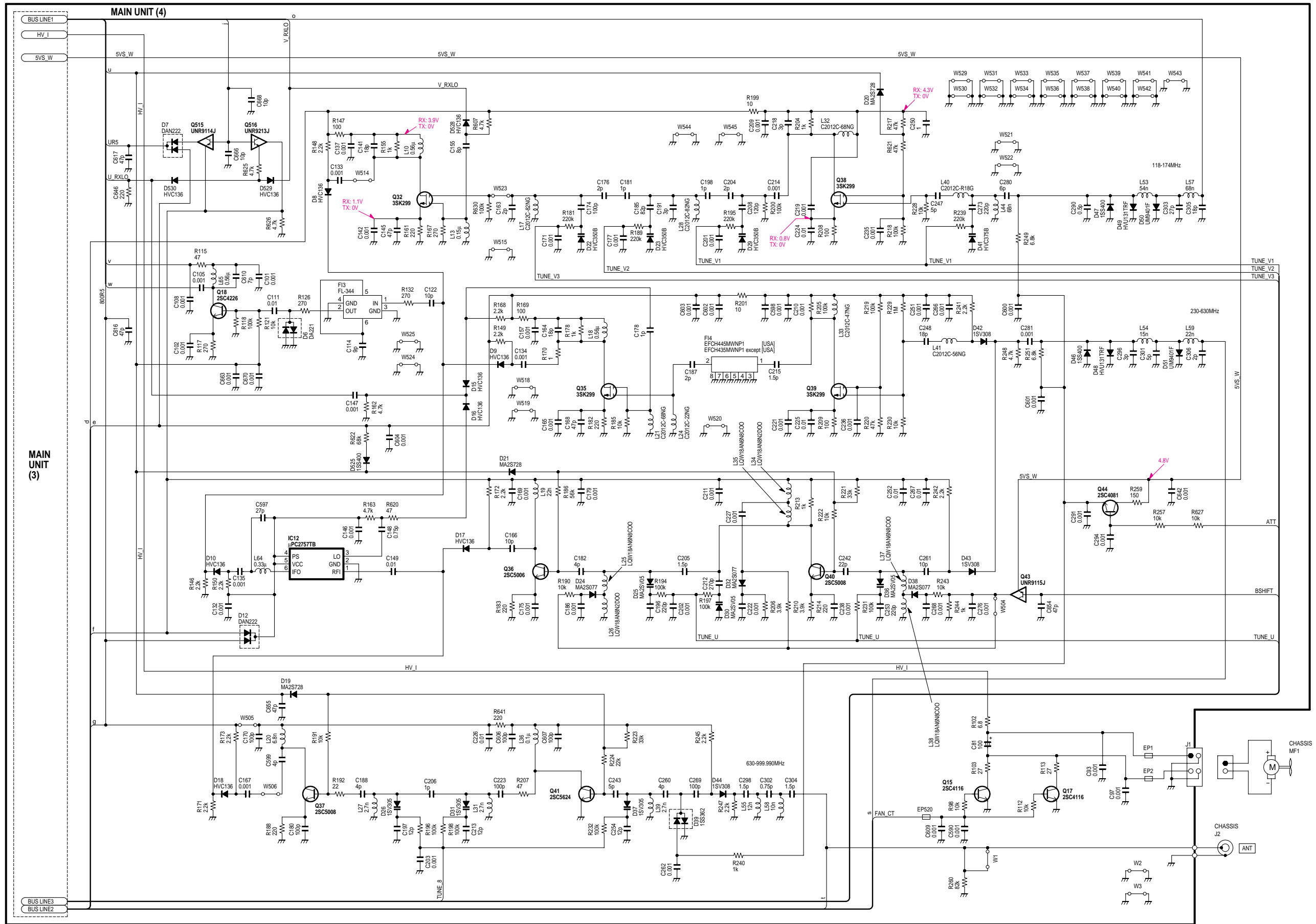
SECTION 11 VOLTAGE DIAGRAMS

11-1 CONTROL UNIT









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Fax : 06 6793 0013
URL : <http://www.icom.co.jp/world/index.html>

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<Corporate Headquarters>
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Phone : (425) 454-8155 Fax : (425) 454-1509
URL : <http://www.icomamerica.com>
<Customer Service>
Phone : (425) 454-7619

Icom Canada

Glenwood Centre #150-6165
Highway 17 Delta, B.C., V4K 5B8, Canada
Phone : (604) 952-4266 Fax : (604) 952-0090
URL : <http://www.icomcanada.com>

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Phone : 03 9387 0666 Fax : 03 9387 0022
URL : <http://www.icom.net.au>

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Auckland, New Zealand
Phone : 09 274 4062 Fax : 09 274 4708
URL : <http://www.icom.co.nz>

Beijing Icom Ltd.

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URL : <http://www.icomspain.com>

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Zac de la Plaine, 1, Rue Brindejonc des Moulinais
BP 5804, 31505 Toulouse Cedex, France
Phone : (33) 5 61 36 03 03 Fax : (33) 5 61 36 03 00
URL : <http://www.icom-france.com>

Asia Icom Inc.

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Phone : (02) 2559 1899 Fax : (02) 2559 1874
URL : <http://www.asia-icom.com>

Count on us!

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