



# SERVICE MANUAL

VHF MARINE TRANSCEIVER

**IC-M23**  
**IC-M24**

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S-14720XZ-C1  
Apr. 2011

Icom Inc.

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## INTRODUCTION

This service manual describes the latest technical information for the **IC-M23** and **IC-M24** VHF MARINE TRANSCEIVER, at the time of publication.

MODEL	VERSION	TRANSMIT POWER	SUPPLIED CHARGER
IC-M24	USA	5 W	BC-199SA
	EXP	5 W	BC-199SE
IC-M23	CHN	5 W	
	EUR-1	5 W	
	EUR	5 W	
	UK	5 W	—
	FRG	5 W (1 W)	BC-199SE
	HOL	5 W	
	AUS	5 W	BC-199SV

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

## CAUTION

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

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

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

## ORDERING PARTS

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

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

### <ORDER EXAMPLE>

1110003491	S.IC	TA31136FNG	IC-M23	MAIN UNIT	5 pieces
8820001210	Screw	2438 screw	IC-M24	Top cover	10 pieces

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



(IC-M24)

## REPAIR NOTES

1. Make sure that 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 30 dB to 40 dB attenuator between the transceiver and a Deviation Meter or Spectrum Analyzer, when using such test equipment.
8. **READ** the instructions of the test equipment thoroughly before connecting it to the transceiver.

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## ■ IC-M23

## ◇ GENERAL

- Frequency coverage : Transmitting 156.000–161.450 MHz  
Receiving 156.000–163.425 MHz
- Mode : FM (16K0G3E)
- Antenna impedance : 50 Ω (nominal)
- Power supply requirement : BP-266 only (3.7 V DC nominal; negative ground)
- Current drain (approximately) : TX (5 W/1.0 W/0.5 W) 2.3 A/0.9 A/0.7 A  
Maximum audio 0.35 A typical  
Power save 8 mA typical
- Frequency stability : ±1.5 kHz
- Operating temperature range : –15°C to +55°C
- Dimensions : 58.5 (W) × 128.5(H) × 34.5(D) mm  
(Projections not included)
- Weight : Approximately 260 g  
(including battery pack, antenna, belt clip)

## ◇ TRANSMITTER

- Output power : 5 W (approx.; High)/1 W (Low)/0.5 W (E\_Low)\*  
\*1 W (High) and 0.5 W (Low) for German version, depending on the pre-programmed setting
- Modulation system : Variable reactance frequency modulation
- Maximum frequency deviation : ±5 kHz
- Adjacent channel power : 70 dB
- Spurious emissions : 0.25 μW
- Audio harmonic distortion : 10% (at 60% deviation)
- Residual modulation : 40 dB
- Audio frequency response : +1 dB to –3 dB of 6 dB oct. from 300–3000 Hz

## ◇ RECEIVER

- Receive system : Double-conversion superheterodyne
- Intermediate frequency : 1st 21.7 MHz, 2nd 450 kHz
- Sensitivity (20 dB SINAD) : –4 dBμ emf typical
- Squelch sensitivity : –5 dBμ emf typical (at threshold)
- Intermodulation : 68 dB
- Hum and noise : 40 dB
- Audio frequency response : +1 dB to –3 dB of –6 dB oct. from 300–3000 Hz
- Spurious response : 70 dB
- Adjacent channel selectivity : 70 dB
- Audio output power (8 Ω) : 0.2 W (at 1 kHz, 10% distortion)

## ■ IC-M24

## ◇ GENERAL

- Frequency coverage : Transmitting 156.025–157.425 MHz  
Receiving 156.050–163.275 MHz
- Mode : FM (16K0G3E)
- Antenna impedance : 50 Ω (nominal)
- Power supply requirement : BP-266 only (3.7 V DC nominal; negative ground)
- Current drain (approximately) : TX (5 W/1.0 W) 2.3 A/0.9 A  
Max. audio 0.35 A typical  
Power save 8 mA typical
- Frequency stability : ±10 ppm
- Operating temperature range : –20°C to +60°C; –4°F to +140°F
- Dimensions : 58.5 (W) × 128.5(H) × 34.5(D) mm  
(projections not included) 2.3 (W) × 5.6 (H) × 1.3 (D) inch
- Weight : Approximately 260 g; 9.2 oz  
(including battery pack, antenna and belt clip)

## ◇ TRANSMITTER

- Output power : 5 W (approximately; High) and 1 W (Low)
- Modulation system : Variable reactance frequency modulation
- Maximum frequency deviation : ±5 kHz
- Adjacent channel power : 70 dB
- Spurious emissions : –68 dBc typical
- Residual modulation : 40 dB
- Audio frequency response : +1 dB to –3 dB of 6 dB oct. from 300–3000 Hz

## ◇ RECEIVER

- Receive system : Double-conversion superheterodyne
- Intermediate frequency : 1st 21.7 MHz, 2nd 450 kHz
- Sensitivity (12 dB SINAD) : 0.25 μV typical
- Squelch sensitivity : 0.35 μV typical (at threshold)
- Intermodulation : 70 dB typical
- Spurious response : 70 dB typical
- Adjacent channel selectivity : 70 dB typical
- Audio output impedance : 8 Ω
- Audio output power : 0.6 W typical (at 10% distortion)

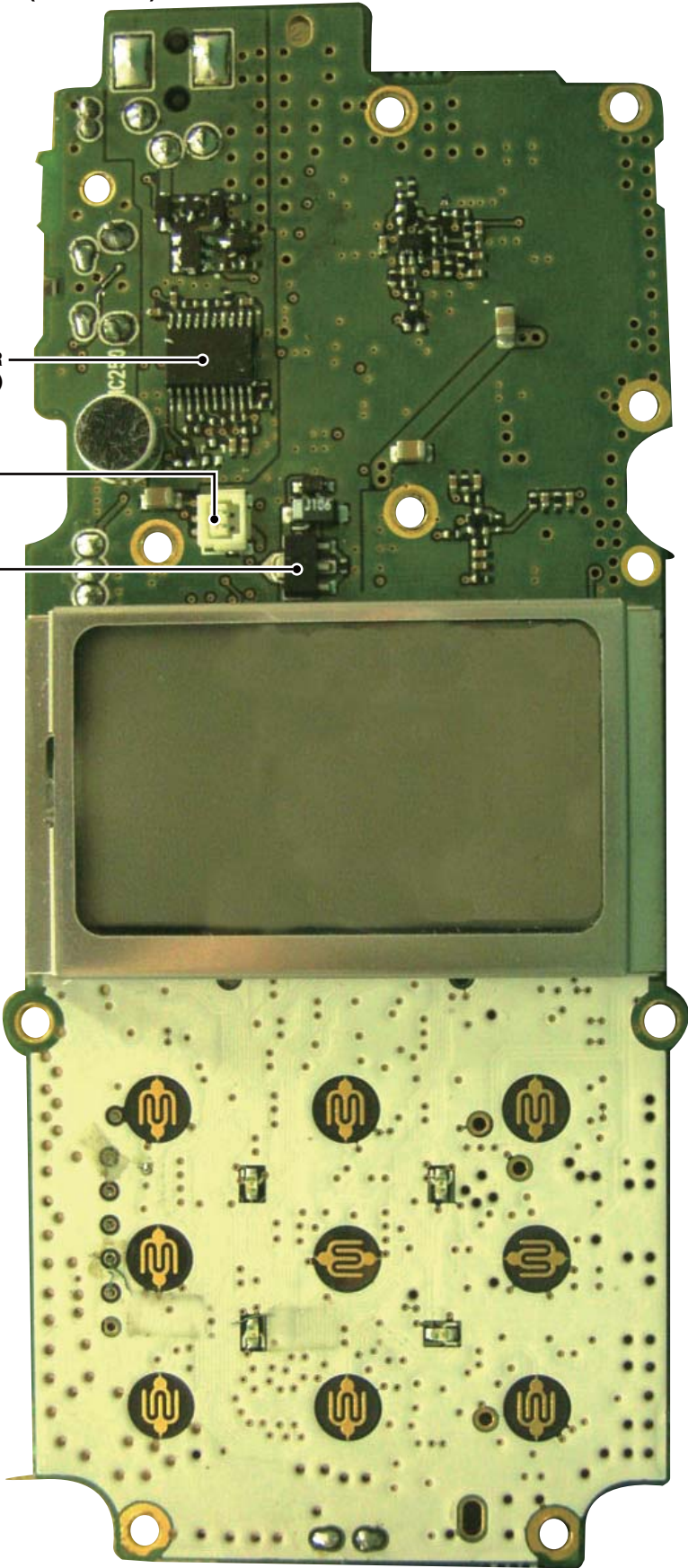
All stated specifications are subject to change without notice or obligation.

• MAIN UNIT  
(TOP VIEW)

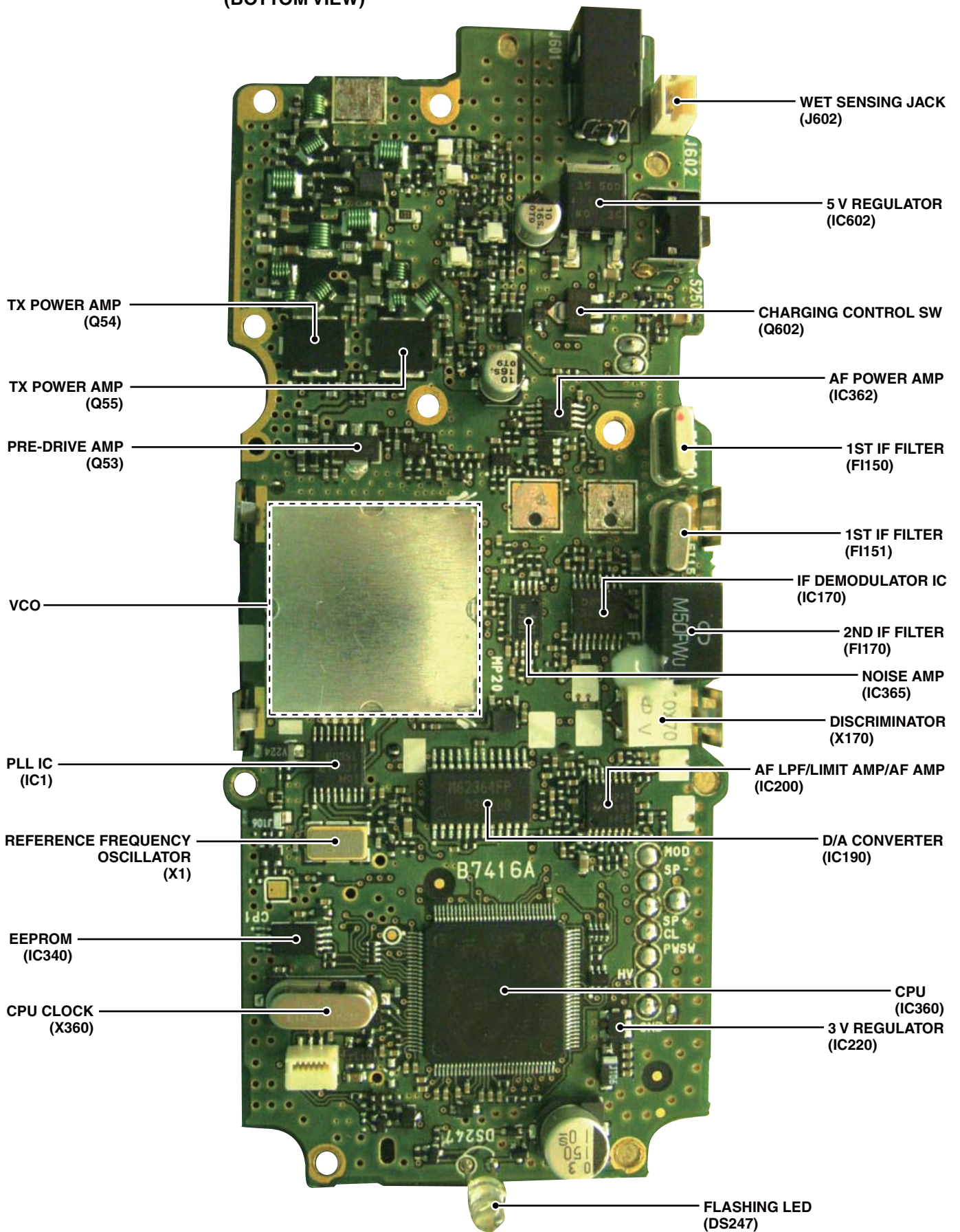
CHARGING CONTROLLER  
(IC601)

SPEAKER JACK  
(J251)

M3V LINE SW  
(Q225)



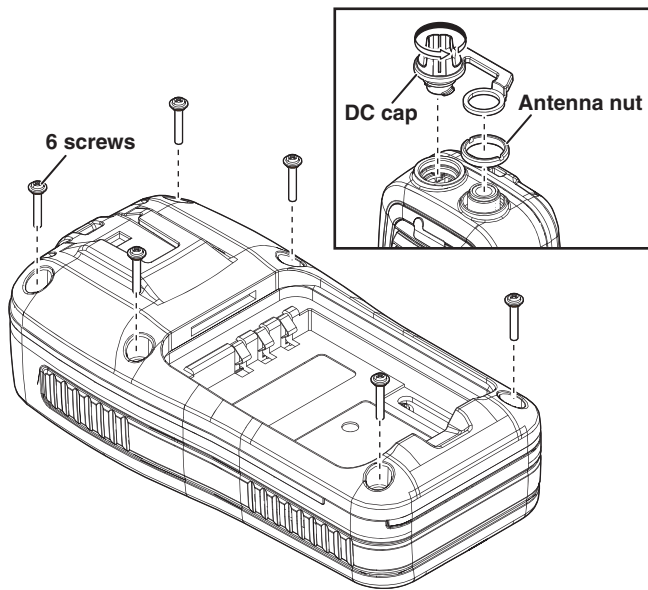
• MAIN UNIT  
(BOTTOM VIEW)



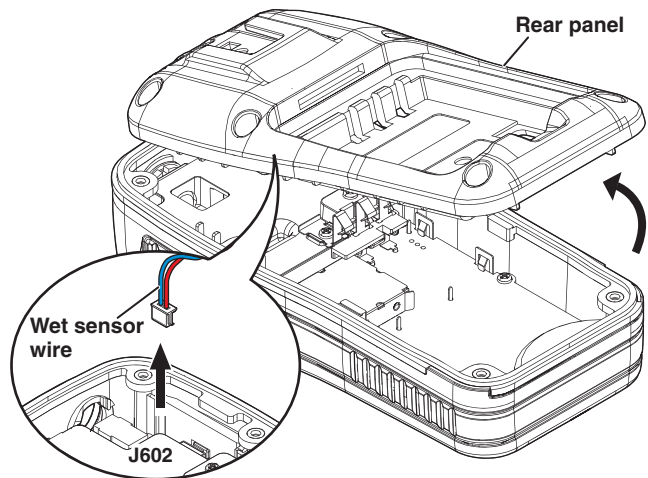
# SECTION 3 DISASSEMBLY INSTRUCTION

## 1. REMOVING THE PCB

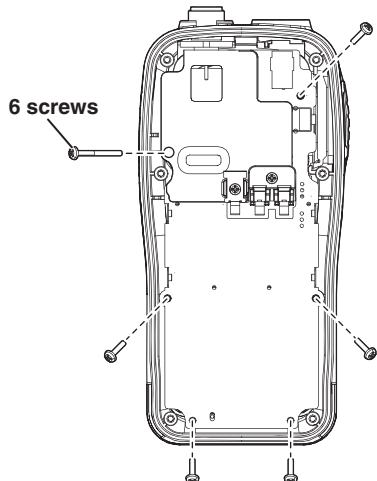
- 1) Remove the battery pack from the transceiver.
- 2) Remove the DC cap and antenna nut.
- 3) Remove 6 screws from the rear panel.



- 4) CAREFULLY lift the rear panel up and unplug the wet sensor wire.

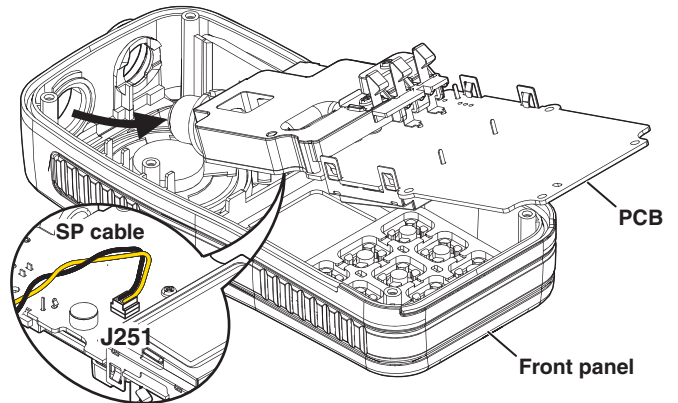


- 5) Remove 6 screws from the PCB.



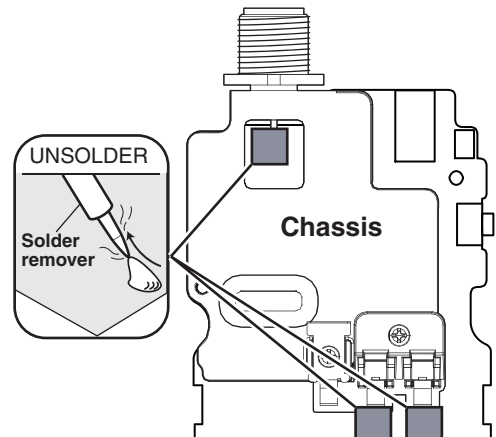
(Continued on the right above.)

- 6) CAREFULLY lift the PCB out of the front panel, and then turn it over in order to unplug the speaker wire.

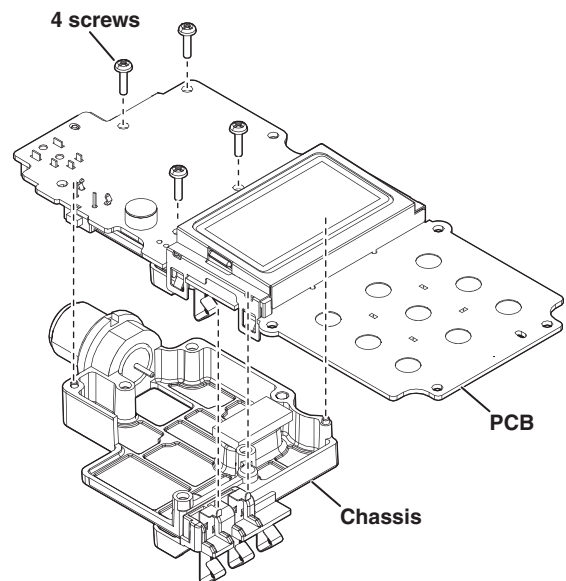


## 2. REMOVING THE CHASSIS

- 1) Unsolder 3 points shown.



- 2) Remove 4 screws from the PCB, and then remove the CHASSIS.



## 4-1 RECEIVER CIRCUITS

### RF CIRCUITS

The RF circuits consist of RF filters, antenna switch (ANT SW), RF amplifier (RF AMP), etc., and extract and amplify the signal of frequency which is desired to receive.

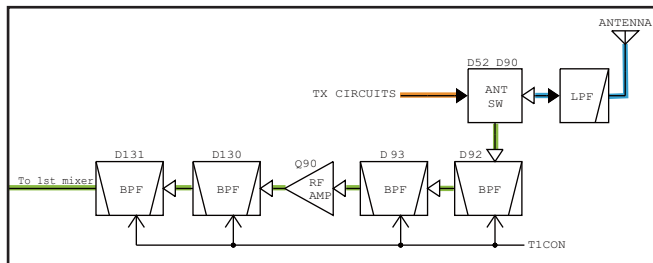
#### • ANTENNA SWITCHING CIRCUIT

The RF signal from the antenna is passed through the LPF (L81, L82, C83–C86, C89) and antenna SW (D52, D90, L90, C90, C91), and then applied to the RF AMP (Q90) through the 2-staged tuned BPF (D92, D93, L92, L93, C95, C97–C100, C117).

#### • RF AMPLIFIER

The filtered RX signal is amplified by the RF AMP (Q90) and passed through another 2-staged BPF (D130, D131, L96, L97, L110, L112–L115) to remove unwanted signals. The filtered signal is applied to the 1st mixer (Q150).

#### • RF CIRCUITS



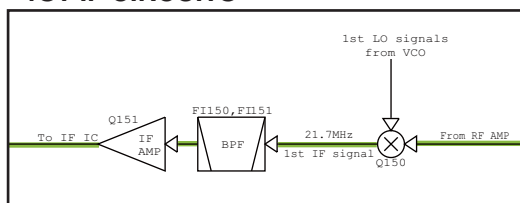
## 1ST IF, 2ND IF AND DEMODULATOR CIRCUITS

### • 1ST IF CIRCUITS

The RX signal is mixed with 1st LO signal at the 1st mixer (Q150), resulting in the 21.7 MHz 1st IF signal. The converted 1st IF signal is filtered by the crystal filters (F1150 and F151) to remove unwanted out-of-band signals.

The filtered 1st IF signal is amplified by the 1st IF AMP (Q151), and then applied to the IF demodulate IC (IC170, pin 16).

### • 1ST IF CIRCUITS



### • 2ND IF AND DEMODULATOR CIRCUITS

IC170 is an IF demodulate IC which contains the 2nd local oscillator, 2nd mixer, limiter and quadrature detector in its package.

The 21.25 MHz reference frequency signal from the PLL IC (IC1, pin 2) is applied to the IF demodulate IC (IC170, pin 2) as the 2nd LO signal, and then mixed with 21.7 MHz 1st IF signal from the 1st AMP (Q151). The resulting signal of 450 kHz 2nd IF signal is output from the pin 3 of IC170.

The 2nd IF signal is filtered by the external ceramic filter (F1170) to extract 450 kHz signal only, and then applied to the internal quadrature detector to be frequency-demodulated. The demodulated AF signals are output from the pin 9.

The quadrature detector is a frequency demodulator which uses a discriminator (X170) as a phase delay, and provides demodulation without any adjustment.

### SQUELCH CIRCUIT

A portion of AF signal from the IF demodulate IC is adjusted in level by the D/A converter (IC190), and then applied to the noise amplifier (IC170, R174–R176, C179, C180).

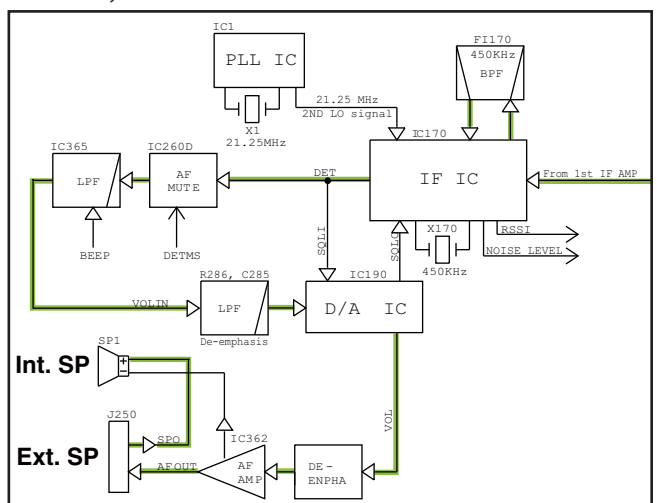
Only noise components (approximately 30 kHz signal) are amplified by the noise amplifier, and then rectified by the internal noise detector to be converted into DC voltage corresponding to noise level; the squelch voltage. The squelch voltage is output from the pin 14 of IC170, and then applied to the A/D port of the CPU (IC360, pin 33).

The CPU (IC360) compares input voltage and preset squelch level to control audio signals ON/OFF (emit/mute).

### RX AF CIRCUITS

The demodulated AF signal from the IF demodulate IC (IC170, pin 9) is passed through the AF mute SW (IC260D) and LPF (IC365). The filtered AF signal is de-emphasized by R286 and C285 to obtain –6 dB/oct. of frequency response, and then applied to the D/A converter (IC190). The level-adjusted AF signal is amplified by the AF power amplifier (IC362), and then applied to the speaker (CHASSIS: SP1).

### • 2ND IF, DEMODULATOR AND RX AF CIRCUITS





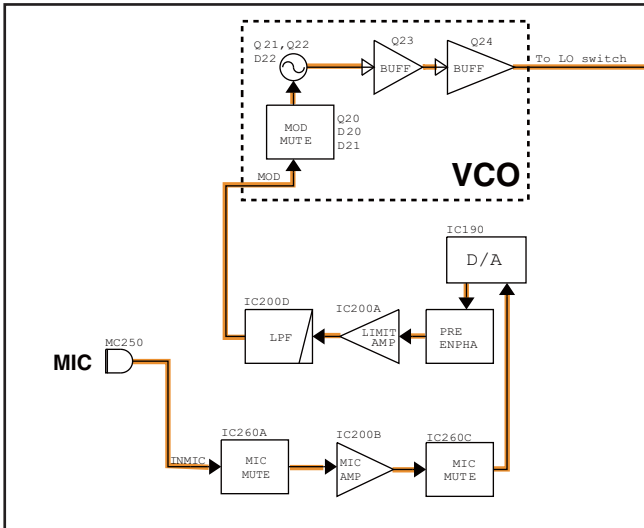
## 4-2 TRANSMITTER CIRCUITS

### TX AF CIRCUITS

AF signal from the microphone (MIC signals) is passed through the MIC mute SW (IC260A), amplified by MIC AMP (IC200B), and then applied to the D/A converter (IC190), through another MIC mute SW (IC260C).

The level-adjusted MIC signal is pre-emphasized by R201 and C385 to obtain +6 dB/oct of frequency response, and then passed through the limiter (IC200A) to prevent over deviation. The amplitude-limited MIC signal is filtered by the splatter filter (IC200D) to remove 3 kHz and higher signals, and then applied to the VCO (Q21, Q22, D22) for frequency modulation.

### • TX AF AND MODULATION CIRCUITS



### TX AMPLIFIERS

The frequency-modulated signal from the VCO (Q21, Q22, D22) is passed through the buffers (Q23 and Q24) and LO SW (D50), and then sequentially amplified by the buffer AMP (Q50) and pre-drive AMP (Q53).

The amplified signal is splitted by the power splitter (L100, L101, R463, C445, C446) and applied to the power AMPs (Q54 and Q55). The amplified signals are combined at the power combiner (L107, L108, R465, C457, C458) to obtain the TX output power.

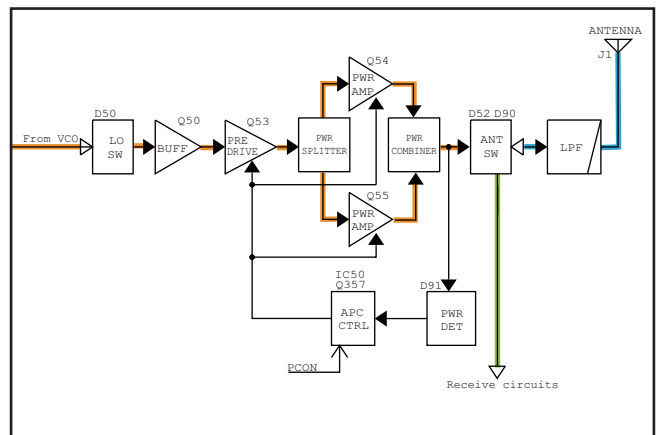
The amplified TX signal is passed through the ANT SW (D52) and LPF, and then applied to the antenna.

### APC CIRCUIT

A portion of TX output signal is rectified by D91 to produce the DC voltage which corresponds to the TX power level.

The APC AMP (IC50) compares the voltage and TX power setting voltage from the D/A converter (IC190). The resulting voltage from the APC AMP controls the gain of both driver AMP (Q53) and power AMPs (Q54 and Q55), to keep the TX output power stable.

### • TX AMPLIFIERS AND APC CIRCUIT



### 4-3 FREQUENCY SYNTHESIZER CIRCUITS

#### VCO

While transmitting, the oscillation frequency of VCO (Q21, Q22, D22) is determined by the value of D22, L22, C26 and C27, and the frequency modulation is carried out by adding modulation signal to D20.

The generated signal is passed through the buffers (Q23 and Q24), and then applied to the pre-drive AMP (Q53), through the LO SW (D50) and buffer (Q50).

While receiving, D21 is turned ON and C28 is connected to the GND to shift the oscillation frequency lower.

The generated signal is passed through the buffers (Q23 and Q24), and then applied to the 1st mixer (Q150), through the LO SW (D51).

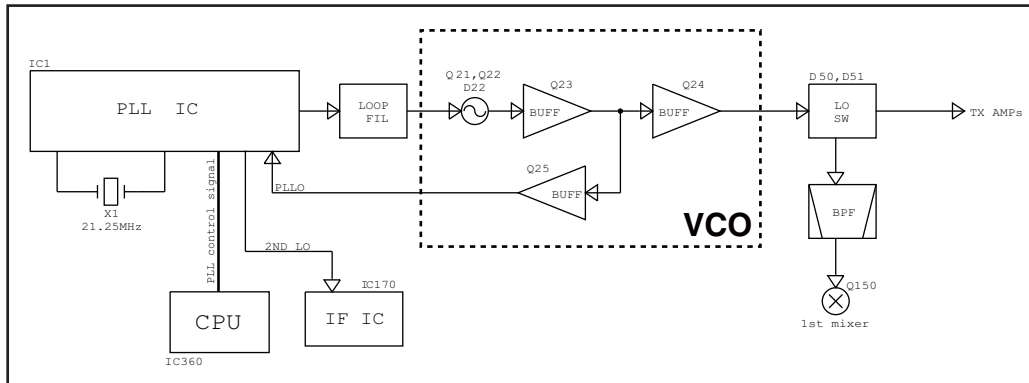
#### PLL

IC1 is a PLL IC which contains the prescaler, programmable counter, phase comparator and charge pump in its package.

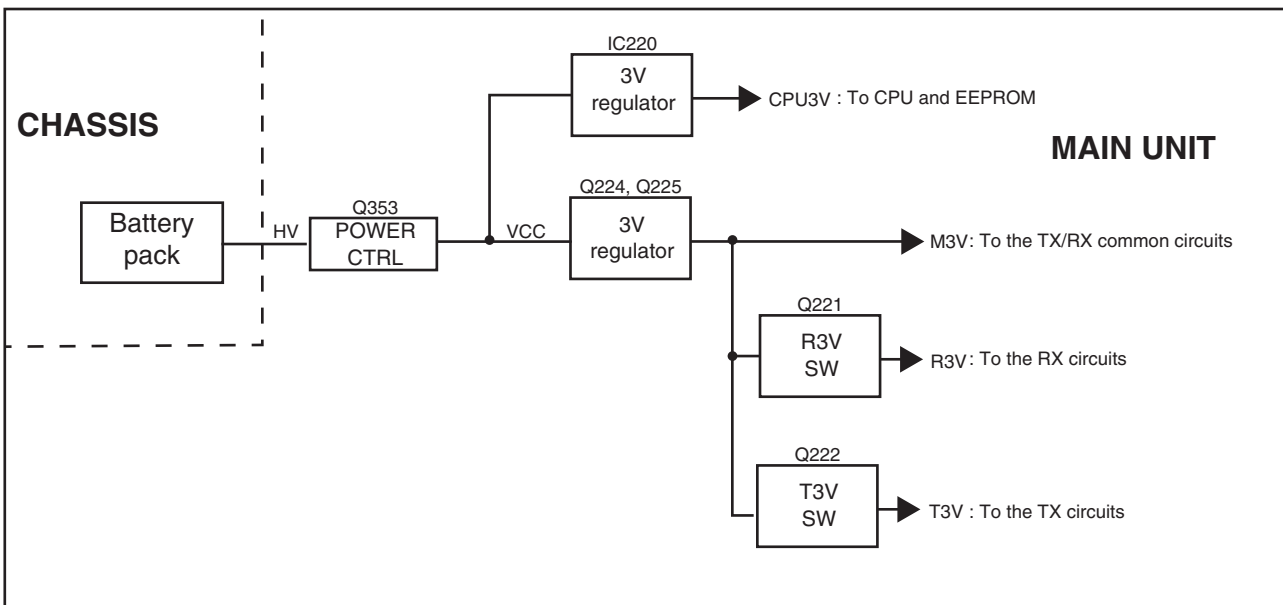
The 21.25 MHz reference frequency signal is fed from X1.

The loop filter for the VCO is composed by R8, R10, R22, C11, C13 and C24.

#### • FREQUENCY SYNTHESIZER CIRCUITS



### 4-4 VOLTAGE BLOCK DIAGRAM



## 4-5 PORT ALLOCATIONS

### • CPU (IC360)

PIN No.	LINE NAME	DESCRIPTION	I/O
1	BEEP	Beep audio (Squarewave).	O
2	PS	PLL power save mode control.	O
3	TDEC	Decoded tone signal. (for monitoring purpose)	O
4	DASTB	Strobe for the D/A converter.	O
5	PLSTB	Strobe for the PLL IC.	O
10	SDATA	Serial data for the PLL IC and D/A converter.	O
11	SCK	Serial clock to the PLL IC and D/A converter.	O
12	ESCK	Serial clock for the EEPROM.	O
13	ESDA	Serial clock from/to the EEPROM.	I/O
25	RES	CPU reset.	I
27	TEMPV	Temperature sensing voltage.	I
28	BTEMPV	Battery temperature sensing voltage.	I
29	LOINV	Lock voltage from the PLL IC.	I
30	TDETV	TX power sensing voltage.	I
31	BATTV	Battery voltage. (Divided voltage)	I
32	RSSIV	RSSI voltage from the IF demodulate IC.	I
33	NOISV	Noise level sensing voltage from the IF demodulate IC.	I
34	DCV	Input voltage detection.	I
36	WDECV*	Weather alert tone signal.	I
38	ATIS**	ATIS signal.	O
51-72	SEG0-SEG21	LCD driver segment terminals.	O
77	LEDS	Backlight control.	O
78	CRESET	Charging control IC reset.	O
79	LCDS	LCD contrast control.	O
80	MICMS	MIC mute SW control. L=MIC mute.	O
81	ATX	MIC control. H=While transmitting.	O
85	AFVS	AF power AMP control. H=While the squelch is opened.	O
86	V3VS	VCO power supply control.	O
87	M3VS	Main power supply control.	O
88	LOW	TX power control. H=The TX power is set to Low.	O
89	R3VS	R3V line control. L=While receiving. (RX circuits activated)	O
90	T3VS	T3V line control. L=While transmitting. (TX circuits activated)	O
97	PON	Main power supply line control.	O
98	DETMS	RX AF line mute. L=Mute.	O
99	LEDI-R	Charge status. L=While charging. Pulse=Charging error.	I
100	LEDI-G	Charge status. L=When the battery is fully charged.	I

\*: M24 only \*\*: [FRG] and [HOL] only

PIN No.	LINE NAME	DESCRIPTION	I/O
101	PTTM	MIC mute control. L=MIC mute.	O
103	PTTIN	[PTT] input. H=Pushed.	I
106	LOW	TX power control. H=TX power is set to low.	O
107	TXMS	Transmitting control. H=TX mute.	O
108	16/9	[16/9] input. L=Pushed.	I
109	CH/WX	[CH/WX] input. L=Pushed.	I
110	UP	[▲] input. L=Pushed.	I
111	DOWN	[▼] input. L=Pushed.	I
112	FAV	[FAV] input. L=Pushed.	I
113	VOL/SQL	[VOL/SQL] input. L=Pushed.	I
114	SCAN	[SCAN] input. L=Pushed.	I
116	H/L	[H/L] input. L=Pushed.	I
117	UNLK	PLL unlock signal input. (PLL malfunction detection) H=PLL unlocked.	I
119	PWSW	[Ⓞ] input. H=Pushed.	I

### • D/A CONVERTER (IC190)

PIN No.	LINE NAME	DESCRIPTION
1, 2	FCON	Reference frequency adjustment voltage.
3, 4	PCON	TX output power adjustment voltage.
9, 10	MODC	Deviation adjustment.
11, 12	MSENS	MIC signal level (MIC sensitivity) adjustment.
13, 14	VOLO	AF output power adjustment.
15, 16	SQLO	Squelch threshold level adjustment.
21, 22	T1CON	BPF tuning voltage.

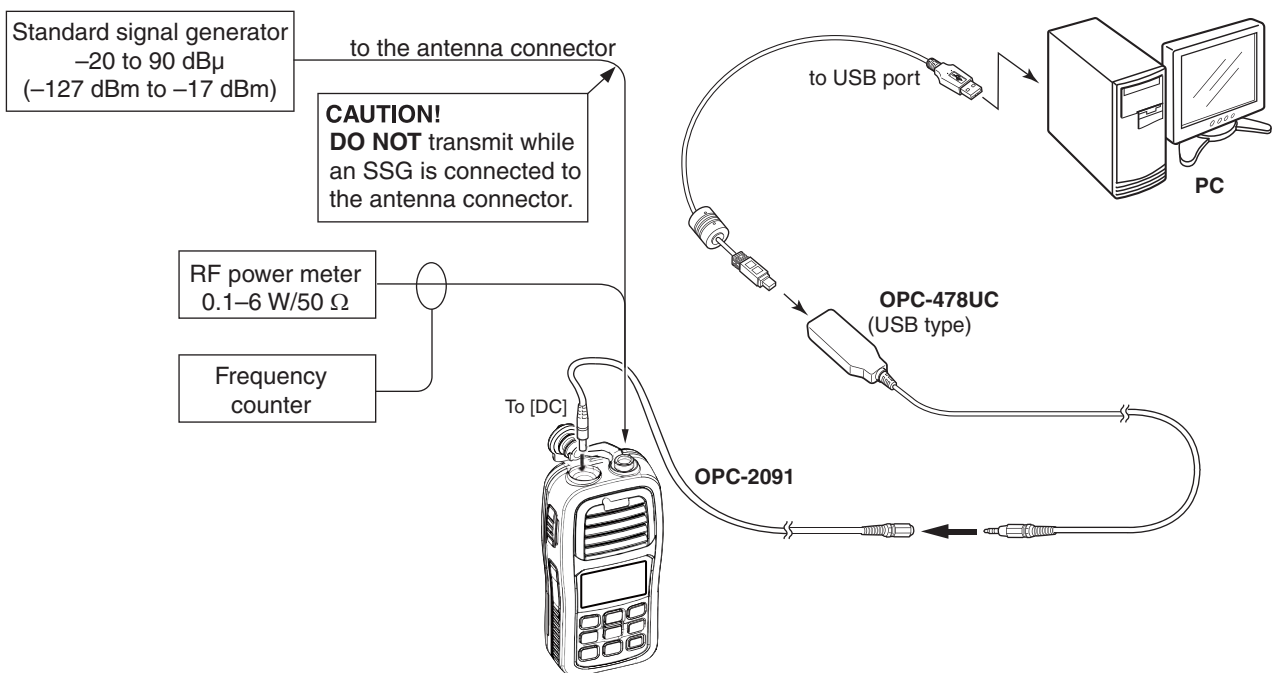
# SECTION 5 ADJUSTMENT PROCEDURE

## 5-1 PREPARATION

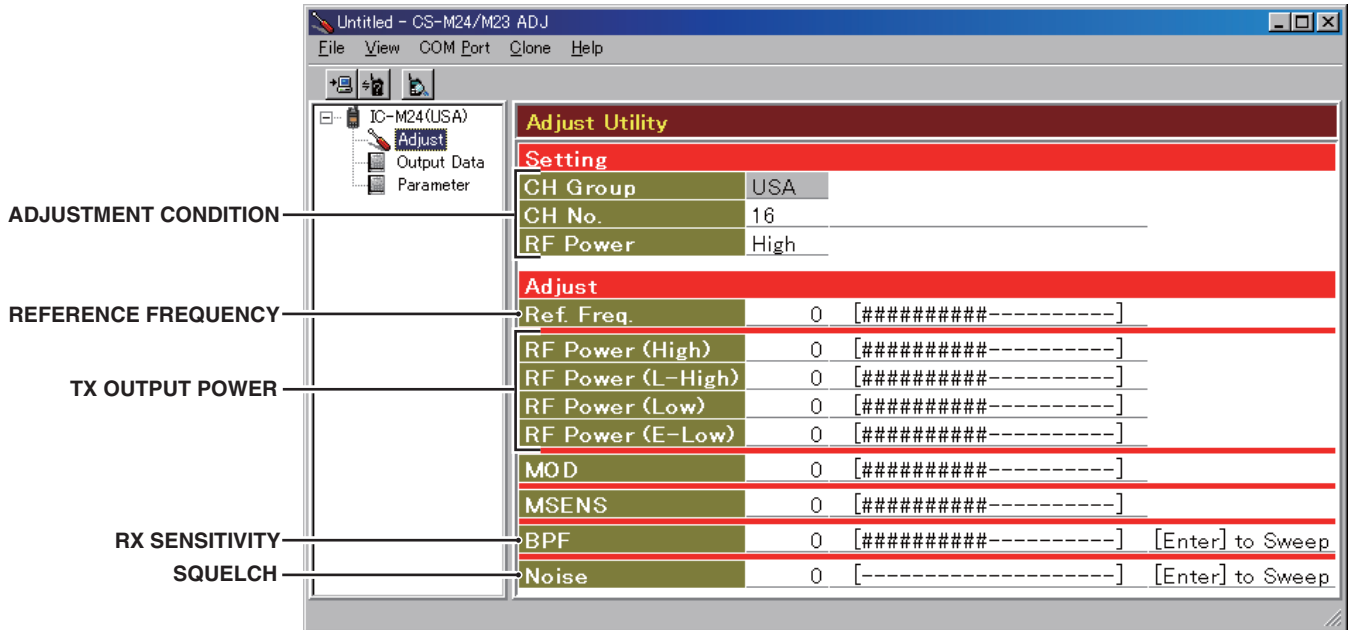
### REQUIRED EQUIPMENTS

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
Cloning software	CS-M24/M23 ADJ (Revision 1.0 or later)	Cables	OPC-478UC and OPC-2091
RF power meter (50 Ω terminated)	Measuring range : 0.1–6 W	Frequency counter	Frequency range : 0.1–300 MHz
	Frequency range : 100–300 MHz		Frequency accuracy : ±1 ppm or better
	SWR : Less than 1.2 : 1	Standard signal generator (SSG)	Input level : Less than 1 mW
			Frequency range : 0.1–300 MHz
			Output level : –20 dBμ to 90 dBμ
			(–127 to –17 dBm)

### CONNECTION



## ADJUSTMENT UTILITY SCREEN

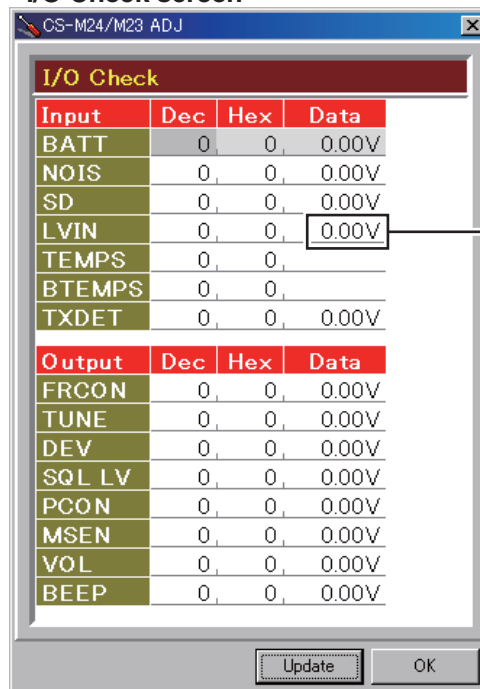


## 5-2 FREQUENCY ADJUSTMENTS

- 1) Select an adjustment item using [↑]/[↓] on the PC's keyboard.
- 2) Set or modify the adjustment value as specified using [←]/[→] on the PC's keyboard, then push [ENTER].

ADJUSTMENT	TRANSCIVER'S CONDITION	OPERATION	ADJUSTMENT ITEM	VALUE
PLL LOCK VOLTAGE VERIFICATION	1 • CH. : 16 • Receiving	1) Connect an RF power meter to the antenna connector. 2) Click the [Update (F5)] button to check on the "I/O Check screen" as below.	[LVIN] (On the "I/O Check screen")	1.95–2.95 V
	2 • CH. : 16 • Transmitting			1.50–2.50 V
REFERENCE FREQUENCY	1 • CH. : 16 • Transmitting	• Loosely couple a frequency counter to the antenna connector.	[Ref. Freq.]	156.800000 MHz (±500 Hz)

### • I/O Check screen



The Lock Voltage appears here

(The values shown above are example only.  
Each transceiver has own values.)

### 5-3 RECEIVE ADJUSTMENTS

- 1) Select an adjustment item using [↑]/[↓] on the PC's keyboard.
- 2) Set or modify the adjustment value as specified using [←]/[→] on the PC's keyboard, then push [ENTER].

ADJUSTMENT	TRANSCEIVER'S CONDITION	OPERATION	ADJUSTMENT ITEM	VALUE
RX SENSITIVITY	1	<b>NOTE:</b> When "RX SENSITIVITY" is re-adjusted, "SQUELCH" must be re-adjusted too.		
		<ul style="list-style-type: none"> <li>• CH. : 16</li> <li>• Receiving</li> </ul>	<ul style="list-style-type: none"> <li>• Connect an SSG to the antenna connector and set it as;                      Frequency : 156.800 MHz                      Level† : +30 dBμ (-77 dBm)                      Modulation : 1 kHz                      Deviation : ±3.0 kHz</li> </ul>	[BPF]
SQUELCH	1	<b>NOTE:</b> When "RX SENSITIVITY" must be adjusted before "SQUELCH." And when "RX SENSITIVITY" is re-adjusted, "SQUELCH" must be re-adjusted too.		
		<ul style="list-style-type: none"> <li>• CH. : 16</li> <li>• Receiving</li> </ul>	<ul style="list-style-type: none"> <li>• Connect an SSG to the antenna connector and set it as;                      Frequency : 156.800 MHz                      Level† : -4 dBμ (-111 dBm) [M24] and [AUS]                      -3 dBμ (-110 dBm) [M23] except [AUS]                      Modulation : 1 kHz                      Deviation : ±3.0 kHz</li> </ul>	[Noise]

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

### 5-4 TRANSMIT ADJUSTMENTS

- 1) Select an adjustment item using [↑]/[↓] on the PC's keyboard.
- 2) Set or modify the adjustment value as specified using [←]/[→] on the PC's keyboard, then push [ENTER].

ADJUSTMENT	TRANSCEIVER'S CONDITION	OPERATION	ADJUSTMENT ITEM	VALUE	
TX OUTPUT POWER (High)	1	<ul style="list-style-type: none"> <li>• CH. : 16</li> <li>• Transmitting</li> </ul>	<ul style="list-style-type: none"> <li>• Connect an RF power meter to the antenna connector.</li> </ul>	4.5 W	
(L_High)*				[RF Power (High)]	2.5 W
(Low)				[RF Power (L_High)]	0.75 W
(E_Low)*				[RF Power (Low)]	0.45 W
			[RF Power (E_Low)]		

\*: For only [FRG] version.









**[MAIN UNIT]**

REF NO.	PARTS NO.	DESCRIPTION	M.	H/V LOCATION
DS240	5040003060	S.LED SML-512WWT86	T	53.1/3.8
DS241	5040003060	S.LED SML-512WWT86	T	61.1/3.8
DS242	5040003510	S.LED LNJ426W83RA	T	17.2/32.2
DS243	5040003510	S.LED LNJ426W83RA	T	28.1/32.2
DS244	5040003510	S.LED LNJ426W83RA	T	17.2/18.5
DS245	5040003510	S.LED LNJ426W83RA	T	28.1/18.5
DS246	5030003400	LCD TAK-35920 FX3340<ITAK>		
DS247	5040003560	LED RT3-234HRH16T-BNS <ROD>		
DS248	5040003001	S.LED SML-A12UT T86J	T	2.9/25.3
MC250	7700002710	MIC EM6027P-46C33-G <HOR>		
S250	2260001900	SWI SW-149 (SKHLLD)		
EP2	6910014690	S.BEA MPZ1608S221A-T	B	71.4/7.9
EP3	6910014690	S.BEA MPZ1608S221A-T	B	88.1/12.7
EP8	6910021240	S.BEA MMZ1005A152ET	B	61.1/17.0
EP10	6910014690	S.BEA MPZ1608S221A-T	B	83.0/22.2
EP11	6910018460	S.BEA MMZ1005Y102C-T	B	105.4/42.0
EP360	8930082550	LCD SRCN-3340-SP-N-W (SHJ)	T	

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

# SECTION 7

# MECHANICAL PARTS

## [CHASSIS PARTS]

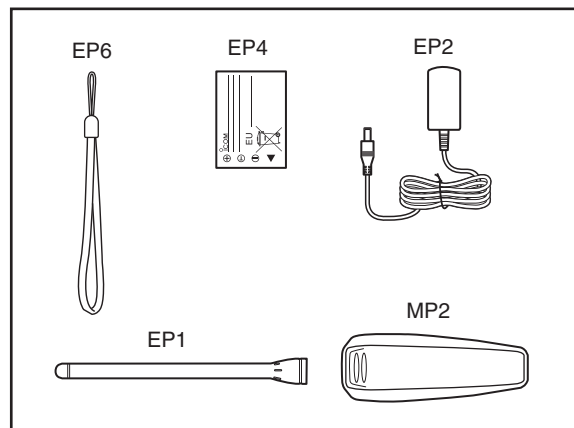
REF NO.	ORDER NO.	DESCRIPTION	QTY.
J31	6910014190	2497 ANT CONNECTOR <EIK>	1
SP1	2510001410	036D0803-1	1
W1	8900009640	OPC-963	1
W2	8900020040	OPC-2138	1
MP1	8210026940	3340 FRONT PANELASSEMBLY	[M24] 1
	8210027040	3340 FRONT PANEL (A)ASSEMBLY	[M23] 1
MP5	8930082450	3340 KEYBOARD <SEP>	[M24] 1
	8930082590	3340 KEYBOARD (A) <SEP>	[M23] 1
MP6	8930082510	3340 PTT BUTTON (TOP)	1
MP7	8930082370	3340 PTT HOLDER	1
MP10	8110010040	3340 REAR COVER	1
MP11	8930082480	3340 COVER SEAL (TOP)	1
MP12	8930082400	3340 RELEASE BUTTON	1
MP13	8930056540	PUSH SPRING (AH)	2
MP14	8850001950	SEALING WASHER (Y) (TOT)	1
MP15	8830003440	3285 ANT NUT	1
MP16	8930082360	3340 JACK CAP	1
MP17	8930082380	3340 CAP HOLDER	1
MP18	8930082470	3340 MIC SEAL (TOP)	1
MP21	8210026930	3340 REAR PANEL	1
MP22	8930082500	3340 MAIN SEAL (TOP)	1
MP24	8820001510	3062 SCREW	6
MP25	8930063690	O-RING (BA) (TOP)	6
MP31	8010022080	3340 CHASSIS 2X1	1
MP32	8930082440	3340 TERMINAL HOLDER	1
MP33	8810009561	PHBT M2 X 6 NI-ZK3	10
MP34	8930082560	3340 A-TERMINAL Y1233	[USA] 1
	8930082560	3340 A-TERMINAL Y1233	[EXP] 1
	8930083330	3340 C-TERMINAL Y1242	[CHN] 1
	8930083330	3340 C-TERMINAL Y1242	[EUR-1] 1
	8930083330	3340 C-TERMINAL Y1242	[EUR] 1
	8930083330	3340 C-TERMINAL Y1242	[UK] 1
	8930083330	3340 C-TERMINAL Y1242	[FRG] 1
	8930083330	3340 C-TERMINAL Y1242	[HOL] 1
	8930082560	3340 A-TERMINAL Y1233	[AUS] 1
MP35	8930082570	3340 B-TERMINAL Y1234	2
MP39	8810009511	PHBT M2 X 4 NI-ZC3 (3.6-4.0)	1
MP42	8810008751	PHBT M2 X15 NI-ZK3	1
MP48	8930030920	1301 SHEET	1
MP50	8930082490	O-RING (CH) (TOP)	1
MP51	8930082680	3340 DETECTION PIN	2
MP52	8930082630	INSULATION SHEET (MU)	1
MP53	8930083180	SPONGE (LG)	1
MP54	8930083370	3340 FERRITE SHEET	[CHN] 2
	8930083370	3340 FERRITE SHEET	[EUR-1] 2
	8930083370	3340 FERRITE SHEET	[EUR] 2
	8930083370	3340 FERRITE SHEET	[UK] 2
	8930083370	3340 FERRITE SHEET	[FRG] 2
	8930083370	3340 FERRITE SHEET	[HOL] 2

## [MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J251*	6510021901	BM02B-ASRS-TF (LF) (SN)	1
J601*	6510027970	LGP2631-0200FC	1
J602*	6510009351	B2B-ZR (LF) (SN)	1
DS246*	5030003400	TAK-35920 FX3340 <ITAK>	1
DS247*	5040003560	RT3-234HRH16T-BNS <ROD>	1
MC250*	7700002710	EM6027P-46C33-G <HOR>	1
S250*	2260001900	SW-149 (SKHLLD)	1
EP360	8930082550	SRCN-3340-SP-N-W (SHJ)	1
MP20*	8510014940	2601 VCO CASE Y641	1
MP21*	8510014950	2601 VCO COVER Y642	1
MP22*	6910014760	OG-503040	[CHN] 1
	6910014760	OG-503040	[EUR-1] 1
	6910014760	OG-503040	[EUR] 1
	6910014760	OG-503040	[UK] 1
	6910014760	OG-503040	[FRG] 1
	6910014760	OG-503040	[HOL] 1
MP360	8210026950	3340 REFLECTOR	1
MP361	8930082580	3340 LCD HOLDER Y1232	1
MP362	8930080490	THERMAL SHEET (BU) TC200HSV1.4 (6.8X14)	1
MP363	8930082620	3340 WHITE SHEET	1

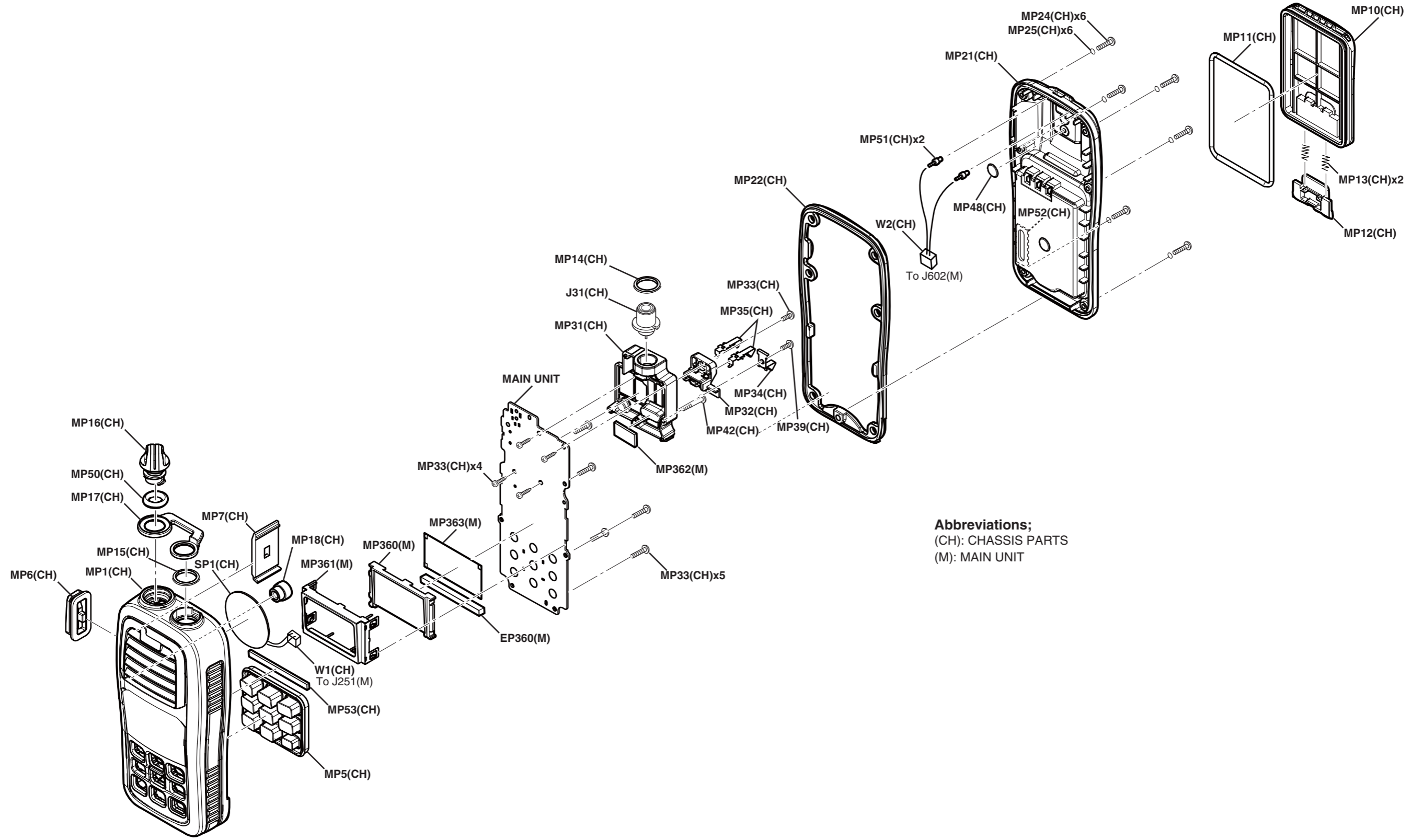
## [ACCESSORIES]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	(Optional)	FA-SC58V-1	1
EP2	(Optional)	BC-199SA	[USA] 1
	(Optional)	BC-199SE	[EXP] 1
	(Optional)	BC-199SE	[CHN] 1
	(Optional)	BC-199SE	[EUR-1] 1
	(Optional)	BC-199SE	[EUR] 1
	(Optional)	BC-199SE	[FRG] 1
	(Optional)	BC-199SE	[HOL] 1
	(Optional)	BC-199SV	[AUS] 1
EP4	(Optional)	BP-266	1
EP6	6910018620	BLACK HANDY STRAP <TOM>	1
MP2	(Optional)	MB-124	1



\*: Refer to "BOARD LAYOUTS" for the location.

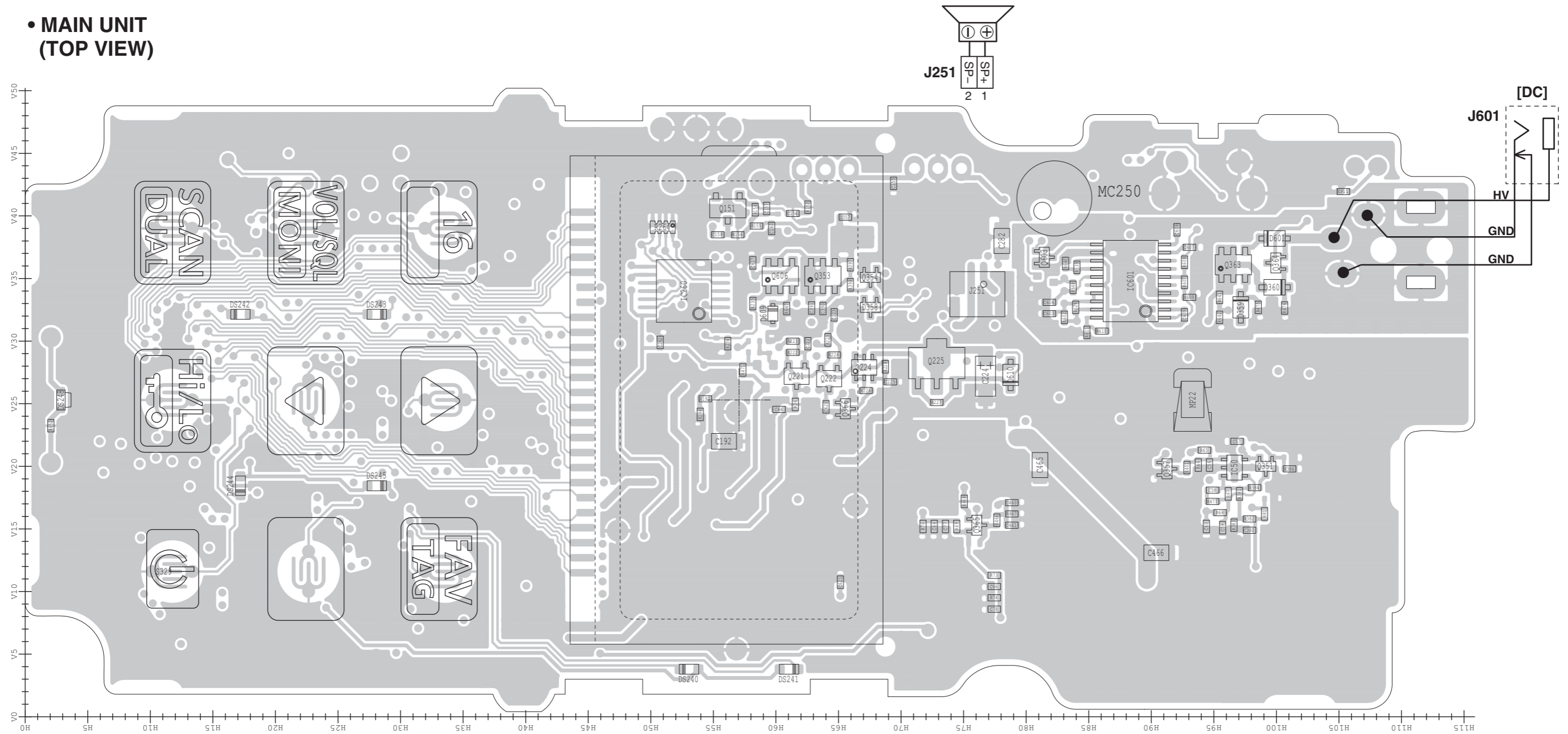
**Screw abbreviations** A, B0, BT: Self-tapping PH: Pan head ZK: Black NI-ZU: Nickel-Zinc SUS: Stainless



**Abbreviations;**  
 (CH): CHASSIS PARTS  
 (M): MAIN UNIT

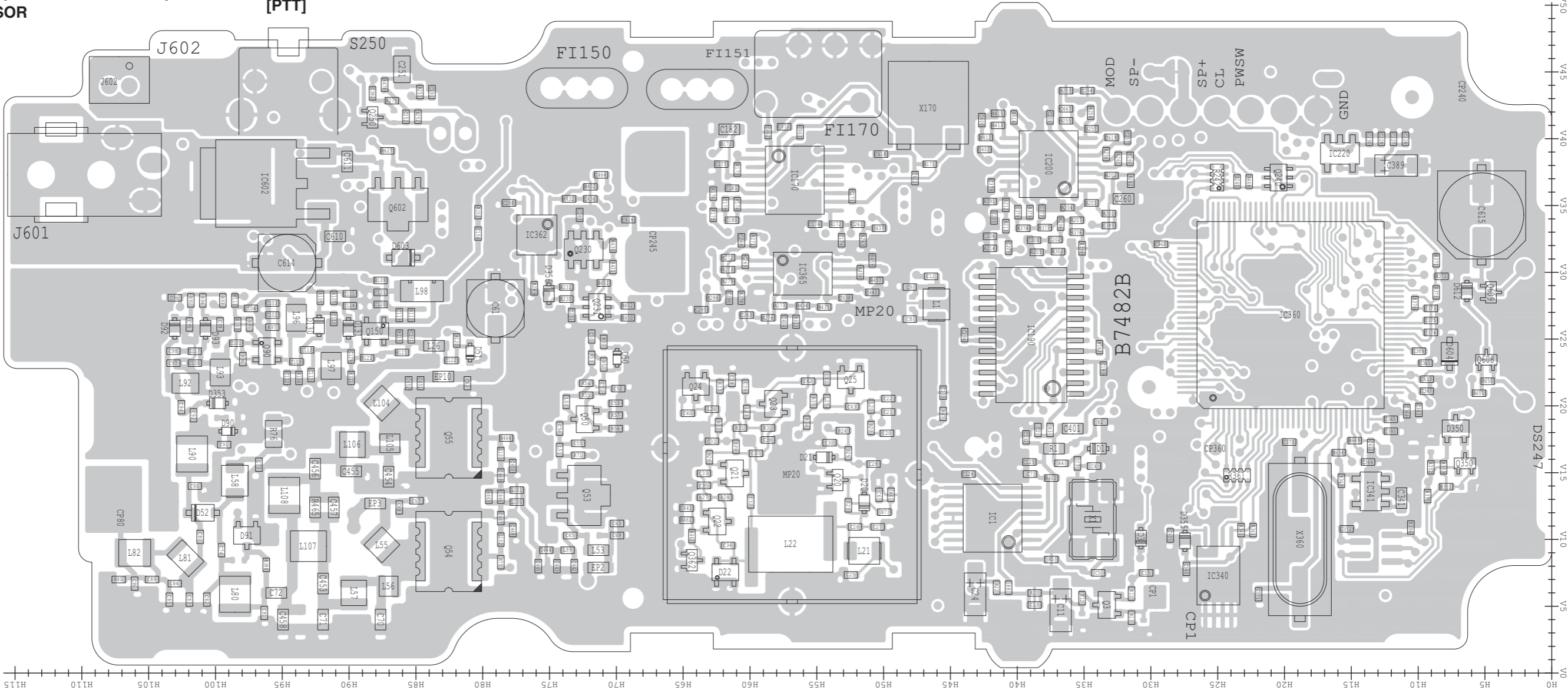
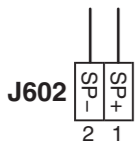
The combination of this page and next page shows the top side and bottom side of actual P.C. board.

• MAIN UNIT  
(TOP VIEW)



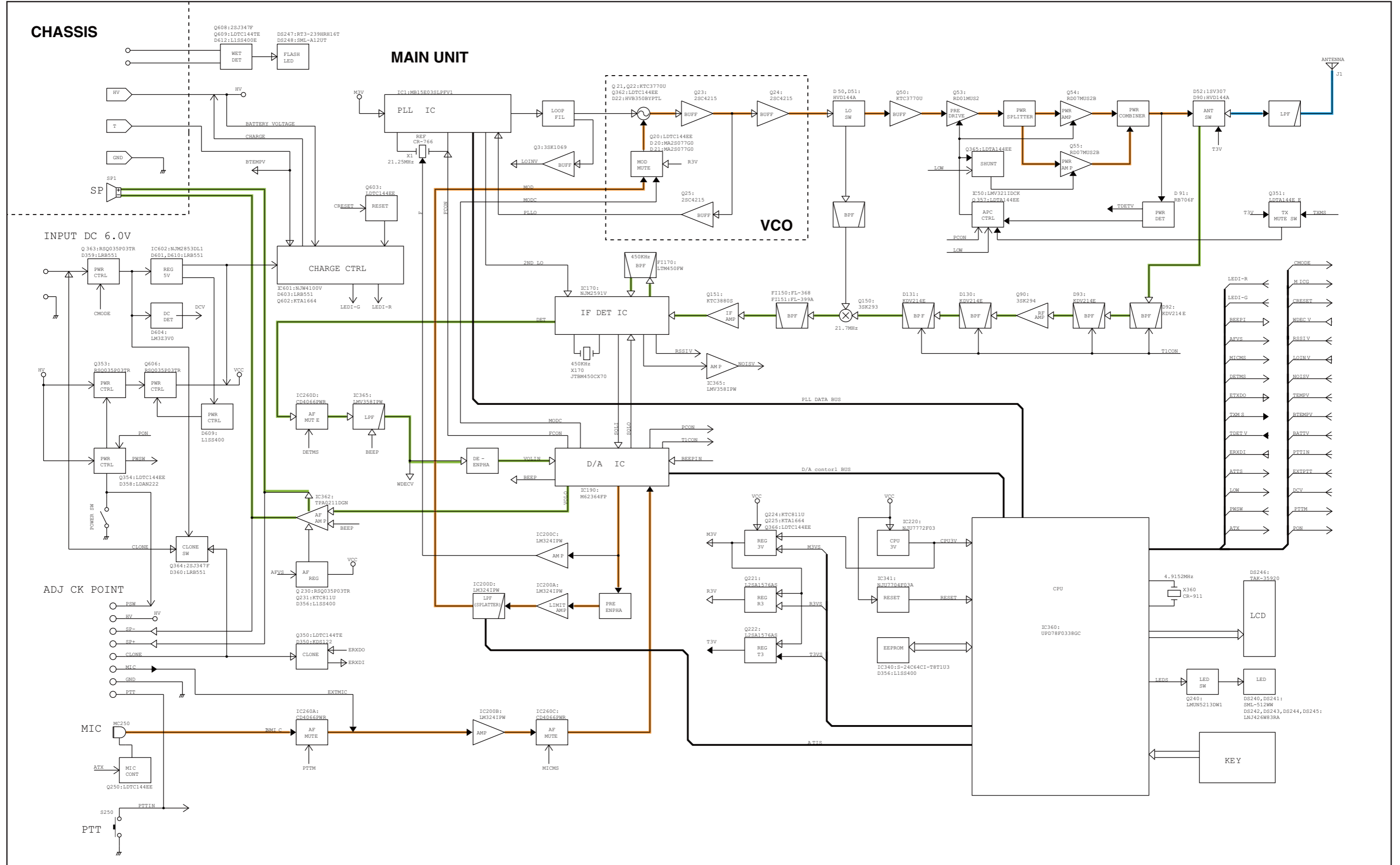
• MAIN UNIT  
(BOTTOM VIEW)

WET SENSOR



SECTION 9

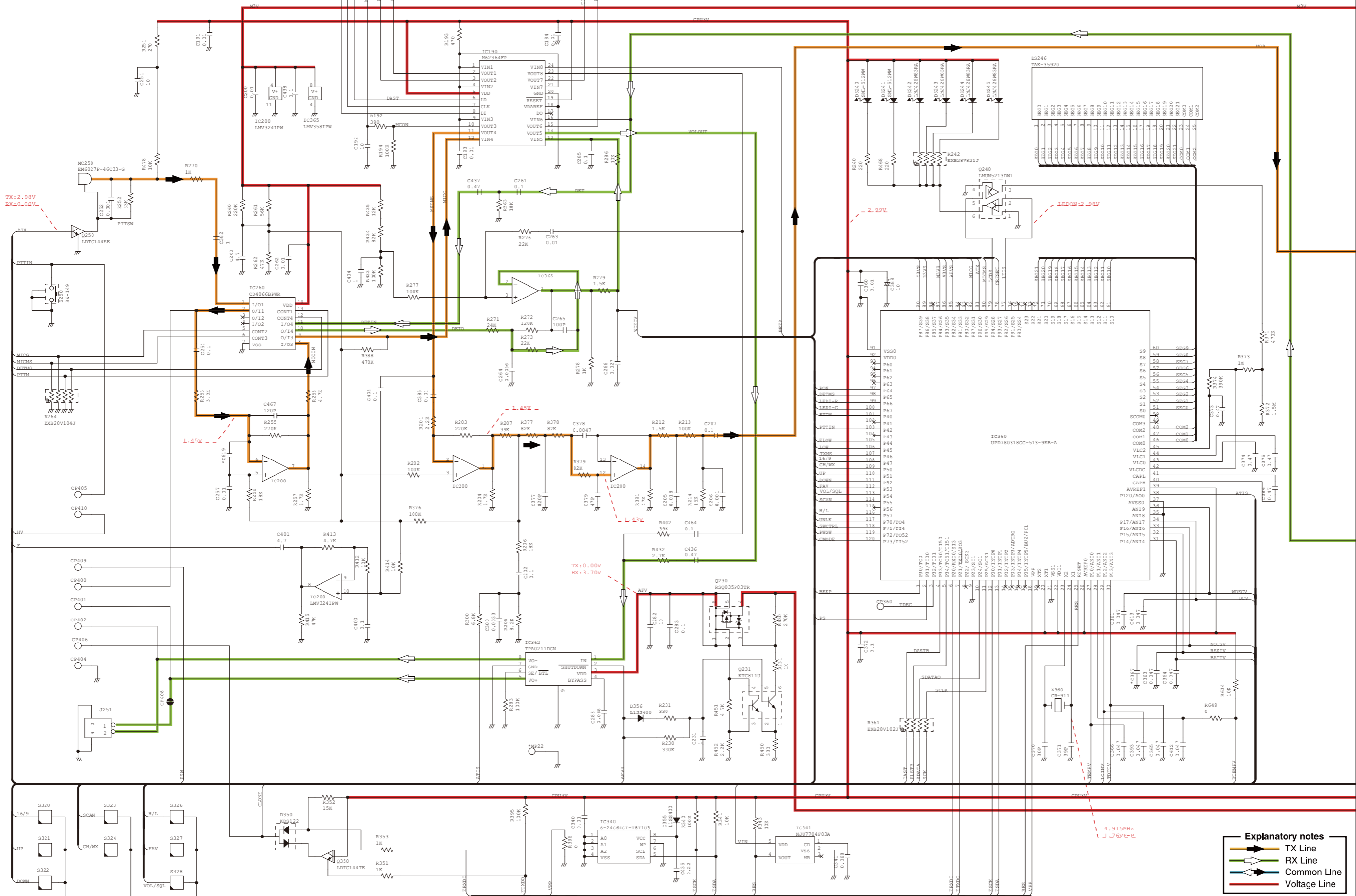
BLOCK DIAGRAM



# SECTION 10

# VOLTAGE DIAGRAM

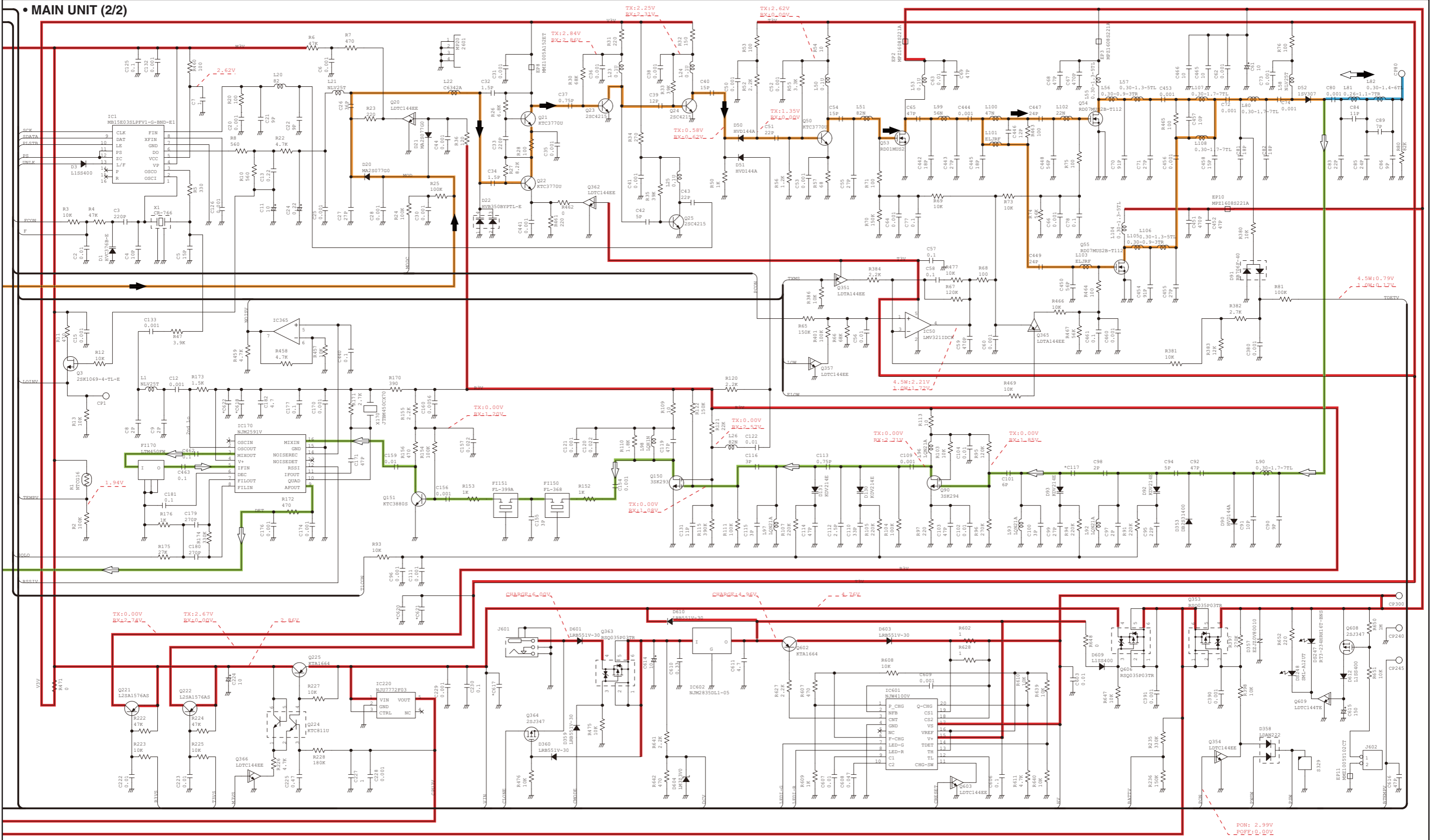
• MAIN UNIT (1/2)



\*: Refer to the PARTS LIST for the value and name of component.



• MAIN UNIT (2/2)



**Explanatory notes**

- TX Line
- RX Line
- Common Line
- Voltage Line

\*: Refer to the PARTS LIST for the value and name of component.

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