



SERVICE MANUAL

144 MHz FM TRANSCEIVER

IC-T2H
IC-T2E-T

INTRODUCTION

This service manual describes the latest service information for the IC-T2H/E-T FM TRANSCEIVER at the time of publication.

MODEL	VERSION	SYMBOL
IC-T2H	U.S.A.	USA
	Europe	EUR
	U.K.	UK
	Italy	ITA
	Asia	SEA
	C.S. America/-1	CSA/-1
	Taiwan	TWN
Asia-1	ANI	
IC-T2E-T	Thailand	THA

To upgrade quality, all 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. Such a connection could cause a fire hazard and/or electric shock.

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

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

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

ORDERING PARTS

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

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

<SAMPLE ORDER>

1140006560 S.IC HD6433875A45H IC-T2H MAIN UNIT 1 piece
8810009560 Screw B0 2 × 6 ZK IC-T2H CHASSIS 6 pieces

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

REPAIR NOTES

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB or 50 dB attenuator between the transceiver and a deviation meter or spectrum analyser when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.



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SECTION 1 SPECIFICATIONS

■ GENERAL

- Frequency coverage

Version	Transmit	Receive
U.S.A.	140.000–150.000 MHz*	136.000–174.000 MHz*
Europe, U.K. Thailand	144.000–146.000 MHz	144.000–146.000 MHz
Italy, Asia, ANI, C.S.A.	136.000–174.000 MHz*	136.000–174.000 MHz*
Taiwan	145.000–146.000 MHz	145.000–146.000 MHz

Guaranteed frequency range: * 144–148 MHz

- Mode : FM (F2, F3)
- Current drain (at 9.6 V DC) : Transmit at 6.0 W 1.6 A (typical)
at 5.0 W 1.5 A (typical) [Thailand]
at 1.0 W 0.7 A (typical)
Receive max. audio 210 mA (typical)
power saved 25 mA (typical)
standby 80 mA (typical)
- Frequency stability : ± 10 ppm (0°C to +50°C; 32°F to 122°F)
- Usable temperature range : -10°C to 60°C; 14°F to 140°F
- Antenna connector : BNC (50 Ω)
- No. of memory channels : 43 ch (40 regulator, 2 scan edges and 1 call)
- Acceptable power supply : 9.6 V DC (supplied Ni-Cd cells; negative ground)
- Frequency resolution : 5 kHz and 12.5 kHz
- Dimensions (Projections not included) : 58(W) \times 140.5(H) \times 32.3(D) mm; 2⁹/₃₂(W) \times 5¹⁷/₃₂(H) \times 1⁹/₃₂(D) inch
- Weight (with BP-199) : 420 g; 14.8 oz

■ TRANSMITTER

- Output power (9.6 V DC) : 6 W typical (high)
5 W typical (high) [Thailand] only
0.7 W typical (low)
- Modulation system : Variable reactance frequency modulation
- Max. frequency deviation : ± 5 kHz
- Spurious emissions : Less than -60 dB
- External microphone connector : 3-conductor 2.5 (d) mm (1/10") / 2 k Ω

■ RECEIVER

- Receive system : Double conversion superheterodyne
- Intermediate frequencies : 1st 30.85 MHz
2nd 450 kHz
- Sensitivity (12 dB SINAD) : Less than 0.18 μ V (-122 dBm)
- Squelch sensitivity (threshold) : Less than 0.18 μ V (-122 dBm)
- Selectivity : More than 15 kHz/-6 dB
Less than 30 kHz/-60 dB
- Spurious and image refection ratio (except 2nd IF image frequency) : 60 dB (typical)
- Audio output power (at 9.6 V DC) : 500 mW (typical at 10% distortion with an 8 Ω load)
- External speaker connector : 3-conductor 3.5 (d) mm (1/8") / 8 Ω

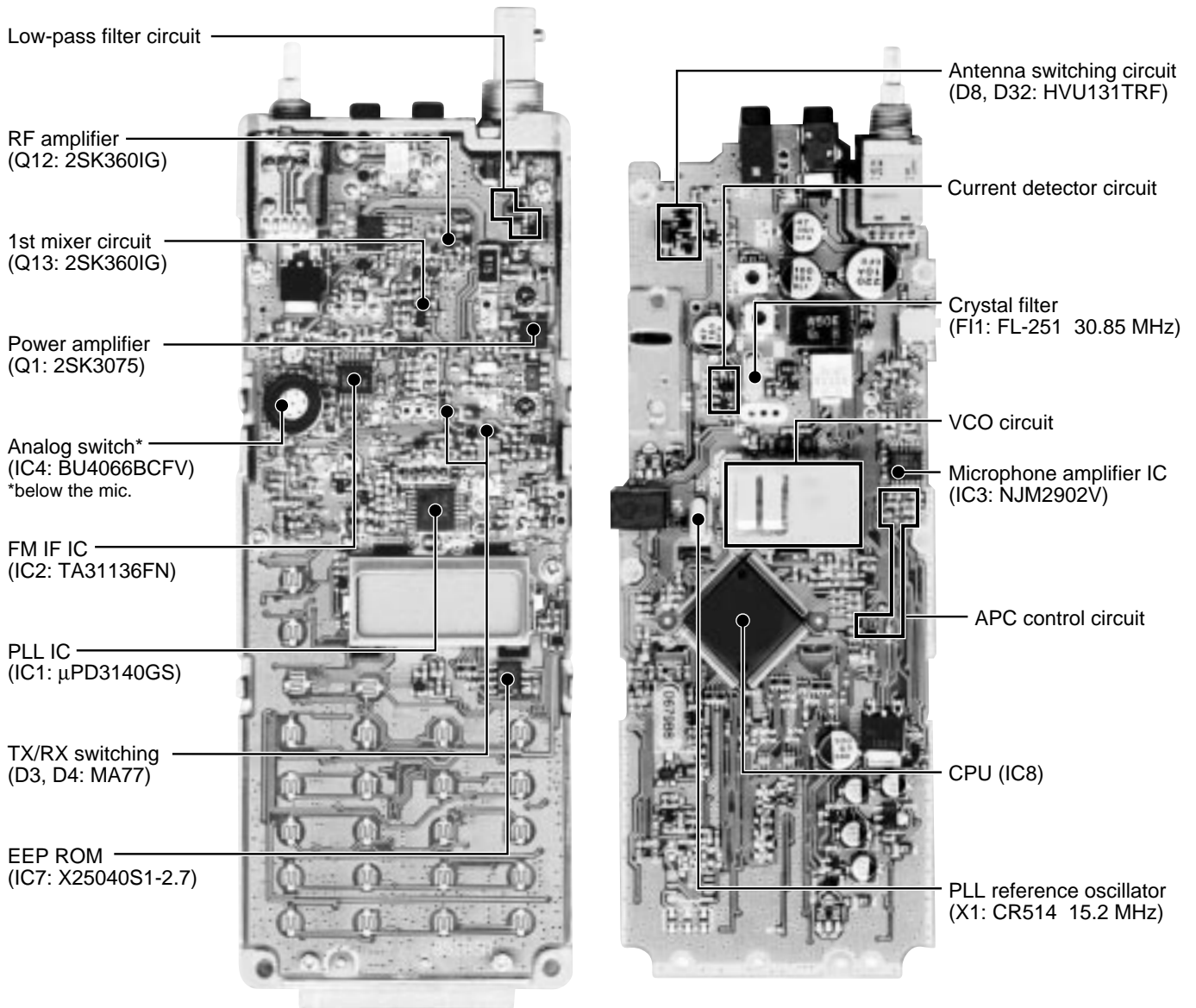
All stated specifications are subject to change without notice or obligation.

SECTION 2 INSIDE VIEWS

• MAIN UNIT

TOP VIEW

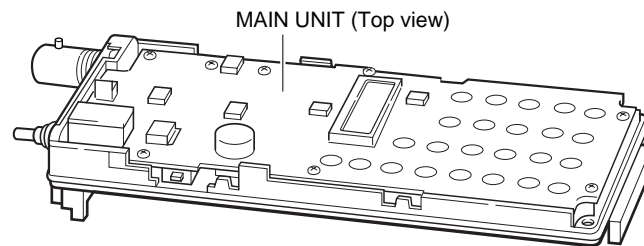
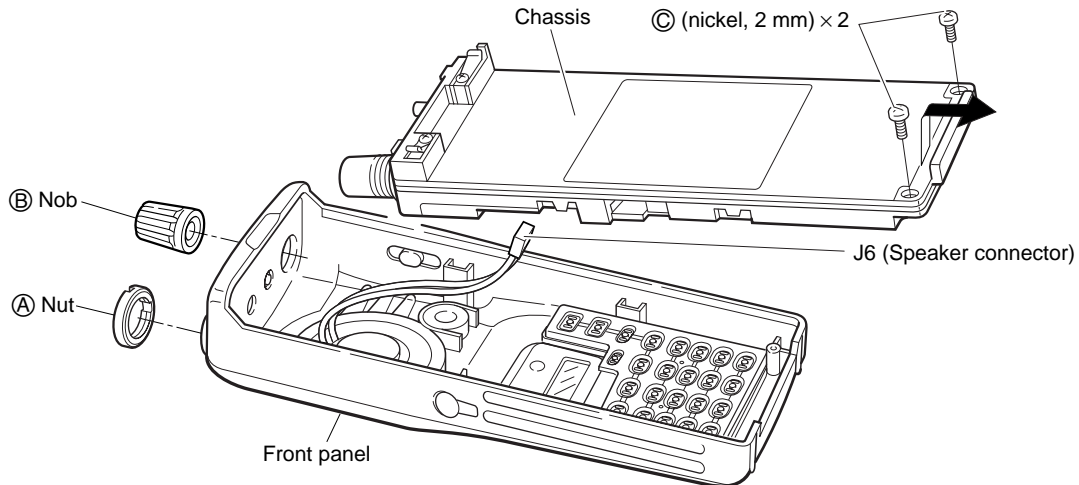
BOTTOM VIEW



SECTION 3 DISASSEMBLY INSTRUCTIONS

• Removing the chassis panel

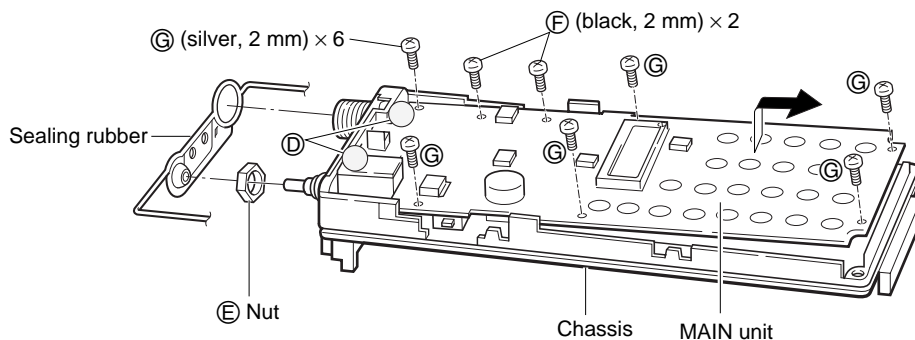
- ① Unscrew 1 nut, (A), and remove 1 nob, (B).
- ② Unscrew 2 screws, (C).
- ③ Remove the the chassis in the direction of the arrow.
- ④ Unplug J6 to separate front panel and chassis.



[chassis panel]

• Removing the MAIN unit

- ① Remove the sealing rubber.
- ② Unsolder 2 points, (D), and unscrew 1 nut, (E).
- ③ Unscrew 2 screws, (F), and 6 screws, (G) (silver, 2 mm), to separate the chassis and MAIN unit.
- ④ Remove the MAIN unit in the direction of the arrow.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT

Received signals passed through the low-pass filter (L1–L3, C1–C7). The filtered signals are applied to the $\lambda/4$ type antenna switching circuit (D8, D32, L15, L16, C76–C78).

The antenna switching circuit functions as a low-pass filter while transmitting. However, its impedance becomes very high while D8 and D32 are turned ON. Thus transmit signals are blocked from entering the receiver circuits. The antenna switching circuit employs a $\lambda/4$ type diode switching system. The passed signals are then applied to the RF amplifier circuit.

4-1-2 RF CIRCUIT

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

The signals from the antenna switching circuit pass through a bandpass filter (D10, L26) after being amplified at the RF amplifier (Q29). The filtered signals are amplified at another RF amplifier (Q12), then applied to the 1st mixer circuit after out-of-band signals are suppressed at the bandpass filter (D11, D12, L18, L19, C92, C94, C96, C236).

D10–D12 employ varactor diodes that track the bandpass filters and are controlled by the T4/PWR signal from the CPU (IC8, pins 54–59). These diodes tune the center frequency of an RF passband for wide bandwidth receiving and good image response rejection.

4-1-3 1ST MIXER AND 1ST IF CIRCUITS

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

The signals from the RF circuit are mixed at the 1st mixer (Q13) with a 1st LO signal coming from the VCO circuit to produce a 30.85 MHz 1st IF signal.

The 1st IF signal is applied to a crystal filter (F11) to suppress out-of-band signals. The filtered 1st IF signal is applied to the IF amplifier (Q14), then applied to the 2nd mixer circuit (IC2, pin 16).

4-1-4 2ND IF AND DEMODULATOR CIRCUITS

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

The 1st IF signal from the IF amplifier is applied to the 2nd mixer section of the FM IF IC (IC2, pin 16), and is mixed with the 2nd LO signal to be converted to a 450 kHz 2nd IF signal.

The FM IF IC contains the 2nd mixer, limiter amplifier, quadrature detector and active filter circuits. A 30.4 MHz 2nd LO signal is produced at the PLL circuit by doubling its reference frequency.

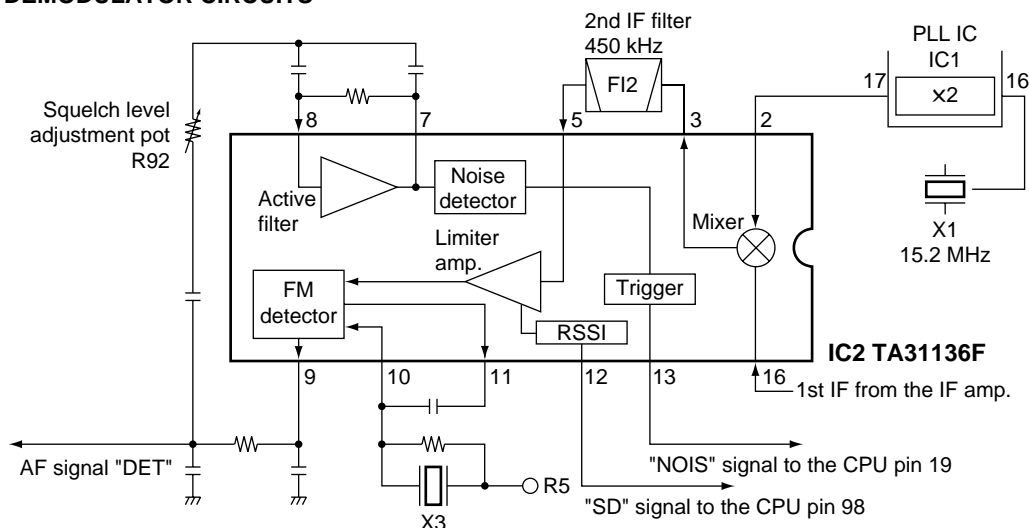
The 2nd IF signal from the 2nd mixer (IC2, pin 3) passes through a ceramic filter (F12) to remove unwanted heterodyned frequencies. It is then amplified at the limiter amplifier (IC2, pin 5) and applied to the quadrature detector (IC2, pins 10, 11) to demodulate the 2nd IF signal into AF signals.

4-1-5 AF CIRCUIT

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

AF signals from the FM IF IC (IC2, pin 9) are applied to the analog switch (IC4, pin 1) via the AF filter circuit (IC3b, pins 6, 7). The output signals from pin 11 are applied to the AF power amplifier (IC5, pin 4) after passing through the [VOL] control (VR board, R1).

•2nd IF AND DEMODULATOR CIRCUITS



The AF signals from the [VOL] control are applied to the AF power amplifier circuit (IC5, pin 4) to obtain the specified audio level. The amplified AF signals, output from pin 10, are applied to the internal speaker (SP1) via the [SP] jack when no plug is connected to the jack.

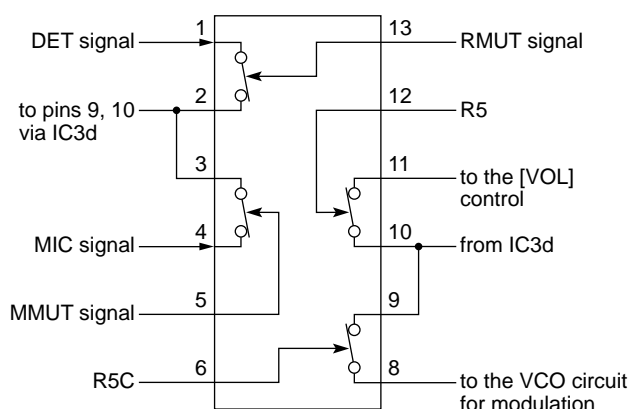
4-1-6 SQUELCH CIRCUIT

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

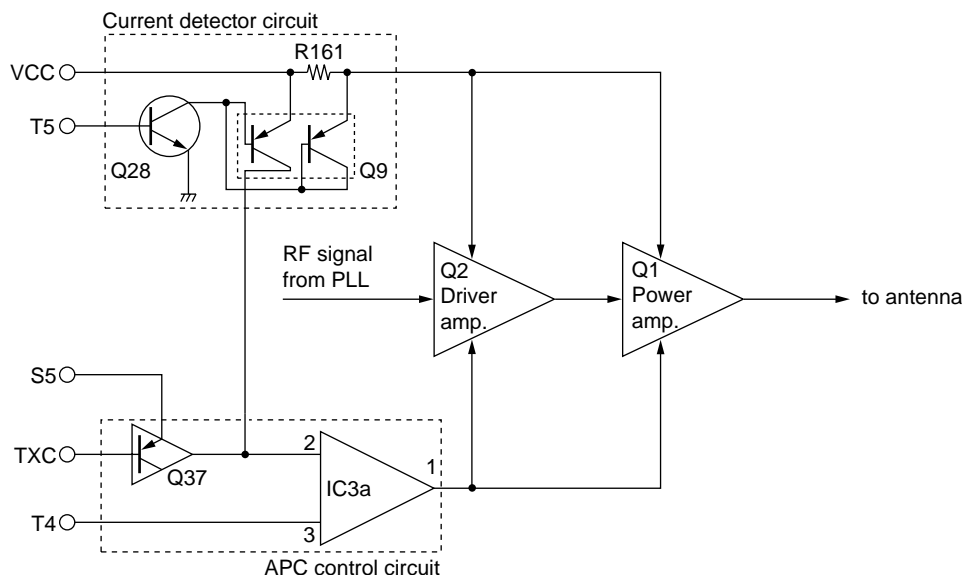
A portion of the AF signals from the FM IF IC (IC2, pin 9) are applied to the active filter section (IC2, pin 8) where noise components are amplified and detected with an internal noise detector. The squelch input level adjustment pot (R92) is connected in parallel to the active filter input (pin 8) to control the input noise level.

The trigger circuit converts the detected signals to a HIGH or LOW signal and applies this (from pin 13) to the CPU (IC8, pin 19) as the NOIS signal. When the CPU receives a HIGH level NOIS signal, the CPU controls the RMUT line to cut the AF signals at the analog switch IC (IC4). At the same time, the AFON line controls the AF regulator circuit (Q15, Q16) to cut out the VCC power source for the AF power amplifier (IC5).

• Analog switch (IC4)



• APC circuit



4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT

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

The AF signals from the microphone are applied to the microphone amplifier circuit (IC3c, pin 10). The amplified AF signals are passed through the low-pass filter circuit (IC3d, pins 13, 14) via the analog switch (IC4, pins 2, 3). The filtered AF signals are applied to the modulator circuit after passing through the analog switch (IC4, pins 8, 9) and the deviation adjustment pot (R119).

4-2-2 MODULATION CIRCUIT

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

The audio signals (SHIFT) change the reactance of D6 to modulate an oscillated signal at the VCO (Q7, Q8). The oscillated signal is amplified at the buffer-amplifiers (Q4, Q6), then applied to the T/R switching circuit (D3, D4).

4-2-3 DRIVE/POWER AMPLIFIER CIRCUITS

The signal from the VCO circuit passes through the T/R switching circuit (D3) and is amplified at the buffer (Q3), drive (Q2) and power (Q1) amplifiers to obtain 5.5 W (4.5 W: Thailand only) of RF power (at 9.6 V DC/typical). The amplified signal passes through the antenna switching circuit (D1), and low-pass filter (L1-L3, C1-C7) and is then applied to the antenna connector (J1).

The bias current of the drive (Q2) and power (Q1) amplifiers is controlled by the APC circuit to stabilize the output power.

4-2-4 CURRENT DETECTOR CIRCUIT

The current detector circuit (Q9, Q28, R161) detects total driving current of the drive and the power amplifiers, using the current sensor (R161). The differential amplifier (Q9) detects voltage differences between the current sensor input and output voltages, then outputs control voltage to the APC circuit.

4-2-5 APC CIRCUIT

The APC circuit (IC3a, Q37) protects drive and power amplifiers from excessive currents and selects HIGH or LOW output power.

The output voltage from the current detector circuit is applied to the inverting amplifier (IC3a, pin 2), and the T4/PWR signal from the CPU (IC8, pins 54–59) is applied to the other input for reference.

When the driving current increases, the input voltage of the differential amplifier (Q9, pin 1) will be decreased. In such cases, input voltage of the inverting amplifier (pin 2) is increased to decrease the output power.

Q37 is controlled by the TXC signal from the CPU (IC8, pin 50) to select HIGH or LOW output power.

4-3 PLL CIRCUIT

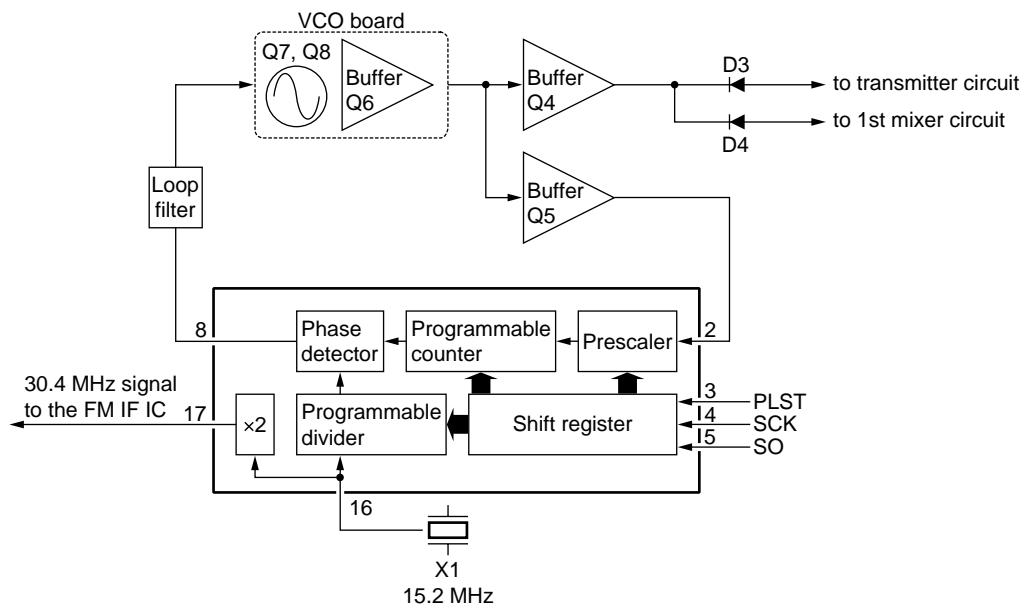
A PLL circuit provides stable oscillation of the transmit frequency and receive 1st LO frequency. The PLL output compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by the divided ratio (N-data) of a programmable divider.

The PLL circuit contains the VCO circuit (Q7, Q8, D6). The oscillated signal is amplified at the buffer-amplifiers (Q5, Q6) and then applied to the PLL IC (IC1, pin 2).

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

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

• PLL circuit



A portion of the VCO signal is amplified at the buffer-amplifier (Q4, Q6) and is then applied to the receive 1st mixer or transmit buffer-amplifier circuit via the T/R switching diode (D3, D4).

4-4 POWER SUPPLY CIRCUITS VOLTAGE LINE

Line	Description
BATT	The voltage from the attached battery pack/case.
VCC	The same voltage as the BATT line controlled by the [PWR/VOL] control.
CPU5	Common 5 V converted from the VCC line by the reference regulator circuit (IC6). The output voltage is applied to the CPU (IC8) and the 5V regulator circuit, etc.
5V	Common 5 V converted from the VCC line at the 5 V regulator circuit (Q18, Q19) using the CPU5 line voltage for reference.
T5	Transmit 5 V converted from the VCC line at the T5 regulator circuit (Q22, Q40).
R5	Receive 5 V converted from the 5 V line at the R5 regulator circuit (Q21). The regulated voltage is applied to the receiver circuits.
S5	Common 5 V converted from the 5V line by the S5 regulator circuit (Q20).
OPT	The same voltage as the 5V line for the optional HM-75A or HS-51 through a resistor (R132).

4-5 PORT ALLOCATIONS

CPU (IC8)

Pin number	Port name	Description
1	CIN	Input port for CTCSS signal for decoding.
9	RESET	Input port for the reset signal.
11	CSIFT	Output reference oscillator for the CPU control signal.
12	SCK	Output clock signal to the PLL (IC1) and EEPROM (IC7) ICs, etc.
13	SI	Input port for the data signals from EEPROM (IC7), etc.
14	SO	Output data signal to the PLL (IC1) and EEPROM (IC7) ICs, etc.
15	UNLK	Input port for PLL unlock signal from the PLL IC (IC1). High: During unlock
16	CLIN	Input port for the cloning signal.
17	CLOUT	Output port for the cloning signal.
18	PLST	Outputs strobe signals to the PLL IC (IC1).
19	NOIS	Input port for noise signals (pulse type) from the FM IF IC (IC2, pin 13).
26	CONT	Outputs LCD contrast control signal. High: When normal level is selected.
36–41	KS0–KS5	Output ports for key matrix.
42	MMUT	Outputs the analog switch (IC4) control signal. Low : While DTMF or ANI signals are output.
43	RMUT	Outputs the analog switch (IC4) control signal. Low : While muted.
44–47	KR0–KR5	Input ports for key matrix.
48	R5C	Outputs R5 regulator control signal. Low : While receiving
49	S5C	Output S5 regulator control signal. Low : While power is ON.
50	TXC	Outputs transmit output power select (HIGH or LOW) signal. Low : HIGH power is selected.
51	T5C	Input ports for the [PTT] switch. High: While [PTT] is pushed
52	LIGHT	Outputs LCD backlight control signal. High: When backlighting is ON
53	AFON	Outputs the regulator circuit control signal for the AF amplifier. High: While AF amplifier is activated.

Pin number	Port name	Description
54–60	T4/PWR	Output ports for: •tunable bandpass filter control signal while receiving. •reference signal for the APC circuit while transmitting.
90	BEEP	Outputs beep audio signals.
91	DTMF	Outputs DTMF signals while pushing the keypad during transmit.
94	PTT	Input port for the [PTT] switch.
96	TEMP	Input port for internal temperature detection.
98	SD	Input port for the S-meter signal from the FM IF IC (IC2, pin 12).
100	VIN	Input port for overvoltage detection from the connected power supply or battery pack.

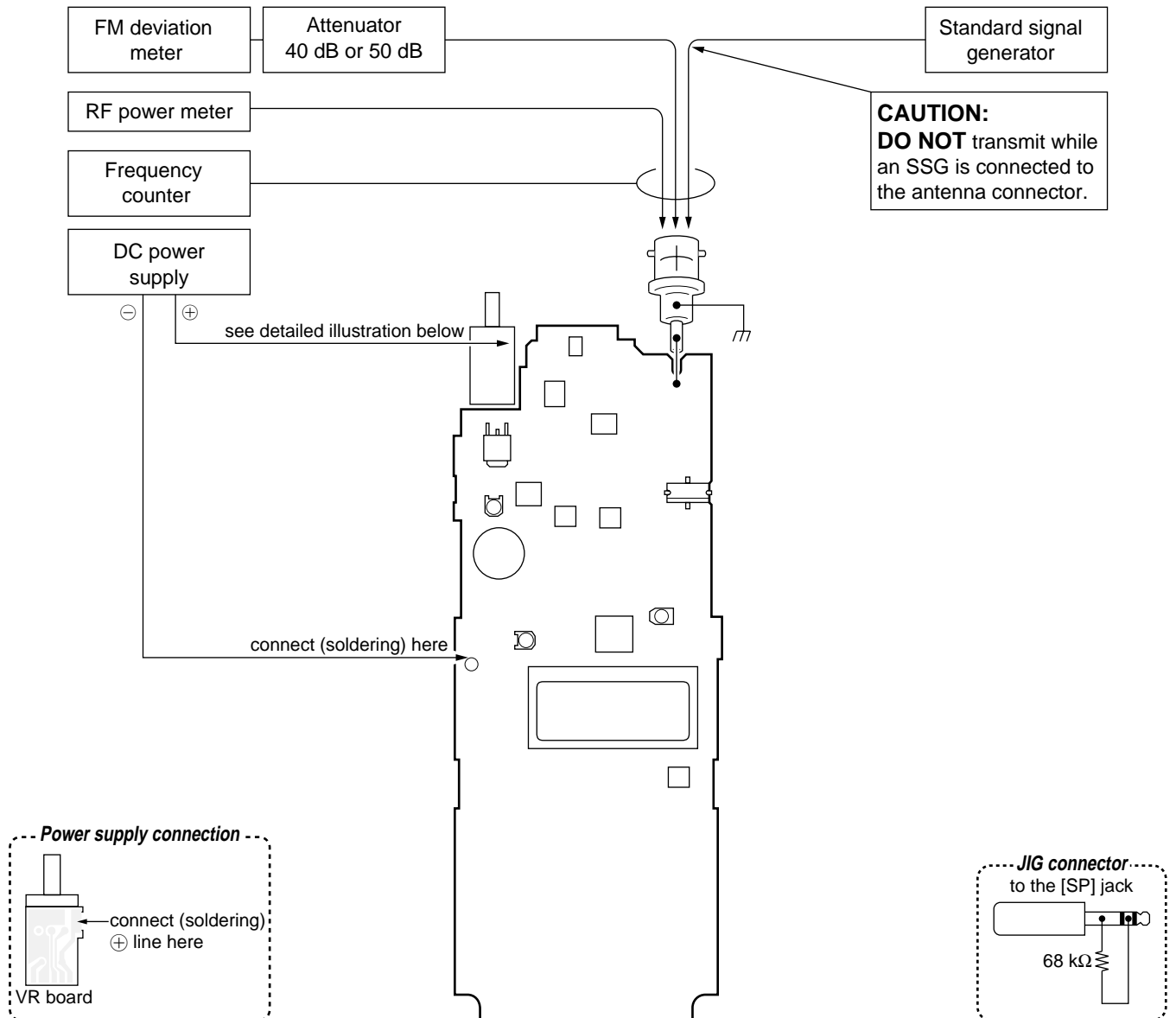
SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 9.6 V DC Current capacity : 5 A or more	Audio generator	Frequency range : 300–3000 Hz Measuring range : 1–500 mV
RF power meter (terminated type)	Measuring range : 1–10 W Frequency range : 120–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Attenuator	Power attenuation : 40 or 50 dB Capacity : 10 W or more
Frequency counter	Frequency range : 0.1–300 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Standard signal generator (SSG)	Frequency range : 0.1–300 MHz Output level : 0.1 μV–32 mV (–127 to –17 dBm)
FM deviation meter	Frequency range : DC–300 MHz Measuring range : 0 to 5 kHz	DC voltmeter	Input impedance : 50 kΩ/V DC or better
Digital multimeter	Input impedance : 10 MΩ/V DC or better	Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
		AC millivoltmeter	Measuring range : 10 mV–10 V

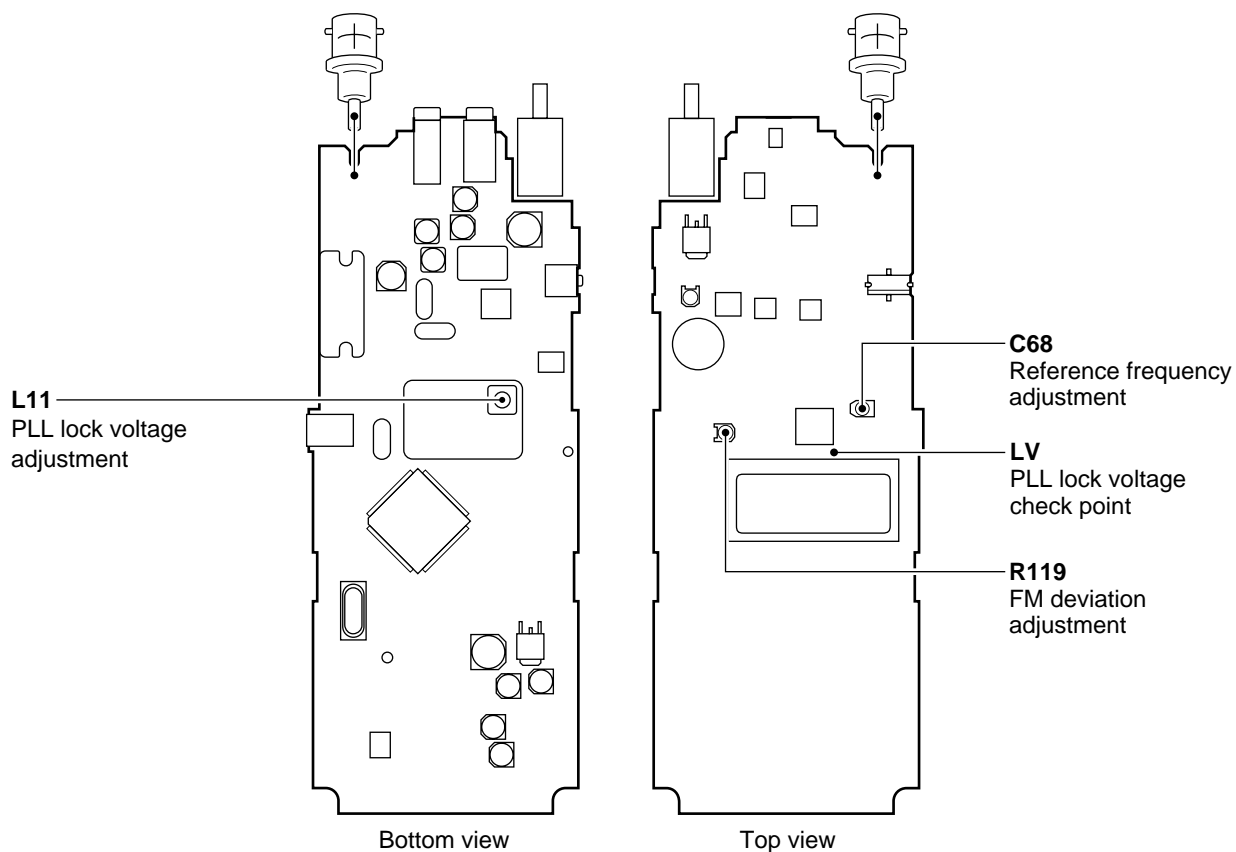
■ CONNECTIONS



5-2 PLL AND TRANSMITTER ADJUSTMENTS

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
PLL LOCK VOLTAGE	1 <ul style="list-style-type: none"> • Operating frequency : 146.000 MHz • Receiving 	MAIN	Connect a digital multi-meter to the check point LV.	1.40 V	VCO board	L11
REFERENCE FREQUENCY	1 <ul style="list-style-type: none"> • Operating frequency : 146.000 MHz • Transmitting 	Top panel	Connect an RF power meter or a terminator to the antenna connector and loosely couple a frequency counter.	146.000000 MHz	MAIN	C68
OUTPUT POWER	1 <ul style="list-style-type: none"> • Operating frequency : 146.000 MHz • HIGH/LOW switch : HIGH • Connect the "JIG" to the [SP] jack. • Transmitting 	Top panel	Connect an RF power meter to the antenna connector.	4.5 W [THA] 5.5 W [other]	Front Panel	Push [▲] or [▼] switch while transmitting.
	2 <ul style="list-style-type: none"> • HIGH/LOW switch : LOW • Transmitting 			1.0 W		
FM DEVIATION	1 <ul style="list-style-type: none"> • Operating frequency : 146.000 MHz • HIGH/LOW switch : HIGH • Connect an audio generator to the [MIC] jack and set as : 1 kHz/90 mV • Set an FM deviation meter as: HPF : OFF LPF : 20 KHz De-emphasis : OFF Detector : (P-P)/2 • Transmitting 	Top panel	Connect an FM deviation meter to the antenna connector through an attenuator.	±4.5 kHz	MAIN	R119

• MAIN unit

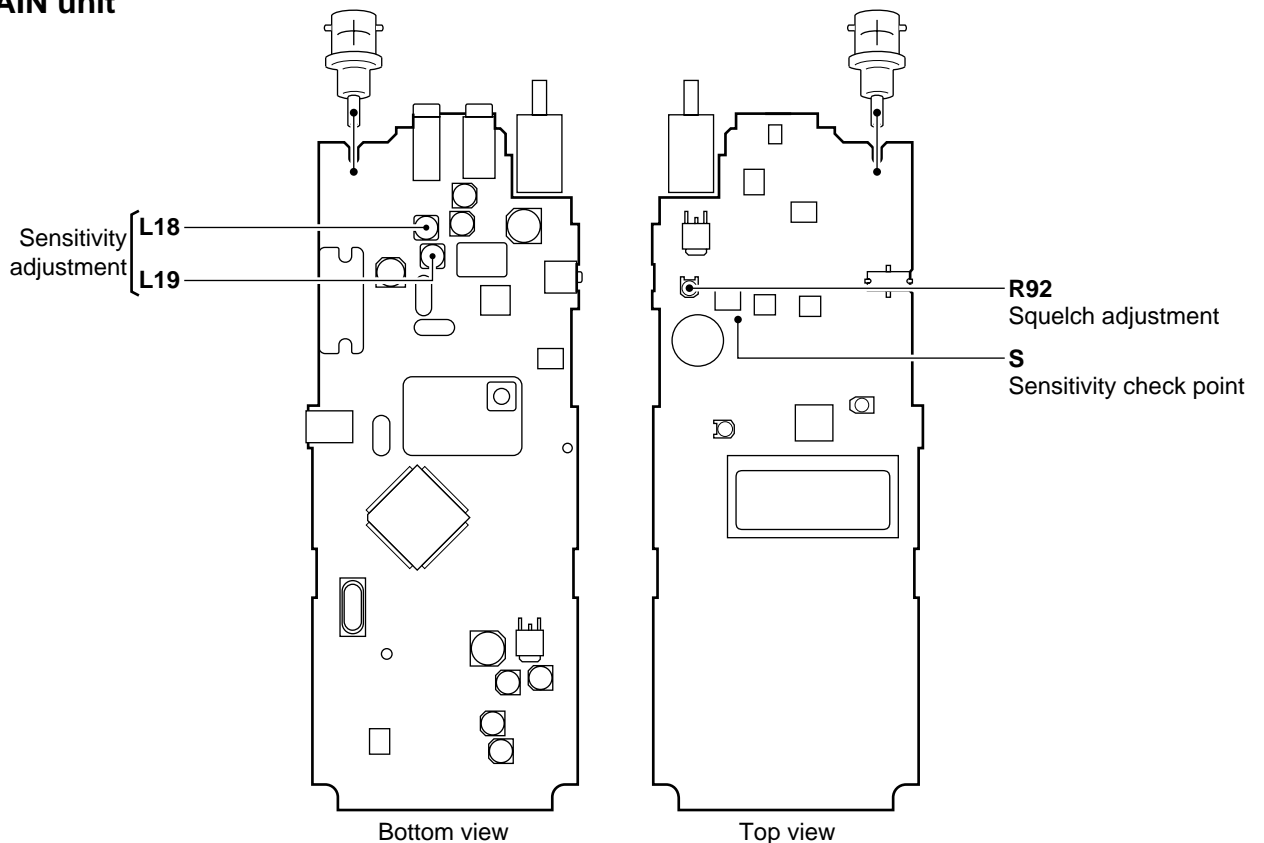


5-3 RECEIVER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	1 <ul style="list-style-type: none"> Operating freq. : 146.000 MHz Connect an SSG to the antenna connector and set as: <ul style="list-style-type: none"> Frequency : 146.000 MHz Level : 1 μV* (-107 dBm) Modulation : 1 kHz Deviation : \pm3.5 kHz Receiving 	MAIN	Connect a digital voltmeter to check point S.	Maximum level	MAIN	Adjust in sequence L18, L19
S-METER	1 <ul style="list-style-type: none"> Operating freq. : 146.000 MHz Connect the "JIG" to the [SP] jack. Connect an SSG to the antenna connector and set as: <ul style="list-style-type: none"> Frequency : 146.000 MHz Level : 0.5 μV* (-113 dBm) Modulation : OFF Receiving 	Front panel	LCD		Front panel	Push and hold the [◀] switch.
	2 <ul style="list-style-type: none"> Set an SSG output level for the S-meter to S3 (3 dot). 	SSG	Output level	0.89–0.28 μ V (-106 to -118 dBm)		Verify
SQUELCH	1 <ul style="list-style-type: none"> Operating freq. : 146.000 MHz SQL set : Auto Connect an SSG to the antenna connector and set as: <ul style="list-style-type: none"> Frequency : 146.000 MHz Level : 0.1 μV* (-127 dBm) Modulation : 1 kHz Deviation : \pm3.5 kHz Receiving 	Speaker		At the point where the AF signals just disappear.	MAIN	R92

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

• MAIN unit



SECTION 6 PARTS LIST

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
IC1	1130007610	S.IC	μPD3140GS-E1 (DS8)	
IC2	1110003490	S.IC	TA31136FN (D/EL)	
IC3	1110003780	S.IC	NJM2902V-TE1	
IC4	1130008090	S.IC	BU4066BCFV-E1	
IC5	1110001810	S.IC	TA7368F (TP1)	
IC6	1180001080	S.IC	S-81250PG-PD-T1	
IC7	1140006050	S.IC	X25040SI-2.7T6	
IC8	1140006470	S.IC	HD6433875A41H	[THA] only
	1140006560	S.IC	HD6433875A45H	other
IC9	1130007560	S.IC	LC73881M-TLM	[ANI] only
IC10	1130004170	S.IC	TC4S01F (TE85R)	[ANI] only
IC11	1110003500	S.IC	S-80742SL-A6-T1	
Q1	1560001060	S.FET	2SK3075 (TE12L)	
Q2	1560001100	S.FET	2SK3074 (TE12L)	
Q3	1530000371	S.TRANSISTOR	2SC3356 R25-T2B	
Q4	1530002560	S.TRANSISTOR	2SC4403-3-TL	
Q5	1530002920	S.TRANSISTOR	2SC4226-T2 R25	
Q9	1590002160	S.TRANSISTOR	XP6401-(TX)	
Q12	1560000800	S.FET	2SK360IG-TR (D/E)	
Q13	1560000800	S.FET	2SK360IG-TR (D/E)	
Q14	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)	
Q15	1520000650	S.TRANSISTOR	2SB1201-S-TL	
Q16	1590001190	S.TRANSISTOR	XP6501-(TX).AB	
Q17	1520000430	S.TRANSISTOR	2SB1462-R(TX)	
Q18	1520000650	S.TRANSISTOR	2SB1201-S-TL	
Q19	1590001190	S.TRANSISTOR	XP6501-(TX).AB	
Q20	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)	
Q21	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)	
Q22	1520000460	S.TRANSISTOR	2SB1132 T100 R	
Q23	1530002280	S.TRANSISTOR	2SC4081 T107 S	
Q25	1530002280	S.TRANSISTOR	2SC4081 T107 S	
Q27	1520000460	S.TRANSISTOR	2SB1132 T100 R	
Q28	1530002280	S.TRANSISTOR	2SC4081 T107 S	
Q29	1530002920	S.TRANSISTOR	2SC4226-T2 R25	
Q31	1590000660	S.TRANSISTOR	DTC144TU T107	
Q32	1590001070	S.TRANSISTOR	UN521D (TX)	
Q33	1530002280	S.TRANSISTOR	2SC4081 T107 S	
Q34	1560000540	S.FET	2SK880-Y (TE85R)	
Q35	1530002280	S.TRANSISTOR	2SC4081 T107 S	
Q36	1530002280	S.TRANSISTOR	2SC4081 T107 S	
Q37	1590000720	S.TRANSISTOR	DTA144EUA T106	
Q39	1590001060	S.TRANSISTOR	DTA114TUA T106	[ANI] only
Q40	1590001170	S.TRANSISTOR	XP1501-(TX).AB	
D1	1790000620	S.DIODE	MA77 (TX)	
D3	1790000620	S.DIODE	MA77 (TX)	
D4	1790000620	S.DIODE	MA77 (TX)	
D8	1710000870	S.DIODE	HVU131TRF	
D10	1720000370	S.VARICAP	HVU350TRF	
D11	1720000370	S.VARICAP	HVU350TRF	
D12	1720000370	S.VARICAP	HVU350TRF	
D14	1790001260	S.DIODE	MA2S077-(TX)	
D15	1790001280	S.DIODE	MA111 (TX)	
D16	1790001200	S.DIODE	MA6S121 (TX)	
D17	1790001200	S.DIODE	MA6S121 (TX)	
D18	1790001280	S.DIODE	MA111 (TX)	except [THA]
D20	1790001280	S.DIODE	MA111 (TX)	[ANI] only
D22	1160000050	S.DIODE	DAP202U T107	[USA]
	1750000220	S.DIODE	DA113W T107	[ITA], [CSA/CSA-1], [TWN]
D23	1750000240	S.DIODE	DA112 T107	[EUR], [UK], [THA]
D24	1750000130	S.DIODE	DA112 T107	[THA], [TWN]
D25	1790000670	S.DIODE	DA204U T107	
D27	1750000130	S.DIODE	SB07-03C-TB	
D27	1750000130	S.DIODE	DA204U T107	
D31	1790001280	S.DIODE	MA111(TX)	[ANI] only
D32	1710000870	S.DIODE	HVU131TRF	
D33	1790001280	S.DIODE	MA111(TX)	[TWN] only
D34	1790001280	S.DIODE	MA111(TX)	
F11	2020001300	XTAL	FL-251 (30.850 MHz)	
F12	2020001270	CERAMIC	CFWM450E	

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
X1	6050009420	XTAL	CR-514 (15.200000 MHz)
X2	6050010110	S.XTAL	CR-584 (6.79966 MHz)
X3	6050009020	S.CERAMIC	EFOS4194E3 [ANI] only
X4	6070000210	S.DISCRIMINATOR	CDBCA450CX24
L1	6200008260	S.COIL	0.30-1.7-8TL 60N
L2	6200008260	S.COIL	0.30-1.7-8TL 60N
L3	6200008260	S.COIL	0.30-1.7-8TL 60N
L4	6200008710	S.COIL	0.28-1.1-4-TR 14.3N
L5	6200008480	S.COIL	0.30-1.4-5-TR 25N
L6	6200002820	S.COIL	LQN 1A 47NJ04
L7	6200006990	S.COIL	ELJRE 56NG-F
L8	6200006990	S.COIL	ELJRE 56NG-F
L10	6200003640	S.COIL	MLF1608K 100K-T
L13	6200002930	S.COIL	ELJFC 1R5K-F
L14	6200007000	S.COIL	ELJRE 82NG-F
L15	6200008260	S.COIL	0.30-1.7-8TL 60N
L16	6200008500	S.COIL	0.30-1.3-6TL 28N
L17	6200005700	S.COIL	ELJRE 22NG-F
L18	6150004960	S.COIL	LS-523
L19	6150004960	S.COIL	LS-523
L20	6200004950	S.COIL	NL 252018T-1R8J
L21	6200003550	S.COIL	MLF1608A 4R7K-T
L22	6200002710	S.COIL	ELJFC 1R8K-F
L24	6200004480	S.COIL	MLF1608D R82K-T
L25	6200002930	S.COIL	ELJFC 1R5K-F
L26	6200006990	S.COIL	ELJRE 56NG-F
L30	6200006990	S.COIL	ELJRE 56NG-F
L31	6200005730	S.COIL	ELJRE 39NG-F
L32	6200006990	S.COIL	ELJRE 56NG-F
L33	6200005720	S.COIL	ELJRE 33NG-F
L34	6200003640	S.COIL	MLF1608K 100K-T
L35	6200006980	S.COIL	ELJRE R10G-F
			[EUR], [UK], [ITA], [USA]
R2	7030005320	S.RESISTOR	RR0816P-103-D (10 kΩ)
R3	7030005390	S.RESISTOR	RR0816P-102-D (1 kΩ)
R5	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R7	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R9	7030003290	S.RESISTOR	ERJ3GEYJ 560 V (56 Ω)
R10	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R11	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R12	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R13	7030003270	S.RESISTOR	ERJ3GEYJ 390 V (39 Ω)
R15	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R16	7030003370	S.RESISTOR	ERJ3GEYJ 271 V (270 Ω)
R18	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R20	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R21	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R30	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R32	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R33	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R34	7030003420	S.RESISTOR	ERJ3GEYJ 681 V (680 Ω)
R45	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R46	7030003290	S.RESISTOR	ERJ3GEYJ 560 V (56 Ω)
R47	7030003330	S.RESISTOR	ERJ3GEYJ 121 V (120 Ω)
R48	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R49	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R52	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R53	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (100 kΩ)
R54	7030008050	S.RESISTOR	RR0816R-184-D (180 kΩ)
R55	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R58	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)
R59	7030003220	S.RESISTOR	ERJ3GEYJ 150 V (15 Ω)
R61	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R62	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R64	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R66	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R68	7030003300	S.RESISTOR	ERJ3GEYJ 680 V (68 Ω)
			[SEA], [THA], [CSA/CSA-1], [TWN], [ANI]
R69	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)
			[SEA], [THA], [CSA/CSA-1], [TWN], [ANI]
	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
			[EUR], [UK], [ITA], [USA]

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION
R70	7030003480	S.RESISTOR ERJ3GEYJ 222 V (2.2 kΩ)
R71	7030003290	S.RESISTOR ERJ3GEYJ 560 V (56 Ω)
R76	7030003480	S.RESISTOR ERJ3GEYJ 222 V (2.2 kΩ)
R77	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω)
R79	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R80	7030003670	S.RESISTOR ERJ3GEYJ 823 V (82 kΩ)
R81	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω)
R82	7030003450	S.RESISTOR ERJ3GEYJ 122 V (1.2 kΩ)
R83	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω)
R84	7030003390	S.RESISTOR ERJ3GEYJ 391 V (390 Ω)
R85	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R86	7030003670	S.RESISTOR ERJ3GEYJ 823 V (82 kΩ)
R87	7030003460	S.RESISTOR ERJ3GEYJ 152 V (1.5 kΩ)
R88	7030003720	S.RESISTOR ERJ3GEYJ 224 V (220 kΩ)
R89	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R90	7510000890	S.THERMISTOR NTCCF2012 3NH 153KC-T
R91	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)
R92	7310002760	S.TRIMMER RV-152 (RH03A3AJ4X0HA) 223
R93	7030003570	S.RESISTOR ERJ3GEYJ 123 V (12 kΩ)
R94	7030003770	S.RESISTOR ERJ3GEYJ 564 V (560 kΩ)
R95	7030003750	S.RESISTOR ERJ3GEYJ 394 V (390 kΩ)
R96	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R97	7030003710	S.RESISTOR ERJ3GEYJ 184 V (180 kΩ)
R98	7030003710	S.RESISTOR ERJ3GEYJ 184 V (180 kΩ)
R99	7030003540	S.RESISTOR ERJ3GEYJ 682 V (6.8 kΩ)
R100	7030003470	S.RESISTOR ERJ3GEYJ 182 V (1.8 kΩ)
R101	7030003800	S.RESISTOR ERJ3GEYJ 105 V (1 MΩ)
R102	7030003200	S.RESISTOR ERJ3GEYJ 100 V (10 Ω)
R103	7030003570	S.RESISTOR ERJ3GEYJ 123 V (12 kΩ)
R104	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R105	7030003320	S.RESISTOR ERJ3GEYJ 101 V (100 Ω)
R106	7030003570	S.RESISTOR ERJ3GEYJ 123 V (12 kΩ)
R107	7030003710	S.RESISTOR ERJ3GEYJ 184 V (180 kΩ)
R108	7030003750	S.RESISTOR ERJ3GEYJ 394 V (390 kΩ)
R109	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R112	7030003800	S.RESISTOR ERJ3GEYJ 105 V (1 MΩ)
R114	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R115	7030003690	S.RESISTOR ERJ3GEYJ 124 V (120 kΩ)
R116	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R117	7030003460	S.RESISTOR ERJ3GEYJ 152 V (1.5 kΩ)
R118	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R119	7310002600	S.TRIMMER RV-110 (RH03A3AS4X0AA) 473
R120	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)
R121	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R122	7030003470	S.RESISTOR ERJ3GEYJ 182 V (1.8 kΩ)
R123	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R125	7030003720	S.RESISTOR ERJ3GEYJ 224 V (220 kΩ)
R126	7030003570	S.RESISTOR ERJ3GEYJ 123 V (12 kΩ)
R127	7030003200	S.RESISTOR ERJ3GEYJ 100 V (10 Ω)
R128	7030003200	S.RESISTOR ERJ3GEYJ 100 V (10 Ω)
R130	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R131	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω)
R132	7030000340	S.RESISTOR MCR10EZJH 470 Ω (471)
R133	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R134	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R137	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R139	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R141	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R144	7030003620	S.RESISTOR ERJ3GEYJ 333 V (33 kΩ)
R146	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R147	7030003720	S.RESISTOR ERJ3GEYJ 224 V (220 kΩ)
R148	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R149	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R151	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R155	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω)
R156	7030000170	S.RESISTOR MCR10EZJH 18 Ω (180)
R157	7030000170	S.RESISTOR MCR10EZJH 18 Ω (180)
R158	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R159	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R160	7030000270	S.RESISTOR MCR10EZJH 120 Ω (121)
R161	7030007330	S.RESISTOR ERJ1WRSJR15U (0.15 Ω)
R162	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R163	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)
R166	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R167	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R168	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R169	7030003550	S.RESISTOR ERJ3GEYJ 822 V (8.2 kΩ)
R174	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)
R176	7030003530	S.RESISTOR ERJ3GEYJ 562 V (5.6 kΩ)
R178	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R181	7030005870	S.RESISTOR RR0816R-104-D (100 kΩ)
R182	7510000910	S.THERMISTOR NTCCF2012 4AH 473KC-T

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION
R183	7030003380	S.RESISTOR ERJ3GEYJ 331 V (330 Ω)
R186	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R191	7030003590	S.RESISTOR ERJ3GEYJ 183 V (18 kΩ)
R192	7030003590	S.RESISTOR ERJ3GEYJ 183 V (18 kΩ)
R195	7030003590	S.RESISTOR ERJ3GEYJ 183 V (18 kΩ)
R196	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R197	7030003780	S.RESISTOR ERJ3GEYJ 684 V (680 kΩ)
R199	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R200	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R202	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R203	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R204	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)
R205	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)
R207	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R208	7030003650	S.RESISTOR ERJ3GEYJ 563 V (56 kΩ)
R209	7030003770	S.RESISTOR ERJ3GEYJ 564 V (560 kΩ)
R210	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R213	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R214	7030003570	S.RESISTOR ERJ3GEYJ 123 V (12 kΩ)
R215	7030005520	S.RESISTOR RR0816R-334-D (330 kΩ)
R216	7030005630	S.RESISTOR RR0816R-154-D (150 kΩ)
R217	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ) [ANI] only
R218	7030003630	S.RESISTOR ERJ3GEYJ 393 V (39 kΩ)
R219	7030003660	S.RESISTOR ERJ3GEYJ 683 V (68 kΩ)
R220	7030003720	S.RESISTOR ERJ3GEYJ 224 V (220 kΩ)
R221	7030003740	S.RESISTOR ERJ3GEYJ 334 V (330 kΩ)
R224	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R226	7410000950	S.ARRAY EXB-V8V 102JV
R227	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R229	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)
R230	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R231	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R234	7030003670	S.RESISTOR ERJ3GEYJ 823 V (82 kΩ)
R235	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R236	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R237	7410000750	S.ARRAY EXB-V4V 104JV (100 kΩ)
R238	7030003220	S.RESISTOR ERJ3GEYJ 150 V (15 Ω)
R239	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R240	7030003320	S.RESISTOR ERJ3GEYJ 101 V (100 Ω)
	7030003400	S.RESISTOR ERJ3GEYJ 471 V (470 Ω) [SEA], [THA], [CSA/CSA-1], [TWN], [ANI] [EUR], [UK], [ITA], [USA]
R242	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R243	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R245	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R246	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)
R247	7030003670	S.RESISTOR ERJ3GEYJ 823 V (82 kΩ)
R248	7030003710	S.RESISTOR ERJ3GEYJ 184 V (180 kΩ)
R249	7030003740	S.RESISTOR ERJ3GEYJ 334 V (330 kΩ)
R252	7410000770	S.ARRAY EXB-V4V 102JV (1 kΩ)
R253	7410000950	S.ARRAY EXB-V8V 102JV
R254	7410000770	S.ARRAY EXB-V4V 102JV (1 kΩ)
R255	7410000950	S.ARRAY EXB-V8V 102JV
R256	7410000950	S.ARRAY EXB-V8V 102JV
R257	7410000770	S.ARRAY EXB-V4V 102JV (1 kΩ)
R258	7030003780	S.RESISTOR ERJ3GEYJ 684 V (680 kΩ)
R259	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R260	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R261	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R262	7030003580	S.RESISTOR ERJ3GEYJ 153 V (15 kΩ)
R263	7030003720	S.RESISTOR ERJ3GEYJ 224 V (220 kΩ)
R264	7030005520	S.RESISTOR RR0816R-334-D (330 kΩ)
R266	7030003340	S.RESISTOR ERJ3GEYJ 151 V (150 Ω)
R267	7030003540	S.RESISTOR ERJ3GEYJ 682 V (6.8 kΩ)
R268	7030003570	S.RESISTOR ERJ3GEYJ 123 V (12 kΩ)
R269	7030003600	S.RESISTOR ERJ3GEYJ 223 V (22 kΩ)
R272	7030003520	S.RESISTOR ERJ3GEYJ 472 V (4.7 kΩ)
R279	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)
R280	7030003250	S.RESISTOR ERJ3GEYJ 270 V (27 Ω)
R281	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R282	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R283	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R284	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R285	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R286	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R287	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R289	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R290	7030003440	S.RESISTOR ERJ3GEYJ 102 V (1 kΩ)
R291	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ) [ANI] only
R292	7030003290	S.RESISTOR ERJ3GEYJ 560 V (56 Ω)
R294	7030003560	S.RESISTOR ERJ3GEYJ 103 V (10 kΩ)

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R295	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R296	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R297	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R298	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)
C1	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A
C2	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A
C3	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C4	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A
C5	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C6	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A
C7	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C8	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C9	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C10	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C11	4030007100	S.CERAMIC	C1608 CH 1H 560J-T-A
C13	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C14	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C15	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C17	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C19	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C20	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C21	4510004640	S.ELECTROL	ECEV1CA470SP
C22	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C23	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C24	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C25	4030007060	S.CERAMIC	C1608 CH 1H 270J-T-A
C26	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C27	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C28	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C30	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C31	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C32	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C46	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C47	4550006360	S.TANTALUM	ECST1VY104R
C48	4550006160	S.TANTALUM	ECST1CY155R
C51	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C53	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A
C54	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C56	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C63	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A
C64	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C65	4030009910	S.CERAMIC	C1608 CH 1H 040B-T-A
C66	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C67	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C68	4610002140	S.TRIMMER	CTZ3S-20C-WI-PF
C69	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C70	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C71	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C73	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C75	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C76	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C77	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C78	4030009530	S.CERAMIC	C1608 CH 1H 030B-T-A
C79	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A
C80	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A
C81	4030007150	S.CERAMIC	C1608 CH 1H 151J-T-A
C85	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A
C87	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C90	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C92	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C94	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C95	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C96	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C97	4030009560	S.CERAMIC	C1608 CH 1H R75B-T-A
C99	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C102	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
			[SEA], [THA], [CSA/CSA-1], [TWN], [ANI] [EUR], [UK], [ITA], [USA]
C105	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C106	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C107	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C108	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C110	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C111	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C112	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C113	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C114	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C116	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C117	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C118	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C119	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C120	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C121	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C122	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C123	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C124	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C125	4030008650	S.CERAMIC	C1608 JB 1H 332K-T-A
C126	4030008850	S.CERAMIC	C1608 JB 1C 123K-T-A
C128	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C129	4550006680	S.TANTALUM	ECST0JY156R
C131	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C132	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A
C133	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C134	4030007140	S.CERAMIC	C1608 CH 1H 121J-T-A
C135	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C136	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A
C137	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C138	4550006600	S.TANTALUM	ECST0JY335R
C139	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C140	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C141	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C142	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C144	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C145	4510007120	S.ELECTROL	ECEV1AA101SP
C146	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C147	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C148	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C149	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C150	4550006700	S.TANTALUM	ECST1AY106R
C151	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C152	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C153	4510005370	S.ELECTROL	ECEV1AA221P
C154	4550006200	S.TANTALUM	ECST0JY106R
C155	4510004630	S.ELECTROL	ECEV1CA100SR
C156	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C157	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C158	4510005320	S.ELECTROL	ECEV0JA101SP
C159	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C160	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C161	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C162	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C163	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C164	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C165	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C166	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C167	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C169	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C170	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C171	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C172	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C173	4510004640	S.ELECTROL	ECEV1CA470SP
C174	4510005430	S.ELECTROL	ECEV0JA220SR
C175	4510005430	S.ELECTROL	ECEV0JA220SR
C176	4510005430	S.ELECTROL	ECEV0JA220SR
C177	4550006680	S.TANTALUM	ECST0JY156R
C179	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C193	4030006970	S.CERAMIC	C1608 CH 1H 060D-T-A
C194	4030007060	S.CERAMIC	C1608 CH 1H 270J-T-A
C195	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C196	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C197	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C198	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C199	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C200	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C201	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C202	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C203	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C204	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C205	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C211	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C212	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C213	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C217	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C218	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C220	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C222	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C225	4030008850	S.CERAMIC	C1608 JB 1C 123K-T-A
C226	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C227	4030008890	S.CERAMIC	C1608 JB 1C 273K-T-A
C228	4030008650	S.CERAMIC	C1608 JB 1H 332K-T-A
C230	4550006140	S.TANTALUM	ECST1EY474R

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C231	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C232	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C233	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C234	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C236	4030009530	S.CERAMIC	C1608 CH 1H 030B-T-A
C243	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C245	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C246	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C247	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C248	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C249	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C250	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C251	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C252	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C256	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C258	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C260	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C264	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C272	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C278	4550006680	S.TANTALUM	ECST0JY156R
C279	4030007120	S.CERAMIC	C1608 CH 1H 820J-T-A
C281	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C285	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C290	4030009000	S.CERAMIC	C2012 JB 1C 224K-T-A
C291	4550006150	S.TANTALUM	ECST1CY105R
C295	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C296	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C298	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C299	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C300	4550006650	S.TANTALUM	ECST1CY685R
J2	6450001680	CONNECTOR	HSJ1122-010010
J3	6450001690	CONNECTOR	HSJ1456-01-220
J4	6450000870	CONNECTOR	HEC2711-01-020
J5	6510007080	CONNECTOR	PI28A-02M
J6	6910010850	CONNECTOR	IMSA-9230B-1-05Z080-T
DS1	5030001460	LCD	LM-1462B
DS2	5010000160	S.LED	LNJ310M6URA
DS3	5010000160	S.LED	LNJ310M6URA
DS4	5040002190	S.LED	LNJ808R8ERA
MC1	7700002160	MICROPHON	KUC3523-040245
S1	2230000900	S.SWITCH	JPM1990-2013R
W1	7030003860	S.JUMPER	ERJ3GE JPW V
W10	7030003860	S.JUMPER	ERJ3GE JPW V
EP1	910050712	PCB	B 5193B
EP2	8930042590	LCD CONTACT	SRCN-1922-SP-N-W

[ANI] only

[VCO BOARD]

REF NO.	ORDER NO.	DESCRIPTION	
Q6	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q7	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q8	1530002920	S.TRANSISTOR	2SC4226-T2 R25
D5	1720000370	S.VARICAP	HVU350TRF
D6	1790000620	S.DIODE	MA77 (TX)
L10	6200006670	S.COIL	ELJRE 68NG-F
L11	6130002760	S.COIL	LB-312
L12	6200004480	S.COIL	MLF1608D R82K-T
R22	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R23	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R24	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R25	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R26	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R27	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R28	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R29	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
C33	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C34	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C35	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C36	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C37	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C38	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C39	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C40	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C41	4030007060	S.CERAMIC	C1608 CH 1H 270J-T-A
C44	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C45	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C259	4030007160	S.CERAMIC	C1608 CH 1H 181J-T-A
J1	6910010840	CONNECTOR	IMSA-9230B-1-05Z057-T
EP1	910050691	PCB	B 5195A

[VR BOARD]

REF NO.	ORDER NO.	DESCRIPTION	
R1	7210002950	VARIABLE	RV-312 (RK0971110)
C1	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
EP1	910050701	PCB	B 5196A

S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 CABINET PARTS

[CHASSIS PARTS]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510020350	ANT connector BNC-R148	1
SP 1	2510000960	Speaker K036NA500-26	1
MP1	8010017200	2078 Chassis	1
MP2	8210014430	1902 Front panel	1
MP3	8210014340	1922 PTT panel	1
MP4	8210014330	1922 Contact base	1
MP5	8610010420	Knob N261	1
MP6	8930048080	1922 10-Key (A)	1
MP7	8930042070	1922 MIC cap	1
MP8	8930042050	1922 DC cap	1
MP10	8930042090	1922 Plus terminal	1
MP11	8930042080	1922 Minus terminal	1
MP13	8930011900	SP net (A) FX573	1
MP14	8930042060	1922 LCD holder	1
MP15	8210014380	1922 Reflector	1
MP16	8310040680	1922 Window plate (E)	1
MP17	8930042680	1902 MIC seal	1
MP18	8930042790	1902 Rear sheet (C) [THA]	1
	8930047930	1902 Rear sheet (J) [SEA], [CSA/-1], [TWN], [ANI]	1
	8930047940	1902 Rear sheet (K) [USA]	1
	8930047950	1902 Rear sheet (L) [EUR], [UK], [ITA]	1
MP19	8830001250	Nut antenna connector-101	1
MP20	8810000100	Screw PH M2x4 ZK	2
MP21	8810009510	Screw PH BT M2x4 NI-ZU	6
MP22	8810009510	Screw PH BT M2x4 NI-ZU	1

Screw abbreviations: PH: Pan head B0: Self-tapping
NI: Nickel ZK: Black

[CHASSIS PARTS]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
MP23	8810009510	Screw PH BT M2x4 NI-ZU	2
MP24	8810009560	Screw PH BT M2x6 ZK	2
MP25	8810009560	Screw PH BT M2x6 ZK	2
MP26	8830001010	Hex nut (A)	1
MP28	8510011170	1902 VCO cover	1
MP30	8510011241	1902 PA shield plate-1 [EUR], [UK], [ITA]	1
MP31	8930043730	Isolating sheet FB [EUR], [UK], [ITA]	1
MP32	8930043610	Isolating sheet EZ	1
MP33	8930046430	1902 MIC sponge	1
MP34	8930048150	Sponge (FZ)	1
MP35	8510012000	2191 VR rug plate	1

[MAIN UNIT]

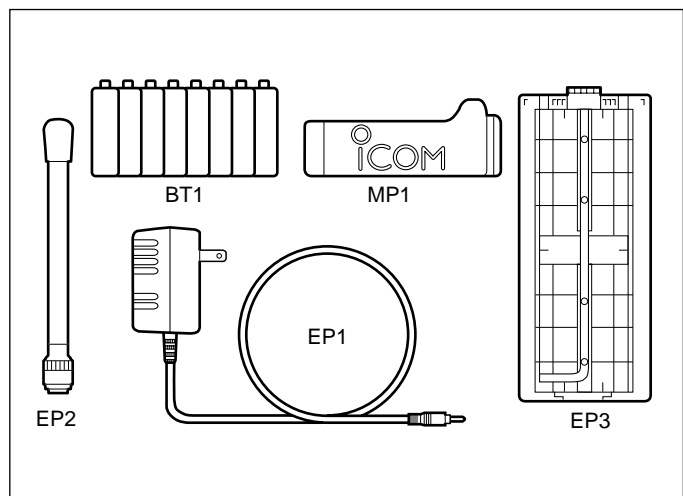
REF NO.	ORDER NO.	DESCRIPTION	QTY.
DS 1	5030001460	LM-1462B	1
EP 2	8930042590	LCD contact SRCN-1922-SP-N-W	1
MP1	8410002230	2078 PA heat sink	1

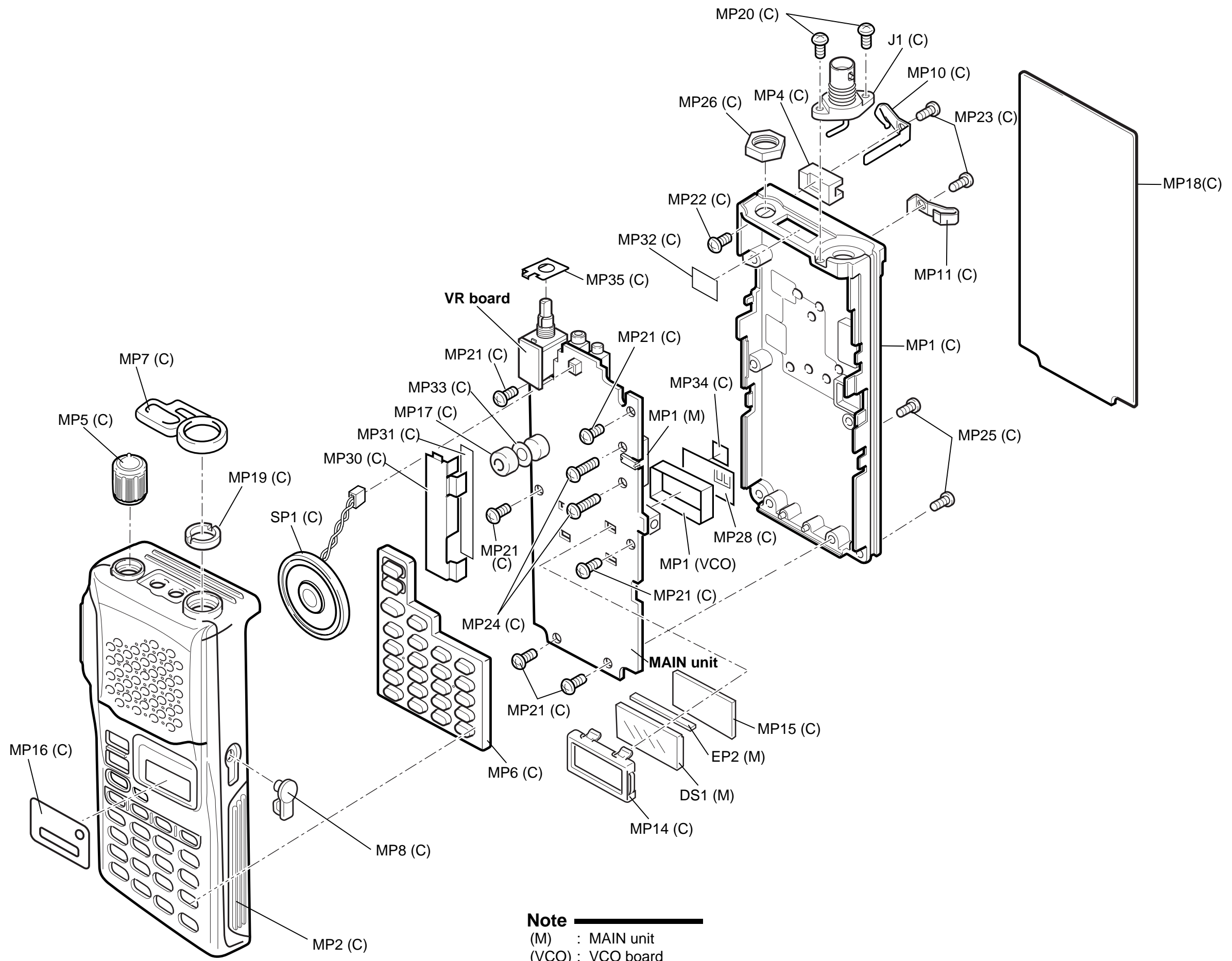
[VCO BOARD]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8510010920	1902 VCO case	1

7-2 ACCESSORIES

REF NO.	ORDER NO.	DESCRIPTION	QTY.
BT 1	3030000420	NICD cel-KR0.7AAUR SAFT [USA], [EUR], [UK], [ITA], [CSA/-1]	8
	3030000450	NICD cel-KR0.7AAUR ASIA [SEA], [THA], [TWN], [ANI]	8
EP 1	Optional products	Charger BC-110A [USA], [CSA], [TWN]	1
	Optional products	Charger BC-110D [EUR], [ITA], [SEA], [THA], [ANI]	1
	Optional products	Charger BC-110C [CSA/-1]	1
EP 2	3310001790	Antenna FA-B2C ACC	1
EP 3	8010016831	Battery case BP-194	1
MP1	8930042040	1922 Belt clip	1





Note

- (M) : MAIN unit
- (VCO) : VCO board
- (C) : CHASSIS

SECTION 8 SEMI-CONDUCTOR INFORMATION

8 - 1 TRANSISTORS

NAME	SYMBOL	INSIDE VIEW
2SA1588 - GR	ZG	
2SB1132 - R	BAR	
2SB1201-S	2M	
2SC3356 - R25 2SC4081 - S 2SC4215 - O 2SC4226 - R25 2SC4403 - 3	R25 BS QO R25 LY3	
2SK3074	WA	
2SK3075	RF72	
2SK360IG - TR	IG	

NAME	SYMBOL	INSIDE VIEW
2SK880 - Y	XY	
DTA114TU DTC144TU DTC144EU	94 06 26	
UN521D	8M	
XP1501 - AB	5R	
XP6401	5O	

8 - 2 DIODES

NAME	SYMBOL	INSIDE VIEW
DA112	AZ	
DA113W	AY	
DA204U	P	
DAP202U	P	
HVU131TRF	P1	
HVU350TRF	4	
MA111 MA2S077	1B S	

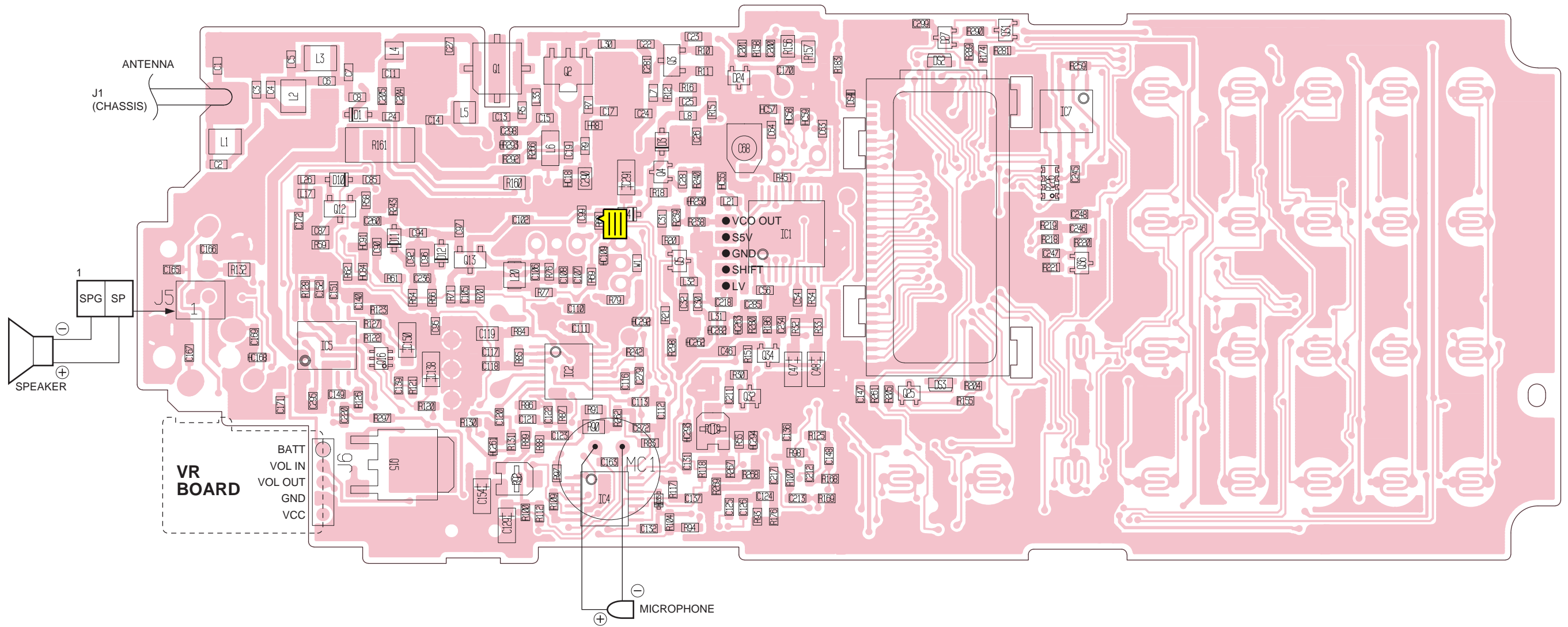
NAME	SYMBOL	INSIDE VIEW
MA6S121	M2D	
MA77	4B	
SB07-03C-TB	J	

SECTION 9 BOARD LAYOUTS

9 - 1 MAIN UNIT

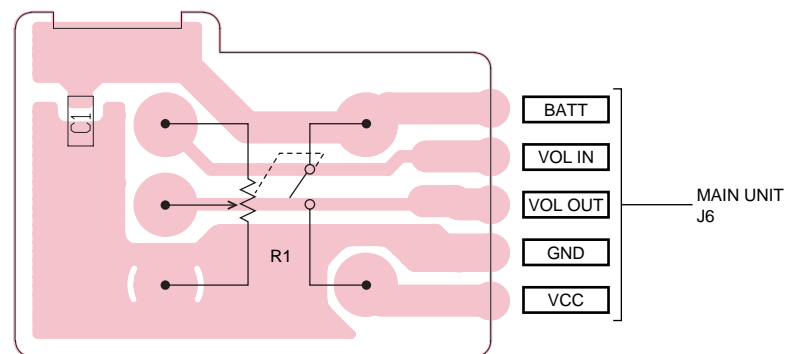
The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

• TOP VIEW



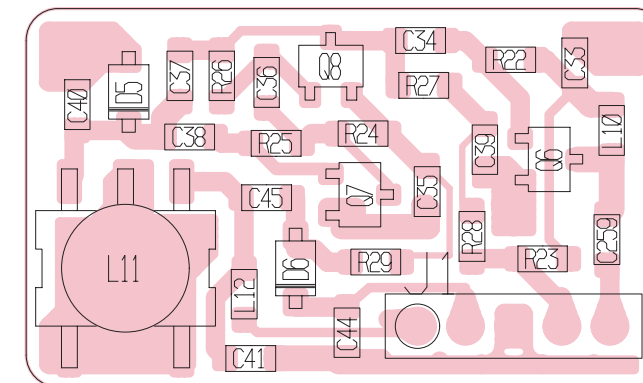
9 - 2 VR BOARD

• TOP VIEW



9 - 3 VCO BOARD

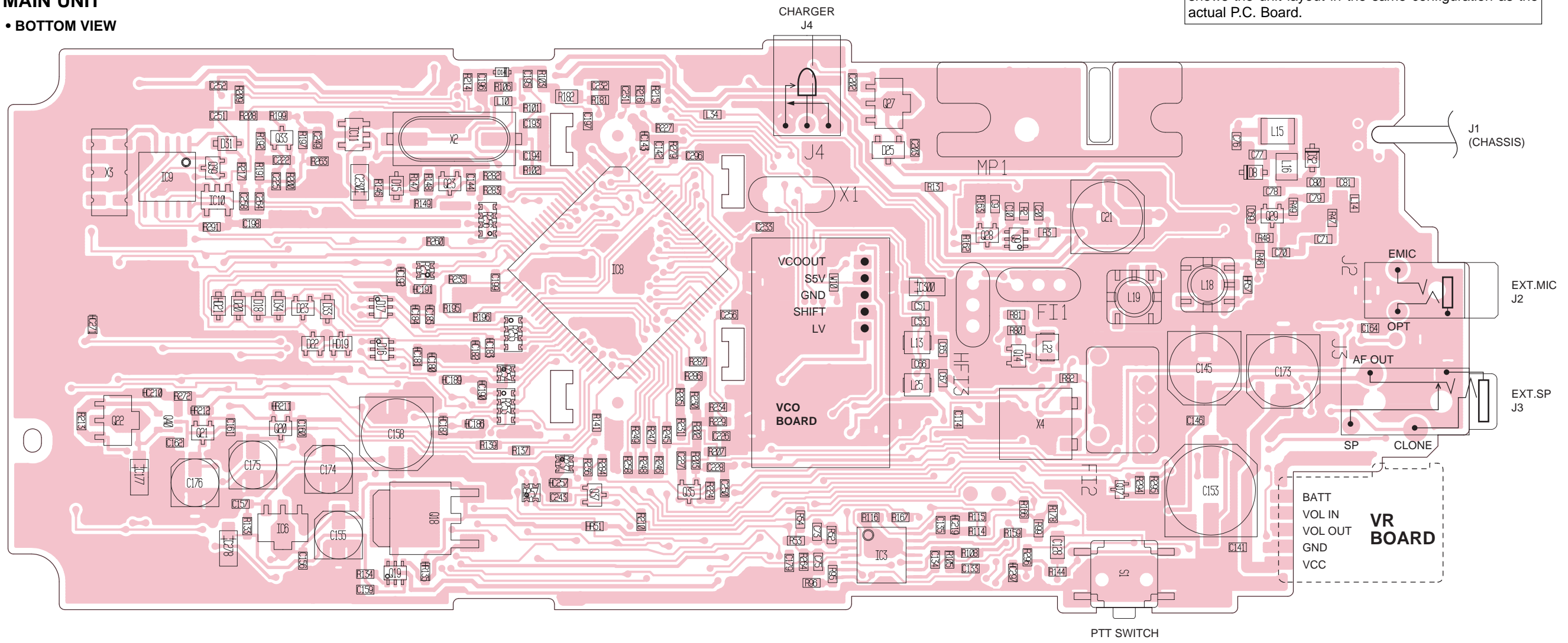
• TOP VIEW



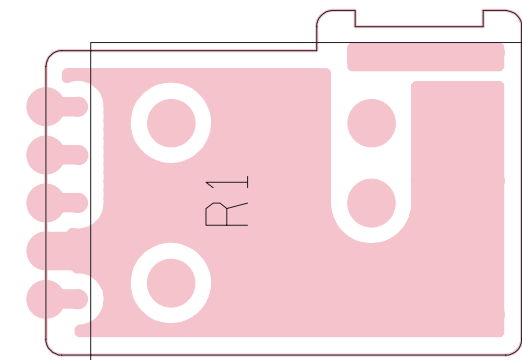
LV
SHIFT
GND
S5V
VCO OUT

MAIN UNIT
• BOTTOM VIEW

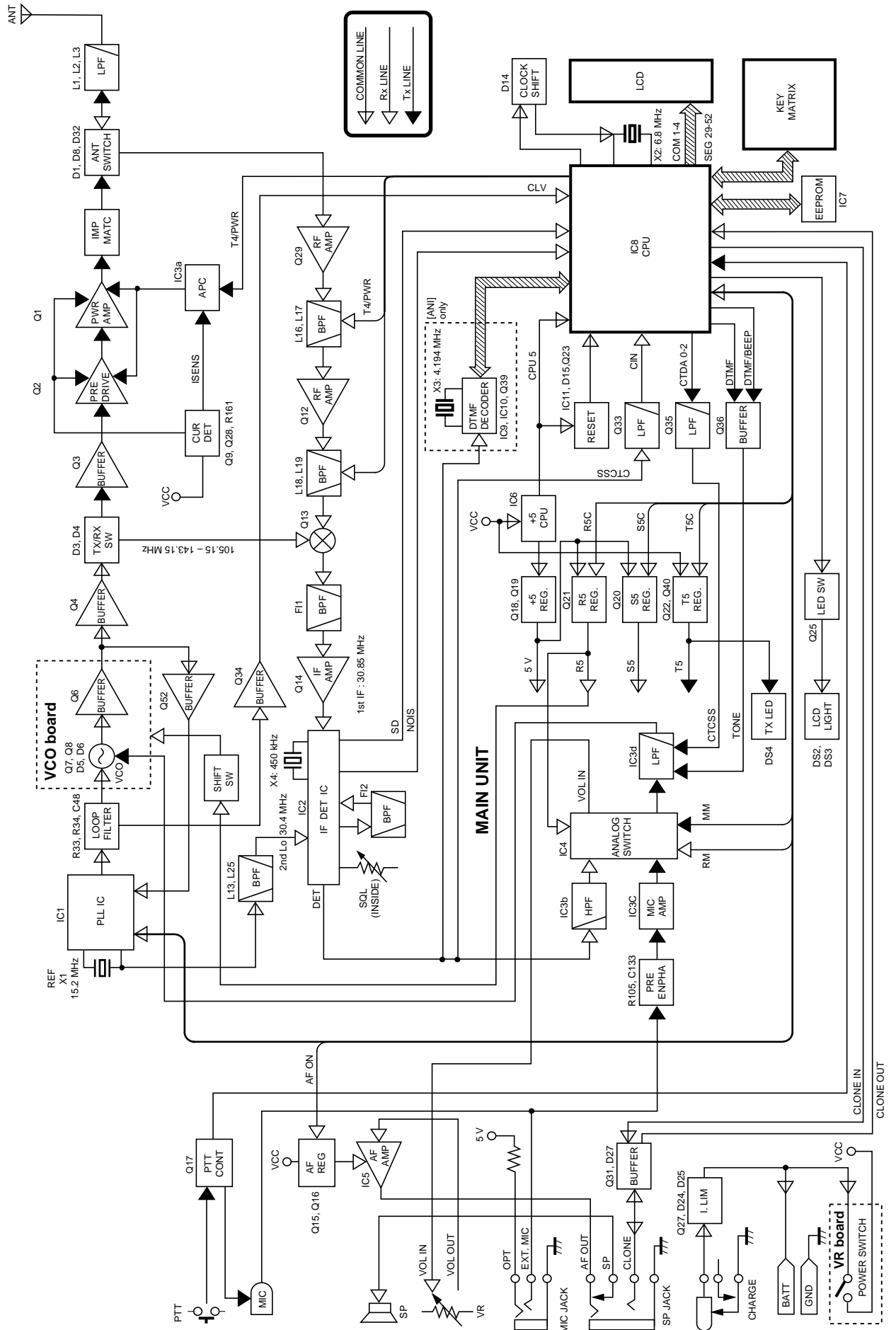
The combination of this page and the previous page shows the unit layout in the same configuration as the actual P.C. Board.



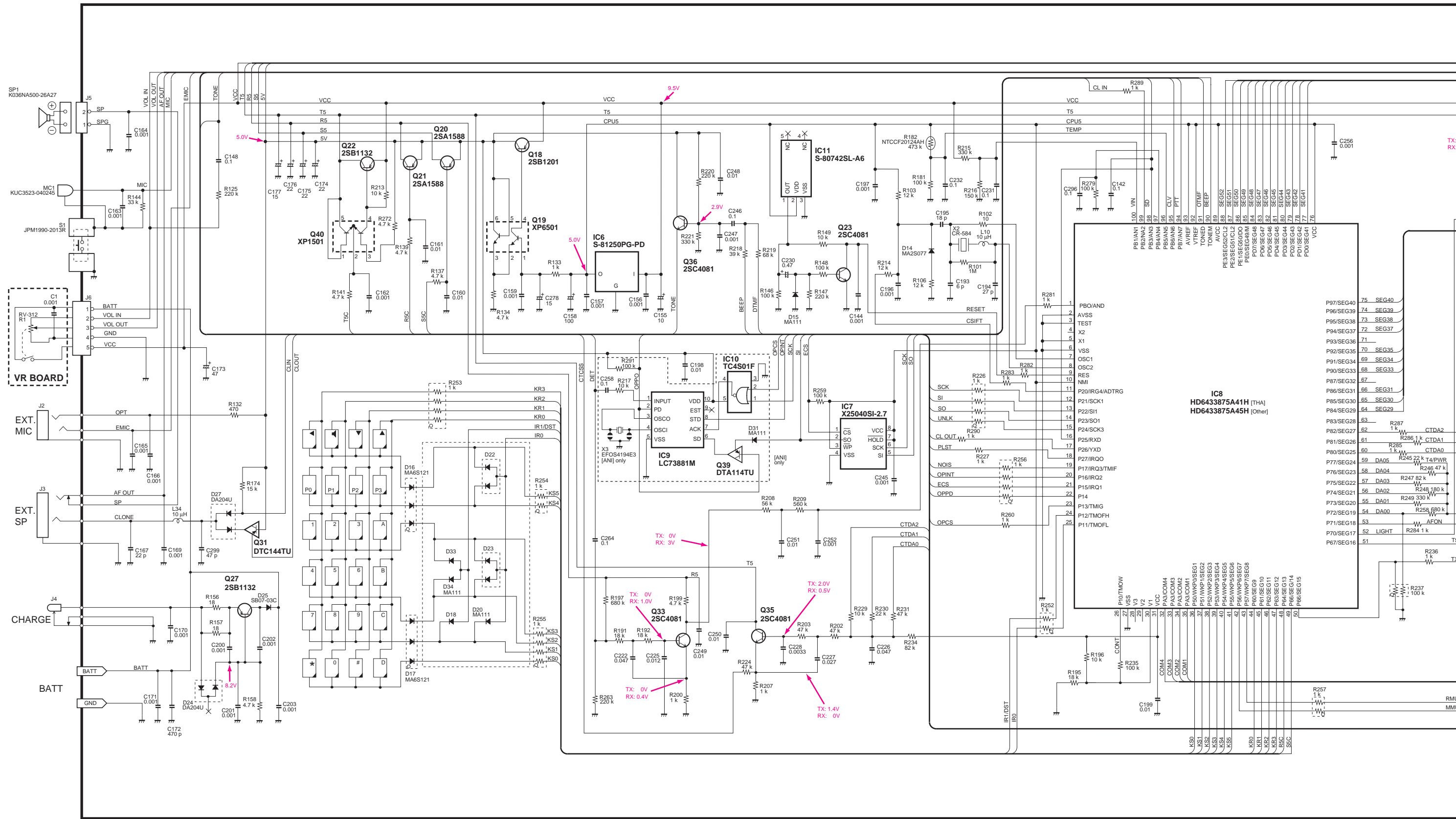
VR BOARD
• BOTTOM VIEW



SECTION 10 BLOCK DIAGRAM

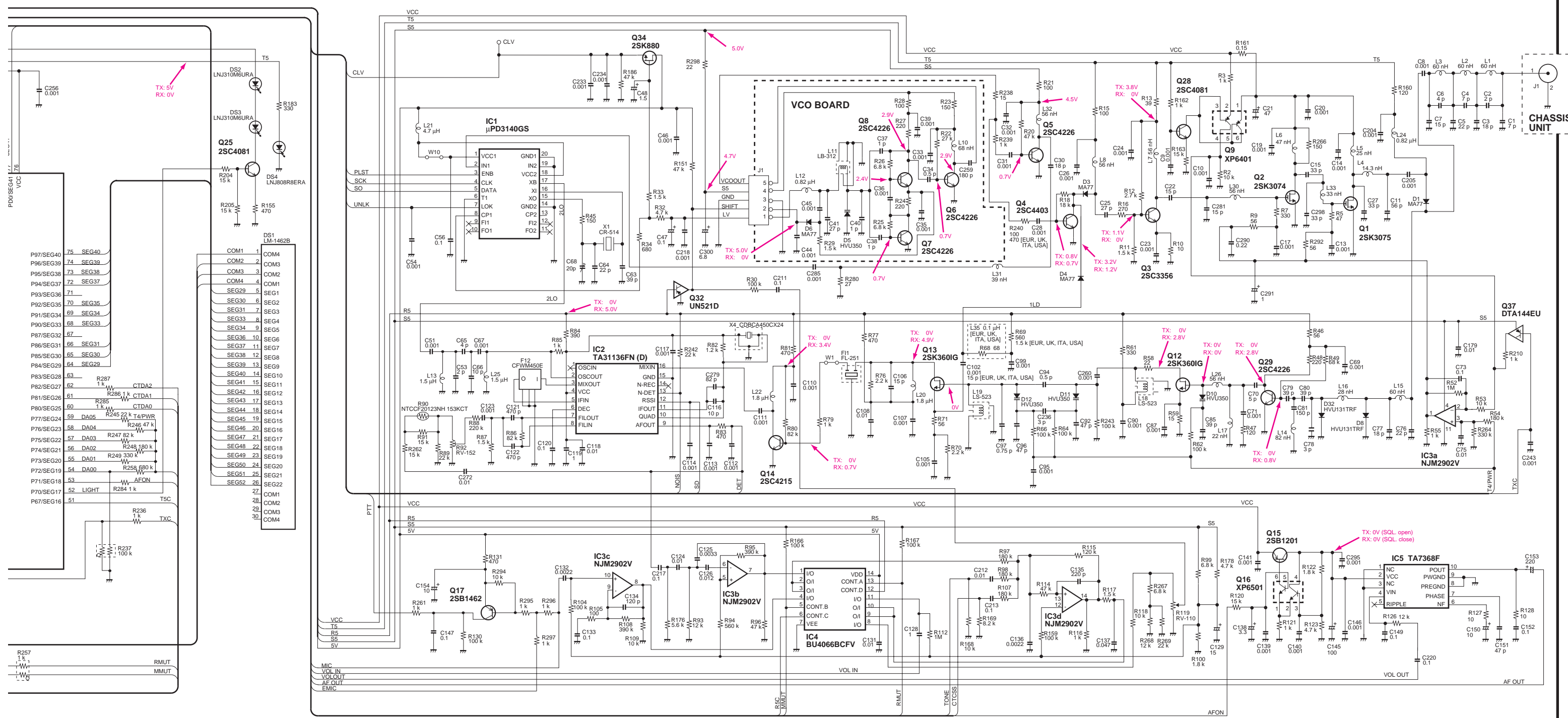


SECTION 11 VOLTAGE DIAGRAM



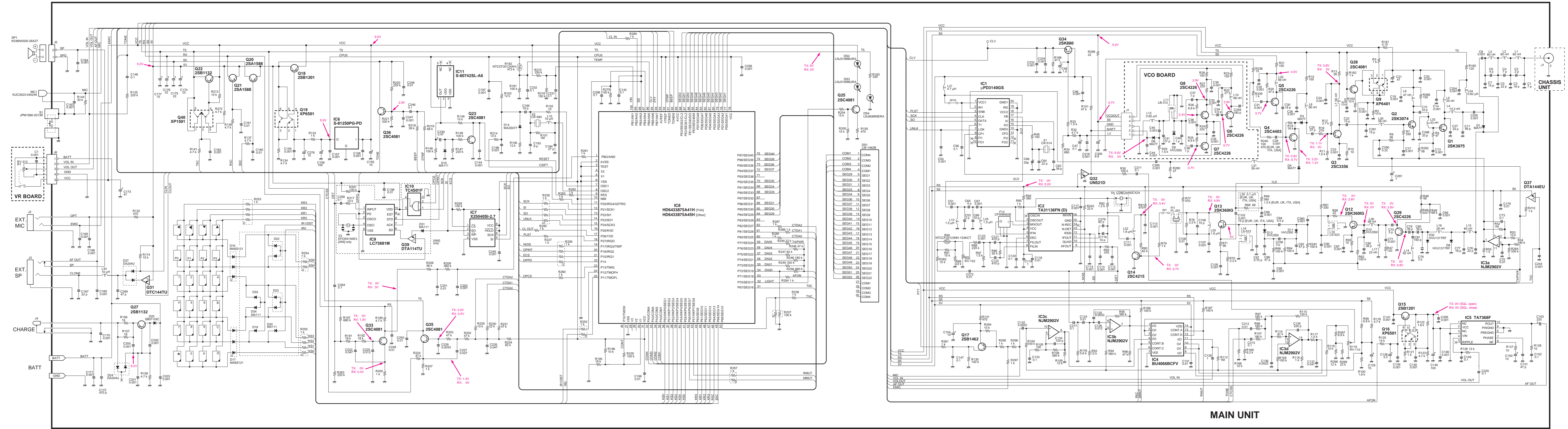
COMPLETE VIEW





MAIN UNIT

SECTION 11 VOLTAGE DIAGRAM



LEFT SIDE

RIGHT SIDE

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