



# SERVICE MANUAL

VHF AIR BAND TRANSCEIVER

## **IC-A210**

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S-14401XZ-C1  
Sep. 2007

Icom Inc.

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## INTRODUCTION

This service manual describes the latest service information for the **IC-A210** VHF AIR BAND TRANSCEIVER at the time of publication.

MODEL	VERSION	CHANNEL SPACING	CARRIER POWER
IC-A210	USA-01	25.0 kHz	8 W
	EXP-01		
	CHN-01		

### UNIT ABBREVIATIONS:

F=FRONT UNIT  
M=MAIN UNIT

## CAUTION

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

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

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

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

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



(IC-A210)

## ORDERING PARTS

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

1. 10-digit Icom parts numbers
2. Component name
3. Equipment model name and unit name
4. Quantity required

### <ORDER EXAMPLE>

1110003491 S.IC TA31136FNG IC-A210 MAIN UNIT 5 pieces  
8820001210 Screw 2438 screw IC-A210 Top cover 10 pieces

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

## REPAIR NOTES

1. Make sure the 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 Standard Signal Generator or a Sweep Generator.
7. **ALWAYS** connect a 50 dB to 60 dB attenuator between the transceiver and a Deviation Meter or Spectrum Analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting a test equipment to the transceiver.

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### ■ General

- Frequency range : 118.000 to 136.975 MHz  
161.650 to 163.275 MHz\*
- Channel spacing : 25 kHz
- Frequency stability :  $\pm 5$  ppm
- Operating temperature :  $-20^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$   
 $-4^{\circ}\text{F}$  to  $+131^{\circ}\text{F}$
- Antenna impedance :  $50\ \Omega$
- Number of memory channels : 10 memory channels  
200 group channels  
10 history channels  
10 GPS channels  
10 weather channels\*
- Mode : AM (A3E)
- Power supply requirement : 13.80 V / 27.50 V DC  
(negative ground)
- Dimensions : 160 (W)  $\times$  34 (H)  $\times$  271 (D) mm  
(projections not incl.)  $6^{5/16}$ (W)  $\times$   $1^{11/32}$ (H)  $\times$   $10^{21/32}$ (D) in
- Weight : approx 1.0 kg; 2.2 lb

### ■ Transmitter

- Mode : A3E
- Output power : 8 W  
(Carrier power)
- Spurious emissions :  $-60$  dBc
- Microphone impedance :  $600\ \Omega$
- Modulation limiting : 70% (Max 98%)

### ■ Receiver

- Receive system : Double conversion  
superheterodyne
- Intermediate frequencies : 1st 38.85 MHz  
2nd 450 kHz
- Sensitivity : (AM) Less than  $2\ \mu\text{V}$  (pd)  
at 6 dB S/N  
(FM) Less than  $1.4\ \mu\text{V}$   
at 12 dB SINAD\*
- Selectivity : 6 dB  $\pm 3$  kHz  
60 dB  $\pm 22$  kHz
- Spurious response rej. : More than 74 dB $\mu$
- Audio output power : 5 W with a  $4\ \Omega$  load (External  
speaker)  
60 mW with a  $500\ \Omega$  load  
(Headphone)

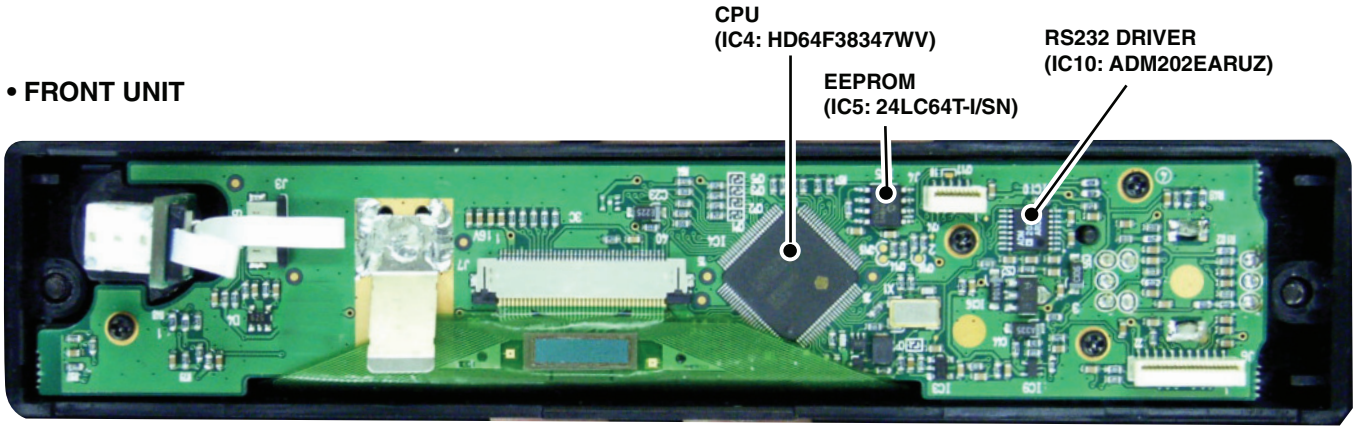
\*U.S.A. version only, receiving only.

Measurements made in accordance with RTCA DO-186B for U.S.A. version.  
All stated specifications are subject to change without notice or obligation.

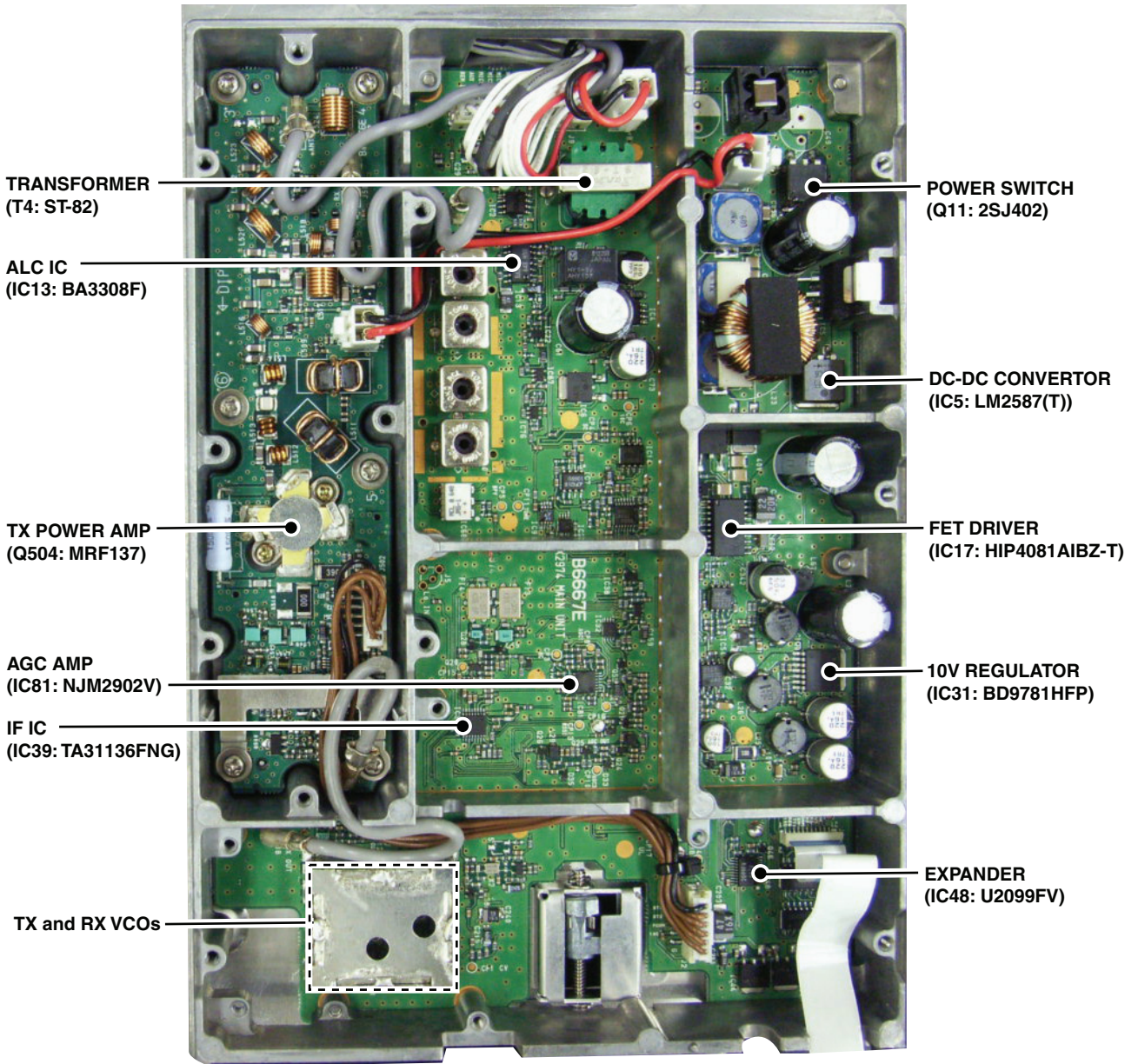
# SECTION 2

# INSIDE VIEWS

## • FRONT UNIT



## • MAIN AND PA UNITS



## 3-1 RECEIVER CIRCUITS

### RF CIRCUITS

RF circuits consist of RF filters, antenna switch (ANT SW), RF Amplifier (RF AMP), etc., and extracts and amplifies the signals of frequency which desired to receive.

The received signals (RX signals) from the antenna are passed through the LPF, ANT SW (as an LPF in RX), attenuator, and the two-staged tuned BPF.

The filtered RX signals are amplified by the RF AMP, and passed through another two-staged tuned BPF. The filtered RX signals are then applied to the 1st IF circuits.

The ANT SW toggles RX line and TX line. While receiving, the TX line and the antenna is disconnected to prevent RX signals entering. The RX line is disconnected from the GND simultaneously, and an LPF which guides received signals to the RX circuits is composed.

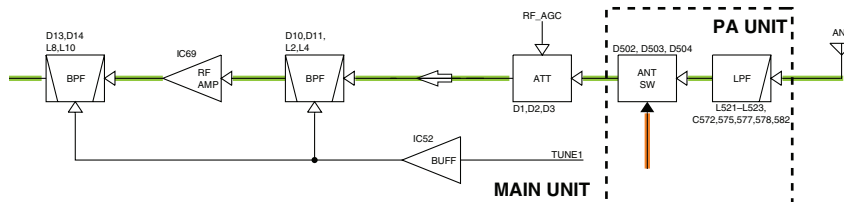
While transmitting, serial-connected PIN diodes are ON, thus the TX line is connected to the antenna, and the RX line is connected to the GND simultaneously to prevent transmit signal entering.

The attenuator functions as a part of the AGC circuit. The AGC voltage which is applied to the PIN diodes controls RX signal level to enter the RX circuits.

The tuned-BPF is adjusted so that it responds to receiving frequency and rejects all others, by the variable capacitor whose capacitance is varied by applied voltage "T1" and "T2."

The RF AMP amplifies RX signals to a level suited to the 1st mixer.

### • RF CIRCUITS



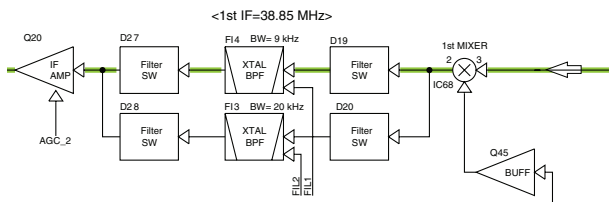
### 1ST IF CIRCUITS

The 1st IF circuits consist of 1st mixer, 1st IF filter and 1st IF amplifier. And it converts the RX signals into the 1st IF signal, then filters to remove unwanted signals and amplifies.

The filtered RX signals are applied to the 1st mixer to be converted into the 1st IF signal, by being mixed with the 1st Local Oscillator (LO) signals from the RX VCO via buffer.

The converted 1st IF signal is passed through the 1st IF filter (FI4 for AM RX, FI3 for WX RX) via filter switches, to be removed unwanted signals. The filtered 1st IF signal is amplified by the 1st IF AMP. The amplified 1st IF signal is then applied to the 2nd IF circuits.

### • 1ST IF CIRCUITS



### 2ND IF AND DEMODULATOR CIRCUITS

The 2nd IF circuits consist of 2nd mixer, 2nd IF filter, 2nd IF amplifier. And it converts the 1st IF signal into the 2nd IF signal, then filters to extract 2nd IF signal only and amplifies. And the demodulator circuit converts the 2nd IF signal to AF signals.

### • AM signals

The amplified 1st IF signal is applied to the FM IF IC, and converted into the 2nd IF signal, by being mixed with the 2nd LO from the X2, at internal 2nd mixer. The converted 2nd IF signal is filtered by external 2nd IF filter (FI5), and amplified by three external 2nd IF AMPs. The amplified 2nd IF signal is AM-demodulated by Q21. A PN junction construction inside Q21 is used for AM detection to obtain low output impedance. The demodulated AF signals are applied to the RX AF circuits via the ANL (Automatic Noise Limiter) circuit which reduces pulse-type noises, when the ANL function is activated.

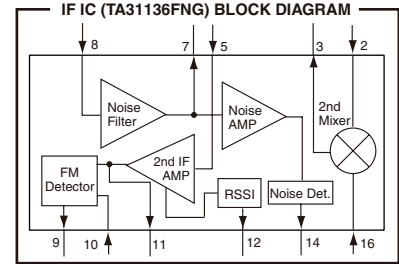
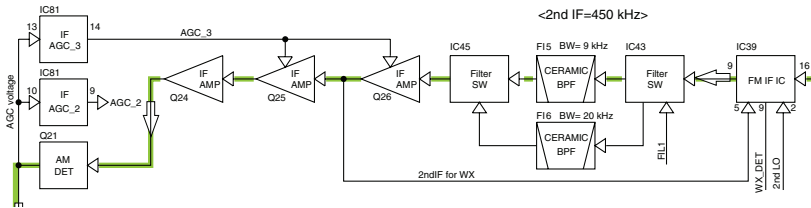
**• Weather Alert (WX) signals**

FM IF demodulator IC “TA31136FNG” contains whole of the 2nd IF circuits and FM demodulator circuit too.

The amplified 1st IF signal is applied to the FM IF IC, and converted into the 2nd IF signal, by being mixed with the 2nd LO from the X2, at internal 2nd mixer. The converted 2nd IF signal is filtered by external 2nd IF filter (FI6), and amplified by external 2nd IF AMP. The amplified 2nd IF signal is applied to the FM IF IC again (pin 5), and saturation-amplified by internal 2nd IF AMP. The amplified 2nd IF signal is FM-demodulated by the quadrature detector.

The demodulated AF signals are applied to the RX AF circuits.

**• 2ND IF CIRCUITS**



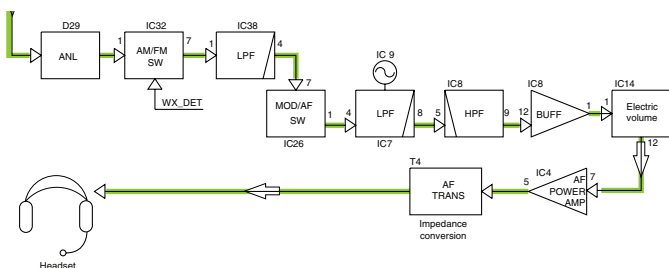
**RX AF CIRCUITS**

The RX AF circuits consist of AF filters, AF amplifier, AF power amplifier, etc., and amplify, filter the AF signals demodulated by the demodulator circuits.

The demodulated AF signals are passed through the AM/AF SW and LPF. The filtered AF signals are passed through the MOD/AF SW and the switched capacitor filter (IC7) which removes unwanted signals. The filtered AF signals are passed through the HPF, and amplified by buffer, then applied to the electric volume IC for audio level adjustment. The level-adjusted AF signals are power-amplified by AF power AMP to obtain AF output level. The power-amplified AF signals are converted its impedance into 500 ohms by the AF transformer, then applied to the connected headset via the K-CONNECT UNIT or MB-113.

The ANL circuit is a limiter which reduces pulse-type noises by cutting off the AF line temporarily. When the ANL function is activated (ANL SW; IC70 is OFF), demodulated AF signals are applied to the cathode of D29 (switching diode) only. If a pulse-type noise is included in the demodulated AF signals, the cathode voltage of D29 becomes higher than anode voltage, and D29 turns OFF to cut-off the AF line. Thus, if the RX signals contains pulse-type noise, the demodulated AF signals are not applied to the RX AF circuits.

**• RX AF CIRCUITS**



**AGC (Automatic Gain Control) CIRCUIT**

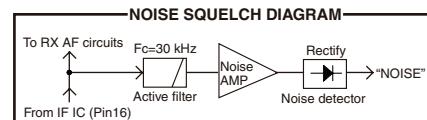
The AGC circuit effectively reduces the RX signal level if the signal is strong, and raises it when it is weaker. The AGC circuit detects the overall strength of the signal and automatically adjusting the gain of the 2nd IF AMPs to maintain an approximately constant average level of the received signals.

A portion of 2nd IF signal is converted into DC voltage (AGC voltage) which is in proportion to the RX signal level, at the AM detector (Q21). The AGC voltages “AGC\_2” and “AGC\_3” are applied to the emitter terminals of 2nd IF AMPs, to control the gain of these AMPs for stable 2nd IF signal level.

**SQUELCH CIRCUIT**

The squelch circuit cuts off the AF output signals when no RF signals are received. Extracting noise components (approx. 30 kHz signals) in the demodulated AF signals, the squelch circuit sets attenuation level to infinity.

A portion of FM-demodulated AF signal from the FM IF IC is passed through the noise filter to extract the noise components (approx. 30 kHz signals) only. The noise components are rectified to be converted into the pulse-type signal by noise detector to produce DC voltage corresponding to the noise level "NOISE" signal. The "NOISE" signal is applied to the CPU (F; IC4, pin 90) and compared with the reference level preset in the CPU.



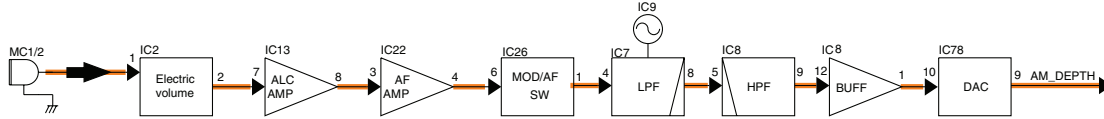
If the CPU interprets that the noise level is higher than preset one, the CPU sends the serial data "SDA\_VOL2" to the electric volume IC (IC14), via the expander (IC49) and dual gate logic IC (IC46). The serial data sets the attenuation level to infinity to close the squelch.

### 3-2 TRANSMITTER CIRCUITS

#### TX AF CIRCUITS

The TX AF circuit consists of microphone amplifier (MIC AMP), ALC and AF filters. ALC (Automatic Level Control) is an amplifier which reduces its gain automatically to prevent over deviation.

#### • TX AF CIRCUITS



The audio signals from the connected headset's microphone (MIC signals) are passed through the electric volume to be adjusted MIC gain, and amplified by ALC (Automatic Level Control) AMP and MIC AMP. The amplified MIC signals are passed through the MOD/AF SW and the switched capacitor filter (IC7) which removes unwanted signals. The filtered AF signals are passed through the HPF, and amplified by buffer, then applied to the AM modulation circuits as the modulation signals, via the DAC for deviation adjustment.

#### AM MODULATION CIRCUITS

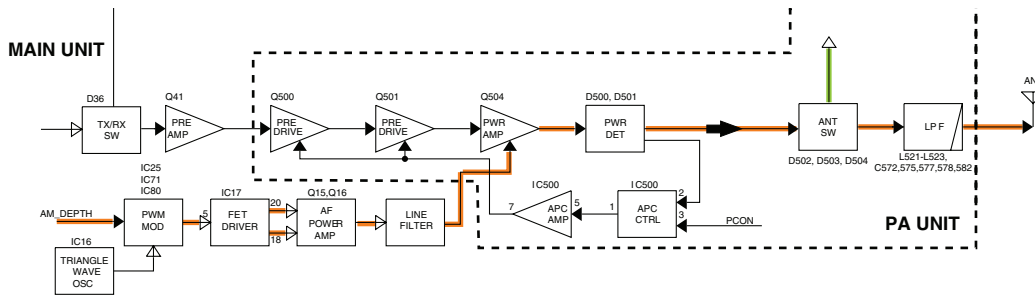
The AM modulation circuits modulate the carrier with the MIC signals (=modulation signals).

The level-adjusted modulation signals are applied to the PWM modulation circuit via the AF SW (IC71, pins 1, 2), then converted into the triangle wave form by being mixed with the triangle wave which is generated by the IC16, at IC25.

The triangle wave form modulation signals applied to the FET driver to drive the AF power AMP (FETs; Q15, Q16).

The power-amplified modulation signals are applied to the drain terminal of the TX power AMP, then the corrector current of the TX amplifier changes corresponding to the amplitude of the modulation signals. Thus the gain of the TX amplifier changes corresponding to the amplitude of the modulation signals, and it causes change of the TX output power to obtain an Amplitude Modulation.

#### • AM MODULATION AND TX AMPLIFIER CIRCUITS



#### TX AMPLIFIERS

The TX amplifiers consist several RF amplifier (pre-driver, driver, power, etc.), and amplify the VCO output to the transmit output level.

The TX VCO output is applied to the RF amplifier via buffers (Q33 and Q35) and TX/RX switch (D36), and amplified to the level need for PA UNIT. The TX signal is amplified by pre-driver and driver AMPs. The amplified TX signal is then power-amplified by power AMP where the AM modulation is accomplished.

The power-amplified TX signal is passed through the TX power detector, ANT SW and LPF (as a harmonic filter), then applied to the antenna via the K-CONNECT UNIT or MB-113.

#### APC CIRCUIT

The APC (Automatic Power Control) circuit stabilizes transmit output power to prevent transmit output power level change, which is caused by load mismatching or heat effect, etc.

The power detector rectifies a portion of the TX signal and converts it into DC voltage which is in proportion to the transmit output power level. The detected voltage is applied to the input terminal (pin 3) of dual operational AMP (IC500; as a comparator). The TX power setting is applied to another input terminal as the reference voltage.

The comparator compares the detected voltage and reference voltage, and the difference of voltage is output from output terminal.

The output voltage is amplified by APC AMP, and controls the bias of the pre-driver and driver amplifiers to reduce/increase the gain of these amplifiers for stable TX output power.



### 3-3 FREQUENCY SYNTHESIZER CIRCUITS VCO

A VCO is an oscillator whose oscillating frequency is determined by the applied voltage. This transceiver has two VCOs; RX VCO and TX VCO. The RX VCO generates the 1st LO signals for the 1st IF signal produce, and TX VCO generates TX signal.

The voltage applied to each VCO is passed through the ripple filter which removes ripples on the VCC line.

#### • RX VCO

The RX VCO oscillates 79.150 to 98.125 MHz LO signals for normal RX and WX channels. The generated 1st LO signals are applied to the 1st mixer (IC68, pin 6) via the buffer AMPs (Q33, Q35, Q45), TX/RX SW (D36) and the LPF (harmonic filter).

#### • TX VCO

The TX VCO oscillates 118.000 to 136.975 MHz transmit signals. The generated TX signal is applied to the RF amplifier (Q41) via the buffer AMPs (Q33, Q35), TX/RX SW (D36).

A portion of the VCO output is applied to the PLL IC via the buffer and harmonic filter.

### PLL (Phase Locked Loop) CIRCUIT

The PLL circuit provides stable oscillation for both of the TX and 1st LO frequencies (for RX). By comparing feedbacked VCO output and reference frequency signals, the PLL corrects the difference of the frequencies.

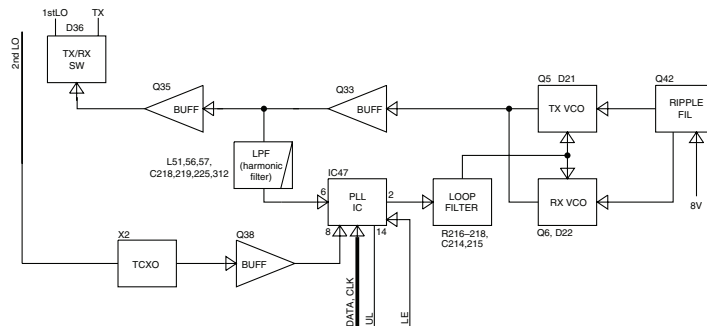
A portion of RX/TX VCO output is applied to the PLL IC via buffer (Q33) and harmonic filter. The applied VCO output is divided according to the serial data including divide ratio from the CPU, at the prescaler and programmable divider. In the same way, the reference frequency signal from the TCXO is applied to the PLL IC and divided so that these two applied signals are the same frequency.

The divided and frequency-matched signals (VCO output and the reference frequency signals) are applied to the phase comparator and phase-compared. The resulted phase difference is detected as a phase-type signal, and level-adjusted at the charge pump then output. The output pulse type signal is passed through the loop filter to be converted into the DC voltage (=Lock Voltage).

Applying the lock voltage to the variable capacitor which composes a part of the resonator of RX/TX VCO, the capacitance of variable capacitor changes corresponding to the applied lock voltage. This causes the change of resonation frequency that determine the VCO oscillating frequency to keep the VCO frequency constant.

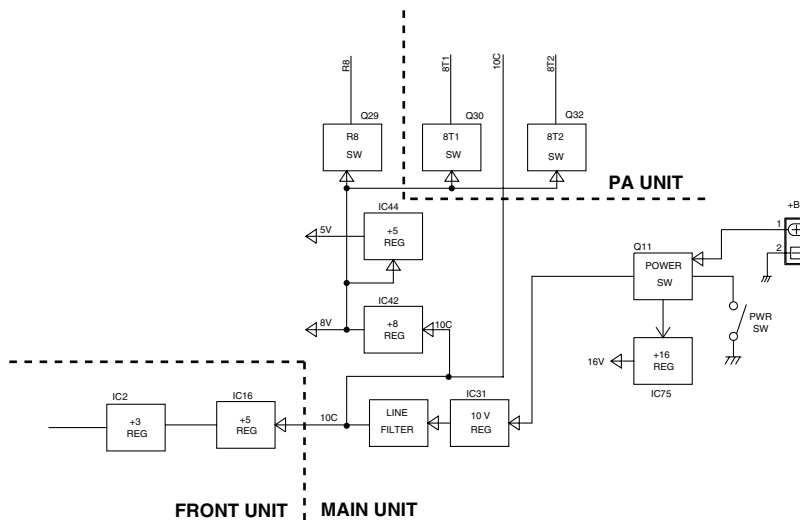
When the oscillation frequency drifts, its phase changes from that of the reference frequency, causing a lock voltage change to compensate for the drift in the VCO oscillating frequency.

#### • FREQUENCY SYNTHESIZER CIRCUITS



### 3-4 VOLTAGE DIAGRAMS

Voltage from the power supply is routed to the whole of the transceiver via regulators and switches.



### 3-5 PORT ALLOCATIONS

#### • CPU (F: IC4)

Pin No.	Line name	Description	I/O
1	EC	[EC] key. (pulled up)	I
2	DIAL	[DIAL] key. (pulled up)	I
3	BEEP	Beep audio.	O
4	MONI	[VOL] switch. (push)	I
7	PTT1_0	External [PTT1/2] keys.	I
15	RESET	Reset signal from the reset IC (F: IC3).	I
19	REG_C2	Regulator control signal to the +16V regulator (M: IC75). "Low"=ON	O
24	INCOM_0	External intercom switch (pulled up).	I
25	SFT	Clock frequency shift signal to system clock oscillator (F: Q6).	O
34–37	V3–V0	Power supply for EL display (F: DS11).	O
40	SCK	Serial clock to the EEPROM (F: IC5).	O
43	SDN1	Phase-A signal from rotary encoder (S1; inner).	I
44	SUP1	Phase-B signal from rotary encoder (S1; inner).	I
45	SDN2	Phase-A signal from rotary encoder (S1; outer).	I
46	SUP2	Phase-B signal from rotary encoder (S1; outer).	I
52	DATA_IC11	Serial data to the LED driver (F: IC15).	O
53	CLK_IC12	Serial clock to the LED driver (F: IC15).	O
54–56	A–C	I/O setting signals to the logic IC (M: IC49).	O
57	CDC	Common serial clock/data output to MAIN UNIT control signal.	O
67–82	D0–D15	EL display driver (F: IC6, IC7) control data bus.	I/O
88	REM_0	External [REMOTE] key. (pulled up)	I
89	RSSI	RSSI signal from the FM IF IC (M: IC39).	I
90	NOISE	Noise signal from the FM IF IC (M: IC39).	I
91	VOX1	VOX (pilot side) signal from the VOX detector (M: IC3, D16).	I
92	VOX2	VOX (co-pilot side) signal from the VOX detector (M: IC3, D17).	I
93	VR	Volume level from the VR (VR UNIT; R1).	I
94	PHOTO	Luminescence level from light sensor (F: IC9, D2).	I
95	UL	Unlock signal from PLL IC (M: IC47). "Low"=PLL unlocked.	I
96	SWAP	[←→] key. (pulled up)	I
97	RCL	[RCL] key. (pulled up)	I
98	MEM	[MEM] key. (pulled up)	I
99	DUAL	[DUAL] key. (pulled -up)	I

#### • EXPANDER (M: IC48)

Pin No.	Line name	Description
8	SEND	TX voltage line control signal to the 8T2 switch (M: Q32). "Low"=While transmitting.
9	VCO1	TX VCO control signal to the VCO switch (M: Q2). "High"=TX VCO is selected.
10	VCO2	RX VCO control signal to the VCO switch (M: Q3). "High"=RX VCO is selected.
11	AM/FM	RX mode toggling signal to the AM/FM switch (M: Q48). "Low"=AM mode is selected.
12	FIL1	1st IF filter (M: F13, BW=20 kHz) select signal. "Low"=F13 (BW=20 kHz) is selected.
13	FIL2	1st IF filter (M: F14, BW=9 kHz) select signal. "Low"=F14 (BW=9 kHz) is selected.
14	MM	AF mute signal to the MUTE SW (M: Q58, Q59). "High"=AF line is muted.
16	ANL	ANL circuit control signal to the ANL switch (M: IC70). "Low"=ANL function is activated.

# SECTION 4 ADJUSTMENT PROCEDURE

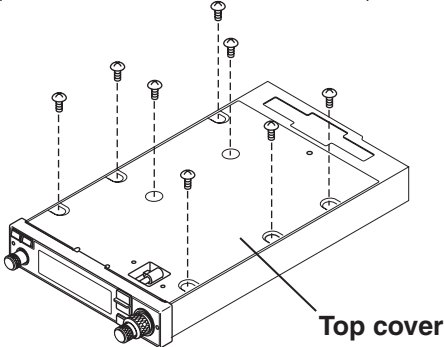
## 4-1 PREPARATION

### REQUIRED EQUIPMENTS

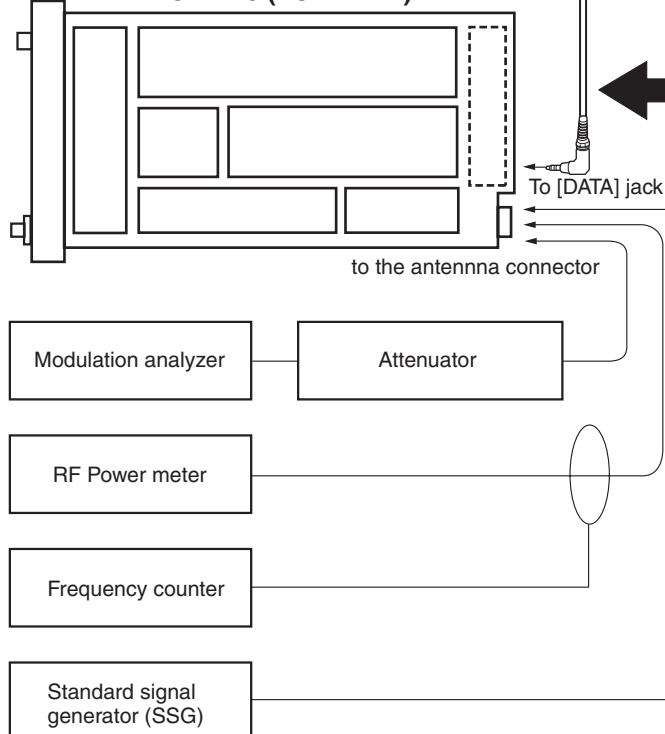
EQUIPMENT	SPECIFICATION	EQUIPMENT	SPECIFICATION
Adjustment software	"CS-A210 ADJ" (Revision 1.0 or later)	JIG cable (Modified molex® cable)	(See the illust below)
Power supply	Output voltage : 13.8 V DC Current capacity : More than 5 A	Digital voltmeter	Input impedance : 50 kΩ Measuring range : 0.1–10V
RF power meter (terminated type)	Measuring range : 0.1–20 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Standard signal generator (SSG)	Frequency range : 0.1–300 MHz Output level : 0.1 mV to 32 mV (–127 to –17 dBm)
Frequency counter	Frequency range : 0.1–300 MHz Frequency accuracy: ±1 ppm or better Input level : Less than 1 mW	AC millivoltmeter	Measuring range : 10 mV to 10 V
		Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
Modulation Analyzer	Frequency range : 30–300 MHz Measuring range : 0 to ±10 kHz	External speaker	Input impedance : 4 Ω Capacity : More than 10 W
Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV	Attenuator	Power attenuation: 30 dB Capacity : More than 50 W

### CONNECTION

**REMOVE THE TOP COVER** before adjustment. Before starting adjustment, remove the top cover from the chassis to expose the MAIN UNIT. (DO NOT remove the bottom cover)



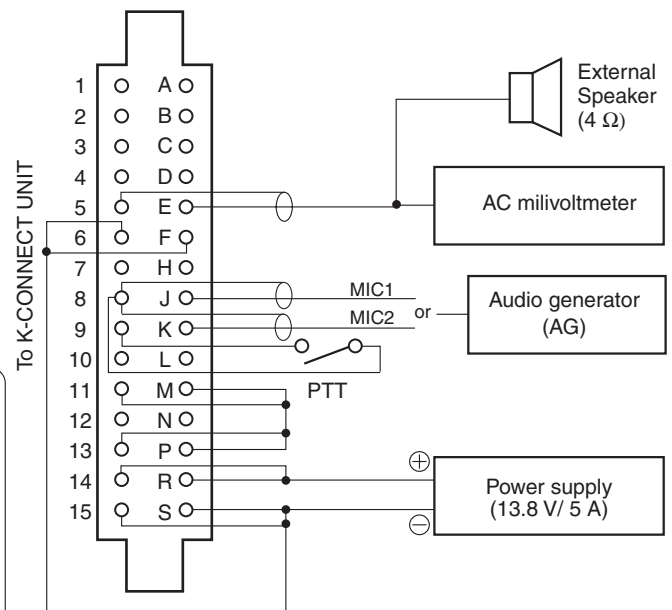
IC-A210 (TOP VIEW)



#### SYSTEM REQUIREMENTS

- Microsoft® Windows® Me/2000/XP and Windows Vista™
- RS-232C serial port (D-sub 9 pin)

**USE K-CONNECT UNIT** for adjustment. If MB-113 is attached to the transceiver, attach the original rear unit 'K-CONNECT UNIT.' MB-113 has no [DATA] jack.



Microsoft, Windows and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

**CAUTION:**  
Do not connect the SSG while transmitting

## ADJUSTMENT SOFTWARE INSTALLATION

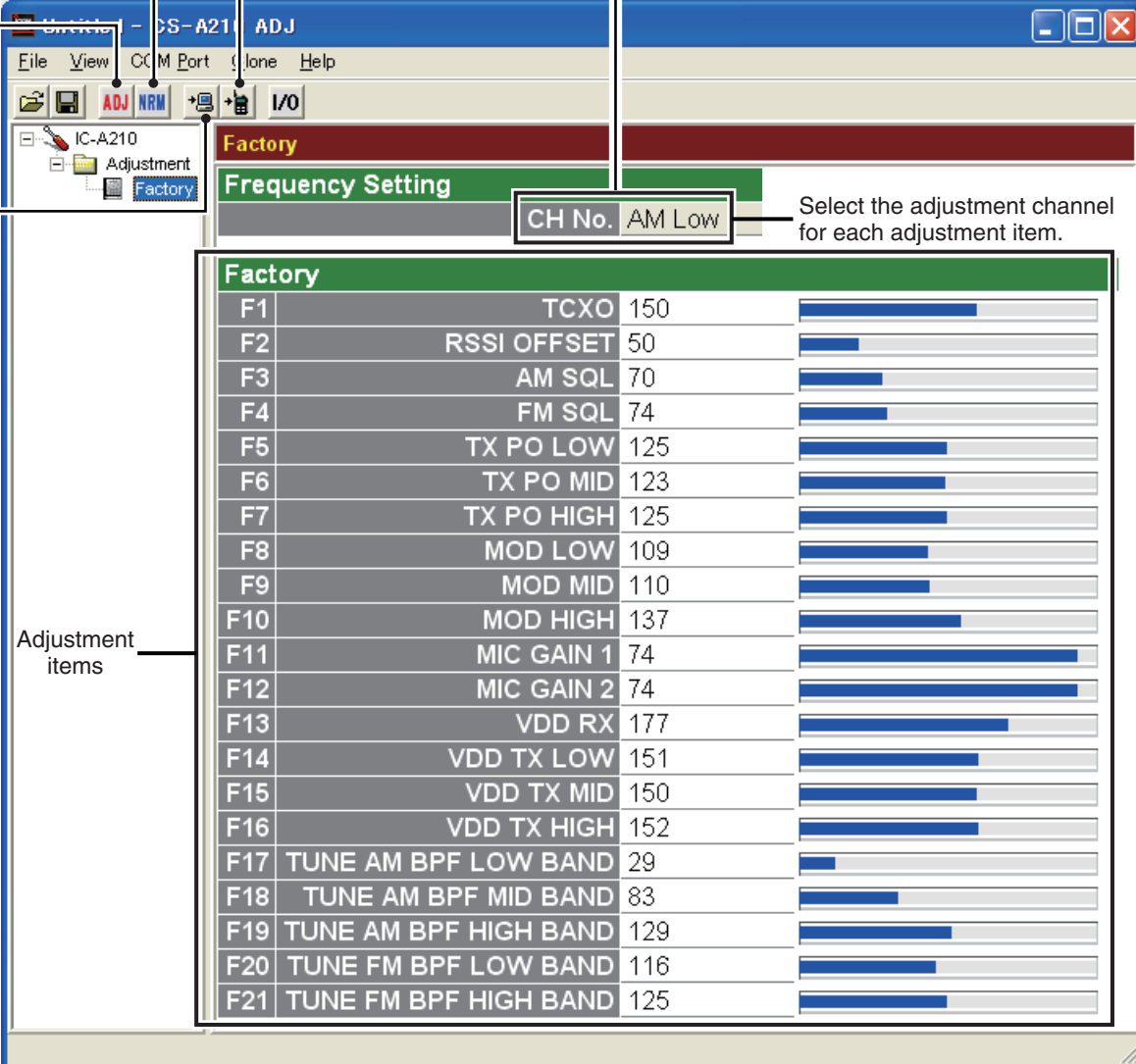
- ① Quit all applications if Windows is running.
- ② Insert the CD into the appropriate CD drive.
- ③ Double-click the "Setup.exe" contained in the 'CS-A210 ADJ' folder in the CD drive.
- ④ The "Welcome to the InstallShield Wizard for CS-A210 ADJ" will appear. Click [Next>].
- ⑤ The "Choose Destination Location" will appear. Then click [Next>] to install the software to the destination folder. (e.g. C:\Program Files\Icom\CS-A210 ADJ)
- ⑥ After the installation is completed, the "InstallShield Wizard Complete" will appear. Then click [Finish].
- ⑦ Eject the CD.
- ⑧ Program group 'CS-A210 ADJ' appears in the 'Programs' folder of the start menu, and 'CS-A210 ADJ' icon appears on the desk top screen.

## WHOLE PROCEDURE OF ADJUSTMENT

- ① Connect the transceiver and PC with OPC-1529R.
- ② Turn the transceiver power ON.
- ③ Boot up Windows, and click the program group 'CS-A210 ADJ' in the 'Programs' folder of the [Start] menu, then CS-A210 ADJ's window appears.
- ④ Click [ADJ] icon to enter the adjustment mode.
- ⑤ Click [READ] icon to load the initial data from the transceiver.
- ⑥ Set or modify adjustment data as specified in the guidances (pages 4-3 to 4-6).
- ⑦ When the adjustment is finished, click [WRITE] icon.
- ⑧ Click [NRM] icon to quit the adjustment mode, and return to the normal mode.

### ADJUSTMENT SOFTWARE SCREEN

CH No.	Frequency (MHz)
AM LOW	118.000
AM MID	127.500
AM HIGH	136.975
FM LOW	161.650
FM HIGH	163.275



[WRITE]

[NRM]

[ADJ]

[LOAD]

Factory

Frequency Setting

CH No. AM Low

Select the adjustment channel for each adjustment item.

Factory			
F1	TCXO	150	
F2	RSSI OFFSET	50	
F3	AM SQL	70	
F4	FM SQL	74	
F5	TX PO LOW	125	
F6	TX PO MID	123	
F7	TX PO HIGH	125	
F8	MOD LOW	109	
F9	MOD MID	110	
F10	MOD HIGH	137	
F11	MIC GAIN 1	74	
F12	MIC GAIN 2	74	
F13	VDD RX	177	
F14	VDD TX LOW	151	
F15	VDD TX MID	150	
F16	VDD TX HIGH	152	
F17	TUNE AM BPF LOW BAND	29	
F18	TUNE AM BPF MID BAND	83	
F19	TUNE AM BPF HIGH BAND	129	
F20	TUNE FM BPF LOW BAND	116	
F21	TUNE FM BPF HIGH BAND	125	

Adjustment items

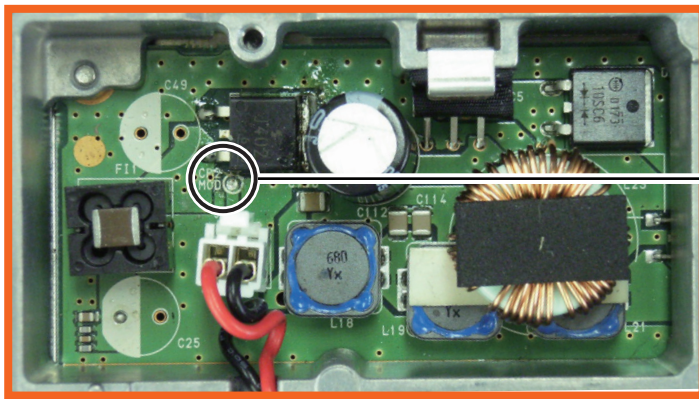
\* This screen is an example only. Each transceiver has its own specific values for each setting.

## 4-2 FREQUENCY ADJUSTMENT

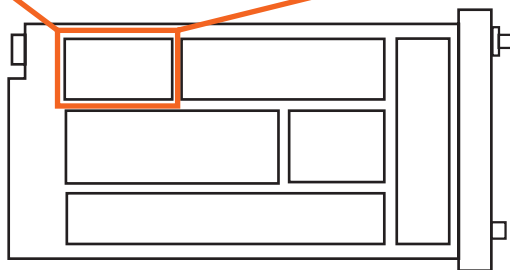
Select an adjustment item using [↑] / [↓] keys, then set to the specified value using [←] / [→] keys on the connected PC's keyboard.

ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION	ADJUSTMENT ITEM/POINT	VALUE
VDD Voltage (RX)	1 <ul style="list-style-type: none"> <li>• CH No. : [AM MID]</li> <li>• Receiving</li> </ul>	Connect a Digital voltmeter to the CP2 on the MAIN UNIT.	[F13] (CS-A210 ADJ)	13.4–13.6 V
Lock Voltage (RX)	1 <ul style="list-style-type: none"> <li>• CH No. : [AM HIGH]</li> <li>• Receiving</li> </ul>		C136 (MAIN UNIT)	
(TX)	2 <ul style="list-style-type: none"> <li>• CH No. : [AM HIGH]</li> <li>• Transmitting</li> </ul>		C127 (MAIN UNIT)	3.4–3.6 V
Lock Voltage Verify (RX)	1 <ul style="list-style-type: none"> <li>• CH No. : [AM LOW]</li> <li>• Receiving</li> </ul>	Connect a Digital voltmeter to the CP1 on the MAIN UNIT.	(Verify)	More than 0.5 V
(TX)	2 <ul style="list-style-type: none"> <li>• CH No. : [AM LOW]</li> <li>• Transmitting</li> </ul>			
Reference Frequency	1 <ul style="list-style-type: none"> <li>• CH No. : [AM HIGH]</li> <li>• Connect an RF Power Meter to the antenna connector.</li> <li>• Transmitting</li> </ul>	Loose couple an Frequency Counter to the antenna connector.	[F1] (CS-A210 ADJ)	136.975 MHz

### • VDD volatage (RX and TX) adjustments

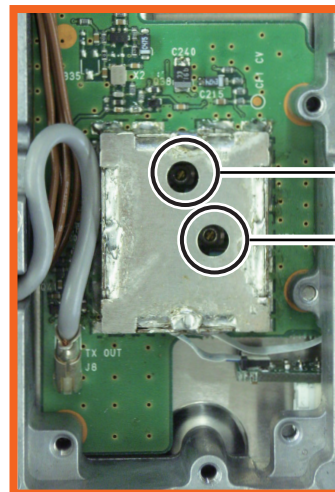


VDD voltage (RX and TX) check point CP2



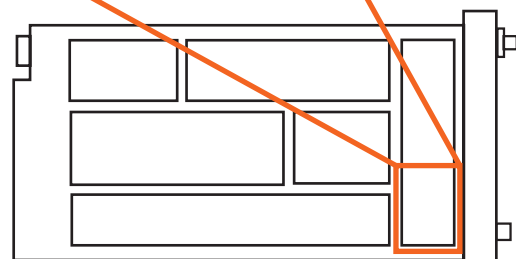
IC-A210 (TOP VIEW)

### • Lock volatge adjustment



Lock voltage (TX) adjust point C127

Lock voltage (RX) adjust point C136



IC-A210 (TOP VIEW)

### 4-3 TRANSMIT ADJUSTMENT

Select an adjustment item using [↑] / [↓] keys, then set to the specified value using [←] / [→] keys on the connected PC's keyboard.

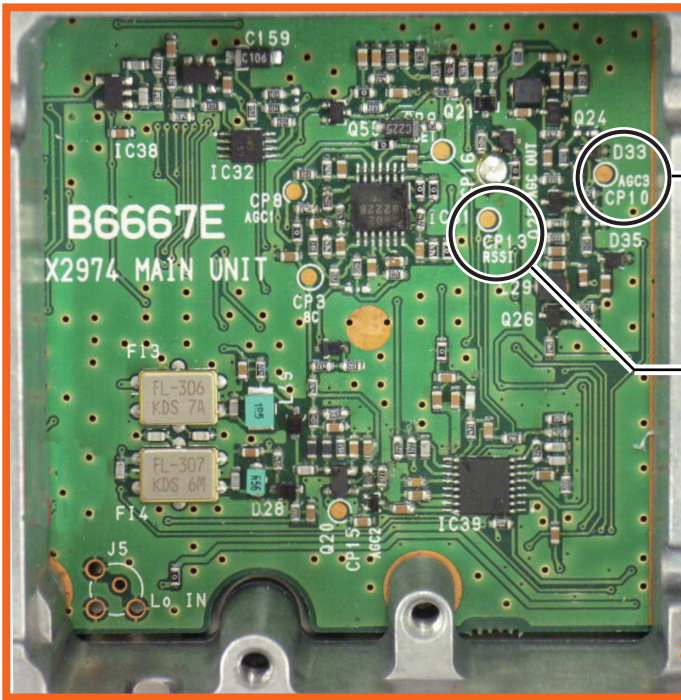
ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION	ADJUSTMENT ITEM/POINT	VALUE
TX Output Power -Preset- (Low) ----- (Mid) ----- (High)	1 • CH No. : [AM MID] • No audio signals applied to the MIC line. • Receiving	Set the adjustment value on the CS-A210 ADJ.	[F5] (CS-A210 ADJ)	"200" (adjust value)
			[F6] (CS-A210 ADJ)	
			[F7] (CS-A210 ADJ)	
TX Output Power -VDD voltage- (Low) ----- (Mid) ----- (High)	2 • CH No. : [AM LOW] • No audio signals applied to the MIC line. • Transmitting	Connect a Digital voltmeter to the <b>CP2</b> on the MAIN UNIT.	[F14] (CS-A210 ADJ)	14.3–14.7 V
	• CH No. : [AM MID] • No audio signals applied to the MIC line. • Transmitting		[F15] (CS-A210 ADJ)	
	• CH No. : [AM HIGH] • No audio signals applied to the MIC line. • Transmitting		[F16] (CS-A210 ADJ)	
TX Output Power -Adjust- (Low) ----- (Mid) ----- (High)	3 • CH No. : [AM LOW] • No audio signals applied to the MIC line. • Transmitting	Adjust the adjustment value on the CS-A210 ADJ.	[F5] (CS-A210 ADJ)	7.8–8.2 W [A210]
	• CH No. : [AM MID] • No audio signals applied to the MIC line. • Transmitting		[F6] (CS-A210 ADJ)	
	• CH No. : [AM HIGH] • No audio signals applied to the MIC line. • Transmitting		[F7] (CS-A210 ADJ)	
Deviation -Preparation-	1 • Connect a Modulation Analyzer to the antenna connector through an attenuator.	Set the Modulation Analyzer as; HPF : OFF LPF : OFF De-emphasis : OFF Detector : (P-P)/2	–	–
	• Connect an Audio Generator to the MIC1 line.	Set the Audio Generator as; Modulation : 1 kHz Level : 300 mV rms Wave form : Sine wave	–	–
Deviation -MIC gain preset- (MIC1) ----- (MIC2)	2 • CH No. : [AM MID] • Receiving	Set the adjustment value on the CS-A210 ADJ.	[F11] (CS-A210 ADJ)	75
			[F12] (CS-A210 ADJ)	
Deviation -Adjust- (Low) ----- (Mid) ----- (High)	3 • CH No. : [AM MID] • Transmitting	Adjust the adjustment value on the CS-A210 ADJ.	[F8] (CS-A210 ADJ)	86–90%
	• CH No. : [AM MID] • Transmitting		[F9] (CS-A210 ADJ)	
	• CH No. : [AM HIGH] • Transmitting		[F10] (CS-A210 ADJ)	
Deviation -MIC gain adjust- (MIC1) ----- (MIC2)	4 • CH No. : [AM MID] • Set the Audio Generator as; Level : 80 mV rms • Transmitting	Adjust the adjustment value on the CS-A210 ADJ.	[F11] (CS-A210 ADJ)	70–80%
			[F12] (CS-A210 ADJ)	

## 4-4 RECEIVE ADJUSTMENT

Select an adjustment item using [↑] / [↓] keys, then set to the specified value using [←] / [→] keys on the connected PC's keyboard.

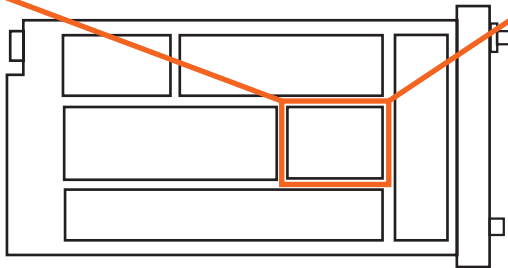
ADJUSTMENT	ADJUSTMENT CONDITION	OPERATION	ADJUSTMENT ITEM/POINT	VALUE
<b>RX Tuning Voltage</b>	1 <ul style="list-style-type: none"> <li>• CH No. : [AM LOW]</li> <li>• Receiving</li> </ul>	Connect a Digital voltmeter to the <b>CP5</b> on the MAIN UNIT.	[F17] (CS-A210 ADJ)	4.9–5.1 V
<b>RX BPF (AM)</b>	1 <ul style="list-style-type: none"> <li>• Connect a Standard Signal Generator (SSG) to the antenna connector.</li> </ul>	Set the SSG as; Frequency : 118.000 MHz Level : 0 dB $\mu$ V (1 kHz, 30% Dev.)	–	–
	2 <ul style="list-style-type: none"> <li>• CH No. : [AM LOW]</li> <li>• Receiving</li> </ul>	Connect a Digital voltmeter to the <b>CP10</b> on the MAIN UNIT.	L2, L4, L8, L10 (MAIN UNIT)	Minimum voltage
	3 <ul style="list-style-type: none"> <li>• CH No. : [AM LOW]</li> <li>• Set the SSG as; Frequency : 127.500 MHz</li> <li>• Receiving</li> </ul>		[F18] (CS-A210 ADJ)	
	4 <ul style="list-style-type: none"> <li>• CH No. : [AM LOW]</li> <li>• Set the SSG as; Frequency : 136.975 MHz</li> <li>• Receiving</li> </ul>		[F19] (CS-A210 ADJ)	
<b>RX BPF (FM)</b>	1 <ul style="list-style-type: none"> <li>• Connect a Standard Signal Generator (SSG) to the antenna connector.</li> </ul>	Set the SSG as; Frequency : 161.650 MHz Level : 0 dB $\mu$ V (1 kHz, 3.5 kHz Dev.)	–	–
	2 <ul style="list-style-type: none"> <li>• CH No. : [FM LOW]</li> <li>• Receiving</li> </ul>	Connect a Digital voltmeter to the <b>CP13</b> on the MAIN UNIT.	[F20] (CS-A210 ADJ)	Maximum voltage
	3 <ul style="list-style-type: none"> <li>• CH No. : [FM HIGH]</li> <li>• Receiving</li> </ul>		[F21] (CS-A210 ADJ)	
<b>SQUELCH (AM)</b>	1 <ul style="list-style-type: none"> <li>• Connect a Standard Signal Generator (SSG) to the antenna connector.</li> </ul>	Set the SSG as; Frequency : 127.500 MHz Level : 0 dB $\mu$ V (1 kHz, 30% Dev.)	–	–
	2 <ul style="list-style-type: none"> <li>• CH No. : [AM MID]</li> <li>• Receiving</li> </ul>	Decrease the adjustment value <b>[F3]</b> to close the squelch once, then increase the value to open the squelch.	[F3]	Squelch open
<b>SQUELCH (FM)</b>	1 <ul style="list-style-type: none"> <li>• Connect a Standard Signal Generator (SSG) to the antenna connector.</li> </ul>	Set the SSG as; Frequency : 163.275 MHz Level : 0 dB $\mu$ V (1 kHz, 3.5 kHz Dev.)	–	–
	2 <ul style="list-style-type: none"> <li>• CH No. : [FM HIGH]</li> <li>• Receiving</li> </ul>	Decrease the adjustment value <b>[F4]</b> to close the squelch once, then increase the value to open the squelch.	[F4]	Squelch open

• Receive adjustments

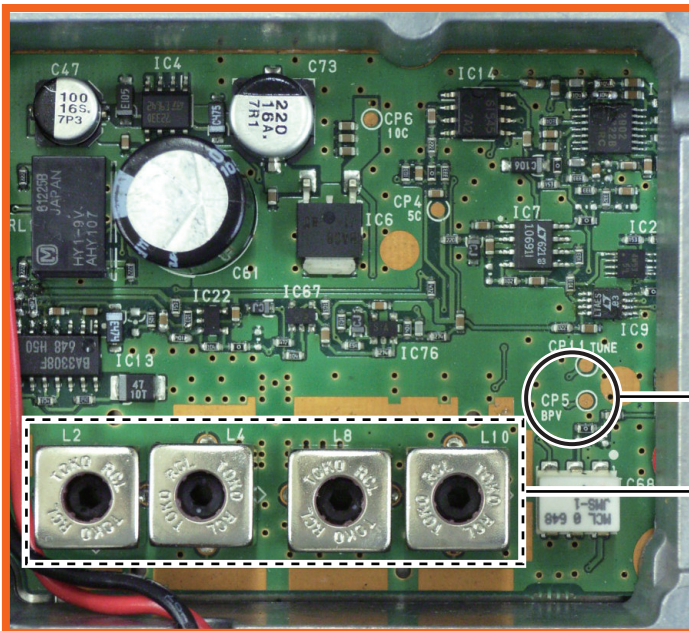


RX BPF (AM) check point  
CP10

RX BPF (FM) check point  
CP13

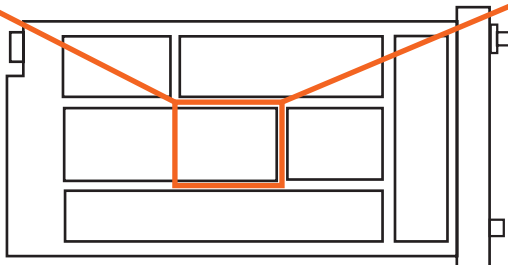


IC-A210 (TOP VIEW)



Tuning voltage check point  
CP5

RX BPF adjust points  
L2, L4, L8 and L10



IC-A210 (TOP VIEW)

















**[VR UNIT]**

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R1	7210003270	VAR TP76N00NA-26F-10KB-2974		
R2	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	6.8/7.8
R3	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	6.8/3.3
C1	4030006900	S.CER C1608 JB 1H 103K-T	T	3/3.3
C2	4030006900	S.CER C1608 JB 1H 103K-T	T	3/7.8
C3	4030006860	S.CER C1608 JB 1H 102K-T	B	8.2/7
C4	4030006860	S.CER C1608 JB 1H 102K-T	B	8.2/3.8
J1	6510026160	S.CNR 06FLZ-SM2-TB (LF) (SN)	B	3.3/5.1

**[K-CONNECT UNIT]**

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
D1	1790001250	S.DIO MA2S111-(TX)	T	10.9/9.7
D2	1790001250	S.DIO MA2S111-(TX)	T	10.9/8.1
D3	1790001250	S.DIO MA2S111-(TX)	T	15.4/12.3
D4	1790001250	S.DIO MA2S111-(TX)	T	15.4/8.8
D5	1790001750	S.DIO DSM3MA4	T	51.3/6.7
L1	6110001660	COL LA-252		
R1	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	26.4/12.5
R2	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	21.1/12.3
R3	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	28.3/12.3
R4	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	33.3/12.5
R5	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	30.7/13.3
R6	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	31.3/11.6
R7	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	7.5/8.9
R8	7030003580	S.RES ERJ3GEYJ 153 V (15 k)	T	8.9/8.9
R9	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	16.8/12.3
R10	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	8.9/12.3
R11	7540000250	ABS SA05C 401N		
R12	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	107.1/18
R13	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	107.1/11.4
R14	7030003860	S.RES ERJ3GE JPW V	T	25.2/10
R15	7030003860	S.RES ERJ3GE JPW V	T	22.6/10.4
R16	7030003860	S.RES ERJ3GE JPW V	T	29.4/9.8
R17	7030003860	S.RES ERJ3GE JPW V	T	32.1/9.6
R18	7030003860	S.RES ERJ3GE JPW V	T	36.5/9.6
R19	7540000410	ABS ERZV14D470		
C1	4030006900	S.CER C1608 JB 1H 103K-T	T	18.1/12.3
C2	4030004750	S.CER C2012 JB 1H 103K-T	T	69.5/8
C3	4030004750	S.CER C2012 JB 1H 103K-T	T	64.4/6.6
C4	4030006860	S.CER C1608 JB 1H 102K-T	T	39.1/12.7
C5	4030006860	S.CER C1608 JB 1H 102K-T	T	22.3/12.3
C6	4030006860	S.CER C1608 JB 1H 102K-T	T	41.7/12.7
C7	4030006860	S.CER C1608 JB 1H 102K-T	T	37.8/12.7
C8	4030006860	S.CER C1608 JB 1H 102K-T	T	24.3/13.2
C9	4030006860	S.CER C1608 JB 1H 102K-T	T	35.2/12.7
C10	4030006860	S.CER C1608 JB 1H 102K-T	T	36.5/12.7
C11	4030006860	S.CER C1608 JB 1H 102K-T	T	43/12.7
C12	4030006860	S.CER C1608 JB 1H 102K-T	T	40.4/12.7
C13	4030006860	S.CER C1608 JB 1H 102K-T	T	19.3/12.3
C14	4030006860	S.CER C1608 JB 1H 102K-T	T	10.8/12.3
C15	4030006860	S.CER C1608 JB 1H 102K-T	T	13.5/12.3
C16	4030006860	S.CER C1608 JB 1H 102K-T	T	14.1/8.8
C17	4030006860	S.CER C1608 JB 1H 102K-T	T	7.5/12.3
C18	4030006860	S.CER C1608 JB 1H 102K-T	T	12.2/12.3
C19	4030006860	S.CER C1608 JB 1H 102K-T	T	12.9/8.8
C20	4030006860	S.CER C1608 JB 1H 102K-T	T	107.1/19.2
C21	4030006860	S.CER C1608 JB 1H 102K-T	T	107.1/10.2
C22	4030011070	S.CER GRM31M2C2H5R0CY21L	T	121.8/15.1
C23	4030011070	S.CER GRM31M2C2H5R0CY21L	T	121/6.4
C24	4030006860	S.CER C1608 JB 1H 102K-T	T	67.2/6.9
C25	4030018980	S.CER C1608 JB 1H 104K-T	T	65.9/6.9
J1	6510014210	CNR BNC-BJ		
J3	6510011591	CNR B2P-VH (LF) (SN)		
J4	6510018941	S.CNR B13B-PH-SM4-TB (LF) (SN)	T	31.1/3.9
J6	6510017150	CNR TMP-S01X-C1		
J7	6510026480	CNR HSJ1650-010020		
F1	5210001070	S.FUS 0451008.MRL	T	68.2/10.6
W1	7120000490	JMP ERD25T0		

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



# SECTION 6

# MECHANICAL PARTS

## [CHASSIS PARTS]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
W1	8900016940	OPC-1820	1
W2	8900016950	OPC-1737	1
W3	8900016960	OPC-1738	1
W4	8900016970	OPC-1739	1
W5	8900016980	OPC-1740	1
W6	8900016990	OPC-1741	1
W7	8900017000	OPC-1743	1
W8	8900017010	OPC-1744	1
W9	8900017021	OPC-1745A	1
MP1	8010020770	2974 CHASSIS	1
MP2	8110009140	2974 T-COVER	1
MP3	8930072790	2974 STOPPER PLATE	2
MP4	8110009150	2974 B-COVER	1
MP5	8510018420	2974 SHIELD COVER	1
MP6	8210023930	2974 FRONT PANEL (Incl. MP7, MP8)	1
MP7	8930072770	2974 V-LENS	1
MP8	8930072780	2974 E-LENS	1
MP9	8310069720	2974 WINDOW PLATE	1
	8310069720	2974 WINDOW PLATE	1
	8930072860	2974 WINDOW SHEET	1
MP10	8930072860	2974 WINDOW SHEET	1
MP11	8610013150	Knob K-264	1
MP12	8610013160	Knob K-265	1
MP13	8610013170	Knob K-265 (A)	1
MP14	8610013180	Knob K-266	1
MP15	8610013190	Knob K-266 (A)	1
MP16	8610013200	Knob N-356	1
MP17	8610013210	Knob N-357	1
MP18	8610013220	Knob N-358	1
MP19	8930072830	2974 A-SPONGE	1
MP20	8930072840	2974 B-SPONGE	1
MP21	8930073160	2974 S-LENS	1
MP22	8820001450	2974 CAP SCREW	2
MP23	8930073260	Shield sponge (CD)	1
MP24	8930073270	2974 INSULATION SHEET	1
MP25	8930073480	2974 CLIP	1
MP26	8930022572	867 STOPPER-2	2
MP27	8820000691	867 CUP SCREW-1	2
MP28	8930024080	867 SPRING	2
MP29	8860000740	Spring pin M1.2X6 SUS	2
MP30	8850000690	Flat washer M3 SUS 3X7X0.5	4
MP31	8810002950	Screw BiH M3X6 SUS	27
MP32	8810003131	Setscrew (A) 2.6X6 ZC3	2
MP33	8810010151	Screw BT B0 2X10 SUS SSBC	4
MP34	8830001470	VR nut (N)	1
MP35	8810006300	Setscrew (C) 3X8 SUS	16
MP36	8810003520	Hex stop screw M3X3 ZK	4
MP37	8930069430	Insulation sheet (LM)	1
MP38	8930027730	Sponge (DC)	1
MP39	8930057730	Shield sponge (J)	3
MP43	8950000180	Cable tie -80	4

[USA-01]  
[EXP-01]

## [FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
DS11	5060000020	UEL127	1
S1	2250000580	EC11EAB24C	1
S2*	2230001200	LS35J2-T	1
S3*	2230001200	LS35J2-T	1
S4*	2230001200	LS35J2-T	1
S5*	2230001200	LS35J2-T	1
S6*	2230001200	LS35J2-T	1

## [K-CONNECT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J4*	6510018941	B13B-PH-SM4-TB (LF) (SN)	1
J6	6510017150	TMP-S01X-C1	1
J7*	6510024680	HSJ1636-011020	1
F1*	5210001070	0451008.MRL	1

## [PA UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J500*	6510011591	B2P-VH (LF) (SN)	1
J501	6510017150	TMP-S01X-C1	1
J502*	6510022311	B5B-PH-SM4-TB (LF) (SN)	1
J503	6510017150	TMP-S01X-C1	1
J504	6510017150	TMP-S01X-C1	1
MP1	8510012910	2270 RUG	1
MP3*	6910014760	OG-503040	1

## [VOLUME UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
R1	7210003270	TP76N00NA-26F-10KB-2974	1
J1*	6510026160	06FLZ-SM2-TB (LF) (SN)	1

## [ACCESSORIES]

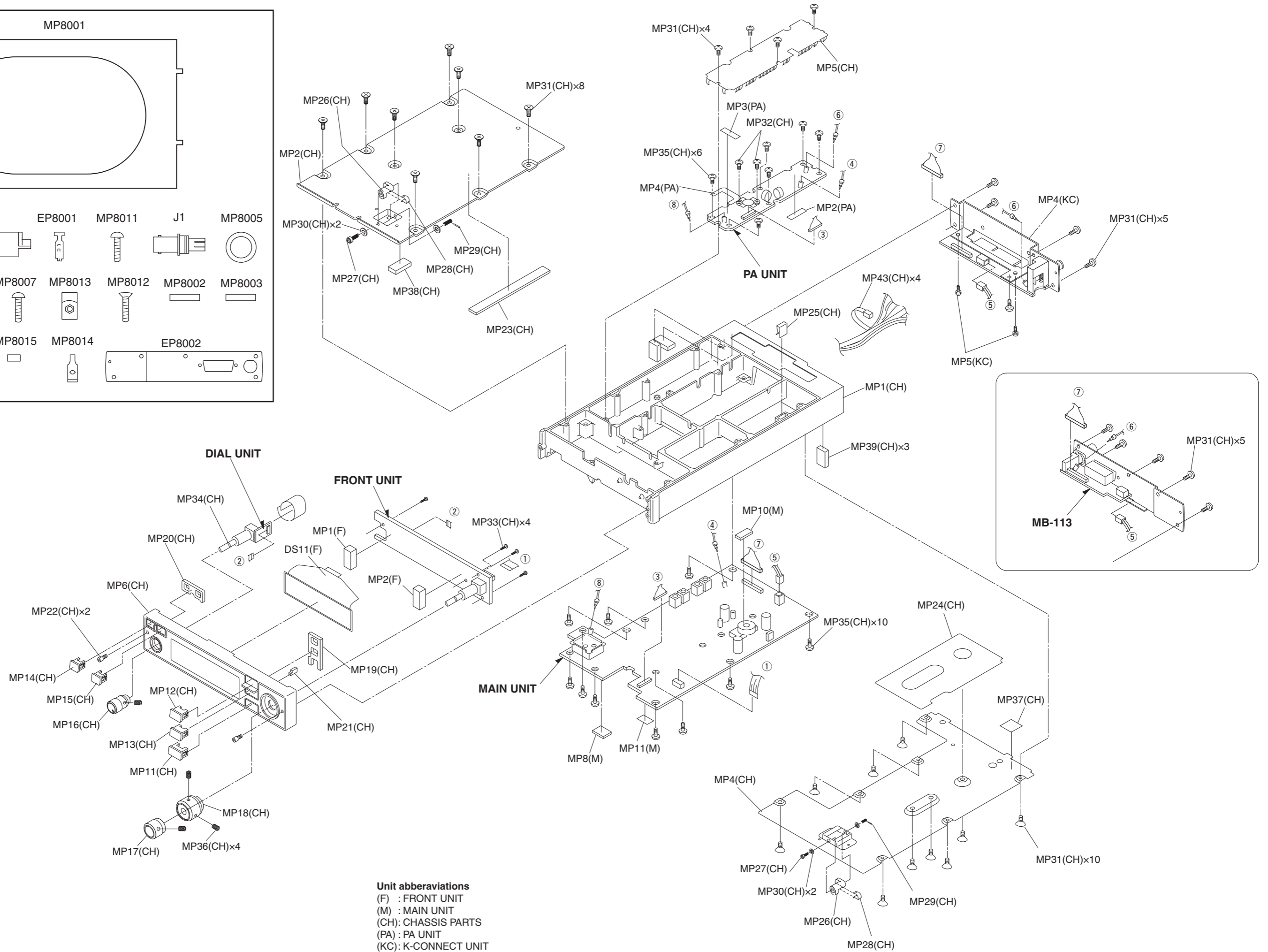
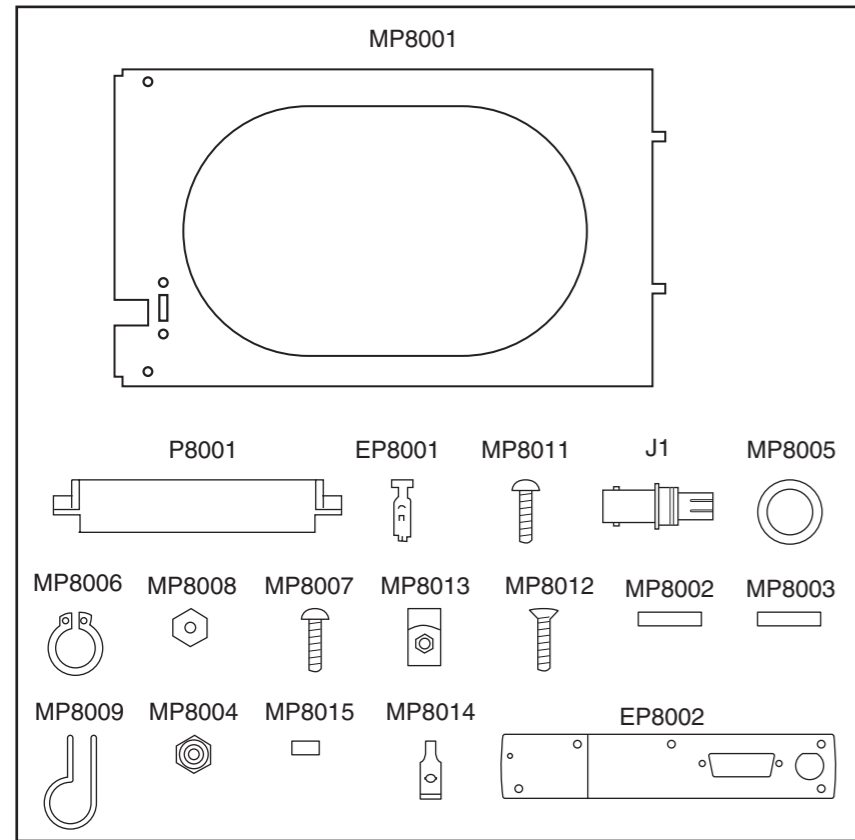
REF NO.	ORDER NO.	DESCRIPTION	QTY.
J8001	6510026350	2974BNC-LP	1
P8001	6510013840	4338-15	1
P8002	6510014430	DS-6532	1
EP8001	6510013850	4366-GL	30
EP8002	0880002520	MB-113	1
MP8001	8010011621	867 BRACKET-1	1
MP8002	8310023870	867 O.P. LABEL	1
MP8003	8310023880	867 O.P. LABEL (A)	1
MP8004	8830000730	Self-clinching nylon Nut TPLC-440	2
MP8005	8850001210	ICOM washer (V)	1
MP8006	8860000720	C-ring S 11 SUS	1
MP8007	8810007080	Screw BiH UNC NO.6X12.7 SUS	1
MP8008	8830000740	Nut UNC NO.6 SUS	1
MP8009	8950002550	Nylon clip SL-9N	1
MP8010	8830000750	Nylon Nut UNC NO.6 SUS	1
MP8011	8810007070	Screw BiH UNC NO.4X12.7 SUS	2
MP8012	8810007060	Screw UNC NO.6X12.7 SUS	6
MP8013	8830000761	Clip nut UNC NO.6-1	6
MP8014	8830000771	Speed nut U-TYPE UNC NO.6 ZC3	4
MP8015	8930022970	867 pin	2

## [MAIN UNIT]

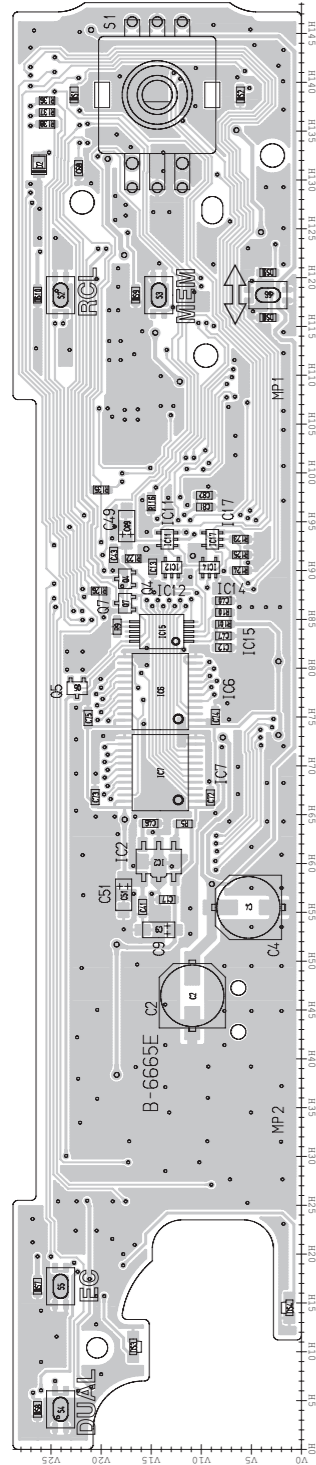
REF NO.	ORDER NO.	DESCRIPTION	QTY.
RL1*	6330001730	AHY107	1
CP1*	6910009670	HK3-S-T	1
J1	6510011591	B2P-VH (LF) (SN)	1
J3	6510007020	TMP-J01X-V6	1
J7*	6510026100	22FLT-SM2-TB (LF) (SN)	1
J8	6510018450	TMP-S01X-B1	1
J9*	6510018941	B13B-PH-SM4-TB (LF) (SN)	1
J10	6510021071	S2P-VH (LF) (SN)	1
J11*	6510022311	B5B-PH-SM4-TB (LF) (SN)	1
S1*	2260003060	NANOSMDC016F	1
T4	5920000751	ST-82 (P)FL	1
MP1*	8510018070	2979 VCO case	1
MP2*	8510017600	OG-363050	1
MP3*	8510017600	OG-363050	1
MP5*	8510017600	OG-363050	1
MP6*	8510017600	OG-363050	1
MP7*	8510017600	OG-363050	1

\*: Refer to SECTION 9 "BOARD LAYOUTS."

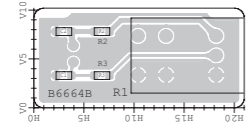
• ACCESSORIES



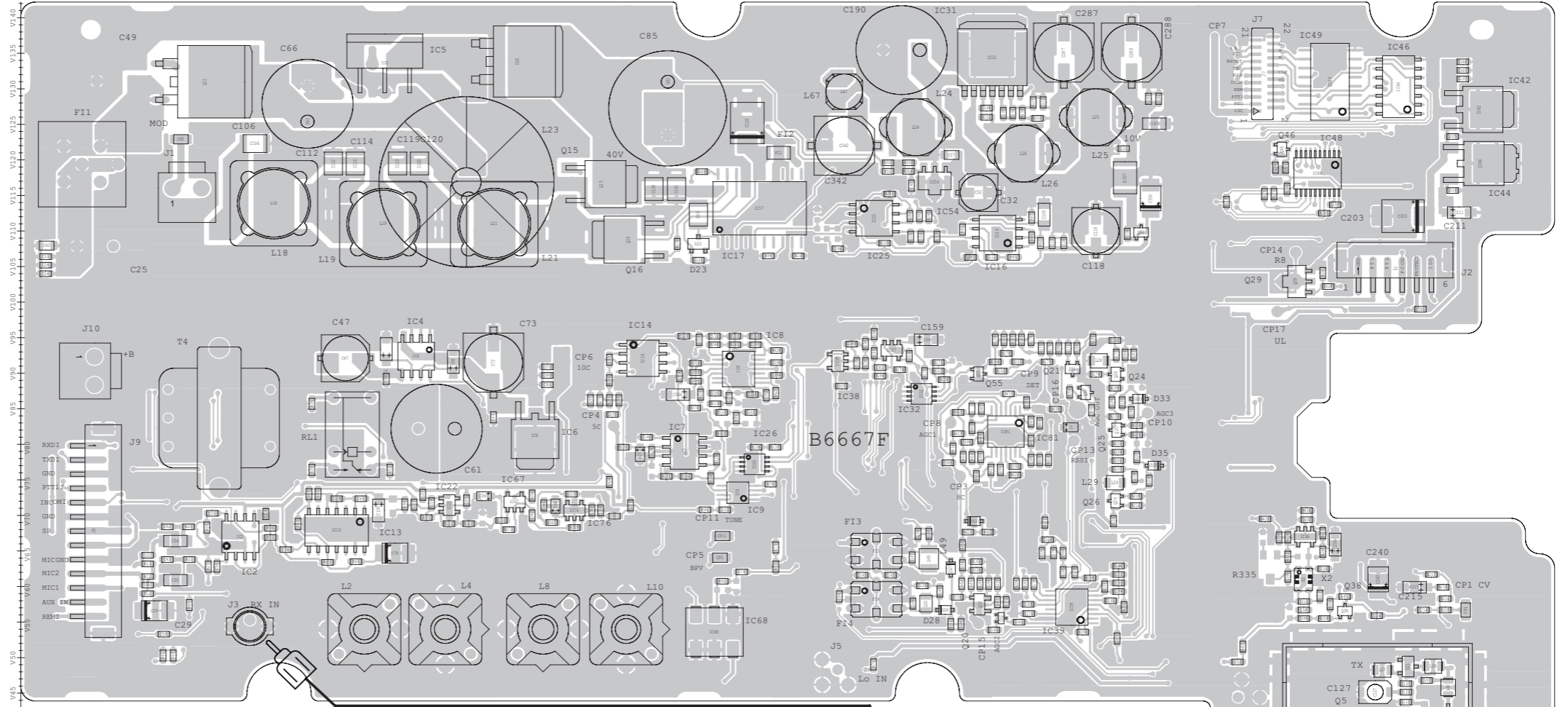
• FRONT UNIT (TOP VIEW)



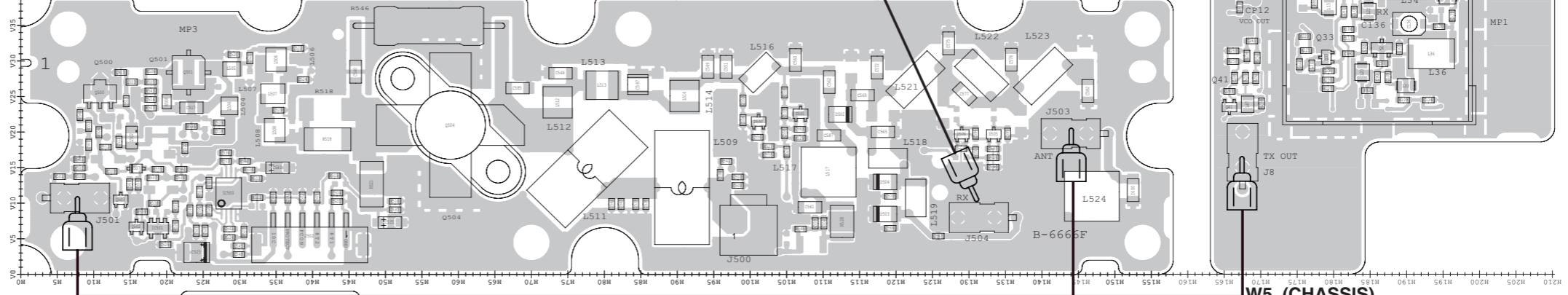
• VOLUME UNIT (TOP VIEW)



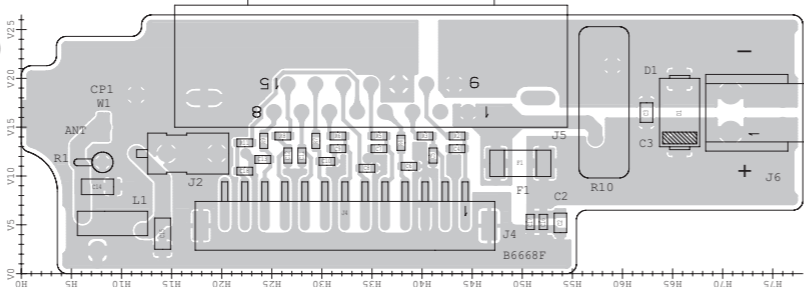
• MAIN UNIT (TOP VIEW)



• PA UNIT (TOP VIEW)



• MB-113 (TOP VIEW)



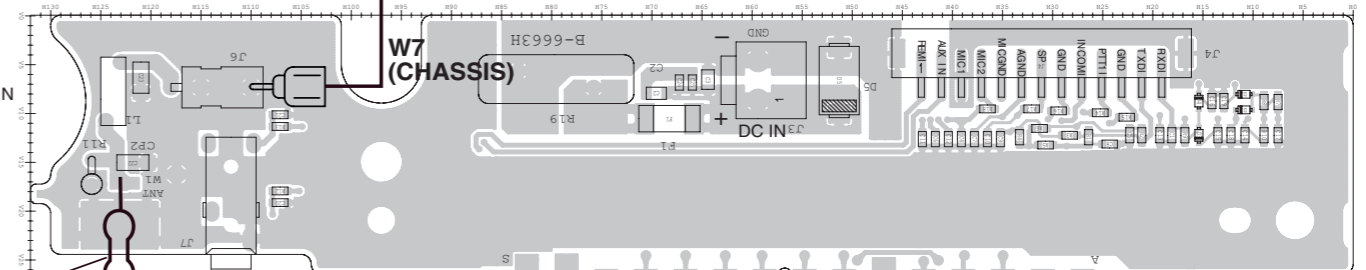
W1 (CHASSIS)

ANTENNA CONNECTOR (J1; CHASSIS)

W7 (CHASSIS)

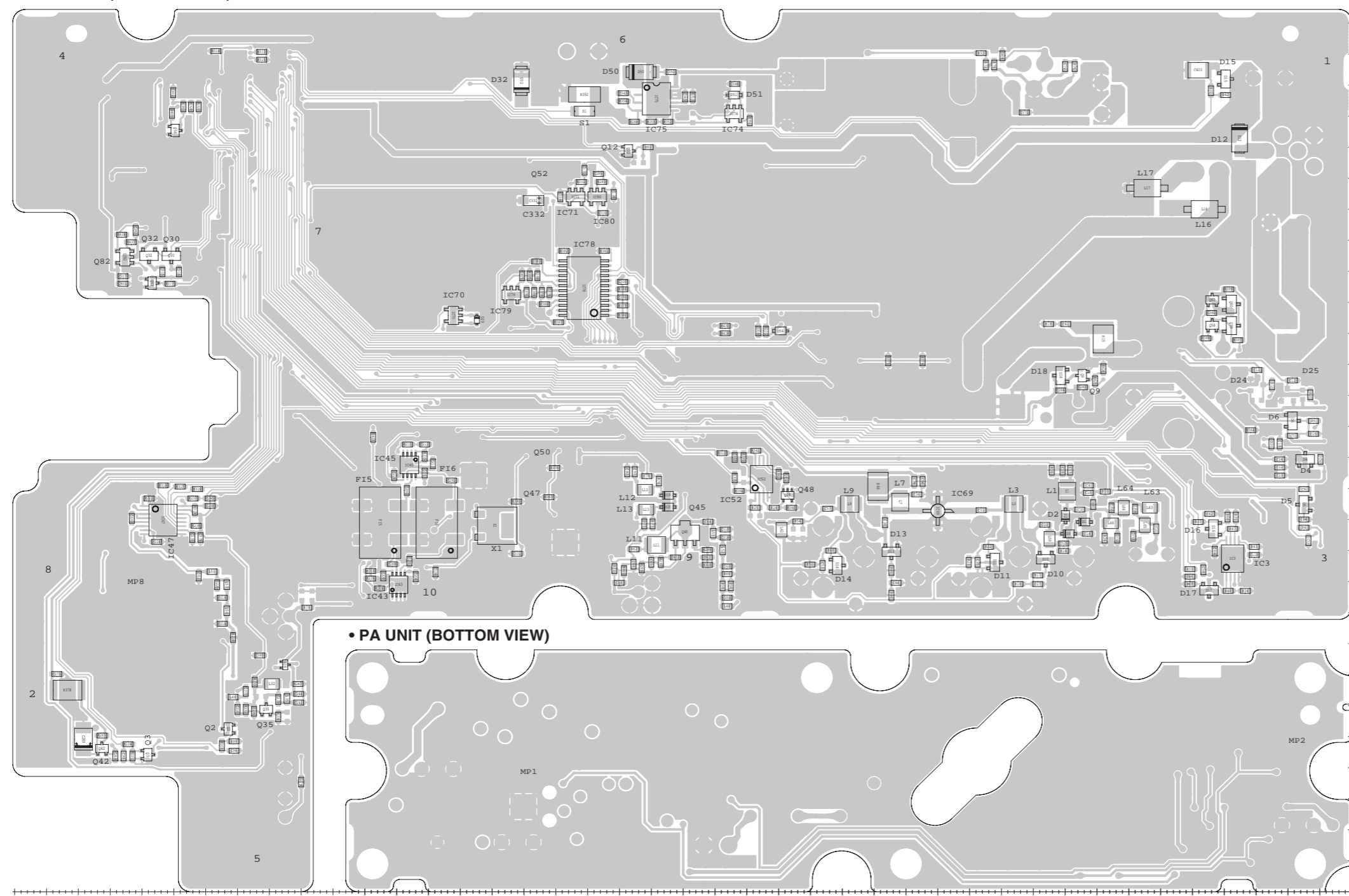
W5 (CHASSIS)

• K-CONNECT UNIT (TOP VIEW)

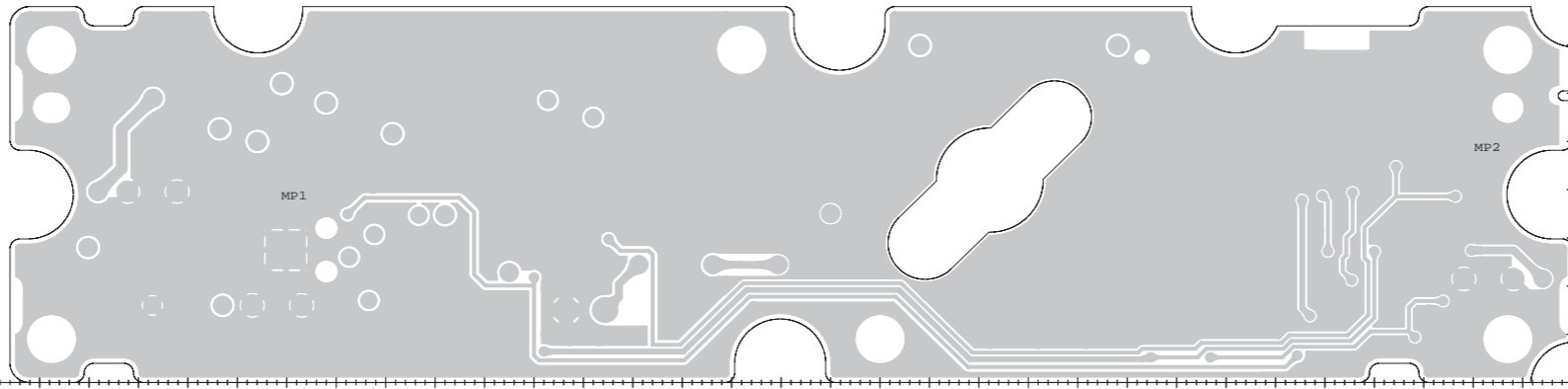


The combination of this side and the bottom side shows the board layout in the same configuration as the actual P.C.Board.

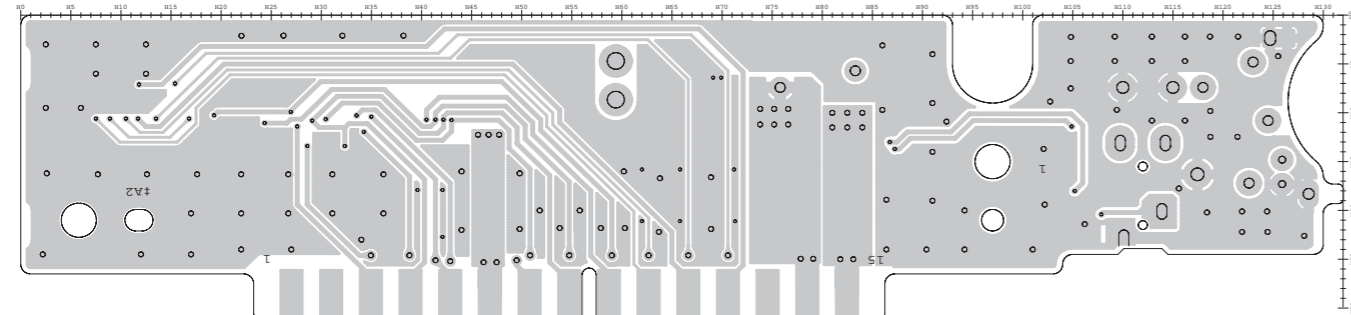
• MAIN UNIT (BOTTOM VIEW)



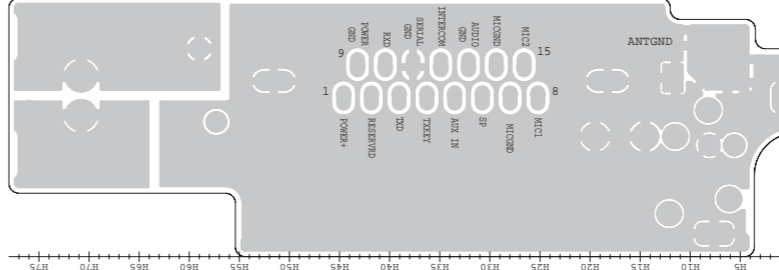
• PA UNIT (BOTTOM VIEW)



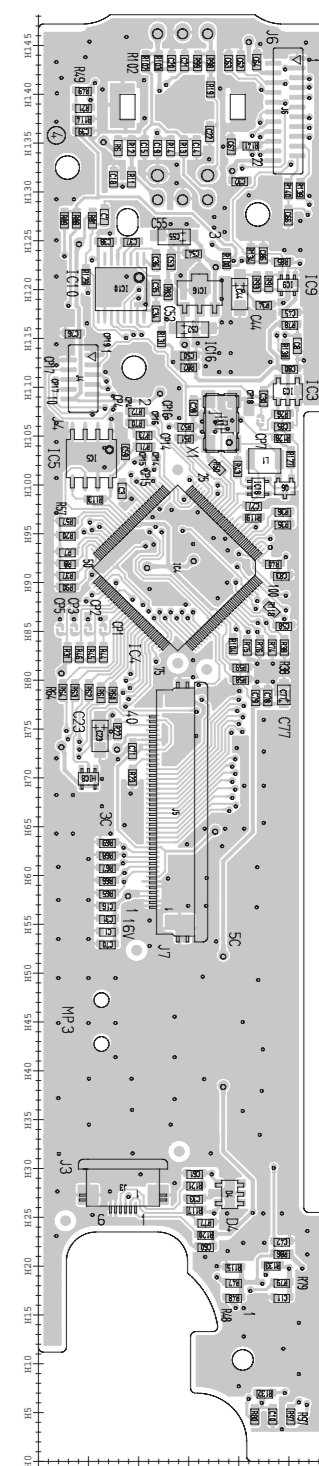
• K-CONNECT UNIT (BOTTOM VIEW)



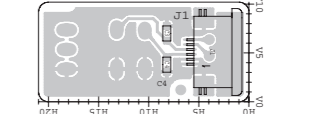
• MB-113 (BOTTOM VIEW)



• FRONTUNIT (BOTTOM VIEW)

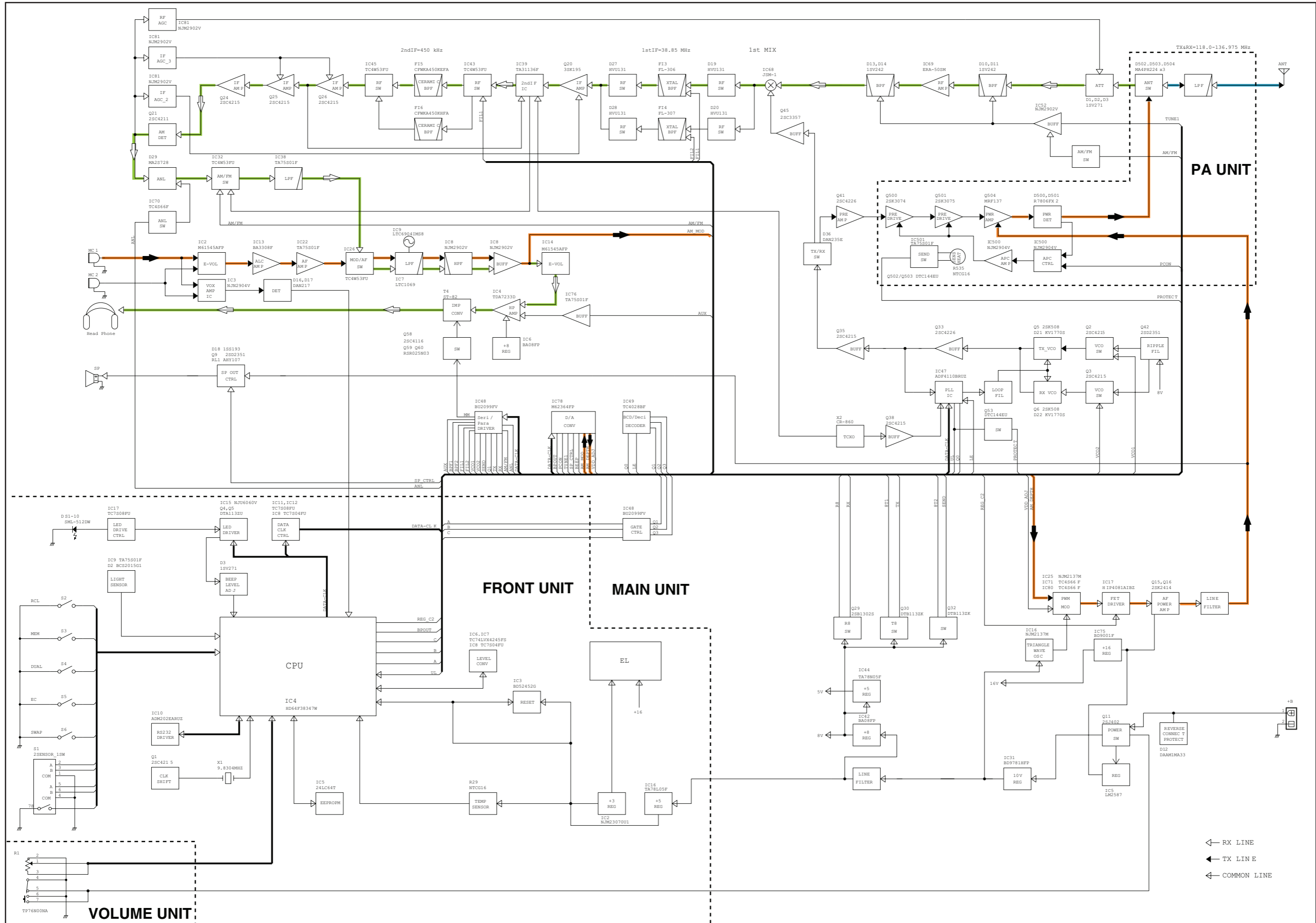


• VOLUME UNIT (BOTTOM VIEW)



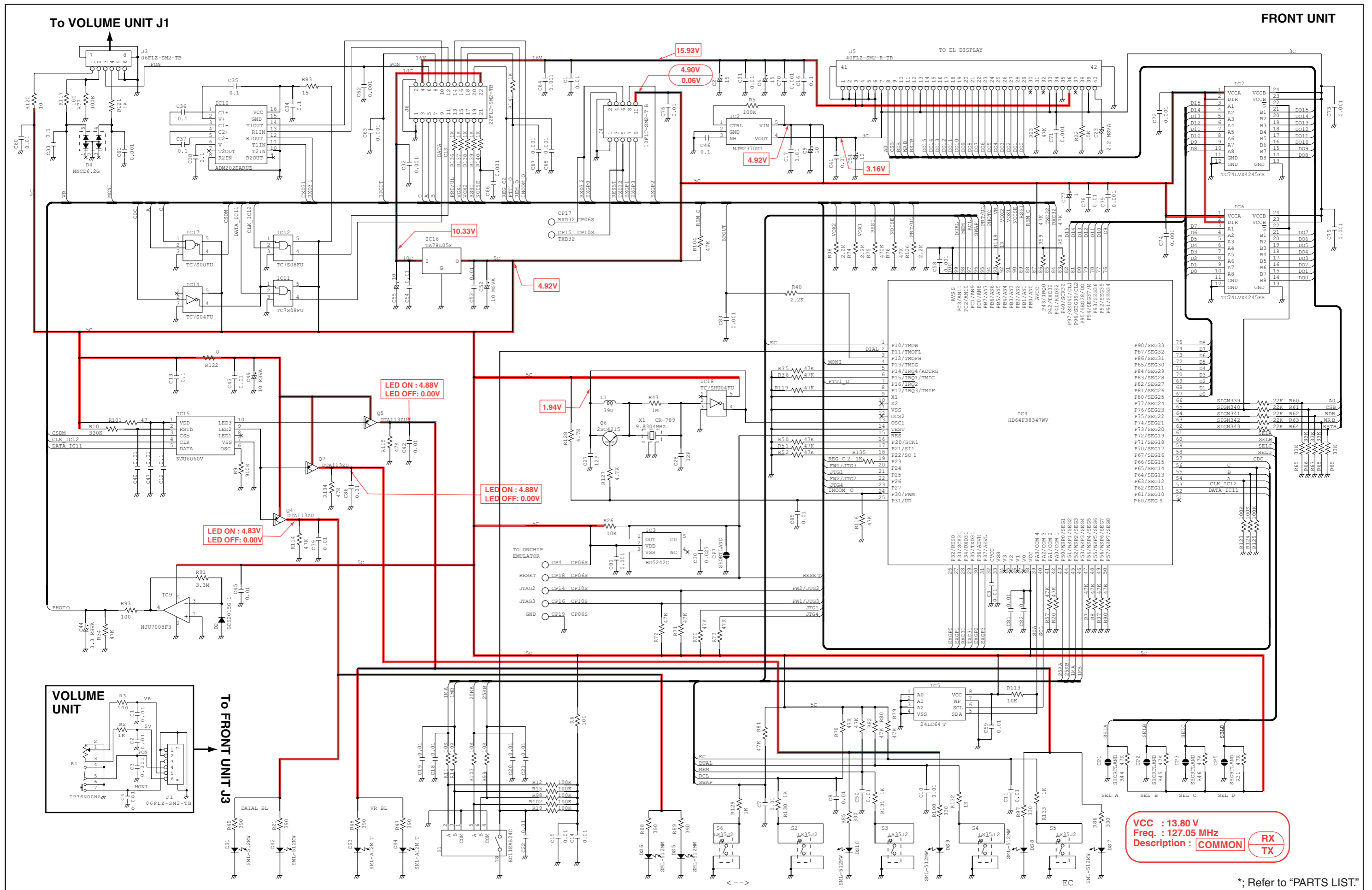
# SECTION 8

# BLOCK DIAGRAM



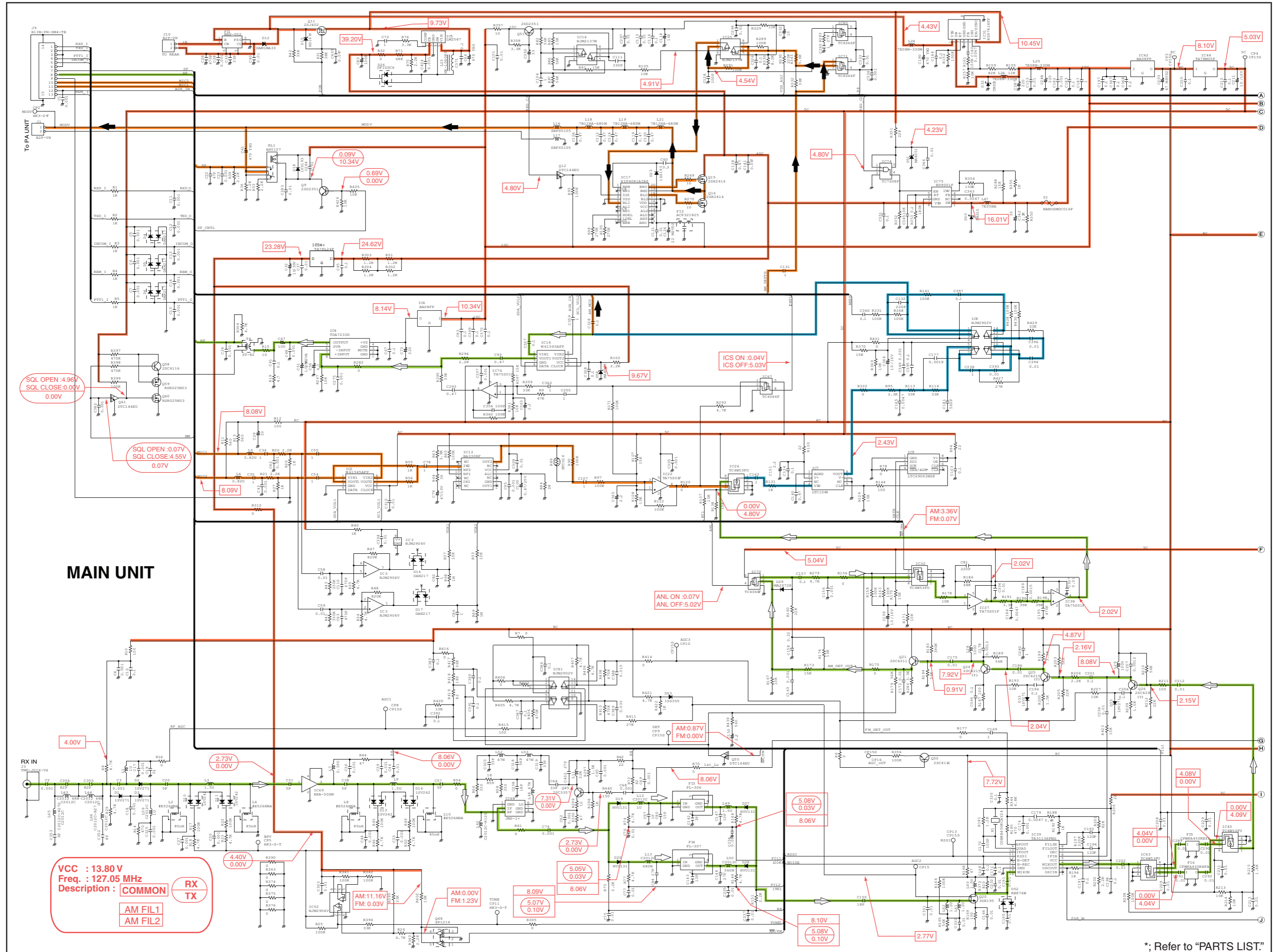
# SECTION 9

# VOLTAGE DIAGRAM



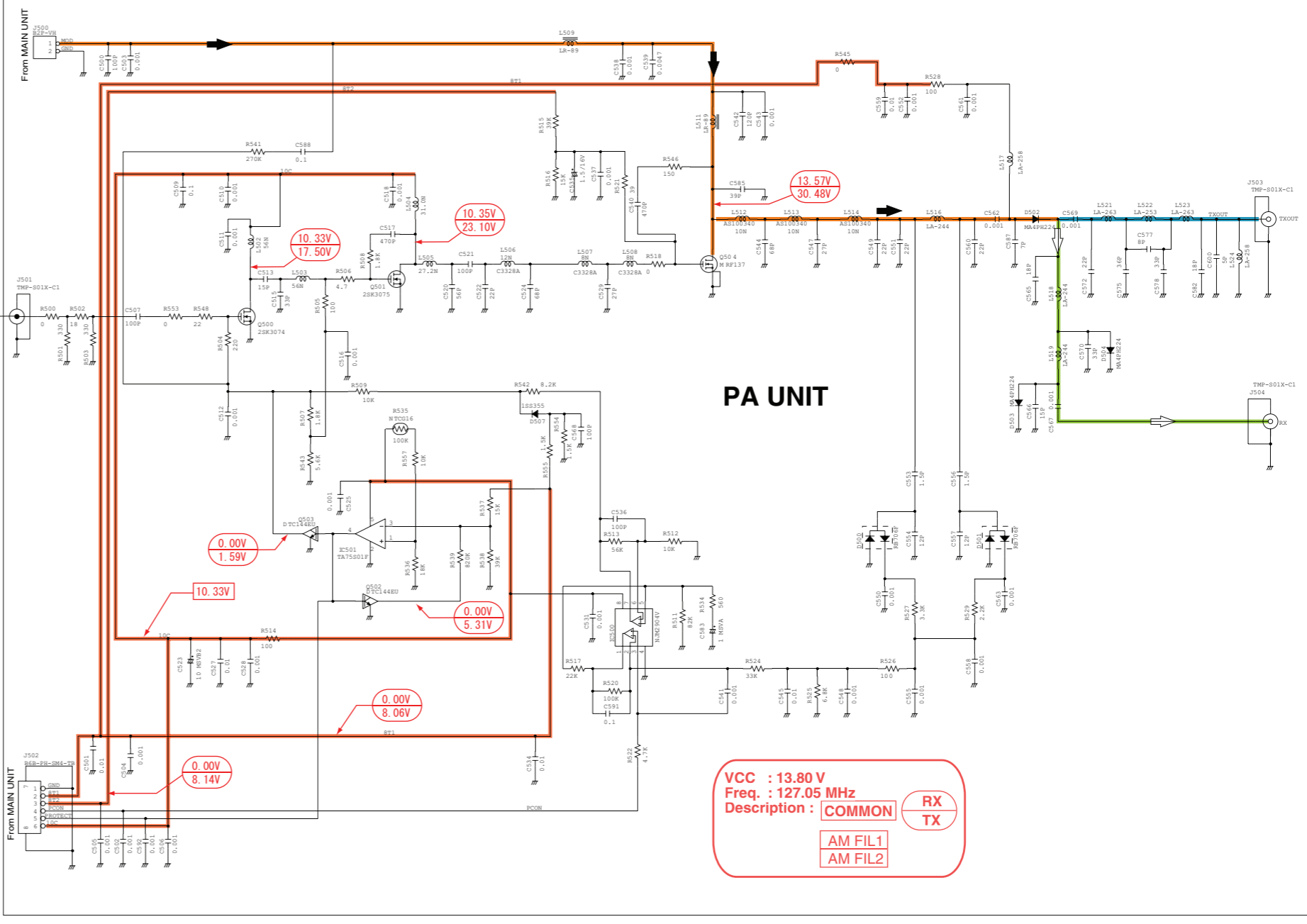
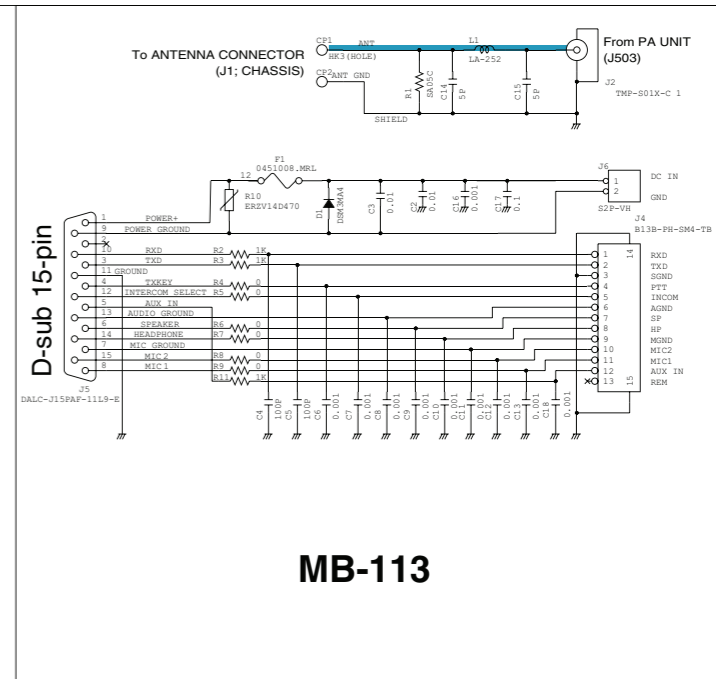
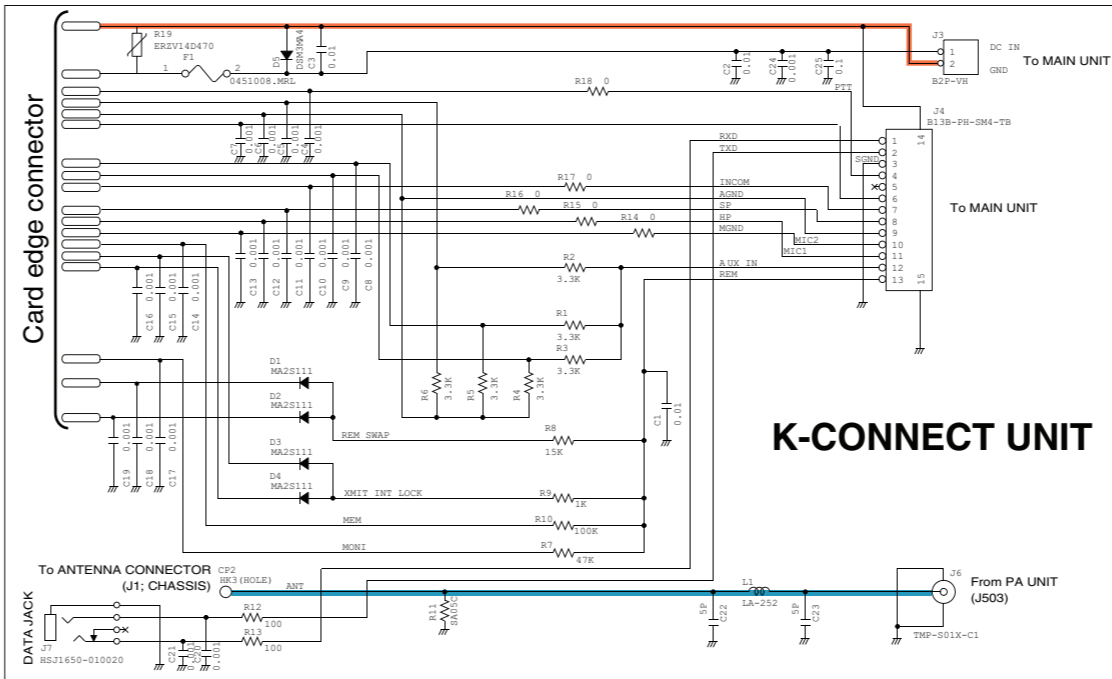
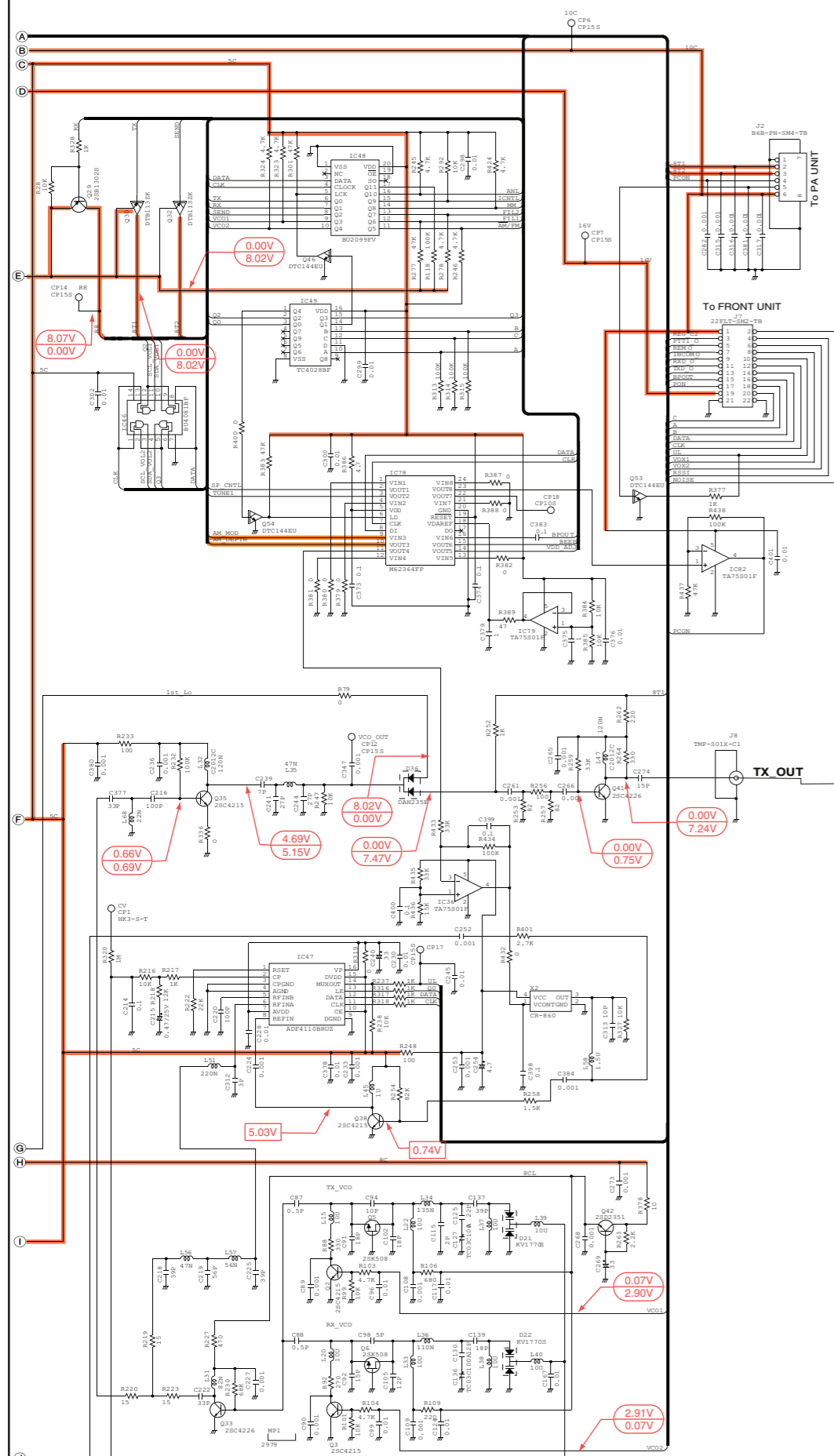
VCC : 13.80 V  
Freq. : 127.05 MHz  
Description : COMMON  
RX TX

\*; Refer to "PARTS LIST."



\*; Refer to "PARTS LIST."

# MAIN UNIT



VCC : 13.80 V  
 Freq. : 127.05 MHz  
 Description : COMMON RX TX  
 AM FIL1  
 AM FIL2

\*; Refer to "PARTS LIST"



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