



# SERVICE MANUAL

VHF MARINE TRANSCEIVER

**IC-M2A**  
**IC-M21**

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## INTRODUCTION

This service manual describes the latest service information for the **IC-M2A/IC-M21** VHF MARINE TRANSCEIVER at the time of publication.

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

Model	Version	Symbol	AC adapter	TX high power
IC-M2A	U.S.A.	[USA]	BC-147A	5W
	S.E.Asia	[SEA]	BC-147E	
IC-M21	Europe	[EUR]		
	United Kingdom	[UK]	—	
	Germany	[FRG]	BC-147E	1W

## DANGER

**NEVER** connect the transceiver to an AC outlet or to a DC power supply that uses more than 10 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 (100mW) 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>

1130007020 S.IC TC7S66FU IC-M2A MAIN UNIT 1 piece  
8810004860 Screw PH M 2 x 6 ZK IC-M21 Chassis 10 pieces

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



IC-M2A

IC-M21

## 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 turning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB to 50 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

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# SECTION 1 SPECIFICATIONS

		IC-M2A	IC-M21	
GENERAL	Frequency coverage	Tx: 156.025 MHz–157.425 MHz Rx: 156.025 MHz–163.275 MHz	Tx: 156.000 MHz–161.450 MHz Rx: 156.000 MHz–163.425 MHz	
	Mode	16K0G3E (FM)		
	Power supply requirement	BP-224 (7.2 V DC)		
	Usable temperature	–20 °C to +60 °C (–4°F to +140°F)	–15 °C to +55 °C (+5°F to +131°F)	
	Frequency stability	± 10 ppm	± 1.5 kHz	
	Current drain (with BP-224)	Tx	at 5 W	1.5 A
			at 3 W	1.2 A
			at 1 W	0.7 A
			at 0.5 W	0.6 A [FRG] only
		Rx	at maximum audio	200 mA
			at stand-by	20 mA
	Antenna impedance	Type STUD / 50 Ω		
	Dimensions (Projections not included)	61(W) × 135(H) × 41(D) mm; 2 <sup>13</sup> / <sub>32</sub> (W) × 5 <sup>5</sup> / <sub>16</sub> (H) × 1 <sup>5</sup> / <sub>8</sub> (D) inch (with BP-224)		
	Weight (with antenna and BP-224)	360 g; 12.7 oz (approx.)		
TRANSMITTER	RF output power (at 7.2 V DC)	Hi power; 5 W Hi power; 1 W	5 W / 3 W / 1 W (High / Mid / Low) 1 W / 0.5 W (High / Low) [OTHER] [FRG]	
	Modulation system	Variable reactance frequency modulation		
	Max. frequency deviation	± 5.0 kHz		
	Frequency error	± 10 ppm	± 1.5 kHz	
	Spurious emissions	–65 dBc	250 nW	
	Adjacent channel power	60 dB	70 dB	
	Residual modulation	40 dB		
	Audio harmonic distortion	Less than 10 % at 60 % deviation		
	Audio frequency response	+ 1 kHz to –3 dB of 6 dB octave from 300 Hz to 3000 Hz		
	Microphone impedance	2 kΩ		
RECEIVER	Receive system	Double-conversion super heterodyne		
	Intermediate frequencies	1st: 21.70 MHz, 2nd: 450 kHz		
	Sensitivity	0.25 μV at 12 dB SINAD	0.79 μV emf at 12 dB SINAD (typical)	
	Squelch sensitivity	0.35 μV	1.0 μV emf (typical)	
	Adjacent channel selectivity	70 dB (typical)	70 dB	
	Spurious response	70 dB (typical)	70 dB	
	Intermodulation	70 dB (typical)	68 dB	
	Hum and noise	40 dB		
	Audio output power ( at 7.4 V)	350 mW typical at 10 % distortion with an 8 Ω load	200 mW at 10 % distortion with an 8 Ω load	
	Audio frequency response	–3 dB to +1 dB of –6 dB octave from 300 Hz to 3000 Hz		

Measurements made in accordance with TIA/EIA-603 or EN-301-178-2.

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

## ■ VHF MARINE CHANNEL LIST (For IC-M2A)

Channel No.			Frequency (MHz)		Channel No.			Frequency (MHz)		Channel No.			Frequency (MHz)	
USA	INT	CAN	Transmit	Receive	USA	INT	CAN	Transmit	Receive	USA	INT	CAN	Transmit	Receive
	01	01	156.050	160.650	21A		21A	157.050	157.050	73	73	73	156.675	156.675
01A			156.050	156.050		22		157.100	161.700	74	74	74	156.725	156.725
	02	02	156.100	160.700	22A		22A	157.100	157.100	77*	77	77*	156.875	156.875
	03	03	156.150	160.750		23	23	157.150	161.750		78		156.925	161.525
03A			156.150	156.150	23A			157.150	157.150	78A		78A	156.925	156.925
	04		156.200	160.800	24	24	24	157.200	161.800		79		156.975	161.575
		04A	156.200	156.200	25	25	25	157.250	161.850	79A		79A	156.975	156.975
	05		156.250	160.850	26	26	26	157.300	161.900		80		157.025	161.625
05A		05A	156.250	156.250	27	27	27	157.350	161.950	80A		80A	157.025	157.025
06	06	06	156.300	156.300	28	28	28	157.400	162.000		81		157.075	161.675
	07		156.350	160.950		60	60	156.025	160.625	81A		81A	157.075	157.075
07A		07A	156.350	156.350		61		156.075	160.675		82		157.125	161.725
08	08	08	156.400	156.400	61A		61A	156.075	156.075	82A		82A	157.125	157.125
09	09	09	156.450	156.450		62		156.125	160.725		83	83	157.175	161.775
10	10	10	156.500	156.500			62A	156.125	156.125	83A		83A	157.175	157.175
11	11	11	156.550	156.550		63		156.175	160.775	84	84	84	157.225	161.825
12	12	12	156.600	156.600	63A			156.175	156.175	84A			157.225	157.225
13*	13	13*	156.650	156.650		64	64	156.225	160.825	85	85	85	157.275	161.875
14	14	14	156.700	156.700	64A		64A	156.225	156.225	85A			157.275	157.275
15*	15*	15*	156.750	156.750		65		156.275	160.875	86	86	86	157.325	161.925
16	16	16	156.800	156.800	65A	65A	65A	156.275	156.275	86A			157.325	157.325
17*	17	17*	156.850	156.850		66		156.325	160.925	87	87	87	157.375	161.975
	18		156.900	161.500	66A	66A	66A*	156.325	156.325	87A			157.375	157.375
18A		18A	156.900	156.900	67*	67	67	156.375	156.375	88	88	88	157.425	162.025
	19		156.950	161.550	68	68	68	156.425	156.425	88A			157.425	157.425
19A		19A	156.950	156.950	69	69	69	156.475	156.475			21b	Rx only	161.650
20	20	20*	157.000	161.600	70	70	70	Rx only	156.525			25b	Rx only	161.850
20A			157.000	157.000	71	71	71	156.575	156.575			28b	Rx only	162.000
	21	21	157.050	161.650	72	72	72	156.625	156.625			83b	Rx only	161.775

\* Low power only

**NOTE:** Channels 3, 21, 23, 61, 64, 81, 82 and 83 **CANNOT** be used by the general public in USA waters.

## ■ WX CHANNEL LIST ([IC-M2A] only)

Weather channel	Frequency (MHz)		Weather channel	Frequency (MHz)	
	Transmit	Receive		Transmit	Receive
WX01	Receive only	162.550	WX06	Receive only	162.500
WX02	Receive only	162.400	WX07	Receive only	162.525
WX03	Receive only	162.475	WX08	Receive only	161.650
WX04	Receive only	162.425	WX09	Receive only	161.775
WX05	Receive only	162.450	WX10	Receive only	163.275

## ■ VHF MARINE CHANNEL LIST (For IC-M21)

Channel No.		Frequency (MHz)		Channel No.		Frequency (MHz)		Channel No.		Frequency (MHz)	
USA	INT	Transmit	Receive	USA	INT	Transmit	Receive	USA	INT	Transmit	Receive
	01	156.050	160.650		22	157.100	161.700	74	74	156.725	156.725
01A		156.050	156.050	22A		157.100	157.100	77*	77	156.875	156.875
	02	156.100	160.700		23	157.150	161.750		78	156.925	161.525
	03	156.150	160.750	23A		157.150	157.150	78A		156.925	156.925
03A		156.150	156.150	24	24	157.200	161.800		79	156.975	161.575
	04	156.200	160.800	25	25	157.250	161.850	79A		156.975	156.975
	05	156.250	160.850	26	26	157.300	161.900		80	157.025	161.625
05A		156.250	156.250	27	27	157.350	161.950	80A		157.025	157.025
06	06	156.300	156.300	28	28	157.400	162.000		81	157.075	161.675
	07	156.350	160.950	37A		157.850	157.850	81A		157.075	157.075
07A		156.350	156.350		60	156.025	160.625		82	157.125	161.725
08	08	156.400	156.400		61	156.075	160.675	82A		157.125	157.125
09	09	156.450	156.450	61A		156.075	156.075		83	157.175	161.775
10	10	156.500	156.500		62	156.125	160.725	83A		157.175	157.175
11	11	156.550	156.550		63	156.175	160.775	84	84	157.225	161.825
12	12	156.600	156.600	63A		156.175	156.175	84A		157.225	157.225
13*	13	156.650	156.650		64	156.225	160.825	85	85	157.275	161.875
14	14	156.700	156.700	64A		156.225	156.225	85A		157.275	157.275
15*	15*	156.750	156.750		65	156.275	160.875	86	86	157.325	161.925
16	16	156.800	156.800	65A	65A	156.275	156.275	86A		157.325	157.325
17*	17	156.850	156.850		66	156.325	160.925	87	87	157.375	161.975
	18	156.900	161.500	66A	66A	156.325	156.325	87A		157.375	157.375
18A		156.900	156.900	67*	67	156.375	156.375	88	88	157.425	162.025
	19	156.950	161.550	68	68	156.425	156.425	88A		157.425	157.425
19A		156.950	156.950	69	69	156.475	156.475				
20	20	157.000	161.600	70	70	Rx only	156.525				
20A		157.000	157.000	71	71	156.575	156.575				
	21	157.050	161.650	72	72	156.625	156.625				
21A		157.050	157.050	73	73	156.675	156.675				

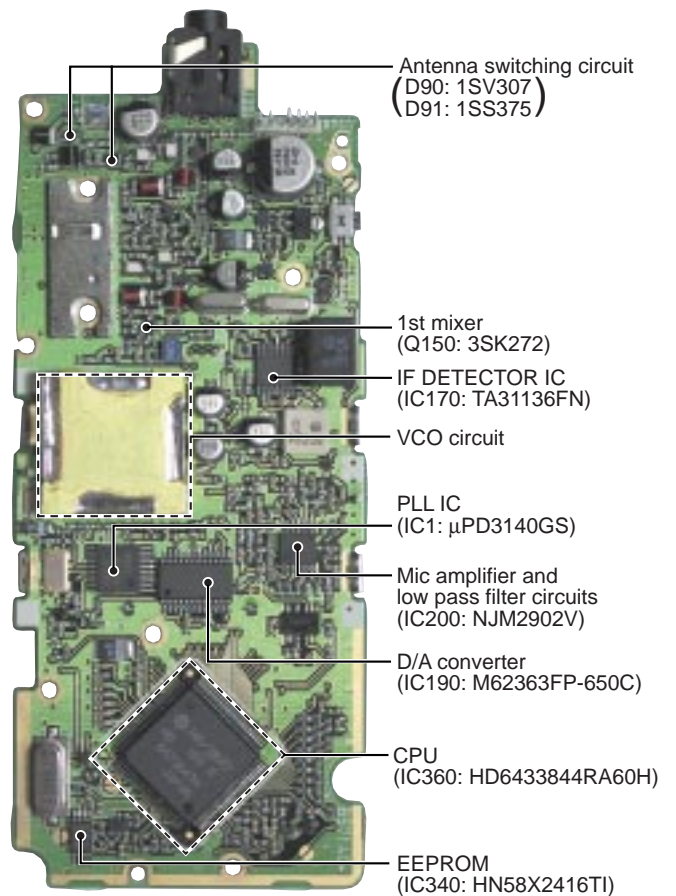
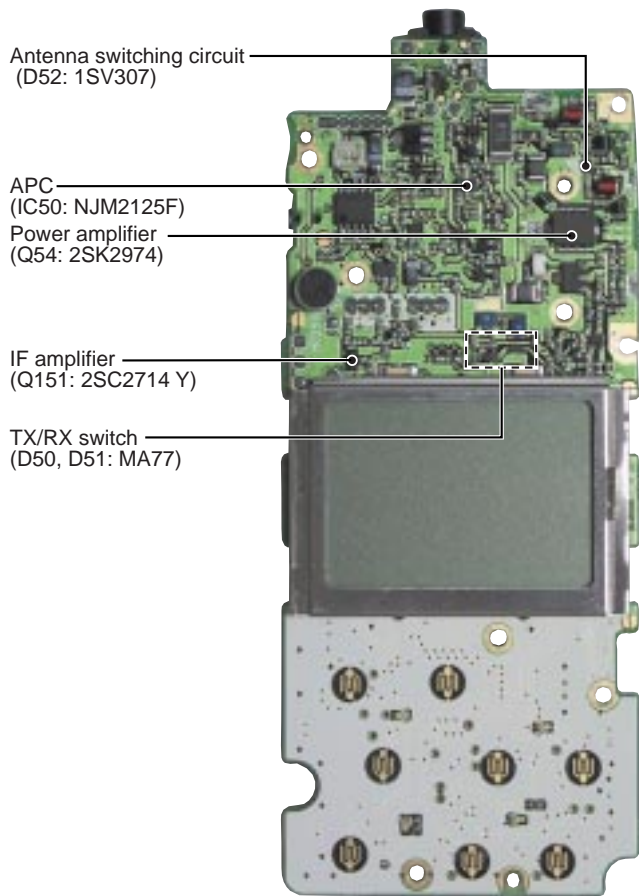
\* Low power only

# SECTION 2 INSIDE VIEWS

## • MAIN UNIT

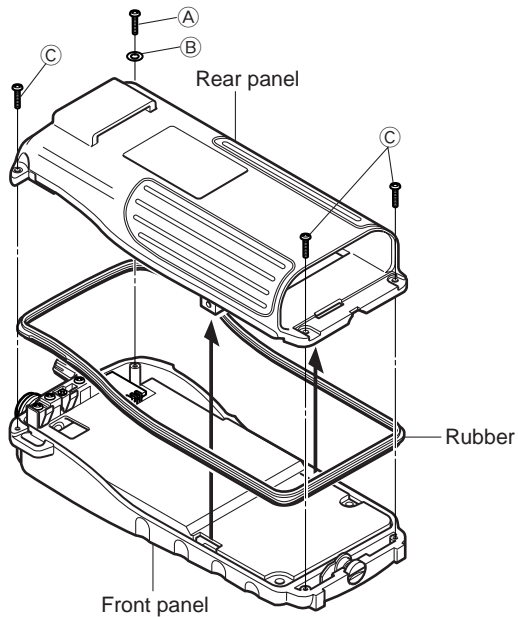
TOP VIEW

BOTTOM VIEW



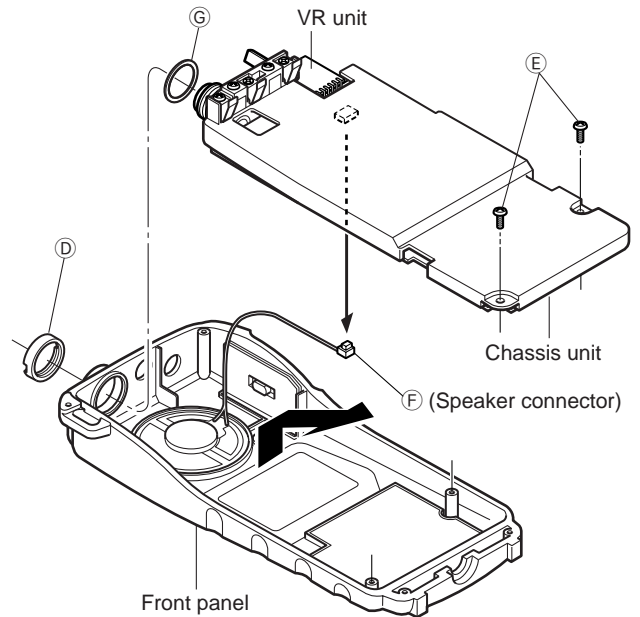
## SECTION 3 DISASSEMBLY INSTRUCTIONS

### • Removing the Rear panel



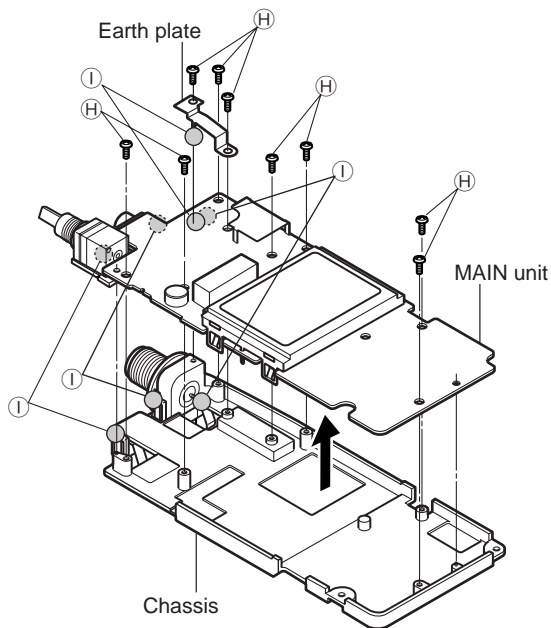
- ① Unscrew 1 screw, **A** (2 x 10 mm), and remove 1 washer, **B**.
- ② Unscrew 3 screws, **C** (2 x 8 mm).
- ③ Remove the rear panel and rubber from the front panel.

### • Removing the Chassis unit



- ① Unscrew 1 nut, **D**.
- ② Unscrew 2 screws, **E** (2 x 6 mm).
- ③ Take off the chassis unit in the direction of the arrow.
- ④ Unplug, **F**, to separate the front panel, J251, and the chassis unit.
- ⑤ Remove 1 washer, **G**.

### • Removing the MAIN unit



- ① Unscrew 9 screws, **H** (2 x 4 mm).
- ② Unsolder 4 points, **I**, and remove earth plate.
- ③ Separate the MAIN unit and the chassis.



# SECTION 4 CIRCUIT DESCRIPTION

## 4-1 RECEIVER CIRCUITS

### 4-1-1 ANTENNA SWITCHING CIRCUIT (MAIN UNIT)

The antenna switching circuit functions as a low-pass filter while receiving and as resonator circuit while transmitting. The circuit does not allow transmit signals to enter receiver circuits.

Received signals from the antenna connector pass through the low-pass filter (L80–L82, C80–C86) and antenna switching circuit (D52, D90, D91). The filtered signals are then applied to the RF amplifier circuit (Q90).

### 4-1-2 RF AND 1ST MIXER CIRCUITS (MAIN UNIT)

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

The signals from the antenna switching circuit are passed through the tunable bandpass filter (D92, D93) and amplified at the RF amplifier (Q90). The amplified signals are passed through another tunable bandpass filter (D130), and then applied to the 1st mixer circuit (Q150).

The filtered signals are mixed at the 1st mixer (Q150) with a 1st LO signal coming from the PLL circuit to produce a 21.7 MHz 1st IF signal. The 1st IF signal is passed through two crystal filters (F1150, F1151) and is then amplified at the IF amplifier (Q151).

### 4-1-3 2ND IF AND DEMODULATOR CIRCUITS (MAIN UNIT)

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 and obtain stable receiver gain.

The 1st IF signal is applied to a 2nd mixer section of the FM IF IC (IC170, pin 16). The signal is then mixed with a 2nd LO signal for conversion into a 450 kHz 2nd IF signal.

IC170 contains the 2nd mixer, limiter amplifier, quadrature detector and active filter circuits. A 21.25 MHz 2nd LO signal is produced at the PLL circuit using the reference frequency.

The 2nd IF signal from the 2nd mixer (IC170, pin 3) passes through ceramic filters (F1170) to remove unwanted heterodyned frequencies. It is then amplified at the limiter amplifier section (IC170, pin 5) and applied to the quadrature detector section (IC170, pins 10 and 11) to demodulate the 2nd IF signal into AF signals.

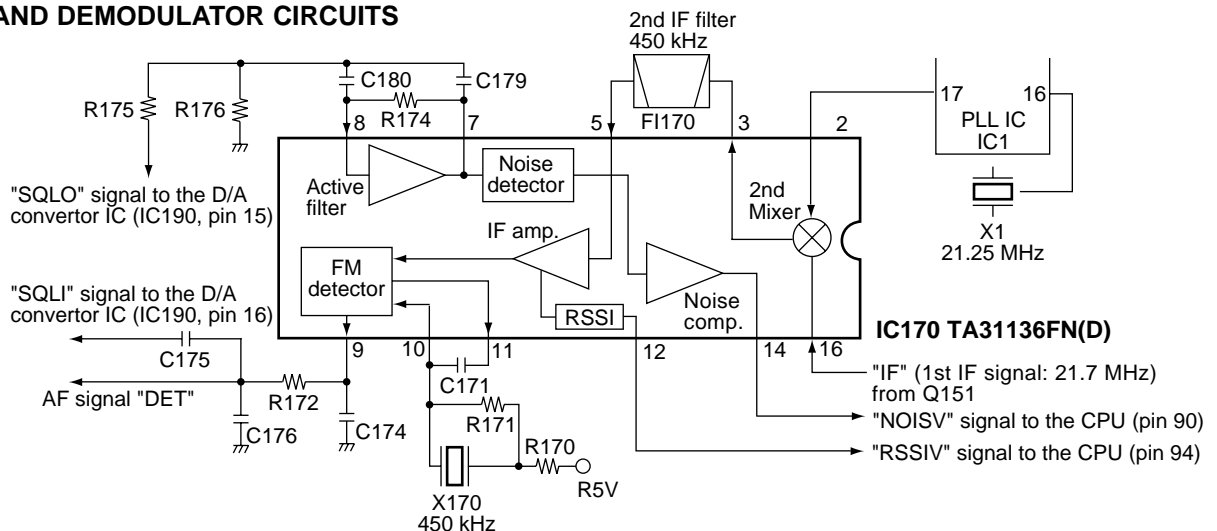
### 4-1-4 AF CIRCUIT (MAIN UNIT)

AF signals from the FM IF IC (IC170, pin 9) are fed to the analog switch (IC260).

The AF signals (detected signals) are passed through the analog switch (IC260, pins 2 and 1) and are then applied to the active low-pass filter (IC200c, pin 9).

The filtered AF signals are applied to and adjusted audio level at the [VOL] control (VR unit; R500). The level controlled signals are passed through the AF mute switch (Q280) which is controlled by "IVOLM" signal from the CPU (IC9, pin 31). The passed signals are applied to the AF power amplifier (IC280, pin 4), and then output to the internal speaker or [EXT SP] jack after being passed through the de-emphasis circuit (R286, C285) to obtain the -6 dB/octave frequency characteristics.

## • 2ND IF AND DEMODULATOR CIRCUITS



#### 4-1-5 SQUELCH CIRCUIT (MAIN UNIT)

The 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.

A portion of the AF signals divided by C175 from the FM IF IC (IC170, pin 9) are applied to the D/A convertor (IC190, pin 16) to adjust amplitude. The signals from the D/A convertor (IC190, pin 15) are applied to the active filter section (IC170, pin 8). The active filter section amplifies and filters noise components. The filtered signals are applied to the noise detector section and output from IC170 (pin 14) as the "NOISV" signal.

The "NOISV" signal from IC170 (pin 14) is applied to the CPU (IC360, pin 90). The CPU compares the set squelch level voltage and "NOISV" signal voltage to control the squelch output.

### 4-2 TRANSMITTER CIRCUITS

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

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 passed through the pre-emphasis circuit (R253, C254) and are then applied to the microphone amplifier (IC200b). The amplified AF signals are applied to analog switch (IC260, pin 5).

The AF signals are amplified again at the limiter-amplifier (IC200a) and then passed through the low-pass filter (IC200d, pins 10 and 8). The filtered audio is applied to the modulation circuit as the "MOD" signal.

#### 4-2-2 MODULATION CIRCUIT (MAIN UNIT)

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

The audio signals "MOD" change the reactance of D22 and D23 to modulate an oscillated signal at the VCO circuit (Q21, Q22, D22, D23). The oscillated signal is amplified at the buffer-amplifiers (Q23, Q24).

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

The signal from the VCO circuit passes through the transmit/receive switching circuit (D50, D51) and is applied to the buffer-amplifier (Q50). The amplified signal is amplified by the pre-driver (Q53) and the power amplifier (Q54) to obtain 5 W of RF power (at 7.2 V). The amplified signal passes through the antenna switching circuit (D52), and low-pass filter (L80–L82, C80–C86) and is then applied to the antenna connector.

The bias current of the pre-driver (Q53) and the power amplifier (Q54) is controlled by the APC circuit to stabilize the output power.

#### 4-2-4 APC CIRCUIT (MAIN UNIT)

The APC (Automatic Power Control) circuit provides stable output power from the power amplifier even when the input voltage or temperature changes, and selects HIGH, MIDDLE or LOW (1W type selects HIGH or LOW) output power. The APC circuit consists of a power detector and APC control circuits.

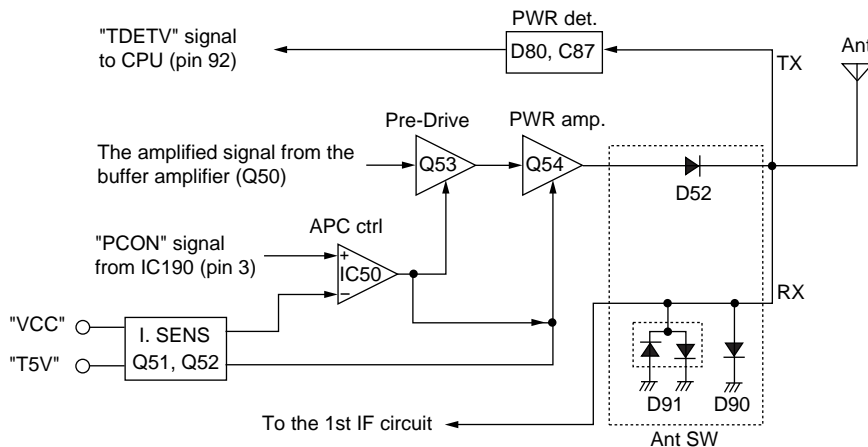
##### • POWER DETECTOR CIRCUIT (MAIN UNIT)

The power detector circuit (D80, C87) detects the transmit output power level and converts it to DC voltage as the "TDETV" signal. The detected signal is applied to the APC control circuit.

##### • APC CONTROL CIRCUIT (MAIN UNIT)

The "TDETV" signal from the power detector circuit is applied to the CPU (IC360, pin 92) to control the input voltage of the pre-driver (Q53) and the power amplifier (Q54). When the output power changes, the CPU (IC360) outputs APC control signal to the D/A converter (IC190). And then "PCON" signal from the D/A converter controls the APC controller (IC50) to provide stable output power.

##### • APC CIRCUIT



### 4-3 PLL CIRCUIT (RF UNIT)

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

The PLL circuit contains a VCO (Q21, Q22, D22, D23). The oscillated signal is amplified at the buffer-amplifiers (Q23, Q25) and then applied to the PLL IC (IC1, pin 19).

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

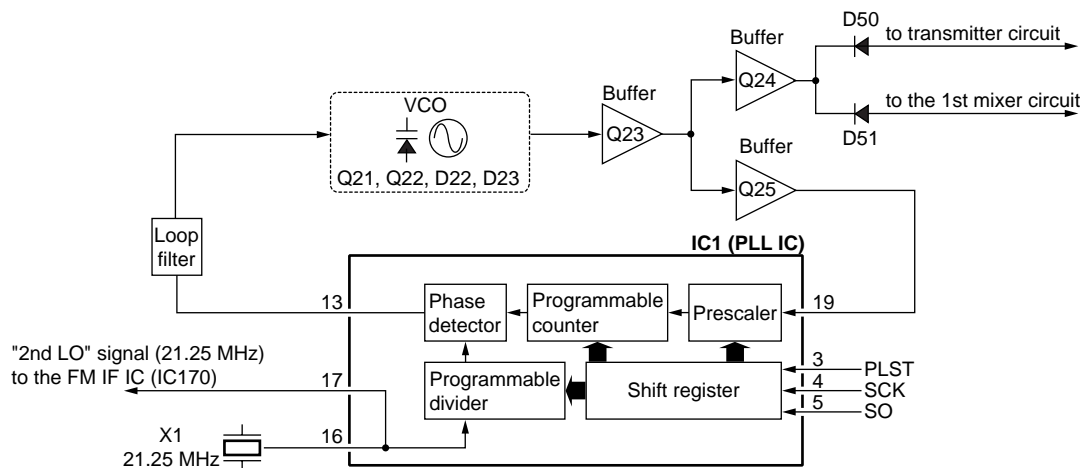
If the oscillated signal drifts, the phase of its frequency changes from the reference frequency, causing a lock voltage changes to compensate for the drift in the oscillated frequency.

A portion of the VCO signal is amplified at buffer-amplifiers (Q23, Q24) and is then applied to the receive 1st mixer (Q150) or transmit buffer amplifier (Q50) via the TX/RX switching diode (D50, D51).

### 4-4 POWER SUPPLY CIRCUITS VOLTAGE LINES

LINE	DESCRIPTION
HV	The voltage from the attached battery pack.
VCC	The same voltage as the HV line (battery voltage) which is controlled by the power switch (RF unit; [OFF/VOL] control).
CPU5V	Common 5 V converted from the VCC line by the CPU5V regulator circuit (IC220). The output voltage is applied to the CPU (MAIN unit; IC360), REG5V regulator, etc.
5V	Common 5V converted from the VCC line by the 5V regulator circuit (Q223–Q225). The output voltage is applied to the D/A converter (IC190) and PLL IC (IC1), etc.
R5V	Receive 5V converted from the 5V line by the R5 regulator circuit (Q221). The regulated voltage is applied to the MOD MUTE circuit (Q20, D20, D21) and receiver circuit.
V5V	Common 5V converted from the 5V line by the V5 regulator circuit (Q220). The regulated voltage is applied to the VCO circuit
T5V	Transmit 5V converted from the 5V line by the T5 regulator circuit (Q222). The regulated voltage is applied to the transmitter circuit.

#### • PLL CIRCUIT



## 4-5 PORT ALLOCATIONS

### 4-5-1 CPU (IC360)

Pin number	Port name	Description
1 2	LCDC1 LCDC2	Outputs LCD contrast control signal.
3	BEEP	Outputs beep audio signals.
5	UNLK	Input port for unlock signal. High : PLL is unlocked.
7	BTYPE	Input port for battery's type and cloning cable connecting detection. Low : While alkaline cell battery is used in the battery case.
8	BPFS	Outputs RF band-pass filters control signal. High : While receiving below 159.990 MHz. Low : While receiving above 160.000 MHz.
16	SCK	Outputs serial clock.
17	PLST	Outputs strobe signal to the PLL IC (IC1, pin 3).
18	SDATA	Outputs serial data.
19	DAST	Outputs strobe signal to the D/A converter IC (IC190, pin 6).
20	LEDK	Outputs key pad back light control signal. High : While key pad back light is ON.
21	LEDL	Outputs LCD back light control signal. High : While LCD back light is ON.
23	ESDA	I/O port for the EEPROM (IC340, pin 5) serial data signals.
24	V5VS	Outputs the V5 regulator control signal.
25	T5VS	Outputs the T5 regulator control signal.
26	R5VS	Outputs the R5 regulator control signal.
27	AFVS	Outputs the AF regulator control signal.
28	CLIN	Input port for the cloning signal.
29	CLOUT	Outputs the cloning signal.
30	IVOLM	Output the speaker mute switch control signal. High : While the AF output is muted.
51	HL	Input port for the [H/L] key. Low : While [H/L] key is pushed.
52	SQL	Input port for the [SQL] key. Low : While [SQL] key is pushed.
53	UP	Input port for the [▲] key. Low : While [▲] key is pushed.

Pin number	Port name	Description
54	DOWN	Input port for the [▼] key. Low : While [▼] key is pushed.
55	16CH	Input port for the [16] key. Low : While [16] key is pushed.
56	CHWX	Input port for the [CH/WX] key. Low : While [CH/WX] key is pushed.
57	SCAN	Input port for the [SCN] key. Low : While [SCN] key is pushed.
58	DW	Input port for the [DW] key. Low : While [DW] key is pushed.
83	5VS	Outputs 5V regulator control signal.
84	MICM	Outputs the MIC mute switch control signal. Low : While muted.
85	DETM	Outputs the detector mute control signal. Low : While muted.
86	WET	Input port for transceiver's internal inundation detection.
88	WXTV	Input port for WX tone detection.
91	BATTV	Input port for the battery voltage detection.
93	TEMPV	Input port for the transceiver's internal temperature detection.
94	RSSIV	Input port for the RSSI signal from the FM IF IC (IC170, pin 12) to detect receiving signal strength.
95	PTT	Input port for the [PTT] switch. High : While [PTT] switch is pushed.

### 4-5-2 D/A converter IC (IC190)

Pin number	Port name	Description
2	FCON	Output signal to adjust the reference frequency.
3	PCON	Output signal to adjust TX power.
10	MCON	Output signal to adjust modulation while transmitting.
11	BEPO	Output signal to adjust beep tone level while "AUTO" is selected in set mode.
14	BEPST	Output signal to adjust beep tone level while 1-10 scale is selected in set mode.
15	SQLO	Output signal to adjust squelch level.

# SECTION 5 ADJUSTMENT PROCEDURES

## 5-1 PREPARATION

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 7.5 V DC Current capacity : 3 A or more	FM deviation meter	Frequency range : 30–300 MHz Measuring range : 0 to ±10 kHz
RF power meter (terminated type)	Measuring range : 0.1–10 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Audio generator	Frequency range : 300–3000 Hz Measuring range : 1–500 mV
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 : 100–300 MHz Output level : 0.1 μV–32 mV (–127 to –17 dBm)
Digital multimeter	Input impedance : 10 MΩ/DC or better	Attenuator	Power attenuation : 40 dB or more Capacity : 10 W or more

### ■ ENTERING THE ADJUSTMENT MODE

- Push and hold the [H/L] key and [PTT] switch, and then turn power ON.

### ■ OPERATING IN THE ADJUSTMENT MODE

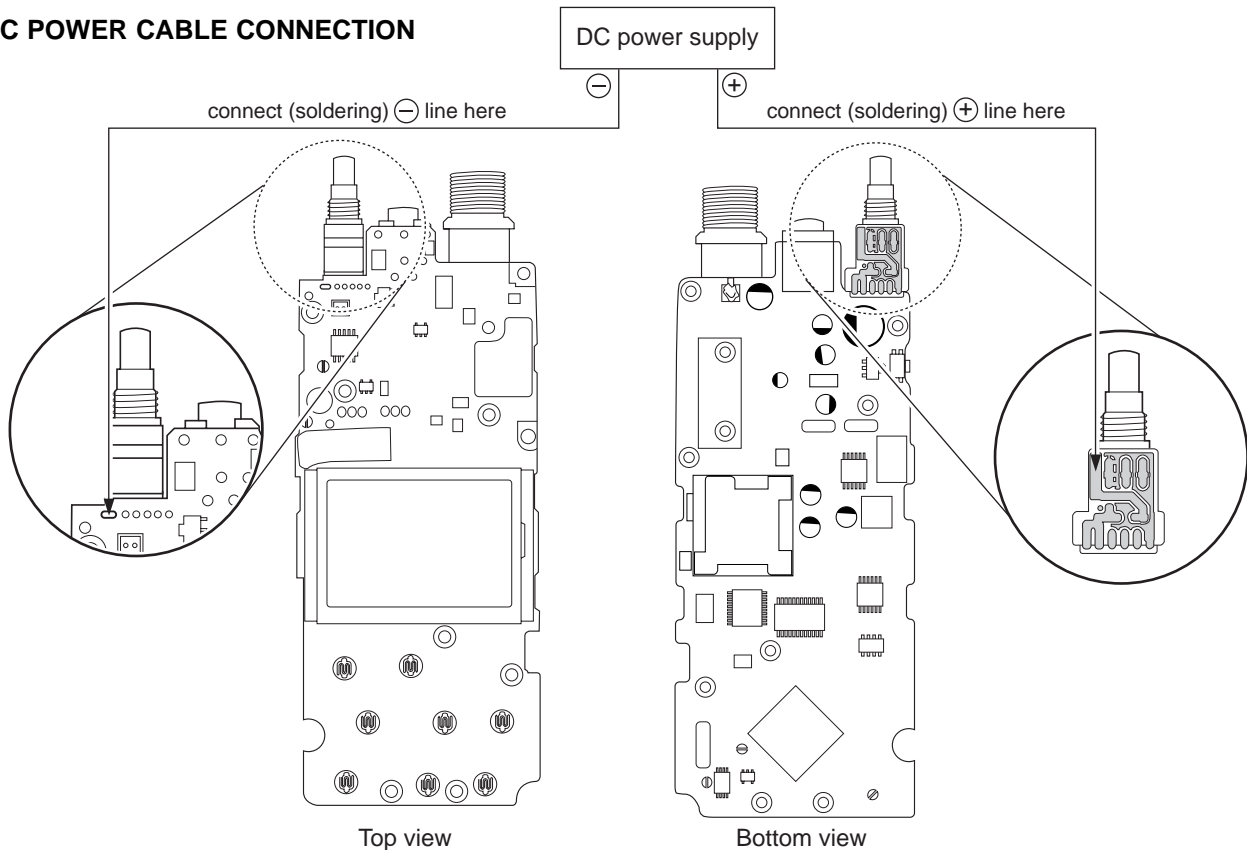
- Change adjustment items: [16] key
- Change adjustment values: [▲] and [▼] keys

### ■ EXITING THE ADJUSTMENT MODE

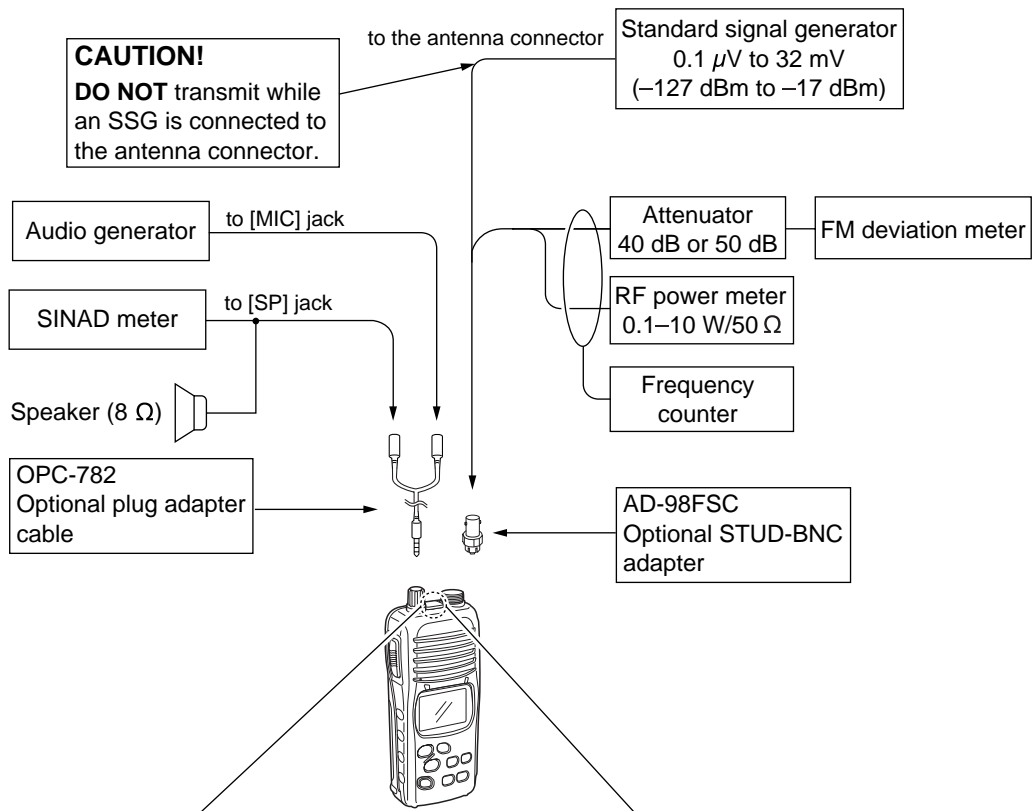
When adjustment is finished, need to do follow operation to cancel the adjustment mode. Otherwise, the transceiver does not work properly.

- Turn power OFF.
- Push and hold the [H/L] key and [PTT] switch, and then turn power ON.

### • DC POWER CABLE CONNECTION



• CONNECTION

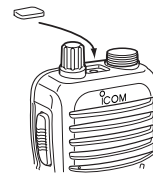


**DETACHING/ATTACHING THE TOP PANEL**

**CAUTION!**  
**DO NOT** detach the TOP PANEL except for adjustment or cloning to maintain the water resistance capability.



Detach the TOP PANEL with a sharp point such as tweezers for adjustment.  
**BE CAREFUL** cracking the TOP PANEL.



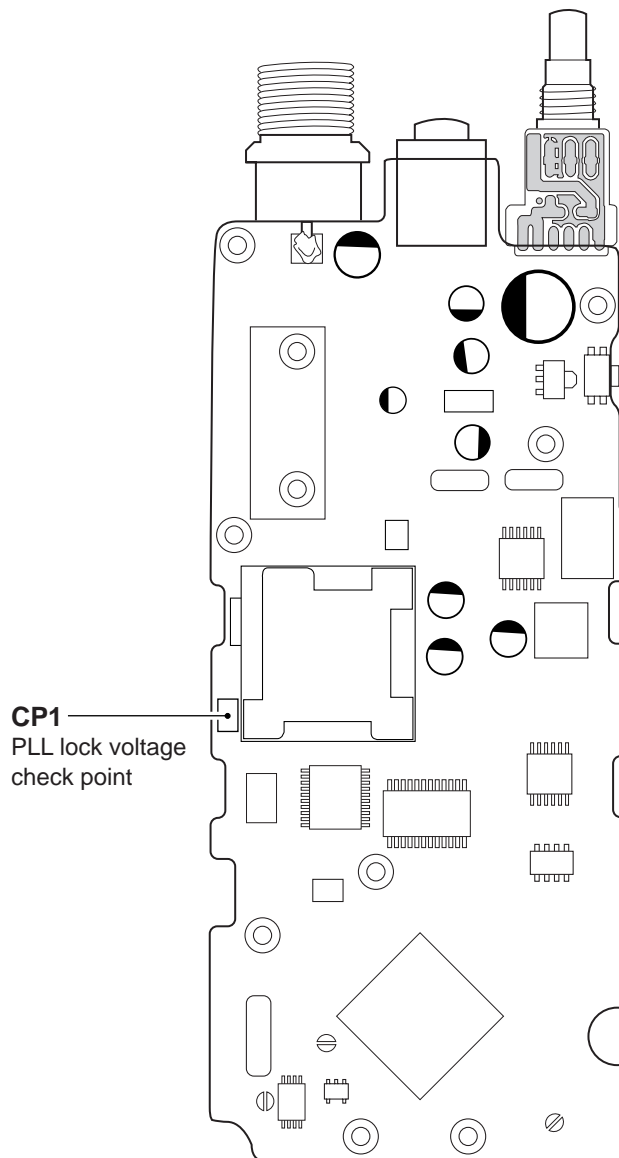
After adjustment, be sure to reattach the TOP PANEL to maintain the water resistance capability.

**NOTE:** If the tape on the back of the TOP PANEL has lost its adhesion, replacement to a new one is necessary.

## 5-2 PLL AND RX SENSITIVITY ADJUSTMENTS

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
LOCK VOLTAGE	1 <ul style="list-style-type: none"> <li>• Operating channel : ch16</li> <li>• Receiving</li> </ul>	MAIN	Connect a digital multi-meter or oscilloscope to the check point CP1.	1.8 V		Verify
	2 <ul style="list-style-type: none"> <li>• Operating channel : ch16</li> <li>• Output power : Low</li> <li>• Transmitting</li> </ul>			1.7 V		
RX SENSITIVITY	1 <ul style="list-style-type: none"> <li>• Operating channel : ch16</li> <li>• Set an SSG as:               <ul style="list-style-type: none"> <li>Frequency : 156.8 MHz (ch. 16)</li> <li>Level : 3.2 <math>\mu</math>V* (-97 dBm)</li> <li>Modulation : 1 kHz</li> <li>Deviation : <math>\pm</math>3.5 kHz</li> </ul> </li> <li>• Receiving</li> </ul>	Top Panel	Connect an SSG to the antenna connector and a SINAD meter with 8 $\Omega$ load to the [SP] jack.	0.35 $\mu$ V (-116 dBm) [M2A] 0.56 $\mu$ V (-112 dBm) [M21]		Verify

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



### 5-3 ADJUSTMENT MODE ADJUSTMENTS

Select an operation using [16] key, then set specified value using [▲] / [▼] keys on the transceiver's front panel.

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	
		UNIT	LOCATION		
REFERENCE FREQUENCY [Fr]	1 <ul style="list-style-type: none"> <li>Operating channel : ch16</li> <li>Output power : Low</li> <li>Connect an RF power meter or a 50 Ω dummy load to the antenna connector.</li> <li>Transmitting</li> </ul>	Top Panel	Loosely couple the frequency counter to the antenna connector.	156.8000 MHz	
OUTPUT POWER [Po H] (Hi)	1 <ul style="list-style-type: none"> <li>Operating channel : ch16</li> <li>Output power : Hi</li> <li>Transmitting</li> </ul>	Top panel	Connect an RF power meter to the antenna connector.	5.0 W	
	[Po M] (Mid.)			2 <ul style="list-style-type: none"> <li>Output power : Mid.</li> <li>Transmitting</li> </ul>	3.0 W
	[Po L] (Low)			3 <ul style="list-style-type: none"> <li>Output power : Low</li> <li>Transmitting</li> </ul>	0.8 W
	[Po ML] (Extra-Low)			4 <ul style="list-style-type: none"> <li>Output power : Extra-Low</li> <li>Transmitting</li> </ul>	0.45 W
FM DEVIATION [dE]	1 <ul style="list-style-type: none"> <li>Operating channel : ch16</li> <li>Output power : Low</li> <li>Connect an audio generator to the [MIC] jack and set as: 1 kHz/25 mV</li> <li>Set an FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P-P)/2</li> <li>Transmitting</li> </ul>	Top panel	Connect an FM deviation meter to the antenna connector through an attenuator.	±4.3 kHz	
SQUELCH LEVEL [nL]	1 <ul style="list-style-type: none"> <li>Operating channel : ch16</li> <li>Set an SSG as: Frequency : 156.8 MHz (ch. 16) Level : 0.63 μV* (-111 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz</li> <li>Receiving</li> </ul>	Top panel	Connect an SSG to the antenna connector and a SINAD meter with 8 Ω load to the [SP] jack.	12 dB SINAD	
	2 <ul style="list-style-type: none"> <li>Receiving</li> </ul>			At the point where the signals just appears.	
S-METER [SL]	1 <ul style="list-style-type: none"> <li>Operating channel : ch16</li> <li>Set an SSG as: Frequency : 156.8 MHz (ch. 16) Level : 1 μV* (-107 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz</li> <li>Receiving</li> </ul>	Top panel	Connect an SSG to the antenna connector and a SINAD meter with 8 Ω load to the [SP] jack.	Push [▲] or [▼] key, then S-METER is adjusted automatically.	

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



# SECTION 6 PARTS LIST

## [VR UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R500	7210003130	VARIABLE	TP76N97N-13F-10KA-2497
EP500	0910055331	PCB	B 5715A

## [MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
IC1	1130007610	S.IC	μPD3140GS-E1 (DS8)
IC50	1120002830	S.IC	NJM2125F-TE1
IC170	1110003200	S.IC	TA31136FN (EL)
IC190	1190000350	S.IC	M62363FP-650C
IC200	1110003780	S.IC	NJM2902V-TE1
IC220	1110005350	S.IC	NJM2870F05-TE1
IC260	1140003830	S.IC	TC4W66F (TE12L)
IC280	1110001810	S.IC	TA7368F (TP1)
IC340	1130010390	S.IC	HN58X2416TI
IC341	1130009110	S.IC	S-80942ANMP-DD6-T2
IC360	1140010410	S.IC	HD6433844RA60H (FX-2497A)
Q20	1590000430	S.TRANSISTOR	DTC144EUA T106
Q21	1530002920	S.TRANSISTOR	2SC4226-T1 R25
Q22	1530002920	S.TRANSISTOR	2SC4226-T1 R25
Q23	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q24	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q25	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q50	1530002920	S.TRANSISTOR	2SC4226-T1 R25
Q51	1530002060	S.TRANSISTOR	2SC4081 T106 R
Q52	1590002160	S.TRANSISTOR	XP6401-(TX)
Q53	1560001020	S.FET	2SK2973 (MTS101P)
Q54	1560001050	S.FET	2SK2974
Q90	1530002920	S.TRANSISTOR	2SC4226-T1 R25
Q150	1580000660	S.FET	3SK272-(TX)
Q151	1530002360	S.TRANSISTOR	2SC2714-Y (TE85R)
Q220	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)
Q221	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)
Q222	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)
Q223	1590000430	S.TRANSISTOR	DTC144EUA T106
Q224	1590001190	S.TRANSISTOR	XP6501-(TX) .AB
Q225	1520000450	S.TRANSISTOR	2SB1132 T100 Q
Q230	1520000450	S.TRANSISTOR	2SB1132 T100 Q
Q231	1590001190	S.TRANSISTOR	XP6501-(TX) .AB
Q240	1590001770	S.TRANSISTOR	XP1213 (TX)
Q250	1590002530	S.TRANSISTOR	UN911H (TX)
Q280	1530003090	S.TRANSISTOR	2SC4213-B (TE85R)
Q350	1590000660	S.TRANSISTOR	DTC144TU T106
D1	1720000670	S.VARICAP	HVU17TRF
D20	1790001260	S.DIODE	MA2S077-(TX)
D21	1790000620	S.DIODE	MA77 (TX)
D22	1720000780	S.VARICAP	HVU350B TRF
D23	1720000780	S.VARICAP	HVU350B TRF
D50	1790000620	S.DIODE	MA77 (TX)
D51	1790000620	S.DIODE	MA77 (TX)
D52	1790000580	S.DIODE	1SV307 (TPH3)
D80	1790001210	S.DIODE	1SS375-TL
D90	1790000580	S.DIODE	1SV307 (TPH3)
D91	1790001210	S.DIODE	1SS375-TL
D92	1790000620	S.DIODE	MA77 (TX)
D93	1790000660	S.DIODE	MA728 (TX)
D130	1790000620	S.DIODE	MA77 (TX)
D350	1750000130	S.DIODE	DA204U T106
FI150	2010002570	XTAL	FL-346 (21.700 MHz)
FI151	2010002570	XTAL	FL-346 (21.700 MHz)
FI170	2020001270	CERAMIC	CFWLB450KE2A-B0 (CFWM450E)

## [MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
X1	6050011350	S.XTAL	CR-726 (21.250 MHz)
X170	6070000190	S.DISCRIMINATOR	CDBCB450KCAY24-R0
X360	6050010290	S.XTAL	CR-610 (7.9872 MHz)
L1	6200008070	S.COIL	MLF1608E 6R8K 6.8U
L20	6200007000	S.COIL	ELJRE 82NG-F
L21	6200003090	S.COIL	NL 322522T-2R7J-3
L22	6200008190	S.COIL	0.25-1.9-8TL 80N
L23	6200006980	S.COIL	ELJRE R10G-F
L24	6200006980	S.COIL	ELJRE R10G-F
L25	6200006980	S.COIL	ELJRE R10G-F
L49	6200005740	S.COIL	ELJRE 47NG-F
L50	6200006980	S.COIL	ELJRE R10G-F
L51	6200007000	S.COIL	ELJRE 82NG-F
L52	6200010230	S.COIL	EXCCL3216U1
L53	6200002330	S.COIL	LQN 1A 15N.J04
L54	6200010230	S.COIL	EXCCL3216U1
L55	6200009240	S.COIL	0.20-1.0-7TL 31N
L56	6200008530	S.COIL	0.30-1.0-4TL 12N
L57	6200008400	S.COIL	0.35-1.6-6TL 36N
L58	6200003710	S.COIL	NL 252018T-2R7J
L80	6200008450	S.COIL	0.35-1.6-5TL 28N
L81	6200008450	S.COIL	0.35-1.6-5TL 28N
L82	6200008400	S.COIL	0.35-1.6-6TL 36N
L90	6200008150	S.COIL	0.35-1.6-7TL 44N
L91	6200007760	S.COIL	LQN21A 82NJ04
L92	6200007760	S.COIL	LQN21A 82NJ04
L93	6200008190	S.COIL	0.25-1.9-8TL 80N
L94	6200008190	S.COIL	0.25-1.9-8TL 80N
L95	6200004720	S.COIL	MLF1608D R10K-T
L120	6200002430	S.COIL	NL 252018T-082J
L121	6200002410	S.COIL	NL 252018T-056J
L122	6200003550	S.COIL	MLF1608A 4R7K-T
L130	6200007760	S.COIL	LQN21A 82NJ04
L131	6200007760	S.COIL	LQN21A 82NJ04
L132	6200008190	S.COIL	0.25-1.9-8TL 80N
L133	6200008190	S.COIL	0.25-1.9-8TL 80N
L150	6200003680	S.COIL	LQN 1N R82M
R1	7510001160	S.THERMISTOR	NTCCM1608 4LH 473KC
R2	7030003940	S.RESISTOR	ERJ3GEYF 104 V (100 kΩ)
R3	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R4	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R5	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R6	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R7	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R8	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R9	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R10	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R20	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R22	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)
R23	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R24	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R25	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R26	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R27	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R28	7030003350	S.RESISTOR	ERJ3GEYJ 181 V (180 Ω)
R29	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
R30	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R31	7030003420	S.RESISTOR	ERJ3GEYJ 681 V (680 Ω)
R32	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
R33	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R34	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R35	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R36	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R50	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R52	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R53	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R54	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R55	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R56	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R57	7030003310	S.RESISTOR	ERJ3GEYJ 820 V (82 Ω)
R58	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R59	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R60	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R61	7030007330	S.RESISTOR	ERJ1WRSJR15U (0.15 Ω)
R62	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R63	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R64	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R65	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R66	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R67	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R68	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R69	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R70	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R71	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R72	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R73	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R74	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R75	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R76	7030000280	S.RESISTOR	MCR10EZHJ 150 Ω (151)
R80	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R81	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R82	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)
R90	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R91	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R93	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R94	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R95	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω) [M2A]
	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω) [M21]
R96	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω) [M2A]
	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω) [M21]
R115	7030003270	S.RESISTOR	ERJ3GEYJ 390 V (39 Ω) [M21] only
R120	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R121	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R130	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R131	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R132	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R133	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R134	7030003300	S.RESISTOR	ERJ3GEYJ 680 V (68 Ω)
R150	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R151	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R152	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R153	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R154	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R155	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R156	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R170	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
R171	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R172	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R173	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R174	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R175	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R176	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R192	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
R193	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R194	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R201	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R202	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R203	7030003810	S.RESISTOR	ERJ3GEYJ 125 V (1.2 MΩ)
R204	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R205	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R206	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R207	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R212	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R213	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R214	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R220	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R221	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R222	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R223	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R224	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R225	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R226	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R227	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R228	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R230	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R231	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R232	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R233	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R234	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R235	7030005930	S.RESISTOR	ERJ3GEYF 334 V (330 kΩ)
R236	7030008090	S.RESISTOR	ERJ3KEF 1503 V (150 kΩ)
R240	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R241	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)
R242	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R245	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R250	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R251	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R252	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R253	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R255	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R256	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R257	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R258	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R260	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R261	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)
R262	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)
R263	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R264	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R265	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R271	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R272	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R273	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R274	7030003750	S.RESISTOR	ERJ3GEYJ 394 V (390 kΩ)
R275	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R276	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R277	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R278	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R279	7030003460	S.RESISTOR	ERJ3GEYJ 132 V (1.5 kΩ)
R281	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R282	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R283	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R284	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R286	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R288	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R289	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R300	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R301	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R302	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R303	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R304	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R305	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R306	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R307	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R308	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R309	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R310	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R311	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R312	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R313	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R314	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R315	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R340	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R341	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R343	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R345	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R346	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R350	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R351	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R352	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R353	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R360	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R361	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R362	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R363	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R364	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R365	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R366	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R367	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R371	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R372	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R373	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R374	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R375	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R376	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R377	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R378	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R379	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
C1	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C2	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C3	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C4	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C5	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C6	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C7	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION
C8	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A
C9	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A
C10	4030008920	S.CERAMIC C1608 JB 1H 473K-T-A
C11	4550006560	S.TANTALUM ECST1CY225R
C12	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C20	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C21	4030007000	S.CERAMIC C1608 CH 1H 090D-T-A
C22	4030007000	S.CERAMIC C1608 CH 1H 090D-T-A
C24	4030011600	S.CERAMIC C1608 JB 1E 104K-T-N
C25	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C26	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C27	4030007080	S.CERAMIC C1608 CH 1H 390J-T-A
C28	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C29	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C30	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C31	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C32	4030009540	S.CERAMIC C1608 CH 1H 1R5B-T-A
C33	4030007170	S.CERAMIC C1608 CH 1H 221J-T-A
C34	4030009540	S.CERAMIC C1608 CH 1H 1R5B-T-A
C35	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C36	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C37	4030009570	S.CERAMIC C1608 CH 1H 0R3B-T-A
C38	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C39	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C40	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A
C41	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C42	4030009920	S.CERAMIC C1608 CH 1H 050B-T-A
C43	4030007050	S.CERAMIC C1608 CH 1H 220J-T-A
C44	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C48	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A
C49	4030007040	S.CERAMIC C1608 CH 1H 180J-T-A
C50	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C51	4030007010	S.CERAMIC C1608 CH 1H 100D-T-A
C52	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C53	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C54	4030007030	S.CERAMIC C1608 CH 1H 150J-T-A
C55	4030009650	S.CERAMIC C1608 CH 1H 240J-T-A
C56	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C57	4030011600	S.CERAMIC C1608 JB 1E 104K-T-N
C58	4030011600	S.CERAMIC C1608 JB 1E 104K-T-N
C59	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C60	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C61	4510006970	S.ELECTROLYTIC ECEV1CA330WR
C62	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C63	4030011340	S.CERAMIC C1608 CH 1H 471J-T-A
C64	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C65	4030007130	S.CERAMIC C1608 CH 1H 101J-T-A
C66	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C67	4030011340	S.CERAMIC C1608 CH 1H 471J-T-A
C68	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C70	4030018020	S.CERAMIC C1608 CH 1H 910J-T-A
C71	4030007060	S.CERAMIC C1608 CH 1H 270J-T-A
C72	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C73	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C80	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C81	4030007030	S.CERAMIC C1608 CH 1H 150J-T-A
C82	4030009920	S.CERAMIC C1608 CH 1H 050B-T-A
C83	4030007050	S.CERAMIC C1608 CH 1H 220J-T-A
C84	4030006980	S.CERAMIC C1608 CH 1H 070D-T-A
C85	4030007060	S.CERAMIC C1608 CH 1H 270J-T-A
C87	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A
C88	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C90	4030007070	S.CERAMIC C1608 CH 1H 330J-T-A
C91	4030007050	S.CERAMIC C1608 CH 1H 220J-T-A
C92	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C93	4030009910	S.CERAMIC C1608 CH 1H 040B-T-A
C94	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C95	4030007070	S.CERAMIC C1608 CH 1H 330J-T-A
C96	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C97	4030009510	S.CERAMIC C1608 CH 1H 010B-T-A
C98	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C99	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A
C100	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C101	4030007070	S.CERAMIC C1608 CH 1H 330J-T-A
C102	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C103	4030009920	S.CERAMIC C1608 CH 1H 050B-T-A
C104	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C105	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C106	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C107	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C108	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C109	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION
C110	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C115	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A [M21] only
C120	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C121	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C122	4030007030	S.CERAMIC C1608 CH 1H 150J-T-A
C123	4030007010	S.CERAMIC C1608 CH 1H 100D-T-A
C130	4030009920	S.CERAMIC C1608 CH 1H 050B-T-A
C131	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C132	4030007070	S.CERAMIC C1608 CH 1H 330J-T-A
C133	4030017990	S.CERAMIC MCH185A130JK
C134	4030009510	S.CERAMIC C1608 CH 1H 010B-T-A
C135	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C136	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C137	4030009520	S.CERAMIC C1608 CH 1H 020B-T-A
C138	4030017990	S.CERAMIC MCH185A130JK
C139	4030007070	S.CERAMIC C1608 CH 1H 330J-T-A
C140	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C141	4030009920	S.CERAMIC C1608 CH 1H 050B-T-A
C142	4030007020	S.CERAMIC C1608 CH 1H 120J-T-A
C143	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C150	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C151	4030007100	S.CERAMIC C1608 CH 1H 560J-T-A
C152	4030008880	S.CERAMIC C1608 JB 1H 223K-T-A
C153	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C154	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C155	4030011770	S.CERAMIC C1608 CH 1H 060B-T-A
C156	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C157	4030008880	S.CERAMIC C1608 JB 1H 223K-T-A
C158	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C159	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C160	4030008770	S.CERAMIC C1608 JB 1H 562K-T-A
C170	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C171	4030007120	S.CERAMIC C1608 CH 1H 820J-T-A
C174	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C175	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C176	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C177	4030011600	S.CERAMIC C1608 JB 1E 104K-T-N
C178	4030011810	S.CERAMIC C1608 JB 1A 224K-T-N
C179	4030007140	S.CERAMIC C1608 CH 1H 121J-T-A
C180	4030007140	S.CERAMIC C1608 CH 1H 121J-T-A
C181	4030011600	S.CERAMIC C1608 JB 1E 104K-T-N
C191	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C192	4510004630	S.ELECTROLYTIC ECEV1CA100SR
C193	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C194	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C200	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C202	4030011600	S.CERAMIC C1608 JB 1E 104K-T-N
C205	4030008870	S.CERAMIC C1608 JB 1H 183K-T-A
C206	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C207	4030011600	S.CERAMIC C1608 JB 1E 104K-T-N
C220	4510005430	S.ELECTROLYTIC ECEV0JA220SR
C221	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C222	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C223	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C224	4510005430	S.ELECTROLYTIC ECEV0JA220SR
C225	4030011810	S.CERAMIC C1608 JB 1A 224K-T-N
C226	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C227	4550006710	S.TANTALUM ECST1AX226R
C228	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C229	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C230	4550006820	S.TANTALUM ECST1DX106R
C231	4030017490	S.CERAMIC C1608 JB 1A 105K-T-N
C232	4030011600	S.CERAMIC C1608 JB 1E 104K-T-N
C233	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C240	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C250	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C251	4510004630	S.ELECTROLYTIC ECEV1CA100SR
C252	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C254	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C257	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C260	4510004630	S.ELECTROLYTIC ECEV1CA100SR
C261	4030011600	S.CERAMIC C1608 JB 1E 104K-T-N
C262	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C263	4030006900	S.CERAMIC C1608 JB 1H 103K-T-A
C264	4030008770	S.CERAMIC C1608 JB 1H 562K-T-A
C265	4030007150	S.CERAMIC C1608 CH 1H 151J-T-A
C266	4030008890	S.CERAMIC C1608 JB 1H 273K-T-A
C267	4030011810	S.CERAMIC C1608 JB 1A 224K-T-N
C280	4030017480	S.CERAMIC C1608 JB 1A 474K-T-N
C281	4550006140	S.TANTALUM ECST1EY474R
C282	4510004630	S.ELECTROLYTIC ECEV1CA100SR
C283	4030011600	S.CERAMIC C1608 JB 1E 104K-T-N

S.=Surface mount

**[MAIN UNIT]**

REF NO.	ORDER NO.	DESCRIPTION	
C284	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C285	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C286	4550006200	S.TANTALUM	ECST0JY106R
C287	4030007150	S.CERAMIC	C1608 CH 1H 151J-T-A
C288	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C289	4510005370	S.ELECTROLYTIC	ECEV1AA221P
C300	4030008650	S.CERAMIC	C1608 JB 1H 332K-T-A
C340	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C341	4030008890	S.CERAMIC	C1608 JB 1H 273K-T-A
C342	4550006670	S.TANTALUM	ECST1AD107R
C350	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C351	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C352	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C360	4030006900	S.CERAMIC	C1608 JB 1H 103K-T-A
C361	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C363	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C364	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C365	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C366	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C367	4030008900	S.CERAMIC	C1608 JB 1H 333K-T-A
C368	4030008920	S.CERAMIC	C1608 JB 1H 473K-T-A
C370	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C371	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C372	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C373	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C374	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C375	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C376	4030011600	S.CERAMIC	C1608 JB 1E 104K-T-N
C377	4030009490	S.CERAMIC	C1608 JB 1H 821K-T-A
C378	4030006880	S.CERAMIC	C1608 JB 1H 472K-T-A
C379	4030007100	S.CERAMIC	C1608 CH 1H 560J-T-A
J240	6910014180	CONNECTOR	MSA-9230B-1-06Z124-T
J250	6450001910	CONNECTOR	HSJ1594-010050
J251	6510021900	S.CONNECTOR	BM02B-ASRS-TF
DS240	5040002660	S.LED	FY1101F-TR (LED)
DS241	5040002660	S.LED	FY1101F-TR (LED)
DS242	5040002310	S.LED	SML-311YTT86
DS243	5040002310	S.LED	SML-311YTT86
DS244	5040002310	S.LED	SML-311YTT86
DS245	5040002310	S.LED	SML-311YTT86
DS360	5030002220	LCD	A0153A
MC250	7700002480	MICROPHONE	SKB-2746 LPC
S250	2230001060	S.SWITCH	EVQ-PUL 02K
EP1	0910054495	PCB	B 5714E
EP360	8930057100	LCD CONTACT	SRCN-2497-SP-N-W

S.=Surface mount

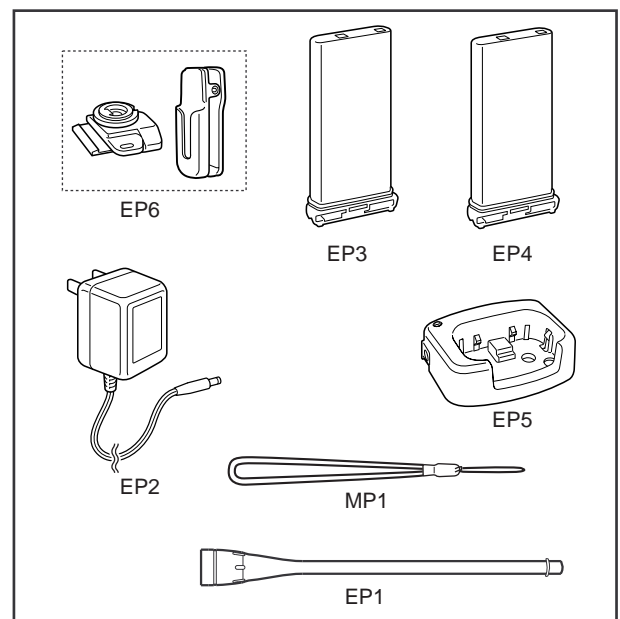
# SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

## [CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J31	6910014190	2497 ANT Connector	1
SP1	2510001091	036D0801A	1
W1	8900009640	OPC-963	1
MP1	8210018470	2497 front panel	[M2A] 1
	8210018760	2497 front panel (C)	[M21] 1
MP2	8310052570	2497 window plate	1
MP3	8930011900	SP-net (A)	1
MP4	8930039000	1757 sheet	1
MP5	8930056920	2497 Key board	[M2A] 1
	8930057230	2497 Key board (A)	[M21] 1
MP6	8930058020	2497 PTT button	1
MP7	8930056960	2497 PTT holder	1
MP8	8610011151	2497 Batt lock-1	1
MP9	8930056941	2497 lock plate-1	1
MP10	8930057690	O ring (AQ)	1
MP11	8830001470	VR nut (N)	1
MP12	8610010420	Knob N-261	1
MP13	8610007510	Knob spring No.7800	1
MP14	8850001950	Sealing washer (Y)	1
MP15	8830001250	ANT Connector-101	1
MP16	8210018500	2497 top panel	1
MP17	8930057260	2497 top sheet	1
MP21	8210018480	2497 rear panel	1
MP22	8930056950	2497 main seal	1
MP23	8810010120	Screw B0 2 x 8 SUS ZK	3
MP24	8810010150	Screw B0 2 x 10 SUS ZK	1
MP25	8850001880	Sealing washer (W)	1
MP31	8010018810	2497 chassis	1
MP32	8930056980	2497 terminal holder	1
MP33	8810009560	Screw B0 2 x 6 ZK (BT)	2
MP34	8930056890	2497 A-terminal	1
MP35	8930056900	2497 B-terminal	1
MP36	8810008640	Screw B0 2 x 4 NI-ZU (BT)	2
MP37	8930056910	2497 C-terminal	1
MP38	8810009510	Screw B0 2 x 4 NI-ZU (BT)	1
MP39	8810009510	Screw B0 2 x 4 NI-ZU (BT)	8
MP40	8930057720	2497 earth plate	[M2A] 1
	8930058050	2497 A-earth plate	[M21] 1
MP41	8810009510	Screw B0 2 x 4 NI-ZU (BT)	1
MP42	8810009560	Screw B0 2 x 6 ZK (BT)	2
MP43	8510014580	2497 Main shield	[M21] only 1
MP44	8930024961	Terminal rubber	3

## [MAIN UNIT]

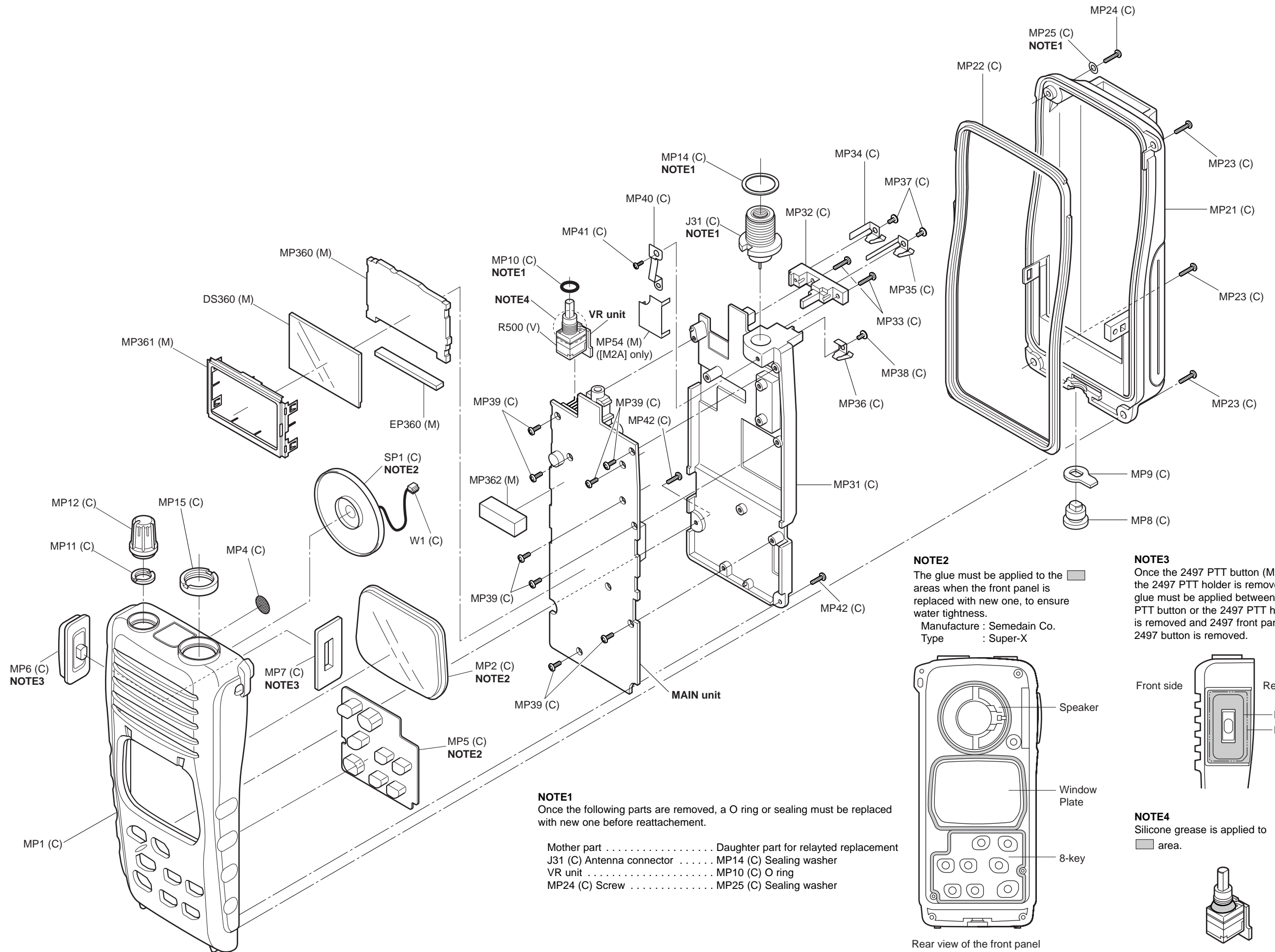
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
DS360	5030002220	A0153A	1
EP360	8930057100	SRCN-2497-SP-N-W	1
MP20	8510014330	2497 VCO case	1
MP21	8510011101	1922 VCO cover-1	1
MP50	8410002370	2337 PA heatsink	1
MP54	8510014420	2497 Shield plate	[M2A] only 1
MP360	5210018490	2497 Reflector	1
MP361	8930056930	2497 LCD holder	1
MP362	8930057810	Sponge (GW)	1



## [ACCESSORIES]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	Optional product	Antenna FA-SC55V	1
EP2	Optional product	Charger BC-147A	[USA] only 1
		Charger BC-147E	[OTHER] 1
EP3	Optional product	Battery BP-223 ACC	[USA], [UK] only 1
EP4	Optional product	Battery BP-224 ACC	1
EP5	Optional product	Charger BC-150 ACC	1
EP6	Optional product	Adapter MB-87 ACC	1
MP1	8010018080	Strap belt HK-009	1

**Screw abbreviations**    B0, BT: Self-tapping  
    ZK: Black  
    NI-ZU: Nickel-zinc  
    SUS: Stainless



MP6 (C)  
NOTE3

MP12 (C)  
MP11 (C)

MP15 (C)  
MP4 (C)

MP7 (C)  
NOTE3

MP2 (C)  
NOTE2

MP5 (C)  
NOTE2

MP1 (C)

MP361 (M)

DS360 (M)

MP360 (M)

EP360 (M)

SP1 (C)  
NOTE2

W1 (C)

MP39 (C)

MP362 (M)

MP39 (C)

MP39 (C)

MP39 (C)

MP39 (C)

MP10 (C)  
NOTE1

NOTE4

VR unit

R500 (V)

MP54 (M)  
(M2A) only

MP40 (C)

MP41 (C)

MP14 (C)  
NOTE1

J31 (C)  
NOTE1

MP32 (C)

MP34 (C)

MP37 (C)

MP35 (C)

MP33 (C)

MP38 (C)

MP36 (C)

MP31 (C)

MP42 (C)

MAIN unit

NOTE1

Once the following parts are removed, a O ring or sealing must be replaced with new one before reattachment.

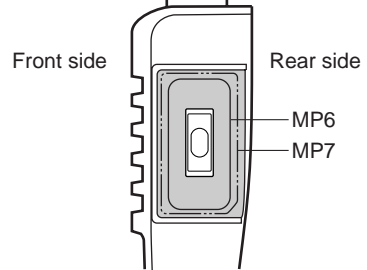
Mother part	.....	Daughter part for relayed replacement
J31 (C) Antenna connector	.....	MP14 (C) Sealing washer
VR unit	.....	MP10 (C) O ring
MP24 (C) Screw	.....	MP25 (C) Sealing washer

NOTE2

The glue must be applied to the areas when the front panel is replaced with new one, to ensure water tightness.  
Manufacture : Semedain Co.  
Type : Super-X

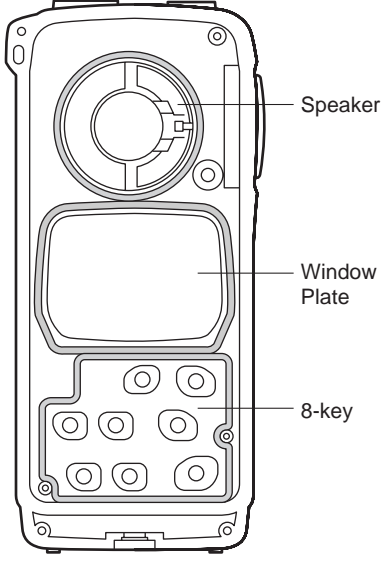
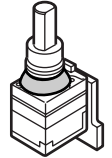
NOTE3

Once the 2497 PTT button (MP6 (C)) or the 2497 PTT holder is removed, the glue must be applied between the 2497 PTT button or the 2497 PTT holder when is removed and 2497 front panel when 2497 button is removed.



NOTE4

Silicone grease is applied to the area.



Rear view of the front panel

UNIT abbreviations (C): CHASSIS PARTS, (M): MAIN UNIT, (V): VR UNIT

• BC-150 CHARGER PARTS LIST

ELECTRICAL PARTS

[CHARGE UNIT]

REF. NO.	ORDER NO.	DESCRIPTION
R1	7070001130	RESISTOR 120 ERG2SJ
R2	7070001140	RESISTOR 150 ERG2SJ
R3	7010007100	RESISTOR 1K PSD1/4V
J1	6510023070	CONNECTOR HEC2305-01-250
DS1	5040001390	LED TLG124A
EP1	0910054642	PCB B-5787B

MECHANICAL PARTS

[CHASSIS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8510014350	2523 Case	1
MP2	8110007680	2523 Cover	1
MP3	8810008660	Screw B0 3 x 8 NI-ZU (BT)	2
MP4	8930047830	Leg cushion (C)	2

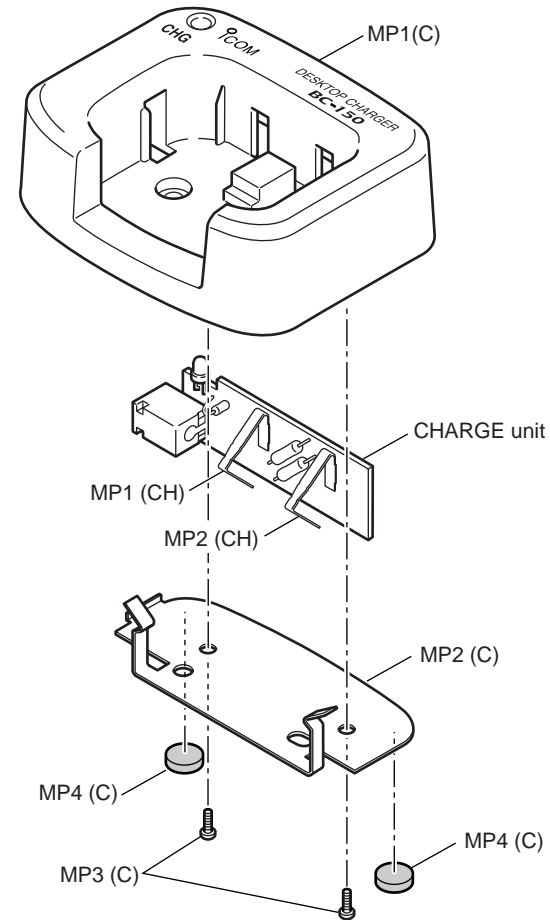
[CHARGE UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8930057120	2523 Terminal	1
MP2	8930057120	2523 Terminal	1

[ACCESSORIES]

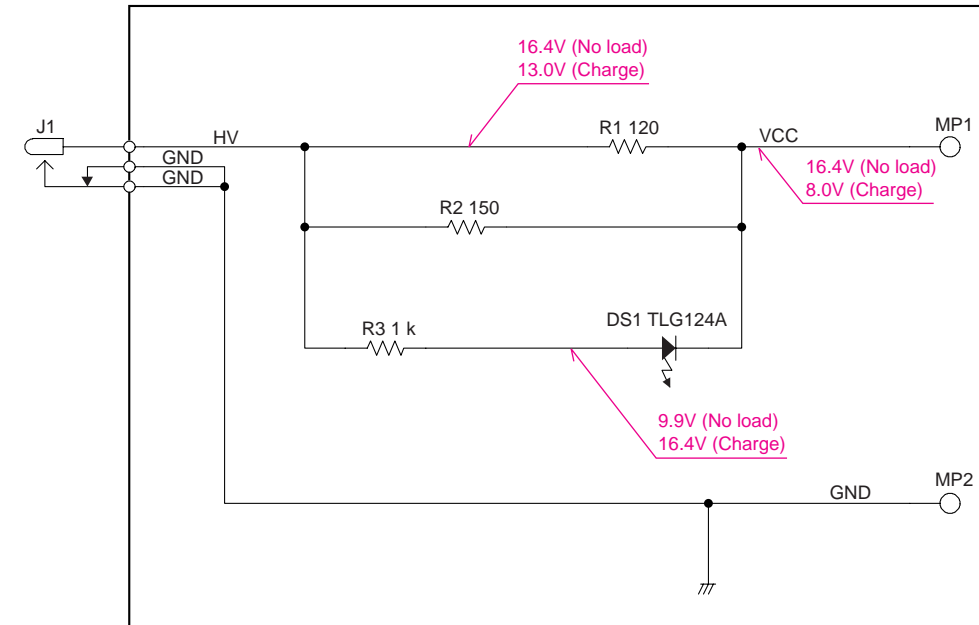
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8810001460	Screw A0 3.5 x 20 SUS	2

Screw abbreviations A0, B0, BT: Self-tapping  
 NI-ZU: Nickel-zinc  
 SUS: Stainless



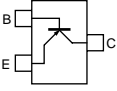
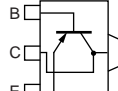
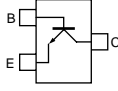
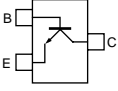
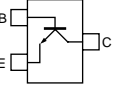
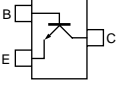
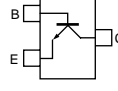
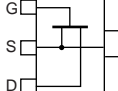
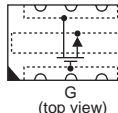
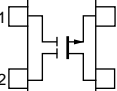
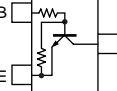
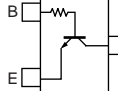
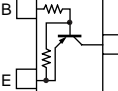
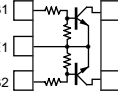
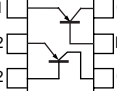
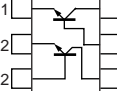
NOTE: (C) : CHASSIS  
 (CH): CHARGE UNIT

• BC-150 VOLTAGE DIAGRAM

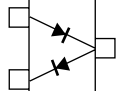
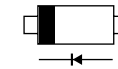
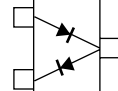
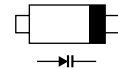
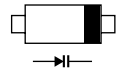
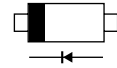
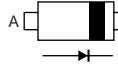
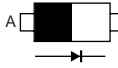


# SECTION 8 SEMI-CONDUCTOR INFORMATION

## • TRANSISTOR AND FETS

<b>2SA1588 GR</b> (Symbol: ZG) 	<b>2SB1132 Q</b> (Symbol: BAQ) 	<b>2SC2714 Y</b> (Symbol: QY) 	<b>2SC4081 R</b> (Symbol: BR) 	<b>2SC4213 B</b> (Symbol: AB) 
<b>2SC4215 O</b> (Symbol: QO) 	<b>2SC4226 R25</b> (Symbol: R25) 	<b>2SK2973</b> (Symbol: K1) 	<b>2SK2974</b> (Symbol: K2974)  (top view)	<b>3SK272</b> (Symbol: K) 
<b>DTC144 EUA</b> (Symbol: 26) 	<b>DTC144 TU</b> (Symbol: 06) 	<b>UN911 H</b> (Symbol: 6P) 	<b>XP1213</b> (Symbol: 9L) 	<b>XP6401</b> (Symbol: 5O) 
<b>XP6501 AB</b> (Symbol: 5N) 				

## • DIODES

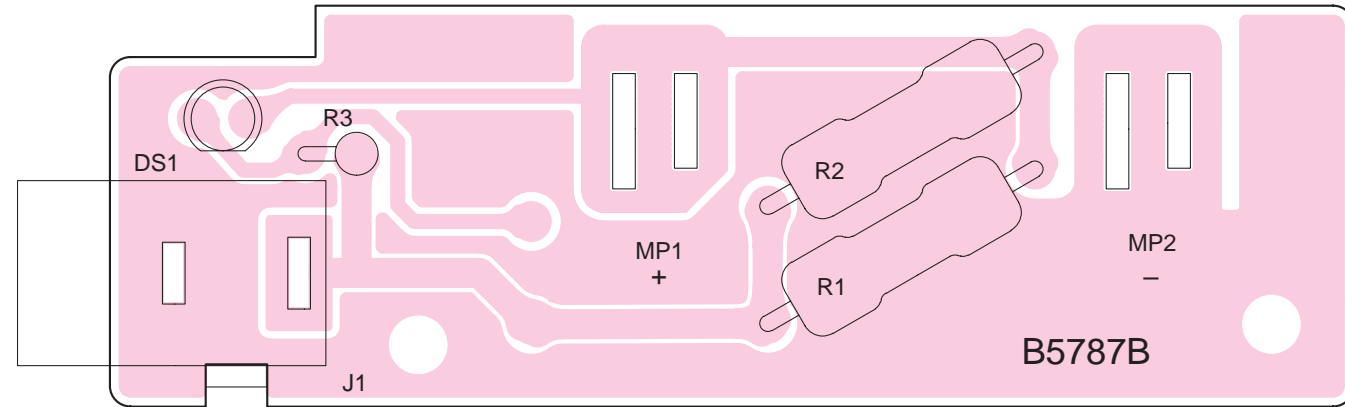
<b>1SS375</b> (Symbol: FH) 	<b>1SV307</b> (Symbol: TX) 	<b>DA204 U</b> (Symbol: K) 	<b>HVU17 TRF</b> (Symbol: E) 	<b>HVU350 B</b> (Symbol: 4) 
<b>MA2S077</b> (Symbol: S) 	<b>MA728</b> (Symbol: 2A) 	<b>MA77</b> (Symbol: 4B) 		



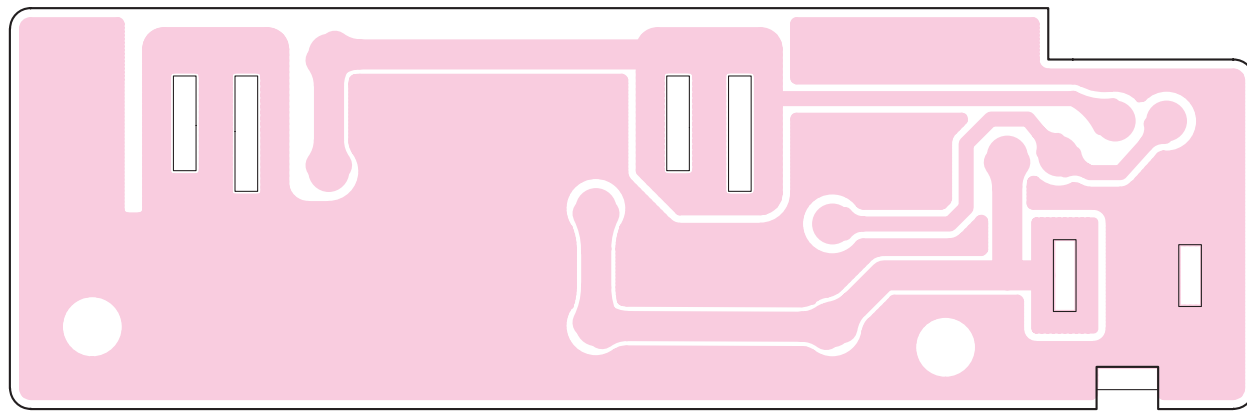
## SECTION 9 BOARD LAYOUTS

### 9-1 CHARGE UNIT (BC-150)

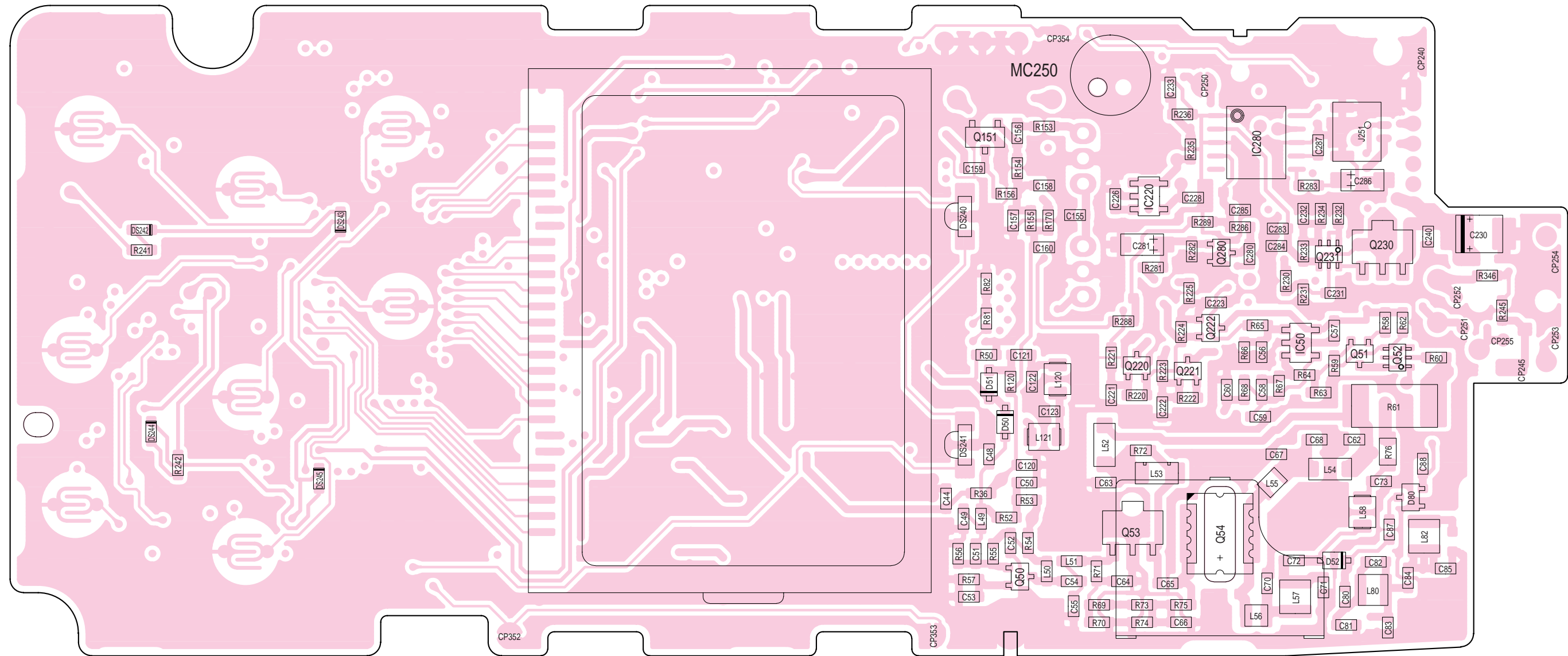
#### • TOP VIEW



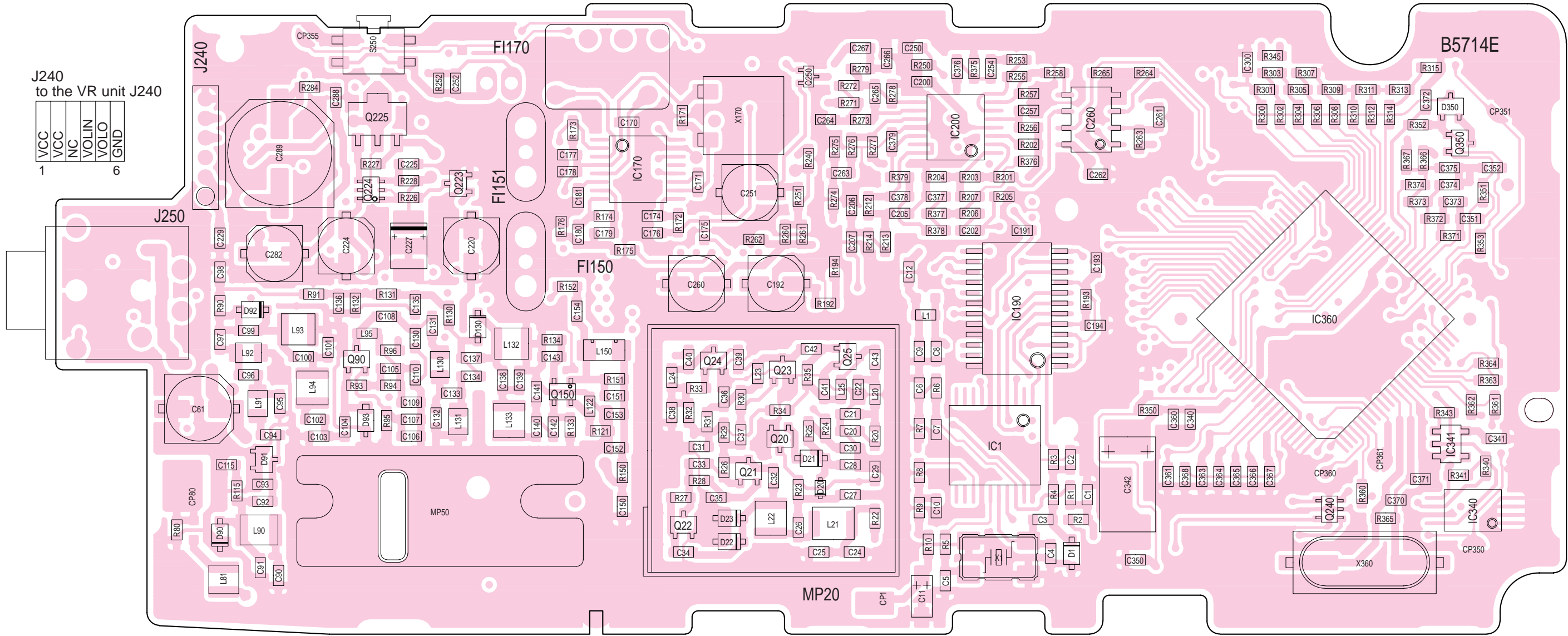
#### • BOTTOM VIEW



9-2 MAIN UNIT  
• TOP VIEW



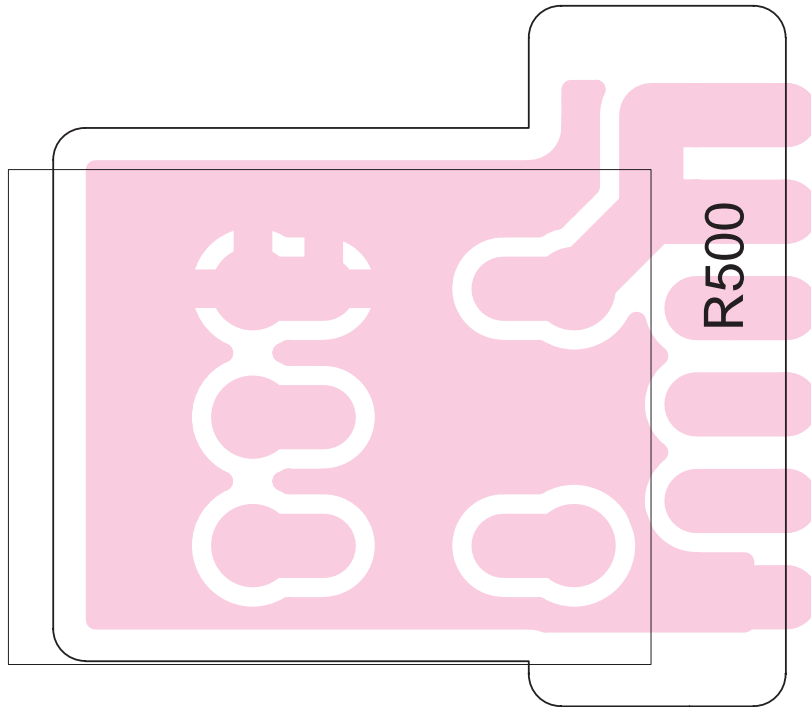
• BOTTOM VIEW



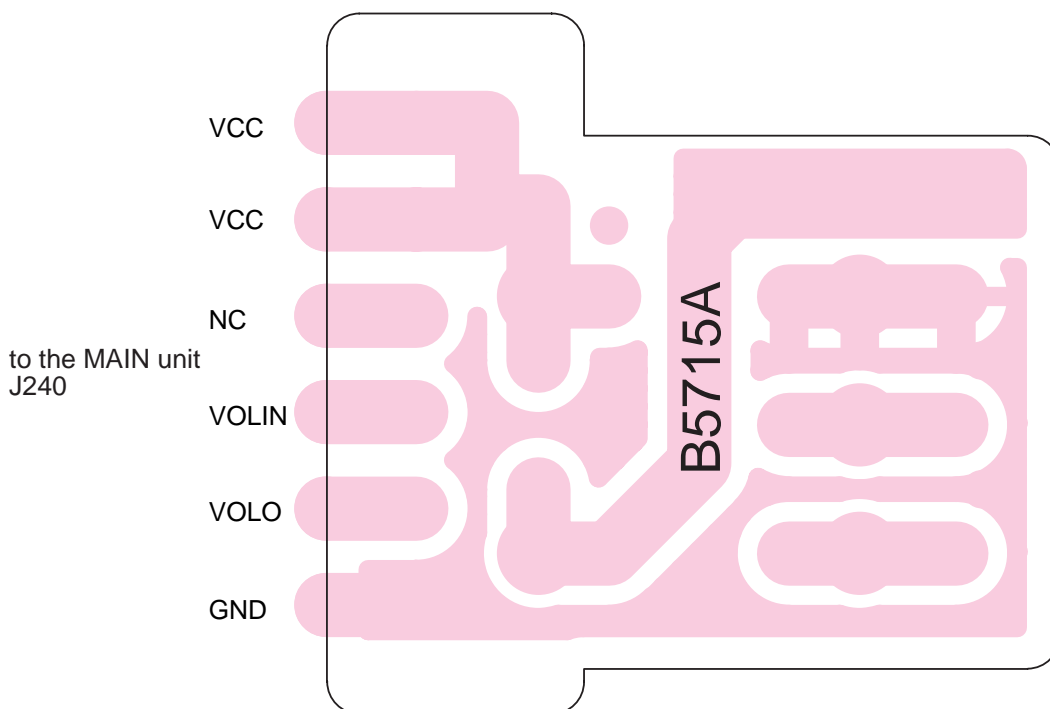
J240 to the VR unit J240

VCC	VCC	NC	VOLIN	VOLO	GND
1					6

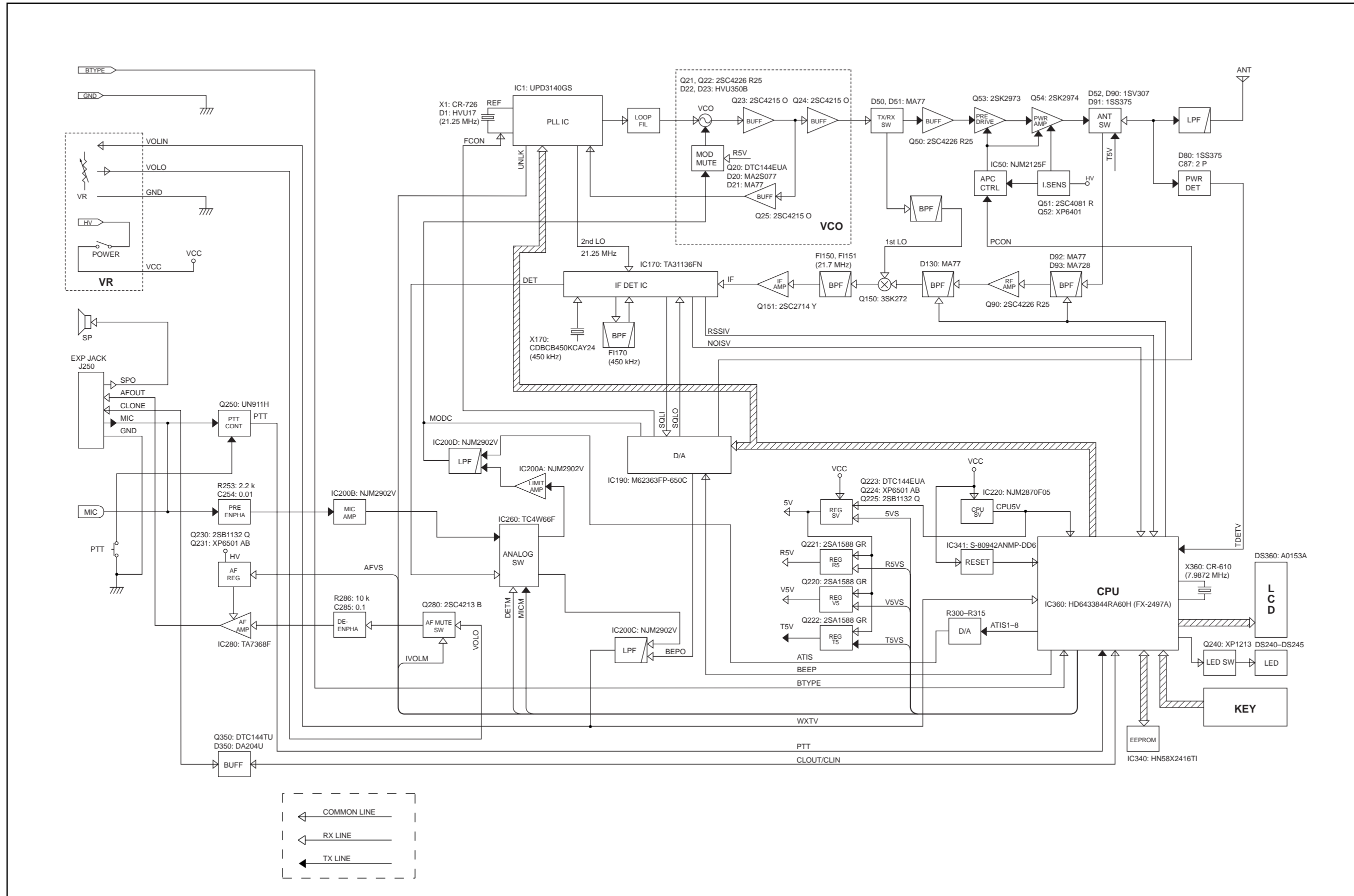
**9-3 VR UNIT**  
• TOP VIEW



• BOTTOM VIEW

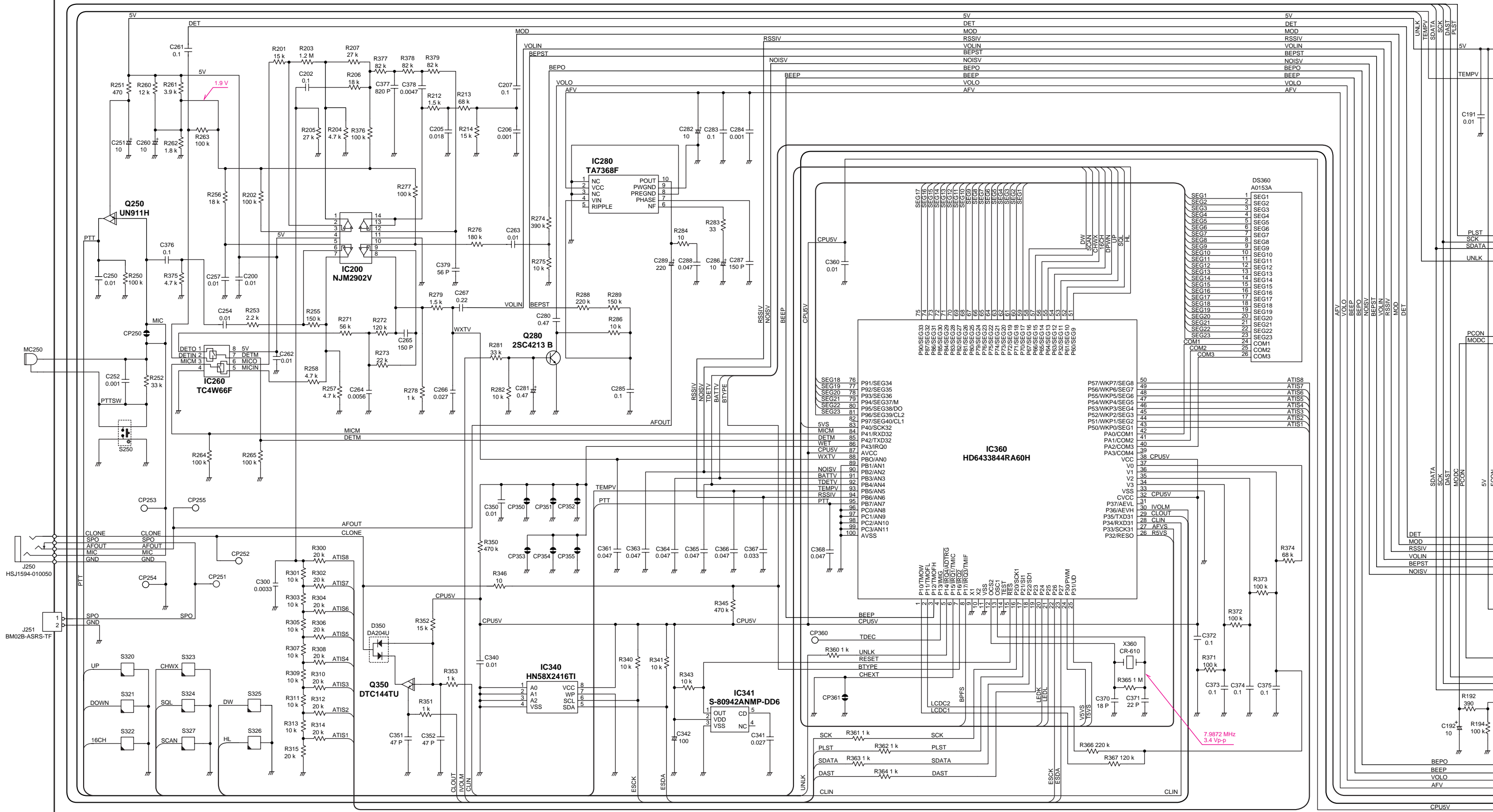


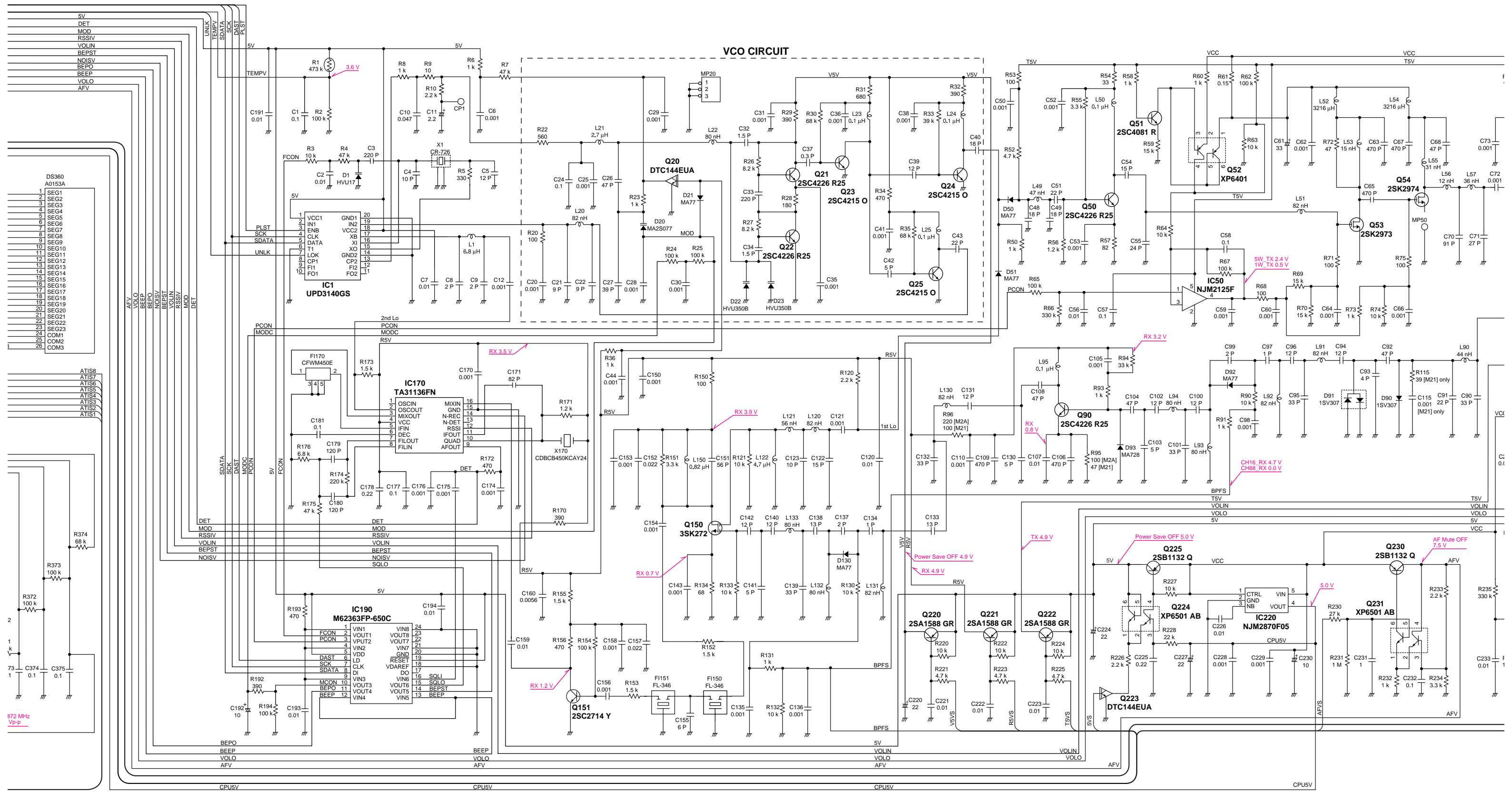
# SECTION 10 BLOCK DIAGRAM

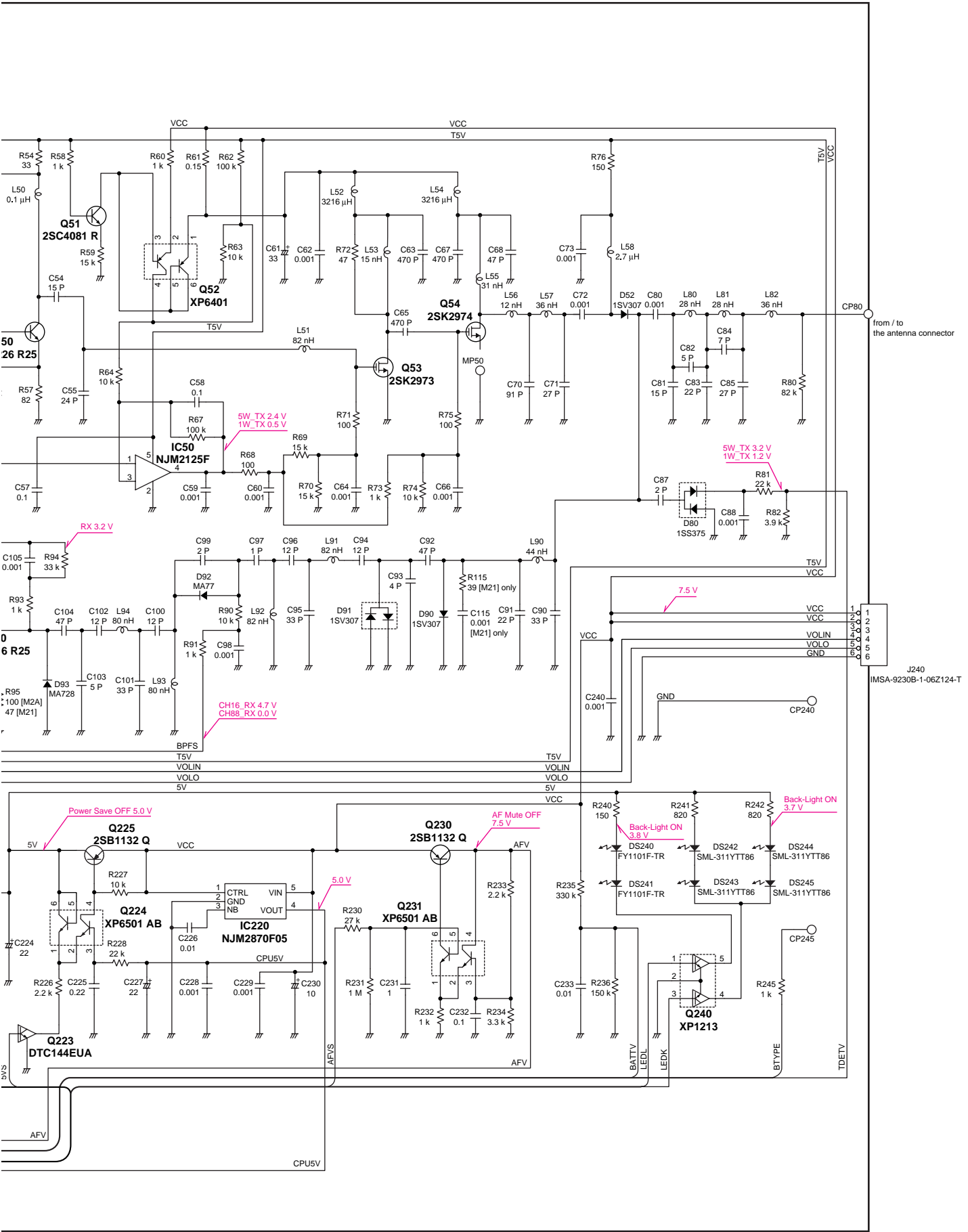


# SECTION 11 VOLTAGE DIAGRAM

## 11-1 MAIN UNIT



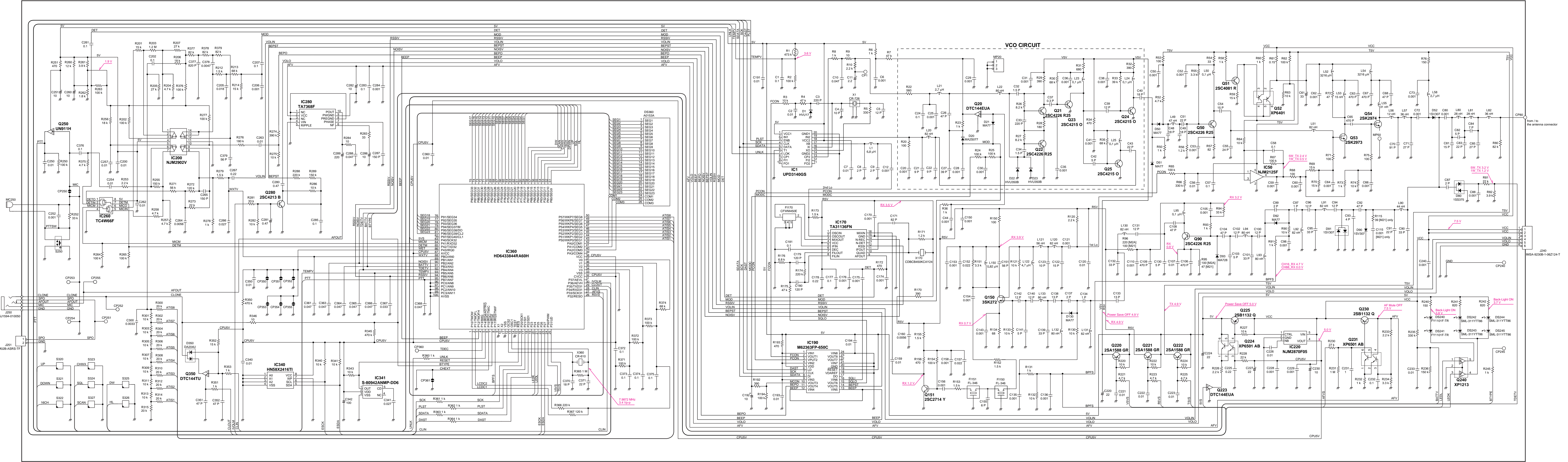




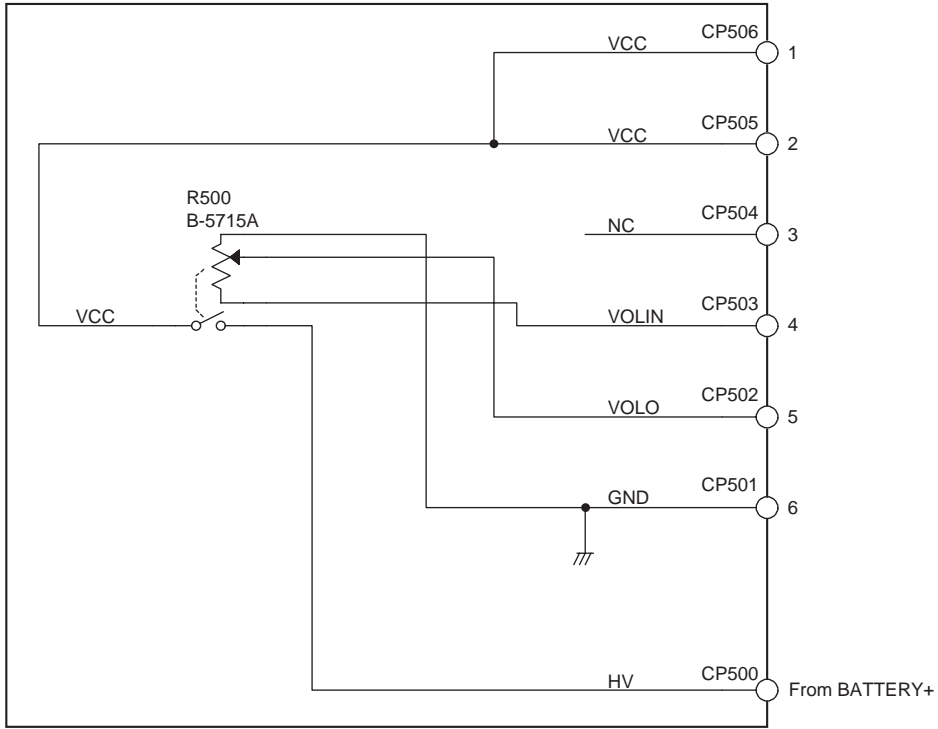


# SECTION 11 VOLTAGE DIAGRAM

## 11-1 MAIN UNIT



# 11-2 VR UNIT



## Icom Inc.

1-1-32, Kamiminami, Hirano-ku, Osaka 547-0003, Japan  
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Fax : +81 (06) 6793 0013  
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E-mail : [info@icomcanada.com](mailto:info@icomcanada.com)

### Icom (Australia) Pty. Ltd.

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290-294 Albert Street, Brunswick, Victoria, 3056, Australia  
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URL : <http://www.icom.net.au>  
E-mail : [sales@icom.net.au](mailto:sales@icom.net.au)

### Icom New Zealand

146A Harris Road, East Tamaki,  
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