

Feb. 2010



SERVICE MANUAL ADDENDUM

IC-V80 IC-V80E

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PARTS LIST	1
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SERVICE MANUAL

VHF TRANSCEIVER

IC-V80
IC-V80E

S-14618XZ-C1
Nov. 2009

Icom Inc.

INTRODUCTION

This service manual describes the latest technical information for the **IC-V80/IC-V80E** VHF TRANSCEIVER, at the time of publication.

MODEL	VERSION	SUPPLIED BATTERY PACK	SUPPLIED BATTERY CHARGER
V80	USA	BP-263	-
	EXP		
	USA-11	BP-264	BC-191
	AUS-21		
	EXP-11		
	EXP-21		
	USA-12		
	KOR-02		
	AUS-22	BP-265	BC-192
	EXP-12		
	EXP-22		
	USA-13		
	AUS-23	BP-265	BC-193
	EXP-13		
EXP-23			
V80E	EUR	BP-263	-
	CHN	-	
	EUR-21	BP-264	BC-191
	UK-01		
	EUR-22		
	UK-02	BP-265	BC-192
	EUR-23		
	UK-03		

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

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>

1130008351 LV2105V-TLM-E IC-V80 MAIN UNIT 5 pieces
 8210026120 3254 FRONT PANEL IC-V80E CHASSIS 10 pieces

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



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.

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 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 coverage : (unit: MHz)

Version	TX	RX
U.S.A. AUS	144–148	136–174*
CHN EXP	136–174*	136–174*
EUR UK KOR	144–146	144–146

* Guaranteed: Only 144–148 MHz range

- Mode : FM, FM-N
- Number of memory channels : 207
(incl. 6 scan edges and 1 Call channel)
- Usable temperature range : -20°C to $+60^{\circ}\text{C}$; -4°F to $+140^{\circ}\text{F}$
- Tuning steps : 5, 10, 12.5, 15, 20, 25, 30 and 50 kHz
- Frequency stability : ± 2.5 ppm
(-20°C to $+60^{\circ}\text{C}$; -4°F to $+140^{\circ}\text{F}$)
- Power supply : Icom specified battery pack/case
- Current drain (at 7.2 V DC: typical)
 - Transmit at 5.5 W (High) : 1.4 A
 - at 2.5 W (Mid.) : 0.9 A
 - at 0.5 W (Low) : 0.6 A
 - Receive standby : 65 mA
 - power save : 20 mA
 - max. audio : 310 mA (internal speaker)
180mA (external speaker)
- Antenna connector : BNC (50 Ω)
- Dimensions : 58(W) \times 112(H) \times 30(D) mm;
(projections not included) $2\frac{9}{32}$ (W) \times $4\frac{13}{32}$ (H) \times $1\frac{3}{16}$ (D) in
- Weight (approx.)
(without battery pack/case and ant.) : 140 g; 4.9 oz

■ Transmitter

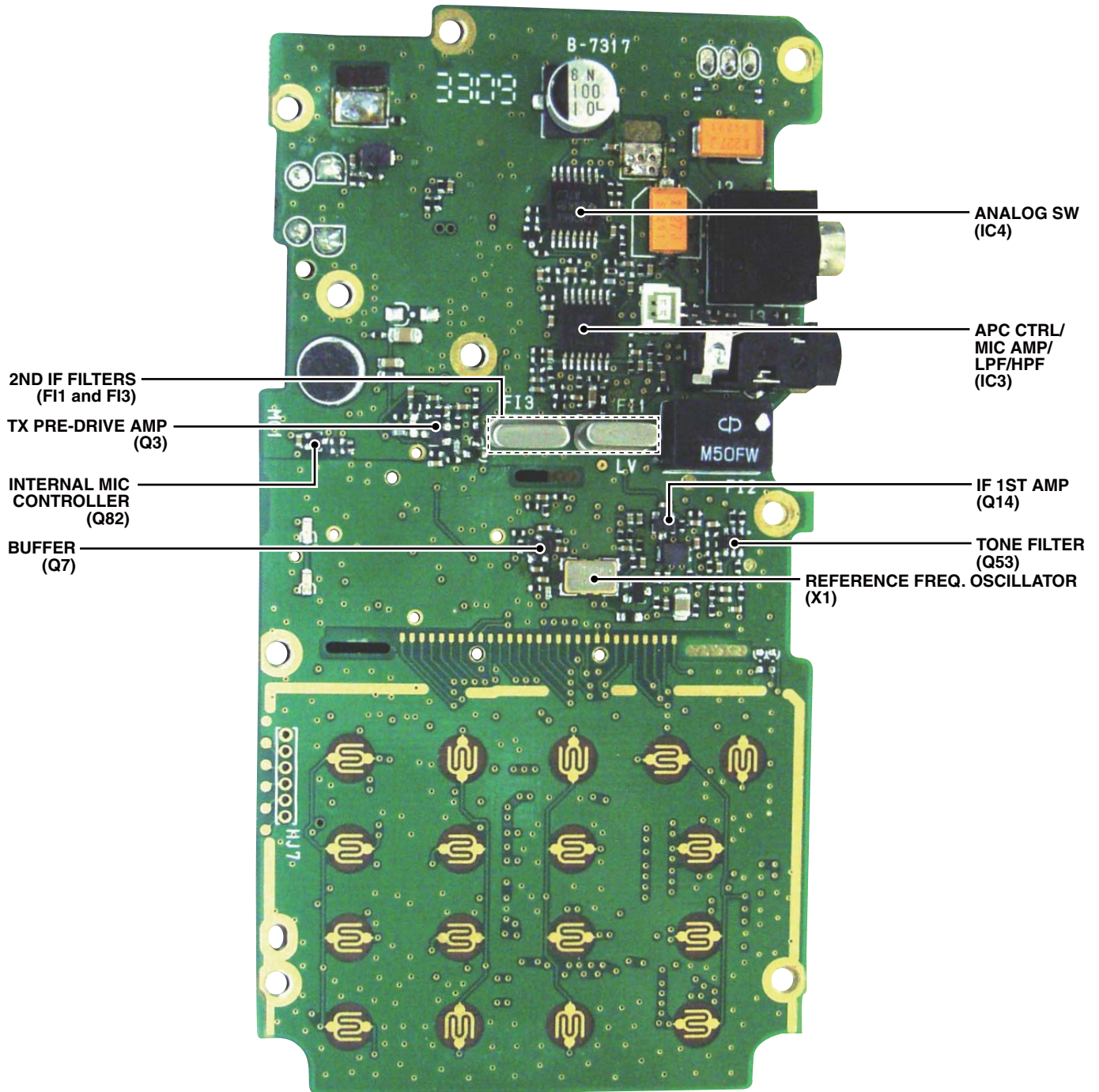
- Modulation system : Variable reactance freq. modulation
- Output power (at 7.2 V DC) : High 5.5 W, Mid. 2.5 W, Low 0.5 W.
- Max. frequency deviation : FM (wide) ± 5.0 kHz
FM (narrow) ± 2.5 kHz
- Spurious emissions : Less than -60 dBc
- External mic. connector : 3-conductor 2.5 (d) mm ($\frac{1}{16}$ "/2.2 k Ω)

■ Receiver

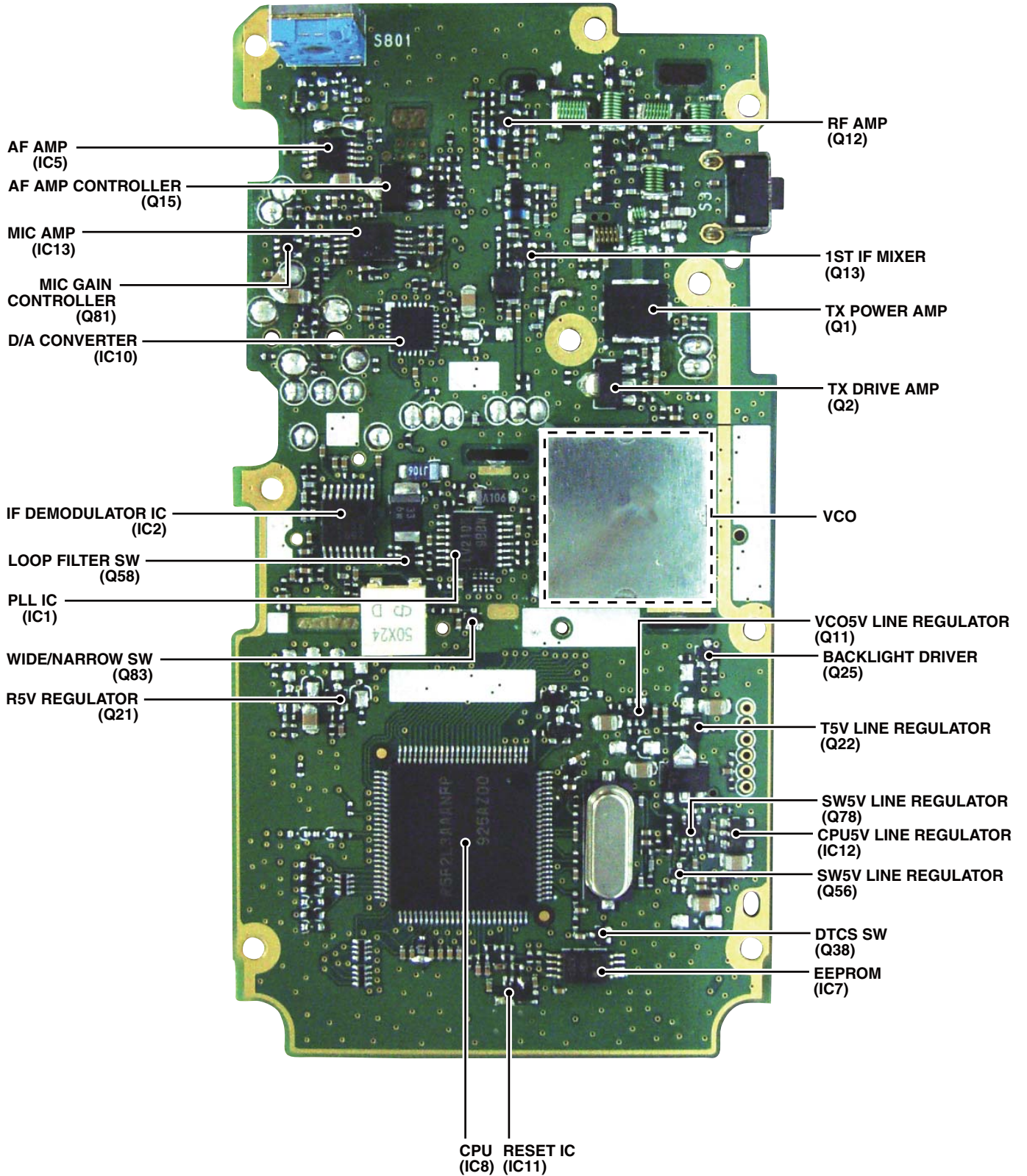
- Receive system : Double-conversion superheterodyne
- Intermediate frequencies : 1st: 21.7 MHz, 2nd: 450 kHz
- Sensitivity (at 12 dB SINAD) : -0.14 μV typ.
- Squelch sensitivity (threshold) : -0.1 μV typ.
- Selectivity : FM (wide) 70 dB typ.
FM (narrow) 50 dB typ.
- Spurious and image rejection : 75 dB typ.
- Intermodulation : FM (wide) 70 dB typ.
FM (narrow) 65 dB typ.
- Audio output power (at 10% distortion)
 - Internal speaker : 0.75 W typ. with a 16 Ω load
 - External speaker : 0.45 W typ. with a 8 Ω load
- External speaker connector : 3-conductor 3.5(d) mm; ($\frac{1}{8}$ "/8 Ω)

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

• MAIN UNIT
(TOP VIEW)



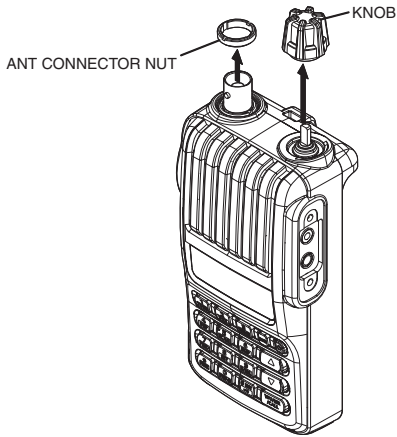
• MAIN UNIT
(BOTTOM VIEW)



SECTION 3 DISASSEMBLY INSTRUCTION

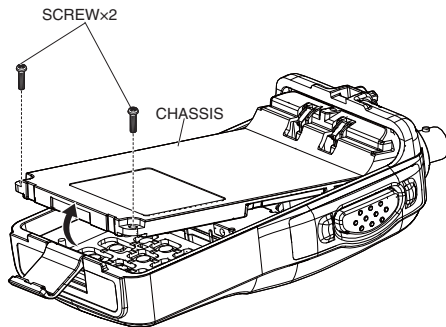
1. REMOVING THE CHASSIS

1) Remove the ANT connector nut and knob.



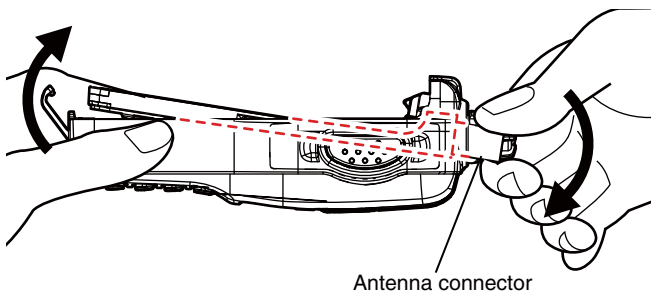
2) Remove 2 screws from the bottom of the CHASSIS.
3) Lift the bottom of the CHASSIS up in the direction of the arrow.

BE CAREFUL to not pull out the **speaker wire** when separating the CHASSIS and the FRONT PANEL.

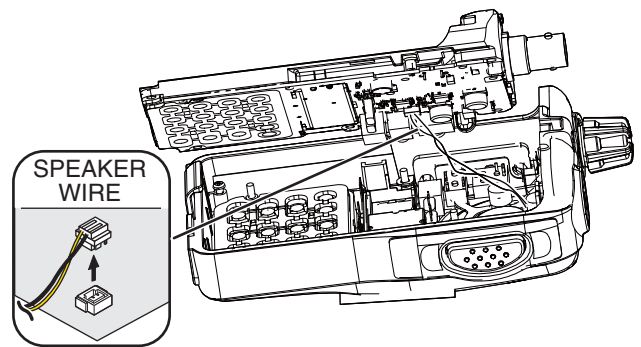


For easy separation of the CHASSIS

Use the antenna connector as the grip to GENTLY lift the bottom of the CHASSIS up slightly.

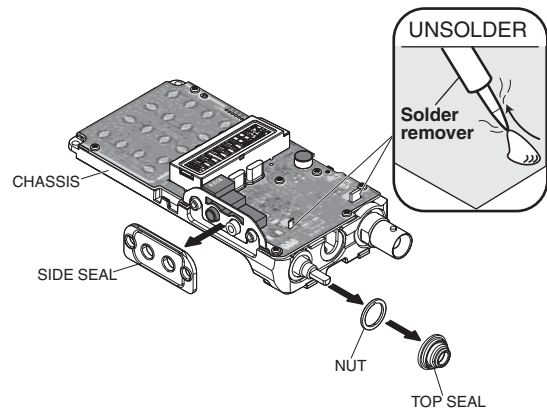


4) CAREFULLY lift the chassis out of the FRONT PANEL and turn it over in order to unplug the speaker wire.

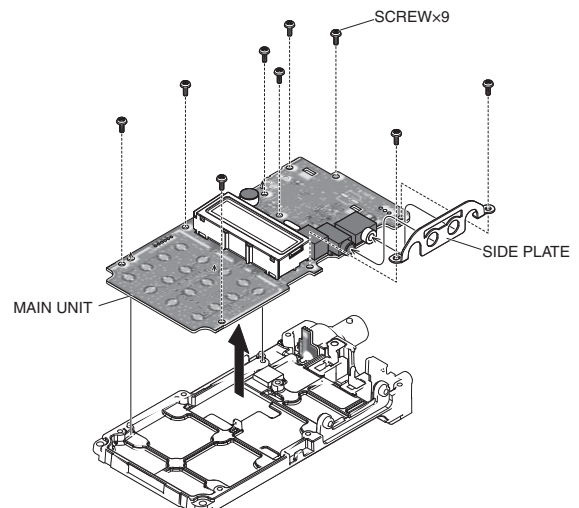


2. REMOVING THE MAIN UNIT

1) Remove the top seal, side seal and nut from the CHASSIS.
2) Unsolder the 2 points shown.



3) Remove the 9 screws and the side plate from the MAIN UNIT.



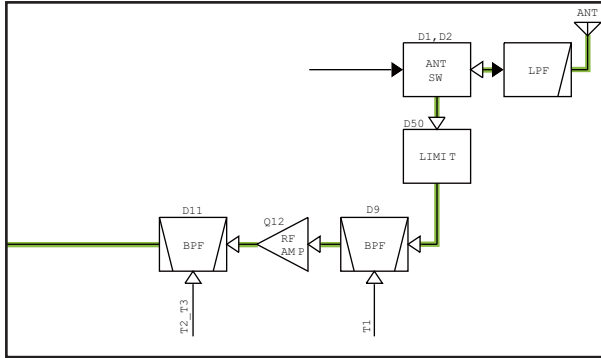
(Continued to the right above)

4-1 RECEIVER CIRCUITS

RF CIRCUITS

The RX signal from the antenna is passed through the LPF, antenna SW (D1 and D2) and limiter (D50), then filtered by the tuned BPF (D9). The filtered RX signal is then applied to the RF AMP (Q12). The amplified RX signal is filtered by another tuned BPF (D11), then applied to the 1st IF circuits.

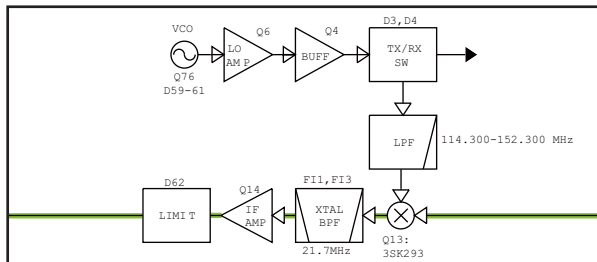
• RF CIRCUITS



1ST IF CIRCUITS

The RX signal from the RF circuits is applied to the 1st IF mixer (Q13), to be mixed with the 1st local oscillator (LO) signal generated by the VCO (Q76, D59–D61), resulting in the 21.7 MHz 1st IF signal. The 1st IF signal is filtered by the 1st IF filter (crystal filter; F11 and F13) to remove unwanted signal, and applied to the 1st IF AMP (Q14). The amplified 1st IF signal is applied to the 2nd IF circuit via the limiter (D62).

• 1ST IF CIRCUITS



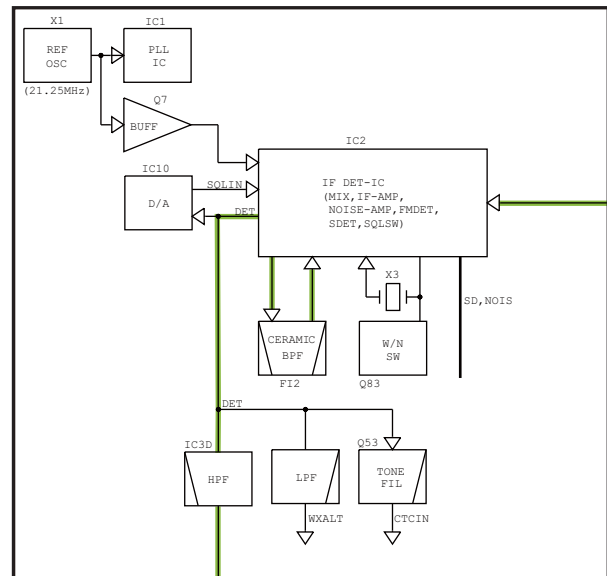
2ND IF CIRCUITS AND DEMODULATOR

IC2 is the IF demodulator IC which contains the 2nd IF mixer, 2nd IF AMP, FM detector, etc. in its package.

The signal from the 1st IF circuits is applied to the 2nd IF mixer, to be mixed with the 2nd LO signal generated by the reference frequency oscillator, resulting in the 450 kHz 2nd IF signal. The 2nd IF signal is filtered by the external 2nd IF filter (ceramic filter; F12) to remove any unwanted signal, and applied to the 2nd IF AMP. The amplified 2nd IF signal is applied to the frequency demodulator circuit.

The demodulated AF signal is applied to the RX AF circuits.

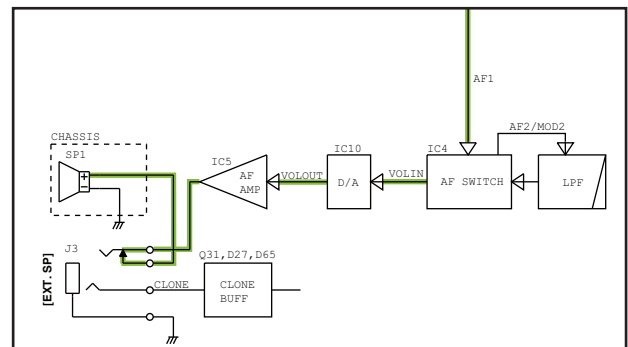
• 2ND IF CIRCUITS



RX AF CIRCUITS

The demodulated AF signal from the IF demodulator IC (IC2) is passed through the HPF (IC3D), which separates the voice and tone signals, AF line SW (IC4), and then adjusted in level by the D/A converter (IC10). The level-adjusted AF signal is applied to the AF power AMP (IC5). The power-amplified AF signal is applied to the internal speaker or to an external speaker.

• RX AF CIRCUITS



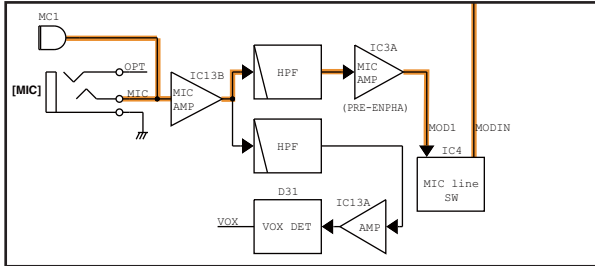
4-2 TRANSMITTER CIRCUITS

TX AF CIRCUITS

The audio signal from the internal or external microphone (MIC signal) is applied to the MIC AMP (IC13B). The amplified MIC signal is passed through the HPF (R266, C132, C304) and the MIC AMP with pre-emphasis circuitry (IC3A). The pre-emphasized MIC signal is passed through the MIC line SW (IC4), and applied to the D/A converter (IC10).

The level-adjusted MIC signal is applied to the modulation circuits as the modulation signal.

• TX AF CIRCUITS

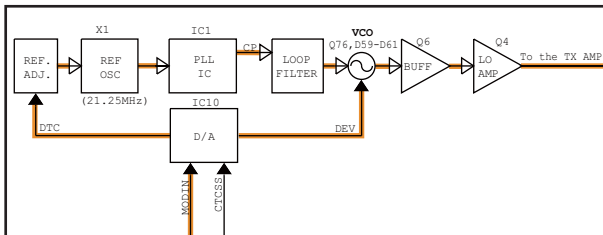


MODULATION CIRCUITS

The modulation signal from the TX AF circuits are applied to the VCO to frequency modulate it.

The frequency modulated VCO output is amplified by the buffer (Q6), amplified by the LO AMP (Q4), then applied to the TX amplifier circuits via the LO SW (D3 and D4) as the TX signal.

• MODULATION CIRCUITS

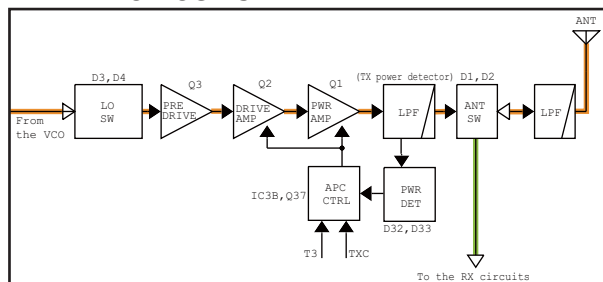


TX AMPLIFIER CIRCUITS

The TX signal from the VCO is amplified by the pre-drive AMP (Q3), drive AMP (Q2) and power AMP (Q1) in sequence, to obtain the TX output power.

The power-amplified TX signal is fed to the antenna through the LPFs and antenna SW (D1 and D2).

• TX AMP CIRCUITS



4-3 FREQUENCY SYNTHESIZER CIRCUITS

The oscillation frequency of the VCO is determined by the variable capacitors (D59 and D60). While transmitting, D58 is ON, and C461 and C462 provide the RF path to GND. This shifts the oscillating frequency range higher. Adding modulation signal to D61 provides frequency modulation.

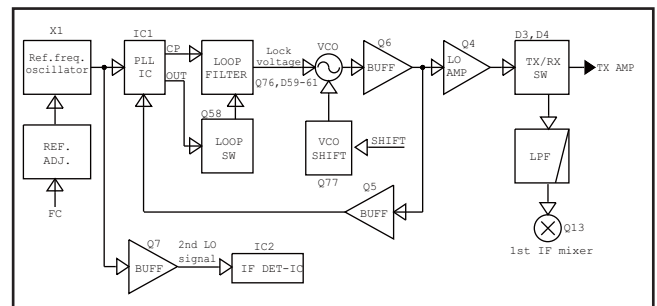
The output signal of the VCO is passed through the buffer AMP (Q6), and applied to the buffer AMP (Q5: for PLL feedback) or the buffer AMP (Q4: LO AMP).

The output signal of the buffer AMP (Q5: for PLL feedback) is applied to the PLL IC (IC1). The applied signal is phase-compared with the reference frequency signal from the TCXO (X1), and the resulting signal is output from the PLL IC via the charge pump, and then applied to the VCO as the lock voltage, after being passed through the loop filter.

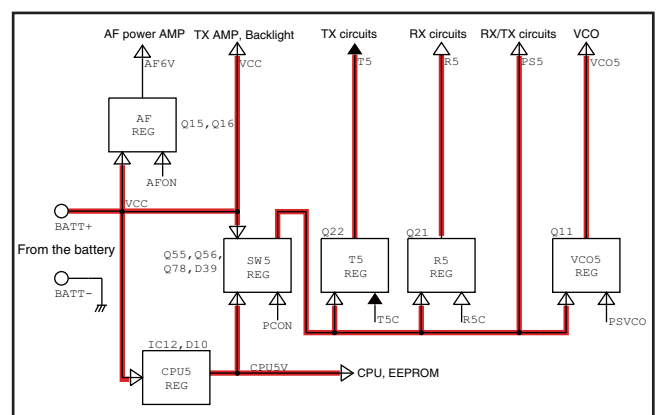
Q58 shifts the characteristic of the loop filter for shorter PLL lockup time when the transceiver needs to lock the PLL up immediately.

The VCO's power supply circuit (Q11), which works as a ripple filter, has the capability of fast ON/OFF switching operation that works even when the transceiver is in the power save mode.

• FREQUENCY SYNTHESIZER CIRCUITS



4-4 VOLTAGE BLOCK DIAGRAM



4-5 PORT ALLOCATIONS

• CPU (IC8)

Pin No.	LINE NAME	DESCRIPTION	I/O
1	MMUT	MIC mute switching. L=MIC mute.	O
3	TONE	DTMF/1750 Hz tones and beep sounds.	O
4	CTCOUT	CTCSS/DTCS signals.	O
10	RESET	CPU reset signal. H=The CPU is reset.	I
15	CSHIFT	CPU clock shift control. H=While the oscillation frequency is shifted.	O
17	DUSE	DTCS filter switching. H=while the DTCS is in use.	O
18	UNLK	PLL unlock detect. H=While the PLL circuit is unlocked.	I
19	NOIS	Noise signal.	I
22	POWER	[POWER] key input.	I
23	PTT	External PTT input. H=An external PTT is pushed.	I
24	SHIFT	VCO oscillation frequency shift control. L=While receiving.	O
25	PSVCO	Power supply line for the VCO switching. H=While the VCO is activated.	O
26	PS5C	Power supply line "PS5" switching. L=While the transceiver is in the power save mode.	O
27	R5C	Power supply line "R5" switching. L=While receiving.	O
28	T5C	Power supply line "T5" switching. L=While transmitting.	O
29	TXC	Transmitting control. L=TX mute.	O
30	PCON	Power supply line "SW5V" switching. H=While transceiver's power is ON.	O
62	NWC	Discriminator dumping resistor switching. H=While receiving in the wide mode.	O
63	INTPTT	Internal PTT input. L=[PTT] is pushed.	I
64	ITNMIC	Internal microphone control.	O
65	MIC2	Microphone gain control. H=MIC gain "L."	O
66	MIC1	Microphone gain control. H=MIC gain "M."	O
67	LEDC	LCD backlight control. H=Backlight ON.	O
68	DICK	CONTROL DIAL [VOL] inputs.	I
69	DIUD		
71-74	KS0-KS3	Keypad scanning signal outputs.	O
75-77	KR0-KR3	Keypad inputs.	I

Pin No.	LINE NAME	DESCRIPTION	I/O
80	VOX	Microphone voice input detect.	I
81	VIN	Remaining battery voltage.	I
83	TEMP	The temperature sensing voltage.	I
84	SD	RSSI from the IF demodulator IC (IC2, pin 13).	I
85	CTCIN	CTCSS/DTCS signals.	I
86	WXALT	Weather alert detect.	I
87	DASTB	D/A converter strobe.	O
88	PLLSTB	PLL strobe.	O
89	DATA	Common serial data.	O
90	CK	Common serial clock.	O
94	ESCK	Clock to the EEPROM.	O
95	ESDA	Serial data to/from the EEPROM.	I/O
98	SPMUTE	Speaker output control. H=Speaker mute.	O
99	AFON	AF power AMP control. L=The AF power AMP is deactivated.	O
100	RMUT	RX AF line mute switching. L=AF mute.	O

• D/A CONVERTER (IC10)

Pin No.	LINE NAME	DESCRIPTION	I/O
23	T1	Tuned BPF (D9) tuning voltage.	O
24	T2	Tuned BPF (D11) tuning voltage.	O
7	T3	• While receiving: BPF tuning voltage. • While transmitting: TX power control reference voltage.	O
8	FC	Reference frequency adjust voltage.	O
10	DET	Squelch threshold level adjustment.	I
11	SQL		O
12	DTC	DTCS deviation adjustment.	O
13	MODIN		I
18	MODIN	FM deviation adjustment.	I
19	DEV		O
20	VOLOUT	Audio output power adjustment.	O
21	VOLIN		I

SECTION 5 ADJUSTMENT PROCEDURE

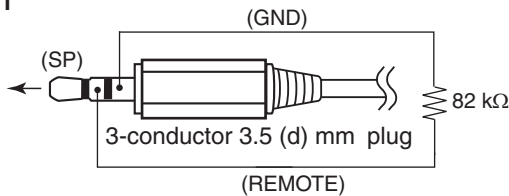
5-1 PREPARATION

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
Power supply	Voltage range : 1–12 V DC Current capacity : 3 A	JIG cables	(See the illust shown below)
RF power meter (50 Ω terminated)	Measuring range : 0.1–10 W Frequency range : 100–300 MHz SWR : Less than 1.2 : 1	Frequency counter	Frequency range : 0.1–300 MHz Frequency accuracy : ±0.5 ppm or better Input level : Less than 1 mW
Modulation Analyzer	Frequency range : 0.1–300 MHz Measuring range : 0 to ±10 kHz	Standard signal generator (SSG)	Frequency range : 0.1–300 MHz Output level : –20 dBμ to 90 dBμ (–127 to –17 dBm)
AC millivolt meter	Measuring range : 10 mV to 10 V	Attenuator	Power attenuation : 30 dB Capacity : More than 10 W
Voltmeter	Measuring range : 1–12 V	Audio generator (AG)	Frequency range : 300–3000 Hz Output level : 1–500 mV

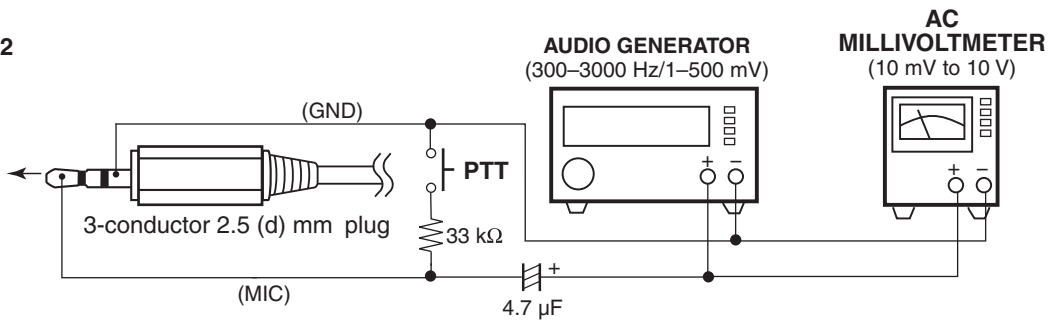
CAUTION! BACK UP the originally programmed memory data in the transceiver before starting adjustment.
When the adjustment is finished, the memory data may be cleared.

JIG CABLE

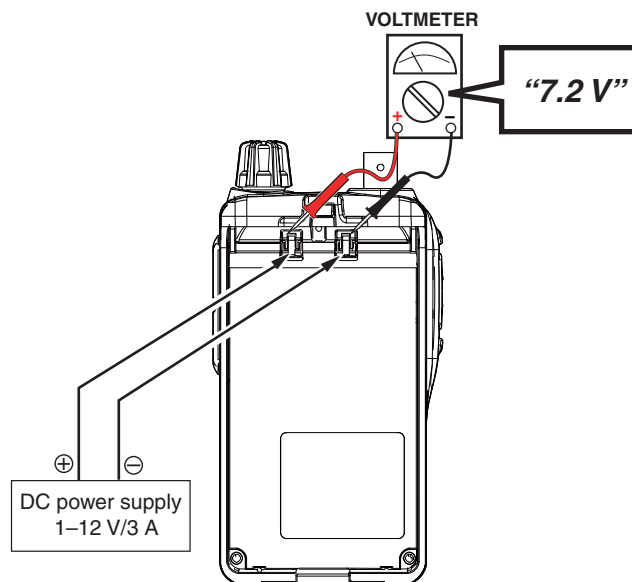
JIG cable #1



JIG cable #2

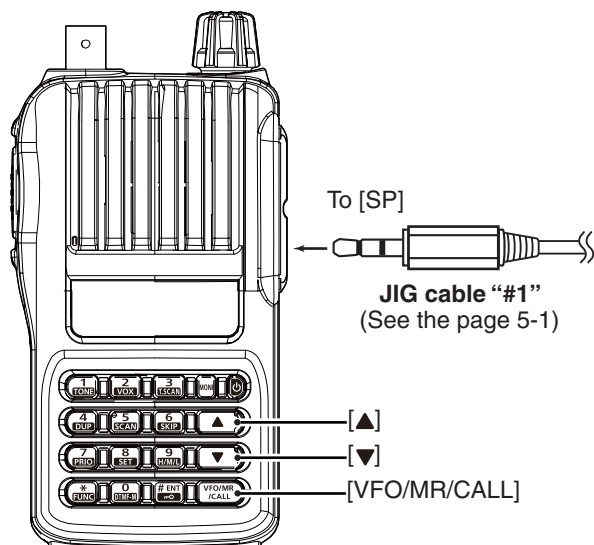


POWER SUPPLY

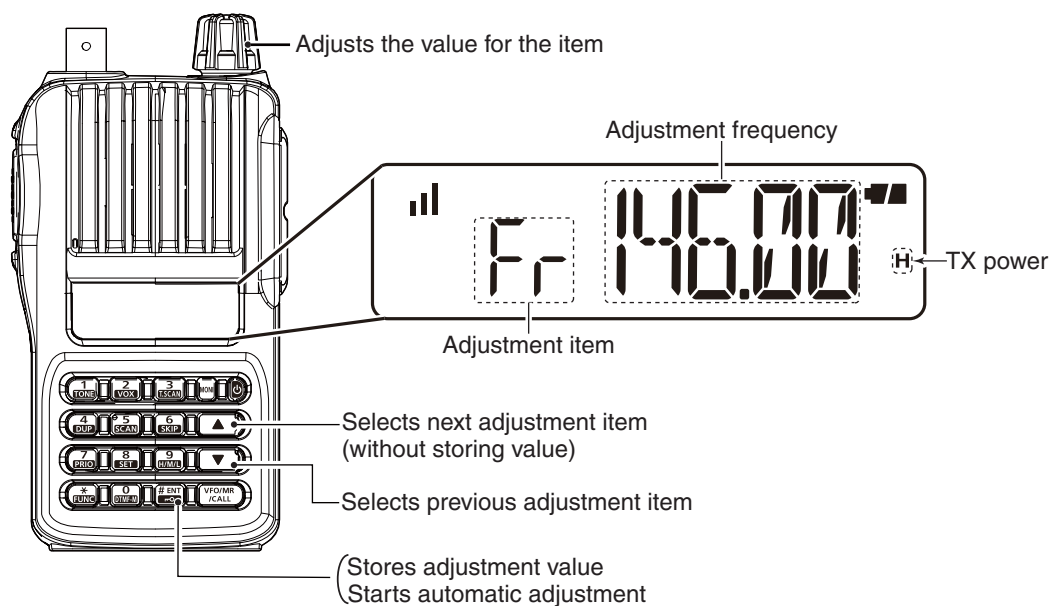


ENTERING ADJUSTMENT MODE

- 1) Turn the power OFF.
- 2) Connect the JIG cable "#1" (See the page 5-1) to the [SP] jack.
- 3) While pushing [▲], [▼] and [VFO/MR/CALL], turn the power ON.



KEY ASSIGNMENTS FOR THE ADJUSTMENT MODE



QUITTING ADJUSTMENT MODE

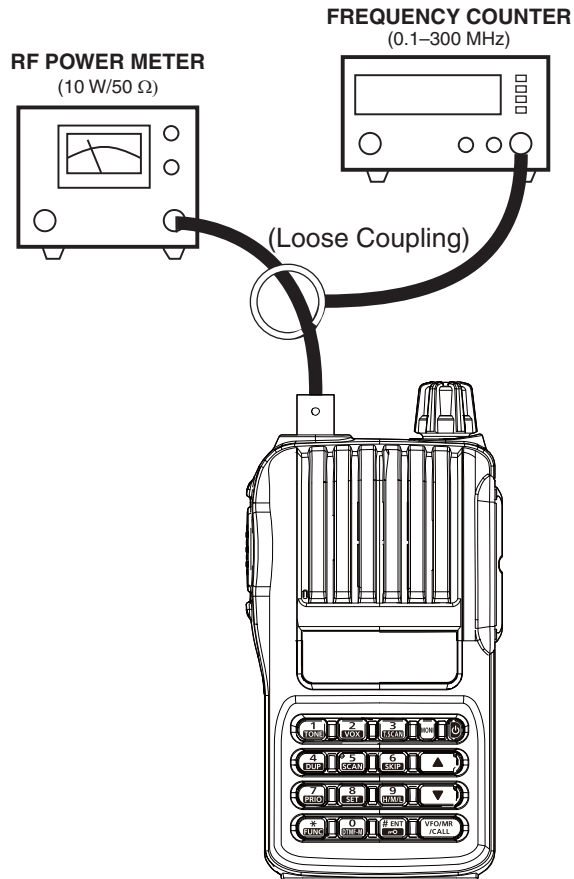
- 1) Turn the power OFF.
- 2) Disconnect the JIG cable "#1," then turn the power ON.

5-2 FREQUENCY ADJUSTMENT

- 1) Select an adjustment item using [▲]/[▼].
- 2) Set or modify the adjustment value as specified using [DIAL], then push [ENT].

ADJUSTMENT	TRANSCEIVER'S CONDITION	OPERATION	ADJUSTMENT ITEM	VALUE
REFERENCE FREQUENCY	1 <ul style="list-style-type: none"> • Frequency : 146.000 MHz • Transmitting 	<ul style="list-style-type: none"> • Loosely couple a frequency counter to the antenna connector. 	Fr	146.0000 MHz (±100 Hz)

■ CONNECTION



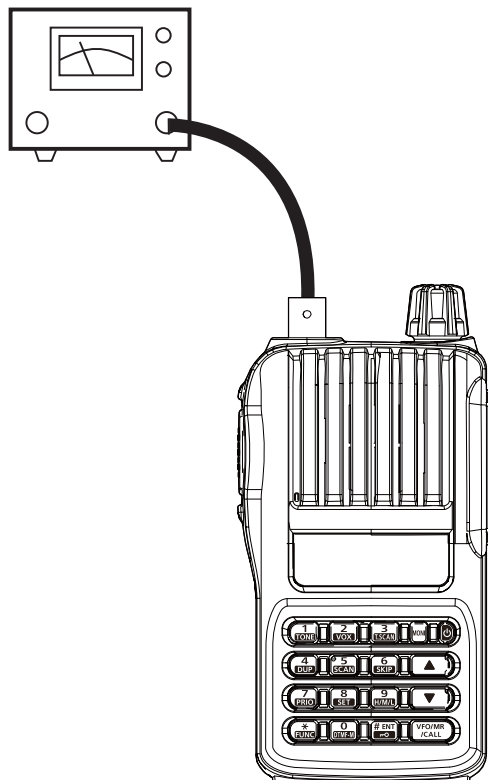
5-3 TRANSMIT ADJUSTMENTS

- 1) Select an adjustment item using [**▲**]/[**▼**].
- 2) Set or modify the adjustment value as specified using [**DIAL**], then push [**ENT**].

ADJUSTMENT	TRANSCEIVER'S CONDITION	OPERATION	ADJUSTMENT ITEM	VALUE
TX OUTPUT POWER (Hi power)	1 • Frequency : 146.000 MHz • Transmitting	• Connect an RF power meter to the antenna connector.	$P_{O\ H}$	5.3–5.7 W
(Mid power)	2 • Transmitting		$P_{O\ M}$	2.3–2.7 W
(Low power)	3 • Transmitting		$P_{O\ L}$	0.4–0.6 W

■ CONNECTION

RF POWER METER
(10 W/50 Ω)



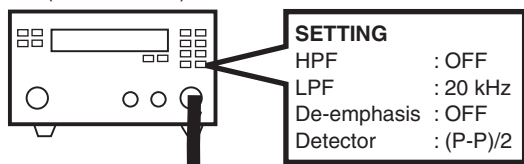
5-3 TRANSMIT ADJUSTMENTS (continued)

- 1) Select an adjustment item using [▲]/[▼].
- 2) Set or modify the adjustment value as specified using [DIAL], then push [ENT].

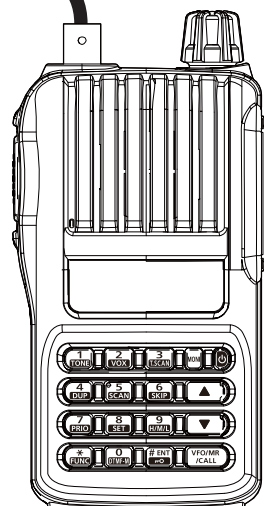
ADJUSTMENT	TRANSCEIVER'S CONDITION	OPERATION	ADJUSTMENT ITEM	VALUE	
FM DEVIATION (Band low)	1	<ul style="list-style-type: none"> • Frequency : 144.000 MHz • Transmitting 	1) Connect a modulation analyzer to the antenna connector through an attenuator, and set it as; HPF : OFF LPF : 20 kHz	±4.1 to ±4.3 kHz	
	(Band high)				2
MODULATION BALANCE (Band low)	1	<ul style="list-style-type: none"> • Frequency : 144.000 MHz • Transmitting 	1) Connect a modulation analyzer to the antenna connector through an attenuator, and set it as; HPF : OFF LPF : 20 kHz2)	±4.1 to ±4.3 kHz	
	(Band high)				2
TONE DEVIATION (CTCSS)	1	<ul style="list-style-type: none"> • Frequency : 146.000 MHz • Transmitting 	1) Connect a modulation analyzer to the antenna connector through an attenuator, and set it as; HPF : OFF LPF : 20 kHz 2) No audio signals are applied.	±0.7 to ±0.8 kHz	
	(DTCS)			2	±0.7 to ±0.8 kHz
	(DTMF)			3	±3.4 to ±3.6 kHz
	(EUROPEAN TONE)			4	±3.4 to ±3.6 kHz

CONNECTION

MODULATION ANALYZER
(0.1–300 MHz)



ATTENUATOR
(30 dB/10 W)








To [MIC]

JIG cable "#2"
(See the page 5-1)

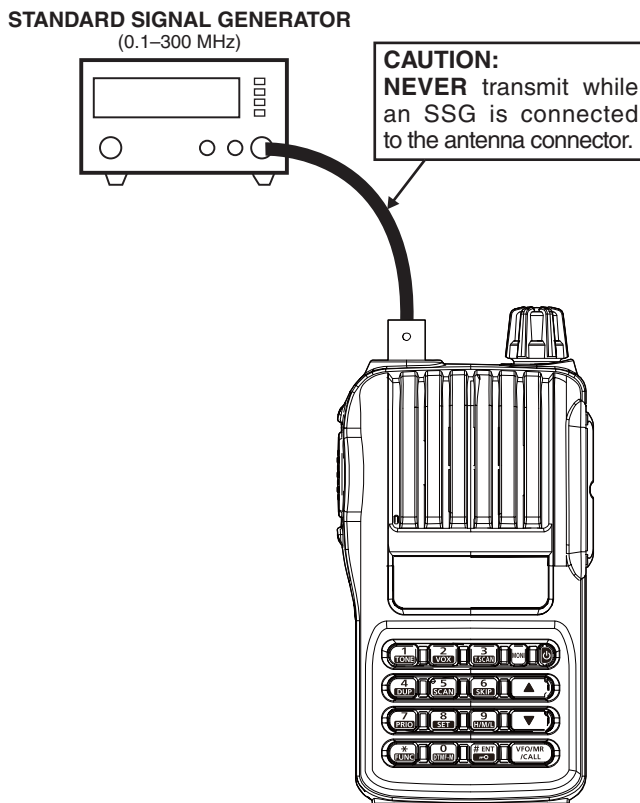
5-4 RECEIVE ADJUSTMENTS

- 1) Select an adjustment item using [**▲**]/[**▼**].
- 2) Set or modify the adjustment value as specified using [**DIAL**], then push [**ENT**].

ADJUSTMENT	TRANSCEIVER'S CONDITION	OPERATION	ADJUSTMENT ITEM	VALUE	
RX SENSITIVITY (Band low)	1	<p>NOTE: When "RX SENSITIVITY" is re-adjusted, "S-METER" must be re-adjusted too.</p> <ul style="list-style-type: none"> • Frequency : 136.020 MHz • Receiving 		Push [ENT] (Automatic adjustment)	
	(Band center)	<ul style="list-style-type: none"> • Frequency : 155.020 MHz • Receiving 			
	(Band high)	<ul style="list-style-type: none"> • Frequency : 173.980 MHz • Receiving 			
SQUELCH (Wide mode)	1	<ul style="list-style-type: none"> • Frequency : 146.020 MHz • Receiving 		Push [ENT] (Automatic adjustment)	
	(Narrow mode)				<ul style="list-style-type: none"> • Receiving
S-METER	1	<p>NOTE: When "RX SENSITIVITY" must be adjusted before "S-METER." And when "RX SENSITIVITY" is re-adjusted, "S-METER" must be re-adjusted too.</p> <ul style="list-style-type: none"> • Frequency : 146.020 MHz • Receiving 		Push [ENT] (Automatic adjustment)	
		<ul style="list-style-type: none"> • Connect an SSG to the antenna connector and set it as; Frequency : 146.020 MHz Level† : -9 dBμ (-116 dBm) Deviation : None 			

†; The output level of the standard signal generator (SSG) is indicated as the SSG's terminated (50 Ω) circuit.

CONNECTION



SECTION 7

MECHANICAL PARTS

[CHASSIS PARTS]

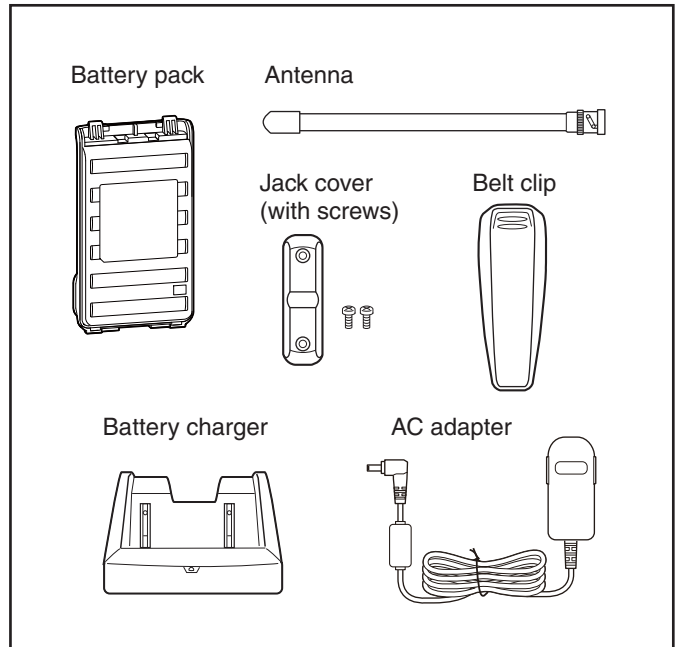
REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510027690	BNC-R170 (A)	1
SP1	2510001550	K036NA511-10	1
W1	8900016360	OPC-1190A	1
EP1	0910066440	B-7318	1
MP1	8010021710	3285 CHASSIS	1
MP2	8930079900	3285 TERMINAL HOLDER	1
MP3	8930080100	3285 PLUS TERMINAL	1
MP4	8210025800	3285 BOTTOM PANEL	1
MP5	8930079890	3285 LOCK PLATE	1
MP6	8930079960	3254 PTT RUBBER	1
MP7	8930079880	3254 PTT BUTTON	1
MP8	8930080150	3285 SIDE SEAL	1
MP9	8930080400	3285 MINUS TERMINAL	1
MP10	8930080090	3285 SIDE PLATE	1
MP11	8930080380	3285 SHAFT	1
MP12	8610009240	KNOB SPRING NO.7800P	1
MP13	8930080650	SP NET (G)	1
MP14	8930046020	1123 SHEET (A)-1	1
MP15	8930080250	3254 MIC SPONGE	1
MP16	8930069710	THERMALLY SHEET (BC)	1
MP17	8830003430	3254 ANT NUT	1
MP18	8830003390	VR NUT (AB)	1
MP19	8210026120	3254 FRONT PANEL (A) (Incl. MP4-7, 11,13, 20)	1
MP19	8210026130	3254 FRONT PANEL (Incl. MP4-7, 11,13, 20) [V80E]	1
MP20	8210025940	3254 PTT PANEL	1
MP21	8310075620	3254 WINDOW PLATE	1
MP22	8610014170	KNOB N-391 (Incl. MP12)	1
MP23	8930080270	3254 WINDOW SHEET	1
MP24	8930080280	3254 TOP SEAL	1
MP25	8930080300	3254 KEYBOARD	1
MP26	8810009511	SCREW BT B0 2X4 NI-ZC3 (BT)	9
MP27	8810009511	SCREW BT B0 2X4 NI-ZC3 (BT)	1
MP28	8810008641	OTAP 1FLAT WASHER B0 2X4 NI-ZC3 (BT)	2
MP29	8810008761	SCREW BT B0 2X8 NI-ZC3 (BT)	2
MP30	8850001950	SEALING WASHER (Y)	1
MP32	8930080240	3254 SP HOLDER	1

[ACCESSORIES]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	3310002840	FA-B2E	1
EP2	(Optional)	BP-264 EXP [EUR-21], [UK-01], [USA-11], [AUS-21], [EXP-11], [EXP-21], [EUR-22], [UK-02], [USA-12], [KOR-02], [AUS-22], [EXP-12], [EXP-22]	1
	(Optional)	BP-265 [EUR-23], [UK-03], [USA-13], [AUS-23], [EXP-13], [EXP-23]	1
EP3	(Optional)	BC-191 EXP Except [EUR], [USA], [CHN], [EXP]	1
EP4	(Optional)	BC-123SE [EUR-21], [EXP-21], [EUR-23], [EXP-23]	1
	(Optional)	BC-123SA [USA-11], [EXP-11], [USA-13]	1
	(Optional)	BC-123SV [AUS-21], [AUS-23]	1
	(Optional)	BC-147SE [EUR-22], [EXP-22]	1
	(Optional)	BC-147SA [USA-12], [EXP-12]	1
	(Optional)	BC-147SV [AUS-22]	1
	(Optional)	BC-123SA [EXP-13]	1
EP5	(Optional)	BP-263 [EUR], [USA], [EXP]	1
MP1	(Optional)	MB-124 Except [CHN]	1
MP2	8210025840	3285 JACK PANEL	1
MP3	8810004861	SCREW PH M2X6 ZK3	2

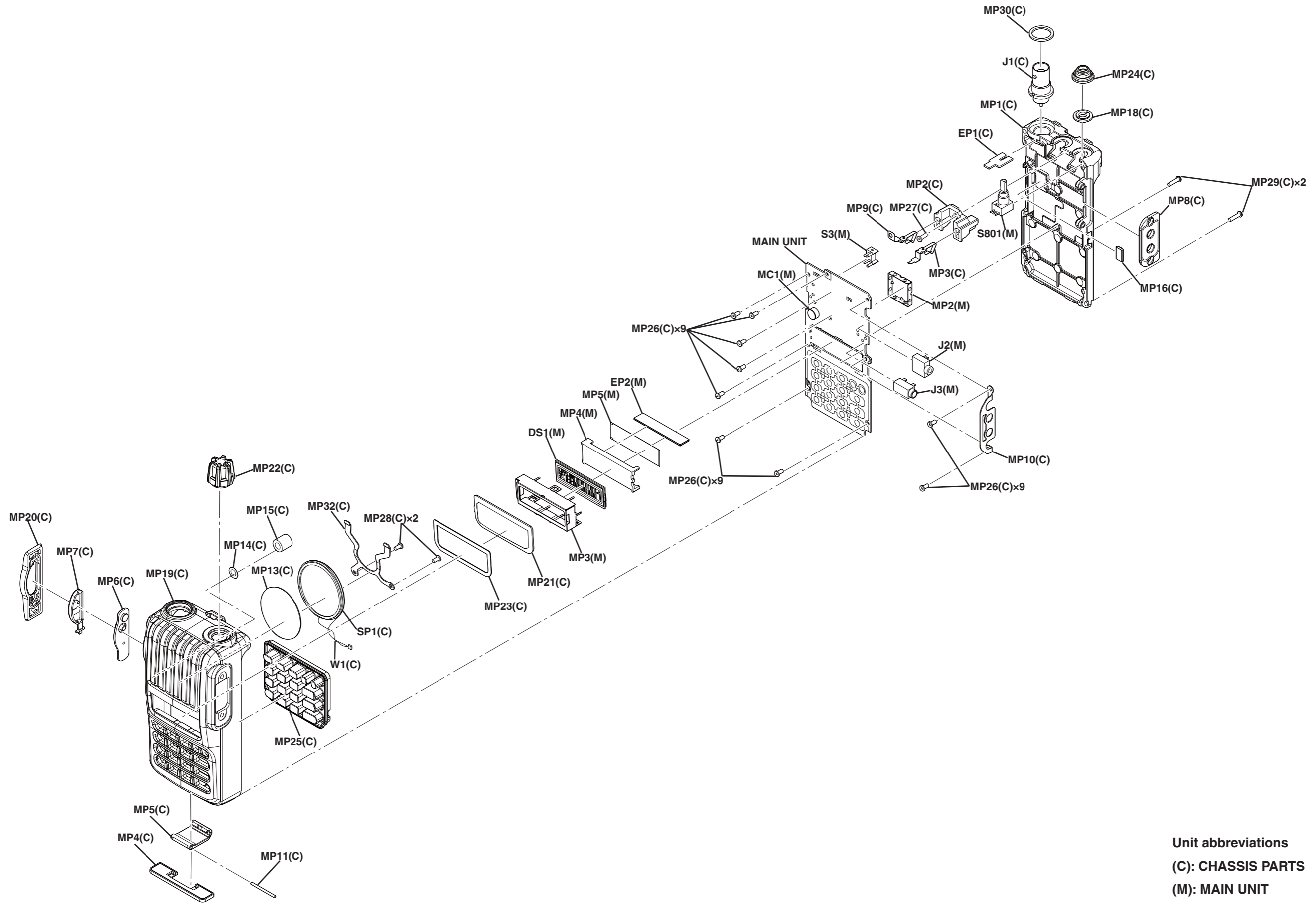
[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
J2	6450000131	HSJ1102-018540	1
J3	6510025880	TC38-108-01	1
J6*	6510021901	BM02B-ASRS-TF (LF) (SN)	1
DS1	5030003270	TAK-35426	1
MC1	7700002940	EM6027P-45C33-G	1
S3	2260001900	SW-149 (SKHLLD)	1
S801	7600000210	TP70N00E2015F-1903	1
EP2	8930080320	SRCN-3254-SP-N-W	1
MP1*	8510019610	3254 VCO CASE	1
MP2	8510019600	3254 VCO COVER	1
MP3	8930080290	3254 LCD HOLDER	1
MP4	8210025950	3254 REFLECTOR	1
MP5	8930080260	3254 WHITE SHEET	1



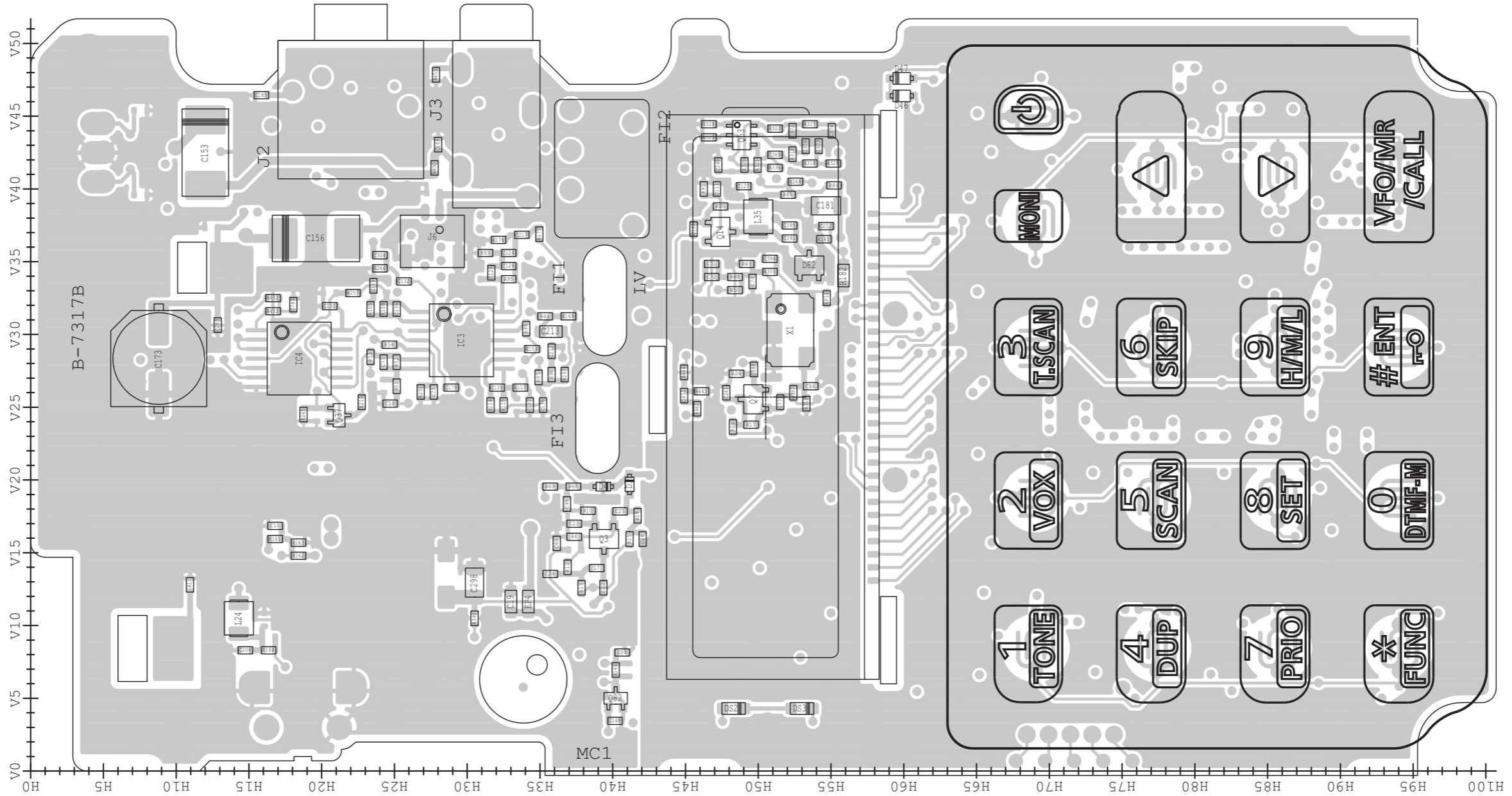
*: Refer to "BOARD LAYOUTS" for the location.

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

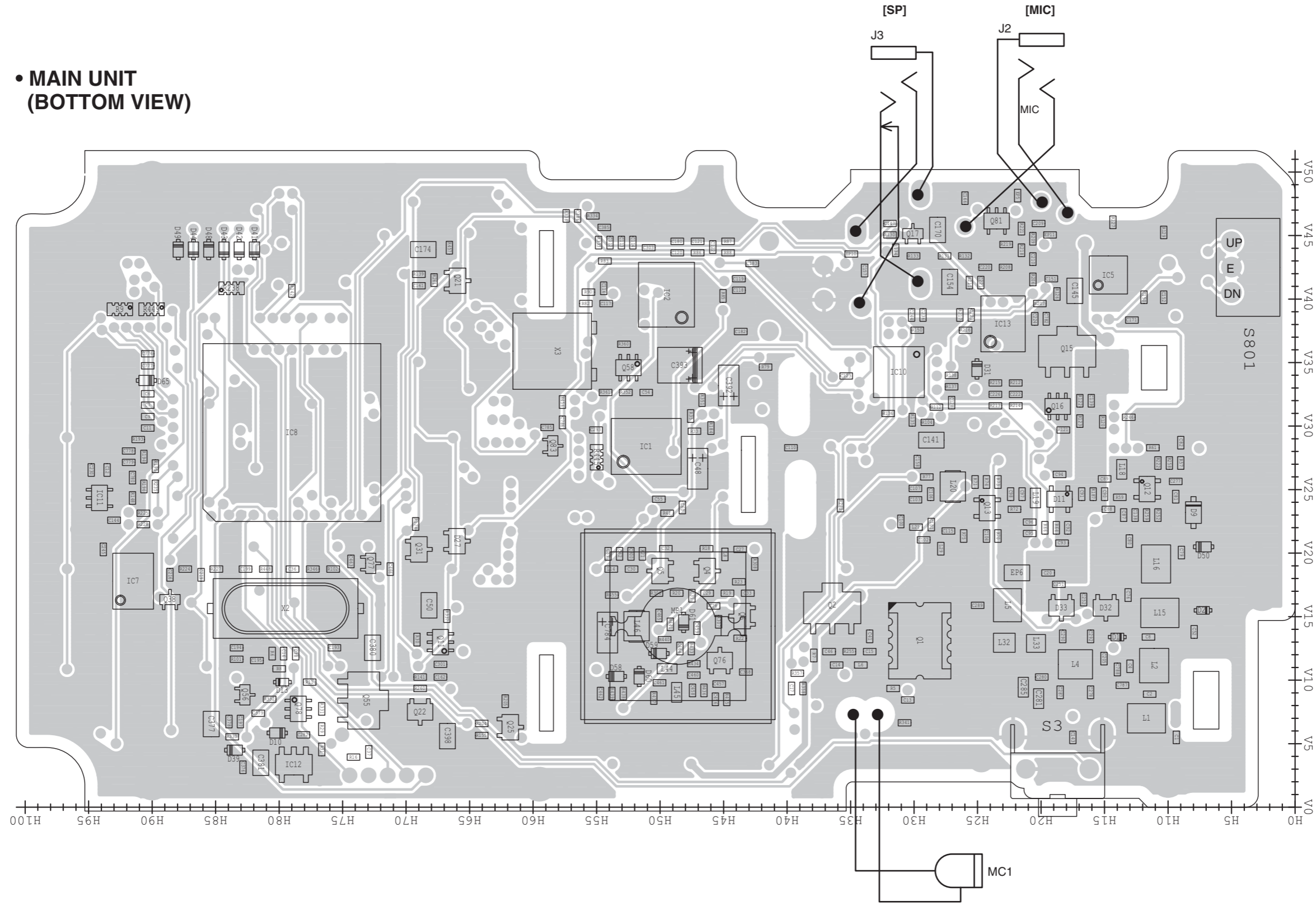


Unit abbreviations
(C): CHASSIS PARTS
(M): MAIN UNIT

• MAIN UNIT
(TOP VIEW)

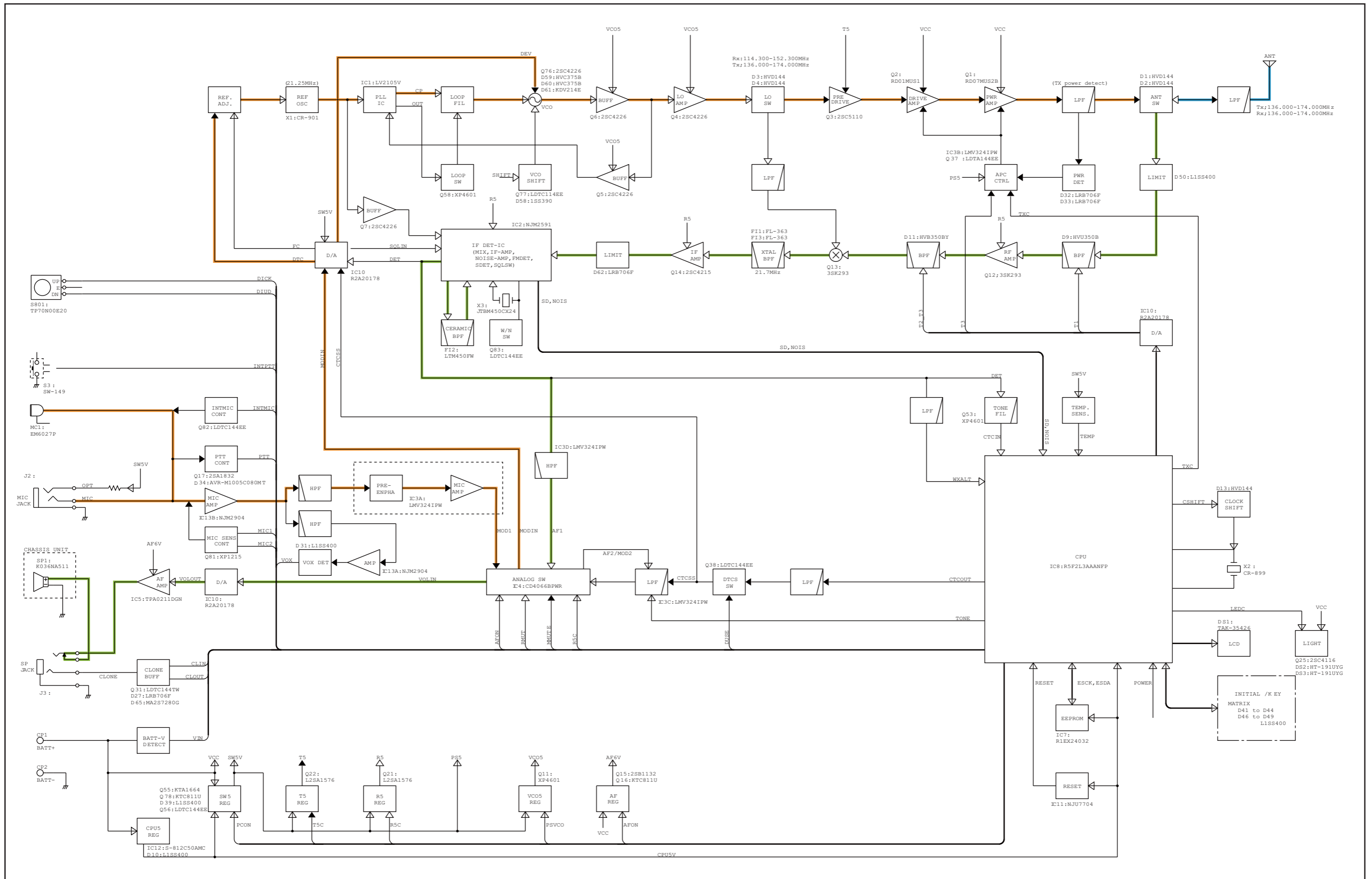


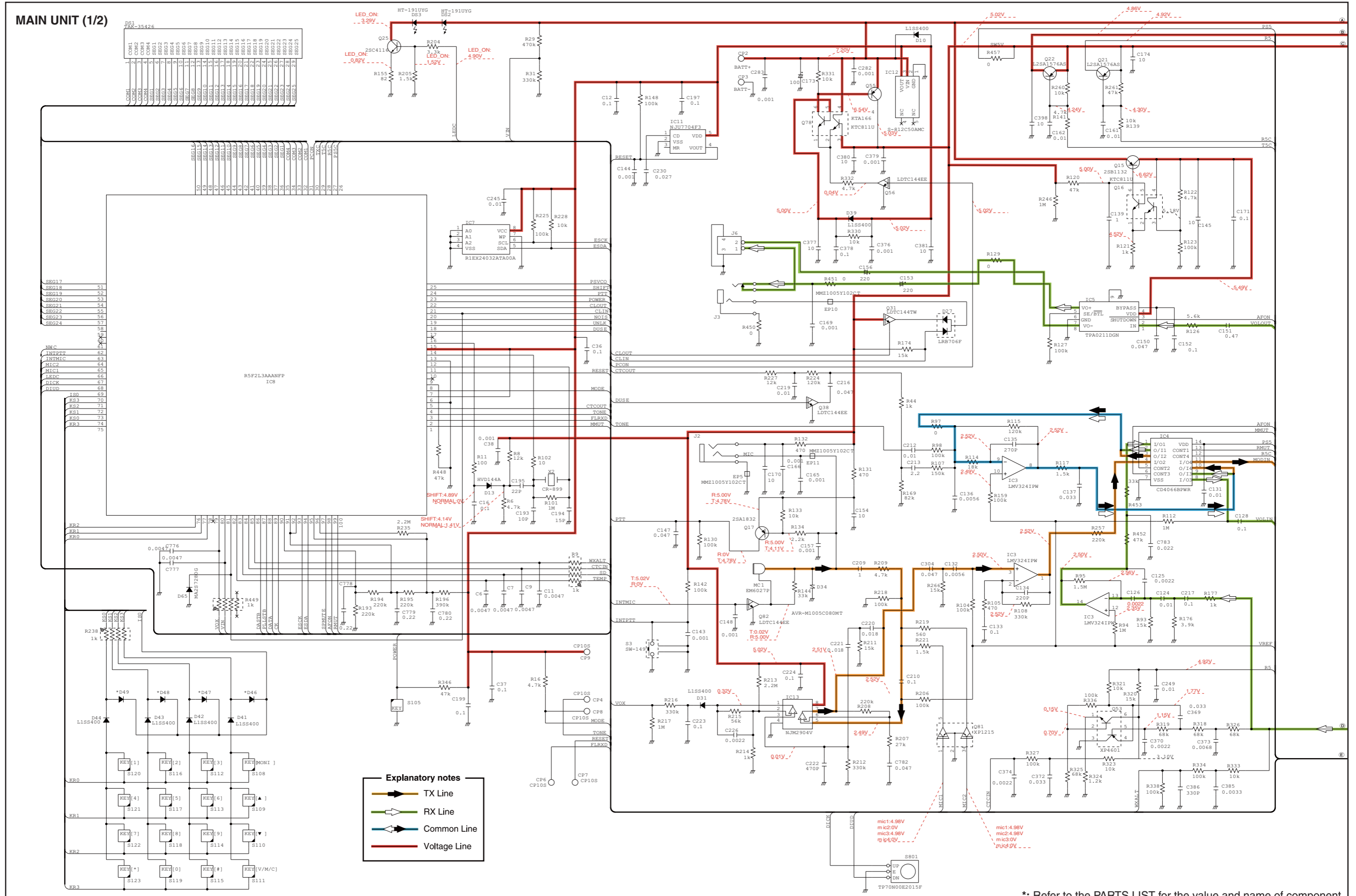
• MAIN UNIT
(BOTTOM VIEW)



SECTION 9

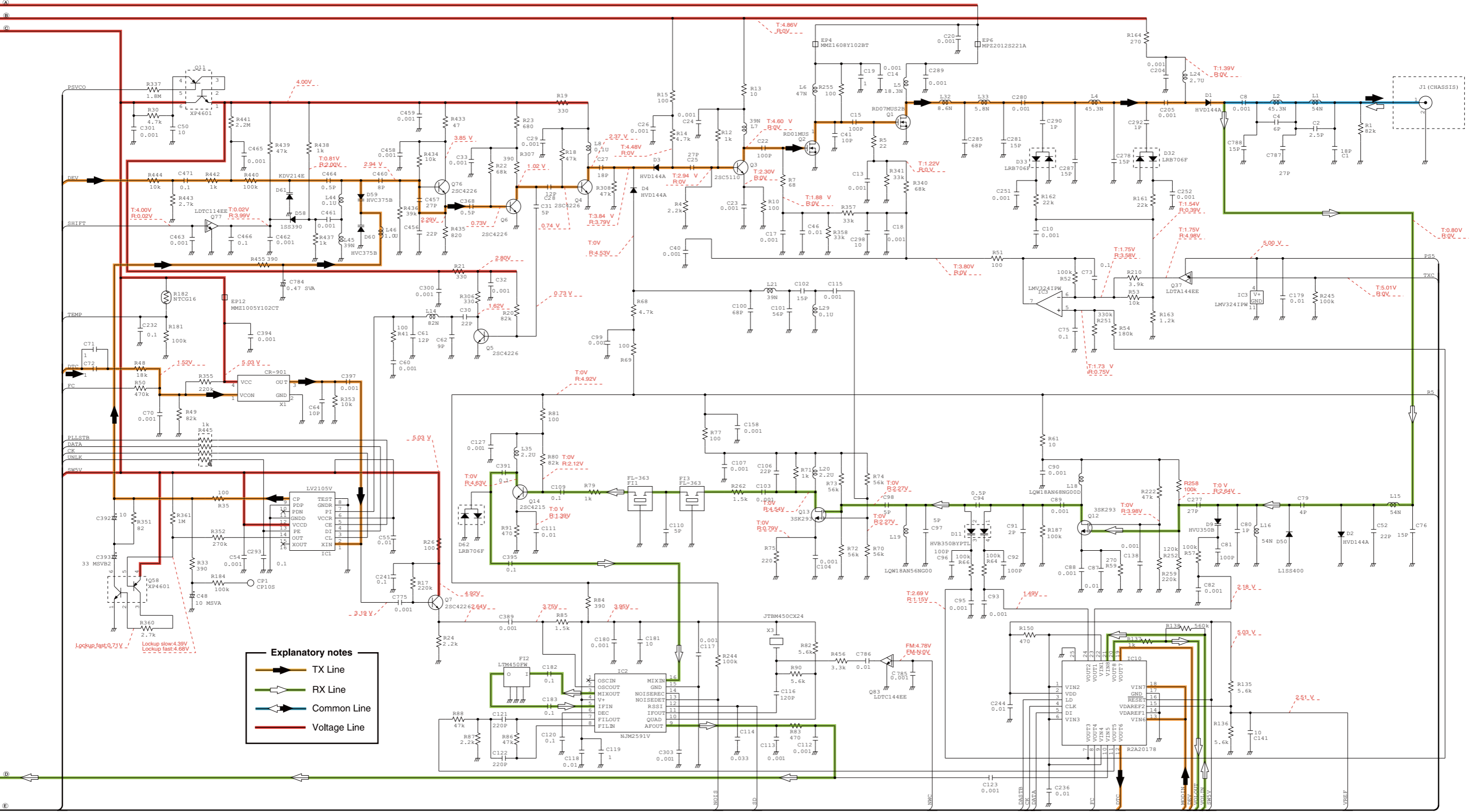
BLOCK DIAGRAM





*: 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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