ICOM

SERVICE MANUAL

VHF TRANSCEIVER

IC-F50V
IC-F51V

S-14406XZ-C1
Sep. 2007

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **IC-F50V/F51V** VHF TRANSCEIVER at the time of publication.

Model	Version		Symbol	Channel spacing (kHz)	Vibration	Voice storage
F50V	USA	USA	[A]	15.0/30.0	N/A	N/A
		USA-01	[B]		Yes	N/A
		USA-02	[C]		Yes	Yes
	Export	EXP	[D]	12.5/25.0	N/A	N/A
		EXP-01	[E]		Yes	N/A
		EXP-02	[F]		Yes	Yes
F51V	Europe	EUR	[G]	12.5/20.0/25.0	N/A	N/A
		EUR-01	[H]		Yes	N/A
		EUR-02	[I]		Yes	Yes
	China	CHN	[J]	12.5/25.0	N/A	N/A
		CHN-01	[K]		Yes	N/A
		CHN-02	[L]		Yes	Yes

UNIT ABBREVIATIONS:
F=FRONT UNIT
M=MAIN UNIT
V=VR UNIT
CO=CONNECT UNIT

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 specified. 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 parts numbers
2. Component name
3. Equipment model name and unit name
4. Quantity required

<ORDER EXAMPLE>

1110003491	S.IC	TA31136FNG	IC-F50V	MAIN UNIT	5 pieces
8820001210	Screw	2438 screw	IC-F51V	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 throughly before connecting a test equipment to the transceiver.

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MAIN UNIT (Right side) 10-3

SECTION 1 SPECIFICATIONS

■ GENERAL

• Frequency coverage	: TX/RX	136–174 MHz	
• Number of conventional channels	: 128 ch / 8 banks		
• Type of emission	: Wide	16K0F3E (25.0 kHz)	
	Middle	14K0F3E (20.0 kHz)	[EUR] only
	Narrow	11K0F3E (12.5 kHz)	
• Antenna impedance	: 50 Ω (Nominal)		
• Operating temperature range	: –30˚C to +60˚C; –22˚F to +140˚F		[USA], [EXP], [CHN]
	–25˚C to +55˚C		[EUR]
• Power supply requirement (nominal)	: Specified Icom's battery packs only (7.2 V DC; negative ground)		
• Current drain (Approx.)	: Receiving	85 mA (stand-by)	
		500 mA (max. audio with internal speaker)	
		350 mA (max. audio with external speaker)	
	Transmitting	1.8 A (at 5.0 W)	
		0.7 A (at 1.0 W)	
• Dimensions (Projections not included)	: 56.0 (W)×97.0 (H)×36.4 (D) mm; 2 7/32 (W)×3 13/16 (H)×1 7/16 (D) in.		
• Weight (Incl. BP-227)	: Approx. 280 g; 9 7/8 oz.		

■ TRANSMITTER

• Output power	: 5 W (High)/2 W (Low2)/1 W (Low1)	
• Modulation	: Variable reactance frequency modulation	
• Maximum frequency deviation	: ±5.0 kHz (Wide)	
	±4.0 kHz (Middle)	[EUR] only
	±2.5 kHz (Narrow)	
• Frequency stability	: ±2.5 ppm	
• Spurious emissions	: 70 dB typ.	[USA], [EXP], [CHN]
	0.25 μW (≤1 GHz), 1.0 μW (>1 GHz)	[EUR]
• Adjacent channel power	: 70 dB min. (Wide, Middle)	
	60 dB min. (Narrow)	
• Audio harmonic distortion	: 3% (at AF 1 kHz 40% deviation)	
• FM Hum and noise (without CCITT filter) [USA], [EXP], [CHN] only	: 40 dB min., 46 dB typ. (Wide)	
	34 dB min., 40 dB typ. (Narrow)	
• Residual modulation (with CCITT filter) [EUR] only	: 50 dB min., 55 dB typ. (Wide)	
	43 dB min., 53 dB typ. (Middle)	
	40 dB min., 50 dB typ. (Narrow)	
• Limitting charact of modulator	: 60–100% of max. deviation	
• Microphone impedance	: 2.2 kΩ	

■ RECEIVER

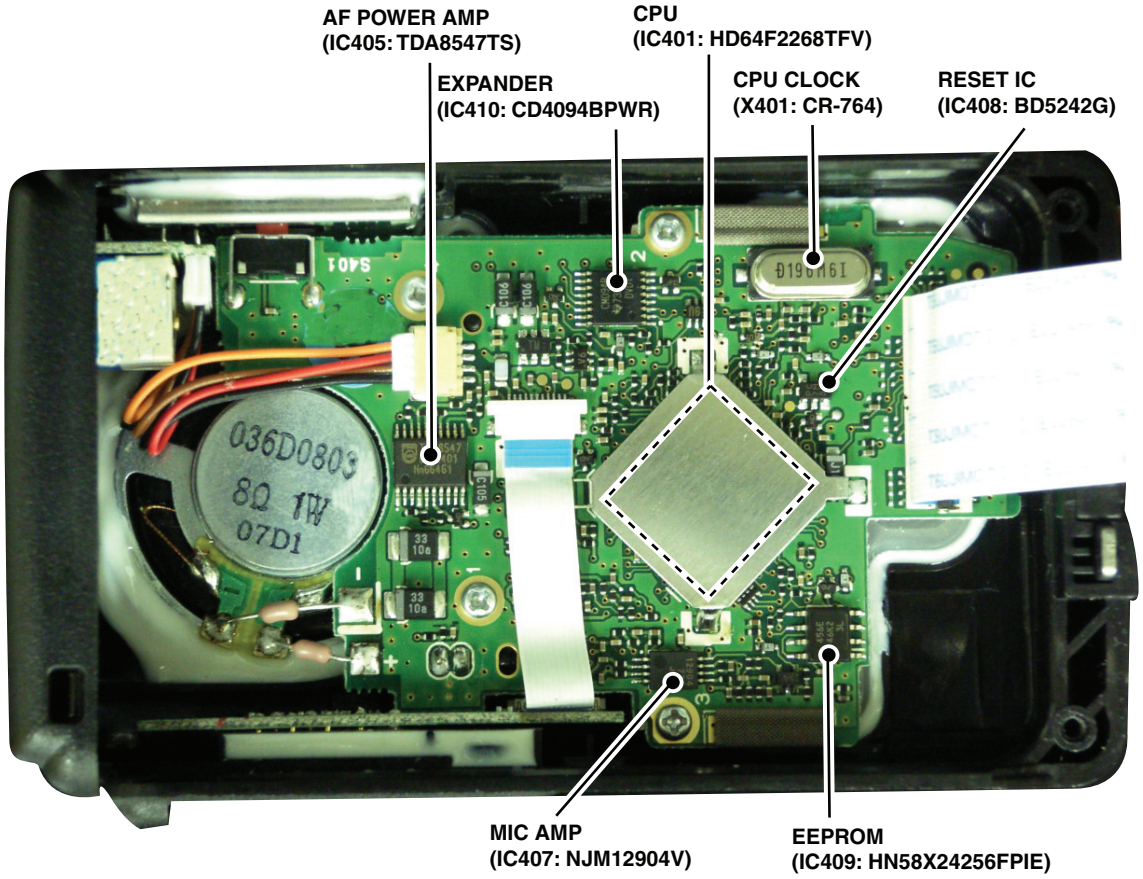
• Receive system	: Double-conversion superheterodyne system	
• Intermediate frequencies	: 1st IF: 46.35 MHz, 2nd IF: 450 kHz	
• Sensitivity	: 0.25 μV typ. at 12 dB SINAD	[USA], [EXP], [CHN]
	–4 dBμ V (EMF) typ. at 20 dB SINAD	[EUR]
• Squelch sensitivity (at threshold)	: 0.25 μV typ.	[USA], [EXP], [CHN]
	–4 dBμ V (EMF) typ.	[EUR]
• Adjacent channel selectivity	: 70 dB min., 75 dB typ. (Wide, Middle)	
	60 dB min., 65 dB typ. (Narrow)	
• Spurious response	: 70 dB	
• Intermodulation rejection ratio	: 70 dB min., 74 dB typ.	[USA], [EXP], [CHN]
	65 dB min., 67 dB typ.	[EUR]
• Hum and noise (without CCITT filter) [USA], [EXP], [CHN] only	: 40 dB min., 45 dB typ. (Wide)	
	34 dB min., 40 dB typ. (Narrow)	
• Hum and noise (with CCITT filter) [EUR] only	: 45 dB min., 55 dB typ. (Wide)	
	43 dB min., 53 dB typ. (Middle)	
	40 dB min., 50 dB typ. (Narrow)	
• Audio output power (at 5% distortion with an 8 Ω load)	: 0.7 W typ. (max. audio with internal speaker)	
	0.5 W typ. (max. audio with external speaker)	
• Audio output impedance	: 8 Ω	

Specifications are measured in accordance with TIA/EIA 603 ([USA], [EXP], [CHN]) or EN 300 086 ([EUR]).

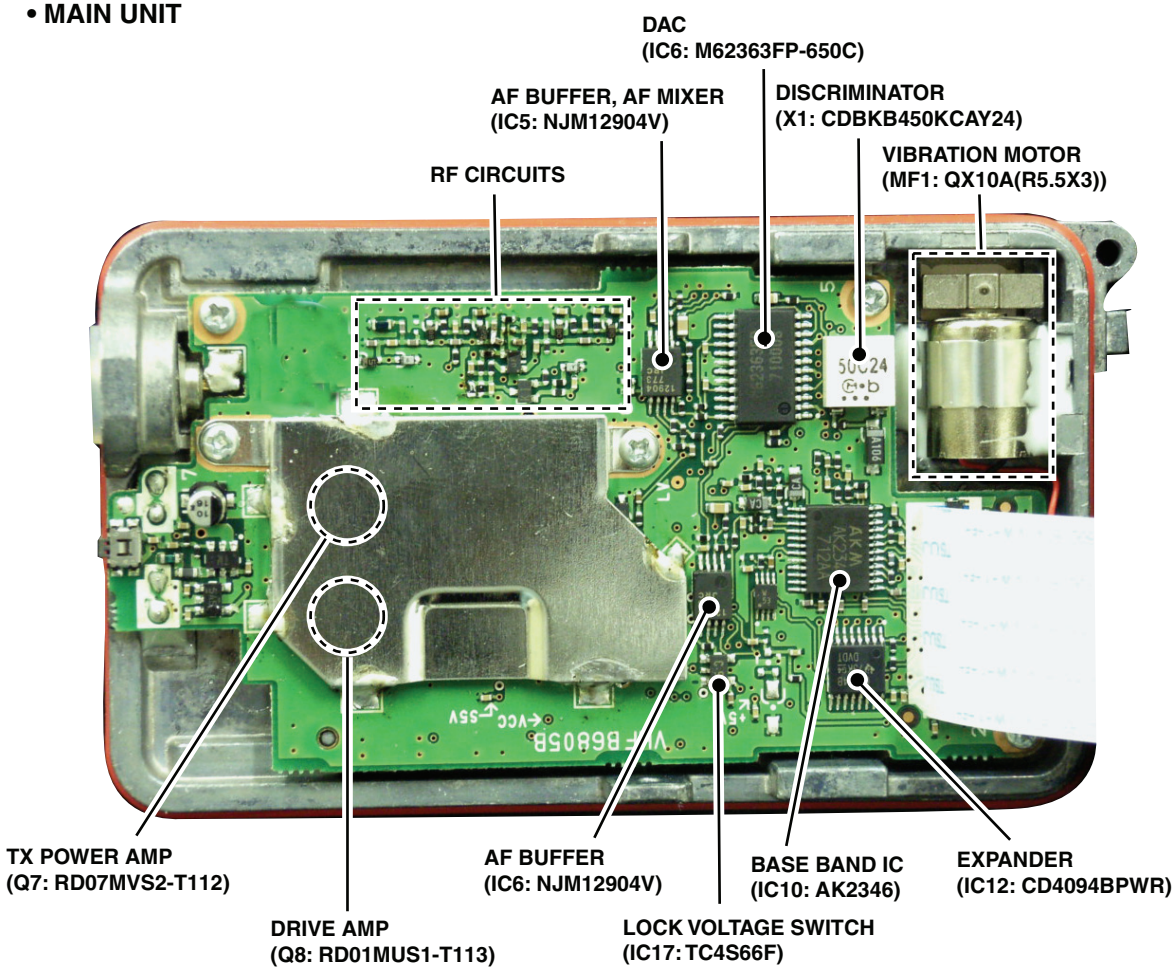
All stated specifications are subject to change without notice or obligation.

SECTION 2 INSIDE VIEWS

• FRONT UNIT



• MAIN UNIT

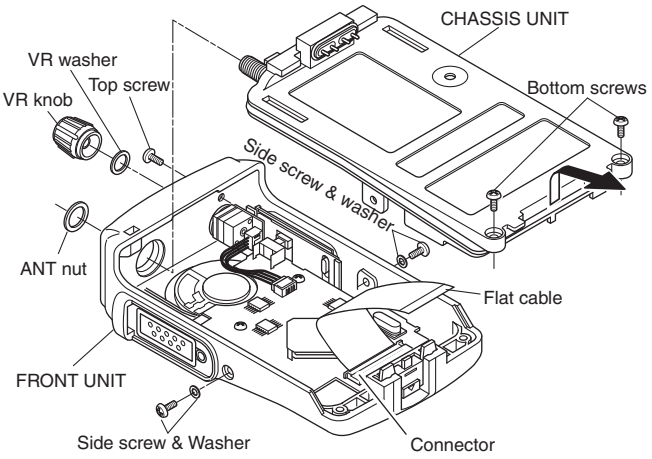


SECTION 3 DISASSEMBLY INSTRUCTION

1. REMOVING THE CHASSIS UNIT

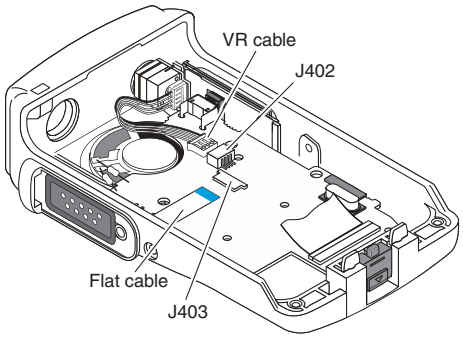
BE CAREFUL about the **flat cable** and **connector** when separating the CHASSIS UNIT from the FRONT UNIT.

① Unscrew the ANT nut, and remove the VR knob.
② Remove the VR washer, and unscrew the top screw.
③ Unscrew side screws and washers.
④ Unscrew bottom screws.
⑤ Take off the CHASSIS UNIT carefully in the direction of the arrow.
⑥ Disconnect the flat cable from the CHASSIS UNIT (MAIN UNIT).

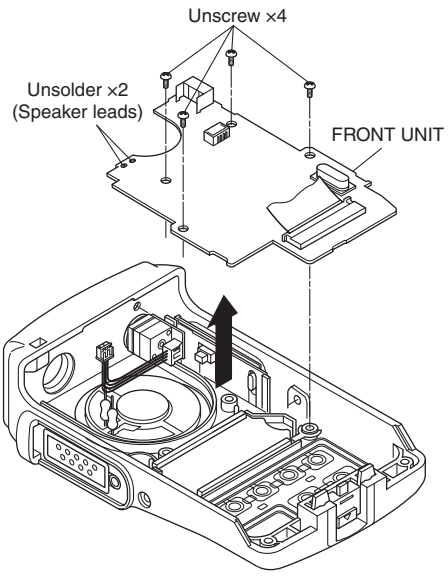


2. REMOVING THE FRONT UNIT

① Disconnect the VR cable from J402.
② Disconnect the flat cable from J403.

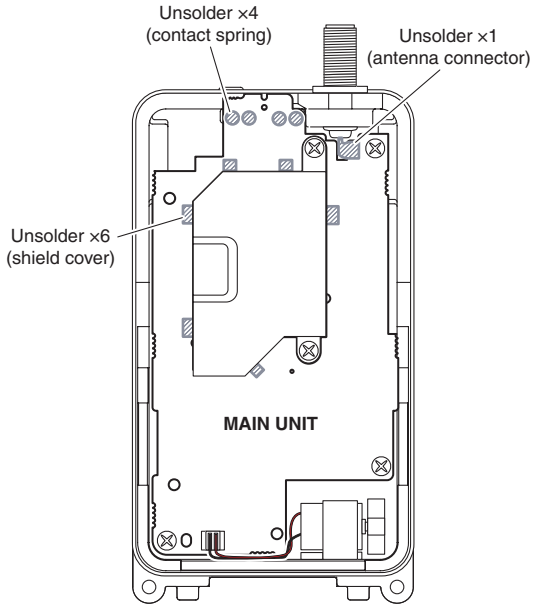


③ Unscrew 4 screws.
④ Unsolder 2 points (at the speaker leads).
⑤ Take off the FRONT UNIT in the direction of the arrow.

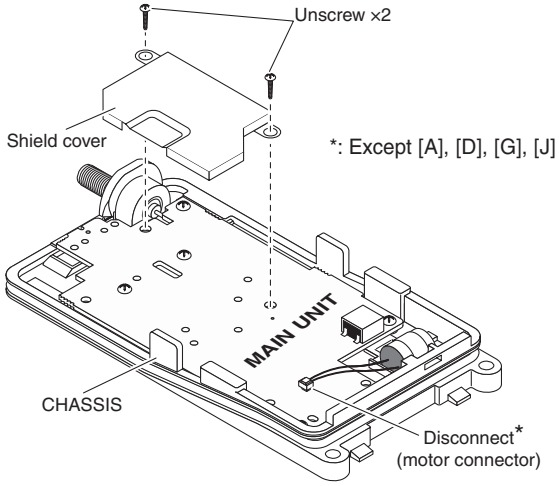


3. REMOVING THE MAIN UNIT

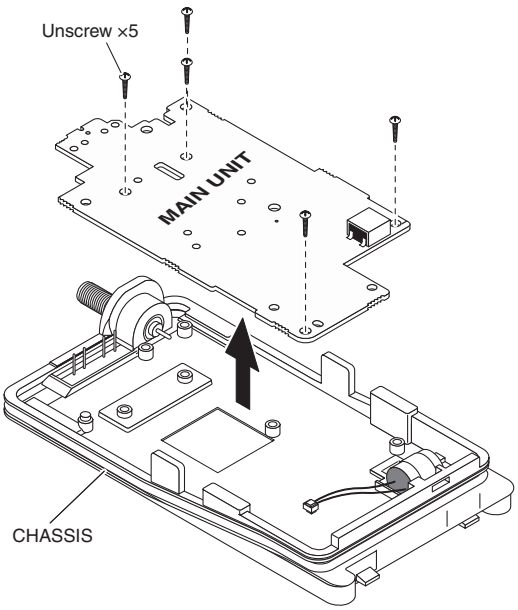
① Unsolder 6 points from the shield cover.
② Unsolder 4 points from the contact spring.
③ Unsolder 1 point from the antenna connector.



④ Unscrew 2 screws, and remove the shield cover.
⑤ Disconnect the motor connector* from the MAIN UNIT.



⑥ Unscrew 5 screws, and take off the MAIN UNIT.



SECTION 4 CIRCUIT DESCRIPTION

4-1 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), limitter , BEF (Band Eliminate Filter) 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.

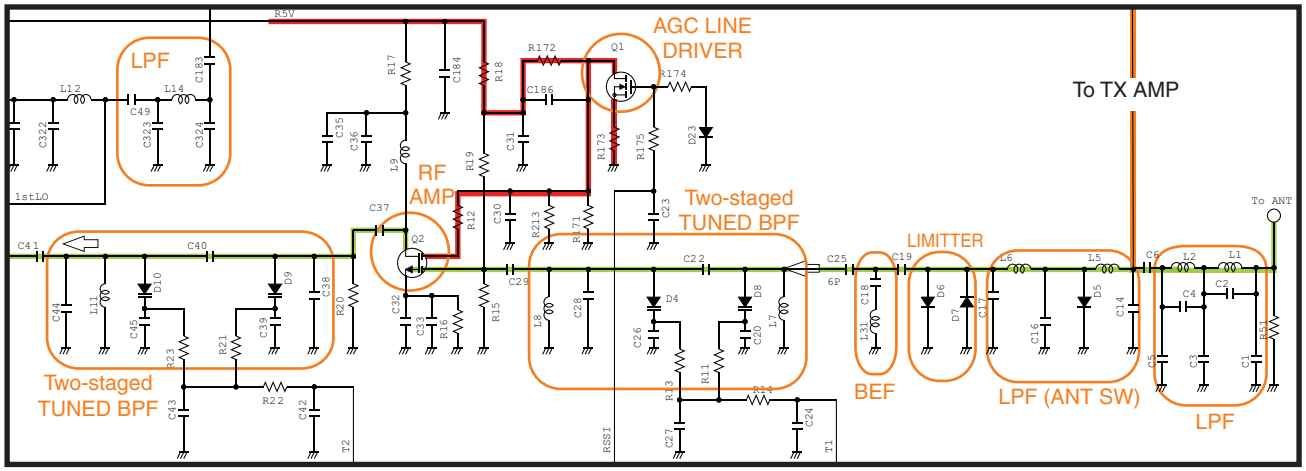
While transmitting, serial-connected PIN diodes are ON, thus the TX line is connected to the antenna, and the RX line is connected to the GND simultaneously to prevent TX signal entering.

The limitter protects RX line from over-level RF inputs, and the BEF (=trap) damps unwanted signals to GND.

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 added voltage "T1" and "T2."

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

• RF CIRCUITS



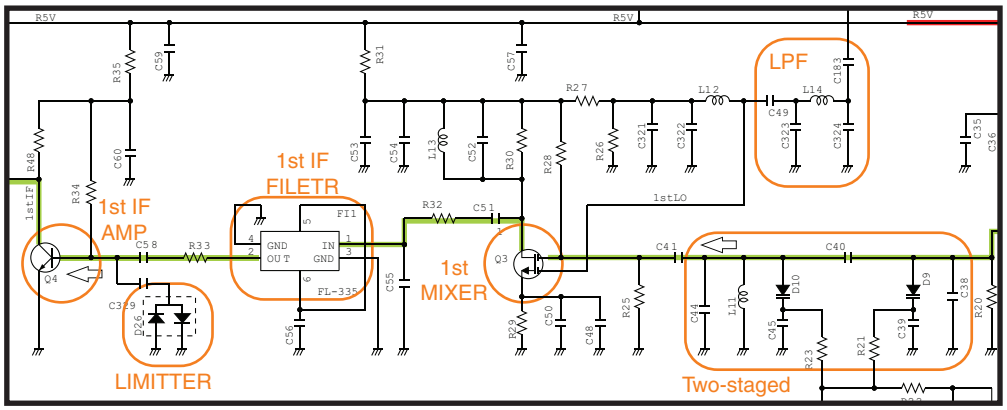
1ST IF CIRCUITS

The 1st IF circuits consist of 1st mixer, 1st IF filter and 1st IF amplifier (IF AMP). 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 “1stLO” from the RX VCO via the LPF.

The converted 1st IF signal is passed through the 1st IF filter to be removed unwanted signals. The filtered 1st IF signal is applied to the 1st IF AMP via the limitter. The amplified 1st IF signal is then applied to the 2nd IF circuits.

• 1ST IF CIRCUITS

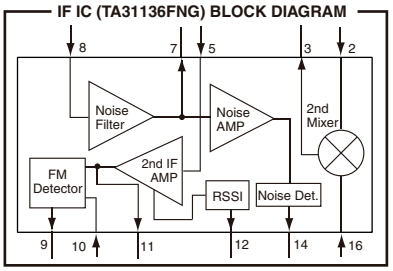


2ND IF AND FM DEMODULATOR CIRCUITS

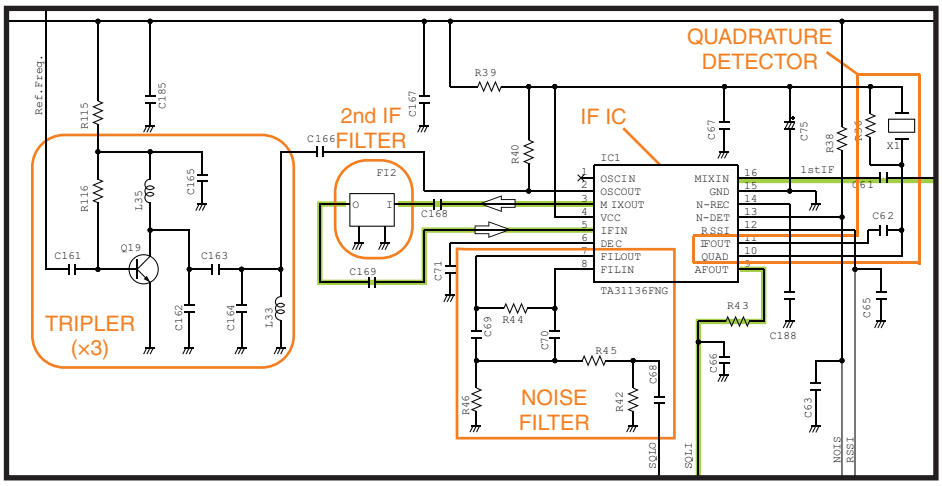
The 2nd IF circuits consist of 2nd mixer, 2nd IF filter, 2nd IF amplifier. And it converts the 1st IF signal into the 2nd IF signal, then filters to remove unwanted signals and amplifies. IF IC "TA31136FNG" contains whole of the 2nd IF circuits and FM demodulator circuit too.

The 1st IF signal is applied to the IF IC, and converted into the 2nd IF signal, by being mixed with the 2nd LO signal (from the X2 via the PLL IC (IC4, pins 1, 2) and tripler), at internal 2nd mixer. The converted 2nd IF signal is filtered by external 2nd IF filter (ceramic filter), and saturation-amplified by internal 2nd IF AMP. The amplified 2nd IF signal is FM-demodulated by the quadrature detector.

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



• 2ND IF AND FM DEMODULATOR CIRCUITS



RX AF CIRCUITS

The RX AF circuits consist of AF filters, AF amplifier (AF AMP), AF power amplifier, etc., and amplify, filter the AF signals FM-demodulated by the FM IF IC.

This transceiver employs the base band IC for audio signal processing for both transmit and receive. The base band IC is an audio processor and composed of RF AMPlifier, compressor, expander, scrambler, etc. in its package.

The demodulated AF signals from the IF IC are applied to the base band IC (IC10, pin 23). The applied AF signals are amplified at the amplifier section and level adjusted at the volume controller section, then suppressed unwanted 3 kHz and higher audio signals at LPF. The filtered AF signals are applied (bypassed) the TX/RX HPF, scrambler, de-emphasis sections in sequence.

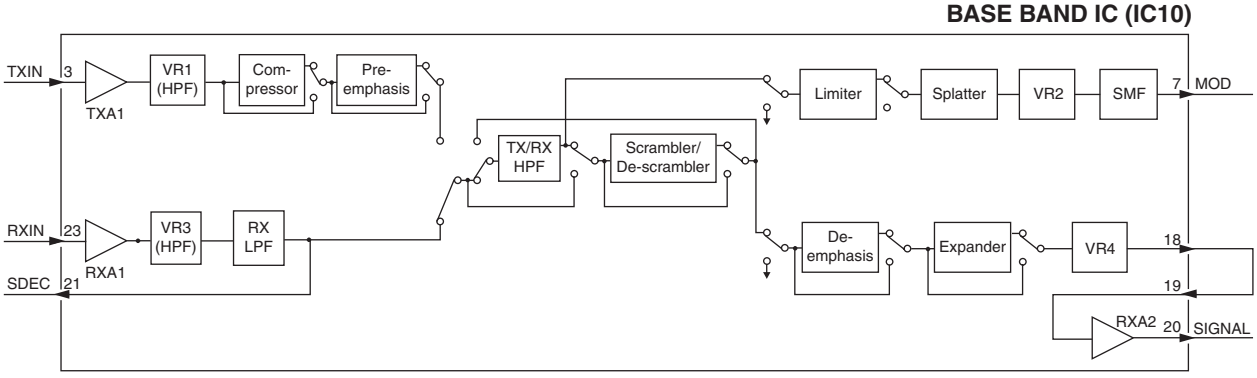
The TX/RX HPF filters out 250 Hz and lower audio signals, and the de-emphasis circuit obtains –6 dB/oct of audio characteristics. The expander expands the compressed audio signals and also noise reduction function is provided.

The AF signals are then level adjusted at the volume controller section and amplified at the amplifier section, then output from pin 20 (IC10).

The processed AF signals from the base band IC (IC10) are applied to the FRONT UNIT via J1 (MAIN) and J401 (FRONT).

The AF signals from the MAIN UNIT "SIGNAL" are passed through the AF mute SW, LPF and variable register (VR UNIT) for audio level adjustment, then applied to the AF power AMP. The amplified AF signals "AFO" are applied to the internal speaker, or external speaker via the [SP MIC] jack (MP701; CHASSIS).

• BASE BAND IC BLOCK DIAGRAM



SQUELCH CIRCUITS

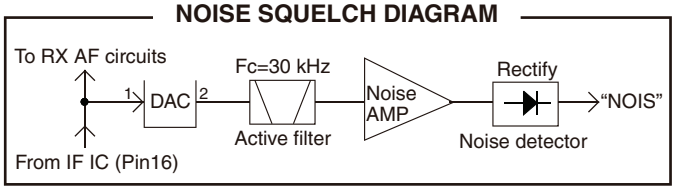
• NOISE SQUELCH

The noise squelch 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 turns the AF power amplifier and AF switches ON and OFF.

A portion of FM-demodulated AF signal from the IF IC is adjusted its level (=squelch threshold level) by DAC (D/A converter; IC6, pins 1, 2), then passed through the noise filter (M: IC1, pins 7, 8 and R42, 44–46, C68–70) 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 "NOIS". Then the DC voltage is applied to the CPU (IC401, pin 41) and compared with the reference level preset in the CPU.

If the CPU interpretes that the noise level is higher than preset one, the CPU sets the "AFON" signal to "High" to turn the AF power AMP controller OFF, and the AF mute SW is turned OFF simultaneously. Thus closing the squelch is accomplished.

NOISE SQUELCH DIAGRAM



• TONE SQUELCH

The tone squelch connects the RX AF line and activates the AF power amplifier to emit the AF signals only when receiving a signal which contains the tone frequency matched with preset in the CPU. Detecting signal in the demodulated AF signals, the tone squelch circuit turns the AF power amplifier and AF switches ON and OFF.

<CTCSS/DTCS>
A portion of FM-demodulated AF signals from the FM IF IC are passed through the tone filter (M: Q6, pins 5, 6) to remove unwanted voice siganls. The filtered tone signals are applied to the CPU (IC401, pin 44).

<2/5 TONE, DTMF>
A portion of FM-demodulated AF signals are output from the baseband IC (M: IC10, pin 21), and passed through the tone filter (M: R136, C220) to remove unwanted voice siganls. The filtered tone signals are applied to the CPU (IC401, pin 43).

The CPU compares the tone frequency/code preset in the CPU, and if the applied tone frequency/code is matched to preset one, the CPU controls the AF power AMP and AF mute SW as same as "NOISE SQUELCH."

4-2 TRANSMITTER CIRCUITS

TX AF CIRCUITS

The TX AF circuits consist of microphone amplifier (MIC AMP) and AF filters. The AF filter cuts off the signals except voice signals (300 Hz or lower and 3 kHz or higher).

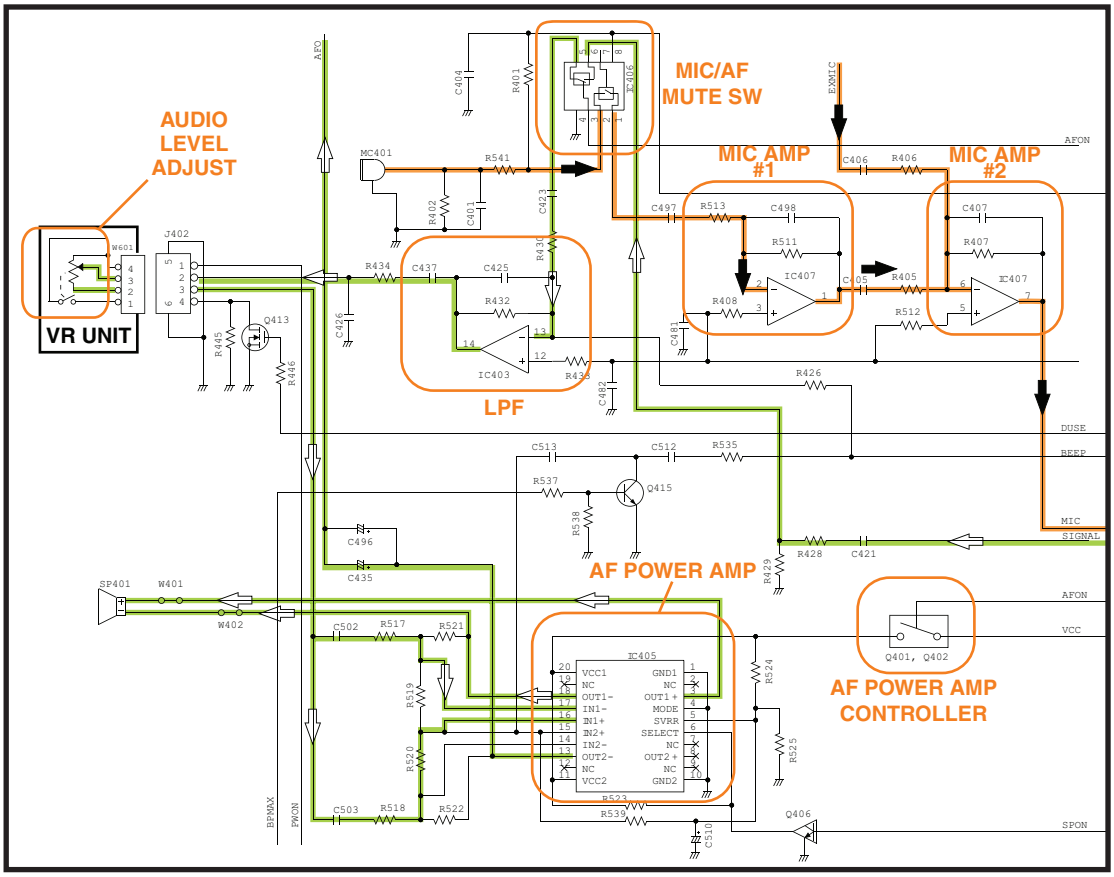
The audio signals from the internal microphone (MIC signals) are passed through MIC mute SW and amplified by two MIC AMPs (#1 and #2).

The MIC signals from the external microphone "EXMIC" are applied to the FRONT UNIT via [SP MIC] jack, and amplified by MIC AMP (#2).

The amplified MIC signals "MIC" are applied to the MAIN UNIT via J401(FRONT UNIT) and J1 (MAIN UNIT).

The MIC signals from the FRONT UNIT are applied to the baseband IC (IC10, pin 3) and processed.

• TX AF CIRCUITS



The applied MIC signals are amplified at the amplifier (TXA1), and level adjusted at the volume controller (VR1). The level adjusted MIC signals are applied (bypassed) the compressor section, pre-emphasis section, TX/RX HPF, de-scrambler, limiter, splatter, in sequence, then applied to another volume controller.

The compressor compresses the MIC signals to provide high S/N ratio for receive side, and the pre-emphasis obtains +6 dB/oct audio characteristics. The TX/RX HPF filters out 250 Hz and lower audio signals, the limiter limits its level and the splatter filters out 3 kHz and higher audio signals. The filtered MIC signals are level adjusted at another volume controller (VR2), and then output from pin 7 via smoothing filter (SMF).

The output MIC signals are passed through the FM/PM SW (IC11, pins 6, 1) and LPF (IC5, pins 2, 1) then applied to the DAC (D/A Converter; IC6, pin 4) and level-adjusted (deviation adjustment). The level-adjusted MIC siganls are output from pin 3, then applied to the modulation circuit as the modulation signals "MOD" via buffer (IC5, pins 6, 7).

MODULATION CIRCUIT

The modulation circuit FM-modulates the VCO oscillating signal with the modulation signals from the TX AF circuits.

• VOICE SIGNAL

The buffer-amplified AF signals are applied to the variable capacitor (VD) to change its reactance for FM modulation.

• TONE SIGNALS

Tone signals are generated in the CPU and applied to the both of the VCO and reference frequency oscillator to be modulated.

<CTCSS/DTCS>

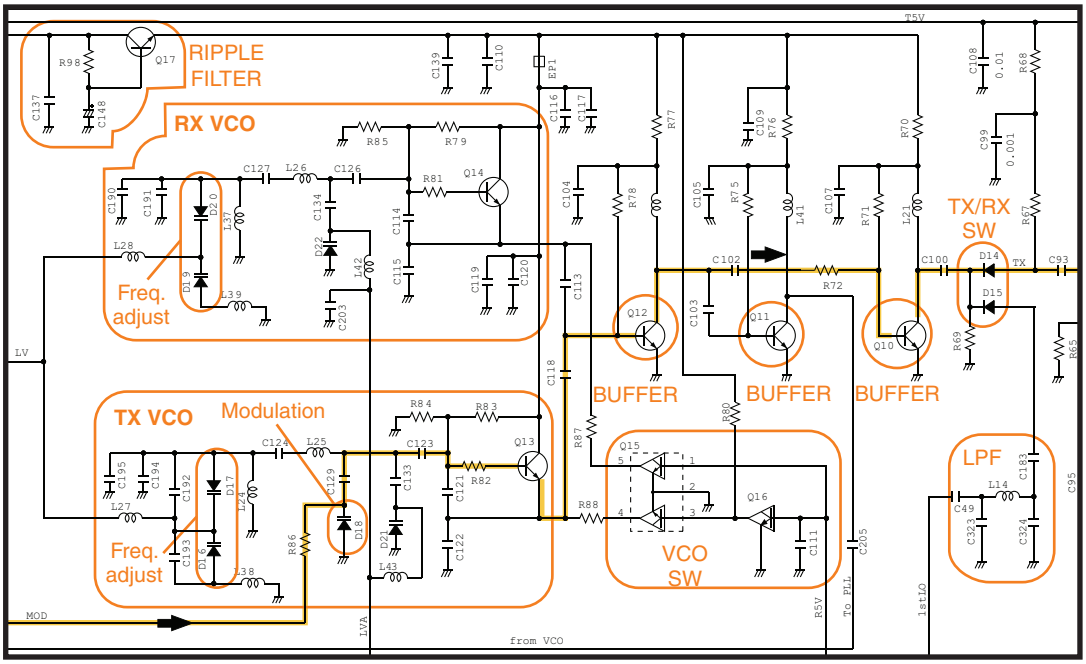
CTCSS/DTCS signals ("CEN0"–"CEN2") are generated by the CPU (F: IC401, pins 79–81) and converted its wave form by R461–R463 (F), then passed through the LPF (F: IC403, pins 3, 1). The filtered CTCSS/DTCS signals are then level-adjusted by DAC (M: IC6, pins 9, 10) and applied to the AF mixer (M: IC5, pin 2) to be mixed with MIC signals, then applied to the TX VCO as the modulation signals. The CTCSS/DTCS signals are also applied to the reference signal oscillator (M; X2) too, via the buffer (M: IC16, pins 2, 1).

<2/5 TONE, DTMF>

2/5 tone and DTMF signals are ("SEN0"–"SEN3") are generated by the CPU (F: IC401, pins 72–75) and converted its wave form by R471–R474 (F), then passed through the two-staged LPF (F: IC403, pins 5, 7 and pins 10, 8). The filtered 2/5 tone and DTMF signals are applied to the AF mixer (M: IC5, pin 2) to be mixed with MIC signals. The mixed signals are then applied to the TX VCO as the modulation signals). The CTCSS/DTCS signals are also applied to the reference signal oscillator (M: X2, pin 1) too, via the buffer (M: IC16, pins 2, 1).

The modulated VCO output is buffer-amplified by two buffers (Q12, Q10), and applied to the pre-driver via TX/RX SW.

• MODULATION CIRCUIT AND TX/RX VCOs



TRANSMIT AMPLIFIERS

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

The TX VCO output is applied to the pre-drive amplifier via the TX/RX switch. The amplified TX signal is amplified by drive amplifier, then power-amplified by the power amplifier to obtain 5 W (max.) of TX output power.

The power-amplified TX signal is passed through the LPFs (as a harmonic filter), ANT SW (TX), and another LPF, then applied to the antenna.

APC CIRCUIT

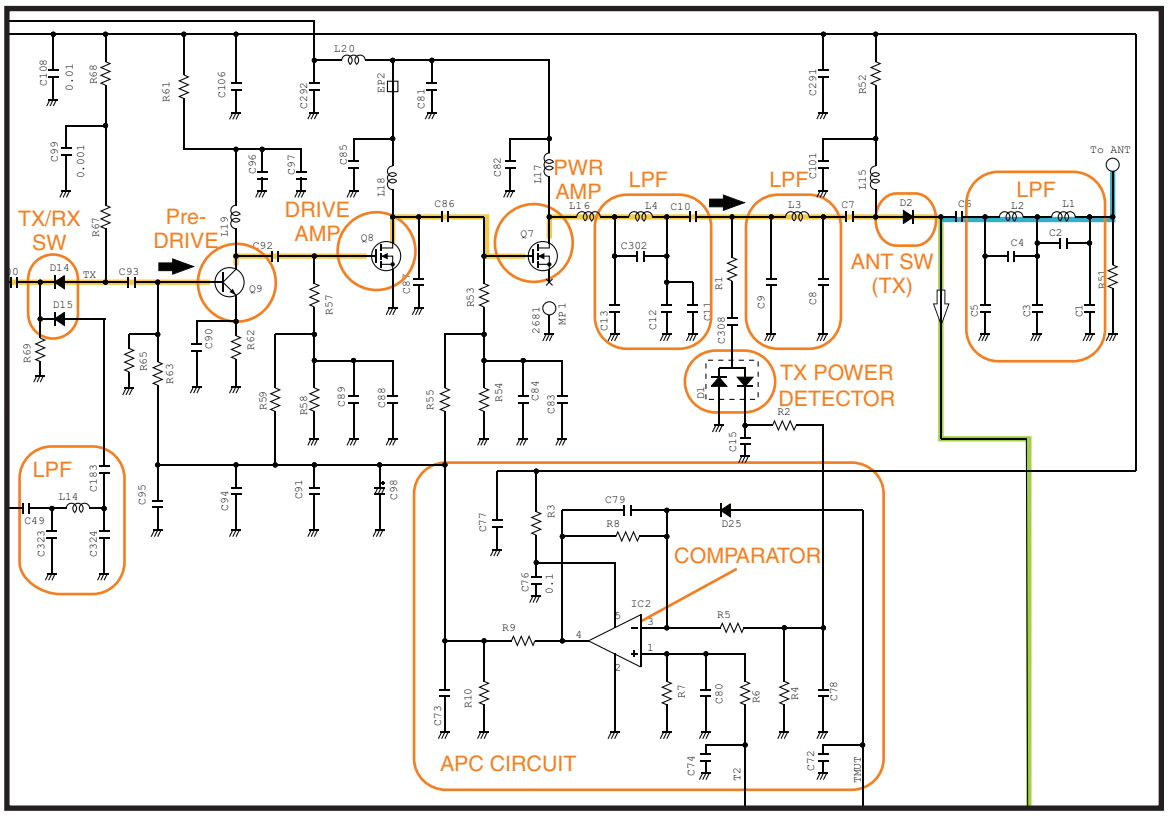
The APC (Automatic Power Control) circuit stabilizes transmit output power to prevent transmit output power level change which is caused by load mismatching or heat effect, etc. The APC circuit also selects transmit output power from high, middle and low power.

A portion of the TX signal is rectified by the power detector to be converted into DC voltage which is in proportion to the transmit output power level. The detected voltage is applied to the comparator. The transmit power setting voltage 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. The output voltage controls the bias of the TX amplifiers to reduce/increase the gain of these amplifiers for stable transmit output power.

The change of transmit power is carried out by changing reference voltage.

• TRANSMIT AMPLIFIERS AND APC CIRCUIT



4-3 FREQUENCY SYNTHESIZER CIRCUITS

VCOs

A VCO is an oscillator which its oscillation 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 produce, and TX VCO generates TX signal. The VCO SW toggles these VCOs.

• RX VCO

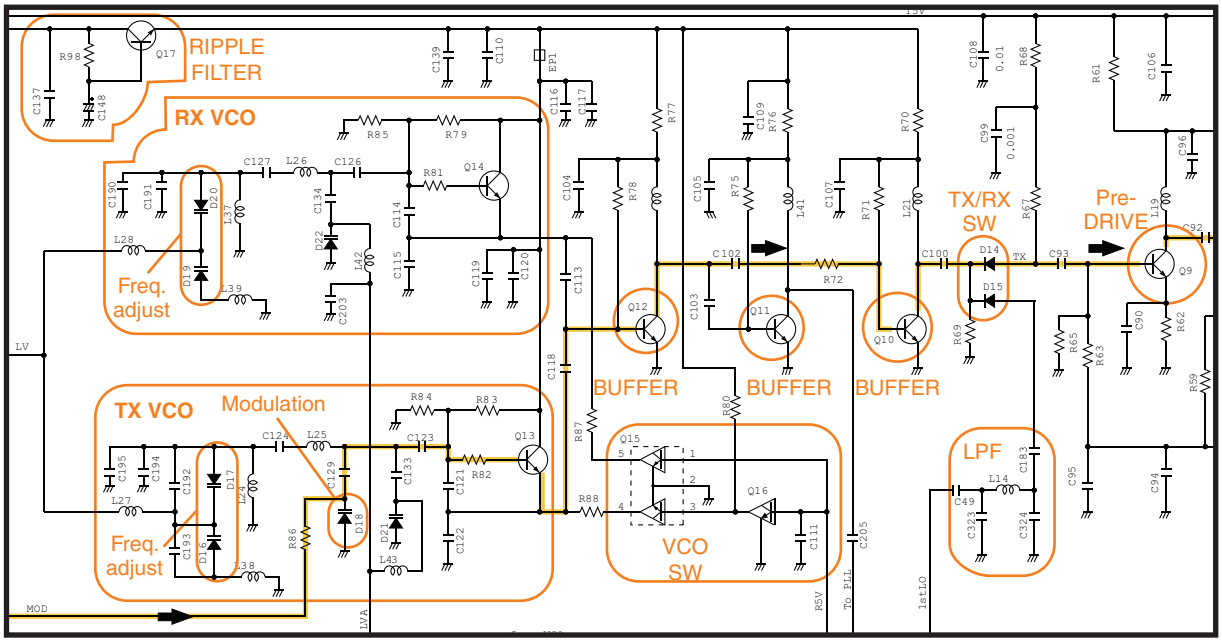
The RX VCO oscillates 89.65 to 127.65 MHz LO signals. The generated 1st LO signals are applied to the 1st mixer (Q3) via two buffers (Q12 and Q10) and LPF.

• TX VCO

The TX VCO oscillates 136 to 174 MHz TX signal. The generated TX signal is applied to the pre-driver (one of TX AMPs) via the TX/RX SW.

A portion of the VCO output is applied to the PLL IC via the buffer (Q11).

• VCOs AND BUFFERS



PLL (Phase Locked Loop) CIRCUIT

The PLL circuit provides stable oscillation for both of the transmit and 1st LO frequencies (for receive). By comparing the feed backed VCO output and the reference frequency signal, the oscillating frequency is stabilized.

The PLL output frequency is controlled by the serial data including divide ratio from the CPU.

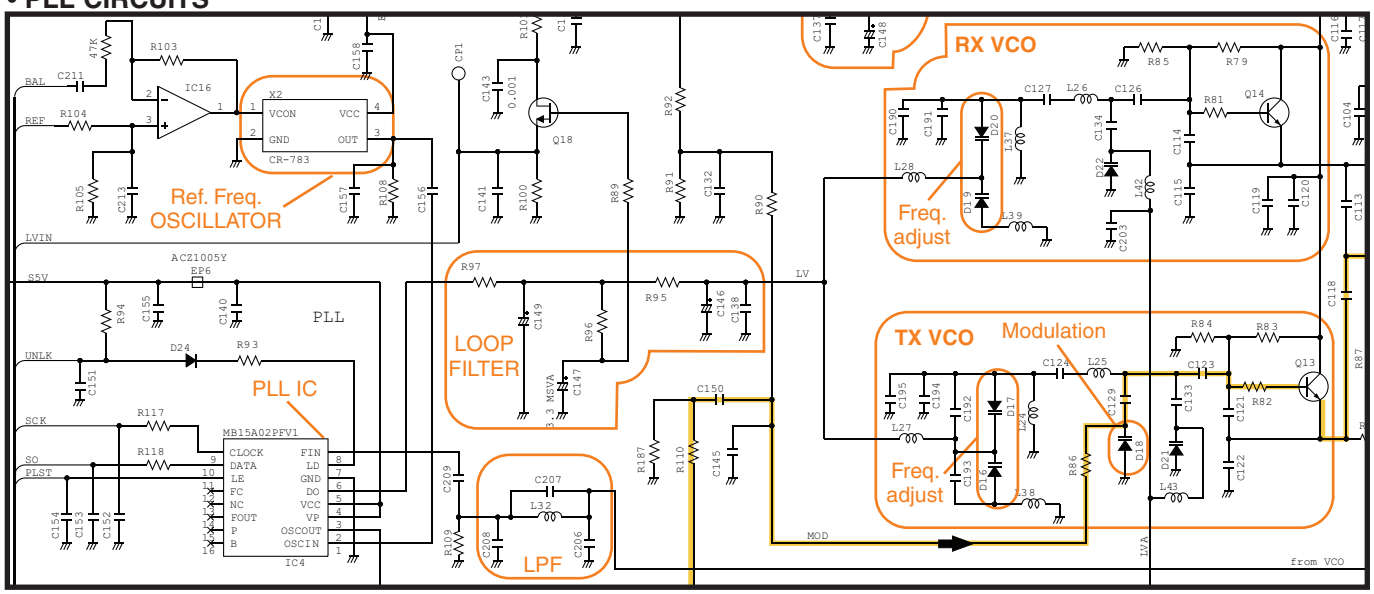
A portion of VCO output from the buffer (Q11) is applied to the PLL IC via LPF. The applied VCO output is divided according to the serial data including divide ratio from the CPU, at the prescaler and programmable divider. In the same way, the reference frequency signal from the reference frequency signal oscillator is applied to the PLL IC and divide so that these are the same frequency.

The frequency-matched 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 capacitors (VD) which composes a part of the resonator of VCO, the capasitance of VDs changes corresponding to the applied lock voltage. This causes the change of resonation frequency that determines 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.

• PLL CIRCUITS



4-4 OTHER CIRCUITS

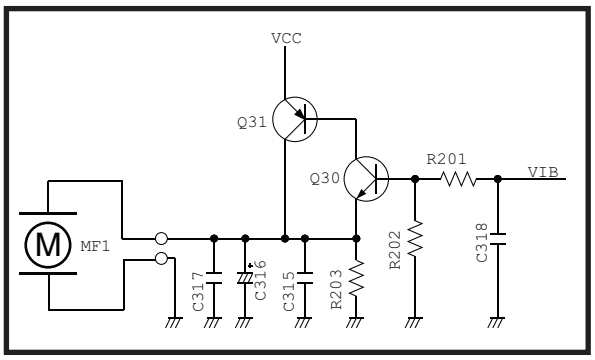
VIBERATION MOTOR CIRCUIT

(except [A], [D], [G], [J])

MF1 is a vibration motor. When the matched RX code signal is received, MF1 rotates to produce viberation.

In vibration mode, and when the transceiver is called, "VIB" signal from the expander (IC12, pin 6) turns to "High(=VCC level)" and motor driver (Q30, Q31) is activated to rotate the vibration motor (MF1).

• MOTOR DRIVER

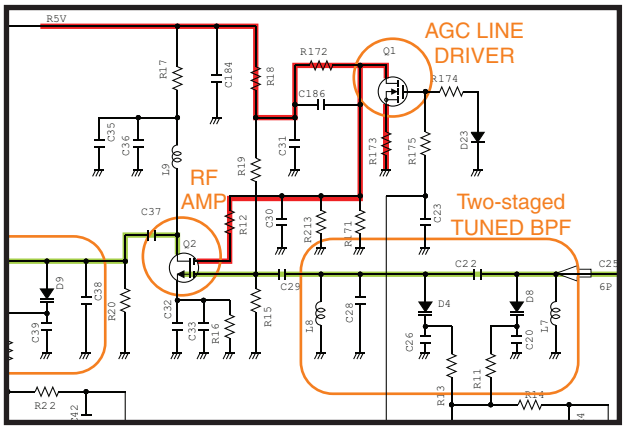


AGC (Automatic Gain Controller) CIRCUIT

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 RF AMP to maintain an approximately constant average level of the received signals.

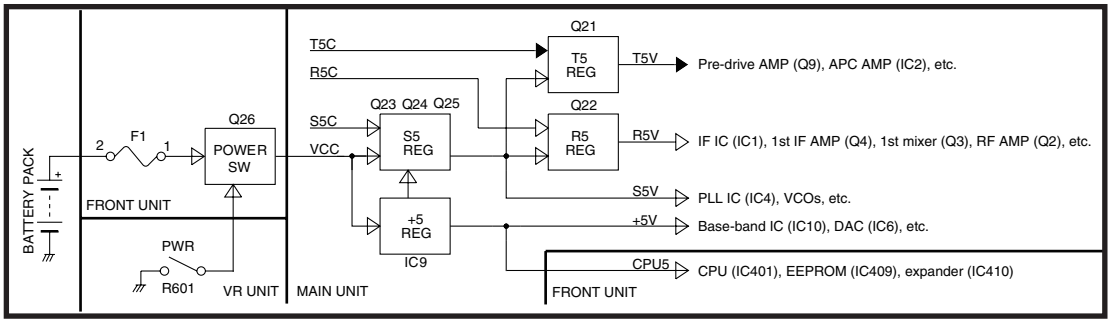
RSSI signal which is in proportion to the RX signal level is applied to the gate terminal of AGC line driver. The driver controls the voltage which supplied to the RF AMP to control the gain of RF AMP.

• AGC CIRCUIT



4-5 VOLTAGE BLOCK DIAGRAM

Voltage from the battery pack is routed to whole of the transceiver via switches and regulators.



4-6 CPU (F: IC401) PORT ALLOCATION

Pin No.	Line name	Description	I/O
1–11	SEG23–13	LCD segment ports.	O
13	SEG12		
15–25	SEG11–1		
26	SO	Serial data to DAC (M: IC6) and audio strage IC (M: IC18).	O
27	SCK	Serial clock to DAC (M: IC6) and audio strage IC (M: IC18).	O
28	MDIO	Data I/O for baseband IC (M: IC10).	I/O
29	MSCK	Clock to the baseband IC (M: IC10).	O
30	SS	Chip select signal to the Voice strage IC* (M: IC18).	O
31	PLST	Strobe signal to the PLL IC (M: IC4).	O
32	SDA	Serial data to DAC and voice strage IC* (M: IC18).	O
33	SCL	Serial clock to DAC (M: IC6) and voice strage IC* (M: IC18).	O
34	INT	Interupt signal to voice strage IC* (M: IC18).	O
35	EXSF	Strobe to the expander (F: IC410).	O
36	EXSM	Strobe to the expander (M: IC12)	O
37	EXOE	Output enable signal to the expander ICs (F: IC410 and M: IC12).	O
38	BEEP	Beep sounds.	O
39	MTDT	Data (MSK TX data) to the baseband IC (M: IC10).	O
40	MTCK	Clock (for MSK TX data) to baseband IC (M: IC10).	O
41	NOISE	Noise level from FM IF IC (M: IC1).	I
43	SDEC	Tone signals (DTMF, 2/5tone).	I
44	CDEC	CTCSS/DTCS signals.	I
45	VOXV	VOX detect. "High"=start to transmit.	I
46	KR1	Key input for [UP], [P0] and [P3] keys. (Pulled up)	I
47	KR0	Key input for [DOWN], [P1] and [P2] keys. (Pulled up)	I
48	BATV	Battery volatge for monitoring.	I
49	LVIN	Lock voltage for monitoring.	I
50	RSSI	RSSI voltage from FM IF IC (M: IC1).	I
51	TEMP	Voltage divided by thermal register (M: R190) and R191. (temperature monitor)	I
52	OPTV	Optional unit detect. "High"=An optional unit is connected.	I
55	UNLK	PLL unlock signal from IC4. "Low"=PLL is unlocked.	I
59	RES	Reset signal from the reset IC (F: IC408).	I
68	BPMAX	Beep sound level control signal to BEEP SW (F: Q415). "Low"=Maximum beep sound level.	O
69	RAC	Row address clock to the Voice strage IC* (M: IC18).	O
70	PTT	[PTT] key (F: S401). (Pulled up)	I
71	MDIR	Serial data I/O control signal to the baseband IC (M: IC10).	O
72–75	SENC3–SENC6	2/5 tone, DTMF signals.	O
78	MRDF	MSK data RX flag/flame detect signal to the baseband IC (M: IC6).	O
79–81	CENC0–CENC2	CTCSS/DTCS signals.	O
82	DAST	Strobe signal to the DAC (M: IC6).	O
88–91	COM4–COM1	LCD common terminals.	–
92–100	SEG32–24	LCD segment ports.	O

***; [C], [F], [I], [L] only**

SECTION 5 ADJUSTMENT PROCEDURE

5-1 PREPARATION

■ REQUIRED EQUIPMENTS

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
Cloning software	CS-F50V CLONING SOFTWARE (Revision 1.0 or later)	JIG cable (Modified OPC-966C/UC)	(See the page 5-3)
RF power meter (terminated type)	Measuring range : 0.1–10 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	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	Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
		AC millivoltmeter	Measuring range : 10 mV to 10 V
Modulation Analyzer	Frequency range : 30–300 MHz Measuring range : 0 to ±10 kHz	External speaker	Input impedance : 8 Ω Capacity : More than 1 W
Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV	Attenuator	Power attenuation : 30 dB Capacity : More than 10 W

■ CLONING ADJUSTMENT CHANNELS

Before starting adjustment, clone adjustment frequencies and other conditions into the transceiver using CS-F50V CLONING SOFTWARE as below.

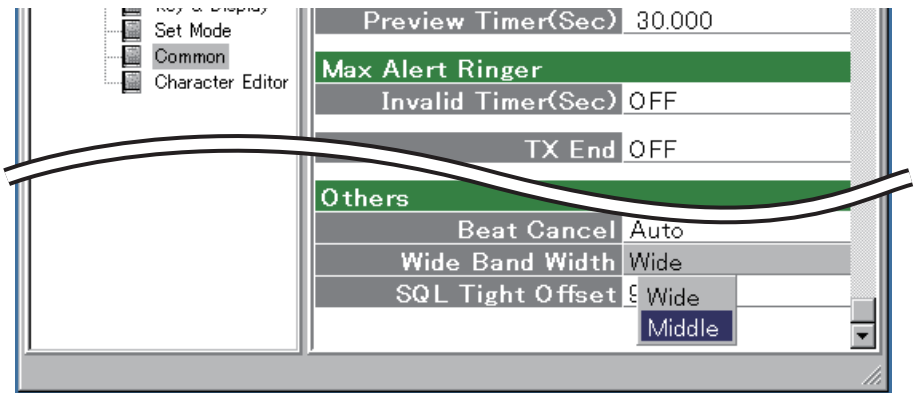
CAUTION!: BACK UP the originally programmed memory data in the transceiver before programming the adjustment frequencies. When program the adjustment frequencies into the transceiver, the transceiver's memory data will be overwritten and lose original memory data at the same time.

• ADJUSTMENT CHANNELS

Zone 1: (Left CH – 113)

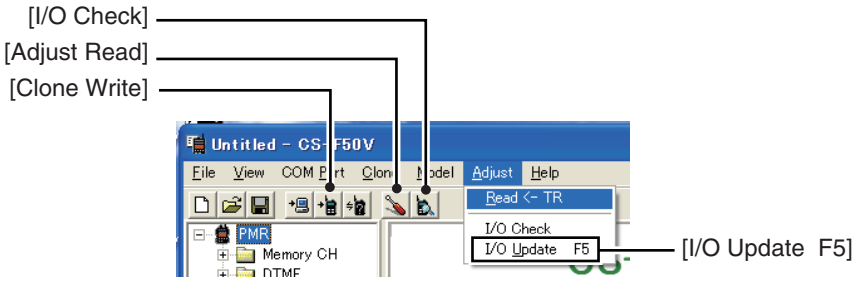
			Frequency (MHz)					C.Tone					
CH	Atr	Inh	RX	TX	TX Inh	W/N	SQL Tight	RX	TX	Text	Com-pander	TOT	RF PWR
1– 1	A		174.000000	<–		W				LV			L1
1– 2	B		174.000000	<–		W				REF			L1
1– 3			155.000000	<–		W				TX HI			H
1– 4			155.000000	<–		W				TX L2			L2
1– 5			155.000000	<–		W				TX L1			L1
1– 6			155.000000	<–		N				Mod N			L1
1– 7			155.000000	<–		W				Mod M			L1
1– 8			155.000000	<–		W				Mod W			L1
1– 9			174.000000	<–		N		007N	<–	BAL N			L1
1– 10			174.000000	<–		W		007N	<–	BAL M			L1
1– 11			174.000000	<–		W		007N	<–	BAL W			L1
1– 12			155.000000	<–		W			151.4	CT/DT			L1
1– 13			136.000000	<–	i	W				BPF			L1
1– 14			136.000000	<–	i	W				S-MTR			L1
1– 15			155.000000	<–	i	W				SQL			L1

NOTE: FOR [EUR], [EUR-01] AND [EUR-02], when adjust "Devation" and "Modulation Balance" in the middle band, change the bandwidth to "Middle" as below.

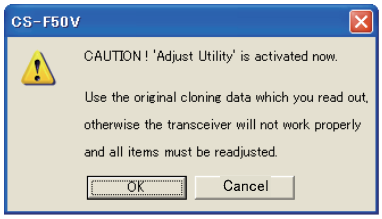


■ STARTING SOFTWARE ADJUSTMENT

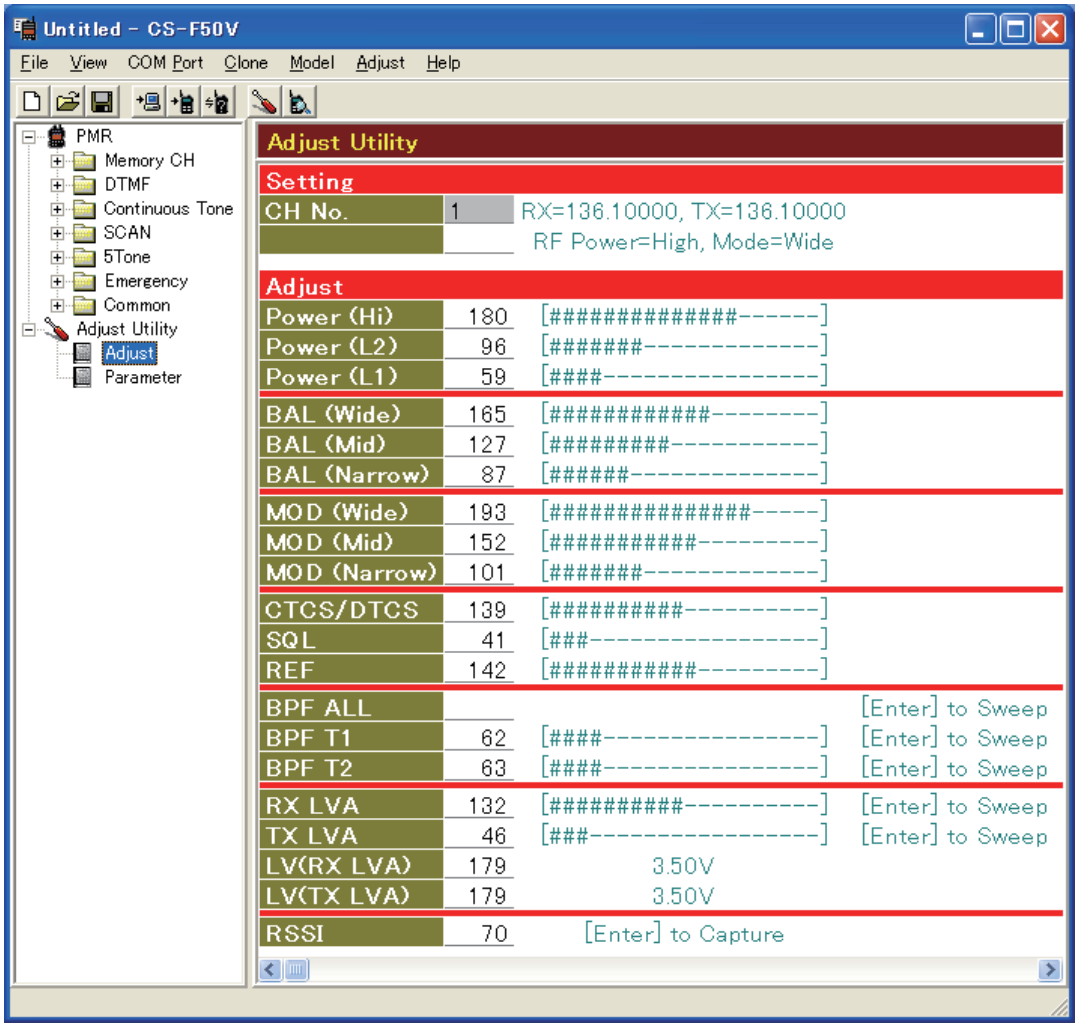
① Connect the transceiver and PC with OPC-966/U. (see the page 5-3)
② Turn the transceiver power ON.
③ Boot up Windows, and click the program group 'CS-F50V' in the 'Programs' folder of the [Start] menu, then CS-F50V's window appears. (Or click the shortcut 'CS-F50V' on the desktop.)
④ Click [Adjust Read] button.



⑤ The 'CAUTION' dialog appears. Click [OK].



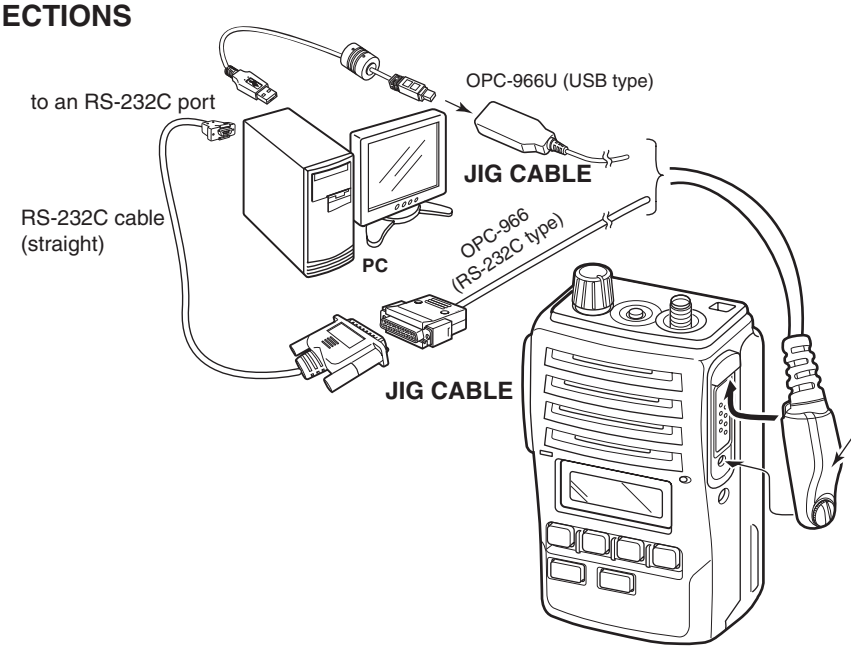
⑥ The adjustment window shows transceiver's condition and adjustment items as below.
⑦ Set or modify adjustment data as specified in the guidances (pages 5-4 to 5-12).



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

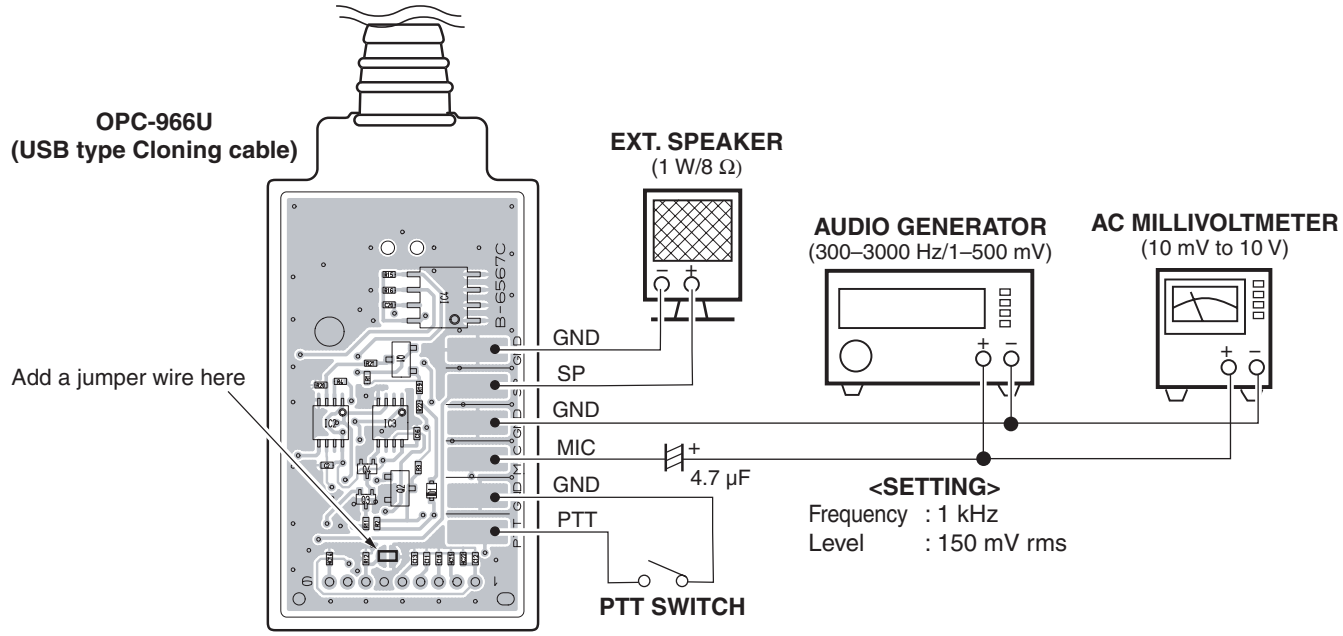
⑧ When the adjustment is completed, click [Clone Write] button.

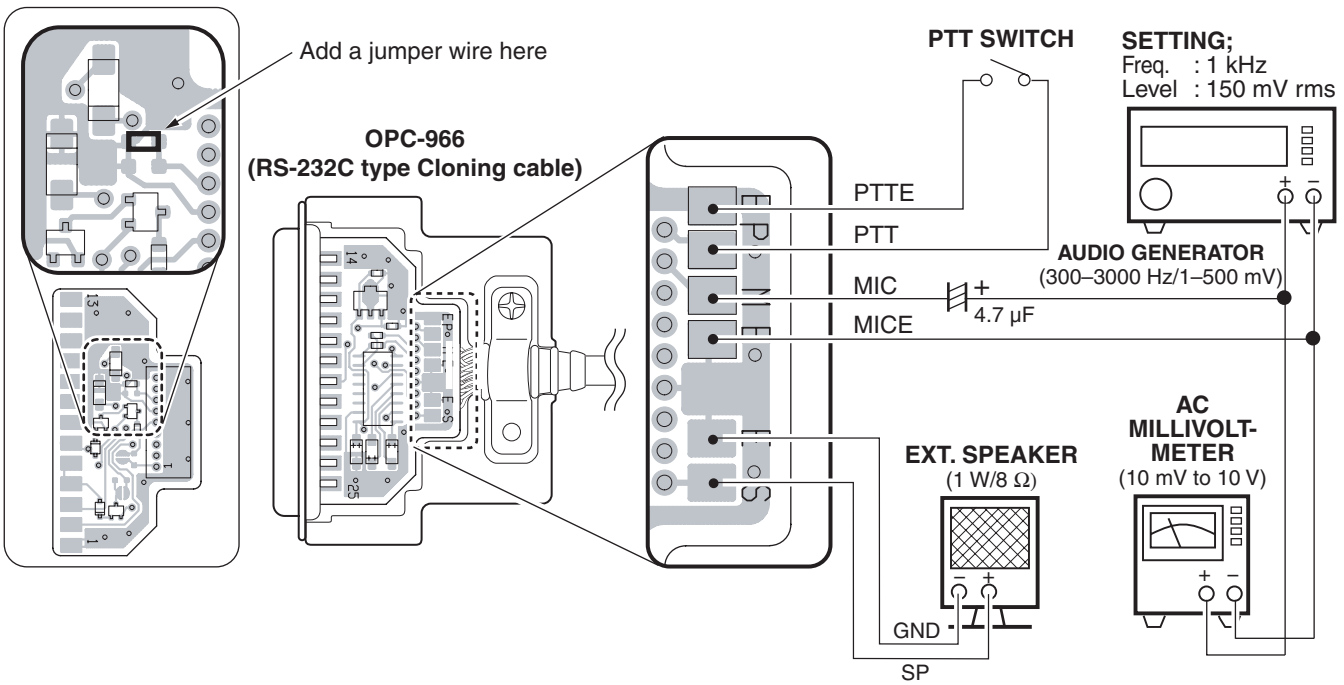
■ PC CONNECTIONS



CAUTION: Attach the [SP MIC] jack snugly, but do not overtighten.
An overtightened jack will damage the connector pins in the transceiver.

■ JIG CABLES



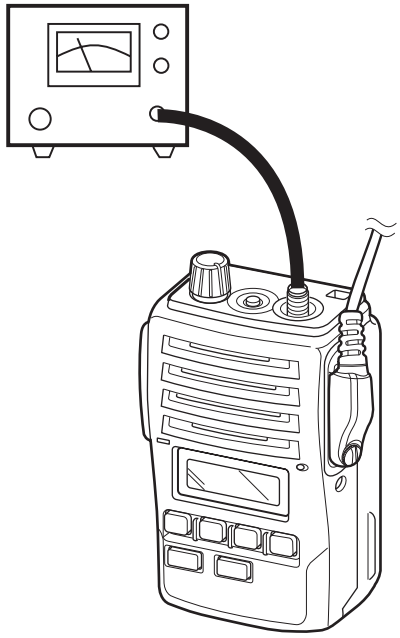


5-2 FREQUENCY ADJUSTMENT

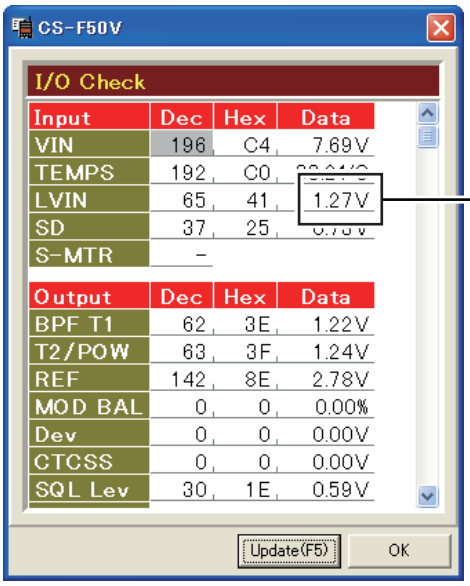
Select an adjustment item using [↑] / [↓] keys, then set to the specified value using [←] / [→] keys on the connected PC's keyboard.

ADJUSTMENT [ADJUST ITEM]		ADJUSTMENT CONDITION	OPERATION	VALUE
PLL LOCK VOLTAGE [RX LVA]	1	• Channel : 1-1 • Receiving	Click [I/O Update (F5)] in the [Adjust] menu (see the page 5-2), then check the "LVIN" item on the I/O check window as below.	3.5 V
[TX LVA]	2	• Channel : 1-1 • Connect an RF Power Meter to the antenna connector. • Transmitting		3.5 V
	CONVENIENT: The "PLL LOCK VOLTAGE" can be adjusted automatically. 1: Set the Lock voltage preset ([RX LVA] and [TX LVA]) to "179." 2: Push the [ENTER] key on the connected PC's keyboard.			
PLL LOCK VOLTAGE (verify)	1	• Channel : 1-13 • Receiving	Click [I/O Update (F5)] in the [Adjust] menu (see the page 5-2), then check the "LVIN" item on the I/O check window as below.	0.9–1.5 V (Verify)
	2	• Channel : 1-13 • Transmitting		0.9–1.5 V (Verify)

RF POWER METER
(10 W/50 Ω)



• I/O CHECK WINDOW

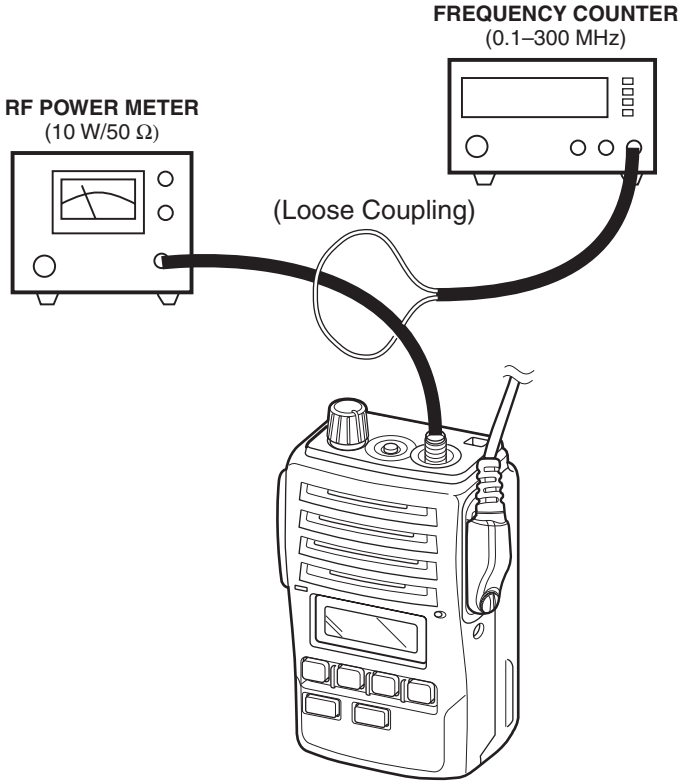


* This screen is an example only. Each transceiver has its own specific values for each setting.

5-2 FREQUENCY ADJUSTMENT (continued)

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

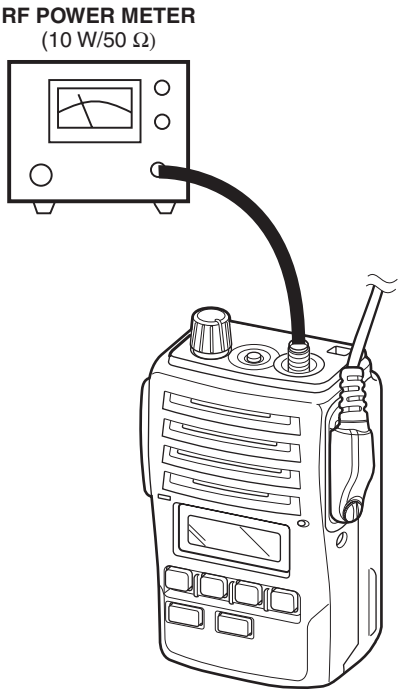
ADJUSTMENT [ADJUST ITEM]		ADJUSTMENT CONDITION	OPERATION	VALUE
REFERENCE FREQUENCY [REF]	1	• Channel : 1-2 • Connect an RF Power Meter to the antenna connector. • Transmitting	Loosely couple a Frequency Counter to the antenna connector.	174.000 MHz



5-3 TRANSMIT ADJUSTMENT

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

ADJUSTMENT [ADJUST ITEM]		ADJUSTMENT CONDITION	OPERATION	VALUE
TRANSMIT OUTPUT POWER (Hight) [Hi]	1	• Channel : 1-3 • Transmitting	Connect an RF power meter to the antenna connector.	5.0 W
(Low2) [L2]	2	• Channel : 1-4 • Transmitting		2.0 W
(Low1) [L1]	3	• Channel : 1-5 • Transmitting		1.0 W

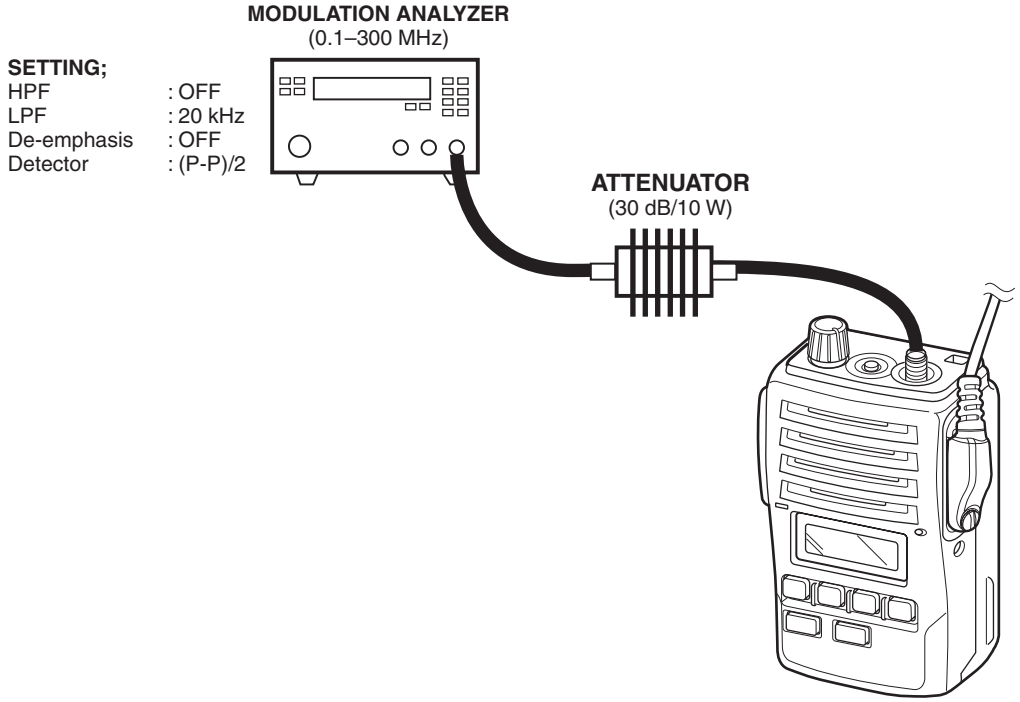


5-3 TRANSMIT ADJUSTMENT (continued)

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

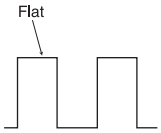
ADJUSTMENT [ADJUST ITEM]		ADJUSTMENT CONDITION	OPERATION	VALUE
FM DEVIATION (Narrow) [MOD(Narrow])	1	• Channel : 1-6 • Connect an Audio Generator and an AC Millivoltmeter to the JIG cable (see the page 5-3). • Transmitting	Connect an Modulation Analyzer to the antenna connector through an Attenuator.	±2.05 to 2.15 kHz
(Middle)* [MOD(Mid])	2	• Channel : 1-7 • Transmitting		±3.15 to 3.25 kHz
(Wide) [MOD(Wide])	3	• Channel : 1-8 • Transmitting		±4.05 to 4.15 kHz

*; [EUR], [EUR-01], [EUR-02] only

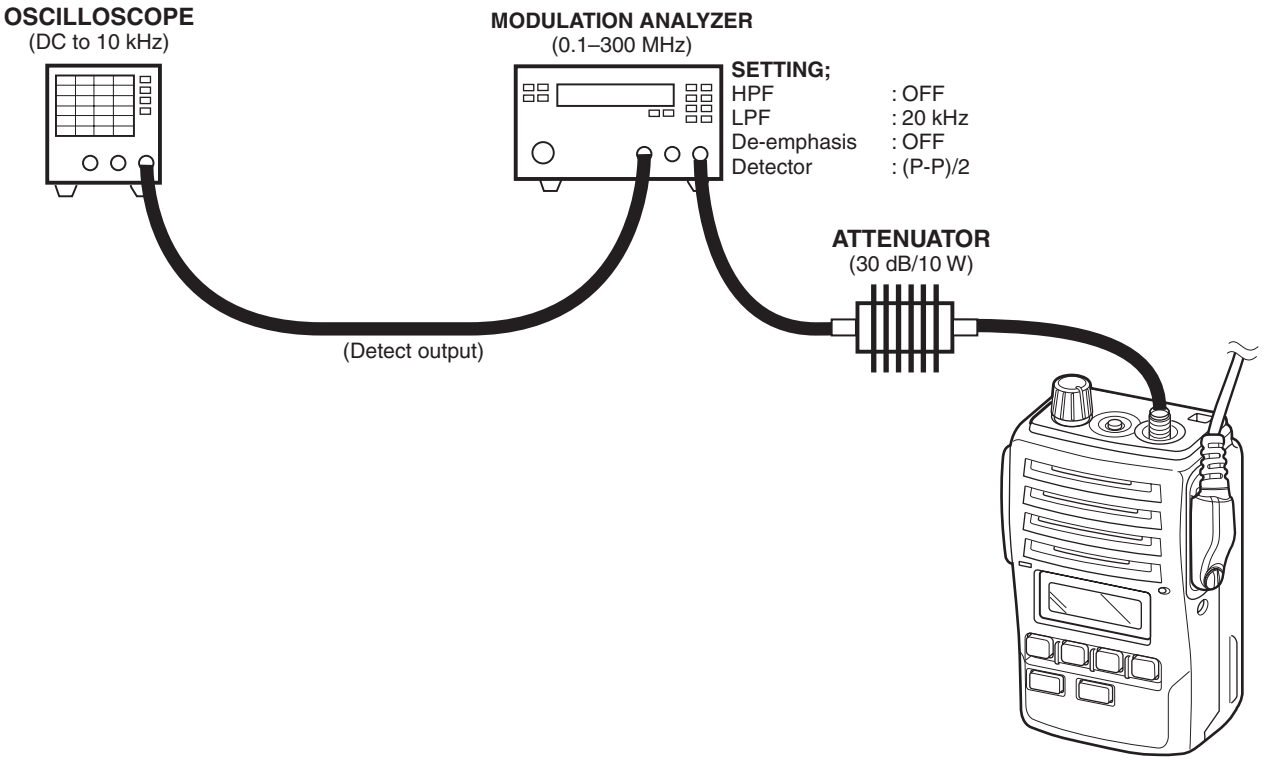


5-3 TRANSMIT ADJUSTMENT (continued)

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

ADJUSTMENT [ADJUST ITEM]		ADJUSTMENT CONDITION	OPERATION	VALUE
MODULATION BALANCE (Narrow) [BAL(Narrow])	1	• Channel : 1-9 • No audio signals are applied to the JIG cable. • Transmitting	Connect an Oscilloscope to the detect output terminal of the Modulation Analyzer.	Set to the square wave form 
(Middle)* [BAL(Mid])	2	• Channel : 1-10 • Transmitting		
(Wide) [BAL(Wide])	3	• Channel : 1-11 • Transmitting		

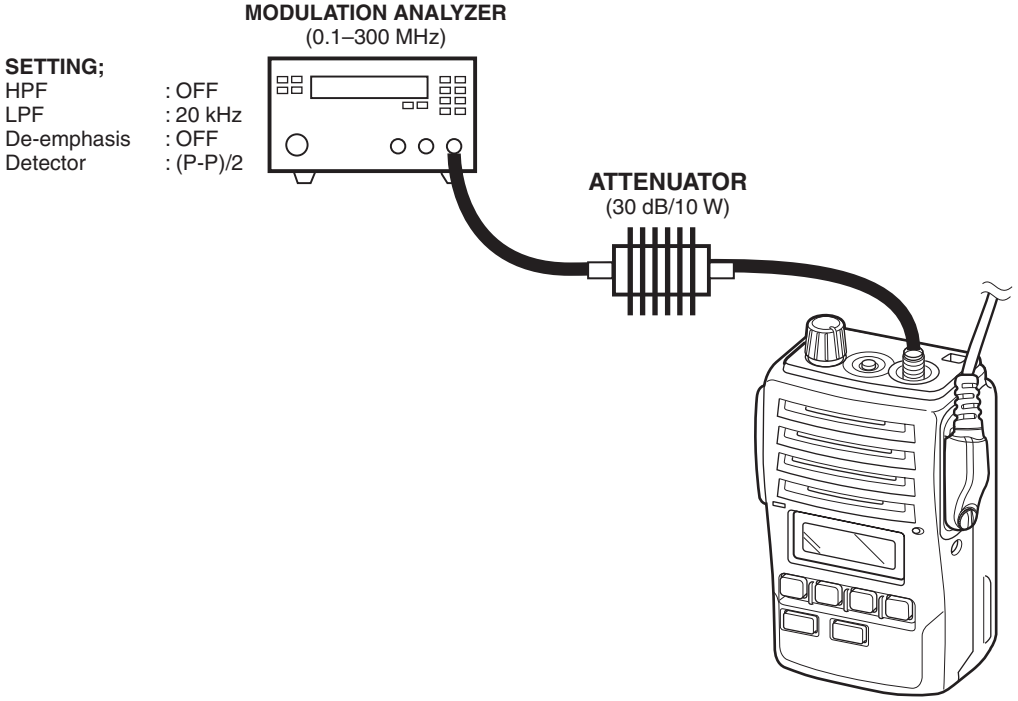
*; [EUR], [EUR-01], [EUR-02] only



5-3 TRANSMIT ADJUSTMENT (continued)

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

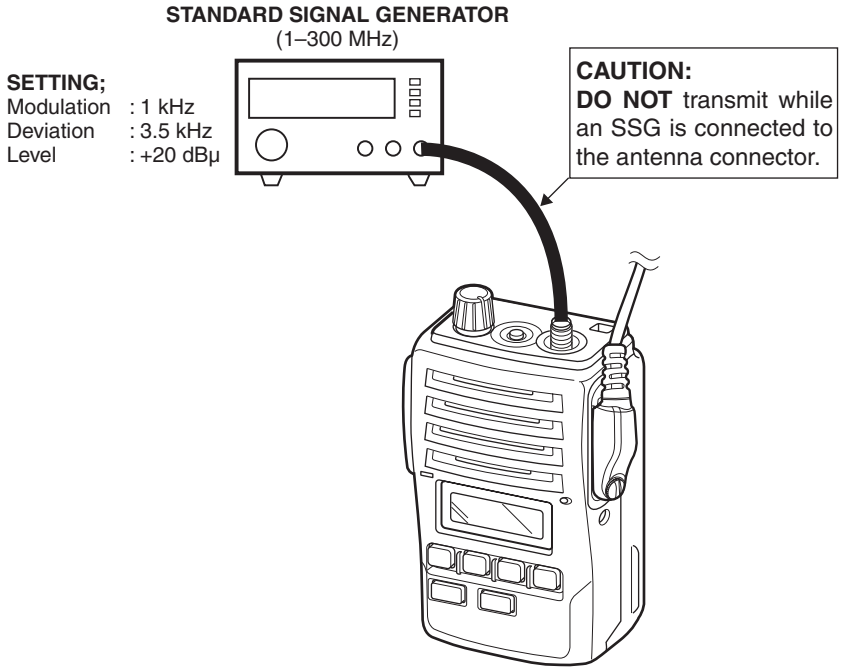
ADJUSTMENT [ADJUST ITEM]		ADJUSTMENT CONDITION	OPERATION	VALUE
CTCSS/DTCS DEVIATION [CTCSS/DTCS]	1	• Channel : 1-12 • No audio signals are applied to the JIG cable. • Transmitting	Connect a Modulation Analyzer to the antenna connector through an Attenuator.	±0.66 to 0.70 kHz



5-4 RECEIVE ADJUSTMENT

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

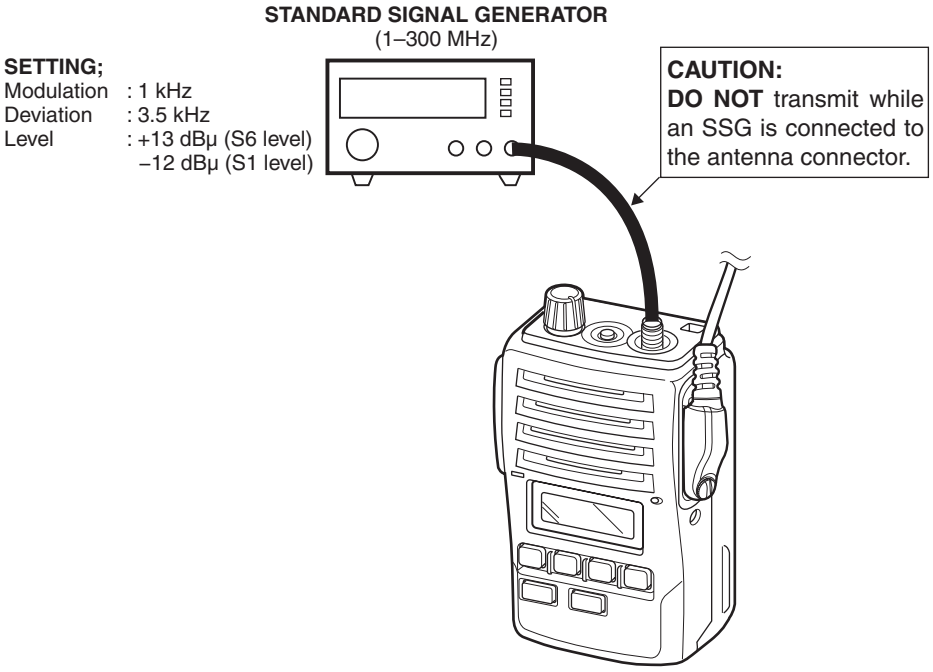
ADJUSTMENT [ADJUST ITEM]		ADJUSTMENT CONDITION	OPERATION	VALUE
RECEIVE SENSITIVITY [BPF T1]	1	• Channel : 1-13 • Connect a Standard Signal Generator to the antenna connector. • Receiving	Put the cursor on the [BPF T1], and push the return key.	(Automatic adjustment)
[BPF T2]	2		Put the cursor on the [BPF T2], and push the return key.	
	CONVENIENT: RECEIVE SENSITIVITY can be adjusted totally. Put the cursor on the [BPF ALL], and push the return key.			



5-4 RECEIVE ADJUSTMENT (continued)

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

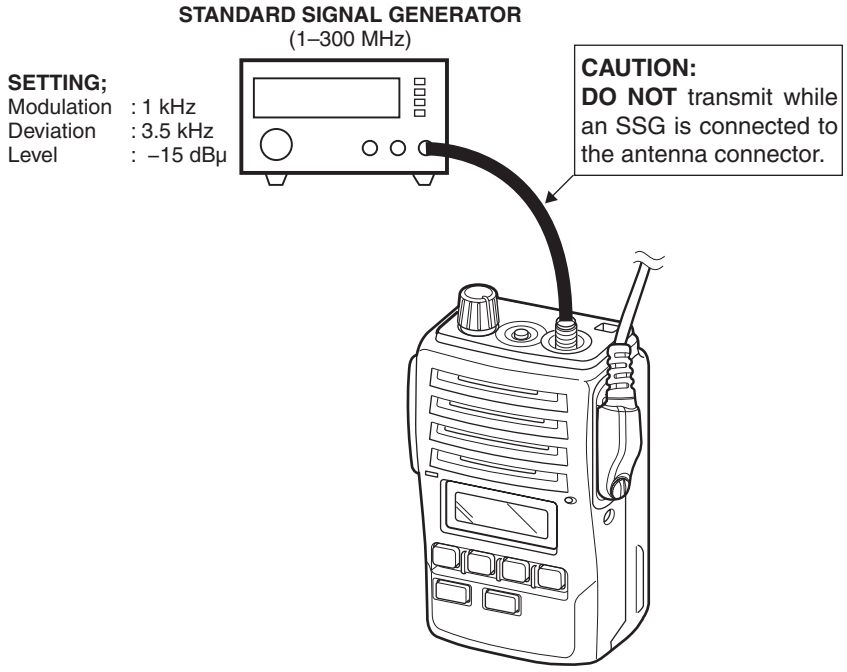
ADJUSTMENT [ADJUST ITEM]		ADJUSTMENT CONDITION	OPERATION	VALUE
S-METER [S-METER] (S6 LEVEL)	**NOTE:** "RECEIVE SENSITIVITY" must be adjusted before "S-METER." Otherwise, "S-METER" will not be adjusted properly.			
	1	• Channel : 1-14 • Connect a Standard Signal Generator to the antenna connector. • Set the SSG output level to "+13 dBμ (–94 dBm)." • Receiving	Push the return key to set the S6 level.	(Automatic adjustment)
[S-METER] (S1 LEVEL)	2	• Set the SSG output level to "–12 dBμ (–119 dBm)." • Receiving	Push the return key to set the S1 level.	



5-4 RECEIVE ADJUSTMENT (continued)

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

ADJUSTMENT [ADJUST ITEM]		ADJUSTMENT CONDITION	OPERATION	VALUE
SQUELCH [SQL]	1	• Channel : 1-15 • Connect a Standard Signal Generator to the antenna connector.	–	Set the [SQL] value to close squelch. Then set [SQL] value at the point where the audio signals just appear.



SECTION 6 PARTS LIST

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
IC401	1140010191	S.IC	HD64F2268TF20V	T	22.9/28
IC403	1110005340	S.IC	NJM12902V-TE1	T	16.9/42.9
IC405	1110006770	S.IC	TDA8547TS/N	T	25.8/53.2
IC406	1130011741	S.IC	TC7W66FK (TE85L,F)	T	8.1/42.4
IC407	1110005330	S.IC	NJM12904V-TE1	T	7.1/31.6
IC408	1110006260	S.IC	BD5242G-TR	T	32/18.5
IC409	1130012690	S.IC	HN58X24256FPIE (SOP8)	T	10.1/17.8
IC410	1130011760	S.IC	CD4094BPWR	T	40.6/36.3
IC411	1130013240	S.IC	TC75S51FU (TE85L,F)	T	6.2/21.3
Q401	1550000090	S.FET	RSQ035P03TR	T	36.3/43.7
Q402	1590003800	S.TR	KTC811U-GR-RTK/P	T	35/39.6
Q406	1590003790	S.TR	KRC404E RTK/P	T	20.9/50.7
Q407	1590003780	S.TR	KRA304E-RTK/P	T	42/31.3
Q408	1590003790	S.TR	KRC404E RTK/P	T	26/39.2
Q409	1590002370	S.TR	XP4111 (TX)	T	39.2/29
Q411	1590003790	S.TR	KRC404E RTK/P	T	29.3/18.8
Q412	1590003780	S.TR	KRA304E-RTK/P	T	14.3/17.6
Q413	1560001330	S.FET	RSR025N03	B	32.3/53
Q414	1590003790	S.TR	KRC404E RTK/P	T	40.8/41.8
Q415	1530003091	S.TR	2SC4213-B (TE85R,F)	B	23.9/51.1
D401	1790001250	S.DIO	MA2S111-(TX)	T	35.4/23.1
D402	1790001250	S.DIO	MA2S111-(TX)	T	35.1/18.1
D403	1790001250	S.DIO	MA2S111-(TX)	T	15/16
D404	1790001260	S.DIO	MA2S077-(TX)	T	37/24
D406	1790001250	S.DIO	MA2S111-(TX)	T	36.5/36
D407	1790001250	S.DIO	MA2S111-(TX)	T	9/23.1
X401	6050011720	S.XTL	CR-764 (19.6608 MHz)	T	42.6/18.8
R401	7030007290	S.RES	ERJ2GEJ 222 X (2.2 k)	T	9.9/44.3
R402	7030005060	S.RES	ERJ2GEJ 333 X (33 k)	T	10.7/52.2
R403	7030005120	S.RES	ERJ2GEJ 102 X (1 k)	T	34.3/22.3
R404	7030005120	S.RES	ERJ2GEJ 102 X (1 k)	T	35.8/20.2
R405	7030007340	S.RES	ERJ2GEJ 153 X (15 k)	T	9.6/35.1
R406	7030005210	S.RES	ERJ2GEJ 822 X (8.2 k)	T	10.5/36.4
R407	7030005230	S.RES	ERJ2GEJ 334 X (330 k)	T	7.4/27.3
R408	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	6.8/36.3
R409	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	36.3/21.4
R410	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	9.8/39.6
R411	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	13.8/20.4
R412	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	29.2/13.9
R413	7030005600	S.RES	ERJ2GEJ 273 X (27 k)	T	27.3/13.7
R414	7030005600	S.RES	ERJ2GEJ 273 X (27 k)	T	36.9/13.6
R415	7030005100	S.RES	ERJ2GEJ 154 X (150 k)	T	39/23.4
R416	7030005100	S.RES	ERJ2GEJ 154 X (150 k)	T	33.4/20.9
R417	7030005170	S.RES	ERJ2GEJ 474 X (470 k)	T	17.5/19
R418	7030005170	S.RES	ERJ2GEJ 474 X (470 k)	T	5.3/16.3
R420	7030005600	S.RES	ERJ2GEJ 273 X (27 k)	T	28.7/37.2
R421	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	29.9/36.5
R422	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	30.2/35.6
R423	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	31.5/36.5
R426	7030005160	S.RES	ERJ2GEJ 105 X (1 M)	T	12.3/35.3
R427	7030005240	S.RES	ERJ2GEJ 473 X (47 k)	T	14.5/37.8
R428	7030005240	S.RES	ERJ2GEJ 473 X (47 k)	T	13.8/36.9
R429	7030005040	S.RES	ERJ2GEJ 472 X (4.7 k)	T	12.3/36.2
R430	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	12.9/40.2
R432	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	14.5/39.6
R433	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	12.2/42.1
R434	7030005000	S.RES	ERJ2GEJ 471 X (470)	B	35/55.4
R437	7030005120	S.RES	ERJ2GEJ 102 X (1 k)	T	32.9/38.4
R438	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	34.7/37.7
R439	7030007290	S.RES	ERJ2GEJ 222 X (2.2 k)	T	36.8/40.2
R440	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	36.1/33.4
R441	7030005070	S.RES	ERJ2GEJ 683 X (68 k)	T	37.3/33.7
R445	7030004980	S.RES	ERJ2GEJ 101 X (100)	B	32.3/55.2
R446	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	B	30.1/52.1
R455	7030005000	S.RES	ERJ2GEJ 471 X (470)	T	43.2/27.8
R456	7030004980	S.RES	ERJ2GEJ 101 X (100)	T	43.2/28.7
R457	7030005000	S.RES	ERJ2GEJ 471 X (470)	B	45.2/48.4
R458	7030005120	S.RES	ERJ2GEJ 102 X (1 k)	B	43.9/49.9
R461	7030008300	S.RES	ERJ2GEJ 184 X (180 k)	T	33.2/32.4
R462	7030005720	S.RES	ERJ2GEJ 563 X (56 k)	T	32/33.2
R463	7030005220	S.RES	ERJ2GEJ 223 X (22 k)	T	31.1/33.6
R464	7030005220	S.RES	ERJ2GEJ 223 X (22 k)	T	31.5/34.8
R465	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	33.2/34.7
R466	7030005240	S.RES	ERJ2GEJ 473 X (47 k)	T	23.9/41.3
R467	7030005240	S.RES	ERJ2GEJ 473 X (47 k)	T	23/41.3
R468	7030005240	S.RES	ERJ2GEJ 473 X (47 k)	T	21.2/41.3
R469	7030005040	S.RES	ERJ2GEJ 472 X (4.7 k)	T	18.5/39
R470	7030005240	S.RES	ERJ2GEJ 473 X (47 k)	T	19.7/38.6
R471	7030005110	S.RES	ERJ2GEJ 224 X (220 k)	T	34.5/24.7
R472	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	33.6/24.7
R473	7030005240	S.RES	ERJ2GEJ 473 X (47 k)	T	32.7/24.7
R474	7030005220	S.RES	ERJ2GEJ 223 X (22 k)	T	31.8/24.3
R475	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	35.7/24.8
R476	7030005070	S.RES	ERJ2GEJ 683 X (68 k)	T	23.3/46.1
R477	7030005070	S.RES	ERJ2GEJ 683 X (68 k)	T	21.7/46.1
R478	7030005070	S.RES	ERJ2GEJ 683 X (68 k)	T	21.2/44.6
R479	7030005070	S.RES	ERJ2GEJ 683 X (68 k)	T	18.3/46.2
R480	7030005070	S.RES	ERJ2GEJ 683 X (68 k)	T	12.5/45
R482	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	36.5/32
R483	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	15.8/21.8

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
R484	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	15.6/20.9
R485	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	14.2/21.7
R486	7410001130	S.ARY	EXB28V102JX	T	13.6/24.7
R487	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	33.9/23.5
R488	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	31.9/31.3
R489	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	32.9/31.2
R490	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	33.8/31.2
R491	7030005530	S.RES	ERJ2GEJ 100 X (10)	T	38.5/18.4
R492	7030005160	S.RES	ERJ2GEJ 105 X (1 M)	T	38.5/20.1
R493	7030008010	S.RES	ERJ2GEJ 123 X (12 k)	T	37.6/19.3
R494	7030008010	S.RES	ERJ2GEJ 123 X (12 k)	T	38.4/25.8
R495	7030008010	S.RES	ERJ2GEJ 123 X (12 k)	T	37.2/20.5
R496	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	11.3/22.8
R497	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	11.9/21.9
R500	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	29/21.1
R501	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	28.1/20.3
R502	7030010080	S.RES	ERJ2RHD 104 X (100 k)	T	38.4/14.3
R503	7030010080	S.RES	ERJ2RHD 104 X (100 k)	T	39.3/14.3
R506	7030007300	S.RES	ERJ2GEJ 332 X (3.3 k)	T	7.6/23.9
R507	7030005600	S.RES	ERJ2GEJ 273 X (27 k)	T	7.6/24.8
R508	7030007290	S.RES	ERJ2GEJ 222 X (2.2 k)	T	5/25.7
R509	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	26.2/18.9
R511	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	9.6/33.2
R512	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	6.2/26.9
R513	7030009290	S.RES	ERJ2GEJ 562 X (5.6 k)	T	7.7/36.3
R515	7520000270	S.POS	PRG21BC4R7MM1RA	T	34.2/46.7
R516	7030007290	S.RES	ERJ2GEJ 222 X (2.2 k)	T	37/38.7
R517	7030008010	S.RES	ERJ2GEJ 123 X (12 k)	T	31.1/50.8
R518	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	30.7/48.7
R519	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	30.4/53.8
R520	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	30.4/52.2
R521	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	30.5/55.1
R522	7030005100	S.RES	ERJ2GEJ 154 X (150 k)	T	30.2/49.6
R523	7030005120	S.RES	ERJ2GEJ 102 X (1 k)	T	21.1/52.3
R524	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	21.1/53.7
R525	7030005090	S.RES	ERJ2GEJ 104 X (100 k)	T	21.5/54.9
R526	7030007340	S.RES	ERJ2GEJ 153 X (15 k)	T	5/24.8
R527	7030005230	S.RES	ERJ2GEJ 334 X (330 k)	T	5/23.9
R528	7030009140	S.RES	ERJ2GEJ 272 X (2.7 k)	T	5/19.6
R529	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	6.6/19.6
R530	7030005160	S.RES	ERJ2GEJ 105 X (1 M)	T	10.4/24.2
R532	7030005700	S.RES	ERJ2GEJ 274 X (270 k)	T	36.7/41.5
R533	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	35.1/41.5
R534	7030005170	S.RES	ERJ2GEJ 474 X (470 k)	T	36.9/34.9
R535	7030005070	S.RES	ERJ2GEJ 683 X (68 k)	T	11.9/33.5
R537	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	B	22/50.7
R538	7030005060	S.RES	ERJ2GEJ 333 X (33 k)	B	22/52.3
R539	7030005040	S.RES	ERJ2GEJ 472 X (4.7 k)	B	25.5/52.8
R541	7030005050	S.RES	ERJ2GEJ 103 X (10 k)	T	10.3/53.4
C401	4030017460	S.CER	ECJ0EB1E102K	T	10.7/51.3
C402	4030017460	S.CER	ECJ0EB1E102K	T	15/20
C403	4030017460	S.CER	ECJ0EB1E102K	T	31/22.6
C404	4030017460	S.CER	ECJ0EB1E102K	T	10.3/43.1
C405	4030017760	S.CER	ECJ0EB1H222K	T	10.5/34.8
C406	4030018110	S.CER	ECJ0EB1H272K	T	9.6/36.7
C407	4030017430	S.CER	ECJ0EC1H101J	T	7.4/26.4
C408	4030016930	S.CER	ECJ0EB1A104K	T	29.6/37.7
C409	4030016930	S.CER	ECJ0EB1A104K	T	27.8/37.6
C410	4030016930	S.CER	ECJ0EB1A104K	T	30.5/37.7
C411	4030016930	S.CER	ECJ0EB1A104K	T	31.7/37.4
C412	4030016930	S.CER	ECJ0EB1A104K	T	36.7/19.3
C413	4030016930	S.CER	ECJ0EB1A104K	T	38.1/24.6
C414	4030017640	S.CER	ECJ0EC1H150J	T	38.1/21.4
C415	4030016790	S.CER	ECJ0EB1C103K	T	34.6/20.2
C416	4030017630	S.CER	ECJ0EC1H120J	T	39.4/19.2
C417	4030017580	S.CER	ECJ0EC1H060C	T	39.4/20.8
C418	4030016930	S.CER	ECJ0EB1A104K	T	39/24.6
C419	4550006050	S.TAN	TEESVA 0J 106M8R	T	24.6/16.9
C420	4030016930	S.CER	ECJ0EB1A104K	T	24.9/18.5
C421	4030016930	S.CER	ECJ0EB1A104K	T	13.5/35.7
C423	4030018890	S.CER	ECJ0EB0J224K	T	12.9/39.2
C425	4030017440	S.CER	ECJ0EC1H221J	T	14.5/38.7
C426	4030017460	S.CER	ECJ0EB1E102K	B	35.6/54.2
C427	4550007080	S.TAN	TEESVA 1C 106M8R	T	40.6/44.3
C428	4030016930	S.CER	ECJ0EB1A104K	T	37.6/47
C429	4030017460	S.CER	ECJ0EB1E102K	T	36.7/47
C430	4030017460	S.CER	ECJ0EB1E102K	T	34.7/36.8
C431	4030016790	S.CER	ECJ0EB1C103K	T	32.9/39.3
C432	4030017460	S.CER	ECJ0EB1E102K	T	38.9/42.7
C435	4550006760	S.TAN	TEESVB21A336M8R	T	18.5/54.3
C437	4030018860	S.CER	ECJ0EB0J105K	B	34.1/55.4
C441	4030016780	S.CER	ECJ0EB1C153K	T	23.4/42.9
C442	4030016930	S.CER	ECJ0EB1A104K	T	22.1/41.3
C443	4030017740	S.CER	ECJ0EB1E821K	T	22.2/42.5
C444	4030016930	S.CER	ECJ0EB1A104K	T	19.7/39.5
C445	4030017460	S.CER	ECJ0EB1E102K	T	33.2/33.8
C446	4030017460	S.CER	ECJ0EB1E102K	T	22.5/45.2
C447	4030017760	S.CER	ECJ0EB1H222K	T	20.1/45.7
C448	4030017690	S.CER	ECJ0EC1H121J	T	22.5/44.3
C449	4030017770	S.CER	ECJ0EB1E332K	T	13.7/45.7
C450	4030017420	S.CER	ECJ0EC1H470J	T	12.2/43.7
C461	4030017420	S.CER	ECJ0EC1H470J	T	39/22.5
C462	4030017420	S.CER	ECJ0EC1H470J	T	32/21
C463	4030017420	S.CER	ECJ0EC1H470J	T	17.5/19.9
C464	4030017420	S.CER	ECJ0EC1H470J	T	4.4/16.3
C465	4030017420	S.CER	ECJ0EC1H470J	T	26.4/13.7

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

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
C466	4030017420	S.CER	ECJ0EC1H470J	T	36.9/14.5
C467	4030017420	S.CER	ECJ0EC1H470J	T	30.5/13.1
C468	4030017420	S.CER	ECJ0EC1H470J	T	40.4/11.5
C473	4030016790	S.CER	ECJ0EB1C103K	T	38.1/15.9
C474	4030018860	S.CER	ECJ0EB0J105K	T	5/26.6
C475	4030017460	S.CER	ECJ0EB1E102K	T	33/45.4
C476	4030017460	S.CER	ECJ0EB1E102K	T	29.9/21.9
C477	4030017420	S.CER	ECJ0EC1H470J	T	33.3/44.1
C478	4030017420	S.CER	ECJ0EC1H470J	T	33.5/41.9
C479	4030017460	S.CER	ECJ0EB1E102K	T	27.8/17.7
C481	4030017460	S.CER	ECJ0EB1E102K	T	6.4/38.1
C482	4030017460	S.CER	ECJ0EB1E102K	T	11.8/41.2
C483	4030017460	S.CER	ECJ0EB1E102K	T	38.8/41.8
C485	4030017460	S.CER	ECJ0EB1E102K	T	33.7/48
C486	4030017460	S.CER	ECJ0EB1E102K	T	32.1/47.5
C487	4030017460	S.CER	ECJ0EB1E102K	T	34.4/35.9
C488	4030017460	S.CER	ECJ0EB1E102K	T	22.1/43.4
C489	4030017460	S.CER	ECJ0EB1E102K	T	9.9/30.9
C490	4030017460	S.CER	ECJ0EB1E102K	T	40.3/27
C491	4030017460	S.CER	ECJ0EB1E102K	T	37.3/37.3
C492	4030017460	S.CER	ECJ0EB1E102K	T	6.8/18.2
C493	4030016930	S.CER	ECJ0EB1A104K	T	17.4/34.7
C494	4030017460	S.CER	ECJ0EB1E102K	T	39.6/67.3
C495	4030017460	S.CER	ECJ0EB1E102K	T	10/40.5
C496	4550006760	S.TAN	TEESVB21A336M8R	T	13.2/54.7
C497	4030018390	S.CER	ECJ0EB1A563K	T	8.1/37.9
C498	4030017430	S.CER	ECJ0EC1H101J	T	10.5/33.2
C499	4030017420	S.CER	ECJ0EC1H470J	T	15.4/36.9
C500	4030016930	S.CER	ECJ0EB1A104K	T	9.3/37.9
C501	4030017730	S.CER	ECJ0EB1E471K	T	35.1/13.2
C502	4030016930	S.CER	ECJ0EB1A104K	T	31.9/49.6
C503	4030018860	S.CER	ECJ0EB0J105K	T	32.3/48.7
C504	4550007080	S.TAN	TEESVA 1C 106M8R	T	40.6/46.4
C505	4030016960	S.CER	ECJ0EB1C183K	T	6.3/25.3
C506	4030016960	S.CER	ECJ0EB1C183K	T	6.3/23.4
C507	4030017730	S.CER	ECJ0EB1E471K	T	5/23
C508	4030017730	S.CER	ECJ0EB1E471K	T	11.3/24.2
C510	4550000460	S.TAN	TEESVA 1C 105M8R	T	23.5/48.6
C512	4030018860	S.CER	ECJ0EB0J105K	B	22.3/49.5
C513	4030018860	S.CER	ECJ0EB0J105K	B	25.9/51.5
J401	6510026130	S.CNR	IMSA-9681S-36Y900	T	30.9/6.2
J402	6510023831	S.CNR	(G) SM04B-SRSS-TB(LF)(SN)	T	34.9/52.5
J403	6510026140	S.CNR	11FH-SM1-TB (LF) (SN)	T	29/43.5
DS401	5030002730	LCD	L3-0048TAY-5		
DS402	5040002420	S.LED	SML-310MT T86	B	13.5/16.1
DS403	5040002420	S.LED	SML-310MT T86	B	32.7/15.3
DS404	5040002961	S.LED	SML-A12MT T86J	B	6.2/38
DS405	5040002961	S.LED	SML-A12MT T86J	B	42.8/38
DS406	5040002670	S.LED	CL-165HR/YG	B	45.3/50.2
MC401	7700002760	MIC	EM6027P-46C33-G-01 <HOR>		
S401	2260002840	SW	SKHLLFA010		
SP401	2510001330	SP	036D0803 <FG>		
W401	8900016840	CBL	OPC-1753 (P0.5,N36,L70) <TJM>		
W402	7120000470	JMP	ERDS2T0		
W403	7120000470	JMP	ERDS2T0		
W404	8900017120	CBL	OPC-1754 (P0.5,N11,L35) <TJM>		
EP402	8930061530	LCT	SRCN-2681-SP-N-W		

[VR UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
R601	7210003130	VAR	TP76N97N-13F-10KA-2497		
W601	8900012340	CBL	OPC-1260		

[CONNECT UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
D701	1790001810	S.VSR	AVR-M1005C080MTABB	T	9.5/31.8
D702	1790001810	S.VSR	AVR-M1005C080MTABB	T	9.2/32.8
D703	1790001810	S.VSR	AVR-M1005C080MTABB	T	4.7/32.3
D704	1790001810	S.VSR	AVR-M1005C080MTABB	T	3.4/32
D705	1790001810	S.VSR	AVR-M1005C080MTABB	T	4.8/20.7
R701	7410001130	S.ARY	EXB28V102JX	T	6.5/32.5
C701	4030017460	S.CER	ECJ0EB1E102K	T	4.6/9.9
C702	4030017460	S.CER	ECJ0EB1E102K	T	4.4/14.2
C704	4030017460	S.CER	ECJ0EB1E102K	T	3.9/17.1
J1	6510026140	S.CNR	11FH-SM1-TB (LF) (SN)	T	3.6/37.1
EP701	6910016330	S.BEA	MMZ1005S 601CT-S	T	6.4/9.9
EP702	6910016330	S.BEA	MMZ1005S 601CT-S	T	4.8/12.9
EP703	6910016330	S.BEA	MMZ1005S 601CT-S	T	4.9/16.5
EP704	6910016330	S.BEA	MMZ1005S 601CT-S	T	4.4/18.4
EP705	6910016330	S.BEA	MMZ1005S 601CT-S	T	4.8/19.4

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
IC1	1110003201	S.IC TA31136FNG (EL)	B	19.1/9.1
IC2	1110002751	S.IC TA75S01F (TE85R,F)	T	52.3/18.1
IC4	1140005991	S.IC MB15A02PFV1-G-BND-ERE1	B	28.7/24.1
IC5	1110005330	S.IC NJM12904V-TE1	T	34.3/9.3
IC6	1190000350	S.IC M62363FP-650C	T	25.2/8.9
IC7	1190001860	S.IC EW-460-FT	B	50.7/39.9
IC9	1110005350	S.IC NJM2870F05-TE1-#FZZB	T	73.8/28.6
IC10	1110006221	S.IC AK2346P-E2/P	T	18.9/25.1
IC11	1130009981	S.IC TC7W53FK (TE85L,F)	T	25.2/29.2
IC12	1130011760	S.IC CD4094BPWR	T	17.2/35.8
IC16	1110005330	S.IC NJM12904V-TE1	T	30/29.1
IC17	1130004201	S.IC TC4S66F (TE85R,F)	T	29.5/35.7
IC18	1190002660	S.IC ISD4004-08MEYI [C], [I], [F], [L] only	B	13.1/36.5
IC19	1180002391	S.REG S-812C33AMC-C2N-G [C], [I], [F], [L] only	B	24.5/41
Q1	1560000841	S.FET 2SK1829 (TE85R,F)	T	46.4/10.8
Q2	1580000731	S.FET 3SK293 (TE85L,F)	T	47.3/8.2
Q3	1580000800	S.FET 3SK324UG-TL-E	B	41.2/9.1
Q4	1530002601	S.TR 2SC4215-O (TE85R,F)	B	23.9/4.1
Q6	1590001650	S.TR XP4601 (TX)	B	5.9/26.7
Q7	1560001232	S.FET RD07MVS2-T112	T	59.8/21.9
Q8	1560001241	S.FET RD01MUS1-T113	T	60.2/28
Q9	1530003421	S.TR 2SC5110-O (TE85R,F)	B	52.4/29
Q10	1530003311	S.TR 2SC5107-O (TE85R,F)	B	47.9/21.9
Q11	1530003311	S.TR 2SC5107-O (TE85R,F)	T	43.7/32.1
Q12	1530003311	S.TR 2SC5107-O (TE85R,F)	B	47.6/29.5
Q13	1530002920	S.TR 2SC4226-T1 R25	B	45/22.4
Q14	1530002920	S.TR 2SC4226-T1 R25	B	43.9/29.9
Q15	1590001400	S.TR XP1214 (TX)	T	45.8/26.2
Q16	1590003790	S.TR KRC404E RTK/P	T	43.4/27
Q17	1530003900	S.TR KTC4075 BL-RTK/P	B	47.4/37.1
Q18	1560000541	S.FET 2SK880-Y (T5RICOM,F)	T	46.4/17.3
Q19	1530003900	S.TR KTC4075 BL-RTK/P	B	26/15.9
Q21	1510001090	S.TR KTA2015Y-RTK/P	B	52.8/36.5
Q22	1510001090	S.TR KTA2015Y-RTK/P	B	31.9/37.9
Q23	1520000840	S.TR KTA1664Y-RTF/P	B	72.1/25.4
Q24	1590003800	S.TR KTC811U-GR-RTK/P	B	72.1/29.2
Q25	1590003780	S.TR KRA304E-RTK/P	B	68.8/31.6
Q26	1550000090	S.FET RSQ035P03TR	T	72.9/25.1
Q29	1590003790	S.TR KRC404E RTK/P	B	54.6/39.7
Q30	1530003900	S.TR KTC4075 BL-RTK/P [C], [I], [F], [L] only	B	36.7/40.4
Q31	1520000840	S.TR KTA1664Y-RTF/P [B], [H], [E], [K], [C], [I], [F], [L] only	B	41.1/39.7
D1	1790001670	S.DIO RB706F-40T106	B	55.5/12.3
D2	1750000581	S.DIO 1SV307 (TPH3,F)	B	59.8/8.3
D4	1750000721	S.VCP HVC375BTRF-E	T	50.2/5.6
D5	1750000581	S.DIO 1SV307 (TPH3,F)	B	57/3.5
D6	1790001260	S.DIO MA2S077-(TX)	T	59.9/7.9
D7	1790001240	S.DIO MA2S728-(TX)	T	56.6/7.9
D8	1750000721	S.VCP HVC375BTRF-E	T	54.6/5.6
D9	1750000711	S.VCP HVC350BTRF-E	T	43.2/5.6
D10	1750000711	S.VCP HVC350BTRF-E	T	38.8/5.6
D12	1790001250	S.DIO MA2S111-(TX)	B	47.6/40.1
D14	1790001260	S.DIO MA2S077-(TX)	B	51.8/23.7
D15	1790001260	S.DIO MA2S077-(TX)	B	51.8/18
D16	1750000771	S.VCP HVC376BTRF-E	B	40.6/20.5
D17	1750000771	S.VCP HVC376BTRF-E	B	42.8/21.8
D18	1720000471	S.VCP 1SV239 (TPH3,F)	T	37.9/21.5
D19	1750000771	S.VCP HVC376BTRF-E	B	40.8/27.4
D20	1750000771	S.VCP HVC376BTRF-E	B	40.8/28.8
D21	1750000721	S.VCP HVC375BTRF-E	B	37.2/22.7
D22	1750000721	S.VCP HVC375BTRF-E	B	37.2/29.4
D23	1790001250	S.DIO MA2S111-(TX)	T	42.1/8.7
D24	1790001250	S.DIO MA2S111-(TX)	B	32.5/29.2
D25	1790001250	S.DIO MA2S111-(TX)	T	53.3/15
D26	1790000980	S.DIO MA742 (TX)	B	28/1.8
FI1	2030000150	S.MLH FL-335 (46.350 MHz)	B	32.4/5.8
FI2	2020002160	S.CER CFWKA450KFFA-R0	B	19.7/21
X1	6070000191	S.DCR CDBKB450KCAY24-R0	T	16.9/9.6
X2	6050011940	S.XTL CR-783 (15.3 MHz)	B	28.4/33.4
X4	6050011730	S.XTL CR-765 (3.6864 MHz)	B	16.6/29.6
L1	6200012780	S.COL 0.30-1.4-6TL 27.2N	B	67.8/7
L2	6200012770	S.COL 0.26-1.1-7TR 24N	B	63.4/5.5
L3	6200012470	S.COL 0.30-1.7-7TL 45.3N	B	62/11.4
L4	6200012390	S.COL 0.30-0.92-3TR 5.8N	B	67.4/13.4
L5	6200012470	S.COL 0.30-1.7-7TL 45.3N	B	57.3/5.8
L6	6200005711	S.COL ELJRE 27NGFA	B	56.5/7.9
L7	6200008090	S.COL LQW2BHN68NJ03L	B	53.6/4.5
L8	6200008090	S.COL LQW2BHN68NJ03L	B	50.9/4.5
L9	6200007750	S.COL LQW2BHN56NJ03L	B	47.3/7.7
L11	6200007750	S.COL LQW2BHN56NJ03L	B	41.3/5.2
L12	6200008090	S.COL LQW2BHN68NJ03L	B	44.1/11.3
L13	6200007850	S.COL ELJNC R82K-F	B	38.1/11.7
L14	6200005681	S.COL ELJRE 15NGFA	B	47.8/12.1
L15	6200002861	S.COL NLV25T-4R7J	B	57.2/9.8
L16	6200012400	S.COL 0.30-0.91-4TL 8.6N	B	68.6/18.3
L17	6200013100	S.COL 0.45-1.5-5TL 18.3N	B	67.3/21.4
L18	6200005701	S.COL ELJRE 22NGFA	T	65.5/26.5
L19	6200005741	S.COL ELJRE 47NGFA	B	54.4/29
L20	6200003590	S.COL EXCCL3225U1	B	71.9/21.4
L21	6200009181	S.COL ELJRE R10JFA	T	47.8/21.4
L22	6200009181	S.COL ELJRE R10JFA	B	47.7/27.6

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
L24	6200003640	S.COL MLF1608E 100K-T	B	41.4/24.4
L25	6200007760	S.COL LQW2BHN82NJ03L	B	38.8/24.9
L26	6200008090	S.COL LQW2BHN68NJ03L	B	37.8/31.6
L27	6200007170	S.COL MLF1608A 3R3K-T	T	41/21.9
L28	6200007170	S.COL MLF1608A 3R3K-T	T	40.4/25.1
L31	6200009181	S.COL ELJRE R10JFA	T	58.8/4.8
L32	6200005721	S.COL ELJRE 33NGFA	T	37.1/32.1
L33	6200004480	S.COL MLF1608D R82K-T	B	27.3/12.7
L35	6200003540	S.COL MLF1608D R22K-T	B	27.8/18.1
L37	6200003640	S.COL MLF1608E 100K-T	B	40.8/30.1
L38	6200008090	S.COL LQW2BHN68NJ03L	B	37.7/21
L39	6200007720	S.COL LQW2BHN33NJ03L	B	37.9/27.7
L41	6200009181	S.COL ELJRE R10JFA	T	41.3/30.9
L42	6200007170	S.COL MLF1608A 3R3K-T	T	36.6/28.5
L43	6200007170	S.COL MLF1608A 3R3K-T	T	36.6/25.1
R1	7030003490	S.RES ERJ3GEYJ 272 V (2.7 k)	B	59.1/11.7
R2	7030005040	S.RES ERJ2GEJ 472 X (4.7 k)	T	55.5/15.2
R3	7030005530	S.RES ERJ2GEJ 100 X (10)	T	52.6/20.3
R4	7030005050	S.RES ERJ2GEJ 103 X (10 k)	T	56.5/17
R5	7030005050	S.RES ERJ2GEJ 103 X (10 k)	T	54.5/15.2
R6	7030005070	S.RES ERJ2GEJ 683 X (68 k)	T	52.1/15.2
R7	7030005310	S.RES ERJ2GEJ 124 X (120 k)	T	50.8/15.7
R8	7030005110	S.RES ERJ2GEJ 224 X (220 k)	T	54.5/17
R9	7030004980	S.RES ERJ2GEJ 101 X (100)	T	55/18.3
R10	7030005030	S.RES ERJ2GEJ 152 X (1.5 k)	T	54.2/20.5
R11	7030005090	S.RES ERJ2GEJ 104 X (100 k)	T	53.4/5.1
R12	7030005530	S.RES ERJ2GEJ 100 X (10)	T	49.3/8.7
R13	7030005090	S.RES ERJ2GEJ 104 X (100 k)	T	51.4/5.1
R14	7030005050	S.RES ERJ2GEJ 103 X (10 k)	T	52.4/7.7
R15	7030005310	S.RES ERJ2GEJ 124 X (120 k)	T	47.7/4.4
R16	7030008280	S.RES ERJ2GEJ 271 X (270)	T	45.4/5.1
R17	7030004970	S.RES ERJ2GEJ 470 X (47)	B	49.1/9.3
R18	7030009320	S.RES ERJ2GEJ 4R7 X (4.7)	B	50.3/9.2
R19	7030005090	S.RES ERJ2GEJ 104 X (100 k)	T	49.6/7.4
R20	7030009270	S.RES ERJ2GEJ 821 X (820)	T	44.4/6.9
R21	7030005110	S.RES ERJ2GEJ 224 X (220 k)	T	42/5.1
R22	7030005050	S.RES ERJ2GEJ 103 X (10 k)	T	37.7/5.1
R23	7030005100	S.RES ERJ2GEJ 154 X (150 k)	T	40/5.1
R24	7030005120	S.RES ERJ2GEJ 102 X (1 k)	B	49.7/11.5
R25	7030005070	S.RES ERJ2GEJ 683 X (68 k)	B	40.2/7.3
R26	7030005070	S.RES ERJ2GEJ 683 X (68 k)	B	42.3/12
R27	7030005100	S.RES ERJ2GEJ 154 X (150 k)	B	42.9/13.8
R28	7030005090	S.RES ERJ2GEJ 104 X (100 k)	B	43/8.6
R29	7030005590	S.RES ERJ2GEJ 680 X (68)	B	40.7/12.7
R30	7030005120	S.RES ERJ2GEJ 102 X (1 k)	B	38.9/9
R31	7030005530	S.RES ERJ2GEJ 100 X (10)	B	35.6/10.7
R32	7030004980	S.RES ERJ2GEJ 101 X (100)	B	37.7/7.6
R33	7030007270	S.RES ERJ2GEJ 151 X (150)	B	26.7/3.9
R34	7030005090	S.RES ERJ2GEJ 104 X (100 k)	B	26.2/5.1
R35	7030004980	S.RES ERJ2GEJ 101 X (100)	B	25.9/6.5
R36	7030005030	S.RES ERJ2GEJ 152 X (1.5 k)	T	18.5/14.1
R38	7030005090	S.RES ERJ2GEJ 104 X (100 k)	B	24.6/7.9
R39	7030004970	S.RES ERJ2GEJ 470 X (47)	B	20.4/4.6
R40	7030005030	S.RES ERJ2GEJ 152 X (1.5 k)	B	19.2/4.2
R42	7030005240	S.RES ERJ2GEJ 473 X (47 k)	B	17.7/13.6
R43	7030005000	S.RES ERJ2GEJ 471 X (470)	B	23.5/12.6
R44	7030006610	S.RES ERJ2GEJ 394 X (390 k)	B	15.6/12.1
R45	7030005100	S.RES ERJ2GEJ 154 X (150 k)	B	16.4/14.5
R46	7030007290	S.RES ERJ2GEJ 222 X (2.2 k)	B	16.8/13.3
R48	7030005010	S.RES ERJ2GEJ 681 X (680)	B	24.6/6
R50	7030005050	S.RES ERJ2GEJ 103 X (10 k)	B	49.7/14
R51	7030003670	S.RES ERJ3GEYJ 823 V (82 k)	B	69.9/7.2
R52	7030007270	S.RES ERJ2GEJ 151 X (150)	B	53.9/9.8
R53	7030007250	S.RES ERJ2GEJ 220 X (22)	T	55.8/23.8
R54	7030005090	S.RES ERJ2GEJ 104 X (100 k)	T	54.2/23.8
R55	7030005040	S.RES ERJ2GEJ 472 X (4.7 k)	T	54.2/22.8
R57	7030005590	S.RES ERJ2GEJ 680 X (68)	T	56.5/28.5
R58	7030005060	S.RES ERJ2GEJ 333 X (33 k)	T	54.6/27.5
R59	7030005040	S.RES ERJ2GEJ 472 X (4.7 k)	T	54.6/26.5
R61	7030005530	S.RES ERJ2GEJ 100 X (10)	T	54.1/30.8
R62	7030004980	S.RES ERJ2GEJ 101 X (100)	B	52.6/31.3
R63	7030005000	S.RES ERJ2GEJ 471 X (470)	B	53.6/26.7
R65	7030005030	S.RES ERJ2GEJ 152 X (1.5 k)	B	51.6/26.7
R67	7030004980	S.RES ERJ2GEJ 101 X (100)	B	53.1/25.2
R68	7030005050	S.RES ERJ2GEJ 103 X (10 k)	B	53.6/23.8
R69	7030005120	S.RES ERJ2GEJ 102 X (1 k)	B	52.2/19.9
R70	7030004980	S.RES ERJ2GEJ 101 X (100)	T	49.3/24.7
R71	7030005090	S.RES ERJ2GEJ 104 X (100 k)	T	49.3/23.7
R72	7030009320	S.RES ERJ2GEJ 4R7 X (4.7)	B	48.6/24.3
R75	7030005110	S.RES ERJ2GEJ 224 X (220 k)	T	44.2/30.1
R76	7030004980	S.RES ERJ2GEJ 101 X (100)	T	44.5/34.9
R77	7030004980	S.RES ERJ2GEJ 101 X (100)	T	49.3/26.7
R78	7030005090	S.RES ERJ2GEJ 104 X (100 k)	B	47.3/26.4
R79	7030008340	S.RES RR0510P-182-D (1.8 k)	B	43.9/32.3
R80	7030005050	S.RES ERJ2GEJ 103 X (10 k)	T	44.7/24
R81	7030010040	S.RES ERJ2GEJ-JPW	B	42.9/32.3
R82	7030009320	S.RES ERJ2GEJ 4R7 X (4.7)	B	44/24.8
R83	7030008340	S.RES RR0510P-182-D (1.8 k)	B	45/24.8
R84	7030011000	S.RES RR0510P-392-D (3.9 k)	B	43/25.6
R85	7030011000	S.RES RR0510P-392-D (3.9 k)	B	45.9/32.3
R86	7030005310	S.RES ERJ2GEJ 124 X (120 k)	T	36.4/22.2
R87	7030005000	S.RES ERJ2GEJ 471 X (470)	T	45.5/28.3
R88	7030008370	S.RES ERJ2GEJ 561 X (560)	T	46.2/24.3
R89	7030005050	S.RES ERJ2GEJ 103 X (10 k)	T	44.5/17.3
R90	7030005110	S.RES ERJ2GEJ 224 X (220 k)	B	32.5/15.5
R91	7030005060	S.RES ERJ2GEJ 333 X (33 k)	B	31.3/15.6
R92	7030005090	S.RES ERJ2GEJ 104 X (100 k)	B	32.5/13.9
R93	7030005120	S.RES ERJ2GEJ 102 X (1 k)	B	31.1/28.4
R94	7030005100	S.RES ERJ2GEJ 154 X (150 k)	B	30.9/29.7
R95	7030009290	S.RES ERJ2GEJ 562 X (5.6 k)	T	40.7/20.7
R96	7030005030	S.RES ERJ2GEJ 152 X (1.5 k)	T	40.7/19.7
R97	7030008370	S.RES ERJ2GEJ 561 X (560)	B	32.6/25.6

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R98	7030007290	S.RES ERJ2GEJ 222 X (2.2 k)	B	47/39
R100	7030005050	S.RES ERJ2GEJ 103 X (10 k)	T	47.1/15.2
R101	7030005120	S.RES ERJ2GEJ 102 X (1 k)	T	45.5/15.2
R102	7030005240	S.RES ERJ2GEJ 473 X (47 k)	T	28.7/22.7
R103	7030005170	S.RES ERJ2GEJ 474 X (470 k)	T	29.1/24.8
R104	7030005110	S.RES ERJ2GEJ 224 X (220 k)	T	29.1/14.6
R105	7030005230	S.RES ERJ2GEJ 334 X (330 k)	T	30.7/23.9
R108	7030005050	S.RES ERJ2GEJ 103 X (10 k)	B	25.9/30
R109	7030005580	S.RES ERJ2GEJ 560 X (56)	T	34.3/31.6
R110	7030005060	S.RES ERJ2GEJ 333 X (33 k)	T	32.4/14.5
R111	7030005090	S.RES ERJ2GEJ 104 X (100 k)	T	30.4/33.5
R113	7030005040	S.RES ERJ2GEJ 472 X (4.7 k)	T	37.2/26.8
R115	7030007570	S.RES ERJ2GEJ 122 X (1.2 k)	B	27.7/19.8
R116	7030007060	S.RES ERJ2GEJ 684X (680 k)	B	26.5/19.3
R117	7030005040	S.RES ERJ2GEJ 472 X (4.7 k)	B	31.7/19.3
R118	7030005040	S.RES ERJ2GEJ 472 X (4.7 k)	B	30.7/19.3
R119	7030005050	S.RES ERJ2GEJ 103 X (10 k)	T	24.3/15.6
R120	7030005000	S.RES ERJ2GEJ 471 X (470)	T	30.8/13.2
R121	7030008010	S.RES ERJ2GEJ 123 X (12 k)	T	26/22.3
R122	7030006610	S.RES ERJ2GEJ 394 X (390 k)	T	26/23.2
R123	7030005080	S.RES ERJ2GEJ 823 X (82 k)	T	17.8/20.2
R124	7030005060	S.RES ERJ2GEJ 333 X (33 k)	T	16.6/19.5
R125	7030005240	S.RES ERJ2GEJ 473 X (47 k)	B	21.3/14.3
R126	7030005230	S.RES ERJ2GEJ 334 X (330 k)	T	14/24.1
R127	7030005600	S.RES ERJ2GEJ 273 X (27 k) [C], [I], [F], [L] only	B	4.3/33.4
R128	7030005060	S.RES ERJ2GEJ 333 X (33 k)	B	3.1/34
R129	7030005240	S.RES ERJ2GEJ 473 X (47 k)	T	24.8/19.2
R130	7030007290	S.RES ERJ2GEJ 222 X (2.2 k)	T	23.9/20.1
R131	7030007290	S.RES ERJ2GEJ 222 X (2.2 k)	T	25.7/19.2
R132	7030005240	S.RES ERJ2GEJ 473 X (47 k)	T	26.9/18.6
R134	7030005060	S.RES ERJ2GEJ 333 X (33 k)	T	25.6/26.2
R135	7030005160	S.RES ERJ2GEJ 105 X (1 M)	T	14/27.7
R136	7030005120	S.RES ERJ2GEJ 102 X (1 k)	T	13.6/22.9
R141	7030005060	S.RES ERJ2GEJ 333 X (33 k)	T	27.9/24.3
R147	7030005090	S.RES ERJ2GEJ 104 X (100 k)	T	32.5/12.5
R148	7030005070	S.RES ERJ2GEJ 683 X (68 k)	T	37.2/10
R150	7030010040	S.RES ERJ2GEJ-JPW	T	22.6/3.1
R151	7030005070	S.RES ERJ2GEJ 683 X (68 k)	T	31.8/10.5
R152	7030008310	S.RES ERJ2GEJ 564 X (560 k)	T	33.8/3.2
R153	7030005100	S.RES ERJ2GEJ 154 X (150 k)	T	31.8/7.3
R154	7030005100	S.RES ERJ2GEJ 154 X (150 k)	T	33.8/5
R155	7030005050	S.RES ERJ2GEJ 103 X (10 k)	T	28.2/2.6
R157	7030005050	S.RES ERJ2GEJ 103 X (10 k)	T	32.6/3.1
R161	7030005050	S.RES ERJ2GEJ 103 X (10 k)	B	50.9/36.6
R162	7030005040	S.RES ERJ2GEJ 472 X (4.7 k)	B	49.6/36
R163	7030005050	S.RES ERJ2GEJ 103 X (10 k)	B	31.6/39.8
R164	7030005040	S.RES ERJ2GEJ 472 X (4.7 k)	B	30.2/39.4
R165	7030005050	S.RES ERJ2GEJ 103 X (10 k)	B	74.6/28.5
R166	7030007290	S.RES ERJ2GEJ 222 X (2.2 k)	B	69.8/28.8
R167	7030005700	S.RES ERJ2GEJ 274 X (270 k)	T	75.1/24.4
R168	7030010080	S.RES ERJ2RHD 104 X (100 k)	T	76/23.3
R169	7030005090	S.RES ERJ2GEJ 104 X (100 k)	B	47.7/41.5
R170	7030005170	S.RES ERJ2GEJ 474 X (470 k)	B	46.8/41.5
R171	7030005080	S.RES ERJ2GEJ 823 X (82 k)	T	50.2/10.5
R172	7030005220	S.RES ERJ2GEJ 223 X (22 k)	T	50.2/8.7
R173	7030009290	S.RES ERJ2GEJ 562 X (5.6 k)	T	44.5/9.6
R174	7030005170	S.RES ERJ2GEJ 474 X (470 k)	T	43.3/10
R175	7030005110	S.RES ERJ2GEJ 224 X (220 k)	T	43.4/10.9
R178	7030005070	S.RES ERJ2GEJ 683 X (68 k)	B	7.1/23.7
R179	7030007570	S.RES ERJ2GEJ 122 X (1.2 k)	B	8.3/25.9
R180	7030005050	S.RES ERJ2GEJ 103 X (10 k)	B	4.8/28.6
R181	7030005220	S.RES ERJ2GEJ 223 X (22 k)	B	9.5/22.7
R182	7030005220	S.RES ERJ2GEJ 223 X (22 k)	B	8.6/23.9
R183	7030005220	S.RES ERJ2GEJ 223 X (22 k)	B	8.1/27.1
R184	7030007340	S.RES ERJ2GEJ 153 X (15 k)	B	6/29
R185	7030007300	S.RES ERJ2GEJ 332 X (3.3 k)	B	4.8/29.5
R186	7030005090	S.RES ERJ2GEJ 104 X (100 k)	B	5.7/24.5
R187	7030007350	S.RES ERJ2GEJ 393 X (39 k)	T	32.8/15.8
R188	7030005110	S.RES ERJ2GEJ 224 X (220 k)	T	31.1/14.9
R189	7030005110	S.RES ERJ2GEJ 224 X (220 k)	T	33.3/14
R190	7510001730	S.TMR ERTJOEP 473J	B	25.9/33.2
R191	7030010080	S.RES ERJ2RHD 104 X (100 k)	B	25/32.3
R192	7030005090	S.RES ERJ2GEJ 104 X (100 k)	T	13.9/35.4
R193	7030005090	S.RES ERJ2GEJ 104 X (100 k)	T	13.9/33.8
R194	7030005050	S.RES ERJ2GEJ 103 X (10 k)	T	22.6/36.5
R196	7030005000	S.RES ERJ2GEJ 471 X (470)	T	30.8/12.3
R197	7030009150	S.RES ERJ2GEJ 824 X (820 k) [C], [I], [F], [L] only	B	4.9/37.7
R198	7030005240	S.RES ERJ2GEJ 473 X (47 k) [B], [H], [E], [K], [C], [I], [F], [L] only	B	21.7/39.4
R199	7030005240	S.RES ERJ2GEJ 473 X (47 k) [C], [I], [F], [L] only	B	21.9/38.4
R201	7030005050	S.RES ERJ2GEJ 103 X (10 k) [B], [H], [E], [K], [C], [I], [F], [L] only	B	36.6/38.5
R202	7030005720	S.RES ERJ2GEJ 563 X (56 k) [B], [H], [E], [K], [C], [I], [F], [L] only	B	37.8/38.1
R203	7030007290	S.RES ERJ2GEJ 222 X (2.2 k) [B], [H], [E], [K], [C], [I], [F], [L] only	B	31/41
R204	7030006610	S.RES ERJ2GEJ 394 X (390 k) [C], [I], [F], [L] only	B	8.9/41.3
R205	7030005050	S.RES ERJ2GEJ 103 X (10 k) [C], [I], [F], [L] only	T	18.7/20.2
R206	7030005050	S.RES ERJ2GEJ 103 X (10 k) [C], [I], [F], [L] only	T	18.7/17.4
R207	7030005220	S.RES ERJ2GEJ 223 X (22 k) [C], [I], [F], [L] only	T	20.5/17.1
R208	7030010090	S.RES ERJ2GEJ 180 X (18) [C], [I], [F], [L] only	B	22/40.6
R210	7030005240	S.RES ERJ2GEJ 473 X (47 k) [A], [G], [D], [J] only	B	18.7/41.3
R211	7030005240	S.RES ERJ2GEJ 473 X (47 k) [A], [G], [D], [J], [B], [H], [E], [K] only	B	17.1/41.3

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REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R212	7030005580	S.RES ERJ2GEJ 560 X (56) [C], [I], [F], [L] only	B	25/38.4
R213	7030005090	S.RES ERJ2GEJ 104 X (100 k) [Europe]	T	51.1/10.5
C1	4030007000	S.CER C1608 CH 1H 090D-T	B	69.9/9.8
C2	4030006990	S.CER C1608 CH 1H 080D-T	B	65.8/6.9
C3	4030007050	S.CER C1608 CH 1H 220J-T	B	67.9/4.7
C4	4030011530	S.CER C1608 CH 1H 110J-T	B	63.1/7.3
C5	4030007050	S.CER C1608 CH 1H 220J-T	B	61.1/4.5
C6	4030017460	S.CER ECJ0EB1E102K	B	60.4/6.2
C7	4030017460	S.CER ECJ0EB1E102K	B	61.6/9
C8	4030007040	S.CER C1608 CH 1H 180J-T	B	64.1/9.8
C9	4030007030	S.CER C1608 CH 1H 150J-T	B	59.1/13
C10	4030017460	S.CER ECJ0EB1E102K	B	64.4/13
C11	4030007040	S.CER C1608 CH 1H 180J-T	B	66.3/15.9
C12	4030009510	S.CER C1608 CH 1H 010B-T	B	65.9/11.3
C13	4030012060	S.CER GRM1882C1H620JD01D	B	68.2/16.4
C14	4030011530	S.CER C1608 CH 1H 110J-T	B	59.7/4.5
C15	4030017460	S.CER ECJ0EB1E102K	B	54.6/14.4
C16	4030017400	S.CER ECJ0EC1H220J	B	54.2/7.3
C17	4030017630	S.CER ECJ0EC1H120J	T	59.7/6.4
C18	4030017380	S.CER ECJ0EC1H050B	T	57/5.1
C19	4030017460	S.CER ECJ0EB1E102K	T	57.9/6.4
C20	4030017430	S.CER ECJ0EC1H101J	T	53.5/3.8
C22	4030017340	S.CER ECJ0EC1H010B	T	52.4/6.4
C23	4030016930	S.CER ECJ0EB1A104K	T	42/10.1
C24	4030017460	S.CER ECJ0EB1E102K	B	52.9/9.8
C25	4030017580	S.CER ECJ0EC1H060C	T	56.1/6.4
C26	4030017430	S.CER ECJ0EC1H101J	T	50.2/3.8
C27	4030017460	S.CER ECJ0EB1E102K	T	52.4/5.1
C28	4030017370	S.CER ECJ0EC1H3R5B	T	49/5.1
C29	4030017560	S.CER ECJ0EC1H2R5B	T	48.7/6.4
C30	4030016930	S.CER ECJ0EB1A104K	T	49.3/10.5
C31	4030016930	S.CER ECJ0EB1A104K	B	51/8.2
C32	4030017460	S.CER ECJ0EB1E102K	T	46.4/5.1
C33	4030017420	S.CER ECJ0EC1H470J	T	46.8/6.4
C35	4030018860	S.CER ECJ0EB0J105K	B	49.6/7.5
C36	4030017460	S.CER ECJ0EB1E102K	B	47.1/9.2
C37	4030016790	S.CER ECJ0EB1C103K	T	45.3/6.9
C38	4030017360	S.CER ECJ0EC1H030B	T	44.4/5.1
C39	4030017460	S.CER ECJ0EB1E102K	T	43/3.8
C40	4030017350	S.CER ECJ0EC1H020B	T	41/6.4
C41	4030017630	S.CER ECJ0EC1H120J	B	41.8/7.3
C42	4030017460	S.CER ECJ0EB1E102K	T	38.2/3.8
C43	4030017460	S.CER ECJ0EB1E102K	T	41/5.1
C44	4030017570	S.CER ECJ0EC1H040B	B	39.8/5.2
C45	4030017460	S.CER ECJ0EB1E102K	T	39.8/3.8
C48	4030016790	S.CER ECJ0EB1C103K	B	40.7/10.9
C49	4030017590	S.CER ECJ0EC1H070C	B	46.1/10.7
C50	4030017460	S.CER ECJ0EB1E102K	B	40.7/11.8
C51	4030017460	S.CER ECJ0EB1E102K	B	38.9/8.1
C52	4030017620	S.CER ECJ0EC1H100C	B	38.9/9.9
C53	4030016790	S.CER ECJ0EB1C103K	B	36.7/9
C54	4030017460	S.CER ECJ0EB1E102K	B	37.3/9.9
C55	4030017570	S.CER ECJ0EC1H040B	B	37.7/6
C56	4030017650	S.CER ECJ0EC1H270J	B	34.1/9.1
C57	4030017460	S.CER ECJ0EB1E102K	B	35.9/12.7
C58	4030017460	S.CER ECJ0EB1E102K	B	25.8/3.9
C59	4030017460	S.CER ECJ0EB1E102K	B	27/7.5
C60	4030016790	S.CER ECJ0EB1C103K	B	26.8/6.3
C61	4030017430	S.CER ECJ0EC1H101J	B	23/6
C62	4030017680	S.CER ECJ0EC1H820J	B	23.6/10.9
C63	4030017420	S.CER ECJ0EC1H470J	B	24.3/8.8
C65	4030017460	S.CER ECJ0EB1E102K	B	24.2/9.7
C66	4030017460	S.CER ECJ0EB1E102K	B	22.2/12.2
C67	4030017460	S.CER ECJ0EB1E102K	B	19.6/3
C68	4030017430	S.CER ECJ0EC1H101J	B	18.9/13.3
C69	4030017430	S.CER ECJ0EC1H101J	B	15/13.3
C70	4030017430	S.CER ECJ0EC1H101J	B	15.9/13.3
C71	4030016930	S.CER ECJ0EB1A104K	B	14.5/10.5
C72	4030017460	S.CER ECJ0EB1E102K	B	52.6/15.1
C73	4030017460	S.CER ECJ0EB1E102K	T	55/19.3
C74	4030017460	S.CER ECJ0EB1E102K	B	51.6/15.1
C75	4550006250	S.TAN TEESVA 1A 106M8R	T	15.5/16.1
C76	4030016930	S.CER ECJ0EB1A104K	T	50.1/18.7
C77	4030017460	S.CER ECJ0EB1E102K	T	52.6/21.3
C78	4030017460	S.CER ECJ0EB1E102K	T	56.5/15.2
C79	4030016930	S.CER ECJ0EB1A104K	T	55.5/17
C80	4030016930	S.CER ECJ0EB1A104K	T	50.8/14.7
C81	4030017490	S.CER C1608 JB 1A 105K-T	T	65.5/22.7
C82	4030017460	S.CER ECJ0EB1E102K	B	66.1/23.4
C83	4030017460	S.CER ECJ0EB1E102K	T	55.6/22.4
C84	4030017730	S.CER ECJ0EB1E471K	T	55.8/24.8
C85	4030017460	S.CER ECJ0EB1E102K	T	65.5/27.7
C86	4030017680	S.CER ECJ0EC1H820J	T	63.8/24.8
C87	4030017650	S.CER ECJ0EC1H270J	T	63.8/26.6
C88	4030017460	S.CER ECJ0EB1E102K	T	56.5/27.5
C89	4030016790	S.CER ECJ0EB1C103K	T	56.5/26.5
C90	4030017460	S.CER ECJ0EB1E102K	B	51.6/31.3
C91	4030017460	S.CER ECJ0EB1E102K	T	54.2/21.8
C92	4030017400	S.CER ECJ0EC1H220J	T	56.5/29.5
C93	4030017640	S.CER ECJ0EC1H150J	B	52.6/26.7
C94	4030017420	S.CER ECJ0EC1H470J	T	54.2/24.8
C95	4030017460	S.CER ECJ0EB1E102K	B	54.6/26.7
C96	4030017460	S.CER ECJ0EB1E102K	B	53.6/31.3
C97	4030017420	S.CER ECJ0EC1H470J	B	54.6/31.3
C98	4550006250	S.TAN TEESVA 1A 106M8R	T	52.4/24.9
C99	4030017460	S.CER ECJ0EB1E102K	B	54.6/23.8
C100	4030017620	S.CER ECJ0EC1H100C	T	49.8/21.2
C101	4030017460	S.CER ECJ0EB1E102K	B	54.9/9.8
C102	4030017590	S.CER ECJ0EC1H070C	B	48.6/26.1
C103	4030017360	S.CER ECJ0EC1H030B	T	46.1/31.4
C104	4030017460	S.CER ECJ0EB1E102K	T	48/27.2

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

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REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
C105	4030017460	S.CER ECJ0EB1E102K	T	44.5/33.9
C106	4030017420	S.CER ECJ0EC1H470J	T	55.1/30.8
C107	4030017460	S.CER ECJ0EB1E102K	T	49.3/22.7
C108	4030016790	S.CER ECJ0EB1C103K	B	54.2/34.4
C109	4030017460	S.CER ECJ0EB1E102K	T	49/34.8
C110	4030017730	S.CER ECJ0EB1E471K	T	49.3/25.7
C111	4030017460	S.CER ECJ0EB1E102K	T	46.5/28.3
C113	4030017540	S.CER ECJ0EC1HR75B	B	45.7/29.6
C114	4030017660	S.CER ECJ0EC1H330J	B	44.9/32.3
C115	4030017660	S.CER ECJ0EC1H330J	B	45/27.6
C116	4030016790	S.CER ECJ0EB1C103K	B	43/27.5
C117	4030017730	S.CER ECJ0EB1E471K	B	44/27.5
C118	4030017530	S.CER ECJ0EC1H0R5B	B	46/26.6
C119	4030017460	S.CER ECJ0EB1E102K	B	44.2/20.5
C120	4030017730	S.CER ECJ0EB1E471K	B	46/20.5
C121	4030017390	S.CER ECJ0EC1H180J	B	44.5/26.1
C122	4030017660	S.CER ECJ0EC1H330J	B	46.6/24.3
C123	4030017510	S.CER ECJ0EC1H680J	B	41.6/26.1
C124	4030017440	S.CER ECJ0EC1H221J	B	40.3/22.7
C126	4030017660	S.CER ECJ0EC1H330J	B	40.6/32.9
C127	4030017420	S.CER ECJ0EC1H470J	B	39.1/29.6
C129	4030017340	S.CER ECJ0EC1H010B	B	37.3/24.7
C132	4030016930	S.CER ECJ0EB1A104K	B	31.3/14.7
C133	4030017400	S.CER ECJ0EC1H220J	B	36.3/24.7
C134	4030017660	S.CER ECJ0EC1H330J	B	36.3/31.3
C135	4030017460	S.CER ECJ0EB1E102K	B	45.4/15.2
C137	4030016790	S.CER ECJ0EB1C103K	B	53.4/38.3
C138	4030017420	S.CER ECJ0EC1H470J	T	40.7/23.1
C139	4030016930	S.CER ECJ0EB1A104K	T	46.7/23
C140	4030016930	S.CER ECJ0EB1A104K	B	28.3/28.4
C141	4030017460	S.CER ECJ0EB1E102K	T	48.1/15.2
C143	4030017460	S.CER ECJ0EB1E102K	T	44.5/15.2
C145	4030017730	S.CER ECJ0EB1E471K	T	36.4/20.3
C146	4550000530	S.TAN TEESVA 1V 104M8R	T	40.8/15.7
C147	4550006390	S.TAN TEESVA 1C 335M8R	T	42.9/15.7
C148	4550006250	S.TAN TEESVA 1A 106M8R	B	45/39.6
C149	4550000270	S.TAN TEESVA 1E 474M8R	B	33/22.6
C150	4030018860	S.CER ECJ0EB0J105K	T	31.6/16.2
C151	4030016930	S.CER ECJ0EB1A104K	B	32.6/31.5
C152	4030017420	S.CER ECJ0EC1H470J	B	32.9/18.1
C153	4030017420	S.CER ECJ0EC1H470J	B	31.2/17.3
C154	4030017420	S.CER ECJ0EC1H470J	B	29.8/18.5
C155	4030017450	S.CER ECJ0EB1E271K	B	30.9/31.5
C156	4030017460	S.CER ECJ0EB1E102K	B	27.1/29.6
C157	4030017620	S.CER ECJ0EC1H100C	B	25.5/30.9
C158	4030016930	S.CER ECJ0EB1A104K	B	25.4/36
C159	4030017460	S.CER ECJ0EB1E102K	B	24.8/34.2
C161	4030017620	S.CER ECJ0EC1H100C	B	25.4/25.5
C162	4030017500	S.CER ECJ0EC1H560J	B	29.3/17.2
C163	4030017570	S.CER ECJ0EC1H040B	B	27.8/14.8
C164	4030017590	S.CER ECJ0EC1H070C	B	28.4/12.9
C165	4030016790	S.CER ECJ0EB1C103K	B	28.9/18.5
C166	4030017360	S.CER ECJ0EC1H030B	B	29/14.1
C167	4030016930	S.CER ECJ0EB1A104K	B	27/8.4
C168	4030016930	S.CER ECJ0EB1A104K	B	20.2/16.4
C169	4030016930	S.CER ECJ0EB1A104K	B	18.7/16.4
C170	4030016930	S.CER ECJ0EB1A104K	T	31.8/8.9
C171	4030018910	S.CER C1608 JB 0J 475K-T	T	32.4/5.2
C172	4030017460	S.CER ECJ0EB1E102K	T	35/4.4
C180	4030016930	S.CER ECJ0EB1A104K	T	37.2/10.9
C182	4030017460	S.CER ECJ0EB1E102K	B	50.1/12.8
C183	4030017590	S.CER ECJ0EC1H070C	B	48.8/13.8
C184	4030017460	S.CER ECJ0EB1E102K	B	50.3/10.2
C185	4030016930	S.CER ECJ0EB1A104K	T	28.5/19.1
C186	4030016930	S.CER ECJ0EB1A104K	T	51.1/8.7
C188	4030017460	S.CER ECJ0EB1E102K	B	23.4/7.6
C190	4030017380	S.CER ECJ0EC1H050B	B	41.3/31.6
C191	4030017570	S.CER ECJ0EC1H040B	B	40.3/31.6
C192	4030017360	S.CER ECJ0EC1H030B	B	41.6/22.2
C193	4030017360	S.CER ECJ0EC1H030B	B	40.3/21.7
C194	4030017380	S.CER ECJ0EC1H050B	B	40.3/24
C195	4030017570	S.CER ECJ0EC1H040B	B	42.9/23.5
C199	4030017460	S.CER ECJ0EB1E102K	B	9.1/28.7
C200	4030017420	S.CER ECJ0EC1H470J	T	28.4/38.2
C201	4030018860	S.CER ECJ0EB0J105K	T	37.8/28.1
C202	4030016930	S.CER ECJ0EB1A104K	T	37.8/24.8
C203	4030017460	S.CER ECJ0EB1E102K	T	38.8/24.8
C205	4030017400	S.CER ECJ0EC1H220J	T	40.7/32.1
C206	4030017630	S.CER ECJ0EC1H120J	T	38.8/31.6
C207	4030017620	S.CER ECJ0EC1H100C	T	37.6/33.3
C208	4030017630	S.CER ECJ0EC1H120J	T	35.3/31.6
C209	4030017460	S.CER ECJ0EB1E102K	B	32.2/27.4
C211	4030018910	S.CER C1608 JB 0J 475K-T	T	29.3/21.3
C213	4030016930	S.CER ECJ0EB1A104K	T	30.7/24.8
C218	4030018910	S.CER C1608 JB 0J 475K-T	T	24.8/2.9
C219	4030018860	S.CER ECJ0EB0J105K	T	30/17.4
C220	4030016970	S.CER ECJ0EB1C223K	T	13.7/21.7
C221	4030016940	S.CER ECJ0EB1A393K	B	8.2/22.6
C222	4030016790	S.CER ECJ0EB1C103K	B	9/27.1
C223	4030016930	S.CER ECJ0EB1A104K	B	5.7/23.6
C225	4030017460	S.CER ECJ0EB1E102K	B	2.5/29.7
C227	4030016790	S.CER ECJ0EB1C103K	B	31.6/12.8
C228	4030017460	S.CER ECJ0EB1E102K	T	24.3/14.7
C229	4030016930	S.CER ECJ0EB1A104K	T	30.4/7.2
C230	4030017460	S.CER ECJ0EB1E102K	T	67.6/25.6
C231	4030016790	S.CER ECJ0EB1C103K	B	51.9/34.4
C232	4030016790	S.CER ECJ0EB1C103K	B	30.1/41
C233	4550006350	S.TAN TEESVB2 1A 226M8R	B	67.3/27.2
C234	4030017730	S.CER ECJ0EB1E471K	B	69.8/29.8
C235	4030016790	S.CER ECJ0EB1C103K	B	66.4/31.4
C236	4510008490	S.ELE EEE1CS100SR	T	74.1/20
C237	4030016790	S.CER ECJ0EB1C103K	T	76/29.9
C238	4550005980	S.TAN TEESVA 1A 475M8R	B	66.7/35.3
C239	4030017330	S.CER ECJ0EF1C104Z	B	68.6/33.4

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
C240	4030017460	S.CER ECJ0EB1E102K	B	32.6/12.3
C241	4030017460	S.CER ECJ0EB1E102K	T	50.1/37.7
C242	4030017460	S.CER ECJ0EB1E102K	B	33.7/36.6
C243	4030016930	S.CER ECJ0EB1A104K	T	30.4/10.4
C245	4030017420	S.CER ECJ0EC1H470J	T	16.4/30.1
C246	4030017420	S.CER ECJ0EC1H470J	T	13.6/29
C247	4030017420	S.CER ECJ0EC1H470J	T	21.5/29.8
C248	4030017420	S.CER ECJ0EC1H470J	T	20.3/30.1
C249	4030017420	S.CER ECJ0EC1H470J	T	19.4/30.1
C250	4030017420	S.CER ECJ0EC1H470J	T	18.5/30.1
C251	4030017420	S.CER ECJ0EC1H470J	T	24.8/22.8
C252	4030017910	S.CER ECJ0EB1H152K	T	27.2/22.7
C253	4030017710	S.CER ECJ0EC1H181J	T	16.6/20.4
C254	4030017750	S.CER ECJ0EB1E122K	T	17.8/18.6
C255	4030016930	S.CER ECJ0EB1A104K	B	22.2/13.1
C256	4030017760	S.CER ECJ0EB1H222K	T	13.1/24.3
C258	4030016930	S.CER ECJ0EB1A104K	B	2.8/35.2
C259	4030017400	S.CER ECJ0EC1H220J	B	9.2/30.6
C260	4030017400	S.CER ECJ0EC1H220J	B	23.9/28.7
C261	4550007690	S.TAN TEESVP 1C 105M8R	T	26/20.9
C262	4550007690	S.TAN TEESVP 1C 105M8R	T	22.5/19.3
C263	4030017460	S.CER ECJ0EB1E102K	T	13.1/26.6
C264	4550007090	S.TAN TEESVA 1A 226M8R	B	12.8/25.9
C265	4030017460	S.CER ECJ0EB1E102K	T	26.8/26.7
C266	4030017720	S.CER ECJ0EB1H331K	T	24.7/26.2
C267	4030016790	S.CER ECJ0EB1C103K	T	25.6/17.6
C269	4030017460	S.CER ECJ0EB1E102K	T	26.9/19.5
C271	4030016930	S.CER ECJ0EB1A104K	T	26.4/33.2
C281	4030016930	S.CER ECJ0EB1A104K	T	13.9/38.3
C287	4030016930	S.CER ECJ0EB1A104K	B	24.1/31.7
C291	4030017460	S.CER ECJ0EB1E102K	B	54.4/15.7
C292	4030017460	S.CER ECJ0EB1E102K	B	72.7/19.4
C293	4030017460	S.CER ECJ0EB1E102K	T	78.8/23.3
C294	4030017460	S.CER ECJ0EB1E102K	B	2.5/30.6
C295	4030017460	S.CER ECJ0EB1E102K	T	70.7/25.9
C296	4030017460	S.CER ECJ0EB1E102K	T	77.2/23.8
C297	4030017460	S.CER ECJ0EB1E102K	T	76.2/22.1
C298	4030017460	S.CER ECJ0EB1E102K	T	4.8/38.1
C299	4030017460	S.CER ECJ0EB1E102K	T	13/38.3
C300	4030017460	S.CER ECJ0EB1E102K	T	10.2/41.2
C301	4030017460	S.CER ECJ0EB1E102K	T	4.8/36.5
C302	4030007090	S.CER C1608 CH 1H 470J-T [A], [G], [D], [J], [B], [H], [E], [K]	B	68.2/15.1
C303	4030016930	S.CER ECJ0EB1A104K	T	22.6/34.2
C305	4030017420	S.CER ECJ0EC1H470J	B	53.5/41.5
C306	4030017460	S.CER ECJ0EB1E102K	T	26.2/39.5
C307	4030016930	S.CER ECJ0EB1A104K	T	76/27.7
C308	4030017530	S.CER ECJ0EC1H0R5B	B	57.4/12
C309	4030018860	S.CER ECJ0EB0J105K [C], [I], [F], [L] only	B	5.3/35.6
C310	4030016930	S.CER ECJ0EB1A104K [C], [I], [F], [L] only	B	4/35.6
C311	4030018860	S.CER ECJ0EB0J105K [C], [I], [F], [L] only	B	4.9/38.6
C312	4030018860	S.CER ECJ0EB0J105K [C], [I], [F], [L] only	B	4.7/36.8
C313	4030016930	S.CER ECJ0EB1A104K [C], [I], [F], [L] only	B	24.2/37.1
C314	4030016930	S.CER ECJ0EB1A104K [C], [I], [F], [L] only	B	22/41.5
C315	4030018860	S.CER ECJ0EB0J105K [B], [H], [E], [K], [C], [I], [F], [L] only	B	31.9/41
C316	4550006250	S.TAN TEESVA 1A 106M8R [B], [H], [E], [K], [C], [I], [F], [L] only	B	34.4/39.7
C317	4030017460	S.CER ECJ0EB1E102K [B], [H], [E], [K], [C], [I], [F], [L] only	B	32.8/41
C318	4030017460	S.CER ECJ0EB1E102K [B], [H], [E], [K], [C], [I], [F], [L] only	B	36.6/37.6
C319	4550006780	S.TAN TEESVB2 0J 476M8R [C], [I], [F], [L] only	B	22.1/35.1
C320	4030017460	S.CER ECJ0EB1E102K [C], [I], [F], [L] only	B	20.8/40.9
C321	4030017420	S.CER ECJ0EC1H470J	B	41.3/13.8
C322	4030017460	S.CER ECJ0EB1E102K	B	42.4/12.9
C323	4030017630	S.CER ECJ0EC1H120J	B	46.1/11.6
C324	4030017610	S.CER ECJ0EC1H090C	B	47.9/14.2
C325	4030016930	S.CER ECJ0EB1A104K [C], [I], [F], [L] only	B	10.5/41.3
C326	4030017460	S.CER ECJ0EB1E102K [C], [I], [F], [L] only	T	19.6/19.3
C327	4030018860	S.CER ECJ0EB0J105K [C], [I], [F], [L] only	T	19.6/17.4
C328	4550006760	S.TAN TEESVB21A336M8R [C], [I], [F], [L] only	B	27.9/40.7
C329	4030017460	S.CER ECJ0EB1E102K	B	26/2.7
J1	6510026130	S.CNR IMSA-9681S-36Y900	T	7.6/30.7
J2	6510021901	S.CNR BM02B-ASRS-TF [B], [H], [E], [K], [C], [I], [F], [L] only	T	2.5/33.2
F1	5210000830	S.FUS ERBFE3R00U	T	77.4/24.9
S1	2260002750	S.SW EVQP7M01K	T	81.2/24
MF1	2710000850	MTR QX10A (R5.5X3) 3.0V [B], [H], [E], [K], [C], [I], [F], [L] only		
EP1	6910015370	S.BEA ACZ1005Y-102-T	T	45.7/23
EP2	6910012350	S.BEA MMZ1608Y 102BT	T	66.4/24.6

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
EP3	6910015370	S.BEA ACZ1005Y-102-T	B	25.4/35.1
EP4	6910015600	S.BEA ACZ1005Y-241 (240)	T	23.9/21.7
EP5	6910015600	S.BEA ACZ1005Y-241 (240)	T	14/26.1
EP6	6910015370	S.BEA ACZ1005Y-102-T	B	28.8/29.7
EP8	6910014730	S.BEA MPZ2012S331A-T	B	75.6/18.6
EP9	6910019100	S.BEA MPZ1608S101AT	T	75.9/26.2

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.
J1	6910014700	2600 ANT CONNECTOR	1
MP1	8010020920	3060 CHASSIS	1
MP2	8950005512	2403 CONTACT SPRING -2	1
MP3	8930058561	2403 A-MAIN SEAL-1	1
MP4	8930059800	2600 PET SHEET	1
MP5	8930059830	2600 SHEET	1
MP6	8930051500	O-ring (AB)	1
MP7	8930055870	O-ring (AO)	1
MP8	8930058550	O-ring (AS)	1
MP9	8830001600	Nut (L)	1
MP10	8830003140	VR NUT (Y)	1
MP11	8850001880	Sealing washer (W)	2
MP12	8810009511	Screw BT B0 2X4 NI-ZC3 (BT)	7
MP13	8810007890	Screw BT B0 2X4 SUS	1
MP14	8810010121	ScrewPH B0 2X8 SUS SSBC	2
MP15	8810010191	Screw BiH M2X4 SUS SSBC	3
MP18	8930073030	3060 MOTOR PLATE Except [A], [D], [G], [J]	1
MP19	8310070300	3060 PLATE	1
MP20	8930073450	3060 VOL SEAL	1

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
DS401	5030002730	L3-0048TAY-5	1
MC401	7700002760	EM6027P-46C33-G-01	1
S401	2260002840	SKHLLFA010	1
SP401	2510001330	036D0803	1
W401	8900016840	OPC-1753	1
W402	7120000470	ERDS2T0	1
W403	7120000470	ERDS2T0	1
W404	8900017120	OPC-1754	1
EP402	8930061530	SRCN-2681-SP-N-W	2
MP401	8210024210	3060 FRONT PANEL (Incl. MP416, MP403, MP402, MP420)	1
MP402	8210019870	2681 TOP PANEL	1
MP403	8930060530	2681 TOP KEY	1
MP404	8930060540	2681 4-2 KEY	1
MP405	8210019880	2681 PTT BUTTON	1
MP406	8930060550	2681 PTT PLATE	1
MP407	8930060711	2681 PTT RUBBER-1	1
MP408	8310059540	2681 LCD PLATE	1
MP409	8930060520	2681 LED LENS	1
MP410	8210019890	2681 REFLECTOR	1
MP411	8310069820	2681 WINDOW PLATE (A)	1
MP412	8930060860	2681 WINDOW SHEET	1
MP413	8930059360	2600 RELEASE BUTTON	1
MP414	8930063030	2721 RELEASE PLATE	1
MP415	8930056540	Push spring (AH)	2
MP416	8830001591	1362 INSERT NUT (A)-1	1
MP417	8930055730	2403 CONNECTOR SEAL	1
MP418	8930055890	2403 CONNECTOR SHEET	1
MP419	8930056430	2403 9-PIN SHEET	1
MP420	8930073610	SP NET (D)	1
MP421	8610011380	Knob N-313 (Incl. MP422)	1
MP422	8610009240	Knob spring NO.7800P	1
MP423	8930068980	2905 VENT SHEET	1
MP424	8810009511	Screw BT B0 2X4 NI-ZC3 (BT)	4
MP425	8510015660	2681 F-SHIELD PLATE	1
MP426	8930061200	2681 MIC RUBBER	1
MP427	8930061120	Shield sponge (AA)	2
MP429	8930062240	SPONGE (HM)	1

*: Refer to SECTION 9 “BOARD LAYOUTS.”
†: Optional product

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
MF1	2710000850	QX10A (R5.5X3)3.0V (WIRE30MM) Except [A], [D], [G], [J]	1
MP1*	8410002531	2681 PA HEATSINK-1	1
MP2*	8510015520	2681 VCO CASE	1
MP3	8510015510	2681 VCO COVER	1
MP4	8510015670	2681 SHIELD PLATE	1
MP5*	6910014760	OG-503040	1

[CONNECT UNIT]

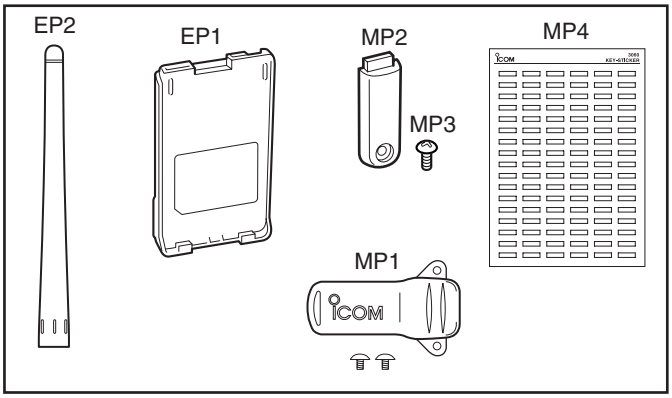
REF NO.	ORDER NO.	DESCRIPTION	QTY.
J1*	6510026140	11FH-SM1-TB (LF) (SN)	1
MP701*	8950005520	2403 9-PIN CONNECTOR	1

[VR UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
R601	7210003130	TP76N97N-13F-10KA-2497	1
W601	8900012340	OPC-1260	1

[ACCESSORIES]

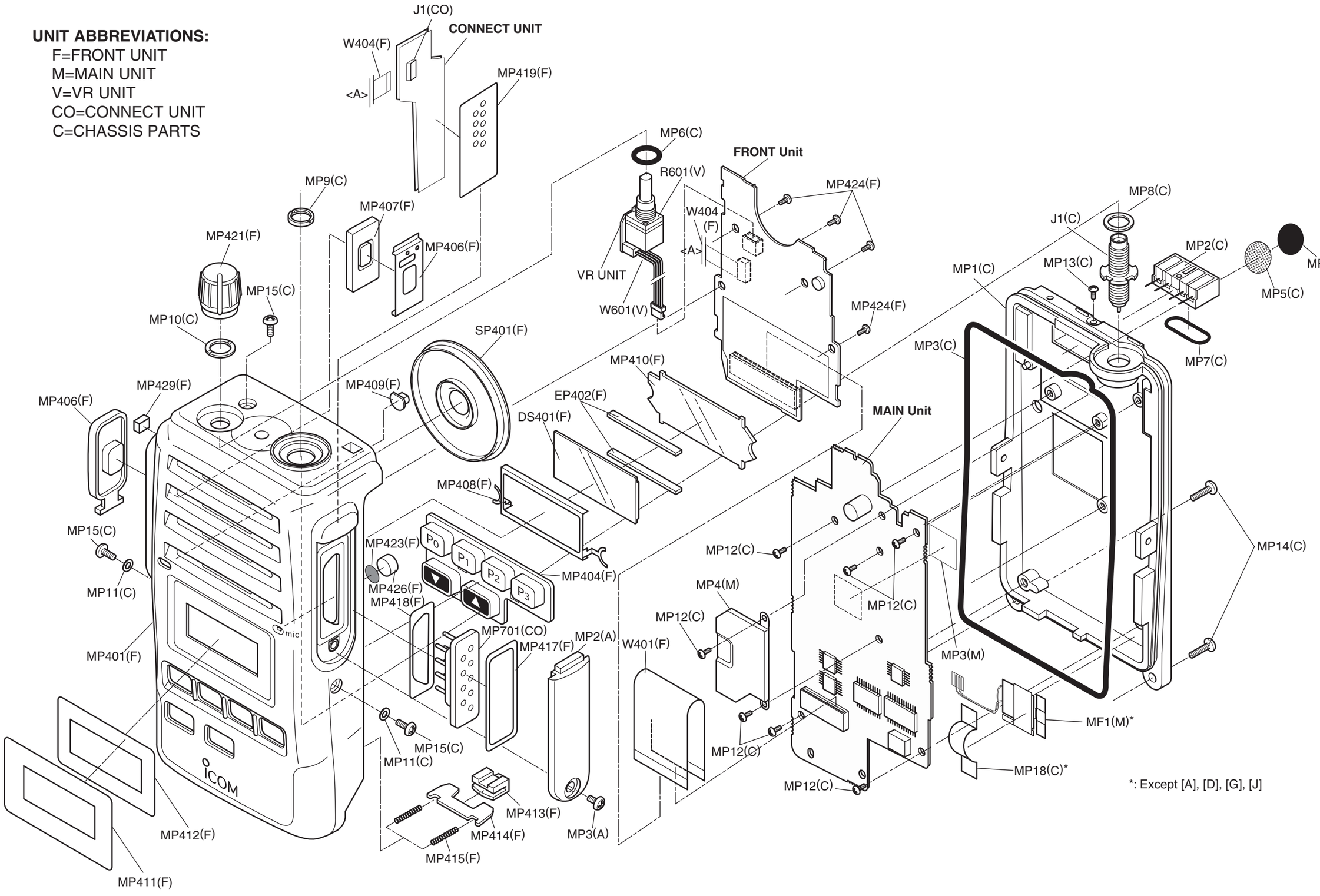
REF NO.	ORDER NO.	DESCRIPTION	QTY.
EP1†	–	BP-227	1
EP2†	–	FA-S59V	1
MP1†	–	MB-98	1
MP2	8210017071	2337 C-PANEL-1	1
MP3	8810010470	Screw truss M3X4 SUS SSBC	1
MP4	8310070780	3060 KEY-STICKER	1



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

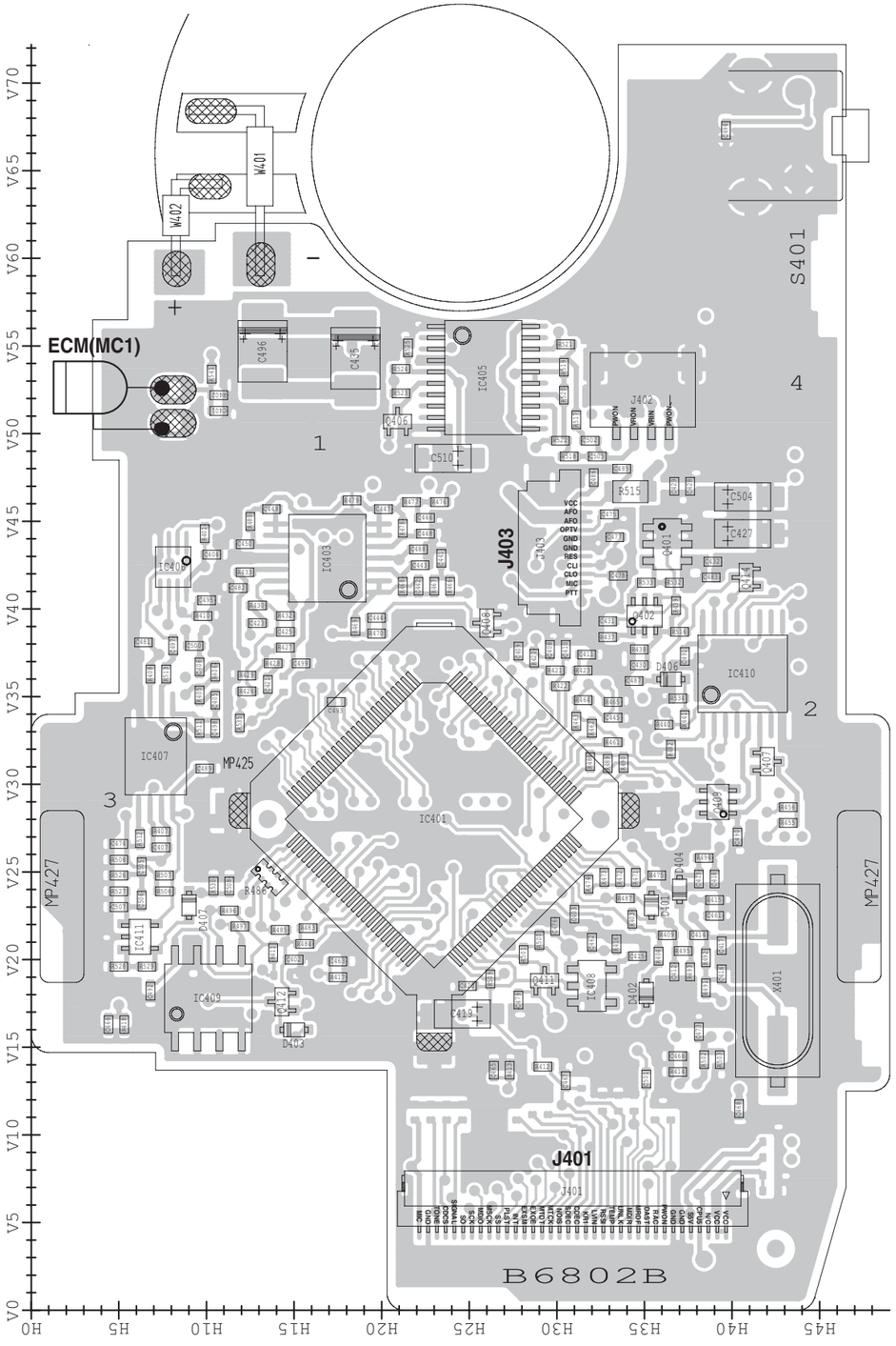
UNIT ABBREVIATIONS:

F=FRONT UNIT
M=MAIN UNIT
V=VR UNIT
CO=CONNECT UNIT
C=CHASSIS PARTS

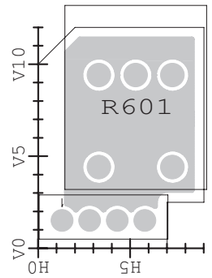


SECTION 8 BOARD LAYOUTS

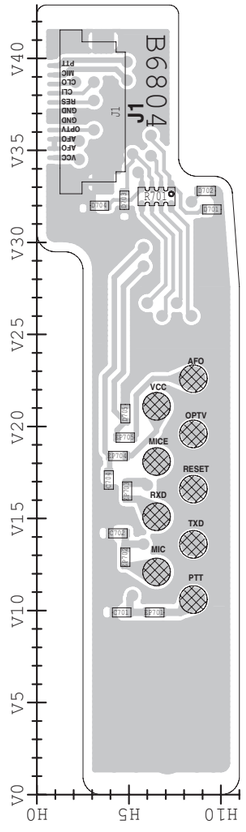
• FRONT UNIT (TOP VIEW)



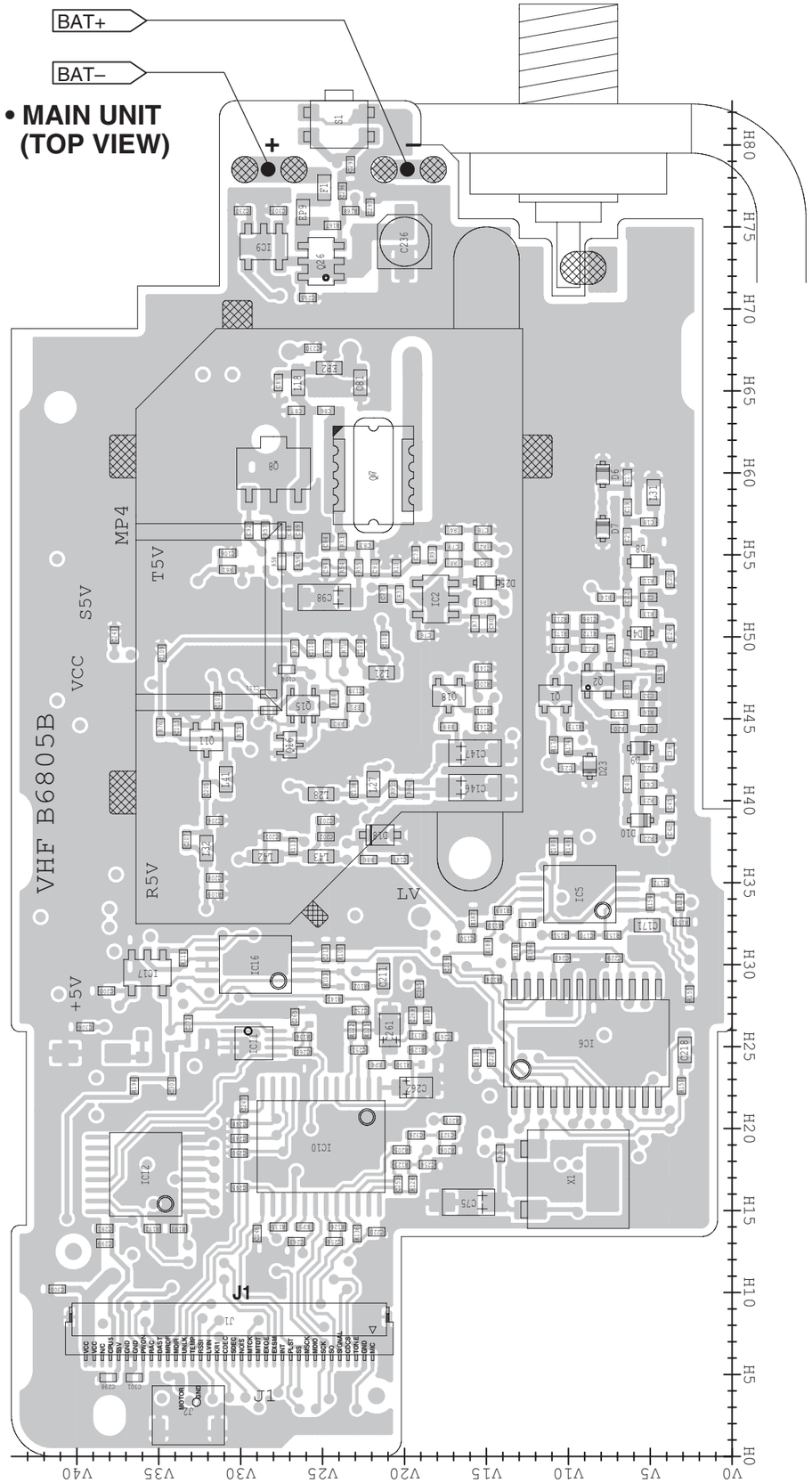
• VR UNIT (TOP VIEW)



• CONNECT UNIT (TOP VIEW)



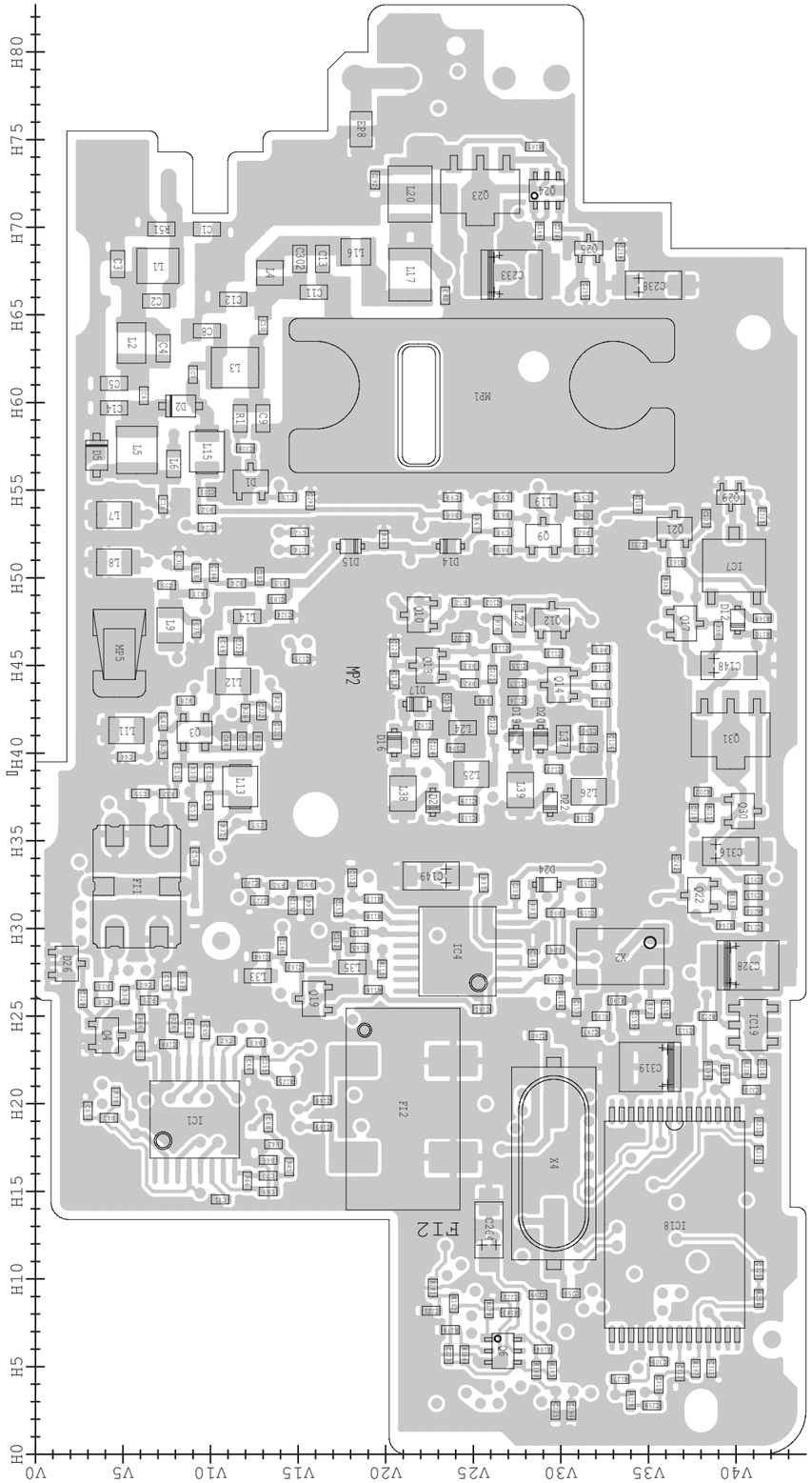
• MAIN UNIT (TOP VIEW)



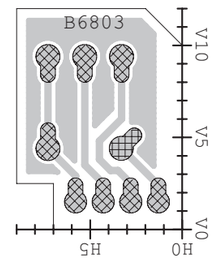
The combination of this side and the bottom side shows the board layout in the same configuration as the actual P.C.Board.

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

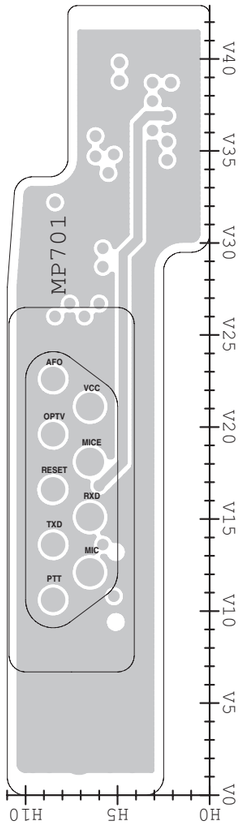
• MAIN UNIT (BOTTOM VIEW)



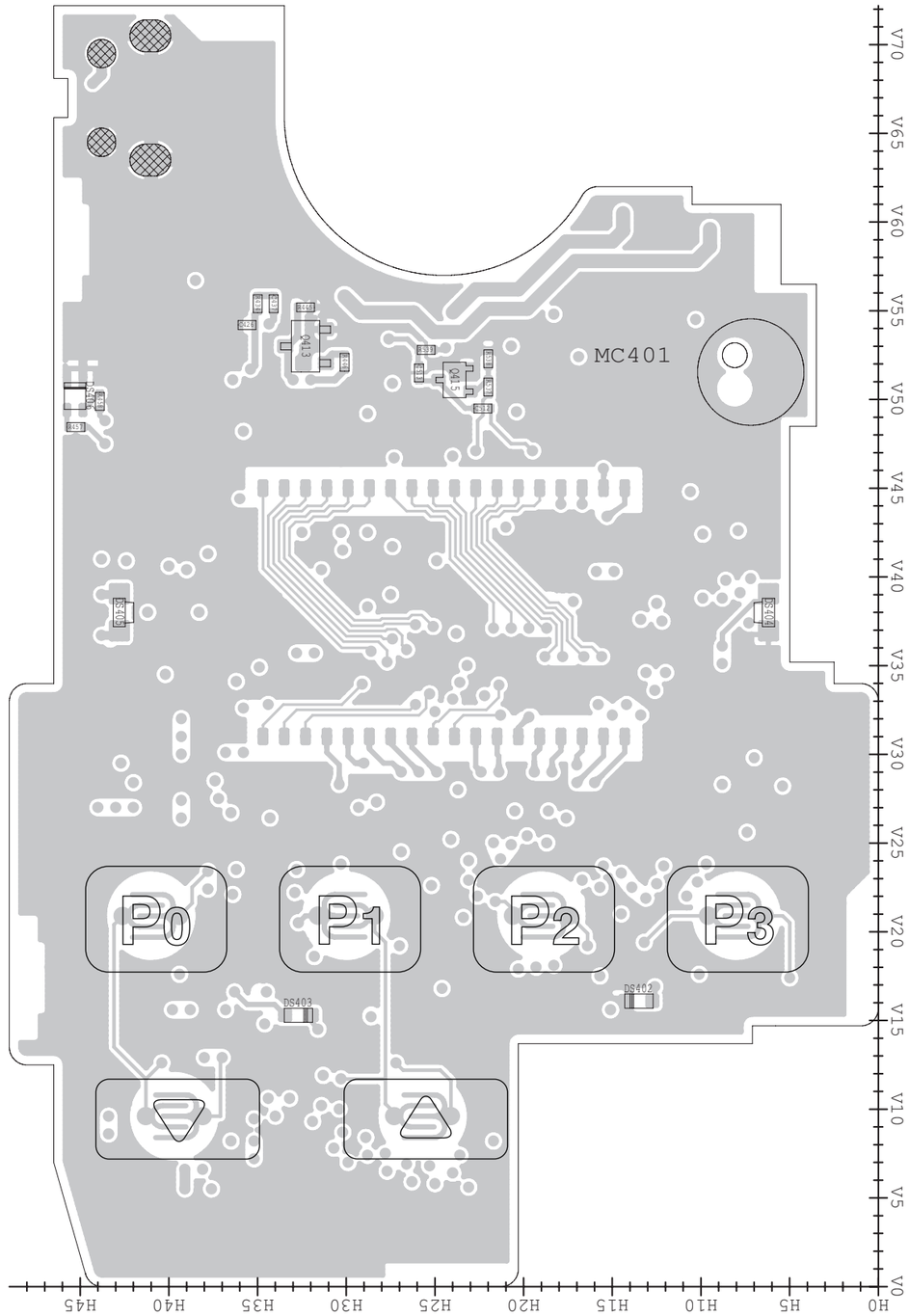
• VR UNIT (BOTTOM VIEW)



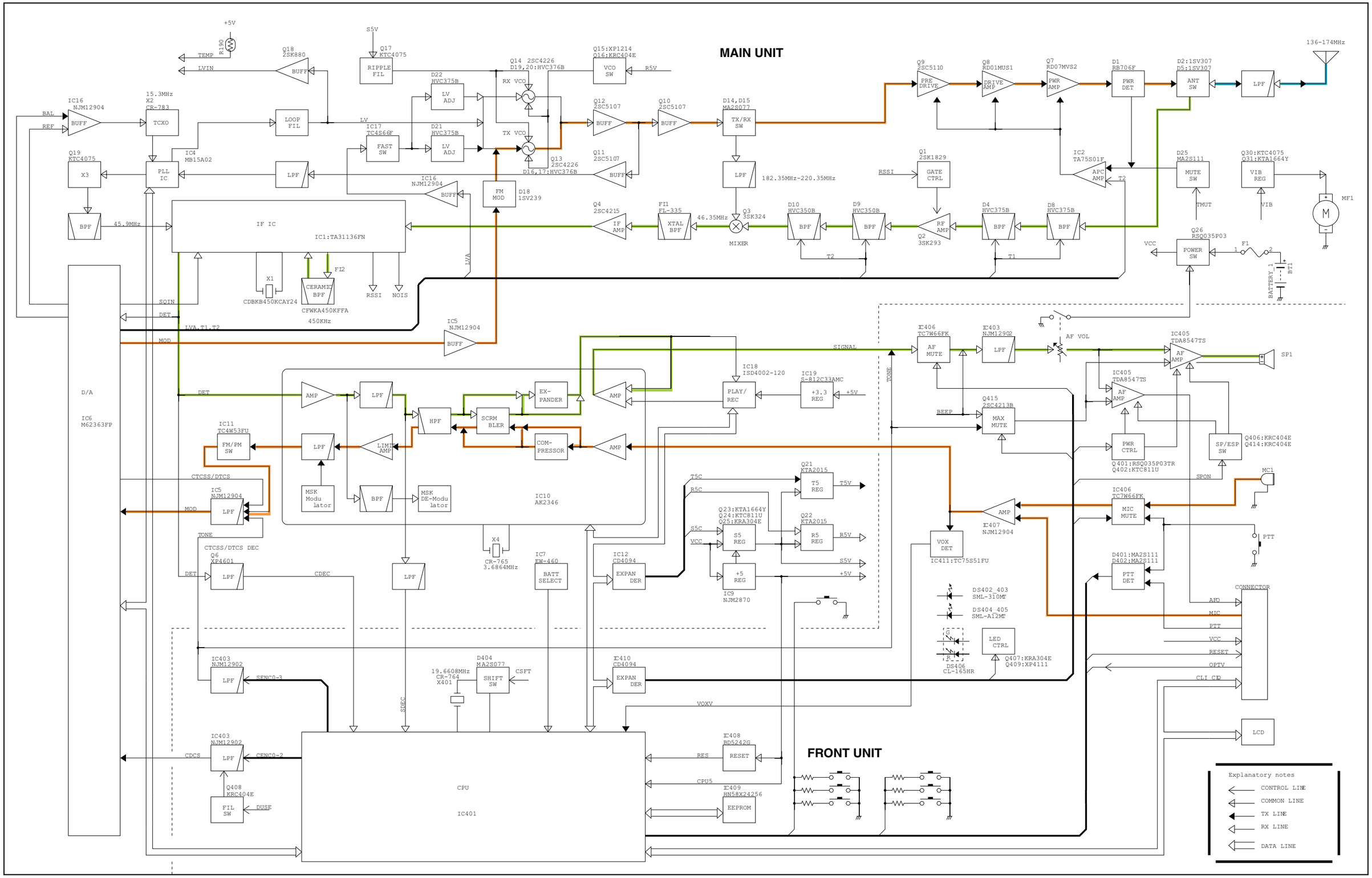
• CONNECT UNIT (BOTTOM VIEW)



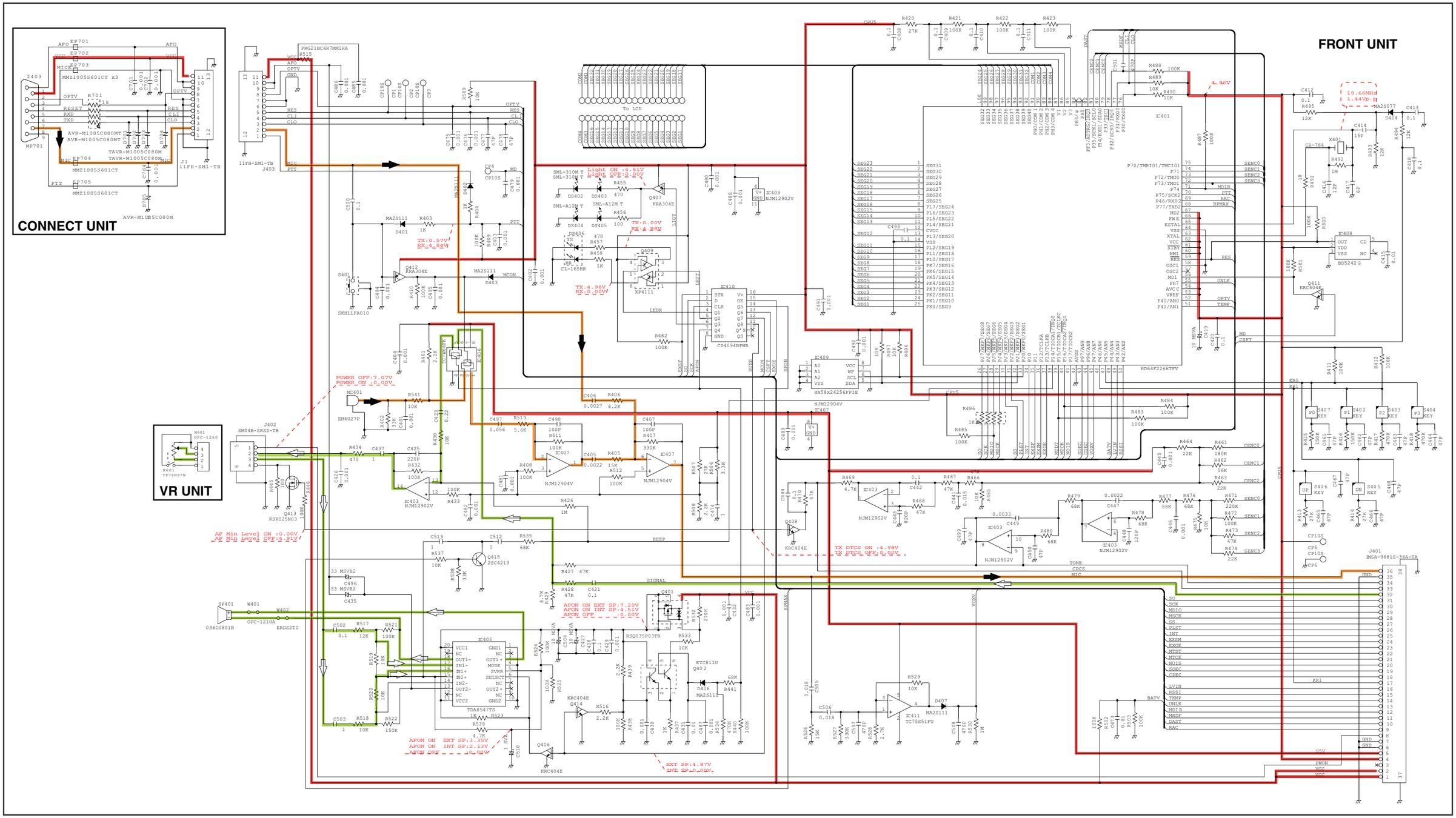
• FRONT UNIT (BOTTOM VIEW)



SECTION 9 BLOCK DIAGRAM

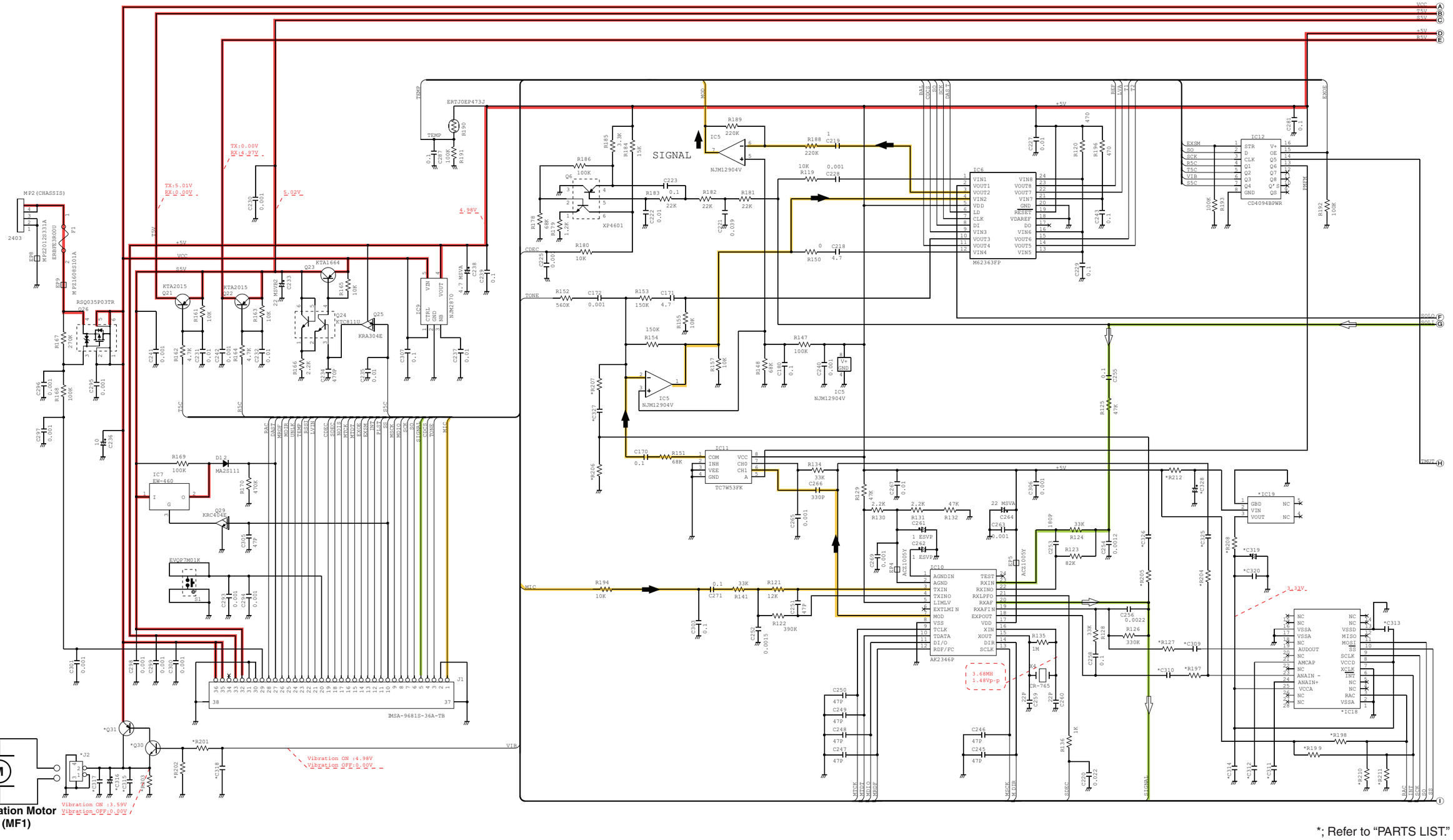


SECTION 10 VOLTAGE DIAGRAM

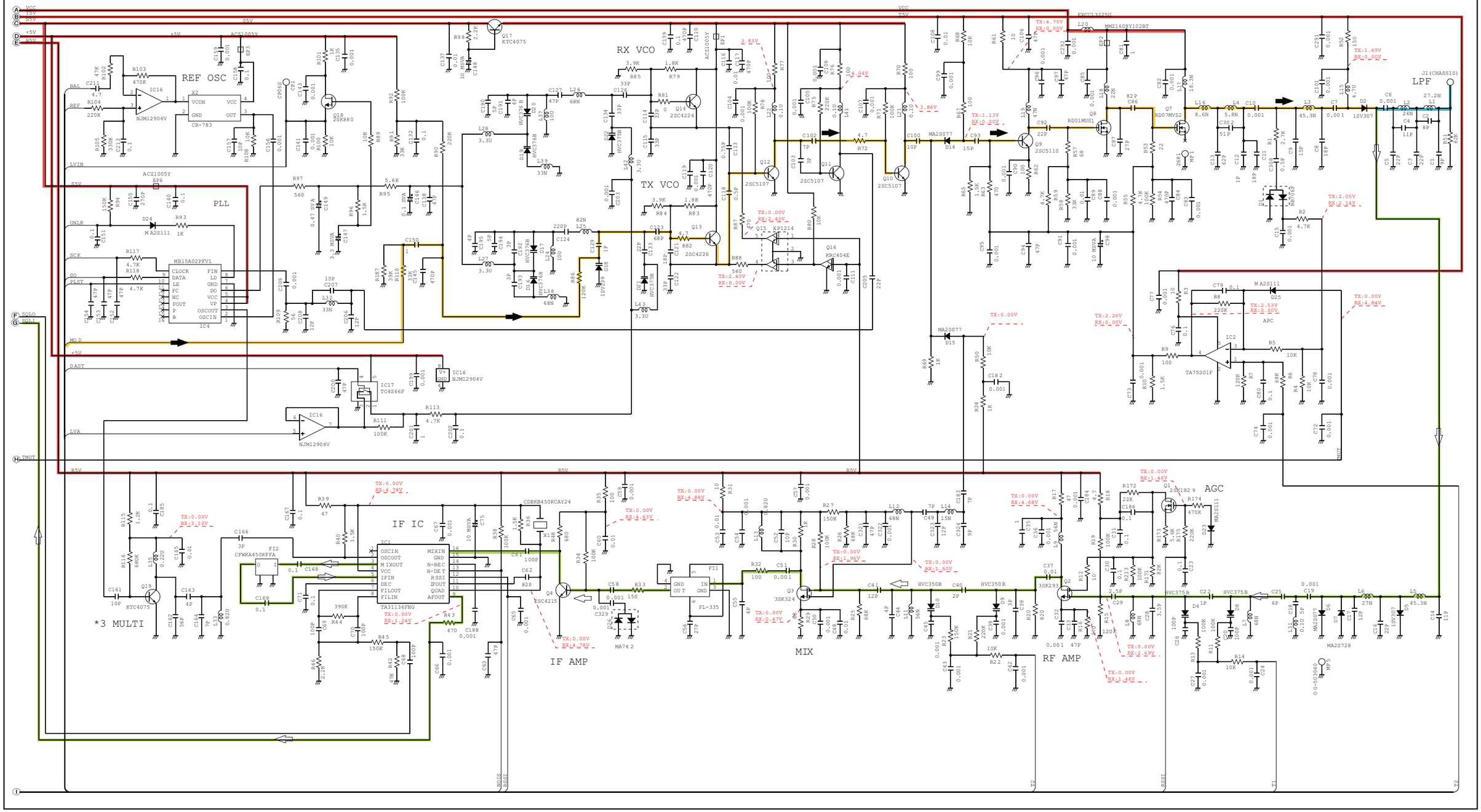


*; Refer to “PARTS LIST.”

MAIN UNIT (Left side)



MAIN UNIT (Right side)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TX VCO
MIX
IF IC
IF AMP
RF AMP
AGC
LPF
APC
*3 MULTI
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IC4 MB15A02PFV1
IC16 NJM12904V
IC17 TC4S66F
X1 CDBKB450KCAY24
FI1 FL-335
FI2 CFWKA450KFFA
Q1 2SK182 9
Q2 3SK293
Q3 3SK324
Q4 2SC4215
Q7 RD07MVS2
Q8 RD01MUS1
Q9 2SC5110
Q10 2SC5107
Q11 2SC5107
Q12 2SC5107
Q13 2SC4226
Q14 2SC4226
Q15 XP1214
Q16 KRC404E
Q17 KTC4075
Q18 2SK880
Q19 KTC4075
D14 MA2S077
D15 MA2S077
D24 MA2S111
D25 MA2S111
MM1608Y102BT
EXCCL3225U
1SV307
MA2S728
RB706F
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